

TECHNICAL DATA

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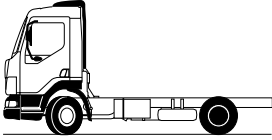
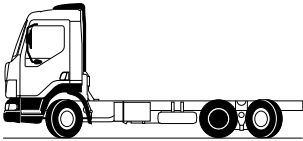
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1. VEHICLE MODELS

1.1 OVERVIEW

FT FA	4 x 2	
FAN	6 x 2	


steered axle


driven axle

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Vehicle models

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2. LOCKING COMPOUNDS AND SEALANTS

2.1 GENERAL



Certain cleaning agents have a negative effect on the functioning of locking compounds. The general rule is therefore that fasteners and components which have been cleaned with a cleaning agent must be treated with a cleaning liquid to ensure that the locking compound functions properly.

OVERVIEW OF LOCKING COMPOUNDS			
Product name	Properties	Applications	DAF number
Loctite 243	- Locking with an average detaching strength - Detachable with normal tools	Locking of threaded connections	0068197
Loctite 2701	- Locking with a high detaching strength - Repairs the fit in bearing housings - Seals against leaks - Difficult to detach	Locking of threaded connections, gear lever ball, freeze plugs	1340646
Loctite 638	- Locking with a high detaching strength under dynamic load - Difficult to detach	Locking of cylindrical connections	0645557
Loctite 648	- Locking with an average detaching strength - Resistant to high temperatures	Locking of threaded connections in warm places	1357032
Loctite 262	- Locking with a high detaching strength - Difficult to detach	Locking of threaded connections, such as the pinion nut	1279841

TECHNICAL DATA**0****Locking compounds and sealants****LF45/55 series****0****Applying the locking compound**

1. Clean both the internal and external threads.
Degrease the thread with a suitable degreasing agent which leaves no residue that could affect proper functioning.
2. Apply one or more drops of locking compound to the thread, depending on the diameter. Never dip the bolt or stud fully into the locking compound.
3. Apply a drop of oil under the bolt head.
Locking compounds also reduce the frictional resistance, which means that applying a drop of oil to the thread is **not** required.
4. Tighten the connection to the specified torque.

OVERVIEW OF SEALING COMPOUNDS			
Product name	Properties	Applications	DAF number
Dirko D	- Resistant to temperatures up to 180°C - Resistant to oil, coolant	Sealing of surface connections	1345014
Loctite 510	- Resistant to temperatures up to 200°C - Resistant to oil, brake fluid, coolant	Sealing of surface (flange) connections that are subjected to high operating temperatures, such as the flywheel housing	0697149
Loctite 574	- Resistant to high pressures (up to 350 bar) - Resistant to oil, brake fluid, coolant	Sealing of surface connections against high pressures	1246867
Loctite Blue	- Resistant to temperatures from 60°C to 260°C - Resistant to oil	Sealing of flexible constructions such as (valve) covers	1242895
Loctite ultra grey	- Silicone sealant, good resistance to coolant - Resistant to temperatures up to 325°C	Sealing of (surface) connections in the cooling system	1284123
Loctite ultra copper	- Silicone sealant, good resistance to oil - Resistant to temperatures of up to 350°C	Sealing of surface connections such as hub covers	1284122
Loctite 5910	- Silicone sealant, good resistance to oil - Resistant to temperatures up to 200°C	Sealing of surface connections, such as front and rear covers of gearboxes, differential housings, hub covers, stub axle flanges and oil cooler	1360102
Loctite 572	- Seals against low pressure immediately after fitting	Threaded connections	0292336

OVERVIEW OF SEALING COMPOUNDS			
Product name	Properties	Applications	DAF number
Loctite 5205	- Surface sealant, specially designed for sealing aluminium parts - Resistant to temperatures up to 150°C - Resistant to water, coolant and oil	Sealing of aluminium parts	1441339
Loctite Form a gasket	- Hardens on contact with metal and on full closure	For locking, fastening and sealing	1322823

OTHER PRODUCTS			
Product name	Properties	Applications	DAF number
Tectyl	Protects the cavities of the cab body against corrosion.	Post-treatment of cab parts to protect against corrosion. Can also be used as protection for metal parts	1343888
Contact spray	Cleaning agent for cleaning and degreasing electronic and electrical connections. Removes moisture and dirt from electrical contacts	Cleaning of electrical contacts	1387608
Loctite cleaner 7063	- Cleans and degreases - Non-inflammable and non-corrosive	For cleaning/degreasing of materials to which a locking compound must be applied	1322827
Molykote BR 2 PLUS	- Lubricating grease is heat-resistant from -30°C to +130°C	- Wherever grease lubrication is appropriate and normal - For almost all ball and roller bearings, plain bearings, guides, couplings, splined shafts, threaded spindles, sprocket drives with a low speed	1389512
Molykote P37	- Grease protects against corrosion and is heat-resistant to 1400°C.	For threaded connections that are exposed to high temperatures, as used for exhaust systems	1391619
Copaslip	- Copper paste with an excellent bond, is anti-corrosive and heat-resistant from -35°C to 1100°C. - Resistant to water, salts and acids. - Prevents wear, oxidation, rust, corroding and locking of metal surfaces.	For connections that are vulnerable to oxidation or corrosion, such as battery terminals, exhaust couplings, etc.	1284344
Renolit HLT2	- Grease (white)	Disc brake adjustment device	1448907

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Locking compounds and sealants

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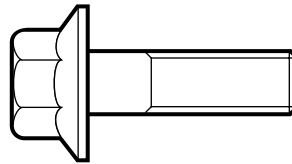
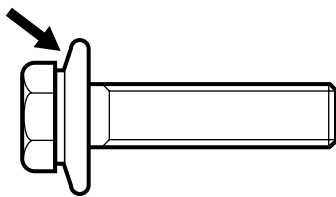
OTHER PRODUCTS			
Product name	Properties	Applications	DAF number
Syntheso GL EP1	- Grease (green)	Rubber guides for disc brake	1448908
Gleitmo 805	- Protects untreated metals against corrosion	For parts which are attached with a fit such as wheel hub units	1443160

3. THREADED CONNECTIONS

3.1 TIGHTENING TORQUES

The tightening torques in the table below are standard torques and only apply to dipped threaded connections.

The property codes are stamped on the nut and bolt, except on the clamping flange bolt. The clamping flange bolt is recognised by a constriction between the hexagonal bolt head and the flange. This constriction is absent in standard flange bolts.



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Clamping flange bolt/standard-flange bolt

Tightening torques for dipped threaded connections

Overview of standard tightening torques for DAF flange bolts and nuts, strength class 10.9/10

Thread pitch	Tightening torque (Nm)	Extra angular displacement ($\pm 10\%$) for bolt stem length L (mm):			
		$L \leq 40$	41-80	81-130	131-180
M8	30 ± 2	30°	60°	90°	120°
M10	60 ± 4	45°	90°	120°	150°
M12 x 1.75	110 ± 8	30°	60°	90°	120°
M12 x 1.25	110 ± 8	45°	90°	120°	150°
M14 x 2	170 ± 15	30°	60°	90°	120°
M14 x 1.5	170 ± 15	45°	90°	120°	150°
M14 x 2	for brake back plates: $170 \pm 15 \text{ Nm} + 60^\circ$				
M16 x 2	260 ± 20	30°	60°	90°	120°
M16 x 1.5	260 ± 20	45°	90°	120°	150°
M18 x 2.5	360 ± 30	30°	45°	60°	80°
M18 x 1.5	360 ± 30	45°	90°	120°	150°
M20 x 1.5	520 ± 40	45°	90°	120°	150°
M22 x 2.5	for steering and track rods: $500 \pm 50 \text{ Nm} + 90^\circ$				

TECHNICAL DATA**0****Threaded connections****LF45/55 series****0**

The bolt stem length L is the length of the bolt between the bolt head and the nut.
If a component is attached with several bolts, all bolts must first be tightened to the specified torque, and subsequently by the angular displacement.

Overview of standard tightening torques for DAF fastenings, strength class 8.8/8

Thread	Tightening torque in Nm
M4	2.8 ± 0.2
M5	5.5 ± 0.4
M6	9.6 ± 0.7
M8	23 ± 2
M10	46 ± 4
M12	79 ± 6
M14	125 ± 9
M16	195 ± 14
M18	280 ± 20
M20	395 ± 30
M22	540 ± 40
M24	680 ± 50
M27	1000 ± 70
M30	1350 ± 100

Overview of standard tightening torques for DAF flange bolts and nuts, strength class 12.9/12

Thread	Tightening torque in Nm
M8	32 ± 3
M10	67 ± 5
M12	113 ± 9
M14	178 ± 14
M16	274 ± 22
M18	385 ± 30
M20	550 ± 43
M22	740 ± 60
M24	925 ± 72
M27	1370 ± 110

Overview of standard tightening torques for DAF clamping flange bolts and nuts, strength class 12.9/12

Thread	Tightening torque in Nm
M12	178 ± 14
M14	274 ± 22
M16	425 ± 35
M18	550 ± 45

Overview of tightening torques, banjo bolts

Thread	Tightening torque in Nm
M6	8 ± 0.8
M8	15 ± 1.5
M10	30 ± 3
M12	40 ± 4
M14	50 ± 5
M16	60 ± 6
M18	70 ± 7

Torque wrench

- Have torque wrenches regularly inspected and calibrated.

Re-use of fasteners (bolt/nut/threaded end)

1. Clean the thread (take particular care to remove locking compound residues) and the clamping faces
2. Check the thread for damage.
To do so, manually screw a new nut/bolt onto the thread to be checked.
If the new nut/bolt cannot be fully hand-screwed onto the entire thread of the fastener to be checked, the fastener is not allowed to be re-used.
3. Apply one drop of engine oil to the upper turn of the bolt (threaded end)/lower turn of the nut and one drop to the clamping faces (other lubricants are not allowed).
4. If a locking compound has been specified, oil should not be applied to the thread.

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Threaded connections

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New bolts/nuts

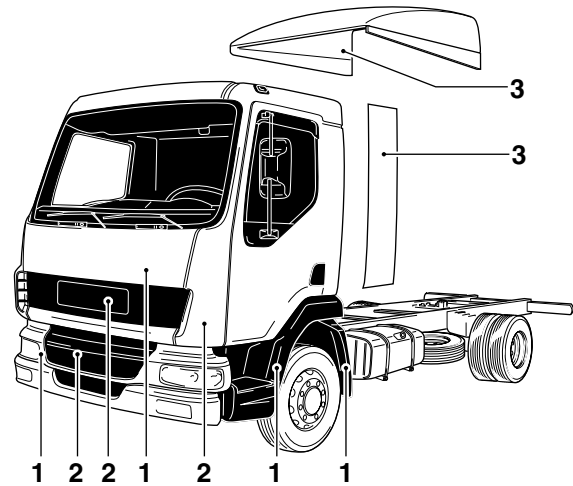
New DAF bolts and DAF nuts, except bolts M4 to M8 with inner-Torx, have already been lubricated. If bolts have not yet been lubricated, a lubricant should be applied.

1. Apply one drop of engine oil to the first turn of the bolt/lower screw thread of the nut and one drop to the clamping faces (other lubricants are not allowed).
2. If a locking compound has been specified, oil should not be applied to the thread.

4. PAINT TREATMENT

4.1 OVERVIEW OF PLASTICS USED

- 1 SMC polyester
- 2 Thermoplastic polymer parts (ASA or ABS)
- 3 Fibre-glass reinforced polyester



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Paint treatment

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SAFETY INSTRUCTIONS AND WARNINGS

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1. SAFETY INSTRUCTIONS AND WARNINGS

1.1 GENERAL SAFETY INSTRUCTIONS

Warning symbol

When text is accompanied by the warning symbol shown here, this indicates that the information provided is essential for the health and personal safety of the mechanic. This warning symbol is also shown if circumstances threaten the safety of the vehicle or could lead to damage to the vehicle.



If any of the safety instructions and warnings contained in this section are ignored, the health and safety of the mechanic may be put at risk. Also, serious damage to the vehicle or even a hazardous situation may result.



M0015

- Comply with all the warnings and safety instructions given in this workshop manual. First read the instructions and warnings on the labels and stickers which are affixed to the various components and comply with them. They have been put there for your health and safety, so do not ignore them!
- Wear clean, fitted clothes and apply protective cream, if necessary, to unprotected parts of your body.
- Always disconnect the earth connection of the battery before working on the vehicle.
- Do not run the engine in an enclosed or unventilated area. Make sure exhaust fumes are properly extracted.

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- Remain at a safe distance from rotating and/or moving components.
- Do not remove the filler cap from the cooling system when the engine is at operating temperature.
- Be careful when changing the oil. Hot oil can cause serious injuries.
- Avoid unnecessary contact with drained oil. Frequent contact damages the skin.
- Various sorts of oil and other lubricants used on the vehicle may constitute a health hazard. This also applies to engine coolant, clutch fluid, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and diesel fuel. So avoid inhaling and direct contact.
- Tilt the cab fully if work must be carried out underneath the cab.
- Always use stands to support the chassis or components when working under the vehicle.
- Be careful when working on activated springs, such as those in spring brake cylinders, valves, and similar. Inadvertently released springs may cause serious injuries. Small springs and circlips may also cause injuries when inadvertently released (wear goggles).
- Always use a tyre cage when fitting and inflating tyres. Thoroughly clean tyres prior to balancing. Only use a balancing device fitted with a protective cover.

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- Always use the appropriate lifting gear (gearbox jack) or approved hoists for the removal and installation of heavy components. Attach the component securely to the lifting or hoisting gear.
- Be careful when working on systems which may be under pressure, such as a trailing axle lifting device, cab tilting mechanism, brake system, steering gear, fuel system, etc.
- After a fire, hazardous residues may remain from the plastics used in some oil seals and sealing rings. Wear protective, acid-resistant clothing and PVC gloves when removing such fire residues. Immerse such fire residues in, or sprinkle them amply with, a calcium hydroxide solution (slaked lime and water). Thoroughly clean the protective clothing after use. Treat the gloves as chemical waste.

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Safety instructions and warnings

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1.2 BATTERIES



Always charge batteries in a properly ventilated area and avoid sparking and naked flames. Always switch the battery charger off before removing the leads. Fast-charging should only be resorted to in an emergency. Disconnect the battery leads when fast-charging is being used.



Wear protective clothing, gloves and a visor when carrying out work that may bring you into contact with battery acid.



Battery acid is an aggressive fluid. In the event of contact with the skin: rinse the skin with plenty of water for a sustained period. If redness or pain persists, consult a doctor. Remove any clothing affected and rinse with water. In the event of contact with the eyes: Rinse with plenty of water for at least 15 minutes and see a doctor. If any is swallowed: do NOT induce vomiting. Rinse the mouth, drink two glasses of water and see a doctor. In the event of inhalation: get some fresh air, rest and consult a doctor.

To prevent damage to electronic components, never disconnect the battery terminals when the engine is running.

Always disconnect the earth connection of the battery before working on the vehicle. Never place tools on a battery. If you do, this could short-circuit the battery or even cause the battery to explode.

Always charge batteries in a properly ventilated area and avoid sparking and naked flames. When charging batteries, an explosive gas mixture may be released.

1.3 WELDING



No welding of the chassis is allowed without special, written permission by DAF. Exceptions to the above are the welding operations described in the manual "Superstructure directives". Non-compliance with welding regulations may cause serious damage to the chassis.



Failure to observe the following instructions may damage the electronic components.

General

- Attach the earth clamp of the welding set as close as possible to the area on the vehicle where the welding is to be done and ensure that it is well in contact with the part being welded.
- Never attach the earth clamp to vehicle components such as the engine, axles, springs, etc. Arcing on these components is also not permitted. Non-compliance with the above instructions may result in serious damage to bearings, springs, etc.
- The accessory or ignition position of the ignition lock must not be switched on. Remove the ignition key from the ignition lock.
- Protect plastic piping, rubber components, plastic components, piston rods of hydraulic cylinders and springs (in particular parabolic springs) from welding splashes and temperatures above 70°C.

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Welding on the chassis

- When welding on the chassis, disconnect the connectors of all electronic equipment (including sensors and actuators), if they are within a 1-metre radius from the point being welded or within a 1-metre radius from the earthing point.
- Disconnect the battery terminals if these are within a within a 1-metre radius from the point being welded or the earth clamp.
- If the battery terminals have to be disconnected, all electronic units mounted on the chassis must be disconnected as well. Also disconnect the cab feed-through connectors and disconnect the power supply and earth cables that are connected to the cab.

Welding on the cab

- When welding on the cab, disconnect the battery terminals.
- Also disconnect the cab feed-through connectors and disconnect the power supply and earth cables that are connected to the cab.
- Disconnect the connectors of all electronic equipment (including sensors and actuators), if they are within a 0.5-metre radius from the point being welded or within a 0.5-metre radius from the earth terminal.

Welding on the superstructure

- Follow the instructions for "Welding on the chassis", together with any specific welding instructions for welding on the superstructure.

Note:

During grinding, protect plastic piping, rubber components, plastic components, piston rods of hydraulic cylinders and springs (in particular parabolic springs) in order to prevent damage caused by grinding sparks.

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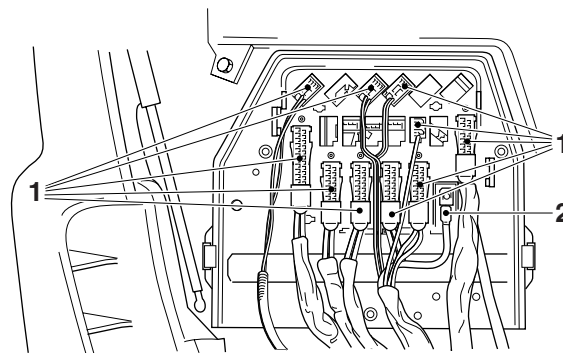
SAFETY INSTRUCTIONS AND WARNINGS

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Safety instructions and warnings

Position of feed-through connectors, earth and power supply cable

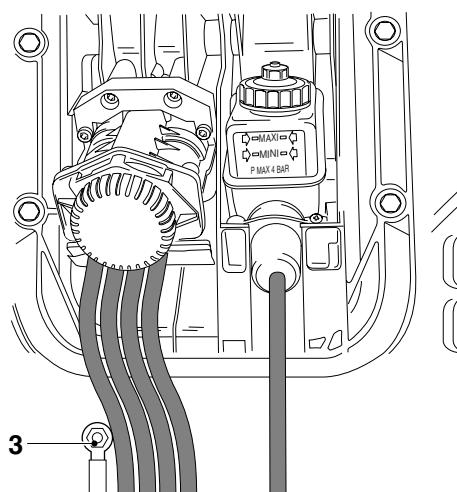
The feed-through connectors (1), and supply cable (2) are located behind the front panel in the plastic case.



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The earth cable (3) is located behind the front panel below the service brake valve.



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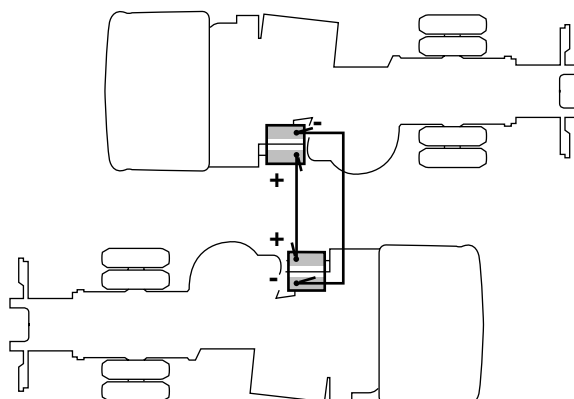
1.4 JUMP-STARTING



- **Never start the vehicle by means of a fast-charging device.**
- **The engine may be started with the aid of jump leads using the power from separate auxiliary batteries (approx. 24V) or from another vehicle with the engine running (approx. 28V).**

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1. Connect the jump leads first to the positive terminal (+), and then to the negative terminal (-).
2. Start the engine.
3. After starting, switch on as many power consumers as possible, on the assisted vehicle, in order to avoid so-called load dump.
4. Then disconnect the jump leads from the negative terminal (-) first, followed by the positive terminal (+).
5. Switch the power consumers off again.



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1.5 PLASTIC PIPES

Removing nipples or banjo unions in polyamide pipes

1. Heat the pipe to remove the nipple or banjo union. Never remove the nipple or banjo union by making an incision in the longitudinal direction of the pipe. This could very easily result in damage to the hose coupling. Even minor damage to the hose coupling will cause leakage.

Fitting nipples or banjo unions in polyamide pipes

1. Do not fit nipples or banjo unions to the same pipe end more than once, because this could result in poor sealing.
2. Cut off the pipe end if it has been used before. If shortening the pipe results in a sharp curve in the pipe or if it makes the pipe too short, a new pipe will have to be fitted.
3. Always use special pliers (special tool, DAF no. 0694829) to fit nipples and banjo unions in polyamide pipes.
4. Clamp the plastic pipe in the special pliers (1).
5. Use a plastic hammer to tap the nipple or banjo union into the pipe.

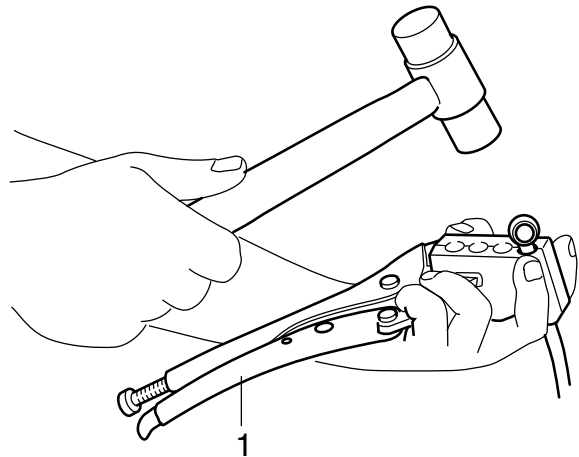
Note:

Never heat a plastic pipe when fitting nipples or banjo unions.

Leakage from pipes

Leakage from fuel and air pipes must be remedied as soon as possible to avoid dangerous situations.

A leaking fuel pipe may constitute a fire hazard, while a leaking air pipe may affect the braking performance of the vehicle.



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In the event of a leakage from a pipe coupling, unlimited tightening of the union nut or banjo bolt is not permitted.

- First check whether the leak is at the connection point between the pipe and coupling or at the connection point between coupling and the component housing.
- Tighten a banjo bolt to the tightening torque specified for the banjo bolt in question.
- A union nut may be tightened a further 180° only once. Tightening the union nut further than this is possible, but entails the risk of excessive deformation of the thrust washer and the pipe, which would seriously weaken the pipe.
- If the leakage has not stopped after the union nut has been retightened, it will be necessary to take the coupling apart.
- Check the parts for deposits and/or damage. Even a small longitudinal scratch on the pipe connector of a nipple or a banjo union may be sufficient to cause a leak.
- In the case of a banjo bolt fastening, check the sealing surfaces. Fit new sealing rings to the fastening and fit them. Tighten the attachment bolts to the specified tightening torque, see "Technical data".

Chafing of pipes

When plastic pipes touch each other or other parts of the vehicle, they may get chafed.

Immediately replace any pipes that show signs of wear.

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When pipes are fitted so close together or so close to other parts of the vehicle that they may touch, they should be secured to prevent chafing.

Use the specially developed pipe clamps. These pipe clamps are available for pipes with a diameter of 6, 10 and 22 mm. The pipe clamps can be joined together.

Releasing an elbow or T-piece and then tightening it in a slightly different position can sometimes prevent chafing.

Secure the pipes with cable ties.

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1.6 WIRING HARNESSES

After the first wiring harness has been disconnected or replaced, it must be reconnected in the original manner and fastened.

Protect the wiring harness against contact with sharp edges. Always use a grommet when passing the wiring harness through an aperture.

Protect the wiring harnesses by enclosing them in a protective sleeve.

Make sure that the joints are watertight. Never remove sealing rings from connectors. Fit the connectors in the correct manner.

Good earth connections are essential. There must be no paint or oxidation between the contact surfaces. Before fitting, apply a conductive grease such as "Coranode" or an equivalent product to the contact surfaces. Tighten the attachment bolt securely.

Make sure that wiring is not located too close to parts which become hot during operation.

"Freely suspended" cables, such as those between the chassis and the cab, must not be kinked or pinched between other parts.

Prevent wiring harnesses from scraping against plastic pipes.

The pins of connectors must always be installed and removed with special tools, to prevent poor connections.

Wiring harnesses and connectors of the airbag and seat belt tensioner system must not be repaired. If damaged, the complete assembly must be renewed.

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1.7 AVOIDING THE RISK OF FIRE

- Check fuel pipes for leakage and fix any leakage immediately (see also Plastic pipes).
- When fitting steel fuel pipes take into account the points listed below.
Fit the fuel pipe free from tension.
Preformed fuel pipes must not be bent.
When refitting a banjo bolt on a fuel pipe, always fit new sealing rings and tighten the banjo bolt to the specified torque.
After tightening, check the fastening for fuel leakage.
Steel fuel pipes fitted without due care and attention can cause fuel leaks which lead to fire hazard.
- In the event of fuel and/or oil leakage or spillage, the engine encapsulation must be thoroughly cleaned. First apply a degreasing agent to the encapsulation material. Then wash down the encapsulation with a steam cleaner or with a high-pressure cleaner.



Maintain a minimum distance of 50 cm between the engine encapsulation and the sprayer nozzle to prevent damage to the encapsulation.

- Clean the engine compartment, in particular the encapsulated part, at regular intervals by removing flammable material such as dead leaves and sawdust.
- Do not leave cleaning rags etc. in the engine compartment.
- Repair leaks in the exhaust system without delay. Badly corroded exhaust components should be replaced before they fail.

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- Always remember to re-fit the heat shields after removal.
- Never replace a defective fuse with a fuse of a higher rating.
- Never connect accessories which are not protected by a fuse.
- Check wiring which is not fuse-protected (battery leads, etc.), to make sure that it is undamaged and properly attached and located.

1.8 TACHOGRAPH CALIBRATION

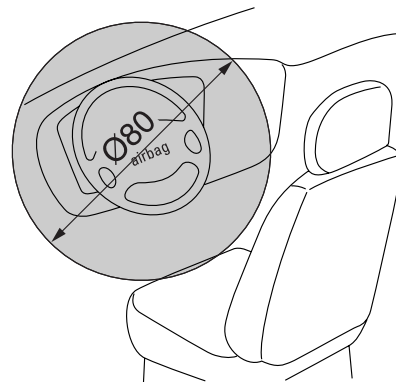
The test bench may be used to calibrate the tachograph (e.g. when changing to a different type of tyre).

If the vehicle is equipped with ASR, the system will interpret turning rear wheels and still front wheels as rear wheel spin. As deceleration is no longer applicable, the system will try to neutralise this "spinning" by slowing down the rear wheels. The result is that the vehicle is thrown from the test bench, which is dangerous.

In order to avoid this, the ABS/ASR system fuses must be removed, rendering the ABS/ASR system inactive. However, this is viewed by the system as faults to be registered in the memory. These faults must be reset after calibration using DAVIE.

1.9 AIRBAG AND SEAT BELT TENSIONER

- Never disconnect an electrical connection in the airbag or seat belt tensioner circuits with the ignition switched on.
- All work on pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)) may only be carried out by employees of approved DAF dealers or workshops who are sufficiently trained on these systems.
- The use of pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)) is subject to various national laws. The legal stipulations must be observed.
- Vehicles equipped with a pyrotechnic system (system with airbag(s) and/or seat belt tensioner(s)) can be identified by a sticker with an airbag symbol (see "General") on the windscreen and/or with the word "AIRBAG" on the airbag unit on the steering wheel.
- If the vehicle is equipped with an airbag and seat belt tensioner system while there is no airbag symbol on the windscreen, this symbol will have to be applied as yet.
- It is not permitted to install accessories on airbag and seat belt tensioner parts or in their operating zones afterwards. The operating zone covers an area the size of a ball with a diameter of 80 cm. Only accessories approved by DAF for vehicles with an airbag and/or seat belt tensioner may be installed, in the place indicated by DAF and in the manner outlined by DAF.



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SAFETY INSTRUCTIONS AND WARNINGS

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Safety instructions and warnings

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- Using equipment or objects that generate strong magnetic fields in the vicinity of parts of the airbag/seat belt tensioner system can lead to unwanted activation of the airbag and/or seat belt tensioner or can make proper operation of the system impossible. The use of such equipment or objects in the vicinity of parts of the airbag/seat belt tensioner system is therefore not recommended.
- Only operations described in the DAF workshop manual and systems manuals are permitted on pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)).
- It is not allowed to leave pyrotechnic units (airbags and/or seat belt tensioners) unattended. If repairs to a vehicle continue for a long time and pyrotechnic units (airbags and/or seat belt tensioners) are involved in the repair, the pyrotechnic units must be stored safely (under lock and key). This means that the storage location must meet local requirements relating to pyrotechnic materials. The pyrotechnic units may not be stored together with different hazardous substances and the location must have the relevant hazard warning symbols and fire protection facilities.
- Before any work is carried out on a pyrotechnic part (airbag and/or seat belt tensioner):
 1. The ignition must be switched off.
 2. The negative battery terminal clamp must be separated carefully.
 3. Wait at least 5 minutes.

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SAFETY INSTRUCTIONS AND WARNINGS

LF45/55 series

Safety instructions and warnings

- If pyrotechnic units have been activated in a crash, the electronic unit and the contact unit must be replaced in addition to the pyrotechnic units. All electrical wiring and connectors must also be visually inspected, and be replaced if any damage or overload is detected.
- Nothing may be stuck onto the airbag cover. Nor may the cover be treated with a cleaner, solvent, grease, paint, lacquer or other material. The surface may only be cleaned using a dry cloth, a cloth dampened with water, or a cloth with a cleaner approved by DAF for this purpose.
- It is not allowed to scrap a vehicle if it still has non-activated airbags and seat belt tensioners on board. In this instance, follow the special scrapping procedure.

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SAFETY INSTRUCTIONS AND WARNINGS

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Safety instructions and warnings

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THREADED CONNECTIONS

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THREADED CONNECTIONS

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1. GENERAL

1.1 DIPPED THREADED CONNECTIONS

DAF vehicles are fitted with threaded connections which have been treated with a lubricant (dipped threaded connection). Factory-galvanised bolts and nuts are wax-dipped. Black annealed and phosphatised bolts and nuts are oil-dipped. The advantage of using a lubricant is that friction during tightening of the threaded connection is reduced, so that the specified pre-tension can be obtained more easily and more accurately. The tightening torque can be reduced while the pre-tension force remains the same.

To achieve a small spread in the pre-tension force, the dipped threaded connection must be tightened accurately. Therefore, always use a reliable and accurate torque wrench.

Note:

Have torque wrenches regularly inspected and calibrated.

To achieve the correct pre-tension when re-using threaded connections, it is important to clean the threaded parts thoroughly. After cleaning, apply one drop of lubricant to the first turn of the screw thread and one drop to the abutting surface of the nut or bolt. If bolts and nuts to be re-used, do not lubricate them with anything other than engine oil. Lubricants other than engine oil or factory-applied lubricant must not be used under any circumstances because of the difference in frictional coefficient.

When locking compounds are used for dipped threaded connections, the instructions given here apply, except for applying lubricant to the first turn of the screw thread.

THREADED CONNECTIONS

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General

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The following applies to all threaded connections (for both new and used vehicles):

- in the case of standard connections, apply the lubricant before fitting, and retighten in accordance with the standard for dipped bolts;
- in the case of special connections, apply the lubricant before fitting, and retighten in accordance with the values specified in the instructions.

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The instructions for using a lubricant also apply to new bolts supplied from the warehouse. Dry threaded connections are not permitted because of their highly variable friction coefficients.

The following threaded connections are used on DAF vehicles:

- Fastenings with strength classes 8.8 and 8,
- flange bolts and nuts with strength classes 10.9 and 10,
- flange bolts and nuts with strength classes 12.9 and 12,
- clamping flange bolts and nuts with strength classes 12.9 and 12.

Threaded connections 10.9/10

Threaded connections 10.9/10 are tightened as standard with a torque followed by an angular displacement. The angular displacement depends on the bolt stem length. For the tightening torque with the applicable angular displacement, see "Technical data" .

If a threaded connection 10.9/10 has to be tightened differently, for example using a tightening torque only, this is indicated in the technical data for the component concerned.

Other threaded connections

Threaded connections 8.8/8, 12.9/12 and clamping flange bolts 12.9/12 are tightened as standard only with a torque. For the standard tightening torques, see "Technical data".

If any of these threaded connections has to be tightened differently, this is indicated in the technical data for the component concerned.

Applying the locking compound

- Clean both the internal and external thread.
- Degrease the thread with a suitable degreasing agent which leaves no residue that could affect proper functioning.
- Apply one or more drops of locking compound to the thread, depending on the diameter. Never dip the bolt or stud fully into the locking compound.
- Apply a drop of oil under the bolt head. Locking compounds also reduce the frictional resistance, which means that applying a drop of oil to the thread is **not** required.
- Tighten the connection to the specified torque.

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SEALS AND BEARINGS

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1. GASKETS

1.1 PAPER AND KLINGERIT GASKETS (rubber-aramide fibre)

The workshop manual specifies when a gasket is required and it also gives information about the type of gasket to be used.

1. Remove the old gasket before fitting a new one.
2. Clean the contact surfaces and check them for damage.
3. Paper gaskets should be sparingly greased before they are fitted. These gaskets are used to seal flat parts and are resistant to oil and moderate heat.
4. Do not grease Klingerit gaskets before fitting. These gaskets usually have a graphite coating. They are used to seal flat surfaces and are resistant to oil, water and heat.
5. There are special instructions for cylinder head gaskets. See the relevant section.
6. Always tighten the attachment bolts evenly.

SEALS AND BEARINGS

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Gaskets

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1.2 LIQUID GASKETS

The workshop manual specifies when a gasket is required and it also gives information about the type of gasket to be used.

Liquid gaskets, which replace conventional gaskets, have been developed to seal flat connections. They are resistant to oil, water and temperatures up to approx. 200°C.

To apply the liquid gasket, follow the instructions below.

Applying a liquid gasket

1. Remove all traces of the old gasket and clean the surfaces to be sealed.
2. Sparingly apply the specified sealant to one of the surfaces to be sealed. Also apply sealant around studs, bores and the like to ensure they are properly sealed.
3. If sealant has got into an (oil) bore of any description, remove it carefully.
4. Put the surfaces to be sealed against each other and tighten the attachment bolts evenly.

2. SEALS

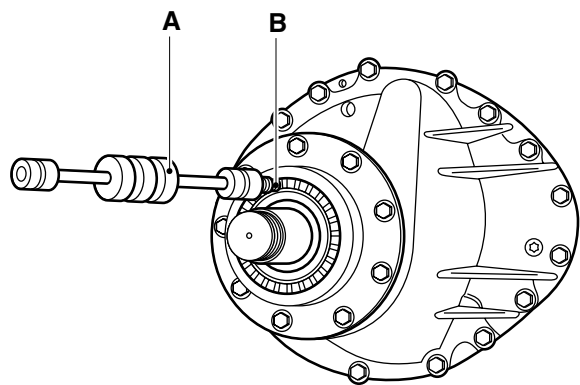
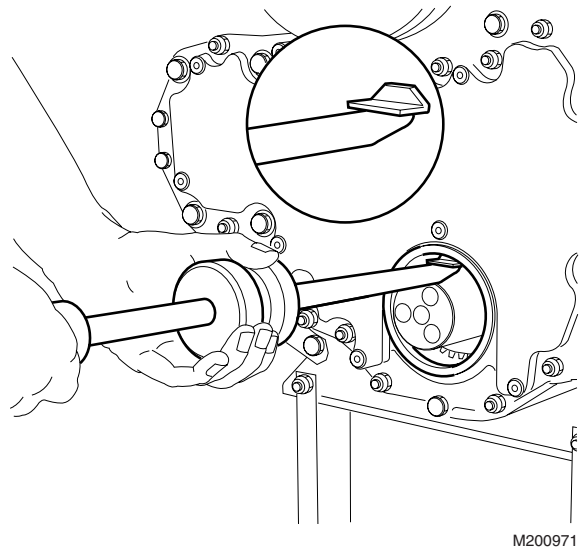
2.1 REMOVING AND FITTING SEALS

There are two kinds of seals: conventional seals and unitised seals.

- The conventional seal is fitted in a recess and its inner ring has its running surface on a shaft.
- The unitised seal is fitted in a fixed position both in a recess and on the shaft. Sealing is achieved internally.

Removing the seal

1. If possible, remove the sealing ring with the special tool (DAF no. 1329458 or DAF nos. 0694928 (A) and 0484899 (B)). When removing the seal, take care not to damage the recess.



SEALS AND BEARINGS

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Seals

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Installing the seal

1. Check the recess in which the seal is to be fitted for damage. Make good any damage.
2. Look for any marks on the outside of the seal indicating the direction of rotation of the shaft.
3. Always use a suitable driving tool to fit a seal and press the seal evenly into place in the recess.
4. Once a unitised seal has been removed from the recess, it must not be re-used.
5. In most cases, a liquid gasket is used to fit a conventional sealing ring with a steel sheathing, whereas oil or liquid soap is used to fit a sealing ring with a rubber sheathing.
6. Always fit unitised sealing rings dry, unless stated otherwise.
7. Always apply a small amount of oil or grease to the sealing lip(s) and running surface of a conventional seal.

3. BEARINGS

3.1 BEARINGS, GENERAL

1. Bearings must be replaced if they are worn, in the case of pitting (small dents in the running surface) and/or if the bearings have been exposed to excess heat (blue spots).
2. When fitting a bearing, make sure that no force is transmitted via the balls or rollers of the bearing. For example, by fitting a bearing on a shaft by pressing on the outer bearing race.
3. Clean the bearing before fitting it.
4. Avoid dirt getting into the bearing while it is being fitted.
5. If the instructions specify that the bearing should be heated before it is fitted, avoid exceeding the temperature specified. Also avoid local overheating.
6. Raise the temperature of the bearing evenly by heating it in the special oil bath. Another option is to place the bearing on an electric cooker. Watch the temperature closely in this case.

SEALS AND BEARINGS

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Bearings

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3.2 FITTING BEARINGS INTO A BEARING HOUSING

Fitting bearings into a bearing housing

1. Always use the correct size of driving tool.
2. Centre the driving tool accurately on the outer bearing race.
3. Preferably press the bearing evenly into the housing, using a pressing tool.

3.3 FITTING BEARINGS TO A SHAFT

Fitting bearings to a shaft

1. Always use the correct size of driving tool.
2. Centre the driving tool carefully on the inner bearing race.
3. Preferably press the bearing evenly onto the shaft, using a pressing tool.

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1. PRESERVATION AND DE-WAXING

1.1 PRESERVATION

Note:

Observe the applicable environmental requirements.

1. Clean the vehicle thoroughly so that all dirt and dust are removed.
2. Use pressurised air to remove any residues from the vehicle.
3. Cover all glazing, headlights and tail lights.
4. Use a spray gun to spray undiluted preserving agent RUSAN D5018 (a FINA product) over the chassis frame and its fittings, all parts and components in the engine compartment and all painted sheet metal parts. Tilt the cab to be able to spray the preserving wax on the cab roof. Make sure that all edges, joints and cavities are sprayed with a "full jet" of preserving agent.
5. Use a brush to apply Rusan D5018 to the wheel studs.



On no account spray preserving agent into brake drums or on to brake discs.



It is not allowed to spend the night in a preserved cab. Sleeping in preserved cab may cause nausea and headaches.

1.2 DE-WAXING

Note:

Observe the applicable environmental and safety requirements.

The vehicle should preferably be placed on a grid floor.



Most de-waxing agents are inflammable. The de-waxing area should be suitable for the safe use of such products.

1. Remove the preserving agent with a solvent, an emulsifying cleaner or a high-pressure hot water cleaner with added solvent.

De-waxing with a high-pressure hot water cleaner should be done carefully and evenly. Set the high-pressure hot water cleaner to a maximum pressure of 100 bar and a maximum temperature of 90°C. Never direct the jet of wax remover too long at the same area, as this could cause serious damage to the paintwork and rubber. If some parts of the treated surface still have preserving agent on them, treat these areas again in the same way.

Note:

A steam cleaner is not suitable for de-waxing because it requires the use of calcium descaling products to keep the inside of the steam coil clean. The dried residues of these products are difficult to remove.

2. After removing the de-waxing agent, rinse the vehicle thoroughly with water.

2. CLEANING VEHICLES

2.1 HIGH-PRESSURE CLEANER

It is advisable to clean the vehicle with a high-pressure cleaner before starting maintenance or service operations. A clean environment makes the engineer's work easier, and enables any vehicle defects to be noticed at an early stage.

Note:

Before cleaning the vehicle, check the engine, axles, gearbox, etc. for evidence of leakage.

If the vehicle is cleaned with a high-pressure cleaner, the latter must be used with care. It is also important to observe the following points:

- Make sure that doors, windows and roof hatch are securely closed during high-pressure cleaning.
- When cleaning the universal joint on the steering box, the spider seals may be forced open by the high-pressure jet of water, so that the grease behind them is flushed away. As a result, the spider may get stuck, so that the steering mechanism will "jam".
- A bleed screw is fitted to the power steering fluid reservoir of the steering gear. Water may enter the tank through this, causing damage to the steering mechanism.
- When cleaning the radiator/intercooler, be careful not to damage the fins.
- Do not direct the high-pressure cleaner jet too long at the air-conditioning system condenser. As a result of the high temperature, the pressure in the system will become excessive, which may cause damage to the system.

GENERAL OPERATIONS

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Cleaning vehicles

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- Make sure that no water can enter the differential or the gearbox via the breathers.
- Make sure that no water can enter via the reservoir bleed screws of clutch, brakes, trailing axle, etc.
- The engine and engine compartment can be cleaned with a high-pressure cleaner. Make sure in this case not to spray onto electrical components, such as the starting motor, alternator, etc.
- Maintain a minimum distance of 50 cm between the engine encapsulation and the sprayer nozzle to prevent damage to the encapsulation.
- Do not direct the jet of water at electrical connections such as connectors, cable plugs of the vehicle lighting system, etc.
- Ensure that no water can enter the air intake system via the air intake or its flexible seals.
- When the vehicle has been cleaned, it must be lubricated again with a grease gun or via the automatic lubrication system. This is important because it prevents the penetration of moisture and dirt at the various pivot points.

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1. PAINT TREATMENT

1.1 GENERAL INSTRUCTIONS

In the chapter "Paint treatment", directives are provided for respraying and repairing DAF paint systems applied on various subsurfaces. The products to be used are supplied by a range of manufacturers. However, only use products from well-known manufacturers who can provide all products for the complete paint structure. The use of these products must be described in the instructions issued by the manufacturer.

Work according to the instructions listed below:

- For rust-removal, use a rust-removal agent based on phosphoric acid.
- To clean and remove any preserving agents, use an organic, chlorine-free solvent.
- Use a two-component epoxy-based or polyester-based primer.
- Use a two-component epoxy-based or polyester-based filler.
- Use a two-component epoxy-based or polyester-based spray filler.
- Use a two-component epoxy-based or polyester-based filler.
- Use a two-component epoxy PUR finishing coat, with a degree of gloss of more than 92 degrees for cab top coats and a degree of gloss of 70 degrees for chassis finishing (measured at 60 degree geometry).
- Maximum drying temperature is 80°C, with the exception of fibre-glass reinforced polyester parts. Maximum drying temperature of fibre-glass reinforced polyester parts is 60°C.
- For the paint structure, only use products from the same supplier.
- Use the products according to the manufacturer's instructions.
- Never use products containing silicone in an aerosol can.

PAINT TREATMENT

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Paint treatment

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Failure to follow the generally applicable safety rules for using paints and similar products can result in serious injury and/or danger.
During work with a rust-removal agent, wear protective gloves and safety goggles.
When using paints and similar products, and when handling paint waste, always work according to the applicable environmental regulations to prevent unnecessary environmental pollution.

Colour coding

The DAF code number of the cab paint is on the paint identification plate.

The paint identification plate is mounted on one of the vehicle's door pillars.

The DAF code number for the cab paint is also marked on the vehicle identity card.

The colour code number of the paint manufacturer "Dupont" is stated in the code number. The "Dupont" colour code number consists of five or six characters/digits. The "Dupont" colour code number is followed by the paint colour or an abbreviation.

For example, in the code number L1041MEYL, L1041 is the "Dupont" colour code number of the paint, ME indicates that it is a metallic paint and YL is the colour abbreviation, in this case yellow.

Removing rust

- Apply the rust-removal agent in accordance with the manufacturer's instructions. The concentration of the rust-removal agent must be adapted to the amount of rust.
- Ideally, use a rust-removal paste on vertical parts.
- Prevent rust-removal agents entering overlap joints.
- Leave the rust-removal agent to work for the time specified by the manufacturer.
- Rinse the area cleaned of rust at least twice with an ample amount of clean tap water.
- Dry the area cleaned of rust.

1.2 RESPRAYING/PAINT REPAIRING OF CAB TOP COAT AND SMC POLYESTER PARTS

Respraying of cab top coat and SMC polyester parts

1. Remove any preserving agents, if applicable; see "General Operations".
2. Remove any rust with a rust-removal agent.
3. Clean the area to be resprayed with a solvent.
4. Sand the section to be resprayed with 3M Scotch Brite ultra fine or an equivalent product.
5. Remove any dust from the sanded section with a Tack-rag cloth.
6. Clean the area to be resprayed with a solvent.
7. Apply primer to any bare patches.
8. Leave the primer to evaporate/dry.
9. Apply a filler, if necessary.
10. Leave the filler to evaporate/dry.
11. Fine-sand with 3M Scotch Brite ultra fine or an equivalent product.
12. Remove any dust from the sanded section with a Tack-rag cloth.
13. Clean the area to be resprayed with a solvent.
14. Apply the top coat according to the manufacturer's instructions.
15. Leave the top coat to evaporate/dry. Observe the drying time as laid down in the manufacturer's instructions.

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Paint treatment

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Paint repairing of cab top coat and SMC polyester parts

1. Remove any preserving agents, if applicable; see "General Operations".
2. Remove any rust with a rust-removal agent.
3. Clean the area to be repaired with a solvent.
4. Sand the area to be repaired first with P80 sand paper and then with P180 sand paper.
5. Remove any dust from the sanded section with a Tack-rag cloth.
6. Fill the area to be repaired.
7. Sand the filled area with P180 sand paper.
8. Fine-sand/roughen the area to be sprayed with 3M Scotch Brite ultra fine or an equivalent product.
9. Remove any dust from the sanded section with a Tack-rag cloth.
10. Clean the area to be sprayed with a solvent.
11. Apply a primer.
12. Leave the primer to evaporate/dry.
13. Apply a filler.
14. Leave the filler to evaporate/dry.
15. If necessary, fine-sand with 3M Scotch Brite ultra fine or an equivalent product. Following fine-sanding, remove any dust with a Tack-rag cloth and clean the area with a solvent.
16. Apply the top coat according to the manufacturer's instructions.
17. Leave the top coat to evaporate/dry. Observe the drying time as laid down in the manufacturer's instructions.

1.3 RESPRAYING/PAINT REPAIRING CHASSIS FINISHING

1. Remove any preserving agents, if applicable; see "General Operations".
2. Remove any rust with a rust-removal agent.
3. Clean the area to be treated with solvent.
4. Sand the area to be treated with P80 sand paper.
5. Remove any dust from the sanded section with a Tack-rag cloth.
6. Clean the area to be treated with solvent.
7. Apply primer to any bare patches.
8. Leave the primer to evaporate/dry.
9. If necessary, sand with P180 sand paper. Following sanding, remove any dust with a Tack-rag cloth and clean the area with a solvent.
10. Apply the top coat according to the manufacturer's instructions.
11. Leave the top coat to evaporate/dry. Observe the drying time as laid down in the manufacturer's instructions.

PAINT TREATMENT

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Paint treatment

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1.4 RESPRAYING SEED TOP COATS

These instructions relate to parts in steel, SMC (Sheet Moulding Compound) plastic or glass-fibre reinforced polyester.

1. Remove any preserving agents, if applicable; see "General Operations".
2. Remove any rust with a rust-removal agent.
3. Clean the area to be resprayed with a solvent.
4. Sand the area to be resprayed first with P80 sand paper and then with P180 sand paper.
5. Remove any dust from the sanded section with a Tack-rag cloth.
6. Clean the area to be resprayed with a solvent.
7. In the case of plastic, blow ionised air over the area to be resprayed, or clean the area with an anti-static liquid.
8. Apply the seed top coat according to the manufacturer's instructions.
9. Leave the paint to evaporate.
10. Observe the drying time as laid down in the manufacturer's instructions.

1.5 RESPRAYING THERMOPLASTIC POLYMER PARTS

Thermoplastic polymers include the following “elastic” plastics: ASA, ABS and PUR.

1. Remove any preserving agents, if applicable; see “General Operations”.
2. Clean the area to be resprayed with a solvent.
3. Sand the area to be resprayed with P180 sand paper
4. Fine-sand with 3M Scotch Brite ultra fine or an equivalent product.
5. Remove any dust from the sanded section with a Tack-rag cloth.
6. Blow ionised air over the area to be resprayed, or clean the area with an anti-static liquid.
7. Clean the area to be sprayed with a solvent.
8. Apply an elastic top coat (10-15% elastifier in the base paint) according to the manufacturer’s instructions.
9. Leave the top coat to evaporate/dry. Observe the drying time as laid down in the manufacturer’s instructions.

1.6 RESPRAYING GLASS-FIBRE REINFORCED POLYESTER PARTS

These parts can be recognised by the visible fibre-glass structure on the rear of the part, and the gel coating on the front of the part.

1. Remove any preserving agents, if applicable; see "General Operations".
2. Clean the area to be resprayed with a solvent.
3. Sand the area to be resprayed first with P80 sand paper and then with P180 sand paper.
4. Remove any dust from the sanded section with a Tack-rag cloth.
5. Fill the area to be resprayed.
6. Leave the filler to dry.
7. Apply spray filler to the part to be resprayed.
8. Leave the spray filler to dry.
9. Sand the filled area first with P80 sand paper and then with P180 sand paper.
10. Remove any dust from the area to be resprayed with a Tack-rag cloth.
11. Clean the area to be resprayed with a solvent.
12. Again remove any dust from the area to be resprayed with a Tack-rag cloth.
13. Blow ionised air over the area to be resprayed, or clean the area with an anti-static liquid.
14. Apply filler to the area to be resprayed.
15. Leave the filler to evaporate/dry.

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16. If necessary, fine-sand with 3M Scotch Brite ultra fine or an equivalent product.
17. Remove any dust from the area to be resprayed with a Tack-rag cloth.
18. Blow ionised air over the area to be resprayed, or clean the area with an anti-static liquid.
19. Apply the top coat according to the manufacturer's instructions.
20. Leave the top coat to evaporate/dry. Drying temperatures must not exceed 60°C. Comply with the drying times listed in the manufacturer's instructions.

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CONVERSION TABLES

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Conversion tables

CONSUMPTION

km/l	1/100 km	miles/gallon (imp)	miles/gallon (US)
n	$\frac{100}{n}$	n x 2.2825	n x 2.352
$\frac{100}{n}$	n	$\frac{282,5}{n}$	$\frac{235,2}{n}$
n x 0.354	$\frac{282,485}{n}$	n	n x 0.83
n x 0.425	$\frac{235,294}{n}$	n x 1.202	n

SPECIFIC CONSUMPTION

g/kW.h	g/hp.h	g/bh.h	lb/bh.h
1	0.7353	0.7455	0.00164
1.36	1	1.014	0.00224
1.341	0.9863	1	0.00220
608.45	447.4	453.6	1

SPEED

cm/sec	m/sec	km/h	feet/sec	mile/h
1	0.01	0.036	0.03281	0.02237
100	1	3.6	3.281	2.237
27.78	0.2778	1	0.9113	0.6214
30.48	0.3048	1.097	1	0.6818
44.70	0.4470	1.609	1.467	1

TEMPERATURE

n° Celsius	=	$\frac{9}{5} n + 32^{\circ}\text{F} = \frac{4}{5} n^{\circ}\text{R} = n + 273.15\text{ K}$
n° Fahrenheit	=	$\frac{5}{9} (n - 32)^{\circ}\text{C} = \frac{4}{9} (n - 32)^{\circ}\text{R} = \frac{5}{9} (n - 32) + 273.15\text{ K}$
n° Réaumur	=	$\frac{5}{4} n^{\circ}\text{C} = \frac{9}{4} n + 32^{\circ}\text{F} = \frac{5}{4} n + 273.15\text{ K}$
n° Kelvin	=	$n - 273.15^{\circ}\text{C} = \frac{9}{5} (n - 273.15) + 32^{\circ}\text{F} = \frac{4}{5} (n - 273.15)^{\circ}\text{R}$

WEIGHT

kg	ounces	pounds (lbs)	short tons *	long tons *	ton (metr.)
1	35.27	2.205	0.001102	0.0009842	0.001
0.02835	1	0.0625	0.00003125	0.0000279	0.00002835
0.4536	16	1	0.0005	0.0004464	0.0004536
907.2	32000	2000	1	0.8929	0.9072
1016	35840	2240	1.12	1	1.016
1000	35274	2205	1.102	0.9842	1

* US + UK

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LF45/55 series**LENGTH**

mm	inches	feet	yards	m	km	mile (stat.)
1	0.03937	0.003281	0.001094	0.001	0.000001	0.0000006214
25.4	1	0.08333	0.2777	0.0254	0.0000254	0.00001577
304.8	12	1	0.3333	0.3048	0.0003048	0.0001894
914.4	36	3	1	0.9144	0.0009144	0.0005682
1000	39.37	3.281	1.0936	1	0.001	0.0006214
1000000	39370	3281	1093.6	1000	1	0.6214
1609350	63360	5280	1760	1609	1.609	1

AREA

mm ²	cm ²	square inches	square feet	square yards	m ²
1	0.01	0.00155	0.00001076	0.000001196	0.000001
100	1	0.155	0.001076	0.0001196	0.0001
645.2	6.452	1	0.006944	0.0007716	0.0006452
92900	929	144	1	0.1111	0.09290
836100	8361	1296	9	1	0.8361
1000000	10000	1550	10.76	1.196	1

VOLUME

cm ³	US				dm ³ (litre)
	cubic inches	pints	quarts	gallons *	
1	0.06102	0.002114	0.001057	0.0002642	0.001
16.39	1	0.03464	0.01732	0.004329	0.01639
473.2	28.874664	1	0.5	0.125	0.4732
946.4	57.75	2	1	0.25	0.9464
3785	231	8	4	1	3.785
1000	61.02	2.114	1.057	0.2642	1

* US Gallon = 0.8327 Imp. Gallons

cm ³	US				dm ³ (litre)
	cubic inches	pints	quarts	gallons **	
1	0.0610248	0.0017598	0.008799	0.000219975	0.001
16.387	1	0.02894	0.01447	0.003618	0.016387
568.2	34.67429136	1	0.5	0.125	0.5682
1136.49	69.319	2	1	0.25	1.13649
4545.95	277.274	8	4	1	4.54596
1000	61.0248	1.7598	0.8799	0.219975	1

** Imp. Gallon = 1.201 US Gallons

0

CONVERSION TABLES

LF45/55 series

Conversion tables

PRESSURE

Pa	bar	kg/cm ²	lbs/sq inch (p.s.i.)	atm
1	0.00001	0.0000101	0.000145	0.0000987
100000	1	1.0197162	14.500364	0.9868813
98066.5	0.980665	1	14.22	0.9678
6894.76	0.0689476	0.070307	1	0.068046
101322.3	1.013223	1.0332	14.70	1
133.32	0.0013332	0.0013595	0.01934	0.0013158
3386.23	0.0338623	0.03453	0.4912	0.3342
9797.82	0.0979782	0.09991	1.421	0.09668
248.89	0.0024889	0.002538	0.03609	0.002456

Pa	column of mercury at 15 °C and g = 980.665 cm/sec ²		column of water at 15 °C and g = 980.665 cm/sec ²	
	mm	inches	m	inches
1	0.0075007	0.0002953	0.0001021	0.0040187
100000	750.06708	29.530981	10.207359	401.87015
98066.5	735.56454	28.96	10.01	0.9678
6894.76	51.715	2.036	0.7037	0.068046
101322.3	760	29.92	10.337	1
133.32	1	0.03937	0.01361	0.0013158
3386.23	25.40	1	0.3456	0.3342
9797.82	73.49	2.893	1	0.09668
248.89	1.867	0.07349	0.02540	0.002456

WORK

Nm	mkg	ft.lbs.	kWh	pkh (metr.)	Hph	kcal
1	0.1019716	0.7375607	0.0000002776	0.0000003776	0.0000003725	0.000238882
9.80665	1	7.233	0.000002723	0.0000037037	0.000003653	0.002342
1.356259695	0.1383	1	0.0000003765	0.00000051206	0.00000050505	0.0003238
3601001.88	367200	2656000	1	1.3599	1.341	860
2647795.5	270000	1952900	0.7353	1	0.9863	632.4
2684570.4375	273750	1980000	0.7455	1.0139	1	641.1
4187.43955	427	3088	0.001163	0.001581	0.00156	1

POWER

kW	hp (metr.)	mkg/sec	kcal/sec	HP	lbs/sec
1	1.36	102	0.2389	1.341	737.7
0.7353	1	75	0.1757	0.9863	542.5
0.009804	0.01333	1	0.002342	0.01315	7.233
4.186	5.693	427	1	5.615	3088
0.7455	1.014	76.04	0.1781	1	550
0.001355	0.00184	0.1383	0.0003238	0.00182	1

CONVERSION TABLES

0

Conversion tables

LF45/55 series

TECHNICAL DATA	0
DIAGNOSTICS	1
INTERNAL CAB COMPONENTS	2
CAB HEATING	3
EXTERNAL CAB COMPONENTS	4
CAB SUSPENSION	5
CAB TILTING GEAR	6
SEATS	7
ACCESSORIES	8

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3. CAB TILTING GEAR	3-1	0210
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5.1 General	5-1	0210
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TECHNICAL DATA

1

Contents

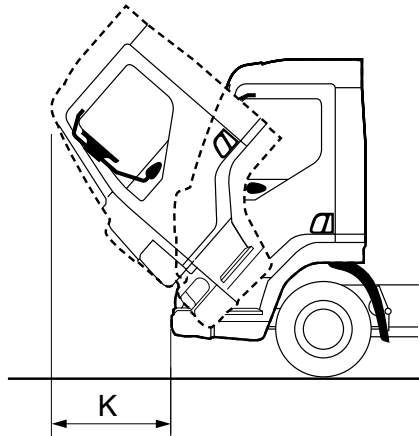
LF45/55 series

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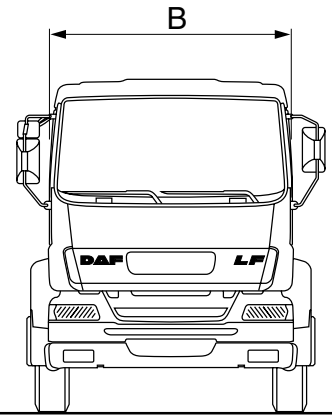
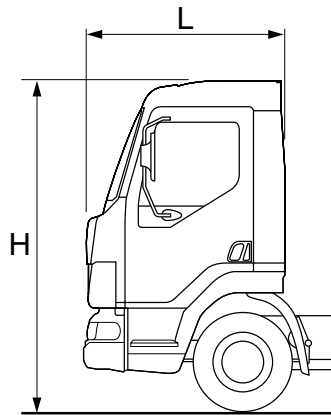
1. INTERNAL AND EXTERNAL CAB COMPONENTS

1.1 GENERAL

Main dimensions and weights



K1 01 170



K1 01 192

Cab dimensions in mm:

length (L)
width (B)
max. height (H)
tilting (K)

Day cab

1600 mm
2130 mm
2900 mm ⁽¹⁾
1105 mm ⁽²⁾

Sleeper Cab

2000 mm
2130 mm
2900 mm ⁽¹⁾
1105 mm ⁽²⁾

Cab weights:

Day cab	595 kg
Sleeper cab	750 kg

Notes:

- (1) Height (H) dependent on version and tyre size
- (2) Dimension K measured from the front of the bumper.

TECHNICAL DATA

1

Internal and external cab components

LF45/55 series

0

Permissible cab weights:

Roof console evenly distributed

max.

5 kg

Roof evenly distributed

150 kg

Weight on the bunk

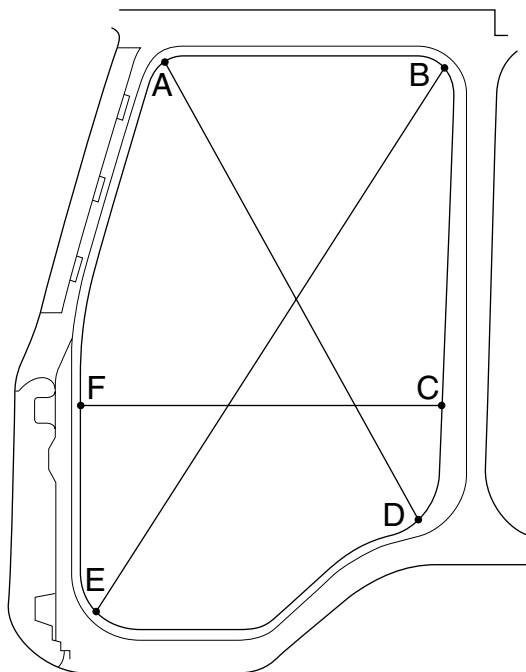
125 kg

Cab side members

Welding on cab side members is **NOT** permitted.

When repairing the cab side member, you must use sheet-metal trimming panels. These must be fitted by spot welding.

Straightening dimensions



K1 01 209

Door opening dimensions

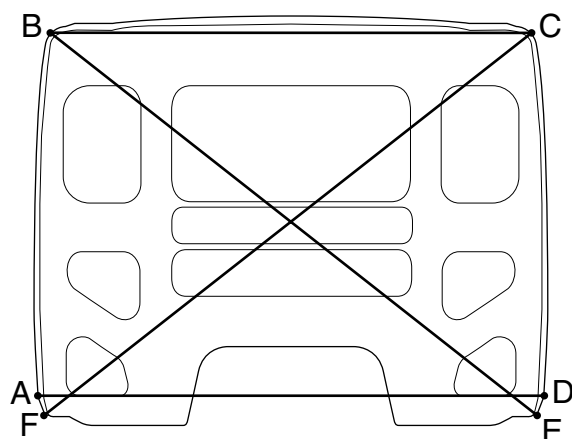
A - D	1283 mm
C - F	887 mm
B - E	1591 mm

TECHNICAL DATA

1

Internal and external cab components

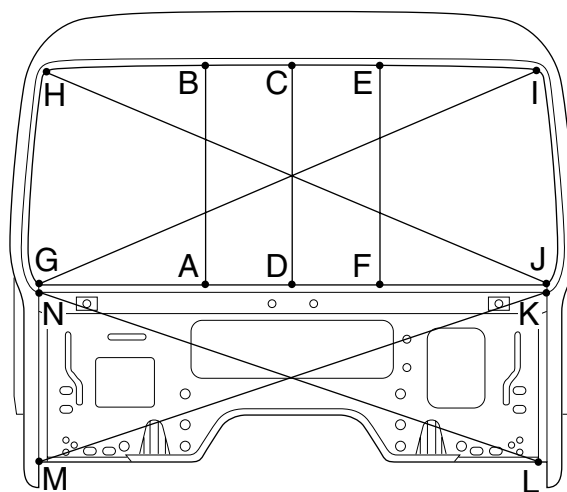
LF45/55 series



K1 01 208

Rear wall dimensions

A - D	2042 mm
B - C	1926 mm
B - E	2435 mm
C - F	2435 mm



K1 01 210

Cab front dimensions

A - B	836 mm
C - D	836 mm
E - F	836 mm
G - I	1973 mm
H - J	1973 mm

Front panel dimensions

N - L	1945 mm
K - M	1945 mm

TECHNICAL DATA

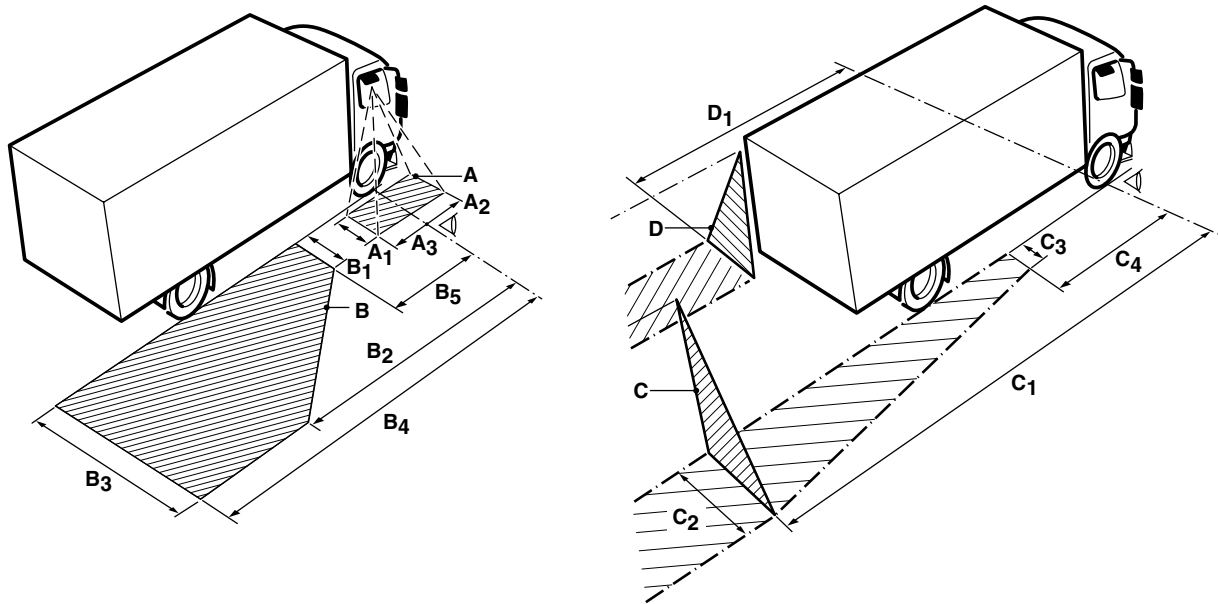
1

Internal and external cab components

LF45/55 series

Field of vision dimensions

0



K100237

Mirror	size 1	size 2	size 3	size 4	size 5
Pavement mirror [A]	1 m	1 m	1.25 m		
Wide-angle mirror [B]	2.5 m	15 m	12.5 m	25 m	3 m
Main mirror on co-driver's side [C]	30 m	3.5 m	0.75 m	4 m	
Main mirror on driver's side [D]	10 m	2.5 m			

Windscreens

Curing times for windscreen adhesive				
Product name	DAF number	Vehicle mobile in workshop after:	Cab can be tilted after:	Vehicle usable after:
Sikaflex 255 FC	1271129	6 hours	8 hours	12 hours
Sika Tack Ultrafast	1241020	2 hours	4 hours	6 hours
Sika Tack plus booster	1357925	1 hour	1 hour ⁽¹⁾	2 hours

Notes:

⁽¹⁾ If a vehicle is equipped with an airbag, the curing time is 2 hours

A relative humidity of less than 50% delays curing, as does a temperature lower than 20°C.

Products applied for bonded windscreens			
Product name	DAF number	Properties	Applications
Sikaflex 255 FC	1271129	Processing time 20 min.	Adhesive (cold process) for bonding windscreens
Sika Tack UF	1241020	Processing time 10 min.	Adhesive (warm process) for bonding windscreens
Sika Tack plus booster	1357925	Processing time 10 min.	Adhesive (cold process) for bonding windscreens
Sika Aktivator	1312362		Cleaning fluid for cleaning the glass and the frame.
Sika remover SR 208	1241019		Removal of adhesive which has not yet hardened. Do not use on surfaces to be bonded.

TECHNICAL DATA

1

Internal and external cab components

LF45/55 series

1.2 TIGHTENING TORQUES

0

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the removed ones.

Steering wheel

Steering wheel attachment bolt	50 ± 5 Nm
--------------------------------	-----------

Universal joint

Universal joint attachment bolt	56 ± 5.6 Nm ⁽¹⁾
---------------------------------	----------------------------

Airbag

Airbag module attachment bolt	5 ± 1 Nm
Contact unit attachment bolt	1.2 Nm
Electronic unit	10 ± 2 Nm

Note:

⁽¹⁾ Always replace the attachment bolt and nut.

2. CAB SUSPENSION

2.1 GENERAL

The day cab can be fitted with rubber spring elements at the front. The version with rubber spring elements at the front does not have a stabiliser.

The coil spring elements are fitted with shock absorbers.

The length of the spring elements and the cab height cannot be adjusted.

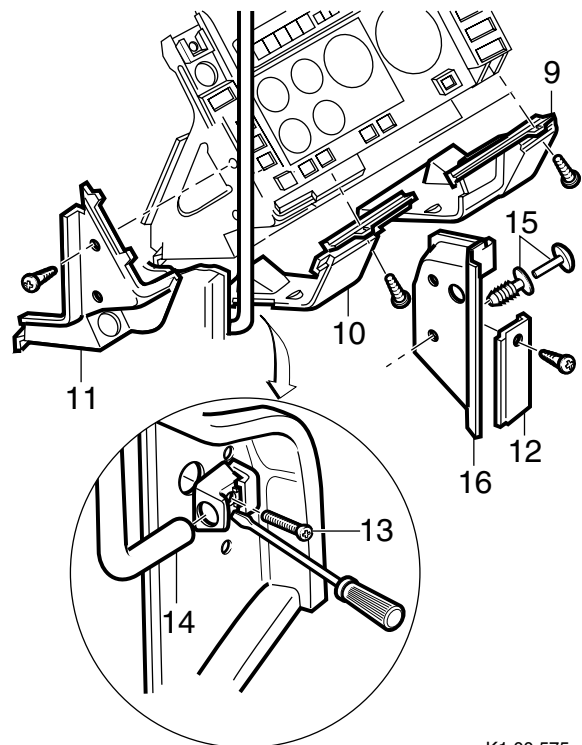
On models equipped with coil spring elements at the front, a difference in cab height can be corrected to a certain extent using the stabiliser bar.

At the rear, coil springs are used. The length of the spring elements varies depending on whether a day cab or a sleeper cab is involved.

Cab support, general

The distance between the cab supports (A) measured from the left side of the left support to the left side of the right support is:

1000 mm



K1 00 575

TECHNICAL DATA

1

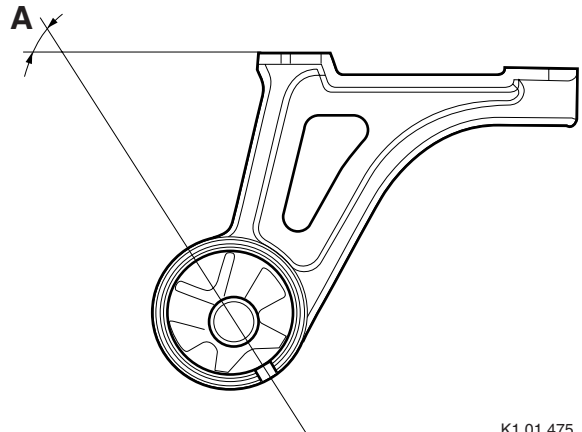
Cab suspension

LF45/55 series

Cab support with silentblock

Silent block mounting angle (A)

67° - 71°

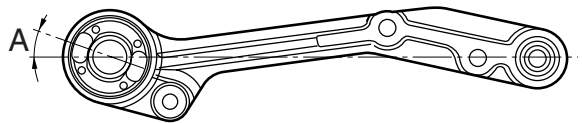


K1 01 475

Cab support with coil spring suspension

Silent block mounting angle (A)

18° - 22°



K1 01 442

0

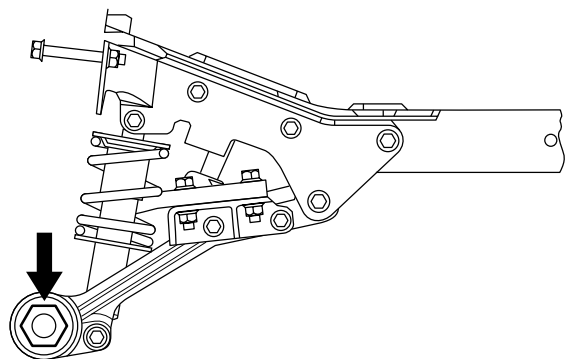
2.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the removed ones.

Attachment bolts for cab suspension using coil springs

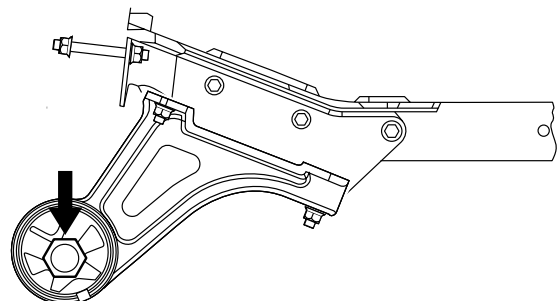
Cab suspension attachment bolt	250 Nm + 150° angular displacement
--------------------------------	------------------------------------



K1 01 573

Attachment bolts for cab suspension using rubber spring elements

Cab suspension attachment bolt	250 Nm + 150° angular displacement
--------------------------------	------------------------------------



K1 01 574

TECHNICAL DATA

1

Cab suspension

LF45/55 series

0

LF45/55 series

Cab tilting gear

3. CAB TILTING GEAR

3.1 GENERAL

Lifting cylinder

Nominal pressure 250 bar

Cab tilting pump

Nominal pressure 250 bar

Pressure limiting valve 350 + 30 bar

3.2 FILLING CAPACITIES

Cab tilting pump

Effective oil capacity of the cab-tilting pump. 200 cm³

TECHNICAL DATA

1

Cab tilting gear

LF45/55 series

0

4. SEATS

4.1 GENERAL

Height control valve

Adjusting dimension X for height control valve

1 - 2 mm

4.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the removed ones.

M8 attachment bolt

22 Nm

M10 attachment bolt

22 Nm

Attachment bolt 7/16" UNF-2B

37 Nm

TECHNICAL DATA

1

Seats

LF45/55 series

0

5. ACCESSORIES

5.1 GENERAL

Roof spoiler

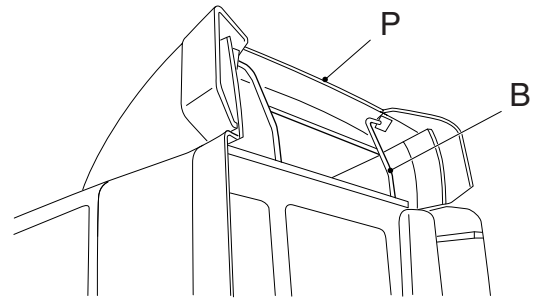
Adjusting range of roof spoiler, aerodynamic and adjustable

350 - 850 mm

Note:

The roof spoiler height can be adjusted using adjusting mechanism (B).

The size is the distance measured between the highest roof spoiler edge (P) and the cab roof plate local to the vehicle centreline.



K1 01 355

Application compounds for rear air foils and roof spoilers

Product name	DAF number	Properties	Applications
Sikaflex 252 (white)	1286578	Working time within 15 min. Curing time 2 days	Kit for fender and roof spoiler attachment

5.2 TIGHTENING TORQUES**0**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the removed ones.

Roof spoiler

Attachment nuts	13 Nm
-----------------	-------

Rear air foil

Attachment nuts	13 Nm
-----------------	-------

Sun visor

Bracket attachment bolts	13 Nm
Bolt for attaching the sun visor to the bracket	10 Nm

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1.1 Fault-finding table, cab tilting mechanism	1-1	0210

DIAGNOSTICS

1

Contents

LF45/55 series

1

1. CAB SUSPENSION

1.1 FAULT-FINDING TABLE, CAB TILTING MECHANISM

COMPLAINT: TILTING CYLINDER FAILS TO RESPOND	
Possible cause	Remedy
Damaged or broken pipe.	Replace pipe or connection.
Pump reservoir empty.	Top up reservoir and check for leakage.
Worn or damaged cylinder seal.	Replace the cylinder or seal.

COMPLAINT: PUMP ROD REBOUNDS	
Possible cause	Remedy
Leaking non-return valve.	Disassemble the two-way valve of the pump. Clean and degrease the valve components. Replace all seals and assemble the two-way valve.

COMPLAINT: PUMP ONLY FUNCTIONS IN THE LAST PART OF THE STROKE	
Possible cause	Remedy
Low oil level in oil reservoir.	Top up oil reservoir.
Leaking inlet valve (ball).	Remove the two-way valve and check the inlet valve. Clean or replace it.
Polluted inlet strainer.	Clean the reservoir and strainer.

COMPLAINT: PUMP FAILS TO BUILD UP PRESSURE	
Possible cause	Remedy
Reservoir level too low.	Top up the reservoir.
Leaking inlet valve (ball).	Remove the two-way valve and check the inlet valve. Clean or replace it.
Worn or damaged O-rings on the two-way valve.	Remove the two-way valve and replace all seals and O-rings.
Pressure-relief valve incorrectly set.	Check the pressure relief valve and adjust, if necessary.

DIAGNOSTICS**1**

Cab suspension

LF45/55 series**COMPLAINT: CAB LOCK CANNOT BE OPENED**

Possible cause	Remedy
Damaged or broken pipe.	Replace pipe or connection.
Jammed piston in locking mechanism.	Repair or replace the locking mechanism.

COMPLAINT: CAB CANNOT BE TILTED

Possible cause	Remedy
Jammed piston in cab locking mechanism.	Repair or replace the locking mechanism.
Pump fails to build up pressure.	Check the operation of the pump.

1

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4.18 Removal and installation, side wall lining	4-37	0210
4.19 Removal and installation, storage trays (sleeper cab)	4-37	0210

INTERNAL CAB COMPONENTS

1

Contents

LF45/55 series

2

1. SAFETY INSTRUCTIONS

General

The cab is equipped with a hydraulic tilting mechanism. The pump is located on co-driver's side at the rear of the cab. The cab locks are opened hydraulically during pumping. Before tilting the cab, make sure that the doors are closed, that there are no loose items in the cab and that the gear lever is in neutral. Tilt the cab fully forward if work must be carried out underneath the cab.



You can stop the cab tilting forward at any time by turning the tap to the reverse tilting position.



When working on a tilted cab (for example when welding, spray-painting or applying bitumen coatings), be sure to cover the piston rod of the lifting cylinder. Welding spatter and paint on the piston rod will inevitably cause damage to the oil seal.

Inspection after a collision

Before tilting the cab after a collision, check the cab rests, the cab hinges and the attachment of the lifting cylinder to the chassis member and cab for cracks.



If the vehicle has been involved in a collision, the cab must under no circumstances be tilted without due precautions. The end stop in the lifting cylinder may be damaged, which might cause the cab to shoot past its end stop.

If possible, suspend the cab in slings and put a stand in front of the cab. Make sure that there is no one in front of the cab while it is being tilted.

INTERNAL CAB COMPONENTS

1

Safety instructions

LF45/55 series

Replacing the lifting cylinder

After a collision, **always** check the lifting cylinder for internal damage.

Replace the lifting cylinder if damaged or if you are in doubt as to the its condition.

Always replace the cylinder if one of the following points has occurred during a collision:

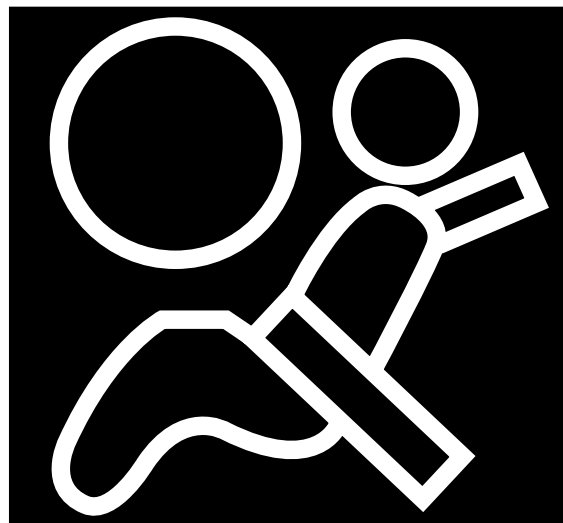
- A. the cab has been pulled out of the cab locks,
- B. the cab locks have been deformed or damaged,
- C. the rear cab springs have been deformed or damaged.

Airbag and seat belt tensioner safety instructions

- Never disconnect an electrical connection in the airbag or seat belt tensioner circuits with the ignition switched on.
- All work on pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)) may only be carried out by employees of approved DAF dealers or workshops who are sufficiently trained on these systems.
- The use of pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)) is subject to various national laws. The legal stipulations must be observed.

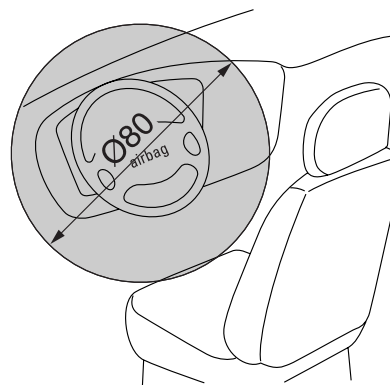
2

- Vehicles equipped with a pyrotechnic system (system with airbag(s) and/or seat belt tensioner(s)) can be identified by a sticker with an airbag symbol on the windscreen and/or with the word AIRBAG on the airbag unit on the steering wheel.
- If the vehicle is equipped with an airbag and seat belt tensioner system while there is no airbag symbol on the windscreen, this symbol will have to be applied as yet.



K101290

- It is not permitted to install accessories on airbag and seat belt tensioner parts or in their operating zones afterwards. The operating zone covers an area the size of a ball with a diameter of 80 cm. Only accessories approved by DAF for vehicles with an airbag and/or seat belt tensioner may be installed, in the place indicated by DAF and in the manner outlined by DAF.



GO 00 235

- Using equipment or objects that generate strong electromagnetic fields in the vicinity of parts of the airbag/seat belt tensioner system can lead to unwanted activation of the airbag and/or seat belt tensioner or can make proper operation of the system impossible. The use of such equipment or objects in the vicinity of parts of the airbag/seat belt tensioner system is therefore not recommended.

INTERNAL CAB COMPONENTS

1

Safety instructions

LF45/55 series

2

- It is not allowed to leave pyrotechnic units (airbags and/or seat belt tensioners) unattended. If repairs to a vehicle continue for a long time and pyrotechnic units (airbags and/or seat belt tensioners) are involved in the repair, the pyrotechnic units must be stored safely (under lock and key). This means that the storage location must meet local requirements relating to pyrotechnic materials. The pyrotechnic units may not be stored together with different hazardous substances and the location must have the relevant hazard warning symbols and fire protection facilities.
- Before any work is carried out on a pyrotechnic part (airbag and/or seat belt tensioner):
 - a. switch off the ignition.
 - b. the negative battery terminal clamp must be separated carefully.
 - c. wait at least 5 minutes.
- If pyrotechnic units have been activated in a crash, the electronic unit and the contact unit must be replaced in addition to the pyrotechnic units. The cable harness assembly and connectors must be inspected visually. If damage or overload is established, the cable harness assembly must be replaced.

1

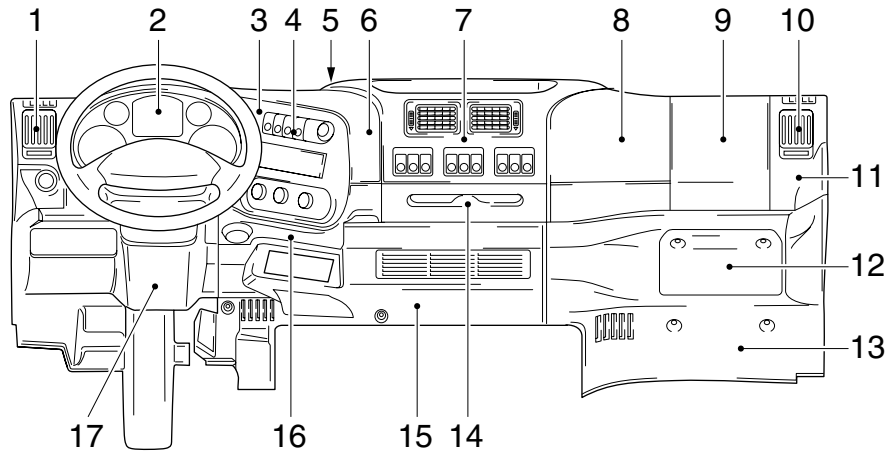
INTERNAL CAB COMPONENTS

LF45/55 series

General

2. GENERAL

2.1 OVERVIEW DRAWING, INTERIOR CAB COMPONENTS



K1 01 438

Legend

1. Left-side ventilation grille
2. Instrument panel
3. Garnish moulding
4. Radio panel
5. Frame rim cover panel
6. Upper dashboard panel on driver's side
7. Central console control panel
8. Upper side of cover panel
9. Upper side of cover
10. Right-side ventilation grille
11. Right-side dashboard panel
12. Lid on central box
13. Lower dashboard panel on co-driver's side
14. Ashtray
15. Engine tunnel dashboard panel
16. Lower dashboard panel on driver's side
17. Steering column dashboard panel

INTERNAL CAB COMPONENTS

1

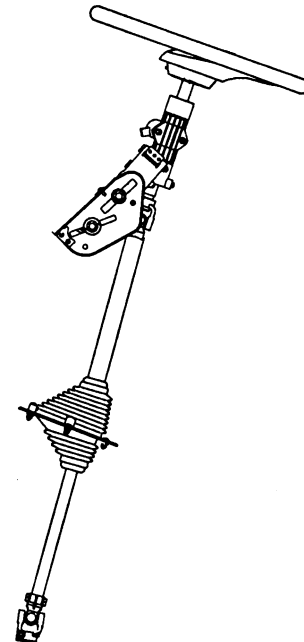
General

LF45/55 series

2.2 SYSTEM DESCRIPTION, STEERING COLUMN

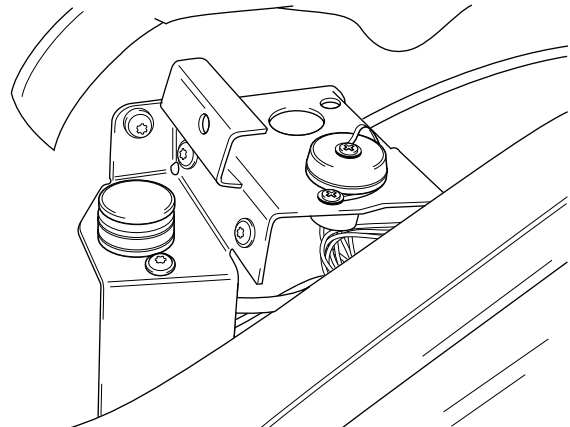
The tilting angle of the steering column can be adjusted manually or pneumatically. A spring-loaded clamping mechanism fixes the steering column in position.

The pneumatically adjusted steering column is unlocked using the air cylinder behind the steering column.



K1 01 425

The operating valve (switch) is situated behind the driver's seat. This valve can be operated by the heel.

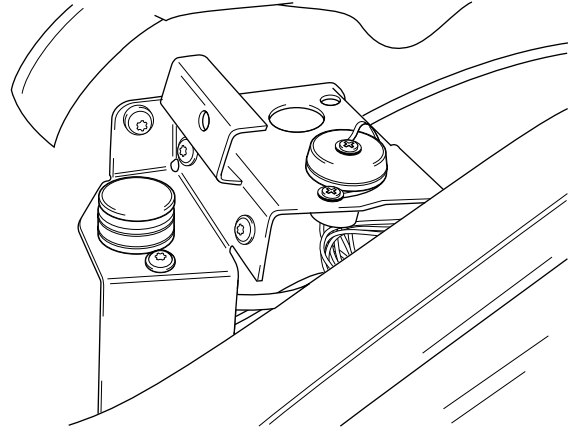


K1 01 202

3. INSPECTION AND ADJUSTMENT

3.1 INSPECTION, STEERING COLUMN SETTING VALVE

1. Check whether the angle of the steering column can be adjusted, once the switch is pressed in with the heel.
2. Check that the adjustment mechanism is securely locked again when the switch is released.
3. If this is not the case, check that no air pipe is trapped. If not, replace the valve (switch).



K1 01 202

INTERNAL CAB COMPONENTS

1

Inspection and adjustment

LF45/55 series

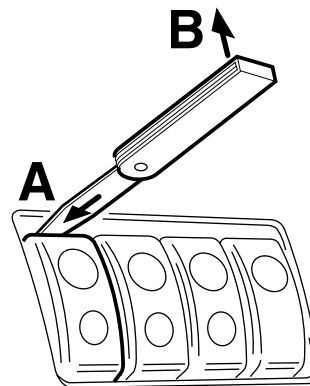
2

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, SWITCHES

Removing switches

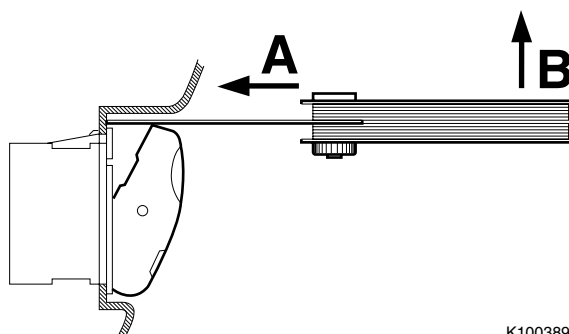
1. Insert a feeler gauge of approx. 1 mm straight between the switch and the panel at the side of the finger-sized depression (A), until it touches the inside of the panel.
2. Remove the switch from its locked position by carefully moving the feeler gauge in the direction of the arrow (B).
3. Carefully remove the switch from the panel. In doing so, ensure that the connector lock does not catch behind the panel, causing the connector to fall behind the panel.
4. If necessary, remove the switch from the connector.



K1 01 186

Installing switches

1. Fit the connector.
2. Insert the switch into the opening in the panel and press until you can feel it lock.



K100389

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

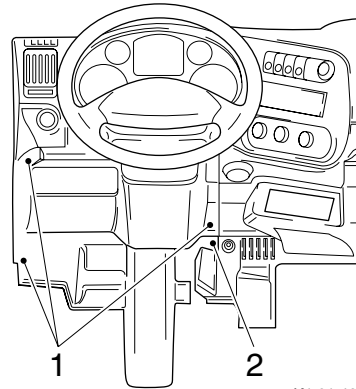
4.2 REMOVAL AND INSTALLATION, DASHBOARD PANELS

Note:

Dashboard panel removal and installation is listed in the correct sequence. To allow each following panel to be removed, the earlier specified panels must be removed first.

Removing steering column dashboard panel

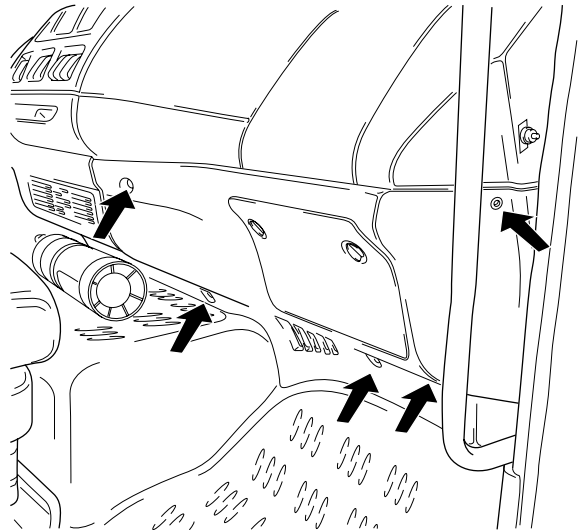
1. If necessary, remove the floor mat.
2. Using the steering column setting, move the steering wheel to its highest possible position.
3. Remove the attachment bolts (1) and panel plug (2) and subsequently the steering column dashboard panel.



K1 01 427

Removing the lower dashboard panel on co-driver's side

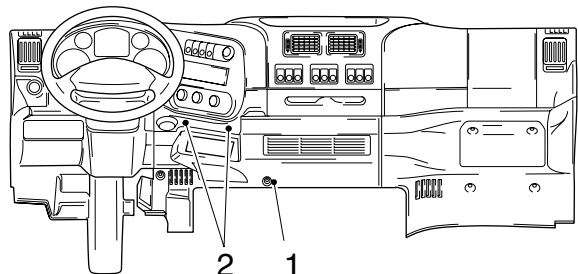
1. Remove the attachment bolts from the lower dashboard panel on co-driver's side. Remove the lower dashboard panel on co-driver's side



K1 01 428

Removing the engine tunnel dashboard panel

1. Remove the attachment bolts (1) and the panel plugs (2). Remove the engine tunnel cover panel.
2. Loosen the 12V power supply connector at the rear.



K1 01 429

1

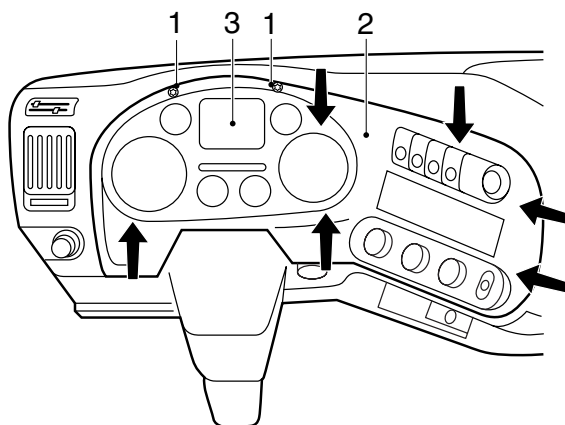
INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

Removing the instrument panel

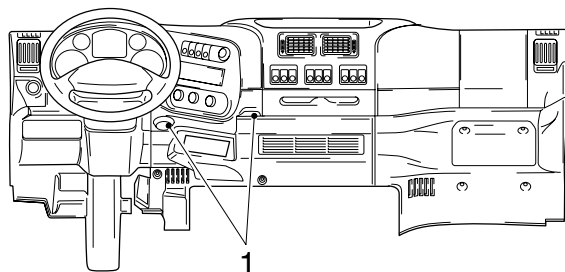
1. Remove the attachment bolts (1) of the garnish moulding (2) around the instrument panel (3).
2. Carefully pull the mounting clips (see arrows) holding down the garnish moulding (2) from the dashboard panel.
3. Remove the attachment bolts from the instrument panel (3).
4. Remove the instrument panel (3).
5. Remove the connector from the instrument panel (3).



K1 01 430

Removing the lower dashboard panel on driver's side

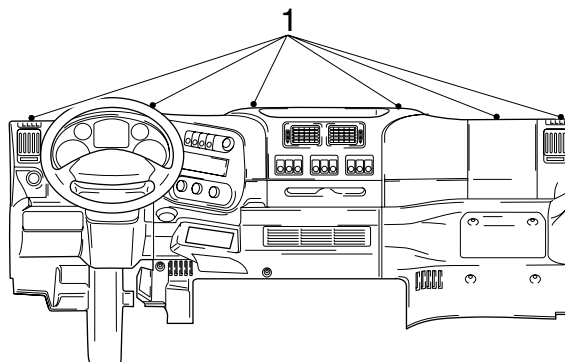
1. Remove the attachment bolts (1). Remove the dashboard panel.
2. Loosen the headlamp height adjustment connector at the rear.
3. Remove the attachment bolts from the connector block at the rear of the dashboard panel.
4. Remove the connector block.



K1 01 431

Removing the window frame cover panel

1. Remove the attachment bolts (1) from the window frame.
2. Take the cover panel out of the window frame.



K1 01 432

INTERNAL CAB COMPONENTS

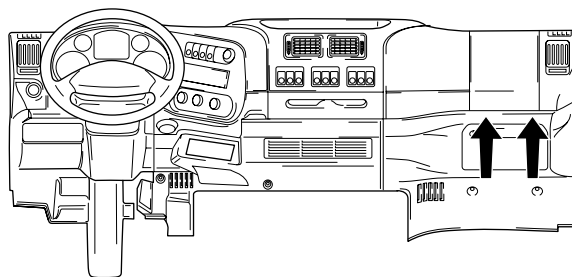
1

Removal and installation

LF45/55 series

Removing the upper cover

1. Remove the attachment bolts at the bottom of the cover.
2. Remove the cover from the upper cover panel by tilting it upwards.

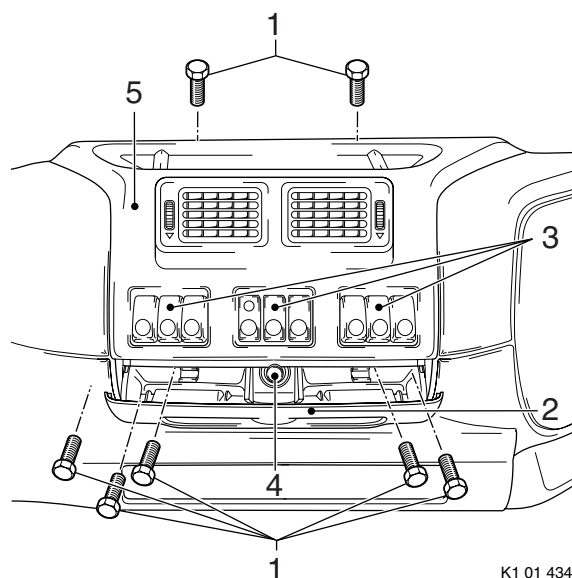


K1 01 433

2

Removing the central console control panel

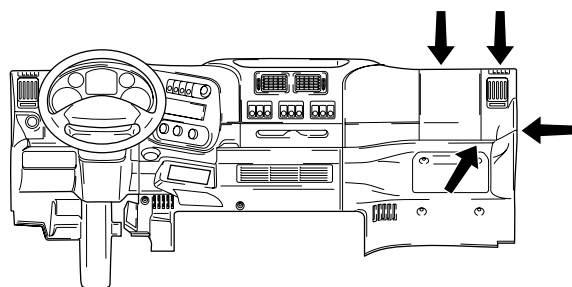
1. Remove the switches (3) from the control panel in the central console (5).
2. Remove the ashtray (2) from the control panel in the central console (5).
3. Remove the attachment bolts (1) from control panel in the central console (5).
4. Remove the control panel from the central console (5).
5. Disconnect the connector of the cigarette lighter (4).



K1 01 434

Removing the right-side dashboard panel

1. Remove the dashboard panel attachment bolts.
2. Remove the connector from the stepwell lighting door switch.



K1 01 435

1

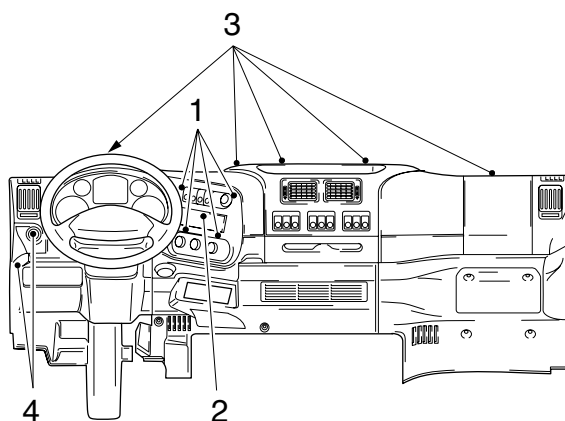
INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

Removing the upper dashboard panel on driver's side

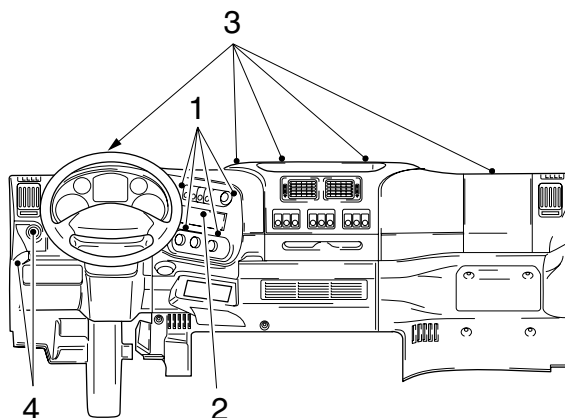
1. Remove the attachment bolts (1) from the radio panel (2).
2. Remove the attachment bolts (3) from the dashboard panel.
3. Cut the cable binders that are used to attach the wiring harnesses to the dashboard panel.
4. Remove the dashboard panel. Unhook the radio panel (2) from the dashboard panel.
5. Disconnect the connector of the light switch (4) and the stepwell lighting door switch.



K1 01 436

Installing the upper dashboard panel on driver's side

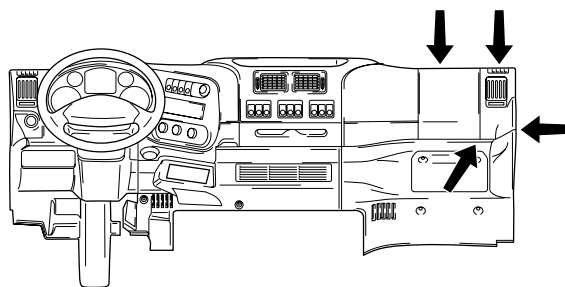
1. Fit the connector of the light switch (4) and the stepwell lighting door switch.
2. Fit the dashboard panel. Hook the radio panel (2) to the dashboard panel.
3. Fix the removed cable harnesses to the dashboard panel using cable binders.
4. Fit the dashboard panel attachment bolts (3).
5. Fit the attachment bolts (1) of the radio panel (2) to the dashboard panel.



K1 01 436

Installing the right-side dashboard panel

1. Fit the connector of the stepwell lighting door switch to the right-side dashboard panel
2. Fit the right-side dashboard panel using the attachment bolts.



K1 01 435

2

INTERNAL CAB COMPONENTS

1

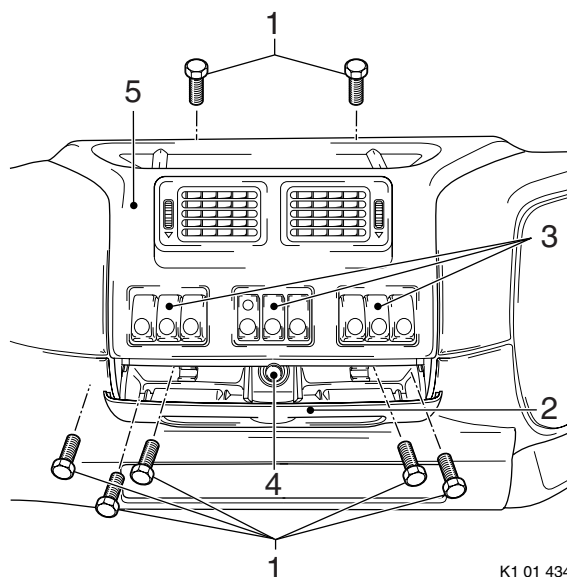
Removal and installation

LF45/55 series

2

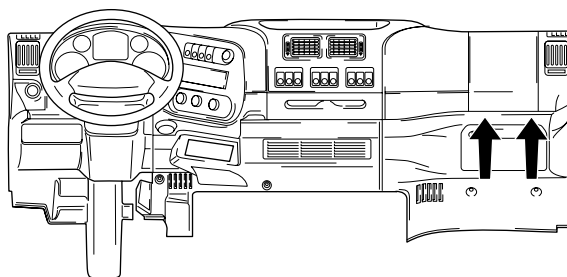
Installing the central console control panel

1. Re-fit the connector of the cigarette lighter (4) to the rear of the control panel of the central console (5).
2. Fit the control panel of the central console (5) to the dashboard.
3. Hook up the switches (3) from the control panel in the central console (5) to the connectors. Re-fit the switches (3) to the control panel in the central console (5).
4. Secure the control panel in the central console (5) using the attachment bolts (1).
5. Fit the ashtray (2) into the control panel in the central console (5).



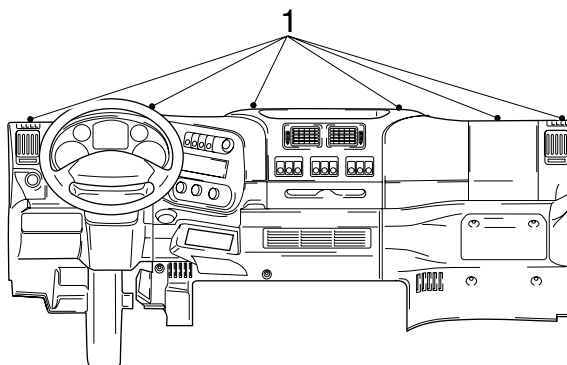
Fitting the upper cover

1. Hook the cover into the cover panel. Fit the cover into the cover panel using the attachment bolts.



Fitting the cover panel into the window frame

1. Fit the cover panel into the window frame using the attachment bolts (1).



1

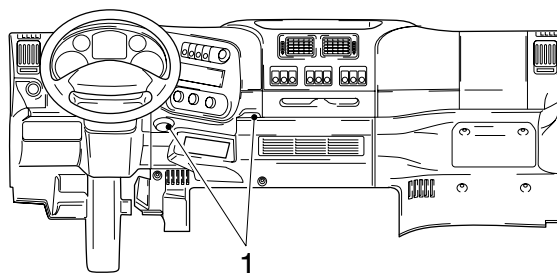
INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

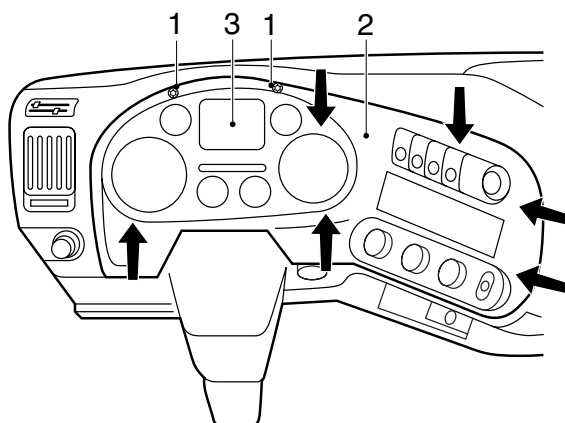
Fitting the lower dashboard panel on driver's side

1. Fit the connector block to the rear of the dashboard panel using the attachment bolts.
2. Fit the connector of the headlamp height adjustment unit to the dashboard panel.
3. Fit the dashboard panel using the attachment bolts (1).



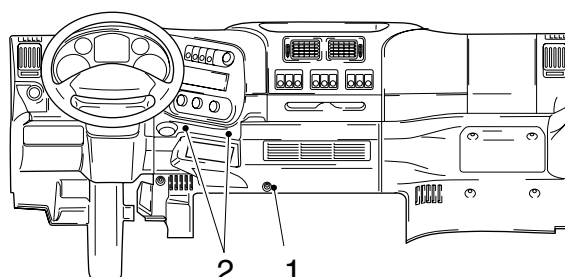
Installing the instrument panel

1. Fit the connector of the instrument panel (3).
2. Fit the instrument panel (3) to the dashboard panel using the attachment bolts.
3. Push the garnish moulding (2) back onto the dashboard panel using the mounting clips. Fix the garnish moulding (2) onto the dashboard panel using the attachment bolts (1).



Fitting the engine tunnel dashboard panel

1. Remove the attachment bolts (1) and the panel plugs (2). Remove the engine tunnel cover panel.
2. Fit the connector of the 12V power supply to the rear of the engine tunnel dashboard panel.



2

INTERNAL CAB COMPONENTS

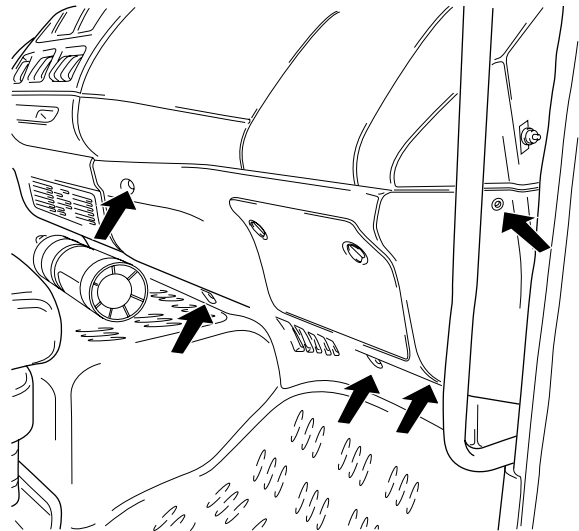
1

Removal and installation

LF45/55 series

Fitting the lower dashboard panel on co-driver's side

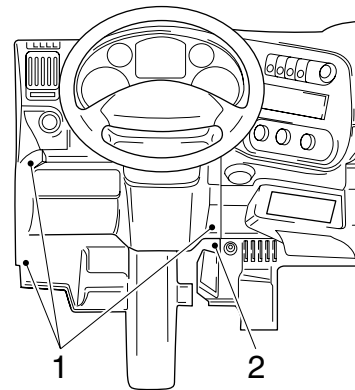
1. Fit the lower dashboard panel on co-driver's side using the attachment bolts.



K1 01 428

Installing the steering column dashboard panel

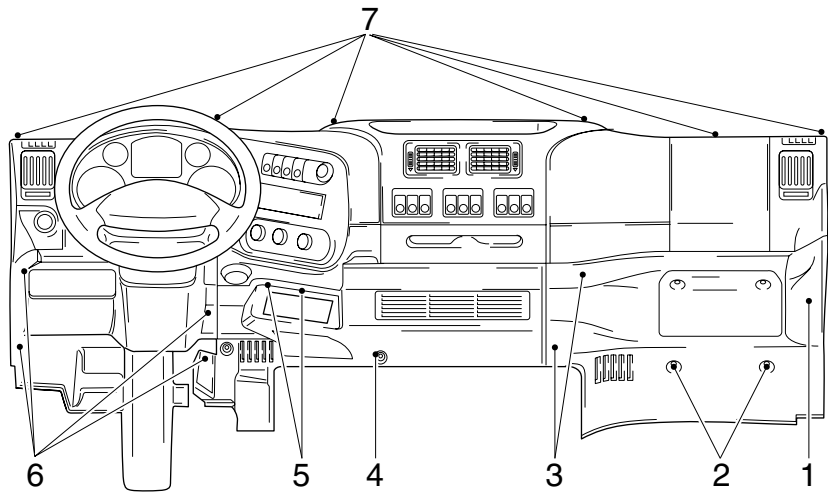
1. Fit the steering column dashboard panel using the attachment bolts (1) and panel plug (2).



K1 01 427

2

4.3 REMOVAL AND INSTALLATION OF COMPLETE DASHBOARD



K1 01 437

Removing the dashboard

1. Disconnect the earth lead from the battery terminal.
2. Remove the attachment bolts and the panel plug (6). Remove the steering column cover panel.
3. Remove the attachment bolts (1), (2) and (3) and remove the cover panel on co-driver's side.
4. Remove the attachment bolts (4) and the panel plugs (5). Remove the engine tunnel cover panel. Remove the connector from the 12V power supply.
5. Remove the attachment bolts (7) and remove the upper cover panel.
6. Open the grille.

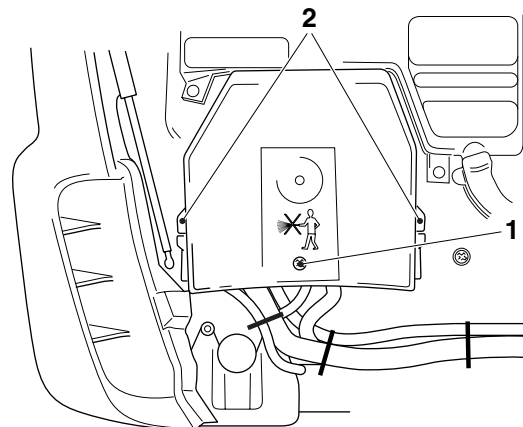
INTERNAL CAB COMPONENTS

1

Removal and installation

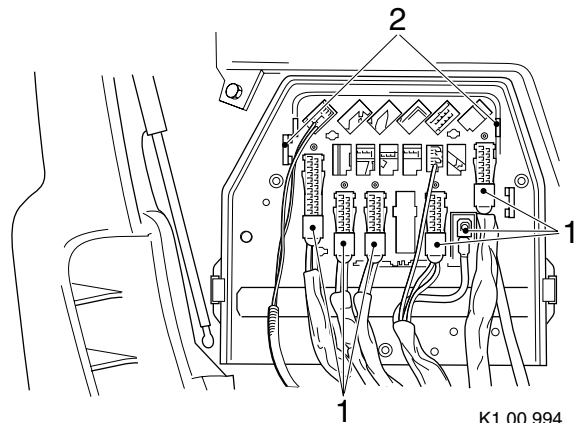
LF45/55 series

7. Remove the attachment bolt (1).
8. Remove the protective cover by pressing the retainer (2) aside.



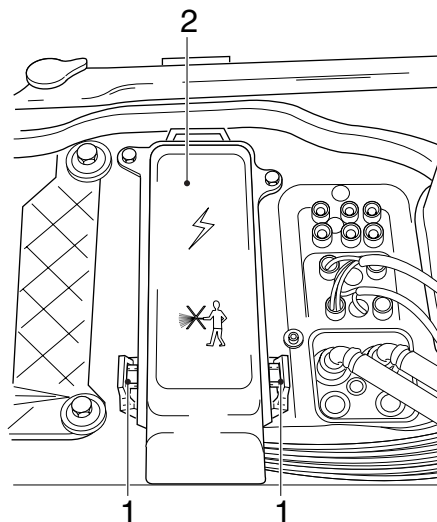
K1 00 988

9. Detach the connectors (1) from the connecting block.
10. Press the connecting block retainer (2) inside and push the complete connecting block inside.



K1 00 994

11. Remove the cover plate (2) by releasing the retainer (1).



K100989

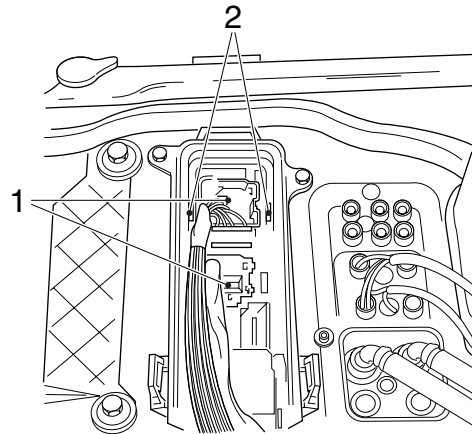
1

INTERNAL CAB COMPONENTS

LF45/55 series

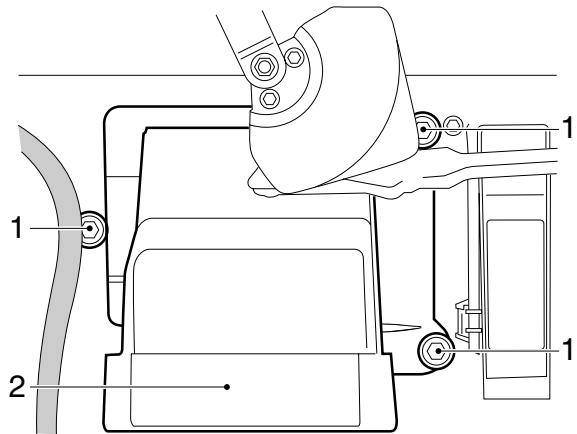
Removal and installation

12. Remove the connectors (2).
13. Push the retainers (1) aside and the connector holder plate inside.



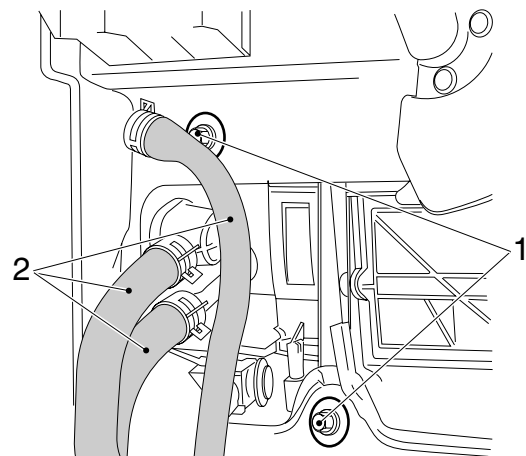
K1 00 990

14. Remove the attachment bolts (1) from the filter casing and remove the filter casing (2).



K1 01 194

15. Remove the attachment bolts (1).
16. Remove the heater hoses (2) and seal the heater tubes.
17. Remove the connectors to the left and right of the steering column.



K1 01 175

2

INTERNAL CAB COMPONENTS

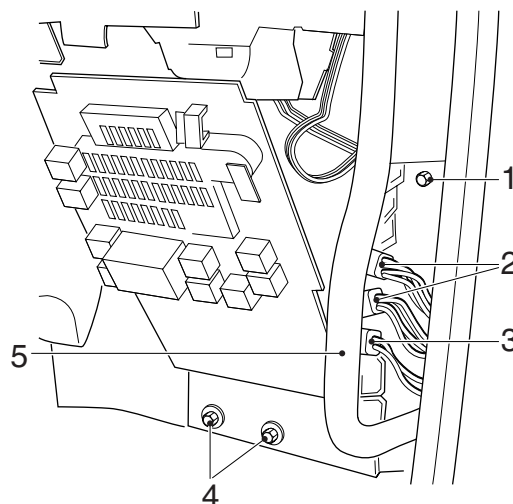
1

Removal and installation

LF45/55 series

2

18. Remove the connectors (2) and the earth connections (3).
19. Remove the attachment bolts on the underside of the dashboard, left and right.
20. Remove the attachment bolts (4) and (1).
21. Pull the cover plate in the A-pillar out of the retainer, remove the grip attachment bolt and remove the grip (5).
22. Remove the floor mats. Remove the diagnostic and ECAS connectors by taking the wiring apart and then removing the attachment bolts. Remove the connectors from the bracket.
23. Remove the floor plate above the wiring.
24. Remove the seat wiring.
25. Remove the attachment bolts from the window frame.
26. Remove the attachment bolts on the underside and remove the complete dashboard.



K1 00 986

Fitting the dashboard

1. Fit the dashboard and secure it in the window frame using a few attachment bolts.
2. Fit the seat wiring.
3. Install the floor plate above the wiring.
4. Fit the ECAS and diagnostic connectors to the bracket.
5. Fit the grip and the cover panel in the A-pillar.
6. Fit the connectors in the central box.
7. Remove the seals from the coolant hoses and attach the hoses.
8. Fit the connectors to the left and right of the steering column.

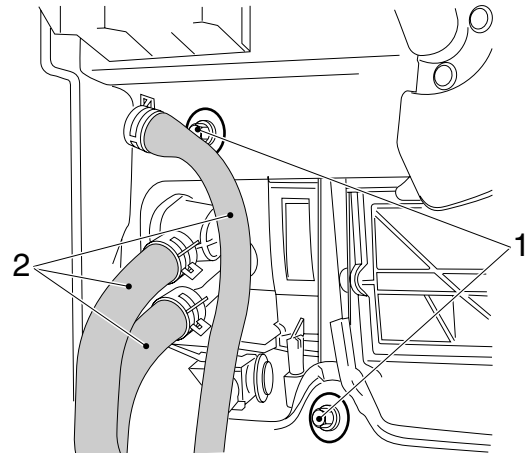
1

LF45/55 series

INTERNAL CAB COMPONENTS

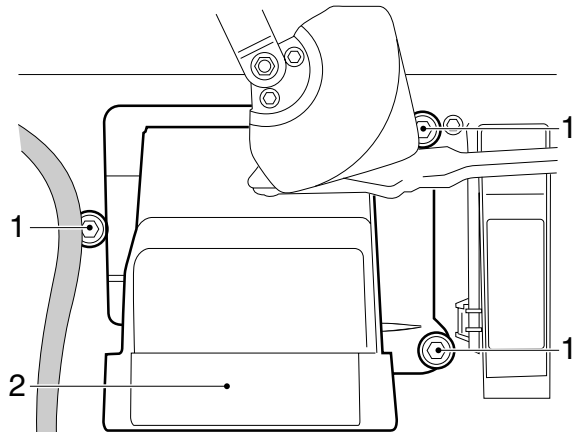
Removal and installation

9. Insert the attachment bolts (1).
10. Fit the heater hoses (2).



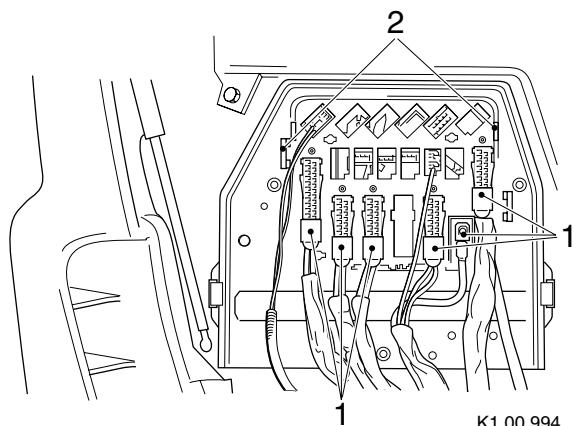
K1 01 175

11. Fit the filter casing (2). Secure the filter casing using the attachment bolts (1).



K1 01 194

12. Fit the plate for the connectors via the inside and press it into the retainers (2).
13. Fit the connectors (1).
14. Fit the cover plate.



K1 00 994

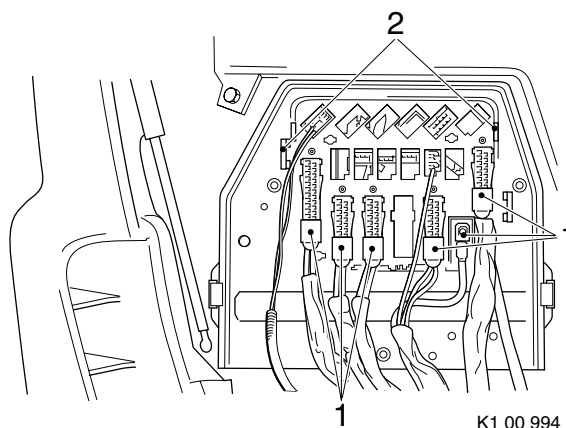
INTERNAL CAB COMPONENTS

1

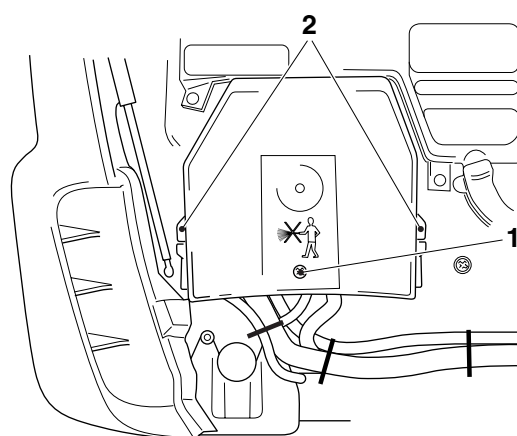
Removal and installation

LF45/55 series

15. Fit the connecting block via the inside and press it firmly into the retainers (2).
16. Fit the connectors (1) to the connecting block. Pay attention to the markings on the components.



17. Fit the protective cover to the cab lead through and secure it using the attachment bolt (1).



18. Close the grille.
19. Fit the attachment bolts under the dashboard to the left and right.
20. Secure the attachment bolts in the window frame.
21. Fit the dashboard panels on co-driver's side.
22. Fit the steering column dashboard panels.
23. Fit the connector of the 12V power supply to the engine tunnel cover panel.
24. Fit the cover panel to the engine tunnel.
25. Fit the earth lead to the battery terminal.

1

INTERNAL CAB COMPONENTS

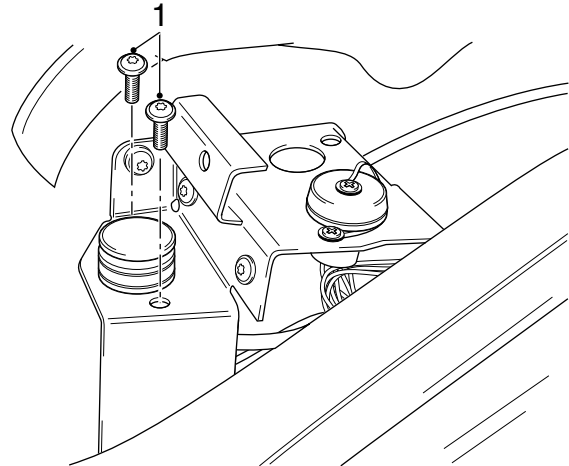
LF45/55 series

Removal and installation

4.4 REMOVAL AND INSTALLATION, PNEUMATIC SWITCH/VALVE OF STEERING COLUMN ADJUSTMENT UNIT

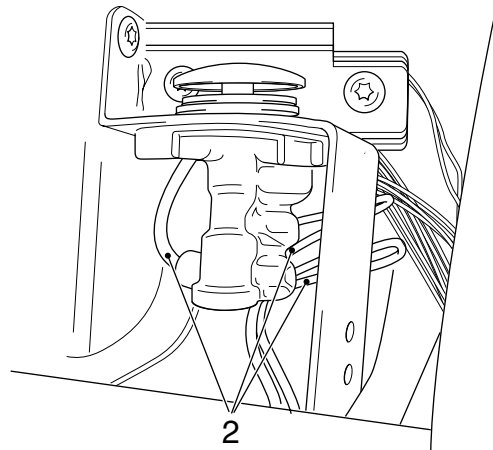
Removing the pneumatic switch/valve of the steering column adjustment unit

1. Lay the floor mat aside.
2. Remove the attachment bolts (1) from the switch/valve.



K1 01 120

3. Remove the bracket holding the switch/valve. Disconnect the air pipes (2) and remove the switch/valve.



K1 01 121

2

INTERNAL CAB COMPONENTS

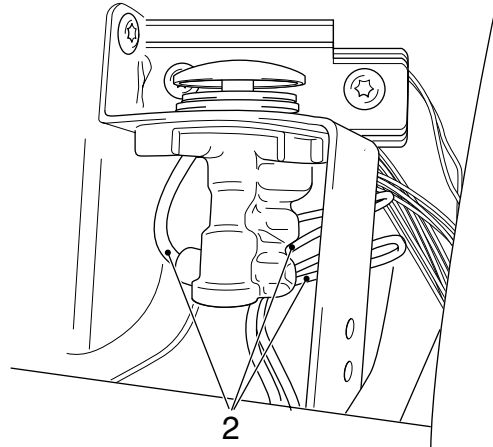
1

Removal and installation

LF45/55 series

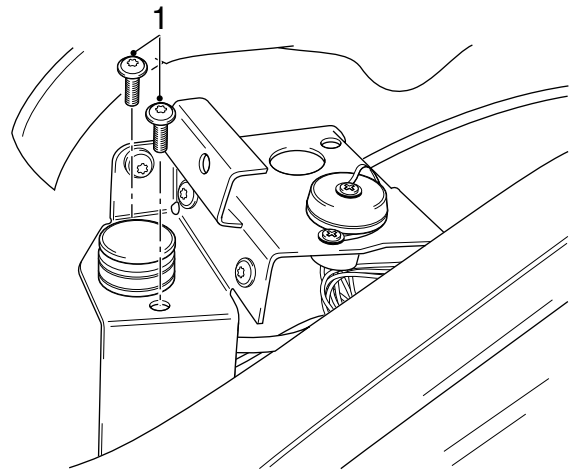
Fitting the pneumatic switch/valve

1. Fit the air pipes (2) to the switch/valve.



K1 01 121

2. Fit the switch/valve and secure them using the attachment bolts (1).



K1 01 120

3. Check the operation of the switch/valve, see chapter "Inspection and Adjustment".
4. Reposition the floor mat.

2

4.5 REMOVAL AND INSTALLATION, STEERING COLUMN

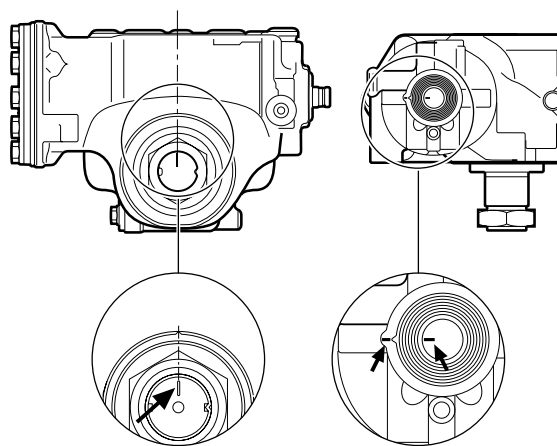
Note:

A steering wheel with an airbag can be recognised by the inscription "airbag" on the cover plate and the "Airbag" sticker on the windscreen.

Steering wheel model without airbag

Removing the steering column without airbag steering wheel

1. Place the steering box in the central position using the marks.



S7 00 623

2. Remove the steering column panel.
3. Depending on the work to be carried out, remove the floor dust cover or the cover panels beneath the steering wheel.
4. If applicable, remove the steering column adjustment air pipe.
5. Remove the connectors from the steering column.
6. Remove the attachment bolt of one universal joint of the steering shaft (depending on the operations to be performed; either the universal joint beneath the steering wheel or the universal joint on the steering box). Before loosening, mark the position of the universal joint versus the steering shaft.
7. Remove the attachment bolts. One of the attachment bolts is a security bolt. Remove this using a drift.
8. Remove the steering column.

INTERNAL CAB COMPONENTS

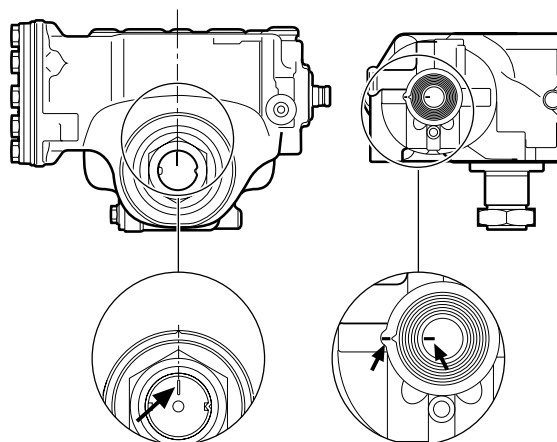
1

Removal and installation

LF45/55 series

Installing the steering column without airbag steering wheel

1. Check whether the steering box is still in the central position, using the markings.



S7 00 623

2. Fit the steering column to the steering shaft and make sure that the marks between the universal joint and steering shaft align. Fit a new attachment bolt with nut in the universal joint. Tighten the attachment bolt to the specified torque, see main group "Technical data".
3. Place the steering column by tightening the top attachment bolts by hand.
4. Attach the air pipes to the connection block behind the dashboard. Check to see that the air pipes are not in contact with any moving parts.
5. Fit the steering column connectors.
6. Fit the lower attachment bolts and lock the steering column.
7. Fit the steering column panel and secure it with the attachment bolts and panel clips.

2

1

INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

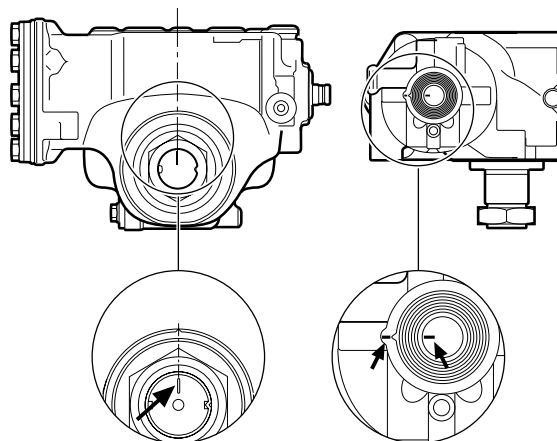
Steering wheel model with airbag



Observe the warnings and safety instructions applicable to working on an airbag system.

Removing the steering column with airbag steering wheel

1. Remove the airbag module.
2. Place the steering box in the central position using the marks.



S7 00 623

3. Remove the panel under the tachograph.



There must at least be 5 minutes waiting time between disconnecting the battery leads and loosening the airbag connector. Non-observance of the 5 minutes waiting time may result in the airbag being activated when the connector is removed.

4. Remove the steering column panel.
5. Depending on the work to be carried out, remove the floor dust cover or the cover panels under the steering wheel.
6. If applicable, remove the steering column adjustment air pipe.
7. Remove the connectors from the steering column.

2

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

8. Remove the attachment bolt of one universal joint of the steering shaft (depending on the operations to be performed; either the universal joint under the steering wheel or the universal joint on the steering box). Before loosening, mark the position of the universal joint versus the steering shaft.
9. Lock the steering wheel to prevent it from turning, using, for example, adhesive tape



If the steering wheel is rotated more than 3 turns to the left or right from the centre position, the airbag contact unit will get damaged.

10. Remove the attachment bolts. One of the attachment bolts is a security bolt. Remove this using a drift.
11. Remove the steering column.

2

1

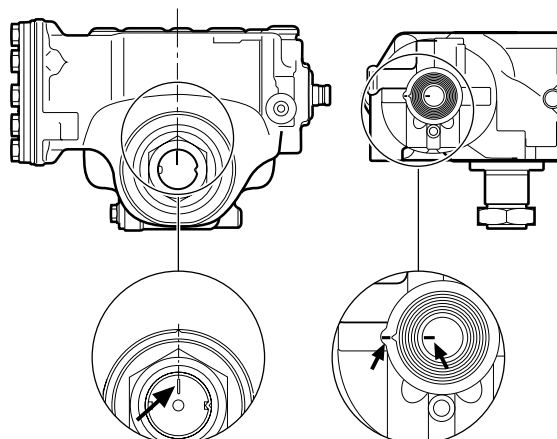
INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

Installing the steering column with airbag steering wheel

1. Check that the steering box is still in the central position, using the marks.



2

S7 00 623

2. Fit the steering column to the steering shaft and make sure that the marks between the universal joint and steering shaft align. Fit a new attachment bolt with nut in the universal joint. Tighten the attachment bolt to the specified torque, see main group "Technical data".
3. Place the steering column by tightening the top attachment bolts by hand.
4. Attach the air pipes to the connection block behind the dashboard. Check to see that the air pipes are not in contact with any moving parts.
5. Fit the steering column connectors.
6. Fit the lower attachment bolts and lock the steering column.
7. Fit the steering column panel and secure it with the attachment bolts and panel clips.
8. Fit the panel.
9. Fit the airbag module.

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

4.6 REMOVAL AND INSTALLATION, STEERING WHEEL

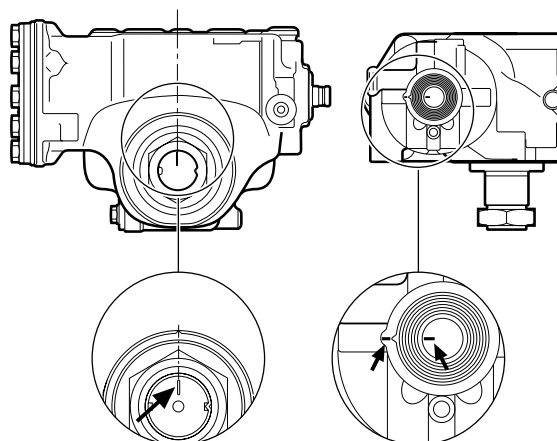
Note:

A steering wheel with an airbag can be recognised by the inscription "Airbag" on the cover plate and the "Airbag" sticker on the windscreen.

Steering wheel without airbag

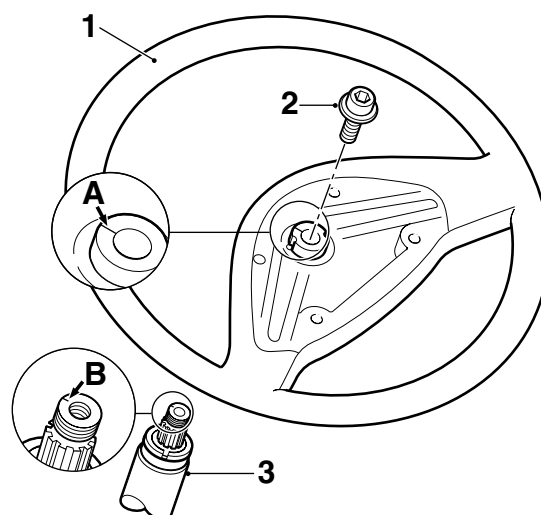
Removing the steering wheel without airbag

1. Check that the steering wheel is not equipped with an airbag.
2. Place the steering box in the central position using the marks.



S7 00 623

3. Remove the cover plate from the steering wheel.
4. Remove the steering wheel bolt (2).
5. Make marks (A and B) on the steering wheel (1) and the steering shaft (3).



K1 01 321

2

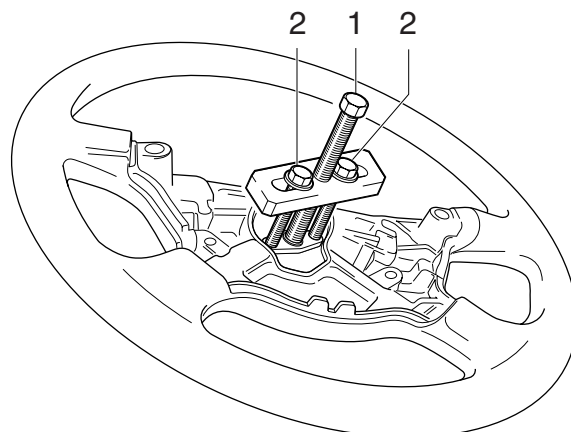
1

INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

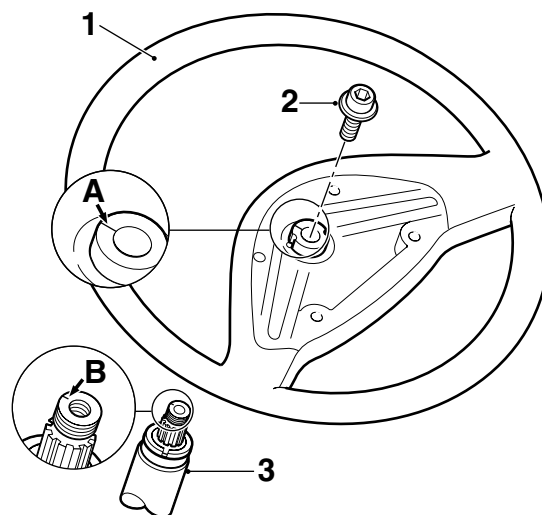
6. Fit the steering wheel puller (DAF no. 1451995) on the steering wheel.
7. Make sure the bottom of the spindle (1) is level with the bottom of the attachment bolts (2).
8. Turn the spindle (1) approximately 10 mm into the steering shaft.
9. Turn both attachment bolts (2) approximately 10 mm into the steering wheel.
10. Evenly tighten both attachment bolts (2) alternately until the steering wheel comes loose.



K1 01 324

Fitting the steering wheel without airbag

1. Fit the steering wheel (1) on the steering shaft (3) so that the markings on the steering wheel and steering shaft (A and B) "align". Ensure that the ridges on the rear of the steering wheel fall into the recesses. Check that the steering box is still in the central position, if a new steering wheel is fitted.
2. Fit the attachment bolt (2). Tighten the attachment bolt to the specified torque, see main group "Technical data".
3. Fit the cover plate on the steering wheel.



K1 01 321

2

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

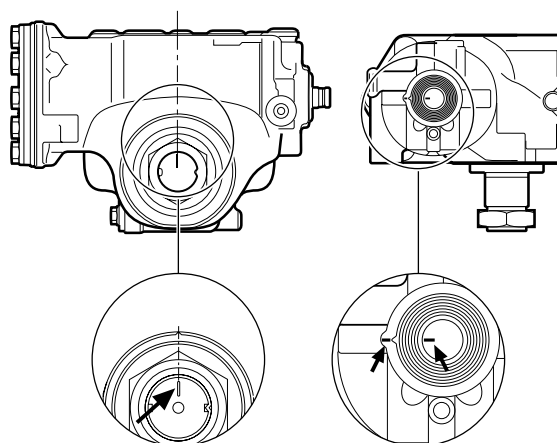
Steering wheel with airbag



Observe the warnings and safety instructions applicable to working on an airbag system.

Removing the steering wheel with airbag

1. Disconnect the earth leads from the battery.
2. Place the steering box in the central position using the marks.



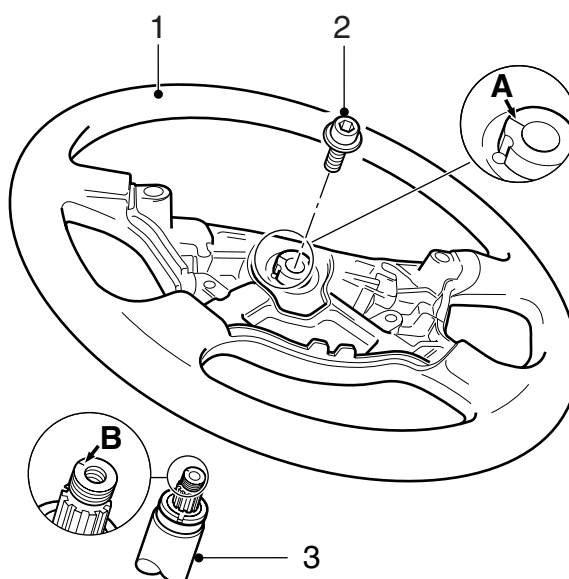
S7 00 623

3. Remove the covers from the steering column.



There must at least be 5 minutes waiting time between disconnecting the battery leads and loosening the airbag connector. Non-observance of the 5 minutes waiting time may result in the airbag being activated when the connector is removed.

4. Remove the steering wheel bolt (2).
5. Make marks (A and B) on the steering wheel (1) and the steering shaft (3).



K1 01 505

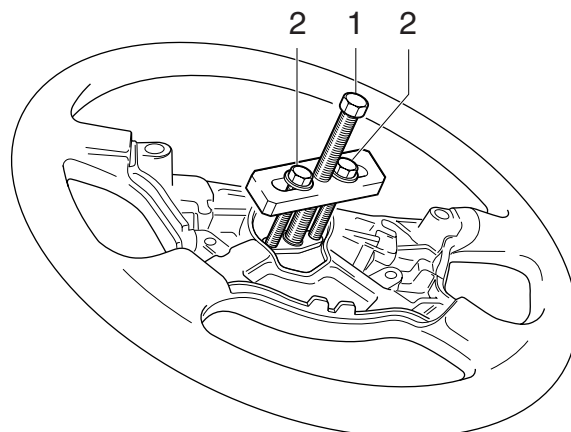
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INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

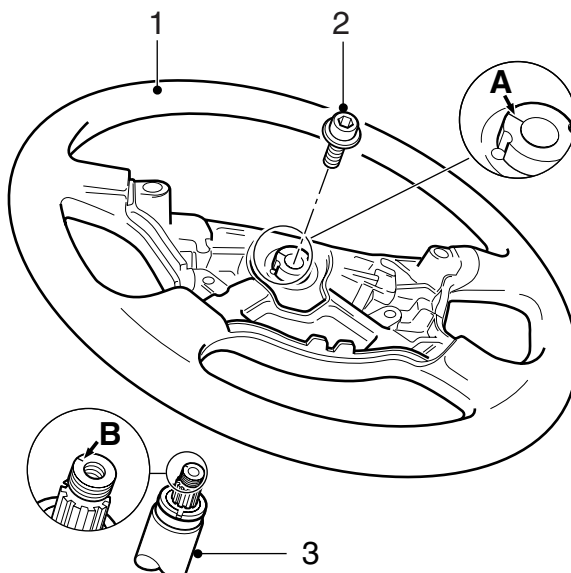
6. Fit the steering wheel puller (DAF no. 1451995) on the steering wheel.
7. Make sure the bottom of the spindle (1) is level with the bottom of the attachment bolts (2).
8. Turn the spindle (1) approximately 10 mm into the steering shaft.
9. Turn both attachment bolts (2) approximately 10 mm into the steering wheel.
10. Evenly tighten both attachment bolts (2) alternately until the steering wheel comes loose.



K1 01 324

Fitting the steering wheel with airbag

1. Fit the steering wheel (1) on the steering shaft (3) so that the markings on the steering wheel and steering shaft (A and B) "align". Ensure that the ridges on the rear of the steering wheel fall into the recesses. Check that the steering box is still in the central position, if a new steering wheel is fitted.
2. Fit the attachment bolt (2). Tighten the attachment bolt to the specified torque, see main group "Technical data".
3. Fit the airbag module.
4. Fit the steering column covers.



K1 01 505

2

INTERNAL CAB COMPONENTS

1

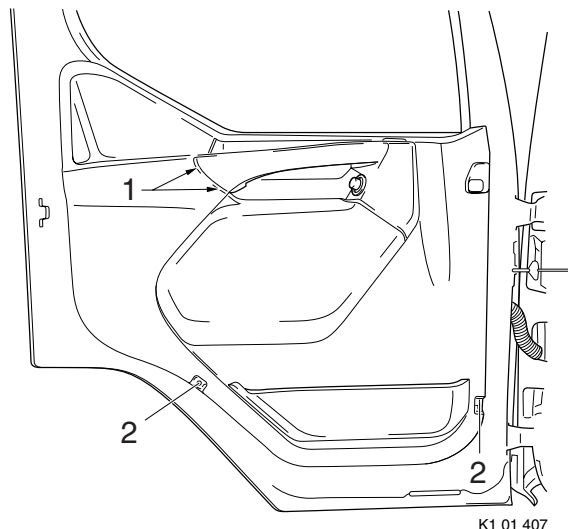
Removal and installation

LF45/55 series

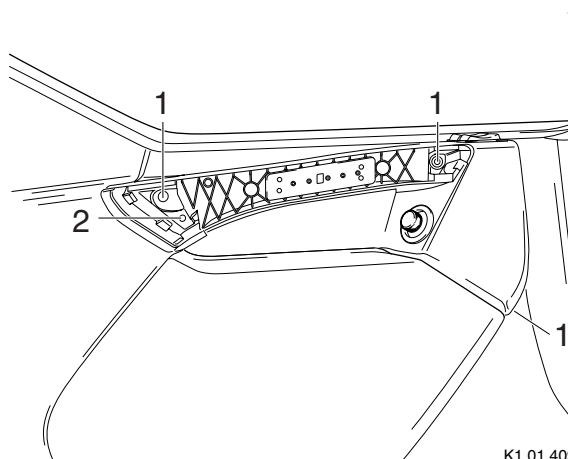
4.7 REMOVAL AND INSTALLATION, DOOR PANEL

Removing the door panel

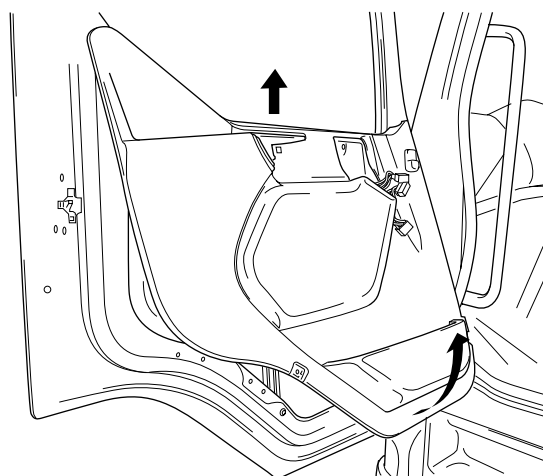
1. Loosen the cap from the grip by pushing a screwdriver into the recesses (1).
2. Remove the cap from the grip.
3. Remove the caps (2) at the bottom of the door.
4. Remove the attachment bolts from the door.



5. Remove the attachment bolts (1) from the grip.
6. Disconnect the electric window and mirror connectors at the inside of the grip.
7. Push the grip down as far as it will go.
8. Push the control cable clip (2) out of the grip.
9. Remove the control cable from the door knob. Put the grip aside.



10. Pull the door panel out of the mounting clips in the door, starting at the bottom.
11. Lift the door panel out of the window frame.



2

1

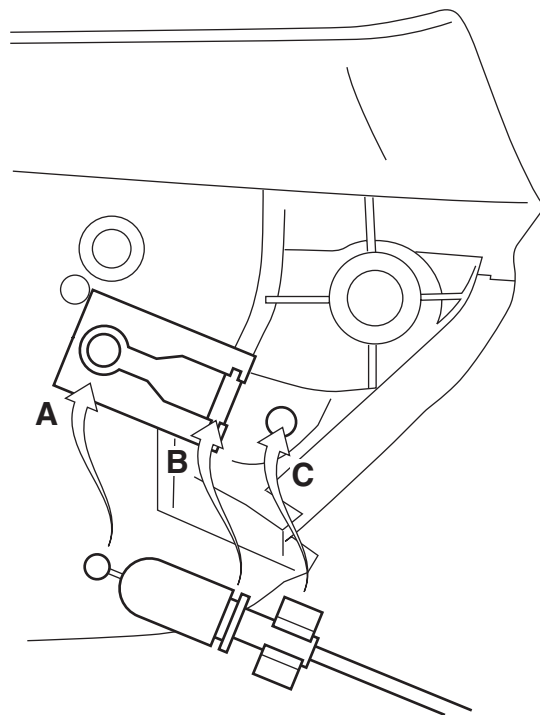
INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

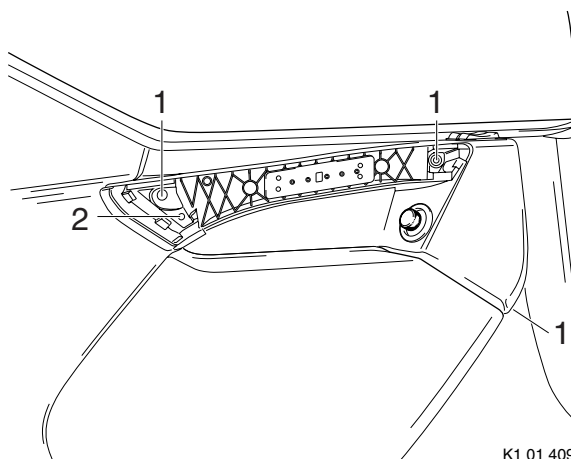
Installing the door panel

1. Fit the door panel into the upper part of the window frame.
2. Press the door panel all around into the door using the mounting clips.
3. Secure the lower part of the door panel using the attachment bolts and fit the caps.
4. Position the grip on the door panel.
5. Fit the nipple of the control cable in the door catch of the grip (A). Fit the coupler into the grip (B).
6. Secure the control cable coupler into the grip (C) using the mounting clip.



K1 01 441

7. Fit the automatic mirror and window connectors into the grip.
8. Fix the grip to the door using the attachment bolts (1).
9. Fit the grip cap.



K1 01 409

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INTERNAL CAB COMPONENTS

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Removal and installation

LF45/55 series

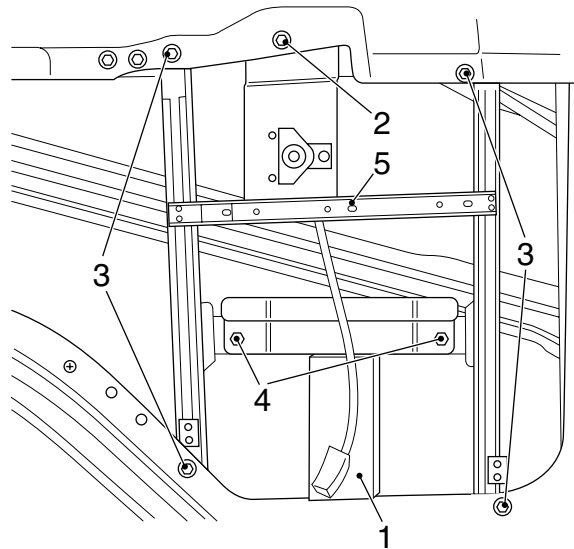
4.8 REMOVAL AND INSTALLATION, MANUALLY OPERATED WINDOW MECHANISM

Removing the manually operated window mechanism

1. Remove the door panel.
2. Remove the door screen.
3. Support the door window using a block (1) and remove the attachment bolts (4). Remove the window on the underside so that it is no longer locked in position.
4. Remove the attachment bolts (3) and the attachment nut (2) from the window mechanism.
5. Tilt the window mechanism (5) and remove it through the bottom of the door.

Installing manually operated window mechanism

1. Fit the window mechanism (5) through the bottom of the door.
2. Remove the block (1) and hook up the door window in the window mechanism. Secure the door window with the attachment bolts (4).
3. Secure the window mechanism with the attachment bolts (3) and nut.
4. Close the door window until nearly shut. Check that the top edge of the window is parallel with the window frame. Loosen the attachment bolts (4), if necessary. Move the window to the correct position and re-tighten the attachment bolts.
5. Fit the door screen.
6. Install the door panel.



K1 00 977

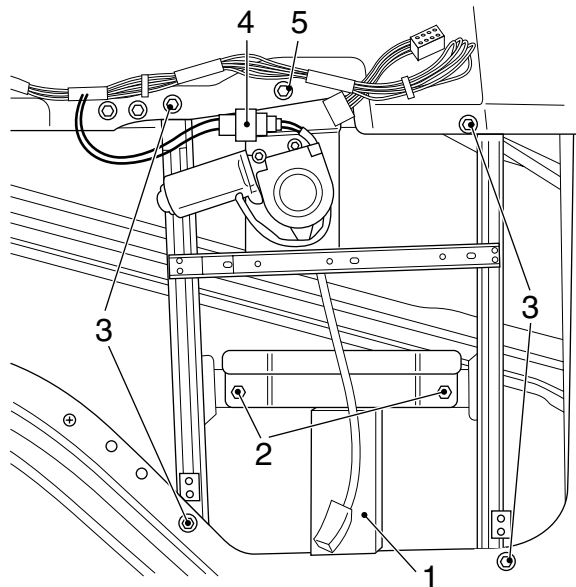
4.9 REMOVAL AND INSTALLATION, ELECTRICALLY OPERATED WINDOW MECHANISM

Removing the electrically operated window mechanism

1. Remove the door panel.
2. Remove the door screen.
3. Lower the window, remove the attachment bolts (2) and slide the window up. Support the window with a block (1).
4. Disconnect the connector (4) from the electric motor.
5. Remove the attachment bolts (2) and nuts (3) and remove the window mechanism from the door through the opening.

Installing the electrically operated window mechanism

1. Fit the window mechanism in the door and fit the attachment bolts (2) and attachment nuts (3).
2. Connect the electric motor connector (4).
3. Lower the window and attach the window mechanism to the door using the attachment bolts (2).
4. Operate the window switch.
Close the window until nearly shut.
Check that the top edge of the window is parallel with the window frame.
Loosen the attachment bolts (2), if necessary.
Move the window to the correct position and re-tighten the attachment bolts.
5. Fit the door screen.
6. Install the door panel.



K1 00 974

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

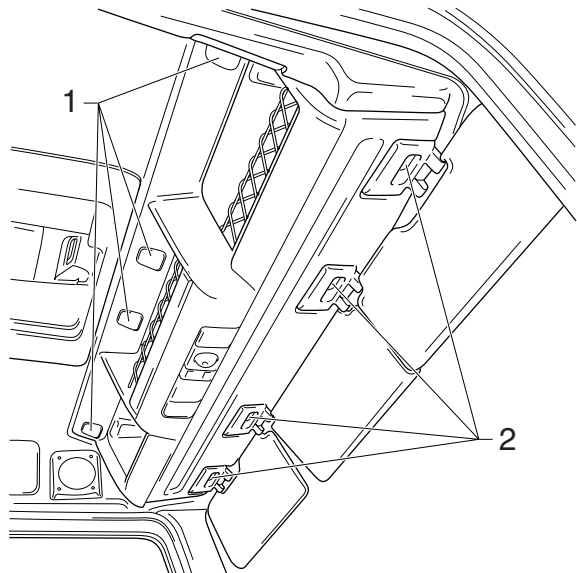
4.10 REMOVAL AND INSTALLATION, ROOF CONSOLE

Removing the roof console

1. Remove the top lighting attachment bolts from the outside of the vehicle and put the lighting aside.
2. Remove the top lighting connector.
3. Remove the wiring covers in the roof console.
4. Remove the interior lighting connector.
5. Remove the loudspeaker and its connector.
6. Remove the wiring harness from the roof console.
7. Remove the attachment bolts (2) from the roof console in the window frame.
8. Remove the covers (1) at the front and remove the attachments bolts behind these covers.
9. Remove the roof console.

Installing the roof console

1. Put the roof console in place and position it using a few attachment bolts.
2. Place the attachment bolts at the front of the roof console and tighten them.
3. Fit the connectors for the interior lighting, loudspeaker and top lighting.
4. Fit the attachment bolts (2) in the window frame.
5. Secure the top lighting with the attachment bolts.
6. Fit the covers (1).

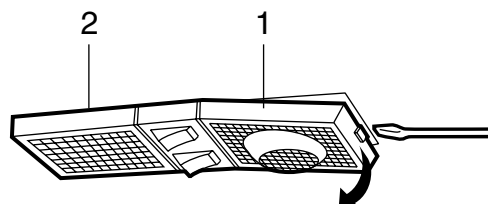


K1 01 123

4.11 REMOVAL AND INSTALLATION, INTERIOR LIGHTING

Removing the interior ceiling lighting

1. Put a screwdriver between the glass cover (1) and the holder (2).
2. Remove the glass cover (1).

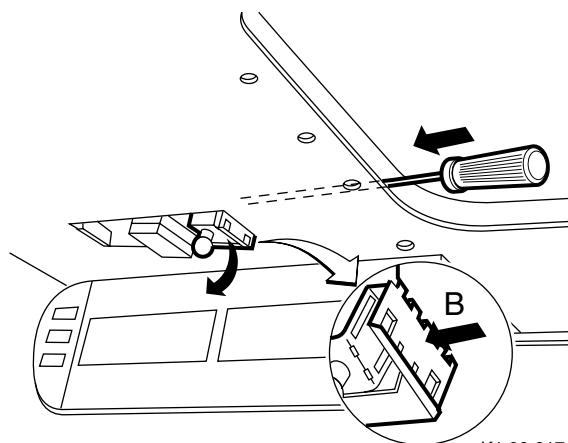


K1 01 169

3. Bend the lock levers (B) inwards.
4. Unplug the connectors and remove the lamp holder.

Fitting the interior ceiling lighting

1. Bend the lock levers (B) outwards.
2. Hook up the connectors and fit the lamp holder (2).
3. Fit the glass cover (1).



K1 00 617

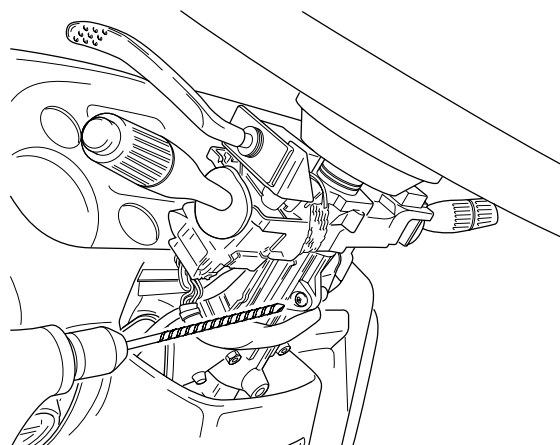
4.12 REMOVAL AND INSTALLATION, IGNITION LOCK

Removing the ignition lock

1. Remove the covers around the steering column under the steering wheel.
2. Disconnect the connectors (behind the dashboard).
3. Drill off the head of the security bolt, use a bit with the same diameter as the hole where the head falls and remove the ignition lock.

Installing the ignition lock

1. Install the ignition lock.
2. Tighten the security bolts with such a tightening torque that the heads break off.
3. Fit the covers around the steering column.



K1 01 134

INTERNAL CAB COMPONENTS

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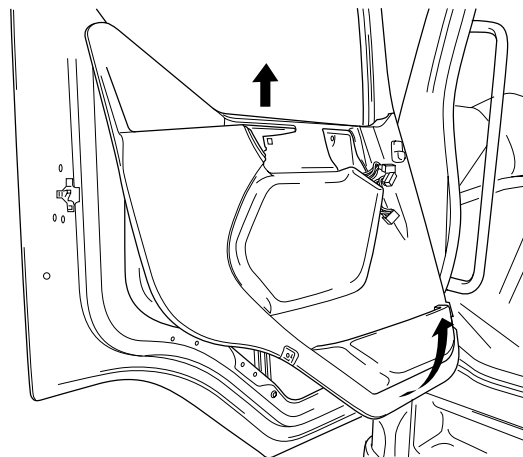
Removal and installation

LF45/55 series

4.13 REMOVAL AND INSTALLATION, COMPLETE DOOR LOCK MECHANISM

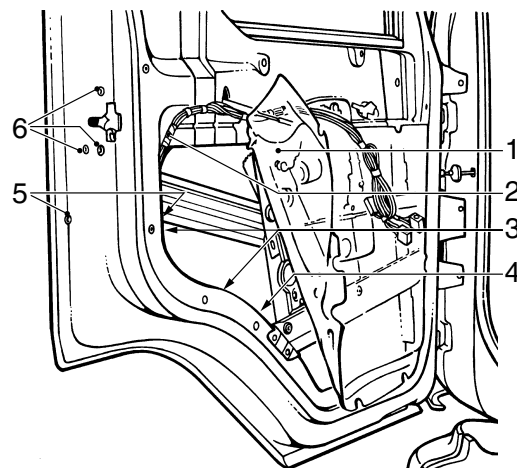
Removing the complete door lock mechanism

1. Close the window.
2. Remove the door panel.

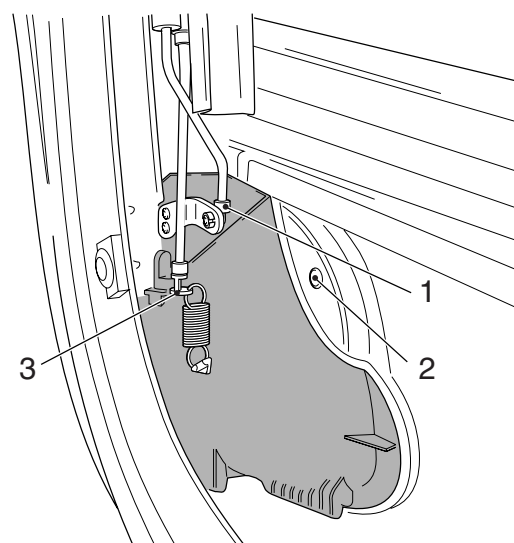


K1 01 408

3. Gently remove the plastic screen (1) from the door.
4. Remove the attachment bolts (6) from the closing mechanism.
5. Remove the attachment bolts (5) from the door lock mechanism.
6. Remove the plug (4) from the central door locking mechanism.
7. Remove the clamping strips (3) holding in place the main wiring harness (2) and the wiring harness of the central door locking mechanism.
8. Lay the main wiring harness (2) aside
9. Remove the control rod by loosening the control rod locking (1) through tilting and unhooking the control rod from the locking.
10. Unhook the door lock mechanism from the door and allow it to be lowered together with the door locking
11. Remove the attachment bolts (3) from the door lock mechanism.



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K1 01 124

2

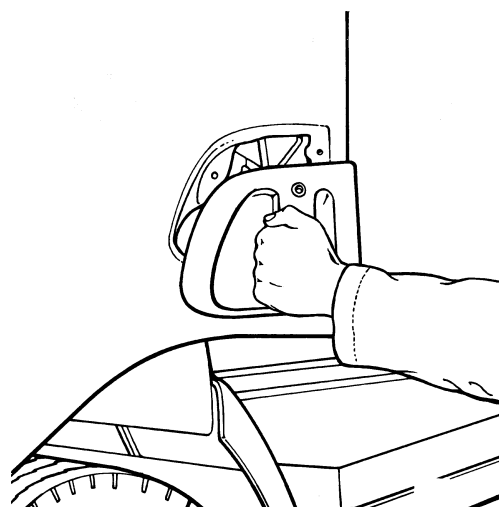
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INTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

12. Remove the complete door lock mechanism from the outside.
13. Remove the closing mechanism together with the motor of the central door locking from the inside of the door.

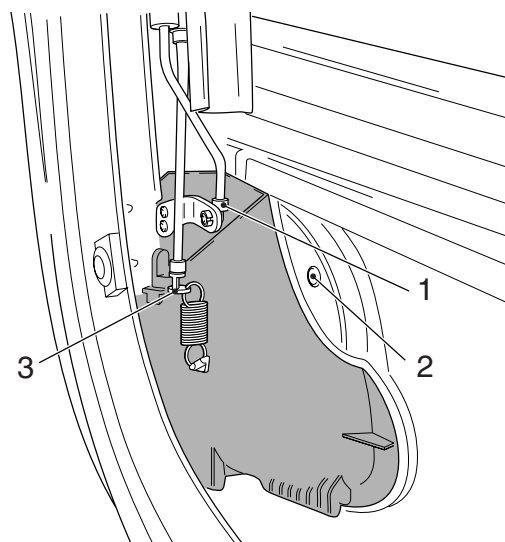


K1 01 171

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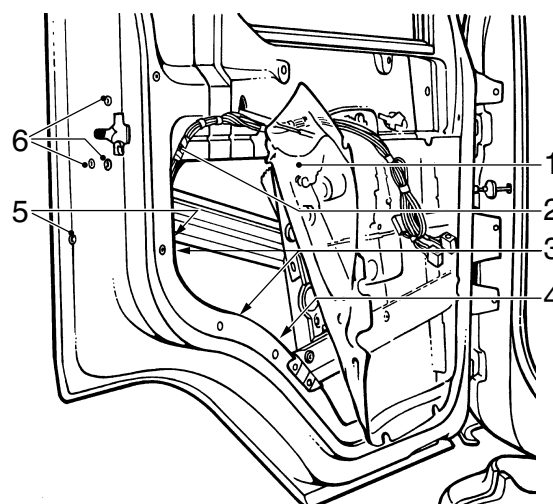
Fitting the complete door lock mechanism

1. Fit the closing mechanism in the door.
2. Hook the control cable (3) in the door lock mechanism.
3. Position the door lock mechanism in the door.
4. Hook the control rod in the locking (1) of the operating lever. Lock the control rod by clicking the locking (1) in place over the control rod.



K1 01 124

5. Fit the attachment bolts (6) of the closing mechanism.
6. Fit the attachment bolts (5) of the door lock mechanism.
7. Fit the plug (4).
8. Secure the main wiring harness (2), the wiring harness of the central door locking and the plug (4) to the threaded ends at the inside of the door, using clamping strips.
9. Fit the door screen (1).
10. Install the door panel.



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INTERNAL CAB COMPONENTS

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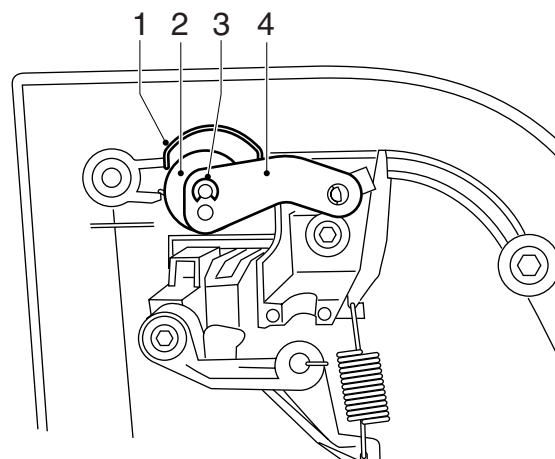
Removal and installation

LF45/55 series

4.14 REMOVAL AND INSTALLATION, DOOR LOCK CYLINDER

Removing the door lock cylinder

1. Remove the complete door lock mechanism.
2. Remove the circlip (3).
3. Detach the operating lever (4).
4. Loosen the locking spring (1) and remove the door lock cylinder (2).



K1 01 440

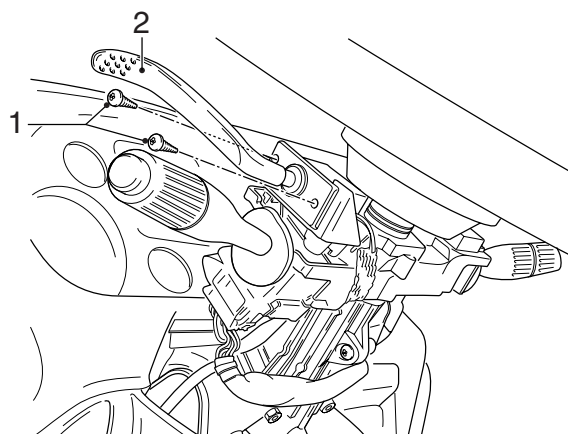
Fitting the door lock cylinder

1. Fit the door lock cylinder (2). Fit the locking spring (1).
2. Fit the operating lever (4).
3. Fit the locking ring (3).
4. Fit the complete door lock mechanism.

4.15 REMOVAL AND INSTALLATION, ENGINE BRAKE SWITCH

Removing the engine brake switch

1. Remove the covers from the steering column.
2. Remove the engine brake switch connector from the connector holder next to the steering column.
3. Remove the attachment bolts (1) from the engine brake switch.
4. Remove the engine brake switch (2).



K1 01 164

Installing the engine brake switch

1. Fit the engine brake switch (2).
2. Secure the attachment bolts (1).
3. Fit the connector.
4. Fit the steering column covers.

2

4.16 REMOVAL AND INSTALLATION, REAR WALL LINING

Removing the rear wall lining

Note:

When working on the upholstery make sure hands are clean or wear gloves.

1. Remove the panel clips on the rear wall of the cab.
2. If applicable, remove the thermostat and clock from their casing using a small screwdriver.
3. Remove the rear wall supports.
4. Remove the (entrance) grip.
5. Remove the rear wall lining. Pay attention to the connectors for the cab heater sensor and lighting.

Installing the rear wall lining

1. Fit the rear wall using the panel clips. Pay attention to the connectors for the cab heater sensor and lighting.
2. Fit the (entrance) grip.
3. Fit the supports to the rear wall.
4. Fit the thermostat and clock if applicable.

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

4.17 REMOVAL AND INSTALLATION, ROOF LINING

Removing the roof lining

1. Remove the dashboard.
2. Remove the steering wheel.

Note:

When working on the upholstery make sure hands are clean or wear gloves.

3. Remove the roof console.
4. Remove the rear window cover, if applicable.
5. Remove the panel clips from the roof lining.
6. Remove the cover panels from the A-pillar.
7. Partially remove the door rubbers.
8. Remove the entrance grips if the vehicle has a sleeper cab.
9. Remove the connectors from the roof console lighting.

Installing the roof lining

1. Fit the roof lining from the co-driver's side.
2. Fit the lighting connectors. Fit the roof console.
3. Fit the entrance grips.
4. Fit the door rubbers.
5. Fit the panel clips.
6. Fit the rear window cover.
7. Fit the cover panels in the A-pillar.
8. Fit the steering wheel.
9. Fit the dashboard.

2

4.18 REMOVAL AND INSTALLATION, SIDE WALL LINING

Removing the side wall lining

Note:

When working on the upholstery make sure hands are clean or wear gloves.

1. Remove the caps from the door pillar.
2. Remove the steel plates that are fixed to the rear wall.
3. If the vehicle has a sleeper cab, the storage trays under the bed need to be removed.
4. Remove the panel clips and the side wall lining.

Installing the side wall lining

1. Fit the side wall lining using the panel clips.
2. If applicable, fit the storage trays.
3. Fit the steel panels to the side walls.
4. Fit the covers in the door pillar.

4.19 REMOVAL AND INSTALLATION, STORAGE TRAYS (SLEEPER CAB)

Removing the storage trays

1. Remove the wooden bed base.
2. Remove the rear wall panel and the side panels.
3. Remove the attachment bolts in the bottom of the storage trays.
4. Remove the storage tray.

Installing the storage trays

1. Put the storage trays in place.
2. Fit the attachment bolts in the bottom of the storage trays.
3. Fit the rear wall panels and the side panels.
4. Fit the wooden cover.

INTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

2

CONTENTS

	Page	Date
1. SAFETY INSTRUCTIONS	1-1	0210
2. GENERAL	2-1	0210
2.1 System description of heater, heater control	2-1	0210
3. REMOVAL AND INSTALLATION	3-1	0210
3.1 Removal and installation, interior filter	3-1	0210
3.2 Removal and installation, heater unit	3-2	0210
3.3 Removal and installation, heater control panel	3-8	0210
3.4 Removal and installation, heater motor	3-10	0210
3.5 Removal and installation, series resistor	3-13	0210
3.6 Removal and installation, heater radiator	3-15	0210

CAB HEATING

1

Contents

LF45/55 series

3

1. SAFETY INSTRUCTIONS



The air conditioning system may only be opened and filled by a specialist. Furthermore, many countries require official certification to carry out such activities.

CAB HEATING

1

Safety instructions

LF45/55 series

3

2. GENERAL

2.1 SYSTEM DESCRIPTION OF HEATER, HEATER CONTROL

The heater is installed in the central console as a complete unit.

The unit contains all control valves, control handles and switches needed for ventilation and heating.

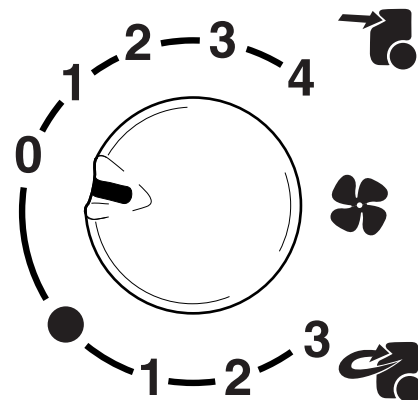
There are two models:

- heating/ventilation system
- heating/ventilation system combined with air conditioning.

The control panel has three rotary knobs.

Knob 1

Five-position switch to control fan speed.



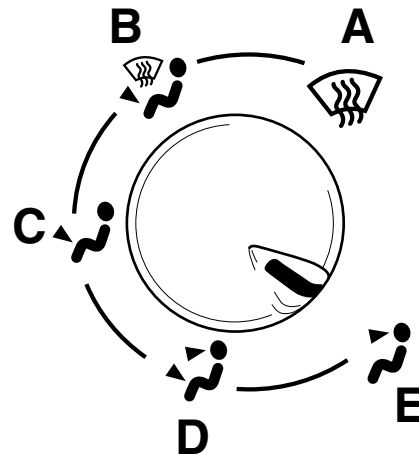
K1 01 197

Three-position switch to control fan speed with recirculation.

Knob 2

Air outlets in the cab.

- 0 = 0-position
- A = windscreen (defroster)
- B = windscreen and leg area
- C = leg area
- D = leg area and dashboard
- E = dashboard



K1 01 195

CAB HEATING

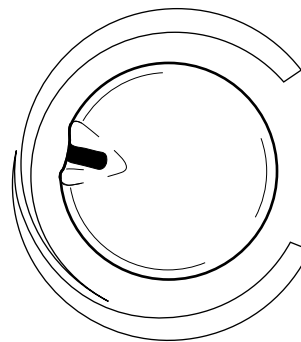
1

General

LF45/55 series

Knob 3

Temperature control: offers a continuously variable supply of hot air from 0 to 100%.



K1 01 196

3

Air distribution

Optimal air distribution in the cab can be achieved by means of knob 2 in combination with the rotating and adjustable vents on the central console and at the sides of the dashboard.

3. REMOVAL AND INSTALLATION

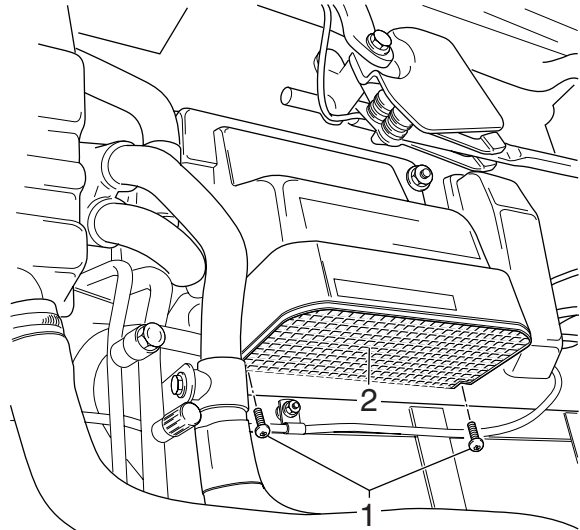
3.1 REMOVAL AND INSTALLATION, INTERIOR FILTER

Removing the interior filter

1. Open the cab grille.
2. Remove the attachment bolts (1) from the grille on the underside of the filter casing.
3. Open the grille (2) and remove the interior filter.

Installing the interior filter

1. Fit the interior filter, close the grille (2) and fit the attachment bolts (1).
2. Close the cab grille.



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CAB HEATING

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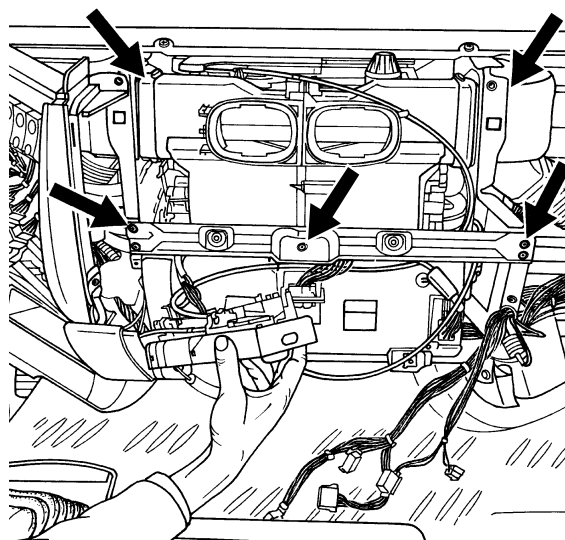
Removal and installation

LF45/55 series

3.2 REMOVAL AND INSTALLATION, HEATER UNIT

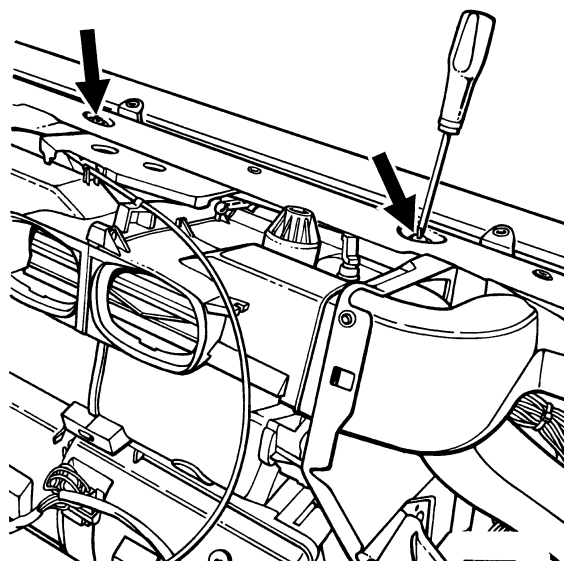
Removing the heater unit

1. Take the cover panel out of the window frame.
2. Remove all dashboard panels on the underside.
3. Remove the upper cover panel.
4. Remove the dashboard panels on the co-driver's side. Remove the garnish moulding around the instrument panel.
5. Remove the attachment bolts from the mounting plate at the front of the heater. Remove the mounting plate and the upper attachment bolts.
6. Take the heater control out of the radio panel and place it on the left-hand side of the heater.
7. Remove the heater unit connectors.
8. Remove the heater unit air ducts.



K1 00 950

9. Remove the upper attachment bolts from the heater unit.



K1 00 951

3

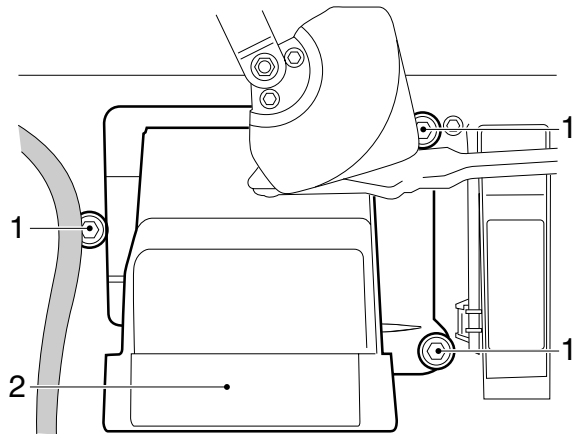
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LF45/55 series

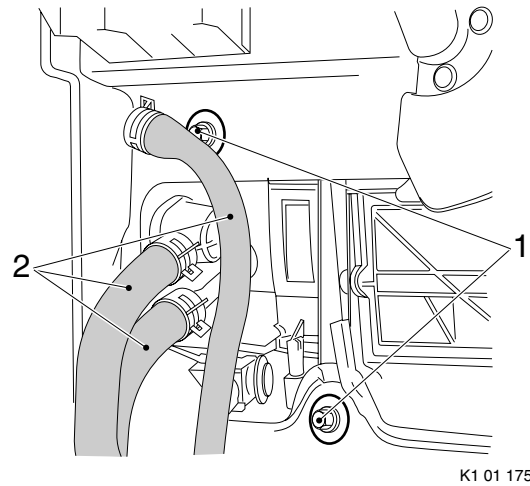
CAB HEATING

Removal and installation

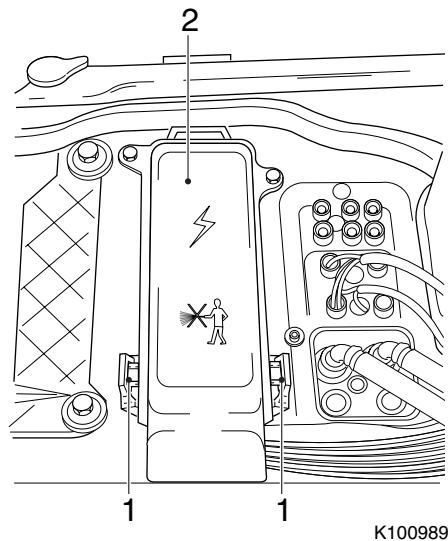
10. Remove the interior filter casing attachment bolts (1) and remove the interior filter casing (2).



11. Remove the attachment bolts from heater unit (1).
12. Partially drain the coolant.
13. Remove the heater hoses (2).



14. Remove the cover (2) at the front by pressing the retainers (1) aside.



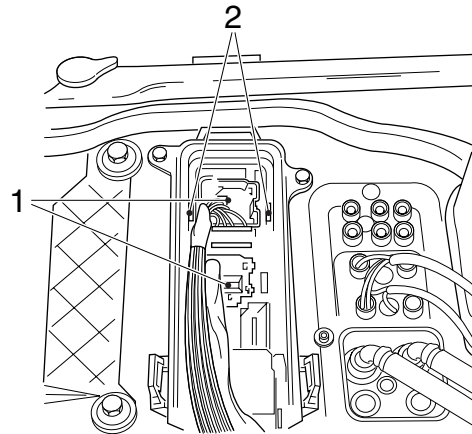
CAB HEATING

1

Removal and installation

LF45/55 series

15. Remove the connectors (1), press the retainers (2) inwards and push the holder complete with connectors inside.



K1 00 990

Note:

If the vehicle has air conditioning fitted, any work on the air conditioning must be done by a qualified person.

16. If relevant, empty the air conditioning unit.
17. Remove the air conditioning pipes.
18. Remove the coolant hoses and seal the openings on the heater unit to prevent the coolant spilling out into the cab.
19. Remove the heater unit.

1

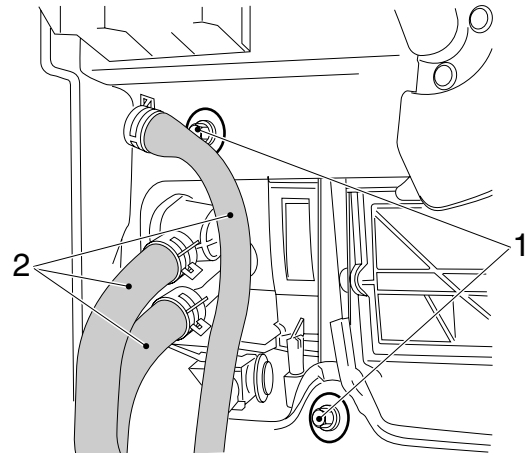
LF45/55 series

CAB HEATING

Removal and installation

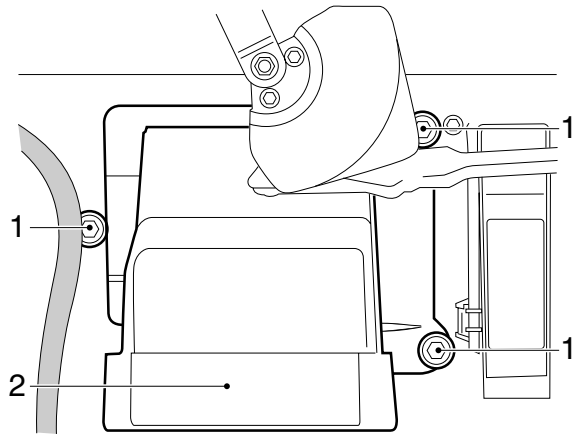
Installing the heater unit

1. Fit the heater unit. Push the holder for the connectors into the scuttle.
2. Fit the attachment bolts (1) and the heater hoses (2).



K1 01 175

3. Fit the interior filter casing (2). Secure it with the attachment bolts (1).



K1 01 194

4. Connect the air conditioning pipes.
5. Fit the heater unit air ducts.

3

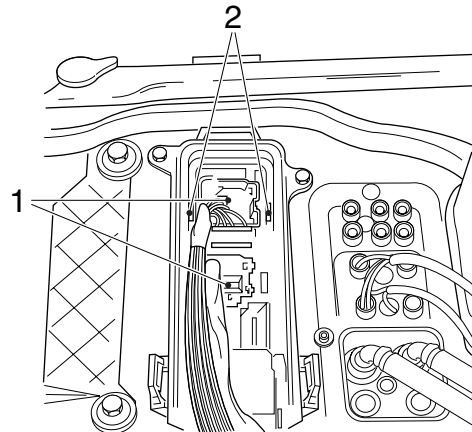
CAB HEATING

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Removal and installation

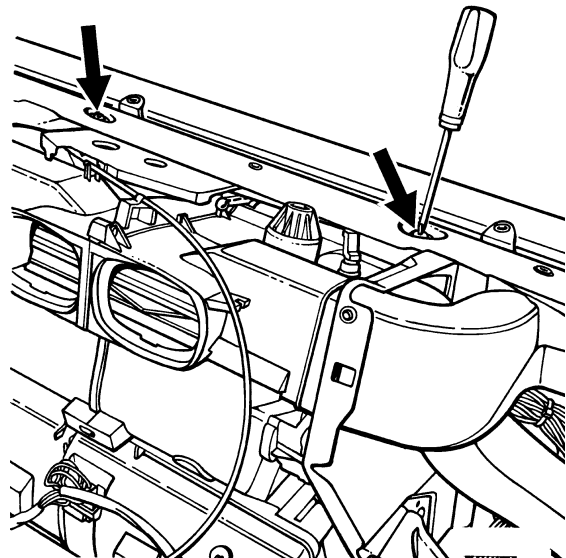
LF45/55 series

6. Fit the connector holder via the inside. Push it into the retainers (2).
7. Fit the connectors (1).



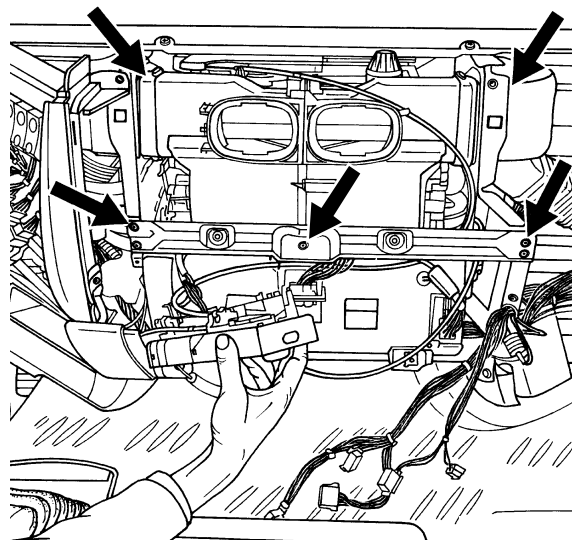
K1 00 990

8. Tighten the upper attachment bolts.



K1 00 951

9. Tighten the attachment bolts at the front.



K1 00 950

1

CAB HEATING

LF45/55 series

Removal and installation

10. Fit the heater control in the radio panel. Fit the garnish moulding around the instrument panel.
11. Re-install all removed dashboard panels.
12. Top up the cooling system.
13. Fill the air conditioning unit, if necessary.

CAB HEATING

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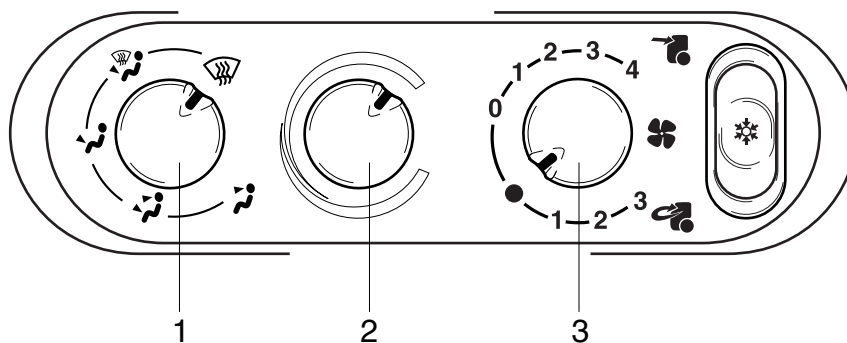
Removal and installation

LF45/55 series

3.3 REMOVAL AND INSTALLATION, HEATER CONTROL PANEL

Removing the heater control panel

1. Remove instrument panel cover panel.
2. Remove the control panel from the radio panel by pushing the right and left clips out.



K1 01 211

3. Put the selection knob (1) in the windscreen demister position. Mark the position of the cable. Remove the clip and take the cable out of the control panel.
4. Set the temperature selection knob (2) to the hottest position. Mark the position of the cable. Remove the clip and take the cable out of the control panel.
5. Set the heater motor selection knob (3) to the "stop"-position. Mark the position of the cable. Remove the clip and take the cable out of the control panel.
6. If applicable, remove the connector from the air conditioning button.
7. Remove the control panel.

1

CAB HEATING

LF45/55 series

Removal and installation

Installing the heater control panel

1. If applicable, fit the connector of the air conditioning button.
2. Fit the control cables and secure them with the clips at the appropriate markings. Make sure that the selection knobs are in the correct position.
3. Fit the control panel and push it into the retainer.
4. Fit the instrument panel cover panel and secure it with the attachment bolts.

3

CAB HEATING

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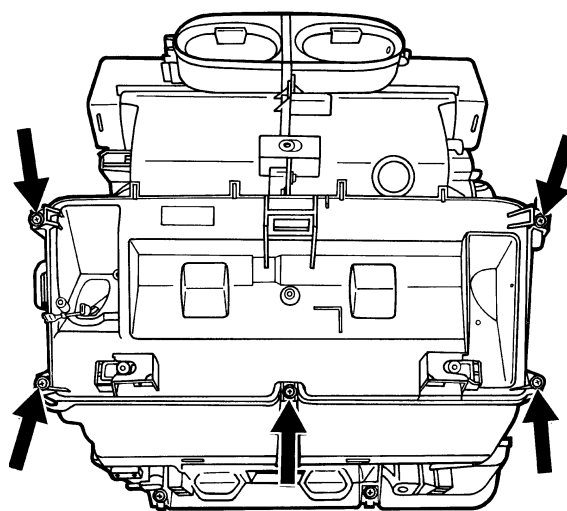
Removal and installation

LF45/55 series

3.4 REMOVAL AND INSTALLATION, HEATER MOTOR

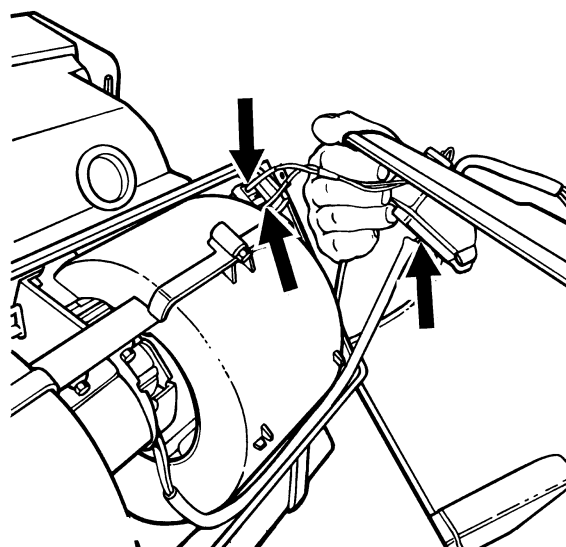
Removing the heater motor

1. Remove the fire extinguisher, if applicable.
2. Remove the dashboard panel on the engine tunnel.
3. Remove the ashtray and the ashtray holder. Take out the cigarette lighter connector and remove the ashtray lighting.
4. Remove the connectors from the heater cover.
5. Remove the cover attachment bolts and put the cover aside.



K1 00 953

6. Remove the connectors from the series resistor.
If applicable, remove the connectors from the air conditioning thermostat.



K1 00 954

7. Remove the cover.

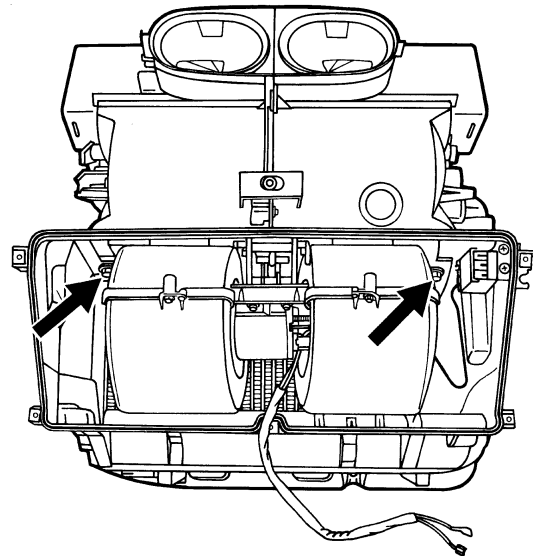
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LF45/55 series

CAB HEATING

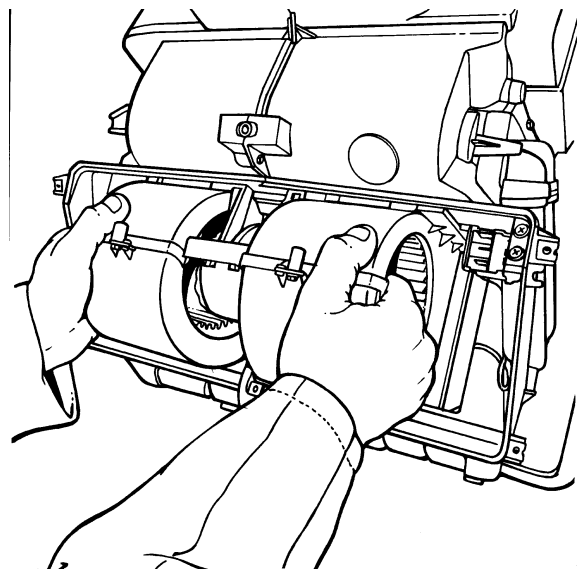
Removal and installation

8. Remove the heater motor attachment bolts.



K1 00 955

9. Remove the heater motor.



K1 00 956

Installing the heater motor

1. Install the heater motor and secure it with the attachment bolts.
2. Fit the connectors to the series resistor.

CAB HEATING

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Removal and installation

LF45/55 series

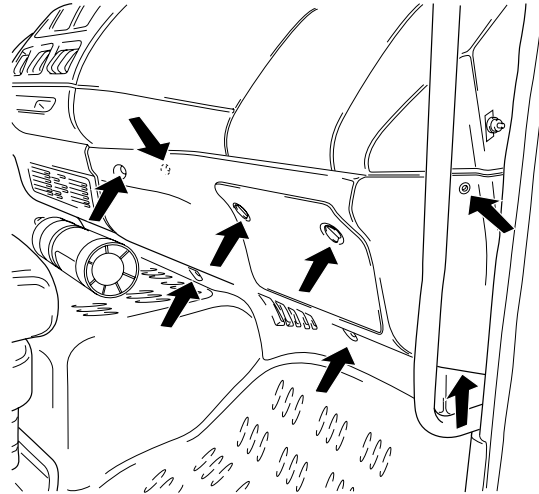
3. If applicable, fit the connectors to the air conditioning thermostat.
4. Fit the cover and secure it with the attachment screws.
5. Fit the connectors to the cover.
6. Fit the dashboard panel to the engine tunnel.

3

3.5 REMOVAL AND INSTALLATION, SERIES RESISTOR

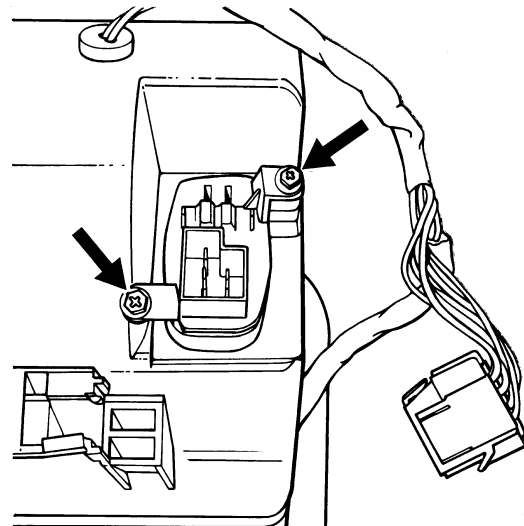
Removing the series resistor.

1. Remove the fire extinguisher, if applicable.
2. Remove the dashboard panels on the underside.

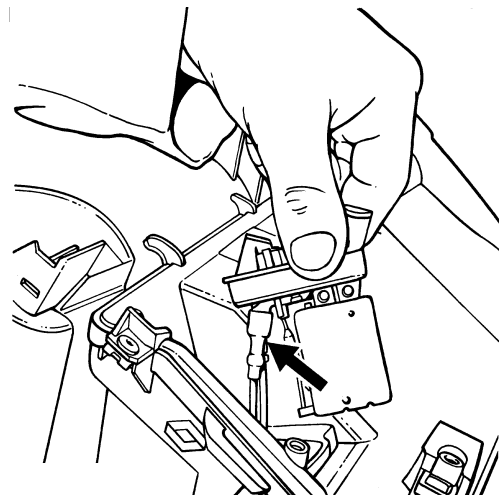


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3. Remove the attachment screws from the series resistor and remove the series resistor from the cover.



4. Detach the connectors from the series resistor and remove the series resistor.



CAB HEATING

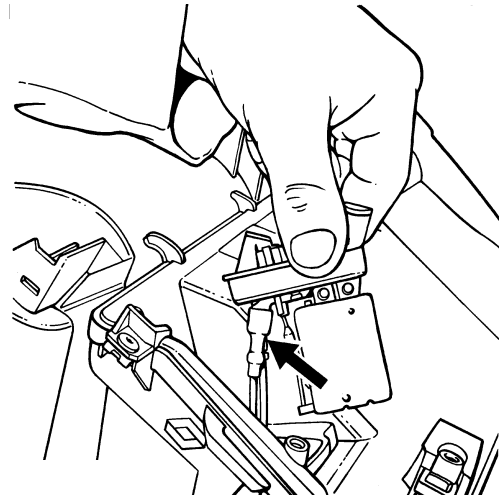
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Removal and installation

LF45/55 series

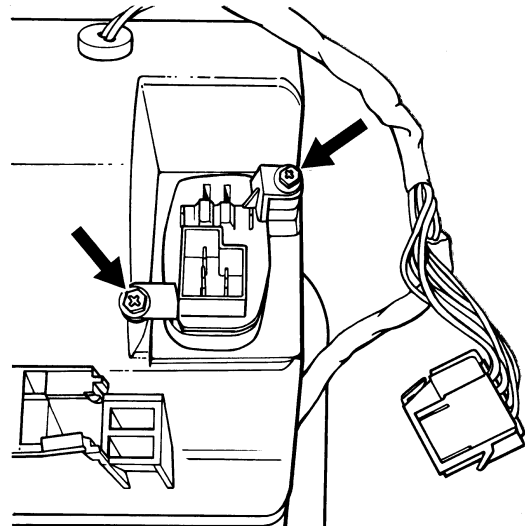
Installing the series resistor

1. Fit the connector to the series resistor.



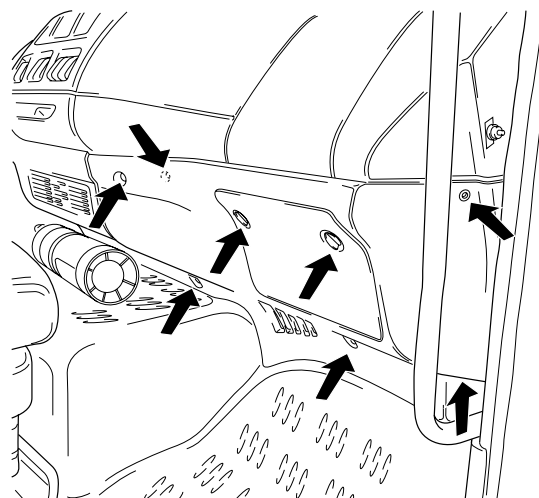
K1 00 958

2. Fit the resistor and secure it using the attachment screws.



K1 00 957

3. Fit the connector to the cover.
4. Fit the dashboard panels on the underside.

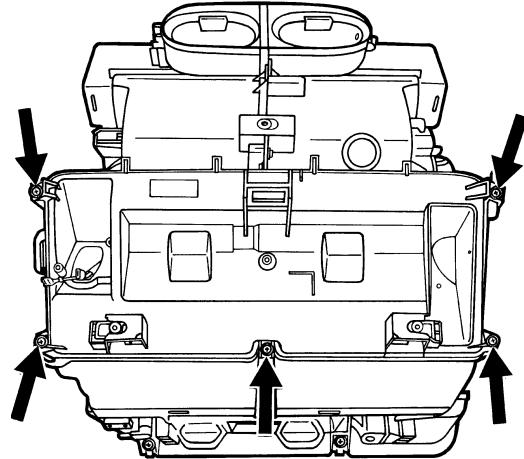


K1 01 133

3.6 REMOVAL AND INSTALLATION, HEATER RADIATOR

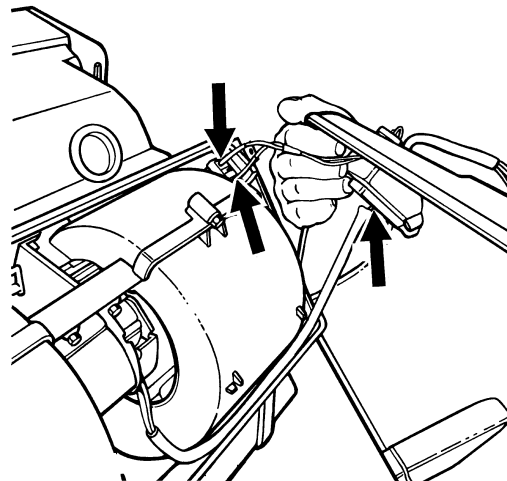
Removing the heater radiator

1. Remove the heater unit.
2. Remove the cover.



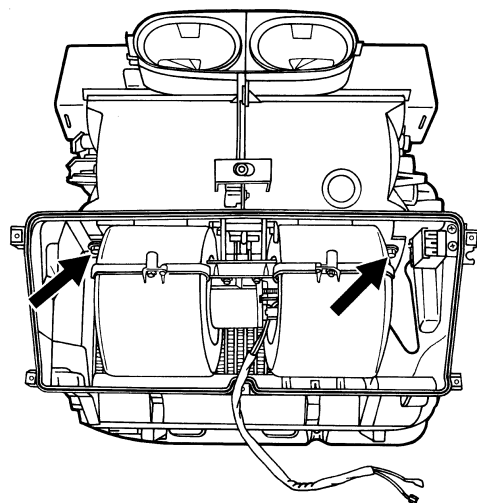
K1 00 953

3. Detach the connectors from the air conditioning thermostat and remove the series resistor.



K1 00 954

4. Remove the heater motor.



K1 00 955

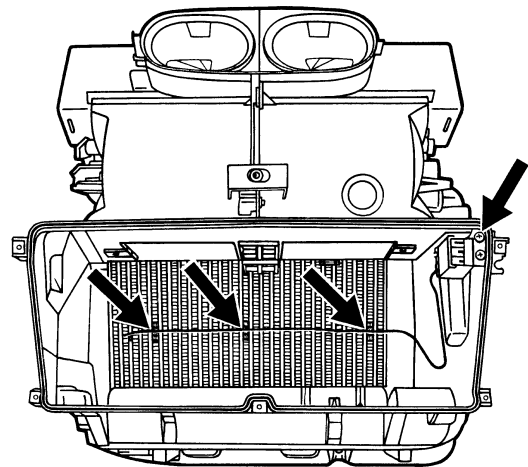
CAB HEATING

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Removal and installation

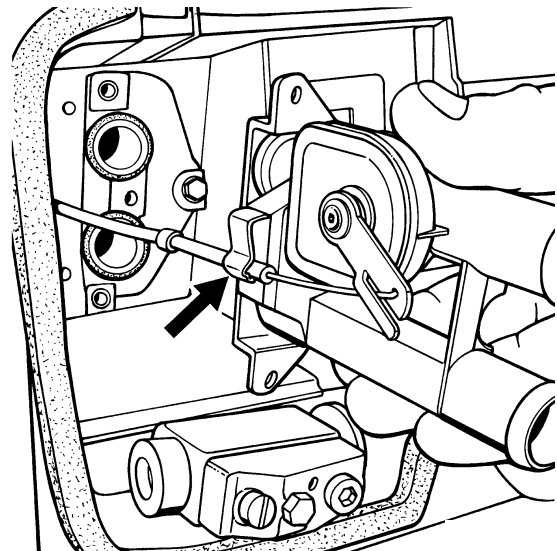
LF45/55 series

5. Remove the attachment bolts from the air conditioning thermostat. Remove the capillary tube from the evaporator.



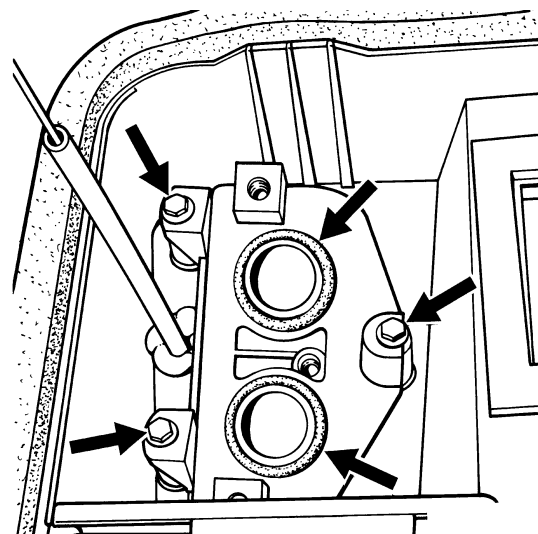
K1 00 959

6. Remove the fastening clip from the control cable and remove the heater valve.



K1 00 961

7. Remove the attachment bolts from the heater valve holder.
8. Remove the O-rings.



K1 00 962

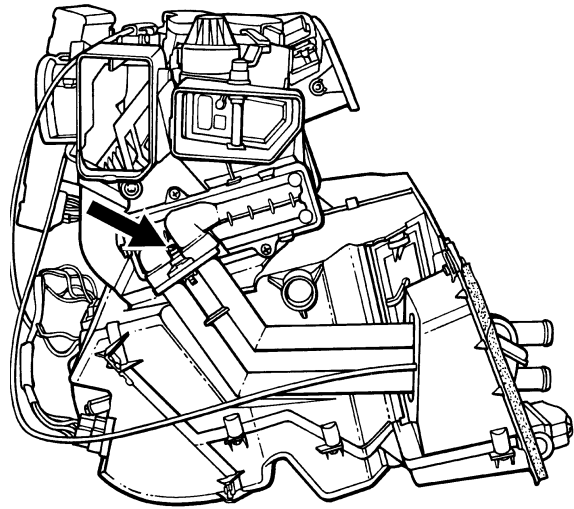
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LF45/55 series

CAB HEATING

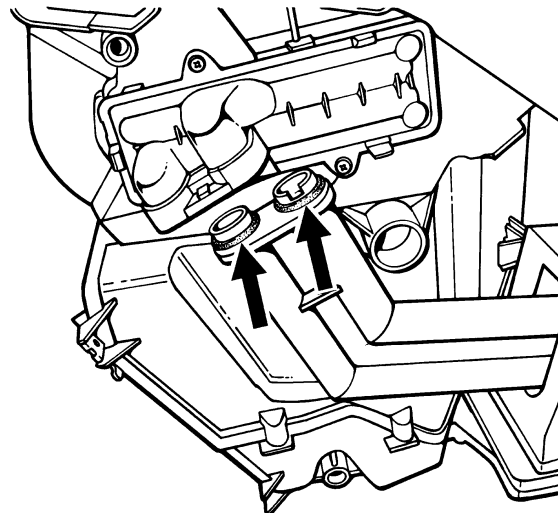
Removal and installation

9. Remove the attachment bolt from the heater pipe fastening.



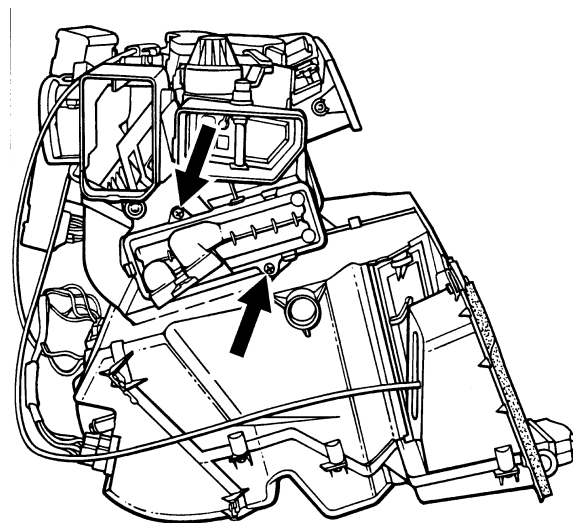
K1 00 963

10. Remove the heater pipes and remove the O-rings.



K1 00 964

11. Remove the radiator attachment bolts.



K1 00 965

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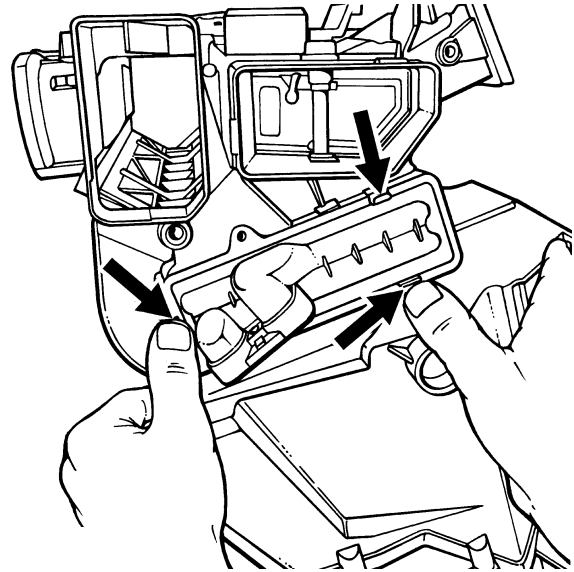
CAB HEATING

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Removal and installation

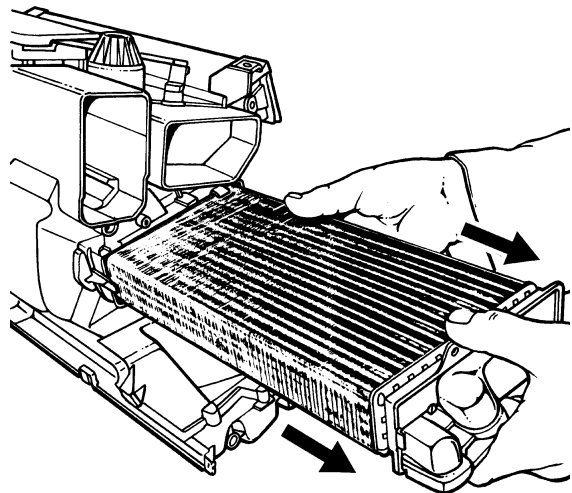
LF45/55 series

12. Push the retainer aside.



K1 00 966

13. Remove the radiator.



K1 00 967

Installing the heating radiator

1. Install the heater radiator in the heating unit.
2. Press the heater radiator into the retainer.
3. Fit the heater radiator attachment bolts.
4. Fit new O-rings and fit the heater pipes.
5. Secure the heater pipe with the attachment bolt.
6. Fit the heater valve holder and secure it using the attachment bolts.
7. Fit the control cable to the heater valve and secure it using the fastening clip.
8. Install the heater motor.
9. Fit the air conditioning thermostat connectors and the series resistor.
10. Fit the heater motor cover.
11. Fit the heater unit.

CAB HEATING

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Removal and installation

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EXTERNAL CAB COMPONENTS

1

Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS

General

The cab is equipped with a hydraulic tilting gear. The pump is located on co-driver's side at the rear of the cab. The cab locks are opened hydraulically during pumping.

Before tilting the cab, make sure that the doors are closed, that there are no loose items in the cab and that the gear lever is in neutral. Tilt the cab fully forward if work is to be carried out underneath the cab.



You can stop the cab tilting forward at any time by turning the cock to the reverse tilting position.



When working on a tilted cab (for example when welding, spray-painting or applying bitumen coatings), be sure to cover the piston rod of the lifting cylinder. Welding spatter and paint on the piston rod will inevitably cause damage to the oil seal.

Inspection after a collision

Before tilting the cab after a collision, check the cab rests, the cab hinges and the attachment of the lifting cylinder to the chassis member and cab for cracks.



If the vehicle has been involved in a collision, the cab must under no circumstances be tilted without due precautions. The end stop in the lifting cylinder may be damaged, which might cause the cab to shoot past its end stop.

If possible, suspend the cab in slings and put a stand in front of the cab. Make sure that there is no one in front of the cab while it is being tilted.

EXTERNAL CAB COMPONENTS

1

Safety instructions

LF45/55 series

Replacing the lifting cylinder

After a collision, **always** check the lifting cylinder for internal damage.

Replace the lifting cylinder if damaged or if you are in doubt as to its condition.

Always replace the cylinder if one of the following points has occurred during a collision:

- A. the cab has been pulled out of the cab locks,
- B. the cab locks have been deformed or damaged,
- C. the rear cab springs have been deformed or damaged.

2. GENERAL

2.1 DESCRIPTION OF EXTERIOR MIRRORS

All exterior mirrors and exterior mirror arms used are factory set for average driving conditions. After the superstructure has been constructed on the vehicle, it is required by law that all exterior mirrors and exterior mirror arms should be re-adjusted in accordance with EC Directive 88/321. This critical adjustment depends entirely on the width of the vehicle's superstructure.

To ensure proper adjustment of the exterior mirror/exterior mirror arms as provided for in the Directive, it is important to follow all adjustment procedures closely.

Exterior mirror classification

This section describes the different types of vehicle exterior mirrors according to the standard EC exterior mirror classification. The following vehicle exterior mirror categories apply to trucks over 7.5 tonnes:

- "Category 2" - Main exterior mirror
- "Category 4" - Wide angle exterior mirror
- "Category 5" - Close-up exterior mirror

Note:

Category 1 (inside) and category 3 (exterior) mirrors are intended for passenger cars.

The exterior mirror consists of convex glass and an aerodynamically shaped mirror housing. The main exterior mirror and wide-angle exterior mirror (only on co-driver side) are fitted to a D-shaped arm on the door. The pavement mirror is attached to the upper part of the door on a separate bracket.

The exterior mirror bracket returns to its original position if it gets flapped back. On several models there is an extra exterior mirror (apart from a pavement mirror) on co-driver side giving the driver a better view of the drawn vehicle.

EXTERNAL CAB COMPONENTS

1

General

LF45/55 series

The main exterior mirror heating and the windscreen heating, can be turned on by a switch on the dashboard. When the exterior mirror heating is turned on, the warning lamp in the switch lights up.

The exterior mirrors can be divided into:

- non-heated exterior mirrors
- heated exterior mirrors (except for pavement mirror) in combination with windscreen heating

2.2 DESCRIPTION OF WINDSCREEN WIPER AND WASHERS

4

There are two windscreen wipers which are equipped with nozzle tips, each of which has three spray nozzles. The high-pressure pump for this washing system abuts the storage tank. The washers are underneath the headlights.

The filler opening of the storage tank for the windscreen washers and possibly the headlight washers is located in the stepwell on driver's side.

2.3 DESCRIPTION OF HEADLIGHT LEVELLING

The cab is equipped with an internal device for adjusting the angle of the headlight beam. Control is by a rotary knob located in the cab. The knob is situated on the dashboard to the right of the steering wheel. The headlights are levelled by means of electric motors located at the bottom of the headlight unit.

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EXTERNAL CAB COMPONENTS

LF45/55 series

Inspection and adjustment

3. INSPECTION AND ADJUSTMENT

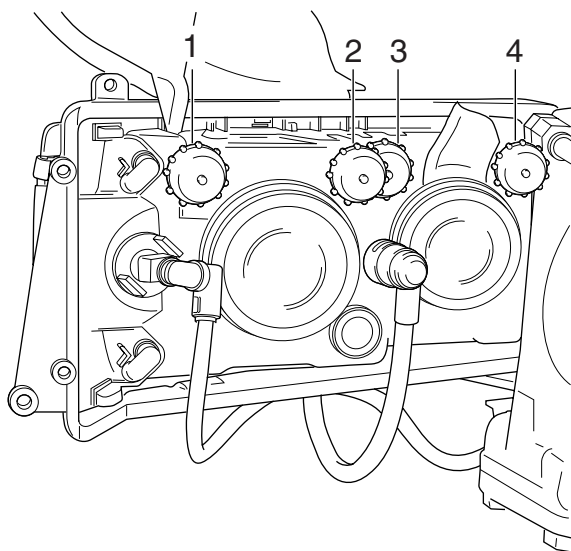
3.1 INSPECTION AND ADJUSTMENT, HEADLIGHTS

Note:

Use adjustment equipment to check and adjust the headlights.

Adjustment, headlamps

1. When adjusting the headlights, check that:
 - the vehicle is unladen and the tyres are inflated to the specified pressure.
 - the vehicle is standing on a flat and level surface.
 - inside the cab the height adjustment of the headlights is in "0"-position.
2. The headlight can be adjusted by four knurled knobs at the rear of the headlight housing; main beam and dipped beam can be adjusted separately:
 - To adjust the dipped beam horizontally, turn knob 1.
 - To adjust the dipped beam vertically, turn knob 2.
 - To adjust main beam horizontally, turn knob 3.
 - To adjust the main beam vertically, turn knob 4.



K1 01 156

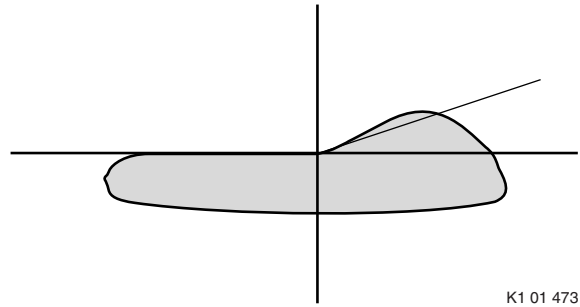
EXTERNAL CAB COMPONENTS

1

Inspection and adjustment

LF45/55 series

3. As clear headlight glass is used the image of the asymmetrical light beam deviates slightly from the usual image. The beam of light is not a straight line that slants upwards, but is slightly convex.
4. Adjust the headlight in such a manner that the intersection of the convex and the horizontal light beam coincides with the intersection of the asymmetrical diagonal and the horizontal adjustment line. It does not matter that the light beam convex is above the asymmetrical diagonal.



4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, WINDSCREEN WIPER SYSTEM

Notes:

Before replacing the wiper linkage, the following points must be observed.

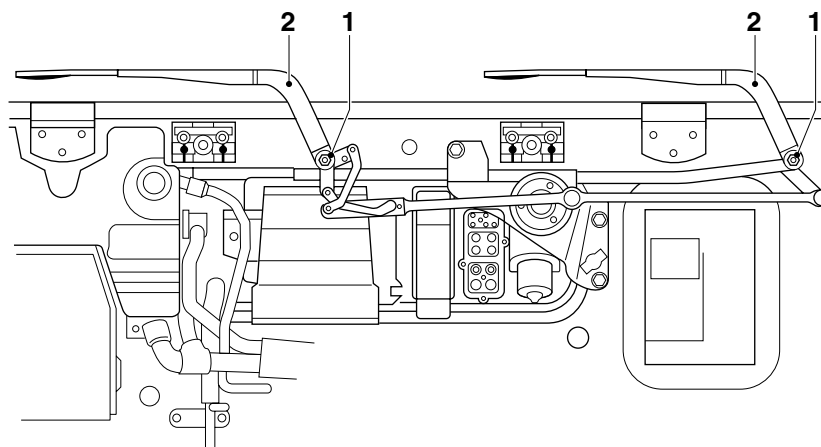
If the bearings of the wiper linkage are worn, replace them as well as the linkage.

Use the correct tools when removing old linkage in order to avoid damaging the seals.

Use FINA Ceran-grease for new linkage.

When fitting new linkage, never hit the sealing covers of the linkage with a hammer or other hard object. These covers are only 1 mm thick and might suffer damage in this way.

If the motor shaft shows evidence of axial play, replace the motor. This play will cause excessive wear to the wiper linkage.



K1 00 985

Removing the windscreen wiper system

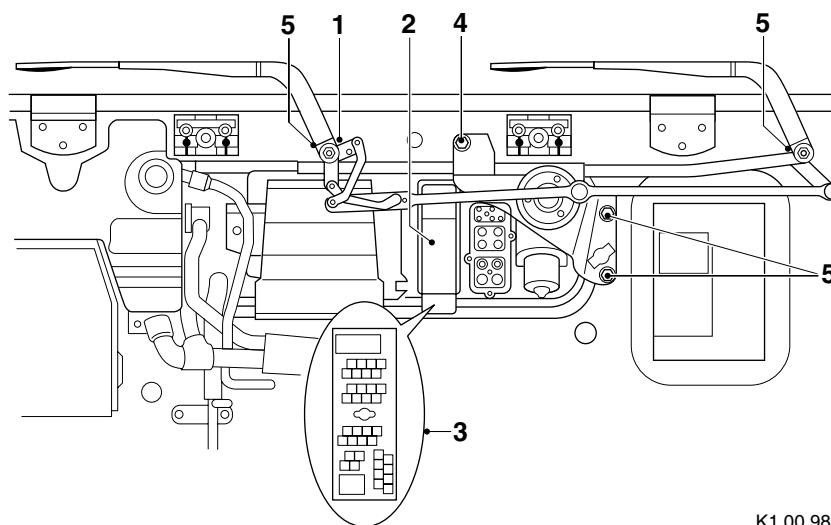
1. Remove the attachment nuts (1) from the windscreen wiper arms and remove the windscreen wiper arms (2) using a pulley puller (trade tool).

EXTERNAL CAB COMPONENTS

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Removal and installation

LF45/55 series



K1 00 984

4

2. Remove the hose for the windscreen wiper fluid (1).
3. Remove the protecting plate (2).
4. Remove the connectors (3).
5. Remove the attachment nut (4).
6. Remove the attachment bolts (5) and remove the windscreen wiper mechanism.

Installing the windscreen wiper mechanism

1. Fit the windscreen wiper mechanism with the attachment bolts (5).
2. Fit the attachment nuts (4).
3. Fit the connectors (3).
4. Fit the protecting plate (2).
5. Fit the hose for the windscreen wiper fluid (1).
6. Put the windscreen washer motor in the neutral position by turning it on and off quickly using the switch in the cab.
7. Fit the windscreen wiper arms.

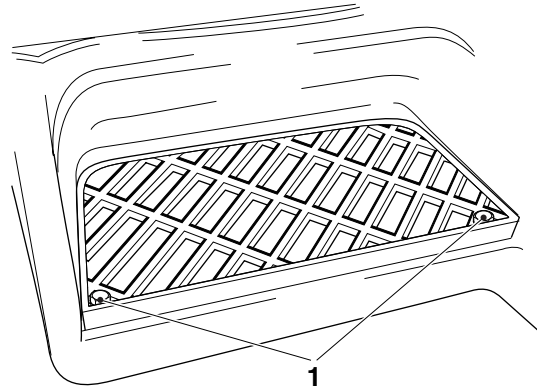
4.2 REMOVAL AND INSTALLATION, ENTRANCE STEP GRILLE

Removing the stepwell and entrance step support

1. Remove the attachment bolts (1) from the stepwell.
2. Remove the grille.

Installing the stepwell and entrance step support

1. Fit the grille.
2. Secure the grille with the attachment bolts (1).



K1 00 987

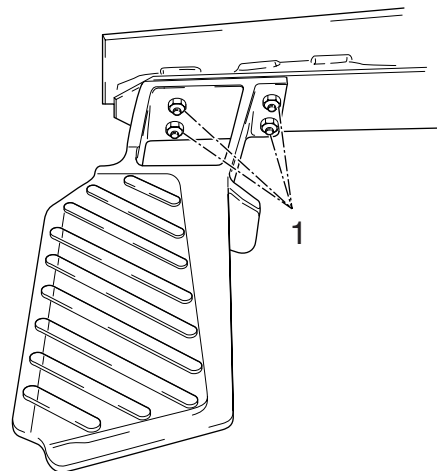
4.3 REMOVAL AND INSTALLATION, ENTRANCE STEP SUPPORT

Removing the entrance step support

1. Tilt the cab forward.
2. Remove the attachment bolts (1).
3. Remove the bracket from the entrance step.

Installing the entrance step support

1. Fit the bracket.
2. Secure the bracket with the attachment bolts (1).
3. Tilt the cab back.



K1 01 151

EXTERNAL CAB COMPONENTS

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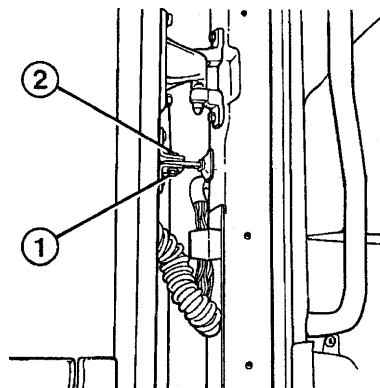
Removal and installation

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4.4 REMOVAL AND INSTALLATION, DOOR

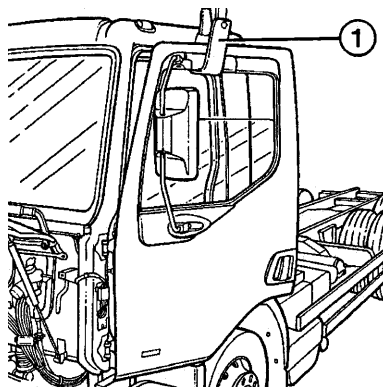
Removing the door

1. Remove the corner piece.
2. Wind the door glass down.
3. Remove the attachment nut (1).
4. Remove the pin (2).



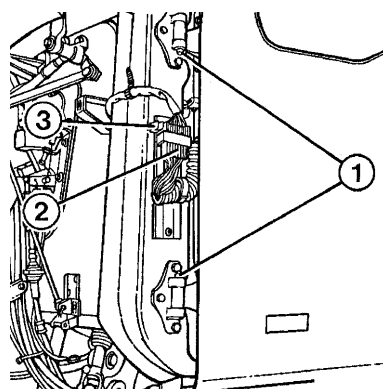
K1 00 979

5. Suspend the door in a hoist using a sling (1).



K1 00 980

6. Remove the cover caps (1).
7. Detach the connector from the holder (3) and take the connector (2) apart.
8. Remove the fitted bolts.
9. Remove the door.



K1 00 981

1

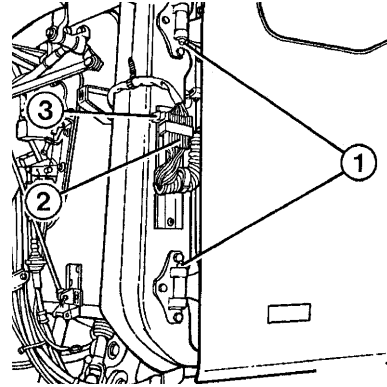
EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

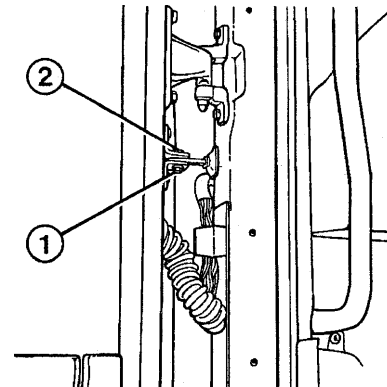
Installing the door

1. Install the door.
2. Place the fitted bolts and tighten them.
3. Fit the cover caps (1).
4. Reassemble the connector (2) and fit it in the holder (3).



K1 00 981

5. Fit the pin (2).
6. Fit the nut (1).
7. Remove the hoist and close the door glass.
8. Fit the corner piece.



K1 00 979

EXTERNAL CAB COMPONENTS

1

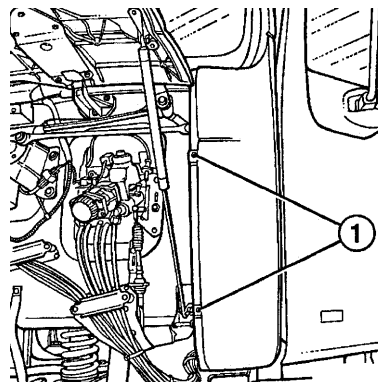
Removal and installation

LF45/55 series

4.5 REMOVAL AND INSTALLATION, CORNER PIECE

Removing the corner piece

1. Open the grille and remove the attachment bolts (1).

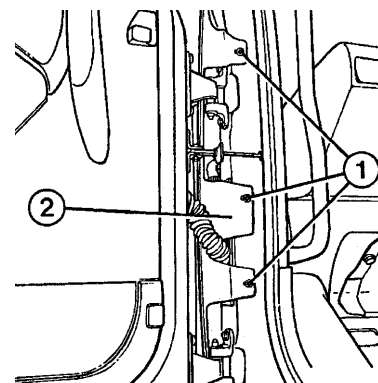


K1 00 982

2. Open the door and remove the attachment bolts (1).
3. Remove the corner piece (2).

Installing the corner piece

1. Fit the corner piece.
2. Secure the corner piece (2) in the door post and at the front of the cab, using the attachment bolts (1).
3. Close the grille.



K1 00 983

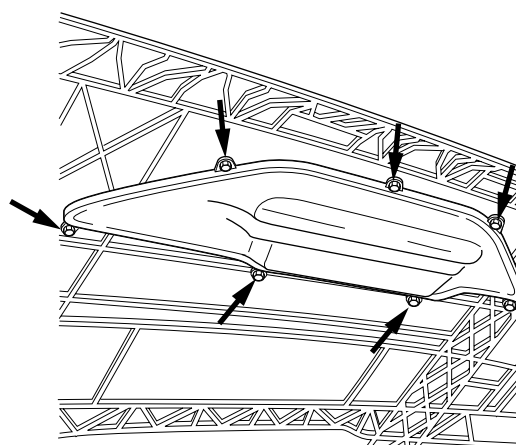
4.6 REMOVAL AND INSTALLATION, LATTICE GRILLE

Removing the lattice grille

1. Open the grille.
2. Remove the attachment bolts from the lattice.
3. Remove the lattice.

Fitting the lattice grille

1. Fit the lattice.
2. Secure the lattice using the attachment bolts.
3. Close the grille.



K1 00 991

1

EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

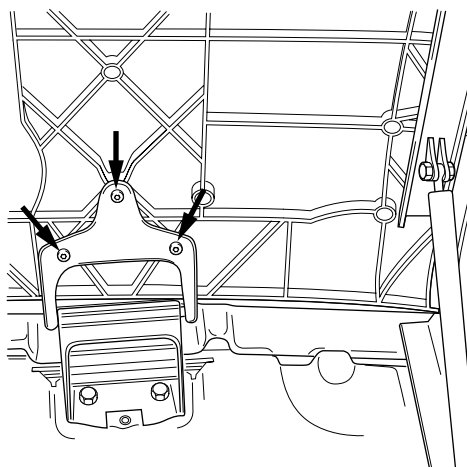
4.7 REMOVAL AND INSTALLATION, GRILLE

Removing the grille

1. Open the grille and support it.
2. Remove the locking clips from the gas spring attachment and remove the gas springs.
3. Remove the attachment bolts from the grille and remove the grille.

Installing the grille

1. Position the grille and secure it using the attachment bolts.
2. Support the grille when open and install the gas springs using the locking clips.
3. Close the grille.



K1 00 992

4

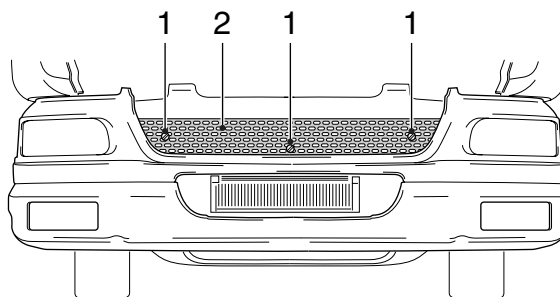
4.8 REMOVAL AND INSTALLATION, LATTICE OF HEADLIGHT COVER PANEL

Removing the lattice from the headlight cover panel

1. Loosen the attachment screws (1) by $\frac{1}{4}$ -of a turn.
2. Remove the lattice (2).

Fitting the lattice of the headlight cover panel

1. Fit the lattice (2).
2. Position the slot of the attachment screws (1) horizontally and push them in place.



K1 01 157

EXTERNAL CAB COMPONENTS

1

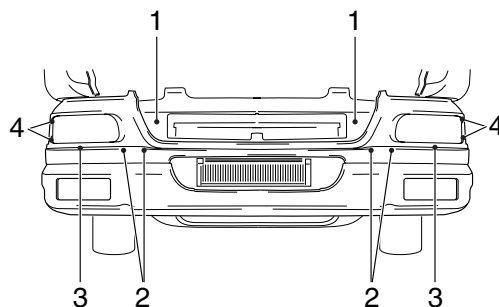
Removal and installation

LF45/55 series

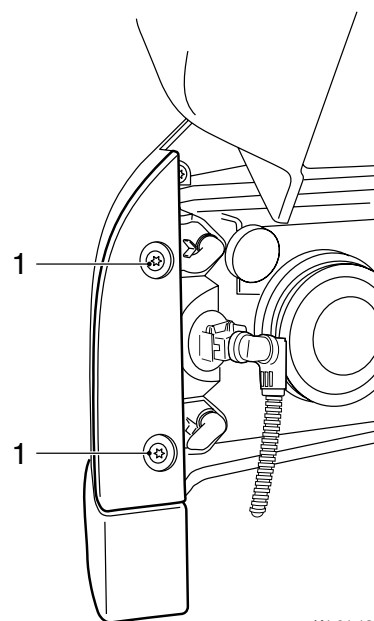
4.9 REMOVAL AND INSTALLATION, HEADLIGHT COVER PANEL

Removing the headlight cover panel

1. Remove the lattice from the cover panel.
2. Remove the attachment bolts (1) from behind the lattice.
3. Remove the attachment bolts with nuts (3 and 4) at the rear of the headlight cover panel.
4. Remove the nuts (2).
5. Remove the attachment bolts (1) on either side and remove the covers.

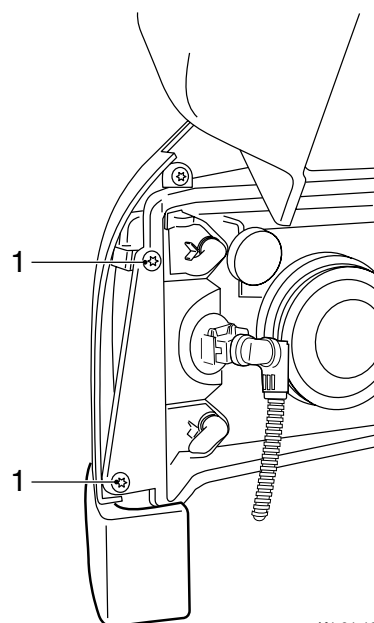


K1 01 185



K1 01 184

6. Remove the attachment bolts (1).
7. Remove the headlight cover panel.



K1 01 199

1

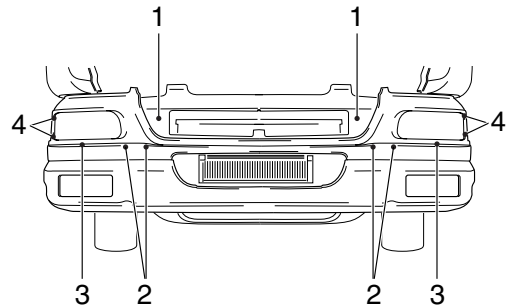
EXTERNAL CAB COMPONENTS

LF45/55 series

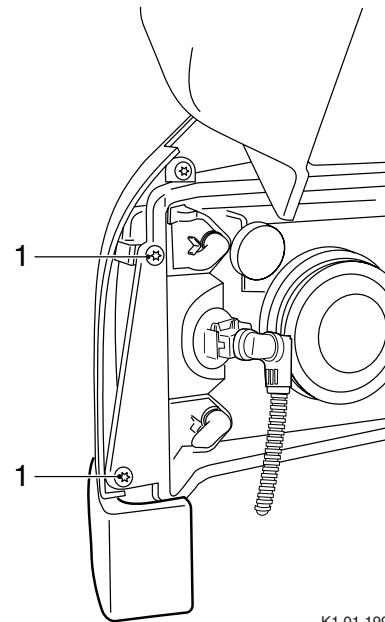
Removal and installation

Installing the headlight cover panel

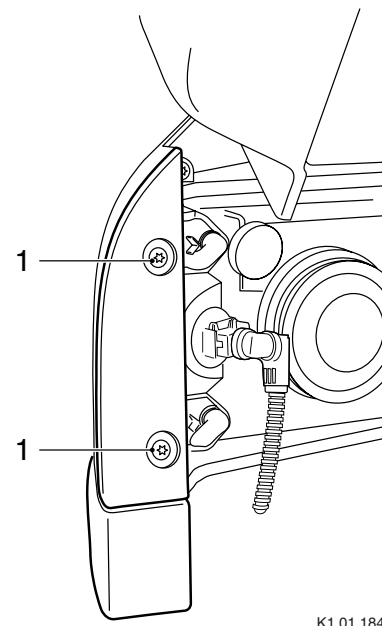
1. Fit the headlight cover panel.
2. Insert the attachment bolts (1).
3. Fit the attachment bolts and nuts (3 and 4) on the rear side of the cover panel.
4. Fit the nuts (2).



5. Insert the attachment bolts (1).



6. Fit the cover panel. Secure it using the attachment bolts (1).
7. Fit the lattice to the cover panel.



EXTERNAL CAB COMPONENTS

1

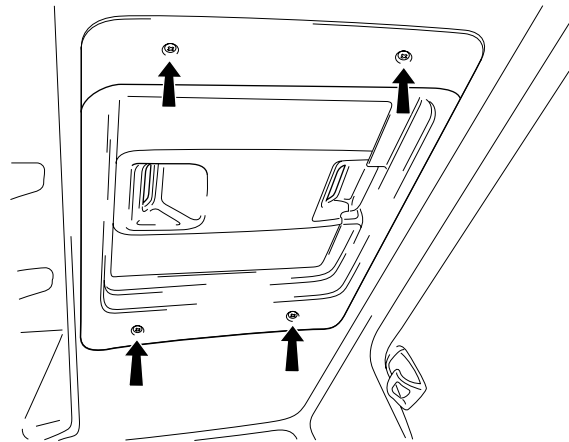
Removal and installation

LF45/55 series

4.10 REMOVAL AND INSTALLATION, ROOF HATCH

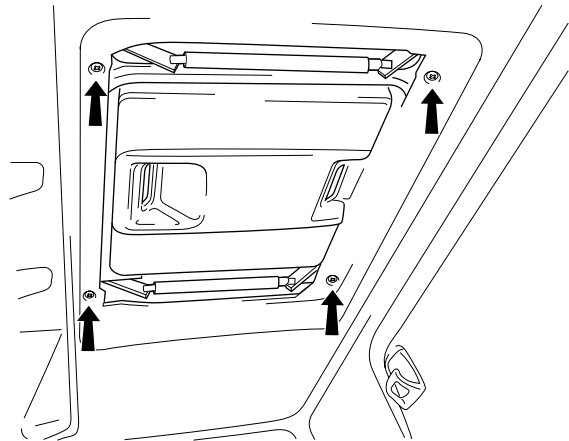
Removing the roof hatch

1. Remove the attachment bolts from the roof hatch weather strip.
2. Remove the roof hatch weather strip.



K1 01 159

3. Remove the roof hatch attachment bolts.



K1 01 160

4. Remove the roof hatch.

Installing the roof hatch

1. Install the roof hatch.
2. Tighten the attachment bolts evenly.
3. Fit the roof hatch weather strip.
4. Secure the roof hatch weather strip with the attachment bolts.

1

EXTERNAL CAB COMPONENTS

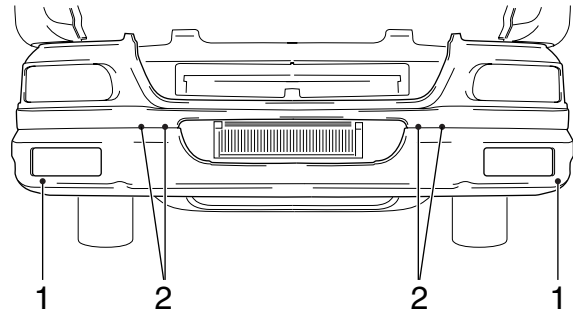
LF45/55 series

Removal and installation

4.11 REMOVAL AND INSTALLATION, BUMPER

Removing the bumper

1. Remove the attachment bolts on the underside of the bumper (1).
2. Remove the attachment bolts (2) on the top of the bumper (1). These attachment bolts can be reached using an open-end spanner on the rear of the bumper.
3. If applicable, remove the lighting connectors.



K1 01 132

Installing the bumper

1. Fit the bumper.
2. Position the bumper. Secure the attachment bolts (1 and 2) on the top and underside.
3. If applicable, fit the lighting connectors.

EXTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

4.12 REMOVAL AND INSTALLATION, WINDSCREEN

Removing the windscreen

1. Remove the grille.
2. Take the cover panel out of the window frame.
3. Remove the windscreen wiper arms.
4. Remove the plastic cover strips on the inside of the front-screen pillars (A-pillar).
5. Protect the curved areas on the outside of the windscreen frame with linen tape. Also use tape to protect the plastic parts on the inside and the defroster openings of the heating and ventilation system.

Note:

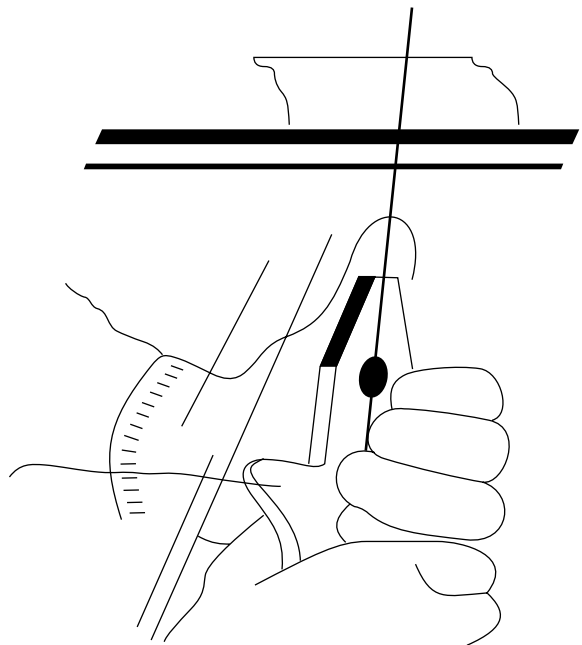
Take care not to damage the paint.

6. Put the wire (special tool, DAF no. 1329415) at approximately the middle of the upper and lower side of the glass using pliers or a special pass-through tool (special tool, DAF no. 1240458) through the sealant.

Note:

Remove the wire pass-through tool before fitting the wire ends to the handles of the cutting wire set.

7. The length of the cutting wire should be 1.5 x the height of the windscreen.
8. Secure the handles that are part of the set, special tool (DAF no. 0499817) to the cutting wire.



K1 00 715

1

EXTERNAL CAB COMPONENTS

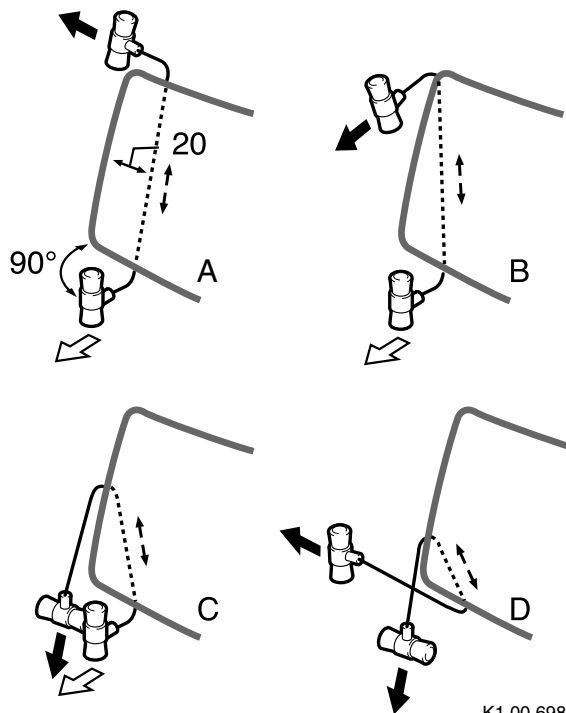
LF45/55 series

Removal and installation

9. Use tape strips to protect the glass from falling out accidentally (after the sealant has been cut through).
10. Start the cutting in the middle. Make sure the wire is kept moving and tightly stretched all the time. If the wire gets twisted, it will inevitably break.
11. Keep the cutting wire as close as possible to the edge of the glass.
12. Make sure the wire ends are crossed before the bottom corners are reached.
13. Take the windscreen out of the frame using the two suction pads, special tool (DAF no. 0484800).
14. Remove any remaining sealant in the window frame with a scraper, special tool (DAF no. 1329417). Make sure the remaining layer of sealant has a thickness of at most 1 to 1.5 mm and that it is flat and smooth.
15. Remove frayed pieces and granules of old sealant and clean the frame thoroughly with a cleaner.

Important tips

- If the new windscreen is fitted at a later time, the old, fully cured sealant should be cleaned 15 minutes before the glass is fitted, to ensure proper adhesion.
- Repair any damage to the paint on the window frame immediately with the right type of paint.
- Always work in a clean area.
- Wear industrial gloves or use a special hand cream.
- Use paper towels or tissues instead of cleaning rags.



K1 00 698

EXTERNAL CAB COMPONENTS

1

Removal and installation

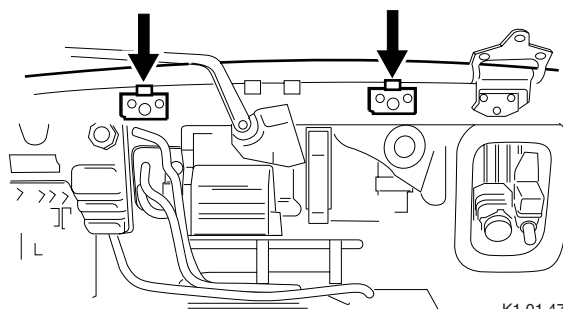
LF45/55 series

Installing the windscreen



Be careful when using cleaner. Contact with the cleaner will cause skin irritation and swallowing will cause burning. Inhaling may cause breathing problems.

1. Any damage to the paint should be repaired well before the windscreen glass is placed. Use the right type of paint.
2. Make sure that the guide rail is smooth and flat (no major irregularities).
3. Check the windscreen for damage.
4. Attach two double suction pads, special tool (DAF no. 0484800) to the outside of the glass.
5. Put the windscreen with the suction pads on a completely clean workbench.
6. Fit the rubber trimming to the glass and secure it with tape on the outside of the glass.
7. Place the glass in the frame without using sealant, starting at the bottom and ensuring that it fits exactly in the frame. If necessary, fill up the rubber spacer blocks by means of which the glass rests on the support blocks.
8. Mark the correct position of the glass in the frame with strips of tape. Cut through the tape in the frame.
9. Remove the glass from the frame and place the glass on the workbench.
10. Clean the glass where the layer of sealant is to be applied. See "Technical data".
11. Clean the sealant within the frame.



K1 01 474

1

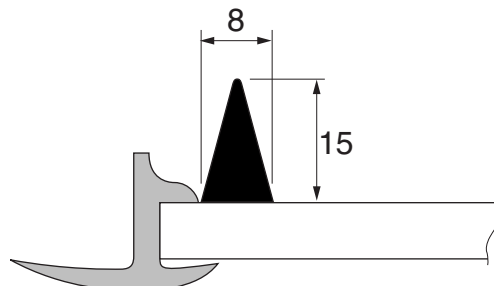
EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

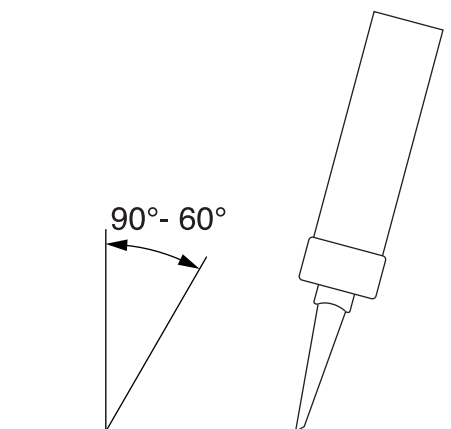
Applying sealant

1. For hot processing, the adhesive should be heated in an oven, special tool (DAF no. 1329416) for 60 minutes at 80°C.
2. Apply the sealant to the rubber as indicated in the diagram. There is no rubber on the underside of the windscreen. Here, the seal beads must be 11 mm from the edge of the glass.



K1 01 215

3. Take note of the processing time when applying the sealant. See "Technical data".
4. Place the sealant gun with the opening 90°/60° onto the windscreen and move it evenly to build up a good layer.
5. Avoid air bubbles in the layer of sealant.



K1 00 722

Note:

If a pneumatic glue gun is used for sealing (special tool DAF no 1240444) then before beginning adjust the pressure in the gun by spraying several test strips.

Fitting the glass

1. For safety, open the windows to avoid undesirable pressure build-up on the windscreen.
2. The glass should be taken from the workbench by two persons and it should be placed in the frame in one go. Use the tape strips to determine the correct position.
3. Make sure that the rubber windscreen trim on the bottom seats properly into the frame.

4

EXTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

4

4. Use a sealant remover to remove the excess sealant immediately from the painted parts, see "Technical data".
5. Depending on the type of sealant used (hardening time), fit straps. See "Technical data". Protect the paint by fitting linen tape in the places where the straps will touch the paint.
6. If applicable, pull two strips round the outside of the windscreen and the cab pillar. Put strips of wood or Tempex underneath to avoid damage.
7. Let the sealant harden. See "Technical data".
8. Remove from the cab body all the tape used for protection and marking.
9. Clean the entire windscreen and the parts of the cab body which have been fouled during installation of the windscreen using a glass cleaner.
10. Fit the A-pillar trimming panels in the cab.
11. Fit the cover panel to the window frame.
12. Fit the windscreen wipers and adjust them.
13. Fit the grille.
14. If the vehicle is fitted with an airbag, apply a new airbag sticker to the windscreen.



K1 01 426

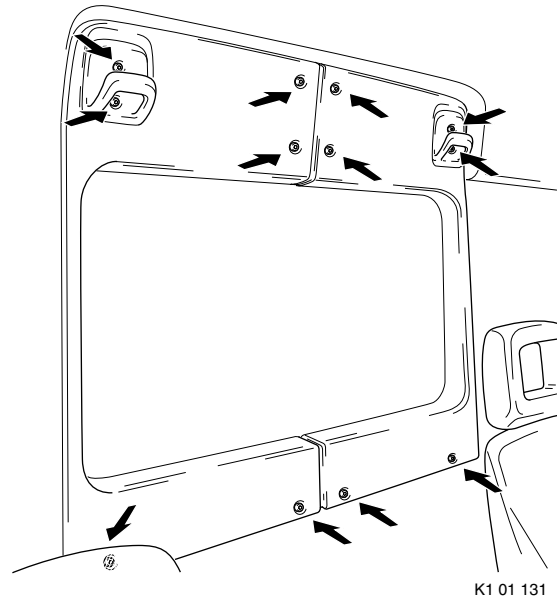
4.13 REMOVAL AND INSTALLATION, REAR WINDOW GLASS

Removing the rear window glass

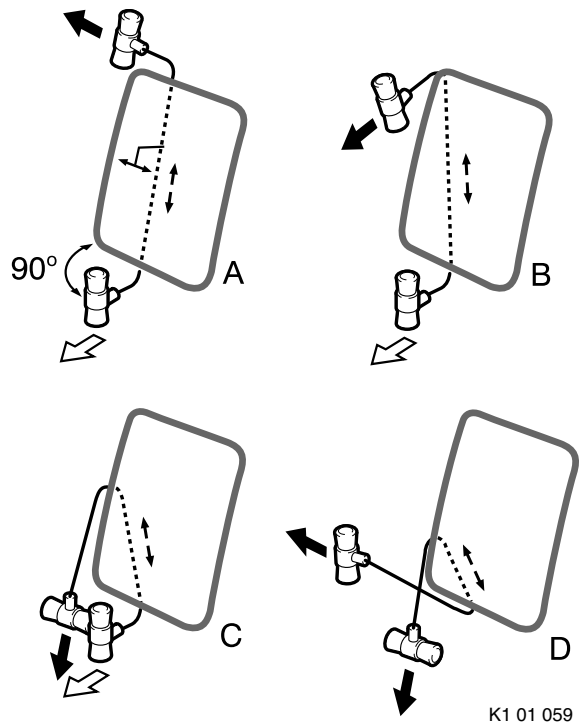
1. Remove the cover panel attachment bolts.
Remove the cover panels.
2. Attach a suction pad (DAF no. 0484800).
3. Put the wire (special tool, DAF no. 1329415) at approximately the middle of the upper and lower side of the glass using pliers or a special pass-through tool (special tool, DAF no. 1240458) through the sealant.

Note:

Remove the wire pass-through tool before fitting the wire ends to the handles of the cutting wire set.



4. The length of the cutting wire should be 1.5 x the height of the window.
5. Secure the handles that are part of the set, special tool (DAF no. 0499817) to the cutting wire.
6. Use tape strips to protect the glass from falling out accidentally (after the sealant has been cut through).
7. Start cutting in the middle. Make sure the wire is kept moving and tightly stretched all the time. If the wire gets twisted, it will inevitably break.
8. Keep the cutting wire as close as possible to the edge of the glass.
9. Make sure the wire ends are crossed before the bottom corners are reached.
10. Take the glass out of the frame using a suction pad, special tool (DAF no. 0484800).



EXTERNAL CAB COMPONENTS

1

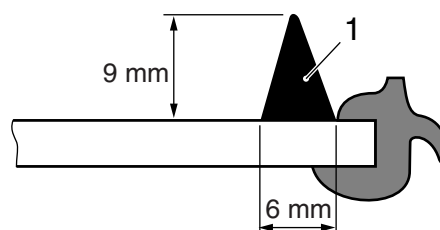
Removal and installation

LF45/55 series

11. Remove any remaining sealant in the window frame with a scraper, special tool (DAF no. 1329417). Make sure the remaining layer of sealant has a thickness of at most 1 to 1.5 mm and that it is flat and smooth.
12. Remove frayed pieces and granules of old sealant and clean the frame thoroughly with a cleaner.

Fitting the rear window glass

1. If necessary, smooth off spare sealant.
2. Apply the adhesive (1) as shown.
3. Fit the spraying nozzle to the cartridge and apply the sealant to the window, spraying as evenly as possible.



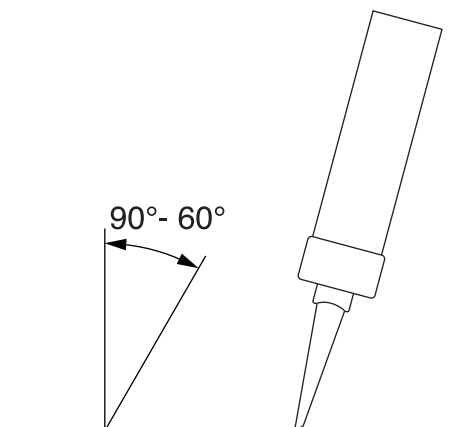
K1 01 178

4. Place the sealant gun with the opening 90°/60° onto the windscreen and move it evenly to build up a good layer.
5. Avoid air bubbles in the layer of sealant.

Note:

If a pneumatic glue gun is used for sealing (special tool DAF no 1240444) then before beginning adjust the pressure in the gun by spraying several test strips.

6. Pay attention to the processing time, see "Technical data".
7. Fit the rear window glass and press it into the frame. Secure the glass in several places with strips of tape around 20 cm long. Open the door windows to prevent pressure in the cab.



K1 00 722

1

EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

8. Let the sealant harden. See "Technical data".
9. Remove from the cab body all the tape used for protection and marking.
10. Clean the entire window and the parts of the cab body which have been fouled during installation of the window glass using a glass cleaner.

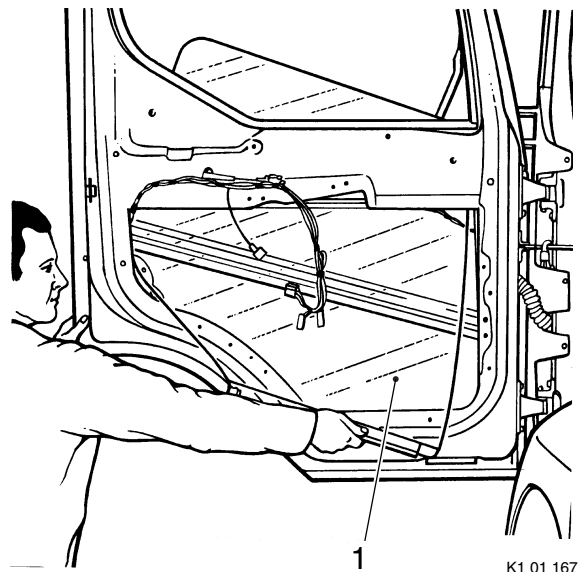
4.14 REMOVAL AND INSTALLATION, DOOR GLASS

Removing door glass

1. Remove the complete window mechanism.
2. Tilt the door glass (1).
3. Remove the door window from below.

Installing door glass

1. Fit the door window from below.
2. Fit the window mechanism.



K1 01 167

4

EXTERNAL CAB COMPONENTS

1

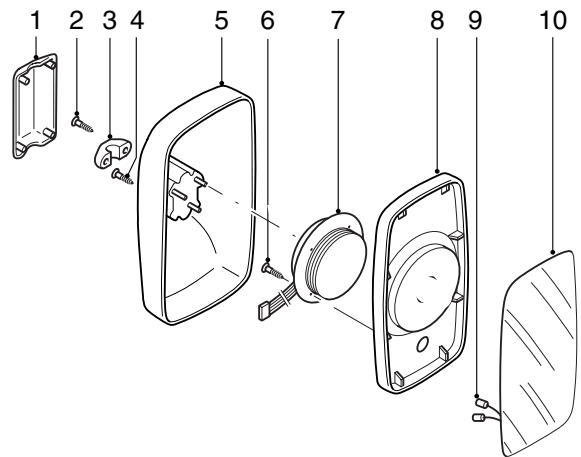
Removal and installation

LF45/55 series

4.15 REMOVAL AND INSTALLATION, EXTERIOR MIRROR GLASS

Removing mirror glass

1. Push in the cover (1) of the mirror housing (5) at the notches. Remove the cover (1) from the exterior mirror housing (5).
2. Disconnect the electrical exterior mirror adjustment connector (7), if applicable.
3. Disconnect the exterior mirror heating connector (9).
4. Remove the attachment bolts (2) from the clamping brackets (3). Mark the position. Remove the outside mirror housing (5).
5. Remove the attachment bolts (4) from the mirror glass holder (8). Push the mirror glass holder (8) out of the mirror housing (5).
6. If fitted, remove the attachment screws (6) from the electrical exterior mirror adjustment (7). Mark the position of the electrical mirror adjustment (7). Remove the electrical mirror adjustment (7) from the mirror glass holder (8).
7. Place the exterior mirror glass holder (8) in a hot water bath of approx. 80°C. Allow the mirror glass holder (8) and mirror (10) to heat for fifteen minutes.
8. Wear isolating gloves to prevent burns. Take the exterior mirror glass holder (8) out of the hot water bath. Carefully press one side of the mirror (10) out of the mirror glass holder (8).
9. Carefully remove the exterior mirror (10) from the mirror glass holder (8).



K1 01 258

1

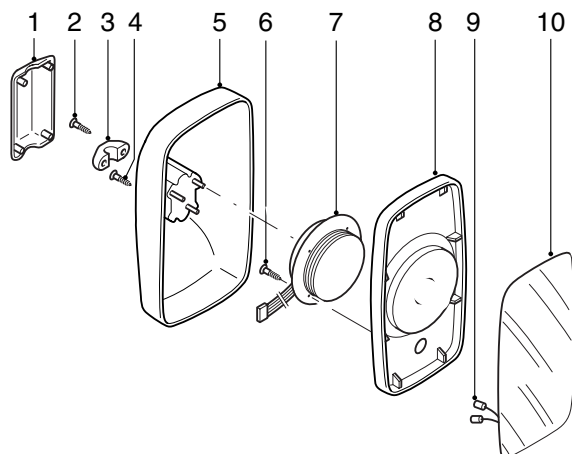
EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

Installing exterior mirror glass

1. Place the exterior mirror glass holder (8) in a hot water bath of approx. 80°C. Allow the mirror glass holder (8) to heat for fifteen minutes.
2. Wear isolating gloves to prevent burns. Take the exterior mirror glass holder (8) out of the hot water bath. Insert the wires of the electrical exterior mirror heating (9) through the grommet in the exterior mirror glass holder (8).
3. Place one side of the mirror glass (10) in the groove of the mirror glass holder (8). Press the edges of the mirror glass holder (8) carefully over the mirror glass (10).
4. Allow the mirror glass holder (8) to cool down.
5. If applicable, fit the electrical exterior mirror adjustment (7) to the mirror glass holder (8), using the attachment bolts (6). Note the fitting position.
6. Fit the exterior mirror glass holder (8) in the mirror housing (5) using the attachment bolts (4). Note the fitting position and the electrical connectors.
7. Fit the mirror housing (5) to the mirror arm, using the attachment bolts (2) and the clamping brackets (3).
8. If applicable, connect the electrical connectors of the electrical mirror adjustment (7) and the mirror heating (9).
9. Fit the cover (1) to the exterior mirror housing (5).



K1 01 258

EXTERNAL CAB COMPONENTS

1

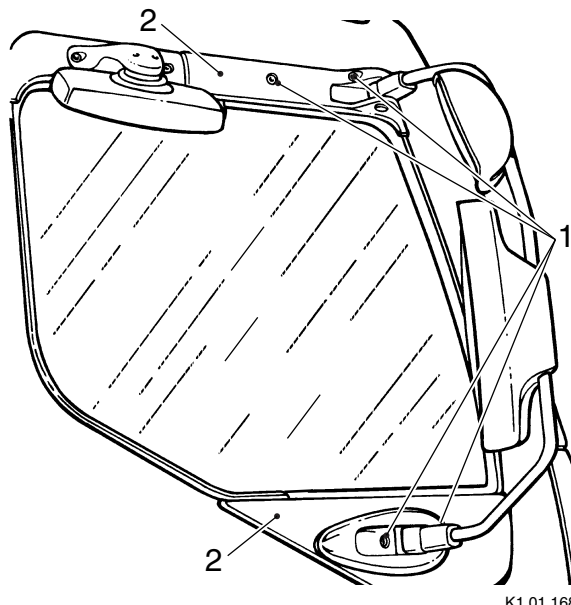
Removal and installation

LF45/55 series

4.16 REMOVAL AND INSTALLATION, EXTERIOR MIRRORS COMPLETE WITH ARMS

Removing the exterior mirror assembly

1. Remove the attachment bolts (1) and remove the exterior mirror assembly with the covers (2).

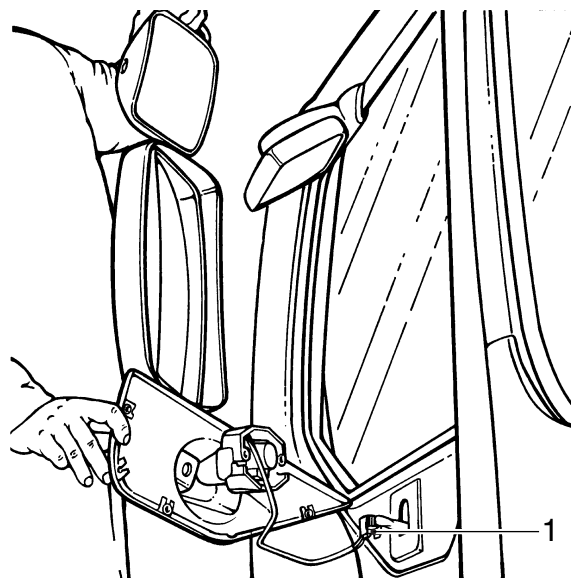


K1 01 168

2. Remove the connector (1).
3. Remove the exterior mirror assembly with the covers.

Installing the exterior mirror assembly

1. Fit the connector (1).
2. Fit the exterior mirror assembly with arm and the covers.
3. Secure the mirror with the attachment bolts. Ensure that the rubber O-rings are fitted between the cover and the door.



K1 01 172

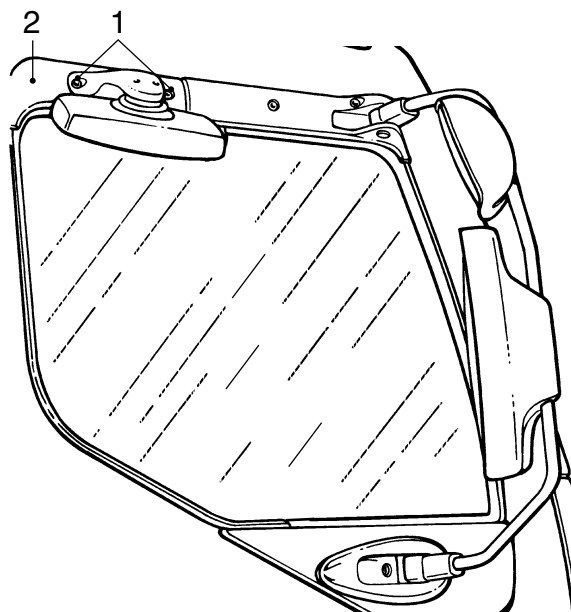
4.17 REMOVAL AND INSTALLATION, PAVEMENT MIRROR

Removing the pavement mirror

1. Remove the attachment bolts (1) and remove the pavement mirror with the cover plate (2).

Installing the pavement mirror

1. Fit the pavement mirror and the cover plate (2) and secure it with the attachment bolts (1).



K1 01 173

4

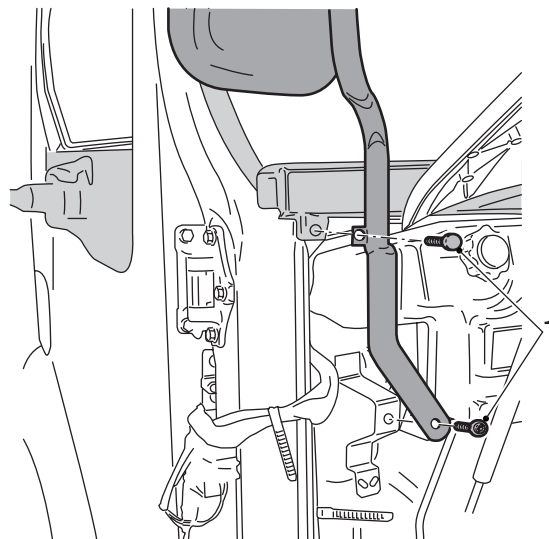
4.18 REMOVAL AND INSTALLATION, DEAD ANGLE EXTERIOR MIRROR

Removing the dead angle exterior mirror

1. Open the cab grille. Open the co-driver's door.
2. Remove the attachment bolts from the corner piece.
3. Remove the corner piece.
4. Disconnect the dead angle exterior mirror heating connector.
5. Remove the attachment bolts (1) from the dead angle exterior mirror.
6. Remove the dead angle exterior mirror.

Installing the dead angle exterior mirror

1. Fit the dead angle exterior mirror using the attachment bolts (1).
2. Connect the dead angle exterior mirror heating connector.
3. Fit the corner piece using the attachment bolts.



K1 01 423

EXTERNAL CAB COMPONENTS

1

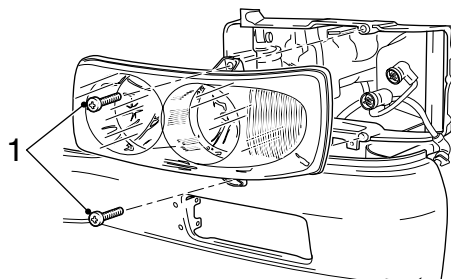
Removal and installation

LF45/55 series

4.19 REMOVAL AND INSTALLATION, HEADLIGHT

Removing headlight

1. Remove the headlight cover panel.
2. Remove the attachment bolts (1) on the front of the headlight.
3. Pull the headlight forward and disconnect the connectors at the rear.
4. Remove the headlight.



K1 01 183

Installing headlight

1. Connect the headlight.
2. Hook up the rubber bulge in the recess on the headlight bracket.
3. Secure the headlight with the attachment bolts (1) at the front.
4. Fit the headlight cover panel.

4

4.20 REMOVAL AND INSTALLATION, HEADLIGHT BRACKET

Removing headlight bracket

1. Remove the headlight cover panel.
2. Remove the headlight.
3. Remove the attachment bolts.
4. Remove the headlight bracket.

Installing headlight bracket

1. Fit the headlight bracket.
2. Secure the headlight bracket with the attachment bolts.
3. Place the headlight in position.
4. Fit the headlight cover panel.

1

EXTERNAL CAB COMPONENTS

LF45/55 series

Removal and installation

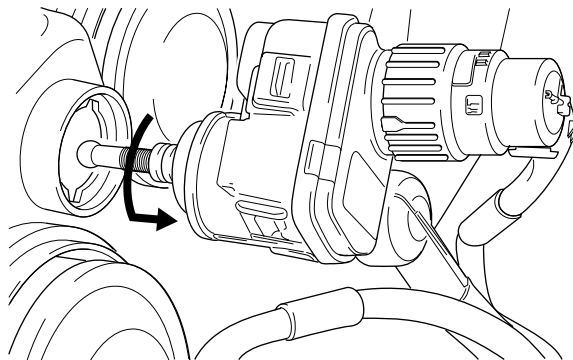
4.21 REMOVAL AND INSTALLATION, HEADLIGHT LEVELLING CONTROL

Removing headlight levelling control

1. Tilt the cab forwards.
2. Remove the connectors from the headlight levelling control.
3. Remove the headlight levelling control by turning it fully anti-clockwise out of the back of the headlight (at the rear).

Installing headlight levelling control

1. Fit the headlight levelling control by screwing it clockwise into the bayonet catch.
2. Fit the headlight levelling connector.
3. Tilt the cab back.



K1 01 100

4

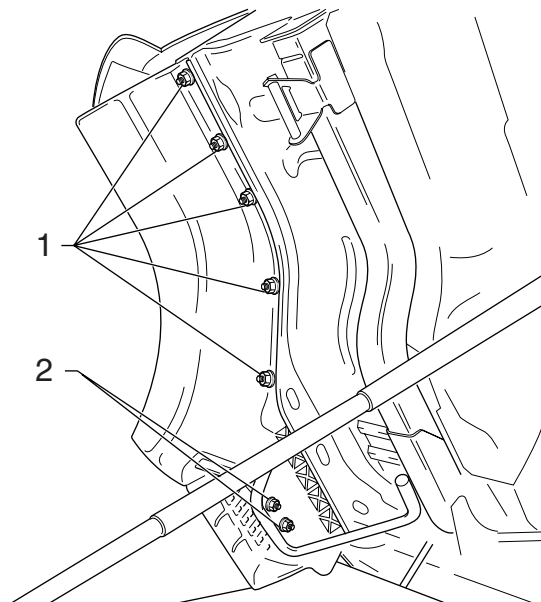
4.22 REMOVAL AND INSTALLATION, MUDGUARD ASSEMBLY

Removing mudguard assembly

1. Tilt the cab forwards.
2. Remove attachment bolts and nuts (1 and 2).
3. Remove the mudguard assembly.

Installing mudguard assembly

1. Fit the mudguard assembly.
2. Fit the attachment bolts (1 and 2).
3. Tilt the cab back.



K1 01 158

EXTERNAL CAB COMPONENTS

1

Removal and installation

LF45/55 series

4

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CAB SUSPENSION

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LF45/55 series

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1. SAFETY INSTRUCTIONS

General

The cab is equipped with a hydraulic tilting gear. The pump is located on co-driver's side at the rear of the cab. The cab locks are opened hydraulically during pumping.

Before tilting the cab, make sure that the doors are closed, that there are no loose items in the cab and that the gear lever is in neutral. Tilt the cab fully forward if work is to be carried out underneath the cab.



You can stop the cab tilting forward at any time by turning the cock to the reverse tilting position.



When working on a tilted cab (for example when welding, spray-painting or applying bitumen coatings), be sure to cover the piston rod of the lifting cylinder. Welding spatter and paint on the piston rod will inevitably cause damage to the oil seal.

Inspection after a collision

Before tilting the cab after a collision, check the cab rests, the cab hinges and the attachment of the lifting cylinder to the chassis member and cab for cracks.



If the vehicle has been involved in a collision, the cab must under no circumstances be tilted without due precautions. The end stop in the lifting cylinder may be damaged, which might cause the cab to shoot past its end stop.

If possible, suspend the cab in slings and put a stand in front of the cab. Make sure that there is no one in front of the cab while it is being tilted.

CAB SUSPENSION

1

Safety instructions

LF45/55 series

Replacing the lifting cylinder

After a collision, **always** check the lifting cylinder for internal damage.

Replace the lifting cylinder if it is damaged or if you are in doubt as to its condition.

Always replace the cylinder if one of the following points has occurred during a collision:

- A. the cab has been pulled out of the cab locks,
- B. the cab locks have been deformed or damaged,
- C. the rear cab springs have been deformed or damaged.

2. GENERAL

2.1 CAB SUSPENSION

The cab is attached to the chassis at four different points. There are several types of cab suspension.

Rubber and spring suspension.

All models use springs for rear suspension. Both rubber and spring suspension are used at the front. If the vehicle uses rubber suspension at the front, a cab stabiliser is not fitted.

Spring suspension

The cab is attached to the chassis with front and rear coil spring elements. These elements cannot be adjusted. There is a cab stabiliser at the front.



Do not tilt the cab if the stabiliser has been removed.

CAB SUSPENSION

1

General

LF45/55 series

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3. INSPECTION AND ADJUSTMENT

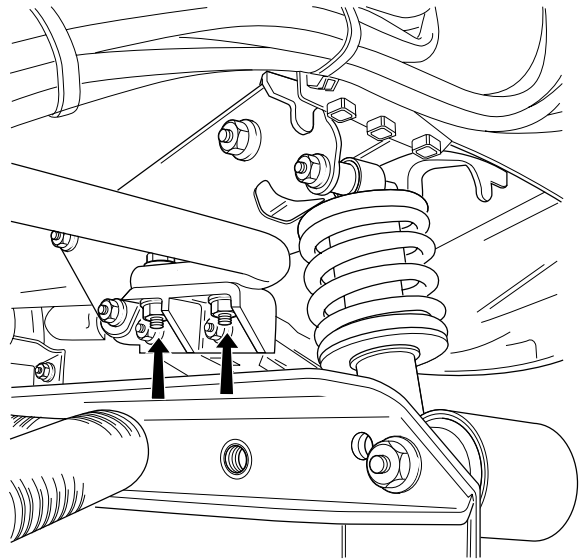
3.1 INSPECTION AND ADJUSTMENT, CAB HEIGHT

Checking the cab height

If the vehicle has spring suspension, it is possible to make some adjustment in cab height.

Setting the cab height

1. Check the height on the left and right sides.
2. Slacken the attachment bolts on the stabiliser.
3. Place a weight in the cab in order to correct the height difference.
4. Tighten the stabiliser attachment bolts.



K1 01 161

CAB SUSPENSION

1

Inspection and adjustment

LF45/55 series

5

4. REMOVAL AND INSTALLATION

4.1 REMOVING THE CAB STABILISER

Removing the cab stabiliser

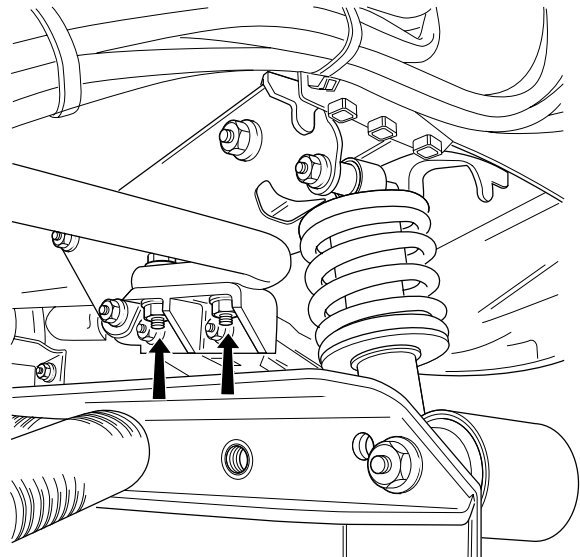
Note:

If the cab has spring suspension, do not tilt the cab without the cab stabiliser.

1. Open the grille.
2. Remove the cab stabiliser attachment bolts.
3. Remove the cab stabiliser.

Installing the cab stabiliser

1. Put the cab stabiliser in place.
2. Tighten the attachment bolts.
3. Inspect the cab for correct alignment, see "Inspection and adjustment".



K1 01 161

CAB SUSPENSION

1

Removal and installation

LF45/55 series

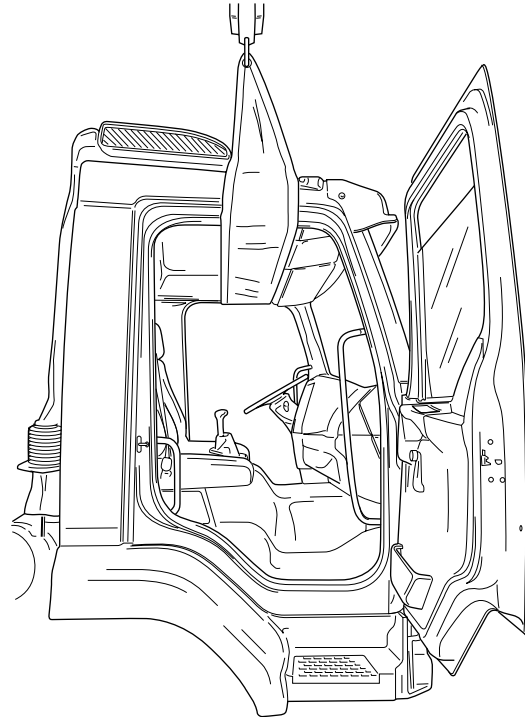
4.2 REMOVAL AND INSTALLATION, FRONT SPRING SUSPENSION CAB SUPPORT

Removing the cab support



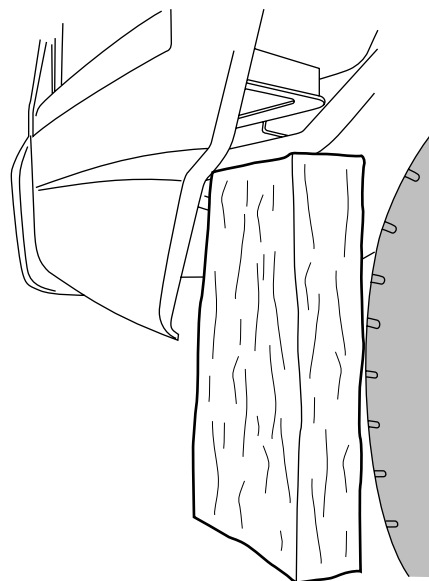
Only use approved lifting equipment.
Comply with general safety instructions when working with lifting equipment.

1. Suspend the cab from the hoisting belt.



K1 01 212

2. Place a block under the entrance step support on the side where the cab support will be removed.
3. Remove the headlight cover panel.



K1 01 198

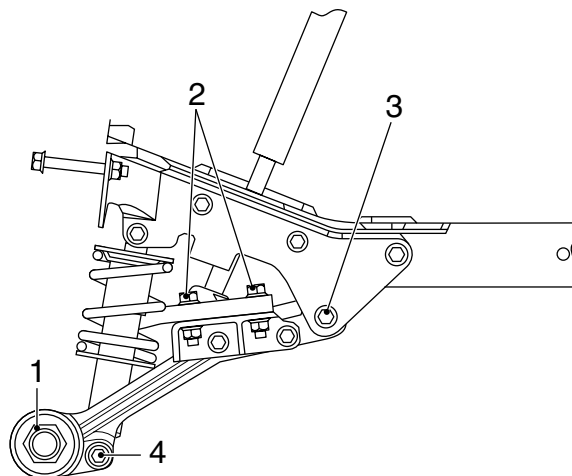
1

LF45/55 series

CAB SUSPENSION

Removal and installation

4. Remove the attachment bolt (1).
5. Remove the cab stabiliser attachment bolts (2).
6. Remove the attachment bolt (3).
7. Remove the suspension attachment bolt (4).
8. Remove the cab support.



K1 01 204

Installing the cab support

1. Fit the support.
2. Check the distance between the cab supports, see "Technical data".
3. Fit the attachment bolts (1) and (3) hand-tighten them with the bolt heads on the inside. Fit the attachment bolts (2) with the bolt heads facing upwards. Fit the attachment bolt (4) with the bolt head on the outer side.
4. Remove the block.
5. Lower the cab and secure the attachment bolt (3). Tighten the attachment bolt (1) to the specified torque. See "Technical data".
6. Remove the hoisting belt.
7. Inspect the cab for correct alignment, see "Inspection and adjustment".
8. Fit the headlight cover panel.

CAB SUSPENSION

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Removal and installation

LF45/55 series

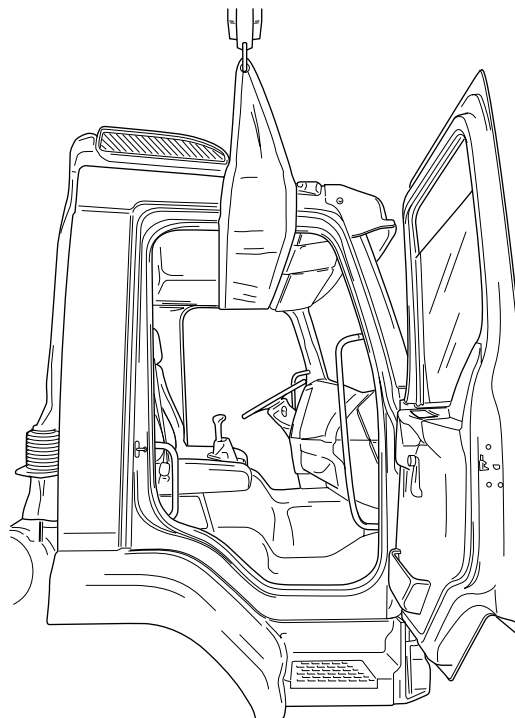
4.3 REMOVAL AND INSTALLATION, CAB FRONT RUBBER SUSPENSION SUPPORT

Removing the cab support



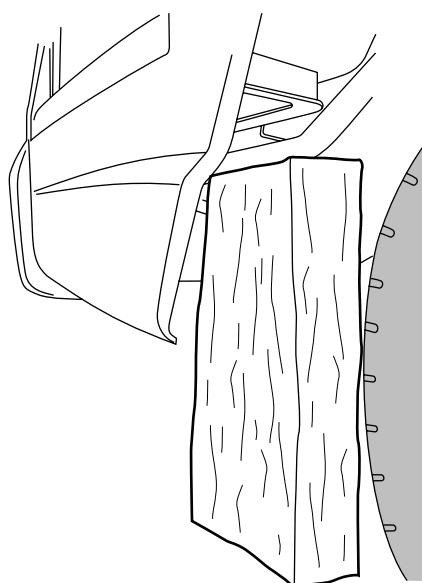
Only use approved lifting equipment.
Comply with general safety instructions when working with lifting equipment.

1. Suspend the cab from the hoisting belt.



K1 01 212

2. Place a block under the entrance step support on the side where the cab support will be removed.
3. Remove the headlight cover panel.



K1 01 198

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LF45/55 series

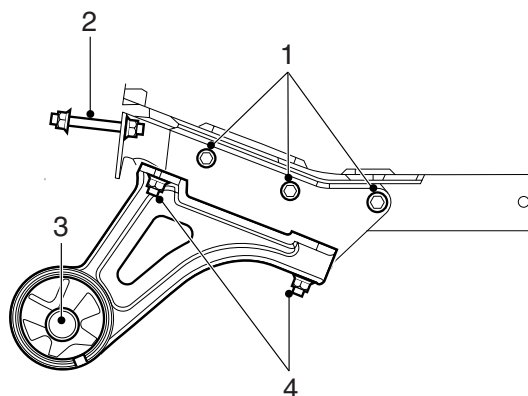
CAB SUSPENSION

Removal and installation

4. Remove the attachment bolt (3).
5. Remove the attachment bolts (4).
6. Remove the cab support.

Installing the cab support

1. Fit the support with the attachment bolts (4), with the bolt heads facing downwards.
2. Check the distance between the cab supports, see "Technical data".
3. Tighten the attachment bolts (4).
4. Remove the block.
5. Lower the cab, tighten the attachment bolt (3) with the bolt head on the outer side to the specified torque, see "Technical data".
6. Remove the hoisting belt.
7. Inspect the cab for correct alignment, see "Inspection and adjustment".
8. Fit the headlight cover panel.



K1 01 476

CAB SUSPENSION

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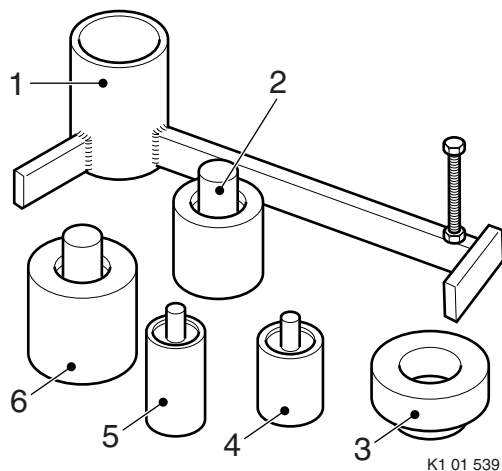
Removal and installation

LF45/55 series

4.4 REMOVAL AND INSTALLATION, SILENT BLOCKS OF FRONT SPRING SUSPENSION CAB SUPPORT

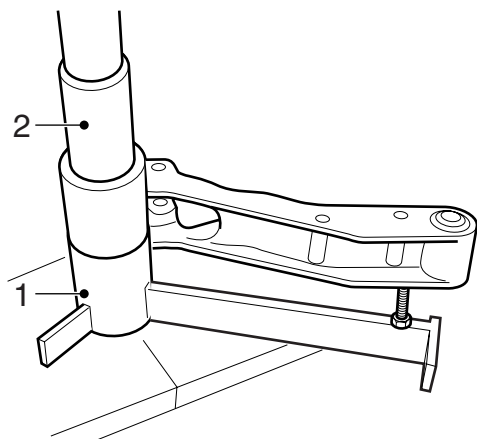
Note:

To remove and install the silent blocks, use special tool (DAF no. 1329471).



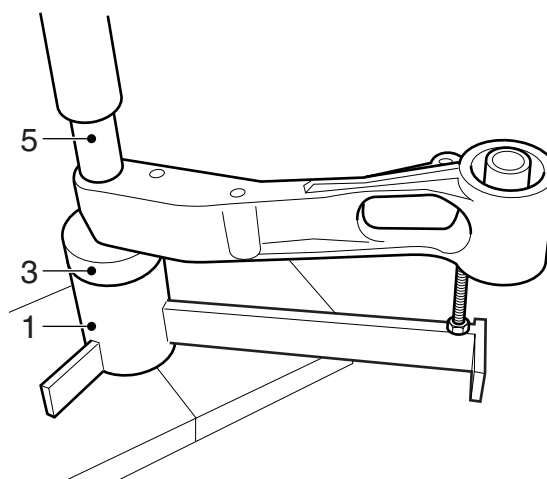
Removing the front silent block

1. Place the housing of the cab support on the base (1) of the special tool (DAF no. 1329471).
2. Force the front silent block (1) out of the housing using the press-out tool (2) of the special tool (DAF no. 1329471).



Removing the rear silent block

1. Place the back-up washer (3) of the special tool (DAF no. 1329471) on the base (1).
2. Place the housing of the cab support on the base (1) with the back-up washer (3).
3. Force the rear silent block out of the housing using the press-out tool (5) of the special tool (DAF no. 1329471).



5

1

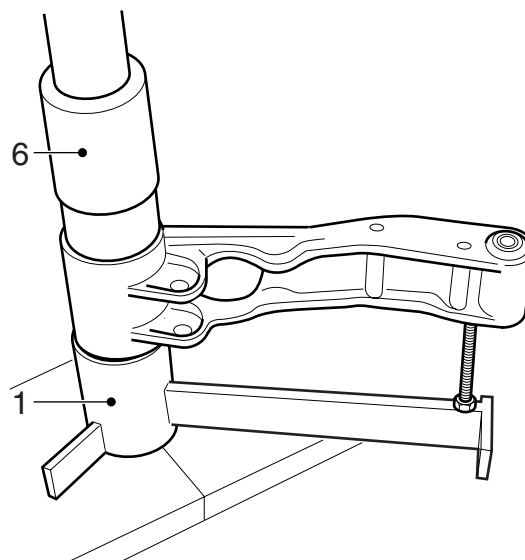
LF45/55 series

CAB SUSPENSION

Removal and installation

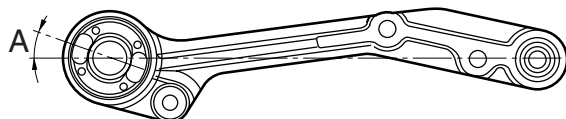
Installing the front silent block

1. Place the housing of the cab support on the base (1).



K1 01 537

2. Place the silent block, its openings in the right positions (angle A), on the housing of the cab support, see "Technical data".

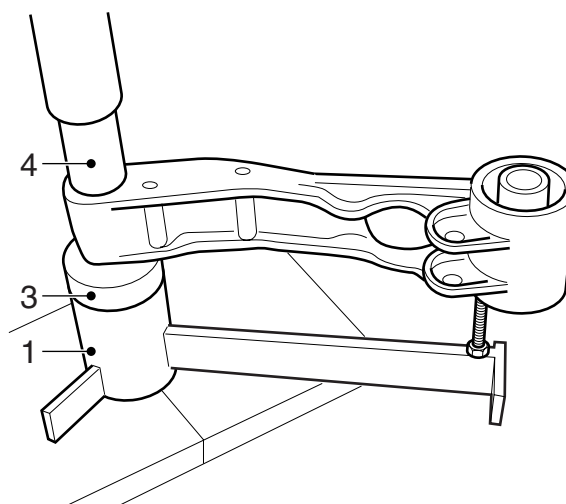


K1 01 442

3. Force the silent block into the housing using the press-in tool (6) of the special tool (DAF no. 1329471).

Installing the rear silent block

1. Place the back-up washer (3) on the base (1).
2. Place the housing of the cab support on the base (1) with the back-up washer (3).
3. Force the silent block into the housing using the press-in tool (4) of the special tool (DAF no. 1329471).



K1 01 536

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CAB SUSPENSION

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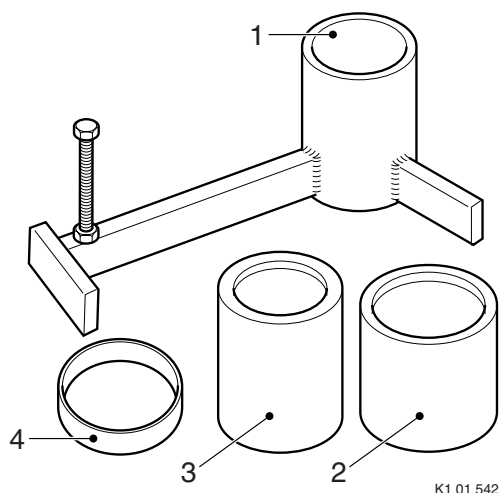
Removal and installation

LF45/55 series

4.5 REMOVAL AND INSTALLATION, SILENT BLOCK OF CAB FRONT RUBBER SUSPENSION SUPPORT

Note:

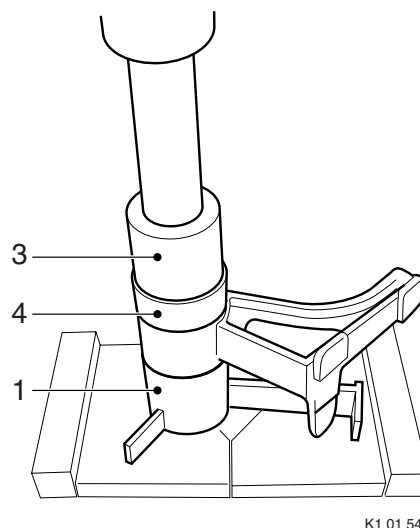
To remove and install the silent block, use special tool (DAF no. 1453126).



5

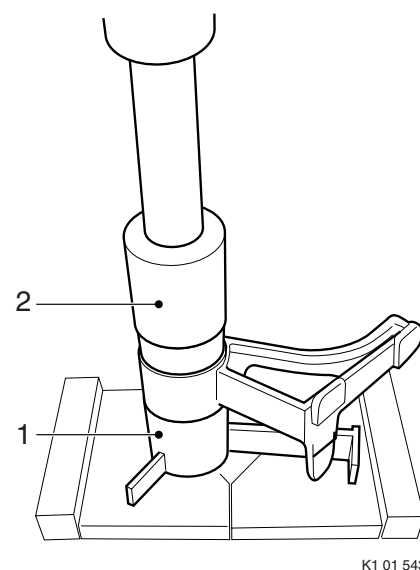
Removing the silent block

1. Place the housing of the cab support on the base (1) of the special tool (DAF no. 1453126).
2. Place the guide ring (4) of the special tool (DAF no. 1453126) over the edge of the silent block.
3. Force the silent block out of the housing using the press-out tool (3) of the special tool (DAF no. 1453126).



Installing the silent block

1. Place the housing of the cab support on the base (1).



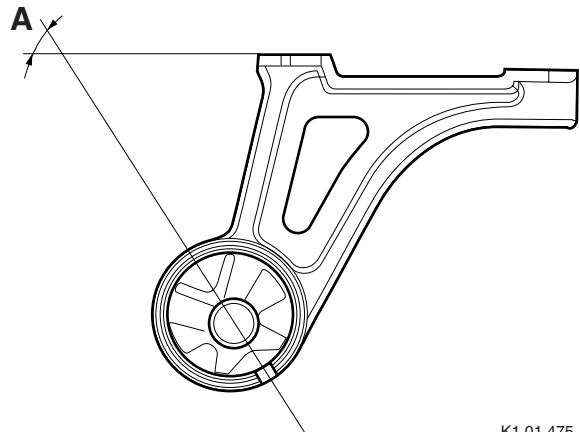
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LF45/55 series

CAB SUSPENSION

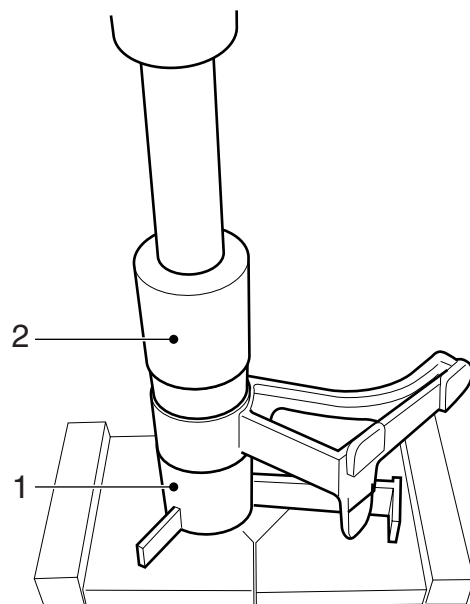
Removal and installation

2. Place the silent block, its openings in the right positions (angle A), on the housing of the cab support, see "Technical data".



K1 01 475

3. Force the silent block into the housing using the press-in tool (2) of the special tool (DAF no. 1453126).



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CAB SUSPENSION

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Removal and installation

LF45/55 series

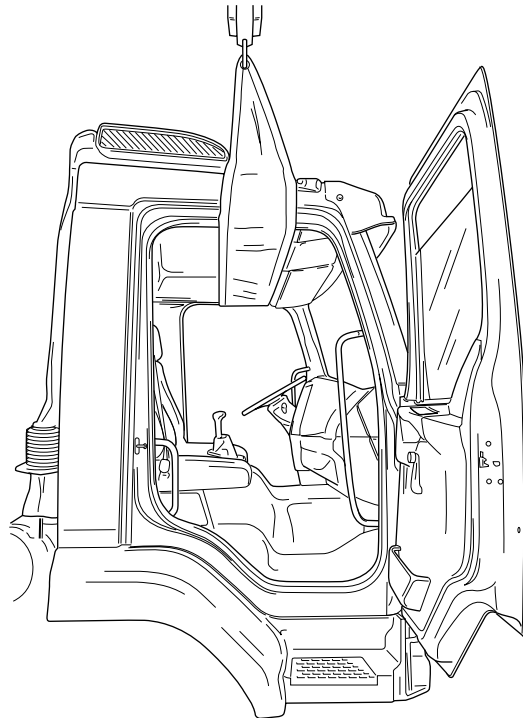
4.6 REMOVAL AND INSTALLATION, COIL SPRING FRONT SUSPENSION

Removing front spring suspension



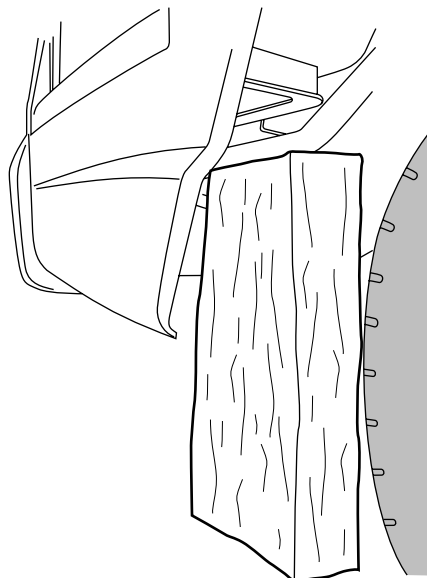
Only use approved lifting equipment.
Comply with general safety instructions when working with lifting equipment.

1. Suspend the cab from the hoisting belt.



K1 01 212

2. Place a block under the entrance step support on the side where the cab support will be removed.
3. Remove the headlight cover panel.



K1 01 198

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LF45/55 series

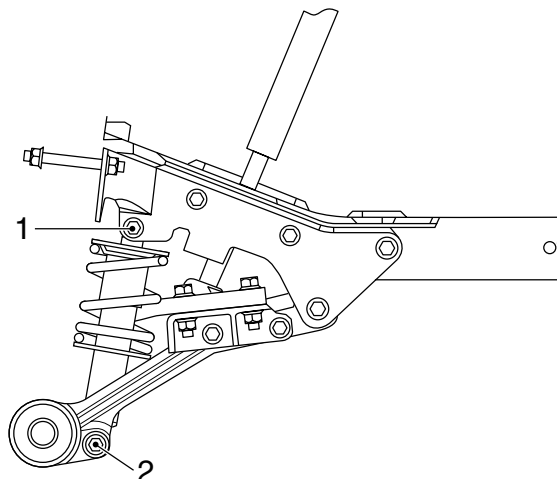
CAB SUSPENSION

Removal and installation

4. Remove the attachment bolts (1) and (2).
5. Remove the coil spring element.

Installing front spring suspension

1. Put the spring element in place.
2. Fit the attachment bolt (1) in the cab support with the bolt head on the inside.
3. Fit the attachment bolt (2) in the chassis support with the bolt head on the outer side.
4. Remove the hoisting belt.
5. Fit the headlight cover panel and secure it with the attachment bolts.



K1 01 205

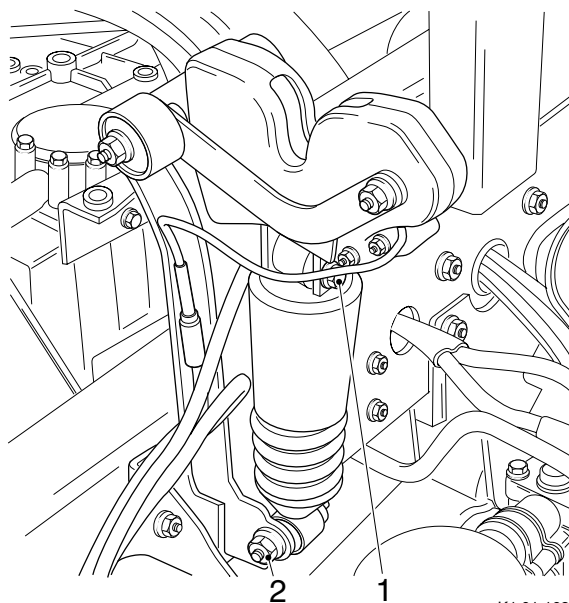
4.7 REMOVAL AND INSTALLATION, REAR COIL SPRING SUSPENSION

Removing rear coil spring suspension

1. Tilt the cab forward.
2. Remove the attachment bolt (1) at the top of the spring element.
3. Remove the attachment bolt and nut (2) at the top.
4. Remove the spring element.

Installing rear coil spring suspension

1. Put the spring element in place.
2. Hand-tighten the attachment bolt (1).
3. Fit the attachment bolt and nut (2) and hand-tighten them.
4. Tilt the cab back.
5. Tighten the attachment bolts and nuts (1), (2).



K1 01 162

CAB SUSPENSION

1

Removal and installation

LF45/55 series

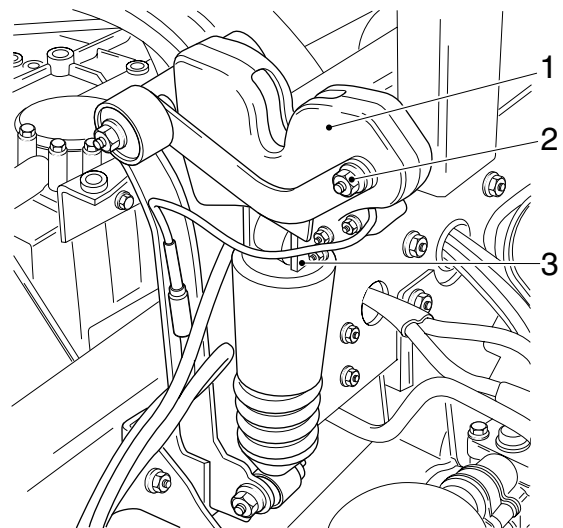
4.8 REMOVAL AND INSTALLATION, CAB LOCKING MECHANISM

Removing cab locking mechanism

1. Tilt the cab until it is released from the cab lock.
2. Support the cab using a hoist or place a block or support underneath.
3. Switch the tilting pump to reverse tilting.
4. Remove the proximity switch connector at the right-hand side.
5. Remove the hydraulic line (quick-release coupling).
6. Remove the attachment bolts (2 and 3).
7. Remove the cab lock (1).

Installing cab lock mechanism

1. Fit the cab-locking mechanism (1).
2. Fit the attachment bolts (2 and 3) and hand-tighten them.
3. Connect the hydraulic line.
4. Fit the connector of the cab tilting switch.
5. Carefully lower the cab. When doing so, ensure that the locks are open.
6. Tighten the attachment bolts (2 and 3).



K1 01 203

4.9 REMOVAL AND INSTALLATION, COMPLETE CAB

Removing complete cab



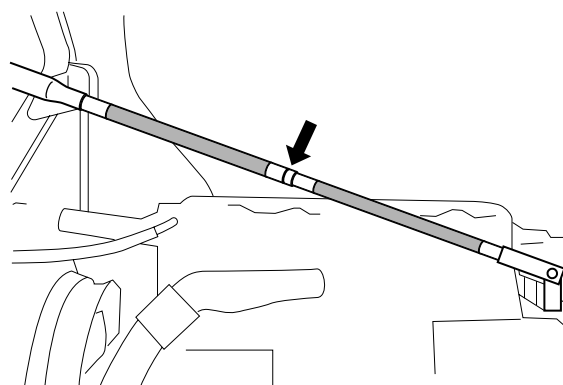
**Only use approved lifting equipment.
Comply with general safety instructions when working with lifting equipment.**

1. Disconnect the earth lead from the battery terminal.

Note:

Work on the air conditioning unit should only be carried out by qualified personnel.

2. If applicable, drain the air conditioning unit.
3. Drain the cooling water. Remove cooling water pipes.
4. Tilt the cab forward. Remove the spring clip from the selector rod. Pull the selector rod apart.
5. Tilt the cab back and place wood blocks under the cab, so that it does not go into the locked position.



K1 01 213

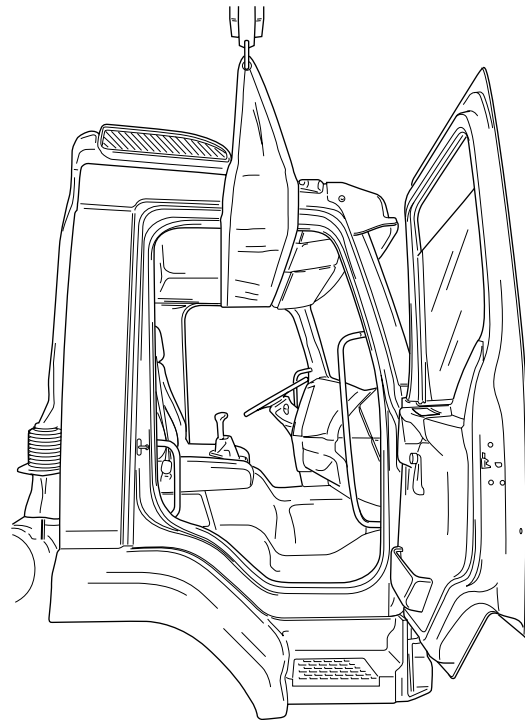
CAB SUSPENSION

1

Removal and installation

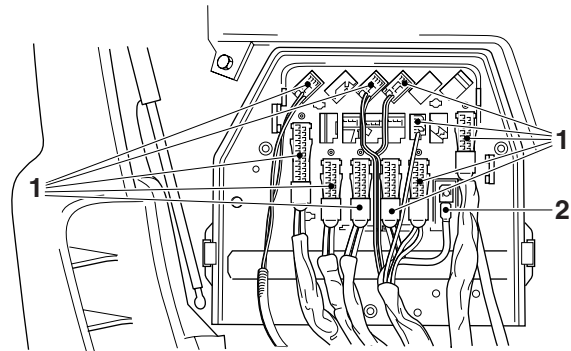
LF45/55 series

6. Fit the hoisting belt to support the cab.



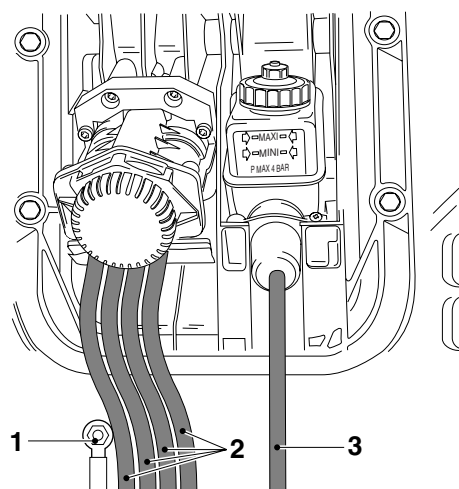
K1 01 212

7. Remove the cover from the cab lead-through and remove the positive cable (2).
8. Remove the connectors (1).
9. Remove the wiring harness attachment.
10. Remove the air pipes from the cab lead-through.



G0 00 203

11. Disconnect the air pipes (2) from the service brake valve.
12. Remove the clutch cylinder pipe (3). Collect the clutch fluid.
13. Remove the earth lead (1).
14. Remove the (air) pipe attachment.
15. Remove the lifting cylinder pin.



K1 01 214

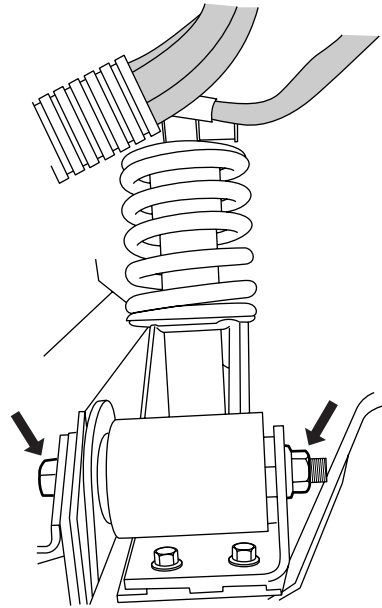
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LF45/55 series

CAB SUSPENSION

Removal and installation

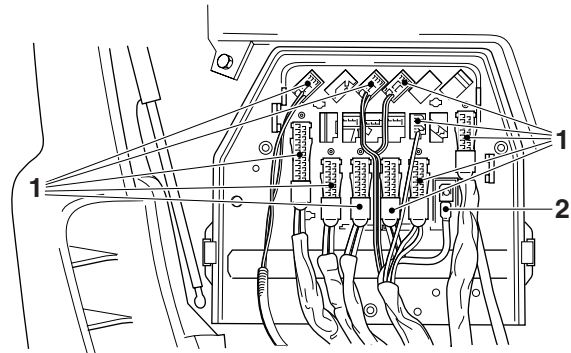
16. Hoist the cab a little way and remove the attachment bolts at the front.
17. Remove the complete cab.



K1 01 218

Installing complete cab

1. Install the cab.
2. Fit the attachment bolts at the front.
3. Fit the lifting cylinder pin.
4. Connect the air pipes to the cab lead-through.
5. Fit the connectors (1). Fit the positive cable (2).



G0 00 203

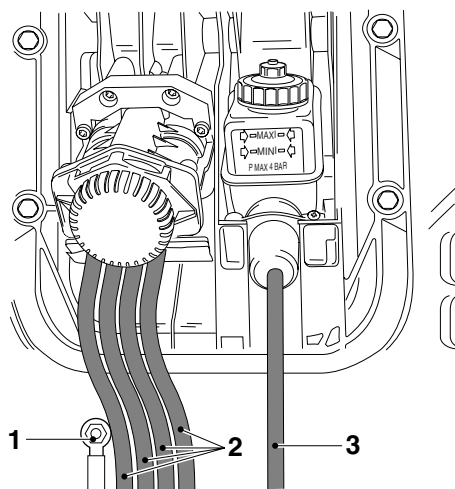
CAB SUSPENSION

1

Removal and installation

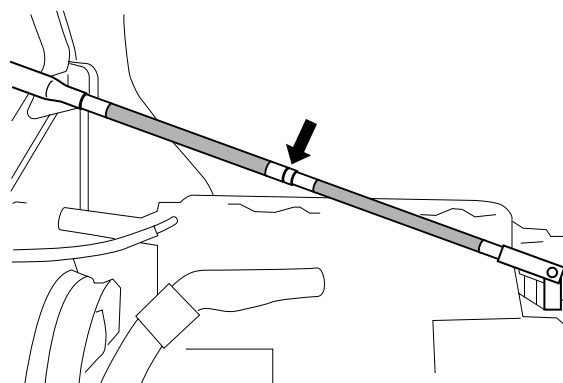
LF45/55 series

6. Fit the pipes (2) to the service brake valve. Secure the clutch cylinder (3) pipe with the retaining clip. Bleed the clutch cylinder.
7. Fit the earth lead (1).



K1 01 214

8. Secure pipes with clamping strips to prevent chafing and pipes being worn through.
9. Remove the hoisting belt.
10. Tilt the cab forward.
11. Re-connect the selector rod and fit the spring clip in the selector rod.



K1 01 213

12. Fit the coolant hoses. Fill the cooling system.
13. Fill the air conditioning unit, if necessary..
14. Fit the earth lead to the battery terminal.

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CAB TILTING GEAR

1

Contents

LF45/55 series

6

1. SAFETY INSTRUCTIONS

General

The cab is equipped with a hydraulic tilting gear. The pump is located on co-driver's side at the rear of the cab. The cab locks are opened hydraulically during pumping.

Before tilting the cab, make sure that the doors are closed, that there are no loose items in the cab and that the gear lever is in neutral. Tilt the cab fully forward if work is to be carried out underneath the cab.



You can stop the cab tilting forward at any time by turning the cock to the reverse tilting position.



When working on a tilted cab (for example when welding, spray-painting or applying bitumen coatings), be sure to cover the piston rod of the lifting cylinder. Welding spatter and paint on the piston rod will inevitably cause damage to the oil seal.

Inspection after a collision

Before tilting the cab after a collision, check the cab rests, the cab hinges and the attachment of the lifting cylinder to the chassis member and cab for cracks.



If the vehicle has been involved in a collision, the cab must under no circumstances be tilted without due precautions. The end stop in the lifting cylinder may be damaged, which might cause the cab to shoot past its end stop.

If possible, suspend the cab in slings and put a stand in front of the cab. Make sure that there is no one in front of the cab while it is being tilted.

CAB TILTING GEAR

1

Safety instructions

LF45/55 series

Replacing the lifting cylinder

After a collision, **always** check the lifting cylinder for internal damage.

Replace the lifting cylinder if it is damaged or if you are in doubt as to its condition.

Always replace the cylinder if one of the following points has occurred during a collision:

- A. the cab has been pulled out of the cab locks,
- B. the cab locks have been deformed or damaged,
- C. the rear cab springs have been deformed or damaged.

2. GENERAL

2.1 SYSTEM DESCRIPTION, CAB TILTING MECHANISM

General

The cab is equipped with a hydraulic tilting gear.

The pump is on co-driver side behind the stepwell.

The cab locks are automatically released during pumping.

The hydraulic locking mechanism has a switch on one side, to activate the warning light for tilted cab (in the instrument panel).

If the vehicle has been involved in a collision, check the following points before tilting the cab.

- cab rests,
- cab hinges,
- attachment of the lifting cylinder,
- hydraulic system for leakage.

After this check, continue to proceed with utmost care.

If possible, suspend the cab in slings and put a stand in front of the cab.

After a collision, always check the lifting cylinder for internal damage.

Tilting the cab:

- Make sure there are no people immediately in front of the cab.
- Make sure there is sufficient clearance around the cab.
- Make sure there are no loose objects inside the cab.
- Apply the parking brake.
- Move the gear lever to the right position and turn off the engine.
- Close the doors.
- Turn the cab-tilting pump cock as far to the right as possible.
- Position the rod in the pump and operate the pump.

You can stop the cab tilting forward at any time by turning the cock anticlockwise.

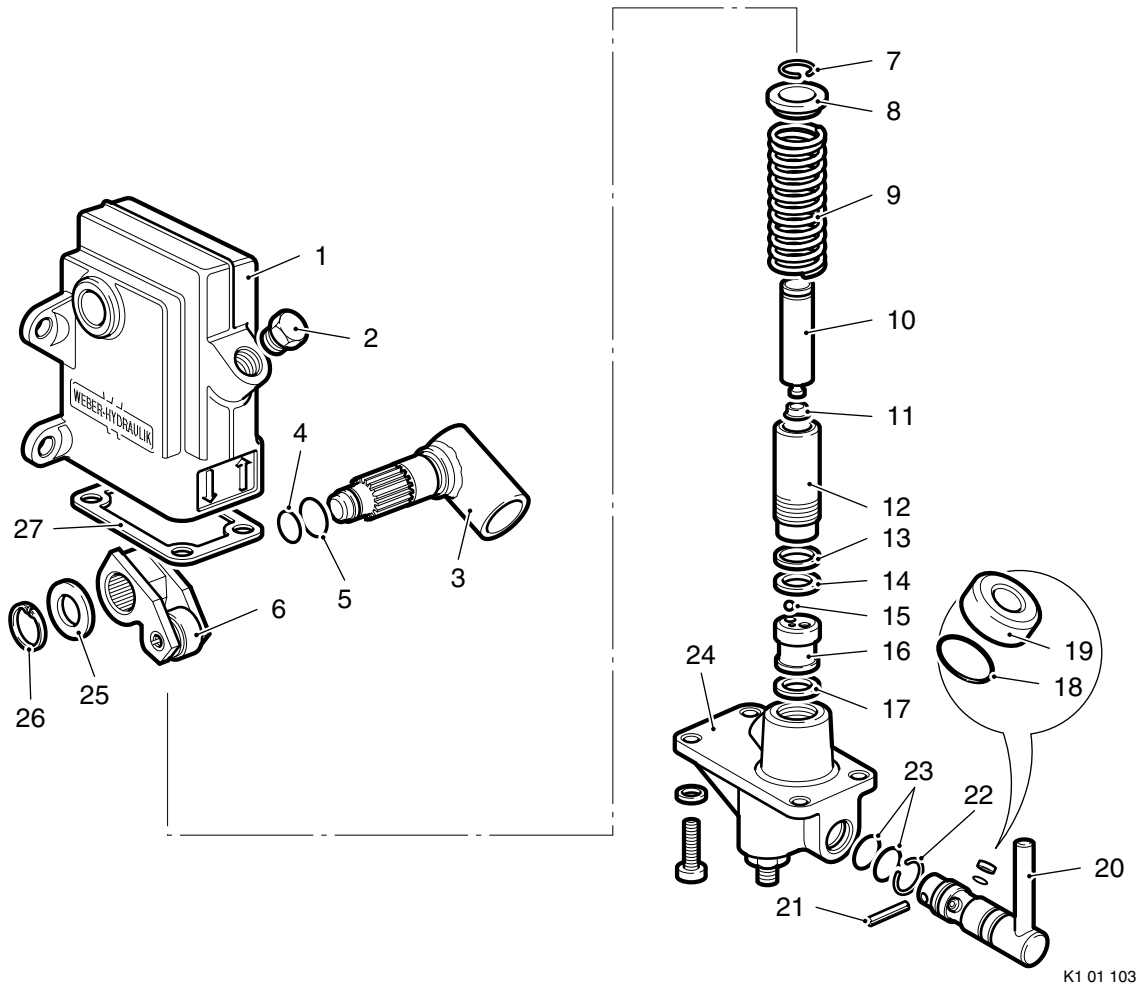
CAB TILTING GEAR

1

General

LF45/55 series

2.2 OVERVIEW DRAWING, CAB TILTING PUMP



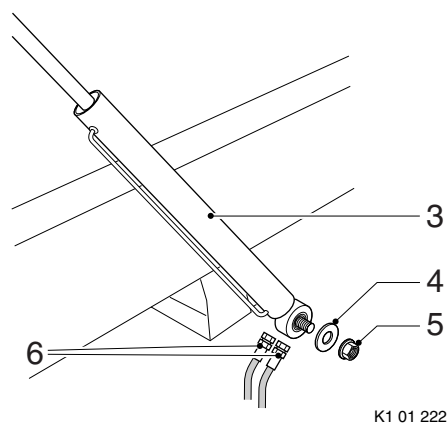
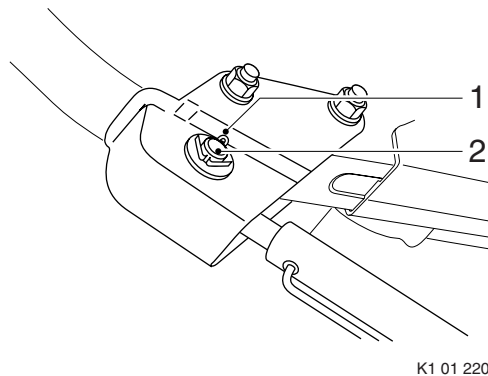
Legend

- | | |
|---------------------|------------------------|
| 1. Reservoir | 15. Ball |
| 2. Filler plug | 16. Valve block |
| 3. Lever block | 17. Copper washer |
| 4. O-ring | 18. O-ring |
| 5. O-ring | 19. Seal |
| 6. Cam | 20. Direction selector |
| 7. Circlip | 21. Pin |
| 8. Washer | 22. Circlip |
| 9. Spring | 23. O-ring |
| 10. Plunger | 24. Pump housing |
| 11. Grooved ring | 25. Spacer |
| 12. Plunger housing | 26. Spring washer |
| 13. Seal | 27. Gasket |
| 14. Copper washer | |

2.3 OVERVIEW DRAWING, LIFTING CYLINDER

Legend

1. Split pin
2. Dowel pin
3. Lifting cylinder
4. Washer
5. Bottom attachment nut
6. Hydraulic lines



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3. INSPECTION AND ADJUSTMENT

3.1 CHECKING CAB-TILTING PUMP

Checking cab-tilting pump

1. Check all hoses and connections for any leakage.
2. Disconnect the hoses from the pump and close off the connections to the pump.
3. Check the oil level in the pump.
4. Place the switch cock in the "lowering" position, apply a few pump strokes and check whether the pressure-relief valve is activated. Then place the switch cock in the "lifting" position and check the operation of the pressure-relief valve again.
5. Inspect the pump plunger for any leakage.

If the above checks of the pump are unsuccessful, the lifting cylinder is defective. A defective pump is often the result of contaminated hydraulic oil.

CAB TILTING GEAR

1

Inspection and adjustment

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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, LIFTING CYLINDER

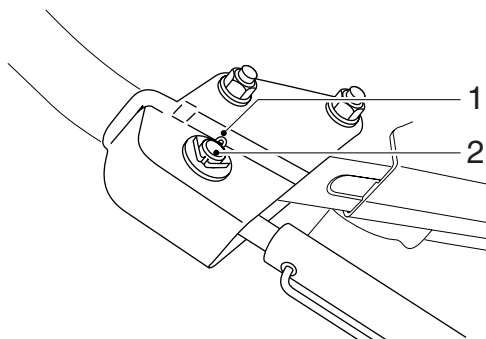
Removing lifting cylinder

Notes:

Do **not** remove the lifting cylinder while the cab is in the tilted position.

Mark the piping before removing it.

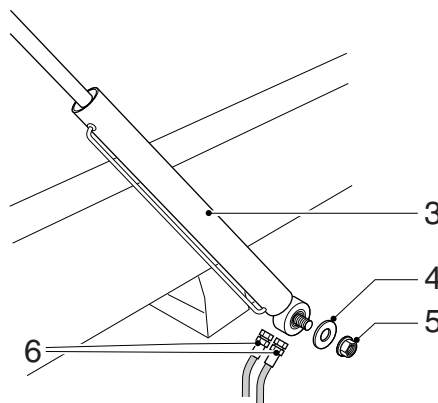
1. Remove all dirt and grease in the cylinder.
2. Place an appropriate receptacle under the pump, loosen the hydraulic pipes (6) and plug the ends to prevent dirt getting in.
3. Remove the split pin (1) from the cab support. Remove the pin (2).



4. Remove the nut and washer (4 and 5).
5. Remove the lifting cylinder (3).

Installing lifting cylinder

1. Fit the lifting cylinder (3).
2. Fit the washer and nut (4 and 5) to the underside.
3. Position the lifting cylinder. Fit the pin (2) with the split pin (1) to the cab support.
4. Connect the pipes (6). Bleed the cylinder, see "Draining and filling".



CAB TILTING GEAR

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Removal and installation

LF45/55 series

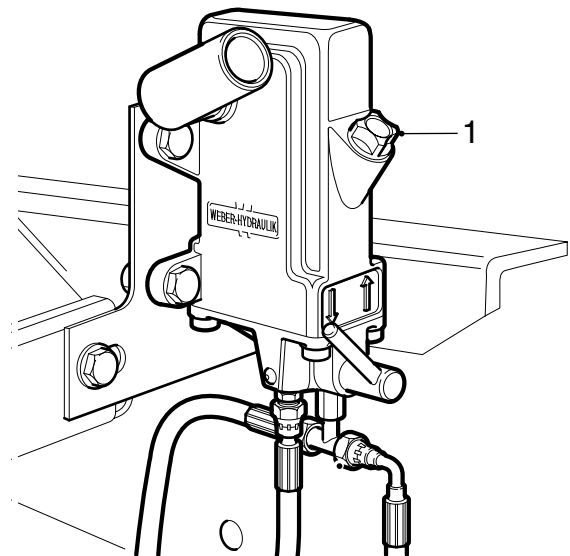
4.2 REMOVAL AND INSTALLATION, CAB TILTING PUMP

Removing cab tilting pump

1. Remove all dirt and grease from the pump.
2. Place a receptacle beneath the pump to capture any escaping fluid.
3. Mark the pipes and take them out of the pump holder, plug the ends of the pipes to prevent dirt getting in.
4. Remove the nuts and attachment bolts that connect the pump to the chassis bracket, and remove the pump.

Installing cab tilting pump

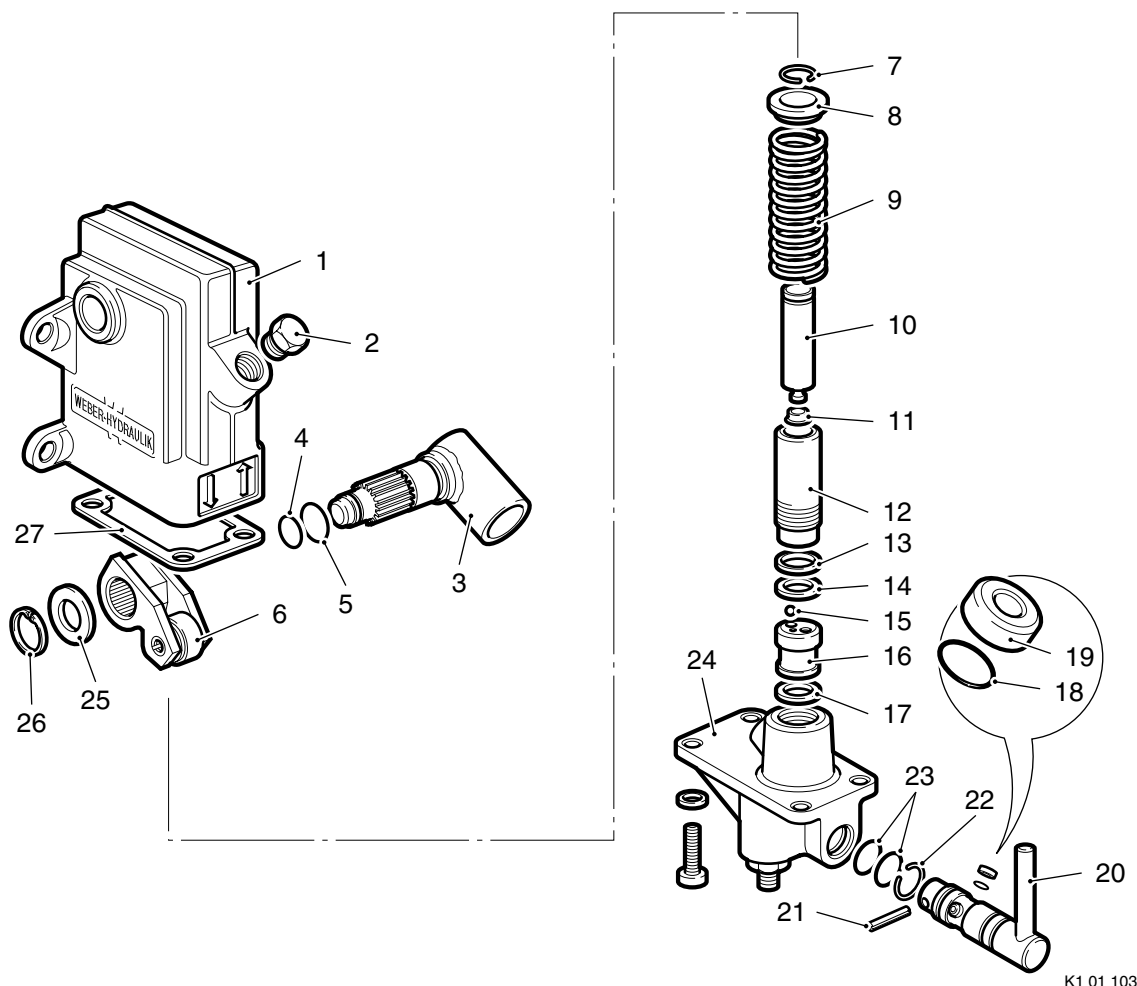
1. Install the cab tilting pump. Secure the cab tilting pump with the attachment bolts.
2. Fit the pipes.
3. For filling (1) and bleeding, see "Draining and filling".



K1 01 105

5. DISASSEMBLY AND ASSEMBLY

5.1 DISASSEMBLY AND ASSEMBLY, CAB TILTING PUMP



Disassembling cab tilting pump

1. Remove the pump, see "Removal and installation".
2. Remove the socket head screws and take the pump housing (24) out of the reservoir (1). Take account of the fact that the pump housing is spring-loaded.
3. Remove the gasket (27).
4. Take the circlip (7), plunger (10), grooved ring (11), spring washer (8) and the spring itself out of the plunger housing (12).

CAB TILTING GEAR

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Disassembly and assembly

LF45/55 series

5. Turn the plunger housing (12) off the pump housing (24) and remove the seal (13) and the copper washer (14).
6. Push the valve block (16) out of the pump housing and pay attention to the ball (15).
7. Remove the copper washer (17).

Note:

The valve block (16) is a sealed unit with a pressure-relief valve inside that is set by the manufacturer and cannot be taken apart.

8. Tap the pin (21), which attaches the cross bar and within it the direction selector (20), until it is loose and take the cross bar carefully off the housing. Pay attention to the O-rings (18) and (23) and seal (19).
9. Remove the spring washer (26) and the spacer (25) that secure the lever block (3).
10. Remove the lever block (3) and the cam (6) of the reservoir (1). Pay attention to the O-rings (4) and (5).

Assembling cab tilting pump

1. Check and the O-rings (4) and (5) and replace them if necessary. Fit the lever block (3) and the cam (6) with O-rings (4) and (5) in the reservoir (1).
2. Fit the spacer (25) and the spring washer (26) to the lever block (3).
3. Check the O- rings (18) and (23) and the seal (19). Replace them if necessary.
4. Fit the O- rings (18) and (23) and the seal (19) to the direction selector (20). Fit the direction selector (20) into the pump housing (24).
5. Fit the pin (21).
6. Place the copper washer (17) on the pump housing (24) and fit the valve block (16). Pay attention to the ball (15).

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CAB TILTING GEAR

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Disassembly and assembly

7. Check seal (13) and replace if necessary.
8. Turn the plunger housing (12) with the seal (13) and copper washer (14) in the pump housing (24).

Note:

The bevelled side of the seal (13) points in the direction of the plunger housing (12).

9. Fit the grooved ring (11) and the plunger (10) in the plunger housing (12).
10. Fit the spring (9), the spring washer (8) and the circlip (7).
11. Fit a new gasket to the pump housing (24).
12. Fit the pump housing (24) in the reservoir (1) in line with the marks.
13. Tighten the socket head screws.

CAB TILTING GEAR

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Disassembly and assembly

LF45/55 series

6. DRAINING AND FILLING

6.1 FILLING AND BLEEDING, TILTING MECHANISM

Filling and bleeding, cab tilting mechanism

Note:

The cab tilting pump and lifting cylinder are self-bleeding.

The cab must be tilted completely back.

Check whether the lifting components have been fitted correctly and whether the connected piping is secure enough.

1. Fill the reservoir to the maximum level, see fluids and lubricants specifications.
2. Put the pump in the forward tilting position.
3. Tilt the cab completely forward.
4. Tilt the cab all the way back.
5. Remove the filler plug and top up the oil.
6. Repeat this process three times to bleed the whole system.
7. Fit the filler plug.

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Draining and filling

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4.30 Removal and installation, height adjustment handle of gas-sprung seat ...	4-26	0210
4.31 Removal and installation, gas spring of gas-sprung seat	4-27	0210

SEATS

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1. SAFETY INSTRUCTIONS

- Replace the seat belt if the belt is worn or damaged.
- If the seat belts have been highly stressed during a collision, the entire mechanism must be replaced, even if no damage can be observed.
- Always check the seat attachments for any fractures or cracks after a collision.
- After a collision, always check whether the seat attachment bolts have been subjected to excessive stress.
- Do not use abrasive cleaning agents to clean the seat belts; these may damage the seat belt material.
- Seat repairs must be carried out by trained technicians only.
- The illustrations in this manual usually represent the left-hand seat or the left-hand side. For the right-hand seat or right-hand side, repairs are carried out in a similar way.
- After each repair, a functional test must be carried out; in the case of pneumatic repairs, also carry out an air-tightness test.
- Do not lean on the seat if the back rest has been fully folded forwards.
- It is necessary, however, to restore the routes of the air pipes and cables and their connections in the original positions.
- Also keep to the proper colour position when installing the air pipes.
- Air pipes and cables must not be kinked.
- In the case of transport and storage, ensure that the seat is placed on its longitudinal slides.

SEATS

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Safety instructions

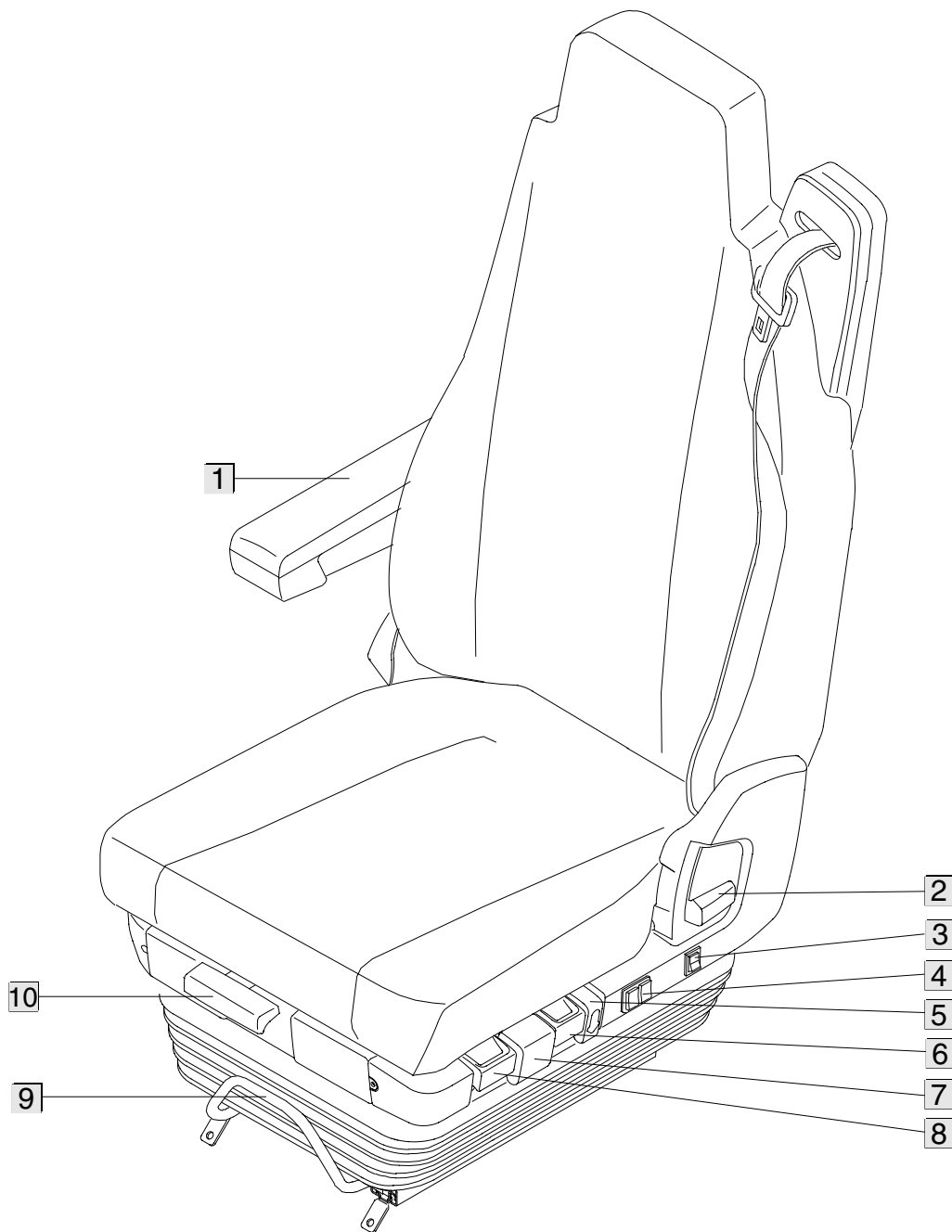
LF45/55 series

SEAT WITH SEAT BELT TENSIONERS

- If a seat is equipped with a seat belt tensioner, the system manual for the airbag and seat belt tensioner must be consulted for the various safety instructions and instructions for packing and treating pyrotechnic components.
- A seat with seat belt tensioner can be identified by the airbag. If a vehicle is equipped with an airbag, the driver seat automatically also has a pyrotechnic seat belt tensioner.
- A vehicle with an airbag can be identified by the text "airbag" on the steering wheel and by a sticker on the windscreen stating that the vehicle is equipped with an airbag.

2. GENERAL

2.1 OPERATION



K1 01 371

Legend

- | | |
|--------------------------------------|--|
| 1. Arm rest | 6. Seat height operating lever |
| 2. Backrest adjuster operating lever | 7. Seat tilting operating lever |
| 3. Seat heating switch | 8. Operating lever for shock absorber adjuster |
| 4. Lumbar position switches | 9. Seat adjuster |
| 5. Rapid-lowering operating lever | 10. Seat squab adjuster |

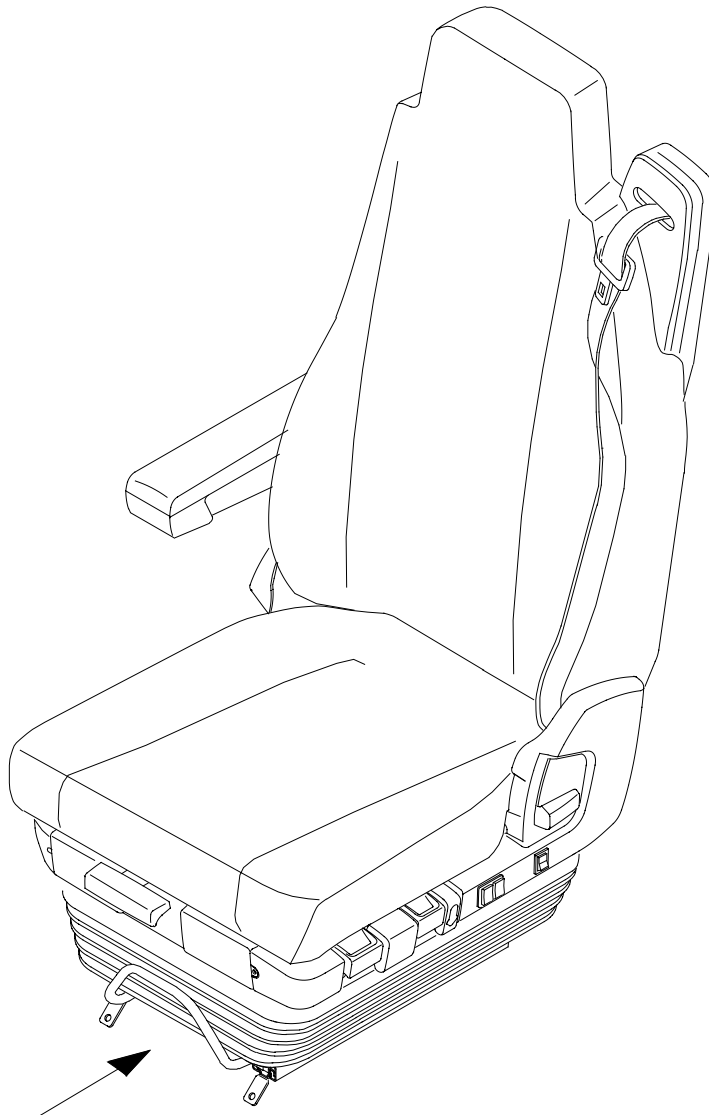
SEATS

1

General

LF45/55 series

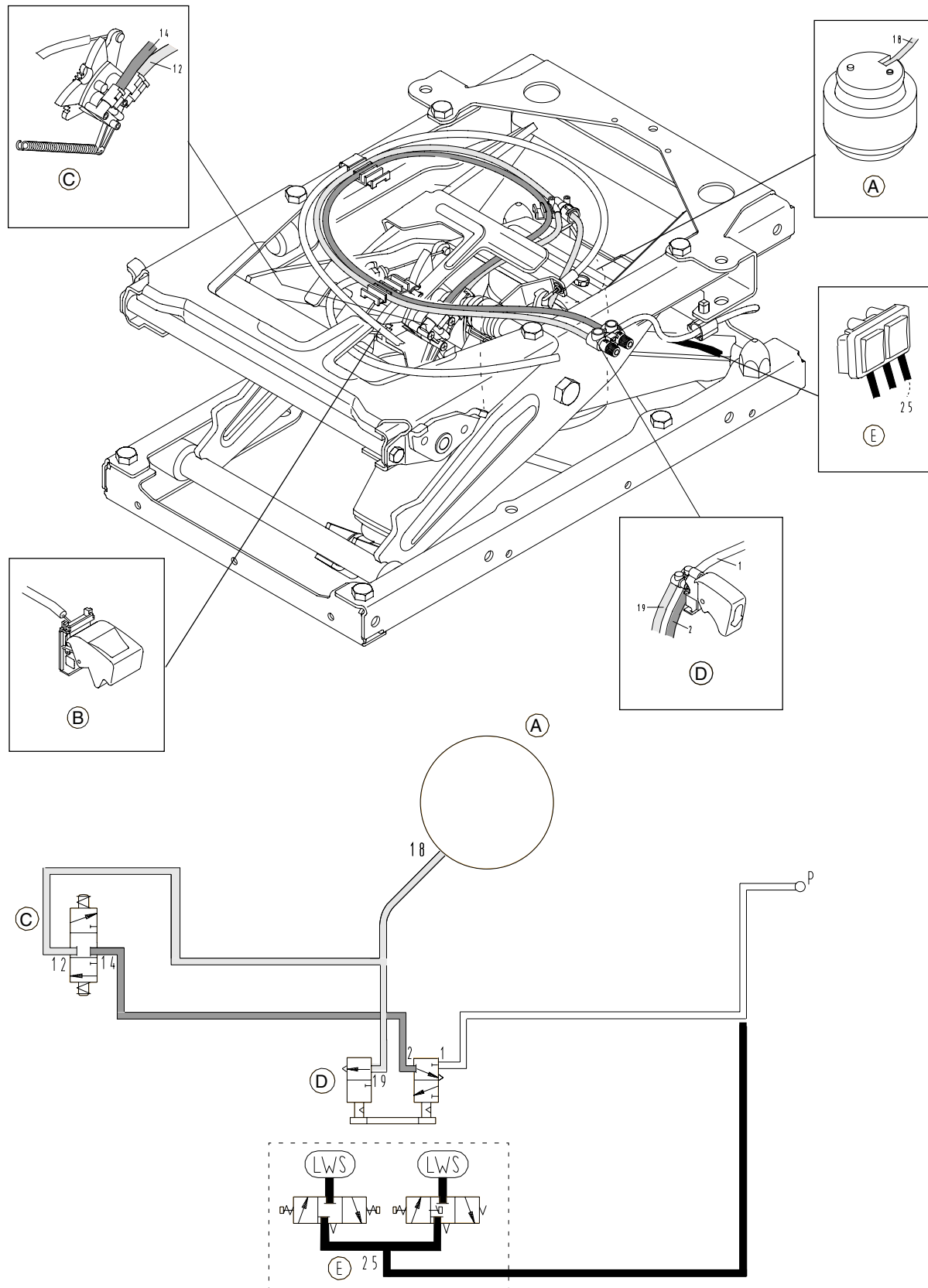
2.2 SERIAL/TYPE PLATE OF SEAT



K1 01 372

- The sticker with the serial number is located on the guide rail at the side of the seat. Other stickers with serial and part numbers are located on the front of the seat frame and are visible upon removal of the seat squab.
- When ordering parts, always state the serial number of the seat.

2.3 SYSTEM DESCRIPTION, AIR-SPRUNG SEAT



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SEATS

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General

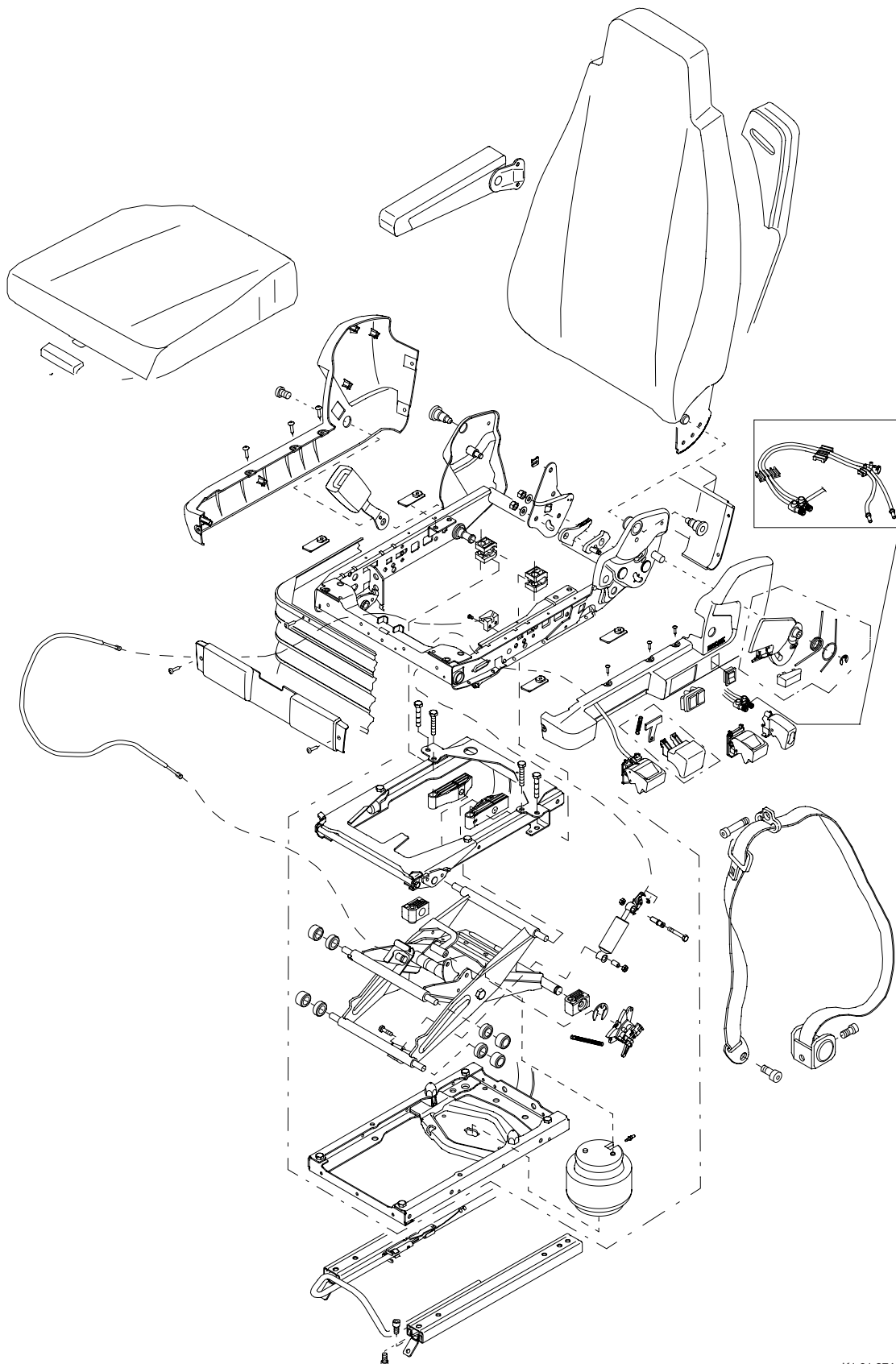
LF45/55 series

Legend

- A. Air bellows
- B. Height adjustment
- C. Height control valve
- D. Rapid-lowering valve
- E. Lumbar position adjustment valve

- p. Air supply

2.4 OVERVIEW DRAWING, AIR-SPRUNG SEAT



K1 01 374

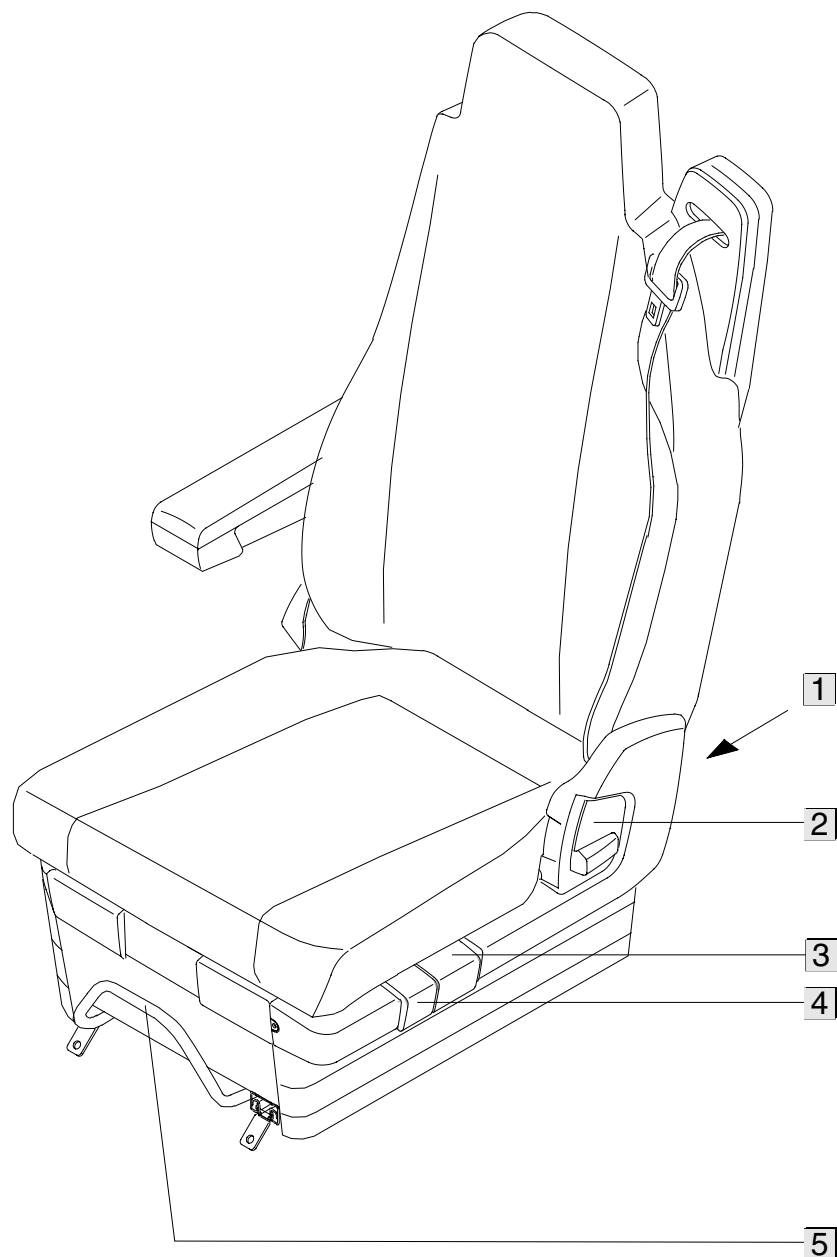
SEATS

1

General

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2.5 OPERATION, GAS-SPRUNG SEAT

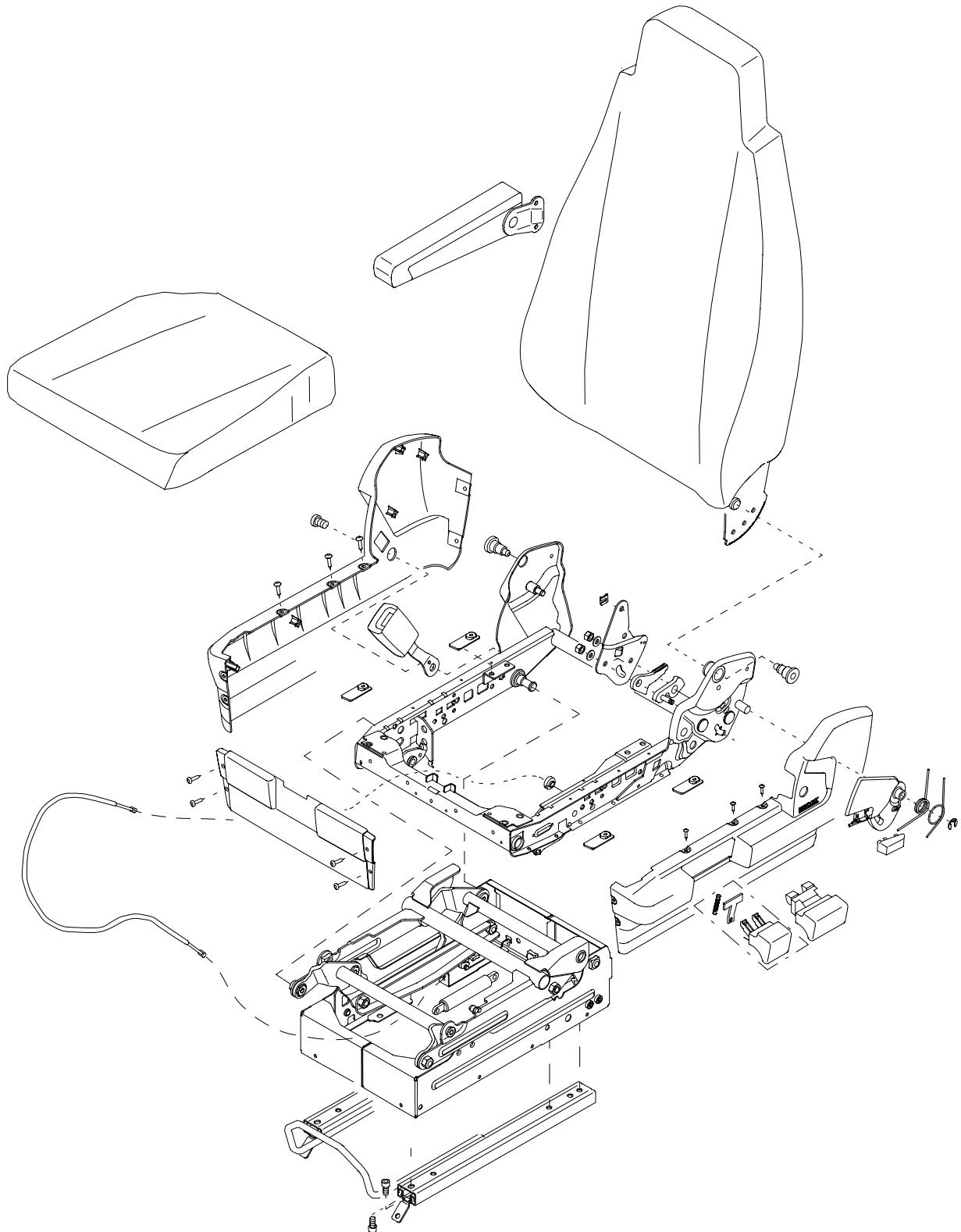


K1 01 375

Legend

1. Serial number
2. Backrest adjuster operating lever
3. Seat height operating lever
4. Seat tilting operating lever
5. Seat adjuster

2.6 OVERVIEW DRAWING, GAS-SPRUNG SEAT



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SEATS

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General

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3. INSPECTION AND ADJUSTMENT

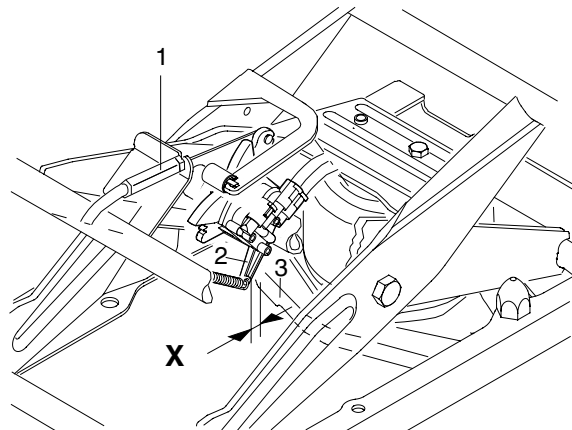
3.1 INSPECTION, SEAT BELT OPERATION

- Pull the belt quickly out of its retracting unit to test the locking action. The belt must lock. It must not be possible to pull the belt out any further after locking.
- Check the seat belts for wear.

3.2 ADJUSTING THE CONTROL CABLE OF THE HEIGHT CONTROL VALVE

Adjusting the control cable of the height control valve

1. Remove the seat squab.
2. Loosen the lock nut of the cable tensioner (1).
3. Set the seat in its highest position.
4. Adjust the distance (X) between the operating lever (2) of the height control valve and the bottom air bellows carrier (3) to the prescribed distance, see "Technical data".



SEATS

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Inspection and adjustment

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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, SEAT ASSEMBLY

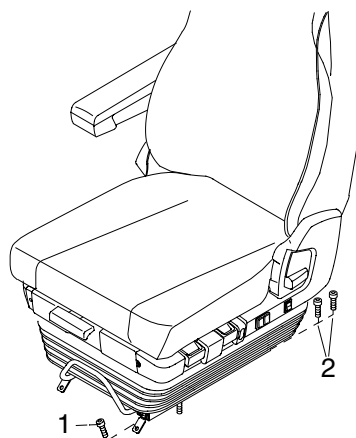
- If the seat is equipped with seat belt tensioners, turn the ignition off and disconnect the batteries before disconnecting the plug of the seat belt tensioner in the seat.
- If the vehicle is equipped with an airbag, the seat automatically has a seat belt tensioner. You can identify the presence of an airbag by the text on the steering wheel and a sticker on the windscreen stating "airbag".

Removing seat assembly

1. Remove the air pipe while pressing the circlip of the quick-release coupling and pulling the pipe from the coupling.
2. Detach the electric seat heating connector.
3. If applicable, unplug the seat belt tensioner connector.
4. Slide the seat backwards and remove the front attachment screws (1) of the seat slide.
5. Slide the seat forwards and remove the rear attachment screws (2) of the seat slide.
6. Remove the seat from the cab.

Installing seat assembly

1. Position the seat on the seat rails with the centring pins in the centring holes in the cab. Make sure that the air pipes and power supply cables do not get pinched off.
2. Slide the seat backwards and tighten the front attachment screws (1).
3. Slide the seat forwards and tighten the rear attachment screws (2).
4. Connect the air pipe.
5. Install the seat heating connector.



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SEATS

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Removal and installation

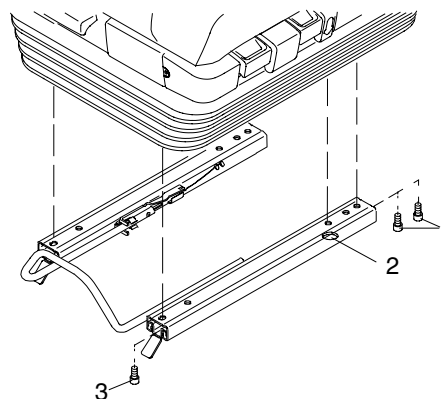
LF45/55 series

6. Fit the seat belt tensioner connector.
7. Connect the batteries.

4.2 REMOVAL AND INSTALLATION, SEAT SLIDE

Removing seat slide

1. Remove the seat assembly.
2. Slide both seat slides forwards until the rear attachment screws (1) can be reached through the holes (2) in the slide.
3. Remove the rear attachment screws.
4. Slide the seat slides backwards.
5. Remove the front attachment screws (3).
6. Take the seat slides off the seat frame.



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Installing seat slide

1. Fit the seat slides to the seat frame using the front attachment screws (3).
2. Fit the rear attachment screws (2) through the mounting holes in the seat slides (1).
3. Install the seat assembly.

7

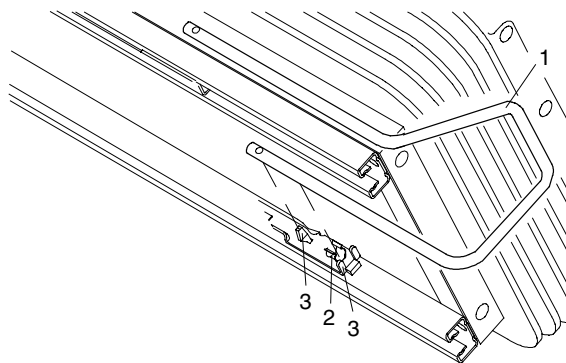
4.3 REMOVAL AND INSTALLATION, SEAT ADJUSTING MECHANISM

Removing seat adjusting mechanism

1. Slide the seat into the frontmost position.
2. Press the bracket (1) of the seat adjusting mechanism out of the attachment clamp (2) and the supporting cams (3).

Installing seat adjusting mechanism

1. Press the seat adjusting mechanism bracket (1) on either side into the attachment clamps (2) and the supporting cams (3).

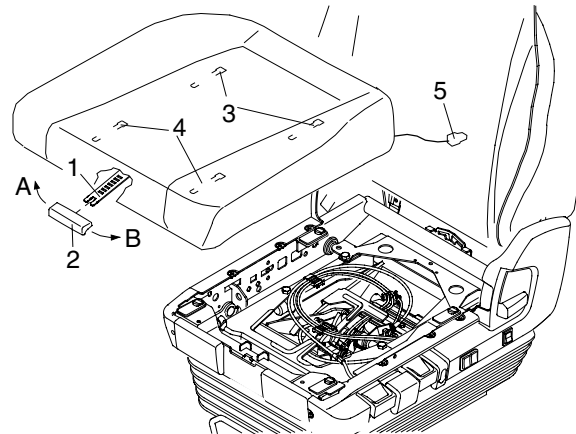


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4.4 REMOVAL AND INSTALLATION, SEAT SQUAB

Removing seat squab

1. Slide the seat squab into the frontmost position.
2. Detach the Velcro between the backrest and seat squab.
3. Put a screwdriver between the operating lever (1) of the seat squab and the seat frame.
4. Push the lever (1) up and to the right (A) until you can slide it over the locking mechanism on the seat frame.
5. Pull the squab further forwards. Lift the squab from the guides (3, 4).
6. In the case of seat heating, disconnect the electrical connector (5) at the rear and at the bottom of the seat squab.
7. If necessary, take the hand grip (2) off the operating lever (1).



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Installing seat squab

1. If necessary, fit the hand grip (2) on the operating lever (1).
2. When installing the seat squab, slide it at the rear end onto the frame approximately 2 cm into the rearmost guides (3).
3. When doing so, press the seat squab down at the front and slide the seat squab into the frontmost guides (4) until the operating lever (1) of the seat squab snaps into position.
4. In the case of seat heating, connect the connector (5).
5. In the case of a stepwise adjustable seat squab check after installation that the slat of the operating lever (1) snaps into all openings. If necessary, move the slat to the left (B) or right (A) until it snaps.

SEATS

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Removal and installation

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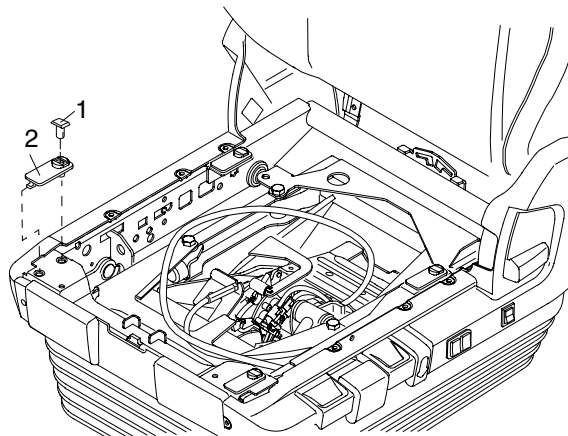
4.5 REMOVAL AND INSTALLATION, SEAT SQUAB GUIDE

Removing seat squab guide

1. Remove the seat squab.
2. Remove the central circlip (1) from the seat squab guide (2).
3. Remove the seat squab guide (2) from the seat frame.

Installing seat squab guide

1. Fit the seat squab guide (2) on the seat frame.
2. Fit the central circlip (1) into the seat squab guide.
3. Fit the seat squab.



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4.6 REMOVAL AND INSTALLATION, FRONT COVER PANEL

Removing front cover panel

1. Remove the attachment screws of the front cover panel.
2. Detach the front cover panel from the side panels.

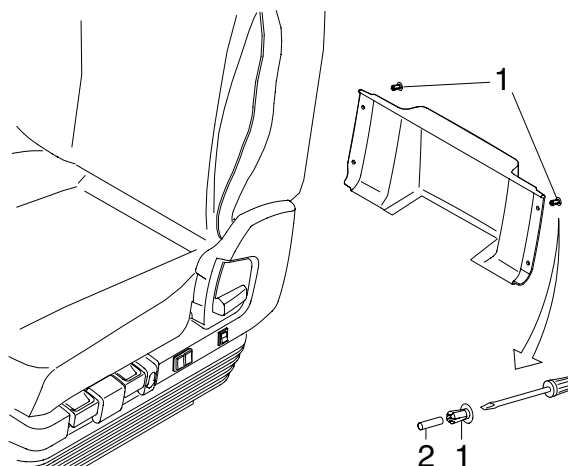
Installing front cover panel

1. Fit the front cover panel to the side panels using the attachment screws.

4.7 REMOVAL AND INSTALLATION, REAR COVER PANEL

Removing rear cover panel

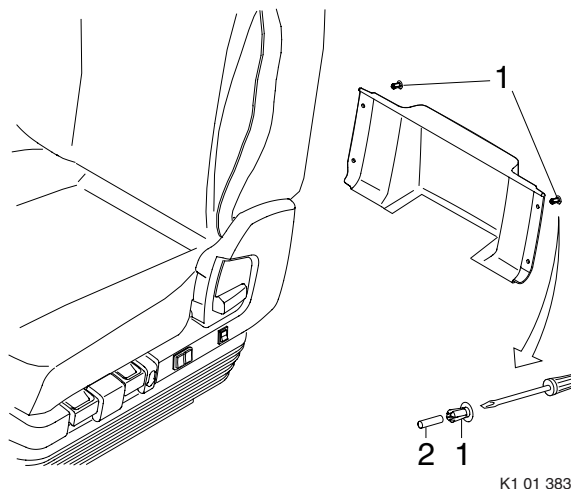
1. Press the central locking pins (2) out of the attachment plugs (1), collect the locking pins (2) and keep them.
2. Take the attachment plugs (1) out of the attachment holes of the rear cover panel.
3. Detach the rear cover panel from the side panels.



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Installing rear cover panel

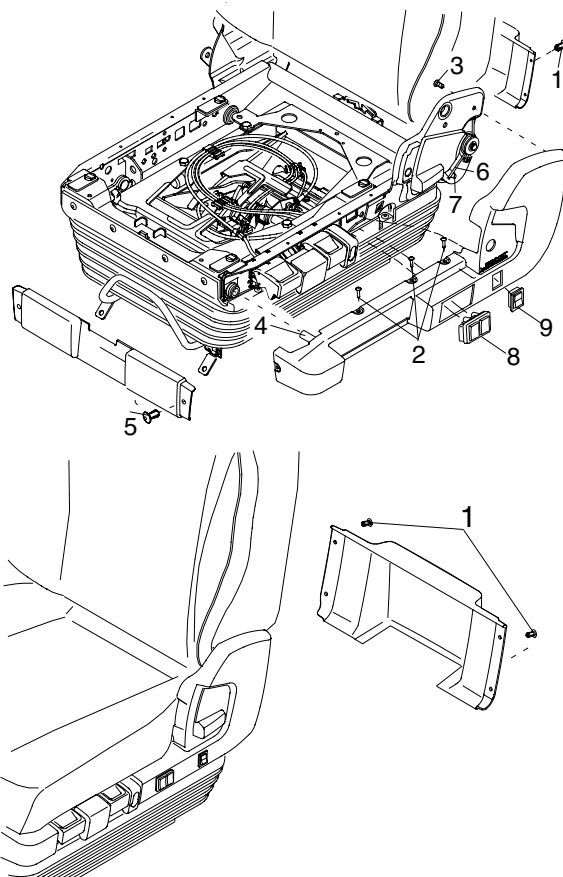
1. Fit the rear cover panel to the side panels using the attachment plugs (1).
2. Secure the attachment plugs (1) by fitting the pins (2).



4.8 REMOVAL AND INSTALLATION, COVER PANEL ON CONTROL SIDE

Removing cover panel on control side

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove the front cover panel (5).
4. Remove the rear cover panel (1).
5. Fold the backrest forwards.
6. Remove the attachment screw (3) on the inside of the backrest hinge bracket.
7. Fold the backrest back.
8. Remove the attachment screws (2) on the seat frame.
9. Disconnect the air pipes on the switches of the lumbar support adjustment (8). You may mark the sequence of connection.
10. Disconnect the connector on the seat heating switch (9).
11. Disconnect the cover panel of the seat frame and tilt the cover panel over the backrest adjuster lever (7).



SEATS

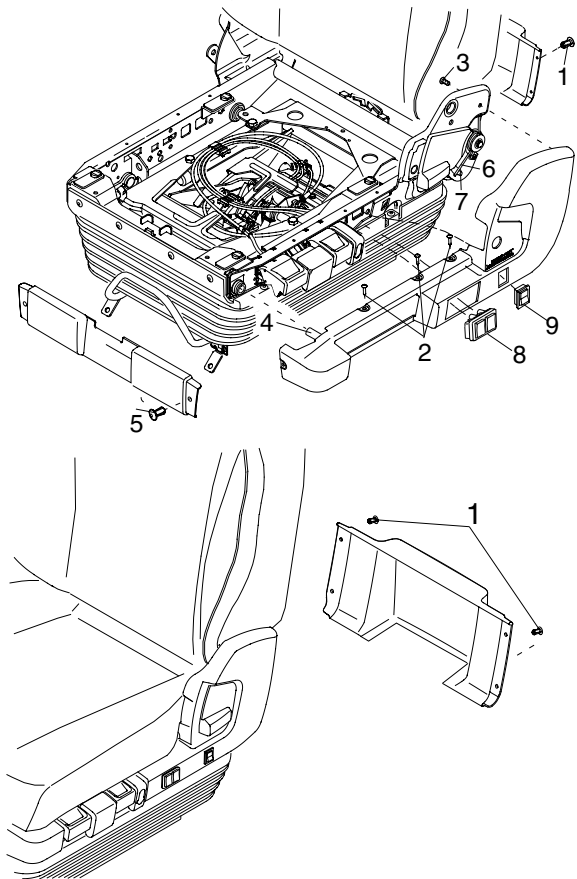
1

Removal and installation

LF45/55 series

Installing cover panel on control side

1. Tilt the cover panel into mounting position over the backrest adjuster lever (7). Check that the reset spring (6) is still on the cam of the backrest adjuster lever (7).
2. Fit the air pipes of the lumbar support adjuster (8).
3. Fit the connector of the seat heating switch (9).
4. Fit the cover panel to the seat frame using the centring pin (4) and the attachment screws (2).
5. Fit the cover panel to the backrest hinge bracket using the attachment screw (3).
6. Fit the front cover panel (5), rear cover panel (1) and the seat squab.
7. Install the seat assembly.



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4.9 REMOVAL AND INSTALLATION, COVER PANEL ON NON-CONTROL SIDE

Removing cover panel on non-control side

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove the front cover panel.
4. Remove the rear cover panel.
5. Remove the attachment screw on the inside of the backrest hinge bracket.
6. Remove the attachment screws on the seat frame.
7. Remove the attachment screw of the seat belt lock.
8. Remove the seat belt lock.
9. Remove the cover panel.

Installing cover panel on non-control side

1. Fit the cover panel to the seat frame and the backrest hinge bracket using the attachment screws.
2. Fit the seat belt lock using the attachment screw.
3. Fit the front cover panel using the attachment screws.
4. Fit the rear cover panel using the attachment plugs.
5. Fit the seat squab.
6. Install the seat assembly.

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4.10 REMOVAL AND INSTALLATION, DUST BOOT

Removing dust boot

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove all cover panels.
4. Remove the air pipe to the quick-release coupling on the connector block at the seat rear.
5. Disconnect the attachment caps and the clamps on the seat frame.
6. Pull the rubber dust boot at the front over the operating lever of the horizontal seat adjusting mechanism and the guide slides.
7. Remove the rubber dust boot completely from the seat.

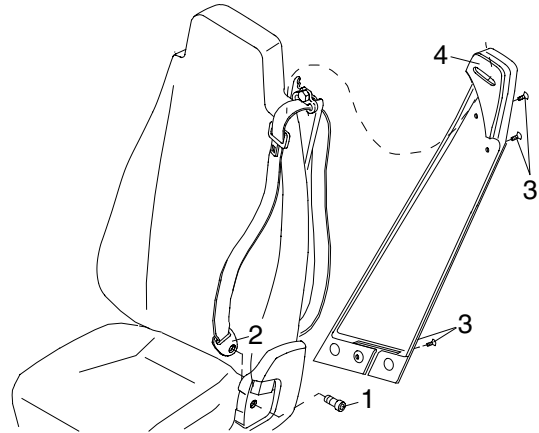
Installing dust boot

1. Fit the rubber dust boot to the seat over the guide slides.
2. Fasten the rubber dust boot to the seat frame (all round) using the fastening caps. Press the attachment caps of the rubber dust boot into the attachment holes with a driving tool.
3. Fasten the dust boot with the clamps.
4. Fit the air pipe to the quick-release coupling on the connector block.
5. Fit all cover panels.
6. Fit the seat squab.
7. Install the seat assembly.

4.11 REMOVAL AND INSTALLATION, SEAT BELT GUIDE PANEL

Removing seat belt guide panel

1. Lift the operating lever of the backrest adjuster. Remove the attachment bolt (1) of the seat belt mount (2). Remove the seat belt mount (2).
2. Remove the attachment screws (3) of the seat belt guide panel from the backrest.
3. Lift the seat belt guide panel of the seat belt guide off the backrest. Guide the seat belt with mount and latch through the opening at the front of the seat belt guide panel (4).
4. Remove the seat belt guide panel from the backrest.



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Installing seat belt guide panel

1. Guide the seat belt with mount (2) through the opening of the seat belt guide panel (4).
2. Fit the seat belt guide panel to the backrest using the attachment screws (3).
3. Fit the seat belt mount (2) to the seat frame using the attachment bolt (1).

4.12 REMOVAL AND INSTALLATION, BACKREST

Removing backrest

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove all cover panels.
4. Remove the attachment bolts of the seat belt guide panel (3).
5. Remove the attachment screws (1) of the fastening strip (1).
6. Remove the seat belt guide (3) with seat belt from the backrest.

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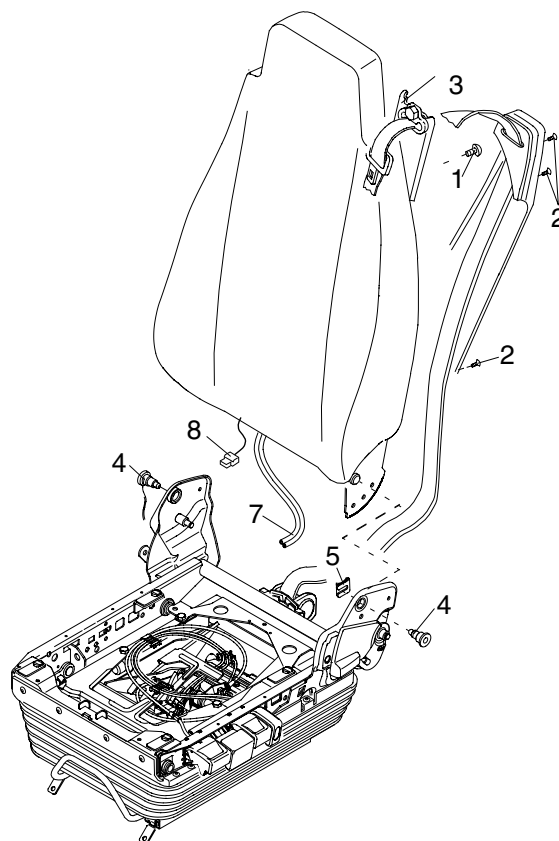
Removal and installation

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7. Disconnect the air pipes (7) to the backrest. Mark the position of the air pipes.
8. In the case of electric seat heating, disconnect the electrical connector (8) to the seat.
9. Remove the circlip (5) on the attachment screw (4) of the backrest hinge.
10. Remove the attachment screws (4) of the backrest hinges.
11. Remove the backrest from the seat frame.

Installing backrest

1. Install the backrest in the correct position on the seat frame.
2. Clean the attachment bolts (4) of the backrest hinge. Apply locking compound to the attachment bolts.
3. Fit the attachment bolts (4) in the backrest hinge. Fit the attachment bolt (4) with circlip (5).
4. Fit the air pipes (7) to the backrest.
5. In the case of electric seat heating, connect the electrical connector (8).
6. Fit the seat belt guide (3) with the attachment bolt (1) to the backrest.
7. Fit the seat belt guide panel to the backrest using the attachment bolts (2).
8. Fit all cover panels. Fit the seat squab.
9. Install the seat assembly.



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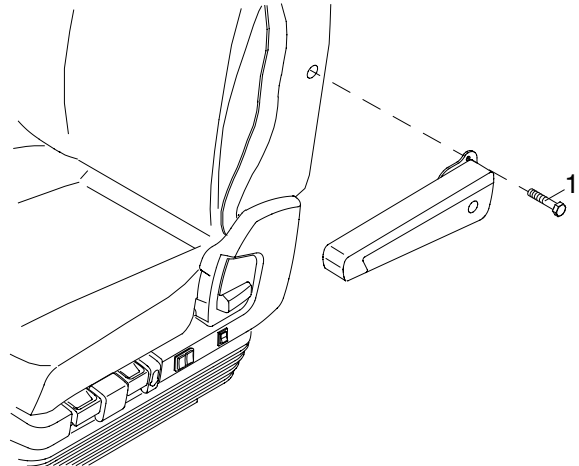
4.13 REMOVAL AND INSTALLATION, ARM REST

Removing arm rest

1. Remove the cap on the attachment screw (1) in the arm rest.
2. Turn the attachment screw (1) of the arm rest out of the backrest and remove it.

Installing arm rest

1. Fit the arm rest to the backrest using the attachment screw (1).
2. Fit the cap on the attachment screw (1) in the arm rest.



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4.14 REMOVAL AND INSTALLATION, SEAT BELT MECHANISM

- If a seat is equipped with a seat belt tensioner, the system manual for the airbag and seat belt tensioner must be consulted for the various safety instructions and instructions for removing, installing, packing and treating pyrotechnic components.
- A seat with seat belt tension can be identified by the airbag. If a vehicle is equipped with an airbag, the driver seat automatically also has a pyrotechnic seat belt tensioner.
- A vehicle with an airbag can be identified by the text "airbag" on the steering wheel and by a sticker on the windscreen stating that the vehicle is equipped with an airbag.

Removing seat belt mechanism

1. Remove the rear cover panel.
2. Lift the operating lever of the backrest adjuster and remove the attachment bolt (6) underneath of the seat belt mount. Remove the seat belt mount.
3. Remove the seat belt guide panel.

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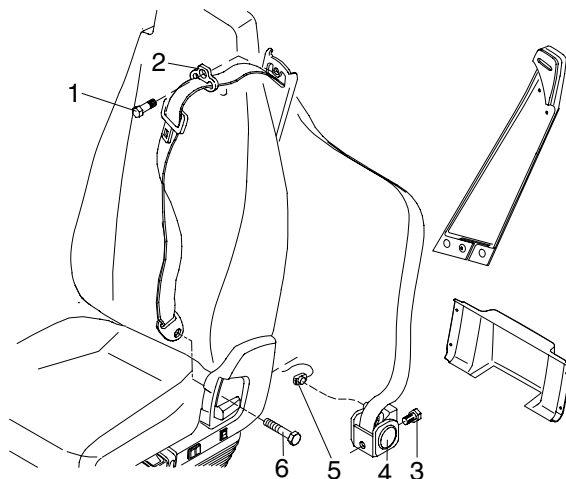
Removal and installation

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4. Remove the attachment bolt (1) of the seat-belt guide (2). Remove the seat-belt guide (2).
5. If there is a seat belt tensioner, disconnect the plug of the seat belt tensioner (5) on the seat belt roll (4).
6. Remove the attachment bolt (3) of the seat belt roll (4). Remove the seat belt roll (4).

Installing seat belt mechanism

1. Fit the seat belt roll (4) to the frame using the attachment bolt (3). Tighten the attachment bolt to the specified tightening torque. See main group "Technical data".
2. Fit the seat belt guide (2) with seat belt to the backrest.
3. Fit the seat belt guide panel to the backrest.
4. Fit the seat belt mount to the seat frame using the attachment bolt (6) and tighten the attachment bolt to the specified tightening torque. See "Technical data".
5. Fit the rear cover panel to the seat frame.



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4.15 REMOVAL AND INSTALLATION, SEAT BELT LOCK

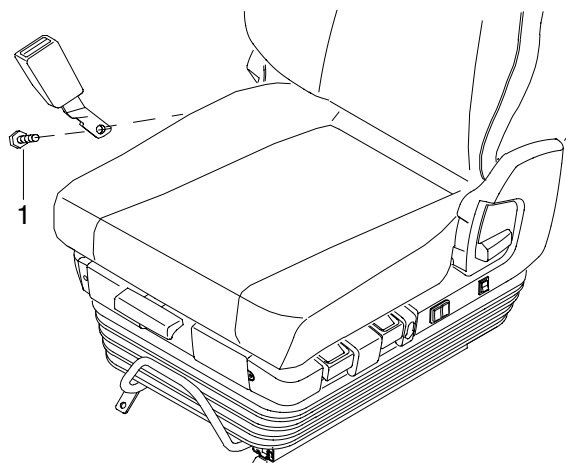
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Removing seat belt lock

1. Remove the attachment bolt (1) of the seat belt lock (2).
2. Take the seat belt lock (2) from the seat frame and the cover panel.

Installing seat belt lock

1. Fit the seat belt lock (2) through the opening in the cover panel.
2. Fit the seat belt lock (2) to the seat frame using the attachment bolt (1).
3. Tighten the attachment bolt (1) to the specified tightening torque. See main group "Technical data".



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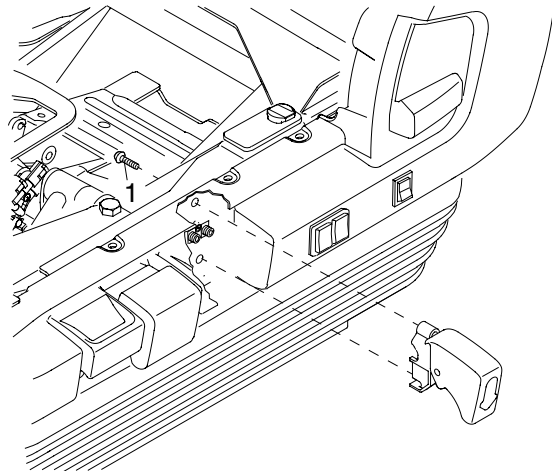
4.16 REMOVAL AND INSTALLATION, RAPID-LOWERING HANDLE

Removing rapid-lowering handle

1. Remove the seat squab.
2. Remove the attachment bolts (1) of the rapid-lowering handle.
3. Remove the rapid-lowering handle from the seat frame.

Installing rapid-lowering handle

1. Fit the rapid-lowering handle to the seat frame using the attachment screws.
2. Fit the seat squab.

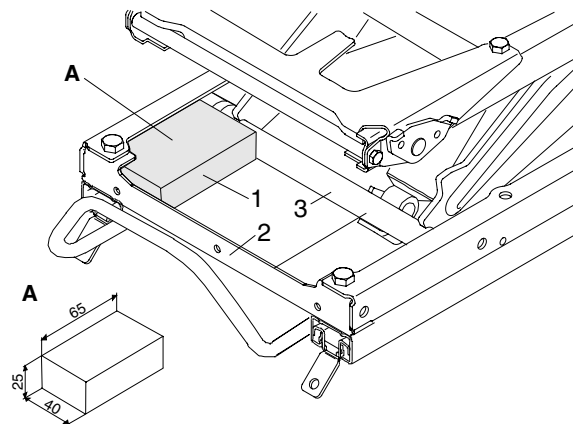


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4.17 REMOVAL AND INSTALLATION, MANIFOLD

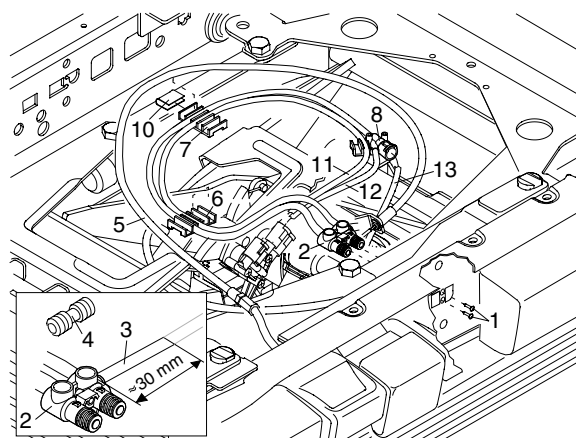
Removing manifold

1. Remove the seat squab.
2. Lock the seat in its highest position using a spacer block. The spacer block serves to prevent the frame from lowering when work is carried out on the air pipes. Since you can easily make it yourself, it cannot be ordered from DAF. The block is sized 65x40x25 mm (LxWxH).
3. Remove rapid-lowering handle.



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4. Remove the attachment bolts (1) of the manifold (2).
5. Disconnect the manifold (2) from the seat frame.
6. When replacing the manifold, cut loose the transparent air supply pipe, approximately 3 cm from the manifold (3).
7. Remove the pipe guide (7) from the attachment clamp (10). Remove the control cable (5) from the pipe guide.
8. Disconnect the pipe guide (6).



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9. Disconnect the air pipes (11) (red) and (12) (yellow) from the quick-release coupling to the height control valve.
10. Disconnect the air pipe (11) of the air bellows from the quick-release coupling (8).
11. Remove the complete manifold (2) with pipes from the seat frame.

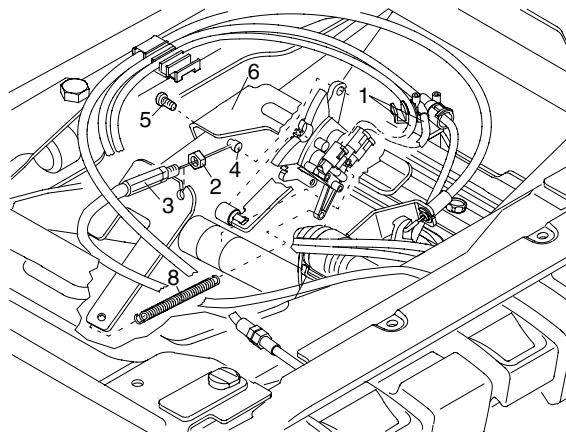
Installing manifold

1. Repair the air supply pipe to the new manifold (2) using the repair kit (4) supplied.
2. Fit the manifold (2) on the seat frame.
3. Fit the control cable (5) in the pipe guide (7). Fit the pipe guide (7) in the attachment clamp (10).
4. Fit the pipe guide (6).
5. Lay the pipes back into the original position (before removal) in the pipe clips (6 and 7).
6. Connect the air pipe (11) of the air bellows to the quick-release coupling (8).
7. Connect the air pipes (11) (red) and (12) (yellow) to the height control valve.
8. Fit the rapid-lowering handle.
9. Remove the seat lock.
10. Check the pipes and system for air tightness and proper operation.
11. Fit the seat squab.

4.18 REMOVAL AND INSTALLATION, HEIGHT CONTROL VALVE

Removing height control valve

1. Remove the seat back.
2. Remove the air pipes (1) on the coupling piece of the height control valve. Note the position of the pipes.
3. Remove the attachment bolt (5) on the bracket (6). Remove the bracket.
4. Loosen nut (2) of the connection piece (3). Remove the control cable from the bracket.
5. Unhook the cable eye (4) from the lever.
6. Remove the reset spring (8) of the height control valve.
7. Snap the height control valve off the cross bar in the seat frame.



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Installing height control valve

1. Snap the height control valve onto the cross bar of the seat frame.
2. Fit the reset spring (8).
3. Install the bracket (6).
4. Hook the control cable (4) into the bracket. Fit the connection piece (3) with nut (2).
5. Fit the air pipes (1) in the quick-release coupling. Remember the sequence.
6. Check the pipes and system for air tightness and proper operation.
7. Fit the seat squab.

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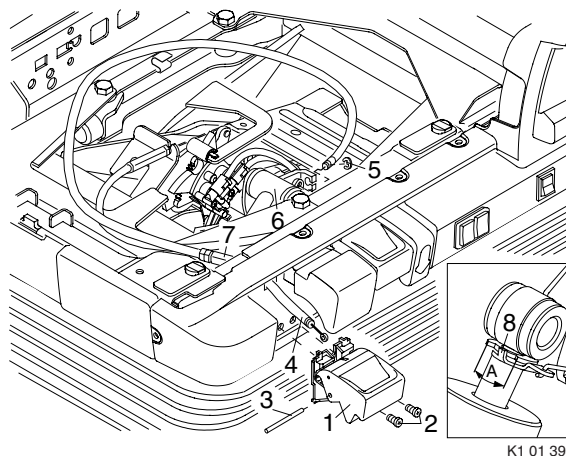
Removal and installation

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4.19 REMOVAL AND INSTALLATION, VERTICAL DAMPING ADJUSTER

Removing vertical damping adjuster

1. Remove the seat squab.
2. Remove the attachment bolts (2) of the vertical damping lever (1).
3. Disconnect the vertical damping lever (1) from the seat frame.
4. Press the attachment pin (3) of the control cable (4) from the vertical damping lever (1).
5. Disconnect the control cable (4) from the vertical damping lever (1).
6. Disconnect the circlip (5) of the control cable on the fixing bracket near the shock absorber (6).
7. Unhook the control cable from the control lever of the shock absorber (6).



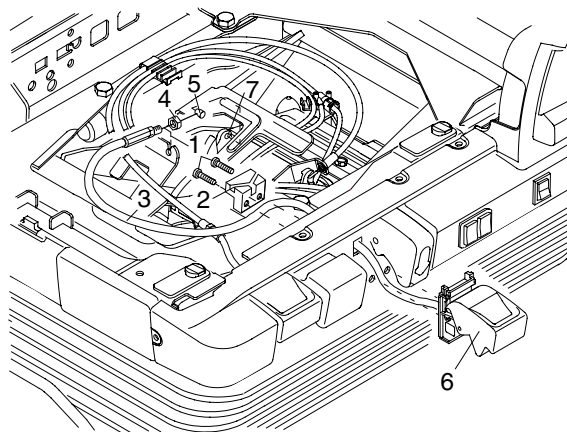
Installing vertical damping adjuster

1. Hook the control cable into the control lever of the shock absorber (6).
2. Fasten the control cable in the fixing bracket near the shock absorber (6).
3. Secure the control cable on the fixing bracket using circlip (5).
4. Fit the control cable in the opening in the seat frame.
5. Fit the control cable (4) in the operating lever (1) using the attachment pin (3).
6. Fit the vertical damping lever (1) on the seat frame using the attachment bolts (2).
7. Loosen the lock nut of the control cable adjuster (7). Using the nut, adjust the cable until the movement of the control lever (8) on the shock absorber (6) covers the entire range (A).
8. Fit the seat squab.
9. Check the system for proper operation.

4.20 REMOVAL AND INSTALLATION, HEIGHT ADJUSTMENT HANDLE

Removing height adjustment handle

1. Remove the seat squab.
2. Remove the nut (4) of the control cable (3). Unhook the cable from the bracket (1).
3. Unhook the cable eye (5) from the control lever (7) of the height control valve.
4. Remove the attachment screws (1) of the operating handle (6).
5. Remove the operating handle (6) from the seat frame.
6. Remove the guide block (2) for the control cable (3) from the seat frame.
7. Remove the tension springs from the operating lever (6).
8. Remove the attachment pin from the components of the operating lever (6).
9. Detach the components of the operating handle (6) and unhook the control cable (3) from the attachment.



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Installing height adjustment handle

1. Hook the control cable (3) into the interior of the operating handle (6).
2. Assemble both components of the operating handle (6) using the attachment pin.
3. Fit the tension springs in the operating handle (6).
4. Fit the operating handle (6) with control cable (3) and guide block (2) on the seat frame.
5. Fit the control cable (3) on the bracket (1).
6. Hook the cable eye (5) into the lever (7) on the height control valve.
7. If necessary, readjust the control cable play.

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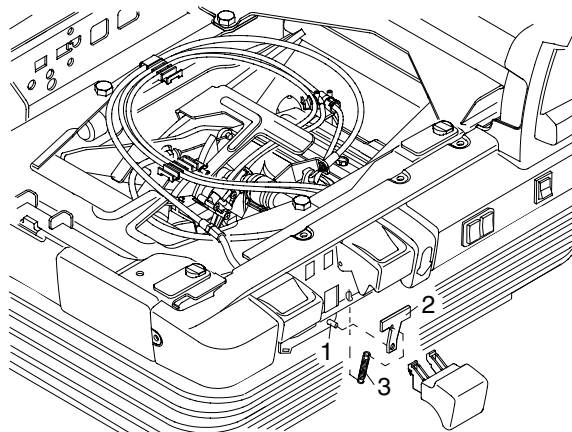
4.21 REMOVAL AND INSTALLATION, SEAT TILTING HANDLE

Removing seat tilting handle

1. Remove the seat squab.
2. Press the locking lip at the bottom of the control button. Remove the control button from the handle.
3. Remove the reset spring (3) from the handle.
4. Push the spring end (1) of the seat angle lock out of the recess in the metal T-piece (2).
5. Remove the metal T-piece (2).
6. Tilt the handle out of the seat frame.

Installing seat tilting handle

1. Tilt the handle into the seat frame.
2. Place the metal T-piece (2) back in the handle. Click the spring end (1) of the seat angle lock out into the recess in the metal T-piece (2).
3. Fit the reset spring (3) to the handle and the seat frame.
4. Click the control button onto the handle.
5. Fit the seat squab.



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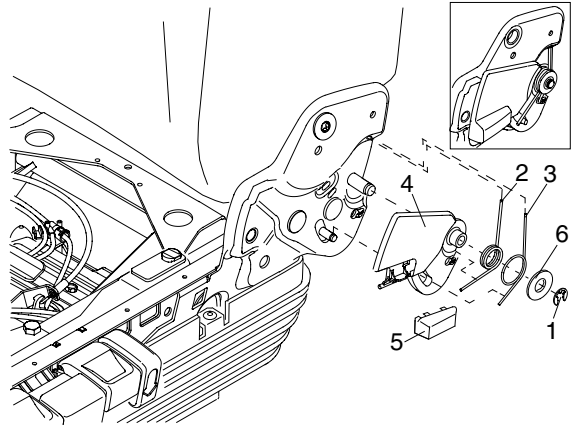
4.22 REMOVAL AND INSTALLATION, BACKREST ADJUSTER LEVER

Removing backrest adjuster lever

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove all cover panels.
4. Remove the circlip (1) on the operating lever (4).
5. Remove the lock washer (6) on the operating lever (4).
6. Slide the operating lever (4) with the springs (2, 3) off the hinge pin. Pay attention to the position of the springs (2, 3).

Installing backrest adjuster lever

1. Fit the operating lever (4) with the springs (2, 3) to the hinge pin.
2. Fit the lock washer (6) and the circlip (1) to the hinge pin.
3. Fit the cover panels and the seat squab.
4. Install the seat assembly.

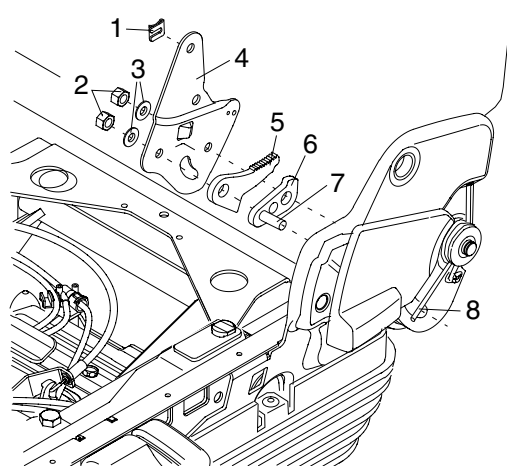


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4.23 REMOVAL AND INSTALLATION, BACKREST ADJUSTER

Removing the backrest adjuster

1. Remove the lumbar support.
2. Remove the circlip (1) from the locking plate (4) of the backrest adjuster.
3. Remove the attachment nuts (2) from the locking plate (4).
4. Hook the spring end (8) of the cam (7) onto the operating pin (6).
5. Remove the locking plate (4) with the locking pin (5) and the operating pin (6).



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SEATS**1****Removal and installation****LF45/55 series****Installing backrest adjuster**

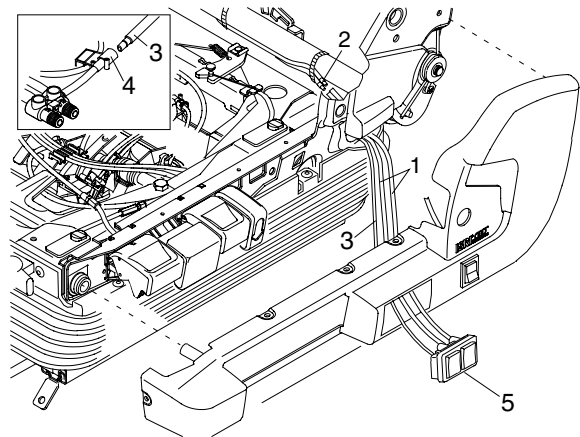
1. Place the locking plate (4) with the locking pin (5) and the operating pin (6) back on the mounting plate of the backrest adjuster.
2. Hook the spring end (8) of the cam (7) onto the operating pin (6).
3. Fix the locking plate (4) to the mounting plate using the attachment nuts (2).
4. Fit the circlip (1) to the locking plate.
5. Fit the back rest.

4.24 REMOVAL AND INSTALLATION, LUMBAR POSITION CONTROL VALVE**Removing lumbar position control valve**

1. Remove the cover panel on control side.
2. Disconnect the air supply pipe (3) from the coupling (4).
3. Disconnect the air pipes (1) to the lumbar cushions in the backrest from the connecting piece (2) or from the control valve (5) itself.
4. Remove the lumbar position control valve (5) from inside the cover panel.

Installing lumbar position control valve

1. Fit the lumbar position control valve (5) in the cover panel.
2. Fit the air pipes (3) of the lumbar cushions in the backrest to the connecting piece (2) or to the control valve (5) itself.
3. Connect the air supply pipe (3) to the coupling (4).
4. Fit the cover panel on control side to the seat frame.



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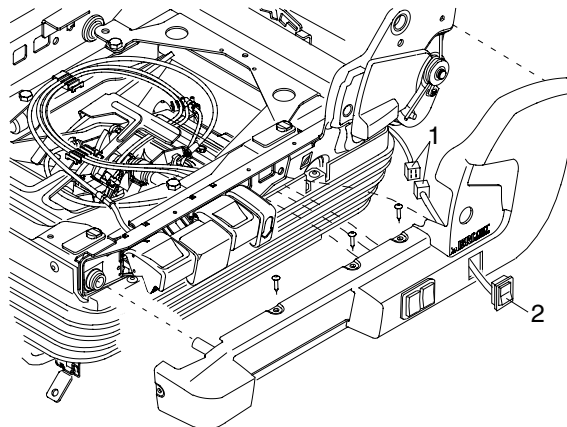
4.25 REMOVAL AND INSTALLATION, SEAT HEATING SWITCH

Removing seat heating switch

1. Remove the cover panel on control side.
2. Unplug the connector (1).
3. Remove the seat heating switch (2) from inside the cover panel.

Installing seat heating switch

1. Connect the connector (1).
2. Fit the seat heating switch (2) in the cover panel.
3. Fit the cover panel on control side.

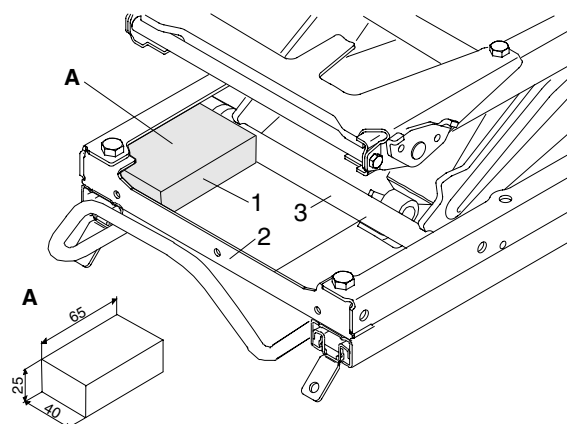


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4.26 REMOVAL AND INSTALLATION, VERTICAL DAMPER

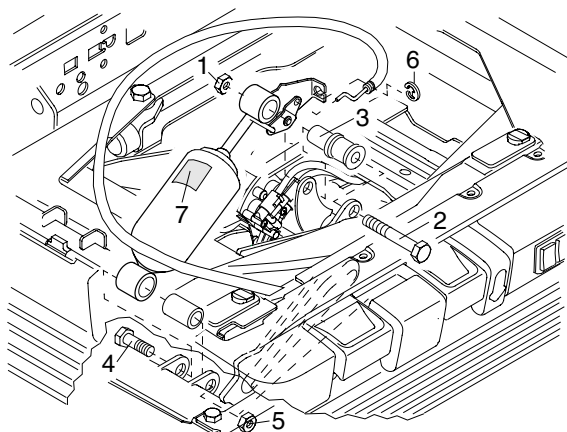
Removing vertical damper

1. Remove the seat assembly.
2. Remove the seat squab.
3. Lock the seat in its highest position using a spacer block. The spacer block serves to prevent the frame from lowering when work is carried out on the air pipes. Since you can easily make it yourself, it cannot be ordered from DAF. The block is sized 65x40x25 mm (LxWxH).



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4. Disconnect the circlip (6) of the control cable on the fixing bracket near the shock absorber (7).
5. Unhook the control cable from the control lever of the shock absorber (7).
6. Remove the attachment nuts (1, 5) and attachment bolts (2, 4) from the fixing bushes (3, 8) of the shock absorber (7).
7. Remove the shock absorber (7) from the seat frame.



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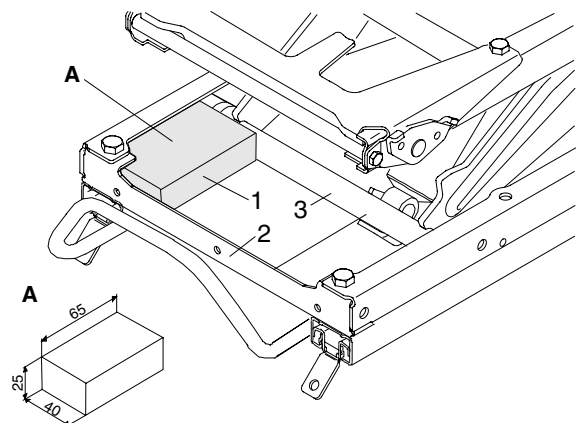
Installing vertical damper

1. Fit the shock absorber (7) in the seat frame fixing brackets using the fixing bushes (3, 8), attachment nuts (1, 5) and attachment bolts (2, 4). Fit the shock absorber (7) with the sticker facing up.
2. Hook the control cable into the control lever of the shock absorber (6).
3. Fit the control cable to the fixing bracket of the shock absorber.
4. Fit the circlip (6) to the control cable.
5. Check the adjustment of the control cable.
6. Remove the seat lock.
7. Fit the seat squab.
8. Install the seat assembly.

4.27 REMOVAL AND INSTALLATION, AIR BELLOWS

Removing air bellows

1. Remove the seat assembly.
2. Remove the seat squab.
3. Lock the seat in its highest position using a spacer block. The spacer block serves to prevent the frame from lowering when work is carried out on the air pipes. Since you can easily make it yourself, it cannot be ordered from DAF. The block is sized 65x40x25 mm (LxWxH).
4. Disconnect the quick-release coupling (5) of the air pipe (2) to the air bellows. Pay attention to the position of the air pipe.
5. Remove the attachment bolt (1) from the top of the air bellows.



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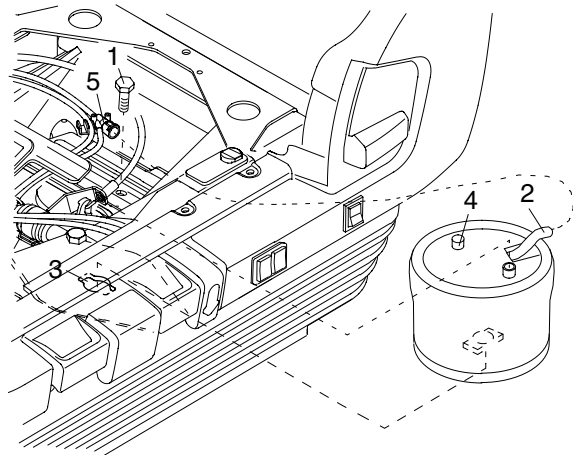
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6. Push the air bellows positioning bush (4) out of the upper cross member.
7. Loosen the air bellows a quarter stroke from the lower cross member (3). Take the air bellows out of the lower cross member.
8. Remove the air bellows from behind the seat frame.

Installing air bellows

1. Place the air bellows in the seat frame between the upper and lower cross members.
2. Turn the air bellows into the lower cross member (3). Pay attention to the position of the air pipe (2).
3. Fit the air bellows in the upper cross member using the attachment bolt (1); pay attention to the positioning bush (4).
4. Connect the air pipe (2) of the air bellows to the quick-release coupling (5).
5. Remove the seat lock.
6. Fit the seat squab.
7. Install the seat assembly.



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4.28 REMOVAL AND INSTALLATION, SEAT SQUAB FRAMEWORK

Removing seat squab framework

1. Remove the seat assembly.
2. Remove the seat squab.
3. Remove all cover panels.
4. Remove the backrest (3) with the belt (1, 2).
5. Detach the dust boot from the framework.
6. Detach the control cable (5) from the vertical damper adjuster.
7. Disconnect the control cable (6) from the height control valve.

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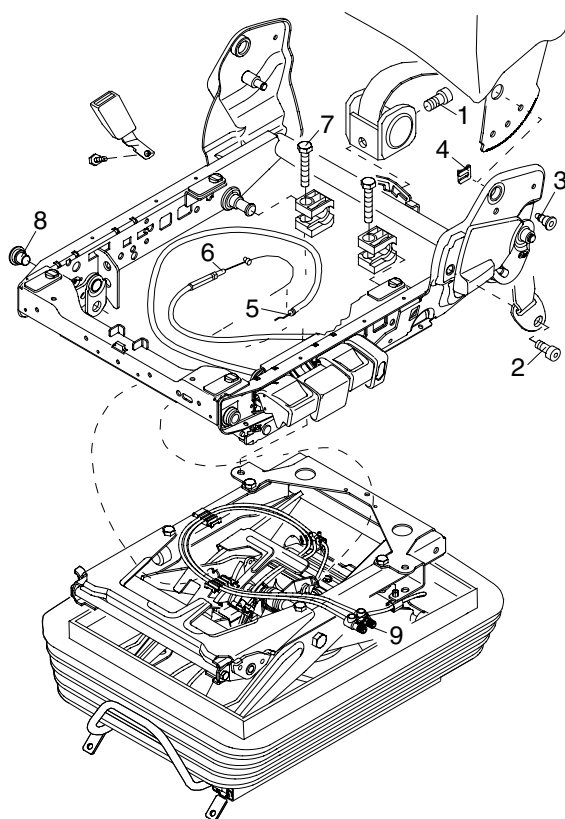
Removal and installation

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8. Disconnect the manifold (9) from the air pipes.
9. Remove the attachment bolts (7) from the rear hinges on the framework.
10. Set the largest possible angle and remove the front hinge bolts (8) from the framework.
11. Disconnect the air pipes from the framework.

Installing seat squab framework

1. Attach the framework on the frame using the front hinge bolts (8). Fit the air pipes.
2. Fit the rear hinges of the framework using the attachment bolts (7).
3. Fit the manifold (9).
4. Connect the control cable of the height control valve (6) and the vertical damper (5).
5. Fit the dust boot.
6. Fit the backrest, the belt and the cover panels.
7. Fit the seat squab.
8. Install the seat assembly.



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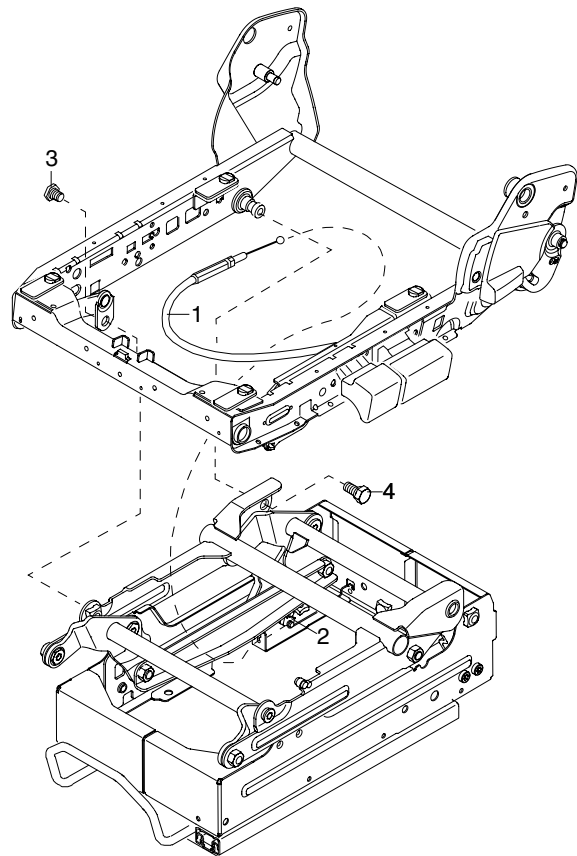
4.29 REMOVAL AND INSTALLATION, FRAMEWORK OF GAS-SPRUNG SEAT SQUAB

Removing framework of gas-sprung seat squab

1. Remove the seat assembly.
2. Remove the seat squab and backrest assembly
3. Detach the control cable (1) from the height adjustment handle (2).
4. Adjust the seat to the correct position, remove the front (3) and rear (4) attachment bolts.

Installing framework of gas-sprung seat squab

1. Fit the front (3) and rear (4) attachment bolts.
2. Connect the control cable (1) to the height adjustment handle (2).
3. Fit the seat squab and backrest assembly
4. Fit the seat assembly.



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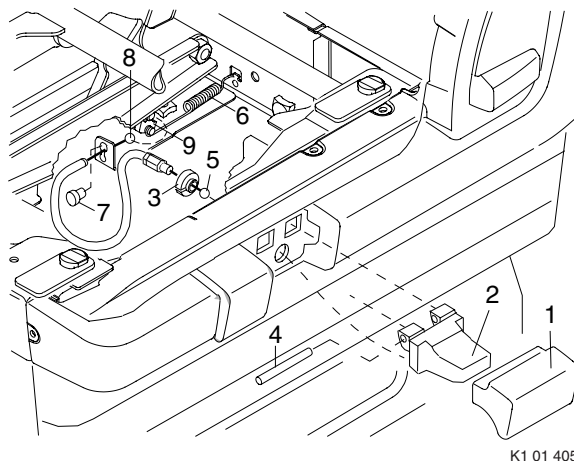
Removal and installation

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4.30 REMOVAL AND INSTALLATION, HEIGHT ADJUSTMENT HANDLE OF GAS-SPRUNG SEAT

Removing height adjustment handle of gas-sprung seat

1. Remove the seat squab.
2. Press the locking lip at the bottom of the control button (1). Remove the control button from the handle (2).
3. Remove the circlip (3) from the control cable.
4. Push the pin (4) out of the handle (2).
5. Remove the control cable attachment ball (5) from the handle (2).
6. Remove the handle (2) from the frame.
7. Remove the reset spring (6).
8. Remove the stop (7). Unhook the attachment ball (8) from the handle (9).



Installing height adjustment handle of gas-sprung seat

1. Hook the attachment ball (8) into the handle (9). Fit the nut (7).
2. Fit the reset spring (6).
3. Fit the handle (2) into the frame.
4. Fit the attachment ball (5) into the handle (2).
5. Fit the pin (4) into the handle (2).
6. Fit the circlip (3) to the control cable.
7. Push the control button (1) on the operating handle (2).
8. Fit the seat squab.

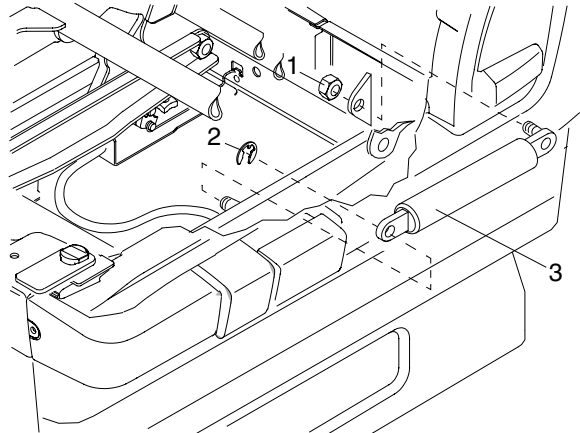
4.31 REMOVAL AND INSTALLATION, GAS SPRING OF GAS-SPRUNG SEAT

Removing gas spring of gas-sprung seat

1. Remove the seat squab.
2. Remove the nut (1).
3. Remove the circlip (2).
4. Remove the gas spring (3).

Installing gas spring of gas-sprung seat

1. Fit the gas spring (3).
2. Fit the circlip (2).
3. Fit the nut (1).
4. Fit the seat squab.



K1 01 406

SEATS

1

Removal and installation

LF45/55 series

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2.1 Adjusting roof spoiler	2-1	0210
3. REMOVAL AND INSTALLATION	3-1	0210
3.1 Removal and installation, roof spoiler (aerodynamic)	3-1	0210
3.2 Removal and installation, roof spoiler (aerodynamic and adjustable)	3-2	0210
3.3 Removal and installation, rear air foils	3-3	0210
3.4 Removal and installation, windscreen sun visor	3-4	0210
3.5 Removal and installation, combi-light	3-4	0210
3.6 Removal and installation, seat covers	3-5	0210

ACCESSORIES

1

Contents

LF45/55 series

1. SAFETY INSTRUCTIONS

General

The cab is equipped with a hydraulic tilting gear. The pump is located on co-driver's side at the rear of the cab. The cab locks are opened hydraulically during pumping.

Before tilting the cab, make sure that the doors are closed, that there are no loose items in the cab and that the gear lever is in neutral. Tilt the cab fully forward if work is to be carried out underneath the cab.



You can stop the cab tilting forward at any time by turning the tap to the reverse tilting position.

ACCESSORIES

1

Safety instructions

LF45/55 series

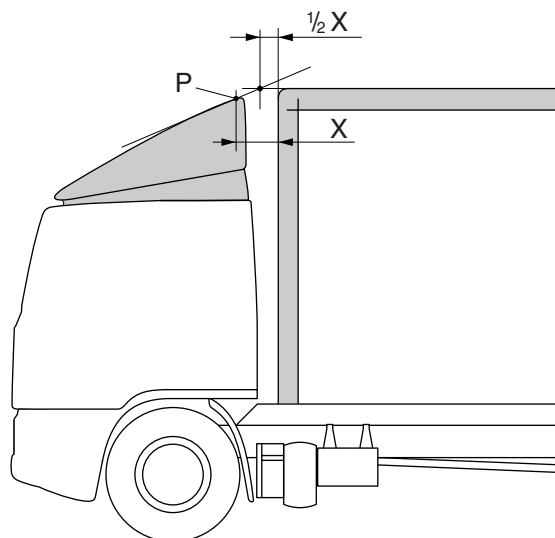
2. INSPECTION AND ADJUSTMENT

2.1 ADJUSTING ROOF SPOILER

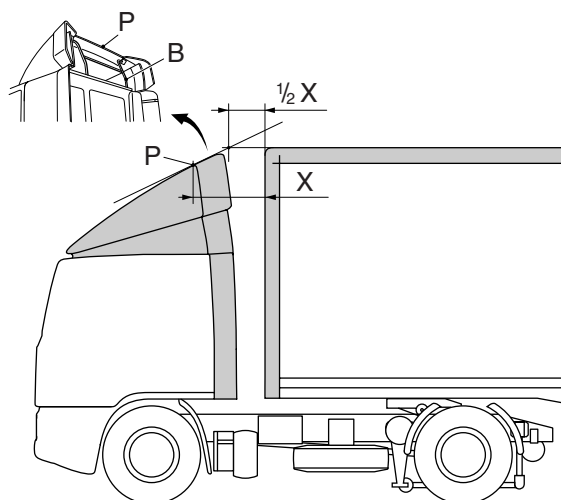
Note:

Correct adjustment of the roof spoiler is essential to minimise fuel consumption.

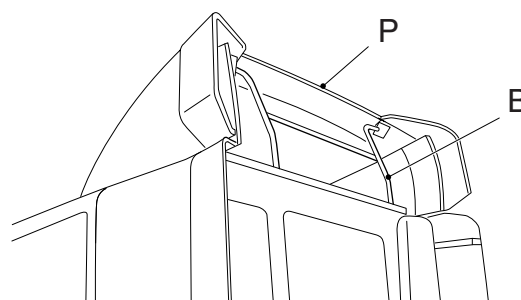
1. Place the vehicle on a level and horizontal surface. Make sure that in the case of a tractor/semi-trailer combination the tractor is straight in front of the semi-trailer.
2. Determine the centreline of the vehicle and put a slat on the superstructure roof protruding into the cab direction.
3. Put another slat (as a tangent) onto the outer roof spoiler edge (P) pointing into the direction of the superstructure.
4. Both slats should cross at half the distance ($\frac{1}{2} X$) between the roof spoiler edge and the start of the superstructure.
The roof spoiler height can be adjusted using adjusting mechanism (B). For the roof spoiler adjusting range, see main group "Technical data".



K1 01 357



K1 01 356



K1 01 355

ACCESSORIES

1

Inspection and adjustment

LF45/55 series

3. REMOVAL AND INSTALLATION

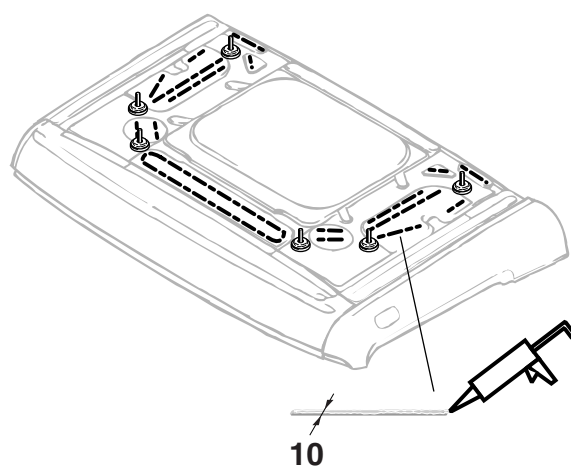
3.1 REMOVAL AND INSTALLATION, ROOF SPOILER (AERODYNAMIC)

Removing roof spoiler (aerodynamic)

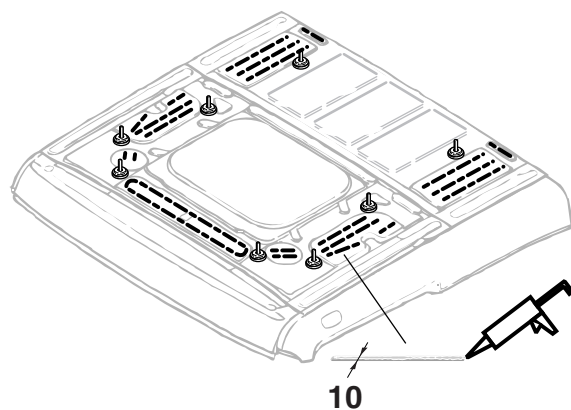
1. Remove the attachment nuts of the roof spoiler.
2. Carefully detach the roof spoiler assembly from the cab roof and carefully cut loose any sealant between the spoiler and cab roof.
3. Remove the residual sealant from the roof cab and roof spoiler.

Installing roof spoiler (aerodynamic)

1. Degrease the cab roof at the positions where the new sealant is to be applied.
2. Apply the specified sealant, see main group "Technical data", at the indicated positions on the cab roof.
3. Fit the roof spoiler assembly to the cab roof.
4. Fit the roof spoiler attachment nuts and tighten the attachment nuts to the specified tightening torque. See main group "Technical data".



K1 01 416



K1 01 417

ACCESSORIES

1

Removal and installation

LF45/55 series

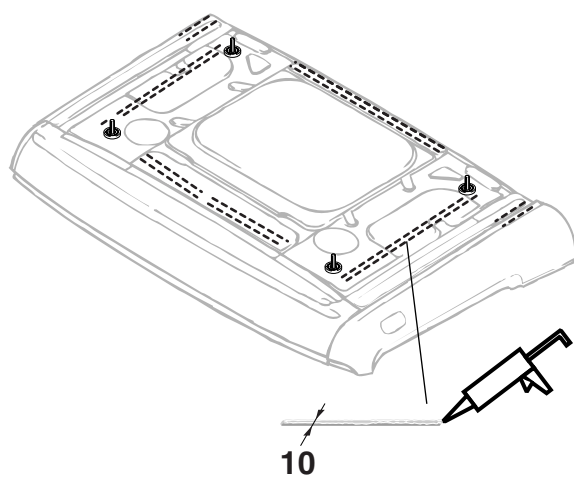
3.2 REMOVAL AND INSTALLATION, ROOF SPOILER (AERODYNAMIC AND ADJUSTABLE)

Removing roof spoiler (aerodynamic and adjustable)

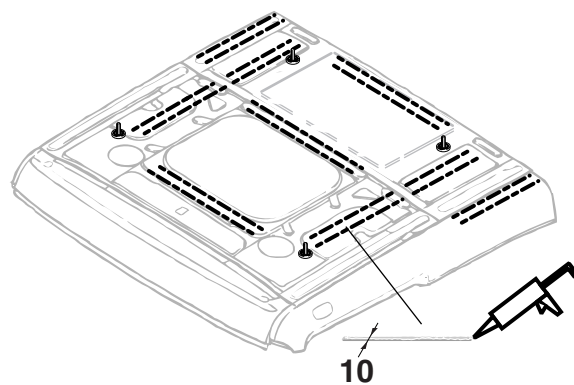
1. Remove the attachment nuts of the roof spoiler.
2. Carefully detach the roof spoiler assembly from the cab roof and carefully cut loose any sealant between the spoiler and cab roof.
3. Remove the residual sealant from the roof cab and roof spoiler.

Installing roof spoiler (aerodynamic and adjustable)

1. Degrease the cab roof at the positions where the new sealant is to be applied.
2. Apply the specified sealant, see main group "Technical data", at the indicated positions on the cab roof.
3. Fit the roof spoiler assembly to the cab roof.
4. Fit the roof spoiler attachment nuts and tighten the attachment nuts to the specified tightening torque. See main group "Technical data".
5. Check the setting of the roof spoiler, see chapter "Inspection and adjustment".



K1 01 418



K1 01 419

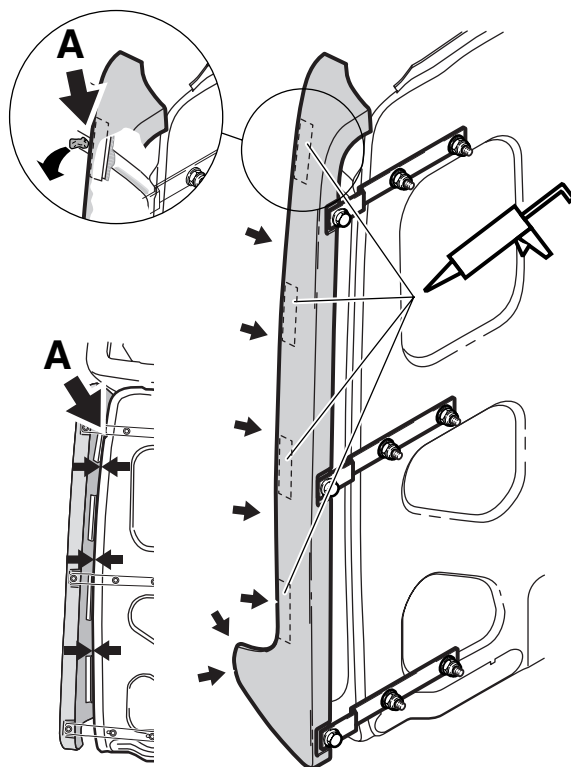
3.3 REMOVAL AND INSTALLATION, REAR AIR FOILS

Removing rear air foils

1. Remove the attachment nuts of the cab wall attachment brackets.
2. Carefully detach the rear air foils from the cab and carefully cut loose any sealant between the cab and rear air foil.
3. Remove the residual sealant from the roof and rear air foil.

Installing rear air foils

1. Degrease the rear air foil parts and the cab at the positions where sealant is to be applied.
2. Position the rear air foil against the cab and check that the rear air foil fits the entire cab wall.
3. Put a plug in the drip channel between the rear air foil and the cab wall (A).
4. Apply the specified sealant to the attachment surfaces. See main group "Technical data".
5. Fit the rear air foil to the cab wall using the attachment nuts and tighten the attachment nuts to the specified tightening torque. See main group "Technical data".
6. Wait until the sealant has set and remove the plug from the drip channel.



K1 01 420

ACCESSORIES

1

Removal and installation

LF45/55 series

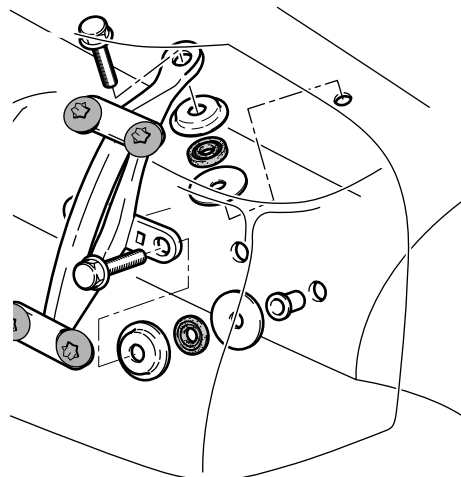
3.4 REMOVAL AND INSTALLATION, WINDSCREEN SUN VISOR

Removing windscreen sun visor

1. Remove the attachment bolts of the attachment brackets from the threaded holes in the cab.
2. Remove the attachment brackets.

Installing windscreen sun visor

1. Fit the attachment brackets to the cab using the attachment bolts. Tighten the attachment bolts to the specified tightening torque. See main group "Technical data".



K1 01 421

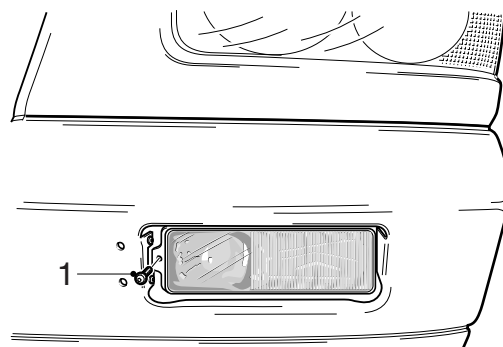
3.5 REMOVAL AND INSTALLATION, COMBI-LIGHT

Removing combi-light

1. Remove the combi-light connector.
2. Remove the attachment screw (1) and take the combi-light out of the bumper.

Installing combi-light

1. Fit the combi-light with attachment screw (1) into the bumper.
2. Fit the combi-light connector.



K1 01 358

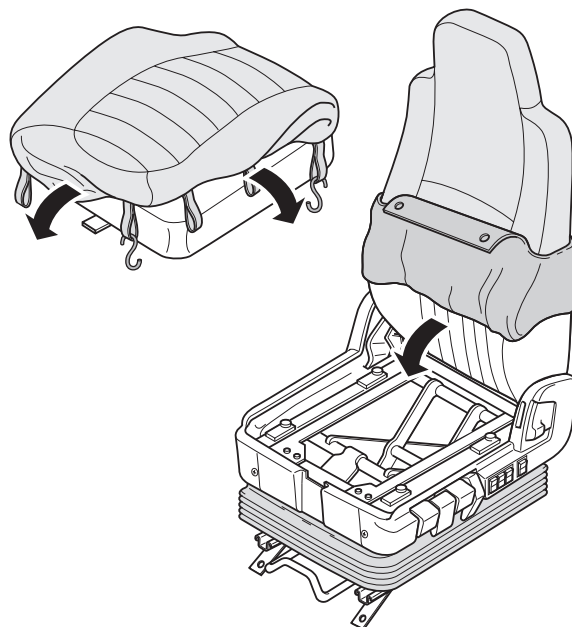
3.6 REMOVAL AND INSTALLATION, SEAT COVERS

Removing seat covers

1. If necessary, remove the attachment bolts of the armrests and, if necessary, remove the armrests.
2. Remove the attachment bolts of the cover on the seat-belt guide.
3. Remove the cover of the seat-belt guide from the backrest.
4. Remove the attachment bolt of the seat-belt guide.
5. Remove the seat-belt guide from the backrest.
6. Remove the seat squab by pressing the releasing device of the seat adjusting mechanism at the front of the seat cushion.
7. Remove the seat cover from the backrest by detaching the cover at the bottom and pulling it upward.
8. Remove the seat cover from the seat by detaching the attachment hooks and pulling the cover from the seat.

Installing the seat covers

1. Fit the seat cover on the seat.
2. Tighten the seat cover on the seat, using the attachment hooks.
3. Fit the seat cover on the backrest.
4. Check that the attachment holes for the seat-belt guide and, if necessary, the armrests are free.
5. If applicable, fit the armrests to the backrest using the attachment bolts.
6. Fit the seat-belt guide to the backrest using the attachment bolt.
7. Fit the cover of the seat-belt guide to the backrest using the attachment bolts.
8. Slide the seat into the seat frame until it snaps into the lock.



K1 01 422

ACCESSORIES

1

Removal and installation

LF45/55 series

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DIAGNOSTICS	1
BE ENGINE	2
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CE ENGINE	5
CE ENGINE COOLING SYSTEM	6
CE ENGINE LUBRICATION SYSTEM	7

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5.2 Tightening torques	5-2	200505
5.3 Filling capacities	5-2	200505
6. CE ENGINE LUBRICATION SYSTEM	6-1	200505
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TECHNICAL DATA

2

Contents

LF45/55 series

0

1. BE ENGINE

1.1 GENERAL

Cold engine

A cold engine is an engine which, having reached operating temperature, has been allowed to cool down for at least **six hours**.

Warm engine

A warm engine is an engine which, having reached operating temperature, has been at a standstill for not more than **thirty minutes**.

Direction of rotation of the engine

The direction of rotation of the engine is clockwise, as seen from the vibration damper end.

First cylinder of the engine

The first cylinder of the engine is the cylinder at the vibration damper end of the engine.

Left-hand and right-hand side of the engine

The left-hand side of the engine is the side where the air compressor and electronic unit are mounted. The right-hand side of the engine is the side where the turbocharger and oil filter are mounted.

Engine types

Coding

BE 99 C
BE 110 C
BE 123 C

General specifications

Environmental standard

Euro 3 (C)

Number of cylinders

4 cylinders in line

Valves

4 per cylinder

Bore x stroke

102 x 120 mm

Cubic capacity

3.9 litres

Weight

approx. 391 kg

Cooling

fluid

Air inlet system

Turbocharger intercooling

Fuel injection

direct

Injection sequence

1-3-4-2

Compression ratio

BE 99 C

17.0 : 1

BE 110 C

17.0 : 1

BE 123 C

17.3 : 1

ENGINE TYPE	P (kW) at rpm	M (Nm) at rpm
BE 99 C	99 at 2500	500 at 1200 - 1600
BE 110 C	110 at 2500	550 at 1250 - 1600
BE 123 C	123 at 2500	600 at 1200 - 1600

Intake manifold

Fit the intake manifold using sealant

Loctite Ultra Grey

Exhaust manifold

Maximum flatness deviation

0.20 mm

TECHNICAL DATA**2**

BE engine

LF45/55 series**0****Cylinder block**

Flatness deviation in longitudinal direction

max. 0.076 mm

Flatness deviation in lateral direction

max. 0.051 mm

Cylinder head

Rough value

0.4 - 1.6 mm

Flatness deviation in longitudinal direction

max. 0.305 mm

Flatness deviation in lateral direction

max. 0.076 mm

Test pressure with air

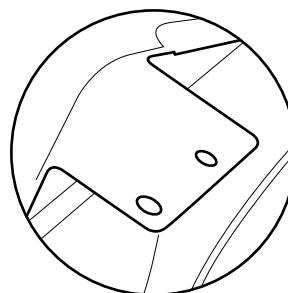
max. 2.75 bar

Water test temperature

approx. 60°C

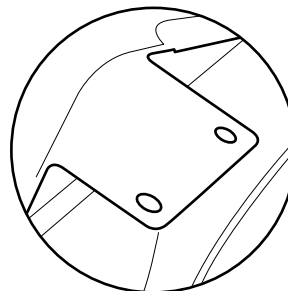
Cylinder head gasket

Thickness: 1.15 mm



M201231

Thickness: 1.25 mm



M201232

Type of cylinder head gasket to be used:

Average piston protrusion	Thickness of cylinder head gasket
< 0.301 mm	1.15 mm
≥ 0.301 mm	1.25 mm

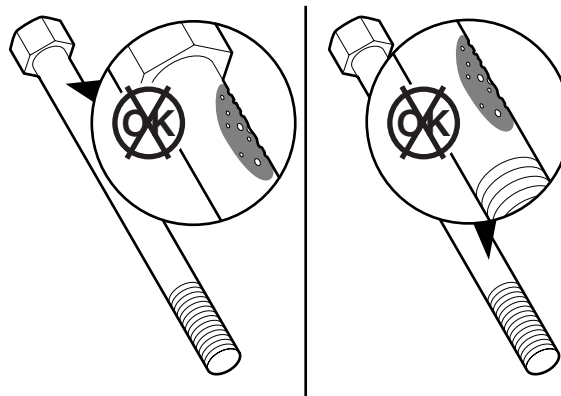
Cylinder head bolts

Maximum dimensions of visible corrosion or pitting

1 cm²

Maximum pitting depth

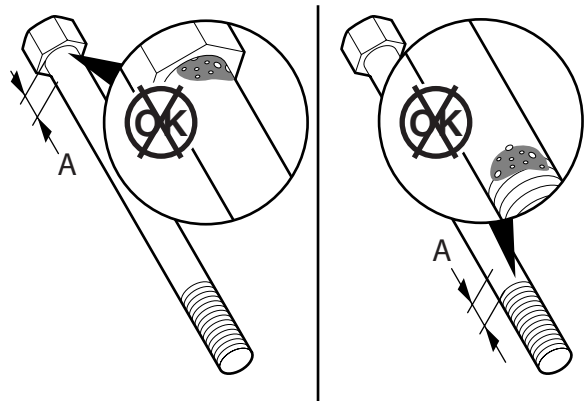
0.12 mm



M201249

Length of area below bolt head and just above beginning of screw thread where corrosion or pitting is not allowed (A)

3.2 mm



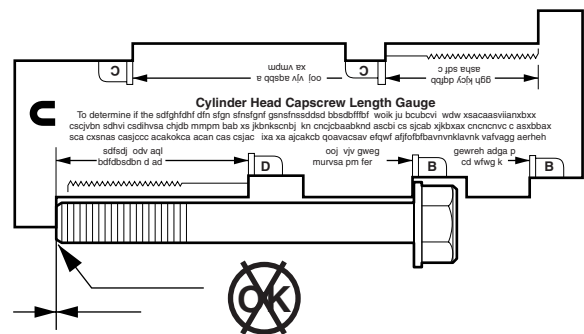
M201250

Maximum free length of short cylinder head bolt (130 mm nominal)

132.1 mm

Maximum free length of long cylinder head bolt (150 mm nominal)

152.1 mm



M201252

Valve clearance

Inspection dimensions, cold valve clearance

Intake

0.15 - 0.40 mm

Exhaust

0.40 - 0.75 mm

Setting dimensions, cold valve clearance

Intake

0.25 mm

Exhaust

0.50 mm

Timing gear

Fit the timing gear case using sealant

Loctite Ultra Grey

Front engine panel

Fit front engine panel using sealant

Loctite Ultra Grey

Gear backlash

Crankshaft gear - camshaft gear

0.076 - 0.28 mm

Oil pump gear - idler gear

0.250 - 0.30 mm

End float

Crankshaft end float

0.267 ± 0.165 mm

Camshaft end float

0.230 ± 0.130 mm

Oil sump pressure

New engine

60 - 80 l/min.

Worn engine

180 l/min.

TECHNICAL DATA**2**

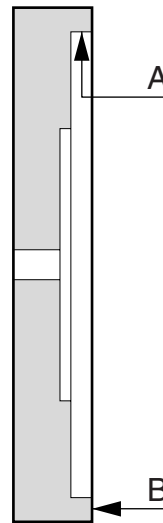
BE engine

LF45/55 series**0**

Oil sump pressure conversion table	
Inches (water)	Litres per minute (l/min.)
1	50
2	84
3	103
4	119
5	133
6	145
7	155
8	164
9	172
10	180
11	187
12	193
13	200
14	206
15	211
16	217
17	222
18	226
19	229
20	232

Flywheel/starter ring gear

Radial run-out, measured on the inside of the flywheel outer edge (A)	max. 0.127 mm
Axial deviation, measured on the flywheel outer edge (B)	max. 0.406 mm
Heat starter ring gear (max. 20 min.)	max. 125°C



M201199

Flywheel housing

Fit flywheel housing using sealant

Loctite 5205

Vibration damper

Difference in thickness at 4 places must not exceed

6.35 mm

TECHNICAL DATA**2**

BE engine

LF45/55 series**0****1.2 TIGHTENING TORQUES**

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Starter motor

Attachment bolts	43 Nm
------------------	-------

Automatic poly-V-belt tensioner

Attachment bolts	43 Nm
------------------	-------

Alternator

Alternator bracket attachment bolts	30 Nm
Alternator attachment bolts	60 Nm
Pulley attachment nut	80 Nm

Air compressor

Compressor attachment nuts	80 Nm
Pipe attachments	39 Nm

Steering pump

Attachment bolts, steering pump	55 Nm
Line connection in the pump, delivery side	36 Nm
Attachment bolts, cover	20 Nm
Attachment bolts, reservoir	8 Nm

Air-conditioning compressor

Compressor support attachment bolts	30 Nm
Compressor attachment bolts	60 Nm

Valve gear

Rocker setting bolt lock nut	24 Nm
Valve sleeve attachment bolts	24 Nm
Valve cover attachment bolts	10 Nm
Rocker seat attachment bolts	36 Nm
Injector wiring	1 Nm

Intake manifold

Intake manifold attachment bolts	24 Nm
Fuel rail attachment bolts	24 Nm
Glow element attachment bolts	14 Nm
Air inlet hose clamps	7 Nm

Exhaust manifold

Attachment bolts	43 Nm ⁽¹⁾
Heat shields	56 - 64 Nm

(1) Tighten crosswise from inside to outside.

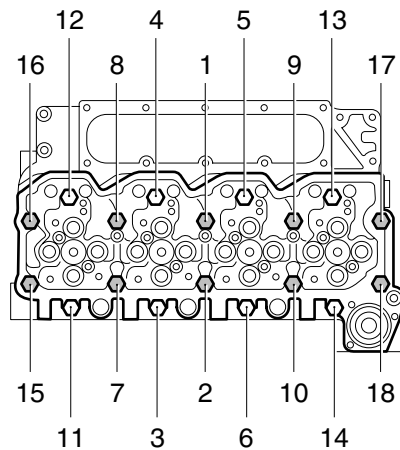
Cylinder head**Note:**

Apply a drop of engine oil on the thread of the attachment bolts and under the bearing surface of the bolt heads.

Phase 1

All attachment bolts 35 Nm ⁽¹⁾

(1) Tighten the bolts in the order indicated

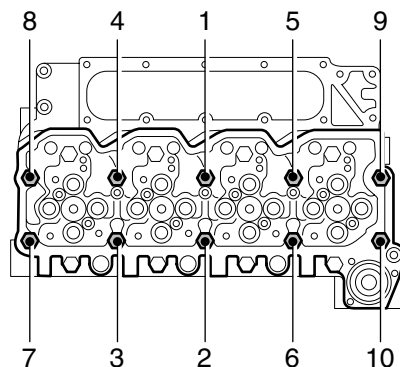


M201142

Phase 2

Use **only** attachment bolts that are 150 mm in length 55 Nm ⁽¹⁾

(1) Tighten the bolts in the order indicated



M201201

TECHNICAL DATA

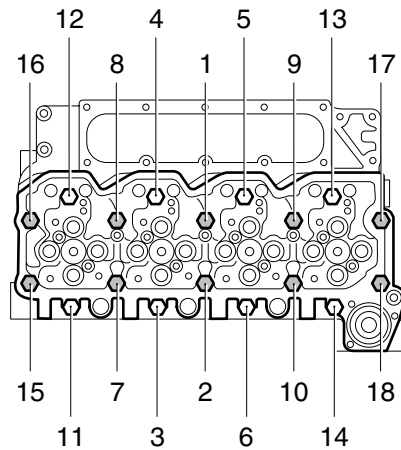
2

BE engine

LF45/55 series
0
Phase 3

 All attachment bolts 2 steps of 90° angular displacement each ⁽¹⁾

(1) Tighten the bolts in the order indicated



M201142

Vibration damper

Attachment bolts

95 Nm

Timing gear

Camshaft locking plate attachment bolts

24 Nm

M8 attachment bolts for timing gear case

24 Nm

M10 attachment bolts for timing gear case

47 Nm

M12 attachment bolts for timing gear case

50 Nm

Camshaft gear attachment bolts

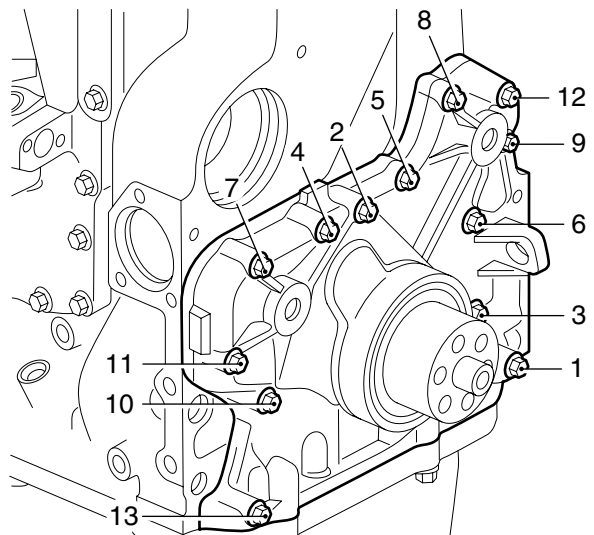
36 Nm

Attachment bolts, cap, front of engine

 Attachment bolts,
cap, front of
engine ⁽¹⁾

24 Nm

(1) Tighten the attachment bolts in the order indicated



M201144

Flywheel

Attachment bolts

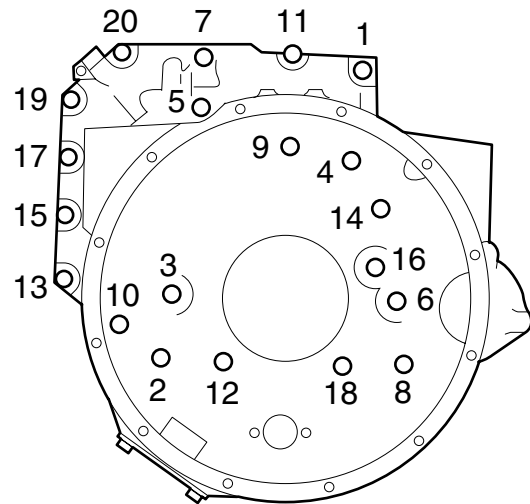
30 Nm + 60° angular displacement

Flywheel housing

M10 attachment
bolts ⁽¹⁾ 49 Nm

M12 attachment
bolts ⁽¹⁾ 85 Nm

(1) Tighten the attachment bolts in the order indicated



M201080

Engine mounting, front

Engine bracket attachment bolts/nuts 110 Nm

Engine mounting, rear

Bolts attaching engine bracket to chassis 110 Nm + 90° angular displacement

Bolts attaching engine bracket to engine 110 Nm + 60° angular displacement

Bolts attaching support to engine bracket 170 Nm + 90° angular displacement

Engine hanger brackets

Front engine hanger bracket attachment bolts 77 Nm

Rear engine hanger bracket attachment bolts 43 Nm

TECHNICAL DATA

2

BE engine

LF45/55 series

0

2. BE ENGINE COOLING SYSTEM

2.1 GENERAL

Thermostat

Thermostat opening temperatures:

thermostat opens at

approx. 81°C

thermostat fully open at

approx. 94°C

Full thermostat opening at

14.3 mm

Header tank pressure cap

Pressure relief valve opening pressure

approx. 0.75 bar

Vacuum relief valve opening pressure

approx. 0.1 bar

Pressure-testing cooling system

Test pressure

0.5 - 0.7 bar

Cleaning cooling system

Product name	Properties	Applications	DAF number
RP cleaner	Cleaning time 45 min. with engine running	Cleaning cooling system	1334996

TECHNICAL DATA

2

BE engine cooling system

LF45/55 series**0**

2.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Coolant pump

Attachment bolts	24 Nm
------------------	-------

Thermostat housing

Attachment bolts	10 Nm
------------------	-------

Radiator

Attachment nuts	89 Nm
-----------------	-------

2.3 FILLING CAPACITIES

Cooling system capacity	approx. 20 litres
-------------------------	-------------------

3. BE ENGINE LUBRICATION SYSTEM

3.1 GENERAL

Oil pressure

Lubricating oil pressure at engine idling speed	min. 0.69 bar
Lubricating oil pressure at full-load engine speed	min. 2.07 bar
Bypass pressure regulator opening pressure	3.52 bar

Oil filter

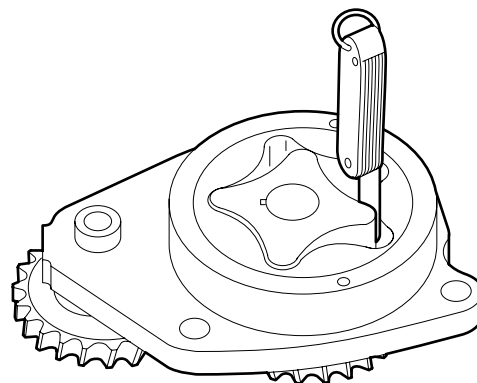
Type	disposable filter
Number	1
Location in the oil circuit	full flow

Oil cooler

Oil cooler pressure test temperature	approx. 60°C
Oil section test pressure	4.5 - 5.0 bar
Opening pressure of bypass valve at a pressure difference of	3.45 bar

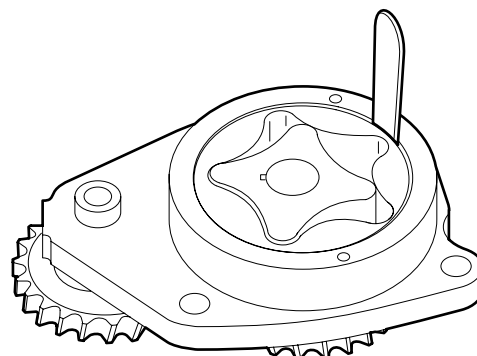
Lubricating oil pump

Maximum clearance, inner rotor - outer rotor	0.178 mm
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M201077

Maximum clearance, outer rotor - pump housing	0.381 mm
---	----------



M201076

TECHNICAL DATA

2

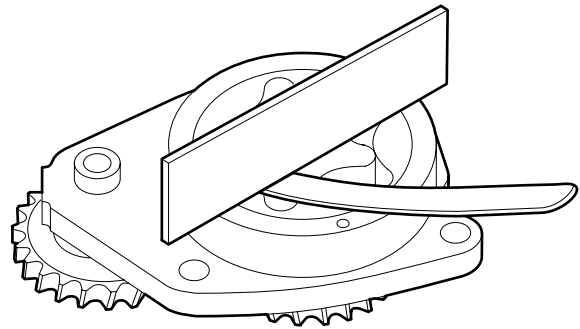
BE engine lubrication system

LF45/55 series

0

Maximum clearance
of inner and outer
rotor relative to the
pump housing,
measured with a
straight edge

0.127 mm



M201075

Lubricating oil pump gear backlash

Lubricating oil pump idler gear - lubricating oil
pump gear

0.25 - 0.30 mm

Crankshaft gear - lubricating oil pump idler gear

0.15 - 0.25 mm

Crankshaft gear - lubricating oil pump gear

0.30 - 0.50 mm

Oil consumption

Maximum permissible engine oil consumption

0.5% of the average fuel consumption

Example:

Average measured fuel consumption:

25 litres/100 km = 250 litres/1000 km

Maximum permissible engine oil consumption:

$0.5\% \times 250 = 1.25$ litres/1000 km

- Engine oil consumption of 1.25 litres / 1000 km is permissible
- Engine oil consumption > 1.25 litres / 1000 km; check the engine using the diagnostics table. See "Diagnostics".

3.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

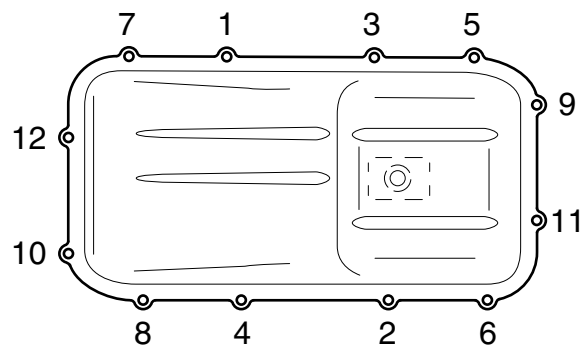
When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Oil sump

Oil sump attachment bolts 24 Nm ⁽¹⁾

Oil drain plug 60 Nm

(1) Tighten the attachment bolts in the order indicated

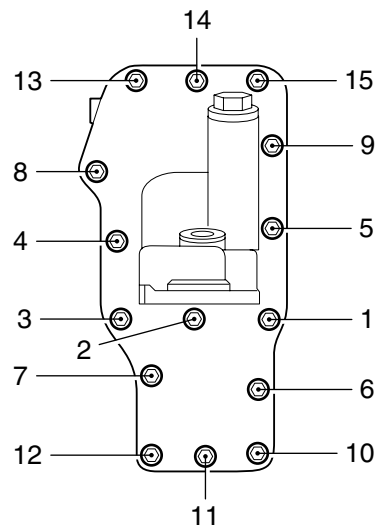


M201078

Oil cooler

Attachment bolts connecting oil cooler to cylinder block 24 Nm ⁽¹⁾

(1) Tighten the attachment bolts in the order indicated



M201145

TECHNICAL DATA

2

BE engine lubrication system

LF45/55 series

0

Oil pump

Attachment bolts 24 Nm

Turbocharger oil supply pipe

Union on filter head 24 Nm

Union on turbocharger 28 Nm

3.3 FILLING CAPACITIES

Lubrication system

Total capacity, including oil cooler and oil filter 13 litres

Oil sump capacity, maximum level 11 litres

Oil sump capacity, minimum level 8.9 litres

4. CE ENGINE

4.1 GENERAL

0

Cold engine

A cold engine is an engine which, having reached operating temperature, has been allowed to cool down for at least **six hours**.

Warm engine

A warm engine is an engine which, having reached operating temperature, has been at a standstill for not more than **thirty minutes**.

Direction of rotation of the engine

The direction of rotation of the engine is clockwise, as seen from the vibration damper end.

First cylinder of the engine

The first cylinder of the engine is the cylinder at the vibration damper end of the engine.

Left-hand and right-hand side of the engine

The left-hand side of the engine is the side where the air compressor and electronic unit are mounted. The right-hand side of the engine is the side where the turbocharger and oil filter are mounted.

Engine types

Coding

CE 136 C

CE 162 C

CE 184 C

General specifications

Environmental standard

Euro 3 (C)

Number of cylinders

6 cylinders in line

Valves

4 per cylinder

Bore x stroke

102 x 120 mm

Cubic capacity

5.9 litres

Compression ratio

17,3:1

Fuel injection

direct

Injection sequence

1-5-3-6-2-4

Air inlet system

Turbocharger intercooling

Cooling

fluid

Weight

approx. 498 kg

ENGINE TYPE	P (kW) at rpm	M (Nm) at rpm
CE 136 C	136 at 2500	700 at 1200 - 1600
CE 162 C	162 at 2500	820 at 1250 - 1600
CE 184 C	184 at 2500	950 at 1200 - 1600

Intake manifold

Fit the intake manifold using sealant

Loctite Ultra Grey

Exhaust manifold

Maximum flatness deviation

0.20 mm

Cylinder block

Flatness deviation in longitudinal direction

max. 0.076 mm

Flatness deviation in lateral direction

max. 0.051 mm

TECHNICAL DATA**2**

CE engine

LF45/55 series**0****Cylinder head**

Rough value

0.4 - 1.6 mm

Flatness deviation in longitudinal direction

max. 0.305 mm

Flatness deviation in lateral direction

max. 0.076 mm

Test pressure with air

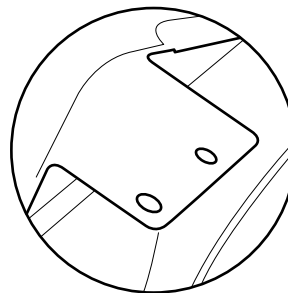
max. 2.75 bar

Water test temperature

approx. 60°C

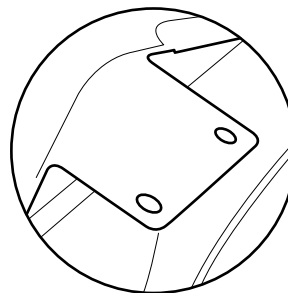
Cylinder head gasket

Thickness: 1.15 mm



M201231

Thickness: 1.25 mm



M201232

Type of cylinder head gasket to be used:

Average piston protrusion	Thickness of cylinder head gasket
< 0.301 mm	1.15 mm
≥ 0.301 mm	1.25 mm

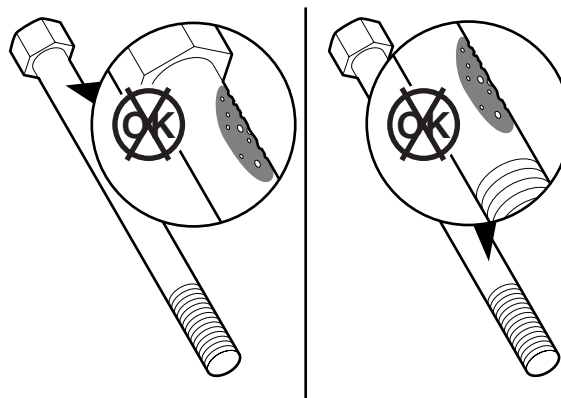
Cylinder head bolts

Maximum dimensions of visible corrosion or pitting

1 cm²

Maximum pitting depth

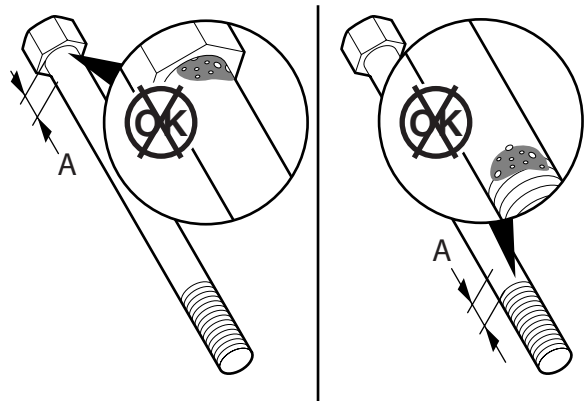
0.12 mm



M201249

Length of area below bolt head and just above beginning of screw thread where corrosion or pitting is not allowed (A)

3.2 mm



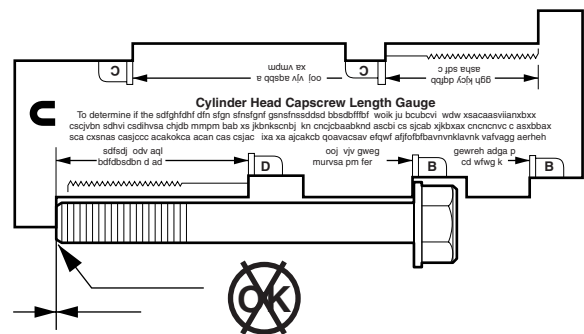
M201250

Maximum free length of short cylinder head bolt (130 mm nominal)

132.1 mm

Maximum free length of long cylinder head bolt (150 mm nominal)

152.1 mm



M201252

Valve clearance

Inspection dimension, cold valve clearance

Intake

0.15 - 0.40 mm

Exhaust

0.40 - 0.75 mm

Setting dimension, valve clearance (cold)

Intake

0.25 mm

Exhaust

0.50 mm

Timing gear

Fit the timing gear case using sealant

Loctite Ultra Grey

Front engine panel

Fit front engine panel using sealant

Loctite Ultra Grey

Gear backlash

Crankshaft gear - camshaft gear

0.076 - 0.28 mm

Oil pump gear - idler gear

0.250 - 0.30 mm

End float

Crankshaft end float

0.267 ± 0.165 mm

Camshaft end play

0.230 ± 0.130 mm

Oil sump pressure

New engine

60 - 80 l/min.

Worn engine

180 l/min.

TECHNICAL DATA**2**

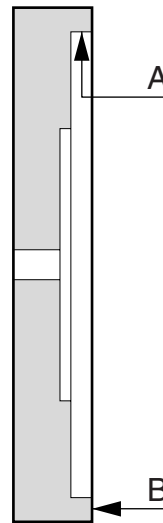
CE engine

LF45/55 series**0**

Oil sump pressure conversion table	
Inches (water)	Litres per minute (l/min.)
1	50
2	84
3	103
4	119
5	133
6	145
7	155
8	164
9	172
10	180
11	187
12	193
13	200
14	206
15	211
16	217
17	222
18	226
19	229
20	232

Flywheel/starter ring gear

Radial run-out, measured on the inside of the flywheel outer edge (A).	max. 0.127 mm
Axial deviation, measured on the flywheel outer edge (B).	max. 0.406 mm
Heat starter ring gear (max. 20 min.)	max. 125°C



M201199

Flywheel housing

Fit flywheel housing using sealant

Loctite 5205

Vibration damper

Difference in thickness at 4 places must not
exceed:

6.35 mm

TECHNICAL DATA**2**

CE engine

LF45/55 series**0****4.2 TIGHTENING TORQUES**

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Starter motor

Attachment bolts	43 Nm
------------------	-------

Automatic poly-V-belt tensioner

Attachment bolts	43 Nm
------------------	-------

Alternator

Alternator bracket attachment bolts	30 Nm
Alternator attachment bolts	60 Nm
Pulley attachment nut	80 Nm

Air compressor

Compressor attachment nuts	80 Nm
Pipe attachments	39 Nm

Steering pump

Attachment bolts, steering pump	55 Nm
Line connection in the pump, delivery side	36 Nm
Attachment bolts, cover	20 Nm
Attachment bolts, reservoir	8 Nm

Air-conditioning compressor

Compressor support attachment bolts	30 Nm
Compressor attachment bolts	60 Nm

Valve gear

Rocker setting bolt lock nut	24 Nm
Valve sleeve attachment bolts	24 Nm
Valve cover attachment bolts	10 Nm
Rocker seat attachment bolts	36 Nm
Injector wiring	1 Nm

Intake manifold

Intake manifold attachment bolts	24 Nm
Fuel rail attachment bolts	24 Nm
Glow element attachment bolts	14 Nm
Air inlet hose clamps	7 Nm

Exhaust manifold

Attachment bolts	43 Nm ⁽¹⁾
Heat shields	56 - 64 Nm

(1) Tighten crosswise from inside to outside.

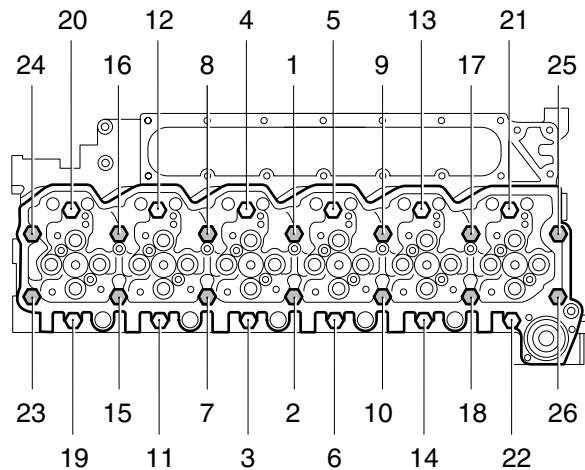
Cylinder head**Note:**

Apply a drop of engine oil on the thread of the attachment bolts and under the bearing surface of the bolt heads.

Phase 1

All attachment bolts 35 Nm ⁽¹⁾

(1) Tighten the bolts in the order indicated

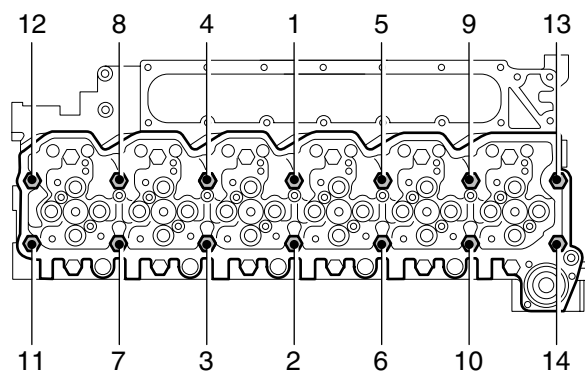


M201143

Phase 2

Use **only** attachment bolts that are 150 mm in length 55 Nm ⁽¹⁾

(1) Tighten the bolts in the order indicated



M201202

TECHNICAL DATA

2

CE engine

LF45/55 series

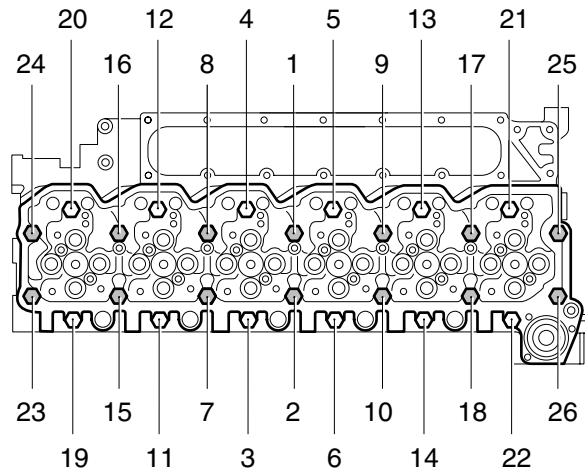
0

Phase 3

All attachment bolts

2 steps of 90°
angular
displacement
each ⁽¹⁾

(1) Tighten the bolts in the order indicated



M201143

Vibration damper

Attachment bolts

1st phase

2nd phase

50 Nm

90° angular displacement

Timing gear

Camshaft locking plate attachment bolts

M8 attachment bolts for timing gear case

M10 attachment bolts for timing gear case

M12 attachment bolts for timing gear case

Camshaft gear attachment bolts

24 Nm

24 Nm

47 Nm

50 Nm

36 Nm

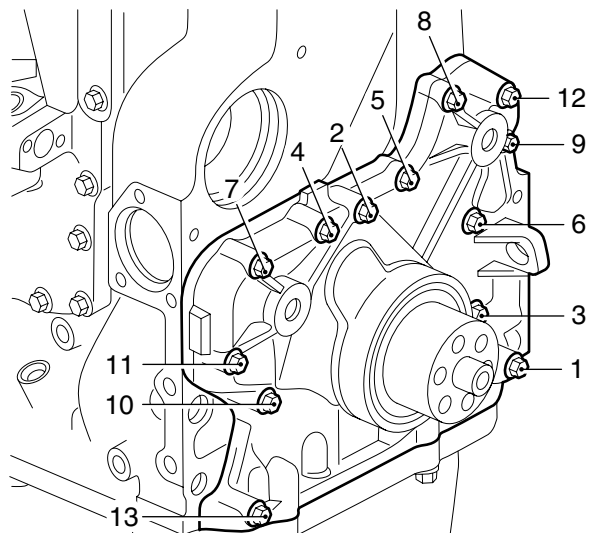
Front engine panel

Front engine panel

attachment bolts

24 Nm ⁽¹⁾

(1) Tighten the attachment bolts in the order indicated



M201144

Flywheel

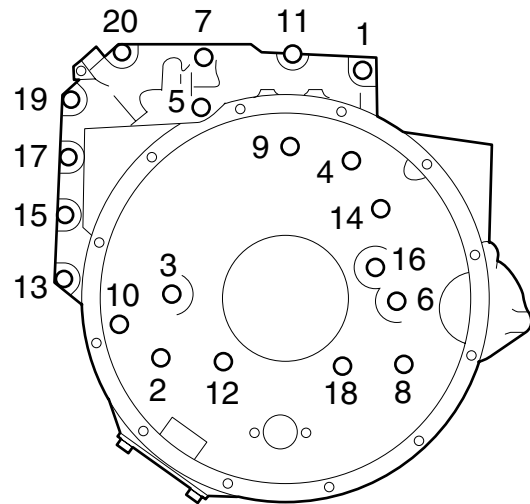
Attachment bolts

30 Nm + 60° angular displacement

Flywheel housing

M10 attachment bolts	49 Nm ⁽¹⁾
M12 attachment bolts	85 Nm ⁽¹⁾

(1) Tighten the attachment bolts in the order indicated



M201080

Engine mounting, front

Engine bracket attachment bolts/nuts	110 Nm
--------------------------------------	--------

Engine mounting, rear

Bolts attaching engine bracket to chassis	110 Nm + 90° angular displacement
Bolts attaching engine bracket to engine	110 Nm + 60° angular displacement
Bolts attaching support to engine bracket	170 Nm + 90° angular displacement

Engine hanger brackets

Front engine hanger bracket attachment bolts	77 Nm
Rear engine hanger bracket attachment bolts	43 Nm

TECHNICAL DATA

2

CE engine

LF45/55 series

0

5. CE ENGINE COOLING SYSTEM

5.1 GENERAL

Thermostat

Thermostat opening temperatures:

thermostat opens at

approx. 81°C

thermostat fully open at

approx. 94°C

Full thermostat opening at

14.3 mm

Header tank pressure cap

Pressure relief valve opening pressure

approx. 0.75 bar

Vacuum relief valve opening pressure

approx. 0.1 bar

Pressure-testing cooling system

Test pressure

0.5 - 0.7 bar

Cleaning cooling system

Product name	Properties	Applications	DAF number
RP cleaner	Cleaning time 45 min. with engine running	Cleaning cooling system	1334996

TECHNICAL DATA

2

CE engine cooling system

LF45/55 series**0**

5.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Coolant pump

Attachment bolts

24 Nm

Thermostat housing

Attachment bolts

10 Nm

Radiator

Attachment nuts

89 Nm

5.3 FILLING CAPACITIES

Cooling system capacity

approx. 22 litres

6. CE ENGINE LUBRICATION SYSTEM

6.1 GENERAL

Oil pressure

Lubricating oil pressure at engine idling speed
 Lubricating oil pressure at full-load engine speed
 Bypass pressure regulator opening pressure

min. 0.69 bar
 min. 2.07 bar
 3.52 bar

Oil filter

Type
 Number
 Location in the oil circuit

disposable filter
 1
 full flow

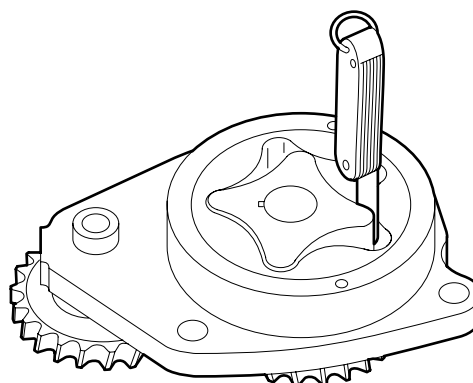
Oil cooler

Oil cooler pressure test temperature
 Oil section test pressure
 Opening pressure of bypass valve at a pressure difference of

approx. 60°C
 4.5 - 5.0 bar
 3.45 bar

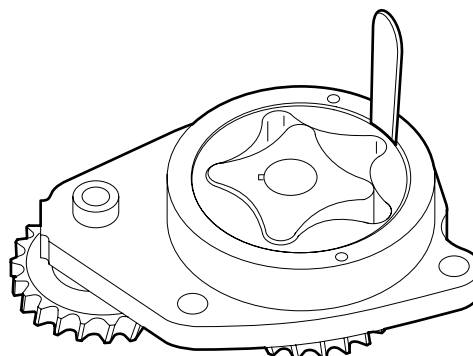
Lubricating oil pump

Maximum clearance,
 inner rotor - outer
 rotor 0.178 mm



M201077

Maximum clearance,
 outer rotor - pump
 housing 0.381 mm



M201076

TECHNICAL DATA

2

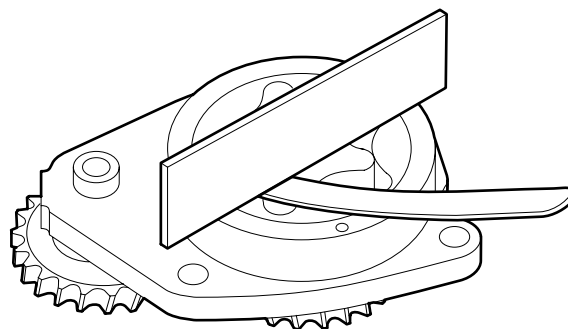
CE engine lubrication system

LF45/55 series

0

Maximum clearance
of inner and outer
rotor relative to the
pump housing,
measured with a
straight edge

0.127 mm



M201075

Lubricating oil pump gear backlash

Lubricating oil pump idler gear - lubricating oil
pump gear

0.25 - 0.30 mm

Crankshaft gear - lubricating oil pump idler gear

0.15 - 0.25 mm

Crankshaft gear - lubricating oil pump gear

0.30 - 0.50 mm

Oil consumption

Maximum permissible engine oil consumption

0.5% of the average fuel consumption

Example:

Average measured fuel consumption:

25 litres/100 km = 250 litres/1000 km

Maximum permissible engine oil consumption:

$0.5\% \times 250 = 1.25$ litres/1000 km

- Engine oil consumption of 1.25 litres / 1000 km is permissible
- Engine oil consumption > 1.25 litres / 1000 km; check the engine using the diagnostics table. See "Diagnostics".

6.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Oil filter

Attachment bolts to connect filter head to engine block

24 Nm

Oil sump

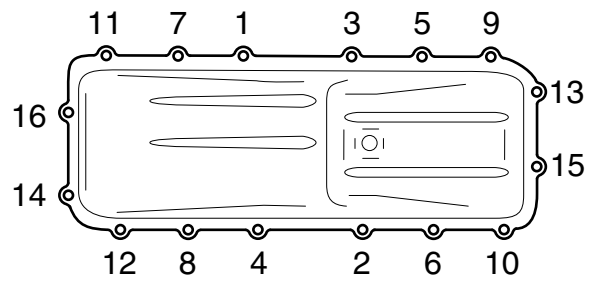
Oil sump attachment bolts

24 Nm ⁽¹⁾

Oil drain plug

60 Nm

(1) Tighten the attachment bolts in the order indicated



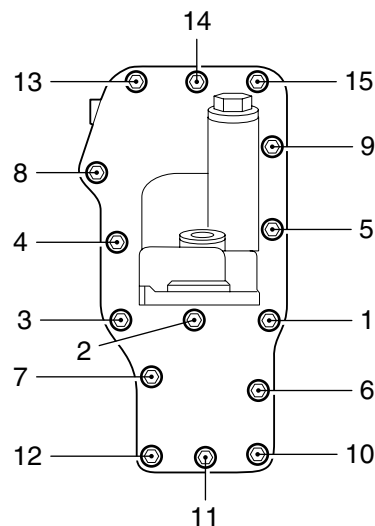
M201079

Oil cooler

Attachment bolts connecting oil cooler to cylinder block

24 Nm ⁽¹⁾

(1) Tighten the attachment bolts in the order indicated



M201145

TECHNICAL DATA

2

CE engine lubrication system

LF45/55 series

0

Oil pump

Attachment bolts 24 Nm

Turbocharger oil supply pipe

Union on filter head 24 Nm

Union on turbocharger 28 Nm

6.3 FILLING CAPACITIES

Lubrication system

Total capacity, including oil cooler and oil filter 19.5 litres

Oil sump capacity, maximum level 17.5 litres

Oil sump capacity, minimum level 15.5 litres

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DIAGNOSTICS

2

Contents

LF45/55 series

1

1. TRACTIVE PROBLEMS

1.1 INTRODUCTION

There may be many reasons why a vehicle's performance is below standard.

Some of these may be mechanical, but some may be psychological in nature. It is therefore important to identify the problem properly.

Try to get as much information as possible from the customer or driver.

- When does the vehicle not perform properly?
- What are the road or weather conditions when this occurs?
- What are the vehicle's loading conditions?
- Is the vehicle not being compared with a vehicle with completely different specifications, for instance engine power?
- Is the vehicle being driven in the correct engine speed range?

If the answers are unsatisfactory, ask the customer or driver for facts.

- Tachograph cards of trips
- Reliable consumption figures of trips

Following correct identification of the complaint, vehicle performance can be tested by an acceleration test.

If the vehicle fails to pass the acceleration test, a boost pressure curve may be plotted as an aid to identifying the cause.

Note:

Checking the boost pressure will in general only make sense after the vehicle has covered at least 20,000 km.

1.2 ACCELERATION TEST

1. Use the "Acceleration test form", which is included in the Workshop Manual.
2. Do the checks set out under "Before starting the acceleration test".

Note:

The work described depends on the type of engine and vehicle.

3. Establish a test route where the difference between the measured times in both directions does not exceed 15%. If the difference in time exceeds 15%, find another test route.
4. Establish the starting and end points on the selected test route, to ensure that exactly the same route can be taken in both directions. Do the entire test at least twice and take the average time.
5. Run the drive train at operating temperature (drive for at least 15 minutes with a loaded vehicle).

Note:

When switched on, the air compressor, air-conditioning compressor and fan consume 10 to 15 kW engine power on average. During the test try to avoid these consumers being switched on.

6. Connect DAVIE and follow the instructions given.
7. Fully depress the accelerator pedal during the acceleration test.

Result of first acceleration test

If the acceleration time is not achieved, first carry out the following work.

- Check the fuel system for the presence of air.
- Replace or clean the air filter element.
- Check the adjustment of the wastegate on the turbocharger.
- Check the exhaust brake butterfly valve for correct operation.
- Check the charge cooler exterior for dirt deposits.
- Clean the water separator.
- Check that the primer pump is attached.
- Replace the fuel fine filter.
- Check the suction pipe of the tank for clogging by coarse dirt.
- Check the fuel suction line for clogging and flow resistance.
- Check the fuel tank for fouling. Clean with a steam cleaner, if necessary.
- Check the air intake system for any leaks.
- Check the exhaust system for any leaks.
- Check the exhaust system for blockages by measuring the exhaust gas back pressure.
- Check the turbocharger impellers on the compressor and turbine sides for damage and for deposits of salt or any other contaminants.
- Check both the valve clearance and the DEB clearance.
- Check the injector pipes for damage.
- Check the fuel gallery/rail pressure.
- Check the fuel lift pump output.
- Check whether the right type of components has been fitted. This includes turbocharger, injectors, etc.
- Check the opening pressure of the injectors.

Repeat the acceleration test. If necessary, plot a boost pressure curve.

DIAGNOSTICS**2**

Tractive problems

LF45/55 series**1.3 ACCELERATION TEST FORM****1****General data**

Customer's name: _____

Chassis number: _____

Registration number: _____

Test conditions

Weather conditions: dry / rain / wet road / drizzle

Wind force: none / average / strong

Outside temperature: _____ °C

Vehicle data

Vehicle type: _____ Trailer type: _____ Superstructure: _____

Total combination weight: _____ kg Total vehicle height: _____ m

Cab type: day / sleeper / space / superspace

Aerodynamics: roof spoiler / fenders / front spoiler / skirts / sun visor / _____

Engine type: _____ Gearbox type: _____ Transmission: _____

Rear axle type: _____ Transmission: _____

Tyre size: front: _____ rear: _____

Tyre make: _____ Energy: _____

Space between cab and superstructure/trailer: _____ m

TOPEC data

Starting speed: _____ km/h End speed: _____ km/h

Gear selection: _____ Acceleration time: _____ sec.

Measured time of outward journey: 1: _____ sec.

2: _____ sec.

3: _____ sec.

Average time of outward journey: _____ sec.

Average time: _____ sec.

Measured time of return journey: 1: _____ sec.

2: _____ sec.

3: _____ sec.

Average return time: _____ sec.

1.4 ACCELERATION TEST USING DAVIE

The acceleration test can also be carried out using DAVIE. Collect the necessary data and, after starting DAVIE, go to the engine management system and carefully follow the instructions in DAVIE for carrying out the test correctly.

The test results should be saved to diskette after each test.



The acceleration test in DAVIE should only be started when the vehicle is stationary. As the communication between the accelerator pedal sensor and the unit will be broken for a short time when DAVIE is started up, this can lead to dangerous situations when the vehicle is being driven.

When driving, never start a "direct test" or "guide diagnosis".

DIAGNOSTICS

2

Tractive problems

LF45/55 series

1

2. BE/CE ENGINE, GENERAL

2.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**2**

BE/CE engine, general

LF45/55 series**2.2 FAULT-FINDING TABLE, ENGINE FUNCTIONS****1**

SYMPTOM: ENGINE CAN BE STARTED, BUT DOES NOT RUN	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Fuel filter clogged	Replace the fuel filter and clean the system
While carrying out an engine test with DAVIE, communication with DAVIE was interrupted	Remove the battery earth lead and then refit it
No fuel supply/fuel lift pump defective; no delivery	Check: - the fuel level - the pipes for blockage and leaks - the fuel lift pump

SYMPTOM: ENGINE STALLS AND RUNS AGAIN AFTER RE-STARTING	
Possible cause	Remedy
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal

SYMPTOM: ENGINE STARTS POORLY	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Fuel filter clogged	Replace the fuel filter and clean the system
Battery voltage too low	Charge the batteries
Mechanical defect or clogging in injector	Replace the injector
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary
Internal leakage between the fuel supply pipe and the injector	Check the fuel supply pipe/injector connections for internal leaks

SYMPTOM: ENGINE RUNS AT (INCREASED) IDLING SPEED AND DOES NOT RESPOND TO ACCELERATOR PEDAL	
Possible cause	Remedy
Mechanical defect of accelerator pedal sensor	Check: - the mechanical connection between the sensor and the accelerator pedal - the accelerator pedal sensor
Fuel quantity adjustment by ABS/ASR	
Engine brake input signal present	Check the electrical system of the engine brake

SYMPTOM: DIESEL KNOCK DURING ACCELERATION	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Injector defective	Inspect the injectors

SYMPTOM: IRREGULAR RUNNING OF ENGINE	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Fuel filter clogged	Replace the fuel filter
Connection points on injectors mixed up	Connect the correct connection points to the correct injector
Mechanical defect or clogging in injectors	Replace the injectors
Injector defective	Inspect the injectors
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary
Pressure relief valve on fuel rail does not shut off	Check the pressure relief valve

DIAGNOSTICS**2**

BE/CE engine, general

LF45/55 series**1**

SYMPTOM: REDUCED POWER AT ALL ENGINE SPEEDS	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Fuel filter clogged	Replace the fuel filter
Mechanical defect of accelerator pedal sensor	Check: - the mechanical connection between the sensor and the accelerator pedal - the accelerator pedal sensor
Fault in electrical components/wiring of: - contacts - contact resistors in connector contacts	Check the electrical system
Air filter clogged	Replace or clean the air filter
Turbocharger defective/wastegate control incorrect	Check the turbocharger/wastegate control
Air leak in inlet system	Pressure-test the inlet system
Mechanical defect or clogging in injectors	Replace the injectors
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary

SYMPTOM: REDUCED POWER ABOVE A CERTAIN ENGINE SPEED	
Possible cause	Remedy
Fuel filter partially clogged	Replace the fuel filter
Air filter partially clogged.	Replace or clean the air filter
Air leak in inlet system	Pressure-test the inlet system
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary

SYMPTOM: WHITE/BLUE SMOKE IS EMITTED	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Fuel filter clogged	Replace the fuel filter and clean the system
Mechanical defect or clogging in injectors	Replace the injectors
Injector defective	Inspect the injectors
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary

SYMPTOM: BLACK SMOKE IS EMITTED	
Possible cause	Remedy
Injector defective	Inspect the injectors

SYMPTOM: FUEL CONSUMPTION TOO HIGH	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Fuel filter clogged	Replace the fuel filter and clean the system
Air leak in inlet system	Pressure-test the inlet system
Mechanical defect or clogging in injectors	Replace the injectors
Leak in fuel system	Check for leaks

SYMPTOM: REDUCED MAXIMUM ENGINE SPEED	
Possible cause	Remedy
Air in fuel system	Check for drawing in of air: - via the suction pipe - via the fuel lift pump seal
Fuel filter clogged	Replace the fuel filter and clean the system
Turbocharger defective	Check turbocharger
Mechanical defect or clogging in injectors	Replace the injectors
Fuel quantity adjustment by ABS/ASR	
Fuel lift pump delivery too low	Check the fuel lift pump and replace if necessary

DIAGNOSTICS**2**

BE/CE engine, general

LF45/55 series**2.3 FAULT-FINDING TABLE, VEHICLE FUNCTIONS****1**

SYMPTOM: VEHICLE SPEED CONTROL DOES NOT WORK	
Possible cause	Remedy
Fault in electrical components/wiring of: - steering column switch - proximity switch	Check the electrical system
Condition(s) for disengaging vehicle speed control present	Check for presence of disengaging condition(s)

SYMPTOM: ENGINE SPEED CONTROL DOES NOT WORK	
Possible cause	Remedy
Condition(s) for disengaging engine speed control present	Check for presence of disengaging condition(s)
Fault in electrical components/wiring of: - wiring harness - steering column switch	Check the electrical system

SYMPTOM: PRE-GLOWING AND AFTER-GLOWING FUNCTION DOES NOT WORK	
Possible cause	Remedy
Fault in electrical components/wiring of: - wiring harness - warning lamp, pre-glowing - glow element - relay, glow element	Check the electrical system

SYMPTOM: ENGINE CANNOT BE SWITCHED OFF WITH IGNITION KEY	
Possible cause	Remedy
Power supply to electronic unit not cut off. Power supply to electronic unit after contact not cut off with contact switch.	Check the electrical system

SYMPTOM: FAULT INDICATOR LAMP DOES NOT GO ON OR DOES NOT GO OFF	
Possible cause	Remedy
Fault in electrical components/wiring of: - wiring harness - electronic unit	Check the electrical system

SYMPTOM: NO COMMUNICATION POSSIBLE WITH DAVIE	
Possible cause	Remedy
Fault in electrical components/wiring of: - wiring harness - diagnostic connector Power supply to electronic unit after contact not cut off with contact switch. No supply voltage to the electronic unit Electronic unit defective	Check the electrical system

DIAGNOSTICS

2

BE/CE engine, general

LF45/55 series

1

3. BE/CE ENGINE COOLING SYSTEM

3.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**2**

BE/CE engine cooling system

LF45/55 series**3.2 FAULT-FINDING TABLE****1**

SYMPTOM: ENGINE TEMPERATURE INCREASES	
Possible cause	Remedy
Incorrect injectors installed	Check whether the correct injectors have been installed
Inlet system failure	Check the inlet system
Lubrication system failure	Check the lubrication system
Incorrect poly-V-belt tension	Check the poly-V-belt tensioner or replace the poly-V-belt
Insufficient coolant	Check the coolant level. Top up if necessary
Coolant hose torn or clogged	Check the coolant hoses
Air cooler and cooling system radiator fouled	Check/clean the air cooler and cooling system radiator
Wastegate setting is too high	Check the wastegate setting
Air hose from the turbocharger housing to the wastegate diaphragm leaks or is not connected	Check the air hose. Replace if necessary.
Incorrect or malfunctioning pressure cap	Check the pressure cap
Thermostat opens insufficiently or not at all	Check the thermostat and its operation
Coolant pump defective	Check the coolant pump shaft, bearings and impeller. Replace the coolant pump if necessary
Viscous fan defective	Check operation of the viscous fan
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel

SYMPTOM: EXTERNAL COOLANT LEAKAGE	
Possible cause	Remedy
Coolant hoses defective	Check the coolant hoses
Coolant pipes defective	Check the coolant pipes
Radiator leaking	Check the radiator. Pressure-test if necessary
Coolant pump leaking	Check coolant pump. If necessary, measure bearing play
Defective oil cooler	Inspect the oil cooler. Pressure-test if necessary
Defective pressure cap	Check the pressure cap. Pressure-test if necessary
Heater leaking	Check the heater hoses

SYMPTOM: INTERNAL COOLANT LEAKAGE	
Possible cause	Remedy
Defective cylinder head gasket	Check the cylinder head gasket
Cracked cylinder head or cylinder block	Check the cylinder head and cylinder block for internal cracks. Pressure-test if necessary
Defective compressor cylinder head gasket	Replace the compressor cylinder head gasket
Defective oil cooler	Check whether there is coolant in the lubrication system
Defective expansion plugs in cylinder block or cylinder head	Replace the leaking expansion plug(s)

DIAGNOSTICS

2

BE/CE engine cooling system

LF45/55 series

1

4. BE/CE ENGINE LUBRICATION SYSTEM

4.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**2**

BE/CE engine lubrication system

LF45/55 series**4.2 FAULT-FINDING TABLE****1**

SYMPTOM: ENGINE OIL PRESSURE TOO LOW	
Possible cause	Remedy
Engine oil level too low	Top up engine oil to maximum level
External oil leaks	Visually check the engine for leaks. Repair if necessary
Engine oil pressure and temperature sensor or engine oil pressure control switch faulty	Check the sensor or switch. Replace if necessary
Oil does not meet the required specifications	Change the engine oil and the oil filter
Oil temperature is too high	Check the oil cooler
Oil mixed with coolant or fuel.	Change the engine oil and the oil filter
Oil suction pipe loose or broken	Check oil pipe. Repair if necessary
Oil pressure control valve fails to operate	Check the oil pressure control valve
Inadequate functioning of oil pump	Check the oil pump
Main or big-end bearings worn out	Check main or big-end bearings
Piston cooler oil nozzle has come loose	Check oil nozzle. Replace if necessary
Fouling between oil pressure control valve and seat	Check/clean the oil pressure control valve
Oil filter fouled	Replace the oil filter

SYMPTOM: ENGINE CONSUMES TOO MUCH OIL	
Possible cause	Remedy
Inlet system failure	Check the inlet system
Exhaust system failure	Check the exhaust system
Oil cooler leaks	Check whether there is lubricating oil in the engine cooling system
Oil temperature is too high	Check that the correct oil cooler has been installed
Excessive blow-by	Check the compression pressure and carry out a cylinder leak test Check the condition of the piston rings and cylinder liners
Worn piston rings and/or cylinder walls	Replace the piston rings and/or drill/hone the cylinders Check the air inlet system Check oil specifications
Turbocharger defective	Check the turbocharger

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

BE ENGINE

2

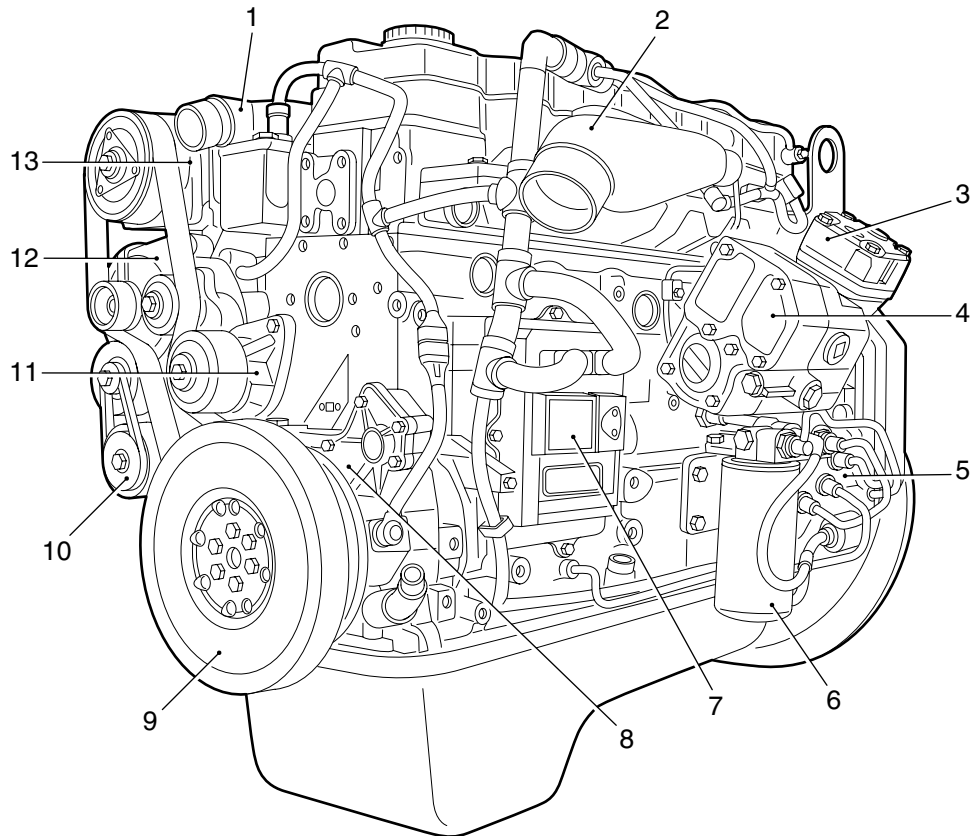
Safety instructions

LF45/55 series

2

2. GENERAL

2.1 LOCATION OF COMPONENTS



1. Thermostat housing
2. Intake manifold
3. Air compressor
4. Steering pump with reservoir
5. High-pressure pump
6. Fuel filter
7. ECS-DC3 electronic unit
8. Front engine panel
9. Vibration damper
10. Automatic tensioner
11. Coolant pump
12. Alternator
13. Air-conditioning compressor

M201141

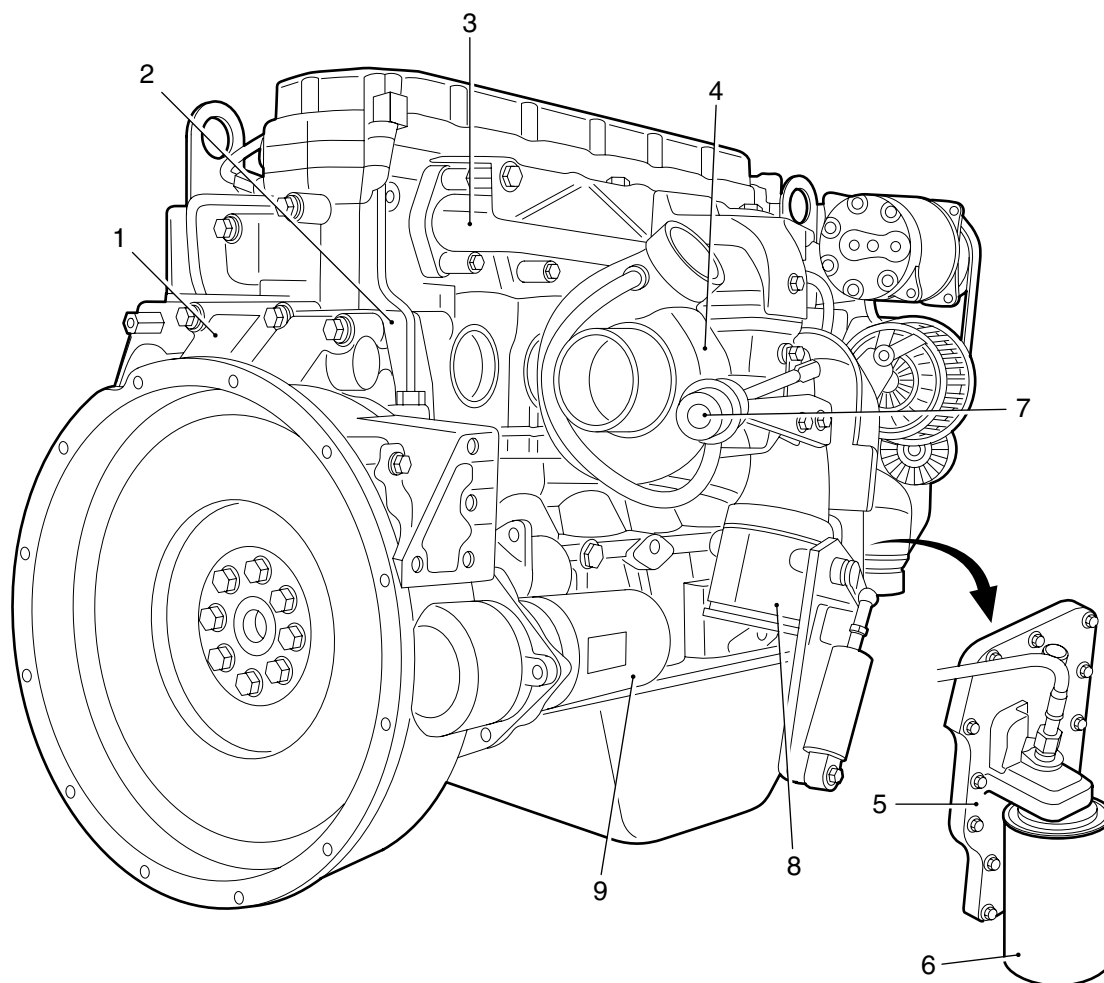
BE ENGINE

2

General

LF45/55 series

2



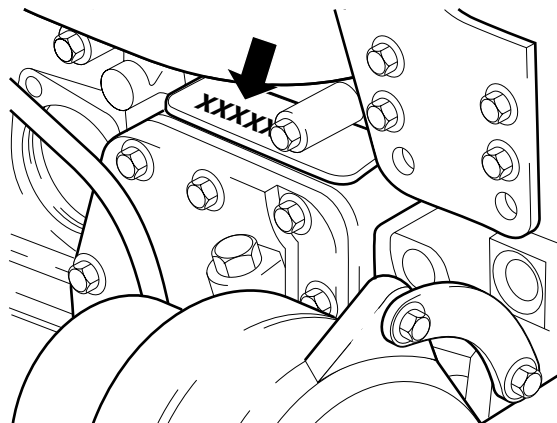
M201140

1. Flywheel housing
2. Timing gear case
3. Exhaust manifold
4. Turbocharger
5. Oil cooler
6. Oil filter
7. Wastegate diaphragm
8. Exhaust brake
9. Starter motor

2.2 IDENTIFICATION

Engine number

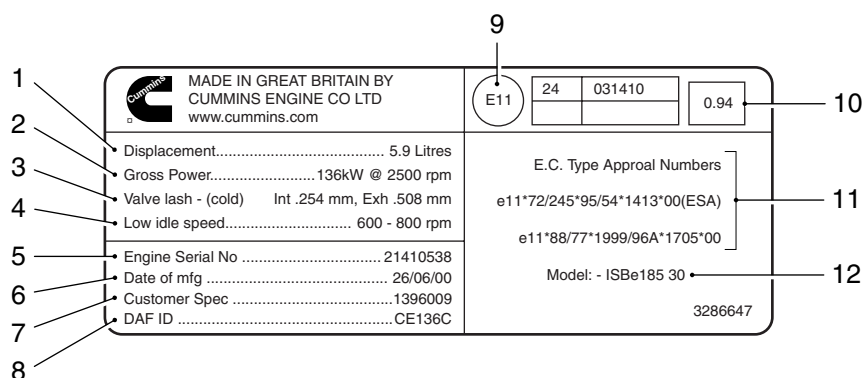
The engine number is stamped front right in the cylinder block, at the top of the lubricating oil cooler housing.



M2 01 138

Engine identification plate

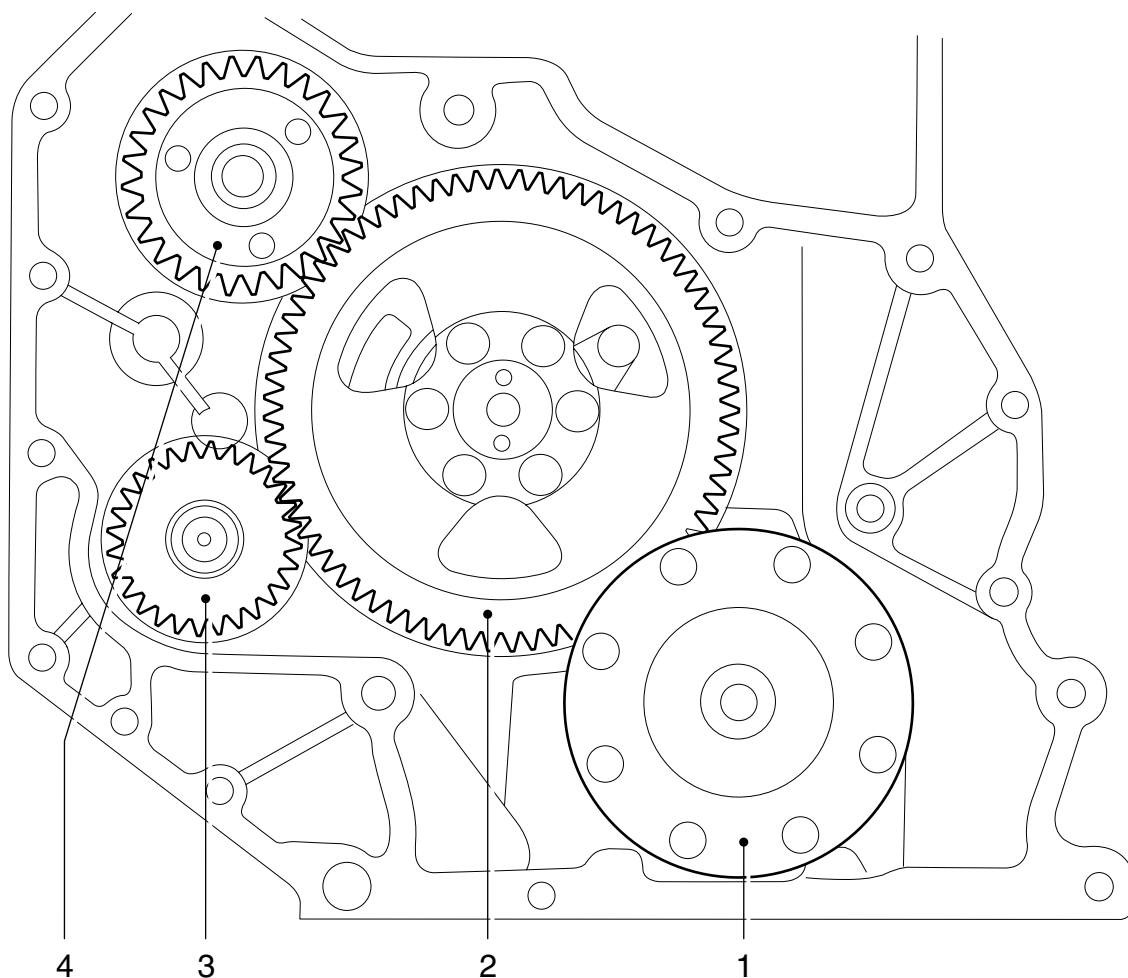
The engine identification plate is located at the top of the flywheel housing or on the valve cover, depending on the production date.



M201135

1. Cubic capacity
2. Engine output
3. Valve clearance
4. Idle engine speed
5. Engine number
6. Production date
7. Client specification
8. DAF type designation
9. Indication of country of origin
10. Free acceleration smoke level (K factor)
11. Type approval numbers
12. Cummins type designation

2.3 OVERVIEW DRAWING, TIMING GEAR



1. Crankshaft
2. Camshaft
3. High-pressure pump
4. Compressor

M201432

3. CHECKING AND ADJUSTING

3.1 CHECKING AND ADJUSTING BE ENGINE VALVE CLEARANCE

Note:

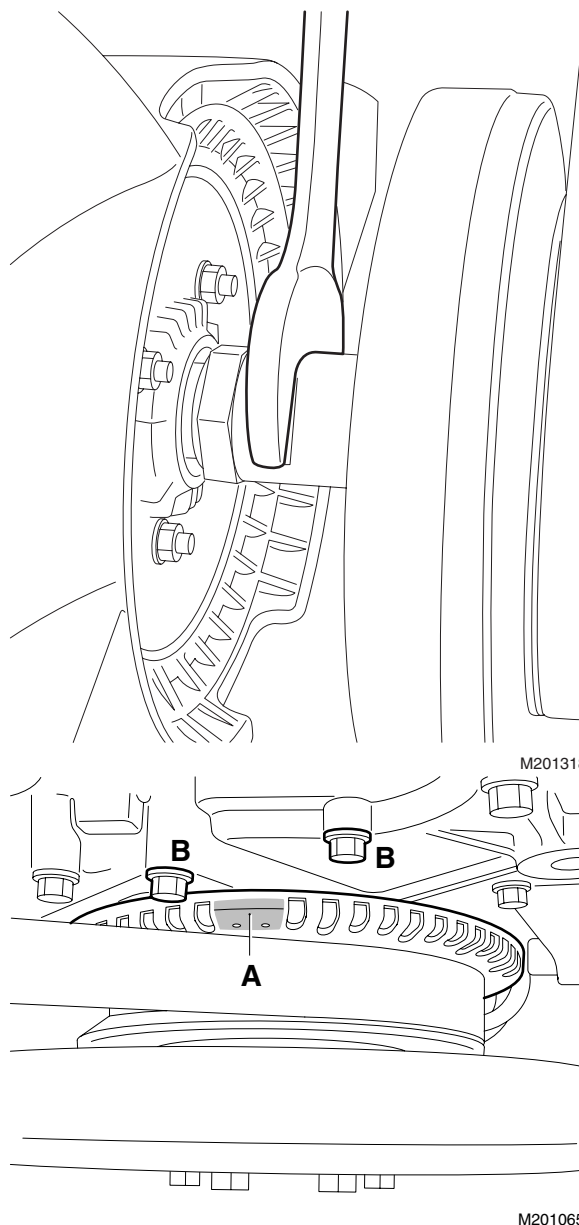
Checking and adjusting valve clearance must only be done when the engine is cold.

1. Remove the valve cover. See "Removing and installing".
2. Use an open-end spanner on the fan shaft to turn the crankshaft clockwise, as seen from the vibration damper end (this is the engine's normal direction of rotation), until the mark (A) is between the bolts (B) and the valves of cylinder 1 are in overlap position.

Note:

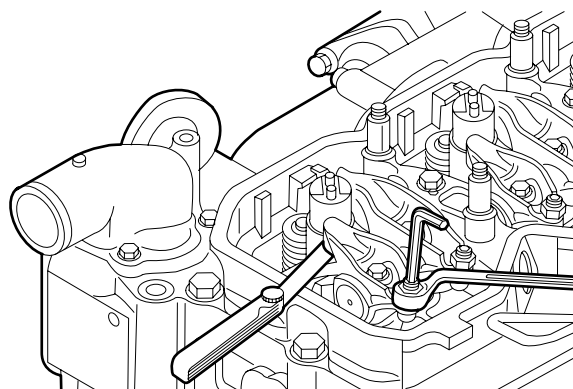
"Overlap" is the moment at which the inlet valves start opening and the exhaust valves stop closing.

The inlet valves are operated by the short rockers and the exhaust valves by the long rockers.



BE ENGINE**2****Checking and adjusting****LF45/55 series**

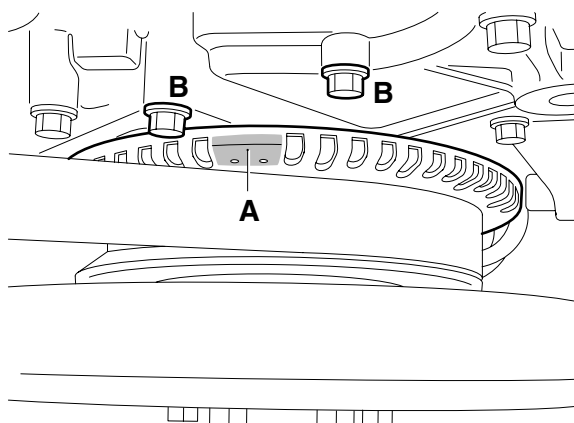
3. Check/correct the valve clearance of the specified inlet and exhaust valves. Set the correct valve clearance by loosening the lock nut and rotating the adjusting screw in the correct direction; see "Technical data" for the correct valve clearance.



M201064

Cylinder	Inlet valve	Exhaust valve
1		
2		X
3	X	
4	X	X

4. Using an open-end spanner on the fan shaft, turn the crankshaft one rotation further so that the mark (A) is once again between the bolts (B) and the valves of cylinder 4 overlap.
5. Check/correct the valve clearance of the specified inlet and exhaust valves. Set the correct valve clearance by loosening the lock nut and rotating the adjusting screw in the correct direction; see "Technical data" for the correct valve clearance.



M201065

Cylinder	Inlet valve	Exhaust valve
1	X	X
2	X	
3		X
4		

6. Fit the valve cover. See "Removing and installing".
7. Fit the flexible pipe, air inlet pipe and bracket.

3.2 CHECKING AND ADJUSTING TIMING GEAR

Note:

The engine is fitted with gears on either side. The gears at the vibration damper end only drive the oil pump. These gears have no marks and may be fitted in any position.

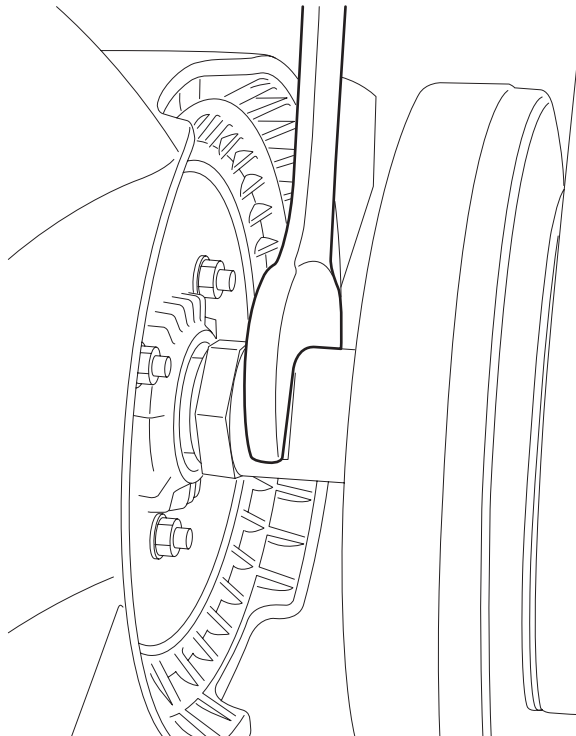
The timing gear wheels on the flywheel side drive the camshaft, air compressor and fuel pump. Only the camshaft gear and the crankshaft gear have marks which must be aligned. The other gears may be fitted randomly.

1. Remove the engine encapsulation panels.
2. Remove the gearbox.
3. Remove the flywheel. See "Removing and installing".
4. Remove the flywheel housing. See "Removing and installing".

Note:

When the engine crankshaft or camshaft is turned separately, the pistons and valves may touch each other.

5. Use an open-end spanner on the fan shaft to turn the crankshaft clockwise, as seen from the vibration damper end, until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.



M201318

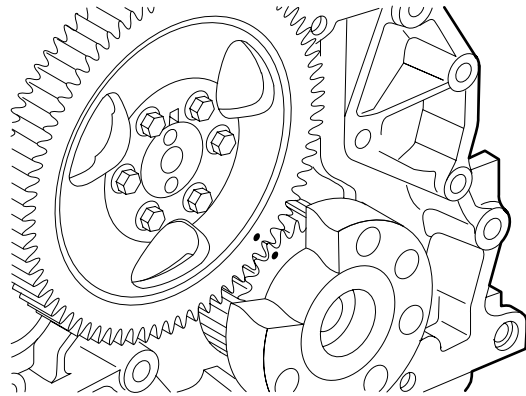
BE ENGINE

2

Checking and adjusting

LF45/55 series

6. Check that the marked tooth falls exactly into the marked depth. If not, remove and refit the camshaft gear. See "Removing and installing".
7. Fit the flywheel housing. See "Removing and installing".
8. Fit the flywheel. See "Removing and installing".
9. Fit the gearbox.
10. Fit the engine encapsulation panels.



M201146

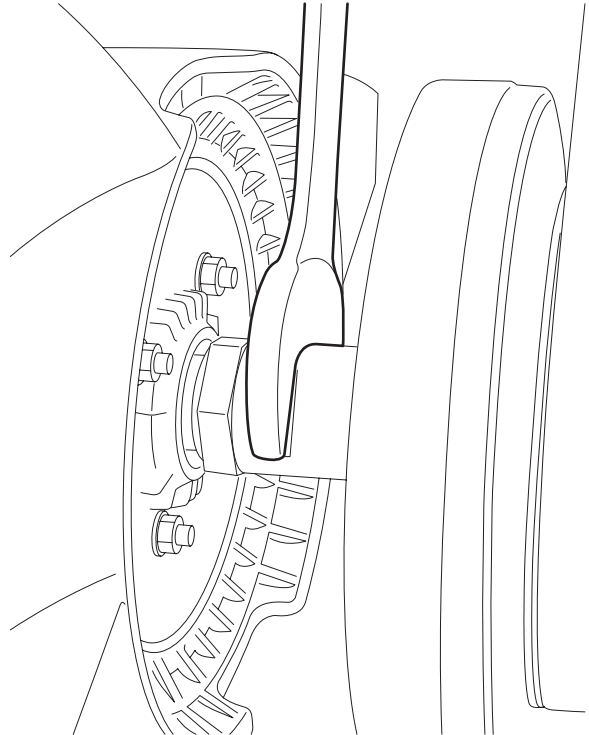
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3.3 CHECKING PISTON PROJECTION

Note:

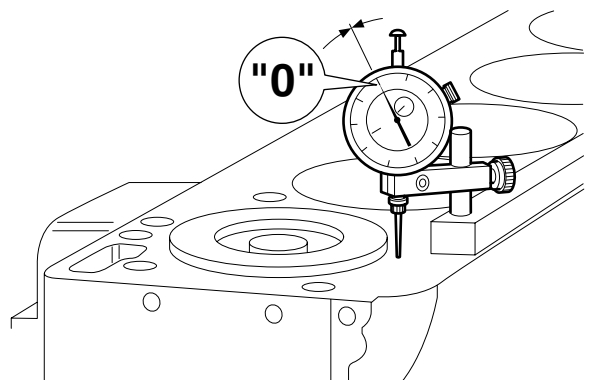
The piston projection determines which thickness of cylinder head gasket must be used.

1. Use an open-end spanner on the fan shaft to turn the crankshaft, so that the piston of cylinder 1 is in the top dead centre (TDC).
2. Clean the upper surface of the cylinder block and the pistons.



M201318

3. Place a dial gauge on the upper surface of the cylinder block next to cylinder 1 and set the gauge to zero.



M201233

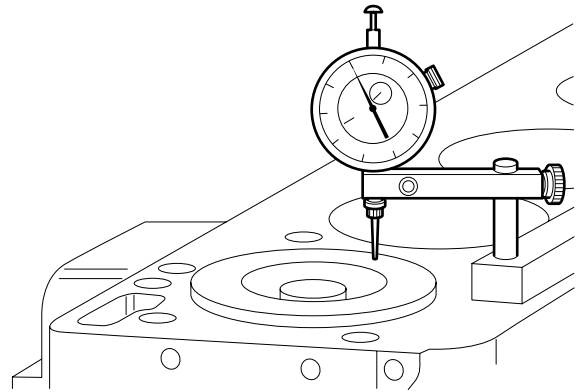
BE ENGINE

2

Checking and adjusting

LF45/55 series

4. Pull up the stylus of the dial gauge and move it to the edge of the first piston, above the gudgeon pin.
5. Use an open-end spanner on the fan shaft to turn the crankshaft anti-clockwise and clockwise, at the same time reading the dial gauge to find the highest position of the piston. Make a note of this reading.
6. Repeat this measurement for the other pistons.
7. Calculate the average value of the piston projection above the cylinders.



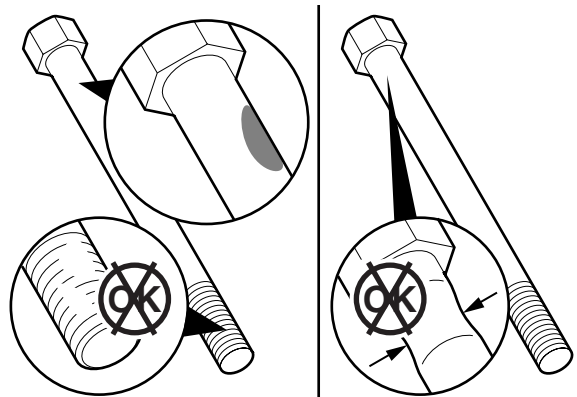
M201234

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3.4 CHECKING CYLINDER HEAD BOLTS

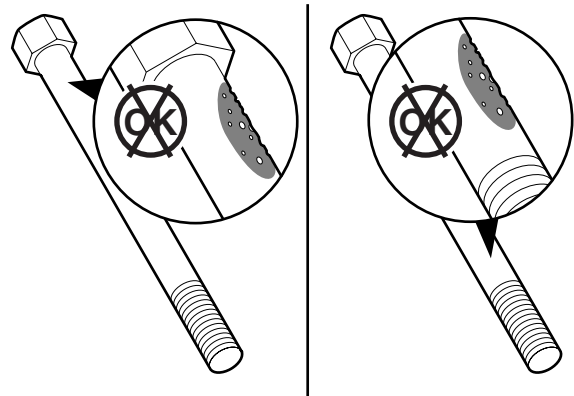
Cylinder head bolts can be re-used provided they satisfy a number of conditions. If a cylinder head bolt does not meet one or more of these conditions, new cylinder head bolts must be used.

1. Check cylinder head bolts for damaged screw threads, corroded surfaces and constriction as a result of overstretching.



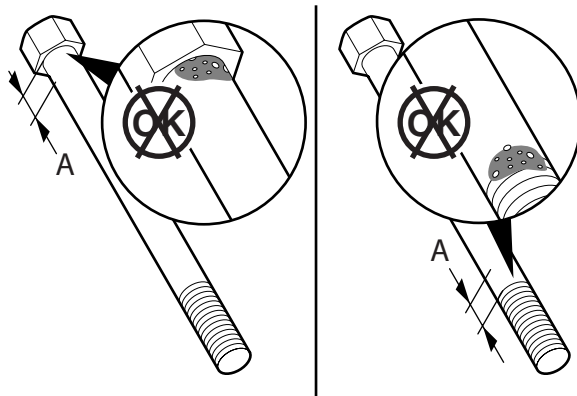
M201248

2. Check the dimensions of visible pitting on the cylinder head bolt, see "Technical data".



M201249

3. Check the cylinder head bolt for visible corrosion or pitting immediately under the bolt head and directly above the start of the screw thread, see "Technical data".



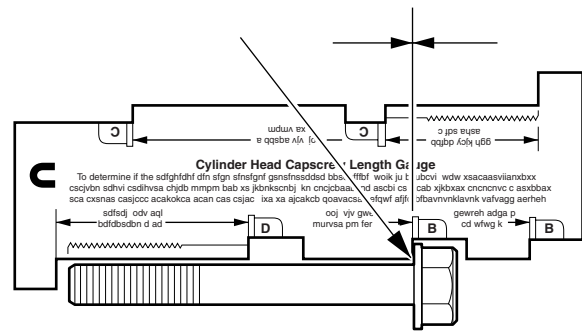
M201250

BE ENGINE**2**

Checking and adjusting

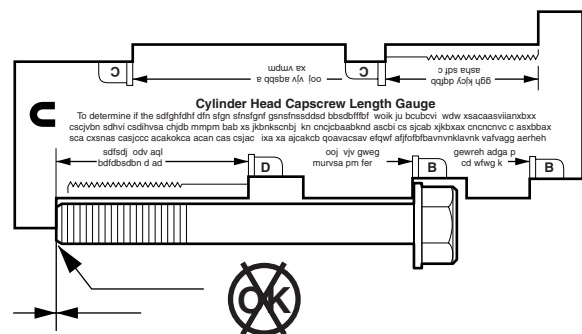
LF45/55 series

4. Check the free length of the cylinder head bolt. Use the special tool (DAF no. 1329477) for this purpose. Place the bolt head against the abutting surface.



M201251

5. The end of the bolt must not touch the gauge.



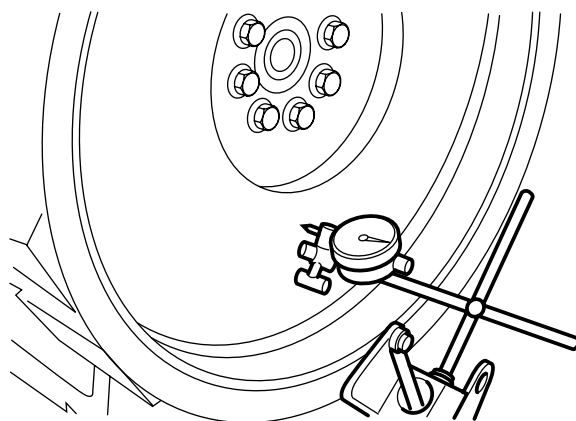
M201252

3.5 INSPECTING THE FLYWHEEL

If cracks are visible on the flywheel, on the contact surface of the clutch plate, it must be replaced.

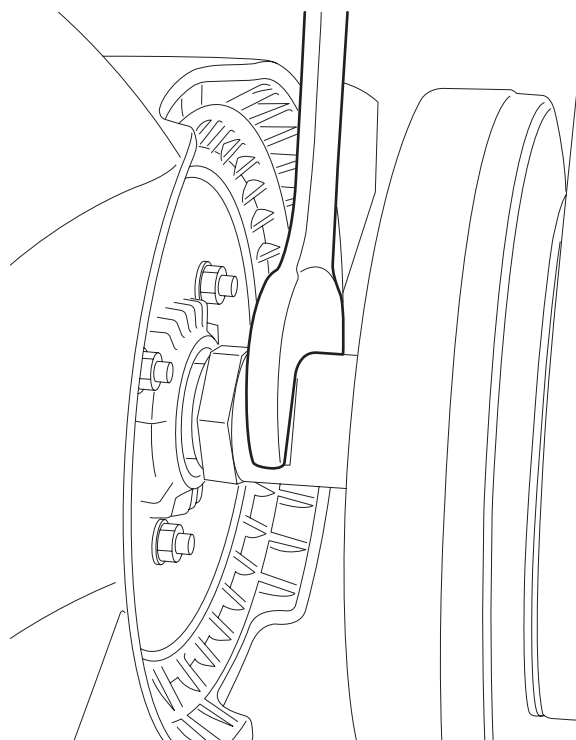
Checking flywheel run-out

1. Clean the flywheel.
2. Place a metal strip on the edge of the flywheel housing to fit a dial gauge.
3. Place the dial gauge on the metal strip.
4. Place the stylus of the dial gauge as close as possible to the outer edge of the flywheel.
5. Set the dial gauge to "0".



M200230

6. Use an open-end spanner on the fan shaft to crank the engine through 360°, and measure the maximum dial gauge reading. Compare the reading with the specified value, see 'Technical data'.



M201318

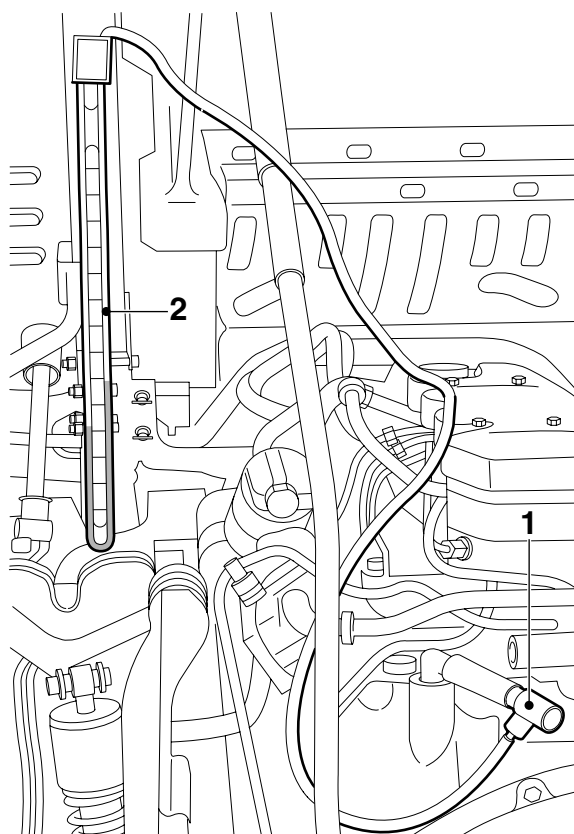
3.6 INSPECTION, ENGINE OIL SUMP PRESSURE



Be careful when working on an engine at operating temperature.

The oil sump pressure is measured to quickly check the cylinder seals. The readings obtained are an indication of the leakage from all cylinders.

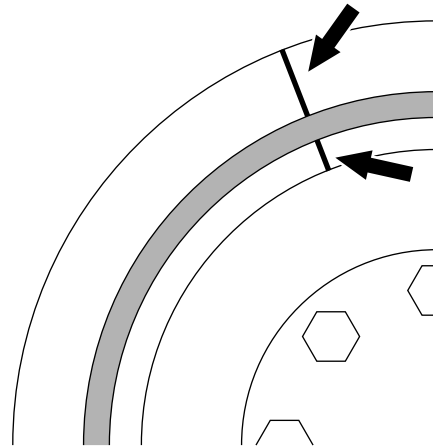
1. Bring the engine up to operating temperature.
2. Turn off the engine and fit the special tool (DAF no. 1240080) (1) to the crankcase breather hose.
3. Fit the special tool with a water pressure gauge (DAF no. 1240081) (2) using a hose and start the engine.
4. Using the water pressure gauge, measure the oil sump pressure at idling speed and compare the measured reading with the technical data. See "Technical data".



M201316

3.7 INSPECTION, VIBRATION DAMPER

1. Check the reference lines. The reference lines should form a single line.
2. Inspect the rubber part for damage or degradation. If the rubber part shows cracks or if there are bits of rubber missing, the vibration damper must be replaced.



G0 00 199

3.8 INSPECTING THE CYLINDER HEAD

1. Check the sealing plugs and expansion plugs of the cylinder head for leaks. If necessary, pressure-test the cylinder head.
2. Inspect the cylinder head for damage to the sealing surface and any cracks.
3. Check the cylinder head for smoothness using a straight edge and feeler gauge. See "Technical data".

Note:

The cylinder head must be replaced if it does not meet the specified values.

BE ENGINE

2

Checking and adjusting

LF45/55 series

3.9 INSPECTING THE CYLINDER BLOCK

1. Inspect the cylinder block for damage to the sealing surface and any cracks.
2. Check the cylinder block for smoothness using a straight edge and feeler gauge. See "Technical data".

2

4. REMOVING AND INSTALLING

4.1 REMOVAL AND INSTALLATION, ENGINE



Suspend the engine securely from the hoist, using approved lifting gear.

Various fluids will be released when fluid pipes are removed.

Collect these fluids. Personal safety and the risk of fire should always be considered.

Note:

Because of the large number of vehicle specifications, it is not feasible to exactly specify the engine removal and installation procedures for every vehicle.

This description only includes the most important points requiring attention.

- Disconnect the earth lead from the battery terminal.
- Avoid opening fluid systems as much as possible. If possible, remove and set aside the engine components.
- When removing the engine, ensure that no parts or dirt fall into the engine, radiator or other components. All openings that are freed should therefore be plugged.
- Wiring harnesses are vulnerable. If damaged, they may cause failures. Make sure these wiring harnesses are not live and are clear of moving parts.
- Fit all attachment bolts and tighten them to the correct torque.
- The engine should not be allowed to rest on the oil sump. Because the oil sump is made of sheet material, it will be severely damaged by the engine's weight.
- The engine should not be allowed to rest on the flywheel housing. It can easily be damaged by the engine's weight.

4.2 REMOVAL AND INSTALLATION, ENGINE MOUNTS



Suspend the engine securely from the hoist, using approved lifting gear. Various fluids will be released when fluid pipes are removed. Collect these fluids. Personal safety and the risk of fire should always be considered.

2

Removing the engine mounts

1. Disconnect the earth lead from the battery terminal.
2. Drain the coolant.
3. Remove the hoses between the engine and the radiator.
4. Remove the attachment bolts from the radiator torque rod bracket on the engine side.
5. Remove the air inlet hoses between the engine and the air cooler. Plug the openings.
6. Detach the air-conditioning pipes, if present, at the top of the radiator.
7. Detach the heater hose bracket at the top of the radiator.
8. Remove the oil supply pipe from the engine.
9. Remove the lower connector from electronic unit ECS-DC3.
10. Remove the attachment bolts of the viscous fan clutch on the drive flange and place the viscous fan clutch with the fan in the wind tunnel.
11. Suspend the engine securely in the hoist.
12. Remove the engine mount attachment bolts at the front and rear of the engine.
13. Hoist the engine very carefully as far as necessary and support it properly.
14. Remove the engine mounts.

Installing the engine mounts

1. Tighten the engine mounting attachment bolts to the specified torque. See "Technical data".
2. Fit the viscous fan clutch with the fan. Tighten the attachment bolts to the specified torque. See "Technical data".
3. Fit the connector of electronic unit ECS-DC3.
4. Fit the oil supply pipe.
5. Fit the heater hose bracket at the top of the radiator.
6. Fit the bracket for the air-conditioning pipes at the top of the radiator.
7. Fit the torque rod bracket between the engine and the radiator.
8. Fit the air inlet hoses between the engine and the air cooler.
9. Fit the coolant hoses between the engine, radiator and the header tank.
10. Fit the torque rod between the radiator and the engine.
11. Fill the cooling system. See "Draining and filling".
12. Connect the battery earth lead.

4.3 REMOVAL AND INSTALLATION, VALVE COVER



When the engine or parts thereof are opened, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened.

2

Removing the valve cover

1. Clean the area around the valve cover.
2. Remove the banjo bolt and the attachment of the plastic crankcase breather tube.
3. Remove the valve cover attachment nuts.
4. Remove the valve cover.

Installing the valve cover

1. Clean the sealing surface of the valve sleeve and the valve cover.
2. Check the valve cover gasket. If it is not damaged it may be re-used.
3. Fit the valve cover gasket to the valve cover.
4. Fit the valve cover.
5. Fit the attachment nuts of the valve cover and tighten them to the specified torque. See "Technical data".
6. Fit the plastic crankcase breather tube and the banjo bolt to the valve cover.

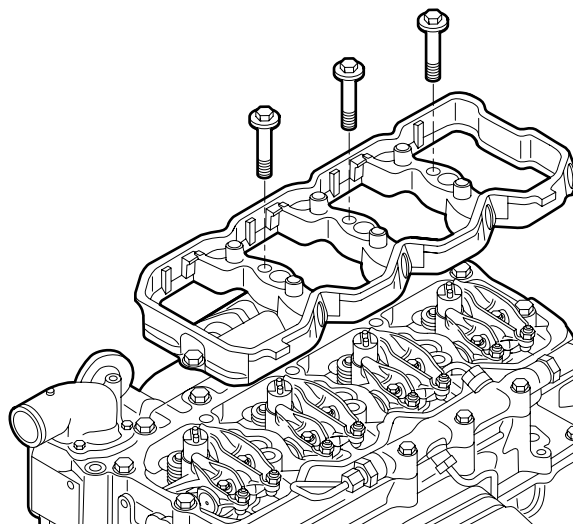
4.4 REMOVAL AND INSTALLATION, VALVE SLEEVE



When the engine or parts thereof are opened, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened.

Removing the valve sleeve

1. Remove the valve cover.
2. Detach the feed-through connectors from the injectors.
3. Remove the injector wiring from the injectors.
4. Remove the attachment bolts from the valve sleeve.
5. Remove the valve sleeve with the gasket.



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Installing the valve sleeve

1. Clean the sealing surface of the cylinder head and valve sleeve.
2. Check the valve sleeve gasket. If it is undamaged, it may be re-used. Fit the valve sleeve gasket onto the valve sleeve.
3. Fit the valve sleeve.
4. Tighten the valve sleeve attachment bolts to the specified torque. See "Technical data".



Tightening the injector wiring to a higher torque than specified may cause damage to the injector.

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Removing and installing

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5. Fit the injector wiring on the injectors and tighten it to the specified torque. See "Technical data".
6. Fit the feed-through connectors of the injectors.
7. Fit the valve cover.

2

4.5 REMOVAL AND INSTALLATION, VALVE GEAR

Removing the valve gear

1. Remove the valve cover.
2. Loosen the lock nuts on the valve stem bolts and unscrew the bolts until they abut.
3. Remove the rocker seat attachment bolts.

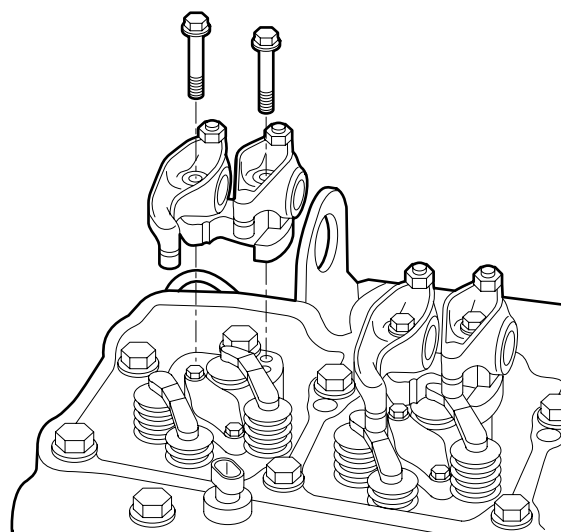
Note:

Number the rocker seats so that they can be refitted in their original position.

4. Remove the rocker seats with the rockers.
5. Remove the bridges.

Installing the valve gear

1. Check that the push rods are in the correct position in the valve tappets and apply a drop of engine oil to the push rod cavity.
2. Fit the bridges on the valves.
3. Fit the push rods in their original position.
4. Hand-tighten the rocker seats and rockers in their original position.
5. Tighten the attachment bolts to the specified torque. See "Technical data".
6. Adjust the valve clearance. See "Inspection and adjustment".
7. Fit the valve cover.

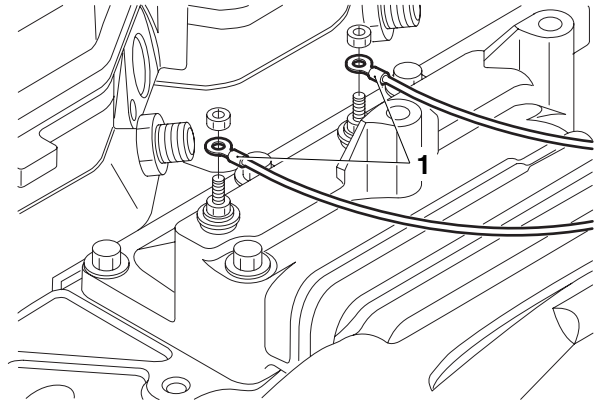


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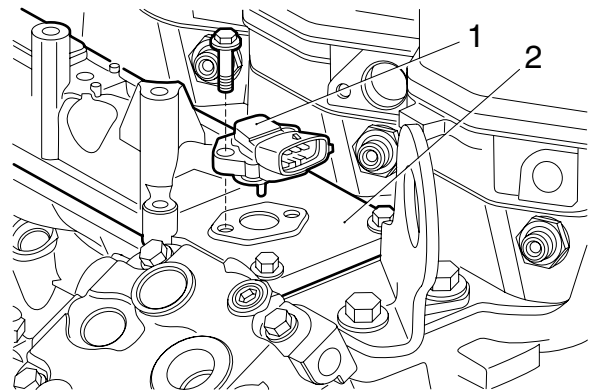
4.6 REMOVAL AND INSTALLATION, INTAKE MANIFOLD

Removing the intake manifold

1. Remove the hose from the intake manifold coming from the intercooler.
2. Detach the electric wiring from the glow elements (1) (if fitted) using the connectors.
3. Remove the fuel rail.
4. Remove the inlet air boost pressure sensor/ temperature sensor (1) from the intake manifold.
5. Remove the intake manifold (2).
6. Cover the open inlet duct from the cylinder head to prevent the ingress of foreign matter.



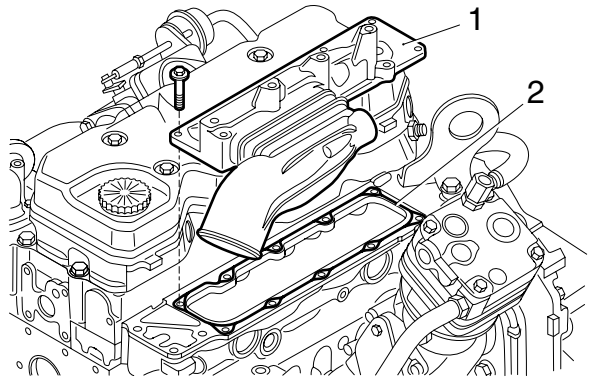
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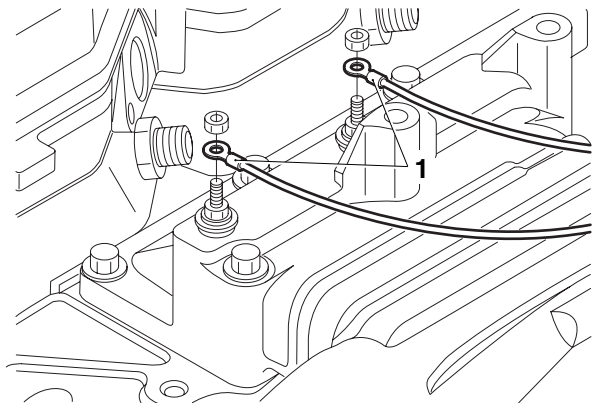
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Installing the intake manifold

1. Thoroughly clean the sealing surfaces of the intake manifold and the cylinder head. Do not let any particles fall into the open inlet duct in the cylinder head.
2. Apply a bead (2) of sealant to the sealing surfaces from the cylinder head to the intake manifold (1). See "Technical data".
3. Fit the intake manifold immediately and tighten the attachment bolts to the specified torque. See "Technical data".
4. Fit the inlet air boost pressure sensor/temperature sensor on the intake manifold.
5. Fit the fuel rail.
6. Connect the electric wiring to the glow elements (if fitted) using the connectors (1).
7. Fit the hose to the intake manifold coming from the intercooler.



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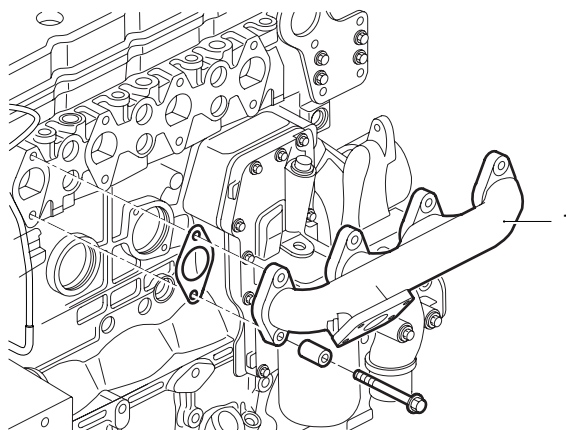


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4.7 REMOVAL AND INSTALLATION, EXHAUST MANIFOLD

Removing the exhaust manifold

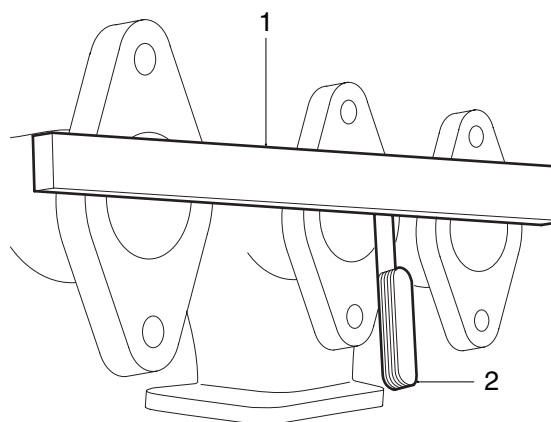
1. Remove the heat shields from the exhaust manifold.
2. Remove the turbocharger.
3. Remove the exhaust manifold (1) and gaskets.



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Installing the exhaust manifold

1. Check the surface of the exhaust manifold for smoothness with a steel ruler (1) and feeler gauge (2). Compare the reading with the values listed in 'Technical data'.
2. Fit new gaskets to the exhaust manifold and install the manifold. Tighten the attachment bolts, from the middle outwards alternately. For the specified tightening torque, see 'Technical data'.
3. Fit the turbocharger.
4. Install the heat shields to the exhaust manifold and tighten the attachment bolts to the specified torque. See 'Technical data'.



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4.8 REMOVING AND INSTALLING CYLINDER HEAD



When components are removed from any part of the engine, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened. Plug all openings that are freed.

Removing cylinder head

1. Drain the coolant.
2. Disconnect all electrical wiring around the engine which is required for removing the cylinder head.
3. Disconnect the air inlet pipe from the air cooler on the turbocharger side.
4. Remove the poly-V-belt.
5. Remove the heat shields from the exhaust manifold.
6. If fitted, remove the attachment bolts of the air-conditioning compressor.
7. Remove the attachment bolts from the alternator/air-conditioning compressor bracket and remove the attachment bracket.
8. Remove the attachment bolts from the exhaust manifold and move the manifold and the turbocharger a little away from the cylinder head.
9. Remove the other coolant hoses that are attached to the cylinder head.



When removing components from the fuel system, dirt can enter. This may result in serious damage. The area around the fuel system should therefore be cleaned before opening it. Detached pipes must be plugged immediately.

10. Detach the injector pipes on the injector side.
11. Detach the supply pipe between the high-pressure pump and fuel rail on the fuel rail side.
12. Detach the fuel return pipe from the fuel rail and from the cylinder head.

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Removing and installing

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13. Unscrew the attachment bolts from the fuel rail and remove it.
14. Unscrew the attachment bolts from the intake manifold and remove it.

Note:

To avoid dirt entering the intake opening, it must be taped up.

15. Remove the valve cover.
16. Remove the valve sleeve.
17. Remove the valve gear.
18. Remove the push rods. Mark the push rods so that they can be refitted in their original position.
19. Remove the fuel supply pipes.
20. Remove the injectors.
21. Remove the attachment bolts from the cylinder head in the reverse order to that followed for tightening. See "Technical data".
22. Remove the cylinder head from the cylinder block. Keep the gasket to enable the correct new head gasket to be selected.
23. Remove any gasket remnants from the cylinder head and the cylinder block.
24. Check the cylinder block. See "Checking and adjusting".
25. Check the threaded holes in the cylinder block for damage and cracking.
26. Check the cylinder head. See "Checking and adjusting".

Installing cylinder head

1. Clean the threaded holes in the cylinder head using a screw tap.

Note:

Cylinder head gaskets are available in two thicknesses. The thickness of the cylinder head gasket can be identified by the position of the holes in the projecting cylinder head gasket lip under the exhaust manifold on cylinder 2. See "Technical data" for the cylinder head gasket thicknesses.

2

2. Position the new cylinder head gasket. If the type of cylinder head gasket is known, use a gasket of the same type as the one removed.

Note:

If the type of cylinder head gasket removed is not known or if the main components of the driving gear have been changed, the type of gasket required must be determined afresh.

To do this, measure the average piston projection. See "Checking and adjusting". Select the correct type of cylinder head gasket using the information in "Technical data" and fit it.

3. Check that all lubricating and coolant ducts are free.
4. Position the cylinder head carefully on the cylinder block and ensure that the cylinder head fits well over the dowel pins.
5. Check the cylinder head bolts. See "Checking and adjusting". Use new cylinder head bolts if one bolt does not meet one or more conditions.
6. Apply engine oil to the thread and to the underside of the bolt head.
7. Position the cylinder head bolts and hand-tighten them.

Note:

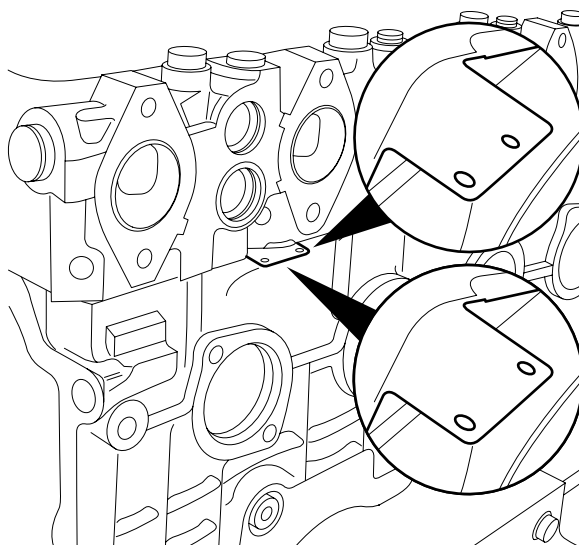
The short cylinder head bolts must be fitted in the outer rows.

8. Tighten the cylinder head bolts to the specified torque and in the sequence shown. See "Technical data".
9. Fit the exhaust manifold with new gaskets and tighten the attachment bolts to the specified torque. See "Technical data".
10. Fit the injectors.

Note:

Ensure that the injector is fitted correctly, bearing in mind the supply opening.

11. Fit the fuel supply pipes.



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2

12. Fit the push rods in their original position and apply a drop of engine oil to the head of the push rod.
13. Fit the valve gear.
14. Fit the valve sleeve.
15. Tighten the injector wiring to the specified torque. See "Technical data".
16. Fit the valve cover.
17. Remove any gasket remnants from the intake manifold and the cylinder head.

Note:

Ensure that the air inlet is free of gasket remnants.

18. Apply sealant to the intake manifold and fit it. See "Technical data".
19. Fit the fuel rail.
20. Fit the injector pipes.
21. Fit the supply pipe between the high-pressure pump and fuel rail.
22. Fit the fuel return pipe on the fuel rail and cylinder head.
23. Connect the various coolant hoses.
24. Fit the bracket of the alternator/air-conditioning compressor.
25. If present, fit the air-conditioning compressor.
26. Fit the poly-V-belt.
27. Fit the heat shields.
28. Fit the air inlet pipe of the air cooler on the turbocharger side.
29. Connect the electrical wiring.

4.9 REMOVAL AND INSTALLATION, AIR COMPRESSOR

Removing the air compressor

1. Partially drain the coolant.
2. Remove the steering pump.
3. Remove the coolant pipes.
4. Remove the air pipes.
5. Remove the attachment bolts from the air compressor and remove it.
6. Remove the O-ring from the compressor housing.

Installing the air compressor

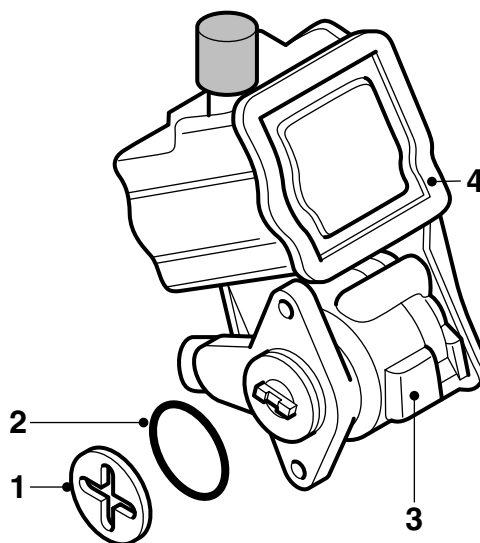
1. Fit the compressor with a new O-ring and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the air pipes.
3. Fit the coolant pipes.
4. Fit the steering pump.
5. Fill the cooling system.

4.10 REMOVING AND INSTALLING STEERING PUMP**Note:**

When replacing a worn steering pump, you are advised to fully drain the steering oil and replace the steering oil reservoir and integrated filter. In extreme situations, the steering pump may have been worn to such an extent that metal pump parts have entered the steering box. Check the steering box for internal wear using the test case.

Removing steering pump

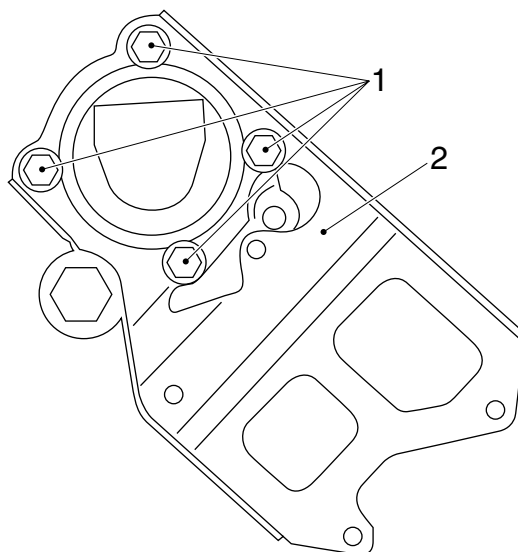
1. Clean the line connections.
2. Place a receptacle underneath the steering pump.
3. Remove the lines from the steering pump and plug the line and pump openings. The filter is fitted in the return line, which means that should any dirt enter it will immediately also enter the steering gear.
4. Remove the attachment bolts and remove the steering pump (3) and the driver (1) from the compressor.
5. Remove the reservoir (4) from the pump (3).



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Installing steering pump

1. If necessary, fit the bracket (2) on top of the new pump. Do not remove the cover from the pump to do this. Tighten the attachment bolts (1) evenly to the specified torque. See "Technical data".



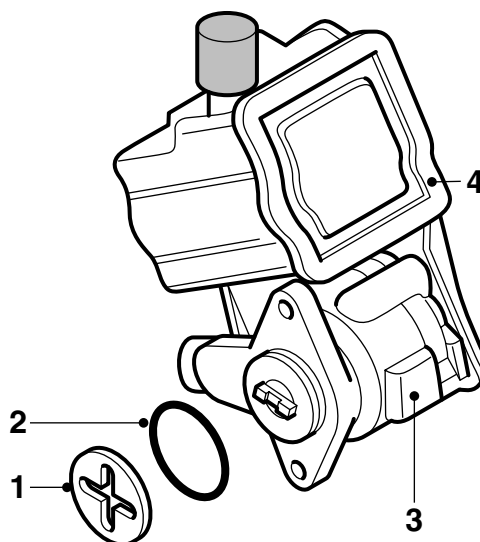
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2. Check the driver (1) for wear.
3. If necessary, connect the line couplings to the steering pump to be fitted. Tighten the couplings to the specified torques; see "Technical data".



If the specified tightening torques are exceeded, the aluminium pump housing may be damaged.

4. Fit a new O-ring (2) on the steering pump and grease it lightly.
5. Crank the engine until the compressor driver half is horizontal.
6. Grease the driver (1) lightly and fit it to the compressor driver half.
7. Fit the reservoir (4) on the pump.
8. Fit the pump (3). Tighten the attachment bolts evenly to the specified tightening torque; see "Technical data".
9. Fit the lines.
10. Fill and bleed the steering gear hydraulic system.
11. Take a test drive and check the pump and line connections for leaks.



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4.11 REMOVAL AND INSTALLATION, STARTER MOTOR

Removing the starter motor

1. Remove both battery leads from the battery terminals.
2. Remove the electrical connections from the starter motor.
3. Remove the attachment nuts from the starter motor and remove the starter motor.
4. Check the starter pinion for damage.

Installing the starter motor

1. Clean the contact surfaces of the starter motor and the flywheel housing.
2. Install the starter motor in the flywheel housing and tighten the attachment nuts to the specified torque. See "Technical data".
3. Fit the electrical connections of the starter motor.
4. Reconnect both leads to the battery terminals.

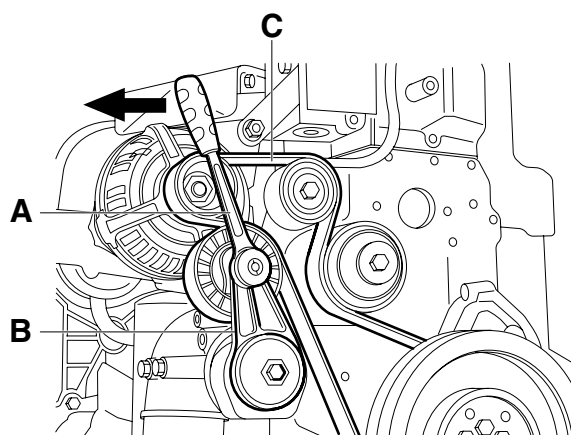
4.12 REMOVAL AND INSTALLATION, POLY-V-BELT

Removing the poly-V-belt

1. Remove the battery terminal clamp from the negative terminal of the starter battery and break the contact.
2. Put a ratchet with a $\frac{3}{8}$ " socket (A) in the arm (B) of the belt tensioner and slacken the belt so that it can be removed from the belt pulleys. Carefully let the belt tensioner expand to the stop.
3. Remove the poly-V-belt (C), lifting it over the fan.

Installing the poly-V-belt

1. Inspect the pulleys for damage, rust and grease deposits. Clean or replace the belt pulleys if necessary.
2. Fit the poly-V-belt over the fan.
3. Place a ratchet with a $\frac{3}{8}$ " socket in the arm of the belt tensioner and push the belt against the spring pressure so that it can be placed on all belt pulleys. Carefully let the belt tensioner spring back until the belt is tensioned.



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4.13 REMOVAL AND INSTALLATION, ALTERNATOR

Removing the alternator

1. Remove both battery leads from the battery terminals.
2. Remove the alternator electrical connections.
3. Remove the poly-V-belt.
4. Remove the attachment bolts from the alternator and remove it.

Installing the alternator

1. Fit the alternator and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the poly-V-belt.
3. Fit the alternator electrical connections.
4. Reconnect both leads to the battery terminals.

4.14 REMOVAL AND INSTALLATION, FLYWHEEL

Removing the flywheel

1. Remove the gearbox.
2. Remove the clutch release assembly and the clutch plate.
3. Remove the attachment bolts from the flywheel.
4. To guide the flywheel during removal, fit two threaded ends - each approx. 90 mm - to the now-empty bolt holes.
5. Place two bolts in the circumference of the flywheel and carefully pull the flywheel free.

Installing the flywheel

1. Clean the flywheel housing.
2. Clean the crankshaft flange and attachment bolts.
3. Clean the rear of the flywheel and inspect it. See "Inspection and adjustment".
4. Fit the flywheel.
5. Apply a drop of engine oil to the attachment bolts and install them. Tighten the attachment bolts in a crosswise sequence to the specified torque. See "Technical data".
6. Fit the clutch plate and the clutch release assembly.
7. Fit the gearbox.

4.15 REMOVAL AND INSTALLATION, STARTER RING GEAR

Removing the starter ring gear

1. Remove the flywheel.
2. Remove the starter ring gear by tapping it off the flywheel, using a blunt chisel. If this is not possible, cut the starter ring gear between two teeth, using a sharp chisel.

Installing the starter ring gear

1. Clean the flywheel and the starter ring gear. Ensure that the contact areas are free of grease.
2. Heat the new starter ring gear evenly in an oven. See "Technical data".
3. Tap the starter ring gear onto the flywheel so that the bevelled sides of the teeth point towards the starter motor. Ensure that the starter ring gear is properly fitted to the flywheel.
4. Fit the flywheel.

4.16 REMOVAL AND INSTALLATION, FLYWHEEL HOUSING SEAL

Removing the flywheel housing seal

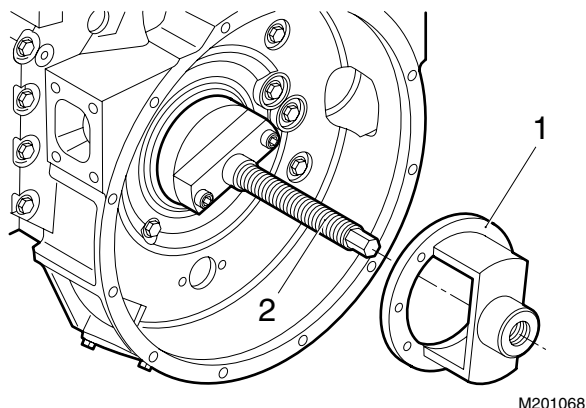
1. Remove the gearbox.
2. Remove the clutch release assembly and the clutch plate.
3. Remove the flywheel.
4. Fit the threaded spindle (2) of the special tool (DAF no. 1329475) on the crankshaft flange.

5. Screw the push/pull piece (1) onto the spindle up to the flywheel housing.

Note:

Mark the drill at a length of 22 mm using a piece of tape.

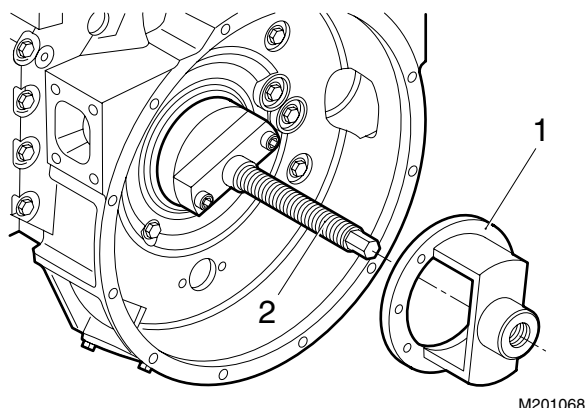
6. Drill a hole through the base plate to the tape marking and fit a screw in the seal to keep the base plate in its place.
7. Drill the other five holes and fit screws.
8. Turn the threaded spindle (2) clockwise until the seal has been removed.



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Installing the flywheel housing seal

1. Clean and inspect the seal chamber. Even minimal damage may cause a leak.
2. Fit the threaded spindle (2) of the special tool (DAF no. 1329475) on the crankshaft flange.
3. Put a new seal over the crankshaft.
4. Screw the push/pull piece (1) onto the threaded spindle (2) up to the seal.
5. Turn the threaded spindle (2) anti-clockwise until the push/pull piece (1) is level with the flywheel housing. The seal has been properly fitted once it is level with the flywheel housing.
6. Remove the special tool.
7. Fit the flywheel.
8. Fit the clutch plate and the clutch release assembly.
9. Fit the gearbox.



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4.17 REMOVAL AND INSTALLATION, FLYWHEEL HOUSING

Removing the flywheel housing

1. Remove the starter motor.
2. Remove the flywheel.
3. Remove the flywheel housing seal.
4. Suspend the engine securely in the hoist.
5. Remove the engine brackets.
6. Detach the crankcase breather on the flywheel housing so that the attachment bolt can be accessed.
7. Remove the flywheel housing attachment bolts.
8. Remove the flywheel housing.

Installing the flywheel housing

1. Remove any gasket remnants from the contact areas.
2. Check the sealing surfaces for damage.
3. Check the flywheel housing for cracks.
4. Apply a sealant to the sealing face of the cylinder block. See "Technical data". Apply the sealant with a roller or brush evenly over the entire sealing face.
5. Install the flywheel housing and tighten the attachment bolts in the correct sequence to the specified torque. See "Technical data".
6. Fit the engine brackets.
7. Fit the flywheel housing seal.
8. Fit the flywheel.
9. Fit the starter motor.

4.18 REMOVAL AND INSTALLATION, VIBRATION DAMPER

Removing the vibration damper

1. Remove the attachment bolts of the fan and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper and remove it.

Installing the vibration damper

1. Check the vibration damper. See "Inspection and adjustment".
2. Fit the vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".
3. Fit the poly-V-belt.
4. Fit the fan.

4.19 REMOVAL AND INSTALLATION, CRANKSHAFT SENSOR RING

Removing the crankshaft sensor ring

1. Remove the attachment bolts from the viscous fan clutch and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper.
4. Remove the vibration damper and the crankshaft sensor ring.

Installing the crankshaft sensor ring

1. Fit the crankshaft sensor ring with vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".

Note:

There is only one way of fitting the crankshaft sensor ring. For this purpose, a pin has been fitted which fits into a bore in the crankshaft sensor ring.

2. Fit the poly-V-belt.
3. Fit the fan and tighten the attachment bolts to the specified torque. See "Technical data".

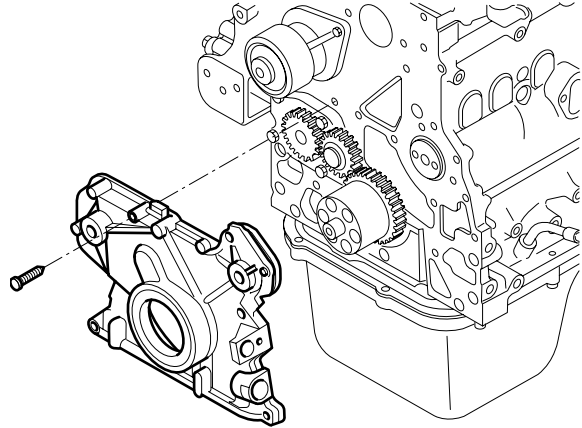
4.20 REMOVING AND INSTALLING FRONT ENGINE PANEL

Removing front engine panel

1. Remove the poly-V-belt.
2. Remove the attachment bolts from the vibration damper and remove the damper along with the crankshaft pulley.
3. Remove the front crankshaft seal.
4. Remove the attachment bolts from the front engine panel and remove it.

Installing front engine panel

1. Remove any gasket remnants from the contact areas.
2. Check the sealing surfaces for damage.
3. Check the engine panel for cracks.
4. Apply a sealant to the sealing surface of the cylinder block. See "Technical data". Apply the sealant with a roller or brush evenly over the entire sealing surface.
5. Fit the engine panel and tighten the attachment bolts to the specified torque. See "Technical data".
6. Fit a new front crankshaft seal.
7. Fit the crankshaft pulley and the vibration damper. Tighten the attachment bolts to the specified torque. See "Technical data".
8. Fit the poly-V-belt.

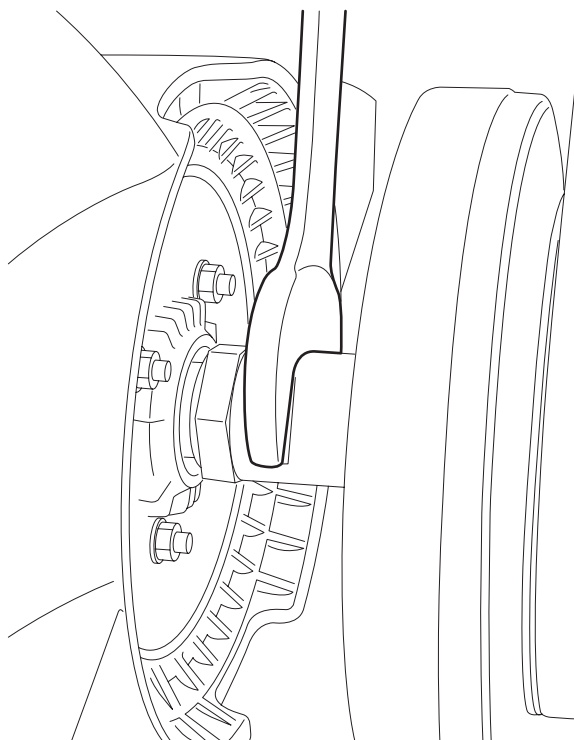


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4.21 REMOVAL AND INSTALLATION, CAMSHAFT GEAR

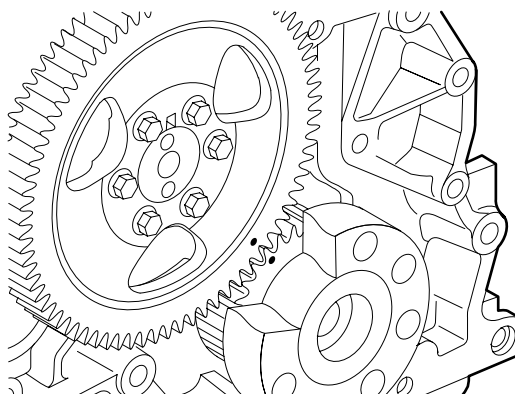
Removing the camshaft gear

1. Remove the flywheel housing.
2. Use an open-end spanner on the fan shaft to crank the crankshaft until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.
3. Remove the air compressor.



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4. Remove the attachment bolts from the camshaft gear and remove it.



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Installing the camshaft gear

1. Fit the camshaft gear making sure that the timing gear is properly set. See 'Inspection and adjustment'.

Note:

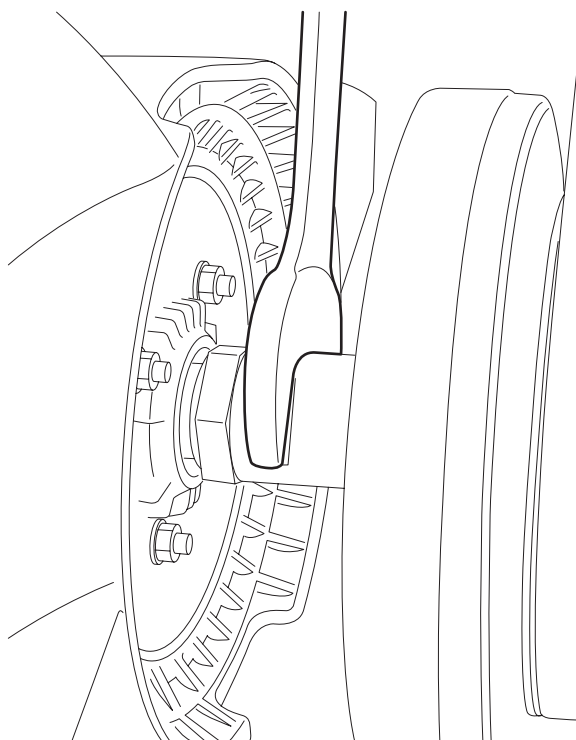
There is only one way of fitting the camshaft gear. For this purpose, a recess has been made which falls over a pin on the camshaft.

2. Tighten the attachment bolts to the specified torque. See 'Technical data'.
3. Fit the air compressor.
4. Fit the flywheel housing.

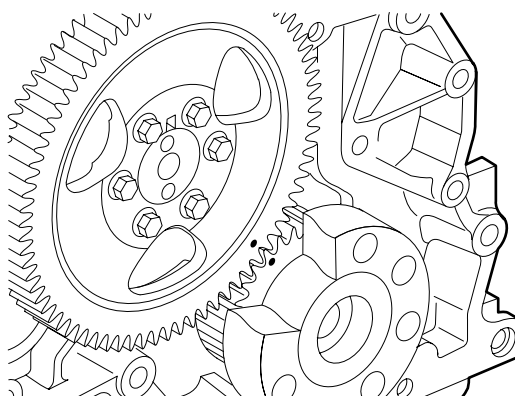
4.22 REMOVAL AND INSTALLATION, TIMING GEAR CASE

Removing the timing gear case

1. Remove the flywheel housing.
2. Remove the steering pump.
3. Remove the air compressor.
4. Remove the high-pressure pump.
5. Use an open-end spanner on the fan shaft to crank the crankshaft until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.
6. Remove the camshaft gear.
7. Loosen the sump bolts and remove the sump bolts fitted in the timing gear case.

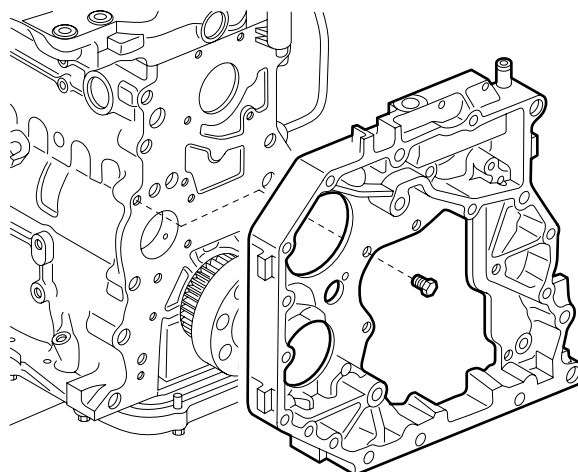


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8. Remove the attachment bolts from the timing gear case and remove it.



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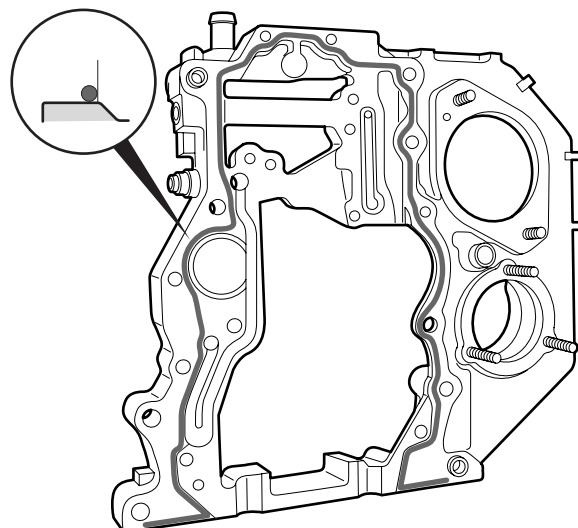
Installing the timing gear case

1. Apply a sealant to the sealing surface of the cylinder block. See "Technical data". Apply the sealant in accordance with the pattern and at the indicated location. The bead has to be 1.5 to 2.0 mm thick. Fit the timing gear case with liquid sealant and tighten the attachment bolts to the specified torque. See "Technical data".

Note:

If too much sealant is used, or if the sealant is applied in a wrong place, this may cause obstruction of an oil channel or oil sump ventilating duct. This could result in serious damage.

2. Fit the sump bolts and tighten them to the specified torque. See "Technical data".
3. Fit the camshaft gear.
4. Fit the high-pressure pump.
5. Fit the air compressor.
6. Fit the steering pump.
7. Fit the flywheel housing.



M201242

4.23 REMOVAL AND INSTALLATION, FRONT CRANKSHAFT SEAL

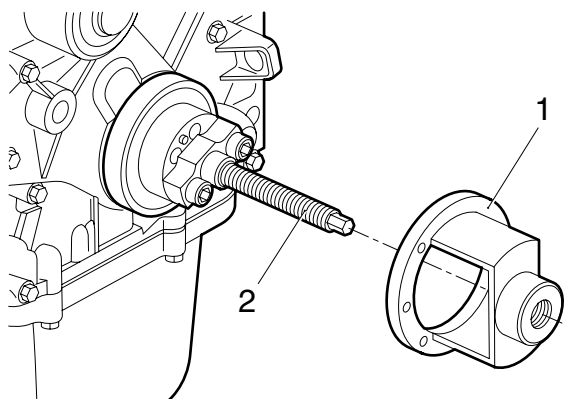
Removing the front crankshaft seal

1. Remove the attachment bolts of the fan and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper and remove the damper along with the crankshaft pulley.
4. Fit the threaded spindle (2) of the special tool (DAF no. 1453179) on the crankshaft flange.
5. Screw the push/pull piece (1) onto the spindle up to the engine panel.

Note:

Mark the drill at a length of 18 mm using a piece of tape.

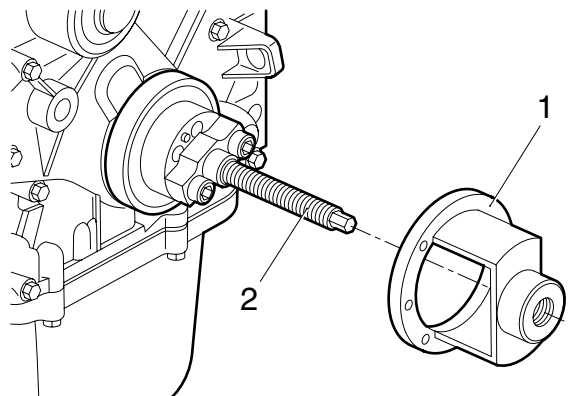
6. Drill a hole through the base plate to the tape marking and fit a screw in the seal to keep the base plate in its place.
7. Drill the other five holes and fit screws.
8. Turn the threaded spindle (2) clockwise until the seal has been removed.



M201069

Installing the front crankshaft seal

1. Clean and inspect the seal chamber. Even minimal damage may cause a leak.
2. Fit the threaded spindle (2) of the special tool (DAF no. 1453179) on the crankshaft flange.
3. Put a new seal over the crankshaft.
4. Screw the push/pull piece (1) onto the threaded spindle (2) up to the seal.
5. Turn the threaded spindle (2) anti-clockwise until the push/pull piece (1) is level with the top panel. The seal has been properly fitted once it is level with the engine panel.
6. Remove the special tool.
7. Inspect the vibration damper.
8. Fit the crankshaft pulley and the vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".
9. Fit the poly-V-belt.
10. Fit the fan.



M201069

BE ENGINE

2

Removing and installing

LF45/55 series

2

5. CLEANING

5.1 CLEANING THE ENGINE

Note:

It is advisable to clean the engine and the surrounding area with a high-pressure cleaner before starting maintenance or service operations. A clean environment makes your work easier and enables you to notice any engine defects at an early stage.

Before cleaning the engine, check for any leaks.

If the engine is cleaned with a high-pressure cleaner, this must be done with care. It is also important to observe the following points:

- when cleaning the universal joint on the steering box, the spider seals may be forced open by the high-pressure jet of water, so that the grease behind them is flushed away. As a result, the spider may get stuck, so that the steering mechanism will jam.
- there is a bleed vent on the power steering fluid reservoir of the steering gear. Water may enter the reservoir through this bleed vent, causing damage to the steering gear.
- when cleaning the radiator/intercooler element, be careful not to damage the fins.
- do not direct the high-pressure cleaner jet too long at the air-conditioning system condenser. As a result of the high temperature, the pressure in the system will become excessive, which may cause damage to the system.
- ensure that no water can enter the gearbox via the bleed vents.
- make sure that no water can enter via the clutch reservoir bleed vents.
- the engine compartment can be cleaned with a high-pressure cleaner. Never direct the jet of water towards electrical components.
- do not aim the high-pressure cleaner jet at electrical components and electrical connections such as the electronic unit, sensors, connectors and vehicle lighting through-connections, etc.
- ensure that no water can enter the air inlet system via the air inlet or its flexible seals.

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BE ENGINE COOLING SYSTEM

2

Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

BE ENGINE COOLING SYSTEM

2

Safety instructions

LF45/55 series

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2. GENERAL

2.1 SYSTEM DESCRIPTION, COOLING SYSTEM

The cooling system consists of a water pump, a radiator, a header tank, an oil cooler, an air compressor, a thermostat housing with one thermostat and pipes.

The water pump is located below the thermostat in the engine block.

The thermostat housing is part of the cylinder head.

From the delivery side of the water pump, the coolant is directed to the oil cooler via an opening at the back of the water pump. Afterwards the coolant flows to the cylinder block.

The coolant flows through the cylinder block, along the cylinder liners, and up to the cylinder head.

The coolant leaves the cylinder head through the thermostat housing.

Depending on the coolant temperature, the thermostat distributes the coolant flow to the radiator or back to the water pump.

The coolant transported to the radiator enters the radiator at the top and leaves it at the bottom. From the bottom of the radiator, the coolant is returned to the water pump via the return pipe.

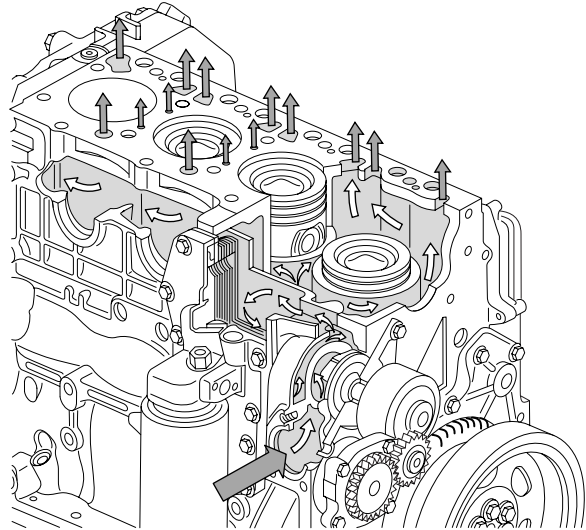
The connection pipe to the header tank is also connected to the return pipe from the radiator. When the coolant heats up, it flows to the header tank. When the coolant cools down, it will flow back from the header tank.

The oil cooler is not only intended to cool the lubricating oil, but also to heat it in a "cold" engine.

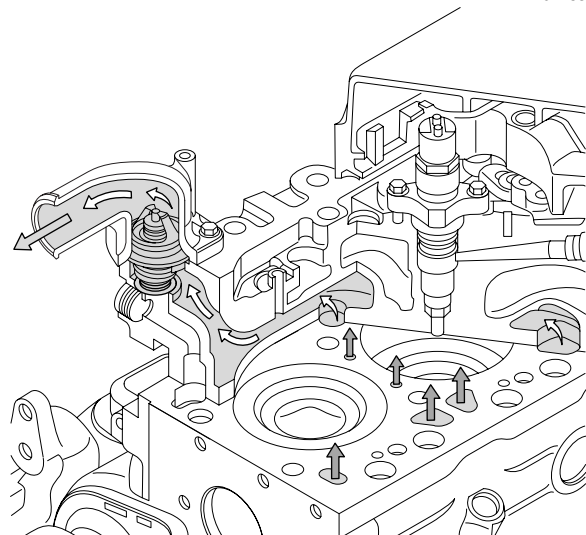
From the cylinder block, some of the coolant flows through the air compressor.

From the air compressor, the coolant is returned to the engine block via a pipe.

The pipe which takes the coolant to the cab heater is connected to the cylinder head. From the heater, the coolant is returned to the water pump via a pipe.



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BE ENGINE COOLING SYSTEM

2

General

LF45/55 series

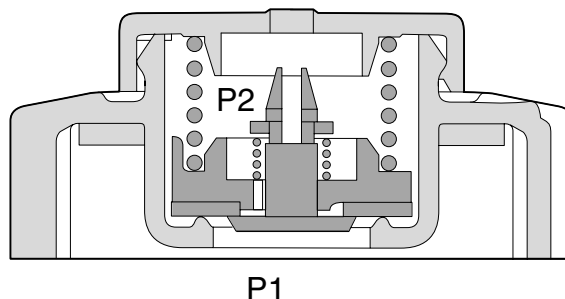
3

3. DESCRIPTION OF COMPONENTS

3.1 PRESSURE CAP

The pressure cap is fitted on the header tank by means of a threaded connection.
To fill the cooling system, there is a filler cap at the front of the header tank.

The pressure cap has two valves: a pressure relief valve and a vacuum relief valve.
Normally, both valves are closed.



M201151

Overpressure

As a result of the rising coolant temperature, the pressure (P1) in the cooling system will increase. If the pressure in the cooling system becomes too high (0.7 bar), the pressure relief valve (1) will open against the pressure of the spring.

Negative pressure

If the coolant temperature drops, the pressure (P1) in the cooling system will decrease. If the pressure (P1) in the cooling system drops to approximately 0.1 bar below the ambient air pressure (P2), the underpressure valve will be opened.

BE ENGINE COOLING SYSTEM

2

Description of components

LF45/55 series

3.2 THERMOSTAT

Operation, thermostat

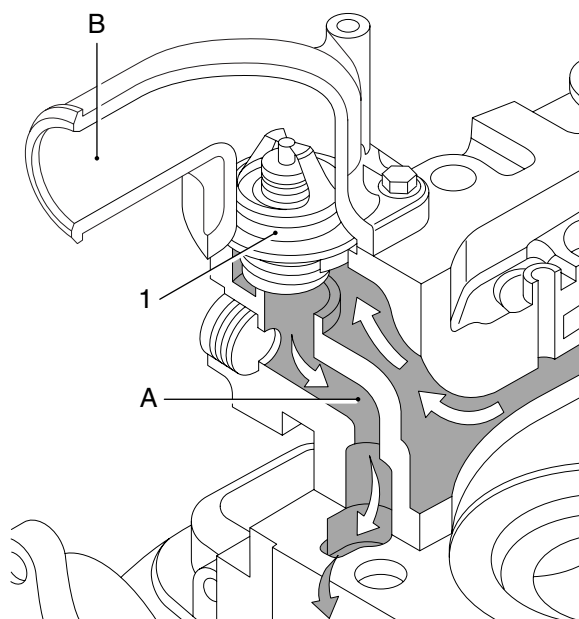
Coming from the cylinder head, the coolant passes through the thermostat. Depending on the coolant temperature and the corresponding position of the thermostat, there are three possibilities:

Thermostat closed

The coolant has not yet reached the opening temperature of the thermostat (1).

The supply channel (B) to the radiator is completely closed.

The coolant flows directly to the water pump through a bypass (A) and the water pump returns the coolant to the cylinder block.



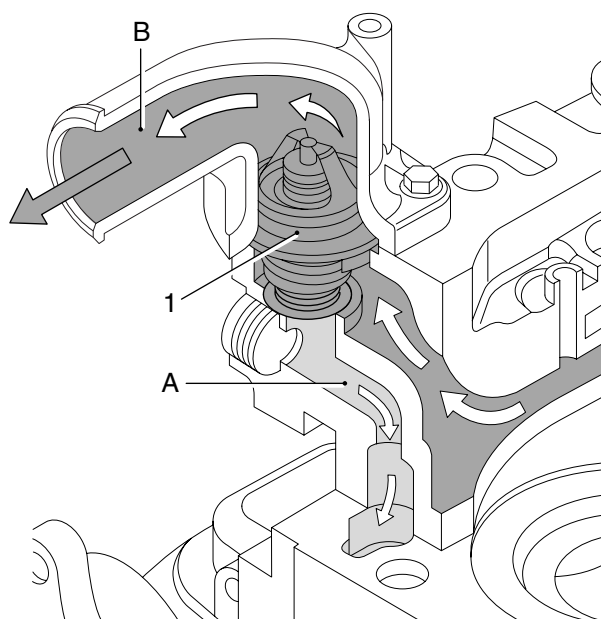
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Thermostat starts opening

The coolant has reached the opening temperature of the thermostat (1).

The supply channel (B) to the radiator is opened and the bypass (A) is partially closed.

Now coolant will flow both through the supply channel (B) to the radiator and directly to the water pump through the bypass channel (A).



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LF45/55 series

BE ENGINE COOLING SYSTEM

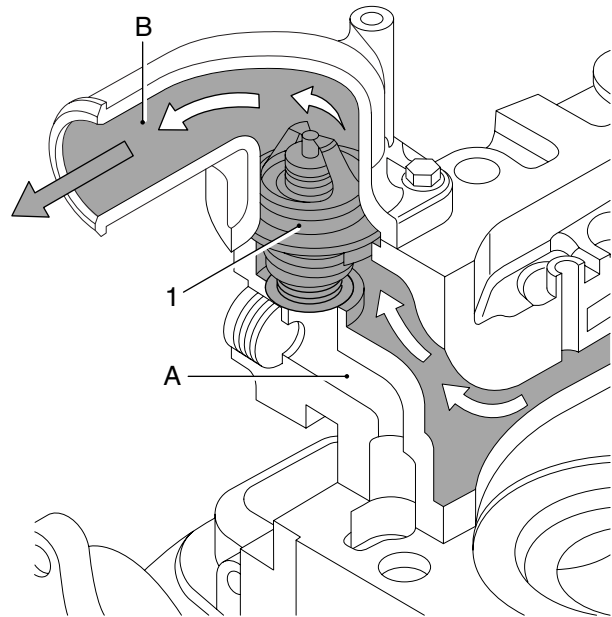
Description of components

Thermostat fully opened

The temperature of the coolant has further increased. The supply channel (B) to the radiator is fully opened and the bypass (A) is fully closed. The entire coolant circulation now flows via the supply channel (B) to the radiator where it is cooled before flowing back to the water pump.

In the event of excessive coolant temperatures, removing the thermostat as an emergency solution is **not permitted**.

If the thermostat is removed from the engine, uncooled coolant will flow to the water pump through the bypass (A). As a result, the coolant temperature will continue to rise.



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BE ENGINE COOLING SYSTEM

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Description of components

LF45/55 series

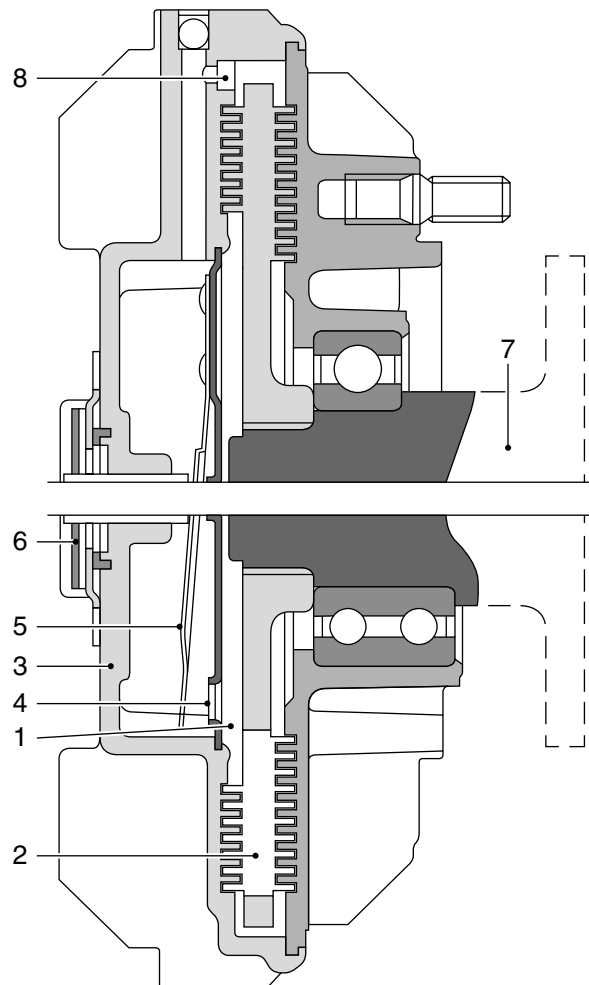
3.3 VISCOUS FAN CLUTCH

The fan is connected to the engine by means of a viscous fan clutch. If, under certain circumstances, the heat is not sufficiently dissipated by the air flow passing through the radiator, the fan will have to draw in extra cooling air through the radiator. In a viscous fan clutch, the drive torque is transmitted by a silicone fluid.

The fan clutch is divided into two chambers. In the working area (1) is the rotor (2), which is connected to the drive flange (7). The supply chamber (3) rotates freely round the drive flange (7) and is connected to the fan. There is silicone fluid in the supply chamber (3). The opening (4) in the supply chamber (3) is closed by a valve (5). The valve (5) is operated by a bimetallic strip (6).

If the opening (4) in the supply chamber (3) is closed by the valve (5), no silicone fluid can enter the working area (1). The silicone fluid still present in the working area (1) will flow back to the supply chamber (3) through the bores (8). As only very little fluid will be left in the working area (1), there will be a great difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) with the fan.

When the air temperature increases, the bimetallic strip (6) will bend and the valve (5) will partially release the opening (4) in the supply chamber (3). Through this opening, a limited amount of silicone fluid can enter the working area (1) and flow past the rotor (2). This will cause friction, so that the difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) with the fan will decrease.



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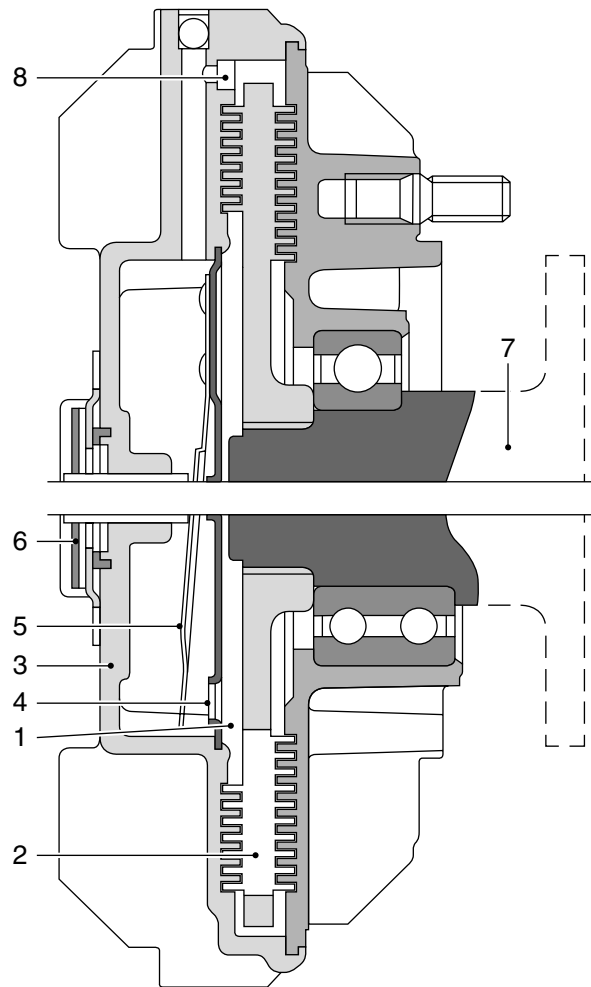
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LF45/55 series

BE ENGINE COOLING SYSTEM

Description of components

As the air temperature rises, the bimetallic strip (6) will continue to bend and the opening (4) in the supply chamber (3) will be fully released. The further the opening (4) in the supply chamber (3) is released, the more silicone fluid will flow into the working area (1) and past the rotor (2). As a result of the increase in friction, the difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) will further decrease.



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BE ENGINE COOLING SYSTEM

2

Description of components

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3

4. CHECKING AND ADJUSTING

4.1 PRESSURE-TESTING COOLING SYSTEM



When the coolant is hot, there is overpressure in the cooling system. Carefully remove the filler cap to release the overpressure. Coolant is a toxic fluid. Contact with the skin should therefore be avoided. To avoid damaging the cylinder block, do not top up a warm engine with cold coolant.

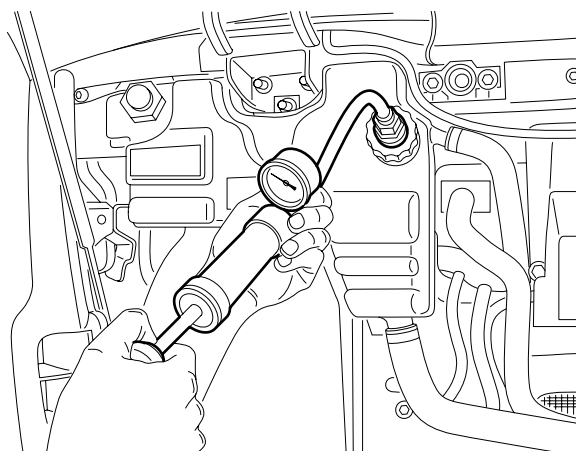
The cooling system can be checked for leaks with a pressure-test pump.
If this is done when the engine is warm, any cracks can be spotted more quickly.

1. Open the grille.
2. Remove the filler cap.
3. Fill the cooling system to the correct level.
4. Raise the engine temperature. This need not be the operating temperature.

Note:

By fitting the pressure-test pump onto the filler opening of the header tank, the pressure cap can also be tested.

5. Fit a pressure-test pump. Pressure-test the system at the specified pressure. See "Technical data".
6. Check the cooling system for leakage.



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BE ENGINE COOLING SYSTEM

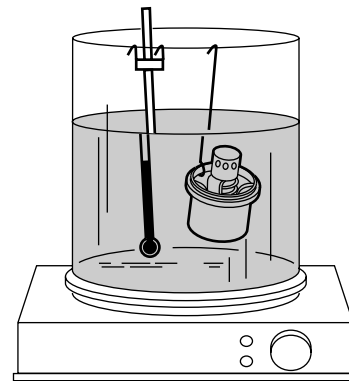
2

Checking and adjusting

LF45/55 series

4.2 INSPECTING THE THERMOSTAT

1. Remove the thermostat. See "Removal and installation".
2. Inspect the sealing surfaces of the thermostat housing for damage.
3. Check the thermostat seat for damage.
4. Check whether the thermostat is fully closed.
5. Place the thermostat in a container filled with clean water.
6. Place a thermometer in the container and heat the water. Check at which temperature the thermostat opens and whether it opens fully. See "Technical data".



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3

4.3 INSPECTION, VISCOUS FAN CLUTCH



Do not run the engine in an enclosed or unventilated area. Make sure exhaust fumes are properly extracted. Remain at a safe distance from rotating and/or moving components.

Testing with a cold engine

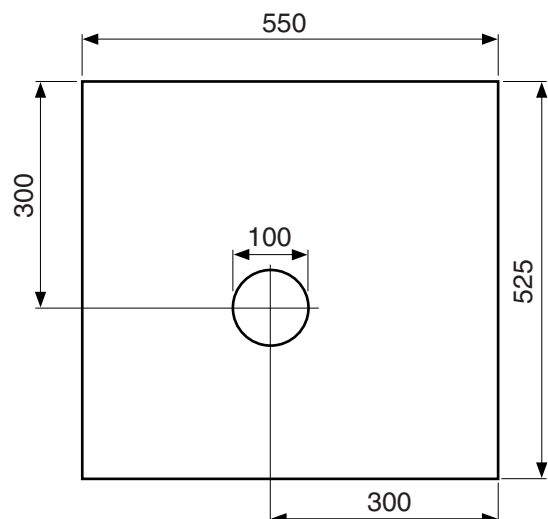
During this test, the slip in the viscous fan clutch is measured while the clutch is not operating. This test must be carried out when the engine is "cold" (coolant temperature approximately 50°C).

1. Check the coolant level, and top up as necessary.
2. Start the engine and run it at idling speed for at least 5 minutes.
Then use an optical rev counter to measure the fan speed at different engine speeds (from idling to maximum engine speed).
During this test procedure, the speed of the fan should be approx. 600 to 1100 rpm.

Testing with a warm engine

This test checks whether the bimetallic strip starts opening the valve at an operating temperature of 85 - 95°C.

1. Check the coolant level, and top up as necessary. Be careful when topping up the coolant of a warm engine.
2. Take a sheet of cardboard with a 100 mm hole, as shown in the drawing opposite, and place it in front of the radiator, with the hole in front of the viscous clutch.
3. Check that the gearbox is in neutral.
4. Bring the cooling system to operating temperature.
5. Allow the fan drive flange to run at a speed of 1000 rpm. Then use an optical rev counter to determine the difference between the rotating speeds of the fan and the drive flange. The speeds will differ as a result of slip in the viscous clutch. When the clutch is fully engaged, the slip must not exceed 10%. If it is more, the viscous fan clutch must be replaced.



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BE ENGINE COOLING SYSTEM

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Checking and adjusting

LF45/55 series

3

5. REMOVING AND INSTALLING

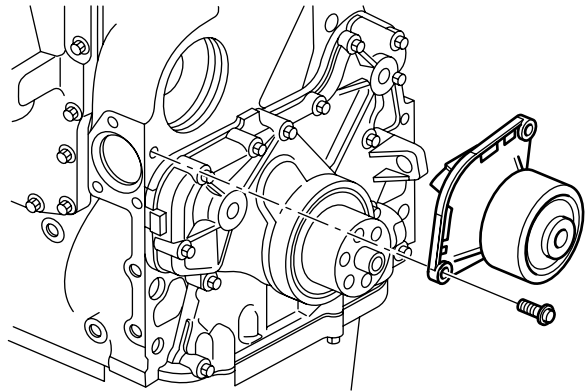
5.1 REMOVAL AND INSTALLATION, COOLANT PUMP

Removing the coolant pump

1. Drain the coolant. See "Draining and filling".
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the coolant pump and remove it.

Installing the coolant pump

1. Thoroughly clean the sealing surfaces of the coolant pump and the cylinder block.
2. Fit a new O-ring to the coolant pump.
3. Install the coolant pump and tighten the attachment bolts to the specified torque. See "Technical data".
4. Fit the poly-V-belt.
5. Fill the cooling system. See "Draining and filling".



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BE ENGINE COOLING SYSTEM

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Removing and installing

LF45/55 series

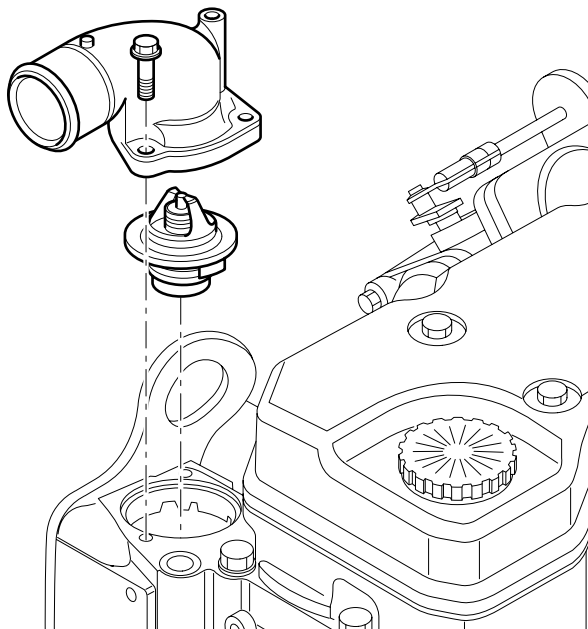
5.2 REMOVAL AND INSTALLATION, THERMOSTAT

Removing the thermostat

1. Drain the coolant. See "Draining and filling".
2. Remove the water hose between the thermostat housing and the radiator.
3. Remove the thermostat housing attachment bolts.
4. Remove the thermostat housing.
5. Remove the thermostat.

Installing the thermostat

1. Fit a new sealing ring to the thermostat.
2. Fit the thermostat in the thermostat housing.
3. Fit the thermostat housing onto the cylinder head.
4. Fit the thermostat housing attachment bolts. Tighten the attachment bolts to the specified torque. See 'Technical data'.
5. Fit the water hose between the thermostat housing and the radiator.
6. Fill the cooling system. See "Draining and filling".



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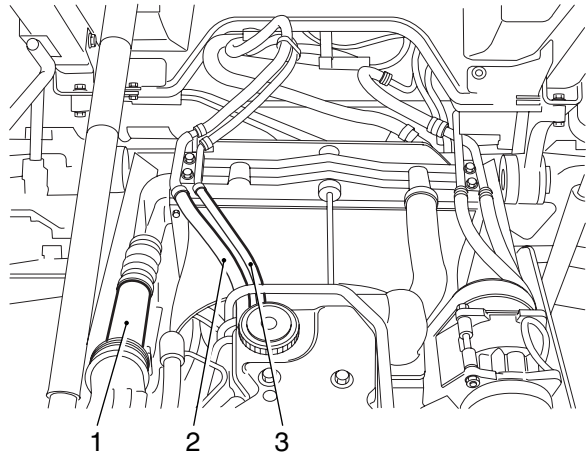
5.3 REMOVAL AND INSTALLATION, VISCOUS FAN CLUTCH

Removing the viscous fan clutch

1. Drain some of the coolant. See "Draining and filling".
2. Remove the air inlet hose with air inlet pipe between the intercooler and the inlet manifold (1).
3. Disconnect the heater hose (2) and bleed hose (3) on engine side and bend it to the front.
4. Remove the attachment nuts from the fan.
5. Remove the bolts attaching the viscous fan clutch to the drive flange. Remove the viscous fan clutch with the fan from the wind tunnel.

Note:

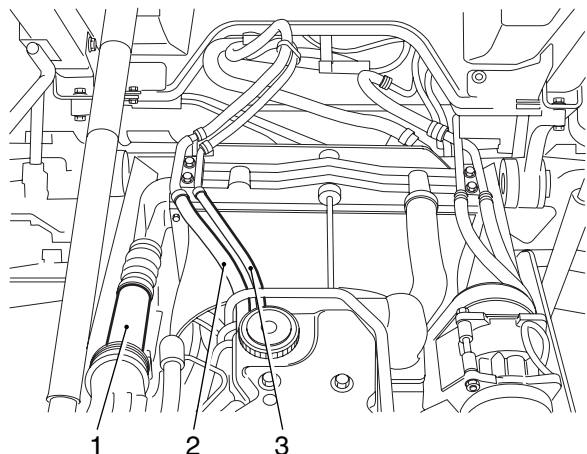
The viscous fan clutch must always be stored **vertically**.



M201161

Installing the viscous fan clutch

1. Place the new viscous fan clutch in the fan. Position it in the wind tunnel and fit the viscous fan clutch with the fan onto the drive flange.
2. Tighten the attachment nuts of the fan.
3. Fit the heater hose (2) and bleed hose (3).
4. Fit the air inlet hose with air inlet pipe between the intercooler and the inlet manifold (1).
5. Fill the cooling system. See "Draining and filling".
6. Run the engine and check that all connections are sealed properly.



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BE ENGINE COOLING SYSTEM

2

Removing and installing

LF45/55 series

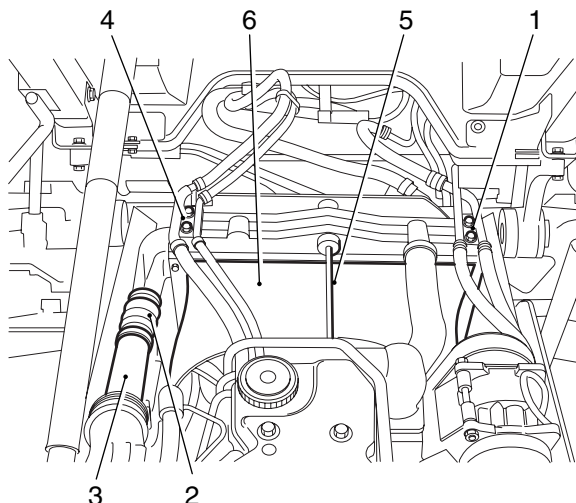
5.4 REMOVAL AND INSTALLATION, RADIATOR

Note:

The removal and installation procedure for the radiator unit allows for the presence of an air-conditioning unit. If such a unit is not present, the relevant sections can be skipped.

Removal, radiator

1. Drain the coolant.
2. Remove the fan.
3. Remove the coolant hoses from the radiator.
4. Remove the bracket (1) of the air-conditioning pipes from the radiator.
5. Remove the left-hand air inlet hose (2) and air inlet pipe (3) from the inlet manifold to the intercooler.
6. Remove the right-hand connecting hose from the inlet pipe to the intercooler.
7. Remove the bracket (4) of the heater and bleed hoses from the radiator.
8. Remove the torque rod (5).
9. Remove the retainer clips from the condenser brackets.
10. Remove the bolts of the wind tunnel (6) and remove the wind tunnel.
11. Remove the attachment bolts from the intercooler and remove the cover plate.
12. Remove the attachment bolts from the radiator brackets. Remove the radiator and tilt the condenser slightly to free the air-conditioning pipes.



M201162

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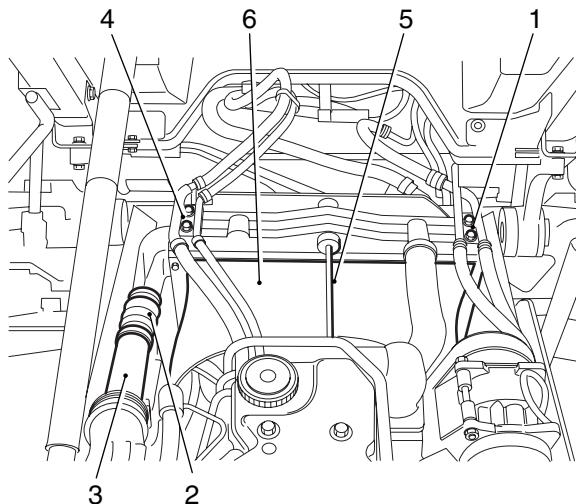
BE ENGINE COOLING SYSTEM

LF45/55 series

Removing and installing

Installing the radiator

1. Fit the radiator in the chassis. Tighten the attachment nuts to the specified torque. See "Technical data".
2. Fit the intercooler onto the radiator and fit the cover plate.
3. Install the wind tunnel (6).
4. Install the torque rod (5).
5. Suspend the condenser at the bottom in the brackets and fit the retainer clips.
6. Fit the fan.
7. Fit the bracket (4) of the heater and bleed hoses on the radiator.
8. Fit the coolant hoses to the radiator
9. Fit the right-hand air inlet hose from the inlet pipe to the intercooler.
10. Fit the left-hand air inlet hose (2) and air inlet pipe (3) from the inlet manifold to the intercooler.
11. Fit the bracket (1) of the air-conditioning pipes on the radiator
12. Fill the cooling system. See "Draining and filling".
13. Run the engine and check that all connections are sealed properly.



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BE ENGINE COOLING SYSTEM

2

Removing and installing

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3

6. DRAINING AND FILLING

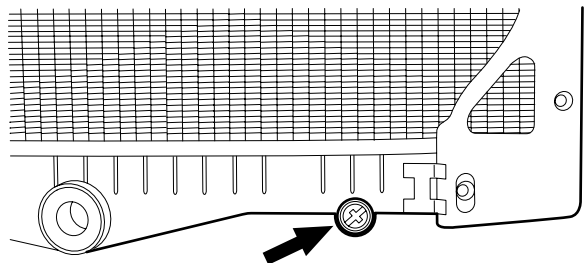
6.1 DRAINING, FILLING AND BLEEDING THE COOLING SYSTEM



In order to avoid damaging the engine block, do not top up a warm engine with cold coolant. Coolant is a toxic fluid and must be handled with care. Protect skin and eyes. Coolant is harmful to the environment; after use, it should be processed as industrial chemical waste. When the coolant is hot, there is overpressure in the cooling system. When removing the filler cap, allow the overpressure to escape by first loosening the filler cap one turn.

Draining the cooling system

1. Turn the heater temperature control knob in the cab to the maximum 'hot' setting.
2. Remove the cooling system filler cap.
3. Collect the coolant. Position suitable containers under the drain points.
4. Drain the cooling system at the radiator via the drain plug.
5. Flush the cooling system.
6. Close the drain plug.



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BE ENGINE COOLING SYSTEM

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Draining and filling

LF45/55 series

Filling and bleeding the cooling system

1. Turn the heater temperature control knob in the cab to the maximum 'hot' setting.
2. Fill the cooling system with the specified coolant.
3. Run the engine for several minutes.
4. The cooling system is self-bleeding. Ensure that the bleed pipe from the thermostat housing to the header tank is not kinked or pinched.

Note:

Make sure that air can escape when the cooling system is filled.

5. Check the coolant level, and top up with coolant if necessary.

3

7. CLEANING

7.1 CLEANING THE EXTERIOR OF RADIATOR AND AIR COOLER



Inhalation of dust may have serious consequences for your health. Take the necessary precautions, such as wearing goggles and a facemask.

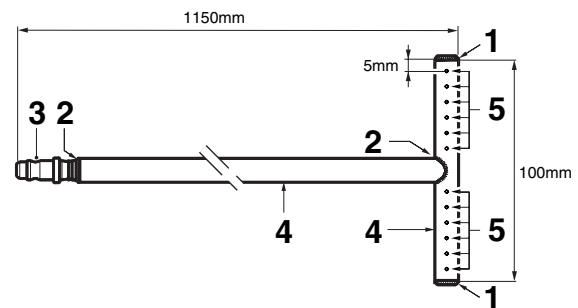
Note:

With the aid of a simple tool, the radiator and the air cooler can be blow-cleaned.

The tool (radiator cleaner) cannot be ordered from DAF. It should be manufactured by yourself according to the drawing.

Key to drawing:

- 1 Solder up
- 2 Solder
- 3 Quick-release coupling for air hose
- 4 Steel pipe, $\varnothing$ 10 mm
- 5 6 x $\varnothing$ 1.5 mm between holes, with a centre-to-centre distance between the holes of 7 mm, drilled on one side



M2108

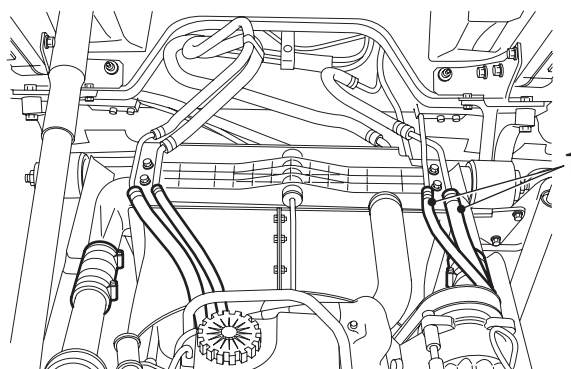
BE ENGINE COOLING SYSTEM

2

Cleaning

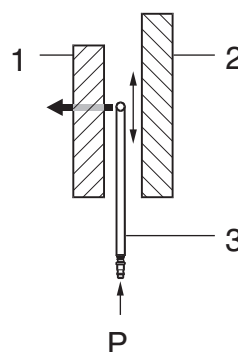
LF45/55 series

1. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (1) on the radiator and remove the condenser from the air cooler supports. Push the condenser as far as possible forwards.



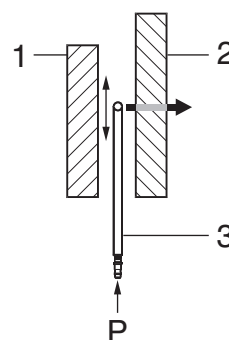
i400824

2. Insert the radiator cleaner (3) between the air cooler (1) and radiator (2) from underneath, with the air holes facing the air cooler (1).
3. Apply air pressure to the radiator cleaner (3) and continue blow-cleaning the air cooler (1) until no more dirt comes out.



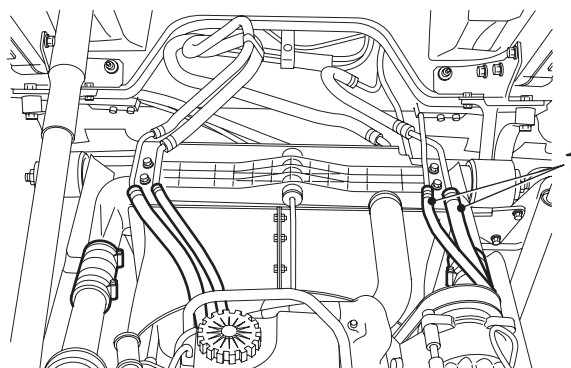
M201351

4. Turn the radiator cleaner (3) over, turning the holes towards the radiator (2), and blow-clean the radiator (2).



M201352

5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (1) on the radiator.



i400824

3

7.2 FLUSHING COOLING SYSTEM



In order to avoid damaging the engine block, do not top up a warm engine with cold coolant or other fluid.

Coolant is a toxic fluid and must be handled with care. Protect skin and eyes.

Coolant is harmful to the environment; after use, it should be processed as industrial chemical waste.

1. Drain the entire cooling system.
2. Fill the cooling system with tap water and add a cooling system cleaner. See "Technical data".
3. Leave the engine running until the thermostat is fully open.
4. Now leave the engine running for a further 45 minutes.
5. Drain the entire cooling system.
6. Fill the cooling system with tap water.
7. Leave the engine running until the thermostat is fully open.
8. Now leave the engine running for a further five minutes.
9. Drain the entire cooling system.
10. Fill the cooling system with the specified coolant.
11. Check the coolant level.

BE ENGINE COOLING SYSTEM

2

Cleaning

LF45/55 series

3

2

BE ENGINE LUBRICATION SYSTEM

LF45/55 series

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BE ENGINE LUBRICATION SYSTEM

2

Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

BE ENGINE LUBRICATION SYSTEM

2

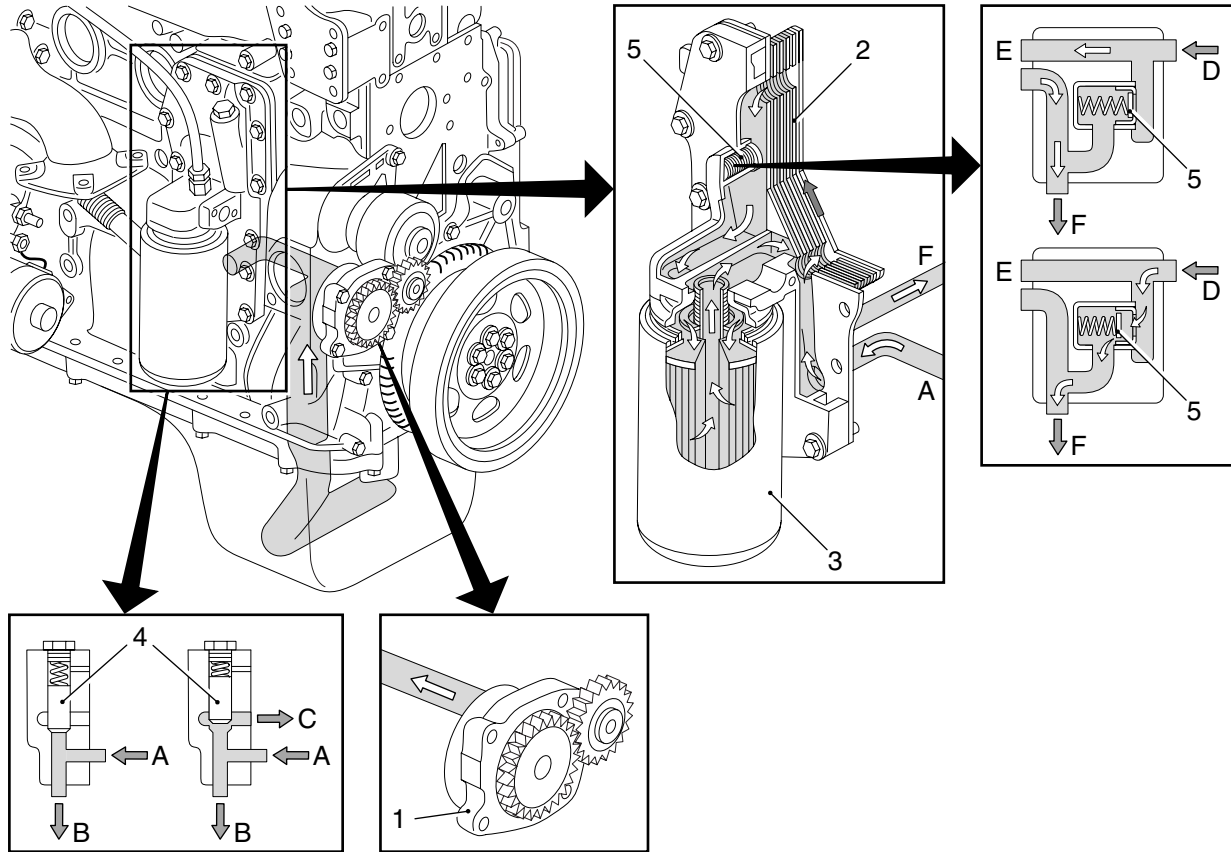
Safety instructions

LF45/55 series

4

2. GENERAL

2.1 SYSTEM DESCRIPTION, LUBRICATION SYSTEM



- A From lubricating oil pump
 B To oil cooler
 C To lubricating oil pump
 D From oil cooler
 E To oil filter
 F To main oil channel

M201120

General

The lubricating oil pump (1) is directly driven by the crankshaft via an idler gear.

The lubricating oil pump draws the oil from the oil sump and pumps it via the oil cooler (2) and the lubricating oil filter (3) to the main oil channel in the cylinder block. From the main oil channel, the lubricating oil is further distributed to the various components requiring lubrication.

Oil cooler

The oil cooler (2) is connected to the cooling system. The oil cooler warms up the lubricating oil in a "cold" engine and cools it in a "warm" engine.

BE ENGINE LUBRICATION SYSTEM

2

General

LF45/55 series

Pressure-limiting valve

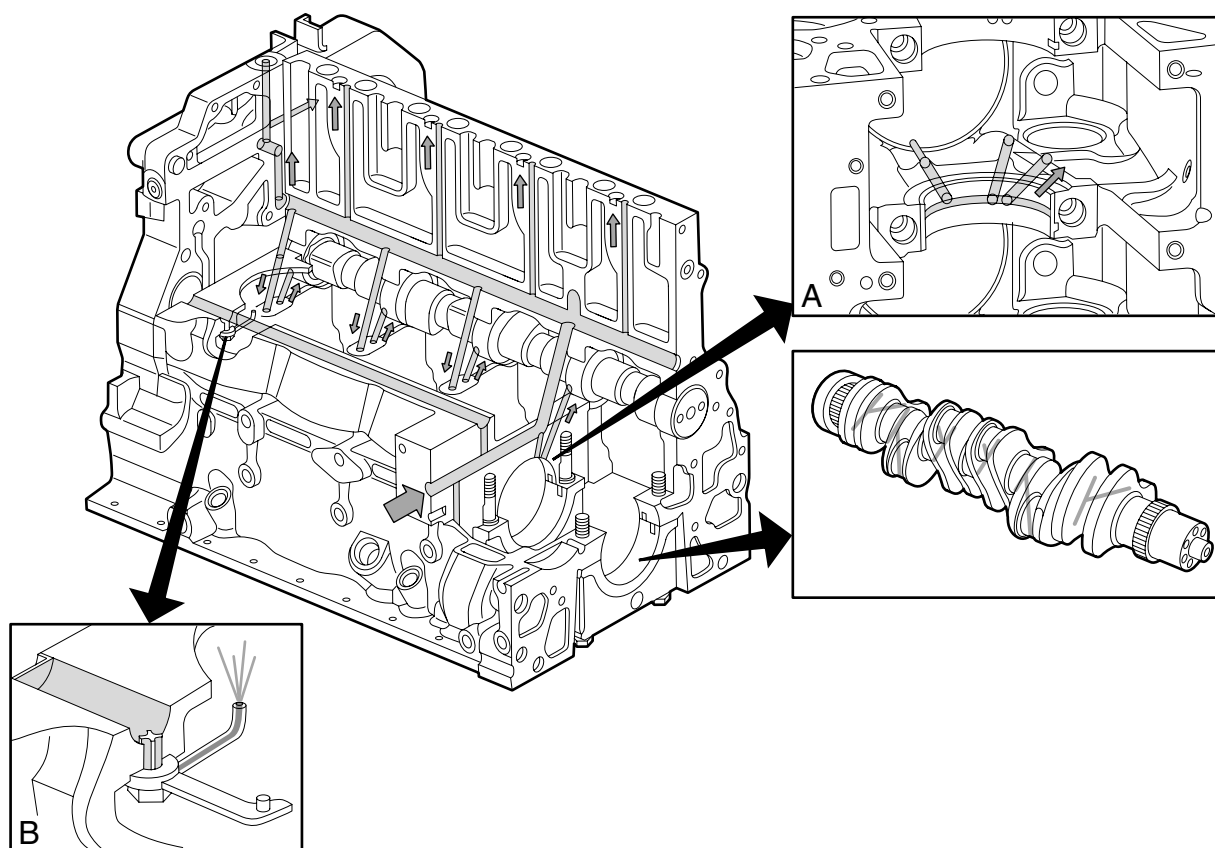
A pressure limiting valve (4) is fitted in the oil cooler housing.

When the pressure set for the pressure limiting valve has been reached, the valve opens and allows the excess lubricating oil to be discharged to the supply side of the lubricating oil pump.

Oil filter

The oil is cleaned in the disposable oil filter (3). A pressure relief valve (5) fitted in the oil cooler housing opens if the pressure in the filter becomes too high as a result of contamination or cold oil. The oil then passes through the filter unfiltered.

4



M201260

Main oil channel

From the main oil channel, lubricating oil is supplied to the crankshaft main bearings (A) and via an oil channel in the crankshaft also to the big-end bearings.

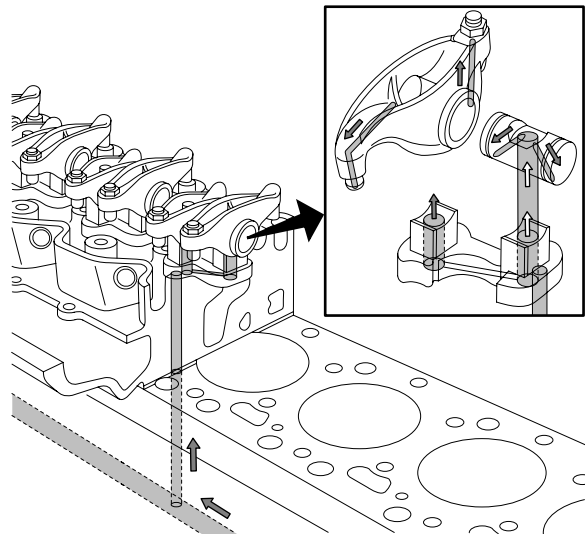
From the main oil channel, lubricating oil is pumped to the camshaft.

Cylinder head

From the main oil channel, vertical oil channels pass through the cylinder block to the cylinder head. This bore is continued in the cylinder head to supply lubricating oil to the rockers.

Piston and gudgeon pin

The pistons are lubricated by oil nozzles (B). In addition to its lubricating function, the lubricating oil has an important cooling function. A hole has been drilled at the top of the connecting rod, through which the oil that the oil nozzles spray against the piston head may reach the upper big-end bearing and the gudgeon pin.



M201123

Turbocharger

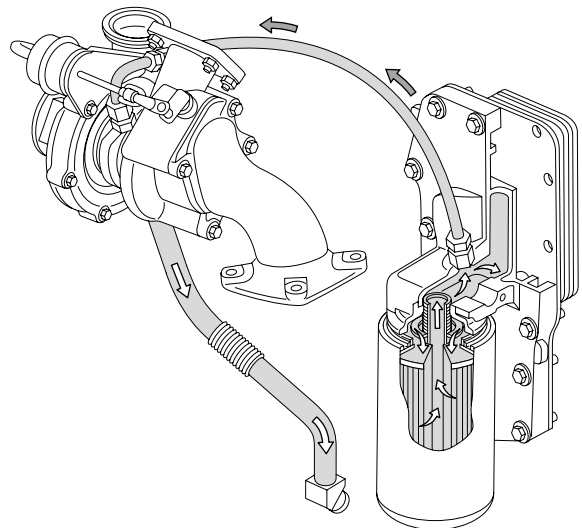
The turbocharger is lubricated via an oil pipe from the oil cooler housing.

The oil discharge pipe from the turbocharger is connected to the cylinder block, from where the oil returns to the oil sump.

Air compressor

The air compressor is supplied with oil from an oil channel in the timing gear case connected to the main oil channel.

The oil returning from the air compressor flows from the front of the air compressor to the timing gear case, and from there to the oil sump.



M201122

BE ENGINE LUBRICATION SYSTEM

2

General

LF45/55 series

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3. CHECKING AND ADJUSTING

3.1 CHECKING ENGINE OIL CONSUMPTION

Engine oil consumption relates to the engine oil used during combustion in the engine. Since engine oil consumption is affected by driving style and the use to which the vehicle is put, it is also related to average fuel consumption. See "Technical data" for the maximum permissible engine oil consumption.

Test conditions

1. An engine oil consumption test is only meaningful after the engine has been run in (approx. 25,000 km).
2. Check the engine carefully for engine oil leakage before carrying out an engine oil consumption test. First repair any leaks.
3. Check the average fuel consumption and engine oil consumption as accurately as possible.
4. Only check the engine oil level when the engine is at operating temperature and only when the engine has been turned off for five minutes.
5. Make sure the vehicle is horizontal before checking the engine oil level.

BE ENGINE LUBRICATION SYSTEM

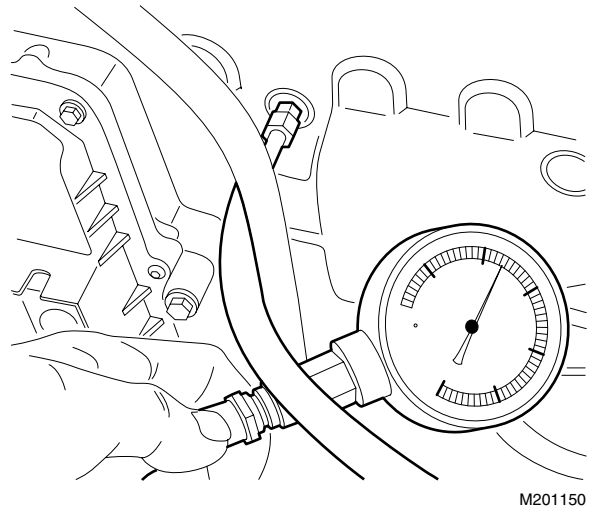
2

Checking and adjusting

LF45/55 series

3.2 INSPECTION, LUBRICATING OIL PRESSURE

1. Bring the engine up to operating temperature.
2. Remove the plug from the main oil channel. It is located on the left, in the centre of the engine block.
3. Connect the special tool (DAF no. 0535551) to the oil pressure gauge connection.
4. Start the engine and measure the lubricating oil pressure at idling speed and at full-load engine speed. Compare the pressure readings with the technical data. See "Technical data".
5. Stop the engine and remove the oil pressure gauge. Fit a new sealing ring in the plug and insert the plug.



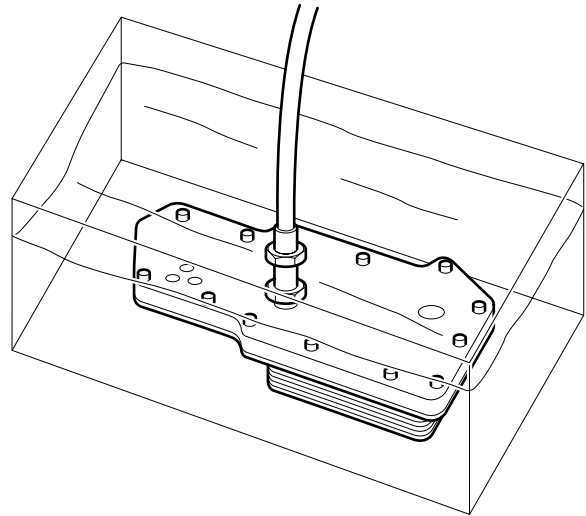
3.3 PRESSURE-TESTING THE OIL COOLER

1. Remove the oil cooler. See 'Removal and installation'.
2. Fit special tool (DAF no. 1329478) to the oil cooler.
3. Connect an air hose with pressure reducer valve to the special tool.
4. Immerse the oil cooler in warm water and set the specified air pressure. See 'Technical data' for the specified water temperature and the test pressure.
5. Check the cooling element for leakage.

Note:

The oil cooler should be replaced if it is leaking.

6. Remove the special tool.
7. Fit the oil cooler. See 'Removal and installation'.



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BE ENGINE LUBRICATION SYSTEM

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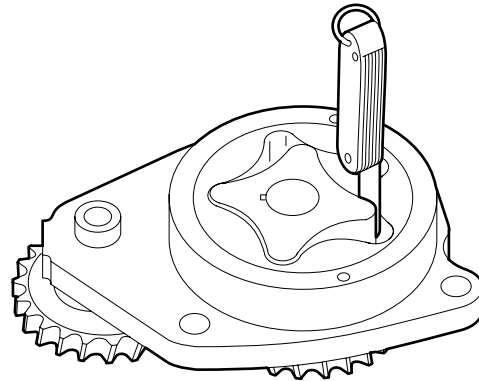
Checking and adjusting

LF45/55 series

3.4 INSPECTING THE LUBRICATING OIL PUMP

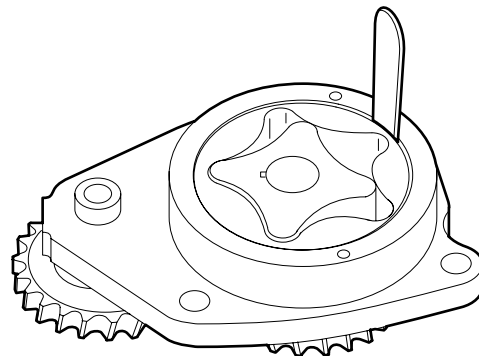
Inspecting the lubricating oil pump

1. Check the lubricating oil pump drive gears for damage and excessive wear.
2. Check the drive gear backlash. See 'Technical data'.
3. Remove the rear plate from the lubricating oil pump.
4. Check the play between the inner and outer rotors using a feeler gauge. See 'Technical data'.



M201077

5. Check the play between the outer rotor and the pump housing using a feeler gauge. See 'Technical data'.



M201076

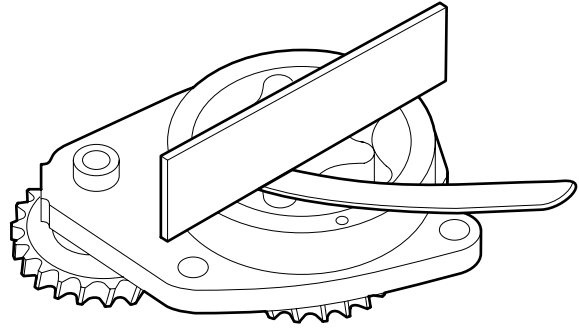
2

BE ENGINE LUBRICATION SYSTEM

LF45/55 series

Checking and adjusting

6. Using a feeler gauge and a straight edge check the play between the inner and outer rotors in relation to the pump housing. See 'Technical data'.
7. Mark the top of the outer rotor and remove the outer rotor.
8. Check the inner rotor and outer rotor for damage and excessive wear.
9. Fit the outer rotor with the marked side upwards.
10. Fit the rear plate.



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BE ENGINE LUBRICATION SYSTEM

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Checking and adjusting

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4

4. REMOVING AND INSTALLING

4.1 REMOVAL AND INSTALLATION, LUBRICATING OIL FILTER



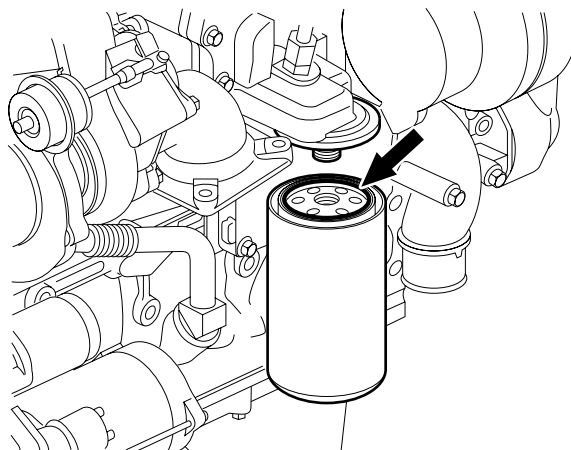
To prevent skin injury, avoid unnecessary contact with the drained lubricating oil. Be careful when changing the oil. Hot oil may cause serious injuries.

Removing the oil filter

1. Clean the location and the area surrounding the filter element if extremely fouled.
2. Remove the filter element by turning it anti-clockwise. Collect any oil that is flowing out.
3. Remove the O-ring if it has not been removed already.

Installing the oil filter

1. Lightly oil the filter element sealing ring.
2. Fill the filter element with clean oil. Use the specified oil.
3. Fit the filter until the seal abuts, and tighten it by hand another $\frac{3}{4}$ to a full turn.
4. Run the engine for a short time and check whether the oil filter is correctly sealed.
5. Check the oil level and correct if necessary. Use the specified oil.



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BE ENGINE LUBRICATION SYSTEM

2

Removing and installing

LF45/55 series

4.2 REMOVAL AND INSTALLATION, OIL COOLER

Removing the oil cooler

1. Drain the coolant. See "Draining and filling".
2. Remove the lubricating oil filter.
3. Remove the turbocharger oil supply pipe.
4. Remove the attachment bolts from the oil cooler and remove the oil cooler.

Installing the oil cooler

1. Fit the oil cooler with new gaskets and tighten the attachment bolts to the specified torque and in the specified sequence. See "Technical data".
2. Tighten the oil supply pipe to the specified torque. See "Technical data".
3. Fit the lubricating oil filter.
4. Fill the cooling system.
5. Run the engine briefly, and check that the oil cooler does not leak.
6. Check the lubricating oil level.
7. Check the coolant level.

4

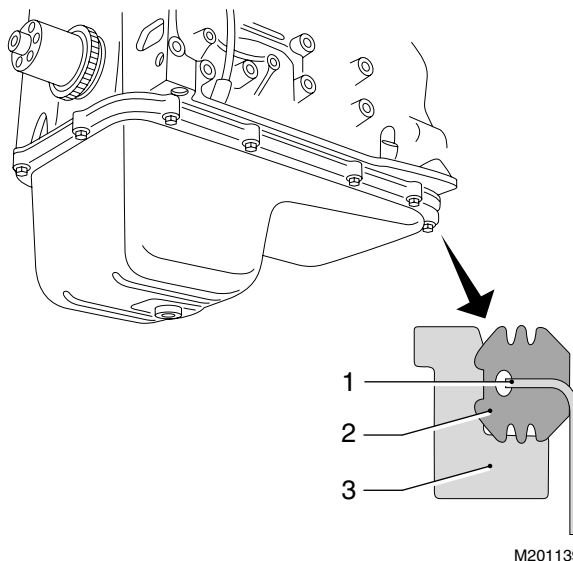
4.3 REMOVAL AND INSTALLATION, OIL SUMP

Removing the oil sump

1. Drain the engine oil. See "Draining and filling".
2. Support the oil sump.
3. Remove the attachment bolts all around.
4. Remove the oil sump (1) with sealing rubber (2) and flange (3).

Installing the oil sump

1. Thoroughly clean the sealing surfaces of the oil sump and the engine block.
2. Check the oil sump sealing rubber (2). Damaged sealing rubbers must be replaced.
3. Fit the oil sump (1) with sealing rubber (2) and flange (3) upright.
4. Fit the attachment bolts in the specified sequence and tighten them to the specified torque. See "Technical data".
5. Fill the engine with the correct amount of lubricating oil. See "Draining and Filling".
6. Run the engine for a short time and check for oil leaks. Then check the oil level.



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Removing and installing

LF45/55 series

4.4 REMOVING AND INSTALLING LUBRICATING OIL PUMP

Removing lubricating oil pump

1. Remove the fan.
2. Remove the poly-V-belt.
3. Remove the vibration damper and the crankshaft pulley.
4. Remove the front crankshaft seal.
5. Remove the front engine panel.
6. Remove the attachment bolts from the lubricating oil pump crosswise and remove it.

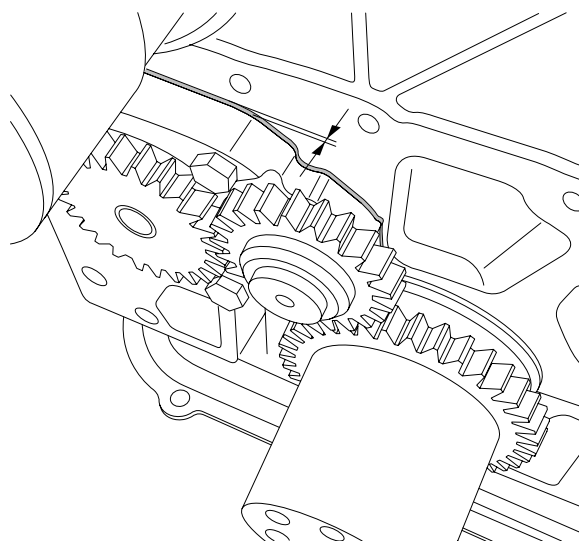
Installing lubricating oil pump

1. Check the lubricating oil pump. See "Checking and adjusting".
2. Fill the lubricating oil pump with engine oil and position the lubricating oil pump in the cylinder block.
3. Fit the attachment bolts and tighten them crosswise to the specified torque. See "Technical data".

Note:

The rear plate of the lubricating oil pump is at the back of the bore; if the lubricating oil pump is fitted correctly, the flange will not touch the cylinder block.

4. Fit the front engine panel.
5. Fit a new front crankshaft seal.
6. Fit the crankshaft pulley and the vibration damper.
7. Fit the poly-V-belt.
8. Fit the fan.



M201124

5. DRAINING AND FILLING

5.1 DRAINING AND REPLENISHING ENGINE OIL



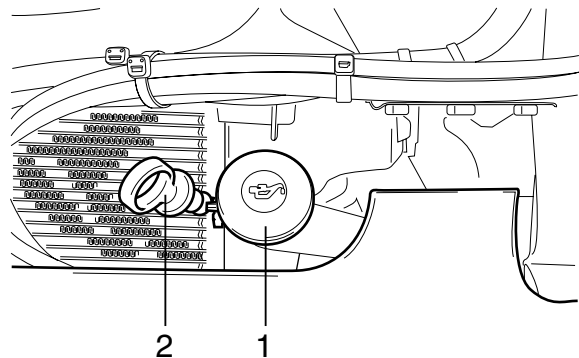
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining engine oil

1. Ensure that the vehicle is standing on a flat and level surface.
2. Drain the engine oil at operating temperature using the drain plug in the oil sump.
3. Replace the drain plug sealing ring and tighten the drain plug to the specified torque; see "Technical data".

Replenishing engine oil

1. Fill the engine through the oil filler pipe (1) with the specified quantity of engine oil; see "Technical data".
2. Use the dipstick (2) to check the engine oil level.



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Draining and filling

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2.3 Overview drawing, timing gear	2-4	200505
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CE ENGINE

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

CE ENGINE

2

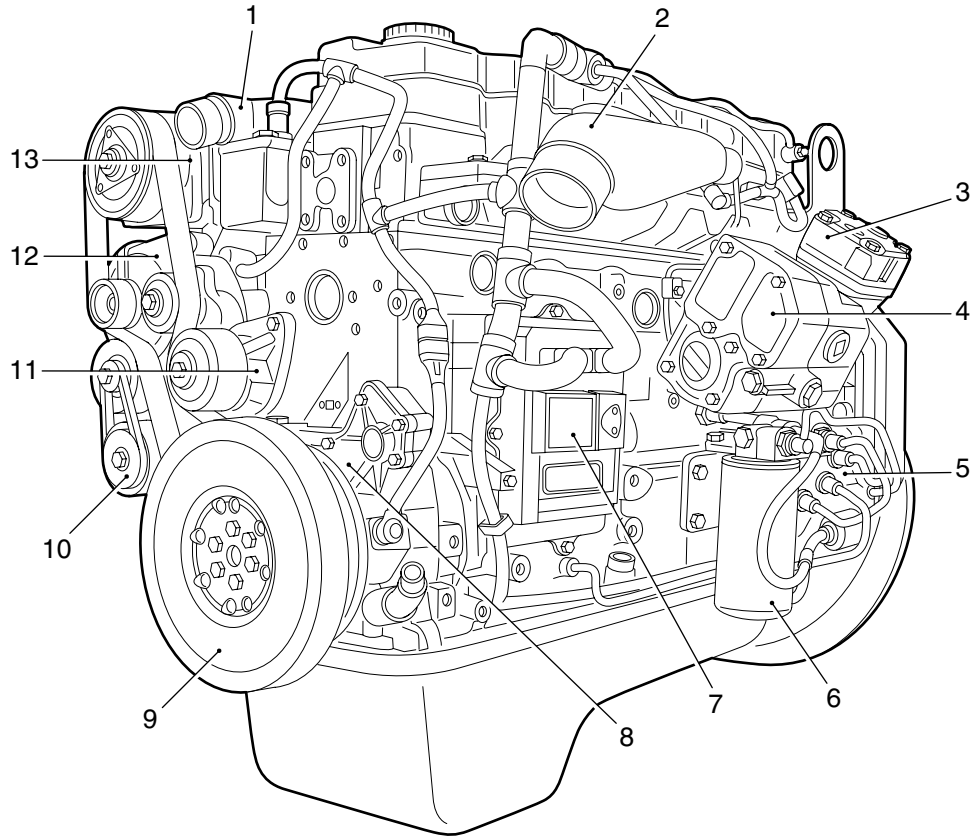
Safety instructions

LF45/55 series

5

2. GENERAL

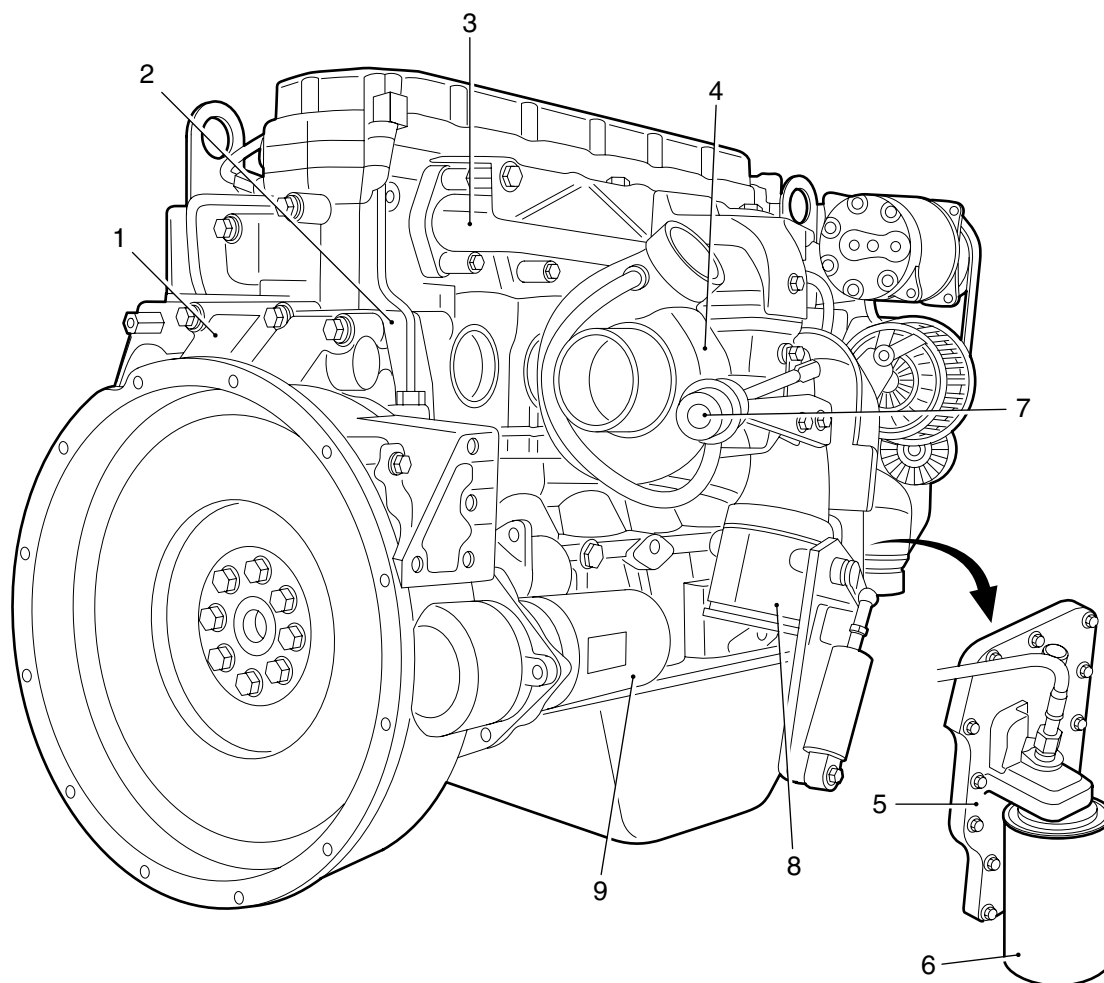
2.1 LOCATION OF COMPONENTS



1. Thermostat housing
2. Intake manifold
3. Air compressor
4. Steering pump with reservoir
5. High-pressure pump
6. Fuel filter
7. ECS-DC3 electronic unit
8. Front engine panel
9. Vibration damper
10. Automatic tensioner
11. Coolant pump
12. Alternator
13. Air-conditioning compressor

M201141

5



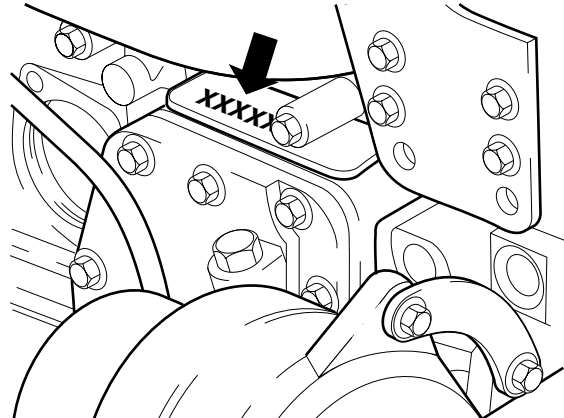
M201140

1. Flywheel housing
2. Timing gear case
3. Exhaust manifold
4. Turbocharger
5. Oil cooler
6. Oil filter
7. Wastegate diaphragm
8. Exhaust brake
9. Starter motor

2.2 IDENTIFICATION

Engine number

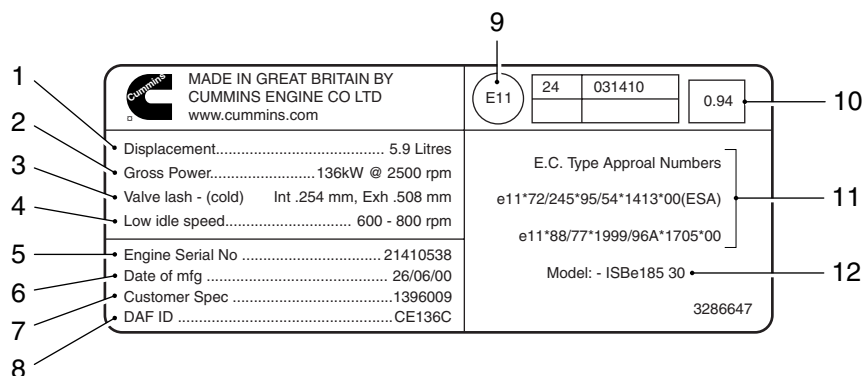
The engine number is stamped front right in the cylinder block, at the top of the lubricating oil cooler housing.



M2 01 138

Engine identification plate

The engine identification plate is located at the top of the flywheel housing or on the valve cover, depending on the production date.

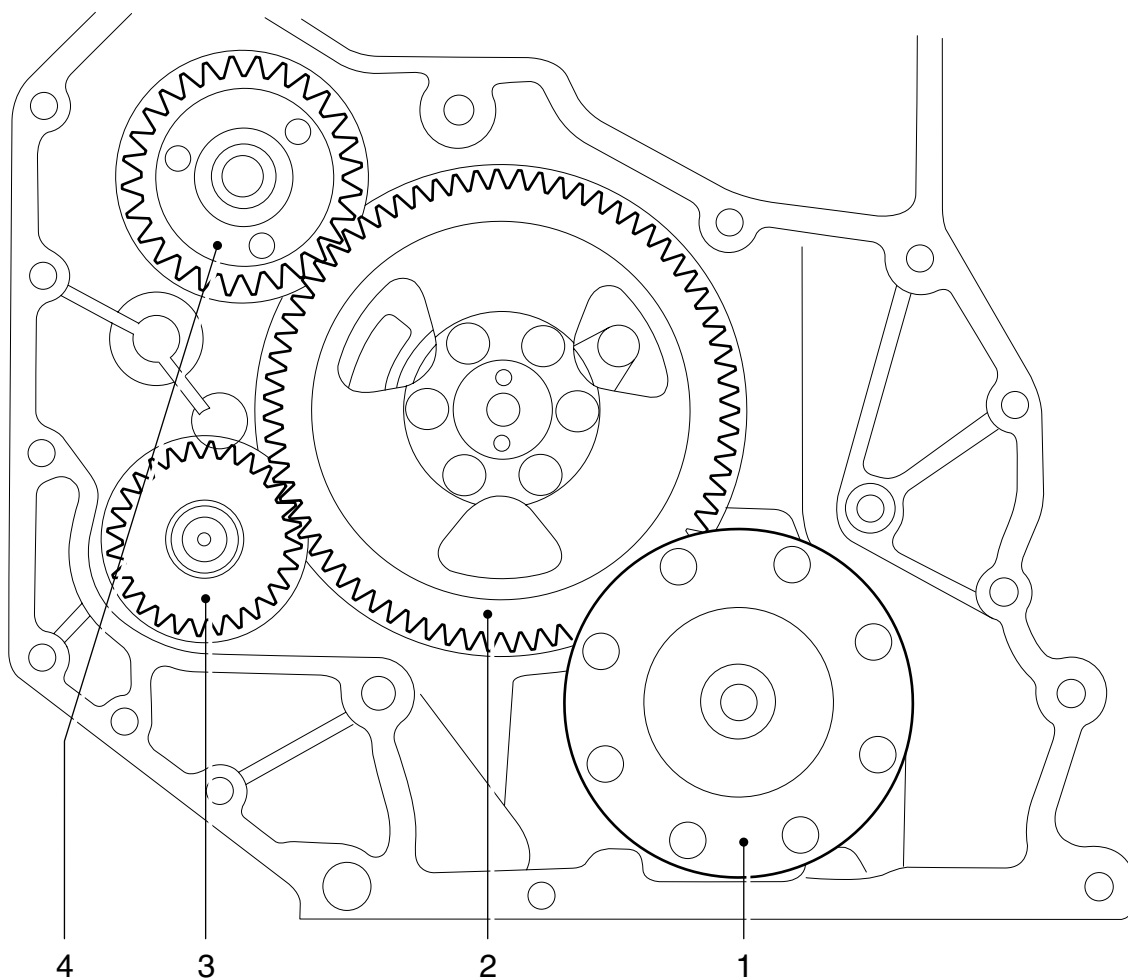


M201135

1. Cubic capacity
2. Engine output
3. Valve clearance
4. Idle engine speed
5. Engine number
6. Production date
7. Client specification
8. DAF type designation
9. Indication of country of origin
10. Free acceleration smoke level (K factor)
11. Type approval numbers
12. Cummins type designation

2.3 OVERVIEW DRAWING, TIMING GEAR

5



1. Crankshaft
2. Camshaft
3. High-pressure pump
4. Compressor

M201432

3. CHECKING AND ADJUSTING

3.1 INSPECTION AND ADJUSTMENT, CE ENGINE VALVE CLEARANCE

Note:

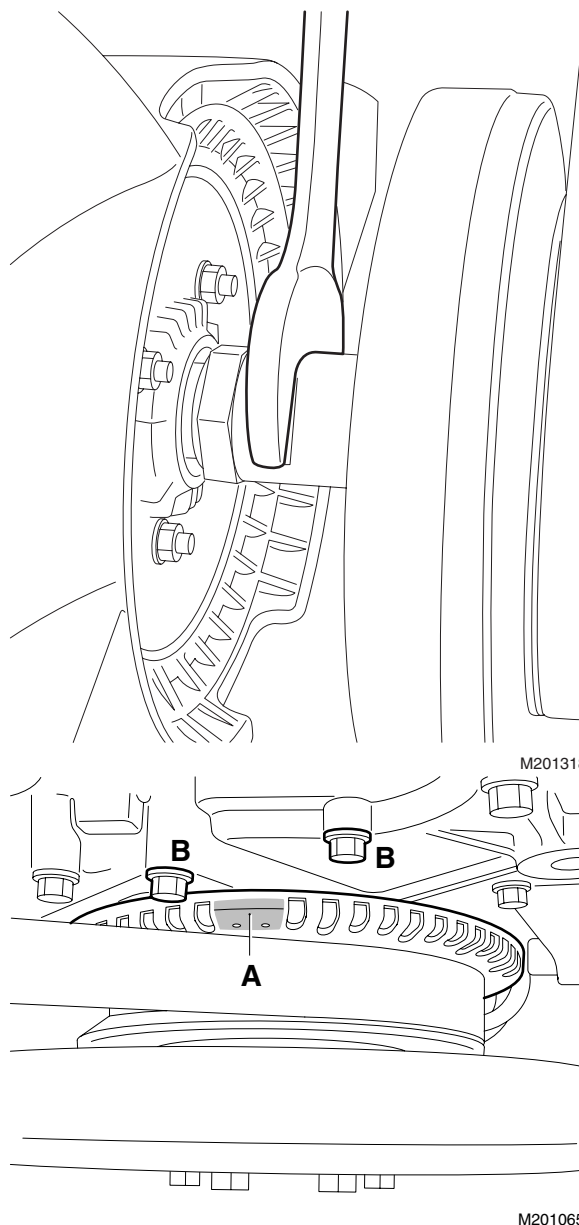
Inspection and adjustment of valve clearance must only be carried out when the engine is cold.

1. Remove the valve cover. See 'Removal and installation'.
2. Use an open-end spanner on the fan shaft to turn the crankshaft clockwise, as seen from the vibration damper end (this is the engine's normal direction of rotation), until the mark (A) is between the bolts (B) and the valves of cylinder 1 are in overlap position.

Note:

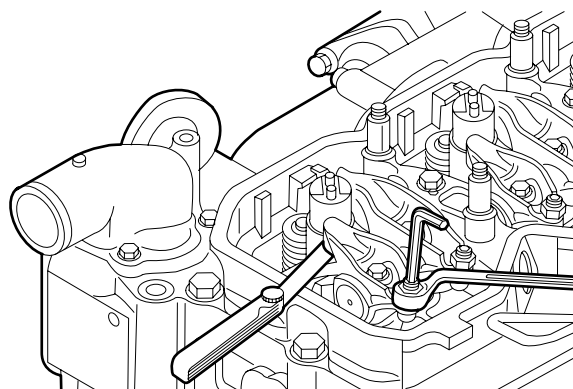
"Overlap" is the moment at which the inlet valves start opening and the exhaust valves stop closing.

The inlet valves are operated by the short rockers and the exhaust valves by the long rockers.



CE ENGINE**2****Checking and adjusting****LF45/55 series**

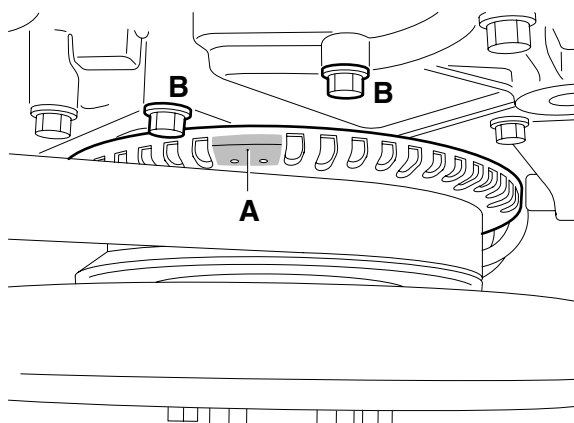
3. Check/correct the valve clearance of the specified inlet and exhaust valves. Set the correct valve clearance by loosening the locknut and rotating the adjusting screw in the correct direction; see "Technical data" for the correct valve clearance.



M201064

Cylinder	Inlet valve	Exhaust valve
1		
2		X
3	X	
4		X
5	X	
6	X	X

4. Using an open-end spanner on the fan shaft, turn the crankshaft one rotation further so that the mark (A) is once again between the bolts (B) and the valves of cylinder 6 overlap.
5. Check/correct the valve clearance of the specified inlet and exhaust valves. Set the correct valve clearance by loosening the locknut and rotating the adjusting screw in the correct direction; see "Technical data" for the correct valve clearance.



M201065

Cylinder	Inlet valve	Exhaust valve
1	X	X
2	X	
3		X
4	X	
5		X
6		

6. Fit the valve cover. See "Removal and installation".

3.2 CHECKING AND ADJUSTING TIMING GEAR

Note:

The engine is fitted with gears on either side. The gears at the vibration damper end only drive the oil pump. These gears have no marks and may be fitted in any position.

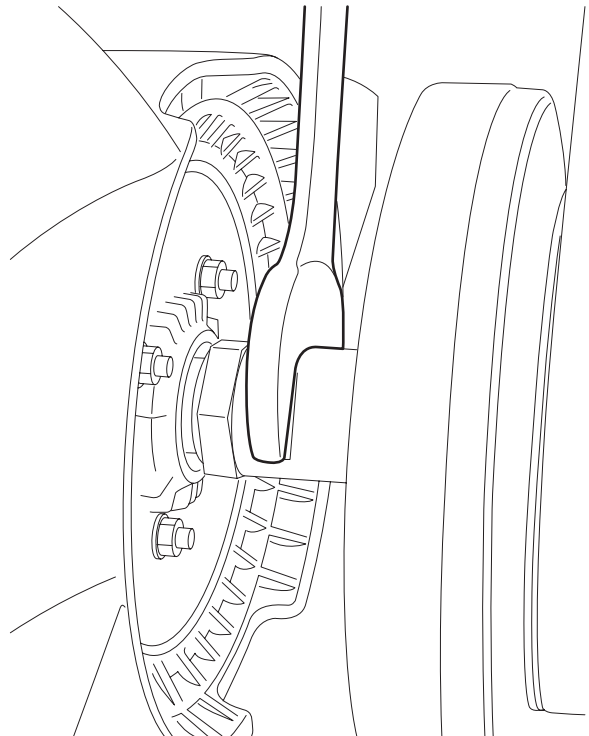
The timing gear wheels on the flywheel side drive the camshaft, air compressor and fuel pump. Only the camshaft gear and the crankshaft gear have marks which must be aligned. The other gears may be fitted randomly.

1. Remove the engine encapsulation panels.
2. Remove the gearbox.
3. Remove the flywheel. See "Removing and installing".
4. Remove the flywheel housing. See "Removing and installing".

Note:

When the engine crankshaft or camshaft is turned separately, the pistons and valves may touch each other.

5. Use an open-end spanner on the fan shaft to turn the crankshaft clockwise, as seen from the vibration damper end, until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.



M201318

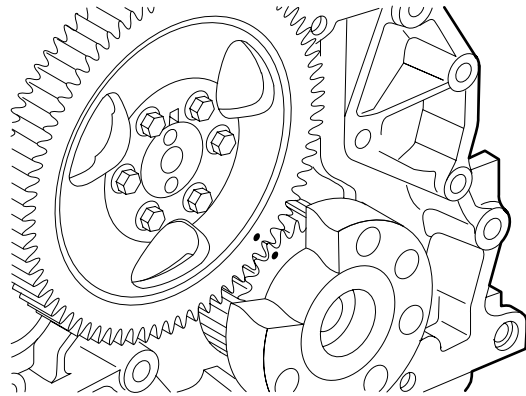
CE ENGINE

2

Checking and adjusting

LF45/55 series

6. Check that the marked tooth falls exactly into the marked depth. If not, remove and refit the camshaft gear. See "Removing and installing".
7. Fit the flywheel housing. See "Removing and installing".
8. Fit the flywheel. See "Removing and installing".
9. Fit the gearbox.
10. Fit the engine encapsulation panels.



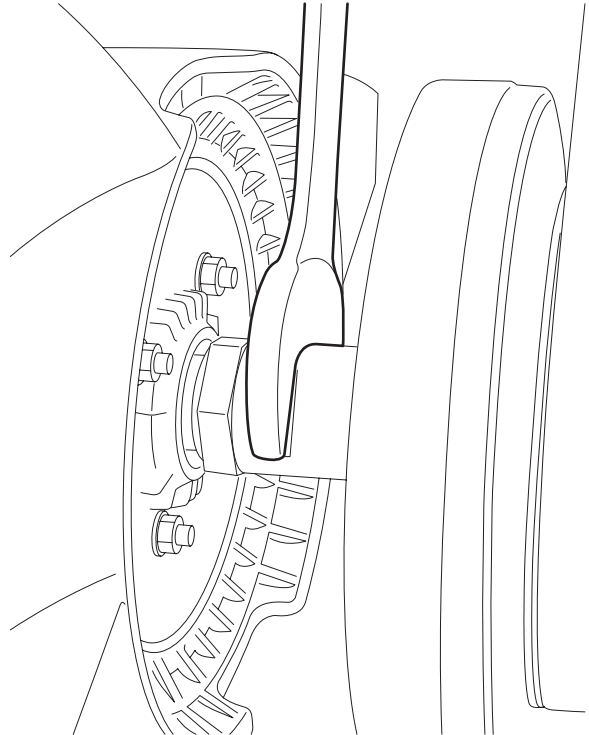
M201146

3.3 CHECKING PISTON PROJECTION

Note:

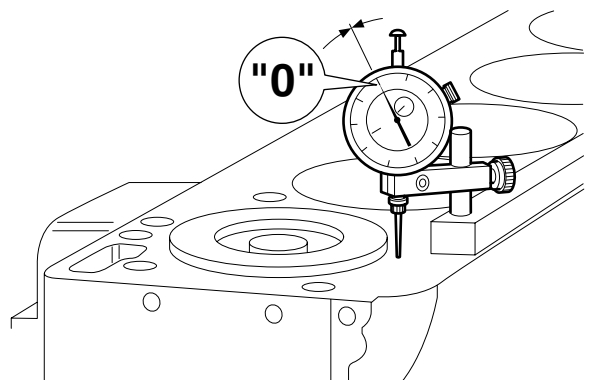
The piston projection determines which thickness of cylinder head gasket must be used.

1. Use an open-end spanner on the fan shaft to turn the crankshaft, so that the piston of cylinder 1 is in the top dead centre (TDC).
2. Clean the upper surface of the cylinder block and the pistons.



M201318

3. Place a dial gauge on the upper surface of the cylinder block next to cylinder 1 and set the gauge to zero.



M201233

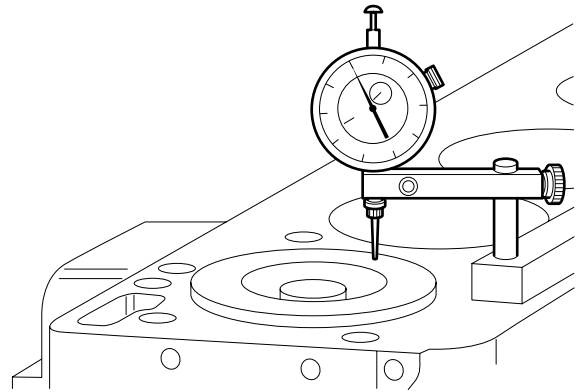
CE ENGINE

2

Checking and adjusting

LF45/55 series

4. Pull up the stylus of the dial gauge and move it to the edge of the first piston, above the gudgeon pin.
5. Use an open-end spanner on the fan shaft to turn the crankshaft anti-clockwise and clockwise, at the same time reading the dial gauge to find the highest position of the piston. Make a note of this reading.
6. Repeat this measurement for the other pistons.
7. Calculate the average value of the piston projection above the cylinders.

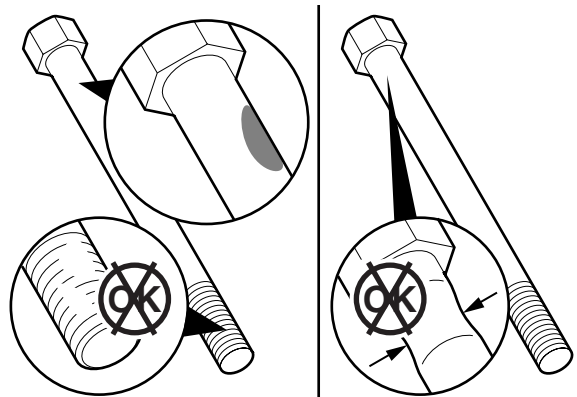


M201234

3.4 CHECKING CYLINDER HEAD BOLTS

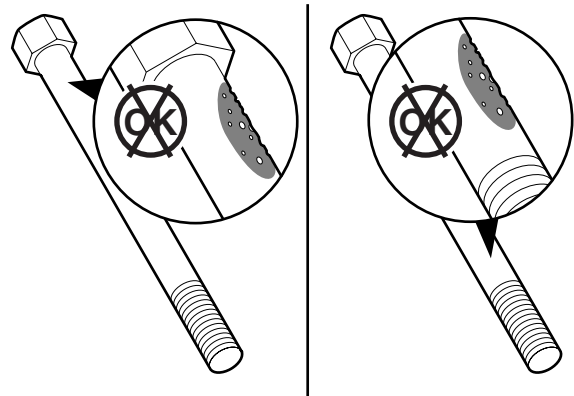
Cylinder head bolts can be re-used provided they satisfy a number of conditions. If a cylinder head bolt does not meet one or more of these conditions, new cylinder head bolts must be used.

1. Check cylinder head bolts for damaged screw threads, corroded surfaces and constriction as a result of overstretching.



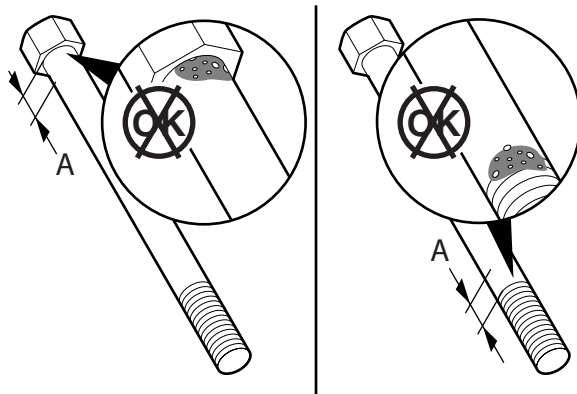
M201248

2. Check the dimensions of visible pitting on the cylinder head bolt, see "Technical data".



M201249

3. Check the cylinder head bolt for visible corrosion or pitting immediately under the bolt head and directly above the start of the screw thread, see "Technical data".



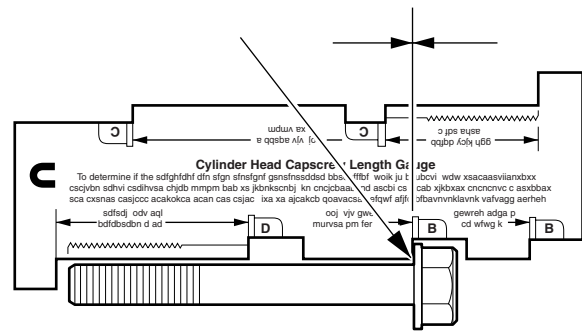
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CE ENGINE**2**

Checking and adjusting

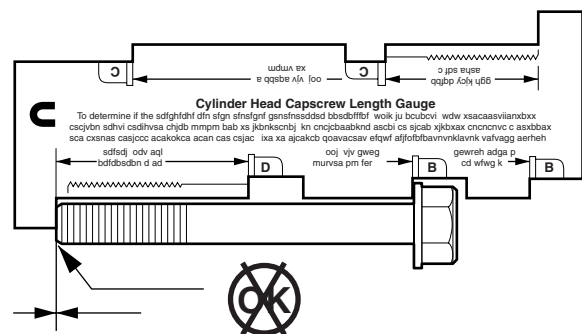
LF45/55 series

4. Check the free length of the cylinder head bolt. Use the special tool (DAF no. 1329477) for this purpose. Place the bolt head against the abutting surface.



M201251

5. The end of the bolt must not touch the gauge.

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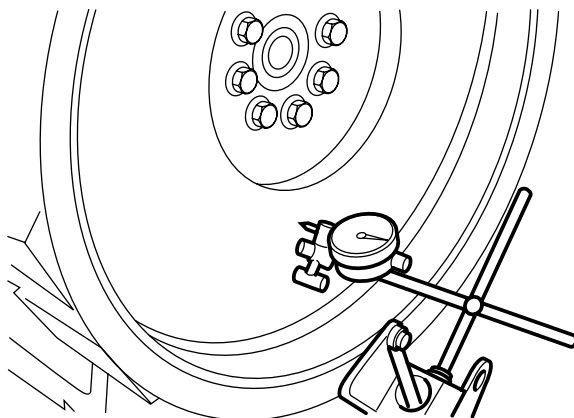
M201252

3.5 INSPECTING THE FLYWHEEL

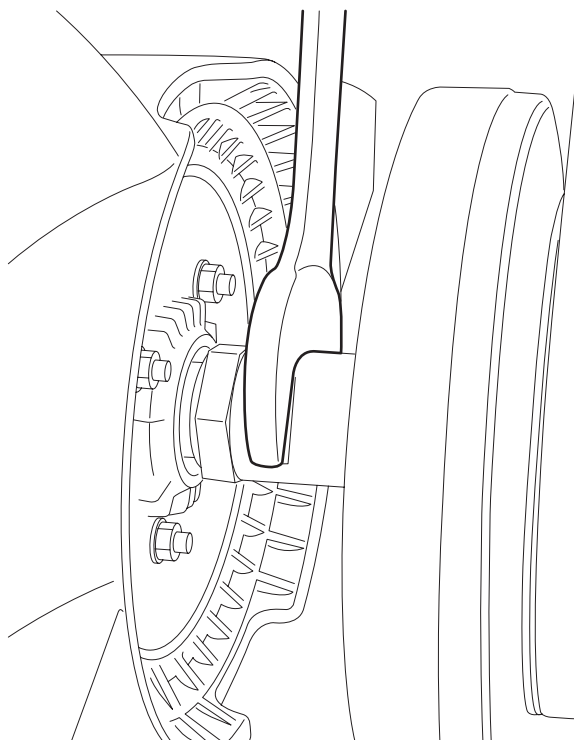
If cracks are visible on the flywheel, on the contact surface of the clutch plate, it must be replaced.

Checking flywheel run-out

1. Clean the flywheel.
2. Place a metal strip on the edge of the flywheel housing to fit a dial gauge.
3. Place the dial gauge on the metal strip.
4. Place the stylus of the dial gauge as close as possible to the outer edge of the flywheel.
5. Set the dial gauge to "0".
6. Use an open-end spanner on the fan shaft to crank the engine through 360°, and measure the maximum dial gauge reading. Compare the reading with the specified value, see 'Technical data'.



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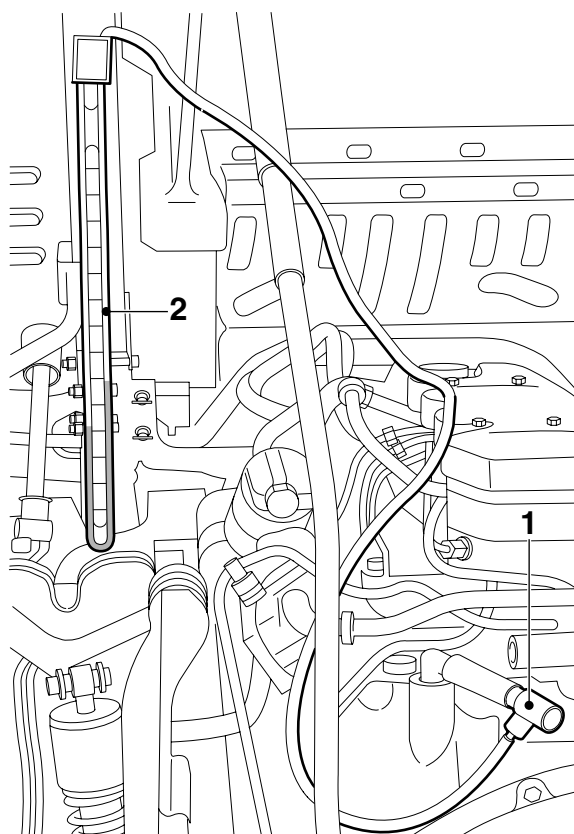
3.6 INSPECTION, ENGINE OIL SUMP PRESSURE



Be careful when working on an engine at operating temperature.

The oil sump pressure is measured to quickly check the cylinder seals. The readings obtained are an indication of the leakage from all cylinders.

1. Bring the engine up to operating temperature.
2. Turn off the engine and fit the special tool (DAF no. 1240080) (1) to the crankcase breather hose.
3. Fit the special tool with a water pressure gauge (DAF no. 1240081) (2) using a hose and start the engine.
4. Using the water pressure gauge, measure the oil sump pressure at idling speed and compare the measured reading with the technical data. See "Technical data".



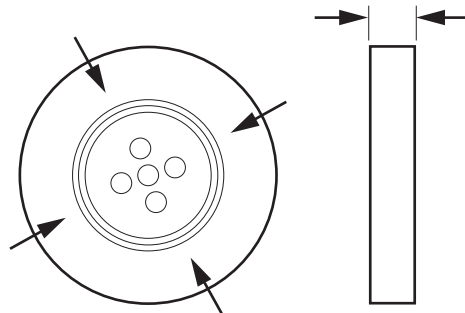
M201316

3.7 INSPECTING THE CE ENGINE VIBRATION DAMPER

Note:

The viscous vibration damper is filled with a silicone liquid. After some time this silicone liquid may expand.

1. Remove the paint at four places on either side of the vibration damper.
2. Measure the thickness at these four places at a distance of 80 mm from the outer edge. Compare the reading with the technical data. See 'Technical data'.



M201394

3.8 INSPECTING THE CYLINDER HEAD

1. Check the sealing plugs and expansion plugs of the cylinder head for leaks. If necessary, pressure-test the cylinder head.
2. Inspect the cylinder head for damage to the sealing surface and any cracks.
3. Check the cylinder head for smoothness using a straight edge and feeler gauge. See "Technical data".

Note:

The cylinder head must be replaced if it does not meet the specified values.

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3.9 INSPECTING THE CYLINDER BLOCK

1. Inspect the cylinder block for damage to the sealing surface and any cracks.
2. Check the cylinder block for smoothness using a straight edge and feeler gauge. See "Technical data".

4. REMOVING AND INSTALLING

4.1 REMOVAL AND INSTALLATION, ENGINE



Suspend the engine securely from the hoist, using approved lifting gear.

Various fluids will be released when fluid pipes are removed.

Collect these fluids. Personal safety and the risk of fire should always be considered.

Note:

Because of the large number of vehicle specifications, it is not feasible to exactly specify the engine removal and installation procedures for every vehicle.

This description only includes the most important points requiring attention.

- Disconnect the earth lead from the battery terminal.
- Avoid opening fluid systems as much as possible. If possible, remove and set aside the engine components.
- When removing the engine, ensure that no parts or dirt fall into the engine, radiator or other components. All openings that are freed should therefore be plugged.
- Wiring harnesses are vulnerable. If damaged, they may cause failures. Make sure these wiring harnesses are not live and are clear of moving parts.
- Fit all attachment bolts and tighten them to the correct torque.
- The engine should not be allowed to rest on the oil sump. Because the oil sump is made of sheet material, it will be severely damaged by the engine's weight.
- The engine should not be allowed to rest on the flywheel housing. It can easily be damaged by the engine's weight.

4.2 REMOVAL AND INSTALLATION, ENGINE MOUNTS



Suspend the engine securely from the hoist, using approved lifting gear. Various fluids will be released when fluid pipes are removed. Collect these fluids. Personal safety and the risk of fire should always be considered.

Removing the engine mounts

1. Disconnect the earth lead from the battery terminal.
2. Drain the coolant.
3. Remove the hoses between the engine and the radiator.
4. Remove the attachment bolts from the radiator torque rod bracket on the engine side.
5. Remove the air inlet hoses between the engine and the air cooler. Plug the openings.
6. Detach the air-conditioning pipes, if present, at the top of the radiator.
7. Detach the heater hose bracket at the top of the radiator.
8. Remove the oil supply pipe from the engine.
9. Remove the lower connector from electronic unit ECS-DC3.
10. Remove the attachment bolts of the viscous fan clutch on the drive flange and place the viscous fan clutch with the fan in the wind tunnel.
11. Suspend the engine securely in the hoist.
12. Remove the engine mount attachment bolts at the front and rear of the engine.
13. Hoist the engine very carefully as far as necessary and support it properly.
14. Remove the engine mounts.

Installing the engine mounts

1. Tighten the engine mounting attachment bolts to the specified torque. See "Technical data".
2. Fit the viscous fan clutch with the fan. Tighten the attachment bolts to the specified torque. See "Technical data".
3. Fit the connector of electronic unit ECS-DC3.
4. Fit the oil supply pipe.
5. Fit the heater hose bracket at the top of the radiator.
6. Fit the bracket for the air-conditioning pipes at the top of the radiator.
7. Fit the torque rod bracket between the engine and the radiator.
8. Fit the air inlet hoses between the engine and the air cooler.
9. Fit the coolant hoses between the engine, radiator and the header tank.
10. Fit the torque rod between the radiator and the engine.
11. Fill the cooling system. See "Draining and filling".
12. Connect the battery earth lead.

4.3 REMOVAL AND INSTALLATION, VALVE COVER



When the engine or parts thereof are opened, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened.

Removing the valve cover

1. Clean the area around the valve cover.
2. Remove the banjo bolt and the attachment of the plastic crankcase breather tube.
3. Remove the valve cover attachment nuts.
4. Remove the valve cover.

Installing the valve cover

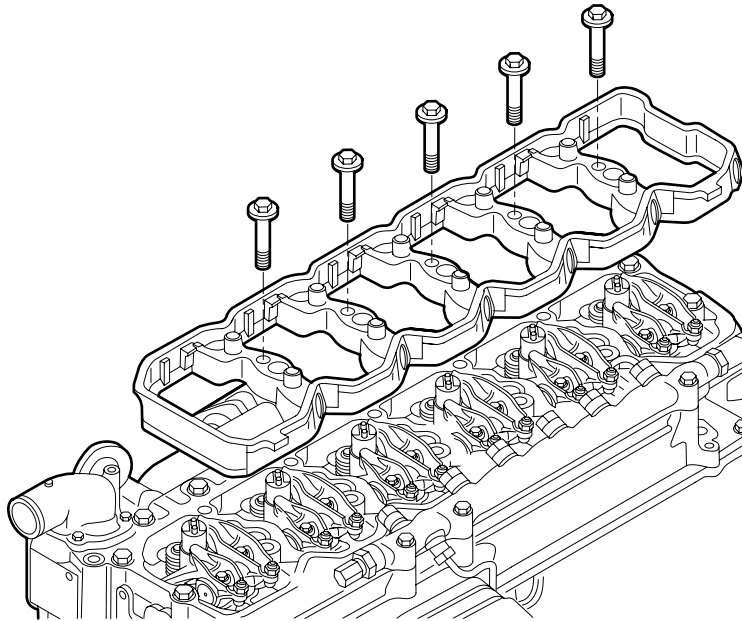
1. Clean the sealing surface of the valve sleeve and the valve cover.
2. Check the valve cover gasket. If it is not damaged it may be re-used.
3. Fit the valve cover gasket to the valve cover.
4. Fit the valve cover.
5. Fit the attachment nuts of the valve cover and tighten them to the specified torque. See "Technical data".
6. Fit the plastic crankcase breather tube and the banjo bolt to the valve cover.

4.4 REMOVAL AND INSTALLATION, VALVE SLEEVE



When the engine or parts thereof are opened, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened.

Removing the valve sleeve



1. Remove the valve cover.
2. Detach the feed-through connectors from the injectors.
3. Remove the wiring from the injectors.
4. Remove the attachment bolts from the valve sleeve.
5. Remove the valve sleeve with the gasket.

M201422

Installing the valve sleeve

1. Clean the sealing surface of the cylinder head and valve sleeve.
2. Check the valve sleeve gasket. If it is undamaged, it may be re-used. Fit the valve sleeve gasket onto the valve sleeve.
3. Fit the valve sleeve.
4. Tighten the valve sleeve attachment bolts to the specified torque. See "Technical data".



Tightening the injector wiring to a higher torque than specified may cause damage to the injector.

5. Fit the injector wiring on the injectors and tighten it to the specified torque. See "Technical data".
6. Fit the feed-through connectors of the injectors.
7. Fit the valve cover.

4.5 REMOVAL AND INSTALLATION, VALVE GEAR

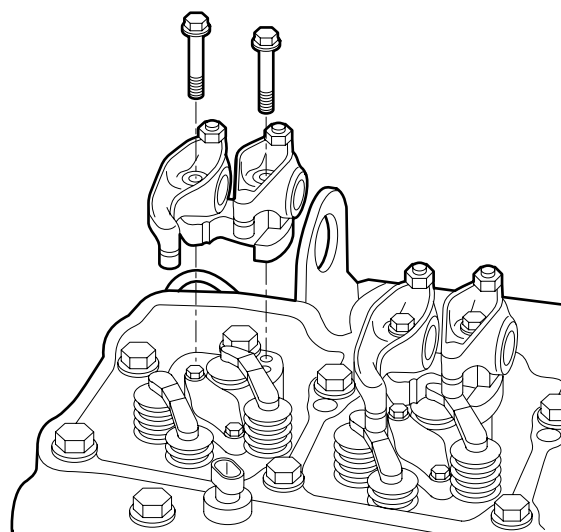
Removing the valve gear

1. Remove the valve cover.
2. Loosen the lock nuts on the valve stem bolts and unscrew the bolts until they abut.
3. Remove the rocker seat attachment bolts.

Note:

Number the rocker seats so that they can be refitted in their original position.

4. Remove the rocker seats with the rockers.
5. Remove the bridges.



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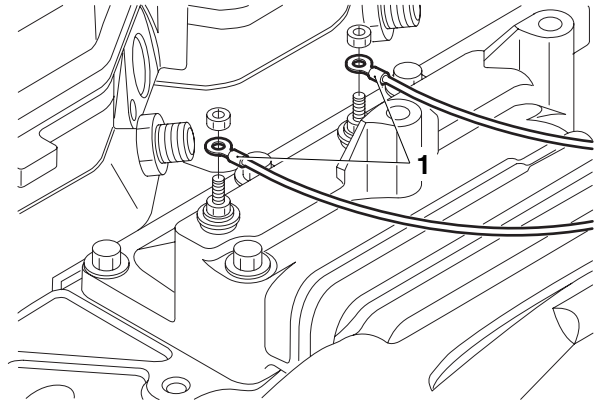
Installing the valve gear

1. Check that the push rods are in the correct position in the valve tappets and apply a drop of engine oil to the push rod cavity.
2. Fit the bridges on the valves.
3. Fit the push rods in their original position.
4. Hand-tighten the rocker seats and rockers in their original position.
5. Tighten the attachment bolts to the specified torque. See "Technical data".
6. Adjust the valve clearance. See "Inspection and adjustment".
7. Fit the valve cover.

4.6 REMOVAL AND INSTALLATION, INTAKE MANIFOLD

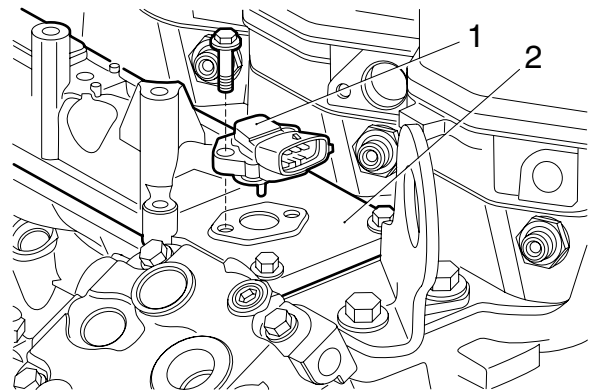
Removing the intake manifold

1. Remove the hose from the intake manifold coming from the intercooler.
2. Detach the electric wiring from the glow elements (1) (if fitted) using the connectors.
3. Remove the fuel rail.



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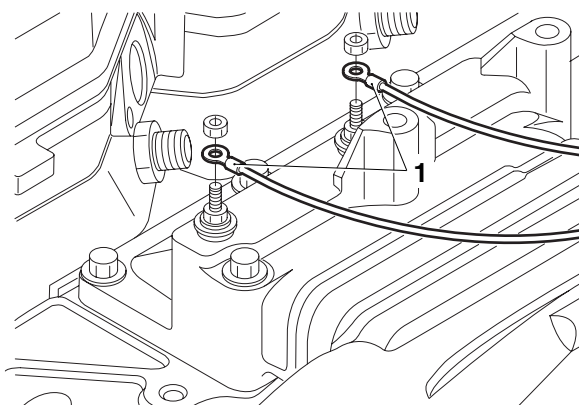
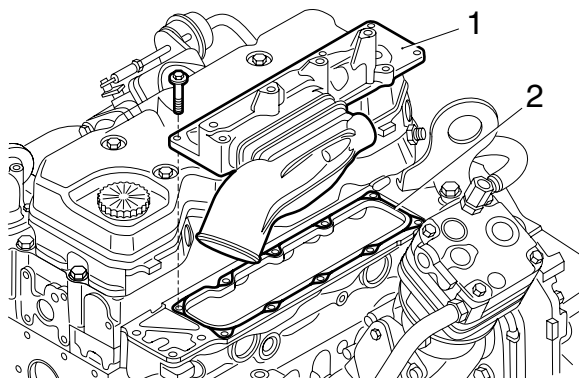
4. Remove the inlet air boost pressure sensor/temperature sensor (1) from the intake manifold.
5. Remove the intake manifold (2).
6. Cover the open inlet duct from the cylinder head to prevent the ingress of foreign matter.



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Installing the intake manifold

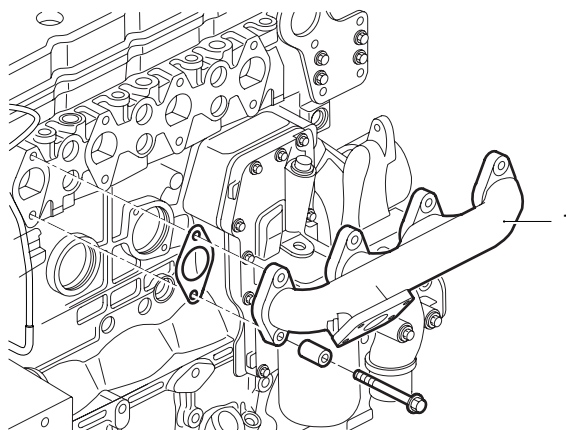
1. Thoroughly clean the sealing surfaces of the intake manifold and the cylinder head. Do not let any particles fall into the open inlet duct in the cylinder head.
2. Apply a bead (2) of sealant to the sealing surfaces from the cylinder head to the intake manifold (1). See "Technical data".
3. Fit the intake manifold immediately and tighten the attachment bolts to the specified torque. See "Technical data".
4. Fit the inlet air boost pressure sensor/temperature sensor on the intake manifold.
5. Fit the fuel rail.
6. Connect the electric wiring to the glow elements (if fitted) using the connectors (1).
7. Fit the hose to the intake manifold coming from the intercooler.



4.7 REMOVAL AND INSTALLATION, EXHAUST MANIFOLD

Removing the exhaust manifold

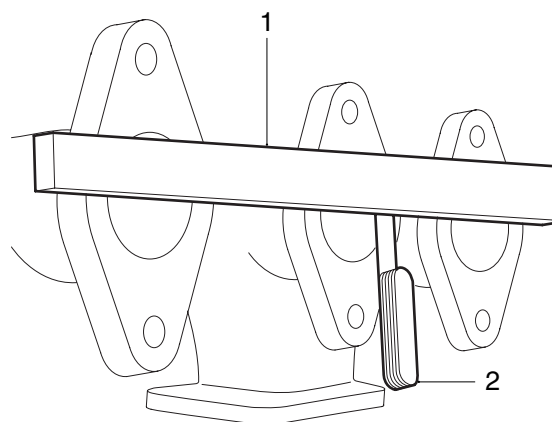
1. Remove the heat shields from the exhaust manifold.
2. Remove the turbocharger.
3. Remove the exhaust manifold (1) and gaskets.



i400524

Installing the exhaust manifold

1. Check the surface of the exhaust manifold for smoothness with a steel ruler (1) and feeler gauge (2). Compare the reading with the values listed in 'Technical data'.
2. Fit new gaskets to the exhaust manifold and install the manifold. Tighten the attachment bolts, from the middle outwards alternately. For the specified tightening torque, see 'Technical data'.
3. Fit the turbocharger.
4. Install the heat shields to the exhaust manifold and tighten the attachment bolts to the specified torque. See 'Technical data'.



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4.8 REMOVING AND INSTALLING CYLINDER HEAD



When components are removed from any part of the engine, dirt may enter. This may cause serious damage to the engine. The engine should therefore be cleaned thoroughly before it is opened. Plug all openings that are freed.

Removing cylinder head

1. Drain the coolant.
2. Disconnect all electrical wiring around the engine which is required for removing the cylinder head.
3. Disconnect the air inlet pipe from the air cooler on the turbocharger side.
4. Remove the poly-V-belt.
5. Remove the heat shields from the exhaust manifold.
6. If fitted, remove the attachment bolts of the air-conditioning compressor.
7. Remove the attachment bolts from the alternator/air-conditioning compressor bracket and remove the attachment bracket.
8. Remove the attachment bolts from the exhaust manifold and move the manifold and the turbocharger a little away from the cylinder head.
9. Remove the other coolant hoses that are attached to the cylinder head.



When removing components from the fuel system, dirt can enter. This may result in serious damage. The area around the fuel system should therefore be cleaned before opening it. Detached pipes must be plugged immediately.

10. Detach the injector pipes on the injector side.
11. Detach the supply pipe between the high-pressure pump and fuel rail on the fuel rail side.
12. Detach the fuel return pipe from the fuel rail and from the cylinder head.

CE ENGINE

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Removing and installing

LF45/55 series

13. Unscrew the attachment bolts from the fuel rail and remove it.
14. Unscrew the attachment bolts from the intake manifold and remove it.

Note:

To avoid dirt entering the intake opening, it must be taped up.

15. Remove the valve cover.
16. Remove the valve sleeve.
17. Remove the valve gear.
18. Remove the push rods. Mark the push rods so that they can be refitted in their original position.
19. Remove the fuel supply pipes.
20. Remove the injectors.
21. Remove the attachment bolts from the cylinder head in the reverse order to that followed for tightening. See "Technical data".
22. Remove the cylinder head from the cylinder block. Keep the gasket to enable the correct new head gasket to be selected.
23. Remove any gasket remnants from the cylinder head and the cylinder block.
24. Check the cylinder block. See "Checking and adjusting".
25. Check the threaded holes in the cylinder block for damage and cracking.
26. Check the cylinder head. See "Checking and adjusting".

5

Installing cylinder head

1. Clean the threaded holes in the cylinder head using a screw tap.

Note:

Cylinder head gaskets are available in two thicknesses. The thickness of the cylinder head gasket can be identified by the position of the holes in the projecting cylinder head gasket lip under the exhaust manifold on cylinder 2. See "Technical data" for the cylinder head gasket thicknesses.

2. Position the new cylinder head gasket. If the type of cylinder head gasket is known, use a gasket of the same type as the one removed.

Note:

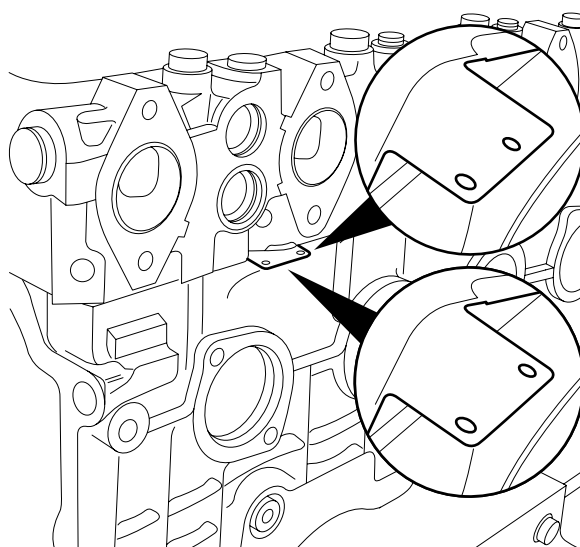
If the type of cylinder head gasket removed is not known or if the main components of the driving gear have been changed, the type of gasket required must be determined afresh.

To do this, measure the average piston projection. See "Checking and adjusting". Select the correct type of cylinder head gasket using the information in "Technical data" and fit it.

3. Check that all lubricating and coolant ducts are free.
4. Position the cylinder head carefully on the cylinder block and ensure that the cylinder head fits well over the dowel pins.
5. Check the cylinder head bolts. See "Checking and adjusting". Use new cylinder head bolts if one bolt does not meet one or more conditions.
6. Apply engine oil to the thread and to the underside of the bolt head.
7. Position the cylinder head bolts and hand-tighten them.

Note:

The short cylinder head bolts must be fitted in the outer rows.



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Removing and installing

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8. Tighten the cylinder head bolts to the specified torque and in the sequence shown. See "Technical data".
9. Fit the exhaust manifold with new gaskets and tighten the attachment bolts to the specified torque. See "Technical data".
10. Fit the injectors.

Note:

Ensure that the injector is fitted correctly, bearing in mind the supply opening.

11. Fit the fuel supply pipes.
12. Fit the push rods in their original position and apply a drop of engine oil to the head of the push rod.
13. Fit the valve gear.
14. Fit the valve sleeve.
15. Tighten the injector wiring to the specified torque. See "Technical data".
16. Fit the valve cover.
17. Remove any gasket remnants from the intake manifold and the cylinder head.

Note:

Ensure that the air inlet is free of gasket remnants.

18. Apply sealant to the intake manifold and fit it. See "Technical data".
19. Fit the fuel rail.
20. Fit the injector pipes.
21. Fit the supply pipe between the high-pressure pump and fuel rail.
22. Fit the fuel return pipe on the fuel rail and cylinder head.
23. Connect the various coolant hoses.

5

24. Fit the bracket of the alternator/air-conditioning compressor.
25. If present, fit the air-conditioning compressor.
26. Fit the poly-V-belt.
27. Fit the heat shields.
28. Fit the air inlet pipe of the air cooler on the turbocharger side.
29. Connect the electrical wiring.

4.9 REMOVAL AND INSTALLATION, AIR COMPRESSOR

Removing the air compressor

1. Partially drain the coolant.
2. Remove the steering pump.
3. Remove the coolant pipes.
4. Remove the air pipes.
5. Remove the attachment bolts from the air compressor and remove it.
6. Remove the O-ring from the compressor housing.

Installing the air compressor

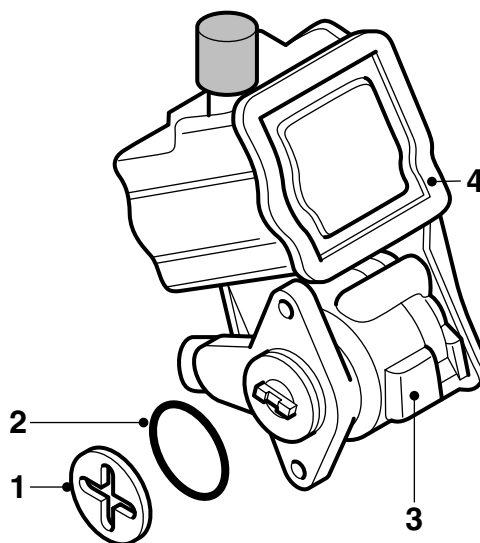
1. Fit the compressor with a new O-ring and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the air pipes.
3. Fit the coolant pipes.
4. Fit the steering pump.
5. Fill the cooling system.

4.10 REMOVING AND INSTALLING STEERING PUMP**Note:**

When replacing a worn steering pump, you are advised to fully drain the steering oil and replace the steering oil reservoir and integrated filter. In extreme situations, the steering pump may have been worn to such an extent that metal pump parts have entered the steering box. Check the steering box for internal wear using the test case.

Removing steering pump

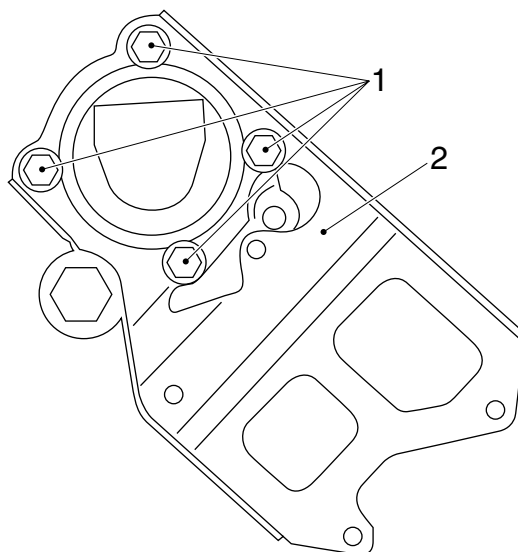
1. Clean the line connections.
2. Place a receptacle underneath the steering pump.
3. Remove the lines from the steering pump and plug the line and pump openings. The filter is fitted in the return line, which means that should any dirt enter it will immediately also enter the steering gear.
4. Remove the attachment bolts and remove the steering pump (3) and the driver (1) from the compressor.
5. Remove the reservoir (4) from the pump (3).



S7 00 575

Installing steering pump

1. If necessary, fit the bracket (2) on top of the new pump. Do not remove the cover from the pump to do this. Tighten the attachment bolts (1) evenly to the specified torque. See "Technical data".



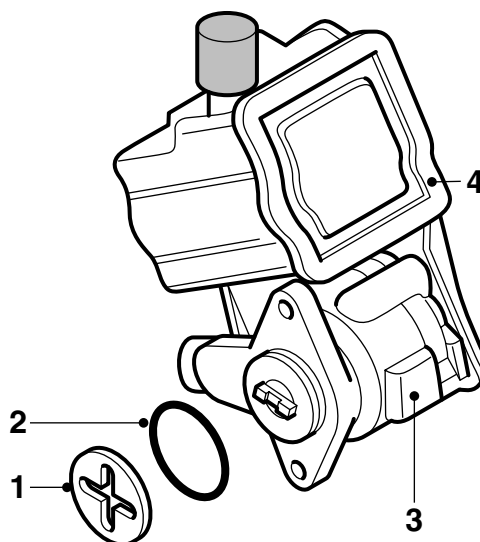
S7 00 609

2. Check the driver (1) for wear.
3. If necessary, connect the line couplings to the steering pump to be fitted. Tighten the couplings to the specified torques; see "Technical data".



If the specified tightening torques are exceeded, the aluminium pump housing may be damaged.

4. Fit a new O-ring (2) on the steering pump and grease it lightly.
5. Crank the engine until the compressor driver half is horizontal.
6. Grease the driver (1) lightly and fit it to the compressor driver half.
7. Fit the reservoir (4) on the pump.
8. Fit the pump (3). Tighten the attachment bolts evenly to the specified tightening torque; see "Technical data".
9. Fit the lines.
10. Fill and bleed the steering gear hydraulic system.
11. Take a test drive and check the pump and line connections for leaks.



S7 00 575

4.11 REMOVAL AND INSTALLATION, STARTER MOTOR

Removing the starter motor

1. Remove both battery leads from the battery terminals.
2. Remove the electrical connections from the starter motor.
3. Remove the attachment nuts from the starter motor and remove the starter motor.
4. Check the starter pinion for damage.

Installing the starter motor

1. Clean the contact surfaces of the starter motor and the flywheel housing.
2. Install the starter motor in the flywheel housing and tighten the attachment nuts to the specified torque. See "Technical data".
3. Fit the electrical connections of the starter motor.
4. Reconnect both leads to the battery terminals.

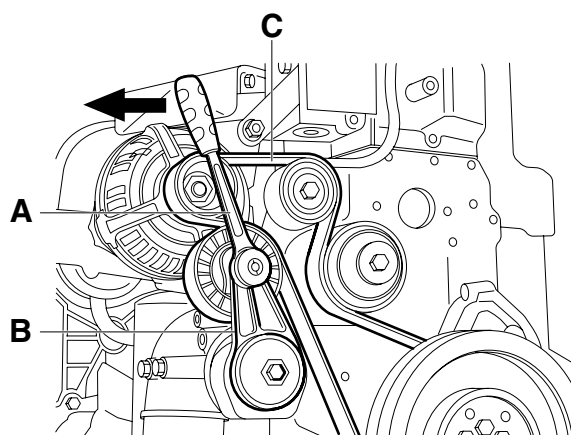
4.12 REMOVAL AND INSTALLATION, POLY-V-BELT

Removing the poly-V-belt

1. Remove the battery terminal clamp from the negative terminal of the starter battery and break the contact.
2. Put a ratchet with a $\frac{3}{8}$ " socket (A) in the arm (B) of the belt tensioner and slacken the belt so that it can be removed from the belt pulleys. Carefully let the belt tensioner expand to the stop.
3. Remove the poly-V-belt (C), lifting it over the fan.

Installing the poly-V-belt

1. Inspect the pulleys for damage, rust and grease deposits. Clean or replace the belt pulleys if necessary.
2. Fit the poly-V-belt over the fan.
3. Place a ratchet with a $\frac{3}{8}$ " socket in the arm of the belt tensioner and push the belt against the spring pressure so that it can be placed on all belt pulleys. Carefully let the belt tensioner spring back until the belt is tensioned.



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4.13 REMOVAL AND INSTALLATION, ALTERNATOR

Removing the alternator

1. Remove both battery leads from the battery terminals.
2. Remove the alternator electrical connections.
3. Remove the poly-V-belt.
4. Remove the attachment bolts from the alternator and remove it.

Installing the alternator

1. Fit the alternator and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the poly-V-belt.
3. Fit the alternator electrical connections.
4. Reconnect both leads to the battery terminals.

4.14 REMOVAL AND INSTALLATION, FLYWHEEL

Removing the flywheel

1. Remove the gearbox.
2. Remove the clutch release assembly and the clutch plate.
3. Remove the attachment bolts from the flywheel.
4. To guide the flywheel during removal, fit two threaded ends - each approx. 90 mm - to the now-empty bolt holes.
5. Place two bolts in the circumference of the flywheel and carefully pull the flywheel free.

Installing the flywheel

1. Clean the flywheel housing.
2. Clean the crankshaft flange and attachment bolts.
3. Clean the rear of the flywheel and inspect it. See "Inspection and adjustment".
4. Fit the flywheel.
5. Apply a drop of engine oil to the attachment bolts and install them. Tighten the attachment bolts in a crosswise sequence to the specified torque. See "Technical data".
6. Fit the clutch plate and the clutch release assembly.
7. Fit the gearbox.

4.15 REMOVAL AND INSTALLATION, STARTER RING GEAR

Removing the starter ring gear

1. Remove the flywheel.
2. Remove the starter ring gear by tapping it off the flywheel, using a blunt chisel. If this is not possible, cut the starter ring gear between two teeth, using a sharp chisel.

Installing the starter ring gear

1. Clean the flywheel and the starter ring gear. Ensure that the contact areas are free of grease.
2. Heat the new starter ring gear evenly in an oven. See "Technical data".
3. Tap the starter ring gear onto the flywheel so that the bevelled sides of the teeth point towards the starter motor. Ensure that the starter ring gear is properly fitted to the flywheel.
4. Fit the flywheel.

4.16 REMOVAL AND INSTALLATION, FLYWHEEL HOUSING SEAL

Removing the flywheel housing seal

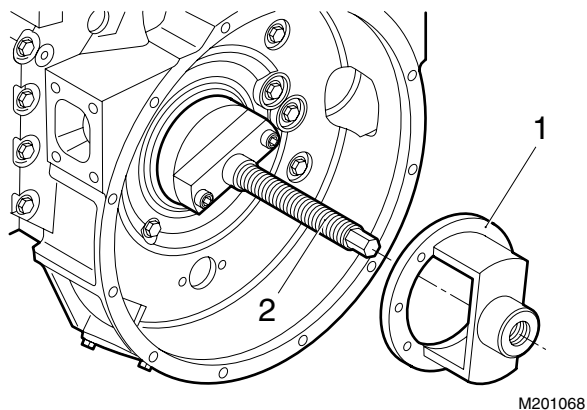
1. Remove the gearbox.
2. Remove the clutch release assembly and the clutch plate.
3. Remove the flywheel.
4. Fit the threaded spindle (2) of the special tool (DAF no. 1329475) on the crankshaft flange.

5. Screw the push/pull piece (1) onto the spindle up to the flywheel housing.

Note:

Mark the drill at a length of 22 mm using a piece of tape.

6. Drill a hole through the base plate to the tape marking and fit a screw in the seal to keep the base plate in its place.
7. Drill the other five holes and fit screws.
8. Turn the threaded spindle (2) clockwise until the seal has been removed.



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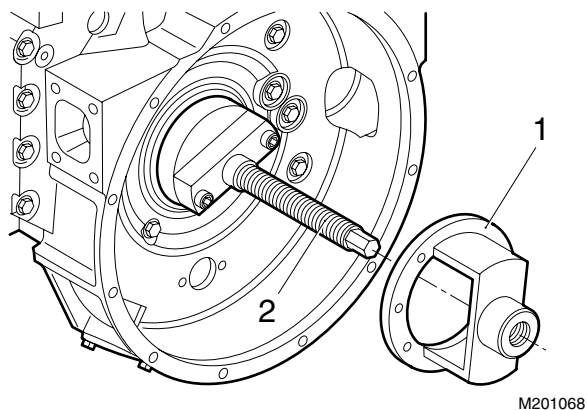
2

Removing and installing

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Installing the flywheel housing seal

1. Clean and inspect the seal chamber. Even minimal damage may cause a leak.
2. Fit the threaded spindle (2) of the special tool (DAF no. 1329475) on the crankshaft flange.
3. Put a new seal over the crankshaft.
4. Screw the push/pull piece (1) onto the threaded spindle (2) up to the seal.
5. Turn the threaded spindle (2) anti-clockwise until the push/pull piece (1) is level with the flywheel housing. The seal has been properly fitted once it is level with the flywheel housing.
6. Remove the special tool.
7. Fit the flywheel.
8. Fit the clutch plate and the clutch release assembly.
9. Fit the gearbox.



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4.17 REMOVAL AND INSTALLATION, FLYWHEEL HOUSING

Removing the flywheel housing

1. Remove the starter motor.
2. Remove the flywheel.
3. Remove the flywheel housing seal.
4. Suspend the engine securely in the hoist.
5. Remove the engine brackets.
6. Detach the crankcase breather on the flywheel housing so that the attachment bolt can be accessed.
7. Remove the flywheel housing attachment bolts.
8. Remove the flywheel housing.

Installing the flywheel housing

1. Remove any gasket remnants from the contact areas.
2. Check the sealing surfaces for damage.
3. Check the flywheel housing for cracks.
4. Apply a sealant to the sealing face of the cylinder block. See "Technical data". Apply the sealant with a roller or brush evenly over the entire sealing face.
5. Install the flywheel housing and tighten the attachment bolts in the correct sequence to the specified torque. See "Technical data".
6. Fit the engine brackets.
7. Fit the flywheel housing seal.
8. Fit the flywheel.
9. Fit the starter motor.

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4.18 REMOVAL AND INSTALLATION, VIBRATION DAMPER

Removing the vibration damper

1. Remove the attachment bolts of the fan and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper and remove it.

Installing the vibration damper

1. Check the vibration damper. See "Inspection and adjustment".
2. Fit the vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".
3. Fit the poly-V-belt.
4. Fit the fan.

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4.19 REMOVAL AND INSTALLATION, CRANKSHAFT SENSOR RING

Removing the crankshaft sensor ring

1. Remove the attachment bolts from the viscous fan clutch and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper.
4. Remove the vibration damper and the crankshaft sensor ring.

Installing the crankshaft sensor ring

1. Fit the crankshaft sensor ring with vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".

Note:

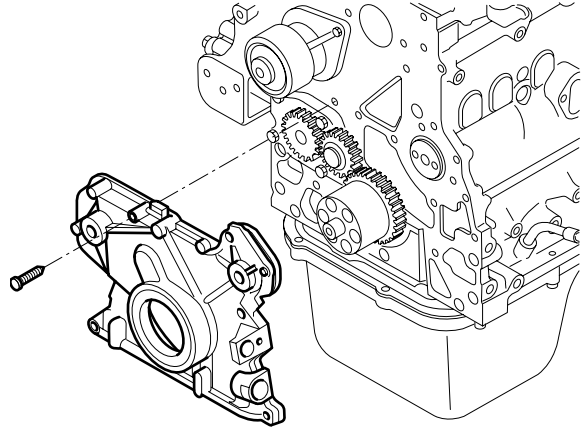
There is only one way of fitting the crankshaft sensor ring. For this purpose, a pin has been fitted which fits into a bore in the crankshaft sensor ring.

2. Fit the poly-V-belt.
3. Fit the fan and tighten the attachment bolts to the specified torque. See "Technical data".

4.20 REMOVING AND INSTALLING FRONT ENGINE PANEL

Removing front engine panel

1. Remove the poly-V-belt.
2. Remove the attachment bolts from the vibration damper and remove the damper along with the crankshaft pulley.
3. Remove the front crankshaft seal.
4. Remove the attachment bolts from the front engine panel and remove it.



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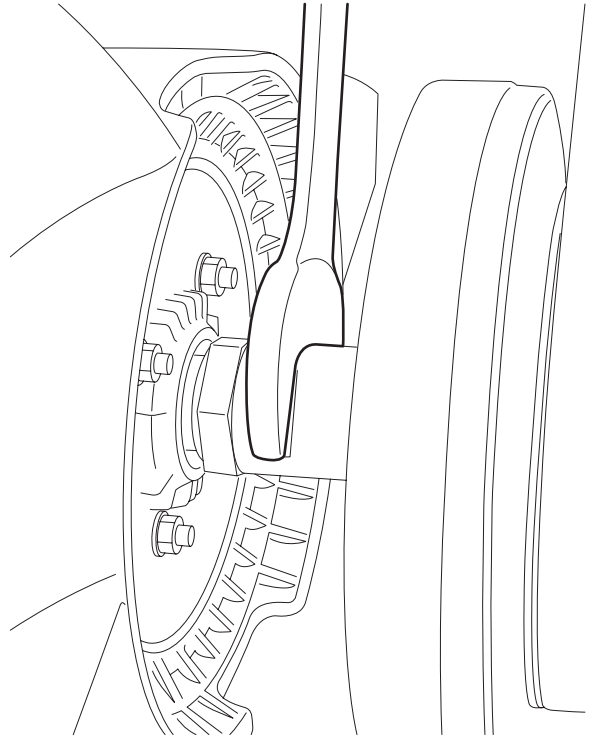
Installing front engine panel

1. Remove any gasket remnants from the contact areas.
2. Check the sealing surfaces for damage.
3. Check the engine panel for cracks.
4. Apply a sealant to the sealing surface of the cylinder block. See "Technical data". Apply the sealant with a roller or brush evenly over the entire sealing surface.
5. Fit the engine panel and tighten the attachment bolts to the specified torque. See "Technical data".
6. Fit a new front crankshaft seal.
7. Fit the crankshaft pulley and the vibration damper. Tighten the attachment bolts to the specified torque. See "Technical data".
8. Fit the poly-V-belt.

4.21 REMOVAL AND INSTALLATION, CAMSHAFT GEAR

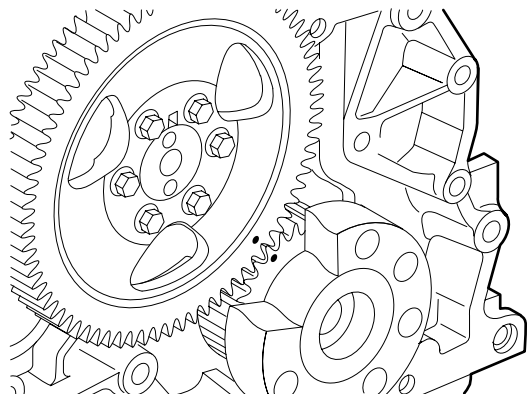
Removing the camshaft gear

1. Remove the flywheel housing.
2. Use an open-end spanner on the fan shaft to crank the crankshaft until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.
3. Remove the air compressor.



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4. Remove the attachment bolts from the camshaft gear and remove it.



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Installing the camshaft gear

1. Fit the camshaft gear making sure that the timing gear is properly set. See 'Inspection and adjustment'.

Note:

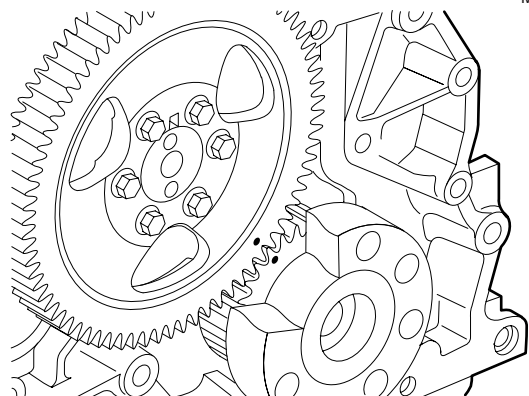
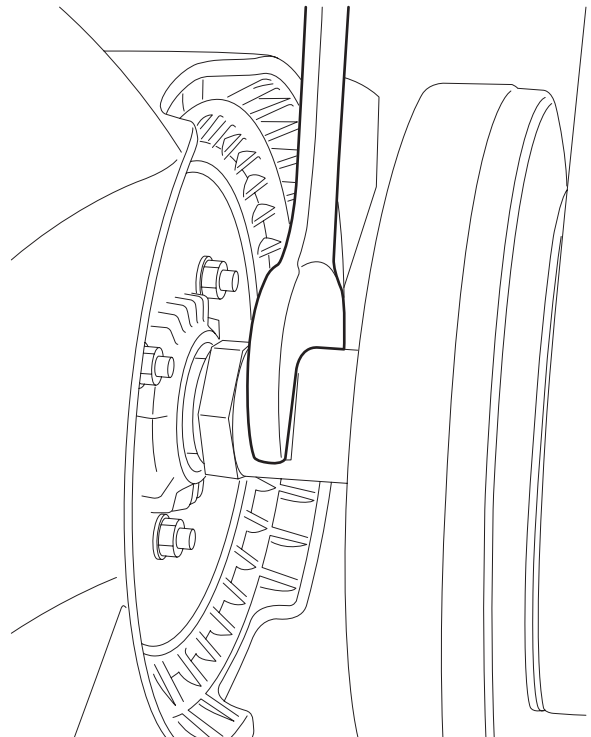
There is only one way of fitting the camshaft gear. For this purpose, a recess has been made which falls over a pin on the camshaft.

2. Tighten the attachment bolts to the specified torque. See 'Technical data'.
3. Fit the air compressor.
4. Fit the flywheel housing.

4.22 REMOVAL AND INSTALLATION, TIMING GEAR CASE

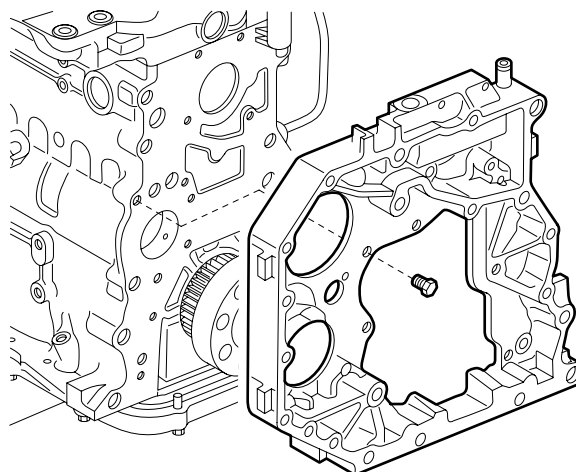
Removing the timing gear case

1. Remove the flywheel housing.
2. Remove the steering pump.
3. Remove the air compressor.
4. Remove the high-pressure pump.
5. Use an open-end spanner on the fan shaft to crank the crankshaft until the marks in the crankshaft gear and camshaft gear match. The crankshaft gear has a punched hole in the tooth which has to fall into the tooth depth of the camshaft gear marked with a punched hole.
6. Remove the camshaft gear.
7. Loosen the sump bolts and remove the sump bolts fitted in the timing gear case.



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8. Remove the attachment bolts from the timing gear case and remove it.



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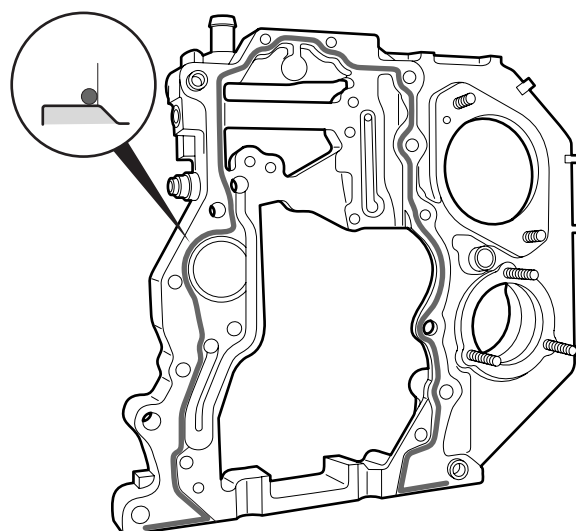
5**Installing the timing gear case**

1. Apply a sealant to the sealing surface of the cylinder block. See "Technical data". Apply the sealant in accordance with the pattern and at the indicated location. The bead has to be 1.5 to 2.0 mm thick. Fit the timing gear case with liquid sealant and tighten the attachment bolts to the specified torque. See "Technical data".

Note:

If too much sealant is used, or if the sealant is applied in a wrong place, this may cause obstruction of an oil channel or oil sump ventilating duct. This could result in serious damage.

2. Fit the sump bolts and tighten them to the specified torque. See "Technical data".
3. Fit the camshaft gear.
4. Fit the high-pressure pump.
5. Fit the air compressor.
6. Fit the steering pump.
7. Fit the flywheel housing.



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4.23 REMOVAL AND INSTALLATION, FRONT CRANKSHAFT SEAL

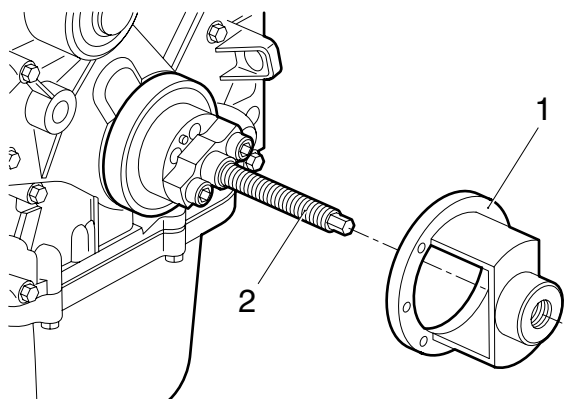
Removing the front crankshaft seal

1. Remove the attachment bolts of the fan and place the fan in the wind tunnel.
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the vibration damper and remove the damper along with the crankshaft pulley.
4. Fit the threaded spindle (2) of the special tool (DAF no. 1453179) on the crankshaft flange.
5. Screw the push/pull piece (1) onto the spindle up to the engine panel.

Note:

Mark the drill at a length of 18 mm using a piece of tape.

6. Drill a hole through the base plate to the tape marking and fit a screw in the seal to keep the base plate in its place.
7. Drill the other five holes and fit screws.
8. Turn the threaded spindle (2) clockwise until the seal has been removed.



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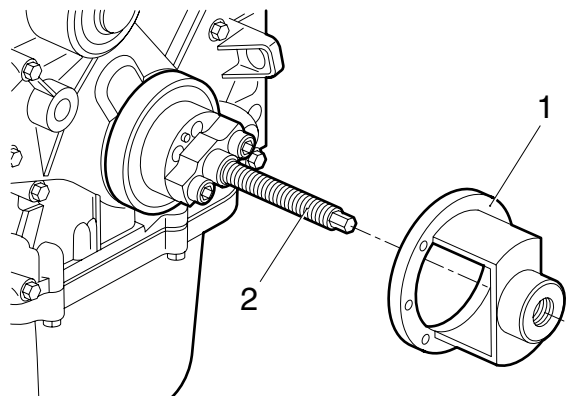
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Installing the front crankshaft seal

1. Clean and inspect the seal chamber. Even minimal damage may cause a leak.
2. Fit the threaded spindle (2) of the special tool (DAF no. 1453179) on the crankshaft flange.
3. Put a new seal over the crankshaft.
4. Screw the push/pull piece (1) onto the threaded spindle (2) up to the seal.
5. Turn the threaded spindle (2) anti-clockwise until the push/pull piece (1) is level with the top panel. The seal has been properly fitted once it is level with the engine panel.
6. Remove the special tool.
7. Inspect the vibration damper.
8. Fit the crankshaft pulley and the vibration damper and tighten the attachment bolts to the specified torque. See "Technical data".
9. Fit the poly-V-belt.
10. Fit the fan.



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5. CLEANING

5.1 CLEANING THE ENGINE

Note:

It is advisable to clean the engine and the surrounding area with a high-pressure cleaner before starting maintenance or service operations. A clean environment makes your work easier and enables you to notice any engine defects at an early stage.

Before cleaning the engine, check for any leaks.

If the engine is cleaned with a high-pressure cleaner, this must be done with care. It is also important to observe the following points:

- when cleaning the universal joint on the steering box, the spider seals may be forced open by the high-pressure jet of water, so that the grease behind them is flushed away. As a result, the spider may get stuck, so that the steering mechanism will jam.
- there is a bleed vent on the power steering fluid reservoir of the steering gear. Water may enter the reservoir through this bleed vent, causing damage to the steering gear.
- when cleaning the radiator/intercooler element, be careful not to damage the fins.
- do not direct the high-pressure cleaner jet too long at the air-conditioning system condenser. As a result of the high temperature, the pressure in the system will become excessive, which may cause damage to the system.
- ensure that no water can enter the gearbox via the bleed vents.
- make sure that no water can enter via the clutch reservoir bleed vents.
- the engine compartment can be cleaned with a high-pressure cleaner. Never direct the jet of water towards electrical components.
- do not aim the high-pressure cleaner jet at electrical components and electrical connections such as the electronic unit, sensors, connectors and vehicle lighting through-connections, etc.
- ensure that no water can enter the air inlet system via the air inlet or its flexible seals.

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Cleaning

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Contents

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

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Safety instructions

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2. GENERAL

2.1 SYSTEM DESCRIPTION, COOLING SYSTEM

The cooling system consists of a water pump, a radiator, a header tank, an oil cooler, an air compressor, a thermostat housing with one thermostat and pipes.

The water pump is located below the thermostat in the engine block.

The thermostat housing is part of the cylinder head.

From the delivery side of the water pump, the coolant is directed to the oil cooler via an opening at the back of the water pump. Afterwards the coolant flows to the cylinder block.

The coolant flows through the cylinder block, along the cylinder liners, and up to the cylinder head.

The coolant leaves the cylinder head through the thermostat housing.

Depending on the coolant temperature, the thermostat distributes the coolant flow to the radiator or back to the water pump.

The coolant transported to the radiator enters the radiator at the top and leaves it at the bottom. From the bottom of the radiator, the coolant is returned to the water pump via the return pipe.

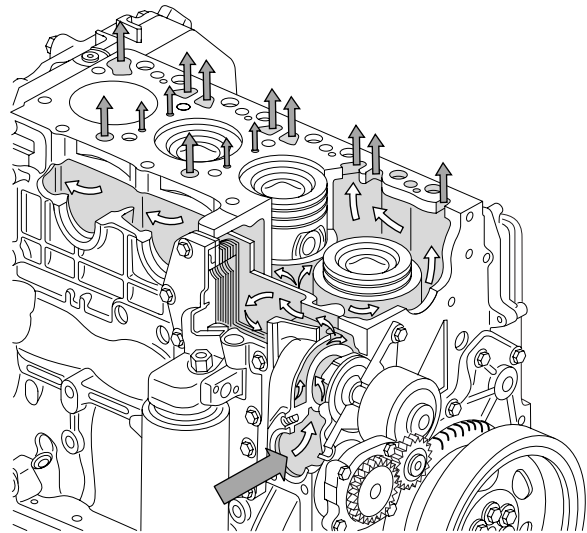
The connection pipe to the header tank is also connected to the return pipe from the radiator. When the coolant heats up, it flows to the header tank. When the coolant cools down, it will flow back from the header tank.

The oil cooler is not only intended to cool the lubricating oil, but also to heat it in a "cold" engine.

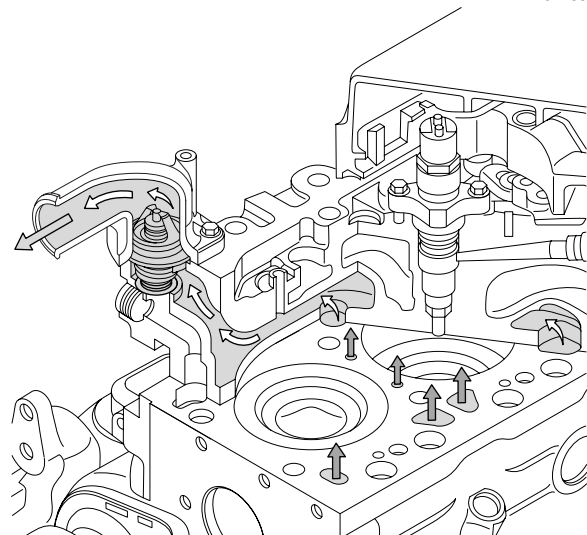
From the cylinder block, some of the coolant flows through the air compressor.

From the air compressor, the coolant is returned to the engine block via a pipe.

The pipe which takes the coolant to the cab heater is connected to the cylinder head. From the heater, the coolant is returned to the water pump via a pipe.



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CE ENGINE COOLING SYSTEM

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General

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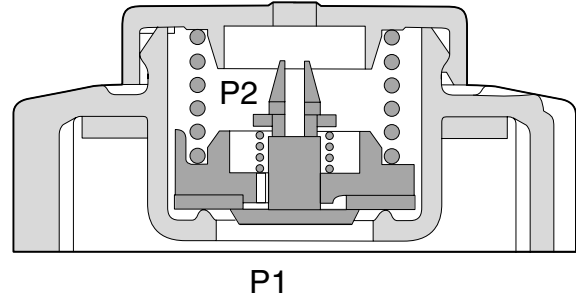
3. DESCRIPTION OF COMPONENTS

3.1 PRESSURE CAP

The pressure cap is fitted on the header tank by means of a threaded connection.

To fill the cooling system, there is a filler cap at the front of the header tank.

The pressure cap has two valves: a pressure relief valve and a vacuum relief valve. Normally, both valves are closed.



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Overpressure

As a result of the rising coolant temperature, the pressure (P1) in the cooling system will increase. If the pressure in the cooling system becomes too high (0.7 bar), the pressure relief valve (1) will open against the pressure of the spring.

Negative pressure

If the coolant temperature drops, the pressure (P1) in the cooling system will decrease. If the pressure (P1) in the cooling system drops to approximately 0.1 bar below the ambient air pressure (P2), the underpressure valve will be opened.

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Description of components

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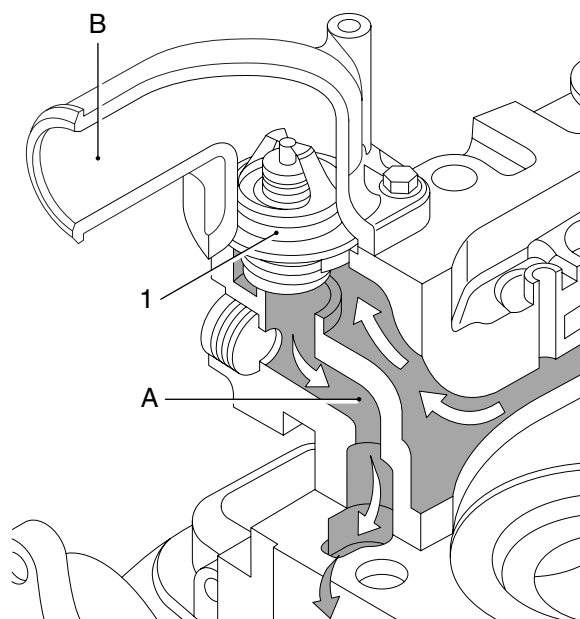
3.2 THERMOSTAT

Operation, thermostat

Coming from the cylinder head, the coolant passes through the thermostat. Depending on the coolant temperature and the corresponding position of the thermostat, there are three possibilities:

Thermostat closed

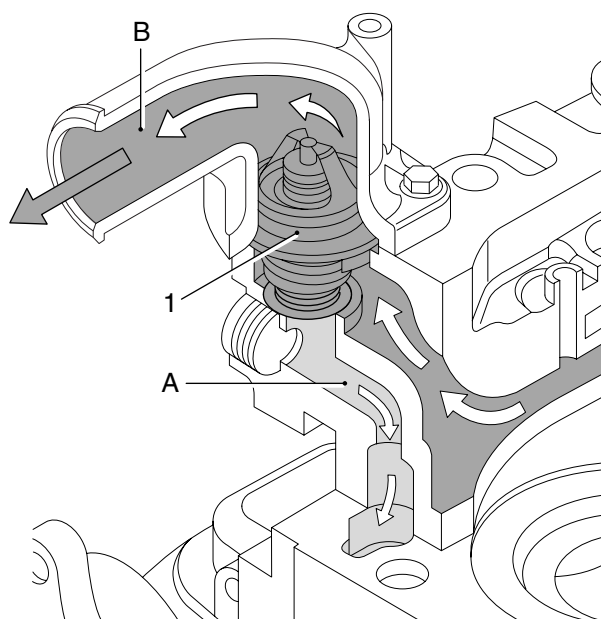
The coolant has not yet reached the opening temperature of the thermostat (1). The supply channel (B) to the radiator is completely closed. The coolant flows directly to the water pump through a bypass (A) and the water pump returns the coolant to the cylinder block.



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Thermostat starts opening

The coolant has reached the opening temperature of the thermostat (1). The supply channel (B) to the radiator is opened and the bypass (A) is partially closed. Now coolant will flow both through the supply channel (B) to the radiator and directly to the water pump through the bypass channel (A).



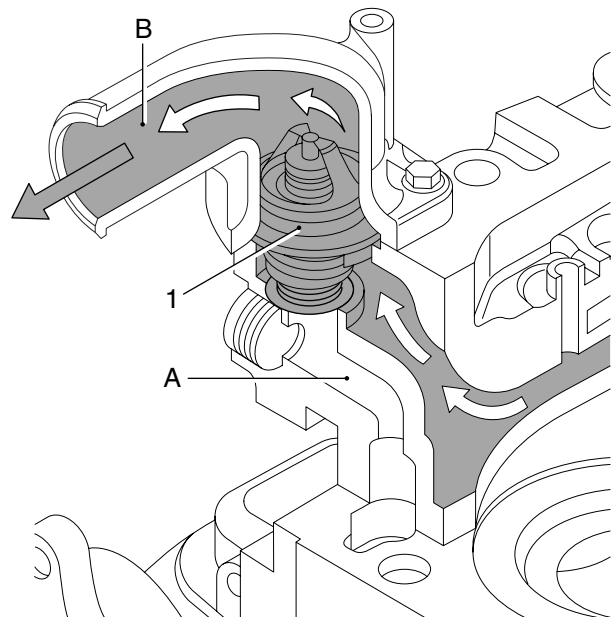
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Thermostat fully opened

The temperature of the coolant has further increased. The supply channel (B) to the radiator is fully opened and the bypass (A) is fully closed. The entire coolant circulation now flows via the supply channel (B) to the radiator where it is cooled before flowing back to the water pump.

In the event of excessive coolant temperatures, removing the thermostat as an emergency solution is **not permitted**.

If the thermostat is removed from the engine, uncooled coolant will flow to the water pump through the bypass (A). As a result, the coolant temperature will continue to rise.



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Description of components

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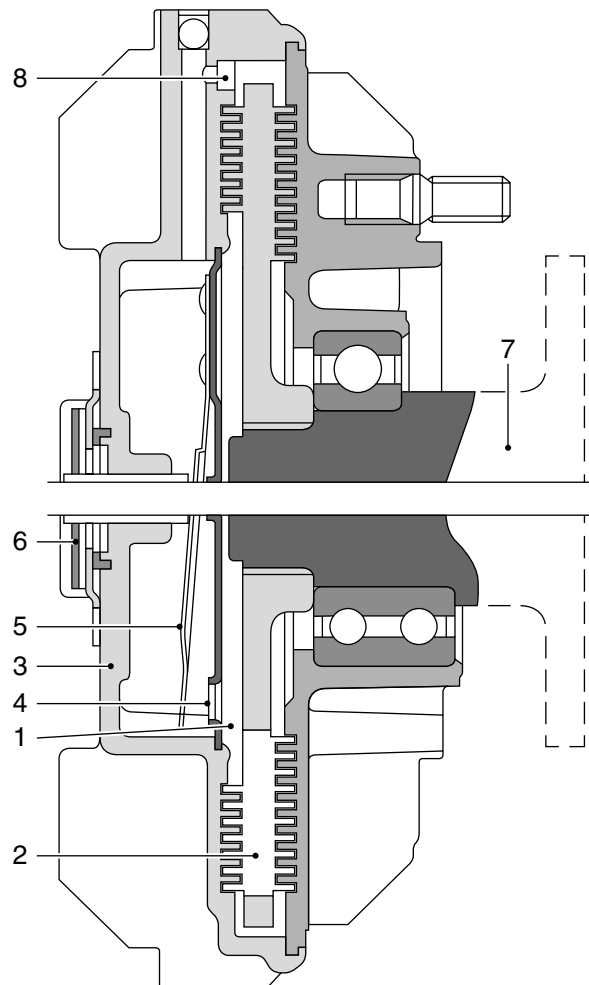
3.3 VISCOUS FAN CLUTCH

The fan is connected to the engine by means of a viscous fan clutch. If, under certain circumstances, the heat is not sufficiently dissipated by the air flow passing through the radiator, the fan will have to draw in extra cooling air through the radiator. In a viscous fan clutch, the drive torque is transmitted by a silicone fluid.

The fan clutch is divided into two chambers. In the working area (1) is the rotor (2), which is connected to the drive flange (7). The supply chamber (3) rotates freely round the drive flange (7) and is connected to the fan. There is silicone fluid in the supply chamber (3). The opening (4) in the supply chamber (3) is closed by a valve (5). The valve (5) is operated by a bimetallic strip (6).

If the opening (4) in the supply chamber (3) is closed by the valve (5), no silicone fluid can enter the working area (1). The silicone fluid still present in the working area (1) will flow back to the supply chamber (3) through the bores (8). As only very little fluid will be left in the working area (1), there will be a great difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) with the fan.

When the air temperature increases, the bimetallic strip (6) will bend and the valve (5) will partially release the opening (4) in the supply chamber (3). Through this opening, a limited amount of silicone fluid can enter the working area (1) and flow past the rotor (2). This will cause friction, so that the difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) with the fan will decrease.



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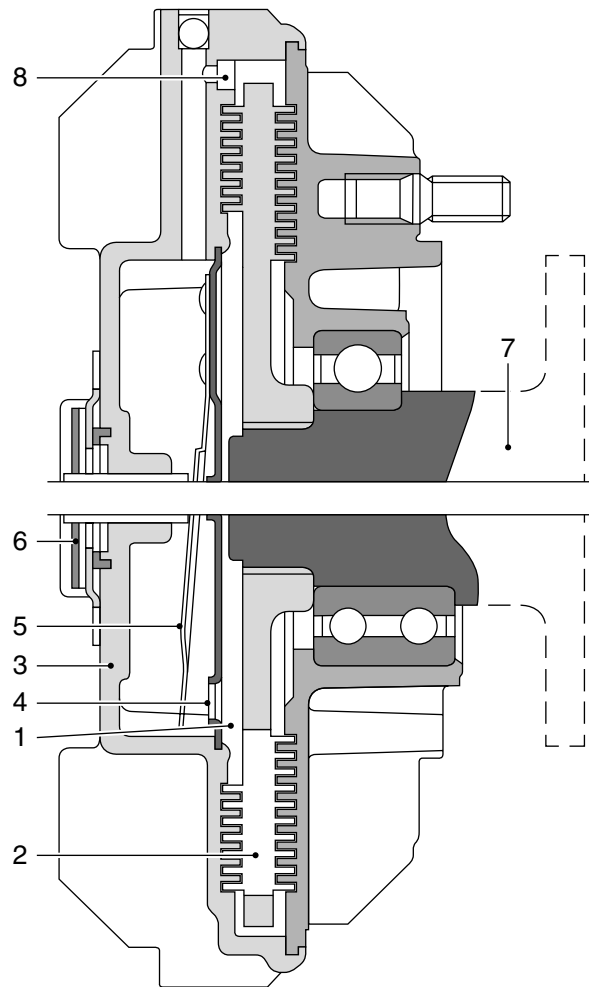
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Description of components

As the air temperature rises, the bimetallic strip (6) will continue to bend and the opening (4) in the supply chamber (3) will be fully released. The further the opening (4) in the supply chamber (3) is released, the more silicone fluid will flow into the working area (1) and past the rotor (2). As a result of the increase in friction, the difference in rotating speed (slip) between the drive flange (7) and the supply chamber (3) will further decrease.



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Description of components

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4. CHECKING AND ADJUSTING

4.1 PRESSURE-TESTING COOLING SYSTEM



When the coolant is hot, there is overpressure in the cooling system. Carefully remove the filler cap to release the overpressure. Coolant is a toxic fluid. Contact with the skin should therefore be avoided. To avoid damaging the cylinder block, do not top up a warm engine with cold coolant.

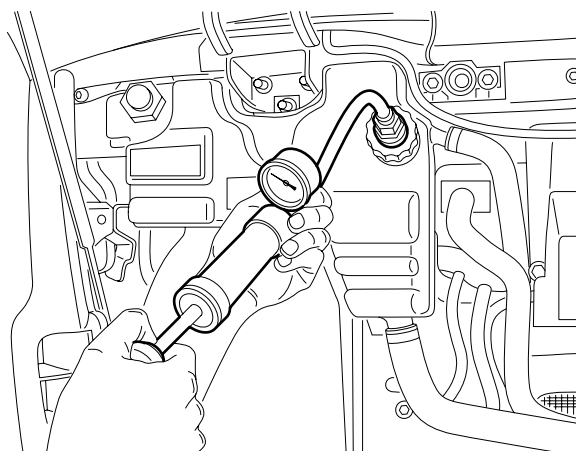
The cooling system can be checked for leaks with a pressure-test pump.
If this is done when the engine is warm, any cracks can be spotted more quickly.

1. Open the grille.
2. Remove the filler cap.
3. Fill the cooling system to the correct level.
4. Raise the engine temperature. This need not be the operating temperature.

Note:

By fitting the pressure-test pump onto the filler opening of the header tank, the pressure cap can also be tested.

5. Fit a pressure-test pump. Pressure-test the system at the specified pressure. See "Technical data".
6. Check the cooling system for leakage.



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CE ENGINE COOLING SYSTEM

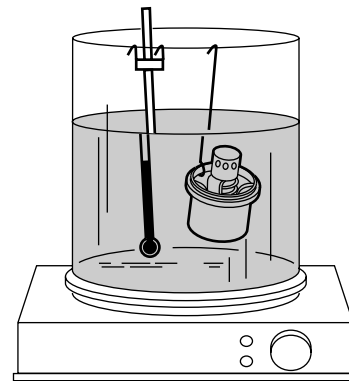
2

Checking and adjusting

LF45/55 series

4.2 INSPECTING THE THERMOSTAT

1. Remove the thermostat. See "Removal and installation".
2. Inspect the sealing surfaces of the thermostat housing for damage.
3. Check the thermostat seat for damage.
4. Check whether the thermostat is fully closed.
5. Place the thermostat in a container filled with clean water.
6. Place a thermometer in the container and heat the water. Check at which temperature the thermostat opens and whether it opens fully. See "Technical data".



M200513

4.3 INSPECTION, VISCOUS FAN CLUTCH



Do not run the engine in an enclosed or unventilated area. Make sure exhaust fumes are properly extracted. Remain at a safe distance from rotating and/or moving components.

Testing with a cold engine

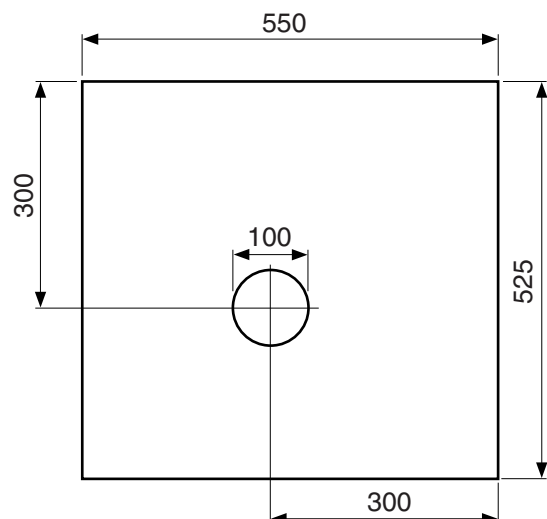
During this test, the slip in the viscous fan clutch is measured while the clutch is not operating. This test must be carried out when the engine is "cold" (coolant temperature approximately 50°C).

1. Check the coolant level, and top up as necessary.
2. Start the engine and run it at idling speed for at least 5 minutes. Then use an optical rev counter to measure the fan speed at different engine speeds (from idling to maximum engine speed). During this test procedure, the speed of the fan should be approx. 600 to 1100 rpm.

Testing with a warm engine

This test checks whether the bimetallic strip starts opening the valve at an operating temperature of 85 - 95°C.

1. Check the coolant level, and top up as necessary. Be careful when topping up the coolant of a warm engine.
2. Take a sheet of cardboard with a 100 mm hole, as shown in the drawing opposite, and place it in front of the radiator, with the hole in front of the viscous clutch.
3. Check that the gearbox is in neutral.
4. Bring the cooling system to operating temperature.
5. Allow the fan drive flange to run at a speed of 1000 rpm. Then use an optical rev counter to determine the difference between the rotating speeds of the fan and the drive flange. The speeds will differ as a result of slip in the viscous clutch. When the clutch is fully engaged, the slip must not exceed 10%. If it is more, the viscous fan clutch must be replaced.



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CE ENGINE COOLING SYSTEM

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Checking and adjusting

LF45/55 series

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5. REMOVING AND INSTALLING

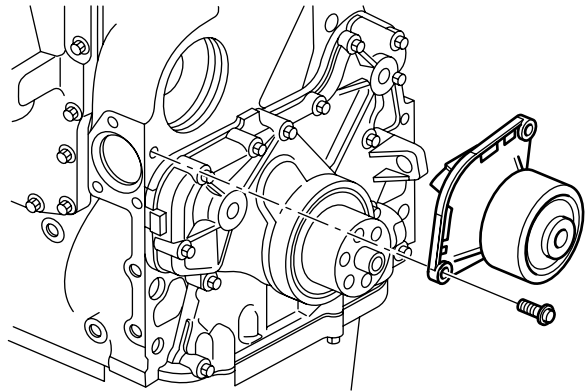
5.1 REMOVAL AND INSTALLATION, COOLANT PUMP

Removing the coolant pump

1. Drain the coolant. See "Draining and filling".
2. Remove the poly-V-belt.
3. Remove the attachment bolts from the coolant pump and remove it.

Installing the coolant pump

1. Thoroughly clean the sealing surfaces of the coolant pump and the cylinder block.
2. Fit a new O-ring to the coolant pump.
3. Install the coolant pump and tighten the attachment bolts to the specified torque. See "Technical data".
4. Fit the poly-V-belt.
5. Fill the cooling system. See "Draining and filling".



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CE ENGINE COOLING SYSTEM

2

Removing and installing

LF45/55 series

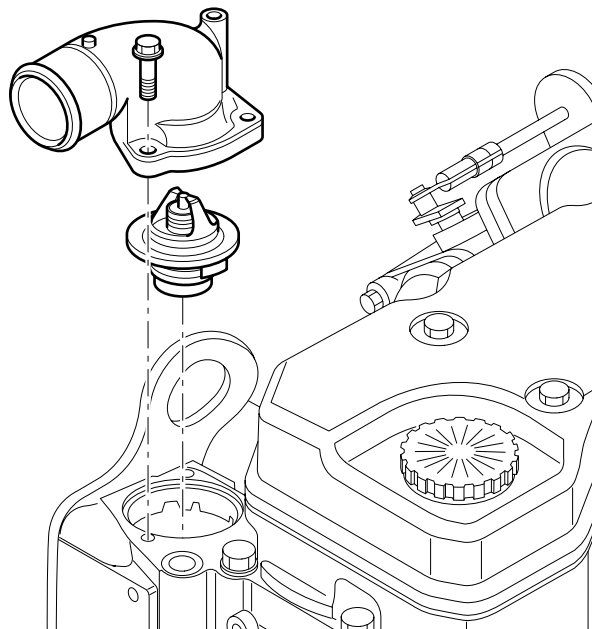
5.2 REMOVAL AND INSTALLATION, THERMOSTAT

Removing the thermostat

1. Drain the coolant. See "Draining and filling".
2. Remove the water hose between the thermostat housing and the radiator.
3. Remove the thermostat housing attachment bolts.
4. Remove the thermostat housing.
5. Remove the thermostat.

Installing the thermostat

1. Fit a new sealing ring to the thermostat.
2. Fit the thermostat in the thermostat housing.
3. Fit the thermostat housing onto the cylinder head.
4. Fit the thermostat housing attachment bolts. Tighten the attachment bolts to the specified torque. See 'Technical data'.
5. Fit the water hose between the thermostat housing and the radiator.
6. Fill the cooling system. See "Draining and filling".



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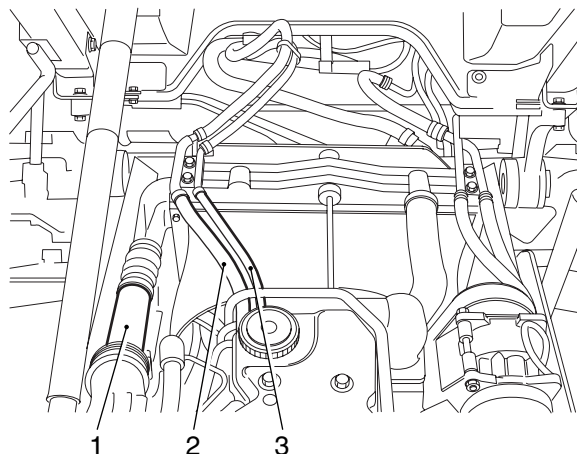
5.3 REMOVAL AND INSTALLATION, VISCOUS FAN CLUTCH

Removing the viscous fan clutch

1. Drain some of the coolant. See "Draining and filling".
2. Remove the air inlet hose with air inlet pipe between the intercooler and the inlet manifold (1).
3. Disconnect the heater hose (2) and bleed hose (3) on engine side and bend it to the front.
4. Remove the attachment nuts from the fan.
5. Remove the bolts attaching the viscous fan clutch to the drive flange. Remove the viscous fan clutch with the fan from the wind tunnel.

Note:

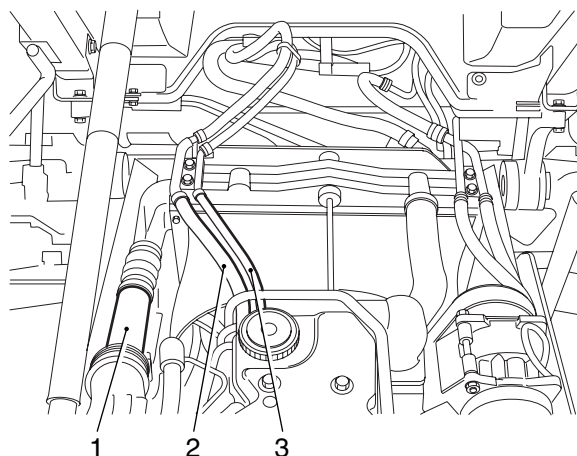
The viscous fan clutch must always be stored **vertically**.



M201161

Installing the viscous fan clutch

1. Place the new viscous fan clutch in the fan. Position it in the wind tunnel and fit the viscous fan clutch with the fan onto the drive flange.
2. Tighten the attachment nuts of the fan.
3. Fit the heater hose (2) and bleed hose (3).
4. Fit the air inlet hose with air inlet pipe between the intercooler and the inlet manifold (1).
5. Fill the cooling system. See "Draining and filling".
6. Run the engine and check that all connections are sealed properly.



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CE ENGINE COOLING SYSTEM

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Removing and installing

LF45/55 series

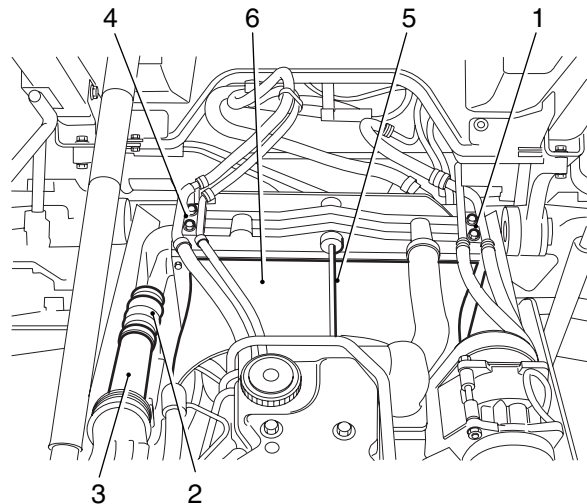
5.4 REMOVAL AND INSTALLATION, RADIATOR

Note:

The removal and installation procedure for the radiator unit allows for the presence of an air-conditioning unit. If such a unit is not present, the relevant sections can be skipped.

Removal, radiator

1. Drain the coolant.
2. Remove the fan.
3. Remove the coolant hoses from the radiator.
4. Remove the bracket (1) of the air-conditioning pipes from the radiator.
5. Remove the left-hand air inlet hose (2) and air inlet pipe (3) from the inlet manifold to the intercooler.
6. Remove the right-hand connecting hose from the inlet pipe to the intercooler.
7. Remove the bracket (4) of the heater and bleed hoses from the radiator.
8. Remove the torque rod (5).
9. Remove the retainer clips from the condenser brackets.
10. Remove the bolts of the wind tunnel (6) and remove the wind tunnel.
11. Remove the attachment bolts from the intercooler and remove the cover plate.
12. Remove the attachment bolts from the radiator brackets. Remove the radiator and tilt the condenser slightly to free the air-conditioning pipes.



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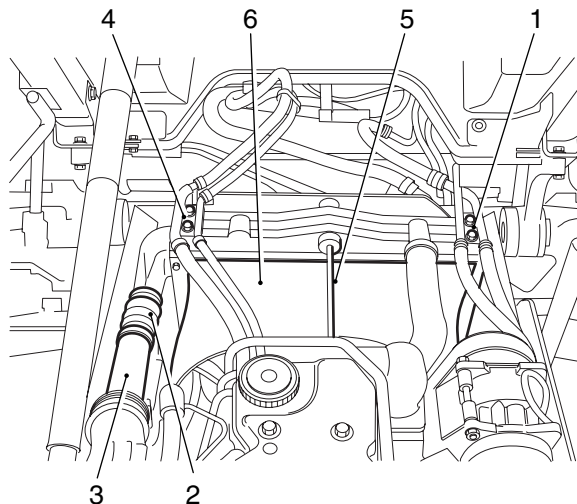
CE ENGINE COOLING SYSTEM

LF45/55 series

Removing and installing

Installing the radiator

1. Fit the radiator in the chassis. Tighten the attachment nuts to the specified torque. See "Technical data".
2. Fit the intercooler onto the radiator and fit the cover plate.
3. Install the wind tunnel (6).
4. Install the torque rod (5).
5. Suspend the condenser at the bottom in the brackets and fit the retainer clips.
6. Fit the fan.
7. Fit the bracket (4) of the heater and bleed hoses on the radiator.
8. Fit the coolant hoses to the radiator
9. Fit the right-hand air inlet hose from the inlet pipe to the intercooler.
10. Fit the left-hand air inlet hose (2) and air inlet pipe (3) from the inlet manifold to the intercooler.
11. Fit the bracket (1) of the air-conditioning pipes on the radiator
12. Fill the cooling system. See "Draining and filling".
13. Run the engine and check that all connections are sealed properly.



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CE ENGINE COOLING SYSTEM

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Removing and installing

LF45/55 series

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6. DRAINING AND FILLING

6.1 DRAINING, FILLING AND BLEEDING THE COOLING SYSTEM



In order to avoid damaging the engine block, do not top up a warm engine with cold coolant. Coolant is a toxic fluid and must be handled with care. Protect skin and eyes. Coolant is harmful to the environment; after use, it should be processed as industrial chemical waste. When the coolant is hot, there is overpressure in the cooling system. When removing the filler cap, allow the overpressure to escape by first loosening the filler cap one turn.

Draining the cooling system

1. Turn the heater temperature control knob in the cab to the maximum 'hot' setting.
2. Remove the cooling system filler cap.
3. Collect the coolant. Position suitable containers under the drain points.
4. Drain the cooling system at the radiator via the drain plug.
5. Flush the cooling system.
6. Close the drain plug.

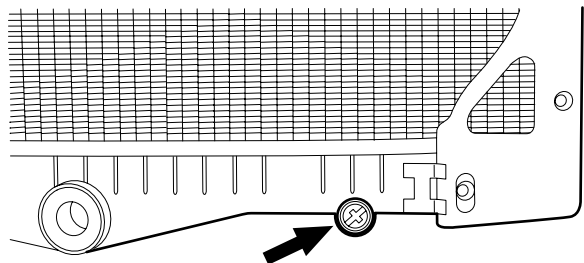
Filling and bleeding the cooling system

1. Turn the heater temperature control knob in the cab to the maximum 'hot' setting.
2. Fill the cooling system with the specified coolant.
3. Run the engine for several minutes.
4. The cooling system is self-bleeding. Ensure that the bleed pipe from the thermostat housing to the header tank is not kinked or pinched.

Note:

Make sure that air can escape when the cooling system is filled.

5. Check the coolant level, and top up with coolant if necessary.



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CE ENGINE COOLING SYSTEM

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Draining and filling

LF45/55 series

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7. CLEANING

7.1 CLEANING THE EXTERIOR OF RADIATOR AND AIR COOLER



Inhalation of dust may have serious consequences for your health. Take the necessary precautions, such as wearing goggles and a facemask.

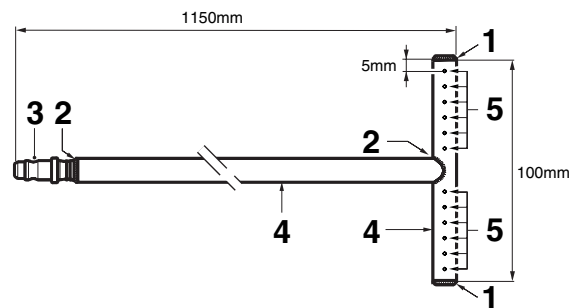
Note:

With the aid of a simple tool, the radiator and the air cooler can be blow-cleaned.

The tool (radiator cleaner) cannot be ordered from DAF. It should be manufactured by yourself according to the drawing.

Key to drawing:

- 1 Solder up
- 2 Solder
- 3 Quick-release coupling for air hose
- 4 Steel pipe, $\varnothing$ 10 mm
- 5 6 x $\varnothing$ 1.5 mm between holes, with a centre-to-centre distance between the holes of 7 mm, drilled on one side



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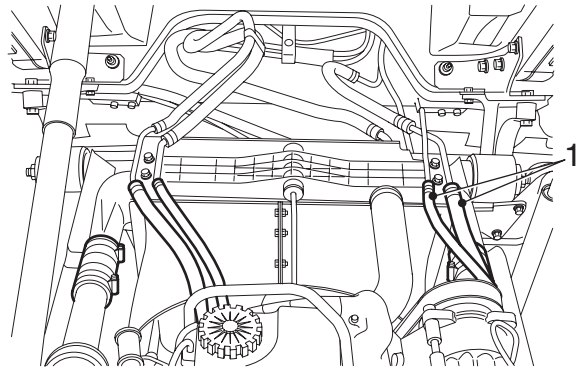
CE ENGINE COOLING SYSTEM

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Cleaning

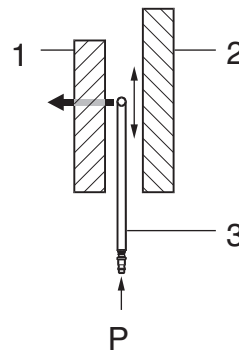
LF45/55 series

1. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (1) on the radiator and remove the condenser from the air cooler supports. Push the condenser as far as possible forwards.



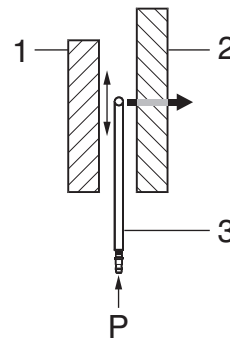
i400824

2. Insert the radiator cleaner (3) between the air cooler (1) and radiator (2) from underneath, with the air holes facing the air cooler (1).
3. Apply air pressure to the radiator cleaner (3) and continue blow-cleaning the air cooler (1) until no more dirt comes out.



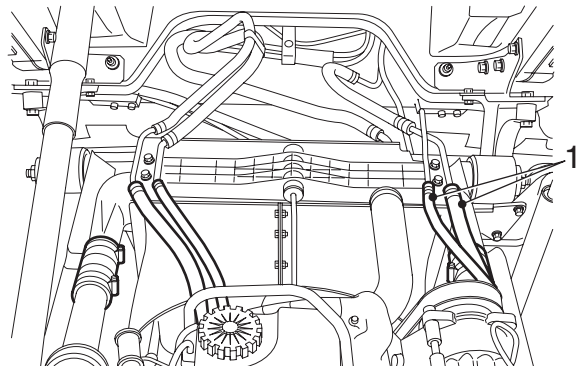
M201351

4. Turn the radiator cleaner (3) over, turning the holes towards the radiator (2), and blow-clean the radiator (2).



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5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (1) on the radiator.



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7.2 FLUSHING COOLING SYSTEM



In order to avoid damaging the engine block, do not top up a warm engine with cold coolant or other fluid.

Coolant is a toxic fluid and must be handled with care. Protect skin and eyes.

Coolant is harmful to the environment; after use, it should be processed as industrial chemical waste.

1. Drain the entire cooling system.
2. Fill the cooling system with tap water and add a cooling system cleaner. See "Technical data".
3. Leave the engine running until the thermostat is fully open.
4. Now leave the engine running for a further 45 minutes.
5. Drain the entire cooling system.
6. Fill the cooling system with tap water.
7. Leave the engine running until the thermostat is fully open.
8. Now leave the engine running for a further five minutes.
9. Drain the entire cooling system.
10. Fill the cooling system with the specified coolant.
11. Check the coolant level.

CE ENGINE COOLING SYSTEM

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Cleaning

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CE ENGINE LUBRICATION SYSTEM

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

CE ENGINE LUBRICATION SYSTEM

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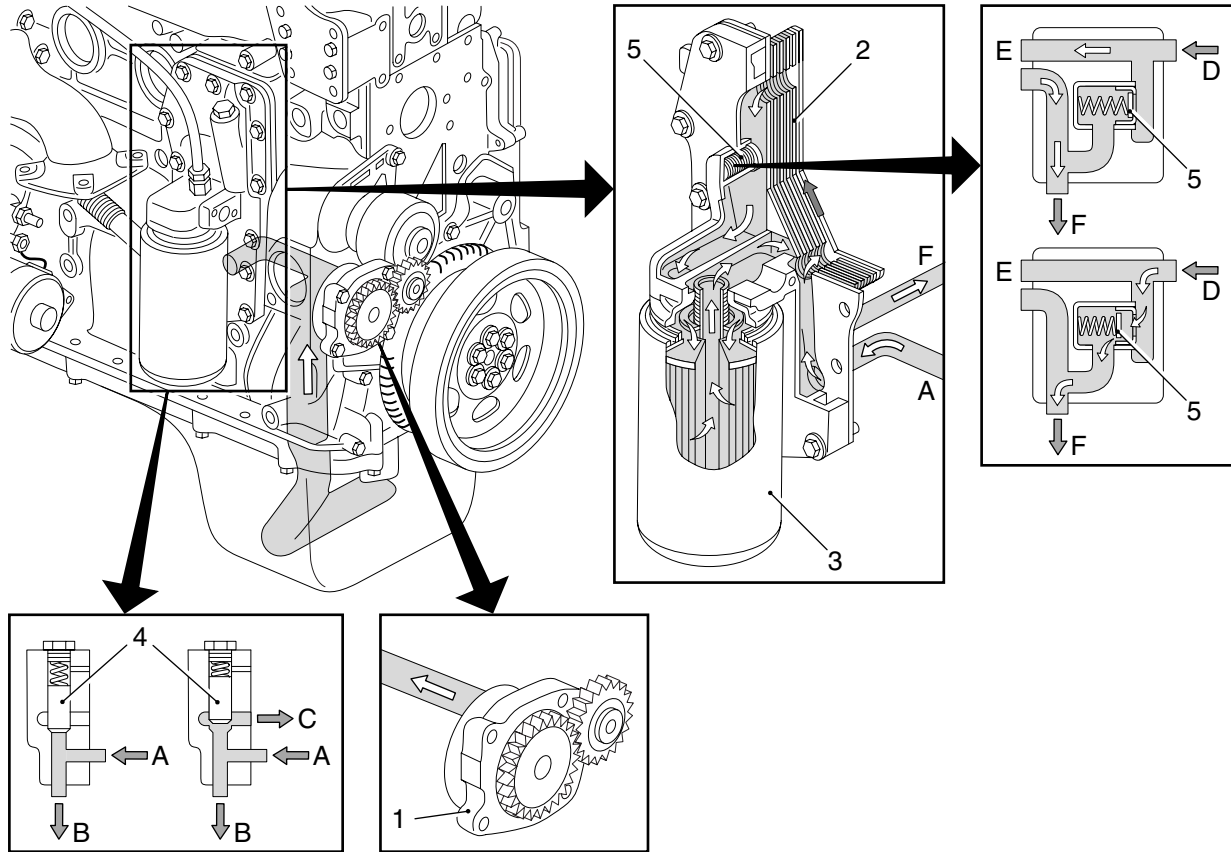
Safety instructions

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2. GENERAL

2.1 SYSTEM DESCRIPTION, LUBRICATION SYSTEM



- A From lubricating oil pump
- B To oil cooler
- C To lubricating oil pump
- D From oil cooler
- E To oil filter
- F To main oil channel

General

The lubricating oil pump (1) is directly driven by the crankshaft via an idler gear.

The lubricating oil pump draws the oil from the oil sump and pumps it via the oil cooler (2) and the lubricating oil filter (3) to the main oil channel in the cylinder block. From the main oil channel, the lubricating oil is further distributed to the various components requiring lubrication.

Oil cooler

The oil cooler (2) is connected to the cooling system. The oil cooler warms up the lubricating oil in a "cold" engine and cools it in a "warm" engine.

CE ENGINE LUBRICATION SYSTEM

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General

LF45/55 series

Pressure-limiting valve

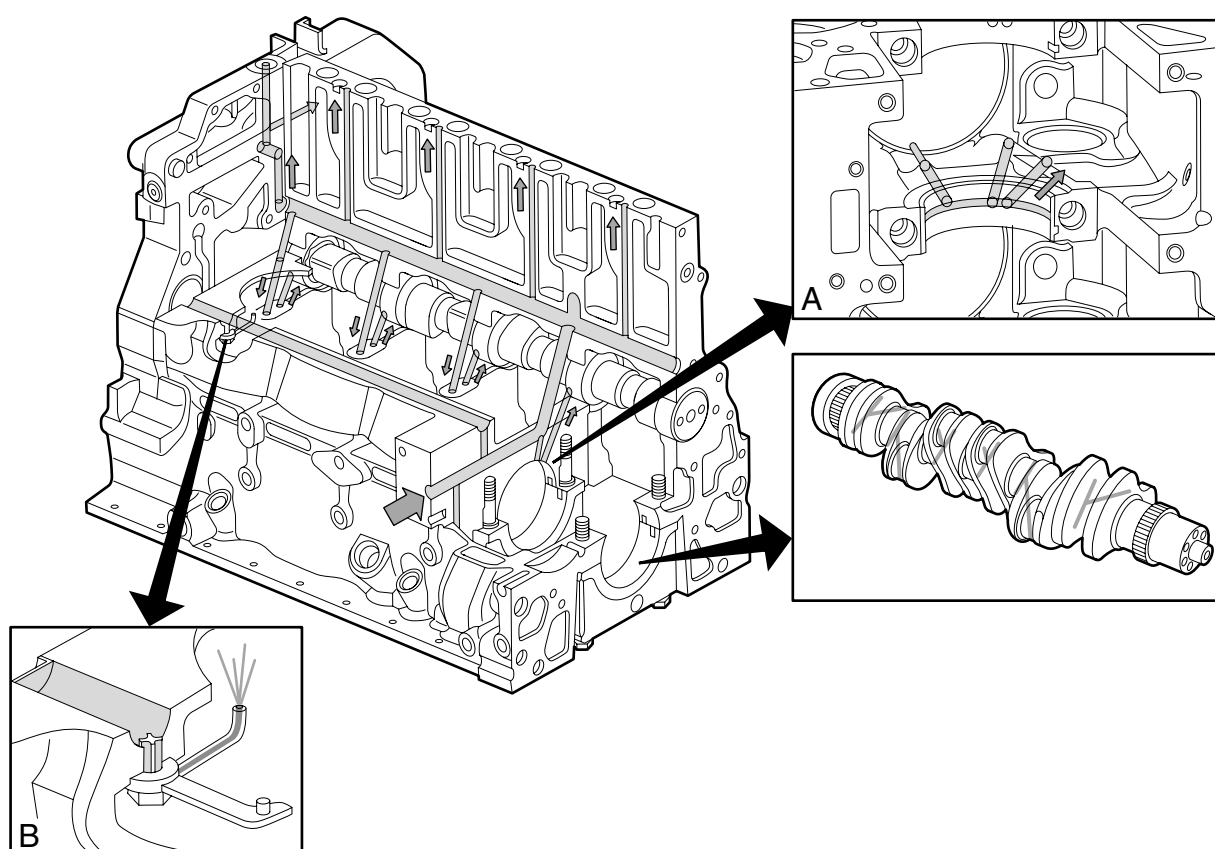
A pressure limiting valve (4) is fitted in the oil cooler housing.

When the pressure set for the pressure limiting valve has been reached, the valve opens and allows the excess lubricating oil to be discharged to the supply side of the lubricating oil pump.

Oil filter

The oil is cleaned in the disposable oil filter (3).

A pressure relief valve (5) fitted in the oil cooler housing opens if the pressure in the filter becomes too high as a result of contamination or cold oil. The oil then passes through the filter unfiltered.



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Main oil channel

From the main oil channel, lubricating oil is supplied to the crankshaft main bearings (A) and via an oil channel in the crankshaft also to the big-end bearings.

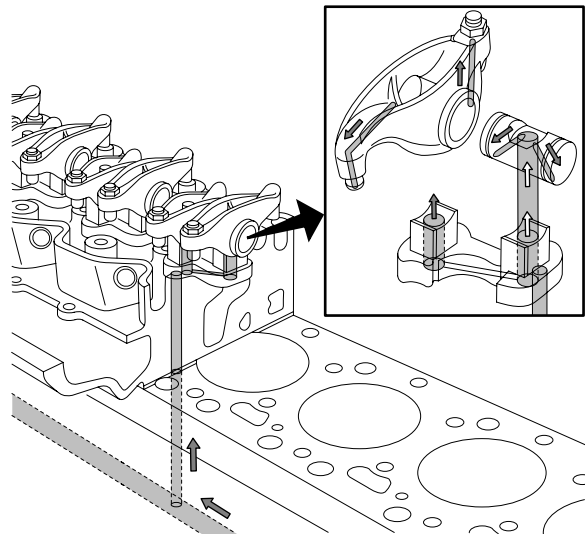
From the main oil channel, lubricating oil is pumped to the camshaft.

Cylinder head

From the main oil channel, vertical oil channels pass through the cylinder block to the cylinder head. This bore is continued in the cylinder head to supply lubricating oil to the rockers.

Piston and gudgeon pin

The pistons are lubricated by oil nozzles (B). In addition to its lubricating function, the lubricating oil has an important cooling function. A hole has been drilled at the top of the connecting rod, through which the oil that the oil nozzles spray against the piston head may reach the upper big-end bearing and the gudgeon pin.



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Turbocharger

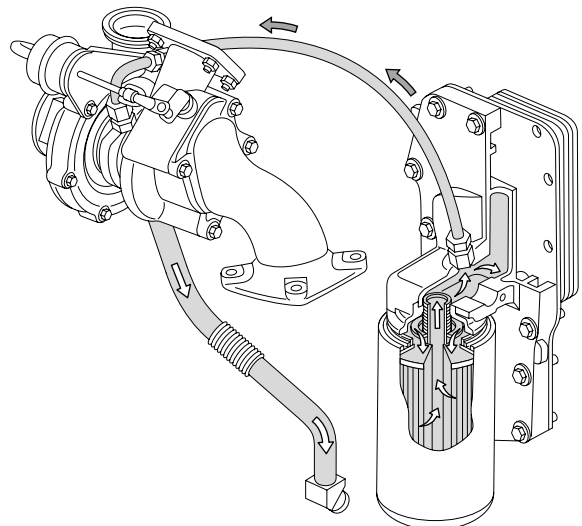
The turbocharger is lubricated via an oil pipe from the oil cooler housing.

The oil discharge pipe from the turbocharger is connected to the cylinder block, from where the oil returns to the oil sump.

Air compressor

The air compressor is supplied with oil from an oil channel in the timing gear case connected to the main oil channel.

The oil returning from the air compressor flows from the front of the air compressor to the timing gear case, and from there to the oil sump.



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CE ENGINE LUBRICATION SYSTEM

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General

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3. CHECKING AND ADJUSTING

3.1 CHECKING ENGINE OIL CONSUMPTION

Engine oil consumption relates to the engine oil used during combustion in the engine. Since engine oil consumption is affected by driving style and the use to which the vehicle is put, it is also related to average fuel consumption. See "Technical data" for the maximum permissible engine oil consumption.

Test conditions

1. An engine oil consumption test is only meaningful after the engine has been run in (approx. 25,000 km).
2. Check the engine carefully for engine oil leakage before carrying out an engine oil consumption test. First repair any leaks.
3. Check the average fuel consumption and engine oil consumption as accurately as possible.
4. Only check the engine oil level when the engine is at operating temperature and only when the engine has been turned off for five minutes.
5. Make sure the vehicle is horizontal before checking the engine oil level.

CE ENGINE LUBRICATION SYSTEM

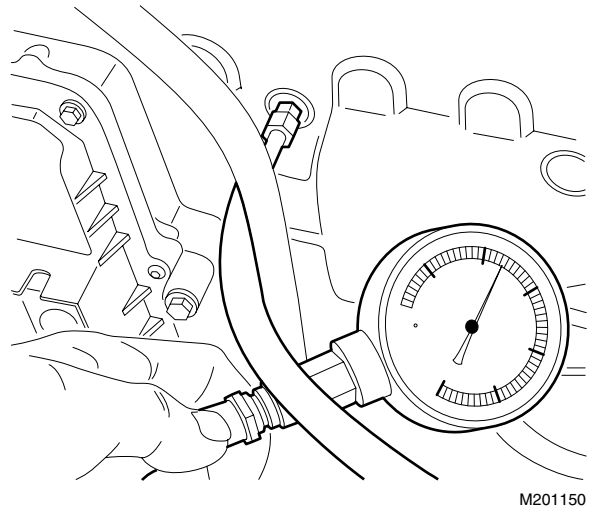
2

Checking and adjusting

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3.2 INSPECTION, LUBRICATING OIL PRESSURE

1. Bring the engine up to operating temperature.
2. Remove the plug from the main oil channel. It is located on the left, in the centre of the engine block.
3. Connect the special tool (DAF no. 0535551) to the oil pressure gauge connection.
4. Start the engine and measure the lubricating oil pressure at idling speed and at full-load engine speed. Compare the pressure readings with the technical data. See "Technical data".
5. Stop the engine and remove the oil pressure gauge. Fit a new sealing ring in the plug and insert the plug.



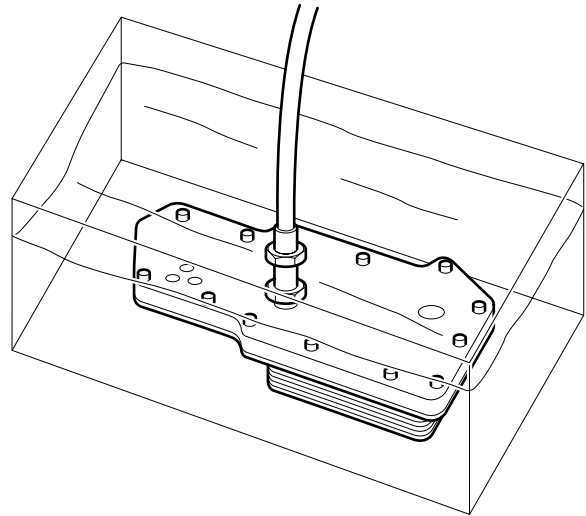
3.3 PRESSURE-TESTING THE OIL COOLER

1. Remove the oil cooler. See "Removal and installation".
2. Fit special tool (DAF no. 1329478) to the oil cooler.
3. Connect an air hose with pressure reducer valve to the special tool.
4. Immerse the oil cooler in warm water and set the specified air pressure. See "Technical data" for the specified water temperature and the test pressure.
5. Check the cooling element for leakage.

Note:

The oil cooler should be replaced if it is leaking.

6. Remove the special tool.
7. Fit the oil cooler. See "Removal and installation".



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CE ENGINE LUBRICATION SYSTEM

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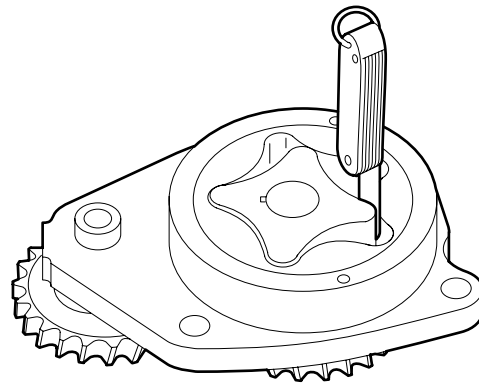
Checking and adjusting

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3.4 INSPECTING THE LUBRICATING OIL PUMP

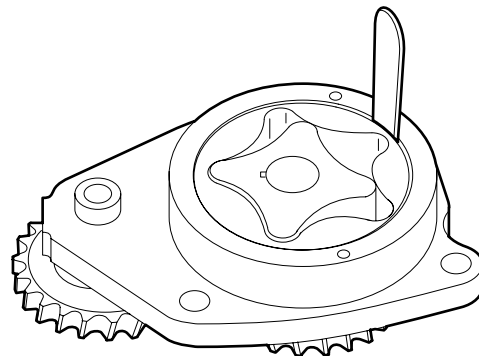
Inspecting the lubricating oil pump

1. Check the lubricating oil pump drive gears for damage and excessive wear.
2. Check the drive gear backlash. See "Technical data".
3. Remove the rear plate from the lubricating oil pump.
4. Check the play between the inner and outer rotors using a feeler gauge. See "Technical data".



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5. Check the play between the outer rotor and the pump housing using a feeler gauge. See "Technical data".



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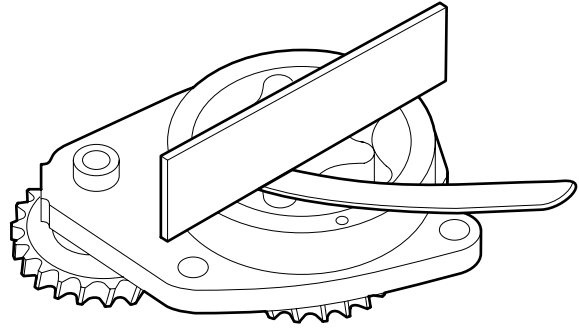
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CE ENGINE LUBRICATION SYSTEM

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Checking and adjusting

6. Using a feeler gauge and a straight edge check the play between the inner and outer rotors in relation to the pump housing. See "Technical data".
7. Mark the top of the outer rotor and remove the outer rotor.
8. Check the inner rotor and outer rotor for damage and excessive wear.
9. Fit the outer rotor with the marked side upwards.
10. Fit the rear plate.



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Checking and adjusting

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4. REMOVING AND INSTALLING

4.1 REMOVAL AND INSTALLATION, LUBRICATING OIL FILTER



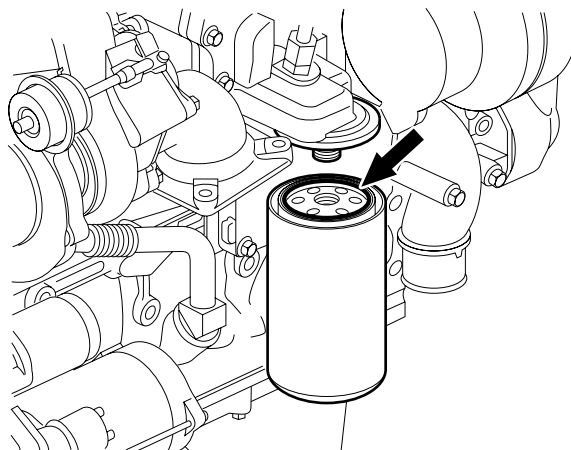
To prevent skin injury, avoid unnecessary contact with the drained lubricating oil. Be careful when changing the oil. Hot oil may cause serious injuries.

Removing the oil filter

1. Clean the location and the area surrounding the filter element if extremely fouled.
2. Remove the filter element by turning it anti-clockwise. Collect any oil that is flowing out.
3. Remove the O-ring if it has not been removed already.

Installing the oil filter

1. Lightly oil the filter element sealing ring.
2. Fill the filter element with clean oil. Use the specified oil.
3. Fit the filter until the seal abuts, and tighten it by hand another $\frac{3}{4}$ to a full turn.
4. Run the engine for a short time and check whether the oil filter is correctly sealed.
5. Check the oil level and correct if necessary. Use the specified oil.



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CE ENGINE LUBRICATION SYSTEM

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Removing and installing

LF45/55 series

4.2 REMOVAL AND INSTALLATION, OIL COOLER

Removing the oil cooler

1. Drain the coolant. See "Draining and filling".
2. Remove the lubricating oil filter.
3. Remove the turbocharger oil supply pipe.
4. Remove the attachment bolts from the oil cooler and remove the oil cooler.

Installing the oil cooler

1. Fit the oil cooler with new gaskets and tighten the attachment bolts to the specified torque and in the specified sequence. See "Technical data".
2. Tighten the oil supply pipe to the specified torque. See "Technical data".
3. Fit the lubricating oil filter.
4. Fill the cooling system.
5. Run the engine briefly, and check that the oil cooler does not leak.
6. Check the lubricating oil level.
7. Check the coolant level.

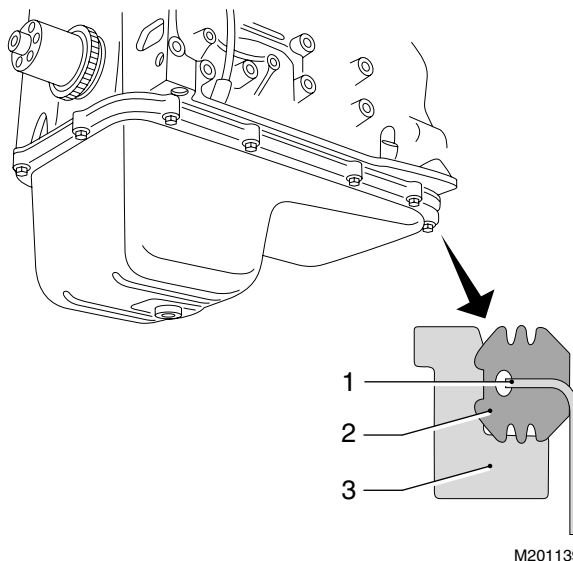
4.3 REMOVAL AND INSTALLATION, OIL SUMP

Removing the oil sump

1. Drain the engine oil. See "Draining and filling".
2. Support the oil sump.
3. Remove the attachment bolts all around.
4. Remove the oil sump (1) with sealing rubber (2) and flange (3).

Installing the oil sump

1. Thoroughly clean the sealing surfaces of the oil sump and the engine block.
2. Check the oil sump sealing rubber (2). Damaged sealing rubbers must be replaced.
3. Fit the oil sump (1) with sealing rubber (2) and flange (3) upright.
4. Fit the attachment bolts in the specified sequence and tighten them to the specified torque. See "Technical data".
5. Fill the engine with the correct amount of lubricating oil. See "Draining and Filling".
6. Run the engine for a short time and check for oil leaks. Then check the oil level.



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Removing and installing

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4.4 REMOVING AND INSTALLING LUBRICATING OIL PUMP

Removing lubricating oil pump

1. Remove the fan.
2. Remove the poly-V-belt.
3. Remove the vibration damper and the crankshaft pulley.
4. Remove the front crankshaft seal.
5. Remove the front engine panel.
6. Remove the attachment bolts from the lubricating oil pump crosswise and remove it.

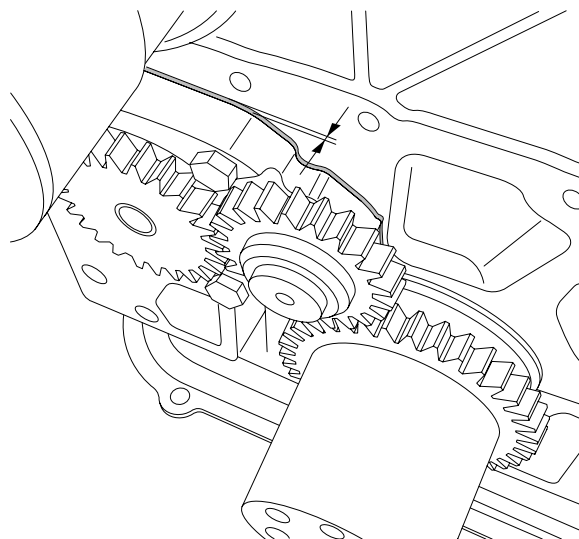
Installing lubricating oil pump

1. Check the lubricating oil pump. See "Checking and adjusting".
2. Fill the lubricating oil pump with engine oil and position the lubricating oil pump in the cylinder block.
3. Fit the attachment bolts and tighten them crosswise to the specified torque. See "Technical data".

Note:

The rear plate of the lubricating oil pump is at the back of the bore; if the lubricating oil pump is fitted correctly, the flange will not touch the cylinder block.

4. Fit the front engine panel.
5. Fit a new front crankshaft seal.
6. Fit the crankshaft pulley and the vibration damper.
7. Fit the poly-V-belt.
8. Fit the fan.



M201124

5. DRAINING AND FILLING

5.1 DRAINING AND REPLENISHING ENGINE OIL



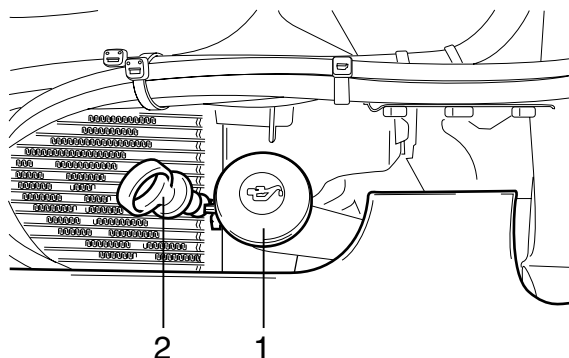
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining engine oil

1. Ensure that the vehicle is standing on a flat and level surface.
2. Drain the engine oil at operating temperature using the drain plug in the oil sump.
3. Replace the drain plug sealing ring and tighten the drain plug to the specified torque; see "Technical data".

Replenishing engine oil

1. Fill the engine through the oil filler pipe (1) with the specified quantity of engine oil; see "Technical data".
2. Use the dipstick (2) to check the engine oil level.



M201433

CE ENGINE LUBRICATION SYSTEM

2

Draining and filling

LF45/55 series

7

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ZF 6S-850 GEARBOX	5
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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES	7
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TECHNICAL DATA

3

Contents

LF45/55 series

0

1. MECHANICAL GEARBOX CONTROL

1.1 GENERAL

Switch button

Locking compound

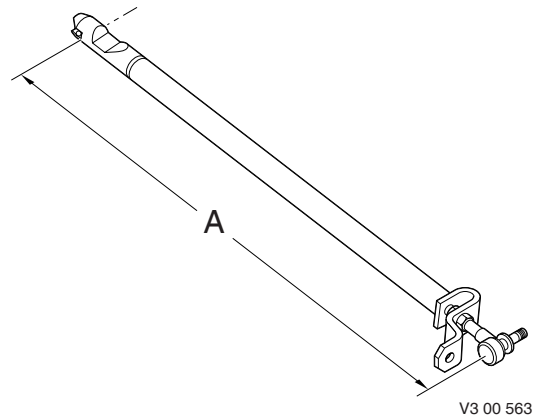
Loctite 243

Control rod

Lubricant

Molykote BR2S or BR2 plus

Control rod underneath the cab

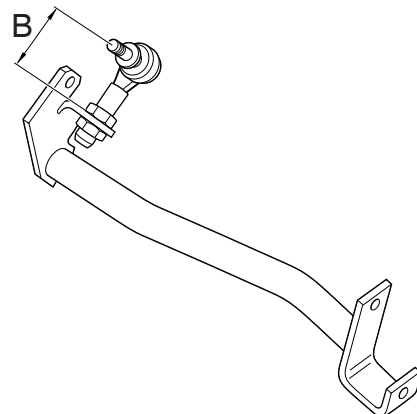


V3 00 563

Length A

Engine	Gearbox	Cab suspension	Class	Length A [mm]
CE engine	ZF 6S850	steel	1	669
CE engine	ZF 6S850	rubber	1	664
CE engine	ZF 6S850	steel	2 + 3	674
CE engine	ZF 6S850	rubber	2 + 3	669
CE engine	FS6309A	steel	2 + 3	674
CE engine	FS6309A	rubber	2 + 3	669

Control rod behind the cab



V3 00 564

Length B

60 - 62 mm

TECHNICAL DATA

3

Mechanical gearbox control

LF45/55 series

0

1.2 TIGHTENING TORQUES

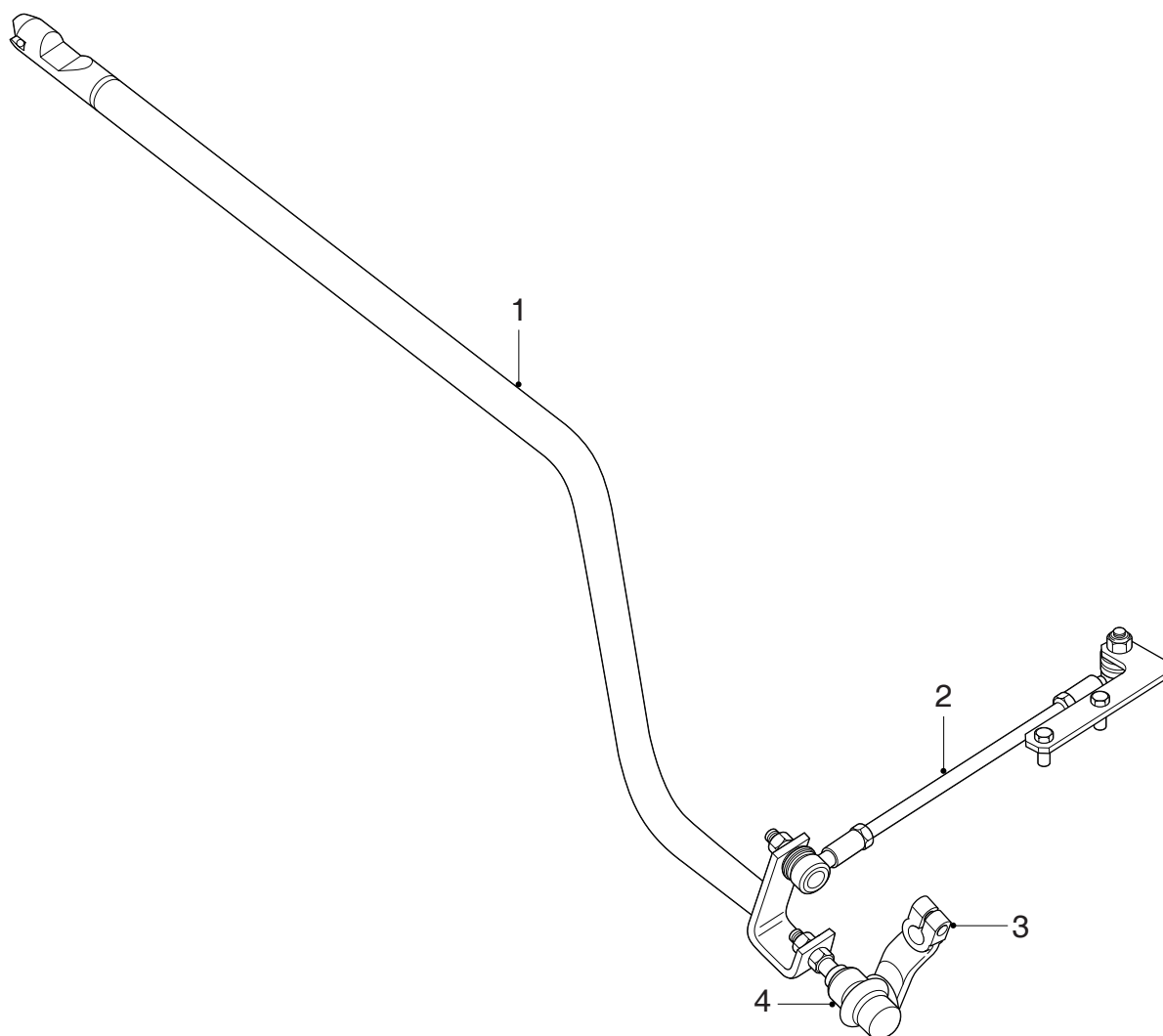
The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Operating mechanism,
2 adjustment options

0



V3 00 567

Control rod (1)

Lubricant

Molykote BR2S or BR2 plus

Torque rod (2)

Attachment nuts

48 Nm

Lock nuts

28 Nm

Ball joint (4)

Attachment nut

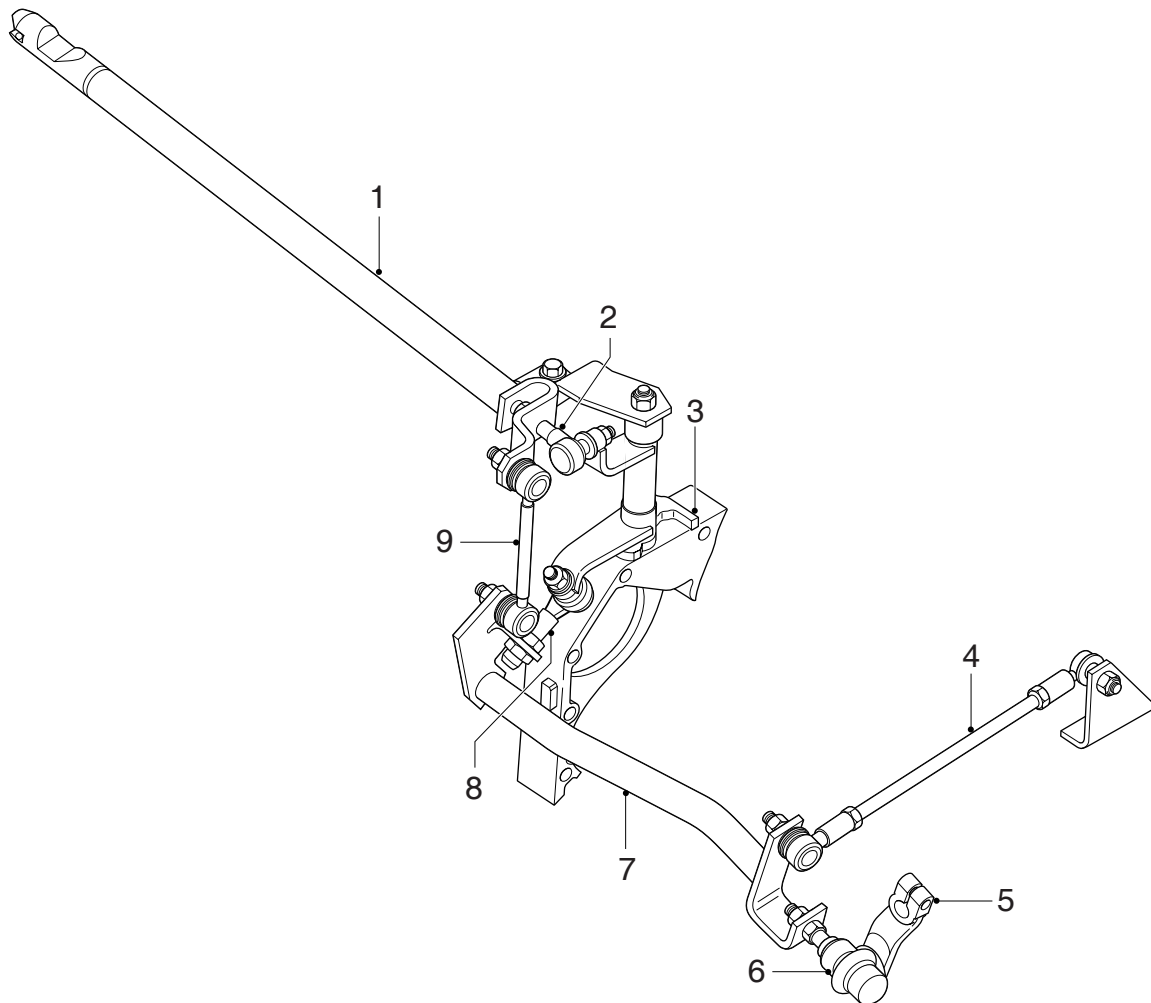
48 Nm

Lock nuts

45 Nm

TECHNICAL DATA**3**

Mechanical gearbox control

LF45/55 series**0****Operating mechanism,
4 adjustment options**

V3 00 566

Control rod (1)

Lubricant

Molykote BR2S or BR2 plus

Ball joint (2)

Attachment nut

48 Nm

Lock nuts

48 Nm

Torque rod (4)

Attachment nuts

48 Nm

Lock nuts

28 Nm

Ball joint (6)

Attachment nut

48 Nm

Lock nuts

48 Nm

Ball joint (8)

Attachment nuts

48 Nm

Lock nuts

48 Nm

3

TECHNICAL DATA

LF45/55 series

Mechanical gearbox control

Torque rod (9)

Attachment nuts

48 Nm

Gear lever unit

Attachment bolts

18 Nm ⁽¹⁾

Eaton switch button

Attachment nut

70 Nm ⁽¹⁾

(1) Use Loctite 243

0

TECHNICAL DATA

3

Mechanical gearbox control

LF45/55 series

0

LF45/55 series

Pneumatic gearbox control

2. PNEUMATIC GEARBOX CONTROL

2.1 GENERAL

Filter/governor

Governed pressure

5.34 - 5.69 bar

0

TECHNICAL DATA**3**

Pneumatic gearbox control

LF45/55 series**0****2.2 TIGHTENING TORQUES**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Filter/governor

M6 attachment bolts	13 Nm
Cover	25 Nm

Selector valve single-H

M6 attachment bolts	22 Nm
M16 discharge valve attachment bolts	19 Nm
M8 cover plate attachment bolts	22 Nm

Range-change cylinder

M8 cover attachment bolts	17 Nm
M16 nut on piston	105 Nm

Bleed valve

Attachment	19 Nm
------------	-------

Eaton switch button

Attachment nut	70 Nm ⁽¹⁾
----------------	----------------------

(1) Use Loctite 243

LF45/55 series

ZF S5-42 gearbox

3. ZF S5-42 GEARBOX

3.1 GENERAL

Input shaft

Pre-tension

0.02 - 0.09 mm

Secondary shaft

Pre-tension

0.02 - 0.09 mm

TECHNICAL DATA**3**

ZF S5-42 gearbox

LF45/55 series**0****3.2 TIGHTENING TORQUES**

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Gearbox

Attachment bolts	60 Nm
------------------	-------

Drive flange

'Direct drive' attachment nut	400 Nm ⁽¹⁾
Overdrive attachment nut	330 Nm ⁽²⁾

Gearbox front cover

Attachment bolts	23 Nm
------------------	-------

Selector shaft housing

Selector shaft housing attachment bolts	23 Nm
Shifting arm lock nut	46 Nm
Gearbox control attachment nut	52 Nm
Bleeder	10 Nm

Plugs

Oil level check/filler plug	50 Nm
Drain plug	50 Nm

(1) Fit new nut and apply Loctite 270 to it

(2) Fit new nut and apply Loctite 262 to it

3

TECHNICAL DATA

LF45/55 series

ZF S5-42 gearbox

3.3 FILLING CAPACITIES

Gearbox	Capacity
S5-42	3.5 litres

0

TECHNICAL DATA

3

ZF S5-42 gearbox

LF45/55 series

0

4. ZF 6S-850 GEARBOX

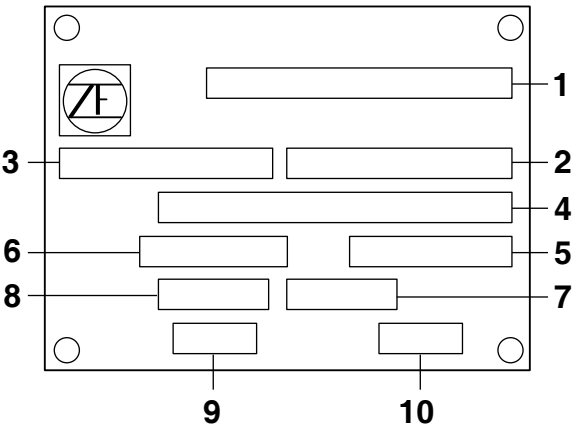
4.1 GENERAL

Gearbox type

Each gearbox has a type plate attached to it, indicating the type of gearbox. This data can also be found on the vehicle identity card for the vehicle concerned.

ZF gearbox type plate

- 1. Type of gearbox
- 2. Serial no. (ZF)
- 3. Parts list (ZF)
- 4. Specification no.
- 5. Pulse generator ratio
- 6. Gearbox ratio
- 7. Engine speed using PTO
- 8. PTO speed
- 9. Gearbox oil capacity
- 10. Oil specification



V300049

Output shaft bearing axial play

Output shaft bearing axial play 0.00 - 0.10 mm

Bearing axial play, main and input shafts

Bearing axial play, main and input shafts 0.00 - 0.10 mm

Secondary shaft bearing axial play

Secondary shaft bearing axial play 0.00 - 0.10 mm

TECHNICAL DATA**3**

ZF 6S-850 gearbox

LF45/55 series**0****4.2 TIGHTENING TORQUES**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Gearbox

Attachment bolts	60 Nm
------------------	-------

Drive flange

Drive flange Ø 120 mm attachment bolt	120 Nm
---------------------------------------	--------

Drive flange Ø 150 mm attachment bolt	140 Nm
---------------------------------------	--------

Gearbox front cover

Attachment bolts	23 Nm
------------------	-------

Selector shaft housing

Selector housing attachment bolts	23 Nm
-----------------------------------	-------

Shifting arm lock nut	46 Nm
-----------------------	-------

Gearbox control attachment nut	52 Nm
--------------------------------	-------

Bleeder	10 Nm
---------	-------

Plugs

Oil level check/filler plug	50 Nm
-----------------------------	-------

Drain plug	50 Nm
------------	-------

LF45/55 series

ZF 6S-850 gearbox

4.3 FILLING CAPACITIES

Gearbox type	Filling amounts at oil change (litres)	First filling, e.g. on repair (litres)
ZF 6S-850	7.5	7.5

TECHNICAL DATA

3

ZF 6S-850 gearbox

LF45/55 series

0

5. EATON FS/6309A GEARBOX

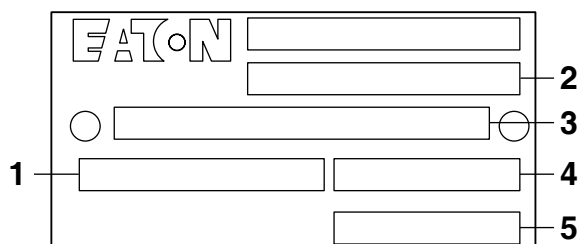
5.1 GENERAL

Gearbox type

Each gearbox has a type plate attached to it, indicating the type of gearbox. You can also find this data on the identity card for the vehicle concerned.

Eaton gearbox type plate

1. Type of gearbox
2. Specification no. Eaton
3. DAF article Eaton code
4. Serial no. Eaton
5. Production date code



V300378

The Eaton specification number is unique to each customer and gives detailed information on the development level of the gearbox. The number must be quoted whenever replacement parts are ordered.

Input shaft play of adjusting rings:

3.70 mm
3.75 mm
3.80 mm
3.85 mm
3.90 mm
3.95 mm

Colour coding:

Red, green, white
Yellow, green, blue
Blue, green, white
Red, green, yellow
Green, green, white
Red, green, red

Secondary shaft pre-load

New bearings
Original bearings

0.075 - 0.125 mm
0.000 - 0.050 mm

Sealant

Gearbox housing front cover contact surfaces

Loctite 518

Input shaft

Lithium-based grease, class NLGI 3

Filter/governor

Governed pressure

5.3 - 5.7 bar

TECHNICAL DATA**3**

Eaton FS/6309A gearbox

LF45/55 series**0****5.2 TIGHTENING TORQUES**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Gearbox

Attachment bolts	60 Nm
------------------	-------

Drive flange

M39 attachment nut	650 Nm ⁽¹⁾
Drive flange oil seal housing attachment bolts	37 Nm

Gearbox front cover

Attachment bolts	37 Nm
------------------	-------

Selector shaft housing

Selector shaft housing attachment bolts	37 Nm ⁽²⁾
M8 retaining cover attachment bolts	22 Nm
M8 shifting arm lock nut	25 Nm
M10 shifting arm lock nut	37 Nm
End cover attachment bolts	22 Nm
Bleeder	19 Nm
Bleed valve	22 Nm

Filter/governor

M6 attachment bolts	13 Nm
Cover	25 Nm

Plugs

Oil level check/filler plug	35 Nm
Drain plug	44 Nm

(1) Use new nut

(2) Use Loctite 243

3

TECHNICAL DATA

LF45/55 series

Eaton FS/6309A gearbox

5.3 FILLING CAPACITIES

Gearbox	Contents
Eaton FS/6309A	8.5 litres

0

TECHNICAL DATA

3

Eaton FS/6309A gearbox

LF45/55 series

0

LF45/55 series

Allison 1000 & 2000 automatic gearboxes

6. ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

6.1 GENERAL

Torque converter pilot bearing

Lubricant on installation

Molykote BR2S or BR2 plus

TECHNICAL DATA**3**

Allison 1000 & 2000 automatic gearboxes

LF45/55 series**0****6.2 TIGHTENING TORQUES**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Gearbox

Attachment bolts	60 Nm
Hydraulic pipes to oil cooler	25 Nm
Bolts attaching gearbox to flywheel housing	34 Nm

Flexplates

Flexplate adapter attachment bolts	64 Nm
Crankshaft attachment bolts	30 Nm + 60° angular displacement

Selector switch

Attachment bolts	27 Nm
Attachment nut	24 Nm

Speed sensor

Attachment bolt	12 Nm
-----------------	-------

Oil sump

Attachment bolts	27 Nm
------------------	-------

PTO cover

Attachment bolts	43 Nm
------------------	-------

Plugs

Gearbox drain plug	35 Nm
Oil cooler drain plug	28 Nm
Oil cooler air bleed plug	28 Nm

Hydraulic lines

Attachment to gearbox	25 Nm
-----------------------	-------

Drive flange

Attachment bolt	122 Nm
-----------------	--------

3

TECHNICAL DATA

LF45/55 series

Allison 1000 & 2000 automatic gearboxes

6.3 FILLING CAPACITIES

Gearbox	Capacity
Allison 1000 & 2000 series	Approx. 10 litre

0

TECHNICAL DATA

3

Allison 1000 & 2000 automatic gearboxes

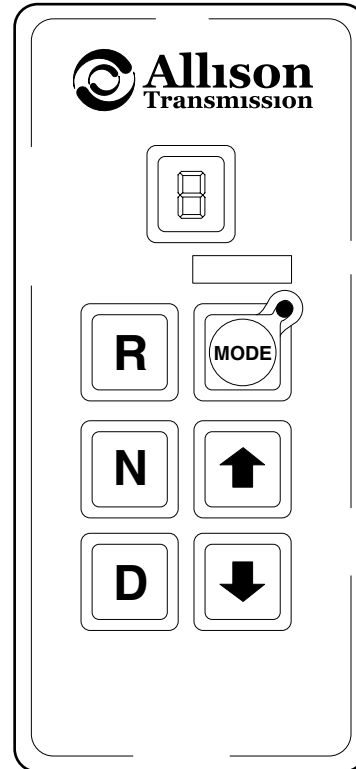
LF45/55 series

0

7. ALLISON MD3060 AUTOMATIC GEARBOX

7.1 GENERAL

The Allison MD3060 automatic gearbox is electronically controlled and has a diagnostics system that can record possible faults in the memory of the ECU (Electronic Control Unit). The faults can be read at a later date. The system is operated and the faults are read via the selector keypad. This selector keypad has a display and is located next to the driver's seat; it replaces the gear lever with manual gearboxes.



V300392

Torque converter pilot bearing
Lubricant on installation

Molykote BR2S or BR2 Plus

TECHNICAL DATA**3**

Allison MD3060 automatic gearbox

LF45/55 series**0****7.2 TIGHTENING TORQUES**

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Gearbox

Attachment bolts	60 Nm
Bleeder	14 Nm
Main connector	2.5 Nm
Coolant pipes	55 Nm
Rear mounting bracket	100 Nm
PTO bracket	55 Nm
Flywheel housing adapter, M10 x 1.5	55 Nm

Drive flange

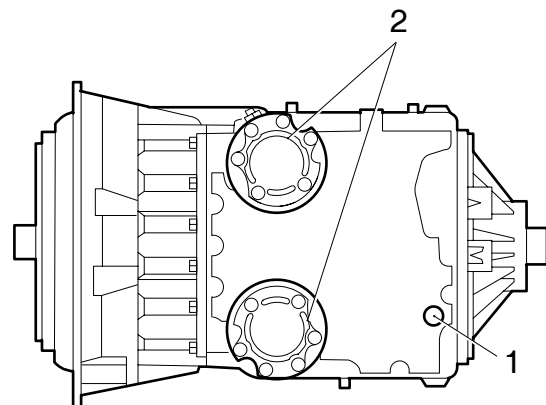
Attachment bolt	75 Nm
-----------------	-------

Flexplates

Flexplate adapter attachment bolts	36 Nm
Torque converter attachment bolts	36 Nm

Oil cooler

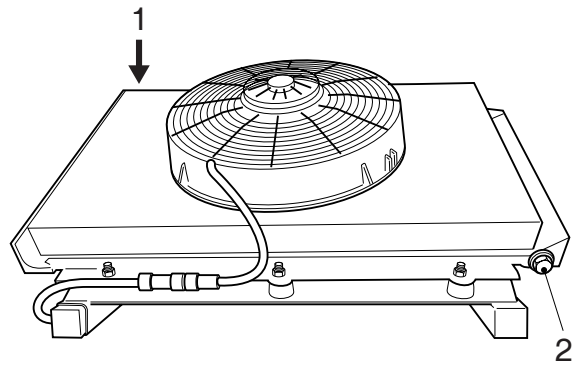
Hydraulic lines	60 Nm
-----------------	-------



V300371

Plugs

Oil drain plug (1)	28 Nm
Oil filter cover attachment bolts (2)	55 Nm



V3 00 883

Oil cooler air bleed plug (1)
Oil cooler drain plug (2)

28 Nm
28 Nm

TECHNICAL DATA**3**

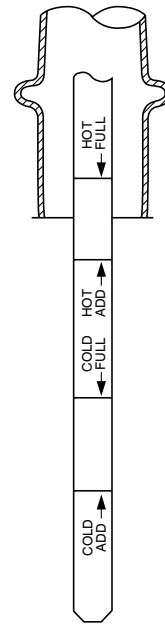
Allison MD3060 automatic gearbox

LF45/55 series**0****7.3 FILLING CAPACITIES****Allison automatic gearbox oil capacities**

Type of gearbox	Capacity at first filling	Capacity at second filling
MD 3060P 4" oil sump	27 litres	20 litres

The oil level when cold must be on the "Cold full" mark.

"Cold add" add when cold
 "Cold full" full when cold
 "Hot add" add when hot
 "Hot full" full when hot



W 3 03 099

LF45/55 series

Clutch

8. CLUTCH**8.1 GENERAL****0**

Gearbox	Clutch release assembly	Clutch plate
ZF S5-42	MF 362	WGTZ (1 $\frac{1}{2}$ ")
ZF S6-850	MF 395	WGTZ (1 $\frac{1}{2}$ ")
Eaton FS/6309A	MF 395	WGTZ (1 $\frac{1}{4}$ ")

8.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques.

The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

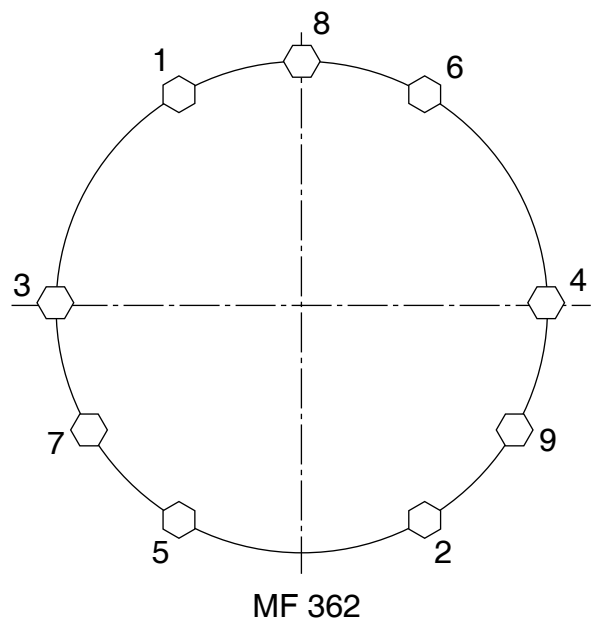
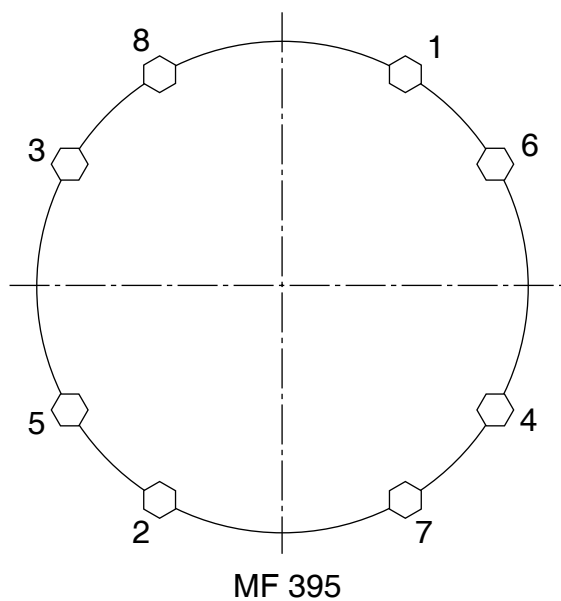
When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Clutch release assembly

MF 362 clutch release assembly attachment bolts 40 Nm

MF 395 clutch release assembly attachment bolts 80 Nm

Tighten attachment bolts as illustrated



V3 00 414

LF45/55 series

Clutch

8.3 FILLING CAPACITIES

Clutch

First filling

approx. 0.4 litres

TECHNICAL DATA

3

Clutch

LF45/55 series

0

9. PROP SHAFTS**9.1 GENERAL****Spicer**

LF 45	LF 55 (12 - 15 ton)	LF 55 (17 - 19 ton)
SPL 39	-	-
SPL 55	SPL 55	-
SPL 70	SPL 70	SPL 70
SPL 100	SPL 100	SPL 100
-	-	SPL 140

Monotron

		PEP 5
		PEP 6
		C2040

9.2 TIGHTENING TORQUES

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The other threaded connections not specified must therefore be tightened to the torque mentioned in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Drive flange

M10 attachment bolts	60 Nm
M12 attachment bolts	105 Nm

Spicer intermediate bearing

SPL 39 and SPL 55 central nuts	400 Nm
SPL 70, SPL 100 and SPL 140 central nuts	685 Nm

Spicer universal joint

$\frac{5}{16}$ " attachment bolts, UNF clamping bow, prop shaft - universal joint	38 Nm
$\frac{3}{8}$ " attachment bolts, UNF clamping bow, prop shaft - universal joint	70 Nm
M8 attachment bolts, clamping piece, universal joint circlip SPL 140	38 Nm

Spicer suspension bearing

Bracket attachment bolts	110 Nm + 30° angular displacement
--------------------------	-----------------------------------

Monotron suspension bearing

M10 bracket attachment bolts	60 Nm
M12 bracket attachment bolts	105 Nm

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2. PNEUMATIC GEARBOX CONTROL	2-1	200508
2.1 Fault-finding table	2-1	200508
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6.1 Fault-finding table	6-1	200508

DIAGNOSTICS

3

Contents

LF45/55 series

1

1. MECHANICAL GEARBOX CONTROL

1.1 FAULT-FINDING TABLE

COMPLAINT: GEAR LEVER VIBRATES	
Possible cause	Remedy
Excessive play at control hinge points	Check/repair all points in the control

COMPLAINT: ENGAGING GEARS IS HEAVY	
Possible cause	Remedy
Gearbox control pivot and hinge points dry or compressed	Check/repair all points in the control
Incorrect adjustment of control	Check/adjust all points in the control
Mechanical problem in gearbox	See "Mechanical gearbox" fault-finding table

COMPLAINT: GEARS CANNOT BE ENGAGED	
Possible cause	Remedy
Gearbox control pivot and hinge points dry or compressed	Check/repair all points in the control
Incorrect adjustment of control	Check/adjust all points in the control
Mechanical problem in gearbox	See "Mechanical gearbox" fault-finding table

COMPLAINT: GEARBOX JUMPS OUT OF GEAR	
Possible cause	Remedy
Incorrect adjustment of control	Check/adjust all points in the control
Mechanical problem in gearbox	See "Mechanical gearbox" fault-finding table

DIAGNOSTICS

3

Mechanical gearbox control

LF45/55 series

1

2. PNEUMATIC GEARBOX CONTROL

2.1 FAULT-FINDING TABLE

COMPLAINT: NOT POSSIBLE TO ENGAGE HIGH OR LOW RANGE	
Possible cause	Remedy
Air pressure too low	Check air supply of circuit 4
Neutral position valve defective or incorrectly connected	Connect valve properly or replace
Faulty downshift protection valve	Replace valve
Defective high/low range engaging cylinder	Check cylinder and replace if necessary

COMPLAINT: HIGH/LOW RANGE ENGAGING CYLINDER ENGAGES LOW AT TOO HIGH A SPEED	
Possible cause	Remedy
Incorrect VIC frequency value	Adjust value

COMPLAINT: HIGH OR LOW RANGE ENGAGING IS SLOW	
Possible cause	Remedy
Air pressure too low	Check air supply of circuit 4
Piping blocked	Check piping and clean, if necessary
Defective neutral position valve	Replace valve

COMPLAINT: HIGH/LOW RANGE ENGAGING CYLINDER WORKS THE WRONG WAY ROUND	
Possible cause	Remedy
Air pipes on the high/low range engaging cylinder are incorrectly connected	Connect engaging cylinder air pipes correctly

COMPLAINT: NOT POSSIBLE TO ENGAGE LOW RANGE	
Possible cause	Remedy
VIC defective	Check VIC and replace, if necessary
Incorrect vehicle speed signal	Check vehicle speed signal

DIAGNOSTICS

3

Pneumatic gearbox control

LF45/55 series

1

3. MECHANICAL GEARBOX

3.1 FAULT-FINDING TABLE

COMPLAINT: ENGAGING GEARS IS HEAVY	
Possible cause	Remedy
Gearbox oil level too low	Top up oil level
Oil with incorrect specification in the gearbox	Fill gearbox with oil of correct specification
Problem in mechanical gearbox control	See "Mechanical gearbox control" fault-finding table
Clutch plate is not released	See "Clutch" fault-finding table

COMPLAINT: GEARS CANNOT BE ENGAGED	
Possible cause	Remedy
Retaining element fitted too deep	Check/repair retaining elements
Problem in mechanical gearbox control	See "Mechanical gearbox control" fault-finding table
Range-change switch does not work properly	See "Pneumatic section of gearbox control" fault-finding table

COMPLAINT: GEARBOX JUMPS OUT OF GEAR	
Possible cause	Remedy
Adjustment of gearshift cover on gearbox	Mount gearshift cover on gearbox without any play
Defective retaining element or wrong type of retaining element fitted in gearshift cover	Replace retaining element or fit other type of retaining element
Problem in mechanical gearbox control	See "Mechanical gearbox control" fault-finding table

COMPLAINT: SINGLE H BECOMES DOUBLE H	
Possible cause	Remedy
Locking plate in control cover not positioned correctly	Check assembly of control cover

DIAGNOSTICS

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Mechanical gearbox

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4. AUTOMATIC GEARBOX

4.1 READING/DELETING ALLISON MD 3060 FAULT CODES

Fault code read function

To enter the fault code reading mode, briefly press the two arrow keys **twice simultaneously**. "D-1" appears on the display, followed by "-".

This means that at that point there are no faults (active faults) in the system. It also means that no faults have been registered that were earlier temporarily present and have now been cleared (inactive faults). The fault code reading function can be left by pressing "D", "N", or "R" or the arrow keys.

If the red lamp lights up while reading a fault code, this means that there is an active fault in the gearbox.

No message during reading means that the fault is inactive.

The ECU can save five active/inactive fault codes in its memory and show them on the display.

Fault codes consist of two sets of two digits (main codes and sub-codes). To read the codes consecutively, the **"MODE"** button must be pressed each time.

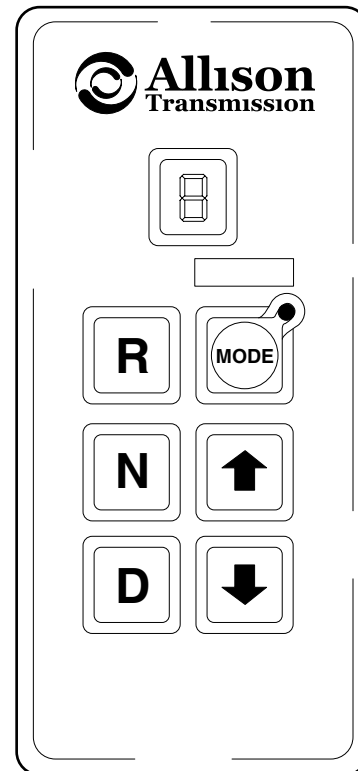
The letters and digits appear one at a time on the display.

Example:

D1	25 - 22
D2	21 - 12
D3	24 - 12
D4	-

The hyphen after D4 means that there are no further faults and that it is therefore not necessary to look at level D5.

As the ECU can only contain the five most important codes, the five most important codes will be seen on D1 to D5. Only when one of the faults has been remedied will the ECU be in a position to show a less important fault.



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DIAGNOSTICS

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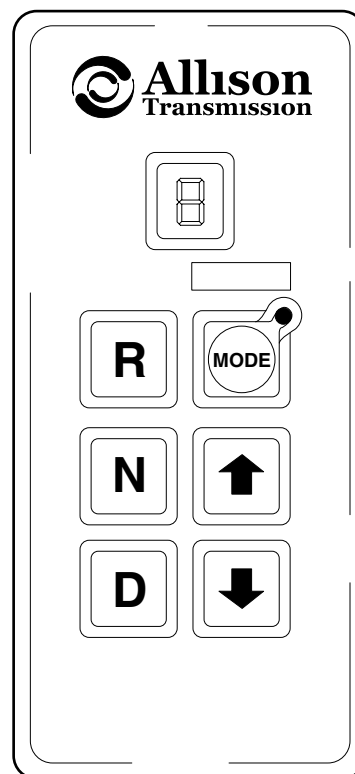
Deleting fault codes

After faults have been remedied, the ECU memory must be deleted. This is done as follows. Press the arrow keys twice simultaneously. This is the fault code reading mode. Press the "MODE" key and hold it down until the red lamp flashes three times (the first flash will be after approx. three seconds, the second after approx. 10 seconds). All codes, active or inactive, have now been deleted. Codes which return following deleting and can therefore no longer be deleted are active. Both types of fault need their causes tracing and remedying as quickly as possible. After the fault codes have been deleted the ignition must be switched off and re-started; otherwise it will not be possible to drive. This can be seen from the flashing of the gear lever position.

Inactive faults are automatically deleted by the ECU if the fault no longer occurs after the vehicle ignition has been switched off and on 25 times.

It is not possible to remedy all fault codes. Fault codes that cannot be found in the "Table of Fault Codes" can best be remedied by an Allison dealer.

He has test and diagnostic apparatus at his disposal that can be connected to a special diagnostic socket in the central box (next to the DAVIE connector).



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4.2 ALLISON MD 3060 TABLE OF FAULT CODES

Main code	Sub-code	RECOMMENDED PROCEDURES
Electronic control unit (ECU) supply		
13	12 Low	Check the following points: 1. earth and positive battery cables connected, firmly attached and clean. 2. batteries are charged. 3. vehicle loading system fails to load or loads too little or too much. 4. VIM fuse (Vehicle Interface Module). 5. VIM connections are firmly attached, clean and undamaged. 6. the correct wiring is used. 7. ECU connections are firmly attached, clean and undamaged. If all these points are in order, contact your Allison dealer.
	23 High	
Accelerator pedal sensor		
21	12 23	Check the following points: 1. Accelerator pedal sensor connector is properly connected. 2. no interruptions or short circuits between wires or earth in wiring harness to accelerator pedal sensor. Replace the accelerator pedal sensor if necessary. If all these points are in order, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Speed sensors		
22	14 15 16	Check the following points: 1. connectors are firmly attached, clean and undamaged. 2. the speed sensor attachment bolt is tightened to the specified torque. 3. no interruptions or short circuits between wires or earth in wiring harness to sensor. If all these points are in order, contact your Allison dealer.
Selector keypad		
23	12 13 14 15 23 24	Check the following points: 1. ECU connections - connectors are connected and clamped. 2. selector keypad is connected and the wire loop has been cut through. 3. no interruptions or short circuits between wires or earth in wiring harness to selector. Replace the selector if possible. If all these points are in order, contact your Allison dealer.
Temperature in the gearbox sump too low		
24	12	Check the following points: 1. temperature is lower than -6°C. 1. If this is the case, it is a normal response to the ambient temperature. 2. If not, check whether the main gearbox is firmly connected and that the connectors are undamaged. If all these points are in order, contact your Allison dealer.

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Main code	Sub-code	RECOMMENDED PROCEDURES
Temperature in the gearbox sump is too high		
24	23	1. Run the engine at idling speed. 2. Ensure that the vehicle is entirely horizontal. 3. Check whether the correct dip stick has been installed. 4. Check the oil level. 5. If necessary, correct the oil level. 6. If the oil level is in order, check whether the engine system has overheated, causing the gearbox to overheat. 7. Check that the ECU and gearbox connectors are correctly connected, firmly attached and undamaged. If all these points are in order, contact your Allison dealer.
Output shaft speed sensor		
25	00 11 22 33 44 55 66 77	Check the following points: 1. connector is connected. 2. sensor bolt is firmly attached. 3. ECU is firmly attached with no damaged connectors. 4. oil level. 5. no interruptions or short circuits between wires or earth in wiring harness to sensor. If all these points are in order, contact your Allison dealer.
Coupling 3 pressure switch open		
32	00 33 55 77	1. Let the engine idle while the vehicle's parking brake is applied. Check the following points: 1. specified dip stick. 2. correct oil level. 2. Check the following points: 1. gearbox main connector is connected, is firmly attached, is clean and undamaged. 2. ECU connector is connected, is firmly attached, is clean and undamaged. 3. no interruptions or short circuits between wires or earth in wiring harness. If all these points are in order, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Sensor fault in gearbox oil sump		
33	12 23	Check the following points: 1. gearbox main connector is connected, is firmly attached, is clean and undamaged. 2. ECU connector is connected, is firmly attached, is clean and undamaged. 3. no interruptions or short circuits between wires or earth in wiring harness. If all these points are in order, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
EEPROM fault		
34	12	1. Re-calibrate if necessary. 2. If re-calibration is impossible, replace the ECU. 3. If ECU replacement is impossible, contact your Allison dealer.
	13	
	14	
	15	
	16	
EEPROM writing error as a result of loss of power supply		
35	00	Check the following points: 1. ECU is firmly attached, clean and undamaged. 2. VIM (Vehicle Interface Module) is firmly attached, clean and undamaged. 3. the vehicle manufacturer has used the specified wiring for power supply and earth connection. 4. battery positive pole. 5. battery earth connection. 6. specified connections for vehicle ignition. If all these points are in order, contact your Allison dealer.
	16	
Hardware/software not compatible		
36	00	1. Replace ECU if possible. 2. Re-program ECU if possible. 3. If replacement or re-programming is not possible, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Interruption or short circuit in electromagnetic valve circuit		
41	12	Check the following points: 1. gearbox main connector is connected, is firmly attached, is clean and undamaged. 2. ECU connector is connected, is firmly attached, is clean and undamaged. 3. visual inspection of the wiring harness: no damage, chafed or too taut wires, no screws through the wiring harness. 4. no interruptions or short circuits between wires or earth in wiring harness. Replace wiring harness if necessary. If all these points are in order, contact your Allison dealer.
	13	
	14	
	15	
	16	
	20	
	22	
	23	
	24	
	25	
	26	

DIAGNOSTICS**3**

Automatic gearbox

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Main code	Sub-code	RECOMMENDED PROCEDURES
Short circuit in the electromagnetic valve circuit to the battery		
42	12 13 14 15 16 21 22 23 24 25 26	Check the following points: 1. gearbox main connector is connected, is firmly attached, is clean and undamaged. 2. ECU connector is connected, is firmly attached, is clean and undamaged. 3. visual inspection of the wiring harness: no damage, chafed or too taut wires, no screws through the wiring harness. 4. no interruptions or short circuits between wires or earth in wiring harness. 5. Replace wiring harness if necessary. 6. incompetent repairs. If all these points are in order, contact your Allison dealer.
ECU circuits		
43	21 25 26	1. replace the ECU. 2. Contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Transmission ration test on the gear to be changed from (during shifting)		
51	01 10 12 21 23 45 65	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. If all these points are in order, contact your Allison dealer.
Coupling 3 pressure switch fails to register pressure drop during shifting		
52	01 08 32 34 54 56 71 78 79 99	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. 4. check that there is no interruption or short circuit between wires or earth connection in the main wiring harness to the gearbox. If all these points are in order, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Engine and turbine rev test when engaging neutral		
53	08 18 28 29 38 39 48 49 58 59 68 69 78 99	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. If all these points are in order, contact your Allison dealer.
Transmission ratio test immediately after changing gear		
54	01,07 10,12 17,21 23,32 34,43 45,54 56,65 70,71 80,81 83,85 86,92 93,95 96,97	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. If all these points are in order, contact your Allison dealer.

Main code	Sub-code	RECOMMENDED PROCEDURES
Pressure in coupling 3 immediately after changing gear		
55	17 87 97	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. 4. check that there is no interruption or short circuit between the wiring or earth connection in the coupling 3 pressure switch wiring. 5. Check the following points: 1. main connector is properly connected, clean and undamaged. 2. ECU connector is properly connected, clean and undamaged. 3. rev sensor is properly connected, clean and undamaged. If all these points are in order, contact your Allison dealer.

DIAGNOSTICS**3**

Automatic gearbox

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Main code	Sub-code	RECOMMENDED PROCEDURES
Range test		
56	00	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. If all these points are in order, contact your Allison dealer.
	11	
	22	
	33	
	44	
	55	
	66	
	77	

Main code	Sub-code	RECOMMENDED PROCEDURES
Range test when using coupling C3		
57	11	Check the following points: 1. engine speed sensor and output shaft speed sensor are connected. The connectors are undamaged and clean. 2. no interruptions or short circuits between wires or earth in sensor wiring. 3. let the engine idle in neutral while the vehicle is on the brake. Check the following points: 1. specified dip stick. 2. oil level. 4. check that there is no interruption or short circuit between the wiring or earth connection in the coupling 3 pressure switch wiring. 5. Check the following points: 1. main connector is properly connected, clean and undamaged. 2. ECU connector is properly connected, clean and undamaged. 3. rev sensor is properly connected, clean and undamaged. If all these points are in order, contact your Allison dealer.
	22	
	44	
	66	
	88	
	99	
Fault in ECU		
69	12,13	1. Delete the fault codes and try to re-start the vehicle. 2. If the fault re-occurs, replace the ECU. 3. If the fault has not been cleared, contact your Allison dealer.
	14,15	
	16,21	
	22,23	
	24,25	
	26,32	
	33,34	
	35,36	

5. CLUTCH

5.1 FAULT-FINDING TABLE

1

SYMPTOM: CLUTCH PEDAL FAILS TO RETURN	
Possible cause	Remedy
Broken pedal return spring	Replace spring
Worn clutch pedal bearings	Check bearings and replace if necessary
Dirt in hydraulic system	Clean system and fill with fresh fluid
Incorrect fluid in hydraulic system	Replace with fluid of correct specification
Air in hydraulic system	Bleed the system

SYMPTOM: CLUTCH PEDAL STICKS WHEN PRESSED	
Possible cause	Remedy
Leak in hydraulic system	Check system
Air in hydraulic system	Bleed hydraulic system
Release bearing incorrectly fitted	Fit the release bearing correctly
Fork hinge points or fork itself worn	Check hinge points and fork; replace if necessary
Defective clutch servo	Repair and/or replace clutch servo
Gearbox front cover worn or broken	Check, replace gearbox front cover

SYMPTOM: PEDAL FORCE TOO HIGH	
Possible cause	Remedy
No or insufficient pressure in circuit 4 of the brake system	Check circuit 4 of the brake system
Kinked air pipe	Check pipe and replace if necessary
Kinked hydraulic pipe	Check pipe and replace if necessary
Worn clutch pedal bearings	Check bearings and replace if necessary
Defective clutch servo and/or main cylinder	Repair or replace clutch servo and/or main cylinder Note: In the case of a swollen seal, clean the system and re-fill with new fluid

SYMPTOM: RESIDUAL PRESSURE IN CLUTCH SYSTEM	
Possible cause	Remedy
Bleed vent in reservoir cap closed off	Check bleed vent in cap
Compensation bore in main cylinder closed off by swollen seal or insufficient free thrust pin travel.	Check free thrust pin travel or repair/replace main cylinder Note: In the case of a swollen seal, clean the system and re-fill with new fluid

DIAGNOSTICS**3**

Clutch

LF45/55 series**SYMPTOM: FLUID LEAK VIA VENT OPENING**

Possible cause	Remedy
Leak through piston seal in clutch servo	Repair or replace clutch servo Note: A drop of oil in the vent opening is a normal situation and is not a reason to repair/replace the clutch servo

SYMPTOM: CLUTCH PLATE SLIPS

Possible cause	Remedy
Worn lining	Replace lining
Oil on lining	Replace linings and check engine and gearbox sealing rings
Dirt on clutch plate and flywheel	Clean plate and surrounding area
Burnt clutch plate	Check entire clutch and replace if necessary
Clamping force of clutch release assembly too low or absent	Check clutch release assembly and replace if necessary
Clutch release assembly is not released	Check clutch release assembly

SYMPTOM: CLUTCH RELEASE ASSEMBLY FAILS TO RELEASE

Possible cause	Remedy
Fluid level in hydraulic system too low	Top up fluid
Incorrect pedal setting	Check setting and adjust if necessary
Air in hydraulic system	Bleed hydraulic system
Leak in hydraulic system	Check hydraulic system
Fingers of clutch release assembly broken	Replace clutch release assembly
Wrong clutch release assembly has been fitted	Fit correct clutch release assembly
Clutch fork is broken	Replace fork
Clutch release assembly badly soiled	Clean entire clutch
Defective clutch servo	Check clutch servo and replace if necessary
Thrust bearing incorrectly fitted	Fit thrust bearing correctly
Clutch housing disconnected from gearbox	Tighten the clutch housing bolts to the correct torque

6. PROP SHAFTS

6.1 FAULT-FINDING TABLE

SYMPTOM: VIBRATION IN DRIVE LINE AT LOW SPEED	
Possible cause	Remedy
Universal joint angle too large, caused for example by excessive caster	Check universal joint angle
Play in universal joints	Replace universal joint
Play in suspension bearing	Replace suspension bearing
Play in slide coupling	Replace prop shaft
Forks not in line	Align forks

SYMPTOM: VIBRATION IN DRIVE LINE AT HIGH SPEED	
Possible cause	Remedy
Prop shaft imbalance	Balance prop shafts or replace if necessary

DIAGNOSTICS

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Prop shafts

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1.4 Overview drawing, gear lever unit	1-4	200508
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MECHANICAL GEARBOX CONTROL

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Contents

LF45/55 series

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1. GENERAL

1.1 DESCRIPTION OF MECHANICAL GEARBOX CONTROL

Mechanical gearbox control

As a result of the use of different engines, gearboxes and cabs there are many different versions of the operating mechanisms of the mechanical gearboxes.

The operating mechanism must be adjusted in such a way that the gearbox does not jump out of gear and engaging gears is not too heavy. The operating mechanism must not touch any other vehicle parts during operation.

The various types of operating mechanism can be classified on the basis of the number of adjustable points:

- 2 adjustment options
- 4 adjustment options

Before carrying out the adjustment, the gear lever must be fixed in the neutral position. This is done using the special tool. The operating mechanism is then adjusted so that everything can be fitted without tension.

The versions with 4 adjustment options have two adjustable control rods that must be of a specified length. The versions with two adjustment options must be adjusted in such a way that everything can be fitted without tension.

Operating mechanism, RHD

For 5, 6 and 9-gear boxes in combination with a 4 or 6-cylinder engine the operating mechanism is the same. Small differences in length and/or shape are possible, however.
All operating mechanisms used have 2 adjustment options.

Operating mechanism, LHD

For 5 and 6-gear boxes in combination with a 4-cylinder engine the operating mechanism has 2 adjustment options.
For 6 and 9-gear boxes in combination with a 6-cylinder engine the operating mechanism has 4 adjustment options.

MECHANICAL GEARBOX CONTROL

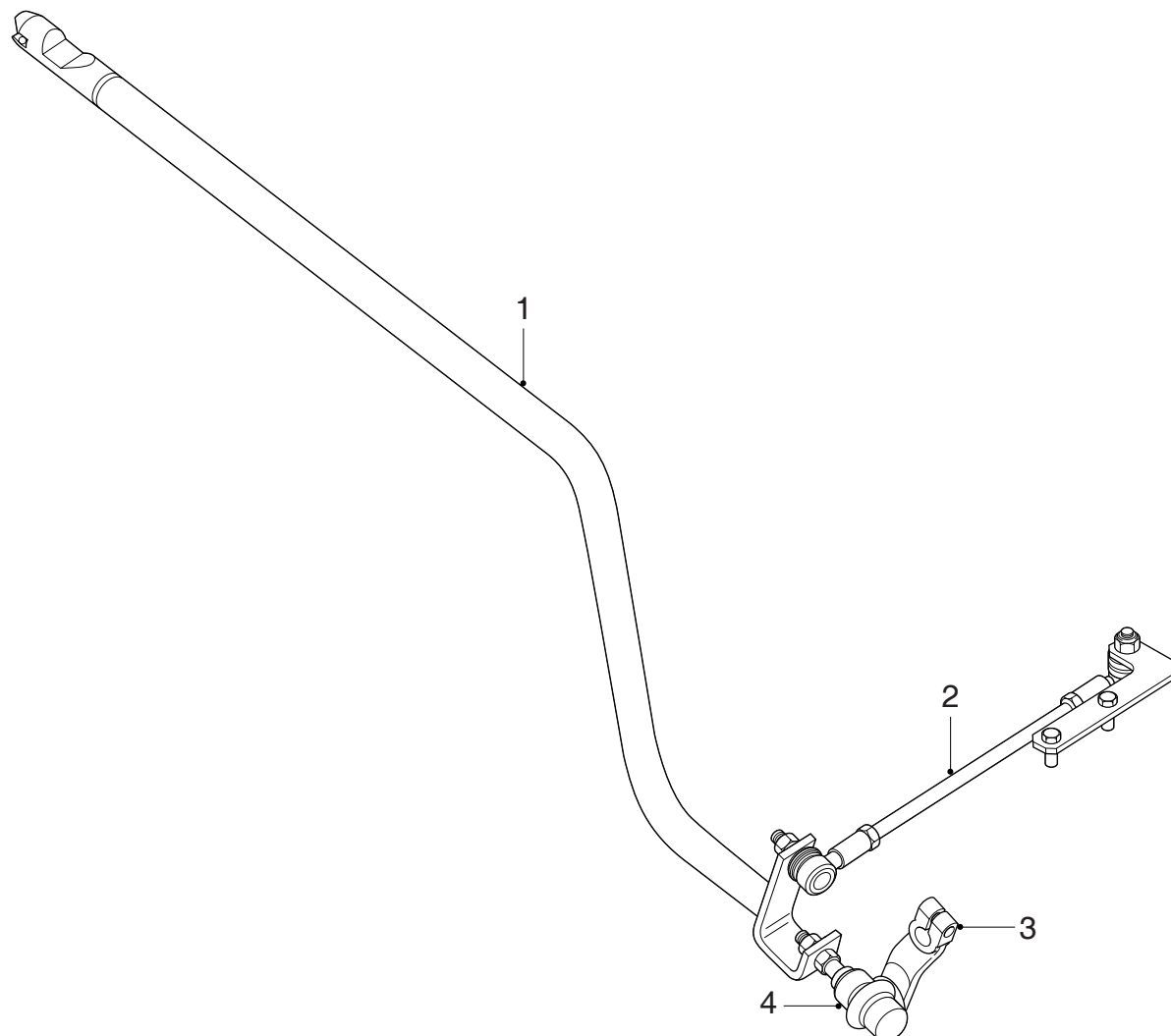
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General

LF45/55 series

1.2 OVERVIEW DRAWING, OPERATING MECHANISM, 2 ADJUSTMENT OPTIONS

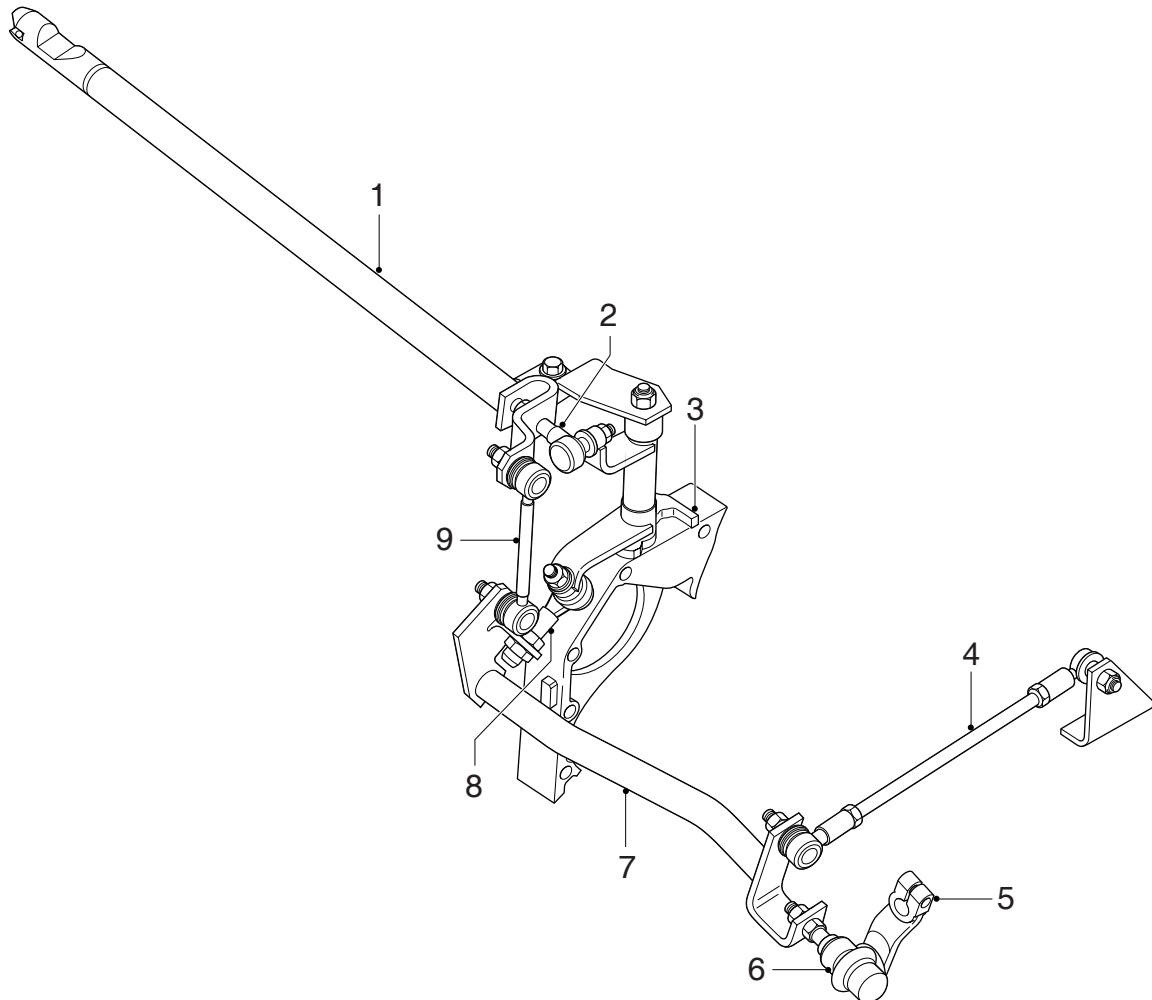
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- 1. Control rod
- 2. Torque rod
- 3. Gearbox lever
- 4. Ball joint

V3 00 567

1.3 OVERVIEW DRAWING, OPERATING MECHANISM, 4 ADJUSTMENT OPTIONS



1. Control rod underneath the cab
2. Ball joint
3. Bracket
4. Torque rod
5. Gearbox lever
6. Ball joint
7. Control rod behind the cab
8. Ball joint
9. Torque rod

V3 00 566

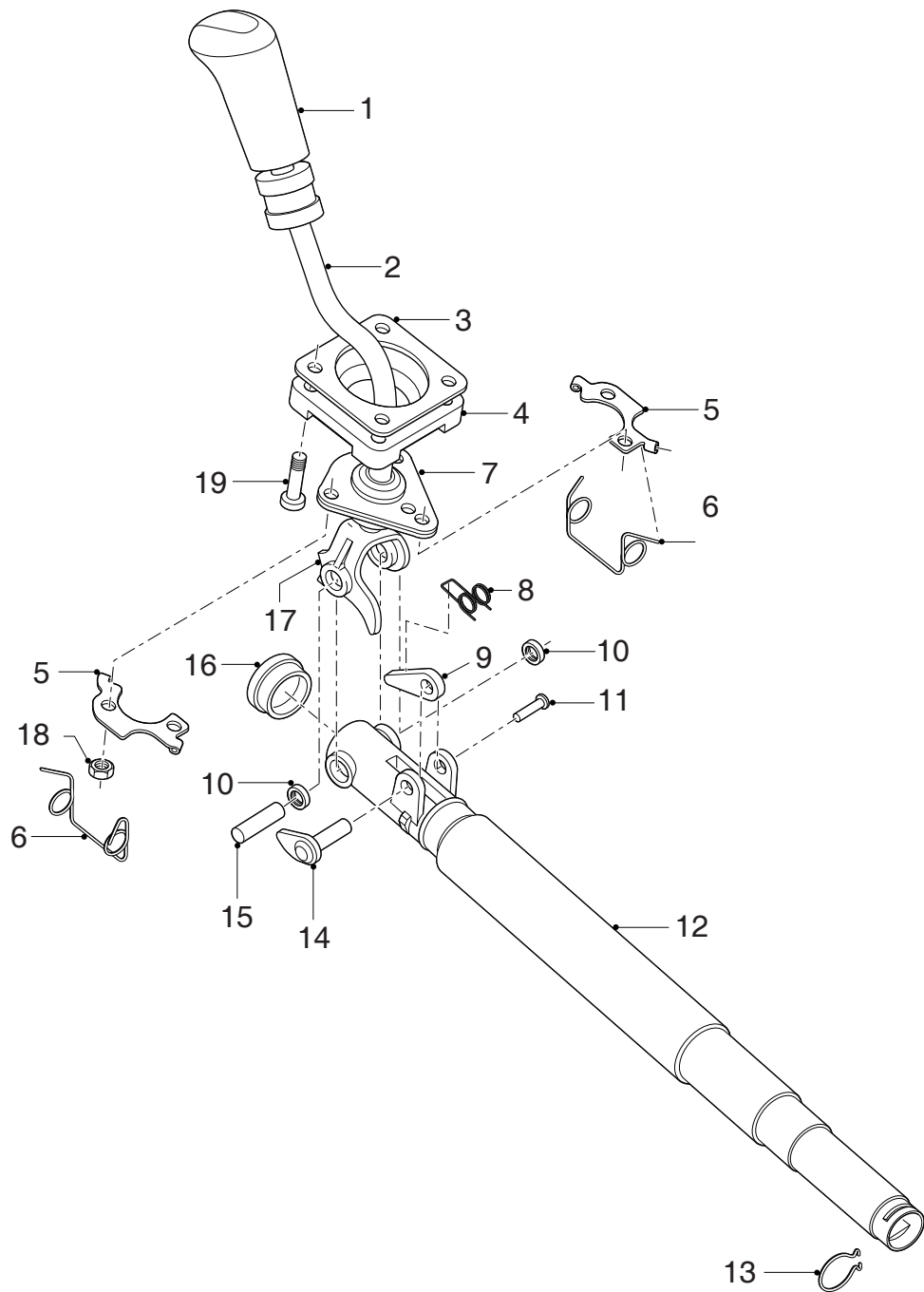
MECHANICAL GEARBOX CONTROL

3

General

LF45/55 series

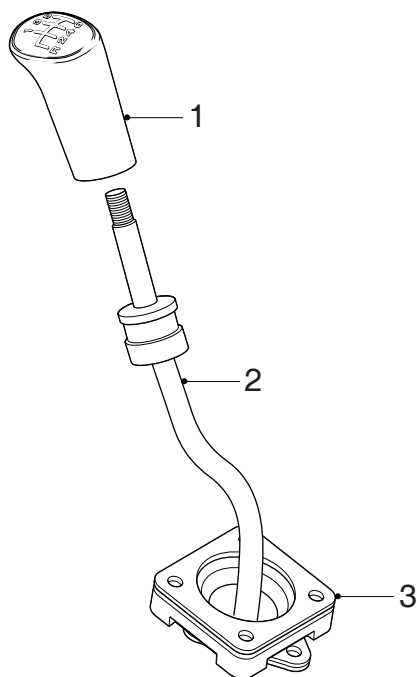
1.4 OVERVIEW DRAWING, GEAR LEVER UNIT



V3 00 568

- | | | | |
|-----|------------------|-----|------------------------|
| 1. | Switch button | 11. | Clamping pin |
| 2. | Gear lever | 12. | Telescopic control rod |
| 3. | Attachment plate | 13. | Retainer clip |
| 4. | Vibration damper | 14. | Pawl |
| 5. | Spring holder | 15. | Axle |
| 6. | Centring spring | 16. | Plug |
| 7. | Bearing housing | 17. | Gear lever pawl |
| 8. | Spring | 18. | Attachment nut |
| 9. | Control rod pawl | 19. | Attachment bolt |
| 10. | Needle bearing | | |

1.5 OVERVIEW DRAWING, ZF GEARBOX GEAR LEVER



V3 00 569

- 1. Switch button
- 2. Gear lever
- 3. Bearing housing

MECHANICAL GEARBOX CONTROL

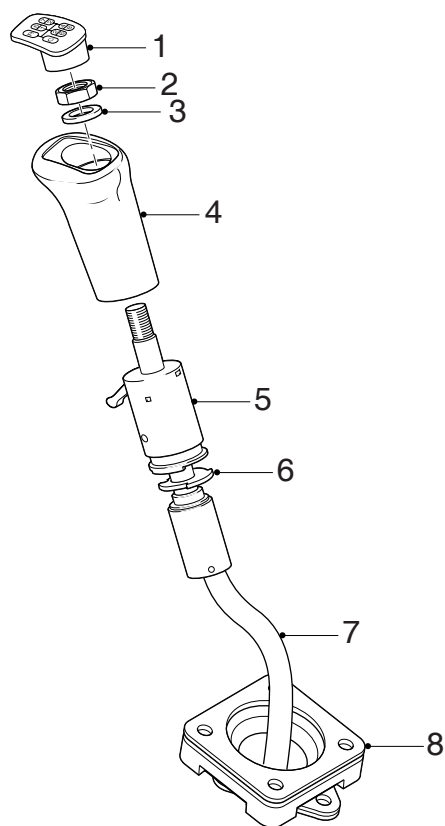
3

General

LF45/55 series

1.6 OVERVIEW DRAWING, EATON GEAR LEVER

2



V3 00 572

1. Cover plate
2. Attachment nut
3. O-ring
4. Switch button
5. Range group operating switch
6. Clamping plate
7. Gear lever
8. Bearing housing

2. INSPECTION AND ADJUSTMENT

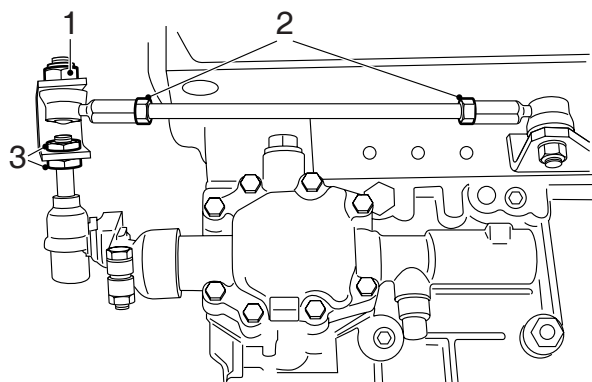
2.1 INSPECTING AND ADJUSTING OPERATING MECHANISM, 2 ADJUSTMENT OPTIONS

Inspecting operating mechanism, 2 adjustment options

1. Push the control against the spring pressure to check whether it can move freely in neutral.
2. Check that all gears can be engaged without parts coming into contact with each other.
3. During a test drive, check that the gear remains engaged under changing conditions.

Adjusting the gearbox control, 2 adjustment options

1. Remove the switch button (see "Removal and installation").
2. Remove the gaiter (see "Removal and installation").
3. Loosen the lock nuts (3) of the gearbox lever.
4. Loosen the lock nuts (2) of the torque rod on both sides.
5. Remove attachment nut (1) from the torque rod on control rod side.



V3 00 575

MECHANICAL GEARBOX CONTROL

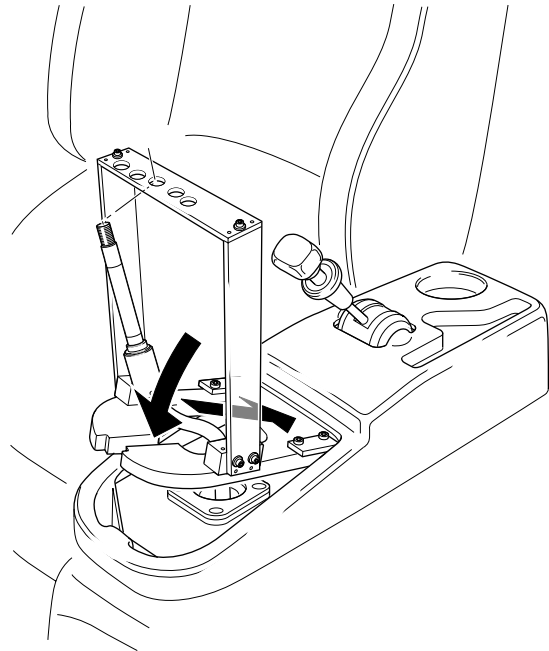
3

Inspection and adjustment

LF45/55 series

2

6. Fix the gear lever by fitting the special tool (DAF no. 1329488) over the gear lever and inserting the end of the gear lever through the appropriate opening.

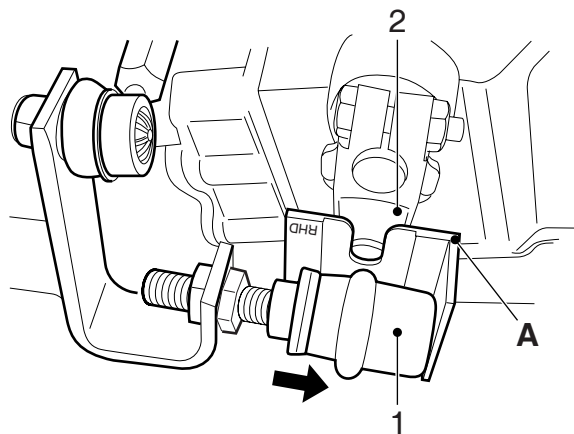


V3 00 580

7. Fit the special tool (DAF no. 1453143) between the ball joint (1) and the arm (2). Centre the ball joint (1) by pressing it against the shoulder of the special tool (A).

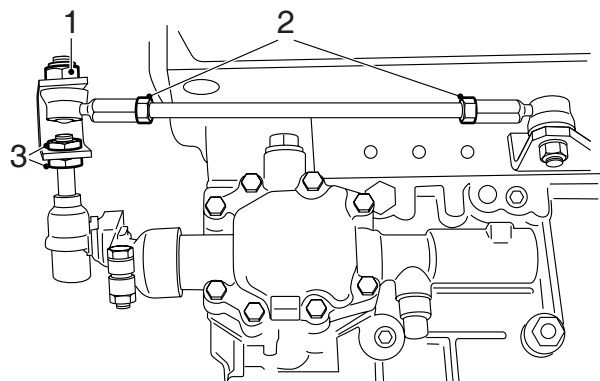
Note:

On the special tool (A) (DAF no. 1453143) it is shown which side of the tool must be used for LHD vehicles and which side for RHD vehicles.



V3 00 840

8. Hand-tighten the lock nuts (3) of the gearbox lever without moving the control rod.
9. Tighten the lock nuts (3) on the gearbox lever to the specified torque without moving the control rod. See "Technical data".
10. Adjust the length of the torque rod in such a way that it can be positioned in the control rod without tension. Tighten the attachment nut (1) to the specified torque. See "Technical data".



V3 00 575

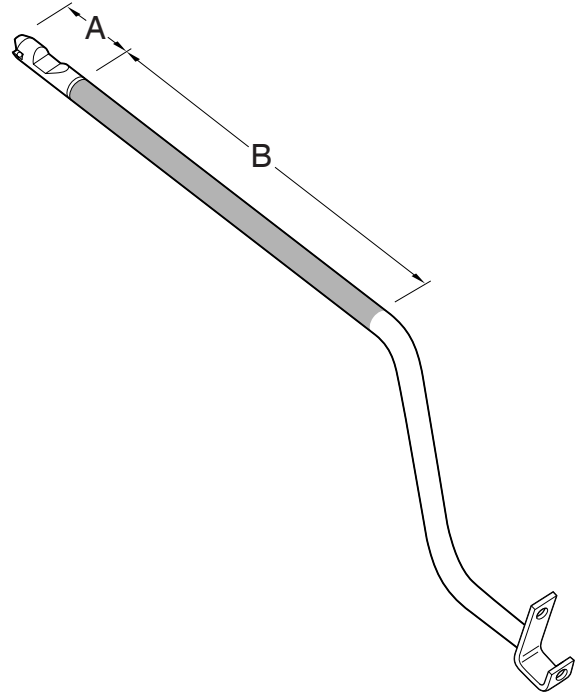
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MECHANICAL GEARBOX CONTROL

LF45/55 series

Inspection and adjustment

11. Tighten the lock nuts (2) on the torque rod to the specified torque without moving the torque rod. See "Technical data".
12. Remove the special tool from the ball joint.
13. Clean part (A) of the control rod and remove any grease.
14. Apply the specified lubricant lightly to section (B) of the control rod. See "Technical data".
15. Remove the special tool and fit the gaiter. See "Removal and installation".
16. Fit the switch button. See "Removal and installation".



V3 00 746

2

MECHANICAL GEARBOX CONTROL

3

Inspection and adjustment

LF45/55 series

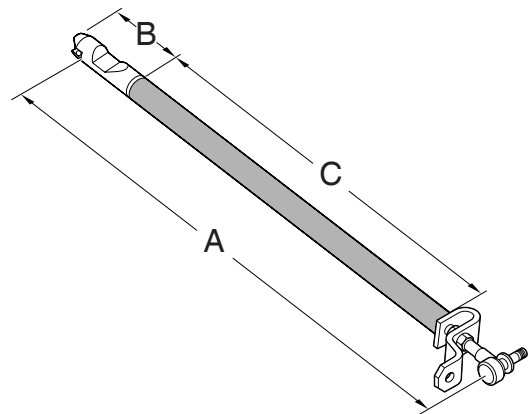
2.2 INSPECTING AND ADJUSTING OPERATING MECHANISM, 4 ADJUSTMENT OPTIONS

Inspecting operating mechanism, 4 adjustment options

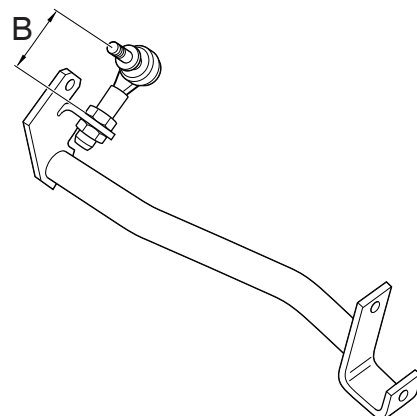
1. Push the control against the spring pressure to check whether it can move freely in neutral.
2. Check that all gears can be engaged without parts coming into contact with each other.
3. During a test drive, check that the gear remains engaged under changing conditions.

Adjusting the gearbox control, 4 adjustment options

1. Remove the retaining clip and disassemble the control rods underneath the cab.
2. Measure the length of the control rod and compare the measured reading (A) with the specified reading. See "Technical data".
3. If necessary, adjust the length.
4. Clean part (B) of the control rod and remove any grease.
5. Apply the specified lubricant lightly to section (C) of the control rod. See "Technical data".
6. Measure the length (B) of the control rod ball joint behind the cab and compare the measured reading with the specified reading. See "Technical data".
7. If necessary, adjust the length of the ball joint.
8. Remove the switch button (see "Removal and installation").
9. Remove the gaiter (see "Removal and installation").



V3 00 745



V3 00 564

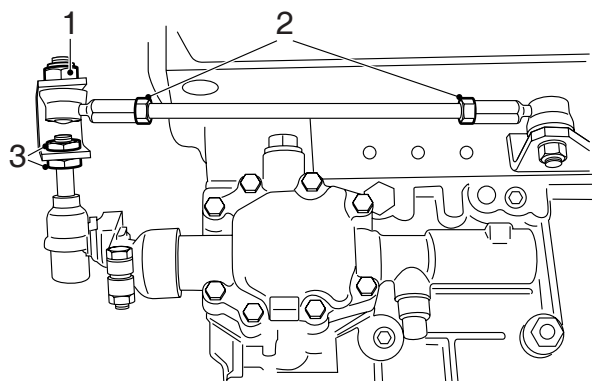
3

MECHANICAL GEARBOX CONTROL

LF45/55 series

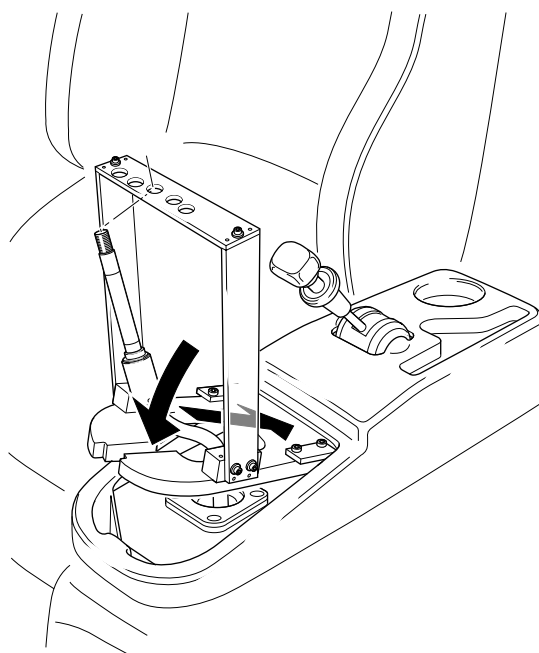
Inspection and adjustment

10. Loosen the lock nuts (3) of the gearbox lever.
11. Loosen the lock nuts (2) of the torque rod on both sides.
12. Remove attachment nut (1) from the torque rod on control rod side.



V3 00 575

13. Fix the gear lever by fitting the special tool (DAF no. 1329488) over the gear lever and inserting the end of the gear lever through the appropriate opening.

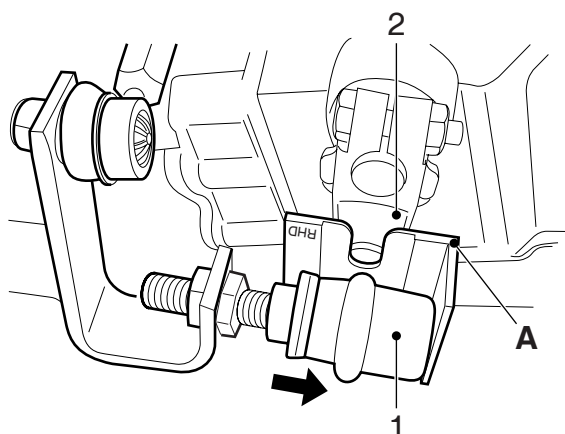


V3 00 580

14. Fit the special tool (DAF no. 1453143) between the ball joint (1) and the arm (2). Centre the ball joint (1) by pressing it against the shoulder of the special tool (A).

Note:

On the special tool (A) (DAF no. 1453143) it is shown which side of the tool must be used for LHD vehicles and which side for RHD vehicles.



V3 00 840

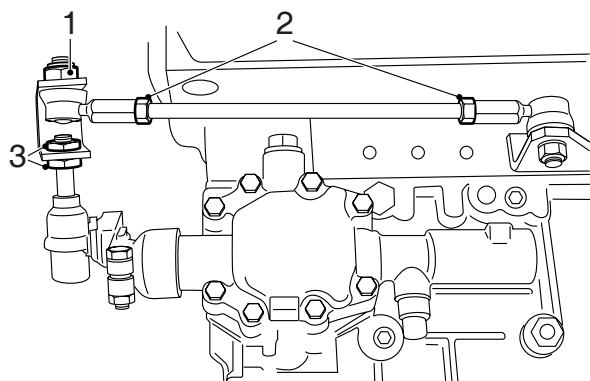
MECHANICAL GEARBOX CONTROL

3

Inspection and adjustment

LF45/55 series

15. Hand-tighten the lock nuts (3) of the gearbox lever without moving the control rod.
16. Tighten the lock nuts (3) on the gearbox lever to the specified torque without moving the control rod. See "Technical data".
17. Adjust the length of the torque rod in such a way that it can be positioned in the control rod without tension. Tighten the attachment nut (1) to the specified torque. See "Technical data".
18. Tighten the lock nuts (2) on the torque rod to the specified torque without moving the torque rod. See "Technical data".
19. Remove the special tool from the ball joint.
20. Remove the special tool and fit the gaiter. See "Removal and installation".
21. Fit the switch button. See "Removal and installation".



V3 00 575

2

3. REMOVAL AND INSTALLATION

3.1 REMOVING AND INSTALLING SWITCH BUTTON

Removing ZF gearbox switch button

1. Turn the switch button anti-clockwise away from the gear lever.

Installing ZF gearbox gear lever

1. Apply locking compound to the gear lever wire. See "Technical data".
2. Turn the switch button clockwise onto the gear lever.
3. Position the switch button so that it corresponds to the gear-shift movement.

Removing Eaton gearbox switch button

1. Remove the cover plate and the gear-change pattern from the top of the switch button.
2. Remove the attachment nut from the switch button.
3. Remove the switch button.
4. Remove the gaiter.
5. Position the gear lever as far forward as possible and remove the range-change switch.

Installing Eaton gearbox switch button

1. Position the gear lever as far forward as possible and fit the range-change switch over the gear lever.
2. Position the air pipes so that they cannot get trapped between the gear lever and the cab.
3. Fit the gaiter.
4. Apply locking compound to the gear lever wire. See "Technical data".
5. Fit the switch button onto the gear lever and tighten the attachment nut to the specified torque. See "Technical data".
6. Fit the cover plate.

MECHANICAL GEARBOX CONTROL

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Removal and installation

LF45/55 series

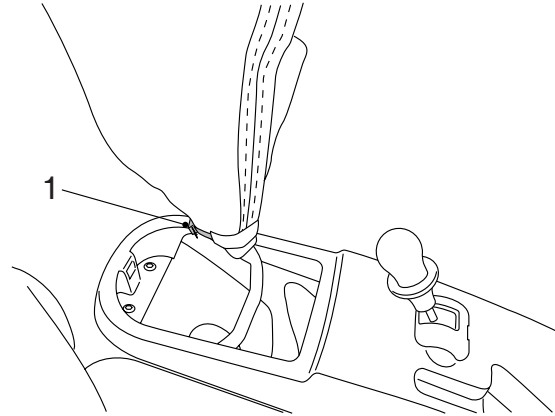
3.2 REMOVING AND INSTALLING GAITER

Removing gaiter

1. Remove the switch button.
2. Disconnect the underside of the gaiter.
3. Pull the gaiter over the switch button and remove the clamping strap (1).
4. Remove the gaiter.

Installing gaiter

1. Fit a new clamping strap on the inside of the gaiter.
2. Fit the top of the gaiter inside out over the gear lever and tighten the clamping strap (1).
3. Pull the entire gaiter over the gear lever.
4. Tighten the underside of the gaiter.



V3 00 578

2

3.3 REMOVING AND INSTALLING GEAR LEVER UNIT

Removing gear lever unit

1. Remove the switch button.
2. Remove the gaiter.
3. Remove the retainer clip from the telescopic control rod underneath the cab and remove the gear lever unit.
4. Remove the attachment bolts of the gear lever on the bottom of the cab.

Installing gear lever unit

1. Slide the gear lever unit and the telescopic control rod onto the gearbox control and fit the retainer clip.
2. Install the gear lever in the cab via the feed-through.
3. Fit the gear lever attachment bolts and tighten them to the specified torque. See "Technical data".
4. Fit the gaiter.
5. Fit the switch button.
6. Check that the operating mechanism does not touch any vehicle parts during shifting.

MECHANICAL GEARBOX CONTROL

3

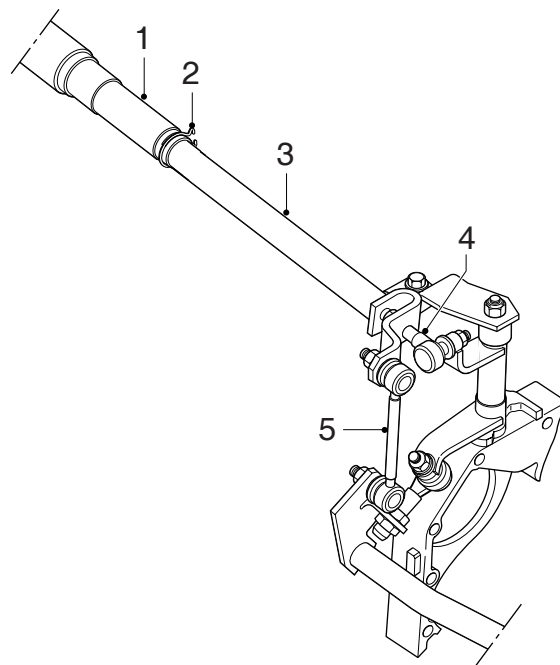
Removal and installation

LF45/55 series

3.4 REMOVING AND INSTALLING CONTROL ROD UNDERNEATH THE CAB

Removing control rod underneath the cab

1. Remove the retainer clip (2) of the telescopic control rod (1).
2. Remove the attachment nuts from the ball joint (4) and torque rod (5).



V3 00 573

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3

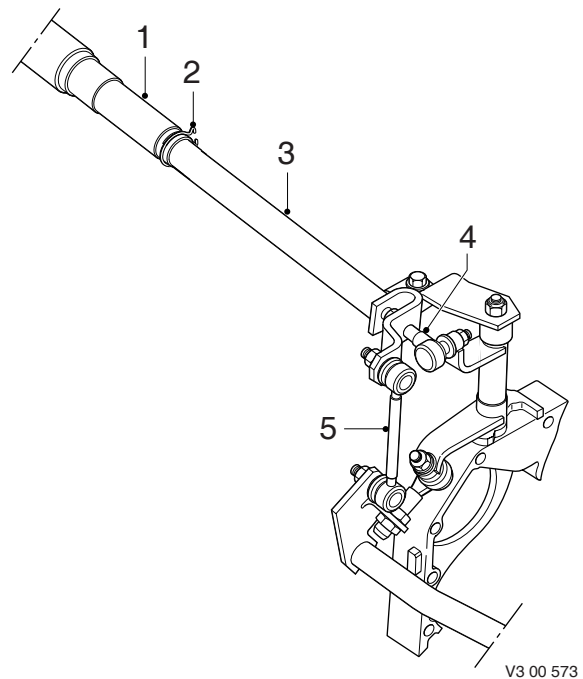
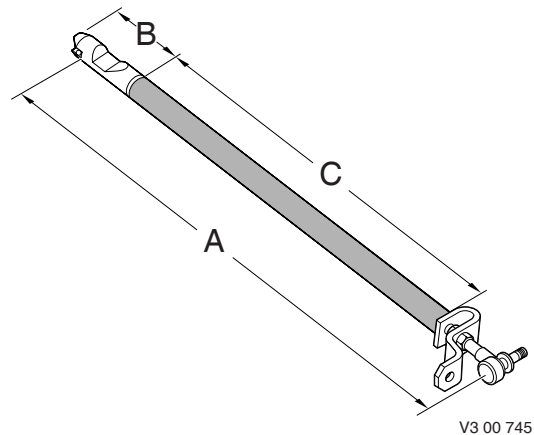
MECHANICAL GEARBOX CONTROL

LF45/55 series

Removal and installation

Installing control rod underneath the cab

1. Adjust the length (A) of the control rod (3).
See "Technical data".
2. Clean part (B) of the control rod and remove any grease.
3. Apply the specified lubricant lightly to section (C) of the control rod. See "Technical data".
4. Fit the control rod (3) into the telescopic control rod (1) and fit the retainer clip (2).
5. Tighten the attachment nuts of the ball joint (4) and the torque rod to the specified torque. See "Technical data".
6. Check the functioning of the operating mechanism. See "Inspection and adjustment".



2

MECHANICAL GEARBOX CONTROL

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Removal and installation

LF45/55 series

3.5 REMOVING AND INSTALLING REAR CONTROL ROD

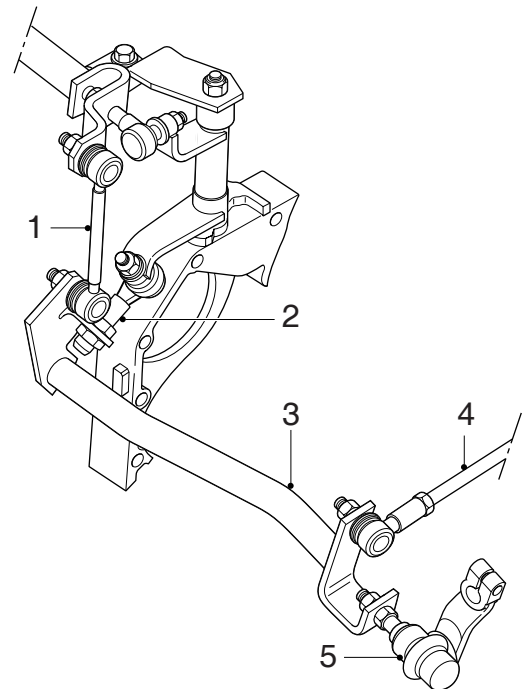
Removing control rod behind the cab

1. Remove the attachment nut from the ball joint (2).
2. Remove the attachment nut from torque rods (1) and (4).
3. Remove the lock nut from the ball joint (5).

Note:

Make sure that the rearmost lock nut on the ball joint (5) is not moved.

4. Remove the control rod (3).



V3 00 574

2

3

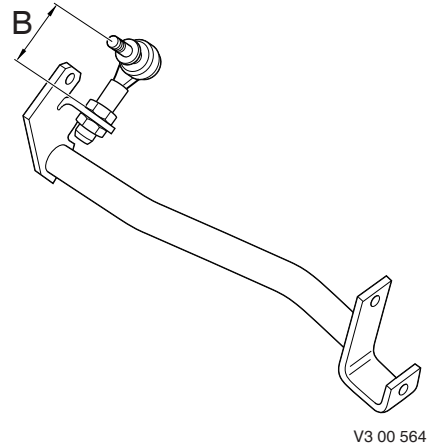
MECHANICAL GEARBOX CONTROL

LF45/55 series

Removal and installation

Installing control rod behind the cab

1. Adjust the length (B) of the control rod (3).
See "Technical data".

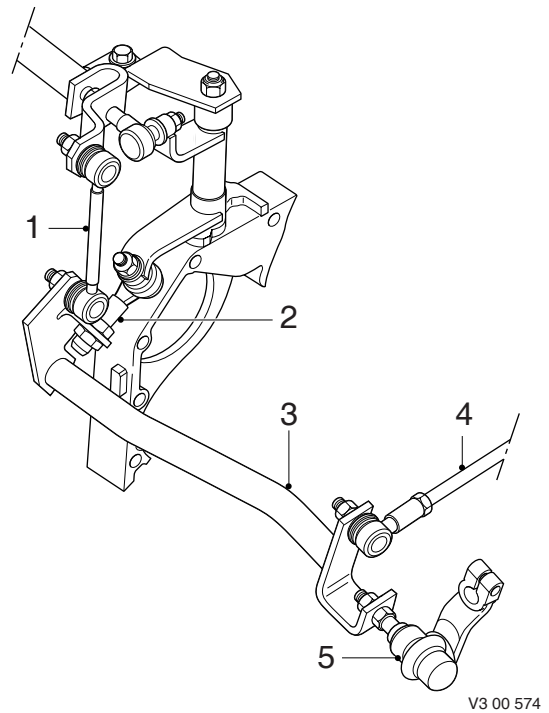


2. Fit the control rod (3) and fit and hand-tighten all attachment nuts.
3. Tighten all attachment and lock nuts to the specified torque. See "Technical data".

Note:

Make sure that the control rod does not turn while the attachment and lock nuts are being tightened.

4. Check the functioning of the operating mechanism. See "Inspection and adjustment".



2

MECHANICAL GEARBOX CONTROL

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Removal and installation

LF45/55 series

2

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5.1 Cleaning filter/governor	5-1	200508

PNEUMATIC GEARBOX CONTROL

3

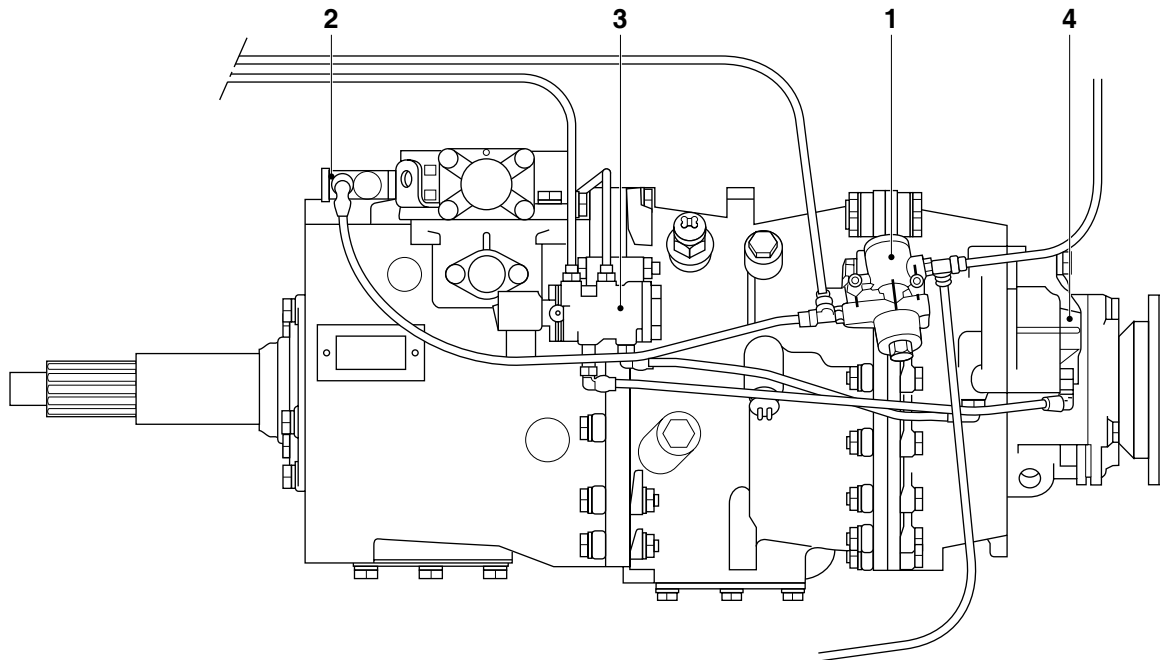
Contents

LF45/55 series

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1. GENERAL

1.1 LOCATION OF COMPONENTS IN PNEUMATIC SECTION OF GEARBOX CONTROL



1. Filter/governor
2. Neutral position valve
3. Electropneumatic downshift protection valve
4. Range group engaging cylinder

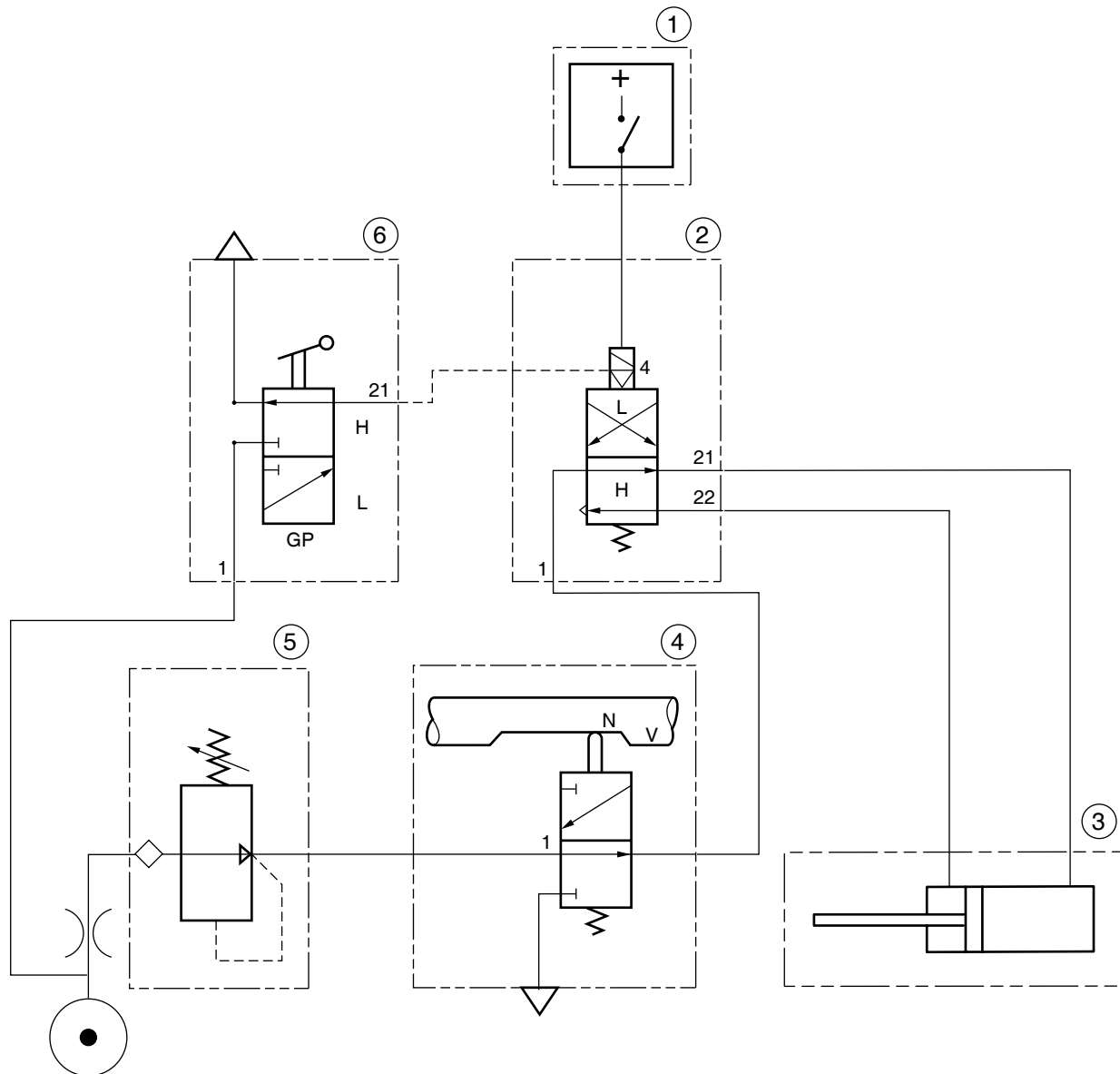
PNEUMATIC GEARBOX CONTROL

3

General

LF45/55 series

1.2 PNEUMATIC DIAGRAM, GEARBOX CONTROL

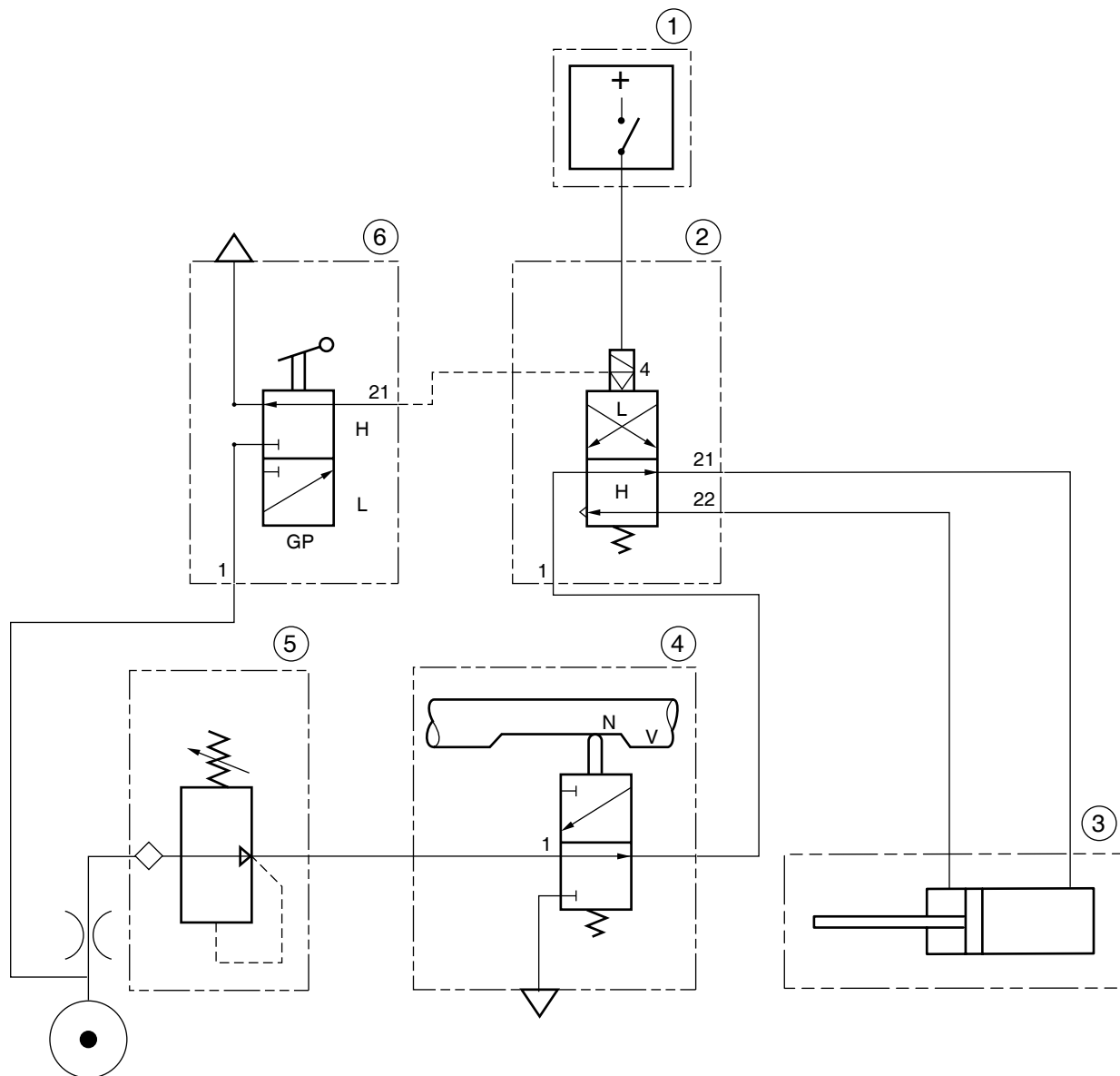


V3 00 359

1. VIC electronic unit
2. Electropneumatic downshift protection valve
3. Range group engaging cylinder
4. Neutral position valve
5. Filter/governor
6. Range group operating switch

- L Position "low"
H Position "high"
N Gearbox selector shaft in neutral
V Gearbox selector shaft engaged

1.3 SYSTEM DESCRIPTION, PNEUMATIC SECTION OF GEARBOX CONTROL



V3 00 359

The pressure in the pneumatic section of the gearbox control is filtered and reduced in the filter/governor (5). From the filter/governor the system pressure goes to the neutral position valve (4) and the range group operating switch (6) located on the ball of the gear lever.

When the range group operating switch is activated a pneumatic command will be sent to the electropneumatic downshift protection valve (2).

PNEUMATIC GEARBOX CONTROL

3

General

LF45/55 series

The electropneumatic downshift protection valve can only be activated when the vehicle speed is below a certain value. This is so as to prevent damage to the drive line. When the vehicle speed is low enough, the electropneumatic downshift protection valve is activated and the system pressure goes from the neutral position valve to the range group engaging cylinder.

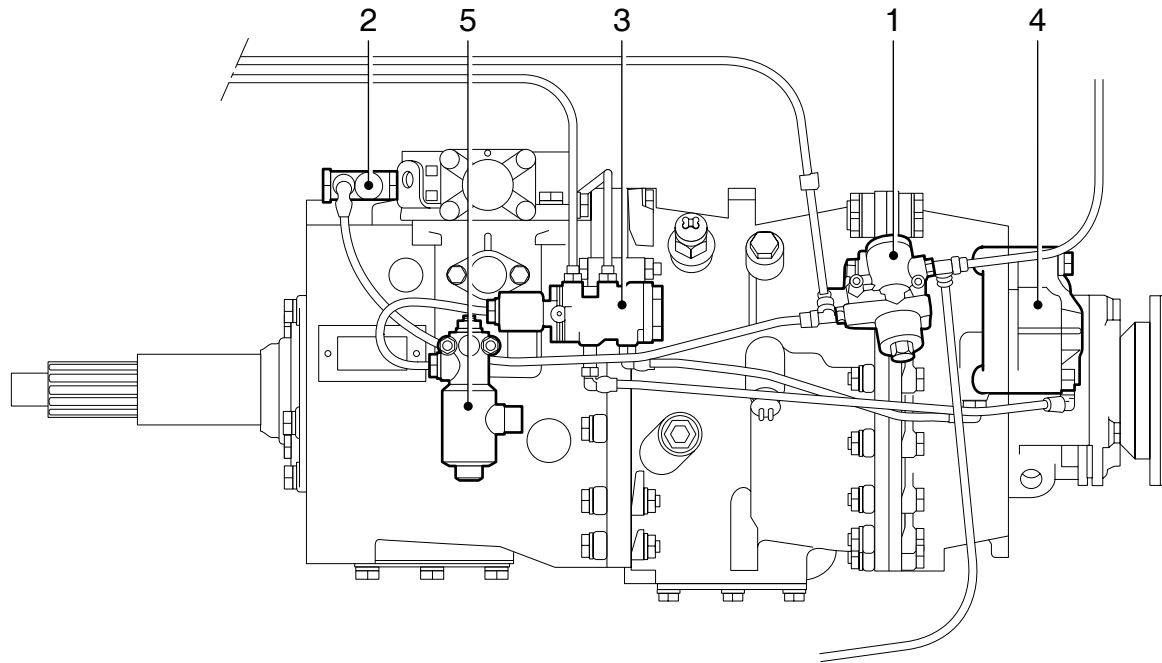
The neutral position valve is activated when the gear lever is moved through the neutral position.

3

2. DESCRIPTION OF COMPONENTS

2.1 FILTER/GOVERNOR

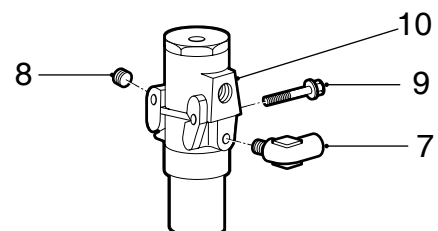
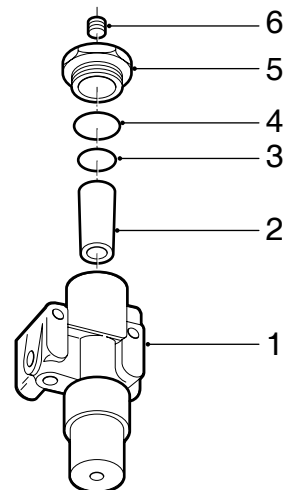
Filter/governor (1) on gearbox



V300558-2

Overview drawing, filter/governor

1. Filter/governor
2. Filter element
3. Seal
4. O-ring
5. Cover
6. Plug
7. Output
8. Selector valve output plug
9. Attachment bolt
10. Supply pressure input



V300430

PNEUMATIC GEARBOX CONTROL

3

Description of components

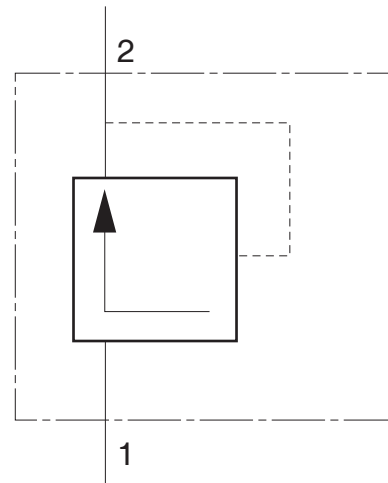
LF45/55 series

The full vehicle supply pressure from circuit four of the brake system must pass through the air filter.

The supply pressure goes through the bore (1) in the valve and will force the piston down against the spring pressure.

The spring cannot be adjusted.

The system pressure (see "Technical data") goes via connection point (2) to the range group operating switch and the neutral position valve.



2.2 GEAR LEVER SELECTOR VALVE

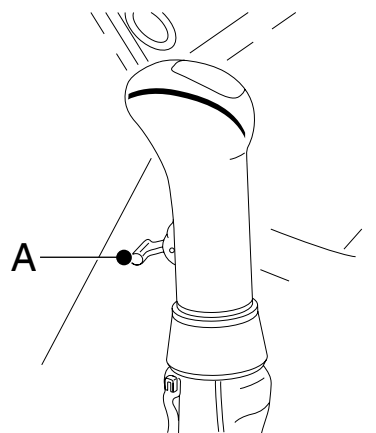
Changing to the low or high speed range is done with switch (A) on the ball of the gear lever.

When the switch is facing down it means that the low speed range has been or is being engaged.

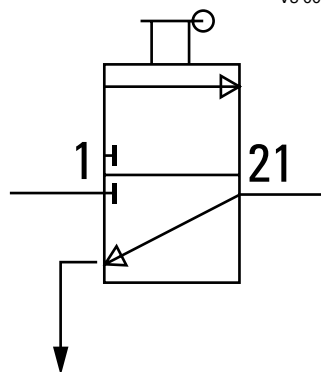
When the switch is facing up the high speed range has been or is being engaged.

Pre-selection is possible. A particular range is switched only when the gear lever is moved through the neutral position.

The pressure on connection 1 is the system pressure. When the switch is operated a pneumatic command will be sent from connection 21 to the electropneumatic downshift protection valve.



V3 00 562



V3 00 477

PNEUMATIC GEARBOX CONTROL

3

Description of components

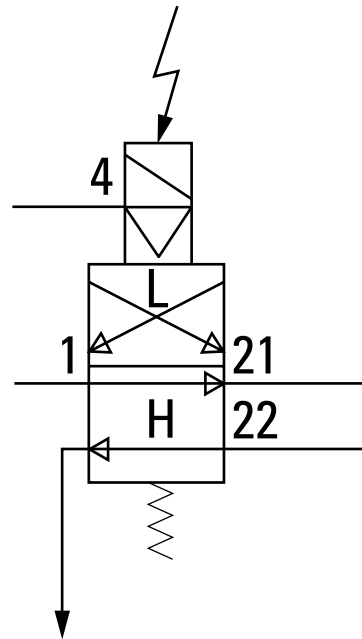
LF45/55 series

2.3 ELECTROPNEUMATIC DOWNSHIFT PROTECTION VALVE

The electropneumatic downshift protection valve receives a certain frequency value relating to the vehicle speed from the VIC.

If this value is too high, the connection between the electropneumatic downshift protection valve and earth will be broken. Despite the pneumatic command from the range group operating switch to connection point (4) on the electropneumatic downshift valve, it is not now possible to switch to the low range.

The system pressure to connection point (1) on the electropneumatic downshift protection valve is only available when the gear lever, and hence also the neutral position valve, is in the neutral position.

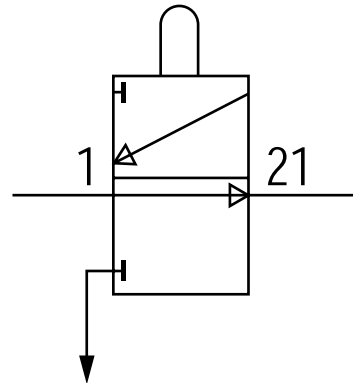


V3 00 478

3

2.4 NEUTRAL POSITION VALVE

The neutral position valve is mounted on the selector shaft housing. Inside the selector shaft is a slot that corresponds to the neutral position of the selector shaft. The neutral position valve pawl drops into this slot. When a gear is engaged, the neutral position valve pawl moves out of the slot, thereby switching the valve. In the neutral position the system pressure is sent to the electropneumatic downshift protection valve. In the event of a gear change, the gear lever and the neutral position valve will be moved through the neutral position. At that moment the neutral position valve sends the system pressure from connection (21) to the electropneumatic downshift protection valve.



V3 00 476

PNEUMATIC GEARBOX CONTROL

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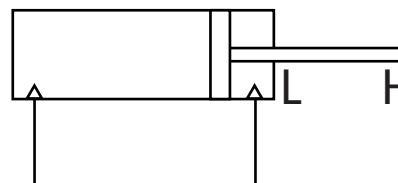
Description of components

LF45/55 series

2.5 RANGE GROUP ENGAGING CYLINDER

The range group engaging cylinder is mounted on the rear of the gearbox.

The engaging cylinder is supplied from the electropneumatic downshift protection valve.



V3 00 479

3. INSPECTION AND ADJUSTMENT

3.1 PROGRAMMING PARAMETERS USING DAVIE

After a gearbox has been replaced by a gearbox that uses a different reduction rate, it will be necessary to reprogram the VIC by means of DAVIE XD.

This is to ensure that the downshift protection valve is enabled and disabled at the correct vehicle speeds.

It is not possible to adjust the frequencies of the gate protection and the range-change protection with the standard program of DAVIE XD. If the vehicle configuration is changed, this should always be reported.

PNEUMATIC GEARBOX CONTROL

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Inspection and adjustment

LF45/55 series

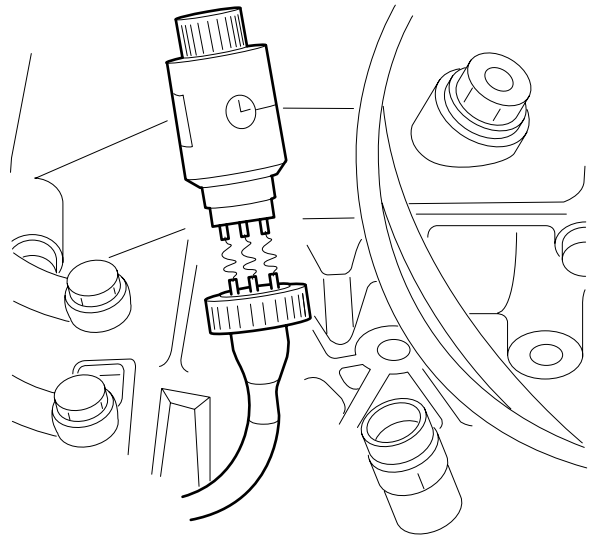
3.2 SIMULATING SPEED SIGNAL

The speed signal can be simulated with DELSI (DAF no. 0694941). DELSI must be connected to the speed sensor connector.

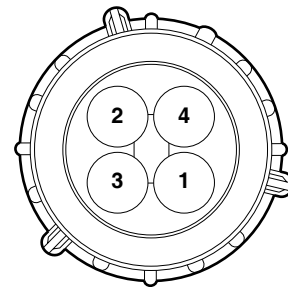
Before connecting DELSI to the speed sensor connector, an adapter cable must be made. The adapter cable must consist of the following wiring:

- Pin 1: speed sensor, power supply
- Pin 2: speed sensor, earth
- Pin 3: speed sensor, "real-time" speed/distance signal
- Pin 4: not in use

When the speed sensor connector is disconnected, a fault is stored in the tachograph. This fault can be deleted using DAVIE XD.



V300425C



K100873

3

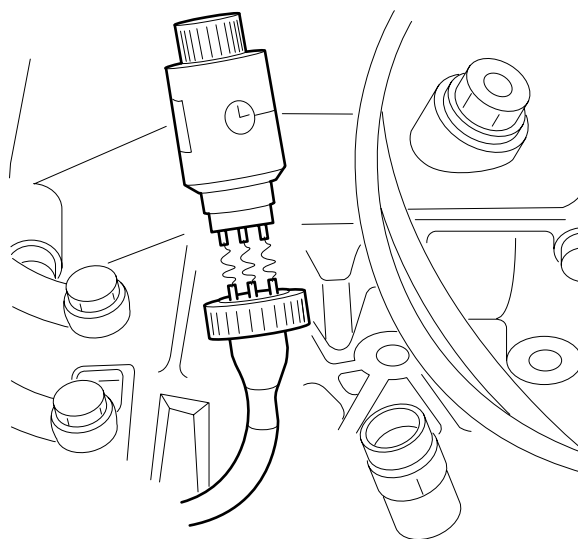
3.3 INSPECTION, DOWNSHIFT PROTECTION VALVE

Inspection without vehicle speed signal

1. Make sure there is sufficient air pressure in the brake system.
2. Position the gear lever in neutral.
3. Switch the vehicle ignition on.
4. Use the range group operating switch on the ball of the gear lever to select the lower range. The range group should now switch to the lower range.
5. Switch the vehicle ignition off. The range group should now automatically switch to the higher range.

Inspection with the vehicle speed signal

1. Make sure there is sufficient air pressure in the brake system.
2. Connect special tool DELSI (DAF no. 0694941).
3. Position the gear lever in neutral.
4. Switch the vehicle ignition on.
5. Use the range group operating switch on the ball of the gear lever to select the lower range. The range group should now switch to the lower range.



V300425c

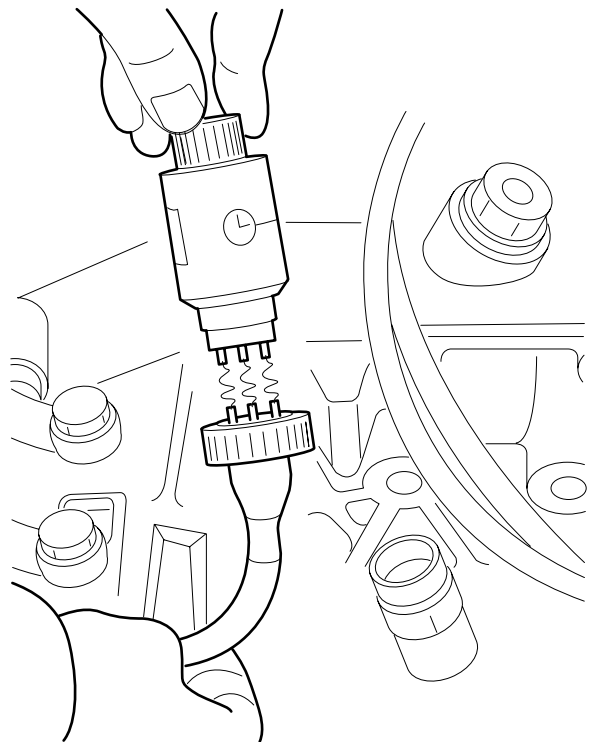
PNEUMATIC GEARBOX CONTROL

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Inspection and adjustment

LF45/55 series

6. Use DELSI to raise the simulated vehicle speed slowly to approximately 40 km/h. As the vehicle speed increases, the range group should automatically switch to the higher range.
7. Use DELSI to decrease the simulated vehicle speed slowly to approximately 0 km/h. As the vehicle speed decreases, the range group should automatically switch to the lower range.

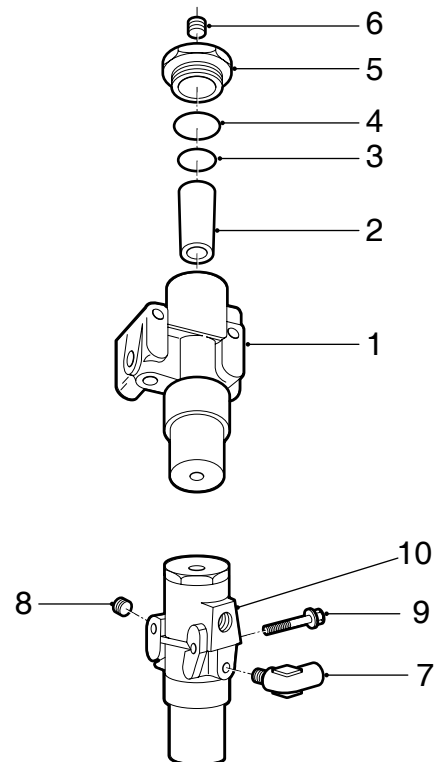


V300426

3.4 INSPECTION, FILTER/GOVERNOR

Inspection, filter/governor

1. Remove the plug from the extra outlet (9) and install a pressure gauge.
2. Check the service pressure. See "Technical data".



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PNEUMATIC GEARBOX CONTROL

3

Inspection and adjustment

LF45/55 series

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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, FILTER/GOVERNOR

Removal, filter/governor

1. Blow off the air reservoirs.
2. Unscrew the air pipes.
3. Remove the two attachment bolts from the filter/governor and remove the filter/governor.

Installation, filter/governor

1. Install the filter/governor on the attachment bracket. Tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the air pipes.
3. Pressurise the system.
4. Check the system for air leakage.
5. Check the operation of the valve. See "Inspection and adjustment".

PNEUMATIC GEARBOX CONTROL

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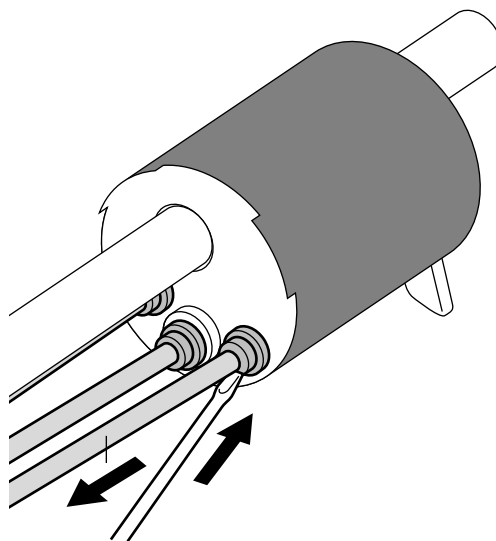
Removal and installation

LF45/55 series

4.2 REMOVING AND INSTALLING RANGE GROUP OPERATING SWITCH

Removing range group operating switch

1. Blow off the air reservoirs.
2. Detach the bottom of the gaiter and partially pull the gaiter over the gear lever knob.
3. Remove the clamping strap on the inside of the gaiter.
4. Remove the cover cap with the gear-change pattern on the top of the gear lever.
5. Remove the attachment nut on the top of the gear lever and remove the gear lever knob.
6. Remove the gaiter.
7. Mark the various air pipes and disconnect them from the range-change switch using a small screwdriver.
8. Remove the range-change switch and the clamping piece.



V3 00 429

Installing range group operating switch

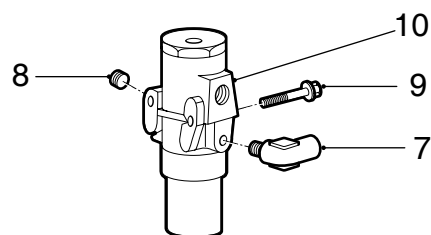
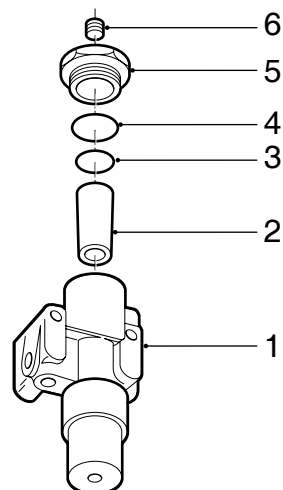
1. Install the clamping piece on the gear lever.
2. Connect the various air pipes to the range-change switch as indicated by the markings.
3. Install the range-change switch on the gear lever. Ensure that the clamping piece is properly mounted on the range-change switch.
4. Slide the gaiter over the gear lever.
5. Fit the switch button onto the gear lever and tighten the attachment nut to the specified torque. See "Technical data".
6. Install a clamping strap on the inside of the gaiter.
7. Pressurise the system.
8. Check the system for air leakage.
9. Check the operation of the range group operating switch.

5. CLEANING

5.1 CLEANING FILTER/GOVERNOR

Cleaning filter/governor

1. Remove the cover (5).
2. Remove the filter element (2) from the housing (1).
3. Clean the filter element (2) with cold water and soap, or replace if necessary.
4. Blow-clean the filter element (2) and the housing (1) from the inside with compressed air.
5. Replace the O-ring (4) and the sealing ring (3), if necessary.
6. Fit the cover (5) and tighten it to the specified torque. See "Technical data".
7. Pressurise the system.
8. Check the system for air leakage.



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Cleaning

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3.1 Checking gearbox oil level	3-1	200508
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ZF S5-42 GEARBOX

3

Contents

LF45/55 series

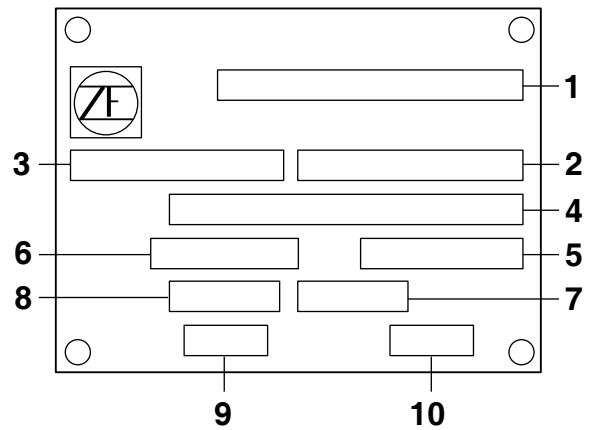
4

1. GENERAL

1.1 ZF GEARBOX TYPE

Each gearbox has a type plate attached to it, indicating the type of gearbox. This data can also be found on the vehicle identity card for the vehicle concerned.

1. Type of gearbox
2. ZF serial number
3. Parts list (ZF)
4. Specification number
5. Pulse generator ratio
6. Gearbox ratio
7. Engine speed using PTO
8. PTO speed
9. Gearbox oil capacity
10. Oil specification



V300049

ZF S5-42 GEARBOX

3

General

LF45/55 series

1.2 SYSTEM DESCRIPTION, GEARBOX

The gearbox consists of five synchromesh forward gears and one non-synchromesh reverse gear. The fifth gear is "close ratio" or "wide ratio", depending upon the model.

4

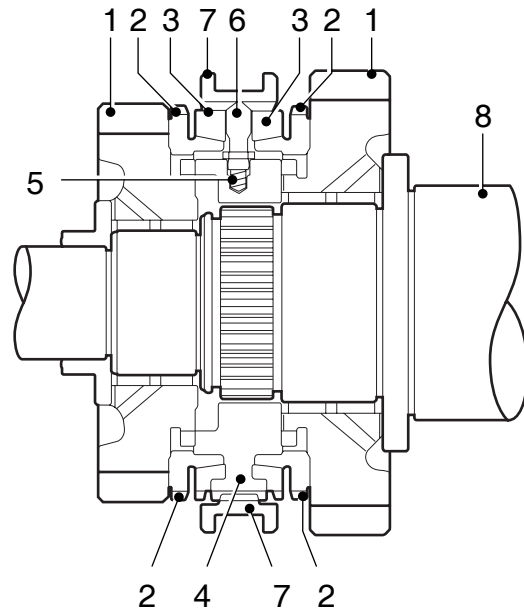
2. DESCRIPTION OF COMPONENTS

2.1 SYNCHRONISER

B-lock synchronisation

1. gear wheel
2. selector ring
3. synchromesh ring
4. selector sleeve
5. pressure spring
6. thrust piece
7. selector sleeve
8. main shaft

The synchroniser consists of the following parts:



ZF S5-42 GEARBOX

3

Description of components

LF45/55 series

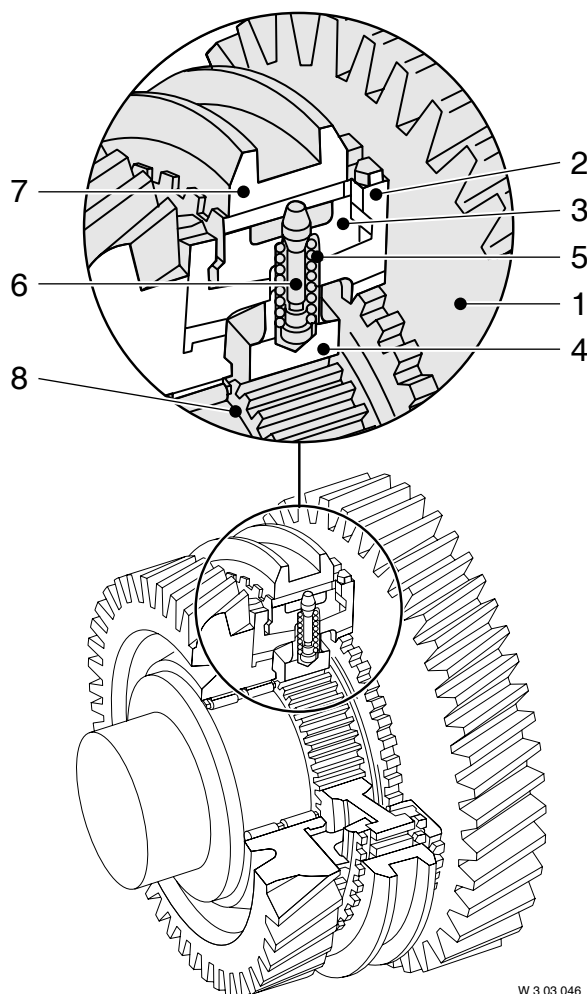
In neutral, the selector sleeve (7) is in the centre position.

Pressure springs (5) push the thrust pieces (6) into a wedge-shaped recess in the selector sleeve (7).

The gear wheels (1) and corresponding selector rings (2) move freely around the main shaft (8).

If the selector sleeve (7) is shifted to the right from the neutral position, the synchromesh ring (3) is pushed against the friction cone of the selector ring (2) by the thrust pieces (6).

The difference in speed immediately turns the synchromesh ring (3) as far as a stop on the selector sleeve support (4), which is not in the figure, and thus prevents further movement of selector sleeve (7).

**4**

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LF45/55 series

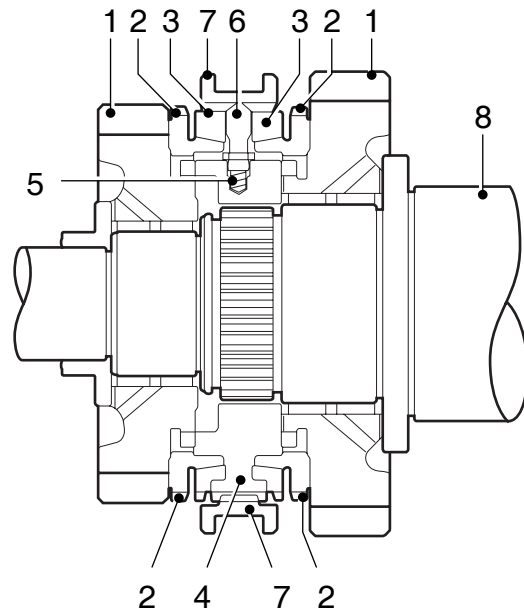
ZF S5-42 GEARBOX

Description of components

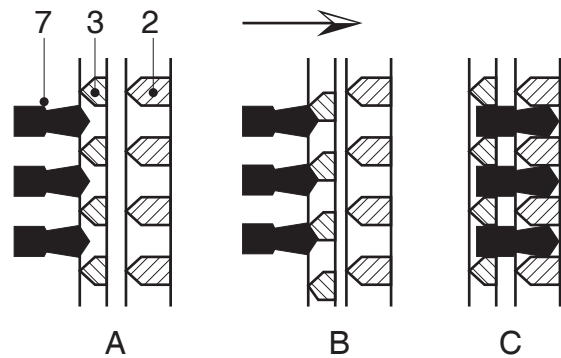
As a result of continued pressure on selector sleeve (7) (friction), the speed of the gear (1) to be shifted with selector ring (2) matches the speed of the main shaft (8).

The bevelled sides of the teeth on the synchromesh ring (3) and selector sleeve (7) cause synchromesh ring (3) to be turned back slightly after synchronisation.

This releases the lock and allows selector sleeve (7) to be moved into the teeth of selector ring (2). As a result, the relevant gear is engaged.



- A. Not connected
- B. Synchronise
- C. Connected



V301005

ZF S5-42 GEARBOX

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Description of components

LF45/55 series

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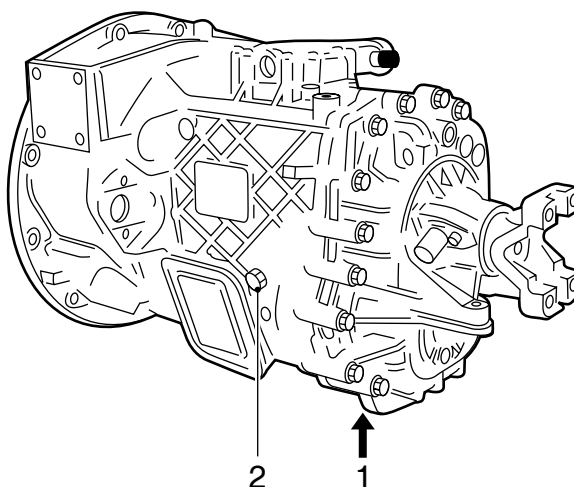
3. INSPECTION AND ADJUSTMENT

3.1 CHECKING GEARBOX OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Place the vehicle on a flat and level surface.
2. Wait for some minutes to allow the oil to flow back.
3. Remove the level check/filler plug (2) and check the oil level.
4. The oil level must reach the rim of the level check/filler opening.
5. After checking the oil level, tighten the level check plug to the specified torque. See "Technical data".



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ZF S5-42 GEARBOX

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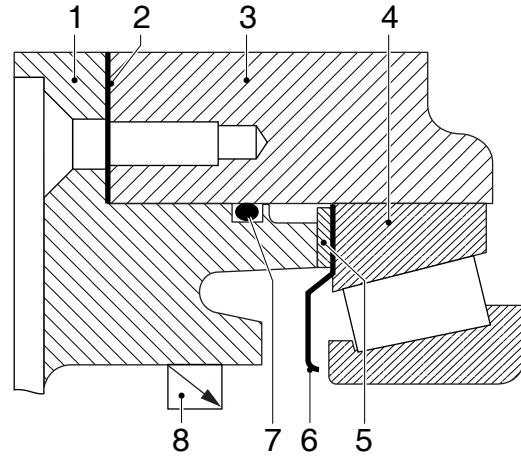
Inspection and adjustment

LF45/55 series

3.2 INSPECTING AND ADJUSTING INPUT SHAFT PRE-LOAD

Inspecting and adjusting input shaft pre-load

1. Remove the gearbox. See "Removal and installation".
2. Remove the gearbox front cover from the input shaft. See "Removal and installation".
3. Uniformly press the outer bearing race (4), so that the bearing is free of play. Constantly rotate the input shaft while applying pressure so that the bearing is set.



V3 00 413

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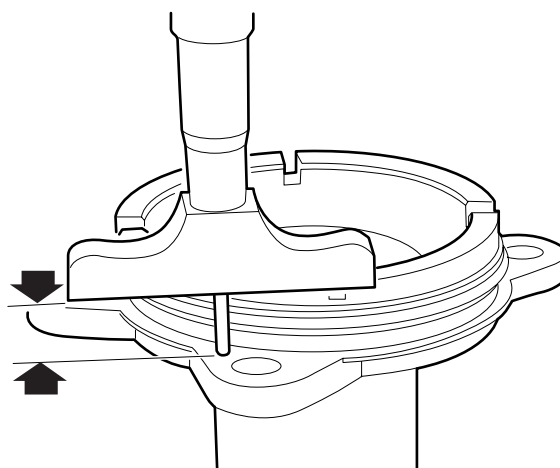
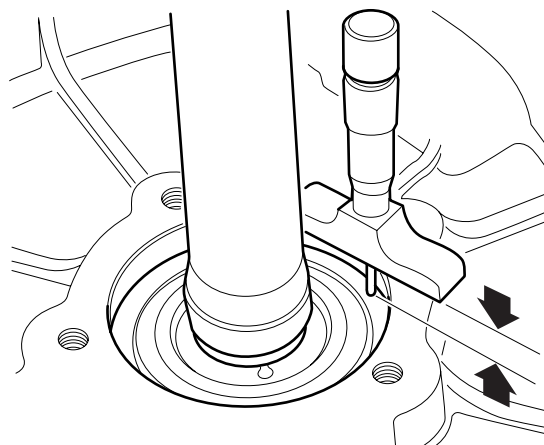
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LF45/55 series

ZF S5-42 GEARBOX

Inspection and adjustment

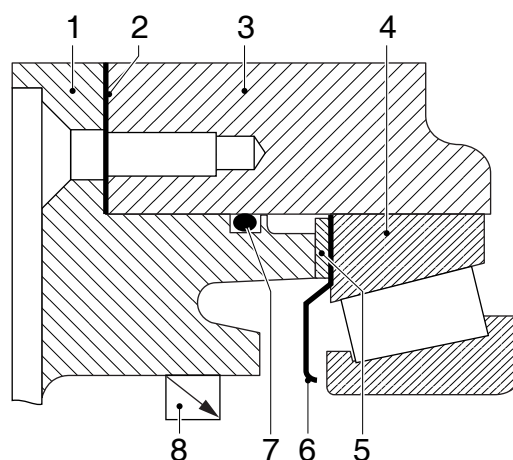
4. Use a depth gauge to measure the depth from the front of the housing down to the outer bearing race, distance A.
5. Use a depth gauge to determine the height the ball bearing protrudes from the gearbox front cover to the attachment surface, distance B.



V301011

6. For the pre-load tolerance, see "Technical data".
7. Using a micrometer, measure the thickness of the oil baffle (6).
8. Calculate the thickness of the adjusting ring (5) according to the following example:

Distance A	17.5 mm
Distance B	15.7 mm
Thickness of oil baffle	0.3 mm
Pre-load tolerance	+ 0.5 mm
Adjusting ring thickness	1.55 mm
9. Compare the value of the adjusting ring with the calculated value and replace the ring if necessary.
10. Fit a new gasket (2) in the gearbox front cover (1) and fit it on the gearbox. See "Removal and installation".
11. Fit the gearbox. See "Removal and installation".



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ZF S5-42 GEARBOX

3

Inspection and adjustment

LF45/55 series

4

4. REMOVAL AND INSTALLATION

4.1 REMOVING AND INSTALLING THE GEARBOX

Removing the gearbox

1. Disconnect the earth lead from the battery terminal.
2. Remove the silencer cap above the clutch.
3. Remove the attachment bolts of the prop shaft flange and remove the prop shaft.
4. Remove the intermediate bearing, if fitted.
5. Remove the attachment bolt from the exhaust bracket on the gearbox.
6. Remove the clamping strip from the exhaust pipe.
7. Remove the attachment bolt of the rubber suspension point on the end of the exhaust.
8. Twist the end-pipe of the exhaust loose and remove it.
9. Remove the attachment bolts from the clutch cylinder and remove it.
10. Remove all electrical connectors.
11. Remove the compressor pipe bracket.
12. Remove the torque rod of the selector rod.
13. Remove the elbow of the selector rod on the selector shaft fork.
14. Support the gearbox and remove the attachment bolts around it.
15. Manoeuvre the gearbox to the rear until it is free and then remove it.

ZF S5-42 GEARBOX

3

Removal and installation

LF45/55 series

Installing the gearbox

1. Engage the highest gear in order to align the keys of the input shaft with the clutch plate.
2. Fit the gearbox onto the engine. If necessary, rotate the drive flange in order to align the keys.
3. Fit the gearbox attachment bolts all around and tighten them to the specified torque. See "Technical data".
4. Install the torque rod and secure it by means of new self-locking nuts.
5. Install the elbow of the gearbox control on the selector finger. Use a new self-locking nut.
6. Fit the exhaust bracket.
7. Install the compressor pipe bracket.
8. Fit the electrical connectors onto the gearbox.
9. Fit the clutch cylinder.
10. Install the exhaust pipe, fasten it with the clamping strap and fit the attachment bolt of the suspension rubber.
11. Fit the prop shaft flange onto the gearbox.
12. Fit the intermediate bearing, if present.
13. Check the oil level. See "Inspection and adjustment".
14. Fit the silencer cap.
15. Fit the earth lead to the battery terminal.

4

4.2 REMOVING AND INSTALLING DRIVE FLANGE

Removing drive flange

1. Disconnect the earth cable from the batteries.
2. Make a reference mark on the prop shaft in relation to the gearbox drive flange.
3. Remove the nuts and bolts, if any, with which the intermediate bearing of the prop shaft is fixed to the cross member of the chassis.
4. Disconnect the prop shaft from the gearbox drive flange. Support the shafts at a suitable point on the chassis.
5. Fit the special tool (DAF no. 0484977) onto the drive flange.
6. Remove the lock nut. Remove the special tool from the drive flange.

Note:

Do NOT use the old lock nut again.

7. Using special tool (DAF no. 0484978), remove the drive flange from the main shaft.

Installing drive flange

1. Heat the drive flange to a temperature of 70°C and place it on the main shaft.
2. Fit special tool (DAF no. 0484977) onto the drive flange.
3. Apply locking compound to the screw thread. See "Technical data".
4. Tighten the new lock nut to the specified torque. See "Technical data".
5. Fit the prop shaft to the gearbox drive flange. Ensure that the reference markings are placed opposite each other. Fix the intermediate bearing onto the cross member of the chassis. Tighten the bolts to the specified torque. See "Technical data".
6. Connect the earth clamp to the batteries.

ZF S5-42 GEARBOX

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Removal and installation

LF45/55 series

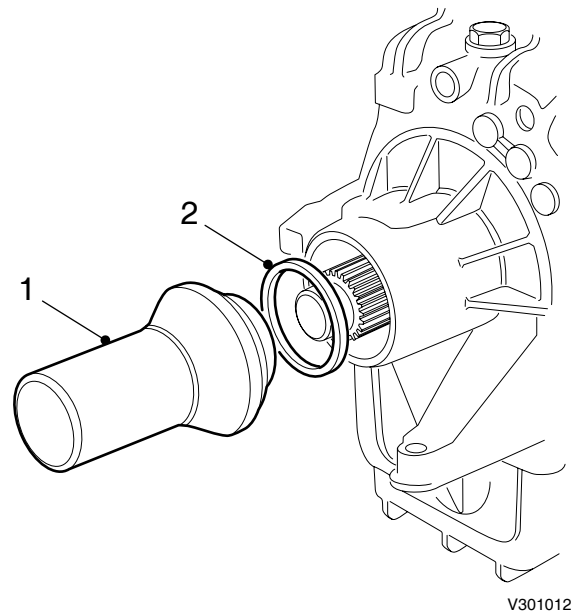
4.3 REMOVING AND INSTALLING OUTPUT SHAFT OIL SEAL

Removing output shaft oil seal

1. Remove the drive flange.
2. Prise the seal (2) out of the rear housing of the gearbox.

Installing output shaft oil seal

1. Using special tool (DAF no. 0694816) (1), fit the new seal in the rear housing.
2. Fit the drive flange.



V301012

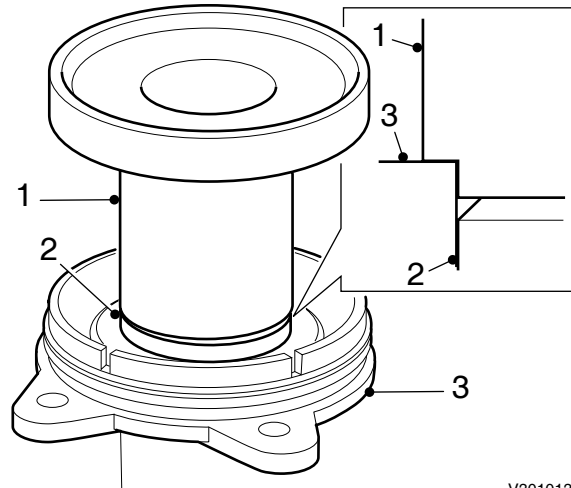
4.4 REMOVING AND INSTALLING GEARBOX FRONT COVER OIL SEAL

Removing gearbox front cover oil seal

1. Remove the gearbox.
2. Remove the release mechanism.
3. Remove the gearbox front cover (3).
4. Prise the oil seal (2) out of the gearbox front cover. Inspect the O-ring. If it is damaged, replace the O-ring.

Installing gearbox front cover oil seal

1. Fit the oil seal using special tool (DAF no. 1240498) (1) at the right depth in the gearbox front cover (3).
2. Install the gearbox front cover (3) with the O-ring on the gearbox. Tighten the attachment bolts to the specified torque. See "Technical data".
3. Fit the release mechanism.
4. Fit the gearbox.



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ZF S5-42 GEARBOX

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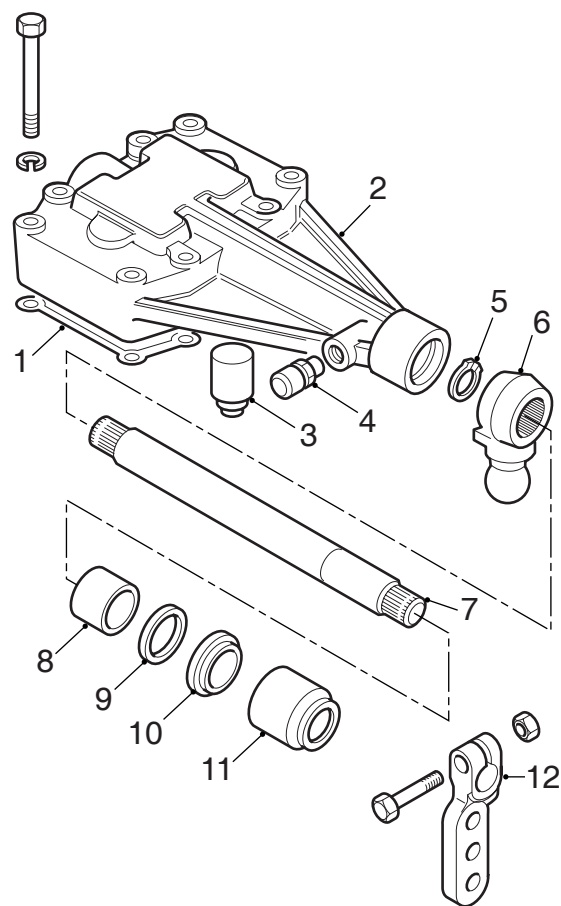
Removal and installation

LF45/55 series

4.5 REMOVING AND INSTALLING SELECTOR SHAFT OIL SEAL

Removing selector shaft oil seal

1. Make a reference marking on the shifting arm (12) and the selector finger (6) in relation to the selector shaft (7).
2. Loosen the locking bolt. Take the shifting arm (12) and the protective cover (11) off the selector shaft.
3. Remove the spring washer (5). Drive the selector shaft (7) out of the selector finger and the housing.
4. Remove the retainer (3) from the housing.
5. Remove the oil seal (9) and the wiper seal (10) from the housing.
6. Use the special tools (DAF no. 0535790) and (DAF no. 0535817) to remove the selector shaft bush (8) from the housing (2).
7. Remove the bleeder (4).



V301014

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Installing selector shaft oil seal

1. Fit the selector shaft bush (8) using the special tool (DAF no. 0192545). Heat the housing (2), if necessary, in order to facilitate assembly.
2. Lubricate the circumference of the seal (9) with a soap solution. Fit the seal with special tool (DAF no. 0535659) in the housing, with the sealing lip on top.
3. Fit the wiper seal (10).
4. Place the special tool (DAF no. 0192546) on the selector shaft (7). Fit the selector shaft.
5. Heat the selector finger (6) to a max. of 100°C. Install the selector shaft (7) in the old position according to the markings made.
6. Fit the spring washer (5).
7. Install the retainer (3). To ease fitting, the housing (2) around the bore can be heated to 120°C.
8. Fit the protective cap (11).
9. Install the shifting arm (12) in the old position in accordance with the markings made. Tighten the shifting arm locking bolt to the specified torque. See "Technical data".
10. Tighten the bleeder (4) to the specified torque. See "Technical data".

ZF S5-42 GEARBOX

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Removal and installation

LF45/55 series

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5. DRAINING AND FILLING

5.1 DRAINING AND FILLING GEARBOX



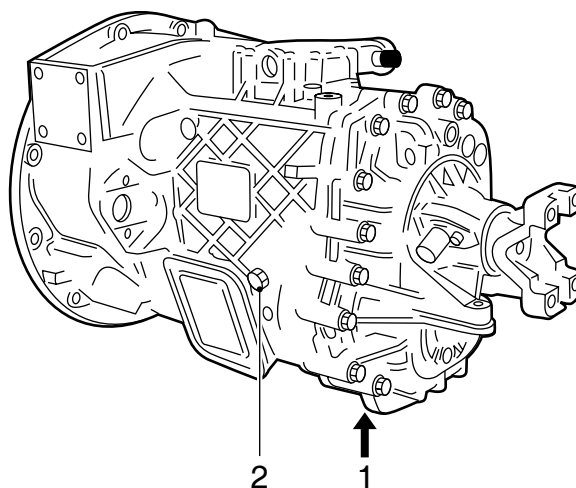
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining gearbox

1. Place the vehicle on a flat and level surface.
2. Drain the gearbox at operating temperature using drain plug (1).

Filling gearbox

1. Clean the drain plug and fit it, tightening to the specified torque; see "Technical data".
2. Fill the oil through level check/filler opening (2) until the oil reaches the rim of the filling opening.
3. After filling the gearbox, tighten the level check plug to the specified tightening torque. See "Technical data".



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ZF S5-42 GEARBOX

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Draining and filling

LF45/55 series

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ZF 6S-850 GEARBOX

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Contents

LF45/55 series

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1. GENERAL

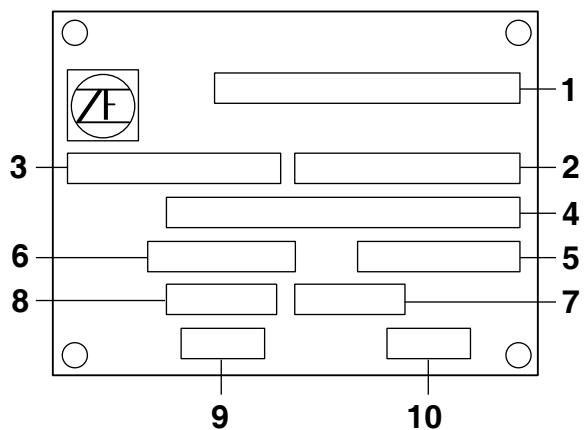
1.1 GENERAL

Gearbox type

Each gearbox has a type plate attached to it, indicating the type of gearbox. You can also find this data on the identity card for the vehicle concerned.

ZF gearbox type plate

1. Type of gearbox
2. Serial no. (ZF)
3. Parts list (ZF)
4. Specification no.
5. Pulse generator ratio
6. Gearbox ratio
7. Engine speed using PTO
8. PTO speed
9. Gearbox oil capacity
10. Oil specification



V300049

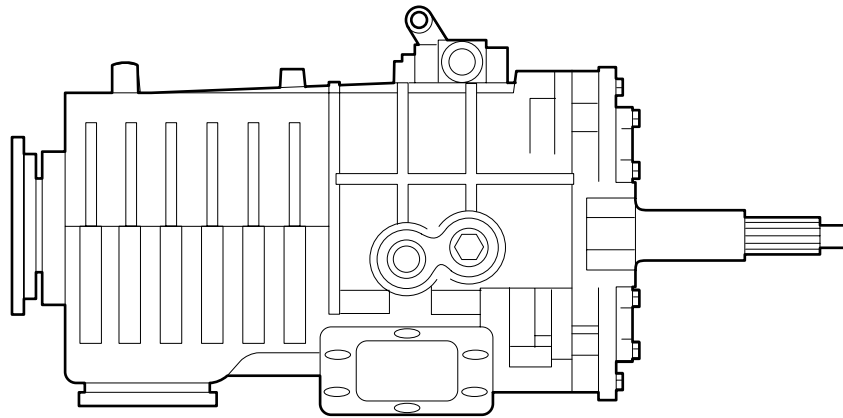
ZF 6S-850 GEARBOX

3

General

LF45/55 series

1.2 SYSTEM DESCRIPTION, ZF 6S-850 GEARBOX



V300466

The gearbox consists of six synchromesh forward gears and one non-synchromesh reverse gear. The first and second gears have double-cone synchronisation. The sixth gear is a direct drive or an overdrive, depending upon the model.

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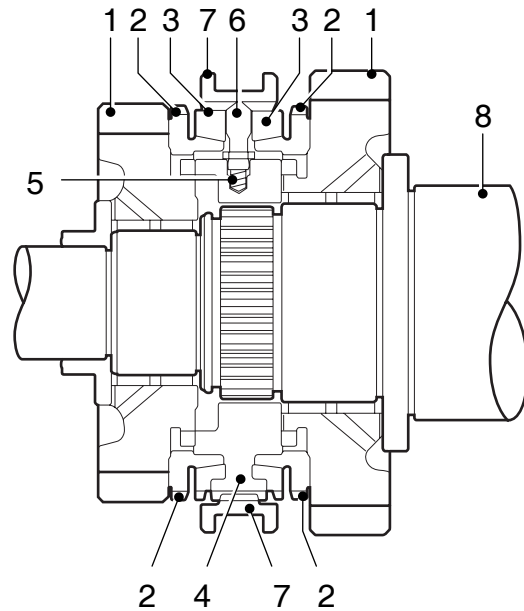
2. DESCRIPTION OF COMPONENTS

2.1 SYNCHRONISER

B-lock synchronisation

1. gear wheel
2. selector ring
3. synchromesh ring
4. selector sleeve
5. pressure spring
6. thrust piece
7. selector sleeve
8. main shaft

The synchroniser consists of the following parts:



ZF 6S-850 GEARBOX

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Description of components

LF45/55 series

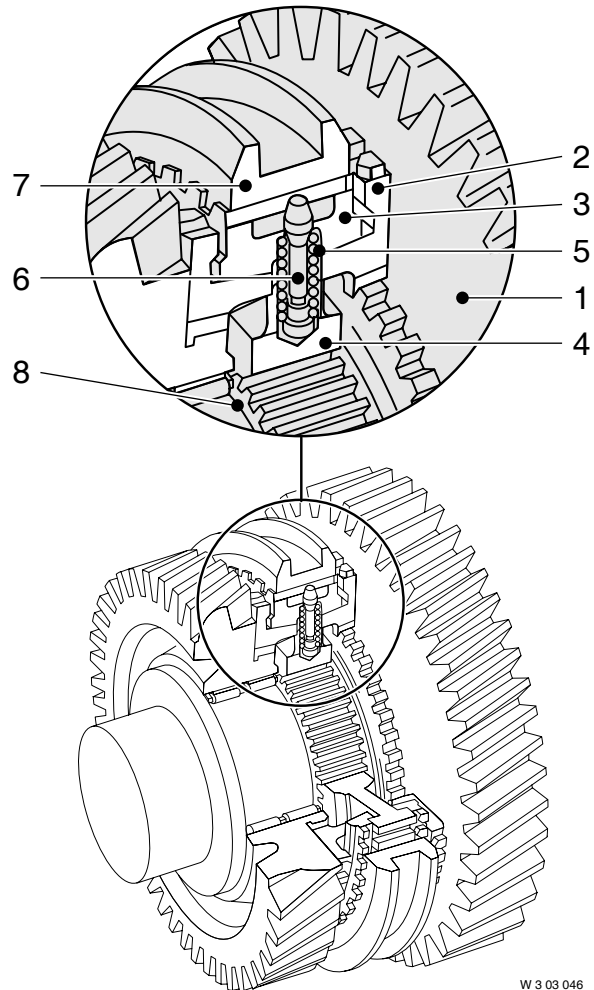
In neutral, the selector sleeve (7) is in the centre position.

Pressure springs (5) push the thrust pieces (6) into a wedge-shaped recess in the selector sleeve (7).

The gear wheels (1) and corresponding selector rings (2) move freely around the main shaft (8).

If the selector sleeve (7) is shifted to the right from the neutral position, the synchromesh ring (3) is pushed against the friction cone of the selector ring (2) by the thrust pieces (6).

The difference in speed immediately turns the synchromesh ring (3) as far as a stop on the selector sleeve support (4), which is not in the figure, and thus prevents further movement of selector sleeve (7).

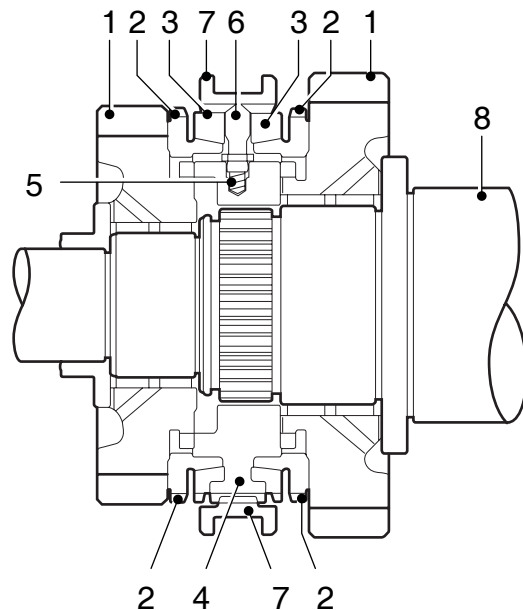


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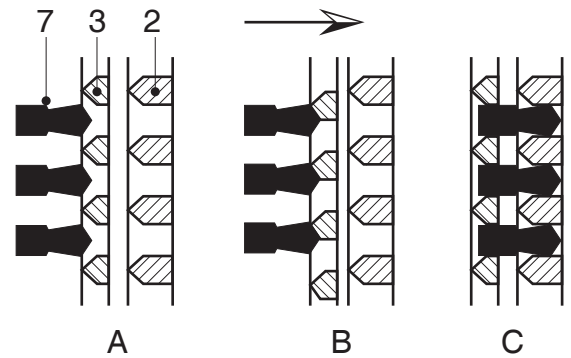
As a result of continued pressure on selector sleeve (7) (friction), the speed of the gear (1) to be shifted with selector ring (2) matches the speed of the main shaft (8).

The bevelled sides of the teeth on the synchromesh ring (3) and selector sleeve (7) cause synchromesh ring (3) to be turned back slightly after synchronisation.

This releases the lock and allows selector sleeve (7) to be moved into the teeth of selector ring (2). As a result, the relevant gear is engaged.



- A. Not connected
- B. Synchronise
- C. Connected



V301005

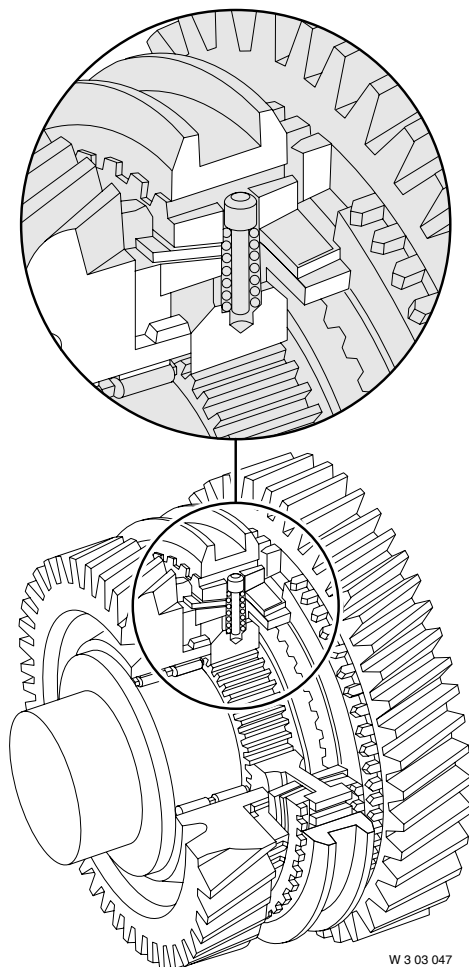
Double-cone synchronisation

As a result of the speed difference to be eliminated in the lower gears, the synchronisation forces may be considerable. In order to achieve effective synchronisation, a synchroniser with a double cone is used.

This synchroniser consists of an outer and an inner ring (synchromesh rings) connected to the main shaft of the gearbox by means of the selector sleeve support.

The ring between the two synchromesh rings is connected to the gear wheel by means of the selector ring.

When the selector sleeve moves into the selector ring, two synchronisation surfaces are active.



ZF 6S-850 GEARBOX

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Description of components

LF45/55 series

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3. INSPECTION AND ADJUSTMENT

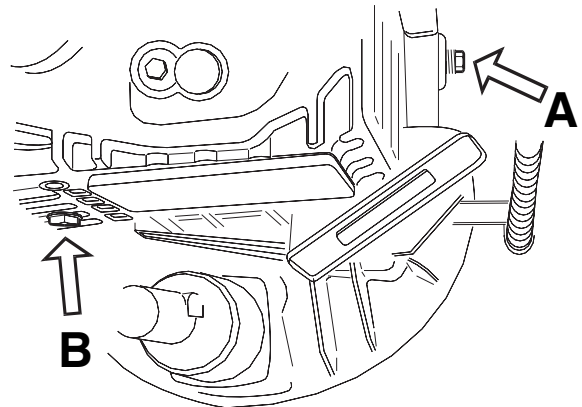
3.1 CHECKING GEARBOX OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

ZF 6S-850 gearbox

1. Position the vehicle on a level surface.
2. Wait for some minutes to allow the oil to flow back.
3. Remove the level check plug and check the oil level.
4. The oil level must reach the rim of the level check/filler opening (A).
5. After checking the oil level, tighten the level check plug to the specified torque. See "Technical data".



M3038

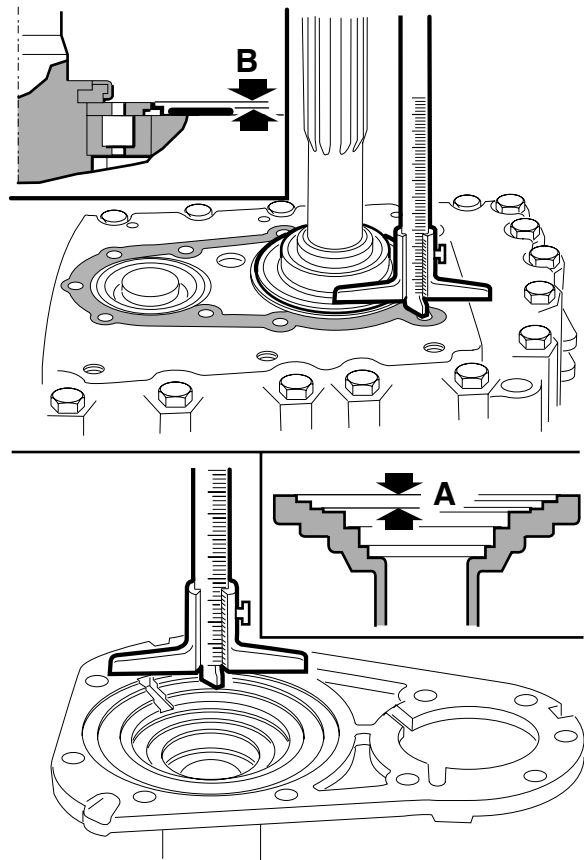
ZF 6S-850 GEARBOX**3**

Inspection and adjustment

LF45/55 series**3.2 INSPECTION AND ADJUSTMENT, INPUT SHAFT BEARING AXIAL PLAY****ZF 6S-850 gearbox**

1. Remove the gearbox. See "Removal and installation".
2. Remove the gearbox front cover from the input shaft. See "Removal and installation".
3. Press the outermost bearing race uniformly so that the bearing is free of play. Constantly rotate the input shaft while applying pressure so that the bearing is set.
4. Use a depth gauge to determine the depth of the chamber in the gearbox front cover, distance A.
5. Install a new gasket in the gearbox housing. Use a depth gauge to determine the height the ball bearing protrudes above the gearbox housing, distance B.
6. Calculate the play as follows. See the table below.

Distance A	8.05 mm
Distance B	- 7.90 mm
Play	0.15 mm
7. Compare the calculated value with the maximum permissible axial play. See "Technical data".
8. If necessary, adjust the axial play by means of another adjusting ring.
9. Fit a new gasket in the gearbox front cover and fit it on the gearbox. See "Removal and installation".
10. Fit the attachment bolts. Tighten the bolts to the specified torque. See "Technical data".
11. Fit the gearbox. See "Removal and installation".



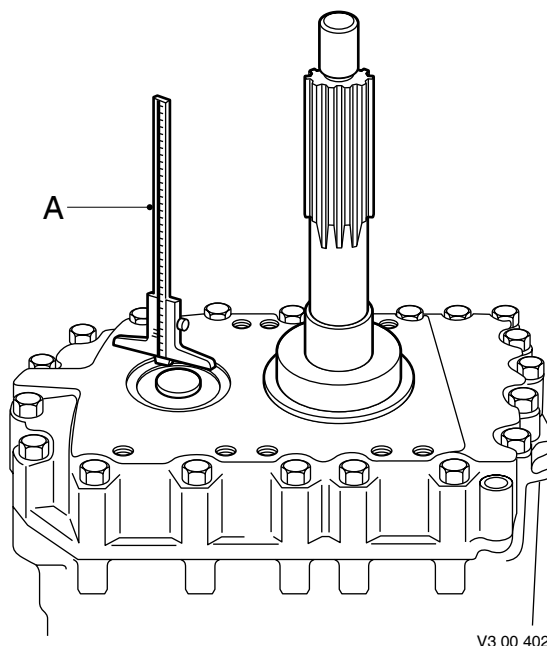
V3 00 435

3.3 INSPECTION AND ADJUSTMENT, SECONDARY SHAFT AXIAL PLAY

Inspection and adjustment, secondary shaft axial play

1. Press the outermost bearing race uniformly so that the bearing is free of play. Rotate the secondary shaft constantly while pressing, so that the bearing gets set.
2. Use a depth gauge to determine the distance between the outer bearing race and the gearbox housing (A).
3. Compare the measured value with the specified permissible value. See "Technical data".
4. If necessary, adjust the axial play by means of another adjusting ring.
5. Calculate the play for the correct size of the adjusting ring as follows:

Distance A	2.95 mm
Gasket thickness	+0.40 mm
Play	(0 - 0.1) - 0.05 mm
Required adjusting ring =	$3.30 \pm 0.05 \text{ mm}$



V3 00 402

ZF 6S-850 GEARBOX

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Inspection and adjustment

LF45/55 series

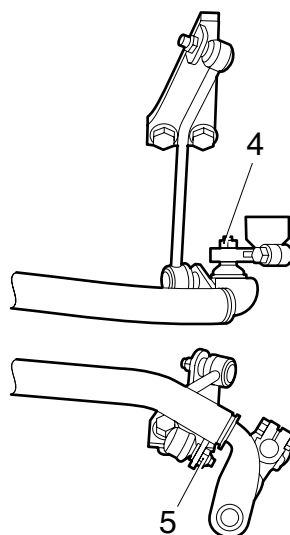
5

4. REMOVAL AND INSTALLATION

4.1 REMOVING AND INSTALLING GEARBOX, BE ENGINE

Removing gearbox assembly

1. Make sure there are no loose items in the cab. Tilt the cab.
2. Disconnect the negative clamp of the battery.
3. Remove the gearbox cable harness and secure it.
4. Loosen the tachometer connection.
5. Remove the shift control by loosening the torque rod bracket and the lever on the selector shaft.
6. Remove the prop shaft and secure it so that it does not interfere with further operations.
7. Remove the exhaust pipe between the engine brake and the silencer.
8. Remove the clutch servo. No air or hydraulic pipes need be removed. Secure the servo and ensure that no one in the cab can operate the clutch pedal as long as the servo is not fitted.
9. Place a jack under the gearbox and remove the bolts around the clutch housing.
10. Use the jack to pull the gearbox away from the engine and remove the gearbox.



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ZF 6S-850 GEARBOX

3

Removal and installation

LF45/55 series

Installing gearbox assembly

1. Before positioning the gearbox, one gear should be engaged in order to allow the input shaft to slide into the clutch plate during installation. Also, apply a small amount of the specified grease to the input shaft.
2. Fit the thrust bearing.
3. Use the jack to move the gearbox towards the engine and fit the attachment bolts around the gearbox.
4. Install the clutch servo and tighten the attachment bolts.
5. Fit the exhaust pipe between the engine brake and the silencer.
6. Fit the drive flange.
7. Fit the shift control.
8. Fit the cable harness and tachometer connection.
9. Connect the negative clamp of the battery.
10. Inspect the shift control.
11. Check the oil level after the gearbox has been installed.
12. If a gearbox of a different type is mounted, or a gearbox with a different reduction, this should be reported. If the correct data are present, they can be input into the VIC using DAVIE XD.

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4.2 REMOVING AND INSTALLING GEARBOX, CE ENGINE

Removing gearbox, CE engine

1. Disconnect the earth lead from the battery terminal.
2. Remove the attachment bolts of the prop shaft flange and remove the prop shaft.
3. If present, remove the attachment bolts from the intermediate bearing.
4. Remove the attachment bolt from the exhaust bracket on the gearbox.
5. Remove the clamping strip from the exhaust pipe.
6. Remove the attachment bolt of the rubber suspension point on the end of the exhaust.
7. Twist the end-pipe of the exhaust loose and remove it.
8. Remove the attachment bolts from the clutch cylinder and remove it.
9. Mark all the electrical connectors and remove them.
10. Remove the compressor pipe bracket.
11. Remove the selector rod from the adjusting mechanism in such a manner that the settings are not changed.
12. Support the gearbox and remove the attachment bolts around it.
13. Manoeuvre the gearbox to the rear until it is free and then remove it.

ZF 6S-850 GEARBOX

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Removal and installation

LF45/55 series

Installing gearbox, CE engine

1. Engage the highest gear in order to align the keys of the input shaft with the clutch plate.
2. Fit the gearbox onto the engine. If necessary, rotate the prop shaft flange in order to align the keys.
3. Fit the gearbox attachment bolts all around and tighten them to the specified torque. See "Technical data".
4. Install the selector rod on the adjusting mechanism. Use new self-locking nuts.
5. Fit the exhaust bracket.
6. Install the compressor pipe bracket.
7. Fit the electronic connectors onto the gearbox.
8. Fit the clutch cylinder.
9. Install the exhaust pipe, fasten it with the clamping strap and fit the attachment bolt of the suspension rubber.
10. Install the prop shaft intermediate bearing, if it has been removed, and tighten the bolts by hand.
11. Fit the prop shaft flange onto the gearbox. Tighten the attachment bolts to the specified torque. See "Technical data".
12. Tighten the intermediate bearing attachment bolts to the specified torque. See "Technical data".
13. Check the oil level. See "Inspection and adjustment".
14. Fit the silencer cap.
15. Fit the earth lead to the battery terminal.

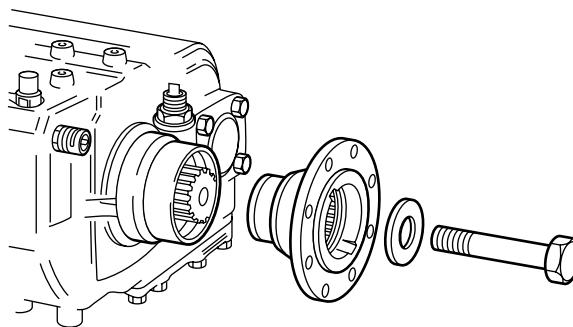
Note:

If a gearbox of a different type is mounted, or a gearbox with a different reduction, this should be reported. If the correct data are present, they can be input into the VIC using DAVIE XD.

4.3 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing the drive flange

1. Make a reference mark on the prop shaft and flange.
2. Detach the prop shaft from the flange and secure it.
3. Fit special tool (DAF no. 0484977) to hold the flange in place.
4. Remove the attachment bolt and washer.
5. Using special tool (DAF no. 0484978), remove the drive flange from the shaft.



V3 00 416

Installing the drive flange

1. Heat the drive flange to a temperature of max. 120°C.
2. Oil the output shaft lightly and slide the drive flange over the shaft in its correct position.
3. Fit the special tool (DAF no. 0484977) onto the drive flange.
4. Tighten the attachment bolt to the specified torque. See "Technical data".
5. Fit the prop shaft. Tighten the attachment bolts to the specified torque. See "Technical data".

ZF 6S-850 GEARBOX

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Removal and installation

LF45/55 series

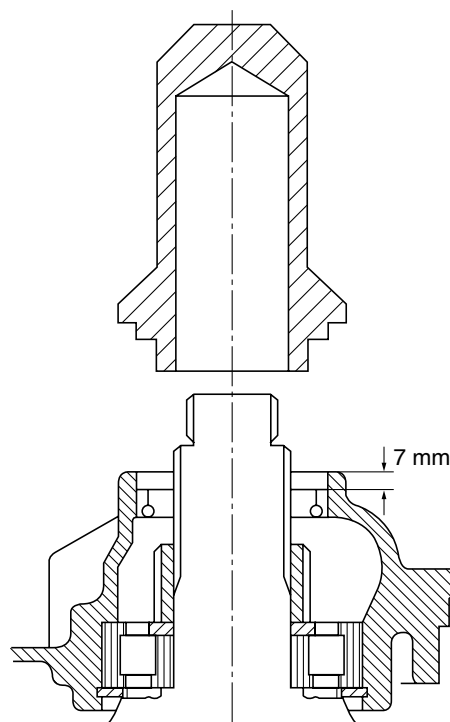
4.4 REMOVAL AND INSTALLATION, OUTPUT SHAFT OIL SEAL

Removing output shaft oil seal

1. Remove the drive flange.
2. Pull the oil seal from the gearbox housing using special tool (DAF no. 0484899).

Installing output shaft oil seal

1. Check the axial play of the output shaft. See "Technical data".
2. Around the oil seal, clean the gearbox housing without letting dirt into the gearbox.
3. Apply a small amount of liquid gasket to the outside of oil seals fitted with a steel cover. Apply a small amount of green soap to the outside of oil seals fitted with a rubber cover.
4. Fit the oil seal in the gearbox housing using special tool (DAF no. 0694816). The tool will position the oil seal at the correct depth in the housing.
5. Fit the drive flange.



W 3 03 048

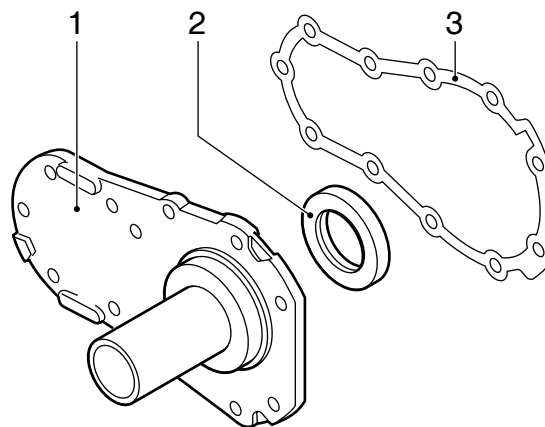
4.5 REMOVAL AND INSTALLATION, GEARBOX FRONT COVER OIL SEAL

Removing gearbox front cover oil seal

1. Remove the gearbox.
2. Remove the release mechanism assembly with fork and thrust bearing.
3. Remove the attachment bolts from the gearbox front cover (1). Remove the gearbox front cover from the input shaft. Keep the filler plates of the input shaft and the secondary shaft.
4. Remove the oil seal (2) from the gearbox front cover.

Installing the gearbox front cover oil seal

1. Apply a small amount of sealant to the outside of oil seals fitted with a steel cover. Apply a small amount of green soap to the outside of oil seals fitted with a rubber cover.
2. Fit the oil seal (2) to the gearbox front cover using special tools (DAF no. 0499809) and (DAF no. 0535409). Fit a new gasket (3).
3. Check the input shaft axial play. See "Inspection and adjustment".
4. Install the gearbox front cover (1). Tighten the bolts to the specified torque. See "Technical data".
5. Install the release mechanism on the gearbox. Tighten the bolts to the specified torque. See "Technical data".
6. Fit the gearbox.



V3 00 401

ZF 6S-850 GEARBOX**3**

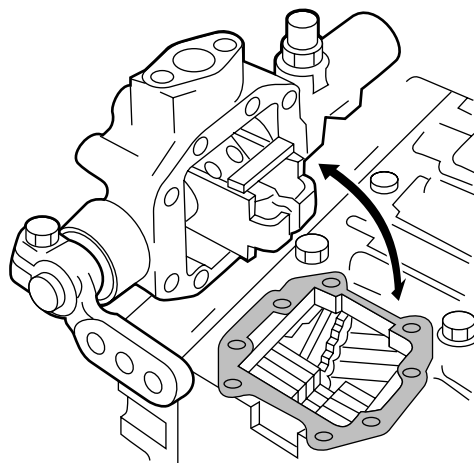
Removal and installation

LF45/55 series**4.6 REMOVAL AND INSTALLATION, SELECTOR SHAFT OIL SEAL****LHD model****Removing selector shaft oil seal**

1. Mark the gearbox lever relative to the selector shaft and remove the control lever with the gearbox control. If necessary, disconnect the torque rod.
2. Remove the selector shaft housing attachment bolts and remove the selector shaft housing assembly from the gearbox.

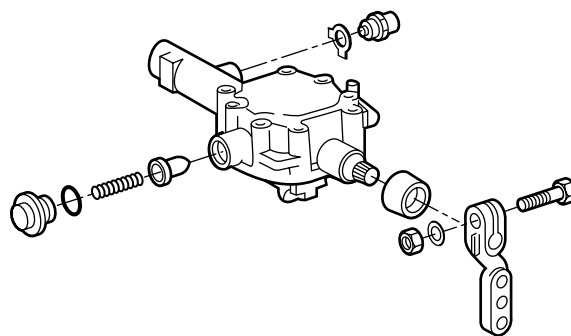


Seal the gearbox opening, so that no dirt can enter.



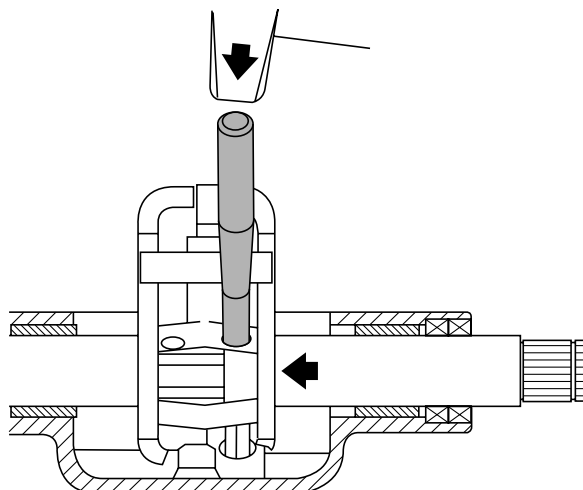
V3 00 398

3. Remove the locking pin and control stop from the selector shaft housing.



V3 00 399

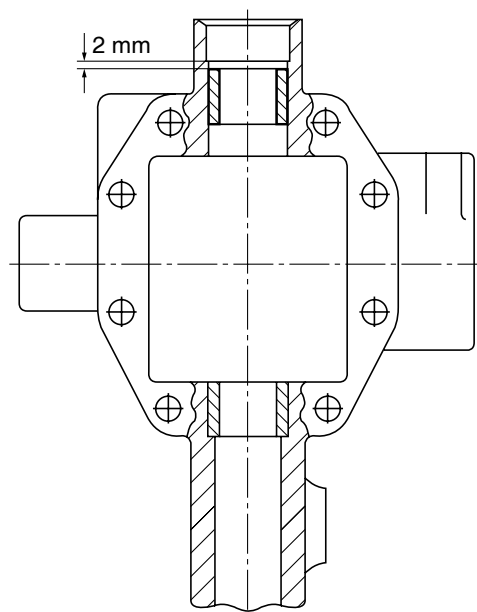
4. Drive the two spring pins out of the selector fingers. Turn the selector fingers so that the spring pins can be driven into a slot in the cover.
5. Remove the circlip and the springs from the rear of the cover. Then remove the shaft and the selector fingers from the cover.



W 3 03 052

5

6. Drive the oil seal and dust seal out of the selector shaft housing. If necessary, the selector shaft bearing bushes can now also be replaced with special tool (DAF no. 0694818). Press the bearing bush on the control side 2 mm under the edge.



W 3 03 050

LHD model

Installing selector shaft oil seal

1. Sparingly apply a liquid gasket to the oil seal and fit it in the control cover using special tool (DAF no. 0535659). Now fit the dust seal in the control cover using special tool (DAF no. 0535659). Apply grease to the oil seal lips.
2. Fit the special tool ((DAF no. 0694817)), a guide sleeve, over the selector shaft and fit the selector fingers and the gear lever lock into the selector housing. Fit the selector shaft. Watch the control stop slot.
3. First fit the control stop before fitting the spring pins.
4. Fit the spring pins and the locking pin.
5. Apply a small amount of sealant to the sealing cap. Install the springs, rings, and the sealing cap. Fit the circlip.
6. Put the gearbox into neutral, install a new gasket in the selector shaft housing and fit it onto the gearbox housing. Tighten the bolts to the specified torque. See "Technical data".
7. Fit the shift control and check that all gear changes function properly.

ZF 6S-850 GEARBOX

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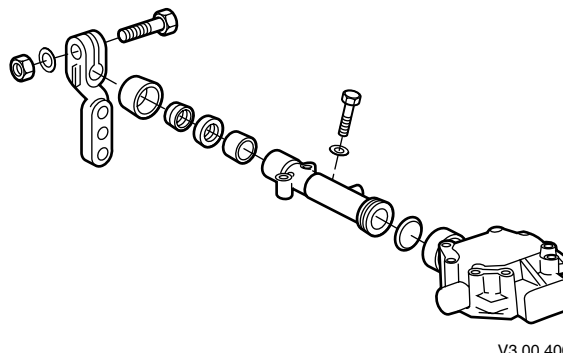
Removal and installation

LF45/55 series

RHD model

Removing selector shaft oil seal

1. Mark the gearbox lever relative to the selector shaft and remove the control lever with the gearbox control. If necessary, disconnect the torque rod.
2. Remove the bearing housing attachment bolts and slide it off the selector shaft.
3. Drive the dust and oil seals out of the bearing housing. If necessary, the selector shaft bearing bush can now also be replaced with special tool (DAF no. 0694818). Press the bearing bush on the spring side 2 mm under the edge.



V3 00 400

Installing selector shaft oil seal

1. Apply a small amount of liquid gasket to the oil seal and fit it in the bearing housing using special tool (DAF no. 0535659). Now fit the dust seal in the bearing housing using special tool (DAF no. 0535659).
2. Apply grease to the oil seal lips. Fit a new O-ring to the selector shaft housing. Fit the selector shaft housing over the selector shaft.
3. Fit the attachment bolts and the gearbox control. Tighten the bolts to the specified torque. See "Technical data". Check that all gear changes function properly.

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5. DRAINING AND FILLING

5.1 DRAINING AND FILLING GEARBOX



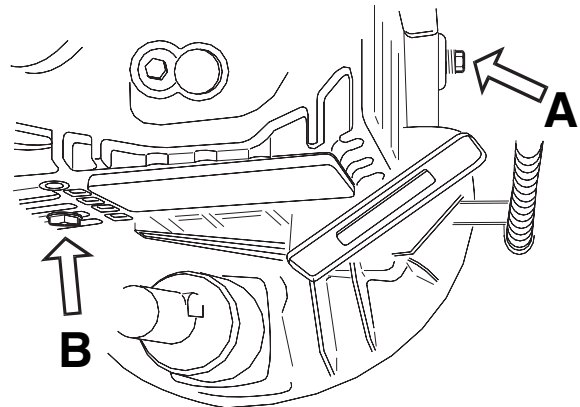
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the gearbox

1. Place the vehicle on a level and horizontal surface.
2. Drain the gearbox at operating temperature using plug (B).

Filling the gearbox

1. Clean the drain plug and fit it, tightening to the specified torque; see "Technical data".
2. Top up oil through the level check/filling opening (A) until the oil reaches the rim of the filling opening.
3. After filling the gearbox, tighten the level check plug to the specified torque; see "Technical data".



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ZF 6S-850 GEARBOX

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Draining and filling

LF45/55 series

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EATON FS/6309A GEARBOX

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LF45/55 series

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1. GENERAL

1.1 GENERAL

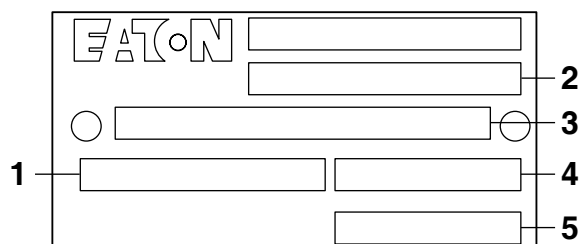
Gearbox type

Each gearbox has a type plate attached to it, indicating the type of gearbox. This data can also be found on the vehicle identity card for the vehicle concerned.

Eaton gearbox type plate

1. Type of gearbox
2. Specification no. Eaton
3. DAF article Eaton code
4. Serial no. Eaton
5. Production date code

The Eaton specification number is unique to each customer and gives detailed information on the development level of the gearbox. The number must be quoted whenever replacement parts are ordered.



V300378

EATON FS/6309A GEARBOX

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General

LF45/55 series

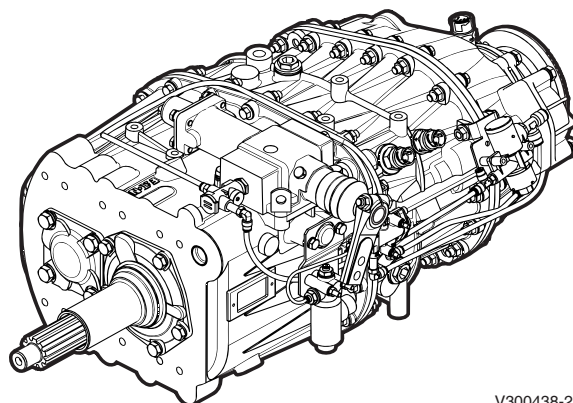
1.2 SYSTEM DESCRIPTION

The gearbox consists of a main gearbox with four synchronomesh forward gears, a non-synchronomesh crawler gear, and one non-synchronomesh reverse gear. Between the main gearbox and the output shaft there is a set of planetary range gears with pneumatic synchronisation.

In the low range (planetary system engaged), the crawler gear and gears 1, 2, 3 and 4 can be engaged.

In the high range (planetary system disengaged), gears 5, 6, 7 and 8 can be engaged.

The switching system is in a "single-H" pattern. Use of the "single-H" system means that the low or high range must be selected by means of a button on the ball of the gear lever prior to engaging gear. The group is changed as soon as the selector shaft passes through the neutral position.



V300438-2

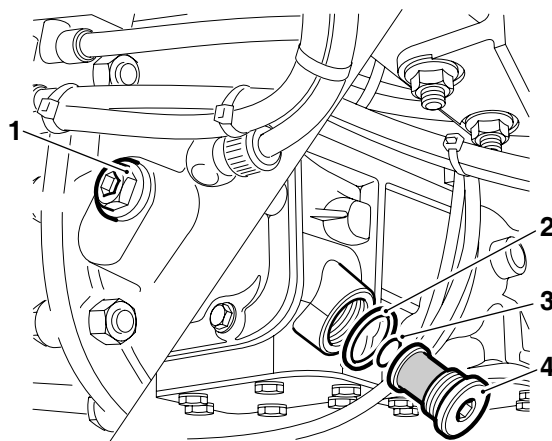
2. INSPECTION AND ADJUSTMENT

2.1 CHECKING GEARBOX OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Wait for some minutes to allow the oil to flow back.
3. Remove the level check/filler plug (1) and check the oil level.
4. The oil level must reach the rim of the level check/filler opening (1).
5. After checking the oil level, tighten the level check plug to the specified torque. See "Technical data".



V3 00 376

EATON FS/6309A GEARBOX

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Inspection and adjustment

LF45/55 series

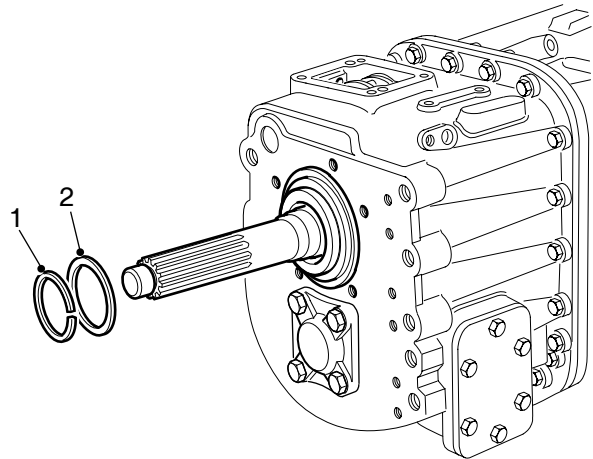
2.2 INSPECTION AND ADJUSTMENT, INPUT SHAFT BEARING AXIAL PLAY

Inspection, input shaft bearing axial play

1. Remove the gearbox. See "Removal and installation".
2. Remove the gearbox front cover from the input shaft. See "Removal and installation".
3. Check whether the circlip (1) is flush in the groove. Check at various places around the shaft.
4. If necessary, adjust the axial play by means of a thicker or thinner adjusting ring (2).

Adjustment, input shaft bearing axial play

1. Remove the circlip (1) of the input shaft bearing.
2. Remove the adjusting ring (2).
3. Place an adjusting ring (2) of the correct thickness between the input shaft bearing and the circlip. See "Technical data".
4. Fit the circlip (1) without any play into the groove. Check at various places around the shaft.
5. Fit a new gasket in the gearbox front cover and install the gearbox front cover. See "Removal and installation".
6. Fit the gearbox. See "Removal and installation".



V3 00 415

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION, GEARBOX ASSEMBLY

Removing gearbox assembly

1. Disconnect the earth lead from the battery terminal.
2. Remove the attachment bolts of the prop shaft flange and remove the prop shaft.
3. Remove the attachment bolts from the intermediate bearing.
4. Remove the attachment bolt from the exhaust bracket on the gearbox.
5. Remove the clamping straps of the intermediate pipe and remove it.
6. Remove the end of the exhaust by removing the clamping strap and the attachment bolt of the rubber suspension point at the end of the exhaust.
7. Remove the attachment bolts from the clutch cylinder and remove it.
8. Mark all the electrical connectors and remove them.
9. Remove the compressor pipe bracket.
10. Mark the various air pipes and remove them.
11. Remove the selector rod from the adjusting mechanism in such a manner that the settings are not changed.
12. Support the gearbox and remove the attachment bolts around it.
13. Manoeuvre the gearbox to the rear until it is free, and then remove it.

EATON FS/6309A GEARBOX

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Removal and installation

LF45/55 series

Installing gearbox assembly

1. Engage the highest gear in order to align the keys of the input shaft with the clutch plate.
2. Fit the gearbox onto the engine. If necessary, rotate the drive flange in order to align the keys.
3. Fit the gearbox attachment bolts all around and tighten them to the specified torque. See "Technical data".
4. Install the selector rod on the adjusting mechanism. Use new self-locking nuts.
5. Fit the exhaust intermediate pipe.
6. Fit the exhaust end pipe.
7. Install the compressor pipe bracket.
8. Install the electronic connectors on the gearbox.
9. Fit the clutch cylinder.
10. Fit the air pipes.
11. Install the intermediate bearing of the prop shaft and tighten the bolts by hand.
12. Fit the prop shaft flange onto the gearbox. Tighten the attachment bolts to the specified torque. See "Technical data".
13. Tighten the intermediate bearing attachment bolts to the specified torque. See "Technical data".
14. Check the oil level. See "Inspection and adjustment".
15. Fit the earth lead to the battery terminal.

Note:

If a gearbox of a different type is mounted, or a gearbox with a different reduction, this should be reported. If the correct data are present, they can be input into the VIC using DAVIE XD.

3.2 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Place a reference mark on the prop shaft in relation to the flange.
2. Remove the bolts that attach the prop shaft to the flange.
3. Support the prop shaft from a suitable location on the chassis.
4. Support the prop shaft from a suitable location on the chassis.
5. Fit special tool (DAF no. 0484977) to hold the flange in place. Remove the lock nut and washer.
6. Remove the flange with a suitable puller.

Note:

In order to prevent the synchroniser for the high/low transmission ratios from coming loose, the output shaft must not slide out of the bearing.

Installing drive flange

1. Place the flange on the output shaft.
2. Place a shim between the flange and the lock nut and turn the flange in the oil seal. Remove the lock nut and shim.
3. Fit special tool (DAF no. 0484977) to the flange. Fit a new lock nut. Tighten the lock nut to the specified torque. See "Technical data".
4. Align the markings. Fit the prop shaft onto the flange. Tighten the bolts to the specified torque. See "Technical data".

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Removal and installation

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3.3 REMOVAL AND INSTALLATION, OUTPUT SHAFT OIL SEAL

Removing output shaft oil seal

1. Remove the drive flange.
2. Remove the attachment bolts from the oil seal housing. Remove the oil seal housing. Remove the oil seal.
3. Clean the contact surfaces of the oil seal and the seal housing.

Installing output shaft oil seal

1. Press the oil seal into the oil seal housing using special tool (DAF no. 1329358).
2. Apply sealant to the contact surface of the seal housing. See "Technical data".
3. Fit the seal housing and tighten the bolts to the specified torque. See "Technical data".
4. Apply grease to the sealing lip of the oil seal.
5. Fit the drive flange.
6. If necessary, top up the gearbox. See "Inspection and adjustment".

6

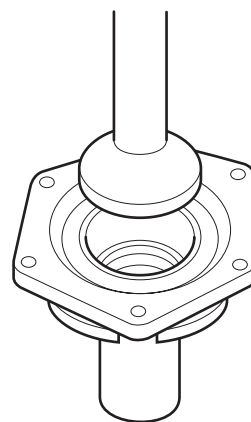
3.4 REMOVAL AND INSTALLATION, GEARBOX FRONT COVER OIL SEAL

Removing gearbox front cover oil seal

1. Remove the gearbox.
2. Remove the attachment bolts from the gearbox front cover. Remove the gearbox front cover. Clean the contact surfaces of the gearbox front cover and the gearbox housing.
3. Remove the oil seal from the gearbox front cover.

Installing gearbox front cover oil seal

1. Fit the seal in the gearbox front cover using special tool (DAF no. 1329354).
2. Apply sealant to the contact surface of the gearbox front cover. Fit the gearbox front cover. Tighten the bolts to the specified torque. See "Technical data".
3. Fit the gearbox.



V301006

EATON FS/6309A GEARBOX

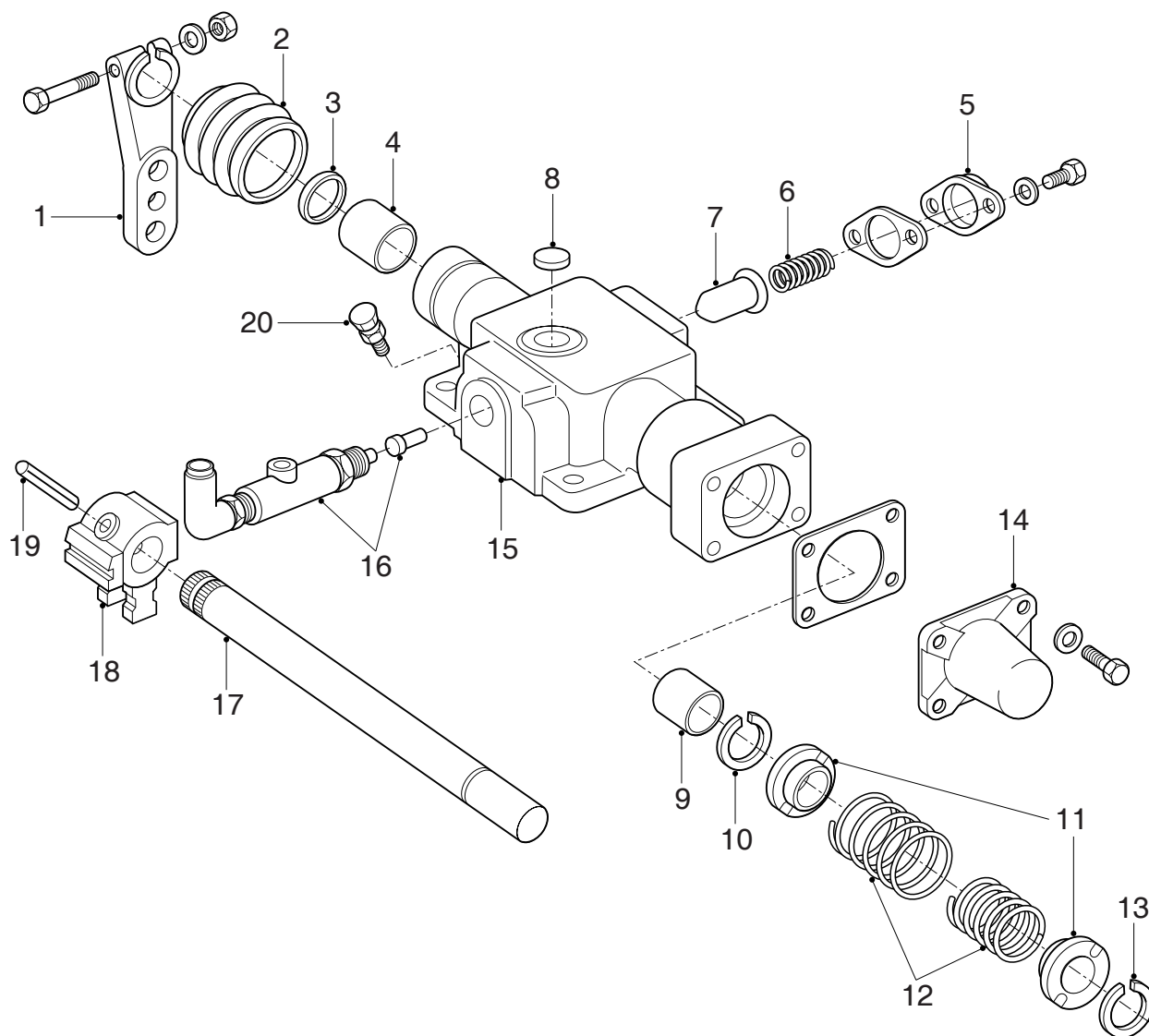
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Removal and installation

LF45/55 series

3.5 REMOVAL AND INSTALLATION, SELECTOR SHAFT OIL SEAL

Removing selector shaft oil seal



V3 00 475

1. Mark the position of the shifting arm (1) relative to the selector shaft (17).
2. Remove the selector shaft lever with the gearbox control attached to it. If necessary, disconnect the torque rod.
3. Remove the rubber sleeve (2).
4. Drain the air reservoirs and remove the air connection from the selector shaft housing.
5. Remove the bleed control valve and pin (16).

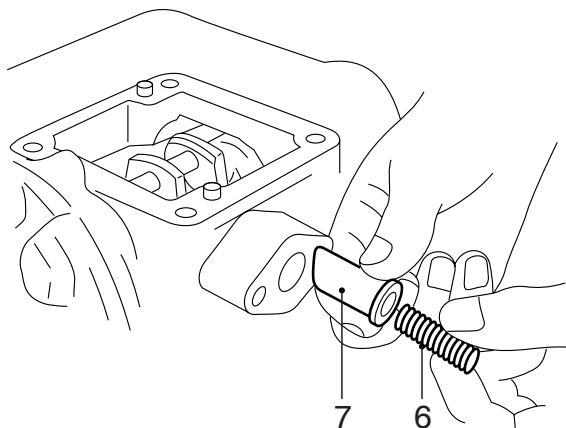
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EATON FS/6309A GEARBOX

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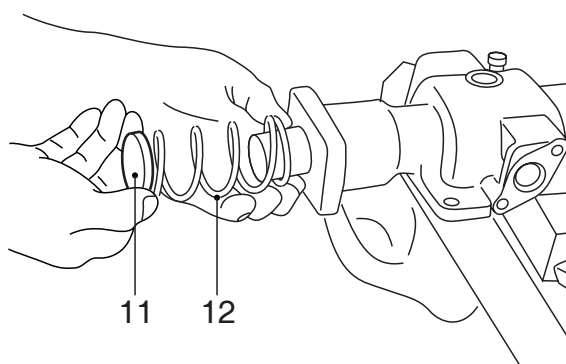
Removal and installation

6. Remove the attachment bolts from the selector shaft housing (15) and remove it.
7. Place the housing in a soft-jawed vice.
8. Remove the retaining cover (5) and pull out the retaining spring (6) and pin (7).
9. Remove the bleeder (20).
10. Remove the end cover (14) and the spring clip (13).



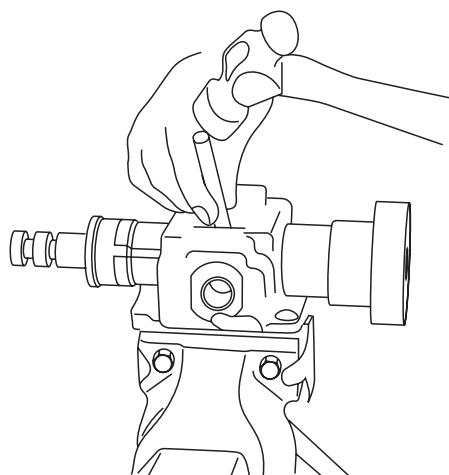
V3 00 547

11. Remove the spring holders (11), the springs (12) and the spring clip (10).



V3 00 506

12. Turn the selector shaft housing over and drive the plug (8) out of the housing.



V3 00 497

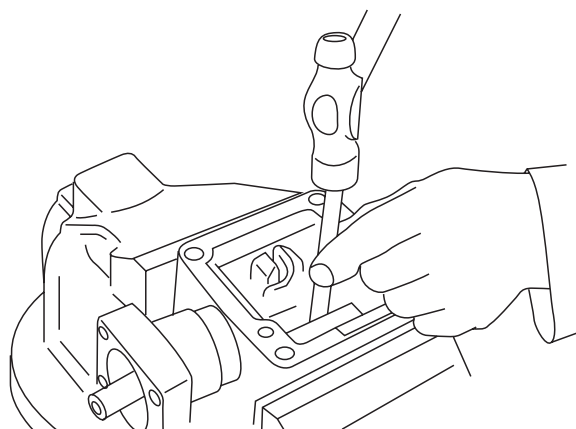
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Removal and installation

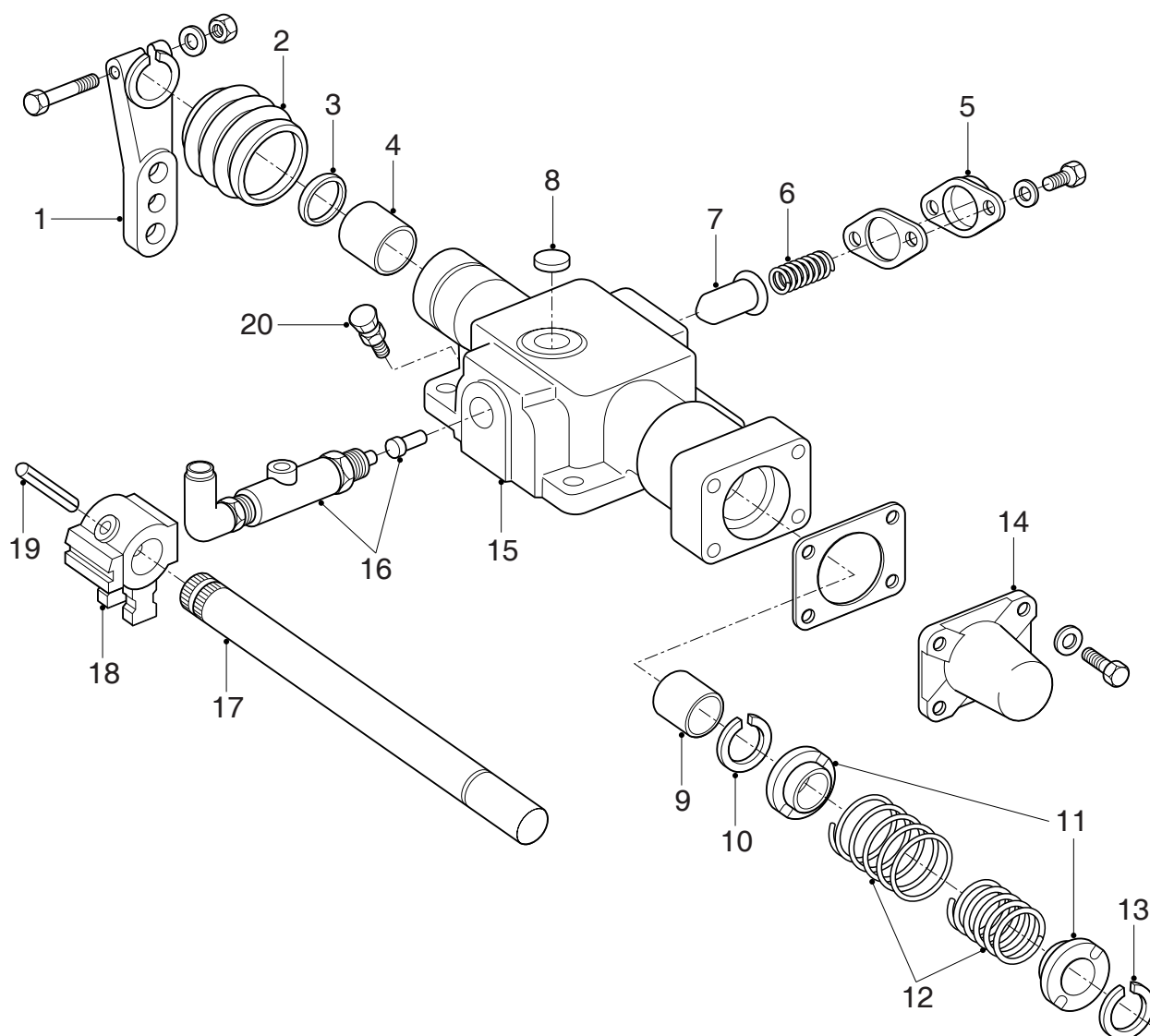
LF45/55 series

13. Turn the selector shaft housing over and drive the pin (19) out of the selector finger (18) and selector shaft (17) via the plug opening. Remove the selector finger and the selector shaft.
14. Remove the oil seal (3) from the selector shaft housing. If necessary, the selector shaft bearing bushes (4) and (9) can now also be removed using a suitable puller.



V3 000507

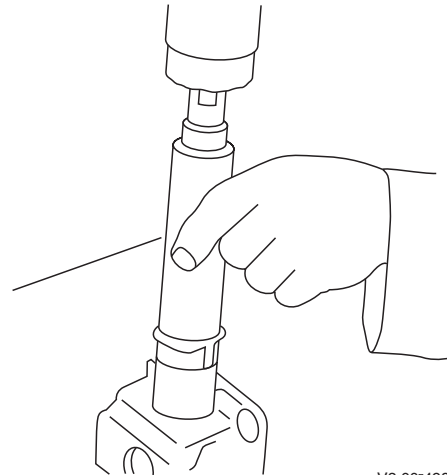
Installing selector shaft oil seal



V3 00 475

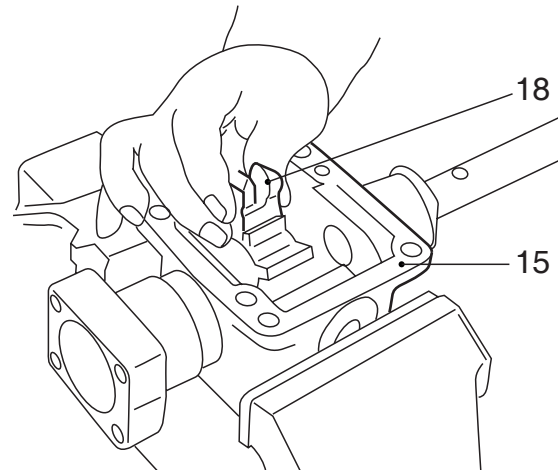
6

1. Fit a new oil seal ring and, if necessary, new bushes (4) and (9) using special tool (DAF no. 1329352).
2. Place the selector finger (18) in the selector shaft housing (15) with the long groove and the hole for the pin (19) pointing towards the rear.



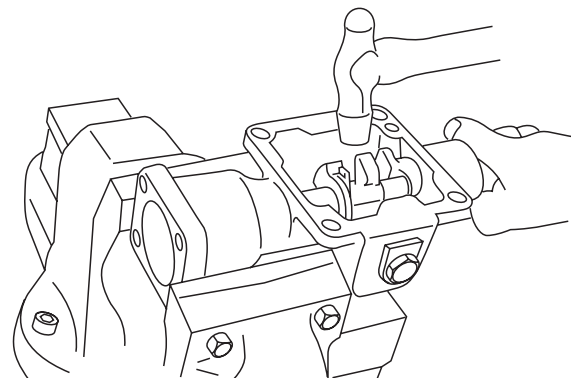
V3 00:498

3. Fit the selector shaft (17) into the selector shaft housing.



V3 00:501

4. Make sure that the holes in the selector finger and the selector shaft are aligned and fit a new pin (19).
5. Fit the spring clip (10) and a spring holder (11) onto the selector shaft.



V3 00:514

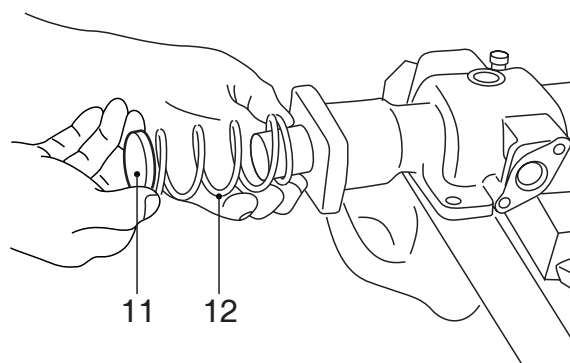
EATON FS/6309A GEARBOX

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Removal and installation

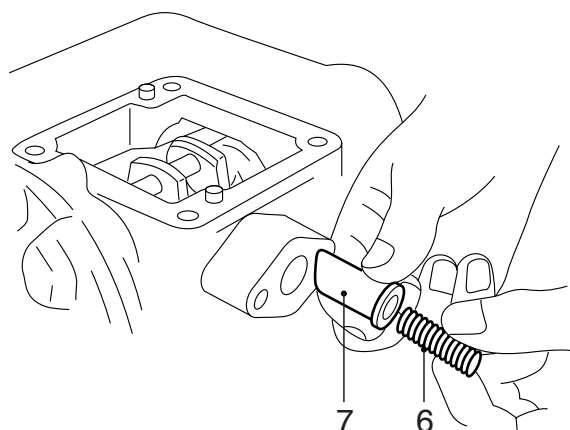
LF45/55 series

6. Fit the springs (12), a spring holder (11) and the spring clip (10) onto the selector shaft.
7. Put a new gasket in the end cover (14) and attach the cover. Tighten the attachment bolts to the specified torque. See "Technical data".



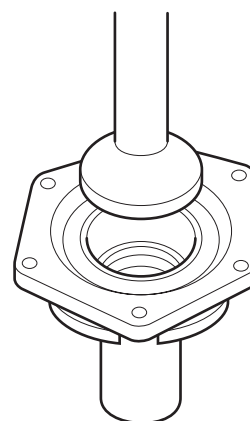
V3 000506

8. Fit the retaining pin (6) and the retaining spring (7) and put a new gasket in the retaining cover (5) before fitting that as well. Tighten the attachment bolts to the specified torque. See "Technical data".
9. Fit the rubber sleeve (2).
10. Tighten the bleeder (20) to the specified torque. See "Technical data".
11. Fit the bleed control valve and pin (16) and tighten to the specified torque. See "Technical data".



V3 00 547

12. Fit the selector shaft housing onto the gearbox using the specified locking compound and tighten the attachment bolts to the specified torque. See "Technical data".
13. Install the shifting arm in the correct position on the selector shaft and tighten the lock nut to the specified tightening torque. See "Technical data".



V301006

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4. DRAINING AND FILLING

4.1 DRAINING AND FILLING GEARBOX



To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining gearbox

1. Place the vehicle on a level and horizontal surface.

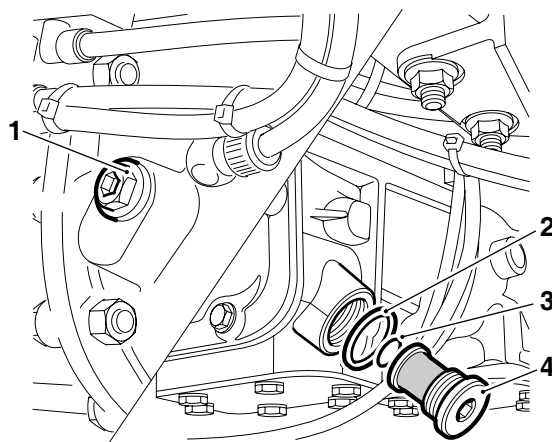
Note:

Drain the gearbox at operating temperature.

2. Remove the combined drain plug/oil strainer (4) and level check/filler plug (1) and drain the oil.
3. Clean the oil strainer (4) in a suitable solvent and dry thoroughly.

Filling gearbox

1. Check and replace the O-ring (3) and the sealing ring (2) if necessary.
2. Fit the combined drain plug/oil strainer, tightening it to the specified torque; see "Technical data".
3. Fill the oil through level check/filler opening (1) until the oil reaches the rim of the level check/filler opening.
4. Fit the level check/filler plug, tightening it to the specified torque; see "Technical data".



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EATON FS/6309A GEARBOX

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Draining and filling

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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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Contents

LF45/55 series

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1. GENERAL

1.1 SYSTEM DESCRIPTION

The Allison 1000 and 2000 series of automatic gearboxes are completely automatic, electronically controlled gearboxes. The automatic gearboxes have five forward gears and one reverse gear.

Design

The different gears are engaged by using three planetary systems and five lamella clutches driven by the electronic unit.

The electronic unit receives signals from the push-button selector block, the selector switch, the accelerator pedal and several speed sensors. On the basis of these signals the electronic unit computes the ideal switching moment.

The torque converter in the automatic gearbox is fitted with a "lock-up". Under certain circumstances the "lock-up" provides a rigid link between the pump and the turbine. As a result, slip losses from the torque converter are overcome. This results in lower fuel consumption.

Starting

To start the vehicle, the gearbox must be in the neutral position. If the gearbox is in a forward gear or in reverse, the vehicle cannot be started.

ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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General

LF45/55 series

Faults

If the electronic unit in the automatic gearbox registers a fault, a warning will be activated. If the vehicle is started during an active warning, the electronic unit will lock the automatic gearbox in the neutral position. The automatic gearbox will no longer respond to gear-lever movements from the neutral position.

If a fault occurs while driving, a warning is activated. The electronic unit decides whether the automatic gearbox:

- is locked in the gear in which the fault occurred;
- is restricted as regards changing up and down;
- ceases to respond to changes from the selector lever;
- ceases to respond to changes from the selector lever from the neutral position.

During a fault changes of direction may no longer be possible.

During a fault the vehicle can be brought to a halt in a safe place. When the ignition is switched off, the automatic gearbox is locked in the neutral position.

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Towing

To tow a vehicle, the prop shaft must be detached at the rear axle. It is also possible to remove the axle shafts. As oil can be lost in this process, it must be avoided as much as possible owing to environmental concerns.



Towing the vehicle without taking the above into consideration may lead to serious damage to the gearbox.

2. DESCRIPTION OF COMPONENTS

2.1 SELECTOR LEVER

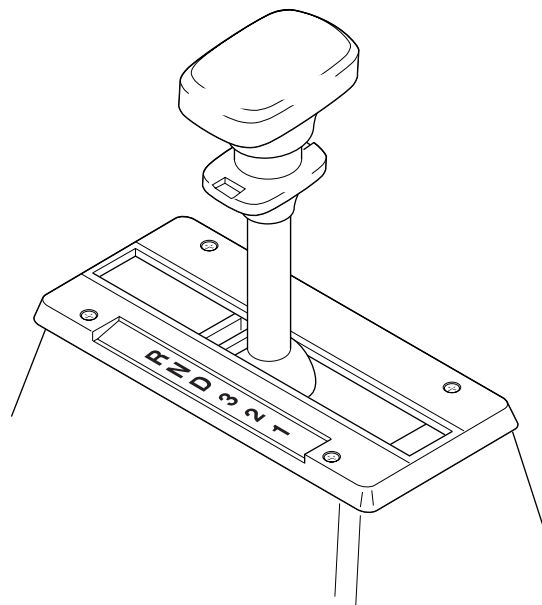
The various gears of the automatic gearbox are selected using the selector lever. The selector lever has four positions for the forward gears (1, 2, 3 and D), a neutral position (N) and a reverse position (R).

The neutral position (N) is the usual position for starting and stopping the engine and for longer stationary periods when the engine is idling. The gearbox must not be put in the neutral position when driving.

In the drive position (D) the gearbox automatically changes up and down in all forward gears.

In positions (1), (2) and (3) the gearbox changes up as far as the selected gear. These positions can be used to keep the engine in the correct rev band or to obtain maximum engine brake performance.

To reverse, the selector lever must be in the (R) position. A warning signal is also activated when reversing.



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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

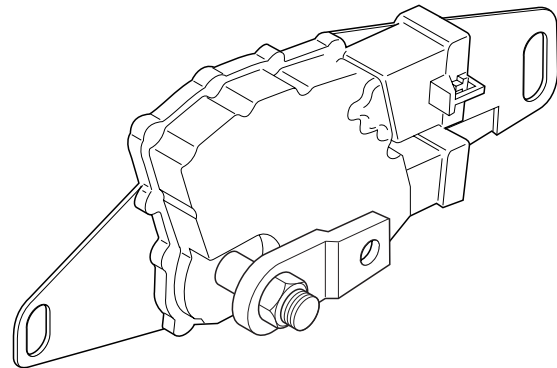
3

Description of components

LF45/55 series

2.2 SELECTOR SWITCH

The selector switch is mounted on the gearbox housing. The selector switch communicates the selector shaft angular displacement to the ECU. Before the vehicle can be started, the electronic unit must receive a signal from the selector switch confirming that the automatic gearbox is in neutral.



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3. INSPECTION AND ADJUSTMENT

3.1 CHECKING OIL LEVEL

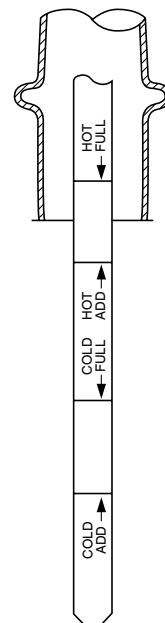
Checking cold oil level

1. Place the vehicle on a flat and level surface and apply the parking brake.
2. Make sure the gearbox is in neutral and allow the engine to idle for several minutes.
3. Apply the service brake, switch the gearbox to **D**, then to **N** and finally switch the gearbox to **R**. The purpose of this is to fill the hydraulic system.
4. Switch the gearbox to the neutral position and release the service brake.
5. Remove the dipstick when the engine is idling and wipe it clean with a lint-free cloth.

Note:

To take the dipstick out of the holder, the sealing cap must be held while the dipstick is turned anti-clockwise.

6. Put the dipstick back.
7. Remove the dipstick and check the oil level. The oil level should be between the "Cold add" and "Cold full" marks.
8. Clean the dipstick with a lint-free cloth and put it back.
9. Remove the dipstick and check the oil level again.
10. Oil needs to be added when the oil level is below the "Cold add" mark.
11. Check the oil level in the gearbox at operating temperature.



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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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Inspection and adjustment

LF45/55 series

Checking hot oil level

1. Bring the gearbox up to operating temperature (approx. 71°C - 93°C).
2. Remove the dipstick when the engine is idling and wipe it clean with a lint-free cloth.

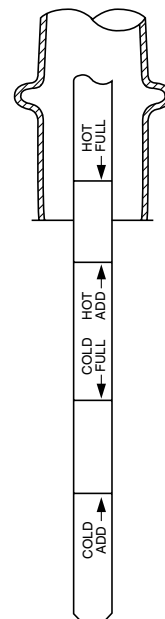
Note:

To take the dipstick out of the holder, the sealing cap must be held while the dipstick is turned anti-clockwise.

3. Put the dipstick back.
4. Remove the dipstick and check the oil level.
5. Remove the dipstick and check the oil level. The oil level should be between the "Hot add" and "Hot full" marks.
6. Clean the dipstick with a lint-free cloth and put it back.
7. Remove the dipstick and check the oil level again.
8. Oil needs to be added when the oil level is below the "Hot add" mark.
9. Oil needs to be drained when the oil level is above the "Hot full" mark.

Note:

The oil level must be checked at least twice. When there are differences between the measurements, check the bleeder for clogging.



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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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Inspection and adjustment

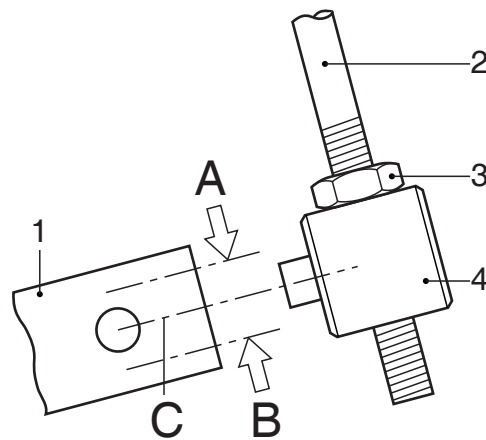
3.2 INSPECTING AND ADJUSTING SELECTOR CABLE

Inspecting selector cable

1. Check that the selector cable has been fitted to the selector arm so that the connecting pin can move freely in every gear. If necessary, adjust the selector cable.

Adjusting selector cable

1. Chock the wheels so that the vehicle cannot roll.
2. Position the selector lever in neutral.
3. Remove the selector cable (2) from the selector arm (1), if applicable.
4. Unscrew the lock nut (3) from the connecting pin (4).
5. Determine the central position (C) of the connecting pin by first pushing the selector cable in (A) and then pulling it out (B). Mark the limit positions of the connecting pin.
6. Move the connecting pin so that when in the central position (C) it is level with the bore in the selector arm.
7. Tighten the lock nut of the connecting pin.
8. Install the connecting pin in the selector arm bore and tighten the lock nut to the specified torque. See "Technical data".
9. Check in every gear that the positions of the selector lever in the cab correspond precisely to the selected gear.



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Inspection and adjustment

LF45/55 series

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4. REMOVAL AND INSTALLATION

4.1 REMOVING AND INSTALLING ENTIRE GEARBOX

Removing gearbox assembly

1. Drain the gearbox. See "Draining and filling".
2. If necessary, remove the oil filler pipe to avoid damage.
3. Remove the oil pipes from and to the oil cooler.
4. Plug the external oil pipes after removing and/or detaching them to prevent dirt entering the oil system.
5. Disconnect the gearbox wiring harness connectors and secure the wiring harness. Plug the openings.
6. Remove the selector cable.
7. Remove the prop shaft.
8. See what is best for gearboxes with PTO: remove the PTO from the gearbox, disconnect the hydraulic pipes from the pump or remove the prop shaft, if fitted.
9. Remove the gearbox from the engine.

ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

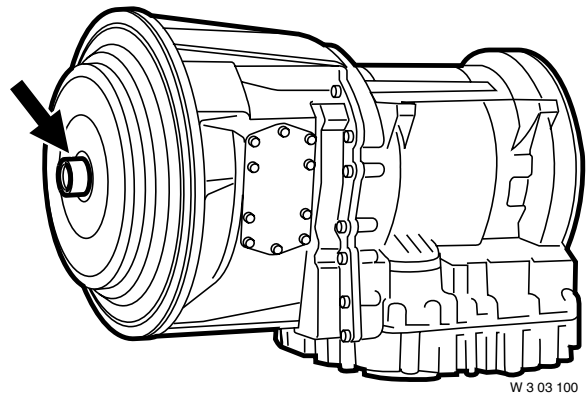
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Removal and installation

LF45/55 series

Installing gearbox assembly

1. When installing the gearbox, apply a small amount of grease to the nose of the torque converter to prevent noise after fitting. See "Technical data".
2. If necessary, fit the PTO.
3. Fit the prop shaft.
4. Fit the wiring harness connectors.
5. Fit the oil pipes from and to the oil cooler.
6. Fit and adjust the selector cable. See "Inspection and adjustment".
7. If necessary, fit the oil filler pipe.
8. Fill the gearbox; see "Draining and filling".



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ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

LF45/55 series

Removal and installation

4.2 REMOVING AND INSTALLING SELECTOR SWITCH

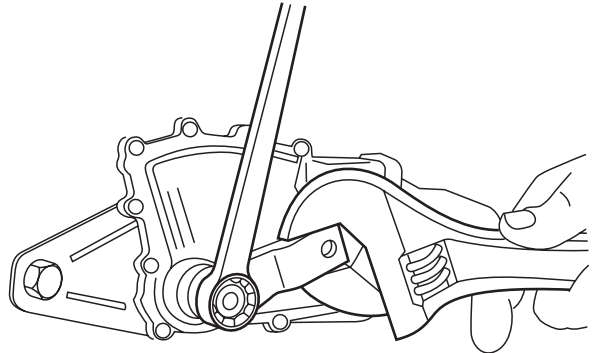
Removing selector switch

1. Remove the selector cable from the selector arm.
2. Remove the attachment nut from the selector shaft.



The selector shaft must not be turned while the attachment nut is being loosened or tightened. While loosening or tightening the attachment nut, lock the selector shaft using the selector arm and an appropriate tool.

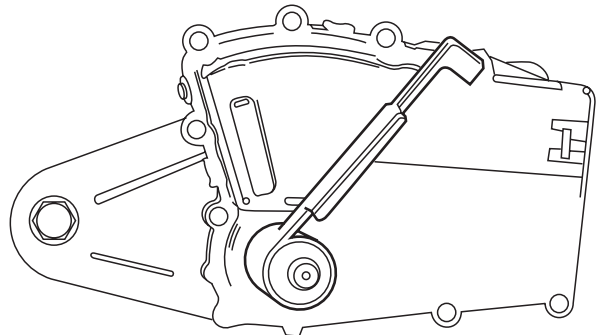
3. Remove the selector arm.
4. Remove the connectors from the selector switch.
5. Take the attachment bolts out of the selector switch and remove it.



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Fitting selector switch

1. Put the selector shaft in the neutral position. See the marks on the gearbox housing.
2. Put the selector switch in the neutral position using special tool (DAF no. 1451992).
3. Fit the selector switch, together with the special tool, over the selector shaft and onto the gearbox housing.
4. Install the selector switch attachment bolts and tighten them to the specified torque. See "Technical data".
5. Fit the selector arm onto the selector shaft and tighten the attachment nut to the specified torque. See "Technical data".



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Removal and installation

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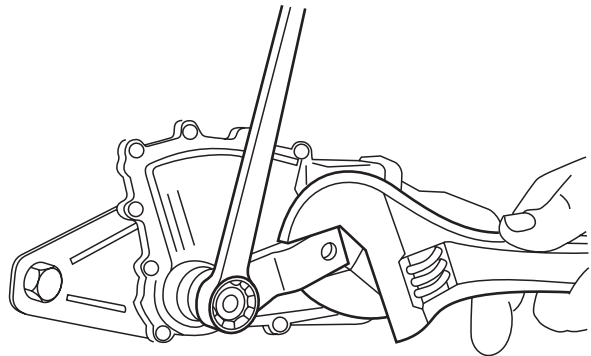


The selector shaft must not be turned while the attachment nut is being loosened or tightened. While loosening or tightening the attachment nut, lock the selector shaft using the selector arm and an appropriate tool.

6. Fit the selector cable into the selector arm.

Note:

The attachment of the selector cable must be fitted so that the connecting pin can move freely in every gear.



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4.3 REMOVING AND INSTALLING OUTPUT SHAFT OIL SEAL

Removing output shaft oil seal

1. Chock the wheels so that the vehicle cannot roll.
2. Loosen the prop shaft and hang the shaft so that it does not interfere with the operations.
3. Take the attachment bolt out of the drive flange and remove the drive flange.
4. Drill two holes in the external cover of the oil seal and turn special tool (DAF no. 0484899) into the oil seal. Pull the oil seal out of the gearbox housing using special tool (DAF no. 0694928).

Installing output shaft oil seal

1. Fit the new oil seal as far as possible into the gearbox housing using special tool (DAF no. 1240037).
2. Check the prop shaft at the level of the oil seal for irregularities and wear.

Note:

Slight irregularities can be smoothed using fine sandpaper.

3. Lightly lubricate the prop shaft at the level of the oil seal with clean gearbox oil.
4. Fit the prop shaft and tighten the attachment bolt to the specified torque. See "Technical data".

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Removal and installation

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4.4 REMOVING AND FITTING SELECTOR SHAFT OIL SEAL

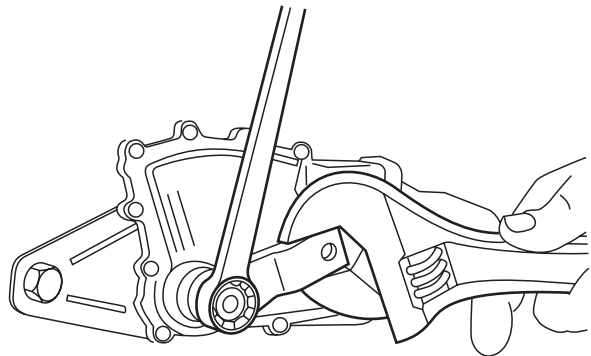
Removing selector shaft oil seal

1. Put the gearbox selector lever in the neutral position.
2. Remove the selector cable from the selector switch.
3. Remove the attachment nut from the selector shaft.



The selector shaft must not be turned while the attachment nut is being loosened or tightened. While loosening or tightening the attachment nut, lock the selector shaft using the selector arm and an appropriate tool.

4. Remove the selector switch.

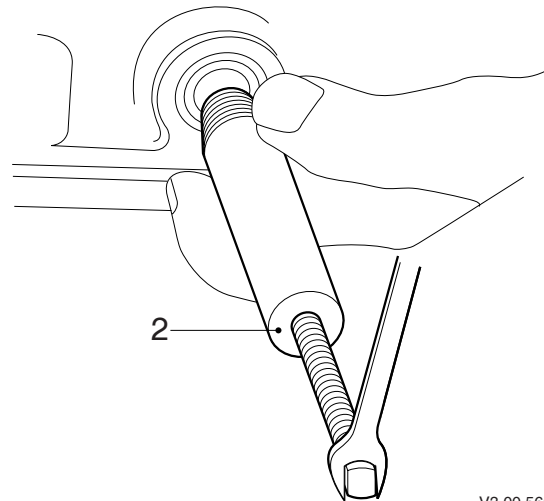


V3 00 482

5. Fit special tool (DAF no. 1453124) over the selector shaft and turn it into the oil seal.
6. Tighten the nut on the special tool (2) and remove the oil seal from the selector shaft bush.
7. Check the selector shaft bush and the selector shaft for irregularities and wear.

Note:

Slight irregularities can be smoothed using fine sandpaper.



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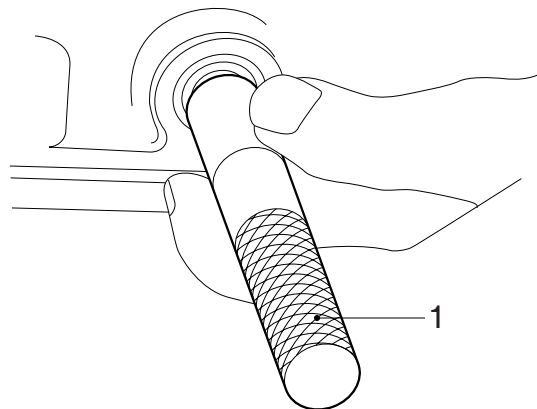
ALLISON 1000 & 2000 AUTOMATIC GEARBOXES

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Removal and installation

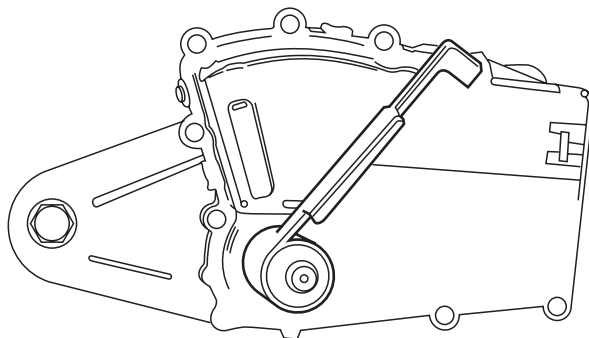
Fitting the selector shaft oil seal

1. Lightly lubricate lip of the oil seal with clean gearbox oil.
2. Fit the oil seal on the special tool (DAF no. 1453125).
3. Fit the oil seal as far as possible into the gearbox housing and remove the special tool (1).



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4. Fit the selector switch using special tool (DAF no. 1451992).



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5. Fit the selector arm onto the selector shaft and tighten the attachment nut to the specified torque. See "Technical data".

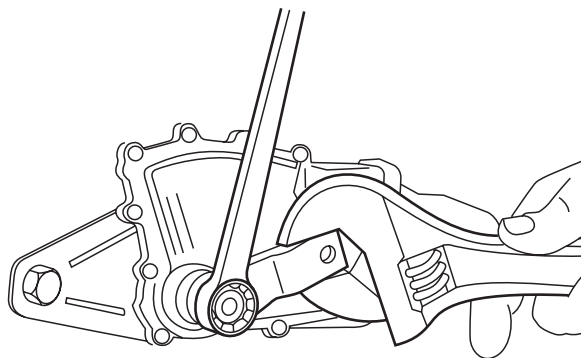


The selector shaft must not be turned while the attachment nut is being loosened or tightened. While loosening or tightening the attachment nut, lock the selector shaft using the selector arm and an appropriate tool.

6. Fit the selector cable into the selector arm.

Note:

The attachment of the selector cable must be fitted so that the connecting pin can move freely in every gear.



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Removal and installation

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4.5 REMOVING AND INSTALLING OIL FILTERS

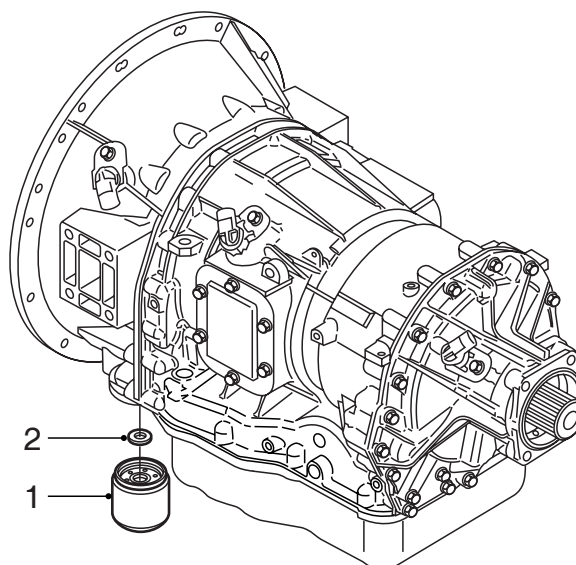
Removing oil filters

1. Clean the oil filters (1) and (5) and the surrounding area.
2. Loosen the oil filters on the gearbox and the heat exchanger.
3. Remove the magnetic rings (2) and (4) and check them for wear particles.

Note:

If there are large wear particles in the wear swarf, this indicates excessive wear in the gearbox and the cause must be ascertained.

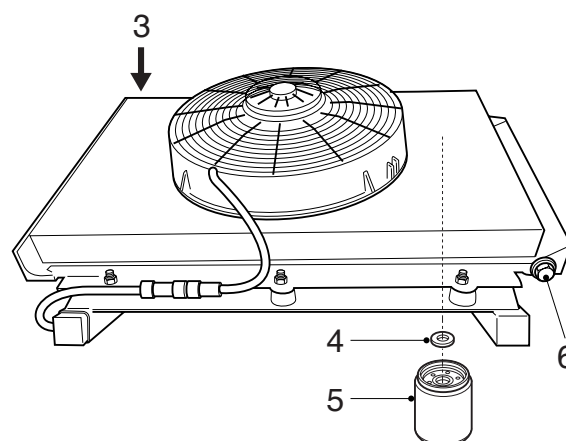
4. Clean the magnetic rings and the contact surfaces on the gearbox housing and the heat exchanger.



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Installing oil filters

1. Fit the magnetic rings (2) and (4) on the gearbox housing and the heat exchanger.
2. Lightly lubricate the new oil filters (1) and (5) with clean gearbox oil and place the oil filters on the gearbox and heat exchanger.
3. Tighten the oil filters until they touch the contact surface. Manually tighten the oil filters another 360°.
4. Check the oil level. See "Inspection and adjustment".



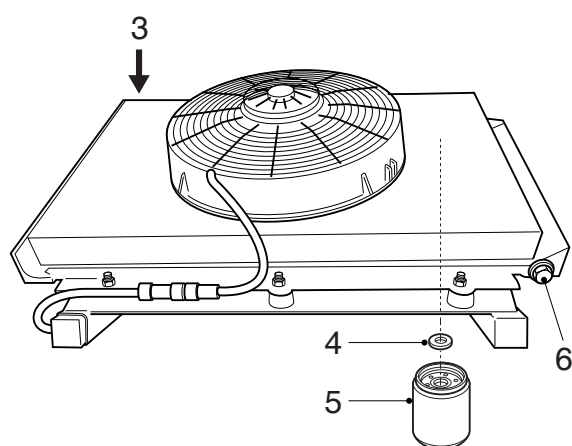
V3 00 556

5. DRAINING AND FILLING

5.1 DRAINING AND FILLING GEARBOX

Draining gearbox

1. Bring the gearbox to operating temperature (approx. 71°C - 93°C) so that the oil can be drained more quickly and more completely.
2. Place the vehicle on a level and horizontal surface.
3. Remove the drain plug from the gearbox oil sump.
4. Remove the drain plug (6) from the heat exchanger and loosen the bleed screw (3).
5. Remove the oil filters. See "Removal and installation".



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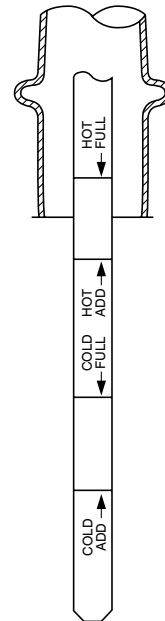
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Draining and filling

LF45/55 series

Filling gearbox

1. Clean the drain plugs, provide them with new sealing rings and fit them, tightening to the specified torque. See "Technical data".
2. Fill the gearbox through the dipstick holder with the specified quantity of oil; see "Technical data".
3. Start the engine and run it at idling speed.
4. If only gearbox oil escapes, tighten the bleed screw (3) to the specified torque. See "Technical data".
5. While the engine is idling, add gearbox oil until the oil level is between the "Cold add" mark and the "Cold full" mark.
6. Check the oil level. See "Inspection and adjustment".



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ALLISON MD 3060 AUTOMATIC GEARBOX

LF45/55 series

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ALLISON MD 3060 AUTOMATIC GEARBOX

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1. GENERAL

1.1 GENERAL

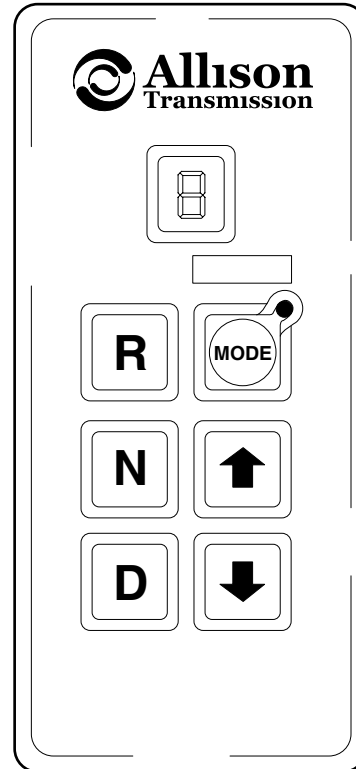
The Allison transmission is electronically controlled and has a diagnostics system that can record any faults in the memory of the ECU (Electronic Control Unit). The faults can be read at a later date. The system is operated and the faults are read via the selector keypad.

This selector has a display and is located immediately next to the driver's seat. The selector replaces the gear lever with manually operated gearboxes.

Type designation:

Example MD3060 P

MD	Medium Duty
3	Gearbox series
0	Transmission ratios occurring in quick succession
6	Number of gears possible
0	Modification number
P	PTO version



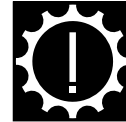
V300392

1.2 SYSTEM DESCRIPTION

"Gearbox" warning symbol

When the vehicle ignition is switched on, the "gearbox" warning symbol will not appear on the DIP display.

If the gearbox symbol in the main display lights up, there is a fault in the gearbox (changing gear) **or** the temperature of the gearbox oil is too high. The "gearbox" warning symbol in the DIP will then be displayed in yellow. The selector keypad LED will also flash three times. The accompanying fault code can be read on the selector display.



The ECU will block the functions of the selector and the gearbox will select a "safe gear" for the gearbox. It is important to drive the vehicle to a safe place as soon as possible and switch the ignition off. It will no longer be possible to shift the gearbox to neutral. The ECU will prevent this.

After approximately 30 seconds start the engine again and shift the gearbox. If the fault is one whereby the gearbox must in no circumstances be shifted, the ECU will no longer shift the gearbox.

The warning symbol in the display of the DIP will then appear in red. The "STOP" warning indicator will also light up.

Driving is therefore no longer possible!

If the fault is one whereby the gearbox may still be shifted, the warning in the main display will disappear. The ECU will have recorded the fault as an inactive fault.

It is now possible to drive the vehicle again, though the fault will still need to be remedied. In this situation, however, it is no longer possible to shift gears.

Gearbox oil temperature

If when driving the gearbox warning lamp lights up in the main display, this may mean that the gearbox oil has reached the maximum temperature of 121°C.

In this situation, the ECU limits gearbox shifting to the first four gears.

It is important to drive to a safe place as soon as possible and let the engine idle in neutral at an increased idling speed.

As a result, the cooling system of the engine will try to cool the gearbox oil.

If after approximately two minutes the warning in the master display has not disappeared, the engine must be turned off and contact made with the nearest DAF dealer.

Use of the engine brake

When the engine brake is operated in third or a higher gear, the ECU will change down to second gear as soon as the engine speed permits so as to get the maximum braking effect from the engine brake.

On the selector display, the second gear selected by the ECU is displayed.

Towing the vehicle

To tow the vehicle, the prop shaft must be detached at the rear axle.

It is also possible to remove the axle shafts. As oil can be lost in this process, it must be avoided as much as possible owing to environmental concerns.



Towing the vehicle without taking the above into consideration may lead to serious damage to the gearbox.

ALLISON MD 3060 AUTOMATIC GEARBOX

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General

LF45/55 series

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2. DESCRIPTION OF COMPONENTS

2.1 AUTOMATIC GEARBOX SELECTOR KEYPAD

The selector has the following functions:

- activating and deactivating the gearbox
- choosing a shift program
- reading the oil level
- reading and deleting fault codes

The selector has the following six keys:

Neutral	Neutral position
Drive	Automatic forward drive
Reverse	Reverse
MODE	Shift program selection
↓	Shifting up
↑	Shifting down

Display shows "N"

Highest gear

Display shows "R"

Normal or economy (LED on) program

Display shows the gear selected

Display shows the gear selected

Neutral position

No gear is activated in the "N" position. The vehicle is **not** locked in this position and can therefore roll.

Use the parking brake to lock the vehicle.

"N" appears on the display.

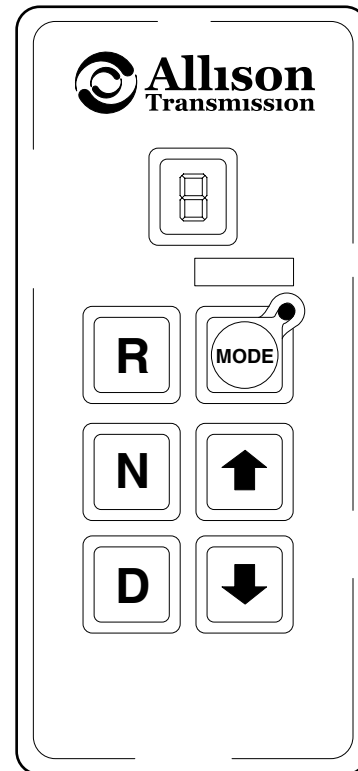
Automatic forward drive

If the "D" position is selected, the vehicle will immediately begin to move (if the brake system is at pressure and the vehicle is not on the parking brake). It is therefore advisable to depress the brake pedal before selecting position "D". In this position, the gearbox can automatically change up to the highest gear.

The highest gear that the gearbox can change up to is shown on the display.

Reverse

If position "R" is chosen, the vehicle will also be immediately set in motion. First depress the brake pedal and then select position "R". "R" appears on the display.



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ALLISON MD 3060 AUTOMATIC GEARBOX

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Description of components

LF45/55 series

Shift program selection

By pressing the "MODE" key briefly once, another shift program can be selected from a stationary as well as a driving position. Two selections are possible:

Normal program

This program is chosen automatically when the vehicle ignition has been switched off. No report is displayed. This program allows the gearbox to shift gears as and when necessary so that driving at higher speeds is possible. This can be desirable on unpaved terrain.

Economy program

The LED lights up on the selector display. This program will in general change gear at somewhat lower engine speeds. This results in more economical fuel consumption.

↓ Shifting down

After selecting the "D" key and when the vehicle is driving, this key can be used to keep the gearbox in a lower gear. The selected gear is shown in the display. The gearbox will not change up further until the "↑" or "D" key is pressed. The number of gears that can be used will appear in the display.

↑ Shifting up

This key is used to change up to a higher gear. However, this is only possible after previously selecting to stay in a low gear.

Faults

If the oil level indicator cannot give the correct oil level, one of the following codes will appear in the display.

OL - 50	Engine speed too low
OL - 59	Engine speed too high
OL - 65	Gearbox is not in neutral
OL - 70	Gearbox oil temperature too low
OL - 79	Gearbox oil temperature too high
OL - 89	Output shaft is not stationary (handbrake)
OL - 95	Oil level indicator is defective

The oil level reading function can be left by pressing "D", "N", or "R".

Note: the function cannot be left by pressing the arrow keys again, as this prompts the diagnostic code reading function. All diagnostic codes are preceded by the letter D followed by a number between 1 and 5. In this function, important fault codes could be deleted from the memory by an unqualified user.

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Description of components

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3. INSPECTION AND ADJUSTMENT

3.1 CHECKING AUTOMATIC GEARBOX OIL LEVEL

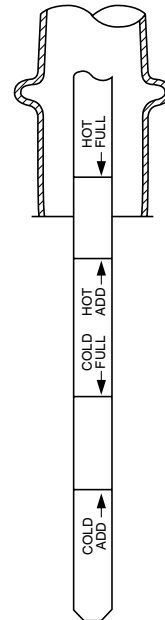
Checking cold oil level

1. Place the vehicle on a flat and level surface.
2. Make sure that the gearbox is in neutral and allow the engine to run for several minutes.
3. Apply the service brake, switch the gearbox to **D**, then to **N** and finally switch the gearbox to **R**. The purpose of this is to fill the hydraulic system.
4. Switch the gearbox to the parking position and release the service brake.
5. Remove the dipstick when the engine is idling and wipe it clean with a lint-free cloth.

Note:

To take the dipstick out of the holder, the sealing cap must be held while the dipstick is turned anti-clockwise.

6. Put the dipstick back.
7. Remove the dipstick and check the oil level. The oil level should be between the "Cold add" and "Cold full" marks.
8. Clean the dipstick with a lint-free cloth and put it back.
9. Remove the dipstick and check the oil level again.
10. Oil needs to be added when the oil level is below the "Cold add" mark.
11. Check the oil level in the gearbox at operating temperature.



ALLISON MD 3060 AUTOMATIC GEARBOX

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Inspection and adjustment

LF45/55 series

Checking hot oil level

1. Bring the gearbox up to operating temperature (approx. 71°C - 93°C).
2. Remove the dipstick when the engine is idling and wipe it clean with a lint-free cloth.

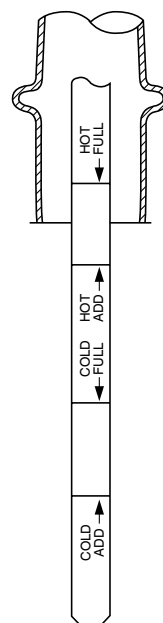
Note:

To take the dipstick out of the holder, the sealing cap must be held while the dipstick is turned anti-clockwise.

3. Put the dipstick back.
4. Remove the dipstick and check the oil level.
5. The oil level should be between the "Hot add" and "Hot full" marks.
6. Clean the dipstick with a lint-free cloth and put it back.
7. Remove the dipstick and check the oil level again.
8. Oil needs to be added when the oil level is below the "Hot add" mark.
9. Oil needs to be drained when the oil level is above the "Hot full" mark.

Note:

The oil level must be checked at least twice. When there are differences between the measurements, check the bleeder for clogging.



W 3 03 099

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ALLISON MD 3060 AUTOMATIC GEARBOX

LF45/55 series

Inspection and adjustment

3.2 CHECKING OIL LEVEL WITH SELECTOR KEYPAD

Checking oil level with selector keypad

1. Place the vehicle on a flat and level surface and apply the parking brake.
2. Put the gearbox in the neutral position and bring the gearbox to operating temperature (approx. 71° - 93°C).
3. Run the engine at idling speed for 2 minutes.

4. Press both arrow keys on the selector keypad simultaneously. The display now shows the letters **O** and **L**.

Note:

O and **L** stand for **Oil Level**

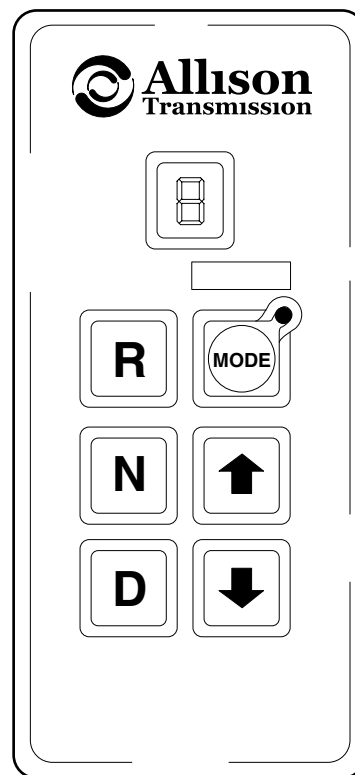
5. When the oil level is correct, the letters **O - K** appear on the display.
When the oil level is too high, this is indicated by **HI** followed by the number of litres in excess.
When the oil level is too low, this is indicated by **LO** followed by the number of litres lacking.

Example

LO-02 means that two litres have to be added.

HI-03 means that three litres have to be drained.

6. Press the **N** key to exit the system.



V300392

ALLISON MD 3060 AUTOMATIC GEARBOX

3

Inspection and adjustment

LF45/55 series

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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, GEARBOX ASSEMBLY

Removing gearbox assembly

1. **Note:**
Before the gearbox can be removed, the gearbox oil must be drained.
2. If necessary, remove the oil filler pipe to avoid damage.
3. Plug the external oil pipes after removing and/or detaching them to prevent dirt entering the oil system.
4. Disconnect the gearbox wiring harness connectors and secure the wiring harness. Plug the openings.
5. Remove the prop shaft.
6. See what is best for gearboxes with PTO: remove the PTO from the gearbox, disconnect the hydraulic pipes from the pump or remove the prop shaft, if fitted.
7. Remove the gearbox from the engine.

ALLISON MD 3060 AUTOMATIC GEARBOX

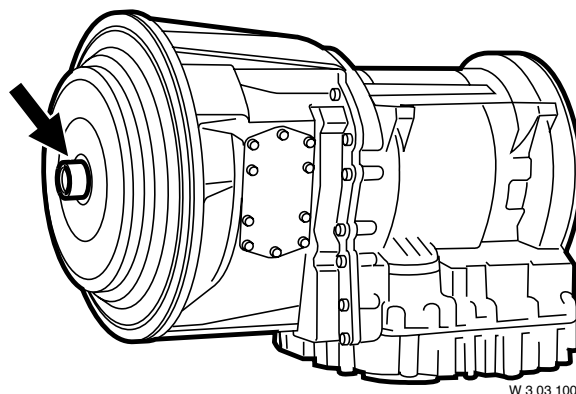
3

Removal and installation

LF45/55 series

Installing gearbox assembly

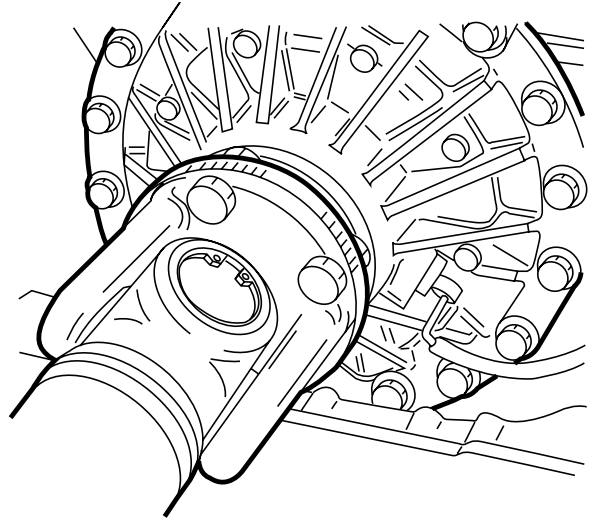
1. When installing the gearbox, apply a small amount of grease to the nose of the torque converter to prevent noise after fitting. See "Technical data".
2. Fit the gearbox attachment bolts all around. Tighten the attachment bolts to the specified torque. See "Technical data".
3. Install the PTO. Tighten the attachment bolts to the specified torque. See "Technical data".
4. If necessary, fit the hydraulic pipes and/or prop shaft. Tighten the attachment bolts to the specified torque. See "Technical data".
5. Fit the prop shaft.
6. Fit the wiring harness connectors.
7. Fit the external oil pipes. Tighten the pipes to the specified torque; see "Technical data".
8. If necessary, fit the oil filler pipe.
9. Fill the gearbox with oil and check the oil level.



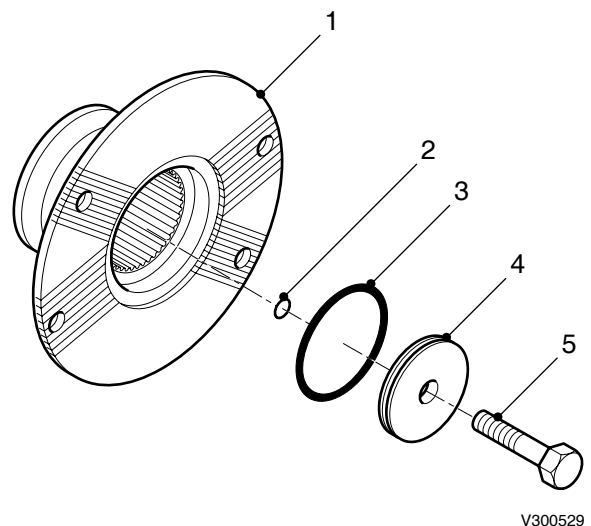
4.2 REMOVING AND INSTALLING OUTPUT SHAFT OIL SEAL

Removing output shaft oil seal

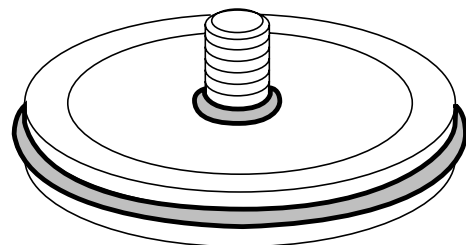
1. Remove the prop shaft and secure it so that it does not interfere with further operations.



2. Unscrew the attachment bolt (5) of the flange without removing it from the locking plate.



3. Remove the bolt and locking plate from the flange. Pay attention to the sealing rings on the outer circumference and on the inside of the locking plate.



ALLISON MD 3060 AUTOMATIC GEARBOX

3

Removal and installation

LF45/55 series

4. Slide the flange off the output shaft or, if necessary, use a tripod puller to pull it off the shaft.
5. Drill two holes in the external cover of the oil seal and turn special tool (DAF no. 0484899) into the oil seal. Pull the oil seal out of the gearbox housing using special tool (DAF no. 0694928).

Installing output shaft oil seal

1. Apply a small amount of liquid gasket to the outside of oil seals fitted with a steel cover. Apply a small amount of green soap to the outside of oil seals fitted with a rubber cover.
2. Fit the oil seal in the gearbox housing using special tool (DAF no. 1240037).
3. Apply a small amount of grease to the oil seal lips and slide the flange over the output shaft until it abuts.
4. Fit new sealing rings (2, 3) to the locking plate and fit it with the attachment bolt to the flange (apply a small amount of grease to the sealing rings).

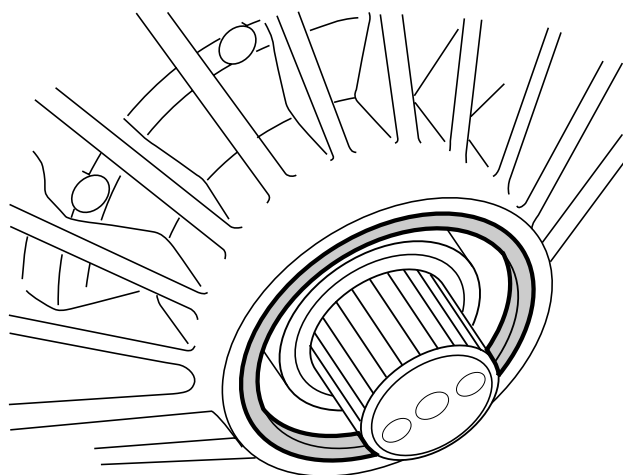
Note:

The attachment bolts on the new gearboxes are no longer secured by a locking plate, but by the self-locking screw thread in the output shaft.

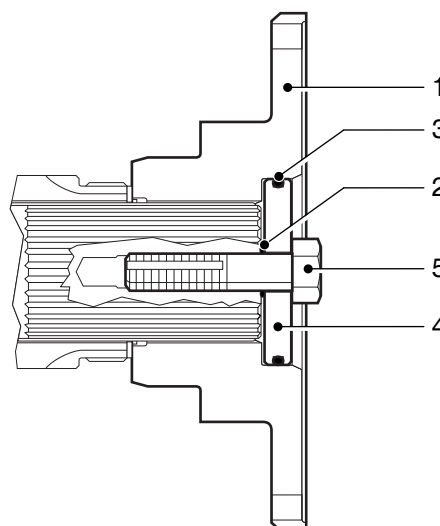
5. Hold the prop shaft flange in place with the special tool (DAF no. 0484977).
6. Tighten the attachment bolt (5) to the specified torque. See "Technical data".



If the locking plate is not tightened to the specified torque, there is a risk of it getting bent during fitting, which could lead to serious oil leakage.



W 3 03 062



V300530

4.3 REMOVAL AND INSTALLATION, OIL FILTERS



To prevent skin injury, avoid unnecessary contact with the drained oil.

Allison MD 3060 automatic gearbox

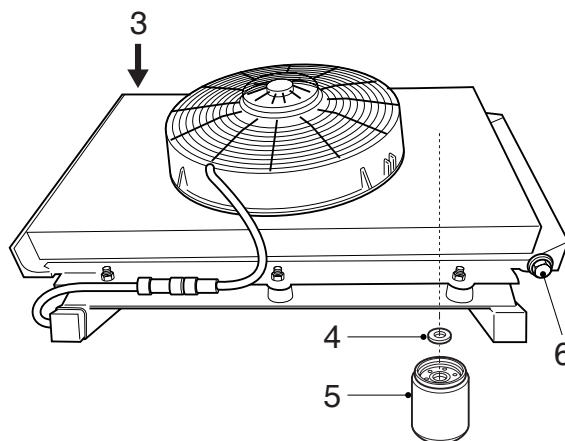
Removing oil cooler oil filter

1. Clean the oil filter (5), if fitted, and the surrounding area.
2. Loosen the oil filter on the heat exchanger. Collect the oil that comes out.
3. Remove the magnetic ring (4) and check it for wear particles.

Note:

If there are large wear particles in the wear swarf, this indicates excessive wear in the gearbox and the cause must be ascertained.

4. Clean the magnetic ring and the contact surfaces on the heat exchanger.



V3 00 556

Fitting oil cooler oil filter

1. Fit the magnetic ring (4) on the heat exchanger.
2. If applicable, lightly lubricate the new oil filter (5) with clean gearbox oil and fit it on the heat exchanger.
3. Tighten the oil filter until it touches the contact surface. Manually tighten the oil filter another 360°.
4. Check the oil level. See "Inspection and adjustment".

ALLISON MD 3060 AUTOMATIC GEARBOX

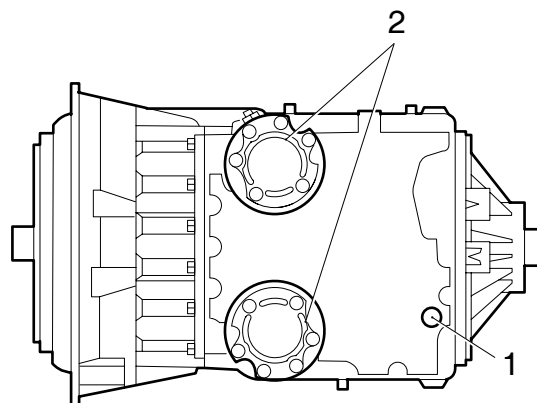
3

Removal and installation

LF45/55 series

Removing oil filters

1. Remove the attachment bolts from the filter covers (2) and remove the filter covers. Collect the oil that comes out.
2. Remove the oil filters from the oil sump.
3. Remove the various O-rings and the gasket from the filter covers.
4. Remove any gasket remains from the filter covers and the contact surfaces.



V300371

Installing oil filters

1. Lubricate the new O-rings with clean gearbox oil and fit the various O-rings on the filter covers.

Note:

Compare the new O-rings to the old ones to ensure that the correct O-rings are used.

2. Fit a new gasket on the filter covers.
3. Lubricate the rubber inner ring of the oil filters with clean gearbox oil and fit the oil filters on the filter covers.
4. Fit the filter covers together with the oil filters on the gearbox and tighten the attachment bolts to the specified torque. See "Technical data".
5. Check the oil level. See "Inspection and adjustment".

5. DRAINING AND FILLING

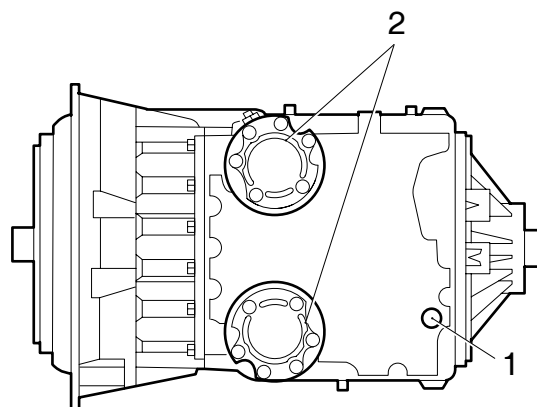
5.1 DRAINING AND FILLING GEARBOX



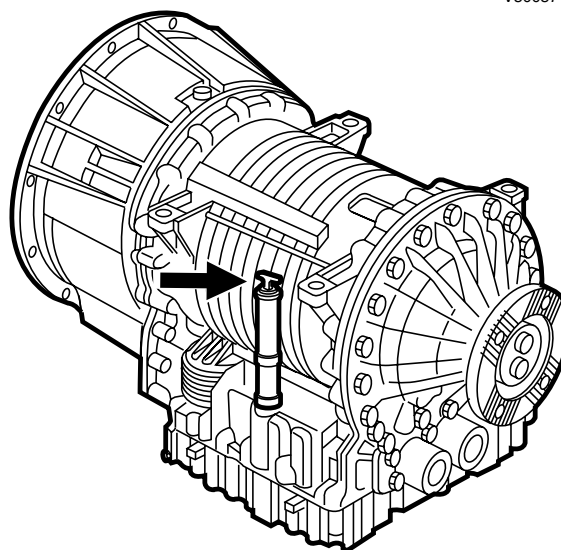
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining gearbox

1. Bring the gearbox to operating temperature (approx. 71°C - 93°C) before the oil is drained, so that the oil can be drained more quickly and more completely.
2. Place the vehicle on a level and horizontal surface.
3. Remove the drain plug (1) from the gearbox oil sump.
4. Remove the oil filters (2). See "Removal and installation".



V300371



W 3 03 098

ALLISON MD 3060 AUTOMATIC GEARBOX

3

Draining and filling

LF45/55 series

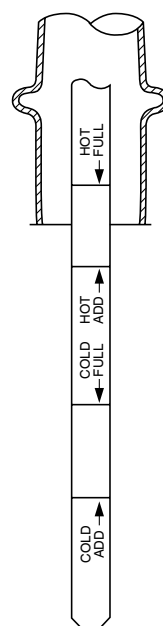
Filling gearbox

1. Clean the drain plug (1), fit a new sealing ring and tighten the plug to the specified torque; see "Technical data".
2. Fit the oil filters (2). See "Removal and installation".
3. Fill the gearbox through the dipstick holder with the specified quantity of oil; see "Technical data".
4. Check that the oil level reaches the "Cold full" mark.

Note:

To take the dipstick out of the holder, the sealing cap must be held while the dipstick is turned anti-clockwise.

5. Check the oil level using the selector keypad. See "Inspection and adjustment".



W 3 03 099

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4. INSPECTION AND ADJUSTMENT	4-1	200508
4.1 Inspecting clutch servo	4-1	200508
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5. REMOVAL AND INSTALLATION	5-1	200508
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CLUTCH

3

Contents

LF45/55 series

1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS



Hydraulic fluid is toxic and can therefore have a damaging effect on your health. Any direct or indirect physical contact should therefore be avoided.



As hydraulic fluid is also corrosive it may damage the paintwork of the vehicle. Any contact between hydraulic fluid and paintwork should therefore be avoided.



Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

CLUTCH

3

Safety instructions

LF45/55 series

2. GENERAL

2.1 SYSTEM DESCRIPTION, CLUTCH

The clutch is a single dry-plate clutch which is hydraulically operated and pneumatically assisted.

The clutch consists of:

- flywheel
- clutch plate
- clutch release assembly

By clamping the clutch plate between the flywheel and the clutch release assembly, a torque can be transferred (by means of friction). The extent of the torque that can be transferred by the clutch is determined by multiplying the maximum engine torque by a safety factor (usually 1.3).

To clamp the clutch plate, a diaphragm (pressure) spring is used in the clutch release assembly.

A diaphragm spring constitutes a simple, strong and cost-effective construction.

Another advantage of the diaphragm spring is that the pressure exerted on a new clutch plate almost equals the pressure exerted on a worn clutch plate.

A diaphragm spring requires a self-centring thrust bearing.

The type of clutch plate used depends on the following factors.

The size of the clutch plate lining must correspond to the desired service life.

The character of the engine (the engine vibrations to be damped) determines the version of the vibration damper design in the hub.

For the clutch plate to engage smoothly the lining material must abut the flywheel and clutch release assembly evenly at all places when engaging.

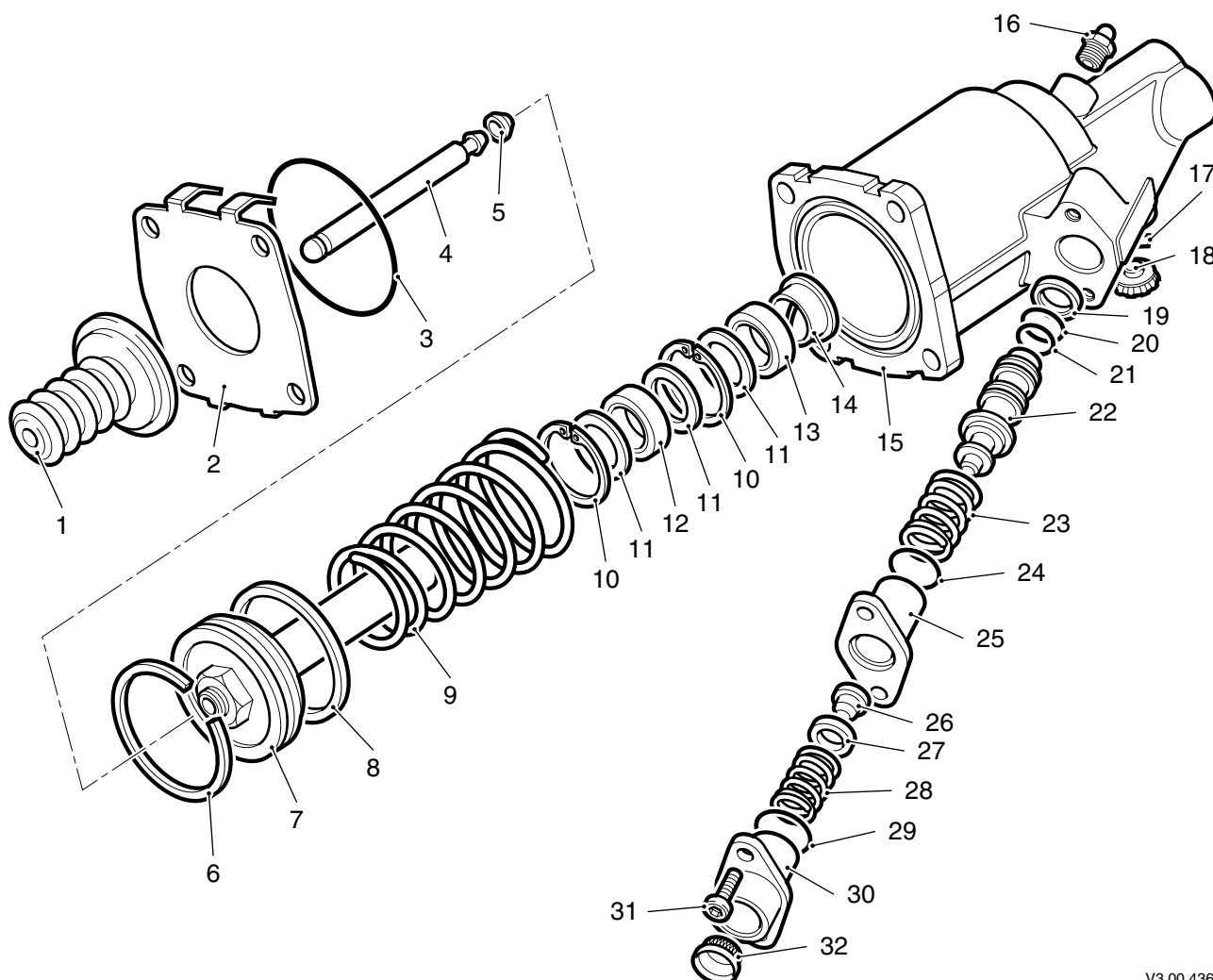
CLUTCH

3

General

LF45/55 series

2.2 OVERVIEW DRAWING, CLUTCH SERVO

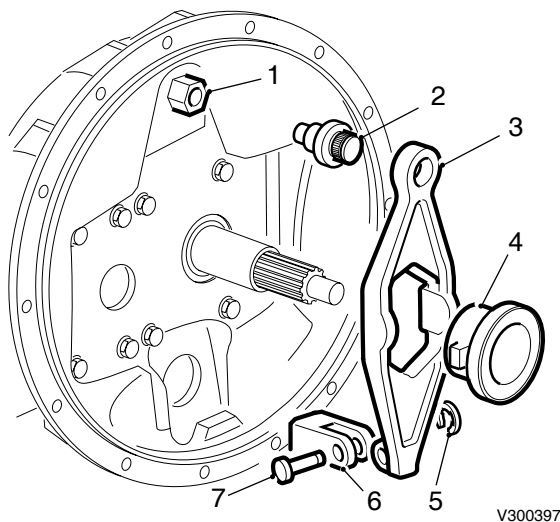


V3 00 436

1. Rubber protective bellows
2. End-plate
3. O-ring
4. Push rod
5. Attachment ring for push rod
6. Split seal
7. Piston
8. Piston seal
9. Conical spring
10. Circlip
11. Washer
12. Seal, hydraulic part, front
13. Seal, hydraulic part, rear
14. Split bearing
15. Booster housing
16. Bleed nipple

17. Vent opening
18. Blow-off nipple
19. Piston seal
20. O-ring
21. O-ring
22. Piston
23. Pressure spring
24. O-ring
25. Spring seat housing
26. Inlet valve
27. Spring seat
28. Reset spring
29. O-ring
30. Connector housing
31. Allen screw
32. Air filter

2.3 OVERVIEW DRAWING, CLUTCH LEVER ATTACHMENT TO CLUTCH HOUSING



1. Screw adapter
2. Ball joint
3. Clutch lever
4. Thrust bearing
5. Clip
6. Claw
7. Yoke pin

CLUTCH

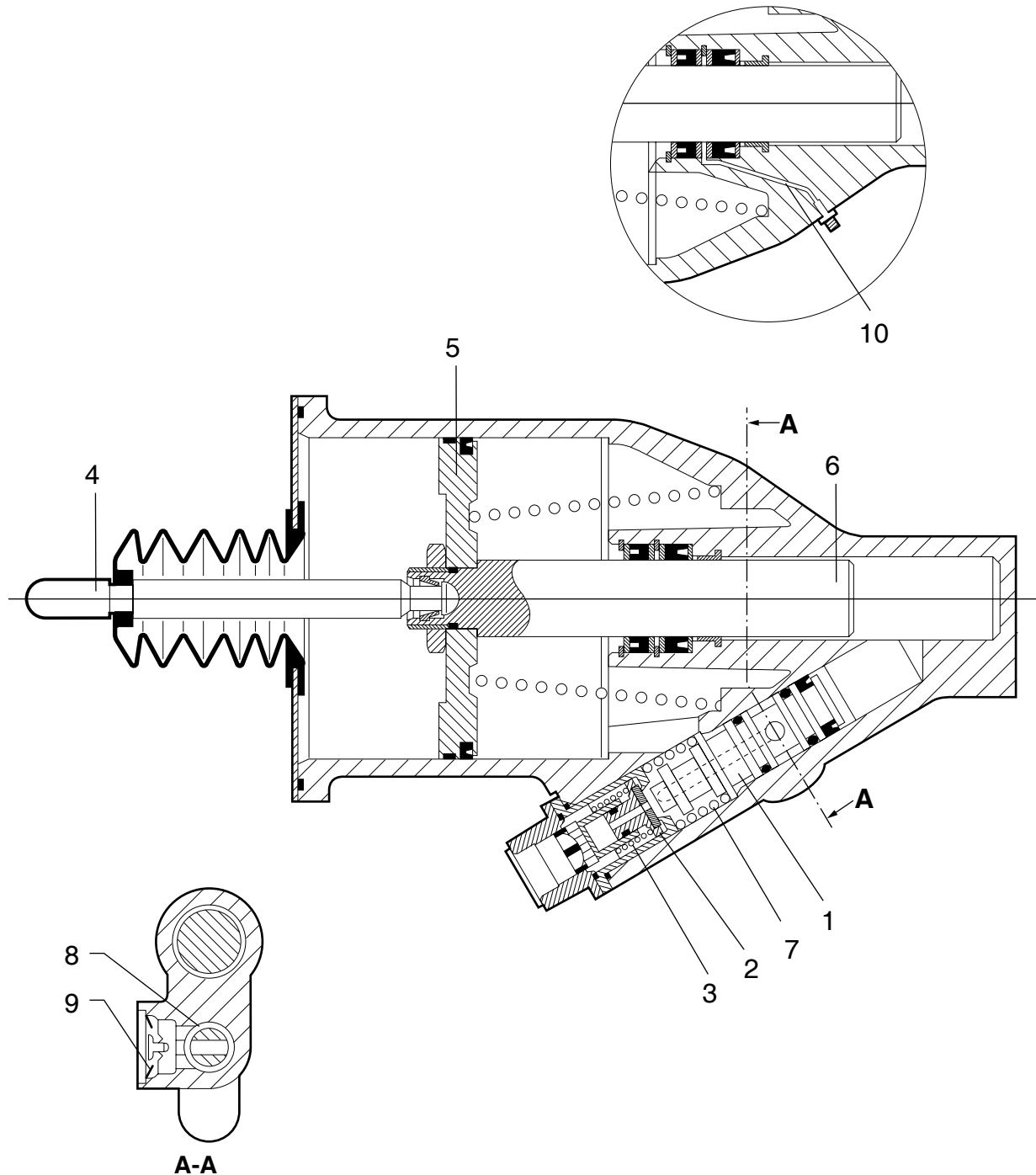
3

General

LF45/55 series

3. DESCRIPTION OF COMPONENTS

3.1 CLUTCH SERVO



V300352-2

Declutching

Depressing the clutch pedal results in a build-up of hydraulic pressure.

This causes the servo piston (1) to push the air valve (2) away from the valve seat, against the force of the springs (3) and (7).

CLUTCH

3

Description of components

LF45/55 series

Air pressure now flows into the cylinder.

The pressure pin (4) is pushed forward by the air pressure building up on air piston (5) and the hydraulic pressure on fluid piston (6).

The pressure pin (4) pushes against the clutch lever, which results in declutching.

State of equilibrium

When the hydraulic pressure and pneumatic support push the pressure pin (4) forwards, a state of equilibrium is achieved between the air pressure and the hydraulic pressure (status when the clutch pedal is not depressed any further).

The servo piston (1) again seals off against the valve seat, closing the air supply and stopping the build-up of pneumatic pressure.

Clutching

When the clutch pedal is released, there is no longer any hydraulic pressure and the servo piston (1) will be pushed back into its original position by pressure spring (7) and any remaining pneumatic support.

As a result, the bleed bore (8) in the servo piston (1) is no longer closed, and venting takes place via bleed vent (9).

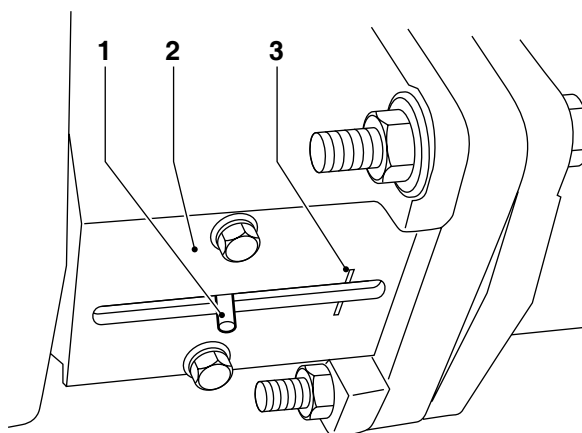
Vent opening

The function of the vent opening (10) is to prevent a build up of pressure between both piston seals.

3.2 WEAR INDICATOR

An indicator (1) is mounted on the push rod of the clutch servo. The end of the indicator can be seen in the groove of the indicator cover (2).

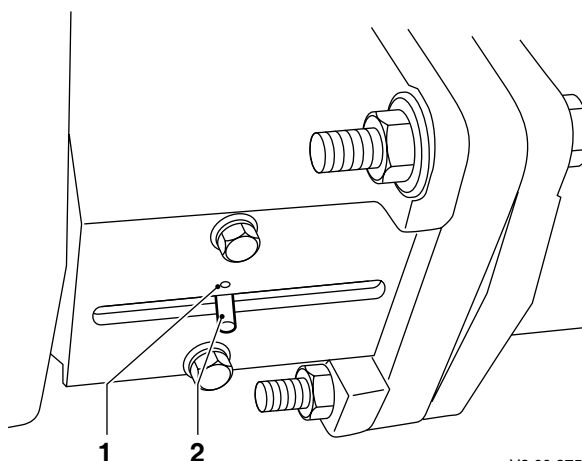
As the clutch plate wears, the indicator (1) will move towards the end mark (3). When the indicator (1) reaches the end mark (3), it may be assumed that the clutch plate is due to be replaced.



V3 00 381

Automatically adjusting clutch release assembly

Check that the wear indicator (2) on the clutch servo is directly opposite the mark (1) on the cover.
If the wear indicator is no longer level with the mark on the clutch servo, replace the clutch plate.



V3 00 375

CLUTCH

3

Description of components

LF45/55 series

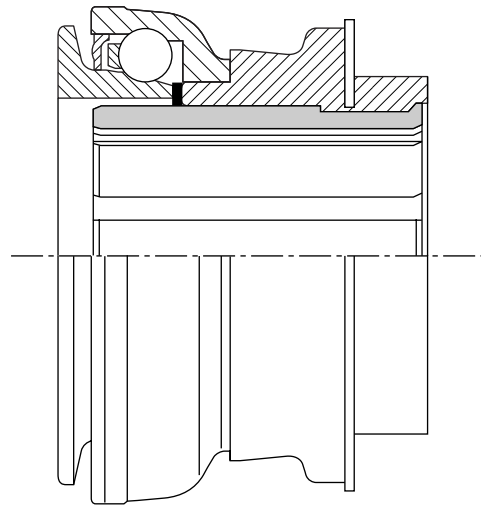
3.3 THRUST BEARING

The thrust bearing is of the pressed type and is maintenance-free.

When mounting the thrust bearing, do not use any grease. The gearbox front cover must be thoroughly cleaned before the thrust bearing is mounted.

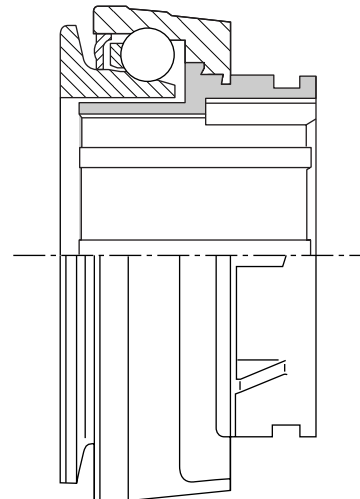
The grease will attack the plastic coating and shorten the service life of the thrust bearing.

LF 45 thrust bearing with ZF S5-42 gearbox



V3 00 387

Thrust bearing, other LF versions



V3 00 388

4. INSPECTION AND ADJUSTMENT

4.1 INSPECTING CLUTCH SERVO



Hydraulic fluid is toxic and can therefore have a damaging effect on your health. Any direct or indirect physical contact should therefore be avoided. As hydraulic fluid is also corrosive it may damage the paintwork of the vehicle. Any contact between hydraulic fluid and paintwork should therefore be avoided.



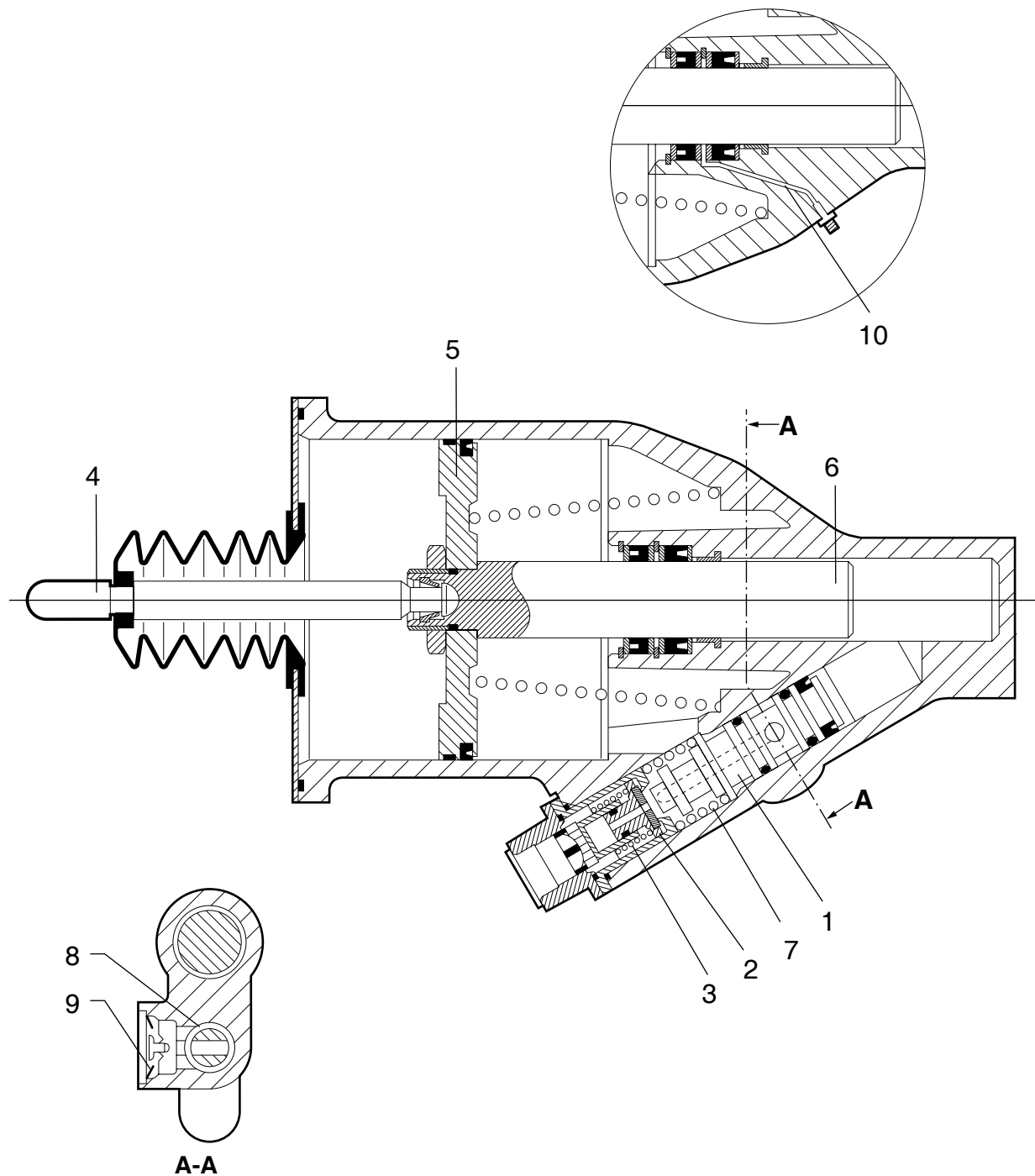
Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

CLUTCH

3

Inspection and adjustment

LF45/55 series



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V300352-2

1. Pressurise the air system.
2. Check for any air leakage via the clutch servo bleed vent.
3. Depress the clutch pedal and check whether there is any leakage via the clutch servo bleed vent.

Note:

While releasing the clutch pedal, the clutch servo should bleed itself via this bleed vent.

4. Depress the clutch pedal and check that there is no leakage via the clutch servo bleed vent.
5. Check that there is no oil leakage via the vent opening (10).

Note:

A drop of oil on the vent opening (10) is normal and is not a reason to replace the clutch servo. If there is constant leakage, the clutch servo must be repaired or replaced. If in doubt as to whether the clutch servo situation is normal or whether there is a leak, inspect the fluid level in the clutch reservoir.

6. Depress the clutch pedal and check whether there is an air leak via the vent opening (10).

CLUTCH

3

Inspection and adjustment

LF45/55 series

4.2 CHECKING CLUTCH FLUID LEVEL

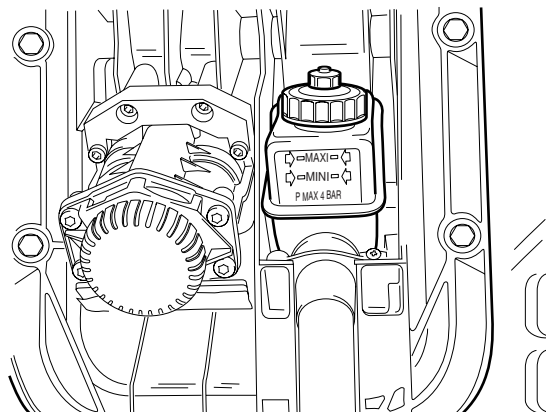


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Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

1. Check whether the fluid level is between the MINI and MAXI marks when the cab is in the driving position.



GO 00 213

5. REMOVAL AND INSTALLATION

5.1 REMOVAL AND INSTALLATION, CLUTCH SERVO



Hydraulic fluid is toxic and can therefore have a damaging effect on your health. Any direct or indirect physical contact should therefore be avoided.



As hydraulic fluid is also corrosive it may damage the paintwork of the vehicle. Any contact between hydraulic fluid and paintwork should therefore be avoided.



Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

Removing clutch servo

1. Remove the air pipe from the clutch servo.
2. Place a container beneath the clutch servo and remove the fluid pipe. Then plug the pipe.

Note:

The clutch servo is mounted against the clutch housing under pre-tension.

3. Remove the attachment nuts from the clutch servo.

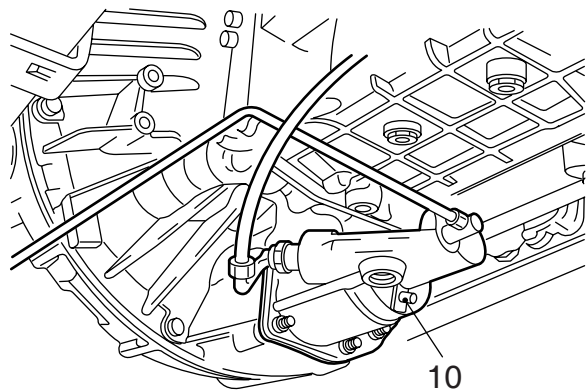
Fitting clutch servo

1. Fit the clutch servo.

Note:

Make sure that the push rod falls into the cup-shaped recess in the wear indicator. Then tighten the attachment nuts evenly.

2. Tighten the attachment nuts evenly.
3. Connect the air and fluid pipes.
4. Fill and bleed the clutch system.



CLUTCH

3

Removal and installation

LF45/55 series

5.2 REMOVAL AND INSTALLATION, THRUST BEARING

Removing thrust bearing

1. Remove the gearbox.
2. Remove the thrust bearing from the gearbox front cover in the clutch housing.

Installation, thrust bearing



In the case of thrust bearings with a plastic coating, no grease should be used on the gearbox front cover. The grease will attack the plastic coating and shorten the service life of the thrust bearing.

1. Check the clutch lever for wear.
2. Check the pressure fingers of the diaphragm spring for wear.
3. Apply a little grease to all pressure surfaces of the clutch lever.
4. Ensure that the gearbox front cover is free of grease and dirt.
5. Install the thrust bearing on the gearbox front cover. **No grease is permitted.**
6. Fit the gearbox.

5.3 REMOVAL AND INSTALLATION, CLUTCH LEVER

Removing clutch lever

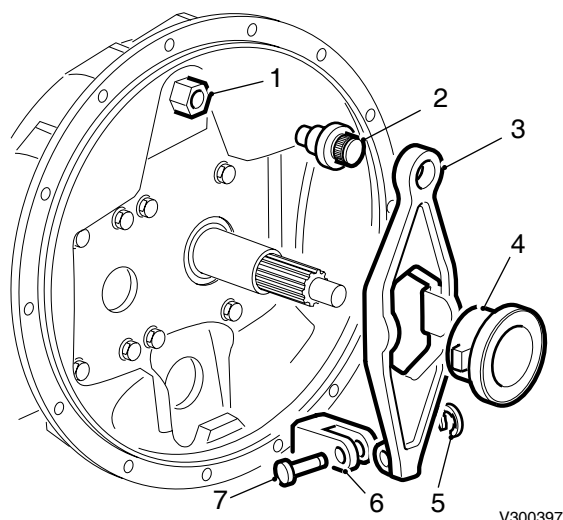
1. Remove the gearbox.
2. Remove the thrust bearing (4).
3. Remove the clip (5) and the yoke pin (7).
4. Force the ball joint (2) which is installed in the clutch lever (3) out of the attachment point in the clutch housing.

Note:

It may be possible to remove the complete support point (1) by turning the attachment point out of the clutch housing.

Fitting clutch lever

1. Apply a little grease to the moving parts of the clutch lever.
2. Lock the support point (1) in the clutch housing with a suitable locking compound.
3. Install the ball joint (2) in the clutch lever (3) and install the clutch lever in the clutch housing.
4. Install the yoke pin (7) in the claw (6) and put on the clip (5).
5. Install the thrust bearing (4).
6. Fit the gearbox.



CLUTCH

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Removal and installation

LF45/55 series

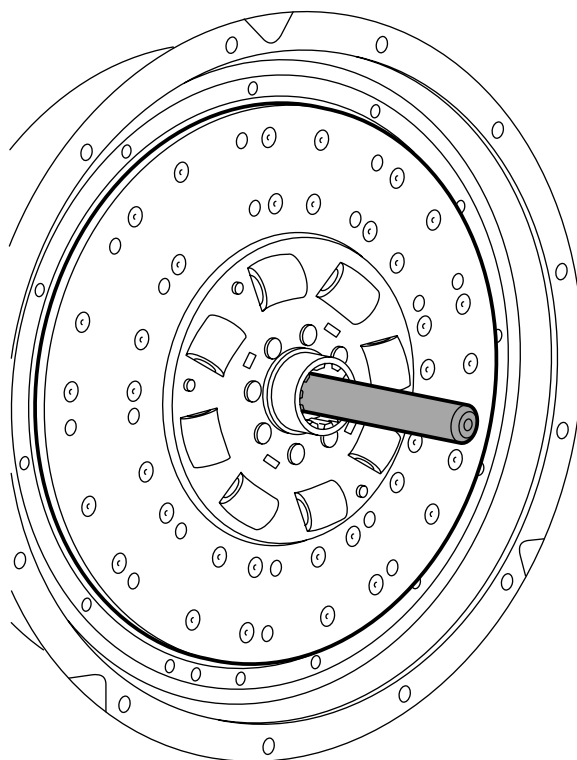
5.4 REMOVAL AND INSTALLATION, CLUTCH RELEASE ASSEMBLY / CLUTCH PLATE

Removing clutch release assembly/clutch plate

1. Remove the gearbox.
2. Insert a dummy input shaft through the hub of the clutch plate in the flywheel pilot bearing.
3. Remove four attachment bolts from around the circumference of the clutch release assembly. Replace them with studs.
4. Remove the remaining attachment bolts of the clutch release assembly evenly.
5. Remove the clutch release assembly by sliding it off the four studs.
6. Remove the clutch plate with the dummy input shaft.

Installing clutch release assembly/clutch plate

1. Check the free movement of the clutch plate on the splines of the gearbox input shaft.
2. Lightly lubricate the end of the dummy input shaft with grease. This will lubricate the hub of the clutch plate.
3. Use a dummy input shaft to position the clutch plate against the flywheel.
4. Install four studs in the flywheel, distributed evenly around the circumference.
5. Support the clutch release assembly and slide it onto the four studs.
6. Fit the attachment bolts and tighten them crosswise to the specified torque. See "Technical data".
7. Fit the gearbox.

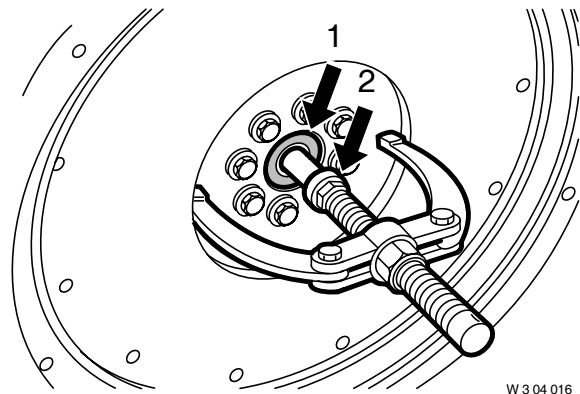


V300124

5.5 REMOVAL AND INSTALLATION, PILOT BEARING

Removing pilot bearing

1. Remove the gearbox.
2. Remove the clutch release assembly and the clutch plate.
3. Use an internal puller (2) to remove the pilot bearing (1) from the flywheel.

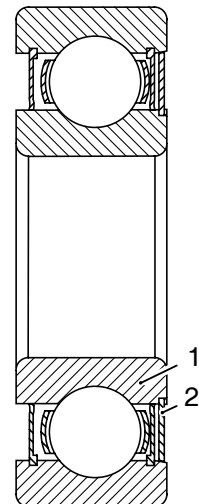


Fitting pilot bearing

1. Check the flywheel bore for dirt and damage.

Note:

The pilot bearing (1) has a grease and dust seal (2) on one side only. When the pilot bearing is installed, the grease and dust seal must be on the clutch plate side.



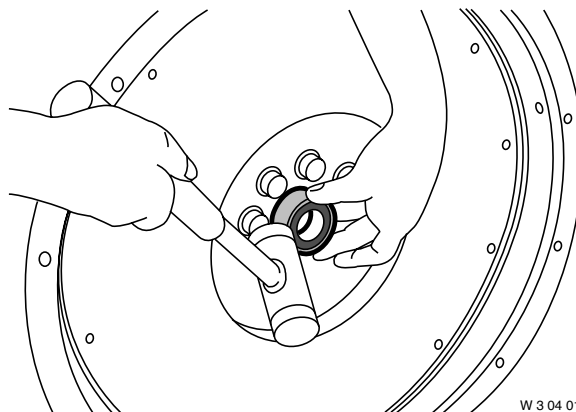
CLUTCH

3

Removal and installation

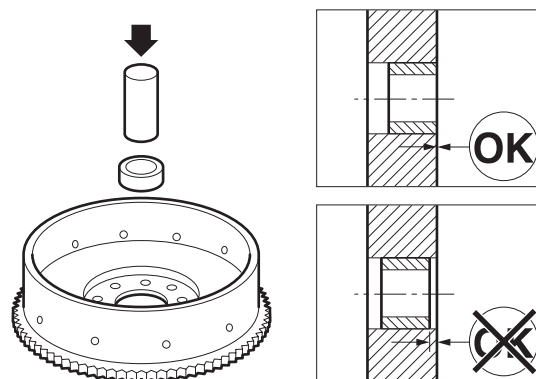
LF45/55 series

2. Use a plastic mallet to install the bearing in the flywheel.



W 3 04 017

3. Fit the clutch release assembly and clutch plate.
4. Fit the gearbox.

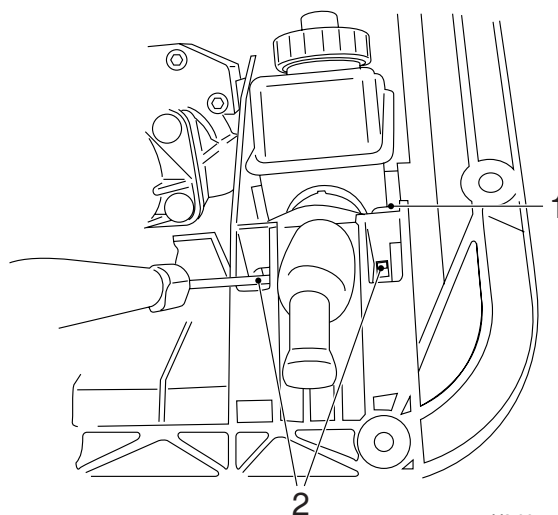


V300989

5.6 REMOVING AND INSTALLING CLUTCH CYLINDER

Removing the clutch cylinder

1. Drain the clutch system; see "Draining and filling".
2. Remove the retainer clip and the hydraulic pipe.
3. Remove the attachment screw from the fastening bridge (1).
4. Using a screwdriver, press the lock levers (2) back and remove the fastening bridge (1).

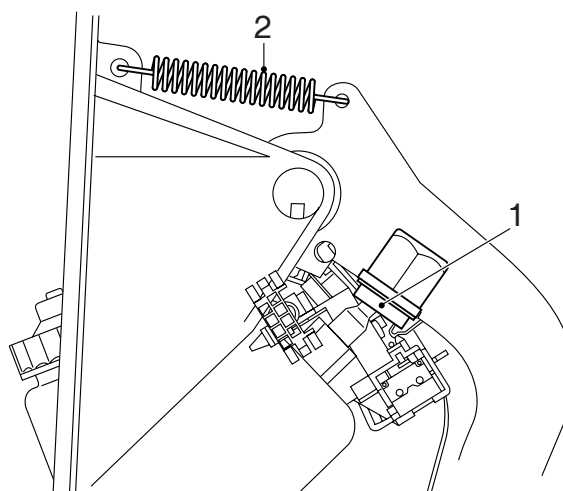


V3 00 577

5. Screw the plastic fastening jig (1) out of the clutch pedal. If necessary, detach the spring (2).
6. Remove the clutch cylinder.

Fitting clutch cylinder

1. Reposition the clutch cylinder in the holder.



V3 00 579

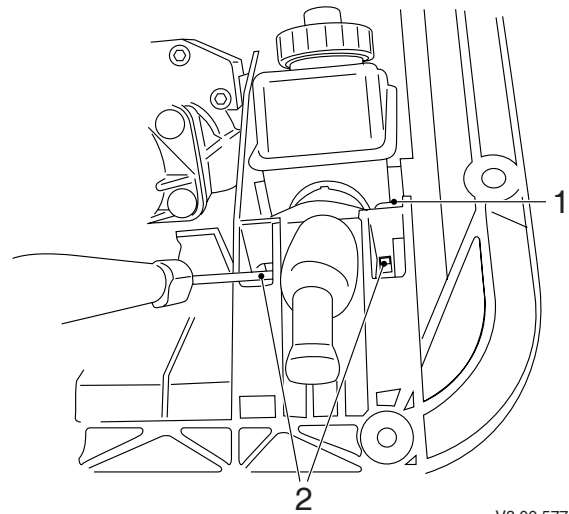
CLUTCH

3

Removal and installation

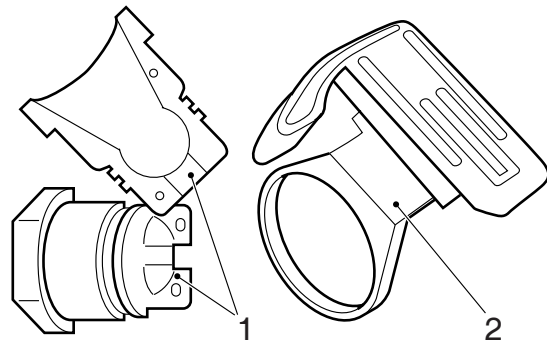
LF45/55 series

2. Fit the fastening bridge (1) and tighten the attachment screw.



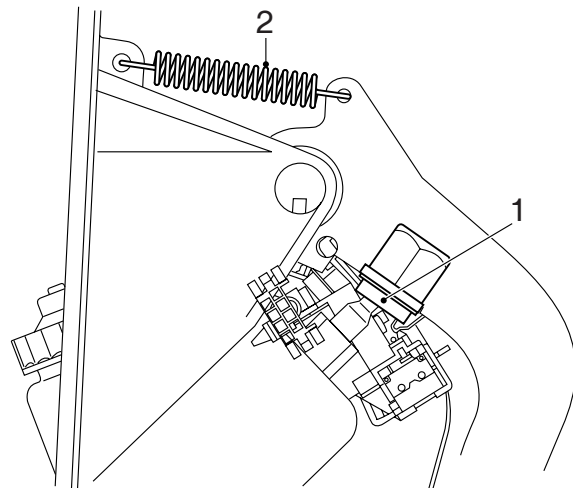
V3 00 577

3. Clip the plastic fastening jig (1) around the clutch cylinder push rod and fit the switch control (2) over the jig.



V3 00 576

4. Screw the plastic fastening jig (1) into the pedal.
5. Fit the spring (2) if it has been removed.
6. Fill the clutch system; see "Draining and filling".



V3 00 579

6. DRAINING AND FILLING

6.1 DRAINING AND FILLING CLUTCH SYSTEM



Hydraulic fluid is toxic and can therefore have a damaging effect on your health. Any direct or indirect physical contact should therefore be avoided. As hydraulic fluid is also corrosive it may damage the paintwork of the vehicle. Any contact between hydraulic fluid and paintwork should therefore be avoided.



Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

Draining clutch system

1. Place a container beneath the clutch servo.
2. Disconnect the supply pipe from the clutch servo and drain the oil from the reservoir by moving the pedal up and down.
3. Reinstall the supply pipe.

Filling clutch system

1. Fill the reservoir with the specified fluid and bleed the system.

6.2 BLEEDING CLUTCH SYSTEM



Hydraulic fluid is toxic and can therefore have a damaging effect on your health. Any direct or indirect physical contact should therefore be avoided. As hydraulic fluid is also corrosive it may damage the paintwork of the vehicle. Any contact between hydraulic fluid and paintwork should therefore be avoided.



Always use new and clean hydraulic fluid which has been kept in a sealed container that meets the specifications. Hydraulic fluid which has absorbed water (from the ambient air) may have an adverse effect on the operation of the clutch system. Avoid any contact with mineral oil. Even one drop of mineral oil in the system will damage the seals.

Bleeding the clutch system using the "servo" bleed tank

1. Connect the "servo" bleed tank to the reservoir.

Note:

Filling too quickly causes foaming, which makes bleeding virtually impossible.

2. Fill the system via the "servo" bleed tank.
3. Connect a transparent pipe to the clutch servo's bleed nipple. Ensure that the hydraulic fluid is collected.
4. Open the bleed nipple two full turns.
5. As soon as no more air bubbles escape from the transparent pipe, the bleed nipple can be closed again.
6. Check the fluid level. See "Inspection and adjustment".

Bleeding the clutch system by operating the clutch pedal

1. Connect a transparent pipe to the clutch servo's bleed nipple. Insert the pipe into a jar filled with the specified fluid. Ensure that the pipe cannot suck in any air.
2. Open the bleed nipple.
3. Gradually depress the clutch pedal and close the bleed nipple. Gradually release the clutch pedal. Repeat this operation. Always top up the clutch fluid reservoir.
4. Pump the clutch pedal again and top up the fluid until no more air bubbles escape through the transparent pipe.
5. Check the fluid level in the reservoir. See "Inspection and adjustment".

Bleeding the clutch system via the clutch servo

Note:

Sometimes it may be difficult to bleed the clutch system. In such cases, the clutch system can also be bled using a priming pump and the bleed nipple on the clutch servo.

Ensure that the priming pump is thoroughly cleaned inside.

1. Connect a transparent pipe to a priming pump (e.g. oil can) and fill the pump with the specified fluid.
2. Continue pumping until fluid without air bubbles flows from the pipe.
3. Connect the pipe to the bleed nipple of the clutch servo and open the bleed nipple.
4. Pump the fluid into the system with the priming pump.
In doing so, observe the following:
 - do not depress the clutch pedal.
 - make sure that no air bubbles are introduced into the system.
 - monitor the fluid level in the priming pump.
 - monitor the fluid level in the clutch reservoir.

CLUTCH

3

Draining and filling

LF45/55 series

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1.2 Overview drawing, Monotron prop shaft	1-2	200508
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2.1 Inspection, prop shaft	2-1	200508
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3.1 Removing and installing Spicer prop shaft/intermediate shaft assembly ..	3-1	200508
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4. DEMOUNTING AND MOUNTING	4-1	200508
4.1 Demounting and mounting universal joint	4-1	200508
4.2 Disassembly and assembly, universal joint	4-5	200508

PROP SHAFTS

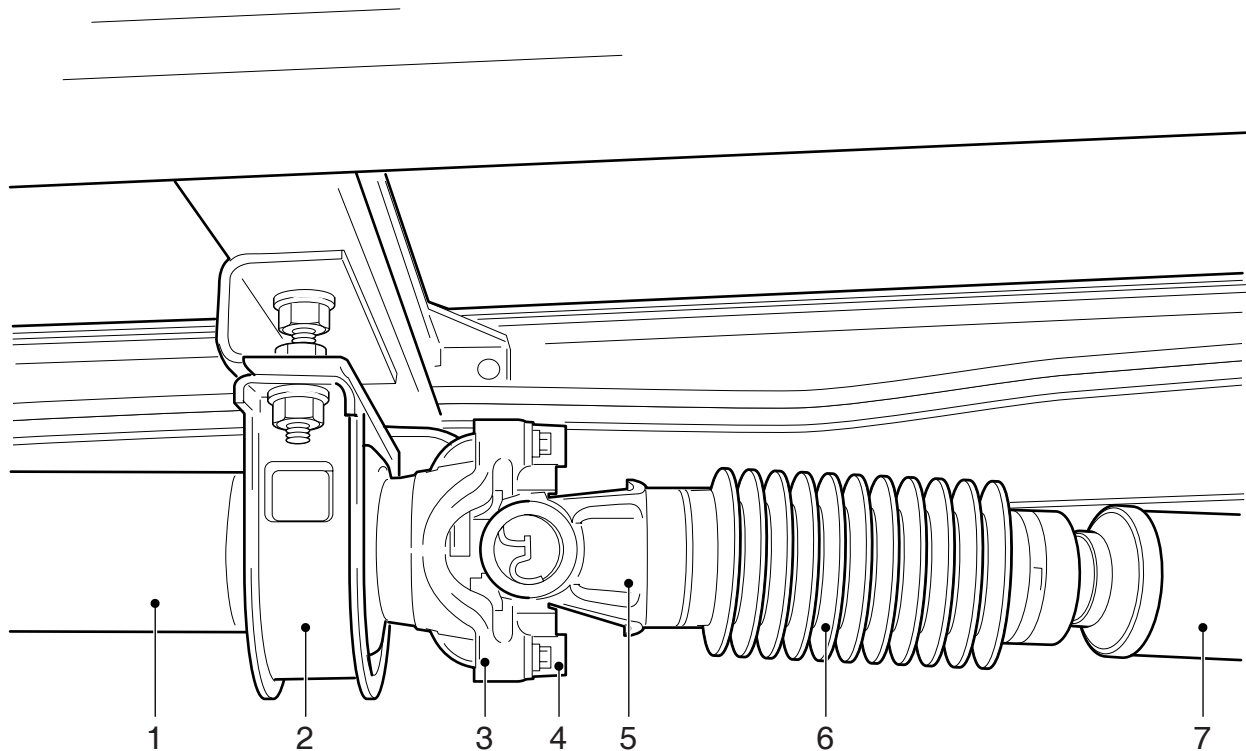
3

Contents

LF45/55 series

1. GENERAL

1.1 OVERVIEW DRAWING, SPICER PROP SHAFT



V3 00 747

1. Intermediate shaft
2. Suspension bearing
3. Prop shaft
4. Clamping piece
5. Fork
6. Slider
7. Prop shaft

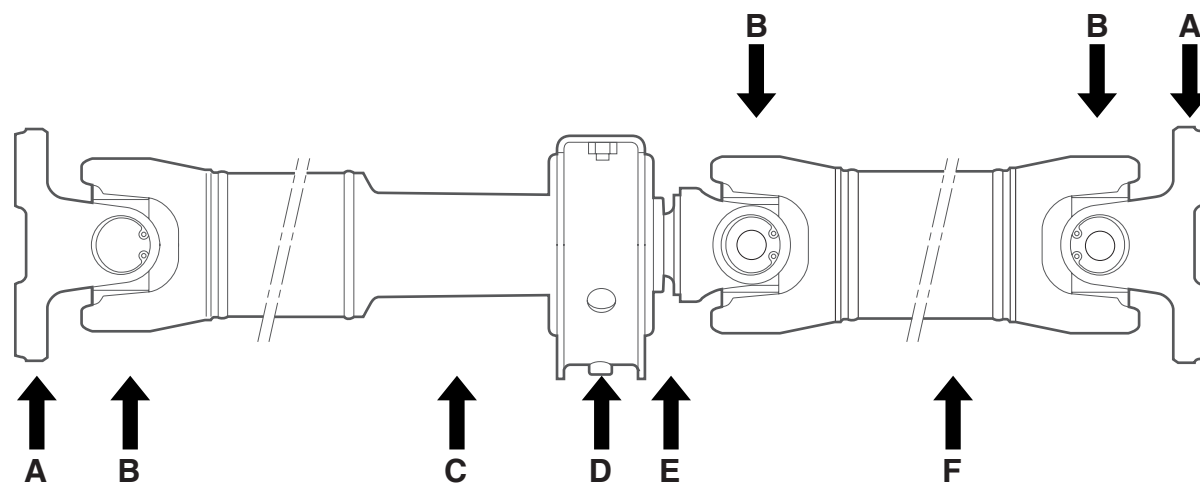
PROP SHAFTS

3

General

LF45/55 series

1.2 OVERVIEW DRAWING, MONOTRON PROP SHAFT



V300999

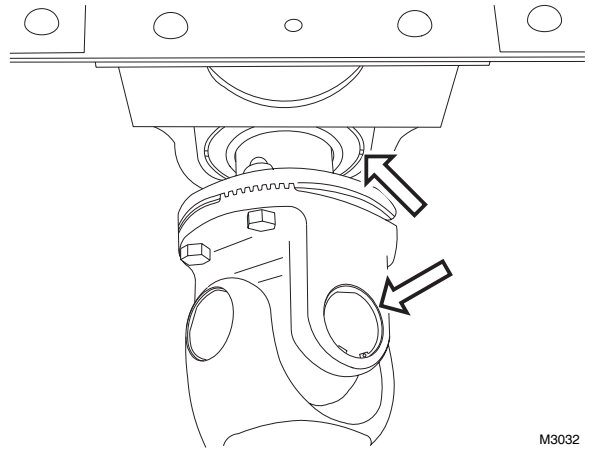
- A Drive flange
- B Fork
- C Intermediate shaft
- D Suspension bearing
- E Slider
- F Prop shaft

2. INSPECTION AND ADJUSTMENT

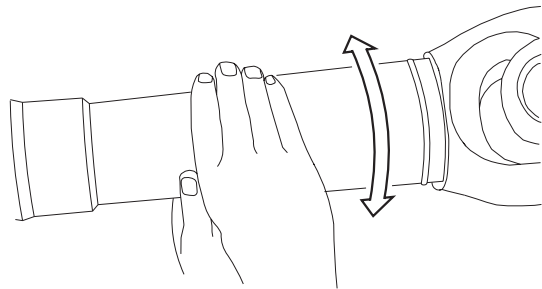
2.1 INSPECTION, PROP SHAFT

Inspection, prop shaft

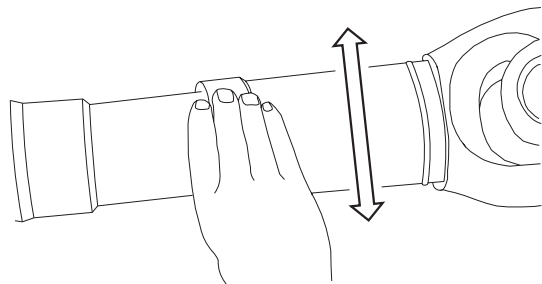
1. Check the universal joints and suspension bearing for play and damage.



2. Check the slide coupling for radial play.



3. There must be no clearly perceptible play on universal joints and suspension bearing.



PROP SHAFTS

3

Inspection and adjustment

LF45/55 series

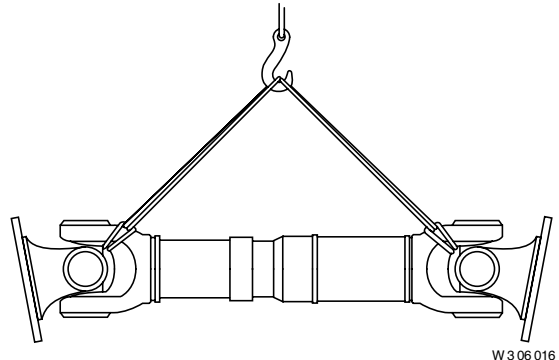
3. REMOVAL AND INSTALLATION

3.1 REMOVING AND INSTALLING SPICER PROP SHAFT/INTERMEDIATE SHAFT ASSEMBLY

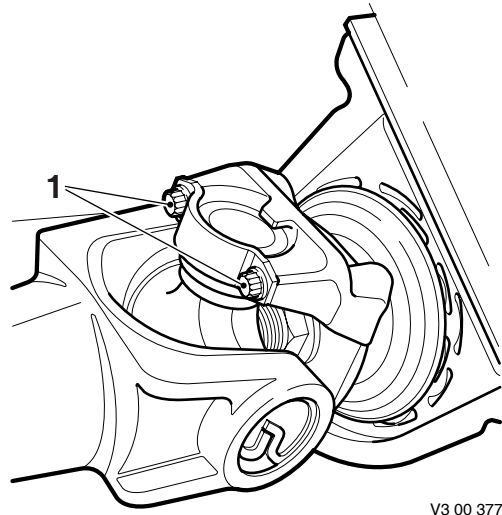
Removing prop shaft/intermediate shaft assembly

Note:

When removing one of the shafts in vehicles with multiple shafts (prop shaft and intermediate shafts), the other shaft must be tied to the chassis or intermediate beam in such a way that it does not obstruct the various operations. Always transport and store shafts horizontally to avoid damage and subsequent imbalance. Support the shaft in at least two places. If possible, hang the shaft in a hoist, using two sturdy ropes.



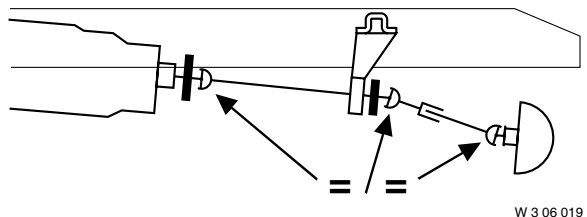
1. Remove the attachment bolts from the flanges and/or clamping pieces (1), and carefully lower the shaft to the ground.
2. Now remove the shaft from under the vehicle.



Installing prop shaft/intermediate shaft assembly

Note:

After repairs have been carried out or a shaft has been replaced, the forks of all shafts must be aligned.



1. Fit the shaft under the vehicle. Use a hoist if possible.
2. Fit the attachment bolts. Tighten the attachment bolts to the specified torque. See "Technical data".

PROP SHAFTS

3

Removal and installation

LF45/55 series

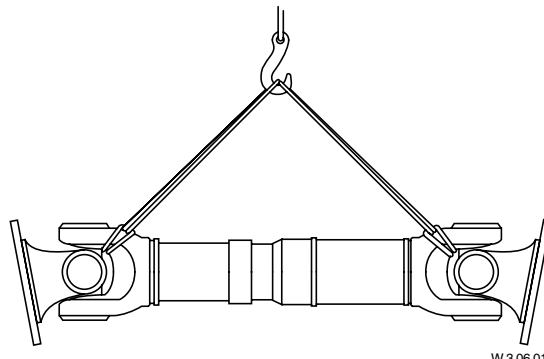
3.2 REMOVAL AND INSTALLATION, PROP SHAFT/INTERMEDIATE SHAFT ASSEMBLY

Removing prop shaft/intermediate shaft assembly

1. When removing one of the shafts in vehicles with multiple shafts (prop shaft and intermediate shafts), the other shaft must be tied to the chassis or intermediate beam in such a way that it does not obstruct the various activities.

Note:

Always transport and store shafts horizontally to avoid damage and subsequent imbalance.
Support the shaft in at least two places. If possible, hang the shaft in a hoist, using two sturdy ropes.



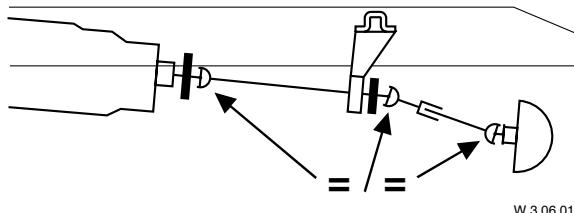
2. Remove the attachment bolts from the flanges and carefully lower the shaft to the ground.
Now remove the shaft from under the vehicle.

Installing prop shaft/intermediate shaft assembly

Note:

After repairs have been carried out or a shaft has been replaced, the marks on the shafts must be opposite each other.

1. Fit the shaft under the vehicle. Use a hoist if possible.
2. Tighten the attachment bolts to the specified torque. See "Technical data".

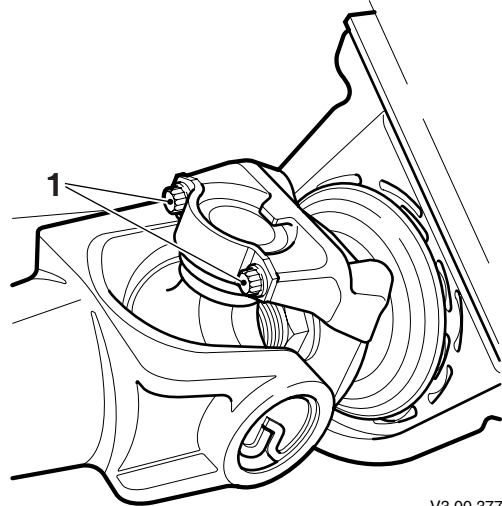


4. DEMOUNTING AND MOUNTING

4.1 DEMOUNTING AND MOUNTING UNIVERSAL JOINT

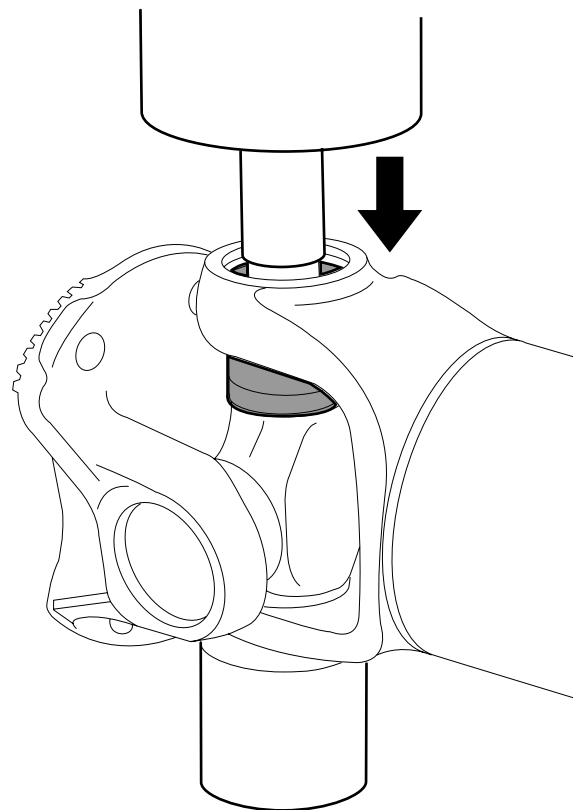
Demounting universal joint

1. Remove the prop shaft and/or intermediate shaft assembly.
2. Remove the circlips and the attachment bolts of the clamping pieces (1) of the spider to be replaced.



V3 00 377

3. Place the shaft on a bush underneath a press, as shown, and press the entire spider including bearings and drive flange down until the spider touches the fork of the shaft.



W306010-2

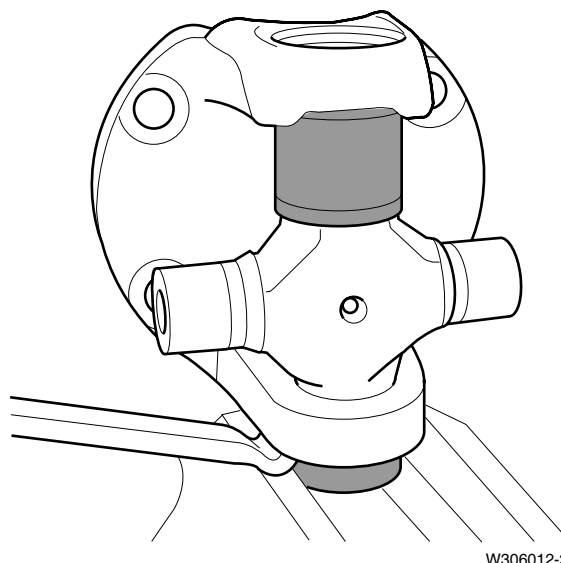
PROP SHAFTS

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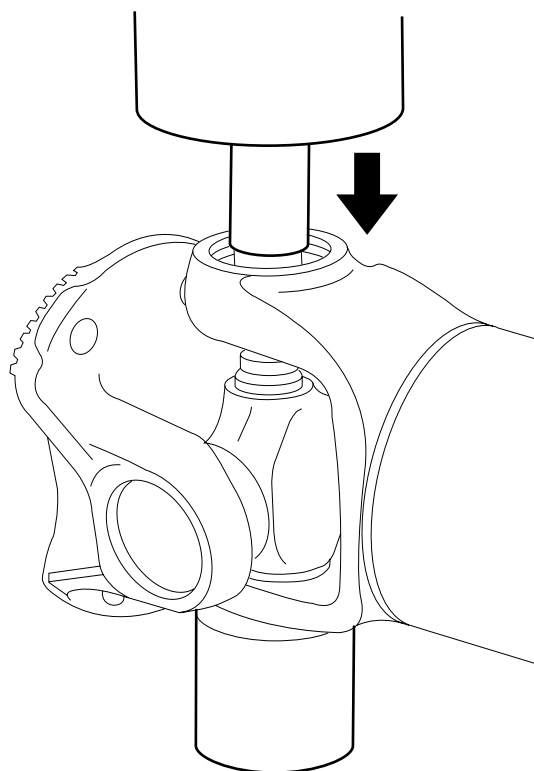
Demounting and mounting

LF45/55 series

4. Rotate the shaft 180° and remove the bearing that has just been pressed out. If the first bearing to be removed fails to come out of the fork entirely, it can be clamped to enable the fork to be pushed up by means of a lever. Place the shaft back on the bush.



5. Push the spider down again in the direction of the shaft fork. Again, continue until the spider touches the fork.
6. The spider and the drive flange can now be tipped out of the shaft fork.
7. Place the drive flange on a bush underneath a press and press the entire spider including bearings and drive flange down until the spider touches the fork of the drive flange.
8. Rotate the drive flange 180° and remove the bearing that has just been pressed out. Place the drive flange back on the bush.
9. Push the spider down again in the direction of the shaft fork. Again, continue until the spider touches the fork.
10. The spider can now be tipped out of the drive flange fork.



Note:

When spiders are being replaced, always replace them including their bearings.

11. Check the components to be reused for any cracks and/or damage.

Mounting universal joint

Note:

After mounting, it must be possible to move the drive flanges and spiders by hand. When mounting the spider, Seeger rings of the same thickness must be used.

3

LF45/55 series

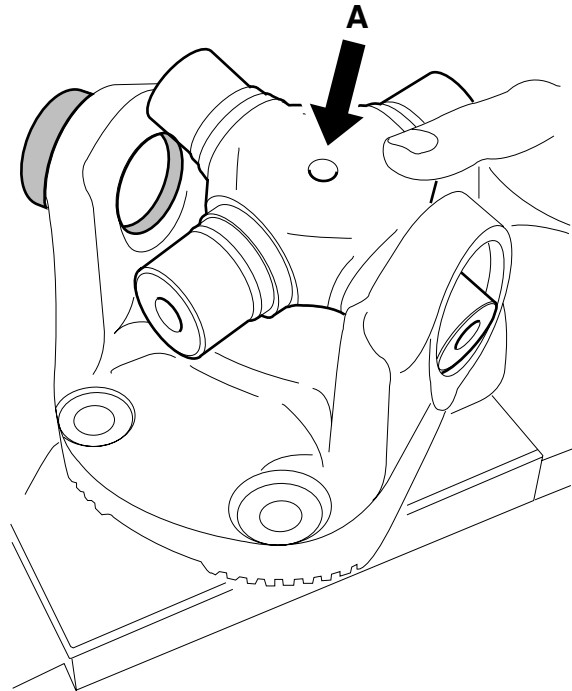
PROP SHAFTS

Demounting and mounting

1. Fit the sealing rings in their proper positions on the bearings and lubricate them lightly so that the needles remain in place.
2. Press one bearing partly into the drive flange.
3. Tip the spider into the drive flange.

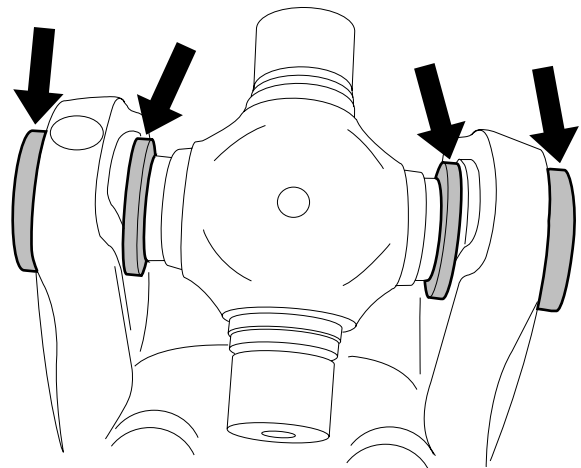
Note:

Maintenance-free spiders do not have a mounting direction. In the case of spiders fitted with lubricating nipples, hole A for the lubricating nipple must point towards the shaft.



W306014-2

4. Slide the spider a little into the fitted bearing and place everything on a bush underneath a press. The opposite bearing can now be pressed into the fork, the spider serving as a guide. During the pressing action, the spider must be able to move freely.



W306017-2

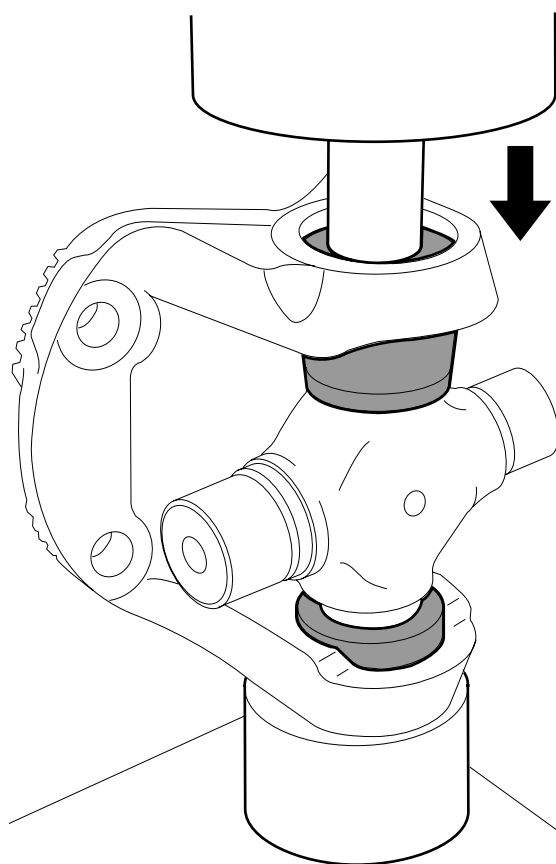
PROP SHAFTS

3

Demounting and mounting

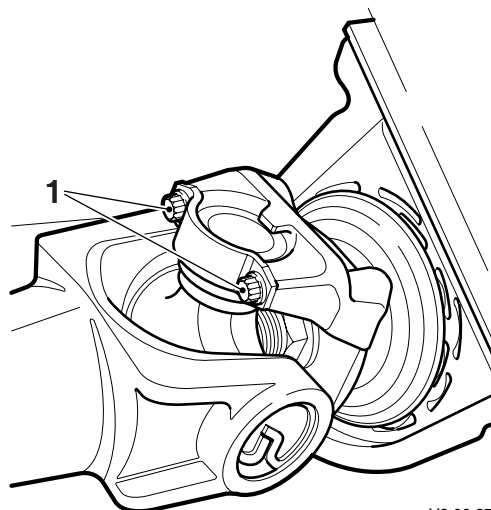
LF45/55 series

5. Continue to press the bearing until a Seeger ring can be fitted on the side being pressed. Fit the Seeger ring and press the opposite bearing further into the fork. Again, the Seeger ring can now be fitted.
6. Fit the sealing rings in their proper positions on the prop shaft bearings and lubricate them lightly so that the needles remain in place.
7. Press one bearing partly into the prop shaft.
8. Slide the spider a little into the fitted bearing and place everything on a bush underneath a press. The opposite bearing can now be pressed into the fork, the spider serving as a guide. During the pressing action, the spider must be able to move freely.
9. Continue to press the bearing until a Seeger ring can be fitted on the side being pressed. Fit the Seeger ring and press the opposite bearing further into the fork. Again, the Seeger ring can now be fitted.



W306013-2

10. Fit the circlips and the attachment bolts of the clamping pieces (1).
11. Install the prop shaft and/or intermediate shaft.

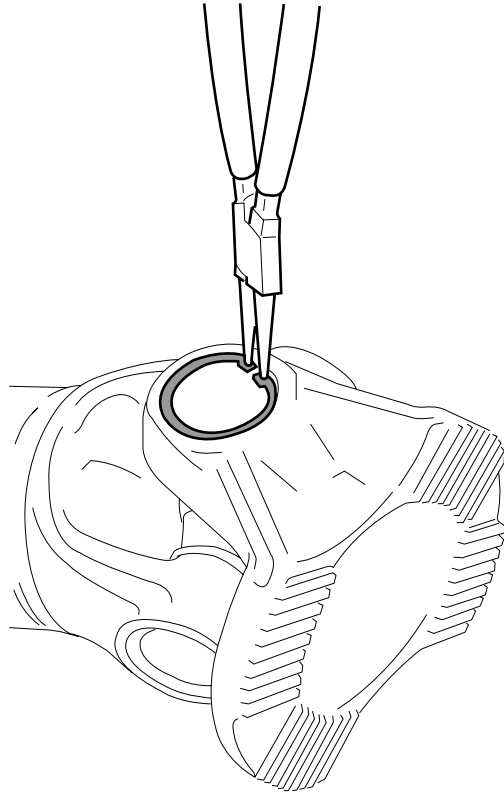


V3 00 377

4.2 DISASSEMBLY AND ASSEMBLY, UNIVERSAL JOINT

Disassembly, universal joint

1. Remove the prop shaft and/or intermediate shaft assembly.
2. If fitted, remove the lubricating nipple and all Seeger rings from the spider to be replaced.



W306009-2

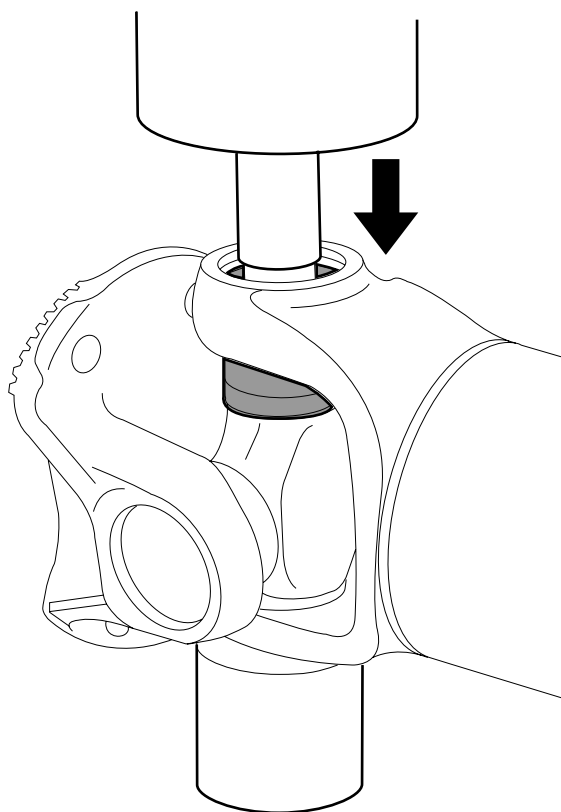
PROP SHAFTS

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Demounting and mounting

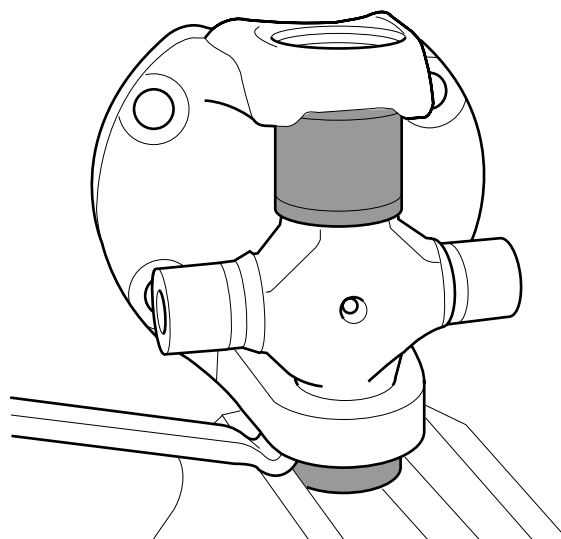
LF45/55 series

3. Place the shaft on a bush underneath a press, as shown, and press the entire spider including bearings and drive flange down until the spider touches the fork of the shaft.



W306010-2

4. Rotate the shaft 180° and remove the bearing that has just been pressed out. If the first bearing to be removed fails to come out of the fork entirely, the bearing can be clamped to enable the fork to be pushed up by means of a lever. Place the shaft back on the bush.



W306012-2

3

PROP SHAFTS

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Demounting and mounting

5. Push the spider down again in the direction of the shaft fork. Again, continue until the spider touches the fork.
6. The spider and the drive flange can now be tipped out of the shaft fork.
7. Place the drive flange on a bush underneath a press and press the entire spider including bearings and drive flange down, until the spider touches the fork of the drive flange.
8. Rotate the drive flange 180° and remove the bearing that has just been pressed out. Place the drive flange back on the bush.
9. Push the spider down again in the direction of the shaft fork. Again, continue until the spider touches the fork.
10. The spider can now be tipped out of the drive flange fork.

Note:

When spiders are being replaced, always replace them including their bearings.

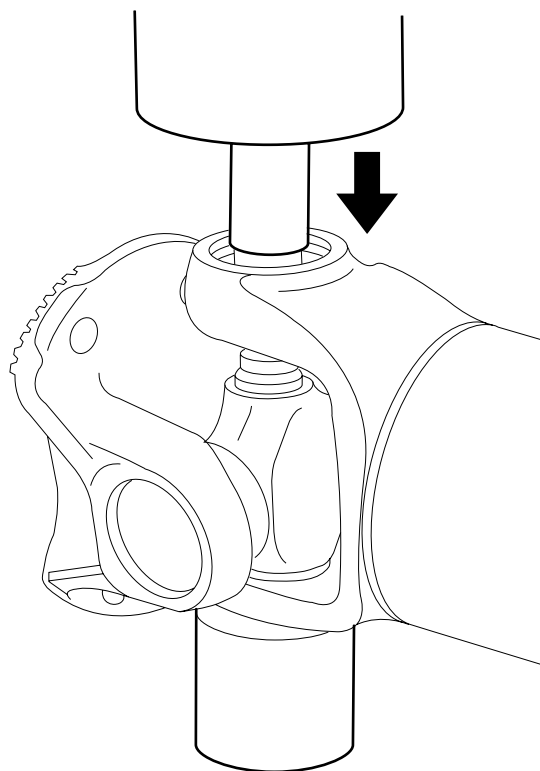
11. Check the components to be reused for any cracks and/or damage.

Assembly, universal joint

Note:

After assembly, it must be possible to move the drive flanges and spiders by hand. When mounting the spider, Seeger rings of the same thickness must be used.

1. Install the sealing rings in their proper positions on the bearings and lubricate them lightly so that the needles remain in place.
2. Press one bearing partly into the drive flange.



W306011-2

PROP SHAFTS

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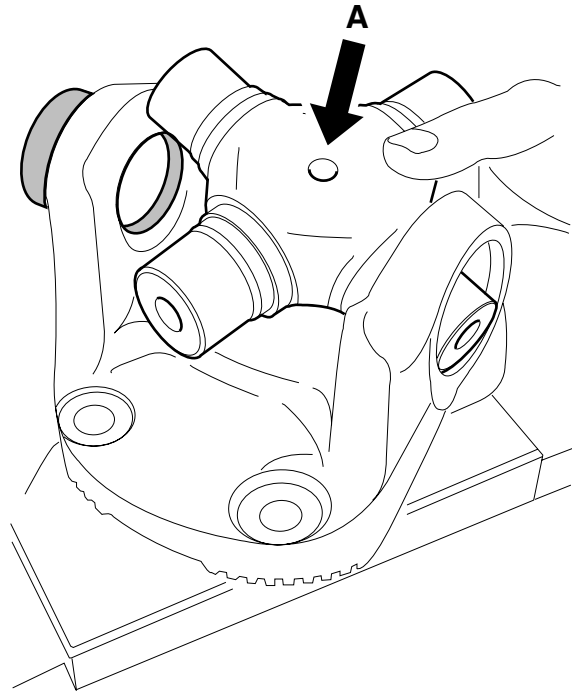
Demounting and mounting

LF45/55 series

3. Tip the spider into the drive flange.

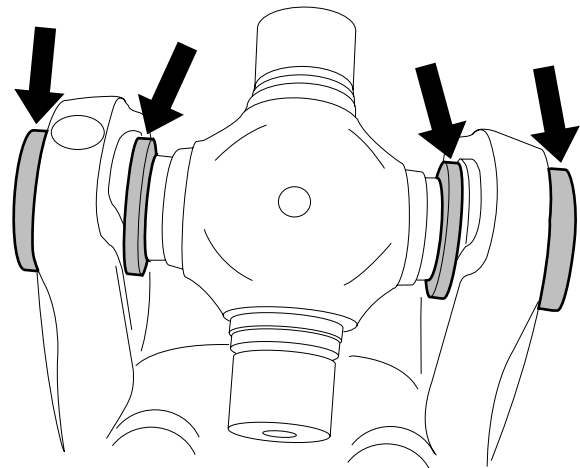
Note:

Maintenance-free spiders do not have an assembly direction. In the case of spiders fitted with lubricating nipples, hole A for the lubricating nipple must point towards the shaft.



W306014-2

4. Slide the spider a little into the installed bearing and place everything on a bush underneath a press. The opposite bearing can now be pressed into the fork, the spider serving as a guide. During the pressing action, the spider must be able to move freely.



W306017-2

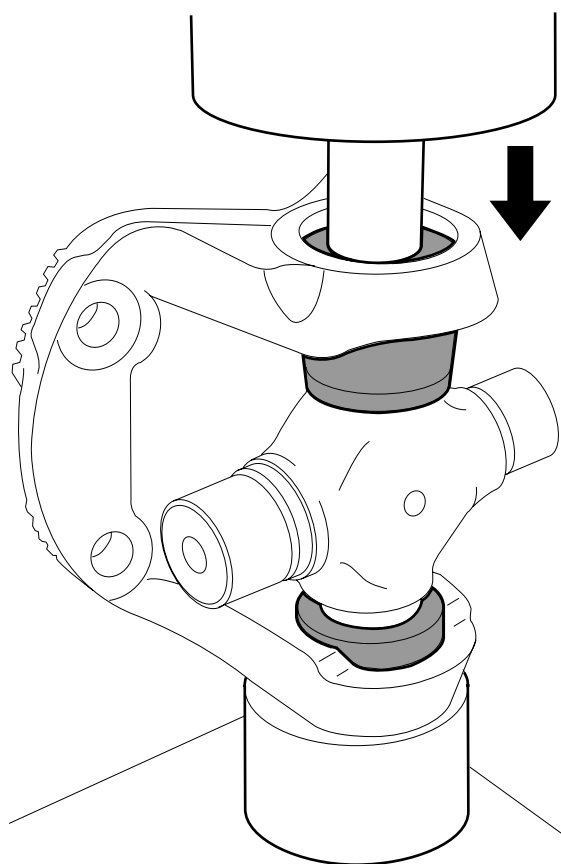
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LF45/55 series

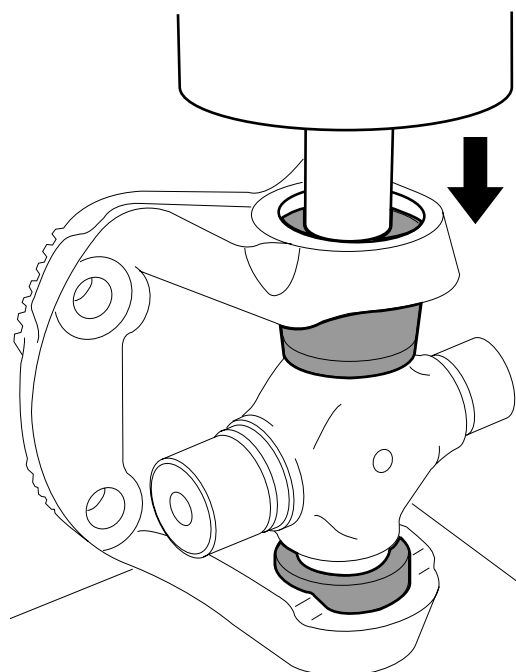
PROP SHAFTS

Demounting and mounting

5. Continue to press the bearing until a Seeger ring can be installed on the side being pressed. Install the Seeger ring and press the opposite bearing further into the fork. Again, the Seeger ring can now be installed.
6. Install the sealing rings in their proper positions on the prop shaft bearings and lubricate them lightly so that the needles remain in place.
7. Press one bearing partly into the prop shaft.
8. Slide the spider a little into the installed bearing and place everything on a bush underneath a press. The opposite bearing can now be pressed into the fork, the spider serving as a guide. During the pressing action, the spider must be able to move freely.
9. Continue to press the bearing until a Seeger ring can be installed on the side being pressed. Install the Seeger ring and press the opposite bearing further into the fork. Again, the Seeger ring can now be installed.
10. If fitted, install the lubricating nipple and lubricate the spider.
11. Install the prop shaft and/or intermediate shaft.



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W306015-2

PROP SHAFTS

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Demounting and mounting

LF45/55 series

TECHNICAL DATA

0

DIAGNOSTICS

1

BE ENGINE FUEL SYSTEM

2

BE ENGINE INLET/EXHAUST SYSTEM

3

ENGINE BRAKE, BE ENGINE

4

CE ENGINE FUEL SYSTEM

5

CE ENGINE INLET/EXHAUST SYSTEM

6

ENGINE BRAKE, CE ENGINE

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TECHNICAL DATA

4

Contents

LF45/55 series

0

1. ENGINE, GENERAL

1.1 GENERAL

BE/CE engine

Cold engine

A cold engine is an engine which, having reached operating temperature, has been allowed to cool down for at least **six hours**.

Warm engine

A warm engine is an engine which, having reached operating temperature, has not been at a standstill for more than **thirty minutes**.

Direction of rotation of the engine

The direction of rotation of the engine is clockwise, as seen from the vibration damper end.

First cylinder of the engine

The first cylinder of the engine is the cylinder at the vibration damper end of the engine.

Left-hand and right-hand side of the engine

The left-hand side of the engine is the side where the air compressor and electronic unit are mounted. The right-hand side of the engine is the side where the turbocharger and oil filter are mounted.

Engine identification

Engine number

The engine number is located in two places on the engine:

- stamped into the engine block, top of the oil cooler
- on the type plate, fitted on the timing gear case or on the flywheel housing (depending on the production date)

Engine type

The type number CE162C indicates:

C engine family

B = 3.92 ltr.

C = 5.88 ltr.

E engine version

E = electronic timing

162 engine output in kilowatt (kW)

C Euro emissions

C = Euro 3

TECHNICAL DATA**4**

Engine, general

LF45/55 series**0****1.2 BE ENGINE, GENERAL****Engine types**

Coding

BE 99 C
BE 110 C
BE 123 C

General specifications

Environmental standard

Euro 3 (C)

Number of cylinders

4 cylinders in line

Valves

4 valves per cylinder

Bore x stroke

102 x 120 mm

Cubic capacity

3.9 litres

Compression ratio

BE 99 C

17.0 : 1

BE 110 C

17.0 : 1

BE 123 C

17.3 : 1

Fuel injection

direct injection

Injection sequence

1-3-4-2

Air inlet system

Turbocharger intercooling

Engine management system

ECS-DC3

Cooling

fluid

Weight

approx. 400 kg

Engine speeds, BE engine

Engine type	Idling rpm	Maximum no-load rpm
BE 99 C	600 - 800	Approx. 2500
BE 110 C	600 - 800	Approx. 2500
BE 123 C	600 - 800	Approx. 2500

1.3 CE ENGINE, GENERAL**Engine types**

Coding

CE 136 C

CE 162 C

CE 184 C

General specifications

Environmental standard

Euro 3 (C)

Number of cylinders

6 cylinders in line

Valves

4 valves per cylinder

Bore x stroke

102 x 120 mm

Cubic capacity

5.9 litres

Compression ratio

17,3 : 1

Fuel injection

direct injection

Injection sequence

1-5-3-6-2-4

Air inlet system

Turbocharger intercooling

Engine management system

ECS-DC3

Cooling

fluid

Weight

approx. 500 kg

Engine speeds, CE engine

Engine type	Idling rpm	Maximum no-load rpm
CE 136 C	600 - 800	approx. 2500
CE 162 C	600 - 800	approx. 2500
CE 184 C	600 - 800	approx. 2500

TECHNICAL DATA

4

Engine, general

LF45/55 series

0

2. BE ENGINE FUEL SYSTEM

2.1 GENERAL

Fuel level element

Angular displacement 70°

Fuel fine filter

Maximum pressure drop across fuel fine filter 2.0 bar

Lift pump

Fuel lift pump pressure in front of fine filter (with engine at idling speed) 5 - 13 bar

Fuel lift pump pressure behind fine filter (with engine at idling speed) 3 - 11 bar

Pressure relief valve opening pressure 11 bar

Maximum underpressure on suction side of fuel lift pump 0.5 bar

High-pressure pump

Pump pressure (dependent on the operating mode of the engine and the electronic calibration) 300 - 1400 bar

Fuel rail

Fuel rail pressure (dependent on the operating mode of the engine and the electronic calibration) 300 - 1400 bar

Fuel rail pressure-limiting valve

Opening pressure 1650 bar

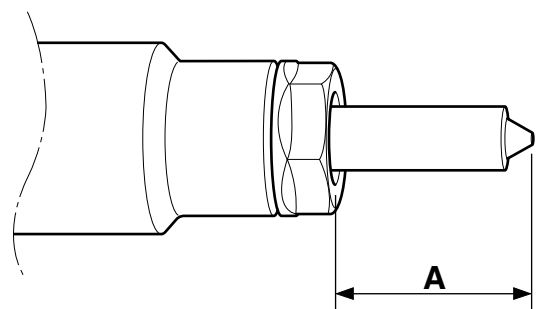
Injector

Number of holes in injector 8

Resistance of magnet coil 0,15 - 0,5 Ω

Injector washer

Nozzle length (distance A)	Washer thickness
21.5 ± 0.2 mm	1.5 mm
23.0 ± 0.2 mm	3.0 mm



i400693

TECHNICAL DATA

4

BE Engine fuel system

LF45/55 series

0

Fuel return overflow valve

Fuel return overflow valve opening pressure 1.2 - 2.0 bar

Fuel return pipe

Maximum return pipe pressure build-up 0.2 bar

Return fuel measurement

Maximum quantity of return fuel at idling speed 120 ml/min.

Minimum permitted time for filling a measuring beaker to a volume of 360 ml 3 min.

2.2 TIGHTENING TORQUES

0

The tightening torques specified in this section are different from the standard tightening torques cited in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque cited in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Electronic unit cooling plate

Attachment bolts holding the electronic unit to the cooling plate	10 Nm
---	-------

Attachment bolts holding the cooling plate to the engine block	24 Nm
--	-------

VOSS quick-release coupling fittings	18 Nm
--------------------------------------	-------

Low-pressure fuel pipes

Banjo bolts	24 Nm
-------------	-------

VOSS quick-release coupling fittings	24 Nm
--------------------------------------	-------

Fuel return overflow valve in cylinder head	24 Nm
---	-------

High-pressure pump

Attachment nuts holding the high-pressure pump to the timing gear case	25 Nm
--	-------

High-pressure fuel pipe

High-pressure pipe union nut	22 Nm
------------------------------	-------

Fuel rail

Attachment bolts	24 Nm
------------------	-------

Pressure-limiting valve	100 Nm
-------------------------	--------

Injector pipes

Injector pipe union nuts	22 Nm
--------------------------	-------

Fuel supply pipe

Fuel supply pipe nut	50 Nm
----------------------	-------

Injectors

Injector clamping bracket attachment bolts	10 Nm
--	-------

Injector electrical connection	1.5 Nm
--------------------------------	--------

TECHNICAL DATA

4

BE Engine fuel system

LF45/55 series

0

3. CE ENGINE FUEL SYSTEM

3.1 GENERAL

Fuel level element

Angular displacement 70°

Fuel fine filter

Maximum pressure drop across fuel fine filter 2.0 bar

Lift pump

Fuel lift pump pressure in front of fine filter (with engine at idling speed) 5 - 13 bar

Fuel lift pump pressure behind fine filter (with engine at idling speed) 3 - 11 bar

Pressure relief valve opening pressure 11 bar

Maximum underpressure on suction side of fuel lift pump 0.5 bar

High-pressure pump

Pump pressure (dependent on the operating mode of the engine and the electronic calibration) 300 - 1400 bar

Fuel rail

Fuel rail pressure (dependent on the operating mode of the engine and the electronic calibration) 300 - 1400 bar

Fuel rail pressure-limiting valve

Opening pressure 1650 bar

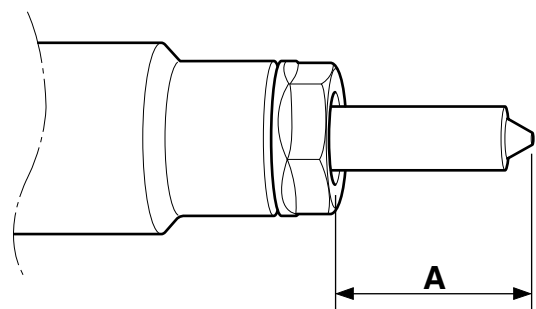
Injector

Number of holes in injector 8

Resistance of magnet coil 0,15 - 0,5 Ω

Injector washer

Nozzle length (distance A)	Washer thickness
21.5 ± 0.2 mm	1.5 mm
23.0 ± 0.2 mm	3.0 mm



i400693

TECHNICAL DATA

4

CE Engine fuel system

LF45/55 series

0

Fuel return overflow valve

Fuel return overflow valve opening pressure 1.2 - 2.0 bar

Fuel return pipe

Maximum return pipe pressure build-up 0.2 bar

Return fuel measurement

Maximum quantity of return fuel at idling speed 180 ml/min.

Time for filling a measuring beaker to a volume of 360 ml > 2 min.

3.2 TIGHTENING TORQUES

The tightening torques specified in this section are different from the standard tightening torques cited in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque cited in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Electronic unit cooling plate

Attachment bolts holding the electronic unit to the cooling plate	10 Nm
---	-------

Attachment bolts holding the cooling plate to the engine block	24 Nm
--	-------

VOSS quick-release coupling fittings	18 Nm
--------------------------------------	-------

Low-pressure fuel pipes

Banjo bolts	24 Nm
-------------	-------

VOSS quick-release coupling fittings	24 Nm
--------------------------------------	-------

Fuel return overflow valve in cylinder head	24 Nm
---	-------

High-pressure pump

Attachment nuts holding the high-pressure pump to the timing gear case	25 Nm
--	-------

High-pressure fuel pipe

High-pressure pipe union nut	22 Nm
------------------------------	-------

Fuel rail

Attachment bolts	24 Nm
------------------	-------

Pressure-limiting valve	100 Nm
-------------------------	--------

Injector pipes

Injector pipe union nuts	22 Nm
--------------------------	-------

Fuel supply pipe

Fuel supply pipe nut	50 Nm
----------------------	-------

Injectors

Injector clamping bracket attachment bolts	10 Nm
--	-------

Injector electrical connection	1.5 Nm
--------------------------------	--------

TECHNICAL DATA

4

CE Engine fuel system

LF45/55 series

0

4. BE ENGINE INLET/EXHAUST SYSTEM

4.1 GENERAL

Turbocharger

BE 99 C
BE 110 C
BE 123 C

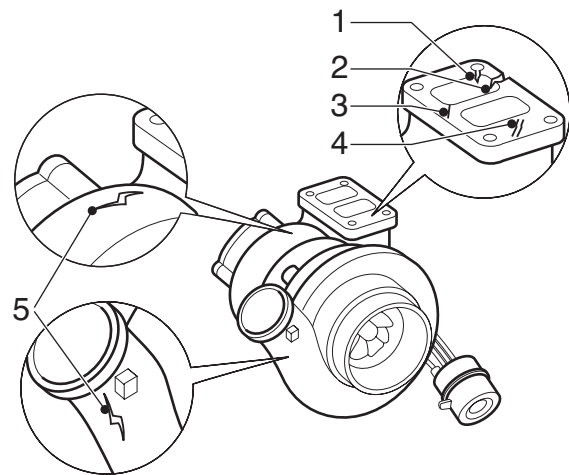
Holset HX 27 W
Holset HX 27 W
Holset HX 27 W

Minimum actuating pressure of wastegate capsule under which the control rod will move
Axial bearing play of compressor shaft
Radial bearing play of compressor shaft

2.0 bar
0.057 - 0.103 mm
0.39 - 0.67 mm

Rejection standards for cracking

1. Cracks in the connector flange must not reach as far as the attachment holes.
2. Cracks in the connector flange must not reach from the channels as far as the exterior.
3. Cracks in the connector flange may not be longer than 15 mm.
4. Cracks in the connector flange must not be less than 6 mm apart.
5. There must be no cracks in the housing.



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Exhaust gas back pressure

At full-load engine speed
Maximum back pressure during engine brake application

100 mbar
4.3 bar

Inlet underpressure

At full-load engine speed (clean air filter)
At full-load engine speed (clogged air filter)

25 mbar
62 mbar

Glow element

Resistance value

180 - 220 mΩ

TECHNICAL DATA**4**

BE Engine inlet/exhaust system

LF45/55 series**0****4.2 TIGHTENING TORQUES**

The tightening torques specified in this section are different from the standard tightening torques cited in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque cited in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Turbocharger

Attachment nuts, exhaust manifold flange/turbo-charger	43 Nm ⁽¹⁾
Oil discharge pipe attachment bolts	23 Nm
Oil supply pipe union	28 Nm
Turbocharger V-clamp	10 Nm

(1) Fasten with Copaslip

Intake manifold

Glow element attachment bolts	14 Nm
-------------------------------	-------

Air cooler

Hose clamps	7 Nm
-------------	------

5. CE ENGINE INLET/EXHAUST SYSTEM

5.1 GENERAL

Turbocharger

CE 136 C
CE 162 C
CE 184 C

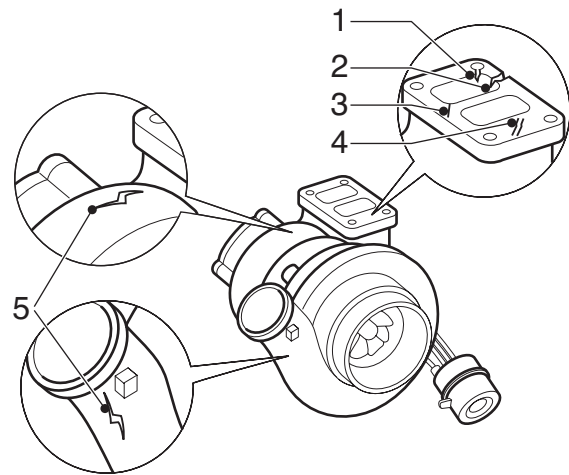
Holset HY 35 W
Holset HY 35 W
Holset HX 35 W

Minimum actuating pressure of wastegate capsule under which the control rod will move
Axial bearing play of compressor shaft
Radial bearing play of compressor shaft

2.0 bar
0.038 - 0.093 mm
0.329 - 0.501 mm

Rejection standards for cracking

1. Cracks in the connector flange must not reach as far as the attachment holes.
2. Cracks in the connector flange must not reach from the channels as far as the exterior.
3. Cracks in the connector flange may not be longer than 15 mm.
4. Cracks in the connector flange must not be less than 6 mm apart.
5. There must be no cracks in the housing.



i400784

Exhaust gas back pressure

At full-load engine speed
Maximum back pressure during engine brake application

100 mbar
4.3 bar

Inlet underpressure

At full-load engine speed (clean air filter)
At full-load engine speed (clogged air filter)

25 mbar
62 mbar

Glow element

Resistance value

180 - 220 mΩ

5.2 TIGHTENING TORQUES

The tightening torques specified in this section are different from the standard tightening torques cited in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque cited in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

Turbocharger

Attachment nuts, exhaust manifold flange/turbocharger	43 Nm ⁽¹⁾
Oil discharge pipe attachment bolts	23 Nm
Oil supply pipe union	28 Nm
Turbocharger V-clamp	10 Nm

(1) Fasten with Copaslip

Glow element

Attachment bolts	14 Nm
------------------	-------

Air cooler

Hose clamps	7 Nm
-------------	------

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DIAGNOSTICS

4

Contents

LF45/55 series

1

1. TRACTIVE PROBLEMS

1.1 TRACTIVE PROBLEMS

The first test that has to be carried out when investigating tractive problems is the acceleration test.

DIAGNOSTICS

4

Tractive problems

LF45/55 series

1

2. FUEL SYSTEM

2.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**4**

Fuel system

LF45/55 series**2.2 FAULT-FINDING TABLE****1**

SYMPTOM: ENGINE CAN BE STARTED, BUT DOES NOT RUN	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
No fuel supply/high-pressure pump or fuel lift pump defective; no delivery	Check: - the fuel level - the rail pressure - the pipes for blockage and leaks - the fuel lift pump - the high-pressure pump

SYMPTOM: ENGINE STALLS AND RUNS AGAIN AFTER RE-STARTING	
Possible cause	Remedy
Air in fuel system	Check for drawing in of air: - via the suction pipe

SYMPTOM: ENGINE STARTS POORLY	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump
Internal fuel leak between fuel supply pipe(s) and injector(s)	Check the quantity of return fuel

SYMPTOM: ENGINE RUNS AT (INCREASED) IDLING SPEED AND DOES NOT RESPOND TO ACCELERATOR PEDAL	
Possible cause	Remedy
Mechanical defect of accelerator pedal sensor	Check: - mechanical connection of sensor/accelerator pedal - accelerator pedal sensor

SYMPTOM: DIESEL KNOCK DURING ACCELERATION	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe
Injector defective	Check the injectors

SYMPTOM: IRREGULAR RUNNING OF ENGINE	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
Injector defective	Check the injectors
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump

SYMPTOM: REDUCED POWER AT ALL ENGINE SPEEDS	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
Mechanical defect of accelerator pedal sensor	Check: - mechanical connection of sensor/accelerator pedal - accelerator pedal sensor
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump

SYMPTOM: REDUCED POWER ABOVE A CERTAIN ENGINE SPEED	
Possible cause	Remedy
Fuel fine filter/coarse filter partially clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
Air leak in inlet system	Pressure-test the inlet system

DIAGNOSTICS**4**

Fuel system

LF45/55 series**1**

SYMPTOM: REDUCED POWER ABOVE A CERTAIN ENGINE SPEED	
Possible cause	Remedy
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump
Fault in electrical components/wiring of: - connectors	Check the electrical system

SYMPTOM: ENGINE SLUGGISH WHEN ACCELERATING OR UNDER HIGH LOAD	
Possible cause	Remedy
Internal fuel leak between fuel supply pipe(s) and injector(s)	Check the quantity of return fuel
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump

SYMPTOM: WHITE/BLUE SMOKE IS EMITTED	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Air in fuel system	Check for drawing in of air: - via the suction pipe
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump
Fault in electrical components/wiring of: - connectors	Check the electrical system

SYMPTOM: BLACK SMOKE IS EMITTED	
Possible cause	Remedy
Injector(s) mechanically defective or clogged	Replace the injectors

SYMPTOM: ENGINE OVERHEATED	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel

SYMPTOM: FUEL CONSUMPTION TOO HIGH	
Possible cause	Remedy
Poor fuel quality	Drain fuel, flush fuel system, replace the fuel filters and fill fuel tank with fuel
Fuel fine filter/coarse filter clogged	Replace fuel fine filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
Leak in fuel system	Check for leaks

SYMPTOM: REDUCED MAXIMUM ENGINE SPEED	
Possible cause	Remedy
Air in fuel system	Check for drawing in of air: - via the suction pipe
Fuel fine filter/coarse filter clogged	Replace the fuel filter and clean the system
Injector(s) mechanically defective or clogged	Replace the injectors
High-pressure pump or fuel lift pump delivery too low	Check: - the high-pressure pump - the fuel lift pump

DIAGNOSTICS

4

Fuel system

LF45/55 series

1

3. INLET/EXHAUST SYSTEM

3.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**4**

Inlet/exhaust system

LF45/55 series**3.2 FAULT-FINDING TABLE****1**

SYMPTOM: REDUCED POWER AT ALL ENGINE SPEEDS	
Possible cause	Remedy
Air filter element blocked	Replace the air filter element
Turbocharger defective/wastegate control incorrect	Check the turbocharger/wastegate control
Air leak in inlet system	Pressure-test the inlet system

SYMPTOM: REDUCED POWER ABOVE A CERTAIN ENGINE SPEED	
Possible cause	Remedy
Air filter element partially blocked	Check/replace the air filter element
Air leak in inlet system	Pressure-test the inlet system

SYMPTOM: FUEL CONSUMPTION TOO HIGH	
Possible cause	Remedy
Turbocharger defective	Check the turbocharger
Air leak in inlet system	Pressure-test the inlet system

SYMPTOM: REDUCED MAXIMUM ENGINE SPEED	
Possible cause	Remedy
Turbocharger defective	Check the turbocharger

SYMPTOM: RISING AND FALLING TURBOCHARGER SOUNDS	
Possible cause	Remedy
Blocked turbocharger air intake	Check air intake and remove any obstacles
Compressor side of turbocharger contaminated	Clean compressor side with a non-corrosive cleaning agent or a soft brush. Check the intake side for carbon deposits or other contamination
Turbocharger damaged	Replace the turbocharger and identify the cause

SYMPTOM: BLACK SMOKE EMERGES FROM EXHAUST	
Possible cause	Remedy
Air filter element blocked	Replace the air filter element
Air leakage between turbocharger and inlet manifold	Check flexible pipes and pressurise intake unit
Air leakage between the inlet manifold and cylinder head	Check for leakage. Replace gaskets, if necessary

SYMPTOM: BLACK SMOKE EMERGES FROM EXHAUST	
Possible cause	Remedy
Compressor side of turbocharger contaminated	Clean compressor side with a non-corrosive cleaning agent or a soft brush. Check the intake side for carbon deposits or other contamination
Gas leak between the exhaust manifold and the cylinder head	Check the fixing bolts and gaskets
Gas leak between the exhaust manifold and the turbocharger	Check the fixing bolts and gaskets
Turbocharger damaged	Replace the turbocharger and identify the cause

SYMPTOM: BLUE SMOKE EMERGES FROM EXHAUST	
Possible cause	Remedy
Air filter element blocked	Replace the air filter element
Air leakage between turbocharger and inlet manifold	Check flexible pipes and pressurise intake unit
Air leakage between the inlet manifold and cylinder head	Check for leakage. Replace gaskets, if necessary
Compressor side of turbocharger contaminated	Clean compressor side with a non-corrosive cleaning agent or a soft brush. Check the intake side for carbon deposits or other contamination
Turbocharger oil discharge pipe clogged	Check oil pipe. Replace as necessary
Turbocharger damaged	Replace the turbocharger and identify the cause

SYMPTOM: OIL LEAK AT TURBINE SIDE OF TURBOCHARGER	
Possible cause	Remedy
Compressor side of turbocharger contaminated	Clean compressor side with a non-corrosive cleaning agent or a soft brush. Check the intake side for carbon deposits or other contamination
Turbocharger oil discharge pipe clogged	Check oil pipe. Replace as necessary
Turbocharger damaged	Replace the turbocharger and identify the cause

SYMPTOM: OIL LEAK AT COMPRESSOR SIDE OF TURBOCHARGER	
Possible cause	Remedy
Air filter element blocked	Replace the air filter element
Turbocharger oil pipe clogged	Check oil pipe. Replace as necessary
Turbocharger damaged	Replace the turbocharger and identify the cause

DIAGNOSTICS**4**

Inlet/exhaust system

LF45/55 series**1**

SYMPTOM: EXHAUST GAS BACK PRESSURE TOO HIGH	
Possible cause	Remedy
Incorrect butterfly valve adjustment	Check the adjustment of the butterfly valve
Butterfly valve incorrectly positioned	Check whether the butterfly valve has been positioned correctly
Butterfly valve partially operated by residual pressure in the operating cylinder	Check operating cylinder
Original exhaust silencer not fitted	Check exhaust silencer
Exhaust pipe crushed or internally blocked by a loose part	Check exhaust system for blockage and/or damage

SYMPTOM: INLET UNDERPRESSURE TOO HIGH	
Possible cause	Remedy
Air filter element blocked	Replace air filter element

4. ENGINE BRAKE

4.1 INTRODUCTION

If there is a fault in the system, it is usually detected by the electronic unit in the form of a fault code. This fault code can be read out using DAVIE. The fault-finding table contains possible causes of symptoms not detected by the electronic unit.

DIAGNOSTICS**4**

Engine brake

LF45/55 series**4.2 FAULT-FINDING TABLE****1**

SYMPTOM: ENGINE BRAKE DOES NOT ENGAGE	
Possible cause	Remedy
Compressor delivering insufficient air pressure.	Check the operation of the compressor.
Air leak in the air pipe from air dryer to exhaust brake valve.	Check air pipe.
Butterfly valve stuck in butterfly valve housing.	Check free movement of butterfly valve.
Electrical fault.	Check electrical circuit.

SYMPTOM: ENGINE BRAKE REMAINS ENGAGED	
Possible cause	Remedy
Butterfly valve stuck in butterfly valve housing.	Check free movement of butterfly valve.
Electrical fault.	Check electrical circuit.

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BE ENGINE FUEL SYSTEM

4

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LF45/55 series

2

1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

BE ENGINE FUEL SYSTEM

4

Safety instructions

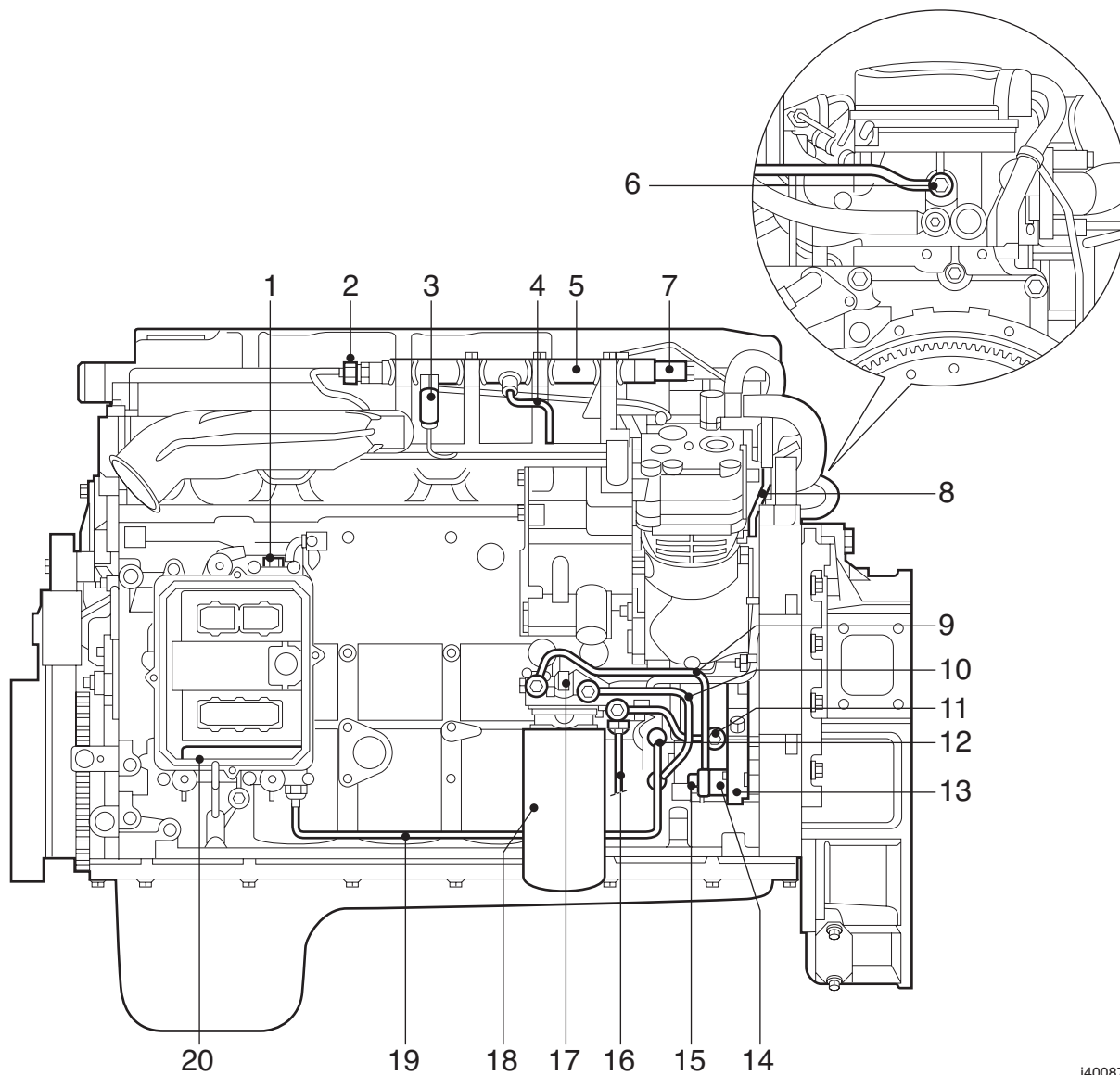
LF45/55 series

2

2. GENERAL

2.1 LOCATION OF COMPONENTS

Location of components, production date
< 2003-49 (chassis number < 0L253643)



i400870

BE ENGINE FUEL SYSTEM

4

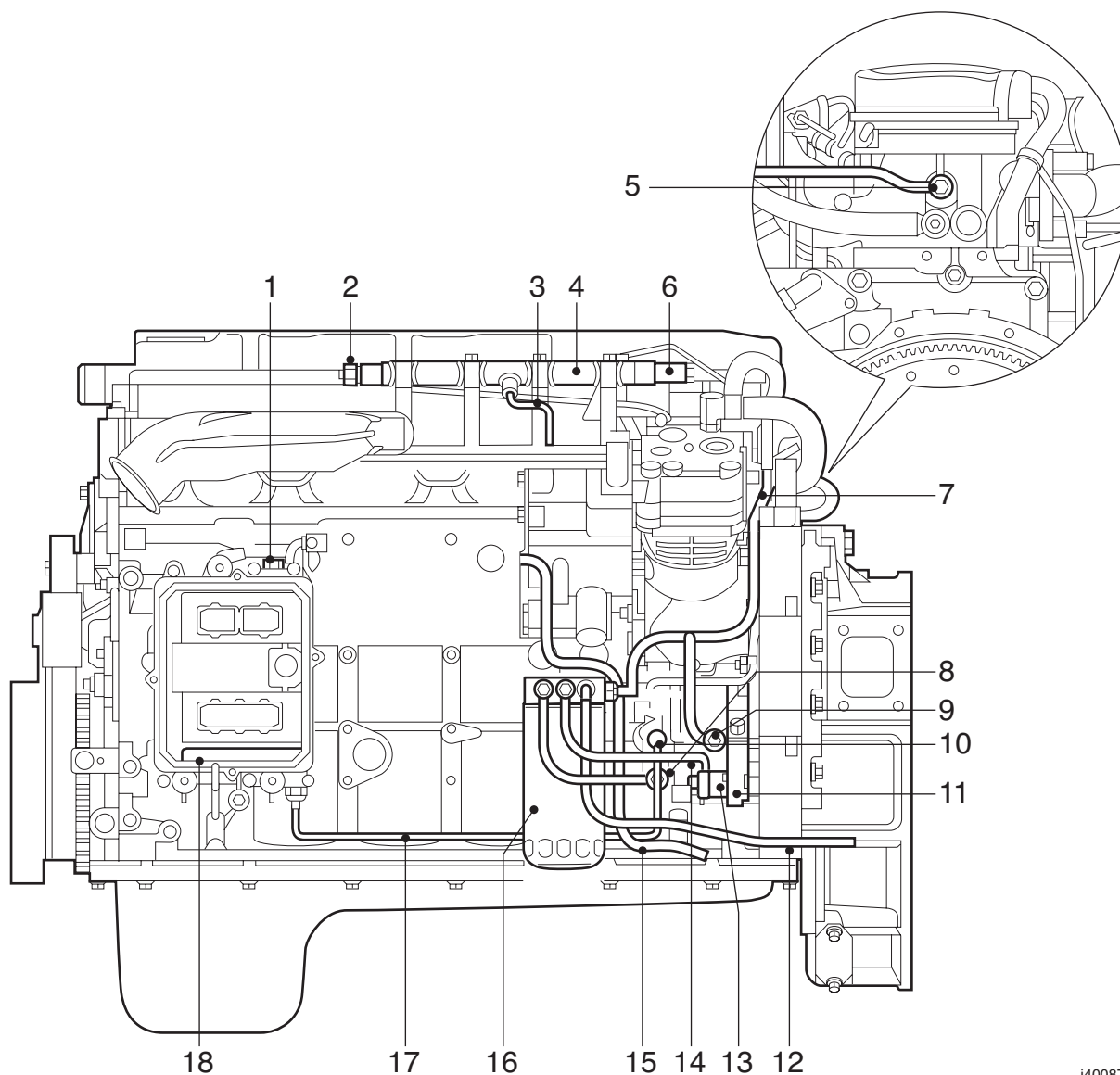
General

LF45/55 series

2

1. Suction pipe to electronic unit cooling plate
2. Injector pipe
3. Fuel rail pressure sensor
4. Fuel pipe to fuel rail
5. Fuel rail
6. Fuel return overflow valve
7. Fuel rail pressure-limiting valve
8. Return pipe from fuel return overflow valve
9. Fuel pipe to high-pressure pump
10. Fuel pipe to fuel fine filter
11. High-pressure pump leak-off pipe
12. Fuel pipe to fuel lift pump
13. High-pressure pump
14. Fuel pump control solenoid valve
15. Fuel pipe to high-pressure pump
16. Return pipe to fuel tank
17. Fuel temperature sensor
18. Fuel fine filter
19. Fuel pipe from electronic unit cooling plate
20. ECS-DC3 electronic unit

Location of components, production date
≥ 2003-49 (chassis number ≥ 0L253643)



i400872

BE ENGINE FUEL SYSTEM

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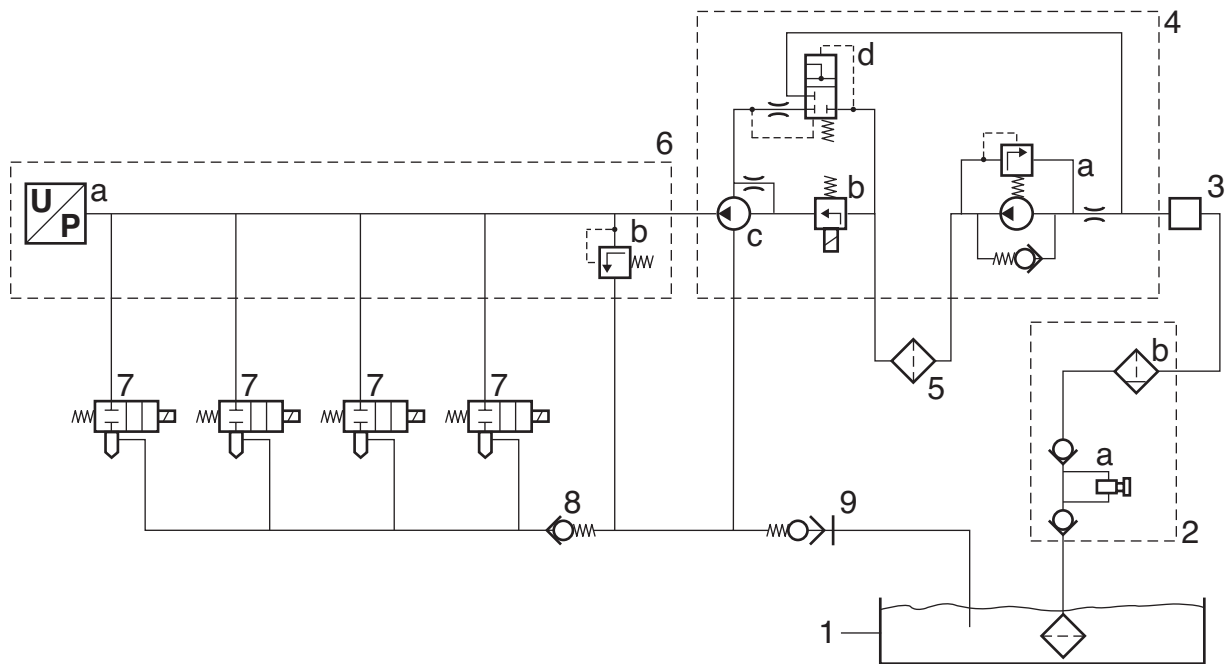
General

LF45/55 series

2

1. Suction pipe to electronic unit cooling plate
2. Fuel rail pressure sensor
3. Fuel pipe to fuel rail
4. Fuel rail
5. Fuel return overflow valve
6. Fuel rail pressure-limiting valve
7. Return pipe from fuel return overflow valve
8. Fuel pipe to fuel fine filter
9. High-pressure pump leak-off pipe
10. Fuel pipe to fuel lift pump
11. High-pressure pump
12. Return pipe to fuel tank
13. Fuel pump control solenoid valve
14. Fuel pipe to high-pressure pump
15. Fuel supply pipe
16. Fuel fine filter
17. Fuel pipe from electronic unit cooling plate
18. ECS-DC3 electronic unit

2.2 SYSTEM DESCRIPTION, ECS-DC3 FUEL SYSTEM



I400828

The fuel lift pump (4a) draws the fuel from the fuel tank (1) through the cooling plate (2) of the electronic unit (3).

The purpose of the cooling plate (3) is to ensure that the electronic unit does not become too hot. The fuel lift pump (4a) is fitted against the high-pressure pump (4c) and is driven by the camshaft gear.

From the fuel lift pump, fuel is forced towards the fuel fine filter (5).

After the filter, the fuel enters the high-pressure pump (4c) via the fuel pump control solenoid valve (4b), which controls the amount of fuel going to the high-pressure pump. Fuel not taken in by the high-pressure pump returns via the bypass valve (4d) to the fuel lift pump supply pipe and part of it is used for lubricating the high-pressure pump.

The high-pressure pump forces the fuel under high pressure to the fuel rail (6). The fuel rail distributes the fuel among the injectors (7). The fuel rail (6) also functions as an accumulator to ensure that large fluctuations in pressure, resulting from injector openings and pump pressure pulses, are prevented as much as possible.

BE ENGINE FUEL SYSTEM

4

General

LF45/55 series

2

The pressure in the fuel rail is registered by the rail pressure sensor (6a). The electronic unit uses this data to control the high-pressure pump (via the fuel pump control solenoid valve), so that the rail pressure can be kept at the desired level. The desired pressure is not constant, but depends on the operating conditions.

A pressure relief valve (6b) is fitted at the end of the fuel rail. If the pressure in the fuel rail rises too high (in emergencies only), this valve ensures that the excess fuel flows back to the return pipe. The return pipe is connected with the return pipe to the fuel tank (1).

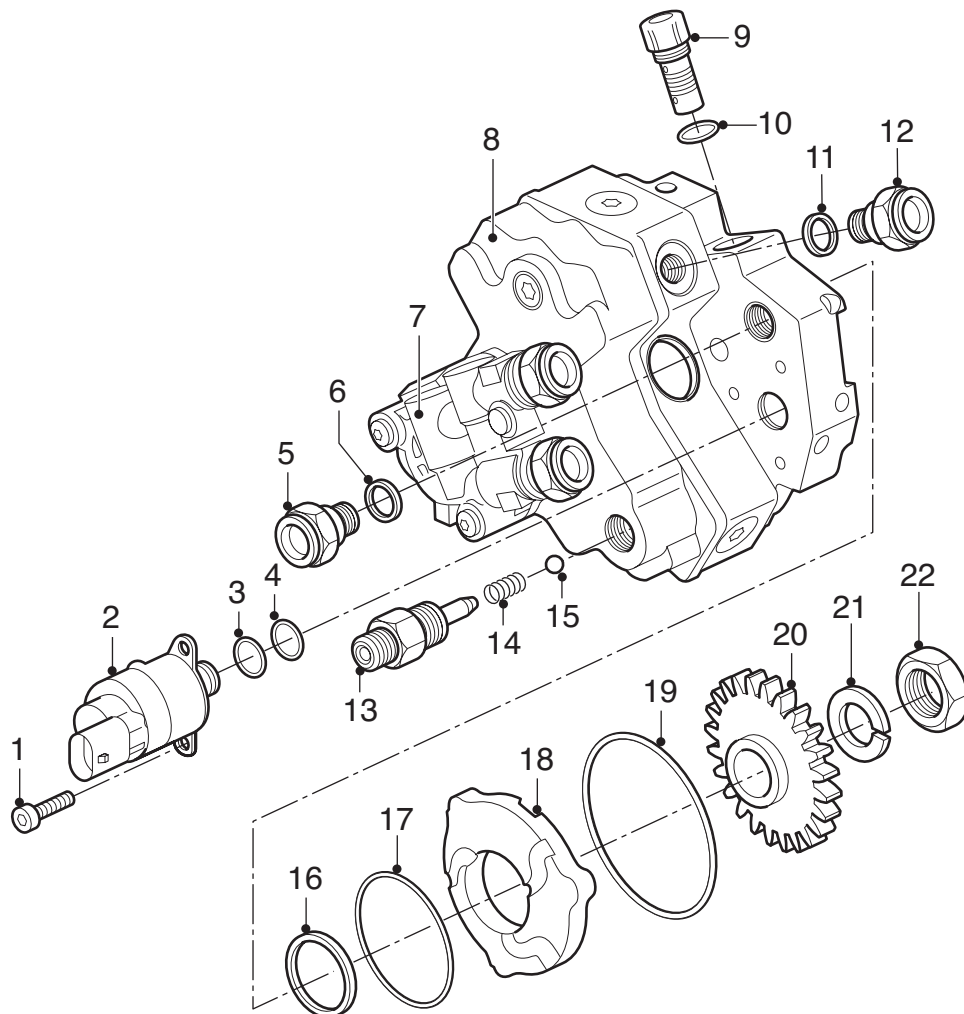
The electronic unit uses the present rail pressure to calculate the time during which the injector needs to be opened in order to obtain the desired injection quantity.

A pressure relief valve (8) connects the injector leak-off ducts in the cylinder head with the return pipe to the fuel tank (1). This pressure relief valve prevents the fuel from flowing out of the injectors when the engine has stopped running.

If the system has been "open", the fuel system can be bled using the primer pump (2a), which is integrated in the water separator/coarse filter (2b).

The return pipe to the tank contains a check valve (9), which is normally closed. As soon as the quick release coupling on the fine filter head is disconnected, the return pipe closes so that it cannot empty.

2.3 OVERVIEW DRAWING, FUEL PUMP



- 1. Attachment bolt
- 2. Fuel pump control solenoid valve
- 3. O-ring
- 4. O-ring
- 5. Fuel pipe connection
- 6. Copper ring
- 7. Lift pump
- 8. High-pressure pump
- 9. Circulation valve
- 10. O-ring
- 11. Copper ring
- 12. Fuel pipe connection
- 13. High-pressure pipe connection
- 14. Spring
- 15. Ball
- 16. Oil seal
- 17. O-ring
- 18. Adapter ring
- 19. O-ring
- 20. Gear wheel
- 21. Sealing ring
- 22. Nut

i400766

BE ENGINE FUEL SYSTEM

4

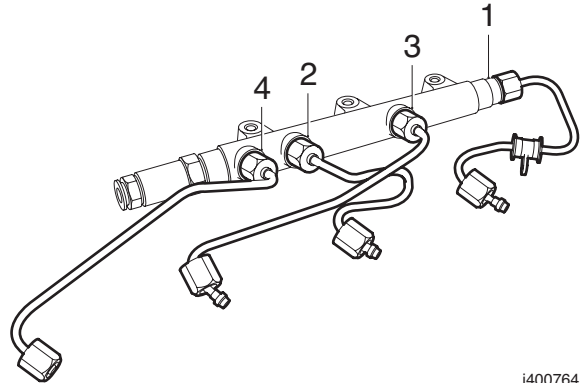
General

LF45/55 series

2.4 OVERVIEW DRAWING, FUEL RAIL

Overview drawing, fuel rail, < production date 2003-49 (chassis number < 0L253643)

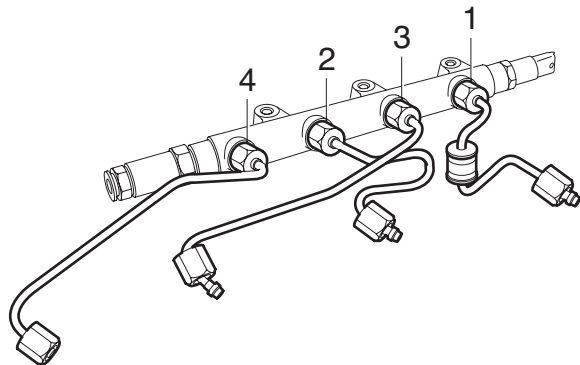
The figure shows the connections to the injector pipes. The numbers indicate the cylinder number of the connection.



i400764

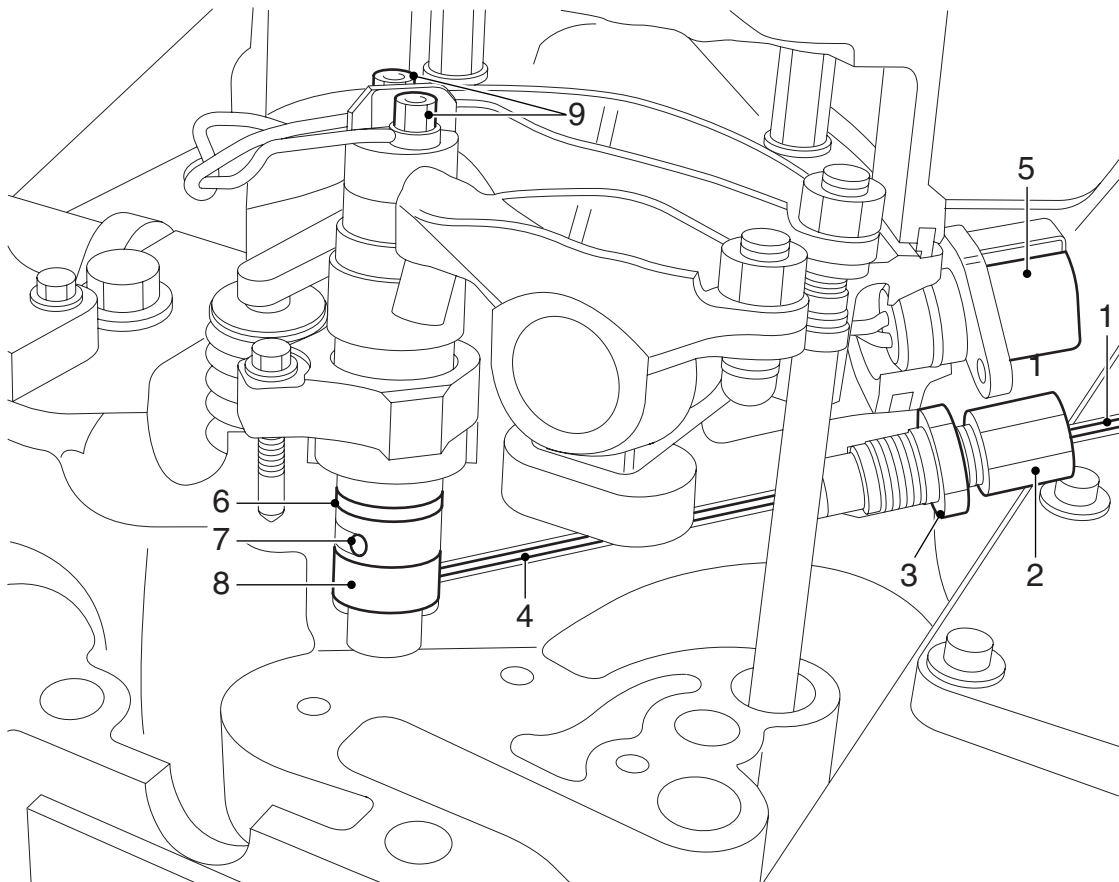
Overview drawing, fuel rail, production date $\geq$ 2003-49 (chassis number $\geq$ 0L253643)

The figure shows the connections to the injector pipes. The numbers indicate the cylinder number of the connection.



i400873

2.5 OVERVIEW DRAWING, FUEL SYSTEM, CYLINDER HEAD



i400653

1. Injector pipe
2. Union
3. Nut
4. Fuel supply pipe
5. Connector to injectors
6. O-ring
7. Return opening
8. Injector
9. Electrical connection

BE ENGINE FUEL SYSTEM

4

General

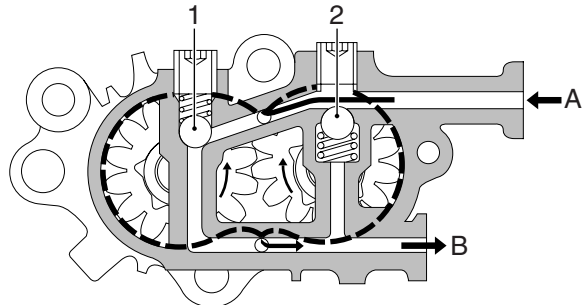
LF45/55 series

2

3. DESCRIPTION OF COMPONENTS

3.1 HIGH-PRESSURE PUMP

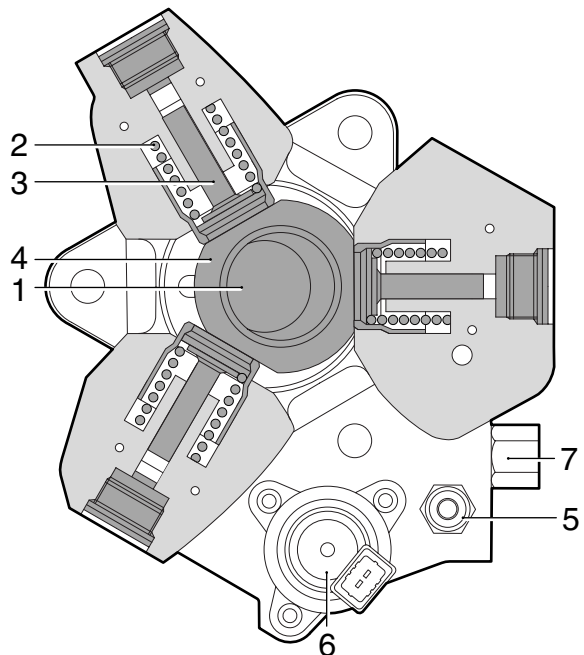
The high-pressure pump is driven by the crankshaft by means of the camshaft gear. The pump shaft rotates at a speed 1.33 times the speed of the crankshaft. The pump shaft drives the fuel lift pump. The fuel drawn from the suction side by the gears is discharged through the exit by the gears due to the reduction in volume. The fuel lift pump has two added valves. The first valve (1) limits the pump pressure, for example if the fine filter is blocked. The second valve (2) opens the by-pass over the fuel lift pump when the primer pump is being used.



i400595

The high-pressure pump shaft (1) has an eccentric. The eccentric drives the eccentric ring (4). The pump plungers (3) are driven by the eccentric ring and pushed back by the spring (2).

The fuel is supplied via the connection (5) and then internally distributed among the three pump elements. Before it is distributed among the pump elements, the supplied fuel is dosed by means of the fuel pump control solenoid valve (6).



i400589

The fuel pump control solenoid valve is controlled by the electronic unit on the basis of the rail pressure sensor signal. This creates a closed control circuit. The fuel pump control solenoid valve is "normally open" and is activated via duty cycle control. The value when the engine is started is fixed. When the measured pressure deviates from the desired (programmed) pressure, the duty cycle value will be adapted until the measured and the desired values correspond. If this is impossible, the electronic unit will generate a warning and record a fault code.

BE ENGINE FUEL SYSTEM

4

Description of components

LF45/55 series

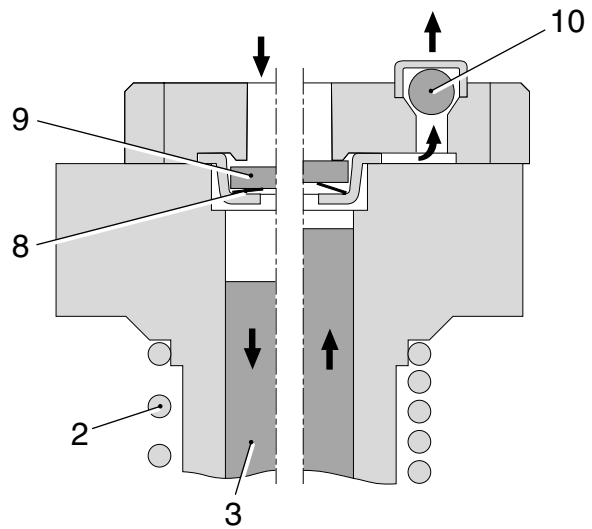
2

During the downward stroke, the fuel is supplied by the fuel lift pump via the suction valve (9) (see illustration on left). During the delivery stroke (illustration on right), the suction valve closes under the load of the spring (8) and the fuel pressure that has built up. The fuel leaves the pump element via the delivery valve (10). The compressed fuel from the three pump elements is collected in the pump housing and leaves the pump via a joint high-pressure connection.

Leaking fuel from the pump elements is discharged via the return connection.

The fuel lift pump has over-capacity in relation to the high-pressure pump. If there is only limited fuel off-take on the rail, the fuel pump control solenoid valve will be virtually closed. The over-supplied fuel will cause an increase in pressure at the inlet of the fuel pump control solenoid valve. The pressure is limited by the circulation valve (7). If the valve is open, the excess supplied fuel will be returned to the suction side of the fuel lift pump. A small amount of fuel is diverted via a restriction to the shaft and the eccentric of the high-pressure pump for lubrication.

When bleeding with the primer pump, any air bubbles will be carried along by the fuel through the low-pressure circuit. Fuel is forced inwards at the connection (5). The fuel pump control solenoid valve is opened fully without being energised, so that the fuel can pass. The pump elements create a high resistance to the fuel, so that the fuel will escape via the lubricating restriction in the pump. In this way the fuel, along with any air bubbles, is discharged to the return pipe.



i400590

3.2 FUEL PUMP CONTROL SOLENOID VALVE

The high-pressure pump has an over-capacity for normal operating conditions. This could lead to large quantities of fuel being forced at high pressure to the fuel rail and then directly being drained out to the return pipe via the pressure-limiting valve on the fuel rail. This produces too much unnecessary heat and loss of capacity because large amounts of fuel are flowing at high pressure.

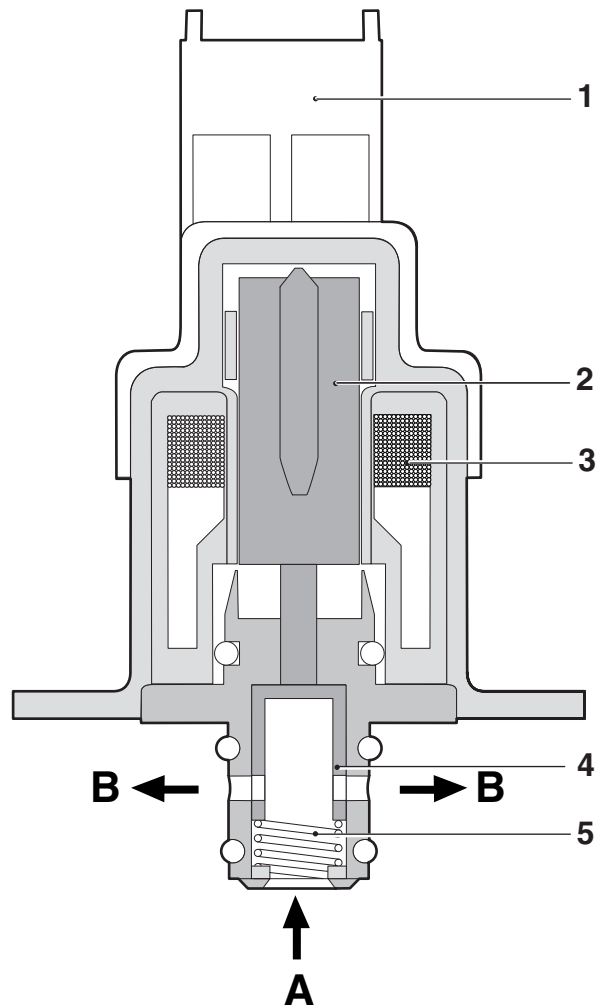
The system has been designed such that only fuel that will be used will be forced under high pressure to the rail. For this reason, a fuel pump control solenoid valve has been fitted at the suction side of the high-pressure pump. This solenoid valve is opened without being energised, so that the high-pressure pump elements can be filled in the normal manner.

If the fuel rail pressure becomes too high, for example because of lower fuel off-take on the rail, the solenoid valve will be energised by the electronic unit with a higher duty cycle, so that the plunger is pressed with a greater force against the spring pressure and the valve reveals a more constricted opening. This reduces the fuel supply to the pump elements and the pump output will thus fall. The fuel rail pressure will also fall as a consequence.

If the rail pressure is too low, the reverse is true.

The current is supplied to the coil (3) via the connector (1). The current pushes the core (2) with the plunger (4) against the pressure of the spring (5). This controls the fuel current from input A to output B.

Due to this valve, under normal circumstances very little fuel flows back from the rail. This improves performance and reduces the generation of heat.



i400591

BE ENGINE FUEL SYSTEM

4

Description of components

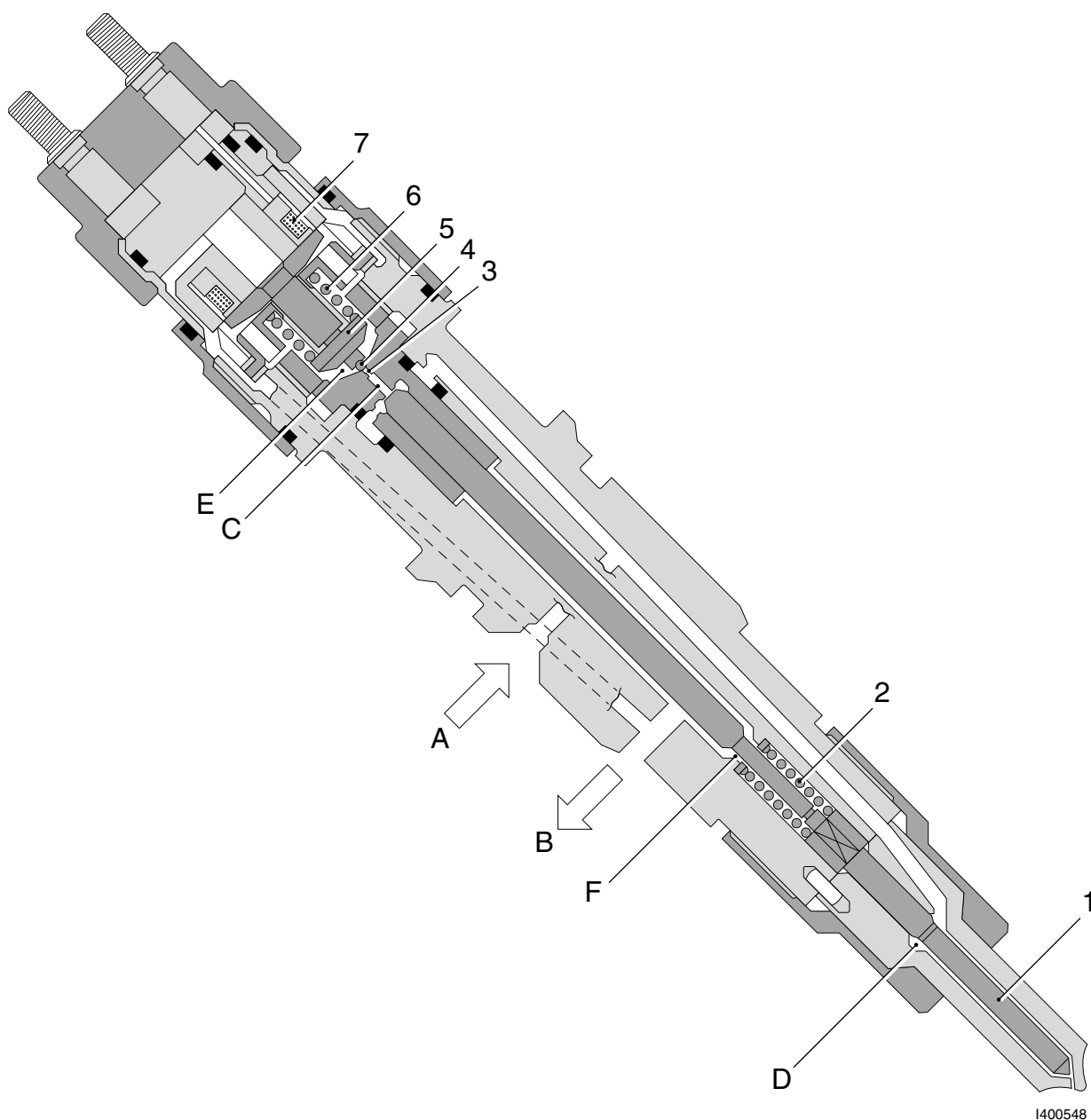
LF45/55 series

3.3 INJECTOR

The injectors can be opened and closed electrically. The injector is normally closed. The load of the spring (2) and the fuel rail pressure that controls chamber C ensure this.

The fuel is supplied from the fuel rail via A. The return fuel can flow back to the fuel tank via B.

When the coil (7) is energised, the armature housing (5) moves up. As a result the pressure in chamber C drops slightly and the injector needle (1) is forced up to chamber D by the rail pressure. The fuel can then be injected.



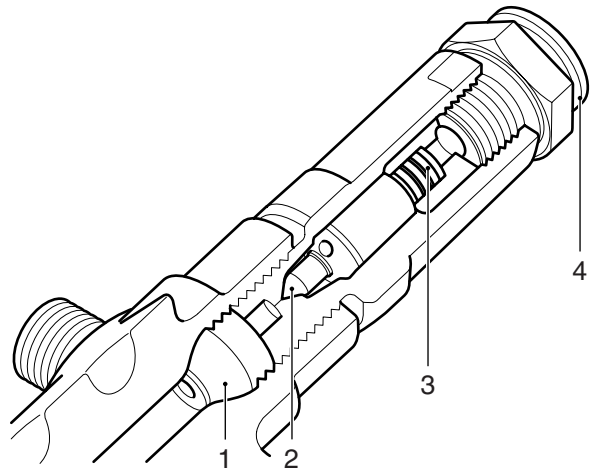
I400548

3.4 FUEL RAIL PRESSURE-LIMITING VALVE

The fuel rail has a pressure-limiting valve so that the rail pressure is maintained at a safe value in emergency situations.

The fuel rail pressure control circuit is normally active. This consists of the fuel lift pump, fuel pump control solenoid valve, high-pressure pump, fuel rail, rail pressure sensor and electronic unit. If a fault occurs, the rail pressure can no longer be controlled. This can rise to the actuating pressure of the fuel rail pressure-limiting valve. This pressure is approx. 1650 bar. In the open position all surplus fuel flows without pressure to the fuel tank return connection.

The valve includes a sealing cone (1), a valve body (2), a spring (3) and a return connection with quick-release coupling (4).



i400592

BE ENGINE FUEL SYSTEM

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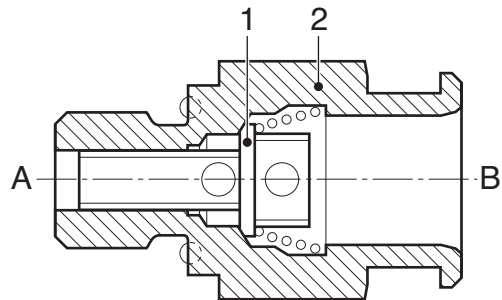
Description of components

LF45/55 series

3.5 FUEL RETURN OVERFLOW VALVE

The injectors are mounted in the cylinder head. The injectors do not have a separate return connection. In place of this there is a longitudinal bore in the cylinder head that meets the injector bores of all cylinders coinciding with the height of the return ports of the injectors. A pressure relief valve is mounted at the end of the bore to prevent vapour bubbles forming in it and to prevent it emptying after the engine is turned off. This valve maintains a residual pressure in relation to the return pressure of 1.2 to 2.0 bar.

The pressure relief valve consists of a spring-loaded plunger (1) and a housing (2) with quick-release inlet and outlet connections (A and B respectively).



i400861

4. INSPECTION AND ADJUSTMENT

4.1 BLEEDING THE FUEL SYSTEM

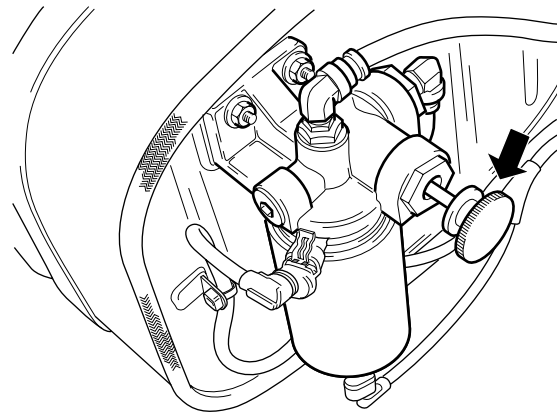


Stop pumping as soon as a greater resistance is felt. If you continue pumping, the fuel system may become internally damaged.

Note:

When the hand pump is used, the fuel system will be automatically bled. Air will be fed back to the tank through the return pipe.

1. Unscrew the button of the primer pump and pull it out.
2. Use the primer pump until a clearly higher resistance is perceptible.
3. Press the button and tighten it.



G0 00 209

BE ENGINE FUEL SYSTEM

4

Inspection and adjustment

LF45/55 series

4.2 CHECKING FUEL LIFT PUMP PRESSURES



When inspecting the fuel pressure, fuel will escape. Collect the fuel and avoid the risk of fire.

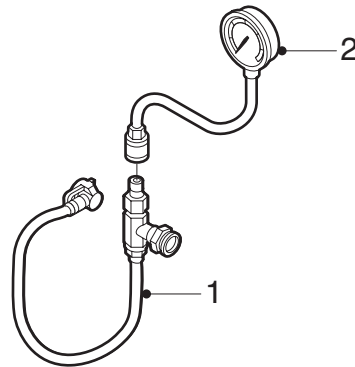


Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

2

Checking underpressure on suction side of fuel lift pump

1. Disconnect the fuel pipe from the electronic unit cooling plate to the fuel lift pump on the suction side of the fuel lift pump; see "Removal and installation".
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the fuel lift pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Measure the underpressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
5. Remove the pressure gauge and the adapter and fit the fuel pipe.
6. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.



i400883

Checking fuel pressure in fuel lift pump in front of fuel fine filter

1. Disconnect the fuel pipe from the lift pump to the fuel fine filter on the delivery side of the lift pump; see "Removal and installation".

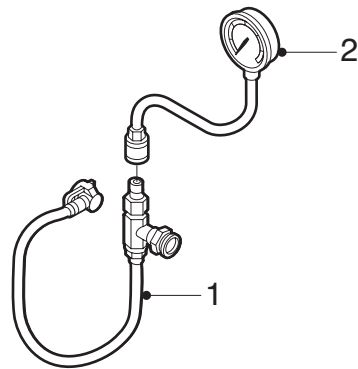
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BE ENGINE FUEL SYSTEM

LF45/55 series

Inspection and adjustment

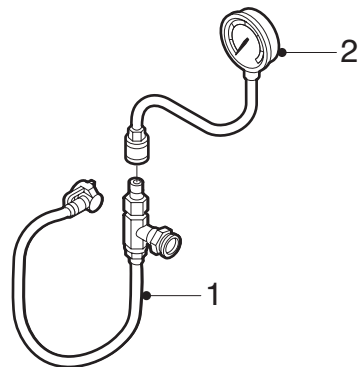
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the fuel lift pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Start the engine and measure the pressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
5. Remove the pressure gauge and the adapter and fit the fuel pipe.
6. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.



i400883

Checking fuel pressure in fuel lift pump after fuel fine filter

1. Disconnect the fuel pipe from the fuel fine filter to the high-pressure pump on the side of the high-pressure pump; see "Removal and installation".
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the high-pressure pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Disconnect the electrical connectors of the injectors from the valve sleeve.
5. Start the engine and measure the pressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
6. Connect the electrical connectors of the injectors to the valve sleeve.
7. Remove the pressure gauge and the adapter and reconnect the fuel pipe.
8. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.



i400883

BE ENGINE FUEL SYSTEM

4

Inspection and adjustment

LF45/55 series

Check pressure drop across fuel fine filter

1. Check the fuel pressure in front of the fuel fine filter.
2. Check the fuel pressure after the fuel fine filter at maximum engine speed.
3. Compare the measured pressure drop across the fuel fine filter with the specified value. See "Technical data". If the pressure drop is too great, the fuel fine filter must be replaced.

2

4.3 INSPECTION, INTERNAL FUEL LEAKS



When inspecting for internal fuel leaks, fuel will escape. Collect the fuel and avoid the risk of fire.



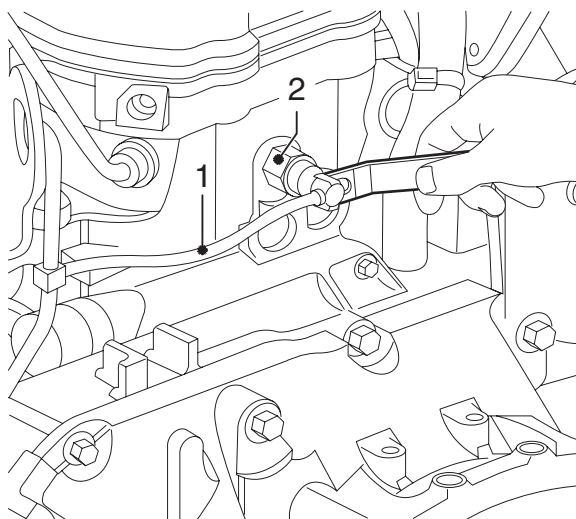
Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.



The common rail system is under high pressure when the engine is running. This pressure can rise to approx. 1400 bar. Even when the engine is not running, there may be a high residual pressure in the fuel rail (approx. 50 bar). Depressurise the system before working on the common rail system by wrapping the coupling in a cloth and then unscrewing it and collecting the escaping fuel in a container.

Inspection, internal fuel leaks

1. Check that all injector pipes have been tightened to the correct torque and that there are no external signs of fuel leakage; see "Technical data".
2. Disconnect the fuel return pipe (1) from the fuel return overflow valve (2) on the rear of the cylinder head.



i400679

BE ENGINE FUEL SYSTEM

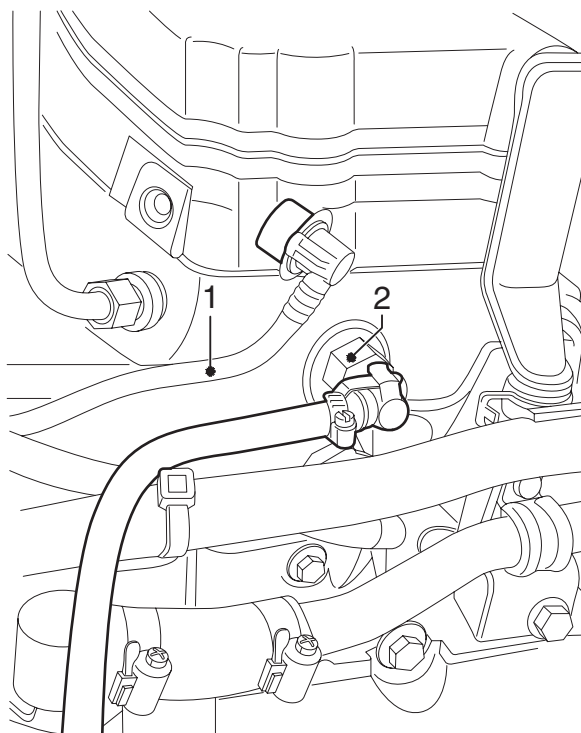
4

Inspection and adjustment

LF45/55 series

2

3. Seal the disconnected fuel pipe (1) using the special tool (DAF no. 1453151) to prevent the return fuel escaping.
4. Fit the special tool (DAF no. 1329476) onto the fuel return overflow valve (2).

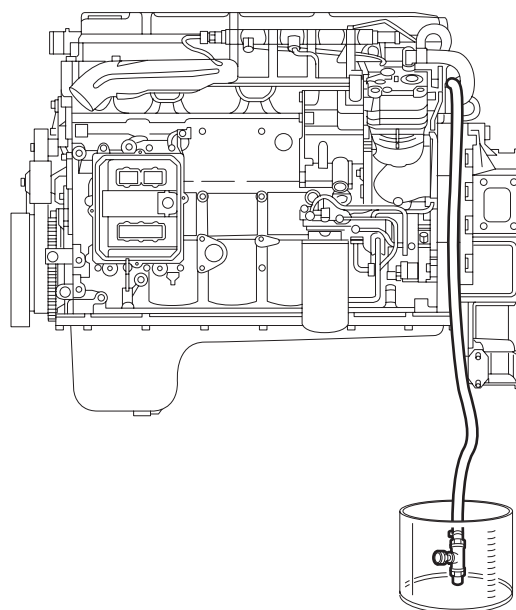


i400680

5. Place the free end of the special tool (DAF no. 1329476) in a container and start the engine.
6. While the engine is idling, measure the quantity of return fuel using a stop watch and a measuring beaker; see "Technical data" for the maximum quantity of return fuel.

Note:

If the quantity of return fuel is within the specified value there are no internal leaks.
If the quantity of return fuel exceeds the specified value, the internal fuel leak must be located.



i400682

Locating internal fuel leak

1. Take the injector pipe out of cylinder 1.
2. Seal the connection of cylinder 1 on the fuel rail using the special tool (DAF no. 1453133). Tighten the plug to 30 Nm.
3. While the engine is idling, use a stop watch to measure the time required to fill a measuring beaker with 360 ml of return fuel. See "Technical data" for the minimum time permitted for filling the measuring beaker.

Note:

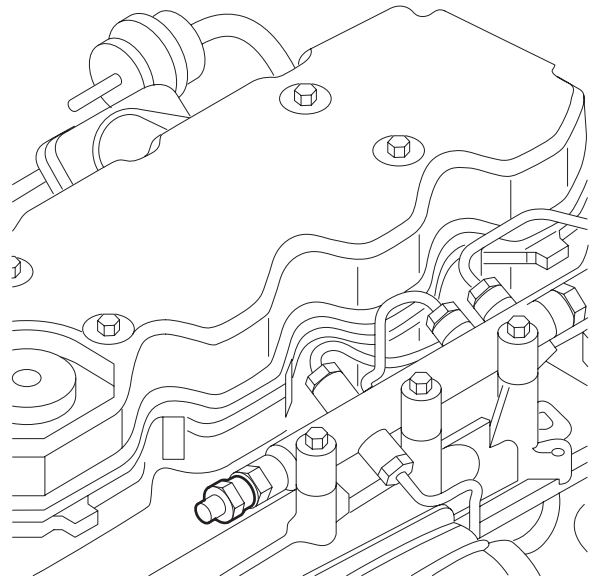
Use a measuring beaker with a mark at 360ml.

4. Remove the special tool (DAF no. 1453133) and reconnect the injector pipe.
5. Repeat the above steps for the other cylinders and note the values.

Note:

When the leaking cylinder has been plugged, the quantity of return fuel will decrease and, as a result, the time it takes to fill the measuring beaker to 360ml will increase. If several high values are measured, this indicates that there may be several leaks. If this is the case, first check the cylinders that give the highest values and then repeat the test.

In the example shown in the table below there is an internal leak in the 3rd cylinder, which could be caused by a leak in the fuel supply pipe and/or a defective injector.



i400681

Example:

Leak test results				
Blocked cylinder	1	2	3	4
Time (s) to fill to 360ml	35	36	200	37

6. In the event of a leak, remove the fuel supply pipe and the injector of the cylinder in question; see "Removal and installation".

BE ENGINE FUEL SYSTEM

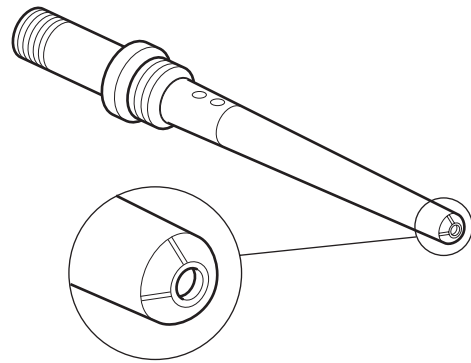
4

Inspection and adjustment

LF45/55 series

2

7. Check the fuel supply pipe for damage and signs of leakage.
Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.
8. Check that the injector fuel connection is not leaking.
Leakage in the injector fuel connection can be recognised by erosion tracks (lines) in the socket of the fuel connection . If necessary or if in doubt, replace the injector.



i400776

Note:

If fuel has been found in the lubricating oil, extra attention must be paid to the O-rings of the injectors, as these have most probably been damaged by increased pressure in the return circuit as a result of an internal leak.

Note:

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
 - If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
 - If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.
9. Fit the injector and fuel supply pipe. See "Removal and installation".
 10. Again inspect for internal fuel leaks to check that there is no leakage.

5. REMOVAL AND INSTALLATION

5.1 REMOVAL AND INSTALLATION, INJECTOR PIPE



Never bend injector pipes as they may kink or crack. The injector pipes form part of the high-pressure section of the fuel system. When the unions are unscrewed, fuel under high pressure may escape. Take measures to prevent fire and injury. Collect the escaping fuel in a suitable container.



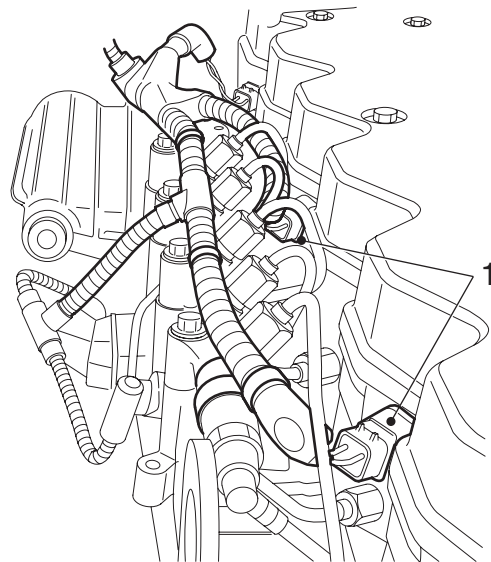
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Note:

Codes (1) are stamped in the injector pipe unions to enable correct positioning. The first figure is the number of cylinders of the engine followed by the fitting position.

Removing the injector pipe

1. Clean the area surrounding the unions, both near the injectors and near the fuel rail.
2. Remove the connectors (1) of the injectors from the valve sleeve.



i400852

BE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

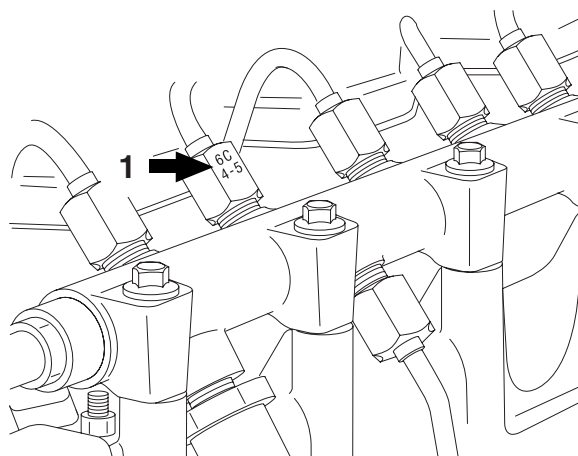
Note:

Note the sequence in which the injector pipes are removed. They should be re-fitted in precisely the reverse order.

3. Unscrew the unions on both sides of the pipe and remove the pipes.
4. Immediately plug the openings.

Installing the injector pipe

1. Clean the injector pipe and blow-clean it with dry compressed air.
2. Fit the injector pipes in reverse order and hand-tighten the unions. When all the pipes and unions are correctly fitted, the unions must be tightened to the specified torque. See "Technical data".
3. Fit the connectors of the injectors in the valve sleeve.
4. Start the engine to bleed the high-pressure section of the fuel system and inspect all fuel pipes for leaks.



i400482

2

5.2 REMOVAL AND INSTALLATION, FUEL SUPPLY PIPE



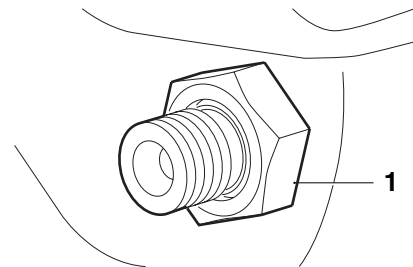
When removing a fuel pipe, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

Removing the fuel supply pipe

1. Disconnect the injector pipes.
2. If necessary, remove the fuel rail.
3. Remove the nut (1) from the fuel supply pipe.



i400486

4. Mark the positions of the fuel supply pipe (1) and pull it out of the cylinder head with special tool (DAF no. 1329473) (2).

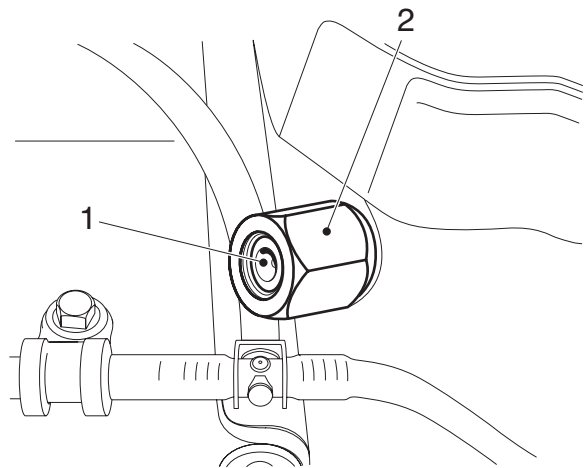
Note:

If the injector is **not** replaced, the fuel supply pipe may be re-used provided it is fitted with the original injector.

Installing the fuel supply pipe

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.



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Removal and installation

LF45/55 series

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1. Check the fuel supply pipe for damage and signs of leakage.
Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.

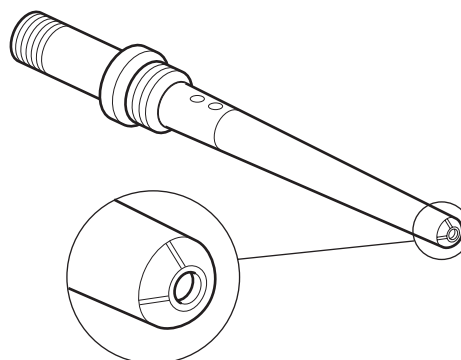
Note:

If any indications of leakage are visible, remove the injector and check the injector fuel connection for signs of leakage.

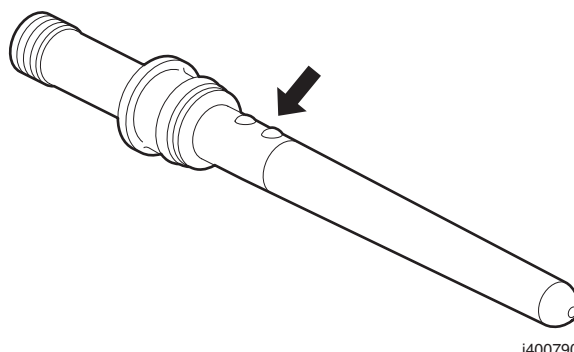
2. Fit a new O-ring on the fuel supply pipe.
3. Apply a thin layer of clean engine oil to the O-ring of the fuel supply pipe, the screw thread of the nut and the contact surface of the nut with the fuel supply pipe.
4. Check the bore of the fuel supply pipe for foreign matter and damage. Also check whether the supply bore in the injector is correctly positioned for the bore, because it is possible to mount the injector turned through 180°, so that the fuel supply port is on the other side.

Note:

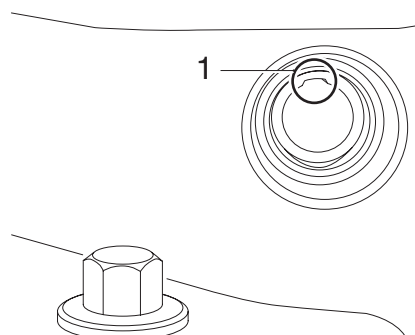
The fuel supply pipe has one or two positioning balls. The fuel supply pipe can only be installed with the ball(s) on top, as the bore in the cylinder head has a groove (1) at the top. Press the fuel supply pipe as far as possible into the bore, with the ball pointing upwards. Ensure that the O-ring is not damaged in this process.



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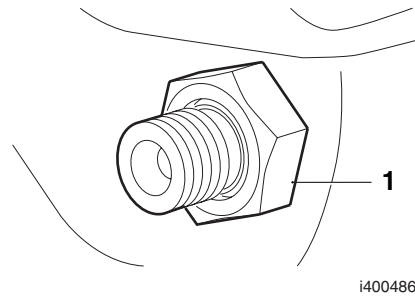
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BE ENGINE FUEL SYSTEM

LF45/55 series

Removal and installation

5. Install the nut (1) and tighten it to the specified torque. See "Technical data".
6. If the fuel rail was removed, re-fit it.
7. Fit the injector pipes.
8. Start the engine to bleed the high-pressure section of the fuel system and inspect the fuel system for leaks.



BE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

5.3 REMOVAL AND INSTALLATION, INJECTOR



When removing an injector, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

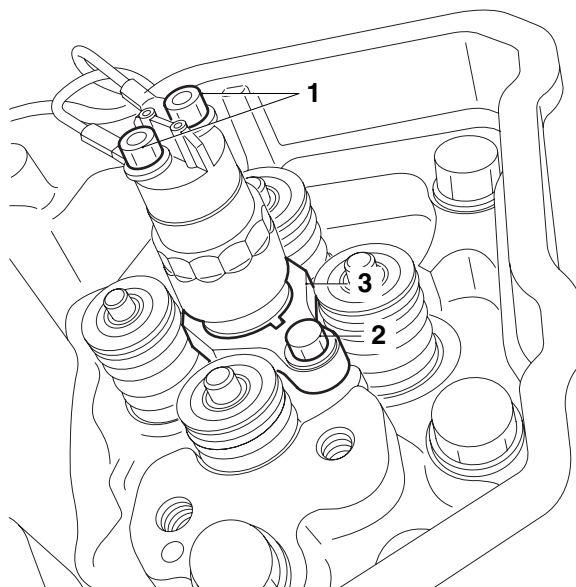
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Removing the injector

1. Remove the fuel return overflow valve to let the return bore in the cylinder head empty to the fullest possible extent. Collect the escaping fuel.
2. Remove the injector pipe.
3. Remove the fuel supply pipe.

Note:

- If an injector is removed without the fuel supply pipe having first been removed, serious damage can ensue.
 - If the injectors are removed, they must be removed together with the fuel supply pipes.
4. Remove the valve cover.
 5. Remove the exhaust valve rockers.
 6. Remove the injector wiring (1).
 7. Remove the two attachment bolts (2) from the injector clamping bracket (3).



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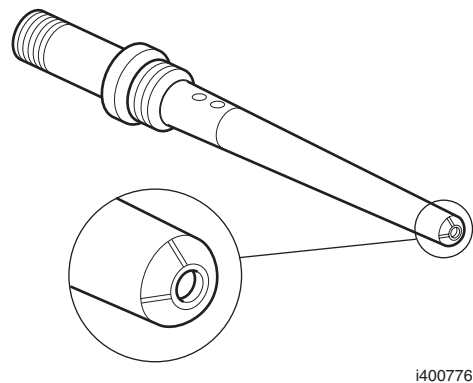
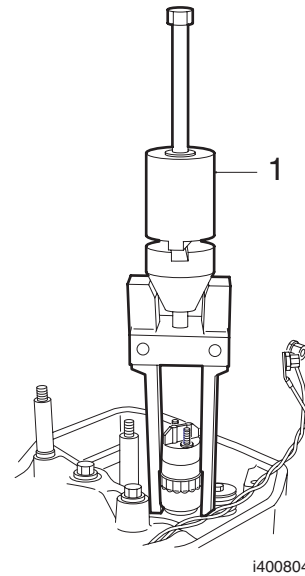
8. Fit the injector puller (1). This is the special tool (DAF no. 0192496). Carefully pull the injector vertically out of the cylinder head.
9. Remove the copper washer from the injector hole and plug the hole immediately.

Installing the injector

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.

1. Clean the injector if it has already been used. See "Cleaning".
2. Clean the injector hole in the cylinder head. The metal surface of the hole must not be touched.
3. Check the fuel supply pipe for damage and signs of leakage. Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.
4. Fit a new O-ring on the fuel supply pipe.
5. Check that the injector fuel connection is not leaking. Leakage in the injector fuel connection can be recognised by erosion tracks (lines) in the socket of the fuel connection. If necessary or if in doubt, replace the injector.



BE ENGINE FUEL SYSTEM

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Removal and installation

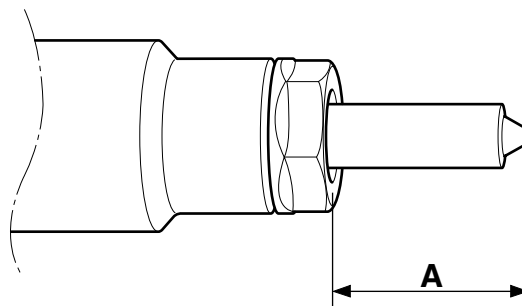
LF45/55 series

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6. Fit a new copper washer on the injector. Measure the length of the injector nozzle (A) **without** fitted washer in order to determine which washer must be used. Fit the correct washer; see "Technical data".

Note:

A wrong washer will cause an incorrect alignment between the fuel supply pipe and the injector. This will lead to internal fuel leaks that will in turn cause loss of power and/or engine damage.



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7. Fit a new O-ring on the injector.

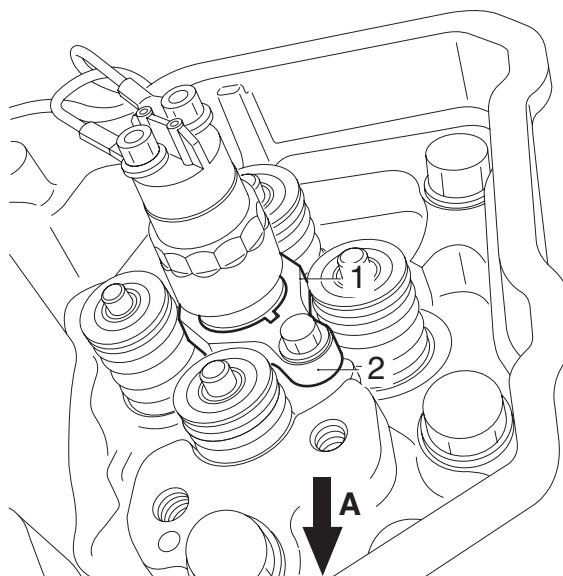
Note:

This O-ring should prevent returning fuel (1.2 - 2.0 bar) flowing via the top of the cylinder head to the oil sump and thinning the oil.

8. Apply a thin layer of clean engine oil to the O-ring of the injector.
9. Fit the injector with the copper washer. First press the injector into the hole as far as possible until a higher resistance can clearly be felt.

Note:

The injector must only be fitted one way. If it is fitted incorrectly, serious damage can ensue. The rounded side (2) of the injector clamping bracket (1) must point to the inlet side of the engine (A).



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BE ENGINE FUEL SYSTEM

LF45/55 series

Removal and installation

10. Fit the attachment bolts (1) in the injector clamping bracket (2) to secure the injector. Tighten the attachment bolts alternately to a torque of 2 Nm.

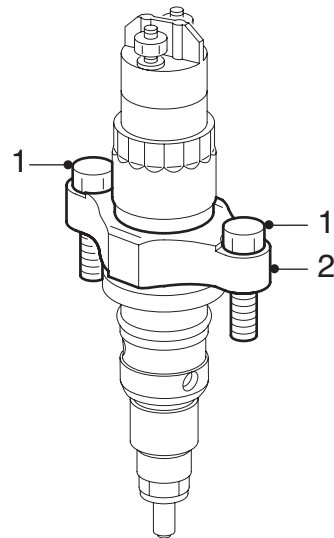
Note:

Pay special attention to the tightening of the attachment bolts (1). The tightening must be carried out alternately; ensure that the injector clamping bracket (2) is not fitted at an angle.

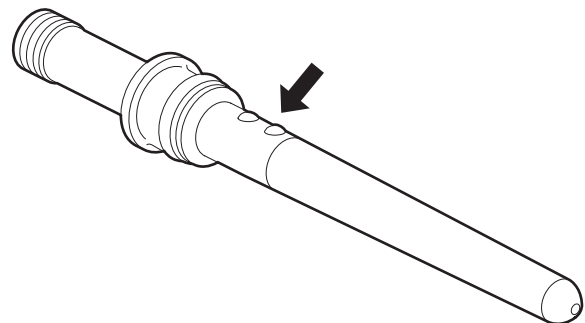
11. Apply a thin layer of clean engine oil to the O-ring of the fuel supply pipe, the screw thread of the nut and the contact surface of the nut with the fuel supply pipe.
12. Check the bore of the fuel supply pipe for foreign matter and damage. Also check whether the supply bore in the injector is correctly positioned for the bore, because it is possible to mount the injector turned through 180°, so that the fuel supply port is on the other side.
13. Fit the fuel supply pipe. Press the fuel supply pipe as far as possible into the bore, with the ball pointing upwards. Ensure that the O-ring is not damaged in this process.

Note:

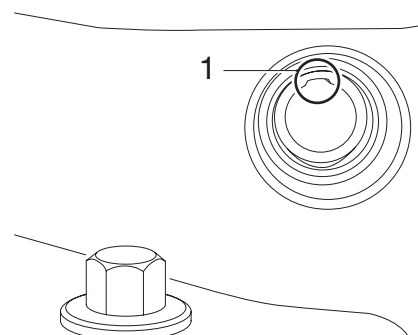
The fuel supply pipe has one or two positioning balls. The fuel supply pipe can only be installed with the ball(s) on top, as the bore in the cylinder head has a groove (1) at the top.



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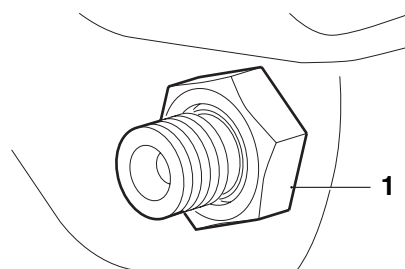
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Removal and installation

LF45/55 series

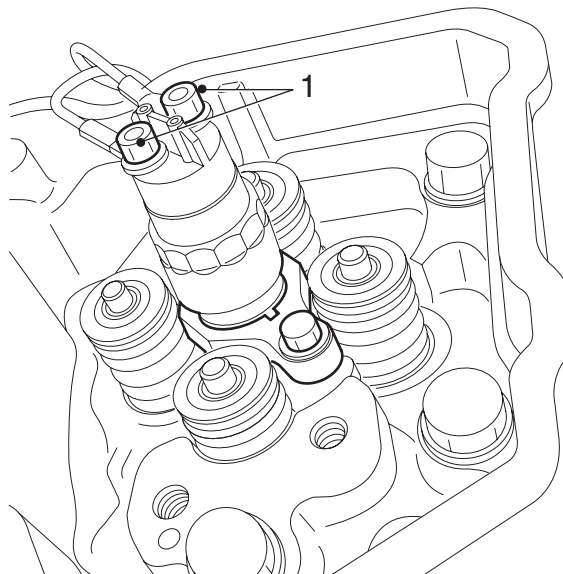
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14. Fit the nut (1). Tighten the nut to a torque of 15 Nm.
15. Tighten the injector attachment bolts to the specified torque; see "Technical data".
16. Tighten the fuel supply pipe nut to the specified torque; see "Technical data".



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17. Connect the injector wiring. Tighten the attachment bolts (1) to the specified torque. See "Technical data".
18. Fit the exhaust valve rockers.
19. Adjust the clearance of the exhaust valves.
20. Fit the valve cover.
21. If the fuel rail was removed, re-fit it.
22. Fit the injector pipe.
23. Fit the fuel return overflow valve to the cylinder head. For the specified tightening torque, see "Technical data".
24. Connect the return pipe to this valve.
25. Start the engine to bleed the high-pressure section of the fuel system and inspect the fuel system for leaks.



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5.4 REMOVAL AND INSTALLATION, FUEL RAIL



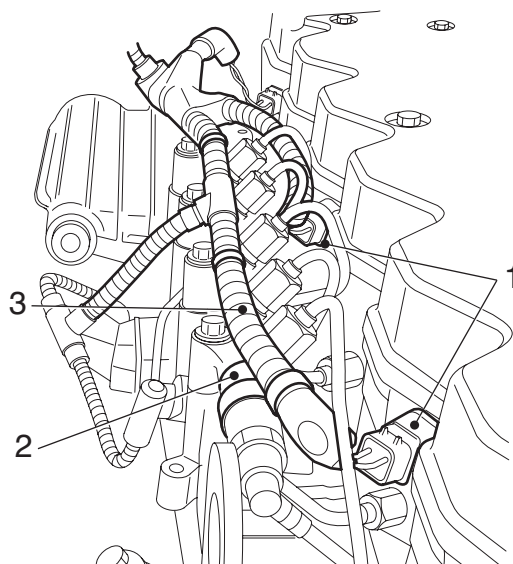
When removing the fuel rail, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing the fuel rail

1. Remove the connector from the fuel rail pressure sensor.
2. If necessary, remove the plug of the inlet air temperature/boost pressure sensor by loosening the connector.
3. Remove the connectors of the injectors (1) from the valve sleeve.
4. Disconnect the cable harness (3) on the fuel rail (2) and bend the cable harness away from the fuel rail.



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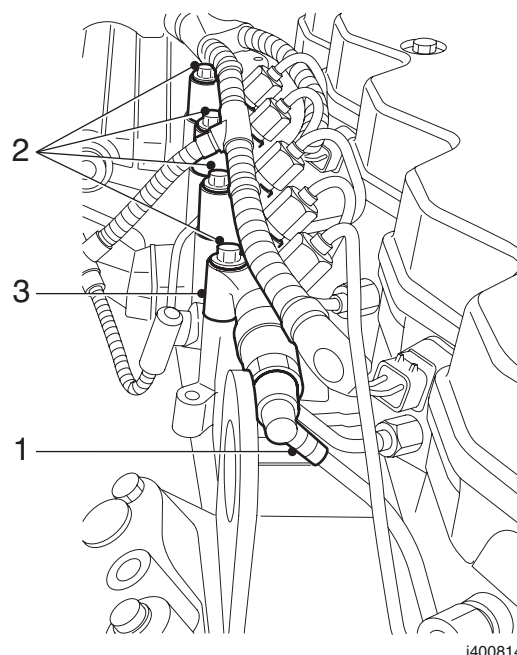
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Removal and installation

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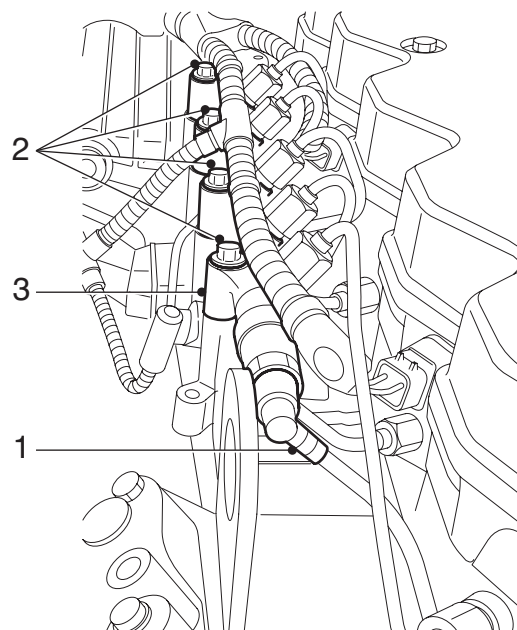
5. Remove the fuel return pipe from the pressure-limiting valve on the fuel rail
6. Loosen the pipe clamps from the high-pressure pipe to the fuel rail.
7. Loosen the high-pressure pipe from the high-pressure pump to the fuel rail on the fuel rail side by unscrewing the union.
8. Disconnect the injector pipes.
9. Remove the fuel rail attachment bolts (2).
10. Remove the fuel rail (3).



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Installing the fuel rail

1. Ensure that the fuel rail is clean.
2. Fit the fuel rail (3) and hand-tighten the attachment bolts (2).
3. Fit the fuel return pipe (1) onto the pressure-limiting valve on the fuel rail.
4. Fit the injector pipes.
5. Fit the pipe clamps from the high-pressure pipe to the fuel rail. Do not tighten them yet.
6. Fit the high-pressure pipe unions from the high-pressure pump to the fuel rail. For the specified tightening torques of the unions, see "Technical data".
7. Tighten the attachment bolts (2) of the fuel rail to the specified torque. See "Technical data".
8. Tighten the bolt connections of the high-pressure pipe clamps.



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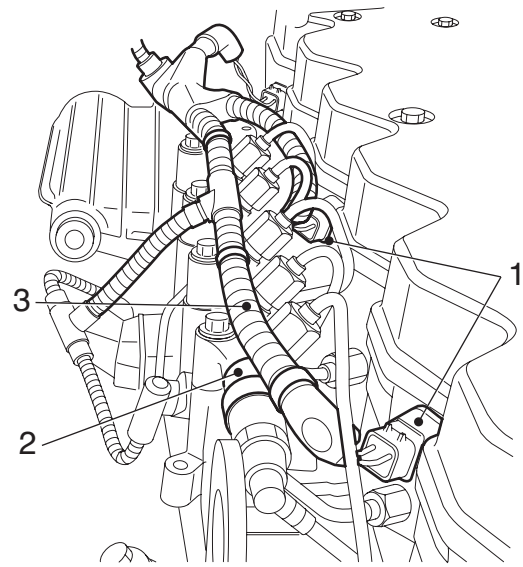
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LF45/55 series

Removal and installation

9. Install the cable harness (3) to the fuel rail (2) and secure it using cable ties.
10. Fit the connectors of the injectors (1) in the valve sleeve.
11. If it has been removed, fit the plug of the inlet air temperature/boost pressure sensor to the sensor.
12. Fit the connector of the fuel rail pressure sensor.
13. Start the engine and check the fuel system for leaks.



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BE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

5.5 REMOVAL AND INSTALLATION, FUEL RAIL PRESSURE-LIMITING VALVE



When removing the pressure-limiting valve, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

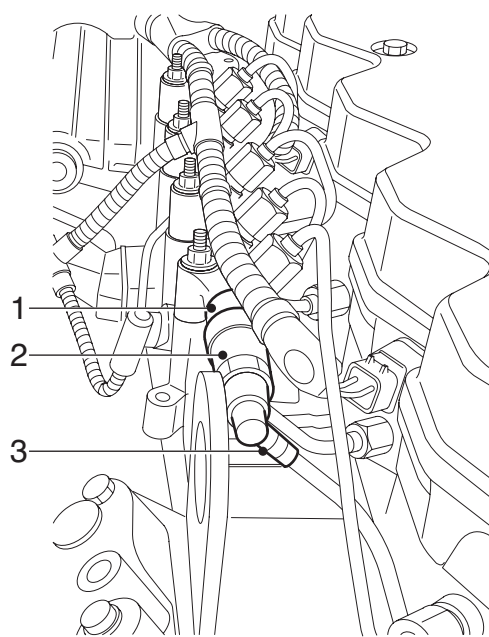
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Removing fuel rail pressure-limiting valve

1. Clean the pressure-limiting valve (2) and the surrounding area.
2. Remove the fuel return pipe (3) from the pressure-limiting valve (2).
3. Remove the pressure-limiting valve (2) from the fuel rail (1).

Installing fuel rail pressure-limiting valve

1. Check the sealing surface and the screw thread of the pressure-limiting valve and the fuel rail.
2. Install the pressure-limiting valve in the fuel rail and tighten the valve to the specified torque. See "Technical data".
3. Fit the fuel return pipe on the pressure-limiting valve.
4. Start the engine and check the pressure-limiting valve for leaks.



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5.6 REMOVAL AND INSTALLATION, HIGH-PRESSURE PUMP



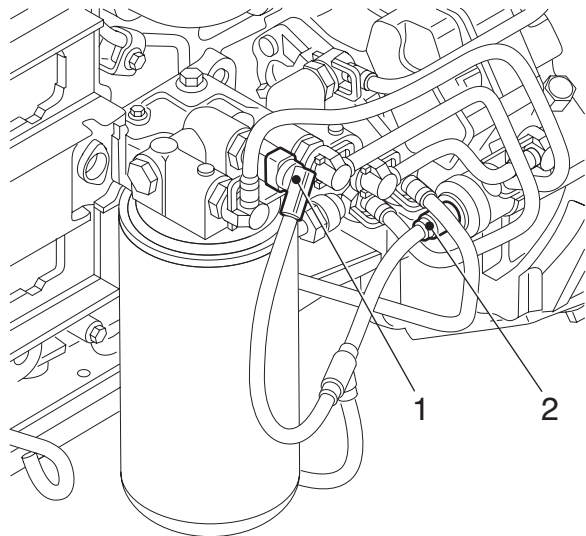
When removing the high-pressure pump, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing the high-pressure pump

1. Clean the high-pressure pump and that part of the engine around it thoroughly with, for example, a steam cleaner. Cover the places at which leaks have been detected to prevent dirt getting into the fuel system.
2. Disconnect the fuel pipes from the high-pressure pump. Loosen the return pipe only on the high-pressure pump.
3. If fitted, uncouple the connector of the fuel temperature sensor (1) on the fuel fine filter head and the connector of the fuel pump control solenoid valve (2).
4. Remove the fuel fine filter together with the filter head.
5. Loosen both unions from the high-pressure pipe to the fuel rail as well as the pipe clamps. Remove the high-pressure pipe. Plug all openings.
6. Remove the three high-pressure pump attachment nuts and then the high-pressure pump.



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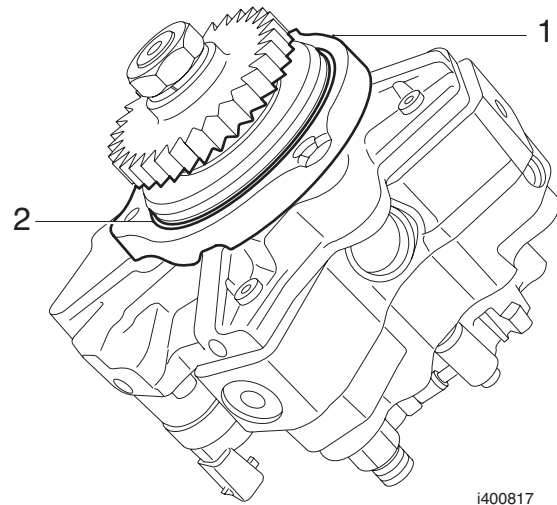
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Removal and installation

LF45/55 series

Note:

The high-pressure pump is fitted on the gear side with an adapter ring (1) and an O-ring (2) in the timing gear case. If the removal of the high-pressure pump is particularly difficult, it may be necessary to press the adapter ring (1) carefully out of the timing gear case using a small pry bar.

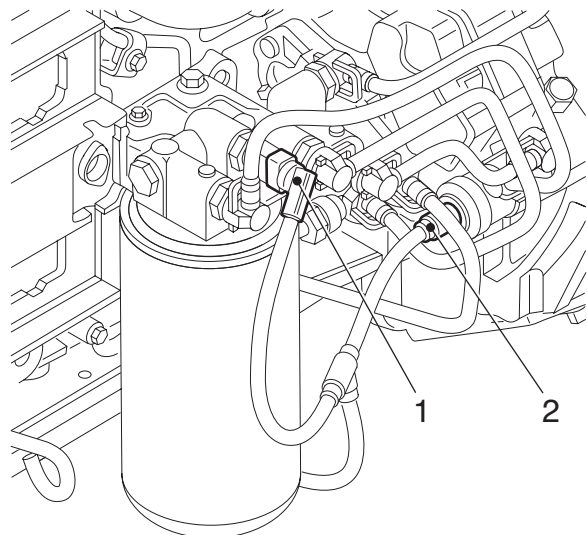


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Installing the high-pressure pump

1. Clean the high-pressure pump. Make sure that no dirt or cleaner can get into the high-pressure pump ducts.
2. Check the high-pressure pump and the drive gear (externally) for wear and damage.
3. Fit a new O-ring (2) on the adapter ring (1) and apply a thin layer of engine oil to the O-ring.
4. Fit the high-pressure pump and press it into the timing gear case by means of the attachment nuts.
5. Tighten the attachment nuts to the specified torque. See "Technical data".
6. Fit the filter head and the fuel fine filter.
7. Fit the high-pressure pump to the fuel rail and tighten the unions. See "Technical data" for the specified tightening torques.
8. Tighten the pipe clamps.
9. If fitted, connect the connector of the fuel temperature sensor (1) on the fuel fine filter head and the connector of the fuel pump control solenoid valve (2).
10. Fit the fuel pipes to the high-pressure pump.
11. Bleed the fuel system. See "Inspection and adjustment".
12. Start the engine and check the fuel system for leaks.



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5.7 REMOVAL AND INSTALLATION, FUEL FINE FILTER



When removing the fuel fine filter, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.

Removing the fuel fine filter

1. Place a container beneath the fuel fine filter and remove the filter.

Note:

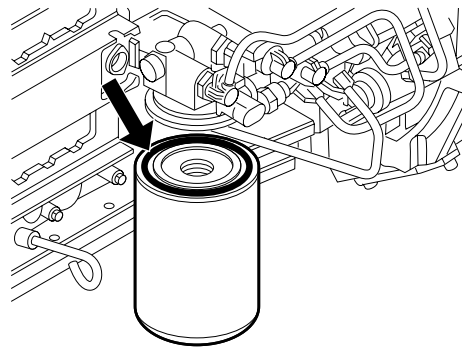
The fuel fine filter is a disposable filter and must therefore not be cleaned and re-used.

Installing the fuel fine filter

Note:

Do not fill the fine filter with fuel until it has been fitted. The fine filter is filled with fuel by the primer pump after it has been fitted. This considerably reduces the risk of dirt getting into the fuel system.

1. Check by hand whether the coupling piece for the filter attachment is securely attached.
2. Lightly lubricate the filter sealing ring with clean engine oil.
3. Fit the filter element onto the housing. Tighten the filter element until the sealing ring abuts. Tighten the filter element a further $\frac{1}{2}$ to $\frac{3}{4}$ turn by hand.
4. Bleed the fuel system. See "Inspection and adjustment".
5. Start the engine and check the fuel system for leaks. If necessary, retighten the filter by hand.



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BE ENGINE FUEL SYSTEM**4**

Removal and installation

LF45/55 series**5.8 REMOVAL AND INSTALLATION, FUEL PREFILTER/WATER SEPARATOR**

When removing the fuel prefilter/water separator, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.

2**Removing the fuel prefilter/water separator filter element**

1. Place a container under the filter.
2. Remove the plug (3) from the water sensor (2).
3. Remove the fuel prefilter/water separator filter element (1) by turning it anti-clockwise.
4. Remove the water sensor (2) from the filter element (1).

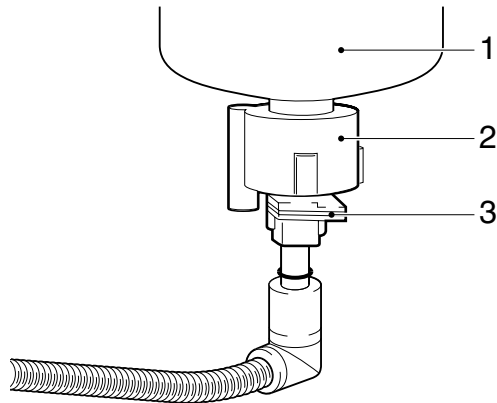
Installing the fuel prefilter/water separator filter element

1. Check by hand whether the coupling piece for the filter attachment is securely attached.
2. Lightly lubricate the sealing ring with engine oil.
3. Fit the fuel prefilter/water separator filter element (1) until the sealing ring abuts. Tighten the filter element a further $\frac{1}{2}$ to $\frac{3}{4}$ turn by hand.
4. Turn the water sensor (2) onto the filter element until it abuts. Tighten the water sensor by about a further $\frac{1}{8}$ - $\frac{1}{4}$ turn.

Note:

Over-tightening the water sensor (2) may damage the sensor and/or cause leakage.

5. Fit the plug (3) on the water sensor (2).
6. Bleed the fuel system. See "Inspection and adjustment".
7. Start the engine and check for leaks. If necessary, retighten the fuel prefilter/water separator filter element (1) by hand.



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5.9 REMOVAL AND INSTALLATION, FUEL LEVEL ELEMENT



When removing the fuel prefilter/water separator, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

Removing fuel level element

1. Disconnect the earth lead from the battery terminal.

Note:
To prevent dirt from entering, first clean the outside of the fuel tank.
2. Drain the fuel tank until it is less than 1/3 full.
3. Remove the connector from the fuel level element.
4. Remove the attachment bolts of the fuel level element and carefully remove the fuel level element from the fuel tank.
5. Remove the gasket.

Installing fuel level element

1. Clean the contact surface of the fuel tank and the fuel level element.
2. Fit a new gasket to the fuel level element and fit the fuel level element.
3. Fit the attachment bolts of the fuel level element.
4. Fit the connector of the fuel level element.
5. Fill the fuel tank with fuel to a level above the lip of the fuel level element and check the tank for leaks.

5.10 REMOVAL AND INSTALLATION, FUEL TANK



When the fuel tank is removed, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

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Removing fuel tank

1. To prevent dirt from entering, first clean the outside of the fuel tank.
2. Drain the fuel tank until it is almost empty.
3. Remove the connector from the fuel level element.
4. Remove the fuel connections from the fuel tank.
5. Loosen the fuel pre-filter/water separator from the fuel tank and put it to the rear.
6. Loosen the tank straps.
7. Remove the fuel tank.

Installing the fuel tank

1. Check the fuel tank for damage.
2. Fit the fuel tank with the straps.
3. Fit the fuel pre-filter/water separator on the fuel tank.
4. Fit the fuel connections on the fuel tank.
5. Fit the connector of the fuel level element.
6. Fill the fuel tank with fuel.
7. Bleed the fuel system. See "Inspection and adjustment".
8. Check the tank and the fuel pipes for leaks.

5.11 REMOVAL AND INSTALLATION, ELECTRONIC UNIT COOLING PLATE



When removing the cooling plate, fuel will escape. Collect the fuel and avoid the risk of fire.



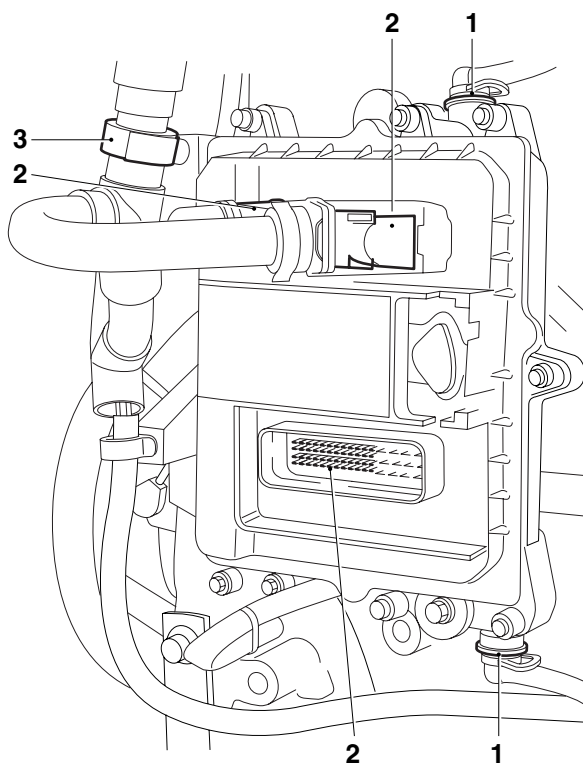
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Note:

The electronic unit, together with the cooling plate, must first be removed from the engine block, after which the cooling plate must be demounted.

Removing electronic unit cooling plate

1. Disconnect the earth lead from the battery terminal.
2. To prevent dirt from entering, first clean the area around the fuel connections.
3. Remove the fuel pipes (1) on the cooling plate of the electronic unit.
4. Uncouple the electrical connectors (2) from the electronic unit and loosen the attachment clip (3) from the cable harness.
5. Remove the attachment bolts by which the electronic unit is fitted to the engine block.
6. Remove the electronic unit and cooling plate.
7. Remove the attachment bolts by which the electronic unit is fitted to the cooling plate and remove the cooling plate.



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BE ENGINE FUEL SYSTEM

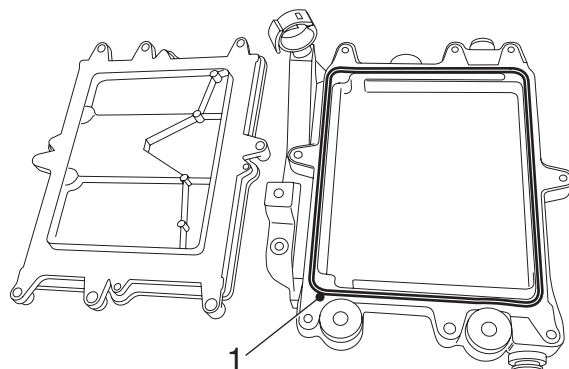
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Removal and installation

LF45/55 series

Installing electronic unit cooling plate

1. Clean the cooling side of the electronic unit and the cooling plate.
2. Inspect the sealing surfaces of the cooling plate and the electronic unit for damage and smoothness.
3. Fit a new sealing rubber (1) in the cooling plate.
4. Fit the cooling plate to the electronic unit and fit the bolts attaching the two parts. Tighten the attachment bolts to the specified torque. See "Technical data".
5. Fit the electronic unit and cooling plate to the engine block and fit the attachment bolts. Tighten the attachment bolts to the specified torque. See "Technical data".
6. Connect the electrical connectors to the electronic unit and attach the cable harness with the clips.
7. Connect the quick-release couplings of the fuel pipes to the electronic unit cooling plate.
8. Bleed the fuel system. See "Inspection and adjustment".
9. Fit the earth lead to the battery terminal.
10. Start the engine and check the fuel system for leaks.



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5.12 REMOVAL AND INSTALLATION, FUEL RETURN OVERFLOW VALVE



When removing the fuel return overflow valve, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

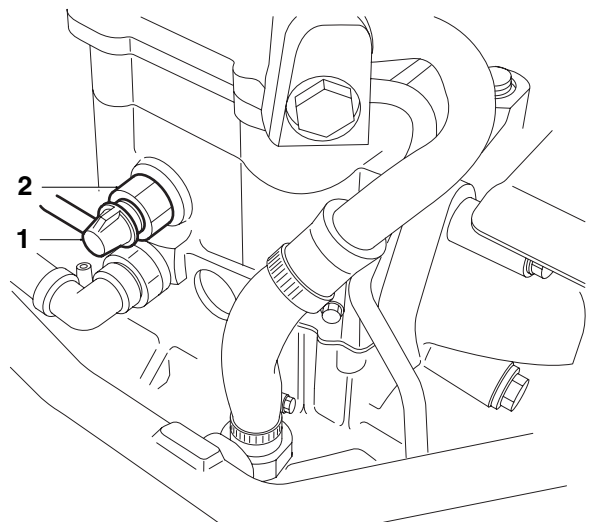
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Removing the fuel return overflow valve

1. To prevent dirt from entering, first clean the area around the fuel return connection.
2. Remove the fuel return pipe (1) on the fuel return overflow valve (2) and plug the pipe.
3. Remove the fuel return overflow valve and collect the escaping fuel.

Installing the fuel return overflow valve

1. Install the fuel return overflow valve. Haal het brandstofretour-overstroomventiel aan met het voorgeschreven aanhaalmoment, zie hoofdgroep "Technische gegevens".
2. Connect the quick-release couplings of the fuel return pipe to the fuel return overflow valve.
3. Start the engine and check the fuel system for leaks.



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BE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

5.13 REMOVAL AND INSTALLATION, LOW-PRESSURE FUEL PIPES



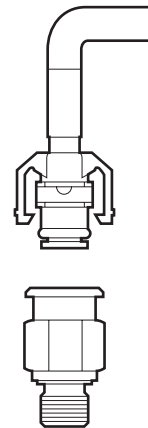
When removing the low-pressure fuel pipes, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

The low-pressure fuel pipes may have two different types of quick-release coupling.

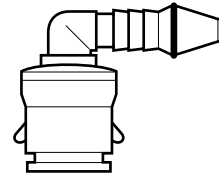
VOSS quick-release coupling



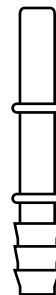
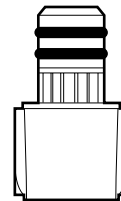
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John Guest quick-release coupling



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Removal and installation

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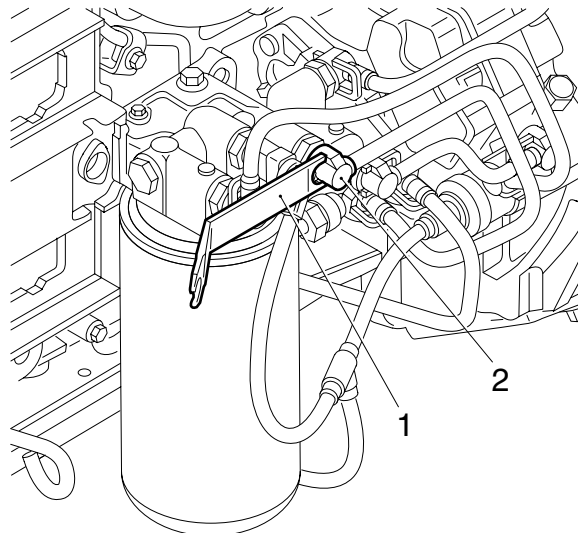
Low-pressure fuel pipes fitted with VOSS quick-release couplings

Removing low-pressure fuel pipes

1. Disconnect the fuel pipe (2) by inserting the special tool (1) (DAF no. 1329470) into the quick-release coupling and removing the pipe from the coupling.
2. Remove the special tool from the quick-release coupling.
3. Plug the openings.

Fitting low-pressure fuel pipes

1. Clean the quick-release coupling parts and apply a thin layer of clean engine oil to the O-ring.
2. Fit the pipe on the quick-release coupling of the component and push the pipe onto it until a clear resistance can be felt and the quick-release coupling audibly clicks.
3. Bleed the fuel system. See "Inspection and adjustment".
4. Start the engine and check the fuel system for leaks.



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Low-pressure fuel pipes fitted with John Guest quick-release couplings

Removing low-pressure fuel pipes

1. Disconnect the fuel pipe by pressing in both lips of the quick-release coupling and removing the pipe from the quick-release coupling.
2. Plug the openings.

Fitting low-pressure fuel pipes

1. Clean the quick-release coupling parts.
2. Fit the pipe on the quick-release coupling of the component and push the pipe onto it until a clear resistance can be felt and the quick-release coupling audibly clicks.
3. Bleed the fuel system. See "Inspection and adjustment".
4. Start the engine and check the fuel system for leaks.

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Removal and installation

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6. CLEANING

6.1 CLEANING INJECTOR



The injector must never be cleaned with a steel brush or pressure cleaning equipment. Never put the brush in the injector bores when cleaning the exterior of the injector nozzle. If this happens, the nozzle must be replaced. Before cleaning the nozzle, cover the injector bores. Only clean the injector with a brass hand brush.

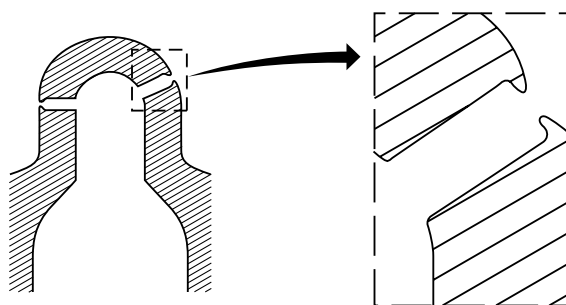
Note:

The use of steel brushes can cause deformation of the injector bores, with the result that the wrong amount of fuel is injected. This deformation cannot be ascertained by measurements or checks.

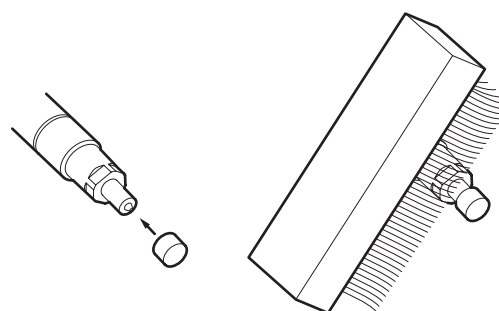
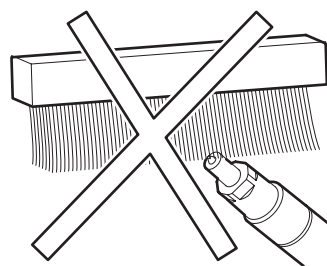
Note:

The disassembly and assembly of injectors is not permitted. Only external cleaning is permitted.

1. Remove the injector. See "Removal and installation".
2. Clean the injector hole in the cylinder head. The metal surface of the hole must not be damaged.
3. Wipe the exterior of the injector with a clean, lint-free cloth. In the case of heavy soiling the injector may be cleaned carefully with a brass hand brush (not the apertures in the injector nozzle!).
4. Fit the injector. See "Removal and installation".



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Cleaning

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BE ENGINE INLET/EXHAUST SYSTEM

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

BE ENGINE INLET/EXHAUST SYSTEM

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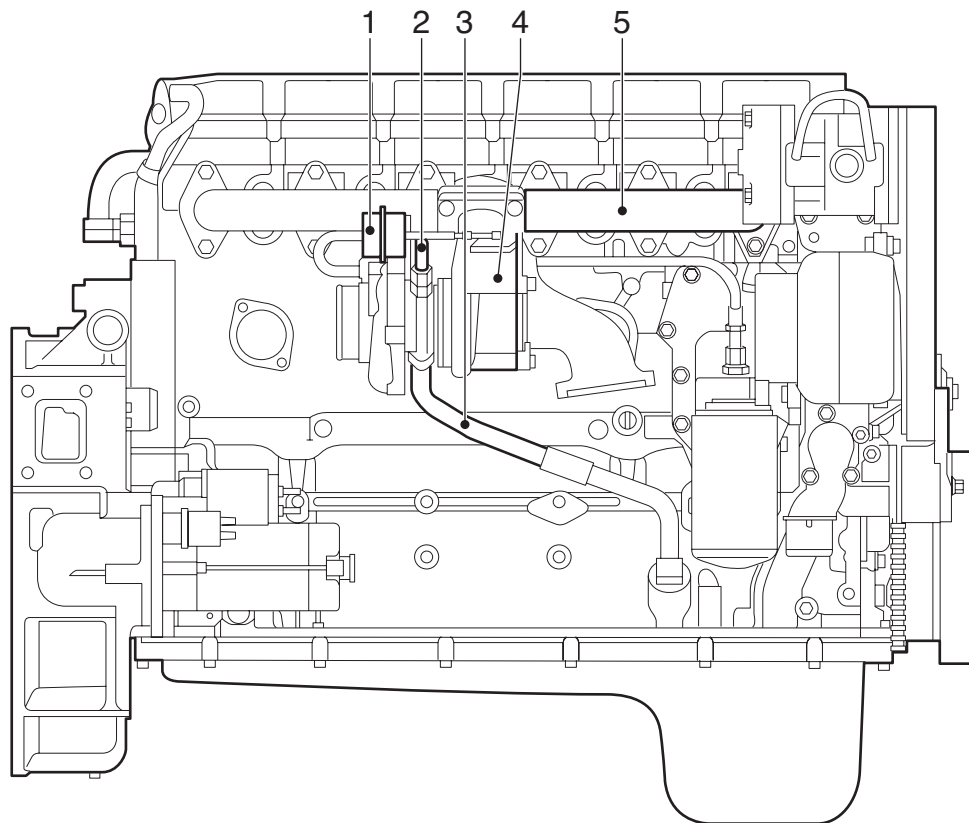
Safety instructions

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2. GENERAL

2.1 LOCATION OF COMPONENTS



1. Wastegate diaphragm box
2. Oil supply pipe
3. Oil discharge pipe
4. Turbocharger
5. Exhaust manifold

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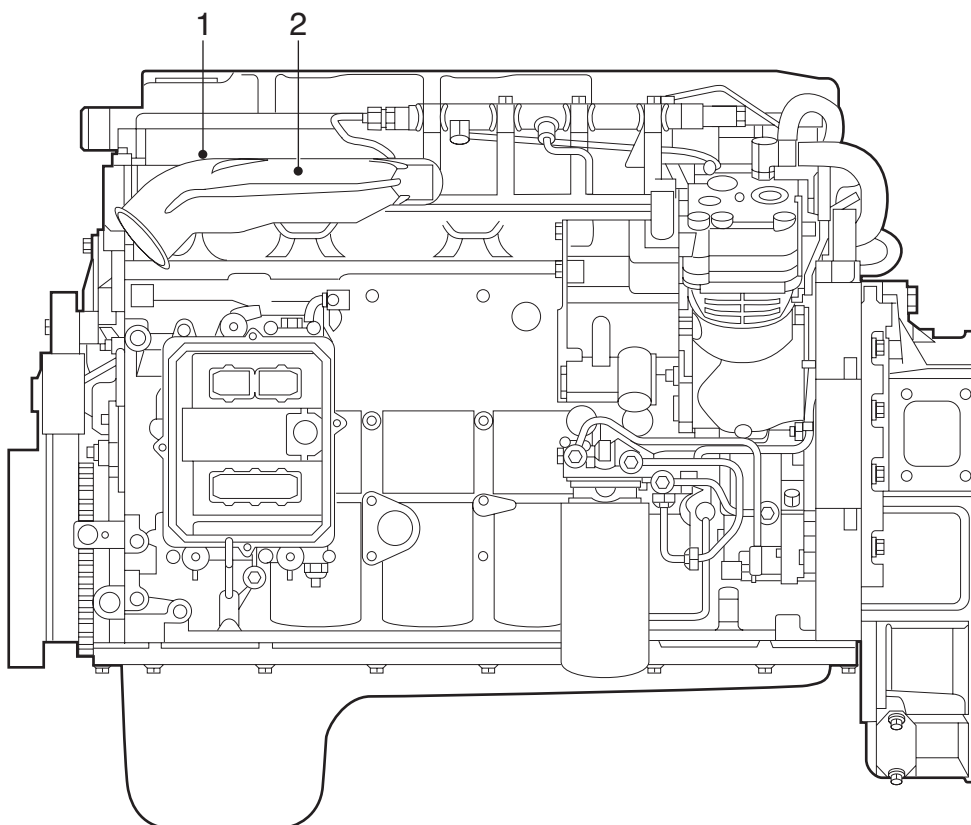
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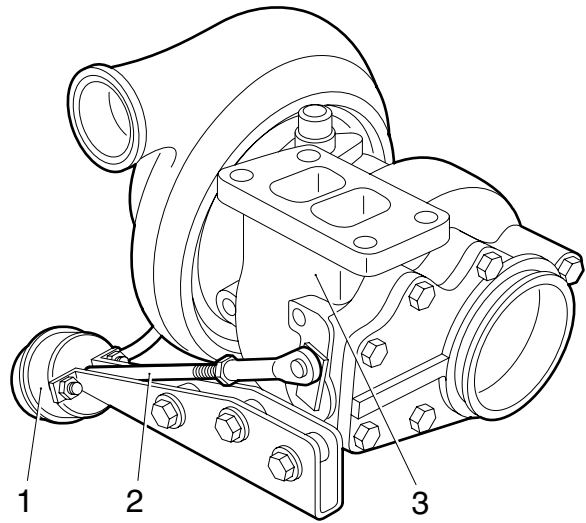
1. Glow element connections
2. Intake manifold

2.2 SYSTEM DESCRIPTION, TURBOCHARGER WITH WASTEGATE

To make the engine more responsive at lower engine speeds, a turbocharger is used that produces a better charge ratio at these speeds. Without provision having been made for this, the boost pressure yielded by this turbocharger would be too high at maximum engine speeds. Use of a wastegate prevents this.

The boost pressure is measured by a diaphragm box (1) on the delivery side of the turbocharger. The diaphragm is pushed back against the spring pressure by the boost pressure. The linked control rod (2) is also pushed back. The control rod operates a valve in the turbine housing (3). The valve in the turbine housing is opened when the maximum pre-set pressure has been reached.

When the valve is opened, some of the exhaust gases will be discharged directly to the exhaust pipe rather than being used to propel the turbine rotor of the turbocharger.



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General

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3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING TURBOCHARGER WASTEGATE

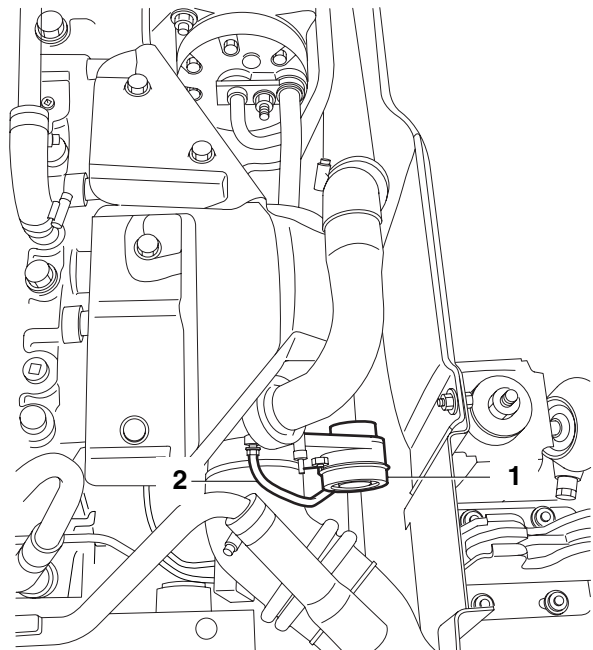
Note:

Depending on the fitting position of the turbocharger, it may be necessary to remove the turbocharger from the engine before this adjustment; see "Removal and installation".

Note:

The turbocharger is calibrated in the factory and must not be re-adjusted. The length of the control rod on the wastegate valve lever may only be changed when assembling a new turbocharger. After that, only an inspection of the actuating pressure of the wastegate may be carried out. If the result is negative, the turbocharger must be replaced.

1. Remove the flexible pipe (2) from the diaphragm box (1) of the wastegate.
2. Connect an air-pressure reducer valve to the diaphragm box of the wastegate. Set the reducer valve to max. 0.2 bar gauge pressure. Connect the reducer valve to a compressed air installation.
3. Set the reducer valve to exactly the same test pressure as listed in "Technical data".
4. Check the diaphragm in the diaphragm box for leaks by listening carefully for a hissing sound from the diaphragm box.
5. Check whether the control rod of the wastegate has moved. If it has not moved, the control rod must be loosened from the lever. Check again whether the control rod has moved. If it has not moved, the diaphragm box must be replaced. If it has moved, the wastegate valve must be made to move freely or, if that does not help sufficiently, the entire compressor unit must be replaced.
6. Remove the flexible pipe with the reducer valve and re-connect the flexible pipe of the compressor pump to the wastegate diaphragm box.



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Inspection and adjustment

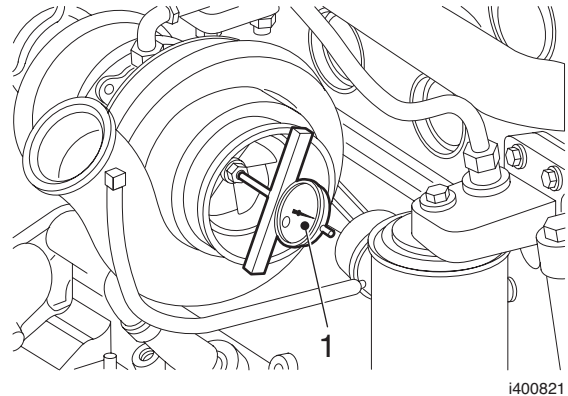
LF45/55 series

3.2 INSPECTING TURBOCHARGER AXIAL BEARING PLAY

Note:

The turbocharger axial bearing play should only be checked when the engine is cold.

1. Remove the exhaust pipe from the turbocharger.
2. Remove the charge pipes from the turbocharger.
3. Fit a dial gauge (1) to the charge supply flange of the turbocharger.
4. Push the compressor shaft away from the dial gauge and set the gauge to zero.
5. Push the compressor shaft to the dial gauge and read off the axial play. Compare the reading with the specified value; see "Technical data". Replace the turbocharger if necessary.
6. Fit the charge pipes to the turbocharger.
7. Fit the exhaust pipe to the turbocharger.



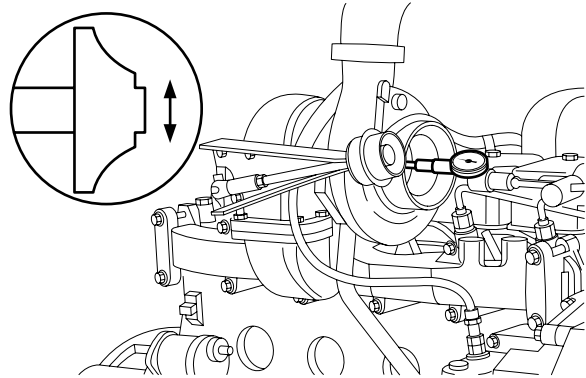
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3.3 INSPECTING TURBOCHARGER RADIAL BEARING PLAY

Note:

The turbocharger radial bearing play should only be checked when the engine is cold.

1. Remove the turbocharger from the exhaust manifold. See "Removal and installation".
2. Fit a pressure gauge to the turbocharger housing and measure the radial play. Compare the reading with the specified value; see "Technical data". Replace the turbocharger if necessary.
3. Fit the turbocharger. See "Removal and installation".



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3.4 CHECKING EXHAUST GAS BACK PRESSURE

Checking exhaust gas back pressure

1. Remove the plug from the exhaust elbow attachment or bore a hole and install a suitable coupling with a pipe. The first part of the pipe must be made of metal, to withstand the high temperatures.

Note:

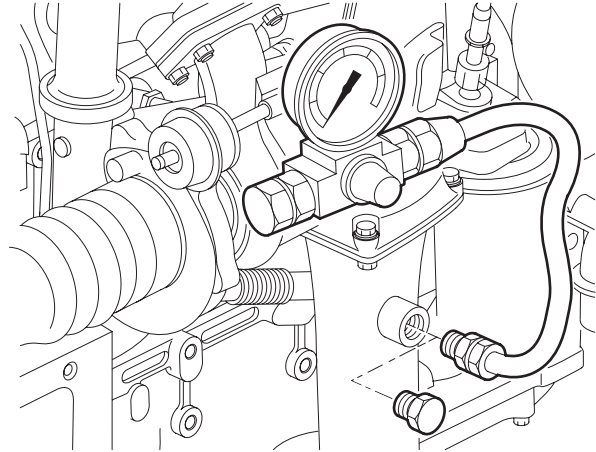
Use an attenuated gauge to prevent excessive shaking of the gauge needle.

2. Connect a pressure gauge to the pipe, with a range of at least 0.1 - 0.2 bar (10 - 20 kPa).

Note:

The engine brake must not be used during measurements. This is to protect the pressure gauge.

3. Measure the exhaust gas back pressure at full-load engine speed and compare the measurements to the specified value. See "Technical data". Check the exhaust system if the exhaust gas back pressure is too high.
4. Remove the pressure gauge and the coupling and fit the plug.



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3.5 INSPECTION AND PRESSURE-TESTING, AIR INLET SYSTEM



When pressure-testing the air inlet system, the plugs may spring off if they are not properly secured. It is therefore important to check the attachment of the plugs before pressure-testing and keep people away from the area.

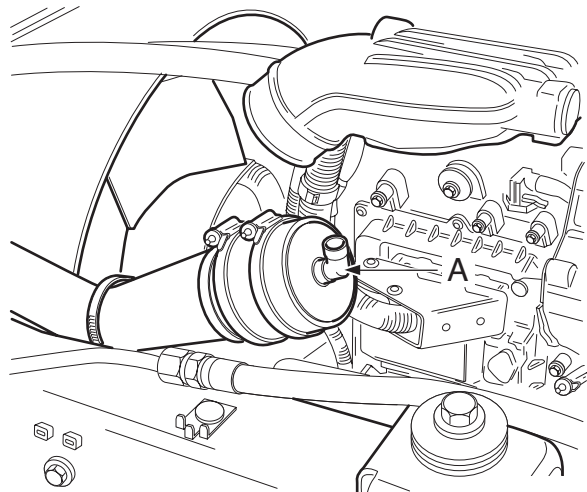
1. Check the condition and mounting of the air inlet channels/pipes of the air intake system.

Note:

In case of doubt as to the proper sealing of the air inlet system, which is indicated by the following:

- loss of power
- high fuel consumption
- unusual noises
- lit engine fault symbol on the instrument panel, ???carry out a pressure test to check the air inlet system for leakage.

2. Remove the right-hand and rear engine encapsulations.
3. Loosen the inlet hose between the air cooler and the inlet manifold at the inlet manifold side.
4. Fit the special tool (DAF no. 1453171) in the hose.



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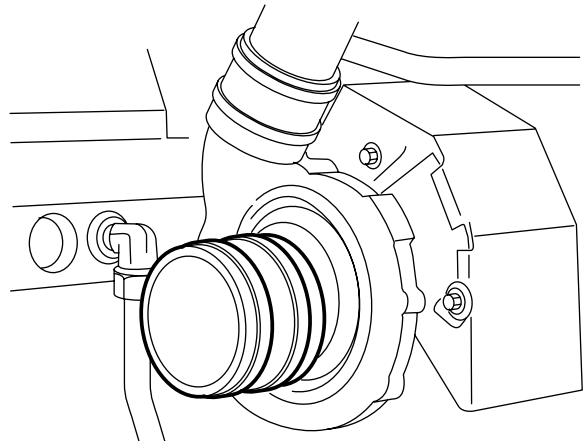
BE ENGINE INLET/EXHAUST SYSTEM

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Inspection and adjustment

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5. Loosen the plastic pipe between the air filter housing and the rubber suction hose on the turbocharger.
6. Install special tool (DAF no. 1453172) in the rubber intake port on the turbocharger.
7. Connect an air pipe with reducer valve to the sealing cap (A) and charge the system to approx. 1 bar.
8. Use a soapy solution to check the whole inlet system for air leaks. Also check whether the pressure gauge of the reducer valve drops.
9. Fit the loosened hoses of the inlet system and the engine encapsulation.



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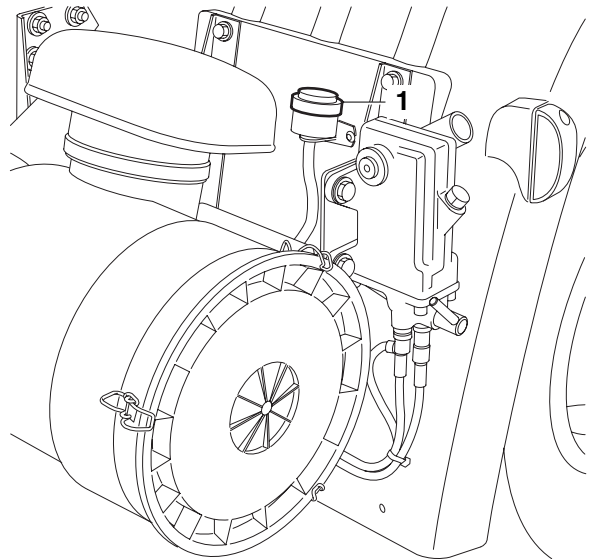
BE ENGINE INLET/EXHAUST SYSTEM

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Inspection and adjustment

3.6 CHECKING INLET UNDERPRESSURE

1. Remove the connection of the air intake pipe underpressure indicator (1) from between the air filter housing and turbocharger.
2. Connect a pressure gauge with a maximum rating of -100 mbar (-10 kPa) to the connection of the underpressure indicator.
3. Measure the inlet underpressure at full-load engine speed and compare the measurement to the specified value. See "Technical data".
4. Fit the connection of the air intake pipe underpressure indicator (1) between the air filter housing and turbocharger.



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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, TURBOCHARGER



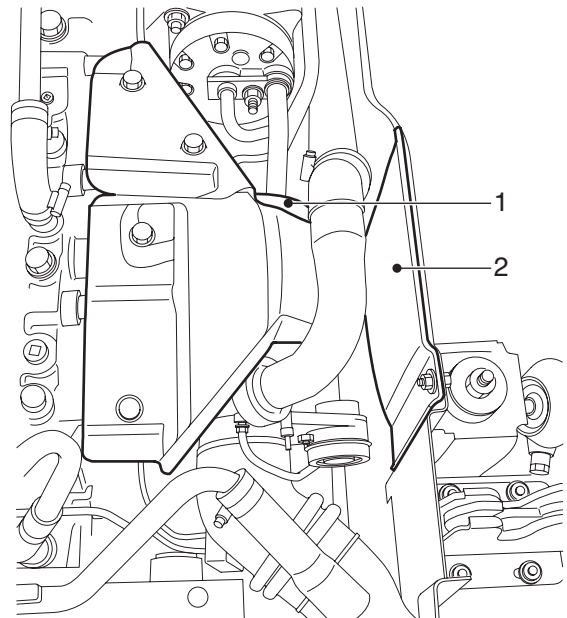
If the turbocharger to be replaced has been damaged to such an extent that parts of it are missing or lubricating oil has entered the inlet system, the inlet and exhaust systems must be checked and cleaned thoroughly in order to prevent serious damage to the engine.

Removing the turbocharger

1. Remove the right-hand engine encapsulation (2).
2. Remove the heat shield (1) from the oil filter.
3. Remove each charge pipe and the turbocharger exhaust pipe.
4. Remove the oil discharge pipe from the turbocharger.
5. Detach the entire oil supply pipe from the oil filter housing to the turbocharger.
6. Remove the attachment bolts from the turbocharger.
7. Remove the turbocharger.
8. Immediately plug the openings.

Installing the turbocharger

1. Clean the turbocharger and the oil supply and discharge pipes.
2. Before installing the turbocharger, check the following:
 - the turbocharger housing and connector flange for cracks. See "Technical data" for rejection standards;
 - the turbocharger shaft must be able to rotate freely;
 - the turbocharger shaft must not run out of true;
 - the turbocharger pump and turbine wheels must not be damaged;
 - there must not be an excessive amount of oil in the compressor side of the turbocharger. A small amount of oil on the inside walls of the compressor side is allowed.



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Removal and installation

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3. Check the adjustment of the turbocharger wastegate. See "Inspection and adjustment".
4. Check the axial bearing play of the turbocharger; see "Inspection and adjustment".
5. Check the radial bearing play of the turbocharger; see "Inspection and adjustment".
6. Clean the sealing surfaces.

Note:

Always use new gaskets when installing the turbocharger.

7. Apply a layer of Copaslip to the exhaust manifold studs.
8. Fit the turbocharger to the exhaust manifold.
9. Fit the attachment nuts and tighten them to the specified torque. See "Technical data".
10. Check that the oil supply and discharge pipes are clean and not blocked, kinked or cracked. Replace the pipes if necessary.

Note:

If the turbocharger oil supply and/or discharge does not function properly, this may result in serious damage to the turbocharger and/or engine.

11. Fit new O-rings to the oil discharge pipe and apply a thin layer of engine oil to them. Fit the oil discharge pipe. For the specified tightening torque, see "Technical data".
12. Pour clean engine oil into the oil supply of the turbocharger and fit the oil supply pipe, after fitting a new copper ring, on the oil filter housing and the turbocharger. Tighten the pipe to the specified tightening torque; see "Technical data".

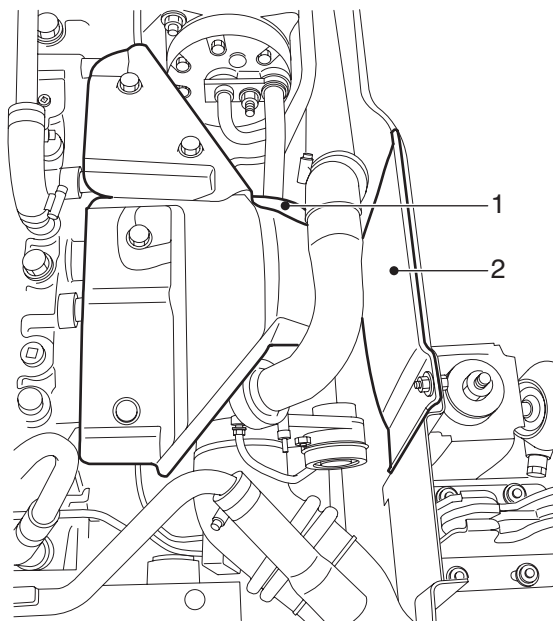
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Removal and installation

13. Fit the exhaust pipe to the turbocharger.
14. Fit the charge pipes to the exhaust pipe.
15. Fit the heat shield (1) to the oil filter.
16. Install the engine encapsulation (2).



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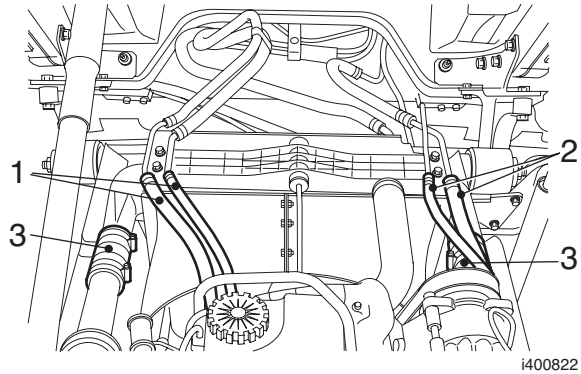
Removal and installation

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4.2 REMOVAL AND INSTALLATION OF AIR COOLER

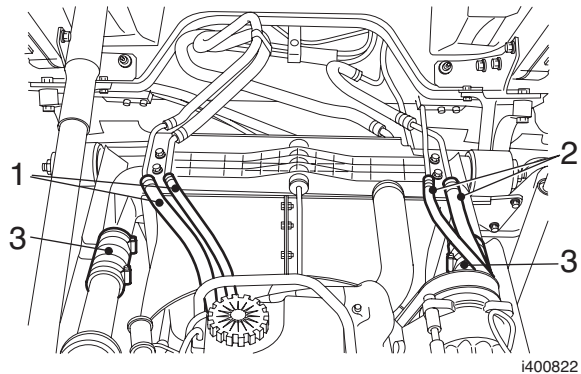
Removing the air cooler

1. Disconnect the earth lead from the battery terminal.
2. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (2) on the radiator and remove the condenser from the air cooler supports.
3. Loosen the support of the coolant pipes (1) on the radiator.
4. Remove the charge pipes (3) from the air cooler and plug the openings.
5. Disconnect the air cooler.
6. Remove the air cooler.



Installing the air cooler

1. Clean the outside of the air cooler with compressed air.
2. Install the air cooler and tighten the air cooler attachments.
3. Fit the charge pipes (3) to the air cooler.
4. Fit the bracket of the coolant pipes (1) on the radiator.
5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (2) on the radiator.
6. Connect the battery terminals.
7. Start the engine and check for leakage.



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Removal and installation

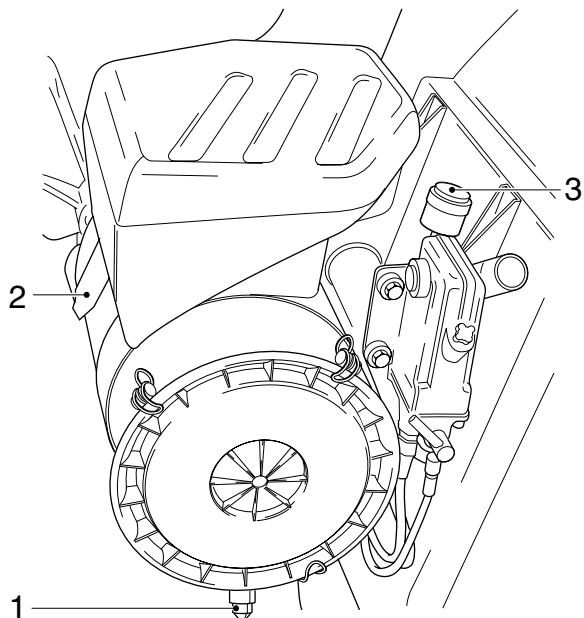
4.3 REMOVAL AND INSTALLATION, AIR FILTER ELEMENT

Removing the air filter element

1. Loosen all clamping brackets on the air filter cover.
2. Remove the air filter cover.
3. Remove the air filter element.
4. Clean the inside of the air filter housing and the air filter cover.
5. Clean the rubber sealing valves (1 and 2) on the filter housing. Check the sealing valve for damage.

Installing the air filter element

1. Fit the air filter element in the air filter housing.
2. Fit the air filter cover.
3. Install all the clamping brackets.
4. Reset the air filter indicator (3) by pressing the knob on the indicator.



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Removal and installation

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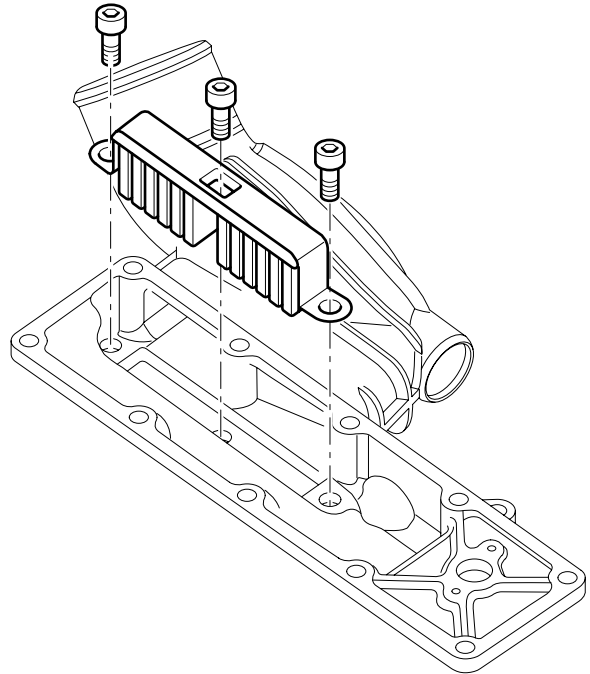
4.4 REMOVAL AND INSTALLATION, GLOW PLUG

Removing the glow plug

1. Remove the inlet manifold.
2. Remove the attachment bolts from the glow plug and remove the glow plug.

Installing the glow plug

1. Fit the glow plug and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the inlet manifold.



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5. CLEANING

5.1 CLEANING THE EXTERIOR OF RADIATOR AND AIR COOLER



Inhalation of dust may have serious consequences for your health. Take the necessary precautions, such as wearing goggles and a facemask.

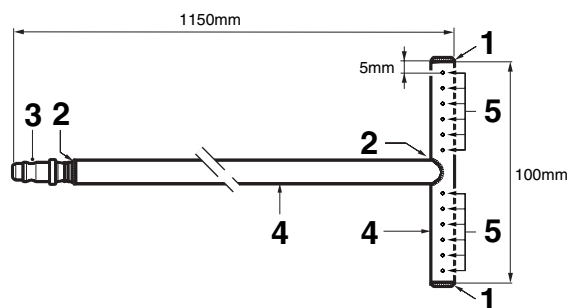
Note:

With the aid of a simple tool, the radiator and the air cooler can be blow-cleaned.

The tool (radiator cleaner) cannot be ordered from DAF. It should be manufactured by yourself according to the drawing.

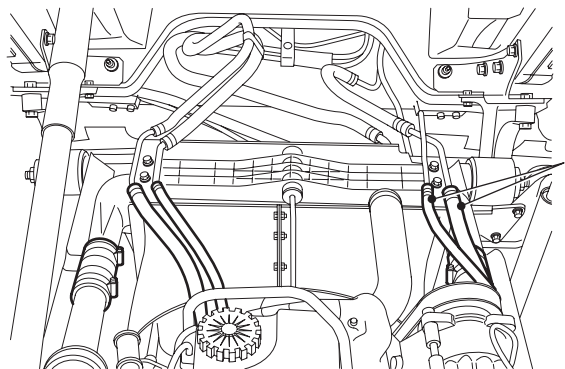
Key to drawing:

- 1 Solder up
- 2 Solder
- 3 Quick-release coupling for air hose
- 4 Steel pipe, $\varnothing$ 10 mm
- 5 6 x $\varnothing$ 1.5 mm between holes, with a centre-to-centre distance between the holes of 7 mm, drilled on one side



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1. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (1) on the radiator and remove the condenser from the air cooler supports. Push the condenser as far as possible forwards.



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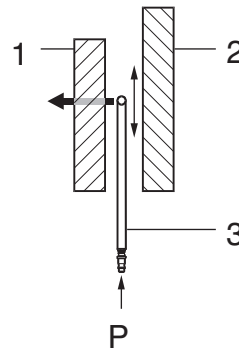
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Cleaning

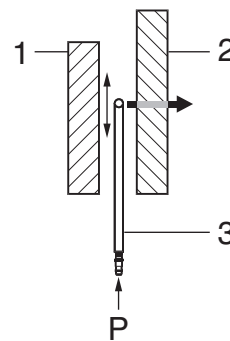
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2. Insert the radiator cleaner (3) between the air cooler (1) and radiator (2) from underneath, with the air holes facing the air cooler (1).
3. Apply air pressure to the radiator cleaner (3) and continue blow-cleaning the air cooler (1) until no more dirt comes out.



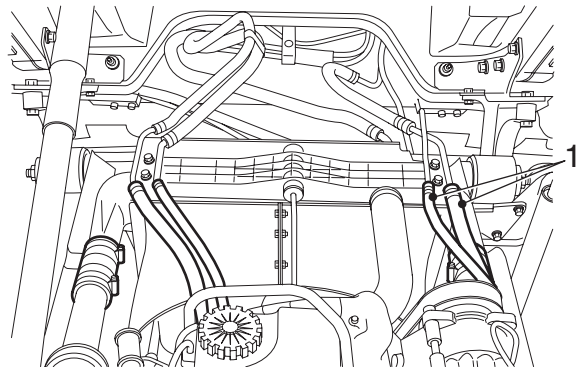
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4. Turn the radiator cleaner (3) over, turning the holes towards the radiator (2), and blow-clean the radiator (2).



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5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (1) on the radiator.



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ENGINE BRAKE, BE ENGINE

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

ENGINE BRAKE, BE ENGINE

4

Safety instructions

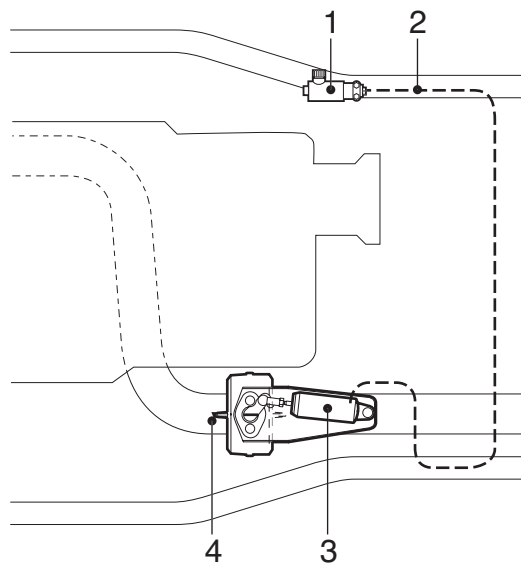
LF45/55 series

4

2. GENERAL

2.1 LOCATION OF EXHAUST BRAKE COMPONENTS

1. Exhaust brake valve
2. Air pipe
3. Operating cylinder, exhaust brake
4. Butterfly valve



ENGINE BRAKE, BE ENGINE

4

General

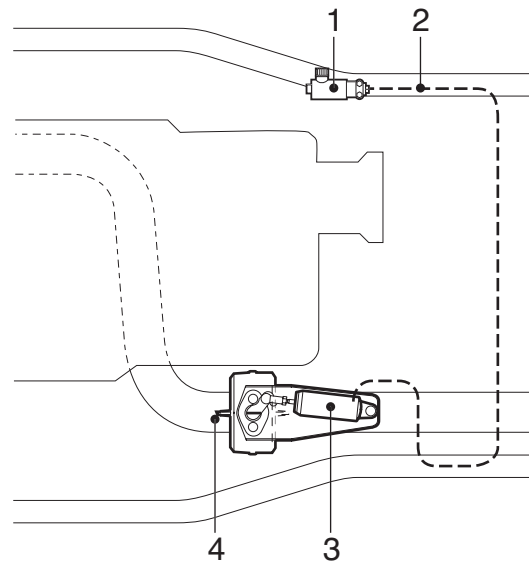
LF45/55 series

2.2 SYSTEM DESCRIPTION, EXHAUST BRAKE

1. Exhaust brake valve
2. Air pipe
3. Butterfly valve operating cylinder
4. Butterfly valve

Note:

The engine brake is an exhaust brake.



i400858

Switching on the exhaust brake

The exhaust brake consists of an engine brake operating switch fitted to the steering column and an operating cylinder (3) connected to the butterfly valve (4) in the exhaust pipe.

If the exhaust brake operating switch is activated, a signal is passed to the engine management system's electronic unit. The operating switch has the positions "off" and "automatic". In the "automatic" position the engine management system's electronic unit engages the exhaust brake whenever this is appropriate and possible. Of course, the electronic unit disengages the exhaust brake when required.

If the exhaust brake is engaged by the electronic unit, the unit energises the exhaust brake valve (1), causing supply pressure to flow to the operating cylinder. The cylinder closes the butterfly valve in the butterfly valve housing. The exhaust pipe is then almost completely closed off. The engine management system's electronic unit also interrupts the fuel supply to the various cylinders. The engine now acts as a compressor, creating a braking action.

The higher the engine speed, the greater the braking action of the engine brake.

Switching off the exhaust brake

If the engine brake control switch is pushed back, the butterfly valve will be re-opened and the fuel supply to the various cylinders will be re-instated.

3. INSPECTION AND ADJUSTMENT

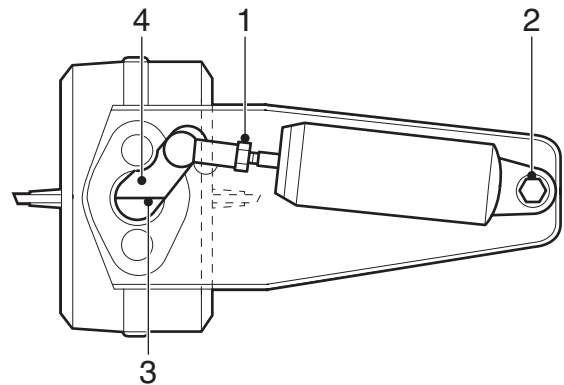
3.1 INSPECTION AND ADJUSTMENT, EXHAUST BRAKE

Checking exhaust brake

1. Check the exhaust brake for smooth operation by pressurising the exhaust brake cylinder yourself.

Setting the exhaust brake

1. Remove the air pipe from the operating cylinder.
2. Slacken lock nut (1) on the piston rod.
3. Remove the attachment nut (2) from the operating cylinder and take the operating cylinder off the support.
4. Open the butterfly valve fully (exhaust brake inactive), indicated by the mark (3) on the butterfly valve shaft, and press the lever (4) against the stop.
5. Set the piston rod length by rotating the operating cylinder in such a way that it can be fitted on the support.
6. Turn the piston rod one more full turn in the ball joint to give the operating cylinder the correct pre-tension.
7. Fit the operating cylinder on the support using the attachment nut (2) and fit the air pipe.
8. Tighten the lock nut (1).
9. Connect the air pipe to the operating cylinder.



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ENGINE BRAKE, BE ENGINE

4

Inspection and adjustment

LF45/55 series

4

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION OF EXHAUST BRAKE

Removing the exhaust brake

1. Loosen the air pipe of the operating cylinder.
2. Remove the exhaust pipe from the exhaust brake.
3. Remove the entire exhaust brake.

Installing exhaust brake

1. Check the butterfly valve for smooth operation.
2. Clean and check the sealing faces of the butterfly valve housing and of the exhaust pipes.
3. Clean the attachment bolts and apply heat-resistant grease to the threads.
4. Fit the exhaust brake.
5. Fit the exhaust pipe.
6. Connect the air pipe.
7. Check the operation of the exhaust brake.

ENGINE BRAKE, BE ENGINE

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Removal and installation

LF45/55 series

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CE ENGINE FUEL SYSTEM

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Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

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So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

CE ENGINE FUEL SYSTEM

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Safety instructions

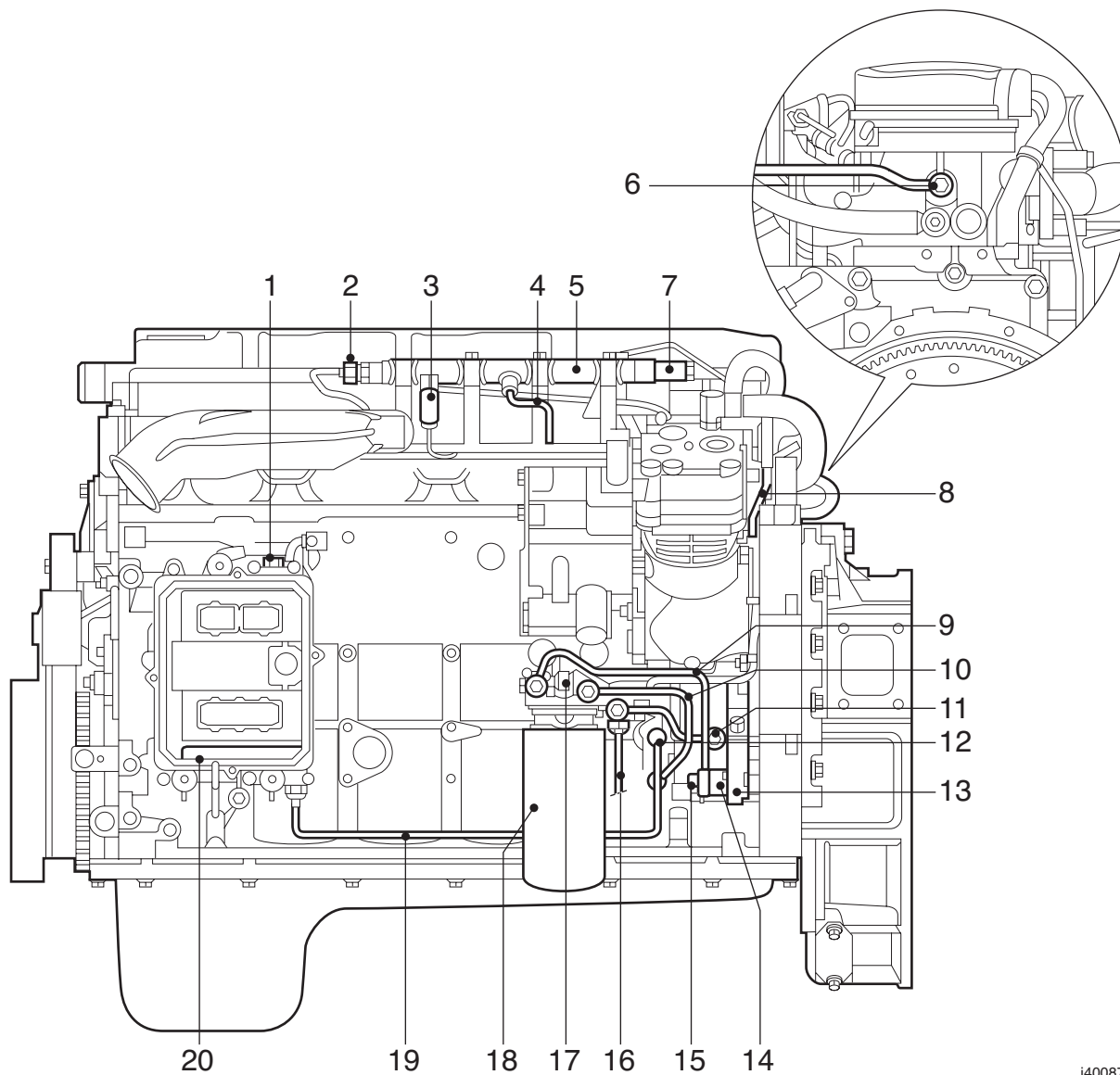
LF45/55 series

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2. GENERAL

2.1 LOCATION OF COMPONENTS

Location of components, production date
< 2003-21 (chassis number < 0L248550)



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CE ENGINE FUEL SYSTEM

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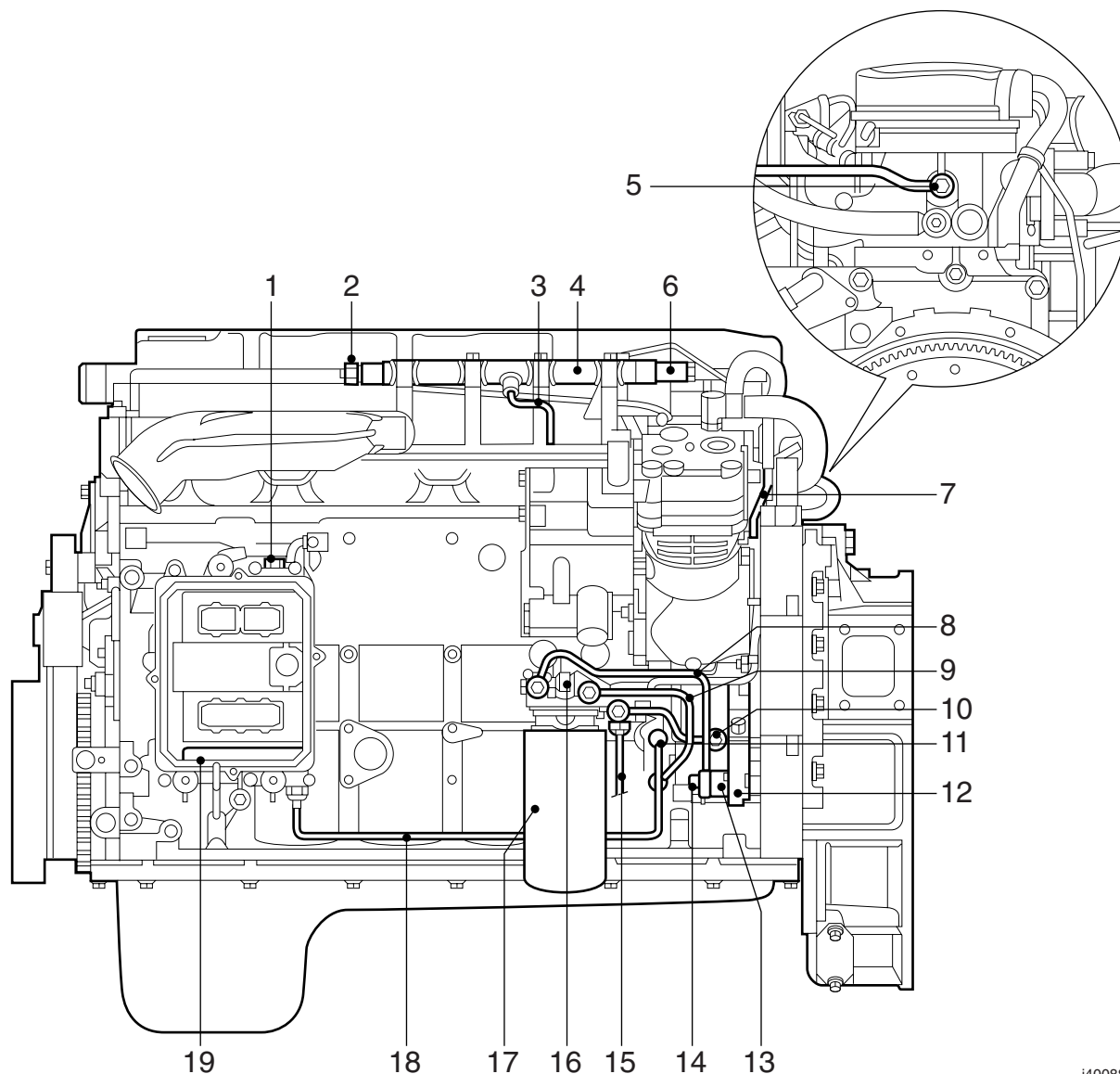
General

LF45/55 series

1. Suction pipe to electronic unit cooling plate
2. Injector pipe
3. Fuel rail pressure sensor
4. Fuel pipe to fuel rail
5. Fuel rail
6. Fuel return overflow valve
7. Fuel rail pressure-limiting valve
8. Return pipe from fuel return overflow valve
9. Fuel pipe to high-pressure pump
10. Fuel pipe to fuel fine filter
11. High-pressure pump leak-off pipe
12. Fuel pipe to fuel lift pump
13. High-pressure pump
14. Fuel pump control solenoid valve
15. Fuel pipe to high-pressure pump
16. Return pipe to fuel tank
17. Fuel temperature sensor
18. Fuel fine filter
19. Fuel pipe from electronic unit cooling plate
20. ECS-DC3 electronic unit

5

Location of components, production date
≥ 2003-21 (chassis number ≥ 0L248550) and
production date < 2003-49 (chassis number
< 0L253643)



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CE ENGINE FUEL SYSTEM

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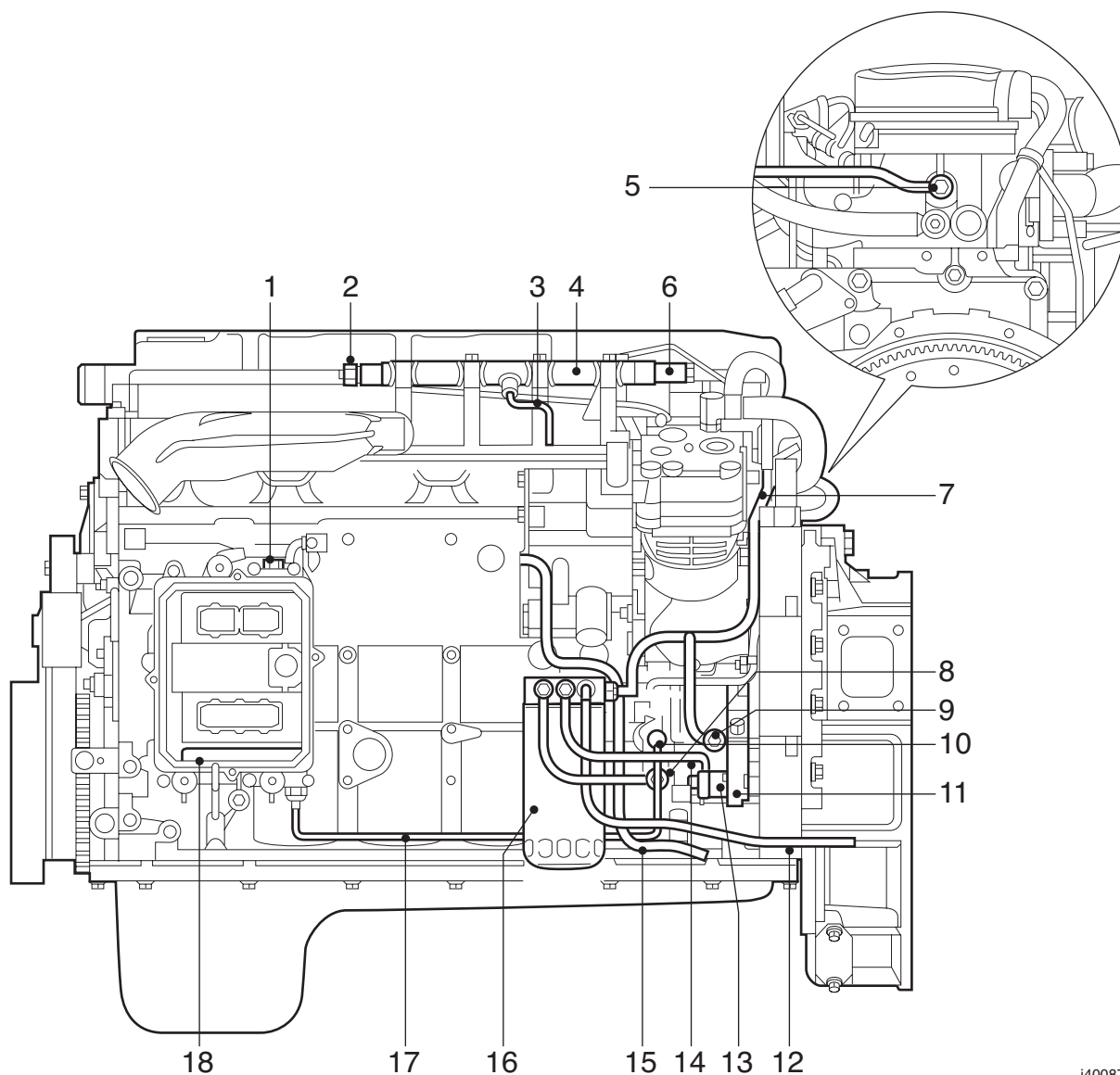
General

LF45/55 series

1. Suction pipe to electronic unit cooling plate
2. Fuel rail pressure sensor
3. Fuel pipe to fuel rail
4. Fuel rail
5. Fuel return overflow valve
6. Fuel rail pressure-limiting valve
7. Return pipe from fuel return overflow valve
8. Fuel pipe to high-pressure pump
9. Fuel pipe to fuel fine filter
10. High-pressure pump leak-off pipe
11. Fuel pipe to fuel lift pump
12. High-pressure pump
13. Fuel pump control solenoid valve
14. Fuel pipe to high-pressure pump
15. Return pipe to fuel tank
16. Fuel temperature sensor
17. Fuel fine filter
18. Fuel pipe from electronic unit cooling plate
19. ECS-DC3 electronic unit

5

Location of components, production date
≥ 2003-49 (chassis number ≥ 0L253643)



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CE ENGINE FUEL SYSTEM

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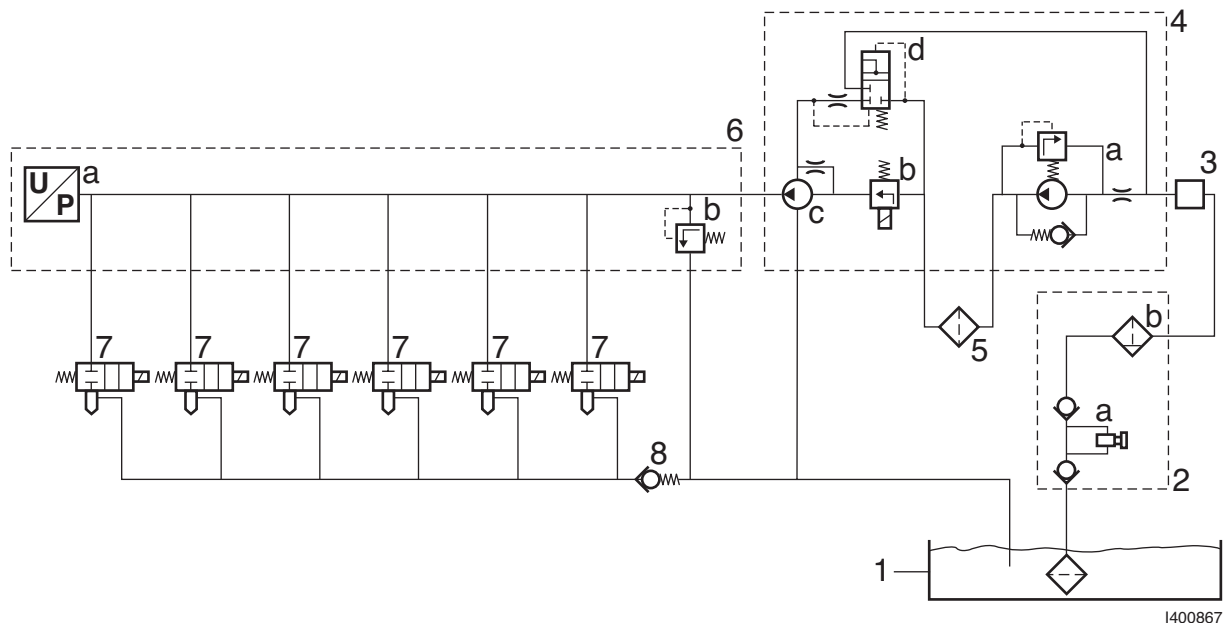
General

LF45/55 series

1. Suction pipe to electronic unit cooling plate
2. Fuel rail pressure sensor
3. Fuel pipe to fuel rail
4. Fuel rail
5. Fuel return overflow valve
6. Fuel rail pressure-limiting valve
7. Return pipe from fuel return overflow valve
8. Fuel pipe to fuel fine filter
9. High-pressure pump leak-off pipe
10. Fuel pipe to fuel lift pump
11. High-pressure pump
12. Return pipe to fuel tank
13. Fuel pump control solenoid valve
14. Fuel pipe to high-pressure pump
15. Fuel supply pipe
16. Fuel fine filter
17. Fuel pipe from electronic unit cooling plate
18. ECS-DC3 electronic unit

5

2.2 SYSTEM DESCRIPTION, ECS-DC3 FUEL SYSTEM



The fuel lift pump (4a) draws the fuel from the fuel tank (1) through the cooling plate of the electronic unit (3).

The purpose of the cooling plate (3) is to ensure that the electronic unit does not become too hot. The fuel lift pump (4a) is fitted against the high-pressure pump (4c) and is driven by the camshaft gear.

From the fuel lift pump, fuel is forced towards the fuel fine filter (5).

After the filter, the fuel enters the high-pressure pump (4c) via the fuel pump control solenoid valve (4b), which controls the amount of fuel going to the high-pressure pump. Fuel not taken in by the high-pressure pump returns via the bypass valve (4d) to the fuel lift pump supply pipe and part of it is used for lubricating the high-pressure pump.

The high-pressure pump forces the fuel under high pressure to the fuel rail (6). The fuel rail distributes the fuel among the injectors (7). The fuel rail (6) also functions as an accumulator to ensure that large fluctuations in pressure, resulting from injector openings and pump pressure pulses, are prevented as much as possible.

The pressure in the fuel rail is registered by the rail pressure sensor (6a). The electronic unit uses this data to control the high-pressure pump (via the fuel pump control solenoid valve), so that the rail pressure can be kept at the desired level. The desired pressure is not constant, but depends on the operating conditions.

CE ENGINE FUEL SYSTEM

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General

LF45/55 series

A pressure relief valve (6b) is fitted at the end of the fuel rail. If the pressure in the fuel rail rises too high (in emergencies only), this valve ensures that the excess fuel flows back to the return pipe. The return pipe is connected with the return pipe to the fuel tank (1).

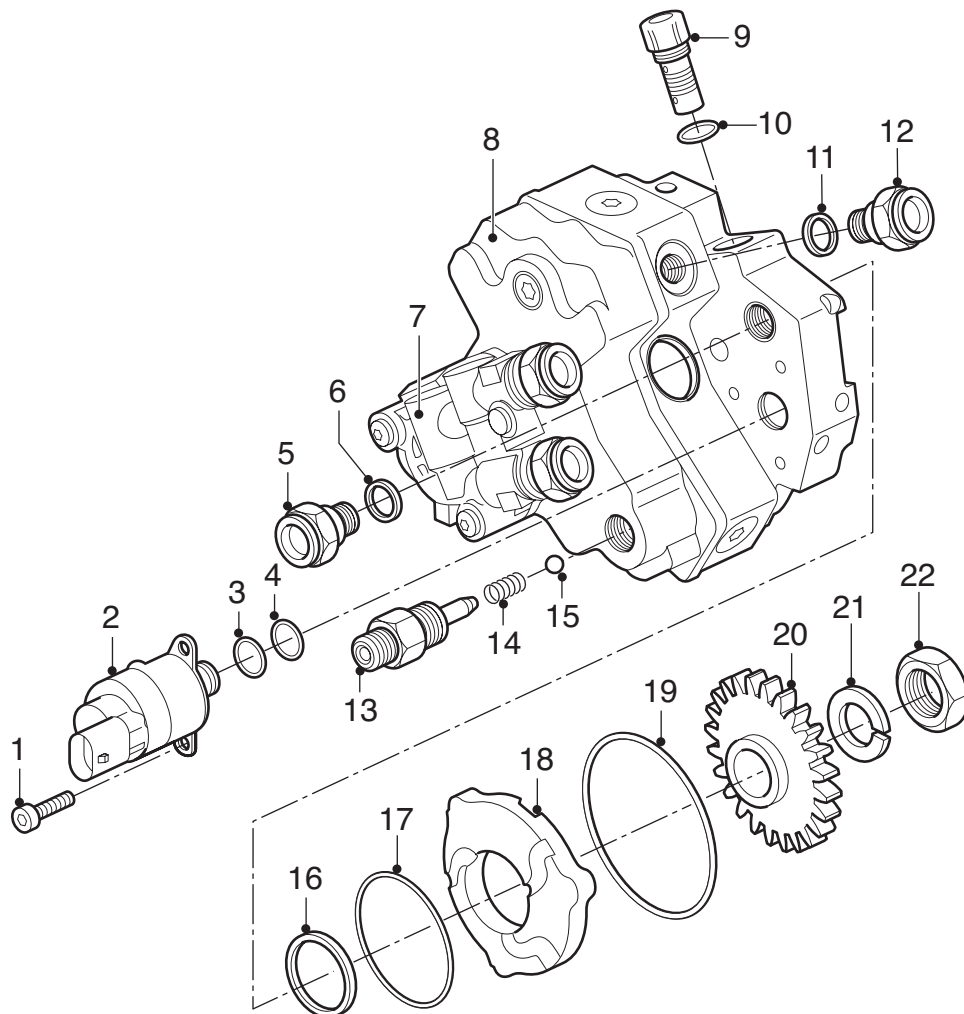
The electronic unit uses the present rail pressure to calculate the time during which the injector needs to be opened in order to obtain the desired injection quantity.

A pressure relief valve (8) connects the injector leak-off ducts in the cylinder head with the return pipe to the fuel tank (1). This pressure relief valve prevents the fuel from flowing out of the injectors when the engine has stopped running.

If the system has been "open", the fuel system can be bled using the primer pump (2a), which is integrated in the water separator/coarse filter (2b).

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2.3 OVERVIEW DRAWING, FUEL PUMP



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1. Attachment bolt
2. Fuel pump control solenoid valve
3. O-ring
4. O-ring
5. Fuel pipe connection
6. Copper ring
7. Lift pump
8. High-pressure pump
9. Circulation valve
10. O-ring
11. Copper ring
12. Fuel pipe connection
13. High-pressure pipe connection
14. Spring
15. Ball
16. Oil seal
17. O-ring
18. Adapter ring
19. O-ring
20. Gear wheel
21. Sealing ring
22. Nut

CE ENGINE FUEL SYSTEM

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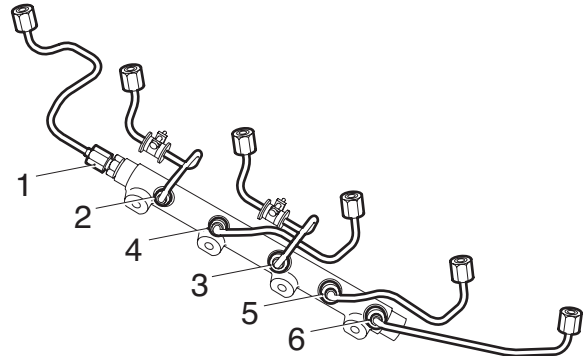
General

LF45/55 series

2.4 OVERVIEW DRAWING, FUEL RAIL

Overview drawing, fuel rail, production date < 2003-21 (chassis number < 0L248550)

The figure shows the connections to the injector pipes. The numbers indicate the cylinder number of the connection.

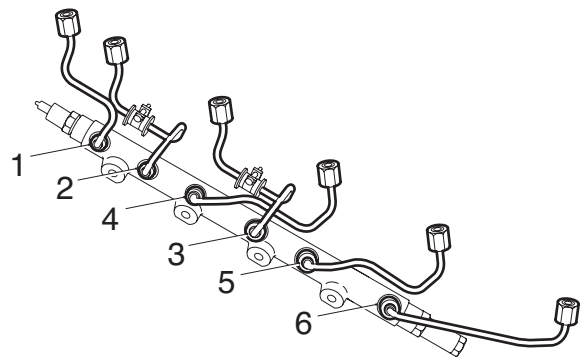


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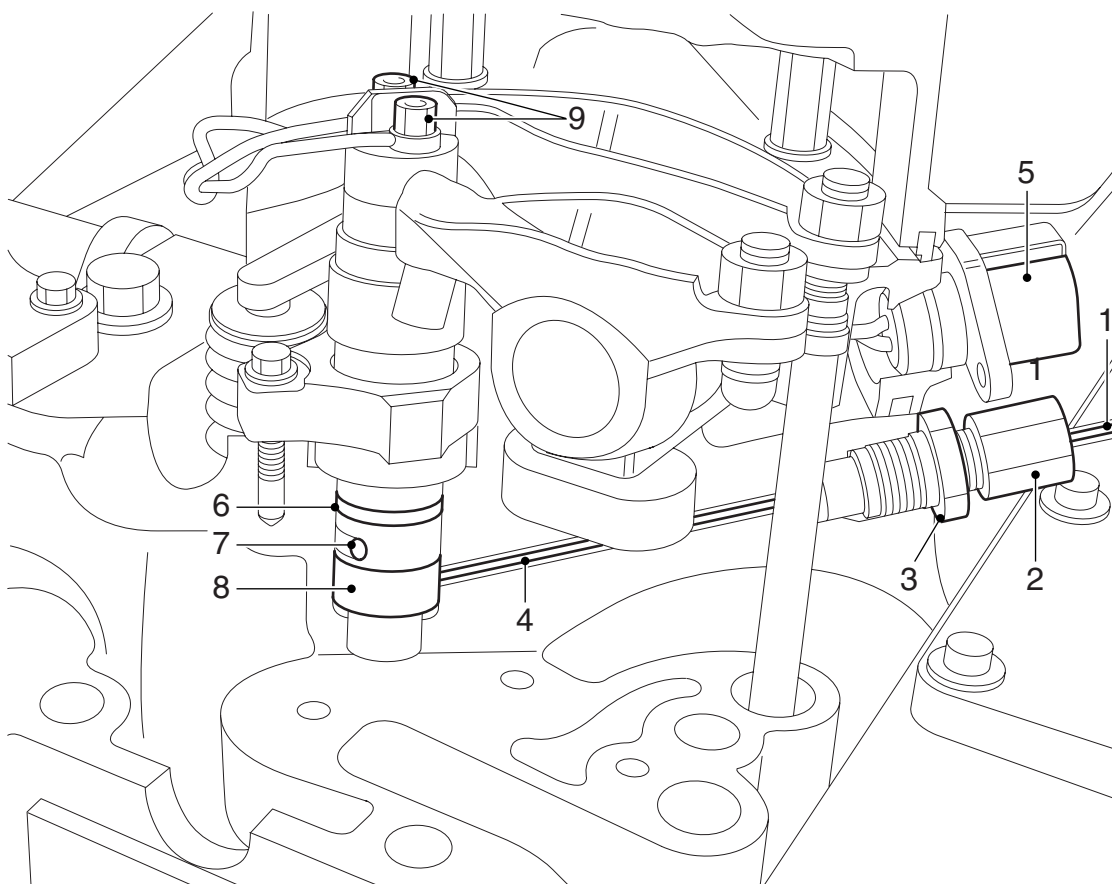
Overview drawing, fuel rail, production date ≥ 2003-21 (chassis number ≥ 0L248550)

The figure shows the connections to the injector pipes. The numbers indicate the cylinder number of the connection.



i400874

2.5 OVERVIEW DRAWING, FUEL SYSTEM, CYLINDER HEAD



i400653

1. Injector pipe
2. Union
3. Nut
4. Fuel supply pipe
5. Connector to injectors
6. O-ring
7. Return opening
8. Injector
9. Electrical connection

CE ENGINE FUEL SYSTEM

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General

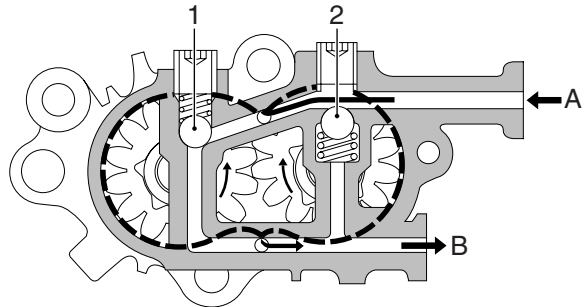
LF45/55 series

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3. DESCRIPTION OF COMPONENTS

3.1 HIGH-PRESSURE PUMP

The high-pressure pump is driven by the crankshaft by means of the camshaft gear. The pump shaft rotates at a speed 1.33 times the speed of the crankshaft. The pump shaft drives the fuel lift pump. The fuel drawn from the suction side by the gears is discharged through the exit by the gears due to the reduction in volume. The fuel lift pump has two added valves. The first valve (1) limits the pump pressure, for example if the fine filter is blocked. The second valve (2) opens the by-pass over the fuel lift pump when the primer pump is being used.

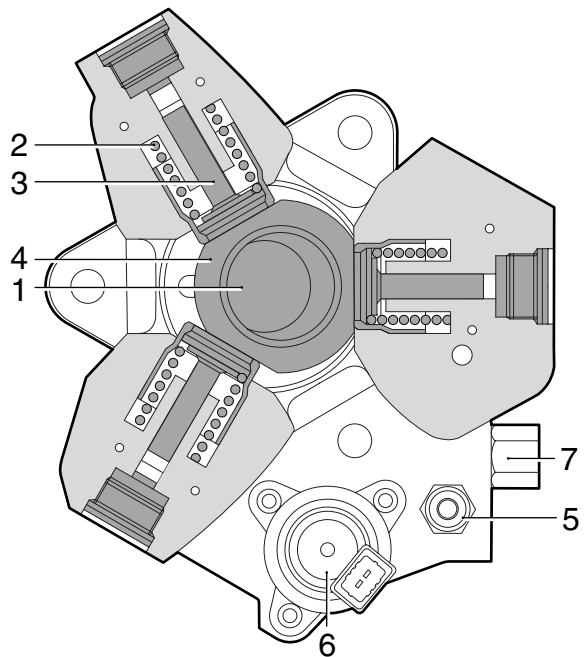


i400595

The high-pressure pump shaft (1) has an eccentric. The eccentric drives the eccentric ring (4). The pump plungers (3) are driven by the eccentric ring and pushed back by the spring (2).

The fuel is supplied via the connection (5) and then internally distributed among the three pump elements. Before it is distributed among the pump elements, the supplied fuel is dosed by means of the fuel pump control solenoid valve (6).

The fuel pump control solenoid valve is controlled by the electronic unit on the basis of the rail pressure sensor signal. This creates a closed control circuit. The fuel pump control solenoid valve is "normally open" and is activated via duty cycle control. The value when the engine is started is fixed. When the measured pressure deviates from the desired (programmed) pressure, the duty cycle value will be adapted until the measured and the desired values correspond. If this is impossible, the electronic unit will generate a warning and record a fault code.



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CE ENGINE FUEL SYSTEM

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Description of components

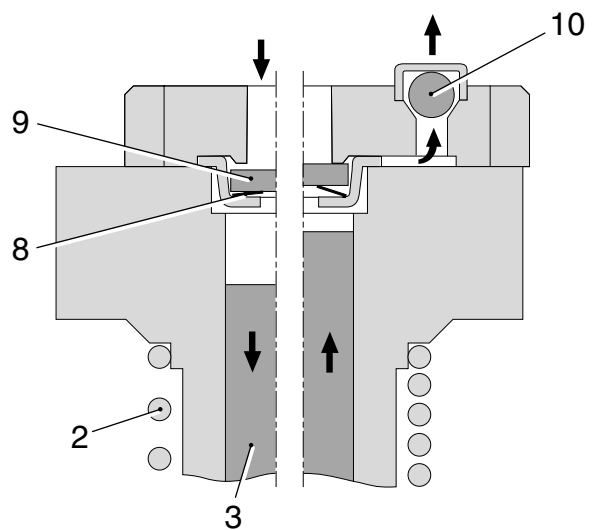
LF45/55 series

During the downward stroke, the fuel is supplied by the fuel lift pump via the suction valve (9) (see illustration on left). During the delivery stroke (illustration on right), the suction valve closes under the load of the spring (8) and the fuel pressure that has built up. The fuel leaves the pump element via the delivery valve (10). The compressed fuel from the three pump elements is collected in the pump housing and leaves the pump via a joint high-pressure connection.

Leaking fuel from the pump elements is discharged via the return connection.

The fuel lift pump has over-capacity in relation to the high-pressure pump. If there is only limited fuel off-take on the rail, the fuel pump control solenoid valve will be virtually closed. The over-supplied fuel will cause an increase in pressure at the inlet of the fuel pump control solenoid valve. The pressure is limited by the circulation valve (7). If the valve is open, the excess supplied fuel will be returned to the suction side of the fuel lift pump. A small amount of fuel is diverted via a restriction to the shaft and the eccentric of the high-pressure pump for lubrication.

When bleeding with the primer pump, any air bubbles will be carried along by the fuel through the low-pressure circuit. Fuel is forced inwards at the connection (5). The fuel pump control solenoid valve is opened fully without being energised, so that the fuel can pass. The pump elements create a high resistance to the fuel, so that the fuel will escape via the lubricating restriction in the pump. In this way the fuel, along with any air bubbles, is discharged to the return pipe.



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3.2 FUEL PUMP CONTROL SOLENOID VALVE

The high-pressure pump has an over-capacity for normal operating conditions. This could lead to large quantities of fuel being forced at high pressure to the fuel rail and then directly being drained out to the return pipe via the pressure-limiting valve on the fuel rail. This produces too much unnecessary heat and loss of capacity because large amounts of fuel are flowing at high pressure.

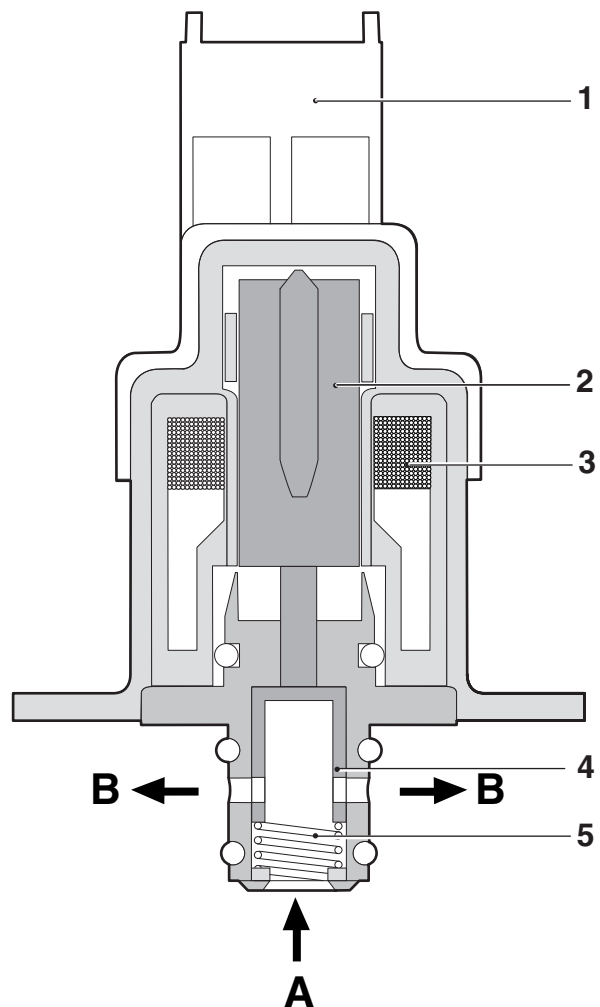
The system has been designed such that only fuel that will be used will be forced under high pressure to the rail. For this reason, a fuel pump control solenoid valve has been fitted at the suction side of the high-pressure pump. This solenoid valve is opened without being energised, so that the high-pressure pump elements can be filled in the normal manner.

If the fuel rail pressure becomes too high, for example because of lower fuel off-take on the rail, the solenoid valve will be energised by the electronic unit with a higher duty cycle, so that the plunger is pressed with a greater force against the spring pressure and the valve reveals a more constricted opening. This reduces the fuel supply to the pump elements and the pump output will thus fall. The fuel rail pressure will also fall as a consequence.

If the rail pressure is too low, the reverse is true.

The current is supplied to the coil (3) via the connector (1). The current pushes the core (2) with the plunger (4) against the pressure of the spring (5). This controls the fuel current from input A to output B.

Due to this valve, under normal circumstances very little fuel flows back from the rail. This improves performance and reduces the generation of heat.



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CE ENGINE FUEL SYSTEM

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Description of components

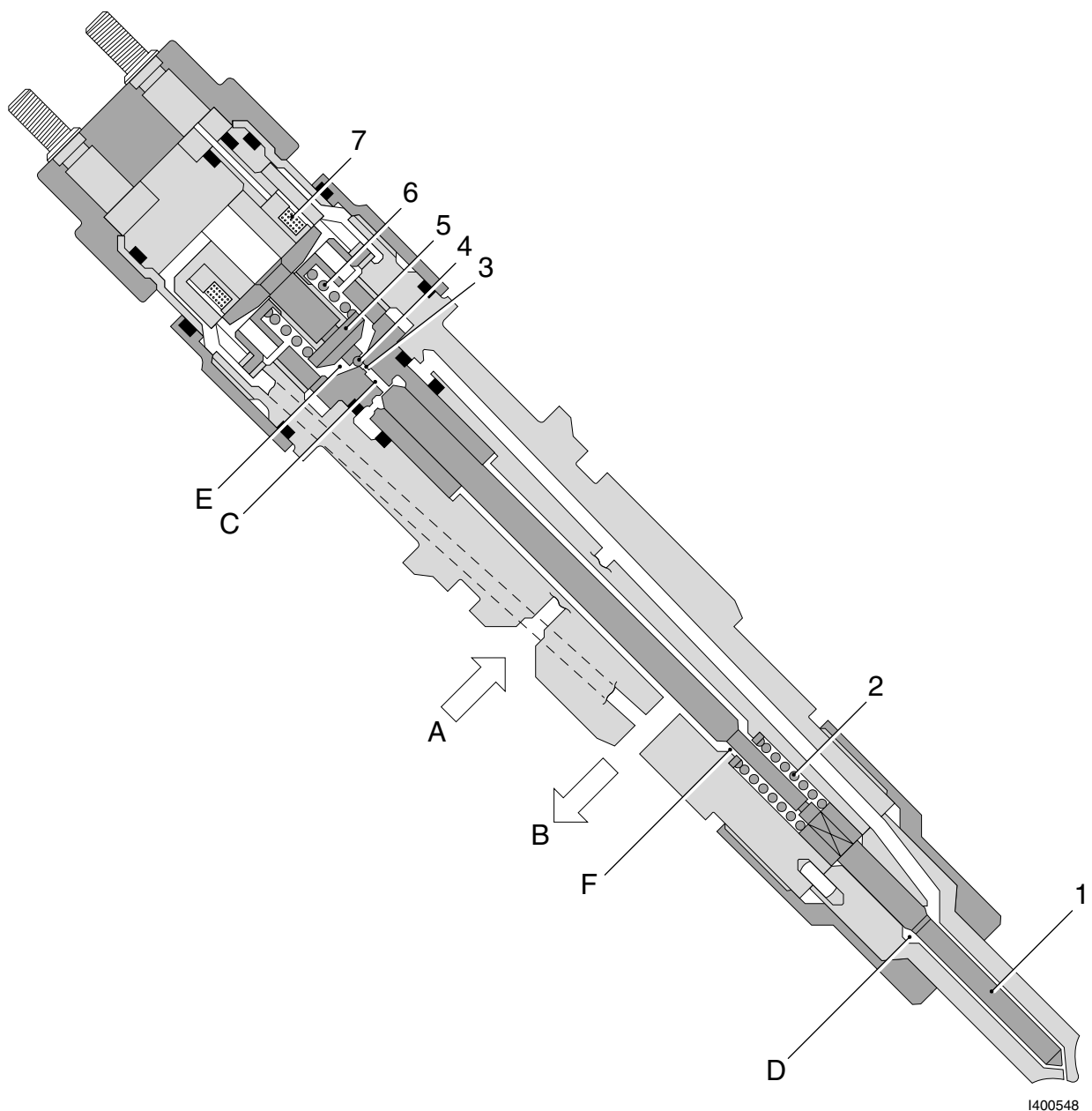
LF45/55 series

3.3 INJECTOR

The injectors can be opened and closed electrically. The injector is normally closed. The load of the spring (2) and the fuel rail pressure that controls chamber C ensure this.

The fuel is supplied from the fuel rail via A. The return fuel can flow back to the fuel tank via B.

When the coil (7) is energised, the armature housing (5) moves up. As a result the pressure in chamber C drops slightly and the injector needle (1) is forced up to chamber D by the rail pressure. The fuel can then be injected.

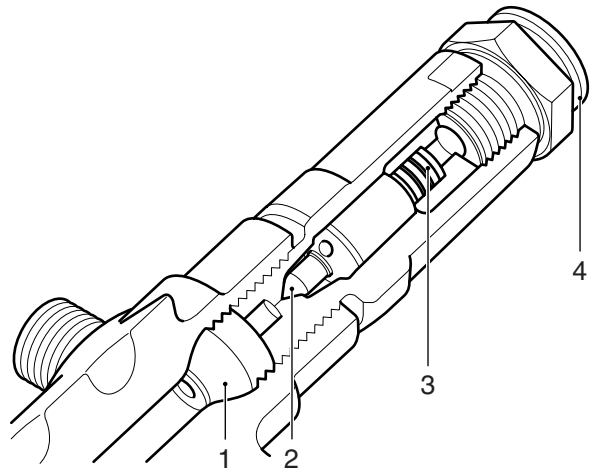
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3.4 FUEL RAIL PRESSURE-LIMITING VALVE

The fuel rail has a pressure-limiting valve so that the rail pressure is maintained at a safe value in emergency situations.

The fuel rail pressure control circuit is normally active. This consists of the fuel lift pump, fuel pump control solenoid valve, high-pressure pump, fuel rail, rail pressure sensor and electronic unit. If a fault occurs, the rail pressure can no longer be controlled. This can rise to the actuating pressure of the fuel rail pressure-limiting valve. This pressure is approx. 1650 bar. In the open position all surplus fuel flows without pressure to the fuel tank return connection.

The valve includes a sealing cone (1), a valve body (2), a spring (3) and a return connection with quick-release coupling (4).



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CE ENGINE FUEL SYSTEM

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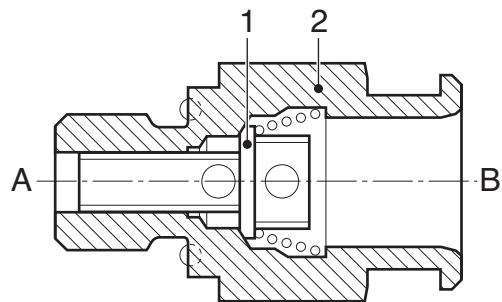
Description of components

LF45/55 series

3.5 FUEL RETURN OVERFLOW VALVE

The injectors are mounted in the cylinder head. The injectors do not have a separate return connection. In place of this there is a longitudinal bore in the cylinder head that meets the injector bores of all cylinders coinciding with the height of the return ports of the injectors. A pressure relief valve is mounted at the end of the bore to prevent vapour bubbles forming in it and to prevent it emptying after the engine is turned off. This valve maintains a residual pressure in relation to the return pressure of 1.2 to 2.0 bar.

The pressure relief valve consists of a spring-loaded plunger (1) and a housing (2) with quick-release inlet and outlet connections (A and B respectively).



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4. INSPECTION AND ADJUSTMENT

4.1 BLEEDING THE FUEL SYSTEM

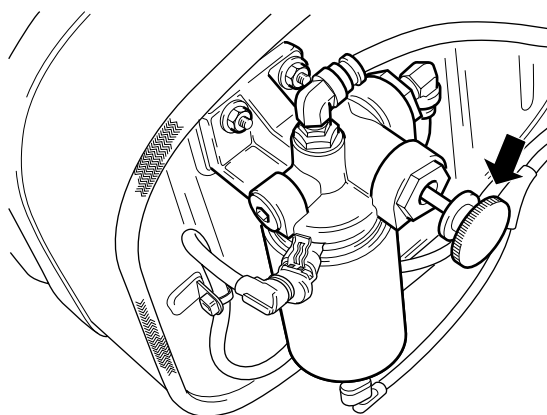


Stop pumping as soon as a greater resistance is felt. If you continue pumping, the fuel system may become internally damaged.

Note:

When the hand pump is used, the fuel system will be automatically bled. Air will be fed back to the tank through the return pipe.

1. Unscrew the button of the primer pump and pull it out.
2. Use the primer pump until a clearly higher resistance is perceptible.
3. Press the button and tighten it.



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CE ENGINE FUEL SYSTEM

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Inspection and adjustment

LF45/55 series

4.2 CHECKING FUEL LIFT PUMP PRESSURES



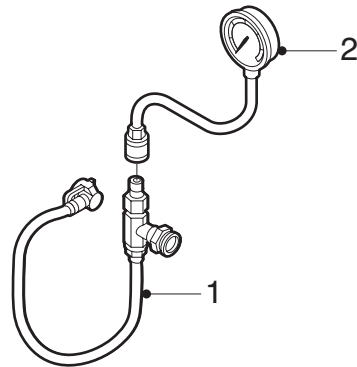
When inspecting the fuel pressure, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Checking underpressure on suction side of fuel lift pump

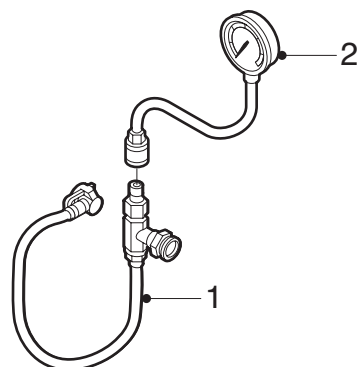
1. Disconnect the fuel pipe from the electronic unit cooling plate to the fuel lift pump on the suction side of the fuel lift pump; see "Removal and installation".
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the fuel lift pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Measure the underpressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
5. Remove the pressure gauge and the adapter and fit the fuel pipe.
6. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.



i400883

Checking fuel pressure in fuel lift pump in front of fuel fine filter

1. Disconnect the fuel pipe from the lift pump to the fuel fine filter on the delivery side of the lift pump; see "Removal and installation".
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the fuel lift pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Start the engine and measure the pressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
5. Remove the pressure gauge and the adapter and fit the fuel pipe.



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CE ENGINE FUEL SYSTEM

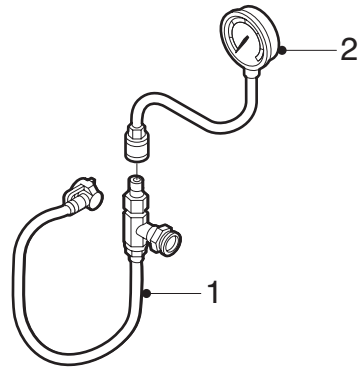
LF45/55 series

Inspection and adjustment

6. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.

Checking fuel pressure in fuel lift pump after fuel fine filter

1. Disconnect the fuel pipe from the fuel fine filter to the high-pressure pump on the side of the high-pressure pump; see "Removal and installation".
2. Fit the adapter (1), special tool (DAF no. 1329476), between the pipe which has been removed and the high-pressure pump and couple a pressure gauge (2) to this adapter.
3. Bleed the fuel system.
4. Disconnect the electrical connectors of the injectors from the valve sleeve.
5. Start the engine and measure the pressure when the engine is idling. Compare the readings with the specified values. See "Technical data".
6. Connect the electrical connectors of the injectors to the valve sleeve.
7. Remove the pressure gauge and the adapter and reconnect the fuel pipe.
8. Bleed the fuel system, start the engine and check the fuel system visually for leaks if no further measurements are to be carried out.



i400883

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Check pressure drop across fuel fine filter

1. Check the fuel pressure in front of the fuel fine filter.
2. Check the fuel pressure after the fuel fine filter at maximum engine speed.
3. Compare the measured pressure drop across the fuel fine filter with the specified value. See "Technical data". If the pressure drop is too great, the fuel fine filter must be replaced.

CE ENGINE FUEL SYSTEM

4

Inspection and adjustment

LF45/55 series

4.3 INSPECTION, INTERNAL FUEL LEAKS



When inspecting for internal fuel leaks, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

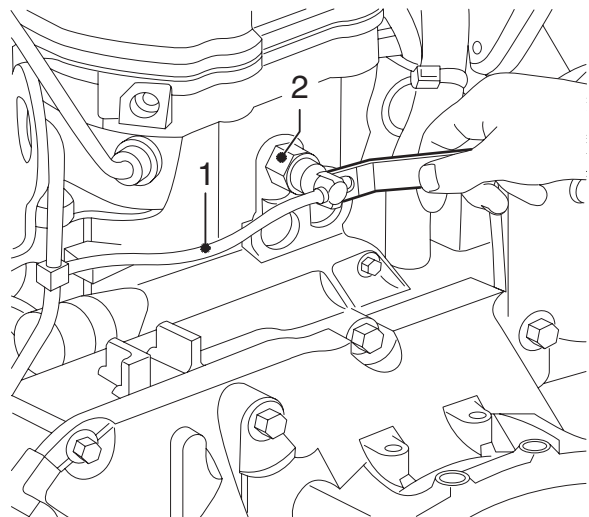


The common rail system is under high pressure when the engine is running. This pressure can rise to approx. 1400 bar. Even when the engine is not running, there may be a high residual pressure in the fuel rail (approx. 50 bar). Depressurise the system before working on the common rail system by wrapping the coupling in a cloth and then unscrewing it and collecting the escaping fuel in a container.

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Inspection, internal fuel leaks

1. Check that all injector pipes have been tightened to the correct torque and that there are no external signs of fuel leakage; see "Technical data".
2. Disconnect the fuel return pipe (1) from the fuel return overflow valve (2) on the rear of the cylinder head.



i400679

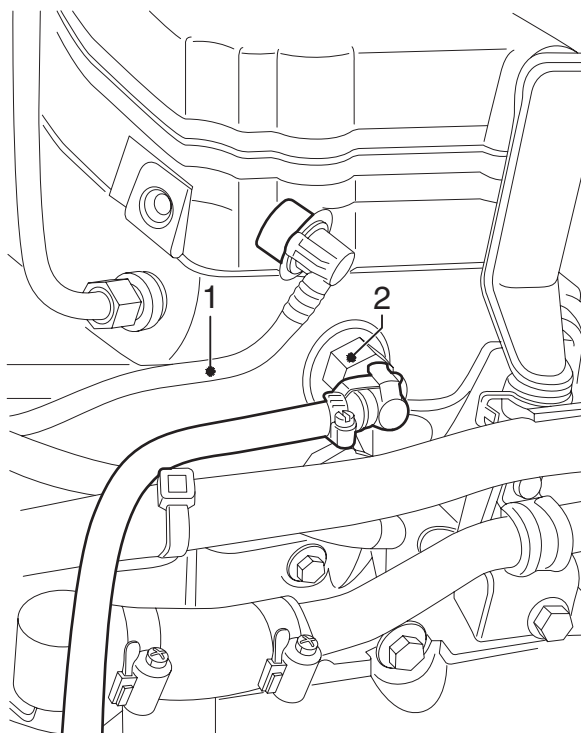
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LF45/55 series

CE ENGINE FUEL SYSTEM

Inspection and adjustment

3. Seal the disconnected fuel pipe (1) using the special tool (DAF no. 1453151) to prevent the return fuel escaping.
4. Fit the special tool (DAF no. 1329476) onto the fuel return overflow valve (2).

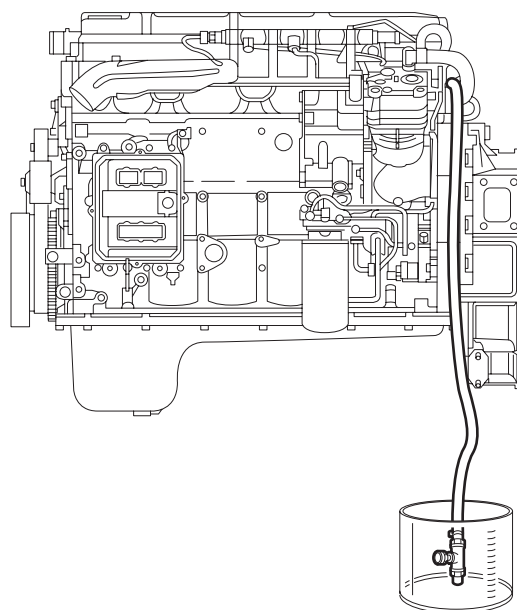


i400680

5. Place the free end of the special tool (DAF no. 1329476) in a container and start the engine.
6. While the engine is idling, measure the quantity of return fuel using a stop watch and a measuring beaker; see "Technical data" for the maximum quantity of return fuel.

Note:

If the quantity of return fuel is within the specified value there are no internal leaks.
If the quantity of return fuel exceeds the specified value, the internal fuel leak must be located.



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CE ENGINE FUEL SYSTEM

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Inspection and adjustment

LF45/55 series

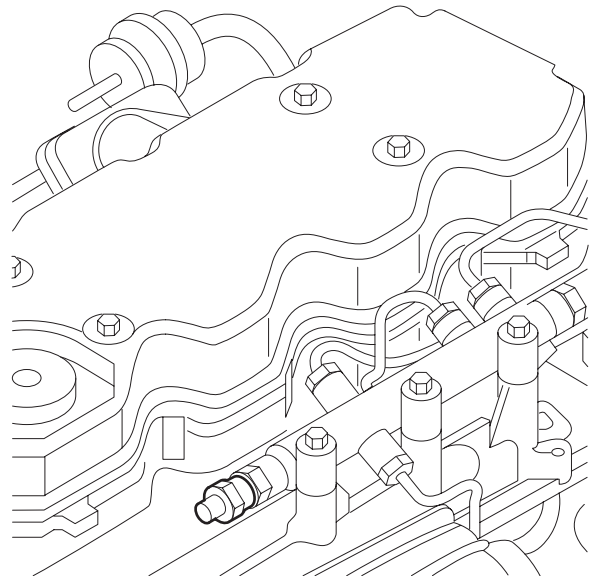
Locating internal fuel leak

1. Take the injector pipe out of cylinder 1.
2. Seal the connection of cylinder 1 on the fuel rail using the special tool (DAF no. 1453133). Tighten the plug to 30 Nm.
3. While the engine is idling, use a stop watch to measure the time required to fill a measuring beaker with 360 ml of return fuel. See "Technical data" for the minimum time permitted for filling the measuring beaker.

Note:

Use a measuring beaker with a mark at 360ml.

4. Remove the special tool (DAF no. 1453133) and reconnect the injector pipe.
5. Repeat the above steps for the other cylinders and note the values.



i400681

Note:

When the leaking cylinder has been plugged, the quantity of return fuel will decrease and, as a result, the time it takes to fill the measuring beaker to 360ml will increase. If several high values are measured, this indicates that there may be several leaks. If this is the case, first check the cylinders that give the highest values and then repeat the test.

In the example shown in the table below there is an internal leak in the 5th cylinder, which could be caused by a leak in the fuel supply pipe and/or a defective injector.

Example:

Leak test results						
Blocked cylinder	1	2	3	4	5	6
Time (s) to fill to 360ml	35	36	35	37	150	38

6. In the event of a leak, remove the fuel supply pipe and the injector of the cylinder in question; see "Removal and installation".

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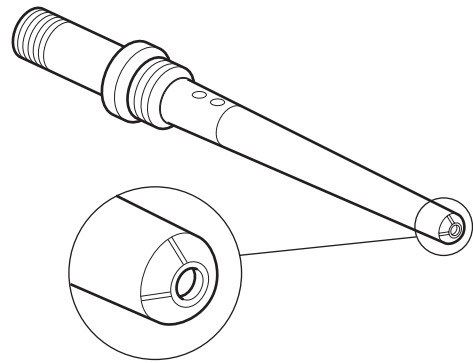
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CE ENGINE FUEL SYSTEM

LF45/55 series

Inspection and adjustment

7. Check the fuel supply pipe for damage and signs of leakage.
Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.
8. Check that the injector fuel connection is not leaking.
Leakage in the injector fuel connection can be recognised by erosion tracks (lines) in the socket of the fuel connection . If necessary or if in doubt, replace the injector.



i400776

Note:

If fuel has been found in the lubricating oil, extra attention must be paid to the O-rings of the injectors, as these have most probably been damaged by increased pressure in the return circuit as a result of an internal leak.

Note:

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
 - If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
 - If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.
9. Fit the injector and fuel supply pipe. See "Removal and installation".
 10. Again inspect for internal fuel leaks to check that there is no leakage.

CE ENGINE FUEL SYSTEM

4

Inspection and adjustment

LF45/55 series

5

5. REMOVAL AND INSTALLATION

5.1 REMOVAL AND INSTALLATION, INJECTOR PIPE



Never bend injector pipes as they may kink or crack. The injector pipes form part of the high-pressure section of the fuel system. When the unions are unscrewed, fuel under high pressure may escape. Take measures to prevent fire and injury. Collect the escaping fuel in a suitable container.



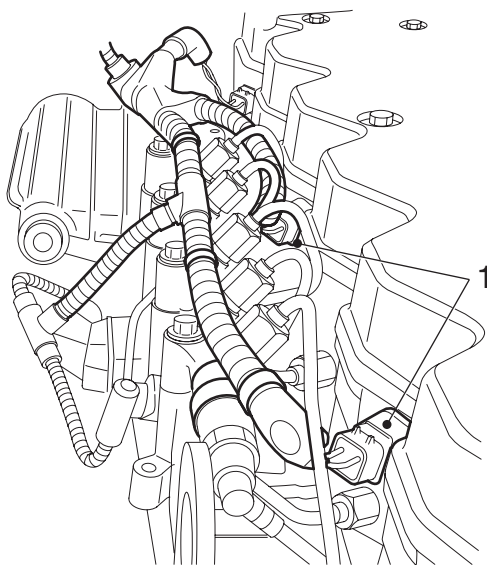
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Note:

Codes (1) are stamped in the injector pipe unions to enable correct positioning. The first figure is the number of cylinders of the engine followed by the fitting position.

Removing the injector pipe

1. Clean the area surrounding the unions, both near the injectors and near the fuel rail.
2. Remove the connectors (1) of the injectors from the valve sleeve.



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CE ENGINE FUEL SYSTEM

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Removal and installation

LF45/55 series

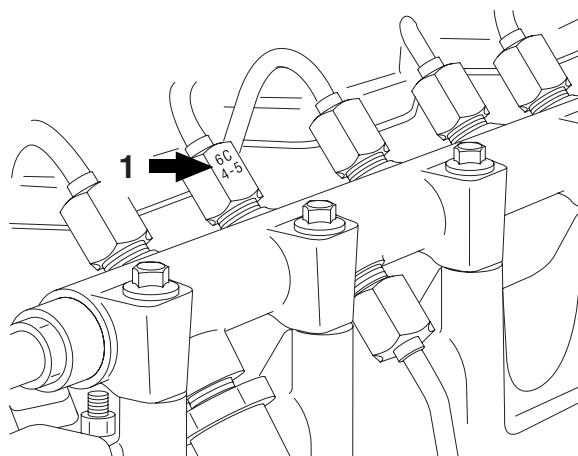
Note:

Note the sequence in which the injector pipes are removed. They should be re-fitted in precisely the reverse order.

3. Unscrew the unions on both sides of the pipe and remove the pipes.
4. Immediately plug the openings.

Installing the injector pipe

1. Clean the injector pipe and blow-clean it with dry compressed air.
2. Fit the injector pipes in reverse order and hand-tighten the unions. When all the pipes and unions are correctly fitted, the unions must be tightened to the specified torque. See "Technical data".
3. Fit the connectors of the injectors in the valve sleeve.
4. Start the engine to bleed the high-pressure section of the fuel system and inspect all fuel pipes for leaks.



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5.2 REMOVAL AND INSTALLATION, FUEL SUPPLY PIPE



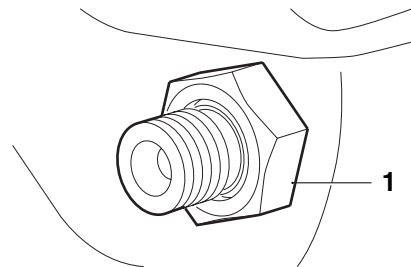
When removing a fuel pipe, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

Removing the fuel supply pipe

1. Disconnect the injector pipes.
2. If necessary, remove the fuel rail.
3. Remove the nut (1) from the fuel supply pipe.



i400486

4. Mark the positions of the fuel supply pipe (1) and pull it out of the cylinder head with special tool (DAF no. 1329473) (2).

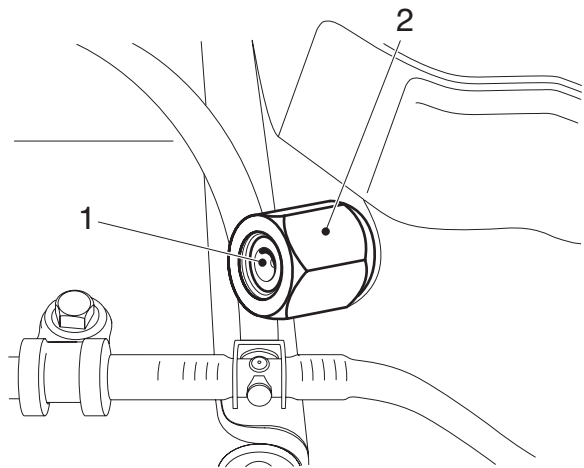
Note:

If the injector is **not** replaced, the fuel supply pipe may be re-used provided it is fitted with the original injector.

Installing the fuel supply pipe

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.



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CE ENGINE FUEL SYSTEM

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Removal and installation

LF45/55 series

1. Check the fuel supply pipe for damage and signs of leakage.
Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.

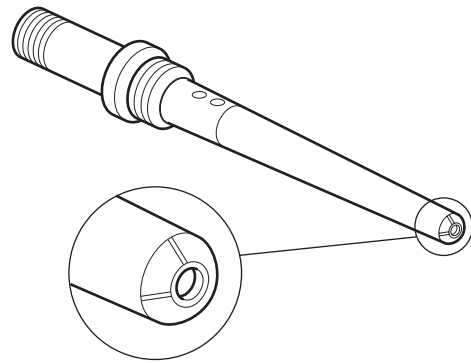
Note:

If any indications of leakage are visible, remove the injector and check the injector fuel connection for signs of leakage.

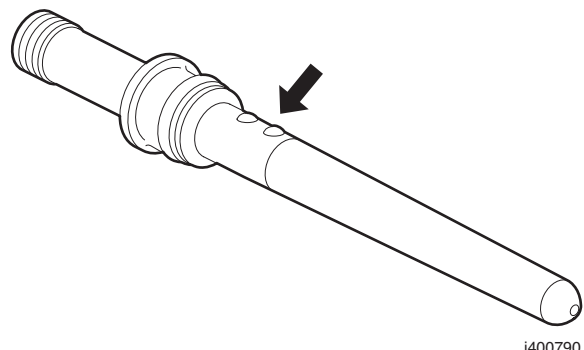
2. Fit a new O-ring on the fuel supply pipe.
3. Apply a thin layer of clean engine oil to the O-ring of the fuel supply pipe, the screw thread of the nut and the contact surface of the nut with the fuel supply pipe.
4. Check the bore of the fuel supply pipe for foreign matter and damage. Also check whether the supply bore in the injector is correctly positioned for the bore, because it is possible to mount the injector turned through 180°, so that the fuel supply port is on the other side.

Note:

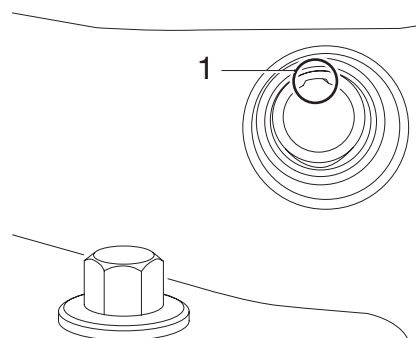
The fuel supply pipe has one or two positioning balls. The fuel supply pipe can only be installed with the ball(s) on top, as the bore in the cylinder head has a groove (1) at the top. Press the fuel supply pipe as far as possible into the bore, with the ball pointing upwards. Ensure that the O-ring is not damaged in this process.



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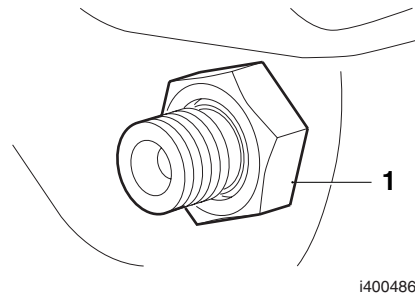
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CE ENGINE FUEL SYSTEM

LF45/55 series

Removal and installation

5. Install the nut (1) and tighten it to the specified torque. See "Technical data".
6. If the fuel rail was removed, re-fit it.
7. Fit the injector pipes.
8. Start the engine to bleed the high-pressure section of the fuel system and inspect the fuel system for leaks.



CE ENGINE FUEL SYSTEM

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Removal and installation

LF45/55 series

5.3 REMOVAL AND INSTALLATION, INJECTOR



When removing an injector, fuel will escape. Collect the fuel and avoid the risk of fire.



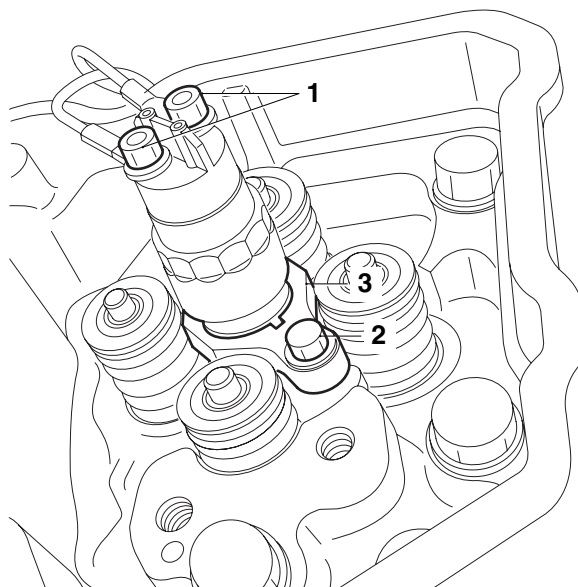
Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

Removing the injector

1. Remove the fuel return overflow valve to let the return bore in the cylinder head empty to the fullest possible extent. Collect the escaping fuel.
2. Remove the injector pipe.
3. Remove the fuel supply pipe.

Note:

- If an injector is removed without the fuel supply pipe having first been removed, serious damage can ensue.
 - If the injectors are removed, they must be removed together with the fuel supply pipes.
4. Remove the valve cover.
 5. Remove the exhaust valve rockers.
 6. Remove the injector wiring (1).
 7. Remove the two attachment bolts (2) from the injector clamping bracket (3).



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LF45/55 series

Removal and installation

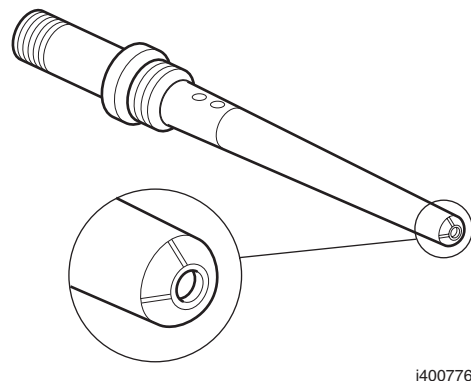
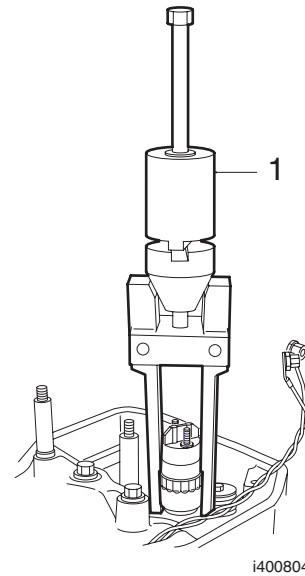
8. Fit the injector puller (1). This is the special tool (DAF no. 0192496). Carefully pull the injector vertically out of the cylinder head.
9. Remove the copper washer from the injector hole and plug the hole immediately.

Installing the injector

The following guidelines must be adhered to:

- If the injector is defective, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and in addition the sealing surface with the injector is damaged, both the injector and the fuel supply pipe must be replaced.
- If the fuel supply pipe is defective and the sealing surface with the injector is not damaged, the fuel supply pipe must be replaced but the injector can be reused.

1. Clean the injector if it has already been used. See "Cleaning".
2. Clean the injector hole in the cylinder head. The metal surface of the hole must not be touched.
3. Check the fuel supply pipe for damage and signs of leakage. Leakage in the fuel supply pipe can be recognised by erosion tracks (lines) on the nose of the supply pipe. If necessary or if in doubt, replace the fuel supply pipe.
4. Fit a new O-ring on the fuel supply pipe.
5. Check that the injector fuel connection is not leaking. Leakage in the injector fuel connection can be recognised by erosion tracks (lines) in the socket of the fuel connection. If necessary or if in doubt, replace the injector.



CE ENGINE FUEL SYSTEM

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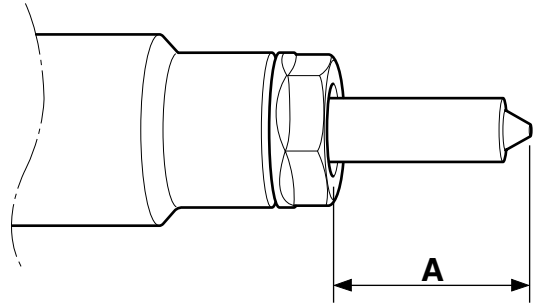
Removal and installation

LF45/55 series

6. Fit a new copper washer on the injector. Measure the length of the injector nozzle (A) **without** fitted washer in order to determine which washer must be used. Fit the correct washer; see "Technical data".

Note:

A wrong washer will cause an incorrect alignment between the fuel supply pipe and the injector. This will lead to internal fuel leaks that will in turn cause loss of power and/or engine damage.



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7. Fit a new O-ring on the injector.

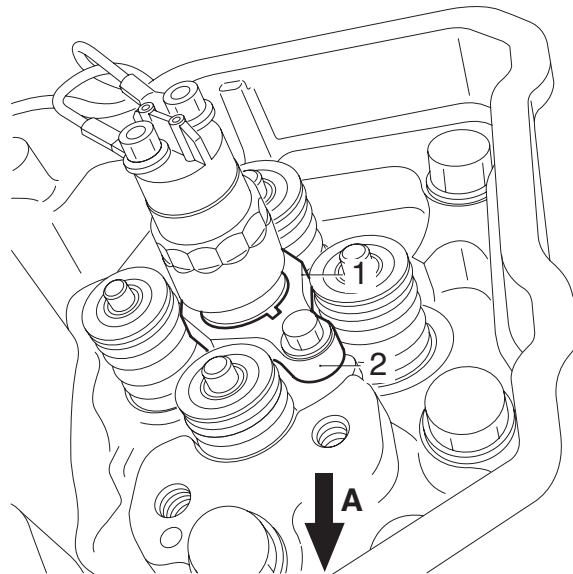
Note:

This O-ring should prevent returning fuel (1.2 - 2.0 bar) flowing via the top of the cylinder head to the oil sump and thinning the oil.

8. Apply a thin layer of clean engine oil to the O-ring of the injector.
9. Fit the injector with the copper washer. First press the injector into the hole as far as possible until a higher resistance can clearly be felt.

Note:

The injector must only be fitted one way. If it is fitted incorrectly, serious damage can ensue. The rounded side (2) of the injector clamping bracket (1) must point to the inlet side of the engine (A).



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LF45/55 series

Removal and installation

10. Fit the attachment bolts (1) in the injector clamping bracket (2) to secure the injector. Tighten the attachment bolts alternately to a torque of 2 Nm.

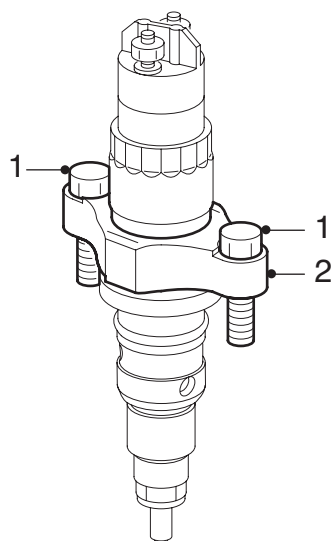
Note:

Pay special attention to the tightening of the attachment bolts (1). The tightening must be carried out alternately; ensure that the injector clamping bracket (2) is not fitted at an angle.

11. Apply a thin layer of clean engine oil to the O-ring of the fuel supply pipe, the screw thread of the nut and the contact surface of the nut with the fuel supply pipe.
12. Check the bore of the fuel supply pipe for foreign matter and damage. Also check whether the supply bore in the injector is correctly positioned for the bore, because it is possible to mount the injector turned through 180°, so that the fuel supply port is on the other side.
13. Fit the fuel supply pipe. Press the fuel supply pipe as far as possible into the bore, with the ball pointing upwards. Ensure that the O-ring is not damaged in this process.

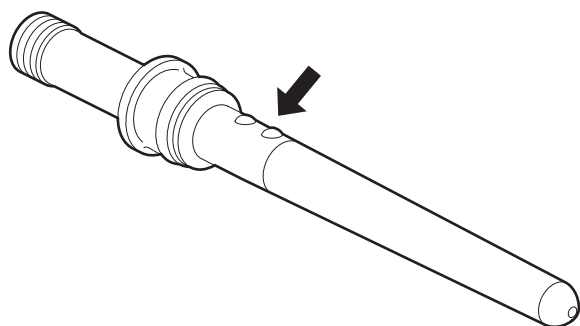
Note:

The fuel supply pipe has one or two positioning balls. The fuel supply pipe can only be installed with the ball(s) on top, as the bore in the cylinder head has a groove (1) at the top.

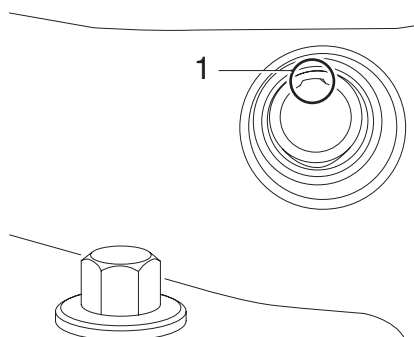


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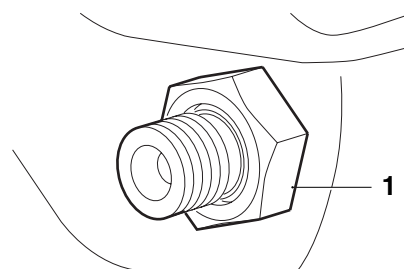
CE ENGINE FUEL SYSTEM

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Removal and installation

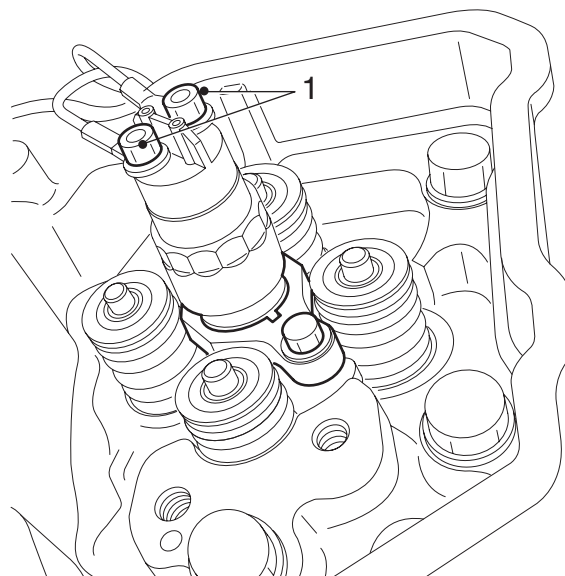
LF45/55 series

14. Fit the nut (1). Tighten the nut to a torque of 15 Nm.
15. Tighten the injector attachment bolts to the specified torque; see "Technical data".
16. Tighten the fuel supply pipe nut to the specified torque; see "Technical data".



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17. Connect the injector wiring. Tighten the attachment bolts (1) to the specified torque. See "Technical data".
18. Fit the exhaust valve rockers.
19. Adjust the clearance of the exhaust valves.
20. Fit the valve cover.
21. If the fuel rail was removed, re-fit it.
22. Fit the injector pipe.
23. Fit the fuel return overflow valve to the cylinder head. For the specified tightening torque, see "Technical data".
24. Connect the return pipe to this valve.
25. Start the engine to bleed the high-pressure section of the fuel system and inspect the fuel system for leaks.



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5.4 REMOVAL AND INSTALLATION, FUEL RAIL



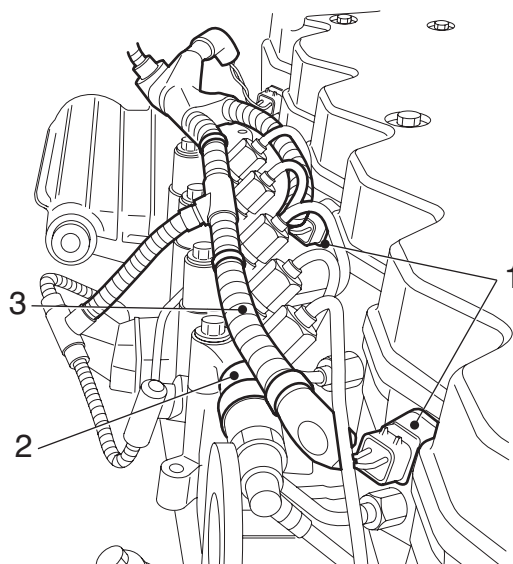
When removing the fuel rail, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing the fuel rail

1. Remove the connector from the fuel rail pressure sensor.
2. If necessary, remove the plug of the inlet air temperature/boost pressure sensor by loosening the connector.
3. Remove the connectors of the injectors (1) from the valve sleeve.
4. Disconnect the cable harness (3) on the fuel rail (2) and bend the cable harness away from the fuel rail.



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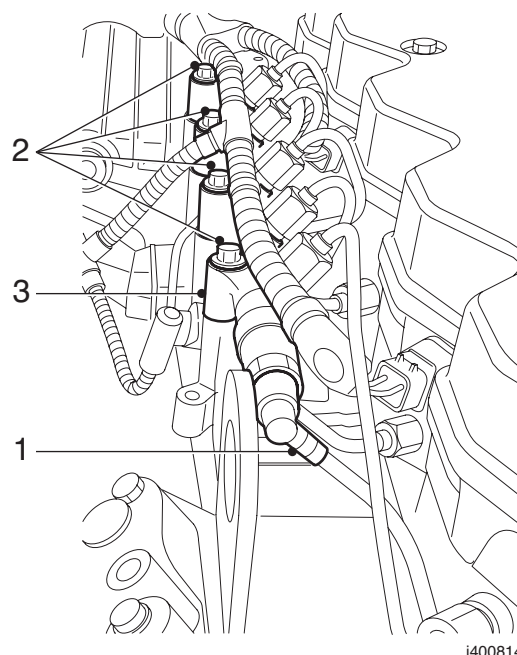
CE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

5. Remove the fuel return pipe from the pressure-limiting valve on the fuel rail
6. Loosen the pipe clamps from the high-pressure pipe to the fuel rail.
7. Loosen the high-pressure pipe from the high-pressure pump to the fuel rail on the fuel rail side by unscrewing the union.
8. Disconnect the injector pipes.
9. Remove the fuel rail attachment bolts (2).
10. Remove the fuel rail (3).

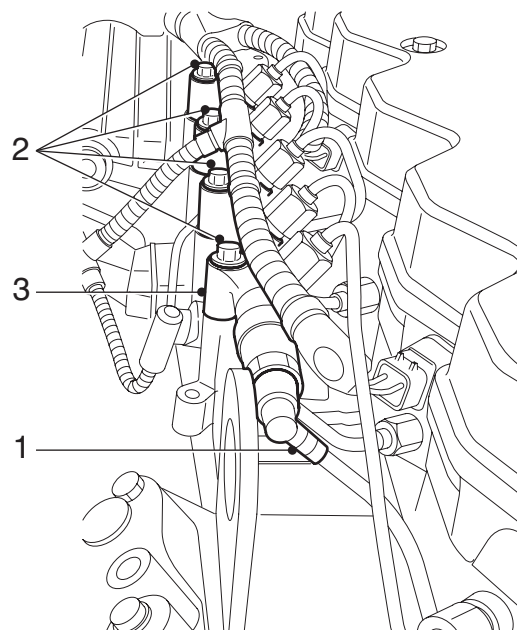


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Installing the fuel rail

1. Ensure that the fuel rail is clean.
2. Fit the fuel rail (3) and hand-tighten the attachment bolts (2).
3. Fit the fuel return pipe (1) onto the pressure-limiting valve on the fuel rail.
4. Fit the injector pipes.
5. Fit the pipe clamps from the high-pressure pipe to the fuel rail. Do not tighten them yet.
6. Fit the high-pressure pipe unions from the high-pressure pump to the fuel rail. For the specified tightening torques of the unions, see "Technical data".
7. Tighten the attachment bolts (2) of the fuel rail to the specified torque. See "Technical data".
8. Tighten the bolt connections of the high-pressure pipe clamps.



i400814

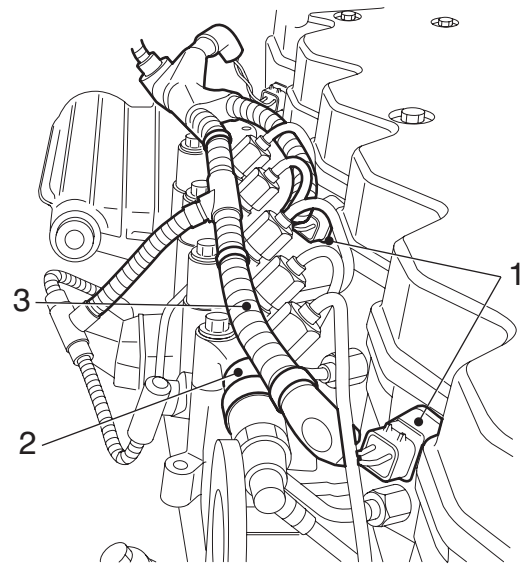
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CE ENGINE FUEL SYSTEM

LF45/55 series

Removal and installation

9. Install the cable harness (3) to the fuel rail (2) and secure it using cable ties.
10. Fit the connectors of the injectors (1) in the valve sleeve.
11. If it has been removed, fit the plug of the inlet air temperature/boost pressure sensor to the sensor.
12. Fit the connector of the fuel rail pressure sensor.
13. Start the engine and check the fuel system for leaks.



CE ENGINE FUEL SYSTEM

4

Removal and installation

LF45/55 series

5.5 REMOVAL AND INSTALLATION, FUEL RAIL PRESSURE-LIMITING VALVE



When removing the pressure-limiting valve, fuel will escape. Collect the fuel and avoid the risk of fire.



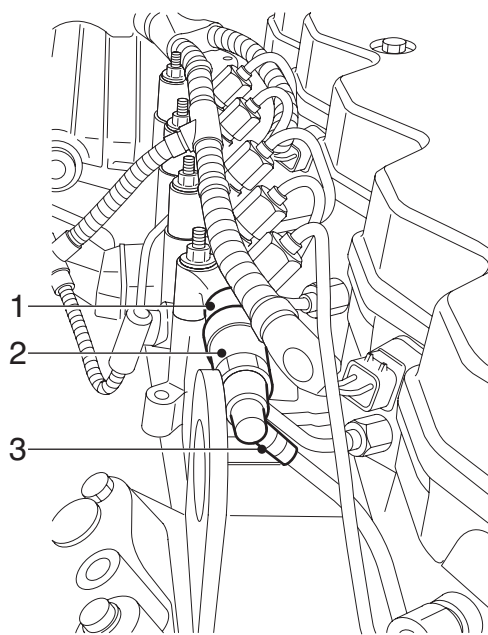
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing fuel rail pressure-limiting valve

1. Clean the pressure-limiting valve (2) and the surrounding area.
2. Remove the fuel return pipe (3) from the pressure-limiting valve (2).
3. Remove the pressure-limiting valve (2) from the fuel rail (1).

Installing fuel rail pressure-limiting valve

1. Check the sealing surface and the screw thread of the pressure-limiting valve and the fuel rail.
2. Install the pressure-limiting valve in the fuel rail and tighten the valve to the specified torque. See "Technical data".
3. Fit the fuel return pipe on the pressure-limiting valve.
4. Start the engine and check the pressure-limiting valve for leaks.



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5.6 REMOVAL AND INSTALLATION, HIGH-PRESSURE PUMP



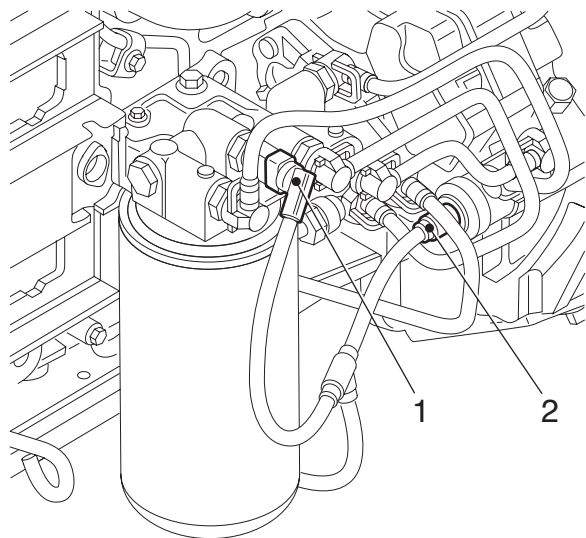
When removing the high-pressure pump, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing the high-pressure pump

1. Clean the high-pressure pump and that part of the engine around it thoroughly with, for example, a steam cleaner. Cover the places at which leaks have been detected to prevent dirt getting into the fuel system.
2. Disconnect the fuel pipes from the high-pressure pump. Loosen the return pipe only on the high-pressure pump.
3. If fitted, uncouple the connector of the fuel temperature sensor (1) on the fuel fine filter head and the connector of the fuel pump control solenoid valve (2).
4. Remove the fuel fine filter together with the filter head.
5. Loosen both unions from the high-pressure pipe to the fuel rail as well as the pipe clamps. Remove the high-pressure pipe. Plug all openings.
6. Remove the three high-pressure pump attachment nuts and then the high-pressure pump.



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CE ENGINE FUEL SYSTEM

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Removal and installation

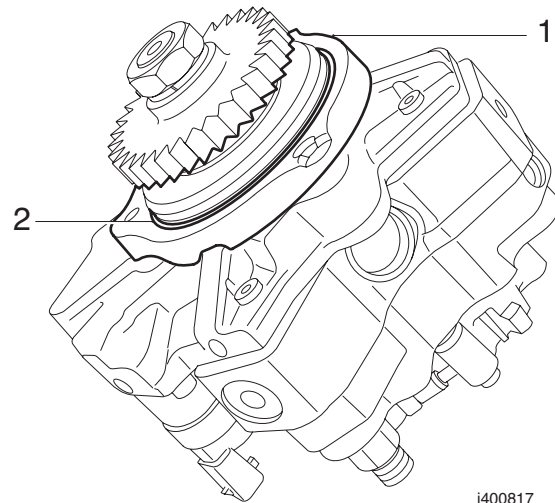
LF45/55 series

Note:

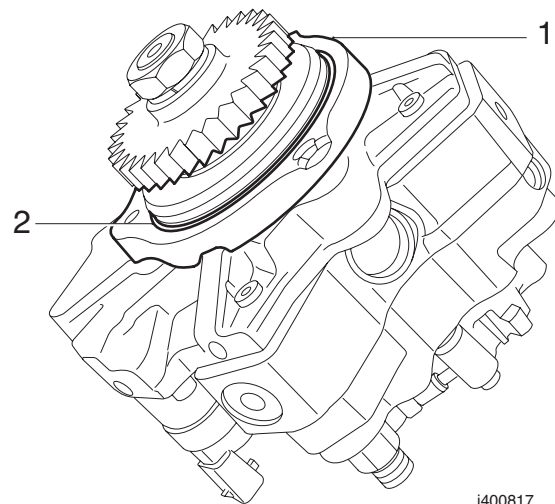
The high-pressure pump is fitted on the gear side with an adapter ring (1) and an O-ring (2) in the timing gear case. If the removal of the high-pressure pump is particularly difficult, it may be necessary to press the adapter ring (1) carefully out of the timing gear case using a small pry bar.

Installing the high-pressure pump

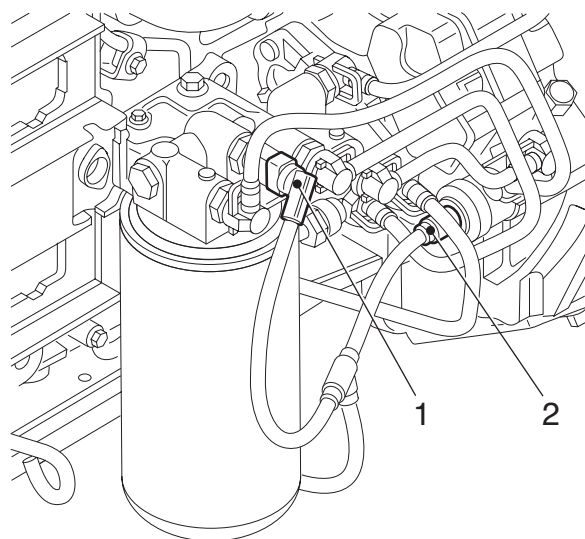
1. Clean the high-pressure pump. Make sure that no dirt or cleaner can get into the high-pressure pump ducts.
2. Check the high-pressure pump and the drive gear (externally) for wear and damage.
3. Fit a new O-ring (2) on the adapter ring (1) and apply a thin layer of engine oil to the O-ring.
4. Fit the high-pressure pump and press it into the timing gear case by means of the attachment nuts.
5. Tighten the attachment nuts to the specified torque. See "Technical data".
6. Fit the filter head and the fuel fine filter.
7. Fit the high-pressure pump to the fuel rail and tighten the unions. See "Technical data" for the specified tightening torques.
8. Tighten the pipe clamps.
9. If fitted, connect the connector of the fuel temperature sensor (1) on the fuel fine filter head and the connector of the fuel pump control solenoid valve (2).
10. Fit the fuel pipes to the high-pressure pump.
11. Bleed the fuel system. See "Inspection and adjustment".
12. Start the engine and check the fuel system for leaks.



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5.7 REMOVAL AND INSTALLATION, FUEL FINE FILTER



When removing the fuel fine filter, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.

Removing the fuel fine filter

1. Place a container beneath the fuel fine filter and remove the filter.

Note:

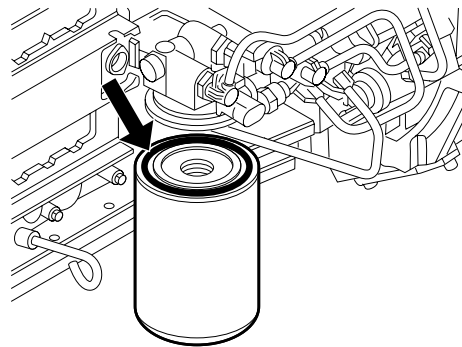
The fuel fine filter is a disposable filter and must therefore not be cleaned and re-used.

Installing the fuel fine filter

Note:

Do not fill the fine filter with fuel until it has been fitted. The fine filter is filled with fuel by the primer pump after it has been fitted. This considerably reduces the risk of dirt getting into the fuel system.

1. Check by hand whether the coupling piece for the filter attachment is securely attached.
2. Lightly lubricate the filter sealing ring with clean engine oil.
3. Fit the filter element onto the housing. Tighten the filter element until the sealing ring abuts. Tighten the filter element a further $\frac{1}{2}$ to $\frac{3}{4}$ turn by hand.
4. Bleed the fuel system. See "Inspection and adjustment".
5. Start the engine and check the fuel system for leaks. If necessary, retighten the filter by hand.



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CE ENGINE FUEL SYSTEM**4**

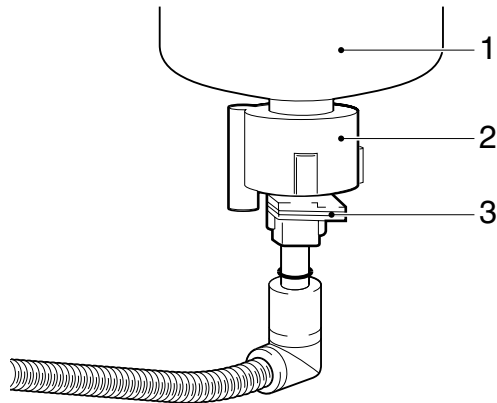
Removal and installation

LF45/55 series**5.8 REMOVAL AND INSTALLATION, FUEL PREFILTER/WATER SEPARATOR**

When removing the fuel prefilter/water separator, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.

Removing the fuel prefilter/water separator filter element

1. Place a container under the filter.
2. Remove the plug (3) from the water sensor (2).
3. Remove the fuel prefilter/water separator filter element (1) by turning it anti-clockwise.
4. Remove the water sensor (2) from the filter element (1).



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Installing the fuel prefilter/water separator filter element

1. Check by hand whether the coupling piece for the filter attachment is securely attached.
2. Lightly lubricate the sealing ring with engine oil.
3. Fit the fuel prefilter/water separator filter element (1) until the sealing ring abuts. Tighten the filter element a further $\frac{1}{2}$ to $\frac{3}{4}$ turn by hand.
4. Turn the water sensor (2) onto the filter element until it abuts. Tighten the water sensor by about a further $\frac{1}{8}$ - $\frac{1}{4}$ turn.

Note:

Over-tightening the water sensor (2) may damage the sensor and/or cause leakage.

5. Fit the plug (3) on the water sensor (2).
6. Bleed the fuel system. See "Inspection and adjustment".
7. Start the engine and check for leaks. If necessary, retighten the fuel prefilter/water separator filter element (1) by hand.

5

5.9 REMOVAL AND INSTALLATION, FUEL LEVEL ELEMENT



When removing the fuel prefilter/ water separator, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

Removing fuel level element

1. Disconnect the earth lead from the battery terminal.
- Note:**
To prevent dirt from entering, first clean the outside of the fuel tank.
2. Drain the fuel tank until it is less than 1/3 full.
3. Remove the connector from the fuel level element.
4. Remove the attachment bolts of the fuel level element and carefully remove the fuel level element from the fuel tank.
5. Remove the gasket.

Installing fuel level element

1. Clean the contact surface of the fuel tank and the fuel level element.
2. Fit a new gasket to the fuel level element and fit the fuel level element.
3. Fit the attachment bolts of the fuel level element.
4. Fit the connector of the fuel level element.
5. Fill the fuel tank with fuel to a level above the lip of the fuel level element and check the tank for leaks.

5.10 REMOVAL AND INSTALLATION, FUEL TANK



When the fuel tank is removed, a quantity of fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing fuel tank

1. To prevent dirt from entering, first clean the outside of the fuel tank.
2. Drain the fuel tank until it is almost empty.
3. Remove the connector from the fuel level element.
4. Remove the fuel connections from the fuel tank.
5. Loosen the fuel pre-filter/water separator from the fuel tank and put it to the rear.
6. Loosen the tank straps.
7. Remove the fuel tank.

Installing the fuel tank

1. Check the fuel tank for damage.
2. Fit the fuel tank with the straps.
3. Fit the fuel pre-filter/water separator on the fuel tank.
4. Fit the fuel connections on the fuel tank.
5. Fit the connector of the fuel level element.
6. Fill the fuel tank with fuel.
7. Bleed the fuel system. See "Inspection and adjustment".
8. Check the tank and the fuel pipes for leaks.

5.11 REMOVAL AND INSTALLATION, ELECTRONIC UNIT COOLING PLATE



When removing the cooling plate, fuel will escape. Collect the fuel and avoid the risk of fire.



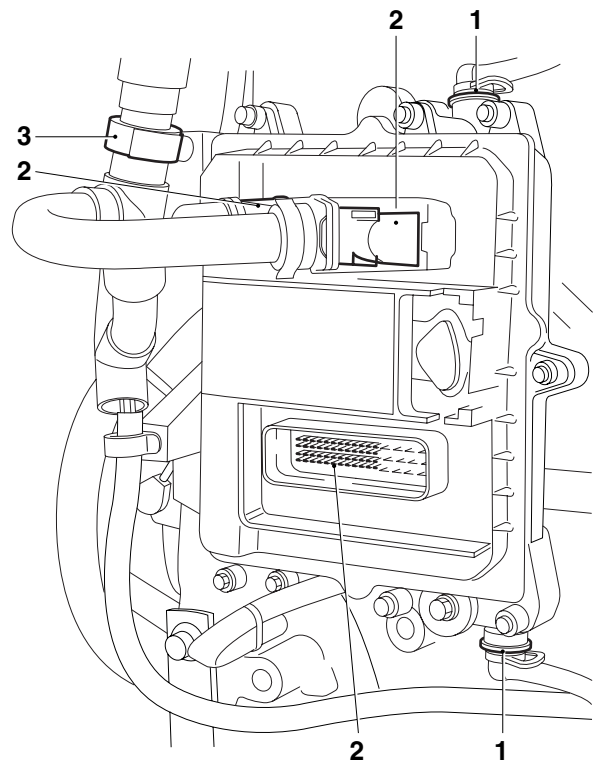
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Note:

The electronic unit, together with the cooling plate, must first be removed from the engine block, after which the cooling plate must be demounted.

Removing electronic unit cooling plate

1. Disconnect the earth lead from the battery terminal.
2. To prevent dirt from entering, first clean the area around the fuel connections.
3. Remove the fuel pipes (1) on the cooling plate of the electronic unit.
4. Uncouple the electrical connectors (2) from the electronic unit and loosen the attachment clip (3) from the cable harness.
5. Remove the attachment bolts by which the electronic unit is fitted to the engine block.
6. Remove the electronic unit and cooling plate.
7. Remove the attachment bolts by which the electronic unit is fitted to the cooling plate and remove the cooling plate.



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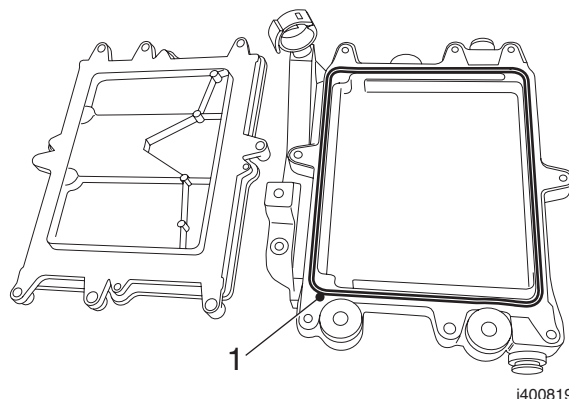
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Removal and installation

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Installing electronic unit cooling plate

1. Clean the cooling side of the electronic unit and the cooling plate.
2. Inspect the sealing surfaces of the cooling plate and the electronic unit for damage and smoothness.
3. Fit a new sealing rubber (1) in the cooling plate.
4. Fit the cooling plate to the electronic unit and fit the bolts attaching the two parts. Tighten the attachment bolts to the specified torque. See "Technical data".
5. Fit the electronic unit and cooling plate to the engine block and fit the attachment bolts. Tighten the attachment bolts to the specified torque. See "Technical data".
6. Connect the electrical connectors to the electronic unit and attach the cable harness with the clips.
7. Connect the quick-release couplings of the fuel pipes to the electronic unit cooling plate.
8. Bleed the fuel system. See "Inspection and adjustment".
9. Fit the earth lead to the battery terminal.
10. Start the engine and check the fuel system for leaks.



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5.12 REMOVAL AND INSTALLATION, FUEL RETURN OVERFLOW VALVE



When removing the fuel return overflow valve, fuel will escape. Collect the fuel and avoid the risk of fire.



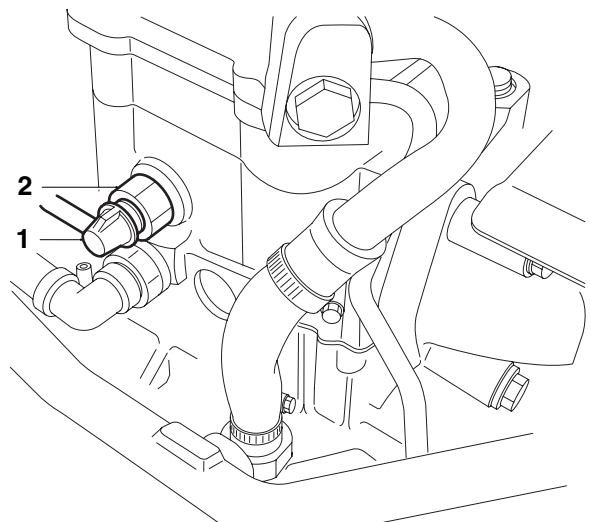
Dirt in the fuel system can lead to significant damage to parts of the system. Prevent this by cleaning the parts before disassembly and then sealing all open connections.

Removing the fuel return overflow valve

1. To prevent dirt from entering, first clean the area around the fuel return connection.
2. Remove the fuel return pipe (1) on the fuel return overflow valve (2) and plug the pipe.
3. Remove the fuel return overflow valve and collect the escaping fuel.

Installing the fuel return overflow valve

1. Install the fuel return overflow valve. Haal het brandstofretour-overstroomventiel aan met het voorgeschreven aanhaalmoment, zie hoofdgroep "Technische gegevens".
2. Connect the quick-release couplings of the fuel return pipe to the fuel return overflow valve.
3. Start the engine and check the fuel system for leaks.



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Removal and installation

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5.13 REMOVAL AND INSTALLATION, LOW-PRESSURE FUEL PIPES



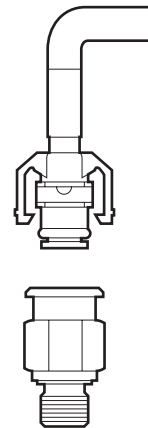
When removing the low-pressure fuel pipes, fuel will escape. Collect the fuel and avoid the risk of fire.



Dirt in the fuel system can lead to significant damage to parts of the system. All open connections must therefore be sealed.

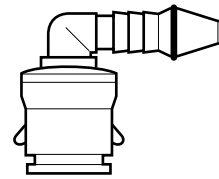
The low-pressure fuel pipes may have two different types of quick-release coupling.

VOSS quick-release coupling

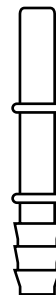
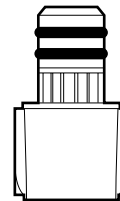


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John Guest quick-release coupling



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Removal and installation

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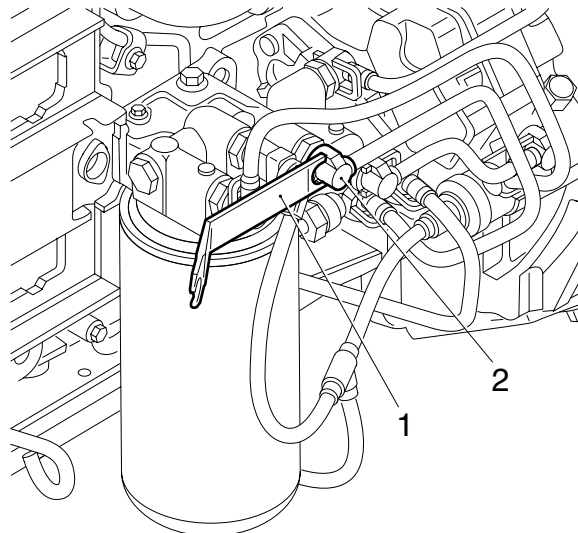
Low-pressure fuel pipes fitted with VOSS quick-release couplings

Removing low-pressure fuel pipes

1. Disconnect the fuel pipe (2) by inserting the special tool (1) (DAF no. 1329470) into the quick-release coupling and removing the pipe from the coupling.
2. Remove the special tool from the quick-release coupling.
3. Plug the openings.

Fitting low-pressure fuel pipes

1. Clean the quick-release coupling parts and apply a thin layer of clean engine oil to the O-ring.
2. Fit the pipe on the quick-release coupling of the component and push the pipe onto it until a clear resistance can be felt and the quick-release coupling audibly clicks.
3. Bleed the fuel system. See "Inspection and adjustment".
4. Start the engine and check the fuel system for leaks.



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Low-pressure fuel pipes fitted with John Guest quick-release couplings

Removing low-pressure fuel pipes

1. Disconnect the fuel pipe by pressing in both lips of the quick-release coupling and removing the pipe from the quick-release coupling.
2. Plug the openings.

Fitting low-pressure fuel pipes

1. Clean the quick-release coupling parts.
2. Fit the pipe on the quick-release coupling of the component and push the pipe onto it until a clear resistance can be felt and the quick-release coupling audibly clicks.
3. Bleed the fuel system. See "Inspection and adjustment".
4. Start the engine and check the fuel system for leaks.

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Removal and installation

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6. CLEANING

6.1 CLEANING INJECTOR



The injector must never be cleaned with a steel brush or pressure cleaning equipment. Never put the brush in the injector bores when cleaning the exterior of the injector nozzle. If this happens, the nozzle must be replaced. Before cleaning the nozzle, cover the injector bores. Only clean the injector with a brass hand brush.

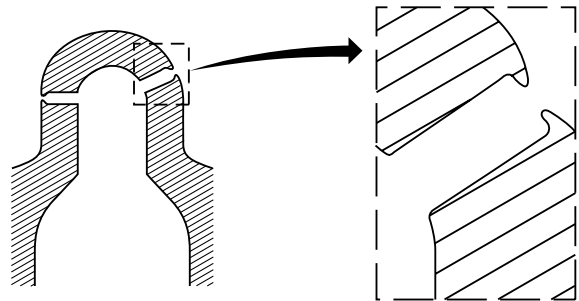
Note:

The use of steel brushes can cause deformation of the injector bores, with the result that the wrong amount of fuel is injected. This deformation cannot be ascertained by measurements or checks.

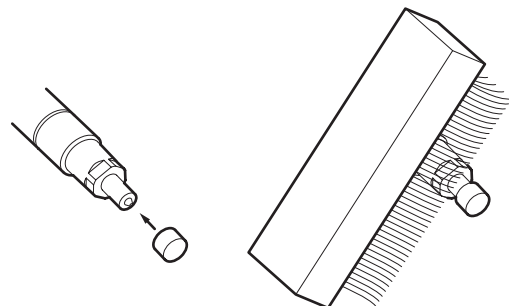
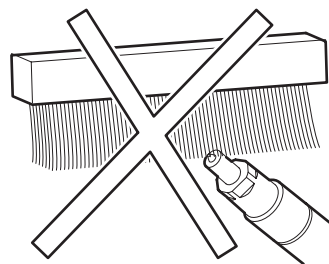
Note:

The disassembly and assembly of injectors is not permitted. Only external cleaning is permitted.

1. Remove the injector. See "Removal and installation".
2. Clean the injector hole in the cylinder head. The metal surface of the hole must not be damaged.
3. Wipe the exterior of the injector with a clean, lint-free cloth. In the case of heavy soiling the injector may be cleaned carefully with a brass hand brush (not the apertures in the injector nozzle!).
4. Fit the injector. See "Removal and installation".



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CE ENGINE FUEL SYSTEM

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Cleaning

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CE ENGINE INLET/EXHAUST SYSTEM

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

CE ENGINE INLET/EXHAUST SYSTEM

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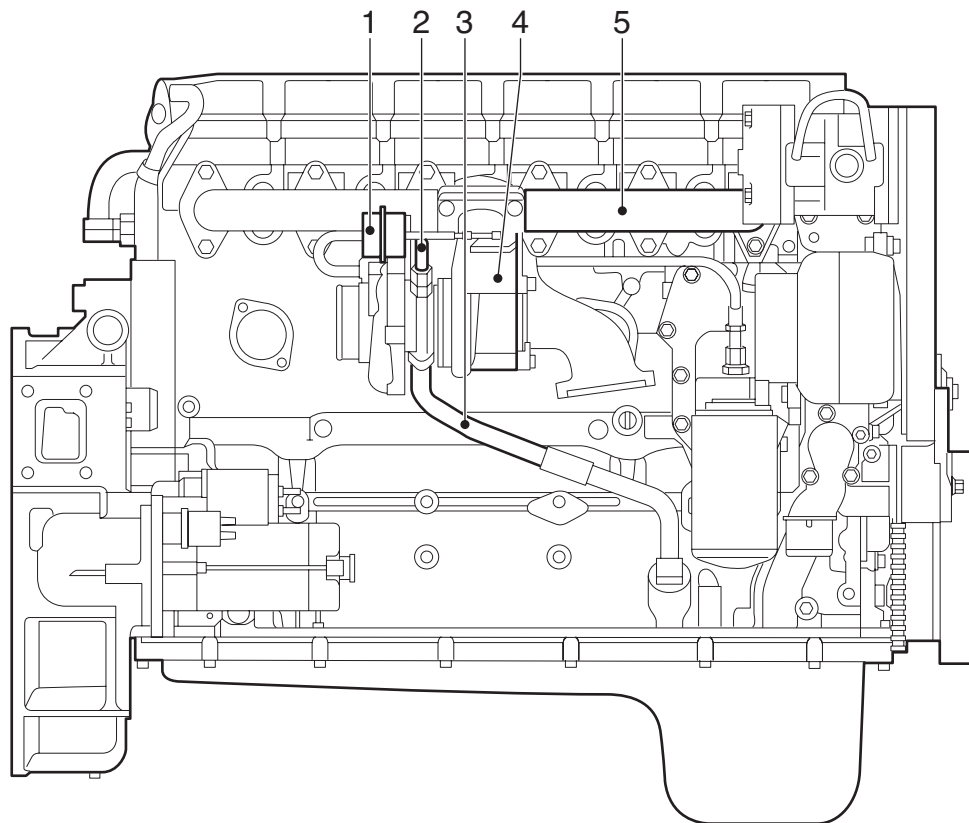
Safety instructions

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2. GENERAL

2.1 LOCATION OF COMPONENTS



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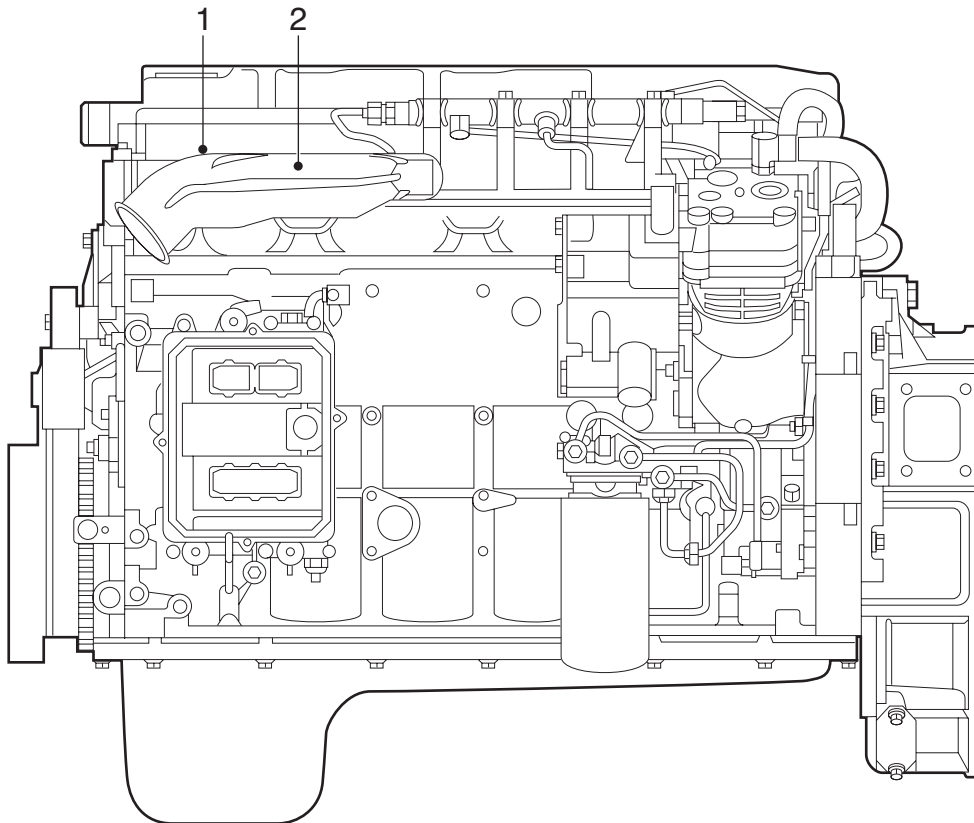
1. Wastegate diaphragm box
2. Oil supply pipe
3. Oil discharge pipe
4. Turbocharger
5. Exhaust manifold

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General

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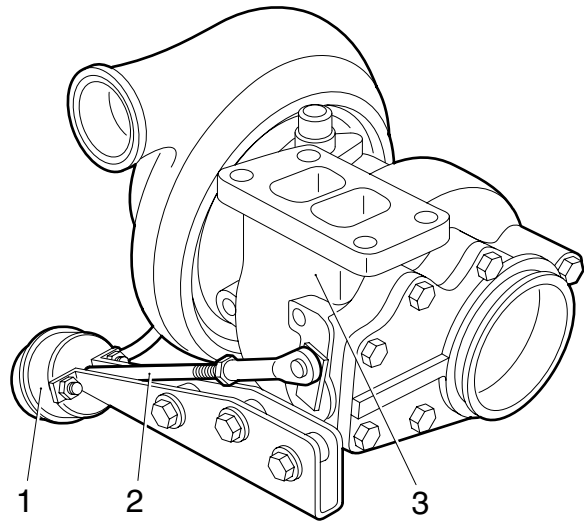
1. Glow element connections
2. Intake manifold

2.2 SYSTEM DESCRIPTION, TURBOCHARGER WITH WASTEGATE

To make the engine more responsive at lower engine speeds, a turbocharger is used that produces a better charge ratio at these speeds. Without provision having been made for this, the boost pressure yielded by this turbocharger would be too high at maximum engine speeds. Use of a wastegate prevents this.

The boost pressure is measured by a diaphragm box (1) on the delivery side of the turbocharger. The diaphragm is pushed back against the spring pressure by the boost pressure. The linked control rod (2) is also pushed back. The control rod operates a valve in the turbine housing (3). The valve in the turbine housing is opened when the maximum pre-set pressure has been reached.

When the valve is opened, some of the exhaust gases will be discharged directly to the exhaust pipe rather than being used to propel the turbine rotor of the turbocharger.



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General

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3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING TURBOCHARGER WASTEGATE

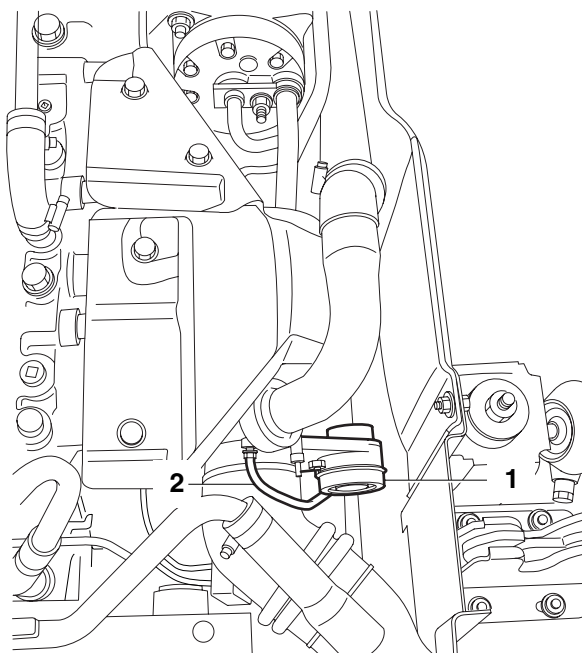
Note:

Depending on the fitting position of the turbocharger, it may be necessary to remove the turbocharger from the engine before this adjustment; see "Removal and installation".

Note:

The turbocharger is calibrated in the factory and must not be re-adjusted. The length of the control rod on the wastegate valve lever may only be changed when assembling a new turbocharger. After that, only an inspection of the actuating pressure of the wastegate may be carried out. If the result is negative, the turbocharger must be replaced.

1. Remove the flexible pipe (2) from the diaphragm box (1) of the wastegate.
2. Connect an air-pressure reducer valve to the diaphragm box of the wastegate. Set the reducer valve to max. 0.2 bar gauge pressure. Connect the reducer valve to a compressed air installation.
3. Set the reducer valve to exactly the same test pressure as listed in "Technical data".
4. Check the diaphragm in the diaphragm box for leaks by listening carefully for a hissing sound from the diaphragm box.
5. Check whether the control rod of the wastegate has moved. If it has not moved, the control rod must be loosened from the lever. Check again whether the control rod has moved. If it has not moved, the diaphragm box must be replaced. If it has moved, the wastegate valve must be made to move freely or, if that does not help sufficiently, the entire compressor unit must be replaced.
6. Remove the flexible pipe with the reducer valve and re-connect the flexible pipe of the compressor pump to the wastegate diaphragm box.



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CE ENGINE INLET/EXHAUST SYSTEM

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Inspection and adjustment

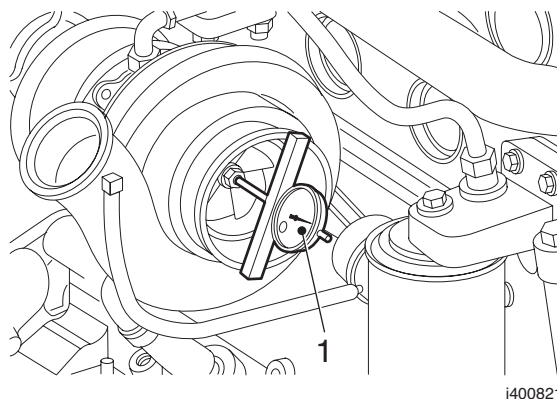
LF45/55 series

3.2 INSPECTING TURBOCHARGER AXIAL BEARING PLAY

Note:

The turbocharger axial bearing play should only be checked when the engine is cold.

1. Remove the exhaust pipe from the turbocharger.
2. Remove the charge pipes from the turbocharger.
3. Fit a dial gauge (1) to the charge supply flange of the turbocharger.
4. Push the compressor shaft away from the dial gauge and set the gauge to zero.
5. Push the compressor shaft to the dial gauge and read off the axial play. Compare the reading with the specified value; see "Technical data". Replace the turbocharger if necessary.
6. Fit the charge pipes to the turbocharger.
7. Fit the exhaust pipe to the turbocharger.



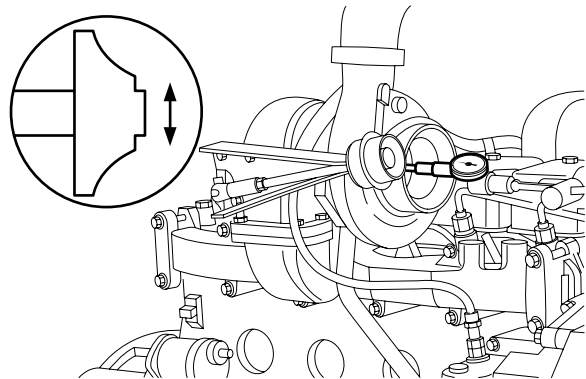
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3.3 INSPECTING TURBOCHARGER RADIAL BEARING PLAY

Note:

The turbocharger radial bearing play should only be checked when the engine is cold.

1. Remove the turbocharger from the exhaust manifold. See "Removal and installation".
2. Fit a pressure gauge to the turbocharger housing and measure the radial play. Compare the reading with the specified value; see "Technical data". Replace the turbocharger if necessary.
3. Fit the turbocharger. See "Removal and installation".



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Inspection and adjustment

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3.4 CHECKING EXHAUST GAS BACK PRESSURE

Checking exhaust gas back pressure

1. Remove the plug from the exhaust elbow attachment or bore a hole and install a suitable coupling with a pipe. The first part of the pipe must be made of metal, to withstand the high temperatures.

Note:

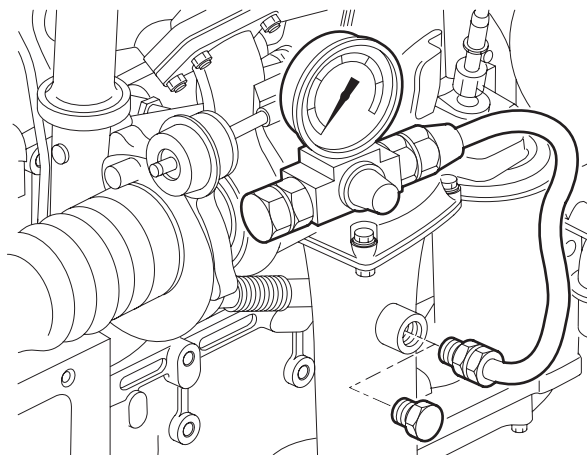
Use an attenuated gauge to prevent excessive shaking of the gauge needle.

2. Connect a pressure gauge to the pipe, with a range of at least 0.1 - 0.2 bar (10 - 20 kPa).

Note:

The engine brake must not be used during measurements. This is to protect the pressure gauge.

3. Measure the exhaust gas back pressure at full-load engine speed and compare the measurements to the specified value. See "Technical data". Check the exhaust system if the exhaust gas back pressure is too high.
4. Remove the pressure gauge and the coupling and fit the plug.



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3.5 INSPECTION AND PRESSURE-TESTING, AIR INLET SYSTEM



When pressure-testing the air inlet system, the plugs may spring off if they are not properly secured. It is therefore important to check the attachment of the plugs before pressure-testing and keep people away from the area.

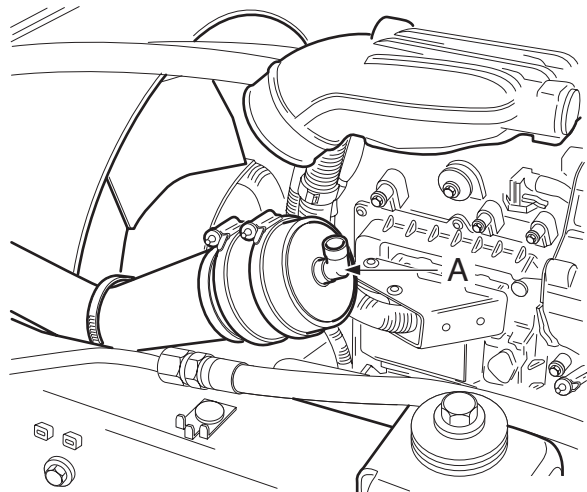
1. Check the condition and mounting of the air inlet channels/pipes of the air inlet system.

Note:

In case of doubt as to the proper sealing of the air inlet system, which is indicated by the following:

- loss of power
- high fuel consumption
- unusual noises
- lit engine fault symbol on the instrument panel, ???carry out a pressure test to check the air inlet system for leakage.

2. Remove the right-hand and rear engine encapsulations.
3. Loosen the inlet hose between the air cooler and the inlet manifold at the inlet manifold side.
4. Fit the special tool (DAF no. 1453171) in the hose.



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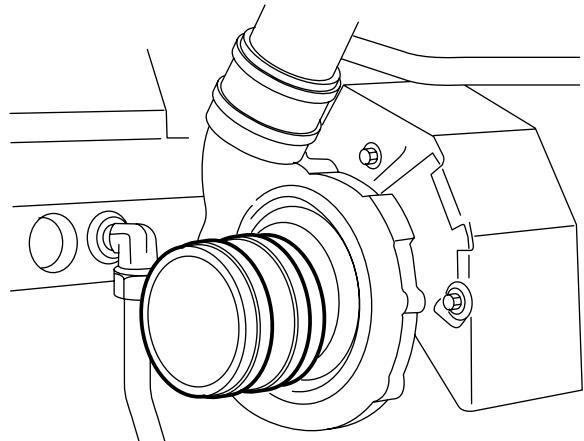
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Inspection and adjustment

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5. Loosen the plastic pipe between the air filter housing and the rubber suction hose on the turbocharger.
6. Install special tool (DAF no. 0694831) in the rubber intake port on the turbocharger.
7. Connect an air pipe with reducer valve to the sealing cap (A) and charge the system to approx. 1 bar.
8. Use a soapy solution to check the whole inlet system for air leaks. Also check whether the pressure gauge of the reducer valve drops.
9. Fit the loosened hoses of the inlet system and the engine encapsulation.



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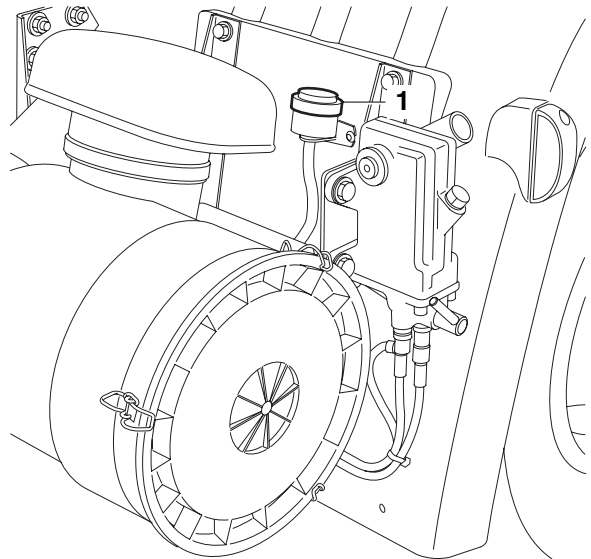
CE ENGINE INLET/EXHAUST SYSTEM

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Inspection and adjustment

3.6 CHECKING INLET UNDERPRESSURE

1. Remove the connection of the air intake pipe underpressure indicator (1) from between the air filter housing and turbocharger.
2. Connect a pressure gauge with a maximum rating of -100 mbar (-10 kPa) to the connection of the underpressure indicator.
3. Measure the inlet underpressure at full-load engine speed and compare the measurement to the specified value. See "Technical data".
4. Fit the connection of the air intake pipe underpressure indicator (1) between the air filter housing and turbocharger.



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Inspection and adjustment

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4. REMOVAL AND INSTALLATION

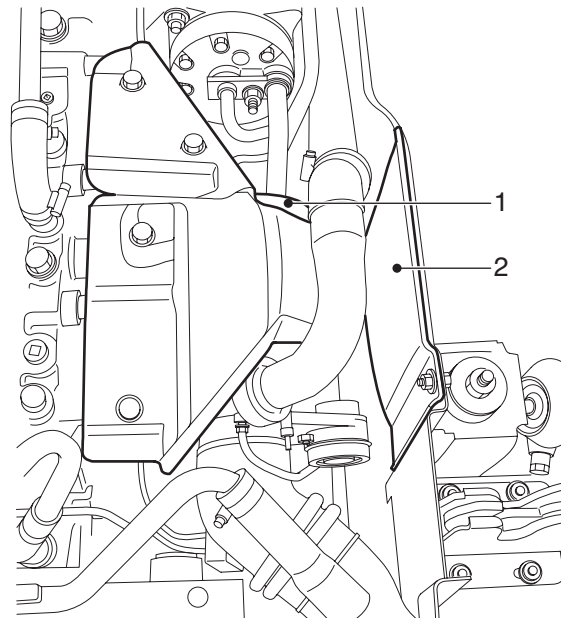
4.1 REMOVAL AND INSTALLATION, TURBOCHARGER



If the turbocharger to be replaced has been damaged to such an extent that parts of it are missing or lubricating oil has entered the inlet system, the inlet and exhaust systems must be checked and cleaned thoroughly in order to prevent serious damage to the engine.

Removing the turbocharger

1. Remove the right-hand engine encapsulation (2).
2. Remove the heat shield (1) from the oil filter.
3. Remove each charge pipe and the turbocharger exhaust pipe.
4. Remove the oil discharge pipe from the turbocharger.
5. Detach the entire oil supply pipe from the oil filter housing to the turbocharger.
6. Remove the attachment bolts from the turbocharger.
7. Remove the turbocharger.
8. Immediately plug the openings.



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Installing the turbocharger

1. Clean the turbocharger and the oil supply and discharge pipes.
2. Before installing the turbocharger, check the following:
 - the turbocharger housing and connector flange for cracks. See "Technical data" for rejection standards;
 - the turbocharger shaft must be able to rotate freely;
 - the turbocharger shaft must not run out of true;
 - the turbocharger pump and turbine wheels must not be damaged;
 - there must not be an excessive amount of oil in the compressor side of the turbocharger. A small amount of oil on the inside walls of the compressor side is allowed.

CE ENGINE INLET/EXHAUST SYSTEM

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Removal and installation

LF45/55 series

3. Check the adjustment of the turbocharger wastegate. See "Inspection and adjustment".
4. Check the axial bearing play of the turbocharger; see "Inspection and adjustment".
5. Check the radial bearing play of the turbocharger; see "Inspection and adjustment".
6. Clean the sealing surfaces.

Note:

Always use new gaskets when installing the turbocharger.

7. Apply a layer of Copaslip to the exhaust manifold studs.
8. Fit the turbocharger to the exhaust manifold.
9. Fit the attachment nuts and tighten them to the specified torque. See "Technical data".
10. Check that the oil supply and discharge pipes are clean and not blocked, kinked or cracked. Replace the pipes if necessary.

Note:

If the turbocharger oil supply and/or discharge does not function properly, this may result in serious damage to the turbocharger and/or engine.

11. Fit new O-rings to the oil discharge pipe and apply a thin layer of engine oil to them. Fit the oil discharge pipe. For the specified tightening torque, see "Technical data".
12. Pour clean engine oil into the oil supply of the turbocharger and fit the oil supply pipe, after fitting a new copper ring, on the oil filter housing and the turbocharger. Tighten the pipe to the specified tightening torque; see "Technical data".

6

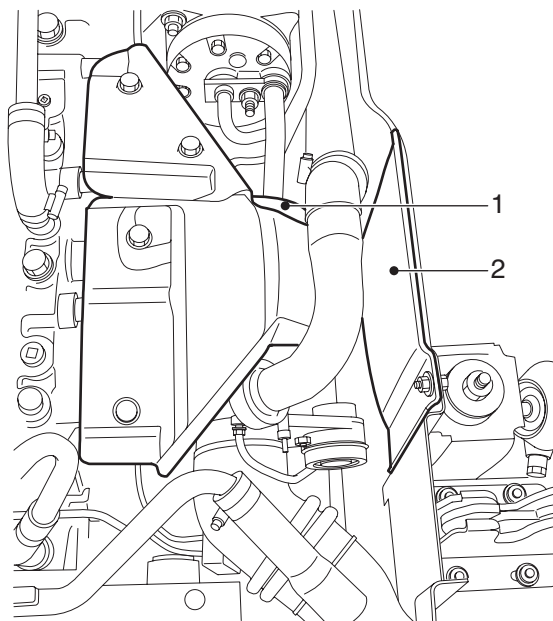
4

CE ENGINE INLET/EXHAUST SYSTEM

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Removal and installation

13. Fit the exhaust pipe to the turbocharger.
14. Fit the charge pipes to the exhaust pipe.
15. Fit the heat shield (1) to the oil filter.
16. Install the engine encapsulation (2).



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CE ENGINE INLET/EXHAUST SYSTEM

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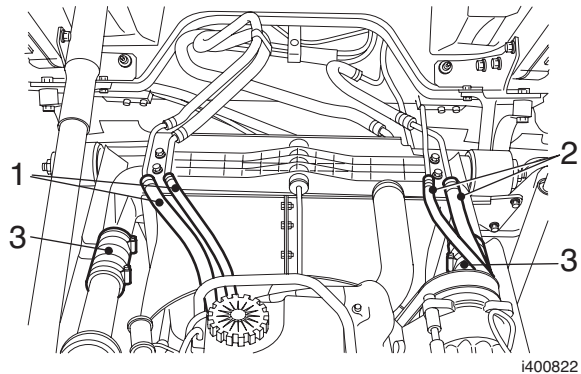
Removal and installation

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4.2 REMOVAL AND INSTALLATION OF AIR COOLER

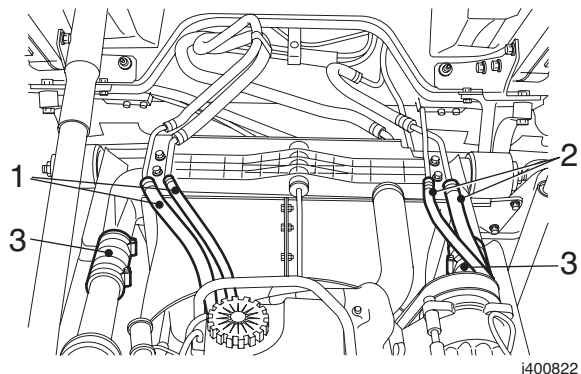
Removing the air cooler

1. Disconnect the earth lead from the battery terminal.
2. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (2) on the radiator and remove the condenser from the air cooler supports.
3. Loosen the support of the coolant pipes (1) on the radiator.
4. Remove the charge pipes (3) from the air cooler and plug the openings.
5. Disconnect the air cooler.
6. Remove the air cooler.



Installing the air cooler

1. Clean the outside of the air cooler with compressed air.
2. Install the air cooler and tighten the air cooler attachments.
3. Fit the charge pipes (3) to the air cooler.
4. Fit the bracket of the coolant pipes (1) on the radiator.
5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (2) on the radiator.
6. Connect the battery terminals.
7. Start the engine and check for leakage.



6

4

CE ENGINE INLET/EXHAUST SYSTEM

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Removal and installation

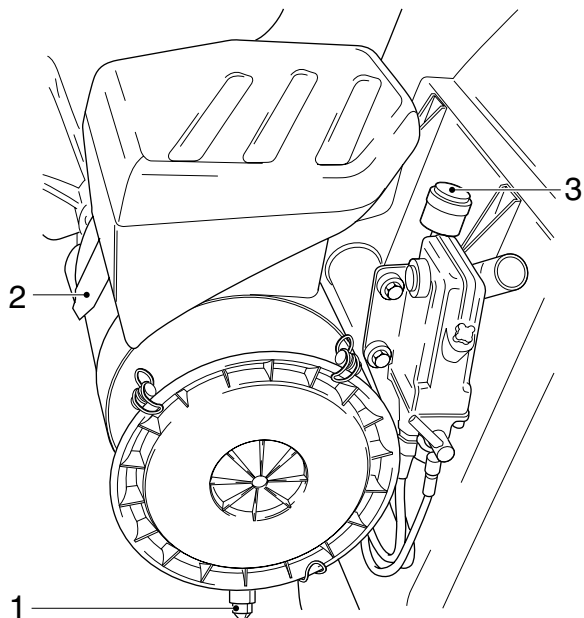
4.3 REMOVAL AND INSTALLATION, AIR FILTER ELEMENT

Removing the air filter element

1. Loosen all clamping brackets on the air filter cover.
2. Remove the air filter cover.
3. Remove the air filter element.
4. Clean the inside of the air filter housing and the air filter cover.
5. Clean the rubber sealing valves (1 and 2) on the filter housing. Check the sealing valve for damage.

Installing the air filter element

1. Fit the air filter element in the air filter housing.
2. Fit the air filter cover.
3. Install all the clamping brackets.
4. Reset the air filter indicator (3) by pressing the knob on the indicator.



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CE ENGINE INLET/EXHAUST SYSTEM

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Removal and installation

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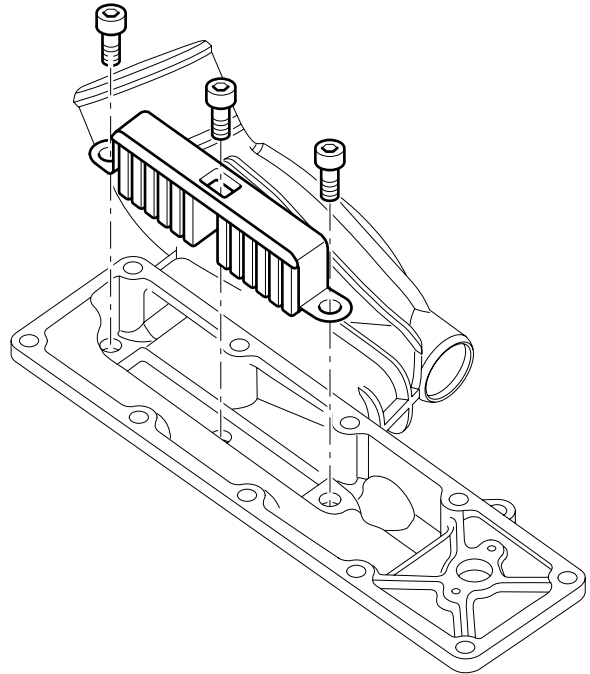
4.4 REMOVAL AND INSTALLATION, GLOW PLUG

Removing the glow plug

1. Remove the inlet manifold.
2. Remove the attachment bolts from the glow plug and remove the glow plug.

Installing the glow plug

1. Fit the glow plug and tighten the attachment bolts to the specified torque. See "Technical data".
2. Fit the inlet manifold.



M201155

5. CLEANING

5.1 CLEANING THE EXTERIOR OF RADIATOR AND AIR COOLER



Inhalation of dust may have serious consequences for your health. Take the necessary precautions, such as wearing goggles and a facemask.

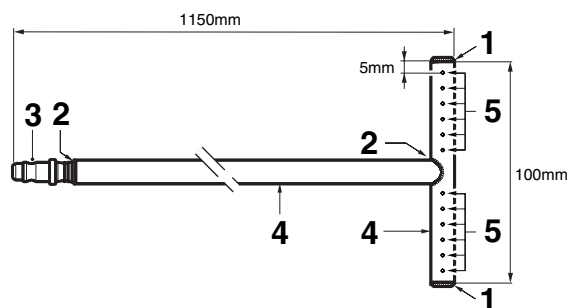
Note:

With the aid of a simple tool, the radiator and the air cooler can be blow-cleaned.

The tool (radiator cleaner) cannot be ordered from DAF. It should be manufactured by yourself according to the drawing.

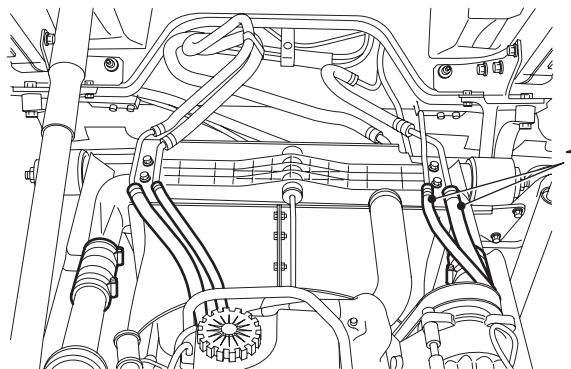
Key to drawing:

- 1 Solder up
- 2 Solder
- 3 Quick-release coupling for air hose
- 4 Steel pipe, $\varnothing$ 10 mm
- 5 6 x $\varnothing$ 1.5 mm between holes, with a centre-to-centre distance between the holes of 7 mm, drilled on one side



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1. If the vehicle has air conditioning, loosen the support of the refrigerant pipes (1) on the radiator and remove the condenser from the air cooler supports. Push the condenser as far as possible forwards.



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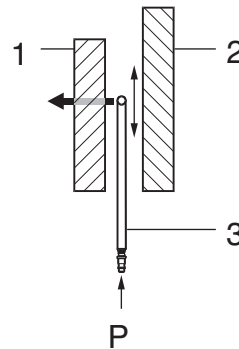
CE ENGINE INLET/EXHAUST SYSTEM

4

Cleaning

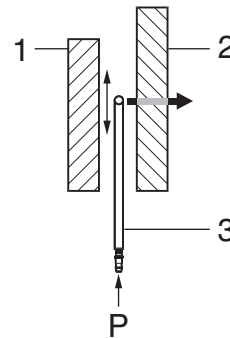
LF45/55 series

2. Insert the radiator cleaner (3) between the air cooler (1) and radiator (2) from underneath, with the air holes facing the air cooler (1).
3. Apply air pressure to the radiator cleaner (3) and continue blow-cleaning the air cooler (1) until no more dirt comes out.



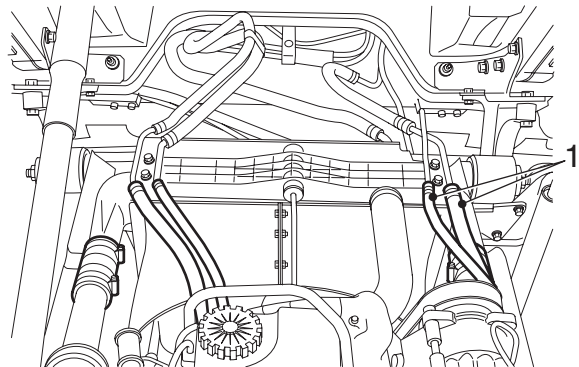
M201351

4. Turn the radiator cleaner (3) over, turning the holes towards the radiator (2), and blow-clean the radiator (2).



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5. If the vehicle has air conditioning, fit the condenser in the air cooler supports and tighten the support of the refrigerant pipes (1) on the radiator.



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4

ENGINE BRAKE, CE ENGINE

LF45/55 series

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2. GENERAL	2-1	200416
2.1 Location of exhaust brake components	2-1	200416
2.2 System description, exhaust brake	2-2	200416
3. INSPECTION AND ADJUSTMENT	3-1	200416
3.1 Inspection and adjustment, exhaust brake	3-1	200416
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ENGINE BRAKE, CE ENGINE

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS

Fuel



Diesel fuel is an extremely flammable liquid, and must not be exposed to naked flames or come into contact with hot surfaces. The diesel fuel fumes remaining in an empty fuel tank form an extremely explosive mixture.

When fuel system components are being removed, some fuel will escape.
To keep this spillage to a minimum, unscrew the tank cap to release any overpressure.

Any spilled fuel must be collected, bearing in mind the risk of fire.

Exhaust gases

Do not run the engine in an enclosed or unventilated area.
Make sure exhaust fumes are properly extracted.



Exhaust gases contain carbon monoxide. Carbon monoxide is a deadly colourless and odourless gas, which, when inhaled, deprives the body of oxygen, leading to asphyxiation. Serious carbon monoxide poisoning may result in brain damage or death.

Moving parts

Remain at a safe distance from rotating and/or moving components.

Various fluids

Various oils and lubricants used on the vehicle may constitute a health hazard.
This also applies to engine coolant, windscreen washer fluid, refrigerant in air-conditioning systems, battery acid and clutch fluid.
So avoid inhaling and direct contact.

Electrical short-circuit

Always disconnect the battery's earth connection during repair or maintenance operations for which the electric power supply is not required.

ENGINE BRAKE, CE ENGINE

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Safety instructions

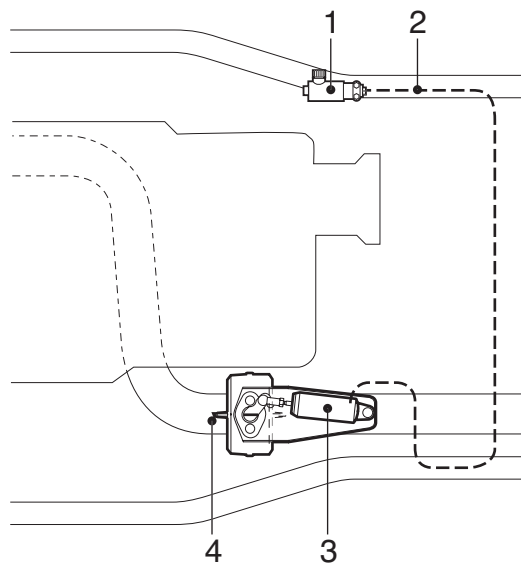
LF45/55 series

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2. GENERAL

2.1 LOCATION OF EXHAUST BRAKE COMPONENTS

1. Exhaust brake valve
2. Air pipe
3. Operating cylinder, exhaust brake
4. Butterfly valve



ENGINE BRAKE, CE ENGINE

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General

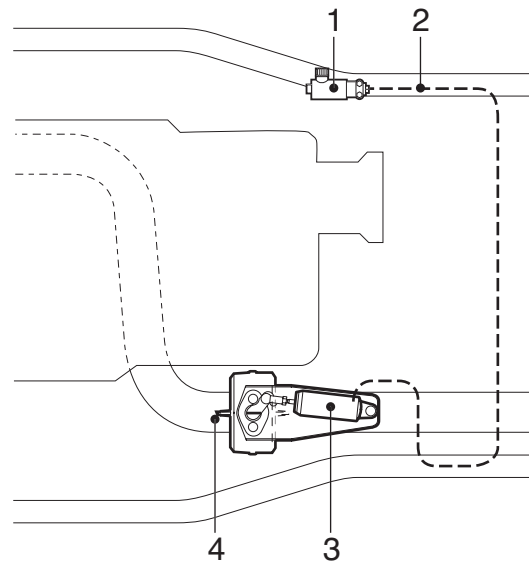
LF45/55 series

2.2 SYSTEM DESCRIPTION, EXHAUST BRAKE

1. Exhaust brake valve
2. Air pipe
3. Butterfly valve operating cylinder
4. Butterfly valve

Note:

The engine brake is an exhaust brake.



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Switching on the exhaust brake

The exhaust brake consists of an engine brake operating switch fitted to the steering column and an operating cylinder (3) connected to the butterfly valve (4) in the exhaust pipe.

If the exhaust brake operating switch is activated, a signal is passed to the engine management system's electronic unit. The operating switch has the positions "off" and "automatic". In the "automatic" position the engine management system's electronic unit engages the exhaust brake whenever this is appropriate and possible. Of course, the electronic unit disengages the exhaust brake when required.

If the exhaust brake is engaged by the electronic unit, the unit energises the exhaust brake valve (1), causing supply pressure to flow to the operating cylinder. The cylinder closes the butterfly valve in the butterfly valve housing. The exhaust pipe is then almost completely closed off. The engine management system's electronic unit also interrupts the fuel supply to the various cylinders. The engine now acts as a compressor, creating a braking action.

The higher the engine speed, the greater the braking action of the engine brake.

Switching off the exhaust brake

If the engine brake control switch is pushed back, the butterfly valve will be re-opened and the fuel supply to the various cylinders will be re-instated.

3. INSPECTION AND ADJUSTMENT

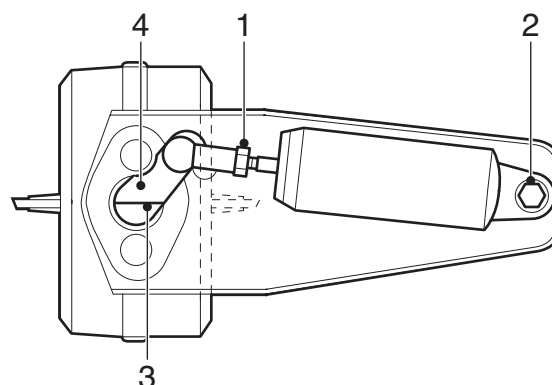
3.1 INSPECTION AND ADJUSTMENT, EXHAUST BRAKE

Checking exhaust brake

1. Check the exhaust brake for smooth operation by pressurising the exhaust brake cylinder yourself.

Setting the exhaust brake

1. Remove the air pipe from the operating cylinder.
2. Slacken lock nut (1) on the piston rod.
3. Remove the attachment nut (2) from the operating cylinder and take the operating cylinder off the support.
4. Open the butterfly valve fully (exhaust brake inactive), indicated by the mark (3) on the butterfly valve shaft, and press the lever (4) against the stop.
5. Set the piston rod length by rotating the operating cylinder in such a way that it can be fitted on the support.
6. Turn the piston rod one more full turn in the ball joint to give the operating cylinder the correct pre-tension.
7. Fit the operating cylinder on the support using the attachment nut (2) and fit the air pipe.
8. Tighten the lock nut (1).
9. Connect the air pipe to the operating cylinder.



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ENGINE BRAKE, CE ENGINE

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Inspection and adjustment

LF45/55 series

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4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION OF EXHAUST BRAKE

Removing the exhaust brake

1. Loosen the air pipe of the operating cylinder.
2. Remove the exhaust pipe from the exhaust brake.
3. Remove the entire exhaust brake.

Installing exhaust brake

1. Check the butterfly valve for smooth operation.
2. Clean and check the sealing faces of the butterfly valve housing and of the exhaust pipes.
3. Clean the attachment bolts and apply heat-resistant grease to the threads.
4. Fit the exhaust brake.
5. Fit the exhaust pipe.
6. Connect the air pipe.
7. Check the operation of the exhaust brake.

ENGINE BRAKE, CE ENGINE

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Removal and installation

LF45/55 series

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TECHNICAL DATA

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1. COMPONENTS**1.1 GENERAL****BULBS**

Dipped beam light	70 W
Main beam light	70 W
Parking light	5 W
Rear light	10 W
Rear fog light	21 W
Reversing light	21 W
Stop light	21 W
Direction indicator lamp	21 W
Front fog light	70 W
Front spot lights	70 W
Interior lighting	10 - 21 W
Bunk lamp	21 W
Stepwell lighting	5 W
Marker light	5 W

Max. current and wire diameter (mm ²)				
Wire diameter	Up to 2 m	2 - 4 m	4 - 8 m	From 8 m
0.5	3	1.5	0.5	
1	9	5	4	
1.5	22.5	13.5	7.5	6
2.0	30	17	10	8
2.5	37.5	22.5	12.5	10
3.0	47	27	16	13
4	60	36	20	16
4.5	69	43	24	19
6	90	54	30	24
7.5	114	73	40	33
10	150	90	50	40
16	240	144	80	64
25	375	225	125	100
35	525	315	175	140
50	750	450	250	200
70	1050	630	350	280
95	1425	855	475	380
120	1800	1080	600	480

TECHNICAL DATA**5****Components****LF45/55 series****0****Alternator****NCB1**

Max. current 80 A
 Rated voltage 28 V

NCB2

Max. current 100 A
 Rated voltage 28 V

Battery

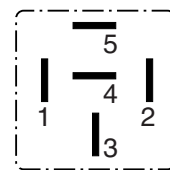
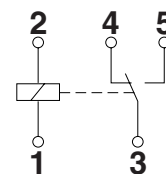
Voltage 12 V
 Max. capacity 128 Ah

Optional:

Voltage 12 V
 Max. capacity 170 Ah

Mini relay (20 A)

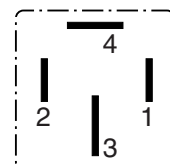
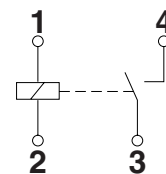
Resistance value of coil approx. 250 Ω
 Measured between points 1 and 2



E501287

Relay (50 A)

Resistance value of coil approx. 175 Ω
 Measured between points 1 and 2



E501288

CDS hand-held transmitters

Battery type (2x) CR1620, 3 V

1.2 TIGHTENING TORQUES

Alternator

Drive pulley

80 Nm $\pm$ 5 Nm

B+ connection

15 Nm

Earth connection

Chassis

35 $\pm$ 10 Nm

TECHNICAL DATA

5

Components

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DIAGNOSTICS

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1

1. BATTERIES

1.1 FAULT-FINDING TABLE

SYMPTOM: NEW BATTERY HEATS UP CONSIDERABLY DURING FILLING	
Possible cause	Remedy
Inadequate formation because of storage in unsuitable or damp conditions over a long period	Allow to cool Charge fully Check the relative density

SYMPTOM: BATTERY OVERFLOWS, BATTERY ACID SPILLS FROM PLUG HOLES	
Possible cause	Remedy
Battery overfilled	Siphon off some of the fluid
Overcharging	Check charging voltage Check/repair charging circuit

SYMPTOM: ACID LEVEL TOO LOW	
Possible cause	Remedy
Leaking battery	Replace the battery
Excessive gas development due to charging current being set too high	Check charging voltage Check/repair charging circuit

SYMPTOM: RELATIVE DENSITY TOO LOW (< 1.240) STARTING TROUBLE	
Possible cause	Remedy
Power consumer left on by mistake	Charge the battery
Insufficient charging	Check alternator drive Check/repair charging circuit

SYMPTOM: RELATIVE DENSITY TOO HIGH (> 1.290)	
Possible cause	Remedy
Topped up with battery acid instead of distilled water	Siphon off some of the fluid and top up with distilled water If necessary, repeat this after mixing (charging)

DIAGNOSTICS**5**

Batteries

LF45/55 series**1**

SYMPTOM: STARTING TROUBLE POOR STARTING TEST RESULT POWER FAILS UNDER LOAD	
Possible cause	Remedy
Discharged battery	Charge the battery
Worn battery (plates corroded and worn away)	Replace the battery
Defective battery ("dead cell")	Replace the battery
Battery sulphated (plates have hardened)	Replace the battery

SYMPTOM: BURNT-IN BATTERY TERMINALS	
Possible cause	Remedy
Cable clamps not securely fitted or poor contact	Have the battery terminals repaired, fit the cable clamps properly and replace the cable clamps if necessary

SYMPTOM: 1 OR 2 CELLS BUBBLE EXCESSIVELY UNDER HIGH LOAD (STARTING OR STARTING TEST)	
Possible cause	Remedy
Defective cells	Replace the battery
Leaking cell partition	Replace the battery

SYMPTOM: BATTERY DISCHARGES VERY FAST (DOES NOT RETAIN POWER)	
Possible cause	Remedy
Insufficient charging	Check the charging. Is the charging time (driving time) sufficient?
Short circuit in charging circuit	Check the charging circuit
Major self discharging, for example due to contamination	Clean the battery
Battery sulphated (on examining the plates, they are found to be hard and, in some cases, whitened)	Replace the battery

SYMPTOM: SHORT BATTERY LIFE	
Possible cause	Remedy
Wrong type of battery chosen (for example if the vehicle has a tail lift)	Replace with battery of a higher capacity (170 Ah)
Often too deeply discharged	Intermediate charging with rectifier
Not recharged after deep discharge (white deposits)	Always charge the battery after deep discharge
Alternator capacity too low	Use alternator with higher capacity (100 A)

SYMPTOM: THE BATTERY HEATS UP DURING USE AND CONSUMES A LOT OF FLUID	
Possible cause	Remedy
Overloading, or charging voltage too high	Check the charging circuit (voltage regulator)

SYMPTOM: BATTERY HAS EXPLODED	
Possible cause	Remedy
Fire or sparks during or just after charging	Ensure good ventilation and exercise due caution as regards fire and sparks
Short circuit between the battery terminals	Exercise caution when storing conductive material (for example, tools)
Internal defect (loose connection)	Replace the battery

SYMPTOM: DEFECTIVE ALTERNATOR AND/OR DIODES (RADIO AND OTHER POLARITY SENSITIVE EQUIPMENT NOT WORKING)	
Possible cause	Remedy
Reversed battery polarity, or incorrect charging	Discharge the battery and charge in the correct direction Replace the battery and/or alternator if necessary

SYMPTOM: BATTERY HAS NO VOLTAGE	
Possible cause	Remedy
Internal open circuit	Replace the battery
Battery very deeply discharged	Charge the battery and test it; replace if necessary

1.2 SERVICE LIFE

The service life of a battery is significantly shortened if it used “cyclically”.

This means that the batteries are used a lot without their being charged.

For example when using a tail lift, cab heater, microwave oven or cooler box.

This is why batteries in commercial vehicles and vehicles used for international transport often fail prematurely (within 1.5 years).

The battery must be charged whenever the voltage measured across one battery falls below 12.5 V. If the battery is not charged, the “sulphating” process will begin.

This is a chemical reaction in the battery that produces lead sulphate. Lead sulphate adheres to the battery plates and can cause short-circuiting between the plates, reducing the capacity of the battery.

However, most lead sulphate breaks down when the battery is recharged.

If a battery is used (discharged) while it is not being charged by the alternator, short-circuiting between the battery plates will occur sooner.

This reduces the capacity and consequently the service life of the battery.

2. ALTERNATOR

2.1 FAULT-FINDING TABLE

SYMPTOM: ALTERNATOR NOT PRODUCING POWER WHEN IDLING	
Possible cause	Remedy
Open circuit in connection 15 on alternator	Repair connection 15
Connection 15 on alternator short-circuited to earth	Repair connection 15
Internal defect	Replace regulator

SYMPTOM: ALTERNATOR WARNING (YELLOW)	
Possible cause	Remedy
Open circuit in "S" connection	Measure the regulated alternator voltage with as many consumers as possible switched on and with the engine turning above idling speed
Open circuit in "L" connection	Check/repair wiring
Open circuit in connection 15	Increase the engine speed to approx. 1500 rpm. If voltage is now present, check connection 15 on the alternator
Voltage difference between "B+" and "S" connections is greater than 2.5 V	Check all contacts between alternator and B+ (contact resistors) Internal battery resistance too high
Voltage too low < 16 V	Check alternator drive. Check wiring on contact resistors

SYMPTOM: ALTERNATOR VOLTAGE HIGH (RED)	
Possible cause	Remedy
Voltage too high > 31 V	Measure voltage
Internal defect	Replace regulator/alternator

DIAGNOSTICS

5

Alternator

LF45/55 series

1

3. FAULT FINDING

The following test equipment and tools can be used to trace faults.

1. The best instrument for this is a digital multimeter. This instrument can be used to measure voltages, currents and resistances without reading errors and it can be used to trace virtually any faults.
2. The "Multimeter" function of DAVIE XD can be used to carry out all the measurements that can be made with an ordinary, separate multimeter.
3. Many, but not all, faults are easily traced by means of warning lamps. Failures caused by poor earthing cannot normally be detected by a warning lamp or buzzer.

The most frequently occurring faults are:

- a. short circuit
- b. open circuits
- c. earthing problems (poor earthing due to corrosion).

3.1 SHORT CIRCUITS

A short circuit is caused by a positive wire shorting somewhere to earth. This can generate a very high current. In most cases this will cause a fuse to blow.

To remedy this failure, use a test lamp of approximately 70 W. First check the diagram to see which consumers are connected to the fuse in question and then switch them all off.

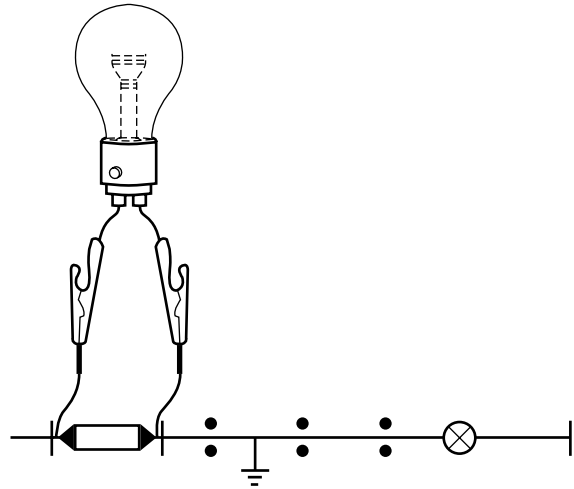
Remove the fuse and connect the test lamp in its place. Now switch each of the consumers on and off one by one. If the lamp comes on very brightly when a consumer is switched on, the fault is almost certainly in the wiring of that consumer. Now check the diagram to see via which connectors the consumer is connected. Now disconnect the first wiring connection (as seen from the fuse).

If the lamp is still bright, the fault is between the fuse and this wiring connection.

If, however, the lamp goes out, the fault is somewhere further on in the wiring.

Now reconnect the connectors and disconnect the next wiring connection. If the lamp is still bright, the failure is between these two wiring connections.

However, if the lamp goes out again, the fault-finding procedure must be continued. The faulty wiring section can be found in this way.



W 5 03 013

3.2 OPEN CIRCUIT

Suppose a consumer is not functioning. The fault may be in the consumer itself, or there may be an open circuit in the wiring.

First switch on the consumer. Then check the consumer for voltage using a test lamp. If no voltage is found, first check whether the fuse is still intact.

If there is voltage at the fuse, check the wiring from the fuse to the consumer. This means every wiring connection must be checked.

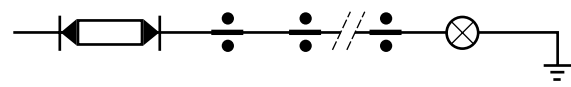
Stop at the first wiring connection that has no voltage. The open circuit will be between this connection and the previous one.

However, if there was a voltage at the consumer, there may still be an open circuit in the negative (earth) wiring. Check this using a test lamp.

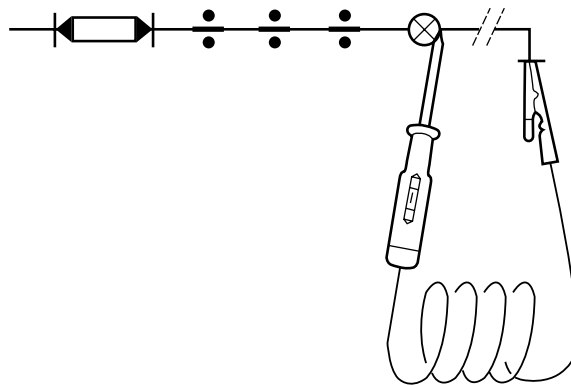
Ensure that the relevant circuit is switched on. Connect one end of the test lamp to earth and the other end to the earth connection of the component to be checked.

If the test lamp comes on, the earth connection of the component is interrupted. If the test lamp does **not** light up, the earth connection will in many cases be in good condition.

If both the positive and negative connections are in good order, the consumer in question must be replaced.



W 5 03 015



W 5 03 016

DIAGNOSTICS

5

Fault finding

LF45/55 series

3.3 EARTHING PROBLEMS

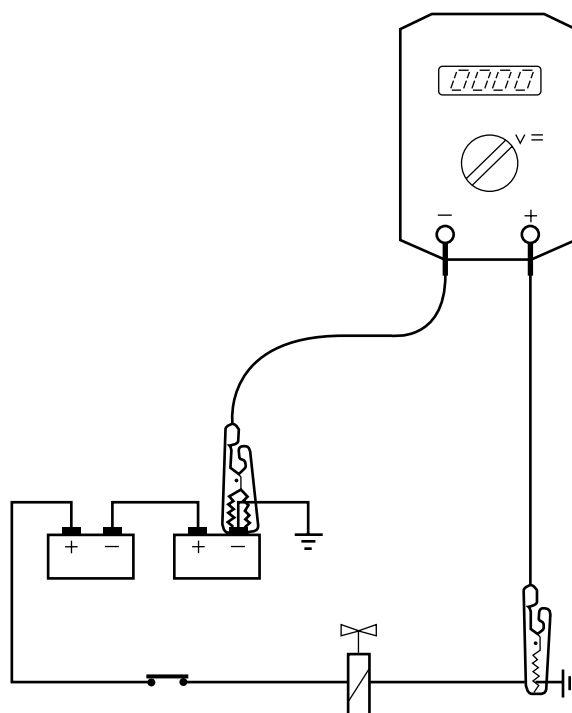
Earthing problems are mainly caused by corrosion between the contact surfaces of electrical connections.

Earthing problems can only be detected using a multimeter (preferably digital). A digital tester is preferable because usually only a few volts will be measured and an analogue meter is generally not precise enough for this purpose. To find out whether a specific earthing point has a good earth connection, use a voltmeter to measure the voltage between the negative battery pole and this earthing point. Switch on as many consumers as possible. If there is a correct earth connection, **no** voltage should be found.

In practice, however, a loss of approx. 0.5 volts will often be measured.

If the reading is higher, the earth connection must be checked carefully.

In this way, the earth connections of all consumers can be checked and measured.



W 5 03 014

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1. GENERAL

1.1 MULTIMETER

The Fluke 87 multimeter allows you to select various measuring options:

Units of measurement

The multimeter should be set to the range for the unit of measurement required.

For example, the voltage, current or resistance range.

The units of measurement are indicated by symbols on the meter. The following symbols are used.

1. DC voltage
2. AC voltage
3. DC current
4. AC current
5. resistance
6. duty cycle
7. frequency

- 1 DCV - $\overline{\overline{V}}$
- 2 ACV - $\tilde{V}$
- 3 DCA - $A\overline{\overline{=}}$
- 4 ACA - $A\sim$
- 5 Ohm - Ω
- 6 %
- 7 Hz

W 5 01 004

1.2 SCOPEMETER

Diagnostics in modern electronic systems is steadily becoming more complex.

Using a multimeter on its own is not always sufficient to diagnose a fault.

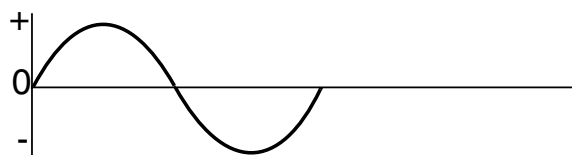
The scopemeter allows complex signals to be measured.

Practical examples of complex signals are:

- PWM signals
- deformation of signals
- CAN-bus signals

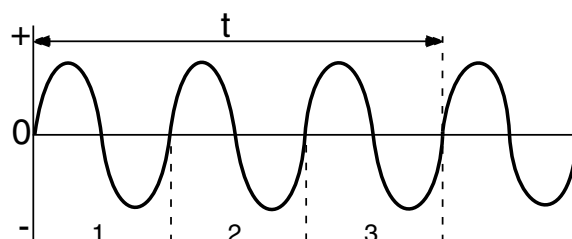
1.3 SIGNAL MEASUREMENTS**Sine-wave signal (AC voltage)**

This signal regularly changes polarity with respect to the "0" line

**Frequency**

The frequency is shown in Hertz (Hz).

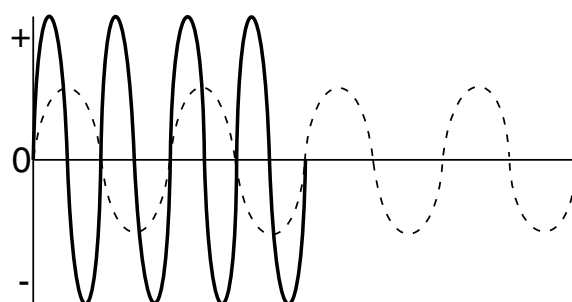
The number of complete sines per second is the frequency of the signal (3 Hz in the diagram).



$t = 1$ second

Voltage

If the number of sines per second increases, not just the frequency increases but also the voltage. This depends on the type of sensor.



W 5 01 002

Measuring a sine-wave signal

The sine-wave signal can be measured in the following ways using a multimeter:

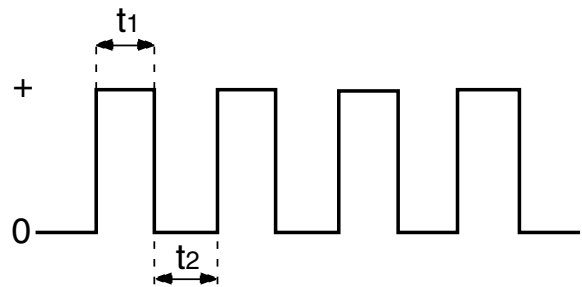
- with the multimeter in the frequency (Hz) position.
In this way, the number of complete sines per second is measured.
- multimeter in the AC voltage position.
In this way, the average value of the supplied voltage is measured.

Sine-wave signals in the vehicle

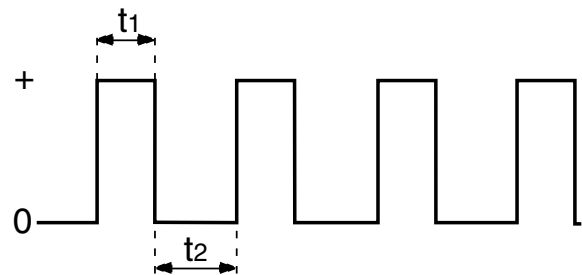
- Wheel speed sensor output signal
- Engine speed sensor output signal.

Square-wave signal

Square-wave signals are signals with only two voltage levels, both of which have the same duration in principle (t_1 is equal to t_2).



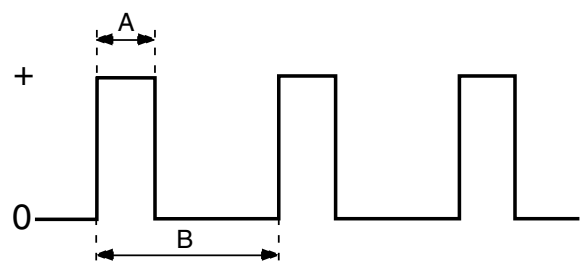
If the duration is different for the two levels (t_1 is not equal to t_2), the signal is also called "pulse train".

**Duty cycle**

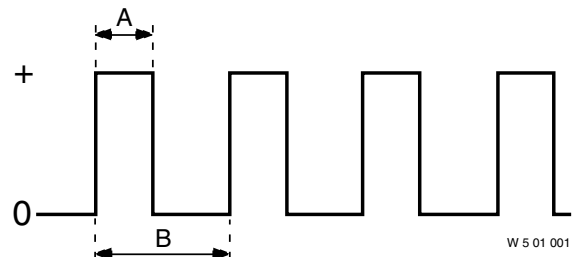
The duty cycle is the ratio between the two voltage levels, expressed as a percentage.

$$\frac{A}{B} \times 100\%$$

The voltage level ratio of a pulse train may change (for example, when the vehicle speed increases).

**Voltage**

If the duty cycle increases, the average voltage will also increase.



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General

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Measuring a square-wave signal

The square-wave signal can be measured in the following ways using a multimeter:

- with the multimeter in the duty cycle (%) position.
In this way, the voltage level ratio is measured.
- multimeter in the DC voltage position.
In this way, the average value of the supplied voltage is measured.

Square-wave signals in the vehicle

- Output signal of the vehicle speed sensor
- Vehicle speed signal from tachograph to electronic units

2

2. DESCRIPTION OF COMPONENTS

2.1 INDUCTIVE SENSOR

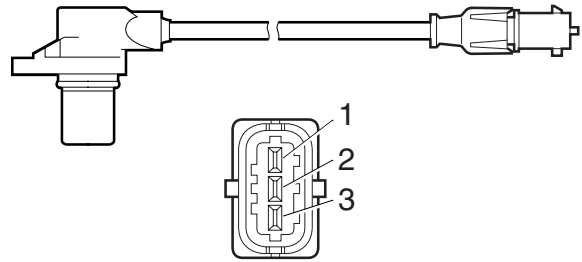
The vehicle has a number of inductive sensors, such as:

- wheel speed sensor
- engine speed sensor
- camshaft sensor

Registering engine speed

The engine speed is registered via the crankshaft position sensor.

The crankshaft position sensor output signal is a sine-wave signal with a frequency corresponding to the number of holes in the pulse disc and the crankshaft rotation frequency. In the engine management electronic unit, the signal is converted into a message, which is sent via the CAN network. The VIC sends this message to the DIP, which then activates the rev counter.



i400442

Engine speed sensor operating principle

The inductive sensor consists of a permanent magnet (1), a core (2) and a coil (3).

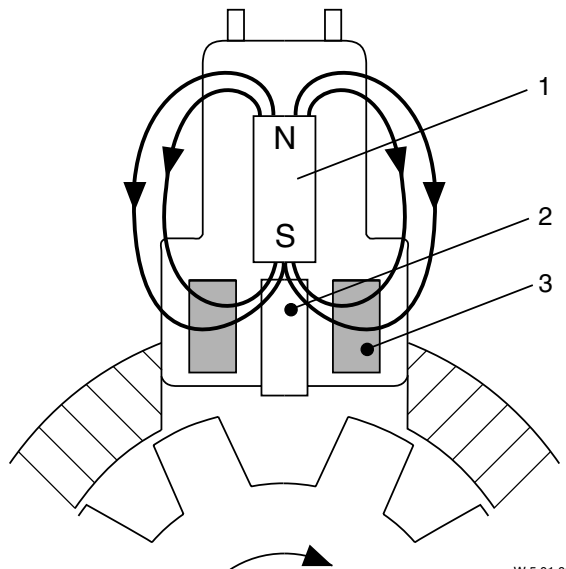
When the inductive sensor is situated between two teeth, the lines of force of the magnetic field will run directly from the north pole to the south pole via the housing.

The moment a tooth approaches the inductive sensor, the lines of force of the magnetic field will run from the north pole to the south pole via the housing, the teeth of the toothed wheel and the core.

As more lines of force are now running through the core, a more powerful magnetic field is obtained.

As a result of this change in the magnetic field, an AC voltage is generated in the coil.

The value of the AC voltage generated depends on the speed of rotation of the toothed wheel and the air gap between sensor (core) and tooth.



W 5 01 005

COMPONENTS

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Description of components

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2.2 VEHICLE SPEED SENSOR

The vehicle speed sensor has two connections for output signals. The real-time speed signal, triggered by a Hall IC, is sent via the first connection,

Via the other connection, a data signal (bi-directional signal) is sent, which involves an exchange of data between the MTCO and the speed sensor. The MTCO requests data from the sensor.

The sensor sends the coded data to the MTCO in sequence, and the MTCO checks the accuracy of this data.

The coded signal consists of the following data:

- serial number of the sensor
- Master key (the same as that of the MTCO)
- coded speed signal

In the MTCO, the coded speed signal is compared with the real-time speed signal. The MTCO sends commands and data to the sensor at 10-second intervals.

Duty cycle speed signal

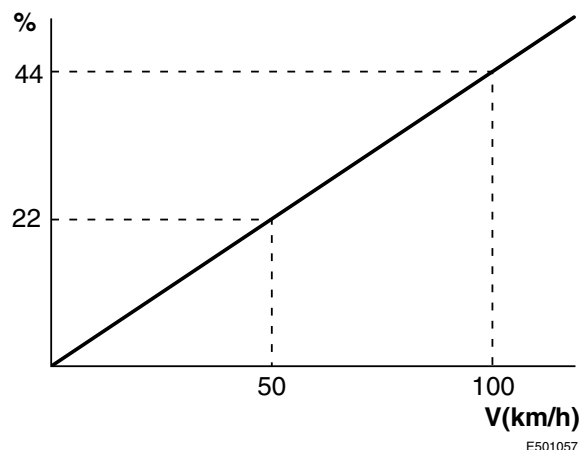
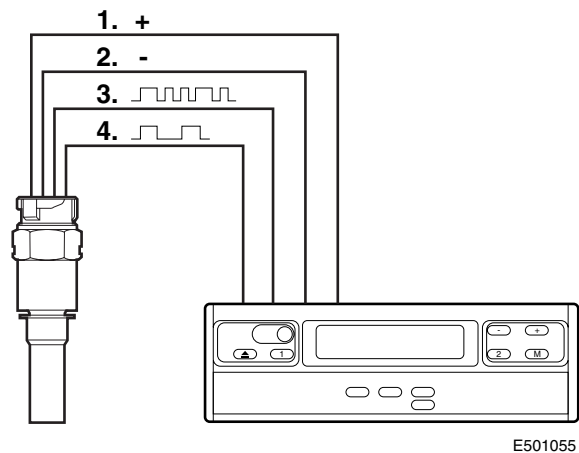
The speed signal sent via the vehicle speed sensor to the MTCO is processed by the MTCO and sent as a message via the CAN network. The speed signal is also converted into a duty cycle signal. This duty cycle signal is used by the electronic units that do not receive the speed signal message via the CAN network.

The diagram alongside shows the linear characteristic of the duty cycle (%) in relation to the vehicle speed (V).

This graph applies to all vehicle models.

Inspection

The duty cycle signal (square-wave voltage) can be checked with a multimeter that is set to the DC voltage or duty cycle range or with a scopemeter.



2.3 TEMPERATURE SENSORS

The vehicle has a number of temperature sensors, such as:

- coolant temperature sensor
- inlet air temperature sensor
- fuel temperature sensor
- ambient air temperature sensor

These sensors are temperature-sensitive resistors.

The resistance of these sensors changes considerably with rises or drops in temperature.

There are two types of temperature sensor:

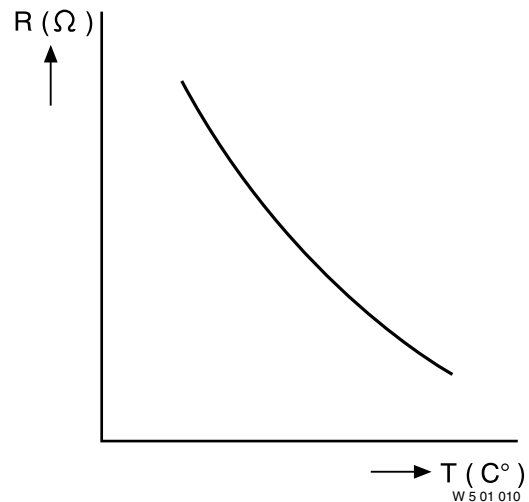
- NTC resistor (Negative Temperature Coefficient)
- PTC resistor (Positive Temperature Coefficient).

NTC resistor

In an NTC resistor, the resistance value reduces as the temperature rises.

Application:

- measuring coolant temperature.



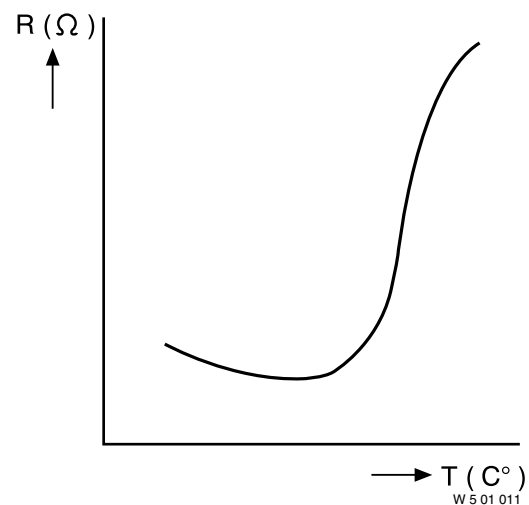
PTC resistor

In a PTC resistor, the resistance value increases as the temperature rises.

In the PTC resistor, in contrast to the NTC resistor, there will be a great change in resistance within a small temperature range.

Application:

- measuring air temperature when cab heater is on.



Inspection

The temperature sensors can be checked using a multimeter that is set to the resistance range.

COMPONENTS

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Description of components

LF45/55 series

2.4 PRESSURE SENSORS

The vehicle has a number of pressure sensors, such as:

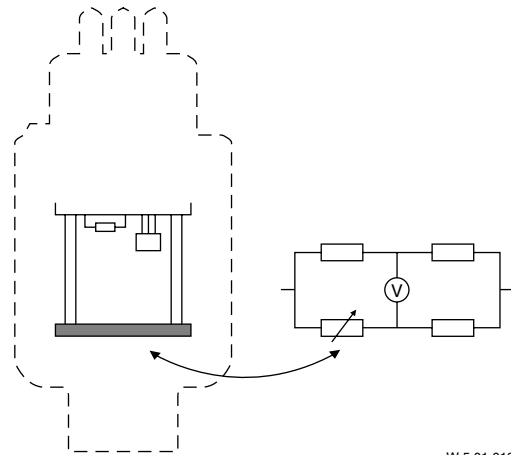
- pressure sensor to register the bellows pressure in ECAS.
- pressure sensor on the air supply unit for pressure gauges in the DIP-4.

There is a diaphragm made of semiconducting material (silicon) in the pressure sensor. When pressure is applied to the diaphragm, it will be deflected. Deflection of the diaphragm leads to a change in the resistance of the semiconducting material.

The diaphragm is part of what is known as a bridge circuit. Deflection of the diaphragm unbalances the bridge circuit, which changes the output signal. The output voltage is in direct proportion to the pressure applied (deflection of the diaphragm).

Inspection

The output voltage can be checked using a multimeter set to the DC voltage range.



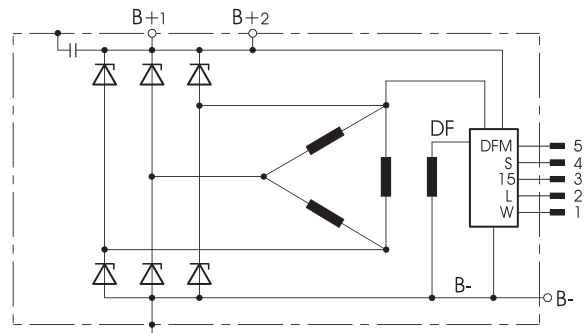
W 5 01 012

2.5 ALTERNATOR

The compact alternator is a lightweight alternator with two internal cooling fans. The electronic controller also controls pre-excitation of the alternator. The function of the exciter diodes has also been taken over by the controller. The alternator generates high currents in the lower speed range.

S sens connection of the regulator
15 power supply after contact
L connection to VIC

The alternator has two B+ connections that are connected to each other internally. B+1 is connected to the batteries and the B+2 connection is connected to the "S" connection on the regulator. B- (earth) is connected to the alternator housing.



E501373

Connection 15

When the contact has been turned on, power is supplied to the alternator via connection 15, pin 3 (1010). The regulator uses this power to activate pre-excitation (self-energising). If there is an open circuit in this connection, the alternator will not produce any power until it reaches a speed of about 5000 rpm. This corresponds to an engine speed of approx. 1500 rpm. The alternator will energise itself when it reaches this speed.

Sens connection

The sens connection, pin 4, can be used to compensate for voltage losses in B+.

There are voltage differences between the alternator and the battery.

Voltage regulation can be improved if these voltage variations can be controlled.

This function is, however, not used. The sens connection is connected directly to B+2 and therefore no voltage differences are measured.

L connection

The L connection, pin 2, is connected to the VIC electronic unit.

This connection is used to activate a fault message in the main display via the VIC, if necessary.

L voltage high: no fault

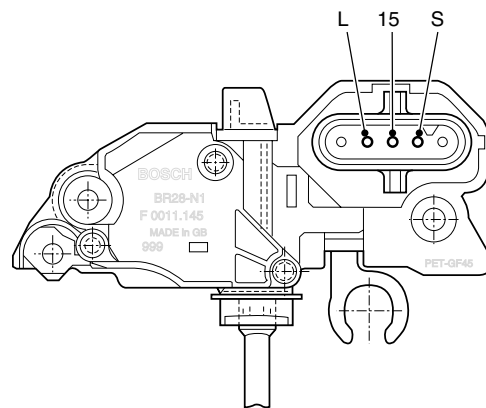
L voltage low: fault

The following faults can be detected via the "L"-connection:

- voltage too low (< 16 V)
- open circuit in connection 15 (1010)
- open circuit in "S" connection - open circuit in "L" connection

These faults are indicated by the yellow "Alternator fault" warning.

Too high a voltage (red warning) can be recognised by too high a voltage (> 31 V) on the VIC electronic unit.



E501129

COMPONENTS

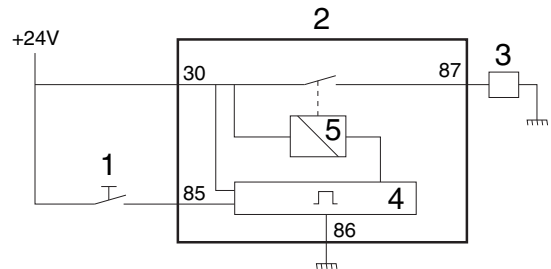
5

Description of components

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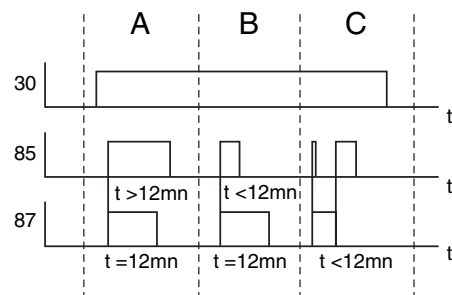
2.6 WINDSCREEN HEATING RELAY

The windscreen heating relay (2) is a time relay with a duration of 12 minutes. The relay is activated by the mirror heating switch (1). This activates the timer (4) in the relay. The timer in its turn activates the internal relay (5), thus supplying the windscreen heating system (3) with power.



E501512

- A. After 12 minutes the timer automatically switches off the internal relay, although the switch continues to be operated.
- B. If the switch is turned off before the 12 minutes have passed, the relay is still switched on for 12 minutes.
- C. If the switch is turned on and off twice in succession within the twelve minutes, the timer will turn off the relay.



E501513

3. DIAGNOSTICS

3.1 DIAGNOSTICS IN ELECTRICAL SYSTEMS

For diagnosis, DAVIE XD is used.

This tool has a two-channel scope and a multimeter function.

DAVIE XD is also used to read data from electronic systems. When a fault arises, it offers the option of selecting a “guided” diagnosis that goes through a series of measurement steps to help locate the cause of the problem.

Refer to the user manual for an extensive description of the operation and possibilities of DAVIE XD.

COMPONENTS

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Diagnostics

LF45/55 series

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WIRING REPAIR

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1. GENERAL

The increasing application of electronics in vehicles means a much broader range of connectors, contacts and wiring is being used. Be sure to pay special attention to this during repairs, so as to avoid unnecessary faults.

1.1 CONNECTOR

A connector is a removable connection between two or more electrical wires or components. The female contacts are on one side and the male contacts on the other side. This way they can be connected and disconnected.

The connector should protect the contacts against unwanted electrical connections and external influences. It also ensures the proper connection of the applicable contacts.

1.2 CONTACT

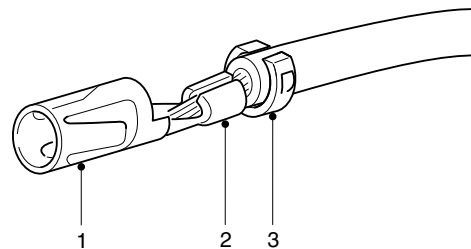
A connector has one or more contacts. These contacts are available in various sizes and models.

However, they all have the same design:

The mating part (1) enables the electrical connection between the contacts.

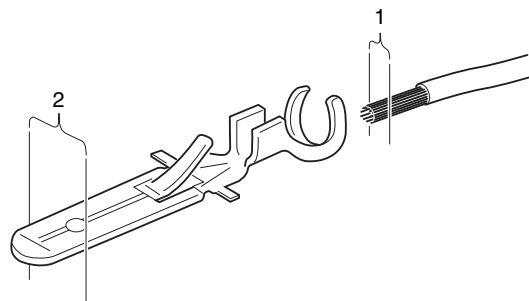
The contact press part (2) is the electrical connection between the stripped part of the wire and the contact.

The relief part (or pull relief) (3) relieves the contact press part from mechanical wear. The insulation relief is placed over the insulating sheath and/or the SCAT.



E501479

With contacts, three dimensions are important: the diameter (1) of the wire to be connected, the size of the contact press part (2), which is linked to the wire diameter, and the size of the mating part (3).



E501504

WIRING REPAIR**5**

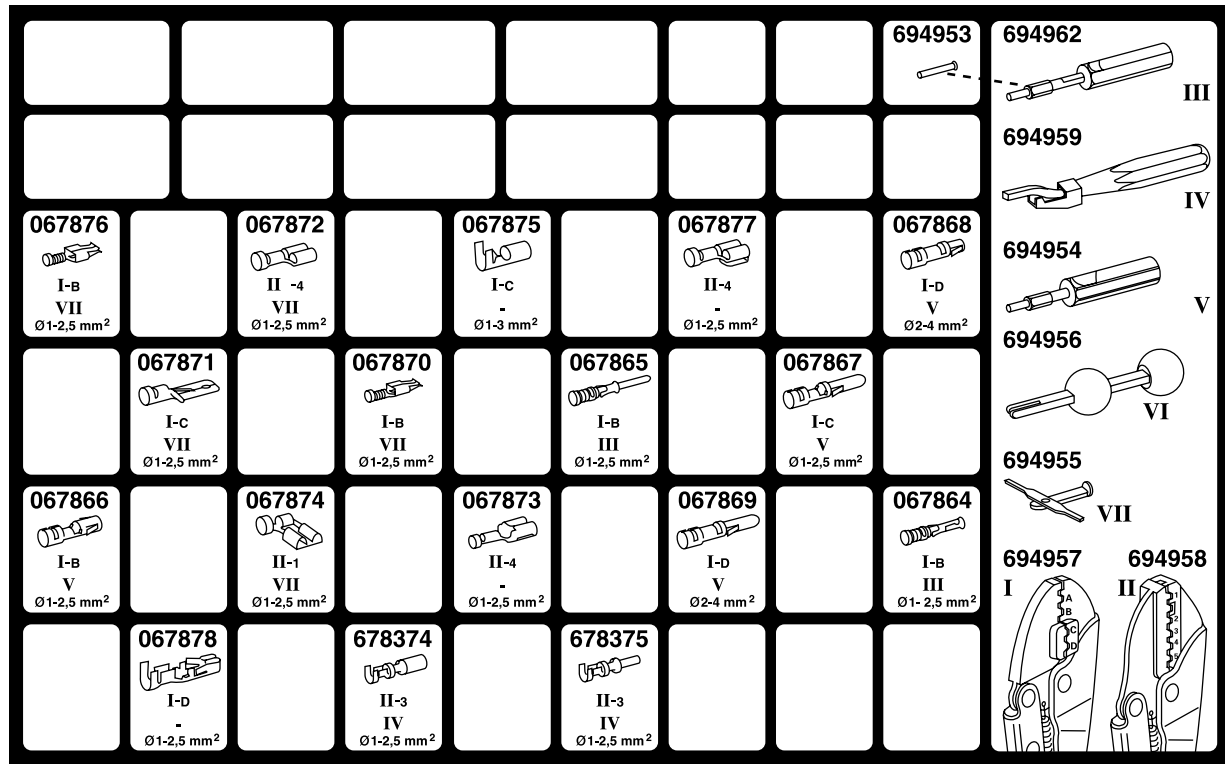
General

LF45/55 series**1.3 CONTACT KITS**

Contact kit A

Contact kit A (DAF no. 0694960) is available for the contacts, except SCAT contacts and micro-timer contacts.

There is a sticker on the inside of the box to facilitate selection of the contact, contact crimping tool and ejector tool.



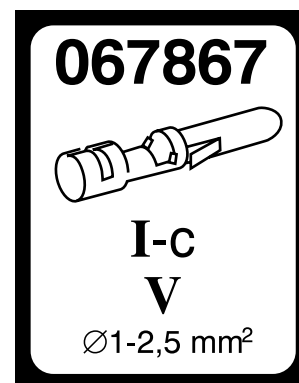
W 5 03 019

At the top the DAF no. of the contact is shown. Roman numerals I and II, shown below the illustrations, refer to the contact crimping tool to be used.

The numeral or letter added to Roman numeral I or II indicates the hole in the contact crimping tool in which the contact is to be placed.

Roman numerals III to VII refer to the type of ejector tool to be used for removing the contact from the connector.

The information at the bottom refers to the core section suitable for the contact.



W 5 03 018

Contact kit B

Additional contact crimping and ejector tools are required for SCAT contacts and for micro-timer contacts. Contact kit B (DAF no. 1240065) is available for this purpose. There is a sticker on the inside of the box to facilitate selection of the contact, contact crimping tool and ejector tool (to be used in the same way as for contact kit A).

Note:

The proper ejector tool and the proper contact crimping tool for each contact can also be found through "Parts Rapido".

WIRING REPAIR

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General

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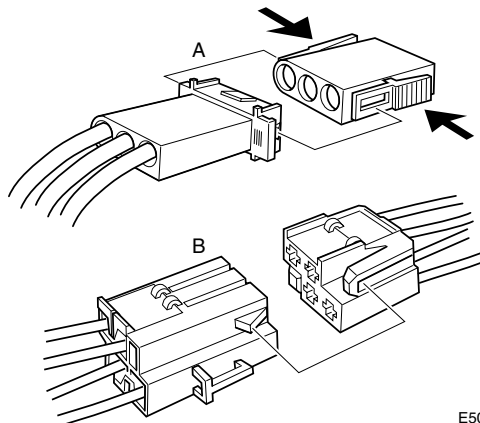
2. REMOVAL AND INSTALLATION

2.1 REMOVAL AND INSTALLATION, CONNECTORS

Unlocking the connectors

The connectors can often be locked with one another or with a component. They can be divided into:

- A. active locking.
This means that the lock must be activated. With this type a lock must often be pressed.
- B. passive locking.
Opens when the parts are pulled apart with a certain force.



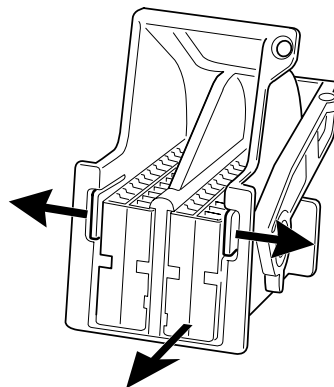
E501480

Two connectors in one housing

These connectors consist of two separate connectors. To remove the contacts first remove the connectors from the connector housing. Push the locking lip aside before removal. The connector can then be slid out of the connector housing.

For example:

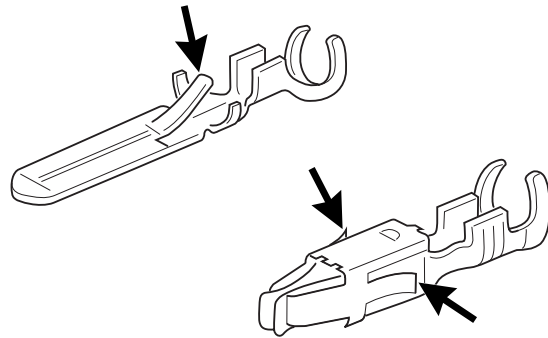
- connector for VIC electronic unit



E501484

2.2 REMOVAL AND INSTALLATION, CONTACTS**Contact lock**

There are various types of contact locks. A few examples are given below. When a lock is applied, individually for each contact, this is called a primary lock. An extra general lock for several contacts in a connector is a secondary lock.



E501481

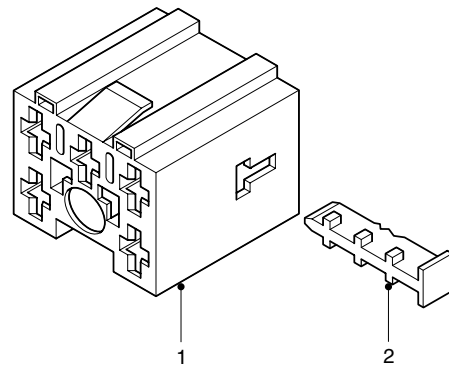
Primary contact lock

To keep an individual contact in the connector in place, a contact is often furnished with one or more locking bolts. This is a primary lock. These locking bolts should never be damaged, with a view to pressing and ejecting the contacts.

Secondary contact lock

This type of lock is normally used on 2 and 3-row connectors.

For connectors (1) with a locking lip (2) first remove the lip before removing the contacts. This is a secondary lock. The locking lip is on the side of the connector and can usually be recognised from a colour that is different from the colour of the connector. The lip is removed entirely. Now the contacts can be removed using the proper ejector tool by unlocking the primary lock.



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Examples:

- cab connectors
- electronic unit connectors

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WIRING REPAIR

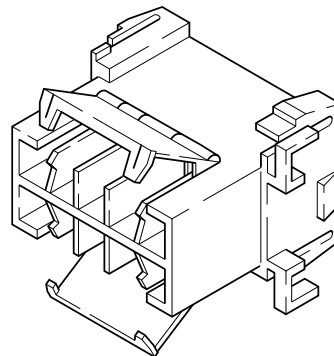
Removal and installation

The contacts may also be locked secondarily by the lower part of the connector. After tilting this lower part, the contacts can be removed by unlocking the primary lock using the proper ejector tool.

This type of lock is used only on 2-row connectors.

For example:

- MTCO connector



E501497

A different type of secondary lock consists of two sliding parts of the connector. The upper half (on the wire insert side) and the lower half form the extra contact lock.

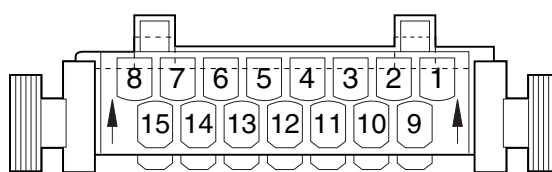
To unlock this secondary contact lock the upper half of the connector must be pushed away slightly in the direction of the arrows on the connector housing.

The contacts can then be removed from the connector using the proper ejector tool.

After any installation of wires with contacts, the connector must be pressed into the lock again. If this is not done it will not fit into the counterpart.

Application examples:

- connector for CDS electronic unit
- connector for ECAS-2/3 electronic unit
- connector for UPEC electronic unit



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WIRING REPAIR

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Removal and installation

LF45/55 series

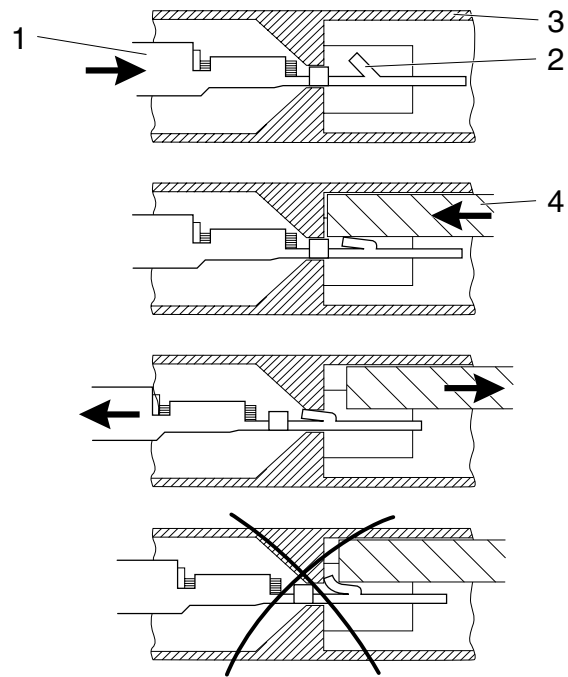
Ejecting contacts

For repair or extension of the wiring a contact may have to be replaced or added. Using special ejector tools a contact can be removed from the connector without being damaged. For the proper ejector tools, see "Parts Rapido".

1. Push the wire with contact forwards (1). The locking bolt (2) is now free from the connector (3).
2. Push the proper ejector tool (4) into the front of the connector. This will push the locking bolt (2) down.
3. The contact can now be removed by gently pulling the wire.

Note:

If the wire is pulled before the ejector tool pushes the locking bolt down, the contact will only be fixed in the connector even more.



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WIRING REPAIR

Removal and installation

Contacts are also used in which the locking bolt (2) is on the rear of the connector (3).

1. Pull the wire and contact backwards (1). The locking bolt (2) is now free from the connector (3).
2. Push the proper ejector tool (4) into the back of the connector. This will push the locking bolt (2) up.
3. The contact can now be removed by gently pushing the wire forwards.

Note:

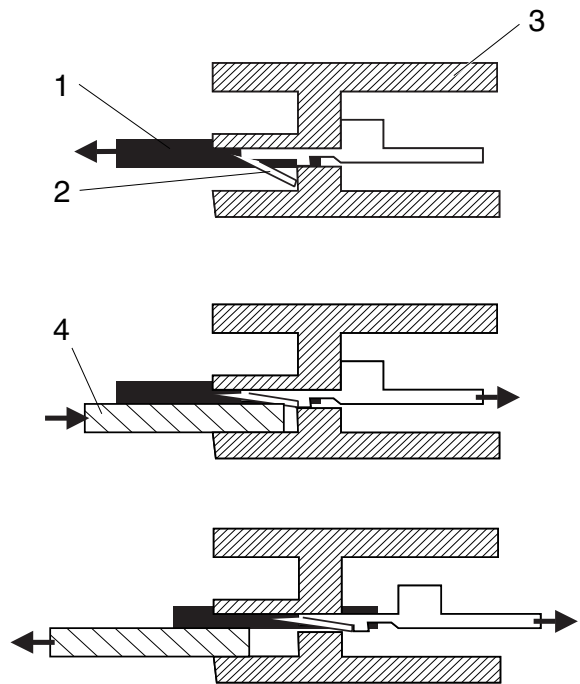
Here the locking bolt works exactly the opposite to the usual connectors.

Application examples:

- EMAS pressure sensor connector
- accelerator sensor connector for CF series / XF series

For each contact a specific ejector tool is required.

The proper ejector tool for each contact can be found through "Parts Rapido".



E501696

Locking an MQS (Micro Quadlock System) contact

Before the contact can be removed, the lock must be unlocked with a needle-shaped object.

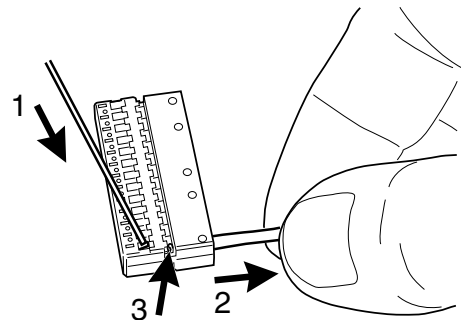
1. First press the lock at the end of the connector (1). At the same time gently pull the wire (2) until resistance is felt.
2. Then press the second lock (3) and again gently pull the wire (2).
3. The contact can now be removed from the connector.

Note:

This type of contact is locked twice and must therefore be unlocked twice.

Application example:

- connector for VIC electronic unit



E501486

WIRING REPAIR

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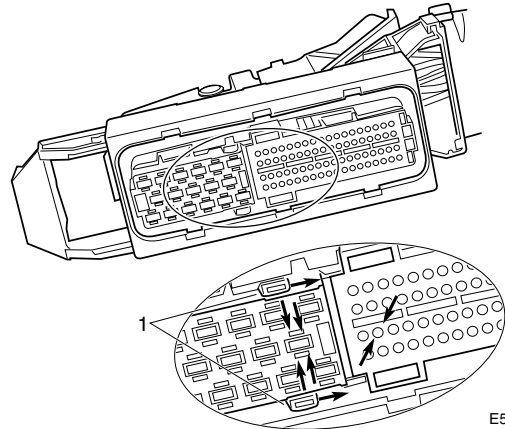
Removal and installation

LF45/55 series

Removing contacts from the Bosch 89-pin connector

To remove a contact from this connector proceed as follows:

1. Fold the protective cover around the wiring harness down by pushing the lock outwards.
2. Now push the two outer halves of the protective cover outwards and then upwards. The protective cover can now be removed.
3. The pink secondary contact lock (1) must be slid to the centre of the connector to enable the contacts to be removed.
4. The contacts can now be removed using the proper ejection tool.



Note:

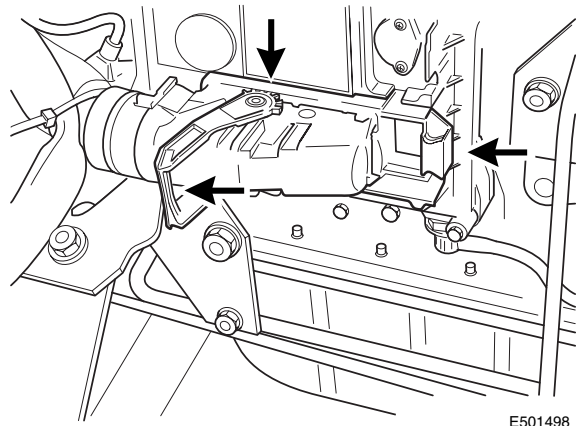
The larger contacts are locked with four locking bolts. The smaller contacts are locked with two locking bolts. Always unlock the locks when adding contacts!

Fitting the Bosch 89-pin connector

When refitting the protective cover, ensure that the siphon and slide are both in the "unlocked" position. If they are not, the connector, when fitted, will not be locked correctly on the electronic unit. As a result, the contact between the connector and the electronic unit may be bad.

Application example:

- connector for ECS-DC3 electronic unit



Removing 39-pin connector contacts

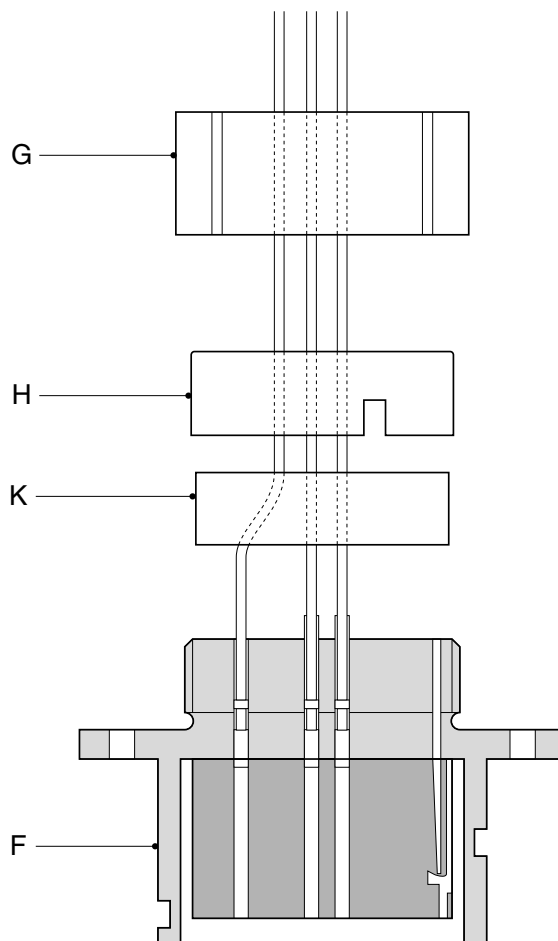
1. Loosen union G.
2. Push pressure ring H and seal K back slightly over the wiring.
3. Then eject the contacts from connector housing F using a special ejector tool from contact kit A or B.

Fitting 39-pin connector contacts

1. Fit union G, pressure ring H over the wiring.
2. Fit new contacts to the wires using the correct tool.
3. Insert the wires and contacts through seal K.
4. Press the contacts to their definitive positions in connector housing F.
5. Press seal K against connector housing F.
6. Position pressure ring H so that the two ridges on the side of connector housing F fall into the pressure ring recesses.
7. Tighten union G by hand.

Note:

- Pressure ring H has contact numbers (their purpose is to enable the contacts to be positioned correctly). These contact numbers must be in the same position as the contact numbers on the connector housing.
- When an incorrectly positioned wire is removed the seal will leak. If a new wire is not inserted a sealing plug should be fitted.



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WIRING REPAIR

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Removal and installation

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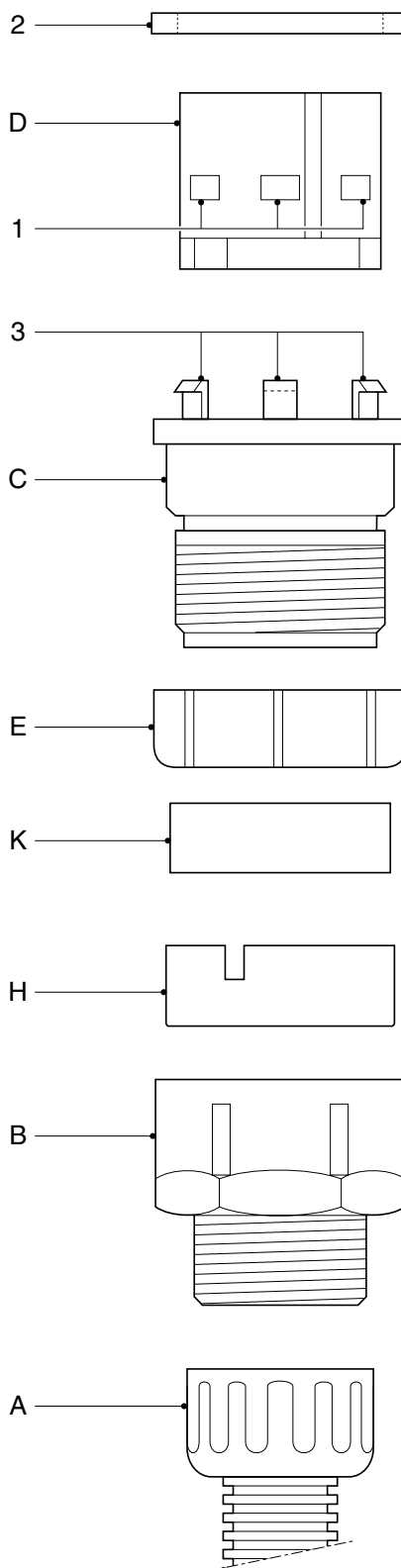
3

Removing contacts from 39-pin connector counterpart

1. Loosen end union nut A and tapered coupling nut B and push these as far as possible back over the insulation pipe.
2. Push pressure ring H and seal K as far as possible back over the wiring harness.
3. Push union E back over the wiring harness.
4. Carefully remove the sealing ring (2).
5. Carefully loosen the locking lugs (3) in connector housing F.
6. Remove centring sleeve D from connector housing C.
7. Then eject the contacts from connector housing C using a special ejector tool from contact kit A or B.

Fitting contacts in 39-pin connector counterpart

1. Push end union nut A and tapered coupling nut B as far as possible back over the insulation pipe.
2. Fit the centring sleeve (D) in connector housing C so that all openings are positioned opposite one another.
3. Check that all locking lugs (3) are positioned in the lock openings (1).
4. Insert the wires without contacts through pressure ring H and seal K.
5. Fit new contacts to the wires using the correct tool.
6. Feed the cable harness through tapered coupling nut B.
7. Press seal K against connector housing C.
8. Position pressure ring H so that the two ridges on the side of connector housing C fall into the pressure ring recesses.
9. Press the connector pins into their correct positions in connector housing C.
10. Fit sealing ring (2) around centring sleeve D and press it until the stop of connector housing C.



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Note:

- When carrying out the last two steps it is important not to twist the cable harness as this can lead to serious damage (wire breakage).
 - Tighten the respective union nuts by hand. Do not use tools (pliers) to do this.
11. Screw tapered coupling nut B onto connector housing C.
 12. Screw end union nut A (with insulation pipe) onto tapered coupling nut B.

2.3 FITTING CONTACTS TO ELECTRICAL WIRES

The increasing application of electronics in vehicles means a much broader range of connectors, contacts and wiring is being used. The result of this is that more attention has to be paid to making and repairing connections. The following criteria should be taken into account:

1. Wires with a reduced insulation thickness, with retention of the mechanical properties, for use with core sections from 0.5 to 2.5 mm².
2. Wires with a normal insulation thickness, for use with core sections from 4 to 120 mm².
3. Wires for various temperature ranges:
T1: from -40°C to +70°C (in cab and chassis) and
T2: from -40°C to +100°C (in engine compartment and gearbox)

Note:

In view of the mechanical strength required, the minimum permissible core section is 1 mm², with the exception of cab wiring. At certain points this may be 0.5 mm².

To ensure the reliability of systems and connections, the following points should be observed when repairs or extensions are made to the wiring:

WIRING REPAIR

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Removal and installation

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- A. Always choose the following:
- the correct type of contact
 - the correct wire diameter for the contact used
 - the correct type of contact material (tin-plated, silver-plated or gold-plated)
- B. Use the right tool for the job. Wire ends are always clamped to a contact. Special crimping tools have been developed for this purpose.

Note:

Connections will only be reliable if these crimping tools are used and the contact is fitted in the correct hole.

- C. Strip the correct length of wire. Always use stripping pliers.
- The rule of thumb is:
strip length = crimp-sleeve length + 1 mm.

Make sure that the core is not damaged during stripping or problems may occur after some time.

Note:

A good connection will only be obtained if points A, B and C are complied with. This implies that both the copper core and the insulation are firmly clamped in place.

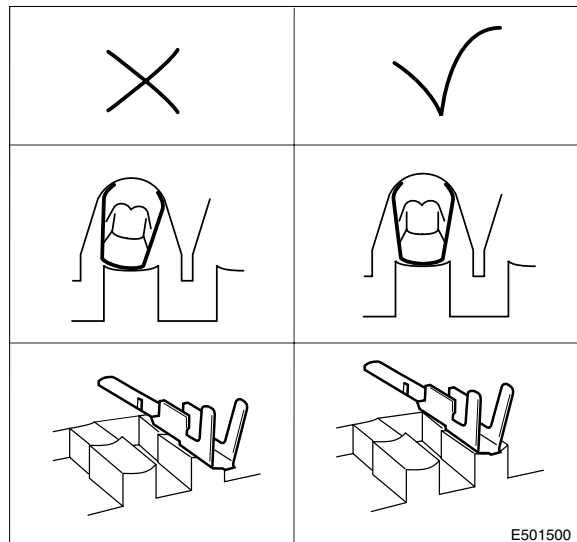
Crimping wire to a contact

Choose the right crimping tool and place the contact in the correct hole.

Note:

The proper crimping tool for each contact can be found through "Parts Rapido".

The contact may never be in a twisted, slanting or slid position (X) in the press clamp opening.



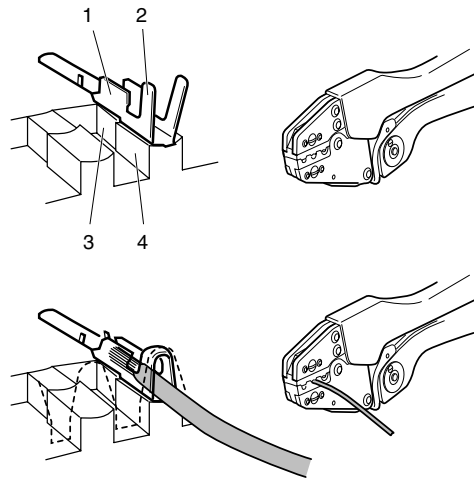
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1. Place the wire in the contact.
2. The stripped wire part, the copper conductor, must be in the contact press part (1).
The wire insulation must be in the relief part (2).
3. Check again whether the wire is in the correct position in the contacts (1 and 2) and press the contact press parts (3 and 4) together.
4. Do not interrupt the contact pressure before the tool is completely compressed in the end position. Only then is full contact pressure reached and the tool can be opened.



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WIRING REPAIR**5**

Removal and installation

LF45/55 series**Copper connection**

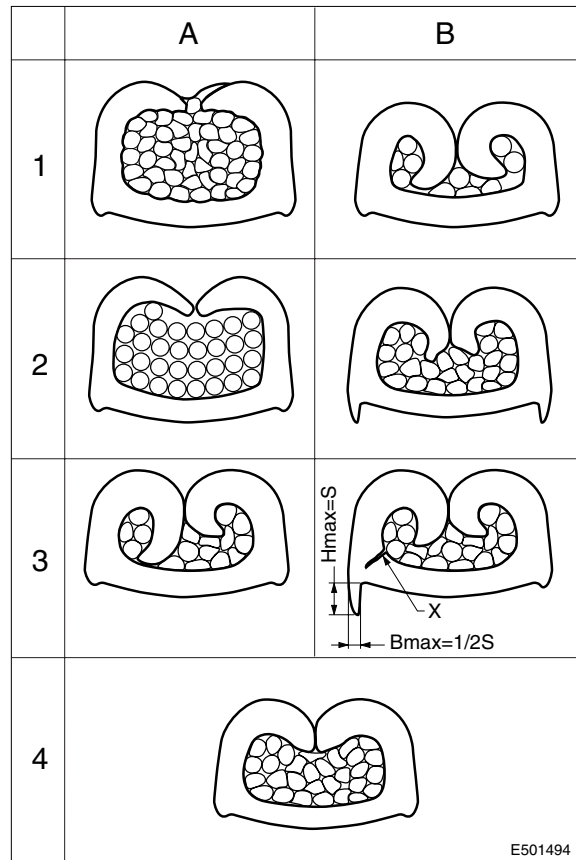
- 1A. Wire diameter too large
- 1B. Wire diameter too small
- 2A. Crimp height too great (hole in crimping tool too large)
- 2B. Crimp height too small (hole in crimping tool too small)
- 3A. Asymmetric crimping
- 3B. Asymmetric crimping
- 4. Proper contact crimping

S = material thickness

x = cracking

3

- 1A. There is a risk that copper conductors could stick out, which would adversely affect the fixed position of the other copper conductors. This may result in a short circuit and loose contact.
- 1B. The contact may crack and the copper conductors may not be sufficiently fixed in the contact.
- 2A. Copper conductors are not sufficiently fixed in the contact. The wire will come loose of the contact.
- 2B. The contact will be damaged. The contact may crack after some time and the wire will then come loose from the contact.
- 3A and B. The contact will be damaged and the copper conductors are not fully fixed in the contact. The wire may come loose. The height of any bulge on the contact may not exceed the material thickness of the contact. The width of this bulge may not exceed half the material thickness.



E501494

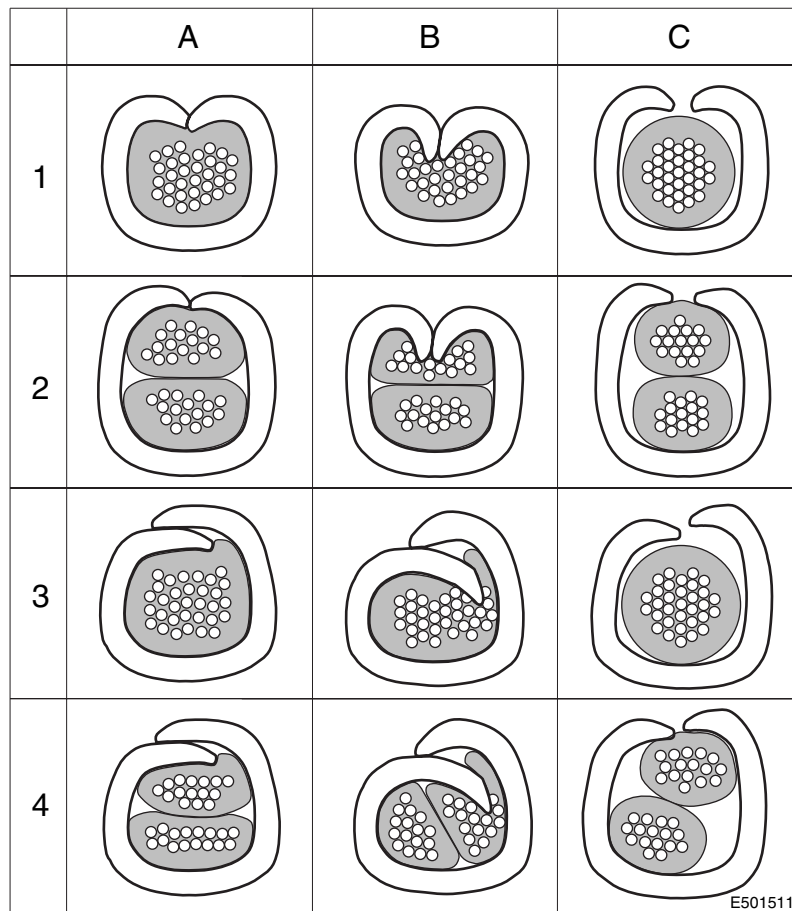
Insulation connection

Different types of crimping are allowed:

1. normal crimping: the two sides of the relief part fully engage the insulation.
 2. double crimping: two wires are clamped in one contact.
 3. overlap crimping: the two sides of the relief part engage one another slightly.
 4. double overlap crimping: two wires are clamped in one contact, the two sides of the relief part engaging one another slightly.
- A. If the insulation connection is correct, the wire is clamped in the relief part with the correct pressure and the insulation is not broken.
- B. If the contact pressure is too high the insulation could break, possibly causing a short circuit.
This may for instance be caused by:
- using the wrong crimping tool
 - using an improper hole in the crimping tool (too small)
 - a defect in the crimping tool delaying the interruption of the contact pressure.
- C. If the contact pressure is not sufficient the insulation may not be clamped and the wire may come loose. This will interrupt the electrical connection but may also result in a short circuit.
This may for instance be caused by:
- using the wrong crimping tool
 - using an improper hole in the crimping tool (too big)
 - interrupting the contact pressure prematurely.

WIRING REPAIR**5**

Removal and installation

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1. Normal crimping

2. Double crimping

3. Overlap crimping

4. Double overlap crimping

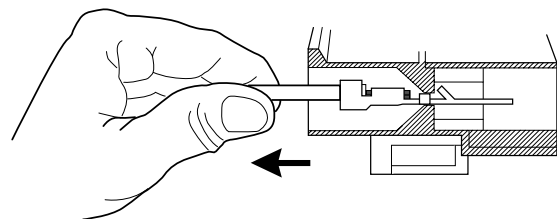
With double crimping the thinnest wire is always at the bottom.

A. Proper insulation connection

B. The insulation is broken

C. The insulation is not secured

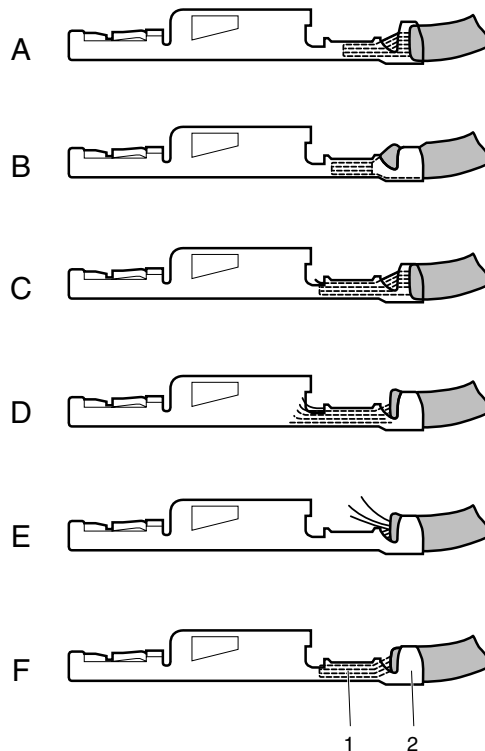
A connection can be checked by gently pulling the wire after the contact is placed in the connector. The lock of the locking bolt in the connector should then be felt.



E501501

Examples of wire-contact connections

- A. Wire not sufficiently slid forwards.
The wire is not sufficiently slid forwards to ensure a proper current transfer and pull relief.
- B. Stripped part of the wire too short.
The stripped part of the wire is too short to ensure a proper current transfer whereas a part of the insulation is clamped underneath the contact press part.
- C. Wire too far backwards.
If the stripped part of the wire is too long and the wire is placed correctly relative to the contact press part, the pull relief will cover too little of the wire.
- D. Wire too far forwards.
If the stripped part of the wire is too long and the wire is placed correctly relative to the pull relief, the copper conductors at the front will stick out too far past the contact press part.
- E. Copper conductors not clamped.
Copper conductors not clamped may cause a short circuit to other wires nearby.
- F. This is a correct connection.



E501499

2.4 FITTING A SCAT SEAL

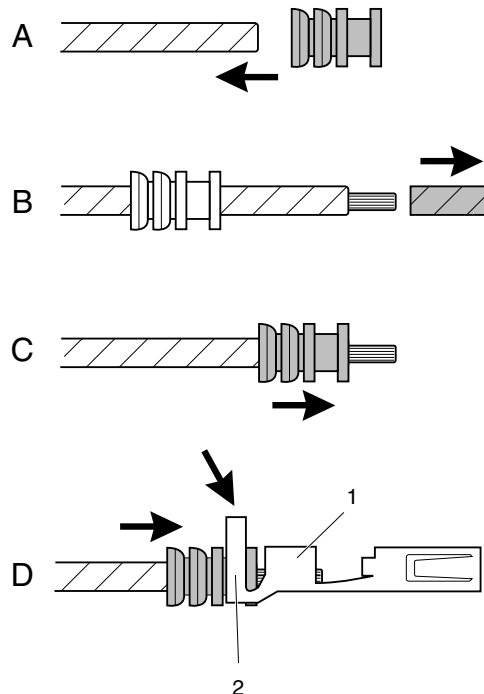
SCATs are used in places where wires are exposed to heavy conditions (environment or application of the vehicle), with the risk of water entering the connector.

The SCAT seal, which is made of silicone, prevents corrosion inside the connector and keeps the seal properties intact in the event of temperature changes.

The SCAT seal is pressed around the wire with the relief part of the contact.

The SCATs are available in various colours and sizes.

1. Select the right SCAT for the wire, contact and connector.
2. Slide the SCAT onto an unstripped wire (A).
3. Slide the SCAT far enough onto the wire and strip the wire to the proper length (B).
4. Slide the SCAT back to the tip of the stripped wire so that the copper just sticks out of the SCAT (C).
5. Place the contact in the proper manner (D) around the SCAT (2) and the stripped wire (1).
6. Now crimp the contact around the SCAT and the wire using the proper crimping tool.



E501503

2.5 FITTING AN ELECTRICAL BUFFER CONNECTION

A buffer connection is made when at least two wire ends must be connected to one another. This may be required because of a wire repair or if a wire is to be added to a connection.

Note:

When adding a new wire to an existing wire, both wires must be of the same thickness. If part of the existing wire is to be removed, try to make sure that the wire number can still easily be found on the wire.

The contact crimping part (1) is the electrical connection to the stripped wire part. The central stop (2) is a limiter, preventing the wire to be connected from being inserted too far. The insulation is a crimp insulating sleeve with glue layer (3), which, after heating by a blow drier, will offer protection against unwanted electrical contact and corrosion.

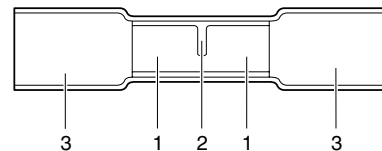
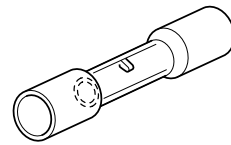
There are three different buffer connectors available: red, blue and yellow. Depending on the wire thicknesses to be connected (and possibly the number of wires to be connected) a specific colour must be used.

- red diameter 0.25 - 0.75 mm²
- blue diameter 1.0 - 2.5 mm²
- yellow diameter 4.0 - 6.0 mm²

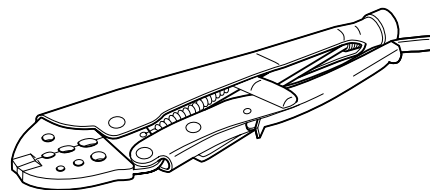


Connecting more than two wires to one another is not recommended. The glue layer of the crimping insulation is not sufficient to seal all resulting gaps. So this is certainly not permitted outside the cab.

It is very important to carry out contact crimping in the correct way to prevent electrical faults. For cold fusion a contact crimping tool is required. This tool creates a cold fusion between wire and buffer connector.



E501489



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WIRING REPAIR

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Removal and installation

LF45/55 series

Fitting the contact crimp connector

1. Select the right buffer connector for the wires to be connected.

Note:

If three wires of the same diameter have to be connected after all, choose a buffer connector that is the same diameter as two of the wires. The single wire on the other side must be stripped to double length and folded double.

The same applies when a wire is used on one side that is twice the diameter of the other.

2. Strip the wire to a length of 4 to 5 mm.

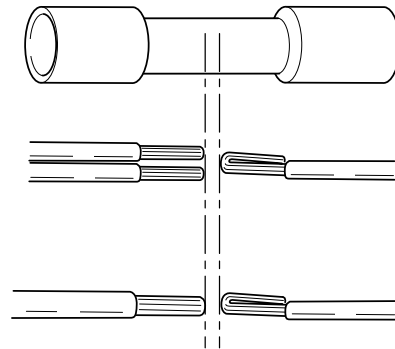
Note:

The stripped wire tip may **not** be twisted.

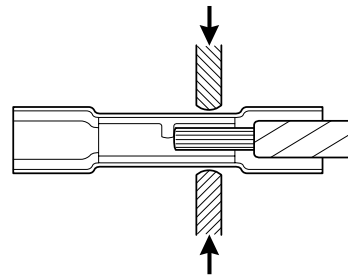
3. Choose the proper contact crimping tool on the basis of the buffer connector and wire diameter, and check the holes to be used.
4. Place the buffer connector in the hole of the tool and clamp it gently so the buffer connector will remain in the hole.
5. Slide the stripped wire ends into the side of the buffer connector that is engaged by the contact crimping tool.

Note:

The insulation of the wire may not be slid into the contact part of the buffer connector.



E501490

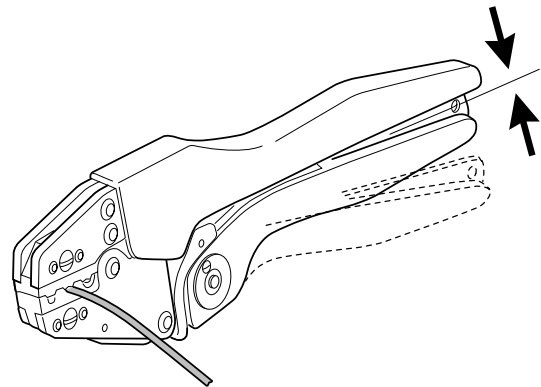


E501492

6. Compress the contact crimping tool: Do not interrupt the contact crimping before the tool is completely compressed to the end position. Only then is full contact crimping achieved and the tool is opened.
7. Repeat this for the other ends of the buffer connector.
8. Check the contact crimping for damage and pull the wires to ensure they are properly fixed.

Note:

Improper contact crimping means a bad connection, which may cause failures.



E501493



Avoid breathing in the vapours produced when heating the crimping insulation.

9. Heat the crimping insulation to fix it properly to the wire insulation. Ensure that the insulation does not get burnt. If the insulation gets burnt it will become brittle and easily break or crack.

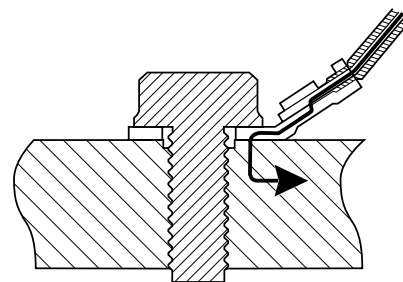
2.6 REMOVAL AND INSTALLATION, EARTH WIRE

When a failure occurs in an electrical system, one of the first things to be checked is the earth connection, with particular attention being paid to earth connection on the chassis.

Points for special attention when checking earth connection on chassis

If an earth connection has been removed and is being re-installed, pay attention to the following:

- the bolt, nut, earth strip and washers must be cleaned (e.g. using a steel brush or sand paper). If a component is corroded, it must be replaced by a new one.
- clean all dirt and paint from the area around the engine/chassis earth connection on both sides of the chassis member so that the bare metal is visible.



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- clean all dirt and paint from the area around the battery/chassis earth connection on the inside of the chassis member so that the bare metal is visible.
- on the earth strip side, the cleaned area must be larger than the contact area of the earth strip.
- on the nut side, the cleaned area must be larger than the contact surface of the nut.
- after fitting the earth connection, a protective zinc primer should be applied to both sides of it and it should be painted.

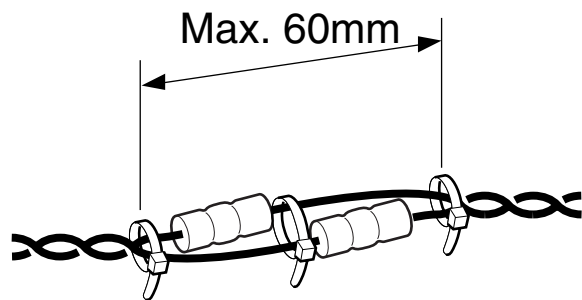
3**2.7 REPAIRING CAN NETWORK WIRING**

When repairing or replacing CAN wiring, the original twisted lengths and diameters of the wiring must be taken into consideration. A 10% tolerance in the twisted length of the wiring is permitted. Winding density 40-50 turns/m.

When repairing the wiring, the winding density must be maintained, with the provision that it is permissible for the wiring at the point of repair to have no windings over a maximum length of 60 mm. When the wiring is being repaired, it must be secured in a wire tie at the end and in the middle.

Replacing CAN wire

1. Measure the length of the original wire when untwisted.
2. Measure the diameter of the original wire. Always take a wire of the same diameter or, if this is not available, of the next size up.
3. Preferably choose a wire of the same colour as the original wire.
4. Follow the routing of the original wire and secure the wire in the original way.



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BATTERIES

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Contents

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1. SAFETY INSTRUCTIONS

1.1 BATTERIES

- Always remove the earth lead before working on batteries.
- When connecting battery leads, always connect the earth lead last.
- Always handle batteries carefully and hold them upright.
- The sulphuric acid in the batteries is an aggressive and poisonous liquid. While working on batteries, wear protective clothing, gloves and safety goggles.
- In case of contact with cloths, the skin or the eyes, wash immediately with copious amounts of water. Consult a doctor in case of contact with eyes or skin.
- When topping up batteries, never allow the fluid level to rise more than 10 mm above the plates or to go higher than the level indicator.
- Never put down tools or other materials that could accidentally short-circuit the battery terminals on the batteries or in the vicinity of batteries. Short-circuited battery terminals may cause the battery to explode.
- Secure the batteries well after completing the work, but not too tightly.

1.2 BATTERY CHARGING

- During battery charging, an explosive gas mixture may be released.
- Only charge batteries in a well ventilated area.
- Never smoke or allow naked flames or sparks in the vicinity of the battery.
- Allow frozen batteries to thaw before charging.
- Switch the charger off before disconnecting the leads to the battery.

BATTERIES

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Safety instructions

LF45/55 series

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2. CHARGING BATTERIES

2.1 GENERAL

- A battery may only be charged using DC current. Connect the positive terminal of the battery to the positive (+) connection of the charger and the negative terminal of the battery to the negative (-) connection of the charger.
The cell sealing plugs may remain on the battery during charging (except during fast charging).
During charging, the cell voltage will rise. This increase in voltage depends on the charging current applied and the temperature. During normal charging, the cell voltage will rise from about 2 volts/cell to about 2.65 volts/cell. If a charging voltage of about 2.35 to 2.4 volts/cell (about 14.2 volts in a 12 V battery) is exceeded, this will start off active gas development. As a consequence of the rise in voltage during charging, the charging current will, as a rule, fall gradually. Overcharging will reduce the service life of a battery.
- If the charging of the battery is continued after it has been fully charged (even with a low current), this will lead to corrosion (corrosive attack) of the grids of the positive battery plates. This type of wear leads to premature redundancy of the battery. Depending on the capacity of the charger, the normal charging time is between 8 and 15 hours.
If during charging the temperature of the battery acid rises to more than 55°C, the charging should be stopped. High temperatures reduce the service life of the battery.
- A battery may be said to be charged if the charging voltage has not increased for more than 2 hours and the acid density (relative density) has reached the nominal value (for example, 1.28 kg/dm³) and does not rise further.

- A charged battery must be used immediately. If this is not possible, maintain the battery as described in the section "Storage of batteries".
- A discharged battery must be charged as soon as possible. If a discharged battery is not recharged, the battery plates may become sulphated (i.e. hard), which will lead to permanent loss of capacity.

2.2 METHODS OF CHARGING



Always disconnect the battery clamps before charging.

4

Normal charging

- Normal charging is done to restore partially or fully discharged batteries to full capacity. In most cases, a charging current of $\frac{1}{20}$ to $\frac{1}{10}$ of the capacity is selected.
- It is important to reduce the charging current during gas development and to switch the charger off when the battery is charged.

Fast charging

- With this charging method, multiples of the normal charge current (approx. 3 to 5 times) are used in order to achieve an acceptable charge condition in the shortest possible time.
- Before fast charging, remove the battery leads in order to prevent damage to the electronic components.
- Remove the cell sealing plugs so that the released gases can easily escape.
- To prevent overcharging, switch to a lower charging current on reaching the gas pressure (2.35 to 2.4 volts/cell).

Note:

Avoid fast charging. Only use this method in exceptional cases. Fast charging causes battery overloading, which reduces the service life of the battery.

Buffer charging

- With this method, the consumer and the charger are both connected to the battery. The charger delivers sufficient current to ensure that the battery remains virtually fully charged. The battery will deliver peak currents to the consumer.
- Buffer charging is best done at a constant (stabilised) voltage.

Trickle charging

- A fully charged battery that is not used for some time will start to discharge of its own accord. It may discharge at a rate of 0.1% to 1% per day. Trickle charging compensates for such discharges.
- The charging current for trickle charging should be around 0.1 A per 100 Ah.

BATTERIES

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Charging batteries

LF45/55 series

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3. STORAGE OF BATTERIES

3.1 GENERAL

Before storing batteries, carry out the following operations:

1. Remove the battery clamps.
2. Clean the battery terminals and the top of the batteries.
3. Grease the battery terminals with petroleum jelly.
4. Check the electrolyte level. The electrolyte level must be approx. 10 mm above the plates or up to the level indicator, if there is one.
If necessary, top up the batteries with distilled water.
5. Check the charging condition of the batteries and charge them if necessary. See the section "Inspection and adjustment".

3.2 STORAGE UP TO FOUR WEEKS.

If batteries (whether as separate units or fitted in a vehicle) are not going to be used for an extended period of time not exceeding four weeks, the following measures should be taken:

1. Do **not** connect the battery leads to the batteries.
2. Check the battery charge level regularly. See "Inspection and adjustment".
If the voltage falls below 12.4 volts, or if the relative density of the electrolyte in one or more of the cells is less than 1.23 kg/dm³, the battery must be charged.

Note:

The higher the ambient temperature, the more rapidly the battery discharges.
The lower the relative density of the electrolyte, the higher the risk of the battery freezing.

3.3 STORAGE FOR MORE THAN FOUR WEEKS

If the batteries will not be used for more than four weeks, the following measures should be taken:

1. Remove the batteries from the vehicle and store them in a frost-free, dry, cool and well ventilated room.
2. Check the charging condition of the batteries regularly, at least once every four weeks. See "Inspection and adjustment". If the voltage falls below 12.4 volts, or if the relative density of the electrolyte in one or more of the cells is less than 1.23 kg/dm³, the battery must be charged.
3. Limit the storage period to a maximum of three months. The longer the period of storage, the greater the permanent loss of capacity.

4. INSPECTION OF BATTERIES

4.1 VISUAL INSPECTION

- A white dividing line at $\frac{1}{3}$ of the plate height (this can be seen through transparent battery boxes) indicates that the battery has been allowed to remain in a seriously discharged condition.
- If the electrolyte is brown and the battery consumes a lot of fluid, this indicates that the battery is overcharged.
- If the electrolyte is turbid and milky and the cells have a white deposit, the battery has become damaged due to insufficient charging (deep discharge).

4.2 INSPECTION OF THE CHARGING CONDITION**Relative density**

- The charging and discharging of the battery leads to a chemical reaction in the battery, which involves sulphuric acid. The sulphuric acid concentration drops as the battery discharges.

The concentration, measured as relative density (kg/dm^3), is a useful yardstick for determining the charging condition of the battery.

- An acidimeter can be used to check the charging condition.

Relative density at 27°C in kg/dm^3

Charged battery : 1.28

Half-charged battery : 1.20

Discharged battery : 1.10

- Measurement corrections are necessary if temperatures are significantly lower or higher. For every 10°C of lower temperature, subtract 0.007 points from the measured value. For each 10°C of higher temperature, 0.007 points must be added. In batteries in good condition, the relative density must be the same in all the cells. The maximum difference between the highest and lowest relative density may not exceed 0.03 kg/dm^3 .

Note:

If the relative density in one of the cells is much lower than in the other cells, the cause may be cell closure. If the relative density of two adjacent cells is much lower than in the other cells, this indicates a leak in the cell partition. In both cases, the battery must be replaced.

Voltage

- The charging condition of the batteries can also be measured using a sensitive, preferably digital voltmeter. This method can only be used 1 to 2 hours after full completion of charging or discharging. Measure the absolute rest voltage (the positive and negative clamps must be removed from the battery). The charging condition of the battery can be calculated using the formula: voltage per cell = relative density (kg/dm^3) + 0.84.

Example:

For a fully charged battery, the relative density per cell is 1.28 kg/dm^3 . The voltage per cell is therefore $1.28 + 0.84 = 2.12 \text{ V}$. A 12 V battery has 6 cells. The total voltage for a charged battery is $6 \times 2.12 = 12.72 \text{ V}$. The voltage of a half-charged battery is approx. 12.24 V. The voltage of a discharged battery is approx. 11.75 V.

4.3 INSPECTION USING A BATTERY TESTER

- The general condition of the battery can be checked quickly using a battery tester. For this check, a load is applied to the battery and then the discharge voltage at the battery terminals is measured. The load applied to the battery must be at least 3 times the capacity of the battery.
- The rule of thumb is that the test can be carried out when the battery is sufficiently charged (relative density 1.25 - 1.28 kg/dm³).
At normal temperatures (10-20°C), the charging voltage for a properly charged battery must be 10 volts after 10 seconds. In the case of a partially discharged battery (relative density 1.25 kg/dm³), the reading should be at least 9 volts.
It is important that the voltage be measured directly at the battery terminals.

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CONNECTION OF ACCESSORIES

LF45/55 series

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1.5 Dashboard lead-through connector for engine speed control application connector	1-15 ...	200440
1.6 Automatic gearboxes application connector	1-18 ...	200440
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CONNECTION OF ACCESSORIES

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LF45/55 series

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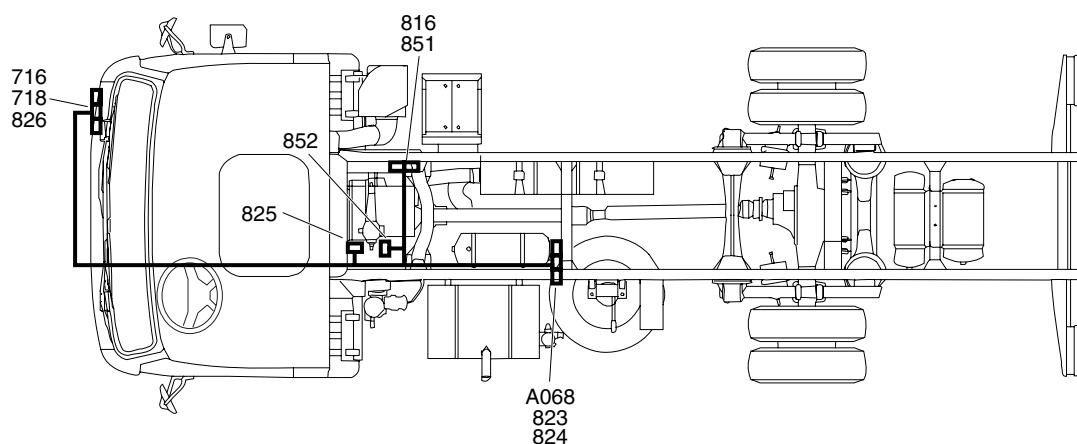
1. CONNECTION OF ACCESSORIES

1.1 GENERAL

On LF vehicles the various possibilities for application connectors and reserve wiring consist of a number of different wiring harnesses.

One extensive application chassis wiring harness is connected to dashboard lead-through connectors 716, 78 and 826.

The following connectors connected to this wiring harness can be found on the chassis: A068, 816, 823, 824, 825, 852 and 851.



E501747

This wiring harness is referred to as the application wiring harness. Wiring harness versions that are less extensive are also possible.

The various applications are described individually below.

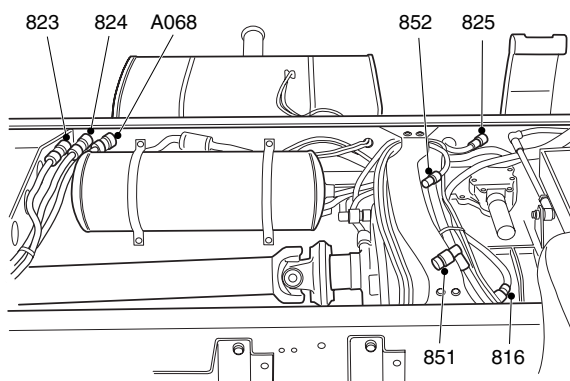
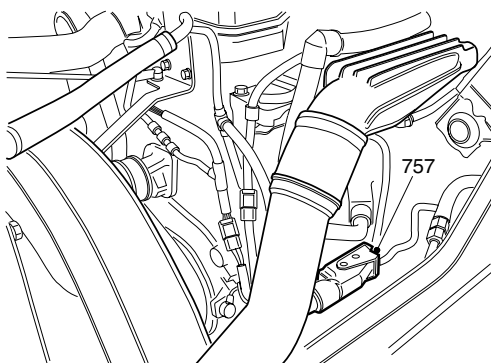
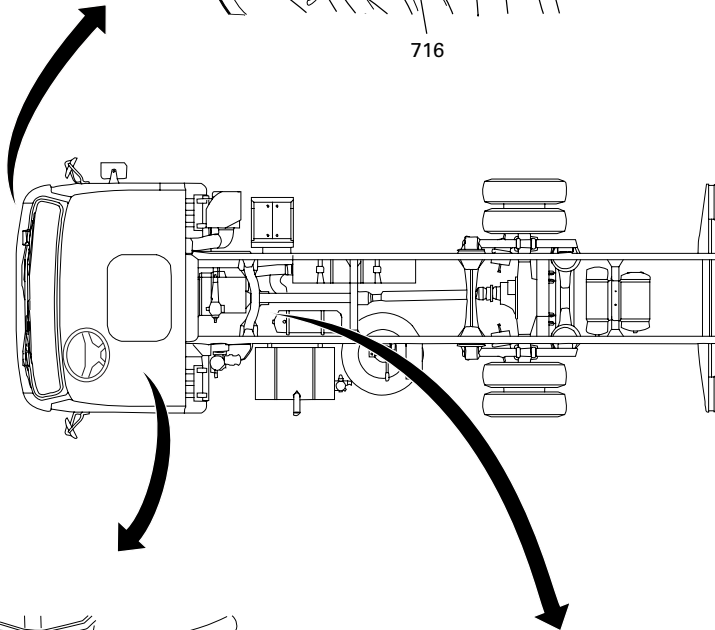
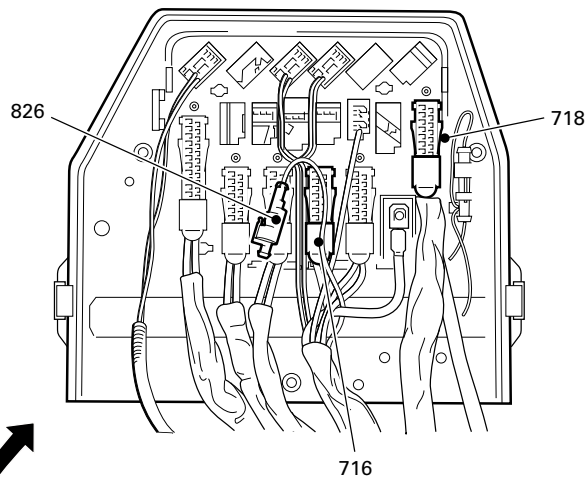
Connector 825 is again connected to connector 757, the B connector, of the ECS-DC3 electronic unit.

CONNECTION OF ACCESSORIES

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Connection of accessories

LF45/55 series



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CONNECTION OF ACCESSORIES

LF45/55 series

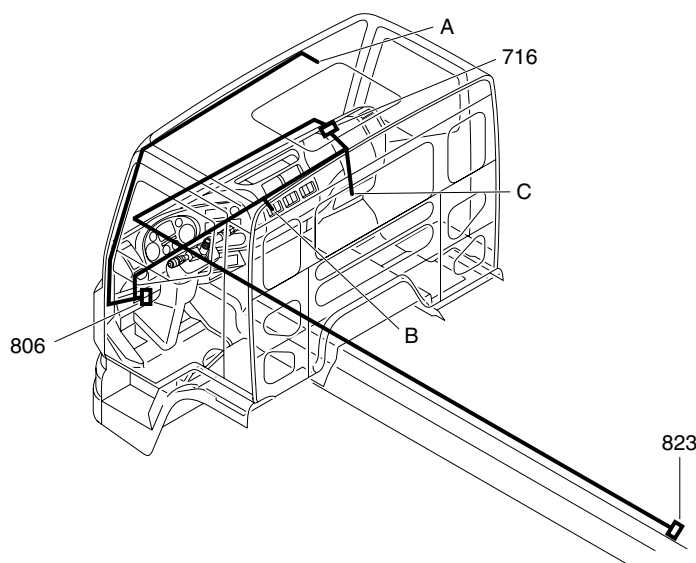
Connection of accessories

1.2 RESERVE WIRES

Additional wiring

A number of return wires (A) run from the roof console to the fuse box (C) through connector 806. These wires run via dashboard lead-through connector 716 and via the application wiring harness to superstructure functions application 823.

Reserve wires (B) run from the dashboard to superstructure functions application connector 823 via dashboard lead-through connector 716.



E501748

- A. Roof console reserve wires X007 - X014
- B. Dashboard reserve wires X003 - X006
- C. Fuse box reserve wires X011 - X014
- 716. Green 16-pin dashboard lead-through connector
- 806. Brown 8-pin dashboard connector
- 823. Black 12-pin chassis connector

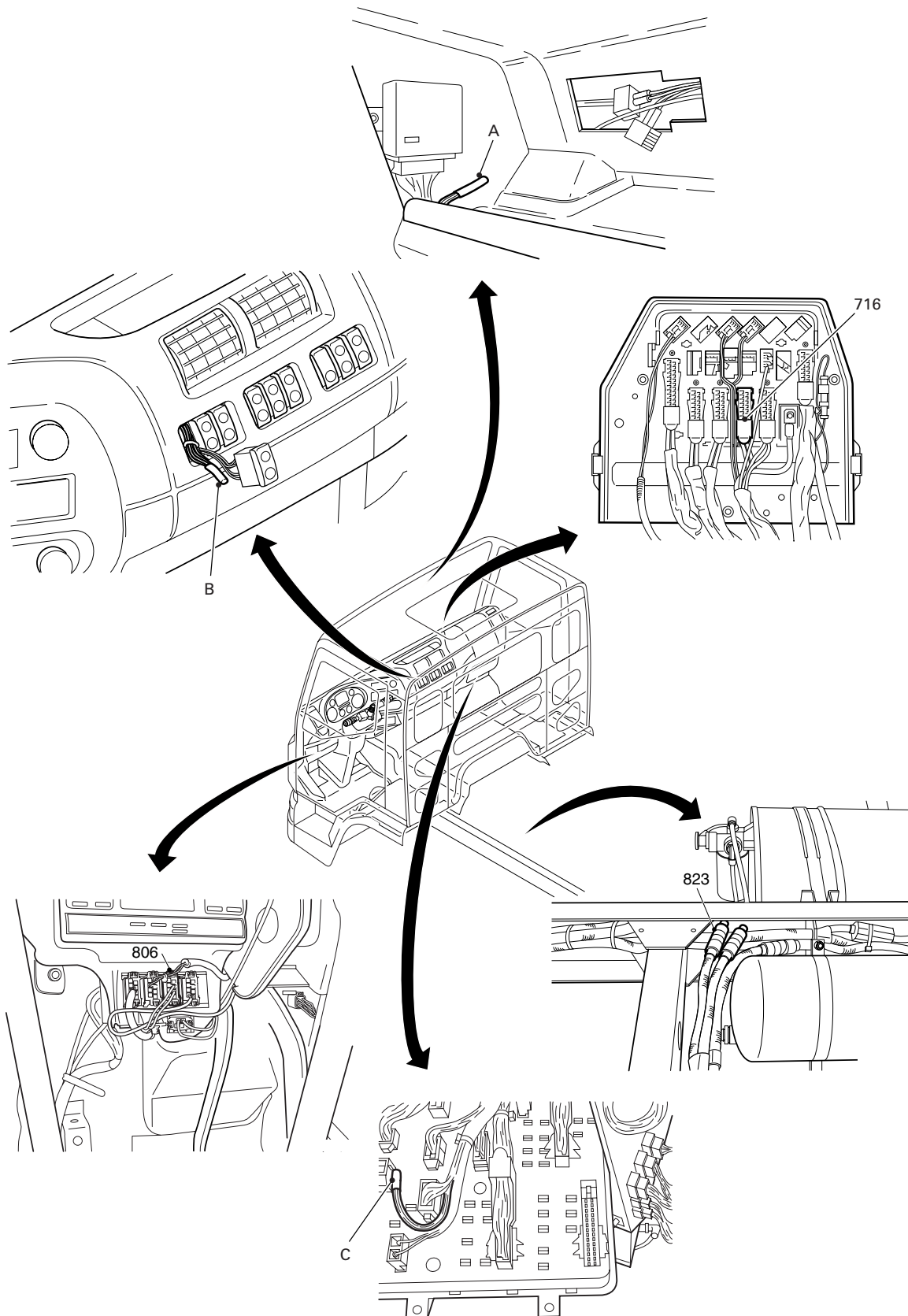
CONNECTION OF ACCESSORIES

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Connection of accessories

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CONNECTION OF ACCESSORIES

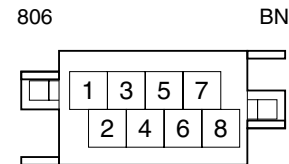
LF45/55 series

Connection of accessories

824 is a superstructure functions application connector that will be described below.

Under the tachograph is a brown 8-pin connector (806) containing the reserve wiring to the roof console.

Pin pattern for wiring harness connector 806:



Pin no.	Wire no.	Description
1	X007	Reserve wire between connector 716 and roof console
2	X008	Reserve wire between connector 716 and roof console
3	X009	Reserve wire between connector 716 and roof console
4	X010	Reserve wire between connector 716 and roof console
5	X011	Reserve wire between fuse box and roof console
6	X012	Reserve wire between fuse box and roof console
7	X013	Reserve wire between fuse box and roof console
8	X014	Reserve wire between fuse box and roof console

CONNECTION OF ACCESSORIES

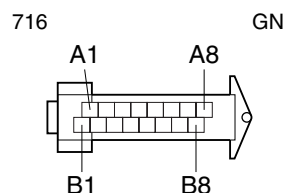
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Connection of accessories

LF45/55 series

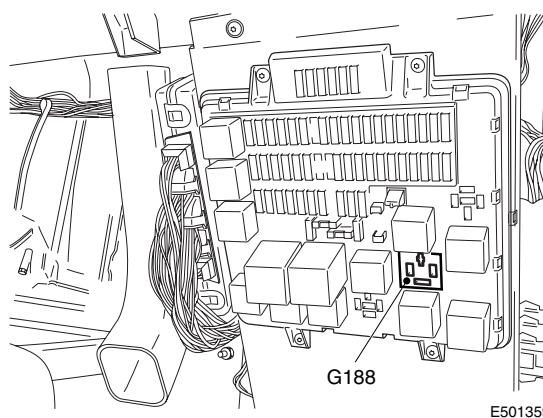
There is a green 16-pole connector (716) with 8 reserve wires in the dashboard lead-through.

Pin pattern for wiring harness connector 716:



Pin no.	Wire no.	Description
A1	3458	Automatic gearbox fault message
A2	1240	Power supply after contact of fuse box
A3	3746	Gear selection during fault
A4	4614	“ABS active” signal for automatic gearbox
A5	-	-
A6	X002	Power supply before contact
A7	X003	Reserve wire to/from dashboard
A8	X004	Reserve wire to/from dashboard
B1	X005	Reserve wire to/from dashboard
B2	X006	Reserve wire to/from dashboard
B3	X007	Reserve wire to/from roof console
B4	X008	Reserve wire to/from roof console
B5	X009	Reserve wire to/from roof console
B6	X010	Reserve wire to/from roof console
B7	3725	RAS-EC “stop”
B8	3726	RAS-EC “warning”

ATTENTION: The power supply **before** contact (X002) is fuse-protected via fuse E048 (25 A). The power supply **after** contact (1240) is only present if relay G188 is fitted. The power supply **after** contact is fuse-protected via fuse E156 (25 A).



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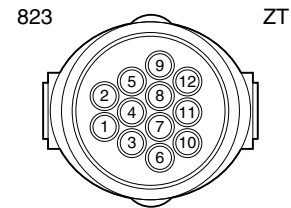
CONNECTION OF ACCESSORIES

LF45/55 series

Connection of accessories

Connector 823 can be found on the chassis near the fuel tank.

Pin pattern for wiring harness connector 823:



Pin no.	Wire no.	Description
1	X003	Reserve wire to/from dashboard
2	X004	Reserve wire to/from dashboard
3	X005	Reserve wire to/from dashboard
4	X006	Reserve wire to/from dashboard
5	-	-
6	-	-
7	X007	Reserve wire to/from roof console
8	X008	Reserve wire to/from roof console
9	X009	Reserve wire to/from roof console
10	X010	Reserve wire to/from roof console
11	-	-
12	-	-

CONNECTION OF ACCESSORIES

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Connection of accessories

LF45/55 series

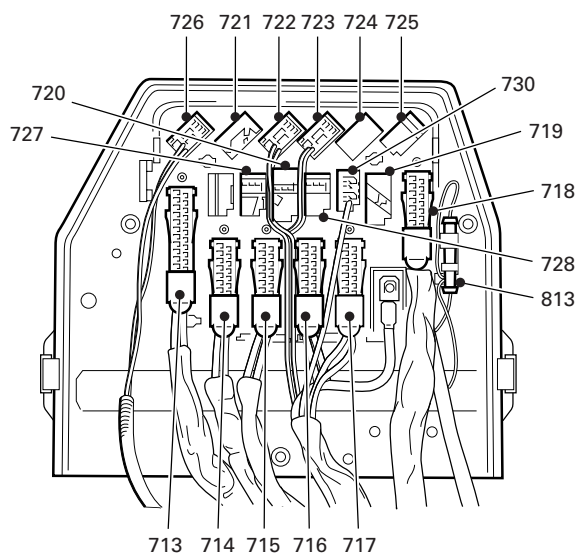
1.3 DASHBOARD LEAD-THROUGH CONNECTORS, GENERAL

At the front of the cab there are a number of connectors placed one next to the other in the dashboard lead-through zone 1 for connectors. There are also lead-throughs for a number of earth wires and for the main power supply wire.

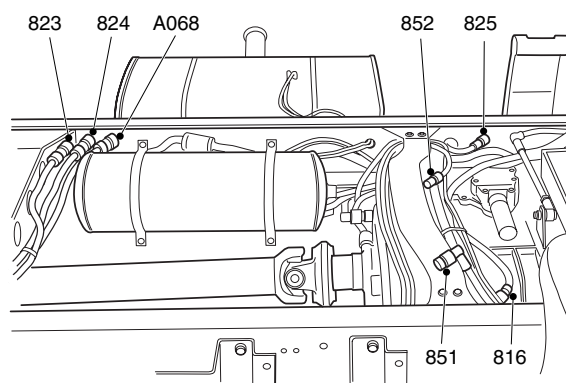
In the descriptions of the various connectors in the dashboard connector lead-through, the view is always from outside the cab.

When a vehicle is fitted with application connectors, this means that two specific wire harnesses are fitted.

- Chassis wiring harness.
Dashboard lead-through connectors 716, 718 and 826 connected to superstructure functions application connectors 823 and 824, engine speed control application connector A068, PTO connectors 816 and 851.
- Engine wiring harness.
Fitted with connector 825 for the engine speed control and connector 852 for "remote throttle".



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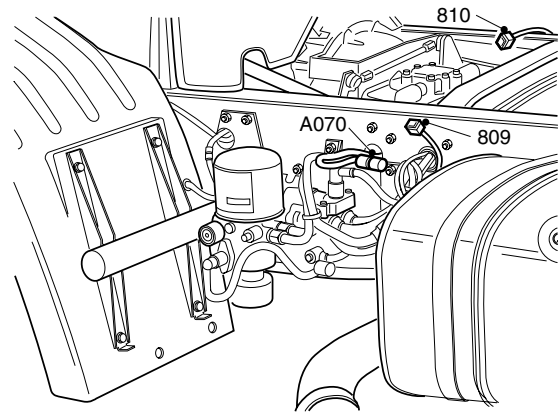
CONNECTION OF ACCESSORIES

LF45/55 series

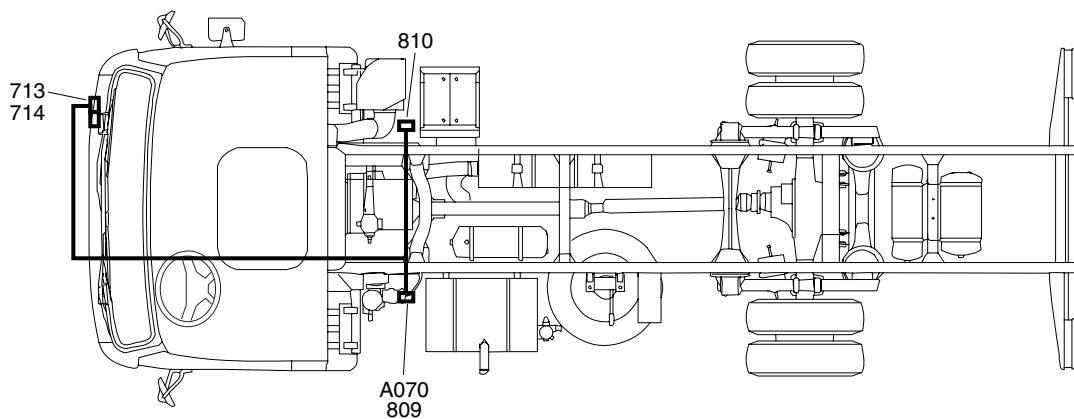
Connection of accessories

1.4 DASHBOARD LEAD-THROUGH CONNECTORS FOR SUPERSTRUCTURE FUNCTIONS APPLICATION CONNECTORS

Together with connectors 809 and 810, application connector A070 forms part of the standard chassis wiring harness. These connectors are connected to dashboard lead-through connectors 713 and 714. Connectors 809 and 810 are not fitted on vehicle type FT.



E501742



E501749

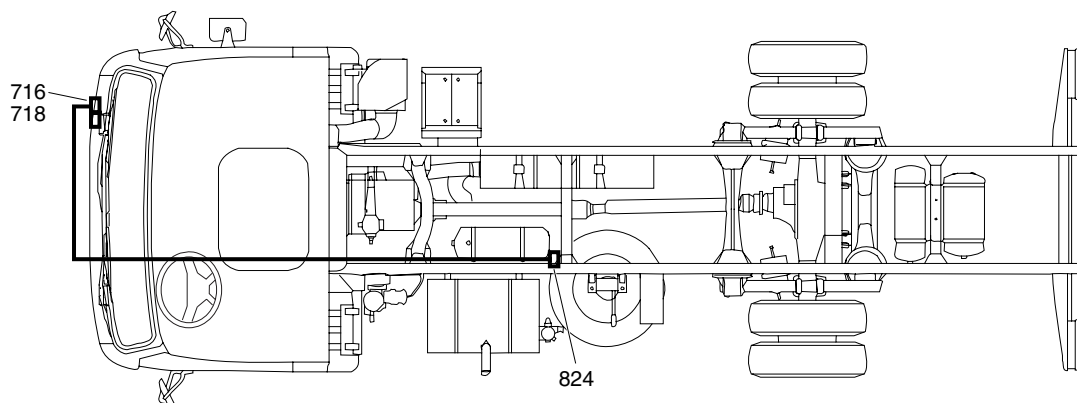
CONNECTION OF ACCESSORIES

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Connection of accessories

LF45/55 series

Superstructure functions application connector 824 is part of the extensive application wiring harness and is connected to dashboard lead-through connectors 716 and 718. Connector 824 is located on the inside of the chassis side member, near the fuel tank.

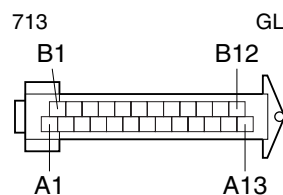


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5**CONNECTION OF ACCESSORIES****LF45/55 series**

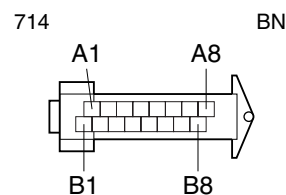
Connection of accessories

**Pin pattern for wiring harness
connector 713:**

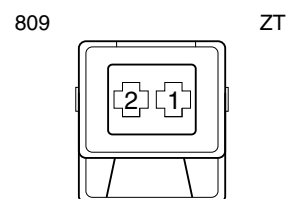
Pin no.	Wire no.	Description
A1	3503	Sensor, fuel level
A2	3402	Parking brake
A3	5104	Reversing buzzer
A4	4517	Differential lock valve
A5	-	
A6	3406	Brake lining wear signal
A7	1217	Reversing switch
A8	2036	Direction indicator, left
A9	2037	Direction indicator, right
A10	2170	Rear light, left
A11	2169	Rear light, right
A12	2152	Fog lights, rear
A13	4601	Stop lights
B1	1356	ABS, drawn vehicle
B2	4591	Reversing buzzer, dashboard switch
B3	1110	Power supply before contact, drawn vehicle
B4	1240	Power supply after contact
B5	5051	Fuel filter heating system
B6	3659	Alarm
B7	2009	Direction indicator, left, drawn vehicle
B8	2008	Direction indicator, right, drawn vehicle
B9	3408	Differential lock dashboard switch
B10	3428	ABS warning, drawn vehicle
B11	3412	Cab lock
B12	2155	Superstructure lighting

CONNECTION OF ACCESSORIES**5**

Connection of accessories

LF45/55 series**Pin pattern for wiring harness connector 714:**

Pin no.	Wire no.	Description
A1	3639	Air pressure sensor, power supply, circuit 2
A2	3638	Air pressure sensor, earth, circuit 1
A3	3639	Air pressure sensor, power supply, circuit 1
A4	3640	Air pressure sensor signal, circuit 1
A5	3020	Vehicle speed sensor, earth
A6	3021	Vehicle speed sensor, power supply
A7	3018	Vehicle speed sensor signal, "real time"
A8	3019	Vehicle speed sensor signal, "coded"
B1	4030	Range-change protection, gearbox
B2	3660	Alarm
B3	4721	Neutral switch, gearbox
B4	4596	Activates PTO valve
B5	5049	'Water in fuel' sensor
B6	1264	Alarm battery
B7	3638	Air pressure sensor, earth, circuit 2
B8	3641	Air pressure sensor signal, circuit 2

Pin pattern for wiring harness connector 809:

Pin no.	Wire no.	Description
1	2170	Rear light, left
2	M	Earth

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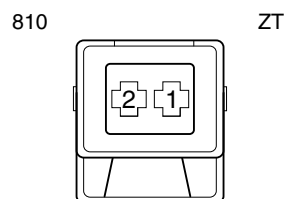
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CONNECTION OF ACCESSORIES

LF45/55 series

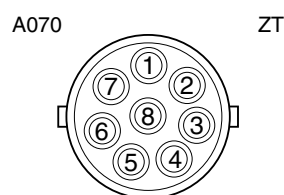
Connection of accessories

Pin pattern for wiring harness connector 810:



Pin no.	Wire no.	Description
1	2169	Rear light, right
2	M	Earth

Pin pattern for wiring harness connector A070:



Pin no.	Wire no.	Description
1	1110	Power supply before contact
2	2155 2169	FA work lamp Rear light, right, FT
3	4601	“Stop light” signal
4	4591	“Reversing light” signal
5	1264	Alarm, power supply
6	3659	Alarm, superstructure/drawn vehicle
7	3660	Alarm, superstructure/drawn vehicle
8	M	Earth

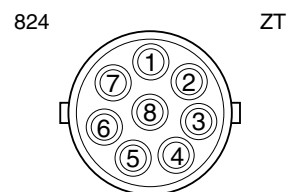
Note:

On FT vehicles pin 2 for possible superstructure lighting is occupied by wire 2169.

CONNECTION OF ACCESSORIES

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Connection of accessories

LF45/55 series**Pin pattern for wiring harness
connector 824:**

Pin no.	Wire no.	Description
1	X002	Power supply before contact
2	1240	Power supply after contact
3	3435	“Engine is running” signal (via the VIC unit)
4	3412	Cab lock (via the VIC unit)
5	3700E	V-CAN, high
6	3701E	V-CAN, low
7	M	Earth
8	M	Earth

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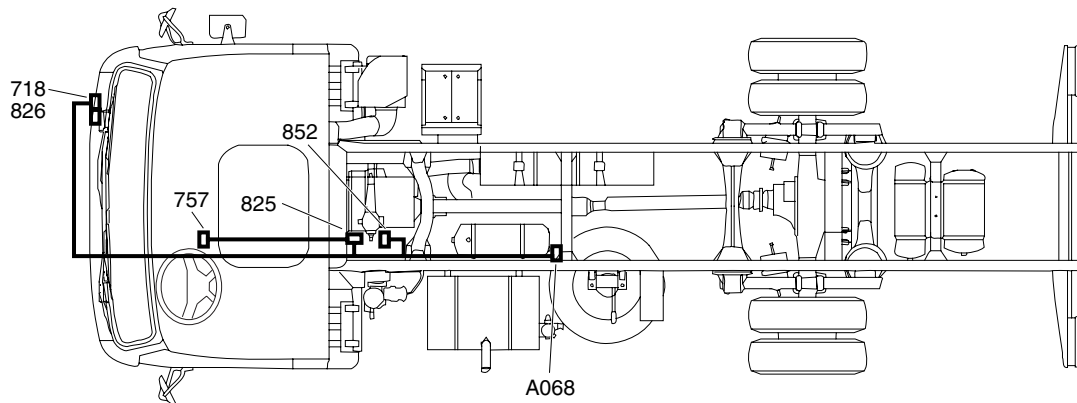
CONNECTION OF ACCESSORIES

LF45/55 series

Connection of accessories

1.5 DASHBOARD LEAD-THROUGH CONNECTOR FOR ENGINE SPEED CONTROL APPLICATION CONNECTOR

The optional application connector for the engine speed control system (connector A068) is a 12-pin Econoseal connector. Most of the pins of connector A068 are connected to dashboard lead-through connector 718 and engine wiring harness connector 825.



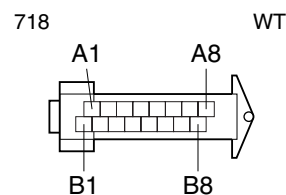
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E501751

Connector A068 is located on the co-driver's side near the air filter housing. In the dashboard lead-through, the wiring harness from connector A068 is connected to the dashboard wiring harness via connector 718.

CONNECTION OF ACCESSORIES**5**

Connection of accessories

LF45/55 series**Pin pattern for wiring harness connector 718:**

Pin no.	Wire no.	Description
A1	4177	Remote control for main switch
A2	3524	PTO status
A3	4176	Remote control for main switch
A4	3435	"Engine is running" signal
A5	1123	ADR MTCO (A1)
A6	4594	PTO remote control
A7	3700E	V-CAN, high
A8	3412	Cab lock
B1	M	Earth
B2	M	Earth
B3	3143	ESC enable
B4	3144	"N1" signal
B5	3145	"N2" signal
B6	3146	"N3" signal
B7	3514	MTCO vehicle speed signal (D3/B7)
B8	3701E	V-CAN, low

Connector A068 is also connected to engine wiring harness connector 825, which in turn is connected to B connector 757 on the ECS-DC3 electronic unit.

Pin pattern for wiring harness connector 825:

825

ZT



Pin no.	Wire no.	Description
1	3003	"Engine speed" signal
2	3039	Vmax application

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CONNECTION OF ACCESSORIES

LF45/55 series

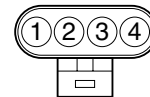
Connection of accessories

The engine wiring harness also has a 4-pin connector for "remote throttle" (852).

Pin pattern for wiring harness connector 852:

852

ZT

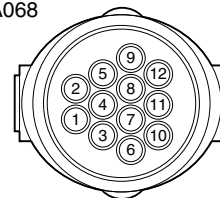


Pin no.	Wire no.	Description
1	4680	Accelerator pedal sensor earth
2	B68	5 V power supply
3	B85	"Remote throttle" signal
4	B21	Accelerator pedal sensor ON/OFF

Pin pattern for wiring harness connector A068:

A068

ZT



Pin no.	Wire no.	Description
1	M	Earth
2	-	-
3	3003	"Engine speed" signal
4	3039	Vmax application
5	-	-
6	-	-
7	3143	ESC enable
8	3144	"N1" signal
9	3145	"N2" signal
10	3146	"N3" signal
11	4594	PTO remote control
12	1240	Power supply after contact

CONNECTION OF ACCESSORIES

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Connection of accessories

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1.6 AUTOMATIC GEARBOXES APPLICATION CONNECTOR

The automatic gearbox application connector is entirely connected to the electronic unit of the automatic gearbox.

The connector's functions described below are those programmed as standard. Depending on the software programmed in the electronic unit, the functions may thus differ from the functions on the vehicle:

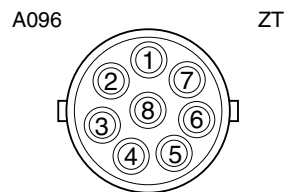
A096 Automatic gearbox socket, superstructure (AT2000)

A074 Automatic gearbox socket, superstructure

Note:

For a detailed explanation of the application connectors on an automatic gearbox, see the "Superstructure guidelines" book.

Pin pattern for wiring harness connector A068:



Pin no.	Wire no.	Description
1	4006	PTO activation only in neutral
2	5628	PTO request
3	110	Second shift program
4	111	"Range inhibit" prevents the PTO from remaining active when the gearbox is put into a gear by accident, for instance
5	112	Switching off overdrive
6	4596	PTO activation
7	3718	Switched gear indicator
8	-	

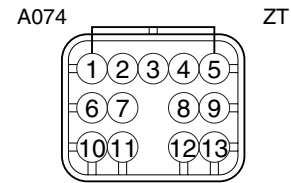
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CONNECTION OF ACCESSORIES

LF45/55 series

Connection of accessories

Pin pattern for wiring harness connector A070:



Pin no.	Wire no.	Description
1	5646	Feedback of neutral position
2	153	"Range inhibit" prevents the PTO from remaining active when the gearbox is put into a gear by accident, for instance.
3	5628	PTO request
4	-	
5	6035	Braking signal
6	5648	Automatic neutral position
7	-	
8	-	
9	167	Vehicle speed signal
10	5647	Earth
11	177	Kickdown
12	5644	Speed limiter for footboard protection
13	-	

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CONNECTION OF ACCESSORIES

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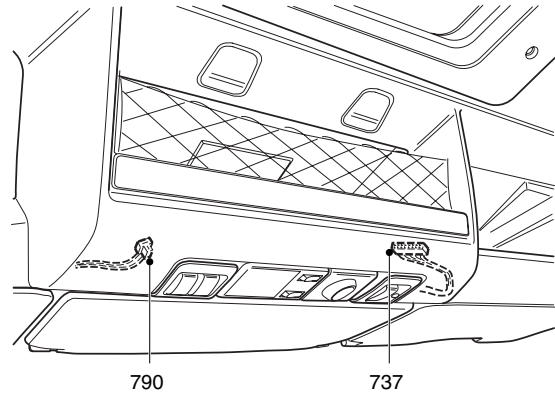
Connection of accessories

LF45/55 series

1.7 CONNECTOR FOR 12V CONNECTION IN ROOF CONSOLE

In the roof console there is a white 2-pin connector, 790, whose purpose is to connect a CB set.

This connector has the following wires: 1153 and earth.



E501163

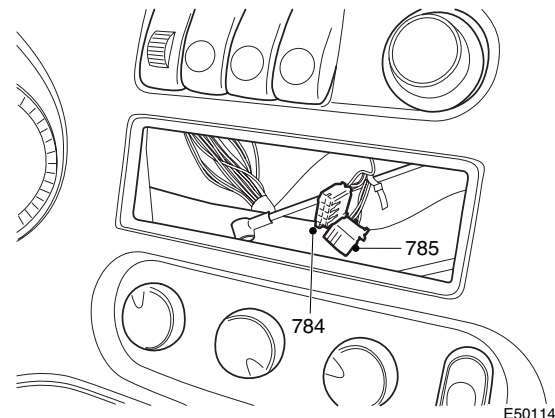
1.8 CONNECTORS FOR CONNECTING THE RADIO

Radio connection

Behind the radio panel there is a connector (connector no. 784) (to ISO standard) for the radio connection; this connector is provided with a power supply before contact of 12 V/10 A (15 A) (1153), power supply after contact (1143) and earth. The wiring for the loudspeakers, connector 785, to the speaker locations above the doors has also been fitted ready for use as standard.

Connectors for connecting the radio.

- 784 Power supply to radio
- 785 Loudspeakers for radio



E501148

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1. LIST OF ABBREVIATIONS	1-1	200440
2. MARKING OF WIRING	2-1	200440
3. READING CIRCUIT DIAGRAMS	3-1	200440
4. READING SECTION DIAGRAMS	4-1	200440

READING DIAGRAMS

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Contents

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1. LIST OF ABBREVIATIONS

Abbreviation	Explanation	Translation/description
ABS-D	Antilock Braking System - version D	Antilock braking system - version D
ABS/ASR-E	Antilock Braking System/Anti-Slip Regulation - version E	Antilock braking system/Anti-slip regulation - version E
ACH-W	Additional Cab Heater - Webasto	Cab heater - Webasto
AGC-A	Automatic Gearbox Control - Allison	Automatic Allison gearbox control
AIRCO	Air conditioning	Air conditioning
ALS-S	Alarm system - Scorpion	Alarm system - Scorpion
ASR	Anti-Slip Regulation	Anti-slip regulation
CAN	Controller Area Network	Multiplex digital communication network
CCU	CAN Connection Unit	CAN connection unit
CDB	Central Distribution Board	Central box
CDM	CAN Data Manager	CAN Data Manager
CDS-3	Central Door Locking System version 3	Central door locking system - version 3
CO	Change Over	Changeover contact
CXB	CAN extension box	CAN extension box
DAVIE XD	DAF Vehicle Investigation Equipment - version XD	DAF vehicle diagnostic tool - version XD
DIP-4	DAF Instrument Pack - version 4	DAF instrument panel - version 4
DVB	DoorVerBinding	Through-connection
ECAS-2	Electronically Controlled Air Suspension system - version 2	Electronically controlled air suspension system - version 2
ECAS-3	Electronically Controlled Air Suspension system - version 3	Electronically controlled air suspension system - version 3
ECS-DC3	Engine Control System DAF Cummins - version 3	DAF Cummins engine management system - version 3
FMS	Fleet Management System	Fleet Management System
MTCO	Modular Tachograph	Modular tachograph
NC	Normally Closed	Normally closed contact
NO	Normally Open	Normally open contact
PTO	Power Take-Off	Power take-off
RAS-EC	Rear Axle Steering - Electronically Controlled	Electronically controlled rear axle steering
VIC	Vehicle Intelligence Centre	Vehicle intelligence centre
VLG/ADR/GGVS/PETREG/RTMDR	Vervoer te Land Gevaarlijke Stoffen	Transport of hazardous substances

READING DIAGRAMS

5

List of abbreviations

LF45/55 series

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2. MARKING OF WIRING

INTRODUCTION

This standard sets out specifications for the uniform use of markings on electrical wiring.

The marking system consists of a numerical system and a colour coding system, thus ensuring a clear wiring layout and precluding faulty connections and manufacturing errors.

The marking system does not apply to vehicles subject to special conditions, such as military vehicles.

Numerical and colour coding

Each numerical code consists of four digits, the first of which refers to the main group and to the colour.

Main groups

Power supplies (red)
1000 to 1999

Lighting (yellow)
2000 to 2999

Warning and control functions (blue)
3000 to 3999

Power consumers (grey)
4000 to 6999

Special applications (colour as desired)
6000 to 6999

Earth connections (white)
Not marked
9000 to 9499 test and signal earth

I-CAN wiring (twisted)
3565 CAN-L (yellow)
3566 CAN-H (grey)

V-CAN wiring (twisted)
3700 CAN-L (yellow)
3701 CAN-H (blue)

Notes:

- The "M" with serial number coding on earth wiring is used for production-related reasons.
- In the case of straight splicing of the wiring (cascading), the numerical codes are shown on each separate wire followed by a serial letter.

READING DIAGRAMS

5

Marking of wiring

LF45/55 series

Earth connections

The application of electronic systems has made it necessary to divide the earth connections into groups. There is a distinction to be made between two different types of earth connection:

- switching earth
- test and signal earth

The switching earth is the conventional type of earth.

The test and signal earth is used exclusively for electronic systems.

The wiring colour for both types of earth is white, but the test and signal earth wiring is marked with numerical codes (from 9000 to 9500).



NEVER USE THE TEST AND SIGNAL EARTH WHEN FITTING AN ELECTRICAL COMPONENT

If you do this, electronic components may not work correctly.

If an electronic component needs to be connected, the earth for this system must be connected to the central earth connection in the cab.

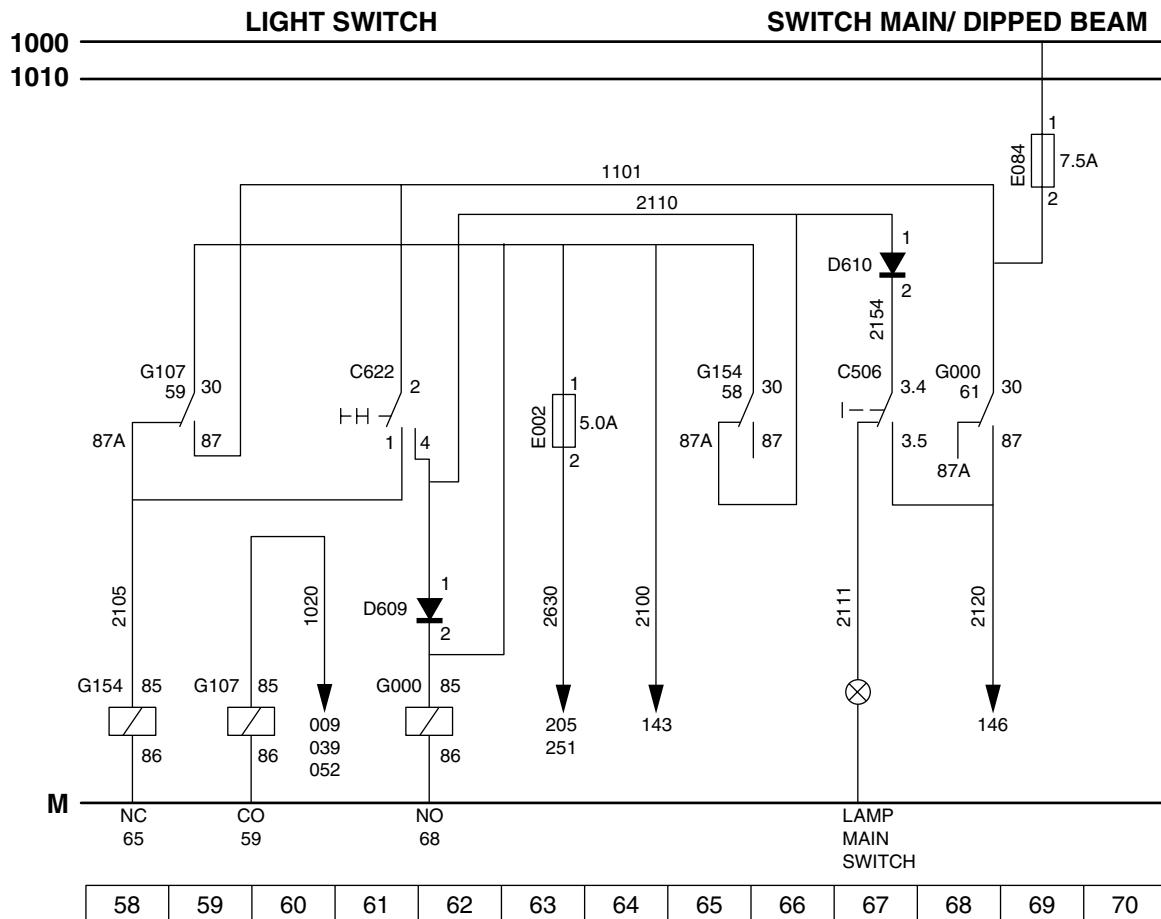
This connecting point is located under the central box behind the dashboard.

Abbreviations used in colour coding

Colour	Abbreviation	Colour	Abbreviation
red	rd	yellow	gl
brown	bn	white	wt
green	gn	grey	gs
blue	bw	black	zt
orange	oe	violet	vi
pink	re		

3. READING CIRCUIT DIAGRAMS

The circuit diagram is intended to show the various circuits in the simplest way possible. Symbols are used to do this.



E501056

1. In the diagram, the indications “1000” and “1010” are shown at the top, left side.
Explanation to these indications:
1000 = power supply before contact.
1010 = power supply after contact.
2. The indication “M” is shown at the bottom of the diagram, left side.
Explanation to this indication:
M = earth connection.

READING DIAGRAMS

5

Reading circuit diagrams

LF45/55 series

3. To make it easier to find your way around the circuit diagram, a “search bar” is included at the bottom, which contains numbers.
These numbers are called location numbers.

In the legend to the circuit diagram the description of the basic code (ECN) is followed by the relevant location number. In this way, a specific component can immediately be located in the diagram.

4. There is an arrow above location numbers 60, 63, 64 and 68 in the example diagram. At the bottom of this arrow is a number. This number refers to the location number on the search bar where you can find the relevant wire number.
5. Under the “M” (earth connection) line, there are the codes “NC”, relating to relay G154, “CO”, relating to relay G107, and “NO”, relating to relay G000.
What this code means:
NC = normally closed contact
CO = changeover contact
NO = normally open contact

These contacts can be found at the location numbers shown under the codes “NC”, “CO” and “NO”.

At the relay contacts shown in the diagram you will also find the location numbers that indicate the relay coil locations.

6. In the circuit diagram you will find the basic codes (for example E002). What these codes stand for can be found in the legend to the relevant circuit diagram.
7. If the wire numbers remain unchanged they will not be repeated in the circuit diagram. For instance, in the example diagram wire 1101 is connected to connection point 87 of relay contact G107, but also to connection point 2 of component C622.

Wire 2100 (at location number 64) is connected to connection point 30 of relay G154, but also to connection point 85 of relay G000, etc.

5

READING DIAGRAMS

LF45/55 series

Reading circuit diagrams

Symbols used

1		2		3		4	
5		6		7		8	
9		10		11		12	
13		14		15		16	
17		18		19		20	
21		22		23		24	
25		26		27		28	

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READING DIAGRAMS

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Reading circuit diagrams

LF45/55 series

29		30		31		32	
33		34		35		36	
37		38		39		40	
41		42		43		44	
45		46		47		48	
49		50		51		52	
53		54		55		56	

E502011

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READING DIAGRAMS

LF45/55 series

Reading circuit diagrams

Symbol number	Description
1	Loudspeaker
2	Electropneumatic or hydraulic valve, 1 driving coil
3	Electropneumatic or hydraulic valve, 2 driving coils
4	Electropneumatic or hydraulic valve, 3 driving coils
5	Diode
6	Bipolar diode
7	LED
8	LED with series resistor
9	4-position switch, key-operated
10	3-position switch with fixed central position, manually operated, spring return
11	Dual 3-position switch with fixed central position, manually operated, spring return
12	Potentiometer with series resistor
13	Potentiometer without series resistor
14	Dual switch; one 2-position switch, manually operated, changeover contact, one 2-position switch, manually operated, contact normally open
15	Dual switch; one 2-position switch, spring return, contact normally open, one 3-position switch, fixed central contact, spring return, changeover contact
16	2-position switch with fixed 0-position, spring return, contact normally open
17	Through-connection
18	Relay with changeover contact
19	Relay with changeover contact
20	Switch, pressure-controlled, dual break, contact normally closed
21	Switch, pressure-controlled, dual break, contact normally open
22	Switch, temperature-controlled, single break, contact normally closed
23	Switch, mechanically operated, dual break, contact normally closed
24	Switch, mechanically operated, dual break, contact normally open
25	Pressure - voltage converter
26	Temperature - voltage converter
27	Revs - pulse converter
28	2-position switch, single break, contact normally open, foot-pedal-operated

READING DIAGRAMS**5**

Reading circuit diagrams

LF45/55 series

Symbol number	Description
29	2-position switch, float-operated, dual break, contact normally closed
30	Sensor, Impedance
31	Sensor, Induction
32	DC motor, key-operated
33	DC motor
34	2-speed DC motor
35	Starter motor
36	Bulb
37	Resistor
38	Fuse
39	Heating element
40	Temperature-switched heating element
41	Socket with two contact sockets
42	2-position switch, fixed central position, manually operated
43	Timer
44	Threefold switch, fixed central position, contact normally open, manually operated, spring return
45	Fluid level, voltage converter
46	Twisted wire
47	Buzzer
48	2-position switch, manually operated, single break, contact normally open, in combination with tubular lamp
49	2-position switch, key-operated, single break, contact normally open
50	Protected wire with earth connection
51	Switch, temperature-operated, single break, contact normally closed
52	Switch, pressure-operated, single break, contact normally closed
53	Twofold, 2-position, magnetically operated reed switch, single break, contact normally open
54	Generator
55	Steering angle sensor
56	VSC module

4. READING SECTION DIAGRAMS

EXPLANATION OF THE POSITION NUMBERS IN THE SECTION DIAGRAMS

In the section diagram only information that is functional in the section diagram described is shown in detail.

1. The wiring is shown in the same colours as the wiring in the vehicle.
2. The wire numbers are as they are printed on the wiring in the vehicle. Suffixes to wire numbers, such as A, B, C, etc., have been omitted.
3. Basic code of a component. For component descriptions, see the legend to the diagram. For more information, see the relevant section diagram.
4. Number of the wire connection point or the PCB track on the component.
5. The basic code of the connector and the connection point on this connector.
6. The symbols indicate which system or component is being referred to (in most cases the symbol is also shown on the lens of the warning lamp or switch).
7. PCB tracks.
8. The central box and instrument panel PCBs are grey.
9. Removable components are shown in white.

READING DIAGRAMS

5

Reading section diagrams

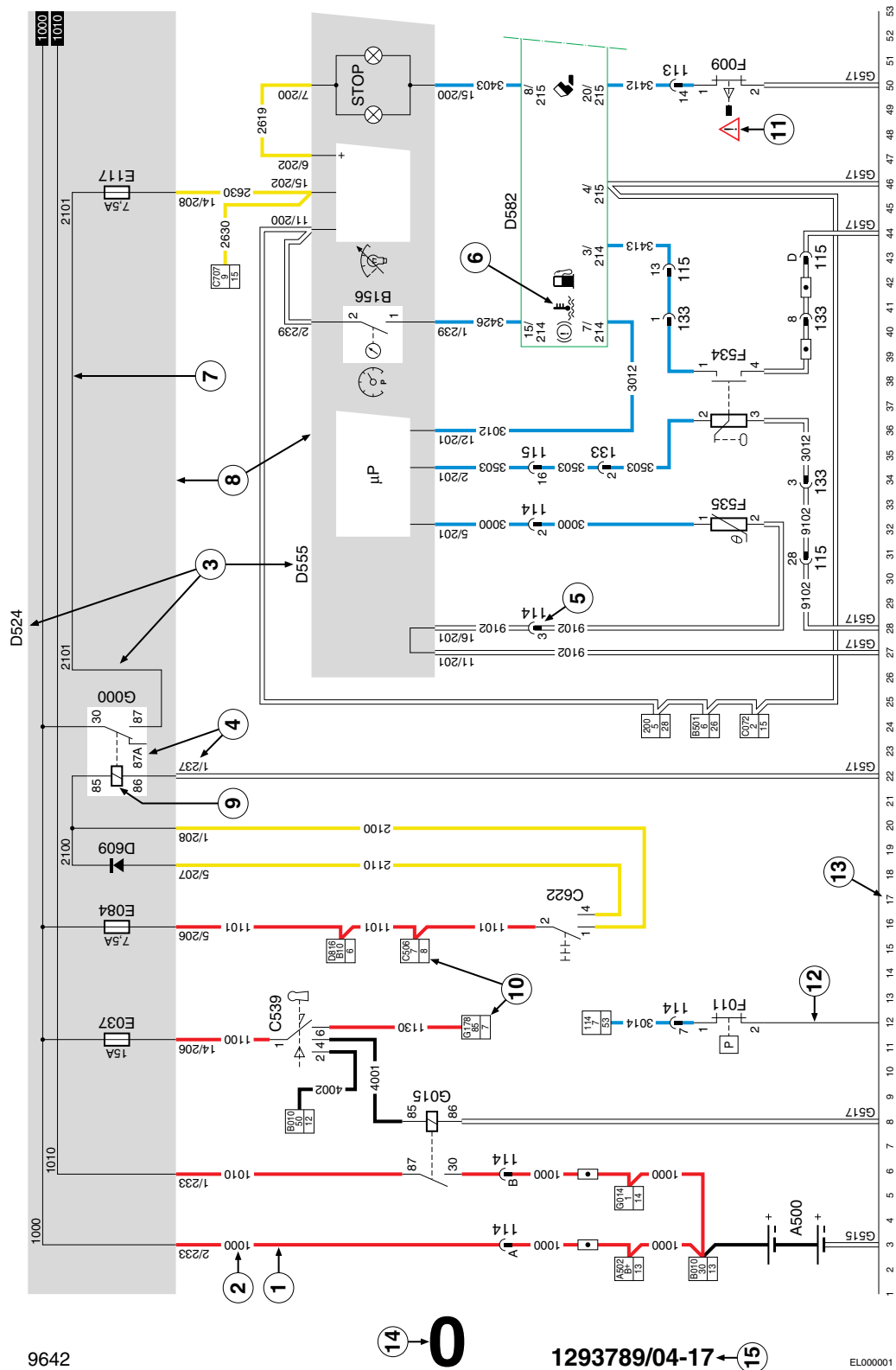
LF45/55 series

10. Reference to the component and connection point and to the section (section diagram) which gives further information about this component.

G178 85
7

G178 = Basic code number of the component
85 = Connection point on the component
7 = Reference to section diagram 7

11. **ATTENTION!** The situation on the vehicle may be different, because of different specifications. Always consult the legend to the diagram.
12. The housing of this component is connected to earth. The line shown is therefore not a wire.
13. Search bar numbers.
14. Drawing number as well as section number.
15. Relation to the circuit diagram.



READING DIAGRAMS

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Reading section diagrams

LF45/55 series

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LOCATION OF COMPONENTS

LF45/55 series

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	Page	Date
1. GENERAL LOCATION OF COMPONENTS	1-1	200440
1.1 Introduction	1-1	200440
1.2 Location of components in relation to circuit diagram 1427090/03-04	1-2	200440

LOCATION OF COMPONENTS

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Contents

LF45/55 series

1. GENERAL LOCATION OF COMPONENTS

1.1 INTRODUCTION

This main group contains an overview of components that do **not** occur in a system manual.

The location of system components is shown in the appropriate system manual.

There is a sticker in the central box, which indicates what relays, through-connections and fuses can be found on the PCB.

LOCATION OF COMPONENTS**5**

General location of components

LF45/55 series**1.2 LOCATION OF COMPONENTS IN RELATION TO CIRCUIT
DIAGRAM 1427090/03-04**

Column 1 = basic codes of component
 Column 2 = description
 Column 3 = location
 Column 4 = page number

1	2	3	4
A000	FA drawn vehicle socket (7-pin)	Chassis rear end	1
A001	Socket, rear fog lamp/reversing light, FT drawn vehicle (7-pin)	Behind cab	1
A004	ABS socket, FA drawn vehicle (7-pin)	Chassis rear end	1
A011	Socket, 12 V accessories (2-pin)	Electrical panel, underside	4
A021	Diagnostic socket (16-pin)	Under floor mat, driver's side	3
A032	AGC diagnostic socket	On chassis side member above air supply unit	6
A074	Automatic gearbox socket, superstructure	On second side member behind gearbox	6
A087	CCU/CDM socket (2-pin)	Under central box	2
A510	Alarm system battery	In central box, above ABS unit	4
B003	Electric drop glass operation motor, driver's side	In driver's side door	3
B004	Electric drop glass operation motor, co-driver's side	In co-driver's side door	3
B042	Air dryer heating element	In air supply unit	7
B043	Air conditioning compressor	Engine, front left	7
B079	Low-range downshift protection valve	Left side of gearbox	1
B182	Water separator fuel heating element	Rear side of fuel tank, on fuel filter housing	2
B192	Exhaust brake valve	On the RH chassis side member	7
B199	Central door locking motor, driver's side	In door under door lock, driver's side	3

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LOCATION OF COMPONENTS

LF45/55 series

General location of components

1	2	3	4
B200	Central door locking motor, co-driver's side	In door under door lock, co-driver's side	3
B201	Internal electrical components for AGC automatic gearbox	In bottom of gearbox housing	6
B241	Fuel filter/water separator heating element sensor	Rear side of fuel tank, under fuel filter	2
B245	PTO 1 control valve	On the RH chassis side member	7
B338	Alarm system horn	Front of side member, left	5
B341	Glow element	In inlet manifold	5
B360	Seat belt tensioner, driver's side	In roll-up mechanism, driver's seat	4
B361	Airbag module	In steering wheel	4
B399	Cooling fan 1, AGC automatic gearbox	Depending on vehicle application	6
B400	Cooling fan 2, AGC automatic gearbox	Depending on vehicle application	6
B401	Horn	Front of side member, left	5
C062	Stepwell lighting, left	At the bottom of door, driver's side	3
C063	Stepwell lighting, right	At the bottom of door, co driver's side	3
C119	Interior lighting with switch, driver's side	At the bottom, centre, in roof console	3
C525	Main switch	Dashboard, centre panel	4
C553	Mechanical main switch	Chassis side member	2
C622	Lighting switch	Next to steering column, left	4
C715	Rotating beam switch	Overhead panel	3
C725	Work lamp switch	Dashboard, centre panel	4
C727	Fog lamp switch, front/rear	Dashboard, electrical panel	4
C736	Roof hatch switch	Overhead panel	3
C748	Cross-axle differential lock switch	Dashboard, electrical panel	4
C750	PTO 1 switch	Dashboard, centre panel	4
C763	Instrument lighting dimming potentiometer	Dashboard, electrical panel	4

LOCATION OF COMPONENTS

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General location of components

LF45/55 series

1	2	3	4
C765	Switch for warning lamps	Dashboard, centre panel	4
C773	Fog lamp switch, rear	Dashboard, electrical panel	4
C774	Central door locking switch	Dashboard, centre panel	4
C804	Switch, adjustable speed limiter	Dashboard, electrical panel	4
C835	Switch to turn off interior detection	Overhead panel	3
C836	Switch to turn off superstructure/drawn vehicle loadspace detection	Dashboard, centre panel	4
C854	Chassis main switch	On outside of chassis, next to the batteries	7
C864	Drop glass operation switch, co-driver's side (driver's side door)	In door panel, co-driver's side	3
C865	Drop glass operation switch, co-driver's side (co-driver's side door)	In door panel, driver's side	3
C866	Drop glass operation switch, driver's side (driver's side door)	In door panel, driver's side	3
C867	Mirror heating switch	Dashboard, electrical panel	4
C868	Mirror adjustment switch	In door panel, driver's side	3
C871	Potentiometer for headlamp height adjustment	Next to steering column, right	4
C880	Reversing buzzer switch	Dashboard, centre panel	4
C892	Heater fan switch	In heating/ventilation panel	4
C893	Air conditioning switch	In heating/ventilation panel	4
D609	Light switch diode	In diode block, against bottom of central box	2
D610	Diode, main beam/dipped beam	In diode block, against bottom of central box	2
D715	Alarm system LED	Overhead panel	3
D758	Diode to prevent feedback to the VIC	In diode block, against bottom of central box	2
D787	Diode, air conditioning compressor link	Internal in air conditioning-compressor link	7

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LOCATION OF COMPONENTS

LF45/55 series

General location of components

1	2	3	4
D802	Electronic unit, ECAS-2 (6x2)	Top side of attachment plate, central box	5
D822	AGC vehicle interface module	On inside of chassis in AGC box	6
D851	Electronic unit, ECAS-3 (4x2)	Top side of attachment plate, central box	5
D866	Electronic unit, AGC-A4 automatic gearbox control	On inside of chassis in AGC box	6
D867	Automatic gearbox selector	In cab on floor	6
D900	Electronic unit, VIC	On inside of attachment plate, central box	5
D905	Electronic unit, CDS	In roof console, co-driver's side	3
D909	Electronic unit, alarm system, ultrasonic	In central box, above ABS unit	4
D910	Electronic unit, battery charger	In central box, above ABS unit	4
D911	Electronic unit, ALS-S alarm system	Against heater housing, left side	4
D912	Electronic unit, immobiliser	Against steering column near ignition/starter switch	4
D924	Electronic unit for main switch	In main switch box on chassis	7
D926	Electronic unit, airbag/seat belt tensioner	Under floor pan, driver's side	4
D941	Electronic unit, ABS/ASR, D version	On top side, central box, horizontal	5
D942	Fuse box	Central box	5
D958	Electronic unit, converter with power supply for radio memory	Next to central box, outside	2
D960	Airbag contact unit	Under steering wheel	4
D961	Electronic unit, ABS/ASR, E version	On top side, central box, horizontal	5
E153	Fuse, power supply for main switch	In main switch box on chassis	7
E286	Main fuse	Behind battery box on chassis	2
E299	Fuse, windscreen heating	Behind battery box on chassis	2

LOCATION OF COMPONENTS**5**

General location of components

LF45/55 series

1	2	3	4
E330	Fuse, 'sens' wire main switches	In main switch box on chassis	7
E349	Main fuse, cab	Behind battery box on chassis	2
E354	Fuse, automatic gearbox, AGC fan	In AGC box on chassis	6
E501	Reversing light switch	On gearbox	1
E509	Air conditioning switch, high/low pressure	In evaporator pipe, on outside of cab, co-driver's side	1
E569	Neutral position switch, gearbox	Gearbox	1
E585	Selector switch, automatic gearbox (AT 1000/2000)	Bottom left on outside of gearbox housing	6
E587	Switch for stop lights/clutch	Above brake pedal and clutch pedal	3
E597	Switch, cooling fans, automatic gearbox (AGC)	In AGC oil cooling radiator	6
F000	Parking brake switch	On valve relay, chassis	1
F009	Control switch, cab tilting	In cab lock, driver's side	1
F087	Control switch, gearbox PTO	On PTO housing, type-dependent	7
F533	Vehicle speed sensor	Gearbox, rear end	1
F601	Output shaft speed sensor, automatic gearbox	At rear of gearbox	6
F602	Input shaft speed sensor, automatic gearbox	At front of gearbox	6
F651	Ambient temperature sensor	Between A-pillar and door, left side	1
F652	Air pressure sensor	On air supply unit	7
F670	Sensor, turbine speed, automatic gearbox	On gearbox	6
F671	Accelerator pedal sensor, ECS-DC3	Above accelerator	3
G014	Glow plug relay	Behind battery box on chassis	2
G185	Starting circuit interrupter relay	On Vehicle Interface Module in AGC box	6
G201	Fuel heating relay, FPH-E	Back of central box	2
G350	Reversing light relay, automatic gearbox	On Vehicle Interface Module in AGC box	6

5**LOCATION OF COMPONENTS****LF45/55 series**

General location of components

1	2	3	4
G367	Main switch relay, power supply	In main switch box on chassis	7
G368	Main switch relay, earth	In main switch box on chassis	7
G397	Windscreen heating relay	In main switch box on chassis	7
G425	Main switch relay	In main switch box on chassis	7
G444	Cooling fan relay, automatic gearbox (AGC-A4)	In AGC box on chassis	6
G507	Earth, 1-pin, chassis - cab	Outside, under windscreen	2
G516	Central cab earth, co-driver's side	Inside, central box	2
G517	Central cab earth, driver's side	Outside, driver's side	2
G520	Central earth, chassis, front end	Chassis side member, behind the shock absorber, driver's side	2
G524	Earth point, glow element	Left side of engine, cylinder head	5
G525	Central earth, flywheel	Chassis side member, behind the shock absorber, co-driver's side	2

LOCATION OF COMPONENTS

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General location of components

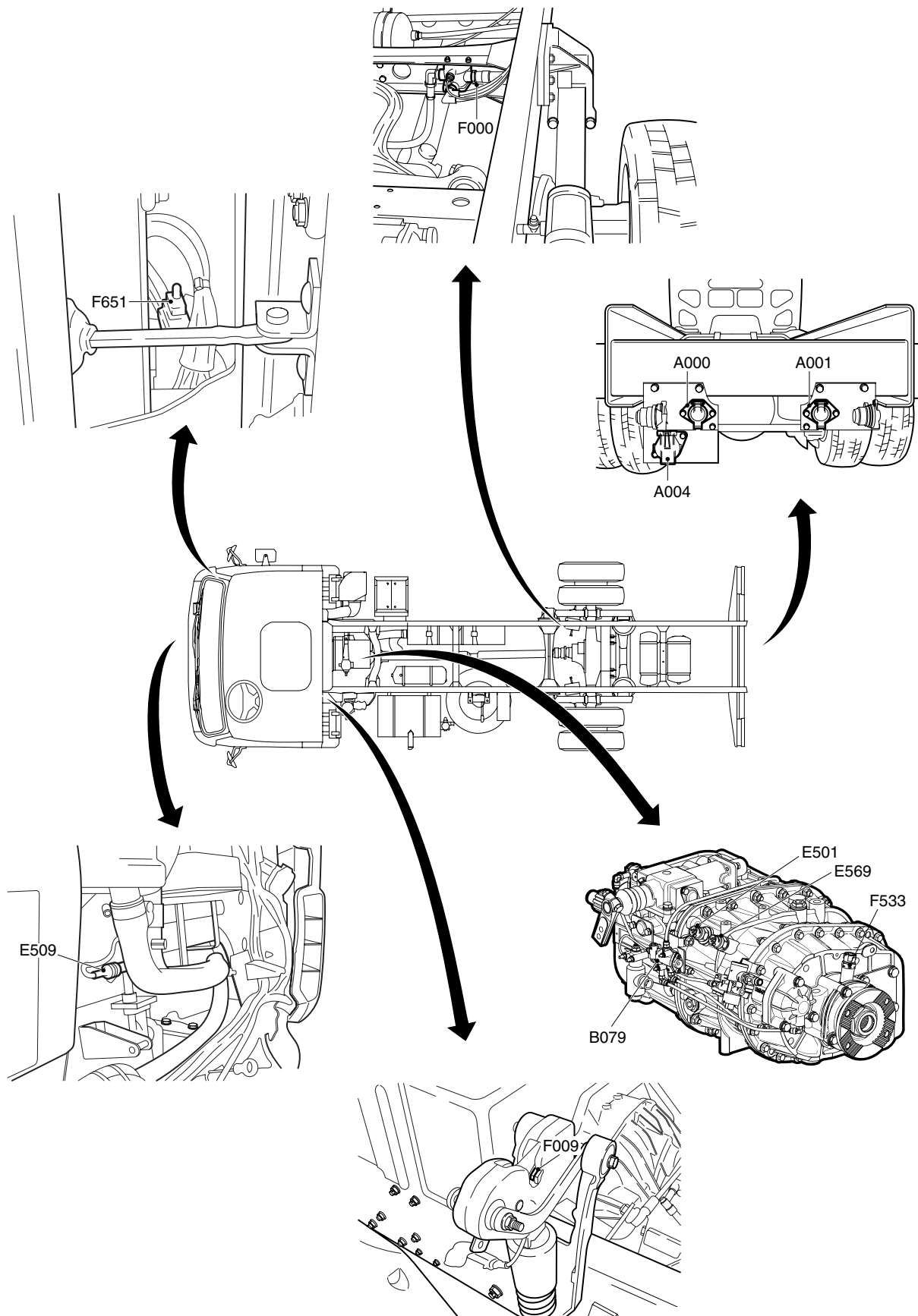
LF45/55 series

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LOCATION OF COMPONENTS

General location of components

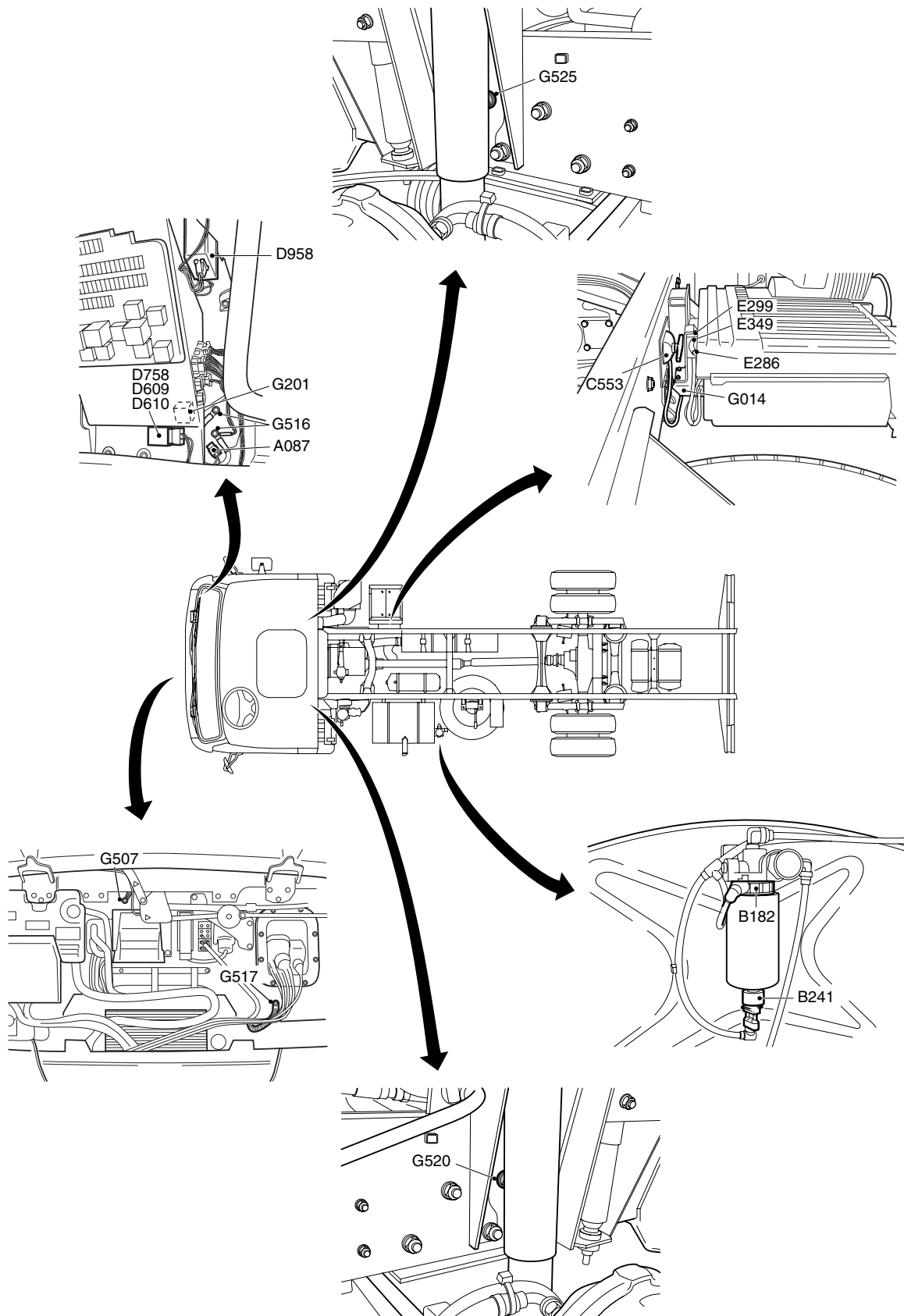


LOCATION OF COMPONENTS

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General location of components

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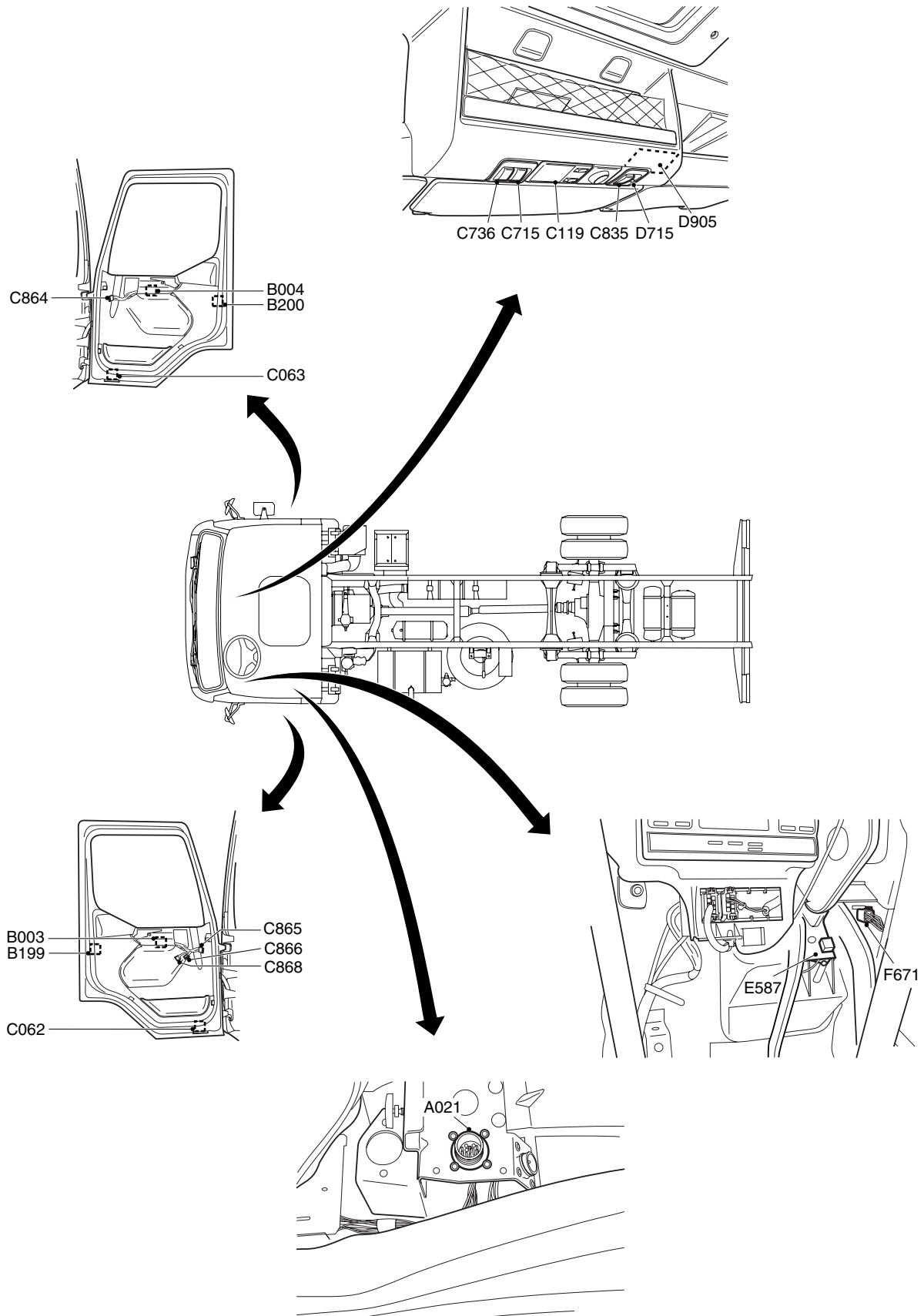
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LOCATION OF COMPONENTS

General location of components

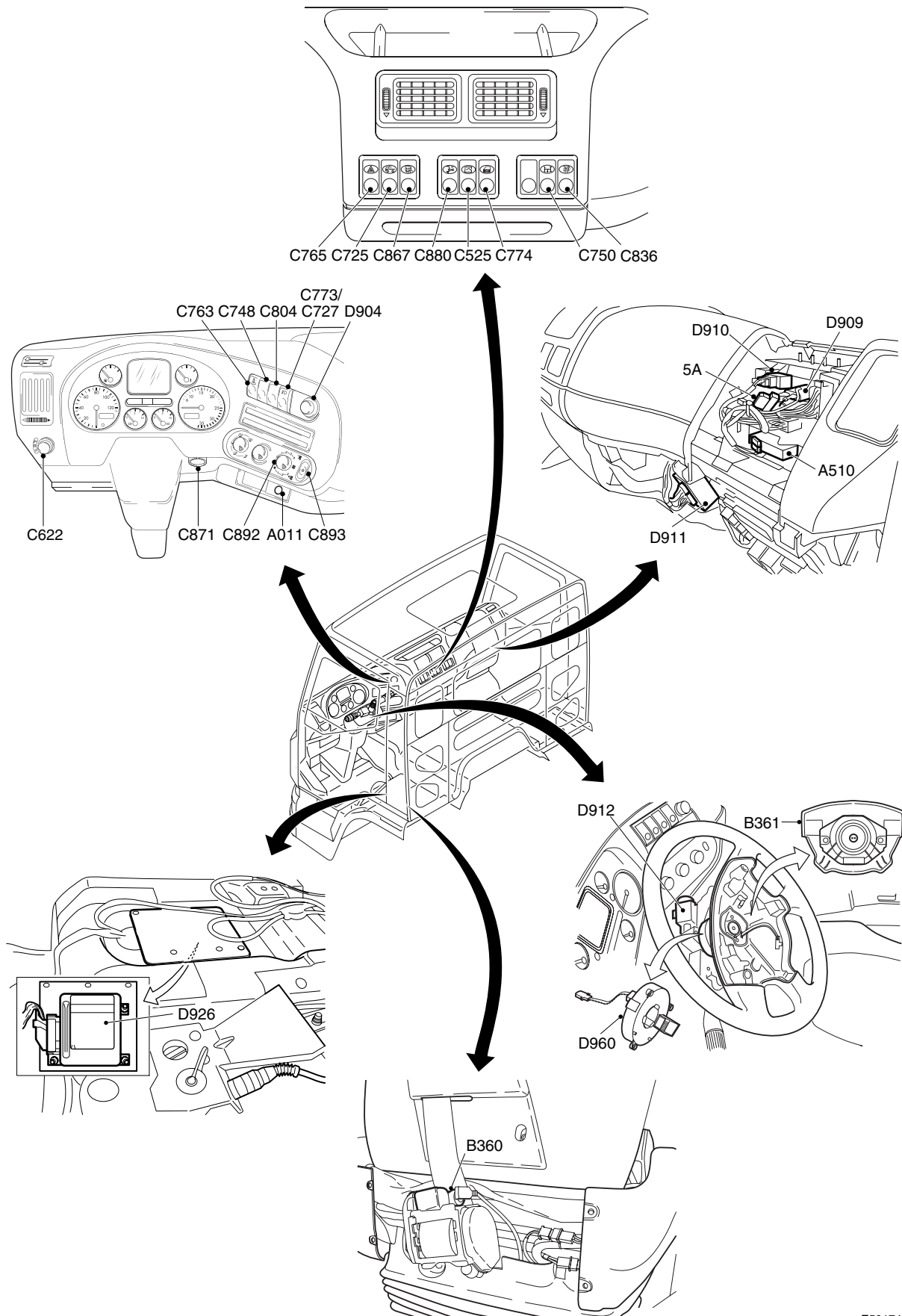


LOCATION OF COMPONENTS

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General location of components

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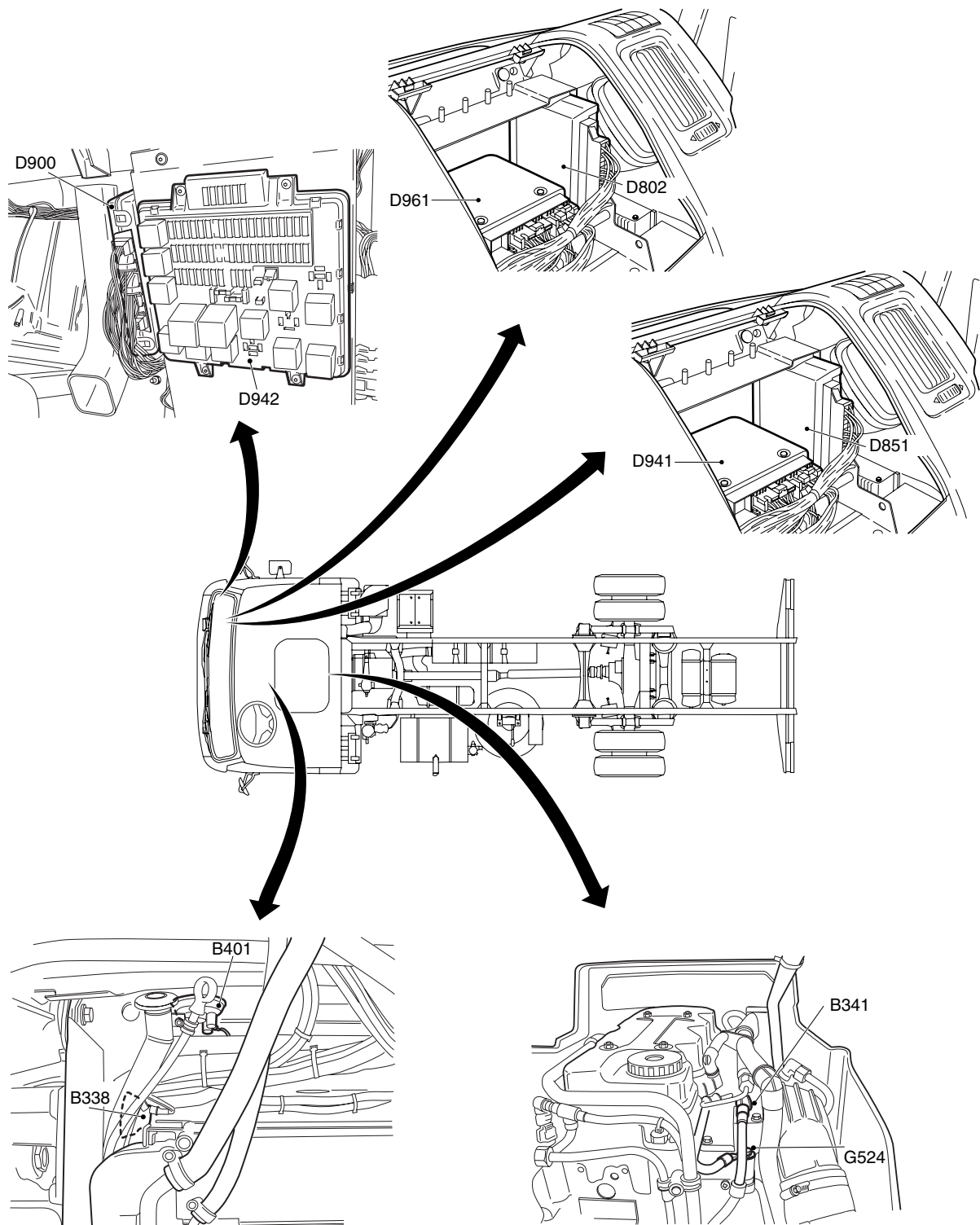
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LOCATION OF COMPONENTS

General location of components

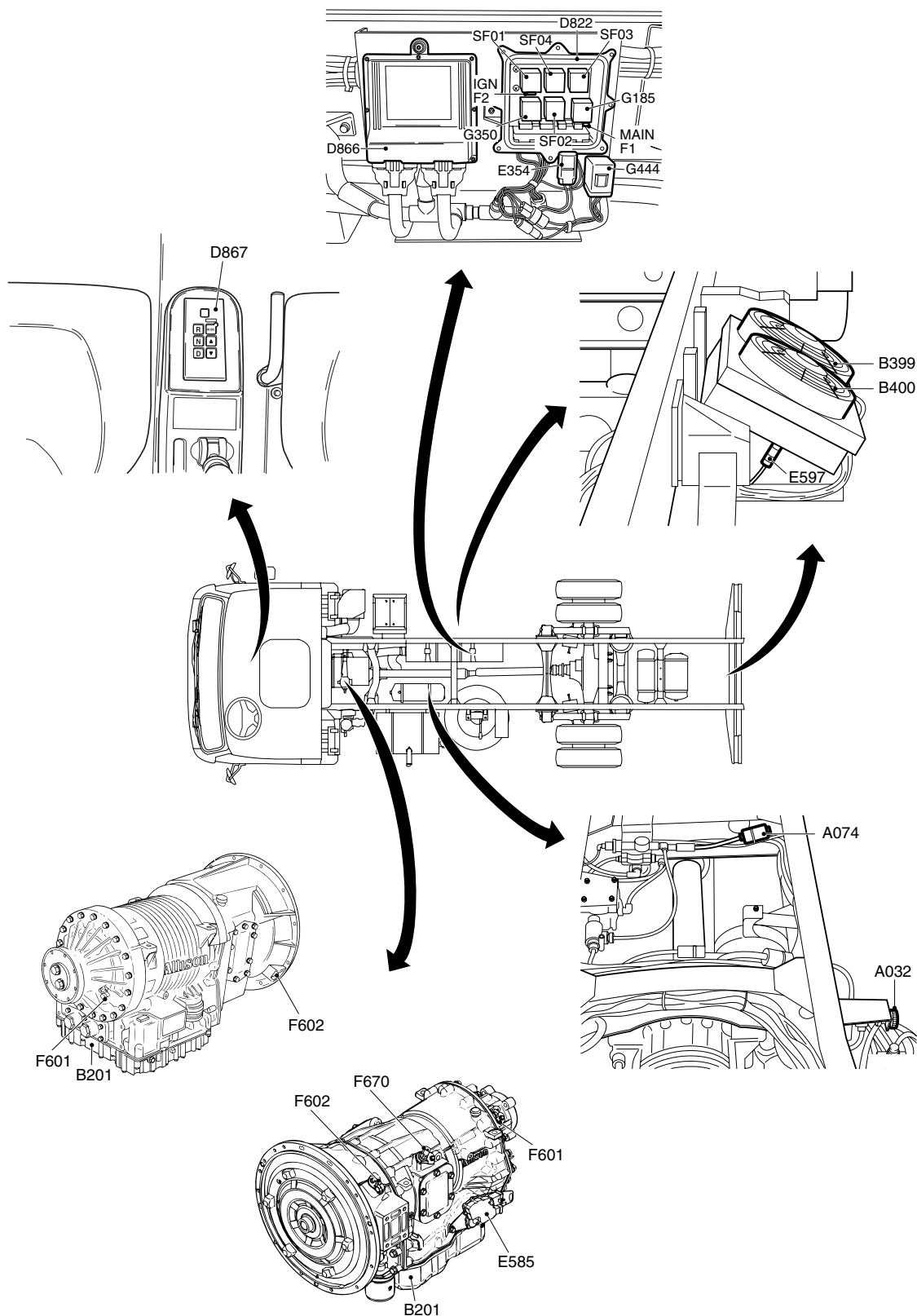


LOCATION OF COMPONENTS

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General location of components

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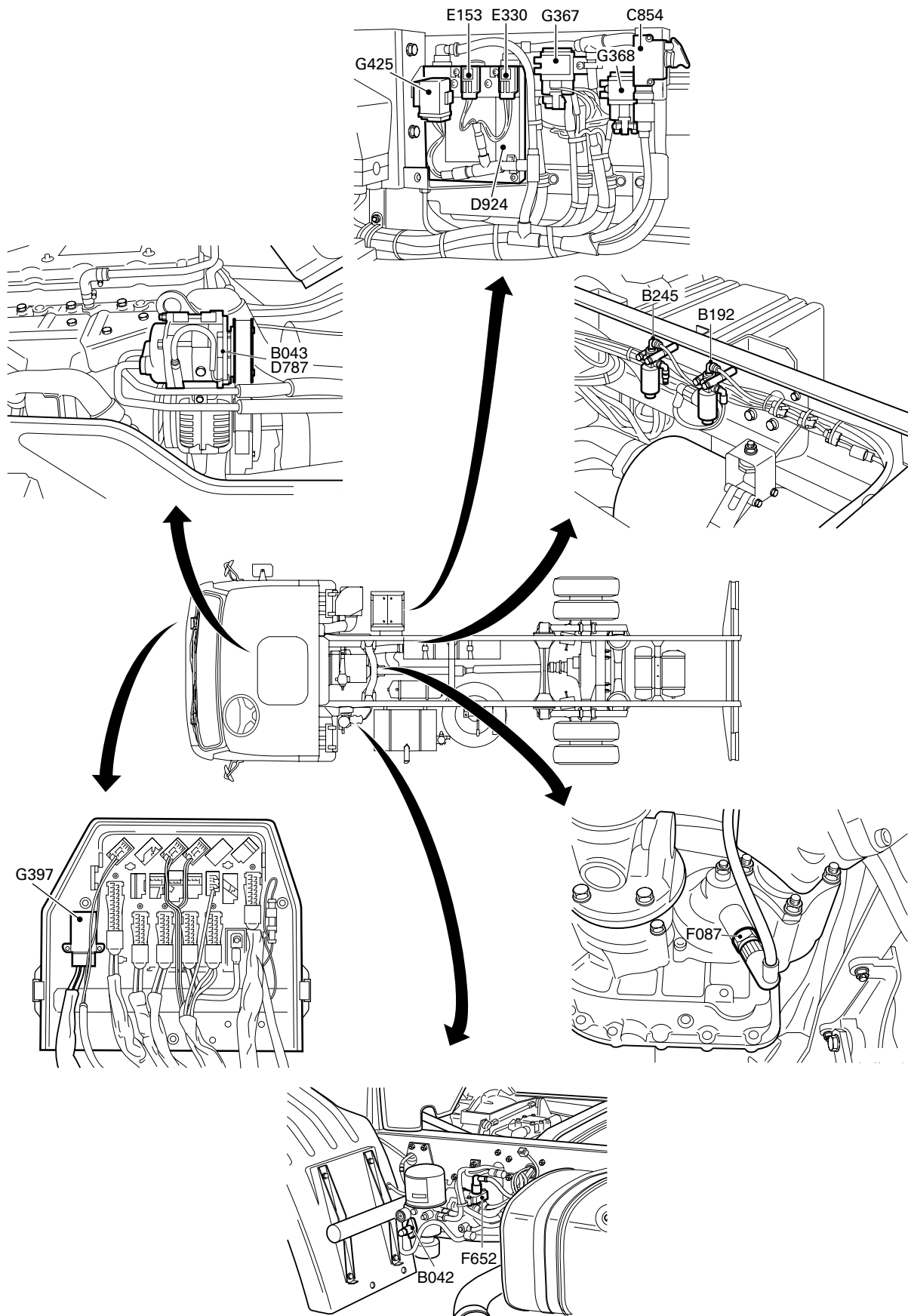
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LOCATION OF COMPONENTS

General location of components



LOCATION OF COMPONENTS

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General location of components

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LOCATION OF CONNECTORS

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LOCATION OF CONNECTORS

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LF45/55 series

5**LOCATION OF CONNECTORS****LF45/55 series**

Location of connectors

1. LOCATION OF CONNECTORS**1.1 LIST OF CONNECTORS**

- Column 1 = Connector coding
 Column 2 = Number of connection points on connector
 Column 3 = Colour of connector
 Column 4 = Description of connector, if applicable
 Column 5 = Location of connector in the vehicle
 Column 6 = Reference to page number (see "Drawings showing location of connectors")

1	2	3	4	5	6
340	35	Black	ECAS-2 electronic unit	Above central box	20
700	25	Brown	PCB connector	On PCB of central box	2
701	25	White	PCB connector	On PCB of central box	2
702	25	Yellow	PCB connector	On PCB of central box	2
703	25	Red	PCB connector	On PCB of central box	2
704	2	Brown	PCB connector	On PCB of central box	2
705	2	Grey	PCB connector, power supply before contact	On PCB of central box	2
706	2	Black	PCB connector	On PCB of central box	2
707	8	Yellow	PCB connector	On PCB of central box	2
708	8	Violet	PCB connector	On PCB of central box	2
709	8	Red	PCB connector	On PCB of central box	2
710	8	Brown	PCB connector	On PCB of central box	2
711	8	Grey	PCB connector	On PCB of central box	2
712	8	White	PCB connector	On PCB of central box	2
713	25	Yellow	Dashboard lead-through connector	Dashboard lead-through zone 1	4
714	16	Brown	Dashboard lead-through connector	Dashboard lead-through zone 1	4
715	16	Red	ABS-D, ABS/ASR-E	Dashboard lead-through zone 1	4
716	16	Green	Dashboard lead-through connector	Dashboard lead-through zone 1	4
717	16	Blue	Automatic gearbox	Dashboard lead-through zone 1	4
718	16	White	Engine speed control	Dashboard lead-through zone 1	4

LOCATION OF CONNECTORS

5

Location of connectors

LF45/55 series

1	2	3	4	5	6
719	8	White	Accelerator pedal sensor	Dashboard lead-through zone 1	4
720	8	Red	Dashboard lead-through connector	Dashboard lead-through zone 1	4
721	8	Yellow	Headlights/ indicator lamps, front	Dashboard lead-through zone 1	4
722	8	Grey	Headlamp height adjustment/ fog lamps, front	Dashboard lead-through zone 1	4
723	8	Violet	ECAS	Dashboard lead-through zone 1	4
724	8	Brown	Dashboard lead-through connector	Dashboard lead-through zone 1	4
725	4	Black	Cab heater	Dashboard lead-through zone 1	4
726	4	Grey	Headlight/windscreen washer	Dashboard lead-through zone 1	4
727	4	Yellow	ASR	Dashboard lead-through zone 1	4
728	4	Blue	Alarm siren	Dashboard lead-through zone 1	4
729	6	Black	Alarm battery charger	Central box	21
730	2	Grey	Dashboard lead-through connector	Dashboard lead-through zone 1	4
731	8	Yellow	Windscreen wiper motor	Dashboard lead-through zone 2	5
732	8	White	Door functions	Dashboard lead-through zone 2	5
733	8	Red	Door functions	Dashboard lead-through zone 2	5
734	8	Violet	Air conditioning switch	Dashboard lead-through zone 2	5
735	8	White	Central door locking	Side of central box	3
736	8	Blue	Loudspeakers, rotating beams, roof hatch, interior lighting	Side of central box	3
737	16	Black	Central door lock	Roof console, centre	9
738	16	Black	Door wiring, driver's side	Between A-pillar and door	8
739	16	Black	Door wiring, co-driver's side	Between A-pillar and door	8
740	4	Black	Alarm/immobiliser LED, roof console	Side of central box	3
741	8	White	Steering column switch, cruise control/engine speed	Next to steering column, inner side	10
742	8	Blue	Steering column switch, windscreen wipers/washer	Next to steering column, inner side	10
743	9	Black	A connector, VIC electronic unit	In central box	6
744	24	Black	B connector, VIC electronic unit	In central box	6

5

LOCATION OF CONNECTORS

LF45/55 series

Location of connectors

1	2	3	4	5	6
745	52	Black	C connector, VIC electronic unit	In central box	6
746	40	Black	D connector, VIC electronic unit	In central box	6
747	9	Black	E connector, VIC electronic unit	In central box	6
748	25	Black	Connector, ECAS electronic unit	Above central box	7
749	15	Black	Connector, ABS-D electronic unit	Above central box	7
750	18	Black	Connector, ABS-D electronic unit	Above central box	7
751	8	Blue	Connector, heater / air conditioning	On heater housing	21
752	8	White	MTCO A connector	On rear of MTCO	12
753	8	Yellow	MTCO B connector	On rear of MTCO	12
754	8	Black	Remote control system, ECAS	Outside, driver floor pan	7
755	14	Black	Connector, DIP	On rear of DIP	1
756	8	Grey	Connector for cab heater system, Webasto	Outside of central box	3
757	89	Black	B connector for ECS-DC3 engine management electronic unit	On left of engine	18
758	2	Black	Reversing buzzer	Left-hand chassis side member, near fuel tank	15
759	6	Black	Fuel pre-heating	Left-hand chassis side member, near fuel tank	14
760	6	Black	ECAS-3 chassis wiring harness, 45LF	Left-hand chassis side member, near fuel tank	15
761	13	Black	ABS	Left-hand chassis side member, near fuel tank	15
762	13	Black	Tail lights/differential lock	Left-hand chassis side member, near fuel tank	15
763	13	White	Drawn vehicle connection	Left-hand chassis side member, near fuel tank	15
764	7	Black	Tail lights, right	On tail light unit, right	15
765	7	Black	Tail lights, left	On tail light unit, left	15

LOCATION OF CONNECTORS**5**

Location of connectors

LF45/55 series

1	2	3	4	5	6
766	3	Black	Differential lock	In chassis side member, near rear axle	16
				Dashboard lead-through zone 1	33
767	2	Black	Break lining wear	In chassis side member, near rear axle	17
768	6	Black	Engine connector	At front of engine block	18
769	7	Black	Air pressure sensor	On top of air supply unit	13
771	14	Black	Cruise control	Steering column, right	10
772	10	Black	Lighting / horn switch, steering column	Steering column, left	10
773	6	Black	Direction indicator switch, steering column	Steering column, left	10
774	4	White	12 V accessories connection	Outside of central box	3
775	4	Black	Immobiliser	Right of steering column	10
776	2	Black	Engine brake valve	Right-hand chassis side member, near air filter	16
777	2	Black	Direction indicator, left side	On mudguard support, left	13
778	2	Black	Direction indicator, right side	On mudguard support, right	14
779	3	Black	Glow plug relay	Chassis side member, near air supply unit	18
780	2	Black	Work lamp	Under cross member, rear cab suspension	17
781	2	Black	Seat heating	Under floor mat, driver's seat	7
782	6	Black	ECAS-3 chassis wiring harness, LF55	Left-hand chassis side member, near fuel tank	15
783	2	Black	ECAS-3 chassis wiring harness, height sensor, left, LF55	Left-hand chassis side member, near fuel tank	15
784	8	Black	Power supply to radio	Behind E-panel, dashboard	12
785	8	White	Loudspeakers for radio	Behind E-panel, dashboard	12
786	8	Blue	Clutch/stop light switch	Under MTCO	11
787	8	White	Engine brake switch	Under MTCO	11
788	6	Black	Mirror adjustment/heating, driver's side	Outside of door, behind mirror bracket shield	8
789	6	Black	Mirror adjustment/heating, co-driver's side	Outside of door, behind mirror bracket shield	8

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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors

1	2	3	4	5	6
790	2	White	CB set	Under panel of roof console	9
791	8	Black	Electronic unit, cab heater	Under storage compartment, behind co-driver's seat	19
792	4	Black	Electronic unit, cab heater	Under storage compartment, behind co-driver's seat	19
793	12	Black	Cab heater control and timer	Side wall, behind driver's seat	19
794	2	Black	Cab heater, fuel pump	Chassis side member, driver's side	20
795	8	Violet	Cab heater	Under storage compartment, behind co-driver's seat	19
796	12	Black	A connector, alarm electronic unit	Next to heater housing	21
797	21	Black	B connector, alarm electronic unit	Next to heater housing	21
798	10	White	Diode block	Below, on central box	3
799	6	Blue	Ultrasonic unit	Above, on central box	21
800	4	Yellow	Alarm, interior detection, superstructure	In side of central box	3
801	4	White	Airbag	Under MTCO	11
802	30	Black	Airbag electronic unit	In floor pan under driver's seat	7
803	8	Green	Airbag	Under MTCO	11
805	2	Black	ECAS-2, voltage and earth	Dashboard lead-through zone 1	31
806	8	Brown	Reserve wiring	Under MTCO	11
807	6	Black	LED electronic unit	Above central box	20
808	8	Yellow	Ignition/starter switch	Next to steering column, inner side	10
809	2	Black	Superstructure lighting, left	Between air supply unit and fuel tank	13
810	2	Black	Superstructure lighting, right	Between air inlet filter and battery pack	13
811	2	Grey	Seat belt tensioner	Rear of co-driver's seat	23
812	8	Black	Ignition unit, airbag	Steering column on airbag ignition unit	22
813	2	Black	MTCO earth, activated when main switch turned on	Dashboard lead-through zone 1	4

LOCATION OF CONNECTORS**5**

Location of connectors

LF45/55 series

1	2	3	4	5	6
814	2	Black	Rotating beam, driver's side	Roof console, co-driver's side	9
815	2	Black	Rotating beam, co-driver's side	Roof console, co-driver's side	9
816	2	Black	PTO control switch	In chassis wiring harness	26
817	2	Yellow	Airbag	On steering wheel, between ignition unit and airbag unit	22
818	2	Green	Seat belt tensioner	Rear of co-driver's seat	23
819	2	Black	Seat heating	Rear of co-driver's seat	23
820	15	Black	Connector, ABS/ASR-E electronic unit	Above central box	24
821	18	Black	Connector, ABS/ASR-E electronic unit	Above central box	24
822	8	Black	Main switch	Right-hand chassis side member	30
823	12	Black	Spare wiring, superstructure functions application connector	Left-hand chassis side member, near fuel tank	25
824	8	Black	Superstructure functions application connector	Left-hand chassis side member, near fuel tank	25
825	2	Black	Motor connector, Vmax/engine speed	Left-hand chassis side member, near gearbox	25
826	1	Black	PTO control	Dashboard lead-through zone 1	4
827	36	Black	A connector for ECS-DC3 engine management electronic unit	On left of engine	18
828	16	Black	C connector for ECS-DC3 engine management electronic unit	On left of engine	18
829	13	Black	Chassis connector, automatic transmissions	Chassis cross member behind gearbox	28
830	4	Black	Motor connector, automatic transmissions	Left-hand chassis side member, near air supply unit	28
831	4	Black	Connector, external current limiter, ADR unit	On chassis in ADR box	31
832	4	Black	Connector, external current limiter, ADR unit	On chassis in ADR box	31
833	2	Black	Power supply, MTCO ADR earth connector	Dashboard lead-through zone 1	30
834	3	Black	VIC power supply and ADR alternator	Dashboard lead-through zone 1	30
835	13	Black	Cab functions chassis connector, RAS-EC	Left-hand chassis side member, near gearbox	26

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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors

1	2	3	4	5	6
836	4	Black	Oil level sensor, RAS-EC	Next to oil tank, on left under cab	27
837	68	Black	Connector, RAS-EC electronic unit	In between two cross members halfway between two rear axles	27
838	4	Black	Angle sensor, rear, RAS-EC	On left-hand brake booster, trailing axle	27
839	4	Black	Front axle angle sensor 1	On top of steering box	27
840	3	Black	Front axle angle sensor 2	On bottom of steering box	27
841	7	Black	Steering valve, RAS-EC	On rear axle cross member	27
842	2	Black	Wheel speed sensor, RAS-EC	On inside of left-hand chassis side member, near rear axles	27
843	13	Black	Automatic gearbox selector (MD3060)	Left-hand chassis side member, near fuel tank	28
844	2	Black	Activation of cooling fans, automatic gearbox	On chassis in AGC box	28
845	1	Black	Temperature switch, cooling fans, automatic gearbox	On chassis in AGC box	28
846	2	Black	Temperature switch, cooling fans, automatic gearbox	On oil cooler radiator unit	29
847	2	Black	Activation of cooling fan 1, automatic gearbox	On oil cooler radiator unit	29
848	2	Black	Activation of cooling fan 2, automatic gearbox	On oil cooler radiator unit	29
849	1	White	Light, automatic gearbox selector (MD3060)	Underside of central box	29
850	6	Black	Intermediate connector for diagnostic connector	Inside of left-hand chassis side member	28
851	4	Black	Activates PTO valve	Inside of right-hand chassis side member	26
852	4	Black	"Remote throttle" application	Chassis cross member behind gearbox	25
853	32	Grey	Connector, electronic unit, automatic gearbox (AT1000/2000)	On chassis in AGC box	31

LOCATION OF CONNECTORS**5**

Location of connectors

LF45/55 series

1	2	3	4	5	6
854	32	Red	Connector, electronic unit, automatic gearbox (AT1000/2000)	On chassis in AGC box	31
855	31	Black	Internal components, automatic gearbox (MD3060)	On rear of automatic transmission	28
856	16	Black	Engine speed sensors for automatic gearbox (MD3060)	On rear of automatic transmission	28
857	20	Grey	Automatic gearbox selector (MD3060)	Under floor mat, engine tunnel	29
858	4	Black	Chassis connector, low-range downshift protection valve	Left-hand chassis side member, near air supply unit	24
859	2	Black	Exhaust brake connector	At front of engine block	18
900	20	Black	Engine speed sensors, selector switch, automatic gearbox (AT1000/2000)	On rear of automatic transmission	31
901	8	Black	Chassis connector, RAS-EC components, front	Left-hand chassis side member, near fuel tank	26
902	2	Black	Alternator connector, voltage before contact in combination with main switch	At front of engine block	18
903	13	Black	Chassis connector, ECAS-2	Left-hand chassis side member, near fuel tank	26
904	2	Black	Intermediate connector, ECAS-2, -pressure sensor	-	31
905	32	Black	S connector, electronic unit, automatic gearbox (MD3060)	On chassis in AGC box	28
906	32	Blue	T connector, electronic unit, automatic gearbox (MD3060)	On chassis in AGC box	28
907	32	Grey	V connector, electronic unit, automatic gearbox (MD3060)	On chassis in AGC box	28
908	2	Black	Cooling fan connector, automatic gearbox (AT1000/2000)	On oil cooler radiator unit	31
952	5	Black	Transmission connector	Left-hand chassis side member, near air supply unit	32

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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors

1	2	3	4	5	6
953	2	Black	Fuel level sensor	Left-hand chassis side member, near fuel tank	32
954	4	Black	Fuel tank connector	Left-hand chassis side member, near fuel tank	32
955	2	Black	FMS power connector	Central box	33

1.2 DRAWINGS SHOWING LOCATION OF CONNECTORS

Explanation of connector drawings

A: Connector coding

B: Colour of connector

BN = brown

BW = blue

GL = yellow

GS = grey

OE = orange

RD = red

VI = violet

WT = white

ZT = black

C: List of pin numbers on connector

The pin numbers on the connector are where possible viewed from the wire input side

LOCATION OF CONNECTORS

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Location of connectors

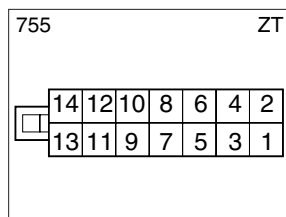
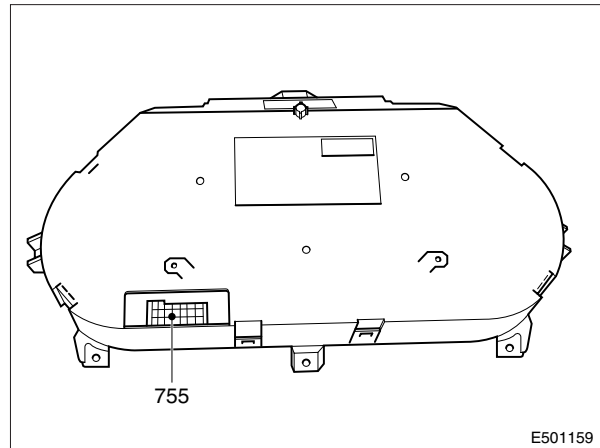
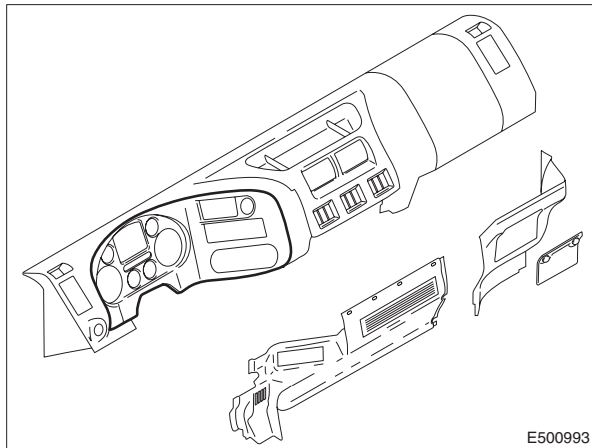
LF45/55 series

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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



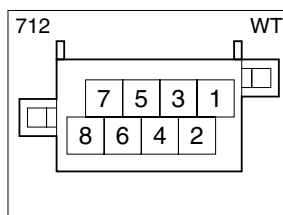
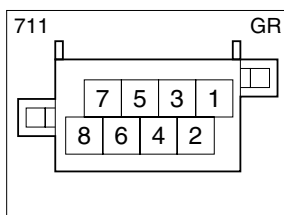
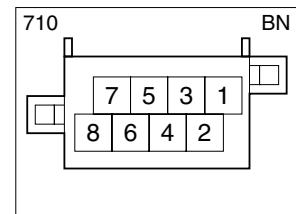
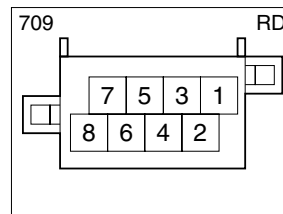
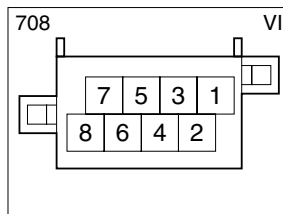
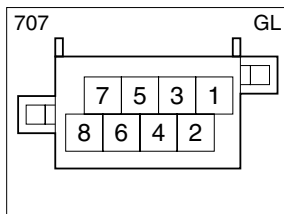
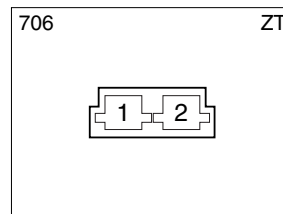
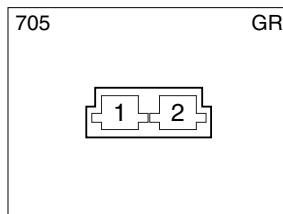
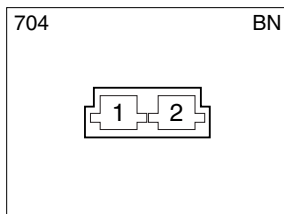
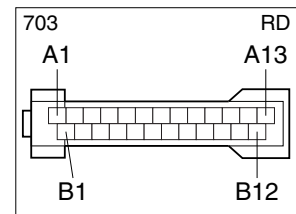
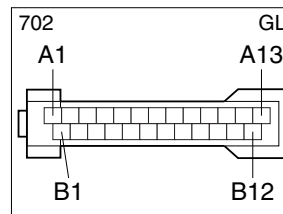
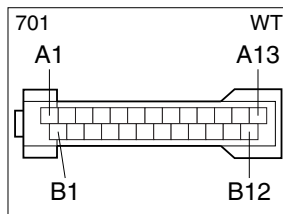
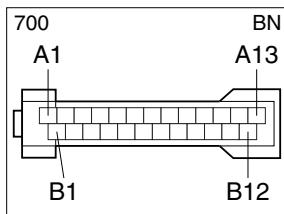
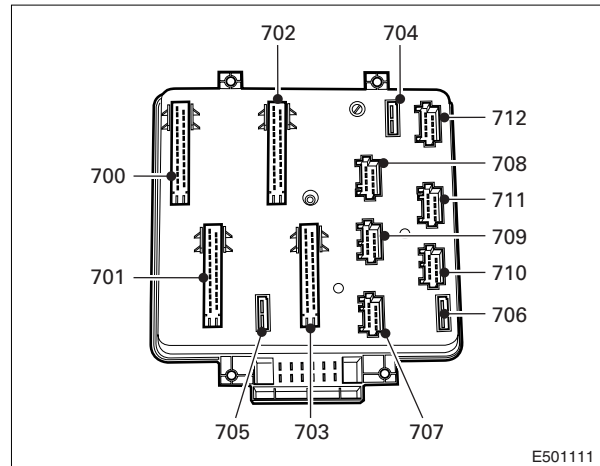
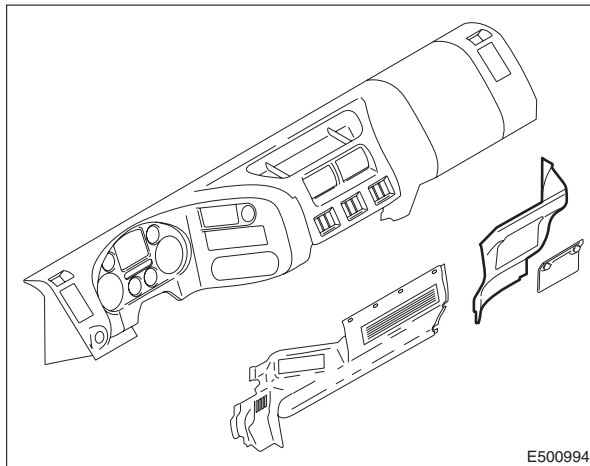
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LOCATION OF CONNECTORS

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Location of connectors

LF45/55 series



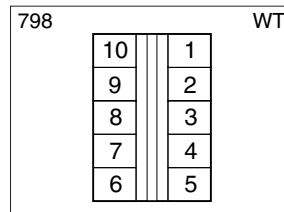
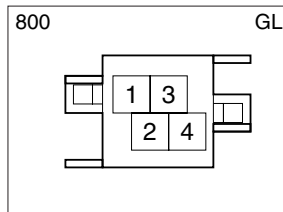
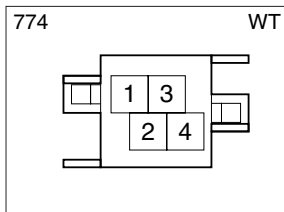
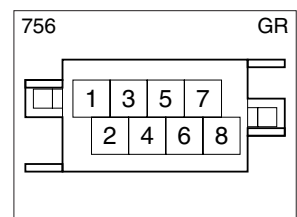
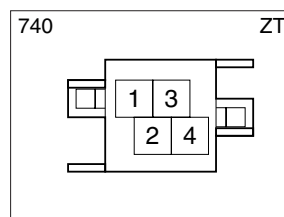
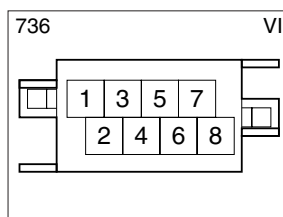
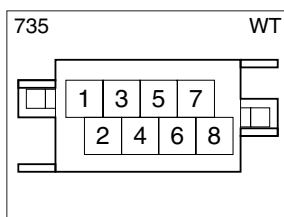
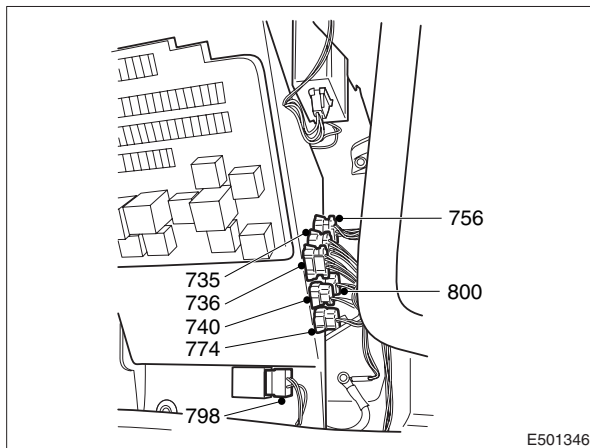
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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



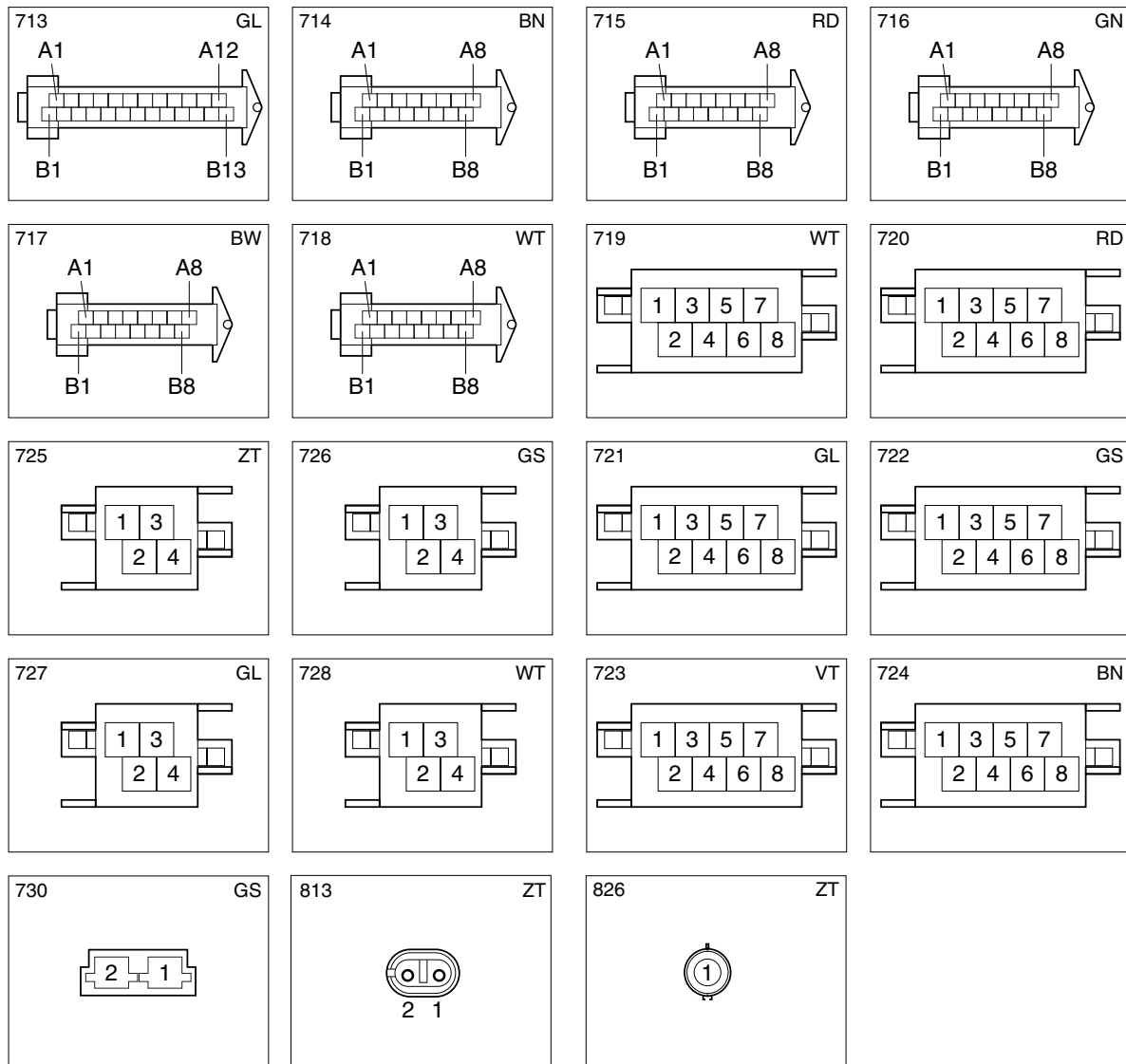
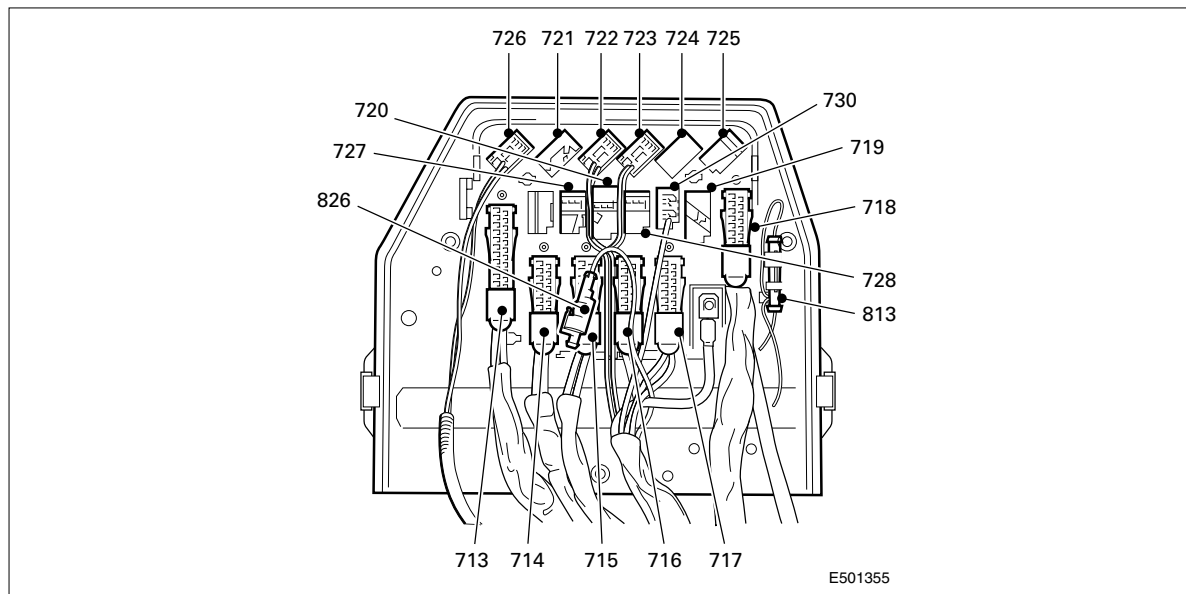
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LOCATION OF CONNECTORS

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Location of connectors

LF45/55 series



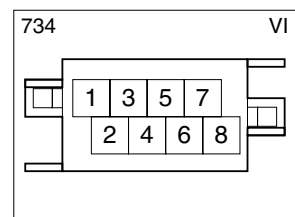
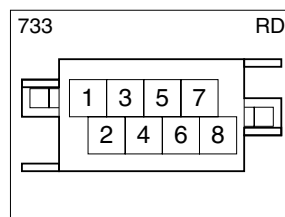
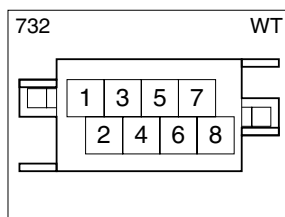
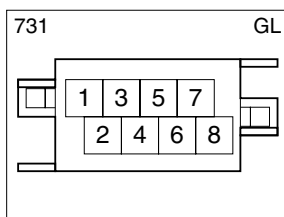
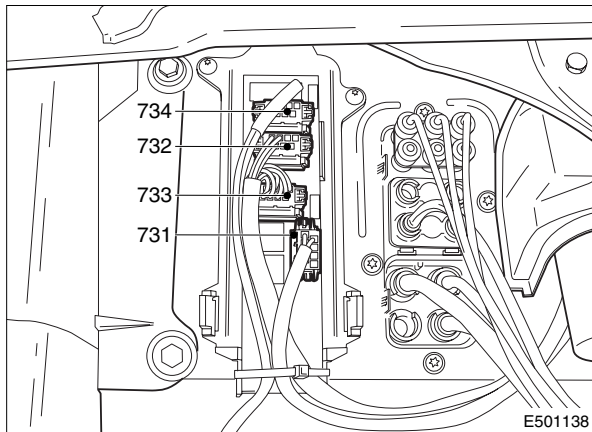
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LOCATION OF CONNECTORS

LF45/55 series

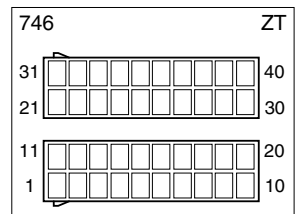
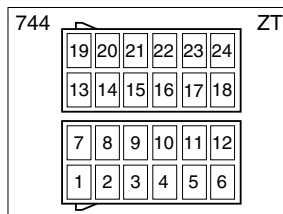
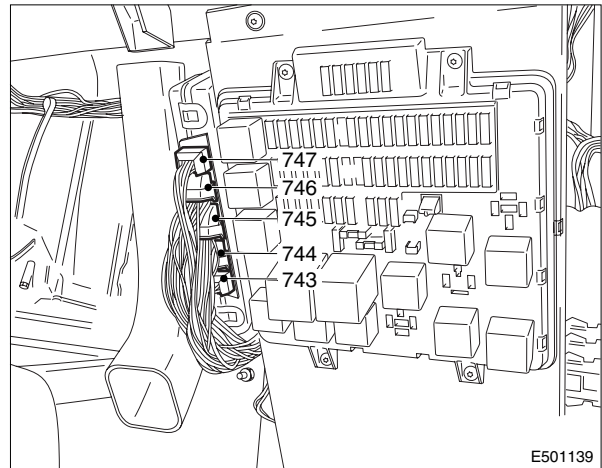
Location of connectors



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LF45/55 series

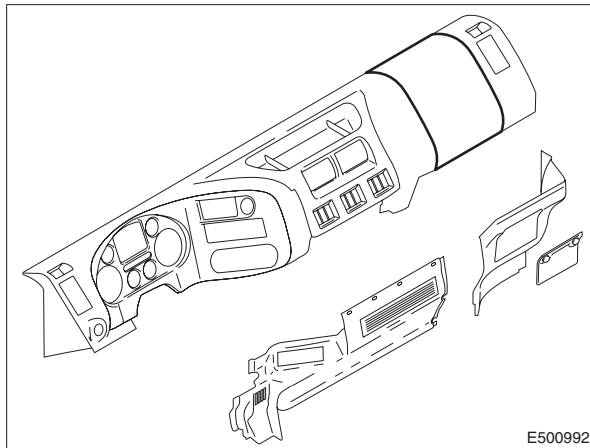


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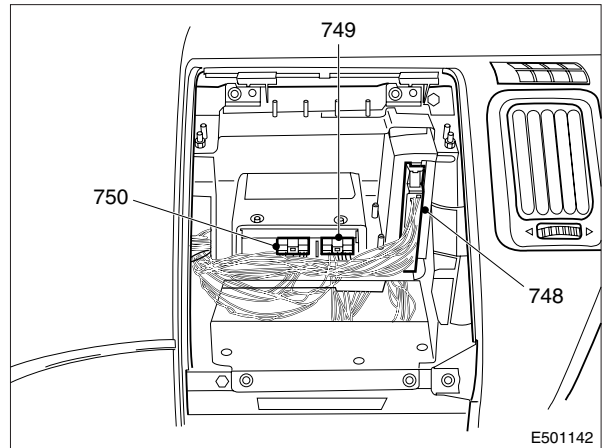
LF45/55 series

LOCATION OF CONNECTORS

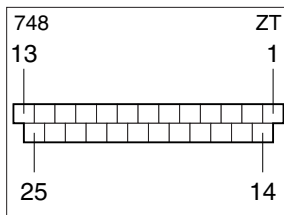
Location of connectors



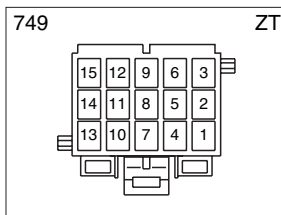
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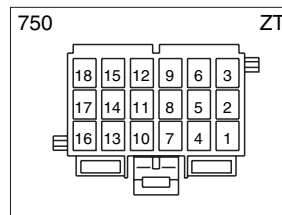
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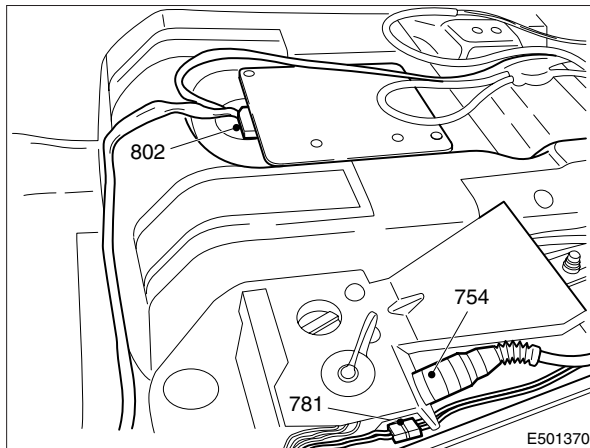


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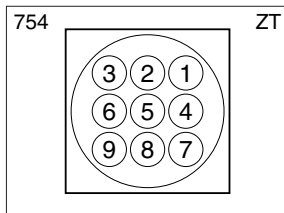


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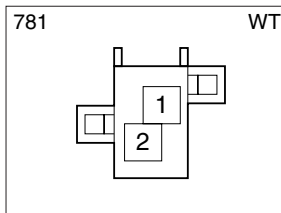
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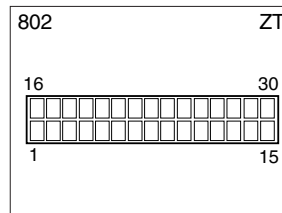
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ZT



WT



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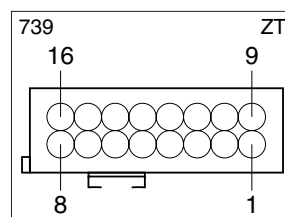
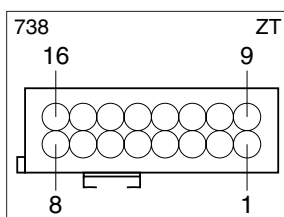
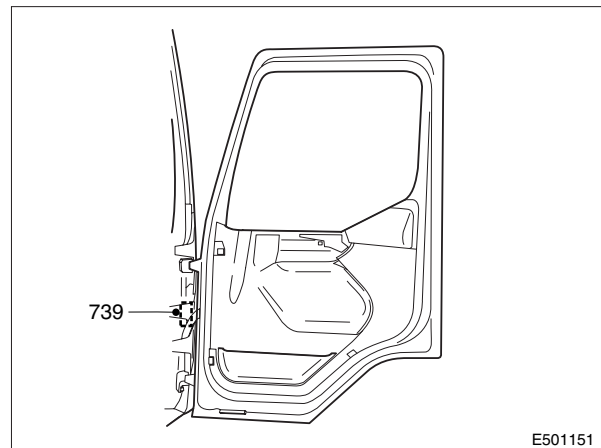
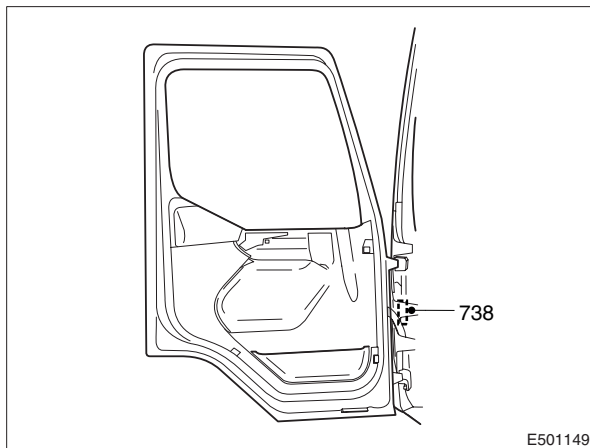
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LOCATION OF CONNECTORS

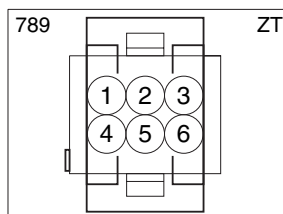
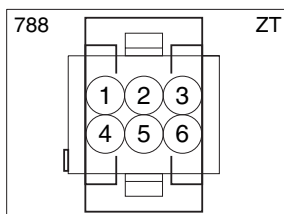
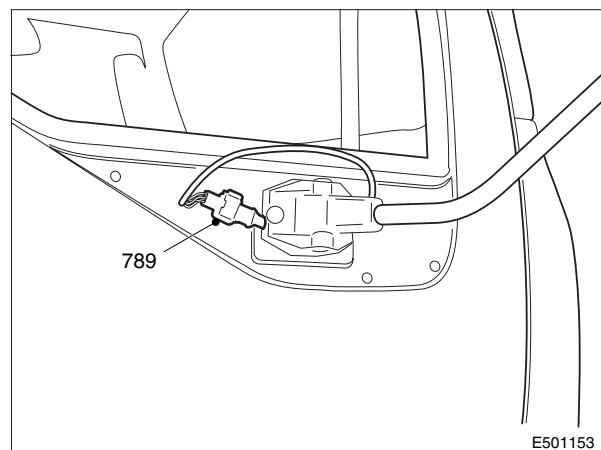
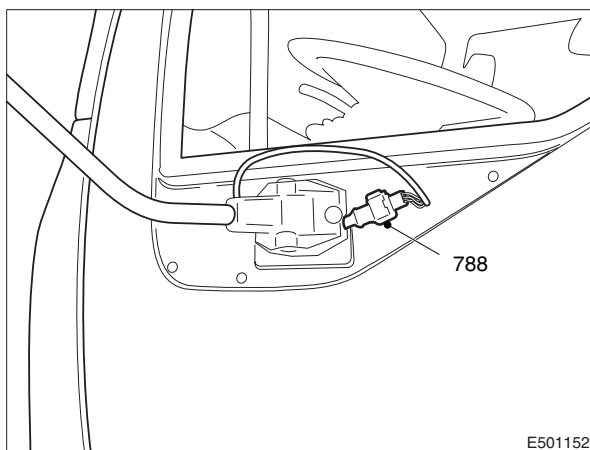
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Location of connectors

LF45/55 series



E501217



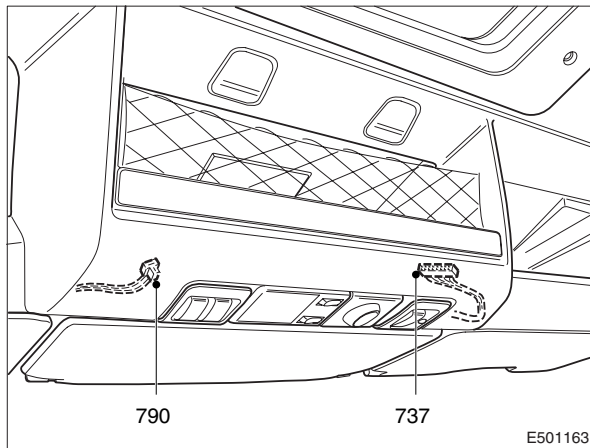
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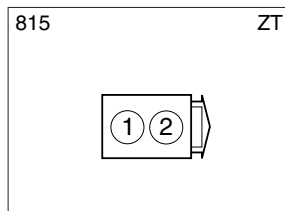
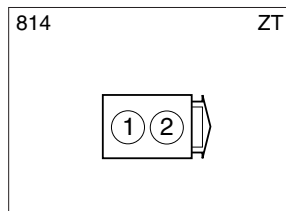
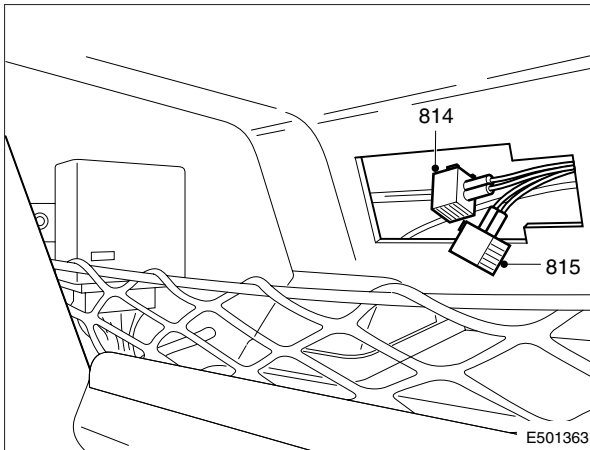
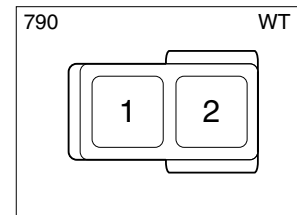
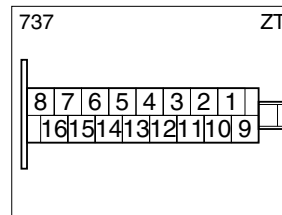
LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



E501720



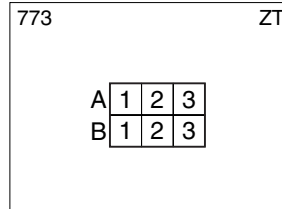
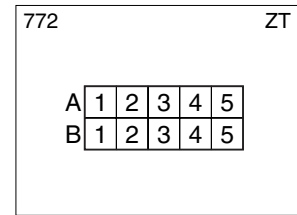
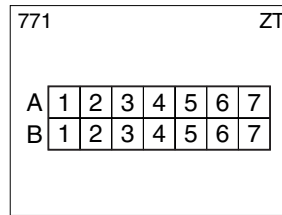
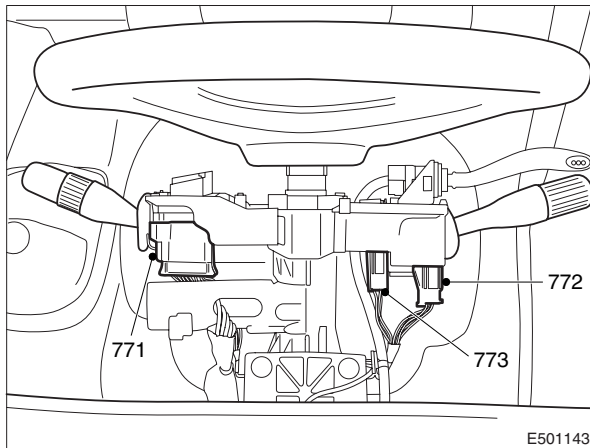
E501378

LOCATION OF CONNECTORS

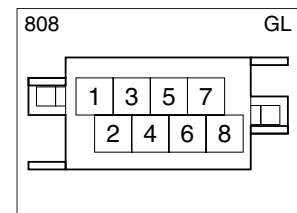
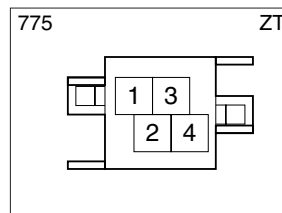
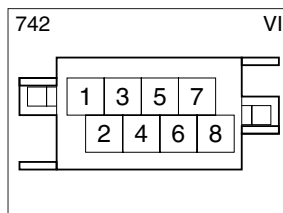
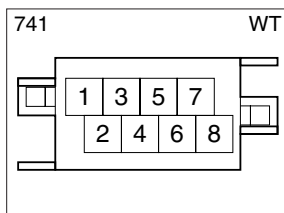
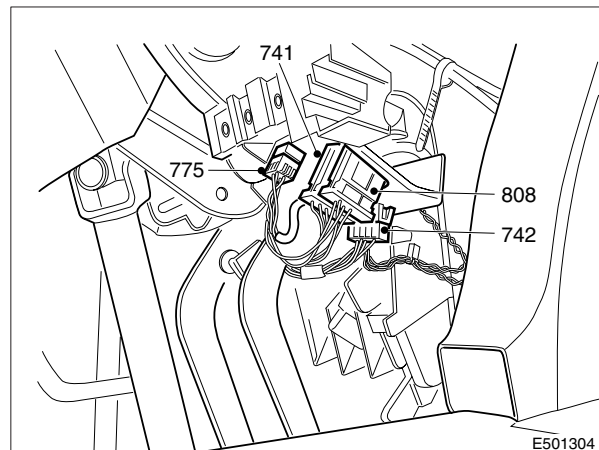
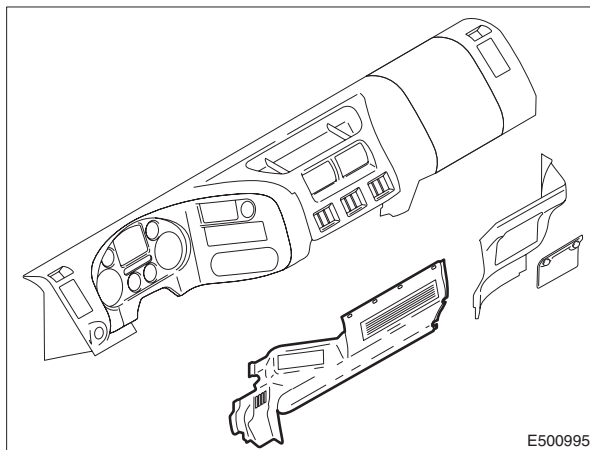
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Location of connectors

LF45/55 series



E501743



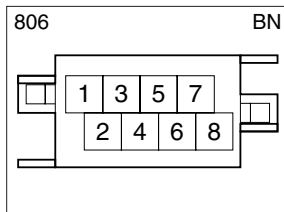
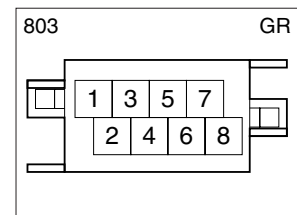
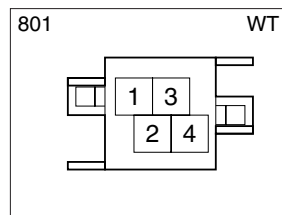
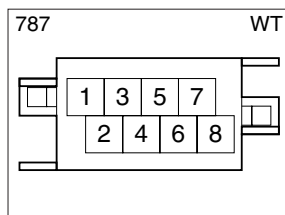
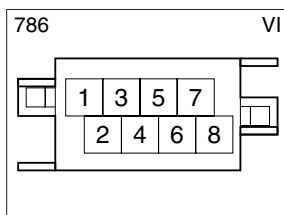
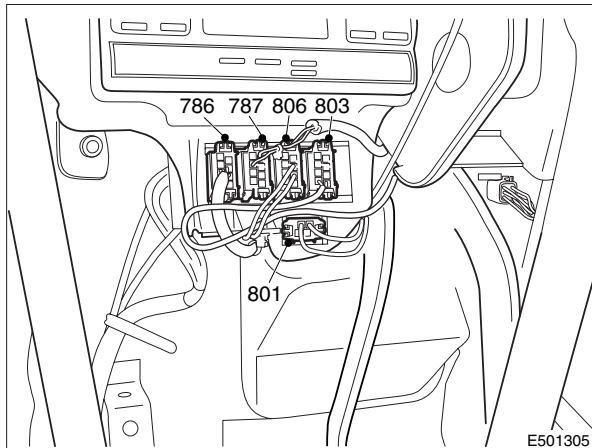
E501379

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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



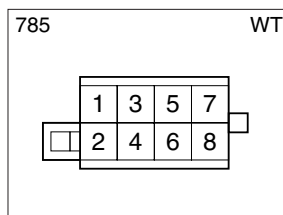
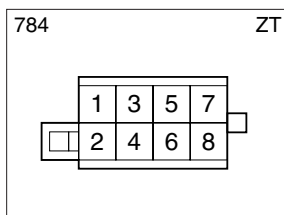
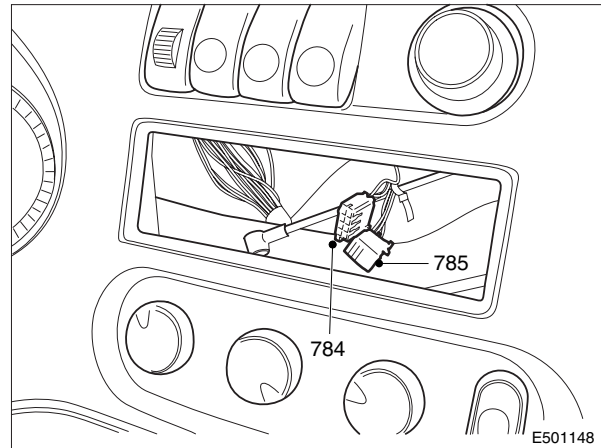
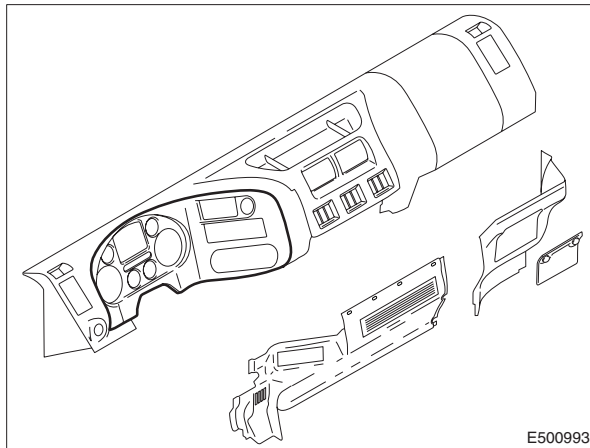
E501380

LOCATION OF CONNECTORS

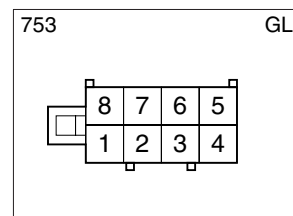
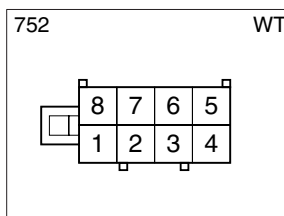
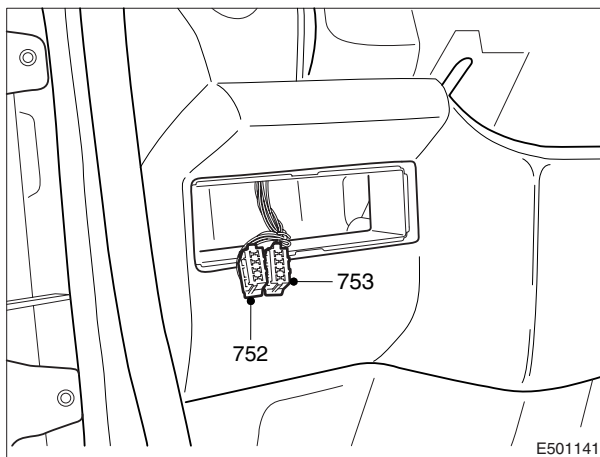
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Location of connectors

LF45/55 series



E501224



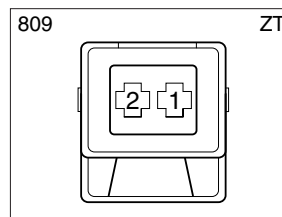
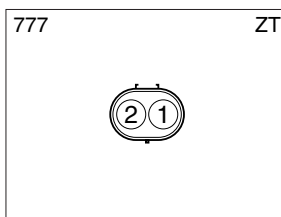
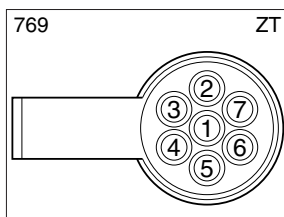
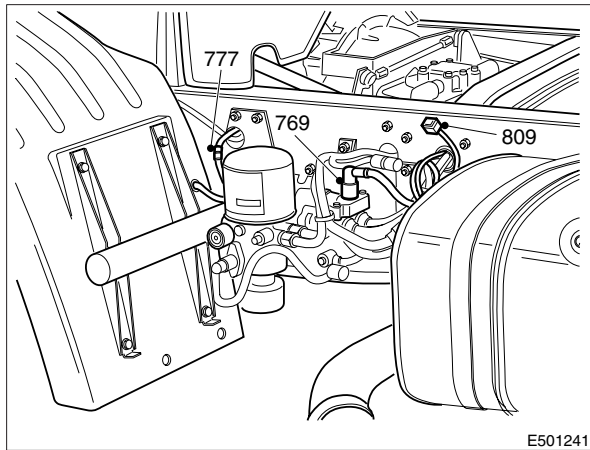
E501225

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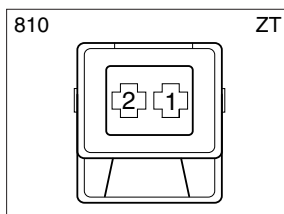
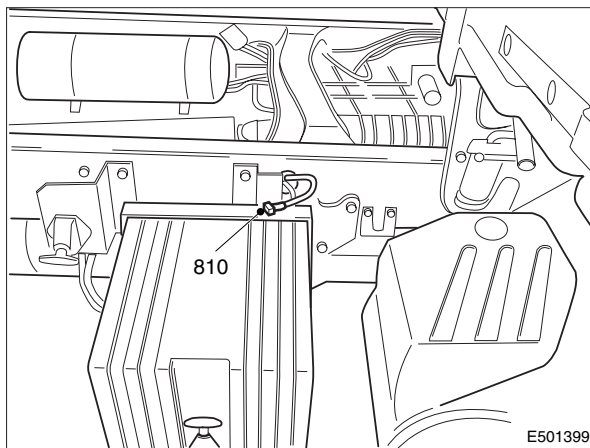
LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



E501382



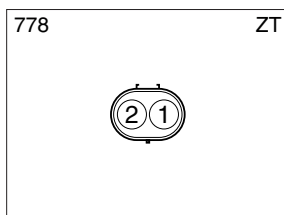
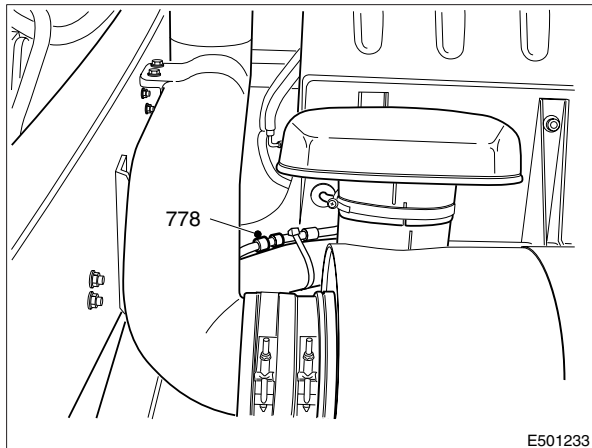
E501400

LOCATION OF CONNECTORS

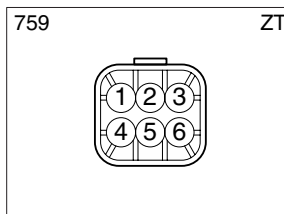
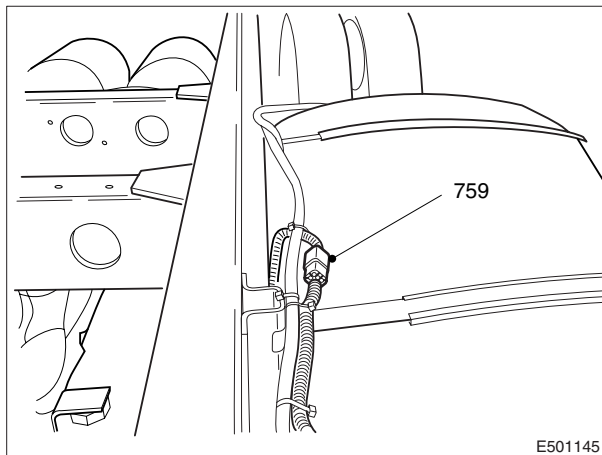
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Location of connectors

LF45/55 series



E501383



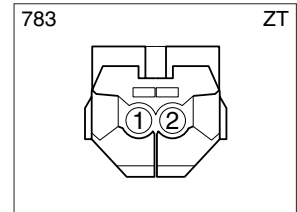
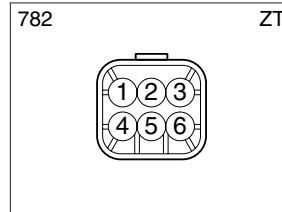
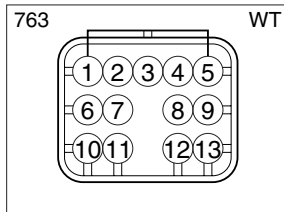
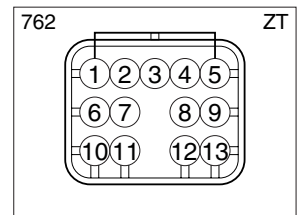
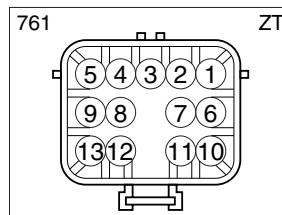
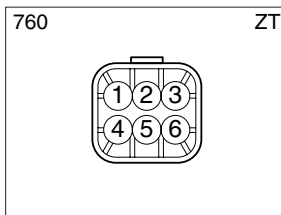
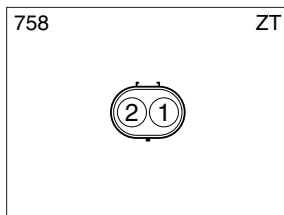
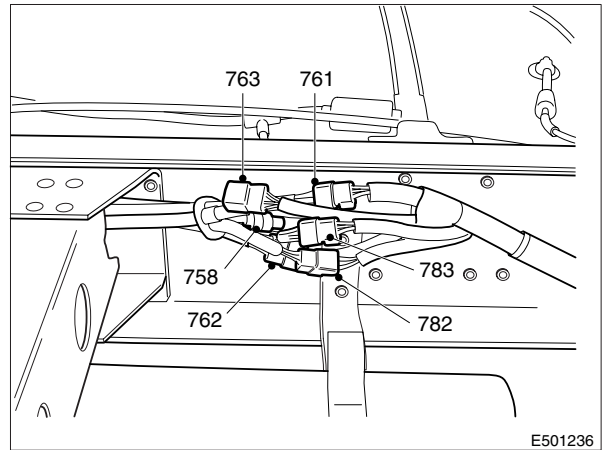
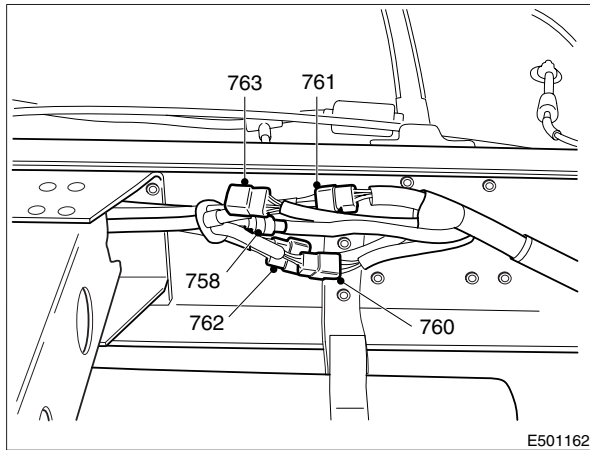
E501226

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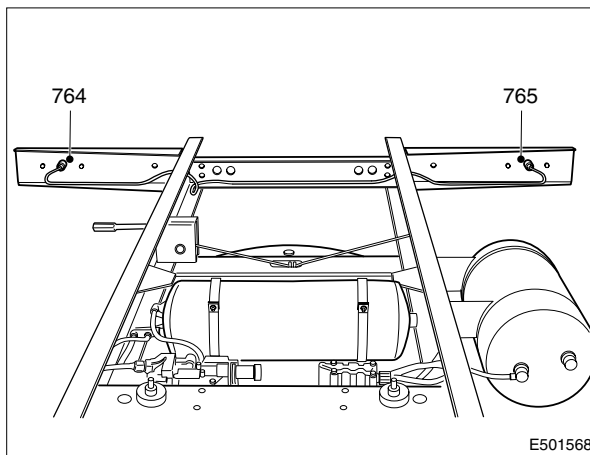
LF45/55 series

LOCATION OF CONNECTORS

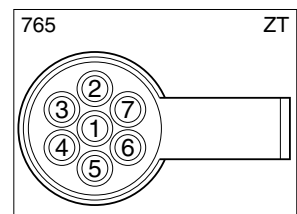
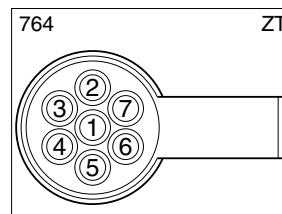
Location of connectors



E501384



E501721

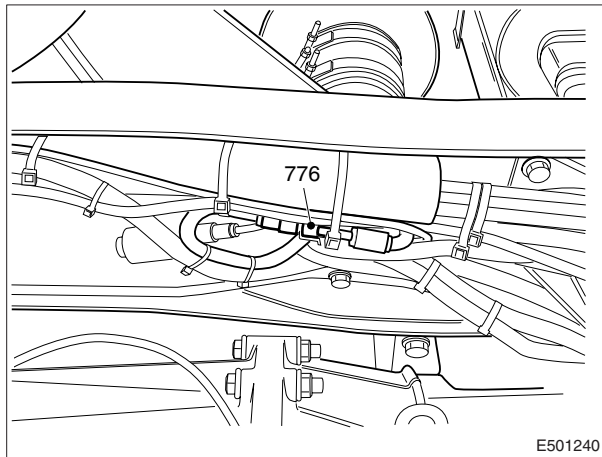


LOCATION OF CONNECTORS

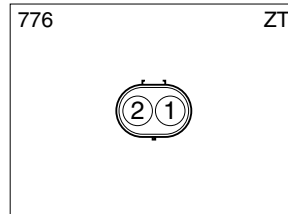
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Location of connectors

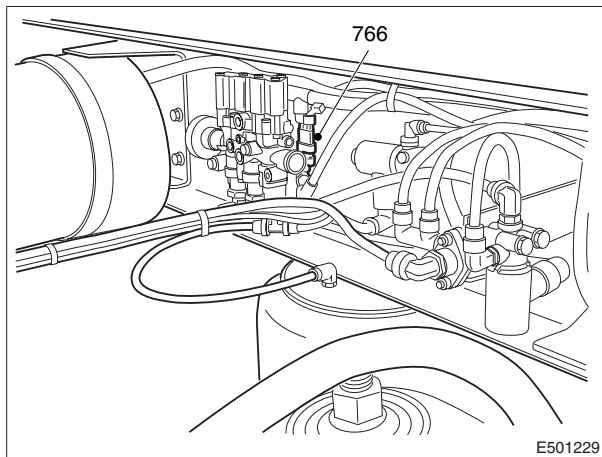
LF45/55 series



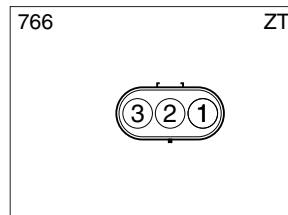
E501240



E501385



E501229



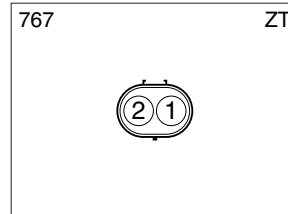
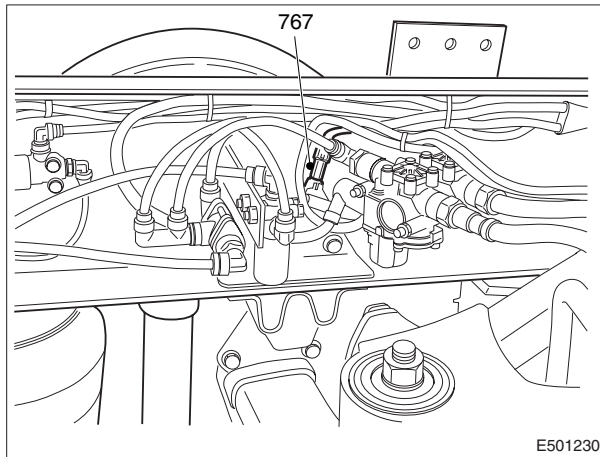
E501386

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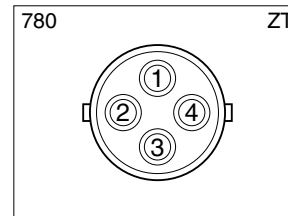
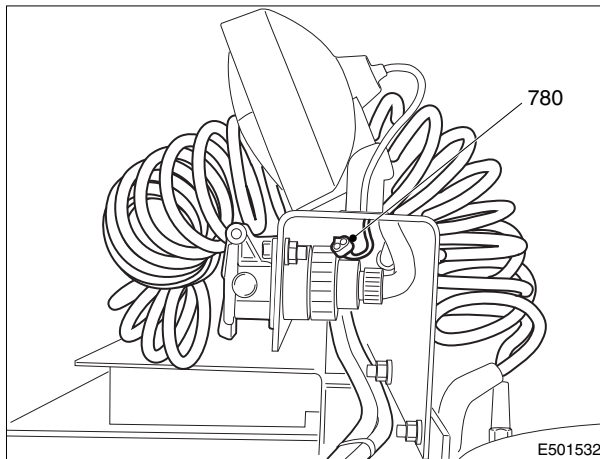
LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



E501387



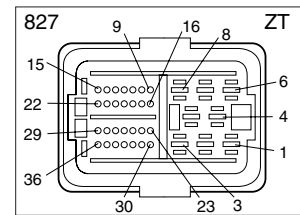
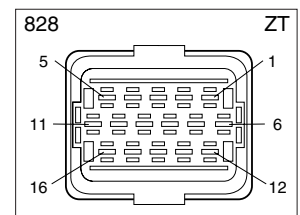
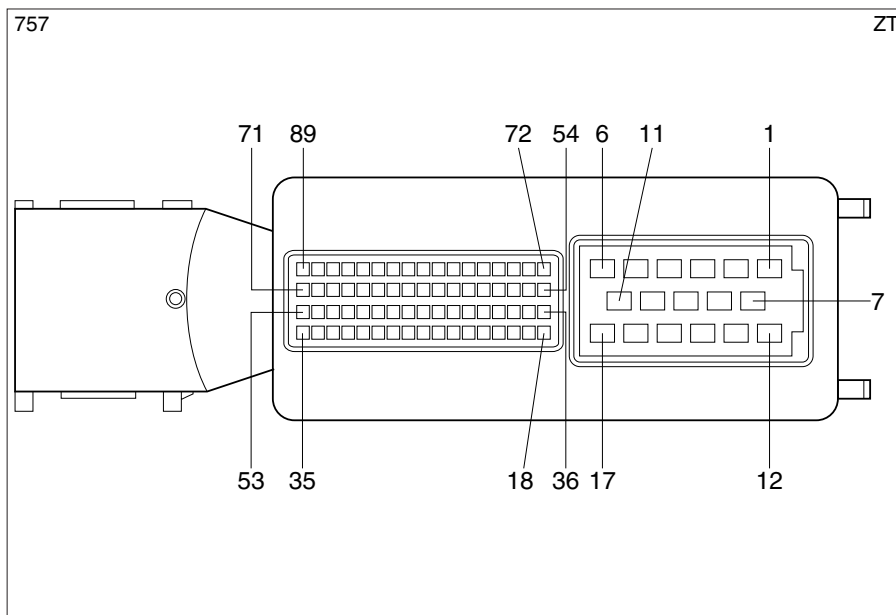
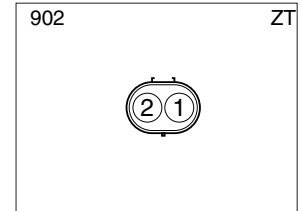
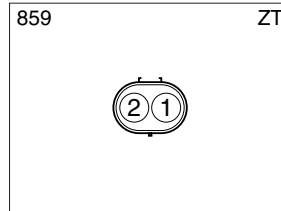
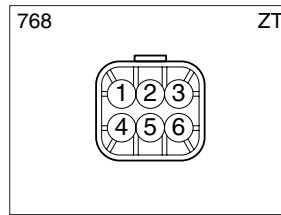
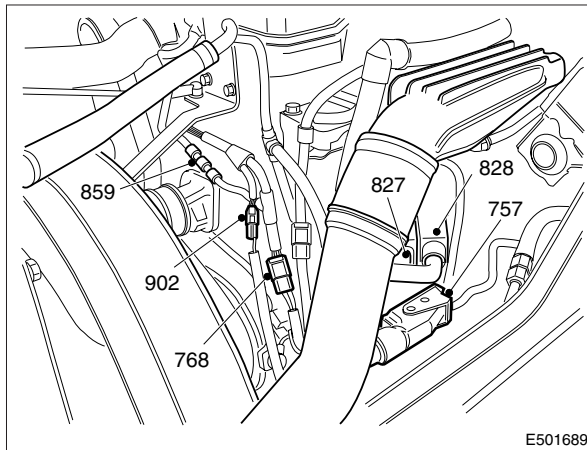
E501722

LOCATION OF CONNECTORS

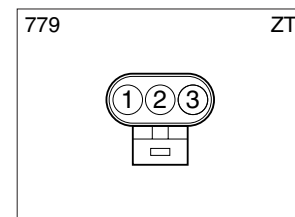
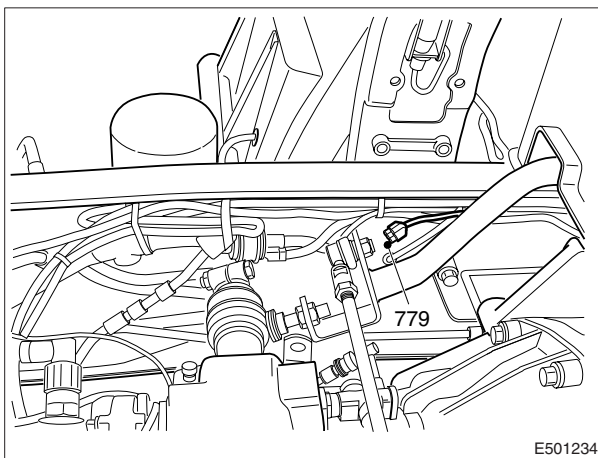
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Location of connectors

LF45/55 series



E501723



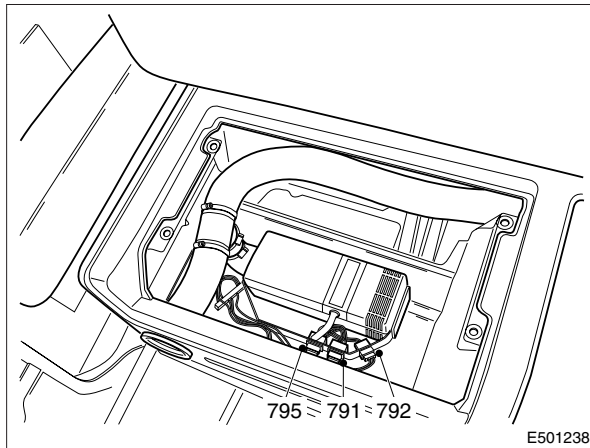
E501389

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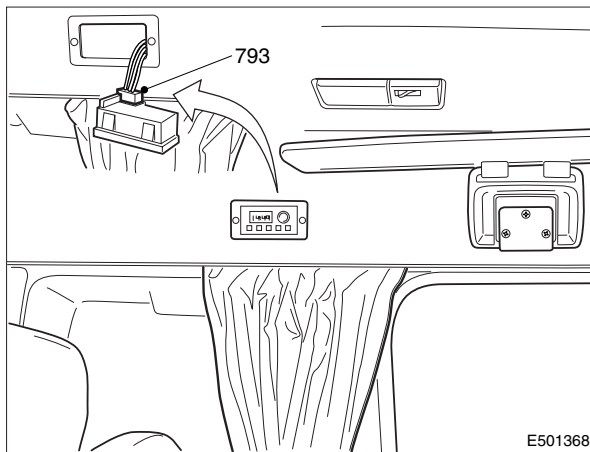
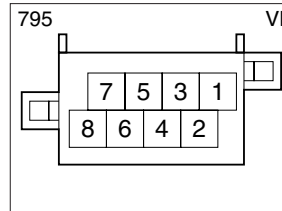
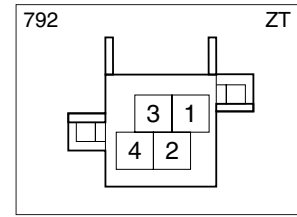
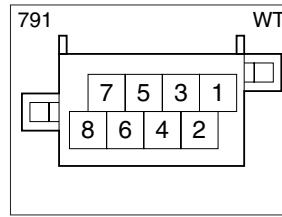
LF45/55 series

LOCATION OF CONNECTORS

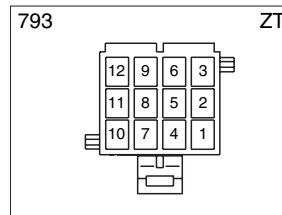
Location of connectors



E501390



E501391

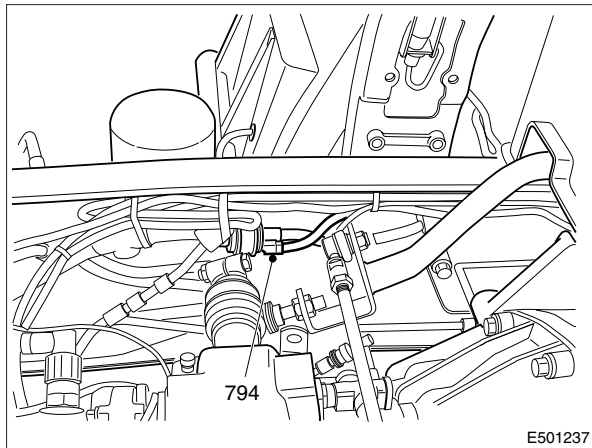


LOCATION OF CONNECTORS

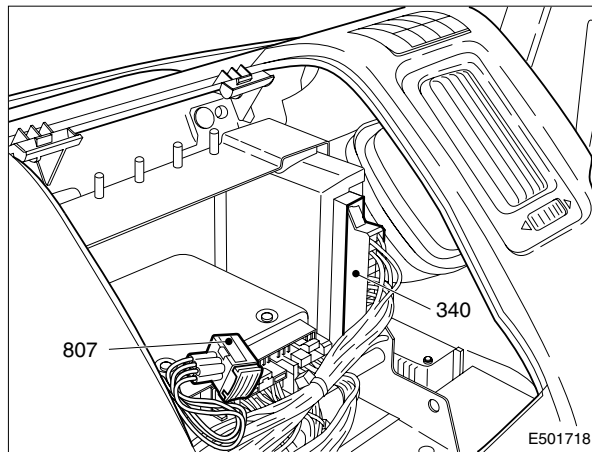
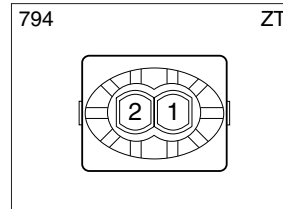
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Location of connectors

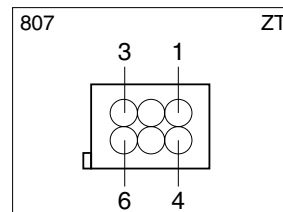
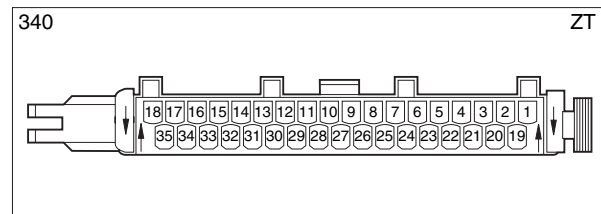
LF45/55 series



E501392



E501724

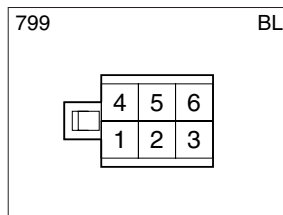
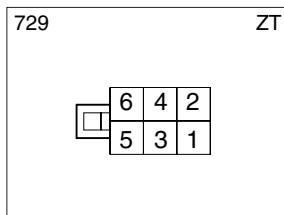
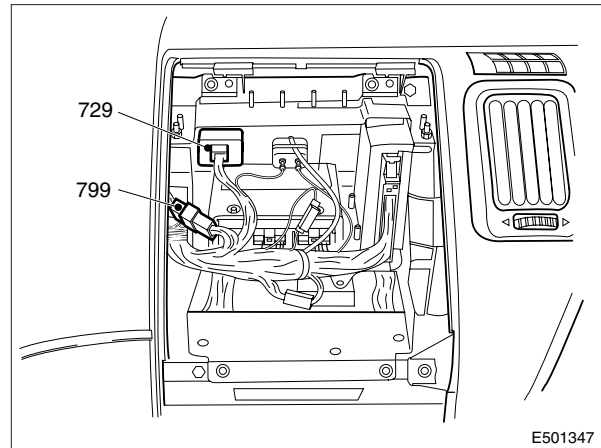
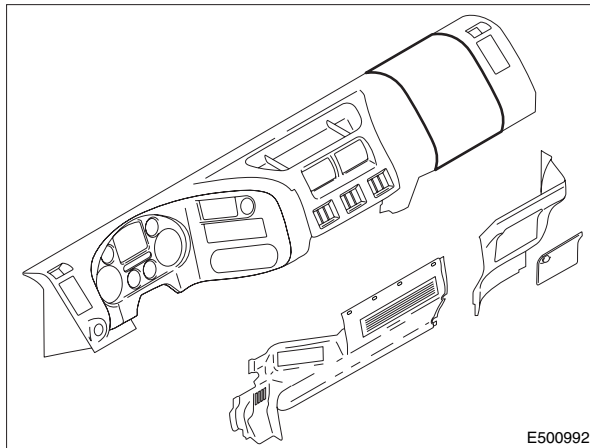


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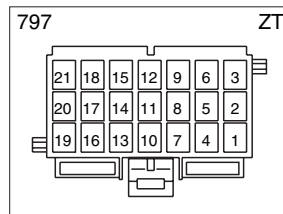
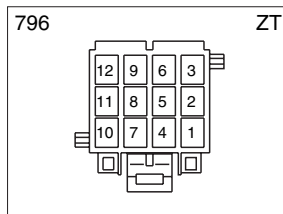
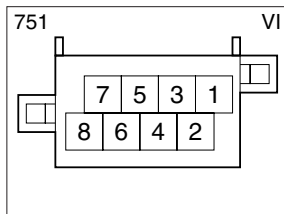
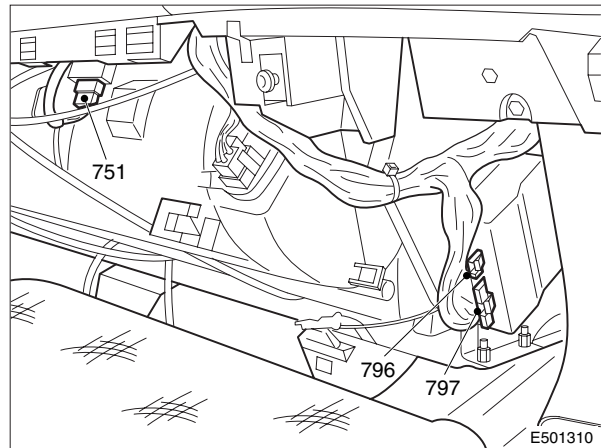
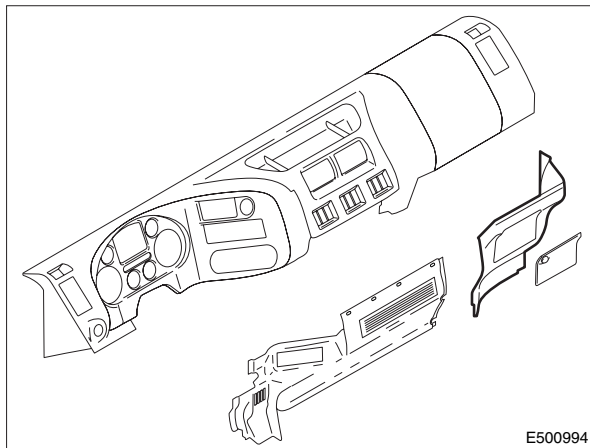
LF45/55 series

LOCATION OF CONNECTORS

Location of connectors



E501393



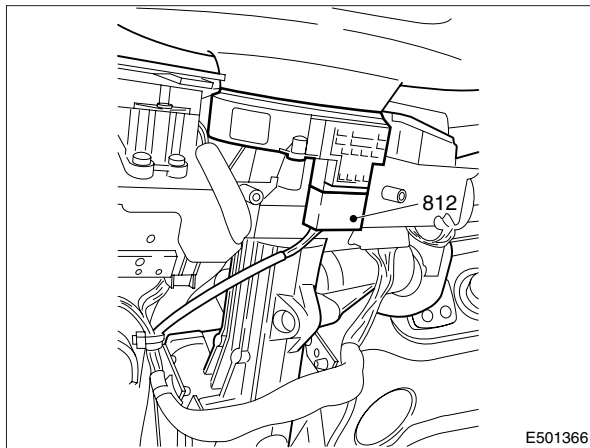
E501394

LOCATION OF CONNECTORS

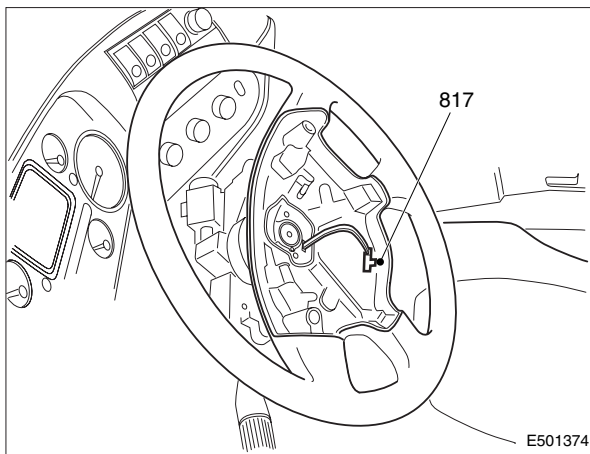
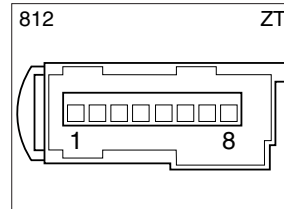
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Location of connectors

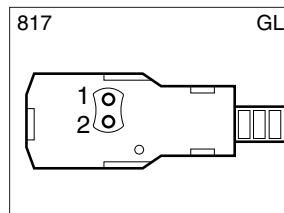
LF45/55 series



E501395



E501396

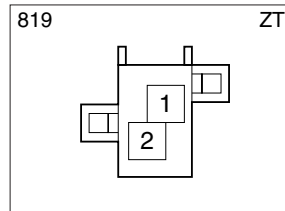
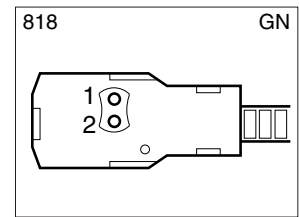
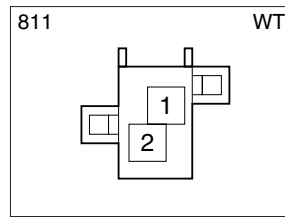
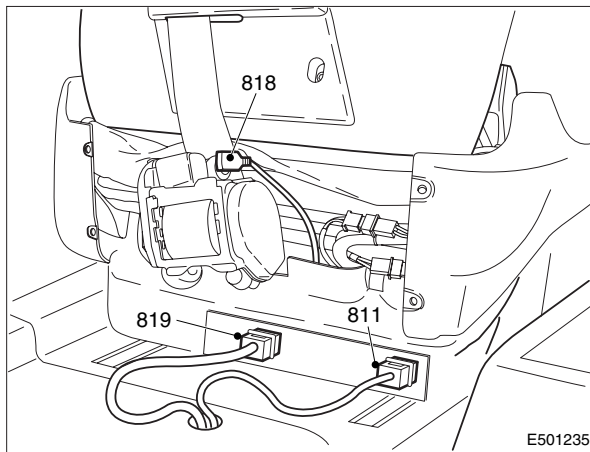


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LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



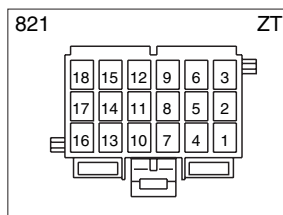
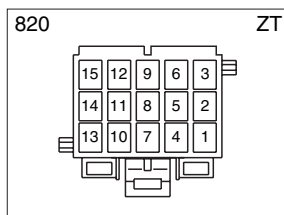
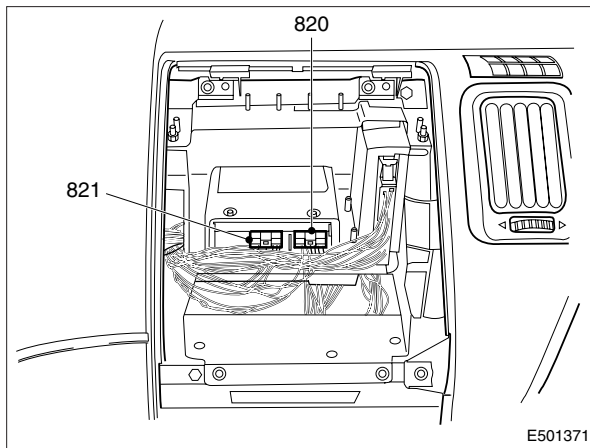
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LOCATION OF CONNECTORS

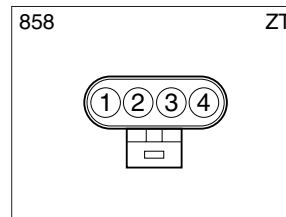
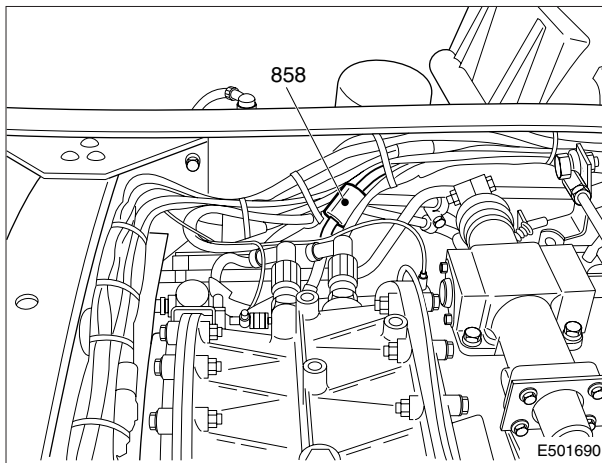
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Location of connectors

LF45/55 series



E501398



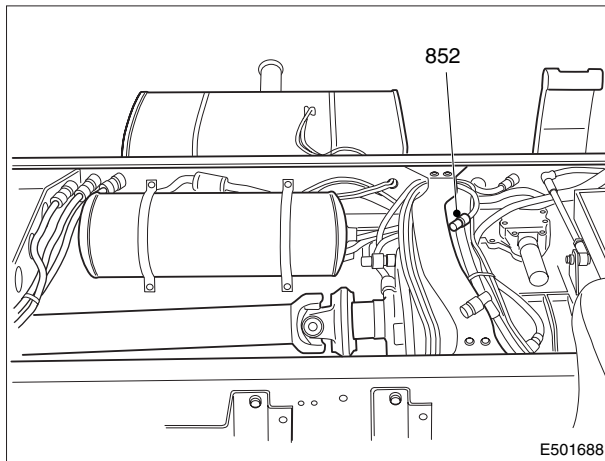
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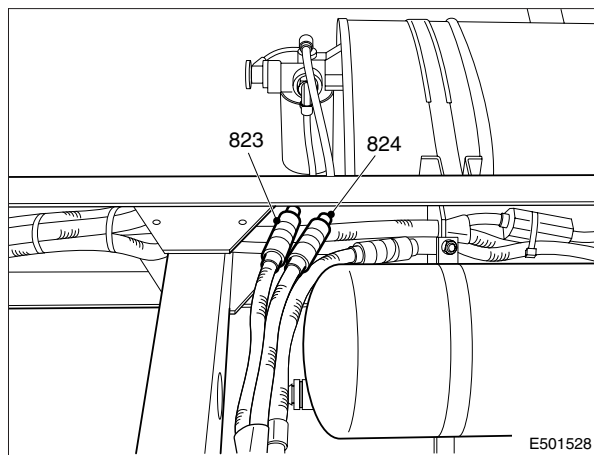
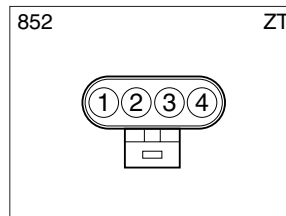
LOCATION OF CONNECTORS

LF45/55 series

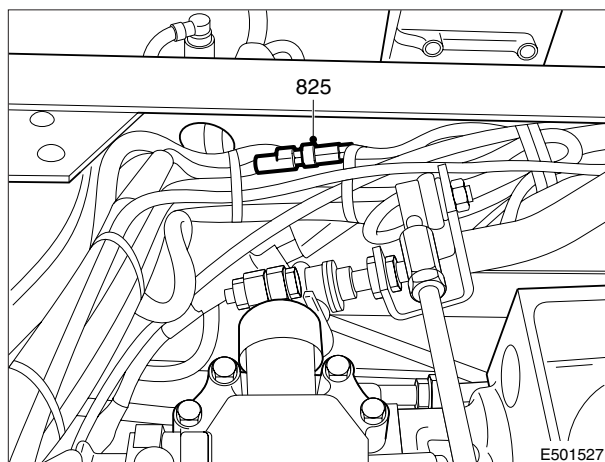
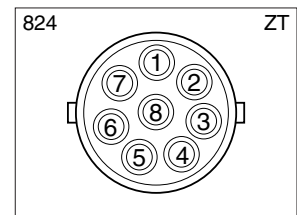
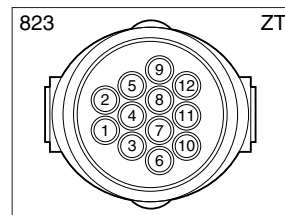
Location of connectors



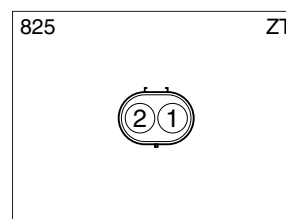
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E501727



E501728

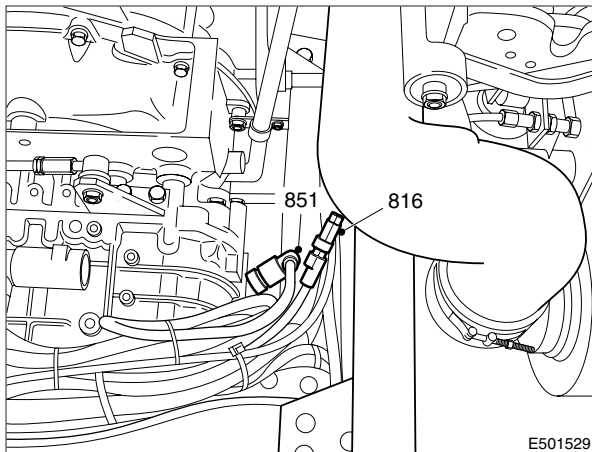


LOCATION OF CONNECTORS

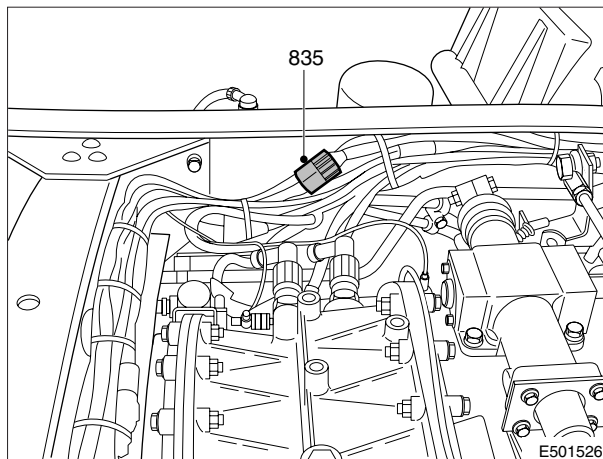
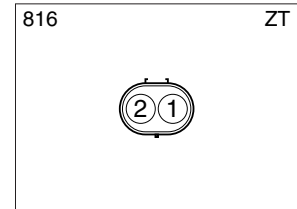
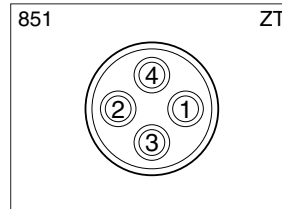
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Location of connectors

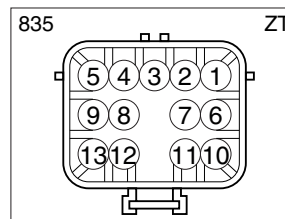
LF45/55 series



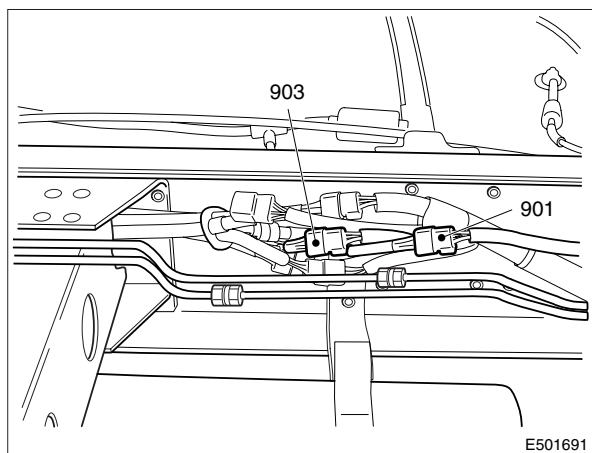
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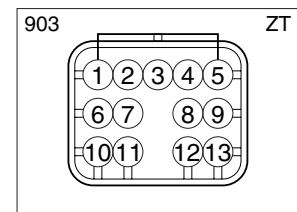
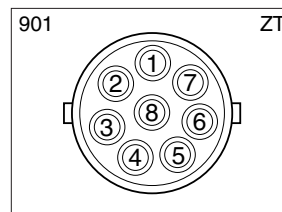
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E501731

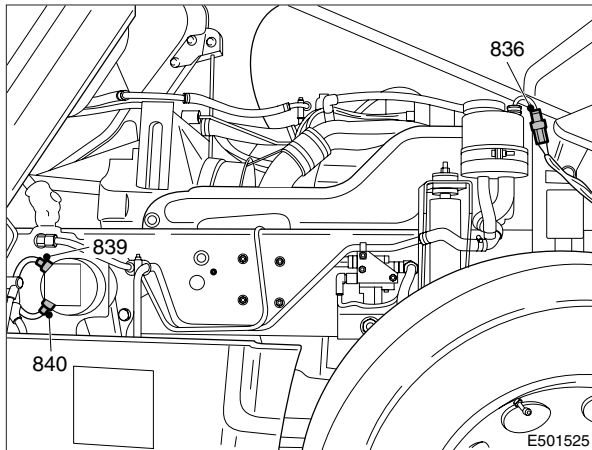


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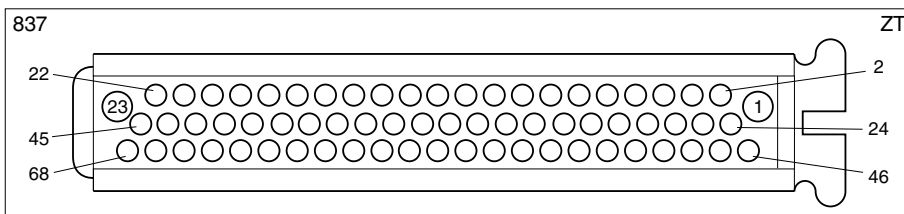
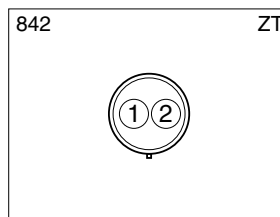
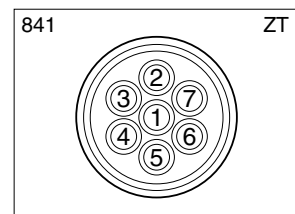
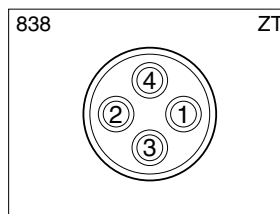
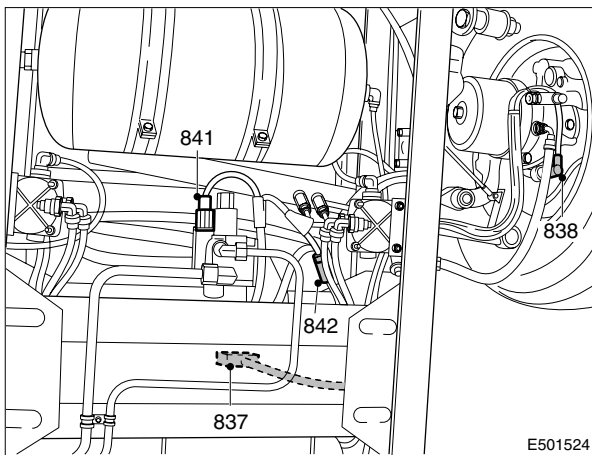
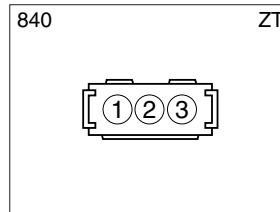
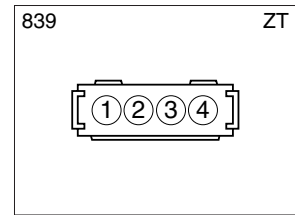
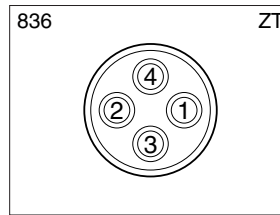
LOCATION OF CONNECTORS

LF45/55 series

Location of connectors



E501732



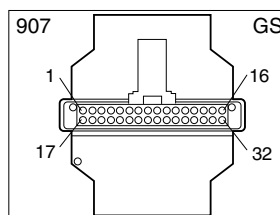
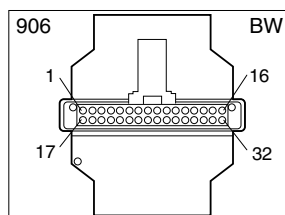
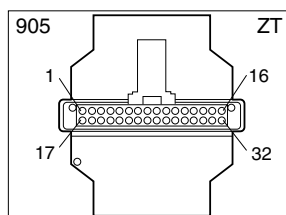
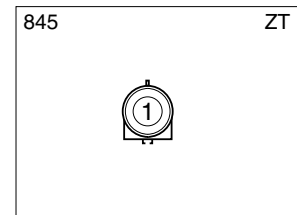
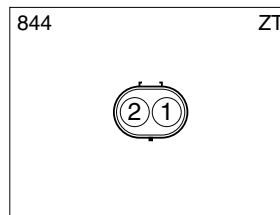
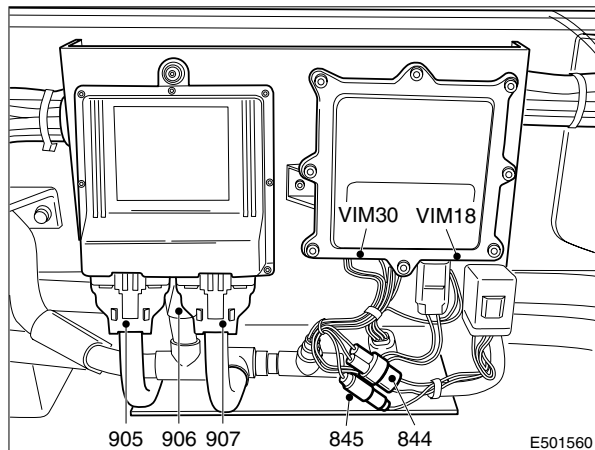
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LOCATION OF CONNECTORS

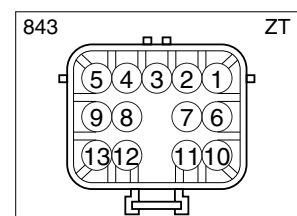
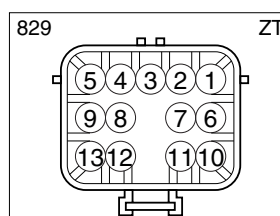
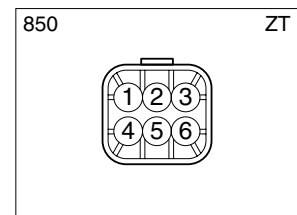
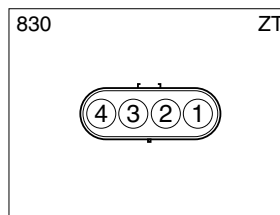
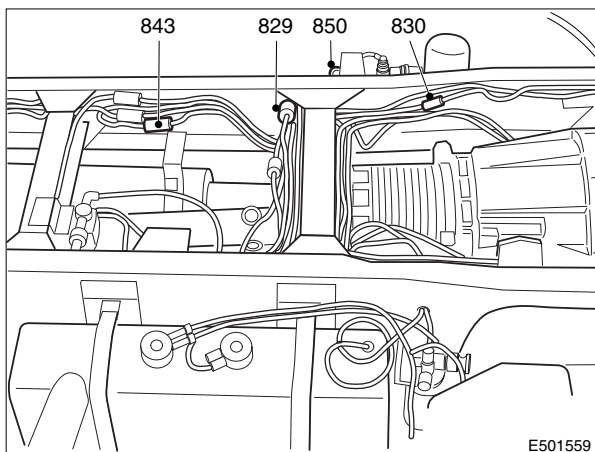
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Location of connectors

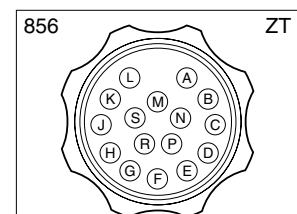
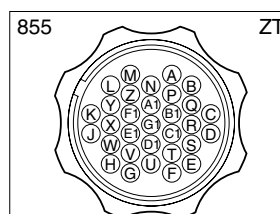
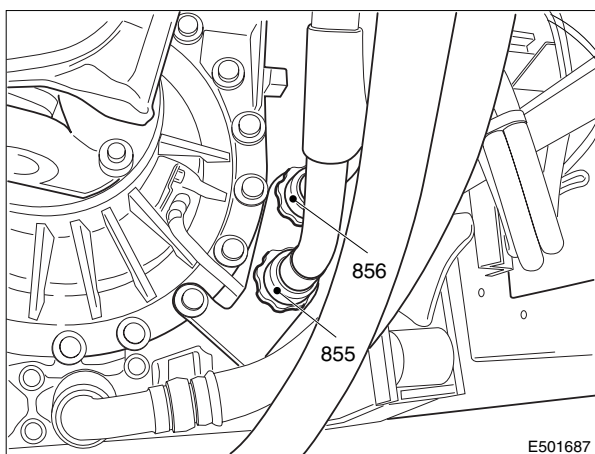
LF45/55 series



E501734



E501735



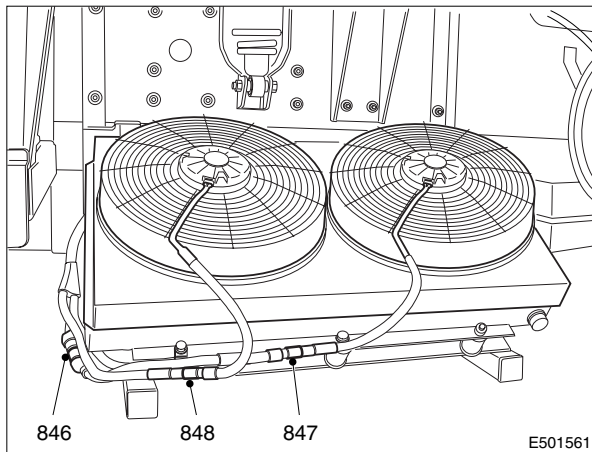
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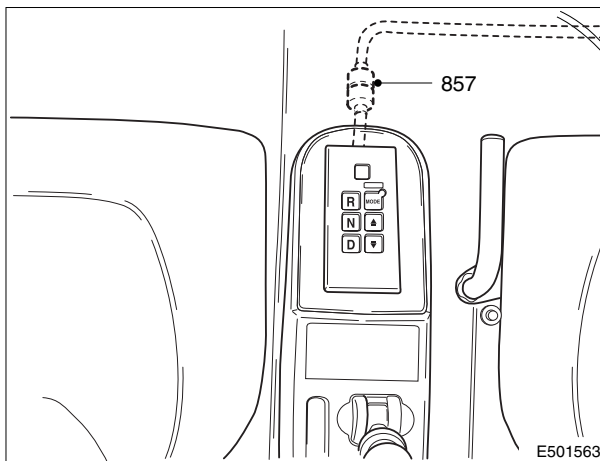
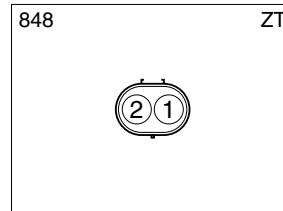
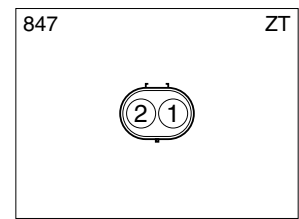
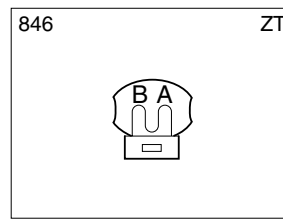
LOCATION OF CONNECTORS

LF45/55 series

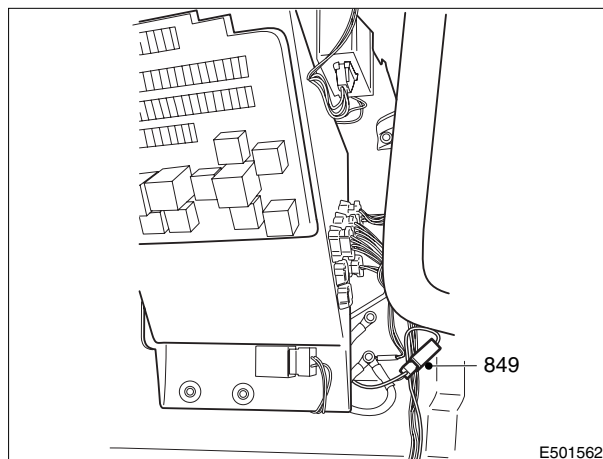
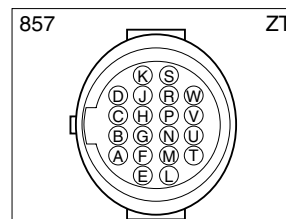
Location of connectors



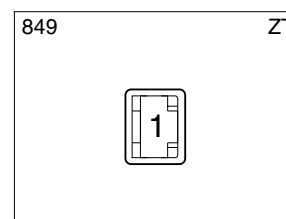
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E501738



E501739

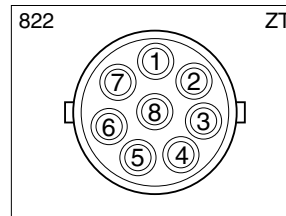
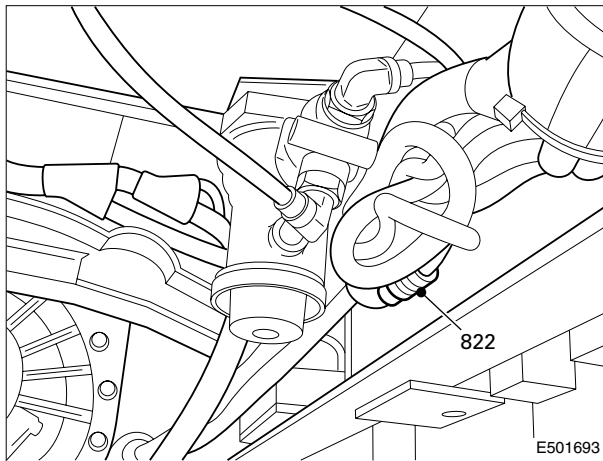


LOCATION OF CONNECTORS

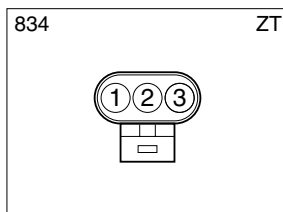
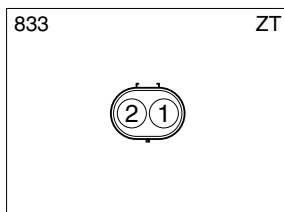
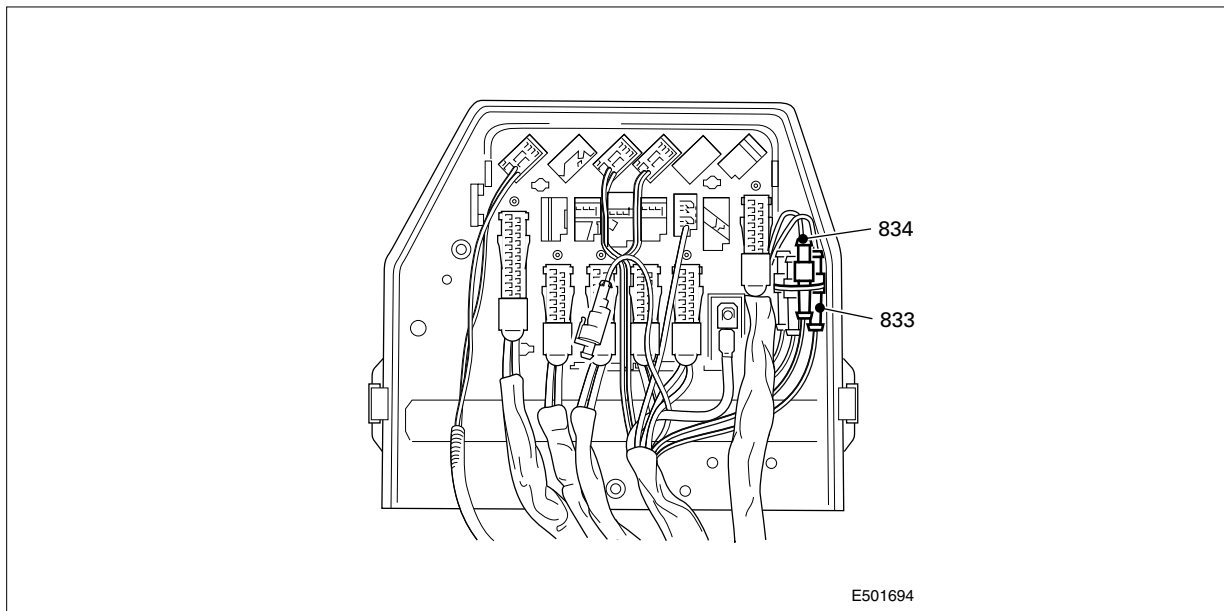
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Location of connectors

LF45/55 series



E501740



E501741

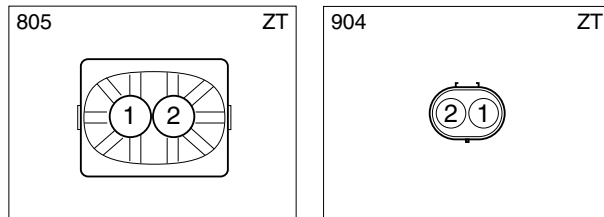
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LOCATION OF CONNECTORS

LF45/55 series

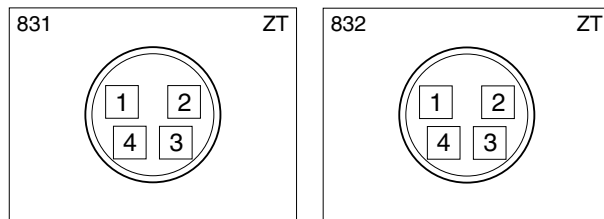
Location of connectors

ECAS-2



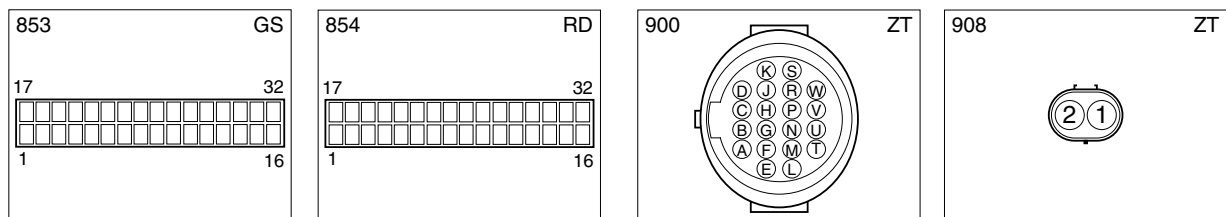
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Main switch



E501782

AT1000/2000



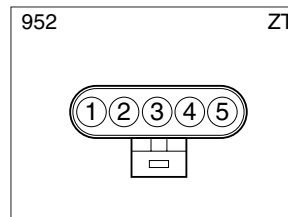
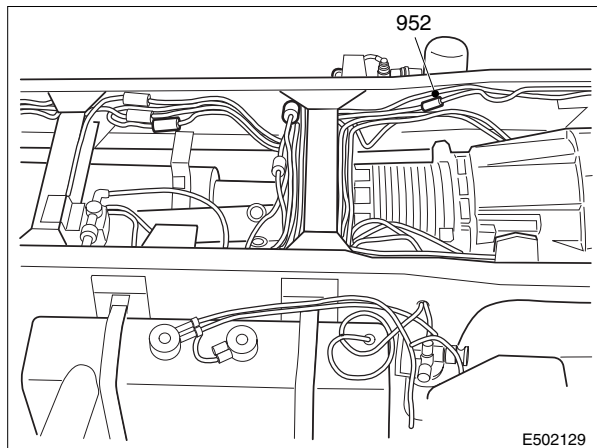
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LOCATION OF CONNECTORS

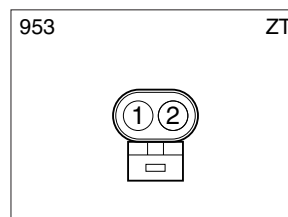
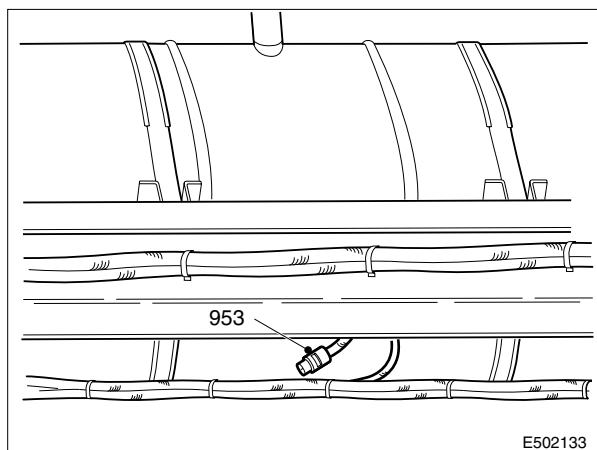
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Location of connectors

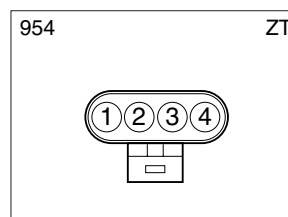
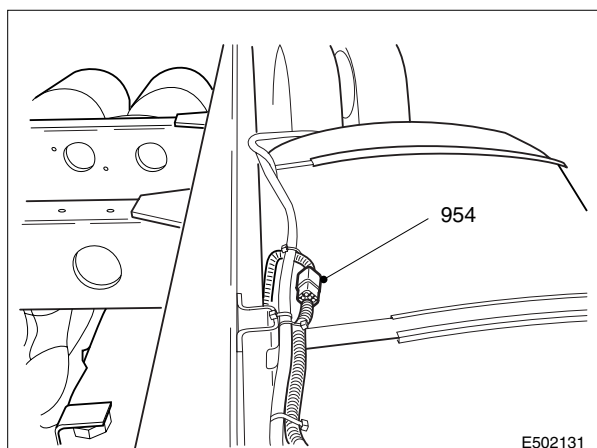
LF45/55 series



E502130



E502134



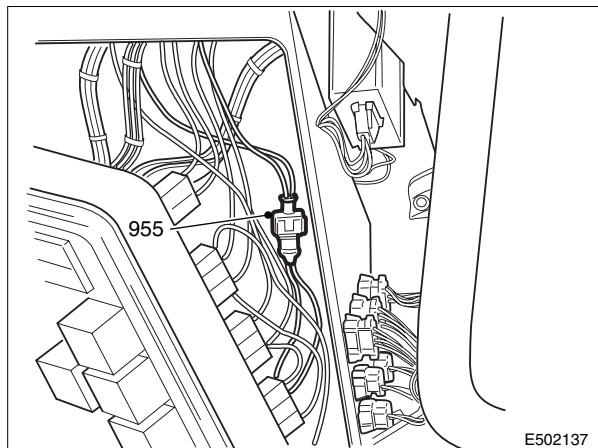
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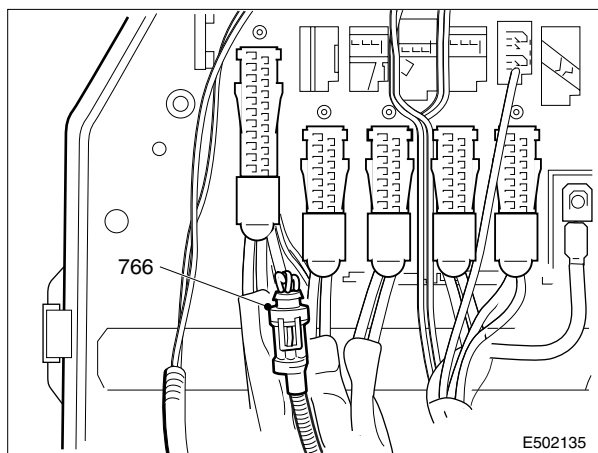
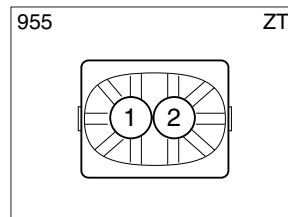
LOCATION OF CONNECTORS

LF45/55 series

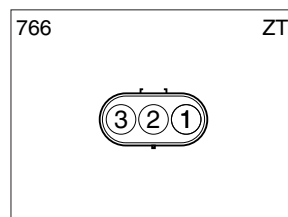
Location of connectors



E502138



E502136



LOCATION OF CONNECTORS

5

Location of connectors

LF45/55 series

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ELECTRICAL SYSTEM

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Contents

LF45/55 series

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1. INTRODUCTION

This main group includes the entire electrical system shown in the form of **section diagrams** and an **overview of connectors/pin allocations**.

Note:

For the location of the connectors in the vehicle, see main group "Location of connectors".

ELECTRICAL SYSTEM

5

Introduction

LF45/55 series

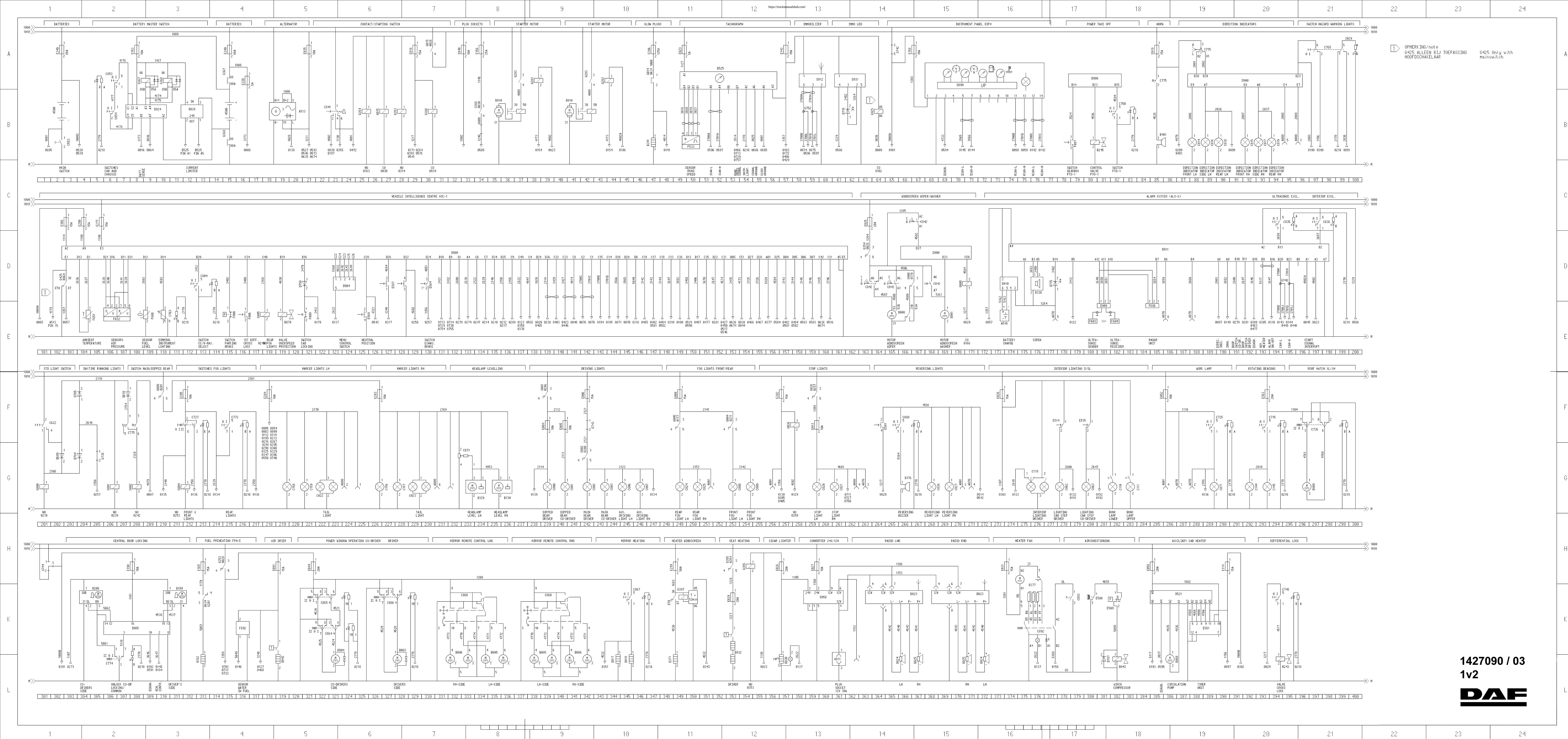
10

2. ELECTRICAL SYSTEM

2.1 CIRCUIT DIAGRAM 1427090/03

This page can be used to make your own notes on the circuit diagram.

[illegible]





ELECTRICAL SYSTEM**5**

Electrical system

LF45/55 series**2.2 OVERVIEW OF BASIC CODES FOR CIRCUIT DIAGRAM 1427090/03**

- 1 Basic code number
 2 Description
 3 Number on search bar

1	2	3
A000	Drawn vehicle socket (7-pin)	0095 0096 0224 0231 0262 0681
A001	Rear fog light/reversing light socket (7-pin)	0251 0256 0270 0286 0682
A004	Socket, ABS/EBS, drawn vehicle (7-pin)	0403
A011	Socket, 12 V accessories (2-pin)	0361
A021	Diagnostics socket (16-pin)	0592
A032	AGC diagnostics socket	0528 0574
A068	Application connector, engine speed control	581
A070	Application connector, superstructure (8-pin)	0177 0186 0188 0263 0271 0287 0288 0682
A074	Automatic gearbox socket, superstructure (MD3060)	0568
A087	CCU/CDM socket (2-pin)	0599
A096	Automatic gearbox socket, superstructure (AT2000)	0522
A500	Batteries (2x)	0002 0015
A510	Alarm system battery	0174
A513	Alternator	0019
B000	Windscreen wiper motor	0165
B001	Windscreen wiper pump	0169
B003	Electric drop glass operation motor, driver's side	0328
B004	Electric drop glass operation motor, co-driver's side	0323
B005	Mirror adjustment motor, left	0335 0339
B006	Mirror adjustment motor, right	0332 0342
B009	Roof hatch motor	0297
B010	Starter motor	0035 0041
B017	Mirror heating, driver's side	0344
B018	Mirror heating, co-driver's side	0345
B023	Radio	0366 0371
B024	Loudspeaker, left	0365 0372

5**ELECTRICAL SYSTEM****LF45/55 series**

Electrical system

1	2	3
B025	Loudspeaker, right	0367 0371
B030	Cigar lighter, driver's side	0357
B032	Seat heating, driver's side	0353
B042	Air dryer heating element	0319
B043	Air conditioning compressor	0382
B068	Fuel metering pump, cab heater	0386
B079	Low-range downshift protection valve	0119
B129	Left-hand headlamp height adjuster motor	0234
B130	Right-hand headlamp height adjuster motor	0236
B131	Solenoid valve, pump unit/injector, cylinder 1	0613 0651
B132	Solenoid valve, pump unit/injector, cylinder 2	0615 0659
B133	Solenoid valve, pump unit/injector, cylinder 3	0616 0658
B134	Solenoid valve, pump unit/injector, cylinder 4	0618 0654
B135	Solenoid valve, pump unit/injector, cylinder 5	0619
B136	Solenoid valve, pump unit/injector, cylinder 6	0621
B176	Reversing buzzer	0266
B182	Water separator fuel heating element	0313
B192	Exhaust brake valve	0633 0671
B199	Central door locking motor, driver's side	0311
B200	Central door locking motor, co-driver's side	0304
B201	Internal electrical components for automatic gearbox	0510 0561
B237	ABS/ASR-D differential lock valve, rear axle	0443
B238	ECAS valve, driven axle, air supply	725
B243	Cross-axle differential lock control valve	0394
B245	PTO 1 control valve	0080
B250	ECAS valve, driven axle, air supply	0709
B253	ECAS valve, driven axle, air supply	0749
B254	ECAS valve, steered leading axle/trailing axle, lifting bellows	0753
B256	ABS valve, front axle, left	0413 0436
B257	ABS valve, front axle, right	0414 0438
B258	ABS valve, driven axle, left	0416 0439
B259	ABS valve, driven axle, right	0441

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

1	2	3
B334	Fuel pump control solenoid valve	0612 0650
B338	Alarm system horn	0176
B341	Glow element	0047
B360	Seat belt tensioner, driver's side	0474
B361	Airbag module	0476
B371	Windscreen heating	0349
B377	Heater motor	0375
B381	RAS-EC valve block	0454
B399	Cooling fan 1, automatic gearbox (AGC)	0501 0535
B400	Cooling fan 2, AGC automatic gearbox	0537
B401	Horn	0085
B402	ABS resistor	0428
B525	Modular tachograph (MTCO)	0052
C000	Dipped beam, left	0239
C001	Dipped beam, right	0241
C002	Main beam, left	0242
C003	Main beam, right	0244
C006	Left spotlight	0245
C007	Right spotlight	0246
C008	Fog lamp, front left	0253
C009	Fog lamp, front right	0255
C014	Direction indicator lamp, front left	0088
C015	Direction indicator lamp, front right	0092
C016	Direction indicator lamp, side left	0089
C017	Direction indicator lamp, side right	0093
C018	Direction indicator lamp, rear left	0090
C019	Direction indicator lamp, rear right	0094
C020	Stop light, left	0259
C021	Stop light, right	0261
C022	Rear light, left	0222
C023	Rear light, right	0229
C024	Fog lamp, rear left	0249

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ELECTRICAL SYSTEM

LF45/55 series

Electrical system

1	2	3
C025	Fog lamp, rear right	0251
C026	Reversing light, left	0268
C027	Reversing light, right	0270
C062	Stepwell lighting, left	0278
C063	Stepwell lighting, right	0280
C071	Work lamp	0289
C110	Bunk light, bottom	0282
C111	Bunk light, top	0283
C119	Interior lighting with switch, driver's side	0276
C144	Rotating beam, left	0292
C145	Rotating beam, right	0293
C156	Marker light, left, 1 st	0226
C157	Marker light, right, 1 st	0228
C158	Marker light, left, 2 nd	0219
C159	Marker light, right, 2 nd	0221
C553	Mechanical main switch	0002
C622	Lighting switch	0201
C715	Rotating beam switch	0293
C725	Work lamp switch	0289
C727	Fog lamp switch, front/rear	0212
C736	Roof hatch switch	0297
C742	Traction assistance switch	0739
C748	Cross-axle differential lock switch	0394
C750	PTO 1 Switch	0082
D758	Diode to prevent feedback to the VIC	120
C763	Instrument lighting dimming potentiometer	0110
C765	Switch for warning lamps	0098
C773	Fog lamp switch, rear	0215
C774	Central door locking switch	0306
C775	Switch, steering column, direction indicators/horn/dipped beam/main beam	0085 0088 0208
C804	Switch, adjustable speed limiter	0113

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

1	2	3
C835	Switch to turn off interior detection	0194
C836	Switch to turn off superstructure/drawn vehicle loadspace detection	0197
C841	Accessories/ignition/starter switch	0023
C842	Windscreen wipers/washer steering column switch	0163 0165 0167 0168
C853	Cab main switch	0006
C854	Chassis main switch	0006
C864	Drop glass switch, co-driver's side (driver's side door)	0323
C865	Drop glass switch, co-driver's side (driver's side door)	0322
C866	Drop glass switch, driver's side (driver's side door)	0327
C867	Mirror heating switch	0345
C868	Mirror adjustment switch	0333 0339
C871	Potentiometer, headlamp height adjustment	0233
C880	Switch, reversing buzzer	0266
C891	Steering column switch, windscreen wiper/washer, cruise control, engine speed control	0483
C892	Heater fan switch	0376
C893	Air conditioning switch	0379
D521	Electronic unit, cab heater	0387
D529	Remote control system, ECAS	0702 0718 0735
D609	Light switch diode	0202
D610	Diode, main beam/dipped beam	0208
D715	Alarm system LED	0177
D784	Diode, Swedish lighting	0204
D785	Diode, Swedish lighting	0204
D787	Diode, air conditioning compressor link	0381
D802	ECAS-2 (6x2) electronic unit	0748
D822	Vehicle interface module AGC	0541
D836	Electronic unit for VLG current limiter	0012
D851	Electronic unit, ECAS-3 (4x2)	0710 0726
D866	Electronic unit, AGC-A4 automatic gearbox control	0552

5

ELECTRICAL SYSTEM

LF45/55 series

Electrical system

1	2	3
D867	Automatic gearbox selector	0553
D899	DIP-4 instrument panel	0070
D900	VIC electronic unit	0080 0091 0132
D903	ECS-DC3 electronic unit	0620 0659
D904	Menu Control Switch, MCS	0124
D905	Electronic unit, CDS	0308
D909	Electronic unit, alarm system, ultrasonic	0181
D910	Electronic unit, battery charger	0174
D911	Electronic unit, ALS-S alarm system	0186
D912	Electronic unit, immobiliser	0060
D924	Electronic unit for main switch	0010
D926	Electronic unit, airbag/seat belt tensioner	0476
D931	LED unit, immobiliser	0063
D936	Electronic unit for automatic gearbox (AGC-T1000/2000)	0514
D940	Electronic unit, RAS-EC	0461
D941	Electronic unit for ABS/ASR, D model	0417
D942	Fuse box	-
D958	Electronic unit, converter with power supply for radio memory	0360
D960	Airbag contact unit	0475
D961	Electronic unit, ABS/ASR, E version	0440
E004	Fuse, dipped beam, driver's side	0239
E005	Fuse, dipped beam, co-driver's side	0240
E006	Fuse, main beam, driver's side	0242
E009	Fuse, front fog lamps	0249
E013	Fuse, stop lights	0259
E018	Windscreen wiper motor fuse	0029
E019	Fuse, horn	0085
E023	Fuse, switch, tachograph timer	0049
E025	Fuse, windscreen wiper motor/windscreen washer motor	0163
E026	Fuse, cigar lighter/door switches/electronic unit, 24/12 V converter with power supply for radio memory	0357

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

1	2	3
E027	Fuse, electronic unit, 24/12 V converter, with power supply for radio memory	0359
E028	Fuse, interior lighting/bunk lamps/central door lock	0273
E031	Fuse, heater fan	0373
E035	Fuse, voltage regulation generator/ECS-DC3	0021
E039	Fuse, seat heating	0353
E043	Fuse, ABS, drawn vehicle	0401
E044	Fuse, mirror heating/electric mirror adjustment/electric drop glass operation	0321
E048	Fuse, drawn vehicle power supply	0033
E051	ECAS fuse	0734
E052	Fuse for work lamp	0286
E053	Fuse, diagnostic connector/alarm system/ECAS	0587
E058	Fuse for cab heater	0385
E062	ECAS fuse	0703 0719
E091	Fuse, air dryer heating element/water separator/RAS-EC/engine speed control application connector	0319
E108	Fuse, VIC	0103
E114	Fuse, cab heater/warning lamps	0390
E143	Fuse, tachograph/alarm system/immobiliser/ABS-D/ABS/ASR-E	0057
E144	Fuse, automatic gearbox (AGC)	0504
E153	Fuse, power supply for main switch	0008
E156	Fuse for accessories lighting	0034
E158	Fuse, DIP-4 instrument panel	0067
E160	ECS-DC3 fuse	0601 0640
E163	Fuse, rotating beams/roof hatch	0293
E165	Fuse, FPH-E fuel heater after contact	0313
E190	Fuse, ABS-D / ABS / ASR-E	0427 0450
E198	Fuse, central door lock	0308
E277	Fuse, VIC	0106
E279	Fuse, voltage regulation generator	0021

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ELECTRICAL SYSTEM

LF45/55 series

Electrical system

1	2	3
E280	Fuse, VIC	0104
E282	Fuse, engine brake switch/stop light switch	0257
E283	Fuse, headlamp height adjustment/width marker light, 1 st , left and right/tail light, right	0226
E284	Fuse, width marker light, 2 nd , left and right/left rear light/search lighting	0218
E285	Fuse, VIC/fog light switch	0212
E286	Main fuse	0047
E290	Fuse, RAS-EC	0453
E297	Fuse, airbag and seat belt tensioner system	0473
E299	Fuse, windscreen heating	0349
E330	Fuse, 'sens' wire main switches	0016
E349	Main fuse, cab	0002 0015
E354	Fuse, automatic gearbox, AGC fan	0501 0534
E501	Reversing light switch	0264
E508	Temperature switch for air conditioning compressor	0380
E509	Air conditioning switch, high/low pressure	0382
E514	Cab stepwell lighting/interior lighting door switch, driver's side	0278
E515	Cab stepwell lighting/interior lighting door switch, co-driver's side	0280
E564	Engine brake switch	0130
E569	Neutral position switch, gearbox	0125
E581	Cab heater timer unit	0388
E585	Selector switch for AT 1000/2000 automatic gearbox	0515
E587	Switch for stop lights/clutch	0127
E597	Switch, cooling fans, automatic gearbox (AGC)	0501
F000	Parking brake switch	0115
F006	Control switch for differential lock, 1 st differential	0116
F009	Control switch, cab tilting	0121
F087	Control switch, gearbox PTO	0079
F107	Control switch for brake lining wear, front left	0488
F108	Control switch for brake lining wear, front right	0490
F111	Control switch for brake lining wear, rear left	0492
F112	Control switch for brake lining wear, rear right	0493

ELECTRICAL SYSTEM**5**

Electrical system

LF45/55 series

1	2	3
F113	Control switch, brake lining wear, rear left, 2 nd rear axle (6x2)	0495
F114	Control switch, brake lining wear, rear right, 2 nd rear axle (6x2)	0497
F116	Oil level switch, RAS-EC	0462
F512	Wheel speed sensor, front axle, left	0407 0430
F513	Wheel speed sensor, front axle, right	0408 0432
F514	Wheel speed sensor, driven axle, left	0410 0433
F515	Wheel speed sensor, driven axle, right	0411 0435
F533	Vehicle speed sensor	0050
F552	Crankshaft sensor	0601 0640
F558	Camshaft sensor	0603 0641
F565	Fuel temperature sensor	0604 0642
F566	Coolant temperature sensor	0605 0644
F601	Output shaft speed sensor, automatic gearbox	0504 0556
F602	Input shaft speed sensor, automatic gearbox	0505 0557
F603	Ultrasonic transmitter	0180
F604	Ultrasonic receiver	0182
F608	Fuel level sensor	0109
F612	Height sensor, ECAS, rear axle, left	0705 0721 0742
F613	Height sensor, ECAS, rear axle, right	0707 0743
F615	ECAS pressure sensor, driven axle, left/right	0746
F647	Engine oil pressure and temperature sensor	0608 0648
F648	Fuel rail pressure sensor	0607 0645
F649	Charge boost pressure and temperature sensor	0610 0647
F651	Ambient temperature sensor	0104
F652	Air pressure sensor	0106
F670	Automatic gearbox turbine speed sensor	0507
F671	ECS-DC3 accelerator pedal sensor	0623 0662
F686	Alarm system radar sensor	0185
F692	Water separator sensor	0316
F695	Trailing axle angle sensor	0457
F696	Front axle angle sensor	0459

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ELECTRICAL SYSTEM

LF45/55 series

Electrical system

1	2	3
F705	Diode for switching off cab heater with running engine	0455
G000	Rear light/marker light and search light relay	0201 0210
G001	Dipped beam relay	0206 0239
G002	Main beam relay	0208 0242
G004	Fog lamp relay, front	0212 0253
G005	Fog lamp relay, rear	0118 0249
G008	Windscreen wiper relay	0166 0171
G014	Glow plug relay	0047 0631 0669
G015	Contact relay	0027 0030
G036	Stop light relay	0258 0259
G185	Starting circuit interrupter relay	0541 (in VIM D822)
G188	Lighting relay, accessories	0030 0034
G201	Fuel heating relay, FPH-E	0313 0634 0673
G203	Takeover relay, starter motor	0037 0038 0042 0044
G294	Relay, automatic gearbox	0541 (in VIM D822)
G350	Reversing light relay, automatic gearbox	0541 (in VIM D822)
G353	Contact relay	0028 0314
G354	Windscreen wiper relay	0025 0163
G355	Seat heating relay	0353 0354
G367	Main switch relay, power supply	0008
G368	Main switch relay, earth	0010 0015
G397	Relay, windscreen heating	0349
G425	Main switch relay	0064 0102
G444	Relay, cooling fans, automatic gearbox (AGC-A4)	0534 0535
G507	Earth, 1-pin, chassis - cab	-
G516	Central cab earth, co-driver's side	-
G517	Central cab earth, driver's side	-
G520	Central earth, chassis, front end	-
G522	Central earth, starter motor	-
G523	Central earth, engine	-
G524	Earth point, glow element	-
G525	Central earth, flywheel	-

ELECTRICAL SYSTEM**5**

Electrical system

LF45/55 series

1	2	3
G528	Central earth connection, cab, left	-
G529	Central earth connection, cab, right	-
G735	Through-connection for Swedish lighting	0205
G742	Through-connection, VIC/DIP-4	0065
G743	Through-connection, main beam	0242
G744	Through-connection, cab heater/warning lamps/central door locking	0301
G748	Node, V-CAN	0195
G750	Node, V-CAN	0448 0599
G752	Node, V-CAN	0059
G753	Node, V-CAN	0596

2.3 SECTION DIAGRAMS FROM CIRCUIT DIAGRAM 1427090/03

Overview of section diagrams of circuit diagram 1427090/03

Section diagram no.	Title of section diagram
A	Voltage before and after contact
B	Overview of earthing points
C	CAN overview
1	Main switch
2	Ignition/starter switch/charging circuit
3	MTCO tachograph
4	Immobiliser
5	Pre-glowing
6	DIP-4
7	Direction indicators/warning lamps
8	VIC
9	Marker lights/parking lights/tail lights
10	Reversing lights/buzzer
11	Lighting/dipped beam/main beam/Swedish lighting/fog lamps
12	Stop lights/cab tilting gear
13	Differential lock
14	Interior lighting
15	Mirror heating/windscreen heating/mirror adjustment
16	Search lighting
17	Air conditioning/heater fan
18	Seat heating/accessories connection
19	Horn/cigar lighter/work lamp/air dryer
20	ABS-D
21	ABS/ASR-E
22	ECS-DC3/exhaust brake
23	Cruise control
24	AGC automatic transmission (AT1000/2000)
25	AGC automatic transmission (MD3060)
26	PTO

ELECTRICAL SYSTEM**5**

Electrical system

LF45/55 series

Section diagram no.	Title of section diagram
27A	ECAS-3 LF45
27B	ECAS-3 LF55
27C	ECAS-2 LF55
29	Headlamp height adjustment/rotating beams
30	24/12 V 10/15 A converter for radio
31	CDS-3/drop glass operation/roof hatch
33	Windscreen wipe/wash system
34	ACH-W with timer
35	Application connectors, engine speed control, superstructure functions and spare wiring
36	Break lining wear
37	ALS-S/battery charger, alarm BV2/BV3
38	Sockets, FA/FT
39	Water separator/fuel pre-heating
40	Airbag/seat belt tensioner
41	RAS-EC

A VOLTAGE BEFORE AND AFTER CONTACT

VOLTAGE BEFORE CONTACT

Wire 1000 runs from the batteries (A500) to the starter motor (B010), connecting point 30, and via the main fuse (E349, 80 A) to dashboard lead-through zone 1. Wire 1000 runs from the glow plug relay fuse (E286, 125 A) to the glow plug relay (G014). Wire 1000 and the + distribution bolt in dashboard lead-through zone 1 provide a constant voltage at pins 1 and 2 of connector 705 on the PCB.

This provides "voltage before contact" for the entire PCB. Power is also provided (by wire 1000) from point 30 on the starter motor to the B+1 connection of the alternator (A513). Wire 1000 goes from the + distribution bolt to the ignition/starter switch (C841).

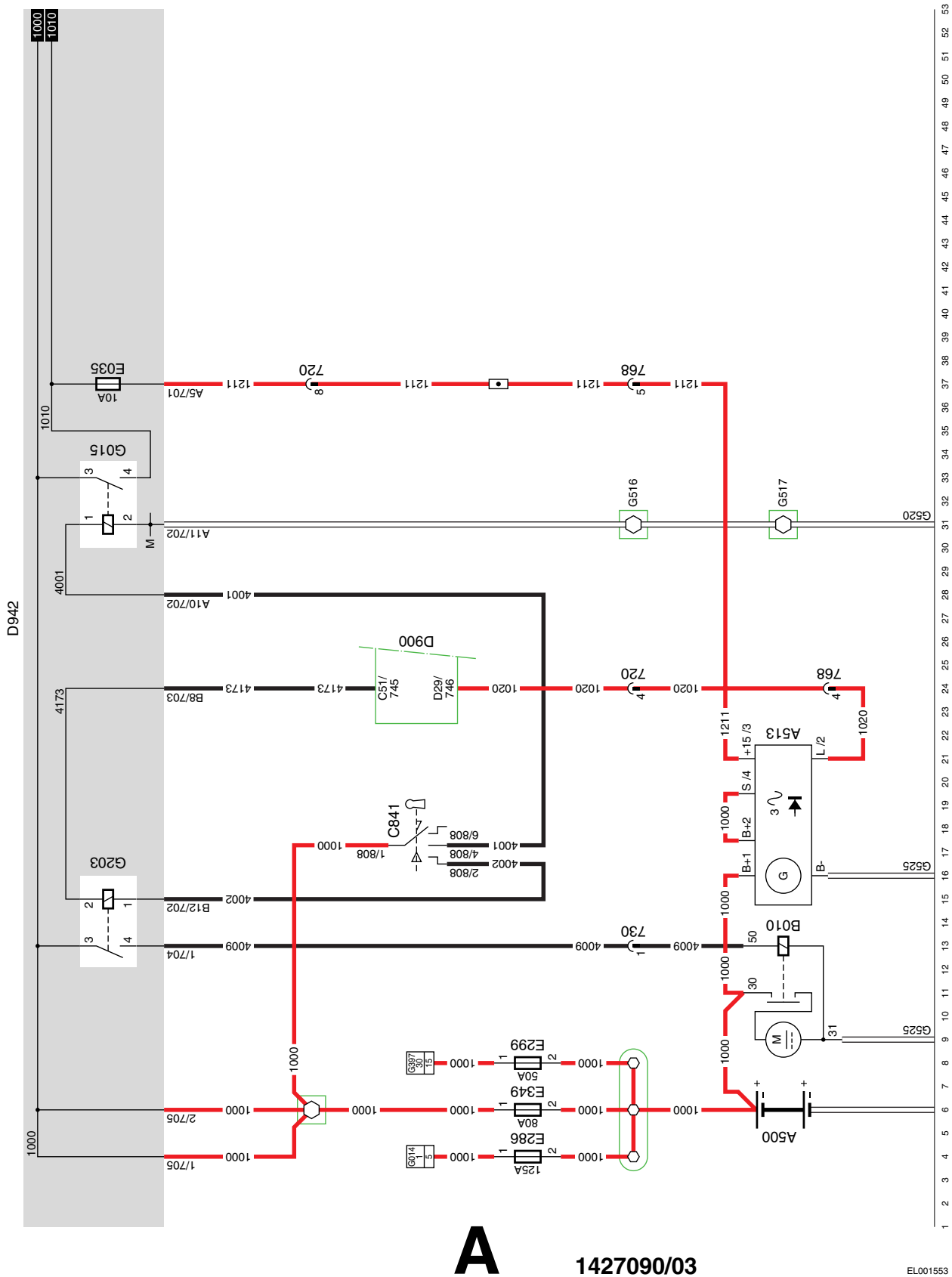
VOLTAGE AFTER CONTACT

When the ignition/starter switch (C841) is set to the "contact" position (connection between points 1 and 4), relay G015 is energised via wire 4001.

This then connects wire 1000 (voltage before contact) to wire 1010 (voltage after contact).

When the ignition/starter switch (C841) is turned against the spring pressure (connection between points 1 and 2), relay G015 remains activated.

When the ignition/starter key is released, the contact/starter switch automatically springs back and remains in the "contact" position.

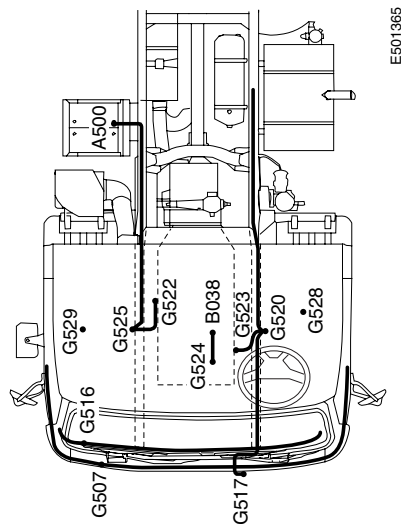


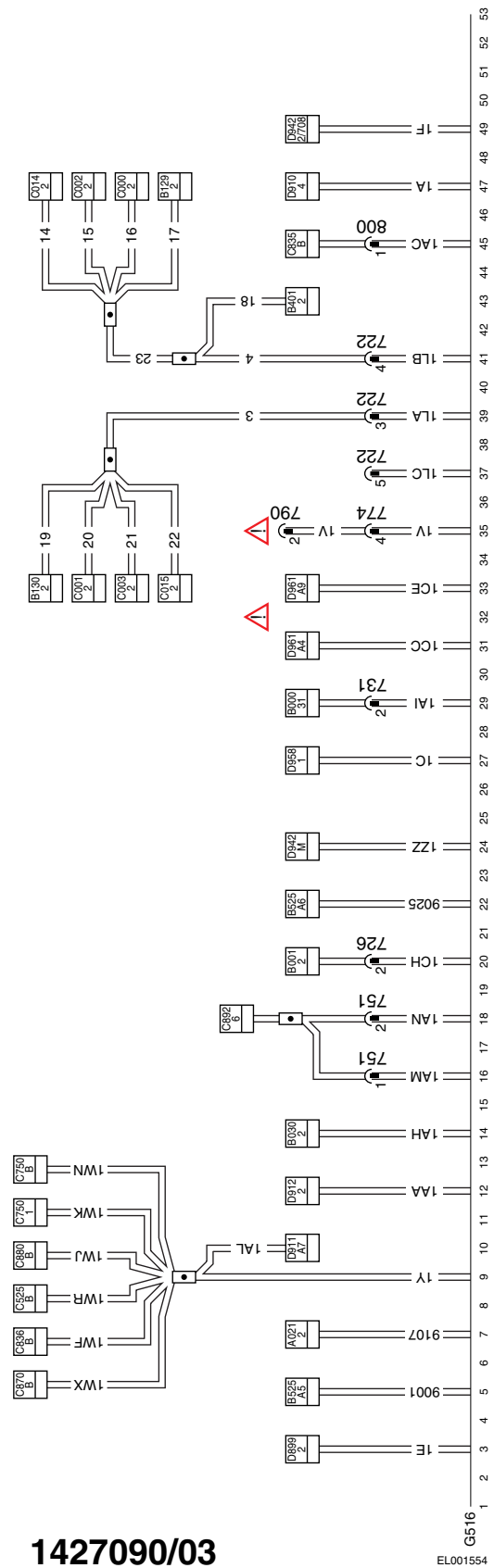
B OVERVIEW OF EARTHING POINTS

This section diagram gives an overview of all the earth connections, with wire markings and connector points.

VARIANTS**Location**

- G516 central earth, cab
- 32 These earth points are also used with an ABS-D (D941) system
- 35 Connector 790 is designed for a CB set
- 68,70 The earth connection ends at connector 718.
- The application wiring harness connected to 718 makes an earth connection directly on the chassis





B

1427090/03

EL001554

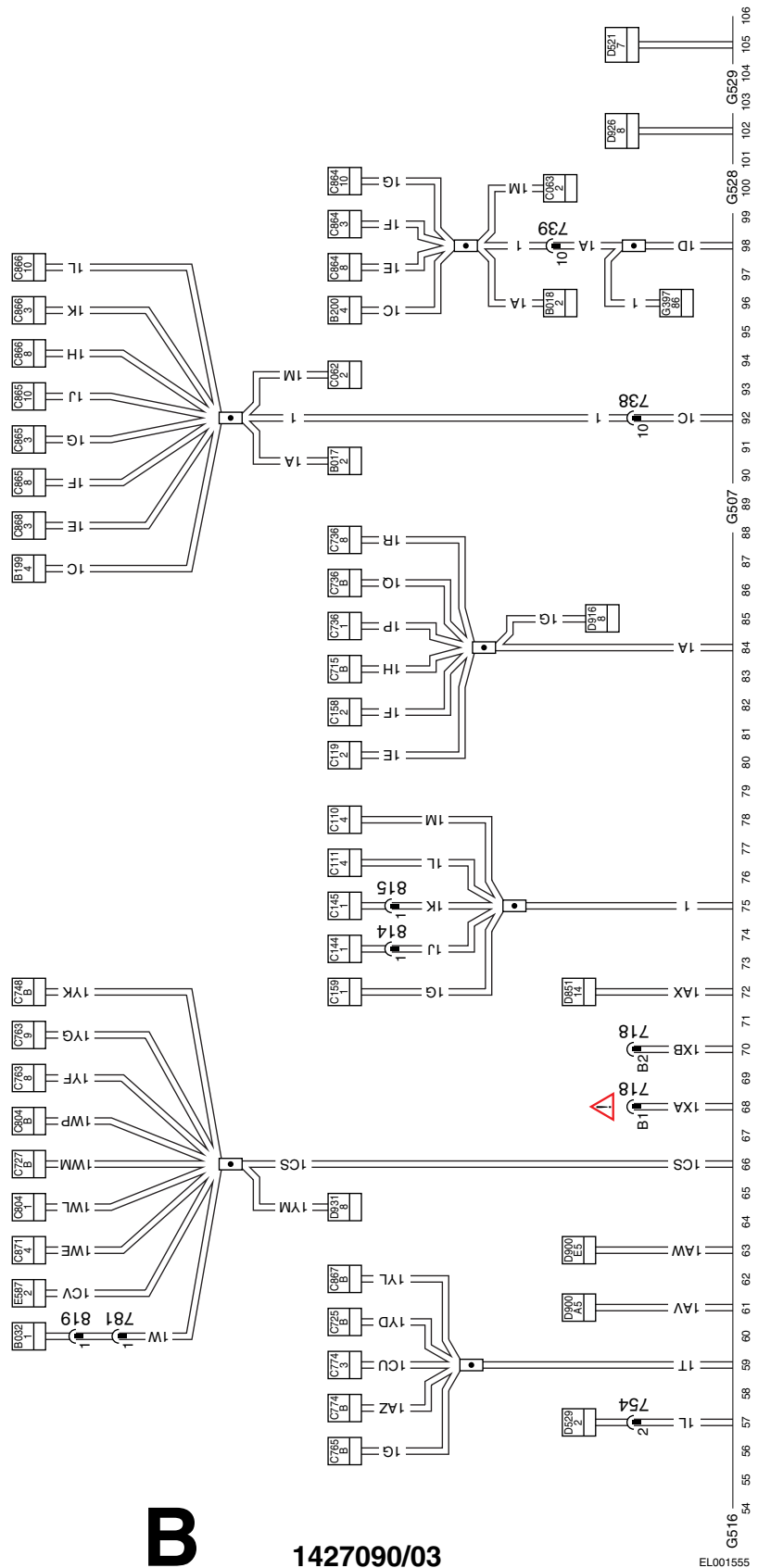
ELECTRICAL SYSTEM

5

Electrical system

LF45/55 series

10



B

1427090/03

EL001555

C CAN OVERVIEW

This section diagram gives an overview of all the CAN connections, with wire markings and connector points.

SEE THE SYSTEM MANUAL FOR MORE INFORMATION

VARIANTS

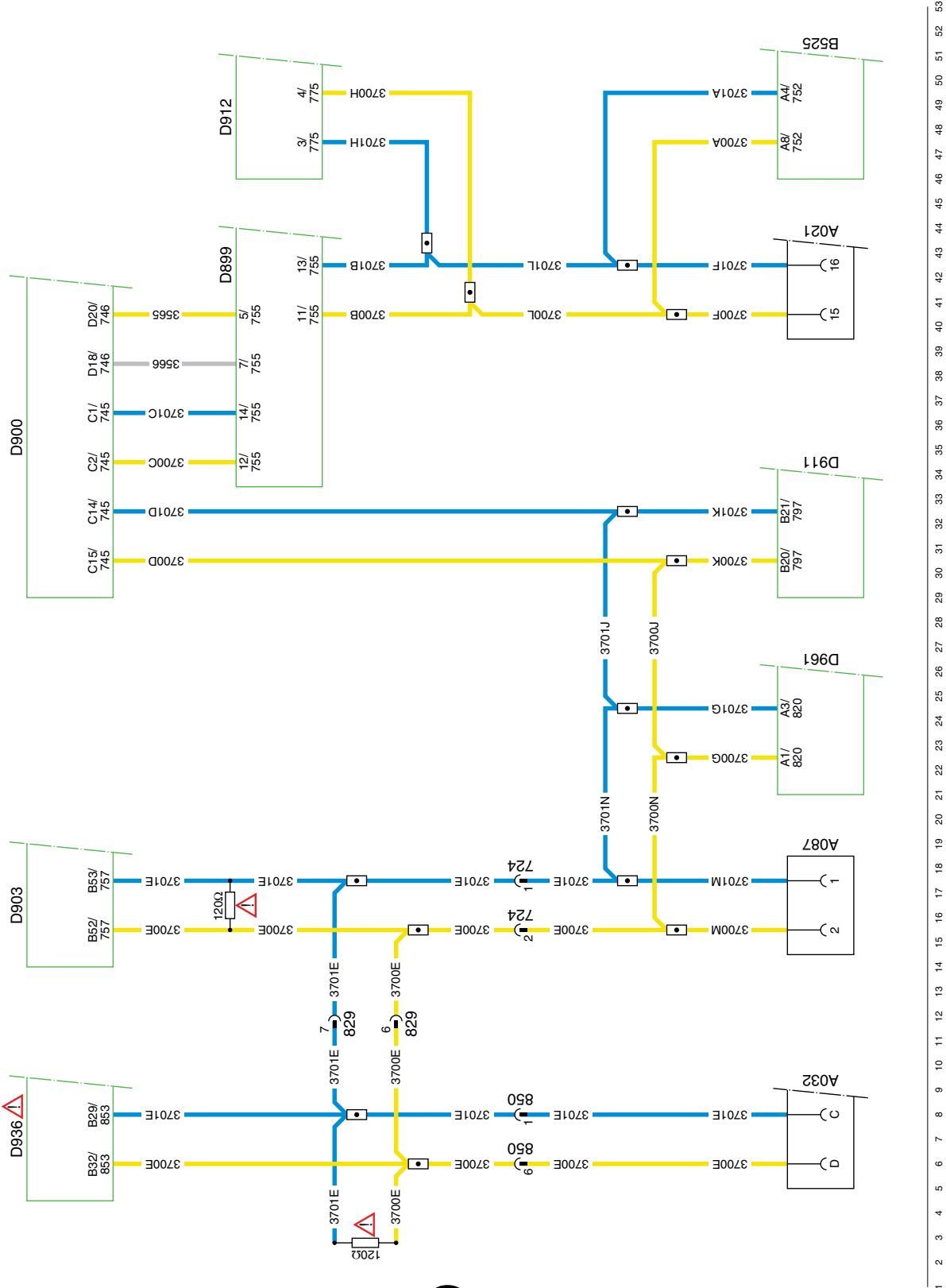
Location

- 2

The terminating resistor is in the automatic transmission wiring harness
- 8

Electronic unit, automatic gearbox, AGC-T1000/2000 (D936):
If MD3060 gearbox is fitted, the electronic unit is for AGC-A4 automatic gearbox operation (D866)
- 16

The terminating resistor is in the wiring harness of the ECS-DC3 engine management system



C

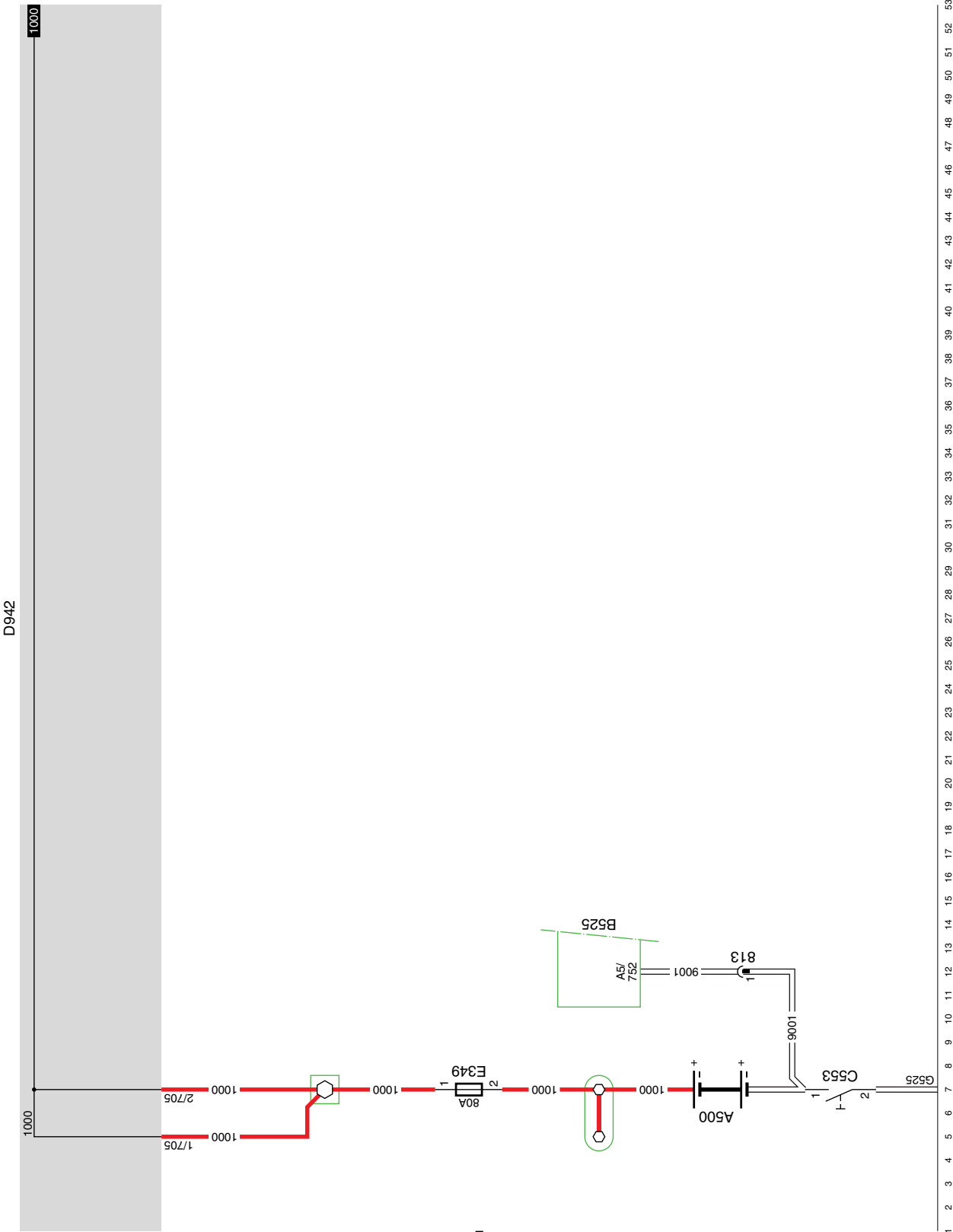
1427090/03

EL001556

1. MAIN SWITCH

MANUALLY OPERATED EARTH BREAKER

Turning main switch C553 anti-clockwise will break the earth connection between the batteries (A500) and the chassis earth point G525. Because the tachograph (B525) must have a power supply and earth connection at all times, earth wire 9001 is connected directly to the earth connection of the batteries through 2-pin dashboard lead-through connector 813 in zone 1.



ELECTRICAL SYSTEM

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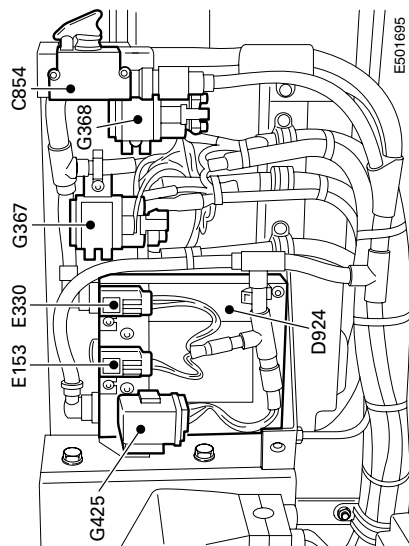
Electrical system

LF45/55 series

Closing the main switch electrically on the chassis



ATTENTION: switch C853 must be in the "main switch on" position (connection between contacts 5 and 7).



Switch C854 (switch for main switch on the chassis) connects the C1 connection to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178. Relays G367 and G368 are immediately energised through wire 4174 and connection point A3 (A3 is connected to earth for 0.5 seconds). This closes the connection between points 88a and 88 of both relay G367 and relay G368. The positive and the negative terminals of the batteries are now connected to the vehicle's power supply.

ELECTRICALLY OPERATED MAIN SWITCH

The main switch (D924) can be closed:

- electrically in the cab
- electrically on the chassis

Closing the main switch electrically in the cab



ATTENTION: switch C854 must be in the "main switch on" position (connection between contacts 1 and 2).

Switch C853 (switch for main switch in cab) connects the C1 and C2 connections to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178. Relays G367 and G368 are immediately energised through wire 4174 and connection point A3 (A3 is connected to earth for 0.5 seconds). This closes the connection between points 88a and 88 of both relay G367 and relay G368. The positive and the negative terminals of the batteries are now connected to the vehicle's power supply. Immediately after switch C853 closes, connection point C2 is internally connected to point A7.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

Immediately after switch C854 closes, connection point C2 is internally connected to point A7.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

The main switch (D924) can be opened:

- electrically in the cab
- electrically on the chassis

Opening the main switch electrically in the cab



ATTENTION: switch C854 must be in the "main switch on" position (connection between contacts 1 and 2).

Switch C853 (switch for main switch in cab) disconnects wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and the C1 and C2 connections from the C4 and C5 connections via wire 4178.

VARIANTS

Location	
76	G368, main switch relay, earth fitted depending on the requirements for transporting hazardous substances These wires are only present if ADR is fitted
88,90	Earth connection to connector 834 is only present if ADR is fitted
94	Connector 831: Only present if the system is fitted with an external current limiter (D826)
97	Connector 832: Only present if the system is fitted with an external current limiter (D826)
98,101	Electronic unit for VLG current limiter (D826): Fitted depending on the requirements for transporting hazardous substances. Version with production date < 2002-49: current limiter (D826) used as shown Version with production date > 2002-49: current limiter integrated into the MTCO (B525)
99	

ATTENTION: switch C853 must be in the "main switch on" position (connection between contacts 5 and 7).



Switch C854 (switch for main switch in cab) breaks the C1 and C2 connections to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178.

Two actions are carried out immediately after switch C854 is opened:

1. Connection point A7 is connected to earth (A2) in the unit.
2. After a delay of approx. 6 seconds, relays G367 and G368 are connected to earth for approx. 0.5 seconds via wire 4175 and connection point A4. This breaks the connection between points 88a and 88 of relays G367 and G368. The positive and the negative terminals of the batteries are now disconnected from the vehicle's power supply.

If the engine is running, it is switched off.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

Note:

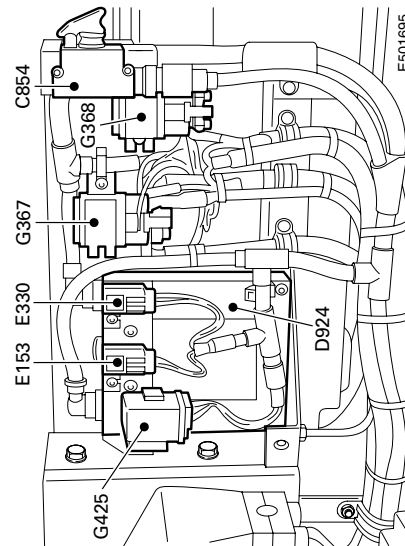
When one of the switches (C853 or C854) that activate the electronic unit (close main switch) is operated, relays G367 and G368 are activated after approximately 3 seconds. If one of the switches is operated again within the 3 seconds, the electronic unit (D924) will select the priority 'main switch ON'.

Two actions are carried out immediately after switch C853 is opened:

1. Connection point A7 is connected to earth (A2).
2. After a delay of approx. 6 seconds, relays G367 and G368 are connected to earth for approx. 0.5 sec. via wire 4175 and connection point A4. This breaks the connection between points 88a and 88 of relays G367 and G368. The positive and the negative terminals of the batteries are now disconnected from the vehicle's power supply.

If the engine is running, it is switched off.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

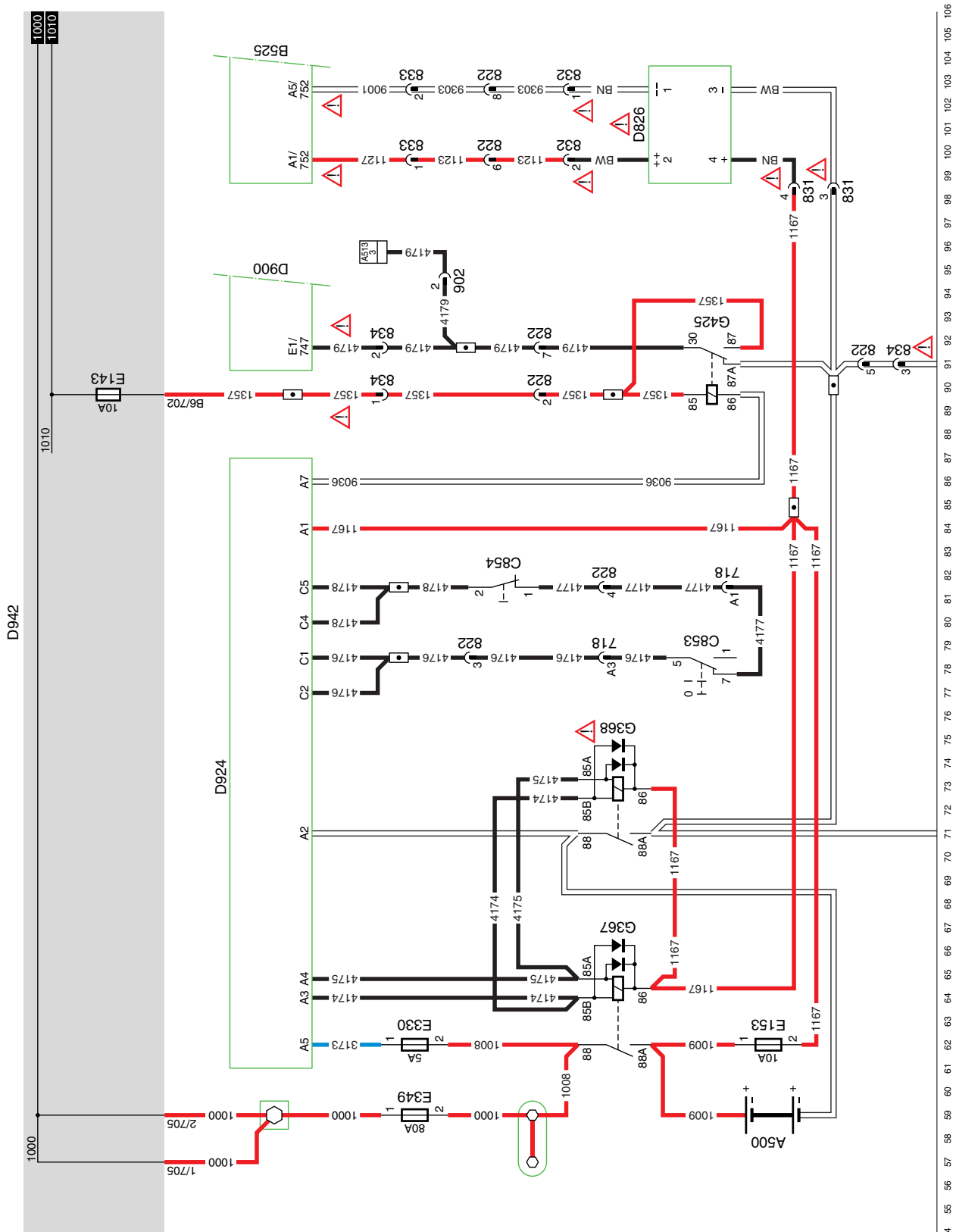
Opening the main switch electrically on the chassis

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series



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1427090/03

EL001557

2. IGNITION/STARTER SWITCH/CHARGING CIRCUIT**CONTACT CIRCUIT**

When ignition/starter switch C841 is turned to the "accessories" position (contact 1 connected to contact 6), the "accessories" relay (G355) is energised via wire 1130. If ignition switch C841 is turned further (contact 1 is connected to 4), ignition relay G015 will be activated via wire 4001. Wire 1010 is supplied with power.

STARTING CIRCUIT

When the contact switch is turned to the "start" position, contacts 1 and 2 in this switch are connected. Power is supplied to relay G203 via wire 4002. The VIC (D900) connects G203 to earth when the neutral position switch (E569) in the gearbox is closed. Relay G203 now supplies power via wire 4009 to connection point 50 of the starter motor (B010). As a result, the starter motor is energised.

This means that if the gearbox is not in neutral the VIC does not connect relay G203 to earth and the relay is therefore not energised.

CHARGING CIRCUIT

When the ignition is switched on, power is supplied to both the B+ connection and connection 15 (pin 3) of the alternator.

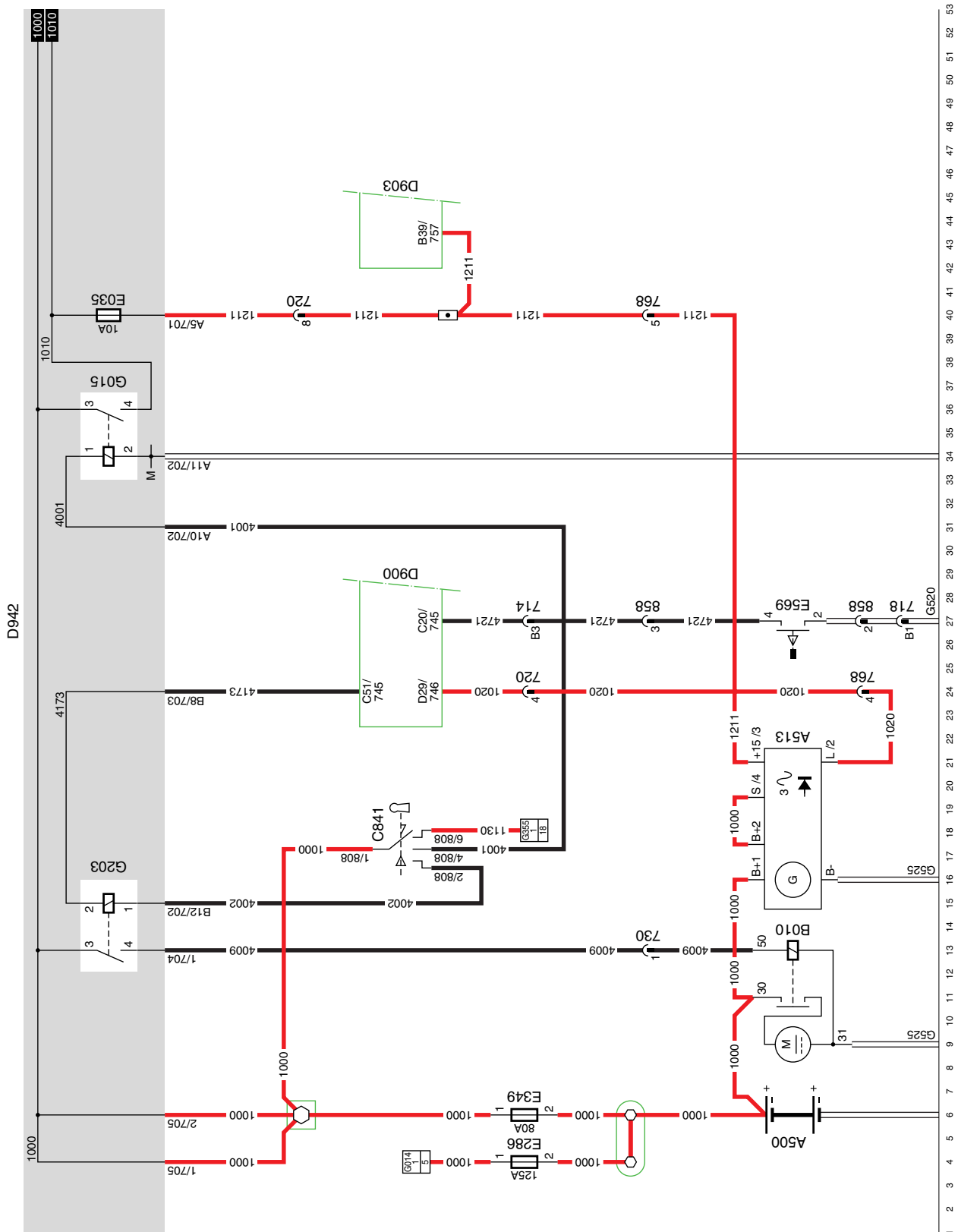
An internal resistor in the alternator is energised by an IC in the carbon brush holder. This resistor ensures that a low level of current passes through the energising resistor. This excites a magnetic field in the alternator.

After starting, the voltage on terminals B+ and 15 (pin 3) will rise to about 28.5 V. Once this voltage is reached, the control IC in the regulator interrupts the pre-exciter coil to enable the voltage to be regulated. The magnetic field will now disappear, so that the generator will not be energised for a short period of time. As a result, the voltage on outputs B+ and 15 will drop.

The regulator reactivates when the voltage drops below 27.6 V. This means that the voltage supplied by the generator remains relatively constant. The batteries are supplied through generator output B+1.

The alternator charging current warning lamp is activated via wire 1020, which is connected to the VIC (D900). The VIC controls the DIP via the CAN network. The voltage on wire 1020 is switched by the control IC. Errors are also shown on the DIP display through this connection.

The alternator is also equipped with a 'sens' connection (pin 4). However, this connection is not used and is now connected directly to B+2. The function of this connection is to correct the voltage difference between B+ and the batteries.



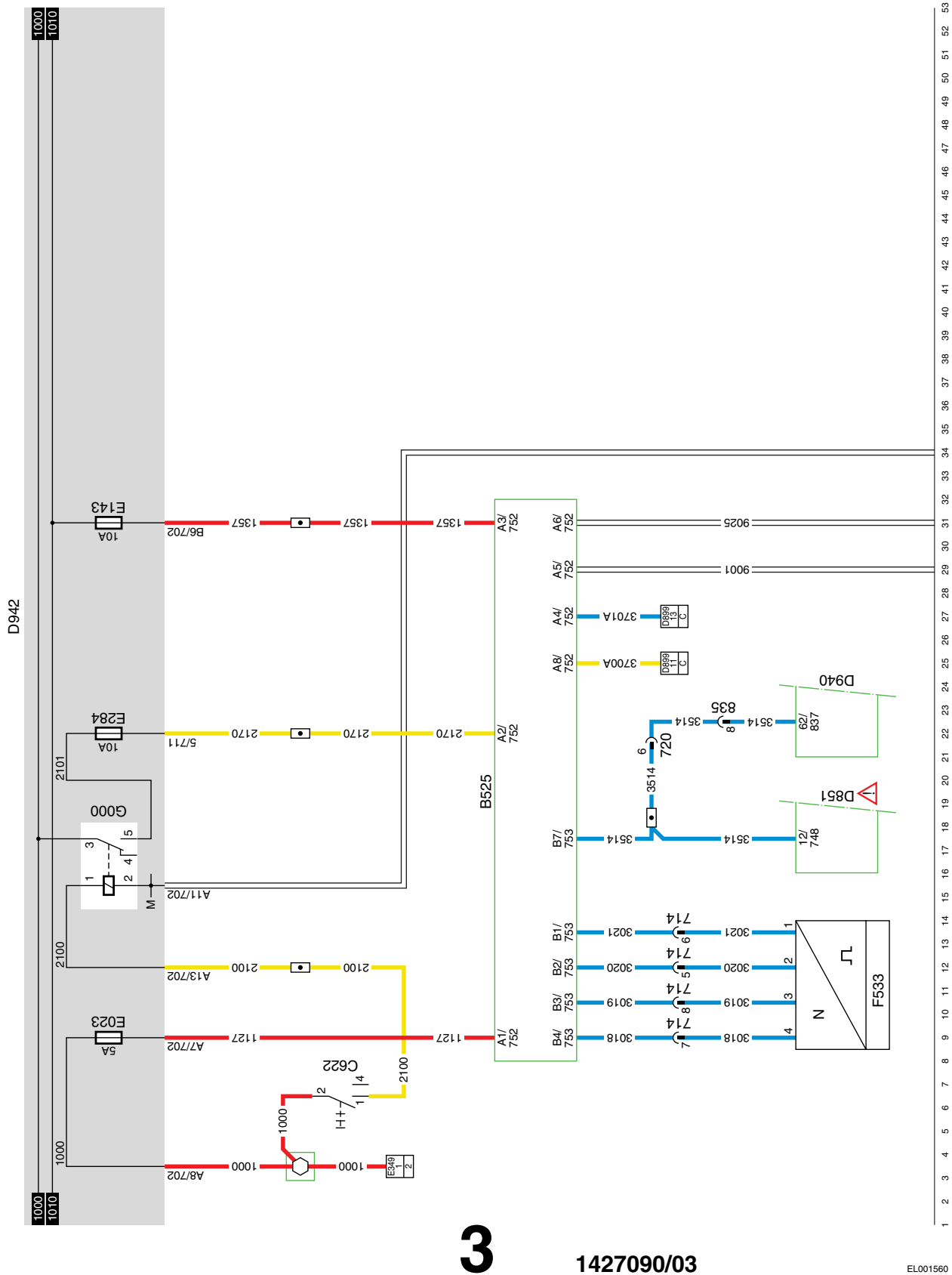
2

1427090/03

EL001559

**3. TACHOGRAPH
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION**

Location
19 Electronic unit, ECAS-3 (D851):
If ECAS-2 fitted, then electronic
unit D802



ELECTRICAL SYSTEM

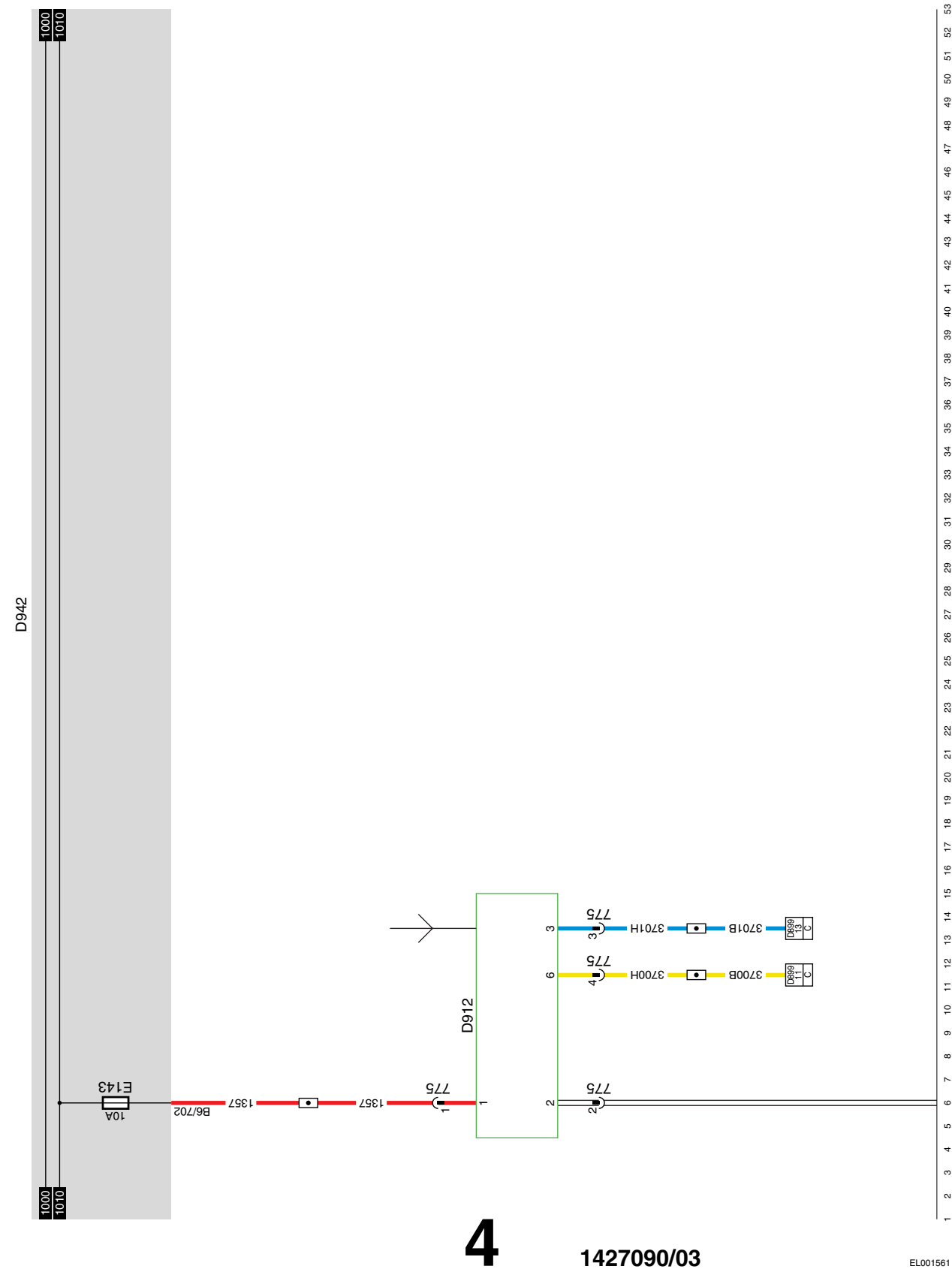
5

Electrical system

LF45/55 series

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**4. IMMOBILISER
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION**



ELECTRICAL SYSTEM

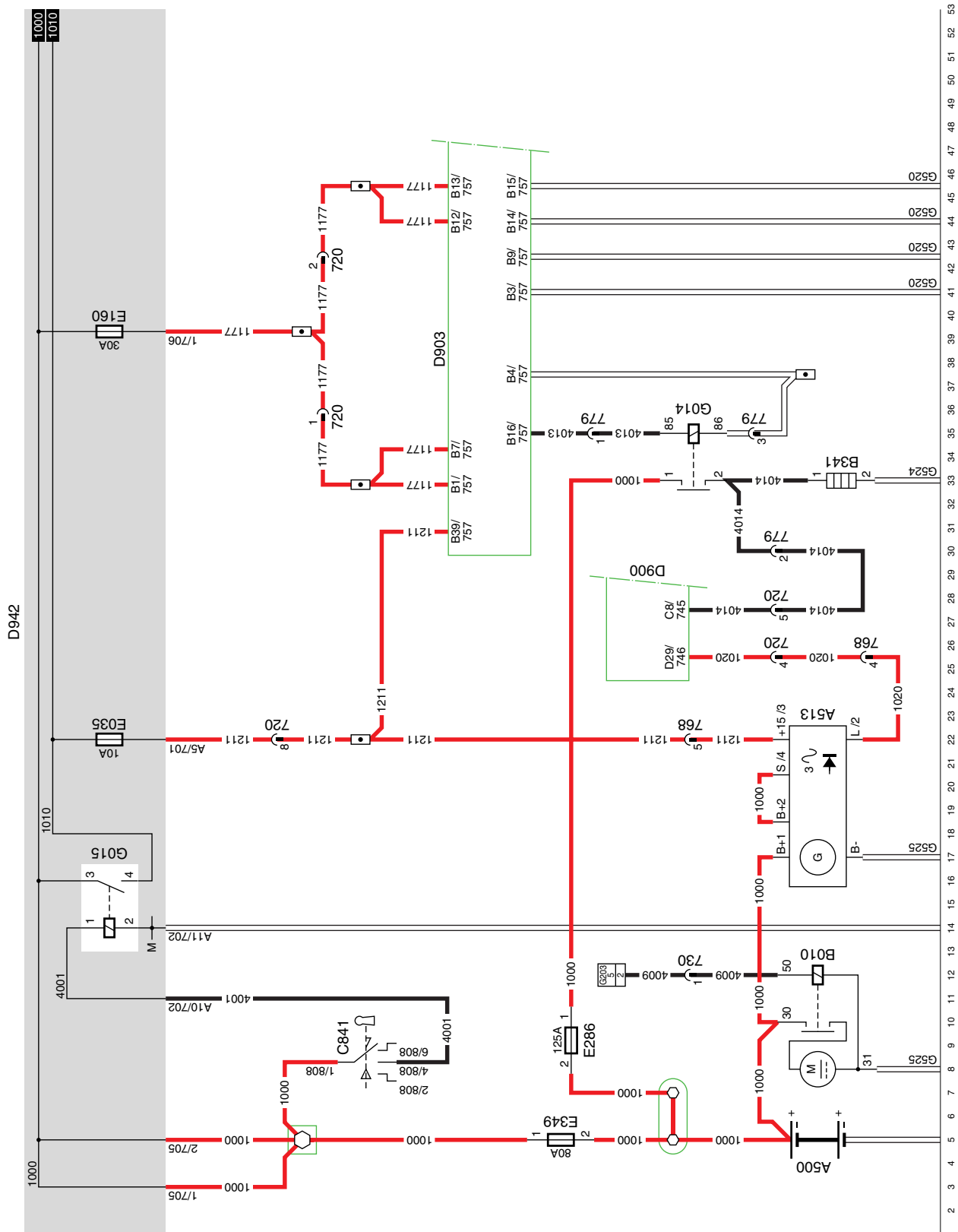
5

Electrical system

LF45/55 series

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**5. PRE-GLOWING
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION**



5

1427090/03

EL001562

10

ELECTRICAL SYSTEM

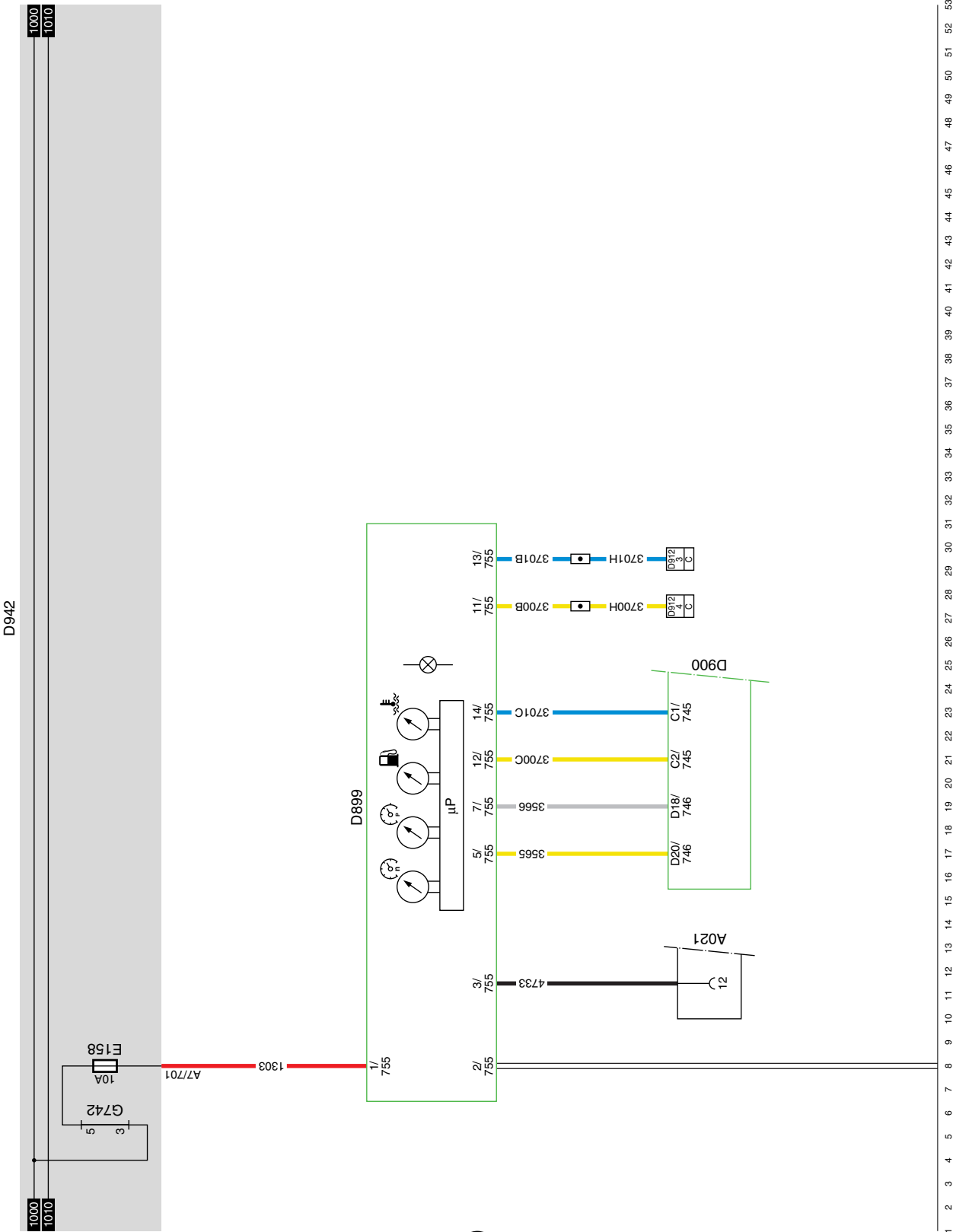
5

Electrical system

LF45/55 series

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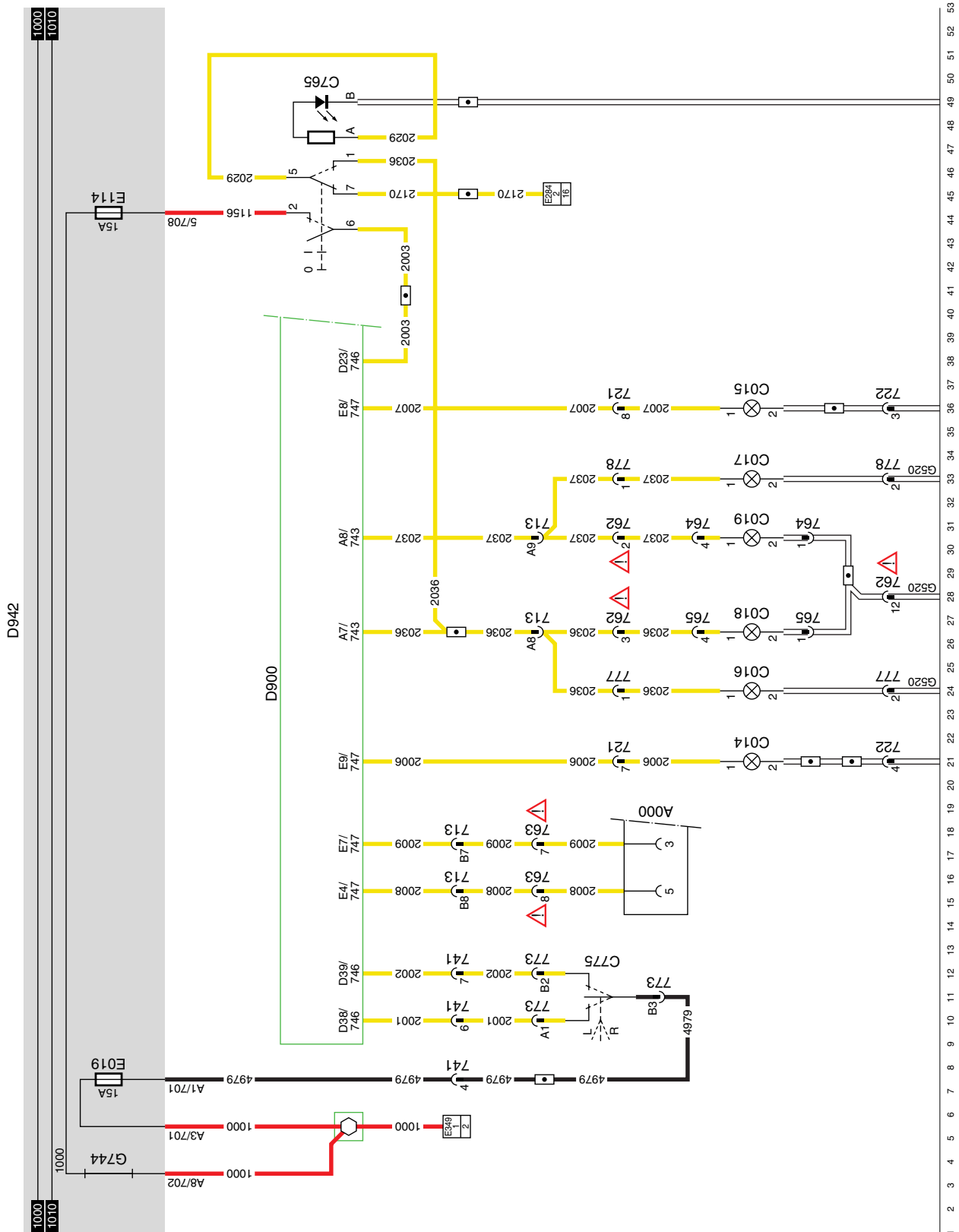
**6. DIP-4
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION**



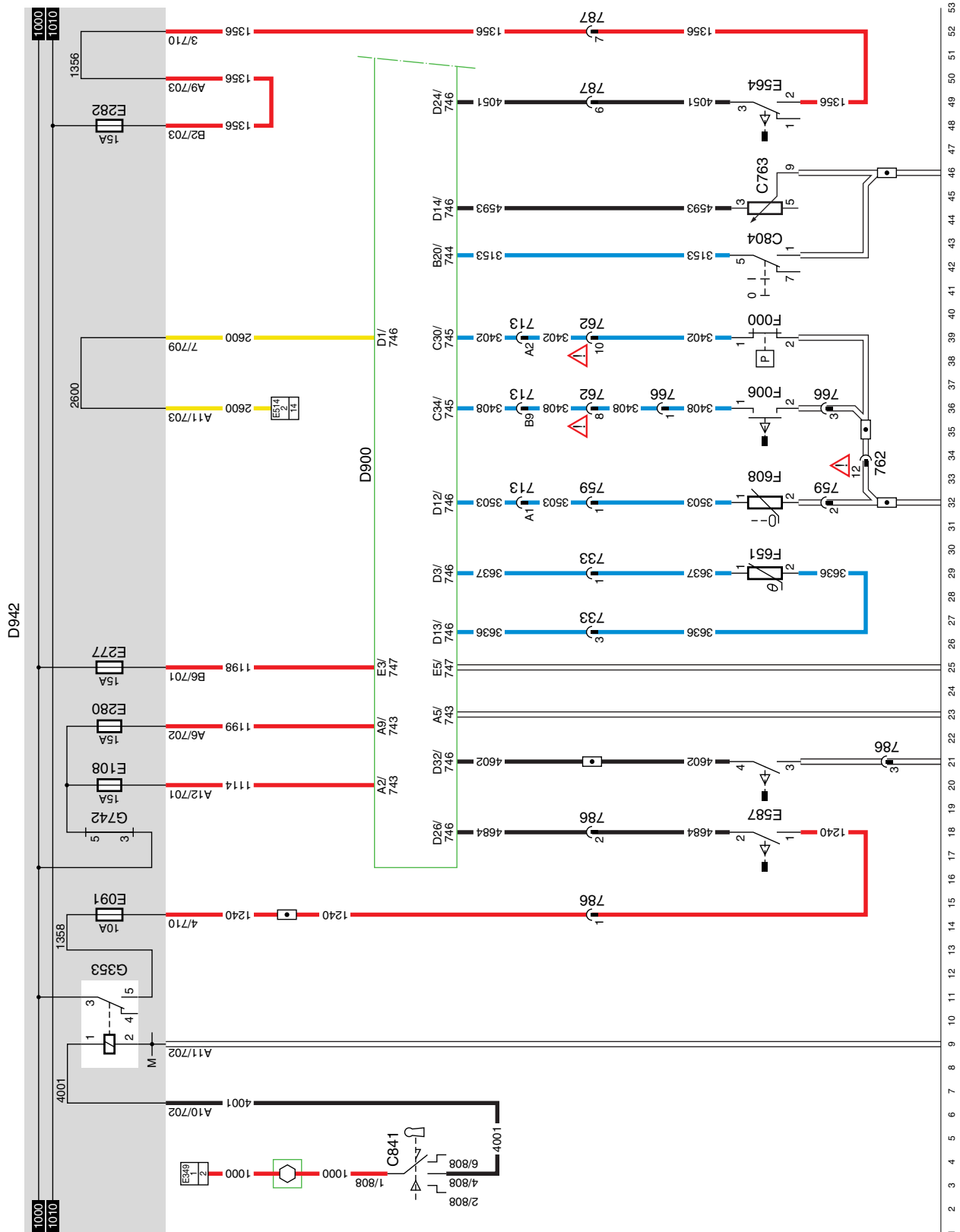
7. DIRECTION INDICATORS AND WARNING LIGHTS
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION

VARIANTS

Location	
15,18	Connector 763: Not fitted on vehicle type FT
26,28,31	Connector 762: Not fitted on vehicle type FT



8.	VIC	
SEE THE SYSTEM MANUAL FOR MORE INFORMATION		
VARIANTS		
	Location	
33,39	Connector 762:	Not fitted on vehicle type FT
88	Electronic unit, ABS/ASR-E (D961): If ABS-D fitted, then electronic unit D941	
116	Electronic unit, automatic gearbox, AGC-T1000/2000 (D936): If MD3060 gearbox is fitted, the electronic unit is for AGC-A4 automatic gearbox operation (D866)	
156	Connector 780:	Not fitted on vehicle type FA. Wire 2155 only fitted in application connector A070
182	Connector 763:	Not fitted on vehicle type FT



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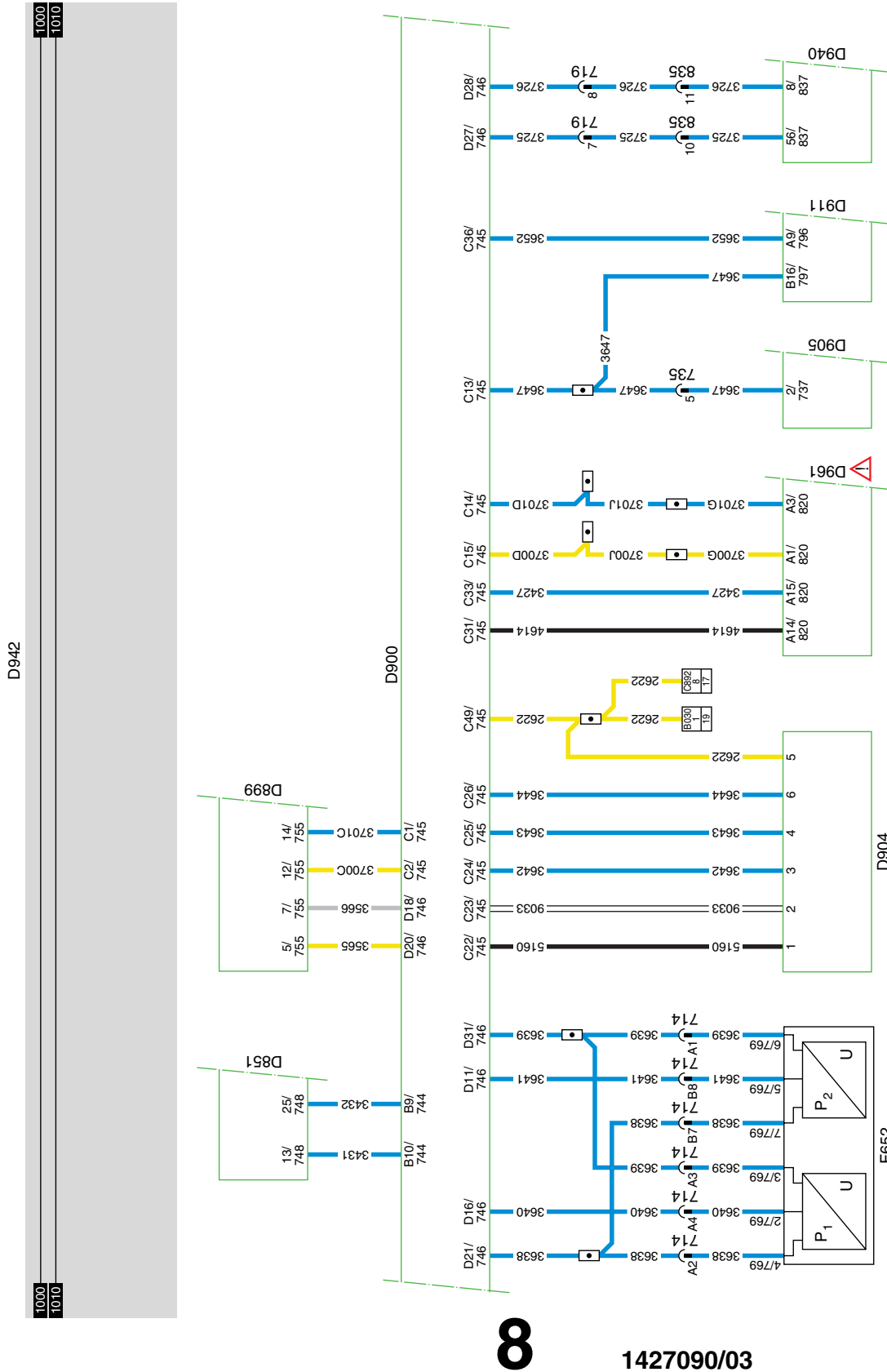
EL001565

ELECTRICAL SYSTEM

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Electrical system

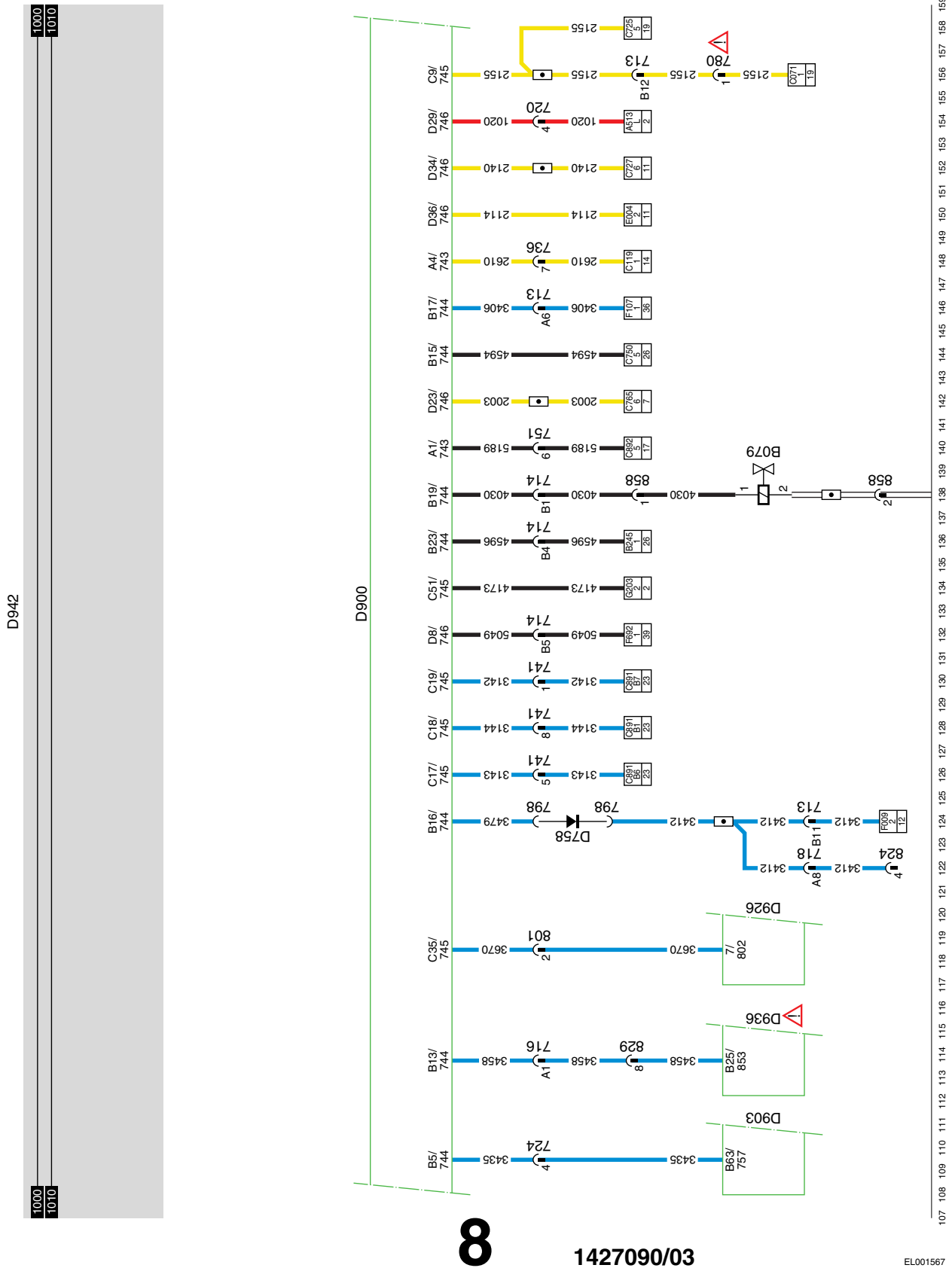
LF45/55 series



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EL001566

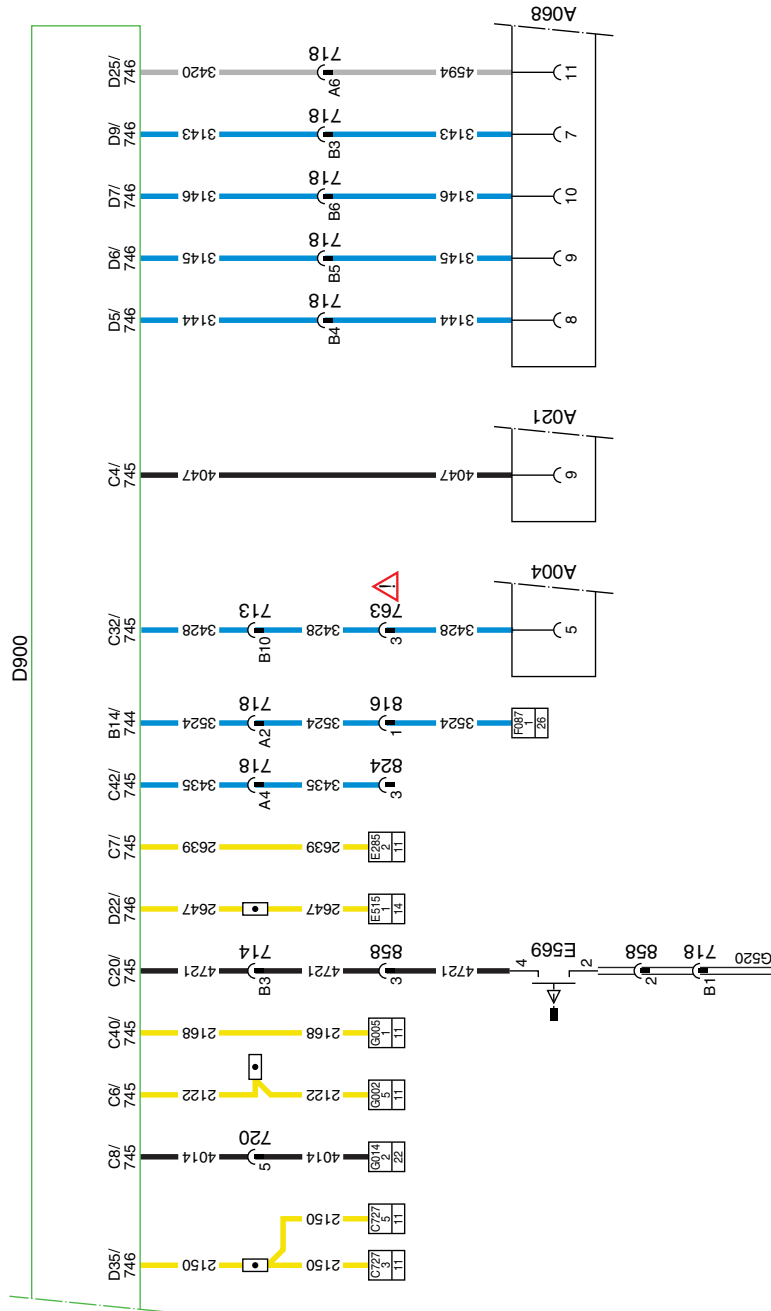
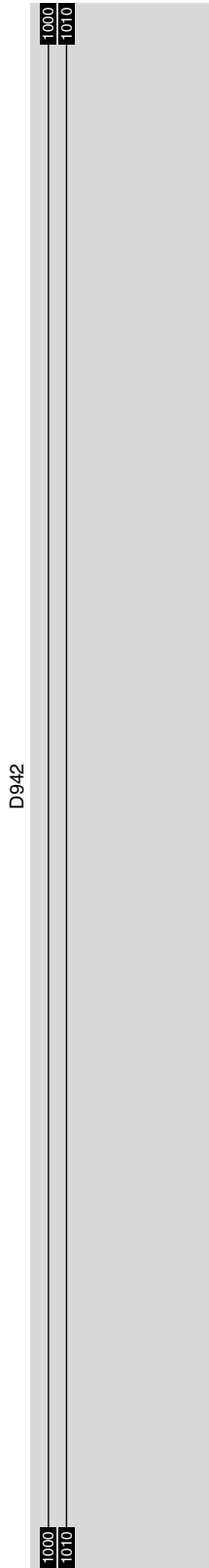


ELECTRICAL SYSTEM

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Electrical system

LF45/55 series



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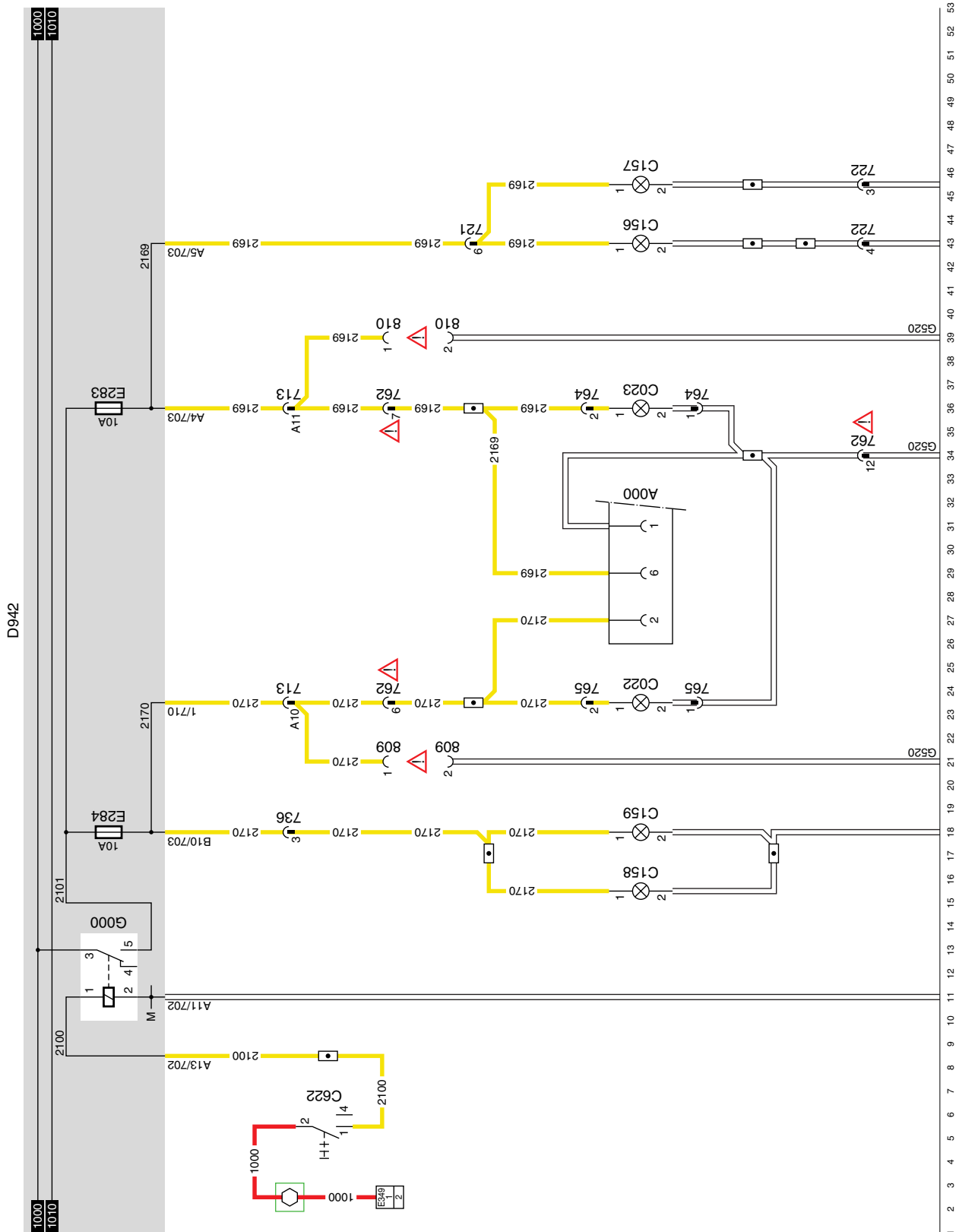
EL001568

9. MARKER LIGHTS/PARKING LIGHTS/TAIL LIGHTS, FA/FT

By switching the lighting switch (C622) to the 1st position (connection between contacts 2 and 1), relay G000 is activated through wire 2100. Relay G000 provides the left/right marker lighting on top of the cab and the left tail light with voltage through fuse E284, wire 2170. A connection is also fitted in drawn vehicle socket A000 (pin 2).
The right-hand tail light and the parking light receives power via fuse E283, wire 2169.
A connection is also provided in drawn vehicle socket A000 (pin 6).

VARIANTS

Location	
21	Connector 809: Only fitted on vehicle type FA
24	Connector 810: Only fitted on vehicle type FA
34,36,39	Connector 762:
	Not fitted on vehicle type FT



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EL001569

10. REVERSING LIGHTS/BUZZER

When the contact is switched on, power is supplied to the reversing light switch (E501) via E018 and wire 1217.

This switch is mounted in the gearbox. The contacts are closed when the gearbox is switched to the “reverse” position.

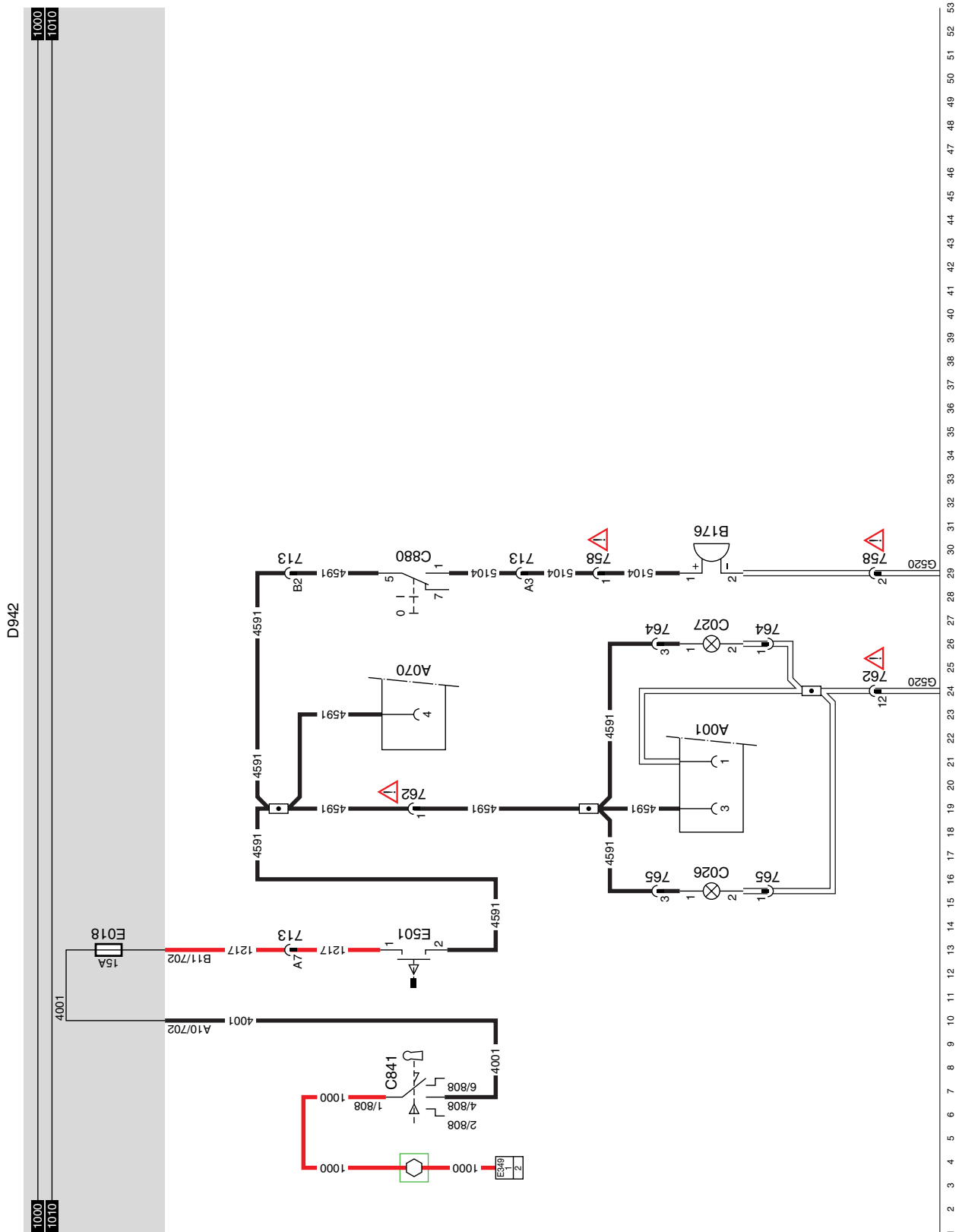
Power is then supplied via wire 4591 to the reversing lights (C026/C027) and drawn vehicle connector A001.

The reversing buzzer (B176) can only be activated via wire 5104 if the dashboard switch (C880) is in position I. Switching C880 to the 0 position turns off the reversing buzzer.

The application connector (A070) also has a connection that is switched by the reversing light switch (E501).

VARIANTS

Location	
22, 27	Connector 762:
	Not fitted on vehicle type FT
32	Connector 758:
	Not fitted on vehicle type FT



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EL001570

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11. LIGHTING/DIPPED BEAM/MAIN BEAM/SWEDISH LIGHTING/FOG LAMPS

MARKER, PARKING AND TAIL LIGHTS

FOR SECTION DIAGRAM AND

EXPLANATION: SEE SECTION DIAGRAM 9

LIGHT SWITCH

Position 1 ("town lights")

By switching the lighting switch (C622) to the 1st position (connection between contacts 2 and 1), relay G000 is activated through wire 2100. Relay G000 provides power to the marker lights and tail lights and to the fog lamps switch (C727), pins 1 and 2. This is done via fuse E285, wire 2639. There is also a connection via the same fuse and wire to the VIC (pin C7/745) for the "light on" buzzer (in DIP).

Position 2 ("dipped beam")

By switching the lighting switch (C622) to the 2nd position (connection between contacts 2 and 4), relay G001 is energised through wire 2110. Power for the dipped beam headlights (C000) and the VIC is supplied via fuse E004 and wire 2114 through pin D36/746. Dipped beam C001 is supplied with power via fuse E005 and wire 2113. Diode D609 ensures that relay G000 remains activated when the light switch is turned to position 2.

MAIN BEAM

"Signalling light"

Steering column switch C775 is supplied with power before contact at pin B3. This power supply is used for signalling. During signalling, points B3 and B4 are connected to each other. This is a spring-loaded connection.

Relay G002 is activated via wire 2120. Relay G002 supplies power to the main beam headlights (C002/C003) via fuse E006, through-connection G743 and wire 2122. Wire 2122 is also connected to pin C6/745 of the VIC and the spotlights (C006/C007). The VIC switches on the "main beam" indicator in the DIP via the I-CAN.

Diode D610 prevents voltage from getting to relays G000 and G001 through connection A4 when the main beam switch is pulled back further during signalling. Otherwise this would activate all the other lights during signalling.

"Main beam"

When the main beam headlights are switched on, points A4 and B4 of the steering column switch (C775) are connected to each other. Pin A4 is supplied with power via diode D610 when light switch C622 is turned to position 2. Relay G002 is then again energised via wire 2120, as a result of which the main beam headlights (C002/C003) will come on.

SWEDISH LIGHTING

Swedish lighting is provided using through-connection G735. When the vehicle ignition is switched on, relays G000 and G001 are directly activated via fuse E282. As a result, the dipped beam headlights are activated and the fog lamp switch (C727) is supplied with power.

Diodes D784 and D785 are fixed on the PCB of the fuse box. In vehicles that do not have Swedish lighting, diode D784 prevents relay G001 from being activated when the light switch (C622) is in position I. Diode D785 prevents relay G000 from being activated when the light switch is moved to position II.

The interior lighting will NOT switch off when the engine is started.

SPOTLIGHT

Operating the main beam switch (C775) energises main beam relay G002 via wire 2120. Relay G002 supplies power to the spotlights (C006/C007) via fuse E006 and wire 2122.

FRONT FOG LIGHTS

Moving the fog lamp switch (C727) to position I (fog lamps, front) activates relay G004 via wire 2140, provided that light switch C622 is in position 1. Relay G004 supplies the front fog lamps (C008/C009) with power through fuse E009 and wire 2142. The VIC (D900) also receives power through wire 2140 at pin D34/746. The VIC switches on the "front fog lamps" indicator on the instrument panel through I-CAN.

REAR FOG LIGHTS

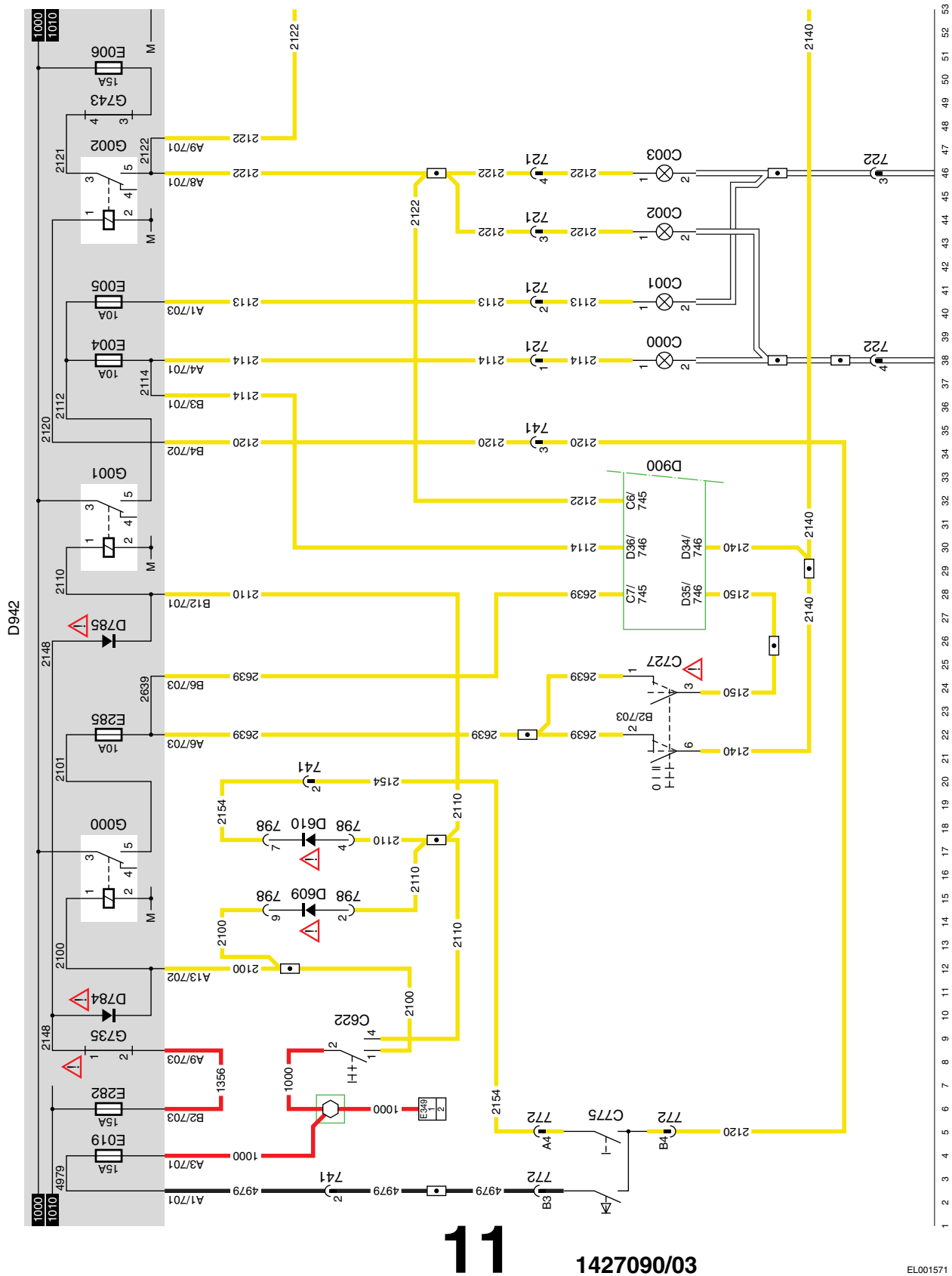
When the fog lamp switch (C727) is set to position II, which is spring-loaded, the VIC receives a voltage signal at pin D35/746, provided that light switch C622 is in position 1. The VIC then activates relay G005 through pin C40/745. Relay G005 supplies power to the rear fog lamps (C024/C025) via fuse E009, wire 2152.

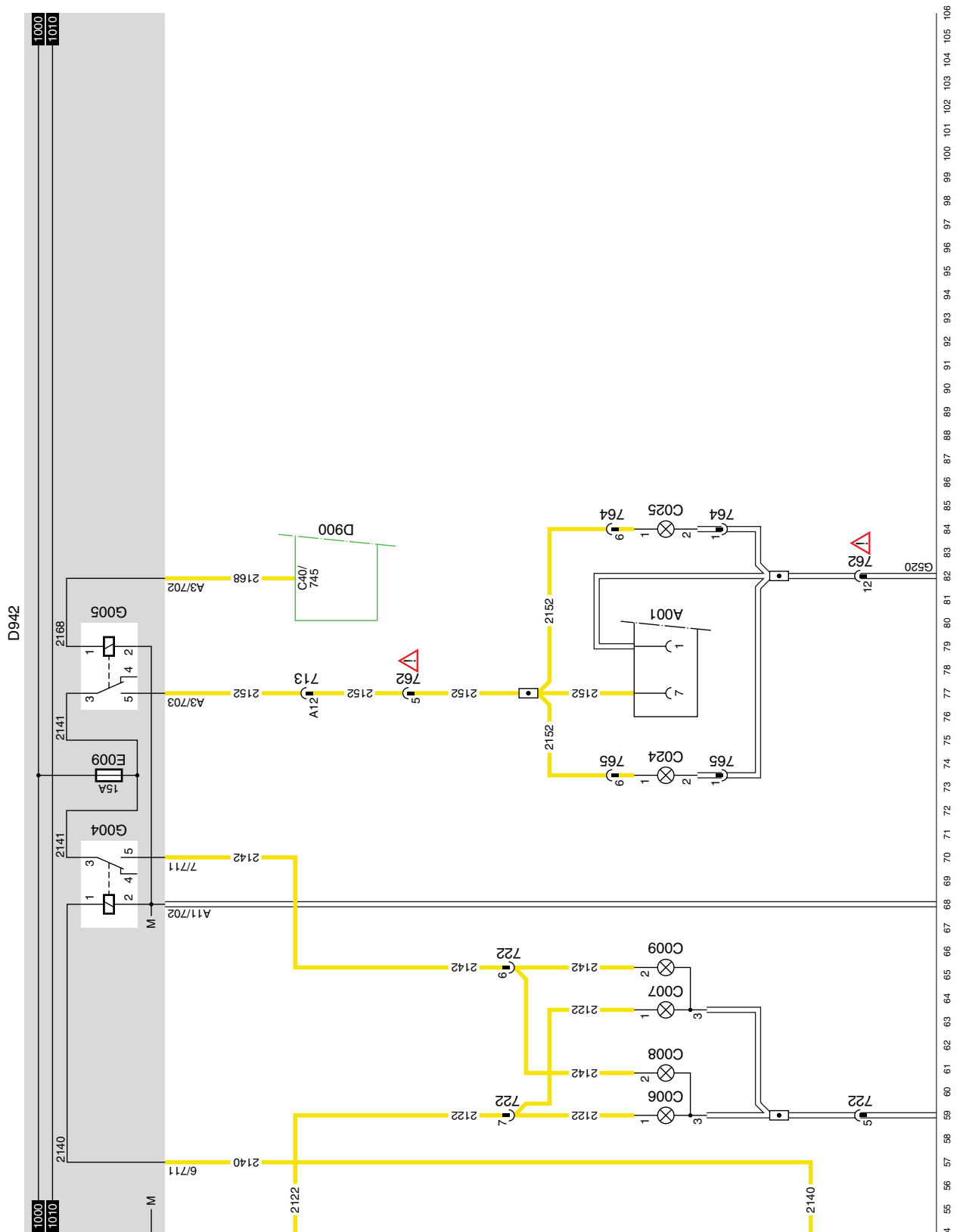
If the lighting or the ignition has been turned off and the lighting is then turned on again, the fog lamp switch (C727) will have to be re-set to position II in order to switch on the rear fog lamps.

Power is also supplied to drawn vehicle connector A001 (pin 7) via wire 2152.

VARIANTS**Location**

9	Removable through-connection G735 for Swedish lighting (see label on fuse box)
11	The diode is located on PCB D492
15	Diode located in diode block on the bottom of the central console
18	Diode located in diode block on the bottom of the central console
24	If only a rear fog light is fitted, switch C727 is replaced by switch C773.
26	The diode is located on PCB D492
76,81	Connector 762: Not fitted on vehicle type FT





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VARIANTS

Location

23,28	Connector 762:
29	Not fitted on vehicle type FT Electronic unit, ECAS-3 (D851): On a 6x2 vehicle, ECAS-2 electronic unit D802 (7/340)

CAB TILTING GEAR

The switch for the cab lock (F009) is a "normally closed" switch. The switch is opened when the cab is in the driving position. When the cab is tilted, the switch closes and pin B16/744 of the VIC is connected to earth via wire 4312.

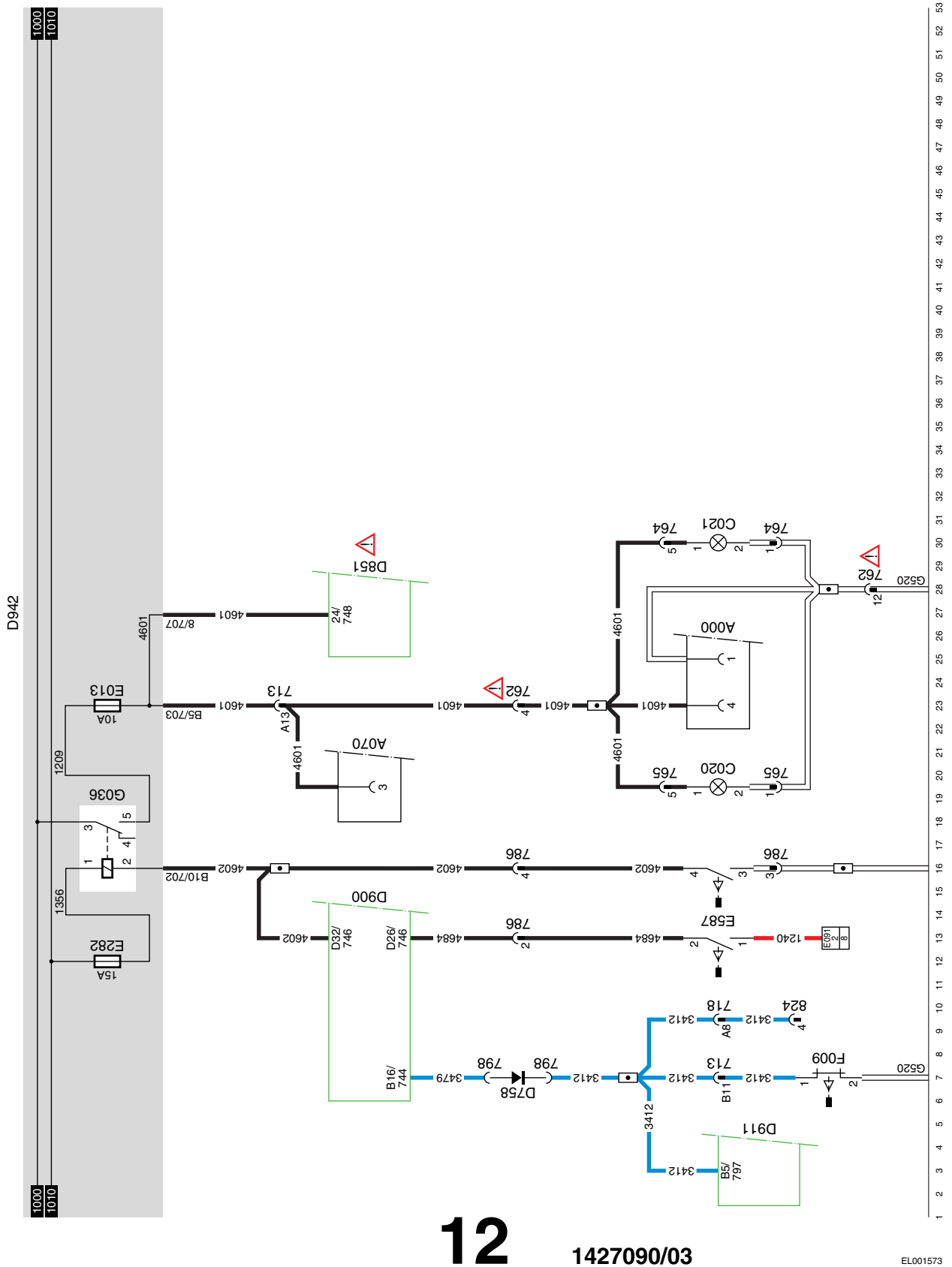
When the alarm is active it knows that the cab is in the driving position because a small current goes to earth through the control switch for cab tilting (F009). Diode D758 prevents this current from also flowing to earth through the VIC (the VIC in sleep mode), in which case the alarm would not know whether the cab is being tilted intentionally or by accident.

12. STOP LIGHTS/CAB TILTING GEAR

STOP LIGHTS

When stop light/clutch operating switch E587 is operated (connection between contacts 4 and 3) by depressing the brake pedal, relay G036 is energised via wire 4602. Power will also be supplied to the VIC (pin D32/746). Through fuse E013, wire 1209, contacts 3 and 5 of relay G036 and wire 4601 a voltage is now applied to the right stop light (C021) and the left stop light (C020), so that they come on. The lights that are connected via drawn vehicle socket A000 will also come on. The ECAS-3 unit (D851) or ECAS-2 unit (D802) then also receives a signal.

Application connector A070 is also connected to wire 4601.



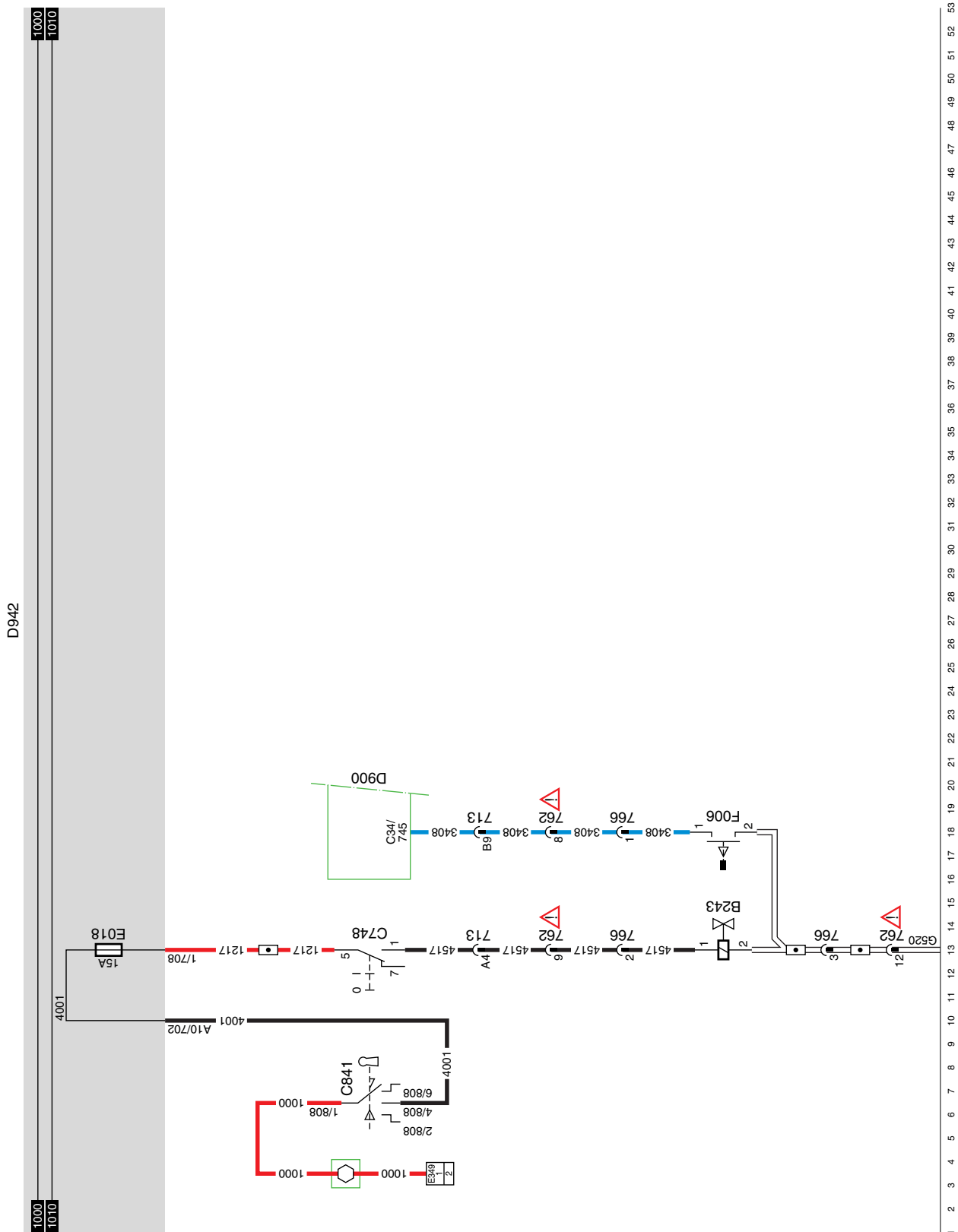
13. DIFFERENTIAL LOCK

If the contact switch (C841) is activated, a voltage is applied through fuse E018 and wire 1217 to the switch for the cross-axle differential lock (C748). If switch C748 is operated, a voltage is applied to the operating valve for the cross-axle differential lock (B243) through wire 4517. If the differential is locked, the differential lock control switch (F006) connects pin C34/745 of the VIC to earth via wire 3408. The VIC will activate the DIP through I-CAN to switch on the “differential lock switched on” indicator.

VARIANTS

Location

17,21 Connector 762:
Not fitted on vehicle type FT



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14. INTERIOR LIGHTING

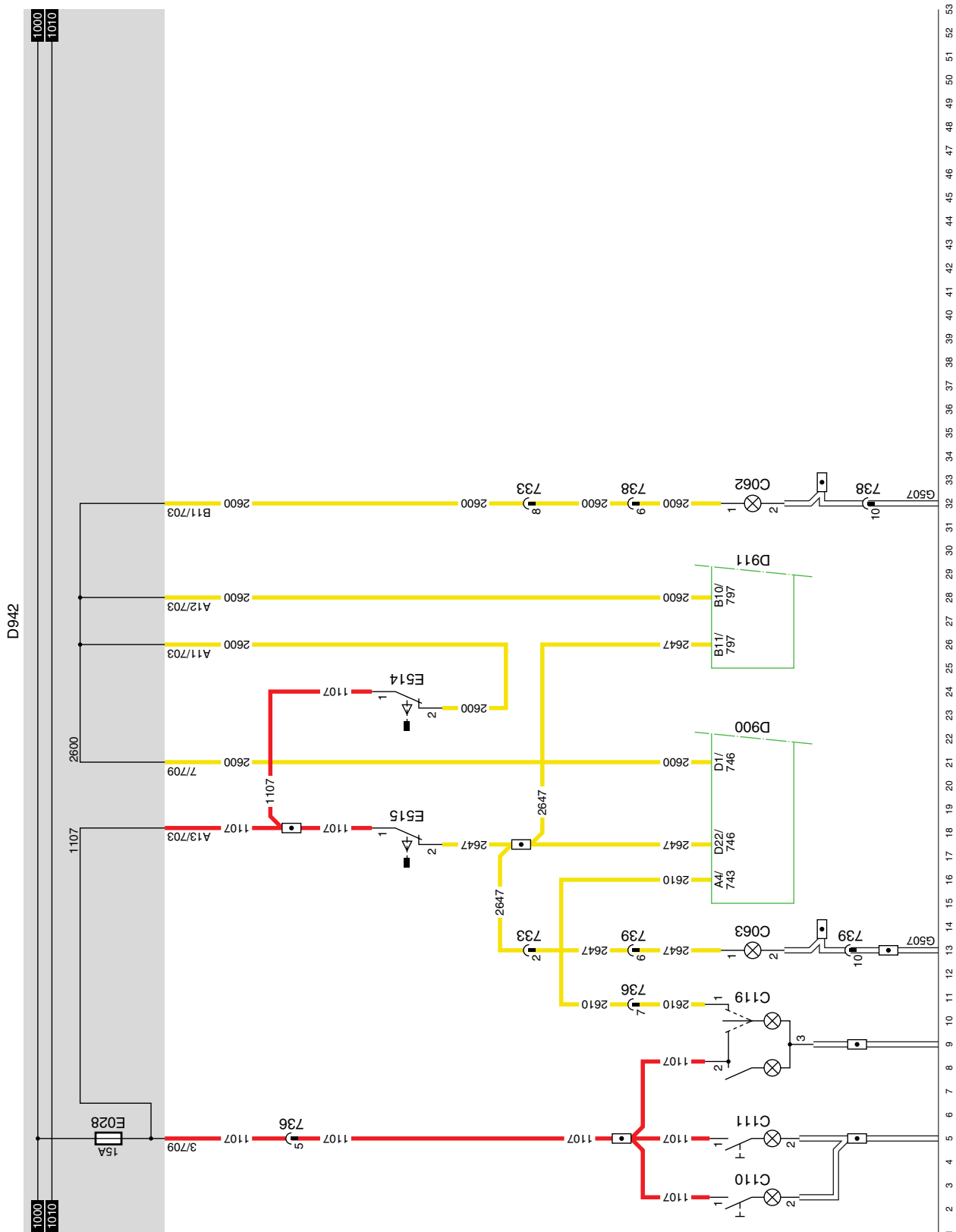
Power is supplied to the door switches (E514 and E515) through fuse E028 and wire 1107. If the door on the driver's side is opened, door switch E514 is activated (connection between 1 and 2). As a result, power will be supplied via wire 2600 to the left-hand stepwell lighting (C062) and to pin D1/746 of the VIC (D900). The VIC also turns on the interior lighting (C119) via pin A4/743, provided that the switches are in the correct position. At the same time, a voltage signal is applied to the alarm system electronic unit (D911). If the alarm system was activated, it can be triggered in this way to activate the alarm horn and hazard warning lights.

Switch E515 provides exactly the same function on the co-driver's side.

When the door on the driver's side is closed (contact between 1 and 2 interrupted), power is no longer supplied to pin D1/746 of the VIC. From this moment, pin A4/743 will continue to be supplied with power for about another 9 seconds.

When the vehicle ignition is switched on, the power supply to pin A4/743 of the VIC will cease immediately. The lighting will be switched off immediately.

In an SL cab, the bunk lights (C110 and C111) receive power through fuse E028. Operating the switches in the bunk lights turns the lights on. The interior lighting (C119) also contains a bunk light function that is activated in exactly the same way.



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EL001575

15. MIRROR HEATING/WINDSCREEN HEATING/MIRROR ADJUSTMENT**MIRROR HEATING**

When the ignition/starter switch (C841) is set to the "contact" position (connection between points 1 and 4), relay G353 is energised via wire 4001. This relay supplies power to the mirror heating switch (C867) and the mirror adjustment switch (C868) via fuse E044 and wire 1208.

When the mirror heating switch (C867) is operated, power is supplied to mirror heating B017 (driver's side) and B018 (co-driver's side) via wire 4532.

The time-dependent windscreen heating relay (G397) will also be energised. This relay will automatically be de-activated after 12 minutes.

WINDSCREEN HEATING SYSTEM

If the vehicle has a windscreen heating system, the windscreen heating relay (G397) will be energised when the mirror heating system is activated.

The windscreen heating system (B371) will be supplied with power via fuse E299. The windscreen heating relay (G397) will automatically be de-activated after 12 minutes.

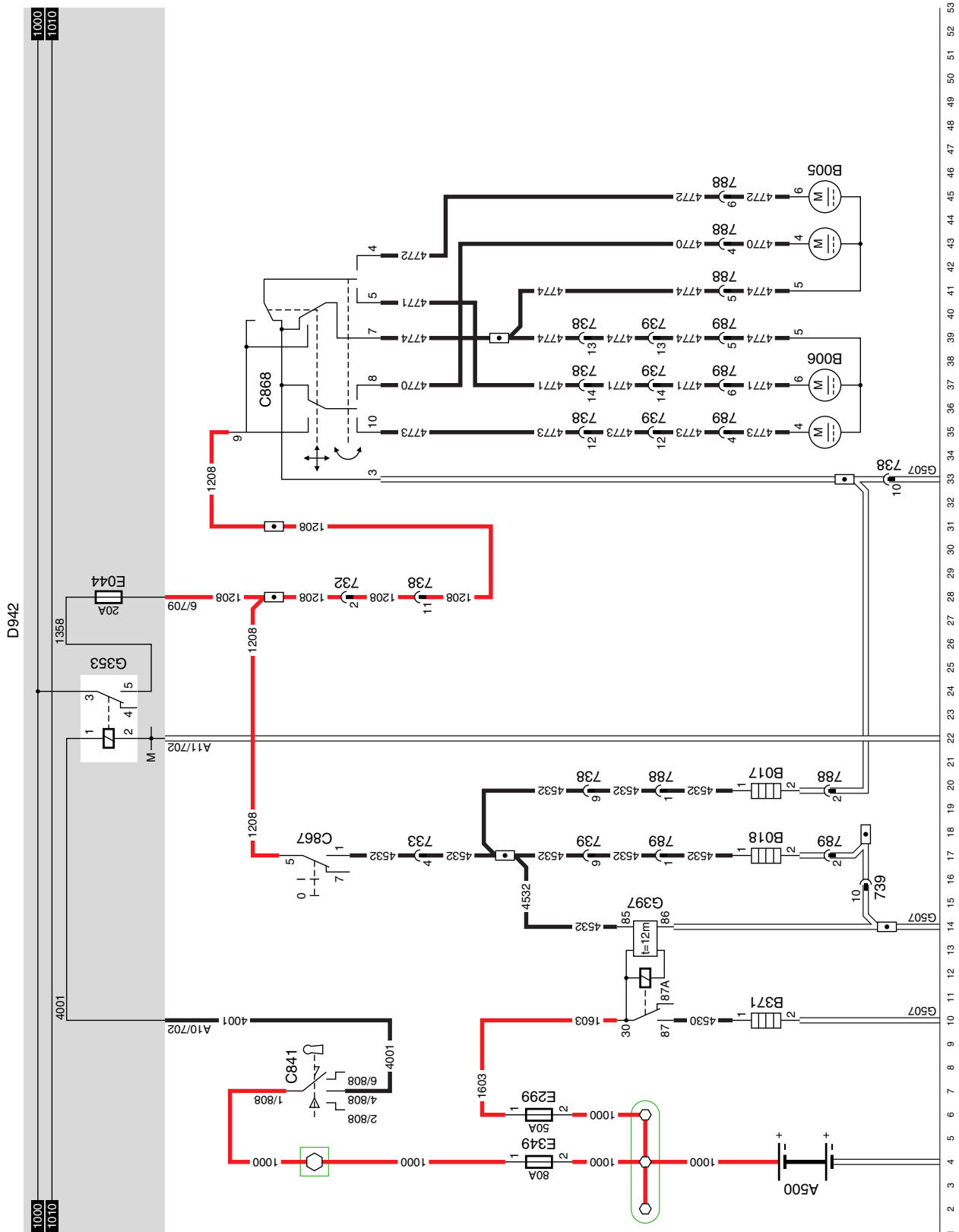
MIRROR ADJUSTMENT

The outside mirrors are adjusted using "joystick" switches C868 (driver's side and co-driver's side). If the handle of the switch is moved from the rest position (centre) in a particular direction, power will be supplied to mirror adjustment motor B005 (left-hand side) or B006 (right-hand side) and the mirror in question will follow the movement of the handle.

When pins 10 and 5 are connected, mirror adjustment switch C868 is in the "right mirror" position. When pins 8 and 4 are connected, the mirror adjustment switch is in the "left mirror" position.

For this, wires 4770 and 4774 (left-hand side) or 4771 and 4774 (right-hand side) supply power to the motor for the left/right movement. Wires 4772 and 4774 (left-hand side) or 4771 and 4774 (right-hand side) supply power to the adjusting motor for the up and down movement.

The mirror adjustment system can only be used if the contact relay (G353) is energised.



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EL001576

16. SEARCH LIGHTING

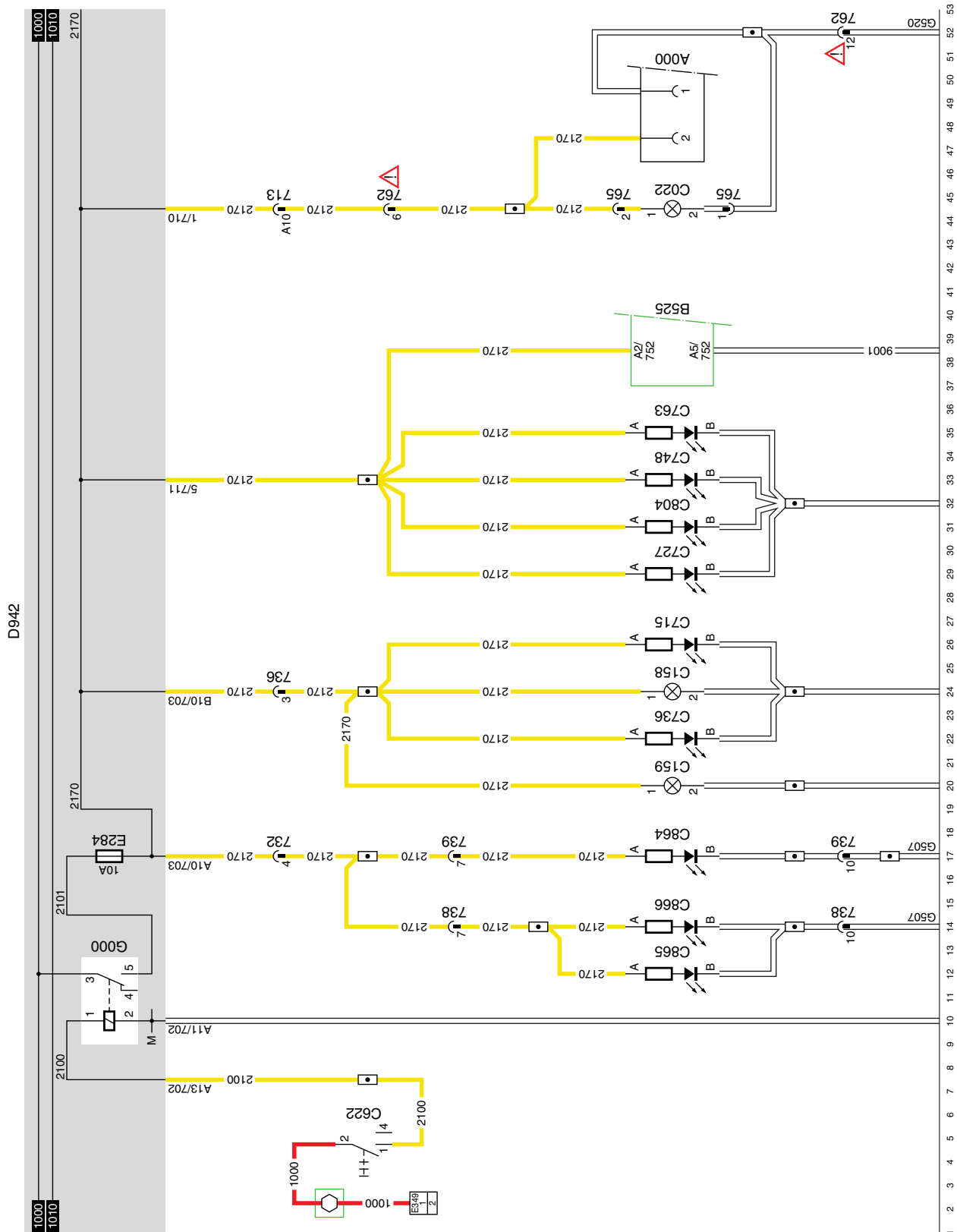
SEARCH LIGHTING

Search lighting refers to lights or LEDs in the various function switches. When the lighting switch (C622) is operated, relay G000 is energised. This relay supplies power to turn on the various search lighting lamps or LEDs through fuse E284 and wire 2170. This also activates the tachograph lighting (B525).

VARIANTS

Location

44, 52 Connector 762:
Not fitted on vehicle type FT



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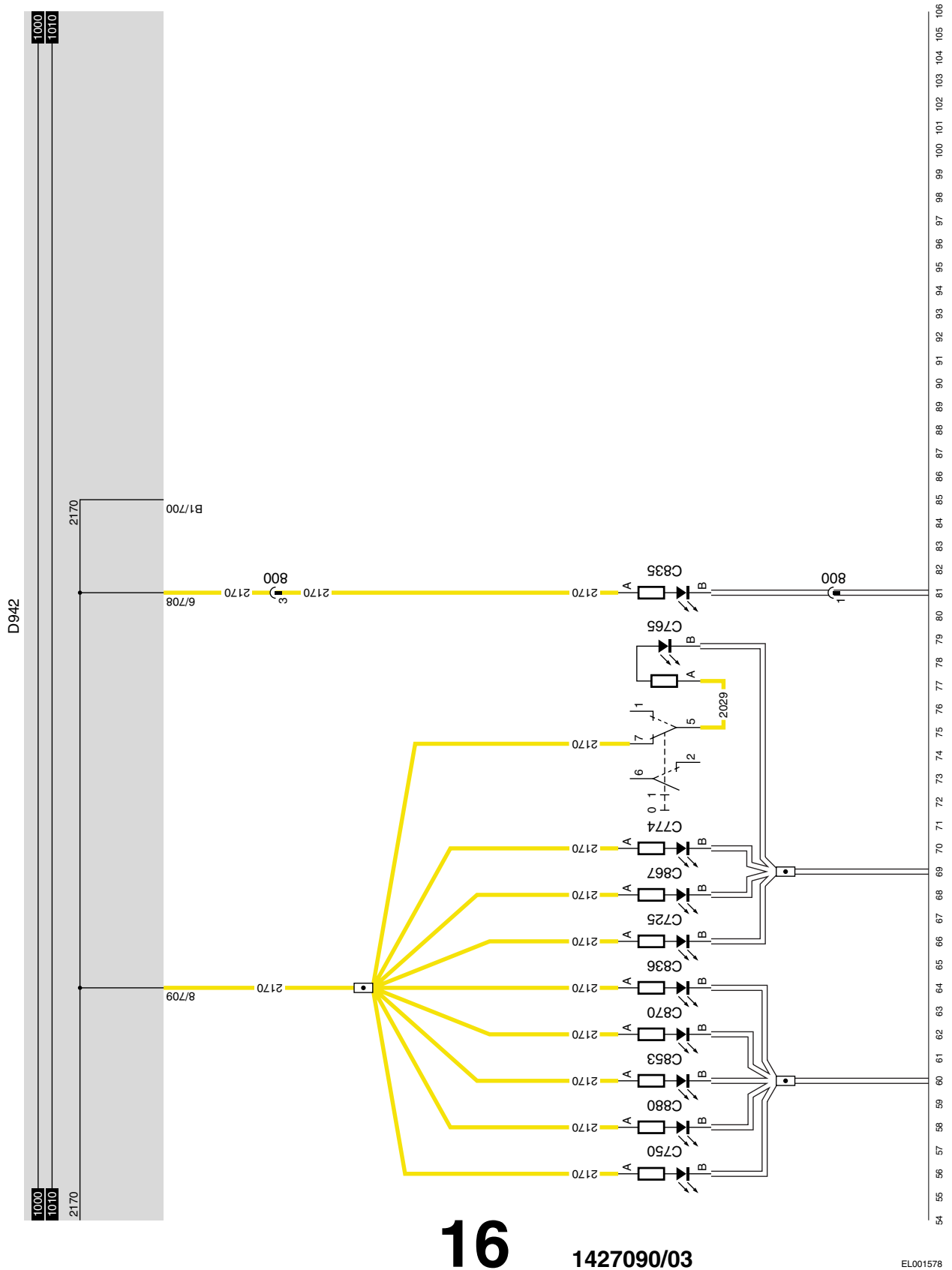
ELECTRICAL SYSTEM

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Electrical system

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17. AIR CONDITIONING/HEATER FAN

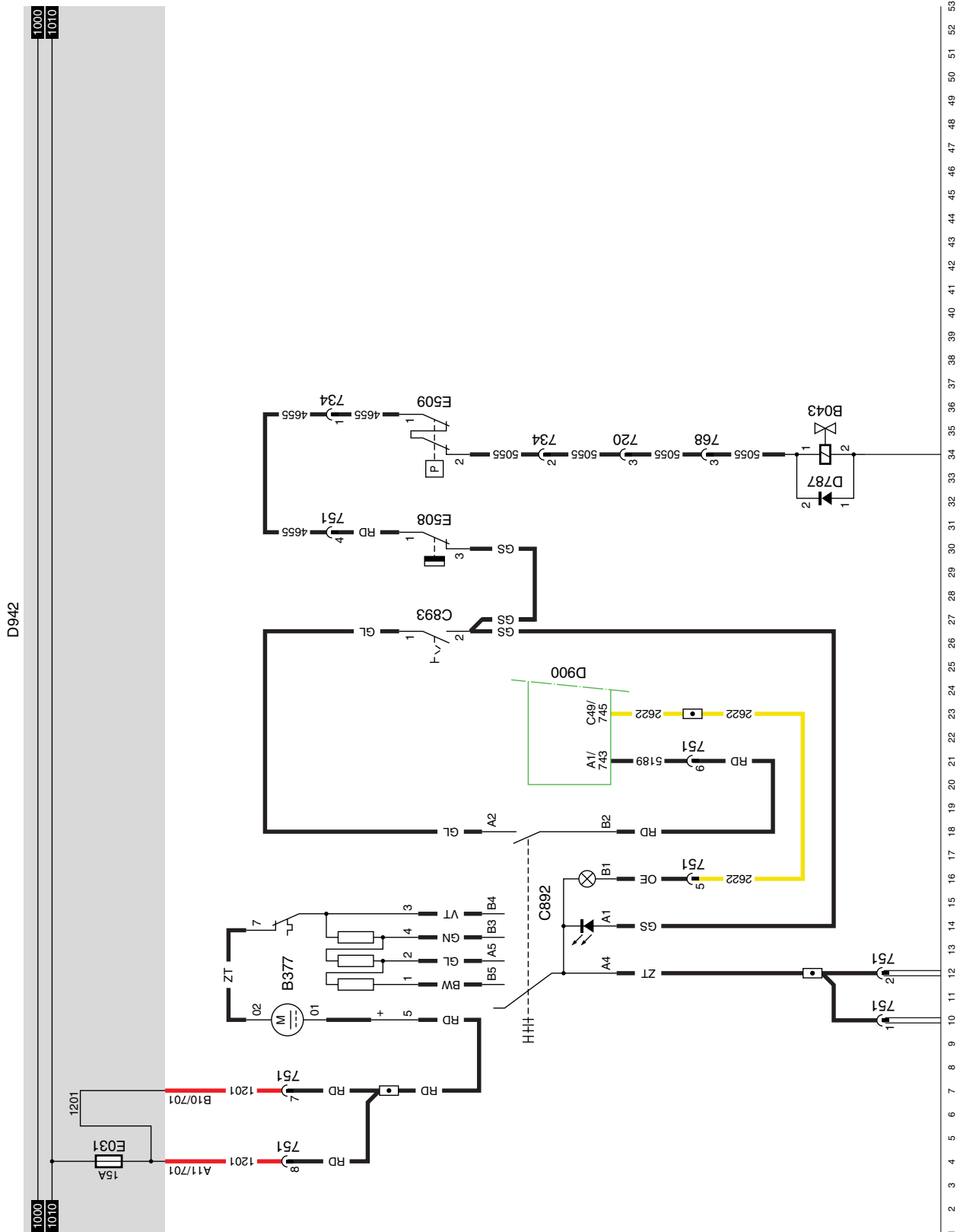
HEATER FAN

The heater motor (B377) is supplied with voltage after contact through fuse E031. The motor is activated when the heater fan switch (C892) is turned, so that earth is connected. The heater fan motor is fitted with an overheating protection device between contact 7 and the connection points of the operating switch.

AIR CONDITIONING

Depending on the engine temperature, voltage is applied to wire 5189 from pin A1/743 of the VIC unit. When the engine temperature goes above a certain value, the VIC unit switches this voltage off so as to prevent the engine from overheating. When the temperature falls back below a particular temperature, the voltage is switched on again. To supply the air conditioning switch (C893) with voltage, the parallel switch in the heater fan switch (C892) must be closed. This switch is closed in positions 1 to 4. The air-conditioning compressor temperature switch (E508) prevents the heater fan from freezing and is closed at normal operating temperature. The air conditioning operating switch, high/low pressure, is operated depending on the pressure in the air conditioning system.

When all conditions have been met, the air conditioning compressor (B043) is activated. Diode D787 is fitted in the air conditioning compressor so as to damp high voltage peaks that can arise during switch-off.



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EL001579

18. SEAT HEATING/ACCESSORIES CONNECTION**SEAT HEATING**

When the vehicle is put into accessories position, relay G355 is energised. This relay supplies power to the driver's side seat heating system (B032) via fuse E039 and wire 1227.

If the seat heating switch is activated, the heating element will start warming up. When the maximum temperature is reached, a thermal switch in the seat heating system switches off the heating element.

ACCESSORIES CONNECTION

12 V accessories socket A011 is connected to 24 V/12 V converter D958 through a white 2-pin connector. 12 V is applied to A011 before contact.

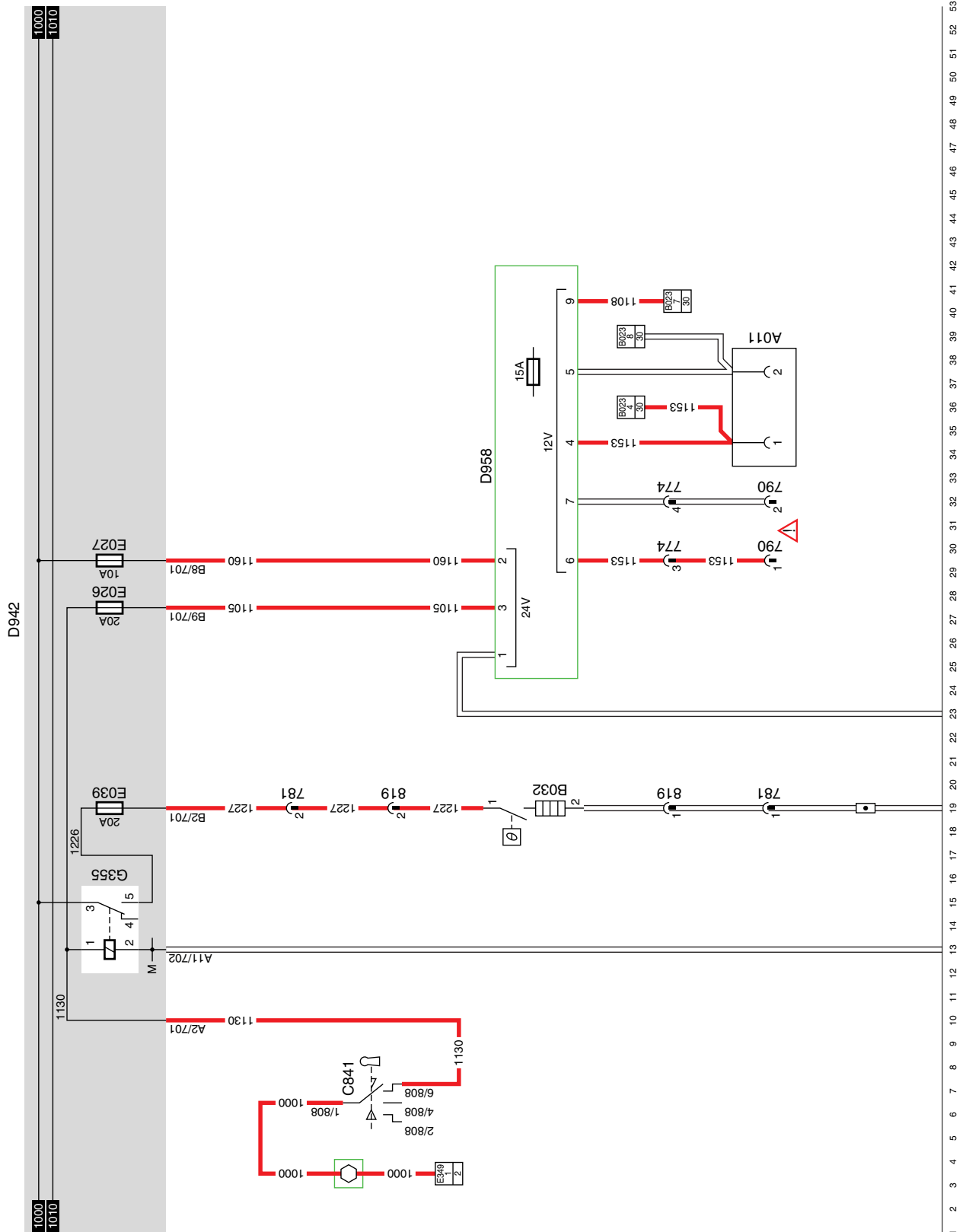
The converter is supplied with power at pin 3 after contact via contact switch C841 and fuse E026.

The "before contact" connection, 1000, is connected via fuse E027 at pin 2.

12 V before contact is applied to CB connector 790 in the roof console through connector 774 on the outside of the central box.

VARIANTS**Location**

31 12 V connector, at top of roof console, to be used with CB, for example.



19. HORN/CIGAR LIGHTER/WORK LAMP/AIR DRYER**HORN**

The horn (B401) is activated before contact via steering column switch C775 (1000). The horn is supplied with power via wire 4979 and fuse E019.

CIGAR LIGHTER

If the ignition switch (C841) is in the accessories position (connection between contacts 1 and 6), cigar lighter B030 is supplied with power via fuse E026 and wire 1105. By depressing the cigar lighter, the heating element is warmed up.

WORK LAMP

Work lamp switch C725 is supplied with voltage from power supply before contact and via fuse E052. When the switch is operated voltage is applied to the work lamp (C071) and to pin C9/745 of the VIC unit in order to activate the "work lamp" indicator on the DIP via I-CAN.

AIR DRYER

When the ignition switch (C841) is on (connection between contacts 1 and 4), relay G353 is activated. This relay supplies power to the air dryer heating element (B042) via fuse E091 and wire 1240. When the maximum temperature is reached, a thermal switch in the air dryer switches off. The water separator sensor (F692) is supplied with power via the same wire.

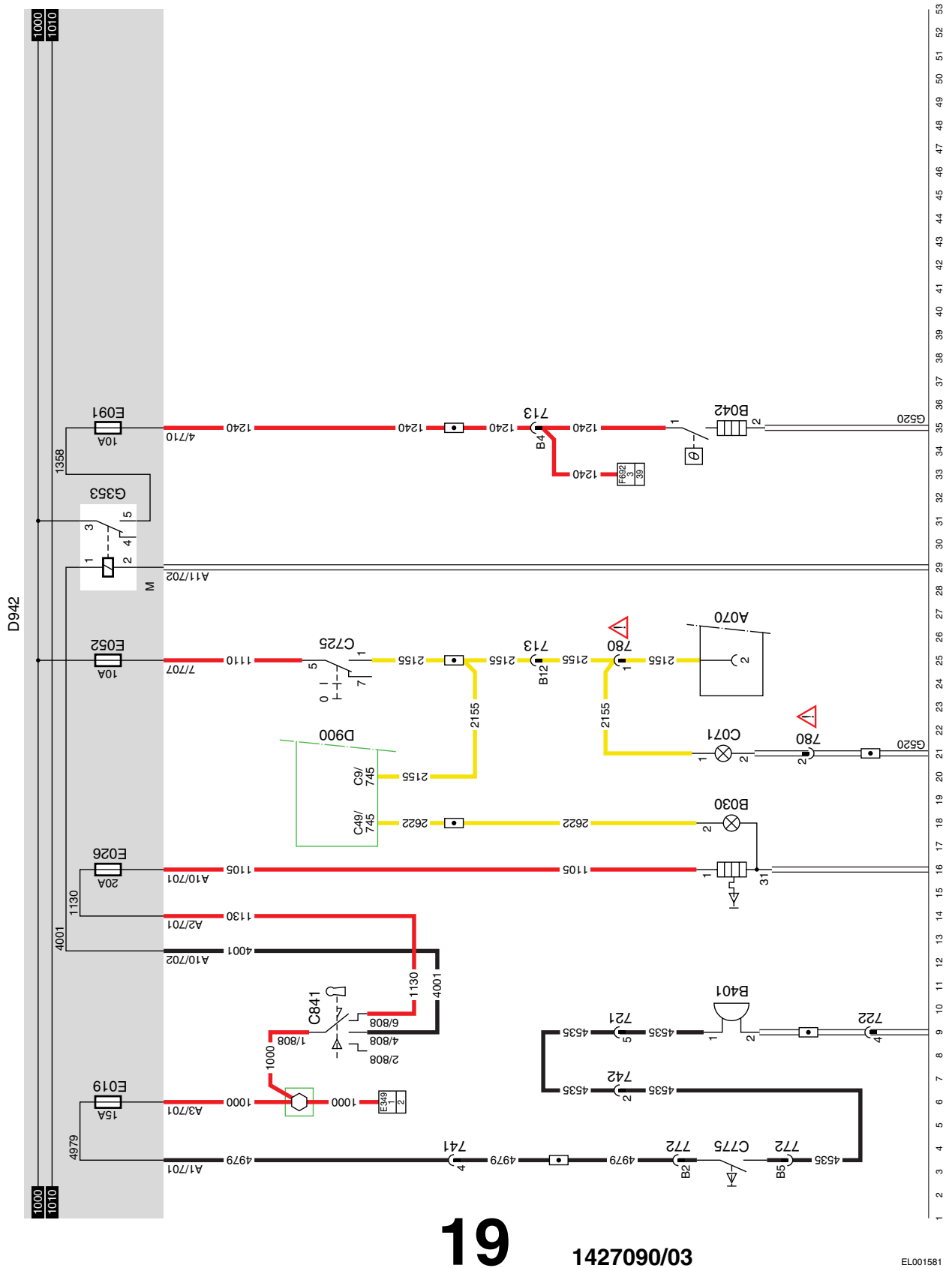
VARIANTS**Location**

20,24

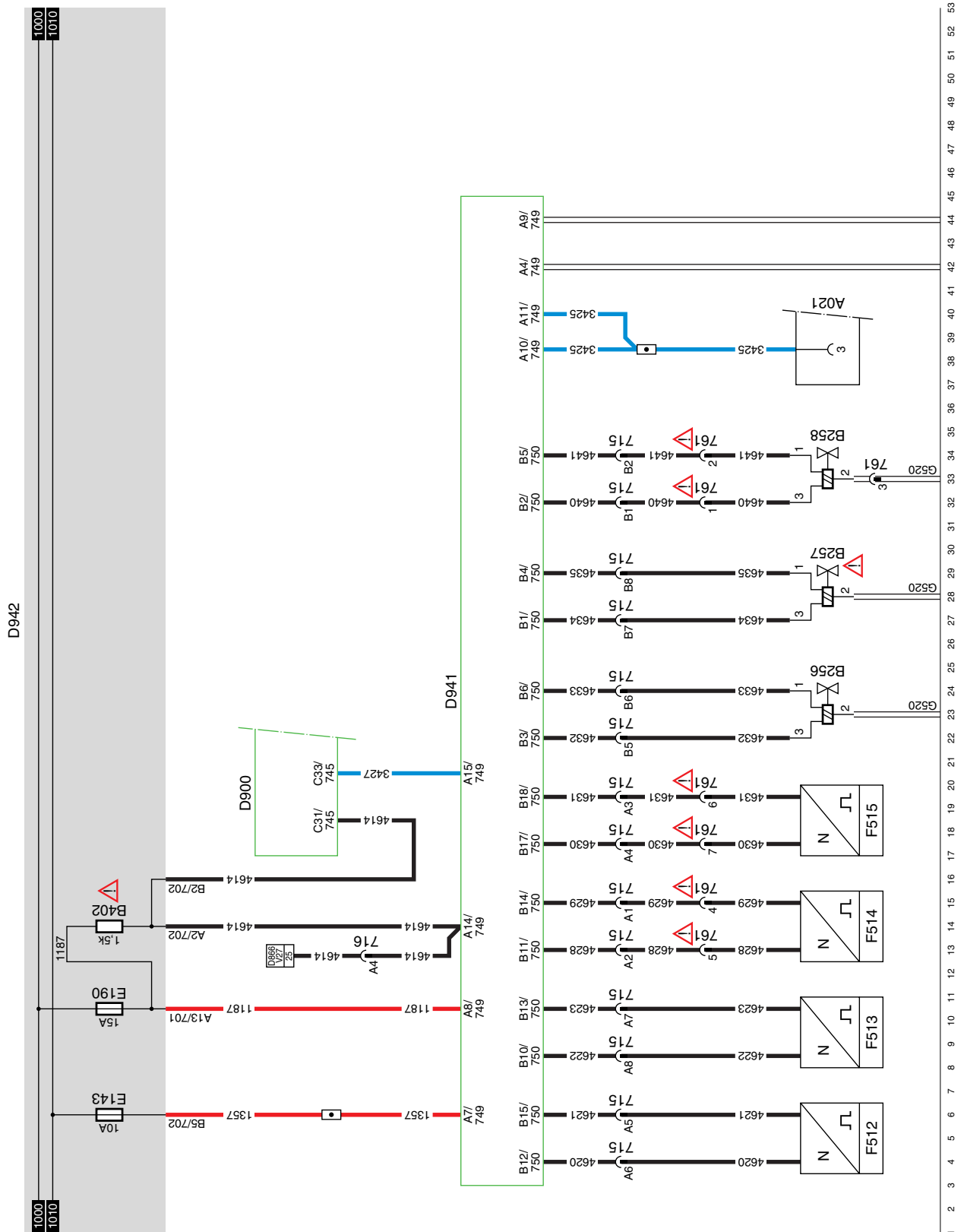
Connector 780:

Not fitted on vehicle type FA.

Wire 2155 only fitted in application connector A070



20. ABS-D	
SEE THE SYSTEM MANUAL FOR MORE INFORMATION	
VARIANTS	
Location	Resistor B402:
14	Fixed on PCB D942
13,15,17,19,	Connector 761:
32,34	Not fitted on vehicle type FT
29	Valve, ABS-D, ABS/ASR-E,
	right front axle, B257:
	Not fitted on 4S/2M system

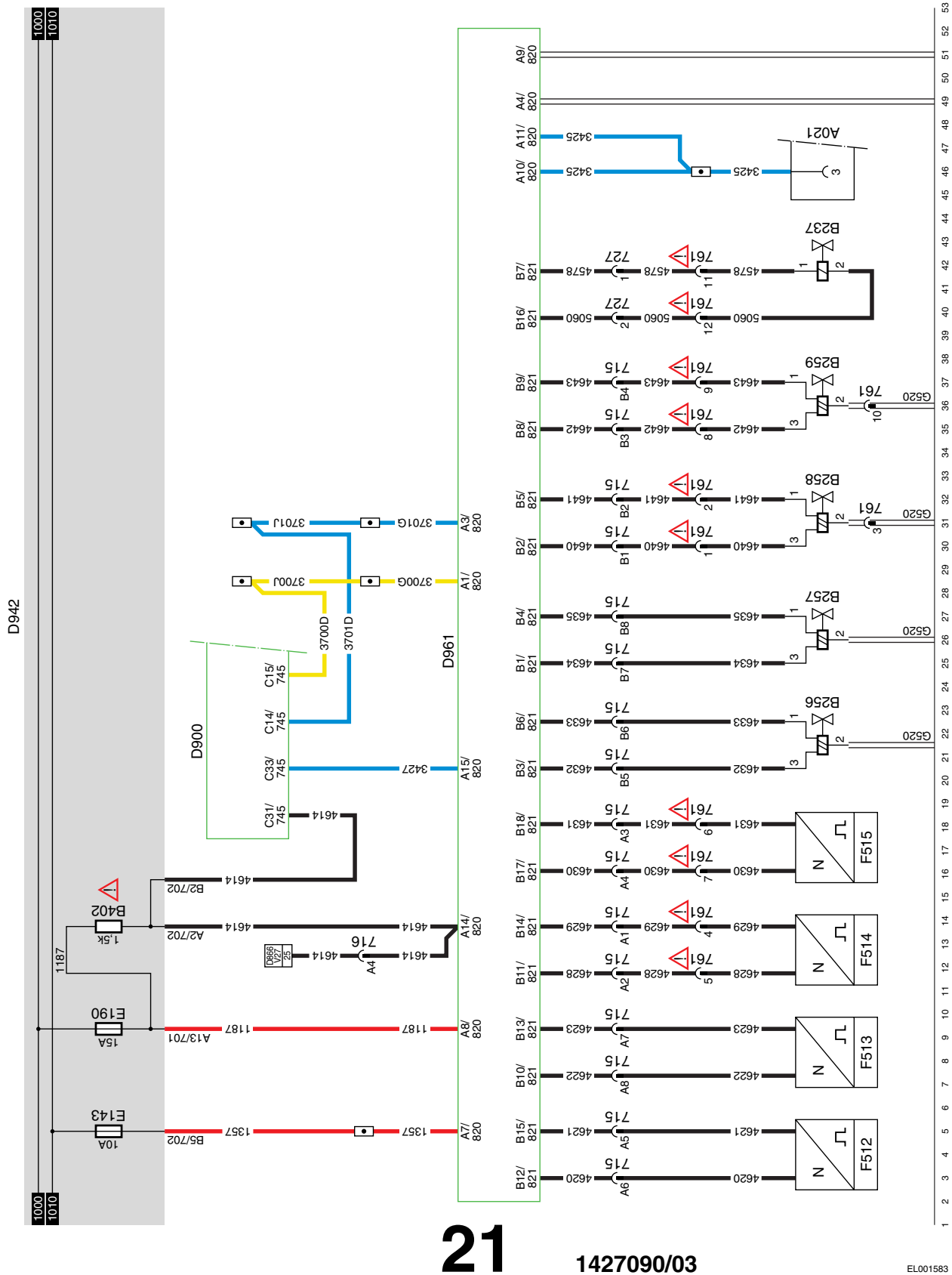


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21. ABS/ASR-E
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION

VARIANTS

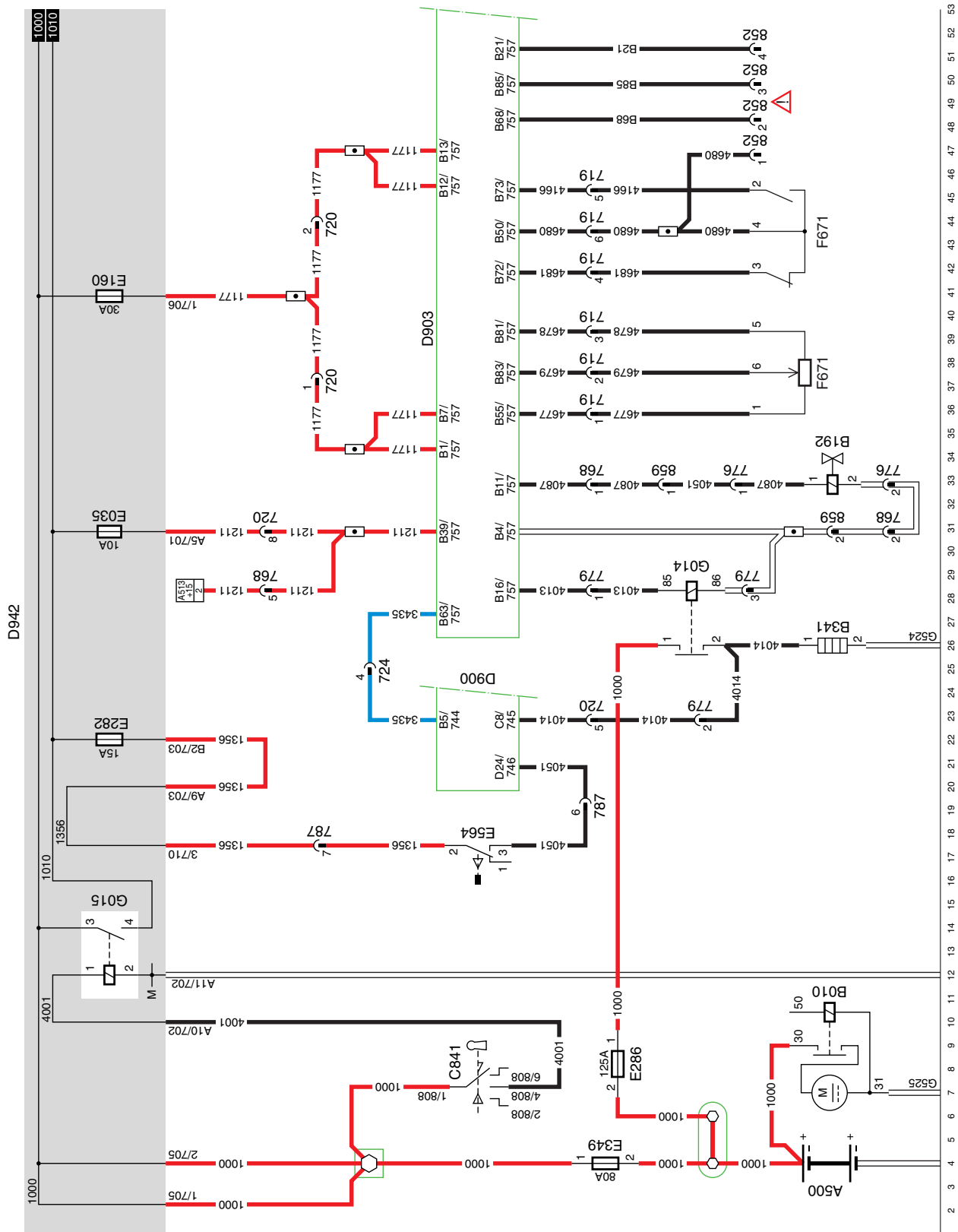
Location	
14	Resistor B402: Fixed on PCB D942
12,14,16,18,31, 33,36,38,40,42	Connector 761: Not fitted on vehicle type FT
29	Valve, ABS-D, ABS/ASR-E, right front axle, B257: Not fitted on 4S/2M system



22. ECS-DC3/EXHAUST BRAKE
FOR MORE INFORMATION SEE SYSTEM
MANUAL

VARIANTS

Location	
49	Connector 852: Optional connector for "remote throttle" function
66	The CAN terminating resistor is fitted in the wiring harness, near the B connector
129	This part of the ECS-DC3 electronic unit relates to the BE engine (4-cylinder)
186	This part of the ECS-DC3 electronic unit relates to the CE engine (6-cylinder)

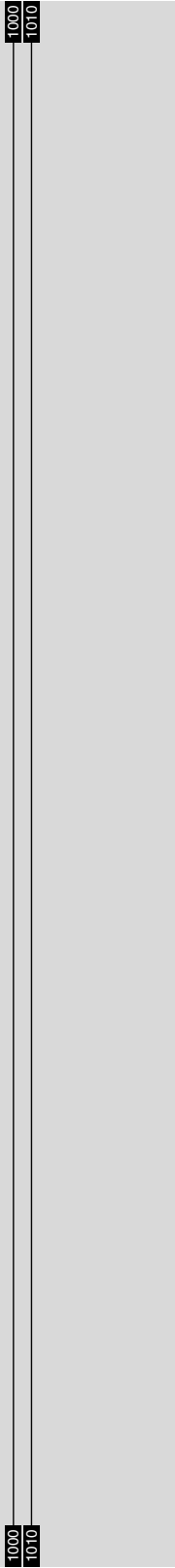


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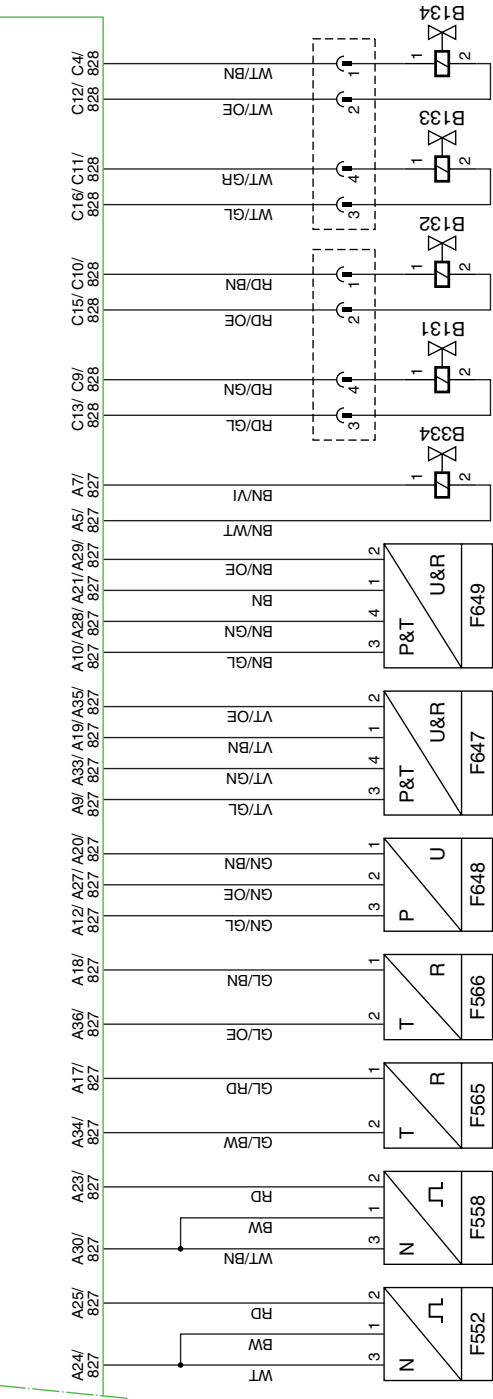
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D942



D903



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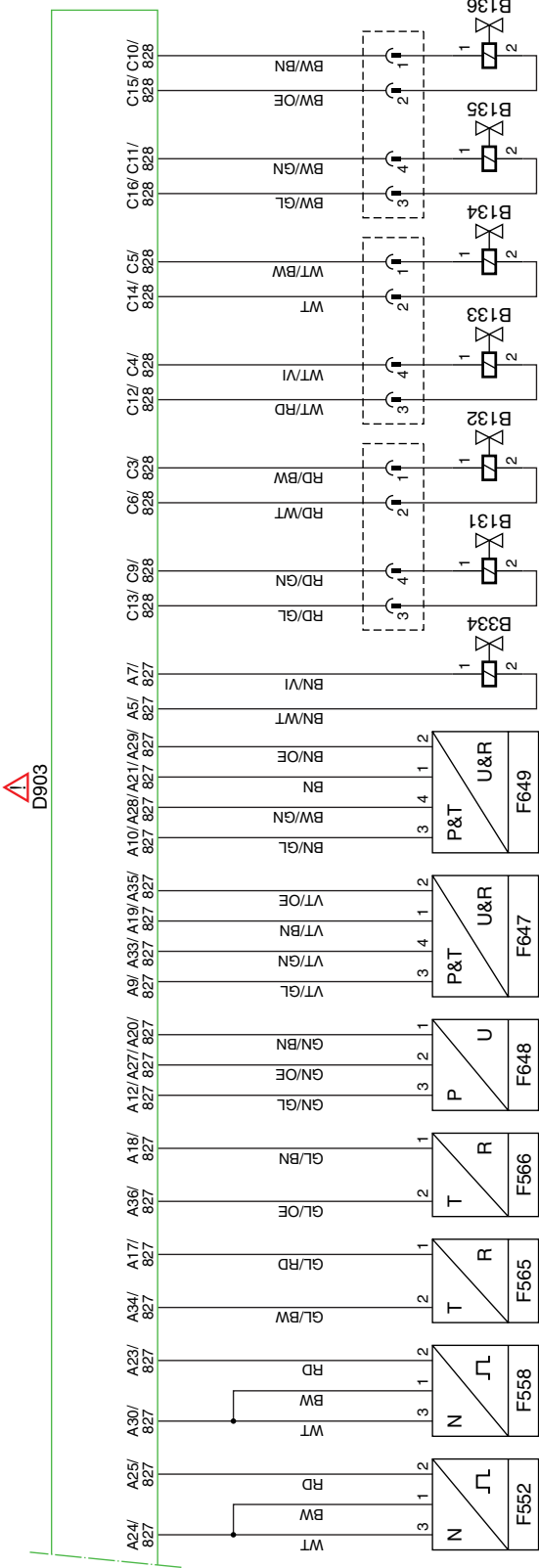
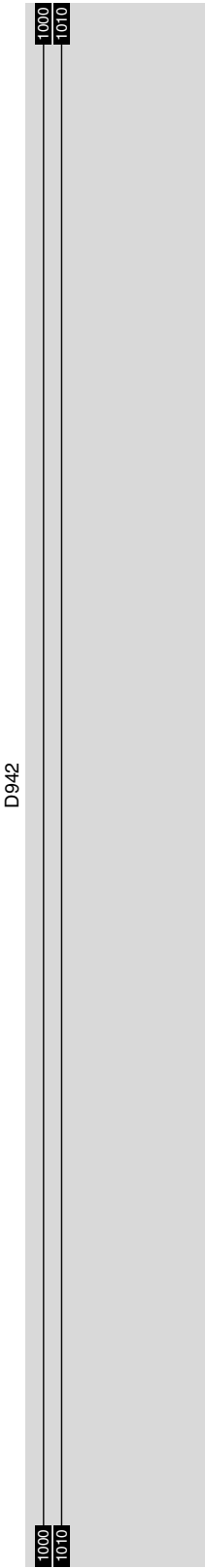
EL001586

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series



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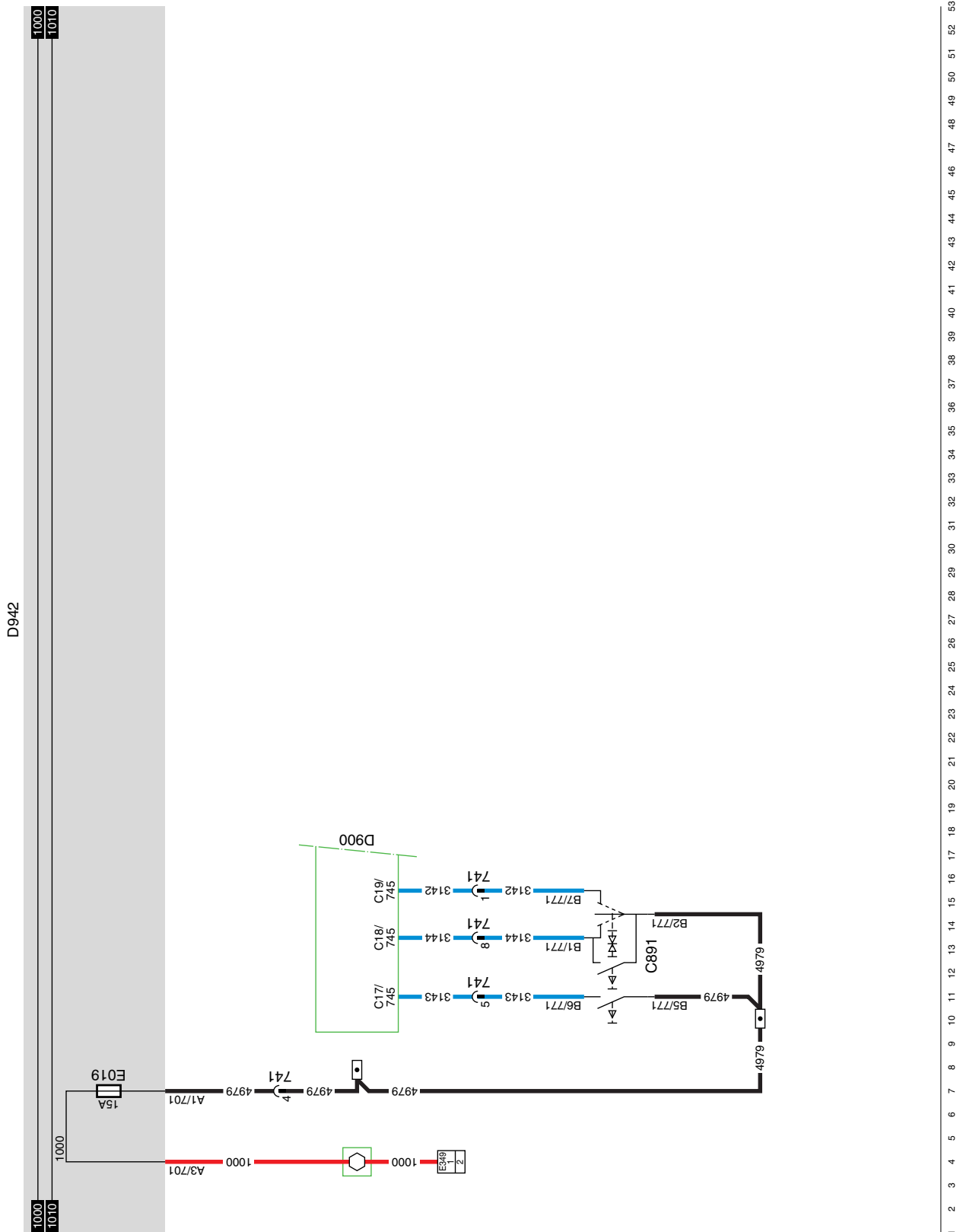
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160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212

EL001587

23. CRUISE CONTROL

The right-hand steering column switch C891 is a multi-function switch for windshield wiper/washer functions and cruise control/engine speed control. The VIC sends the desired commands in respect of vehicle/engine speed to the ECS-DC3 electronic unit via the CAN network (see system manual). When the innermost ring of switch C891 is rotated (B5 with B6), power is supplied to pin 17/745. The "ON" function is now activated. When the outermost ring of switch C891 is rotated downwards (B2 with B1), power is supplied to pin C18/745. This activates the "SET+" function. When the outermost ring of switch C891 is rotated upwards (B2 with B7), power is supplied to pin C19/745. This activates the "RES -" function. Operating the RES button at the end of the switch has the same effect as turning the "RES -" rotary switch.



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EL001588

24. AGC AUTOMATIC GEARBOX (AT1000/2000)

VARIANTS
Location
122 Application connector (A096)

Power supply before contact is obtained directly from the batteries (A500) via a 10 A fuse (E144) and wire 1302.

The voltage before contact can also be found in the diagnostic socket for the automatic gearbox (A032).

Voltage after contact is obtained via fuse E279 and wire 1211.

The AT 1000/2000 automatic gearbox selector switch (E585) receives power after contact through fuse E016 and wire 1217. The reversing lights are activated from the same switch via wire 4591.

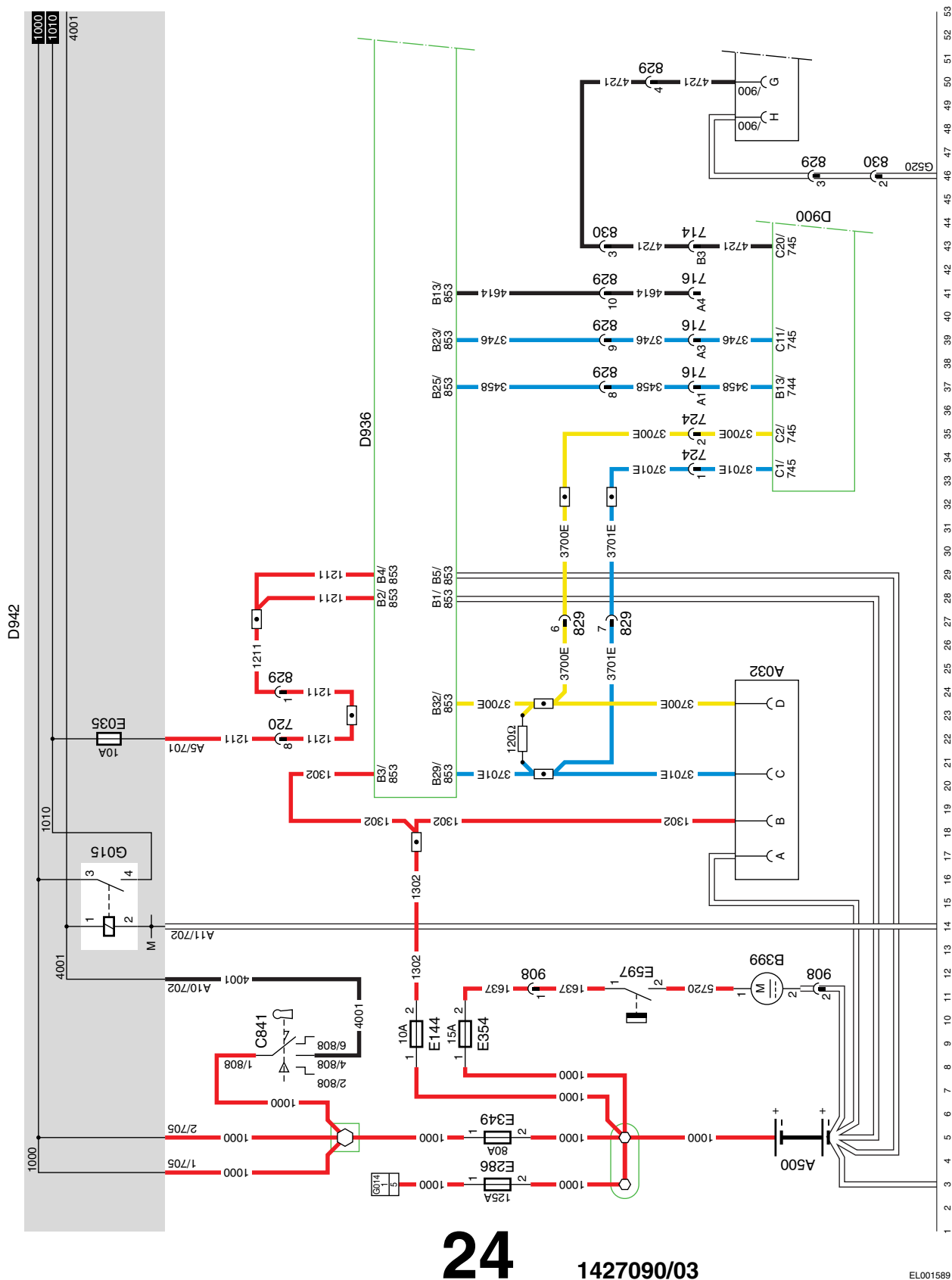
The earth connections are connected directly to the earth side of the batteries (A500).

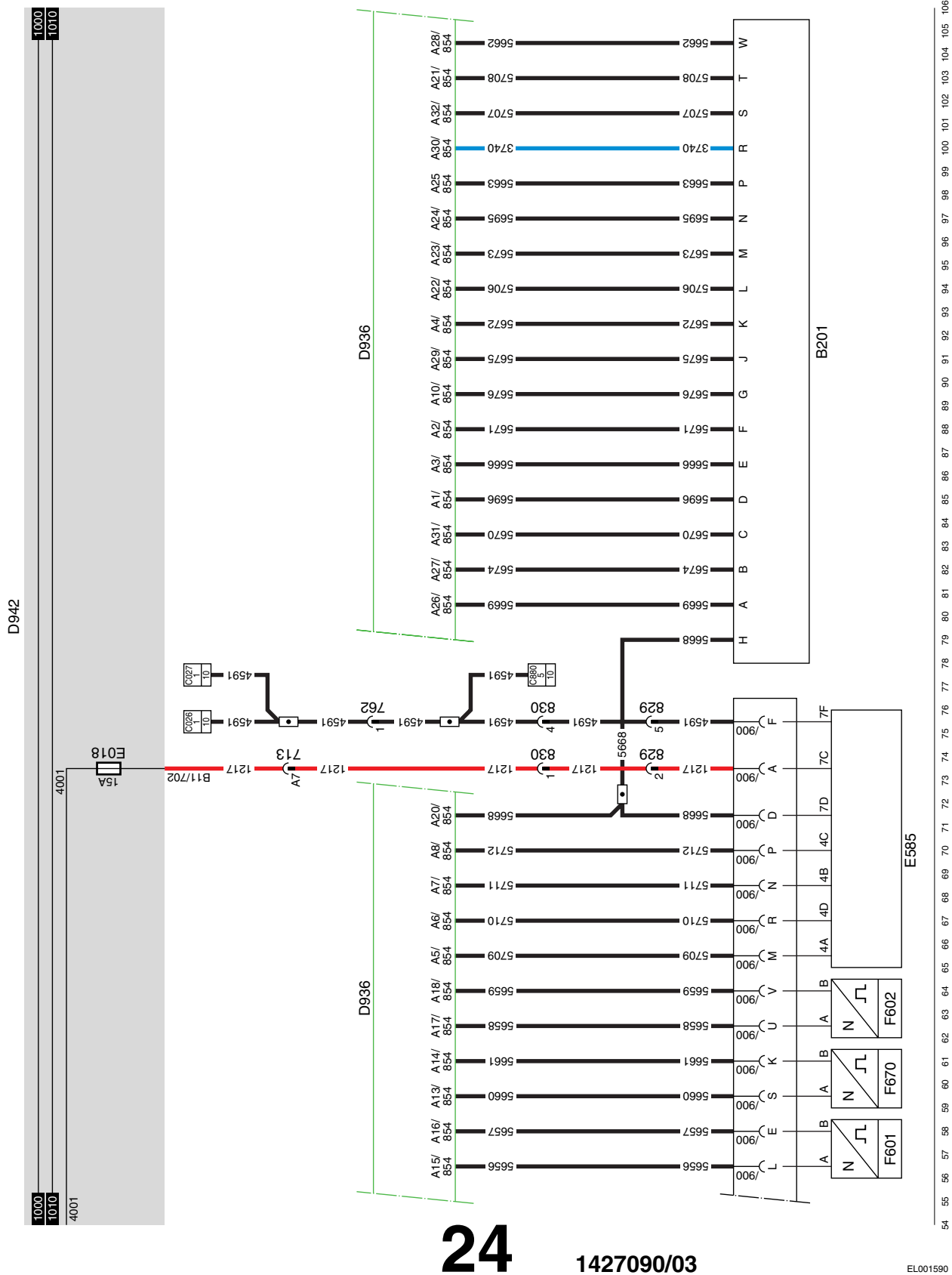
The electrical system of the automatic gearbox is almost completely located on the chassis.

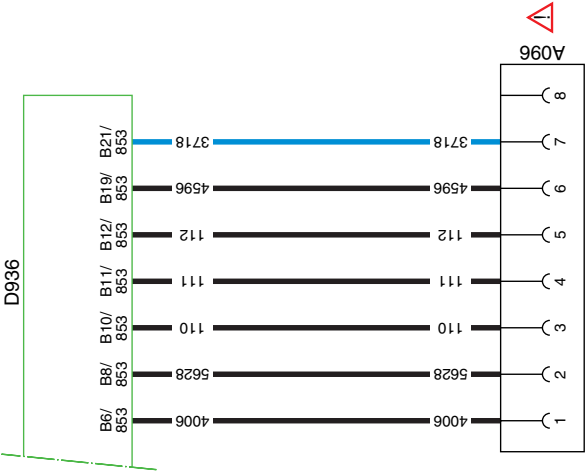
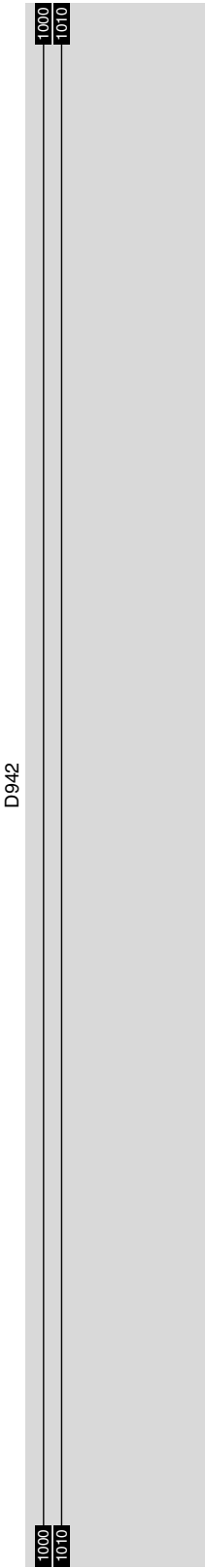
Connections leading into the cab are provided for a number of VIC functions:

- fault messages from the automatic gearbox (B25/853) to the VIC unit (D900)
- "Range inhibit" (B23/853) to the VIC unit (D900)
- CAN connections (B29/853 and B32/853) to the VIC unit (D900)
- Neutral position protection (G/900) to the VIC unit (D900)

Diagnosis of the automatic gearbox takes place via the CAN network, which is connected to the diagnostic socket (A032) and the VIC unit (D900).







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EL001591

25. AGC AUTOMATIC GEARBOX (MD3060)

Power supply before contact is obtained directly from the batteries (A500) via wire 336 and a 10 A fuse (MAIN) in the VIM (D822, pins J1 and J2). The electronic unit (D866) receives voltage before contact at pin V1/907 and V16/907 from the VIM (D822, pins R1 and R2) via wires 1164.

Voltage after contact is obtained via fuse E279 and wire 1211. Wire 1211 is connected directly to electronic unit D866 (pin S4/905). The wire also runs to the VIM (pin C1) and various relays in de VIM are supplied with voltage after contact via a 10 A fuse (IGN). The voltage after contact can also be found in the diagnostic socket for the automatic gearbox (A032).

The earth connections are connected directly to the earth side of the batteries (A500) and also run to the electronic unit (D866) via the VIM (pins K1 and K2).

The electrical system of the automatic gearbox is almost completely located on the chassis.

Connections leading into the cab are provided for a number of VIC functions:

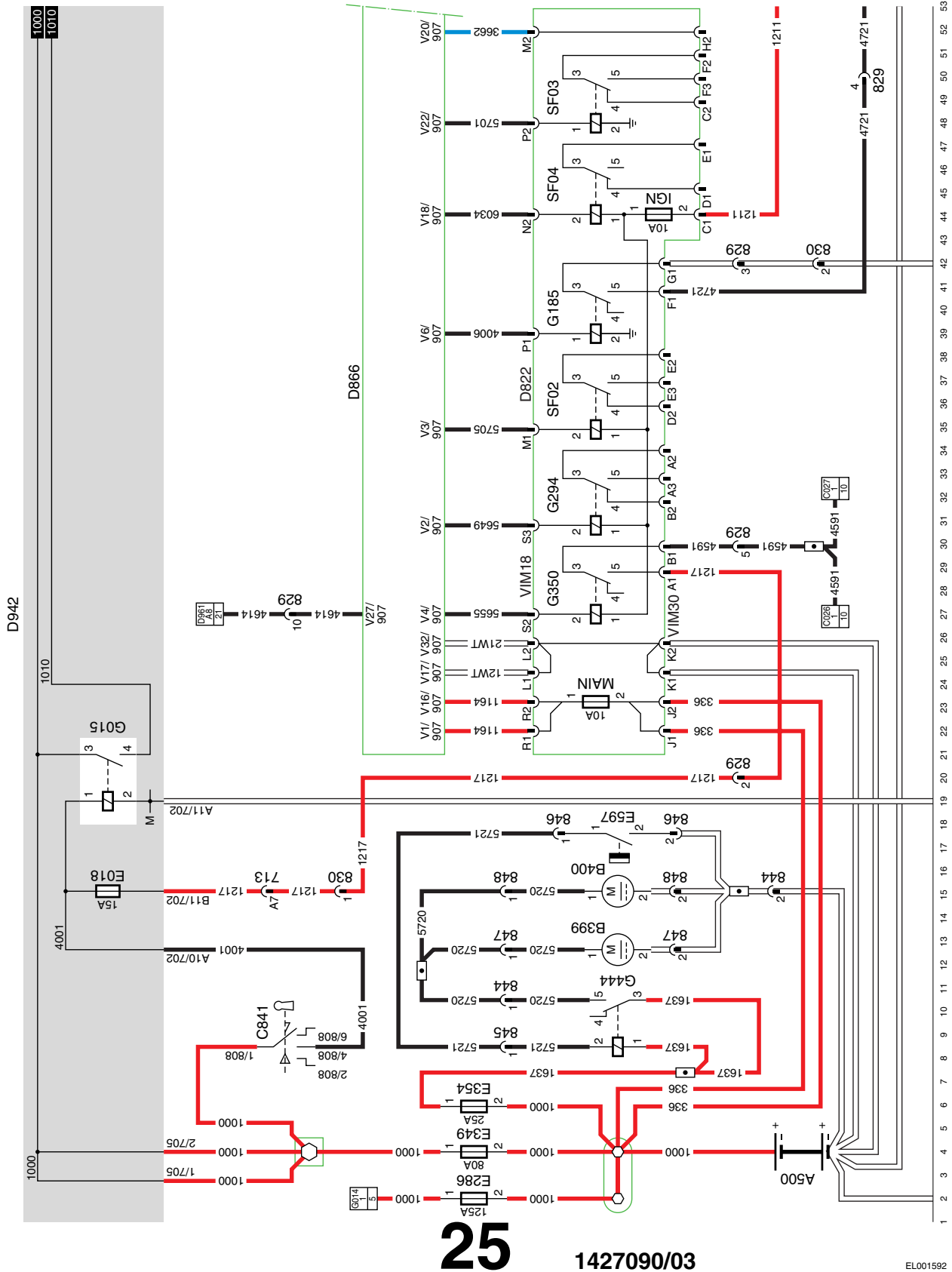
- fault messages from the automatic gearbox (S31/905) to the VIC unit (D900)
- CAN connections (S13/905 and S29/905) to the VIC unit (D900)
- Vehicle interface module (D822, pin F1) to the VIC unit (D900)

Diagnosis of the automatic gearbox takes place via the CAN network, which is connected to the diagnostic socket (A032) and the VIC unit (D900).

Note:

Where an automatic gearbox is fitted, there are two dashboard lead-through connectors, 716. One connector is occupied by spare wiring (see application connectors) and the other has 3 occupied positions (A1, wire 3458; A3, wire 123; and A4, wire 4614), only one of which is connected.

The 716 with the spare wiring is not then connected and hangs loose near the dashboard lead-through.

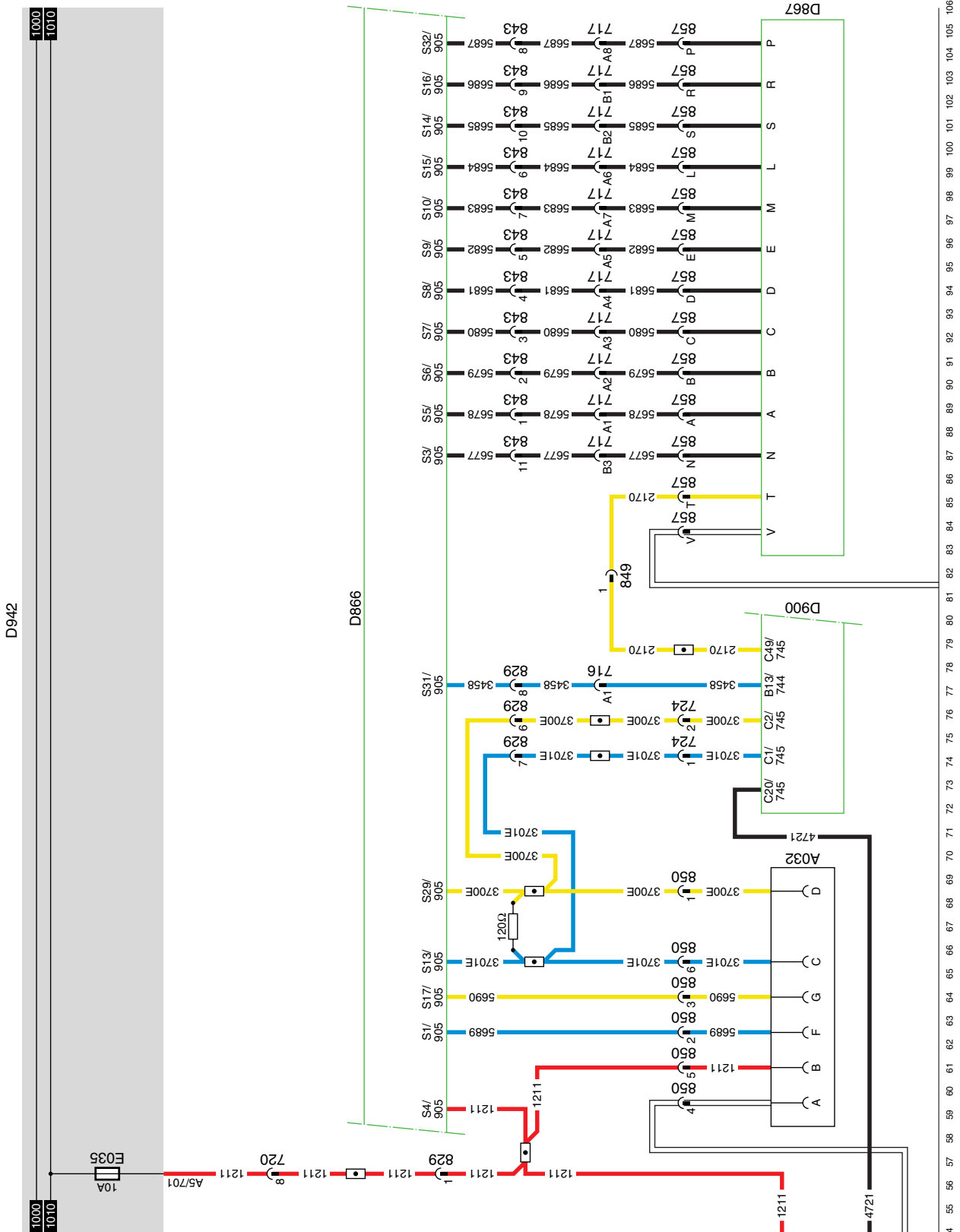


ELECTRICAL SYSTEM

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Electrical system

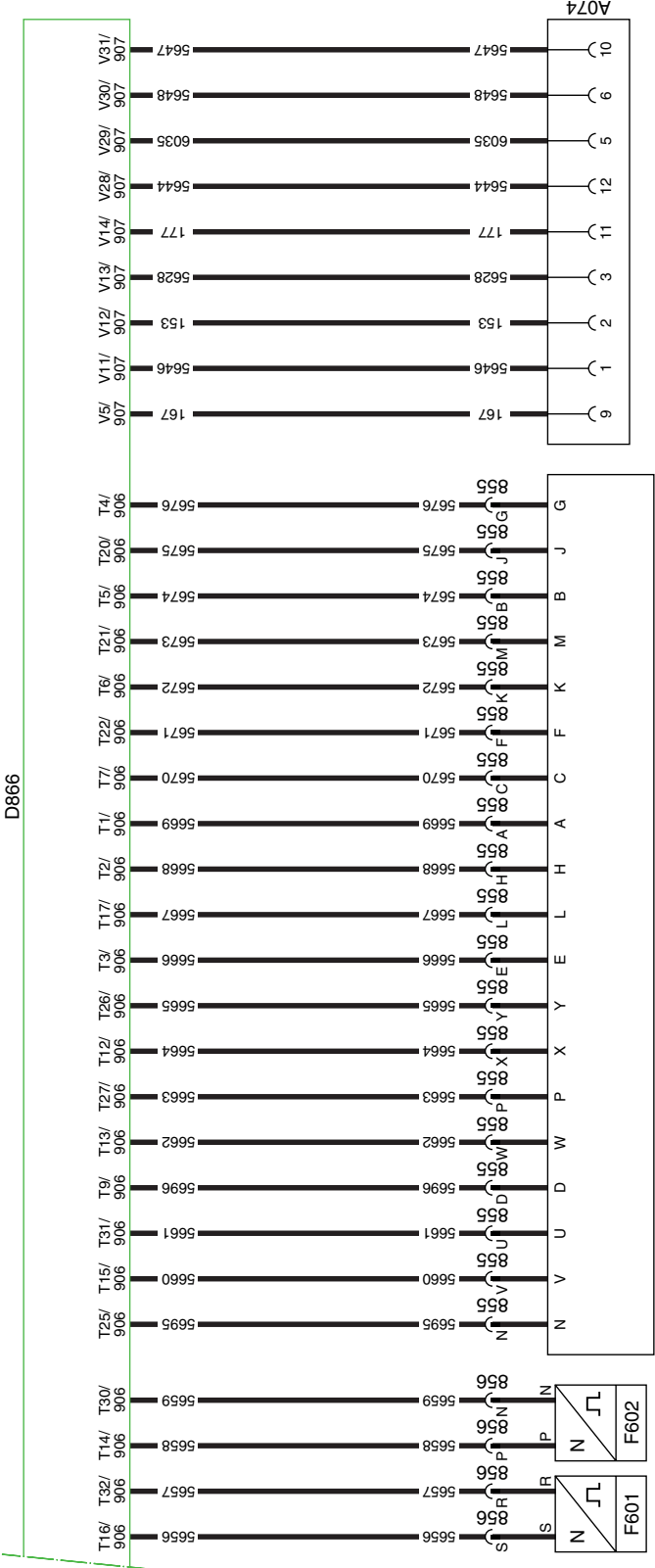
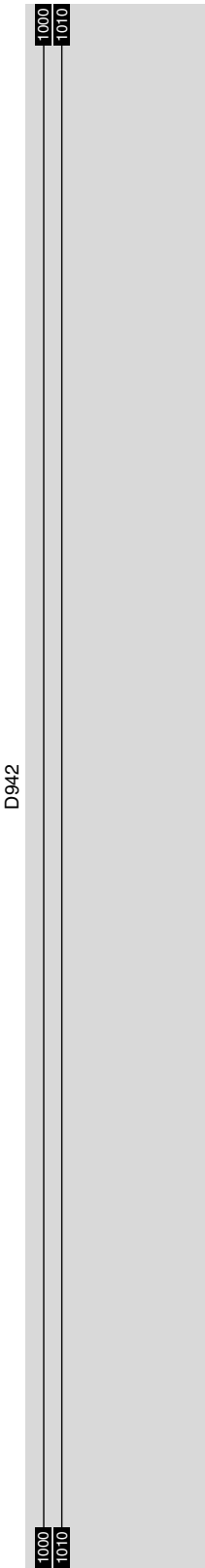
LF45/55 series



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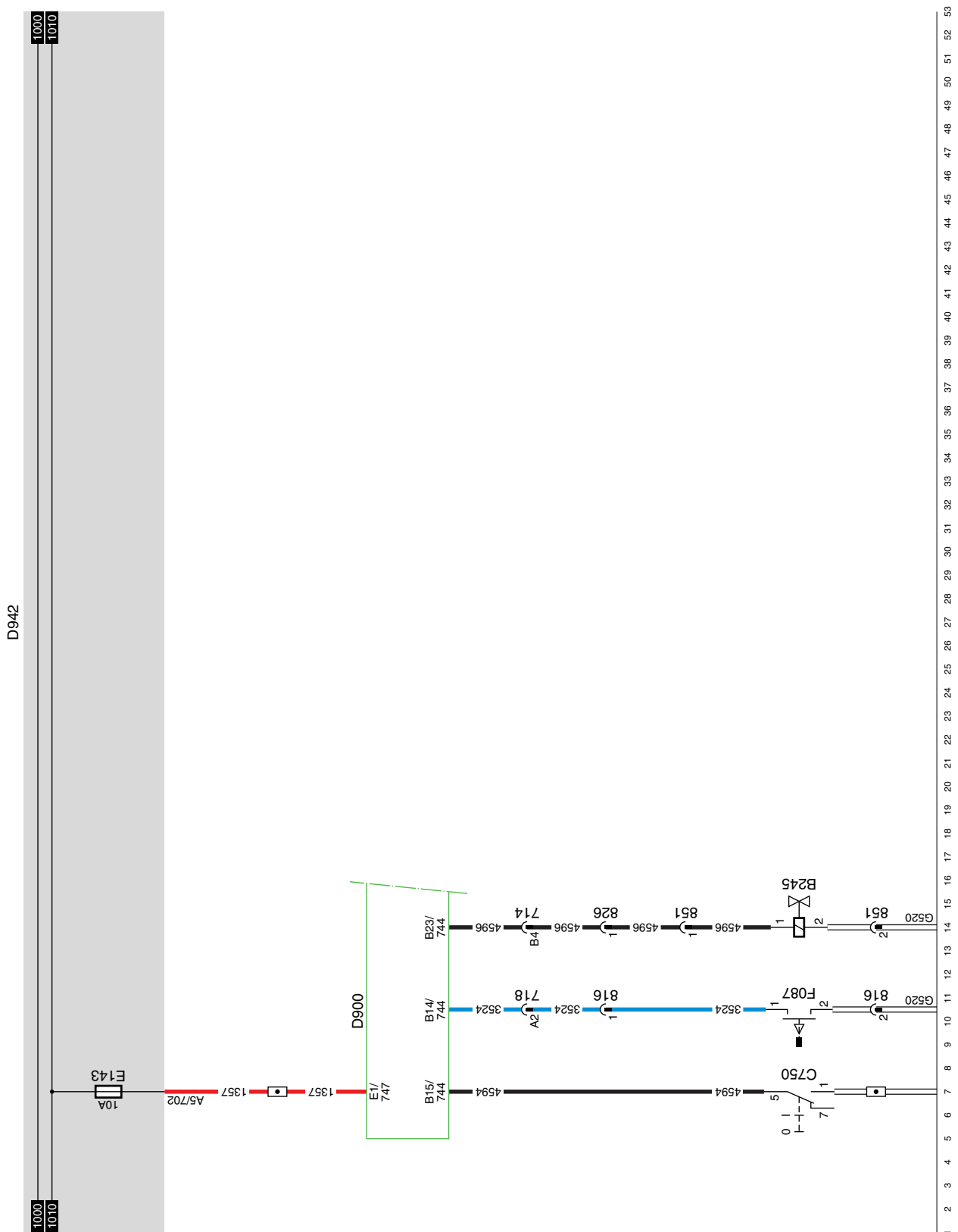
1427090/03

EL001593



26. PTO

When the PTO operating switch (C750) is operated, pin B15/744 of the VIC is connected to earth. Depending on the conditions programmed in the VIC (for example parking brake activated or vehicle speed below a certain value), the PTO operating valve (B245) is supplied with power via pin B23/744 of the VIC. If the PTO is in fact switched on, the gearbox-PTO control switch F087 is operated to provide feedback to connection point B14/744 of the VIC. This will activate the indicator on the DIP.

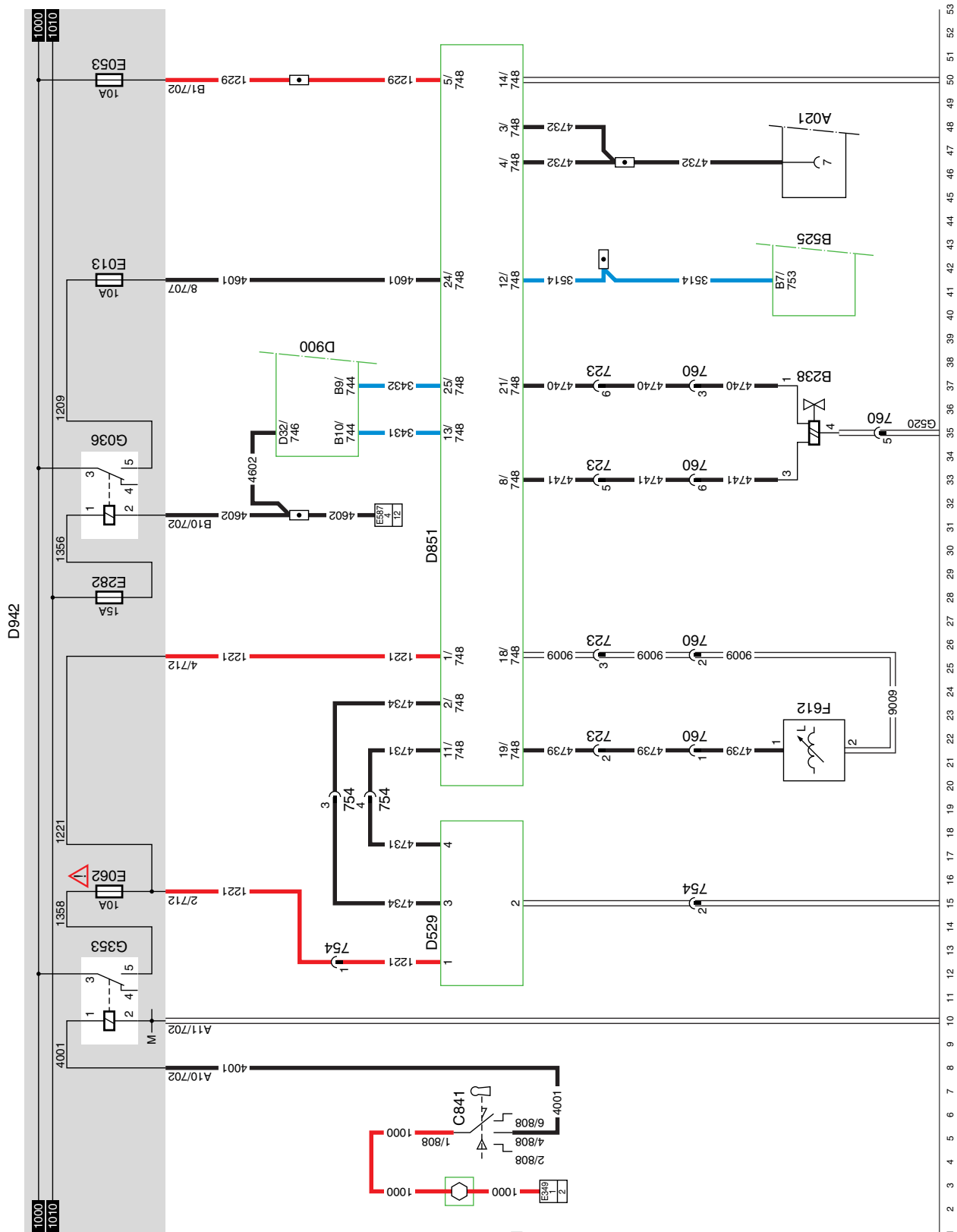


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27A. ECAS-3 4x2 LF45
FOR MORE INFORMATION SEE SYSTEM
MANUAL

VARIANTS

Location
16 Fuse E051 may also be fitted
instead of fuse E062.



27A

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EL001596

ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

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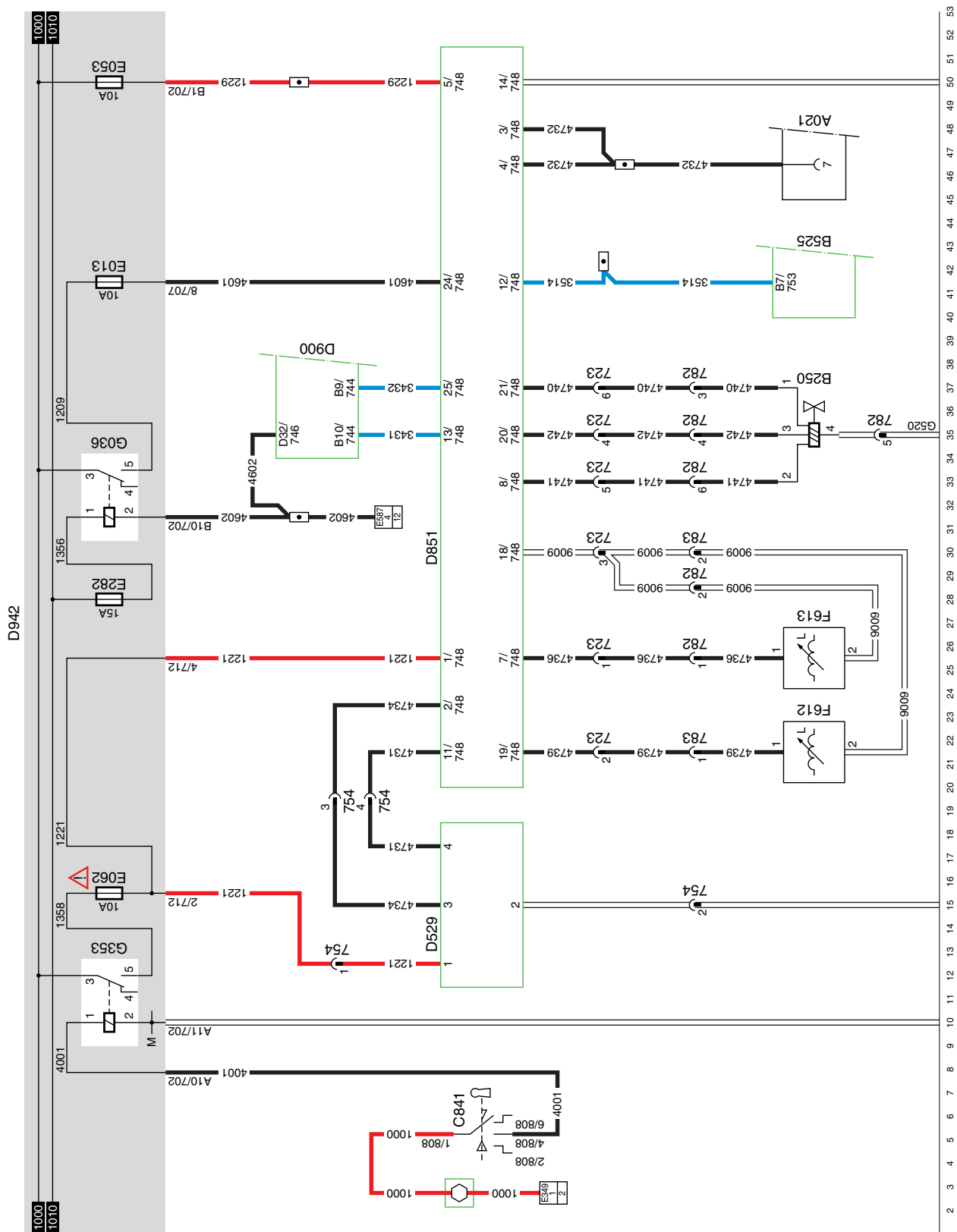
27B. ECAS-3 4x2 LF55

**FOR MORE INFORMATION SEE SYSTEM
MANUAL**

VARIANTS

Location

16 Fuse E051 may also be fitted
instead of fuse E062.



27B

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EL001597

ELECTRICAL SYSTEM

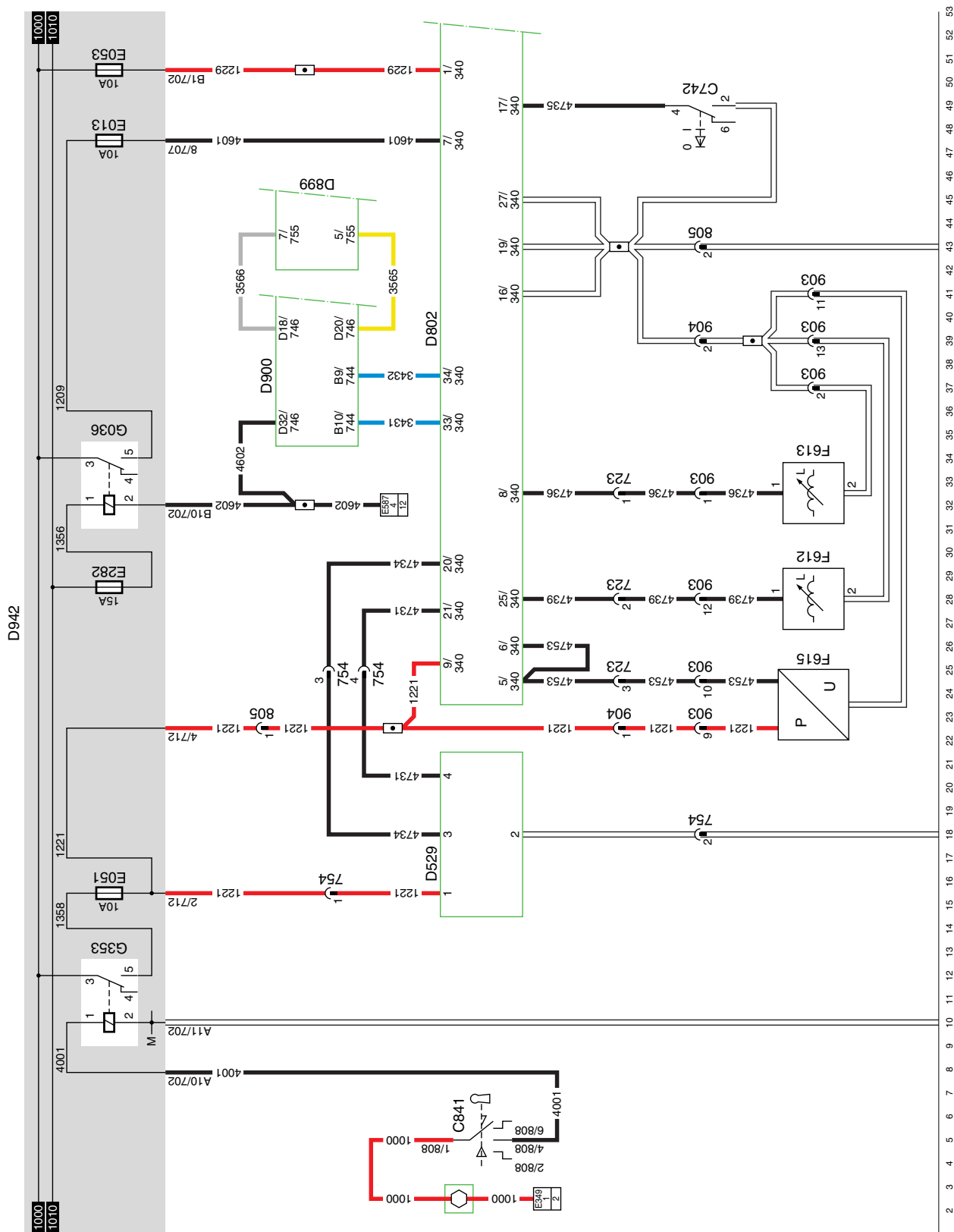
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Electrical system

LF45/55 series

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**27C. ECAS-2 (6x2) LF55
FOR MORE INFORMATION SEE SYSTEM
MANUAL**



27C

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EL001598

ELECTRICAL SYSTEM

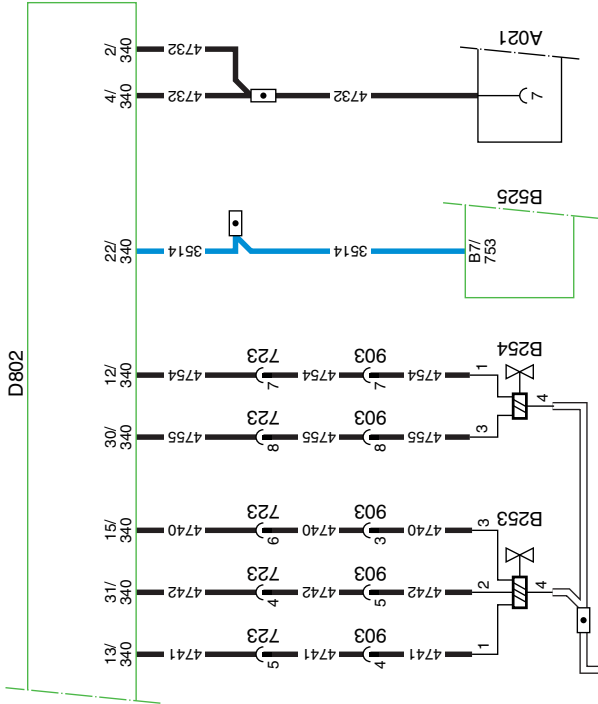
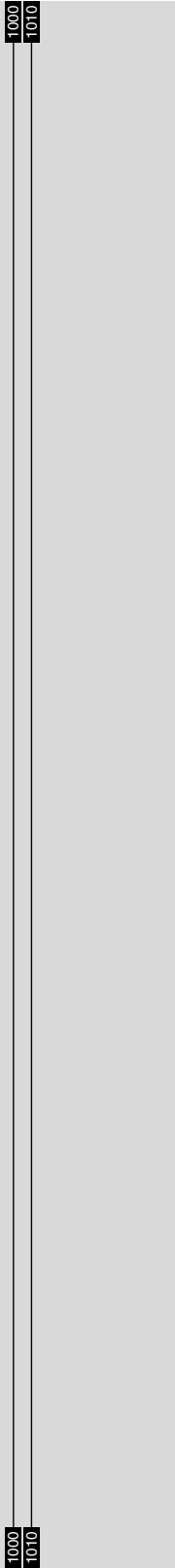
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Electrical system

LF45/55 series

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D942



27C

1427090/03

EL001599

29. HEADLAMP HEIGHT ADJUSTMENT / ROTATING BEAMS**HEADLAMP HEIGHT ADJUSTMENT**

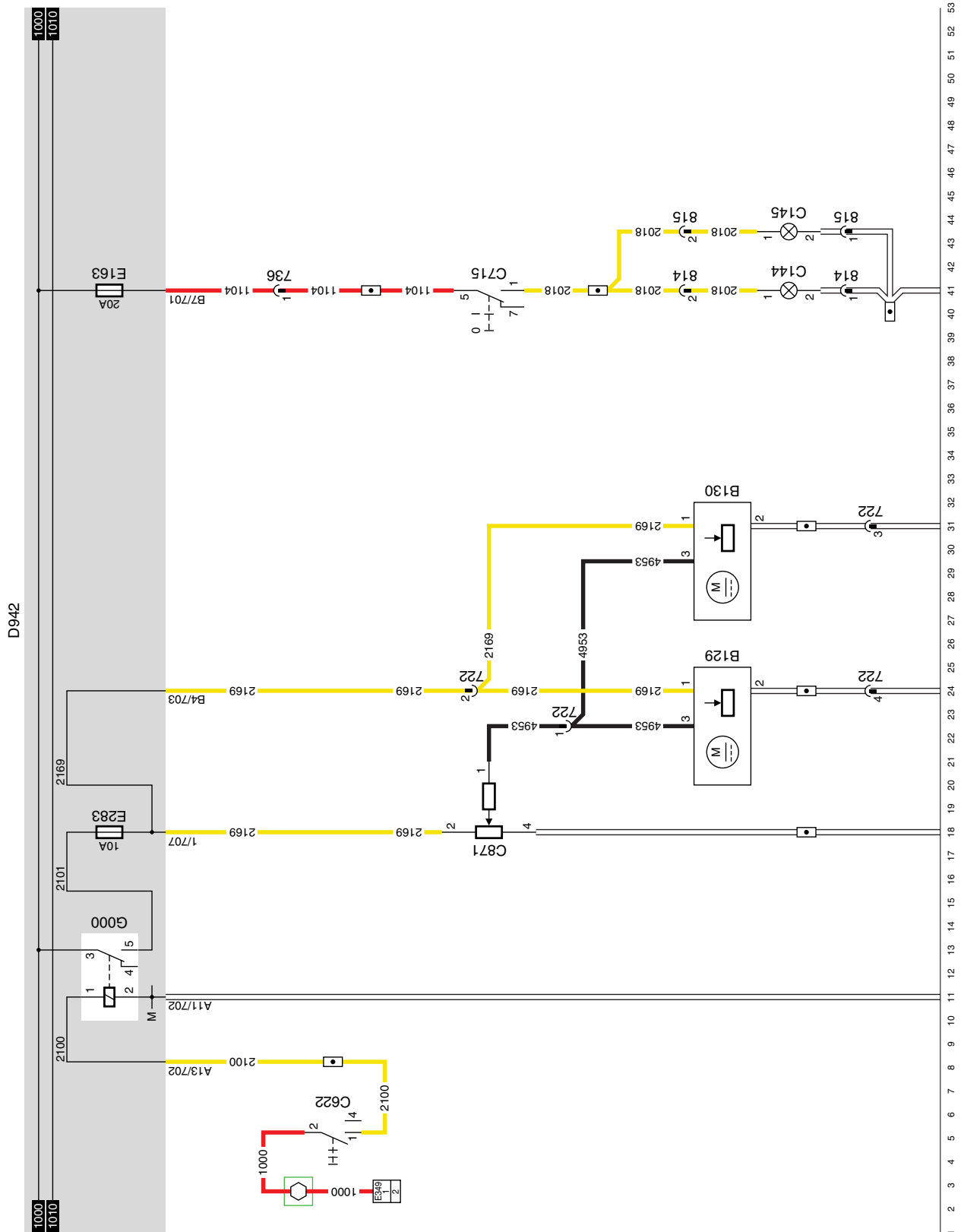
Power before contact is supplied at pin 2 of the lighting switch (C622). If a connection is made to switch C622 (contacts 2 and 1), a voltage is applied to contact 1 of relay G000 (tail light/width marker light relay) via wire 2100. Once the relay is energised, a connection is made between points 3 and 5. As a result, a voltage is applied through relay G000 (contacts 3 - 5), wire 2101, fuse E283 and wire 2169 to pin 2 of switch C871 (potentiometer for headlamp height adjustment). Via the same wire, power is also supplied to pin 1 of the headlamp height-adjustment motor on the left (B129) and right (B130).

When the headlamp height switch is operated, the voltage at pin 1 of the switch will change, so that the headlamp height adjustment motors on the left (B129) and right (B130) will be activated via wire 4953 at pin 3. Depending upon the position of C871 (headlamp height adjustment potentiometer), the motor in the headlamp will be activated. This will continue until electrical equilibrium is achieved. This equilibrium refers to the voltage difference that exists between wires 2169 and 4953 of C871, B129 and B130. The voltage difference should be the same for all three components.

ROTATING BEAMS

The rotating beam switch (C715) is supplied with power before contact via fuse E163 and wire 1104.

When the switch is operated, rotating beam left (C144) and rotating beam right (C145) will be supplied with power via wire 2018.



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EL001600

30. 24 V/12 V CONVERTER FOR RADIO**Note:**

The following description of the operation and connection is intended as a general guideline only.

Also refer to the manufacturer's installation instructions supplied with the radio.

The converter has three 12 V outputs.

- Pin 4: 12 V output before contact
- Pin 6: 12 V output before contact
- Pin 9: 12 V output switched via accessories/ignition switch (C841)

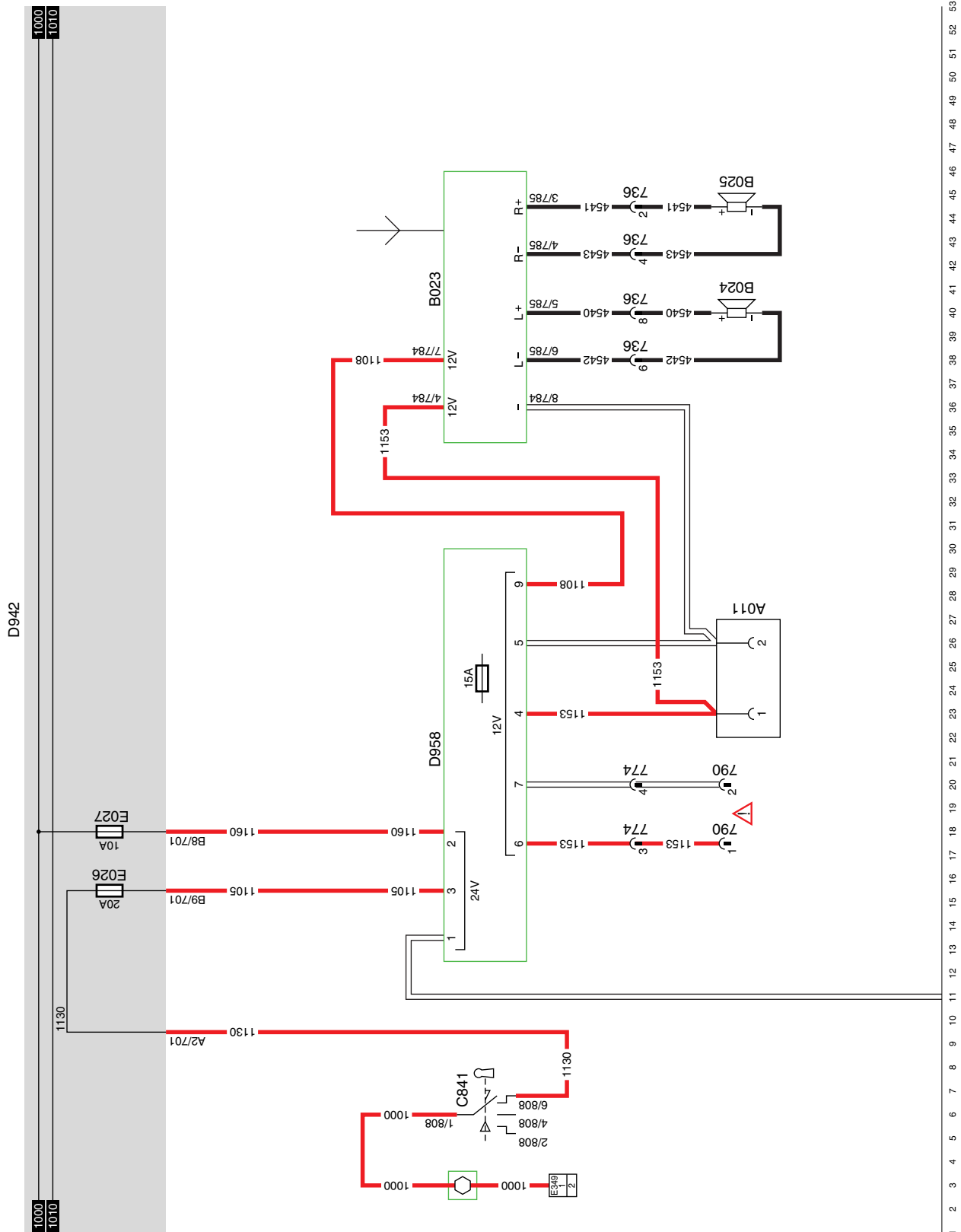
If the contact switch (C841) is in the "accessories" position (connection between contacts 1 and 6), the converter (D958) is supplied with power through wire 1130 and fuse E026. The converter receives power before contact at pin 2 via fuse E027. The converter has an internal fuse to protect the 12 V outputs.

The radio has an aerial connection and 2 loudspeaker outputs which can be used to connect loudspeakers B024 and B025. For more information, see "Connection of accessories".

VARIANTS**Location**

19

Connector 790: Optional connector for, say, the CB or CD player.



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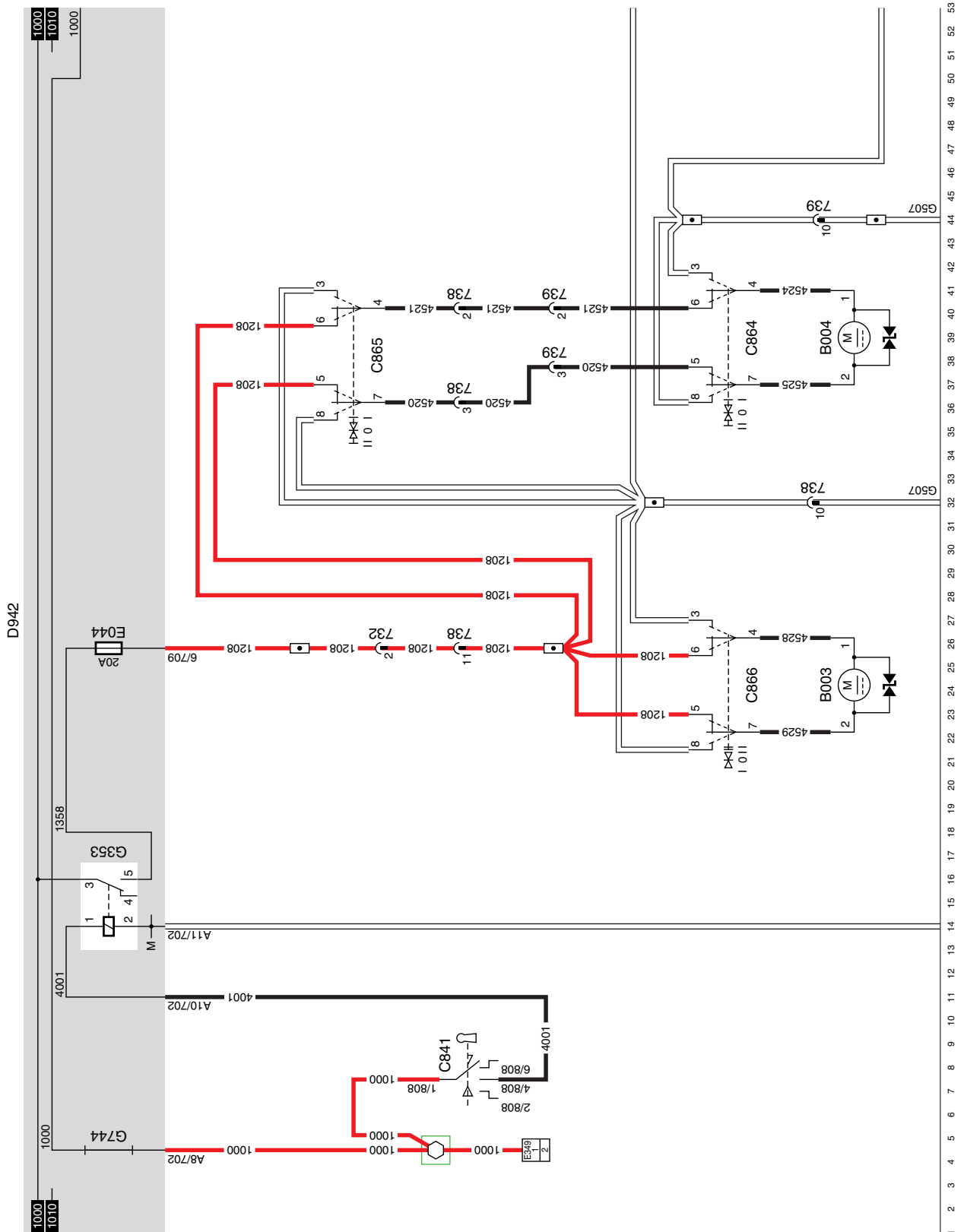
EL001601

31. CDS-3/DROP GLASS OPERATION/ROOF HATCH

DROP GLASS OPERATION

When the vehicle ignition is switched on (connection between pins 1 and 4, C841), relay G353 is energised. Via fuse E044 and wire 1208, relay G353 supplies power to the electric drop glass door switches (C864 in the co-driver's door, C865 in the driver's door for the co-driver's door, and C866 in the driver's door).

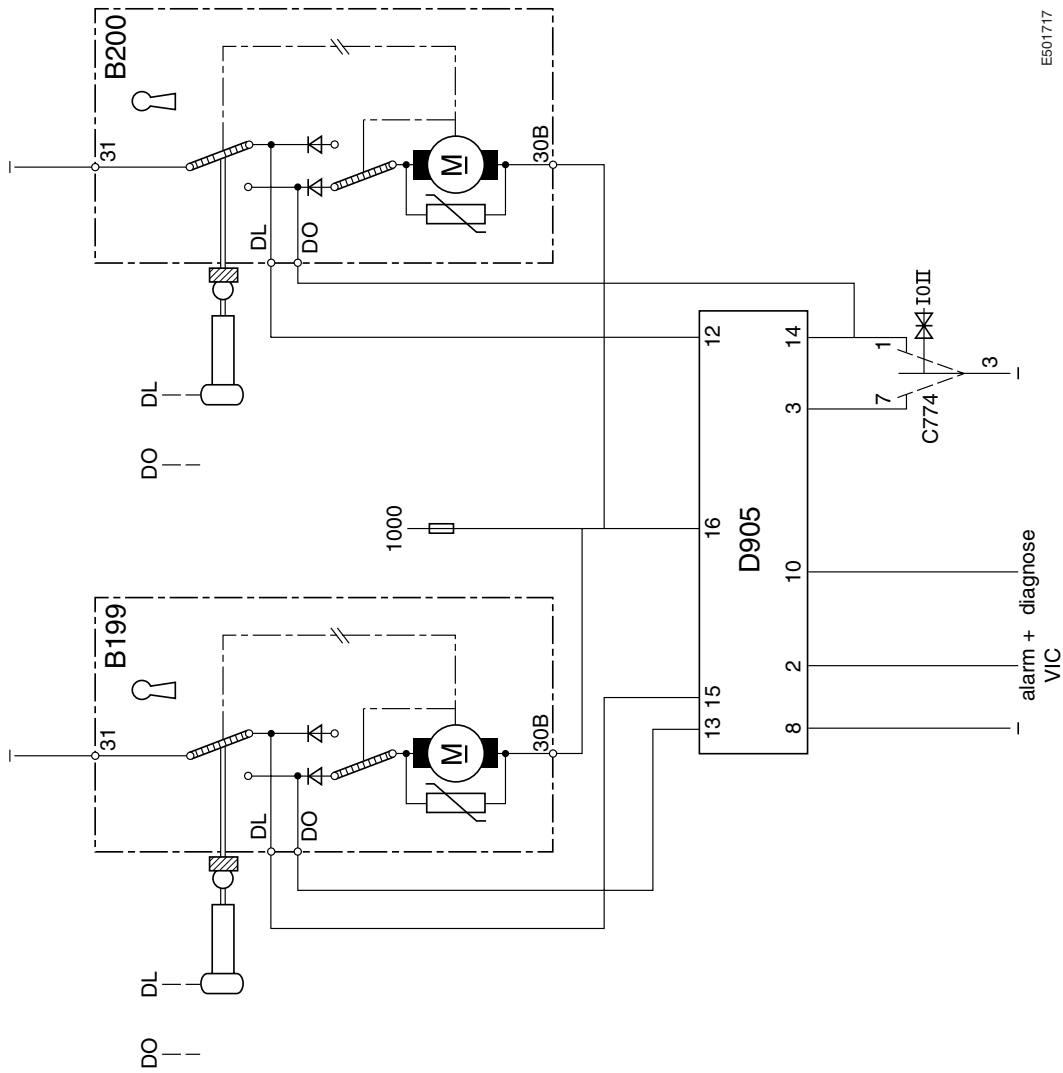
There are two independent drop glass switches. In the rest position, pins 7 and 4 of the switch are connected to power supply via wire 1208. Depending on the side on which the switch is operated, pin 7 or 4 will be connected to earth and the drop glass motor (B003 - driver's side, B004 - co-driver's side) will be activated.



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EL001602



E501717

CENTRAL DOOR LOCKING

Purpose:

- Automatic locking of both doors when one of the doors is locked with the key/button.
- Automatic locking of both doors using remote control.
- If one of the two doors is unlocked using the key/button, only this door will be unlocked; the other door will remain locked.
- Automatic unlocking of the driver's side door using remote control.

Conditions: both doors locked.

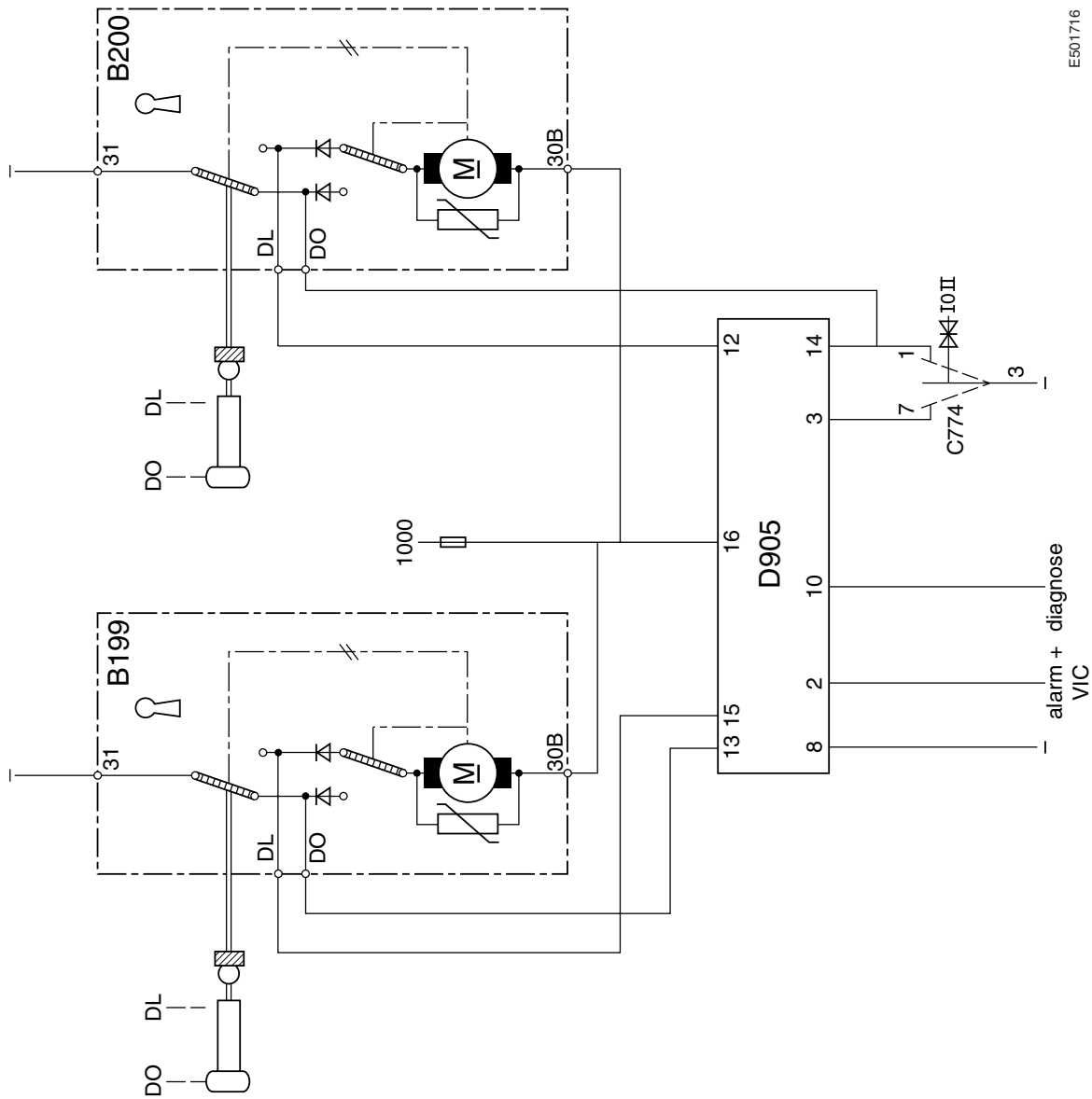
- **Unlocking co-driver's side door using key.**

This is equivalent to opening a door without central locking. The other door remains locked.

- **Unlocking the co-driver's side door using switch C774.**

When switch C774 is operated (pin 3 connected to pin 1), connection DO of component B200 is connected to earth. The co-driver's door will unlock.

- **Unlocking using remote control.**
If the door unlocking button on the remote control unit is pressed, the remote control unit will send a fixed-code signal to the CDS electronic unit (D905). When the CDS electronic unit (D905) recognises the remote control unit on the basis of the fixed code, the remote control unit will send coded messages to the unit (D905). These messages are coded with a rolling code. This rolling code will change every time the remote control is operated. After the CDS electronic unit (D905) has accepted the messages, it will send a signal to the VIC (D900). As a result, the VIC will switch on the interior lighting for a specific period of time.
The CDS unit (D905) now switches pin 13 to earth. This will only activate the motor (B199). The CDS unit (D905) checks the status of the output to the motor (B199). This is done to ensure that the DL connection is not connected to earth when the motor is in the "open" position. The CDS unit can deduce from this whether the driver's side door has been successfully unlocked. The CDS unit (D905) will then send a message to the VIC (D900) via pin 2 stating that the driver's side door has been successfully unlocked. If the driver's side door is not unlocked properly after three attempts, a message will be sent to the VIC (D900) to inform it that the door has not unlocked successfully.



E501716

Conditions: both doors unlocked.

- **Locking driver's side door with key/button.**

The D905 unit will measure an earth signal at pin 15 through connection DL. D905 will now connect pin 12 to earth, which will also activate B200. The co-driver's side door will now lock as well.

- **Locking the driver's side door with key/button.**

The operation is as described above, except that unit D905 will now measure an earth signal at pin 12 and it will connect pin 15 of component B199 to earth. The door on the driver's side will now also be locked.

- **Locking co-driver's side door using switch C774.**

When switch C774 is operated (pin 3 connected to pin 7), an earth signal is created at pin 3 of unit D905. D905 will now connect pin 12 to earth, which will activate B200. This will lock the door on the co-driver's side.

- **The doors on the driver's and co-driver's sides are locked using the remote control unit.**

When the lock doors button on the remote control unit is pressed, a procedure starts that is comparable to the procedure for opening the doors.

ROOF HATCH

Opening roof hatch

When the roof hatch switch (C736) is operated and a connection is made between contacts 2 and 6 and therefore between contacts 1 and 3, a voltage is applied to pin 1 of the roof hatch motor (B009) through fuse E163, switch C736 and wire 4761. The roof hatch will open.

Closing roof hatch

When the roof hatch switch (C736) is operated and a connection is made between contacts 8 and 6 and therefore between contacts 7 and 3, a voltage is applied to pin 2 of the roof hatch motor (B009) through fuse E163, switch C736 and wire 4760. The roof hatch will now close.

However, during the locking operation the CDS unit (D905) will connect pins 12 and 15 to earth. This will activate the motors (B199 and B200). The CDS unit (D905) then checks the status of the outputs to the motors (B199 and B200). It uses this information to determine whether the doors have been successfully locked. The CDS unit (D905) will then send a message to the VIC (D900) via pin 2 stating that the doors have been successfully locked. As a result, the VIC (D900) will switch off the interior lighting. If the doors are not locked properly after three attempts, a message will be sent to the VIC (D900), stating that the locking operation was not successful.

Initialisation

When the CDS unit is supplied with power for the first time (on installing or replacing the electronic unit) or when new hand-held transmitters are used (up to 8), the unit must recognise these hand-held transmitters. To enable the hand-held transmitters to communicate with the CDS unit, the unit and the hand-held transmitters must be taught using DAVIE.

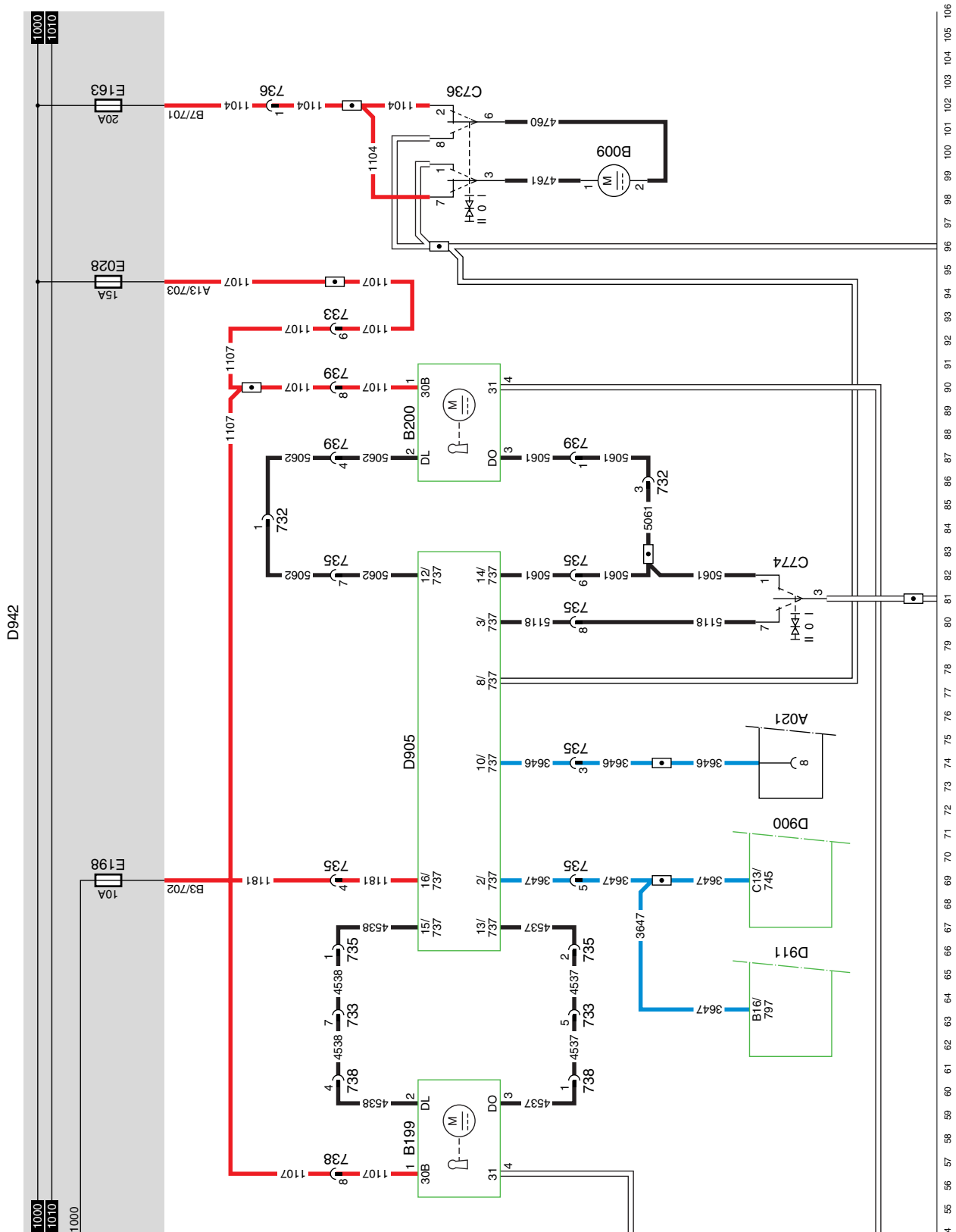
ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

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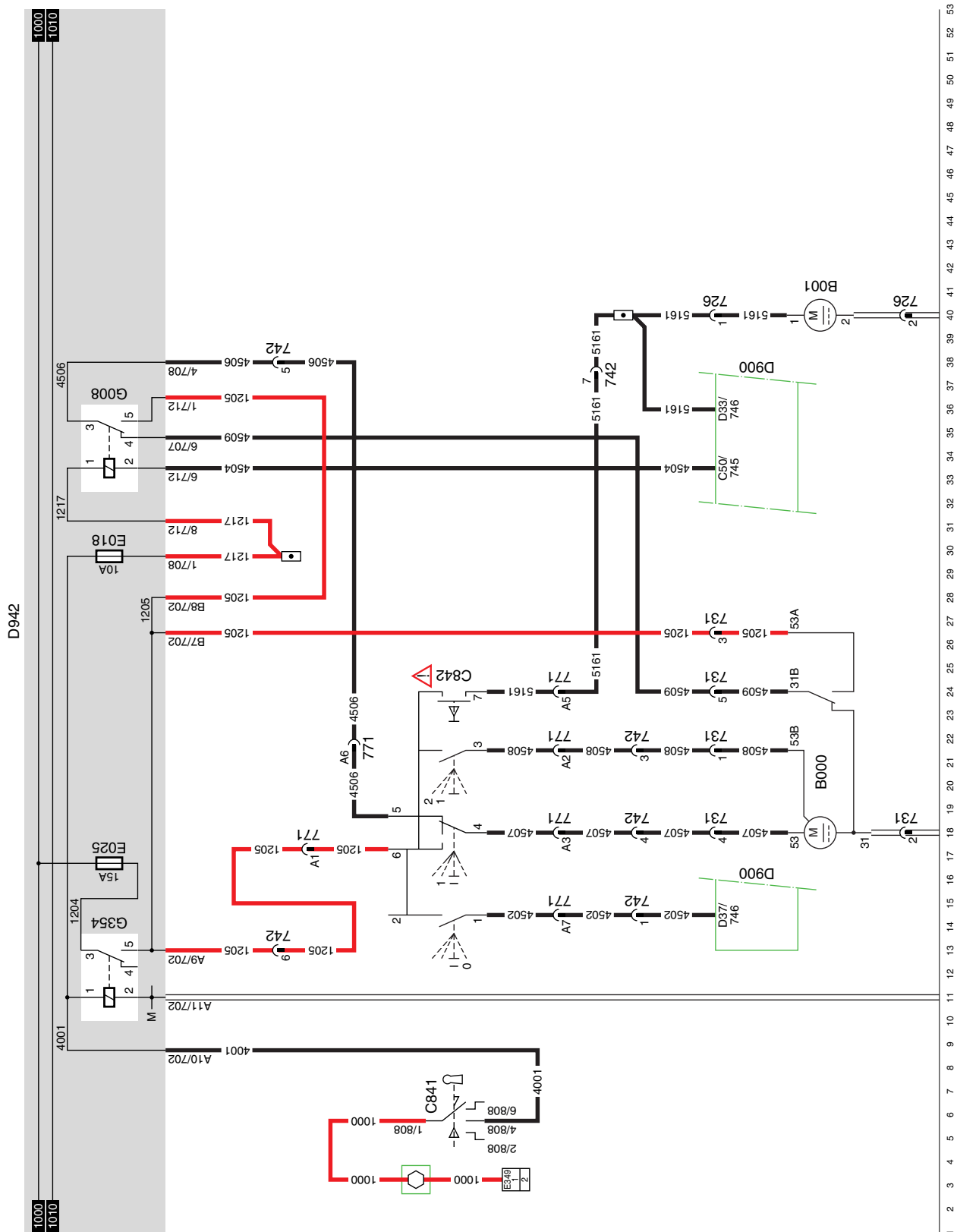
EL001603

33. WINDSCREEN WIPE/WASH SYSTEM
FOR MORE INFORMATION SEE SYSTEM
MANUAL

VARIANTS

Location

- 25 Steering column switch (C842):
If the vehicle is fitted with
cruise control/engine
speed control, the Basic Code
Number of the stalk switch is
C891.



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ELECTRICAL SYSTEM

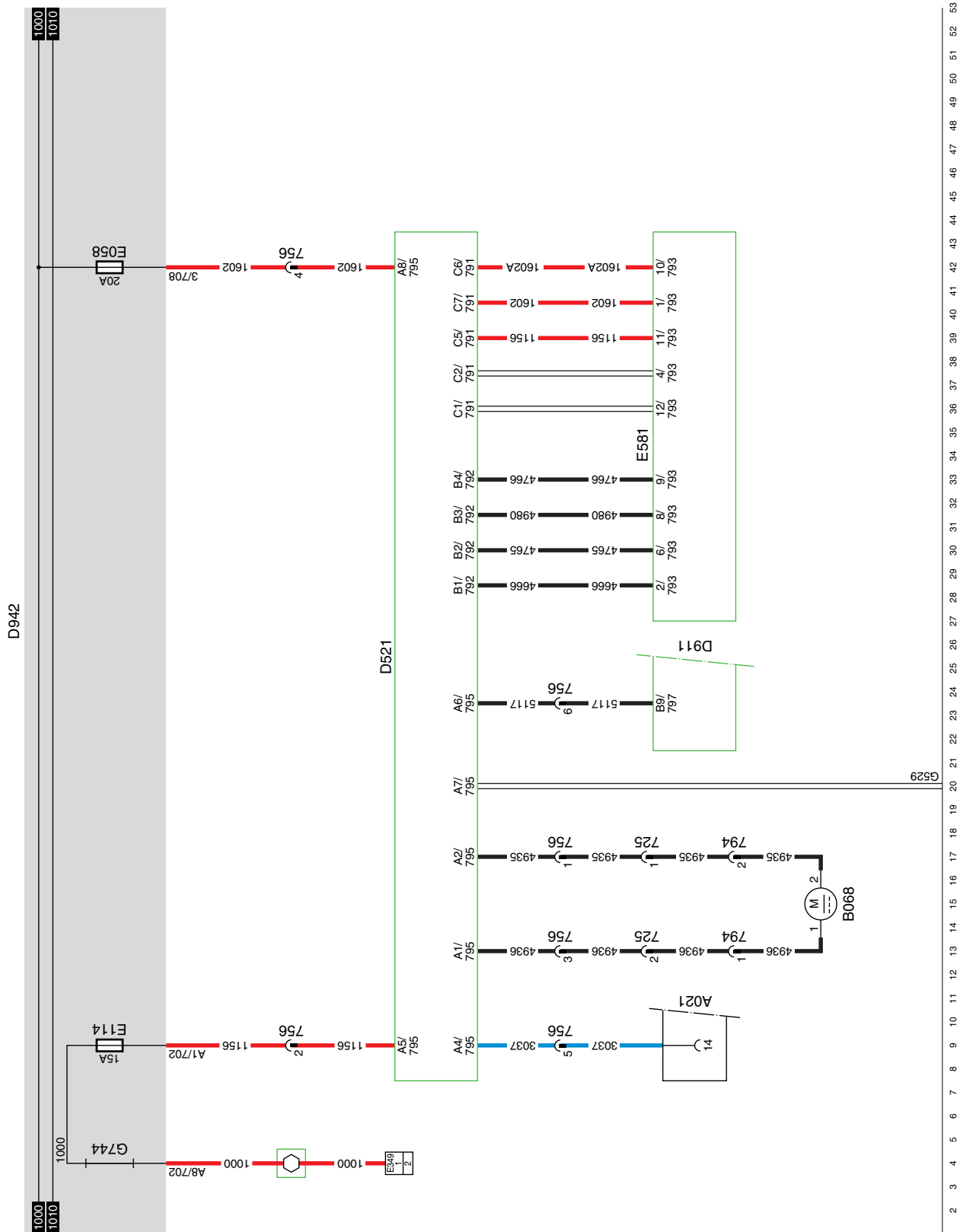
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Electrical system

LF45/55 series

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**34. ACH-W WITH TIMER
FOR MORE INFORMATION SEE SYSTEM
MANUAL**

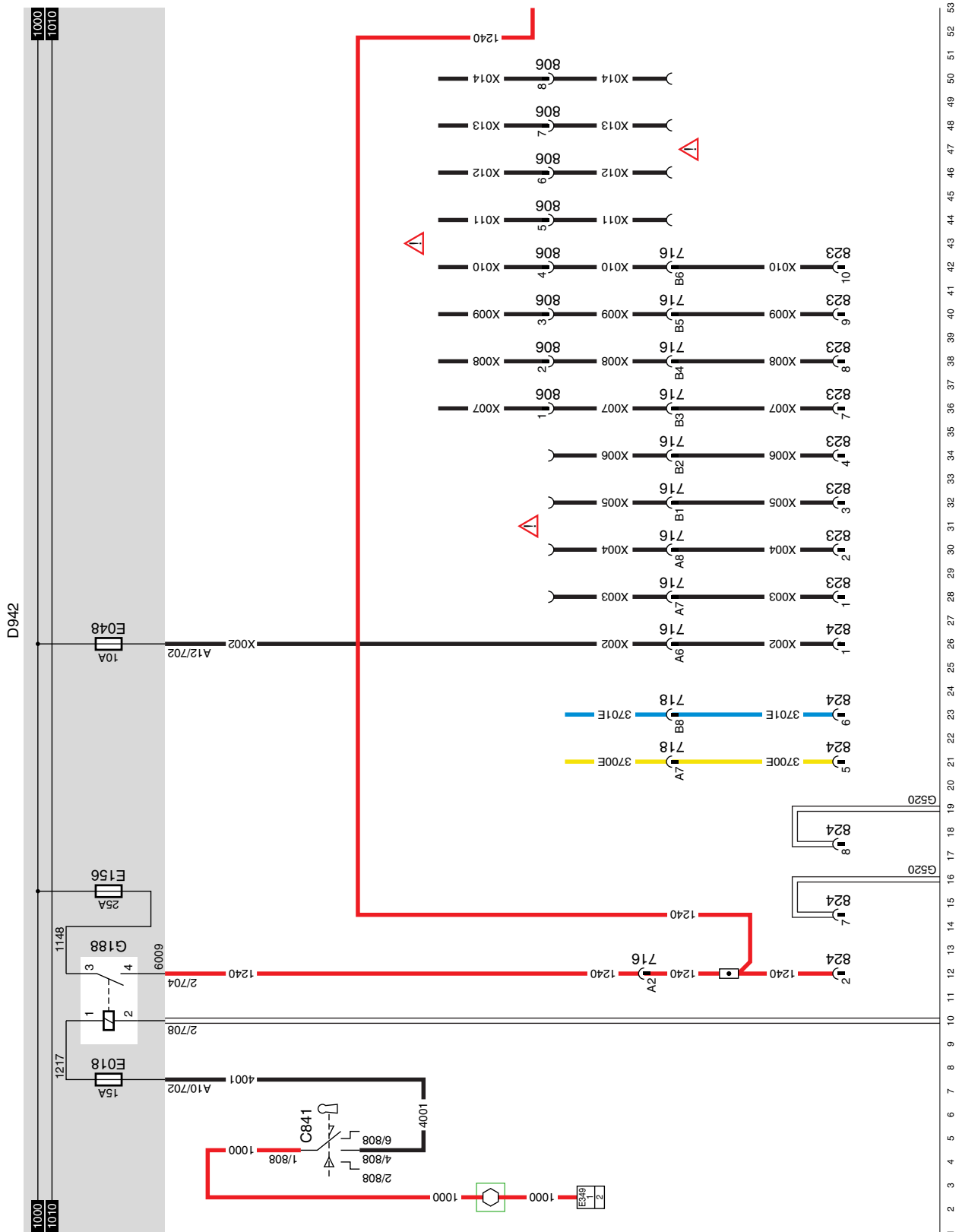


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35. APPLICATION CONNECTOR, ENGINE SPEED CONTROL, SUPERSTRUCTURE FUNCTIONS AND SPARE WIRING
FOR MORE INFORMATION SEE
“CONNECTION OF ACCESSORIES”

VARIANTS

Location	
28,30,32,34	The spare wires are bundled together behind the dashboard central panel
36,38,40,42, 44,46,48,50	The spare wires are bundled together in the co-driver's side roof console
44,46,48,50	The spare wires are bundled together behind the fuse box.



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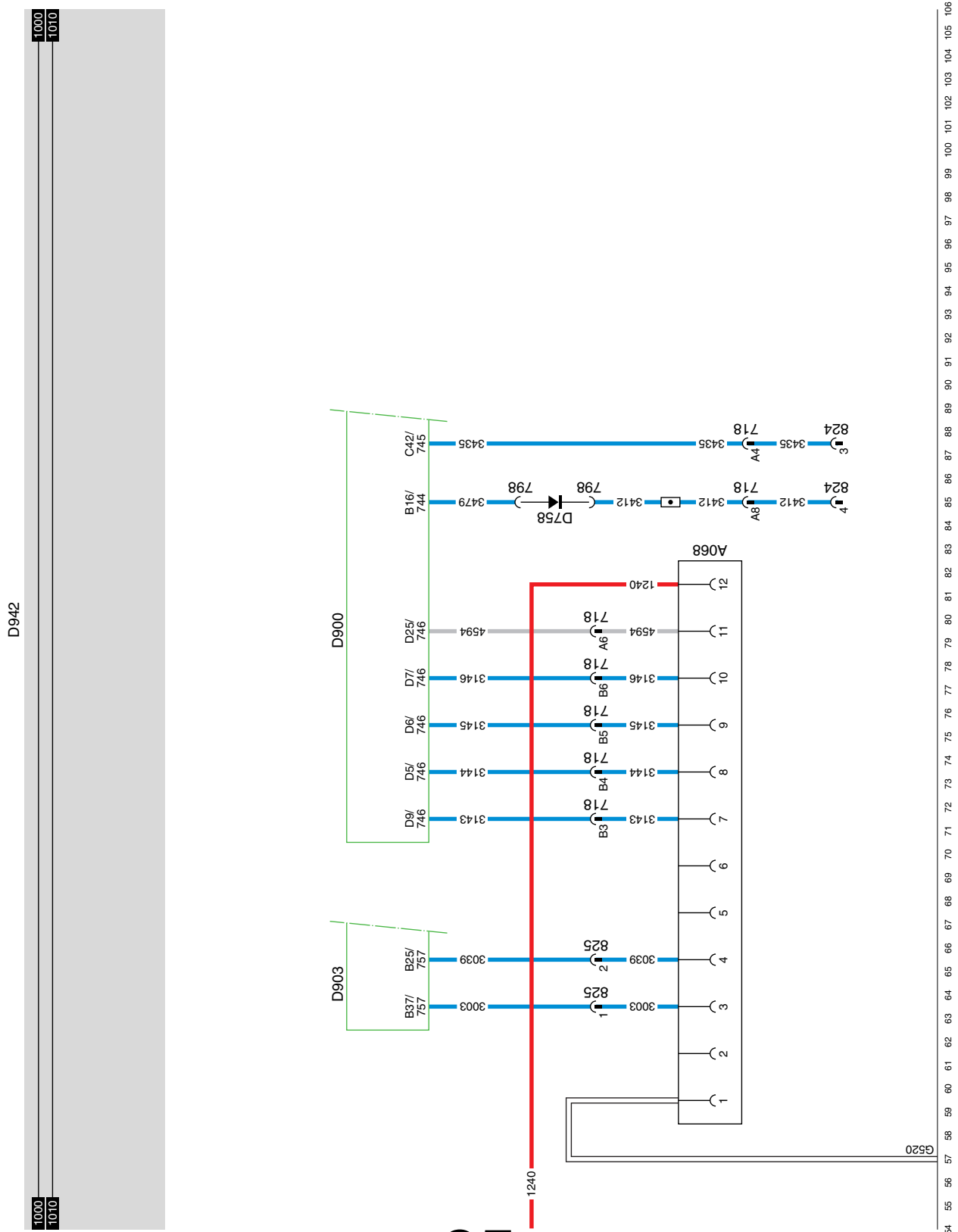
EL001606

ELECTRICAL SYSTEM

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Electrical system

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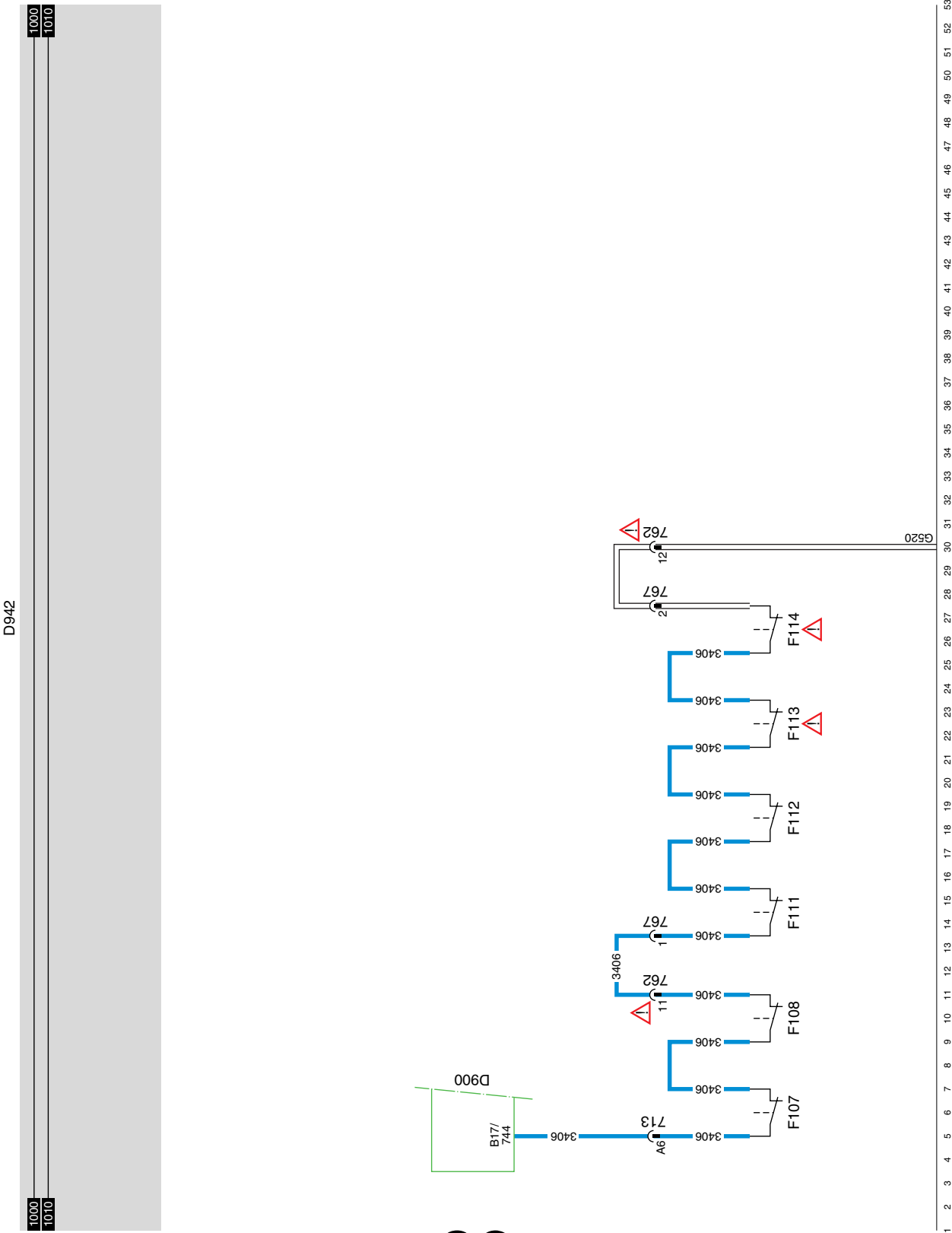
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36. BREAK LINING WEAR

If one of the brake linings is too thin, pin 17, connector 744 of the VIC will, via wire 3406, be interrupted by the appropriate brake lining wear control switch (F107, F108, F111, F112, F113 or F114). The VIC will send a message to the instrument panel, which will then activate the "brake lining wear" indicator.

VARIANTS

Location	
11,30	Connector 762:
	Not fitted on vehicle type FT
22,26	Brake lining wear switches F113 and F114:
	Only applicable to 6x2 vehicles

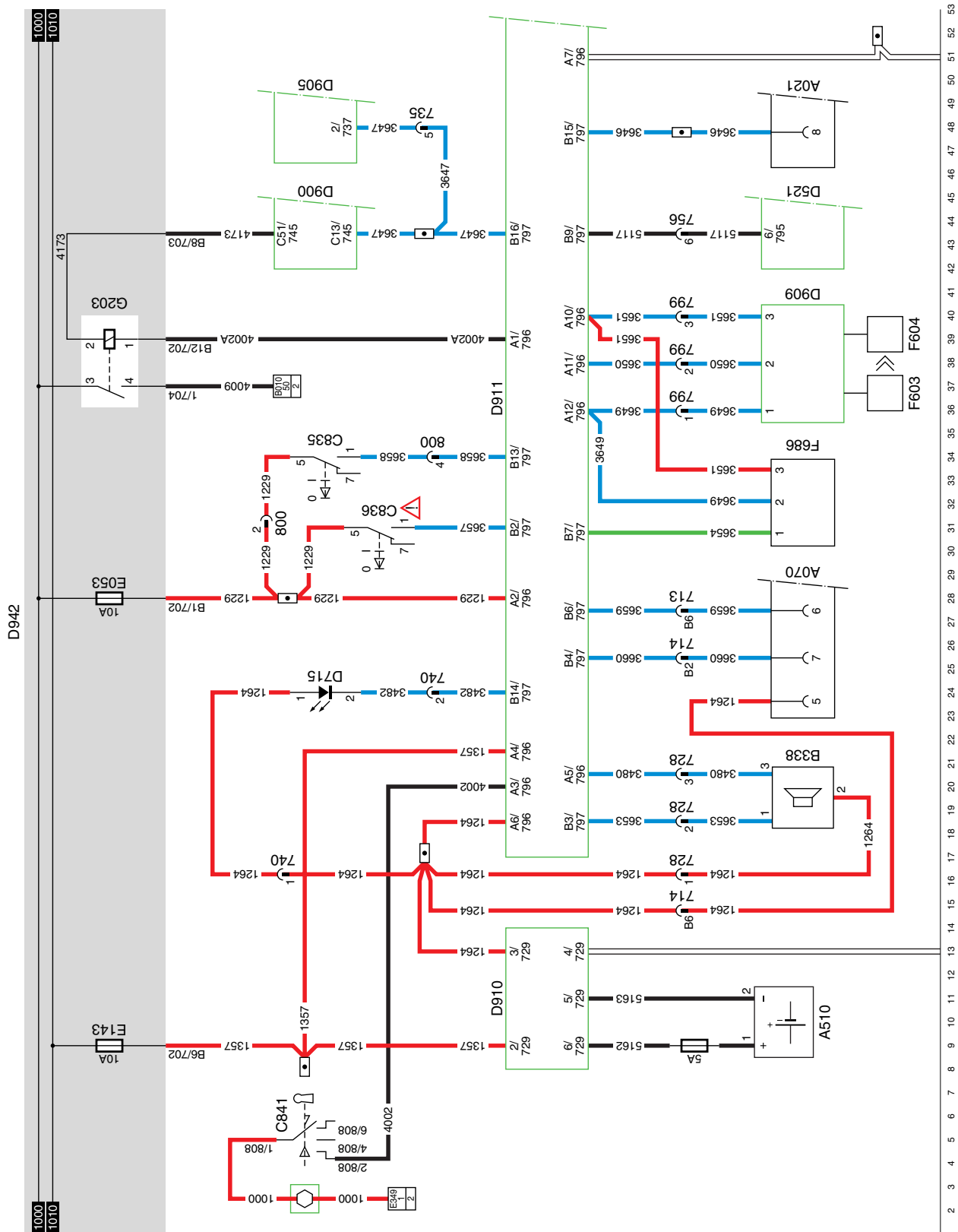


**37. ALS-S/BATTERY CHARGER FOR ALARM BV2/BV3
FOR MORE INFORMATION SEE SYSTEM
MANUAL**

VARIANTS

Location

- | | |
|----|--|
| 1 | If trailer protection fitted. |
| 93 | Where an immobiliser system is fitted, the optional LED alarm system (D715) can be made to flash by the LED unit D931 when the ignition is turned off. |



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EL001609

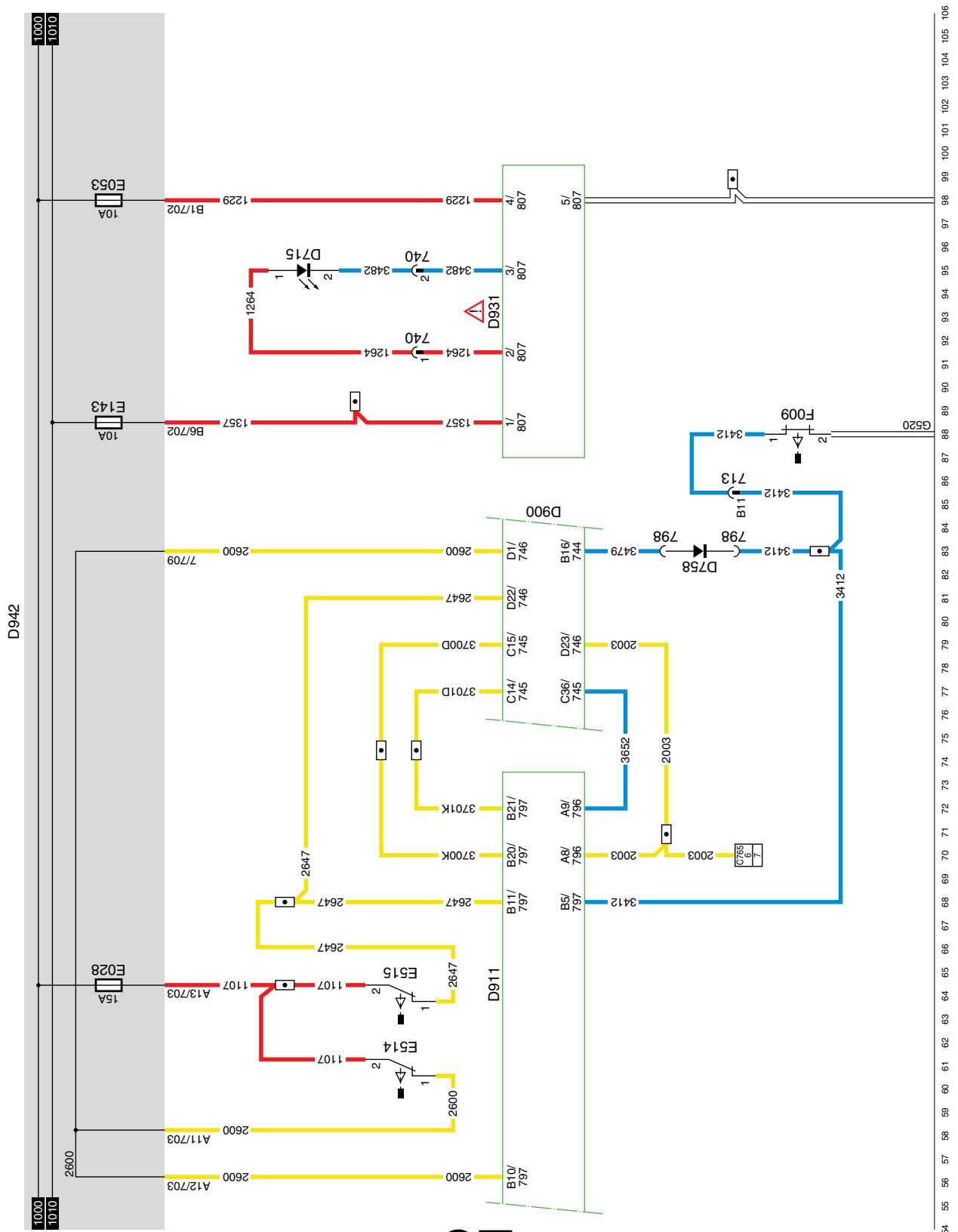
ELECTRICAL SYSTEM

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Electrical system

LF45/55 series

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1427090/03

EL001610

38. SOCKETS, FA/FT**12 V PLUG (A011)**

Pin 1 is connected to the 24/12 V converter (12 V before contact) through wire 1153.

Pin 2 is connected to the earth connection of the converter.

DIAGNOSTIC SOCKET (A021)

The diagnostic socket is located to the left of the driver's seat on the floor plate. This is the socket for the DAVIE connection.

Power before contact is supplied to pin 1 through fuse E053. Pin 2 is connected to earth. The remaining pins are for communication with the various systems and are connected to those systems.

Pin no.	Wire no.	Colour	Description
1	1229	red	Power supply before contact
2	9107	white	Earth
3	3425	blue	ABS-D/ABS/ASR-E
4	-		
5	-		
6	-		
7	4732	black	ECAS-3/ECAS-2
8	3646	blue	CDS, ALS-S, airbag/seat belt tensioner, RAS-EC
9	4047	black	VIC
10	-		
11	-		
12	4733	black	DIP-4
13	-		
14	3037	blue	Cab heater
15	3700	yellow	CAN-network (ECS-DC3, MTCO)
16	3701	blue	CAN-network (ECS-DC3, MTCO)

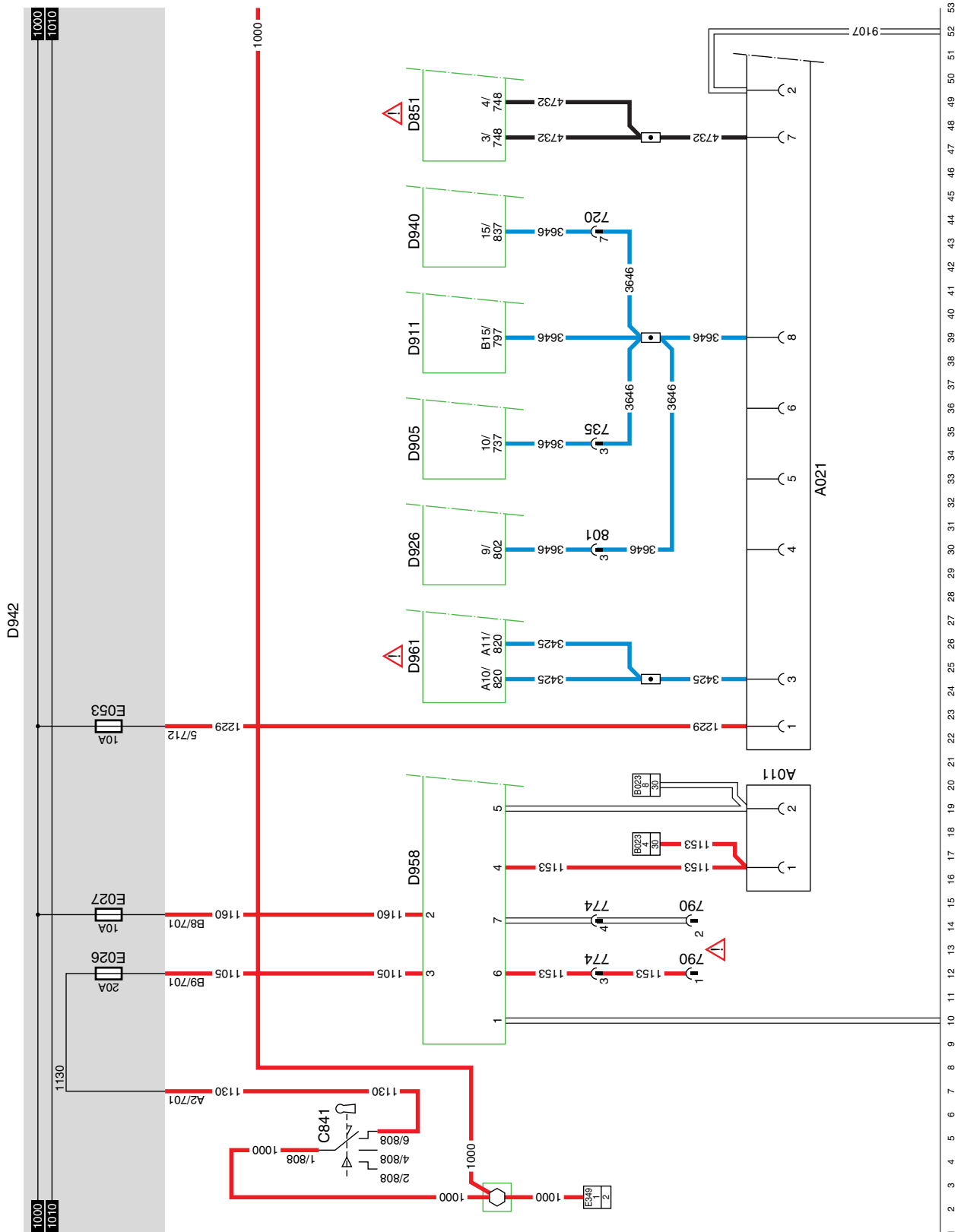
DRAWN VEHICLE SOCKET (A000) (7-pin)		DRAWN VEHICLE ABS/EBS SOCKET (A004)	
Pin 1	connected to earth.	Pin 1	of the drawn vehicle ABS/EBS socket (A004) is connected directly to power before contact via fuse E043 and wire 1119.
When a connection is made between contacts 2 and 1 (marker light/parking light position) by switching on the lighting switch (C622), relay G000 is energised. Relay G000 supplies power to wire 2101 via wire 1000. Via fuses E284 and E283, power is supplied to connector A000 at pin 2 (via wire 2170) and pin 6 (via wire 2169) respectively.		Pin 2	connected directly to power after contact via fuse E282 and wire 1356.
Pin 2	switches the left-hand rear light.	Pin 3	connected to earth.
Pin 3	is connected via wire 2008 to connection point E7/747 of the VIC (D900) (direction, left).	Pin 4	connected to earth.
Pin 4	is connected via wire 4601 and fuse E013 to relay G036 (brake light relay).	Pin 5	connected to pin C32/745 of the VIC (D900) via wire 3428.
Pin 5	is connected via wire 2008 to pin E4/747 of the VIC (D900) (direction, right).	Pin 6	-
Pin 6	switches the right-hand rear light.	Pin 7	-
Pin 7	-	VARIANTS	
SUPERSTRUCTURE APPLICATION CONNECTOR (A070)		Location	
Pin 1	connected to power before contact via wire 1110 and fuse E052.	26	Electronic unit, ABS/ASR, E version (D961): Or electronic unit for ABS/ASR, D version (D941)
Pin 2	on vehicle type FA, connected to the VIC and the work lamp switch (C725) through wire 2155, fuse E283 and wire 2101. On vehicle type FT, pin 2 is connected to the right-hand rear light through wire 2169.	49	Electronic unit, ECAS-3 (D851): Or electronic unit ECAS-2 (D802)
Pin 3	connected to connection point 5 of G036 (stop light relay) via wire 4601 and fuse E013.	79, 81, 91, 117, 126, 135	Connector 762: Not fitted on vehicle type FT
		86, 88, 122, 129, 144, 148, 150	Connector 763: Not fitted on vehicle type FT
REAR FOG LAMP/REVERSING LIGHT SOCKET (A001)			
Pin 1	connected to earth.		
Pin 2	-		
Pin 3	connected via wire 4591 to pin 2 of E501 (reversing lamp switch).		
Pin 4	connected via wire 1110 to power before contact (1000) via fuse E052.		
Pin 5	-		
Pin 6	connected via wire 1356 to power after contact (1010) via fuse E282.		
Pin 7	connected via wire 2152 to relay G005 (rear fog lamp relay).		

ELECTRICAL SYSTEM

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Electrical system

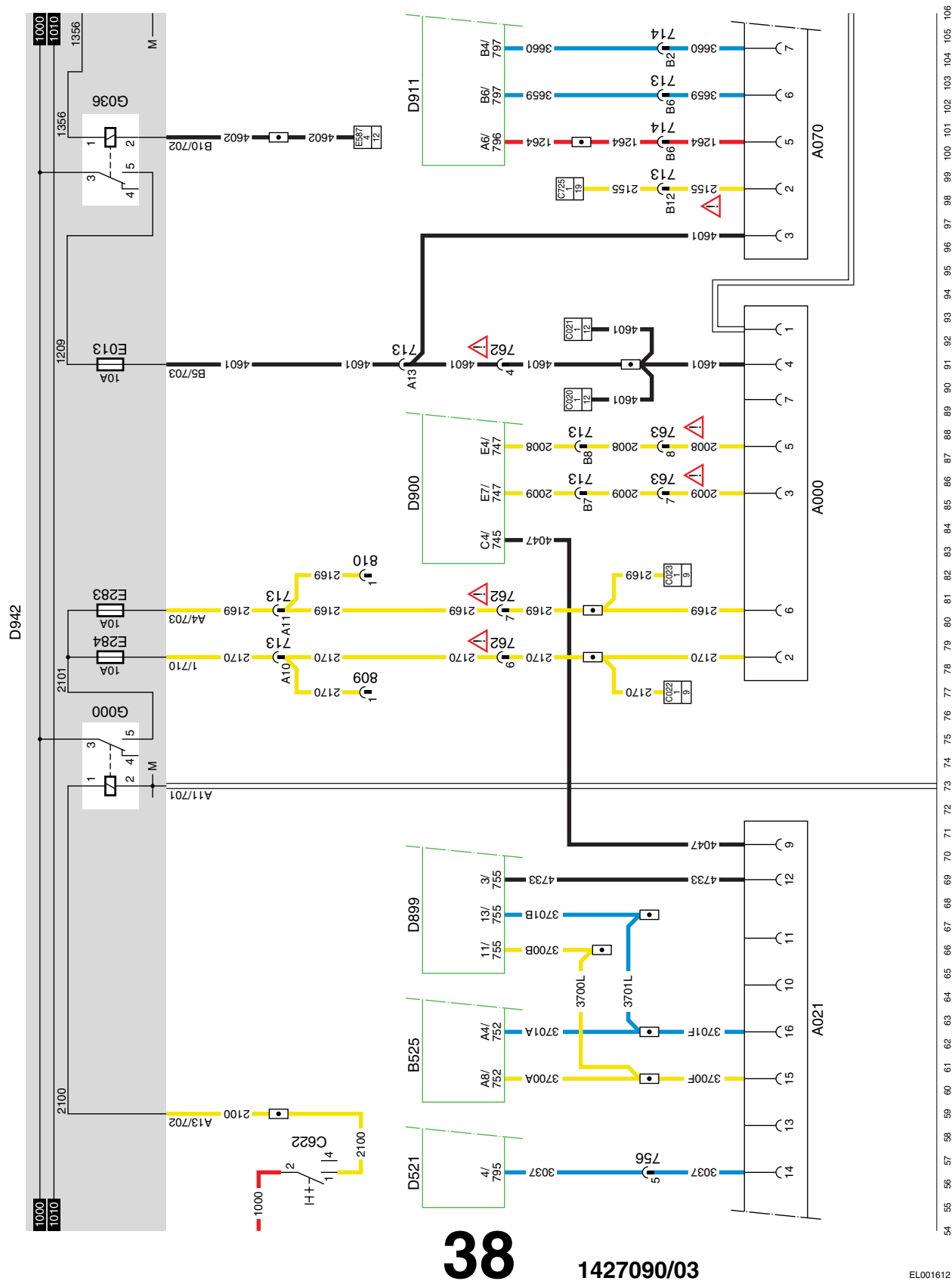
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EL001611

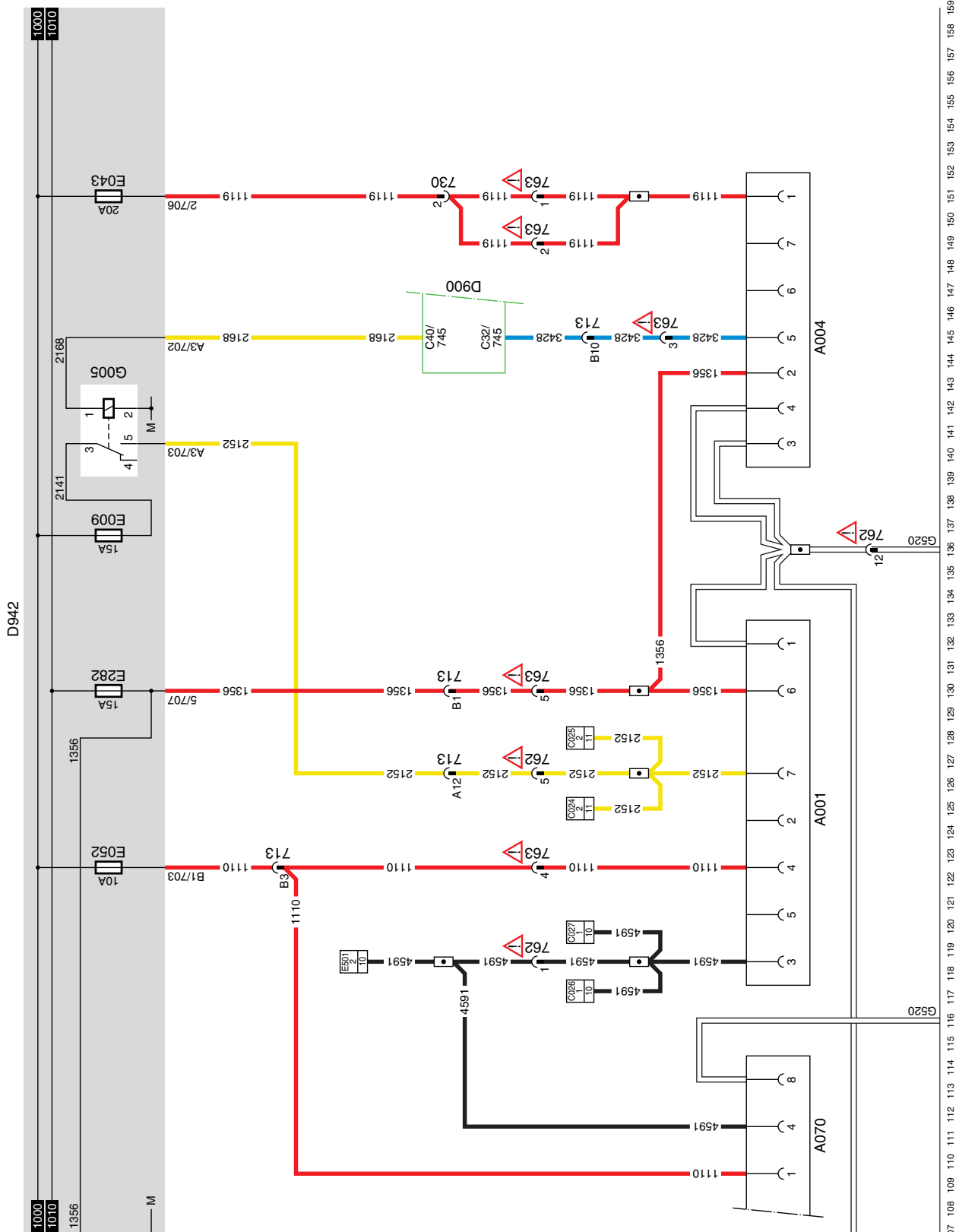


ELECTRICAL SYSTEM

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Electrical system

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EL001613

39. WATER SEPARATOR/FUEL PRE-HEATING**WATER SEPARATOR**

The water separator sensor (F692) is supplied with power via relay G353 and fuse E091. If the water level in the fuel filter becomes too high, the VIC receives a signal at pin D8/746. A warning is then indicated on the DIP through the VIC.

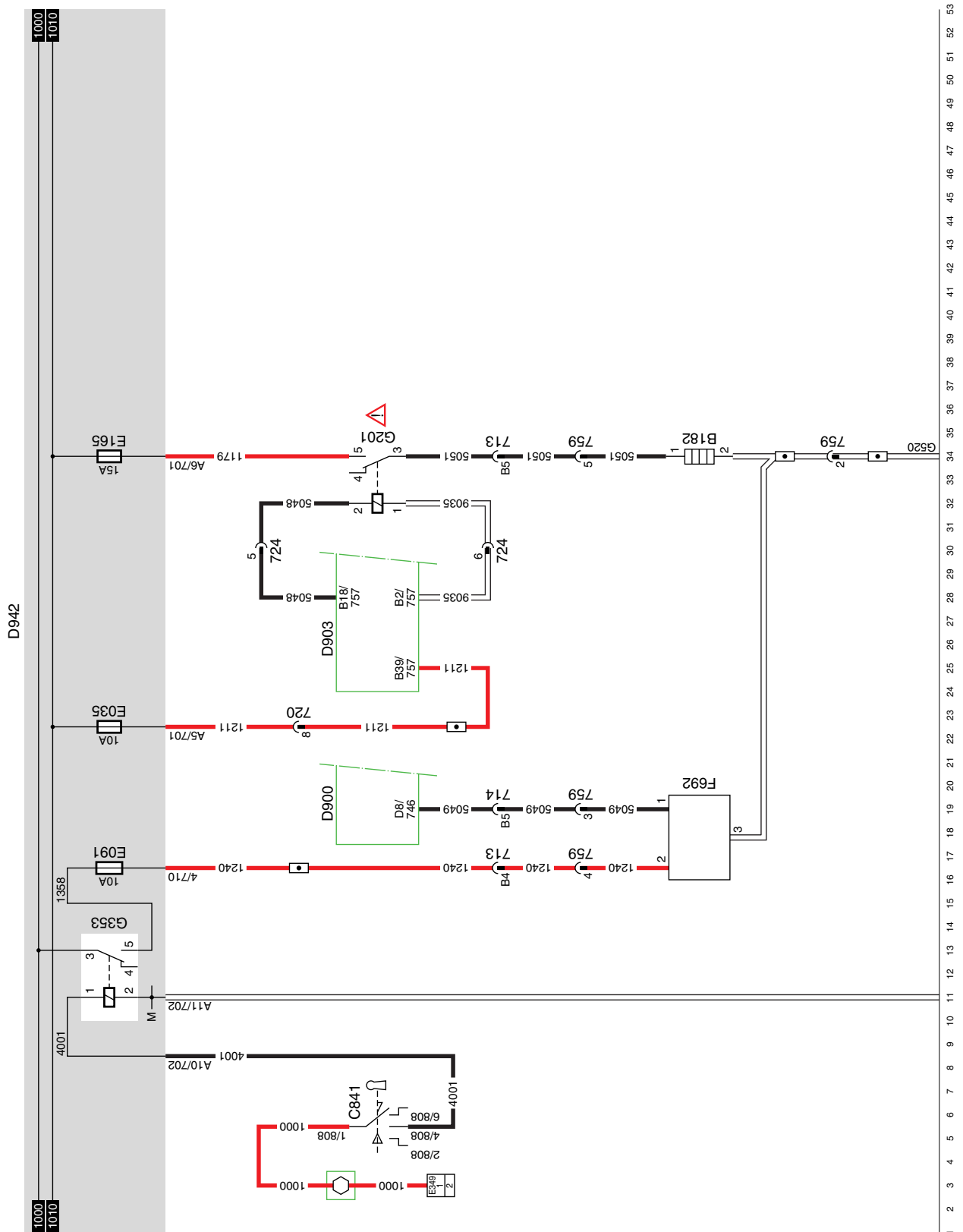
VARIANTS**Location**

34 Fuel heating relay G201:
May be placed behind the central box.

FUEL PRE-HEATING

Depending on the temperature, the ECS-DC3 electronic unit (D903) activates the fuel heater relay (G201).

The relay supplies power to the water separator fuel heating element (B182) through fuse E165.



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40. AIRBAG/SEAT BELT TENSIONER FOR MORE INFORMATION SEE SYSTEM MANUAL

SAFETY INSTRUCTIONS

- Never disconnect an electrical connection in the airbag or seat belt tensioner circuits with the ignition switched on.
- Repairing or modifying the wiring of pyrotechnic systems (systems with airbag(s) and/or seat belt tensioner(s)) is not permitted. The wiring must be replaced if damaged.
- The pyrotechnic units (airbags and/or seat belt tensioners) must be checked using the DAVIE-XD Direct Test. Test lamps, multimeters and oscilloscopes (including those that are part of DAVIE-XD) present a danger and are therefore not permitted.
- Only the wiring harnesses may be checked using test lamps, multimeters or oscilloscopes. Ensure beforehand that no pyrotechnic or electronic units whatsoever are still connected to the wiring harness to be tested.
- Before any work is carried out on a pyrotechnic part (airbag and/or seat belt tensioner):
 - a. switch off the ignition.
 - b. the battery terminal clamp must be carefully separated from the negative terminal.
 - c. wait at least 5 minutes.

ELECTRICAL SYSTEM

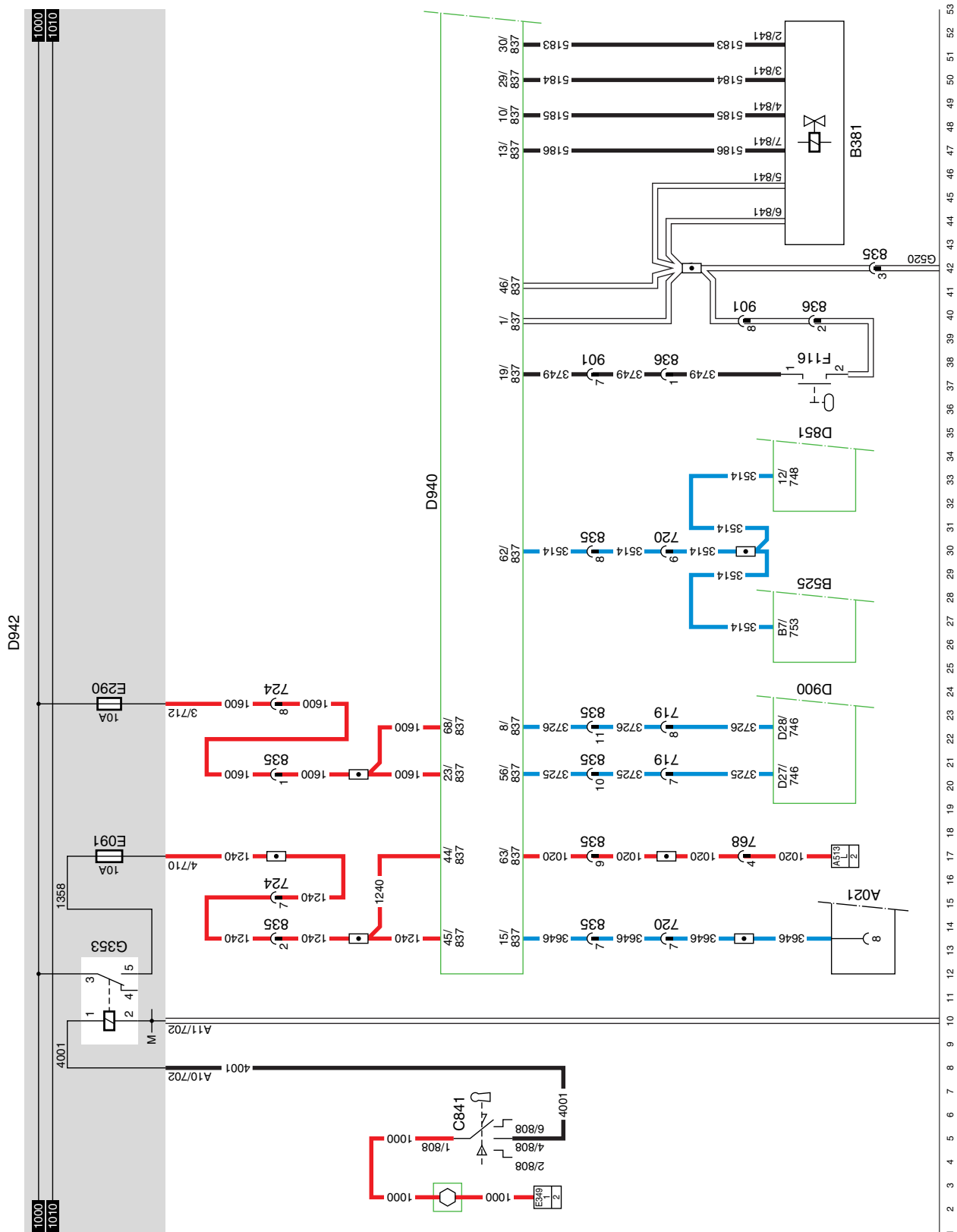
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Electrical system

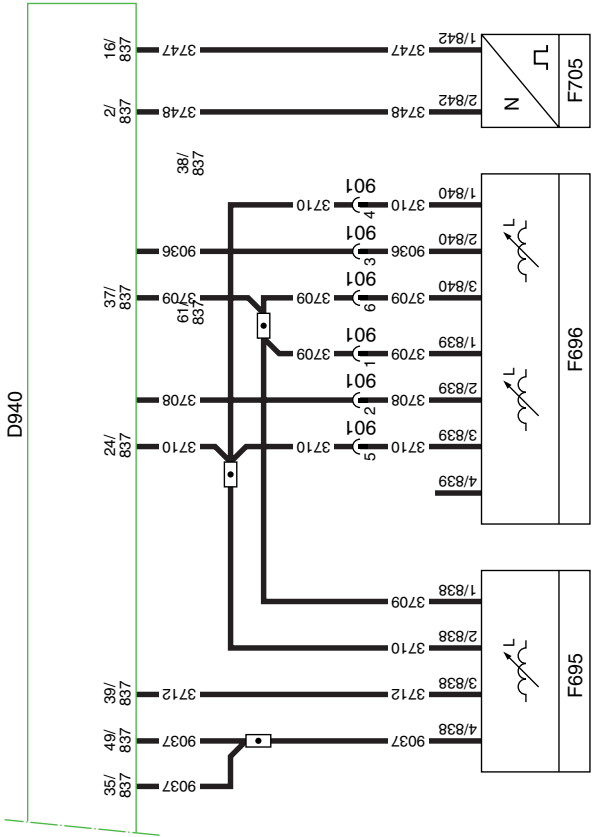
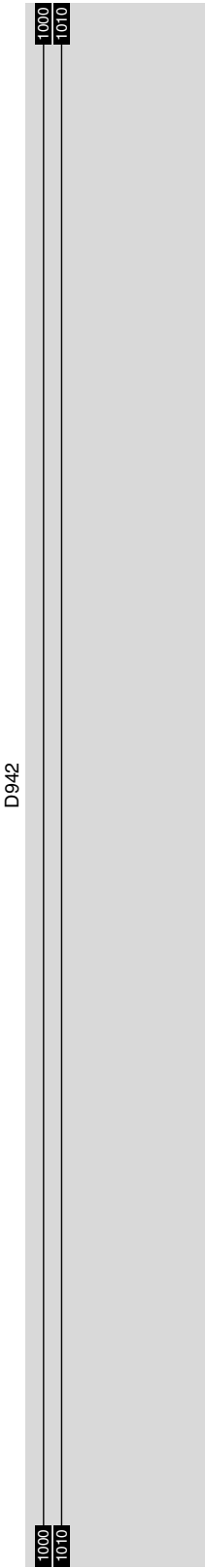
LF45/55 series

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**41. RAS-EC
FOR MORE INFORMATION SEE SYSTEM
MANUAL**



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EL001617

54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

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2.1 Overview of the changes in the electrical system	2-1	200440
2.2 Circuit diagram 1427090/04	2-2	200440
2.3 Overview of basic codes for circuit diagram 1427090/04	2-3	200440
2.4 Section diagrams from circuit diagram 1427090/04	2-13 ...	200440

CHANGES IN THE ELECTRICAL SYSTEM

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Contents

LF45/55 series

1. INTRODUCTION

This main group includes the entire electrical system shown in the form of **circuit diagrams** and an **overview of connectors/pin allocations**.

Circuit diagrams

All information that relates to the complete electrical system of the vehicle is found in the circuit diagrams with the exception of the connectors.

Note:

For the location of the connectors in the vehicle, see "Location of connectors".

CHANGES IN THE ELECTRICAL SYSTEM

5

Introduction

LF45/55 series

5**CHANGES IN THE ELECTRICAL SYSTEM****LF45/55 series**

Changes in the electrical system from chassis number 0L247507

2. CHANGES IN THE ELECTRICAL SYSTEM FROM CHASSIS NUMBER 0L247507**2.1 OVERVIEW OF THE CHANGES IN THE ELECTRICAL SYSTEM**

Section diagram	Electrical system	Changes	From chassis number
A	Voltage before and after contact	Battery earth and starter motor modified for LF55	0L247507
C	CAN overview	CDM-unit (D969) added	0L252611
1	Main switch	Battery earth and starter motor modified for LF55	0L247507
2	Ignition/starter switch/charging circuit	Battery earth and starter motor modified for LF55	0L247507
5	Pre-glowing	Battery earth and starter motor modified for LF55	0L247507
8	VIC	Connector 858 changed to 952 for LF45	0L248731
10	Reversing lights/buzzer	LF45 wiring harness modified	0L248731
12	Stop lights/cab tilting gear	CDM variant added	0L252611
13	Differential lock	LF45 wiring harness modified	0L248731
15	Mirror heating/windscreen heating/mirror adjustment	Battery earth and starter motor modified for LF55	0L247507
19	Horn/cigar lighter/work lamp/air dryer	CDM variant added	0L252611
22	ECS-DC3/exhaust brake	- Oil pressure sensor (F647) replaced by engine oil pressure control switch (F011) - Fuel temperature sensor (F566) no longer fitted	0L253643
24	AGC automatic gearbox (AT1000/2000)	Battery earth and starter motor modified for LF55	0L247507
25	AGC automatic gearbox (MD3060)	Battery earth and starter motor modified for LF55	0L247507
31	CDS-3/drop glass operation/roof hatch	CDM variant added	0L252611
32	CDM	New	0L252611
39	Water separator/fuel pre-heating	CDM variant added	0L252611

The other section diagrams from circuit diagram 1427090/04 contain no functional changes compared with circuit diagram 1427090/03.

CHANGES IN THE ELECTRICAL SYSTEM

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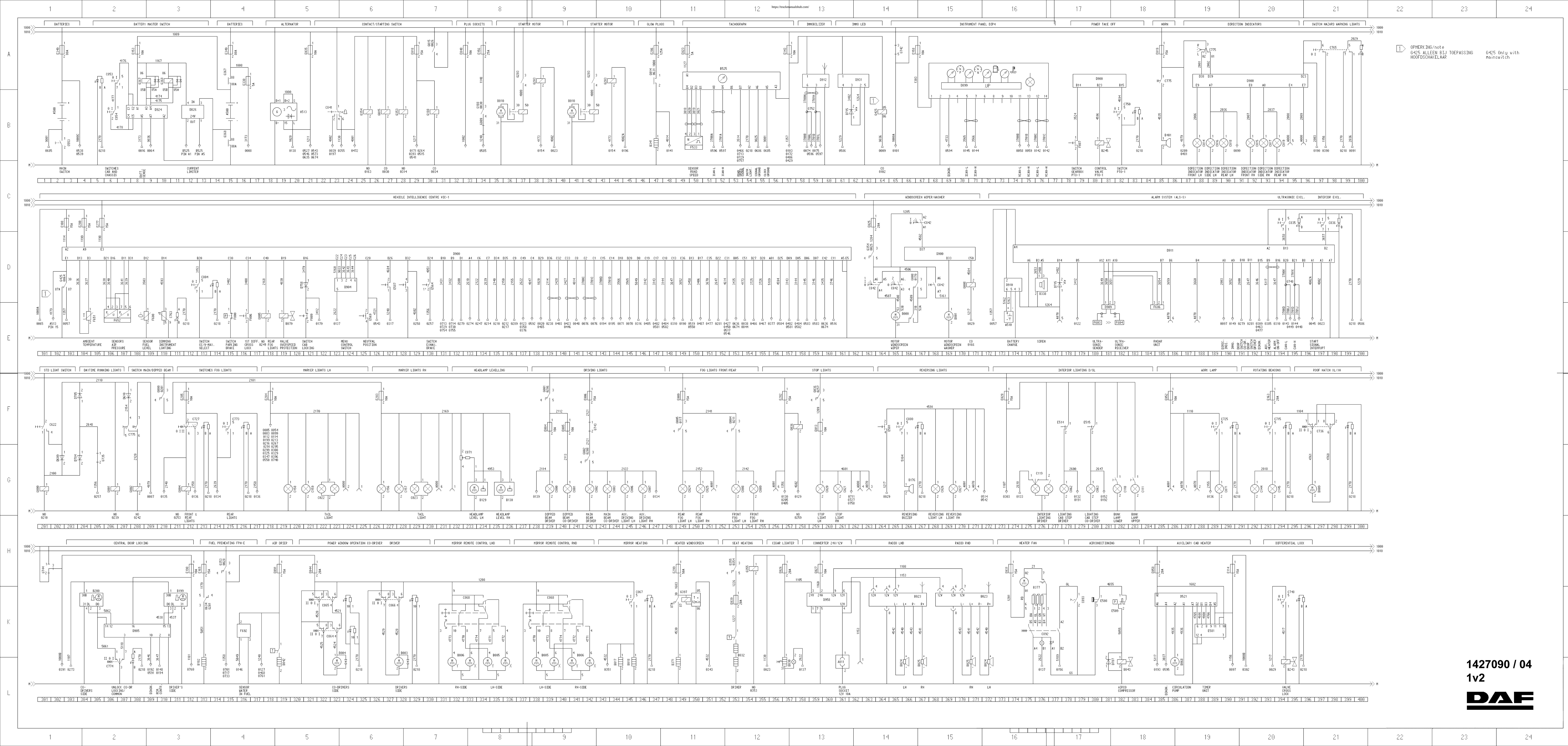
Changes in the electrical system from chassis number 0L247507

LF45/55 series

2.2 CIRCUIT DIAGRAM 1427090/04

This page can be used to make your own notes on the circuit diagram.

[illegible]





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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

2.3 OVERVIEW OF BASIC CODES FOR CIRCUIT DIAGRAM 1427090/04

- 1 Basic code number
- 2 Description
- 3 Number on search bar

1	2	3
A000	Drawn vehicle socket (7-pin)	0095 0096 0224 0231 0262 0681
A001	Rear fog light/reversing light socket (7-pin)	0251 0256 0270 0286 0682
A004	Socket, ABS/EBS, drawn vehicle (7-pin)	0403
A011	Socket, 12 V accessories (2-pin)	0361
A021	Diagnostic socket (16-pin)	0592
A032	AGC diagnostic socket	0528 0574
A068	Application connector, engine speed control	581
A070	Application connector, superstructure (8-pin)	0177 0186 0188 0263 0271 0287 0288 0682
A074	Automatic gearbox socket, superstructure	0568
A087	CCU/CDM socket (2-pin)	0599
A096	Automatic gearbox socket, superstructure (AT2000)	0522
A500	Batteries (2x)	0002 0015
A510	Alarm system battery	0174
A513	Alternator	0019
B000	Windscreen wiper motor	0165
B001	Windscreen wiper pump	0169
B003	Electric drop glass operation motor, driver's side	0328
B004	Electric drop glass operation motor, co-driver's side	0323
B005	Mirror adjustment motor, left	0335 0339
B006	Mirror adjustment motor, right	0332 0342
B009	Roof hatch motor	0297
B010	Starter motor	0035 0041
B017	Mirror heating, driver's side	0344
B018	Mirror heating, co-driver's side	0345
B023	Radio	0366 0371
B024	Loudspeaker, left	0365 0372

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

1	2	3
B025	Loudspeaker, right	0367 0371
B030	Cigar lighter, driver's side	0357
B032	Seat heating, driver's side	0353
B042	Air dryer heating element	0319
B043	Air conditioning compressor	0382
B068	Fuel metering pump, cab heater	0386
B079	Low-range downshift protection valve	0119
B129	Left-hand headlamp height adjuster motor	0234
B130	Right-hand headlamp height adjuster motor	0236
B131	Solenoid valve, pump unit/injector, cylinder 1	0613 0651
B132	Solenoid valve, pump unit/injector, cylinder 2	0615 0659
B133	Solenoid valve, pump unit/injector, cylinder 3	0616 0658
B134	Solenoid valve, pump unit/injector, cylinder 4	0618 0654
B135	Solenoid valve, pump unit/injector, cylinder 5	0619
B136	Solenoid valve, pump unit/injector, cylinder 6	0621
B176	Reversing buzzer	0266
B182	Water separator fuel heating element	0313
B192	Exhaust brake valve	0633 0671
B199	Central door locking motor, driver's side	0311
B200	Central door locking motor, co-driver's side	0304
B201	Internal electrical components for automatic gearbox	0510 0561
B237	ABS/ASR-D differential lock valve, rear axle	0443
B238	ECAS valve, driven axle, air supply	725
B243	Cross-axle differential lock control valve	0394
B245	PTO 1 control valve	0080
B250	ECAS valve, driven axle, air supply	0709
B253	ECAS valve, driven axle, air supply	0749
B254	ECAS valve, steered leading axle/trailing axle, lifting bellows	0753
B256	ABS valve, front axle, left	0413 0436
B257	ABS valve, front axle, right	0414 0438
B258	ABS valve, driven axle, left	0416 0439
B259	ABS valve, driven axle, right	0441

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

1	2	3
B334	Fuel pump control solenoid valve	0612 0650
B338	Alarm system horn	0176
B341	Glow element	0047
B360	Seat belt tensioner, driver's side	0474
B361	Airbag module	0476
B371	Windscreen heating	0349
B377	Heater motor	0375
B381	RAS-EC valve block	0454
B399	Cooling fan 1, AGC automatic gearbox	0501 0535
B400	Cooling fan 2, AGC automatic gearbox	0537
B401	Horn	0085
B402	ABS resistor	0428
B525	Modular tachograph (MTCO)	0052
C000	Dipped beam, left	0239
C001	Dipped beam, right	0241
C002	Main beam, left	0242
C003	Main beam, right	0244
C006	Left spotlight	0245
C007	Right spotlight	0246
C008	Fog lamp, front left	0253
C009	Fog lamp, front right	0255
C014	Direction indicator lamp, front left	0088
C015	Direction indicator lamp, front right	0092
C016	Direction indicator lamp, side left	0089
C017	Direction indicator lamp, side right	0093
C018	Direction indicator lamp, rear left	0090
C019	Direction indicator lamp, rear right	0094
C020	Stop light, left	0259
C021	Stop light, right	0261
C022	Rear light, left	0222
C023	Rear light, right	0229
C024	Fog lamp, rear left	0249

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

1	2	3
C025	Fog lamp, rear right	0251
C026	Reversing light, left	0268
C027	Reversing light, right	0270
C062	Stepwell lighting, left	0278
C063	Stepwell lighting, right	0280
C071	Work lamp	0289
C110	Bunk light, bottom	0282
C111	Bunk light, top	0283
C119	Interior lighting with switch, driver's side	0276
C144	Rotating beam, left	0292
C145	Rotating beam, right	0293
C156	Marker light, left, 1 st	0226
C157	Marker light, right, 1 st	0228
C158	Marker light, left, 2 nd	0219
C159	Marker light, right, 2 nd	0221
C553	Mechanical main switch	0002
C622	Lighting switch	0201
C715	Rotating beam switch	0293
C725	Work lamp switch	0289
C727	Fog lamp switch, front/rear	0212
C736	Roof hatch switch	0297
C742	Traction assistance switch	0739
C748	Cross-axle differential lock switch	0394
C750	PTO 1 switch	0082
D758	Diode to prevent feedback to the VIC	120
C763	Instrument lighting dimming potentiometer	0110
C765	Switch for warning lamps	0098
C773	Fog lamp switch, rear	0215
C774	Central door locking switch	0306
C775	Steering column switch, direction indicators/horn/dipped beam/ main beam	0085 0088 0208
C804	Switch, adjustable speed limiter	0113
C835	Switch to turn off interior detection	0194

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

1	2	3
C836	Switch to turn off superstructure/drawn vehicle loadspace detection	0197
C841	Accessories / ignition / starter switch	0023
C842	Windscreen wipers/washer steering column switch	0163 0165 0167 0168
C853	Cab main switch	0006
C854	Chassis main switch	0006
C864	Drop glass operation switch, co-driver's side (driver's side door)	0323
C865	Drop glass operation switch, co-driver's side (co-driver's side door)	0322
C866	Drop glass operation switch, driver's side (driver's side door)	0327
C867	Mirror heating switch	0345
C868	Mirror adjustment switch	0333 0339
C871	Potentiometer, headlamp height adjustment	0233
C880	Reversing buzzer switch	0266
C891	Steering column switch, windscreen wiper/washer, cruise control, engine speed control	0483
C892	Heater fan switch	0376
C893	Air conditioning switch	0379
D521	Electronic unit, cab heater	0387
D529	Remote control system, ECAS	0702 0718 0735
D609	Light switch diode	0202
D610	Diode, main beam/dipped beam	0208
D715	Alarm system LED	0177
D784	Diode, Swedish lighting	0204
D785	Diode, Swedish lighting	0204
D787	Diode, air conditioning compressor link	0381
D802	Electronic unit, ECAS-2 (6x2)	0748
D822	AGC vehicle interface module	0541
D826	Electronic unit for VLG current limiter	0012
D851	Electronic unit, ECAS-3 (4x2)	0710 0726
D866	Electronic unit, AGC-A4 automatic gearbox control	0552
D867	Automatic gearbox selector	0553
D899	DIP-4 instrument panel	0070

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

1	2	3
D900	Electronic unit, VIC	0080 0091 0132
D903	Electronic unit, ECS-DC3	0620 0659
D904	Menu Control Switch, MCS	0124
D905	Electronic unit, CDS	0308
D909	Electronic unit, alarm system, ultrasonic	0181
D910	Electronic unit, battery charger	0174
D911	Electronic unit, ALS-S alarm system	0186
D912	Electronic unit, immobiliser	0060
D924	Electronic unit for main switch	0010
D926	Electronic unit, airbag/seat belt tensioner	0476
D931	LED unit, immobiliser	0063
D936	Electronic unit for automatic gearbox (AGC-T1000/2000)	0514
D940	Electronic unit, RAS-EC	0461
D941	Electronic unit, ABS/ASR, D version	0417
D942	Fuse box	-
D958	Electronic unit, converter with power supply for radio memory	0360
D960	Airbag contact unit	0475
D961	Electronic unit, ABS/ASR, E version	0440
D969	Electronic unit, CDM	0761
E004	Fuse, dipped beam, driver's side	0239
E005	Fuse, dipped beam, co-driver's side	0240
E006	Fuse, main beam, driver's side	0242
E009	Fuse, front fog lamps	0249
E013	Fuse, stop lights	0259
E018	Fuse, windscreen wiper motor	0029
E019	Fuse, horn	0085
E023	Fuse, switch, tachograph timer	0049
E025	Fuse, windscreen wiper motor/windscreen washer motor	0163
E026	Fuse, cigar lighter/door switches/electronic unit, 24/12 V converter with power supply for radio memory	0357
E027	Fuse, electronic unit, 24/12 V converter, with power supply for radio memory	0359
E028	Fuse, interior lighting/bunk lights/central door lock	0273

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

1	2	3
E031	Fuse, heater fan	0373
E035	Fuse, instruments and warning lamps/parking brake switch/power supply after contact	0021
E039	Fuse, seat heating	0353
E043	Fuse, ABS, drawn vehicle	0401
E044	Fuse, mirror heating/electric mirror adjustment/electric drop glass operation	0321
E048	Fuse, drawn vehicle power supply	0033
E051	Fuse, ECAS	0734
E052	Fuse, work lamp	0286
E053	Fuse, diagnostic connector/LED unit/alarm system	0587
E058	Fuse, cab heater	0385
E062	Fuse, ECAS	0703 0719
E091	Fuse, air dryer heating element/water separator/RAS-EC/engine speed control application connector	0319
E108	Fuse, VIC	0103
E114	Fuse, cab heater/warning lamps	0390
E143	Fuse, tachograph/alarm system/immobiliser/ABS-D/ABS/ASR-E	0057
E144	Fuse, AGC-A4 automatic gearbox	0504
E153	Fuse, power supply for main switch	0008
E156	Fuse, accessories lighting	0034
E158	Fuse, DIP-4 instrument panel	0067
E160	Fuse, ECS-DC3	0601 0640
E163	Fuse, rotating beams/roof hatch	0293
E165	Fuse, FPH-E fuel heater after contact	0313
E190	Fuse, ABS-D / ABS / ASR-E	0427 0450
E198	Fuse, central door lock	0308
E277	Fuse, VIC	0106
E279	Fuse, generator voltage control	0021
E280	Fuse, VIC	0104
E282	Fuse, engine brake switch/stop light switch	0257
E283	Fuse, headlamp height adjustment/width marker light, 1 st , left and right/tail light, right	0226

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

1	2	3
E284	Fuse, width marker light, 2 nd , left and right/tail light, left /search lighting	0218
E285	Fuse, VIC/fog light switch	0212
E286	Main fuse	0047
E290	Fuse, RAS-EC	0453
E297	Fuse, airbag and seat belt tensioner system	0473
E299	Fuse, windscreen heating	0349
E330	Fuse, 'sens' wire main switches	0016
E349	Main fuse, cab	0002 0015
E354	Fuse, automatic gearbox, AGC fan	0501 0534
E501	Reversing light switch	0264
E508	Temperature switch for air conditioning compressor	0380
E509	Air conditioning switch, high/low pressure	0382
E514	Cab stepwell lighting/interior lighting door switch, driver's side	0278
E515	Cab stepwell lighting/interior lighting door switch, co-driver's side	0280
E564	Engine brake switch	0130
E569	Neutral position switch, gearbox	0125
E581	Cab heater timer unit	0388
E585	Selector switch, automatic gearbox (AT 1000/2000)	0515
E587	Switch for stop lights/clutch	0127
E597	Switch, cooling fans, automatic gearbox (AGC)	0501
F000	Parking brake switch	0115
F006	Differential lock control switch, 1 st differential	0116
F009	Control switch, cab tilting	0121
F011	Control switch, engine oil pressure	0608 0647
F087	Control switch, gearbox PTO	0079
F107	Control switch, brake lining wear, front left	0488
F108	Control switch, brake lining wear, front right	0490
F111	Control switch, brake lining wear, rear left	0492
F112	Control switch, brake lining wear, rear right	0493
F113	Control switch, brake lining wear, rear left, 2 nd rear axle (6x2)	0495
F114	Control switch, brake lining wear, rear right, 2 nd rear axle (6x2)	0497

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

1	2	3
F116	Oil level switch, RAS-EC	0462
F512	Wheel speed sensor, front axle, left	0407 0430
F513	Wheel speed sensor, front axle, right	0408 0432
F514	Wheel speed sensor, driven axle, left	0410 0433
F515	Wheel speed sensor, driven axle, right	0411 0435
F533	Vehicle speed sensor	0050
F552	Crankshaft sensor	0601 0640
F558	Camshaft sensor	0603 0641
F566	Coolant temperature sensor	0605 0644
F601	Output shaft speed sensor, automatic gearbox	0504 0556
F602	Input shaft speed sensor, automatic gearbox	0505 0557
F603	Ultrasonic transmitter	0180
F604	Ultrasonic receiver	0182
F608	Fuel level sensor	0109
F612	Height sensor, ECAS, rear axle, left	0705 0721 0742
F613	Height sensor, ECAS, rear axle, right	0707 0743
F615	Pressure sensor, ECAS, driven axle, left/right	0746
F648	Fuel rail pressure sensor	0607 0645
F649	Charge boost pressure and temperature sensor	0610 0647
F651	Ambient temperature sensor	0104
F652	Air pressure sensor	0106
F670	Sensor, turbine speed, automatic gearbox	0507
F671	Accelerator pedal sensor, ECS-DC3	0623 0662
F686	Radar sensor, alarm system	0185
F692	Water separator sensor	0316
F695	Angle sensor, trailing axle	0457
F696	Angle sensor, front axle	0459
F705	Speed sensor, AS Tronic	0455
G000	Rear light/marker light and search light relay	0201 0210
G001	Dipped beam relay	0206 0239
G002	Main beam relay	0208 0242
G004	Relay, front fog lamp	0212 0253

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

1	2	3
G005	Relay, rear fog lamp	0118 0249
G008	Windscreen wiper relay	0166 0171
G014	Glow plug relay	0047 0631 0669
G015	Contact relay	0027 0030
G036	Stop light relay	0258 0259
G185	Starting circuit interrupter relay	0541 (in VIM D822)
G188	Lighting relay, accessories	0030 0034
G201	Fuel heating relay, FPH-E	0313 0634 0673
G203	Transfer relay, starter motor	0037 0038 0042 0044
G294	Relay, automatic gearbox	0541 (in VIM D822)
G350	Reversing light relay, automatic gearbox	0541 (in VIM D822)
G353	Contact relay	0028 0314
G354	Windscreen wiper relay	0025 0163
G355	Seat heating relay	0353 0354
G367	Main switch relay, power supply	0008
G368	Main switch relay, earth	0010 0015
G397	Windscreen heating relay	0349
G425	Main switch relay	0064 0102
G444	Cooling fan relay, automatic gearbox (AGC-A4)	0534 0535
G507	Earth, 1-pin, chassis - cab	-
G516	Central cab earth, co-driver's side	-
G517	Central cab earth, driver's side	-
G520	Central earth, chassis, front end	-
G522	Central earth, starter motor	-
G523	Central earth, engine	-
G524	Earth point, glow element	-
G525	Central earth, flywheel	-
G528	Earth point, cab, airbag LHD/cab heater RHD	-
G529	Earth point, cab, cab heater LHD/airbag RHD	-
G735	Through-connection, Swedish lighting	0205
G742	Through-connection, VIC/DIP-4	0065
G743	Through-connection, main beam	0242

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

1	2	3
G744	Through-connection, cab heater/warning lamps/central door locking	0301
G748	Node, V-CAN	0195
G750	Node, V-CAN	0448 0599
G752	Node, V-CAN	0059
G753	Node, V-CAN	0596

2.4 SECTION DIAGRAMS FROM CIRCUIT DIAGRAM 1427090/04

Section diagram no.	Title of section diagram
A	Voltage before and after contact
C	CAN overview
1	Main switch
2	Ignition/starter switch/charging circuit
5	Pre-glowing
8	VIC
10	Reversing lights/buzzer
12	Stop lights/cab tilting gear
13	Differential lock
15	Mirror heating/windscreen heating/mirror adjustment
19	Horn/cigar lighter/work lamp/air dryer
22	ECS-DC3/exhaust brake
24	AGC automatic gearbox (AT1000/2000)
25	AGC automatic gearbox (MD3060)
31	CDS-3/drop glass operation/roof hatch
32	CDM
39	Water separator/fuel pre-heating

CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series

11

A VOLTAGE BEFORE AND AFTER CONTACT

VOLTAGE BEFORE CONTACT

Wire 1000 runs from the batteries (A500) to the starter motor (B010), connecting point 30, and via the main fuse (E349, 80 A) to dashboard lead-through zone 1. Wire 1000 runs from the main fuse (E286, 125 A) to the glow plug relay (G014). Wire 1000 and the + distribution bolt in dashboard lead-through zone 1 provide a constant voltage at pins 1 and 2 of connector 705 on the PCB.

This provides "voltage before contact" for the entire PCB. Power is also provided (by wire 1000) from point 30 on the starter motor to the B+1 connection of the alternator (A513). Wire 1000 goes from the + distribution bolt to the ignition/starter switch (C841).

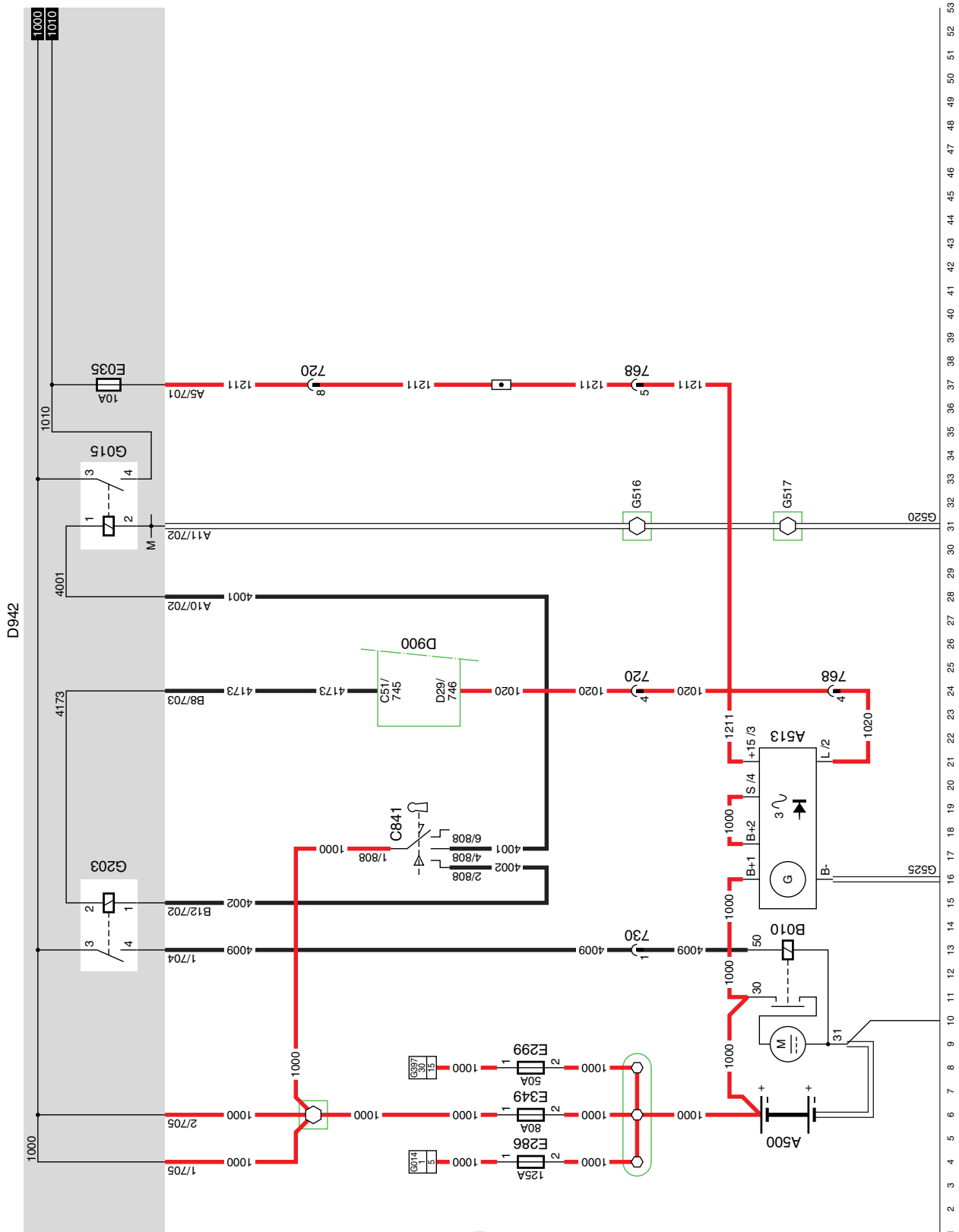
VOLTAGE AFTER CONTACT

When the ignition/starter switch (C841) is set to the "contact" position (connection between points 1 and 4), relay G015 is energised via wire 4001.

This then connects wire 1000 (voltage before contact) to wire 1010 (voltage after contact).

When the ignition/starter switch (C841) is turned against the spring pressure (connection between points 1 and 2), relay G015 remains activated.

When the ignition/starter key is released, the contact/starter switch automatically springs back and remains in the "contact" position.



A

1427090/04

EL001618

C CAN OVERVIEW

This section diagram gives an overview of all the CAN connections, with wire markings and connector points.

SEE THE SYSTEM MANUAL FOR MORE INFORMATION

VARIANTS

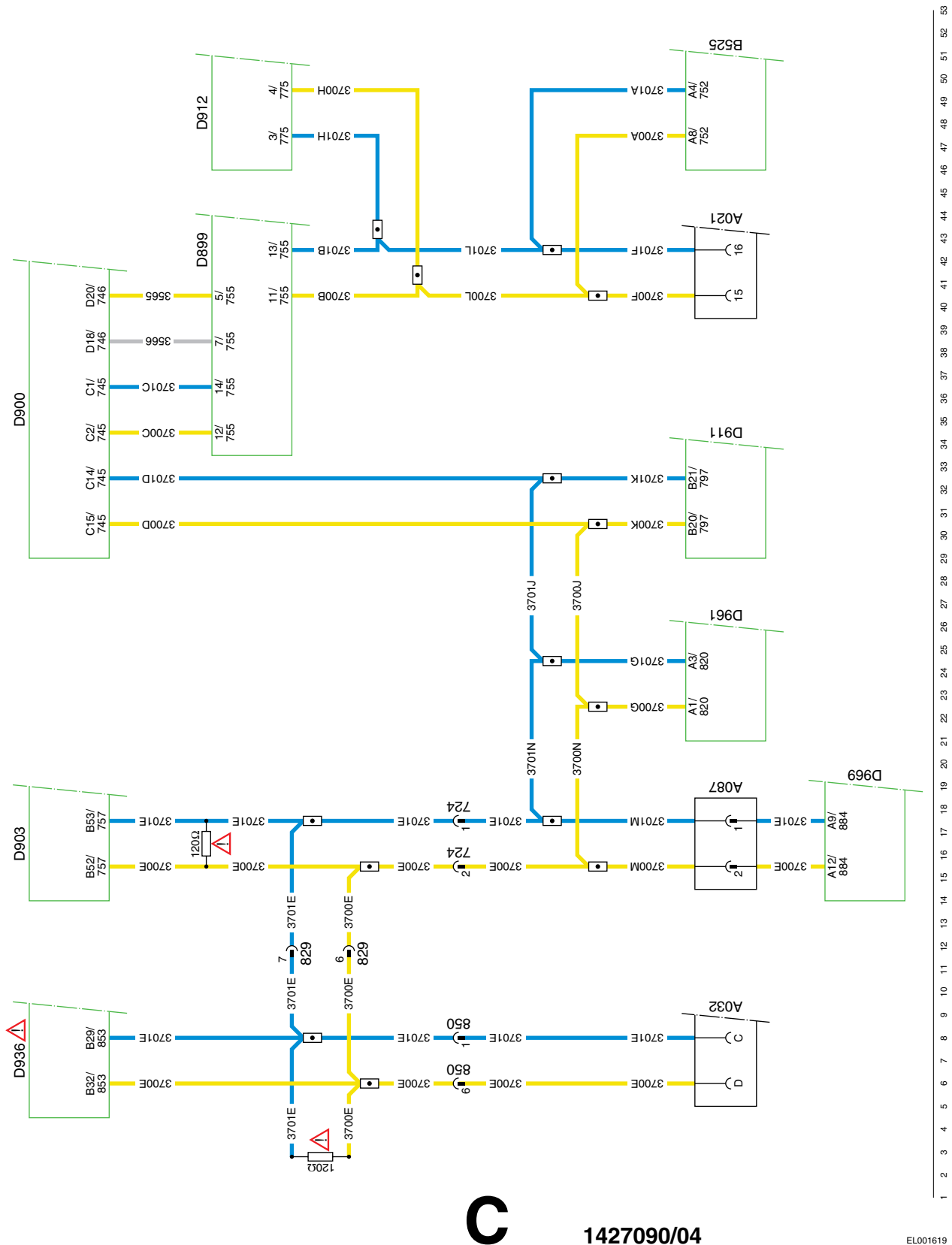
Location	
2	The terminating resistor is in the automatic transmission wiring harness
8	Electronic unit, automatic gearbox, AGC-T1000/2000 (D936): If MD3060 gearbox is fitted, the electronic unit is for AGC-A4 automatic gearbox operation (D866)
16	The terminating resistor is in the wiring harness of the ECS-DC3 engine management system

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507



CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series

11

1. MAIN SWITCH

MANUALLY OPERATED EARTH BREAKER

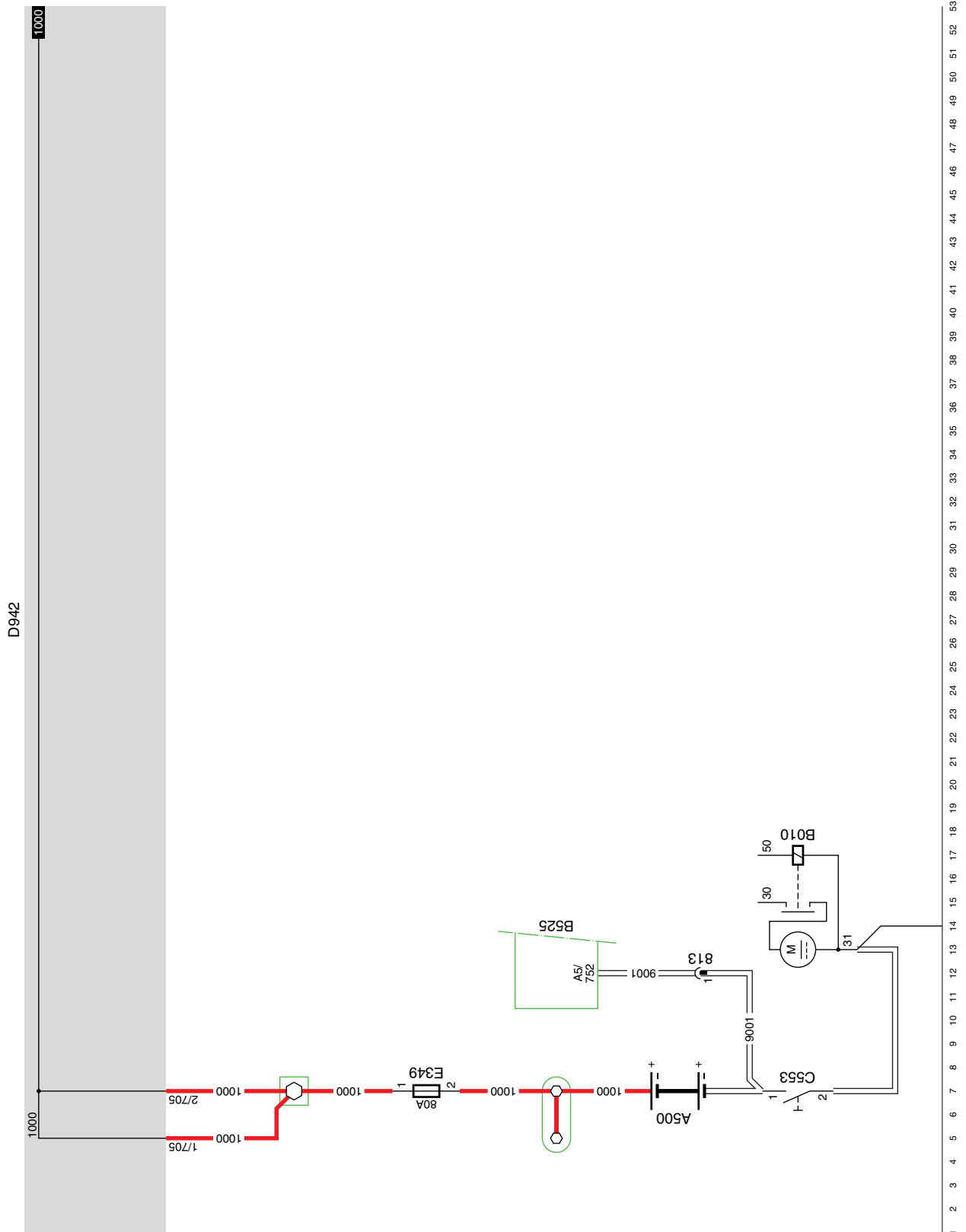
Turning main switch C553 anticlockwise will break the earth connection between the batteries (A500) and the chassis earth point. Because the tachograph (B525) must have a power supply and earth connection at all times, earth wire 9001 is connected directly to the earth connection of the batteries through 2-pin dashboard lead-through connector 813 in zone 1.

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507



1

1427090/04

EL001620

11

CHANGES IN THE ELECTRICAL SYSTEM

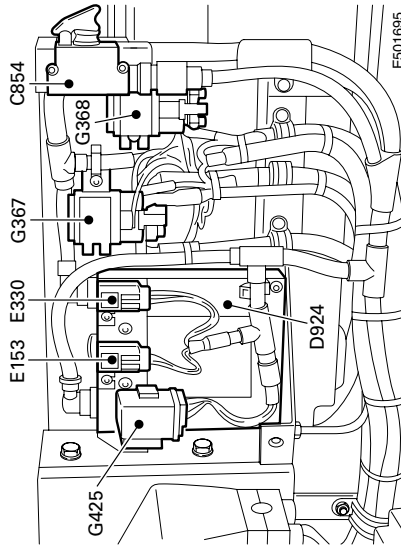
Changes in the electrical system from chassis number 0L247507

LF45/55 series

Closing the main switch electrically on the chassis



ATTENTION: switch C853 must be in the "main switch on" position (connection between contacts 5 and 7).



Switch C854 (switch for main switch on the chassis) connects the C1 connection to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178. Relays G367 and G368 are immediately energised through wire 4174 and connection point A3 (A3 is connected to earth for 0.5 seconds). This closes the connection between points 88a and 88 of both relay G367 and relay G368. The positive and the negative terminals of the batteries are now connected to the vehicle's power supply.

ELECTRICALLY OPERATED MAIN SWITCH

The main switch (D924) can be closed:

- electrically in the cab
- electrically on the chassis

Closing the main switch electrically in the cab



ATTENTION: switch C854 must be in the "main switch on" position (connection between contacts 1 and 2).

Switch C853 (switch for main switch in cab) connects the C1 and C2 connections to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178. Relays G367 and G368 are immediately energised through wire 4174 and connection point A3 (A3 is connected to earth for 0.5 seconds). This closes the connection between points 88a and 88 of both relay G367 and relay G368. The positive and the negative terminals of the batteries are now connected to the vehicle's power supply. Immediately after switch C853 closes, connection point C2 is internally connected to point A7.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

Immediately after switch C854 closes, connection point C2 is internally connected to point A7.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

The main switch (D924) can be opened:

- electrically in the cab
- electrically on the chassis

Opening the main switch electrically in the cab



ATTENTION: switch C854 must be in the "main switch on" position (connection between contacts 1 and 2).

Switch C853 (switch for main switch in cab) disconnects wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and the C1 and C2 connections from the C4 and C5 connections via wire 4178.

VARIANTS

Location	
76	G368, main switch relay, earth: Fitted depending on the requirements for transporting hazardous substances These wires are only present if ADR is fitted. These wires are only present if ADR is fitted
88, 90	Earth connection to connector 834 is only present if ADR is fitted
94	Earth connection to connector 834 is only present if ADR is fitted
97	Connector 831: Only present if the system is fitted with an external current limiter (D826)
98, 101	Connector 832: Only present if the system is fitted with an external current limiter (D826)
99	Electronic unit, VLG current limiter (D826): Fitted depending on the requirements for transporting hazardous substances. Version with production date < 2002-49: current limiter (D826) used as shown Version with production date > 2002-49 with current limiter integrated into the MTCO (B525).
98, 101	

ATTENTION: switch C853 must be in the "main switch on" position (connection between contacts 5 and 7).



Switch C854 (switch for main switch in cab) breaks the C1 and C2 connections to the C4 and C5 connections via wire 4176, contacts 5 - 7 of switch C853, wire 4177, contacts 1 - 2 of switch C854 and wire 4178.

Two actions are carried out immediately after switch C854 is opened:

1. Connection point A7 is connected to earth (A2) in the unit.
2. After a delay of approx. 6 seconds, relays G367 and G368 are connected to earth for approx. 0.5 seconds via wire 4175 and connection point A4. This breaks the connection between points 88a and 88 of relays G367 and G368. The positive and the negative terminals of the batteries are now disconnected from the vehicle's power supply.

If the engine is running, it is switched off.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

Note:

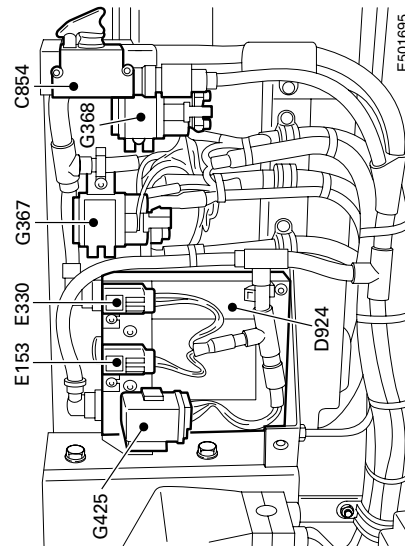
When one of the switches (C853 or C854) that activate the electronic unit (close main switch) is operated, relays G367 and G368 are activated after approximately 3 seconds. If one of the switches is operated again within the 3 seconds, the electronic unit (D924) will select the priority 'main switch ON'.

Two actions are carried out immediately after switch C853 is opened:

1. Connection point A7 is connected to earth (A2).
2. After a delay of approx. 6 seconds, relays G367 and G368 are connected to earth for approx. 0.5 sec. via wire 4175 and connection point A4. This breaks the connection between points 88a and 88 of relays G367 and G368. The positive and the negative terminals of the batteries are now disconnected from the vehicle's power supply.

If the engine is running, it is switched off.

Connection point A5 is connected to the positive terminal via wire 3173 after connection point 88 of relay G367. This connection transmits a signal to the ECU to indicate that relay G367 has switched.

Opening the main switch electrically on the chassis

CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

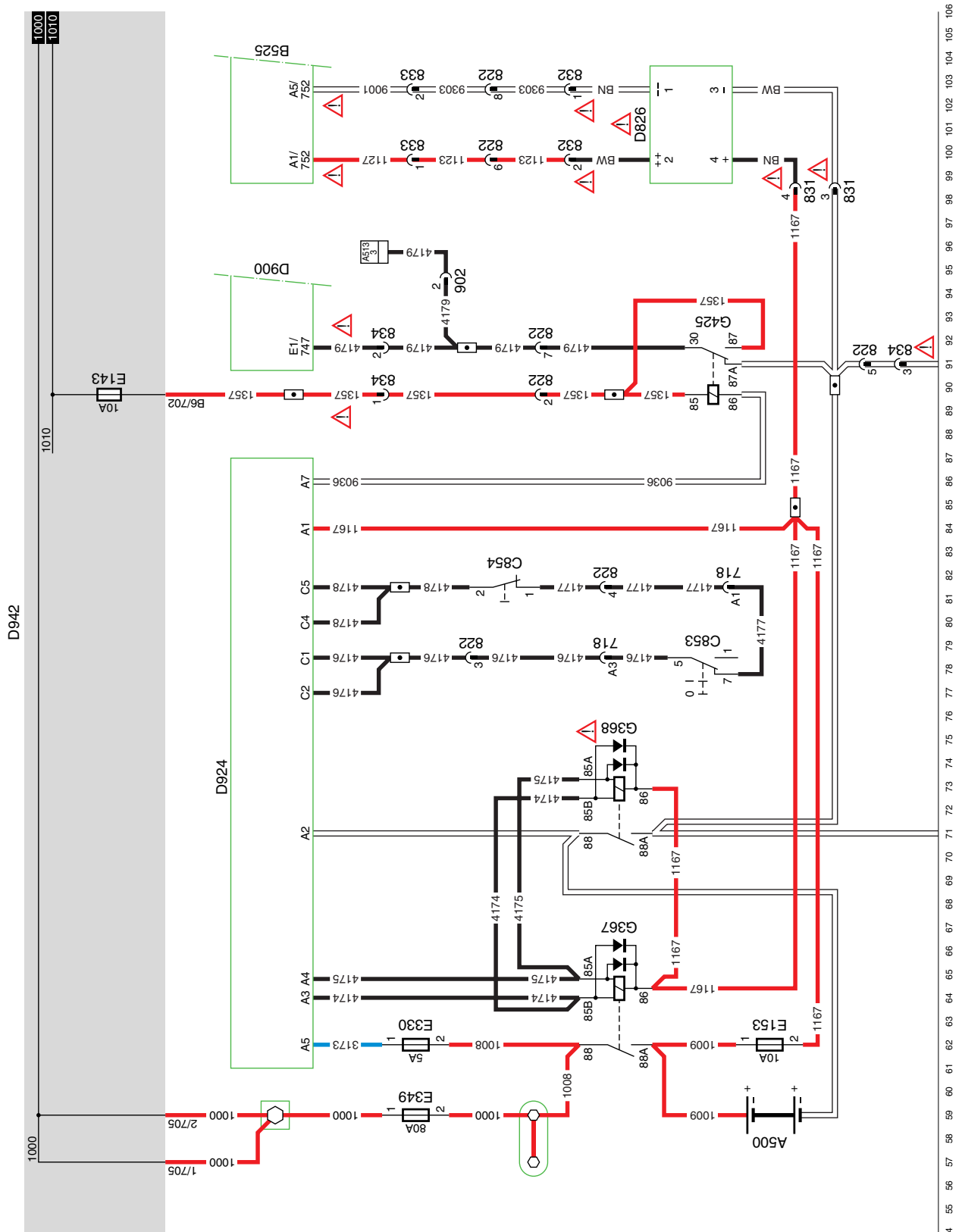
LF45/55 series

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507



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CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

2. IGNITION/STARTER SWITCH/CHARGING CIRCUIT

CONTACT CIRCUIT

When ignition/starter switch C841 is turned to the "accessories" position (contact 1 connected to contact 6), the "accessories" relay (G355) is energised via wire 1130. If ignition switch C841 is turned further (contact 1 is connected to 4), ignition relay G015 will be activated via wire 4001. Wire 1010 is supplied with power.

STARTING CIRCUIT

When the contact switch is turned to the "start" position, contacts 1 and 2 in this switch are connected. Power is supplied to relay G203 via wire 4002. The VIC (D900) connects G203 to earth when the neutral position switch (E569) in the gearbox is closed. Relay G203 now supplies power via wire 4009 to connection point 50 of the starter motor (B010). As a result, the starter motor is energised.

This means that if the gearbox is not in neutral the VIC does not connect relay G203 to earth and the relay is therefore not energised.

CHARGING CIRCUIT

When the ignition is switched on, power is supplied to both the B+ connection and connection 15 (pin 3) of the alternator.

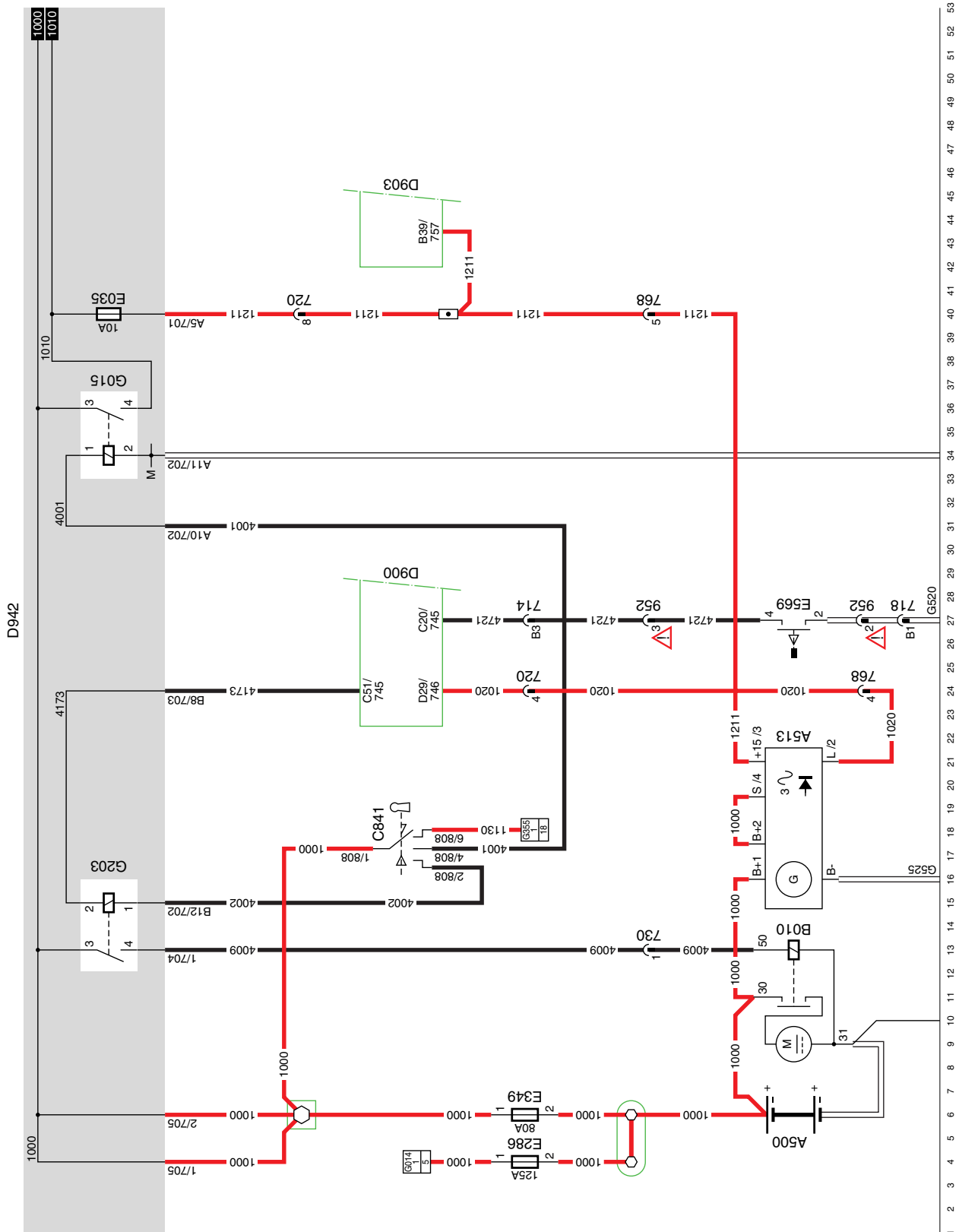
An internal resistor in the alternator is energised by an IC in the carbon brush holder. This resistor ensures that a low level of current passes through the energising resistor. This excites a magnetic field in the alternator.

After starting, the voltage on terminals B+ and 15 (pin 3) will rise to about 28.5 V. Once this voltage is reached, the control IC in the regulator interrupts the pre-exciter coil to enable the voltage to be regulated. The magnetic field will now disappear, so that the generator will not be energised for a short period of time. As a result, the voltage on outputs B+ and 15 will drop.

The regulator reactivates when the voltage drops below 27.6 V. This means that the voltage supplied by the generator remains relatively constant. The batteries are supplied through generator output B+1.

The alternator charging current warning lamp is activated via wire 1020, which is connected to the VIC (D900). The VIC controls the DIP via the CAN network. The voltage on wire 1020 is switched by the control IC. Errors are also shown on the DIP display through this connection.

The alternator is also equipped with a 'sens' connection (pin 4). However, this connection is not used and is now connected directly to B+2. The function of this connection is to correct the voltage difference between B+ and the batteries.



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CHANGES IN THE ELECTRICAL SYSTEM

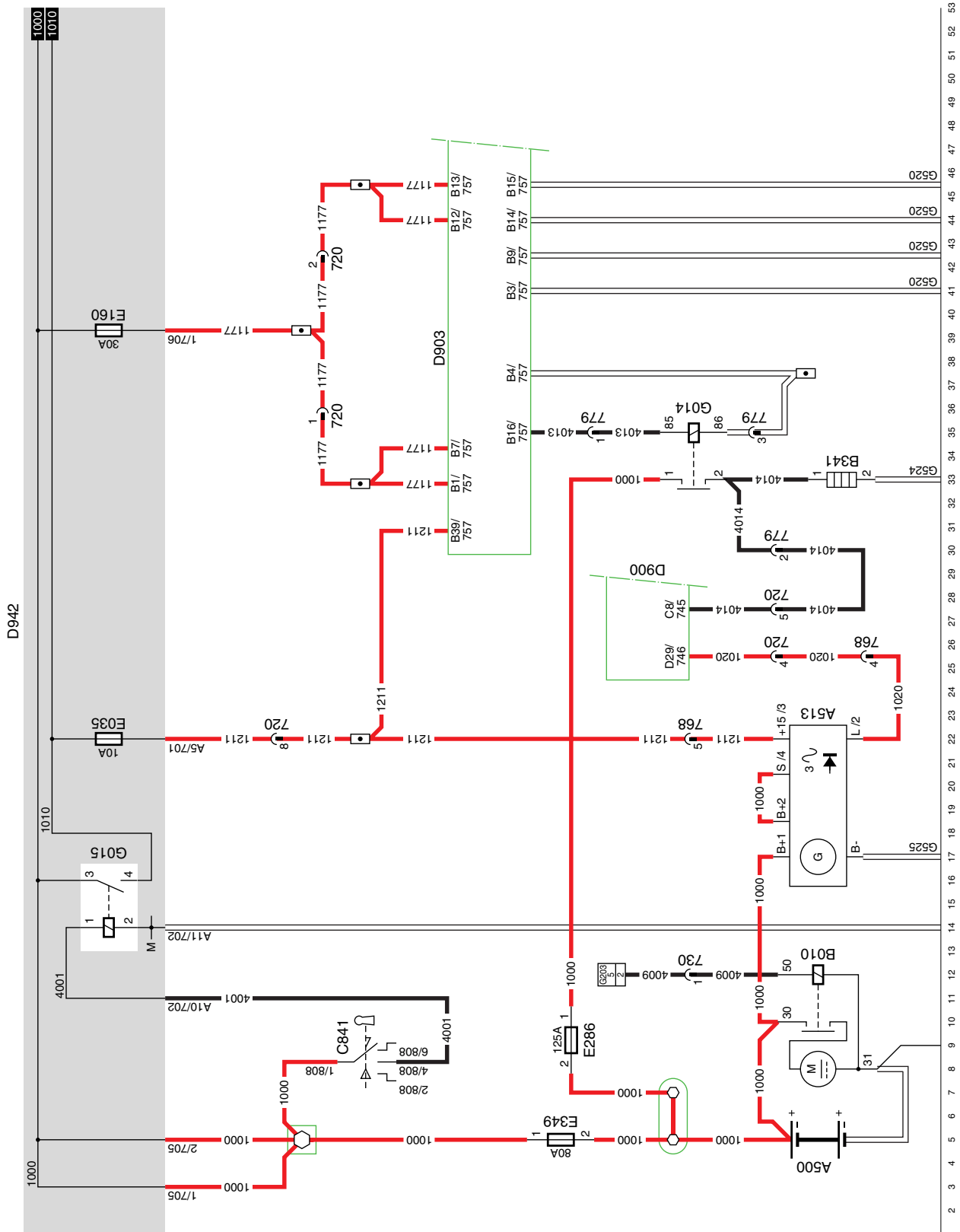
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Changes in the electrical system from chassis number 0L247507

LF45/55 series

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**5. PRE-GLOWING
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION**



CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series

8. VIC
SEE THE SYSTEM MANUAL FOR MORE
INFORMATION

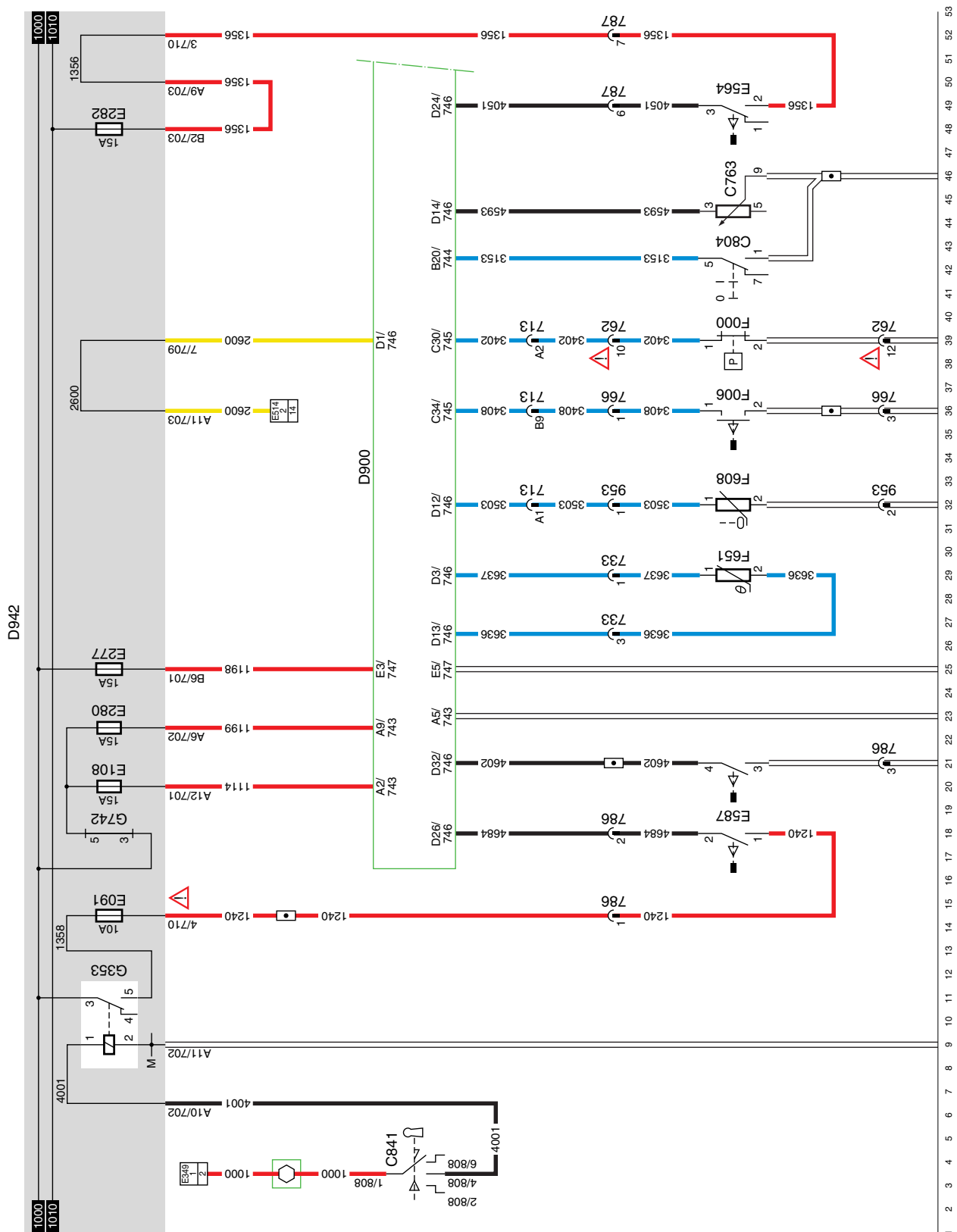
VARIANTS

Location	
14	If the vehicle is fitted with CDM, see section diagram 32
39	Connector 762: not fitted on vehicle type FT
88	Electronic unit, ABS/ASR-E (D961): If ABS-D fitted, the electronic unit is D941
116	Electronic unit, automatic gearbox, AGC-T1000/2000 (D936): If MD3060 gearbox is fitted, the electronic unit is for AGC-A4 automatic gearbox operation (D866)
138	On vehicle type LF55
156	Connector 780: Not fitted on vehicle type FA. Wire 2155 only fitted in application connector A070
182	Connector 763: Not fitted on vehicle type FT

CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

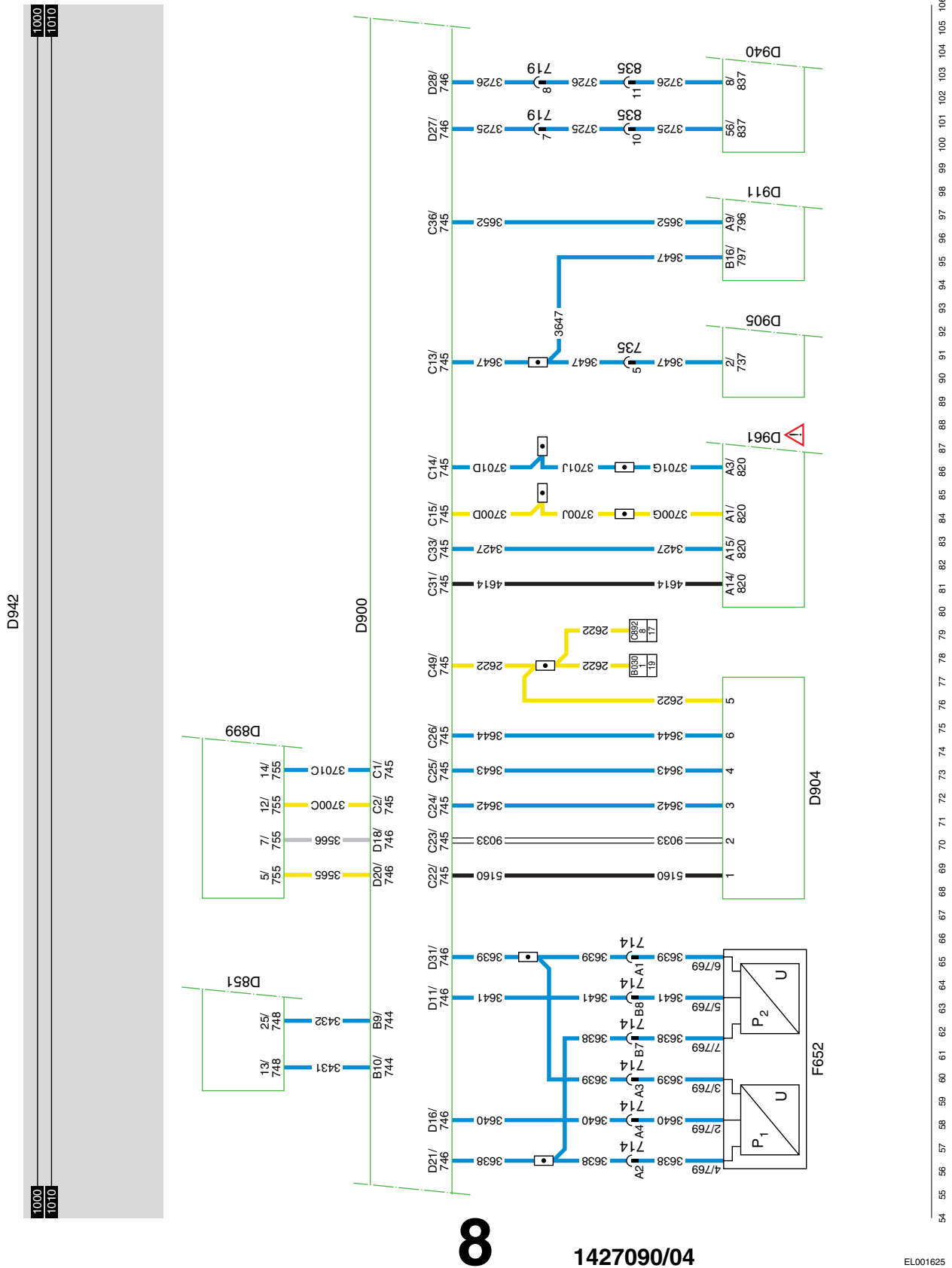


CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

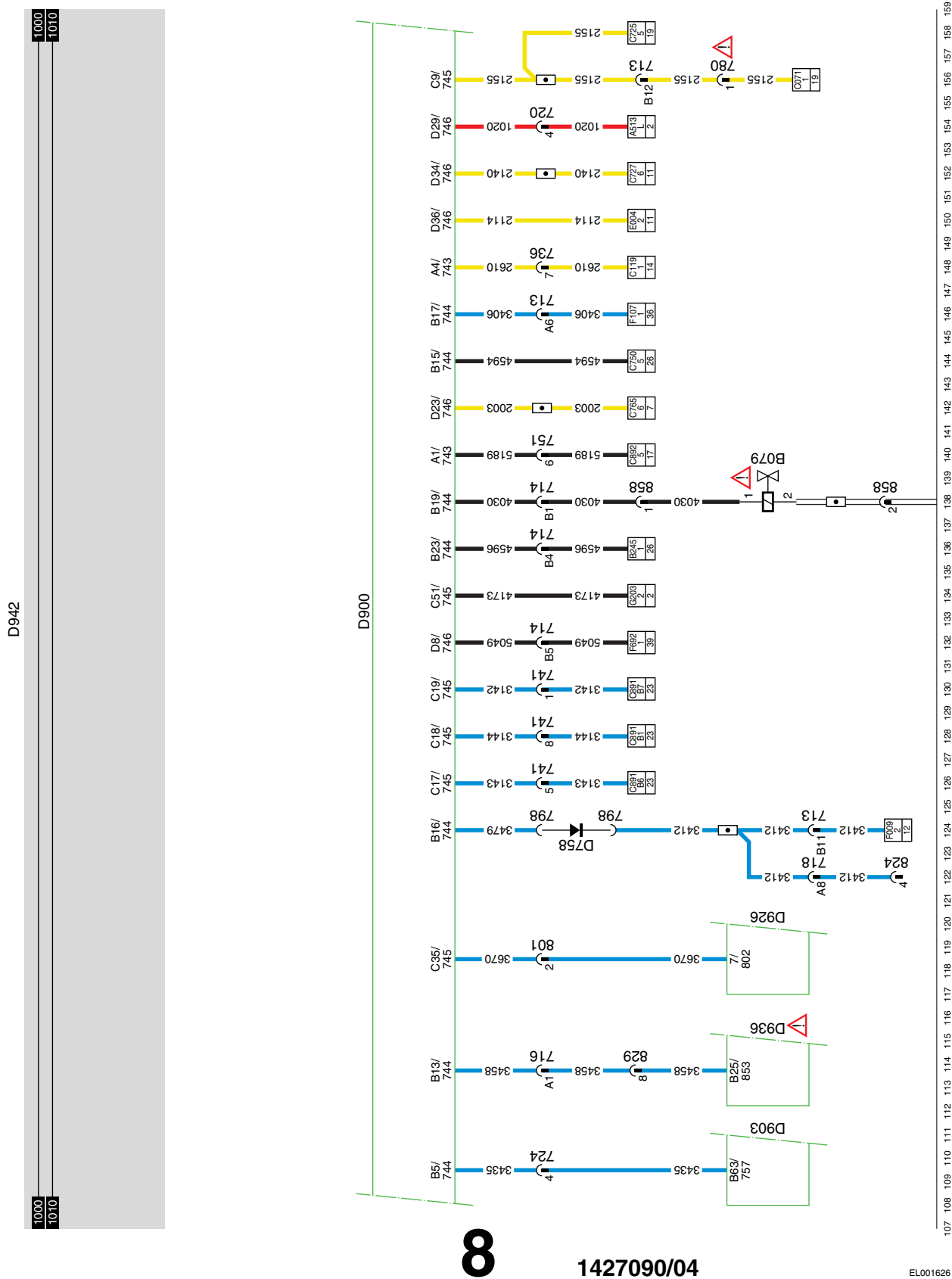


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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507



LF45/55 series



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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507

10. REVERSING LIGHTS/BUZZER

When the contact is switched on, power is supplied to the reversing light switch (E501) via E018 and wire 1217.

This switch is mounted in the gearbox. The contacts are closed when the gearbox is switched to the "reverse" position.

Power is then supplied via wire 4591 to the reversing lights (C026/C027) and drawn vehicle connector A001.

The reversing buzzer (B176) can only be activated via wire 5104 if the dashboard switch (C880) is in position I. Switching C880 to the 0 position turns off the reversing buzzer. The application connector (A070) also has a connection that is switched by the reversing light switch (E501).

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

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12. STOP LIGHTS/CAB TILTING GEAR

STOP LIGHTS

When stop lights/clutch switch E587 is operated (connection between contacts 4 and 3) by depressing the brake pedal, relay G036 is energised via wire 4602. Power will also be supplied to the VIC (pin D32/746). Through fuse E013, wire 1209, contacts 3 and 5 of relay G036 and wire 4601 a voltage is now applied to the right stop light (C021) and the left stop light (C020), so that they come on. The lights that are connected via drawn vehicle socket A000 will also come on. The ECAS-3 unit (D851) or ECAS-2 unit (D802) then also receives a signal. Application connector A070 is also connected to wire 4601.

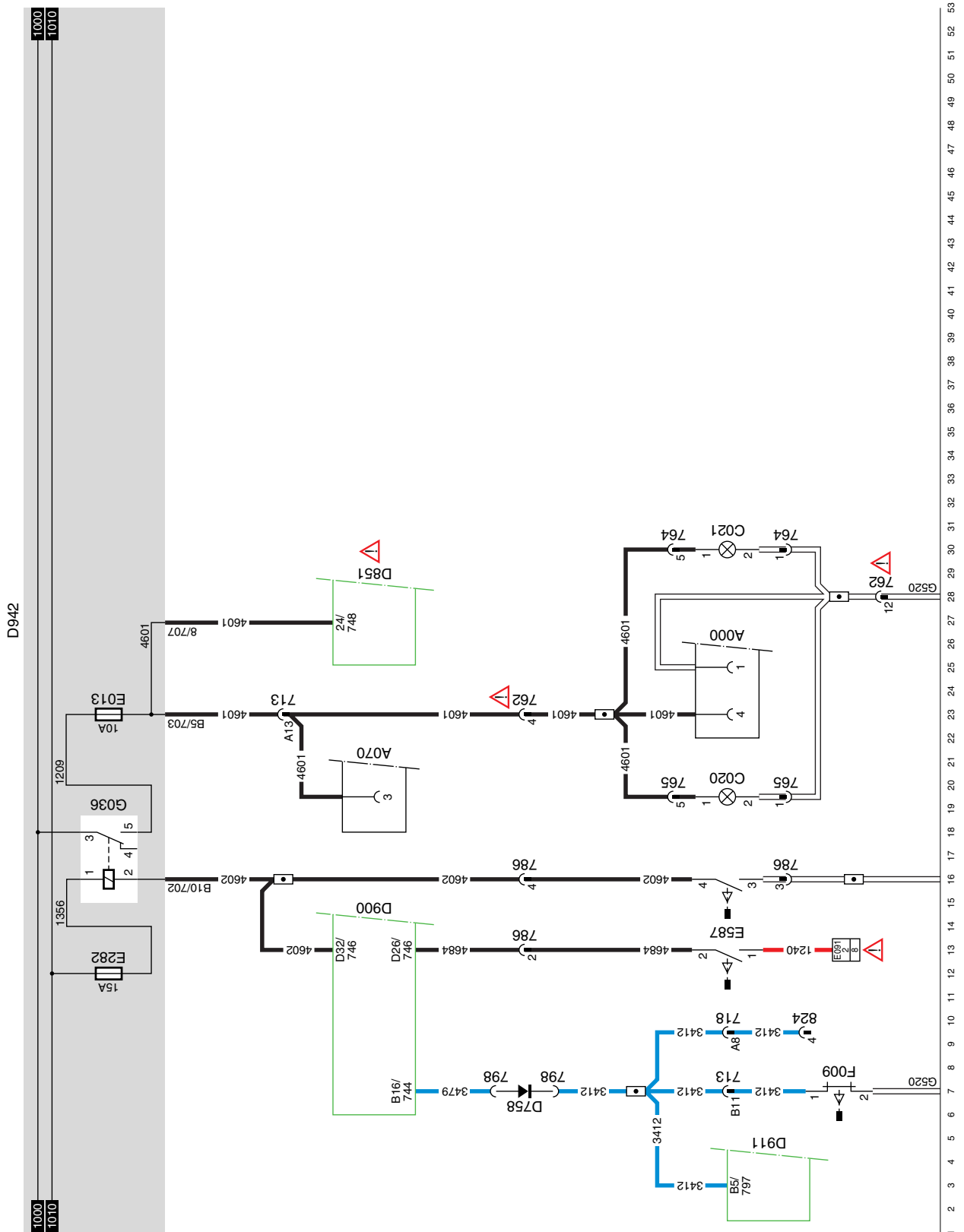
CAB TILTING GEAR

The switch for the cab lock (F009) is a "normally closed" switch. The switch is opened when the cab is in the driving position. When the cab is tilted, the switch closes and pin B16/744 of the VIC is connected to earth via wire 4312. When the alarm is active it knows that the cab is in the driving position because a small current goes to earth through the control switch for cab tilting (F009). Diode D758 prevents this current from also flowing to earth through the VIC (the VIC in sleep mode), in which case the alarm would not know whether the cab is being tilted intentionally or by accident.

VARIANTS

Location

13	If the vehicle is fitted with CDM, see section diagram 32
23,28	Connector 762:
29	Not fitted on vehicle type FT Electronic unit, ECAS-3 (D851): On a 6x2 vehicle, ECAS-2 electronic unit D802 (7/340)



13. DIFFERENTIAL LOCK

If the contact switch (C841) is activated, a voltage is applied through fuse E018 and wire 1217 to the cross-axle differential lock switch (C748). If switch C748 is operated, a voltage is applied to the operating valve for the cross-axle differential lock (B243) through wire 4517. If the differential is locked, the differential lock control switch (F006) connects pin C34/745 of the VIC to earth via wire 3408. The VIC will activate the DIP through I-CAN to switch on the "differential lock switched on" indicator.

CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

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15. MIRROR HEATING/WINDSCREEN HEATING/MIRROR ADJUSTMENT

MIRROR HEATING

When the ignition/starter switch (C841) is set to the "contact" position (connection between points 1 and 4), relay G353 is energised via wire 4001. This relay supplies power to the mirror heating switch (C867) and the mirror adjustment switch (C868) via fuse E044 and wire 1208.

When the mirror heating switch (C867) is operated, power is supplied to mirror heating B017 (driver's side) and B018 (co-driver's side) via wire 4532.

The time-dependent windscreen heating relay (G397) will also be energised. This relay will automatically be de-activated after 12 minutes.

WINDSCREEN HEATING SYSTEM

If the vehicle has a windscreen heating system, the windscreen heating relay (G397) will be energised when the mirror heating system is activated.

The windscreen heating system (B371) will be supplied with power via fuse E299. The windscreen heating relay (G397) will automatically be de-activated after 12 minutes.

MIRROR ADJUSTMENT

The outside mirrors are adjusted using "joystick" switches C868 (driver's side and co-driver's side). If the handle of the switch is moved from the rest position (centre) in a particular direction, power will be supplied to mirror adjustment motor B005 (left-hand side) or B006 (right-hand side) and the mirror in question will follow the movement of the handle.

When pins 10 and 5 are connected, mirror adjustment switch C868 is in the "right-hand mirror" position. When pins 8 and 4 are connected, the mirror adjustment switch is in the "left-hand mirror" position.

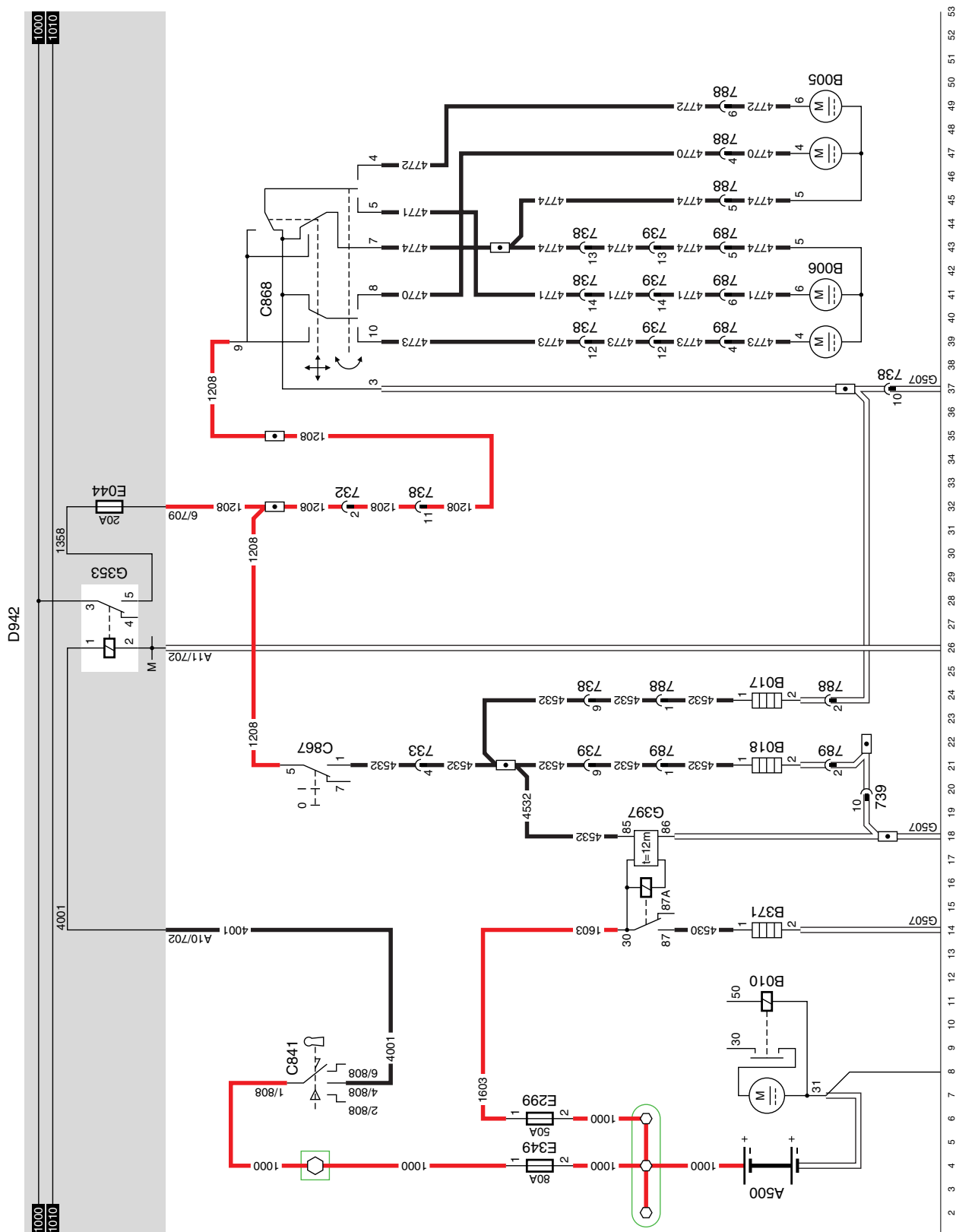
For this, wires 4770 and 4774 (left-hand side) or 4771 and 4774 (right-hand side) supply power to the motor for the left/right movement. Wires 4772 and 4774 (left-hand side) or 4771 and 4774 (right-hand side) supply power to the adjusting motor for the up and down movement.

The mirror adjustment system can only be used if the contact relay (G353) is energised.

CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

Changes in the electrical system from chassis number 0L247507



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CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

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19. HORN/CIGAR LIGHTER/WORK LAMP/AIR DRYER

HORN

The horn (B401) is activated before contact via steering column switch C775 (1000). The horn is supplied with power via wire 4979 and fuse E019.

CIGAR LIGHTER

If the vehicle ignition switch (C841) is in the "accessories" position (connection between contacts 1 and 6), cigar lighter B030 is supplied with power via fuse E026 and wire 1105. By depressing the cigar lighter, the heating element is warmed up.

WORK LAMP

Work lamp switch C725 is supplied with voltage from power supply before contact and via fuse E052. When the switch is operated voltage is applied to the work lamp (C071) and to pin C9/745 of the VIC unit in order to activate the "work lamp" indicator on the DIP via I-CAN.

VARIANTS

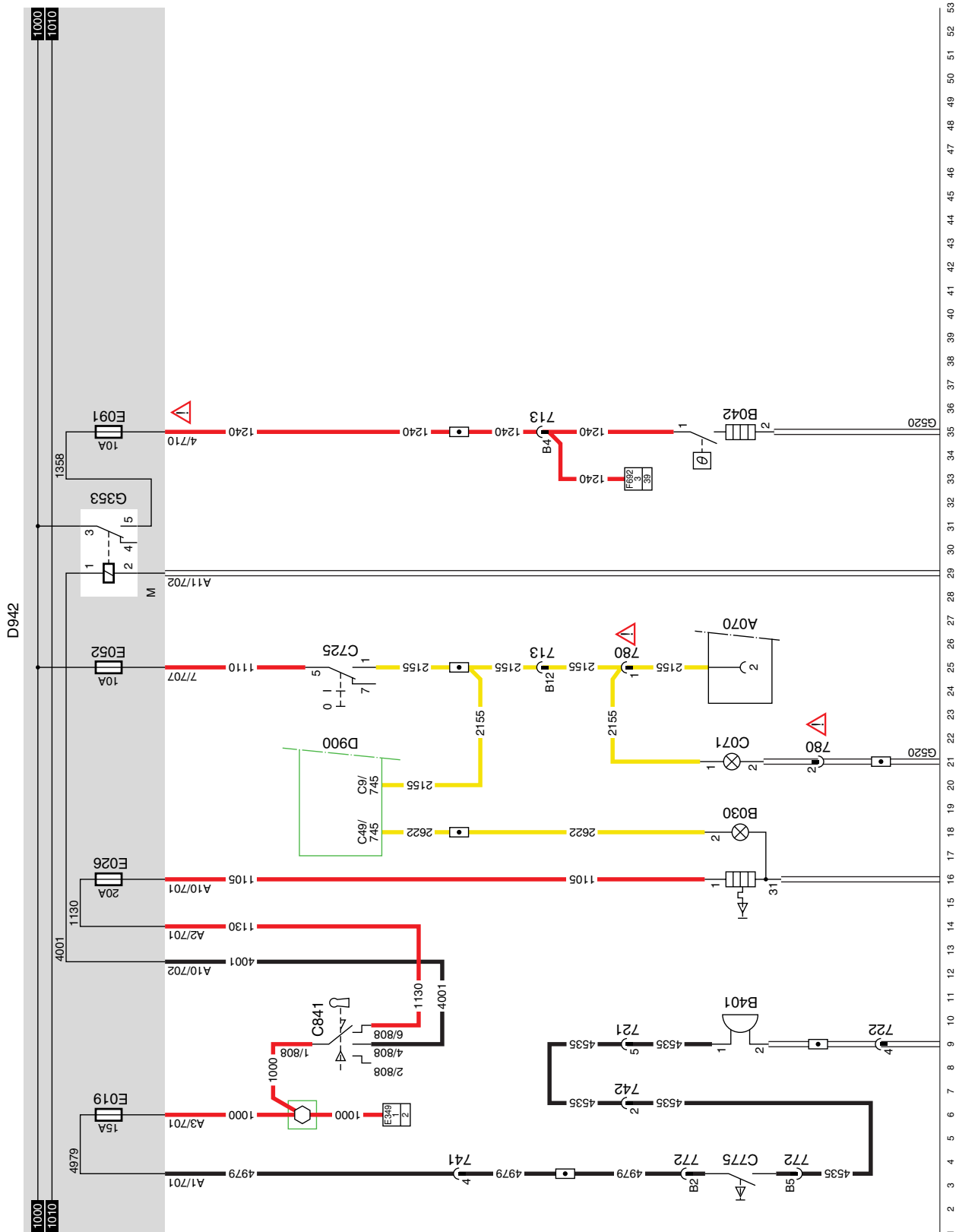
Location

20,24 Connector 780:
Not fitted on vehicle type FA.
Wire 2155 only fitted in application connector A070
If the vehicle is fitted with CDM, see section diagram 32

35

AIR DRYER

When the vehicle ignition (C841) is on (connection between contacts 1 and 4), relay G353 is activated. This relay supplies power to the air dryer heating element (B042) via fuse E091 and wire 1240.
When the maximum temperature is reached, a thermal switch in the air dryer switches off. The water separator sensor (F692) is supplied with power via the same wire.



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CHANGES IN THE ELECTRICAL SYSTEM

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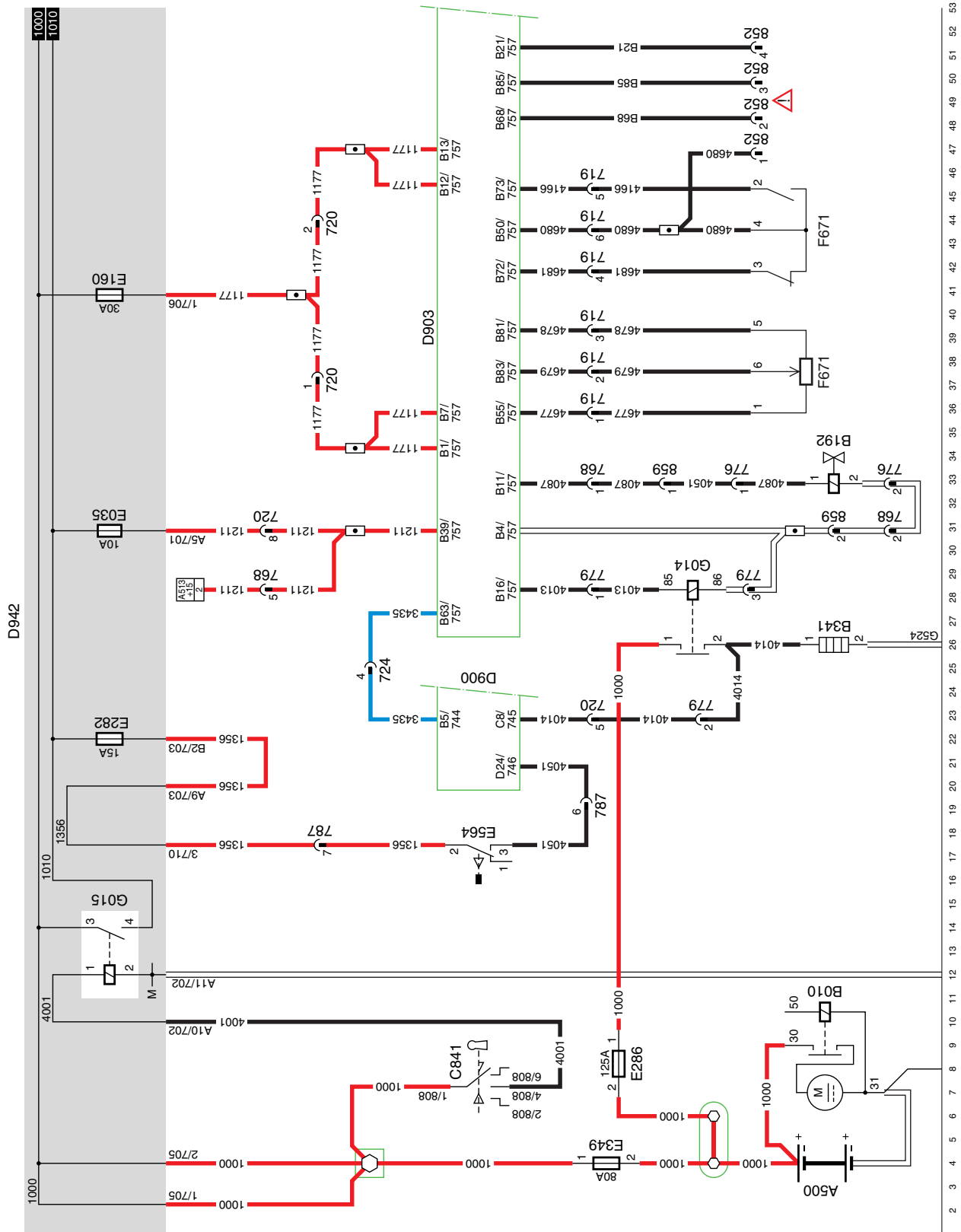
Changes in the electrical system from chassis number 0L247507

LF45/55 series

22. ECS-DC3/EXHAUST BRAKE
FOR MORE INFORMATION SEE SYSTEM
MANUAL

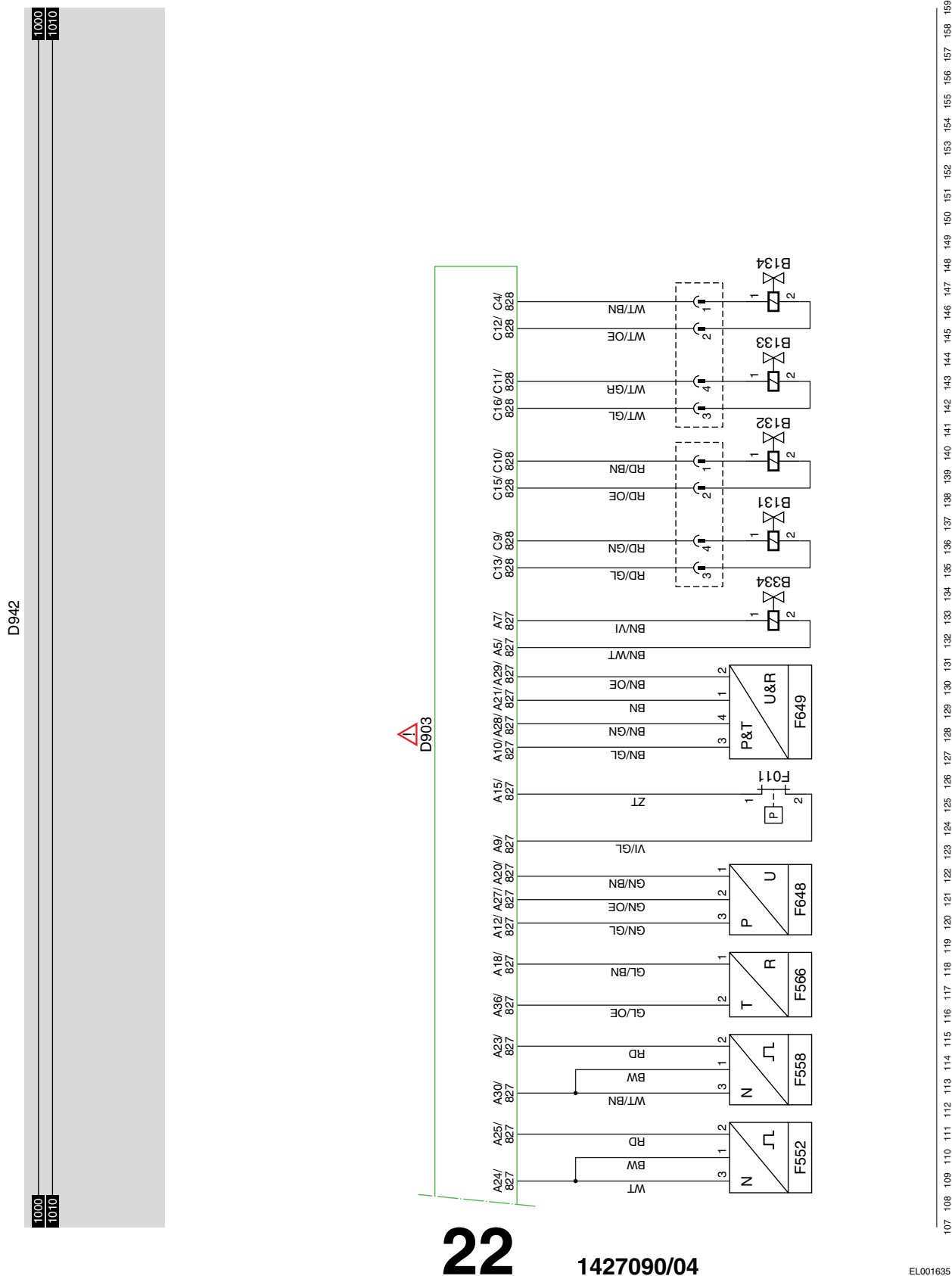
VARIANTS

Location	
49	Connector 852: Optional connector for "remote throttle" function
66	The CAN terminating resistor is fitted in the wiring harness, near the B connector
129	This part of the ECS-DC3 electronic unit relates to the BE engine (4-cylinder)
186	This part of the ECS-DC3 electronic unit relates to the CE engine (6-cylinder)



LF45/55 series





CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

D942

1000
1010

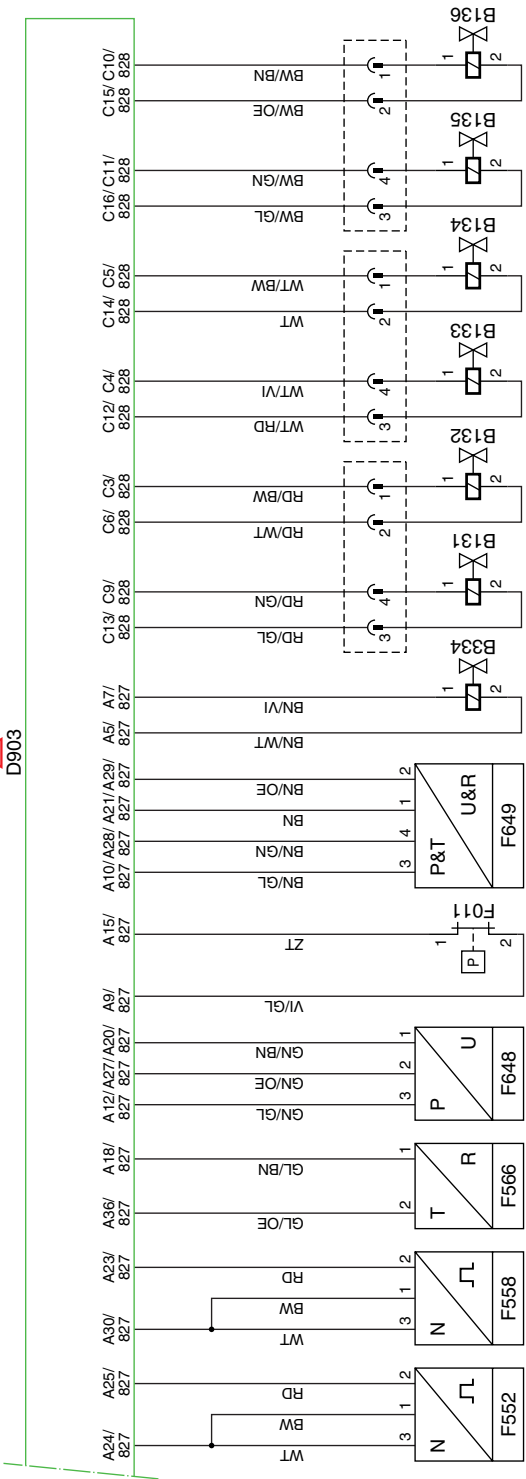
1000
1010



D903

22

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160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212

EL001636

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CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

24. AGC AUTOMATIC GEARBOX (AT1000/2000)

VARIANTS	
Location	
122	Automatic gearbox socket, superstructure (AT2000), A096

Power supply before contact is obtained directly from the batteries (A500) via a 10 A fuse (E144) and wire 1302. The voltage before contact can also be found in the diagnostic socket for the automatic gearbox (A032).

Voltage after contact is obtained via fuse E279 and wire 1211. The AT 1000/2000 automatic gearbox selector switch (E585) receives power after contact through fuse E016 and wire 1217. The reversing lights are activated from the same switch via wire 4591.

The earth connections are connected directly to the earth side of the batteries (A500).

The electrical system of the automatic gearbox is almost completely located on the chassis.

Connections leading into the cab are provided for a number of VIC functions:

- fault messages from the automatic gearbox (B25/853) to the VIC unit (D900)
- "Range inhibit" (B23/853) to the VIC unit (D900)
- CAN connections (B29/853 and B32/853) to the VIC unit (D900)
- Neutral position protection (G/900) to the VIC unit (D900)

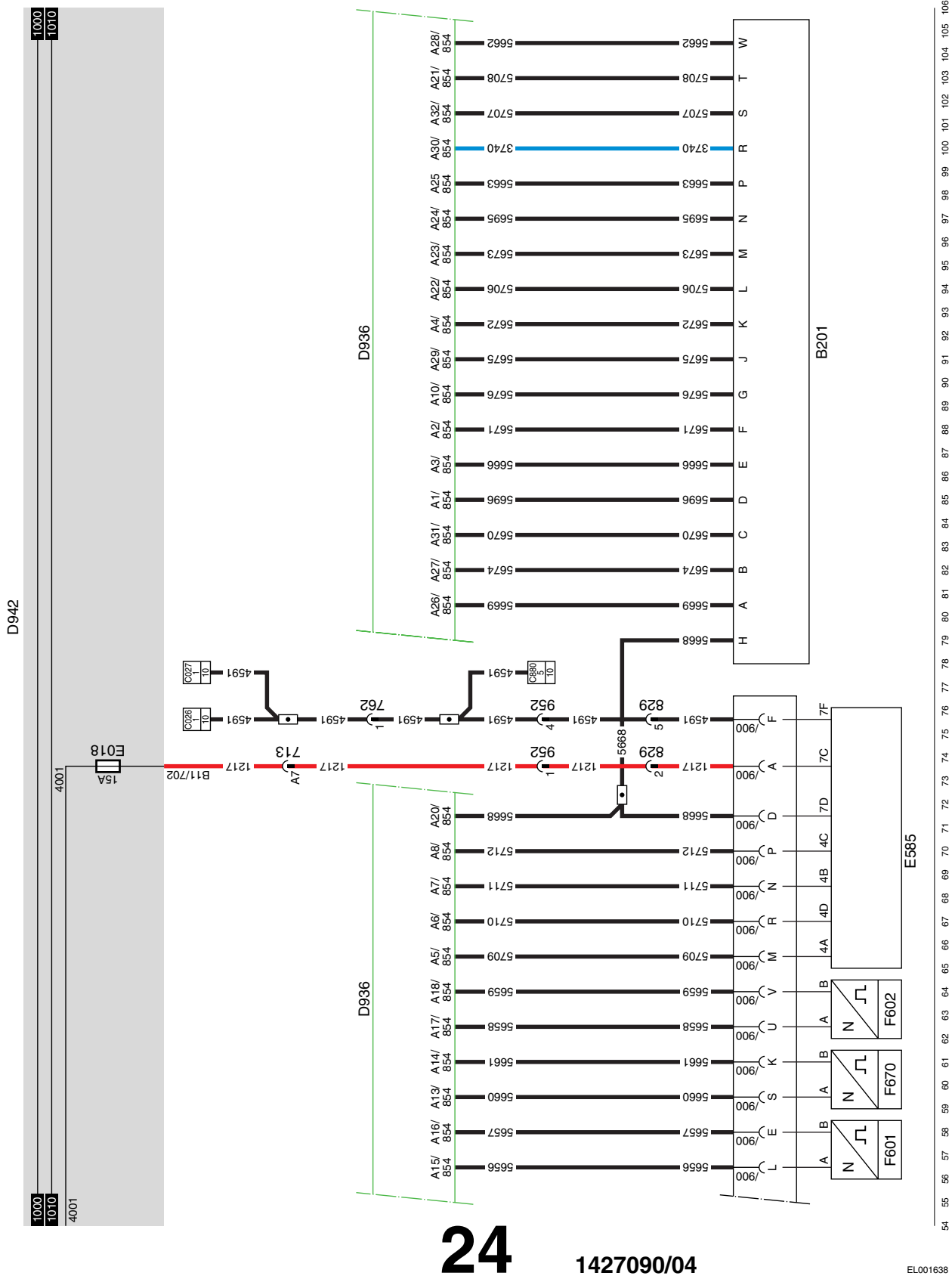
Diagnosis of the automatic gearbox takes place via the CAN network, which is connected to the diagnostic socket (A032) and the VIC unit (D900).

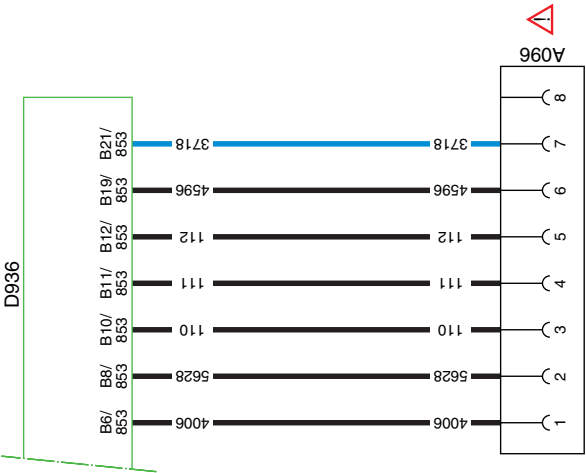
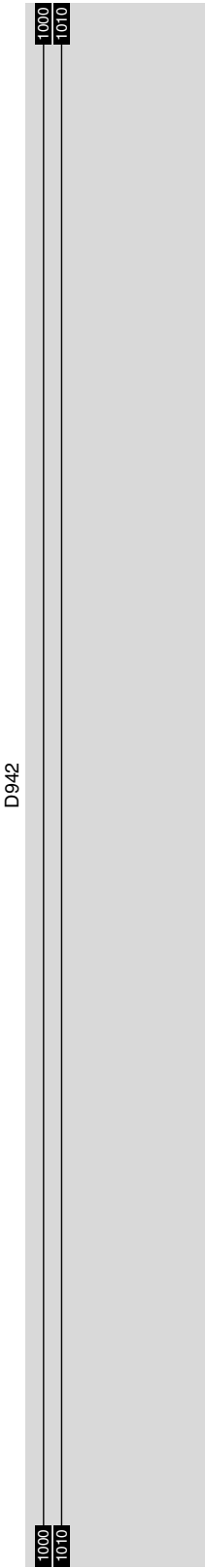
CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series





CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

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25. AGC AUTOMATIC GEARBOX (MD3060)

Power supply before contact is obtained directly from the batteries (A500) via wire 336 and a 10 A fuse (MAIN) in the VIM (D822, pins J1 and J2). The electronic unit (D866) receives voltage before contact at pin V1/907 and V16/907 from the VIM (D822, pins R1 and R2) via wires 1164.

Voltage after contact is obtained via fuse E279 and wire 1211. Wire 1211 is connected directly to electronic unit D866 (pin S4/905). The wire also runs to the VIM (pin C1) and various relays in de VIM are supplied with voltage after contact via a 10 A fuse (IGN). The voltage after contact can also be found in the diagnostic socket for the automatic gearbox (A032).

The earth connections are connected directly to the earth side of the batteries (A500) and also run to the electronic unit (D866) via the VIM (pins K1 and K2).

The electrical system of the automatic gearbox is almost completely located on the chassis.

Connections leading into the cab are provided for a number of VIC functions:

- fault messages from the automatic gearbox (S31/905) to the VIC unit (D900)
- CAN connections (S13/905 and S29/905) to the VIC unit (D900)
- Vehicle interface module (D822, pin F1) to the VIC unit (D900)

Diagnosis of the automatic gearbox takes place via the CAN network, which is connected to the diagnostic socket (A032) and the VIC unit (D900).

Note:

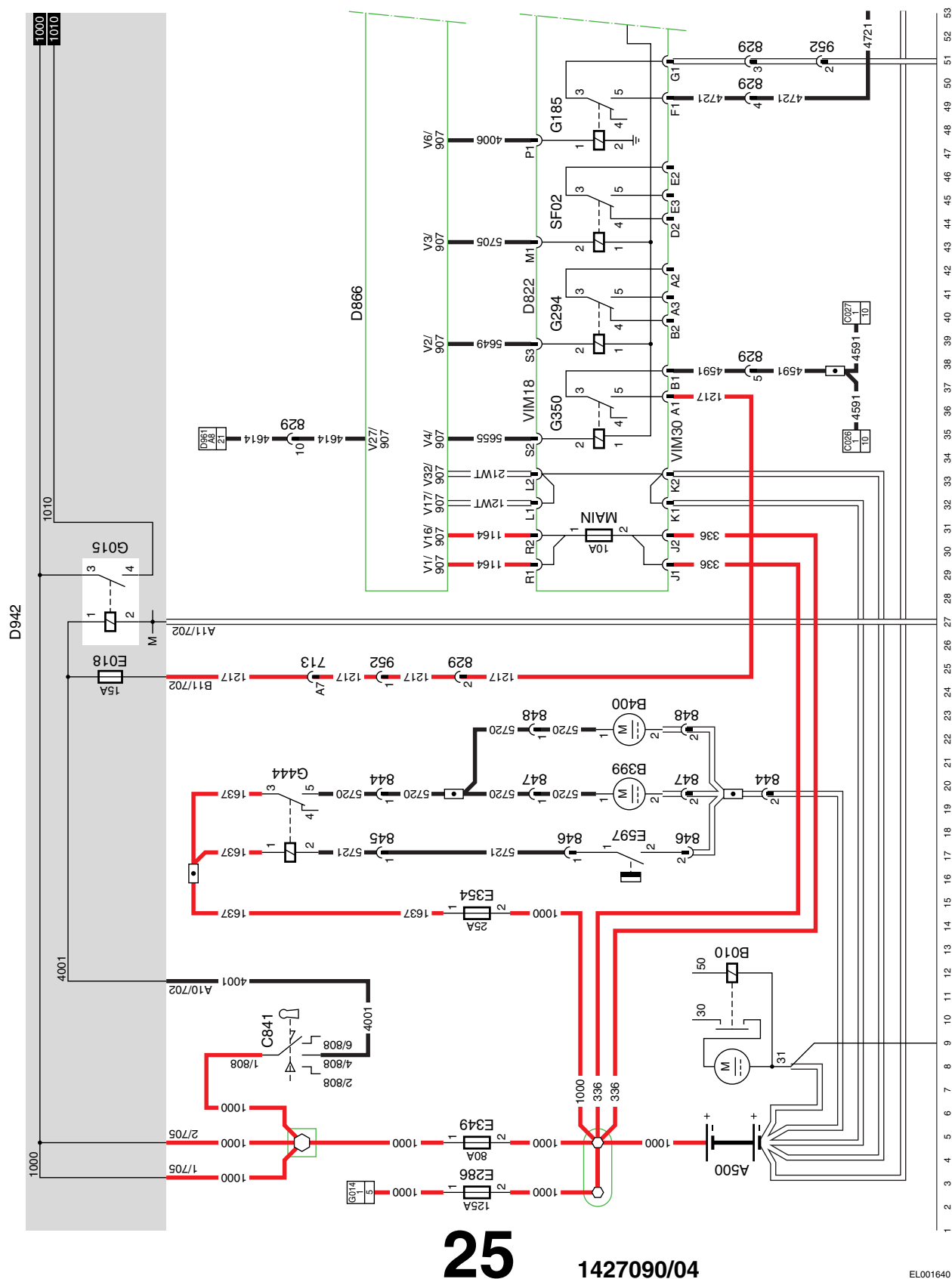
Where an automatic gearbox is fitted, there are two dashboard lead-through connectors, 716. One connector is occupied by spare wiring (see application connectors) and the other has 3 occupied positions (A1, wire 3458; A3, wire 123; and A4, wire 4614), only one of which is connected.

The 716 with the spare wiring is not then connected and hangs loose near the dashboard lead-through.

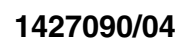
CHANGES IN THE ELECTRICAL SYSTEM

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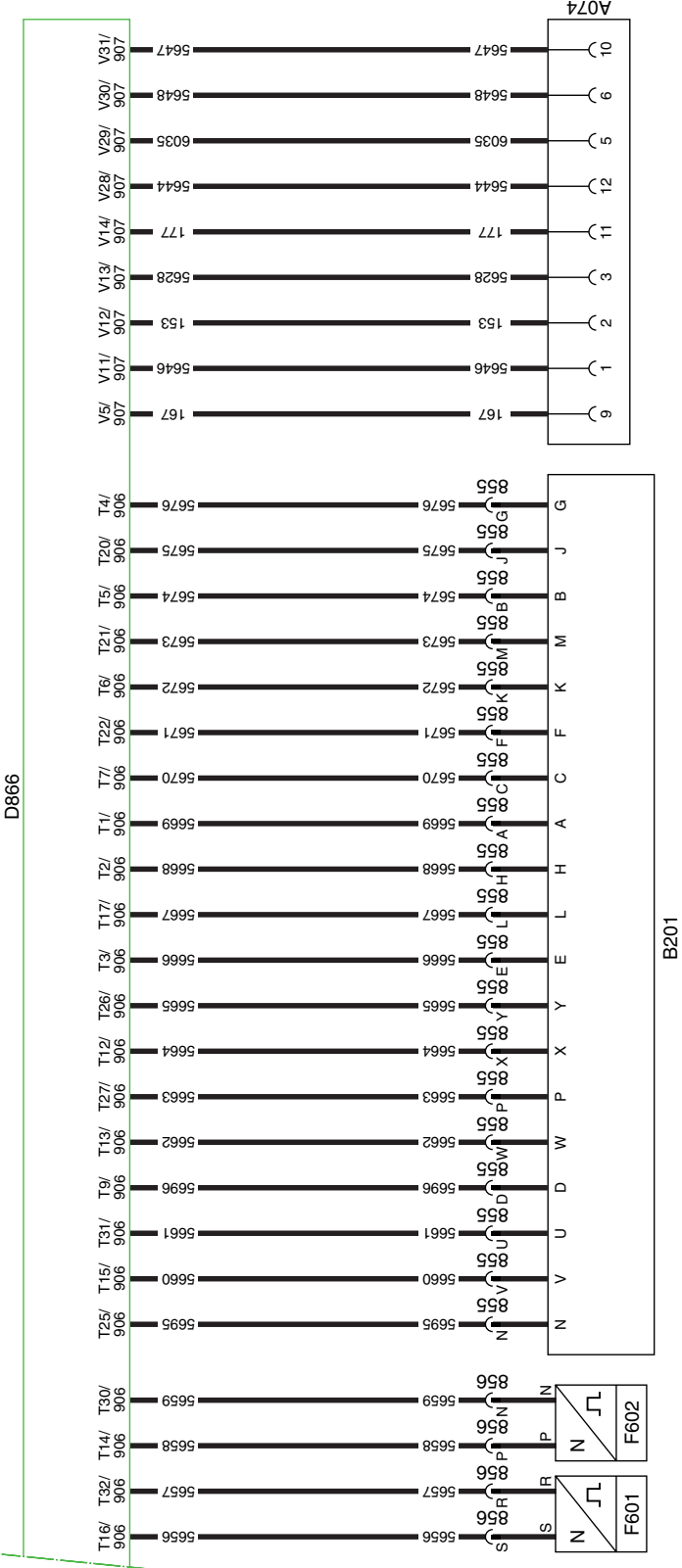
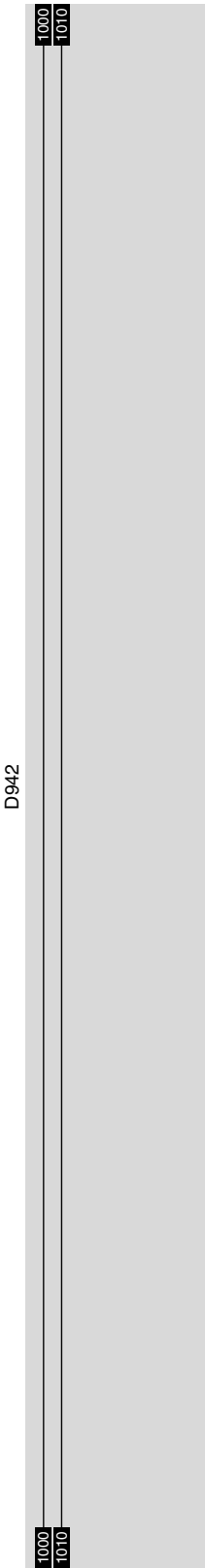
Changes in the electrical system from chassis number 0L247507



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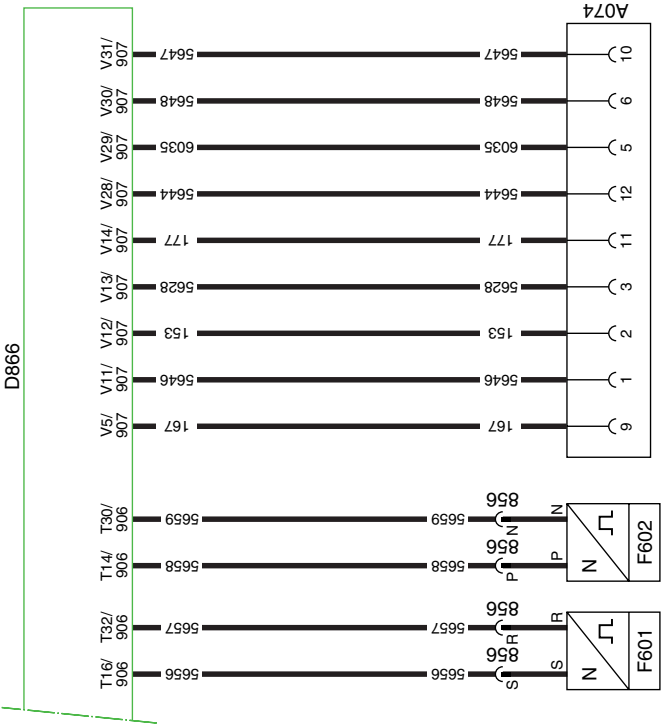
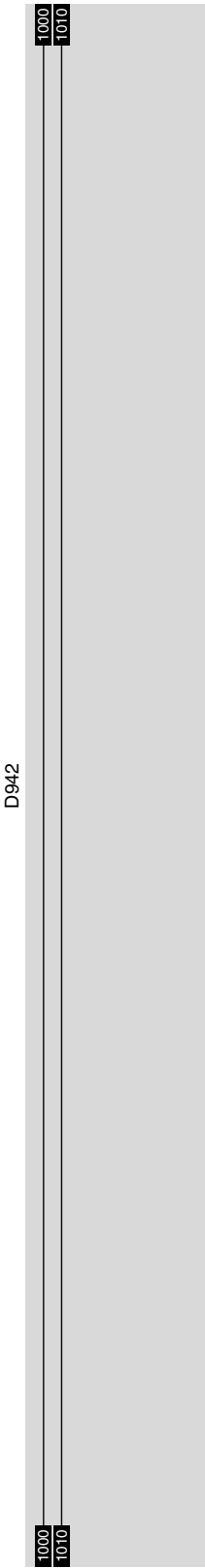
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CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

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CHANGES IN THE ELECTRICAL SYSTEM

LF45/55 series

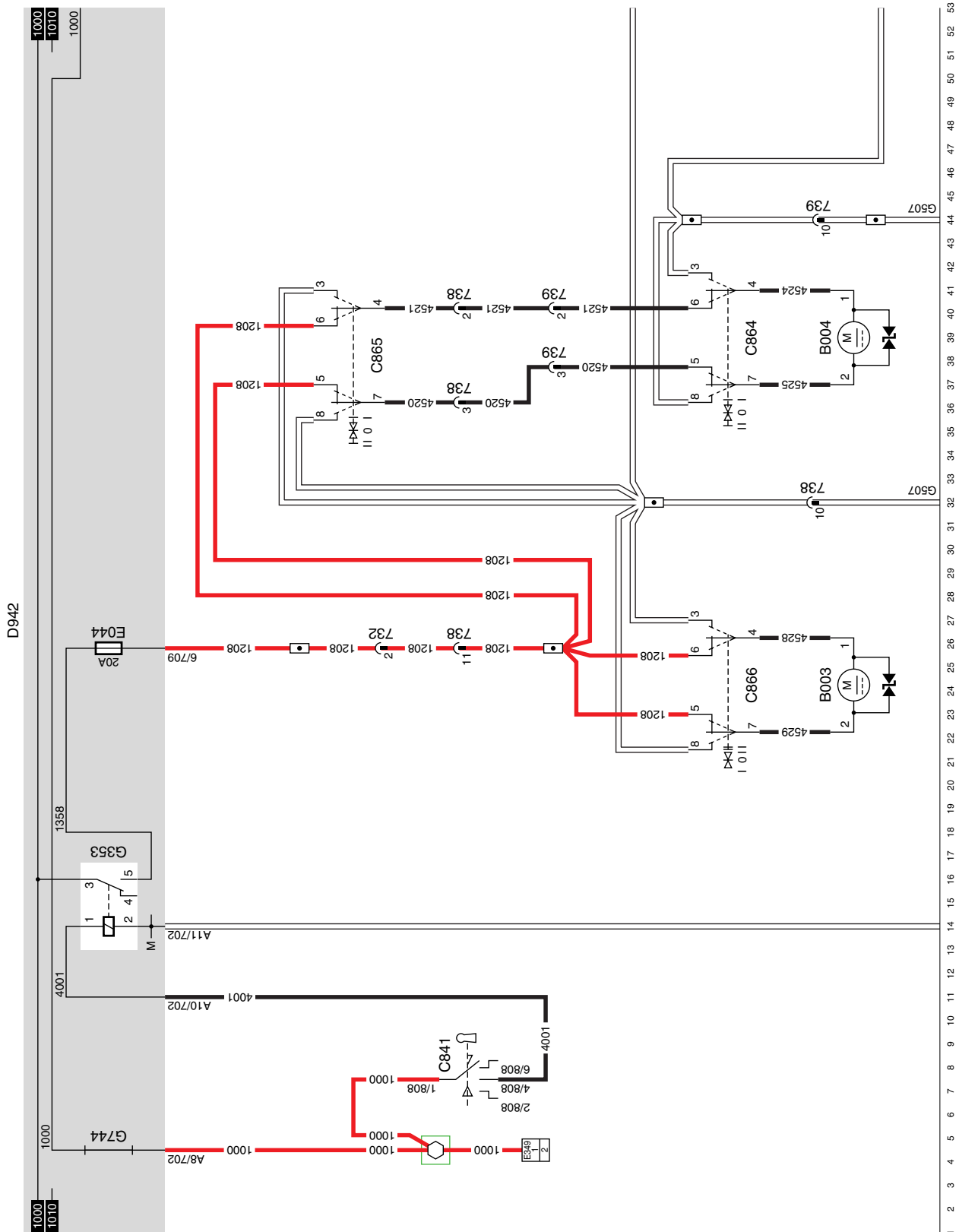
Changes in the electrical system from chassis number 0L247507

31. CDS-3/DROP GLASS OPERATION/ROOF HATCH

DROP GLASS OPERATION

When the vehicle ignition is switched on (connection between pins 1 and 4, C841), relay G353 is energised. Via fuse E044 and wire 1208, relay G353 supplies power to the electric drop glass door switches (C864 in the driver's door, C865 in the co-driver's door for the co-driver's door, and C866 in the driver's door).

There are two independent drop glass switches. In the rest position, pins 7 and 4 of the switch are connected to power supply via wire 1208. Depending on the side on which the switch is operated, pin 7 or 4 will be connected to earth and the drop glass motor (B003 - driver's side, B004 - co-driver's side) will be activated.



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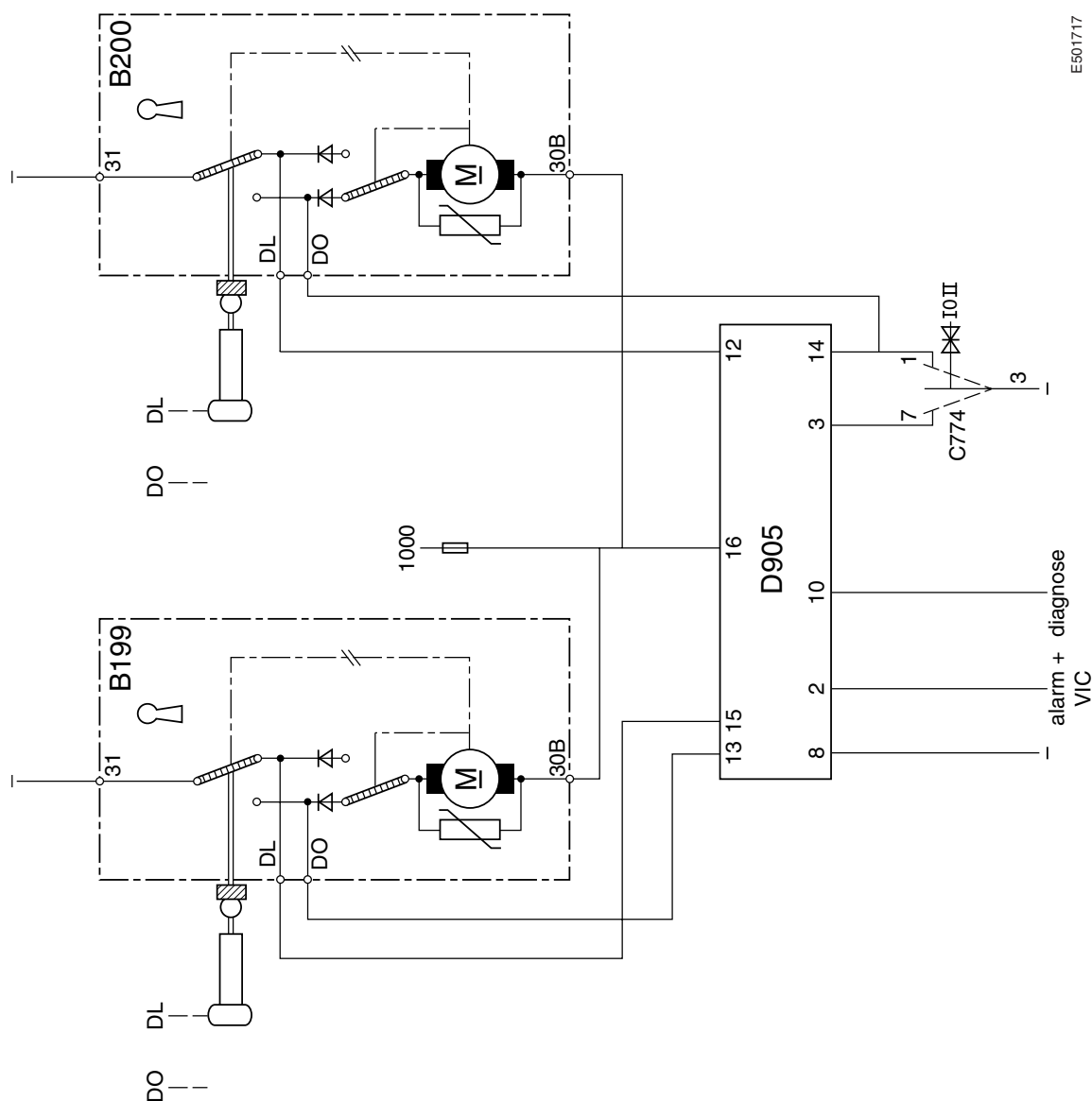
CHANGES IN THE ELECTRICAL SYSTEM

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Changes in the electrical system from chassis number 0L247507

LF45/55 series

E501717



CENTRAL DOOR LOCKING

Purpose:

- Automatic locking of both doors when one of the doors is locked with the key/button.
- Automatic locking of both doors using remote control.
- If one of the two doors is unlocked using the key/button, only this door will be unlocked; the other door will remain locked.
- Automatic unlocking of the driver's side door using remote control.

Conditions: both doors locked.

- **Unlocking co-driver's side door using key.**

This is equivalent to opening a door without central locking. The other door remains locked.

- Unlocking co-driver's side door with switch C774.

When switch C774 is operated (pin 3 connected to pin 1), connection DO of component B200 is connected to earth. The co-driver's door will unlock.

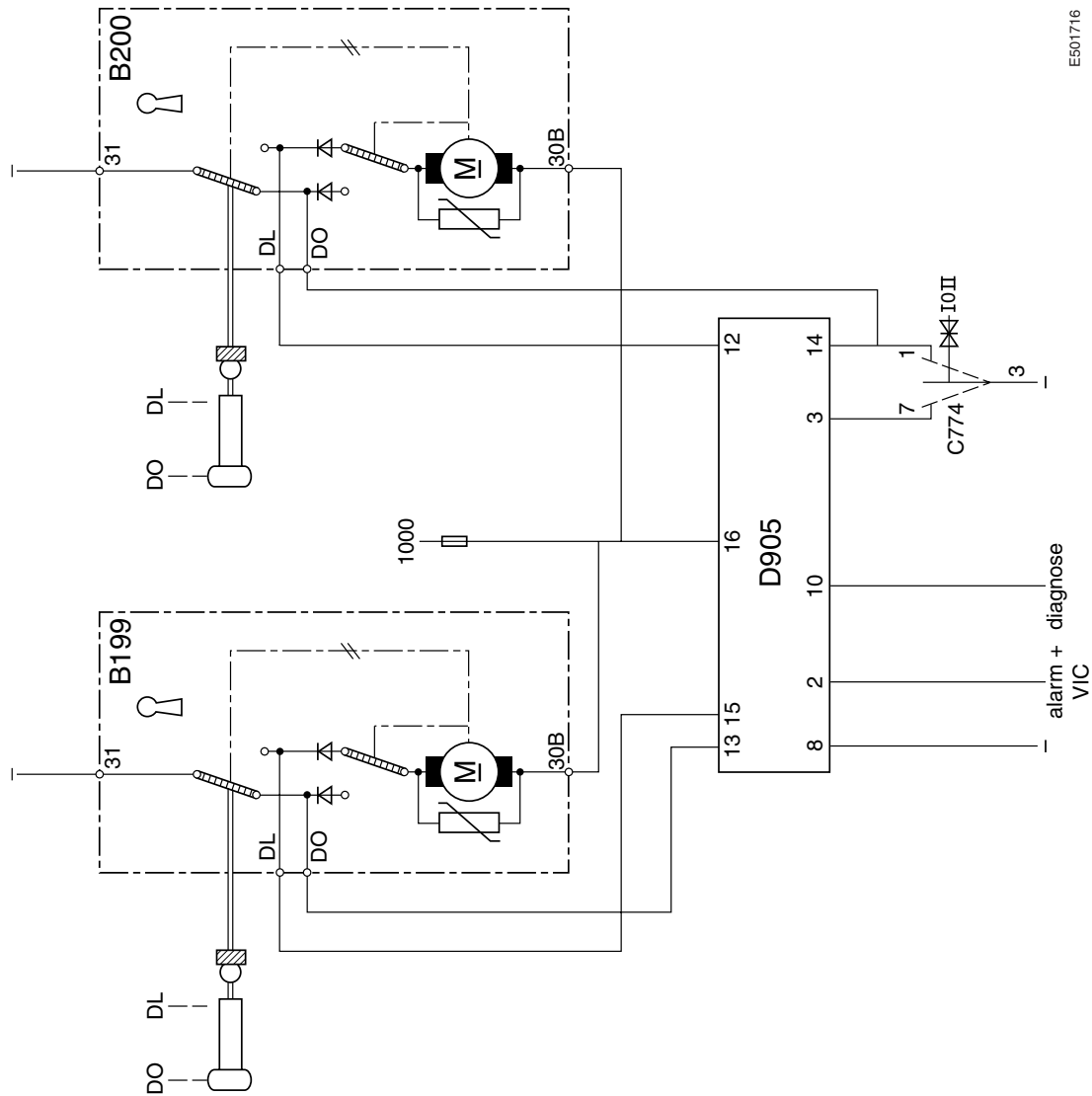
- Unlocking using remote control.
If the door unlocking button on the remote control unit is pressed, the remote control unit will send a fixed-code signal to the CDS electronic unit (D905). When the CDS electronic unit (D905) recognises the remote control unit on the basis of the fixed code, the remote control unit will send coded messages to the unit (D905). These messages are coded with a rolling code. This rolling code will change every time the remote control is operated. After the CDS electronic unit (D905) has accepted the messages, it will send a signal to the VIC (D900). As a result, the VIC will switch on the interior lighting for a specific period of time.
The CDS unit (D905) now switches pin 13 to earth. This will only activate the motor (B199). The CDS unit (D905) checks the status of the output to the motor (B199). This is done to ensure that the DL connection is not connected to earth when the motor is in the "open" position. The CDS unit can deduce from this whether the driver's side door has been successfully unlocked. The CDS electronic unit (D905) will then send a message to the VIC (D900) via pin 2 stating that the driver's side door has been successfully unlocked. If the driver's side door is not unlocked properly after three attempts, a message will be sent to the VIC (D900) to inform it that the door has not unlocked successfully.

CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series



E501716

Conditions: both doors unlocked.

- Locking driver's side door with key/button.

The D905 unit will measure an earth signal at pin 15 through connection DL. D905 will now connect pin 12 to earth, which will also activate B200. The co-driver's side door will now lock as well.

- Locking the driver's side door with key/button.

The operation is as described above, except that unit D905 will now measure an earth signal at pin 12 and it will connect pin 15 of component B199 to earth. The door on the driver's side will now also be locked.

- **Locking co-driver's side door using switch C774.**

When switch C774 is operated (pin 3 connected to pin 7), an earth signal is created at pin 3 of unit D905. D905 will now connect pin 12 to earth, which will activate B200. This will lock the door on the co-driver's side.

- The doors on the driver's and co-driver's sides are locked using the remote control unit.

When the lock doors button on the remote control unit is pressed, a procedure starts that is comparable to the procedure for opening the doors.

VARIANTS

Location

68 If the vehicle is fitted with CDM, see section diagram 32

ROOF HATCH

Opening roof hatch

When the roof hatch switch (C736) is operated and a connection is made between contacts 2 and 6 and therefore between contacts 1 and 3, a voltage is applied to pin 1 of the roof hatch motor (B009) through fuse E163, switch C736 and wire 4761. The roof hatch will open.

Closing roof hatch

When the roof hatch switch (C736) is operated and a connection is made between contacts 8 and 6 and therefore between contacts 7 and 3, a voltage is applied to pin 2 of the roof hatch motor (B009) through fuse E163, switch C736 and wire 4760. The roof hatch will now close.

However, during the locking operation the CDS electronic unit (D905) will connect pins 12 and 15 to earth. This will activate the motors (B199 and B200). The CDS electronic unit (D905) then checks the status of the outputs to the motors (B199 and B200). It uses this information to determine whether the doors have been successfully locked. The CDS unit (D905) will then send a message to the VIC (D900) via pin 2 stating that the doors have been successfully locked. As a result, the VIC (D900) will switch off the interior lighting. If the doors are not locked properly after three attempts, a message will be sent to the VIC (D900), stating that the locking operation was not successful.

Initialisation

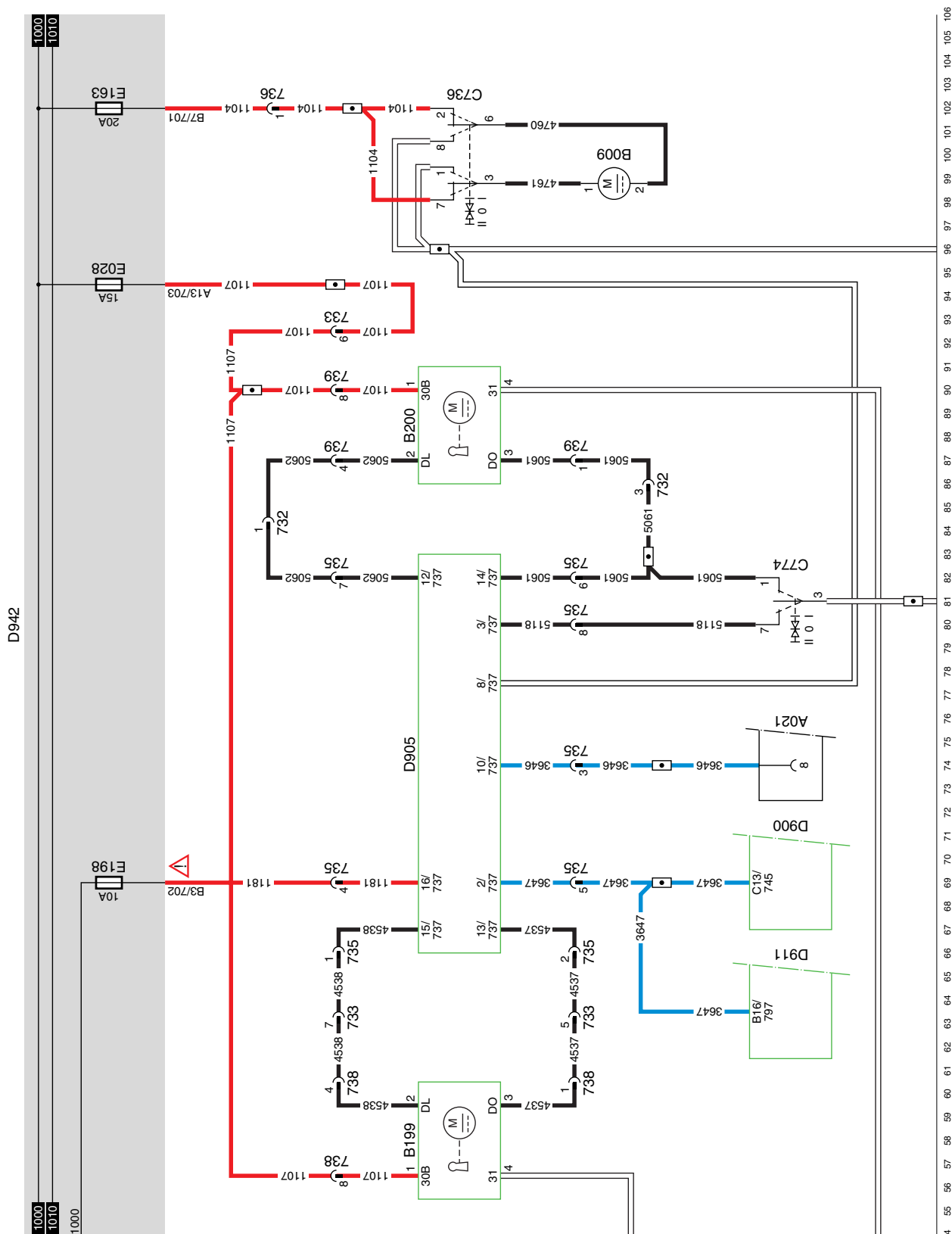
When the CDS electronic unit is supplied with power for the first time (on installing or replacing the electronic unit) or when new hand-held transmitters are used (up to 8), the unit must recognise these hand-held transmitters. To enable the hand-held transmitters to communicate with the CDS unit, the unit and the hand-held transmitters must be taught using DAVIE.

CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series



31

1427090/04

EL001645

CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series

11

**32. CDM
FOR MORE INFORMATION SEE SYSTEM
MANUAL**

39. WATER SEPARATOR/FUEL PRE-HEATING

WATER SEPARATOR

The water separator sensor F692 is supplied with power via relay G353 and fuse E091. If the water level in the fuel filter becomes too high, the VIC receives a signal at pin D8/746. A warning is then indicated on the DIP through the VIC.

VARIANTS

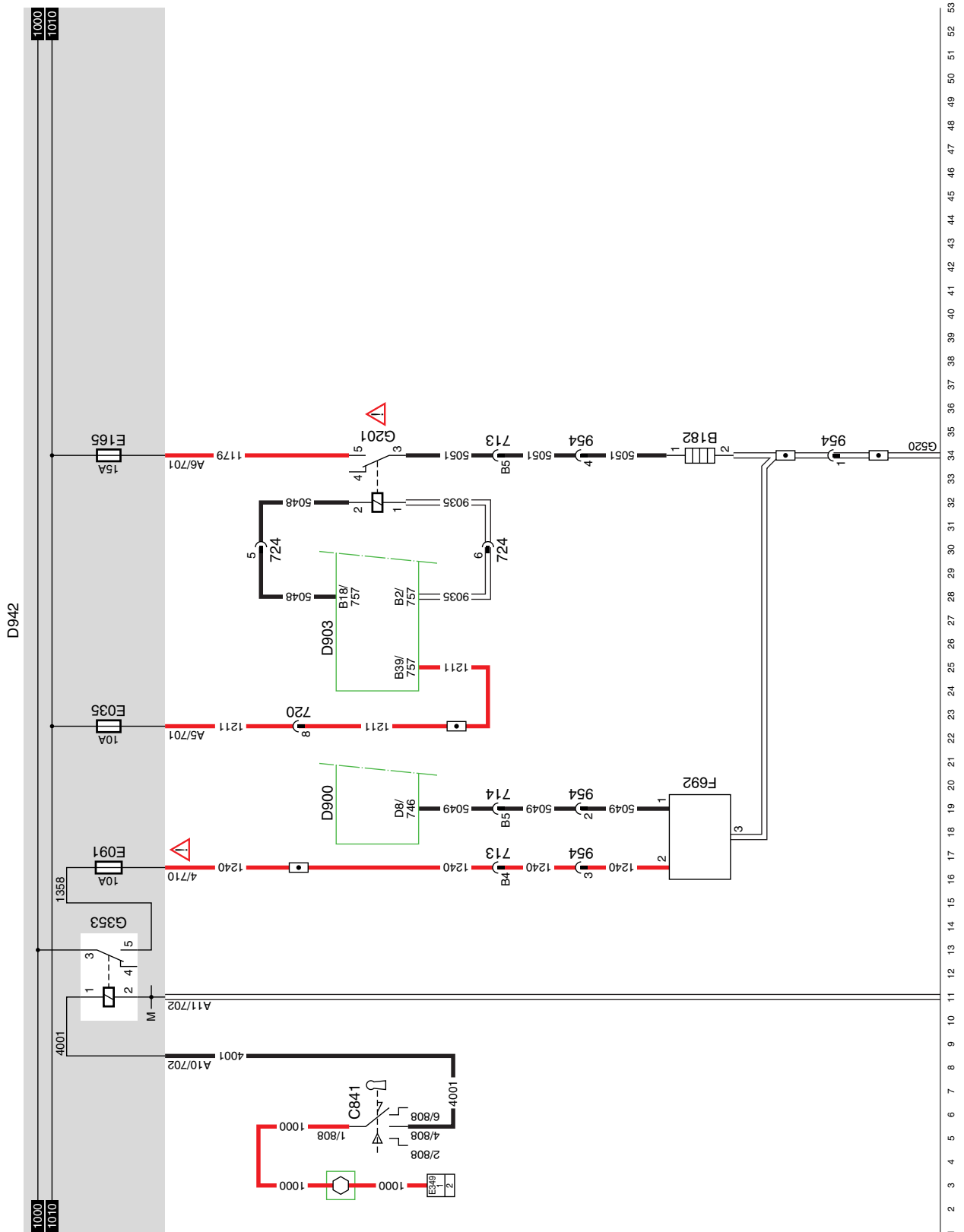
Location

- | | |
|----|---|
| 34 | Fuel heating relay (G201):
May be placed behind the central box. |
| 39 | If the vehicle is fitted with CDM, see section diagram 32 |

FUEL PRE-HEATING

Depending on the temperature, the ECS-DC3 electronic unit (D903) activates the fuel heating relay (G201).

The relay supplies power to the water separator fuel heating element (B182) through fuse E165.



CHANGES IN THE ELECTRICAL SYSTEM

5

Changes in the electrical system from chassis number 0L247507

LF45/55 series

TECHNICAL DATA

DIAGNOSTICS

BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

OPERATION OF BRAKE COMPONENTS

BRAKE SYSTEM AND COMPONENTS

BRAKING PERFORMANCE AND BRAKE EQUALISATION

0

1

2

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4

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CONTENTS

	Page	Date
1. BRAKE SYSTEM AND COMPONENTS	1-1	200436
1.1 General	1-1	200436
1.2 Tightening torques	1-12	200436
1.3 Lubricants	1-16	200436

TECHNICAL DATA

6

Contents

LF45/55 series

0

1. BRAKE SYSTEM AND COMPONENTS

1.1 GENERAL

Coding of components

All components have been provided with number codes.

Structure of the code

First digit

Often used:

- 1 Energy supply (pressure)
- 2 Energy discharge (outgoing command)
- 3 Bleed
- 4 Control connection (incoming command)

Little used:

- 0 Suction connection
- 5 Free
- 6 Free
- 7 Anti-freeze connection
- 8 Lubricating oil connection
- 9 Coolant connection

Where one connection performs several functions, additional 1st digits will be allocated. These are separated by a hyphen.

Second digit

If there are several connections with the same function, a 2nd digit will be added immediately after the 1st one.

Application example: empty/load relay valve

Meaning:

- 1 Air compressor energy supply
- 2 Energy discharge (command) to the next component
- 41 Control connection (incoming)
- 42 Second control connection (incoming)

COMPRESSOR

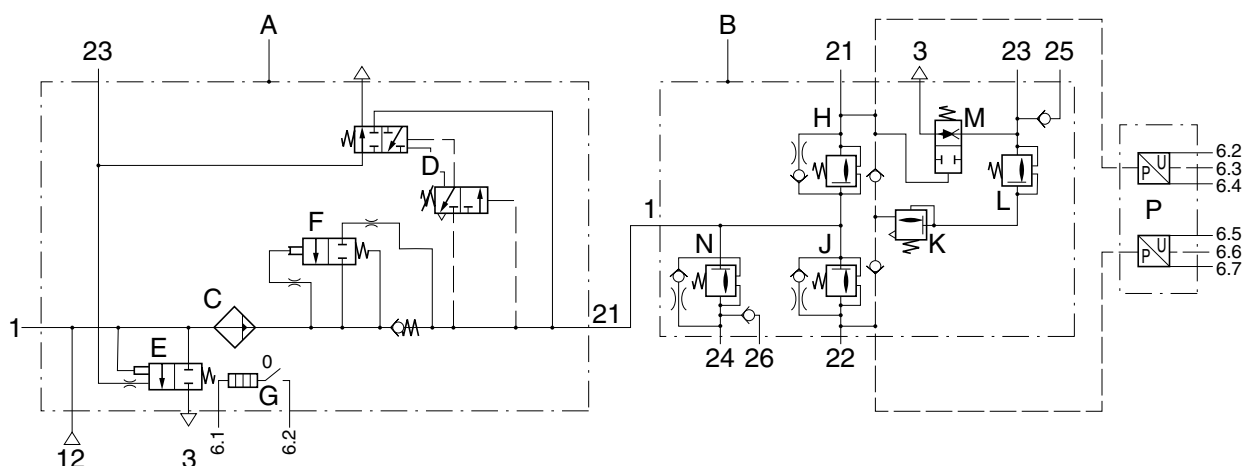
Knorr model

Type:

LK3839

Version:

1-cylinder, liquid-cooled

TECHNICAL DATA**6****Brake system and components****LF45/55 series****0****AIR SUPPLY UNIT****Front axle, leaf-sprung**

R600702

- A Air dryer/pressure regulator (unit)
- B 4-circuit protection valve (unit)
- C Filter/drying grid
- D Pressure regulator
- E Blow-off valve
- F Pneumatic time switch for regeneration
- G Heating element
- H Pressure relief valve with bypass, circuit 1
- J Pressure relief valve with bypass, circuit 2
- K Pressure limiting valve, circuit 3
- L Pressure relief valve, circuit 3
- M Flowback valve, circuit 3
- N Pressure relief valve with bypass, circuit 4
- P Pressure sensors

Cut-out pressure of pressure regulator

10.0 ± 0.2 bar

Cut-in pressure of pressure regulator

1.2 ± 0.2 bar under cut-out pressure

Supply pressure in circuit 1, connection 21

max. 10 bar

Supply pressure in circuit 2, connection 22

max. 10 bar

Supply pressure in circuit 3, connection 23

8.5 - 0.4 bar

Supply pressure in circuit 3, connection 25

8.5 - 0.6 bar

Supply pressure in circuit 4, connection 24

max. 10 bar

Supply pressure in circuit 4, connection 26

max. 10 bar

Opening pressure of circuits 1, 2 and 4

8.5 bar

Opening pressure of circuit 3

7.0 bar

Closing pressure of circuits 1, 2 and 4

7 bar

Closing pressure of circuit 3

5.5 bar

Cut-in temperature of heating element

7°C

Cut-out temperature of heating element

29°C

Circuit 1 activation pressure for flowback function
of circuit 3

< 4.5 bar

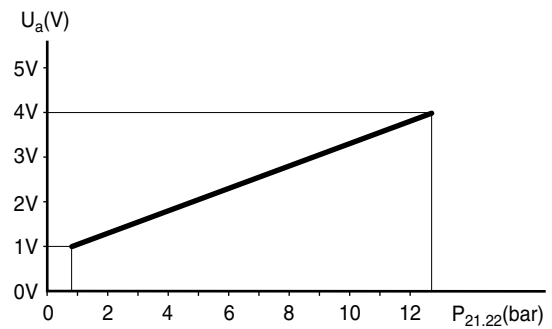
6

TECHNICAL DATA

LF45/55 series

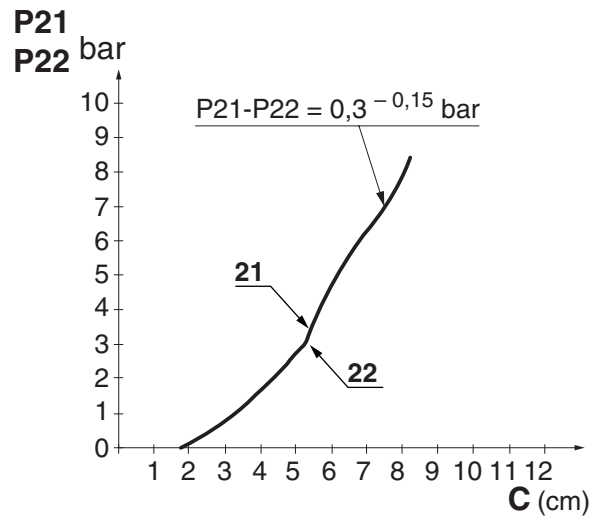
Brake system and components

Pressure sensor reading, circuits 1 and 2
(connections 6.2 - 6.7 in the diagram above)



R600701

FOOT BRAKE VALVE



R600594

Pressure difference between circuits 1 and 2 (between 0 and 3 bar)

0.3 ± 0.15 bar

Pressure reduction in circuits 1 and 2 from 10 to 8 bar

Connection 11
Connection 12
Connection 21
Connection 22

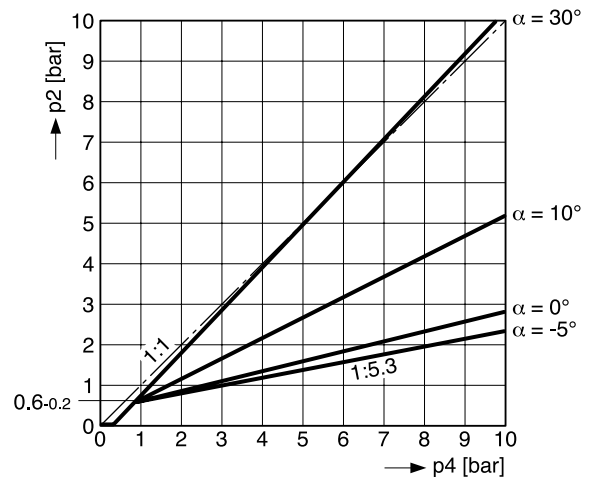
circuit 1 supply
circuit 2 supply
circuit 1 braking pressure
circuit 2 braking pressure

TECHNICAL DATA**6**

Brake system and components

LF45/55 series**0****LOAD-DEPENDENT CONTROL VALVE,
LEAF SPRING**

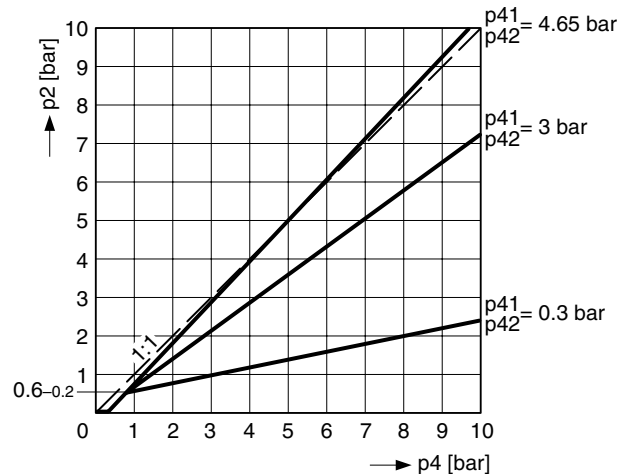
Characteristic



R600704

**LOAD-DEPENDENT CONTROL VALVE,
AIR SUSPENSION**

Characteristic



R600705

LOW-PRESSURE SWITCH

Cut-out pressure:

 5.2 ± 0.2 bar

6

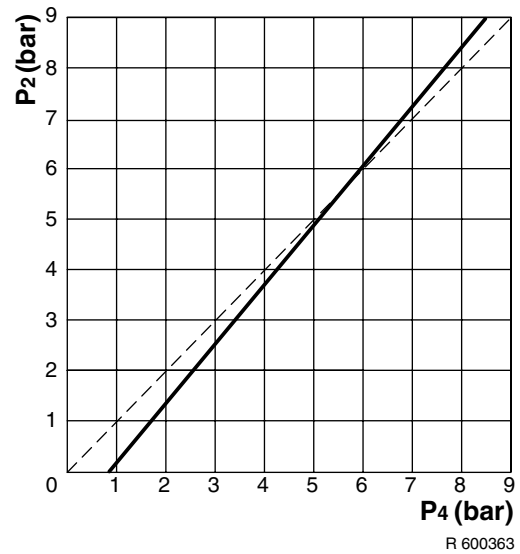
TECHNICAL DATA

LF45/55 series

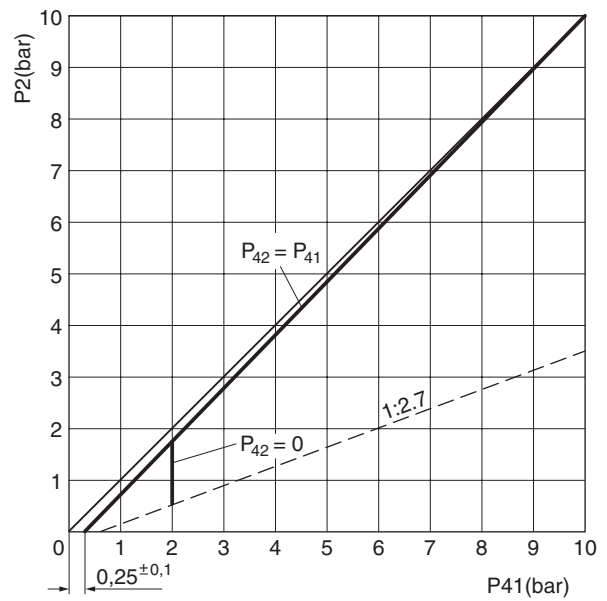
Brake system and components

RELAY VALVE

Fitted with internal filter and silencer



EMPTY/LOAD RELAY VALVE



Maximum reduction ratio
Actuating pressure
Fitted with internal filter and silencer

1 : 2.7
0.25 bar

TECHNICAL DATA

6

Brake system and components

LF45/55 series

0

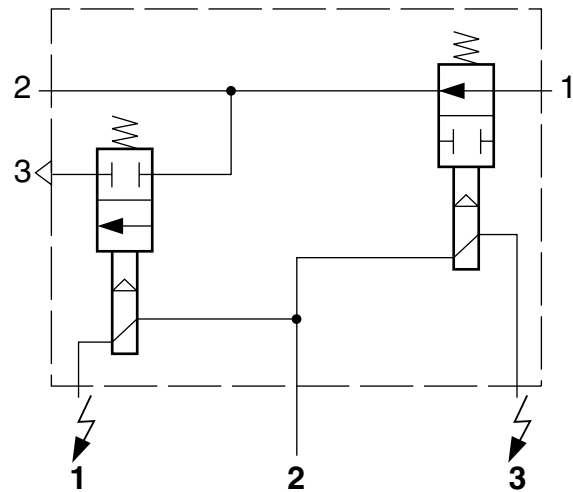
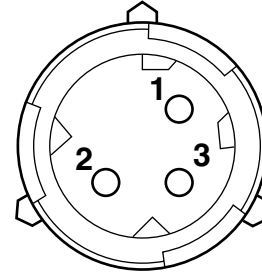
ABS VALVE

Resistance of magnet coil

$15 \pm 5 \text{ ohm at } 25^{\circ}\text{C}$

Electrical connections

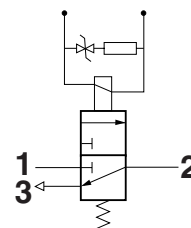
1. Bleed magnet coil
2. Earth
3. Aerate magnet coil



R600370

ASR solenoid valve

1. Supply
2. Port, two-way valve
3. Bleed



R600484

TRAILER VEHICLE CONTROL VALVE

Knorr model

Type:

AC 597BA

Advance

Input pressure

3 bar

Output pressure

3.2 bar

(equals 0.2 bar advance = factory setting)

LF45/55 series**Brake system and components****Advance adjustment**

Adjusting screw (Allen type, 6 mm)

Clockwise increases the advance

Anti-clockwise decreases the advance

Knorr model

Type:

AC 597C

Advance

Input pressure

3 bar

Output pressure

3.5 bar

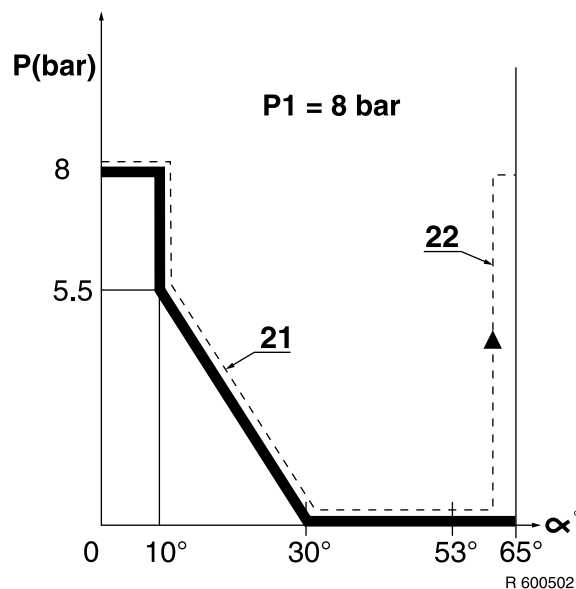
(equals 0.5 bar advance = factory setting)

Advance adjustment

Adjusting screw (Allen type, 6 mm)

Clockwise increases the advance

Anti-clockwise decreases the advance

**PARKING BRAKE VALVE WITH TRAILER
VEHICLE CONNECTION****Wabco model**

Type:

961 723 134 0

Max. output pressure in driving position

approx. 8 bar

TECHNICAL DATA

6

Brake system and components

LF45/55 series

0

PARKING BRAKE VALVE WITHOUT TRAILER VEHICLE CONNECTION

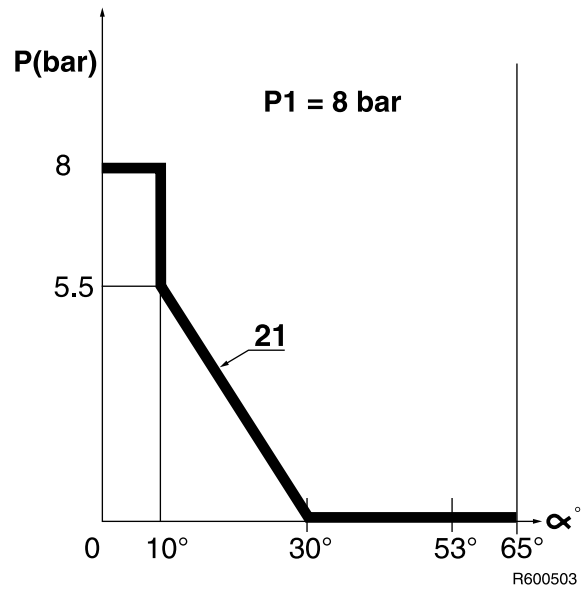
Wabco model

Type:

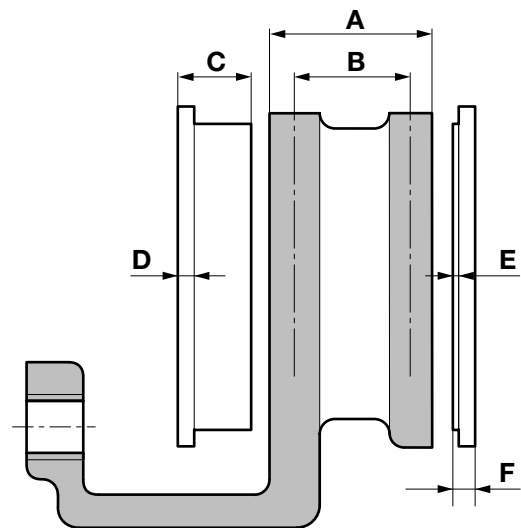
Max. output pressure in driving position

961 723 036 0

approx. 8 bar



BRAKE PADS



R600489

Knorr model

Maximum brake block thickness (C)

Maximum lining thickness (E)

Minimum brake block thickness (F)

Replacing:

30 mm

2 mm (at the thinnest point)

11 mm (at the thinnest point) with 9mm rear plate thickness (D)

all brake pads at the same time for each axle, and with the specified lining only.

Wabco PAN 17 version:

Maximum brake block thickness (C)

26 mm

Maximum lining thickness (E)

2 mm (at the thinnest point)

Minimum brake block thickness (F)

9 mm (at the thinnest point) with 7mm rear plate thickness (D)

Replacing:

all brake pads at the same time for each axle, and with the specified lining only.

Wabco PAN 19-1+ and PAN 19-2 versions:

Maximum brake block thickness (C)

30 mm

Maximum lining thickness (E)

2 mm (at the thinnest point)

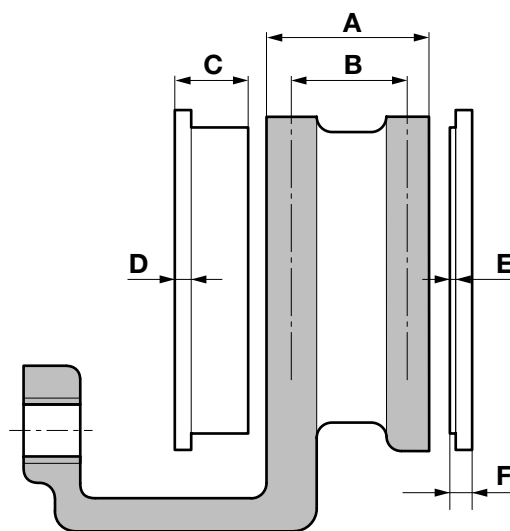
Minimum brake block thickness (F)

11 mm (at the thinnest point) with 9mm rear plate thickness (D)

Replacing:

all brake pads at the same time for each axle, and with the specified lining only.

BRAKE DISC



R600489

Knorr model

Maximum brake disc thickness (A)

45 mm

Minimum brake disc thickness (B)

37 mm (rejection dimension, disc must be replaced)

Minimum thickness, turning dimension

40 mm

Note:

If it is established during brake pad replacement that the brake thickness is less than or equal to 39 mm, the brake disc must also be replaced.

TECHNICAL DATA

6

Brake system and components

LF45/55 series

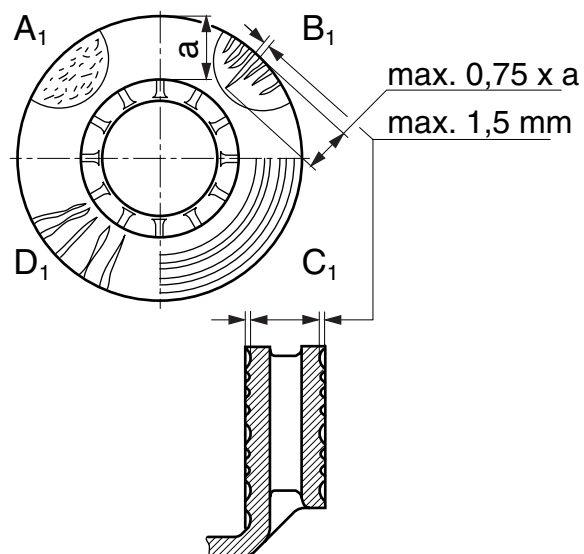
0

The following signs of wear are permissible:

- A1 Crazy cracking.
- B1 Cracks running to the centre up to 1.5 mm wide and deep, max. 0.75 x friction surface width (a).
- C1 Unevenness in the disc surface up to 1.5 mm.

Not permissible:

- D1 Through-going cracks.



R600471

Wabco model

PAN 17 version:

Maximum brake disc thickness (A)

34 mm

Minimum brake disc thickness (B)

28 mm (rejection dimension, disc must be replaced)

Minimum thickness, turning dimension

30 mm

The following signs of wear are permissible:

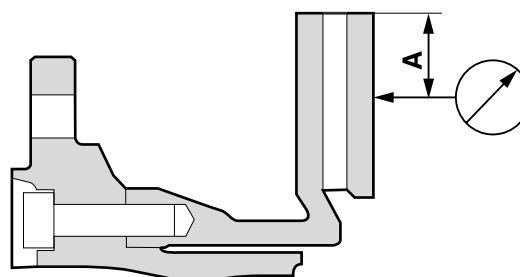
- A1 Crazy cracking.
- B1 Cracks running to the centre up to 1.5 mm wide and deep, max. 0.75 x friction surface width (a).
- C1 Unevenness in the disc surface up to 1.5 mm.

Not permissible:

- D1 Through-going cracks.

Brake disc wobble 0.15 mm

- A Measuring distance is 35 mm



R600508

PAN 19-1+ and PAN 19-2 versions:

Maximum brake disc thickness (A)

45 mm

Minimum brake disc thickness (B)

38 mm (rejection dimension, disc must be replaced)

Minimum thickness, turning dimension

40 mm

The following signs of wear are permissible:

A1 Crazy cracking.

B1 Cracks running to the centre up to 1.5 mm wide and deep, max. 0.75 x friction surface width (a).

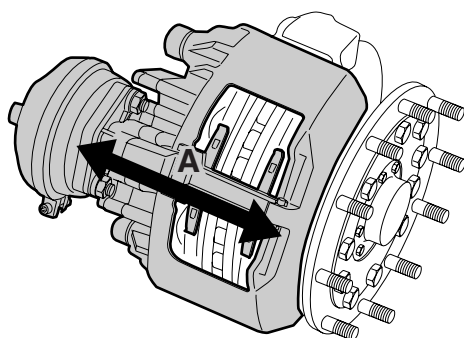
C1 Unevenness in the disc surface up to 1.5 mm.

Not permissible:

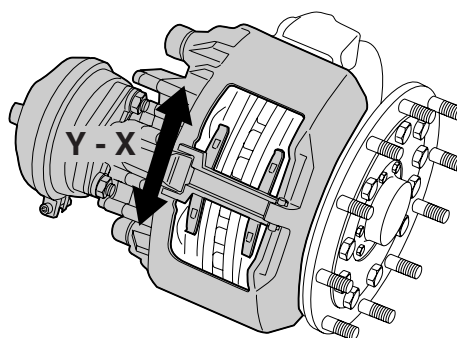
D1 Through-going cracks.

Brake disc wobble 0.15 mm

A Measuring distance is 35 mm

BRAKE CALLIPER**Knorr model**

R600708



R600712

Brake calliper play in axial direction (direction A)

0.6 - 1.0 mm

Brake calliper play on guide bushes ("Y" - "X")

max. 2.0 mm

Play between brake calliper carrier and brake pads ("Y" - "X" direction)

0.3 - 0.9 mm

Wabco model

Play between brake pad/brake disc:

Manually adjustable brake pad/brake disc play after fitting brake pads:

0.7 mm

TECHNICAL DATA**6****Brake system and components****LF45/55 series****0****1.2 TIGHTENING TORQUES**

The tightening torques stated in this section are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections not specified must therefore be tightened to the torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are replaced, it is important that - unless stated otherwise - these bolts and nuts are of exactly the same length and property class as those removed.

QUICK-RELEASE COUPLING

Parker 20 - 30 Nm

SPRING BRAKE CYLINDER

Attachment nuts	195 Nm
Release bolt	70 Nm
Clamping strip attachment nut	40 Nm

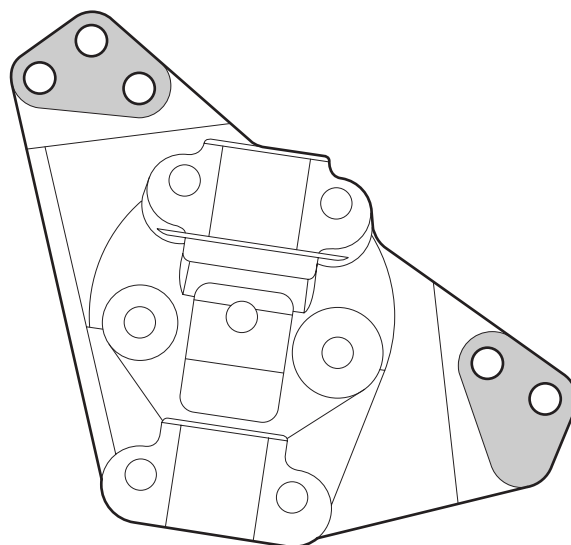
BRAKE CYLINDER

Attachment nuts 195 Nm

BRAKE CALLIPER - BRAKE CARRIER, Knorr model

Sliding sleeve Allen screws (SB7000)	285 Nm ⁽¹⁾
Sliding sleeve Allen screws (SN7000)	180 Nm + 90° ⁽¹⁾
Pressure tool, guide bush bellows	8 Nm
Rubber bearing bush pressure tool (only SN7000)	8 - 45 Nm

(1) Always use new bolts, provided with locking compound. New bolts are supplied with locking compound already applied.



R600744

Brake calliper attachment bolts, front axle

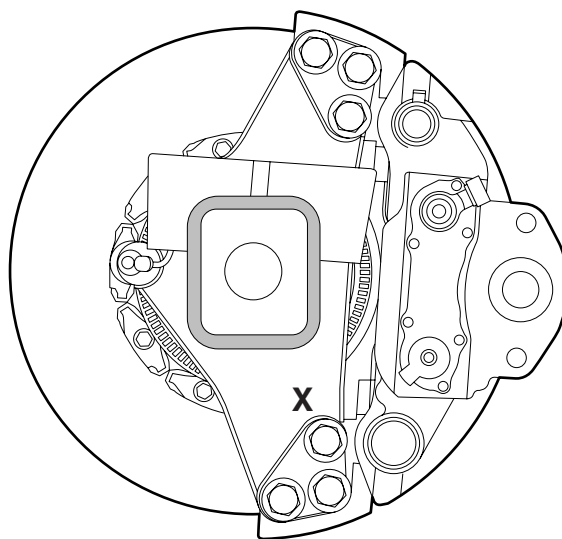
440 Nm ⁽¹⁾ ⁽²⁾

- (1) From production date $\geq 2003-37$ there is one fitted bolt and flange bolts are also fitted.
The fitted bolt must be fitted at the position marked by a small hole.
- (2) In the case of versions with Knorr disc brakes, the attachment of the brake calliper against the stub axle changed starting from production week $\geq 2002-25$. Five bolts are now used instead of six bolts. There is still a hole for the 6th bolt on the brake carrier, but there is no hole on the stub axle.

Brake calliper attachment bolts, rear axle

440 Nm ⁽¹⁾

- (1) From production date $\geq 2003-37$ there is one fitted bolt and flange bolts are also fitted.
 - In the case of the 11.26 rear axle, the fitted bolt must be fitted at the position marked "X".
 - In the case of the 11.32 rear axle, the fitted bolt must be fitted at the position marked by a small hole.



R600791

BRAKE CALLIPER - BRAKE CARRIER, Wabco model

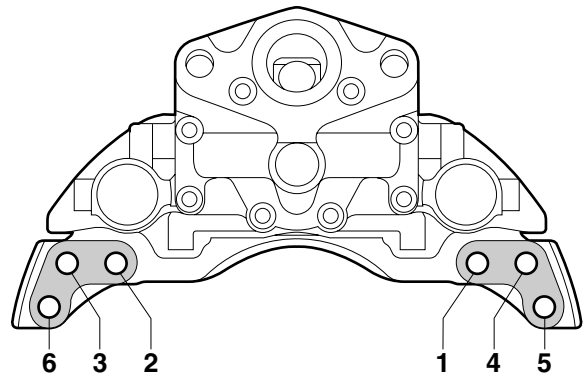
Locking bracket bolt (PAN 17)	20 Nm
Locking bracket bolt (PAN 19-1+ and PAN 19-2)	37 Nm
Guide bush Allen screws (PAN 17)	340 Nm
Guide bush Allen screws (PAN 19-1+ and PAN 19-2)	300 Nm
Brake calliper attachment bolts against stub axle or back plate (PAN 17)	213 Nm
Brake calliper attachment bolts against stub axle or back plate (PAN 19-1+ and PAN 19-2)	470 Nm

TECHNICAL DATA**6**

Brake system and components

LF45/55 series**0****Tightening sequence of brake calliper attachment bolts, Wabco model**

Tightening sequence of brake calliper attachment bolts:



R600520

BRAKE DISC**Knorr model**

Locking plate attachment bolts

32 Nm

Wabco model**PAN 17 version**

Brake disc attachment bolts on front axle

 115 ± 7 Nm

Brake disc attachment bolts on rear axle

130 Nm

PAN 19-1+ and PAN 19-2 versions

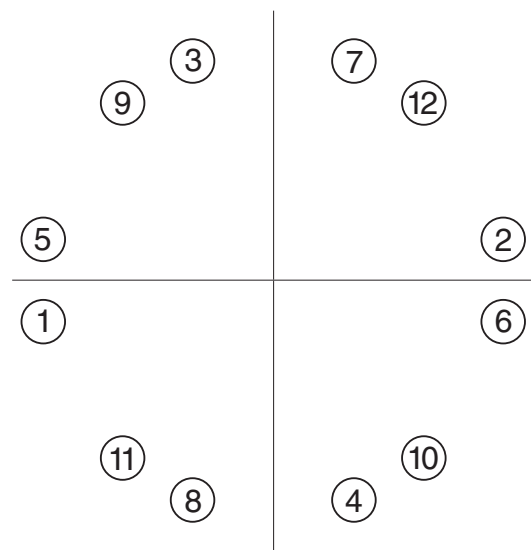
Brake disc attachment bolts on front axle

 210 ± 21 Nm

Brake disc attachment bolts on rear axle

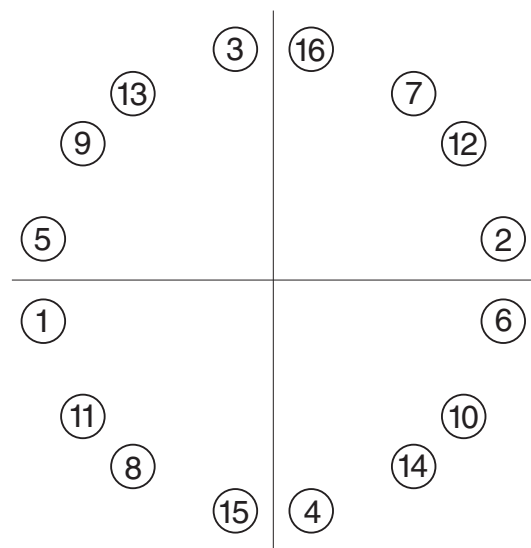
193 Nm

Tightening sequence of brake disc on
F36 axle



R600732

Tightening sequence of brake disc on
F48 axle



R600731

TECHNICAL DATA

6

Brake system and components

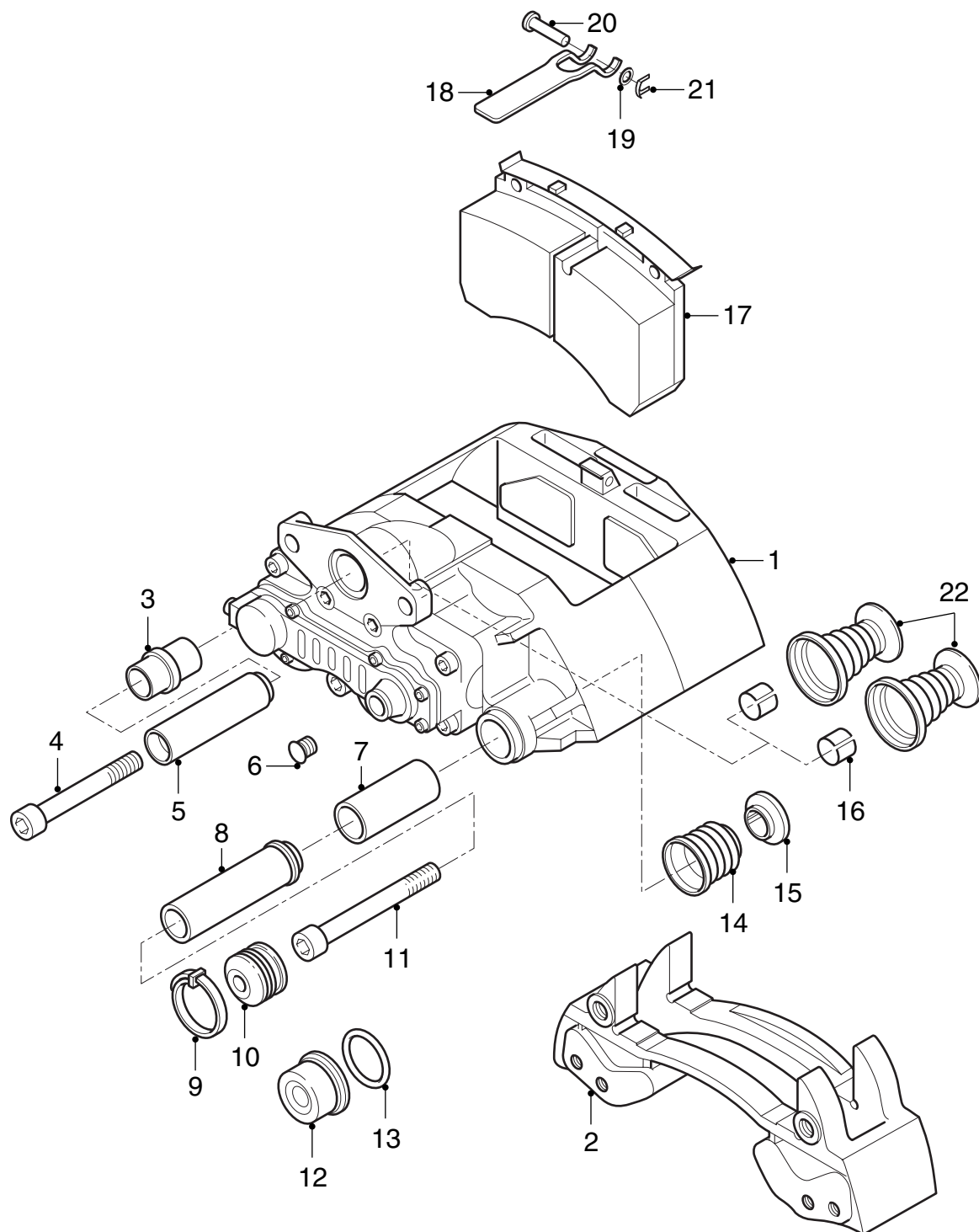
LF45/55 series

0

1.3 LUBRICANTS

BRAKE CALLIPER, KNORR MODEL

SB7000 version



R600541

6

TECHNICAL DATA

LF45/55 series

Brake system and components

Renolit HLT2 (white) for parts 6, 7, 8, the
adjusters (not shown), the brake cylinder lever
and the flange surface for attachment of the
brake cylinder

1448907

Syntheso GL EP1 (green), for parts 3, 5

1448908

0

TECHNICAL DATA

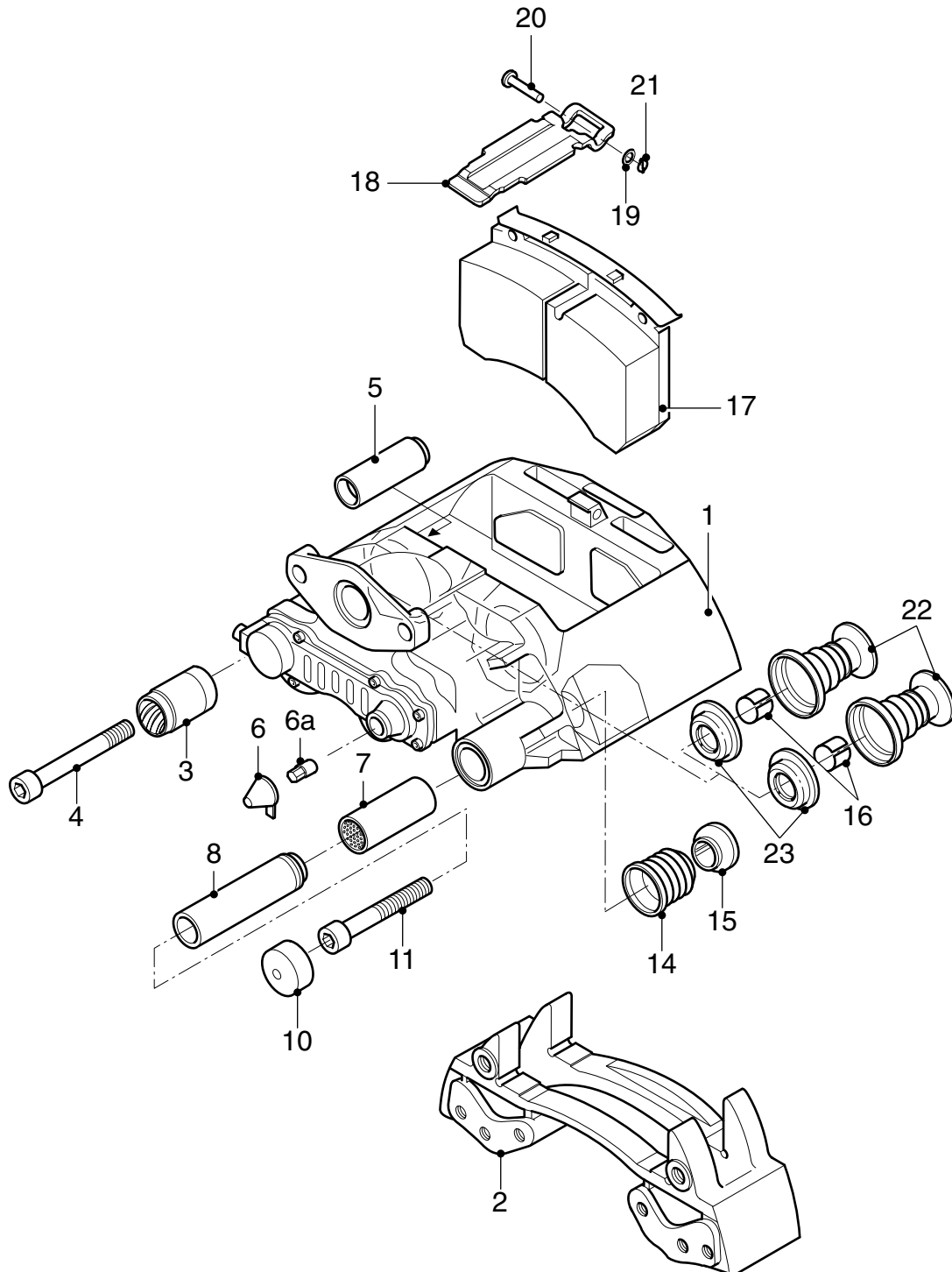
6

Brake system and components

LF45/55 series

0

SN7000 version



Renolit HLT2 (white) for parts 3, 6, 7, 8, the adjusters (not shown), the brake cylinder lever and the flange surface for attachment of the brake cylinder

1448907

R600698

BRAKE CALLIPER, WABCO MODEL

Renolit G-BRF 2

CONTENTS

	Page	Date
1. DISC BRAKE CONSTRUCTION	1-1	200436
1.1 Fault-finding table	1-1	200436

DIAGNOSTICS

6

Contents

LF45/55 series

1

1. DISC BRAKE CONSTRUCTION

1.1 FAULT-FINDING TABLE

SYMPTOM: SQUEALING/NOISE DURING BRAKING	
Possible cause	Remedy
Worn brake pads	Check brake pads and brake disc thickness
Loose parts	Check disc brake construction
Wear/damage to hub bearing	Check hub bearing play
Wear to internal parts of disc brake construction	Check internal parts
Incorrect vehicle combination	Check vehicle combination
Incorrect front axle / rear axle brake pressure balance	Check front axle / rear axle balance

SYMPTOM: IRREGULAR BRAKE PAD WEAR	
Possible cause	Remedy
Fouled/corroded guide bushes	Check the guide bushes
Dirt accumulation between moving parts of the disc brake construction	Clean the disc brake construction
Moisture and dirt on internal mechanical parts	Check and clean the brake calliper seals
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier

SYMPTOM: VEHICLE PULLS TO ONE SIDE DURING BRAKING	
Possible cause	Remedy
Difference in tyre pressure	Check / correct tyre pressure
Difference in tyre size	Check tyres
Different brake cylinder diameters	Check brake cylinder diameters
Broken springs in brake cylinders	Check brake cylinders
Leaking brake cylinders	Check brake cylinders
Fouled brake cylinders	Check the brake cylinders for fouling
Excessive stub axle bearing play	Check stub axle bearing play
Excessive steering ball joint play	Check steering ball joint play
Excessive shackle pin play	Check shackle pin play
Incorrect vehicle combination	Check vehicle combination
Incorrect ABS operation	Check ABS operation
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier

DIAGNOSTICS**6**

Disc brake construction

LF45/55 series**1**

SYMPTOM: POOR BRAKING DECELERATION	
Possible cause	Remedy
Overload due to excessive loading	Check vehicle loading condition
System pressure too low	Check pressure regulator setting
Air leakage in the brake system	Check the brake system for leakage
Insufficient braking power / poor condition of trailer vehicle brake system	Check trailer vehicle
Pinched brake lines	Check / replace brake lines
Brake cylinder stroke too large	Check automatic slack adjuster
Frozen brake system	Check brake system
Brake components affected by road salt	Check the brake components for fouling.
Fouled brake cylinders	Check the brake cylinders for fouling
Incorrect brake cylinder diameter	Check brake cylinders
Incorrect operation / setting of load sensing valve	Check operation / setting of load sensing valve
Incorrect vehicle combination	Check vehicle combination
Incorrect ABS operation	Check ABS operation
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier

SYMPTOM: VIBRATIONS DURING BRAKING	
Possible cause	Remedy
Incorrect wheel tightening procedure	Tighten wheels according to tightening procedure
Non-standard wheels fitted	Fit only standard wheels
Overload due to excessive loading	Check vehicle loading condition
Incorrect front axle / rear axle brake pressure balance	Check front axle / rear axle balance
Wrong brake pad quality	Check brake pads
Dirt/deposits on brake disc	Check/clean brake disc
Loose parts	Check disc brake construction
Wear/damage to hub bearing	Check hub bearing play
Damage to disc brake	Check thickness and condition of brake disc
Play in cab suspension	Check cab suspension
Incorrect vehicle combination	Check vehicle combination

SYMPTOM: LOCKING OF THE BRAKES	
Possible cause	Remedy
Incorrect setting of load sensing valve	Check setting of load sensing valve
Thermal overload of non-locking axle brake pads	Check non-locking axle brake pads
Incorrect system pressure due to incorrect pressure regulator setting	Check pressure regulator setting
Defective trailer vehicle brake system	Check trailer vehicle brake system
Incorrect vehicle combination	Check vehicle combination
Incorrect ABS operation	Check ABS operation
Tyres have too little tread	Check tread
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier

SYMPTOM: INCREASED BRAKE PAD WEAR	
Possible cause	Remedy
Overload due to excessive loading	Check vehicle loading condition
Incorrect setting of load sensing valve	Check setting of load sensing valve
Incorrect vehicle combination or front axle/rear axle balance	Check vehicle combination or front axle/rear axle balance
Defective trailer vehicle brake system	Check trailer vehicle brake system
Air pressure in spring brake cylinders too low during driving, dragging brakes	Check air pressure in spring brake cylinders with the parking brake valve in the driving position
Dragging brakes because parking brake is not released	Check release of parking brake
Dirt under foot brake valve / floor mat too high	Check for free movement of foot brake valve
Dirty / blocked brake valve bleeders	Check valve bleeders
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier
Incorrect setting of the trailer vehicle control valve/ trailer vehicle reaction valve	Check setting of the trailer vehicle control valve/ trailer vehicle reaction valve

DIAGNOSTICS**6**

Disc brake construction

LF45/55 series**1**

SYMPTOM: DRAGGING BRAKES	
Possible cause	Remedy
Leaking foot brake valve to circuit 1 and/or 2	Check the foot brake valve for leaks
Dirt/deposits in brake calliper of disc brake	Check freedom of movement of brake calliper
Brake pads turned back too tightly	Check minimum brake pad play
Air pressure in spring brake cylinders too low during driving	Check output pressure of the double-check relay valve Check four-circuit safety valve for dirt Check output pressure of the parking brake valve in the driving position
Output supply pressure from trailer vehicle control valve to trailer/semi-trailer too low	Check output supply pressure of the trailer vehicle control valve
Dirt under foot brake valve / floor mat too high	Check for free movement of foot brake valve
Dirty / blocked brake valve bleeders	Check valve bleeders
Brake pad stuck in the brake calliper Incorrect play between brake pads and brake carrier	Check the play between brake pads and brake carrier

6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

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BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM 6

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LF45/55 series

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6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

General

1. GENERAL

1.1 BRAKE DIAGRAMS

Due to the large number of variants for each vehicle type and for each country, it is impractical to list all these variants.

Thus a selection has been shown which can form the basis for other variants.

2

BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM 6

General

LF45/55 series

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6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

Brake diagrams for the fully pneumatic brake system

2. BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

2.1 LEGEND, BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

Component no.	Description
1	Compressor
4	Air supply unit A = ECAS connecting point B = Auxiliary consumer connecting point
7	Air reservoir
12	Coupling head
13	Quick-release valve
14	Brake chamber
16	Foot brake valve
19	Parking brake low-pressure switch
21	Load sensing valve, leaf suspension
22	Load sensing valve, air suspension
33	Relay valve
35	Empty/load relay valve
46	Trailer control valve
49	Spring brake cylinder
52	Parking brake valve with trailer control
53	Parking brake valve without trailer control
62	Emergency filling/test connection
B237	ASR valve
B256	ABS valve, front axle
B257	ABS valve, front axle
B258	ABS valve, rear axle
B259	ABS valve, rear axle

2

BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM 6

Brake diagrams for the fully pneumatic brake system

LF45/55 series

2.2 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

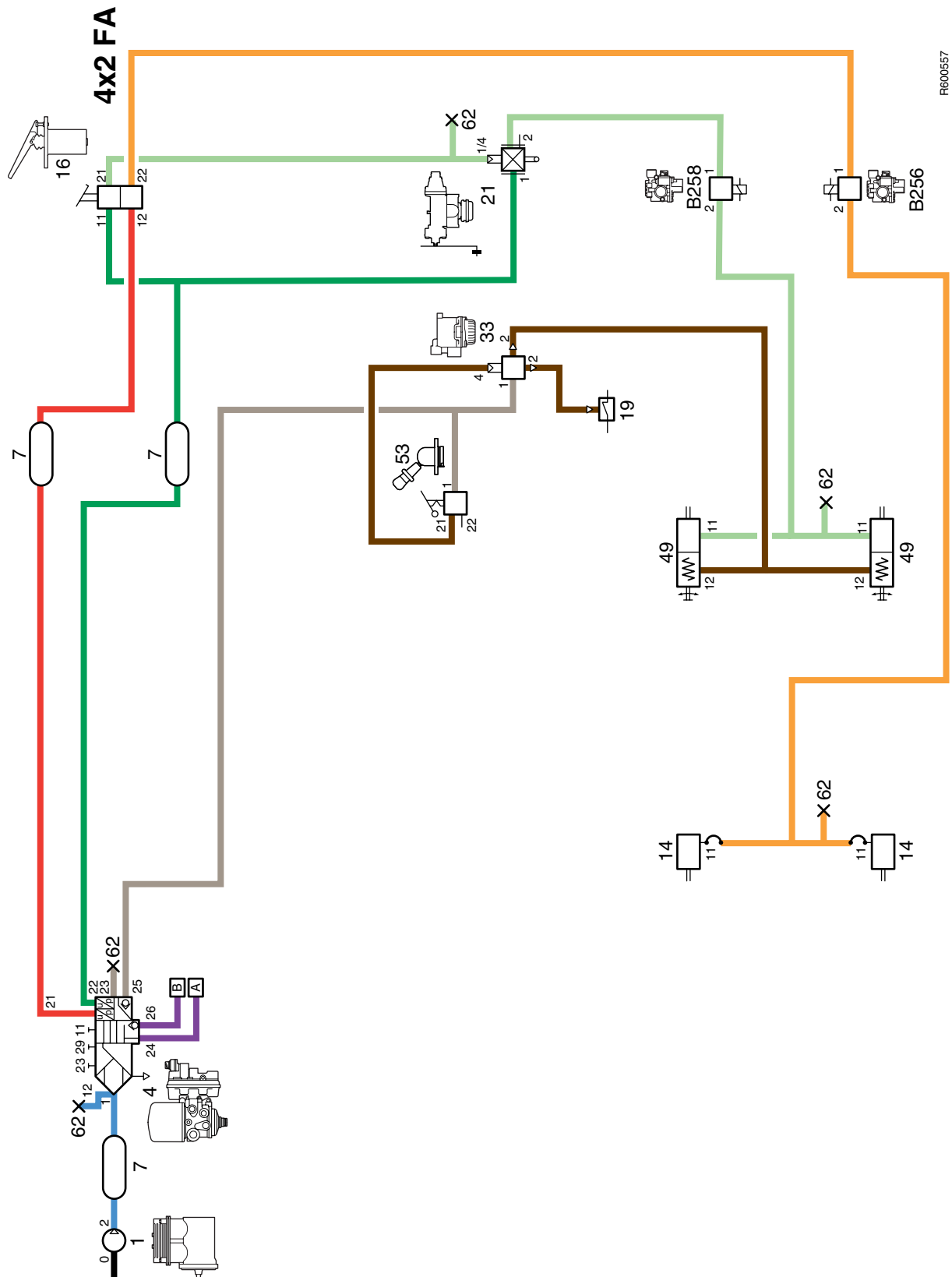
Brake diagram number	Vehicle version
R600557	4x2 vehicle, FA configuration, LF45 - Without trailer connection - With leaf-sprung rear axle - With ABS, without ASR
R600558	4x2 vehicle, FA configuration, LF45 - With trailer connection - With air-sprung rear axle - With ABS, without ASR
R600563	4x2 vehicle, FA configuration, LF45 - Without trailer connection - With leaf-sprung rear axle - With ABS, with ASR
R600560	4x2 vehicle, FA configuration, LF55 - Without trailer connection - With leaf-sprung rear axle - With ABS, without ASR
R600734	4x2 vehicle, FA configuration, LF55 4x2 vehicle, FT configuration, LF55 - With trailer connection - With air-sprung rear axle - With ABS, without ASR
R600564	4x2 vehicle, FA configuration, LF55 - Without trailer connection - With leaf-sprung rear axle - With ABS, with ASR
R600733	6x2 vehicle, FAN configuration, LF55 - With air-sprung rear axle - With ABS, without ASR

6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

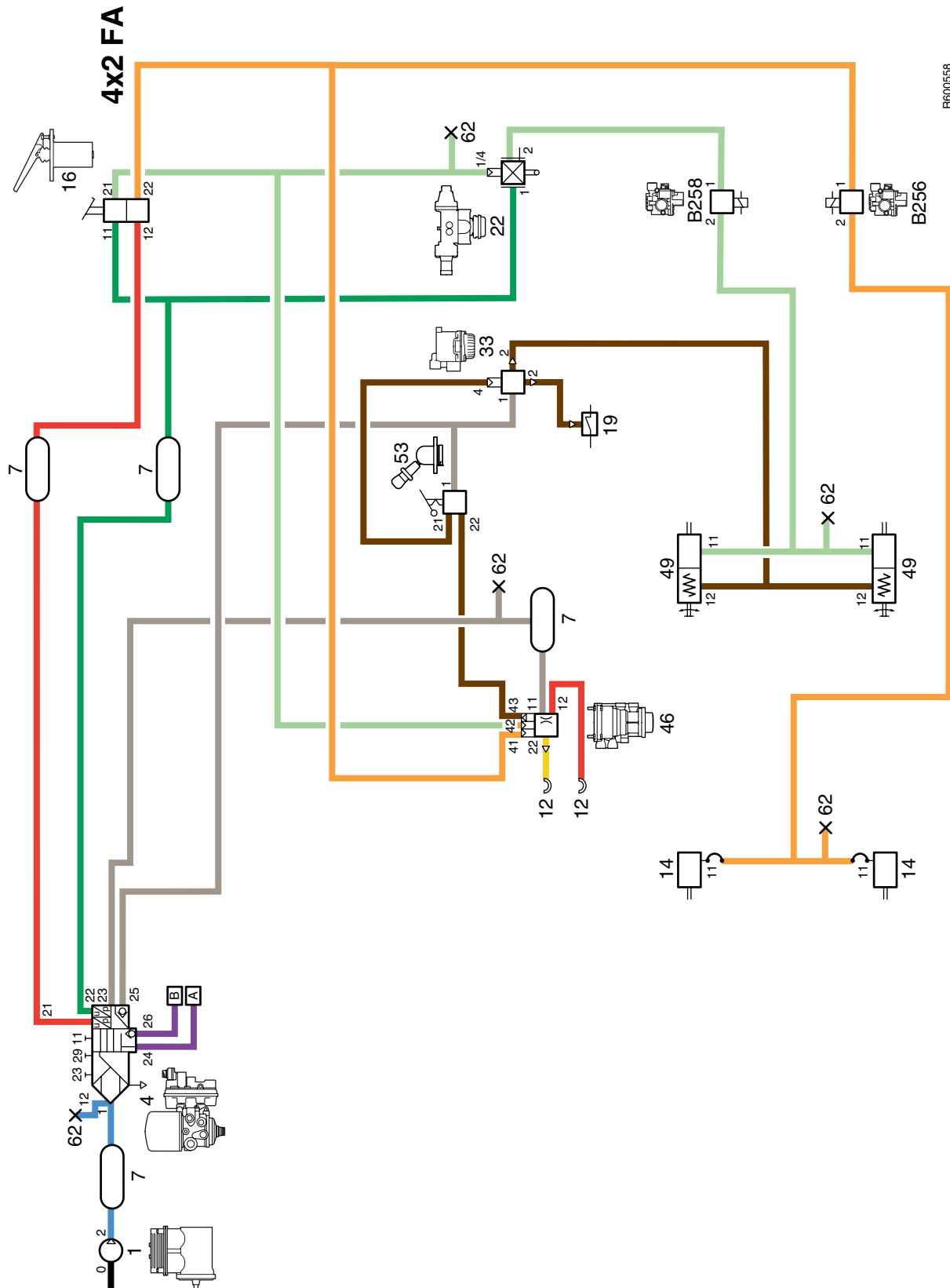
Brake diagrams for the fully pneumatic brake system

BRAKE DIAGRAM R600557



LF45/55 series

R600558

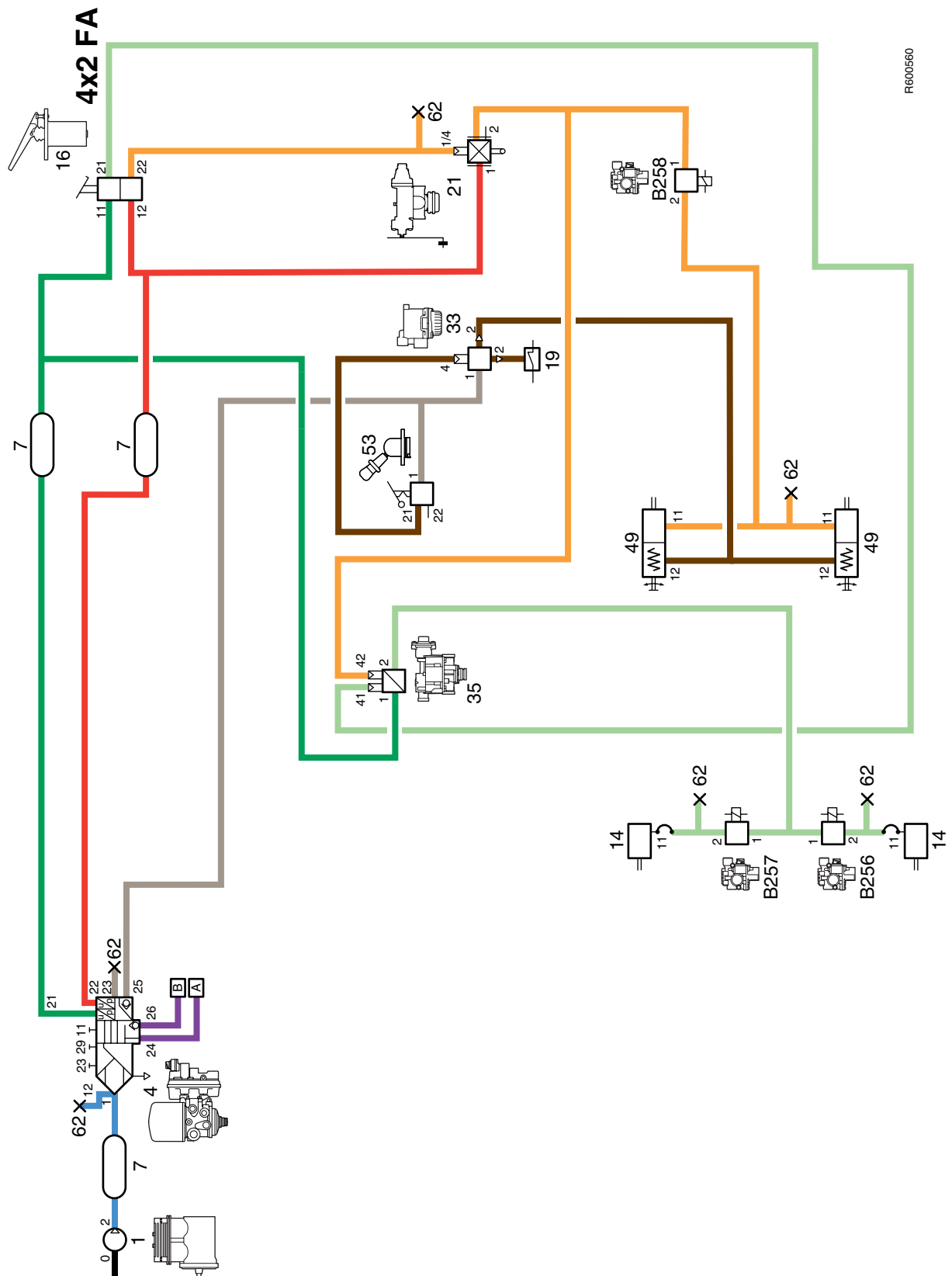


6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

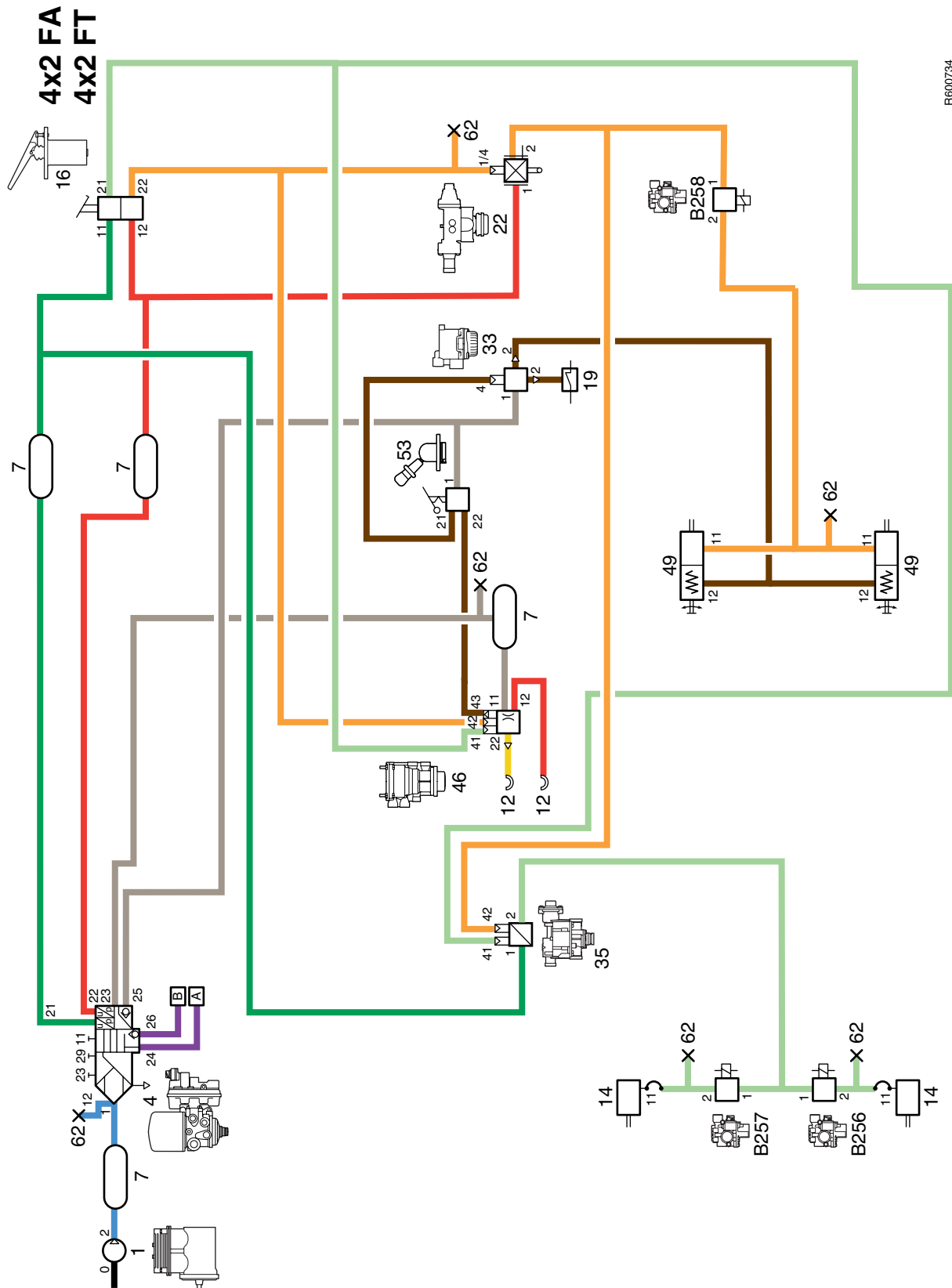
Brake diagrams for the fully pneumatic brake system

BRAKE DIAGRAM R600560



LF45/55 series

R600734

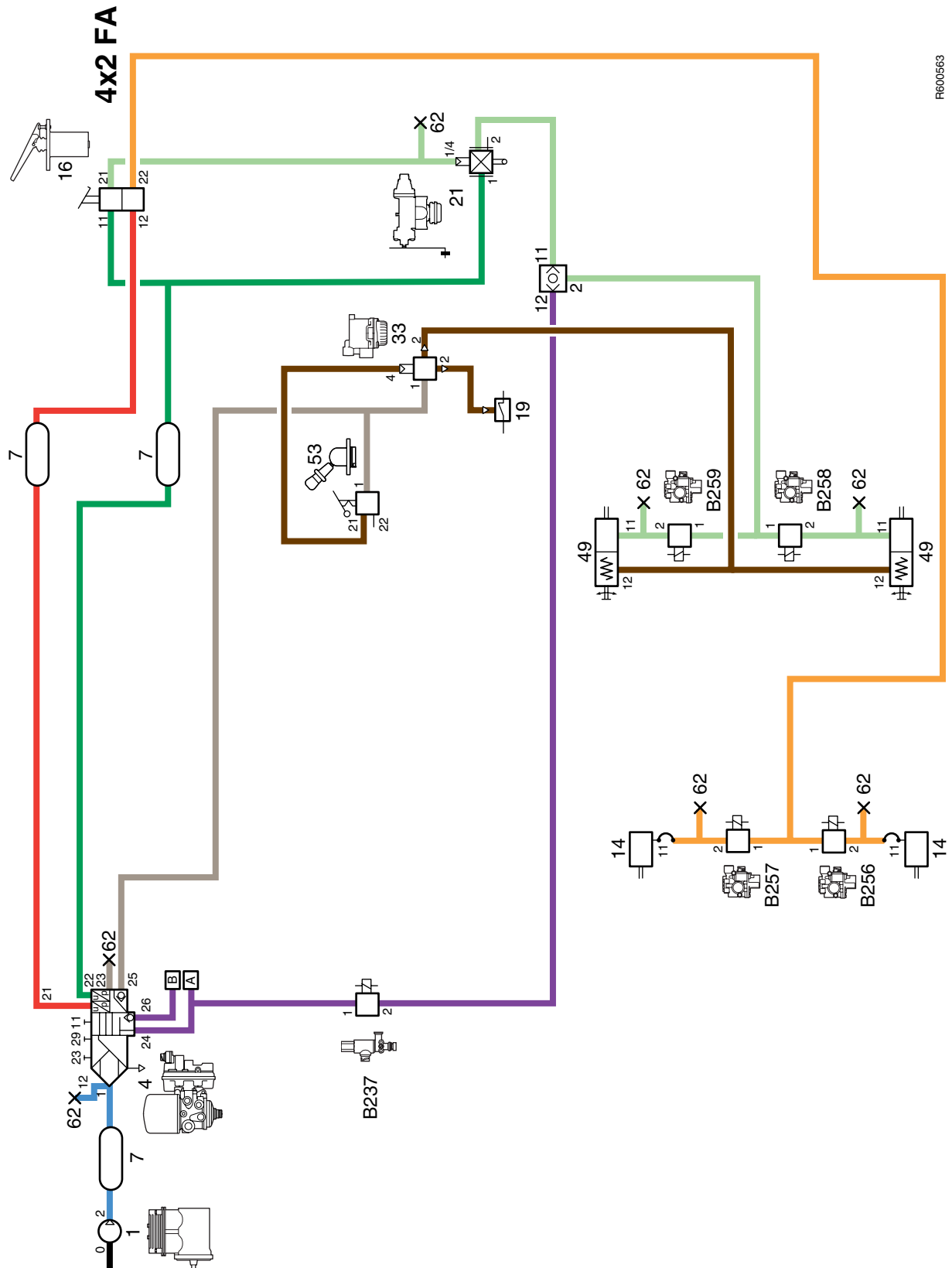


6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

Brake diagrams for the fully pneumatic brake system

BRAKE DIAGRAM R600563

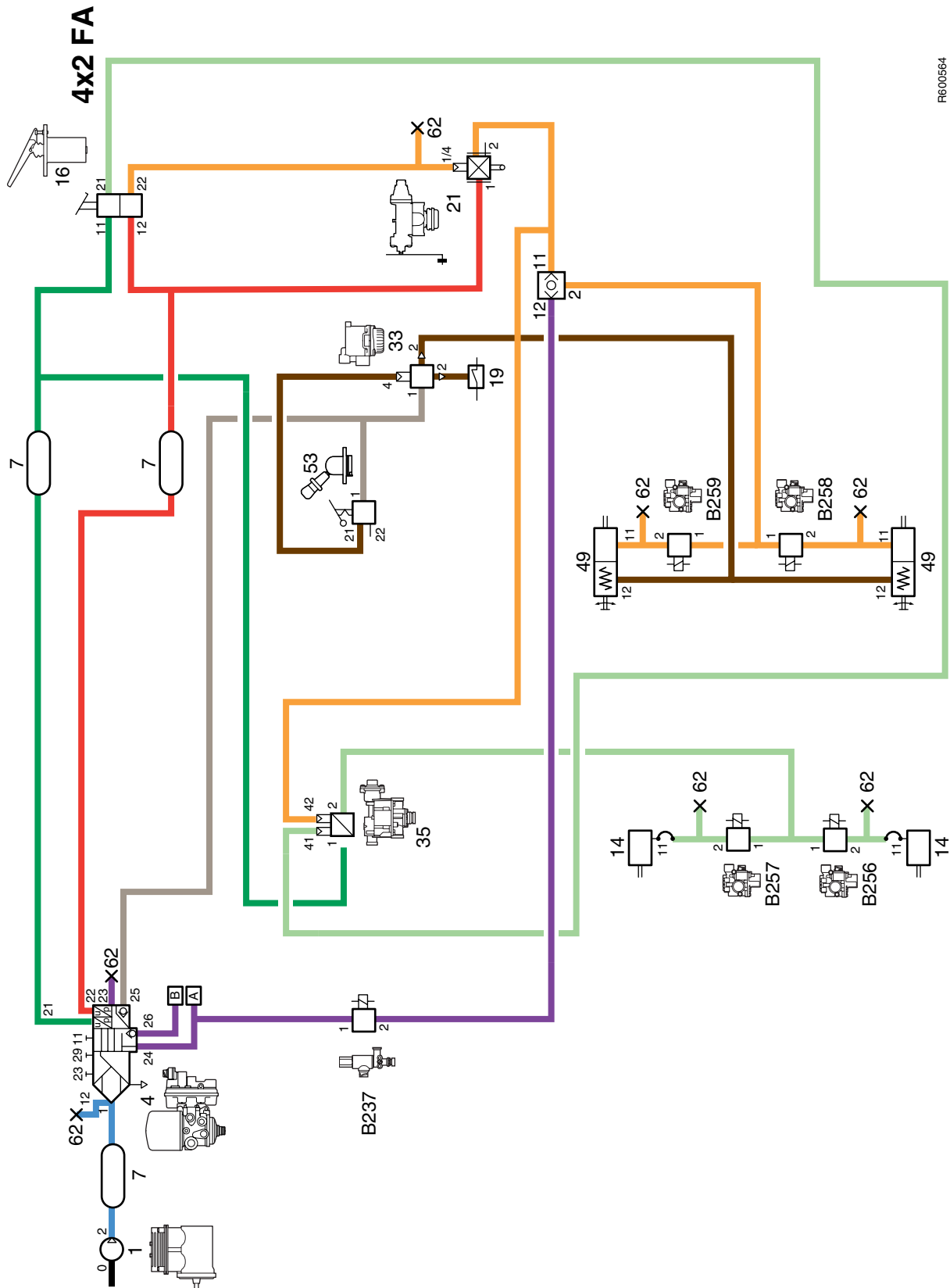


BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM 6

Brake diagrams for the fully pneumatic brake system

LF45/55 series

BRAKE DIAGRAM R600564



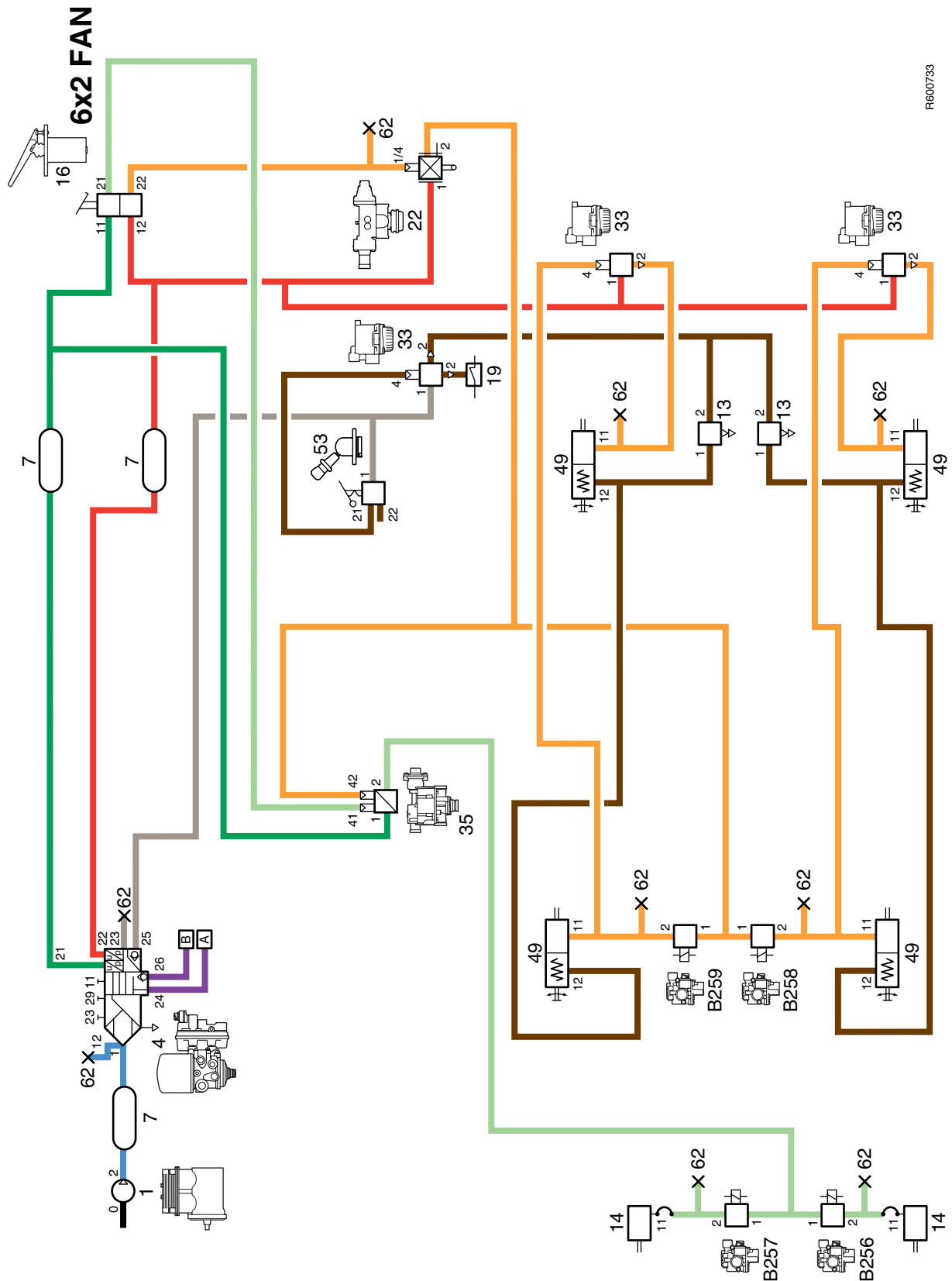
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6 BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM

LF45/55 series

Brake diagrams for the fully pneumatic brake system

BRAKE DIAGRAM R600733



BRAKE DIAGRAMS FOR THE FULLY PNEUMATIC BRAKE SYSTEM 6

Brake diagrams for the fully pneumatic brake system

LF45/55 series

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OPERATION OF BRAKE COMPONENTS

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LF45/55 series

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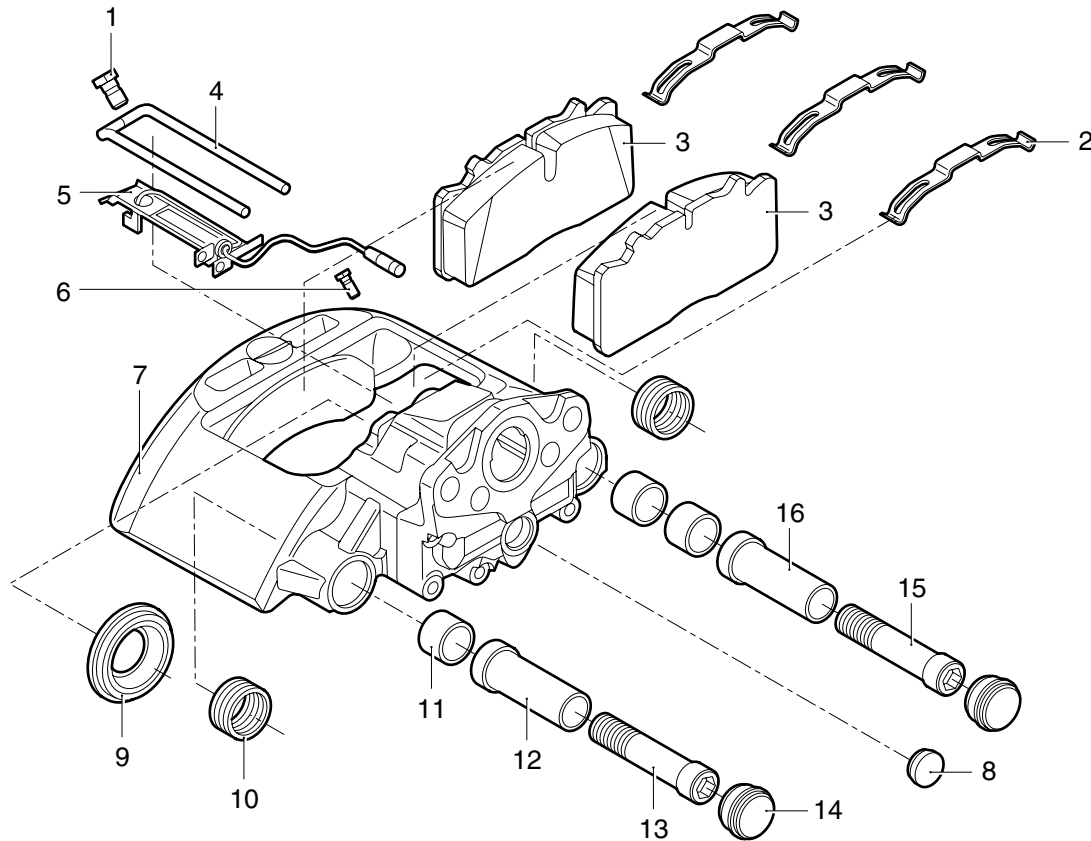
OPERATION OF BRAKE COMPONENTS

LF45/55 series

General

1. GENERAL

1.1 OVERVIEW DRAWING, WABCO PAN 17 AND PAN 19-1+ DISC BRAKE CONSTRUCTION



1. Hexagon
2. Spring clip
3. Brake pads
4. Locking bracket
5. Cable strip
6. Cable clamp attachment screw
7. Brake calliper
8. Cap
9. Brake piston dust cover
10. Guide bush dust cover
11. Bearing bush
12. Guide bush (short)
13. Allen screw (short)
14. Cover
15. Allen screw (long)
16. Guide bush (long)

R600538

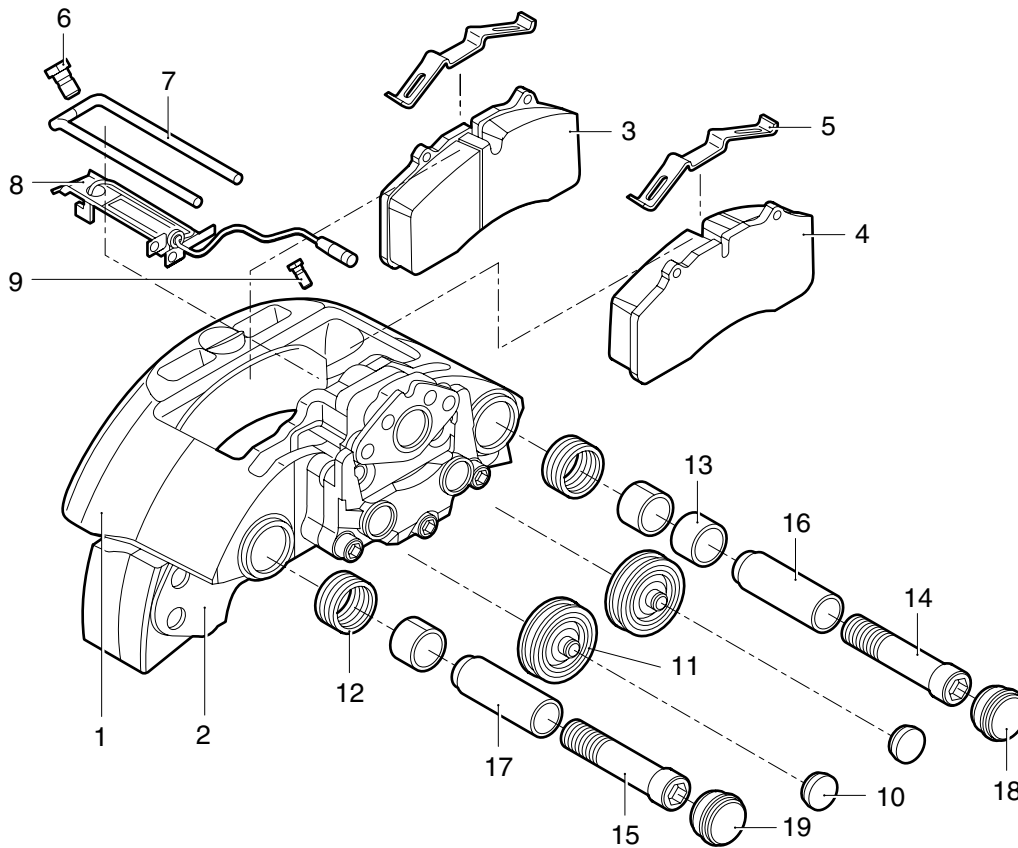
OPERATION OF BRAKE COMPONENTS

6

General

LF45/55 series

1.2 OVERVIEW DRAWING, WABCO PAN 19-2 DISC BRAKE CONSTRUCTION



R600539

1. Brake calliper
2. Brake calliper carrier
3. Wheel-side brake pad
4. Drive-side brake pad
5. Spring clip
6. Hexagon
7. Locking bracket
8. Cable strip
9. Cable clamp attachment screw
10. Cap
11. Brake piston dust cover
12. Guide bush dust cover
13. Bearing bush
14. Allen screw (long)
15. Allen screw (short)
16. Guide bush (long)
17. Guide bush (short)
18. Cover
19. Cover

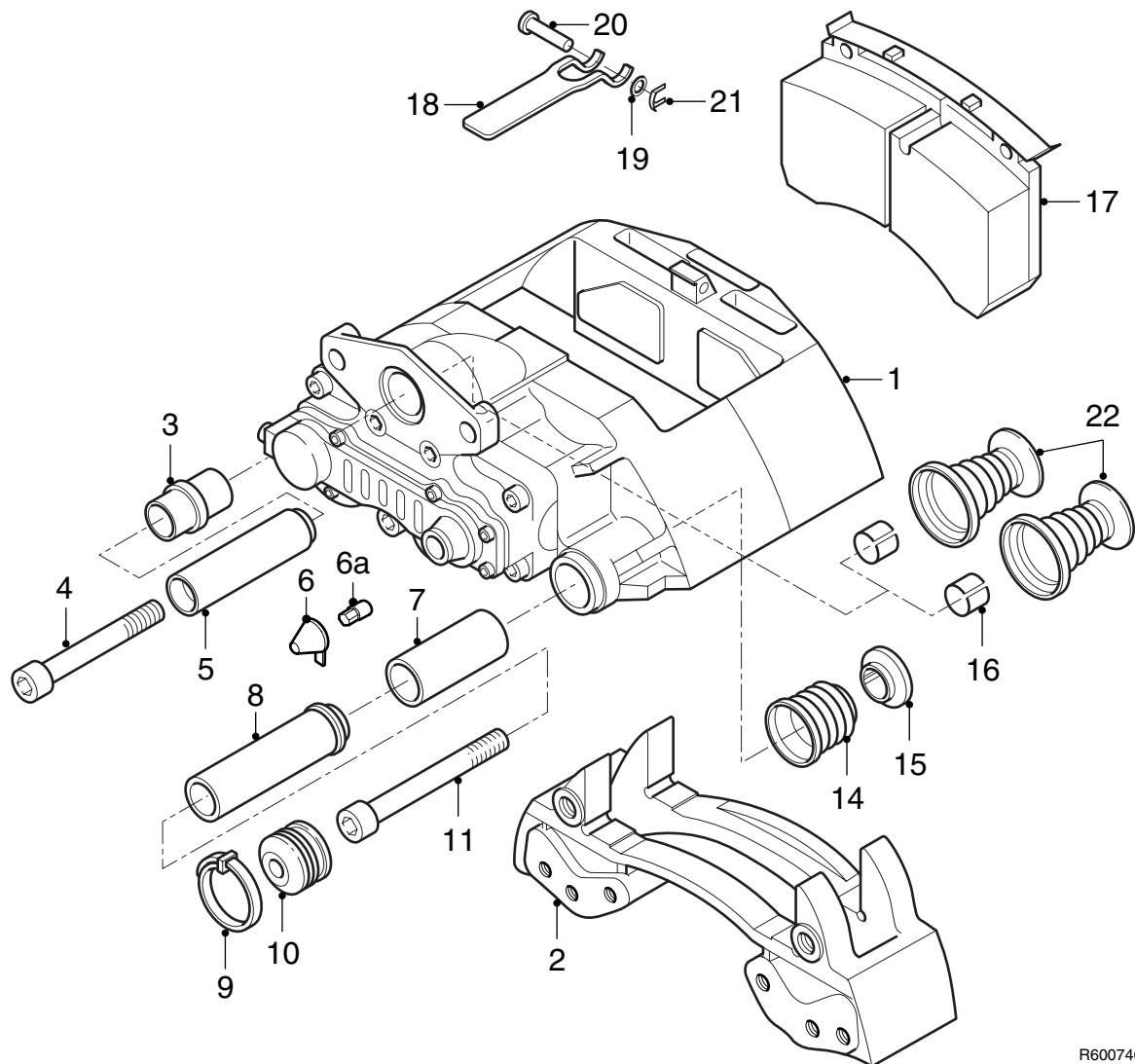
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OPERATION OF BRAKE COMPONENTS

LF45/55 series

General

1.3 OVERVIEW DRAWING, KNORR SB700 DISC BRAKE CONSTRUCTION



R600746

- | | | | |
|----|------------------------|----|----------------------------|
| 1 | Brake calliper | 11 | Allen screw |
| 2 | Brake calliper carrier | 14 | Bellows |
| 3 | Rubber bearing bush | 15 | Ring |
| 4 | Allen screw | 16 | Bearing bushes |
| 5 | Guide sleeve | 17 | Brake pad |
| 6 | Cap | 18 | Attachment bracket |
| 7 | Brass bearing bush | 19 | Sealing ring |
| 8 | Guide sleeve | 20 | Pin |
| 9 | Clamping strap | 21 | Retainer clip |
| 10 | Bellows | 22 | Thrust pieces with bellows |

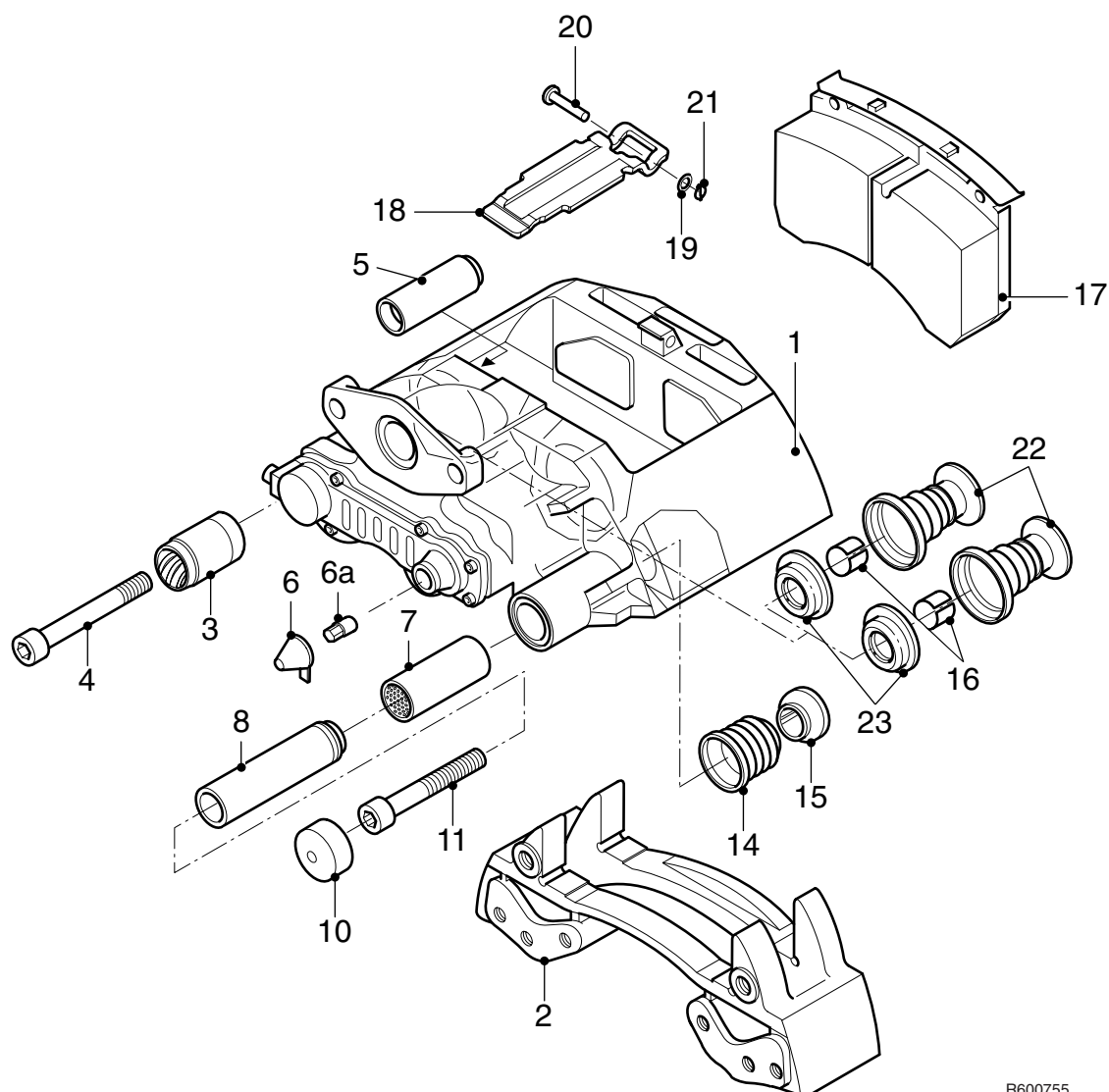
OPERATION OF BRAKE COMPONENTS

6

General

LF45/55 series

1.4 OVERVIEW DRAWING, KNORR SN700 DISC BRAKE CONSTRUCTION



R600755

- | | | | |
|----|------------------------|----|----------------------------|
| 1 | Brake calliper | 14 | Bellows |
| 2 | Brake calliper carrier | 15 | Ring |
| 3 | Rubber bearing bush | 16 | Bearing bushes |
| 4 | Allen screw | 17 | Brake pad |
| 5 | Guide sleeve | 18 | Attachment bracket |
| 6 | Cap | 19 | Sealing ring |
| 6a | Adapter | 20 | Pin |
| 7 | Brass bearing bush | 21 | Retainer clip |
| 8 | Guide sleeve | 22 | Thrust pieces with bellows |
| 10 | Protective cover | 23 | Sealing rings |
| 11 | Allen screw | | |

2. DESCRIPTION OF COMPONENTS

2.1 COMPRESSOR

The compressor is a 225-cm³ one-cylinder design with a water-cooled cylinder head. The compressor is mounted on the left side of the engine against the flywheel housing. The compressor is driven by the camshaft gear via a gear wheel.

OPERATION OF BRAKE COMPONENTS

6

Description of components

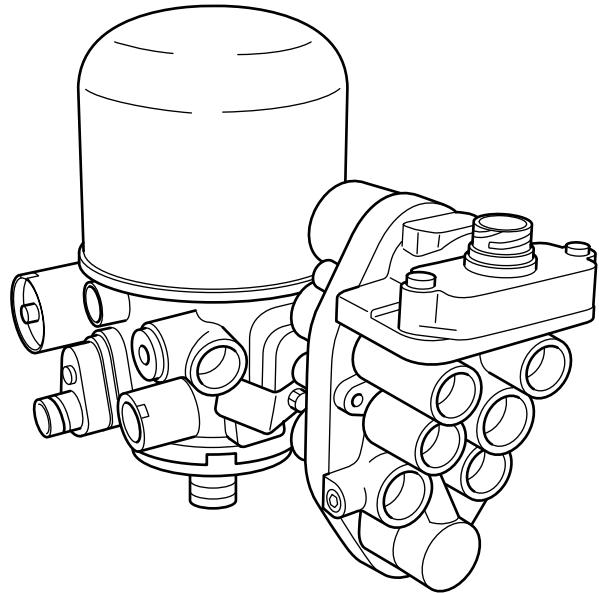
LF45/55 series

2.2 AIR SUPPLY UNIT

Purpose

The air supply unit is a combination of an air dryer, pressure regulator and four-circuit safety valve and has the following functions:

- removing water, oil and other foreign matter from the air before it enters the brake system;
- setting the system pressure by means of a built-in pressure regulator;
- limiting the pressure build-up to a given value;
- splitting the brake system into four circuits and, should one circuit fail, protecting the other circuits against running empty.

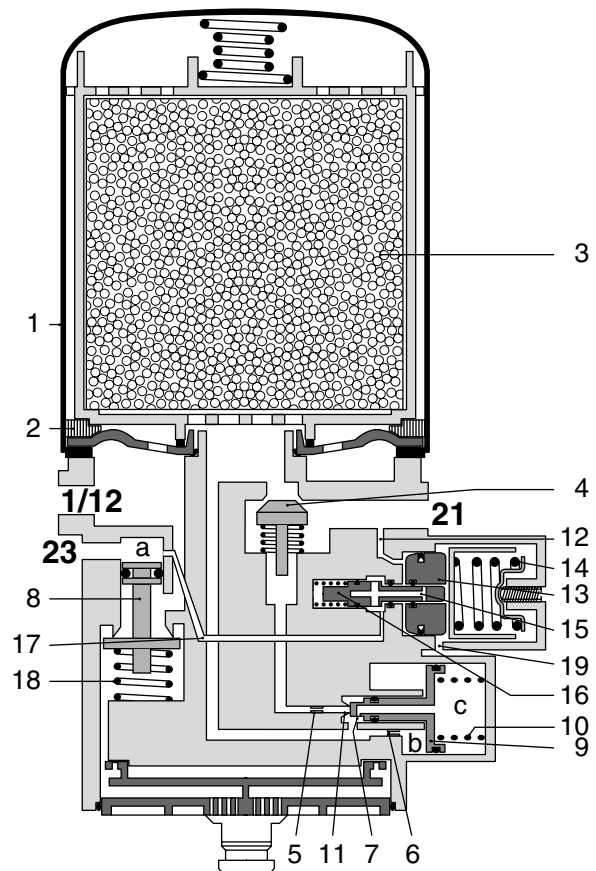


R600359

Air dryer function

Filling the system

The air supplied by the compressor reaches the air dryer via connecting point 1/12. In the filter element (1), the air passes through the coarse filter (2), which sieves out the oil and dirt particles. In addition, the air condenses against the cool wall of the element. Subsequently, the air flows through filter grains (3), which extract the water vapour from the air. The air thus dried flows via a non-return valve (4) to connecting point 21.



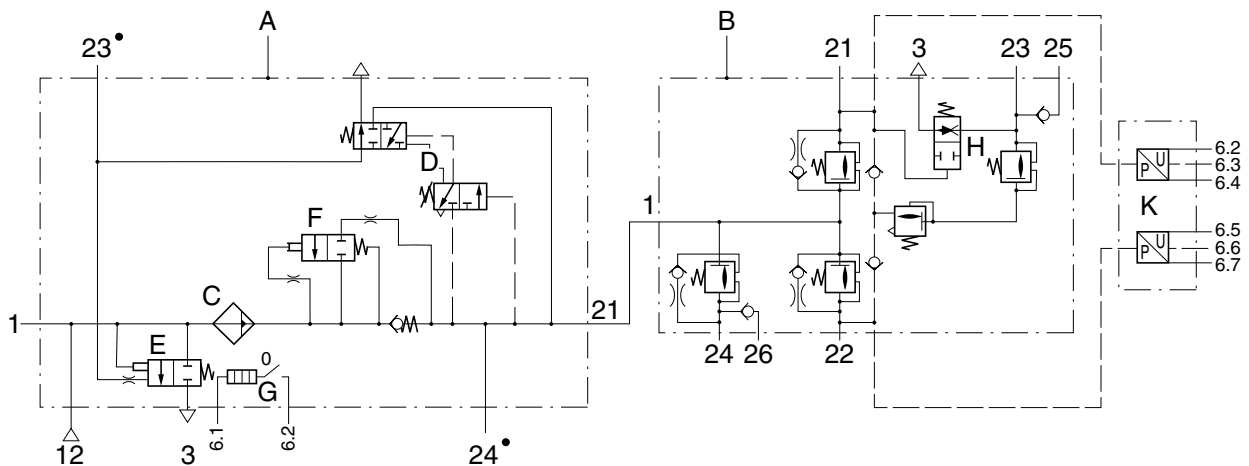
R600504

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OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components



3

R600580

Operation, pressure regulator

The pressure increase occurring during filling is returned to the built-in pressure regulator via bore 12.

When the pre-set cut-out pressure is reached, the control piston (13) is moved to the right against the pressure of spring 14. This releases bore 15 in pin 16. The system pressure will enter space "a" above blow-off valve 8 via bore 17, opening the blow-off valve (8) against the pressure of the spring (18).

If the pressure in the brake system drops to the cut-in pressure due to air consumption, the control piston (13) will move to the left and shut bore 15 in pin 16. This bore, and therefore channel 17 and space a, will now be bled via bore 19. The blow-off valve (8) will close. The compressor will now again build up the pressure in the air system.

Regenerating

A regeneration tank is no longer necessary, because the air inside the circuits is used.

A built-in pneumatic time switch controls the regeneration process:

- throttle 5 determines the amount of air;
- throttle 6 determines the length of time.

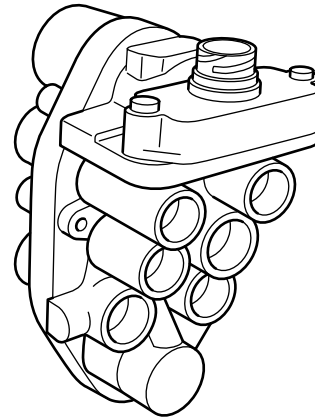
OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

Air is admitted to chamber "b" via throttle 6 and air is also admitted to chamber "c" via bore 7 in the piston (9). On cut-out by the pressure regulator, the blow-off valve (8) is opened and chamber "c" is bled via bore 7. The piston (9) is moved to the right against the pressure of spring 10 as a result of the difference in pressure between chambers "b" and "c". This releases the piston (9) from its seat (11) and air will flow in the opposite direction via throttle 5 from the system through the filter element. At the same time, pressure is reduced in chamber "b" via throttle 6. The piston (9) moves to the left until it abuts the seat (11). Regeneration is now complete.

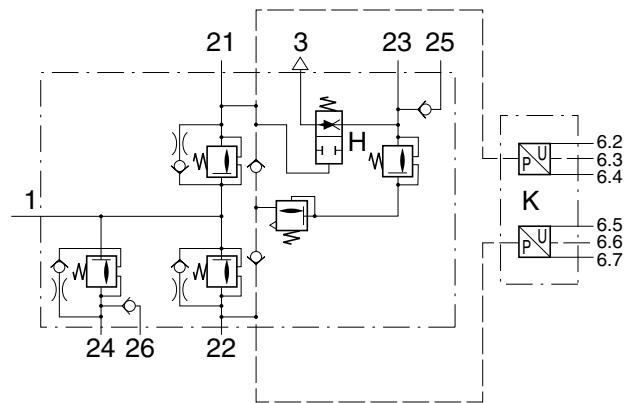


R600475

Four-circuit safety valve operation

The air supply enters via connecting point 1. From there, the air flows to the built-in pressure relief valves of circuits 1, 2 and 4.

As soon as the valve of circuit 1 and/or circuit 2 opens, the air will be able to flow through to circuit 3, the trailer brake and parking brake circuit. For reasons of safety, a built-in flowback function empties circuit 3 when the pressure in circuit 1 is too low. This is done to activate the emergency brake function.



R600476

2.3 WATER BLOW-OFF VALVE

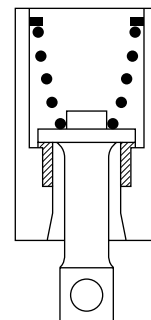
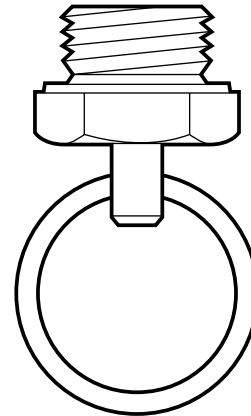
Purpose

The purpose of the water blow-off valve is to enable any condensation in the air reservoir or air pipes to be drained and, if necessary, to bleed the system.

Operation

The valve is kept closed by the spring and the reservoir pressure. By pushing the pin sideways, the valve is lifted off the seat, allowing condensation and compressed air to escape. When the pin is released, the valve is closed.

Check that no other components are present under the blow-off plug, as these could get fouled during the blow-off process.



R600046

OPERATION OF BRAKE COMPONENTS

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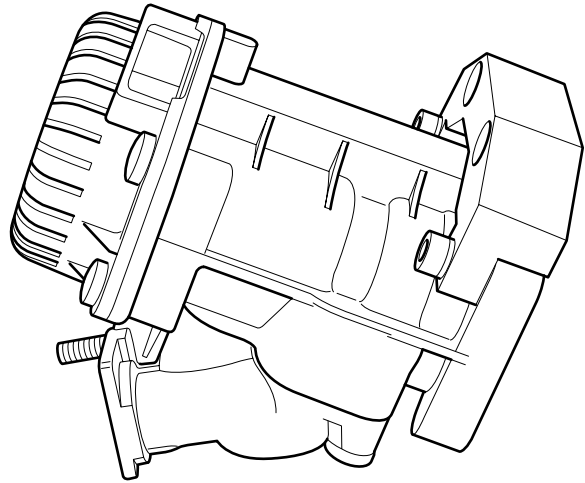
Description of components

LF45/55 series

2.4 FOOT BRAKE VALVE

Purpose

The purpose of the foot brake valve is to allow sensitive aeration and bleeding of both service brake circuits, independently of each other.

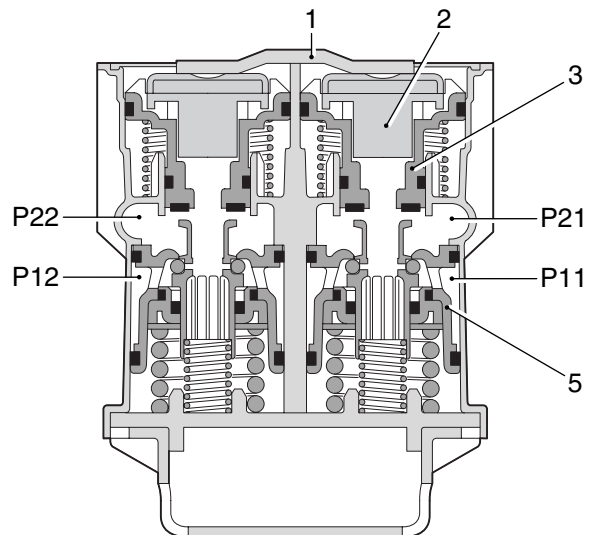


R600588

Operation

The foot brake valve consists of two adjacent parts (Circuit 1 and circuit 2).

If the brake pedal is depressed, a push rod will exert pressure on the pressure plate (1). The pressure plate will force the thrust piece (2) downwards and close the bleed vent together with the operating cylinder (3) and the shut-off valve (4). If the brake pedal is depressed further, the shut-off valve will force the control piston (5) from its seat, causing a connection to be formed between the supply and the outlet (brake pressure). Due to the increase in pressure above the control piston (5), it will be pressed down against the spring tension. This action will stabilise the pressure in P21-22 to the desired value. If the brake pedal is released, the operating piston (3) will be pushed up by the spring tension and the bleed vent will be opened. This will cause the pressure in P21-22 to drop and the control piston (5) to be pushed up by the spring tension, closing the connection between the supply and outlet.



R600570

2.5 RELAY VALVE

Purpose

The purpose of the relay valve is to allow fast aeration and bleeding of the spring brake cylinders and brake cylinders, shortening the brake reaction/release time.

Note:

The hysteresis of the relay valve, which is used for the parking brake, is greater and therefore is **not** suitable for use in the service brake.

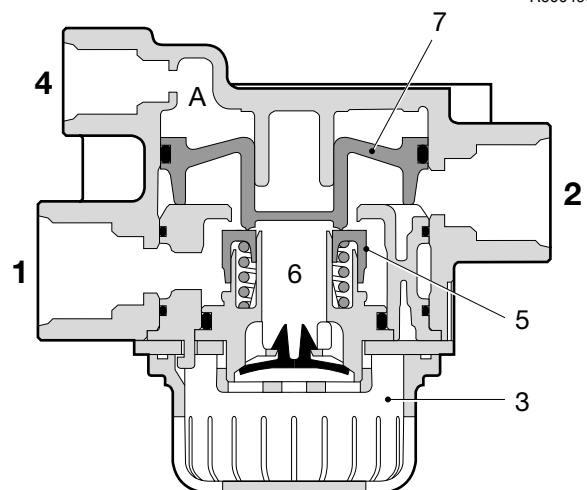
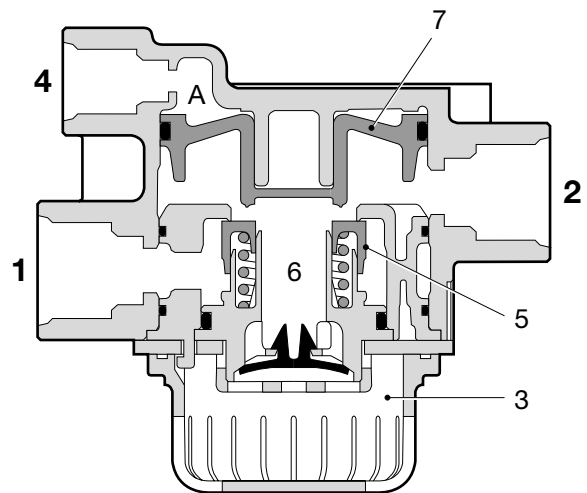
The air reservoir is connected to point 1. When connecting point 4 is pressureless, inlet 5 is closed and outlet 6 opened. The brake chambers connected to point 2 have now been bled.

When compressed air passes through connecting point 4 into chamber "a" above the piston (7), the piston is forced downwards. Outlet 6 is closed and inlet 5 opened. The compressed air now passes from the air reservoir to the brake chambers.

A state of equilibrium is achieved when the pressures on both sides of the piston (7) are equal. Then, both the outlet and the inlet are closed.

The rubber flap over opening 3 prevents dirt from entering, whilst providing a large opening for air to be bled.

When the pressure in connecting point 4 and consequently in chamber "a" drops, the piston (7) is forced upwards. Inlet 5 is closed and outlet 6 opened and as a consequence the brake chambers are bled through bleed opening 3.



OPERATION OF BRAKE COMPONENTS

6

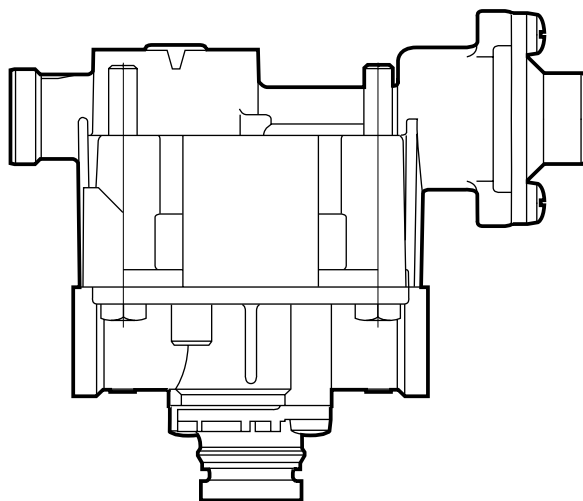
Description of components

LF45/55 series

2.6 EMPTY/LOAD RELAY VALVE

Purpose

The purpose of this valve is to adjust the braking pressure to the front axle depending on the output pressure from the load sensing valve of the rear axle.



R600049

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

Empty/load relay valve

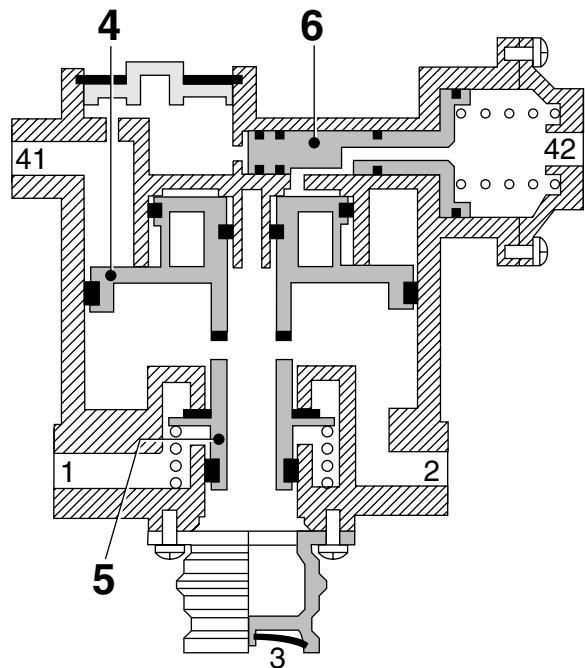
In rest position, relay piston 4 is in its upper position and connecting point 2 (brake cylinders on front axle) is bled via connecting point 3.

When the foot brake is applied, the relay piston is forced downwards via connecting point 41, thus opening valve 5. At connecting point 2 pressure is built up until a set value is reached. Relay piston 4 is then once again forced upwards until there is a state of equilibrium.

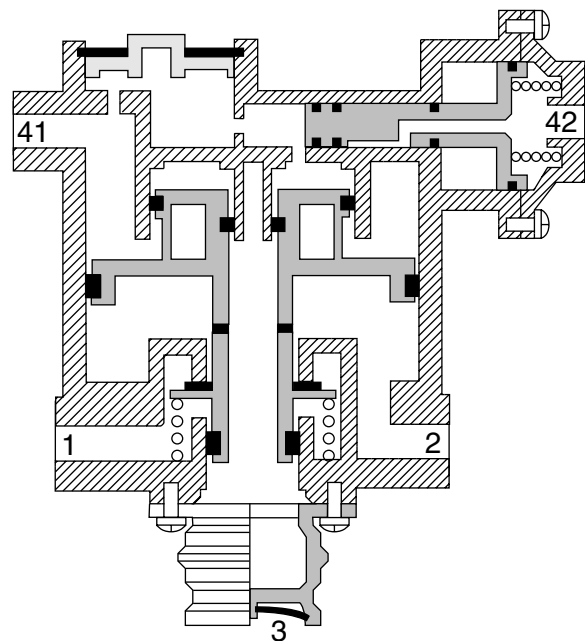
Air has also entered simultaneously via connection point 42 (load sensing valve). This will force piston 6 to the left. Through a bore in piston 6 the pressure now also reaches the central surface of the relay piston (4). This pressure will depend on the loading of the rear axle. As a consequence, the output pressure of this valve is in part dependent on the braking pressure of the rear axle.

The input pressure at connecting point 41 is also applied to the left-hand side of piston 6, via two openings. If no pressure enters via connecting point 42, due to a fault, piston 6 will be forced to the right. The pressure at connecting point 41 will now also reach the central surface of relay piston 4. In this situation, the valve simply operates as a relay valve, and will no longer reduce.

When the foot brake is released, the pressure at connecting points 41 and 42 will disappear. Relay piston 4 will be forced upwards by the pressure beneath it, thus opening the bleed system.



R600493



R600494

3

OPERATION OF BRAKE COMPONENTS

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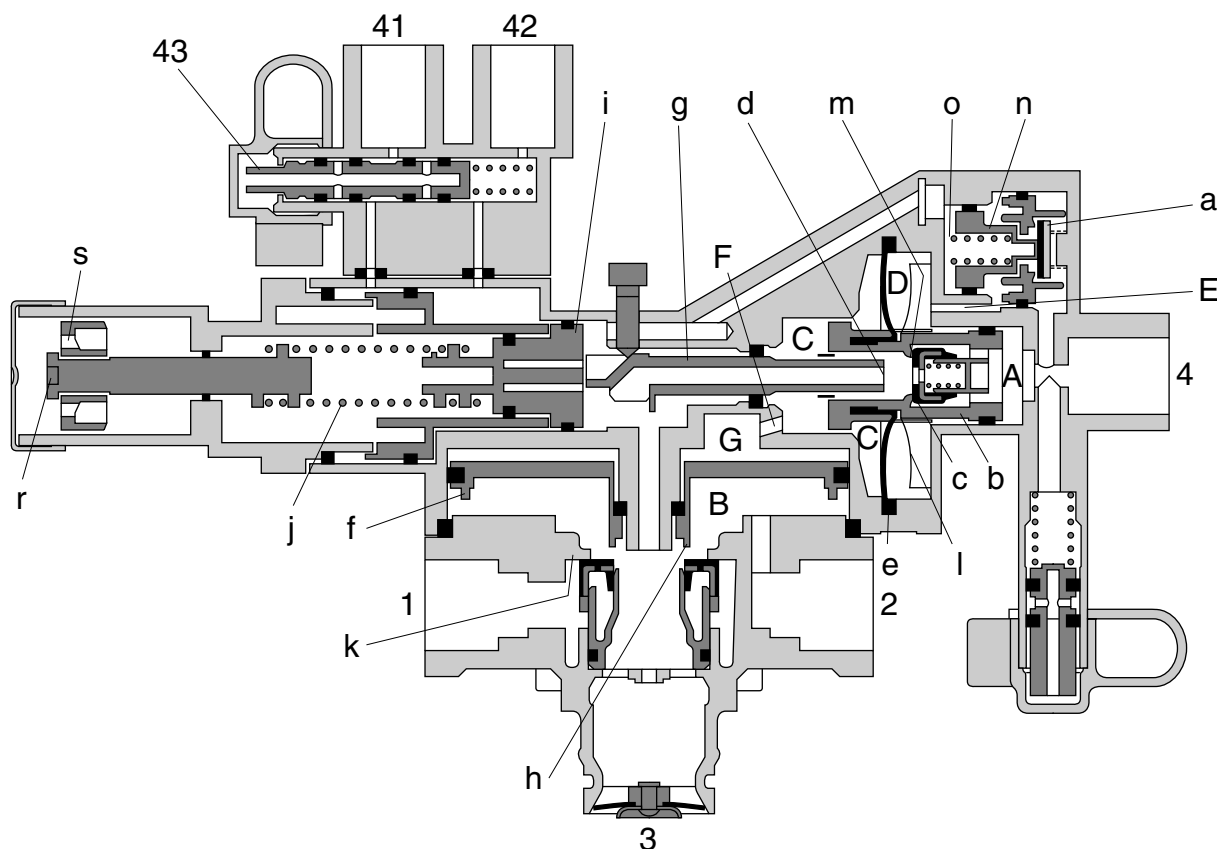
Description of components

LF45/55 series

2.7 LOAD SENSING VALVE, AIR SUSPENSION

Purpose

Automatic control of the brake pressure is dependent on the pressure in the bellows and therefore on the load condition of the vehicle. Thanks to the integrated relay valve, the brake cylinders are aerated and bled quickly.



R600455

Operation

The control valve is activated by the pressure of the left and right bellows via connecting points 41 and 42. The actuated piston (i) that moves against the pressure of the spring (j), brings the tappet (g) to a position that corresponds to the load condition. The calculated average of the bellows pressure on the left and right is the determining factor in this.

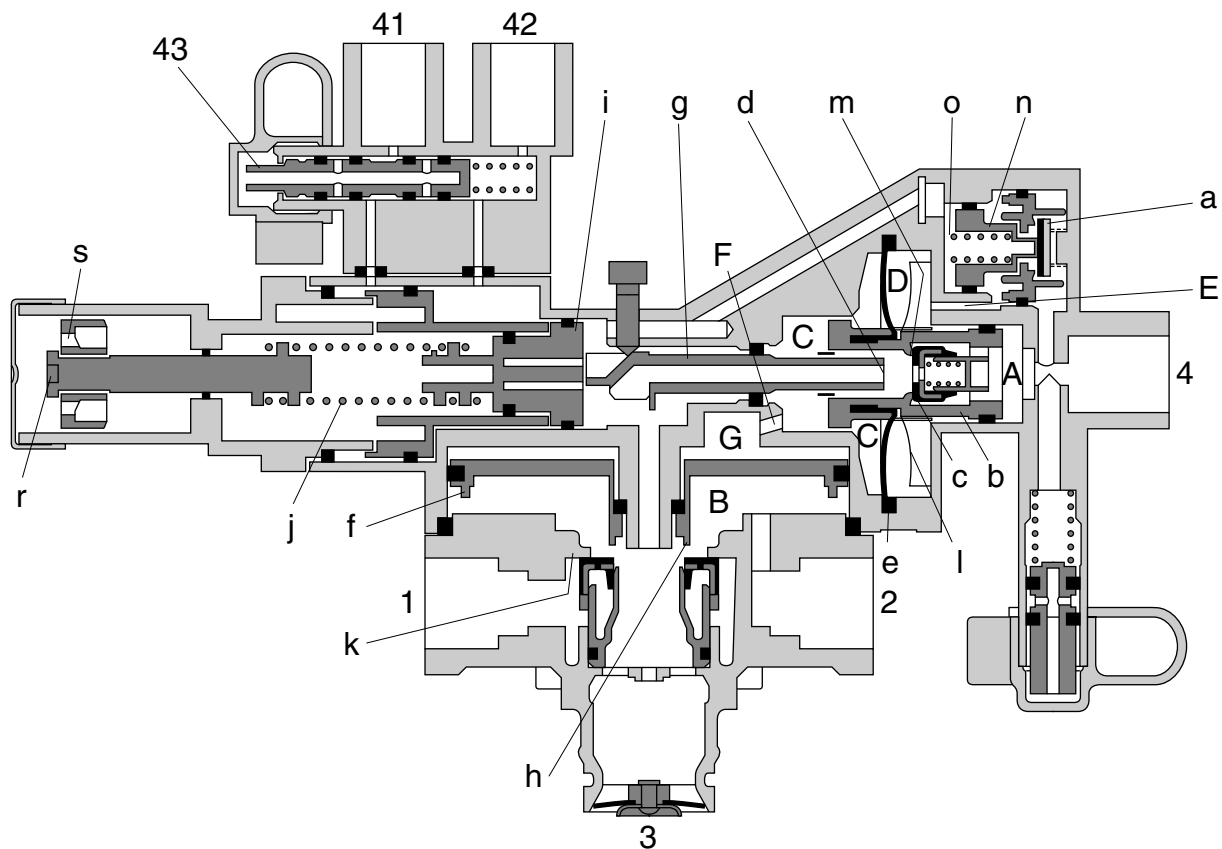
The compressed air provided by the foot brake valve flows via connecting point 4 into space A, pushing piston b to the left. Outlet "d" is closed and inlet "m" is opened, causing compressed air to enter space C to the left of diaphragm "e". Relay piston "f" is operated via duct F and chamber G.

At the same time, compressed air flows through the open valve (a) and duct E into space D to the right of diaphragm "e". Due to this control, the output pressure at partial load and low control pressures is increased to max. 1.4 bar). If the control pressure increases further, piston "n" is moved to the left against the pressure of spring "o" and valve "a" closes.

As pressure builds up in space G, relay piston "f" is pressed downwards. Outlet "h" closes and inlet "k" opens. The air at connecting point 1 now flows to the brake cylinders via connecting point 2.

Now pressure will start to build up in space B under relay piston "f". As soon as this pressure is somewhat higher than that in space G, the piston is pushed upwards and closes inlet "k".

When piston "b" is moved to the left, the vanes (l) attached to it will gradually loosen the diaphragm (e) from the fixed vanes in the valve housing. As a result, the effective diaphragm surface will gradually increase. As soon as the force of the air to the left of the diaphragm exceeds that to the right, piston "b" will move to the right. The inlet (m) will be closed and a set position is reached.



R600455

OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

The position of tappet "g", which depends on the position of piston "i", is indicative of the effective diaphragm surface and therefore of the output brake pressure.

The position of tappet "g" determines to what extent piston "b" must be moved with the vane disc (l) to allow the valve to build up pressure. Due to this movement, the effective surface of the diaphragm will alter.

In full-load position, this surface and that of piston "b" are equally large. The control pressure at connecting point 4 is therefore let through (ratio 1:1) to spaces C and G. The output pressure at 2 will now be equal to the control pressure at connecting point 4.

If the pressure decreases at connecting point 4, piston "b" will be pushed to the right by the pressure in space C. Bleed vent "d" will open and the pressure in spaces C and G will fall. The relay piston will be pushed up due to the pressure still present in space B, causing bleed vent "h" to open. The pressure at connecting point 2 will now fall via bleed vent 3.

A stop bolt in front of tappet "g" ensures that this valve can always provide the minimum brake pressure if the bellows pressure delivered falls below the minimum effective pressure due to a fault. The factory setting of this bolt must not be changed.

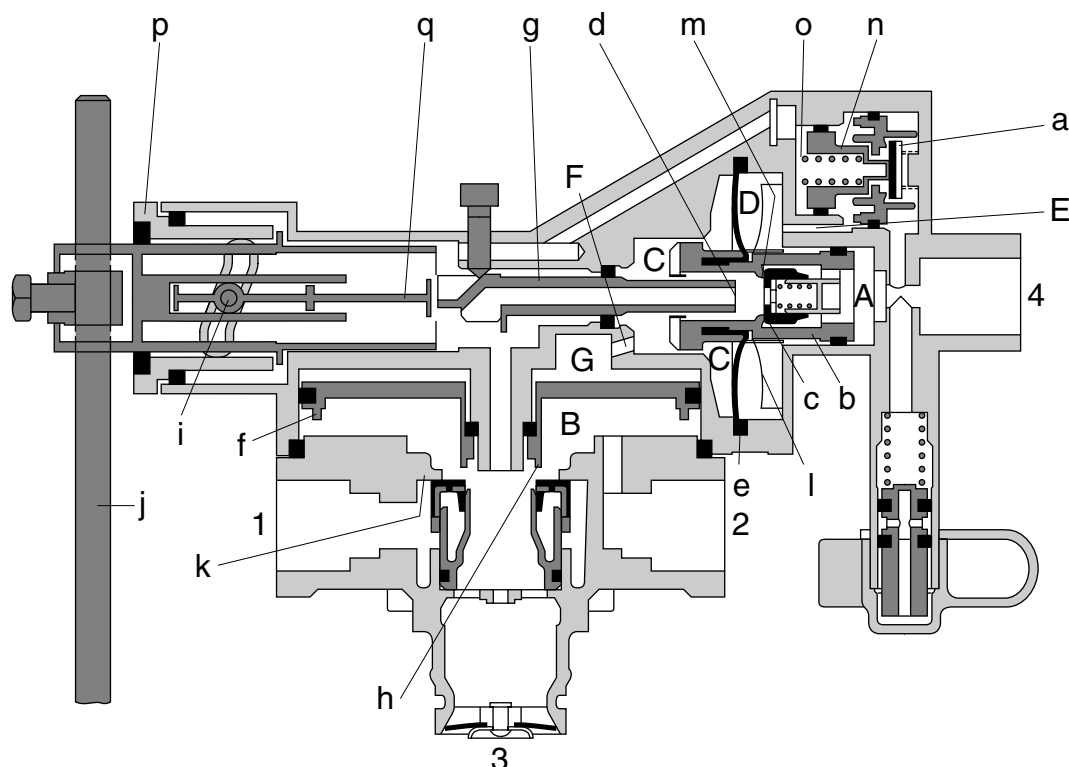
The simulation connection (43) is for controlling the valve. By connecting an air hose to it, the bellows will be pneumatically closed, allowing the valve to be operated with a random test pressure.

3

2.8 LOAD SENSING VALVE, LEAF SUSPENSION

Purpose

Automatic control of the brake force depends on the deflection of the springs and therefore on the loading condition of the vehicle. Thanks to the integrated relay valve, the brake cylinders are aerated and bled quickly.



R600456

Operation

The control valve is attached to the chassis and connected to the rear axle by means of a rod. With unladen vehicles, the distance between the regulator and the axle is largest and the lever (j) points fully downwards. When the vehicle is loaded, this distance decreases and the lever moves upwards, towards full load position. Pin i rotates at the same time as the lever and as a result thereof moves to the right via the control groove in bearing cover p. Rod "q" brings the tappet (g) in a position that corresponds with the loading condition.

The compressed air provided by the foot brake valve flows via connecting point 4 into space A, pushing piston b to the left. Outlet "d" is closed and inlet "m" is opened, causing compressed air to enter space C to the left of diaphragm "e". Relay piston "f" is operated via duct F and chamber G.

OPERATION OF BRAKE COMPONENTS

6

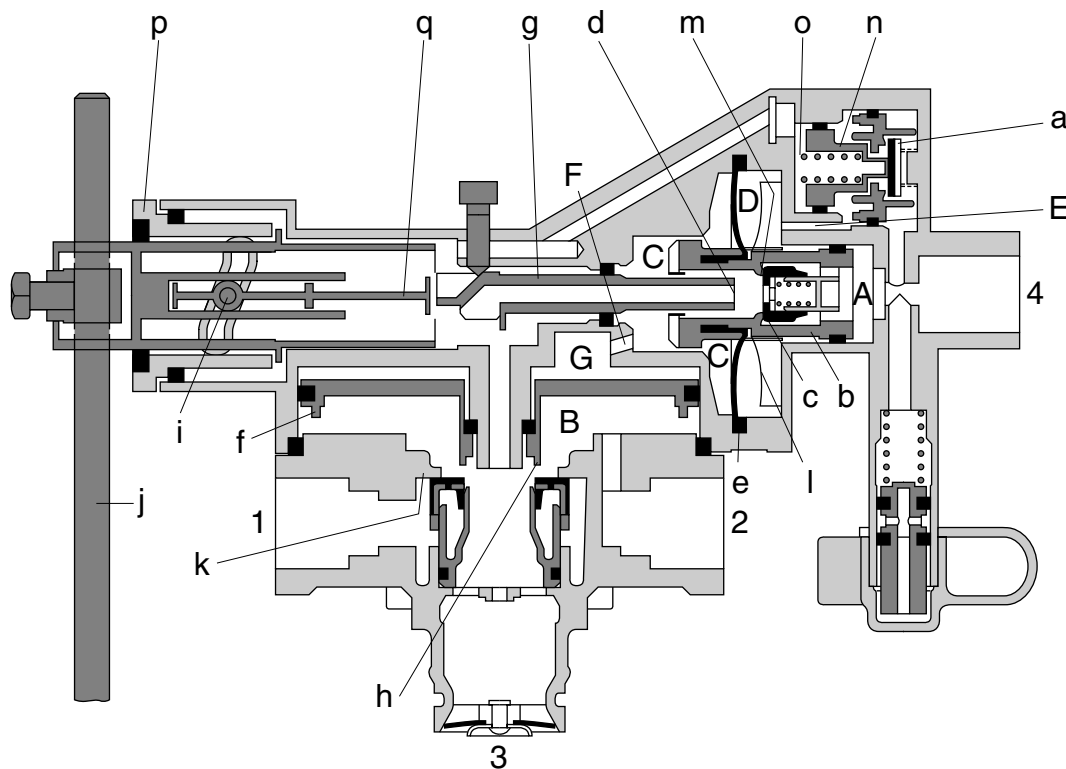
Description of components

LF45/55 series

At the same time, compressed air flows through the open valve (a) and duct E into space D to the right of diaphragm "e". Due to this control, the output pressure at partial load and low control pressures is increased (to max. 1.4 bar). If the control pressure increases further, piston "n" is moved to the left against the pressure of spring "o" and valve "a" closes.

As pressure builds up in space G, relay piston "f" is pressed downwards. Outlet "h" closes and inlet "k" opens. The air at connecting point 1 now flows to the brake cylinders via connecting point 2.

Now pressure will start to build up in space B under relay piston "f". As soon as this pressure is somewhat higher than that in space G, the piston is pushed upwards and closes inlet "k".



R600456

When piston "b" is moved to the left, the vanes (l) attached to it will gradually loosen the diaphragm (e) from the fixed vanes in the fan housing. As a result, the effective diaphragm surface will gradually increase. As soon as the force of the air to the left of the diaphragm exceeds that to the right, piston "b" will move to the right. The inlet (m) will be closed and a set position is reached.

The position of the tappet (g), which is dependent on the position of lever "j", is indicative of the effective diaphragm surface and therefore of the output brake pressure.

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

The position of the tappet (g) determines to what extent piston "b" must be moved with the vane disc (l) to allow the valve to build up pressure. Due to this movement, the effective surface of the diaphragm will alter.

In full-load position, this surface and that of piston "b" are equally large. The control pressure at connecting point 4 is therefore let through (ratio 1:1) to spaces C and G. The output pressure at 2 will now be equal to the control pressure at connecting point 4.

If the pressure decreases at connecting point 4, piston "b" will be pushed to the right by the pressure in space C. Bleed vent d will open and the pressure in spaces C and G will fall. The relay piston will be pushed up due to the pressure still present in space B, causing bleed vent "h" to open. The pressure at connecting point 2 will now fall via bleed vent 3.

A stop bolt in front of the tappet (g) ensures that this valve can always provide the minimum brake pressure if lever "j" is in too low a position due to a fault. The factory setting of this bolt must not be changed.

3

OPERATION OF BRAKE COMPONENTS

6

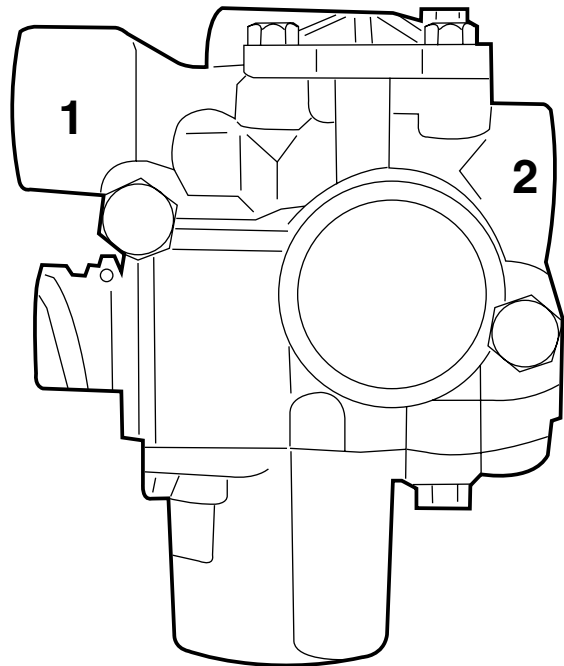
Description of components

LF45/55 series

2.9 ABS VALVE

The ABS valve must keep the pressure constant in the brake chamber during an ABS control, or decrease the pressure in the brake chamber regardless of the pressure leaving the foot brake valve.

If the ABS valve is not operative, it has no function and the input pressure at connecting point 1 is the same as the output pressure at connecting point 2 to the brake chamber.

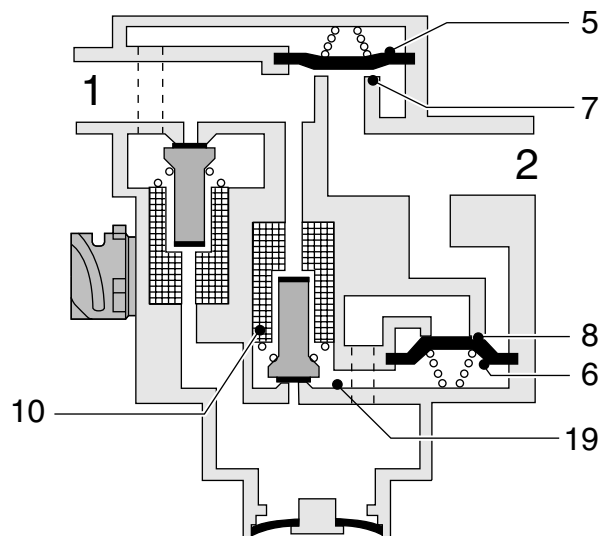
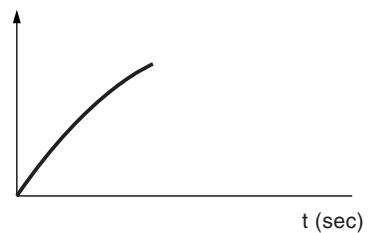


R600264

Increasing pressure at connecting point 2

Input pressure at connecting point 1 coming from the foot brake valve will lift diaphragm 5 from seat 7, causing the brake pressure to be guided to the brake chamber via connecting point 2.

The input pressure will also be guided through a bore past the magnet coil (10) in space 19 under diaphragm 6, causing diaphragm 6 to form a seal on seat 8. Connecting point 2 is thus sealed off from the bleed vent.

 $P_2(\text{bar})$ 

R600629

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

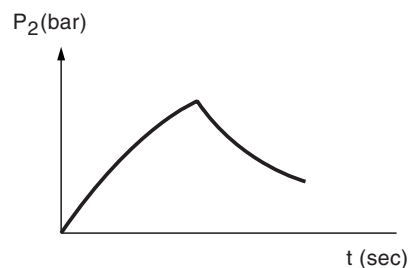
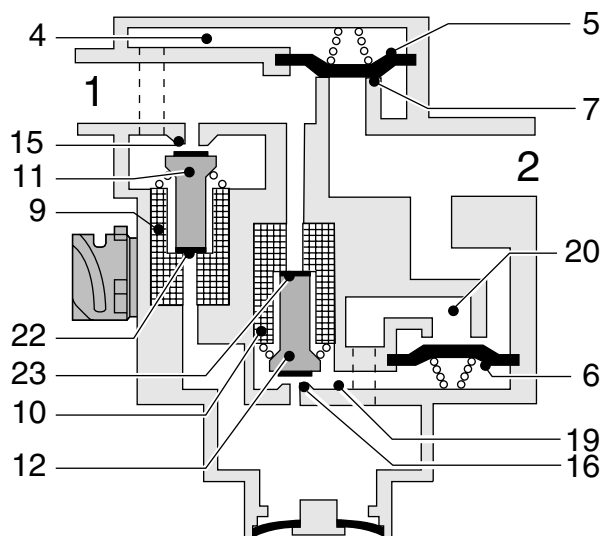
Description of components

Reducing pressure at connecting point 2

By activating the magnet coil (9), the solenoid valve (11) will open bore 15 and close bore 22. As a result, input pressure enters space 15 above diaphragm 5 via a bore. Diaphragm 5 seals against seat 7, so that no more pressure can build up.

By activating the magnet coil (10) at the same time, bore 16 opens and bore 23 closes.

By opening bore 16, the pressure under diaphragm 6 can be reduced via the bleed vent. The pressure in the brake chamber can now escape via connecting point 2, space 20 and an internal bore to the bleed vent.



R600630

3

OPERATION OF BRAKE COMPONENTS

6

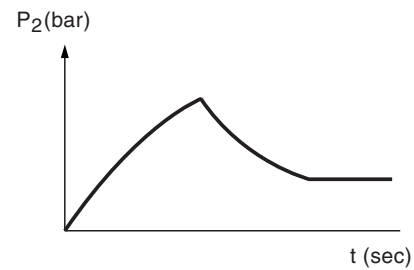
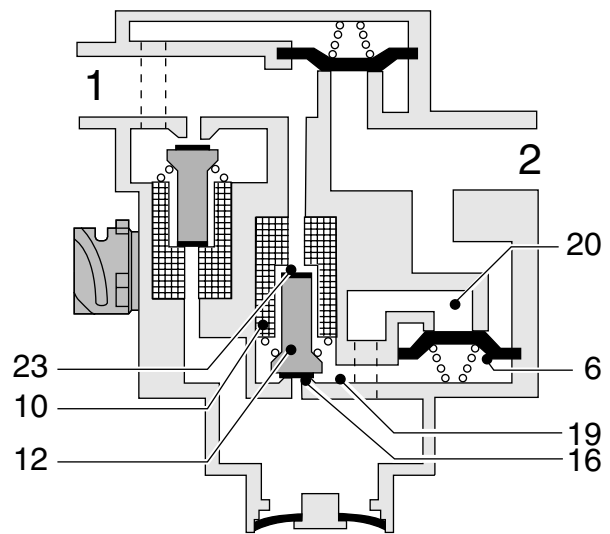
Description of components

LF45/55 series

Maintaining pressure at connecting point 2

By deactivating the magnet coil (10), the input pressure can be guided through a bore past the magnet coil (10) into space 19 under diaphragm 6, thus sealing off diaphragm 6.

The pressure in the brake chamber can now no longer be guided to the bleed vent via space 20. This keeps the pressure in the brake chamber constant.



R600631

6

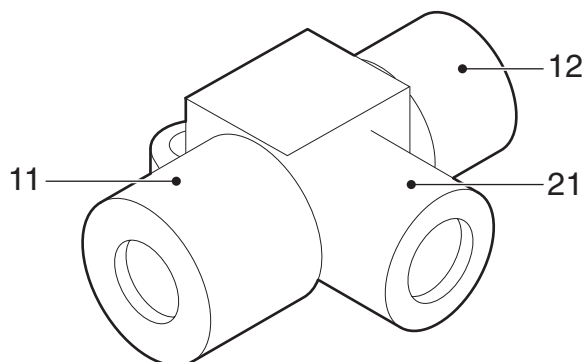
OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

2.10 TWO-WAY VALVE

This valve is used in drum brakes as a double check valve, that is to say a safety measure so that the maximum service brake and parking brake cannot operate the wheel brakes at the same time.



R600747

Purpose

The purpose of this valve is to let through unchanged the highest of two submitted pressure signals.

Operation

When pressure is applied to one of the entrances or if the pressure on one entrance is higher than on the other, the little piston will shut off the other entrance and the air can leave the valve unhindered again via the exit.

No connection can be established between the two entrances.

OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

2.11 ASR SOLENOID VALVE

The ASR valve serves to transfer brake pressure to the ABS valve during an ASR differential brake control. Depending on the slip, the ABS valve will control the brake pressure to the respective brake chamber.

The ASR valve is a simple electropneumatic valve, which is normally closed, that transfers air pressure when it is electrically energised.

The energising is controlled by the ABS/ASR electronic unit.

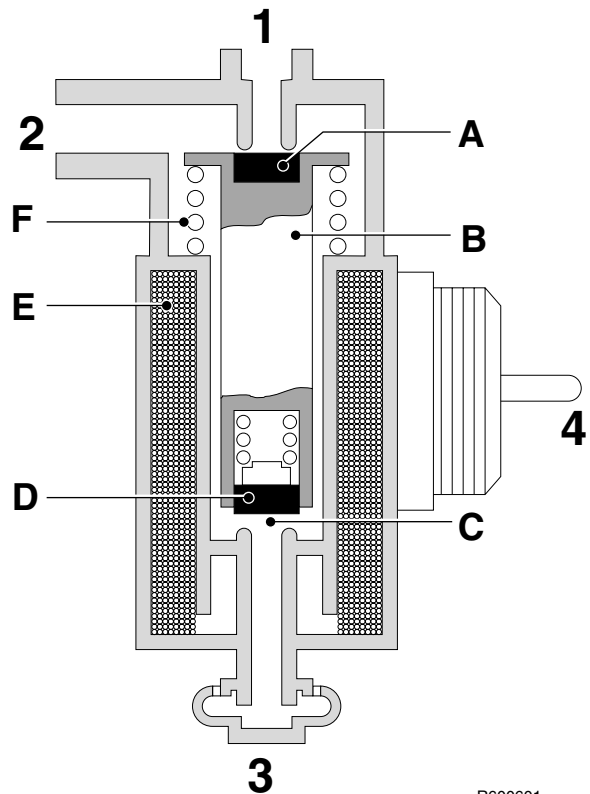
3

Note:

The bleed vent (3) must always point downwards.

If coil E of the ASR valve is energised, core B will move down against the pressure of spring F. Seal A will now open connecting point 1, so that supply pressure can leave the valve via connecting point 2. Opening C and therefore bleed vent 3 are also closed as core B moves downwards.

When coil E is no longer energised, core B will move upward under the influence of spring F. This action will close connecting point 1 and open opening C. Connecting point 2 is now linked to bleed vent 3.



R600601

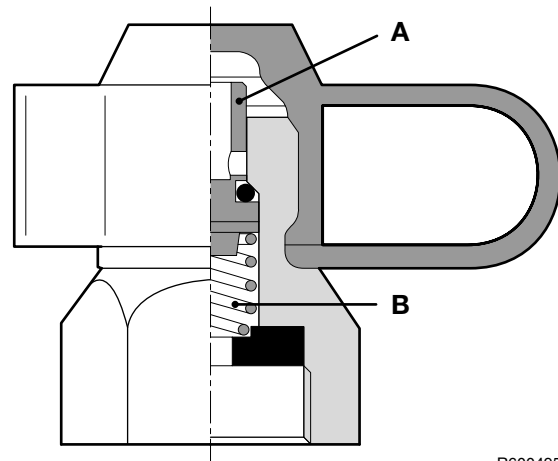
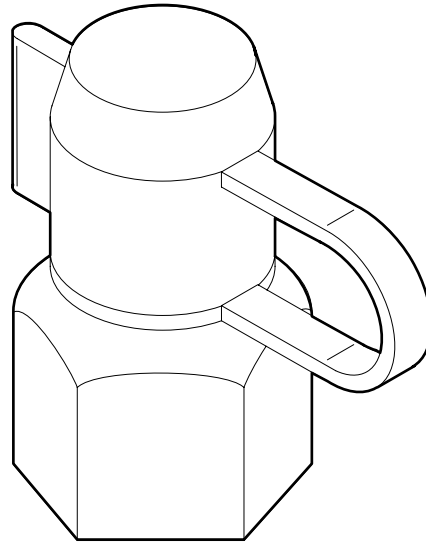
2.12 EMERGENCY FILLING/TEST CONNECTION

In various places in the brake system there are test connections for carrying out inspections and adjustments. A pipe leads from point 24 of the air dryer to the rear left of the cab. There is a test connection here that can be used as an emergency/tyre filling connection.

Note:

With a leaf-spring front axle this test connection is on point 11 of the air dryer.

If a pipe is connected to the test connection, screwing in the union will lift the spring-loaded valve (A) from its seat, opening the supply. If the union is removed, the valve is pushed onto its seat by spring B, closing the supply.



R600495

OPERATION OF BRAKE COMPONENTS

6

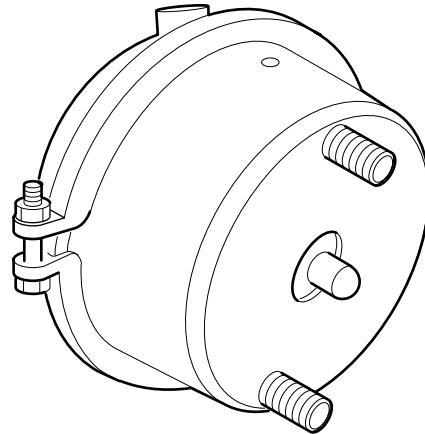
Description of components

LF45/55 series

2.13 BRAKE CYLINDER

Purpose

The purpose of the brake cylinder is to apply the brake shoes or pads to the brake drum/disc.



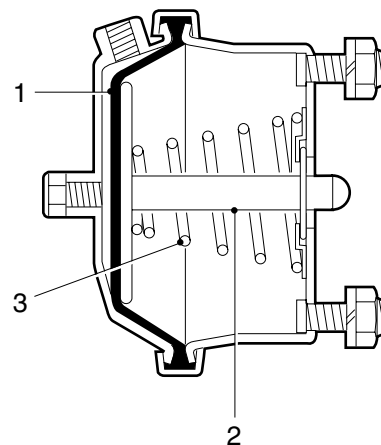
R600505

Operation

When the foot brake valve is operated, compressed air is admitted at the pressure side of the diaphragm (1). The diaphragm (1) and push rod (2) are pushed outwards against the pressure of the spring. As a result, the brake shoes are forced against the brake drum via a lever mechanism. The air on the other side of the diaphragm can escape via bleed holes and the clearance around the push rod.

When the brakes are released, the coil spring (3) will force the push rod and the diaphragm back to their initial position.

When the brakes are released, the brake cylinder will always draw in outside air on the non-pressure side. When the brakes are released the push rod should return fully to its initial position. The actuating pressure should not exceed 0.5 bar.



R600506

2.14 PARKING BRAKE VALVE

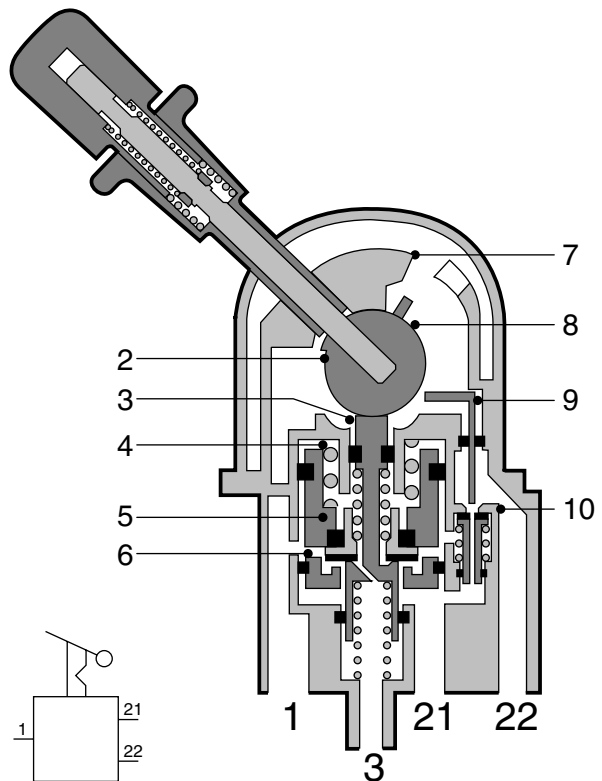
PARKING BRAKE VALVE WITH TRAILER
VEHICLE CONNECTION**Purpose**

The parking brake valve enables simultaneous, controlled operation of both the parking brake system of the prime mover and the trailer brakes.

Operation

The parking brake valve has 3 positions:

- driving
- parking
- test

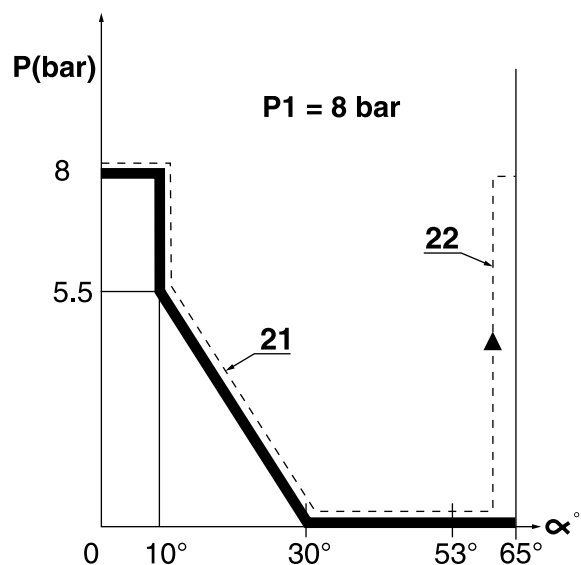


R600397

Driving

With the handle in the driving position, there is a through-connection in the valve of the supply pressure (connecting point 1) to the connecting points for the spring-brake cylinders (21) and the trailer (22). The bleed vent is now closed.

The output pressure at connection points 21 and 22 is now approx. 8 bar (see graph).



R 600502

OPERATION OF BRAKE COMPONENTS

6

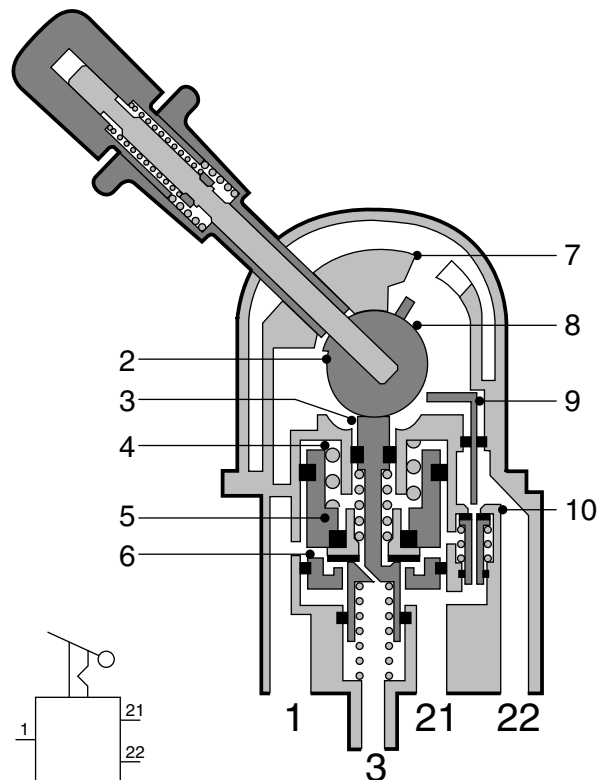
Description of components

LF45/55 series

Emergency braking

If the handle is pulled a little backwards against the spring pressure, tappet 3 will move downwards via the eccentric (2). The space at connecting point 21 can now be bled and as a result the pressure at connecting point 21 will drop. Via the bore in valve 10 the pressure at connection point 22 will also drop. Spring 4 forces piston 5 down until valve 6 comes into contact with the seal collar of tappet 3. A state of equilibrium has now been achieved.

When the handle is moved against stop 7, the bleed vent will remain open, so that the spring brakes and the trailer brakes will be applied to their maximum (max. emergency-brake position).



R600397

Parking

When the handle is pulled past stop 7, it is locked in position.

Connection points 21 and 22 will remain pressureless, so that the spring brakes and the trailer brakes are still applied to their maximum.

Test

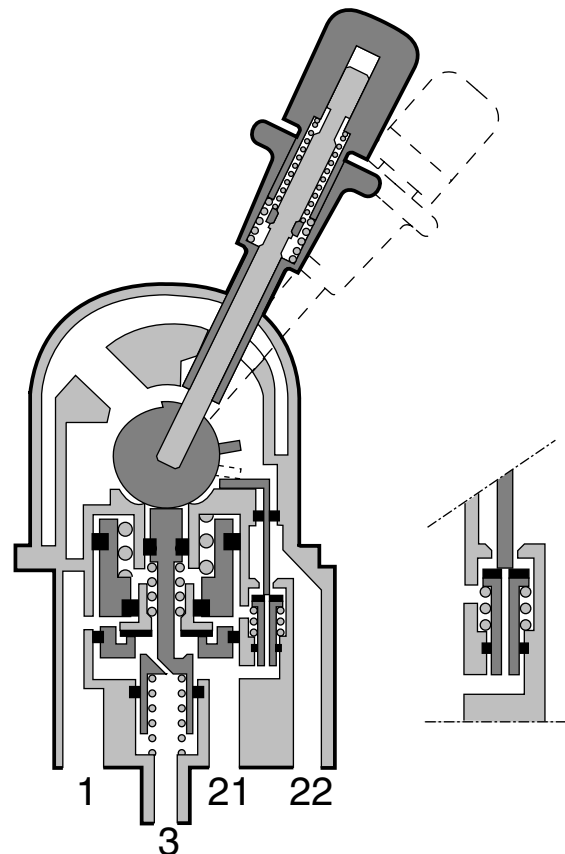
When the handle is moved beyond the parking position, cam 8 will move tappet 9 downwards, causing the bore in valve 10 to be closed and this valve to be lifted from its seat.

The supply pressure can now be passed to connection point 22 via a bore in piston 5. As a result, the trailer brakes will be released.

Connection point 21 remains bled, so that the spring brakes keep the parking brake applied. The combination is now braked only by the force exerted by the spring-brake cylinders on the tractor. It can now be checked whether the combination remains motionless when the trailer vehicle brakes are not applied. When the handle is released, it will automatically return to the parking position.

Releasing the brakes

When the handle is once again moved fully forwards, tappet 3 will move upwards, seat against valve 6 and push it from its seat in piston 5. As a result, the pressure can reach connection points 21 and 22.



R600399

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

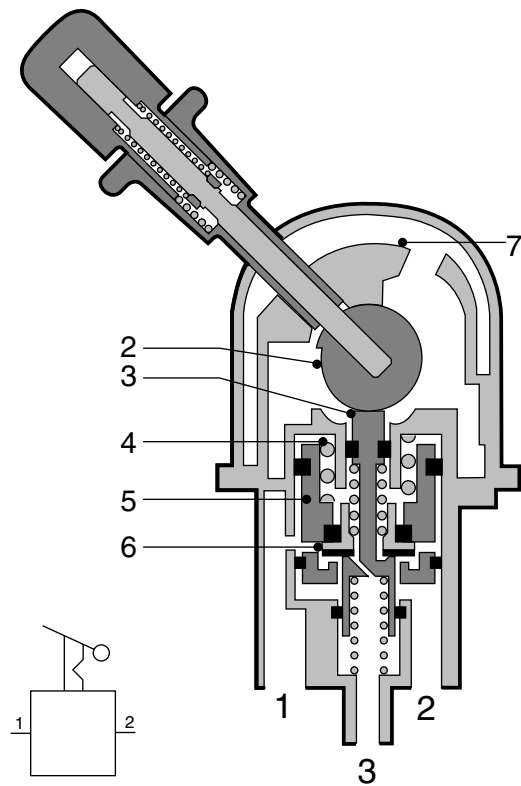
PARKING BRAKE VALVE WITHOUT TRAILER VEHICLE CONNECTION**Purpose**

The parking brake valve enables controlled operation of the parking brake system of the prime mover.

Operation

The parking brake valve has 2 positions:

- driving
- parking



R600400

Driving

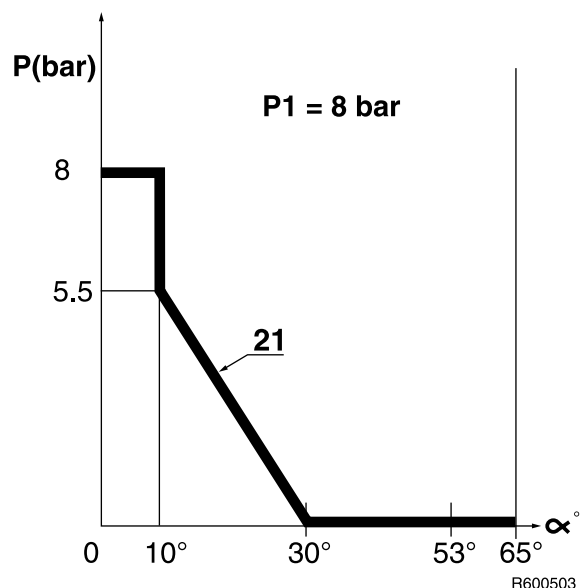
With the handle in the driving position, there is a through-connection of the supply pressure (connecting point 1) to connecting point 2 for the spring brake cylinders. The bleed vent is now closed.

The output pressure at connecting point 2 is now approx. 8 bar (see graph).

Emergency braking

If the handle is pulled a little backwards against the spring pressure, tappet 3 will move downwards via the eccentric (2). The space at connecting point 21 can now be bled and as a result the pressure at connecting point 21 will drop. Spring 4 forces piston 5 down until valve 6 comes into contact with the seal collar of tappet 3. A state of equilibrium has now been achieved.

When the handle is moved against stop 7, the bleed vent will remain open so that the spring brakes are applied to maximum effect (max. emergency brake position).



R600503

OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

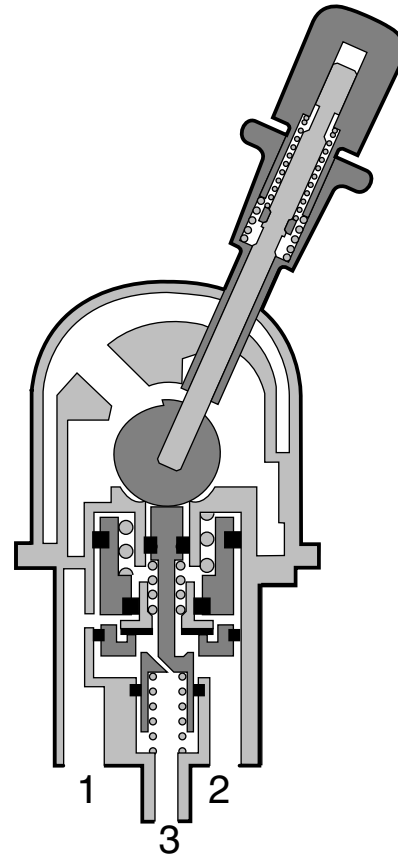
Parking

When the handle is pulled past stop 7, it is locked in position.

Connecting point 2 is still pressureless, so that the spring brakes operate at maximum capacity.

Releasing the brakes

When the handle is once again moved fully forwards, tappet 3 will move upwards, seat against valve 6 and push it from its seat in piston 5. As a result, the supply pressure can reach connection point 2. The pressure at connecting point 2 is now once more equal to the supply pressure at connecting point 1.



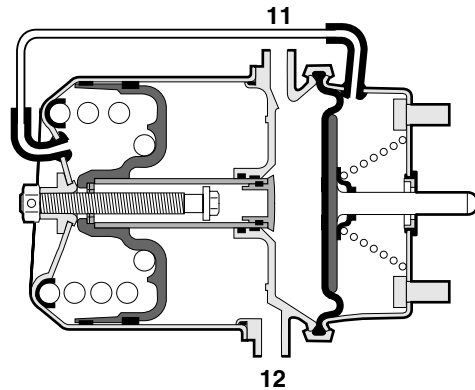
R600402

3

2.15 SPRING BRAKE CYLINDER

Purpose

The purpose of the spring brake cylinder is to force the brake pads against the brake disc when the service or parking brake is operated.



R600908

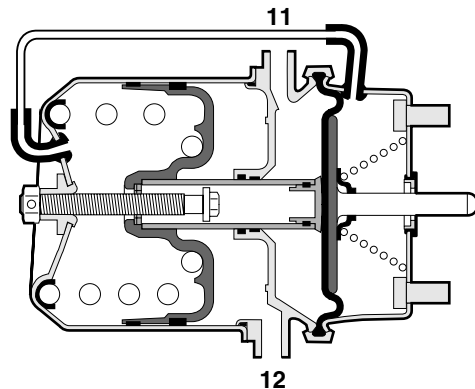
Spring brake cylinder operation

The spring brake cylinder consists of two parts: a part for the service brake, which is designed as a normal brake cylinder, and a part for the parking brake, which is a spring brake cylinder.

Normal position during driving.

The air reservoirs must be at a safe pressure before you start driving. If this is not the case, a warning signal (e.g. a buzzer) will be given.

If this pressure is admitted to the spring brake cylinder, the piston will compress the powerful spring. The push rod is no longer under load and the vehicle brake will be released due to the operation of the spring, etc.



R600909

Service brake

Because the brake cylinder and the spring brake cylinder are separate, the spring brake cannot affect the operation of the service brake.

When the service brake is applied, the powerful spring continues to be compressed, while there is air pressure on the diaphragm of the brake cylinder. When the foot brake valve is operated, the compressed air passes through connection point 11 into the chamber behind the diaphragm. The diaphragm with push rod is pushed out against the spring pressure.

The air on the other side of the diaphragm can escape via bleed holes. When the brakes are released, the spring forces the push rod and the diaphragm back into their original position.

OPERATION OF BRAKE COMPONENTS

6

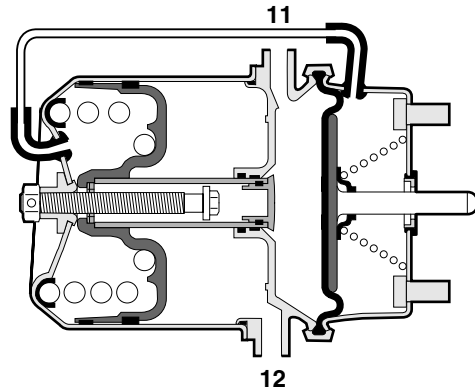
Description of components

LF45/55 series

Parking brake

Connection point 12 is bled.

The powerful spring then forces the piston with the piston tube against the diaphragm, so that the push rod is forced outwards. Here use is made of the continuously available energy of the compressed, powerful spring.



R600908

Release tool, spring brake cylinder with unscrewable release bolt

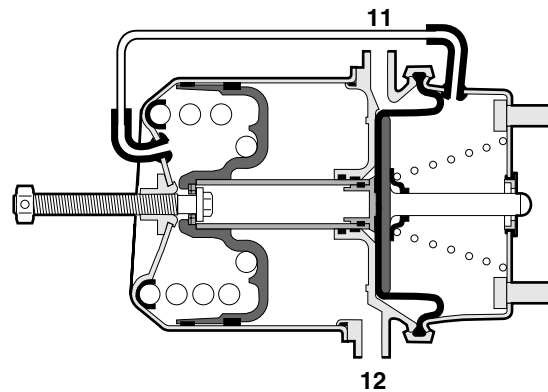
If, due to a failure, no compressed air is available in the spring brake cylinder, the vehicle brakes are automatically applied.

But it must still be possible to tow the vehicle.

The spring brake cylinder is therefore fitted with a release bolt at the rear. By turning this bolt anti-clockwise using a spanner, the powerful spring will be compressed.

As the bolt is provided with a thrust bearing, the torque required is not more than 20 - 40 Nm.

A pneumatic spanner must not be used for this purpose.



R600910



Because the spring brakes have been released mechanically, the parking brake can no longer be applied.

Once the failure has been remedied and sufficient compressed air is available, the control valve can be used to again admit air into the spring brake cylinder.

The release bolt should then be screwed back in with the spanner and tightened to the specified torque. See "Technical data". The pressure in the spring brake cylinder circuit should be at least 5.1 bar.

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OPERATION OF BRAKE COMPONENTS

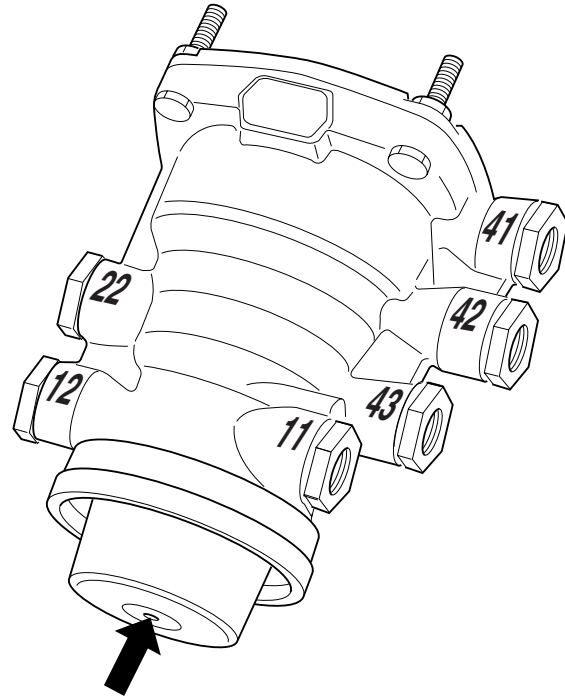
LF45/55 series

Description of components

2.16 TRAILER CONTROL VALVE

Purpose

The purpose of the trailer vehicle control valve is to pass on the brake commands from the prime mover to the trailer vehicle.

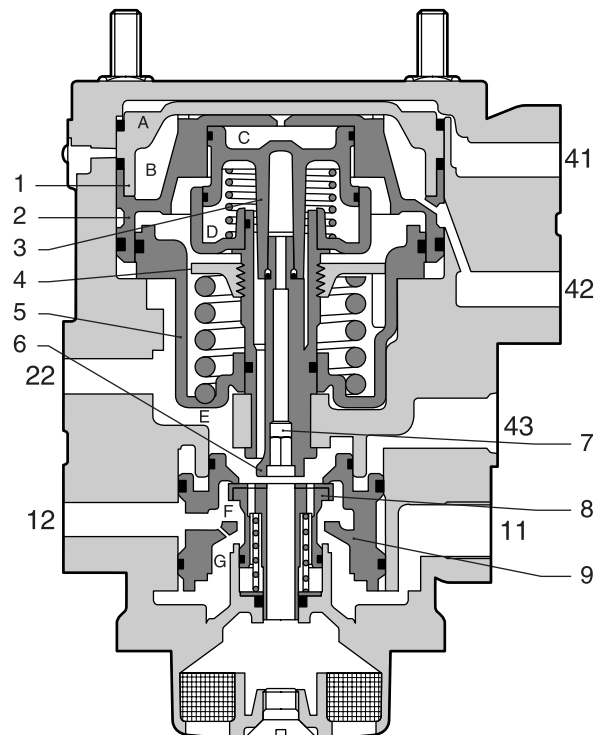


R600335

Operation

Driving

Connecting point 11 is connected to a reservoir and connecting point 43 to the parking brake valve. Both are pressurised and in a state of equilibrium. The service coupling head communicates with the ambient air via connecting point 22, valve 8 and the bleed vent with damper.



R600340

OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

Braking with the service brake

Pressure build-up

Using the foot brake valve, circuit 1, connecting point 41, and circuit 2, connecting point 42, are pressurised.

This pushes down the pistons (1 and 2), causing valve 8 to close the outlet and open the inlet. The brake pressure at connecting point 11 can now flow via valve 8 to connecting point 22, (yellow) trailer vehicle service coupling head, and will cause the trailer vehicle to brake.

Adjusting

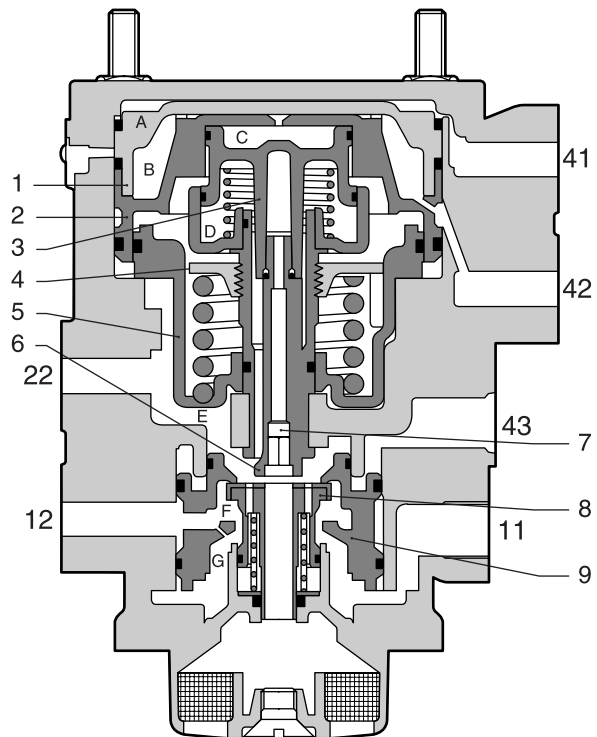
When a pre-set output pressure has been reached at connecting point 22, this pressure will once again force the piston (5) upwards, thus closing valve 8.

There is now a state of balance between the input pressure at connecting point 41 and the output pressure at connecting point 22.

Releasing

When the foot brake valve is released, the input pressure at connecting points 41 and 42 falls away. Pistons 1 and 2 are pushed upwards by the spring under the spring retainer (4).

As a result, valve 8 is closed and the outlet opened, linking connecting point 22 with the bleed vent.



R600340

3

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

Advance**Pressure build-up**

If the foot brake valve is used to build up pressure at connecting points 41 and 42, the output pressure at connecting point 22 will also move piston 5 upwards, closing valve 8.

There is now a state of balance between the input pressure at connecting point 41 and the output pressure at connecting point 22.

Alteration

If adjusting screw 6 is turned clockwise, for example, the spring retainer (4) will be moved downwards, compressing the spring underneath it. Therefore, if the operating pressure at connecting points 41 and 42 remains the same, a higher adjusting pressure will be needed under piston 5. This adjusting pressure is also on the yellow coupling head.

This increase of service pressure to the trailer vehicle in relation to the braking pressure from the prime mover is called advance.

For the setting procedure, see "Inspection and adjustment".

Emergency brake

When the parking brake valve is moved into the locking position, connecting point 43 will be gradually bled.

Piston 9 moves upwards and valve 8 is opened.

Depending on the drop in pressure at connection point 43, a pressure build-up will occur at connection point 22. When a pre-set value has been reached, valve 8 will close, so that a state of equilibrium is achieved.

Parking brake

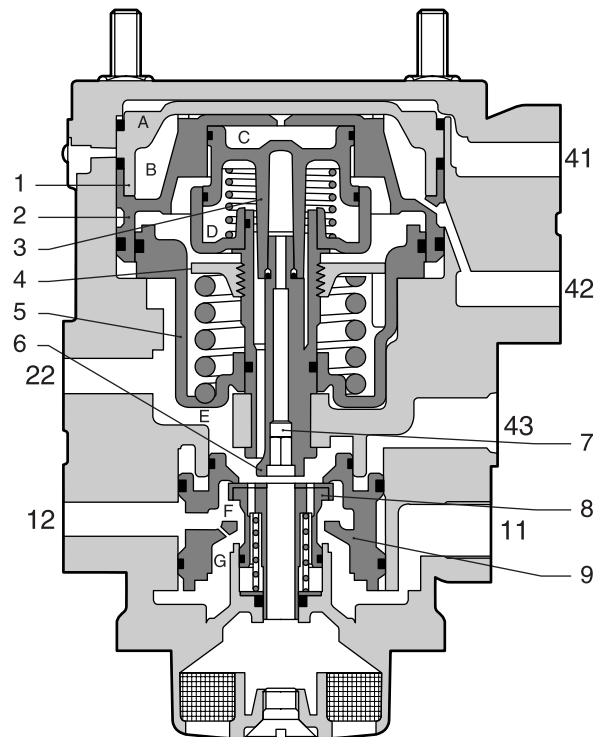
When the parking brake valve is in its maximum position, causing the lever to be locked, connecting point 43 is bled. As a consequence, there is still output pressure at connecting point 22.

Protection against breakage of service line

During braking, pressure will build up at connecting point 22. The air necessary for this is supplied from connecting point 11.

If the service line is broken, pressure will not build up in space E, which will cause piston 9 to move up and close against the bottom of valve 8. The supply from connecting point 11 stagnates, causing pressure to be delivered from connecting point 12.

The pressure in the reservoir pipe drops and the trailer brakes are applied.



R600340

OPERATION OF BRAKE COMPONENTS

6

Description of components

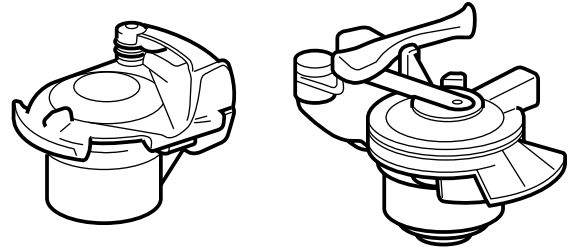
LF45/55 series

2.17 COUPLING HEAD

Application

With spring-loaded valve. Fitted in the dual-line brake system of versions with trailer vehicle connection.

If these automatic coupling heads are applied, there is no need for an air cock.



R600899

Purpose

To connect the air brake system of the prime mover with that of the trailer vehicle.

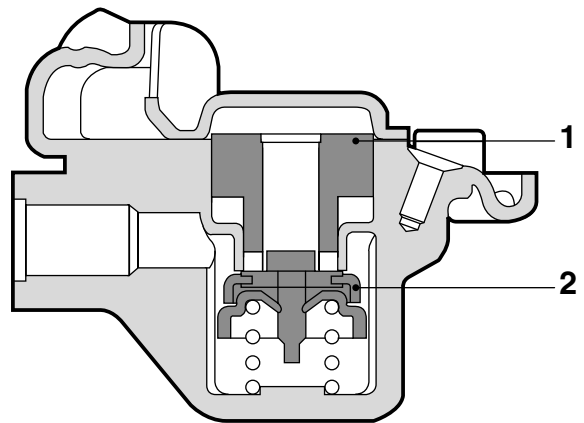
Operation

The spring-loaded valve (2) in the coupling head ensures that the system is isolated from the ambient air.

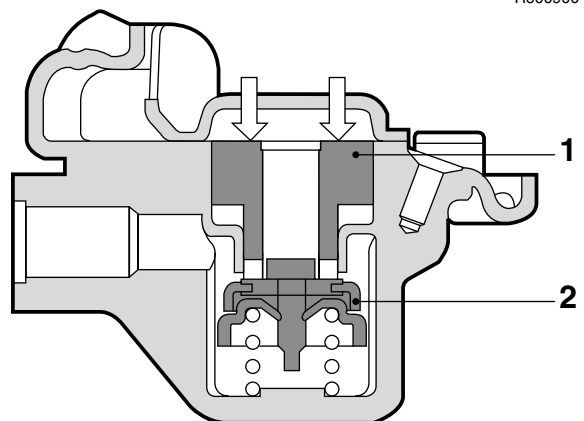
When coupling, turn the counter head until the claws of the two heads rest against the stop under the locking plates. This will prevent the coupling head from disengaging spontaneously. Because the two sealing rings (1) are pressed against each other, the spring-loaded valve remains open so that an air-tight connection is achieved. When the heads are uncoupled, the spring-loaded valve will seal off the pipe on the prime mover.

The coupling head is equipped with a safety cam. This is to prevent different coupling heads being coupled to one another.

If no trailer vehicle is hooked up, the cover of the coupling head must be closed, to avoid fouling.



R600900



R600901

6

OPERATION OF BRAKE COMPONENTS

LF45/55 series

Description of components

2.18 DISC BRAKE CONSTRUCTION, WABCO MODEL

PAN 17 and PAN 19-1+ versions

Operation

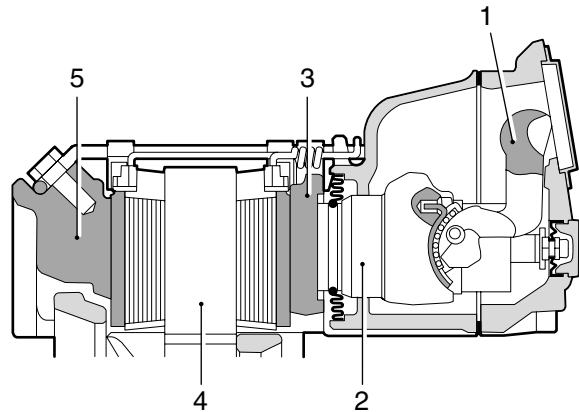
Brakes

This disc brake operates using a pneumatic brake cylinder or spring brake cylinder.

If the brake is applied, the brake cylinder push rod presses against the eccentrically mounted lever (1).

Via brake cylinder 2 and pressure plate 3, the brake pad is pressed against the inside of the brake disc (4).

Due to the reaction force at the eccentric, the floating brake calliper (5) will also press the opposite brake pad with the same force.

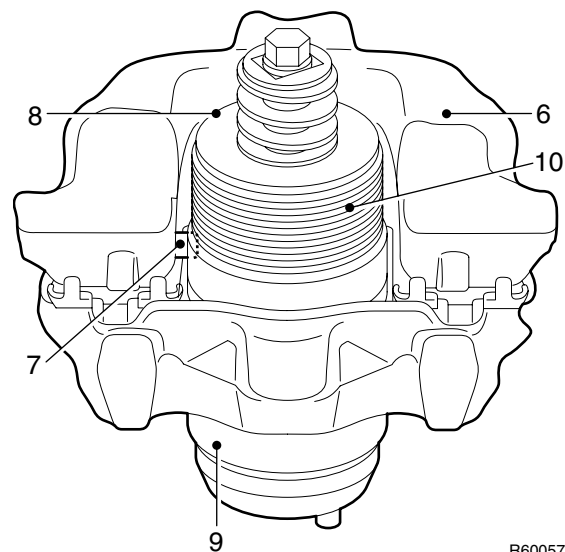


R600574

Adjusting

If the eccentrically mounted lever (6) is operated by the push rod of the brake cylinder, the pin (7) on the lever will rotate the adjuster (8) and the pressure cylinder (9) in the outgoing stroke until the play has been eliminated.

If the brake is no longer being operated, the lever (6) will turn the adjuster (8) back in the opposite direction. The spring (10) in the adjuster will ensure that the pressure cylinder will hardly rotate. The result is that a small total play of about 0.5 mm will remain between the brake pads and brake disc.



R600579

Brake pad wear wires

Brake pad wear wires are fitted to the brake pads. These wires are cut through when the brake lining has been worn down to the minimum thickness.

This is the signal for the VIC system to activate the "brake pad wear" warning symbol on DIP-4.

OPERATION OF BRAKE COMPONENTS

6

Description of components

LF45/55 series

PAN 19-2 version

Operation

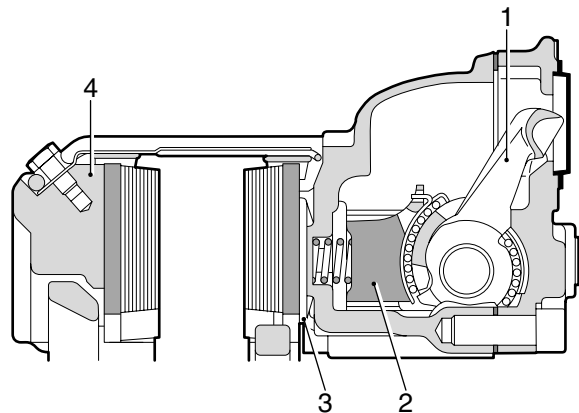
Brakes

This disc brake operates using a pneumatic brake cylinder or spring brake cylinder.

If the brake is applied, the brake cylinder push rod presses against the eccentrically mounted lever (1).

The brake pad is forced against the inside of the brake disc via the brake piston (2) and the pressure plate (3).

Due to the reaction force at the eccentric, the floating brake calliper (4) will also press the opposite brake pad with the same force.



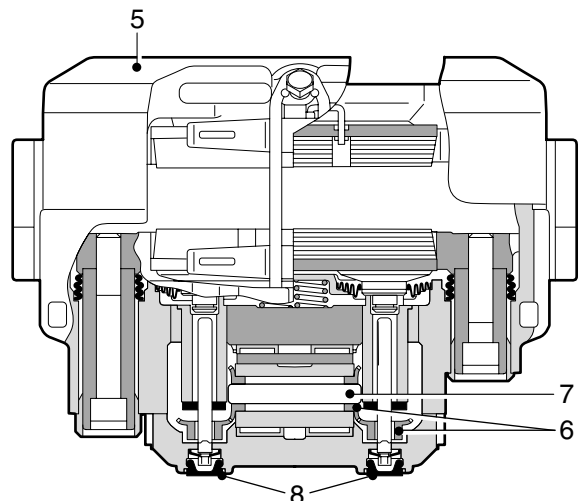
R600578

Adjusting

This adjuster and the eccentric are equipped with teeth (6) that engage each other.

If the play is too great, the adjuster (7) will be rotated by these teeth the next time the brakes are applied, so that the play will be reduced. Under normal conditions, the adjuster will push against the brake pad before rotation can take place. However, if rotation does take place, it will be absorbed by a slip coupling.

By removing one of the rubber caps (8) where the automatic adjuster is located, a hexagon is revealed. Using a ring spanner, the play can be manually set by adjusting this hexagon.



R600577

Brake pad wear wires

Brake pad wear wires are fitted to the brake pads. These wires are cut through when the brake lining has been worn down to the minimum thickness.

This is the signal for the VIC system to activate the "brake pad wear" warning symbol on the instrument panel.

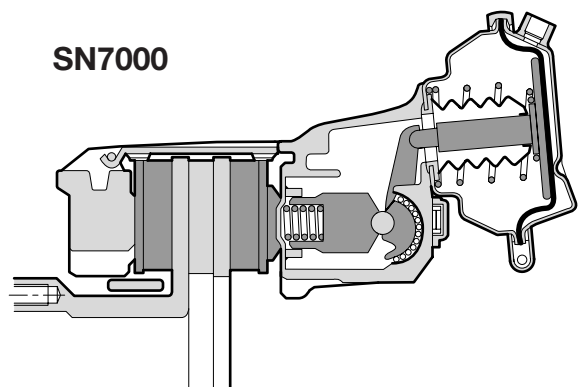
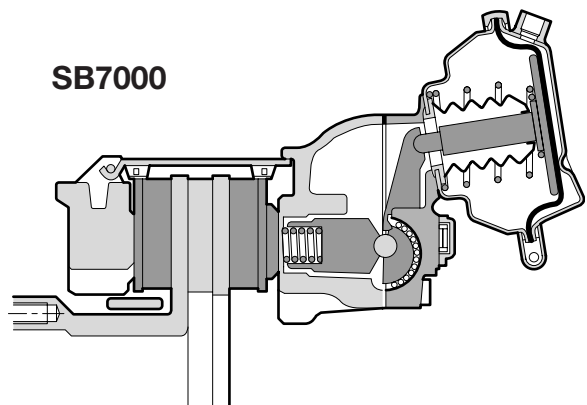
2.19 DISC BRAKE CONSTRUCTION, KNORR MODEL

The disc brake construction consists of the brake disc and the brake calliper. There are two variants of this construction:

- Knorr SB7000, recognisable by the divided housing between the brake cylinder and the brake pad holder.
- Knorr SN7000, recognisable by the undivided housing between the brake cylinder and the brake pad holder.

The operation of the two variants is identical. Only the reconditioning of the brake calliper is different.

The Knorr SB7000 construction has been used since the introduction of the LF 45/55 series. The Knorr SN7000 construction is used in production from week 41-2002 on all front axles and on air-sprung rear axles (Class 3 vehicles). On leaf-sprung rear axles the Knorr SB7000 construction is still used. The operation of the two variants is identical. Only overhauling and the parts of the brake calliper differ.



R600707

Operation

Brakes

This disc brake operates using a pneumatic brake cylinder or spring brake cylinder.

If the brake is applied, the brake cylinder push rod presses against the eccentrically mounted lever (1).

Via the bridge (2) and the threaded bushes (3), the brake pad is pressed against the brake disc (4) at two points on the inside.

Due to the reaction force at the eccentric, the floating brake calliper (5) will also press the opposite brake pad with the same force.

OPERATION OF BRAKE COMPONENTS

6

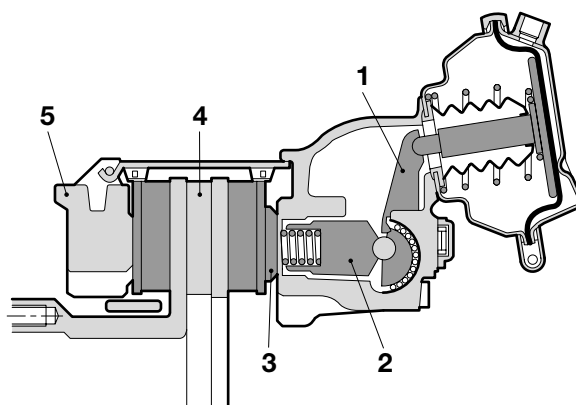
Description of components

LF45/55 series

Adjusting

One of the two threaded bushes (3) is equipped with the mechanics for automatic adjustment of the play between the brake pads and brake disc. This adjuster and the eccentric are equipped with teeth (6) that engage each other.

If the play is too great, the adjuster (8) will be rotated by these teeth the next time the brakes are applied, so that the play will be reduced.

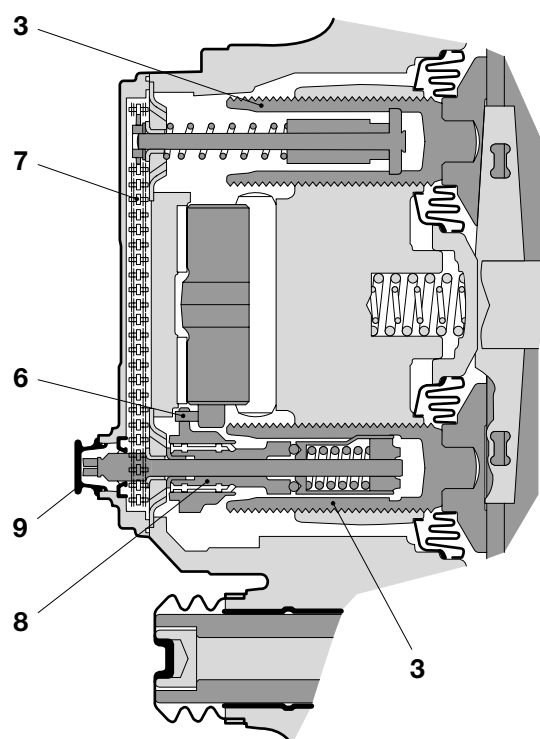


R600486

Under normal conditions, the adjuster will push against the brake pad before rotation can take place. However, if rotation does take place, it will be absorbed by a slip coupling.

The rotation of the adjuster is transferred by means of a chain (7) to the other adjuster.

By removing a rubber cap (9) where the automatic adjuster is located, a hexagon is revealed. Using a ring spanner, the play can be manually set by adjusting this hexagon.



R600487

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OPERATION OF BRAKE COMPONENTS

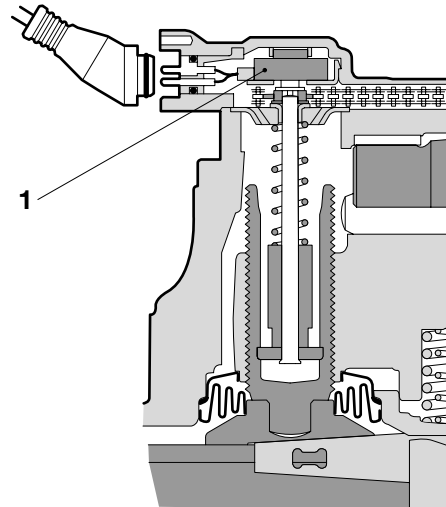
LF45/55 series

Description of components

Wear indicator

The wear sensor, which is fitted on the adjustment mechanism of the brake calliper, contains a series connection of a resistor and a switch. The switch is normally closed and the circuit has a resistance equal to the value of the resistor. When the brake pads are worn, the circuit is interrupted.

This is the signal for the VIC system to activate the "brake pad wear" warning symbol on the instrument panel.



R600488

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OPERATION OF BRAKE COMPONENTS

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Description of components

LF45/55 series

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BRAKE SYSTEM AND COMPONENTS

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1. SAFETY INSTRUCTIONS

1.1 SAFETY INSTRUCTIONS



Always observe the local safety and environmental regulations.



If the parking brake is deactivated when working on the vehicle, place chocks in front of and behind the wheels to prevent the vehicle from moving.



The substances and auxiliary substances (to be) used may constitute a direct or indirect health hazard. For that reason, always wear protective clothing and protective equipment (e.g. goggles, gloves) to prevent inhalation, skin contact, etc.



Use only the specified special tools.



Parts of threaded connections have to be clean and free of lubricants before use.



Check the correct operation of the vehicle, and the brake system in particular if work has been carried out on it, before handing over the vehicle to the user.

BRAKE SYSTEM AND COMPONENTS

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Safety instructions

LF45/55 series

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2. INSPECTION AND ADJUSTMENT

2.1 INSPECTION, COMPRESSOR CAPACITY

1. Bring the engine up to operating temperature.
2. For a vehicle with air suspension, the chassis should be at the normal driving height.
3. Put chocks in front of and behind the rear-axle wheels to prevent the vehicle from moving.
4. Position the parking brake in the driving position.

Note:

If, when draining the air reservoirs, they appear to hold an excessive quantity of oil, check the condition of the compressor and check the compressor for the presence of carbon deposits in the compressor pipes.

5. Bleed the entire brake system.
6. The capacity test requires that a completely empty system should be at operating pressure within 5 minutes, at an engine speed of 0.6 x maximum engine speed.

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

2.2 INSPECTION, FOOT BRAKE VALVE

Inspection, foot brake valve

1. Connect a pressure gauge to a brake chamber of the front axle (in front of the empty/load valve, if present).
2. Connect a pressure gauge to the test connection of the load-dependent control valve.
3. Pressurise the system.
4. Depress the brake pedal a few times, alternately quickly and slowly, until the end stop is reached. Check if there is a discrepancy between both gauge readings (discrepancy maximum 0.3 ± 0.15 bar, at circuit 21 between 0 and 3 bar).
5. If the brake pedal is gradually depressed, there must be no pressure jumps of more than 0.3 ± 0.15 bar in either circuit, at circuit 21 between 0 and 3 bar.
6. When the foot brake valve is completely depressed, the reading of both gauges should indicate the max. output pressure. See "Technical data".
7. When the brake pedal is not depressed, the pressure gauges should not indicate any pressure.

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2.3 INSPECTION AND ADJUSTMENT, LOAD SENSING VALVE, AIR SUSPENSION

Explanatory notes on instruction plate

The information contained on the plate relates to the axle loads, the output pressures and bellows pressures, in accordance with the order of axles beneath the vehicle.

"1" refers to the (first) front axle, "2" to the following axle, etc.

In the entire column, a reading of 6 bar has been filled in under "1".

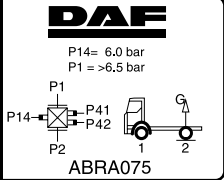
If the vehicle is equipped with an empty/load valve, a pressure ratio is entered in the box under the valve illustration, e.g. "i = 1 : 1.5". The "delivery pressure p2" of axle "1" then indicates variable readings.

These values can be used to check the brake pressure values of the front axle and to carry out the inspection/adjustment below at the same time. To do this, connect a pressure gauge to the test connection of one of the front axle brake cylinders.

Inspection/adjustment

1. Check that the correct valve has been fitted (see instruction plate).
2. Connect pressure gauge 4 to the test connection close to connecting point 1/4 on the load-dependent control valve (input pressure).
3. Connect pressure gauge 2 to the test connection on one of the brake cylinders (service brake connection) of the rear axle.
4. Connect a pressure gauge (43) with a pressure-reducing valve to the simulation connection near connections 41 and 42 of the load-sensing valve (= simulated adjustable bellows pressure).
5. Make sure that the reservoir pressure is higher than 6.5 bar throughout the testing process.
6. Set the simulated bellows pressure to its **second lowest** value, as indicated on the instruction plate.
7. Depress the brake pedal until pressure gauge 4 indicates a pressure of 6 bar.

G (kg)	1 ±0.4 (bar)	2 ±0.2 (bar)	P41,42 (bar)
1000	6.0	2.8	0.4
1500	6.0	3.4	0.9
2000	6.0	4.1	1.3
3000	6.0	5.1	2.3
3468	6.0	6.0	2.7
4700	6.0	6.0	3.8



DAF

P14= 6.0 bar
P1 = >6.5 bar

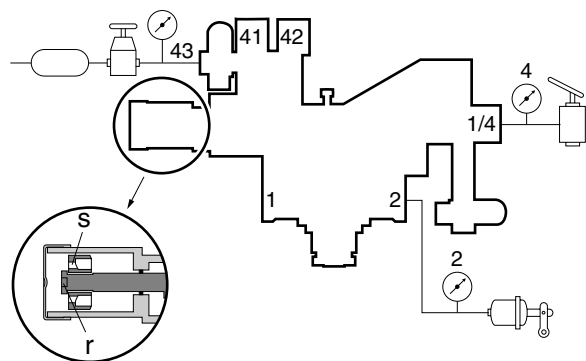
P14 P41 P42

P2

1 2

ABRA075

R6 00 548



R600473

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

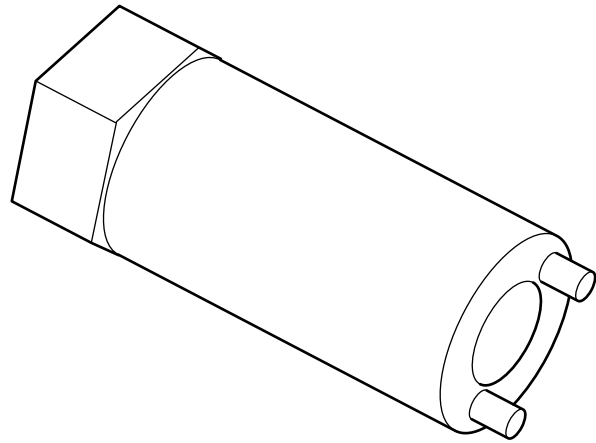
LF45/55 series

8. Read the brake pressure of the rear axle on pressure gauge 2 and check that this brake pressure matches the one listed on the instruction plate in the table under "output pressure p2" to the rear axle.
9. If the measured value is not correct, depressurise connection 43 and, using a special slotted-nut spanner, special tool (DAF no. 1329464), turn the adjusting nut(s):
 - brake pressure too high: unscrew the adjusting nut
 - brake pressure too low: screw in the adjusting nut

Note:

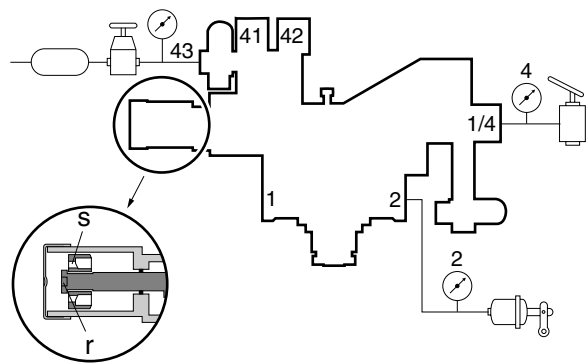
When depressurising the simulation connection (pressure gauge 43), the air hose must remain connected to prevent the (actual) bellows pressure from accidentally activating the valve.

The small socket head screw in the centre of the valve must not be adjusted.



R600478

10. Repeat the procedure described in point 6 until the measured brake pressure value is within the tolerance limits.
11. Set the simulated bellows pressure to its **second highest** value, as indicated on the instruction plate.
12. Depress the brake pedal until pressure gauge (4) indicates a pressure of 6 bar.
13. Read the pressure gauge (2) and check that this braking pressure matches the pressure indicated in the table on the instruction plate.
14. If the measured reading is not correct, depressurise connection 43 and turn the adjusting bolt (r) using a Torx screwdriver:
 - brake pressure too high: screw in the adjusting bolt
 - brake pressure too low: unscrew the adjusting bolt



R600473

Note:

When depressurising the simulation connection (pressure gauge 43), the air hose must remain connected to prevent the (actual) bellows pressure from accidentally activating the valve.

The small socket head screw in the centre of the valve must not be adjusted.

15. If the adjusting bolt (r) has been turned, repeat the procedure from point 6.

6

BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Inspection and adjustment

2.4 INSPECTION AND ADJUSTMENT, LOAD SENSING VALVE, LEAF SUSPENSION

Explanatory notes on instruction plate

The data relating to axle loads and output pressures are listed on the instruction plate following the sequence of the axles beneath the vehicle.

"1" refers to the (first) front axle, "2" to the following axle, etc.

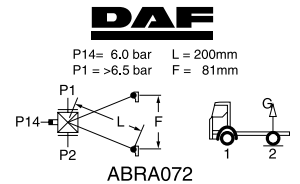
In the entire column, a reading of 6 bar has been filled in under "1". If the vehicle is equipped with an empty/load valve, a pressure ratio is entered in the box under the valve illustration, e.g. "i = 1 : 1.5". The "output pressure P2" of axle 1 will give variable readings.

These values can be used to check the brake pressure values of the front axle and to carry out the inspection/adjustment below at the same time. To do this, connect a pressure gauge to the test connection of one of the front axle brake cylinders.

Inspection/adjustment

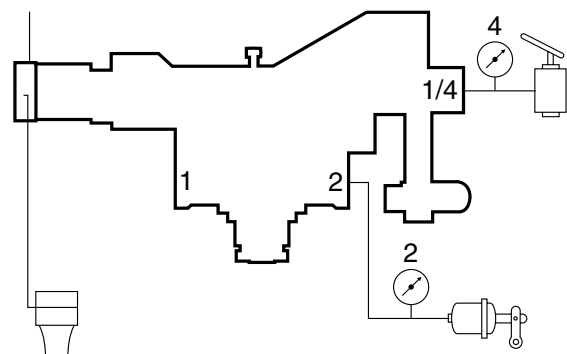
1. Measure the weight plus load of the rear axle.
2. Check the attachment of the control lever and its ease of operation.
3. Check that the right type of valve has been fitted.
4. Check the length of the control lever (see "L" on the instruction plate).
5. Connect a pressure gauge (4) to the test connection near connection 1/4 on the load-sensing valve (input pressure).
6. Connect a pressure gauge (2) to the test connection on one of the brake cylinders (service brake connection) of the rear axle.
7. Make sure that the reservoir pressure is higher than 6.5 bar throughout the testing process.
8. Depress the brake pedal until pressure gauge 4 indicates a value of 6 bar.
9. Read the brake pressure of the rear axle from pressure gauge 2 and check that this value matches the one listed on the instruction plate in the table under "output pressure p2" to the rear axle.

G (kg)	1	2
	±0.4 (bar)	±0.2 (bar)
1000	6.0	2.8
1500	6.0	3.4
2000	6.0	4.0
3000	6.0	5.1
3750	6.0	6.0
4700	6.0	6.0



R6 00 549

4



R600562

BRAKE SYSTEM AND COMPONENTS

6

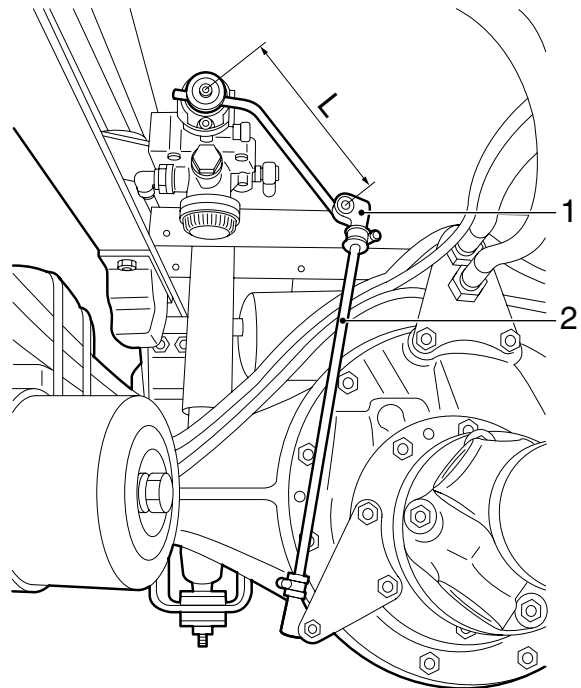
Inspection and adjustment

LF45/55 series

10. If necessary, correct the brake pressure by adjusting the length of the vertical connecting rod (2). Never attempt to alter length L of the (horizontal) control lever.
11. Remove the ball coupling (1) and raise the control lever. Check that the output pressure is now allowed through (almost) without reduction.

Note:

The small socket head screw in the centre of the valve must not be adjusted.



R6 00 568

6

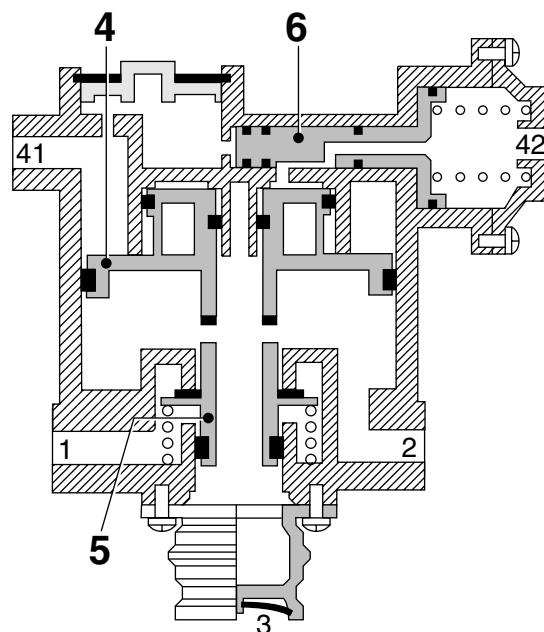
BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Inspection and adjustment

2.5 INSPECTION EMPTY/LOAD RELAY VALVE

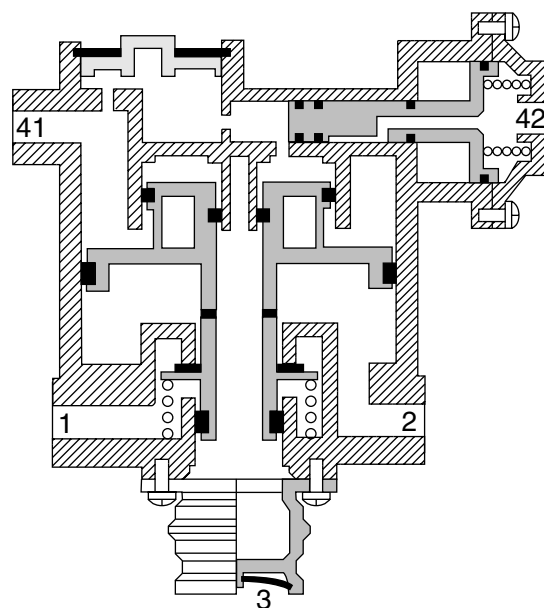
1. Using a T-piece, connect a pressure gauge to connecting point 41.
2. Connect a pressure gauge to the test connection on one of the brake chambers of the front axle.
3. Connect a pressure gauge to the test connection on one of the brake chambers of the rear axle.
4. Pressurise the system.



R600904

Testing when empty

1. Set the load sensing valve to the empty position.
2. Slowly depress the brake pedal.
The pressure on the front axle should rise gradually, not in jumps.
The pressure on the front axle will rise less quickly than that on connecting point 41.
(With an empty vehicle, the difference will be greater than with a partially loaded vehicle).



R600905

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

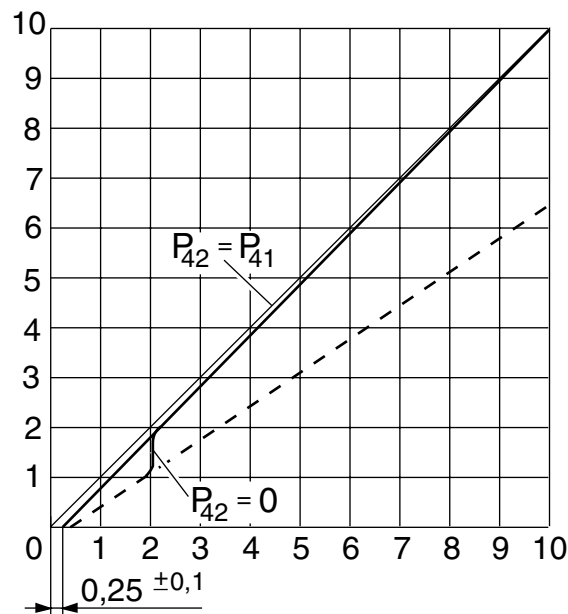
LF45/55 series

Testing when fully loaded

1. Set the load sensing valve to the full-load position.
2. Slowly depress the brake pedal.
The pressure on the front axle should rise gradually, not in jumps.
The pressure on the front axle will rise as quickly (approx. 0.2 bar) as that on connection point 41. It must be possible to approximate the system pressure.

Inspection when faulty

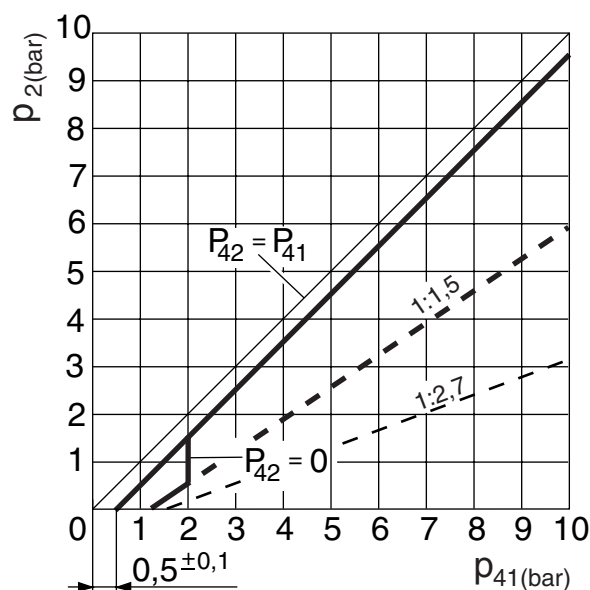
1. Disconnect the pipe to connecting point 42 and plug off the pipe.
2. Repeat point 8.
3. Set the load sensing valve as specified.
4. Reconnect the pipes to points 41 and 42 in the original manner.
5. Remove the pressure gauges.



R600906

Inspection, output pressure to the front axle

1. Measure the rear axle load.
2. Check the load sensing valve setting.
3. Connect a pressure gauge to the test connection for the load sensing valve (input pressure) and a pressure gauge to the test connection on the brake cylinder of the front axle.
4. Make sure that the reservoir pressure exceeds 6.5 bar.
5. Depress the brake pedal until the pressure gauge on the test connection of the load sensing valve reads 6 bar, and read off the braking pressure on the pressure gauge of the front axle.
6. Compare this value with the data in the table attached to the door pillar.

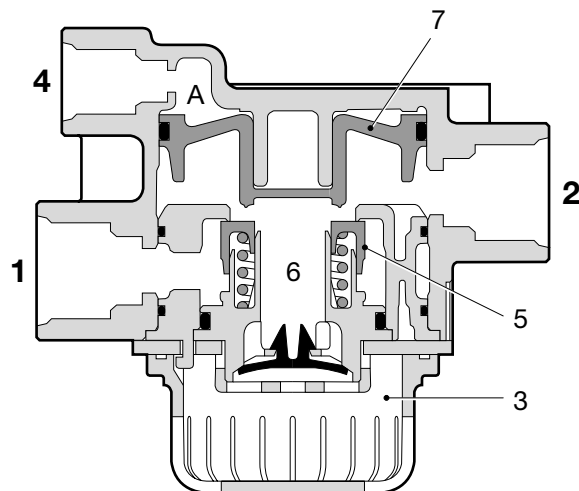


R600745

2.6 INSPECTING THE RELAY VALVE

Inspecting the relay valve

1. Connect a pressure gauge to connecting point 4 of the relay valve.
2. Connect a pressure gauge to connecting point 2 of the relay valve.
3. Pressurise the system.
4. Depending on the position of the relay valve in the brake system, slowly activate the service brake or parking brake.
5. The pressure in the pressure gauge connected to connection point 4 must now increase to approx. 0.8 bar (the increased parking brake actuating pressure) or 0.5 bar (service brake), without there being any noticeable pressure on connection point 2. From this point, the pressures in both pressure gauges must increase identically. The pressure on the gauge connected to point 2 should not rise in jumps. Both gauges should indicate a value corresponding to the graph. See "Technical data".



R600490

BRAKE SYSTEM AND COMPONENTS

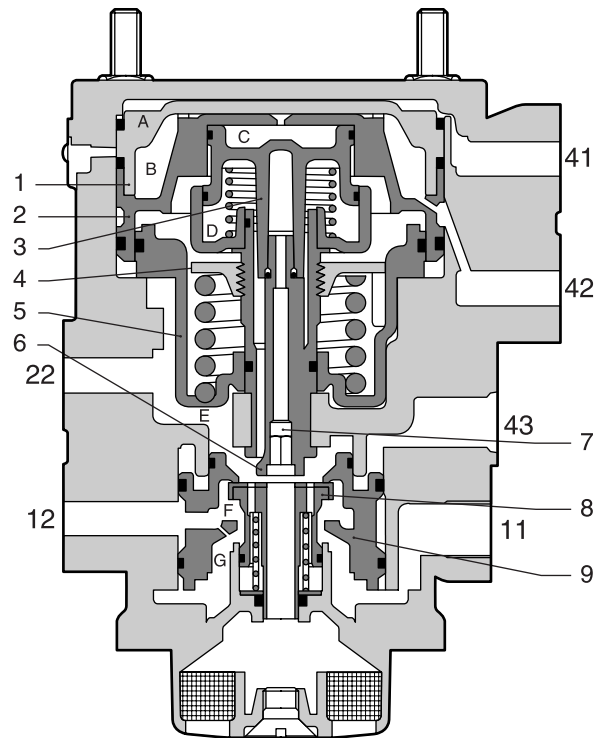
6

Inspection and adjustment

LF45/55 series

2.7 INSPECTION, TRAILER VEHICLE CONTROL VALVE

1. Ensure there is sufficient system pressure.
2. Check whether air is escaping via the bleed vent.
3. Depress the brake pedal, and again check for leaks.
4. Disconnect the pipe at connecting point 42 and plug off this pipe.
5. Depress the brake pedal, and check for pressure build-up in the service pipe (see "Technical data").
6. Reconnect the pipe.
7. Repeat the last three points, but now for connecting point 41.
8. Operate the parking brake: pressure should build up in the service pipe (see "Technical data").
9. Operate the parking brake to the stop, and lock the lever: the service pipe should once again become pressureless.
10. Simulate a leak in the service pipe, and depress the brake pedal; within two seconds, the outflow of air from the leak should slow down considerably.



R600340

4

2.8 INSPECTION AND ADJUSTMENT, ADVANCE IN TRAILER VEHICLE CONTROL VALVE

Inspection, brake pressure advance in drawn vehicle control valve, vehicles with empty/ load relay valve

1. Connect a pressure gauge (1) to the test connection for the load-sensing valve and a pressure gauge (2) to the service coupling head.
2. Simulate full load on the vehicle.
3. Depress the brake pedal until the input pressure (measured at pressure gauge 1) is 3 bar. See "Technical data" for the pressure that should be indicated by pressure gauge 2.
4. If the braking performance of the trailer vehicle (provided it is in good condition) is poorer than that of the prime mover, the advance may be increased by several tenths of a bar.

Inspection, brake pressure advance in drawn vehicle control valve, vehicles without empty/ load relay valve

1. Connect a pressure gauge (1) to the measuring point on the front axle brake cylinder and a pressure gauge (2) to the service coupling head.
2. Depress the brake pedal until the input pressure (measured at pressure gauge 1) is 3 bar. See "Technical data" for the pressure that should be indicated by pressure gauge 2.
3. If the braking performance of the trailer vehicle (provided it is in good condition) is poorer than that of the prime mover, the advance may be increased by several tenths of a bar.

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

Adjusting advance in trailer vehicle control valve

Note:

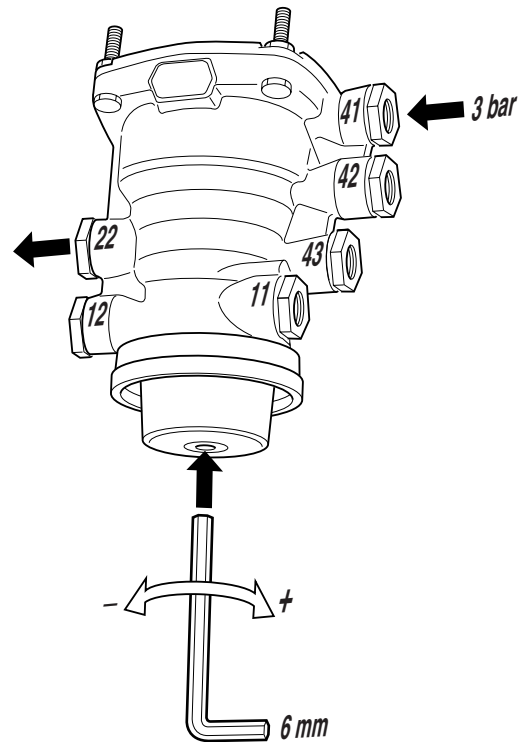
The pressure at which the readings are taken must always be built up. If the specified pressure is exceeded, bleed off sufficient air and once again allow the pressure to build up.

1. Remove the plug.

Note:

Make sure that the valve is not operated when the advance is adjusted.

2. Using a 6mm Allen key, turn the central section (7) anti-clockwise or clockwise to decrease or increase the advance respectively.
3. Measure the advance again.
4. Repeat these actions until the required advance is reached.
5. Re-fit the plug.



R600341

4

2.9 INSPECTION, PARKING BRAKE VALVE

Parking brake valve with trailer control

1. Ensure there is sufficient system pressure.
2. Using T-pieces, connect two pressure gauges to connecting point 43 of the drawn vehicle control valve and to connecting point 42 of the relay valve.

Inspecting the driving position

1. Place the parking brake valve in the driving position. Both pressure gauges must now indicate a pressure of approx. 8 bar. This is the limiting pressure of the air supply unit.

Inspecting the emergency brake

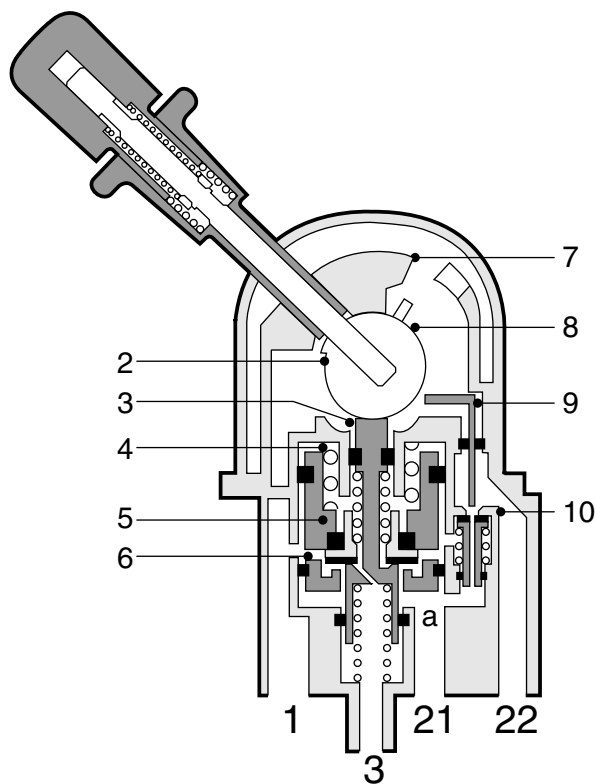
1. Move the parking brake valve slowly towards the parking position. Both pressure gauges should now gradually fall to 0 bar (with the exception of the first 10° angular displacement. See graph in "Technical data").

Inspecting the parking position

1. In the parking position, both pressure gauges should read 0 bar.

Inspecting the test position

1. Place the parking brake valve in the parking position, depress the handle, and move it to the test position. The pressure gauge on connection point 43 of the drawn vehicle control valve should read approx. 8 bar. The pressure gauge at connecting point 42 of the relay valve should read 0 bar.
2. Ensure there is sufficient system pressure.



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BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

Parking-brake valve with pressure limitation and without trailer control

1. Connect a pressure gauge to point 42 of the relay valve, using a tee.

Inspecting the driving position

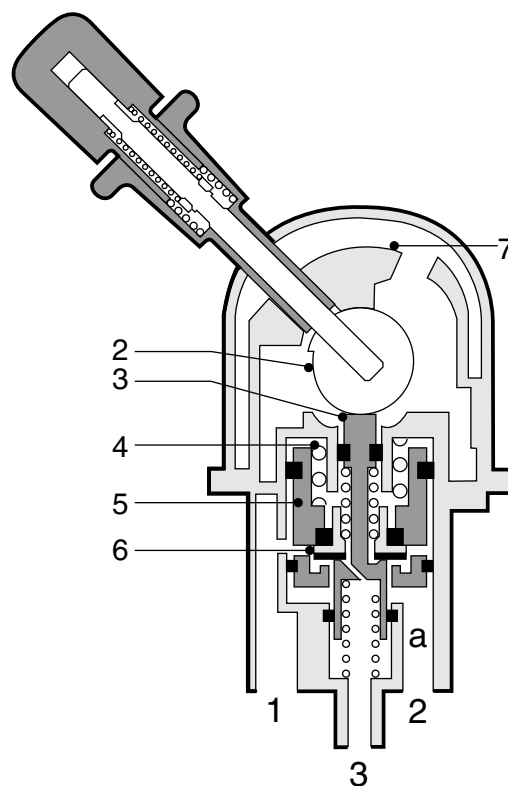
1. Place the parking brake valve in the driving position. The pressure gauge must now indicate a pressure of approx. 8 bar. This is the limiting pressure of the air supply unit.

Inspecting the emergency brake

1. Move the parking brake valve slowly towards the parking position. The pressure gauge should now gradually fall to 0 bar (with the exception of the first 10° angular rotation - see graph).

Inspecting the parking position

1. In the parking position, the pressure gauge should read 0 bar.



R600095

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Inspection and adjustment

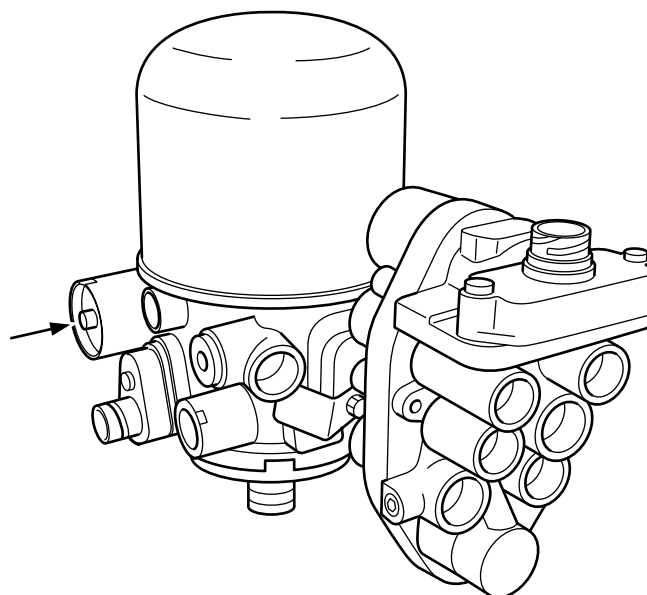
2.10 CHECK AND ADJUST INPUT AND OUTPUT PRESSURES OF THE AIR SUPPLY UNIT

Inspecting the cut-out pressure

1. Connect a pressure gauge to the central drain/filler connection.
2. Pressurise the air system.
3. Check that the pressure regulator cuts out at the correct reading.
4. If this is not the case, adjust the value using the screw on the air dryer (see arrow) as follows:

Adjusting the cut-out pressure

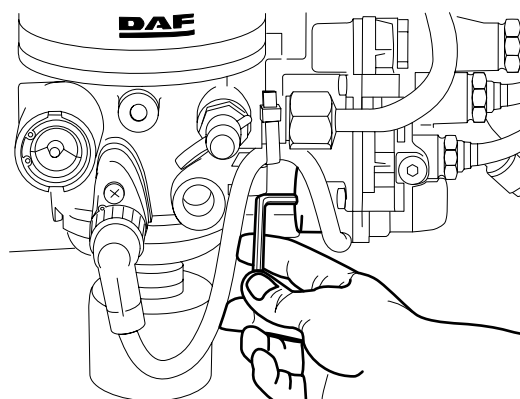
1. If the cut-out pressure is too low, tighten the adjusting screw a little so that the cut-out pressure becomes too high.
2. Ensure that the pressure regulator is switched on. If it is switched off, let some air escape through a reservoir until the system pressure falls beneath the cut-in pressure.
3. Pressurise the air system to a little over 10 bar.
4. Unscrew the adjusting screw until the pressure regulator cuts out (see "Technical data").
5. Check the cut-out pressure in the way mentioned above (see "Technical data").



R600480

Adjusting trailer vehicle system pressure

1. Fit a pressure gauge to the trailer supply connection (red connection).
2. Build up pressure in the brake system (air dryer should blow off).
3. Check the pressure (see "Technical data").
4. If necessary, adjust the pressure by turning the adjusting screw.



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BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

2.11 CHECK AIR DRYER REGENERATION FUNCTION IN THE AIR SUPPLY UNIT

Air dryer regeneration function

1. Pressurise the air system (pressure regulator should cut out).
2. Switch the engine off.
3. The regeneration air should escape via the vent opening of the air dryer, for approximately 20 seconds.

2.12 CHECK THE 4-CIRCUIT SECURITY VALVE OF THE AIR SUPPLY UNIT

Check pressure build-up on circuits 1, 2, 3 and 4

1. Lower the pressure in the system to 0 bar.
2. Connect pressure gauges to circuits 1, 2, 3 and 4.
3. Pressurise the circuits using the compressor (engine speed approx. 1000 rpm).
4. The pressure in circuits 1, 2 and 4 will gradually increase. Once the opening pressure of circuit 3 has been reached (see "Technical Data"), the pressure in circuit 3 will increase.
5. If no more pressure builds up (cut-out pressure reached), the supply pressure in circuits 1, 2, 3 and 4 must meet the stipulated value (see "Technical Data").

Checking circuit 1

1. Turn off the engine and simulate a leak in circuit 1.
2. The pressure in circuit 2 and 4 may not fall below the specified closing pressure of circuit 1. See "Technical data".

Checking circuit 2

1. Make sure the leak in circuit 1 is remedied and pressurise the system again.
2. Turn off the engine and simulate a leak in circuit 2.
3. The pressure in circuit 1 and 4 may not fall below the specified closing pressure of circuit 2. See "Technical data".

Checking circuit 3

1. Make sure the leak in circuit 2 is remedied and pressurise the system again.
2. Turn off the engine and simulate a leak in circuit 3 for the trailer circuit (connection point 23).
3. The pressure in circuit 1.2 and 4 may not fall below the specified closing pressure of circuit 3. See "Technical data".
4. The pressure in circuit 3 for the parking brake circuit (connection point 25) must remain secured by the check valve.

Checking circuit 4

1. Make sure the leak in circuit 3 is remedied and pressurise the system again.
2. Turn off the engine and simulate a leak in circuit 4.
3. The pressure in circuit 1 and 2 may not fall below the specified closing pressure of circuit 4. See "Technical data".

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

Checking circuit 3 flow-back function

1. Make sure the leak in circuit 4 is remedied and pressurise the system again.
2. Turn off the engine and simulate a leak in circuit 1.
3. The pressure in circuit 3 for the trailer circuit (connection point 23) will decrease to 0 bar when the pressure in circuit 1 has reached the activation pressure for the flow-back function. See "Technical data".

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Inspection and adjustment

2.13 INSPECTING BRAKE PADS, WABCO MODEL

With wheels fitted

No external wear indicators are fitted on these models. The brake pad thickness must be inspected by using a mirror and a lamp, if necessary.

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

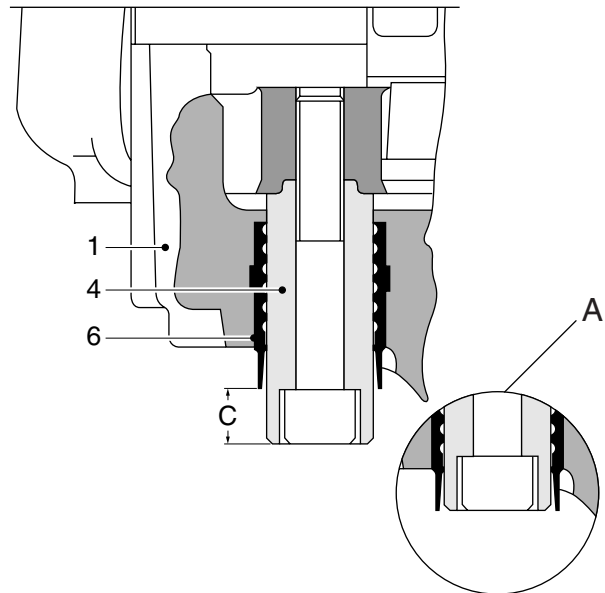
LF45/55 series

2.14 INSPECTING BRAKE PADS, KNORR MODEL

Inspecting Knorr SB7000 brake pads

With wheels fitted:

If the guide sleeve (4) no longer protrudes (C) from the guide bush (6) but is flush with it (detail A), the brake pad thickness must be inspected with the wheels removed. See "Technical data".



R600481

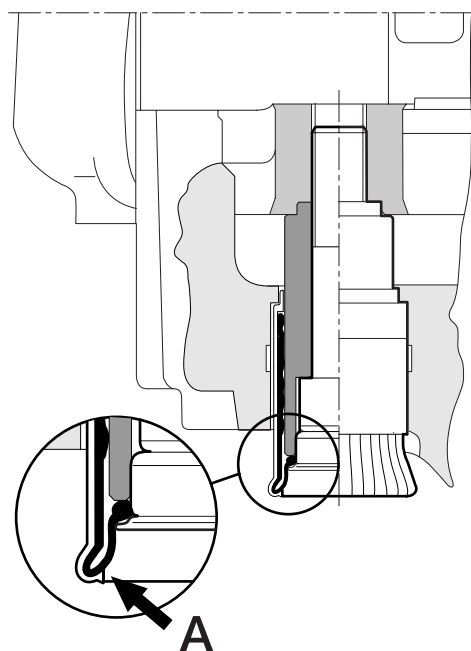
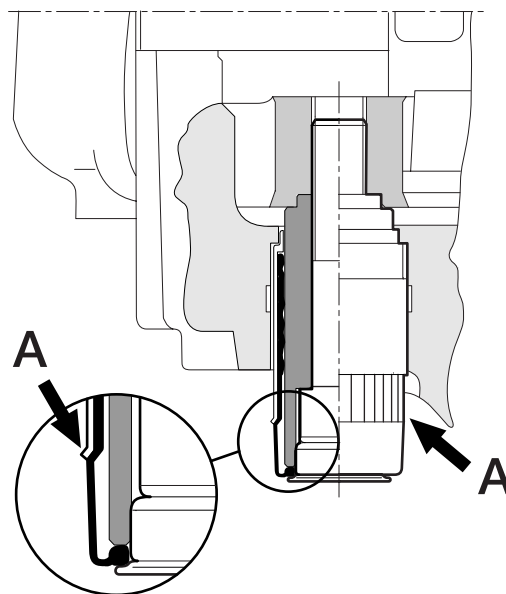
Inspecting Knorr SN7000 brake pads

With wheels fitted

The brake pad thickness can be checked on the basis of the position of the guide bush relative to the rubber bush.

At maximum brake pad thickness the rubber cover is stretched. Wear of the brake pads and movement of the brake calliper along the guide bushes will cause the rubber cover to roll up.

As soon as the transition from the ribbed section of the rubber cover to the smooth section (A) starts to roll inward, the brake pad thickness is to be checked with the wheels removed. See "Technical data".



R600730

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

2.15 INSPECTION, BRAKE DISCS

1. Remove the wheels.
2. Measure the disc thickness at different points to find the thinnest measurement. Compare the reading with the technical data. See "Technical data".
3. Check the brake discs for signs of wear. See "Technical data".

Note:

The brake discs may be turned. See "Technical data".

4

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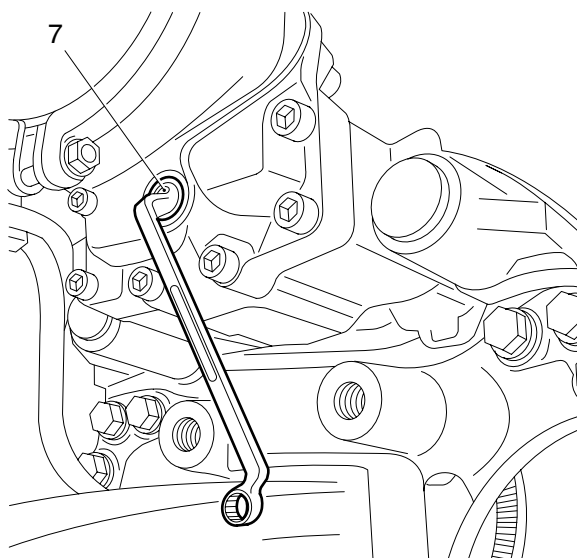
BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Inspection and adjustment

2.16 CHECKING AUTOMATIC DISC BRAKE SLACK ADJUSTER, WABCO MODEL

1. Place chocks in front of and behind the wheels to prevent the vehicle from moving.
2. Put the parking brake in the driving position.
3. Remove the wheel.
4. Remove the covering cap from the slack adjuster.
5. Fit a ring spanner on the hexagonal adjusting bolt (7) and turn it anticlockwise (2-3 clicks).
6. Leave the ring spanner on the adapter and depress the brake pedal 5 times at an output pressure of 1 bar.
7. Check that the ring spanner makes a clockwise turn every time the pedal is depressed. The turns of the ring spanner must decrease in line with the clearance.
8. Place the cap back on the slack adjuster.



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BRAKE SYSTEM AND COMPONENTS

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Inspection and adjustment

LF45/55 series

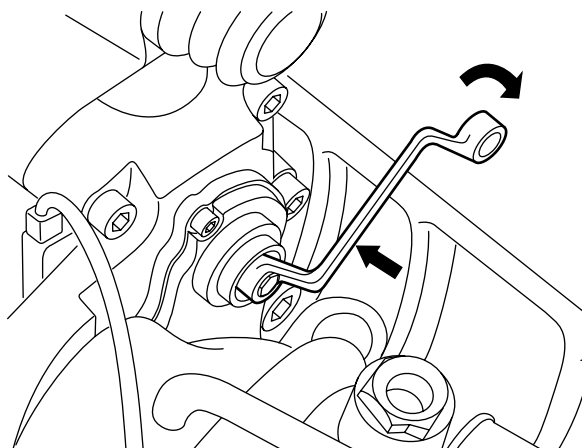
2.17 CHECKING AUTOMATIC DISC BRAKE SLACK ADJUSTER, KNORR MODEL

1. Place chocks in front of and behind the wheels to prevent the vehicle from moving.
2. Put the parking brake in the driving position.
3. Remove the wheel.
4. Remove the covering cap from the slack adjuster.
5. Fit a ring spanner on the adapter and turn the hexagonal adjusting bolt together with the adapter anti-clockwise (2-3 clicks).

Note:

Never turn the hexagonal adjusting bolt without using an adapter. The adapter is a torque safety and will break off when the torque is too high. Without the use of an adapter the mechanics in the brake calliper may become damaged when the torque is too high, so that replacement of the brake calliper may be necessary.

6. Leave the ring spanner on the adapter and depress the brake pedal 5 to 10 times at an output pressure of 2 bar.
7. Check that the ring spanner makes a clockwise turn every time the pedal is depressed. The turns of the ring spanner must decrease in line with the clearance.
8. After the inspection, lightly grease the sealing cap (see "Technical data") and replace it on the slack adjuster.



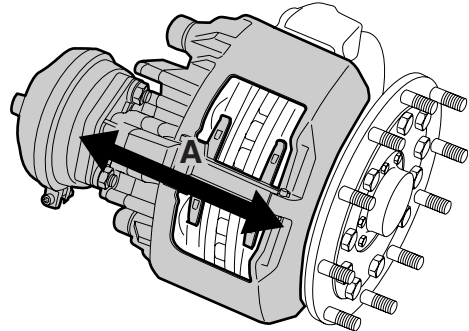
R600468

2.18 INSPECTING BRAKE CALLIPER PLAY, KNORR MODEL

Inspection of the free movement of the brake calliper guide over the brake calliper carrier is the most important thing. That is why initially a simple inspection is carried out on the vehicle of the axial movement of the brake calliper when it is fitted.

General inspection

1. Push and pull the brake calliper back and forth several times in the axial direction (A). This requires considerable effort.
2. Check the play of the brake calliper in the axial direction (A). See "Technical data". If the measured play is incorrect or the brake calliper cannot be moved along the guide bushes, it must be checked in more detail as follows.



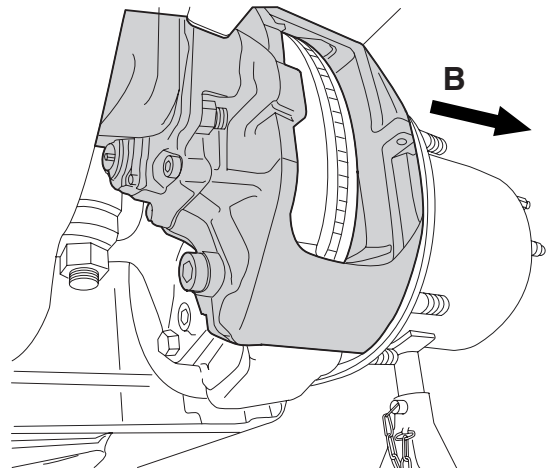
R600708

Inspection of sliding ability

1. Remove the brake pads.
2. Turn the thrust pieces back completely using the adjusting bolt and the adapter.
3. Clean the guide bushes where they are accessible.
4. Check whether the brake calliper can be moved by hand (so without the use of tools) along the full distance (more than 25 mm).

Inspecting guide bush bearing play

1. Pull the brake calliper as far as possible towards the outside of the vehicle (B).



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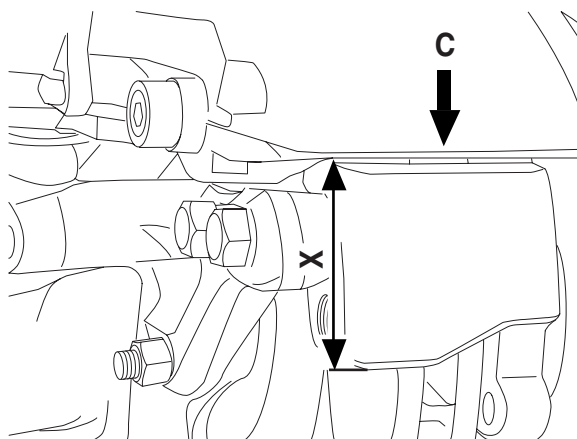
BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

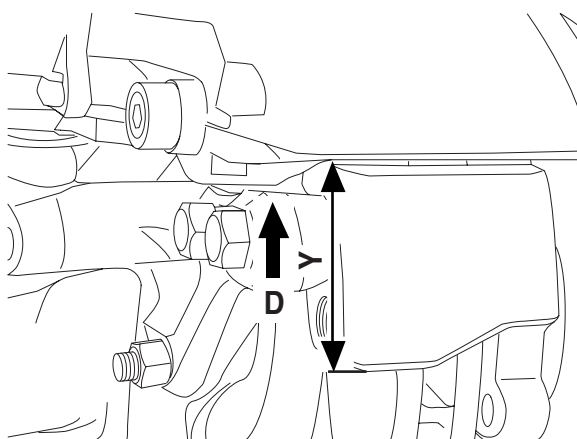
2. Push the brake calliper as far as possible towards the brake calliper support (C).
3. Measure the distance "X".



R600710

4

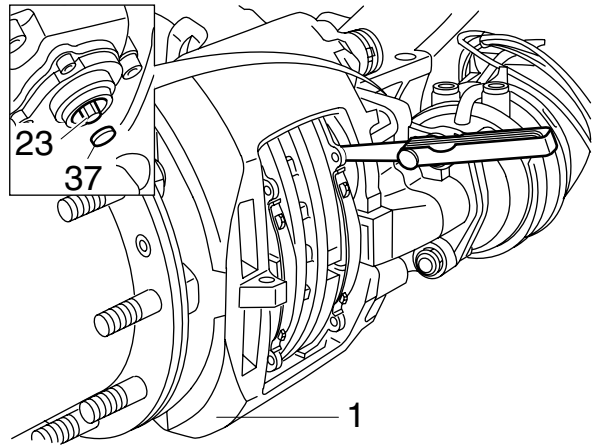
4. Push the reversed brake calliper as far as possible towards the brake calliper support (D).
5. Measure the distance "Y".
6. Calculate the difference between the measured distances, "Y" - "X" (see "Technical data").
7. Fit the brake pads.



R600711

2.19 BRAKE ADJUSTMENT, DISC BRAKE VERSION

1. Position a feeler gauge between the rear of the brake pad and one of the thrust pieces of the brake calliper to check the play. Compare the measured value (see "Technical data").
2. If the play is not correct, it needs to be adjusted. Remove the covering cap from the slack adjuster.
3. Fit a ring spanner on the hexagonal adjusting bolt and turn the hexagonal adjusting bolt anticlockwise until there is ample clearance between the brake pads and the brake disc.

**Note:**

If Knorr disc brake construction is fitted:
Never turn the hexagonal adjusting bolt without using an adapter (23). The adapter is a torque safety and will break off when the torque is too high. Without the use of an adapter the mechanics in the brake calliper may become damaged when the torque is too high, so that replacement of the brake calliper may be necessary.

R600463

4. Position a feeler gauge with the correct thickness (see "Technical data") between the brake pad and the thrust piece of the adjuster with the hexagonal adjusting bolt.
5. Turn the hexagonal adjusting bolt clockwise with the ring spanner until the feeler gauge just fits. Remove the feeler gauge.
6. Apply the brake a number of times so that the play can set.
7. Release the brake. Now it should be possible to turn the hub by hand.
8. Position a feeler gauge between the rear of the brake pad and one of the pressure plates of the brake calliper to check the play. Compare the measured value (see "Technical data").
9. After the inspection, lightly grease the sealing cap (see "Technical data") and replace it on the slack adjuster.

BRAKE SYSTEM AND COMPONENTS

6

Inspection and adjustment

LF45/55 series

2.20 INSPECTION, AIR TIGHTNESS

Air tightness

If the brake system of a vehicle has been charged to the maximum pressure, it should generally be possible to drive the vehicle away after a period of 16 hours of uninterrupted standstill, without first having to charge the brake system to sufficient operating pressure.

This implies a maximum pressure drop of approx. 0.4 bar per hour at normal system pressure.

Note:

Always connect auxiliary consumers and accessories to circuit 4.

4

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION, QUICK-RELEASE COUPLING



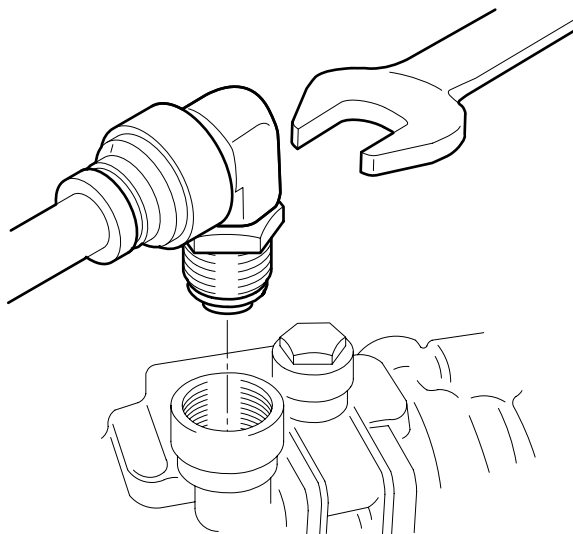
When disconnecting pipes and/or quick-release couplings, ensure that the relevant connection has first been made pressureless.

Removing the quick-release coupling

1. Loosen the quick-release coupling using an open-ended spanner.
2. Remove the quick-release coupling from the valve.

Installing the quick-release coupling

1. Check the bore in the valve for dirt and clean the bore as necessary.
2. Fit the quick-release coupling to the valve.
3. Tighten the quick-release coupling to the specified torque. See "Technical data".



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BRAKE SYSTEM AND COMPONENTS

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Removal and installation

LF45/55 series

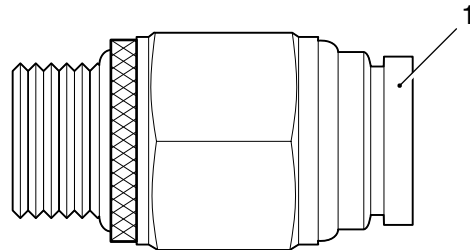
3.2 REMOVAL AND INSTALLATION, PIPE ON QUICK-RELEASE COUPLING



When disconnecting pipes and/or quick-release couplings, ensure that the relevant connection has first been made pressureless.

Removing the pipe on quick-release coupling

1. Press the collar (1) against the quick-release coupling.
2. Press the pipe out of the quick-release coupling.



Installing the pipe on quick-release coupling

1. Check the quick-release coupling for damage. If the quick-release coupling is damaged, it must be replaced.
2. Press the pipe into the quick-release coupling.
3. Pull out the collar (1).

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

3.3 REMOVAL AND INSTALLATION, BRAKE CYLINDER

Removing the brake cylinder

1. Remove the compressed air connection to the brake cylinder.
2. Remove the attachment nuts from the brake cylinder.
3. Remove the brake cylinder.

Installing the brake cylinder

1. Fit the brake cylinder onto the support and tighten the attachment nuts to the specified torque. See "Technical data".
2. Connect the air pipe.

BRAKE SYSTEM AND COMPONENTS

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Removal and installation

LF45/55 series

3.4 REMOVAL AND INSTALLATION, SPRING BRAKE CYLINDER

Removing the spring brake cylinder

1. Place chocks in front of and behind wheels.
2. Put the parking brake valve in the "Driving" position (provide sufficient system pressure: > 7 bar). Unscrew the spring brake cylinder in the release bolt with a 24-mm spanner as far as possible (anti-clockwise).
3. Place the parking brake valve in the "Parking" position and disconnect the two air pipes from the spring brake cylinder.
4. Remove the attachment nuts and spring washers and remove the spring brake cylinder from the support.

Installing the spring brake cylinder

1. Fit the spring brake cylinder onto the support and tighten the attachment nuts to the specified torque. See "Technical data".
2. Connect the air pipes.
3. Put the parking brake valve in the "Driving" position (provide sufficient system pressure: > 7 bar). Turn the release bolt all the way in and tighten it to the specified torque. See "Technical data".
4. Check the connections for leakage.

4

3.5 REMOVAL AND INSTALLATION, COMPRESSOR CYLINDER HEAD GASKET



Always replace the gaskets when carrying out repairs.

Removing the cylinder head gasket

1. Drain some of the coolant.
2. Remove the suction line.
3. Remove the delivery line.
4. Remove the coolant connections.
5. Remove the cylinder head bolts.
6. Remove the cylinder head assembly.

Installing the cylinder head gasket

1. Thoroughly clean all parts.
2. Check that there are no remnants on the piston in the compressor.
3. Install the head gasket.
4. Fit the cylinder head including the inlet plate.
5. Insert the cylinder head bolts.
6. Install the suction line.
7. Install the delivery line.
8. Connect the coolant connections.
9. Fill the cooling system.
10. Check the operation of the compressor. See "Inspection and adjustment".

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

3.6 REMOVAL AND INSTALLATION, AIR DRYER FILTER ELEMENT

Note:

To be certain that the air dryer is functioning properly, the air reservoirs should regularly be checked for condensation.

If repeatedly more than the normal amount of water is drained off, the filter element will have to be replaced.

Under normal circumstances the element must be replaced at least once per year.

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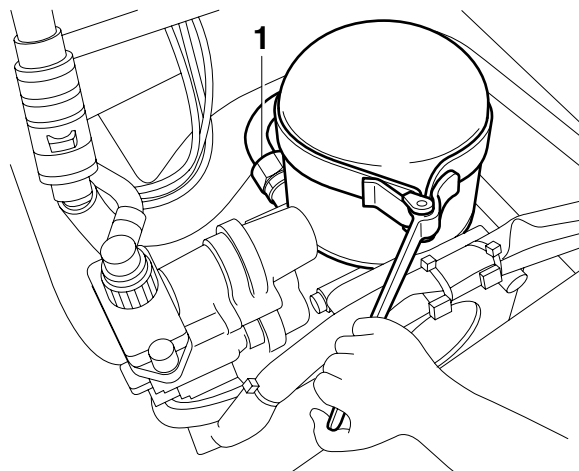
BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

Removing air dryer filter element

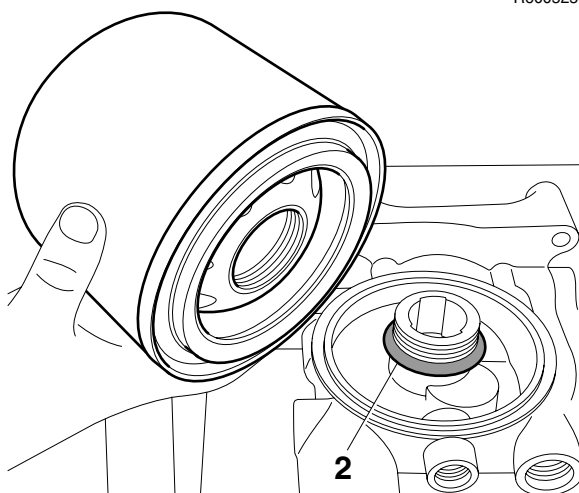
1. Bleed the air dryer by allowing it to regenerate or by loosening the compressor pipe (1), so that the interior of the air dryer is depressurised.
2. Remove the filter element by turning it anti-clockwise using a filter strap spanner.
3. The filter element should be disposed of as if it were an oil filter.
4. Clean the air dryer internally.
5. Check the air dryer threaded connection (2) for damage and then lubricate it sparingly with grease.



R600525

Installing the air dryer filter element

1. Lubricate the sealing ring of the new filter element sparingly with grease.
2. Fit the filter element by manually tightening it until the sealing ring abuts. Then tighten the filter element by hand (approx. 1 turn).
3. Fasten the compressor line (1).
4. Pressurise the system and then check the air dryer for air leaks.
5. Fill in the date on the sticker with a waterproof felt pen by which the filter element must be replaced (max. 1 year after fitting).



R600526

Artikelnummer Reference Teilenummer Référence
1391510
Eerstvolgende vervanging Next change Nächster Wechsel Prochain remplacement
DAF

R600523

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

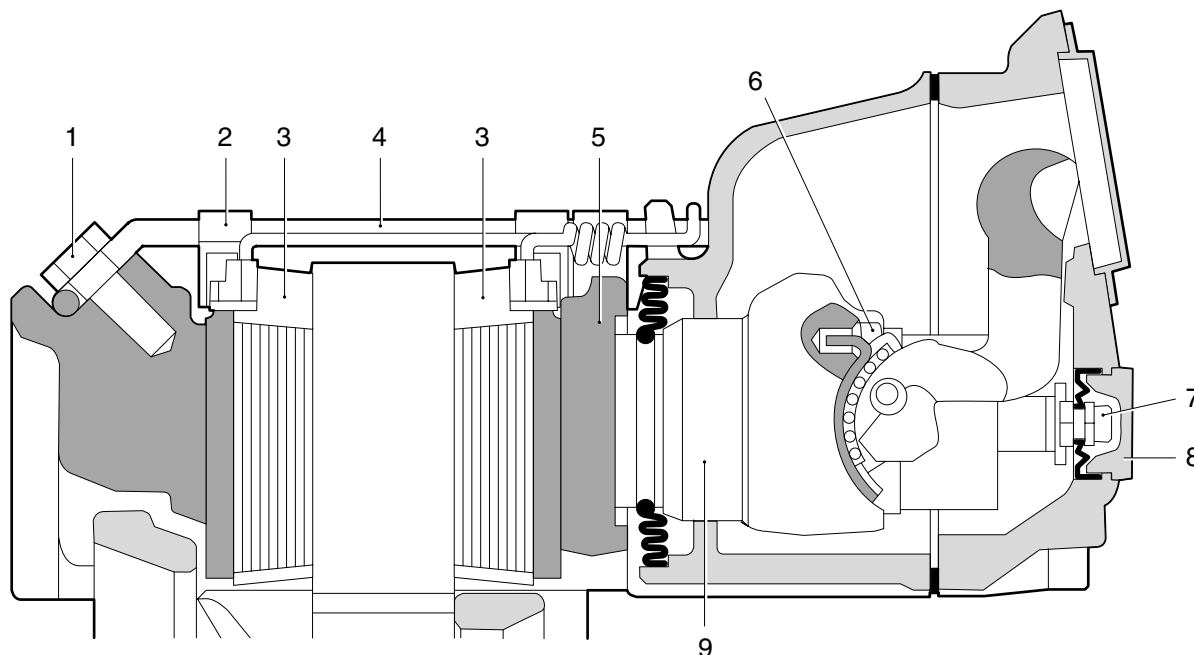
LF45/55 series

3.7 REMOVAL AND INSTALLATION, BRAKE PADS, WABCO MODEL



Never insert fingers between the brake calliper and the brake carrier during and following removal of the brake pads. Always take hold of the brake calliper on the outside.

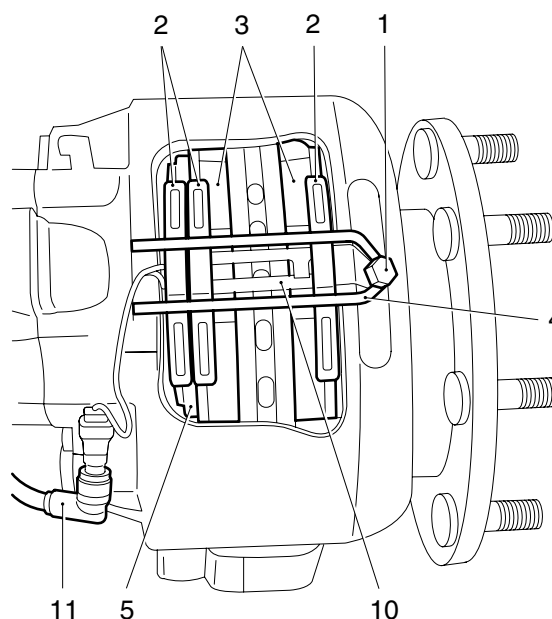
PAN 17 and PAN 19-1+ versions



R600512

Removing the brake pads

1. Apply the parking brake.
If the respective axle has spring brake cylinders, place chocks in front of and behind the wheels of another axle and release the parking brake.
2. Remove the wheels in question.
3. Remove the connector of the wear sensors.
4. Remove the bolt (1).
5. Remove the locking bracket (4).
6. Remove the spring clips (2).
7. Remove the strip (10) and wear sensors from the brake pads.
8. Remove the cap (8) from the brake adjuster.
9. Turn the hexagon (7) clockwise with a ring spanner. Release the brake adjuster.



R600513

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

Note:

Push back the pressure plate (5) manually, while releasing the adjuster. This is to ensure that the pin of the adjusting screw remains in the slot of the pressure plate. Otherwise, there is a chance that the adjusting screw will start turning and damage the gaiter.

10. Remove the brake pads (3) and the pressure plate.
11. Check the pressure plate, the pressure plate guide and the brake pad slots for corrosion. Remove any corrosion carefully with a steel brush.
12. Shift the brake calliper towards the cylinder.
13. Check the dust covers, guide pins and adjusting screw for wear and damage. Replace in the event of damage and/or wear.
14. Shift the brake calliper manually over the guide pins and check the freedom of movement in this way.
15. Check the brake adjuster.
 - Hold the adjusting screw while turning the hexagon (7) anti-clockwise. Check that the piston can move freely.
 - Turn the hexagon (7) completely back (clockwise).
 - Depress the brake pedal lightly a few times to check that the automatic brake adjuster works.
 - Turn the hexagon (7) back (clockwise).

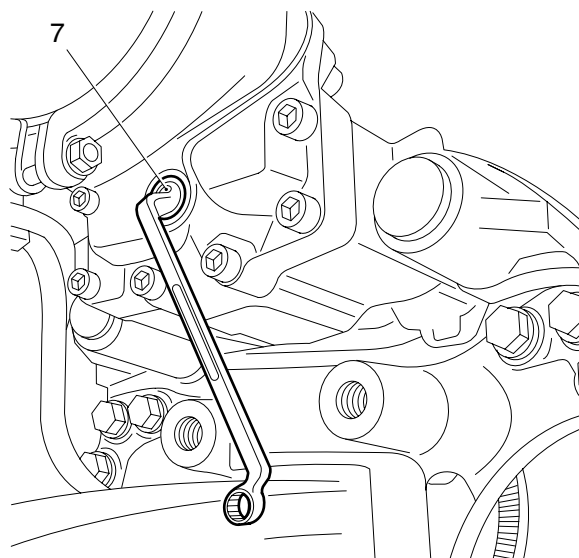
Installing the brake pads

If the brake pads have wear end indicators, they must be replaced at the same time as the brake pads, including accessories.

Note:

Brake pads must always be replaced on both sides of the axle.

1. If necessary, turn the hexagon (7) back completely.
2. Clean the brake pad seats.
3. Place the pressure plate in the brake calliper and attach it to the adjusting screw.
4. First, place a brake pad on the brake piston side.
5. Shift the brake calliper towards the wheel until it touches the brake disc.



R600515

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

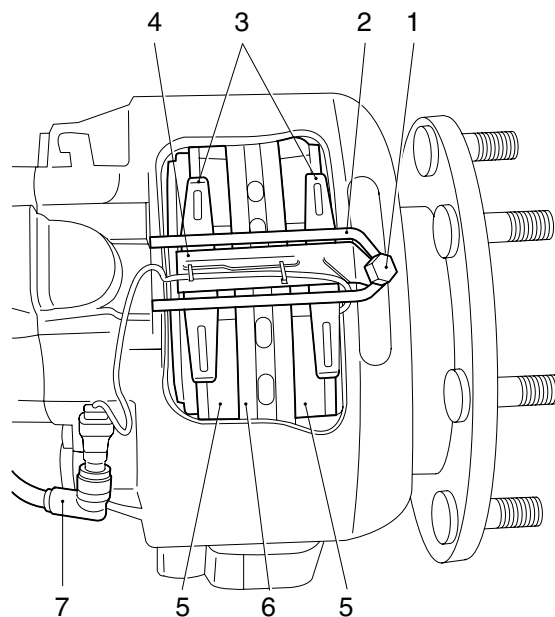
4

6. Now position the other brake pad as well.
7. Separate the inner brake pad from the thrust piece.
8. Position a feeler gauge with the correct thickness (see "Technical data") between the brake pad and the pressure plate and adjust the play using the adjuster with the hexagonal adjusting bolt.
9. Turn the hexagon clockwise until the feeler gauge just fits.
10. Position the new wear sensor with the strip (10).
11. Position the new spring clips.
12. Position the new locking bracket and tighten it with the bolt (1). See "Technical data".
13. Fit the wear sensor connector.
14. Fit the cap (8).

PAN 19-2 version

Removing the brake pads

1. Apply the parking brake.
If the respective axle has spring brake cylinders, place chocks in front of and behind the wheels of another axle and release the parking brake.
2. Remove the wheels in question.
3. Remove the wear sensor connector (7).
4. Remove the bolt (1).
5. Remove the locking bracket (2).
6. Remove the spring clips (3).
7. Remove the strip (4) and wear sensors from the brake pads.
8. Remove the cap(s) from the brake adjuster.
9. Turn the hexagon (9) clockwise with a ring spanner. Release the brake adjuster.
10. Remove the brake pads (5).
11. Check the brake pad slots for corrosion.
Remove any corrosion carefully with a steel brush.



R600571

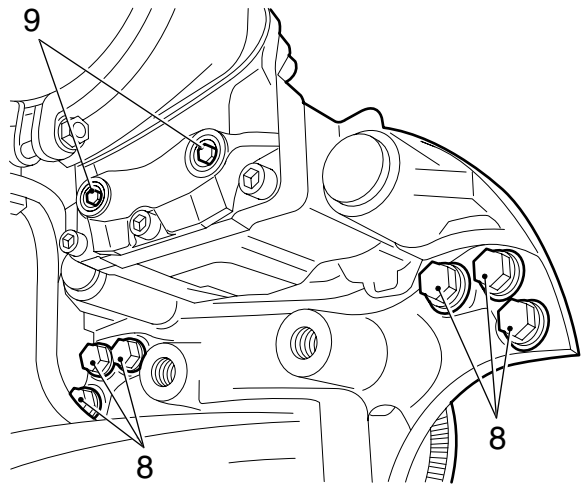
6

BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

12. Shift the brake calliper towards the cylinders.
13. Check the dust covers, guide pins and adjusting screws for wear and damage. Replace in the event of damage and/or wear.
14. Shift the brake calliper manually over the guide pins and check the freedom of movement in this way.
15. Check the brake adjuster.
16. Turn the hexagon (9) completely back (clockwise).
17. Depress the brake pedal lightly a few times to check that the automatic brake adjuster works. Turn the hexagon (9) back (clockwise).



R600572

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Installing the brake pads

If the brake pads have wear end indicators, they must be replaced at the same time as the brake pads, including accessories.

Note:

Brake pads must always be replaced on both sides of the axle.

1. If necessary, turn the hexagon (9) back completely.
2. Clean the brake pad seats.
3. First, place a brake pad on the brake piston side.
4. Shift the brake calliper towards the wheel until it touches the brake disc.
5. Now position the other brake pad as well.
6. Separate the inner brake pad from the thrust pieces.
7. Position a feeler gauge with the correct thickness (see "Technical data") between the brake pad and the thrust piece and adjust the play using the adjuster with the hexagonal adjusting bolt.
8. Turn the hexagon clockwise until the feeler gauge just fits.

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

9. Position the new wear sensor with the strip (4).
10. Position the new spring clips.
11. Position the new locking bracket and tighten it with the bolt (1). (See "Technical data").
12. Fit the wear sensor connector.
13. Fit the cap(s) to the brake adjuster.

4

3.8 REMOVAL AND INSTALLATION, BRAKE PADS, KNORR MODEL



Never insert fingers between the brake calliper and the brake calliper carrier during and following removal of the brake pads. Always take hold of the brake calliper on the outside.

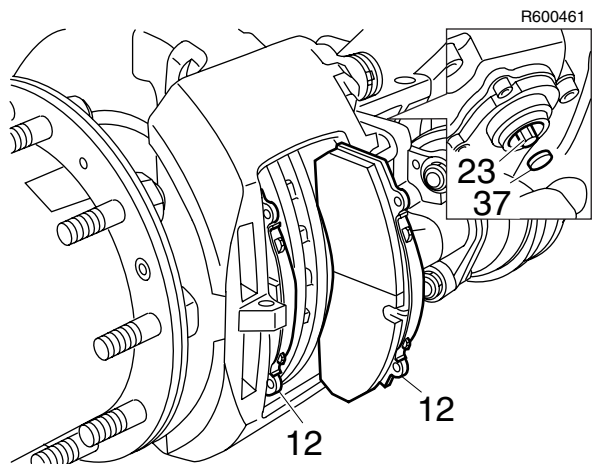
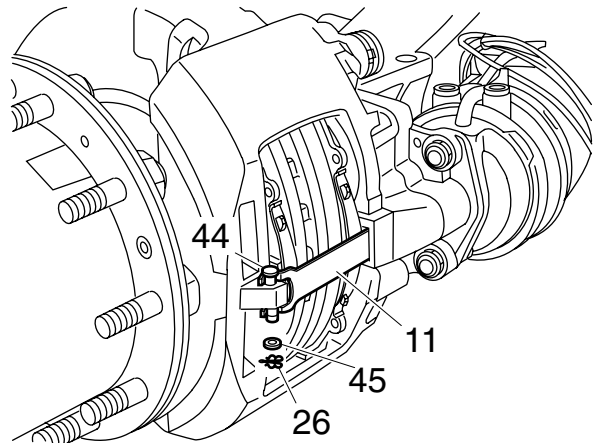
Removing the brake pads

1. Apply the parking brake.
If the respective axle has spring brake cylinders, place chocks in front of and behind the wheels of another axle and release the parking brake.
2. Remove the wheels in question.
3. Remove the hairpin spring (26) and washer (45) from the yoke pin (44) of the locking strip (11).
4. Press the strip on and remove the yoke pin (44).
5. Check the strip for corrosion; replace if necessary.
6. Remove the sealing cap (37).
7. Using a ring spanner and the adapter, turn the hexagonal bolt (23) anti-clockwise until the brake pads (12) can be removed (a clicking noise can be heard).

Note:

Never turn the hexagonal adjusting bolt without using an adapter. The adapter is a torque safety and will break off when the torque is too high. Without the use of an adapter the mechanics in the brake calliper may become damaged when the torque is too high, so that replacement of the brake calliper may be necessary.

8. Remove the brake pads.



R600462

BRAKE SYSTEM AND COMPONENTS

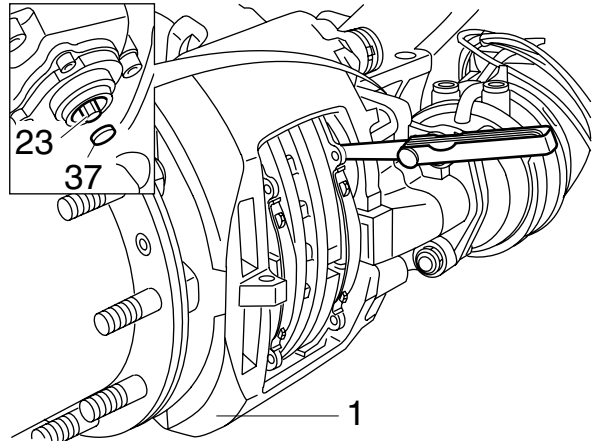
6

Removal and installation

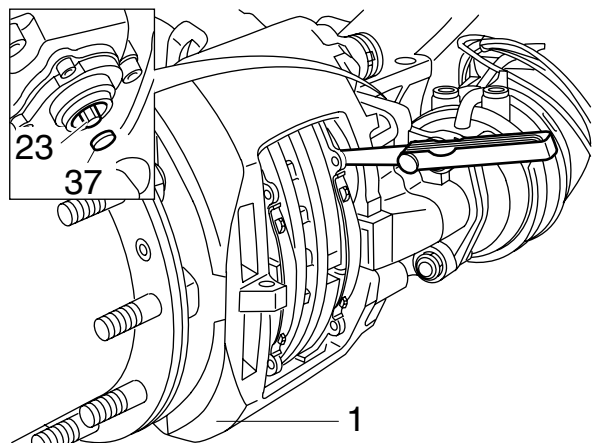
LF45/55 series

Installing the brake pads

1. Check the brake calliper play. See "Inspection and adjustment".
2. If necessary, turn the hexagonal adjusting bolt (23) back completely, using the adapter.
3. Clean the brake pad seats.
4. Check all brake calliper seals (guide bushes, thrust pieces).
5. Shift the brake calliper (1) towards the wheel side.
6. Fit the outer brake pad.
7. Shift the brake calliper towards the brake cylinder side.
8. Fit the inner brake pad.
9. Separate the inner brake pad from the thrust pieces.
10. Position a feeler gauge with the correct thickness (see "Technical data") between the brake pad and the thrust piece of the adjuster with the hexagonal adjusting bolt.
11. Turn the hexagonal adjusting bolt clockwise with the ring spanner and the adapter until the feeler gauge just fits. Remove the feeler gauge.
12. Check the play between the end of the brake pads and the brake calliper carrier (see "Technical data"). If the play is too small, material must be ground off the steel plate of the brake pad. If the play is too large, the brake pads and/or brake carrier must be replaced.
13. Lightly grease the sealing cap (see "Technical data") and replace it on the slack adjuster.
14. Fit the locking strip (11).
15. Press the strip and fit the yoke pin.
16. Fit the washer (45) and the hairpin spring (26) on the yoke pin (44).
17. Apply the service brake once and check that the hub can move freely. If necessary, increase the play.
18. Put the wheels back on.



R600463



R600463

6

BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

3.9 REMOVAL AND INSTALLATION, BRAKE DISC, WABCO MODEL

Removal, brake disc

1. Remove the wheel.
2. Remove the brake calliper from the axle.
3. Remove the hub from the axle.
4. Loosen the Allen screws of the brake disc.
5. Remove the brake disc from the hub.

Installation, brake disc

1. Clean the contact surfaces between the hub and the brake disc.
2. Fit the brake disc on the hub.
3. Fit the Allen screws and tighten them to the specified torque. See "Technical data".
4. Fit the hub and brake disc on the axle.
5. Fit the brake calliper.

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

3.10 REMOVAL AND INSTALLATION, BRAKE DISC, KNORR MODEL

Removal, brake disc

1. Remove the hub.
2. Remove the locking plates.
3. Remove the spring plates between the disc and hub and tap the disc off the hub using a copper hammer.
If the disc does not come free from the hub, it can be removed by placing it on an old brake drum and pushing it off the hub using a press.

Installation, brake disc

1. Remove dirt and corrosion from the contact surfaces of the brake disc and hub.
2. Position the brake disc on the hub.
3. Fit the spring plates and tighten them to the specified torque. See "Technical data".

4

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

3.11 REMOVAL AND INSTALLATION, BRAKE CALLIPER, WABCO MODEL

Removing the brake calliper

1. Remove the plug for the brake pad wear indicator.
2. Remove the brake pads.
3. Remove the brake cylinder.
4. Remove the attachment bolts (8) from the brake calliper.
5. Remove the brake calliper from the axle.

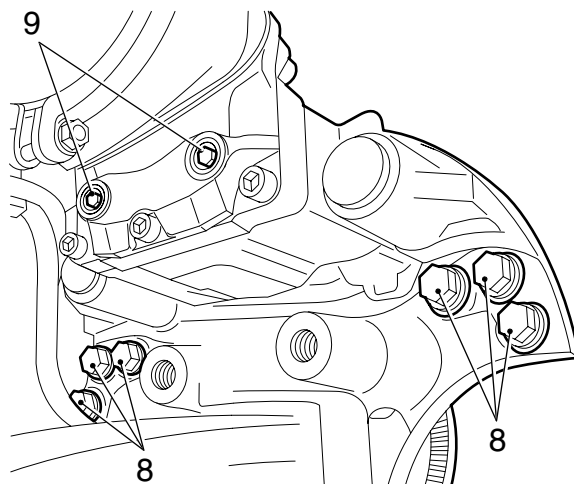
Installing the brake calliper

1. Place the brake calliper on the axle.
2. Turn the attachment bolts into the brake calliper and tighten them to the specified torque. See "Technical data".

Note:

Tighten the attachment bolts in the specified sequence. See "Technical data".

3. Fit the brake cylinder.
4. Fit the brake pads.
5. Fit the plug for the brake pad wear indicator.



R600572

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

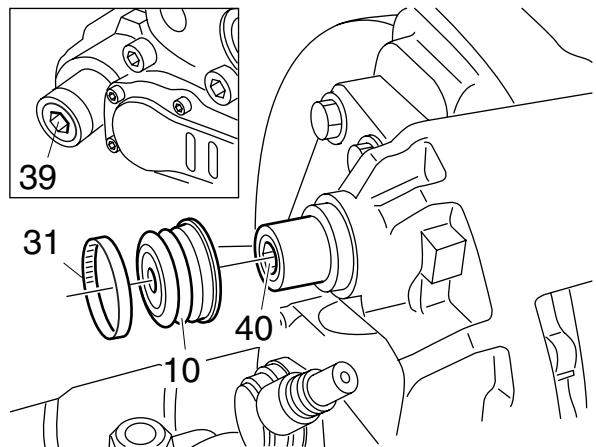
3.12 REMOVAL AND INSTALLATION, BRAKE CALLIPER, KNORR SB7000 VERSION



Never insert fingers between the brake calliper and the brake calliper carrier during and following removal of the brake pads and when a new brake calliper is installed (danger of getting them trapped). Always take hold of the brake calliper on the outside.

Removing the brake calliper

1. Remove the brake pads.
2. Remove the brake cylinder.
3. Remove the plug for the brake pad wear indicator.
4. Remove the clamping strap (31) and the rubber bellows (10).

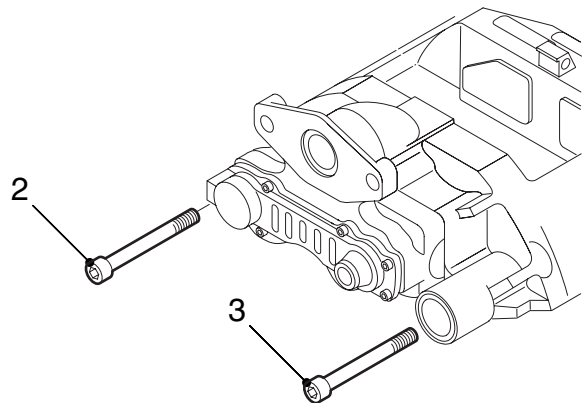


R600466

5. Remove the Allen screws (2 and 3).
6. Remove the brake calliper.

Fitting the brake calliper

1. Clean all parts and check for damage. The sliding surfaces of moving parts must be clean and undamaged.
2. Position the brake calliper on the brake calliper carrier.



R600720

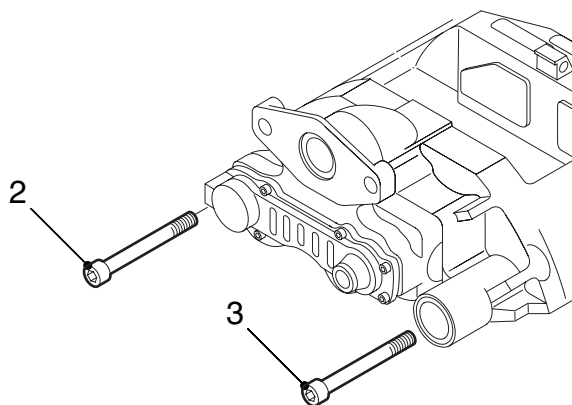
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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

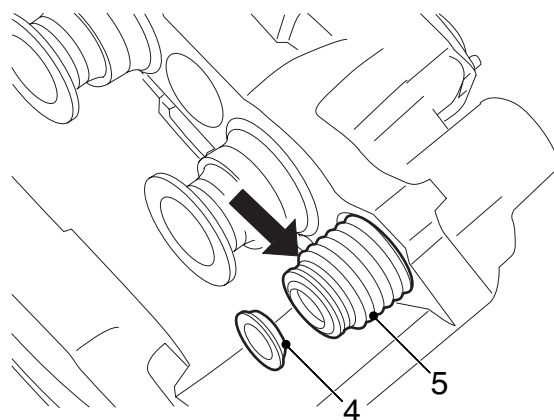
Removal and installation

3. Fit the two Allen screws (2 and 3) and tighten them to the specified torque. See "Technical data". Do not re-use these screws. Always use new screws which have locking compound applied.



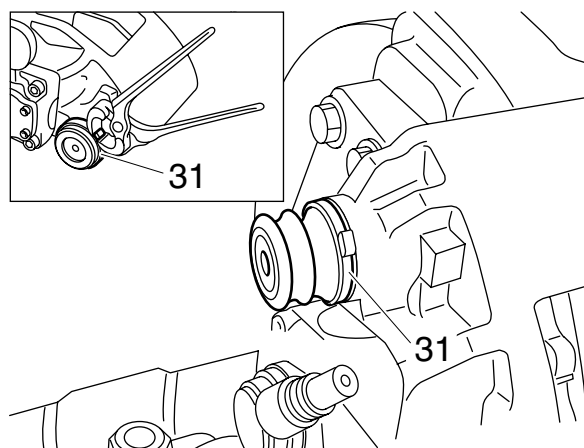
R600720

4. Check that the brake calliper can move freely.
5. Check that the bellows (5) and the ring (4) of the guide bush are properly in place on the inside of the brake calliper.



R600721

6. Check that the automatic adjustment is working properly.
7. Fit the bellows (10) and clamping strap (31). Check the bellows for proper sealing.
8. Fit the brake pads.
9. Fit the plug for the brake pad wear indicator.
10. Fit the brake cylinder.



R600467

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BRAKE SYSTEM AND COMPONENTS

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Removal and installation

LF45/55 series

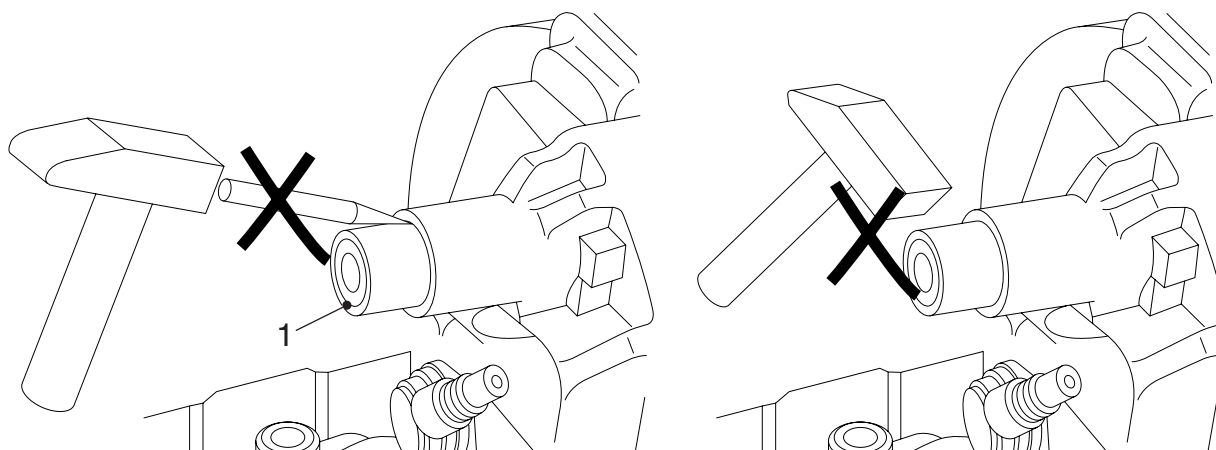
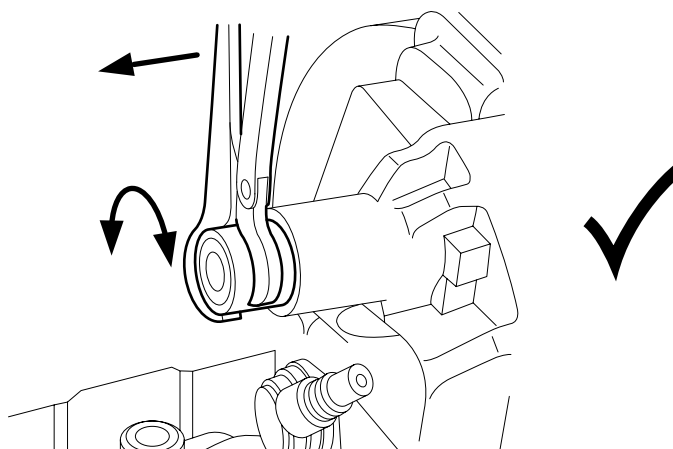
3.13 REMOVAL AND INSTALLATION, BRAKE CALLIPER, KNORR SN7000 VERSION



Never insert fingers between the brake calliper and the brake calliper carrier during and following removal of the brake pads and when a new brake calliper is installed (danger of getting them trapped). Always take hold of the brake calliper on the outside.

Removing the brake calliper

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R600765

1. Remove the brake pads.
2. Remove the brake cylinder.
3. Remove the plug for the brake pad wear indicator.

6

BRAKE SYSTEM AND COMPONENTS

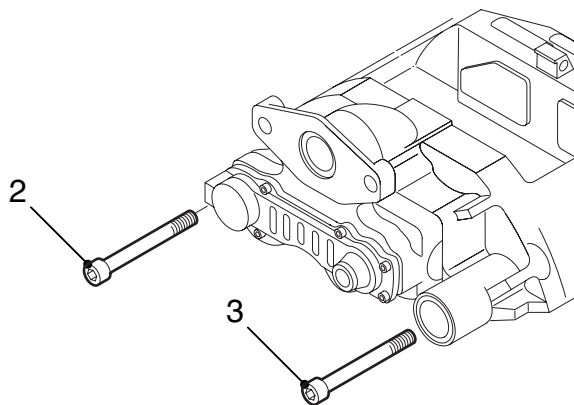
LF45/55 series

Removal and installation

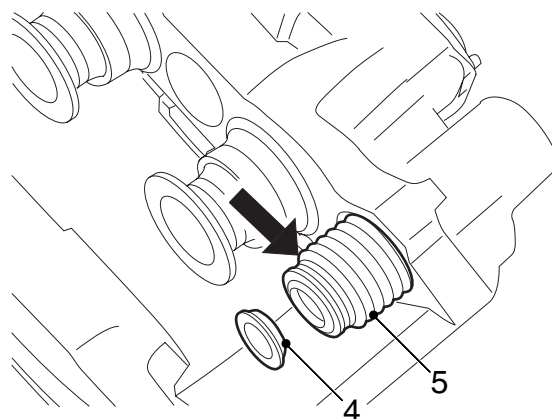
4. Remove the steel cap (1) from the brake calliper. When doing this, do not use force and avoid damage to the brake calliper. If in particular the internal part of the brake calliper is damaged this may result in the movable guide of the brake calliper no longer working. The steel cap must not be re-used.
5. Remove the Allen screws (2 and 3).
6. Remove the brake calliper.

Fitting the brake calliper

1. Clean all parts and check for damage. The sliding surfaces of moving parts must be clean and undamaged.
2. Make sure that the guide pin in the brass bearing bush is positioned in such a way that the rubber bellows is compressed on the inside.
3. Position the brake calliper on the brake calliper carrier.
4. Fit the two Allen screws (2 and 3) and tighten them to the specified torque. See "Technical data". Never re-use these screws. Always use new screws which have locking compound applied.
5. Check that the brake calliper can move freely.
6. Check that the bellows (5) and the ring (4) of the guide bush are properly in place on the inside of the brake calliper.
7. Check that the automatic adjustment is working properly.



R600720



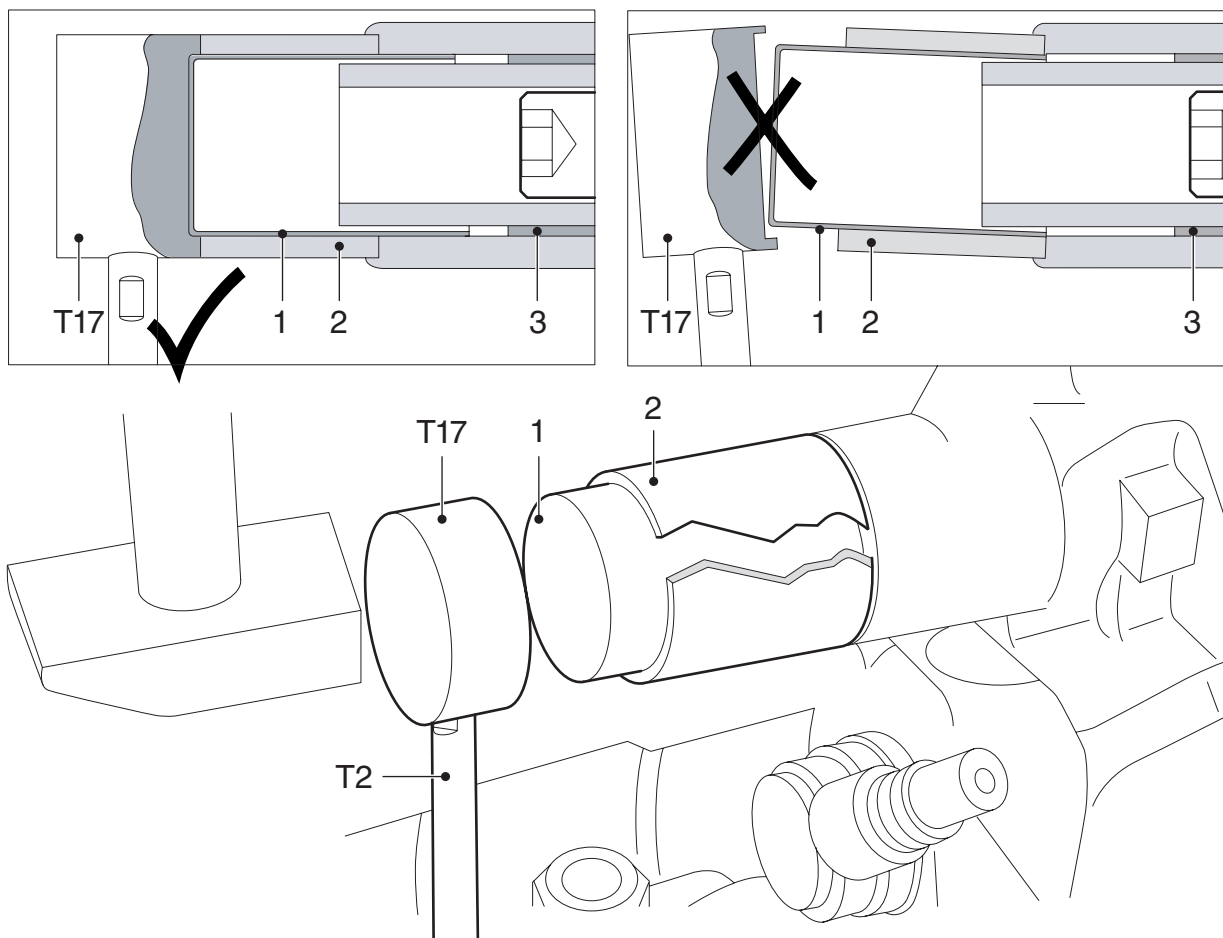
R600721

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series



R600766

8. Assemble a punch from the special tool set (DAF no. 1329495) by means of T2 (only the handle) and T17.
9. Clean the bore in the brake calliper and manually fit a new, clean steel cap (1).
10. Slide the press-in tool (2), special tool (DAF no. 1453140), over the steel cap.
11. Using a hammer and the assembled punch, knock the steel cap as far as the stop in the brake calliper.
12. Fit the brake pads.
13. Fit the plug for the brake pad wear indicator.
14. Fit the brake cylinder.

4

3.14 REMOVAL AND INSTALLATION, BRAKE CALLIPER CARRIER

Removing brake calliper carrier

1. Remove the brake calliper.
2. Remove the attachment bolts from the brake calliper carrier.
3. Remove the brake calliper carrier.

Fitting the brake calliper carrier

1. Clean the brake calliper carrier and the contact surfaces of the stub axle or brake back plate. Pay particular attention to the threaded holes and sliding surfaces of the brake pads.
2. Fit the brake calliper carrier against the stub axle or brake back plate.
3. Fit the attachment bolts and tighten to the specified torque. See "Technical data".

Note:

Starting in production week 2002-25, the attachment of the brake calliper against the stub axle (front axles) may have been changed on models with disc brakes. Five bolts are now used instead of six bolts. The bolt hole for the "6th bolt" is then still fitted in the brake calliper carrier, but not in the stub axle.

BRAKE SYSTEM AND COMPONENTS

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Removal and installation

LF45/55 series

3.15 REMOVING AND INSTALLING THRUST PIECE BELLOWS, WABCO MODEL

PAN 17 and PAN 19-1+ versions

Removing thrust piece bellows

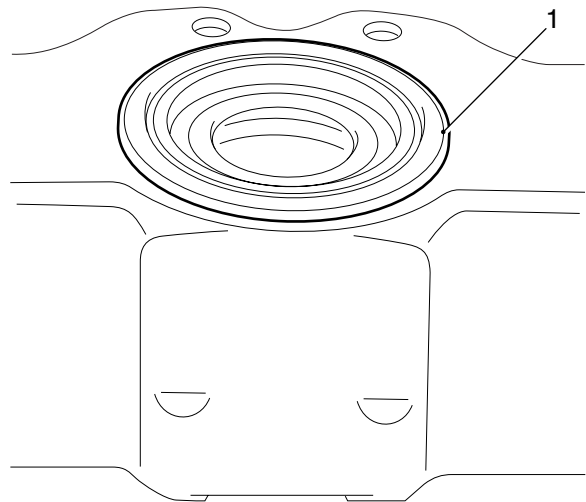
1. Remove the brake pads and the pressure plate.
2. Remove the bellows from the circular slot of the thrust piece.
3. Remove the bellows (1) from the brake calliper using a screwdriver.

Note:

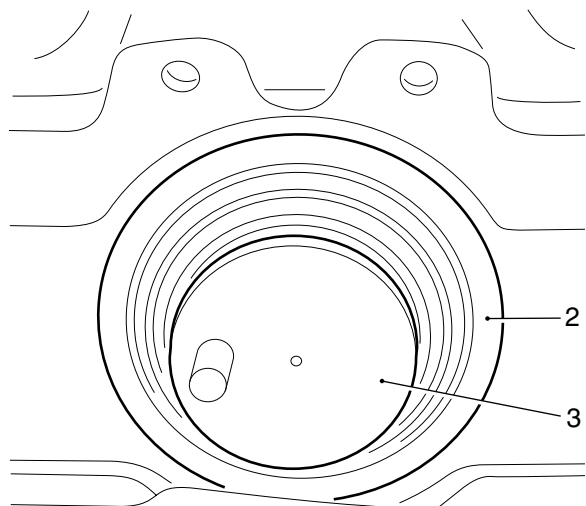
Unscrew the thrust piece a maximum of 30 mm. Do not screw it completely out of the brake calliper, as the brake calliper assembly would then have to be replaced.

Fitting thrust piece bellows

1. Inspect the screw thread of the adjuster for corrosion and damage
2. Apply grease to the screw thread of the adjuster.
3. Turn back the adjuster.
4. Pull the new bellows over the thrust piece.
5. Push the bellows into the seat of the brake calliper (2).
6. Fit the bellows in the seat of the thrust piece (3).
7. Fit the pressure plate and the brake pads.



R600586



R600587

6

BRAKE SYSTEM AND COMPONENTS

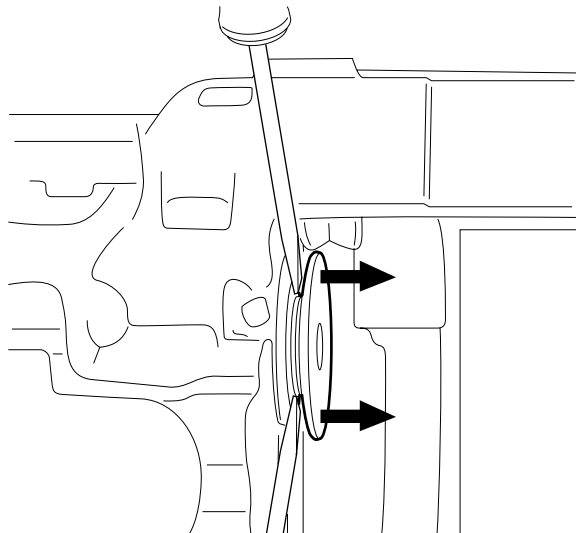
LF45/55 series

Removal and installation

PAN 19-2 version

Removing thrust piece bellows

1. Remove the brake pads.
2. Remove the two thrust pieces from the adjusting screws, using two screwdrivers placed at 180° to each other.



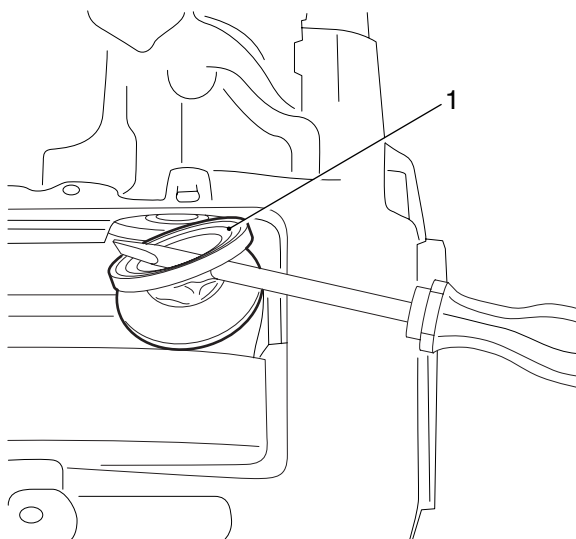
3. Remove the dust covers from the brake calliper seat using a screwdriver (1).

Note:

Unscrew the thrust pieces a maximum of 30 mm. Do not screw them completely out of the brake calliper, as the brake calliper assembly would then have to be replaced.

Fitting thrust piece bellows

1. Inspect the screw thread of the adjuster for corrosion and damage
2. Apply grease to the screw thread of the adjuster.
3. Turn back the adjuster.
4. Position the thrust piece with the bellows in front of the adjusting screw.



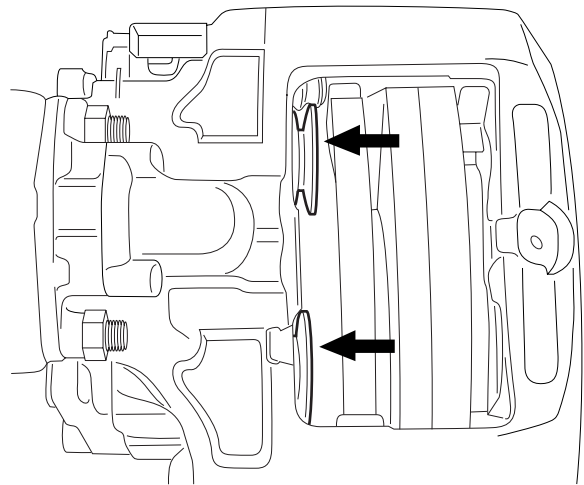
BRAKE SYSTEM AND COMPONENTS

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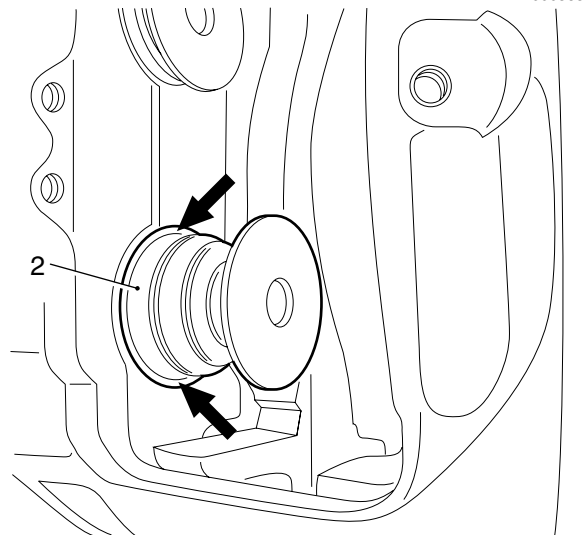
Removal and installation

LF45/55 series

5. Fit the bellows in the seat of the brake calliper (2).
6. Force the thrust piece onto the adjuster.
7. Fit the brake pads.



R600585



R600584

3.16 REMOVING AND INSTALLING BELLOWS WITH BRAKE CALLIPER THRUST PIECE, KNORR SB7000 VERSION

Removing bellows with SB7000 brake calliper thrust piece

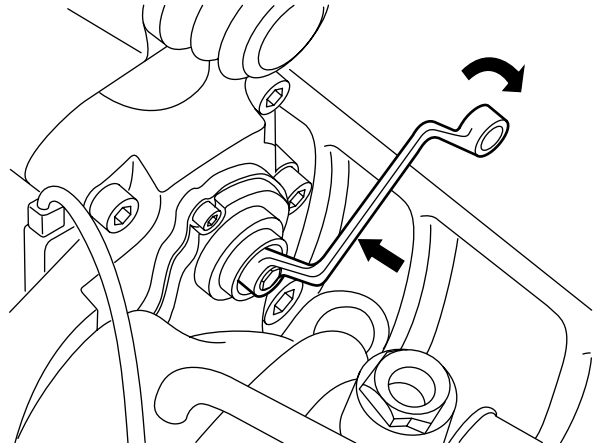
1. Using the hexagonal adjusting bolt, unscrew the thrust pieces as far as is necessary to gain access to the bellows.

Note:

Unscrew the thrust pieces a maximum of 30 mm. Do not screw them completely out of the brake calliper, as the brake calliper assembly would then have to be replaced.

Note:

Never turn the hexagonal adjusting bolt without using an adapter. The adapter is a torque safety and will break off when the torque is too high. Without the use of an adapter the mechanics in the brake calliper may become damaged when the torque is too high, so that replacement of the brake calliper may be necessary.



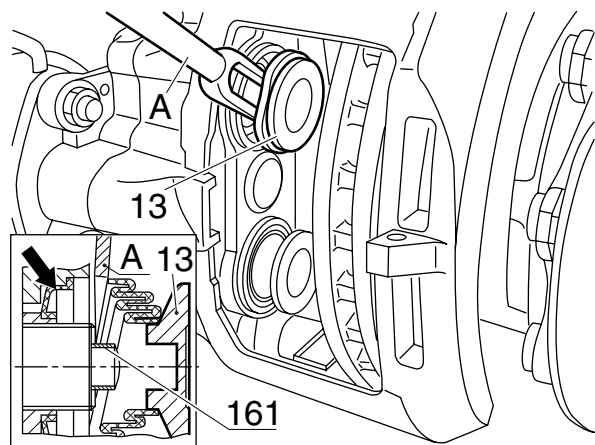
R600468

2. Using a screwdriver, ease the bellows behind the thrust piece out of the brake calliper.

Note:

Do not insert the screwdriver too deeply into the brake calliper. This could damage the seat of the inner seal of the thrust pieces. These cannot be replaced and the brake calliper would then have to be replaced.

3. Press the thrust pieces (13) off the adjusters with the disassembly fork (A), special tool set (DAF no. 1329494).
4. Remove the bearing bushes (161) from the thrust pieces.



R600469

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

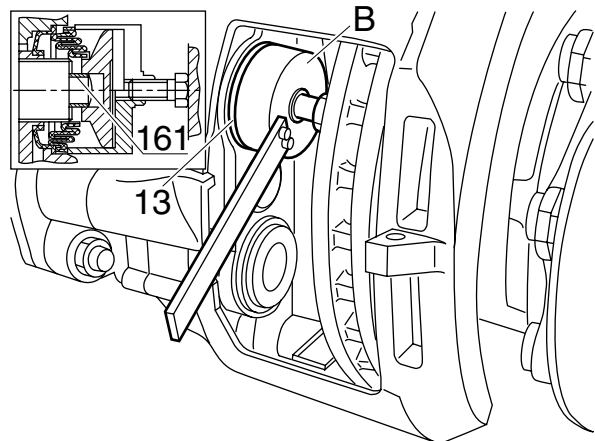
LF45/55 series

Fitting bellows

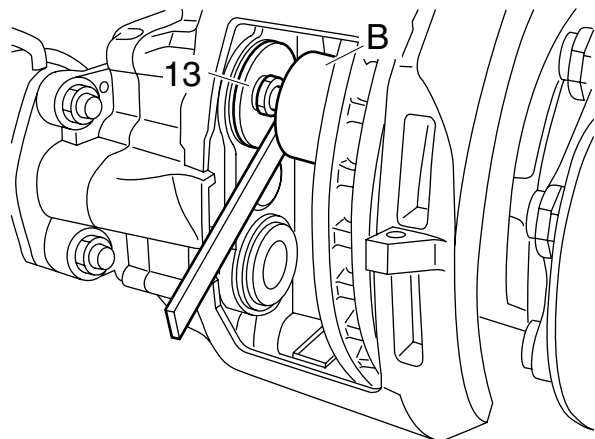
Note:

Do not screw the adjusters entirely out of the brake calliper, as the entire brake calliper would then have to be replaced.

1. Check the screw thread in the adjusters.
2. Grease the screw thread of the adjusters. See "Technical data".
3. Screw the adjusters back into the brake calliper.
4. Fit new bearing bushes (161) on the adjusters.
5. Fit the thrust pieces and bellows (13) on the adjusters.
6. Using the pressure tool and a pin from the special tool set (DAF no. 1329494) (B), press the bellows into its seat.
7. Turn the pressure tool (B) round and press the thrust pieces (13) onto the adjusters.



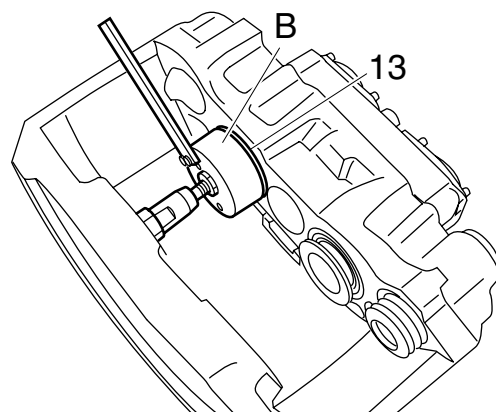
R600470



R600465

Note:

The operations described above can also be performed if the brake calliper has been removed. In that case an additional pin (8) from the special tool set (DAF no. 1329494) must be used, since the brake disc cannot be used for support.



R600464

3.17 REMOVING AND INSTALLING BELLOWS WITH BRAKE CALLIPER THRUST PIECE, KNORR SN7000 VERSION

Removing bellows with SN7000 brake calliper thrust piece

1. Using the hexagonal adjusting bolt, unscrew the thrust pieces as far as is necessary to gain access to the bellows.

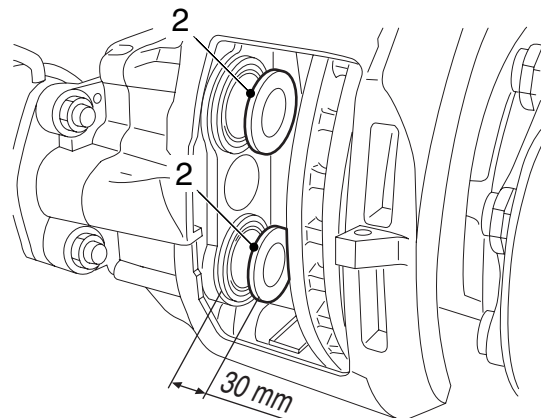
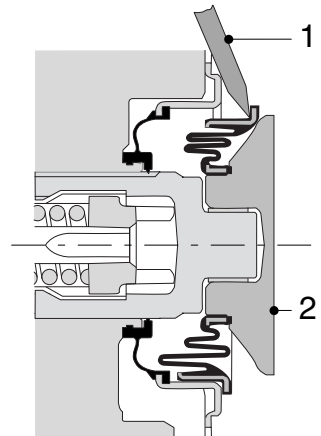
Note:

Unscrew the thrust pieces a maximum of 30 mm. Do not screw them completely out of the brake calliper, as the brake calliper assembly would then have to be replaced.

Note:

Never turn the hexagonal adjusting bolt without using an adapter. The adapter is a torque safety and will break off when the torque is too high. Without the use of an adapter the mechanics in the brake calliper may become damaged when the torque is too high, so that replacement of the brake calliper may be necessary.

2. Using a screwdriver (1), ease the bellows behind the thrust piece (2) out of the brake calliper.



R600713

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

Note:

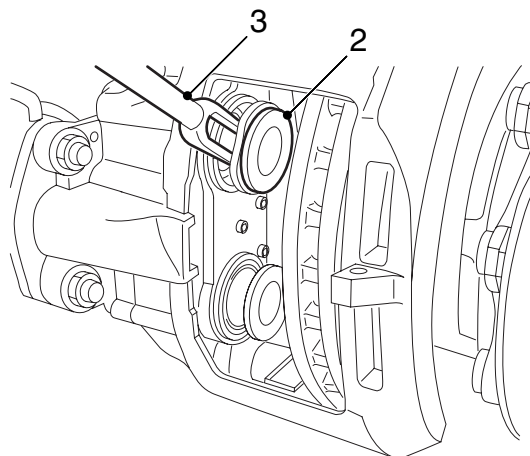
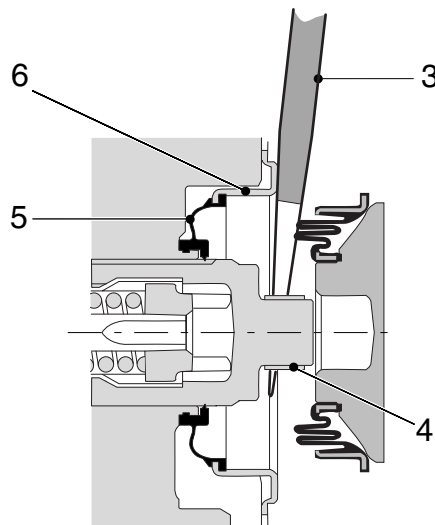
Do not insert the screwdriver (3) too deeply into the brake calliper. This could damage the seat (6) of the inner seal (5) of the thrust pieces. These cannot be replaced and the brake calliper would then have to be replaced.

3. Press the thrust pieces (2) off the adjusters with the disassembly fork (3), special tool set (DAF no. 1329495).
4. Remove the bearing bushes (4) from the thrust pieces.

Note:

If the bellows of the thrust piece is replaced, the inner seal must also always be replaced.

5. Place a brake pad in the brake calliper on the outside so that the adjusters cannot be screwed out of the brake calliper at the next check. Place a 70-mm-thick spacer (self-made) if the brake calliper has been removed from the axle.



R600714

6. Screw the adjuster about 30 mm out of the brake calliper and check the thread of the adjuster for dirt, corrosion and damage.
7. Screw the adjuster all the way back into the brake calliper.
8. Using a screwdriver, ease the inner seal out of the brake calliper.

6

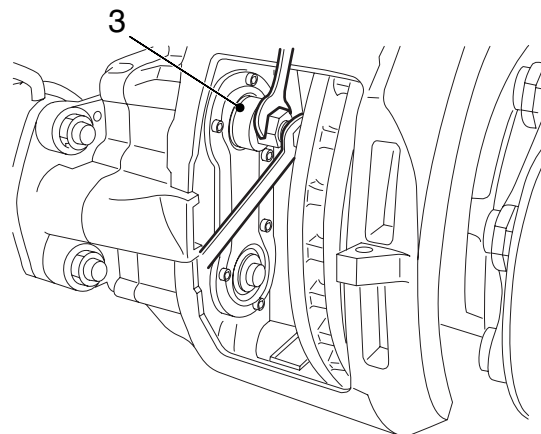
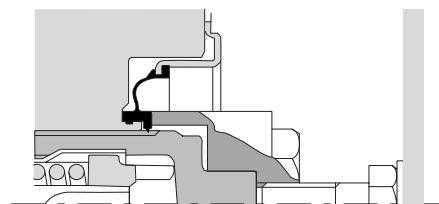
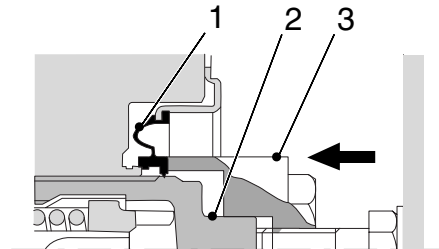
BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

Fitting bellows with SN7000 brake calliper thrust piece

1. Clean the adjuster.
2. Fit the new inner seal (1) on the adjuster.



R600715

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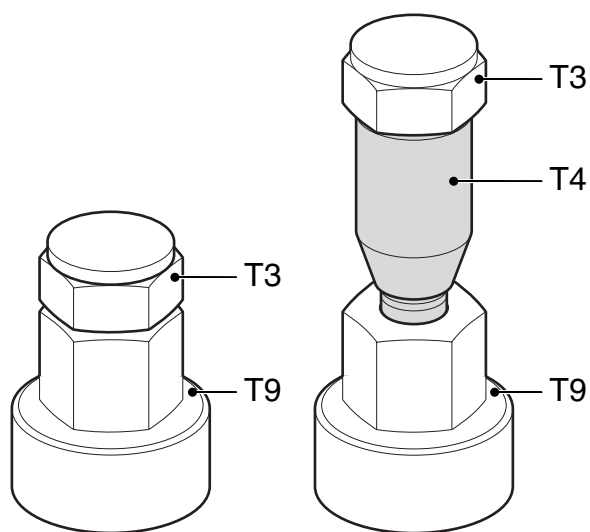
BRAKE SYSTEM AND COMPONENTS

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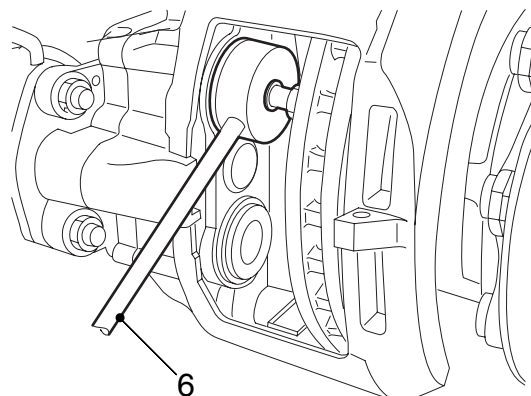
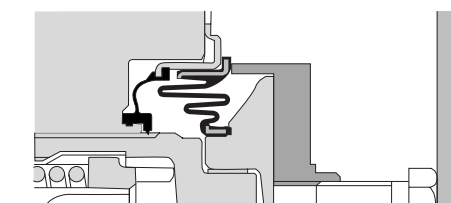
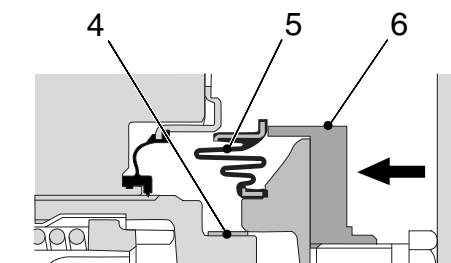
Removal and installation

LF45/55 series

3. Assemble the press from the special tool set (DAF no. 1329495), by means of T3 and T9. If the brake calliper has been removed, T4 must be screwed in between.
4. Using the assembled press (3), push the inner seal (1) onto the adjuster (2).
5. Check that the inner seal is seated correctly by rotating the adjuster 4 or 5 turns out of the brake calliper using the hexagonal adjusting bolt. The inner seal must not turn with it.
6. Grease the screw thread of the adjusters. See "Technical data".
7. Screw the adjusters back into the brake calliper.
8. Fit new bearing bushes (4) on the adjusters.
9. Fit the thrust pieces and bellows (5) on the adjusters.



R600788



R600716

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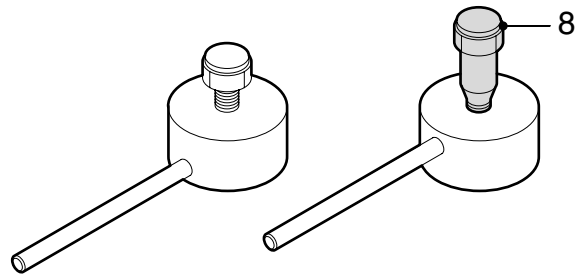
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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

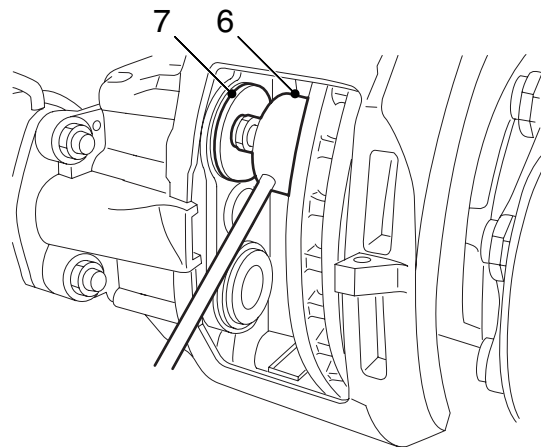
Removal and installation

10. Assemble the press (6) from the special tool set (DAF no. 1329495), by means of T1, T2 and T3. If the brake calliper has been removed, T4 (8) must be screwed in between.



R600718

11. Using the pressure tool (6), push the bellows (5) into its seat.
12. Turn the pressure tool (6) round and press the thrust pieces (7) onto the adjusters.



R600717

BRAKE SYSTEM AND COMPONENTS

6

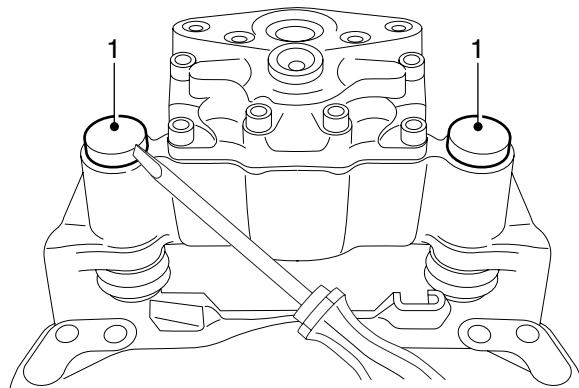
Removal and installation

LF45/55 series

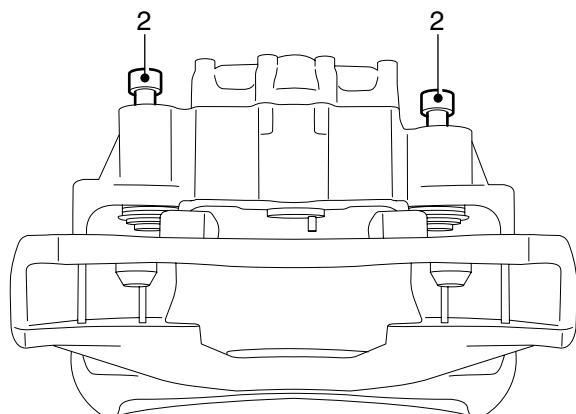
3.18 REMOVAL AND INSTALLATION, BEARING BUSHES, WABCO MODEL

Removal, bearing bushes

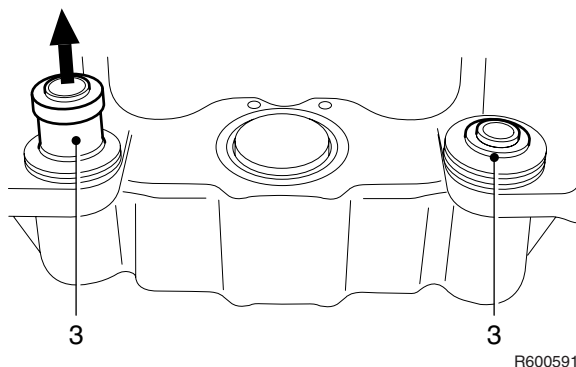
1. Remove the brake cylinder from the brake calliper.
2. Remove the brake calliper from the hub.
3. Remove both covers from the brake calliper using a screwdriver.



4. Unscrew the Allen screws (2).
5. Remove the brake carrier from the brake calliper.



6. Remove the guide bushes (3) from the brake calliper.
7. Remove the guide bush dust covers from the brake calliper.



6

BRAKE SYSTEM AND COMPONENTS

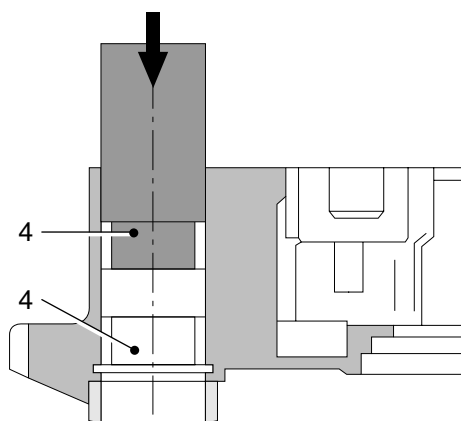
LF45/55 series

Removal and installation

8. Force the bearing bushes out of the brake calliper using the ejector tool, special tool set (DAF no. 1451974); the attachment side for the brake cylinder must point upwards.

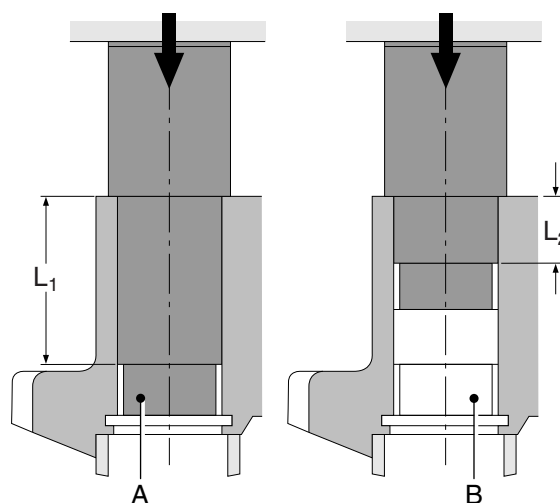
Installation, bearing bushes

1. Clean the bearing bush bores.



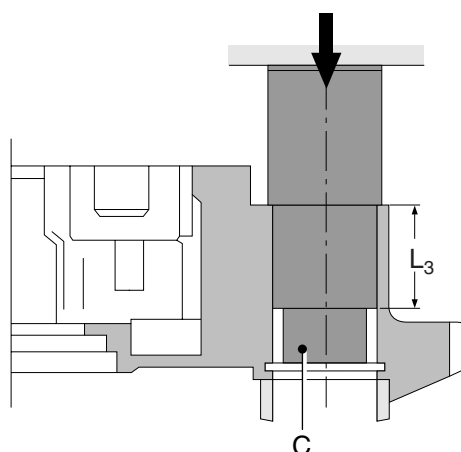
R600592

2. Force a bearing bush into the bearing bush bore (A) using the forcing tool, special tool set (DAF no. 1451974) for the long guide bush.
3. Force a bearing bush into the bearing bush bore (B) using the forcing tool, special tool set (DAF no. 1451974), for the short guide bush.
4. Apply the prescribed lubricant to the bearing bushes and the space between them. See "Technical data".



R600593

5. Force a bearing bush into the bearing bush bore (C) using the forcing tool, special tool set (DAF no. 1451974), for the guide bush.
6. Apply the lubricant provided to the bearing bush.
7. Position the new guide bush dust covers in the brake calliper.
8. Apply the lubricant provided to the guide bushes.
9. Position the guide bushes in the brake calliper.
10. Position the guide bush dust covers over the guide bushes.
11. Position the brake carrier on the brake calliper.
12. Insert the new Allen screws into the brake calliper and tighten to the specified torque. See "Technical data".



R600603

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

Note:

To prevent damage to the guide bush dust covers, the Allen screw of the long guide bush must be tightened first.

13. Check the brake carrier guide and the brake calliper in relation to each other.
14. Position the new covers in the brake calliper.
15. Mount the brake calliper on the hub.
16. Mount the brake cylinder on the brake calliper.

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BRAKE SYSTEM AND COMPONENTS

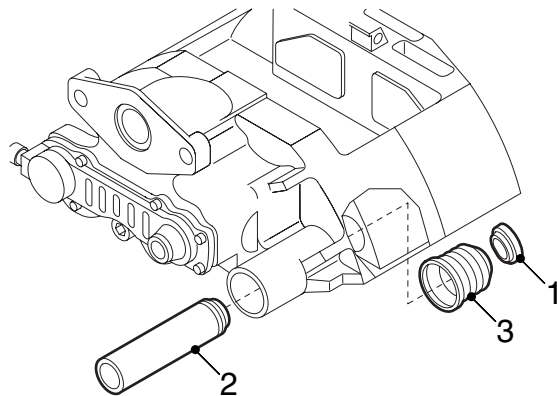
LF45/55 series

Removal and installation

3.19 REMOVING AND INSTALLING BRASS BEARING BUSH OF BRAKE CALLIPER, KNORR SB7000 VERSION

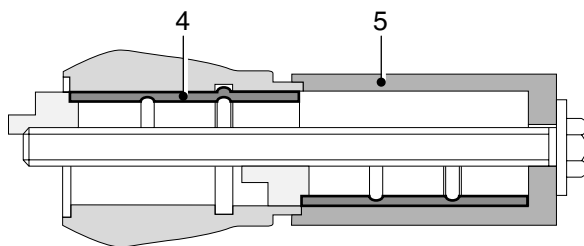
Removing brass bearing bush

1. Remove the brake calliper.
2. Remove washer (1).
3. Remove guide bush (2).
4. Remove the bellows (3).



R600723

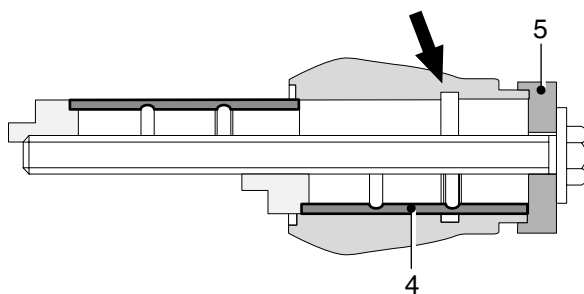
5. Remove the brass bearing bush (4) using a bearing bush extractor (5), special tool set (DAF no. 1329494).
6. Clean the bearing bush bore.



R600727

Fitting brass bearing bush

1. Fit the new brass bearing bush (4) using bearing bush extractor 5, special tool set (DAF no. 1329494).



R600728

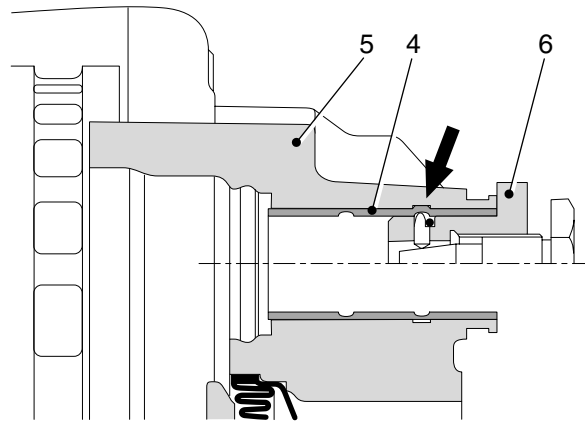
BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

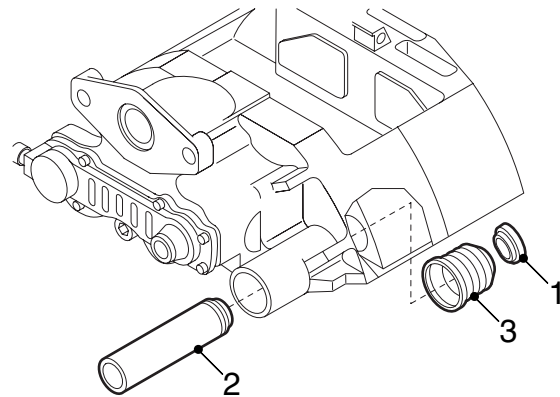
2. Lock the bearing bush (4) in the brake calliper (5) using a locking tool (6), special tool set (DAF no. 1329494).
After the first locking operation, release the locking tool, rotate 60° and lock normally.
3. Check the bearing bush for burrs.
4. Apply lubricant to the bearing bush. See "Technical data".



R600726

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5. Fit the bellows (3).
6. Install the guide bush (2).
7. Install the washer (1).



R600723

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BRAKE SYSTEM AND COMPONENTS

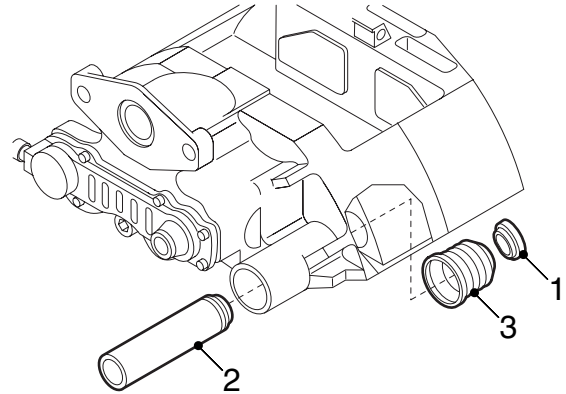
LF45/55 series

Removal and installation

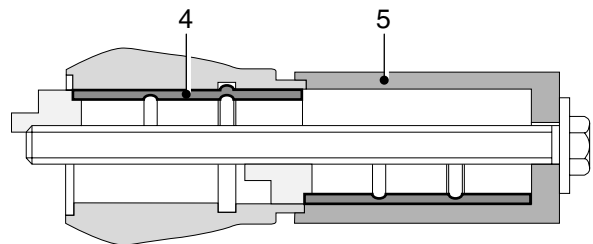
3.20 REMOVING AND INSTALLING BRASS BEARING BUSH OF BRAKE CALLIPER, KNORR SN7000 VERSION

Removing brass bearing bush

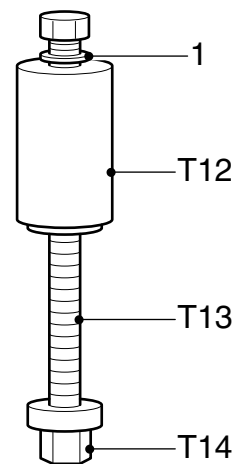
1. Remove the brake calliper.
2. Remove washer (1).
3. Remove guide bush (2).
4. Remove the bellows (3).



5. Remove the brass bearing bush (4) using a bearing bush extractor (5), special tool set (DAF no. 1329495).



6. To do this, use the assembly of T14, T13, T12 and a washer (1).
7. Clean the bearing bush bore.



BRAKE SYSTEM AND COMPONENTS

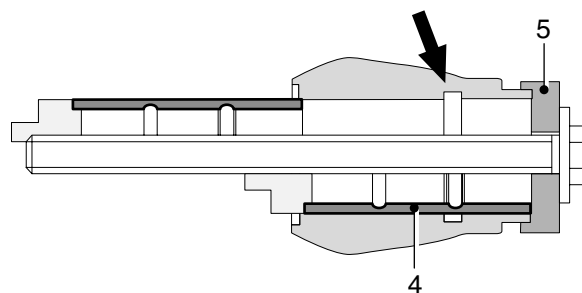
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Removal and installation

LF45/55 series

Fitting brass bearing bush

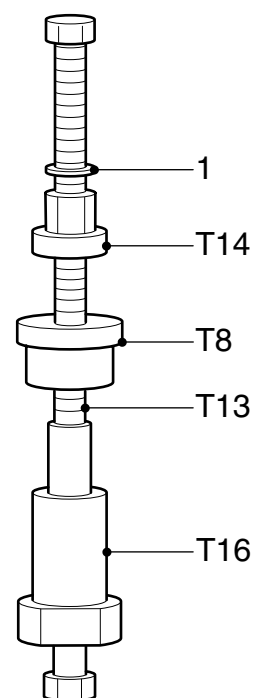
1. Fit the new brass bearing bush (4) using bearing bush extractor 5, special tool set (DAF no. 1329495).



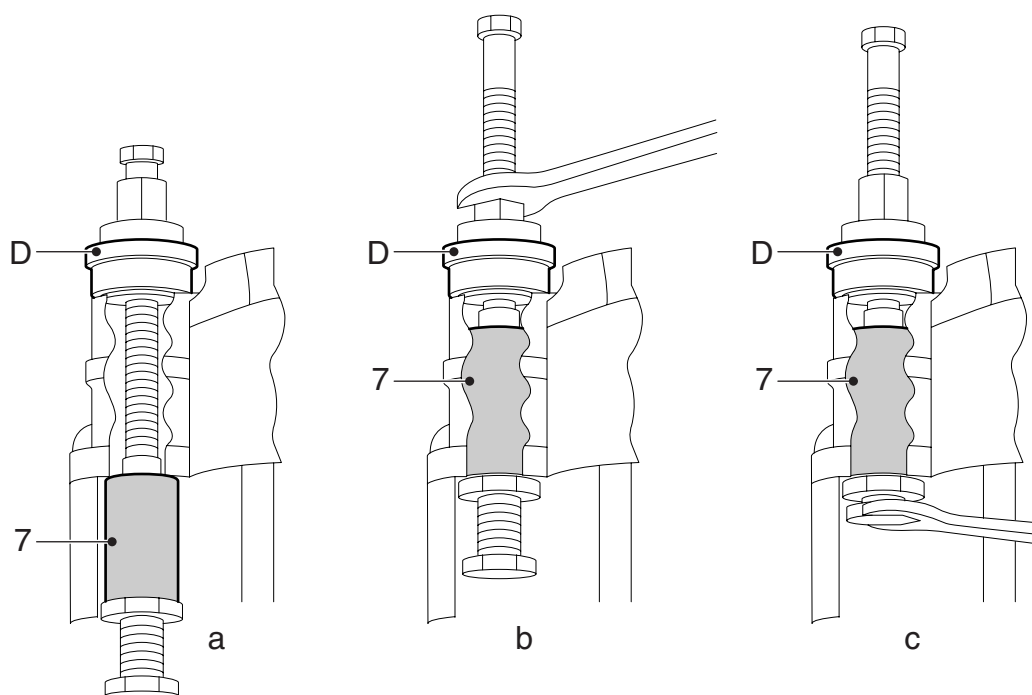
R600728

2. To do this, use the assembly of T16, T13, T8, T14 and a washer (1).

4

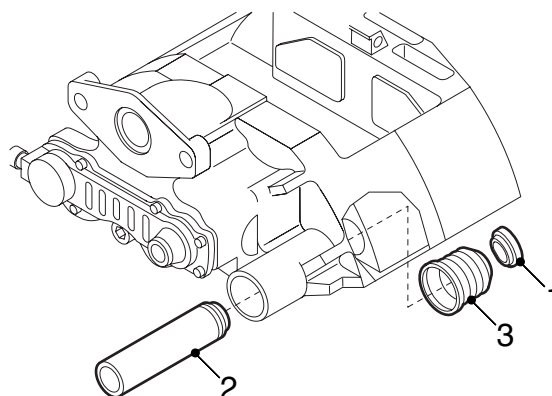


R600760



R600758

3. Tighten the brass nut (T14) of the bearing bush extractor (D) as far as the stop so as to push in the brass bush (7) (a, b). Then tighten the steel bolt of T16 as far as the stop so as to lock the brass bush (c). Loosen the steel bolt of T16 by 20 mm axially, rotate the tool (T16) by 60° and tighten the steel bolt of T16 as far as the stop (c). Remove the bearing bush extractor (D).
4. Check the bearing bush for burrs.
5. Apply lubricant to the bearing bush. See "Technical data".
6. Fit the bellows (3).
7. Install the guide bush (2).
8. Install the washer (1).



R600723

BRAKE SYSTEM AND COMPONENTS

6

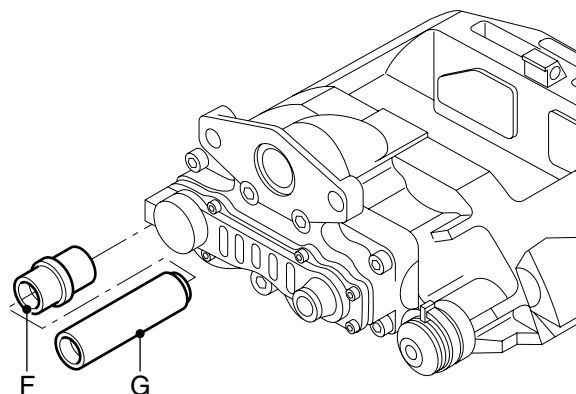
Removal and installation

LF45/55 series

3.21 REMOVING AND INSTALLING RUBBER BEARING BUSH OF BRAKE CALLIPER, KNORR SB7000 VERSION

Removing Knorr SB7000 rubber bearing bush

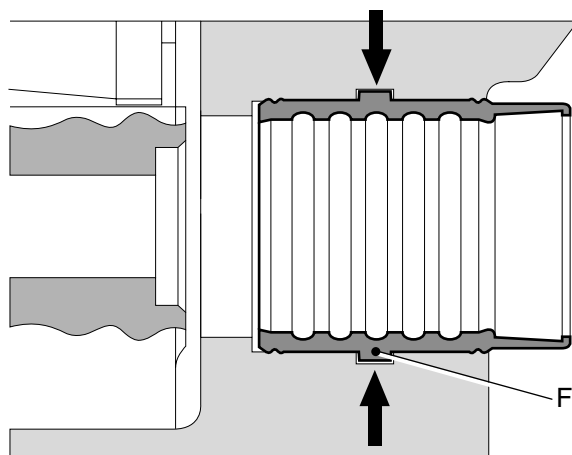
1. Remove the brake calliper.
2. Remove the guide bush (G).
3. Remove the rubber bearing bush (F).
4. Clean the bearing bush bore.



R600599

Fitting Knorr SB7000 rubber bearing bush

1. Apply lubricating grease to the inside and outside of the rubber bearing bush. See "Technical data".
2. Fit the rubber bearing bush to the brake calliper.
3. Slide the bearing bush into the brake calliper until the collar (F) of the bearing bush is flush in the groove.
4. Fit the guide bush.
5. Fit the brake calliper.



R600600

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BRAKE SYSTEM AND COMPONENTS

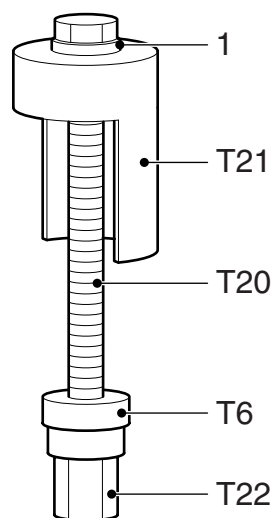
LF45/55 series

Removal and installation

3.22 REMOVING AND INSTALLING RUBBER BEARING BUSH OF BRAKE CALLIPER, KNORR SN7000 VERSION

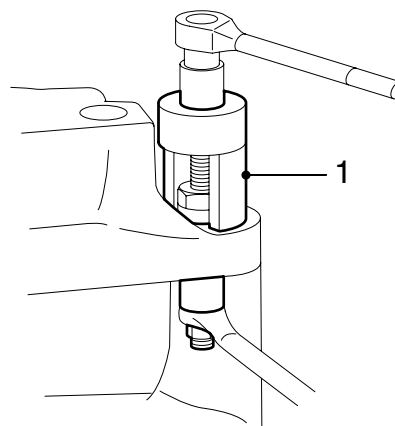
Removing Knorr SN7000 rubber bearing bush

1. Remove the brake calliper.
2. Remove the guide bush.
3. Clean the bearing bush and the bearing bush bore.
4. Assemble the press-out tool from the special tool set (DAF no. 1329495) by means of parts T22, T6, T20, T21 and a washer (1).



R600763

5. Using the press-out tool (1), push the bearing bush out of the brake calliper by retaining T22 and screwing T20 in.



R600729

BRAKE SYSTEM AND COMPONENTS

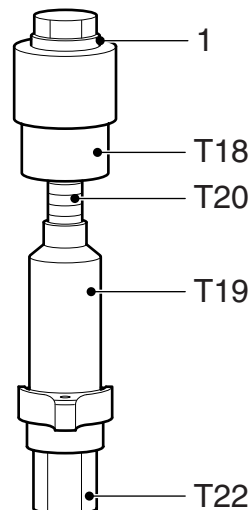
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Removal and installation

LF45/55 series

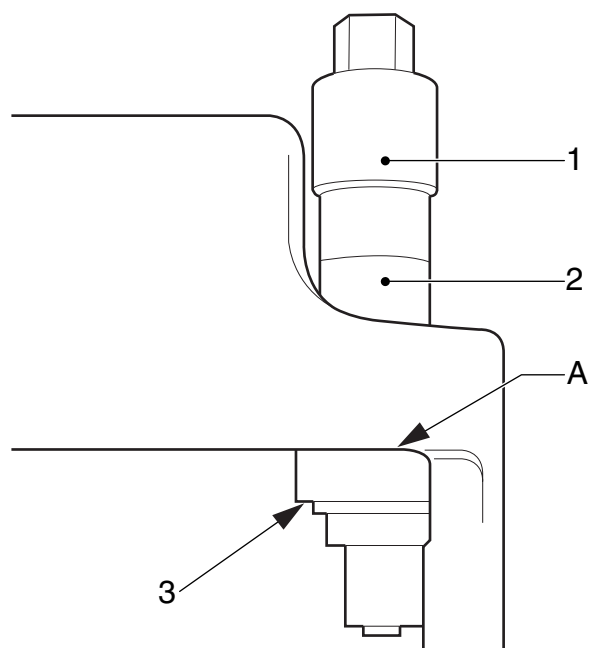
Fitting Knorr SN7000 rubber bearing bush

1. Clean the bearing bore in the brake calliper and, if necessary, protect the surface against corrosion by means of zinc spray.
2. Assemble the press-in tool from the special tool set (DAF no. 1329495) by means of parts T22, T19, T20, T18 and a washer (1).



R600762

3. Fit the rubber bearing bush (2) on the press-in tool (1) and push the bearing bush into the brake calliper. Hand-tighten T22. Make sure that the press-in tool is vertical on the contact surface (A) of the brake calliper by adjusting the small Allen screw (3).
4. Push the rubber bearing bush in using T20 and retain T22 with a spanner. Tighten T20 to the specified torque. See "Technical data". If the required tightening torque is higher or lower than the specified value, the brake calliper must be replaced.
5. Check that the metal outer ring of the bearing bush is secure in the brake calliper.
6. Apply lubricating grease in the bearing bush. See "Technical data".
7. Fit the guide bush.
8. Fit the brake calliper.



R600764

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BRAKE SYSTEM AND COMPONENTS

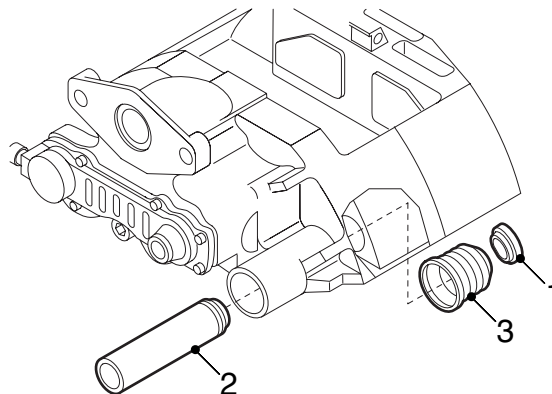
LF45/55 series

Removal and installation

3.23 REMOVING AND INSTALLING BELLOWS OF BRASS BEARING BUSH OF BRAKE CALLIPER, KNORR SB7000 VERSION

Removing bellows of brass bearing bush

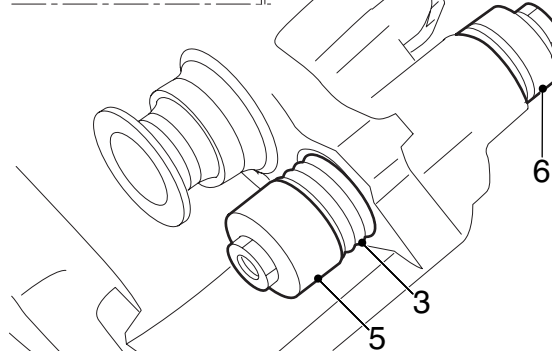
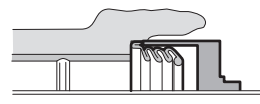
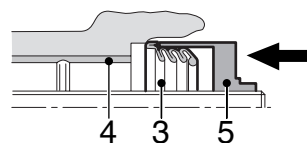
1. Remove the brake calliper.
2. Remove washer (1).
3. Remove the guide bush (2).
4. Remove the bellows (3).



R600723

Fitting the bellows of the guide bush

1. Clean the brass bearing bush (4) in the brake calliper.
2. Check the brass bearing bush for damage and dirt.
3. Place a new bellows (3) in the sleeve (5) of the special tool set (DAF no. 1329494).
4. Place the special tool and bellows in the bore of the brake calliper. Hand-tighten the press (6).
5. Push the bellows into the brake calliper by turning the press bolt clockwise. Remove the press.



R600724

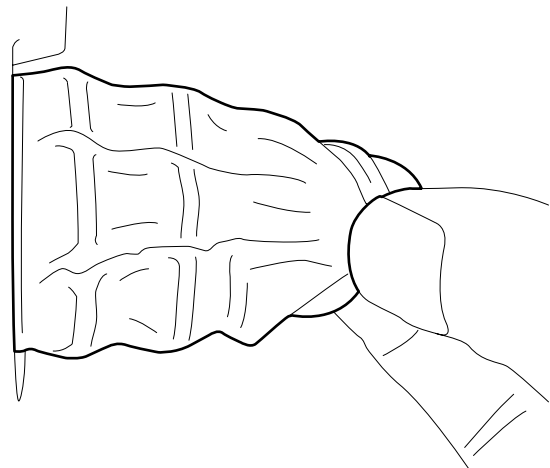
BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

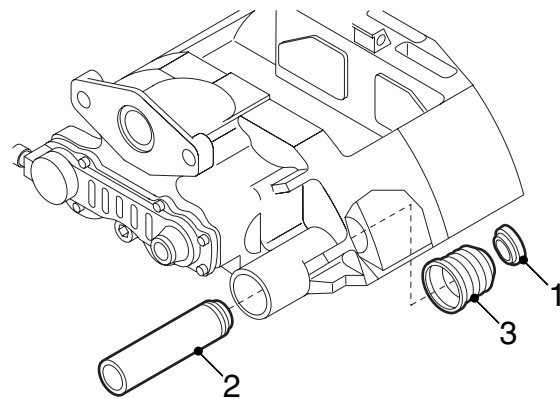
LF45/55 series

6. Check the bellows fastening by pulling it outwards by hand. Damage is not permitted.



R600725

7. Apply lubricating grease to the brass bearing bush and guide bush. See "Technical data".
8. Install the guide bush (2).
9. Install the washer (1).
10. Check that the guide bush moves freely in the brake calliper.
11. Fit the brake calliper.



R600723

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BRAKE SYSTEM AND COMPONENTS

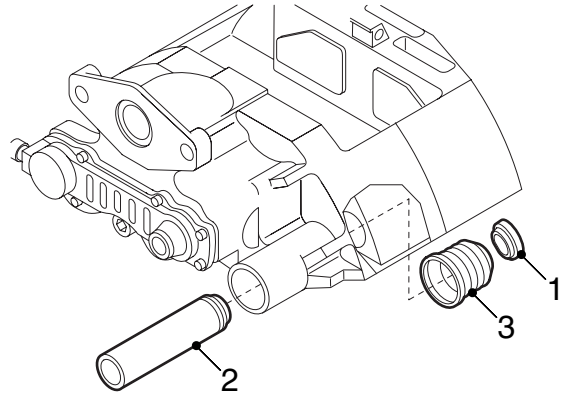
LF45/55 series

Removal and installation

3.24 REMOVING AND INSTALLING BELLOWS OF BRASS BEARING BUSH OF BRAKE CALLIPER, KNORR SN7000 VERSION

Fitting the bellows of the guide bush

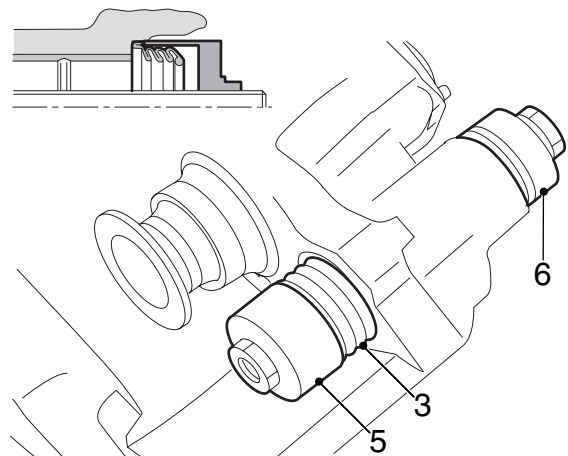
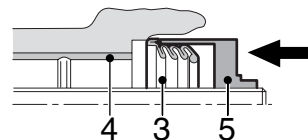
1. Remove the brake calliper.
2. Remove washer (1).
3. Remove the guide bush (2).
4. Remove the bellows (3).



R600723

Fitting the bellows of the guide bush

1. Clean the brass bearing bush (4) in the brake calliper.
2. Check the brass bearing bush for damage and dirt.



R600724

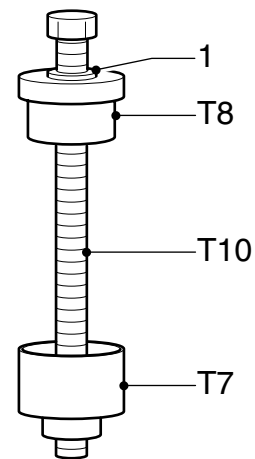
BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

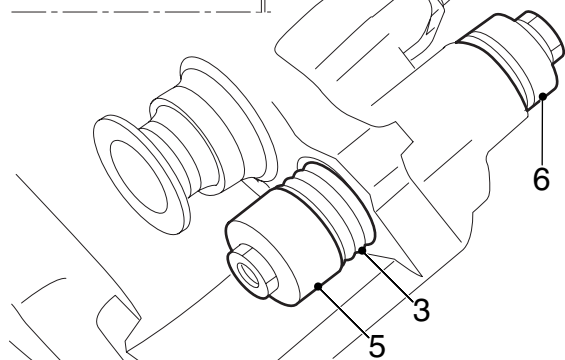
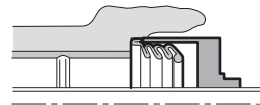
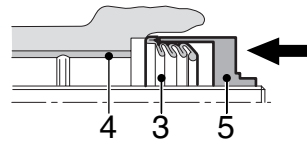
LF45/55 series

3. Assemble a press from the special tool set (DAF no. 1329495). To do this, use T7, T10, T8 and a washer.



R600761

4. Place a new bellows (3) in the sleeve (5) of the assembled press.
5. Place the press and bellows in the bore of the brake calliper. Hand-tighten the press (6).
6. Tighten the press (6) to the specified torque. See "Technical data". Remove the press.



R600724

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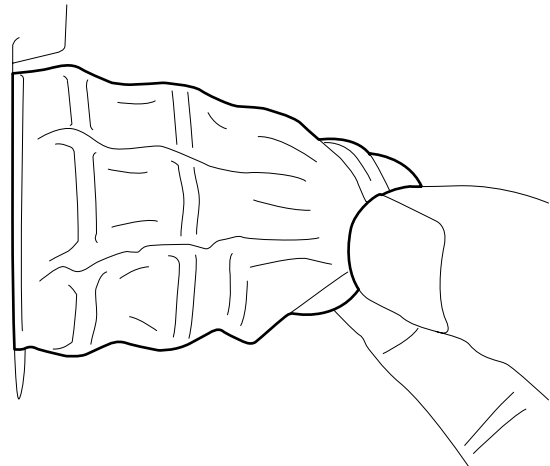
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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

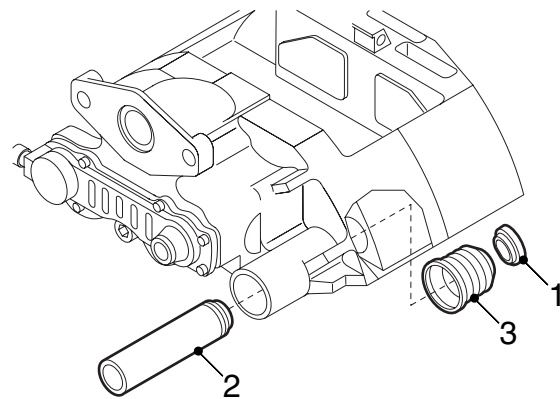
Removal and installation

7. Check the bellows fastening by pulling it outwards by hand. Damage is not permitted.
8. Apply lubricating grease to the brass bearing bush and guide bush. See "Technical data".



R600725

9. Install the guide bush (2).
10. Install the washer (1).
11. Check that the guide bush moves freely in the brake calliper.
12. Fit the brake calliper.



R600723

BRAKE SYSTEM AND COMPONENTS

6

Removal and installation

LF45/55 series

3.25 REMOVAL AND INSTALLATION, BRAKE BACK PLATE IN DISC BRAKES

Removal, brake back plate

1. Remove the brake calliper.
2. Remove the brake calliper carrier.
3. Remove the hub (and brake disc).
4. Remove the brake back plate.

Installation, brake back plate

1. Clean the contact surfaces of the brake back plate and the spindle, and let these surfaces dry for approx. 20 minutes before installing the back plate. Thoroughly clean all other parts.
2. Install the brake back plate and tighten the attachment bolts to the specified torque. See "Technical data".
3. Install the hub (and brake disc).
4. Fit the brake calliper carrier.
5. Fit the brake calliper.

4

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BRAKE SYSTEM AND COMPONENTS

LF45/55 series

Removal and installation

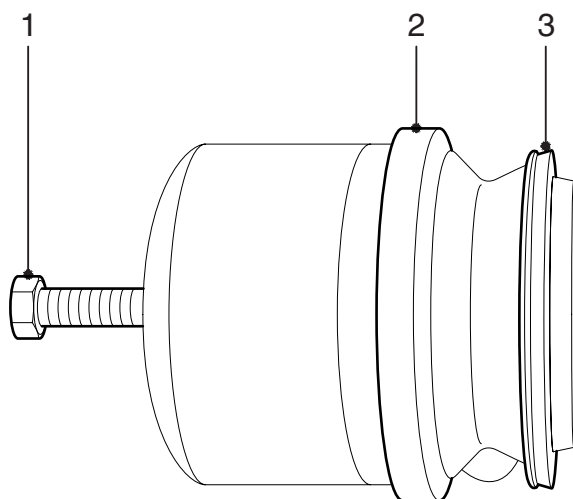
3.26 REMOVAL AND INSTALLATION, BRAKE-CHAMBER DIAPHRAGM

Removal of the brake chamber

1. Clean the spring brake cylinder.
2. Apply pressure to connection point 12 (min. 6.0 bar).
3. Slacken the release bolt (1) of the spring brake cylinder as much as possible.
4. Remove the clamping strap.
5. Remove the spring brake section (2) from the brake cylinder.
6. Remove the diaphragm (3).

Installation of the brake chamber

1. Apply pressure to connection point 12 (min. 6.0 bar).
2. Fit the diaphragm (3).
3. Place the complete spring brake section (2) on the brake cylinder and fit the clamping strip, tightening it to the specified torque. See "Technical data".
4. Screw the release bolt (1) in as far as possible.



R600787

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BRAKE SYSTEM AND COMPONENTS

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Removal and installation

LF45/55 series

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6 BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

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BRAKING PERFORMANCE AND BRAKE EQUALISATION

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6 BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

General

1. GENERAL

1.1 INTRODUCTION

How is a good braking performance of a vehicle combination (truck and trailer vehicle) achieved while still guaranteeing interchangeability both for new vehicle combinations and for combinations following brake reconditioning?

The vehicles should meet the legal requirements and all settings should be in accordance with the directives. However, adhering to the directives does not necessarily mean that there will be no brake problems.

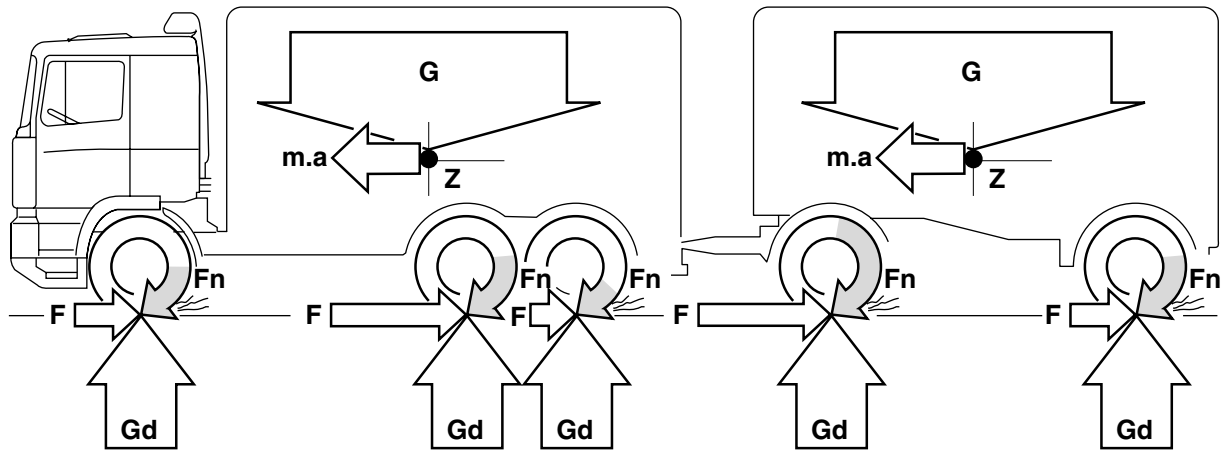
BRAKING PERFORMANCE AND BRAKE EQUALISATION

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General

LF45/55 series

1.2 WHAT IS A VEHICLE COMBINATION WITH A GOOD BRAKING PERFORMANCE?



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G = weight

m = mass

a = deceleration ($m \times a$ is the force changing the axle load)

Dynamic axle load: during braking, changes the load on each axle.

F = braking force ($F_{max} = Gd \times m$)

Gd = dynamic axle load

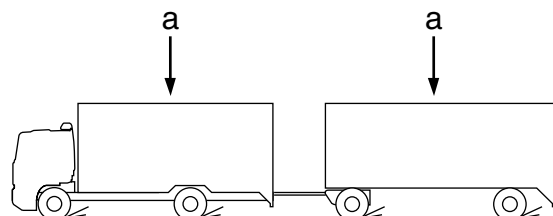
m = the friction coefficient between tyre and road

Fn = braking force of the wheel brake

A vehicle combination of which, in laden condition and with a 1 to 3 bar pressure at the service coupling head, the braking deceleration of the tractive unit is the same or virtually the same as that of the drawn vehicle.

When problems occur which are related to the brake system, such as excessive brake-lining wear, brake vibrations or the vehicle pulling to one side during braking, the cause should primarily be sought in an unbalanced distribution of braking forces.

- for vehicle combinations:
 - between prime mover and trailer vehicle.



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BRAKING PERFORMANCE AND BRAKE EQUALISATION

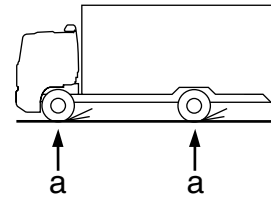
LF45/55 series

General

- for rigid vehicles:
 - between the different axles.

Conditions for a practical distribution of braking forces

- Both the prime mover and the trailer vehicle should have a sufficiently effective brake system without mechanical defects or failures in the air system.



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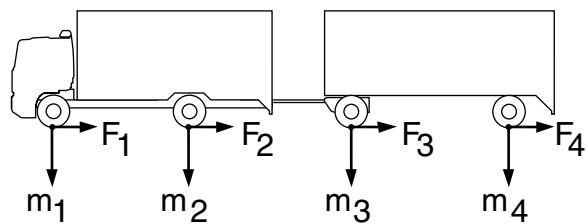
With vehicle combinations the braking performance level of the trailer vehicle may be noticeably lower than that of the truck. This means that the prime mover has to provide a disproportionately large part of the deceleration required for the total vehicle combination. As the brakes of the trailer vehicle will consequently be subjected to low loads only, their condition will deteriorate (risk of glazing), which will lead to even higher overloading of the prime mover brakes. It is therefore important that the adjustment is correct, as dangerous situations can arise where the trailer is jostling the prime mover.

Possible causes of poor braking performance of a trailer vehicle

- unduly large brake-chamber stroke.
- damaged diaphragms in the brake chambers.
- greasy, glazed or fully worn linings.
- the mechanical part of the wheel brake does not operate smoothly.
- a leak in the brake system.
- a blockage in the brake pipe system.
- not all the valves are in good working order.
- incorrect setting of the load-sensing valve.

The starting point is that the braking forces between the axles of the vehicle combination should be distributed in proportion to the axle loads. This will also distribute the temperature correctly over the axles.

Whether this will give the correct distribution between prime mover and trailer vehicle depends not only on the quality of the two brake systems, but also on a correct balancing of the brake pressures. The latter can be achieved by adjusting the advance between tractor and drawn vehicle in such a way that at the most frequently used brake pressures, i.e. 2-3 bar on the service line, the braking performance of the prime mover is the same as that of the trailer vehicle. This can entail a change in the brake pressure advance set by the factory.



$$F_1 : F_2 : F_3 : F_4 = m_1 : m_2 : m_3 : m_4$$

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BRAKING PERFORMANCE AND BRAKE EQUALISATION

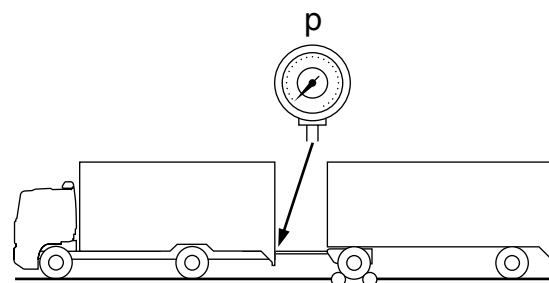
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General

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1.3 BRAKE EQUALISATION MEASUREMENT BY MEANS OF BRAKE DYNAMOMETER

1. Make sure the vehicle combination is in **laden condition**. A laden combination makes for a more reliable and accurate measurement. Furthermore, the maximum braking performance will be achieved when the vehicle combination is in laden condition.
2. The braking forces must be measured on a system with warm brakes. (Normal operating temperature.)
3. The brake linings must have been bedded in. Only then can a reliable verdict on the braking forces be obtained.
4. Write down the braking forces of the various axles on the "brake equalisation form for brake dynamometer" at the following brake pressures, measured at the service coupling head:
 $p = 0.5 - 1.0 - 1.5 - 2.0 - 3.0 - 4.0 - 5.0 \text{ bar}$.
5. Using the data on the "brake equalisation form for brake dynamometer", calculate the braking deceleration percentages.
6. Plot the calculated values in the "brake equalisation form for brake dynamometer" in the appropriate EC band graph and evaluate the measured brake equalisation.



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BRAKING PERFORMANCE AND BRAKE EQUALISATION

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General

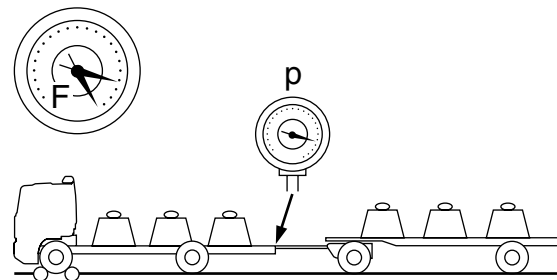
LF45/55 series

Filling in brake equalisation form for brake dynamometer

Note:

1 kg = 10 newtons (N)

1. Determine the weight of the **laden** prime mover and/or trailer vehicle (coupled), and enter these values in the table (in kg or newtons).
2. Make a short test run to warm up the brakes.
3. Position the vehicle, starting with the front axle, on a brake dynamometer.
4. Connect a pressure gauge to the yellow coupling head.
5. Depress the brake pedal until the pressure gauge reading is 0.5 bar.
Always build **up** pressure, i.e. from low to high pressure, and never from high pressure to low pressure, and always begin every measurement with 0 bar.
6. Read the braking forces and write them down in the appropriate column (in kg or newtons).
7. Now repeat this procedure at pressures of 1.0 - 1.5 - 2.0 - 3.0 - 4.0 and 5.0 bar.
8. Also perform these measurements on all other vehicle axles.
9. Count all braking forces that belong to a certain braking pressure and note these in the "Total braking force" column.
10. Divide the braking forces (in kg or newtons) just entered at point 9 by the weight of the vehicle (in kg or newtons), multiply the result by 100 (%) and enter the values thus obtained in the next column.
braking deceleration as % of the weight
11. Plot the values obtained in point 10 in the relevant EC tyre graph.



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BRAKING PERFORMANCE AND BRAKE EQUALISATION

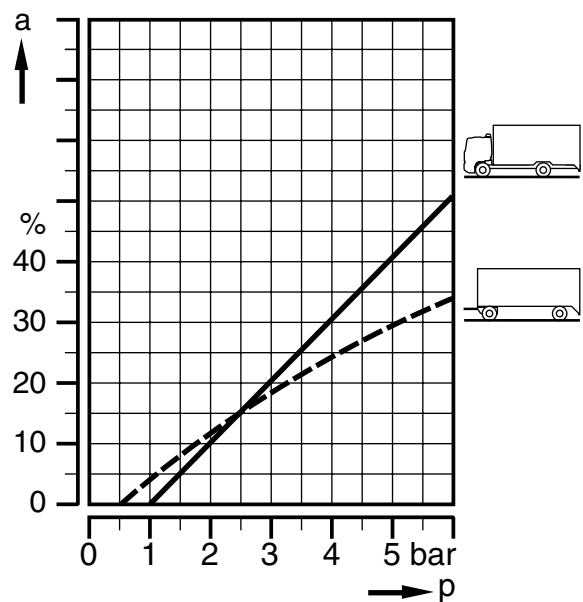
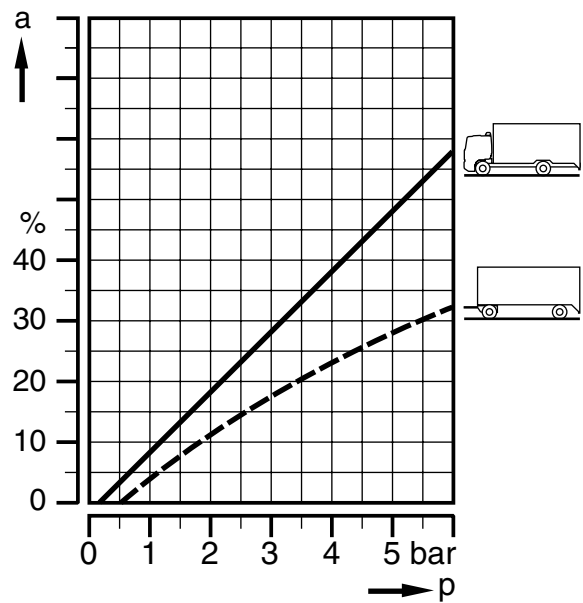
LF45/55 series

General

Example of a diagram for a prime mover and trailer vehicle with poor brake balance.

Example of a diagram for a prime mover and trailer vehicle with correct brake balance.

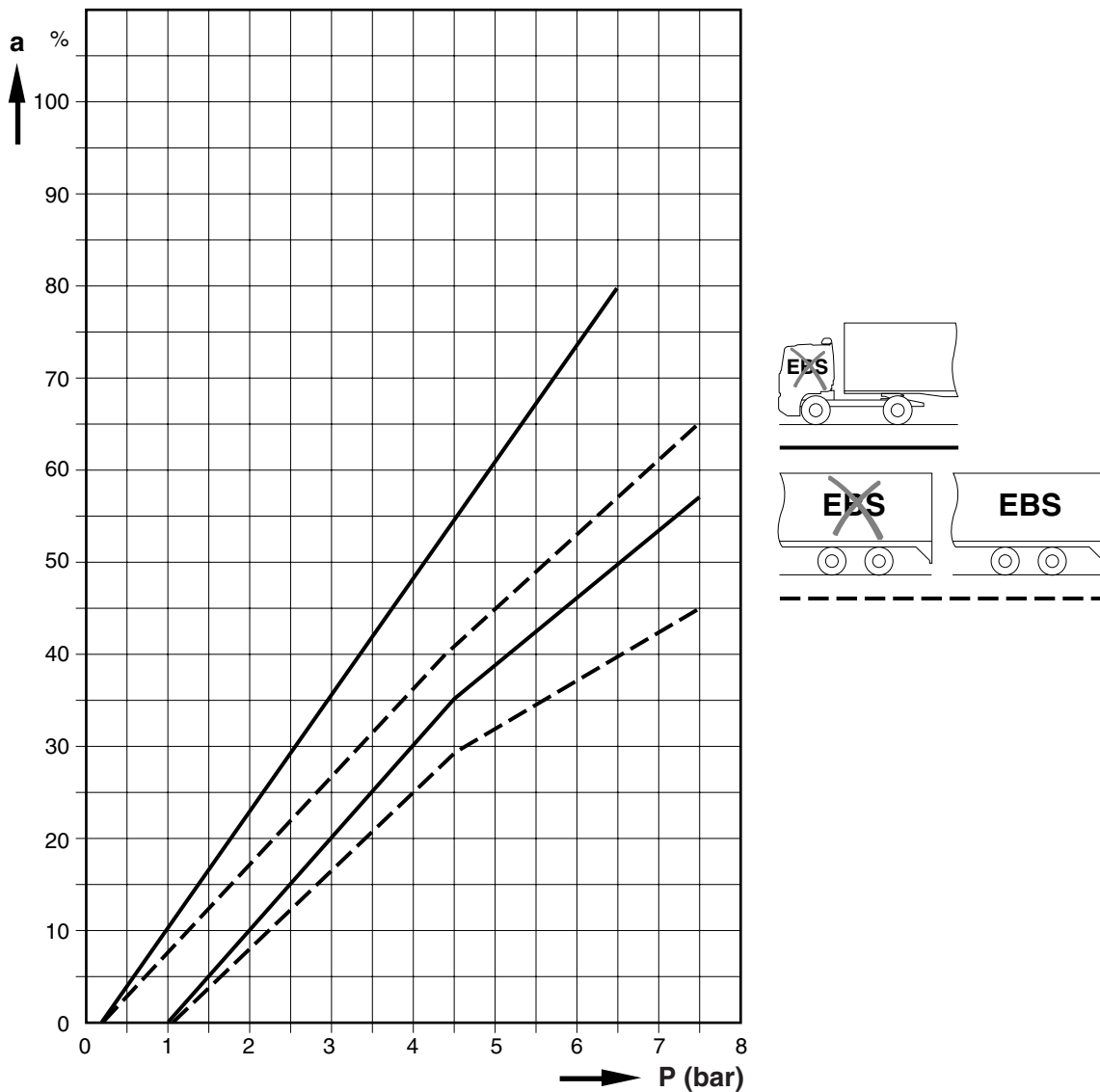
The combination is correctly balanced if the braking performance at 2 - 3 bar for the truck and the trailer vehicle are in a comparable position in the appropriate EC band, i.e. both in the upper part, both in the lower part or both in the middle part.



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BRAKING PERFORMANCE AND BRAKE EQUALISATION**6**

General

LF45/55 series**1.5 EC BAND FOR A LADEN TRACTOR/SEMI-TRAILER COMBINATION**

The "EC band" indicates the limits within which the deceleration value must lie.

The "EC band" applies to:

- tractor with conventional brake system
- semi-trailer with conventional or EBS brake system

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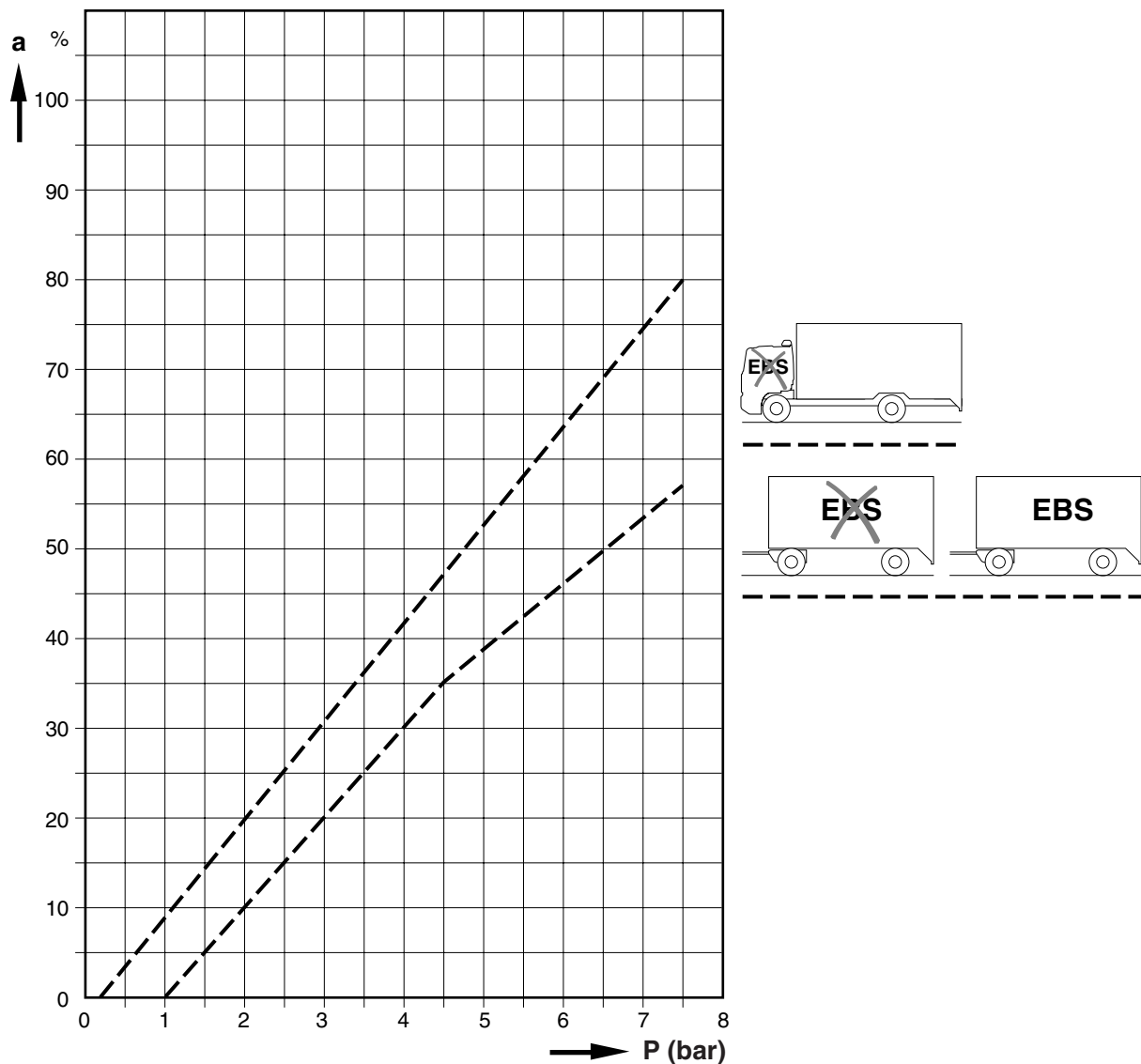
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BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

General

1.6 EC BAND FOR A LADEN TRUCK/TRAILER COMBINATION



The "EC band" indicates the limits within which the deceleration value must lie.

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The "EC band" applies to:

- truck with conventional brake system.
- trailer with conventional or EBS brake system.

Note:

The following applies to mid-axle trailers fitted with air brakes:

The permissible ratio between the deceleration and the pressure at the yellow coupling head of a laden mid-axle trailer with air brakes should be within the two areas derived from the EC band for a laden truck/trailer combination, for which the vertical scale has been multiplied by 0.95.

BRAKING PERFORMANCE AND BRAKE EQUALISATION

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BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

Inspection and adjustment

2. INSPECTION AND ADJUSTMENT

2.1 INSPECTING AND ADJUSTING BRAKE EQUALISATION OF NON-EBS TRUCK WITH NON-EBS TRAILER VEHICLE

Inspecting brake equalisation of non-EBS truck with non-EBS trailer vehicle

1. Take a test drive and evaluate the braking behaviour.
2. In the case of disc brakes, inspect the mechanical condition of the brake calliper, brake disc and brake pads. In the case of drum brakes, inspect the mechanical condition of the brake drums and brake linings. Their condition may provide clues to the settings that need to be made.
3. Perform a brake equalisation test using a brake dynamometer and fill in the "Brake equalisation form for brake dynamometer". See "General".
4. Evaluate the brake equalisation of the combination using the "EC band graph". The combination is correctly balanced if the braking performance at 2 - 3 bar for the truck and the trailer vehicle are in a comparable position in the appropriate EC band, i.e. both in the upper part, both in the lower part or both in the middle part.

Note:

On a tractor/drawn vehicle combination the values for the drawn vehicle may be slightly lower than those for the prime mover. The deceleration values for the truck and the drawn vehicle of a truck/trailer combination should be the same. The reason for this lies in the dynamic axle load displacement, which on semi-trailers causes a transfer of weight to the tractive unit, whereas on trailers it does not cause a transfer of weight to the tractive unit.

5. Due to the adjustment of the brake pressure advance on the truck and/or trailer vehicle the deceleration lines in the "EC band graph" can be affected.

Note:

For optimum interchangeability of vehicles, the correct choice between these two alternatives must be made.

BRAKING PERFORMANCE AND BRAKE EQUALISATION

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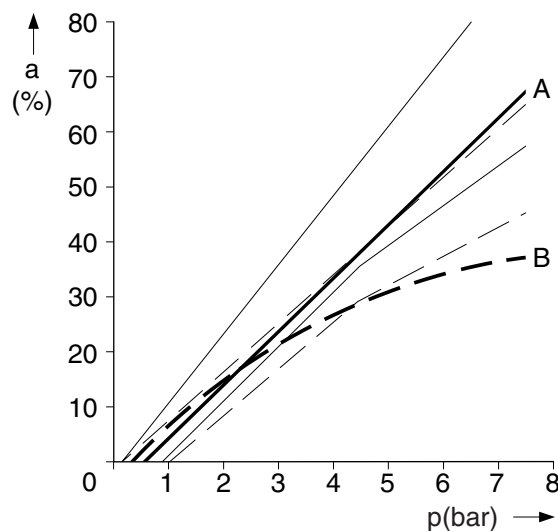
Inspection and adjustment

LF45/55 series

6. If the mechanical condition of the wheel brakes, the results of the test drive and the data obtained from the brake equalisation test using the brake dynamometer give cause for doing so, the brake pressure advance of the trailer vehicle control valve can be adjusted.

Adjusting brake equalisation of non-EBS truck with non-EBS trailer vehicle

1. When the brake pressure advance in the trailer vehicle control valve on the truck is increased or decreased, the position of the curve for the trailer vehicle (B) in the graph will not be affected. This is because the reference pressures are measured at the yellow coupling head (= service line). For the same reason, however, the curve for the truck (A) will shift to the right or the left (will appear to be lower or higher respectively). So the horizontal axis indicates how much the brake pressure advance has to be changed. Reducing the brake pressure advance results in increased deceleration of the truck. Increasing the brake pressure advance results in decreased deceleration of the truck.



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Note:

Increasing the brake pressure advance on the trailer vehicle reaction valve on the trailer vehicle results in increased deceleration of the trailer vehicle.



Bear in mind that an increase in the brake pressure advance does not necessarily improve the braking performance of the trailer vehicle. It only means that the brake pressure balance between prime mover and trailer vehicle is changed. Moreover, in the event of an emergency stop the poorer braking performance of the trailer vehicle will again be noticeable, as the brake pressure advance is eliminated when the maximum brake pressure is used.

2. So the horizontal axis indicates how much the brake pressure advance has to be changed.
3. Take a test run, perform a brake equalisation test using a brake dynamometer and fill in the "Brake equalisation form for brake dynamometer". See "General". If desired or required, the setting of the trailer vehicle control valve can be adjusted again.

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6 BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

Inspection and adjustment

4. If the desired brake equalisation cannot be achieved, the cause must be sought and remedied by means of the diagnostics table. See "Diagnostics".

2.2 INSPECTING AND ADJUSTING BRAKE EQUALISATION OF NON-EBS TRUCK WITH EBS TRAILER VEHICLE

Inspecting brake equalisation of non-EBS truck with EBS trailer vehicle

1. Take a test drive and evaluate the braking behaviour.
2. In the case of disc brakes, inspect the mechanical condition of the brake calliper, brake disc and brake pads. In the case of drum brakes, inspect the mechanical condition of the brake drums and brake linings. Their condition may provide clues to the settings that need to be made.

3. Perform a brake equalisation test using a brake dynamometer and fill in the "Brake equalisation form for brake dynamometer". See "General".

Note:

The EBS trailer vehicle must be correctly connected and the test function of the EBS system must be activated.

4. Evaluate the brake equalisation of the combination using the "EC band graph". The combination is correctly balanced if the braking performance at 2 - 3 bar for the truck and the trailer vehicle are in a comparable position in the appropriate EC band, i.e. both in the upper part, both in the lower part or both in the middle part.

Note:

On a tractor/semi-trailer combination the values for the drawn vehicle may be slightly lower than those for the tractor. The deceleration values for the truck and the drawn vehicle of a truck/trailer combination should be the same. The reason for this lies in the dynamic axle load displacement, which on semi-trailers causes a transfer of weight to the tractive unit, whereas on trailers it does not cause a transfer of weight to the tractive unit.

5. Due to the adjustment of the brake pressure advance on the truck, the deceleration line in the "EC band graph" can be affected.
6. If the mechanical condition of the wheel brakes, the results of the test drive and the data obtained from the brake equalisation test using the brake dynamometer give cause for doing so, the brake pressure advance of the trailer vehicle control valve can be adjusted.

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BRAKING PERFORMANCE AND BRAKE EQUALISATION

LF45/55 series

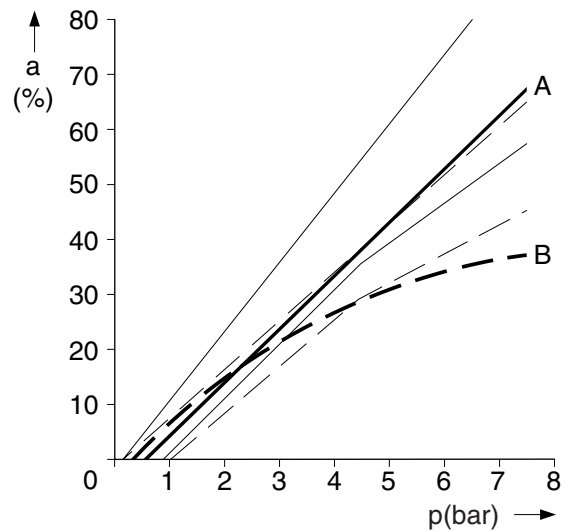
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Inspecting brake equalisation of non-EBS truck with EBS trailer vehicle

1. When the brake pressure advance in the trailer vehicle control valve on the truck is increased or decreased, the position of the curve for the trailer vehicle (B) in the graph will not be affected. This is because the reference pressures are measured at the yellow coupling head (= service line). For the same reason, however, the curve for the truck (A) will shift to the right or the left (will appear to be lower or higher respectively). So the horizontal axis indicates how much the brake pressure advance has to be changed. Reducing the brake pressure advance results in increased deceleration of the truck. Increasing the brake pressure advance results in decreased deceleration of the truck.

Note:

Due to the operation of EBS on the trailer vehicle it is not possible to set the brake pressure advance on the trailer vehicle. The brake pressure advance is automatically adjusted electronically by the EBS.



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Bear in mind that an increase in the brake pressure advance does not necessarily improve the braking performance of the trailer vehicle. It only means that the brake pressure balance between prime mover and trailer vehicle is changed. Moreover, in the event of an emergency stop the poorer braking performance of the trailer vehicle will again be noticeable, as the brake pressure advance is eliminated when the maximum brake pressure is used.

2. So the horizontal axis indicates how much the brake pressure advance has to be changed.
3. Take a test run, perform a brake equalisation test using a brake dynamometer and fill in the "Brake equalisation form for brake dynamometer". See "General". If desired or required, the setting of the trailer vehicle control valve can be adjusted again.
4. If the desired brake equalisation cannot be achieved, the cause must be sought and remedied by means of the diagnostics table. See "Diagnostics".

BRAKING PERFORMANCE AND BRAKE EQUALISATION

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Inspection and adjustment

LF45/55 series

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TECHNICAL DATA

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LF45/55 series

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1. STEERING GEAR, GENERAL

1.1 GENERAL

Steered axles

Vehicle type	GVW	Front axle	Trailing axle
LF45	6 and 8 tonnes	F36	N/A
LF45	10, 11 and 12 tonnes	F48	N/A
LF55	12, 13, 14 and 15 tonnes	F60	N/A
LF55 FAN	12, 13, 14 and 15 tonnes	F60	Steered trailing swivel axle (F60)
LF55	16 and 18 tonnes	152N	N/A

Steering box

Vehicle type	GVW	Steering box	Max. system pressure
LF45	6 and 8 tonnes	ZF8090	130 + 10 bar
LF45	10, 11 and 12 tonnes	ZF8090	180 + 10 bar
LF55	12, 13, 14 and 15 tonnes	ZF8095	150 + 10 bar
LF55 FAN	12, 13, 14 and 15 tonnes	ZF8095	150 + 15 bar
LF55	16 and 18 tonnes	ZF8098	150 + 10 bar

Circulation pressure

Maximum permissible circulation pressure of the steering gear at a steering-oil temperature of 50°C

10 bar max.

Final limiting pressure

Final limiting pressure at a steering-oil temperature of 50°C and an engine speed of 1200-1400 rpm

40 - 45 bar

Steering box internal leaks

Maximum permissible internal leakage in the steering box

ZF 8090 steering box

2.0 l/min.

ZF 8095 and 8098 steering box

2.5 l/min.

TECHNICAL DATA

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Steering gear, general

LF45/55 series**0**

Steering box internal play

Maximum permissible internal play of the steering box with a blocked pitman arm

4 cm steering wheel deflection

Steering pump

LF45 series

ZF 7684 steering pump

LF55 series, other vehicles

ZF 7685 steering pump

LF55 series FAN version

ZF 7687 steering pump

Steering pump output

Steering pump output at a steering oil temperature of 50°C and pressure of 50 bar, at idling speed

ZF 7684 steering pump

5.9 l/min. minimum

ZF 7685 steering pump

7.0 l/min. minimum

ZF 7687 steering pump

10.8 l/min. minimum

Steering pump output at a steering oil temperature of 50°C, pressure of 50 bar and an engine speed of approx. 1300 1400 rpm

ZF 7684 steering pump

8.0 - 10.4 l/min.

ZF 7685 steering pump

16.0 - 20.8 l/min.

ZF 7687 steering pump

22.5 - 27.5 l/min.

2. STEERING BOX

2.1 GENERAL

Steering box

Version:

single-circuit steering box with automatic bleeding, self-adjusting wheel-deflection limiting valves and pressure-limiting valve.

Type:

ZF 8090

used on F36 and F48 front axle.

ZF 8095

used on F60 front axle.

ZF 8098

used on 152N front axle.

Pressure point

Resistance increase in the pressure point

ZF 8090

20 - 60 Ncm

ZF 8095

20 - 80 Ncm

ZF 8098

20 - 100 Ncm

Input shaft end play

ZF 8090

0.005 - 0.025 mm

ZF 8095

0.010 - 0.030 mm

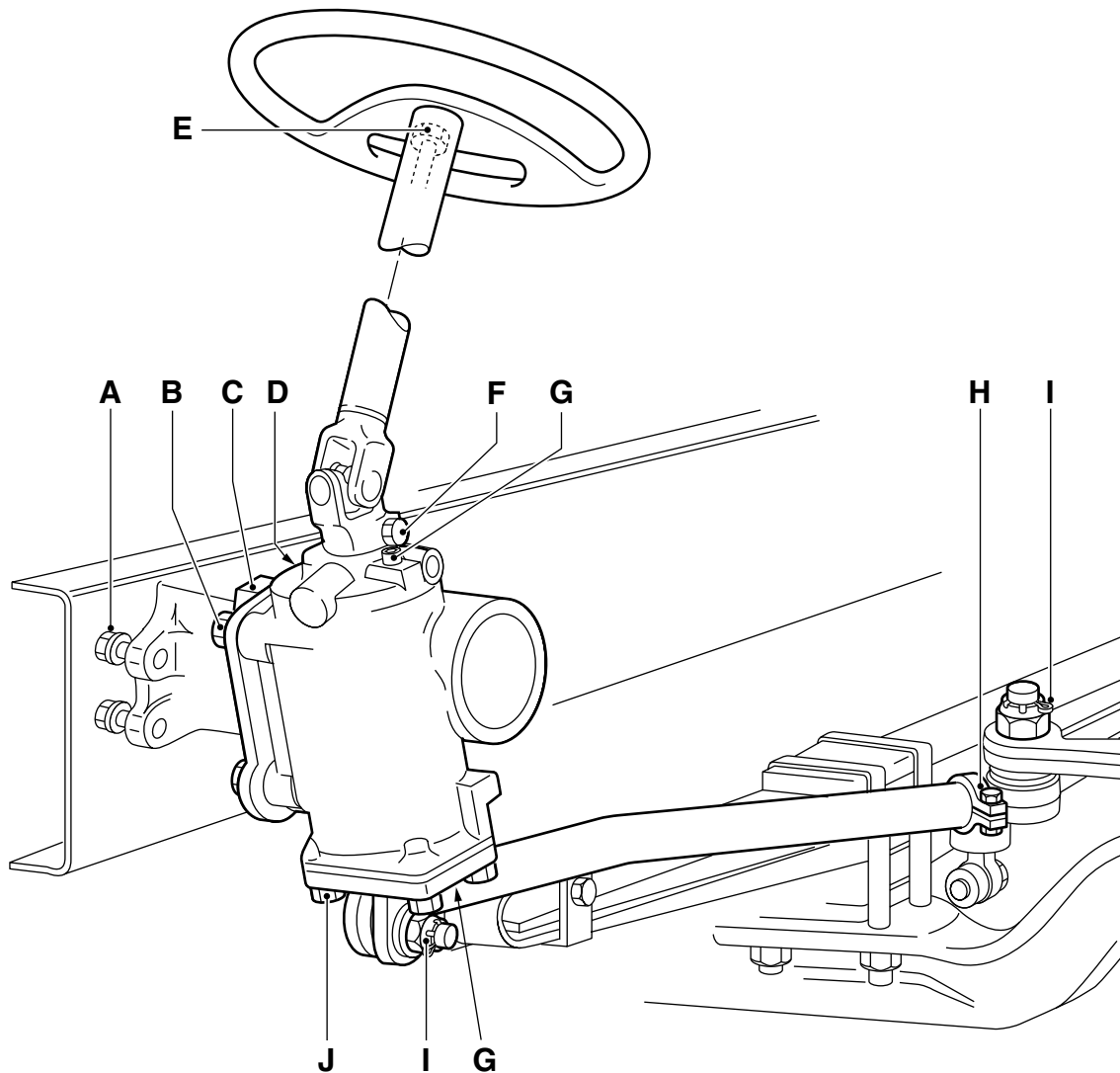
ZF 8098

0.020 - 0.040 mm

2.2 TIGHTENING TORQUES**0**

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

LF45 steering gear

S7 00 884

A.	Attachment bolts/nuts, steering bracket on M12 10.9 chassis	according to standard
	Stud bolt in steering bracket	80 Nm
B.	Bolts/nuts for attaching the steering box to the steering bracket	400 Nm ⁽¹⁾
	Stud bolt in steering box	180 Nm
C.	Pitman-arm attachment nut	350 Nm
D.	Pressure-limiting valve	30 Nm
E.	Steering wheel attachment bolt	50 Nm
F.	Attachment bolt/nut, steering column universal joint	56 Nm ⁽²⁾
G.	Wheel-deflection limiting valve stop bolt	15 Nm
H.	Attachment bolt, steering-rod clamping bracket	48 Nm
I.	Steering rod castle nut	180 Nm ⁽³⁾
J.	Cover attachment bolt	135 Nm

(1) Always use new attachment bolts.

(2) Use new original attachment bolt and nut.

(3) Tighten until the split pin fits (max. 60°).

TECHNICAL DATA

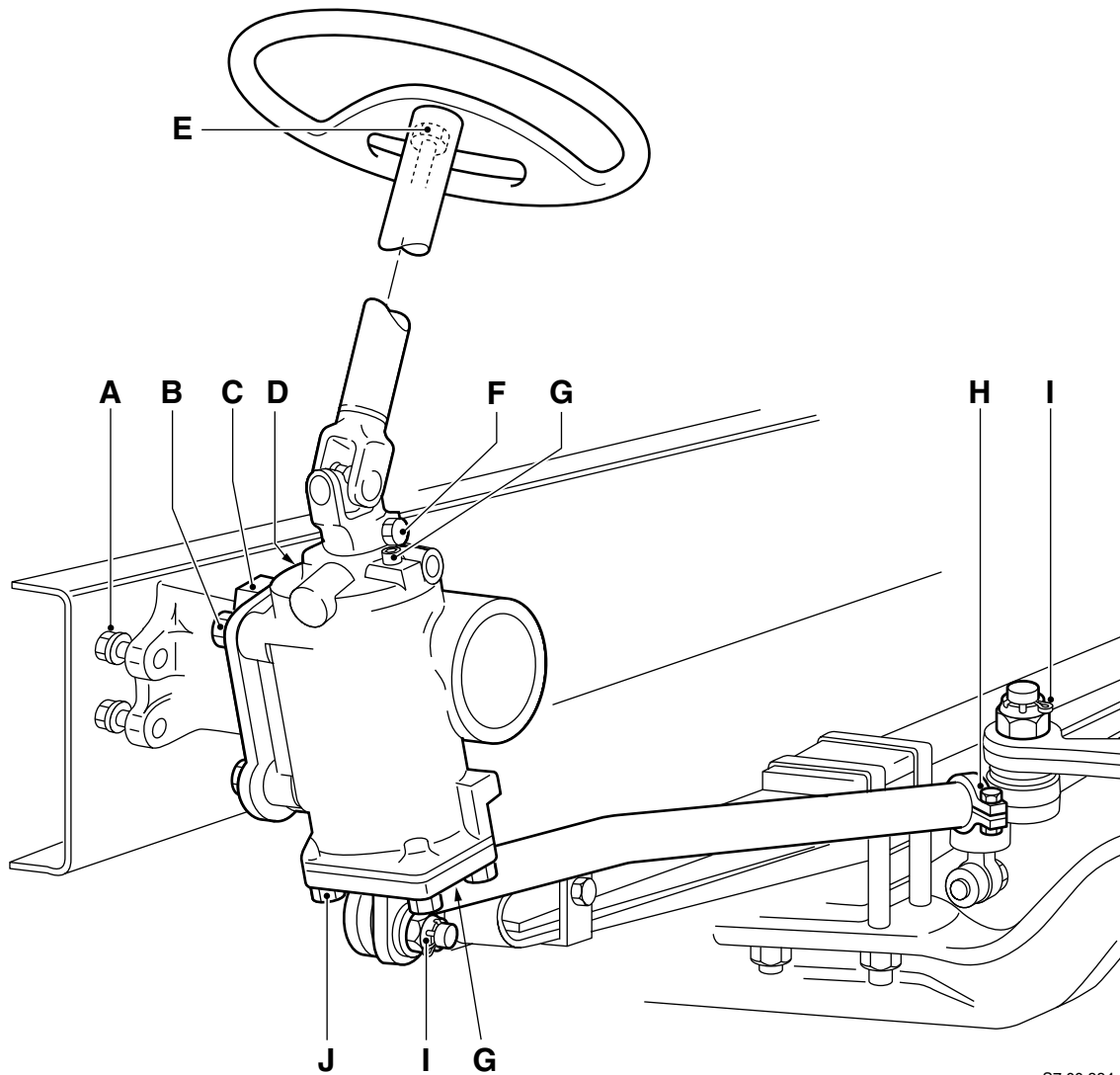
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Steering box

LF45/55 series

LF55 steering gear

0



S7 00 884

- | | | |
|----|---|-----------------------|
| A. | Attachment bolts/nuts, steering bracket on M14 10.9 chassis | according to standard |
| | Stud bolt in steering bracket | 125 Nm |
| B. | Bolts/nuts for attaching the steering box to the steering bracket | 560 Nm ⁽¹⁾ |
| | Stud bolt in steering box | 180 Nm |
| C. | Pitman-arm attachment nut | |
| - | with ZF8095 steering box | 520 Nm |
| - | with ZF8098 steering box | 570 Nm |
| D. | Pressure-limiting valve | 30 Nm |
| E. | Steering wheel attachment bolt | 50 Nm |
| F. | Attachment bolt/nut, steering column universal joint | 56 Nm ⁽²⁾ |
| G. | Wheel-deflection limiting valve stop bolt | 15 Nm |
| H. | Attachment bolt, steering-rod clamping bracket | |
| - | with F60 front axle | 65 Nm |
| - | with 152N front axle | 90 Nm |
| I. | Steering rod castle nut | 220 Nm ⁽³⁾ |
| J. | Cover attachment bolt | |
| - | with ZF8095 steering box | 285 Nm |
| - | with ZF8098 steering box | 189 Nm |

(1) Always use new attachment bolts.

(2) Use new original attachment bolt and nut.

(3) Tighten until the split pin fits (max. 60°).

TECHNICAL DATA

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Steering box

LF45/55 series

0

3. STEERING PUMP/RESERVOIR

3.1 GENERAL

Steering pump

Design

vane pump

Type

ZF 7684, ZF 7685, ZF 7687

Maximum pressure

see steering box type plate

(Pump does not have pressure-limiting valve.)

3.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

Steering pump attachment bolts	46 Nm
Flow-control valve plug	65 Nm
Delivery pipe connection in the pump	36 Nm
Cover attachment bolts	20 Nm
Reservoir attachment bolts	8 Nm

TECHNICAL DATA

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Steering pump/reservoir

LF45/55 series

0

4. F36 AND F48 FRONT AXLE

4.1 GENERAL

Axle journal

Anti-corrosion agent Gleitmo 805

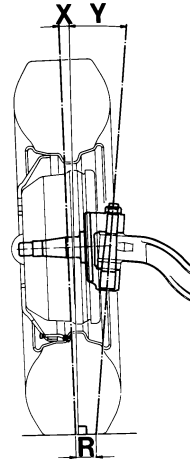
Wheel speed sensor

Anti-corrosion agent Molykote P37

Camber angle and kingpin inclination (KPI)

Camber angle (X) on an unloaded axle $0^{\circ}30'$

King-pin inclination (Y) 7°



S7 00 129

Wheel deflection

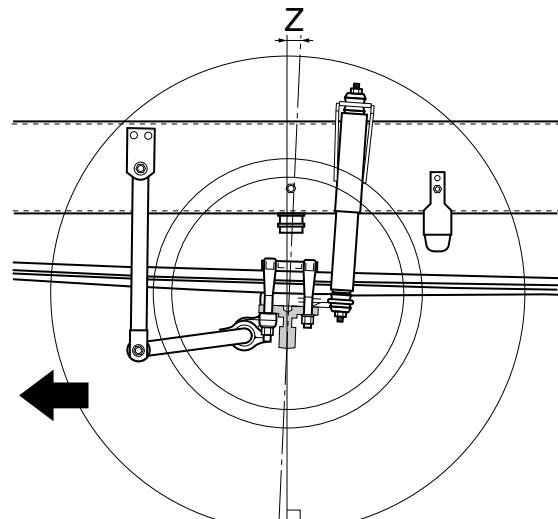
Maximum inner wheel deflection

- F36 axle 53°
- F48 axle 53°

Caster

Z = caster

- F36 axle 4°
- F48 axle 4°



S7 00 607

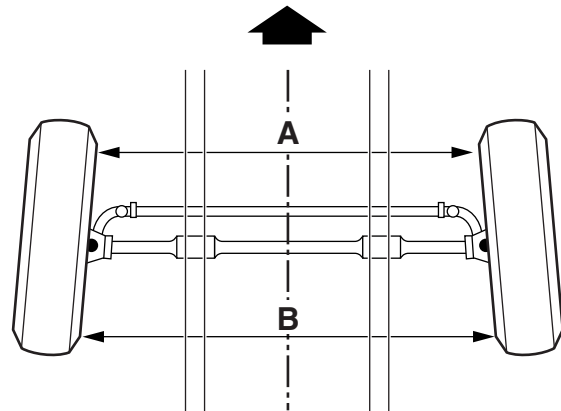
TECHNICAL DATA**7**

F36 and F48 front axle

LF45/55 series**0****Toe**

Measured at the side walls of the tyre (B - A)
in unloaded condition

- F36 axle, toe-in 0 - 1.6 mm
- F48 axle, toe-in 0 - 1.6 mm



S7 00 833

Steering ball joints

Axial play

max. 1.5 mm

Swivel axle

Axial play

- F36 axle 0.05 - 0.12 mm
- F48 axle 0.05 - 0.12 mm

List of shim sizes (thickness) for adjusting
swivel axle play

0.05 mm
0.125 mm
0.25 mm
1.00 mm

Hub

Wheel bearing play

- F36 axle 0.05 -0.20 mm
- F48 axle 0.05 -0.20 mm

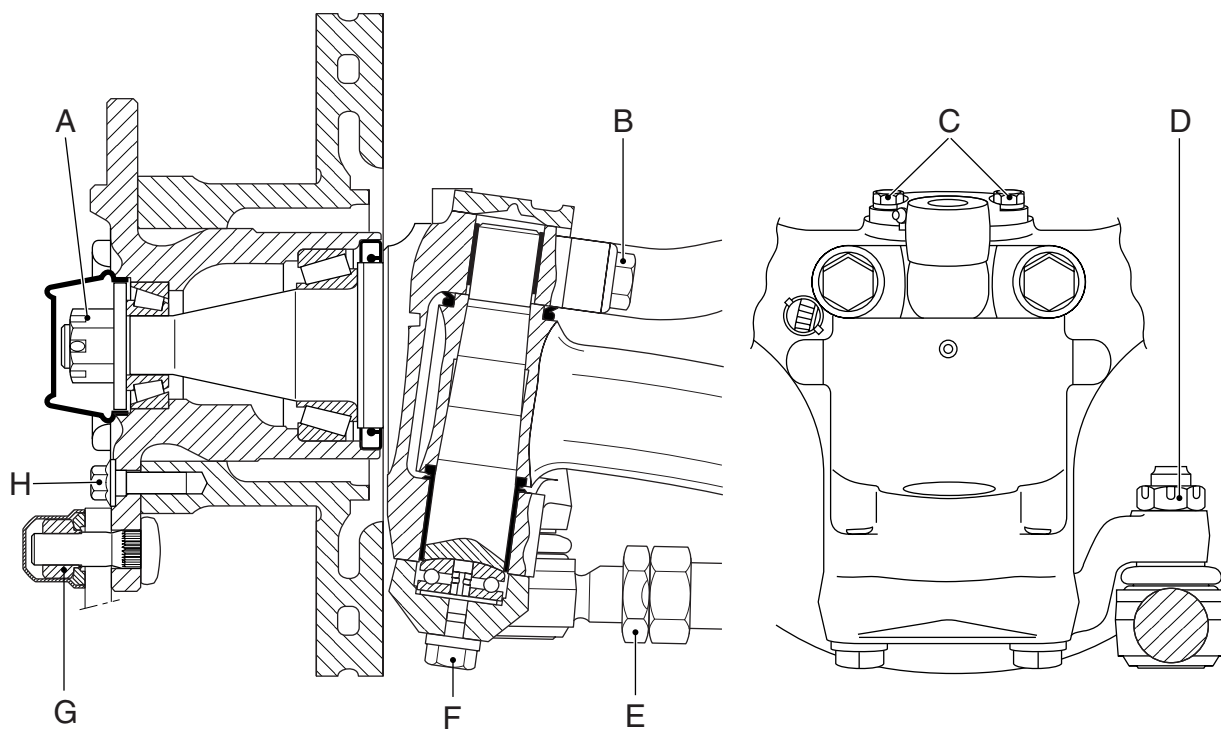
4.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

TECHNICAL DATA**7**

F36 and F48 front axle

LF45/55 series**0**

S7 00 748

A. Hub nut	75 Nm ⁽¹⁾
B. Steering-rod arm attachment bolt	255 ± 15 Nm
C. Top attachment bolt for king-pin cover	25 Nm
D. Track rod castle nut	175 ± 10 Nm ⁽²⁾
E. Track rod lock nut	130 ± 10 Nm ⁽³⁾
F. Bottom attachment bolt for king-pin cover	120 ± 5 Nm
G. Wheel nut	
- F36 axle (M18 x 1.5)	370 ± 30 Nm ⁽⁴⁾
- F48 axle (M20 x 1.5)	485 ± 35 Nm ⁽⁴⁾
H. Hub attachment bolt	115 ± 5 Nm

- (1) Turn the nut anticlockwise (approx. 90°) until the specified wheel bearing play is achieved. Lock with split pin.
- (2) Tighten until the split pin fits (max. 60°).
- (3) Lock nut using locking plate.
- (4) Retighten after 100 km. If new wheel bolts have been fitted, the wheels need additional retightening after 500 km.

5. F60 FRONT AXLE

5.1 GENERAL

Axle journal

Anti-corrosion agent Gleitmo 805

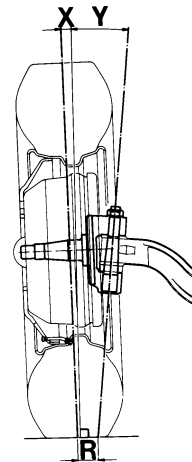
Wheel speed sensor

Anti-corrosion agent Molykote P37

Camber angle and kingpin inclination (KPI)

Camber angle (X) on an unloaded axle $0^{\circ}30'$

King-pin inclination (Y) $7^{\circ}15'$



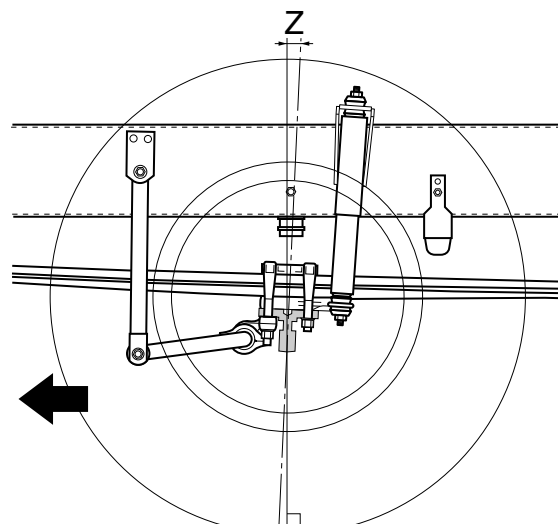
S7 00 129

Wheel deflection

Maximum inner wheel deflection 50°

Caster

Z = caster 3°



S7 00 607

TECHNICAL DATA

7

F60 front axle

LF45/55 series

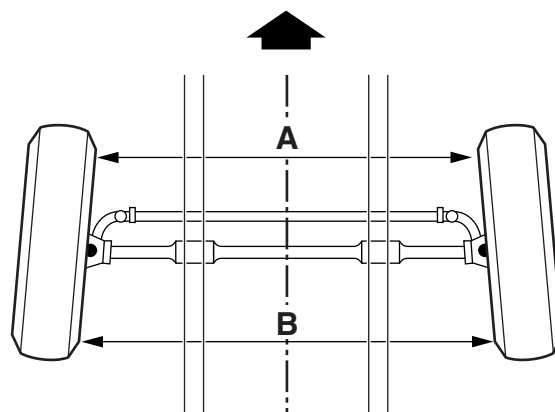
0

Toe

Measured at the side walls of the tyre (B - A)
in unloaded condition

Toe-in

0 - 1.6 mm



S7 00 833

Steering ball joints

Axial play

max. 1.5 mm

King pin

Press-in force

150 kN

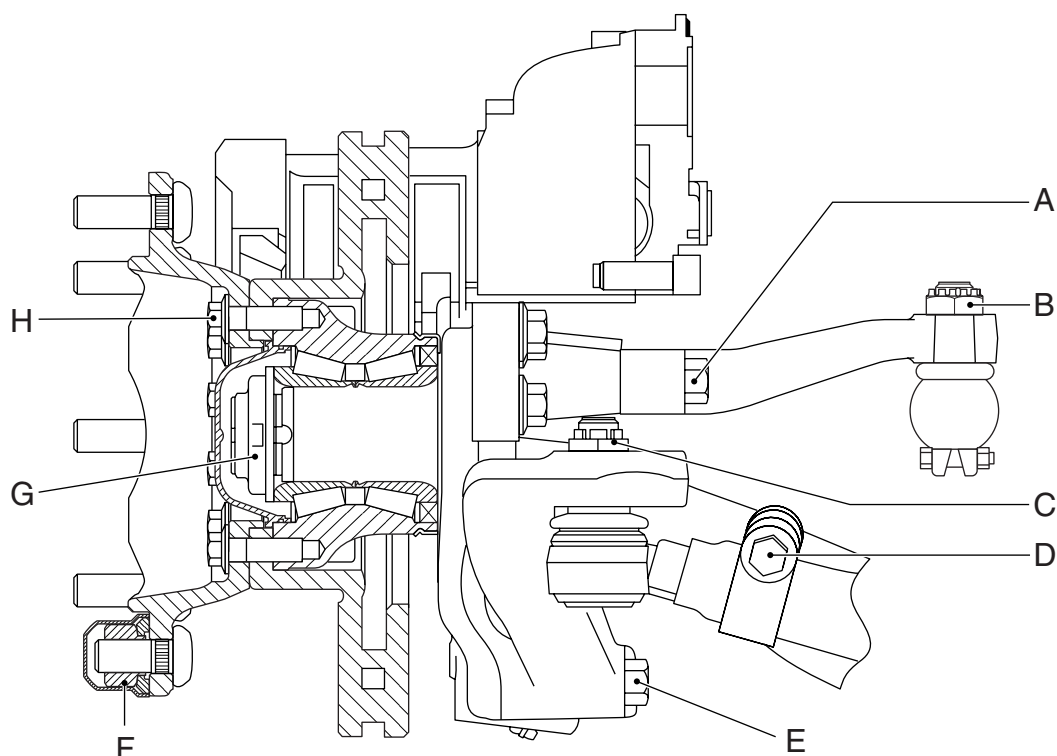
5.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

TECHNICAL DATA**7**

F60 front axle

LF45/55 series**0**

S7 00 698

- | | |
|-------------------------------------|--|
| A. Steering-rod arm attachment bolt | 370 ± 35 Nm ⁽¹⁾ |
| B. Steering rod castle nut | 220 Nm ⁽²⁾ |
| C. Track rod castle nut | 280 ± 25 Nm ⁽²⁾ |
| D. Clamping bracket attachment bolt | 80 ± 10 Nm ⁽³⁾ |
| E. Track-rod arm attachment bolt | 420 ± 40 Nm ⁽¹⁾ |
| F. Wheel nut (M20 x 1.5) | 485 ± 35 Nm ⁽⁴⁾ |
| G. Hub nut | |
| - 1 st phase | 300 Nm ⁽⁵⁾ |
| - 2 nd phase | turn the hub through 10 rotations ⁽⁶⁾ |
| - 3 rd phase | 350 Nm |
| - 4 th phase | turn the hub through 10 rotations ⁽⁶⁾ |
| - 5 th phase | 685 ± 65 Nm |
| H. Wheel hub attachment bolt | 210 ± 40 Nm |

- (1) Apply Loctite 243 to the attachment bolt.
 (2) Tighten until the split pin fits (max. 60°).
 (3) Fit new self-locking nut.
 (4) Retighten after 100 km. If new wheel bolts have been fitted, the wheels need additional retightening after 500 km.
 (5) Fit new hub nut.
 (6) Rotate the hub at a speed of approx. 40 rpm.

6. 152N FRONT AXLE

6.1 GENERAL

Axle journal

Anti-corrosion agent Gleitmo 805

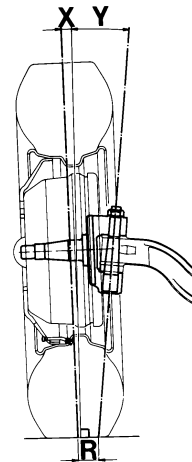
Wheel speed sensor

Anti-corrosion agent Molykote P37

Camber angle and kingpin inclination (KPI)

Camber angle (X) on an unloaded axle 1°

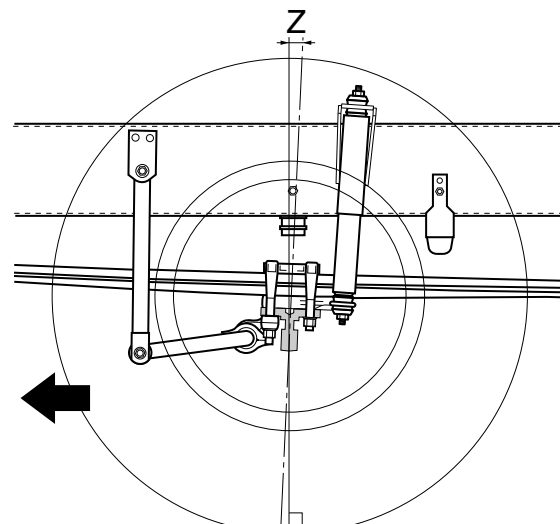
King-pin inclination (Y) $7^{\circ}30'$



S7 00 129

Caster

Z = caster 3°



S7 00 607

TECHNICAL DATA**7**

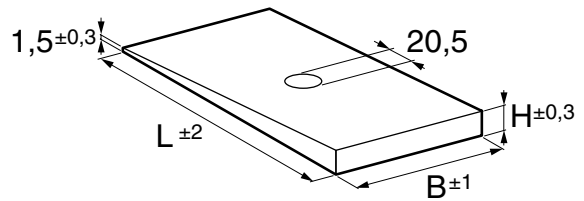
152N front axle

LF45/55 series

List of keys that can be supplied for adjusting caster (Z)

Key angle	W ⁽¹⁾	L	H
0.5°	78	155	2.85
1°	78	155	4.20
1.5°	78	155	5.55
2°	78	155	6.91
2.5°	78	155	8.26
3°	78	155	9.62

(1) Spring leaf width



S7 00 107

Wheel deflection

Maximum inner wheel deflection 50°

Toe

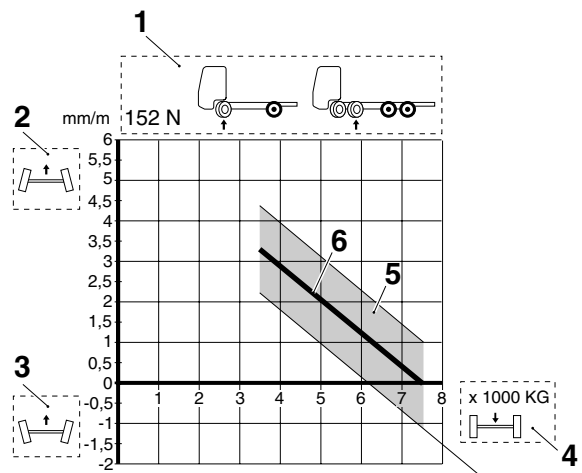
Toe values are shown in the graph.

Note:

In the graph, the toe has a value of 0.5 ± 1 mm/m toe-in at 75% of the permissible loading weight. The axle load consists of the unloaded axle weight + loading weight.

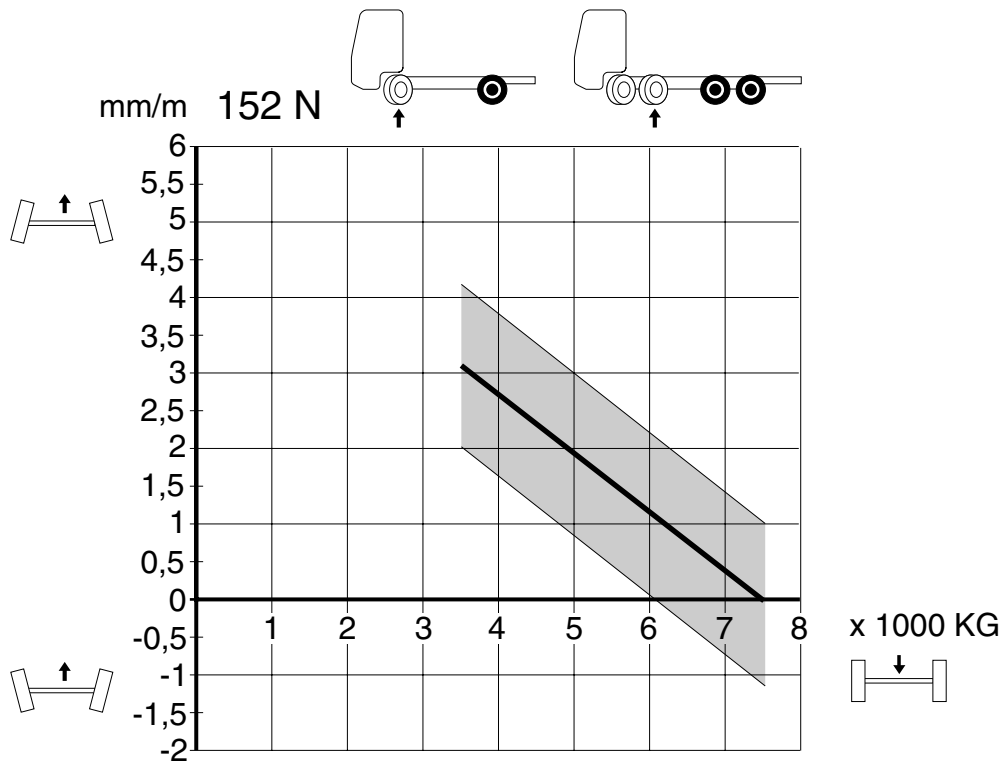
Explanation of graph

- At the top of the graph, the axle type and the axle configuration (1) is shown.
- The toe is shown in mm/m on the left-hand side of the graph. The values above the 0 line show toe-in values, indicated by the symbol (2). The values below the 0 line show toe-out values, indicated by the symbol (3). The toe-out values are shown as negative values.
- The axle load (4) is shown at the bottom of the graph.
- The permitted toe at any axle load is indicated by the shaded area (5) in the graph.
- If the measured value lies outside the shaded area, the toe must be adjusted to the value indicated by the continuous line (6).



S7 00 422

Toe, 152N front axle



Steering ball joints

Axial play max. 1.5 mm

Swivel axle

Axial play 0.05 - 0.3 mm

List of shim sizes (thickness) for adjusting swivel axle play

- 1.50 mm
- 1.75 mm
- 1.88 mm
- 2.00 mm
- 2.13 mm
- 2.25 mm
- 2.38 mm

TECHNICAL DATA

7

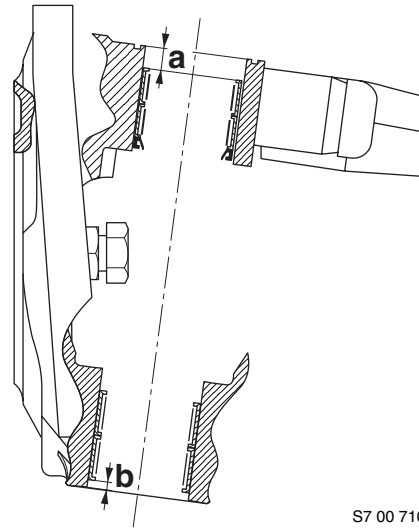
152N front axle

LF45/55 series

0

Wheel offset of needle bearings

- dimension a: 12 - 13 mm
- dimension b: 3 - 4 mm



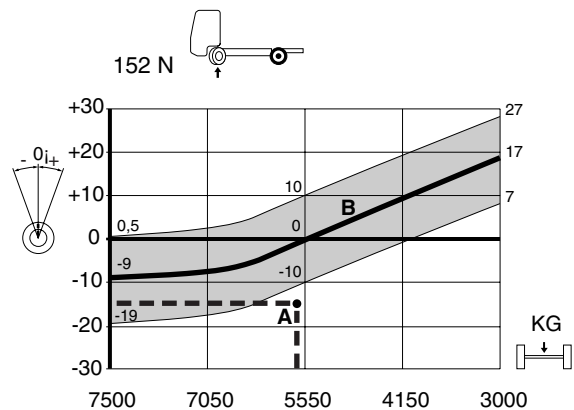
S7 00 710

Steering rod adjustment

The angle between the marks on the steering box input shaft and the mark on the steering box for adjusting the steering rod are shown in the graph. This angle is shown with the wheels of the front axle in the "straight ahead" position.

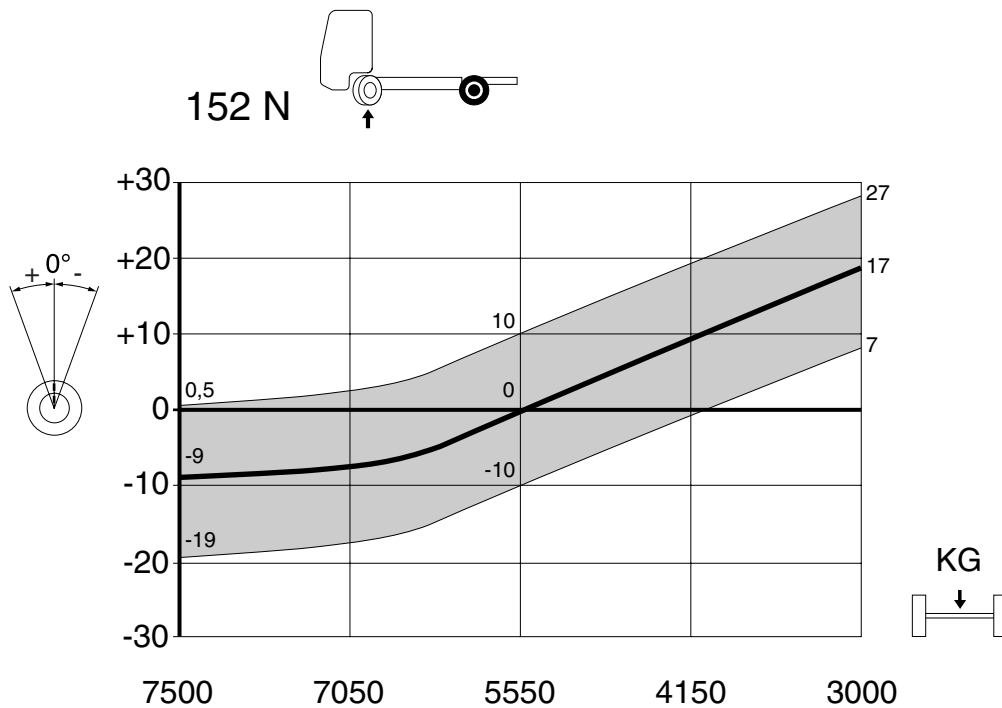
Explanation of graph

1. The axle type and the axle configuration (1) is shown at the top of the graph.
2. The angle between the marks on the steering box input shaft and the mark on the steering box (2) are shown on the left-hand side of the graph.
Note that there are two different graphs for LHD and RHD vehicles.
3. The front axle load (3) is shown at the bottom of the graph.
4. The permitted angle at any axle load is indicated by the shaded area (4) in the graph.
5. If the measured value lies outside the shaded area (4), the angle must be adjusted to the value indicated by the continuous line (5). Set the correct angle by screwing the ball end of the steering rod in or out.



S7 00 877

Steering rod adjustment, LHD vehicles



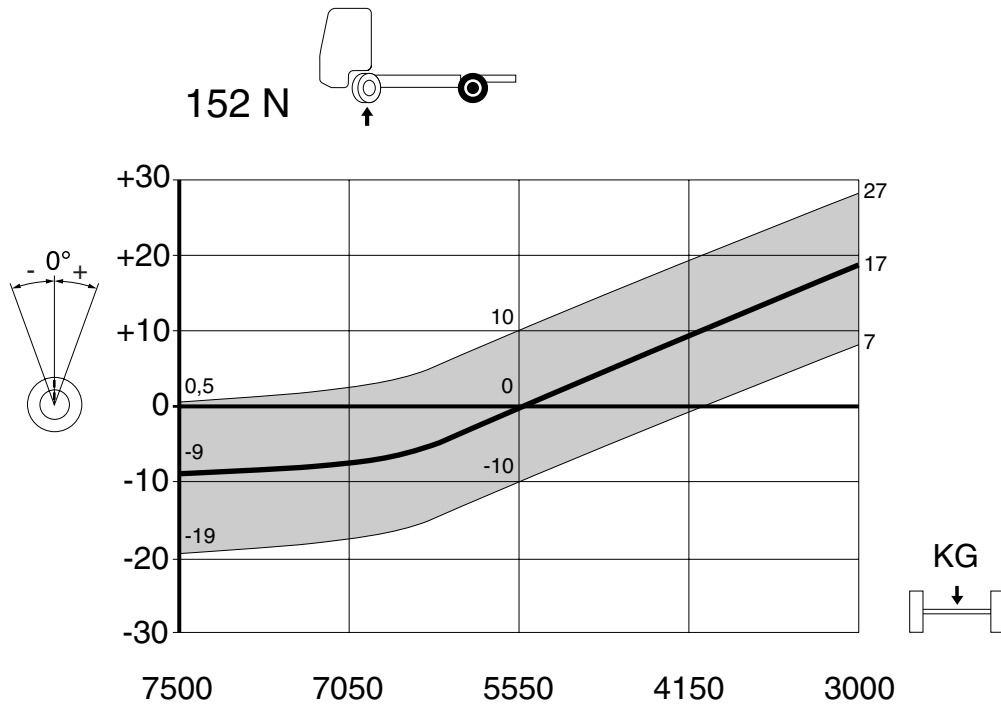
S7 00 886

Note:

“+” on the vertical axis of the graph indicates towards the driver’s side. “-” indicates towards the co-driver’s side.

TECHNICAL DATA**7**

152N front axle

LF45/55 series**Steering rod adjustment, RHD vehicles****0**

S7 00 876

Note:

“+” on the vertical axis of the graph indicates towards the driver’s side. “-” indicates towards the co-driver’s side.

Steering rod arm

Abutting surface of steering rod arm to swivel axle treated with

Loctite 2701

Wheel speed sensor ring

Axial end play

max. 0.25 mm

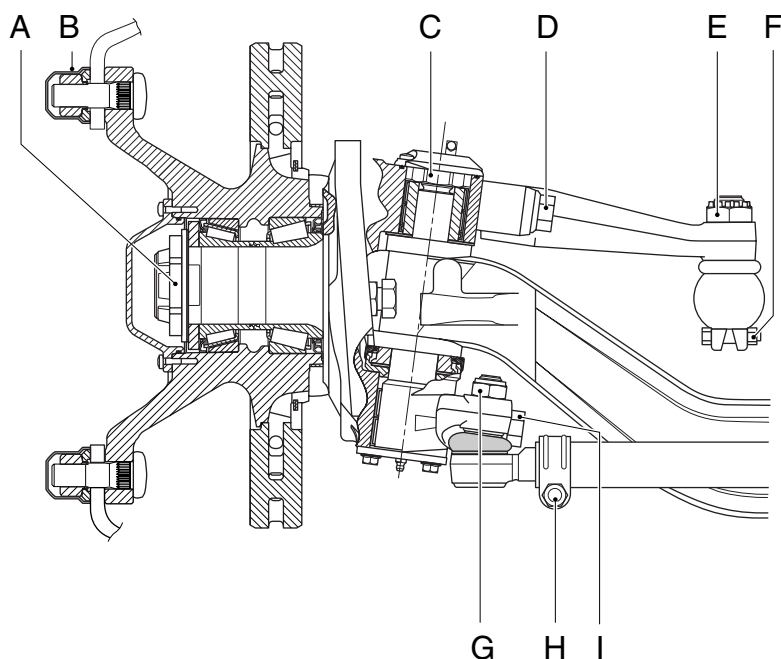
6.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

TECHNICAL DATA**7**

152N front axle

LF45/55 series**0**

S7 00 883

- | | | |
|----|---|--|
| A. | Hub nut of wheel hub unit | |
| - | 1 st phase | 400 Nm ⁽¹⁾ |
| - | 2 nd phase | turn the hub through 10 rotations ⁽²⁾ |
| - | 3 rd phase | 450 Nm |
| - | 4 th phase | turn the hub through 10 rotations ⁽²⁾ |
| - | 5 th phase | 950 Nm |
| B. | Wheel nut | 700 Nm ⁽³⁾ |
| C. | King-pin nut | 595 Nm ⁽⁴⁾ |
| D. | Steering-rod arm attachment bolt | 500 Nm + 90° angular displacement ⁽⁵⁾ |
| E. | Steering rod castle nut | 220 Nm ⁽⁶⁾ |
| F. | Attachment bolt, steering-rod clamping bracket | 90 Nm ⁽¹⁾ |
| G. | M20 attachment nut, track rod | 225 Nm ⁽⁷⁾ |
| H. | M12 attachment bolt, track rod clamping bracket | 80 Nm ⁽¹⁾ |
| I. | Track rod arm attachment bolt | 500 Nm + 90° angular displacement ⁽⁵⁾ |

- (1) Fit new nut.
- (2) Rotate the hub at a speed of approx. 40 rpm.
- (3) Retighten after 100 km. If new wheel bolts have been fitted, the wheels need additional retightening after 500 km.
- (4) Apply Loctite 243 to the nut.
- (5) Fit new attachment bolt. Apply Loctite 243 to the attachment bolt.
- (6) Tighten until the split pin fits (max. 60°).
- (7) Check the screw thread of the ball end for damage. Fit new self-locking nut. Apply Loctite 243 to the nut.

7. STEERED TRAILING SWIVEL AXLE

7.1 GENERAL

Axle journal

Anti-corrosion agent Gleitmo 805

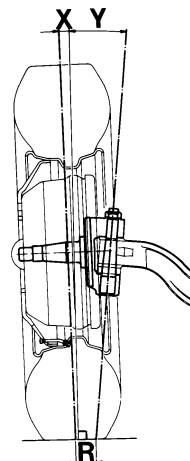
Wheel speed sensor

Anti-corrosion agent Molykote P37

Camber angle and kingpin inclination (KPI)

Camber angle (X) on an unloaded axle $0^{\circ}30'$

King-pin inclination (Y) $7^{\circ}15'$



S7 00 129

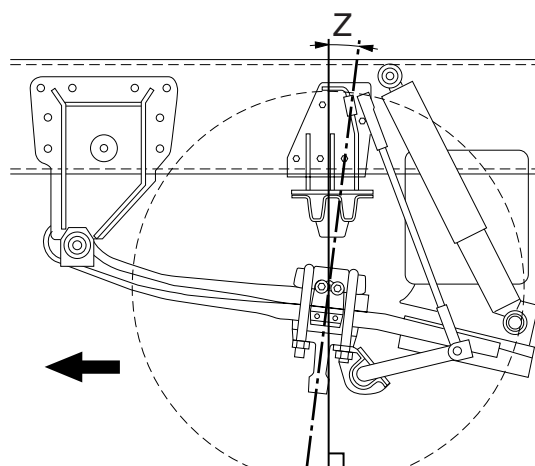
Wheel deflection

Maximum inner wheel deflection 20°

Caster

Z = caster

- unloaded 3°
- loaded 5.4°



S7 00 835

TECHNICAL DATA

7

Steered trailing swivel axle

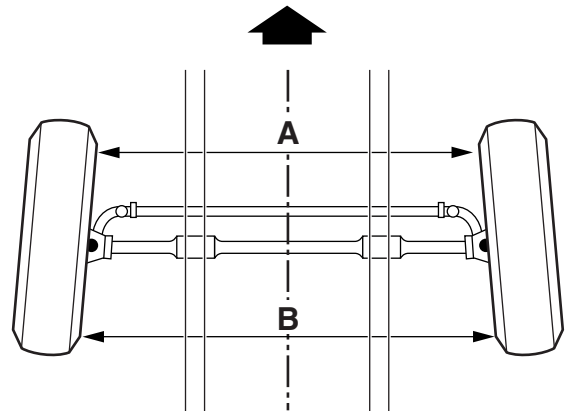
LF45/55 series

0

Toe

Measured at the side walls of the tyre (B - A)
in unloaded condition

Toe-in 0 - 1.6 mm



S7 00 833

Steering ball joints

Axial play max. 1.5 mm

King pin

Pressing force 150 kN

Steering cylinder

Length, retracted 982 ± 5 mm

Length, centre position 1092 ± 5 mm

Length, extended 1202 ± 5 mm

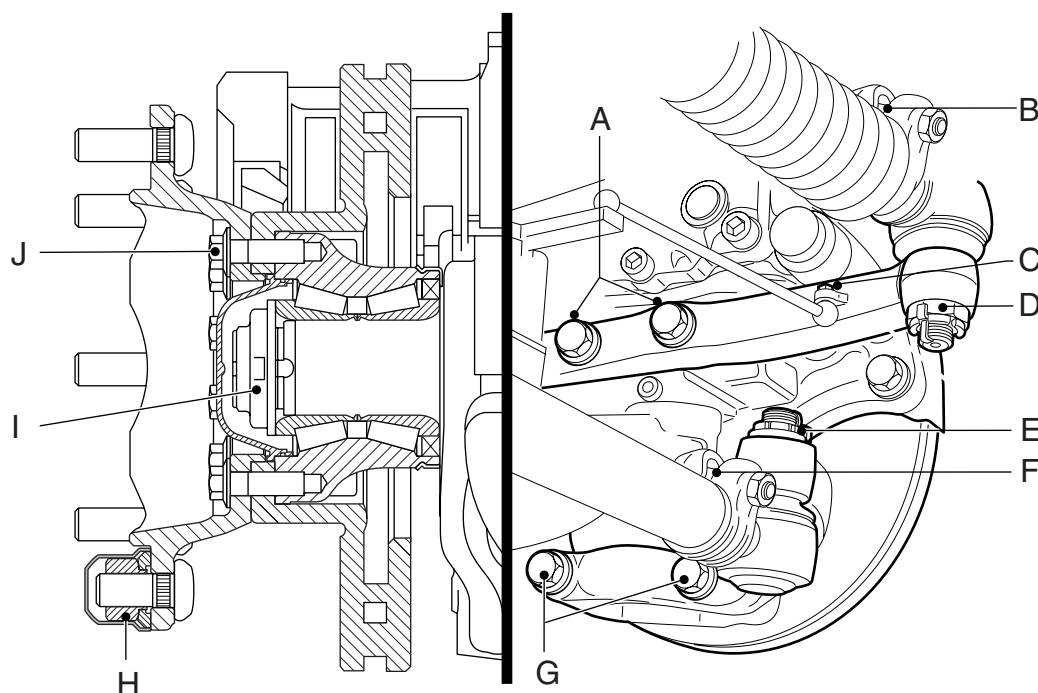
7.2 TIGHTENING TORQUES

The tightening torques stated in this section are different from the standard tightening torques included in the overview of standard tightening torques. Any other threaded connections that are not specified must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the ones removed.

TECHNICAL DATA**7**

Steered trailing swivel axle

LF45/55 series**0**

S7 00 891

A. Steering cylinder arm attachment bolt	370 ± 35 Nm ⁽¹⁾
B. Attachment bolt, steering cylinder clamping bracket	45 Nm ⁽²⁾
C. Attachment nut, trailing axle angle sensor control rod	23 Nm
D. Steering cylinder castle nut	260 ± 20 Nm ⁽³⁾
E. Track rod castle nut	280 ± 25 Nm ⁽³⁾
F. Track rod clamping bracket attachment bolt	80 ± 10 Nm ⁽²⁾
G. Track rod arm attachment bolt	420 ± 40 Nm ⁽¹⁾
H. Wheel nut (M20 x 1.5)	485 ± 35 Nm ⁽⁴⁾
I. Hub nut	
- 1 st phase	300 Nm ⁽⁵⁾
- 2 nd phase	turn the hub through 10 rotations ⁽⁶⁾
- 3 rd phase	350 Nm
- 4 th phase	turn the hub through 10 rotations ⁽⁶⁾
- 5 th phase	685 ± 65 Nm
J. Wheel hub attachment bolt	210 ± 40 Nm

(1) Replace the attachment bolts and apply Loctite 243.

(2) Fit new self-locking nut.

(3) Tighten until the split pin fits (max. 60°).

(4) Retighten after 100 km. If new wheel bolts have been fitted, the wheels need additional retightening after 500 km.

(5) Fit new hub nut.

(6) Rotate the hub at a speed of approx. 40 rpm.

CONTENTS

	Page	Date
1. STEERING GEAR, GENERAL	1-1	200322
1.1 Fault-finding table	1-1	200322

DIAGNOSTICS

7

Contents

LF45/55 series

1

1. STEERING GEAR, GENERAL

1.1 FAULT-FINDING TABLE

SYMPTOM: HEAVY STEERING, TO BOTH SIDES	
Possible cause	Remedy
Tyre pressure of steerable wheels too low.	Check the tyre pressure. Increase tyre pressure to the specified value.
Semi-trailer coupling damaged or insufficiently lubricated.	Inspect/lubricate semi-trailer coupling.
Axle load of steerable axle(s) too high.	Check axle load. Adjust the load.
Steering oil level too low.	Check steering oil level. Top up oil and bleed system. Check system for leaks.
Air in the system.	Bleed the system. Check steering oil for foaming.
Filter is extremely dirty.	Check filter. Replace the filter, if necessary.
Steering oil pipe kinked or pinched off.	Check routing of the steering oil pipes.
The intake opening in the reservoir is (partially) blocked.	Check intake opening in the reservoir.
Tight steering column bearings or universal joint(s).	Jack up front axle and check the steering column tightening torque.
Tight swivel axle bearing.	Check steerable axle(s).
Excessive caster.	Check caster. Reduce if necessary.
System pressure too low.	Check maximum system pressure. Replace pressure-limiting valve or steering pump.
Steering pump output too low.	Check pump output. Check whether the flow-control valve is jammed. Replace steering pump, if necessary.
Excessive internal steering box leakage	Check for internal leaks in steering box.

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**SYMPTOM: HEAVY STEERING, TO ONE SIDE**

Possible cause	Remedy
Faulty two-way valve, on a vehicle with steered trailing swivel axle.	Check operation of two-way valve.
Dirty high-pressure filter, on a vehicle with steered trailing swivel axle.	Check high-pressure filter. Replace the filter, if necessary.
Tyre pressure of steerable wheels too low.	Check the tyre pressure. Increase tyre pressure to the specified value.
Semi-trailer coupling damaged or insufficiently lubricated.	Inspect/lubricate semi-trailer coupling.
Steering oil level too low.	Check steering oil level. Top up oil and bleed system. Check system for leaks.
Air in the system.	Bleed the system. Check steering oil for foaming.
Wheel-deflection limiting valves set incorrectly.	Check setting of the wheel deflection limiting valves.
Tight swivel axle bearing.	Check steerable axle(s).
Misalignment of the steering column universal joints.	Check/adjust position of the universal joints in relation to each other.
Excessive internal steering box leakage on one side.	Check for internal leaks in steering box.

1

SYMPTOM: HEAVY STEERING, OCCASIONALLY	
Possible cause	Remedy
Semi-trailer coupling damaged or insufficiently lubricated.	Inspect/lubricate semi-trailer coupling.
Steering oil level too low.	Check steering oil level. Top up oil and bleed system. Check system for leaks.
Air in the system.	Bleed the system. Check steering oil for foaming.
The steering oil pipe is temporarily kinked or pinched off.	Check routing of the steering oil pipes.
The intake opening in the reservoir is temporarily blocked.	Check reservoir for impurities.
Steering pump output too low because flow-control valve is jammed.	Check the flow-control valve for smooth operation.
Low steering-pump output in "cold condition" and at low engine speed because the partitions jam in the rotor.	Check pump output when steering pump is "cold". Replace steering pump.
Excessive internal steering box leakage at lower pressures.	Check internal steering box leakage at a set pressure of 15-30 bar.
Faulty two-way valve, on a vehicle with steered trailing swivel axle.	Check operation of the two-way valve.

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**SYMPTOM: WHEEL DEFLECTION TOO SMALL**

Possible cause	Remedy
The vehicle is being steered when at a standstill.	Steer while the vehicle is moving.
Incorrect setting of maximum wheel deflection on the axle.	Check maximum wheel deflection and, if adjusted incorrectly, correct.
Wheel deflection limiting valves incorrectly adjusted.	Check setting of the wheel deflection limiting valves.
Axle load of steerable axle(s) too high.	Check the axle load(s). Adjust the load.
System pressure too low.	Check maximum system pressure. Replace pressure-limiting valve or steering pump.
Steering rod adjusted incorrectly.	Check steering rod setting.
Pitman arm installed in the wrong position on steering box output shaft.	Check whether position of pitman arm on the sector shaft is correct, using the marks.
Sector shaft is installed in the wrong position in the steering box.	Put steering box in the central position and check whether the sector shaft is correctly installed, using the marks on the input shaft and on the sector shaft.

1

SYMPTOM: VEHICLE PULLS TO ONE SIDE	
Possible cause	Remedy
Uneven weight distribution causing the vehicle to tilt.	Adjust the weight distribution.
Semi-trailer coupling insufficiently lubricated.	Lubricate semi-trailer coupling.
Driving over cambered roads.	When driving over cambered roads, bear in mind that the vehicle might pull to one side.
Difference in tyre pressure between the wheels on the steerable axle(s).	Check the tyre pressure. Pump both tyres up to the specified value.
Different tyre types or difference in tread depth between tyres of the steerable axle(s).	Always fit tyres of the same type and tread depth on the axle.
Different wheel rims installed on the steerable axle(s).	Always install wheel rims of the same type on the axle.
Fault in one of the tyres.	Replace the tyre on the side to which the vehicle pulls.
Steerable axle brake(s) continue to "hang".	Check brakes. Carry out any repairs.
Misalignment of the steering column universal joints.	Check/adjust position of the universal joints in relation to each other.
Excessive wheel bearing play.	Check the wheel bearings for play. Replace the wheel bearings if necessary.
Incorrect caster.	Check caster. Set correct caster.
Incorrect camber angle.	Check camber angle. Check axle housing.
Incorrect alignment of steerable axle(s).	Check alignment of the steerable axle(s.) Adjust steering rod correctly.
Alignment/calibration of steered trailing swivel axle incorrect.	Check alignment/calibration of steered trailing swivel axle. Correct alignment/calibration.
Alignment of rear axle(s) or of trailer/semi-trailer incorrect.	Check alignment of the rear axle(s) or of trailer/semi-trailer. Align axles.

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**SYMPTOM: VEHICLE PULLS TO ONE SIDE**

Possible cause	Remedy
Front-axle/rear-axle suspension play.	Check suspension. Replace worn parts.
Difference in spring opening between the leaf springs of one axle	Measure the spring opening of the springs. Replace springs.
Incorrect setting of air suspension. This will cause the vehicle to tilt.	Check height adjustment. Set the height control correctly.
Steering-pump output too high.	Check pump output. Check the flow-control valve for smooth operation.
Incorrect hydraulic central position of the steering box.	Check the hydraulic central position of the steering box. The hydraulic central position cannot be adjusted. Replace the steering box.

1

SYMPTOM: VEHICLE IS SEARCHING, TRACKING INSTABILITY	
Possible cause	Remedy
Tyre pressure of steerable wheels too low.	Check the tyre pressure. Increase tyre pressure to the specified value.
Semi-trailer coupling insufficiently lubricated or damaged.	Inspect/lubricate semi-trailer coupling.
Incorrect steering-box pressure-point setting; play at the pressure point or pressure point set too tight.	Check pressure point setting. Set correct pressure point.
Axle load on front axle too low.	Check axle load and adjust the load.
Incorrect toe-in.	Check toe-in. Set correct toe-in.
Incorrect caster.	Check caster. Set correct caster.
Alignment/calibration of steered trailing swivel axle incorrect.	Check alignment/calibration of steered trailing swivel axle. Correct alignment/calibration.
Play in a universal joint or in the steering column sliding joint. Tight universal joint.	Check universal joints and the steering column sliding joint. Replace worn parts.
Misalignment of the universal joints in the steering column.	Check/adjust position of the universal joints in relation to each other.
Play in the steering-rod ball joints	Check ball joints. Replace ball joint.
Steering box, steering bracket or steering rod attachment loose.	Check attachments, retighten bolts/nuts.
Worn or tight swivel axle bearing.	Check swivel axle bearing. Replace worn parts.
Incorrect steering-rod adjustment; when the wheels are in the "straight ahead" position, the steering box is not in its mechanical central position (pressure point).	Check steering rod setting. Adjust steering rod correctly.
Front-axle and/or rear-axle suspension play.	Check axle suspension. Replace worn parts.

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**1**

SYMPTOM: VEHICLE IS SEARCHING, TRACKING INSTABILITY	
Possible cause	Remedy
Steering pump output too high.	Check steering pump output. Check the flow-control valve for smooth operation. Replace steering pump, if necessary.
Excessive internal steering box resistance.	Check internal steering box resistance. Replace steering box.
Internal defect in the steering box.	Replace steering box.

SYMPTOM: STEERING WHEEL DOES NOT RETURN TO THE "STRAIGHT AHEAD" POSITION (OR ONLY VERY SLOWLY)	
Possible cause	Remedy
Tyre pressure of steerable wheels too low.	Check the tyre pressure. Increase tyre pressure to the specified value.
Semi-trailer coupling insufficiently lubricated or damaged.	Inspect/lubricate semi-trailer coupling.
Misalignment of the steering column universal joints.	Check/adjust position of the universal joints in relation to each other.
Axle load on front axle too low.	Check axle load and adjust the load.
Incorrect caster.	Check caster. Set correct caster.
Tight universal joint or steering column bearing.	Check universal joints and steering column bearing. Replace worn parts.
Friction between mechanical parts of the steering gear (pitman arm, steering rod/steering arm or track rod/track rod arm).	Check mechanical parts of the steering gear.
Steering box or steering bracket loose.	Check attachments, retighten bolts.
Tight swivel axle bearing.	Check swivel axle bearing.
Steering pump output too high.	Check pump output. Check the flow-control valve for smooth operation. Replace pump.
Pressure point set too tight.	Check pressure point setting. Adjust pressure point correctly.
Excessive internal steering box resistance.	Check internal steering box resistance. Replace steering box.
Internal defect in the steering box.	Replace steering box.

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**SYMPTOM: JOLTING OF THE STEERING WHEEL**

Possible cause	Remedy
Air in the system.	Check steering oil level and bleed system.
Worn or loose shock absorbers on the front axle.	Check the attachment. Replace shock absorbers.
Steering pump output too low.	Check steering pump output.
Loose steering rod, track rod, steering bracket or steering box.	Check/tighten attachment of these components.
Excessive internal steering box play.	Check the input shaft play. Check the steering box pressure point. Replace the steering box.

SYMPTOM: VIBRATIONS IN THE STEERING WHEEL

Possible cause	Remedy
Dirt between wheel rim and hub.	Remove wheel and clean wheel rim and hub. Install wheel in the specified manner.
Wheel studs unevenly tightened.	Loosen all nuts and tighten these as specified.
Wheel imbalance.	Balance wheel statically and dynamically.

SYMPTOM: AIR IN THE STEERING OIL

Possible cause	Remedy
Reservoir oil level too low.	Check the oil level. Top up oil. Check for leaks.
Internal steering pump seals are poor.	Replace steering pump.

1

SYMPTOM: STEERING OIL LEAKAGE	
Possible cause	Remedy
Leaking delivery or return pipe. Leaking delivery or return-pipe connection.	Check the pipes and pipe connections. Tighten pipes securely.
Reservoir or reservoir/steering pump seal leaking.	Replace the reservoir or repair the reservoir/steering pump seal.
Leaking steering pump.	Check the steering pump for leaks.
Leaking steering box.	On the steering box, check the following seals: - input shaft oil seal - cover O-ring on underside of steering box - pressure-limiting valve O-ring - wheel-deflection limiting valve stop bolts - various plugs and connection nipples Depending on the leak, replace the input shaft oil seal, the O-ring of the cover on the underside of the steering box, the pressure-limiting valve O-ring, the stop bolt and wheel-deflection limiting valve sealing rings and the seals of the various plugs and connection nipples. Replace the steering box in the case of leaks other than those described above.
The melting point of the grease behind the dust seal of the sector shaft or the input shaft is too low. There appears to be a leak in the steering box, but in fact the grease has melted.	Replace the grease with grease of the specified type (melting point > 130°C).

DIAGNOSTICS**7**

Steering gear, general

LF45/55 series**NOISE****Note:**

The steering gear always produces noise.

Normal noise:

- a hissing noise in the steering box while steering. The noise level depends on the system pressure.
- an increasing sound level when the wheel-deflection limiting valve is opened.
- a maximum sound level when the pressure-limiting valve is opened.

SYMPTOM: STEERING PUMP PRODUCES A SQUEALING NOISE WHILE STEERING

Possible cause	Remedy
Oil level too low, causing the steering pump to draw air.	Check the oil level. Top up oil and check for leaks.
Air in the steering oil.	Check oil for the presence of air (foaming). Bleed system and trace the cause.
The intake opening in the reservoir is (partially) blocked.	Check intake opening in the reservoir.

SYMPTOM: THE STEERING PUMP PRODUCES A DIFFERENT NOISE WHEN AT IDLING SPEED. THE NOISE LEVEL INCREASES WHEN THE ENGINE SPEED INCREASES

Possible cause	Remedy
Worn steering pump.	Replace steering pump. Replace steering oil. Clean the reservoir and pipes. Replace filter.

1

SYMPTOM: WHEN STEERING THE SOUND OF METAL SCRAPING AGAINST METAL IS HEARD	
Possible cause	Remedy
Loose steering box, steering bracket or pitman arm.	Check attachment of components. Tighten bolts to the specified tightening torque.
Play in a steering-rod or track-rod ball joint.	Check ball joints. Replace ball joint.
There is friction between steering gear components.	Turn steering gear carefully from one stop to the other and check the mechanical part of the steering gear for friction.
Play in the steering column sliding joint.	Check sliding joint for wear. Replace sliding joint.

DIAGNOSTICS

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Steering gear, general

LF45/55 series

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STEERING GEAR, GENERAL

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LF45/55 series

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1. SAFETY INSTRUCTIONS

The steering gear is one of the most important systems on the vehicle in terms of safety. This should be borne in mind at all times when carrying out maintenance and repair work on the steering gear. Always work in a very clean environment; even the smallest amount of dirt in the system can cause faults.

Repair and maintenance work on the steering gear should only be carried out by experienced mechanics with the appropriate training.



If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.

Tighten all joints to the specified torque, see "Technical data".

Always check pipe connections for leaks after tightening.

If the vehicle has been involved in a collision, in which the steering box or other steering gear components (may) have been damaged, the steering box must always be sent to DAF for inspection or be replaced. This requirement still applies even if no external damage is visible. The steering box may have sustained internal damage in the collision, causing it to be unreliable.

The other steering gear components, which could have been damaged, such as the steering and track rods, steering and track-rod arms, steering bracket, pitman arm and the attachments of these components must always be checked for distortions, cracks, fractures, etc. If possible, all components should be magnaflux tested.

Damaged components must always be replaced. If in doubt, always replace the component.

STEERING GEAR, GENERAL

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Safety instructions

LF45/55 series

Always use original DAF components when replacing components.

Do not take risks. Replace components if in doubt.

Welding of steering-mechanism components is prohibited.

Straightening of steering gear components is prohibited.

An incorrect pressure point setting will affect the vehicle's steering characteristics.

Check the thread of the ball end for damage before fitting a new castle nut or self-locking nut to the ball end.

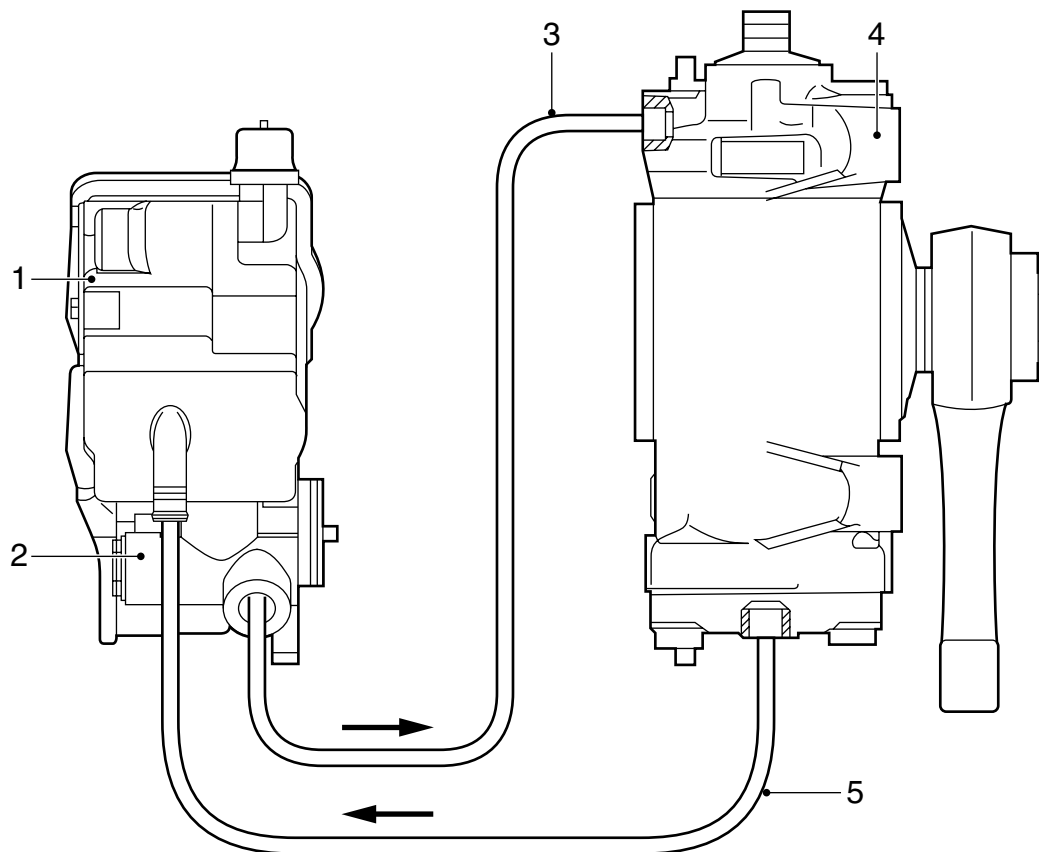


Screwing a new castle nut or self-locking nut onto a ball end with a damaged screw thread can give rise to dangerous situations.

Always take a test drive after completing maintenance or repair work on the steering gear. Be aware during this test drive that the steering gear may not function properly.

2. GENERAL

2.1 OVERVIEW DRAWING OF STEERING GEAR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE



S7 00 536

1. Reservoir
2. Steering pump
3. Delivery pipe
4. Steering box
5. Return pipe

STEERING GEAR, GENERAL

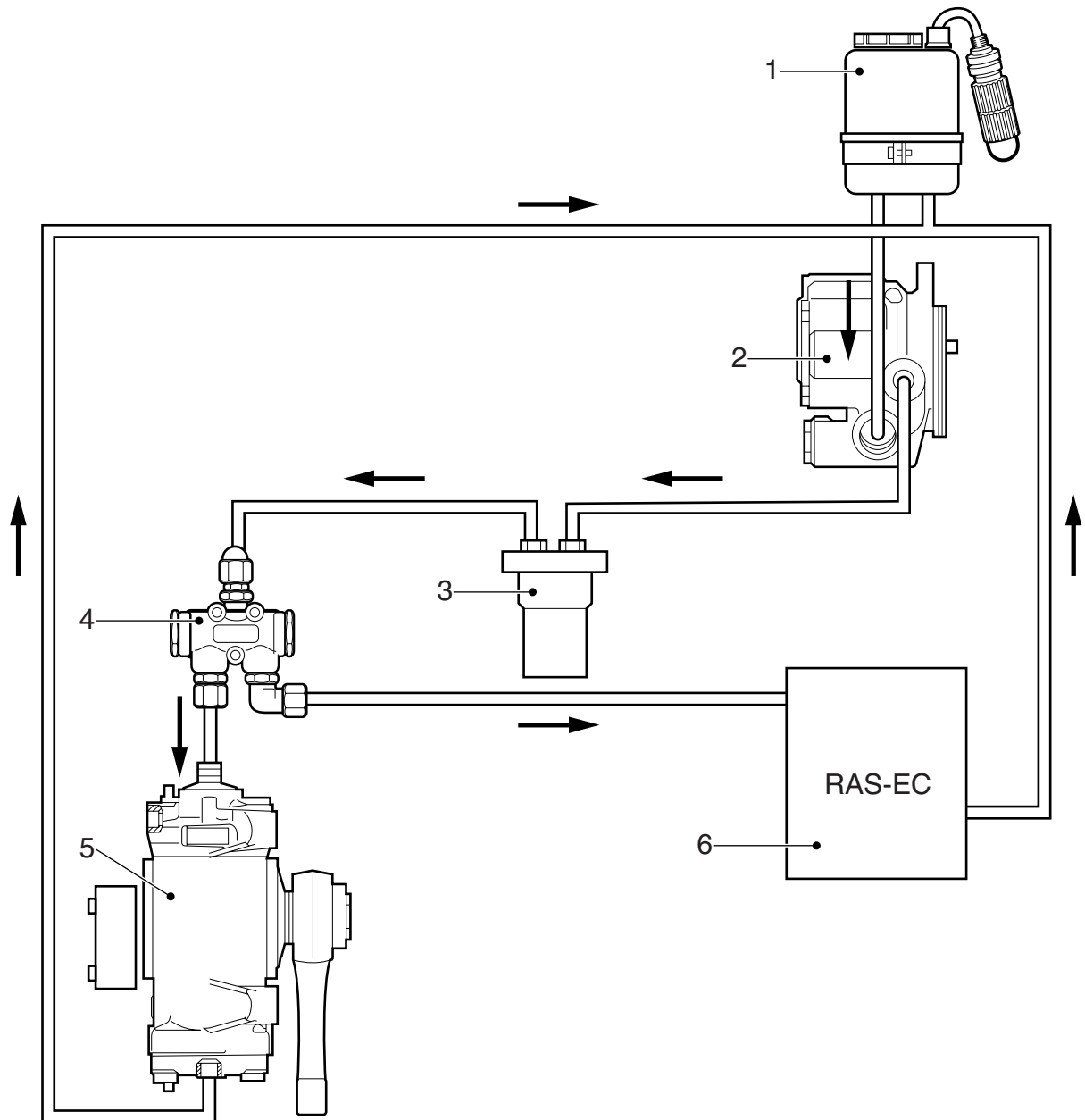
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General

LF45/55 series

2.2 OVERVIEW DRAWING OF STEERING GEAR, VERSION WITH STEERED TRAILING SWIVEL AXLE

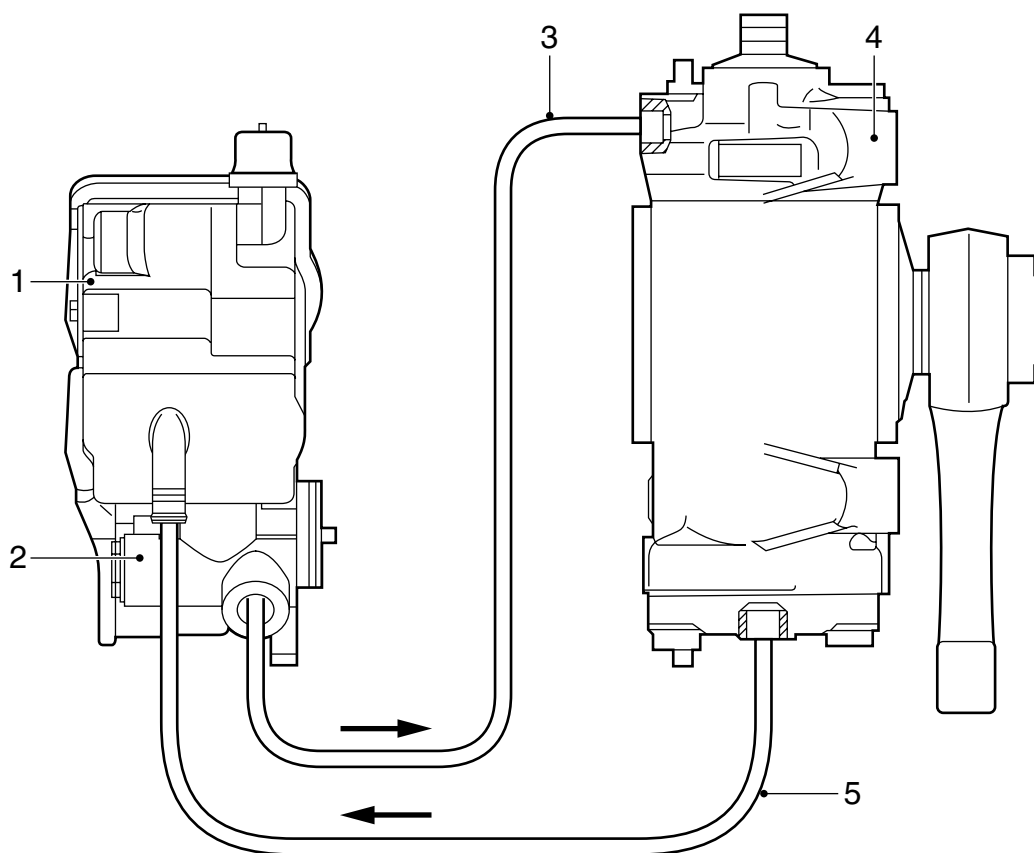
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S7 00 836

1. Reservoir
2. Steering pump
3. High-pressure filter
4. Distribution block
5. Steering box with angle sensor
6. RAS-EC steering gear

2.3 SYSTEM DESCRIPTION OF STEERING GEAR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE



S7 00 536

The oil flows to the steering pump (2) from the reservoir (1) mounted on the steering pump (2). There is a filter in the reservoir (1). The filter and reservoir form part of a single unit. At maximum pump output, the oil is pumped to the reservoir with approx. $\frac{1}{3}$ passing through the filter (2) and approx. $\frac{2}{3}$ of the oil pumped directly to the reservoir (1).

The steering pump is a non-regenerative vane pump. Once the pump starts supplying oil, the steering pump (2) will continue to draw oil by itself.

The steering pump (2) pumps the oil through the delivery pipe (3) to the steering box (4).

STEERING GEAR, GENERAL

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General

LF45/55 series

2

From the steering box (4), the oil is returned to the reservoir (1) through the return pipe (5). The pressure in the return pipe is always low.

The pressure in the delivery pipe (3) varies and depends on the steering force. If there is no steering action, the oil in the delivery pipe is at circulation pressure.

If a steering action takes place, the pressure in the delivery pipe (3) can increase to the preset value of the pressure-limiting valve.

This maximum pressure may occur when the vehicle is steered while at a standstill on a skid-resistant road surface or when the vehicle is parked against a curb and the steering wheel is turned.

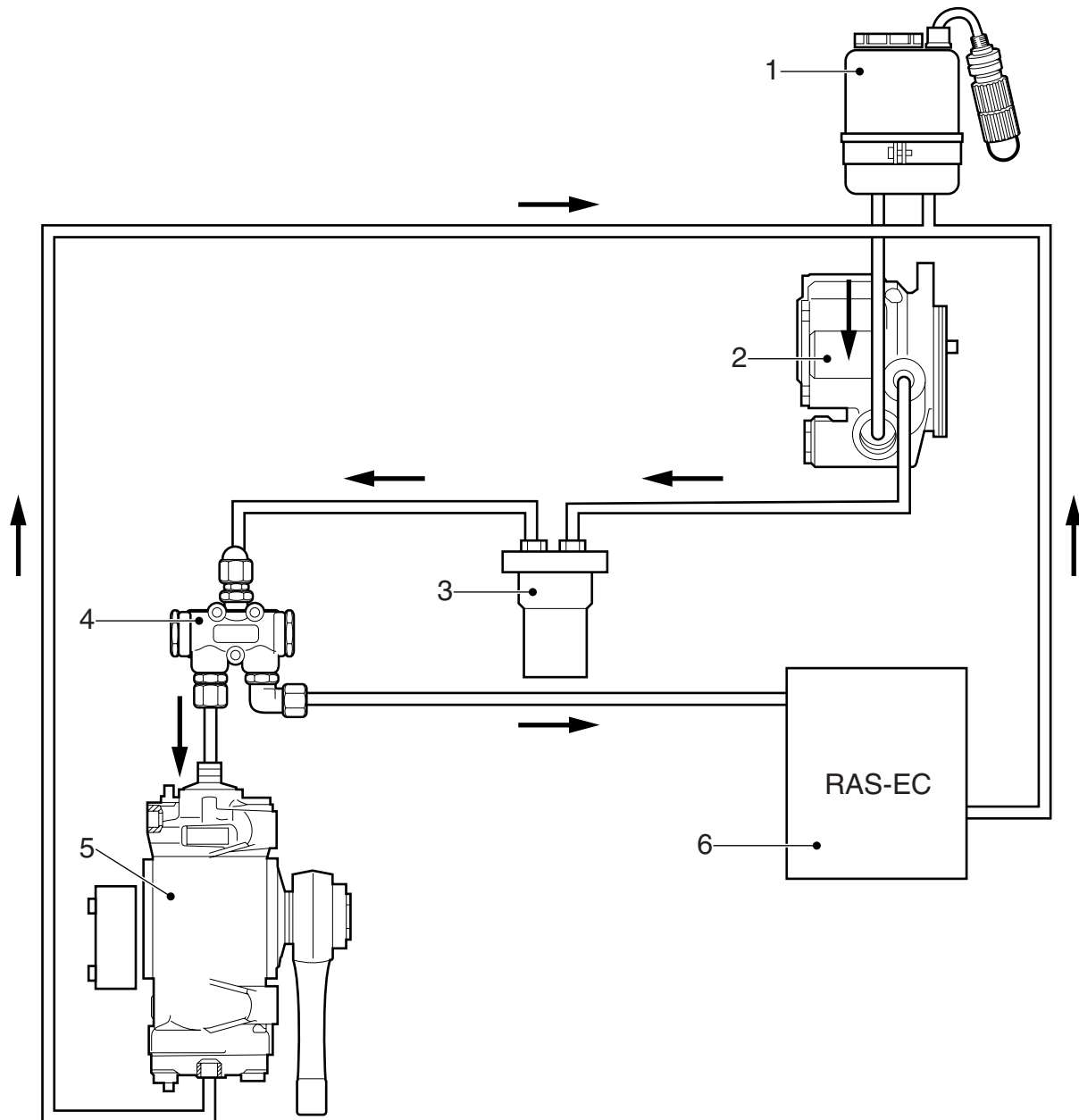
When at maximum pressure a major transmission of energy will take place, resulting in the release of much heat. If this situation lasts too long, the steering pump can be damaged by the heat development.

The steering pump is capable of generating a very high pressure over a short period (depending on the pump type up to approx. 300 bar). This very high pressure can cause certain steering-mechanism components to become overloaded or even to break off. The pressure-limiting valve protects the steering mechanism from excessive pressures. Increasing the system pressure is not permitted. The pressure-limiting valve is located in the steering box. This can be checked using the type plate on the steering box. If a pressure value is stated on the type plate, the component concerned contains a pressure-limiting valve.



It can be very dangerous to replace the steering box or the steering pump with a different type of steering box or pump. Therefore, replacing these components without DAF's express permission is prohibited. If the original type is no longer available, DAF will supply another approved type.

2.4 SYSTEM DESCRIPTION OF STEERING GEAR, VERSION WITH STEERED TRAILING SWIVEL AXLE



S7 00 836

The oil flows to the steering pump (2) from the reservoir (1).
There is a filter element in the reservoir. The filter element is fitted in the return pipe.

STEERING GEAR, GENERAL

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General

LF45/55 series**2**

The steering pump (2) is a non-regenerative vane pump. Once the pump starts supplying oil, the steering pump will continue to draw oil itself. The steering pump pumps the oil through the delivery pipe to the high-pressure filter (3).

The steering oil is pumped from the high-pressure filter to the distribution block (4). The flow of oil is divided into two equal parts in the distribution block: one for the front axle steering gear and one for the rear axle steering gear.

From the steering box (5), the oil is returned to the reservoir (1) through the return pipe. The pressure in the return pipe is always low.

The pressure in the delivery pipe varies and depends on the steering force. If there is no steering action, the oil in the delivery pipe is at circulation pressure.

If a steering action takes place, the pressure in the delivery pipe can increase to the preset value of the pressure-limiting valve.

This maximum pressure can occur when the vehicle is steered while at a standstill on a skid-resistant road surface or when the vehicle is parked against a curb and the steering wheel is turned.

When at maximum pressure a major transmission of energy will take place, resulting in the release of much heat. If this situation lasts too long, the steering pump can be damaged by the heat development.

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It can be very dangerous to replace the steering box or the steering pump with a different type of steering box or pump. Therefore, replacing these components without DAF's express permission is prohibited. If the original type is no longer available, DAF will supply another approved type.

STEERING GEAR, GENERAL

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General

LF45/55 series

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3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING THE STEERING GEAR USING A PRESSURE GAUGE

Note:

A quick check of the steering gear can be carried out using a pressure gauge. The gauge used for checking the final limiting pressure can be used for this purpose.

Only a limited number of measurements can be carried out using a pressure gauge. A test equipment case is required to test the steering pump (output in l/min. at a specific pressure) and the condition of the steering-box (internal sealing, play).

If the cause of the problem cannot be traced with the pressure gauge, the problem on the steering gear should be diagnosed using the test case.



Always check the tightening torque of the steering wheel bolt after the steering wheel has been turned using a torque wrench.

Points for attention when connecting the pressure gauge:

1. Clean the delivery pipe connections that are going to be disconnected.
2. Check the steering box attachment.
3. Check the hydraulic central position.
4. Place proper turning plates under the vehicle's steerable wheels.



Block the vehicle so that it cannot slide off the jack or the turning plates.

STEERING GEAR, GENERAL

7

Inspection and adjustment

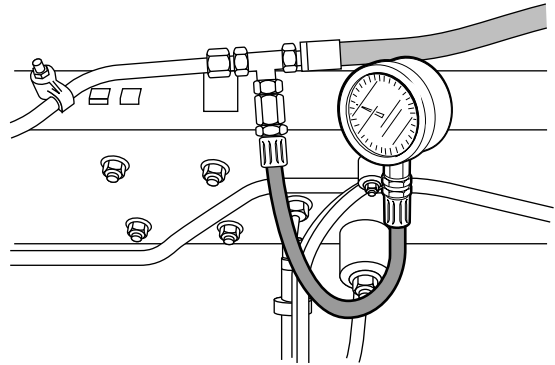
LF45/55 series

Connecting pressure gauge



Only use couplings and pipes which are suitable for the maximum system pressure.

1. Connect the pressure gauge, using the special tool (DAF no. 0535653) to the T-piece in the delivery pipe. Make sure that as little steering oil as possible escapes and clear away spilt oil.
2. Check the steering oil level and top up as necessary.
3. Bleed the steering gear, see "Draining, filling and bleeding".



S7 00 614

Bringing the steering oil up to the test temperature

1. Set the engine speed to 1200 - 1400 rpm.
2. Activate the steering gear for 5 seconds at its maximum, making sure that the pressure does not exceed 50 bar. Do not touch the steering wheel for 5 seconds.
3. Repeat this procedure until the pipes are warm to the touch, at least.

Measuring the circulation pressure

1. Run the engine at idling speed.
2. Check the circulation pressure. Compare the reading with the specified value, see "Technical data".

Checking front axle bearings

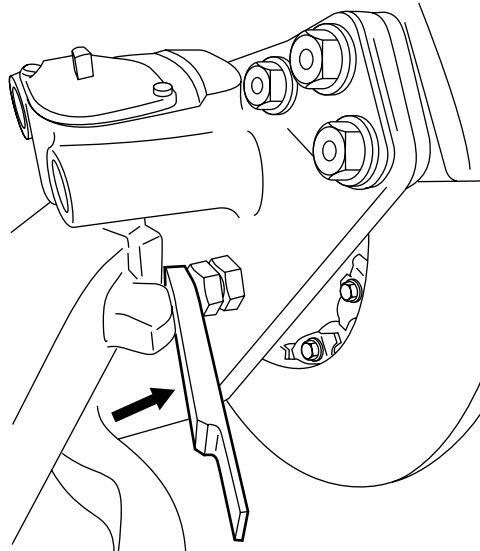
1. Run the engine at idling speed.
2. Turn the steering wheel evenly from the central position to both maximum wheel deflections.
3. Check whether the pressure rises evenly.

Testing the maximum system pressure.

1. Run the engine at idling speed.
2. Activate the steering gear and fit a 15 mm filler piece, special tool (DAF no. 0535996), between the adjusting bolt or the axle stop on the swivel axle and axle-housing stop.



Be careful when fitting the 15 mm filler piece between the adjusting bolt and the axle stop, as there is a danger of limbs getting trapped.



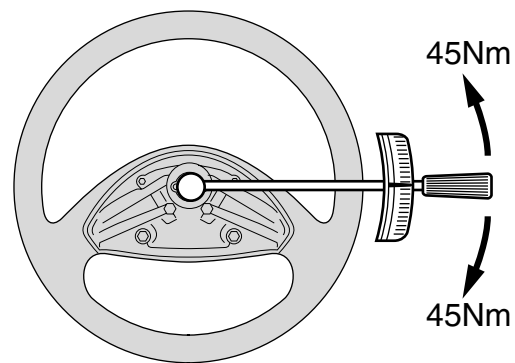
S7 00 598

3. Fit a torque wrench with a dial to the steering wheel attachment bolt. Tighten the bolt to a tightening torque of 45 Nm on the torque wrench.
4. Take the maximum pressure reading on the pressure gauge (the maximum pressure should not be held for more than 5 seconds). Compare the reading with the specified value, see "Technical data".

Note:

If the reading deviates more than 10% from the specified value, the cause should be identified using the test case.

5. Repeat the measurement using the 15 mm filler piece at the other end of the front axle.
6. Retighten the steering-wheel attachment bolt to the specified tightening torque, see "Technical data".
7. Remove the pressure gauge and the T-piece.
8. Check the steering oil level in the reservoir and top up if necessary.
9. Bleed the steering gear, see "Draining, filling and bleeding".



S7 00 611

STEERING GEAR, GENERAL

7

Inspection and adjustment

LF45/55 series

3.2 INSPECTING STEERING GEAR USING THE TEST CASE

Note:

The test case is used to:

- inspect the condition of the entire steering gear on a regular basis;
- make a reliable diagnosis if the steering gear does not function properly.

Inspection using a pressure gauge will only provide information on system pressures, which in some cases might be insufficient to trace the fault. However, this provides no information on the condition of the steering pump (output) and the steering box (internal leaks). This often results, in practice, in steering pumps and steering boxes being replaced unnecessarily.

Electronic test equipment case

“Servotest 550”

The inspection referred to below is carried out using the “Servotest 550” test equipment case. It is also possible to inspect the steering gear using similar equipment that can be used to carry out the same measurements as the “Servotest 550”.

The test case is connected to the delivery pipe, which runs from the steering pump to the steering box.

The “Eingang” (input) pipe connection is fitted with a filter, which should be cleaned regularly, depending on the amount of dirt in the oil.



Always check the tightening torque of the steering wheel bolt after the steering wheel has been turned using a torque wrench.

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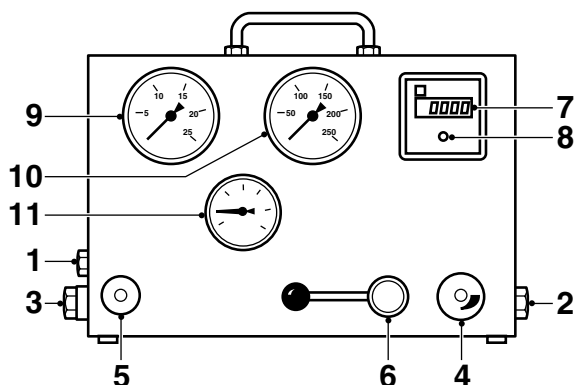
LF45/55 series

STEERING GEAR, GENERAL

Inspection and adjustment

The "Servotest 550" test equipment case consists of the following parts:

1. "Eingang" (input) connection
2. "Ausgang" (output) connection
3. "Tank" connection
4. Valve
5. Non-return valve (throttle)
6. Pressure-limiting valve 120/150 bar (switch over)
7. Output meter 0.01 - 100 l/min.
8. Switch for output meter
9. Low-pressure pressure gauge 0 - 25 bar
10. High-pressure pressure gauge 0 - 250 bar
11. Temperature gauge 0 - 120°C.



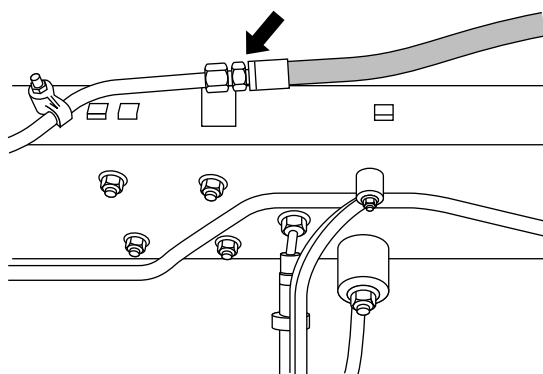
S7 00 020

Points for attention when connecting the test case:

1. Clean the delivery pipe connections that are going to be disconnected.
2. Check the steering box attachment.
3. Check the hydraulic central position.
4. Place proper turning plates under the vehicle's steerable wheels.



Block the vehicle so that it cannot slide off the jack or the turning plates.



S7 00 610

STEERING GEAR, GENERAL

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Inspection and adjustment

LF45/55 series

Connecting the test case

1. Check whether the non-return valve (5) of the "Servotest 550" is completely closed, the valve (4) has been fully opened and the pressure adjusting device (6) of the pressure-limiting valve is set in accordance with the maximum steering system pressure.



Only use couplings and pipes that are suitable for the maximum system pressure.

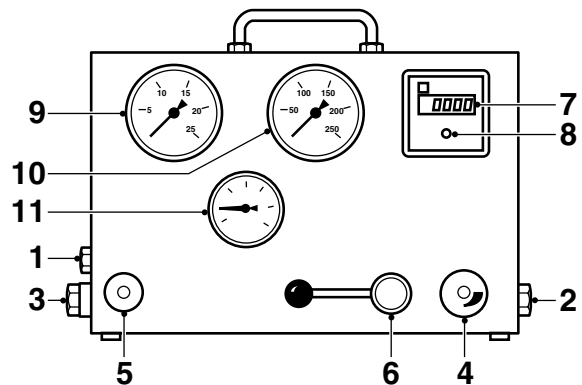
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2. Connect the test case to the delivery pipe. Make sure that as little steering oil as possible escapes and clear away spilt oil. Connect the pipe from the "Eingang" connection of the test equipment case to the part of the pipe from the steering pump. Connect the pipe from the "Ausgang" connection of the test equipment case to the part of the pipe going to the steering box.

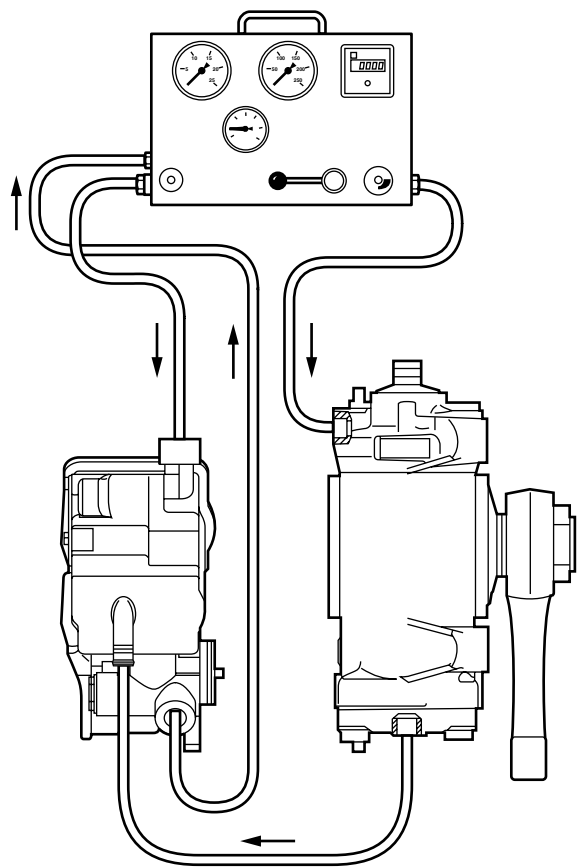
Note:

In the case of vehicles with a steered trailing swivel axle, connect the test case in the delivery pipe downstream of the two-way valve.

3. Place the hose from the "Tank" connection in the reservoir. Connect this hose securely to the reservoir. Ensure that the end of the hose remains below the surface of the oil to prevent foaming.
4. Check the steering oil level and top up as necessary.
5. Start the engine and keep an eye on the steering oil level.
6. Bleed the steering gear, see "Draining, filling and bleeding".



S7 00 020



S7 00 535

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LF45/55 series

STEERING GEAR, GENERAL

Inspection and adjustment

Bringing the steering oil up to the test temperature

1. Set the engine speed to 1200 - 1400 rpm.
2. Slowly close the valve (4), until the pressure gauge (10) indicates a pressure of 50 bar.
3. Wait until the temperature gauge (11) indicates a value of 50°C.
4. Now open the valve (4) completely.

Inspecting steering gear using the test case

Note:

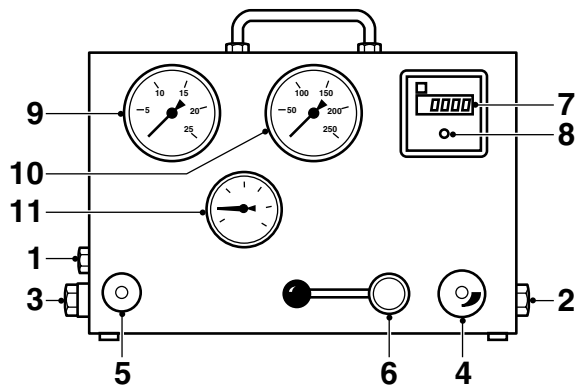
- Check the steering oil temperature regularly while taking measurements. Warm up the steering oil as specified.
- If an incorrect value is found during the measurements, the cause should be traced and rectified before carrying out the next measurement.

Measuring the circulation pressure

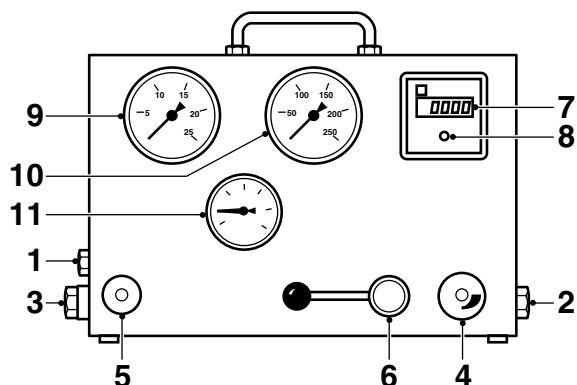
1. Run the engine at idling speed.
2. Open the valve (4) fully.
3. The circulation pressure is indicated on the pressure gauge (9). Compare the reading with the maximum permitted value, see "Technical data".

Checking front axle bearings

1. Run the engine at idling speed.
2. Check whether the valve (4) is fully opened.
3. Turn the steering wheel carefully from the central position to both maximum wheel deflections.
4. Check whether the required pressure rises evenly.



S7 00 020



S7 00 020

STEERING GEAR, GENERAL

7

Inspection and adjustment

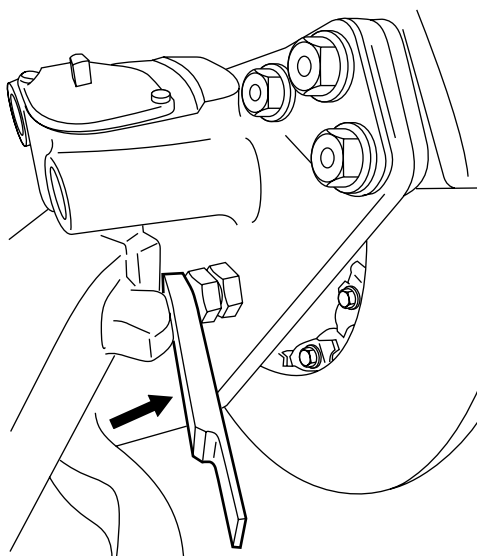
LF45/55 series

Testing the maximum system pressure

1. Run the engine at idling speed.
2. Turn the steering gear. Fit a 15 mm filler piece, special tool (DAF no. 0535996), between the adjusting bolt or the axle stop on the swivel axle and axle housing stop.

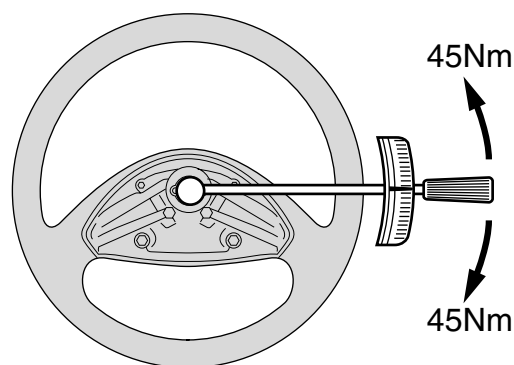


Be careful when fitting the 15 mm filler piece between the adjusting bolt or the axle stop on the swivel axle and the axle stop, as there is a danger of limbs getting trapped.



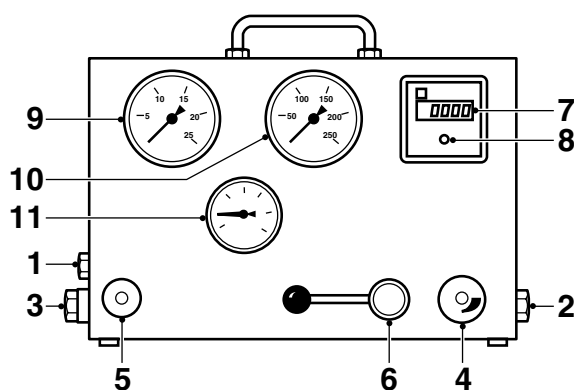
S7 00 598

3. Fit a torque wrench with a dial to the steering wheel attachment bolt. Tighten the bolt to a tightening torque of 45 Nm on the torque wrench.



S7 00 611

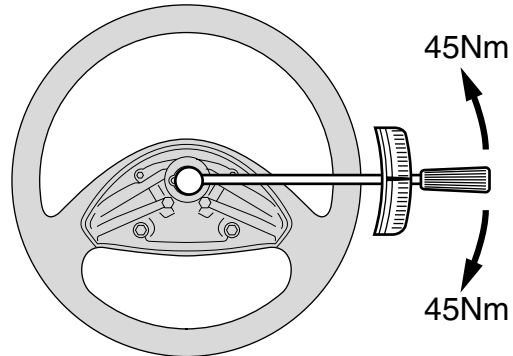
4. Take the pressure reading on the pressure gauge (10) (the maximum pressure must not be maintained for more than 5 seconds). Compare the reading with the specified value, see "Technical data".
5. Repeat the measurement using the 15 mm filler piece at the other end of the front axle.



S7 00 020

Testing the final limiting pressure

1. Turn the steering gear to maximum lock.
2. Set the engine speed at 1200 - 1400 rpm.
3. Fit a torque wrench with a dial to the steering wheel attachment bolt. Tighten the bolt to a tightening torque of 45 Nm on the torque wrench.
4. Read the final limiting pressure off the pressure gauge (10).
5. Compare the reading with the specified value, see "Technical data".
6. Carry out the measurement on the other end of the axle.



S7 00 611

Testing the maximum pump pressure

1. Check whether the pressure-limiting valve (6) is set at the correct pressure.
2. While the engine is at idling speed, slowly close the valve (4) until the maximum pressure is reached on the gauge (10). The maximum pressure may only be maintained for 5 seconds. Otherwise the internal pump components will become too hot. This would result in premature wear in the pump. The pressure is limited to 150 bar by the pressure-limiting valve built into the test equipment case.

Note:

Never turn the steering wheel when the valve (4) is closed. The peak pressures could damage the pump or the test case.

3. Open the valve (4).
4. Compare the reading with the specified value, see "Technical data".

STEERING GEAR, GENERAL

7

Inspection and adjustment

LF45/55 series

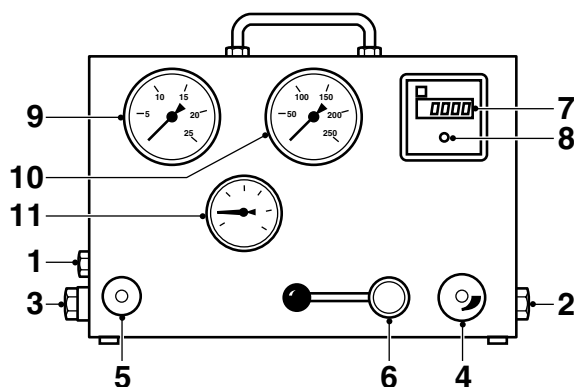
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Testing the pump output

1. Activate the output meter (7) using the switch (8).
2. Set the engine speed at 1200 - 1400 rpm.
3. Close the valve (4) until the pressure gauge (10) indicates the specified pump output pressure, see "Technical data".
4. Take the pump output reading at the output meter (7) and compare this value to the specified value, see "Technical data".

Testing the steering pump flow-control valve

1. Activate the output meter (7) using the switch (8).
2. Slowly increase the engine speed, until the output meter (7) reading no longer rises. Check whether the steering pump output is stable and compare the measured value to the specified value, see "Technical data".
3. Increase and decrease the engine speed and check whether the output increases evenly and then remains stable.
4. Slowly close the valve (4) until the pressure at the pressure gauge (10) has increased to approx. 50 bar. While closing the valve, check whether the pressure gauge (10) needle starts to fluctuate.



S7 00 020

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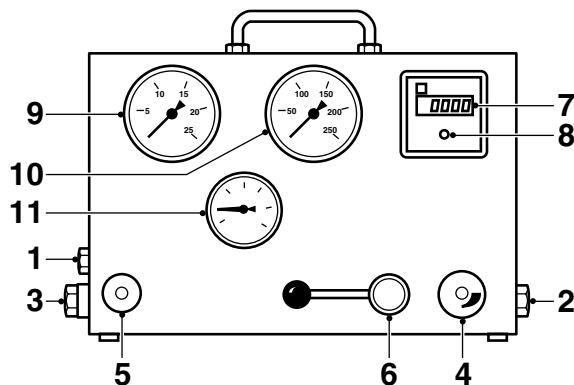
LF45/55 series

STEERING GEAR, GENERAL

Inspection and adjustment

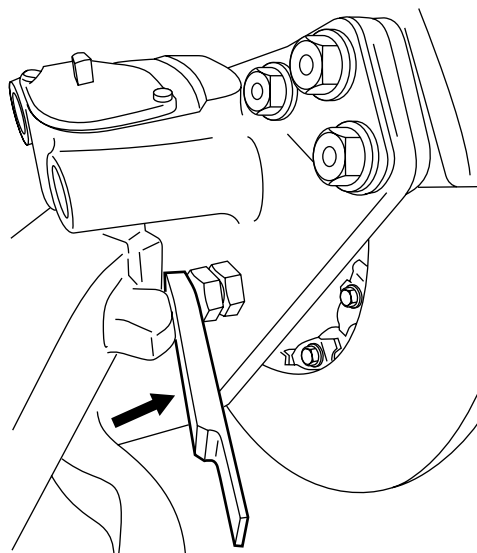
Testing for internal steering box leaks

1. Check that there is a line between the "Tank" connection and the steering oil reservoir. The line to the reservoir should reach the bottom of the reservoir to prevent foaming.
2. Open the non-return valve (5).
3. Close the valve (4) completely.
4. Adjust the pressure to 30 bar below the maximum system pressure using the non-return valve (5), see "Technical data".
5. Open the valve (4) fully.
6. Activate the output meter (7) using the switch (8).



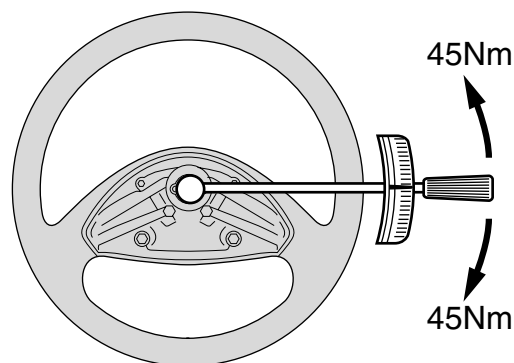
S7 00 020

7. Turn the steering gear. Fit a 15 mm filler piece, special tool (DAF no. 0535996), between the adjusting bolt or the axle stop on the swivel axle and axle housing stop.



S7 00 598

8. Fit a torque wrench with a dial to the steering wheel attachment bolt. Tighten the bolt to a tightening torque of 45 Nm on the torque wrench.
9. Read off the quantity of leaking oil and compare this quantity to the maximum permissible quantity of leaking oil, see "Technical data".
10. Carry out the measurement for the other wheel deflection.



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STEERING GEAR, GENERAL

7

Inspection and adjustment

LF45/55 series

11. If the steering gear “jams”, the test should be repeated with a set pressure of 15 - 30 bar.

Checking steering wheel bolt attachment

1. Retighten the steering wheel attachment bolt to the specified tightening torque, see “Technical data”.

Removing the test case

1. Remove the pipes and re-connect the delivery pipe.
2. Check the steering oil level and top up as necessary.
3. Bleed the system.
4. Inspect the pipe connections for leaks.

2

3.3 CHECKING THE STEERING BOX ATTACHMENT

1. Run the engine at idling speed.
2. Pull the steering wheel with quick jerks.
3. The steering box should not move.

3.4 CHECKING HYDRAULIC CENTRE POSITION

1. Jack up the front axle.
2. Check that the pitman arm is in the central position.
3. Allow the engine to run at a speed of 1200 - 1400 rpm.
4. The pitman arm should not move by itself.

4. DRAINING, FILLING AND BLEEDING

4.1 DRAINING, FILLING AND BLEEDING STEERING GEAR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

The steering oil should be drained if:

- the steering pump is damaged
- the steering oil is dirty
- there is water in the steering oil
- there is serious foaming of the steering oil due to air being drawn in.

Draining steering gear, version without steered trailing swivel axle



Drained steering oil may not be re-used. Store this hydraulic oil separately from the other drained oils and have the oil collected by an authorised waste removal company.

1. Clean the steering box and reservoir connection lines.
2. Jack up the steerable axle.
3. Place a receptacle under the steering box. Take the return pipe off the steering box.
4. Turn the steering wheel slowly from one end stop to the other until the oil stops coming out of the pipe connection(s).
5. Reinstall the pipe which was disconnected.
6. Replace the reservoir and the integrated filter if the steering pump is damaged or the steering oil is dirty.

STEERING GEAR, GENERAL

7

Draining, filling and bleeding

LF45/55 series

Filling/bleeding steering gear without steered trailing swivel axle



Make sure that during filling and bleeding the reservoir always remains filled with oil in order to prevent the pump from drawing in air which would cause foaming in the oil.

2

Air in the hydraulic system can cause serious damage to the steering pump. Air in the hydraulic system can cause the steering gear to jam occasionally.

If there is air in the hydraulic system, a squealing noise will be heard when the steering wheel is turned.

If there is severe foaming, the steering oil should be completely drained.

Trace and repair the leak, after which the system can be filled and bled again.

1. Fill the reservoir to the top with clean oil which complies with the specifications. Wait a little while and then fill the reservoir to the top again.
2. Crank the engine for approx. 2 seconds using the starter motor. Make sure that the reservoir stays filled. Stop cranking immediately if the oil level becomes too low. Top up the steering oil.
3. Crank the engine for approx. 10 seconds using the starter motor. Make sure that the reservoir stays filled. Stop cranking immediately if the oil level becomes too low.

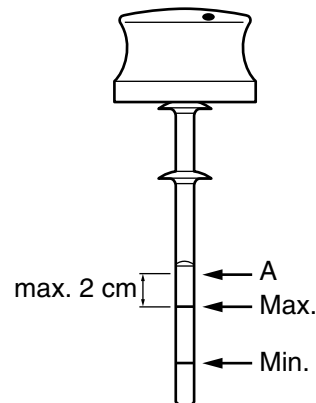
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STEERING GEAR, GENERAL

LF45/55 series

Draining, filling and bleeding

4. Top up the steering oil to the top mark on the dipstick.
5. Repeat points 3 and 4 until the steering oil level no longer decreases.
6. Jack up the steerable axle until the wheels are clear of the floor.
7. Start the engine and, with the engine idling, slowly turn the steering wheel (approx. a $\frac{1}{2}$ turn per second) to anticlockwise and clockwise until the maximum wheel deflection is reached. Continue this until the oil level no longer decreases. Note the steering oil level.
8. Run the engine at idling speed for another 2 minutes. Do not touch the steering wheel during these 2 minutes.
9. Check the steering oil level when the engine is running and, if necessary, top up to the top mark on the dipstick.
10. Stop the engine. The steering oil level must not rise more than 2 cm above the max. mark (A in drawing). If the steering oil level rises by more than 2 cm, there is still air in the system.
11. Put the filler cap on the reservoir again and lower the axle.
12. Inspect the pipe connections for leaks.
13. Take a test drive. Check the steering oil level again and check the pipe connections for leaks.



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STEERING GEAR, GENERAL

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Draining, filling and bleeding

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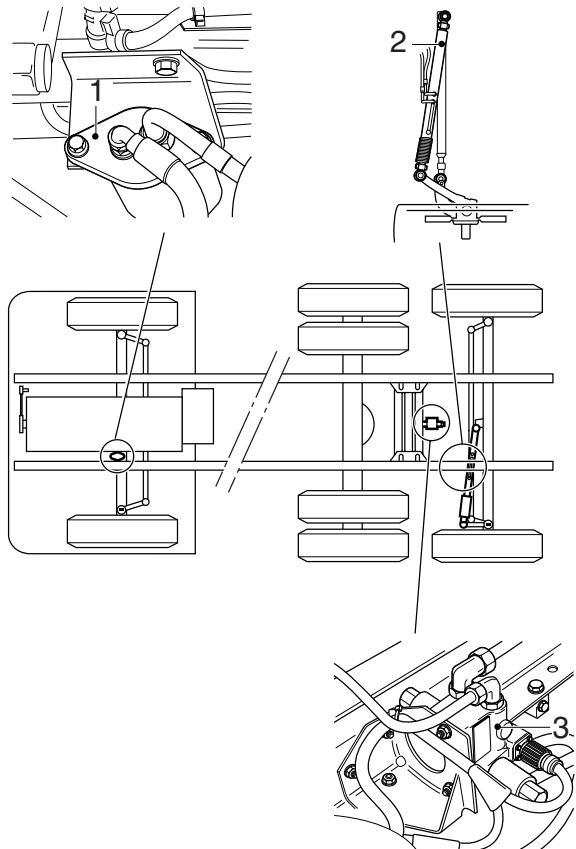
4.2 DRAINING, FILLING AND BLEEDING STEERING GEAR, VERSION WITH STEERED TRAILING SWIVEL AXLE

Draining steering gear, version with steered trailing swivel axle



Drained steering oil may not be re-used. Store this hydraulic oil separately from other drained oils and have the oil collected by an authorised waste-removal company.

1. Jack up the trailing axle and support the axle on stands.
2. Place suitable trays beneath the high-pressure filter (1), the steering cylinder (2) and the valve block (3).
3. Clean the steering oil reservoir and the surrounding area.
4. Take the filter element out of the steering oil reservoir.
5. Clean the housing and the surrounding area of the high-pressure filter. Remove the high-pressure filter.



S7 00 801

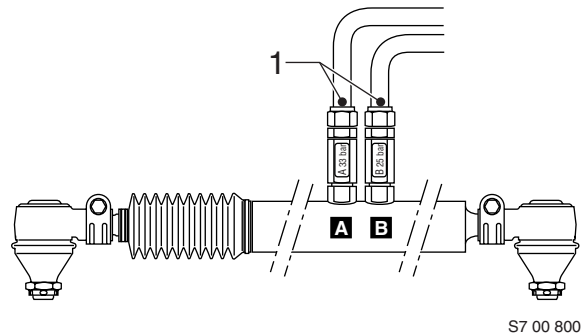
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STEERING GEAR, GENERAL

LF45/55 series

Draining, filling and bleeding

6. Mark the position of the pipes on the damper valve (1) and take the pipes off the damper valves.
7. If necessary, mark the position of the damper valves and remove the damper valves.
8. Manually swivel the trailing axle a few times so that the steering oil is gently released from the steering cylinder.
9. Check the sealing rings of the damper valves for wear and damage. Replace if necessary.
10. Attach the damper valves in their correct position on the steering cylinder.



S7 00 800



The position of the damper valves must not be changed under any circumstances. Changing the damper valves affects the vehicle's handling and steering characteristics.

11. Using the marks made previously, attach the pipes to the damper valves.
12. Fit a new high-pressure filter.
13. Fit a new filter element in the steering oil reservoir.

Filling steering gear, version with steered trailing swivel axle

1. Fill the reservoir to the top with clean oil which complies with the specifications. Wait a little while and then fill the reservoir to the top again.
2. Crank the engine for approx. 2 seconds using the starter motor. Make sure that the reservoir stays filled. Stop cranking immediately if the oil level becomes too low. Top up the steering oil.
3. Crank the engine for approx. 10 seconds using the starter motor. Make sure that the reservoir stays filled. Stop cranking immediately if the oil level becomes too low.

STEERING GEAR, GENERAL

7

Draining, filling and bleeding

LF45/55 series

4. Top up the steering oil to the top mark on the dipstick.
5. Repeat points 3 and 4 until the steering oil level no longer decreases.



Make sure that during filling and bleeding the reservoir always remains filled with oil in order to prevent the pump from drawing in air which would cause foaming in the oil.

2

6. Bleed the steering gear.

Bleeding steering gear, version with steered trailing swivel axle

1. Gently turn the steering wheel in both directions when the level in the reservoir is dropping only slightly or stops dropping altogether.

Note:

System failures can occur as a result of even slight movements of the steering wheel. The yellow warning will then be visible on the DIP and the trailing axle will no longer steer.

If a failure occurs, switch the vehicle ignition off and then on again.

2. Check the steering oil level and let the engine run idle for a few minutes.
3. Gently turn the steering wheel in both directions and check the oil level. Top up oil if necessary.
4. Make a test run and check the steering oil level. Top up oil if necessary.

Note:

Any foaming that occurred during bleeding should have disappeared after the test run.

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STEERING BOX

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1. SAFETY INSTRUCTIONS



If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.

Be careful when tilting the cab or when working under a tilted cab if the steering bracket has to be inspected or replaced because of a collision.

Vital parts of the cab suspension may have been damaged during the collision.

Take the necessary precautions.

If the vehicle has been involved in a collision, in which the steering box or other steering gear components (may) have been damaged, the steering box must always be sent to DAF for inspection or be replaced. This requirement still applies even if no external damage is visible. The steering box may have sustained internal damage in the collision, causing it to be unreliable.

If the pitman arm has been subjected to extremely high loads (in an accident), it should be magnaflux tested, even if no faults are apparent to the naked eye. If such a test is not possible, the pitman arm should always be replaced.

The pitman arm should only be removed using the specified special tool.

If the specified tools are not available, the pitman arm should under no circumstances be removed by dislodging it using a hammer or by heating.

This would result in the pitman arm becoming extremely unreliable and would also permanently damage the sector shaft.

STEERING BOX

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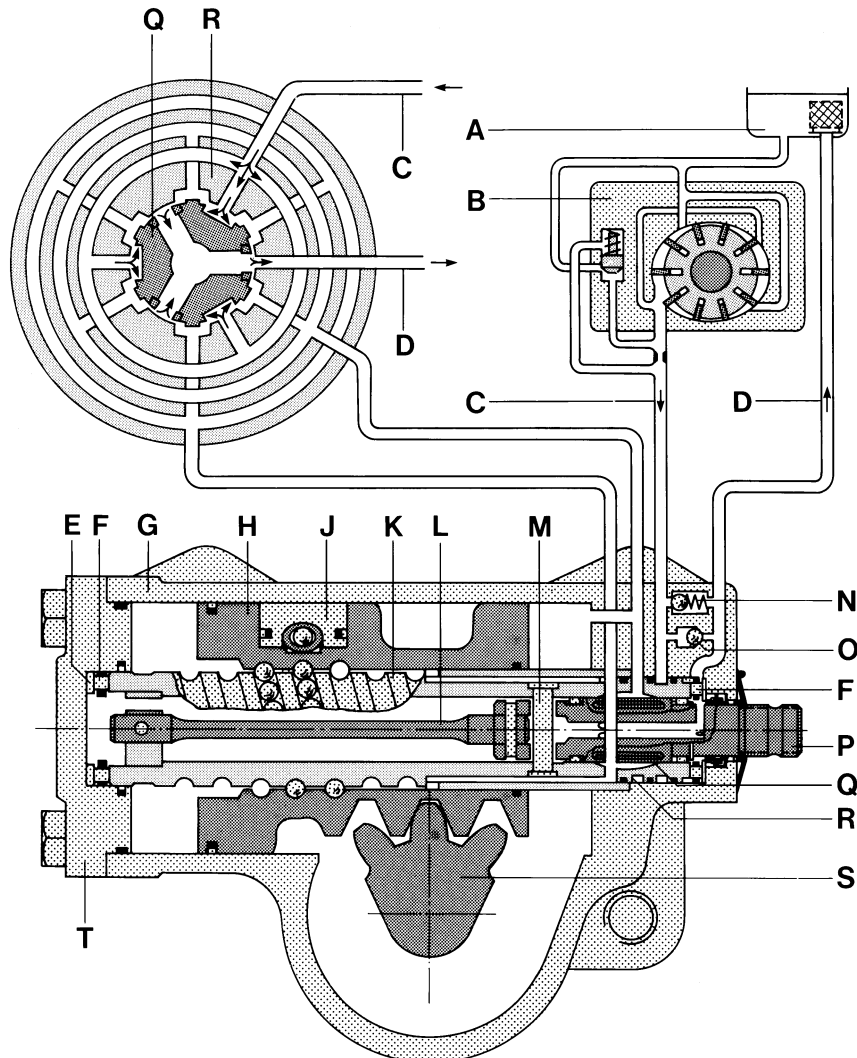
Safety instructions

LF45/55 series

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2. GENERAL

2.1 OVERVIEW DRAWING OF STEERING BOX



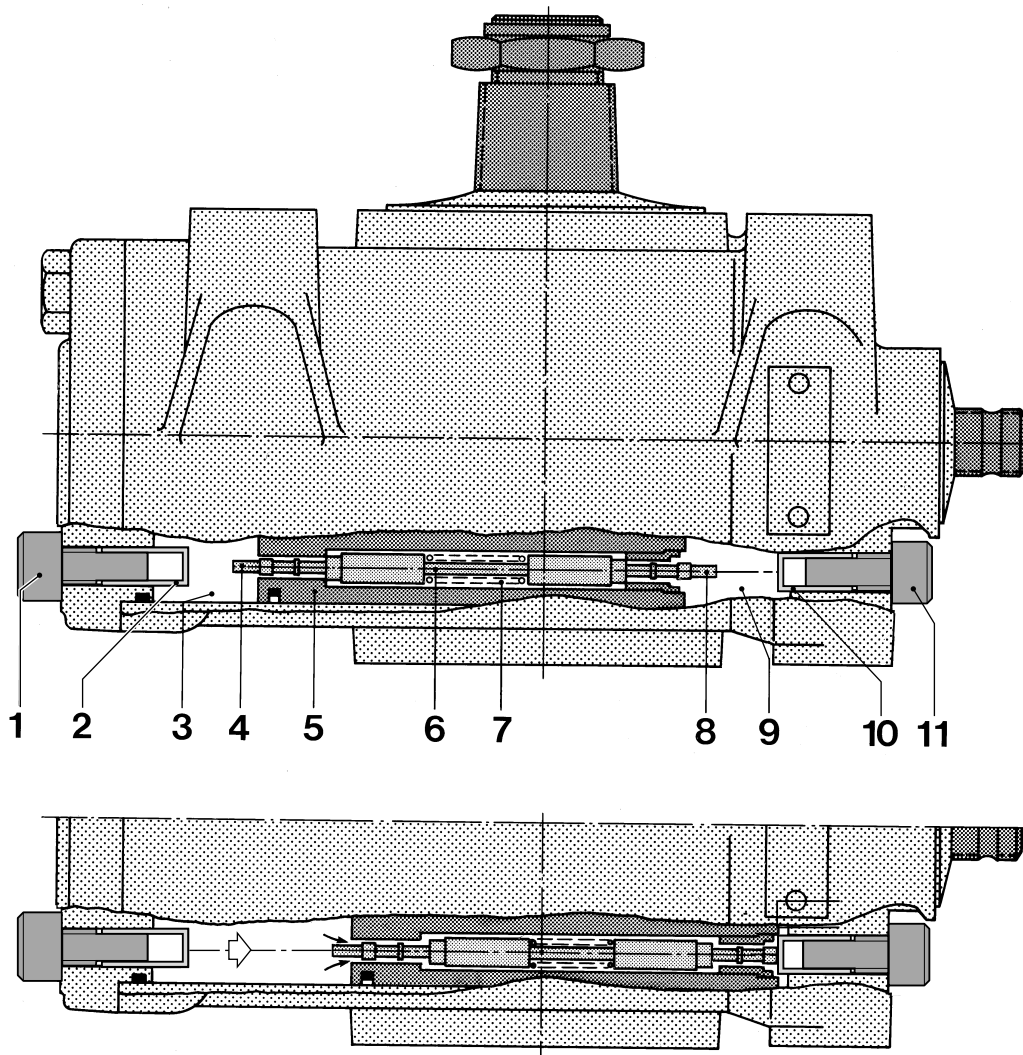
S7 00 265

- A. Reservoir
- B. Steering pump
- C. Delivery pipe
- D. Return pipe
- E. Shim
- F. Pivot bearing
- G. Box
- H. Piston
- J. Ball nut
- K. Worm shaft

- L. Torsion bar
- M. Pin (with internal end stop)
- N. Pressure-limiting valve
- O. Make-up valve (by-pass valve)
- P. Input shaft
- Q. Control valve core
- R. Control valve casing
- S. Sector shaft
- T. Cover

2.2 OVERVIEW DRAWING OF WHEEL-DEFLECTION LIMITING VALVES

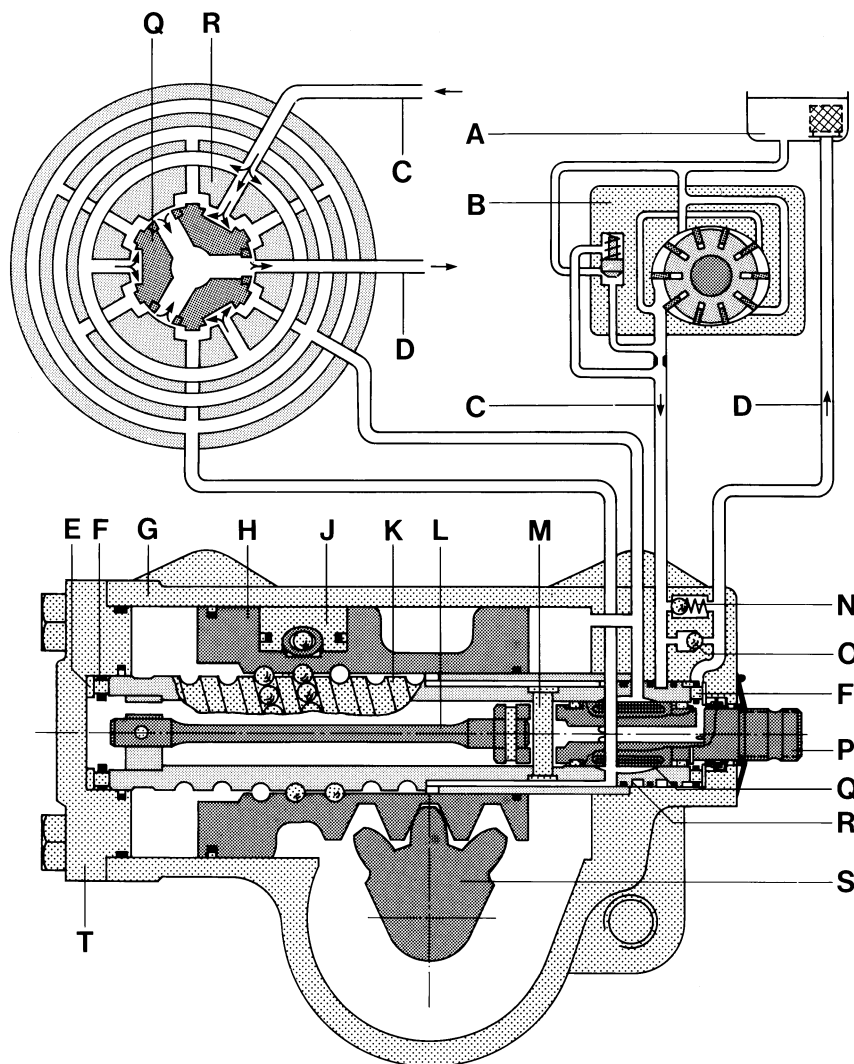
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S7 00 622

1. Stop bolt
2. Sliding bush
3. Left-hand side of the piston
4. Left-hand wheel-deflection limiting valve
5. Piston
6. Guide pin
7. Spring
8. Right-hand wheel-deflection limiting valve
9. Right-hand side of the piston
10. Sliding bush
11. Stop bolt

2.3 OPERATION OF THE STEERING BOX



S7 00 265

The drawing shows a longitudinal section of the steering box with steering pump and reservoir and a cross section of the control valve. The steering pump and the lines are shown schematically in the drawing. The steering box is shown with the control valve in the neutral position.

The steering box is a mechanical steering box that is activated hydraulically.

STEERING BOX

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General

LF45/55 series

Mechanical operation

The input shaft (P) is connected to the worm shaft (K) by the torsion bar (L). Pin (M) which is pressed into the input shaft limits the stroke of the input shaft in relation to the worm shaft.

The torsion bar (L) which cannot transfer large forces will twist as a result of mechanical steering until the pin (M) in the input shaft (P) fits abuts in the worm shaft (K). This pin transfers the majority of the force.

The worm shaft is supported without any play in the box (G) on two axial pivot bearings (F) and shim (E).

If the steering wheel is turned, this movement is transferred by the input shaft (P) into an axial movement of the piston (H) through a ball nut (J) with an endless raceway which is integrated into the piston (H).

This movement is transferred to the sector shaft (S) via the tothing of the piston and the sector shaft (S). The pitman arm connected to the sector shaft will also turn, as will the steerable wheels via the steering rod.

The piston/sector shaft tothing has a variable pitch. In the central position the transmission is more direct, outside the central position the transmission is less direct.

This mechanical process is hydraulically assisted.

3

Hydraulic operation

The hydraulic part consists of a cylinder with piston and a control valve (Q) which is integrated into the input shaft/worm shaft. The oil enters the steering box at the top. The oil leaves the steering box at the bottom through the control valve and the hollow worm. This design keeps the steering box at a more even temperature, even when there is no steering action.

The core (Q) of the control valve and the input shaft (P) form part of a single unit. The casing (R) of the control valve and the worm shaft (K) form part of a single unit.

The input shaft (P) is supported in the worm shaft (K). The input shaft and the worm shaft both have six recesses.

The recesses on the input shaft (P) are connected alternately, with three to the delivery pipe (C) and three to the return pipe (D).

The recesses in the worm (K) are connected alternately, with three to the left-hand side and three to the right-hand side of the piston.

In the neutral control valve position the recesses of the input shaft (P) and the worm (K) are positioned in relation to one another in such away that the left-hand and the right-hand sides of the piston are connected to both the delivery pipe (C) and the return pipe (D).

The forces exerted on the left-hand and right-hand side of the piston (H) are equal and there is a hydraulic central position. The neutral position of the control valve is factory set during the manufacture of the steering box.

STEERING BOX

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General

LF45/55 series

The input shaft (P) is connected to the worm shaft (K) by the torsion bar (L).

When the steering wheel is turned the torsion bar will twist as a result of the friction between the tyre and the road surface. The two parts of the control valve (Q and R) turn in relation to one another, changing the oil flow to and from the piston.

If the steering wheel is turned to the right, pressure builds up on the left-hand side of the piston and the right-hand side is connected to the return pipe. The piston will move to the right. If the force on the input shaft (P) is reduced, the torsion bar (L) will twist back and the control valve will return to its neutral position, thus recovering the hydraulic central position.

If the steering wheel is turned to the left, pressure builds up on the right-hand side of the piston (H) and the left-hand side is connected to the return pipe (D). The piston will move to the left.

Pressure-limiting valve

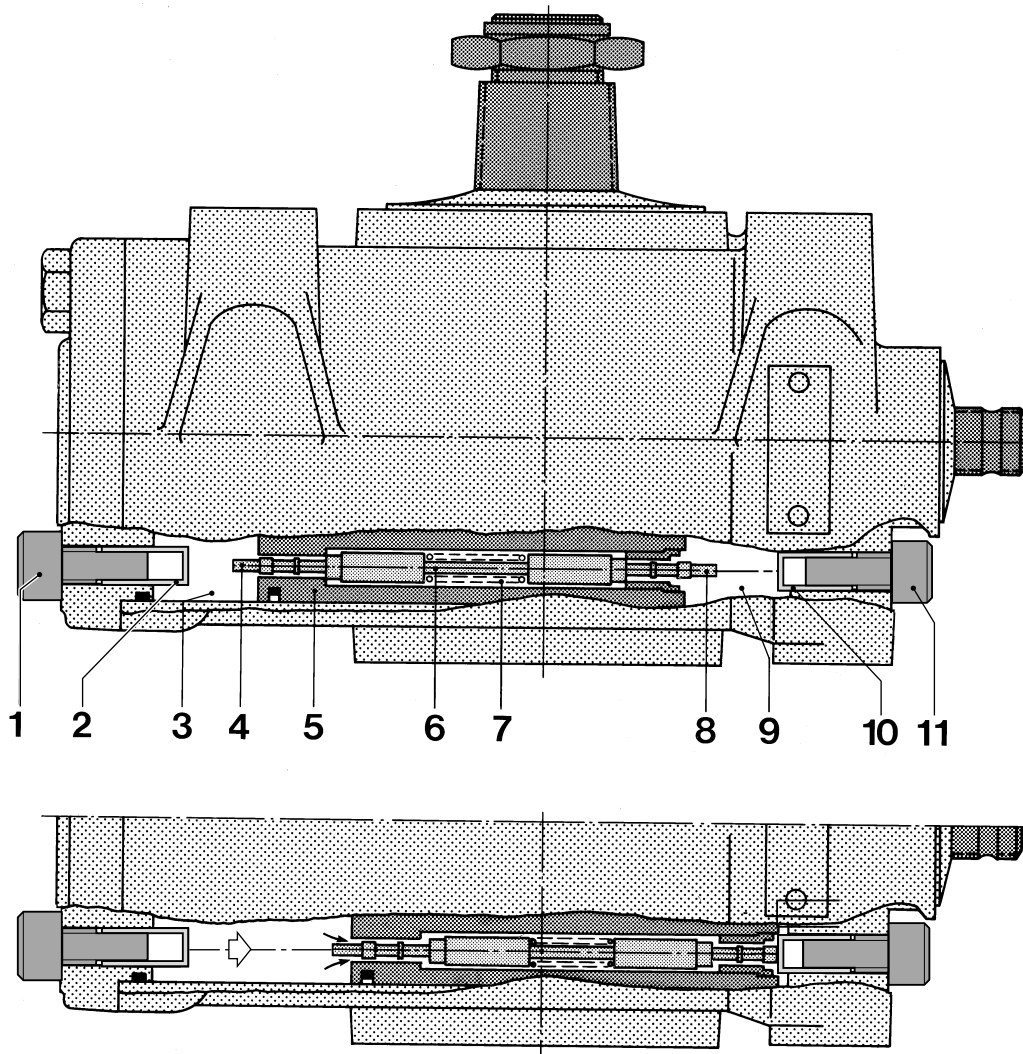
The task of the pressure-limiting valve is to protect the system from being overloaded. The design is very simple and, therefore, relatively insensitive to dirt. The opening pressure is stamped on the valve. The valve cannot be dismantled or adjusted, but can be supplied with various opening pressures.

3

Wheel-deflection limiting valves

The task of the wheel-deflection limiting valves is to limit the pressure at maximum wheel deflection. Otherwise, the pressure could increase to the level at which the pressure-relief valve activates.

In that case, there would be a heavy load on the mechanical part of the steering gear. If this situation were to last for too long, the steering pump could be damaged.



S7 00 622

In the steering box, two wheel-deflection limiting valves (4 and 8) are integrated into the piston (5). The valves cannot be dismantled.

STEERING BOX

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General

LF45/55 series

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The wheel-deflection limiting valves slide over a guide pin (6).

When the pressure on both sides of the piston (5) is equal, the spring (7) pushes them onto their seats.

The left-hand side (3) of the drawing shows the delivery pressure and the right-hand side (9) the return pressure.

In this situation the wheel-deflection limiting valve (4) on the piston delivery side is forced off its seat for a short time against the spring pressure. The chamber between the wheel-deflection limiting valves is now also pressurised and the valve (8) is pressed more firmly onto its seat.

The piston (5) will move to the right. Before the end of the piston stroke is reached the pin of the right-hand wheel-deflection limiting valve (8) will hit the stop bolt (11).

Valve (8) is now pushed off its seat.

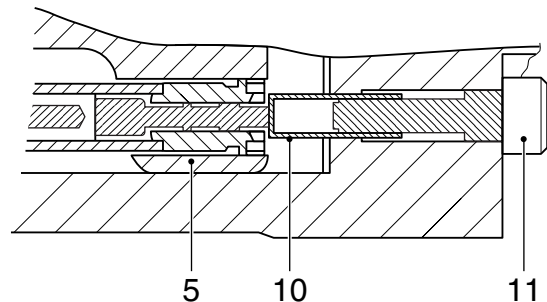
The pressure in the chamber between the wheel-deflection limiting valves now drops and at the same time the left-hand valve (4) is opened again by the pressure.

The left-hand and right-hand sides of the piston are connected together, thereby decreasing the pressure.

The wheel-deflection limiting valves are set automatically in a new steering box.

The stop bolts (1 and 11) have a sliding bush (2 and 10). In a new steering box the sliding bushes (2 and 10) are the maximum length. The first time that the steering gear is rotated fully (anticlockwise and clockwise), the piston (5) touches the sliding bush (2 or 10) before reaching the maximum wheel deflection and pushes the bush further to the stop bolt (1 or 11). This sets both wheel-deflection limiting valves correctly.

If the wheel deflection is reduced, the wheel-deflection limiting valves must be reset. The stop bolts (1 and 11) must be replaced for this procedure.



S7 00 621

Pressure point

The sector shaft has right toothing.

Both bearing races supporting the sector shaft are eccentrically formed.

By turning both bearing races simultaneously in the box, the distance between the sector shaft in relation to the piston can be changed.

When adjusting the pressure point the bearing races are turned until the middle tooth of the sector shaft (the largest tooth) engages the piston toothing correctly.

Note:

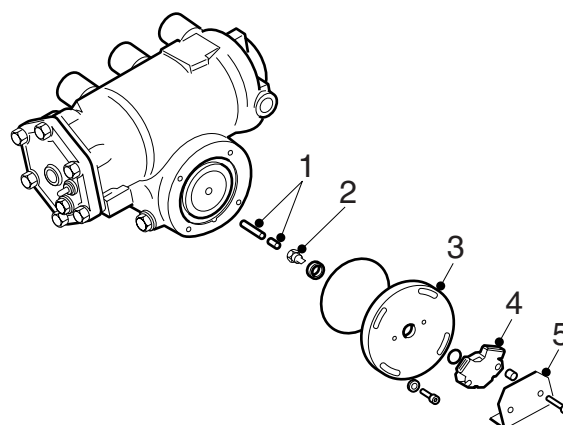
Adjustment of the pressure point should only take place in a workshop designed for this purpose and using the required special tools.

Steering box angle sensor on version with steered trailing swivel axle

An angle sensor (4) is fitted to the steering box on the version with a steered trailing swivel axle. The angle sensor sends data on the steering angle to the RAS-EC system electronic unit.

The angle sensor and the protective cover (5) are fitted to the attachment cover (3). The carrier (2) transfers the rotation of the sector shaft to the angle sensor.

The carrier is connected to the sector shaft by tension bushes (1).



S7 00 831

STEERING BOX

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General

LF45/55 series

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3. INSPECTION AND ADJUSTMENT

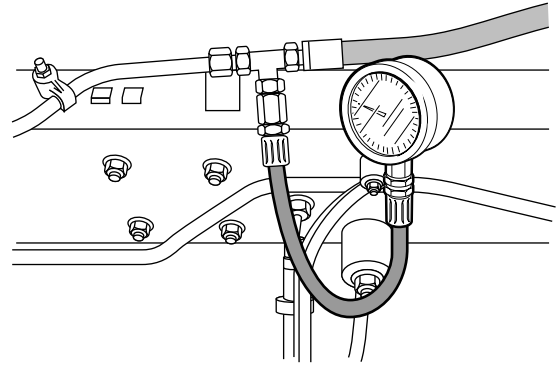
3.1 INSPECTION AND ADJUSTMENT, WHEEL-DEFLECTION LIMITING VALVES

Inspecting wheel-deflection limiting valves

1. If the vehicle has a steered trailing swivel axle, remove the RAS-EC system fuse.
2. Connect the pressure gauge to the T-piece in the delivery pipe using the special tool (DAF no. 0535653). Connect the T-piece as quickly as possible to prevent air getting into the system.
Check the steering oil level in the reservoir after connecting the T-piece and top up the oil if necessary.



Only use couplings and pipes which are suitable for the maximum system pressure.



S7 00 614

3. Bleed the steering gear.
4. Jack up the front axle.
5. Warm up the steering oil as described below, until the pipes are at least warm to the touch.
 - Set the engine speed at 1200 - 1400 rpm.
 - Activate the steering gear for 5 seconds at its maximum, making sure that the pressure does not exceed 50 bar.
 - Do not touch the steering wheel for 5 seconds.
 - Repeat this procedure until the pipes are at least warm to the touch.

Note:

If the steering oil is too cold, considerably higher pressures will be measured.

6. Turn the steering wheel fully to the left.
7. Set the engine speed at 1200 - 1400 rpm.

STEERING BOX

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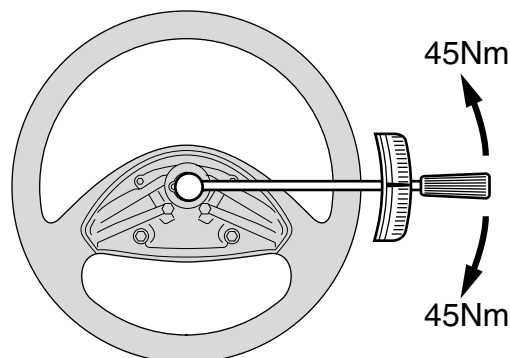
Inspection and adjustment

LF45/55 series

8. Fit a torque wrench with a dial to the steering wheel attachment bolt and tighten the bolt to a tightening torque of 45 Nm on the torque wrench.

Note:

The pressure must never exceed the maximum permissible final limiting pressure. If the pressure rises too high, the valve should be reset before the measurement is continued.



S7 00 611

3

9. The pressure gauge will indicate the final limiting pressure. Compare the reading to the specified value, see "Technical data". Do not maintain this pressure for more than 5 seconds. If the reading is outside the specified values, the final limiting valve should be readjusted.
10. Carry out the measurement once again, with the steering wheel turned fully to the right. The left-hand and right-hand pressures do not need to be exactly the same.
11. Remove the jack.
12. Remove the T-piece.
13. Check the steering oil level in the reservoir and top up if necessary.
14. Bleed the steering gear.
15. Retighten the steering wheel attachment bolt to the specified tightening torque, see "Technical data".
16. If the vehicle has a steered trailing swivel axle, fit the RAS-EC system fuse.

Adjusting the wheel-deflection limiting valves

There are three procedures for making adjustments.

Procedure A, to be used if:

- a new or overhauled steering box is fitted.

Procedure B, to be used if:

- the wheel deflection has been increased.

Procedure C, to be used if:

- the wheel deflection has been reduced.
- the steering box input shaft was rotated to the end stop before the steering box with the steering rod was connected to the steering gear.

Adjustment following procedure A

1. Make sure that the attachment bolts of the steering box and of the steering bracket are tightened to the specified tightening torques, see "Technical data".
2. Check the wheel deflection of the front axle before the steering rod is installed. If necessary, the wheel deflection should be adjusted using the wheel deflection stop bolts on the swivel axles.
3. Install the steering rod.
4. Turn the steering wheel fully anticlockwise and clockwise with the engine running. The wheel deflection stop bolts or end stop points must abut the axle housing for this procedure.
If the maximum wheel deflection is not reached, partially unload the front axle by jacking it up so that the maximum wheel deflection is reached. Never completely unload the front axle when doing this.
The stop bolt sliding bushes are now pushed further onto the stop bolts. This gives the correct setting for the wheel deflection limiting valves.

STEERING BOX

7

Inspection and adjustment

LF45/55 series

Adjustment following procedure B

1. The wheel deflection must be increased using the wheel deflection stop bolts on the swivel axles.
2. Turn the steering wheel fully anticlockwise and clockwise with the engine running. The wheel deflection stop bolts must abut the axle housing for this procedure.
If the maximum wheel deflection is not reached, partially unload the front axle by jacking it up so that the maximum wheel deflection is reached. Never completely unload the front axle when doing this.
The stop bolt sliding bushes are now pushed further onto the stop bolts. This gives the correct setting for the wheel deflection limiting valves.

3

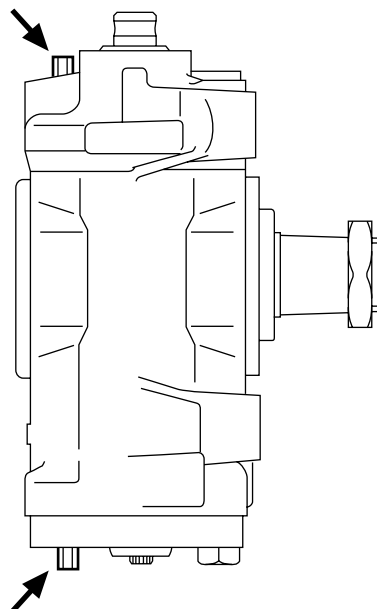
Adjustment following procedure C

1. The wheel deflection must be reduced using the stop bolts on the swivel axles.
2. Remove both stop bolts and replace them with new ones.
Tighten the new stop bolts to the specified tightening torque, see "Technical data".
If the steering oil has not been drained, place a tray under the steering box. When the stop bolt is removed, steering oil will come out of the opening.

Note:

The sliding bush of a used stop bolt must not be taken off the stop bolt and the stop bolt re-fitted.

3. Fill and bleed in the case of an integrated steering box and steering gear.
4. Turn the steering wheel fully anticlockwise and clockwise with the engine running. The wheel deflection stop bolts must abut the axle housing for this procedure.
If the maximum wheel deflection is not reached, partially unload the front axle by jacking it up so that the maximum wheel deflection is reached. Never completely unload the front axle when doing this.
The stop bolt sliding bushes are now pushed further onto the stop bolts. This gives the correct setting for the wheel deflection limiting valves.



S7 00 620

STEERING BOX

7

Inspection and adjustment

LF45/55 series

3.2 INSPECTING THE PRESSURE POINT

Inspecting the pressure point

1. Drain the steering oil.
2. Take the steering rod off the pitman arm.

Note:

If a steering rod is removed, the input shaft must not be rotated more than one turn (starting from the central position). Otherwise, the setting of the wheel deflection limiting valves will be changed.

3. Place the sector shaft in the central position, by aligning the marks on the sector shaft and the steering box.
4. Take the universal joint off the input shaft.
5. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.

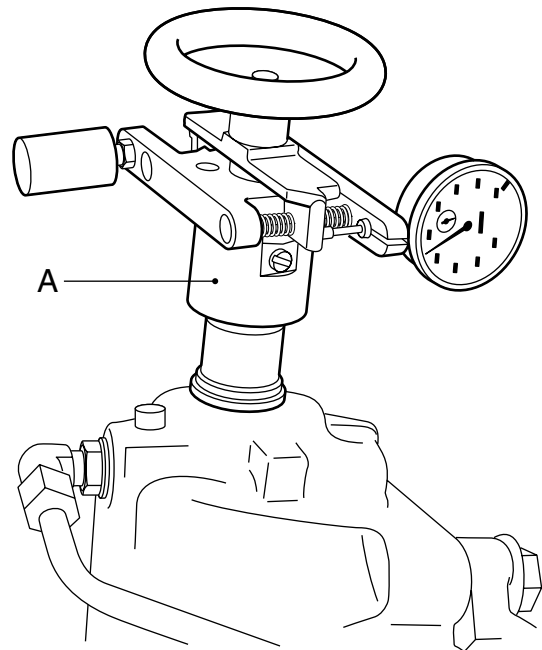


If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.

6. Check whether the sector shaft is still in the central position, using the marks.
7. Fit a micrometer (A) to the resistance-torque tester (ZF order number 8090 798 151).

3

8. Fit the resistance-torque tester (A) to the steering box input shaft.
9. Carefully turn the input shaft approx. $\frac{3}{4}$ turn out of the steering box central position using the resistance-torque tester. Read off the micrometer left and right outside the pressure point. Check whether there is a "heavy" point outside the pressure point. Determine the resistance value using the diagram with the resistance-torque tester.
10. Place the steering box in the central position. Turn the input shaft half a turn from the central position. Turn the input shaft carefully past the central position using the resistance-torque tester and note the micrometer reading in the pressure point. Use the diagram supplied with the resistance-torque tester to determine the resistance value and compare it to the specified value, see "Technical data".



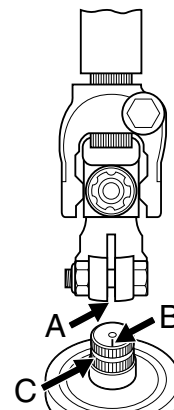
S7 00 624

11. Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



Check that the universal joint is correctly in place on the input shaft so that the attachment bolt can be fitted in the notch (C).

12. Fit a new, original attachment nut and bolt in the universal joint. Tighten the attachment bolt to the specified torque, see "Technical data".
13. Install the steering rod. Tighten the castle nut to the specified tightening torque, see "Technical data".
14. Fill and bleed the steering gear.
15. Take a test drive.



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STEERING BOX

7

Inspection and adjustment

LF45/55 series

3.3 INSPECTION AND ADJUSTMENT, INPUT SHAFT END PLAY

Inspecting input shaft end play

1. Take the steering rod off the pitman arm.

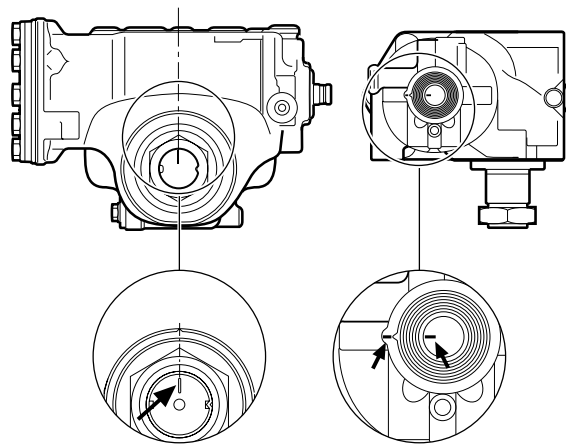
Note:

If a steering rod is removed, the input shaft must not be rotated more than one turn (starting from the central position). Otherwise, the setting of the wheel deflection limiting valves will be changed.

2. Place the sector shaft in the central position, by aligning the marks on the sector shaft and the steering box.
3. Take the universal joint off the input shaft.
4. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.

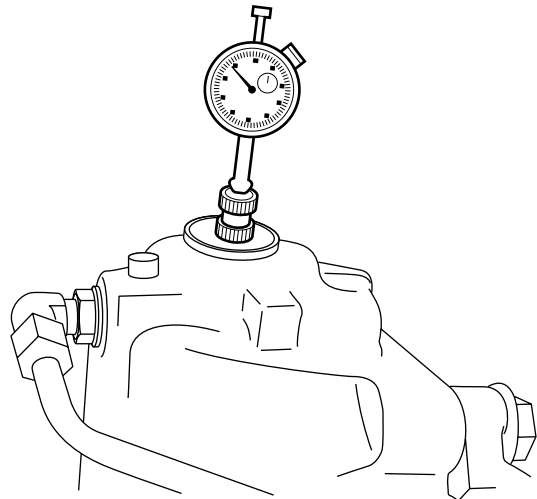


If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.



S7 00 623

5. Fit a dial gauge on the input shaft.
6. Move the pitman arm backwards and forwards and measure the end play in the worm shaft and note the reading. Compare the reading to the specified value, see "Technical data".
If the reading does not match the specified value, the end play must be adjusted.



S7 00 881

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LF45/55 series

STEERING BOX

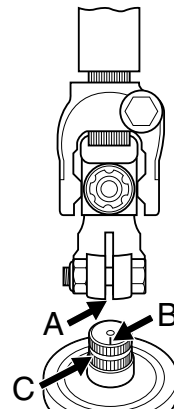
Inspection and adjustment

7. Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



Check that the universal joint is correctly in place on the input shaft so that the attachment bolt can be fitted in the notch (C).

8. Fit a new, original attachment nut and bolt in the universal joint.
Tighten the attachment bolt to the specified torque, see "Technical data".
9. Install the steering rod. Tighten the castle nut to the specified tightening torque, see "Technical data".
If the split-pin hole in the ball end does not match up with the notch in the castle nut, the castle nut should be tightened further.
10. Lock the castle nut with a new split pin.



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STEERING BOX

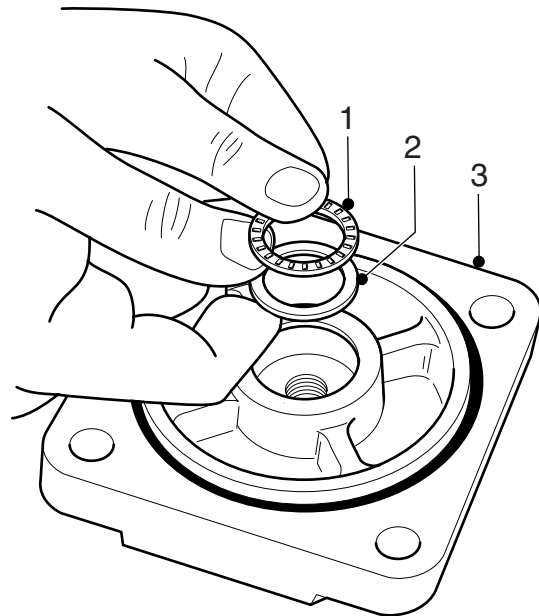
7

Inspection and adjustment

LF45/55 series

Adjusting input shaft end play

1. Clean the steering box and the surrounding area.
2. Remove the cover attachment bolts and remove the cover with the pivot bearing and shim. Collect the steering oil that escapes.
3. Adjust the end play of the input shaft by placing thicker or thinner shims in the cover.
4. Put the pivot bearing (1) on the shim (2) in the cover (3).
5. Replace the O-ring on the cover (3) and fit the cover. Tighten the attachment bolts to the specified tightening torque, see "Technical data".
6. Check the input shaft end play again.
7. Fill and bleed the steering gear.



S7 00 874

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION OF STEERING BOX ASSEMBLY



If the vehicle has been involved in a collision, in which the steering box or other steering gear components (may) have been damaged, the steering box must always be sent to DAF for inspection or be replaced. This requirement still applies even if no external damage is visible. The steering box may have sustained internal damage in the collision, causing it to be unreliable.

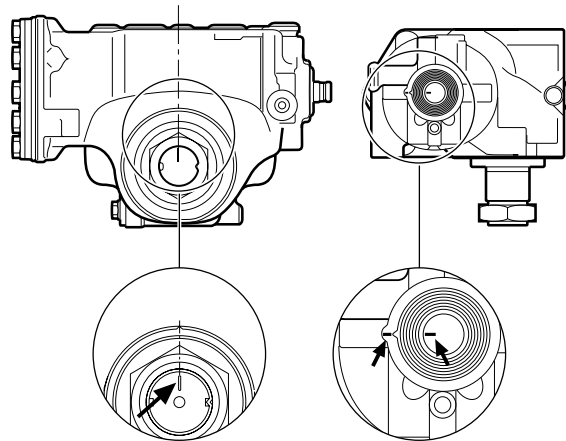
Removing steering box assembly

1. Clean the steering box and the surrounding area.
2. Place the steering gear in the central position. This can be checked using the marks on the steering box.
3. If the vehicle has a steered trailing swivel axle, remove the angle sensor connectors on the steering box.
4. Take the steering oil pipes off the steering box. Collect the steering oil flowing out and plug the openings of the pipes and on the steering box, to prevent dirt entering.
5. Take the steering rod off the pitman arm.

Note:

If the steering rod is removed, the input shaft must not be rotated more than 1 turn (starting from the central position) because otherwise the setting of the wheel-deflection limiting valves will be changed.

6. Take the steering shaft off the input shaft of the steering box.
7. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.



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STEERING BOX

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Removal and installation

LF45/55 series



If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.

Ensure that the steering box is supported securely or safely suspended in a hoist.

8. Remove the steering box attachment bolts/nuts the on the steering bracket. Take the steering box off the vehicle.

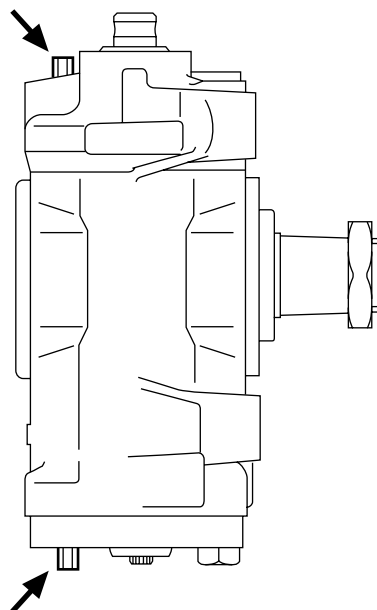
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Note:

If, in order to remove the attachment bolts, the pitman arm must be rotated such that the input shaft is more than one turn out of the central position, the wheel-deflection limiting valve stop bolts must be removed from the steering box. This is to prevent the sliding bush on the stop bolt from being pushed too far onto the stop bolt. Mark the position of the stop bolts and make sure that they do not get mixed up when they are replaced.

Note:

If the vehicle has a steered trailing swivel axle, the angle of rotation of the pitman arm must not be greater than 45°. If the pitman arm needs to rotate further, the steering box angle sensor should be removed first.



S7 00 620

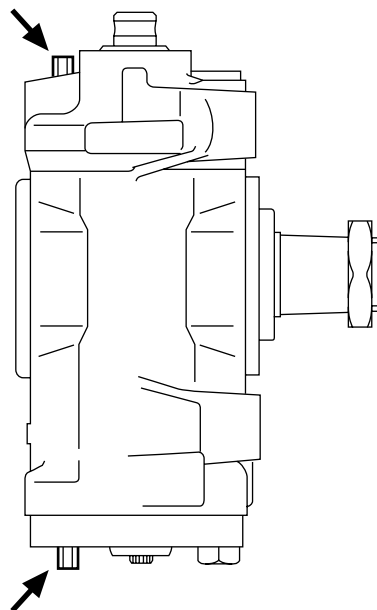
Installing steering box assembly

1. Carefully clean and inspect the threaded holes and the stud bolt of the steering box.
2. If necessary, fit a new stud bolt and tighten the stud bolt to the specified torque, see "Technical data".
3. Clean the contact surfaces of both the steering box and steering bracket. The contact surfaces must be absolutely free of paint (a thin, factory-applied layer of paint is permitted), dirt and grease.
4. In the case of a new or overhauled steering box, fit the pipe connections.
5. Replace the attachment bolts. Because the yield stress is exceeded when the attachment bolts are tightened, they may not be re-used.
Grease the new attachment bolts sparingly. Do not apply too much lubricant. This could result in connections coming loose.
6. Fit the steering box with the pitman arm to the steering bracket.

Note:

If, in order to fit the attachment bolts, the pitman arm has to be rotated such that the input shaft is more than one turn out of the central position, the wheel-deflection limiting valve stop bolts must be removed from the steering box. This is to prevent the sliding bush on the stop bolt from being pushed too far onto the stop bolt.

Mark the position of the stop bolts and make sure that they do not get mixed up when they are replaced.



S7 00 620

STEERING BOX

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Removal and installation

LF45/55 series

Note:

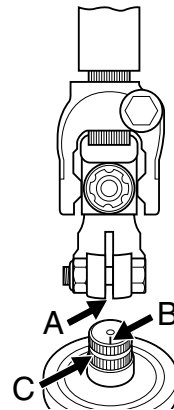
If the vehicle has a steered trailing swivel axle, the angle of rotation of the pitman arm must not be greater than 45°. If the pitman arm needs to rotate further, the steering box angle sensor should be removed first.

7. Tighten the attachment bolts and nuts evenly.
Tighten the attachment bolts to the specified tightening torque, see "Technical data".
8. Fit the pipes to the steering box.
9. Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



Check that the universal joint is correctly in place on the input shaft so that the attachment bolt can be fitted in the notch (C).

10. Fit a new, original attachment nut and bolt in the universal joint.
11. Tighten the attachment bolt to the specified tightening torque, see "Technical data".
12. If the vehicle has a steered trailing swivel axle, fit the angle sensor to the steering box.
13. Install the steering rod. Tighten the castle nut to the specified tightening torque, see "Technical data".
14. Fill and bleed the steering gear.
15. If the steering box input shaft has been rotated more than one turn (starting from the central position) with the steering rod removed, the final limiting pressures must be checked.
16. Take a test drive. During the test drive, check that the steering gear is functioning properly. After the test drive, check the steering gear for leaks.



S7 00 594

4.2 REMOVAL AND INSTALLATION OF STEERING BRACKET



Be careful when tilting the cab or when working under a tilted cab if the steering bracket is being inspected or replaced because of a collision. Vital parts of the cab suspension may have been damaged during the collision. Take the necessary precautions.

Removing steering bracket

1. Remove the steering box.
2. Support the steering bracket. Remove the attachment bolts and take the steering bracket off the chassis.



Inspect the steering bracket thoroughly for deformation and cracks. This is particularly important after a collision for reasons of safety. If possible, the steering bracket should be magnaflux tested. If in doubt, always replace the steering bracket.

STEERING BOX

7

Removal and installation

LF45/55 series

Installing steering bracket

1. Clean the attachment bolts carefully.
2. Screw the attachment nut onto the attachment bolt by hand to test it. If the attachment nut can be easily screwed onto the attachment bolt by hand, the attachment bolt may be re-used. Replace the attachment bolts if necessary.
3. Apply one drop of oil to the first turn of the screw thread and to the underside of the bolt head. Apply no more than one drop of oil as excess oil could penetrate between the contact surfaces, increasing the risk of the connection coming loose.
4. Clean the contact surfaces of both the steering box and steering bracket. The contact surfaces must be absolutely free of paint (a thin, factory-applied layer of paint is permitted), dirt and grease.
5. Place the steering bracket on the chassis. Tighten the attachment bolts evenly to the specified tightening torque, see "Technical data".
6. Install the steering box.

3

4.3 REMOVAL AND INSTALLATION OF PITMAN ARM

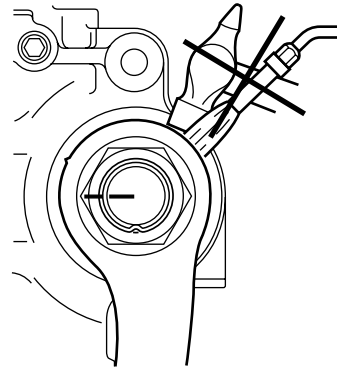


If the pitman arm has been subjected to extremely high loads (in an accident), it should be magnaflux tested, even if no faults are visible to the naked eye. If it is not possible to carry out this test, the pitman arm should be replaced immediately.

The pitman arm should only be removed using the specified special tool.

Under no circumstances should the pitman arm be removed by dislodging it with a hammer or by heating if the specified tool is not available.

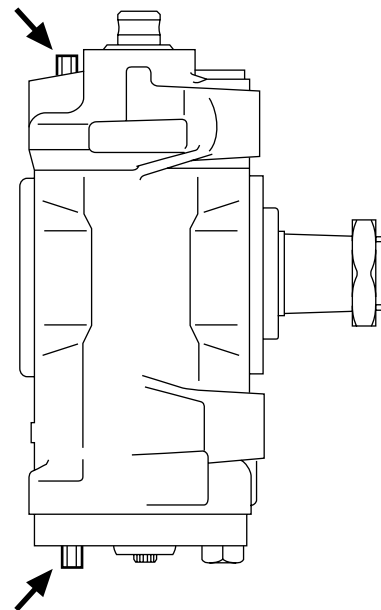
This would result in the pitman arm becoming extremely unreliable and would also permanently damage the sector shaft.



S7 00 617

Removing pitman arm, 8090 steering box.

1. Take the steering box off the vehicle.
2. Mark the position of the stop bolts for the wheel-deflection limiting valves. Remove the stop bolts and plug the openings. While the steering box is being screwed in to allow the attachment nut to be removed, the stop bolts will change position.
3. Clean the screw thread of the sector shaft protruding from the attachment nut.
4. Tap the locking ring of the attachment nut back into its locked position.
5. Remove the sector shaft attachment nut.
6. Fit the hydraulic puller (DAF no. 0485022). Remove the pitman arm using the puller.



S7 00 620

STEERING BOX

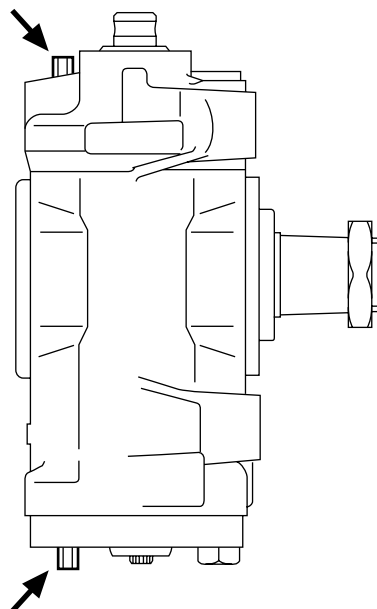
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Removal and installation

LF45/55 series

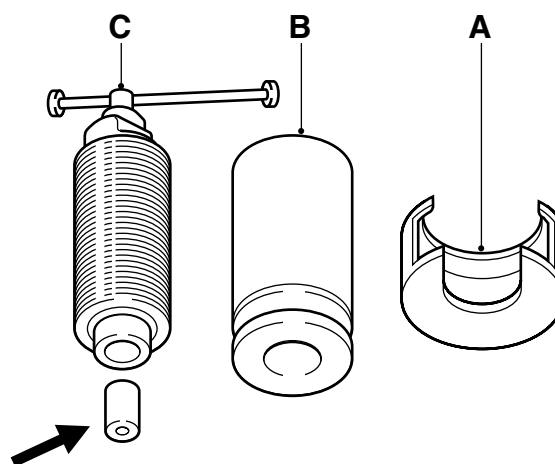
Removing pitman arm, 8095 and 8098 steering box

1. Take the steering box off the vehicle.
2. Mark the position of the stop bolts for the wheel-deflection limiting valves. Remove the stop bolts and plug the openings. While the steering box is being screwed in to allow the attachment nut to be removed, the stop bolts will change position.
3. Clean the screw thread of the sector shaft protruding from the attachment nut.
4. Tap the locking ring of the attachment nut back into its locked position.
5. Remove the sector shaft attachment nut.



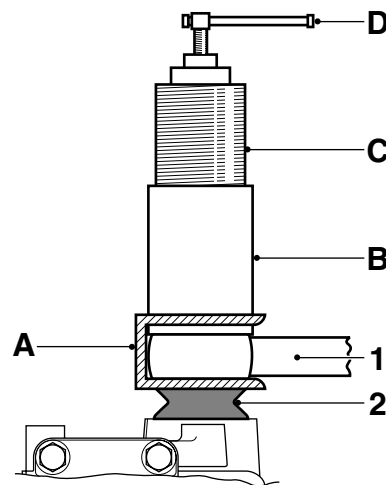
S7 00 620

6. Fit the adjustment spreader (see arrow in drawing) in the hydraulic puller (C), using special tool DAF no. 0535891.
7. Screw the adapter (B), special tool (DAF no. 0694786), partly onto the hydraulic puller (C).



S7 00 029

8. Slide the claw (A), special tool (DAF no. 0694916), over the pitman arm (1).
If necessary, cut off the sector shaft dust seal (2).
9. Slide the adapter (B) with the hydraulic puller (C) into the claw (A).
10. Screw out the spindle (D) of the hydraulic puller (C) as far as possible and then screw the hydraulic puller (C) into adapter (B) as far as possible using an open-end spanner.
11. Screw in the spindle (D) until the pitman arm comes off the sector shaft.
If the pitman arm still has not come off after the spindle has been completely screwed in, screw the spindle out again and screw the puller into the adapter (B) as far as possible. Then screw in the spindle (D) again until the pitman arm comes off.



S7 00 030

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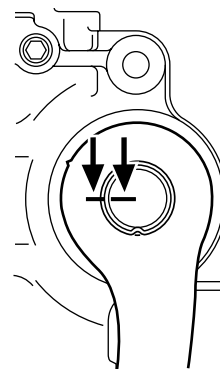
Installing pitman arm

1. Fit a new dust seal on the sector shaft.
2. Grease the surface of the dust seal that is against the steering box using grease with a melting point $> 130^{\circ}\text{C}$.
The grease will protect the seals from dirt and water.
3. Install the pitman arm on the sector shaft so that the marks on the pitman arm and the sector shaft are aligned.

Note:

As the sector shaft nut normally has to be locked in the same position, the sector shaft nut can only be locked twice. After that, the nut must be replaced. The nut must not be locked in the same place again.

4. Fit the nut on the sector shaft and tighten it to the specified torque, see "Technical data".



S7 00 619

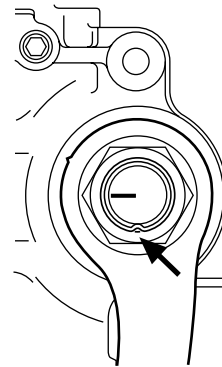
STEERING BOX

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Removal and installation

LF45/55 series

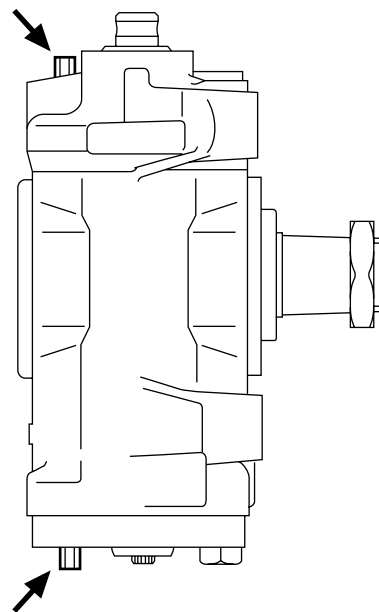
5. Lock the sector shaft nut by tapping the locking ring of the attachment nut at least 2.5 mm into one of the recesses of the sector shaft.
Always use a part of the locking ring that has not been used before.



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6. Re-fit the stop bolts in their original positions and tighten them to the specified tightening torque, see "Technical data".
7. Install the steering box.



S7 00 620

4.4 REMOVAL AND INSTALLATION OF PRESSURE-LIMITING VALVE



Do not install a pressure-limiting valve with a preset value exceeding that of the original valve.

Removing pressure-limiting valve

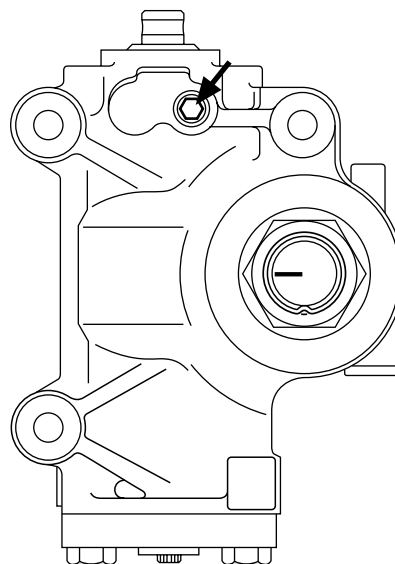
1. Remove the steering box.
2. Clean the pressure-limiting valve and the surrounding area.
3. Remove the pressure-limiting valve.

Note:

The pressure-limiting valve cannot be dismantled or adjusted.

Installing pressure-limiting valve

1. Fit a new O-ring to the pressure-limiting valve and install the valve in the steering box. Tighten the valve to the specified torque, see "Technical data".
2. Install the steering box.
3. Fill and bleed the steering gear.
4. Take a test drive. During the test drive, check that the steering gear is functioning properly. After the test drive, check the steering gear for leaks.



S7 00 616

STEERING BOX

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Removal and installation

LF45/55 series

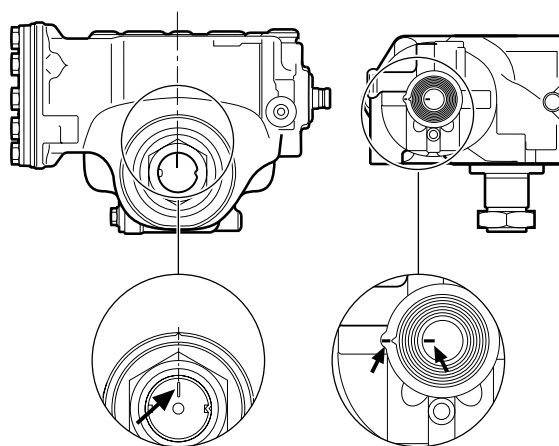
4.5 REMOVAL AND INSTALLATION OF PISTON

Note:

The activities described may only be carried out if the steering box can be tested using a test equipment case after the work has been carried out.

Removing piston

1. Clean the steering box and the surrounding area.
2. Place the steering gear in the central position. This can be checked using the marks on the steering box.
3. If the vehicle has a steered trailing swivel axle, take the angle sensor off the steering box.
4. Mark the end stops of the wheel-deflection limiting valves and remove these.
5. Block the rear wheels, jack up the rear axle and support it on stands.
6. Take the steering rod off the pitman arm.



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7

LF45/55 series

STEERING BOX

Removal and installation

7. Take the universal joint (1) off the steering box.
8. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.

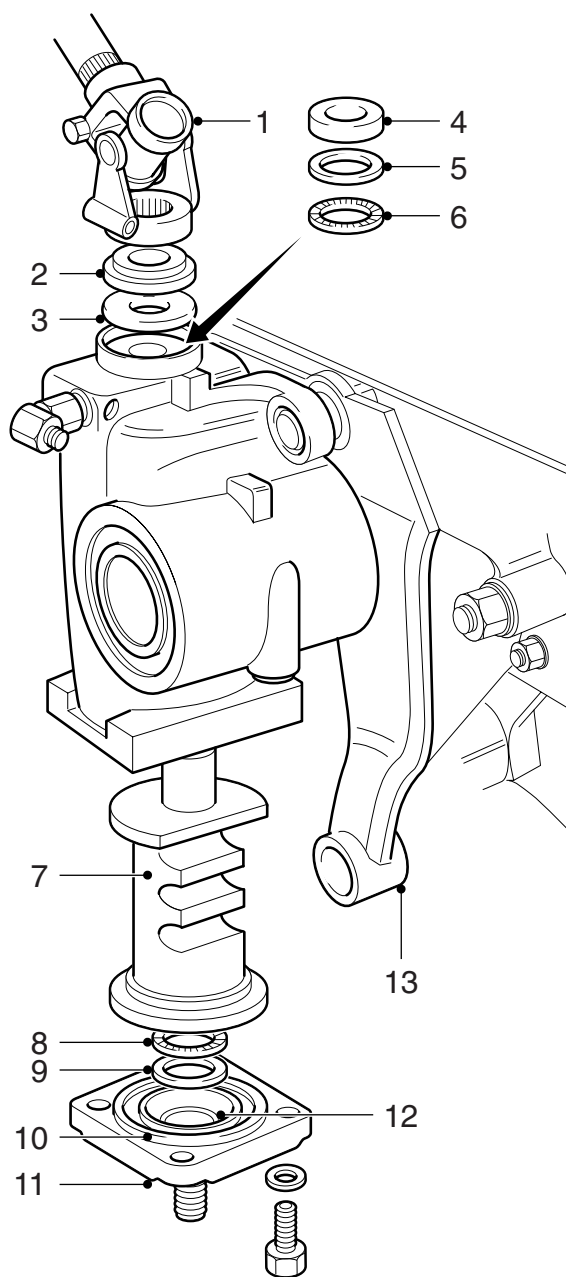


If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.

9. Take the steering oil pipes off the steering box. Collect the steering oil flowing out and plug the openings of the pipes and on the steering box, to prevent dirt entering.
10. Remove the dust cover (2) and the sealing rubber (3).
11. Take the attachment bolts off the cover (11) and remove the cover.
12. Remove the piston (7) by turning the pitman arm (13) so that the piston is forced out of the steering box.

Note:

When the pitman arm is turned, the piston is forced out through the sector shaft. At a certain point the piston will no longer be supported by the sector shaft. Support the piston in an appropriate manner.



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S7 00 837

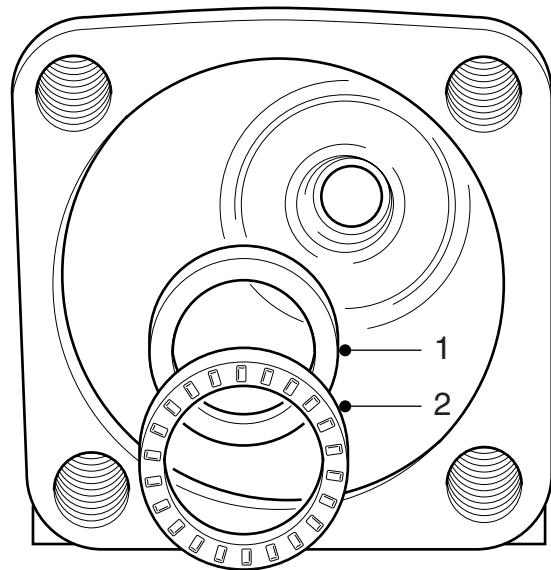
STEERING BOX

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Removal and installation

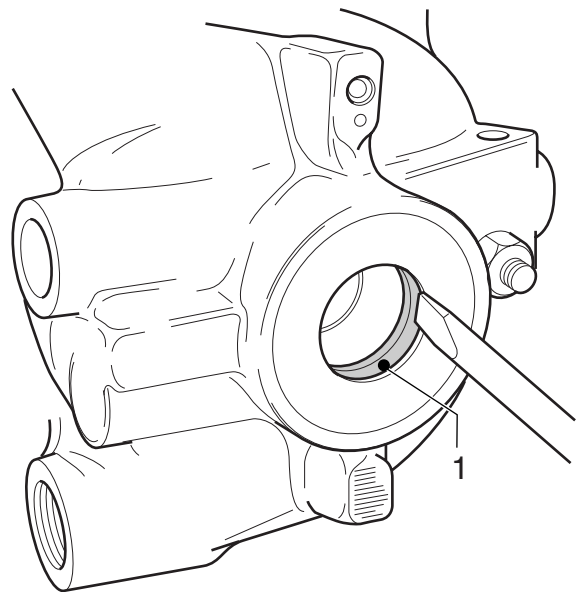
LF45/55 series

13. Take the pivot bearing (2) and the thrust washer (1) out of the housing.



S7 00 863

14. Take the oil seal (1) out of the housing carefully.



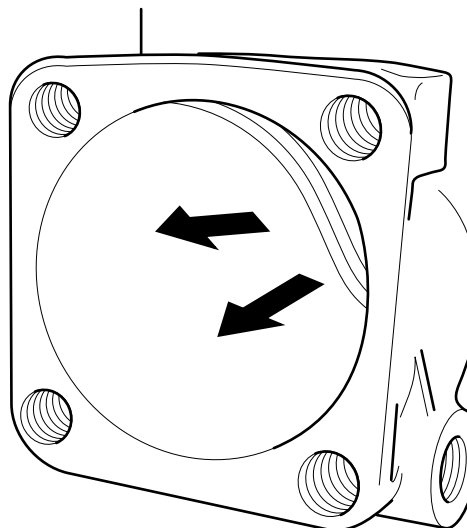
S7 00 864

Checking piston and steering box

Note:

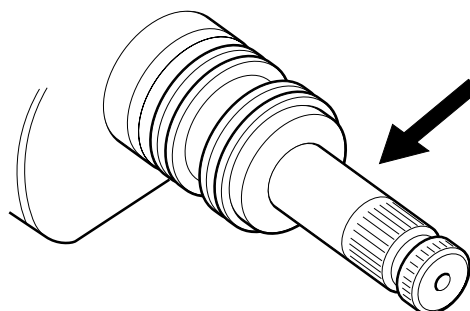
If steering box components are damaged or worn, replace the steering box assembly or have the steering box overhauled in a specialist workshop.

1. Inspect the inside of the steering box for wear and damage.



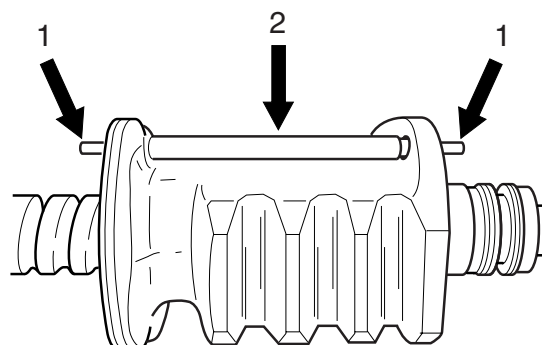
S7 00 865

2. Check the running surface of the oil seal on the input shaft.



S7 00 866

3. Check the wheel-deflection limiting valves for the following points: smooth operation of the wheel-deflection limiting valve, the pins (1) must not be bent and it must not be possible to turn the tube (2) in which the valves are located.



S7 00 867

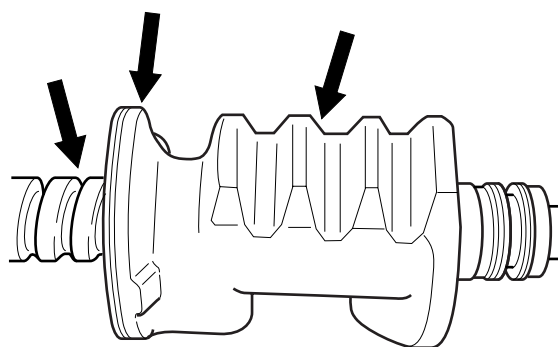
STEERING BOX

7

Removal and installation

LF45/55 series

4. Inspect the worm shaft raceway, the piston running surface and the toothing.

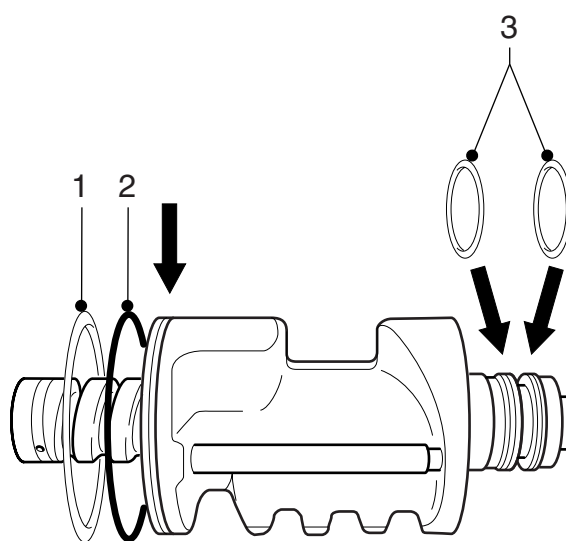


S7 00 868

3

Installing piston

1. Inspect the piston sealing ring (1) and the worm shaft sealing rings (3). If necessary, replace the piston sealing ring (1) and O-ring (2), and the worm shaft sealing rings (3).

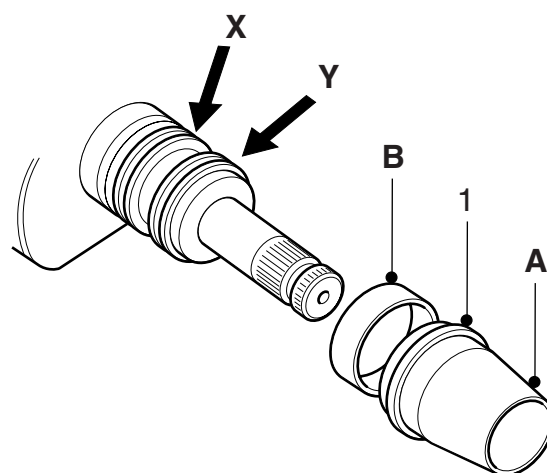


S7 00 869

Note:

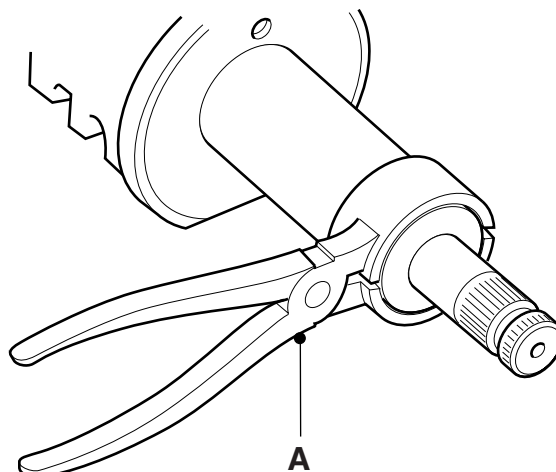
If the sealing rings (3) need to be replaced, follow the procedure below:

- Slide both parts (A and B) of the assembly sleeve, special tool (DAF no. 0485243) for a 8090 steering box and special tool (DAF no. 0192507) for a 8095/8098 steering box, over the worm shaft and grease them sparingly.
- First slide the sealing ring (1) over the assembly sleeve into groove X and then slide the other sealing ring into groove Y.



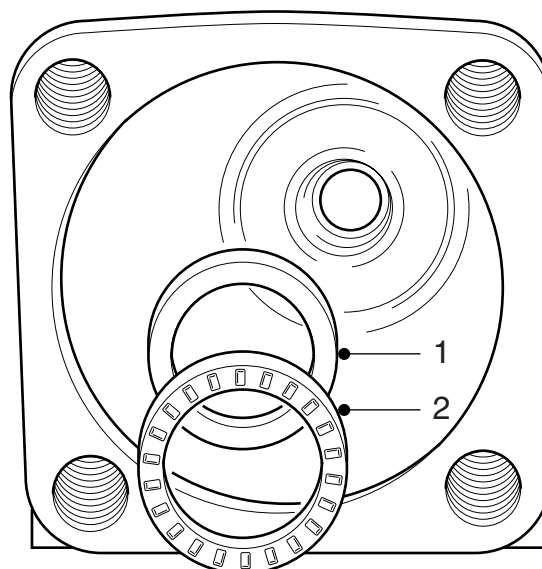
S7 00 870

- The sealing rings become stretched out while they are being fitted. The sealing rings must be compressed using the pliers A, special tool (DAF no. 0485245) for a 8090 steering box and special tool (DAF no. 0192508) for a 8095/8098 steering box.



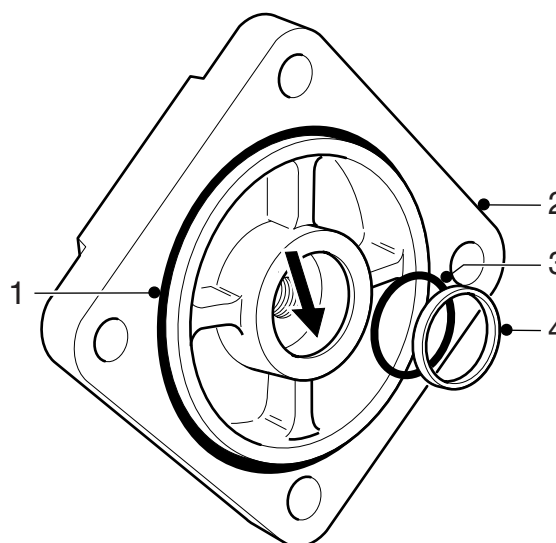
S7 00 871

2. Check the pivot bearing (2) for wear and damage. Replace if necessary.
3. Fit the thrust washer (1) and the pivot bearing (2) in the housing.



S7 00 863

4. Replace the O-ring (1) and check the sealing ring (4) of the cover (2). Replace the sealing ring (4) and the O-ring (3) of the cover (2), if necessary.



S7 00 873

STEERING BOX

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Removal and installation

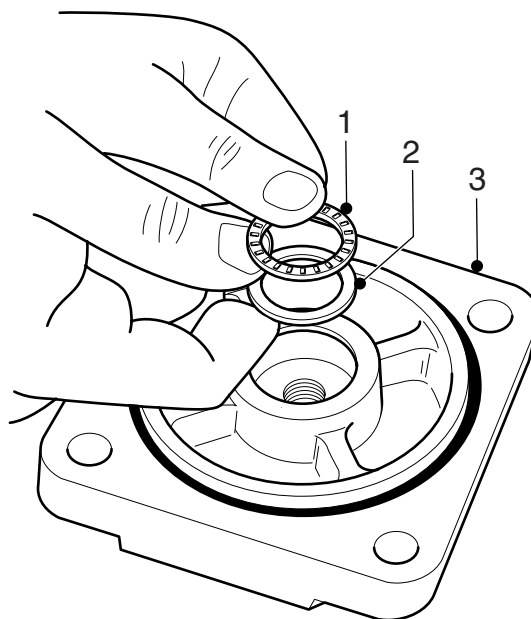
LF45/55 series

3

5. Check the pivot bearing (1) for wear and damage. Replace if necessary.
6. Put the original shim (2) and the pivot bearing (1) in the cover (3).
7. Place the piston in the steering box and move the pitman arm so that the sector shaft pulls the piston into the steering box.
8. Fit the cover with the pivot bearing and shim to the steering box. Ensure that the threaded hole of the stop bolt is in front of the wheel-deflection limiting valve.
9. Install the cover attachment bolts and tighten them crosswise to the specified tightening torque, see "Technical data".
10. Turn the pitman arm from one stop to the other to seat the pivot bearings.
11. Check the end play, see "Inspection and adjustment".
12. Take the attachment bolts off the cover and remove the cover.
13. Remove the piston by moving the pitman arm so that the piston is forced out of the steering box.

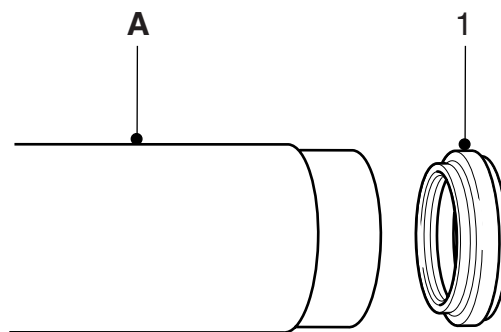
Note:

When the pitman arm is turned, the piston is forced out through the sector shaft. At a certain point the piston will lose its support from the sector shaft. Support the piston in an appropriate manner.



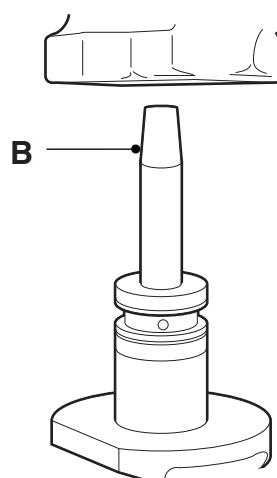
S7 00 874

14. Use the special tool (A), (DAF no. 0485244) for a 8090 steering box and special tool (DAF no. 0192506) for a 8095/8098 steering box, to fit a new oil seal (1) in the steering box.



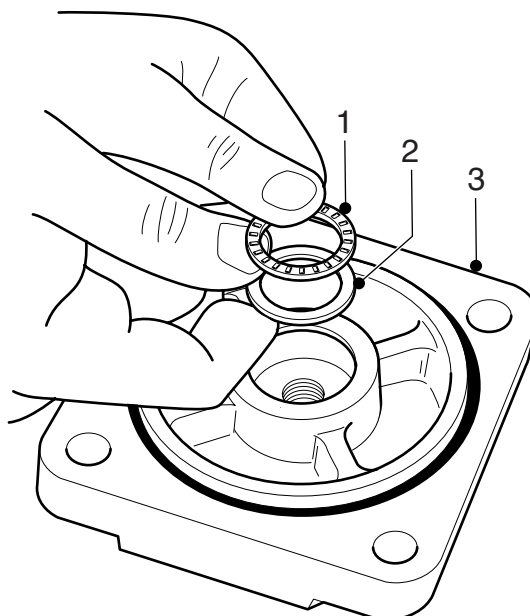
S7 00 872

15. Slide the protective sleeve, special tool (B), (DAF no. 0485242) for a 8090 steering box and special tool (DAF no. 0192509) for a 8095/8098 steering box, over the splines of the input shaft and grease the protective sleeve.
16. Place the piston in the steering box and move the pitman arm so that the sector shaft pulls the piston into the steering box. Remove the protective sleeve.



S7 00 892

17. Grease the shim (2) and the pivot bearing (1) with clean steering oil and fit them in the cover (3).
18. Fit the cover and tighten the attachment bolts to the specified torque, see "Technical data".
19. Grease the area around the input shaft on the top of the housing well using clean grease with a melting point $> 130^{\circ}\text{C}$. The grease will protect the oil seal from dirt and water.



S7 00 874

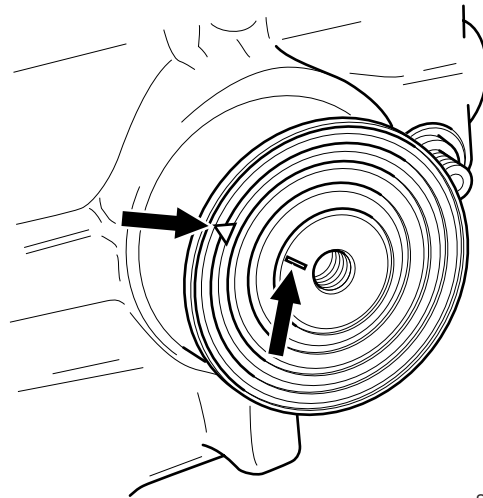
STEERING BOX

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Removal and installation

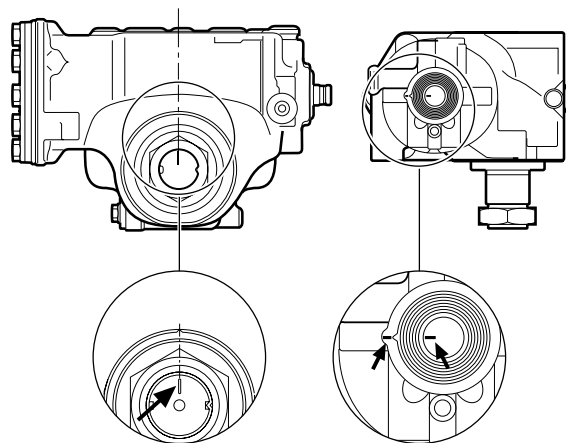
LF45/55 series

20. Fit the sealing rubber and the dust cover. Ensure that the marks on the dust cover and the input shaft are aligned.



S7 00 875

21. Place the steering gear in the central position. This can be checked using the marks on the steering box.
22. Install the stop bolts of the wheel-deflection limiting valves and tighten them to the specified tightening torque, see "Technical data".
23. Fit the steering oil pipes to the steering box.



S7 00 623

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LF45/55 series

STEERING BOX

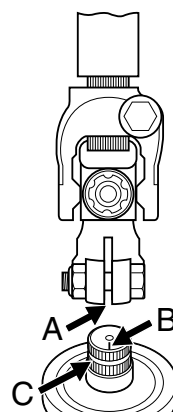
Removal and installation

24. Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



Check that the universal joint is correctly in place on the input shaft so that the attachment bolt can be fitted in the notch (C).

25. Fit a new, original attachment nut and bolt in the universal joint.
26. Tighten the attachment bolt to the specified tightening torque, see "Technical data".
27. Install the steering rod.
28. If the vehicle has a steered trailing swivel axle, fit the angle sensor to the steering box.
29. Fill and bleed the steering gear.
30. Check the operation of the steering box using the test case.
31. Take a test drive. During the test drive, check that the steering gear is functioning properly. After the test drive, check the steering gear for leaks.



S7 00 594

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STEERING BOX

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Removal and installation

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2.1 Removing and installing steering pump, version without steered trailing swivel axle	2-1	200322
2.2 Removing and installing steering pump, version with steered trailing swivel axle	2-3	200322

STEERING PUMP

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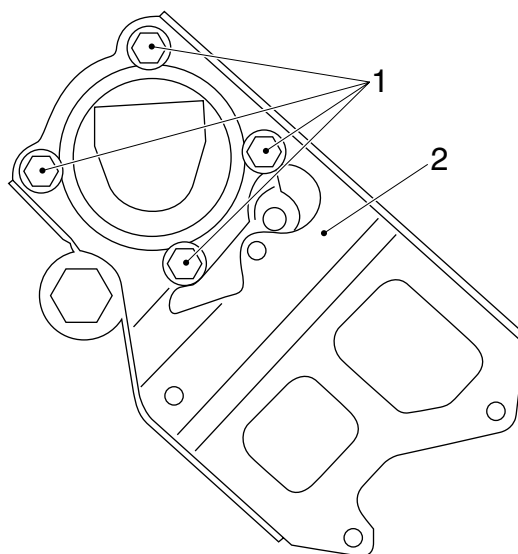
LF45/55 series

4

1. INSPECTION AND ADJUSTMENT

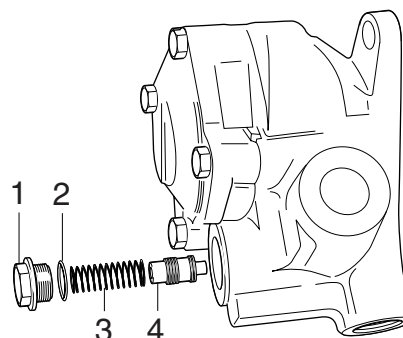
1.1 CHECKING FLOW-CONTROL VALVE, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

1. Clean the steering pump and the surrounding area.
2. Take the steering pump out of the engine.
3. Take the reservoir off the steering pump.
4. Take the bracket (2) off the steering pump. Put the cover on the pump. Refit the attachment bolts (1).



S7 00 609

5. Remove the plug (1).
6. Take the flow-control valve (4) with the spring (3) out of the steering pump. Mark the position of the valve in the valve bore.
7. Check both the valve and the valve bore for dirt. Clean these parts if necessary.
8. Apply plenty of clean steering oil to the valve and fit the valve in the correct position in the bore.
9. Check the valve for smooth operation. The valve should not jam.
10. Fit the valve (4) in the pump.
11. Fit the spring (3).
12. Fit the plug (1), with a new sealing ring (2), to the pump. Tighten the plug to the specified tightening torque, see "Technical data".



S7 00 613

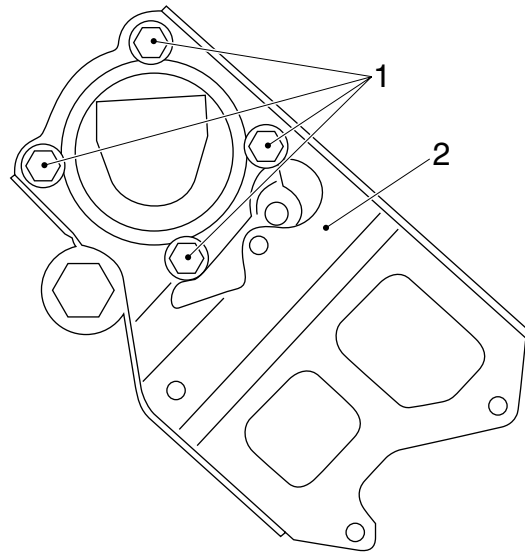
STEERING PUMP

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Inspection and adjustment

LF45/55 series

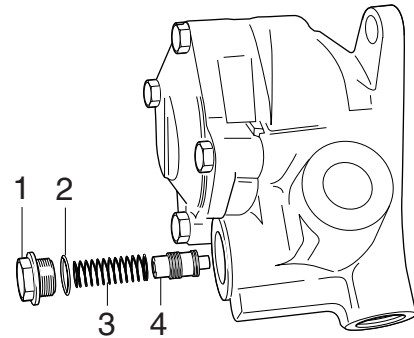
13. Attach the bracket (2) to the pump. Tighten the attachment bolts (1) evenly to the specified torque, see "Technical data".
14. Fit the reservoir to the pump.
15. Fit the pump to the engine.
16. Fill and bleed the steering gear hydraulic system.
17. Take a test drive and check the plug and pump cover for leaks.



S7 00 609

1.2 CHECKING FLOW-CONTROL VALVE, VERSION WITH STEERED TRAILING SWIVEL AXLE

1. Clean the steering pump and the surrounding area.
2. Remove the plug (1).
3. Take the flow-control valve (4) with the spring (3) out of the steering pump. Mark the position of the valve in the valve bore.
4. Check both the valve and the valve bore for dirt. Clean these parts if necessary.
5. Apply plenty of clean steering oil to the valve and fit the valve in the correct position in the bore.
6. Check the valve for smooth operation. The valve should not jam.
7. Fit the valve (4) in the pump.
8. Fit the spring (3).
9. Fit the plug (1), with a new sealing ring (2), to the pump. Tighten the plug to the specified tightening torque, see "Technical data".
10. Fill and bleed the steering gear hydraulic system.
11. Take a test drive and check the plug and pump cover for leaks.



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STEERING PUMP

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Inspection and adjustment

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2. REMOVAL AND INSTALLATION

2.1 REMOVING AND INSTALLING STEERING PUMP, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

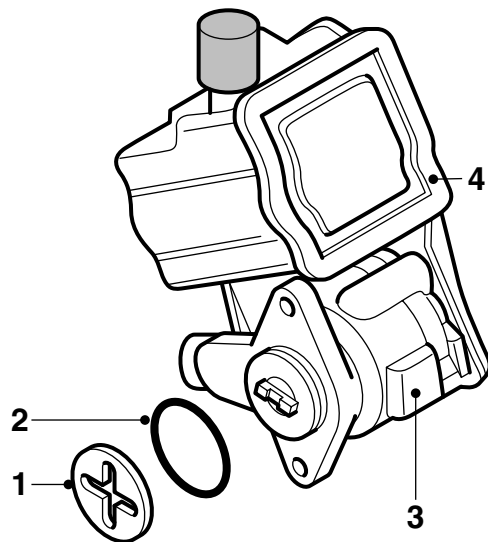
Removing steering pump, version without steered trailing swivel axle

Note:

When replacing a worn steering pump, it is advisable to fully drain the steering oil and replace the steering oil reservoir and built-in filter.

In extreme cases, the steering pump may have been worn to such an extent that metal particles from the pump have entered the steering box. Check the steering box for internal wear using the test equipment case.

1. Clean the pipe connections.
2. Place a receptacle under the steering pump.
3. Take the pipes off the steering pump and plug the pipe and pump openings. The filter is fitted in the return pipe, which means that if any dirt enters, it will immediately get into the system.
4. Remove the electronic unit in the case of a 4 cylinder engine.
5. Remove the attachment bolts and take the steering pump (3) and the carrier (1) off the compressor.
6. Take the reservoir (4) off the pump (3).



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STEERING PUMP

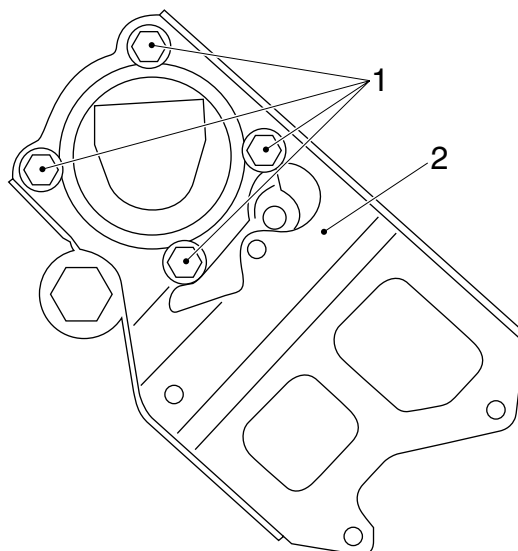
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Removal and installation

LF45/55 series

Installing steering pump, version without steered trailing swivel axle

1. If necessary, fit the bracket (2) on top of the new pump. Do not take the cover off the pump to do this. Tighten the attachment bolts (1) evenly to the specified torque, see "Technical data".



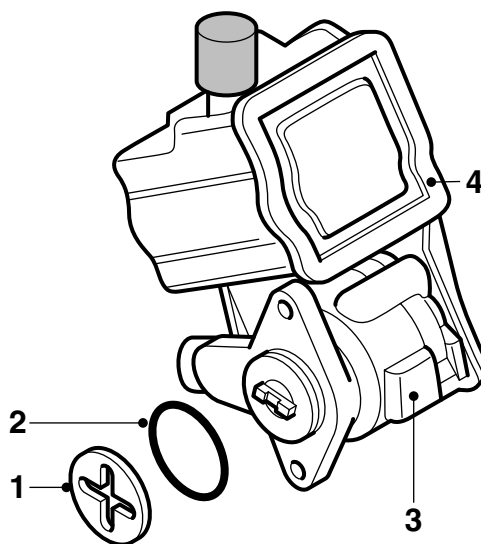
S7 00 609

2. Check the carrier (1) for wear.
3. If necessary, connect the pipe couplings to the steering pump that is about to be installed. Tighten the couplings to the specified torques, see "Technical data".



If the specified tightening torques are exceeded, the aluminium pump housing may be damaged.

4. Fit a new O-ring (2) to the steering pump and grease it lightly.
5. Crank the engine until the compressor driver half is horizontal.
6. Grease the carrier (1) lightly and fit it to the compressor driver half.
7. Fit the reservoir (4) to the pump.
8. Fit the pump (3). Tighten the attachment bolts evenly to the specified tightening torque, see "Technical data".



S7 00 575

9. Fit the electronic unit in the case of a 4 cylinder engine.
10. Fit the pipes.
11. Fill and bleed the steering gear hydraulic system.
12. Take a test drive and check the pump and pipe connections for leaks.

2.2 REMOVING AND INSTALLING STEERING PUMP, VERSION WITH STEERED TRAILING SWIVEL AXLE

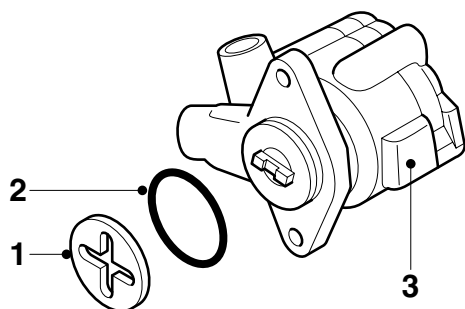
Removing steering pump, version with steered trailing swivel axle

Note:

When replacing a worn steering pump, it is advisable to fully drain the steering oil and replace the filter element in the reservoir and the high-pressure filter.

In extreme cases, the steering pump may have been worn to such an extent that metal particles from the pump have entered the steering box. Check the steering box for internal wear using the test equipment case.

1. Clean the pipe connections.
2. Place a receptacle under the steering pump.
3. Take the pipes off the steering pump and plug the pipe and pump openings. The filter is fitted in the return pipe, which means that if any dirt enters, it will immediately get into the system.
4. Remove the attachment bolts and take the steering pump (3) and the carrier (1) off the compressor.



S7 00 834

STEERING PUMP

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Removal and installation

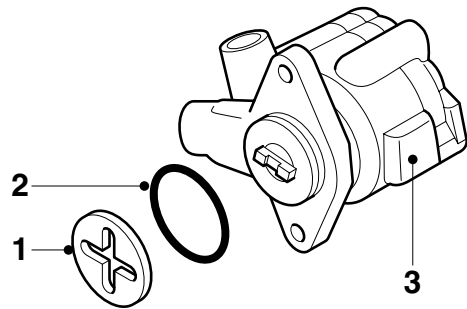
LF45/55 series

Installing steering pump, version with steered trailing swivel axle

1. Check the carrier (1) for wear.
2. If necessary, connect the pipe couplings to the steering pump that is about to be installed. Tighten the couplings to the specified torques, see "Technical data".



If the specified tightening torques are exceeded, the aluminium pump housing may be damaged.



S7 00 834

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3. Fit a new O-ring (2) to the steering pump and grease it lightly.
4. Crank the engine until the compressor driver half is horizontal.
5. Grease the carrier (1) lightly and fit it to the compressor driver half.
6. Fit the pump (3). Tighten the attachment bolts evenly to the specified tightening torque, see "Technical data".
7. Fit the pipes.
8. Fill and bleed the steering gear hydraulic system.
9. Take a test drive and check the pump and pipe connections for leaks.

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RESERVOIR AND LINES

7

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LF45/55 series

5

1. GENERAL

1.1 PIPES, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

Supply pipe

The reservoir is fitted directly to the steering pump, so this system does not have a supply pipe.

Delivery pipe

The delivery pipe connects the steering pump to the steering box and consists partly of a rubber hose and partly of a steel pipe.

The rubber hose has an internal, braided, steel casing. The maximum permissible pressure is marked on the hose.

The couplings are sealed by means of O-rings.

Return pipe

The return pipe connects the reservoir to the steering box and consists partly of a rubber hose and partly of a steel pipe.

The couplings are sealed by means of O-rings.

The hose is attached to the reservoir by means of a hose clamp.

1.2 PIPES, VERSION WITH STEERED TRAILING SWIVEL AXLE

Supply pipe

The supply pipe connects the reservoir to the steering pump and is made of a thick, flexible rubber hose.

The hose is attached to the reservoir by means of a hose clamp.

As the steering pump is non-regenerative, the reservoir should be placed at a specific height above the steering pump.

The length of the supply pipe also influences the operation of the steering pump.

If the reservoir is moved, so that the supply pipe becomes longer, the reservoir must also be placed higher.

Delivery pipe

The steel delivery pipe connects the steering pump to the high-pressure filter. A thick, flexible rubber hose goes from the high-pressure filter to the distribution block. The maximum permissible pressure is marked on the hose.

The rubber hose is connected to the high-pressure filter and the distribution block by means of a union nut.

The steering box and the valve block are connected to the distribution block by a steel pipe.

Return pipe

Steel pipes go from the steering box and from the distribution block to the reservoir. As the steel pipes near the reservoir, lengths of thick rubber hosing are attached to their ends. The two rubber hoses are connected together by a T-piece. A thick, flexible rubber hose connects the reservoir to the T-piece.

The steel pipes are connected to the steering box and the distribution block by means of a union nut. The rubber hoses are attached to the steel pipes, the T-piece and the reservoir by hose clamps.

1.3 OPERATION OF RESERVOIR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

General

A filter element is fitted in the reservoir. This cannot be replaced. If the filter element needs to be replaced (e.g. because the steering oil is very dirty), the whole reservoir must be replaced.

The return oil is partially filtered by the filter. The filter is not fitted in the supply pipe, as the resistance of the filter means that the filter element and reservoir would need to be very large.



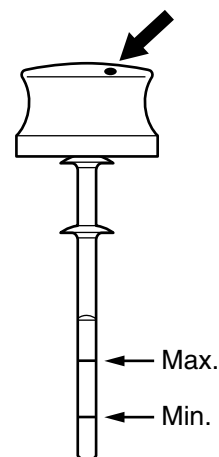
When working on the steering gear, prevent dirt from entering the reservoir and the pipes. When the steering oil is drawn in it is unfiltered, freely allowing dirt to enter the steering gear.

A by-pass valve is fitted under the filter. When the engine is at idling speed and the steering pump output is limited, the by-pass valve is closed. In this case, all return oil passes through the filter. If the steering pump output is at maximum, approx. $\frac{1}{3}$ of the oil will pass through the filter and $\frac{2}{3}$ will flow directly into the reservoir through the by-pass valve.

As the speed at which the oil circulates is very high, eventually all the oil will pass through the filter and the oil will be filtered sufficiently frequently.

The fact that the oil is only partially filtered means that a small filter element can be used.

A dipstick is fitted in the top of the reservoir with a minimum and maximum oil level mark. There is a small air-bleeder hole in the rubber cap of the dipstick. This hole must always be open, otherwise the return pressure will become too high.



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RESERVOIR AND LINES

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General

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1.4 OPERATION OF RESERVOIR, VERSION WITH STEERED TRAILING SWIVEL AXLE

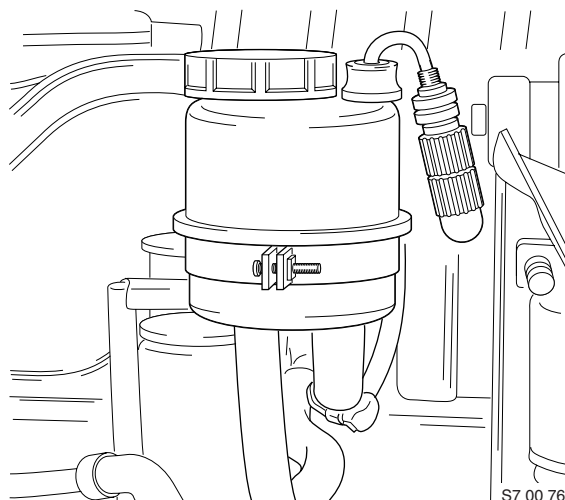
General

A filter element is fitted in the reservoir. The filter element, which can be replaced, partially filters the return oil.

The filter is not fitted in the supply pipe, as the resistance of the filter means that the filter element and reservoir would need to be very large.

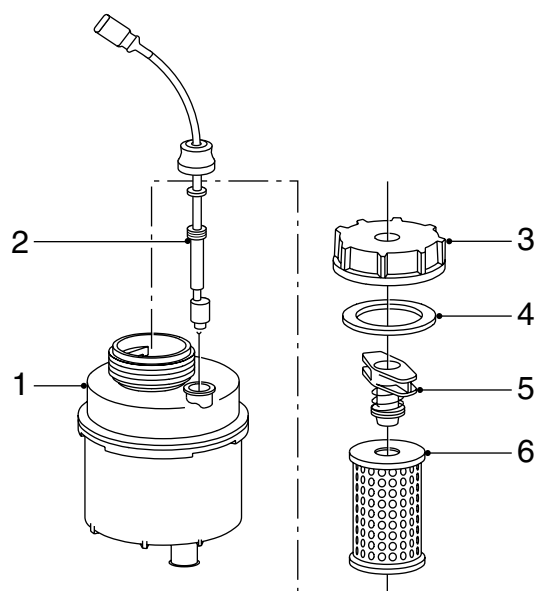


When working on the steering gear, prevent dirt from entering the reservoir and the pipes. When the steering oil is drawn in it is unfiltered, freely allowing dirt to enter the steering gear.



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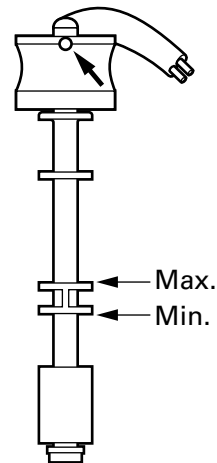
The filter element (6) is kept in place by the filter holder (5). If the resistance in the filter is too great (e.g. because the oil is cold or the filter is dirty), the filter element is partially pushed off its seat. This causes some of the steering oil to pass along the underside of the filter element directly into the reservoir. A spring mounted between the filter element and the filter holder allows this movement of the oil.



The fluid level switch (2) closes if the steering oil drops below the minimum level.

There are marks on the dipstick for the minimum and maximum oil level.

There is a small air-bleeder hole in the rubber cap of the dipstick. This hole must always be open, otherwise the return pressure will become too high.



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RESERVOIR AND LINES

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General

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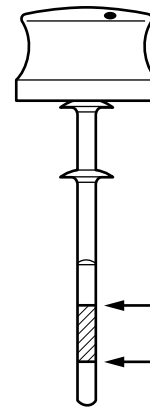
2. INSPECTION AND ADJUSTMENT

2.1 CHECKING STEERING OIL LEVEL

1. Check the steering oil level when the engine is not running.
2. Clean the dipstick and its immediate surroundings to prevent oil from entering the reservoir.
3. Check the fluid level in the reservoir using the dipstick.
4. The steering oil level should be between the marks when the engine is "cold".

Note:

The level may be above the top mark on the dipstick when the steering oil is at operating temperature.



S7 00 676

RESERVOIR AND LINES

7

Inspection and adjustment

LF45/55 series

2.2 CHECKING PIPES

Condition of pipes

- Check all pipes for tightness and wear.
- If in doubt, always replace the pipe.

Pipe connections

- Check each pipe connection for leaks.

Pipe routing

- Pipes must not be twisted during fitting.
A mark (sometimes in the form of text) can be put on the hose to make it easier to carry out this check.
- Pipes must not touch other components (to prevent chafing).
- Pipes must not be sharply bent; this applies especially to the flexible return pipe.
- Pipes must not be pinched off by other components.

3. REMOVAL AND INSTALLATION

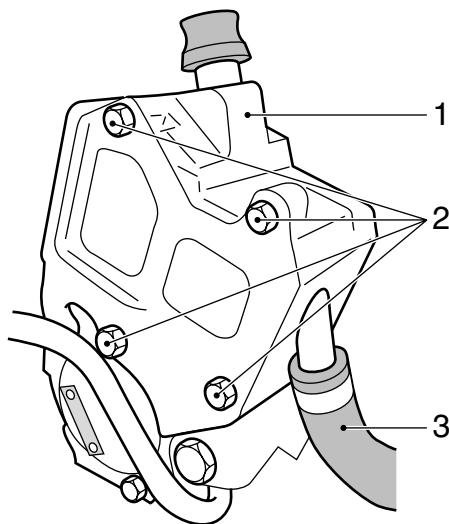
3.1 REMOVING AND INSTALLING RESERVOIR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

Removing reservoir, version without steered trailing swivel axle

1. Clean the reservoir (1) and the surrounding area.
2. Place a receptacle under the reservoir.
3. Take the hose (3) off the reservoir. Plug the hose opening.
4. Remove the attachment bolts (2).
5. Take the reservoir off the steering pump.

Installing reservoir, version without steered trailing swivel axle

1. Fit a new O-ring to the reservoir (1).
2. Fit the reservoir (1) to the steering pump.
3. Fit the attachment bolts (2). Tighten the attachment bolts (2) to the specified torque, see "Technical data".
4. Fit the hose (3) using a new hose clamp.
5. Fill and bleed the system.
6. Check the reservoir and the hose connections for leaks with the engine running.



RESERVOIR AND LINES

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Removal and installation

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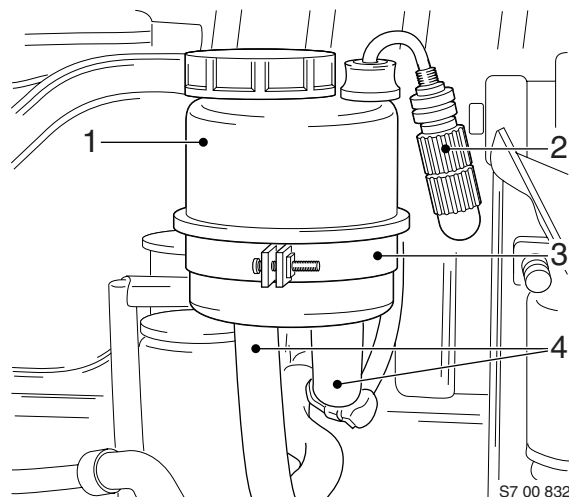
3.2 REMOVING AND INSTALLING RESERVOIR, VERSION WITH STEERED TRAILING SWIVEL AXLE

Removing reservoir, version with steered trailing swivel axle

1. Clean the reservoir (1) and the surrounding area.
2. Place a receptacle under the reservoir.
3. Take the hoses (4) off the reservoir. Plug the hose connections.
4. Disconnect the fluid level switch connector (2).
5. Undo the clamping strap attachment bolt (3) and remove the reservoir.

Installing reservoir, version with steered trailing swivel axle

1. Place the reservoir (1) in the clamping strap (3) and tighten the attachment bolt.
2. Fit the hoses (4) using new hose clamps.
3. Connect the connector (2).
4. Fill and bleed the system.
5. Check the reservoir and the hose connections for leaks with the engine running.



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3.3 REMOVING AND INSTALLING RESERVOIR FILTER ELEMENT, VERSION WITH STEERED TRAILING SWIVEL AXLE

Removing plastic reservoir filter element, version with steered trailing swivel axle

1. Clean the reservoir cover, so that absolutely no dirt can get into the reservoir.
2. Remove the cover (3).
3. Turn the filter holder (5) a quarter turn. Slowly take the filter holder (5) together with the filter element (6) out of the reservoir (1).

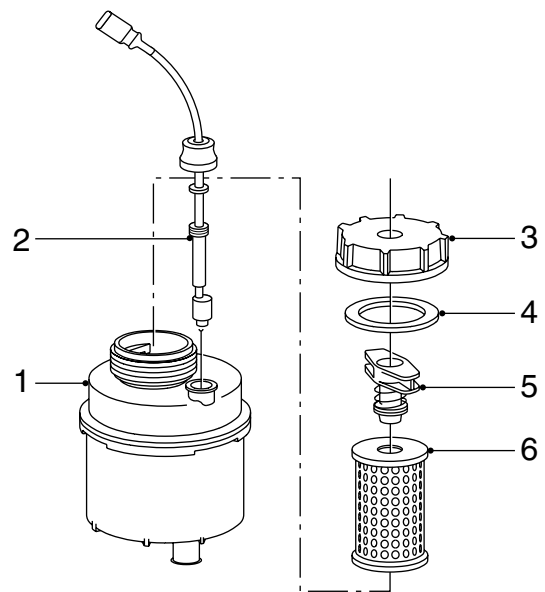
Note:

The filter holder and filter element must be taken out of the reservoir (1) carefully, to ensure that dirt is not left in the reservoir (1).

4. Take the filter element (6) off the filter holder (5).

Installing plastic reservoir filter element, version with steered trailing swivel axle

1. Fit a new filter element (6) in the filter holder (5).
2. Fit the filter holder (5) together with the filter element (6) in the reservoir (1) and turn the filter holder (5) a quarter turn. Make sure that the filter holder (5) engages in its locking element.
3. Check the sealing ring (4) for damage and replace if necessary.
4. Fit the cover (3).
5. Check the fluid level using the dipstick (2), see "Inspection and adjustment".



S7 00 757

3.4 REMOVAL AND INSTALLATION, PIPES

Removing pipes

1. Clean the pipe connections and the surrounding area.
2. Place a receptacle under the pipe connection.
3. Remove the pipe. Plug the openings.

Installing pipes

1. Only install original pipes and hoses supplied by DAF.
2. Points for attention when installing pipes:
 - Fit a new O-ring.
 - Do not twist the pipe when tightening the coupling. A mark can be put on the hose (sometimes in the form of text) to make it easier to carry out this check.
 - The pipe must not touch other components (because of chafing).
 - The pipe must not bend sharply; this applies especially to the flexible supply and return pipes.
 - The pipe must not be not pinched off by other components.
3. If the hose is connected using a hose clamp, replace the hose clamp. Tighten the hose clamp.
Check the contact surfaces for damage if a union nut connection is used.
4. Fill and bleed the system.
5. Check the pipe connections for leaks while turning the steering wheel and with the engine running.

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FRONT AXLE, F36/F48

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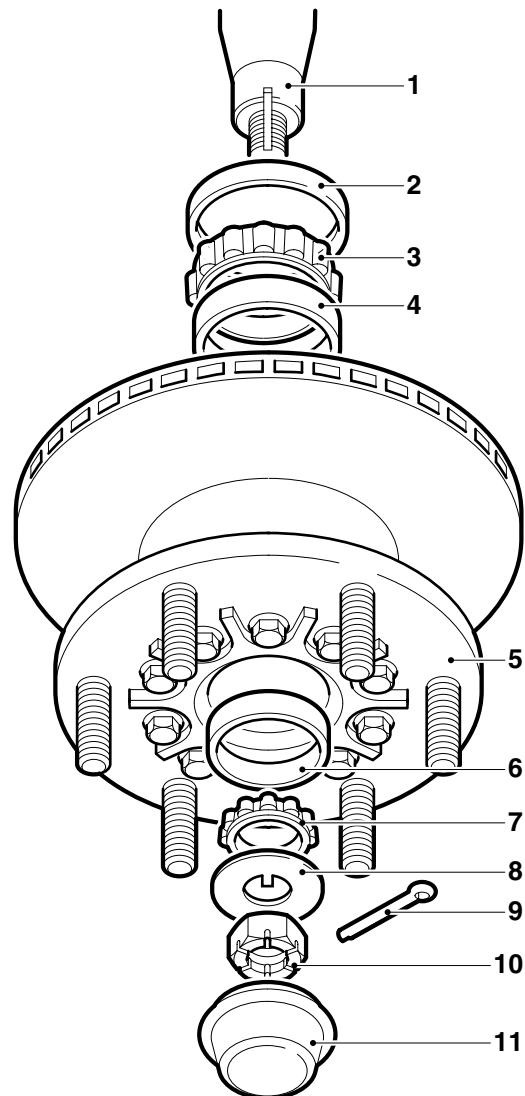
LF45/55 series

6

1. GENERAL

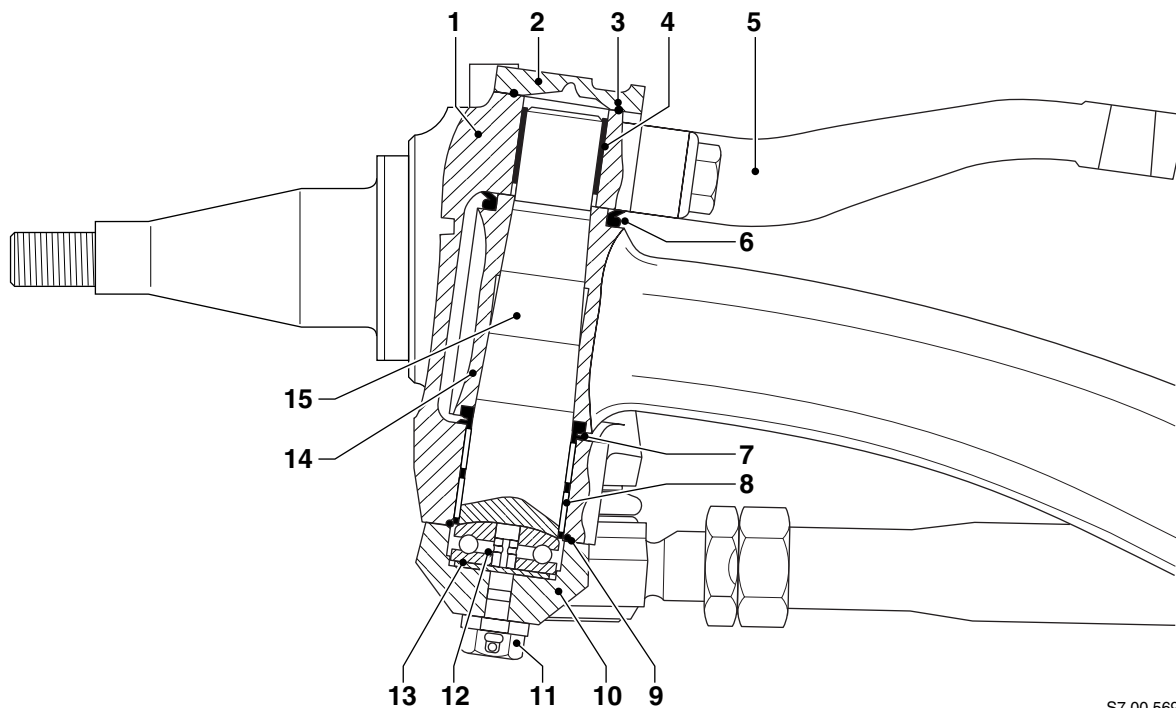
1.1 OVERVIEW DRAWING OF WHEEL HUB

1. Axle journal
2. Oil seal
3. Bearing cage
4. Bearing race
5. Hub
6. Bearing race
7. Bearing cage
8. Circlip
9. Split pin
10. Hub nut
11. Hub cap



S7 00 573

1.2 OVERVIEW DRAWING OF SWIVEL AXLE

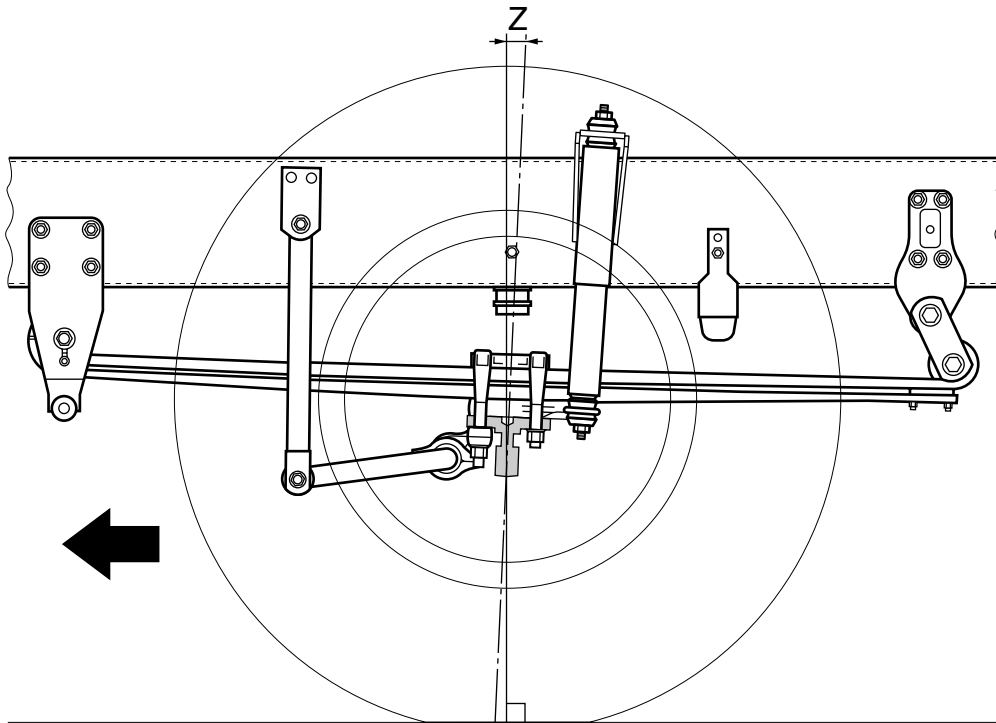


S7 00 569

6

1. Swivel axle
2. Top cover
3. O-ring
4. Bearing bush
5. Steering rod arm
6. Oil seal
7. Oil seal
8. Bearing bush (F36 axle) or needle bearing (F48 axle)
9. O-ring
10. Bottom cover/track rod arm
11. Attachment bolt
12. Thrust bearing
13. Adjusting ring
14. Axle end
15. King pin

1.3 DESCRIPTION OF THE WHEEL SETTINGS



S7 00 606

6

Caster

The caster (Z) is the angle of the axle housing relative to the road surface. The caster is important for the directional stability of the vehicle. Too little caster will lead to the vehicle “searching”, while too much caster will result in “heavy” steering.

If the caster is set incorrectly this will not cause tyre wear.

The caster is determined by the relationship between the road surface and the chassis, assuming that the chassis is parallel to the road surface.

The caster can be checked and adjusted very easily and this does not require any complicated equipment.

FRONT AXLE, F36/F48

7

General

LF45/55 series

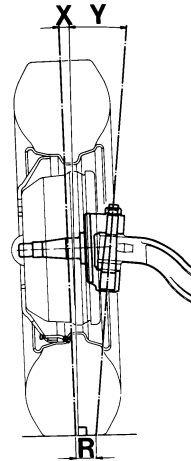
Camber angle and king-pin inclination

The camber angle (X) and the king-pin inclination (Y) are determined by the design of the swivel axle and the axle housing. Neither setting can be adjusted.

Incorrect wheel alignment is caused exclusively by collisions and/or a bent front axle due to overloading.

If one of the wheels is out of alignment on a vehicle, the load of the tyre will be unevenly distributed across the road surface. This will result in irregular tyre wear.

Each wheel must be checked separately.



S7 00 129

Toe

Toe is the difference between distances A and B.

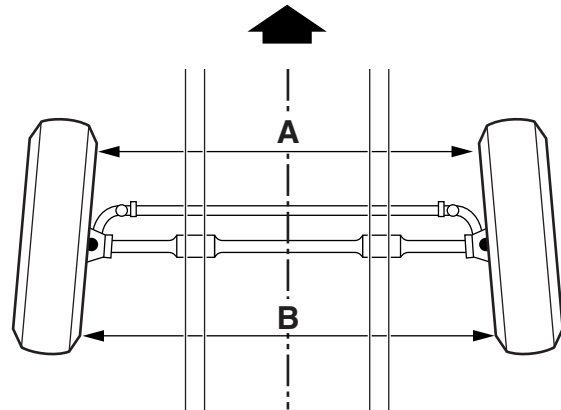
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

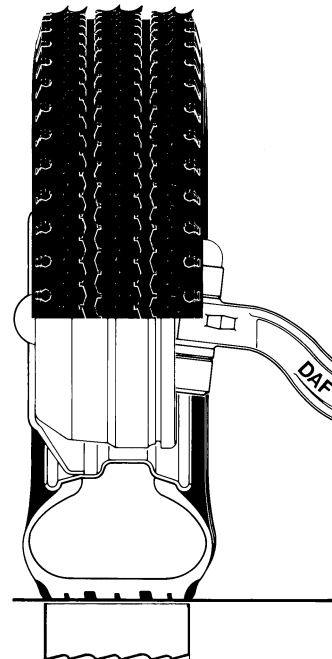
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.

If the toe-in or toe-out is incorrect will cause "chafing" of the tyres on the road surface. This will result in irregular tyre wear.

The same irregular tyre wear is found in vehicles with multiple steerable axles if the wheels are "misaligned" while the vehicle is driving straight ahead.



S7 00 833



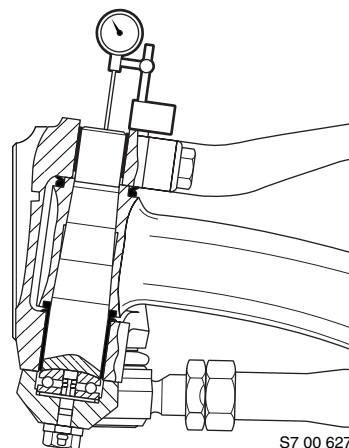
S7 00 126

2. INSPECTION AND ADJUSTMENT

2.1 INSPECTION AND ADJUSTMENT OF SWIVEL AXLE PLAY

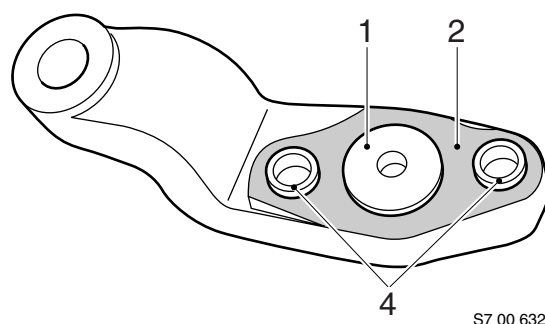
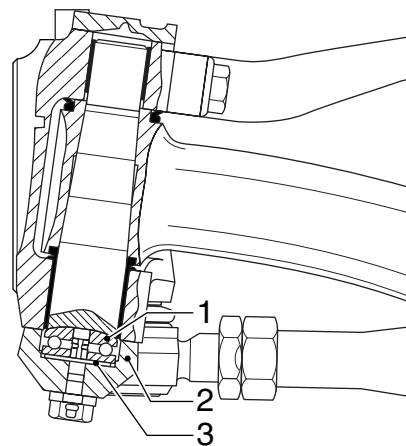
Checking swivel axle play

1. Take the top cover off the swivel axle.
2. Fit the dial gauge to the swivel axle with the stylus on the king pin.
3. Load and unload the swivel axle. Measure swivel axle play when loaded and unloaded. Compare the reading with the permissible play, see "Technical data".



Adjusting swivel axle play

1. Remove the bottom cover/track-rod arm (2), see "Removal and installation".
2. Take the thrust bearing (1) and the adjusting ring (3) off the bottom cover/track rod (2).
3. Check the thrust bearing for wear and damage. If in doubt, replace the thrust bearing.
4. Depending on the measured swivel axle play, fit the correct adjusting ring to produce the specified axial play, see "Technical data".
5. Check the adjusting bushes (4) in the bottom cover/track-rod arm (2).
6. Fit a new O-ring to the bottom of the swivel axle. Make the O-ring stick by applying a layer of grease.
7. Fit the bottom cover/track-rod arm (2). Tighten the attachment bolts to the specified tightening torque, see "Technical data".



FRONT AXLE, F36/F48

7

Inspection and adjustment

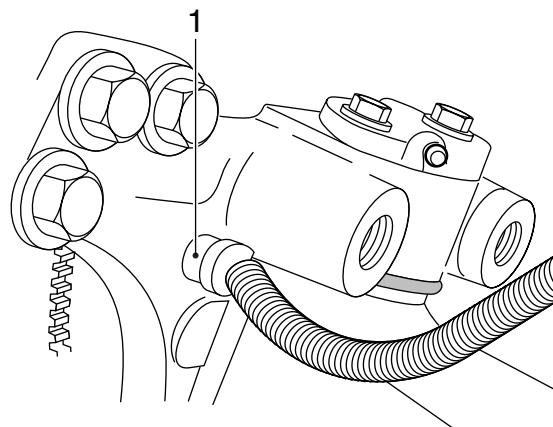
LF45/55 series

8. Check the swivel axle play. If necessary fit an adjusting ring of a different thickness.
9. Fit the O-ring in the top cover.
10. Fit the top cover on the swivel axle. Tighten the attachment bolts to the specified tightening torque, see "Technical data".
11. Lubricate the top and bottom bearing when the vehicle is unloaded until a collar of grease is visible around the sealing rings.

2.2 INSPECTION AND ADJUSTMENT OF WHEEL BEARING PLAY

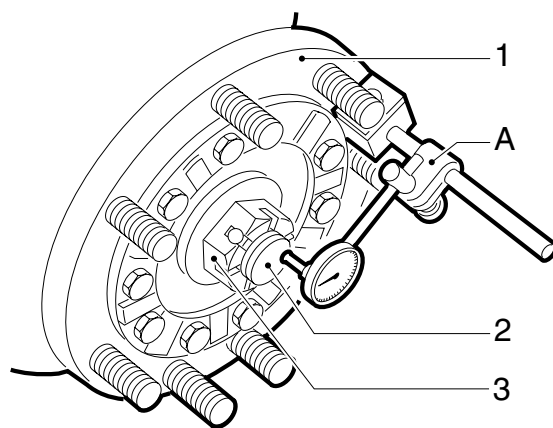
Checking wheel bearing play

1. Support the front axle in a safe manner.
2. Remove the wheel.
3. Remove the wheel-speed sensor (1).
4. Remove the brake calliper.
5. Remove the hub cap.



S7 00 589

6. Fit a dial gauge (A) to the wheel hub (1) with the stylus on the end of the axle end (2).
7. Push and pull the wheel hub (1). Check the wheel bearing play and compare it to the specified value, see "Technical data".
8. Fit the hub cap.
9. Fit the brake calliper.
10. Set the brake pad clearance.
11. Press the wheel-speed sensor against the sensor ring. The required clearance will be produced while on the move.
12. Fit the wheel, see "Removal and installation".



S7 00 633

FRONT AXLE, F36/F48

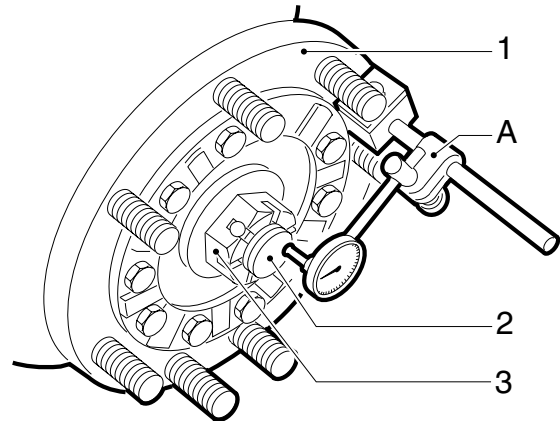
7

Inspection and adjustment

LF45/55 series

Adjusting wheel bearing play

1. Tighten the hub nut (3) to the specified tightening torque, see "Technical data". Turn the hub while securing the hub nut (1), to allow the bearings to seat.
2. Turn the hub nut (3) back approx. 90°. It should be possible to fit the split pin.
3. Check the wheel bearing play against the specified value, see "Technical data".
4. Fit a new split pin.



S7 00 633

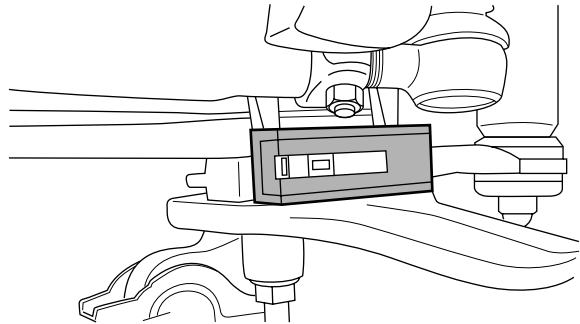
2.3 CHECKING THE CASTER

General

- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The caster can be measured using an angle gauge or wheel alignment equipment.

Checking caster using an angle gauge

1. Clean the spot where the angle gauge is to be placed on the spring seat.
2. Place the angle gauge on a chassis side member and check whether the chassis is parallel with the floor.
If not, the caster reading should be adjusted to the chassis position.
3. Place the angle gauge on the spring seat and measure the angle.
Compare the reading to the specified value, see "Technical data".
4. Carry out the caster measurement at the other end of the axle.
If different readings are obtained, check the front axle suspension for deviations.



S7 00 560

Checking caster using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. Compare the reading to the specified value, see "Technical data".

2.4 CHECKING CAMBER ANGLE

General

- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

Checking camber angle using an angle gauge

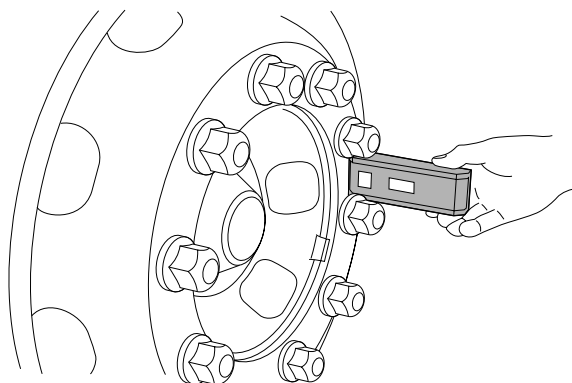
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See "Technical data" for the correct angle.

Checking camber angle using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of a type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. See "Technical data" for the correct angle.

If the angle is incorrect this may be caused by the following:

- excessive swivel axle bearing play
- bent front axle.



S7 00 566

2.5 INSPECTION AND ADJUSTMENT OF TOE

Checking toe

1. Use a high quality tracking gauge or high quality wheel alignment equipment for the inspection. The gauge/equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use. Follow the instructions for the wheel alignment equipment carefully.
2. Ensure that the steering gear is free of tension by, if possible, driving the vehicle straight ahead to the place where the measurement will be taken. If this is not possible, drive forwards and backwards at the place where the measurement will be taken with the steering gear in the "straight ahead" position.
3. Check the toe with the vehicle unladen.
4. Measure the axle toe. Compare the reading to the specified value, see "Technical data".

Note:

If a large difference is measured, the cause must be traced. The deviation could have been caused by excessive wear or by a collision, during which components were bent.

If so, the other steering gear components should be inspected carefully.

FRONT AXLE, F36/F48

7

Inspection and adjustment

LF45/55 series

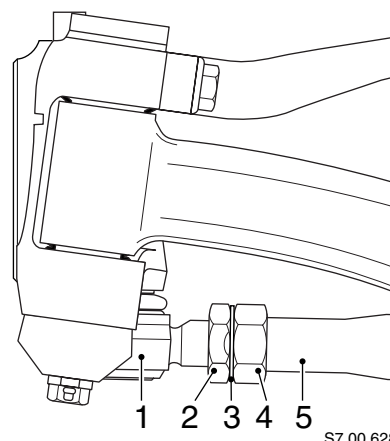
Adjusting toe

1. Bend back the lips of the locking plate (3) at both ends of the track rod.
2. Unscrew the lock nut (2) at both ends of the track rod.
3. Turn the track rod (5) until the toe is correct, see "Technical data".

Note:

Make sure that the threaded ends of the ball joints (1) are not pushed too far out of the track rod (5). The hexagonal tapered sleeve (4) must always fully engage the screw thread of the ball joints.

4. Tighten the lock nut (2) at both ends of the track rod to the specified tightening torque, see "Technical data".
5. Check the toe again.
6. Secure the lock nut (2) and hexagonal tapered sleeve (4) using the locking plate (3). Use lips on the locking plate that have not yet been used for this purpose.



2.6 CHECKING WHEEL DEFLECTION



Work safely and block the vehicle so that it cannot slide off the turning plates.

Checking wheel deflection

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axles and place turning plates under the centre of the wheels.
Only use turning plates that permit wheel displacement caused by the wheel offset.
3. Place the wheels in the “straight ahead” position and lower them until they rest on the turning plates. Set the turning plates to zero.
4. Turn the steering wheel fully clockwise to the end stop and check the wheel deflection on the right, see “Technical data”.
5. Turn the steering wheel fully anticlockwise to the end stop and check the wheel deflection on the left, see “Technical data”.
It is not possible set the maximum wheel deflection.

2.7 INSPECTION AND ADJUSTMENT OF STEERING ROD

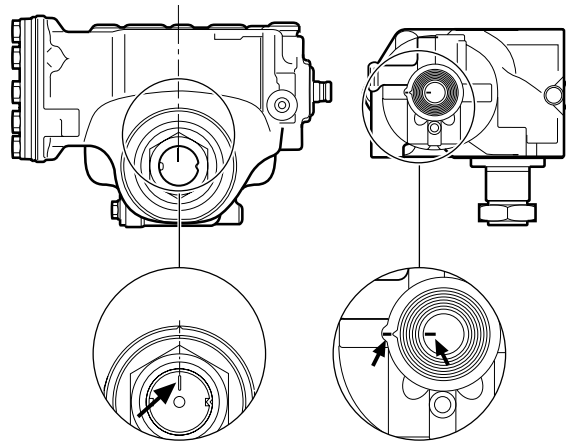
Work safely and block the vehicle so that it cannot slide off the turning plates.

Note:

If faults are found, carry out the inspection with at least 40% vehicle load (as far as possible).

Checking adjustment of steering rod

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axle and place turning plates under the wheels. Only use turning plates that permit wheel displacement caused by the wheel offset.
3. Place the wheels in the “straight ahead” position and lower them until they rest on the turning plates.
4. Check that the steering box is exactly in the central position using the marks in the steering box. The mark on the input shaft should be visible in the slot.
5. Measure the (mis)alignment of the wheel to which the steering rod is connected. This can be done using wheel alignment equipment or by measuring the distance from the wheel rim to the spring leaves at the front and rear of the wheel. The distances at the front and rear of the wheel must be equal.
6. Adjust the length of the steering rod, if the values are different.
If a large difference is measured, the cause must be traced.
The difference may have been caused by a collision during which components were bent. If so, the remaining steering gear components must be checked carefully.



S7 00 623

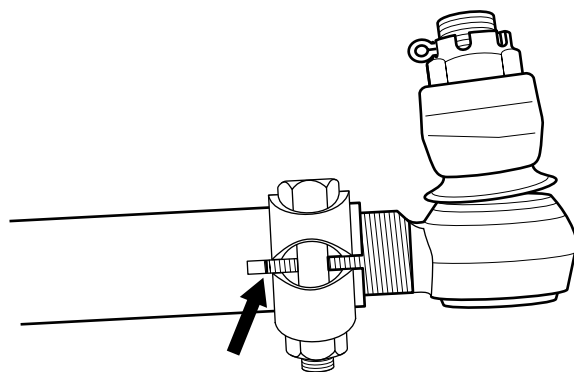
Adjusting steering rod

1. Place the wheel to which the steering rod is connected in the "straight ahead" position. This can be done using wheel alignment equipment or by measuring the distance from the wheel rim to the spring leaves at the front and rear of the wheel. The distances at the front and rear of the wheel must be equal.
2. Unscrew the clamping bracket bolt on the steering rod.
3. Take the steering rod off the steering-rod arm using a ball-end puller, see "Removal and installation".
4. Place the steering box in the central position by aligning the marks.
5. Set the steering rod to the correct length by screwing the ball end in or out.
If the length is not correct because the ball end can only be rotated one full turn, get as close as possible to the correct length.

Note:

Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).

6. Fit the steering rod in the steering-rod arm, see "Removal and installation".
7. Clean and check the clamping bracket bolt. If the bolt is corroded or damaged, it must be replaced.
Replace the self-locking nut.
8. Tighten the clamping bracket bolt to the specified tightening torque, see "Technical data".



S7 00 026

9. Check the position of the steering wheel when it is in the "straight ahead" position. If necessary, correct the position by changing the position of the steering wheel on the steering shaft.

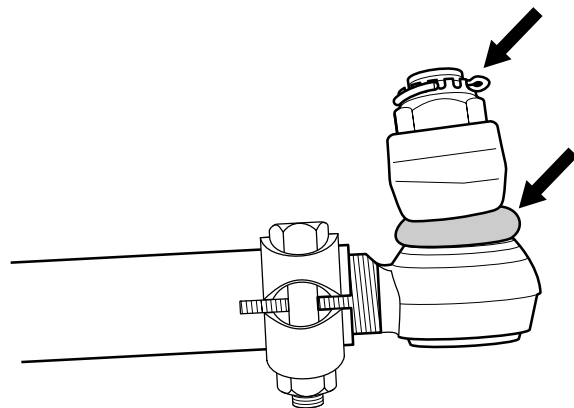


If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.

2.8 CHECKING STEERING BALL JOINT

Checking dust cover

1. Check that the dust cover of the steering ball joint and its seal is not damaged. Replace the steering ball joint if they are damaged.
2. If applicable, check for the presence of the split pin and its condition.



S7 00 540

Checking axial steering ball joint play

1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.

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LF45/55 series

FRONT AXLE, F36/F48

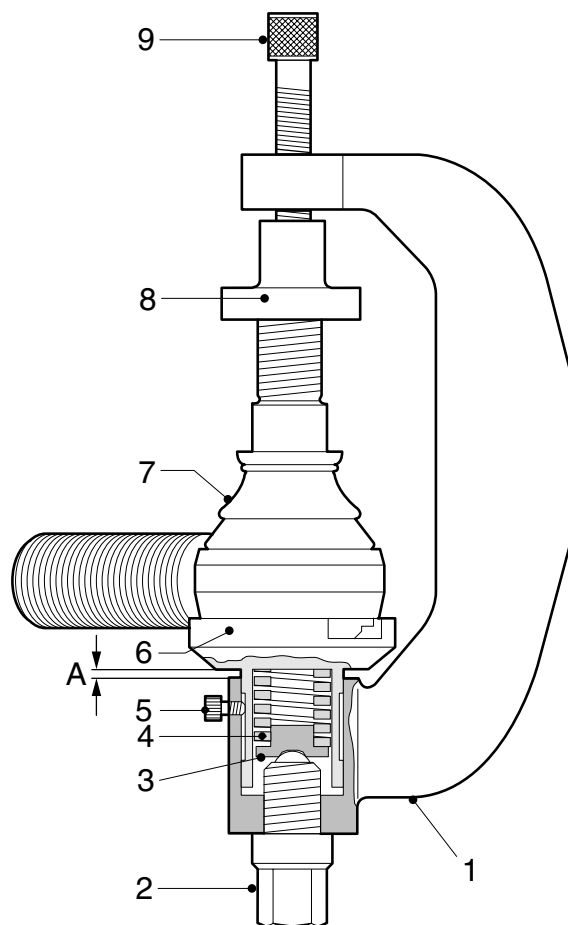
Inspection and adjustment

4. Screw the thrust washer (8) onto the threaded spindle.
5. Fit the spring retainer (3), spring (4) and thrust sleeve (6) in the bracket (1). Fit the locking screw (5). It should be possible to move the thrust sleeve (6) freely.

Note:

Fit the correct thrust sleeve (6).
The thrust sleeve (6) must abut the rim of the steering ball joint (7).

6. Unscrew thrust bolt (2) until the flange of the thrust sleeve (6) abuts the bracket (A=0 mm).
7. Fit the special tool to the steering ball joint (7) and turn the threaded spindle (9) by hand until the special tool is tight around the steering ball joint (7).
8. Tighten the thrust bolt (2) until its head abuts the bracket (1).
9. Measure the play "A" between the thrust sleeve and the bracket using a feeler gauge. Compare the measurement taken with the maximum permissible steering ball joint play, see "Technical data". If necessary, replace the steering ball joint.



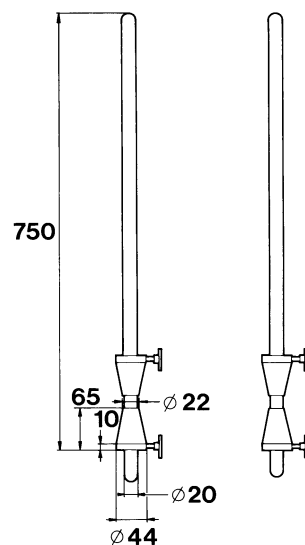
S700426

2.9 CHECKING FRONT AXLE HOUSING**General**

If the vehicle has been involved in a collision or if abnormal deviations are measured when the wheel alignment is checked, it is advisable to check the axle housing.

A number of the measurements below can also be carried out using alignment equipment. Consult the alignment equipment manual for this purpose.

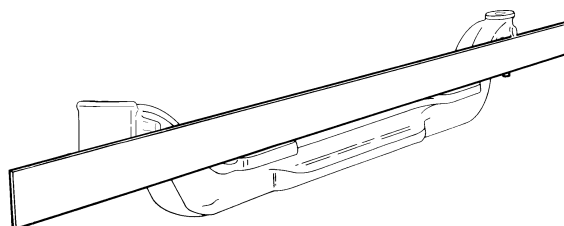
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

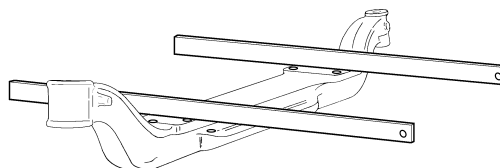
Checking front axle housing

1. Take the front axle off the vehicle and remove both swivel axles, see "Removal and installation".
2. Place a straight edge across the spring seats of the front axle housing and check whether they are aligned.



S7 00 151

3. Place a straight edge across both spring seats and check whether they are parallel with each other.



S7 00 152

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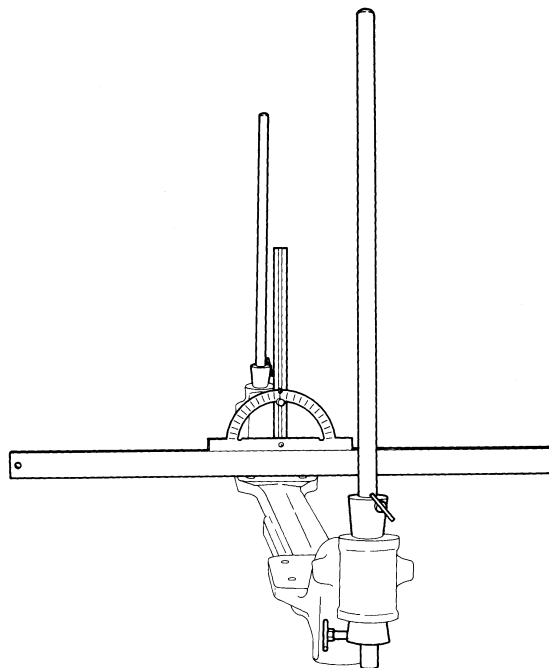
LF45/55 series

FRONT AXLE, F36/F48

Inspection and adjustment

4. Place the two gauge bars in the swivel axle holes.

Place a straight edge with a protractor on the spring seat. Measure the angle of the gauge bars relative to the spring seats. The angle measured should be 90° .

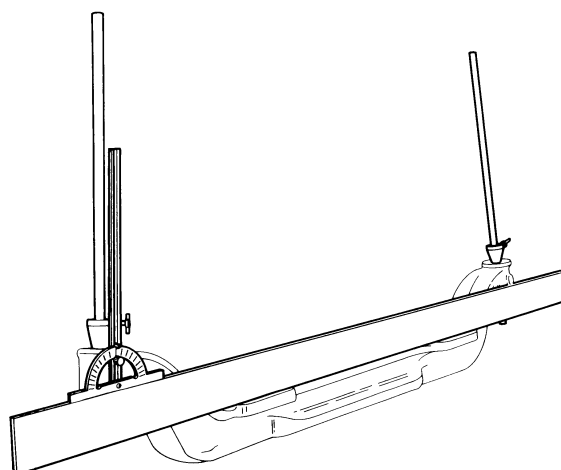


S7 00 149

5. Measure the king pin inclination (KPI) by placing a straight edge with a protractor on the spring seats. By placing the straight edge of the protractor parallel to the gauge bar, the angle can be read. See "Technical data" for the correct angle.
6. If a deviation is found during one of the checks, the axle housing must be replaced.



Straightening of the front axle housing is not permitted. This could affect the strength of the materials.



S7 00 150

2.10 CHECKING WHEEL RIM

General

1. Check the wheel rims for the following:
 - deformation of the wheel rims and wheel disc.
 - deformation or cracking of the wheel stud holes.
 - corrosion, including on the tyre side of the rim and on the rim ring.
2. Cracked or damaged wheel rims or wheel rims with cracked or deformed wheel stud holes must be replaced.
Welding or repairing wheel rims in any way is prohibited. Welds will crack again in the course of time due to the dynamic load.



When taking a damaged wheel rim off the vehicle, deflate the tyre (remove the tyre valve), because of possible tensions in the wheel rim.

3. To prevent damage to the tyre due to corrosion and/or indirect tension cracks (due to notching), the anti-corrosion treatment of the wheel rim must not be damaged in any way.
For removal of corrosion and repairing the paint layer, see "Paint treatment".
Before re-spraying, remove the old layer of paint to prevent the paint layer from becoming too thick. The total layer of paint must not be more than 50 microns thick.



If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.

2.11 CHECKING THE HUB, AXLE JOURNAL AND WHEEL BEARINGS

Checking hub

1. If the bearing race is loose in the hub or has turned in the hub, the hub must be replaced. See "Removal and installation".
2. Check the wheel speed sensor ring for damage.

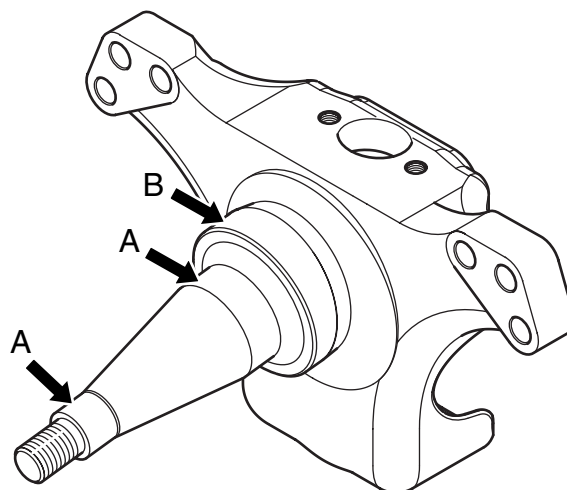
Checking axle journal

1. Check the screw thread, the bearing surfaces of the bearing cages (A) and the running surface of the oil seal (B) for damage.

Checking wheel bearings

1. Check the wheel bearings for damage at the following points:
 - the roller bearing race,
 - the bearing cage,
 - the inner and outer bearing races.

If damage is found, the entire wheel bearing (inner race/bearing cage and bearing race) must be replaced.



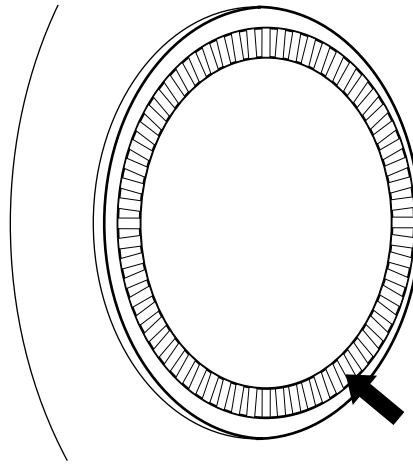
S7 00 625

2.12 CHECKING WHEEL-SPEED SENSOR RING

1. Remove the wheel hub, see "Removal and installation".
2. Check the sensor ring for dirt. Special attention should be paid to deposits of dirt between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
4. Check the wheel speed sensor for smooth operation.
If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent, see "Technical data".



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.



S7 00 893

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5. Fit the wheel hub, see "Removal and installation".
6. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.
7. Check the ABS system for correct operation.

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION OF WHEEL



When removing a wheel with a cracked or damaged wheel rim, always deflate the tyre (remove the tyre valve) because of possible tensions in the wheel rim.

General

- Only use the original DAF wheel rims specified for the vehicle concerned.
- Make sure that tyres of the same type are fitted at both ends of the axle.
- Not cleaning the mating surfaces sufficiently and/or tightening the wheel nuts unevenly may cause vibrations during driving or braking.

Note:

If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

Removing wheel

1. Chock the wheels to prevent the vehicle moving.
2. Clean the screw thread of the wheel studs using a wire brush.
3. Oil the wheel studs sparingly.
4. Unscrew the wheel nuts.
5. Fit a jack as close as possible to the wheel to be replaced.
6. Jack up the vehicle and, if possible, place a support under the axle.
7. Remove the wheel nuts and take the wheel off the hub.

FRONT AXLE, F36/F48

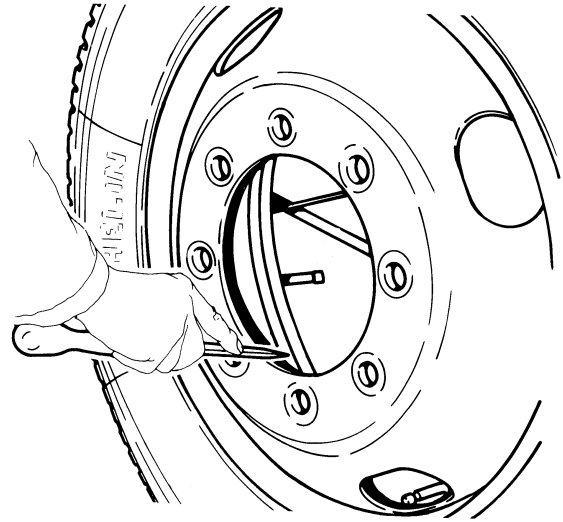
7

Removal and installation

LF45/55 series

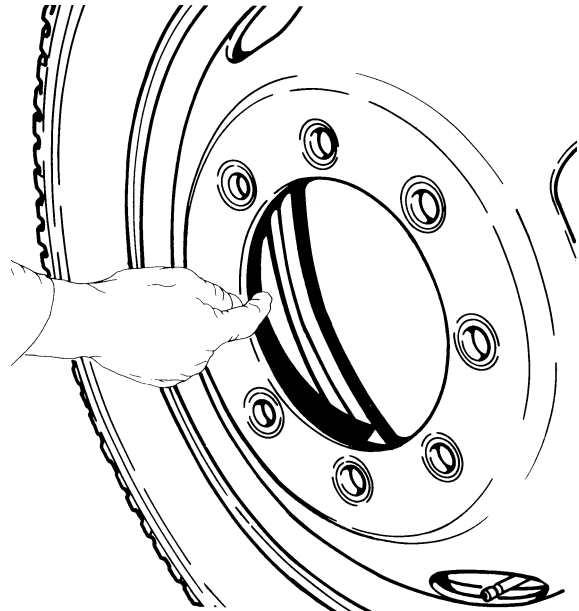
Installing wheel

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



S7 00 096

2. Apply a thin layer of grease to the fitting edge of the wheel hub.
3. Also apply a thin layer of grease to the fitting edge of the wheel rim. This layer of grease is to prevent the wheel rim and the wheel hub from becoming "rust-bound".
4. Check that the contact surfaces of the wheel rim and hub are clean. Clean these if necessary.



S7 00 097

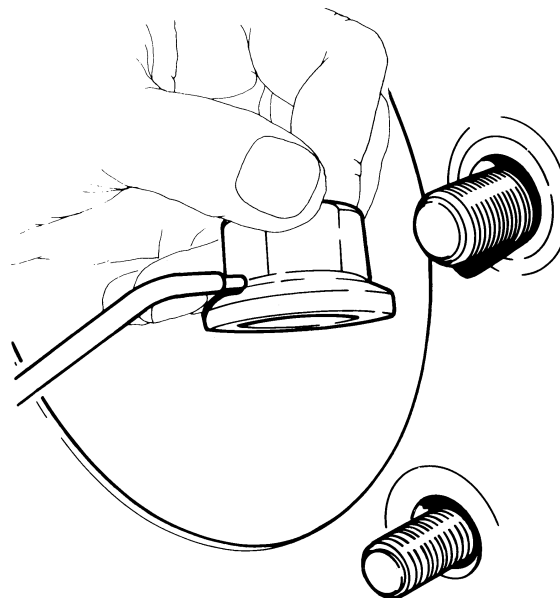
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FRONT AXLE, F36/F48

LF45/55 series

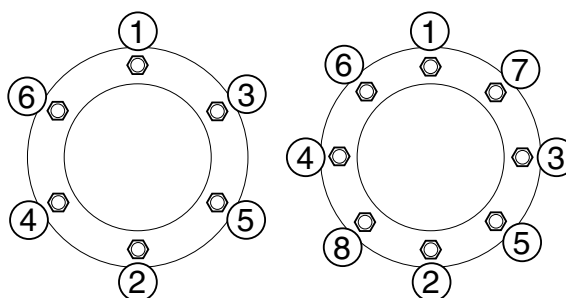
Removal and installation

5. Clean the wheel nuts and then apply a drop of oil between the thrust washer and the nut.
6. Also apply a drop of oil to the first turn of the wheel-stud threads.



S7 00 098

7. Fit the wheel nuts and tighten these evenly according to the sequence in the drawing. A pneumatic spanner may be used for this purpose, but its tightening torque is not very reliable. It will therefore be necessary to retighten the wheel nuts to the specified torque using a torque wrench. For the specified tightening torque, see "Technical data".

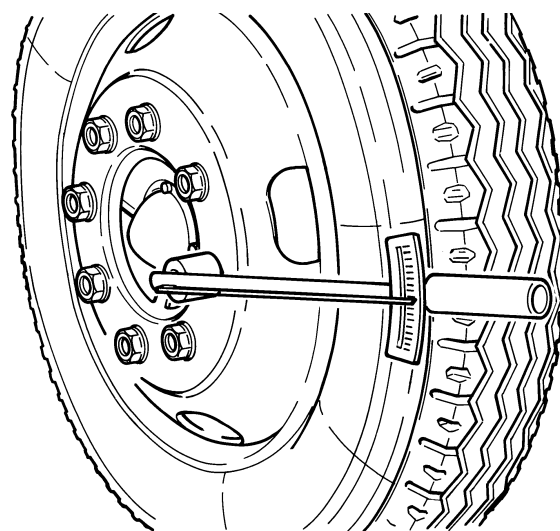


S7 00 631

Note:

Wheel nuts should always be tightened and retightened in cold condition. However, wheel studs should not be tightened in extremely cold conditions.

8. Check the tyre pressure.
9. Retorque the wheel nuts using a torque wrench after 100 km. If new wheel studs are fitted, they need additional retorquing after 500 km.



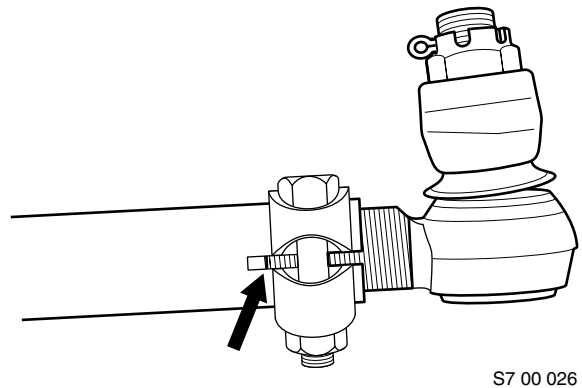
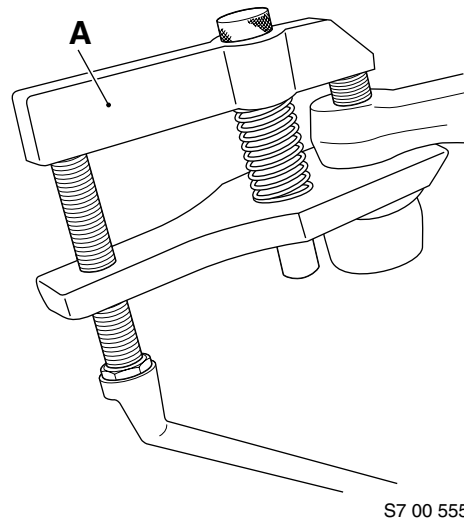
S7 00 099

3.2 REMOVAL AND INSTALLATION OF STEERING ROD**Removing steering rod**

1. Remove the nuts at both ends of the steering rod.
2. Take the ball ends off the steering-rod arm and the pitman arm using a ball-end puller (A).

Installing steering rod

1. When installing a new steering rod, copy the settings of the steering rod to be replaced.
2. Clean the tapered contact surfaces of both the steering-rod balls and the steering-rod arm. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Fit the steering rod using the castle nuts.
4. Check the steering rod setting and adjust, if necessary. See "Inspection and adjustment".
5. Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).
6. Check whether the clamping bracket bolt is tightened to the specified tightening torque, see "Technical data".
7. Tighten the castle nuts to the specified torque, see "Technical data". If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.
8. Lock the castle nuts using new split pins.



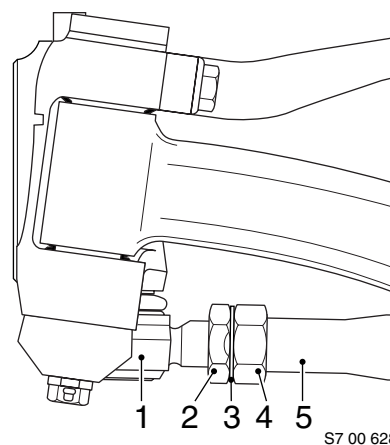
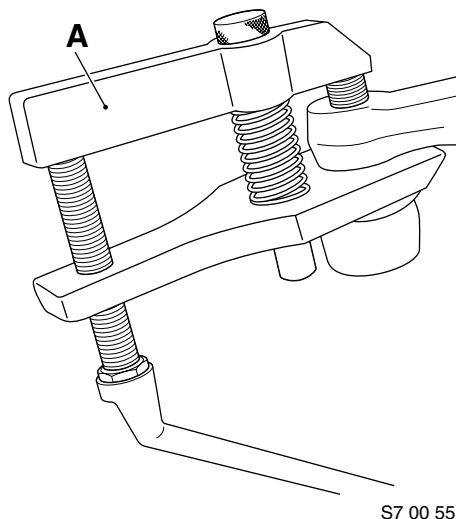
3.3 REMOVAL AND INSTALLATION OF TRACK ROD

Removing track rod

1. Remove the castle nuts.
2. Take the ball ends out of the track-rod arms using a ball-end puller (A).

Installing track rod

1. When installing a new track rod, copy the settings of the track rod to be replaced.
2. Clean the tapered contact surfaces of both the track rod balls and the track rod arms. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Fit the track rod.
4. Fit the castle nuts and tighten them to the specified torque, see "Technical data". If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.
5. Lock the castle nuts using new split pins.
6. Check the axle toe and adjust if necessary. See "Inspection and adjustment".
7. Make sure that the threaded end of the ball joint (1) is not screwed too far out of the track rod (5). The tapered hexagon (4) must always fully engage the screw thread of the ball joint.
8. Check that the lock nut (2) and the tapered hexagon (4) with the locking plate (3) are secure.



3.4 REMOVAL AND INSTALLATION OF STEERING-ROD ARM



These instructions must be followed to the letter. The attachment of the steering-rod arm is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when installing the steering-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing steering-rod arm

1. Take the steering rod out of the steering-rod arm.
2. Remove the attachment bolts (2) with the circlips (3) and the steering-rod arm (3).

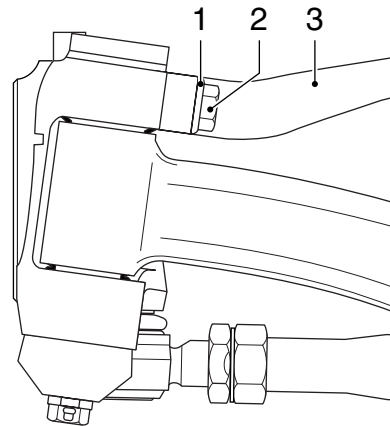
Note:

The attachment bolts must not be reused.

3. Take the steering-rod arm off the swivel axle.

Installing steering-rod arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the steering rod arm.
3. Always use new attachment bolts (2) and circlips (1) when installing the steering-rod arm (1). Evenly tighten the attachment bolts alternately to the specified tightening torque, see "Technical data".
4. Install the steering rod.



S7 00 626

3.5 REMOVAL AND INSTALLATION OF TRACK-ROD ARM



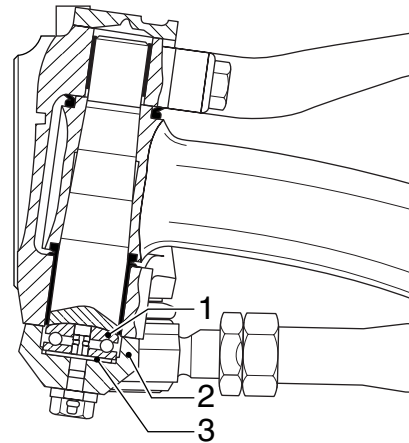
These instructions must be followed to the letter. The attachment of the track-rod arms is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when fitting the track-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing track-rod arm

Note:

The track-rod arm and the bottom cover of the swivel axle form part of a single unit.

1. Take the track rod off the track-rod arm.
2. Remove the bottom cover/track-rod arm (2).
3. Take the thrust bearing (1) and the adjusting ring (3) off the bottom cover/track rod (2).

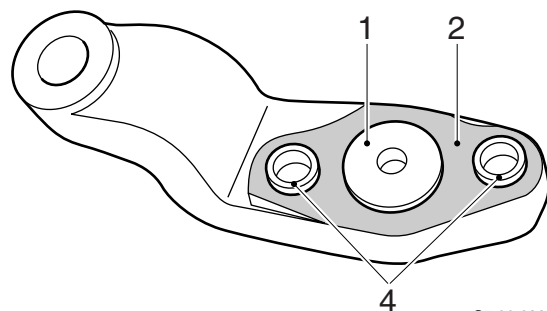


S7 00 629

4. Take the adjusting bushes (4) out of the bottom cover/track-rod arm (2).

Installing track-rod arm

1. Fit the adjusting bushes (4) in the bottom cover/track-rod arm (2).



S7 00 632

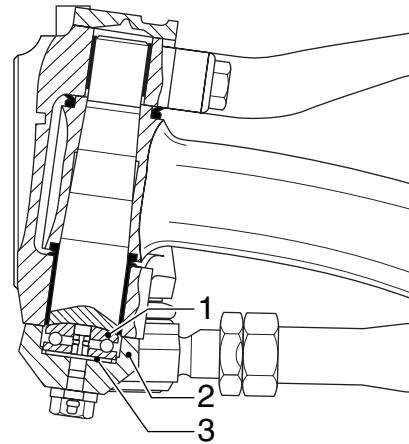
FRONT AXLE, F36/F48

7

Removal and installation

LF45/55 series

2. Check the thrust bearing (1) for wear and damage. If in doubt, replace the thrust bearing (1).
3. Fit the adjusting ring (3).
4. Fit the thrust bearing (1).
5. Fit a new O-ring to the bottom of the swivel axle. Make the O-ring stick by applying a layer of grease.
6. Fit the bottom cover/track-rod arm (2). Tighten the attachment bolts to the specified tightening torque, see "Technical data".
7. Check the axial swivel axle play, see "Inspection and adjustment".
8. Lubricate the top and bottom bearing when the vehicle is unloaded until a collar of grease is visible around the sealing rings.

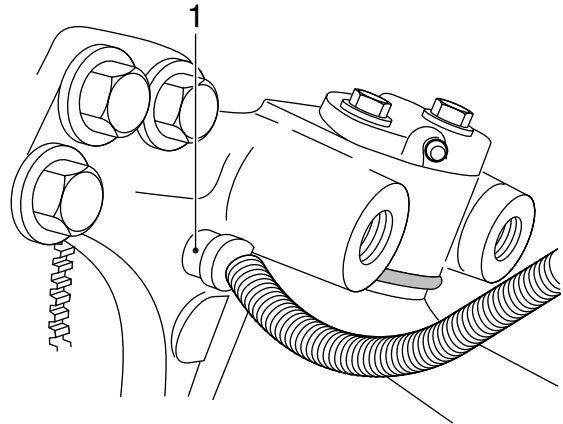


S7 00 629

3.6 REMOVAL AND INSTALLATION OF HUB

Removing hub

1. Support the front axle in a safe manner.
2. Remove the wheel.
3. Remove the wheel-speed sensor (1).
4. Reset the brake pads.
5. Take the brake calliper with attached pipes off the stub axle. Put the brake calliper to one side.

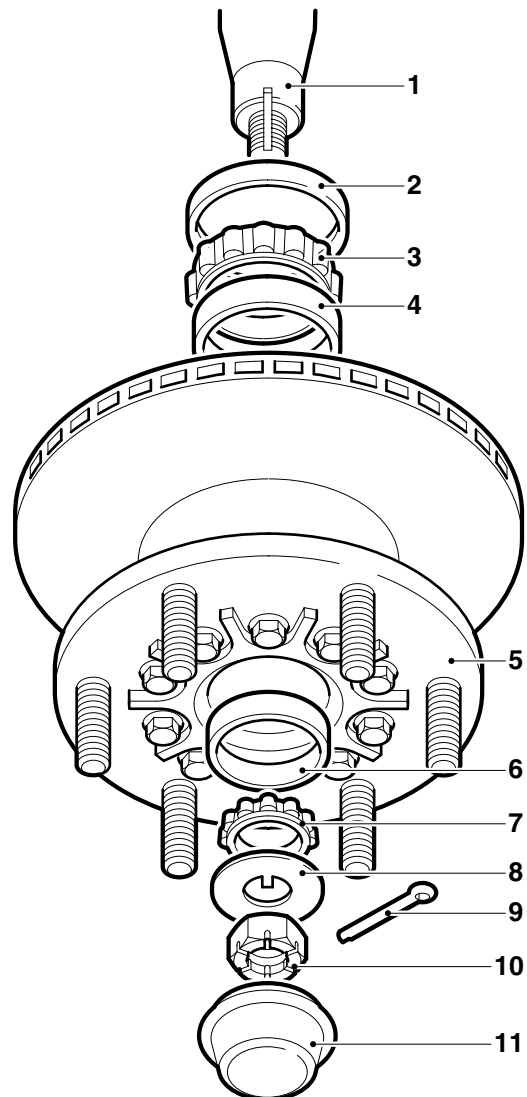


S7 00 589

6. Remove the hub cap (11).
7. Remove the hub nut (10).
8. Take the hub (5) off the axle end (1). Put the circlip (8) and the bearing cage (7) to one side.
9. Take the oil seal (2) off the hub (5).
10. Take the bearing cage (3) out of the hub (5).

Installing hub

1. Clean the axle end (1) and check for damage.
2. Clean the bearing cages (3 and 7).
3. Remove the grease from the hub (5) and clean the ball races (4 and 6).
4. Check the bearing cages (3 and 7) and the ball races (4 and 6) for wear and damage. If necessary, fit new wheel bearings.
5. Apply ample quantities of the specified grease to the bearing cages (3 and 7).
6. Fit the bearing cage (3) in the hub (5).



S7 00 573

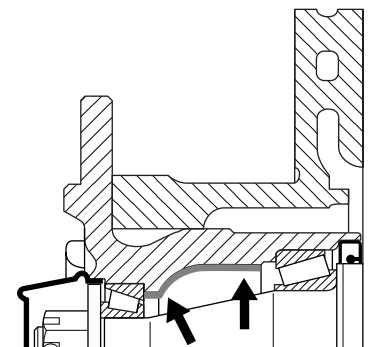
FRONT AXLE, F36/F48

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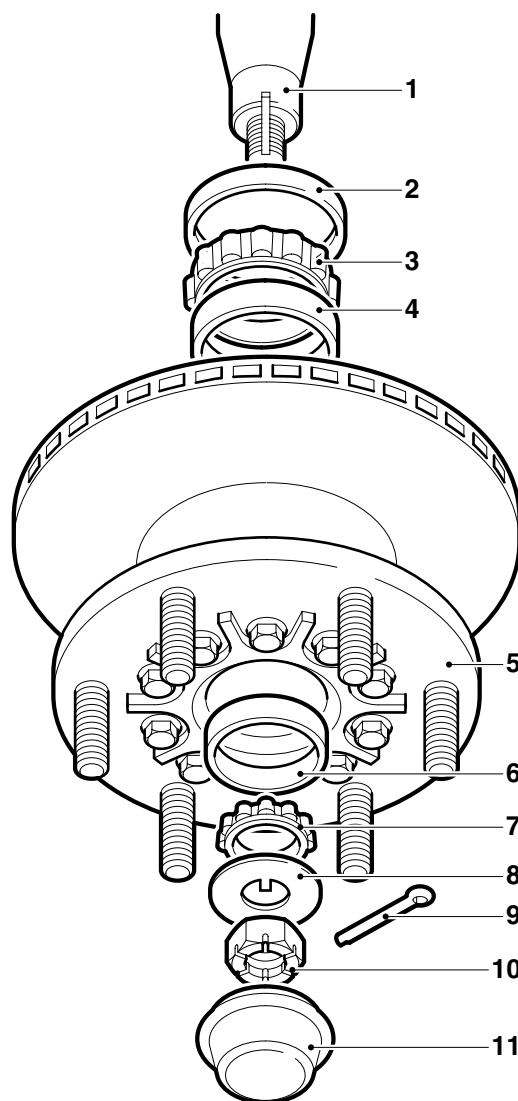
LF45/55 series

7. Apply a layer of grease approx. 6 mm thick to the hub cavity.



S7 00 572

8. Fit a new oil seal (2) in the hub (5).
9. Fit the lock nut (5) to the axle end (1).
10. Fit the bearing cage (7).
11. Apply the specified grease to the front of the bearing cage (7).
12. Fit the circlip (8).
13. Fit the hub nut (10). Set the wheel bearing play, see "Inspection and adjustment".
14. Fit a new split pin (9).
15. Fit the hub cap (11). **Please note:** the hubcap must not be filled with grease.
16. Fit the brake calliper.
17. Set the brake pad clearance. Check that the brake disc runs freely.
18. Install the wheel speed sensor and press it against the sensor ring. The required clearance will be produced while on the move.
19. Fit the wheel.

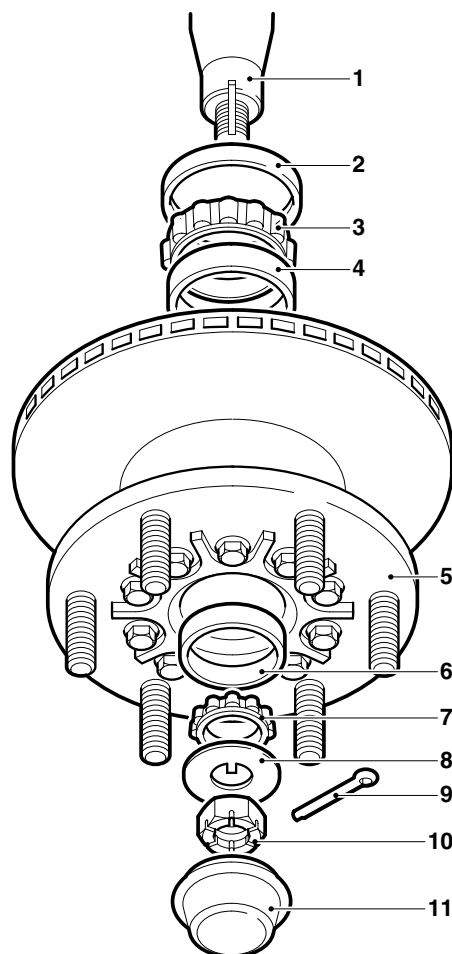


S7 00 573

3.7 REMOVAL AND INSTALLATION OF WHEEL BEARINGS

Removing wheel bearings

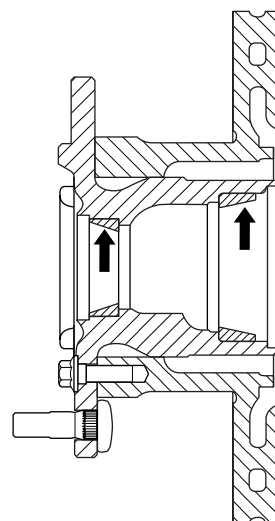
1. Take the hub (5) off the axle end (1).
2. Take the oil seal (2) out of the hub.
3. Take the wheel bearing ball races (4 and 6) out of the hub.



S7 00 573

Installing wheel bearings

1. Press new ball races into the hub. Make sure that the ball races are not damaged while being fitted. Ensure that the ball races are seated well.
2. Fit a new oil seal (2) in the hub.
3. Fit the hub to the axle journal (1).



S7 00 630

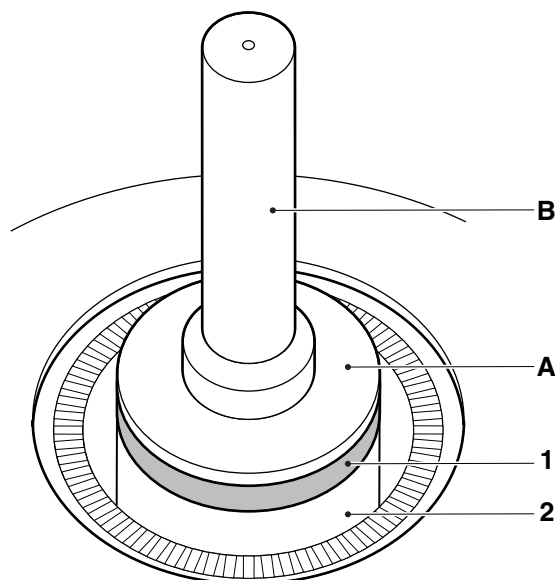
3.8 REMOVAL AND INSTALLATION OF HUB OIL SEAL

Removing hub oil seal

1. Take the oil seal out of the hub using the special tool (DAF no. 1329458). Make sure that the chamber is not damaged when carrying out this procedure.

Installing hub oil seal

1. Fit the special tool (A) (DAF no. 1329485 for the F36 front axle and DAF no. 1329484 for the F48 front axle) in the driver (B) (DAF no. 0499809).
2. Using the special tool, fit the new oil seal (1) in the hub (2). The open end of the oil seal (1) must face the hub (2). Apply a little grease to the sealing lip of oil seal (1).



S7 00 588

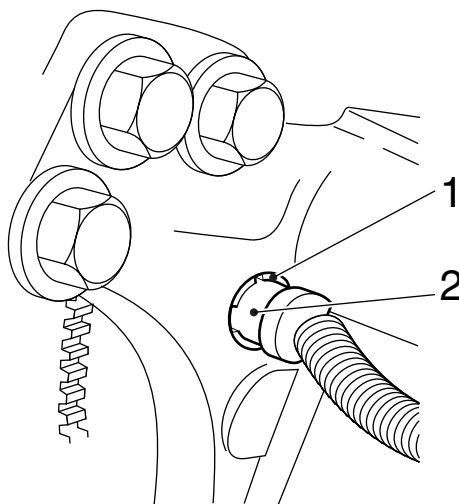
3.9 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

Removing wheel-speed sensor

1. Take the wheel-speed sensor (2) off the swivel axle.
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

Installing wheel-speed sensor

1. Clean the wheel-speed sensor (2) and the clamping sleeve (1). Replace the clamping sleeve (1) if necessary.
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (2), see "Technical data".
3. Fit the wheel speed sensor (2). Press it against the sensor ring by hand. The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.



S7 00 880

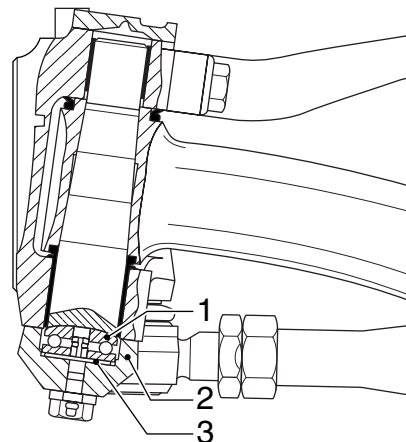


Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for correct operation.

3.10 REMOVAL AND INSTALLATION OF THRUST BEARING**Removing thrust bearing**

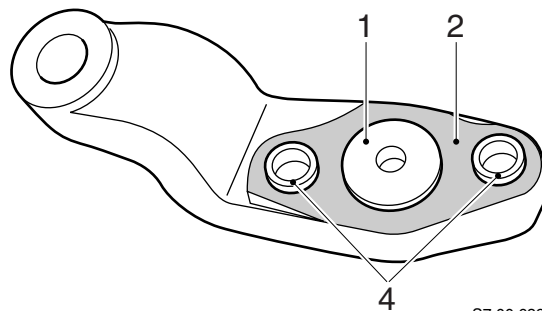
1. Take the bottom cover/track-rod arm (2) off the swivel axle.
2. Take the thrust bearing (1) and the adjusting ring (3) off the bottom cover/track-rod arm (2).
3. Take the O-ring off the bottom of the swivel axle.



S7 00 629

Installing thrust bearing

1. Check the adjusting bushes (4) in the bottom cover/track-rod arm (2).
2. Fit the adjusting ring (3).
3. Fit the thrust bearing (1).
4. Fit a new O-ring to the bottom of the swivel axle. Make the O-ring stick by applying a layer of grease.
5. Fit the bottom cover/track-rod arm (2). Tighten the attachment bolts to the specified tightening torque, see "Technical data".
6. Check the axial swivel axle play, see "Inspection and adjustment".

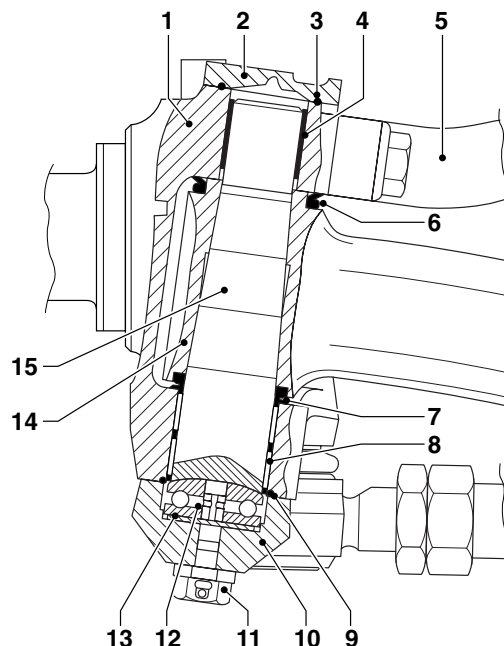


S7 00 632

3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE

Removing swivel axle

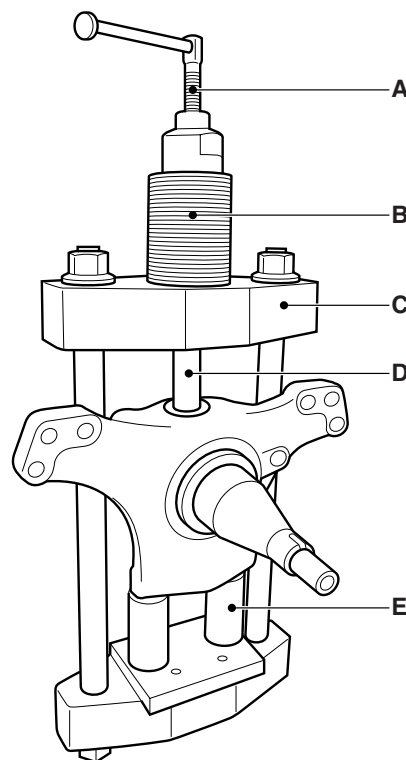
1. Remove the hub.
2. If applicable, take the steering rod out of the steering-rod arm (5).
3. Remove the top cover (2).
4. Remove the bottom cover (10). Take the two adjusting bushes out of the bottom cover.
5. Take the O-ring (9) out of the swivel axle (1).



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6. Remove the king pin using a copper punch. If the king pin does not come loose, follow the procedure below:

- Screw the hydraulic puller (B), special tool (DAF no. 0535891), into the king pin puller (C), special tool (DAF no. 0694767).
- Fit the centring plate (E), special tool (DAF no. 1310489) to the bottom plate of the king pin puller.
- Fit the long pin (D) in the hydraulic puller (B).
- Fit the king pin puller assembly to the swivel axle. Centre the king pin puller on the underside using the adjusting bushes in the swivel axle.
- Screw out the spindle (A) of the hydraulic puller (B) as far as possible.
- Use a spanner to screw the hydraulic puller (B) into the king pin puller (C) as far as possible.



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FRONT AXLE, F36/F48**7****Removal and installation****LF45/55 series**

- Screw the spindle (A) in until the king pin (15) is released.
- If the king pin (15) is not released when the spindle (A) has been fully screwed in, the spindle (A) should be completely unscrewed again and the hydraulic puller (B) screwed further into the king pin puller (C). Then screw in the spindle (A) again.

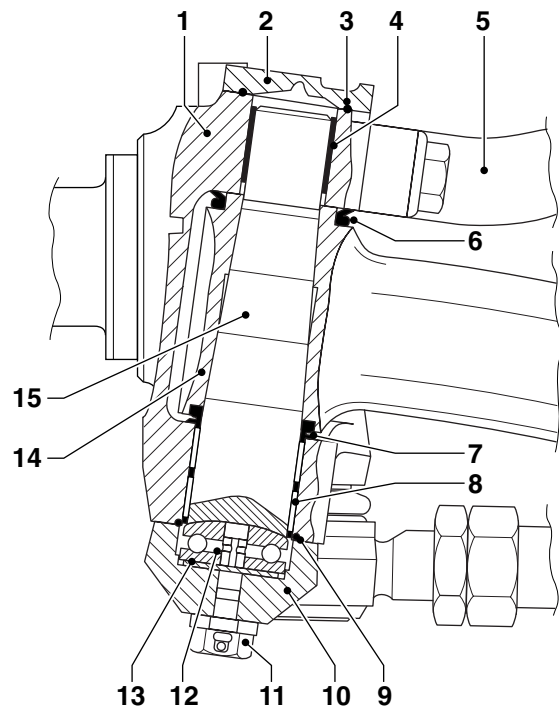
Note:

Ensure, on the F48 front axle, that the needles do not fall out of the needle bearing (8).

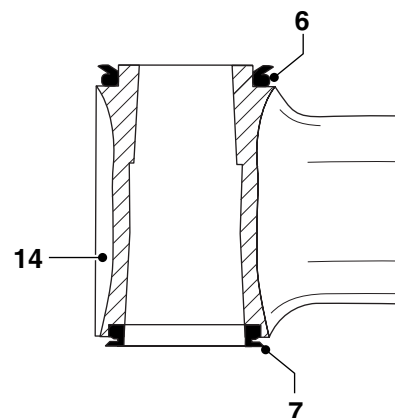
7. Take the swivel axle (1) off the axle end (14).
8. Take the sealing rings (6 and 7) off the axle end (14).
9. Take the thrust bearing (12) and the adjusting rings (13) off the bottom cover (2).

Installing swivel axle

1. Clean all parts.
2. Check the bearing bushes (4 and 8) on the F36 front axle or the bearing bush (4) and the needle bearing (8) on the F48 front axle for wear. Replace if necessary.
3. Check the thrust bearing (12) for wear. Replace if necessary.
4. Check the king pin (15) for damage and wear and replace, if necessary.
5. Fit new sealing rings (6 and 7) to the axle end (14). Fit the sealing rings in the position illustrated.



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S7 00 570

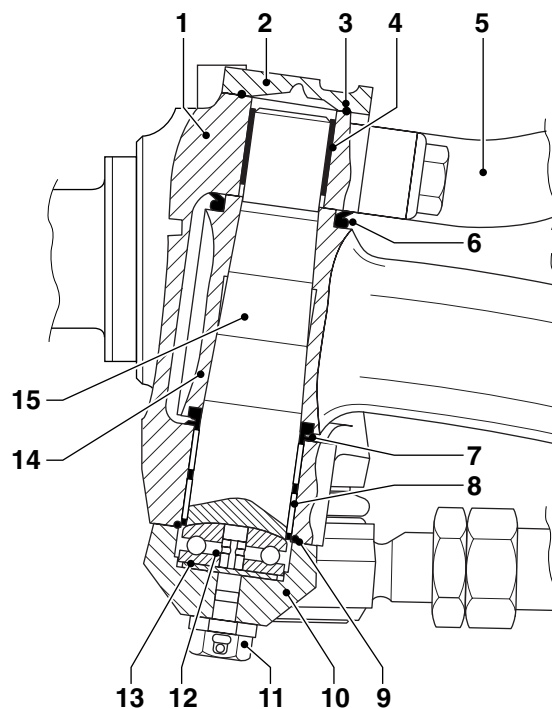
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FRONT AXLE, F36/F48

LF45/55 series

Removal and installation

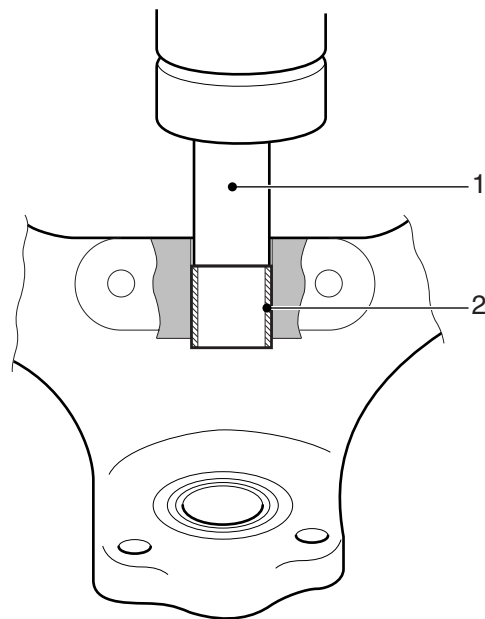
6. Apply grease to the bearing bushes/needle bearing (4 and 8).
7. Fit the swivel axle (1) to the axle end (14).
8. Fit the king pin (15)
9. Tap the king pin (15) gently with a copper punch to keep the axle end (14) in place.
10. Fit the adjusting bushes in the bottom cover.
11. Fit the thrust bearing (12) in the bottom cover (10) without grease together with the adjusting ring (13).
12. Fit the bottom cover (10) to the swivel axle (1). Tighten the attachment bolts (11).
13. Adjust the swivel axle play, see "Inspection and adjustment".
14. If applicable, fit the steering rod in the steering shaft (5).
15. Thoroughly lubricate the swivel axle while it is unloaded.
16. Fit the hub.



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3.12 REMOVAL AND INSTALLATION OF BEARING BUSHES, F36 FRONT AXLE**Removing bearing bushes, F36 front axle**

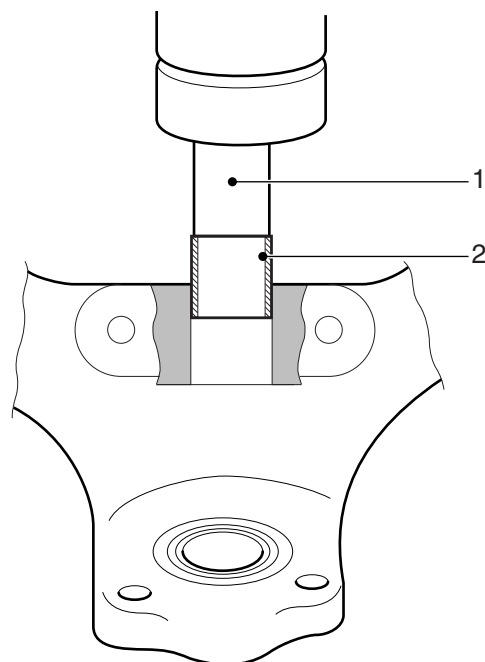
1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the top bearing bush facing upwards.
3. Fit the special tool (DAF no. 1453123C) (1) to the bearing bush (2) and force the bearing bush out of the swivel axle.
4. Turn the swivel axle around and fit the special tool (DAF no. 1453123A) to the bottom bearing bush. Force the bearing bush out of the swivel axle.
5. Clean the swivel axle.



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6**Installing bearing bushes, F36 front axle**

1. Fit the top bearing bush (2) to the special tool (DAF no. 1453123D) (1).
2. Press the bearing bush (2) into the swivel axle until the special tool (1) abuts.
3. Apply plenty of grease to the bearing bush (2).
4. Turn the swivel axle around.
5. Fit the bottom bearing bush to the special tool (DAF no. 1453123B).
6. Press the bearing bush into the swivel axle until the special tool abuts.
7. Apply plenty of grease to the bearing bush.
8. Fit the swivel axle to the axle end.

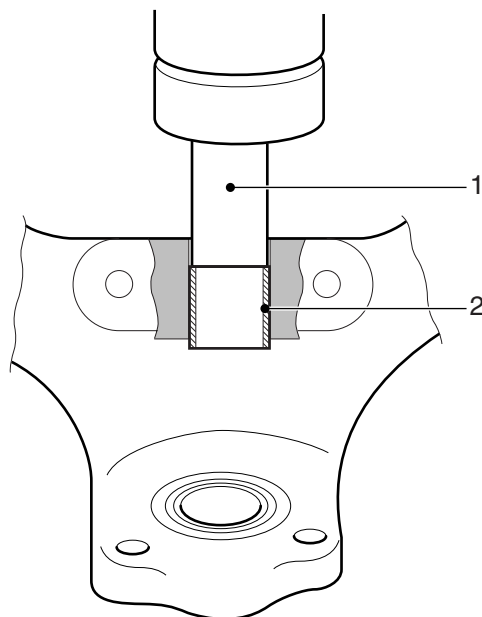


S7 00 890

3.13 REMOVAL AND INSTALLATION OF BEARING BUSH/NEEDLE BEARING, F48 FRONT AXLE

Removing bearing bush/needle bearing, F48 front axle

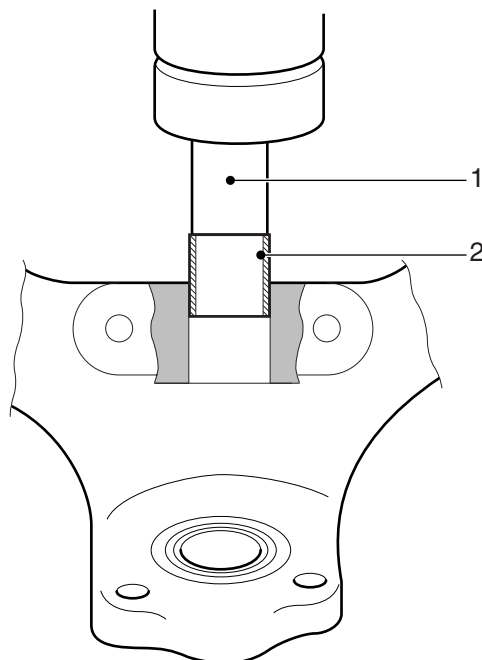
1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the bearing bush facing upwards.
3. Fit the special tool (DAF no. 1451993C) (1) to the bearing bush (2) and force the bearing bush out of the swivel axle.
4. Turn the swivel axle around and fit the special tool (DAF no. 1451993A) to the needle bearing. Force the needle bearing out of the swivel axle.
5. Clean the swivel axle.



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Installing bearing bush/needle bearing, F48 front axle

1. Fit the bearing bush to the special tool (DAF no. 1451993D) (1).
2. Press the bearing bush (2) into the swivel axle until the special tool (1) abuts.
3. Apply plenty of grease to the bearing bush (2).
4. Turn the swivel axle around.
5. Apply plenty of grease to the needle bearing.
6. Fit the needle bearing to the special tool (DAF no. 1451993B).
7. Press the needle bearing into the swivel axle until the special tool abuts.
8. Fit the swivel axle to the axle end.



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Removal and installation

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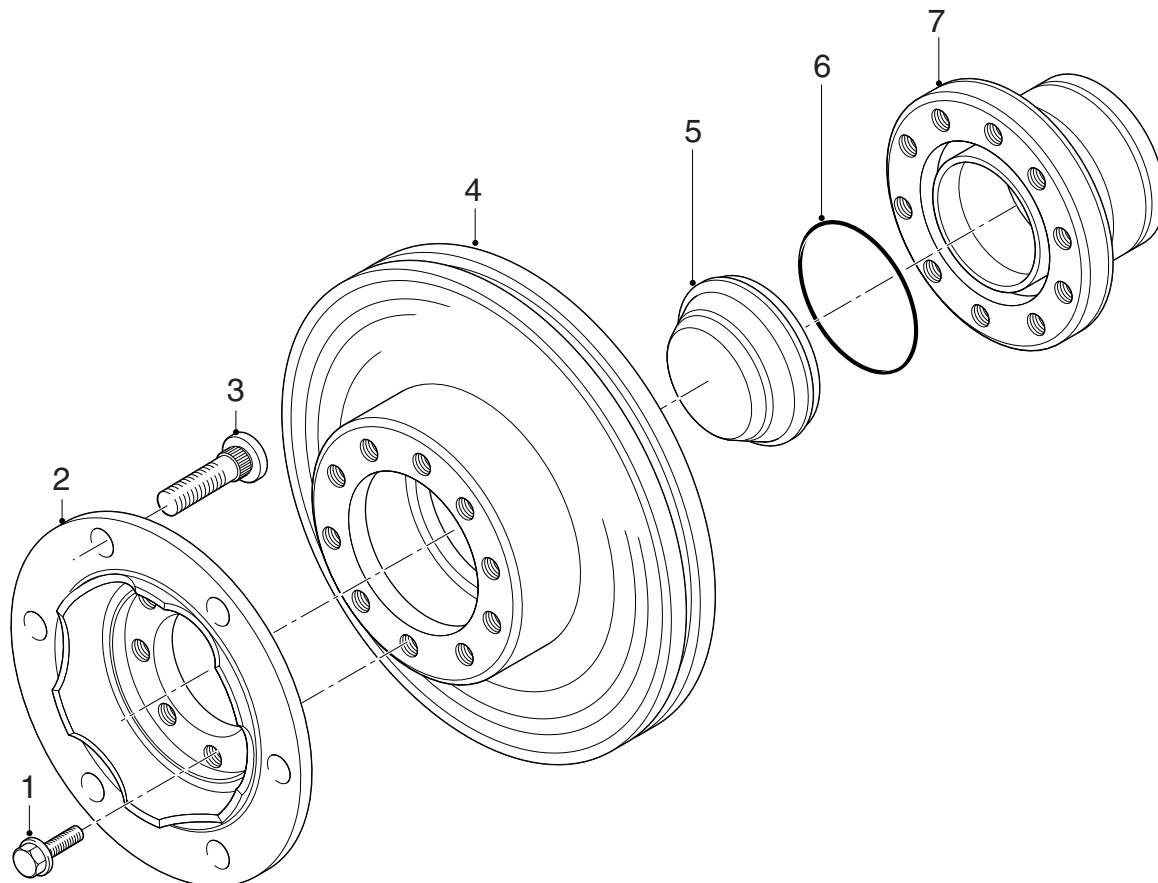
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LF45/55 series

7

1. GENERAL

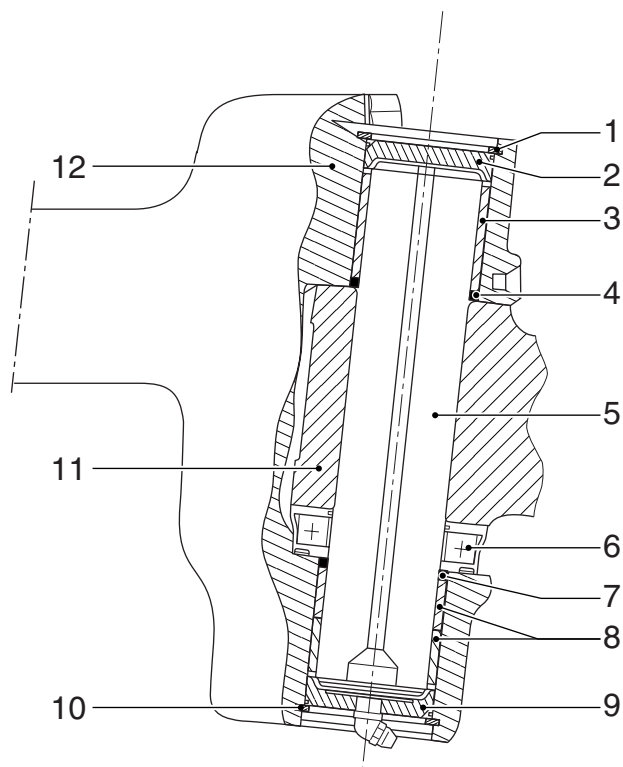
1.1 OVERVIEW DRAWING OF WHEEL HUB UNIT



C9 00 354

1. Attachment bolt
2. Wheel hub
3. Wheel stud
4. Brake disc
5. Hub cap
6. O-ring
7. Compact bearing housing

1.2 OVERVIEW DRAWING OF SWIVEL AXLE



S 700 659

7

1. Circlip
2. Cover
3. Bearing bush
4. Oil seal
5. King pin
6. Thrust bearing
7. Oil seal
8. Needle bearing
9. Cover
10. Circlip
11. Axle end
12. Swivel axle

1.3 DESCRIPTION OF WHEEL HUB UNIT

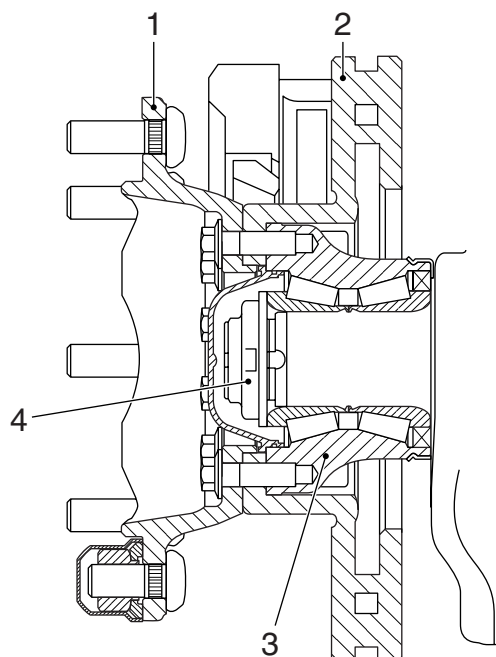
Wheel hub unit

The wheel hub (1), the brake disc (2) and the compact bearing housing (3) together make up the wheel hub unit. Separate components are used, therefore individual parts may be replaced.

The hub nut (4) is secured by tapping the locking ring into the groove of the axle journal.

The bearings in the compact bearing housing are greased and are maintenance-free.

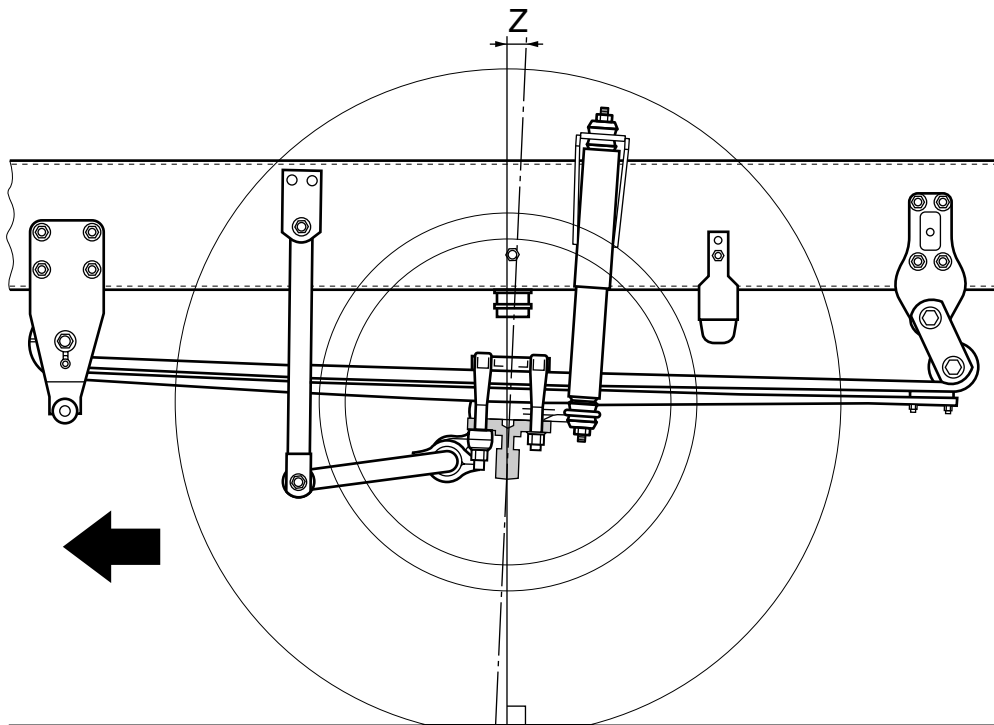
The correct wheel bearing pre-load is achieved by fitting the hub nut as specified. The bearings and/or oil seal cannot be replaced. The whole compact bearing housing assembly must be replaced.



S7 00 703

FRONT AXLE, F60**7**

General

LF45/55 series**1.4 DESCRIPTION OF THE WHEEL SETTINGS**

S7 00 606

7**Caster**

The caster (Z) is the angle of the axle housing relative to the road surface. The caster is important for the directional stability of the vehicle. Too little caster will lead to the vehicle “searching”, while too much caster will result in “heavy” steering.

If the caster is set incorrectly this will not cause tyre wear.

The caster is determined by the relationship between the road surface and the chassis, assuming that the chassis is parallel to the road surface.

The caster can be checked and adjusted very easily and this does not require any complicated equipment.

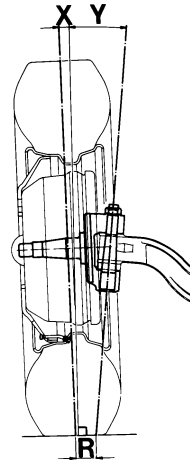
Camber angle and king-pin inclination

The camber angle (X) and the king-pin inclination (Y) are determined by the design of the swivel axle and the axle housing. Neither setting can be adjusted.

Incorrect wheel alignment is caused exclusively by collisions and/or a bent front axle due to overloading.

If one of the wheels is out of alignment on a vehicle, the load of the tyre will be unevenly distributed across the road surface. This will result in irregular tyre wear.

Each wheel must be checked separately.



S7 00 129

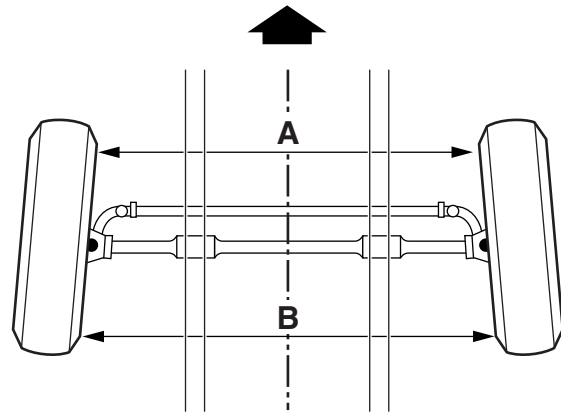
Toe

Toe is the difference between distances A and B.

If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

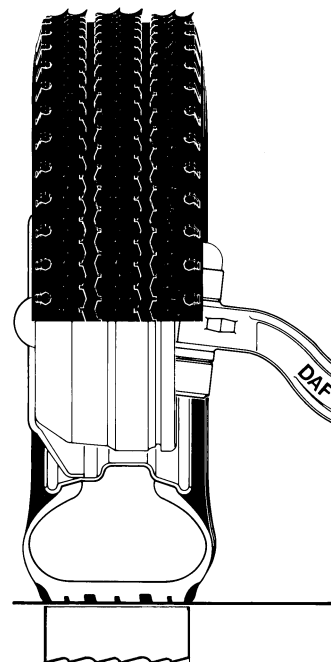
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.



S7 00 833

If the toe-in or toe-out is incorrect will cause "chafing" of the tyres on the road surface. This will result in irregular tyre wear.

The same irregular tyre wear is found in vehicles with multiple steerable axles if the wheels are "misaligned" while the vehicle is driving straight ahead.



S7 00 126

FRONT AXLE, F60

7

General

LF45/55 series

7

2. INSPECTION AND ADJUSTMENT

2.1 CHECKING THE CASTER

General

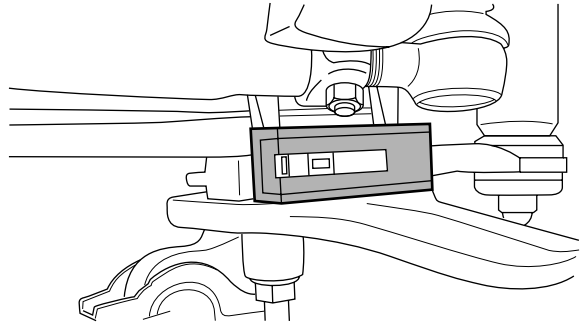
- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The caster can be measured using an angle gauge or wheel alignment equipment.

Checking caster using an angle gauge

1. Clean the spot where the angle gauge is to be placed on the spring seat.
2. Place the angle gauge on a chassis side member and check whether the chassis is parallel with the floor.
If not, the caster reading should be adjusted to the chassis position.
3. Place the angle gauge on the spring seat and measure the angle.
Compare the reading to the specified value, see "Technical data".
4. Carry out the caster measurement at the other end of the axle.
If different readings are obtained, check the front axle suspension for deviations.

Checking caster using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. Compare the reading to the specified value, see "Technical data".



S7 00 560

2.2 CHECKING CAMBER ANGLE

General

- The vehicle must be on a level and horizontal surface with the steering gear in the “straight ahead” position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

Checking camber angle using an angle gauge

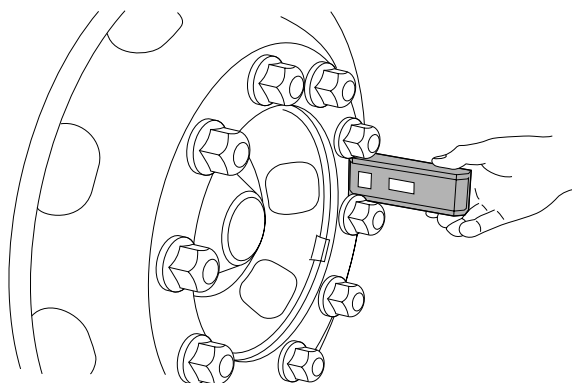
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See “Technical data” for the correct angle.

Checking camber angle using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of a type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. See “Technical data” for the correct angle.

If the angle is incorrect this may be caused by the following:

- excessive swivel axle bearing play
- bent front axle.



S7 00 566

2.3 INSPECTION AND ADJUSTMENT OF TOE

Checking toe

1. Use a high quality tracking gauge or high quality wheel alignment equipment for the inspection. The gauge/equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use. Follow the instructions for the wheel alignment equipment carefully.
2. Ensure that the steering gear is free of tension. If possible, drive the vehicle straight ahead to the place where the measurements will take place. If this is not possible, drive forwards and backwards at the place where the measurement will be taken with the steering gear in the "straight ahead" position.
3. Check the toe with the vehicle unladen.
4. Measure the axle toe. Compare the reading to the specified value, see "Technical data".

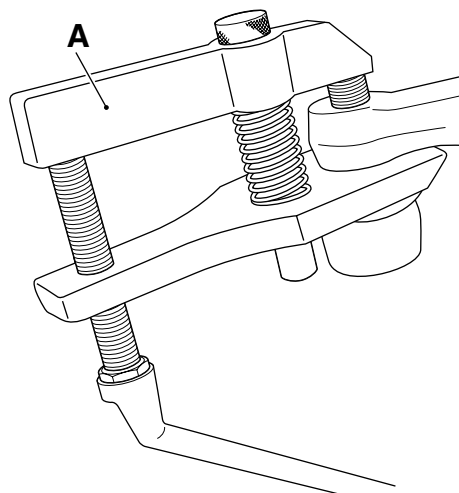
Note:

If a large difference is measured, the cause must be traced. The deviation could have been caused by excessive wear or by a collision, during which components were bent.

If so, the other steering gear components should be inspected carefully.

Adjusting toe

1. Remove the split pin and the castle nut.
2. Take the ball end out of the track-rod arm using a ball-end puller (A).
3. Loosen the clamping bracket bolt until the ball joint can be rotated.
4. Set the correct toe (see "Technical data") by turning the ball joint in or out.



S7 00 555

FRONT AXLE, F60

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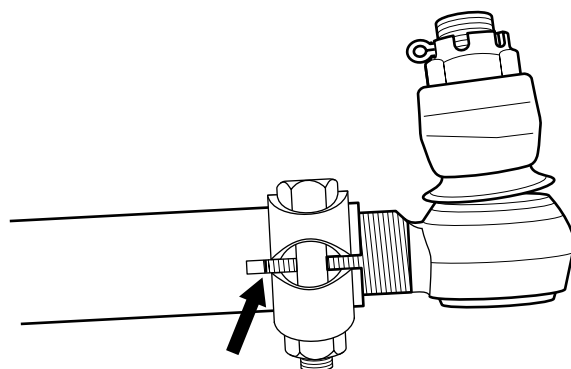
Inspection and adjustment

LF45/55 series

Note:

Make sure that the threaded end of the ball joint is not pushed too far out of the track rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).

5. Clean and check the clamping bracket bolt. If the bolt is corroded or damaged, it must be replaced.
6. Replace the self-locking nut.
7. Tighten the clamping bracket bolt to the specified tightening torque, see "Technical data".
8. Clean the tapered contact surfaces of both the track-rod ball joint and the track-rod arm. The tapered surfaces must be absolutely free of dirt, grease and paint.
9. Fit the ball joint.
10. Fit the castle nut and tighten to the specified torque, see "Technical data". If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.
11. After this, check the toe once again.



S7 00 026

2.4 INSPECTION AND ADJUSTMENT OF WHEEL DEFLECTION



Work safely and block the vehicle so that it cannot slide off the turning plates.

Checking wheel deflection

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axles and place turning plates under the centre of the wheels.
Only use turning plates that permit wheel displacement caused by the wheel offset.
3. Place the wheels in the "straight ahead" position and lower them until they rest on the turning plates. Set the turning plates to zero.
4. Turn the steering wheel fully clockwise to the end stop and check the wheel deflection on the right, see "Technical data".
5. Turn the steering wheel fully anticlockwise to the end stop and check the wheel deflection on the left, see "Technical data".

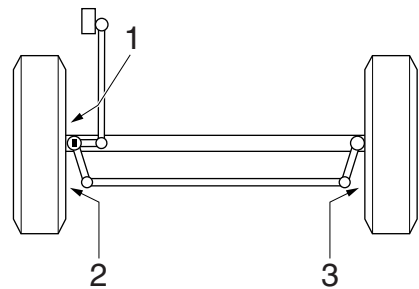
Adjusting wheel deflection

1. The wheel deflection is adjusted by changing the length of the stop bolts on the swivel axle.

Note:

There are two stop bolts (1 and 2) on the swivel axle on the steering box side.

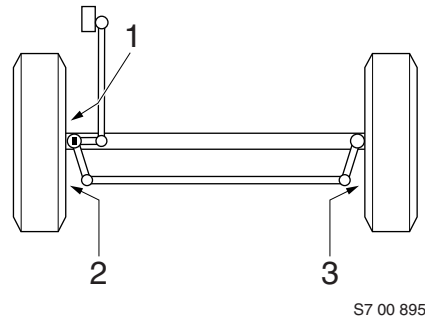
2. Turn the steering wheel until the inner wheel deflection on the steering box side corresponds with the specified inner wheel deflection, see "Technical data".
3. Adjust the length of the stop bolt (2) on the swivel axle on the steering box side.
4. Tighten the stop bolts (1 and 3).
5. Turn the steering wheel until the inner wheel deflection on the opposite side corresponds with the specified inner wheel deflection, see "Technical data".



S7 00 895

FRONT AXLE, F60**7****Inspection and adjustment****LF45/55 series**

6. Adjust the length of the stop bolt (1) on the swivel axle on the steering box side.
7. Adjust the length of the stop bolt (3) on the opposite swivel axle.
8. When the adjustments have been made, make sure that the tyre does not come into contact with other components.
9. If larger tyres, wheel rims or snow chains are fitted, first make sure that these do not come into contact with other components.
10. Reduce the wheel deflection if necessary.
11. When the wheel deflection has been changed, readjust the steering box wheel-deflection limiting valves.

**2.5 INSPECTION AND ADJUSTMENT OF STEERING ROD**

Work safely and block the vehicle so that it cannot slide off the turning plates.

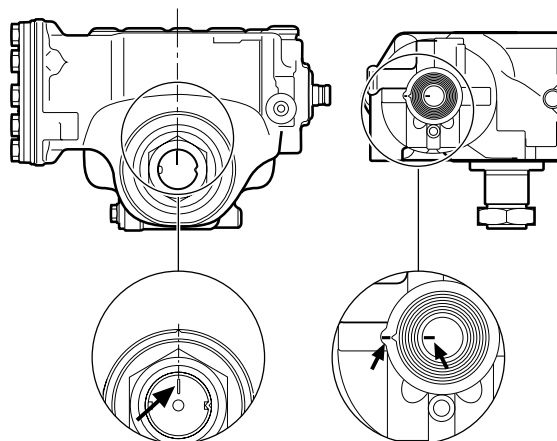
Note:

If faults are found, carry out the inspection with at least 40% vehicle load (as far as possible).

Checking adjustment of steering rod

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axle and place turning plates under the wheels. Only use turning plates that permit wheel displacement caused by the wheel offset.
3. Place the wheels in the “straight ahead” position and lower them until they rest on the turning plates.

4. Check that the steering box is exactly in the central position using the marks in the steering box. The mark on the input shaft should be visible in the slot.
5. Measure the (mis)alignment of the wheel to which the steering rod is connected. This can be done using wheel alignment equipment or by measuring the distance from the wheel rim to the spring leaves at the front and rear of the wheel. The distances at the front and rear of the wheel must be equal.
6. Adjust the length of the steering rod, if the values are different.
If a large difference is measured, the cause must be traced.
The difference may have been caused by a collision during which components were bent. If so, the remaining steering gear components must be checked carefully.



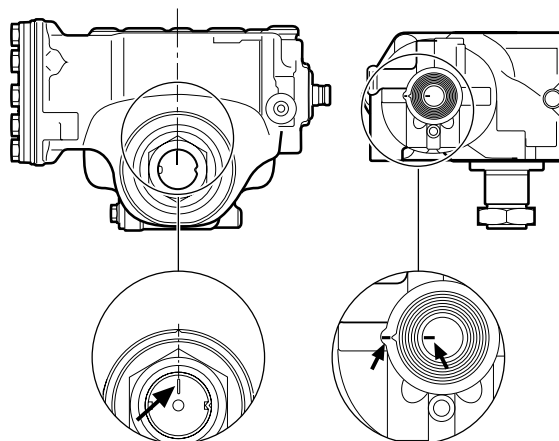
S7 00 623

Adjusting steering rod

1. Place the wheel to which the steering rod is connected in the "straight ahead" position. This can be done using wheel alignment equipment or by measuring the distance from the wheel rim to the spring leaves at the front and rear of the wheel. The distances at the front and rear of the wheel must be equal.
2. Unscrew the clamping bracket bolt on the steering rod.
3. Take the steering rod off the steering-rod arm using a ball-end puller, see "Removal and installation".

FRONT AXLE, F60**7****Inspection and adjustment****LF45/55 series**

4. Place the steering box in the central position by aligning the marks.
5. Set the steering rod to the correct length by screwing the ball end in or out.
If the length is not correct because the ball end can only be rotated one full turn, get as close as possible to the correct length.

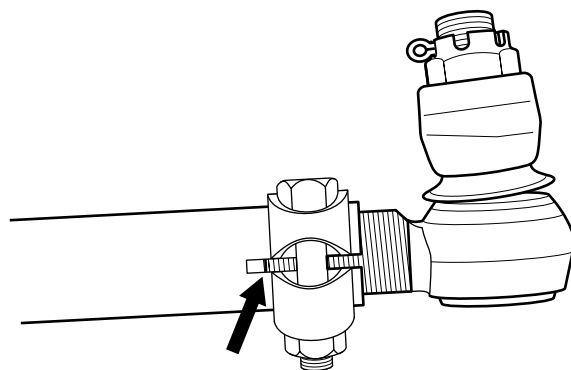


S7 00 623

Note:

Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).

6. Fit the steering rod in the steering-rod arm, see "Removal and installation".
7. Clean and check the clamping bracket bolt. If the bolt is corroded or damaged, it must be replaced.
Replace the self-locking nut.
8. Tighten the clamping bracket bolt to the specified tightening torque, see "Technical data".
9. Check the position of the steering wheel when it is in the "straight ahead" position. If necessary, correct the position by changing the position of the steering wheel on the steering shaft.



S7 00 026



If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.

2.6 CHECKING STEERING BALL JOINT

Checking steering ball joint

1. Check that the dust cover of the steering ball joint and its seal is not damaged.
Replace the steering ball joint if they are damaged.
2. Check for the presence of the split pin and its condition.

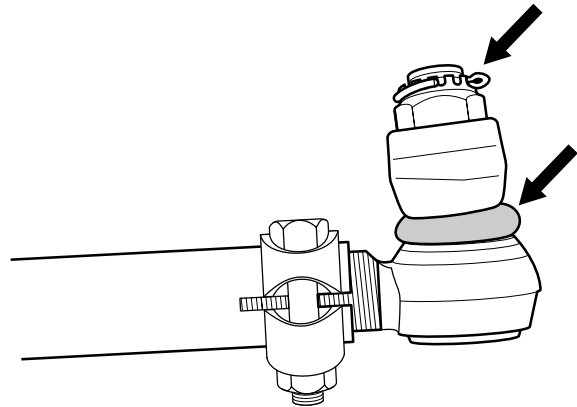
Checking axial steering ball joint play

1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.
4. Screw the thrust washer (8) onto the threaded spindle.
5. Fit the spring retainer (3), spring (4) and thrust sleeve (6) in the bracket (1).
Fit the locking screw (5). It should be possible to move the thrust sleeve (6) freely.

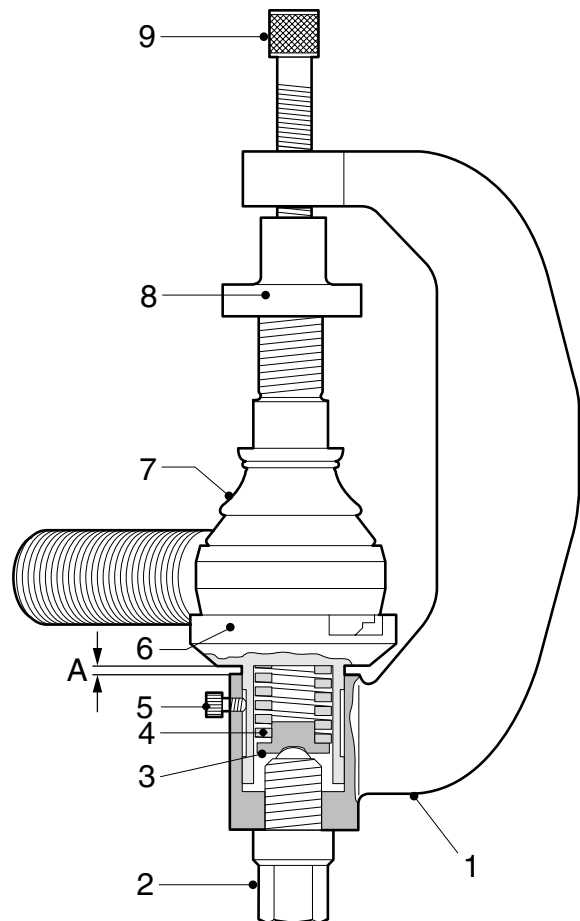
Note:

Fit the correct thrust sleeve (6).
The thrust sleeve (6) must abut the rim of the steering ball joint (7).

6. Unscrew the thrust bolt (2) until the flange of the thrust sleeve (6) abuts the bracket (1) (A=0 mm).
7. Fit the special tool to the steering ball joint (7) and turn the threaded spindle (9) by hand until the special tool is tight around the steering ball joint (7).
8. Tighten the thrust bolt (2) until its head abuts the bracket (1).
9. Measure the play "A" between the thrust sleeve and the bracket using a feeler gauge.
Compare the measurement taken with the maximum permissible steering ball joint play, see "Technical data".
If necessary, replace the steering ball joint.



S7 00 540



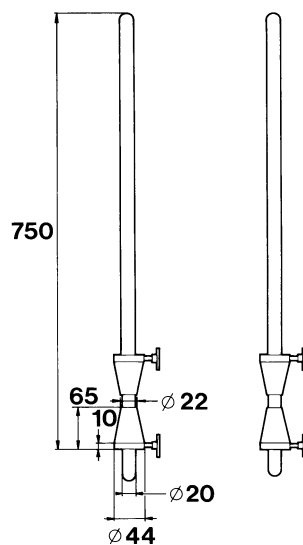
S700426

2.7 CHECKING FRONT AXLE HOUSING**General**

If the vehicle has been involved in a collision or if abnormal deviations are measured when the wheel alignment is checked, it is advisable to check the axle housing.

A number of the measurements below can also be carried out using alignment equipment. Consult the alignment equipment manual for this purpose.

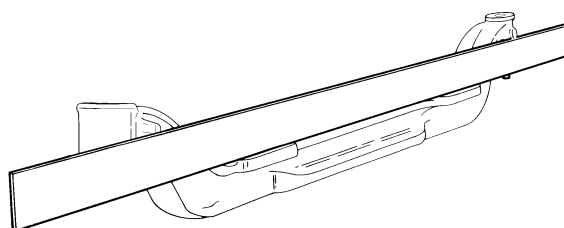
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

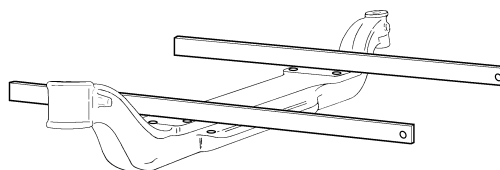
Checking front axle housing

1. Take the front axle off the vehicle and remove both swivel axles, see "Removal and installation".
2. Place a straight edge across the spring seats of the front axle housing and check whether they are aligned.



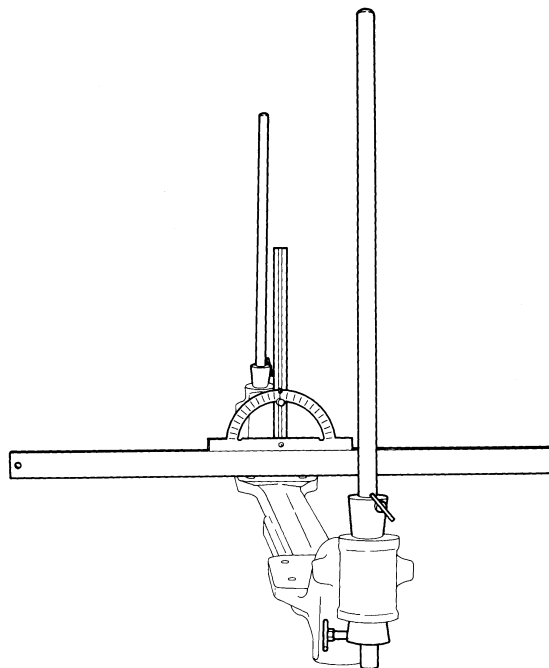
S7 00 151

3. Place a straight edge across both spring seats and check whether they are parallel with each other.



S7 00 152

4. Place the two gauge bars in the swivel axle holes.
Place a straight edge with a protractor on the spring seat. Measure the angle of the gauge bars relative to the spring seats. The angle measured should be 90° .

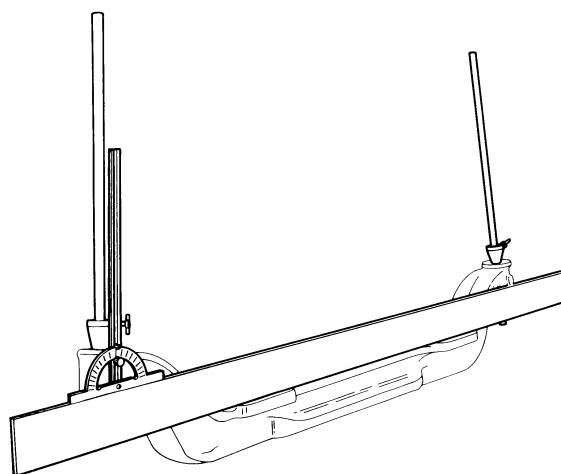


S7 00 149

5. Measure the king pin inclination (KPI) by placing a straight edge with a protractor on the spring seats.
By placing the straight edge of the protractor parallel to the gauge bar, the angle can be read. See "Technical data" for the correct angle.
6. If a deviation is found during one of the checks, the axle housing must be replaced.



Straightening of the front axle housing is not permitted. This could affect the strength of the materials.



S7 00 150

2.8 CHECKING WHEEL RIM

General

1. Check the wheel rims for the following:
 - deformation of the wheel rims and wheel disc.
 - deformation or cracking of the wheel stud holes.
 - corrosion, including on the tyre side of the rim and on the rim ring.
2. Cracked or damaged wheel rims or wheel rims with cracked or deformed wheel stud holes must be replaced.
Welding or repairing wheel rims in any way is prohibited. Welds will crack again in the course of time due to the dynamic load.



When taking a damaged wheel rim off the vehicle, deflate the tyre (remove the tyre valve), because of possible tensions in the wheel rim.

3. To prevent damage to the tyre due to corrosion and/or indirect tension cracks (due to notching), the anti-corrosion treatment of the wheel rim must not be damaged in any way.
For removal of corrosion and repairing the paint layer, see "Paint treatment".
Before re-spraying, remove the old layer of paint to prevent the paint layer from becoming too thick. The total layer of paint must not be more than 50 microns thick.



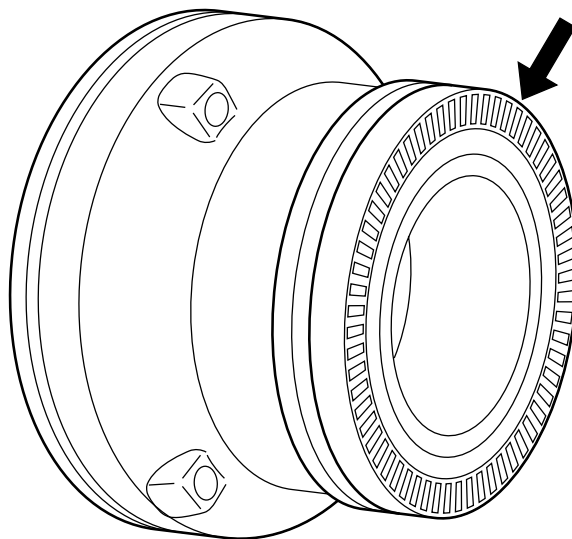
If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.

2.9 CHECKING WHEEL-SPEED SENSOR RING

1. Remove the compact bearing housing, see "Removal and installation".
2. Check the sensor ring for dirt. Special attention should be paid to deposits of dirt between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring for damage. Even the smallest amount of damage could cause a failure. Replace the sensor ring if necessary.
4. Check the sensor for smooth operation. If the sensor is stuck, remove, clean and refit it, see "Removal and installation".



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.



S700697

5. Fit the compact bearing housing, see "Removal and installation".
6. Press the sensor against the sensor ring by hand. The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.
7. Check the ABS system for correct operation.

FRONT AXLE, F60

7

Inspection and adjustment

LF45/55 series

7

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION OF WHEEL



When removing a wheel with a cracked or damaged wheel rim, always deflate the tyre (remove the tyre valve) because of possible tensions in the wheel rim.

General

- Only use the original DAF wheel rims specified for the vehicle concerned.
- Make sure that tyres of the same type are fitted at both ends of the axle.
- Not cleaning the mating surfaces sufficiently and/or tightening the wheel nuts unevenly may cause vibrations during driving or braking.

Note:

If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

Removing wheel

1. Chock the wheels to prevent the vehicle moving.
2. Clean the screw thread of the wheel studs using a wire brush.
3. Oil the wheel studs sparingly.
4. Unscrew the wheel nuts.
5. Fit a jack as close as possible to the wheel to be replaced.
6. Jack up the vehicle and, if possible, place a support under the axle.
7. Remove the wheel nuts and take the wheel off the hub.

FRONT AXLE, F60

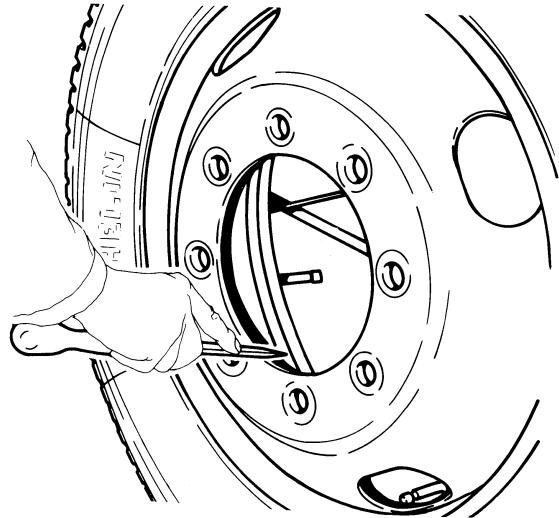
7

Removal and installation

LF45/55 series

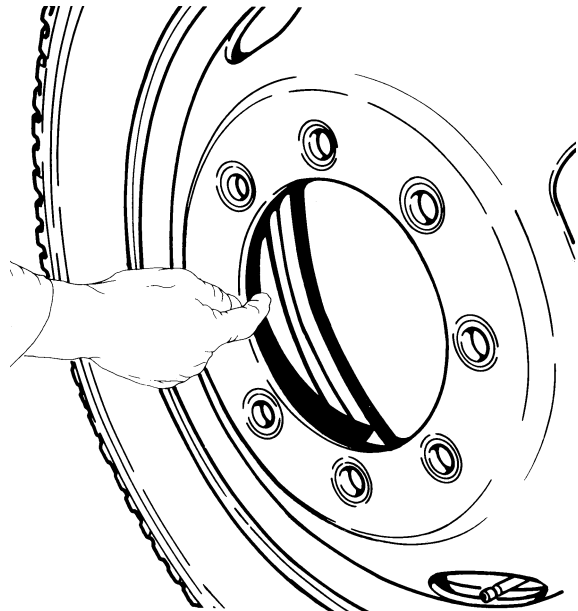
Installing wheel

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



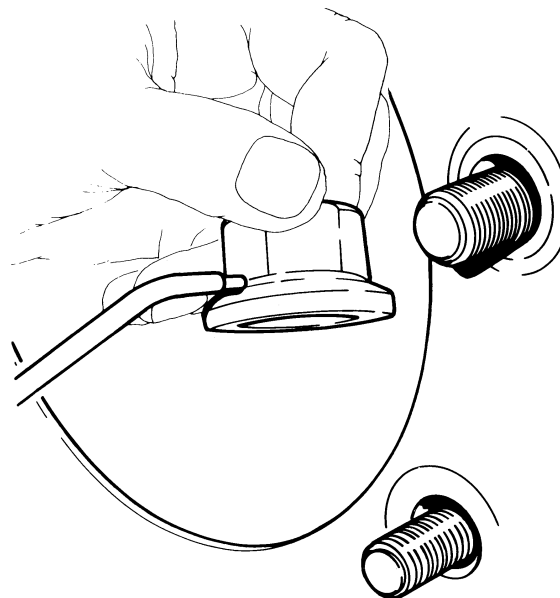
S7 00 096

2. Apply a thin layer of grease to the fitting edge of the wheel hub.
3. Also apply a thin layer of grease to the fitting edge of the wheel rim. This layer of grease is to prevent the wheel rim and the wheel hub from becoming "rust-bound".
4. Check that the contact surfaces of the wheel rim and hub are clean. Clean these if necessary.



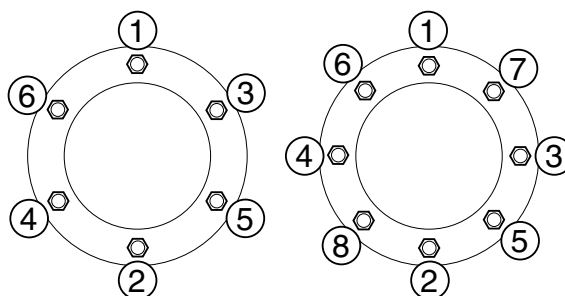
S7 00 097

5. Clean the wheel nuts and then apply a drop of oil between the thrust washer and the nut.
6. Also apply a drop of oil to the first turn of the wheel-stud threads.



S7 00 098

7. Fit the wheel nuts and tighten these evenly according to the sequence in the drawing. A pneumatic spanner may be used for this purpose, but its tightening torque is not very reliable. It will therefore be necessary to retighten the wheel nuts to the specified torque using a torque wrench. For the specified tightening torque, see "Technical data".

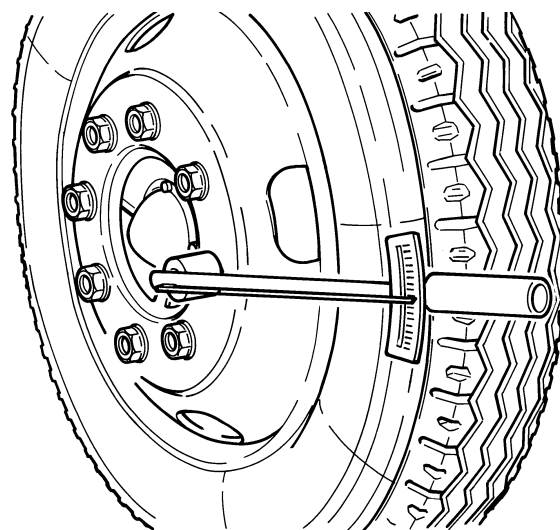


S7 00 631

Note:

Wheel nuts should always be tightened and retightened in cold condition. However, wheel studs should not be tightened in extremely cold conditions.

8. Check the tyre pressure.
9. Retorque the wheel nuts with a torque wrench after 100 km. If new wheel studs are fitted, they need additional retorquing after 500 km.



S7 00 099

3.2 REMOVAL AND INSTALLATION OF STEERING ROD**Removing steering rod**

1. Remove the castle nuts at both ends of the steering rod.
2. Take the ball ends off the steering-rod arm and the pitman arm using a ball-end puller (A).

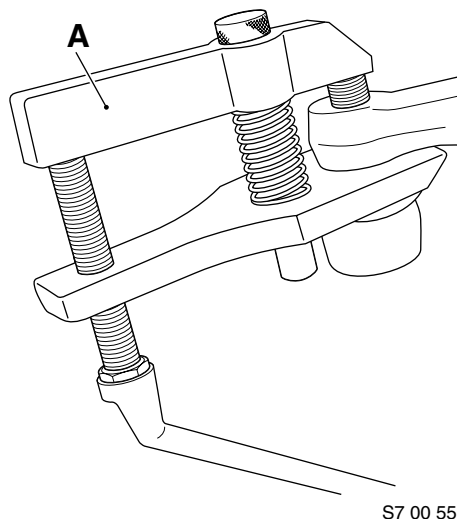
Installing steering rod

1. When installing a new steering rod, copy the settings of the steering rod to be replaced.
2. Clean the tapered contact surfaces of both the steering-rod balls and the steering-rod arm. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Fit the steering rod using the castle nuts.
4. Check the steering rod setting and adjust, if necessary. See "Inspection and adjustment".
5. Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).
6. Check whether the clamping bracket bolt is tightened to the specified tightening torque, see "Technical data".
7. Tighten the castle nuts to the specified torque, see "Technical data".

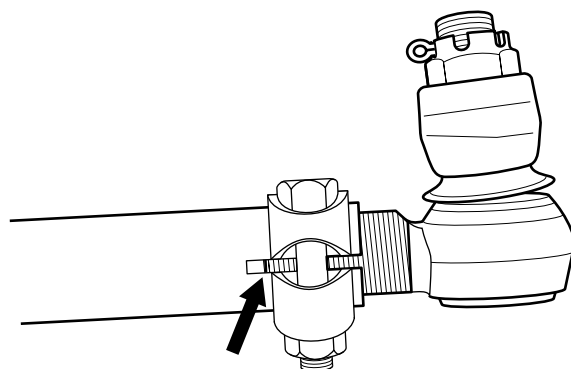
Note:

If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.

8. Lock the castle nuts using new split pins.



S7 00 555



S7 00 026

3.3 REMOVAL AND INSTALLATION OF TRACK ROD

Removing track rod

1. Remove the castle nuts.
2. Take the ball ends out of the track-rod arms using a ball-end puller (A).

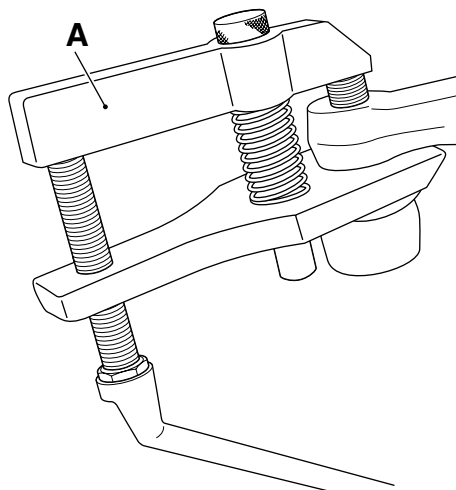
Installing track rod

1. When installing a new track rod, copy the settings of the track rod to be replaced.
2. Clean the tapered contact surfaces of both the track rod balls and the track rod arms. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Fit the track rod.
4. Fit the castle nuts and tighten them to the specified torque, see "Technical data".

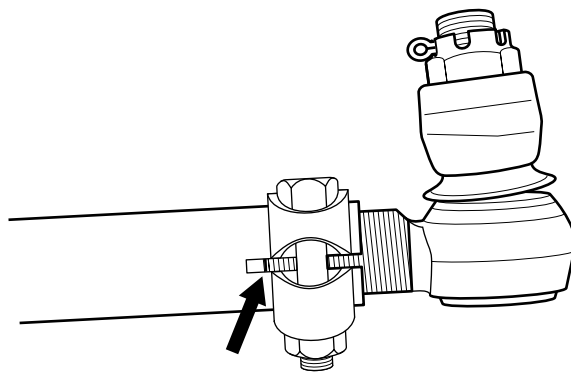
Note:

If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.

5. Lock the castle nuts using new split pins.
6. Check the axle toe and adjust if necessary. See "Inspection and adjustment".
7. Check that the threaded end of the ball joint is fully secured by the clamping piece.
8. Check that the clamping piece bolt is tightened to the specified tightening torque, see "Technical data".



S7 00 555



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3.4 REMOVAL AND INSTALLATION OF TRACK-ROD ARM



These instructions must be followed to the letter. The attachment of the track-rod arms is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when fitting the track-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing track-rod arm

1. Take the track rod off the track-rod arm.
2. Remove the attachment bolts.

Note:

These bolts must not be reused.

3. Take the track-rod arm off the swivel axle.

Installing track-rod arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the arm.
3. Apply the specified locking compound to the new attachment bolts, see "Technical data".
4. Use new attachment bolts when installing the track-rod arm.
Evenly tighten the attachment bolts alternately to the specified tightening torque, see "Technical data".
5. Fit the track rod.

3.5 REMOVAL AND INSTALLATION OF STEERING-ROD ARM



These instructions must be followed to the letter. The attachment of the steering-rod arm is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when installing the steering-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing steering-rod arm

1. Take the steering rod out of the steering-rod arm.
2. Remove the attachment bolts.

Note:

These bolts must not be reused.

3. Take the steering-rod arm off the swivel axle.

Installing steering-rod arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the arm.
3. Apply the specified locking compound to the new attachment bolts, see "Technical data".
4. Use new attachment bolts when installing the steering-rod arm. Evenly tighten the attachment bolts alternately to the specified tightening torque, see "Technical data".
5. Install the steering rod.

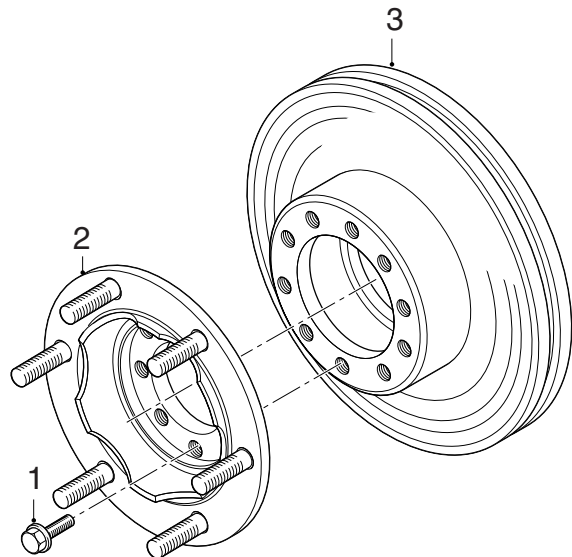
3.6 REMOVAL AND INSTALLATION OF WHEEL HUB

Removing wheel hub

1. Jack up the axle until the wheels are clear of the floor. Place suitable supports under the axle.
2. Remove the wheel.
3. Take the attachment bolts (1) off the wheel hub (2) and remove the wheel hub (2).

Installing wheel hub

1. Check that the contact surfaces of the wheel hub (2) and the brake disc (3) are clean. Clean these if necessary.
2. Install the wheel hub (2) and tighten the attachment bolts (1) crosswise to the specified tightening torque, see "Technical data".
3. Fit the wheel.

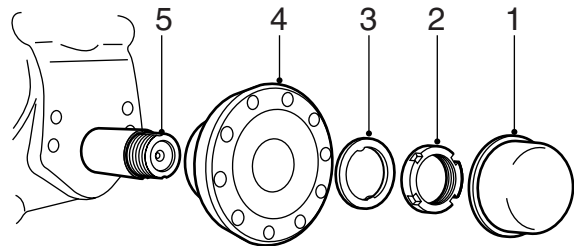


S7 00 802

3.7 REMOVAL AND INSTALLATION OF COMPACT BEARING HOUSING

Removing compact bearing housing

1. Jack up the axle until the wheels are clear of the floor. Place suitable supports under the axle.
2. Remove the wheel.
3. Remove the brake pads and the brake calliper.
4. Remove the wheel hub and the brake disc.
5. Remove the hub cap (1).
6. Tap the locking ring of the hub nut (2) back into its locking position.
7. Remove the hub nut using the special tool (DAF no. 1329376).
8. Remove the thrust washer (3) and slide the compact bearing housing (4) off the axle journal (5).



S7 00 699

Installing compact bearing housing

1. Check the wheel speed sensor ring, see "Inspection and adjustment".
2. Check the axle journal (5) thread carefully for damage.



Never fit the compact bearing housing to an axle journal with a damaged thread.

3. Apply a thin, even layer of the prescribed anti-corrosion agent to the entire circumference of the axle journal, see "Technical data".

Note:

Do not apply too much anti-corrosion agent to the axle journal. When the compact bearing housing is installed, the excess anti-corrosion agent will collect at the rear of the compact bearing housing. When the vehicle is used in daily operation, this can leak out so that the seal wrongly appears to be leaking.

FRONT AXLE, F60

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Removal and installation

LF45/55 series

4. Fit the compact bearing housing (4) to the axle journal.
5. Fit the thrust washer (3).
6. Install a new hub nut (2). Tighten the hub nut in the specified manner, see "Technical data".
Use the special tool (DAF no. 1329376) and a torque amplifier to do so.
7. Fit the hub cap (1).
8. Check that the contact surfaces of the brake disc and the compact bearing housing are clean. Clean these if necessary.
9. Fit the brake disc and the wheel hub.
10. Fit the brake calliper and the brake pads.
11. Check the wheel speed sensor for smooth operation. If the sensor is stuck, remove, clean and refit it.
12. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

13. Fit the wheel.
14. Check the ABS system for correct operation.

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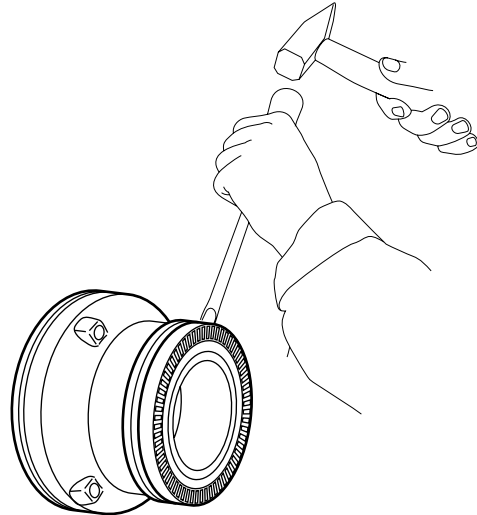
3.8 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR RING

Removing wheel-speed sensor ring

1. Remove the wheel speed sensor.
2. Take the compact bearing housing off the axle journal.
3. Make a notch in the side of the sensor ring, using a hammer and chisel. Make sure that the contact surface of the sensor ring to the compact bearing housing is not damaged in the process.
4. Take the sensor ring off the compact bearing housing.



Once removed, the sensor ring must not be reused.



S7 00 700

Installing wheel-speed sensor ring

1. Check the contact surface of the sensor ring to the compact bearing housing for damage.
2. Check the new sensor ring carefully for possible damage in transit.
3. Fit a new sensor ring to the compact bearing housing using a press and flat plate.
4. Check that the sensor ring makes good contact around the entire circumference.
5. Fit the compact bearing housing to the axle journal.
6. Check the wheel speed sensor for smooth operation. If the sensor is stuck, remove, clean and refit it.
7. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

8. Check the ABS system for correct operation.

3.9 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

Removing wheel-speed sensor

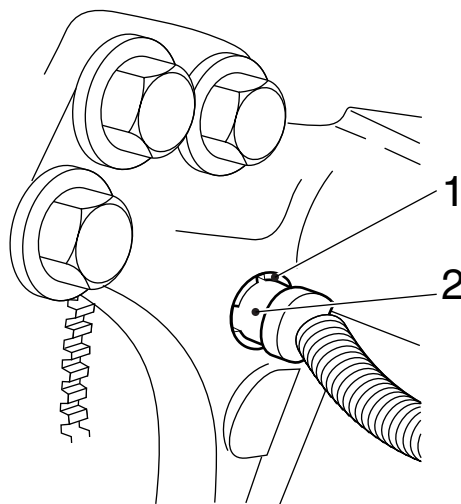
1. Remove the wheel-speed sensor (2).

Installing wheel-speed sensor

1. Clean the wheel-speed sensor (2) and its holder (1). Replace the holder if necessary.
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor, see "Technical data".
3. Fit the wheel speed sensor. Press the sensor against the sensor ring by hand.
4. The air gap between the sensor and the sensor ring is adjusted automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.



S7 00 880

5. Check the ABS system for correct operation.

3.10 REMOVAL AND INSTALLATION OF AXLE ASSEMBLY

Removing axle assembly

1. Engage the vehicle's parking brake and place chocks at the rear wheels.
2. Remove the brake chamber hoses and the disc brakes cables.
3. Take the steering rod out of the steering-rod arm.
4. Remove the stabiliser bar.
5. Loosen the wheel nuts at both ends of the axle, but do not remove these yet.
6. Jack up the vehicle until the wheels are off the ground and place suitable stands under the chassis.
7. Remove the wheel nuts and take the wheels off the axle.
8. Support the axle securely and remove the U-bolt nuts.
9. Remove the axle.

Installing axle assembly

1. Check the U-bolts and U-bolt nuts for corrosion and damage. Replace them if necessary. If they are to be re-used, thoroughly clean the thread and remove any paint.
2. Lift the axle under the vehicle and fit the U-bolts.
3. Install the wheels and tighten the wheel nuts.
4. Lower the vehicle and fit the U-bolt nuts.
5. Tighten the wheel nuts to the specified tightening torque, see "Technical data".
6. Fit the steering rod in the steering-rod arm.
7. Fit the brake chamber hoses and the disc brake cables.

FRONT AXLE, F60

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Removal and installation

LF45/55 series

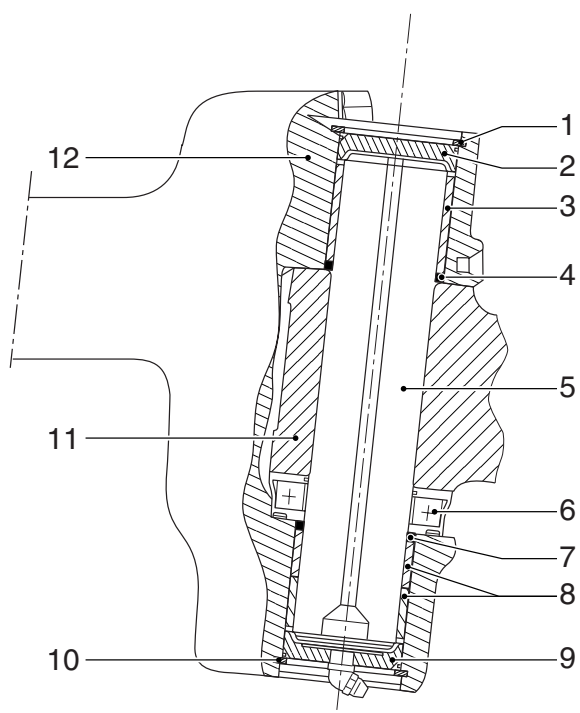
3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE



A hydraulic press with a calibrated pressure gauge is required to remove and install the king pin.

Removing swivel axle

1. Remove the axle assembly.
2. Remove the wheel speed sensor.
3. Remove the track rod.
4. Remove the compact bearing housing
5. Remove the circlips (1 and 10) and the covers (2 and 9).
6. Remove the grease.



S 700 659

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LF45/55 series

FRONT AXLE, F60

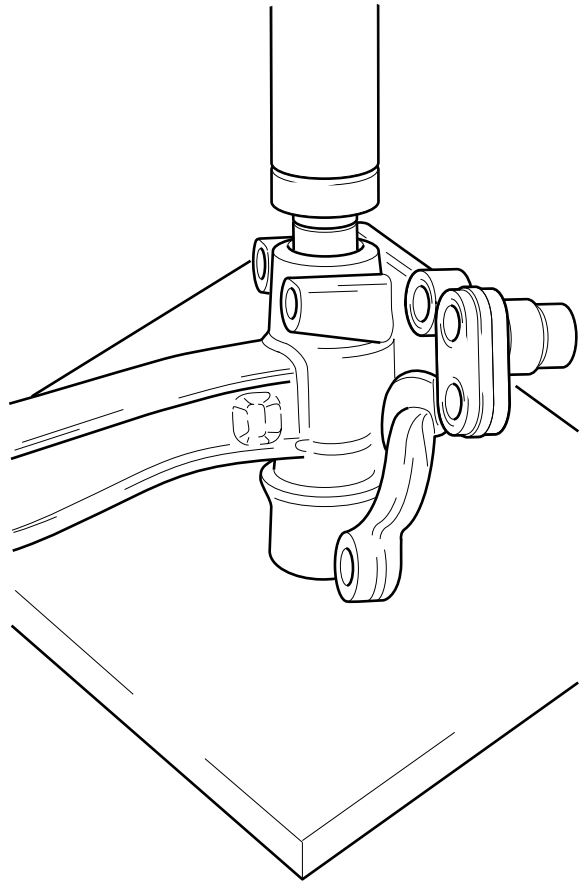
Removal and installation

7. Suspend the axle in the hoist in the correct manner.
8. Position the swivel axle underneath the press, with the bearing bush (3) facing upwards.

Note:

The king pin must be at right angles to the press.

9. Press the king pin carefully out of the swivel axle.
10. Take the swivel axle off the axle end.



S7 00 730

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FRONT AXLE, F60

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Removal and installation

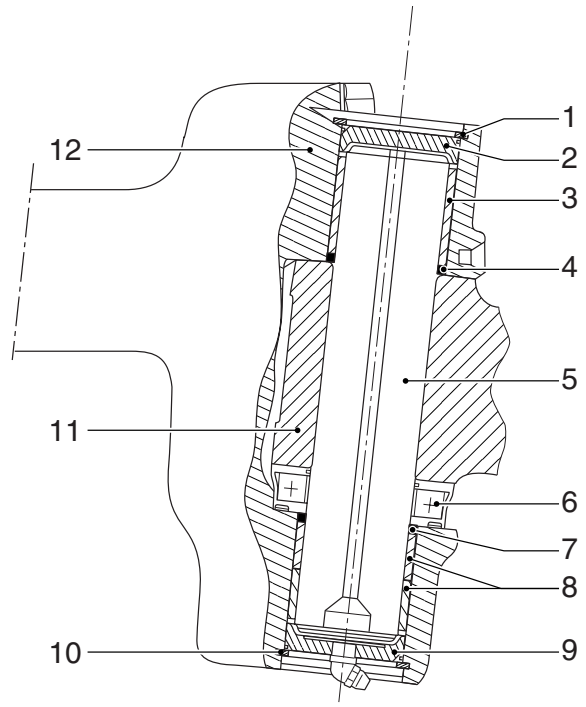
LF45/55 series

Installing swivel axle

Note:

After a collision or when the camber angle is incorrect, the swivel axle must be magnaflux tested. If in doubt, always replace the swivel axle.

1. Check the condition of the needle bearings (8) and the oil seal (7).
2. Check the bearing bush (3) for grooves and check the condition of the oil seal (4).
3. Check the king pin (5) for grooves and corrosion. Small needle punctures or small areas of corrosion can be removed using fine polishing paper. If in doubt, replace the king pin and the needle bearings.
4. Lightly lubricate the king pin.
5. Check the contact surfaces of the thrust bearing (6), the axle end (11) and the swivel axle (12) for damage.
6. Check the thrust bearing for wear.
7. Apply plenty of grease to the needle bearings (8).
8. Position the swivel axle (12) on the press with the needle bearings pointing upwards.
9. Position the axle end (11) in the swivel axle.
10. Install the thrust bearing (6) between the axle end and the swivel axle.



S 700 659

Note:

The thrust bearing must be installed on the side with the needle bearings, with the narrow end facing the needle bearings.

11. Fit the king pin (5) in the swivel axle using a copper punch.

Note:

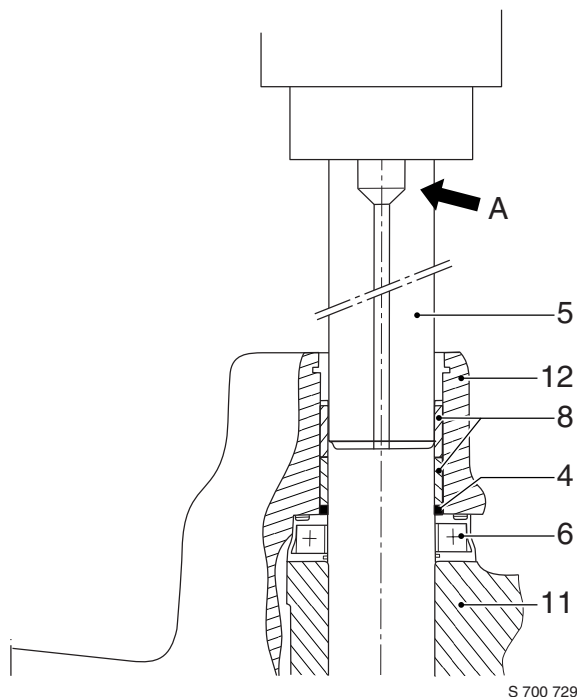
The large bore (A) in the king pin must be at the top.

12. Position the swivel axle underneath the press.

Note:

The king pin must be at right angles to the press.

13. Ensure that the swivel axle, the thrust bearing and the axle end are aligned.



14. Press the king pin into the swivel axle with the specified force, see "Technical data".

15. Check the O-rings of the covers (2 and 9).

16. Fit the covers and the circlips (1 and 10).

Note:

The cover (9) with the lubricating nipple goes at the bottom.

17. Thoroughly lubricate the swivel axle (12) while it is unloaded.

Check whether a collar of grease has formed at the thrust bearing (6).

18. Check that the swivel axle operates smoothly and is not getting stuck anywhere.

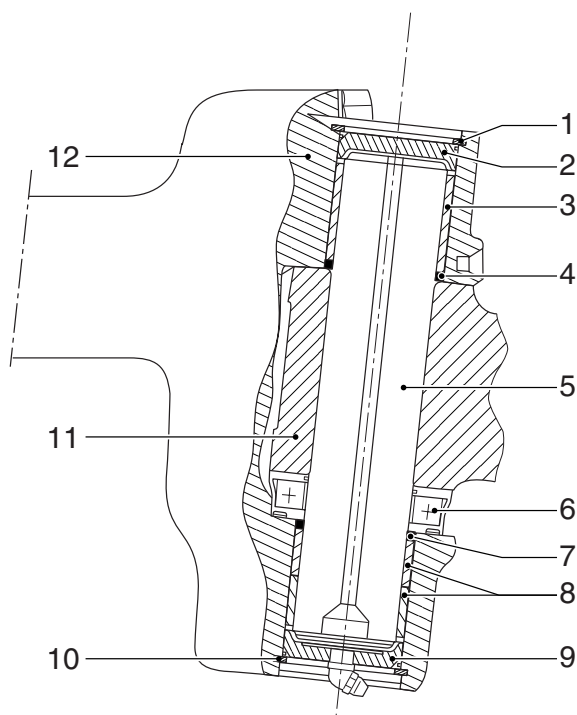
19. Fit the wheel speed sensor.

20. Fit the compact bearing housing

21. Fit the track rod.

22. Install the axle assembly.

23. Check the ABS system for correct operation.

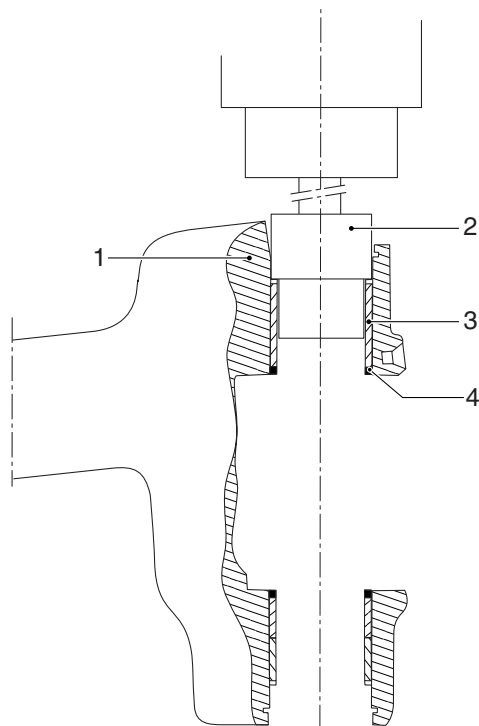


FRONT AXLE, F60**7**

Removal and installation

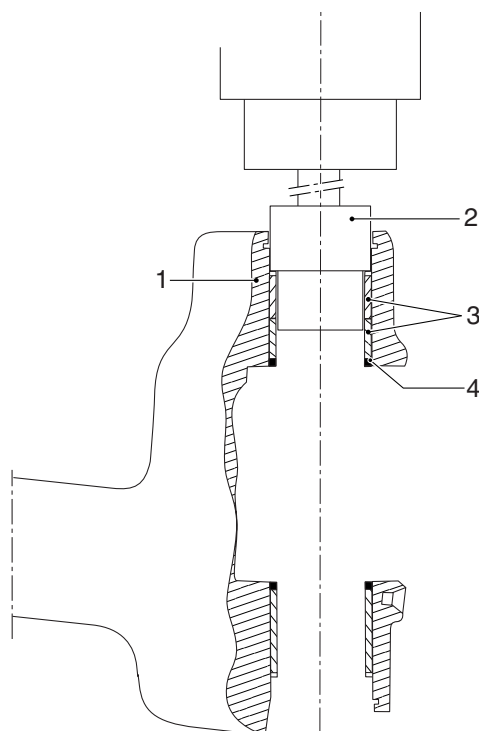
LF45/55 series**3.12 REMOVAL AND INSTALLATION OF SWIVEL AXLE BEARINGS****Removing swivel axle bearings**

1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the bearing bush (3) facing upwards.
3. Fit the special tool (DAF no. 1451994) (2) to the bearing bush and press the bearing bush and the oil seal (4) out of the swivel axle.



S 700 732

4. Turn the swivel axle around and fit the special tool (2) (DAF no. 1451994A) to the needle bearings (3).
5. Press the needle bearings with the oil seal (4) out of the swivel axle.



S 700 731

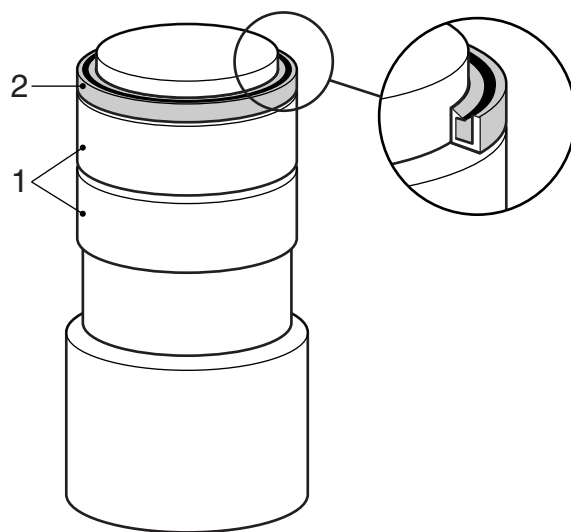
Installing swivel axle bearings

1. Apply plenty of grease to the needle bearings (1).
2. Fit the needle bearings and the oil seal (2) to the special tool (DAF no. 1451994C).

Note:

The closed side of the oil seal must abut the needle bearings.

3. Press the needle bearings and the oil seal into the swivel axle until the special tool abuts.



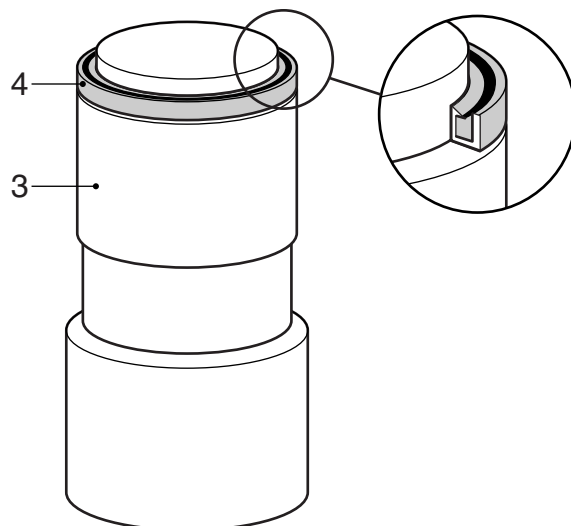
S7 00 701

4. Turn the swivel axle around.
5. Apply plenty of grease to the bearing bush (3).
6. Fit the bearing bush and the oil seal (4) to the special tool (DAF no. 1451994B).

Note:

The closed side of the oil seal must abut the bearing bush.

7. Press the bearing bush and the oil seal into the swivel axle until the special tool abuts.
8. Fit the swivel axle to the axle end.



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FRONT AXLE, F60

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Removal and installation

LF45/55 series

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3.10 Removal and installation of compound thrust bearing	3-19 ...	200322
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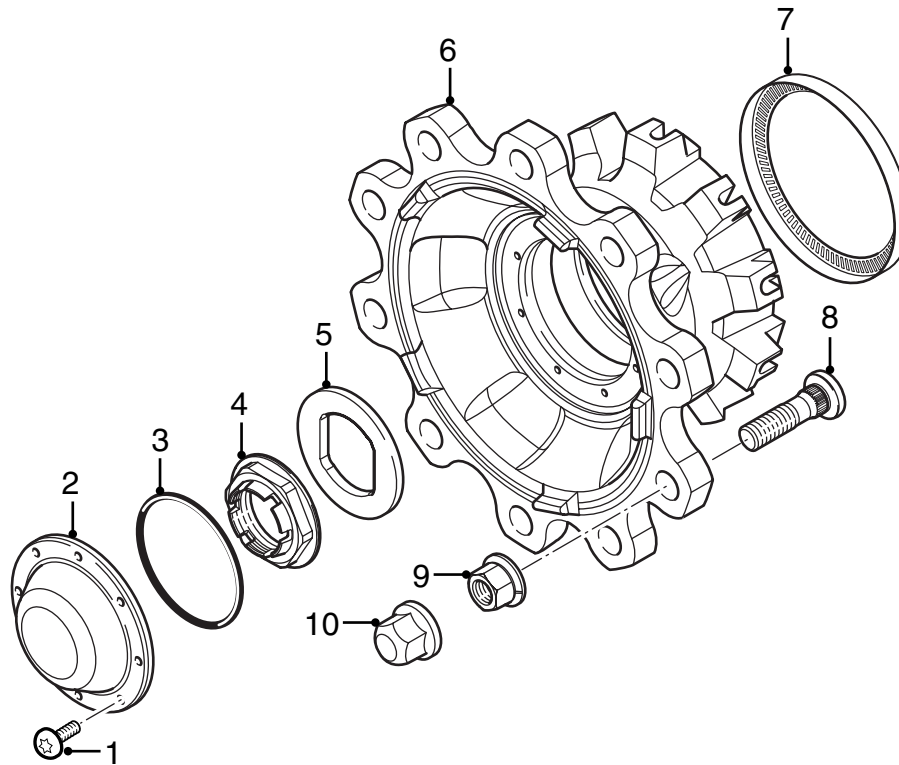
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Contents

LF45/55 series

1. GENERAL

1.1 OVERVIEW DRAWING OF WHEEL HUB



S7 00 544

1. Attachment bolt
2. Hub cover
3. O-ring
4. Hub nut
5. Locking plate
6. Wheel hub unit
7. Wheel speed sensor ring
8. Wheel stud
9. Wheel nut
10. Wheel nut cap

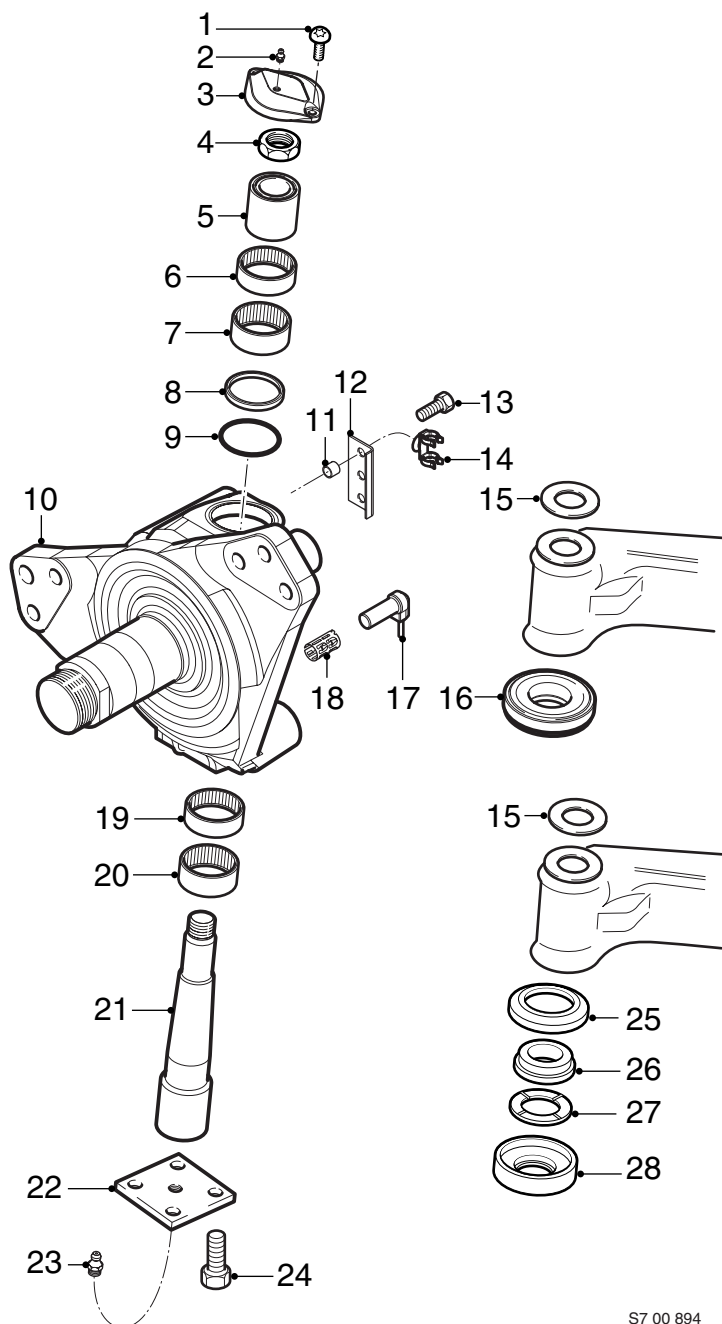
FRONT AXLE, 152N

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General

LF45/55 series

1.2 OVERVIEW DRAWING OF SWIVEL AXLE



S7 00 894

1. Attachment bolt
2. Lubricating nipple
3. Cover
4. Nut
5. Bearing bush
6. Needle bearing
7. Needle bearing
8. Oil seal
9. O-ring
10. Swivel axle
11. Bush
12. Bracket
13. Attachment bolt
14. Clamp
15. Shim
16. Thrust bearing (compound)
17. Wheel-speed sensor
18. Wheel-speed sensor holder
19. Needle bearing
20. Needle bearing
21. King pin
22. Sealing plate
23. Lubricating nipple
24. Attachment bolt
25. Sealing ring (split thrust bearing)
26. Thrust washer (split thrust bearing)
27. Bearing ring (split thrust bearing)
28. Shoulder ring (split thrust bearing)

FRONT AXLE, 152N

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General

LF45/55 series

1.3 DESCRIPTION OF WHEEL HUB UNIT

Wheel hub unit

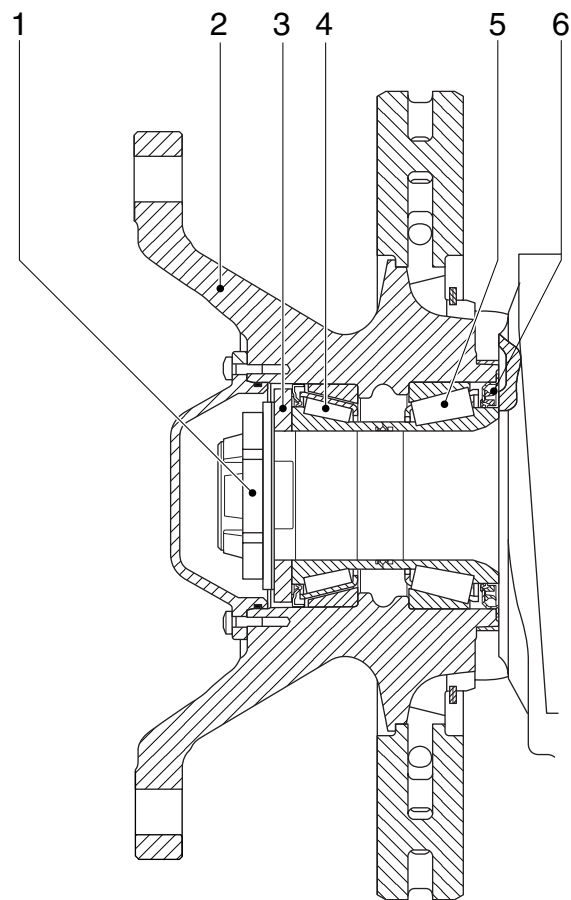
The wheel hub (2), wheel bearings (4 and 5) and oil seal (6) form an assembly which is referred to as the wheel hub unit.

The thrust washer (3), which has two straight surfaces on the inside, prevents the hub nut (1) from coming loose if there are any problems with the bearings. The hub nut (1) is of the self-locking type. The nut is locked by bending the lips on the hub nut (1) outwards.

The bearings (4 and 5) of the wheel hub unit are greased and are maintenance free.

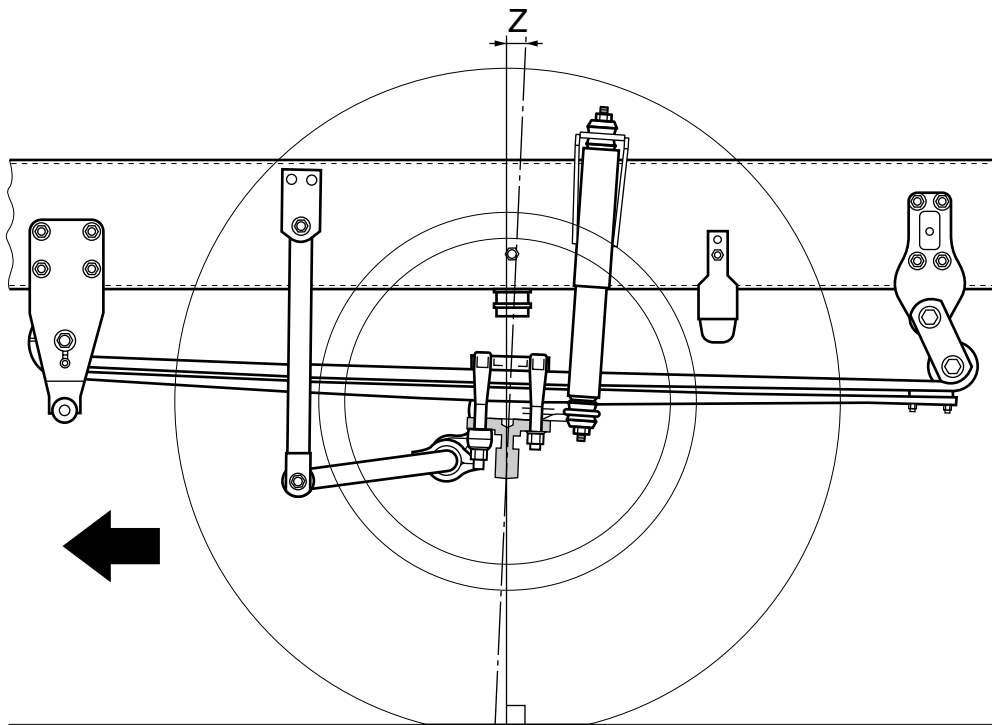
The correct wheel bearing pre-load is achieved by installing the hub nut (1) as specified.

It is not possible to replace the wheel bearings (4 and 5) and/or the hub oil seal (6).



S7 00 578

1.4 DESCRIPTION OF THE WHEEL SETTINGS



S7 00 606

Caster

The caster (Z) is the angle of the axle housing relative to the road surface. The caster is important for the directional stability of the vehicle. Too little caster will lead to the vehicle “searching”, while too much caster will result in “heavy” steering.

If the caster is set incorrectly this will not cause tyre wear.

The caster is determined by the relationship between the road surface and the chassis, assuming that the chassis is parallel to the road surface.

The caster can be checked and adjusted very easily and this does not require any complicated equipment.

FRONT AXLE, 152N

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General

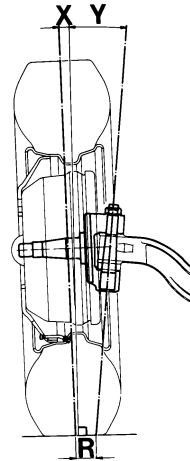
LF45/55 series

Camber angle and king-pin inclination

The camber angle (X) and the king-pin inclination (Y) are determined by the design of the swivel axle and the axle housing. In DAF vehicles, neither setting can be adjusted. Incorrect wheel alignment is caused exclusively by collisions and/or a bent front axle due to overloading.

If one of the wheels is out of alignment on a vehicle, the load of the tyre will be unevenly distributed across the road surface. This will result in irregular tyre wear.

The inspection of vehicles with one steerable axle is the same as the inspection of vehicles with two steerable axles. Each wheel must be checked separately.



S7 00 129

Toe

Toe is the difference between distances A and B.

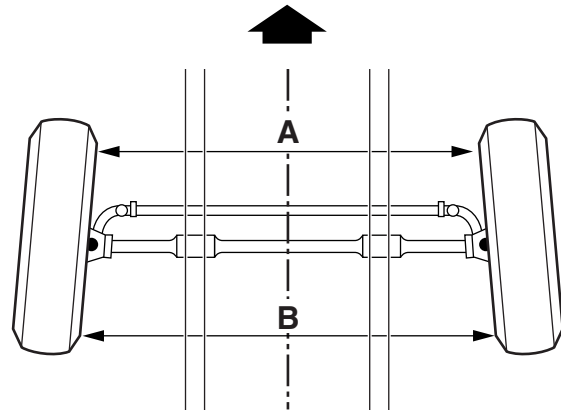
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

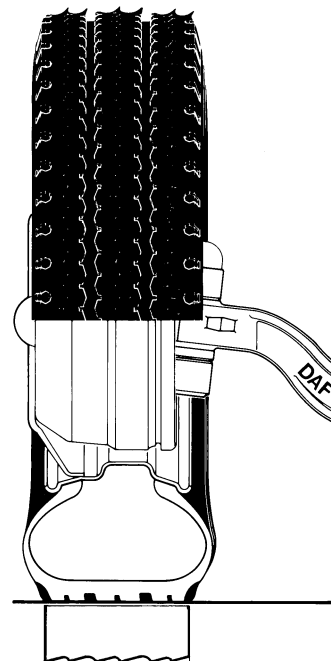
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.

If the toe-in or toe-out is incorrect will cause "chafing" of the tyres on the road surface. This will result in irregular tyre wear.

The same irregular tyre wear is found in vehicles with multiple steerable axles if the wheels are "misaligned" while the vehicle is driving straight ahead.



S7 00 833



S7 00 126

2. INSPECTION AND ADJUSTMENT

2.1 INSPECTION AND ADJUSTMENT OF SWIVEL AXLE PLAY

Checking swivel axle play

1. The vehicle must have its wheels on the ground.

Note:

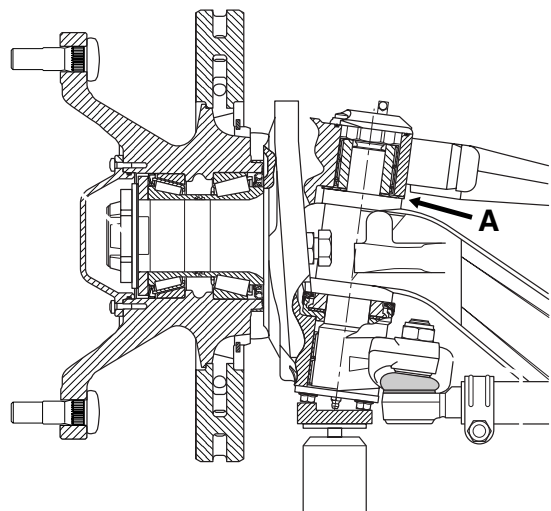
If the wheels have been taken off the front axle (to be overhauled, for example), the swivel axle will hang loose on the axle end. In that case, place a jack under the swivel axle so that the swivel axle is pushed against the underside of the axle end.

2. Using a feeler gauge, measure the distance between the shim and the swivel axle at (A). Take measurements in several places. Compare the measured value with the admissible play, see "Technical data".

Note:

The play should be about equal around the entire circumference of the axle end. If it is not, this indicates that there is radial play in the needle bearings. If there is radial play and one of the measurements taken differs from the specified value, the needle bearings must be replaced, see "Removal and installation".

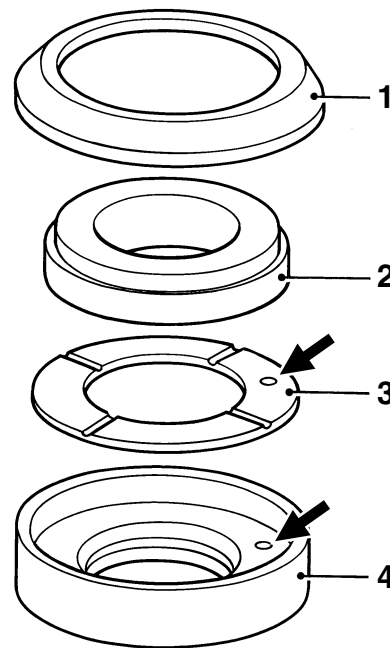
If excessive axial play is measured around the entire circumference of the axle end, the swivel axle thrust bearing is probably worn.



S7 00 579

FRONT AXLE, 152N**7****Inspection and adjustment****LF45/55 series****Adjusting swivel axle play, split thrust bearing**

1. Take the swivel axle off the axle end, see "Removal and installation".
2. Degrease and clean the thrust bearing.
3. Check the thrust bearing for wear and damage. If in doubt, replace the thrust bearing.
4. Check the machined surfaces of the axle end and the swivel axle for damage.
5. Take the dust seal (1) off the thrust washer (2).
6. Assemble the thrust bearing without greasing it and without the dust seal (1). Make sure that the cam on the underside of the bearing ring (3) falls into the recess of the shoulder ring (4). See arrows in the drawing.
7. Fit the swivel axle with its original shim to the axle end.
8. Fit the king pin. Hand-tighten the nut.
9. Place a jack under the swivel axle, so that the thrust bearing is pushed against the axle end.
10. Using a feeler gauge, measure the gap between the shim and the swivel axle. If necessary, insert a shim with a different thickness in order to achieve the specified axial play, see "Technical data".

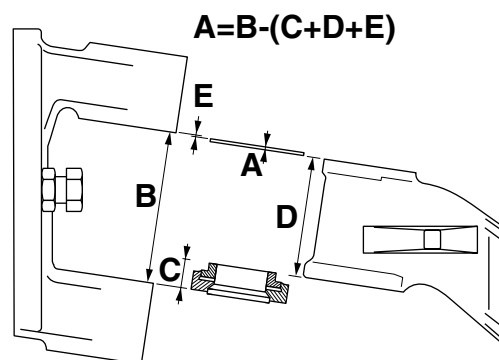


S7 00 114

Note:

The thickness of the shim can also be determined using the formula in the drawing.

- A = thickness of shim
 B = distance between the swivel axle contact surfaces
 C = total thickness of the thrust bearing without the dust seal
 D = axle end dimension
 E = play

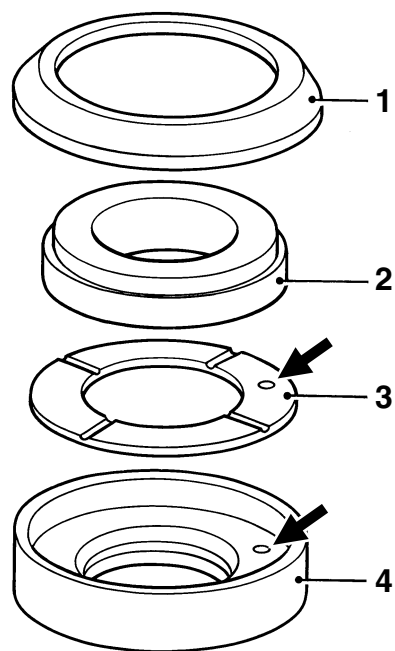


S7 00 815

11. Take the swivel axle off the axle end.
12. Dismantle the thrust bearing and grease the top (side with ribs and lubricating grooves) of the bearing ring (3).
13. Fit a new dust seal (1) to the thrust washer (2).
Make sure that the top of the dust seal is positioned under the top of the thrust washer.
14. Install the swivel axle with the correct shim on the axle end, see "Removal and installation".
15. Measure the play again.

Adjusting swivel axle play, compound thrust bearing

1. Take the swivel axle off the axle end, see "Removal and installation".
2. Check the thrust bearing for wear and damage. If in doubt, replace the thrust bearing.
3. Check the machined surfaces of the axle end and the swivel axle for damage.
4. Fit the swivel axle with its original shim to the axle end.
5. Fit the king pin. Hand-tighten the nut.
6. Place a jack under the swivel axle, so that the thrust bearing is pushed against the axle end.
7. Using a feeler gauge, measure the gap between the shim and the swivel axle. If necessary, insert a shim with a different thickness in order to achieve the specified axial play, see "Technical data".



S7 00 114

FRONT AXLE, 152N

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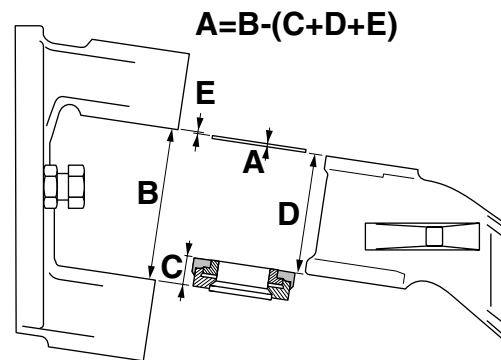
Inspection and adjustment

LF45/55 series

Note:

The thickness of the shim can also be determined using the formula in the drawing.

- A = thickness of shim
B = distance between the swivel axle contact surfaces
C = total thickness of the thrust bearing
D = axle end dimension
E = play



S7 00 577

8. Take the swivel axle off the axle end.
9. Install the swivel axle with the correct shim on the axle end, see "Removal and installation".
10. Check the play once again.

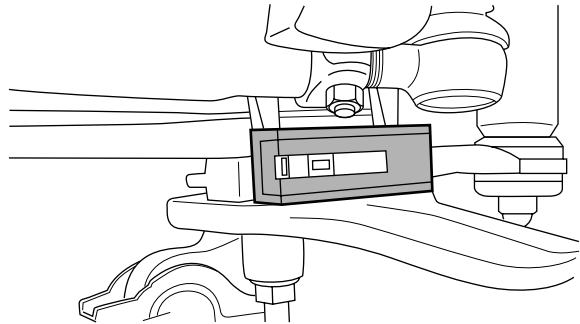
2.2 INSPECTION AND ADJUSTMENT OF CASTER

General

- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The caster can be measured using an angle gauge or wheel alignment equipment.

Checking caster using an angle gauge

1. Clean the spot where the angle gauge is to be placed on the spring seat.
2. Place the angle gauge on a chassis side member and check whether the chassis is parallel with the floor.
If not, the caster reading should be adjusted to the chassis position.
3. Place the angle gauge on the spring seat and measure the angle.
Compare the reading to the specified value, see "Technical data".
4. Carry out the caster measurement at the other end of the axle.
If different readings are obtained, check the front axle suspension for deviations.



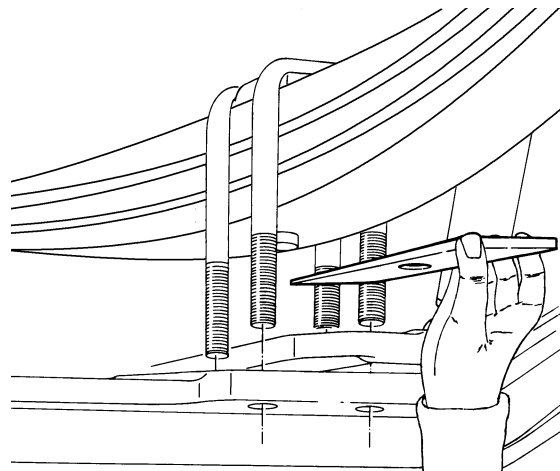
S7 00 560

Checking caster using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. Compare the reading to the specified value, see "Technical data".

Adjusting the caster

1. Fit a key of the required thickness between the spring seat and the spring. See "Technical data" for the available keys.
2. Repeat the measurement once the key has been inserted.



S7 00 146

2.3 INSPECTING CAMBER ANGLE AND KING-PIN INCLINATION

Note:

In the following measurement, only the camber angle is measured. If the camber angle is correct, the king-pin inclination will also be correct.

General

- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

Checking camber angle using an angle gauge

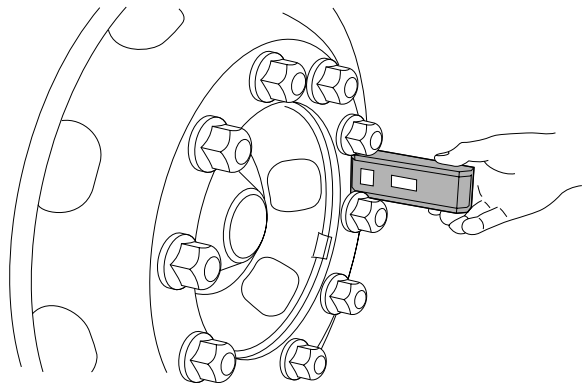
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See "Technical data" for the correct angle.

Checking camber angle using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of a type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. See "Technical data" for the correct angle.

If the angle is incorrect this may be caused by the following:

- excessive swivel axle bearing play
- bent front axle. In this case, the king-pin inclination will also be incorrect.



S7 00 566

2.4 INSPECTION AND ADJUSTMENT OF TOE

Checking toe

1. Measure the axle load of the axle to be checked.
2. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of a type that can be calibrated before every use.
Follow the instructions for the wheel alignment equipment carefully.
3. Ensure that the steering gear is free of tension. If possible, drive the vehicle straight ahead to the place where the measurements will take place. If this is not possible, drive forwards and backwards in this position with the steering gear in the "straight ahead" position. Do not brake excessively because of weight transmission to the front axle.
4. Measure the axle toe.
5. Using the graph for the relevant axle, check whether the toe is correct or must be corrected (see "Technical data").
The two examples below explain how to use the graphs in "Technical data".

Note:

If a large deviation is measured, the cause should be traced. The deviation could have been caused by a collision, during which components were bent. If so, the remaining steering gear components must be checked carefully.

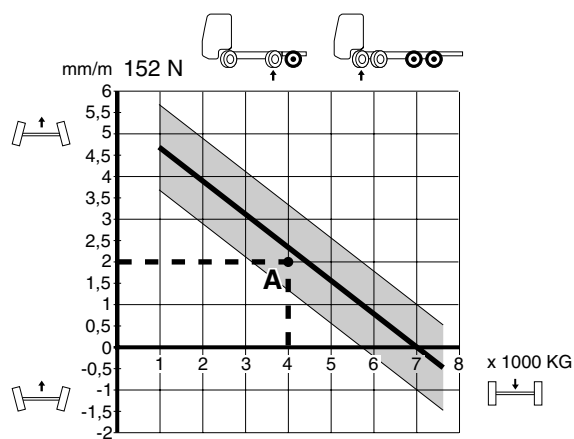
FRONT AXLE, 152N**7****Inspection and adjustment****LF45/55 series****Example 1**

Look at the graph for the 152N axle, used as a leading rear axle or first front axle in vehicles with two steered front axles.

The measured axle load is 4000 kg and the measured toe is 2 mm/m (toe-in).

The intersection of the lines (A) occurs in the shaded area. This shows that the toe is within the permitted tolerance.

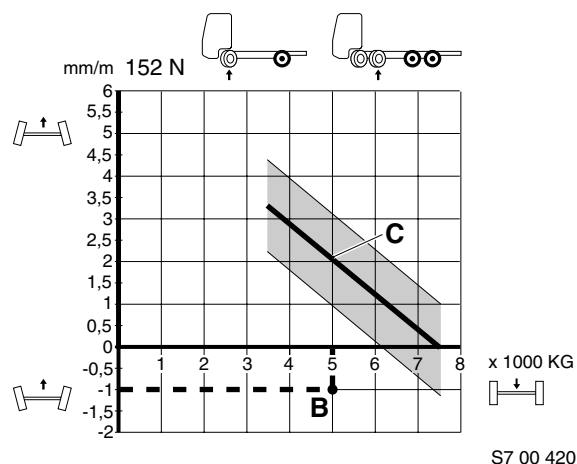
The toe does not need to be corrected.

**Example 2**

Look at the graph for the 152N axle, used as a single front axle or second front axle in vehicles with two steered front axles.

The measured axle load is 5000 kg and the measured toe is -1 mm/m (toe-out).

The intersection of the lines (B) occurs outside the shaded area. This shows that the toe is outside the permitted tolerance. The toe must now be adjusted so that once it has been corrected, the measured toe coincides with the intersecting line (C).



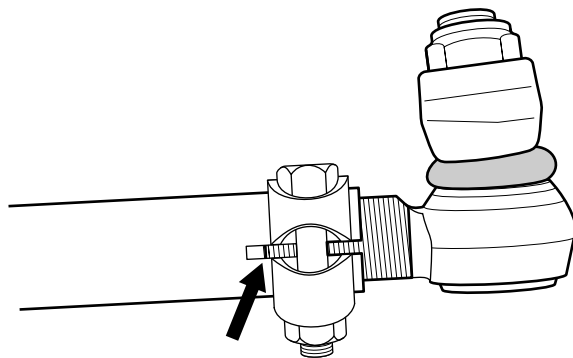
Adjusting toe

1. Slacken the bolts of the clamping brackets until the track rod can be rotated.
2. Set the correct length (see "Technical data") by lengthening or shortening the track rod.

Note:

Make sure that the threaded ends of the ball joints are not pushed too far off the track rod. The clamping bracket should always fully engage the ball-joint screw thread. See the drawing.

3. Clean and check the clamping-bracket bolts. If the bolt is corroded or damaged, it must be replaced. Replace the self-locking nut.
4. Tighten the clamping bracket bolts to the specified tightening torque, see "Technical data".
5. After this, check the toe once again.
6. Make sure that the clamping brackets do not come into contact with the axle housing at maximum wheel deflection. Turn the clamping brackets if necessary. The clamping bracket may have any position.



S7 00 539

2.5 INSPECTION AND ADJUSTMENT OF WHEEL DEFLECTION



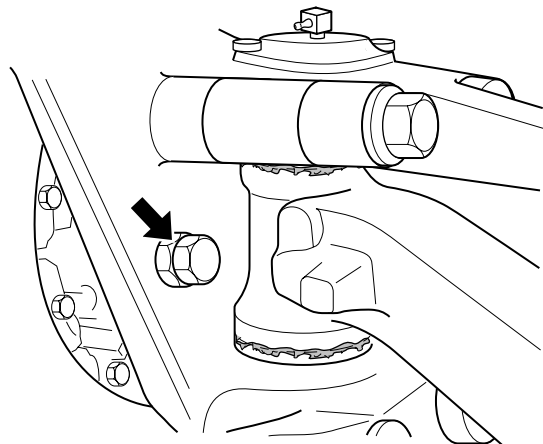
Work safely and block the vehicle so that it cannot slide off the turning plates.

Checking wheel deflection

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axles and place turning plates under the centre of the wheels.
Only use turning plates that permit wheel displacement caused by the wheel offset.
3. Place the wheels in the “straight ahead” position and lower them until they rest on the turning plates. Set the turning plates to zero.
4. Turn the steering wheel fully clockwise to the end stop and check the wheel deflection on the right, see “Technical data”.
5. Turn the steering wheel fully anticlockwise to the end stop and check the wheel deflection on the left, see “Technical data”.

Adjusting wheel deflection

1. The wheel deflection is adjusted by changing the length of the stop bolt on the swivel axle. After the adjustment, secure the bolt using the lock nut.
2. When the adjustments have been made, make sure that the tyre does not come into contact with other components.
3. If larger tyres, wheel rims or snow chains are fitted, first make sure that these do not come into contact with other components. Reduce the wheel deflection if necessary.
4. When the wheel deflection has been changed, readjust the steering box wheel-deflection limiting valves.



S7 00 584

2.6 INSPECTION AND ADJUSTMENT OF STEERING ROD



Work safely and block the vehicle so that it cannot slide off the turning plates.

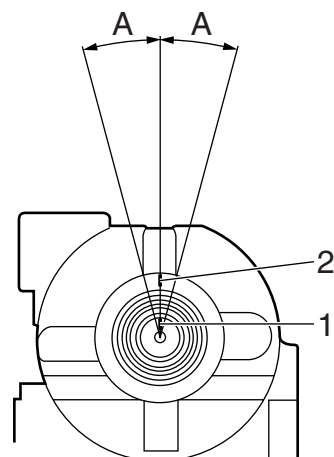
Checking adjustment of steering rod

1. Measure the axle load of the axle to be checked.
2. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
3. Jack up the steerable axle and place turning plates under the wheels.
Only use turning plates that permit wheel displacement caused by the wheel offset.
4. Place the wheels in the "straight ahead" position and lower them until they rest on the turning plates.
5. Take the steering shaft off the input shaft of the steering box.
6. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.



If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.

7. Measure the angle A between the mark on the input shaft (1) and the mark on the steering box (2).
8. Using the graph, check whether the measured angle is correct or must be corrected (see "Technical data").
The example below explains how to use the graph in "Technical data".



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FRONT AXLE, 152N

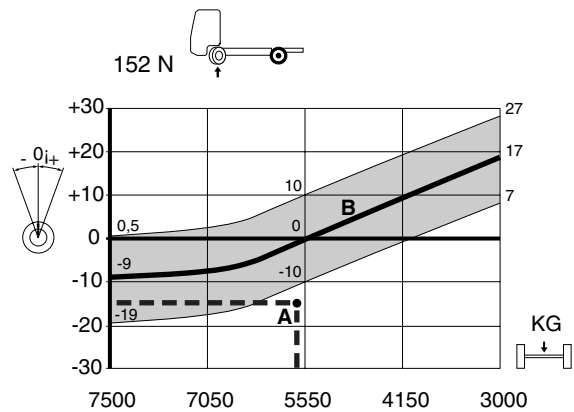
7

Inspection and adjustment

LF45/55 series

Example

The measured axle load is 5600 kg and the measured angle between the mark on the input shaft and the mark on the steering box is -15° . The intersection of the lines (A) is outside the shaded area. This shows that the angle is outside the permitted tolerance. The angle must now be adjusted so that once it has been corrected, the measured angle coincides with the intersecting line (B).



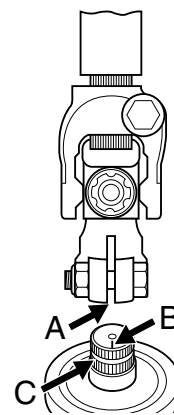
S7 00 877

9. Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



Check that the universal joint is correctly in place on the input shaft so that the attachment bolt can be fitted in the notch (C).

10. Fit a new, original attachment nut and bolt in the universal joint. Tighten the attachment bolt to the specified tightening torque, see "Technical data".



S7 00 594

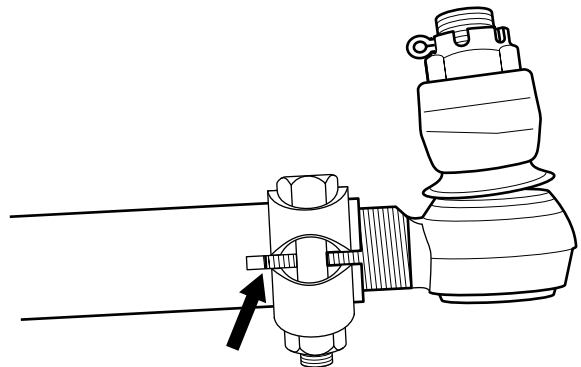
Adjusting steering rod

1. Place the wheel to which the steering rod is connected in the "straight ahead" position. This can be done using wheel alignment equipment or by measuring the distance from the wheel rim to the spring leaves at the front and rear of the wheel. The distances at the front and rear of the wheel must be equal.
2. Unscrew the clamping bracket bolt on the steering rod.
3. Take the steering rod off the steering-rod arm, see "Removal and installation".
4. Set the mark on the input shaft of the steering box and the mark on the steering box to the specified angle on the basis of the graph, see "Technical data".
5. Set the steering rod to the correct length by screwing the ball end in or out. Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).

Note:

If the length is not correct because the ball end can only be rotated one full turn, get as close as possible to the correct length. It is preferable that the steering rod is too long rather than too short.

6. Fit the steering rod in the steering-rod arm, see "Removal and installation".
7. Clean and check the clamping bracket bolt. If the bolt is corroded or damaged, it must be replaced. Replace the self-locking nut.
8. Tighten the clamping bracket attachment bolt to the specified tightening torque, see "Technical data".



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FRONT AXLE, 152N

7

Inspection and adjustment

LF45/55 series

9. Check the position of the steering wheel when it is in the "straight ahead" position. If necessary, correct the position by changing the position of the steering wheel on the steering shaft.

Note:

If the vehicle is unloaded or fully loaded, the steering wheel may not be in the central position.

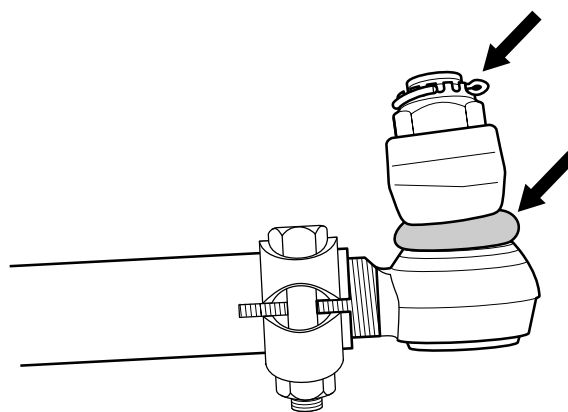


If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.

2.7 CHECKING STEERING BALL JOINT

Checking dust cover

1. Check that the dust cover of the steering ball joint and its seal is not damaged. Replace the steering ball joint if they are damaged.
2. If applicable, check for the presence of the split pin and its condition.



S7 00 540

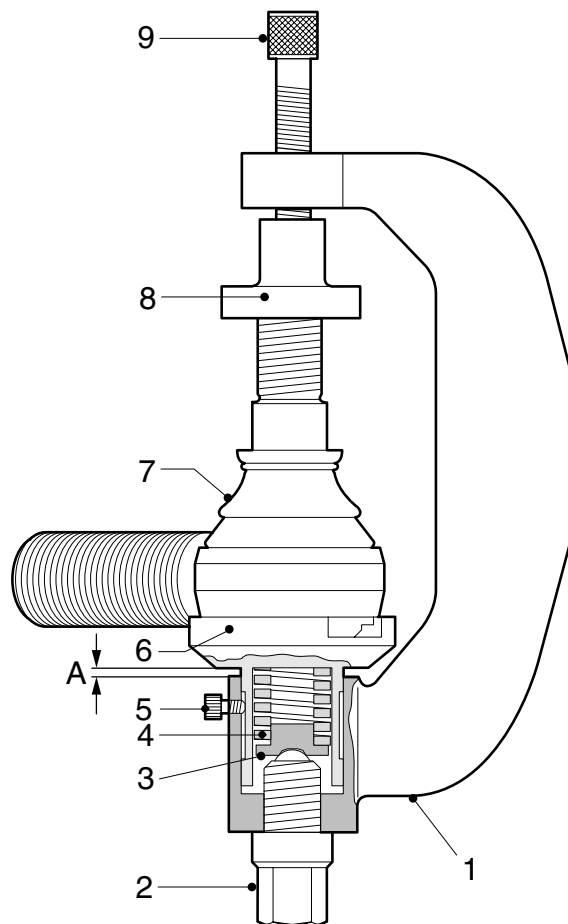
Checking axial steering ball joint play

1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.
4. Screw the thrust washer (8) onto the threaded spindle.
5. Fit the spring retainer (3), spring (4) and thrust sleeve (6) in the bracket (1). Fit the locking screw (5). It should be possible to move the thrust sleeve (6) freely.

Note:

Fit the correct thrust sleeve (6).
The thrust sleeve (6) must abut the rim of the steering ball joint (7).

6. Unscrew the thrust bolt (2) until the flange of the thrust sleeve (6) abuts the bracket (1) (A=0 mm).
7. Fit the special tool to the steering ball joint (7) and turn the threaded spindle (9) by hand until the special tool is tight around the steering ball joint (7).
8. Tighten the thrust bolt (2) until its head abuts the bracket (1).
9. Measure the play "A" between the thrust sleeve and the bracket using a feeler gauge.
Compare the measurement taken with the maximum permissible steering ball joint play, see "Technical data".
If necessary, replace the steering ball joint.



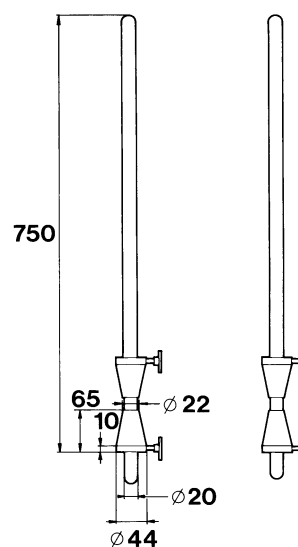
S700426

2.8 CHECKING FRONT AXLE HOUSING**General**

If the vehicle has been involved in a collision or if abnormal deviations are measured when the wheel alignment is checked, it is advisable to check the axle housing.

A number of the measurements below can also be carried out using alignment equipment. Consult the alignment equipment manual for this purpose.

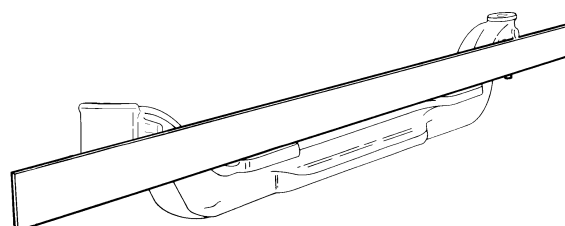
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

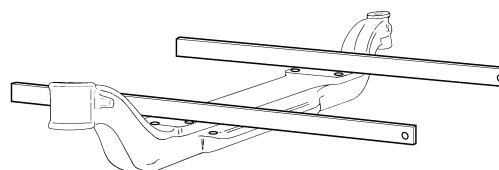
Checking front axle housing

1. Take the front axle off the vehicle and remove both swivel axles, see "Removal and installation".
2. Place a straight edge across the spring seats of the front axle housing and check whether they are aligned.



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3. Place a straight edge across both spring seats and check whether they are parallel with each other.



S7 00 152

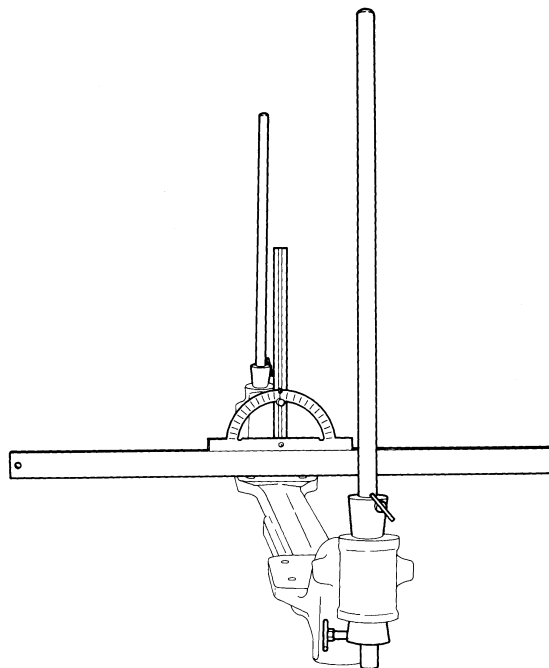
7

LF45/55 series

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Inspection and adjustment

4. Place the two gauge bars in the swivel axle holes.
Place a straight edge with a protractor on the spring seat. Measure the angle of the gauge bars relative to the spring seats. The angle measured should be 90° .

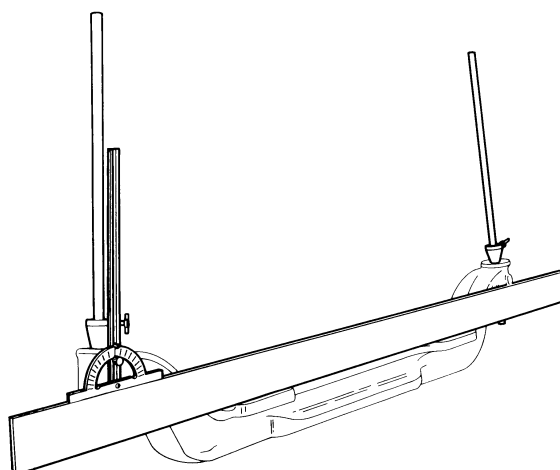


S7 00 149

5. Measure the king pin inclination (KPI) by placing a straight edge with a protractor on the spring seats.
By placing the straight edge of the protractor parallel to the gauge bar, the angle can be read. See "Technical data" for the correct angle.
6. If a deviation is found during one of the checks, the axle housing must be replaced.



Straightening of the front axle housing is not permitted. This could affect the strength of the materials.



S7 00 150

2.9 CHECKING WHEEL RIM

General

1. Check the wheel rims for the following:
 - deformation of the wheel rims and wheel disc.
 - deformation or cracking of the wheel stud holes.
 - corrosion, including on the tyre side of the rim and on the rim ring.
2. Cracked or damaged wheel rims or wheel rims with cracked or deformed wheel stud holes must be replaced.
Welding or repairing wheel rims in any way is prohibited. Welds will crack again in the course of time due to the dynamic load.



When taking a damaged wheel rim off the vehicle, deflate the tyre (remove the tyre valve), because of possible tensions in the wheel rim.

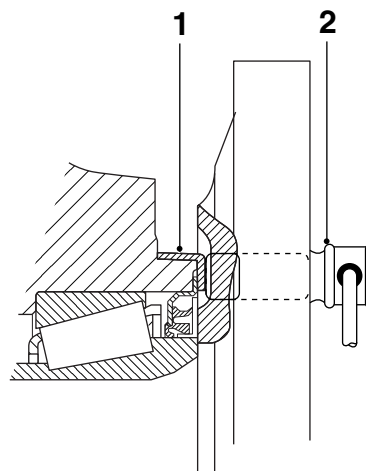
3. To prevent damage to the tyre due to corrosion and/or indirect tension cracks (due to notching), the anti-corrosion treatment of the wheel rim must not be damaged in any way.
For removal of corrosion and repairing the paint layer, see "Paint treatment".
Before re-spraying, remove the old layer of paint to prevent the paint layer from becoming too thick. The total layer of paint must not be more than 50 microns thick.



If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.

2.10 CHECKING WHEEL-SPEED SENSOR RING

1. Remove the wheel hub unit, see "Removal and installation".
2. Check the sensor ring (1) for dirt deposits. Special attention should be paid to deposits of dirt between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring (1) for damage. Even the smallest amount of damage could cause a failure. Replace the sensor ring if necessary.
4. If possible, check the sensor ring (1) for the maximum admissible axial end play, see "Technical data".
5. Check the sensor (2) for smooth operation. If necessary, clean the sensor and apply new grease.



S7 00 543



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

6. Fit the wheel hub unit, see "Removal and installation".
7. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.
8. Check the ABS system for correct operation.

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Inspection and adjustment

LF45/55 series

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION OF WHEEL



When removing a wheel with a cracked or damaged wheel rim, always deflate the tyre (remove the tyre valve) because of possible tensions in the wheel rim.

General

- Only use the original DAF wheel rims specified for the vehicle concerned.
- Make sure that tyres of the same type are fitted at both ends of the axle.
- Not cleaning the mating surfaces sufficiently and/or tightening the wheel nuts unevenly may cause vibrations during driving or braking.

Note:

If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

Removing disc wheel

1. Chock the wheels to prevent the vehicle moving.
2. Clean the screw thread of the wheel studs using a wire brush.
3. Oil the wheel studs sparingly.
4. Unscrew the wheel nuts.
5. Fit a jack as close as possible to the wheel to be replaced.
6. Jack up the vehicle and, if possible, place a support under the axle.
7. Remove the wheel nuts and take the wheel off the hub.

FRONT AXLE, 152N

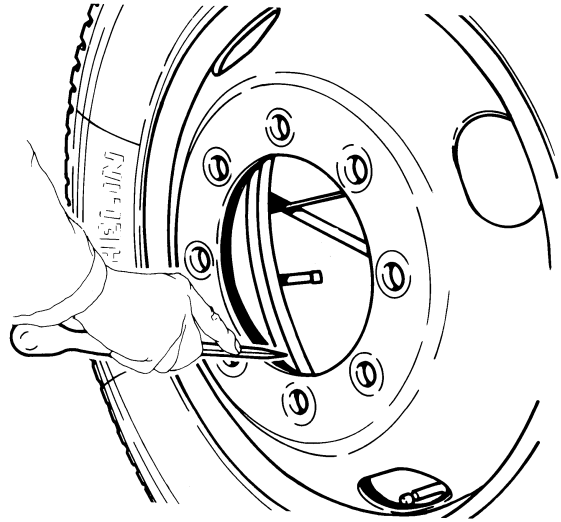
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Removal and installation

LF45/55 series

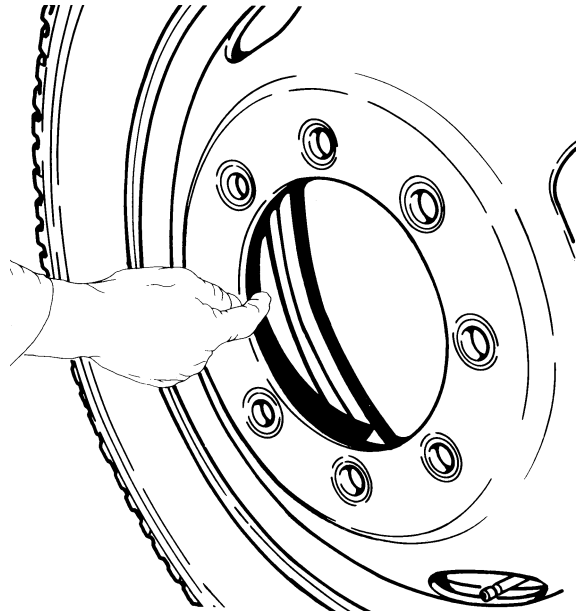
Installing disc wheel

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



S7 00 096

2. Apply a thin layer of grease to the fitting edge of the wheel hub.
3. Also apply a thin layer of grease to the fitting edge of the wheel rim. This layer of grease is to prevent the wheel rim and the wheel hub from becoming "rust-bound".
4. Check that the contact surfaces of the wheel rim and hub are clean. Clean these if necessary.



S7 00 097

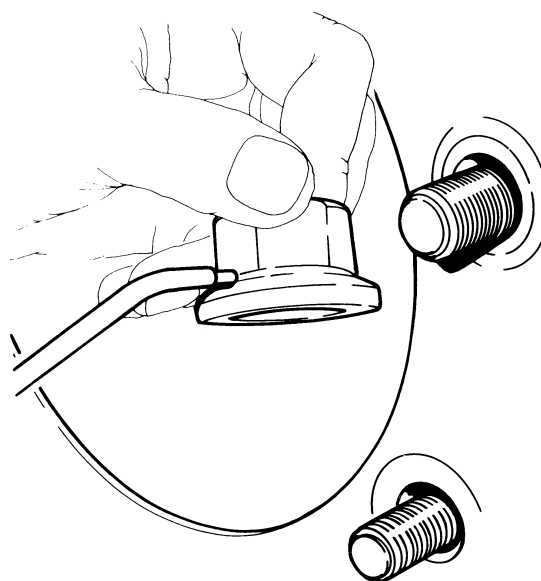
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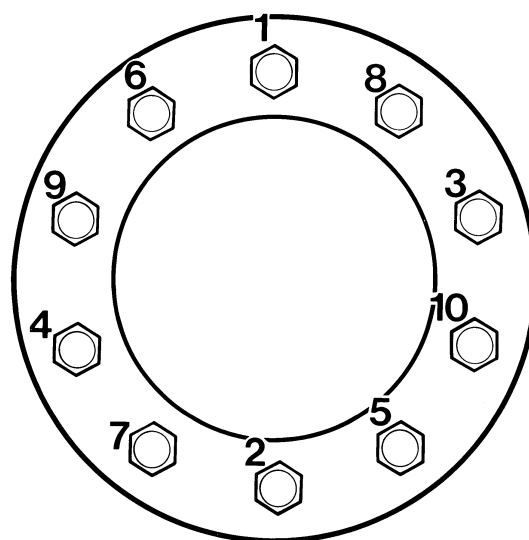
Removal and installation

5. Clean the wheel nuts and then apply a drop of oil between the thrust washer and the nut.
6. Also apply a drop of oil to the first turn of the wheel-stud threads.



S7 00 098

7. Fit the wheel nuts and tighten these evenly according to the sequence in the drawing. A pneumatic spanner may be used for this purpose, but its tightening torque is not very reliable. It will therefore be necessary to retighten the wheel nuts to the specified torque using a torque wrench. See "Technical data" for the specified torque.

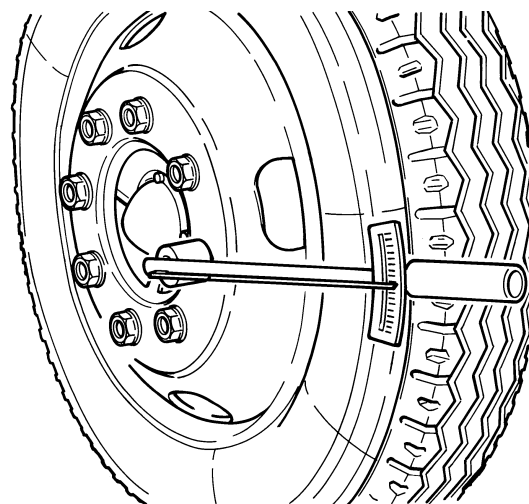


S7 00 095

Note:

Wheel nuts should always be tightened and retightened in cold condition. However, wheel studs should not be tightened in extremely cold conditions.

8. Check the tyre pressure.
9. Retorque the wheel nuts using a torque wrench after 100 km. If new wheel studs are fitted, they need additional retorquing after 500 km.



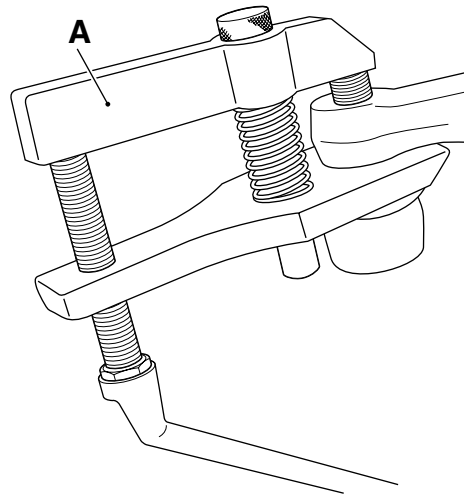
S7 00 099

3.2 REMOVAL AND INSTALLATION OF STEERING ROD**Removing steering rod**

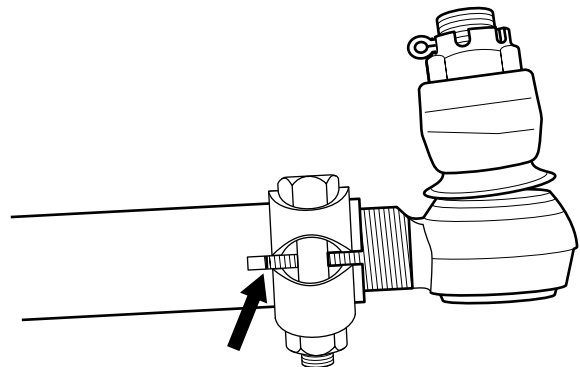
1. Remove the nuts at both ends of the steering rod.
2. Take the ball ends off the steering-rod arm and the pitman arm using a ball-end puller (A).

Installing steering rod

1. When installing a new steering rod, copy the settings of the steering rod to be replaced.
2. Clean the tapered contact surfaces of the steering rod balls, the steering rod arm and the pitman arm. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Install the steering rod.
4. Check the steering rod setting and adjust, if necessary. See "Inspection and adjustment".
5. Make sure that the threaded end of the ball joint is not pushed too far out of the steering rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).
6. Check whether the clamping bracket bolt is tightened to the specified tightening torque, see "Technical data".
7. Tighten the castle nuts to the specified torque, see "Technical data". If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.
8. Lock the castle nuts using new split pins.



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S7 00 026

3.3 REMOVAL AND INSTALLATION OF TRACK ROD

Removing track rod

1. Remove the wheel speed sensor and the connector bracket.

Note:

When the track rod is removed, the swivel axle may be at such an angle that the wheel speed sensor touches other components, which can damage the wheel speed sensor ring.

2. Remove the self-locking nuts. These nuts must not be reused.
3. Take the ball ends out of the track-rod arms using a ball-end puller (A).

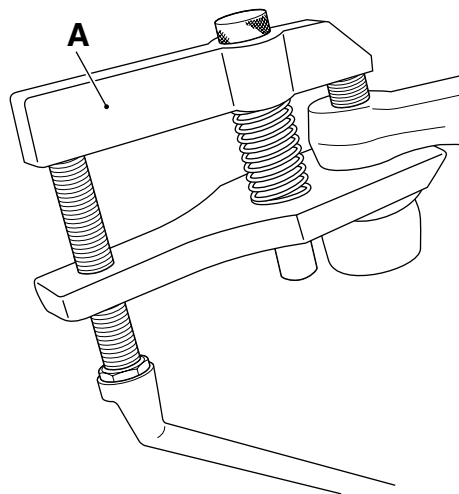
Installing track rod

1. Check the thread of the ball end for damage before fitting a new self-locking nut to the ball end. Screw a new non-self locking nut onto the ball end by hand to check it.

If the new non-self locking nut cannot be screwed down over the whole thread by hand, the ball end must be replaced.



If a new self-locking nut is onto a ball end with a damaged thread, this can give rise to dangerous situations.



S7 00 555

2. When installing a new track rod, copy the settings of the track rod to be replaced.
3. Clean the tapered contact surfaces of both the track rod balls and the track rod arms. The tapered surfaces must be absolutely free of dirt, grease and paint.
4. Fit the track rod.
5. Apply locking compound to the threaded ends of the track rod balls, see "Technical data".

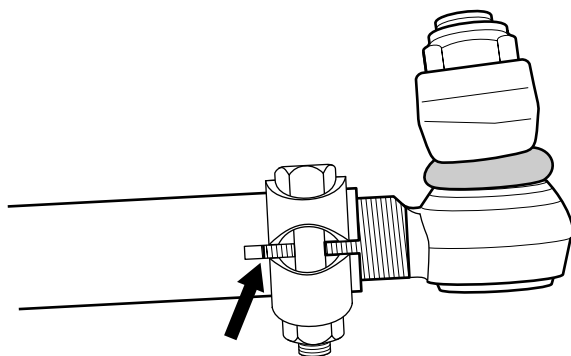
FRONT AXLE, 152N

7

Removal and installation

LF45/55 series

6. Fit the new attachment nuts and tighten them to the specified tightening torque, see "Technical data".
7. Check the axle toe-in and adjust, if necessary. See "Inspection and adjustment".
8. Check whether the threaded ends of the ball joints are fully engaged by the clamping pieces.
9. Check whether the clamping piece bolts are tightened to the specified tightening torque, see "Technical data".
10. Fit the wheel speed sensor and the connector bracket.



S7 00 539

3.4 REMOVAL AND INSTALLATION OF TRACK ARM AND STEERING ROD ARM



These instructions must be followed to the letter. The attachment of the track-rod arms and steering-rod arm is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts for the track-rod and steering-rod arms. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing track-rod arms and steering rod arms

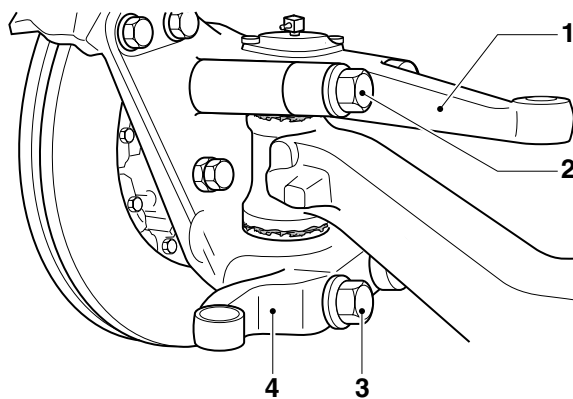
1. Take the track rod and steering rod off the track-rod arm and steering rod arm.

2. Remove the attachment bolts (2 and 3).

Note:

The attachment bolts must not be reused.

3. Take the track-rod arm (4) and the steering rod arm (1) off the swivel axle. A plastic mallet can need to be used to remove the steering rod arm, as locking agent has been applied between the arm and the swivel axle.



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FRONT AXLE, 152N

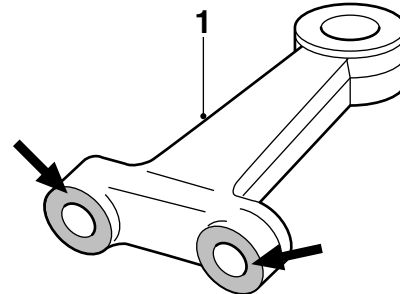
7

Removal and installation

LF45/55 series

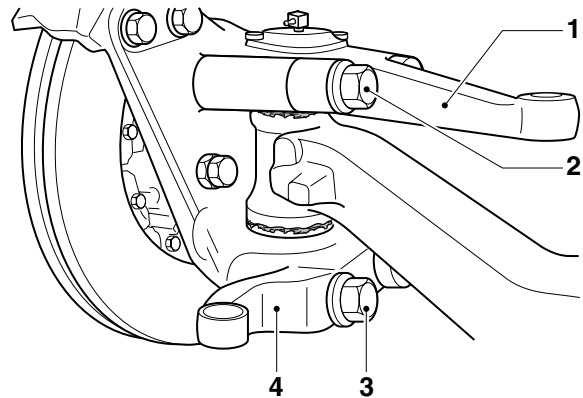
Installing track-rod arm and steering rod arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the arm.
3. Apply locking agent around the steering rod arm bolt holes, see "Technical data".



S7 00 583

4. Always use new attachment bolts when installing the track-rod arm (4) and the steering rod arm (1). Apply locking compound to the new attachment bolts, see "Technical data".
Evenly tighten the attachment bolts alternately. Tighten the attachment bolts to the specified tightening torque, see "Technical data".
5. Fit the track rod and the steering rod.

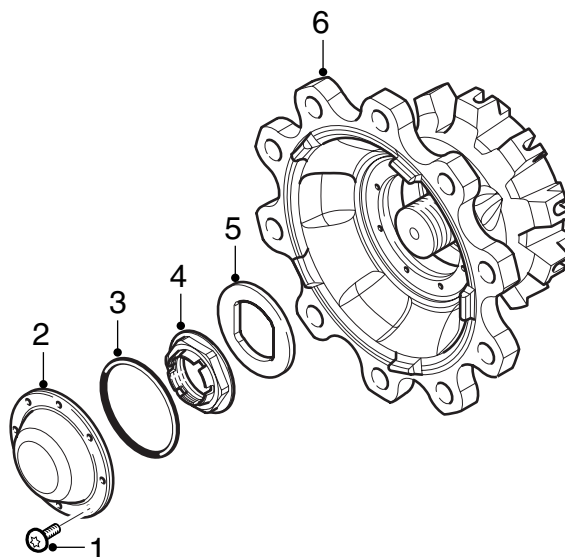


S7 00 582

3.5 REMOVAL AND INSTALLATION OF WHEEL HUB UNIT

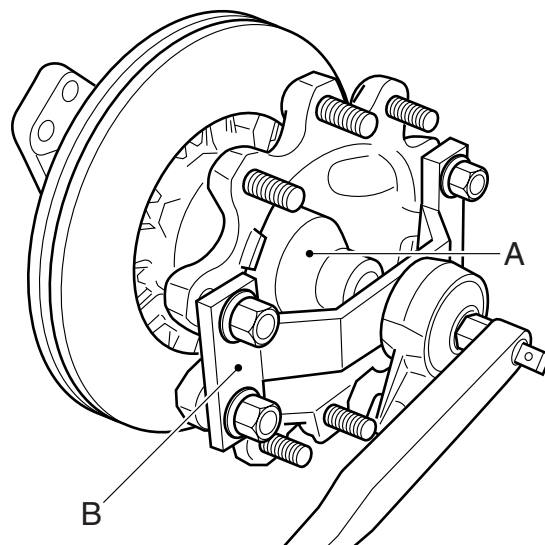
Removing wheel hub unit

1. Jack up the axle until the wheels are clear of the floor. Place suitable supports under the axle.
2. Remove the wheel.
3. Remove the brake calliper.
4. Remove the hub cover (2).



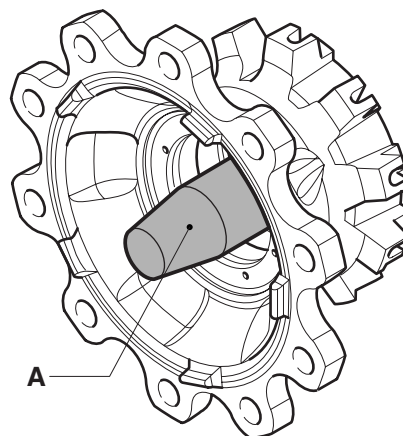
S7 00 581

5. Remove the hub nut (4) using the special tool set (DAF no. 1329496). Fit the socket wrench (A) to the hub nut. Fit the socket wrench guide (B) to the wheel hub unit using four wheel nuts. Loosen the nut using a torque amplifier.



S7 00 641

6. Remove the thrust washer (5).
7. Fit the guide sleeve (A), which is part of the special tool set (DAF no. 1329496), to the axle journal.
8. Remove the wheel hub unit (6) using a lifting device. Take care that the wheel hub unit does not rest on the guide bush (A) as it is not strong enough to take the weight of the wheel hub unit.



S7 00 580

FRONT AXLE, 152N

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Removal and installation

LF45/55 series

Installing wheel hub unit

1. Check the wheel speed sensor ring, see "Inspection and adjustment".
2. Check the axle journal thread carefully for damage.

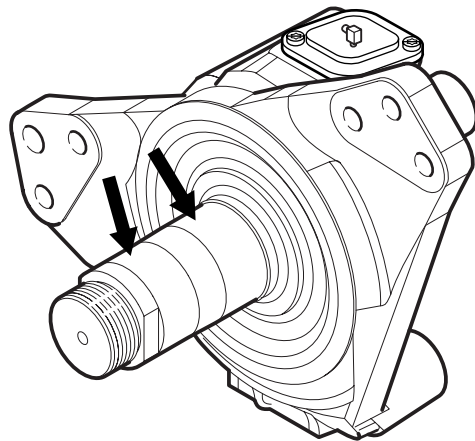


The wheel hub unit must never be fitted to an axle journal with a damaged thread.

3. Apply a thin, even layer of the prescribed anti-corrosion agent to the entire circumference of the axle journal, see "Technical data".

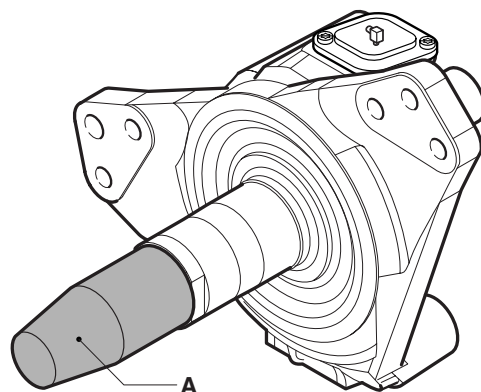
Note:

Do not apply too much anti-corrosion agent to the axle journal. When the wheel hub unit is installed, the excess anti-corrosion agent will collect at the rear of the wheel hub. When the vehicle is used in daily operation, this can leak out so that the seal wrongly appears to be leaking.



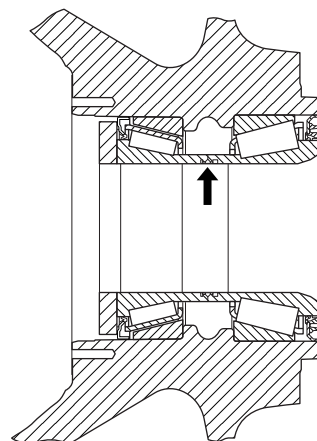
S7 00 547

4. Fit the guide sleeve (A), which is part of the special tool set (DAF no. 1329496), to the axle journal.



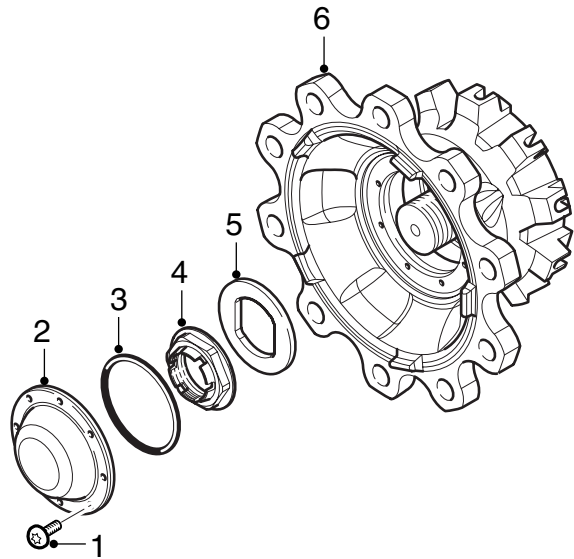
S7 00 561

5. Check that the spring clip, located between the inner bearing races, is positioned correctly.



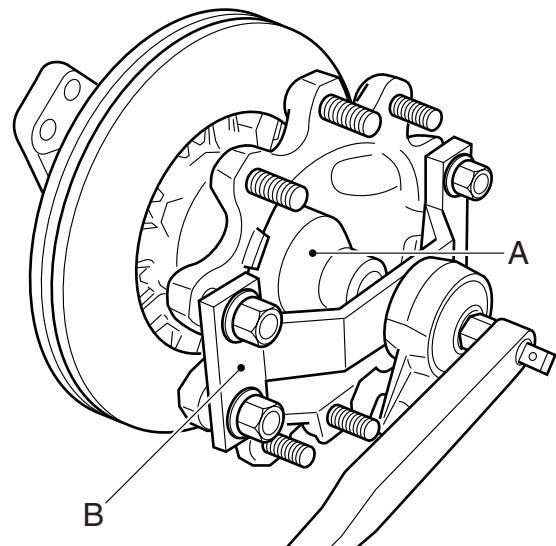
S7 00 747

6. Position the wheel hub unit (6) precisely in front of the axle journal using a lifting device. Slide the wheel hub unit (6) onto the axle journal, without twisting it. Take care that the wheel hub unit does not rest on the guide bush (A) as it is not strong enough to take the weight of the wheel hub unit.
7. Fit the thrust washer (5).
8. Replace the hub nut (4). Apply a few drops of oil to the abutting surface of the hub nut. Fit the hub nut.



S7 00 581

9. Fit the hub nut (4) using the special tool set (DAF no. 1329496). Fit the socket wrench (A) to the hub nut. Fit the socket wrench guide (B) to the wheel hub unit using four wheel nuts. Tighten the hub nut (4) in the specified manner using a torque amplifier, see "Technical data".
10. Fit a new O-ring (3) to the hub cover (2).
11. Fit the brake calliper.
12. Fit the wheel.



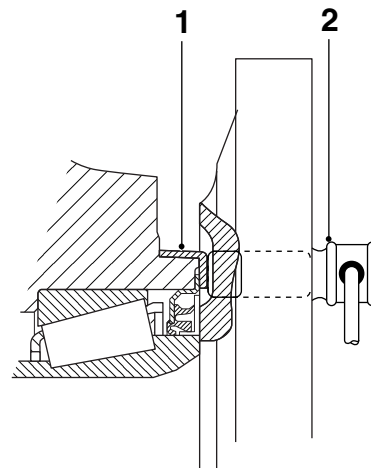
S7 00 641

13. Manually press the wheel speed sensor (2) against the sensor ring (1). The air gap between the sensor and the sensor ring is adjusted while the vehicle is being driven. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

14. Check the ABS system for correct operation.



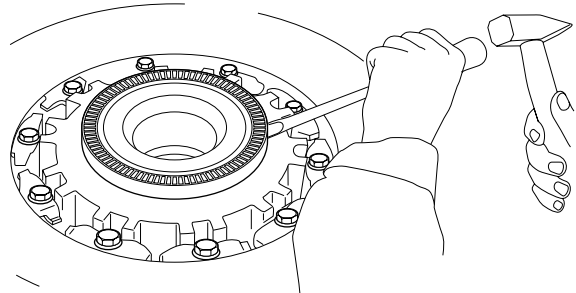
S7 00 543

3.6 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR RING**Removing wheel-speed sensor ring**

1. Remove the wheel speed sensor.
2. Take the wheel hub unit off the axle journal.
3. Make a notch in the side of the sensor ring, using a hammer and chisel. Make sure that the contact surface of the sensor ring to the wheel hub unit is not damaged in the process.
4. Take the sensor ring off the wheel hub unit.



Once removed, the sensor ring must not be reused.



S7 00 554

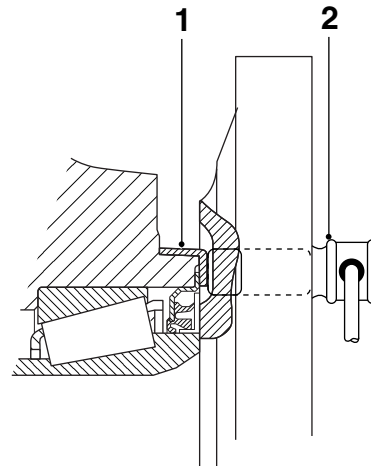
Installing wheel-speed sensor ring

1. Check the contact surface of the sensor ring to the wheel hub unit for damage.
2. Check the new sensor ring carefully for possible damage in transit.
3. Fit a new sensor ring to the wheel hub unit using a press and flat plate.
4. Check that the sensor ring makes good contact around the entire circumference.
5. Fit the wheel hub unit to the axle journal.
6. Manually press the wheel speed sensor (2) against the sensor ring (1). The air gap between the sensor and the sensor ring is adjusted while the vehicle is being driven. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

7. Check the ABS system for correct operation.



S7 00 543

3.7 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

Removing wheel-speed sensor

1. Remove the wheel-speed sensor (2).

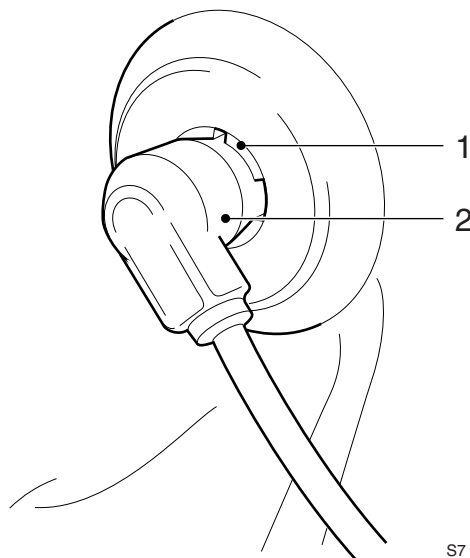
Installing wheel-speed sensor

1. Clean the wheel-speed sensor (2) and its holder (1). Replace the holder (1) if necessary.
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (2), see "Technical data".
3. Fit the wheel speed sensor (2). Manually press the wheel speed sensor (2) against the sensor ring (1). The air gap between the sensor and the sensor ring is adjusted automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

4. Check the ABS system for correct operation.



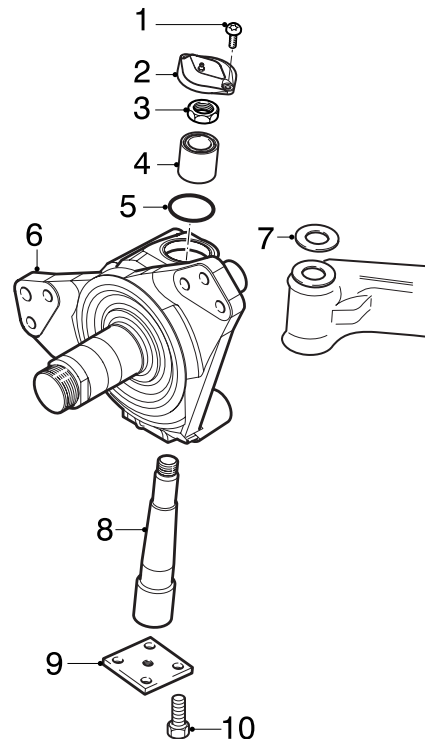
S7 00 796

FRONT AXLE, 152N**7**

Removal and installation

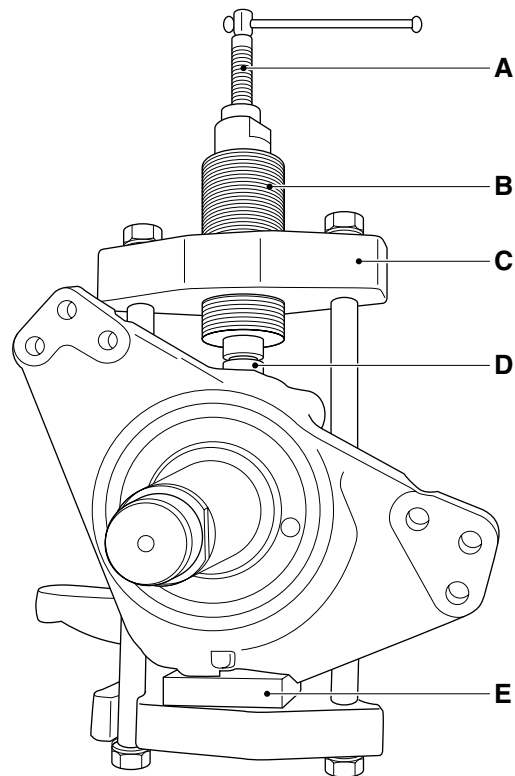
LF45/55 series**3.8 REMOVAL AND INSTALLATION OF SWIVEL AXLE****Removing swivel axle**

1. Remove the wheel hub unit.
2. Remove the track rod and, if applicable, the swivel axle steering rod.
3. Remove the cover (2).
4. Remove the sealing plate (9).
5. Remove the nut (3).



S7 00 538

6. Screw the hydraulic puller (B), special tool (DAF no. 0535891), into the king pin puller (C), special tool (DAF no. 0694767).
7. Fit the centring plate (E), special tool (DAF no. 0694823) to the bottom plate of the king pin puller.
8. Place the pivot (D), special tool (DAF no. 0694919) on the king pin.
9. Fit the king-pin puller to the swivel axle.
10. Align the king-pin puller at the top of the pivot (D). At the bottom, the centring pins of the centring plate (E) should fall into the swivel axle bolt holes.
11. Screw out the spindle (A) of the hydraulic puller (B) as far as possible.
12. Use a spanner to screw the hydraulic puller (B) into the king pin puller (C) as far as possible.



S7 00 552

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13. Screw the spindle (A) in until the king pin (8) is released. If the king pin (8) is not released when the spindle (A) has been fully screwed in, the spindle (A) should be completely unscrewed again and the hydraulic puller (B) screwed further into the king pin puller (C). Then screw in the spindle (A) again.

Note:

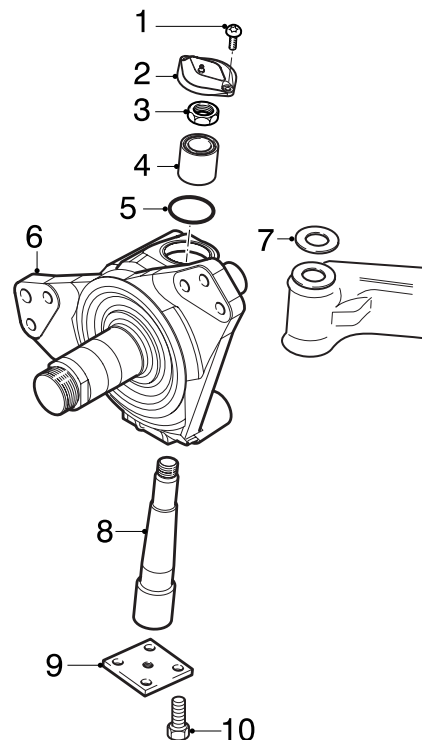
If the king pin (8) is not released, it can be "knocked out". Tap on the unused axle-end stop with a mallet.

14. Take the king pin (8) out of the swivel axle (6). Make sure that none of the needles fall out of the needle bearings.
15. Take the bearing bush (4) out of the swivel axle. Make sure that none of the needles fall out of the needle bearings.
16. Take the swivel axle (6) off the axle end. Ensure that the adjusting ring (7) is kept safely and does not get lost.

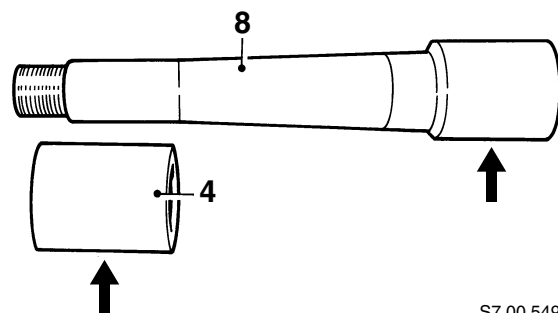
Installing swivel axle

After a collision or when the camber angle is incorrect, the swivel axle must be magnaflux tested. If in doubt, always replace the swivel axle.

1. Check the condition of the needle bearings.
2. Check the bearing surfaces of the king pin (8) and the bearing bush (4) for grooves (see the arrows). Small needle punctures can be removed using fine polishing paper. If in doubt, always replace the king pin (8) and the bearing bush (4).
3. Check the thrust bearing for wear.



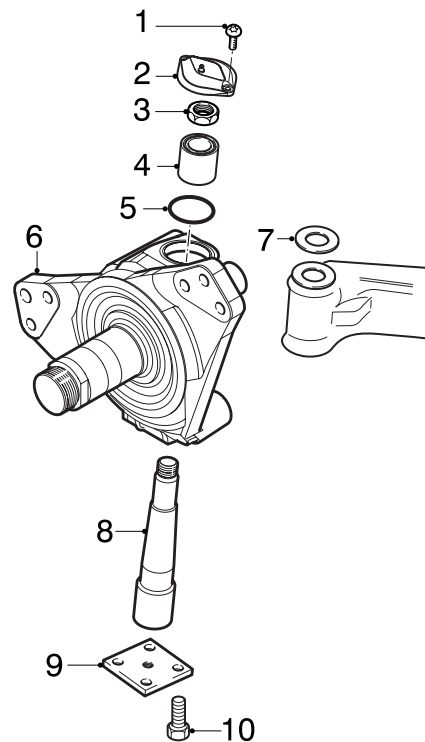
S7 00 538



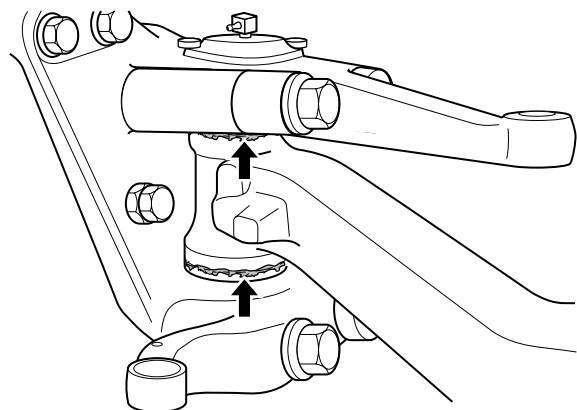
S7 00 549

FRONT AXLE, 152N**7****Removal and installation****LF45/55 series**

4. Check the adjusting ring (7) for damage. Replace the adjusting ring (7) if necessary.
5. Check the contact surfaces of the adjusting ring (7) to the swivel axle and the axle end for damage.
6. Fit the swivel axle (6) with an adjusting ring (7) of the same thickness as the original to the axle end.
7. Centre the adjusting ring (7) using a driver, ensuring that the needles are not pushed out of the bearings in the process.
8. Fit the bearing bush (4), with the tapered side pointing downwards, in the needle bearings.
9. Remove all grease on the tapered part of the king pin (8). Fit the king pin (8) in the swivel axle. Loosely tighten the nut (3).
10. Check the axial play of the swivel axle, see "Inspection and adjustment".
11. Remove the nut (3). Apply locking compound to the screw thread of the king pin (8), see "Technical data". Fit the nut (3) and tighten the nut (3) to the specified torque, see "Technical data".
12. Install the O-ring (5).
13. Fit the cover (2).
14. Apply sealant to the sealing plate (9). Fit the sealing plate.
15. Grease the swivel axle at the top and bottom.
Check whether the grease penetrates between the axle end and the swivel axle at the top. At the thrust bearing, the grease should be forced out along the entire circumference between the oil seal and the thrust bearing (see arrows in drawing).
16. Check that the swivel axle operates smoothly and is not getting stuck anywhere.
17. Fit the track rod and, if applicable, the steering rod.
18. Fit the wheel hub unit.



S7 00 538

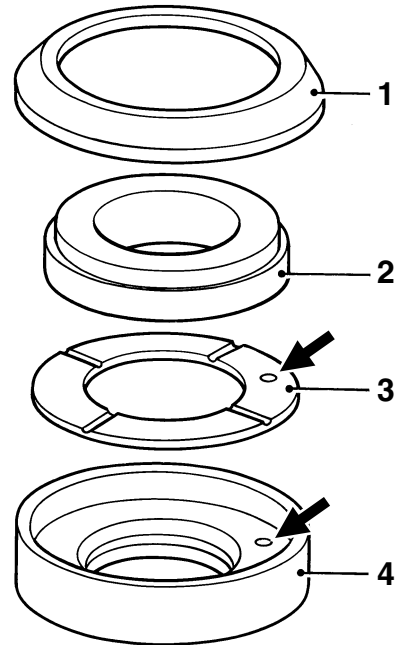
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S7 00 545

3.9 REMOVAL AND INSTALLATION OF SPLIT THRUST BEARING

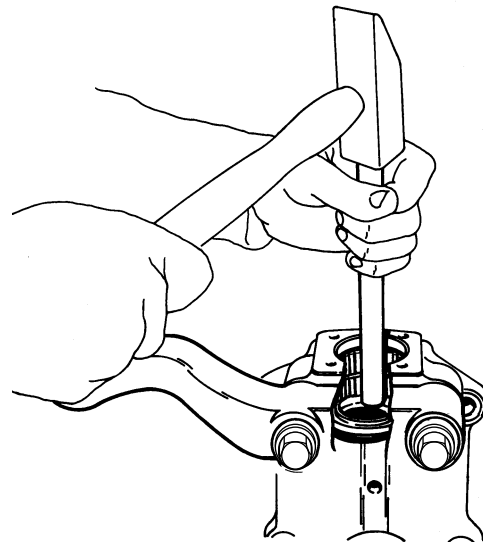
Removing split thrust bearing

1. Take the swivel axle off the axle end.
2. Take the thrust washer (2) with the clamped sealing ring (1) and the bearing ring (3) off the shoulder ring (4).



S7 00 114

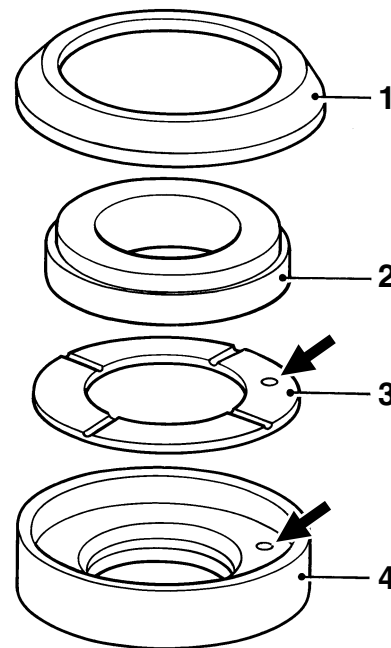
3. Tap the shoulder ring (4) out of the swivel axle using a driver. Make sure that none of the needles fall out of the needle bearings.



S7 00 551

Installing split thrust bearing

1. Fit the shoulder ring (4) in the swivel axle using a press or a plastic mallet. Make sure that none of the needles fall out of the needle bearings.
2. Check that the shoulder ring (4) makes contact with the swivel axle all the way round.
3. Fit the bearing ring (3) in the shoulder ring (4) without greasing it. Make sure that the bearing-ring cam falls into the hole in the shoulder ring.
4. Fit the thrust washer (2) without the sealing ring (1) to the bearing ring (3).
5. Install the swivel axle on the axle end and adjust the axial play using the correct shim, see "Inspection and adjustment".
6. After the correct shim (9) has been found, take the swivel axle off the axle end.
7. Dismantle the thrust bearing and apply plenty of grease to the top (side with ribs and lubricating grooves) of bearing ring (3).
8. Fit a new sealing ring (1) to the thrust washer (2). Make sure that the top of the sealing ring (1) is positioned under the top of the thrust washer (2).
9. Place the thrust washer (2) on the bearing ring (3).
10. Fit the swivel axle with the correct shim on the axle end.

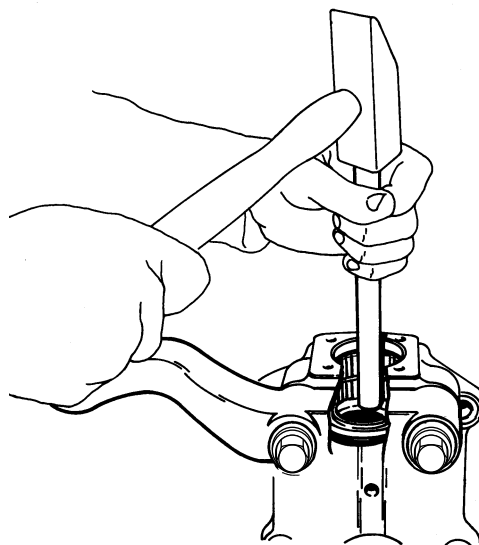


S7 00 114

3.10 REMOVAL AND INSTALLATION OF COMPOUND THRUST BEARING

Removing compound thrust bearing

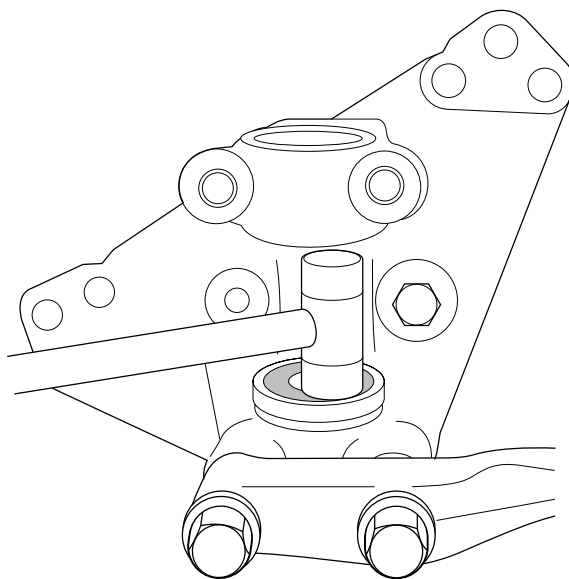
1. Take the swivel axle off the axle end.
2. Tap the entire thrust bearing out of the swivel axle using a driver. Make sure that none of the needles fall out of the needle bearings.



S7 00 551

Installing compound thrust bearing

1. Fit the thrust bearing in the swivel axle using a press or a plastic mallet. Make sure that none of the needles fall out of the needle bearings.
2. Check that the thrust bearing makes contact with the swivel axle all the way round.
3. Fit the swivel axle to the axle end.



S7 00 553

3.11 REMOVAL AND INSTALLATION OF NEEDLE BEARINGS**Removing needle bearings**

1. Take the swivel axle off the axle end.
2. Remove the thrust bearing.
3. Use the needle-bearing puller, special tool (DAF no. 0694827), to remove the needle bearings.
4. Insert the bush (C) in the needle bearings (1).
5. Place the sleeve (B) on the swivel-axle ear.
6. Fit the threaded end (A) in the sleeve (B) and through the bush (C).
7. Screw the thrust piece (D) onto the threaded spindle, until it abuts the bush (C).
8. Pull the needle bearings from the outside to the inside of the swivel axle (see arrows in the drawing). When the needle bearings (1) are taken out of the swivel axle, the oil seal (2) will also be removed.
9. The bottom needle bearings (3) are taken out of the swivel axle in the same way (from the outside to the inside).

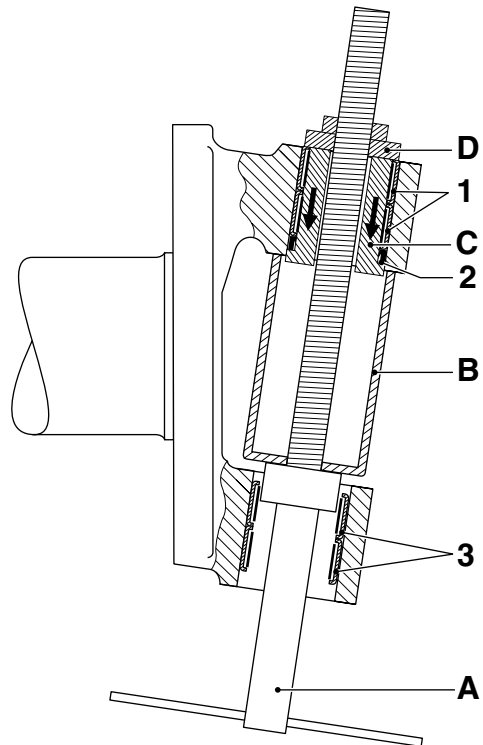
Installing needle bearings

1. To prevent the needle bearings from becoming damaged when they are inserted, use the special tool (DAF no. 0694827).

Note:

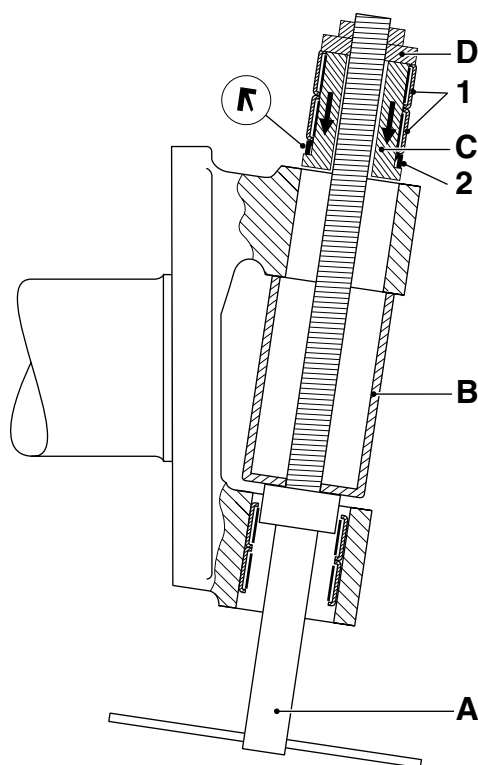
The needle bearings have different lengths. The longest needle bearings must be fitted in the bottom part of the swivel axle.

2. Apply plenty of grease to the needle bearings.



S7 00 550

3. To fit the needle bearings in the top of the swivel axle, proceed as follows:
Fit the oil seal (2) to the bush (C) with the open side pointing towards the bush collar.
Fit both needle bearings (1) to the bush (C).
4. Assemble the special tool (DAF no. 0694827). Press the needle bearings into the swivel axle from the outside to the inside, because of the bevelled sides of the swivel axle.



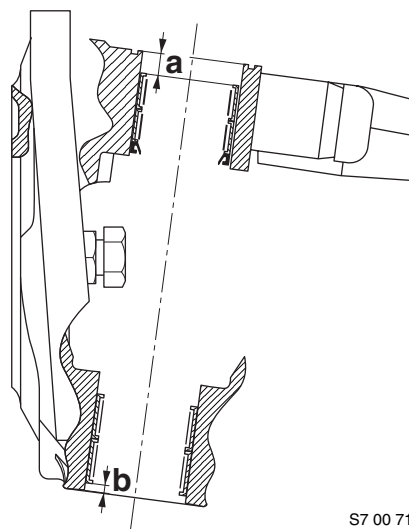
S7 00 548

5. Press the needle bearings into the swivel axle to the specified depth (a), see "Technical data".

Note:

The marked lines on the thrust piece (D) are not applicable.

6. The bottom needle bearings are fitted to the swivel axle in the same way (from the outside to the inside).
7. Press the needle bearings into the swivel axle to the specified depth (b), see "Technical data".
8. Fit the thrust bearing.
9. Fit the swivel axle to the axle end.



S7 00 710

FRONT AXLE, 152N

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Removal and installation

LF45/55 series

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STEERED TRAILING SWIVEL AXLE

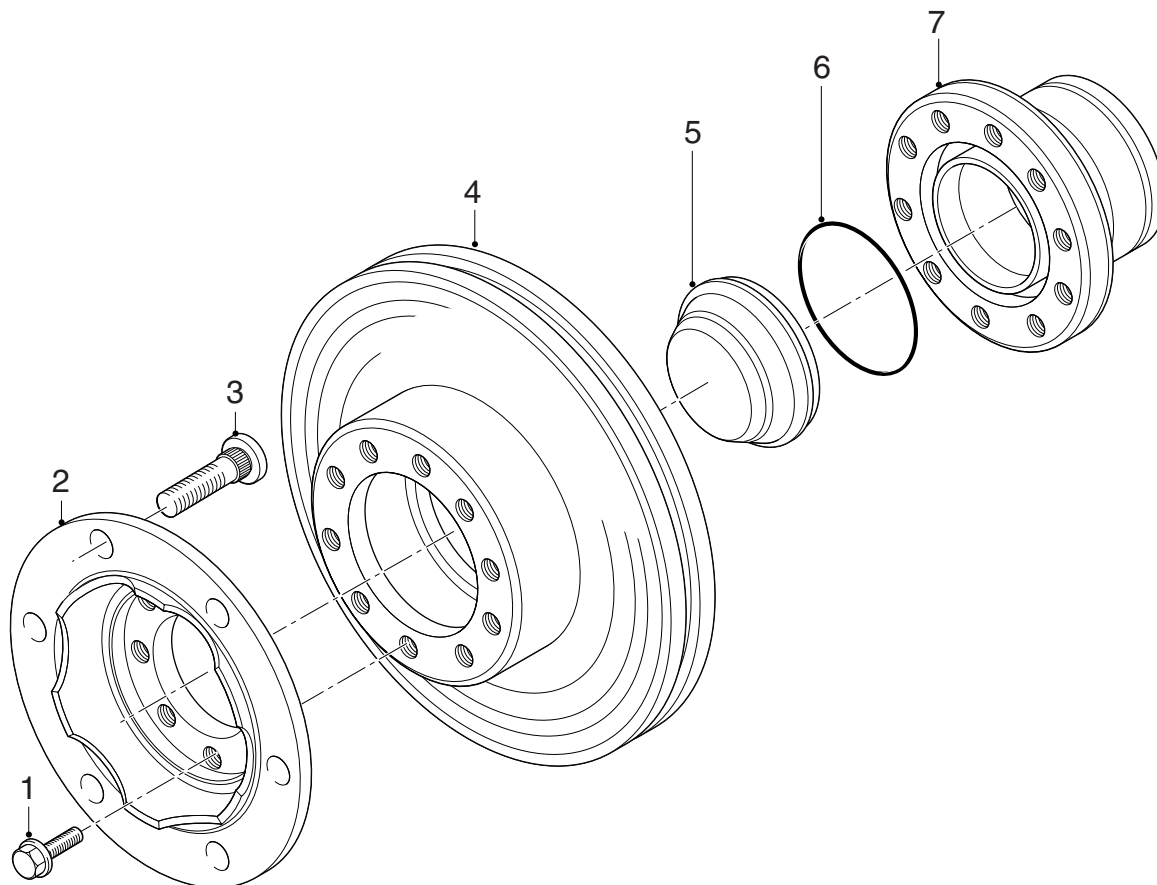
7

Contents

LF45/55 series

1. GENERAL

1.1 OVERVIEW DRAWING OF WHEEL HUB UNIT



C9 00 354

1. Attachment bolt
2. Wheel hub
3. Wheel stud
4. Brake disc
5. Hub cap
6. O-ring
7. Compact bearing housing

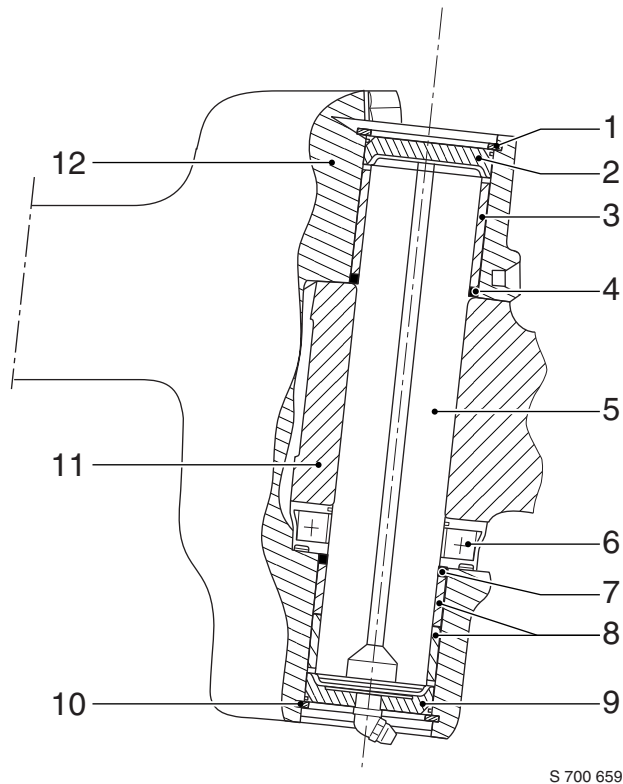
STEERED TRAILING SWIVEL AXLE

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General

LF45/55 series

1.2 OVERVIEW DRAWING OF SWIVEL AXLE



S 700 659

1. Circlip
2. Cover
3. Bearing bush
4. Oil seal
5. King pin
6. Thrust bearing
7. Oil seal
8. Needle bearing
9. Cover
10. Circlip
11. Axle end
12. Swivel axle

1.3 DESCRIPTION OF WHEEL HUB UNIT

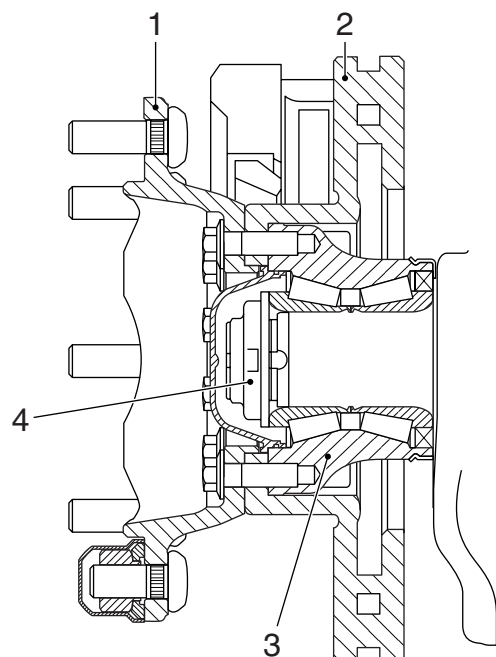
Wheel hub unit

The wheel hub (1), the brake disc (2) and the compact bearing housing (3) together make up the wheel hub unit. Separate components are used, therefore individual parts may be replaced.

The hub nut (4) is secured by tapping the locking ring into the groove of the axle journal.

The bearings in the compact bearing housing are greased and are maintenance-free.

The correct wheel bearing pre-load is achieved by fitting the hub nut as specified. The bearings and/or oil seal cannot be replaced. The whole compact bearing housing assembly must be replaced.



S7 00 703

STEERED TRAILING SWIVEL AXLE

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General

LF45/55 series

1.4 DESCRIPTION OF THE WHEEL SETTINGS

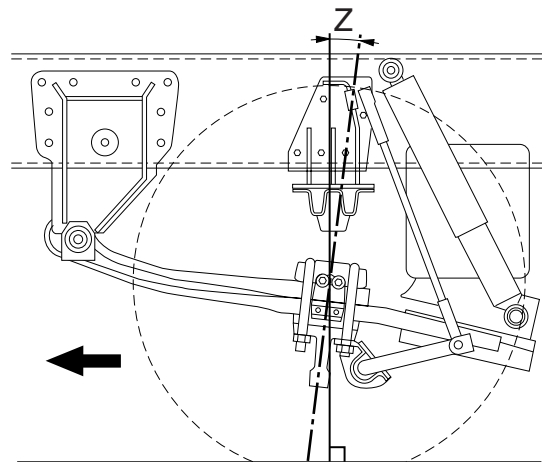
Caster

The caster (Z) is the angle of the axle housing relative to the road surface. The caster is important for the directional stability of the vehicle. Too little caster will lead to the vehicle "searching", while too much caster will result in "heavy" steering.

If the caster is set incorrectly this will not cause tyre wear.

The caster is determined by the relationship between the road surface and the chassis, assuming that the chassis is parallel to the road surface.

The caster can be checked very easily and this does not require any complicated equipment.



S7 00 835

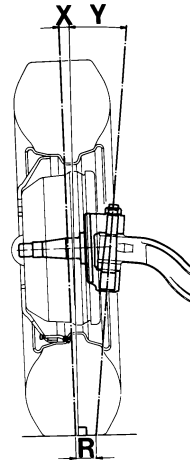
Camber angle and king-pin inclination

The camber angle (X) and the king-pin inclination (Y) are determined by the design of the swivel axle and the axle housing. Neither setting can be adjusted.

Incorrect wheel alignment is caused exclusively by collisions and/or a bent axle housing due to overloading.

If one of the wheels is out of alignment on a vehicle, the load of the tyre will be unevenly distributed across the road surface. This will result in irregular tyre wear.

Each wheel must be checked separately.



S7 00 129

Toe

Toe is the difference between distances A and B.

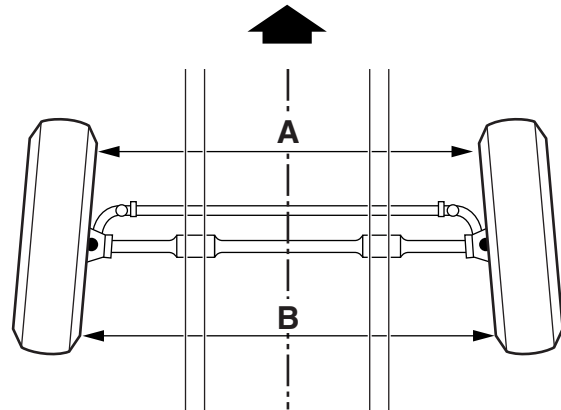
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

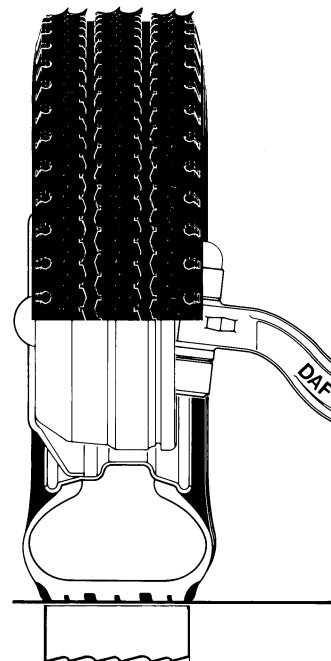
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.

If the toe-in or toe-out is incorrect will cause "chafing" of the tyres on the road surface. This will result in irregular tyre wear.

The same irregular tyre wear occurs on vehicles with multiple steerable axles if the wheels are "misaligned" while the vehicle is driving straight ahead.



S7 00 833



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STEERED TRAILING SWIVEL AXLE

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General

LF45/55 series

2. INSPECTION AND ADJUSTMENT

2.1 CHECKING THE CASTER

General

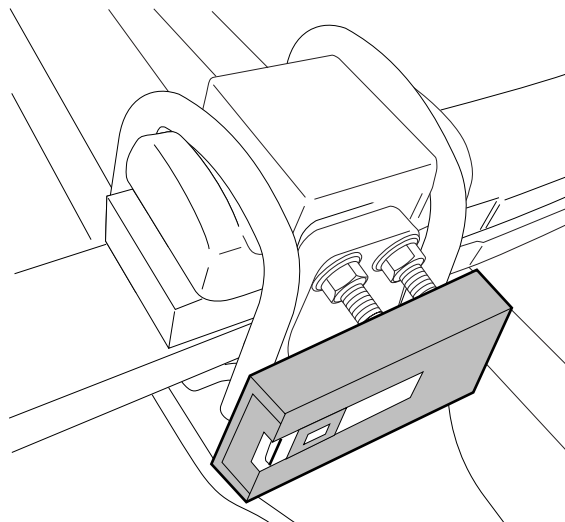
- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The caster can be measured using an angle gauge or wheel alignment equipment.

Checking caster using an angle gauge

1. Clean the spot where the angle gauge is to be placed on the spring seat.
2. Place the angle gauge on a chassis side member and check whether the chassis is parallel with the floor.
If not, the caster reading should be adjusted to the chassis position.
3. Place the angle gauge on the spring seat and measure the angle.
Compare the reading to the specified value, see "Technical data".
4. Carry out the caster measurement at the other end of the axle.
If different readings are obtained, the axle suspension should also be inspected for deviations.

Checking caster using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. Compare the reading to the specified value, see "Technical data".



S7 00 885

STEERED TRAILING SWIVEL AXLE

7

Inspection and adjustment

LF45/55 series

2.2 CHECKING CAMBER ANGLE

General

- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

Checking camber angle using an angle gauge

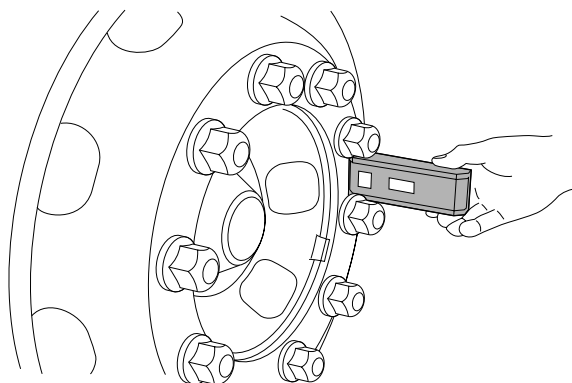
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See "Technical data" for the correct angle.

Checking camber angle using wheel alignment equipment

1. Use high quality wheel alignment equipment for the inspection. The equipment must be calibrated regularly and preferably be of a type that can be calibrated before every use.
2. Follow the instructions for the wheel alignment equipment carefully. See "Technical data" for the correct angle.

If the angle is incorrect this may be caused by the following:

- excessive swivel axle bearing play
- bent trailing axle.



S7 00 566

2.3 INSPECTION AND ADJUSTMENT OF TOE

Checking toe

1. Use a high quality tracking gauge or high quality wheel alignment equipment for the inspection. The gauge/equipment must be calibrated regularly and preferably be of the type that can be calibrated before every use. Follow the instructions for the wheel alignment equipment carefully.
2. Ensure that the steering gear is free of tension. If possible, drive the vehicle straight ahead to the place where the measurements will take place. If this is not possible, drive forwards and backwards at the place where the measurement will be taken with the steering gear in the "straight ahead" position.
3. Check the toe with the vehicle unladen.
4. Measure the toe of the trailing axle. Compare the reading to the specified value, see "Technical data".

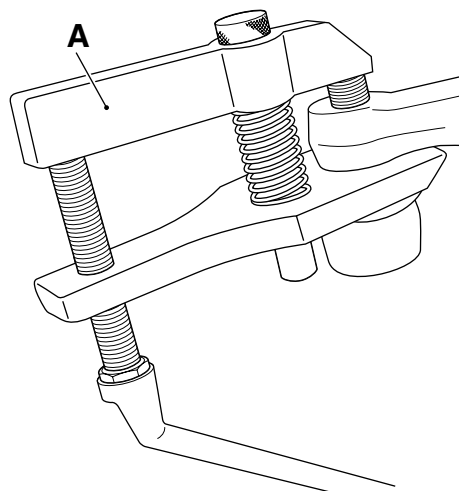
Note:

If a large difference is measured, the cause must be traced. The deviation could have been caused by excessive wear or by a collision, during which components were bent.

If so, the other steering gear components should be inspected carefully.

Adjusting toe

1. Remove the split pin and the castle nut.
2. Take the ball end out of the track-rod arm using a ball-end puller (A).
3. Loosen the clamping bracket bolt until the ball joint can be rotated.
4. Set the correct toe (see "Technical data") by turning the ball joint in or out.



S7 00 555

STEERED TRAILING SWIVEL AXLE

7

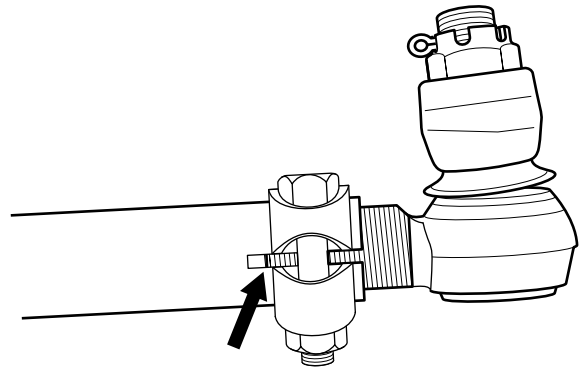
Inspection and adjustment

LF45/55 series

Note:

Make sure that the threaded end of the ball joint is not pushed too far out of the track rod. The clamping bracket must always fully engage the screw thread of the ball joint (see drawing).

5. Clean and check the clamping bracket bolt. If the bolt is corroded or damaged, it must be replaced.
6. Replace the self-locking nut.
7. Tighten the clamping bracket bolt to the specified tightening torque, see "Technical data".
8. Clean the tapered contact surfaces of both the track-rod ball joint and the track-rod arm. The tapered surfaces must be absolutely free of dirt, grease and paint.
9. Fit the ball joint.
10. Fit the castle nut and tighten to the specified torque, see "Technical data". If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.
11. After this, check the toe once again.



S7 00 026

2.4 INSPECTION AND ADJUSTMENT OF WHEEL DEFLECTION



Work safely and block the vehicle so that it cannot slide off the turning plates.

Checking wheel deflection

1. Engage the vehicle parking brake and place chocks in front of and behind the rear wheels.
2. Jack up the steerable axles and place turning plates under the centre of the wheels.
Only use turning plates that permit wheel displacement caused by the wheel offset.

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STEERED TRAILING SWIVEL AXLE

LF45/55 series

Inspection and adjustment

3. Place the wheels in the "straight ahead" position and lower them until they rest on the turning plates. Set the turning plates to zero.
4. Remove the steering cylinder on the swivel axle side, see "Removal and installation".
5. Turn the trailing axle manually so that the vehicle steers to the left. Check the left wheel deflection, see "Technical data".
6. Turn the trailing axle manually so that the vehicle steers to the right. Check the right wheel deflection, see "Technical data".

Adjusting wheel deflection

1. The wheel deflection is adjusted by changing the length of the stop bolts on the swivel axle.
2. Manually turn the trailing axle so that the vehicle steers to the left and until the wheel deflection on the left side matches the prescribed wheel deflection, see "Technical data".
3. Adjust the length of the stop bolt on the swivel axle on left side.
4. Manually turn the trailing axle so that the vehicle steers to the right and until the wheel deflection on the right side matches the prescribed wheel deflection, see "Technical data".
5. Adjust the length of the stop bolt on the swivel axle on right side.
6. Fit the steering cylinder, see "Removal and installation".

STEERED TRAILING SWIVEL AXLE

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Inspection and adjustment

LF45/55 series

2.5 INSPECTION AND ADJUSTMENT OF STEERING CYLINDER

Checking steering cylinder

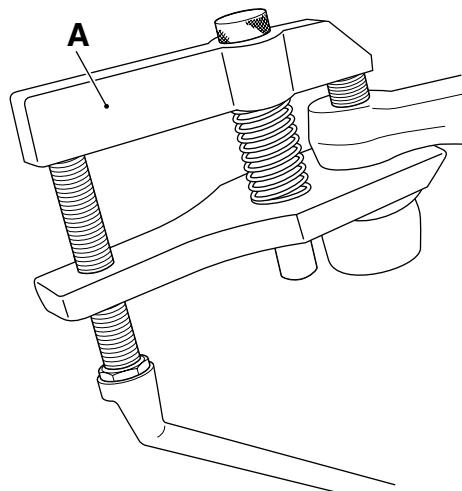
1. Check the steering cylinder for traces of external leaks.
2. Check the piston rod for damage.
3. Position turntables under the wheels of the front axle and trailing axle.
4. Fit alignment equipment.
5. Check the toe. If necessary, adjust the toe.
6. Check the wheel turning angle. If necessary, adjust the wheel turning angle.
7. Check the trailing axle angle sensor.
8. Set the trailing axle precisely in the "straight ahead" position.
9. Check whether the actual length of the steering cylinder matches the prescribed length of the steering cylinder, see "Technical data".

Note:

If the actual length of the steering cylinder does not match the prescribed length, the wheel positions of the trailing axle must be checked and, if necessary, corrected.

Adjusting steering cylinder

1. Set the trailing axle precisely in the "straight ahead" position.
2. Take the castle nuts off the steering cylinder.
3. Take the ball ends out of the steering cylinder arm and lower spring seat using a ball-end puller (A).



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STEERED TRAILING SWIVEL AXLE

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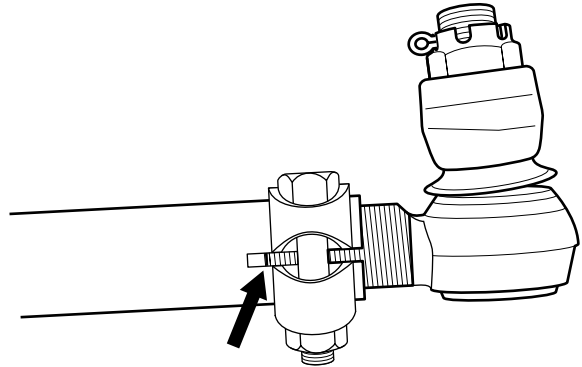
Inspection and adjustment

4. Undo the clamping bracket bolts and adjust the steering cylinder to the prescribed length, see "Technical data".

Note:

Make sure that the threaded ends of the ball ends are not screwed too far out of the steering cylinder. The clamping bracket must always fully engage the ball-joint screw thread, see drawing.

5. Clean and check the clamping-bracket bolts. If the bolt is corroded or damaged, it must be replaced. Replace the self-locking nut.
6. Tighten the clamping bracket bolts to the specified tightening torque, see "Technical data".
7. Fit the ball ends to the steering cylinder arms. Tighten the castle nuts to the specified tightening torque, see "Technical data".
8. Lock the castle nuts using new split pins.
9. Check the operation of the RAS-EC system.

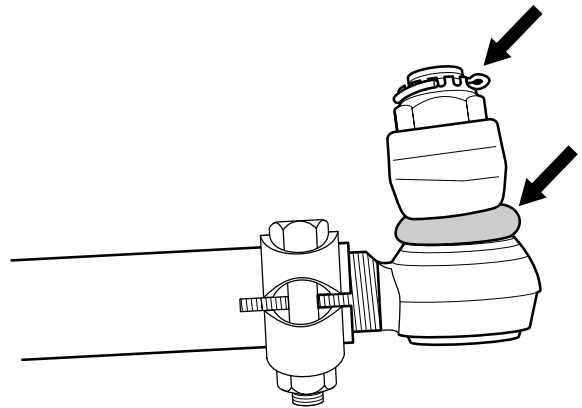


S7 00 026

2.6 CHECKING STEERING BALL JOINT

Checking steering ball joint

1. Check that the dust cover of the steering ball joint and its seal is not damaged. Replace the steering ball joint if they are damaged.
2. Check for the presence of the split pin and its condition.



S7 00 540

STEERED TRAILING SWIVEL AXLE

7

Inspection and adjustment

LF45/55 series

Checking axial steering ball joint play

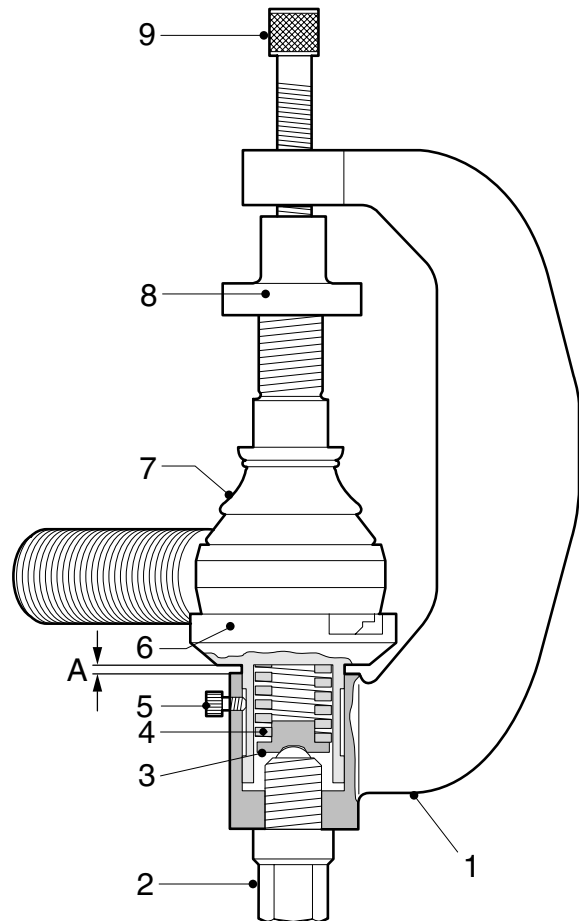
1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the trailing axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.
4. Screw the thrust washer (8) onto the threaded spindle.

5. Fit the spring retainer (3), spring (4) and thrust sleeve (6) in the bracket (1). Fit the locking screw (5). It should be possible to move the thrust sleeve (6) freely.

Note:

Fit the correct thrust sleeve (6). The thrust sleeve (6) must abut the rim of the steering ball joint (7).

6. Unscrew thrust bolt (2) until the flange of the thrust sleeve (6) abuts the bracket (1) (A=0 mm).
7. Fit the special tool to the steering ball joint (7) and turn the threaded spindle (9) by hand until the special tool is tight around the steering ball joint (7).
8. Tighten the thrust bolt (2) until its head abuts the bracket (1).
9. Measure the play "A" between the thrust sleeve and the bracket using a feeler gauge. Compare the measurement taken with the maximum permissible steering ball joint play, see "Technical data". If necessary, replace the steering ball joint.



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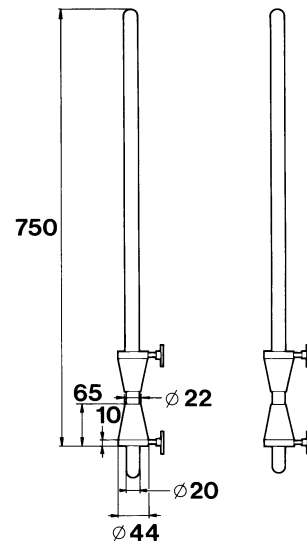
2.7 CHECKING TRAILING AXLE HOUSING

General

If the vehicle has been involved in a collision or if abnormal deviations are measured when the wheel alignment is checked, it is advisable to check the axle housing.

A number of the measurements below can also be carried out using alignment equipment. Consult the alignment equipment manual for this purpose.

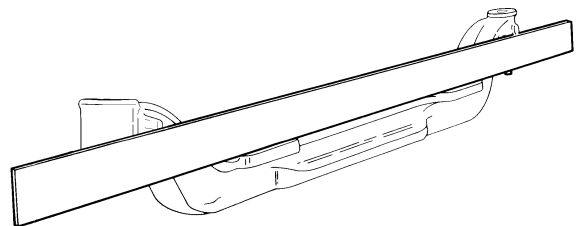
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



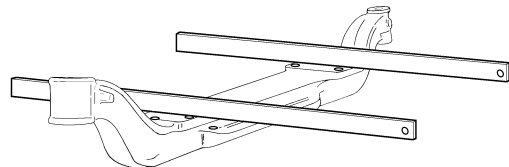
S7 00 119

Checking trailing axle housing

1. Take the trailing axle off the vehicle and remove both swivel axles, see "Removal and installation".
2. Place a straight edge across the spring seats of the axle housing and check whether they are aligned.
3. Place a straight edge across both spring seats and check whether they are parallel with each other.



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STEERED TRAILING SWIVEL AXLE

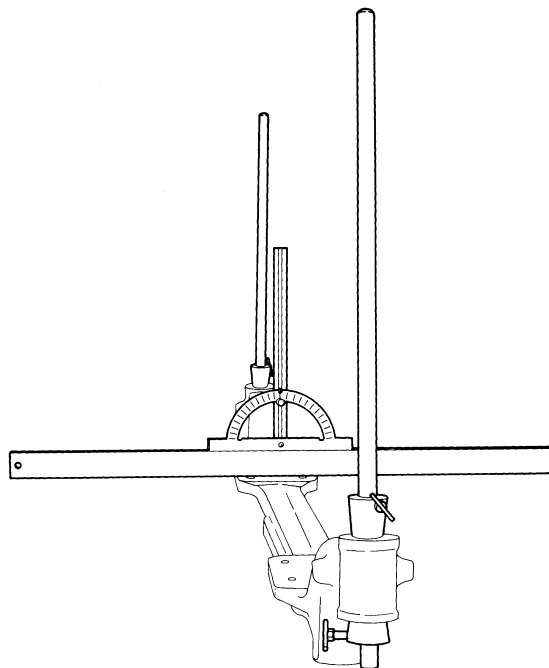
7

Inspection and adjustment

LF45/55 series

4. Place the two gauge bars in the swivel axle holes.

Place a straight edge with a protractor on the spring seat. Measure the angle of the gauge bars relative to the spring seats. The angle measured should be 90° .



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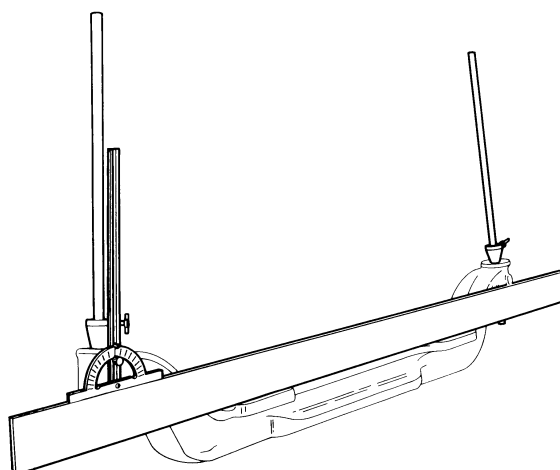
5. Measure the king pin inclination (KPI) by placing a straight edge with a protractor on the spring seats.

By placing the straight edge of the protractor parallel to the gauge bar, the angle can be read. See "Technical data" for the correct angle.

6. If a deviation is found during one of the checks, the axle housing must be replaced.



Straightening of the axle housing is not permitted. This could affect the strength of the materials.



S7 00 150

2.8 CHECKING WHEEL RIM

General

1. Check the wheel rims for the following:
 - deformation of the wheel rims and wheel disc.
 - deformation or cracking of the wheel stud holes.
 - corrosion, including on the tyre side of the rim and on the rim ring.
2. Cracked or damaged wheel rims or wheel rims with cracked or deformed wheel stud holes must be replaced.
Welding or repairing wheel rims in any way is prohibited. Welds will crack again in the course of time due to the dynamic load.



When taking a damaged wheel rim off the vehicle, deflate the tyre (remove the tyre valve), because of possible tensions in the wheel rim.

3. To prevent damage to the tyre due to corrosion and/or indirect tension cracks (due to notching), the anti-corrosion treatment of the wheel rim must not be damaged in any way.
For removal of corrosion and repairing the paint layer, see "Paint treatment".
Before re-spraying, remove the old layer of paint to prevent the paint layer from becoming too thick. The total layer of paint must not be more than 50 microns thick.



If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.

STEERED TRAILING SWIVEL AXLE

7

Inspection and adjustment

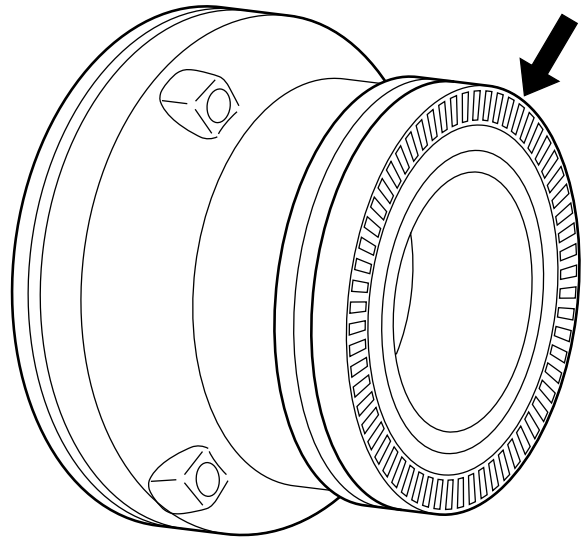
LF45/55 series

2.9 CHECKING WHEEL-SPEED SENSOR RING

1. Remove the compact bearing housing, see "Removal and installation".
2. Check the sensor ring for dirt. Special attention should be paid to deposits of dirt between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring for damage. Even the smallest amount of damage could cause a failure. Replace the sensor ring if necessary.
4. Check the sensor for smooth operation. If the sensor is stuck, remove, clean and refit it, see "Removal and installation".



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.



S700697

5. Fit the compact bearing housing, see "Removal and installation".
6. Press the sensor against the sensor ring by hand. The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.
7. Check the operation of the RAS-EC system.

3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION OF WHEEL



When removing a wheel with a cracked or damaged wheel rim, always deflate the tyre (remove the tyre valve) because of possible tensions in the wheel rim.

General

- Only use the original DAF wheel rims specified for the vehicle concerned.
- Make sure that tyres of the same type are fitted at both ends of the axle.
- Not cleaning the mating surfaces sufficiently and/or tightening the wheel nuts unevenly may cause vibrations during driving or braking.

Note:

If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

Removing wheel

1. Chock the wheels to prevent the vehicle moving.
2. Clean the screw thread of the wheel studs using a wire brush.
3. Oil the wheel studs sparingly.
4. Unscrew the wheel nuts.
5. Fit a jack as close as possible to the wheel to be replaced.
6. Jack up the vehicle and, if possible, place a support under the axle.
7. Remove the wheel nuts and take the wheel off the hub.

STEERED TRAILING SWIVEL AXLE

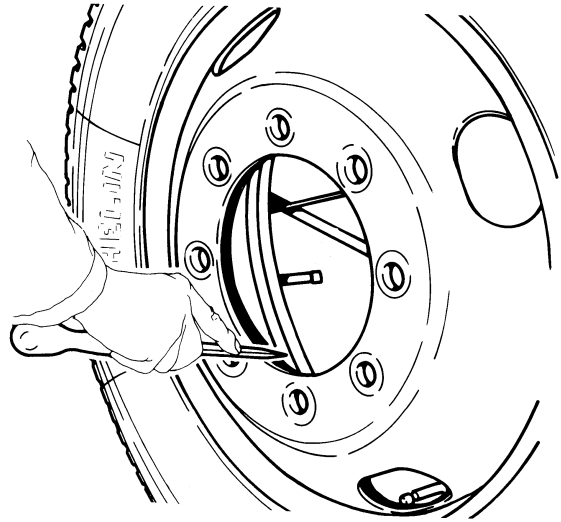
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Removal and installation

LF45/55 series

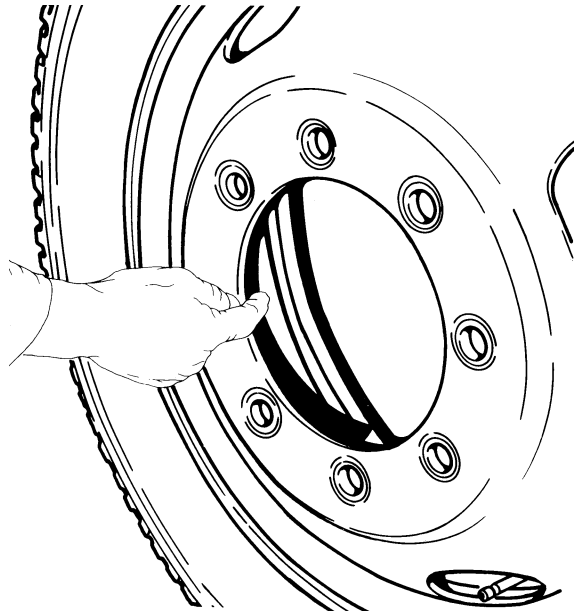
Installing wheel

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



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2. Apply a thin layer of grease to the fitting edge of the wheel hub.
3. Also apply a thin layer of grease to the fitting edge of the wheel rim. This layer of grease is to prevent the wheel rim and the wheel hub from becoming "rust-bound".
4. Check that the contact surfaces of the wheel rim and hub are clean. Clean these if necessary.



S7 00 097

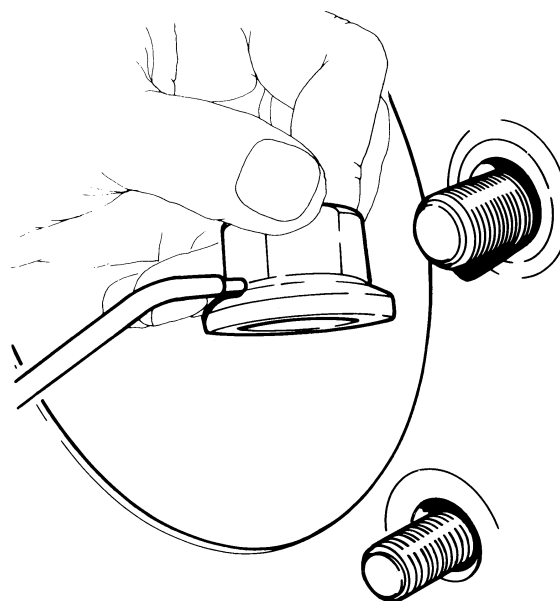
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STEERED TRAILING SWIVEL AXLE

LF45/55 series

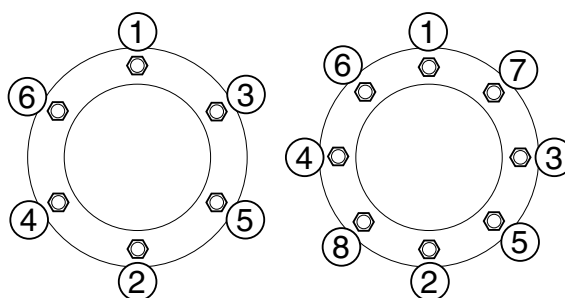
Removal and installation

5. Clean the wheel nuts and then apply a drop of oil between the thrust washer and the nut.
6. Also apply a drop of oil to the first turn of the wheel-stud threads.



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7. Fit the wheel nuts and tighten these evenly according to the sequence in the drawing. A pneumatic spanner may be used for this purpose, but its tightening torque is not very reliable. It will therefore be necessary to retighten the wheel nuts to the specified torque using a torque wrench. See "Technical data" for the specified torque.

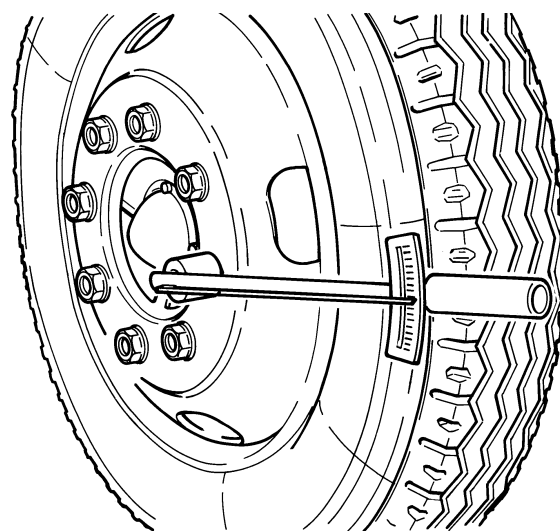


S7 00 631

Note:

Wheel nuts should always be tightened and retightened in cold condition. However, wheel studs should not be tightened in extremely cold conditions.

8. Check the tyre pressure.
9. Retorque the wheel nuts with a torque wrench after 100 km. If new wheel studs are fitted, they need additional retorquing after 500 km.



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STEERED TRAILING SWIVEL AXLE

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Removal and installation

LF45/55 series

3.2 REMOVAL AND INSTALLATION OF TRACK ROD

Removing track rod

1. Remove the castle nuts.
2. Take the ball ends out of the track-rod arms using a ball-end puller (A).

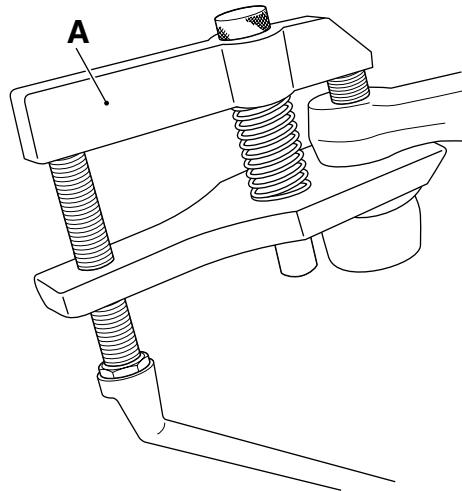
Installing track rod

1. When installing a new track rod, copy the settings of the track rod to be replaced.
2. Clean the tapered contact surfaces of both the track rod balls and the track rod arms. The tapered surfaces must be absolutely free of dirt, grease and paint.
3. Fit the track rod.
4. Fit the castle nuts and tighten them to the specified torque, see "Technical data".

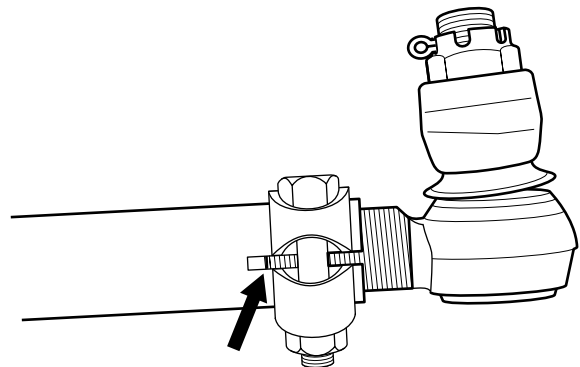
Note:

If the split-pin hole in the ball end does not match the recesses in the castle nut, tighten the castle nut further.

5. Lock the castle nuts using new split pins.
6. Check the trailing axle toe and adjust if necessary. See "Inspection and adjustment".
7. Check that the threaded end of the ball joint is fully secured by the clamping piece.
8. Check that the clamping piece bolt is tightened to the specified tightening torque, see "Technical data".



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3.3 REMOVAL AND INSTALLATION OF TRACK-ROD ARM



These instructions must be followed to the letter. The attachment of the track-rod arms is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when fitting the track-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing track-rod arm

1. Take the track rod off the track-rod arm.
2. Remove the attachment bolts.

Note:

These bolts must not be reused.

3. Take the track-rod arm off the swivel axle.

Installing track-rod arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the arm.
3. Apply the specified locking compound to the new attachment bolts, see "Technical data".
4. Use new attachment bolts when installing the track-rod arm.
Evenly tighten the attachment bolts alternately to the specified tightening torque, see "Technical data".
5. Fit the track rod.

STEERED TRAILING SWIVEL AXLE

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Removal and installation

LF45/55 series

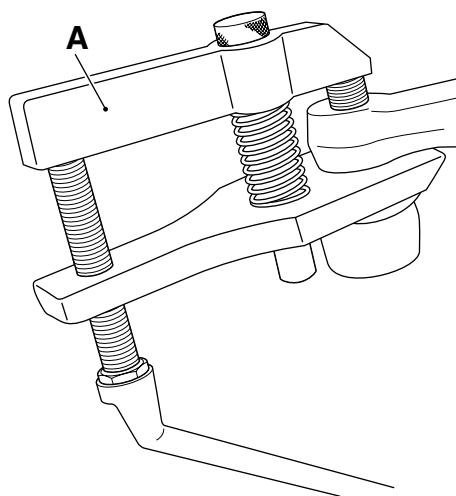
3.4 REMOVAL AND INSTALLATION OF STEERING CYLINDER

Removing steering cylinder



Drained steering oil may not be re-used. Store this hydraulic oil separately from other drained oils and have the oil collected by an authorised waste-removal company.

1. Put the vehicle in the "straight ahead" position.
2. Clean the steering cylinder and the surrounding area.
3. Mark the positions of the hydraulic lines.
4. Place a suitable tray underneath the steering cylinder and remove the hydraulic lines. Plug the openings.
5. Remove the split pins.
6. Remove the castle nuts.
7. Take the ball ends out of the steering cylinder arm and lower spring seat using a ball-end puller (A).



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STEERED TRAILING SWIVEL AXLE

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Removal and installation

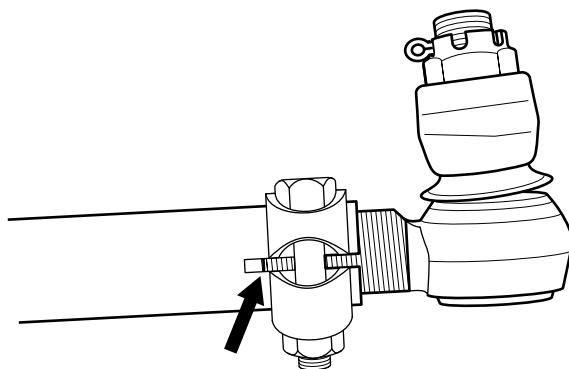
Installing steering cylinder

1. Adjust the trailing axle toe, see "Inspection and adjustment".
2. Undo the clamping bracket bolts and adjust the steering cylinder to the prescribed centre-position length, see "Technical data".

Note:

Make sure that the threaded ends of the ball ends are not screwed too far out of the steering cylinder. The clamping bracket must always fully engage the ball-joint screw thread, see drawing.

3. Clean and check the clamping-bracket bolts. If the bolt is corroded or damaged, it must be replaced. Replace the self-locking nut.
4. Tighten the clamping bracket bolts to the specified tightening torque, see "Technical data".
5. Put the steering cylinder, with the damper valves pointing vertically upwards, on the trailing axle.
6. Tighten the castle nuts to the specified tightening torque, see "Technical data".
7. Lock the castle nuts using new split pins.
8. Attach the hydraulic lines in their correct positions.
9. Top up the system.
10. Check the operation of the RAS-EC system.
11. Inspect the pipe connections for leaks.



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STEERED TRAILING SWIVEL AXLE

7

Removal and installation

LF45/55 series

3.5 REMOVAL AND INSTALLATION OF STEERING CYLINDER ARM



These instructions must be followed to the letter. The attachment of the steering cylinder arm is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when fitting the steering cylinder arm. Always use original attachment bolts of the prescribed length supplied by DAF.

Removing steering cylinder arm

1. Remove the trailing axle angle sensor control rod on the swivel axle side.
2. Take the steering cylinder out of the steering cylinder arm.
3. Remove the steering cylinder arm attachment bolts.

Note:

The attachment bolts must not be reused.

4. Take the steering cylinder arm off the swivel axle.

Installing steering cylinder arm

1. Clean and check the screw thread in the swivel axle. The screw thread must not be damaged.
2. Clean and degrease the contact surfaces of the swivel axle and the steering cylinder arm.
3. Apply the specified locking compound to the new attachment bolts, see "Technical data".
4. Use new attachment bolts when installing the steering cylinder arm. Evenly tighten the attachment bolts alternately to the specified tightening torque, see "Technical data".
5. Fit the steering cylinder to the steering cylinder arm.

7

STEERED TRAILING SWIVEL AXLE

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Removal and installation

6. Fit the trailing axle angle sensor control rod to the steering cylinder arm. Tighten the attachment nut to the specified torque, see "Technical data".
7. Check the operation of the RAS-EC system.

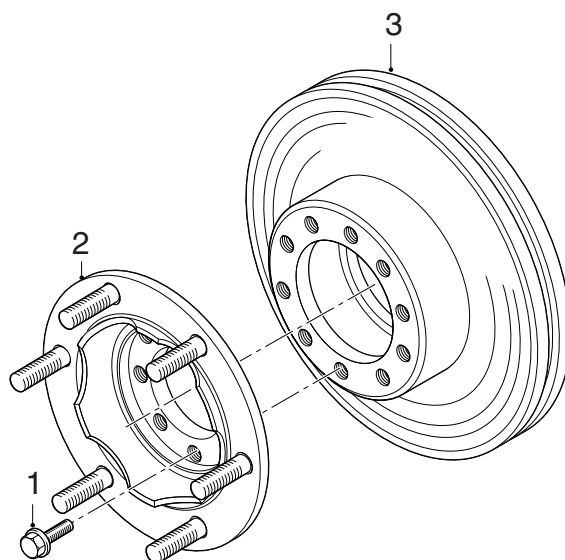
3.6 REMOVAL AND INSTALLATION OF WHEEL HUB

Removing wheel hub

1. Jack up the trailing axle until the wheels are clear of the floor. Place suitable supports under the axle.
2. Remove the wheel.
3. Take the attachment bolts (1) off the wheel hub (2) and remove the wheel hub (2).

Installing wheel hub

1. Check that the contact surfaces of the wheel hub (2) and the brake disc (3) are clean. Clean these if necessary.
2. Install the wheel hub (2) and tighten the attachment bolts (1) crosswise to the specified tightening torque, see "Technical data".
3. Fit the wheel.



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STEERED TRAILING SWIVEL AXLE

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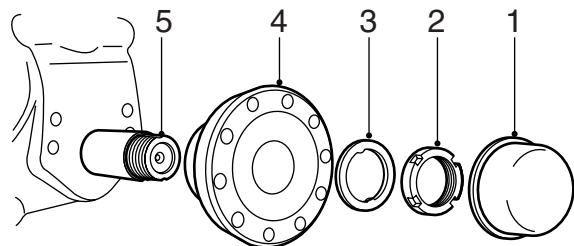
Removal and installation

LF45/55 series

3.7 REMOVAL AND INSTALLATION OF COMPACT BEARING HOUSING

Removing compact bearing housing

1. Jack up the trailing axle until the wheels are clear of the floor. Place suitable supports under the axle.
2. Remove the wheel.
3. Remove the brake pads and the brake calliper.
4. Remove the wheel hub and the brake disc.
5. Remove the hub cap (1).
6. Tap the locking ring of the hub nut (2) back into its locking position.
7. Remove the hub nut using the special tool (DAF no. 1329376).
8. Remove the thrust washer (3) and slide the compact bearing housing (4) off the axle journal (5).



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Installing compact bearing housing

1. Check the wheel speed sensor ring, see "Inspection and adjustment".
2. Check the axle journal (5) thread carefully for damage.



Never fit the compact bearing housing to an axle journal with a damaged thread.

3. Apply a thin, even layer of the prescribed anti-corrosion agent to the entire circumference of the axle journal, see "Technical data".

Note:

Do not apply too much anti-corrosion agent to the axle journal. When the compact bearing housing is installed, the excess anti-corrosion agent will collect at the rear of the compact bearing housing. When the vehicle is used in daily operation, this can leak out so that the seal wrongly appears to be leaking.

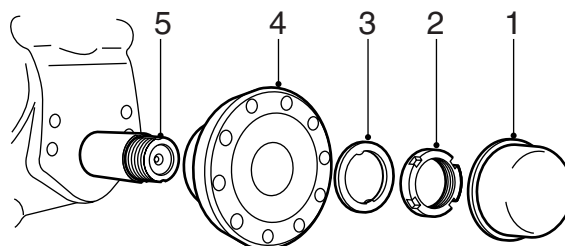
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STEERED TRAILING SWIVEL AXLE

LF45/55 series

Removal and installation

4. Fit the compact bearing housing (4) to the axle journal.
5. Fit the thrust washer (3).
6. Install a new hub nut (2). Tighten the hub nut in the specified manner, see "Technical data".
Use the special tool (DAF no. 1329376) and a torque amplifier to do so.
7. Fit the hub cap (1).
8. Check that the contact surfaces of the brake disc and the compact bearing housing are clean. Clean these if necessary.
9. Fit the brake disc and the wheel hub.
10. Fit the brake calliper and the brake pads.
11. Check the wheel speed sensor for smooth operation. If the sensor is stuck, remove, clean and refit it.
12. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.



S7 00 699



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

13. Fit the wheel.
14. Check the operation of the RAS-EC system.

STEERED TRAILING SWIVEL AXLE

7

Removal and installation

LF45/55 series

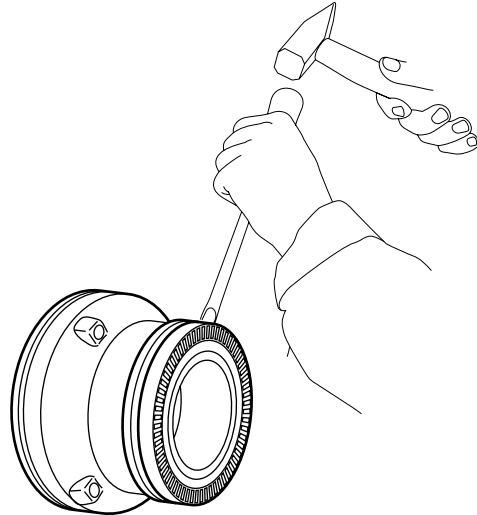
3.8 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR RING

Removing wheel-speed sensor ring

1. Remove the wheel speed sensor.
2. Take the compact bearing housing off the axle journal.
3. Make a notch in the side of the sensor ring, using a hammer and chisel. Make sure that the contact surface of the sensor ring to the compact bearing housing is not damaged in the process.
4. Take the sensor ring off the compact bearing housing.



Once removed, the sensor ring must not be reused.



S7 00 700

Installing wheel-speed sensor ring

1. Check the contact surface of the sensor ring to the compact bearing housing for damage.
2. Check the new sensor ring carefully for possible damage in transit.
3. Fit a new sensor ring to the compact bearing housing using a press and flat plate.
4. Check that the sensor ring makes good contact around the entire circumference.
5. Fit the compact bearing housing to the axle journal.
6. Check the wheel speed sensor for smooth operation. If the sensor is stuck, remove, clean and refit it.
7. Press the sensor against the sensor ring by hand.
The air gap between the sensor and the sensor ring adjusts automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.

8. Check the operation of the RAS-EC system.

3.9 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

Removing wheel-speed sensor

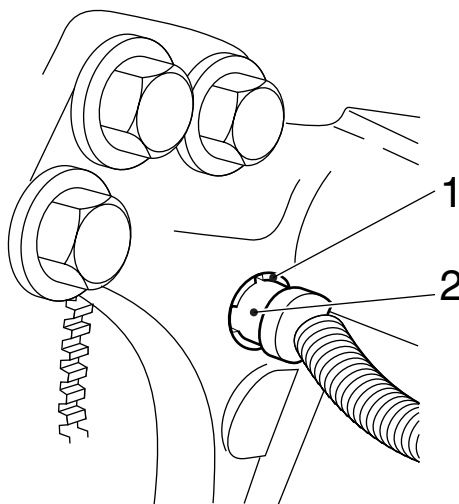
1. Remove the wheel-speed sensor (2).

Installing wheel-speed sensor

1. Clean the wheel-speed sensor (2) and its holder (1). Replace the holder if necessary.
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor, see "Technical data".
3. Fit the wheel speed sensor. Press the sensor against the sensor ring by hand.
4. The air gap between the sensor and the sensor ring is adjusted automatically while the vehicle is being driven.



Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.



S7 00 880

5. Check the operation of the RAS-EC system.

STEERED TRAILING SWIVEL AXLE

7

Removal and installation

LF45/55 series

3.10 REMOVAL AND INSTALLATION OF TRAILING AXLE ASSEMBLY

Removing trailing axle assembly

1. Engage the vehicle's parking brake and place chocks at the front wheels.
2. Remove the brake chamber hoses and the disc brakes cables.
3. Take the connector off the trailing axle angle sensor.
4. Remove the angle sensor control rod on the swivel axle side.
5. Remove the steering cylinder.
6. Remove the stabiliser bar.
7. Loosen the wheel nuts at both ends of the axle, but do not remove these yet.
8. Jack up the vehicle until the wheels are off the ground and place suitable stands under the chassis.
9. Remove the wheel nuts and take the wheels off the axle.
10. Support the axle securely and remove the U-bolt nuts.
11. Remove the axle.

Installing trailing axle assembly

1. Check the U-bolts and U-bolt nuts for corrosion and damage. Replace them if necessary. If they are to be re-used, thoroughly clean the thread and remove any paint.
2. Lift the axle under the vehicle and fit the U-bolts.
3. Install the wheels and tighten the wheel nuts.
4. Lower the vehicle and fit the U-bolt nuts.
5. Tighten the wheel nuts to the specified tightening torque, see "Technical data".
6. Install the steering cylinder.
7. Fit the brake chamber hoses and the disc brake cables.
8. Fit the angle sensor control rod and tighten the attachment nut to the specified tightening torque, see "Technical data".
9. Fit the angle sensor and wheel speed sensor connectors.
10. Check the operation of the RAS-EC system.

STEERED TRAILING SWIVEL AXLE

7

Removal and installation

LF45/55 series

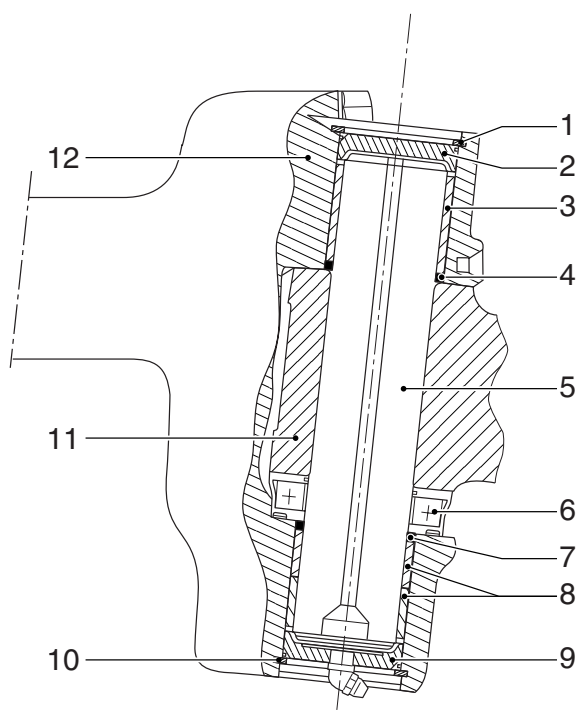
3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE



A hydraulic press with a calibrated pressure gauge is required to remove and install the king pin.

Removing swivel axle

1. Remove the trailing axle assembly.
2. Remove the wheel speed sensor.
3. Remove the track rod.
4. Remove the compact bearing housing
5. Remove the circlips (1 and 10) and the covers (2 and 9).
6. Remove the grease.



S 700 659

7

STEERED TRAILING SWIVEL AXLE

LF45/55 series

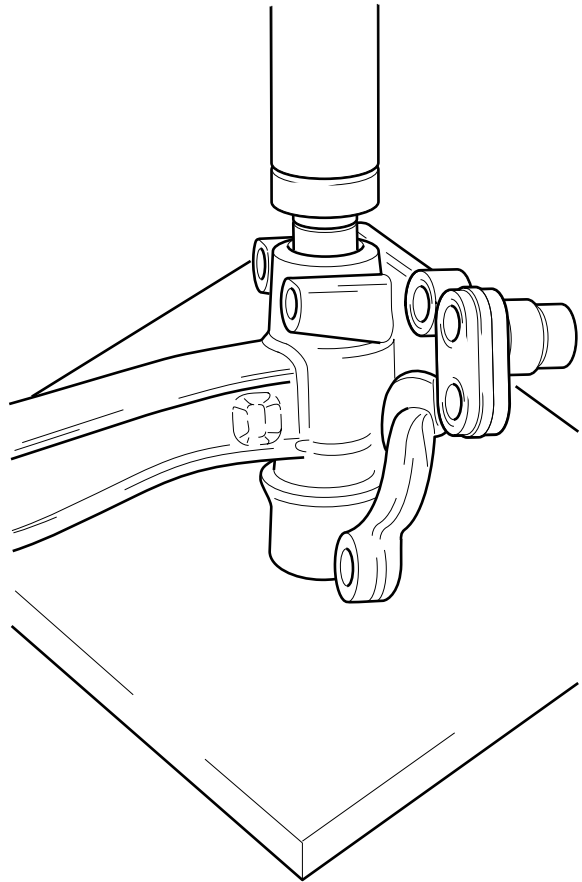
Removal and installation

7. Suspend the axle in the hoist in the correct manner.
8. Position the swivel axle underneath the press, with the bearing bush (3) facing upwards.

Note:

The king pin must be at right angles to the press.

9. Press the king pin carefully out of the swivel axle.
10. Take the swivel axle off the axle end.



S7 00 730

STEERED TRAILING SWIVEL AXLE

7

Removal and installation

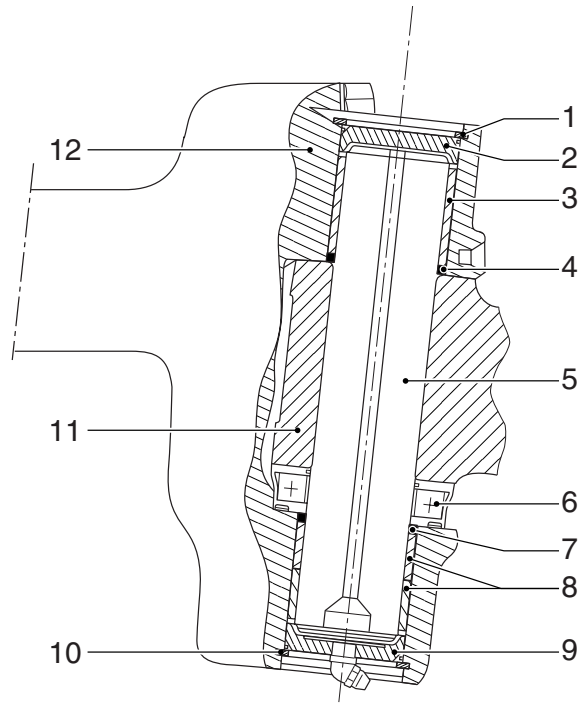
LF45/55 series

Installing swivel axle

Note:

After a collision or when the camber angle is incorrect, the swivel axle must be magnaflux tested. If in doubt, always replace the swivel axle.

1. Check the condition of the needle bearings (8) and the oil seal (7).
2. Check the bearing bush (3) for grooves and check the condition of the oil seal (4).
3. Check the king pin (5) for grooves and corrosion. Small needle punctures or small areas of corrosion can be removed using fine polishing paper. If in doubt, replace the king pin and the needle bearings.
4. Lightly lubricate the king pin.
5. Check the contact surfaces of the thrust bearing (6), the axle end (11) and the swivel axle (12) for damage.
6. Check the thrust bearing for wear.
7. Apply plenty of grease to the needle bearings (8).
8. Position the swivel axle (12) on the press with the needle bearings pointing upwards.
9. Position the axle end (11) in the swivel axle.
10. Install the thrust bearing (6) between the axle end and the swivel axle.

**Note:**

The thrust bearing must be installed on the side with the needle bearings, with the narrow end facing the needle bearings.

7

STEERED TRAILING SWIVEL AXLE

LF45/55 series

Removal and installation

11. Fit the king pin (5) in the swivel axle using a copper punch.

Note:

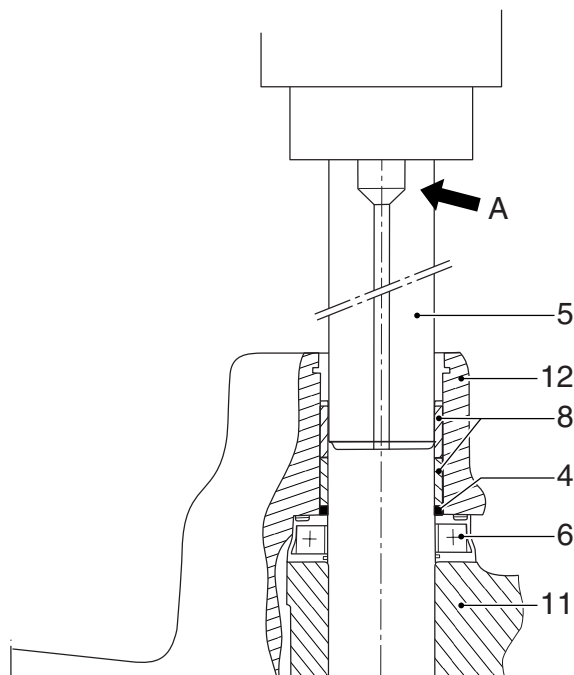
The large bore (A) in the king pin must be at the top.

12. Position the swivel axle underneath the press.

Note:

The king pin must be at right angles to the press.

13. Ensure that the swivel axle, the thrust bearing and the axle end are aligned.



S 700 729

14. Press the king pin into the swivel axle with the specified force, see "Technical data".

15. Check the O-rings of the covers (2 and 9).

16. Fit the covers and the circlips (1 and 10).

Note:

The cover (9) with the lubricating nipple goes at the bottom.

17. Thoroughly lubricate the swivel axle (12) while it is unloaded.

Check whether a collar of grease has formed at the thrust bearing (6).

18. Check that the swivel axle operates smoothly and is not getting stuck anywhere.

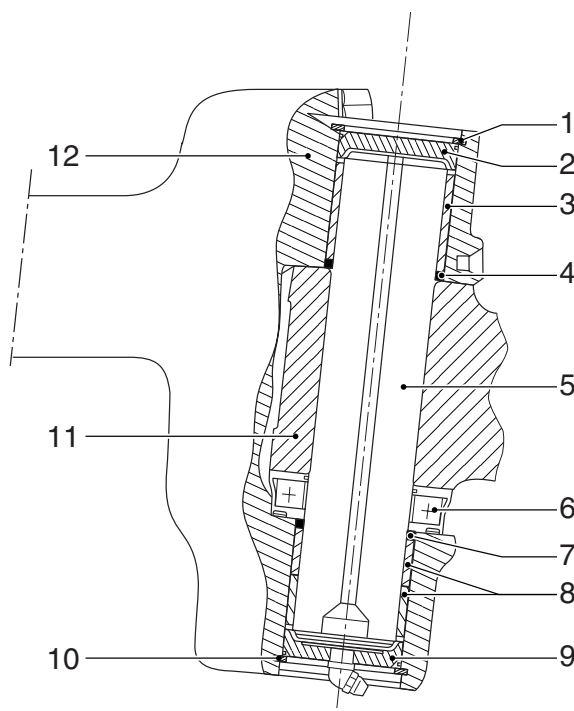
19. Fit the wheel speed sensor.

20. Fit the compact bearing housing

21. Fit the track rod.

22. Fit the trailing axle assembly.

23. Check the operation of the RAS-EC system.



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STEERED TRAILING SWIVEL AXLE

7

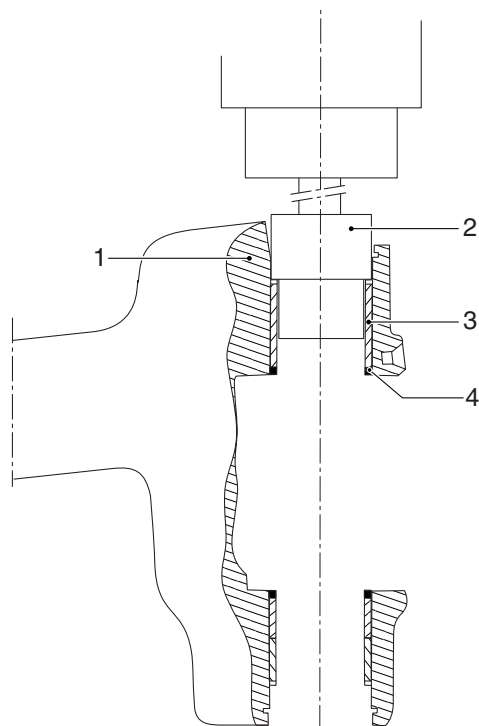
Removal and installation

LF45/55 series

3.12 REMOVAL AND INSTALLATION OF SWIVEL AXLE BEARINGS

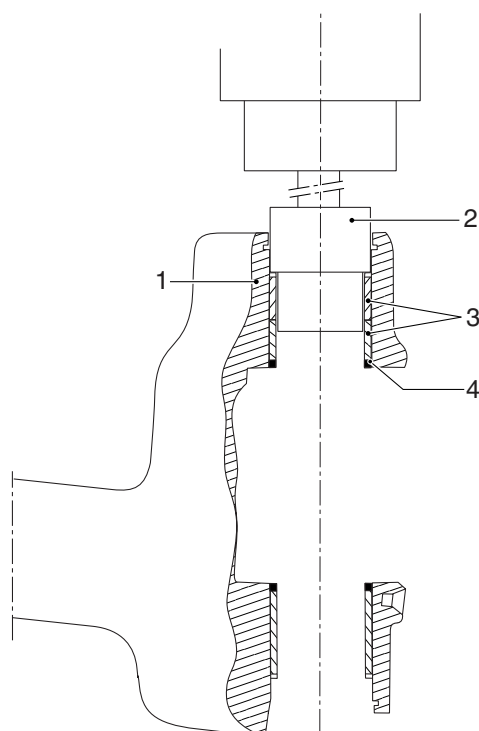
Removing swivel axle bearings

1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the bearing bush (3) facing upwards.
3. Fit the special tool (DAF no. 1451994A) (2) to the bearing bush and press the bearing bush and the oil seal (4) out of the swivel axle.



S 700 732

4. Turn the swivel axle around and fit the special tool (2) (DAF no. 1451994A) to the needle bearings (3).
5. Press the needle bearings with the oil seal (4) out of the swivel axle.



S 700 731

7

STEERED TRAILING SWIVEL AXLE

LF45/55 series

Removal and installation

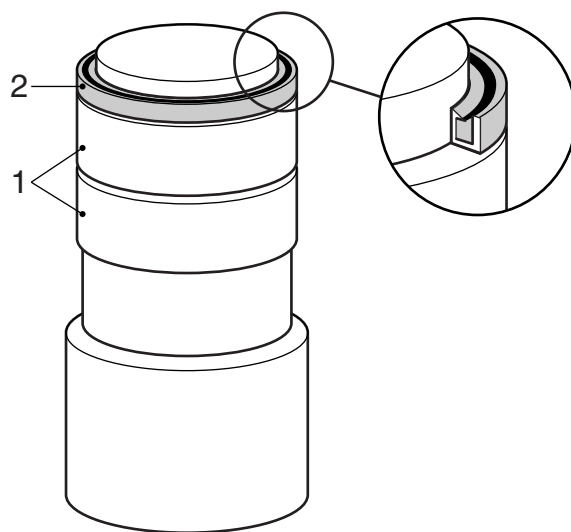
Installing swivel axle bearings

1. Apply plenty of grease to the needle bearings (1).
2. Fit the needle bearings and the oil seal (2) to the special tool (DAF no. 1451994C).

Note:

The closed side of the oil seal must abut the needle bearings.

3. Press the needle bearings and the oil seal into the swivel axle until the special tool abuts.



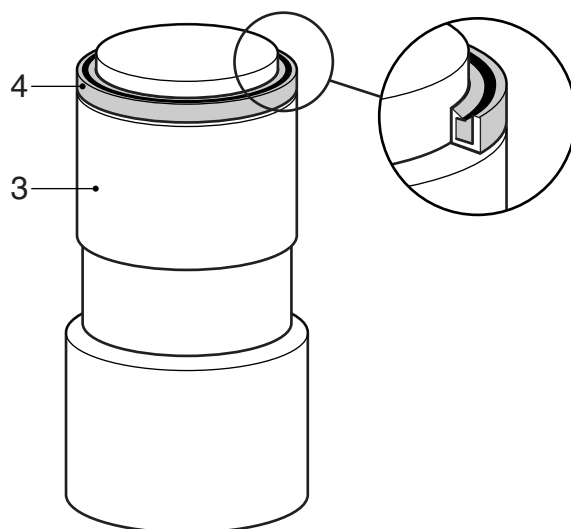
S7 00 701

4. Turn the swivel axle around.
5. Apply plenty of grease to the bearing bush (3).
6. Fit the bearing bush and the oil seal (4) to the special tool (DAF no. 1451994B).

Note:

The closed side of the oil seal must abut the bearing bush.

7. Press the bearing bush and the oil seal into the swivel axle until the special tool abuts.
8. Fit the swivel axle to the axle end.



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STEERED TRAILING SWIVEL AXLE

7

Removal and installation

LF45/55 series

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TECHNICAL DATA

8

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LF45/55 series

0

1. SINGLE REAR AXLE 5.10

1.1 GENERAL

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Pinion gear splines

Sealant

Loctite 572

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

Wheel bearing play

Wheel bearing axial play

0.05 - 0.20 mm

1.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise -.

TECHNICAL DATA

8

Single rear axle 5.10

LF45/55 series**0****Differential**

Attachment bolts/nuts	90 Nm ⁽¹⁾
Drain plug	54 Nm

Wheel hub

Stub axle attachment nuts	82 Nm
Wheel-speed sensor holder attachment bolts	8 Nm
Lock nut	135 Nm
Level check/filler plug	27 Nm

Notes:

1. Only use a new nut

1.3 FILLING CAPACITIES

Differential

Filling capacity	approx. 4.0 litres
------------------	--------------------

Hub

Filling capacity	0.25 litres
------------------	-------------

2. SINGLE REAR AXLE 5.12

2.1 GENERAL

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Crown wheel guide bolt

Sealant

Loctite 572

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

Wheel bearing play

Wheel bearing axial play

0.05 - 0.20 mm

2.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise -.

TECHNICAL DATA**8**

Single rear axle 5.12

LF45/55 series**0****Differential**

Attachment bolts/nuts	80 Nm ⁽¹⁾
Drive flange attachment nut (self-locking)	675 Nm ⁽²⁾
Lock nut for crown wheel guide bolt	120 Nm
Drain plug	54 Nm

Wheel hub

Stub axle attachment nuts	82 Nm
Wheel-speed sensor holder attachment bolts	8 Nm
Lock nut	135 Nm
Level check/filler plug	27 Nm

Notes:

1. Bolts to be treated with Loctite 572
2. Only use a new nut

2.3 FILLING CAPACITIES**Differential**

Filling capacity	approx. 4.0 litres
------------------	--------------------

Hub

Filling capacity	0.25 litres
------------------	-------------

3. SINGLE REAR AXLE 5.14

3.1 GENERAL

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential-gear lock stud bolts

Differential-gear lock stud bolt locking compound

Loctite 2701

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

Wheel bearing play

Wheel bearing axial play

0.05 - 0.20 mm

3.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise -.

TECHNICAL DATA**8**

Single rear axle 5.14

LF45/55 series**0****Differential**

Differential lock cover attachment bolts	20 Nm ⁽¹⁾
Attachment bolts and nuts	90 Nm ⁽¹⁾
Drive flange attachment nut (self-locking)	675 Nm ⁽²⁾
Drain plug	54 Nm

Wheel hub

Stub axle attachment nuts	82 Nm
Wheel-speed sensor holder attachment bolts	8 Nm
Lock nut	135 Nm
Level check/filler plug	27 Nm

Notes:

1. Bolts to be treated with Loctite 572
2. Only use a new nut

3.3 FILLING CAPACITIES**Differential**

Filling capacity	approx. 4.0 litres
------------------	--------------------

Hub

Filling capacity	0.25 litres
------------------	-------------

4. SINGLE REAR AXLE 8.20

4.1 GENERAL

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential-gear lock stud bolts

Differential-gear lock stud bolt locking compound

Loctite 2701

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

Wheel bearing play

Wheel bearing axial play

0.05 - 0.20 mm

4.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise -.

TECHNICAL DATA

8

Single rear axle 8.20

LF45/55 series**0****Differential**

Drive flange attachment nut (self-locking)	675 Nm ⁽¹⁾
Differential lock cover attachment bolts	20 Nm
Attachment bolts/nuts	225 Nm ⁽²⁾
Drain plug	54 Nm

Wheel hub

Stub axle attachment nuts	82 Nm
Wheel-speed sensor holder attachment bolts	8 Nm
Lock nut	135 Nm
Level check/filler plug	27 Nm

Notes:

1. Only use a new nut
2. Bolts to be treated with Loctite 572

4.3 FILLING CAPACITIES

Differential

Filling capacity	approx. 8.0 litres
------------------	--------------------

Hub

Filling capacity	0.25 litres
------------------	-------------

5. SINGLE REAR AXLE 10.20

5.1 GENERAL

Wheel hub

Before installing the wheel hub, axle journal to be treated with

Gleitmo 805

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential-gear lock stud bolts

Differential-gear lock stud bolt locking compound

Loctite 2701

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

5.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise -.

TECHNICAL DATA**8**

Single rear axle 10.20

LF45/55 series**0****Differential**

Drive flange attachment nut (self-locking)	675 Nm ⁽¹⁾
Differential lock cover attachment bolts	20 Nm
Attachment bolts/nuts	225 Nm ⁽²⁾
Drain plug	54 Nm

Wheel hub

- 1 st phase	300 Nm ⁽¹⁾
- 2 nd phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 3 rd phase	350 Nm
- 4 th phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 5 th phase	1100 Nm
Stub axle attachment bolts	260 Nm
Wheel-speed sensor holder attachment bolts	8 Nm

Notes:

1. Only use a new nut
2. Bolts to be treated with Loctite 572

5.3 FILLING CAPACITIES**Differential**

Filling capacity	approx. 9.0 litres
------------------	--------------------

6. SINGLE REAR AXLE 10.26

6.1 GENERAL

Wheel hub

Before installing the wheel hub, axle journal to be treated with

Gleitmo 805

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential-gear lock stud bolts

Differential-gear lock stud bolt locking compound

Loctite 2701

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

6.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise.

TECHNICAL DATA**8**

Single rear axle 10.26

LF45/55 series**0****Differential**

Drive flange attachment nut (self-locking)	1250 Nm ⁽¹⁾ / ⁽³⁾
Differential lock cover attachment bolts	20 Nm
Attachment bolts/nuts	225 Nm ⁽²⁾
Drain plug	54 Nm

Wheel hub

- 1 st phase	300 Nm ⁽¹⁾
- 2 nd phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 3 rd phase	350 Nm
- 4 th phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 5 th phase	1100 Nm
Stub axle attachment bolts	260 Nm
Wheel-speed sensor holder attachment bolts	8 Nm

Notes:

1. Only use a new nut
2. Bolts to be treated with Loctite 572
3. Secure with Loctite 262

6.3 FILLING CAPACITIES**Differential**

Filling capacity	approx. 9.0 litres
------------------	--------------------

7. SINGLE REAR AXLE 11.26

7.1 GENERAL

Wheel hub unit

Before installing the wheel hub unit, axle journal to be treated with

Gleitmo 805

Wheel speed sensor

Anti-corrosion agent

Molykote P37

Differential-gear lock stud bolts

Differential-gear lock stud bolt locking compound

Loctite 2701

Differential attachment stud bolts

Differential attachment stud bolt locking compound

Loctite 2701

Differential attachment

Sealant between differential and axle housing

Loctite 518

Stub axle attachment

Sealant for stub axle flange mating surface

Loctite 518

7.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important that these bolts and nuts are of exactly the same length and property class as the ones removed - unless stated otherwise.

TECHNICAL DATA**8**

Single rear axle 11.26

LF45/55 series**0****Differential**

Drive flange attachment nut	1250 Nm ⁽¹⁾ / ⁽³⁾
Differential-gear lock attachment bolts	20 Nm
Attachment bolts/nuts	225 Nm ⁽²⁾
Drain plug	54 Nm

Wheel hub unit

- 1 st phase	500 Nm ⁽³⁾
- 2 nd phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 3 rd phase	550 Nm
- 4 th phase	turn the hub 10 revolutions at a speed of approx. 40 rpm
- 5 th phase	1300 Nm
Stub axle attachment bolts	260 Nm

Notes:

1. Only fit a new nut and apply Loctite 262 to secure
2. Bolts to be treated with Loctite 572
3. Only use a new nut

7.3 FILLING CAPACITIES**Differential**

Filling capacity	approx. 9.0 litres
------------------	--------------------

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DIAGNOSTICS

8

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LF45/55 series

1

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COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Attachment bolts loosened or broken off	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

DIAGNOSTICS

8

Single rear axle 5.10

LF45/55 series

1

2. SINGLE REAR AXLE 5.12

2.1 FAULT-FINDING TABLE

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Attachment bolts loosened or broken off	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

DIAGNOSTICS

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Single rear axle 5.12

LF45/55 series

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3. SINGLE REAR AXLE 5.14**3.1 FAULT-FINDING TABLE**

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Loosened attachment bolts or broken differential lock parts	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

COMPLAINT: DIFFERENTIAL LOCK IS NOT FUNCTIONING	
Possible cause	Remedy
No air pressure on engaging cylinder	Check compressed air system
Defective pneumatic control	Check or replace pneumatic switch
Defective mechanical shift control	Check shift control

COMPLAINT: DIFFERENTIAL LOCK WARNING LAMP IS NOT FUNCTIONING	
Possible cause	Remedy
Switch on cylinder fitted too high	Readjust switch
Switch on cylinder defective	Replace switch
Fault in electrical circuit	Check electrical circuit

DIAGNOSTICS

8

Single rear axle 5.14

LF45/55 series

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4. SINGLE REAR AXLE 8.20

4.1 FAULT-FINDING TABLE

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Loosened attachment bolts or broken differential lock parts	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

COMPLAINT: DIFFERENTIAL LOCK IS NOT FUNCTIONING	
Possible cause	Remedy
No air pressure on engaging cylinder	Check compressed air system
Defective pneumatic control	Check or replace pneumatic switch
Defective mechanical shift control	Check shift control

COMPLAINT: DIFFERENTIAL LOCK WARNING LAMP IS NOT FUNCTIONING	
Possible cause	Remedy
Switch on cylinder fitted too high	Readjust switch
Switch on cylinder defective	Replace switch
Fault in electrical circuit	Check electrical circuit

DIAGNOSTICS

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Single rear axle 8.20

LF45/55 series

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5. SINGLE REAR AXLE 10.20**5.1 FAULT-FINDING TABLE**

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Loosened attachment bolts or broken differential lock parts	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

COMPLAINT: DIFFERENTIAL LOCK IS NOT FUNCTIONING	
Possible cause	Remedy
No air pressure on engaging cylinder	Check compressed air system
Defective pneumatic control	Check or replace pneumatic switch
Defective mechanical shift control	Check shift control

COMPLAINT: DIFFERENTIAL LOCK WARNING LAMP IS NOT FUNCTIONING	
Possible cause	Remedy
Switch on cylinder fitted too high	Readjust switch
Switch on cylinder defective	Replace switch
Fault in electrical circuit	Check electrical circuit

DIAGNOSTICS

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Single rear axle 10.20

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6. SINGLE REAR AXLE 10.26**6.1 FAULT-FINDING TABLE**

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Loosened attachment bolts or broken differential lock parts	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

COMPLAINT: DIFFERENTIAL LOCK IS NOT FUNCTIONING	
Possible cause	Remedy
No air pressure on engaging cylinder	Check compressed air system
Defective pneumatic control	Check or replace pneumatic switch
Defective mechanical shift control	Check shift control

COMPLAINT: DIFFERENTIAL LOCK WARNING LAMP IS NOT FUNCTIONING	
Possible cause	Remedy
Switch on cylinder fitted too high	Readjust switch
Switch on cylinder defective	Replace switch
Fault in electrical circuit	Check electrical circuit

DIAGNOSTICS

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Single rear axle 10.26

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7. SINGLE REAR AXLE 11.26**7.1 FAULT-FINDING TABLE**

COMPLAINT: NOISES IN REAR AXLE AND DRIVE ASSEMBLY	
Possible cause	Remedy
Oil level too low	Top up oil
Incorrect oil viscosity	Drain oil and top up
Loosened attachment bolts or broken differential lock parts	Drain oil and check drained oil for metal particles
Pinion bearing play	Adjust and/or replace

COMPLAINT: OIL LEAK	
Possible cause	Remedy
Oil level too high	Drain oil
Incorrect oil viscosity	Drain oil and top up
Leaking oil seal	Replace oil seal
Bleeding system blocked	Clean or replace the bleeding system
Oil leakage between the differential gear housing mating surfaces	Clean mating surfaces and apply new sealant

COMPLAINT: DIFFERENTIAL LOCK IS NOT FUNCTIONING	
Possible cause	Remedy
No air pressure on engaging cylinder	Check compressed air system
Defective pneumatic control	Check or replace pneumatic switch
Defective mechanical shift control	Check shift control

COMPLAINT: DIFFERENTIAL LOCK WARNING LAMP IS NOT FUNCTIONING	
Possible cause	Remedy
Switch on cylinder fitted too high	Readjust switch
Switch on cylinder defective	Replace switch
Fault in electrical circuit	Check electrical circuit

DIAGNOSTICS

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Single rear axle 11.26

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SINGLE REAR AXLE 5.10

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Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

SINGLE REAR AXLE 5.10

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Safety instructions

LF45/55 series

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2. GENERAL

2.1 DESCRIPTION OF 5.10 AXLE

Differential

The 5.10 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings for the 5.10 axle is adjusted using a pre-load bush which is placed between the pinion and the inner race of the front bearing.

Wheel hub

The wheel hub has a wheel bearing and hub oil seal that can be replaced separately. The wheel-speed sensor ring is integrated into the wheel hub. The wheel bearing play is adjusted using the hub nut. The correct wheel bearing pre-load is achieved by fitting the hub nut as specified.

The hub nut is secured with a lock nut and a locking plate.

The wheel bearing is greased by the oil in the hub.

The stub axle and brake disc are attached to the wheel hub with attachment nuts and bolts respectively.

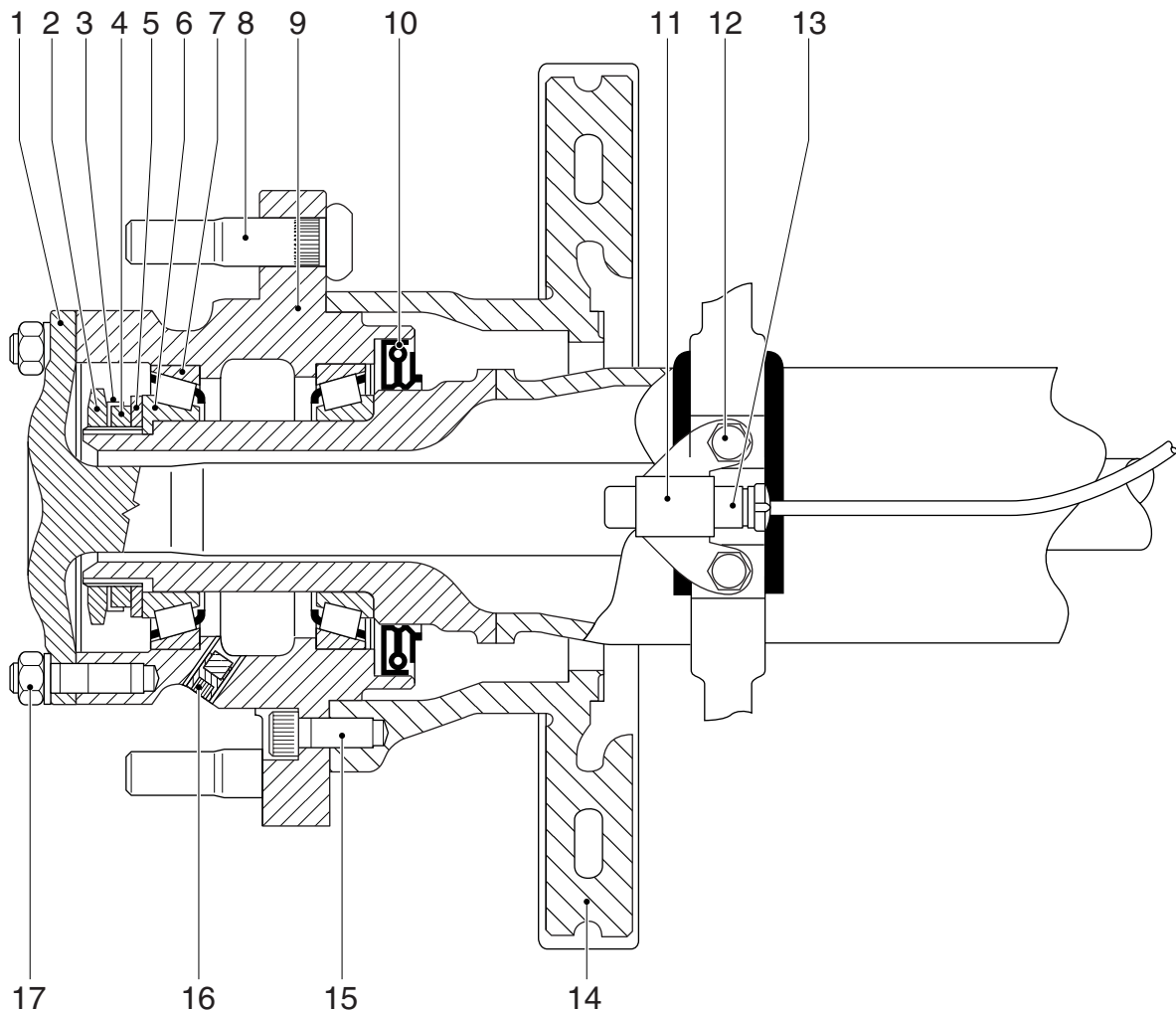
SINGLE REAR AXLE 5.10

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General

LF45/55 series

2.2 OVERVIEW DRAWING, WHEEL HUB



A8 00 384

Legend

- | | |
|-----------------------------|--|
| 1. Stub axle | 10. Hub oil seal |
| 2. Lock nut | 11. Wheel-speed sensor holder attachment bolts |
| 3. Locking plate | 12. Wheel-speed sensor holder |
| 4. Hub nut | 13. Wheel-speed sensor |
| 5. Thrust washer | 14. Brake disc |
| 6. Wheel bearing inner race | 15. Brake disc attachment bolt |
| 7. Wheel bearing outer race | 16. Drain plug |
| 8. Wheel stud | 17. Stub axle attachment nut |
| 9. Wheel hub | |

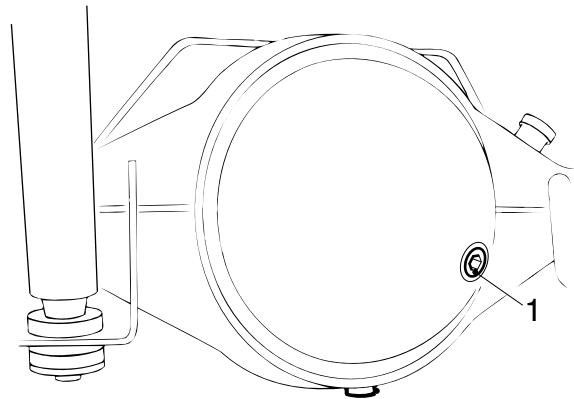
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

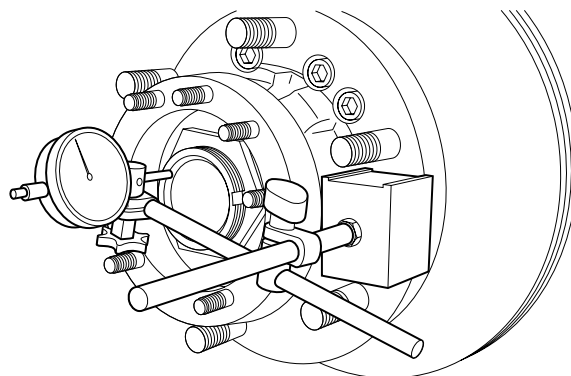
1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



A8 00 375

3.2 INSPECTION AND ADJUSTMENT, WHEEL BEARING PLAY**Inspecting the wheel bearing play**

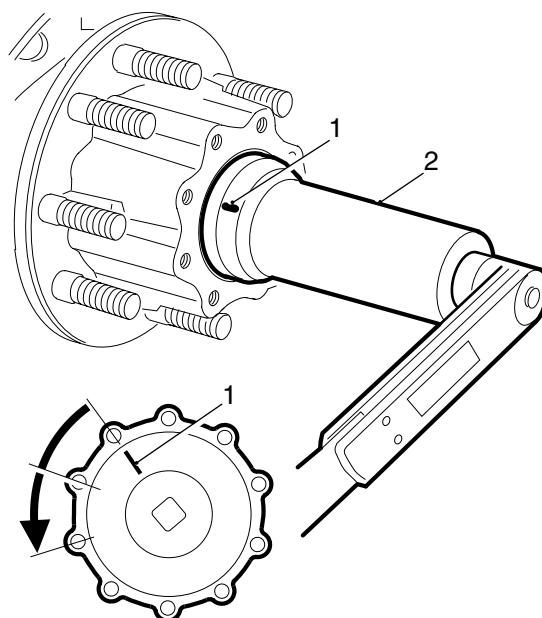
1. Remove the wheel.
2. Remove the stub axle.
3. Remove the brake pads.
4. Fit a micrometer gauge to the wheel hub, with the stylus on the end of the axle journal.
5. Push and pull the wheel hub. Check the wheel bearing play and compare it with the specified value. See main group "Technical data".



A8 00 387

Adjusting the wheel bearing play

1. Remove the lock nut.
2. Tighten the hub nut with a hub nut wrench (DAF No. 0499805) to 136 Nm.
3. Turn the hub two full rotations in order to "seat" the wheel bearings.
4. Mark (1) the hub nut wrench (2).
5. Turn the hub nut 2 strokes back.
6. Check the wheel bearing play.
7. Position the locking plate and fit the lock nut. Tighten the lock nut to the specified tightening torque. See main group "Technical data".
8. Secure the hub nut and lock nut with the locking plate.



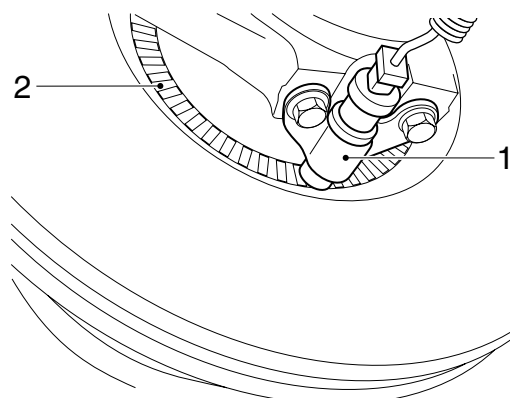
A8 00 380

3.3 INSPECTION, WHEEL-SPEED SENSOR RING

1. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
2. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
3. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



A8 00 391

4. Check the ABS system for proper operation.

SINGLE REAR AXLE 5.10

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Inspection and adjustment

LF45/55 series

2

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Remove the stub axle attachment nuts.
3. Remove the stub axle using a copper punch. When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.

Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment nuts to the specified tightening torque. See main group "Technical data".

SINGLE REAR AXLE 5.10

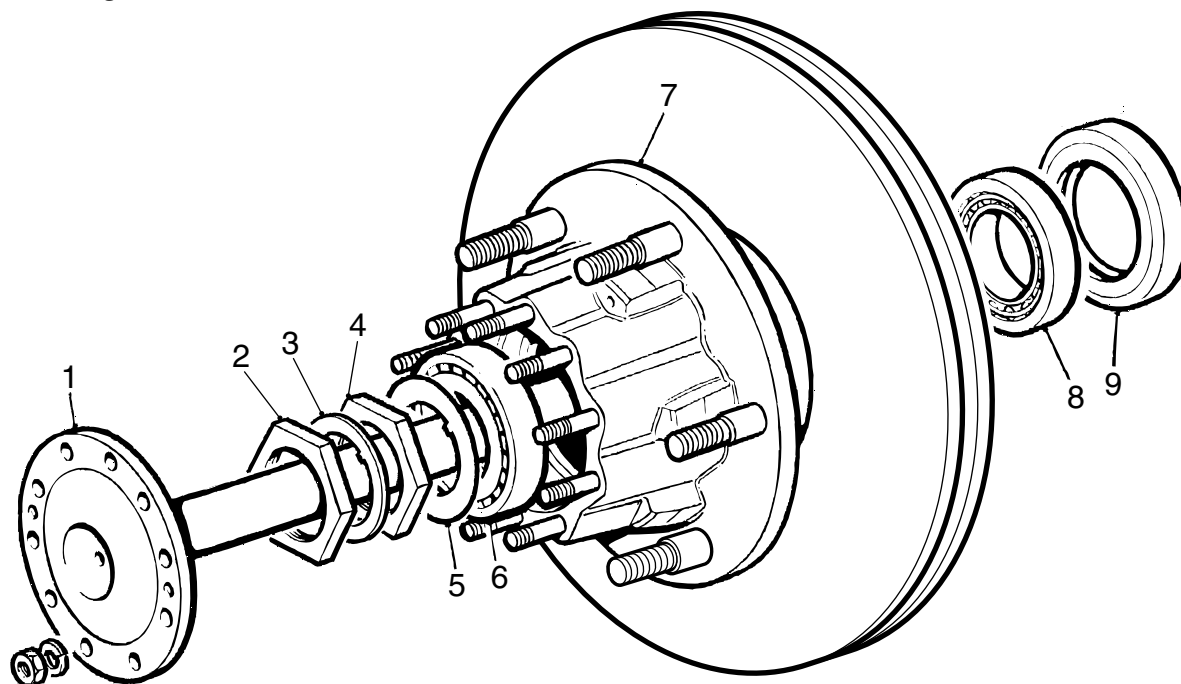
8

Removal and installation

LF45/55 series

4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub



A8 00 394

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle (1).
5. Remove the lock nut (2).
6. Remove the locking plate (3).
7. Remove the hub nut (4).
8. Remove the thrust washer (5).
9. Remove the wheel bearing inner race (6).
10. Remove the wheel hub from the axle journal.

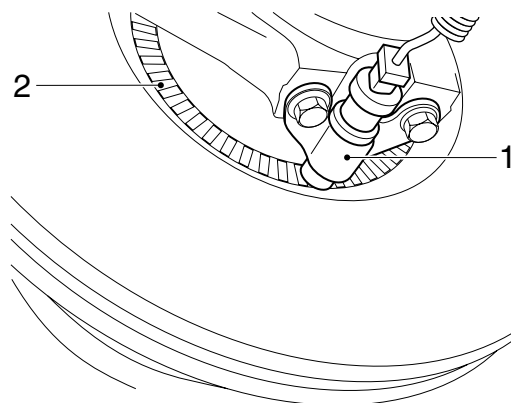
Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seal in the wheel hub for damage. Replace the oil seal if in doubt.
2. Check the axle journal screw thread carefully for damage.
3. Install the wheel hub on the axle journal. Slide the wheel hub onto the axle journal. Fit the wheel bearing inner race (6).
4. Fit the thrust washer (5).
5. Fit the hub nut (4).
6. Adjust the wheel bearing play, see chapter "Inspection and adjustment".
7. Fit the locking plate (3).
8. Fit the lock nut (2). Tighten the lock nut (2) to the specified tightening torque. See main group "Technical data".
9. Secure the lock nut (2) with the locking plate (3).
10. Press the wheel-speed sensor (1) against the sensor ring (2). When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.



A8 00 391

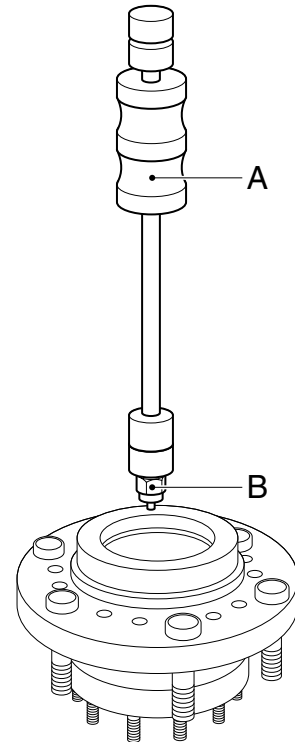
4.3 REMOVAL AND INSTALLATION, HUB OIL SEAL

Removing hub oil seal

1. Remove the wheel hub from the axle journal.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing hub oil seal

1. Use the special tool (DAF No. 0499809) to fit the oil seal such that the marking "outside" is pointing outward.
2. Install the wheel hub.



A8 00 392

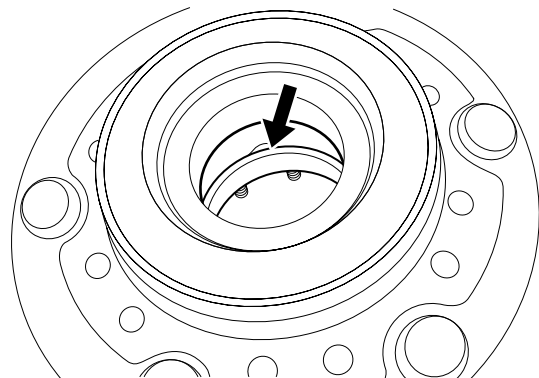
4.4 REMOVAL AND INSTALLATION, WHEEL BEARING

Removing wheel bearing

1. Remove the wheel hub.
2. Remove the oil seal from the wheel hub.
3. There are recesses in the wheel hub for removing the wheel bearing outer race.
4. Remove the wheel bearing outer races from the wheel hub using a driver.

Installing wheel bearing

1. Fit the wheel bearing outer races in the wheel hub using a driver.
2. Fit the hub oil seal.
3. Install the wheel hub.



A8 00 393

4.5 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

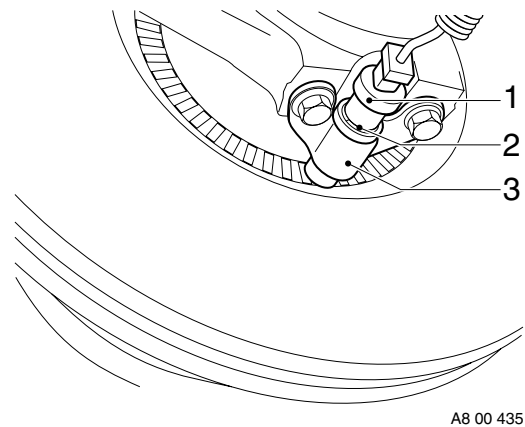
Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.



SINGLE REAR AXLE 5.10

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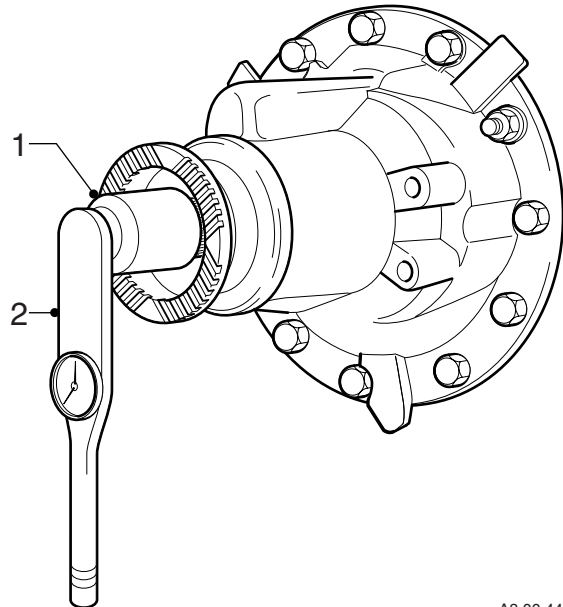
Removal and installation

LF45/55 series

4.6 REMOVAL AND INSTALLATION, DRIVE FLANGE

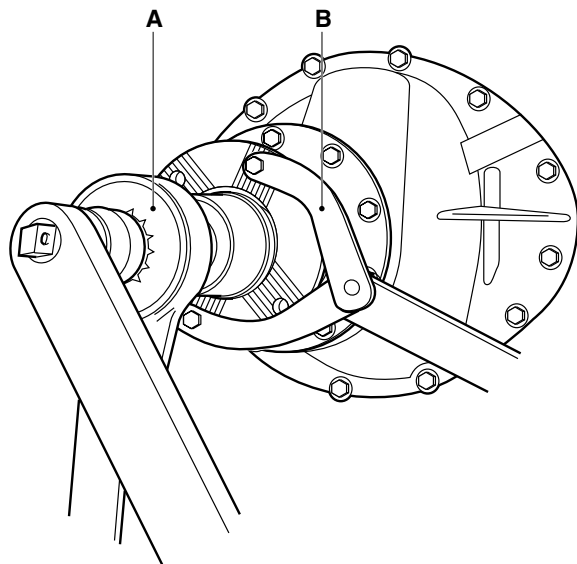
Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Jack up the rear axle and support it on stands.
3. Remove the stub axles.
4. Determine the pre-load of the pinion bearings by turning the drive flange nut using a torque wrench with a dial (2) and a 12-sided socket (1). Write down the measured slip torque.



A8 00 442

5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a 12-sided socket and a torque amplifier (A).
6. Remove the drive flange. If necessary, use a puller.



A8 00 386

Installing drive flange

1. Check the dust seal ring of the drive flange. If required, replace the dust seal ring.
2. Check the drive flange at the oil-seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
3. Clean the splines of the pinion and drive flange.

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SINGLE REAR AXLE 5.10

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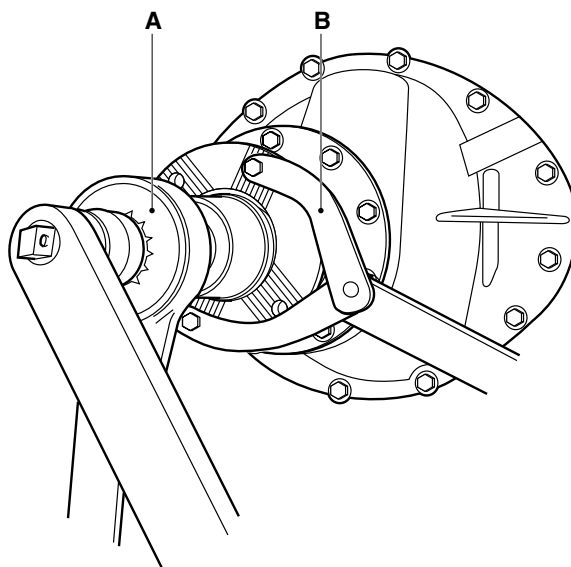
Removal and installation

4. Apply the specified sealant to the splines of the pinion. See main group "Technical data".
5. Fit the drive flange.
6. Fit a new drive flange nut.
7. Fit the special tool (3) (DAF No. 0484977) to the drive flange to prevent it from turning. Tighten the drive flange nut using a 12-sided socket and a torque amplifier (A) until no play is noticeable on the pinion.
8. Turn the drive flange a number of times to "seat" the pinion bearings.
9. Tighten the drive flange until the slip torque of the drive flange nut exceeds the noted value by 0.4 - 0.6 Nm.

Note:

If the slip torque of the drive flange nut exceeds the noted value increased by 0.4 - 0.6 Nm, loosen the drive flange nut a few strokes and repeat the setting procedure.

10. Fit the stub axles.
11. Fit the prop shaft to the drive flange.



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SINGLE REAR AXLE 5.10

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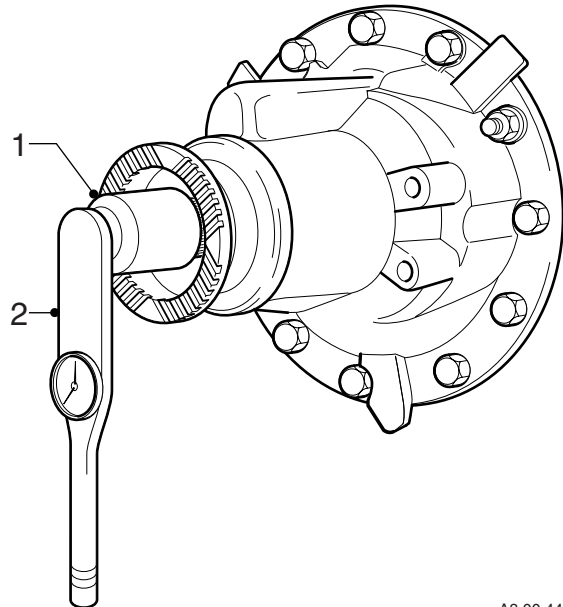
Removal and installation

LF45/55 series

4.7 REMOVAL AND INSTALLATION, PINION OIL SEAL

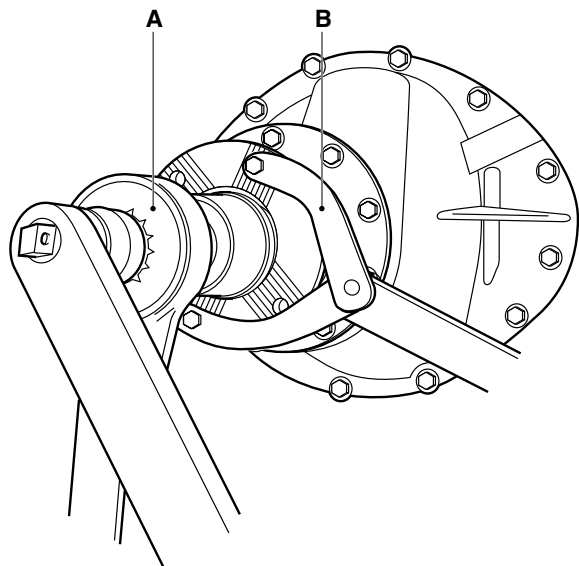
Removing pinion oil seal

1. Remove the prop shaft from the drive flange.
2. Jack up the rear axle and support it on stands.
3. Remove the stub axles.
4. Determine the pre-load of the pinion bearings by turning the drive flange nut using a torque wrench with a dial (2) and a 12-sided socket (1). Write down the measured slip torque.



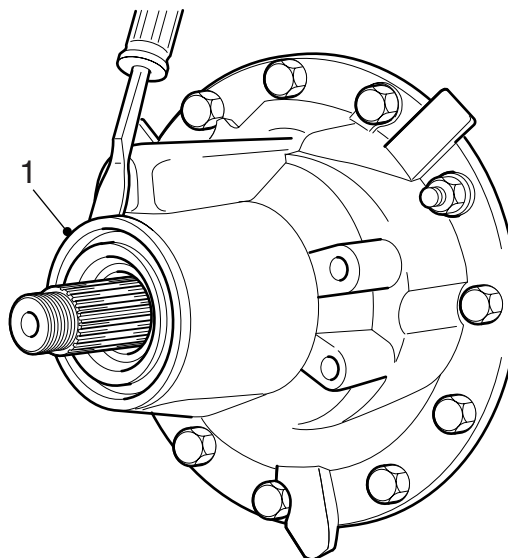
A8 00 442

5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a 12-sided socket and a torque amplifier (A).
6. Remove the drive flange. If necessary, use a puller.



A8 00 386

7. Remove the oil seal (1) from the differential housing.



A8 00 441

Installing pinion oil seal

1. Use the special tool (DAF No. 1453141) to fit the oil seal. Make sure that the steel outer ring of the oil seal abuts fully against the differential housing.
2. Check the dust seal ring of the drive flange. If required, replace the dust seal ring.
3. Check the drive flange at the oil seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
4. Clean the splines of the pinion and drive flange.
5. Apply the specified sealant to the splines of the pinion. See main group "Technical data".
6. Fit the drive flange.
7. Fit a new drive flange nut.

SINGLE REAR AXLE 5.10

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Removal and installation

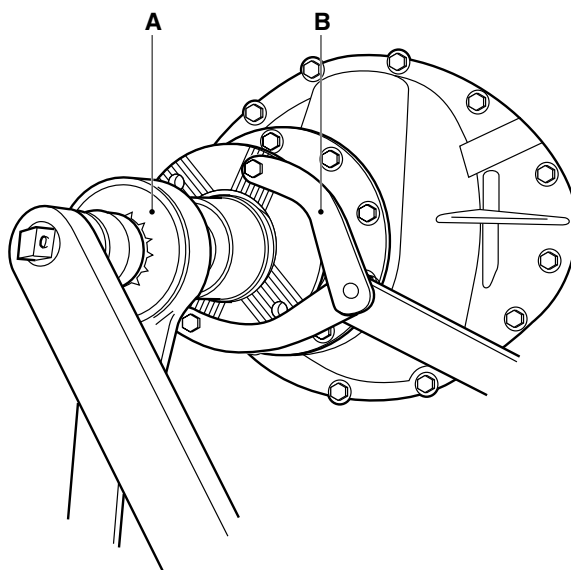
LF45/55 series

8. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Tighten the drive flange nut using a 12-sided socket and a torque amplifier (A) until no play is noticeable on the pinion.
9. Turn the drive flange a number of times to "seat" the pinion bearings.
10. Tighten the drive flange until the slip torque of the drive flange nut exceeds the noted value by 0.4 - 0.6 Nm.

Note:

If the slip torque of the drive flange nut exceeds the noted value increased by 0.4 - 0.6 Nm, loosen the drive flange nut a few strokes and repeat the setting procedure.

11. Fit the stub axles.
12. Fit the prop shaft to the drive flange.



A8 00 386

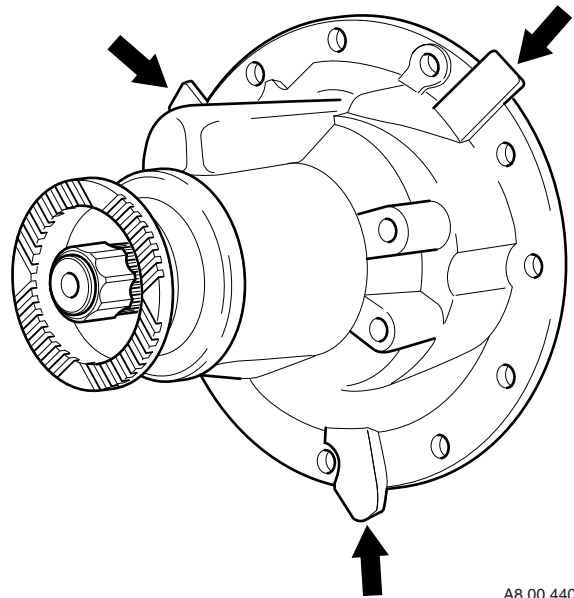
4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL

Removing differential

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Attach the differential securely to a lifting device.
5. Remove the attachment bolts and nuts from the differential.
6. Remove the differential from the axle housing by carefully pressing the differential off the axle housing using a pry bar at the indicated places.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the stub axles.
7. Fit the prop shaft to the drive flange.
8. Fill the differential with oil. See chapter "Draining and filling".



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SINGLE REAR AXLE 5.10

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Removal and installation

LF45/55 series

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5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



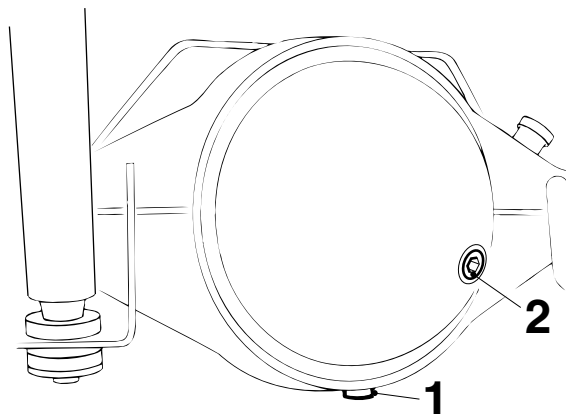
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



A8 00 370

5.2 DRAINING AND FILLING, WHEEL HUBS



To prevent skin injury, avoid unnecessary contact with the drained oil.

Note:

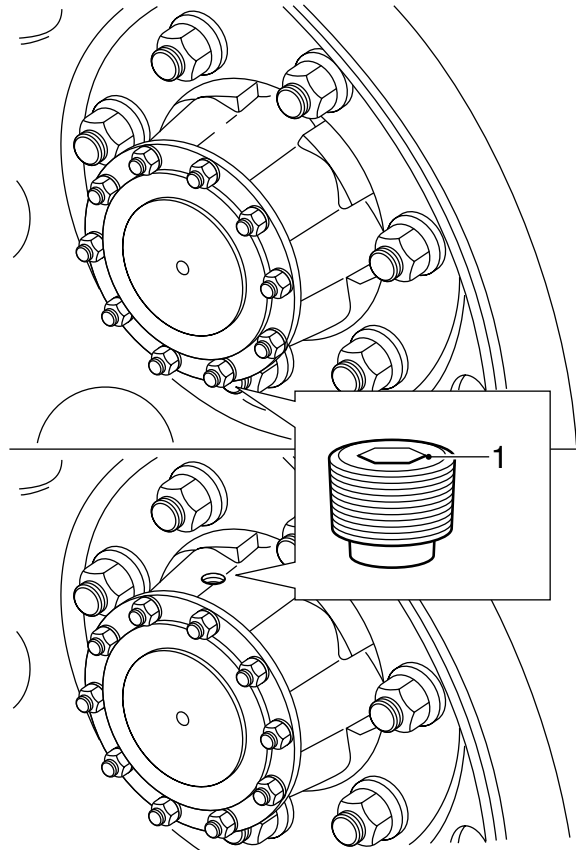
The design of the hub and the location of the drain/filler plug may differ from the illustration, depending on the version.

Draining wheel hub

1. Position the vehicle on a level surface.
2. Position the wheels in such a way that the oil drain/filler plug (1) is at the bottom.
3. Place a suitable tray under the hub to collect the oil. Remove the oil drain/filler plug (1).
4. Drain the oil and let the oil leak out of the hub.

Filling wheel hub

1. Position the wheels in such a way that the oil drain/filler plug (1) is at the top.
2. Fill the wheel hub with the specified and correct quantity of oil. See main group "Technical data".
3. Apply sealant to the screw thread of the oil drain/filler plug (1). Fit the oil drain/filler plug (1) into the hub.



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SINGLE REAR AXLE 5.12

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Contents

LF45/55 series

3

1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

SINGLE REAR AXLE 5.12

8

Safety instructions

LF45/55 series

3

2. GENERAL

2.1 DESCRIPTION OF 5.12 AXLE

Differential

The 5.12 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings for the 5.12 axle is adjusted using shims which are placed between the bearing inner races.

The pinion housing of the 5.12 axle can be removed using jacking bolts.

Wheel hub

The wheel hub has a wheel bearing and hub oil seal that can be replaced separately. The wheel-speed sensor ring is integrated into the wheel hub. The wheel bearing play is adjusted using the hub nut. The correct wheel bearing pre-load is achieved by fitting the hub nut as specified.

The hub nut is secured with a lock nut and a locking plate.

The wheel bearing is greased by the oil in the hub.

The stub axle and brake disc are attached to the wheel hub with attachment nuts and bolts respectively.

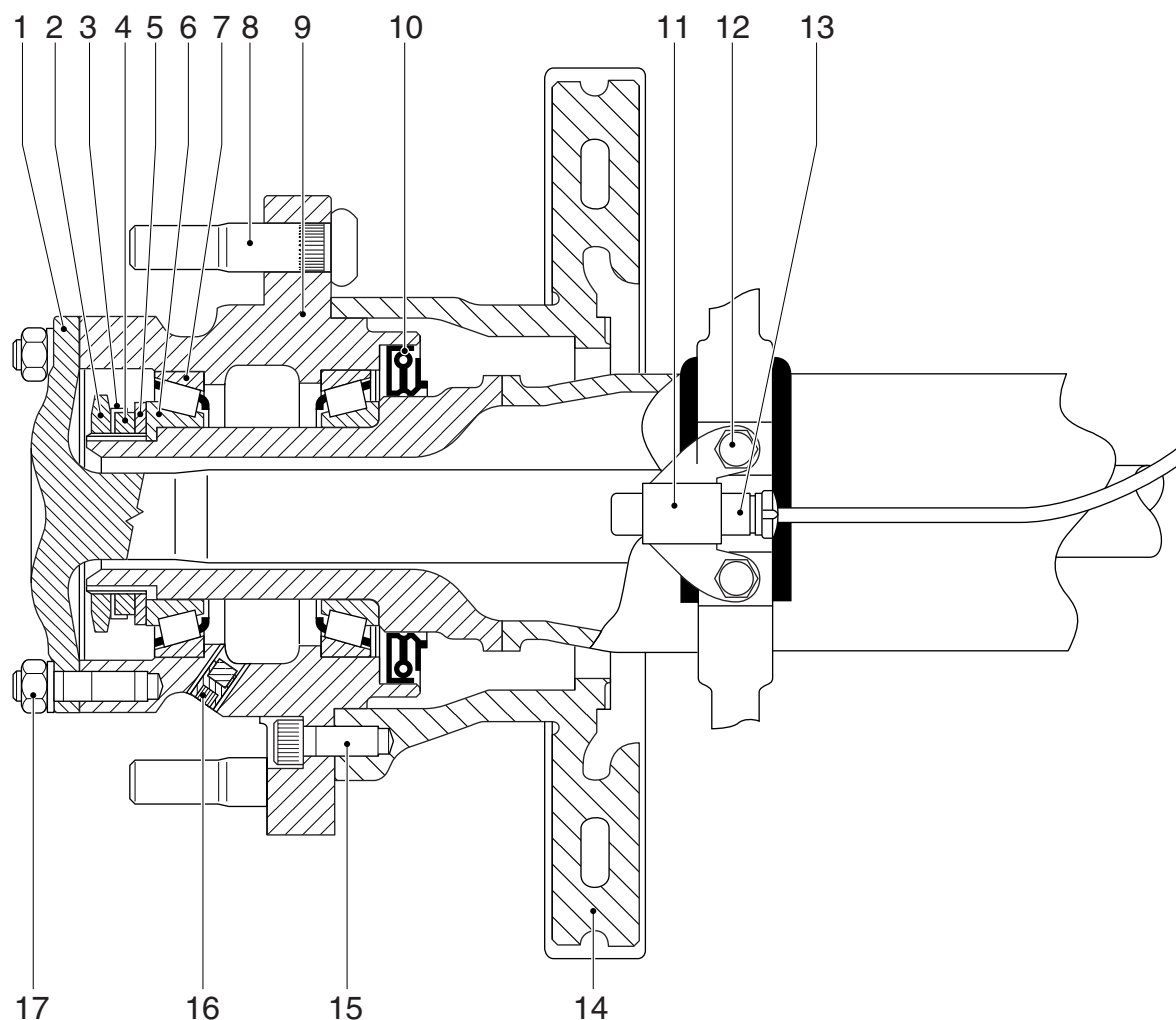
SINGLE REAR AXLE 5.12

8

General

LF45/55 series

2.2 OVERVIEW DRAWING, WHEEL HUB



A8 00 384

Legend

- | | |
|-----------------------------|--|
| 1. Stub axle | 10. Hub oil seal |
| 2. Lock nut | 11. Wheel-speed sensor holder |
| 3. Locking plate | 12. Wheel-speed sensor holder attachment bolts |
| 4. Hub nut | 13. Wheel-speed sensor |
| 5. Thrust washer | 14. Brake disc |
| 6. Wheel bearing inner race | 15. Brake disc attachment bolt |
| 7. Wheel bearing outer race | 16. Drain plug |
| 8. Wheel stud | 17. Stub axle attachment nut |
| 9. Wheel hub | |

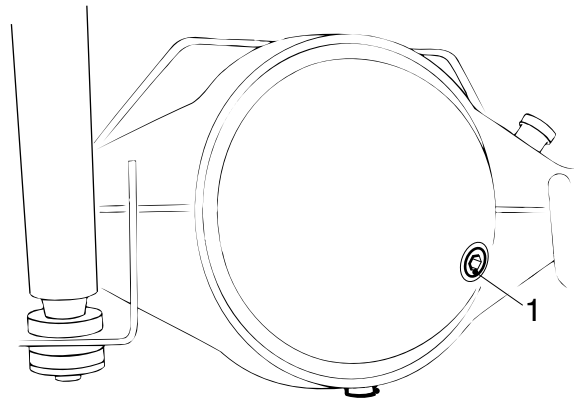
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



A8 00 375

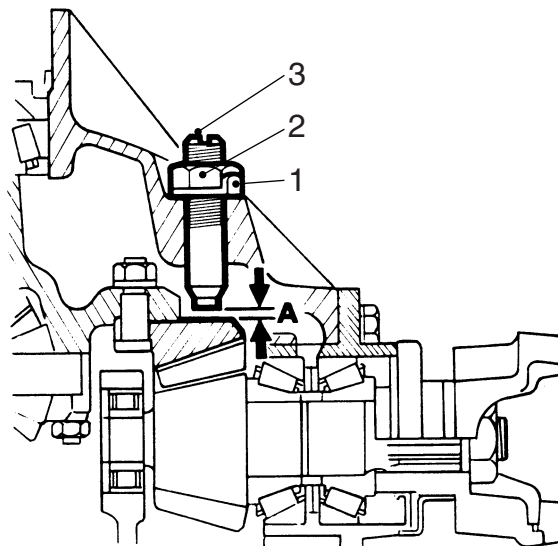
3.2 ADJUSTING THE CROWN WHEEL GUIDE BOLT

1. Place chocks in front of the wheels and engage the parking brake.
2. Loosen the lock ring (1) and loosen the lock nut (2) a few turns.
3. Remove the adjusting screw (3) from the differential.
4. Remove the lock ring (1).
5. Remove any residual sealant from the adjusting screw and apply new sealant to the last 4 windings of the screw thread. See main group "Technical data".
6. Fit the adjusting screw with a new lock ring and tighten the adjusting screw against the crown wheel.
7. Turn the adjusting screw 1/8 stroke back to obtain the required play A.
8. Tighten the lock nut to the specified tightening torque. See main group "Technical data".

Note:

Make sure that the adjusting screw does not turn while the lock nut is being tightened.

9. Secure the lock nut by folding the lips of the lock ring.

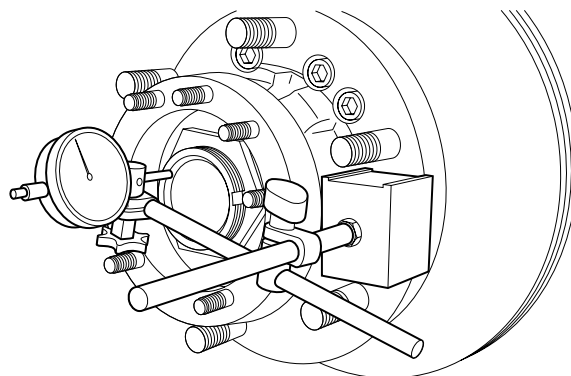


A8 00 429

3.3 INSPECTION AND ADJUSTMENT, WHEEL BEARING PLAY

Inspecting the wheel bearing play

1. Remove the wheel.
2. Remove the stub axle.
3. Remove the brake pads.
4. Fit a micrometer gauge to the wheel hub, with the stylus on the end of the axle journal.
5. Push and pull the wheel hub. Check the wheel bearing play and compare it with the specified value. See main group "Technical data".

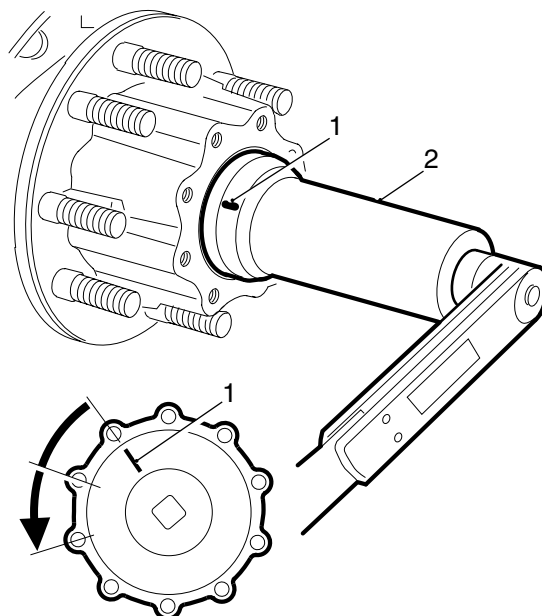


A8 00 387

3

Adjusting the wheel bearing play

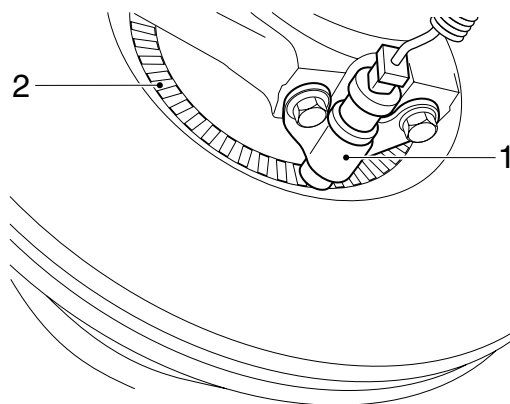
1. Remove the lock nut.
2. Tighten the hub nut with a hub nut wrench (DAF No. 0499805) to 136 Nm.
3. Turn the hub two full rotations in order to "seat" the wheel bearings.
4. Mark (1) the hub nut wrench (2).
5. Turn the hub nut 2 strokes back.
6. Check the wheel bearing play.
7. Position the locking plate and fit the lock nut. Tighten the lock nut to the specified tightening torque. See main group "Technical data".
8. Secure the hub nut and lock nut with the locking plate.



A8 00 380

3.4 INSPECTION, WHEEL-SPEED SENSOR RING

1. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
2. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
3. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



A8 00 391



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Check the ABS system for proper operation.

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Remove the stub axle attachment nuts.
3. Remove the stub axle using a copper punch. When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.

Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment nuts to the specified tightening torque. See main group "Technical data".

SINGLE REAR AXLE 5.12

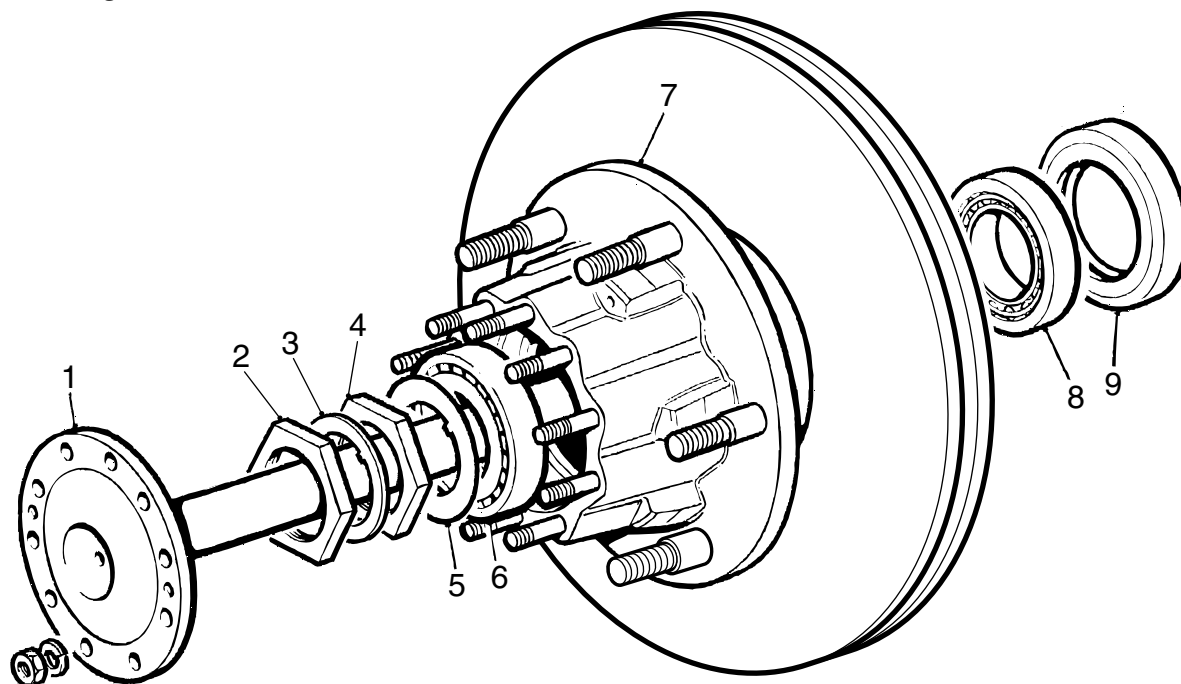
8

Removal and installation

LF45/55 series

4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub



A8 00 394

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle (1).
5. Remove the lock nut (2).
6. Remove the locking plate (3).
7. Remove the hub nut (4).
8. Remove the thrust washer (5).
9. Remove the wheel bearing inner race (6).
10. Remove the wheel hub from the axle journal.

3

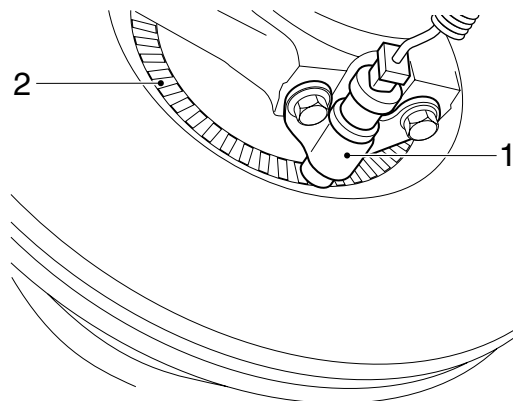
Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seal in the wheel hub for damage. Replace the oil seal if in doubt.
2. Check the axle journal screw thread carefully for damage.
3. Install the wheel hub on the axle journal. Slide the wheel hub onto the axle journal. Fit the wheel bearing inner race (6).
4. Fit the thrust washer (5).
5. Fit the hub nut (4).
6. Adjust the wheel bearing play, see chapter "Inspection and adjustment".
7. Fit the locking plate (3).
8. Fit the lock nut (2). Tighten the lock nut (2) to the specified tightening torque. See main group "Technical data".
9. Secure the lock nut (2) with the locking plate (3).
10. Press the wheel-speed sensor (1) against the sensor ring (2). When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.



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SINGLE REAR AXLE 5.12**8**

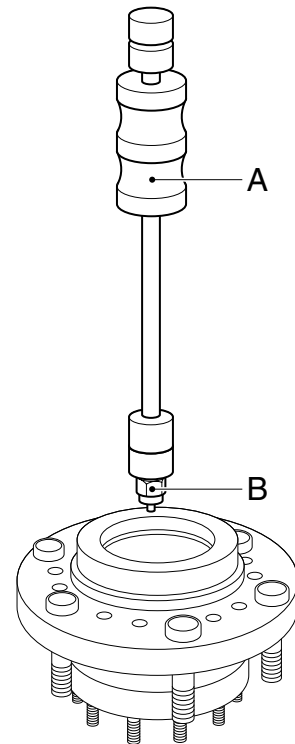
Removal and installation

LF45/55 series**4.3 REMOVAL AND INSTALLATION, HUB OIL SEAL****Removing hub oil seal**

1. Remove the wheel hub from the axle journal.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing hub oil seal

1. Use the special tool (DAF No. 0499809) to fit the oil seal such that the marking "outside" is pointing outward.
2. Install the wheel hub.



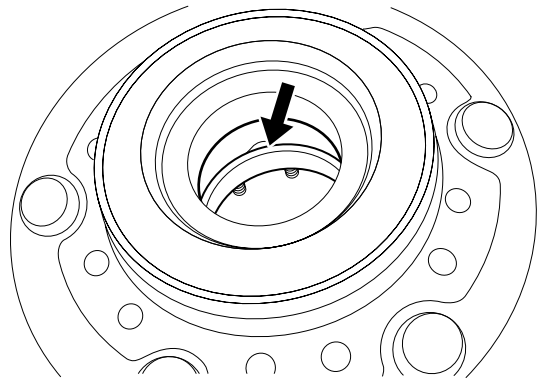
A8 00 392

4.4 REMOVAL AND INSTALLATION, WHEEL BEARING**Removing wheel bearing**

1. Remove the wheel hub.
2. Remove the oil seal from the wheel hub.
3. There are recesses in the wheel hub for removing the wheel bearing outer race.
4. Remove the wheel bearing outer races from the wheel hub using a driver.

Installing wheel bearing

1. Fit the wheel bearing outer races in the wheel hub using a driver.
2. Fit the hub oil seal.
3. Install the wheel hub.



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4.5 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

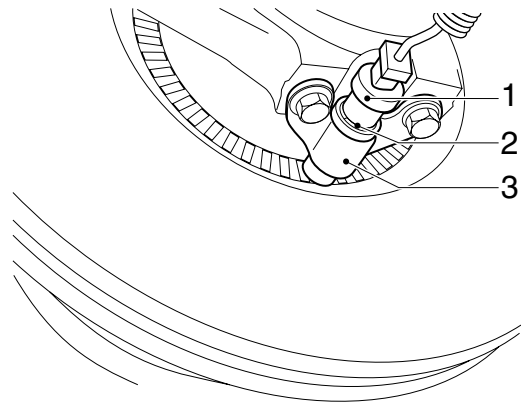
Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.



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SINGLE REAR AXLE 5.12

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Removal and installation

LF45/55 series

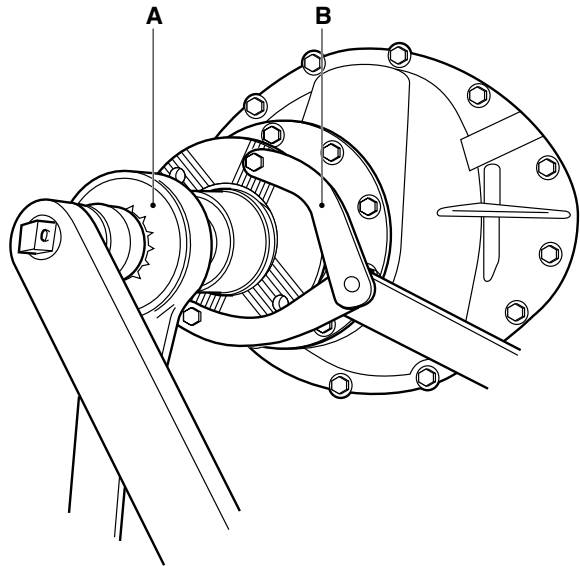
4.6 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil-seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Apply a small amount of oil to the abutting surface of the drive flange nut.
4. Fit a new drive flange nut.
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



A8 00 386

3

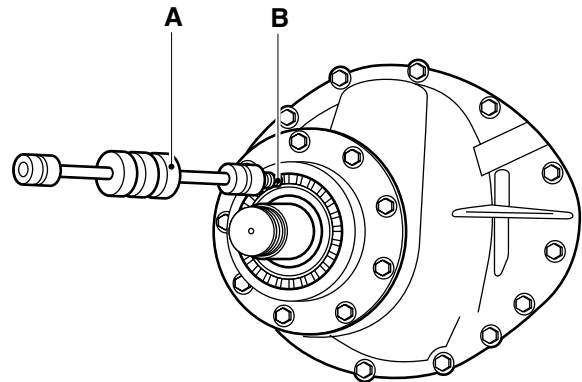
4.7 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 0485183) to fit the oil seal such that the marking "outside" is pointing outward.
2. Fit the drive flange.



A8 00 381

SINGLE REAR AXLE 5.12**8**

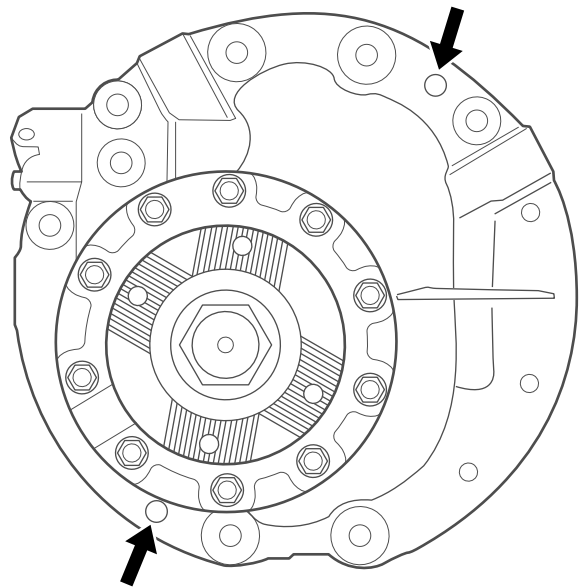
Removal and installation

LF45/55 series**4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL****Removing differential**

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Attach the differential securely to a lifting device.
5. Remove the attachment bolts and nuts from the differential.
6. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the stub axles.
7. Fit the prop shaft to the drive flange.
8. Fill the differential with oil. See chapter "Draining and filling".



A8 00 378

5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



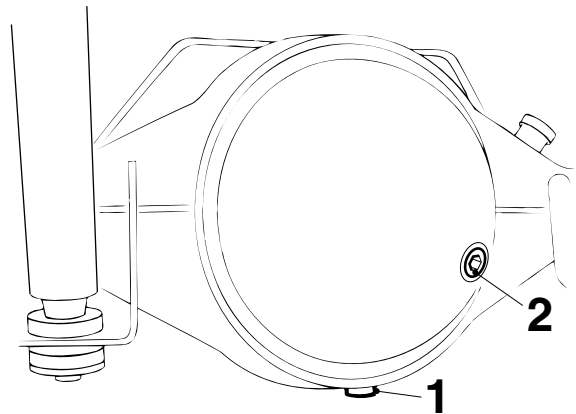
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



A8 00 370

5.2 DRAINING AND FILLING, WHEEL HUBS

To prevent skin injury, avoid unnecessary contact with the drained oil.

Note:

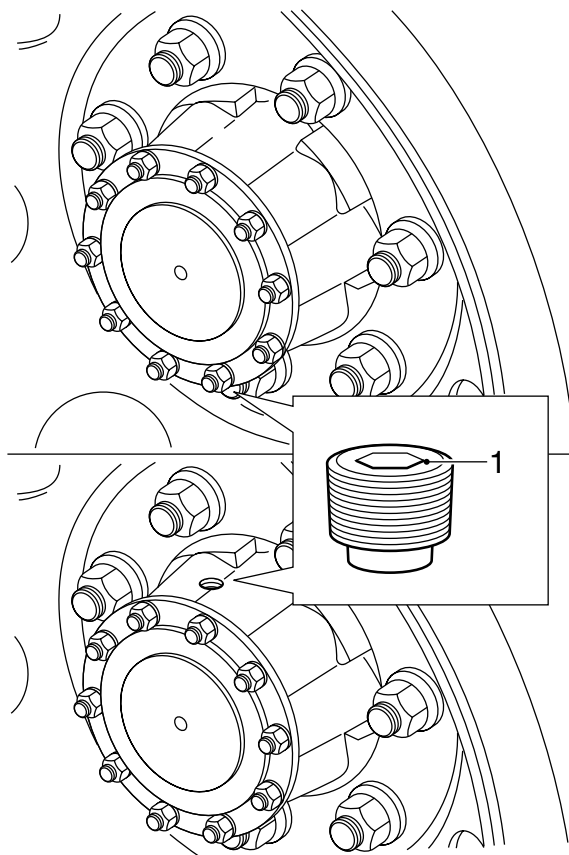
The design of the hub and the location of the drain/filler plug may differ from the illustration, depending on the version.

Draining wheel hub

1. Position the vehicle on a level surface.
2. Position the wheels in such a way that the oil drain/filler plug (1) is at the bottom.
3. Place a suitable tray under the hub to collect the oil. Remove the oil drain/filler plug (1).
4. Drain the oil and let the oil leak out of the hub.

Filling wheel hub

1. Position the wheels in such a way that the oil drain/filler plug (1) is at the top.
2. Fill the wheel hub with the specified and correct quantity of oil. See main group "Technical data".
3. Apply sealant to the screw thread of the oil drain/filler plug (1). Fit the oil drain/filler plug (1) into the hub.



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SINGLE REAR AXLE 5.14

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Contents

LF45/55 series

4

1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

SINGLE REAR AXLE 5.14

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Safety instructions

LF45/55 series

4

2. GENERAL

2.1 DESCRIPTION OF 5.14 AXLE

Differential

The 5.14 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings for the 5.14 axle is adjusted using shims which are placed between the bearing inner races.

The pinion housing of the 5.14 axle can be removed using jacking bolts.

Differential lock

The 5.14 axle is equipped with a variable differential-gear lock.

The satellite gear housing flange is fitted with spline toothing on the right-hand side. The left-hand side of the selector sleeve is equipped with similar toothing.

The selector sleeve has internal splines similar to those on the stub axle.

There is a groove on outside of the selector sleeve accommodating a fork which is attached to the engaging cylinder.

If the engaging cylinder is pressurised using the pneumatic switch, the selector sleeve toothing will mesh with the toothing of the satellite gear housing.

If the engaging cylinder is vented via the pneumatic switch, the spring will ensure that the lock is disengaged.

SINGLE REAR AXLE 5.14

8

General

LF45/55 series

Wheel hub

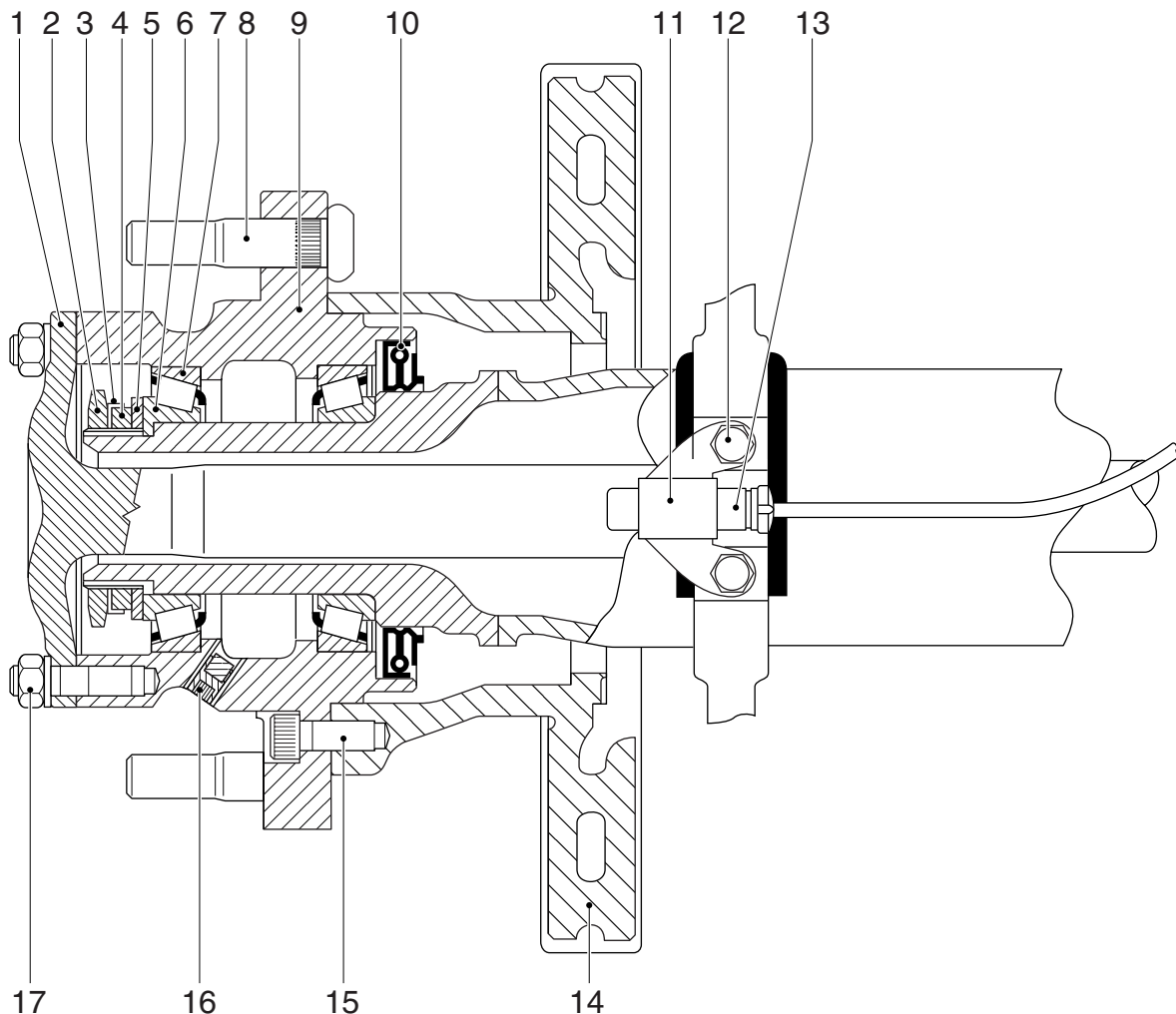
The wheel hub has a wheel bearing and hub oil seal that can be replaced separately. The wheel-speed sensor ring is integrated into the wheel hub. The wheel bearing play is adjusted using the hub nut. The correct wheel bearing pre-load is achieved by fitting the hub nut as specified.

The hub nut is secured with a lock nut and a locking plate.

The wheel bearing is greased by the oil in the hub.

The stub axle and brake disc are attached to the wheel hub with attachment nuts and bolts respectively.

2.2 OVERVIEW DRAWING, WHEEL HUB



A8 00 384

Legend

- | | |
|-----------------------------|--|
| 1. Stub axle | 10. Hub oil seal |
| 2. Lock nut | 11. Wheel-speed sensor holder |
| 3. Locking plate | 12. Wheel-speed sensor holder attachment bolts |
| 4. Hub nut | 13. Wheel-speed sensor |
| 5. Thrust washer | 14. Brake disc |
| 6. Wheel bearing inner race | 15. Brake disc attachment bolt |
| 7. Wheel bearing outer race | 16. Drain plug |
| 8. Wheel stud | 17. Stub axle attachment nut |
| 9. Wheel hub | |

SINGLE REAR AXLE 5.14

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General

LF45/55 series

4

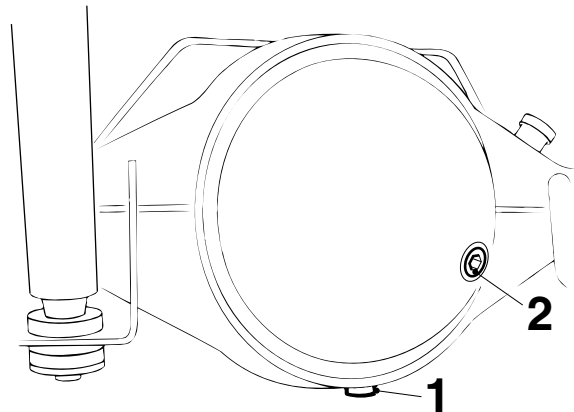
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



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4

3.2 CHECKING OPERATION OF DIFFERENTIAL LOCK

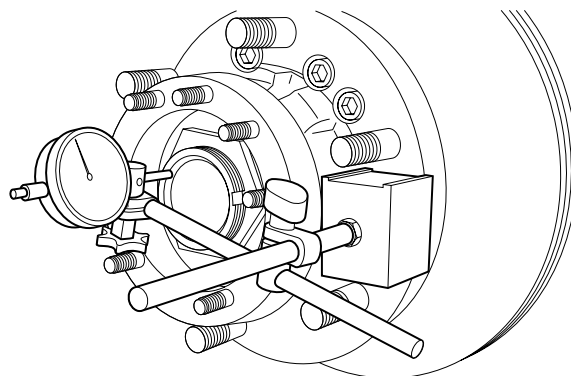
1. Jack up the rear axle and support it on stands.
2. Bring the air system to operating pressure.
3. Engage the differential lock. The warning indicator in the cab should now be activated.
4. Check whether there is a “rigid” connection between the driven wheels.
5. Disengage the differential lock. The warning indicator must no longer be activated and the “rigid” connection between the driven wheels should be interrupted.

SINGLE REAR AXLE 5.14**8**

Inspection and adjustment

LF45/55 series**3.3 INSPECTION AND ADJUSTMENT, WHEEL BEARING PLAY****Inspecting the wheel bearing play**

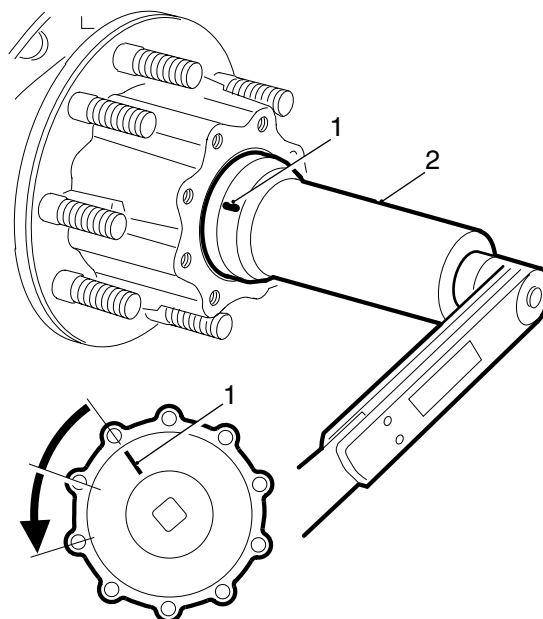
1. Remove the wheel.
2. Remove the stub axle.
3. Remove the brake pads.
4. Fit a micrometer gauge to the wheel hub, with the stylus on the end of the axle journal.
5. Push and pull the wheel hub. Check the wheel bearing play and compare it with the specified value. See main group "Technical data".



A8 00 387

Adjusting the wheel bearing play

1. Remove the lock nut.
2. Tighten the hub nut with a hub nut wrench (DAF No. 0499805) to 136 Nm.
3. Turn the hub two full rotations in order to "seat" the wheel bearings.
4. Mark (1) the hub nut wrench (2).
5. Turn the hub nut 2 strokes back.
6. Check the wheel bearing play.
7. Position the locking plate and fit the lock nut. Tighten the lock nut to the specified tightening torque. See main group "Technical data".
8. Secure the hub nut and lock nut with the locking plate.



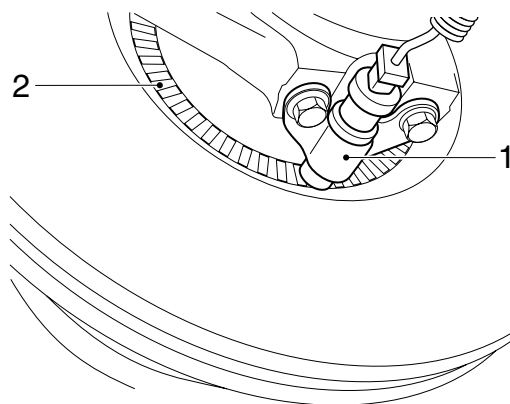
A8 00 380

3.4 INSPECTION, WHEEL-SPEED SENSOR RING

1. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
2. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
3. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



A8 00 391

4. Check the ABS system for proper operation.

SINGLE REAR AXLE 5.14

8

Inspection and adjustment

LF45/55 series

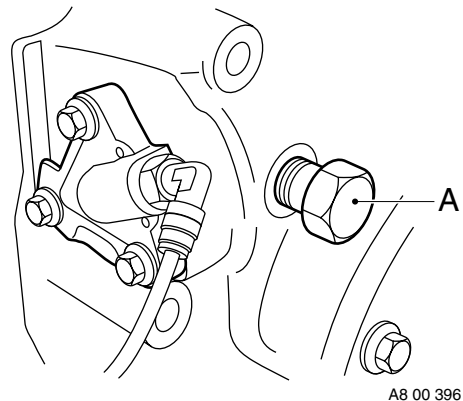
4

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Engage the differential lock, if applicable. Check that the axle is blocked. Replace the switch by the special tool (DAF No. 1329447), see (A). This is to prevent the selector sleeve from falling into the differential when removing the stub axle.
3. Remove the stub axle attachment nuts.
4. Remove the stub axle using a copper punch. When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.



Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment nuts to the specified tightening torque. See main group "Technical data".
4. Engage the differential lock, if applicable, and remove the special tool from the differential lock. Install the switch.

SINGLE REAR AXLE 5.14

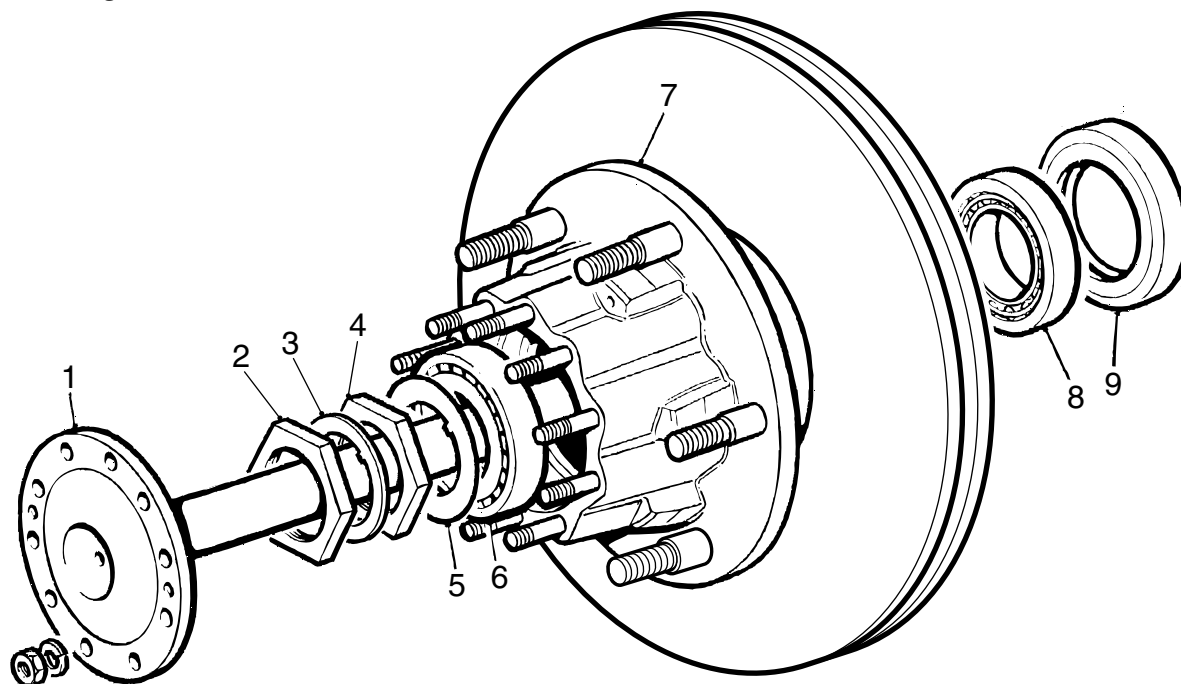
8

Removal and installation

LF45/55 series

4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub



A8 00 394

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle (1).
5. Remove the lock nut (2).
6. Remove the locking plate (3).
7. Remove the hub nut (4).
8. Remove the thrust washer (5).
9. Remove the wheel bearing inner race (6).
10. Remove the wheel hub from the axle journal.

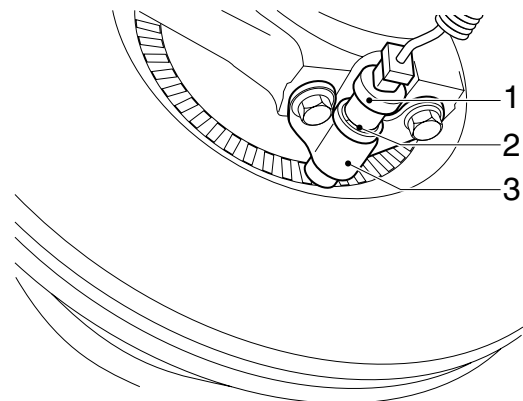
Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seal in the wheel hub for damage. Replace the oil seal if in doubt.
2. Check the axle journal screw thread carefully for damage.
3. Install the wheel hub on the axle journal. Slide the wheel hub onto the axle journal. Fit the wheel bearing inner race (6).
4. Fit the thrust washer (5).
5. Fit the hub nut (4).
6. Adjust the wheel bearing play, see chapter "Inspection and adjustment".
7. Fit the locking plate (3).
8. Fit the lock nut (2). Tighten the lock nut (2) to the specified tightening torque. See main group "Technical data".
9. Secure the lock nut (2) with the locking plate (3).
10. Press the wheel-speed sensor (1) against the sensor ring (2). When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.



A8 00 435

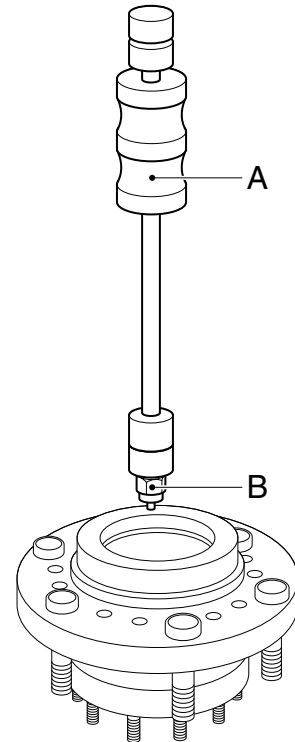
4.3 REMOVAL AND INSTALLATION, HUB OIL SEAL

Removing hub oil seal

1. Remove the wheel hub from the axle journal.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing hub oil seal

1. Use the special tool (DAF No. 0499809) to fit the oil seal such that the marking "outside" is pointing outward.
2. Install the wheel hub.



A8 00 392

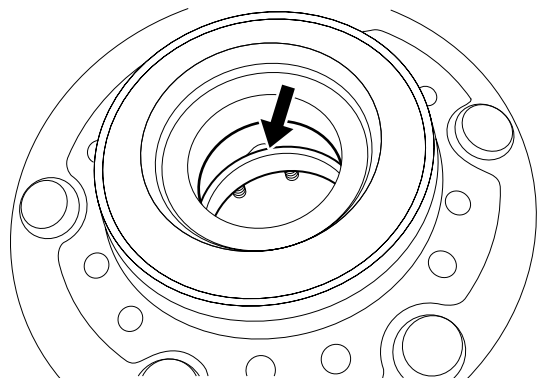
4.4 REMOVAL AND INSTALLATION, WHEEL BEARING

Removing wheel bearing

1. Remove the wheel hub.
2. Remove the oil seal from the wheel hub.
3. There are recesses in the wheel hub for removing the wheel bearing outer race.
4. Remove the wheel bearing outer races from the wheel hub using a driver.

Installing wheel bearing

1. Fit the wheel bearing outer races in the wheel hub using a driver.
2. Fit the hub oil seal.
3. Install the wheel hub.



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4.5 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

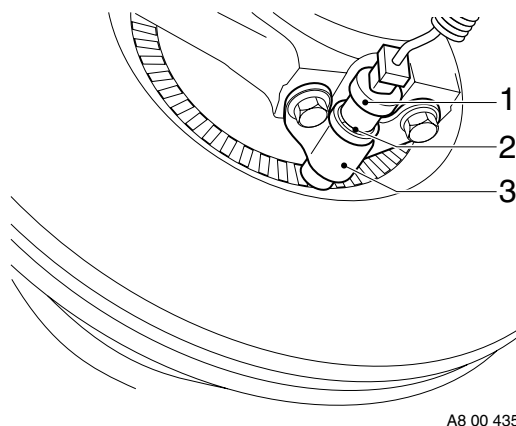
Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.



SINGLE REAR AXLE 5.14

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Removal and installation

LF45/55 series

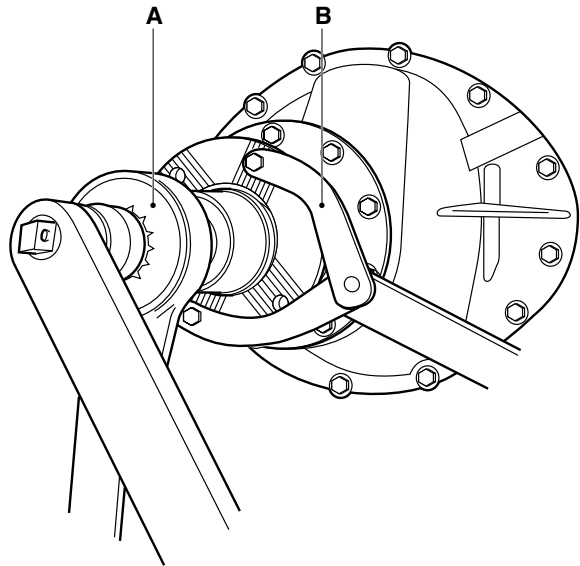
4.6 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil-seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Apply a small amount of oil to the abutting surface of the drive flange nut.
4. Fit a new drive flange nut.
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



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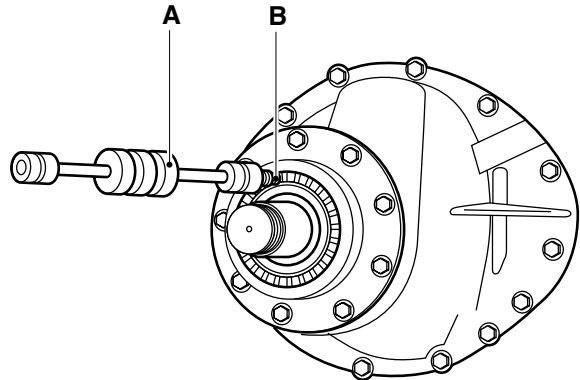
4.7 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 0485183) to fit the oil seal such that the marking "outside" is pointing outward.
2. Fit the drive flange.



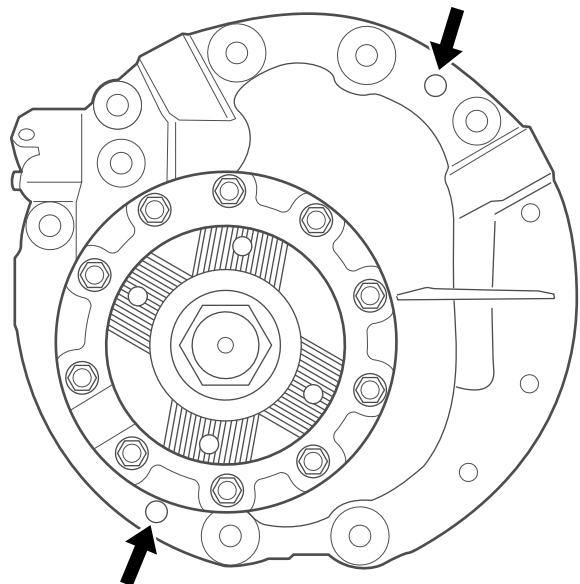
A8 00 381

4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL**Removing differential**

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Remove the air connection for the differential lock, if applicable.
5. Attach the differential securely to a lifting device.
6. Remove the attachment bolts and nuts from the differential.
7. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the air connection to the differential lock.
7. Fit the stub axles.
8. Fit the prop shaft to the drive flange.
9. Fill the differential with oil. See chapter "Draining and filling".



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4.9 REMOVAL AND INSTALLATION, DIFFERENTIAL LOCK OF 5.14 AXLE

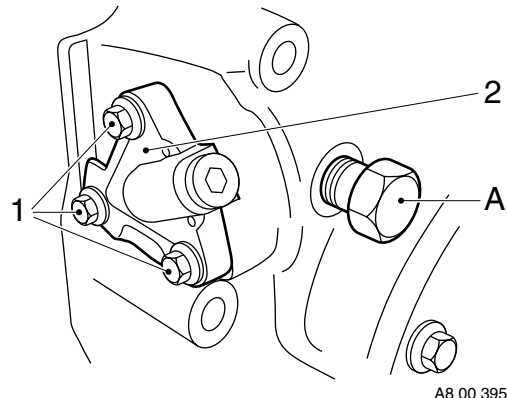
Removing differential lock

1. Remove the differential.



Do not come near the selector sleeve when de-aerating the differential lock.

2. Pressurise the air connection of the differential lock. Remove the special tool (A). Evenly de-aerate the differential lock.
3. Remove the attachment bolts (1) from the cylinder cover (2). Remove the cover.



4. Remove the piston (5).
5. Remove the shifting fork (2) and the selector sleeve (1) with the spring (3).

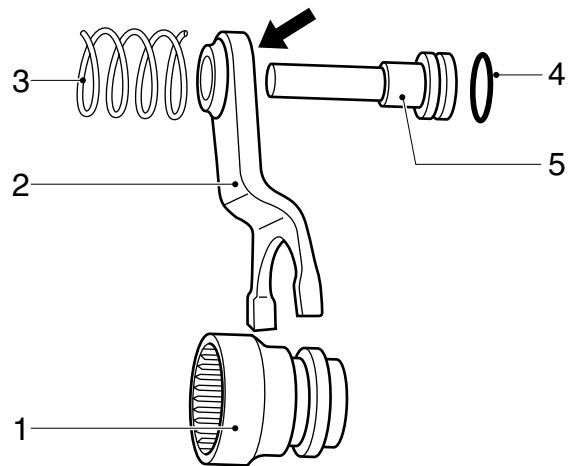
Installing differential lock

1. Install the shifting fork (2) and selector sleeve (1) with the spring (3).

Note:

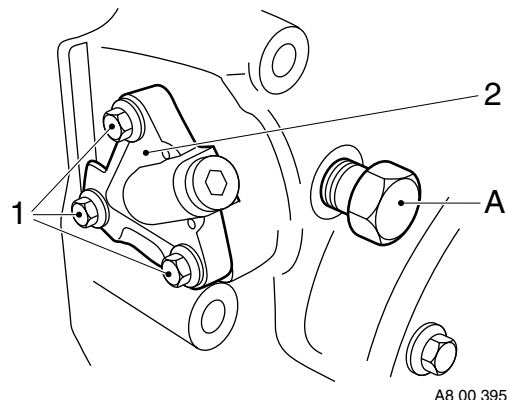
Make sure that the flat side (see arrow) of the shifting fork (2) points towards the piston (5).

2. Apply a small amount of oil to the seal (4) of the piston (5).
3. Install the piston (5).
4. Install the cylinder cover (2) and tighten the attachment bolts (1) evenly. Tighten the attachment bolts (1) to the specified tightening torque. See main group "Technical data".



Do not come near the selector sleeve when de-aerating the differential lock.

5. Pressurise the air connection of the differential lock. Fit special tool (A) (DAF No. 1329447), so that the differential lock is blocked.
6. Install the differential.



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Removal and installation

LF45/55 series

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5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



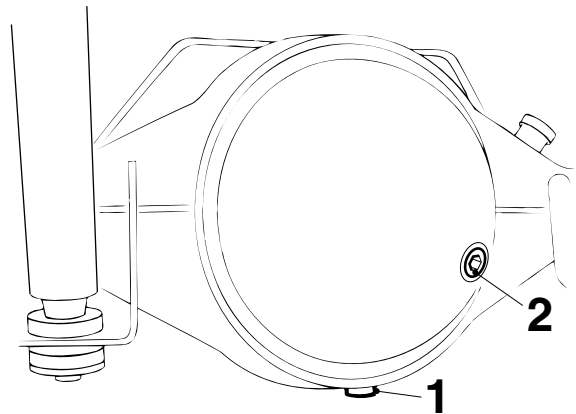
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



A8 00 370

5.2 DRAINING AND FILLING, WHEEL HUBS



To prevent skin injury, avoid unnecessary contact with the drained oil.

Note:

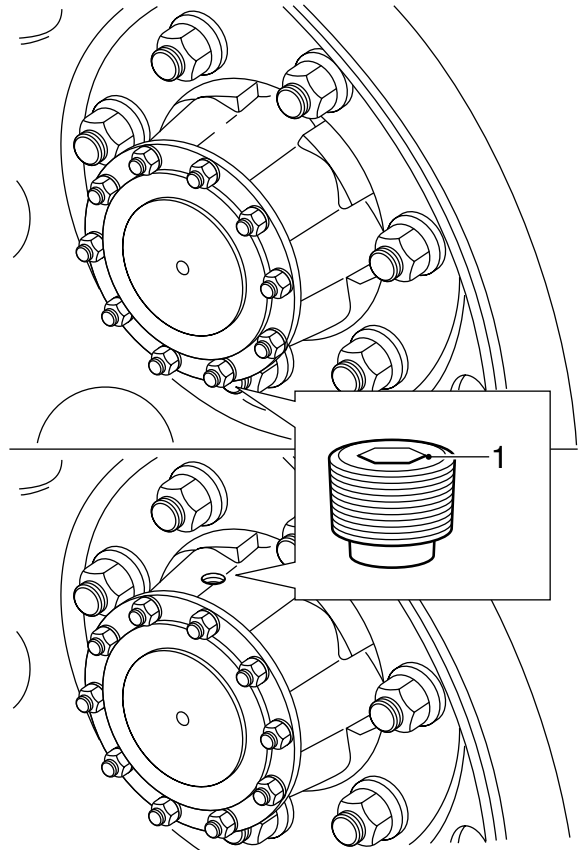
The design of the hub and the location of the drain/filler plug may differ from the illustration, depending on the version.

Draining wheel hub

1. Position the vehicle on a level surface.
2. Position the wheels in such a way that the oil drain/filler plug (1) is at the bottom.
3. Place a suitable tray under the hub to collect the oil. Remove the oil drain/filler plug (1).
4. Drain the oil and let the oil leak out of the hub.

Filling wheel hub

1. Position the wheels in such a way that the oil drain/filler plug (1) is at the top.
2. Fill the wheel hub with the specified and correct quantity of oil. See main group "Technical data".
3. Apply sealant to the screw thread of the oil drain/filler plug (1). Fit the oil drain/filler plug (1) into the hub.



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SINGLE REAR AXLE 8.20

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1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

SINGLE REAR AXLE 8.20

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Safety instructions

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2. GENERAL

2.1 DESCRIPTION OF 8.20 AXLE

Differential

The 8.20 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings is adjusted using shims which are placed between the bearing inner races.

The pinion housing can be removed using jacking bolts.

Differential lock

The 8.20 axle is equipped with a variable differential-gear lock.

The satellite gear housing flange is fitted with spline toothing on the right-hand side. The left-hand side of the selector sleeve is equipped with similar toothing.

The selector sleeve has internal splines similar to those on the stub axle.

There is a groove on outside of the selector sleeve accommodating a fork which is attached to the engaging cylinder.

If the engaging cylinder is pressurised using the pneumatic switch, the selector sleeve toothing will mesh with the toothing of the satellite gear housing.

If the engaging cylinder is vented via the pneumatic switch, the spring will ensure that the lock is disengaged.

SINGLE REAR AXLE 8.20

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General

LF45/55 series

Wheel hub

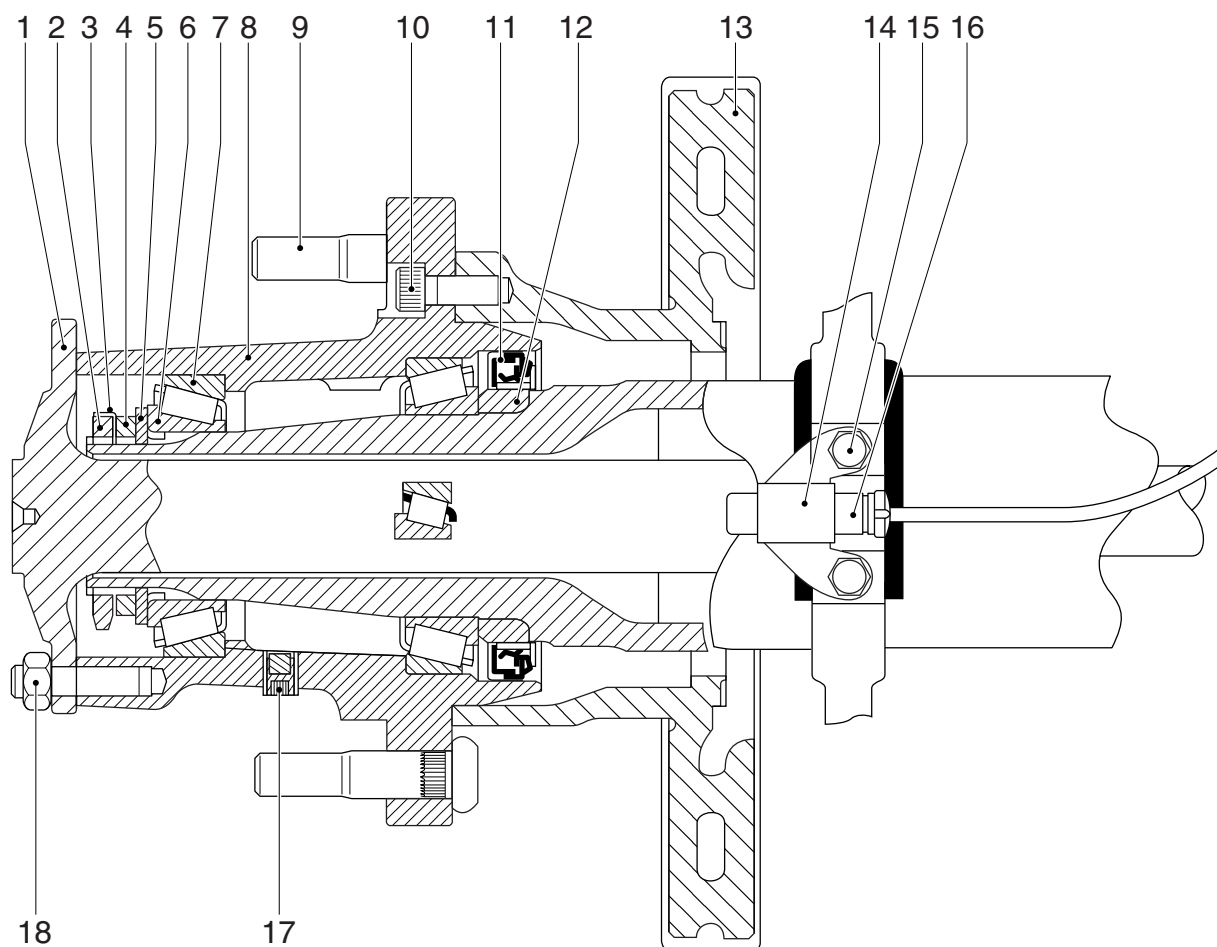
The wheel hub has a wheel bearing and hub oil seal that can be replaced separately. The wheel-speed sensor ring is integrated into the wheel hub. The wheel bearing play is adjusted using the hub nut. The correct wheel bearing pre-load is achieved by fitting the hub nut as specified.

The hub nut is secured with a lock nut and a locking plate.

The wheel bearing is greased by the oil in the hub.

The stub axle and brake disc are attached to the wheel hub with attachment nuts and bolts respectively.

2.2 OVERVIEW DRAWING, WHEEL HUB



A8 00 385

Legend

- | | |
|--------------------------------|---|
| 1. Stub axle | 11. Hub oil seal |
| 2. Lock nut | 12. Race of hub oil seal |
| 3. Locking plate | 13. Brake disc |
| 4. Hub nut | 14. Wheel-speed sensor holder |
| 5. Thrust washer | 15. Wheel-speed sensor holder attachment bolt |
| 6. Wheel bearing inner race | 16. Wheel-speed sensor |
| 7. Wheel bearing outer race | 17. Drain plug |
| 8. Wheel hub | 18. Stub axle attachment nut |
| 9. Wheel stud | |
| 10. Brake disc attachment bolt | |

SINGLE REAR AXLE 8.20

8

General

LF45/55 series

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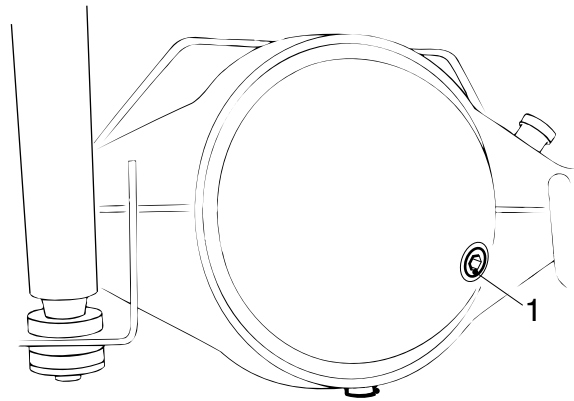
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



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3.2 CHECKING OPERATION OF DIFFERENTIAL LOCK

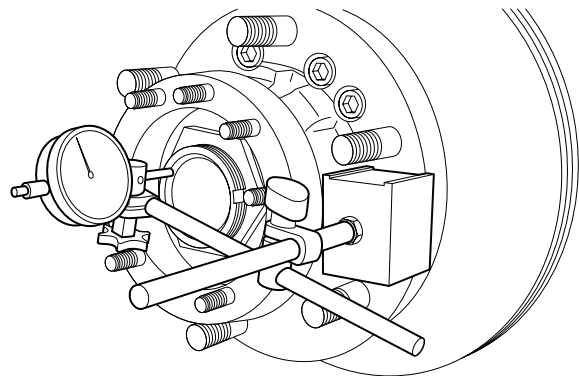
1. Jack up the rear axle and support it on stands.
2. Bring the air system to operating pressure.
3. Engage the differential lock. The warning indicator in the cab should now be activated.
4. Check whether there is a “rigid” connection between the driven wheels.
5. Disengage the differential lock. The warning indicator must no longer be activated and the “rigid” connection between the driven wheels should be interrupted.

SINGLE REAR AXLE 8.20**8**

Inspection and adjustment

LF45/55 series**3.3 INSPECTION AND ADJUSTMENT, WHEEL BEARING PLAY****Inspecting the wheel bearing play**

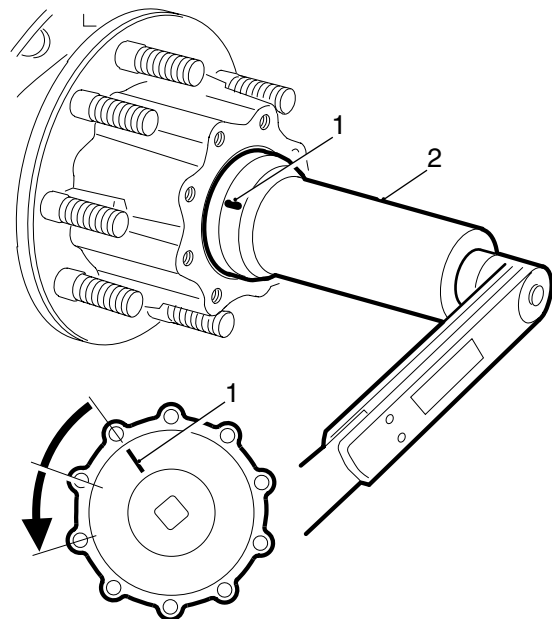
1. Remove the wheel.
2. Remove the stub axle.
3. Remove the brake pads.
4. Fit a micrometer gauge to the wheel hub, with the stylus on the end of the axle journal.
5. Push and pull the wheel hub. Check the wheel bearing play and compare it with the specified value. See main group "Technical data".



A8 00 387

5**Adjusting the wheel bearing play**

1. Remove the lock nut.
2. Tighten the hub nut with a hub nut wrench (DAF No. 0499805) to 136 Nm.
3. Turn the hub two full rotations in order to "seat" the wheel bearings.
4. Mark (1) the hub nut wrench (2).
5. Turn the hub nut 2 strokes back.
6. Check the wheel bearing play.
7. Position the locking plate and fit the lock nut. Tighten the lock nut to the specified tightening torque. See main group "Technical data".
8. Secure the hub nut and lock nut with the locking plate.



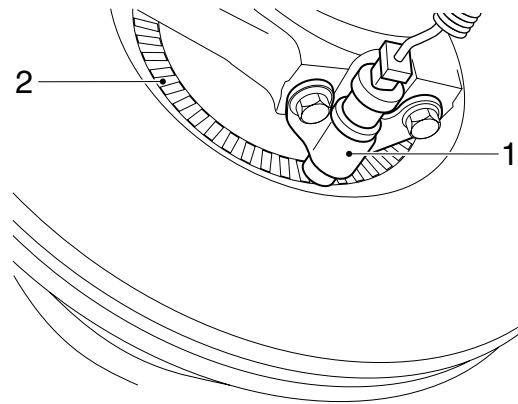
A8 00 380

3.4 INSPECTION, WHEEL-SPEED SENSOR RING

1. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
2. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
3. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



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4. Check the ABS system for proper operation.

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Inspection and adjustment

LF45/55 series

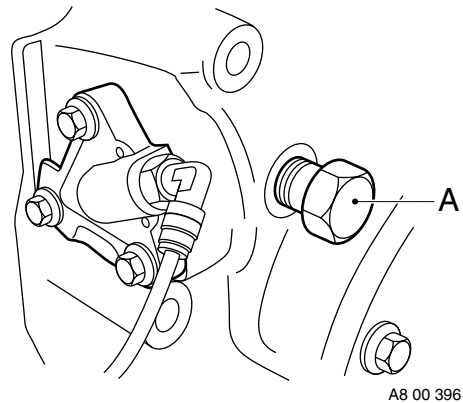
5

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Engage the differential lock. Check that the axle is blocked. Replace the switch by the special tool (DAF No. 1329447), see (A). This is to prevent the selector sleeve from falling into the differential when removing the stub axle.
3. Remove the stub axle attachment bolts.
4. Remove the stub axle using a copper punch.
When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.



Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment bolts to the specified tightening torque. See main group "Technical data".
4. Engage the differential lock and remove the special tool from the differential lock. Install the switch.

SINGLE REAR AXLE 8.20

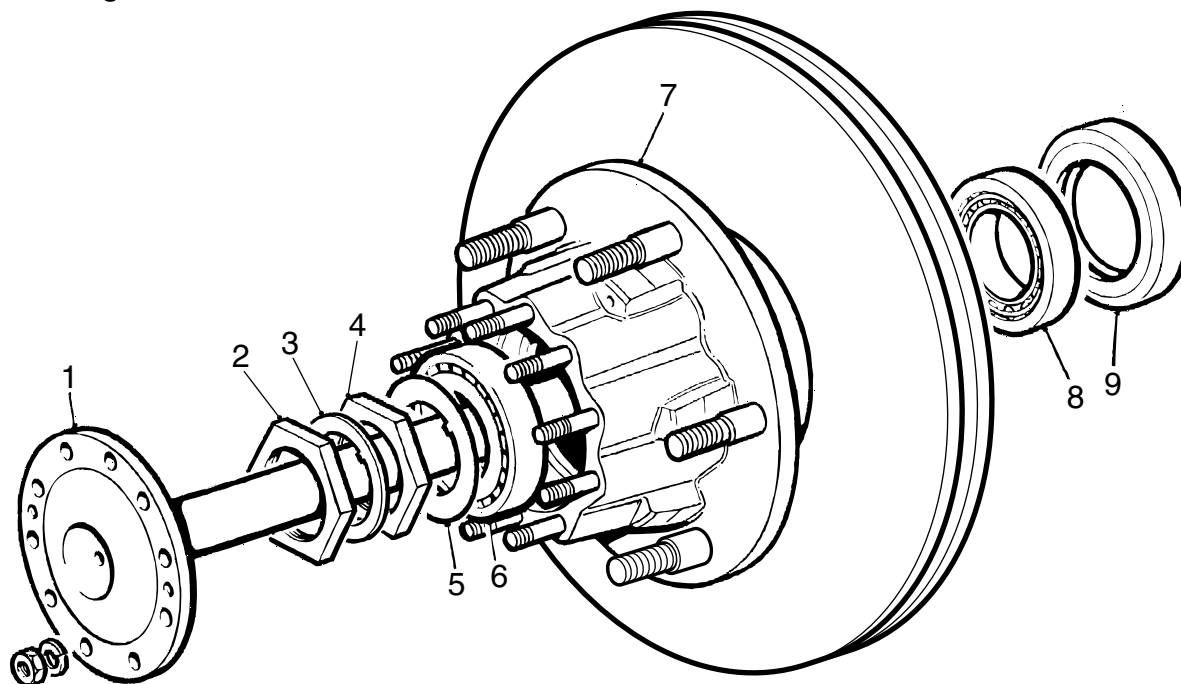
8

Removal and installation

LF45/55 series

4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub



A8 00 394

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle (1).
5. Remove the lock nut (2).
6. Remove the locking plate (3).
7. Remove the hub nut (4).
8. Remove the thrust washer (5).
9. Remove the wheel bearing inner race (6).
10. Remove the wheel hub from the axle journal.

5

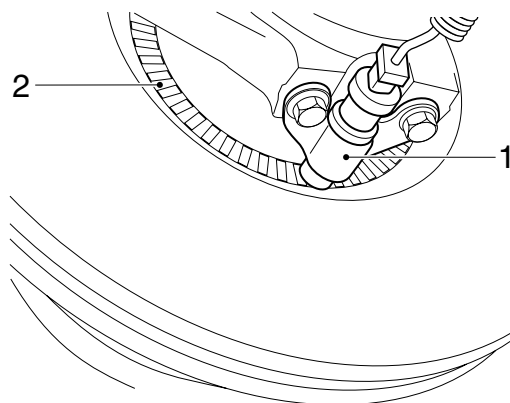
Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seal in the wheel hub for damage. Replace the oil seal if in doubt.
2. Check the axle journal screw thread carefully for damage.
3. Install the wheel hub on the axle journal. Slide the wheel hub onto the axle journal. Fit the wheel bearing inner race (6).
4. Fit the thrust washer (5).
5. Fit the hub nut (4).
6. Adjust the wheel bearing play, see chapter "Inspection and adjustment".
7. Fit the locking plate (3).
8. Fit the lock nut (2). Tighten the lock nut (2) to the specified tightening torque. See main group "Technical data".
9. Secure the lock nut (2) with the locking plate (3).
10. Press the wheel-speed sensor (1) against the sensor ring (2). When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.



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SINGLE REAR AXLE 8.20**8**

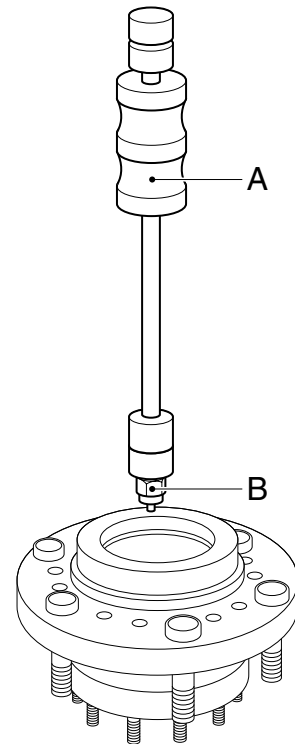
Removal and installation

LF45/55 series**4.3 REMOVAL AND INSTALLATION, HUB OIL SEAL****Removing hub oil seal**

1. Remove the wheel hub from the axle journal.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing hub oil seal

1. Use the special tool (DAF No. 1310453) to fit the oil seal such that the marking "outside" is pointing outward.
2. Install the wheel hub.



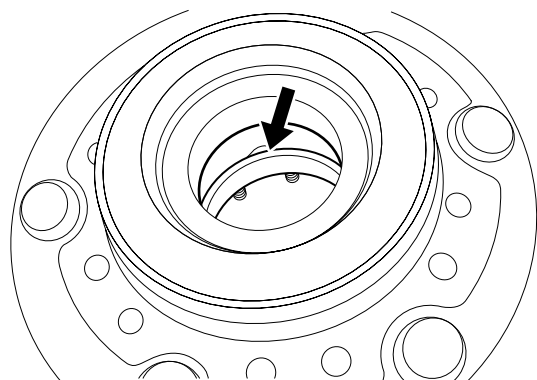
A8 00 392

4.4 REMOVAL AND INSTALLATION, WHEEL BEARING**Removing wheel bearing**

1. Remove the wheel hub.
2. Remove the oil seal from the wheel hub.
3. There are recesses in the wheel hub for removing the wheel bearing outer race.
4. Remove the wheel bearing outer races from the wheel hub using a driver.

Installing wheel bearing

1. Fit the wheel bearing outer races in the wheel hub using a driver.
2. Fit the hub oil seal.
3. Install the wheel hub.



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4.5 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

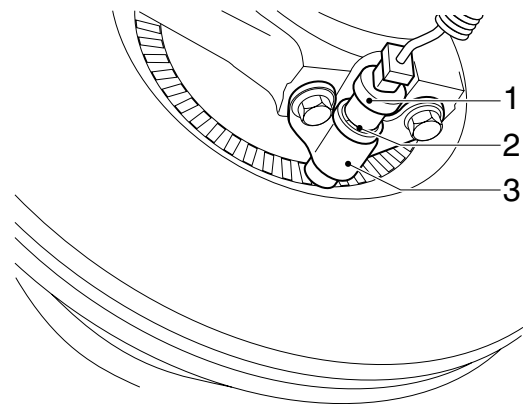
Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.



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SINGLE REAR AXLE 8.20

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Removal and installation

LF45/55 series

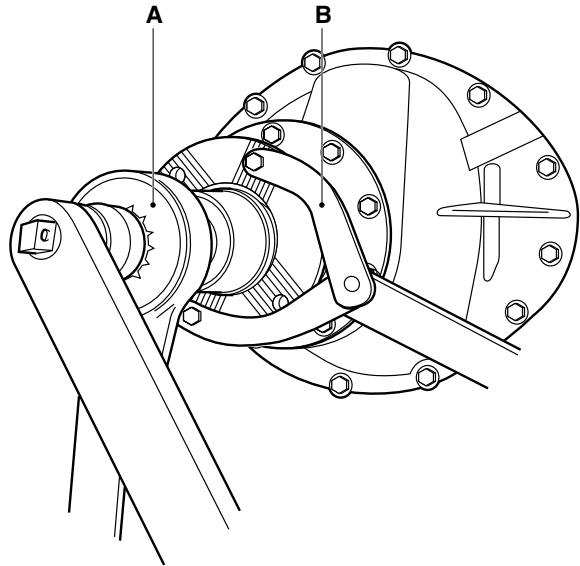
4.6 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Apply a small amount of oil to the abutting surface of the drive flange nut.
4. Fit a new drive flange nut.
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



A8 00 386

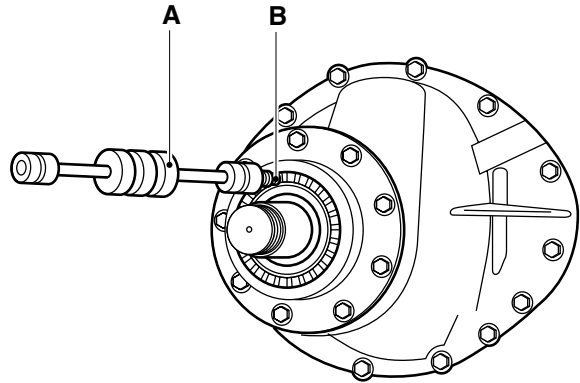
4.7 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 1310407) to fit the oil seal such that the marking "outside" is pointing outward.
2. Fit the drive flange.



A8 00 381

SINGLE REAR AXLE 8.20**8**

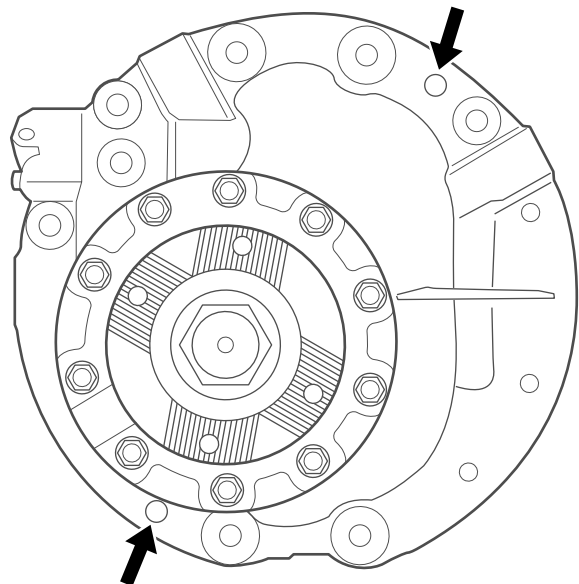
Removal and installation

LF45/55 series**4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL****Removing differential**

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Remove the air connection for the differential lock, if applicable.
5. Attach the differential securely to a lifting device.
6. Remove the attachment bolts and nuts from the differential.
7. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the air connection to the differential lock.
7. Fit the stub axles.
8. Fit the prop shaft to the drive flange.
9. Fill the differential with oil. See chapter "Draining and filling".



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4.9 REMOVAL AND INSTALLATION, DIFFERENTIAL LOCK

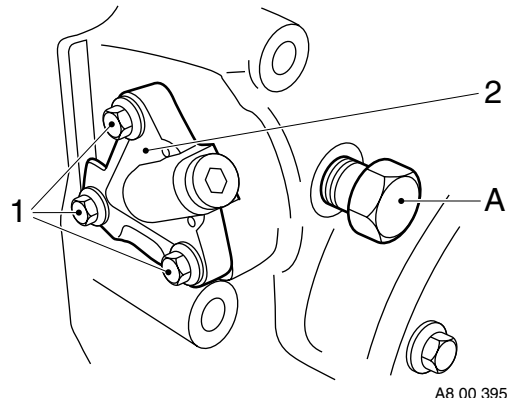
Removing differential lock

1. Remove the differential.

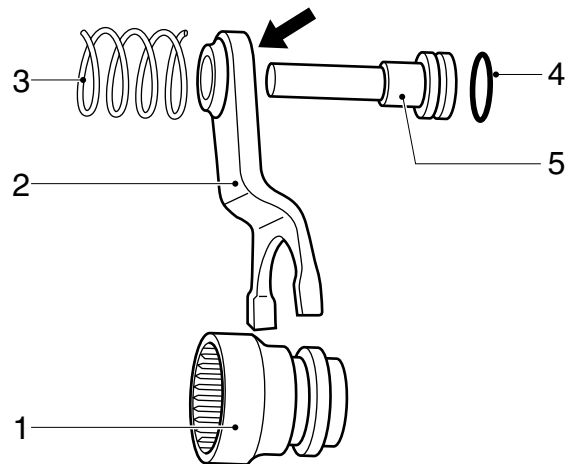


Do not come near the selector sleeve when de-aerating the differential lock.

2. Pressurise the air connection of the differential lock. Remove the special tool (A). Evenly de-aerate the differential lock.
3. Remove the attachment bolts (1) from the cylinder cover (2). Remove the cover.



4. Remove the piston (5).
5. Remove the shifting fork (2) and the selector sleeve (1) with the spring (3).



Installing differential lock

1. Install the shifting fork (2) and selector sleeve (1) with the spring (3).

Note:

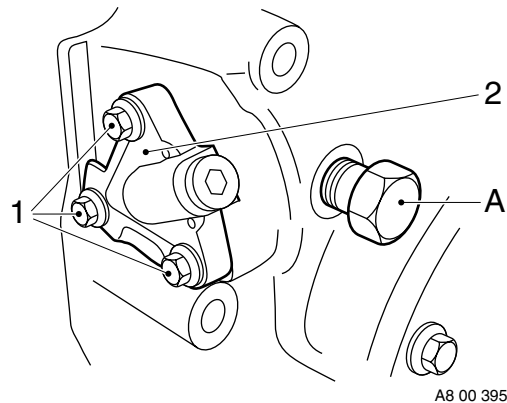
Make sure that the flat side (see arrow) of the shifting fork (2) points towards the piston (5).

2. Apply a small amount of oil to the seal (4) of the piston (5).
3. Install the piston (5).
4. Install the cylinder cover (2) and tighten the attachment bolts (1) evenly. Tighten the attachment bolts (1) to the specified tightening torque. See main group "Technical data".



Do not come near the selector sleeve when de-aerating the differential lock.

5. Pressurise the air connection of the differential lock. Fit special tool (A) (DAF No. 1329447), so that the differential lock is blocked.
6. Install the differential.



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Removal and installation

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5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



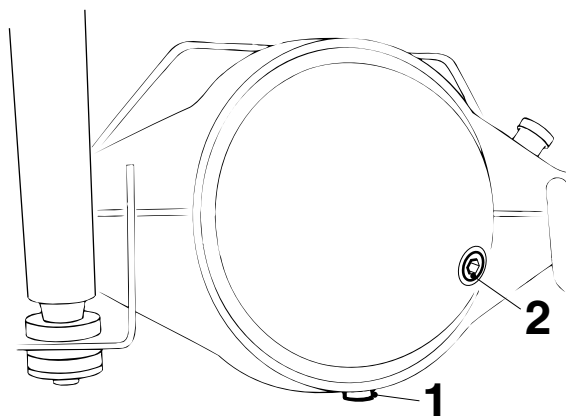
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



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5.2 DRAINING AND FILLING, WHEEL HUBS



To prevent skin injury, avoid unnecessary contact with the drained oil.

Note:

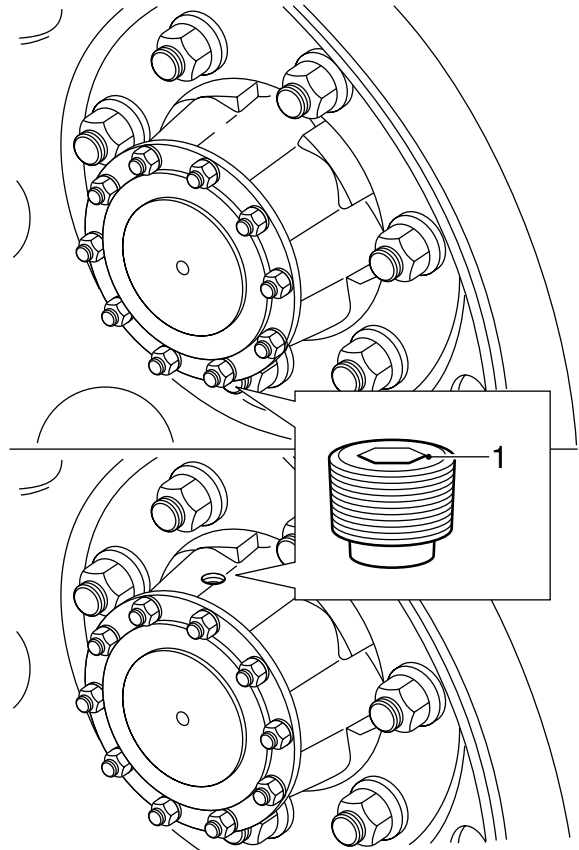
The design of the hub and the location of the drain/filler plug may differ from the illustration, depending on the version.

Draining wheel hub

1. Position the vehicle on a level surface.
2. Position the wheels in such a way that the oil drain/filler plug (1) is at the bottom.
3. Place a suitable tray under the hub to collect the oil. Remove the oil drain/filler plug (1).
4. Drain the oil and let the oil leak out of the hub.

Filling wheel hub

1. Position the wheels in such a way that the oil drain/filler plug (1) is at the top.
2. Fill the wheel hub with the specified and correct quantity of oil. See main group "Technical data".
3. Apply sealant to the screw thread of the oil drain/filler plug (1). Fit the oil drain/filler plug (1) into the hub.



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1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

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Safety instructions

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2. GENERAL

2.1 DESCRIPTION OF 10.20 AXLE

Differential

The 10.20 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings is adjusted using shims which are placed between the bearing inner races.

The pinion housing can be removed using jacking bolts.

Differential lock

The 10.20 axle is equipped with a variable differential-gear lock.

The satellite gear housing flange is fitted with spline toothing on the right-hand side. The left-hand side of the selector sleeve is equipped with similar toothing.

The selector sleeve has internal splines similar to those on the stub axle.

There is a groove on outside of the selector sleeve accommodating a fork which is attached to the engaging cylinder.

If the engaging cylinder is pressurised using the pneumatic switch, the selector sleeve toothing will mesh with the toothing of the satellite gear housing.

If the engaging cylinder is vented via the pneumatic switch, the spring will ensure that the lock is disengaged.

SINGLE REAR AXLE 10.20

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General

LF45/55 series

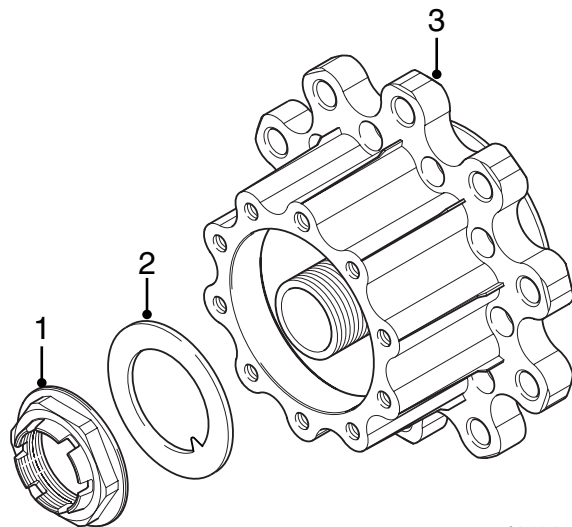
Wheel hub

The wheel hub (3) has a compact bearing. The compact bearing and hub oil seal are a single unit. The compact bearing is retained on the rear side with a spring washer.

The thrust washer (2), which is located between the hub nut (1) and compact bearing, has a lip on the inside. This lip fits into a recess on the axle journal. This prevents the hub nut from loosening if any problems arise with the compact bearing. The hub nut is of the self-locking type. The nut is locked by bending the lips on the hub nut outward.

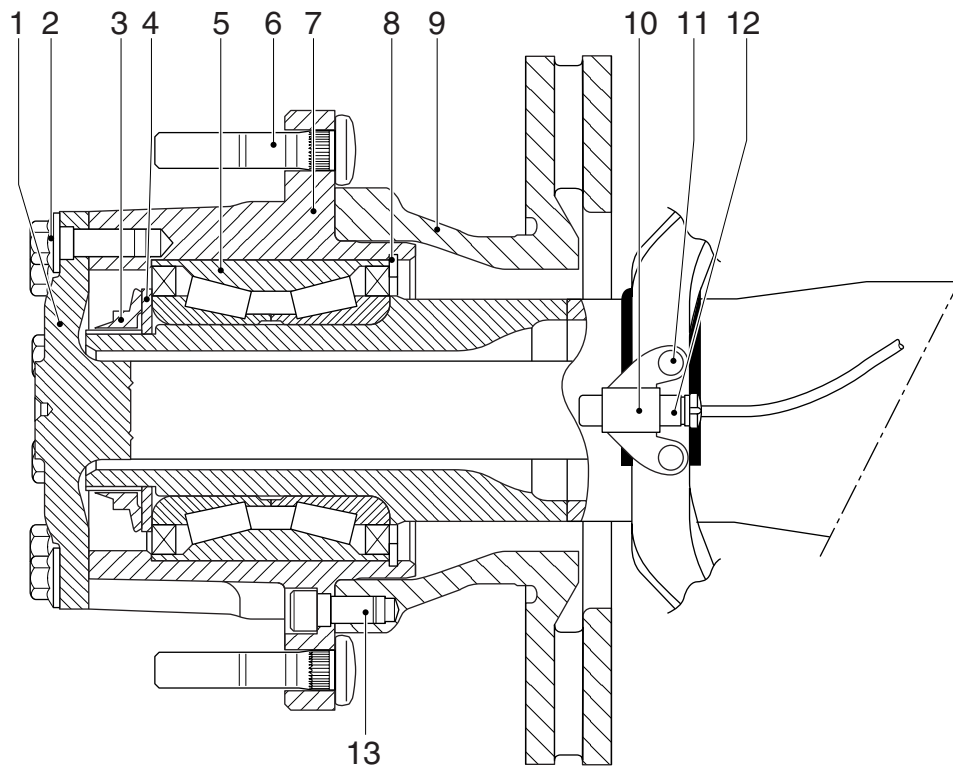
The compact bearing of the wheel hub is greased and is maintenance-free.

The correct wheel bearing pre-load is achieved by fitting the hub nut as specified. The stub axle and brake disc are attached to the wheel hub with bolts.



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2.2 OVERVIEW DRAWING, WHEEL HUB



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Legend

1. Stub axle
2. Stub axle attachment bolt
3. Hub nut
4. Thrust washer
5. Compact bearing
6. Wheel stud
7. Wheel hub
8. Spring washer
9. Brake disc
10. Wheel-speed sensor holder
11. Wheel-speed sensor holder attachment bolts
12. Wheel-speed sensor
13. Brake disc attachment bolt

SINGLE REAR AXLE 10.20

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General

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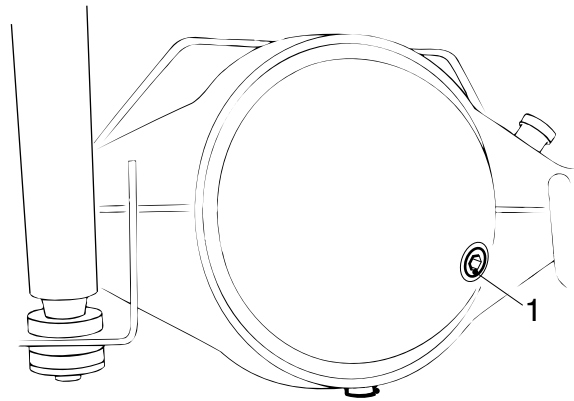
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



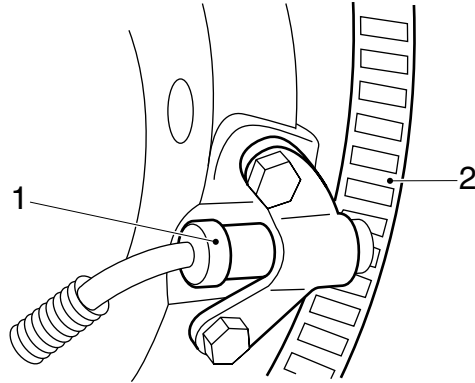
A8 00 375

3.2 CHECKING OPERATION OF DIFFERENTIAL LOCK

1. Jack up the rear axle and support it on stands.
2. Bring the air system to operating pressure.
3. Engage the differential lock. The warning indicator in the cab should now be activated.
4. Check whether there is a "rigid" connection between the driven wheels.
5. Disengage the differential lock. The warning indicator must no longer be activated and the "rigid" connection between the driven wheels should be interrupted.

3.3 INSPECTION, WHEEL-SPEED SENSOR RING

1. Remove the wheel hub.
2. Check the sensor ring (2) for deposits.
Special attention should be paid to deposits between the teeth of the sensor ring.
Clean the sensor ring if necessary.
3. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure.
If necessary, replace the wheel hub.
4. Check the sensor (1) for smooth operation.
If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent.
See main group "Technical data".



A8 00 379



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

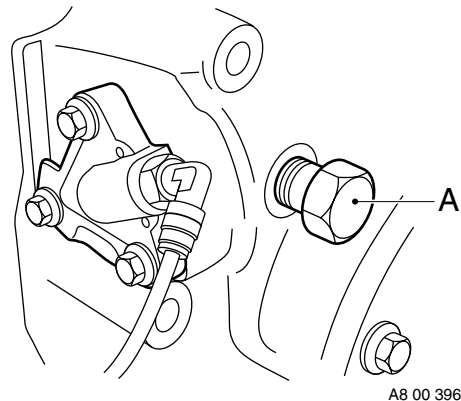
5. Check the ABS system for proper operation.

4. REMOVAL AND INSTALLATION

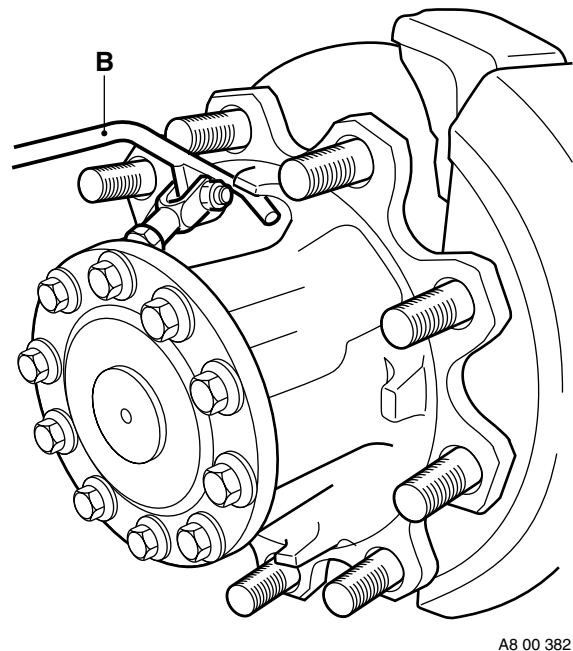
4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Engage the differential lock. Check that the axle is blocked. Replace the switch by the special tool (DAF No. 1329447), see (A). This is to prevent the selector sleeve from falling into the differential when removing the stub axle.



3. Remove the stub axle attachment bolts.
4. Remove the stub axle using special tool (DAF No. 0694980), if required, see (B), or with a copper punch. When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.



Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment bolts to the specified tightening torque. See main group "Technical data".
4. Engage the differential lock and remove the special tool from the differential lock. Install the switch.

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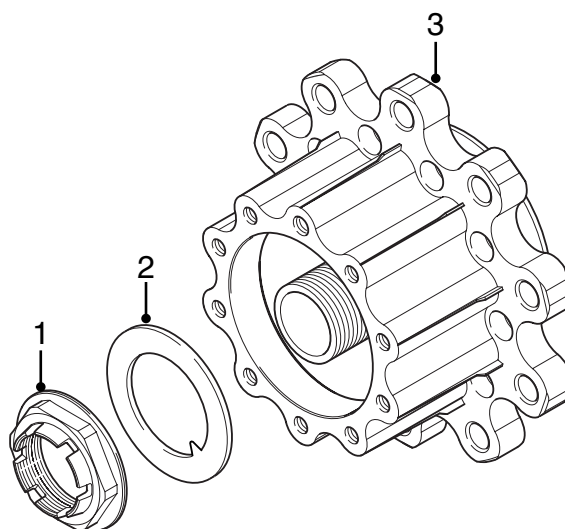
Removal and installation

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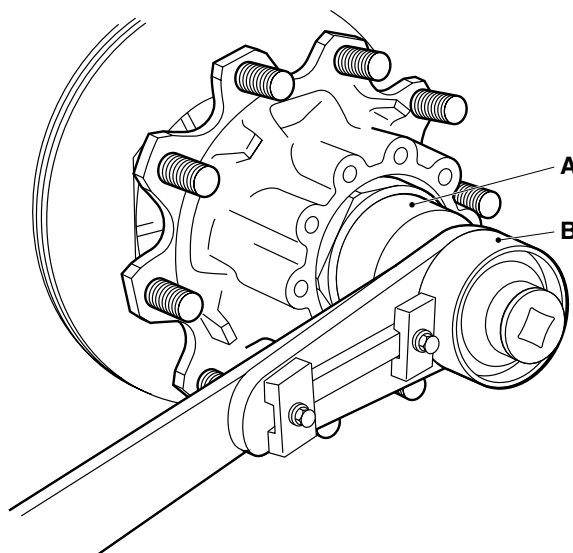
4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle.
5. Remove the hub nut (1) using special tool (A) (DAF No. 0535266) and a torque amplifier (B).
6. Remove the thrust washer (2).

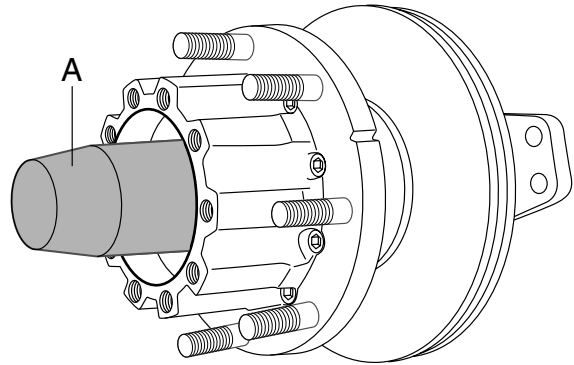


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A8 00 355

7. Install the guide sleeve (A), special tool (DAF No. 1329490), on the axle journal.
8. Attach the wheel hub securely to a movable lifting device.
9. Slide the wheel hub from the axle journal using the lifting device.
Take care that the wheel hub does not rest on the guide sleeve (A) as the latter is not strong enough to take the weight of the wheel hub.



A8 00 389

Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seals in the wheel hub for damage.
2. Check the axle journal screw thread carefully for damage.

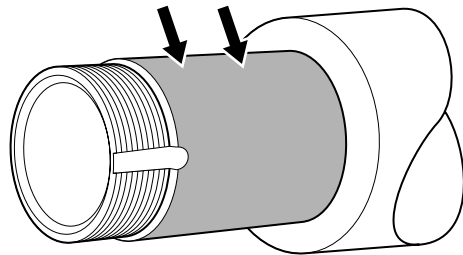


You must never fit a wheel hub on an axle journal with damaged screw thread.

3. Apply a thin and even layer of the specified anti-corrosion agent to the axle journal. See main group "Technical data".

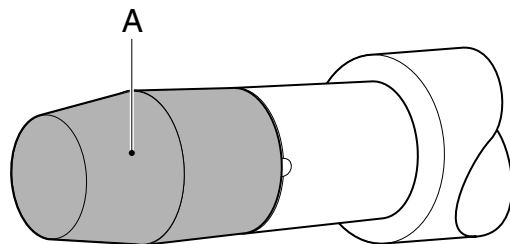
Note:

Do not apply too much anti-corrosion agent to the axle journal. When installing the wheel hub, the excess anti-corrosion agent will collect at the backside of the wheel hub. When the vehicle is used in daily operation, this anti-corrosion agent can leak out so that it looks as if the oil seal leaks.



A8 00 390

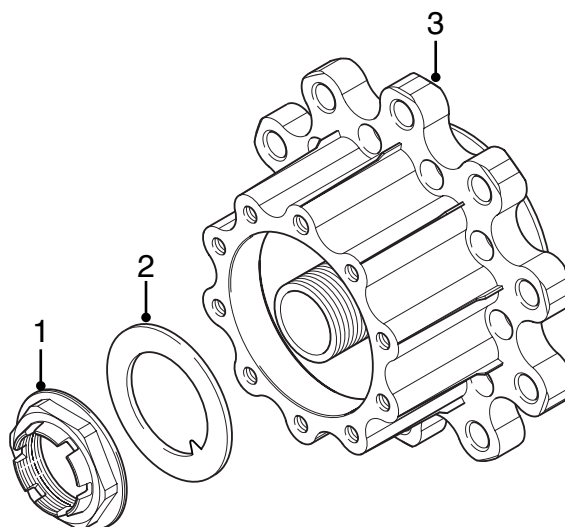
4. Install the guide sleeve (A), special tool (DAF No. 1329490), on the axle journal.
5. Attach the wheel hub securely to a movable lifting device.
6. Position the wheel hub exactly in front of the axle journal using the movable lifting device. Slide the wheel hub onto the axle journal.
Take care that the wheel hub does not rest on the guide sleeve (A) as the latter is not strong enough to take the weight of the wheel hub.



A8 00 397

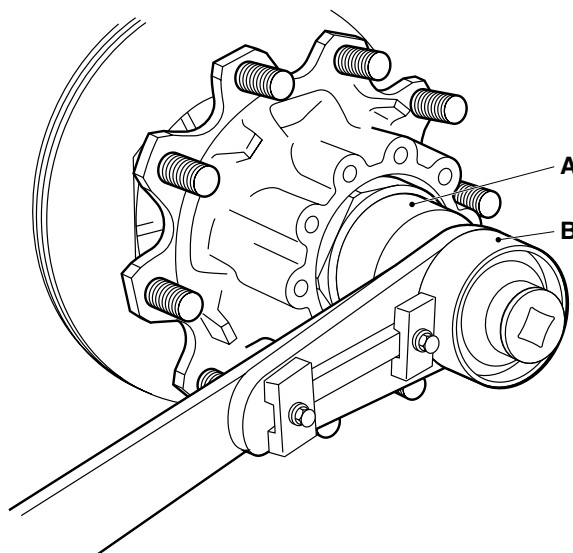
SINGLE REAR AXLE 10.20**8****Removal and installation****LF45/55 series**

7. Fit the thrust washer (2).
8. Replace the hub nut (1). Apply a few drops of oil to the abutting surface of the hub nut. Fit the hub nut.



A8 00 376

9. Tighten the hub nut in the specified manner. See main group "Technical data". Use special tool (A) (DAF No. 0535266) and a torque amplifier (B) to do so.

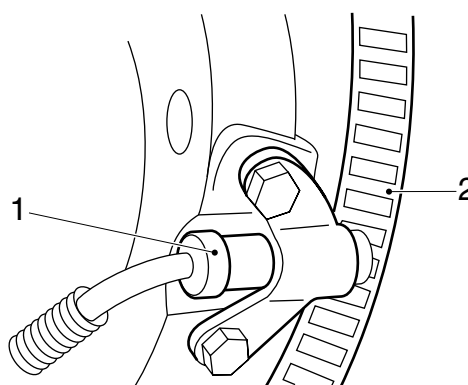


A8 00 355

10. Press the wheel-speed sensor (1) against the sensor ring (2).
When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.
If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



A8 00 379

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.

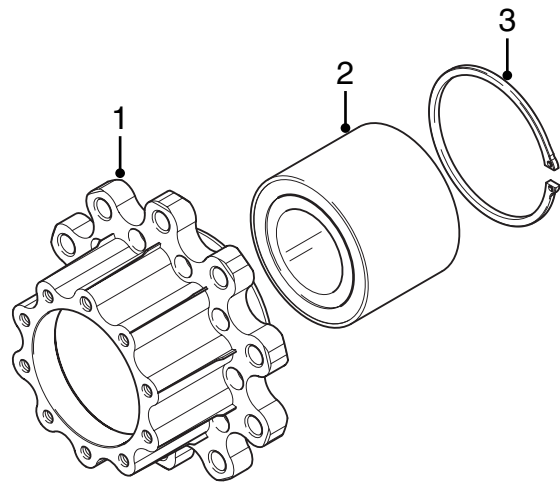
4.3 REMOVAL AND INSTALLATION, COMPACT BEARING

Removing compact bearing

1. Remove the wheel hub (1).
2. Remove the spring washer (3).
3. Remove the compact bearing (2) from the wheel hub using a press.

Installing compact bearing

1. Fit the compact bearing (2) to the wheel hub (1) using a press.
2. Fit the spring washer (3).
3. Install the wheel hub.



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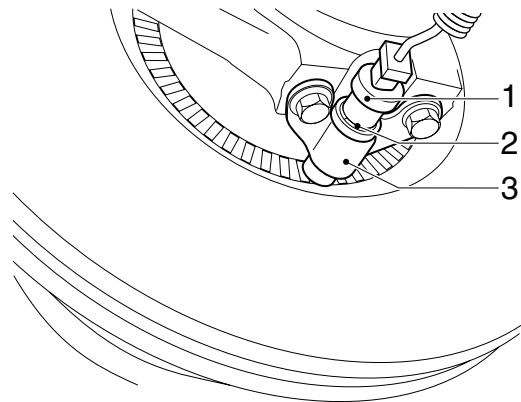
4.4 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



A8 00 435

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Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.

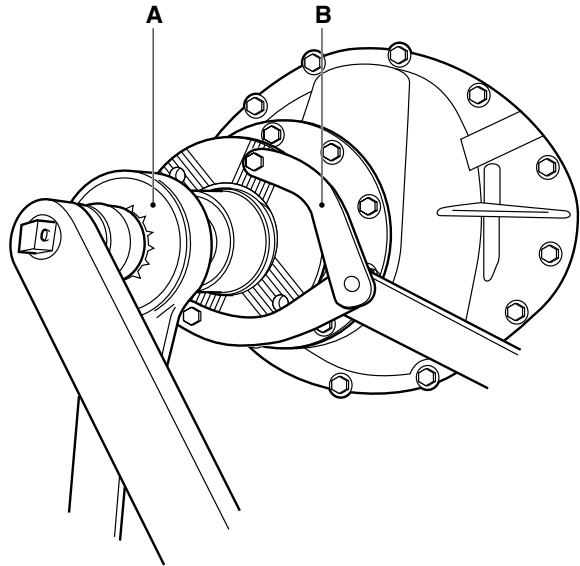
4.5 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Replace the drive-flange nut.
4. Apply a small amount of oil to the abutting surface of the drive flange nut.
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Fit the drive-flange nut. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



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Removal and installation

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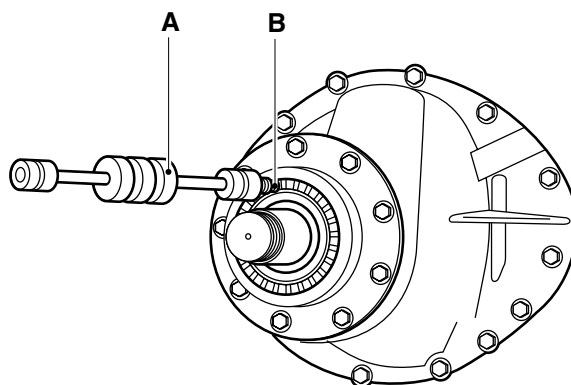
4.6 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 1310407) to fit the oil seal such that the marking "outside " is pointing outward.
2. Fit the drive flange.



A8 00 381

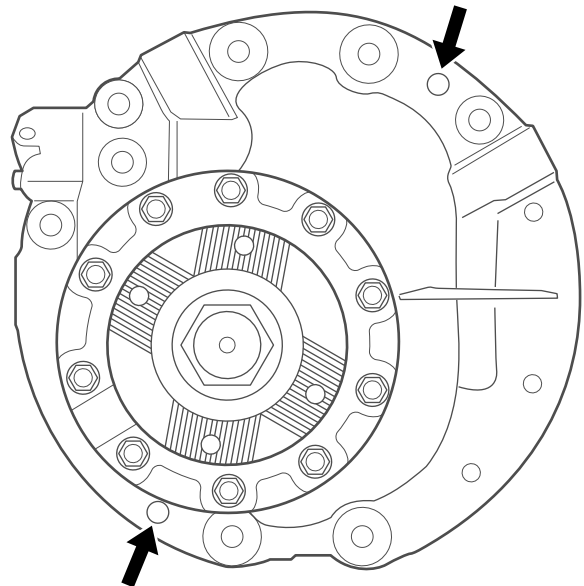
4.7 REMOVAL AND INSTALLATION, DIFFERENTIAL

Removing differential

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Remove the air connection for the differential lock, if applicable.
5. Attach the differential securely to a lifting device.
6. Remove the attachment bolts and nuts from the differential.
7. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the air connection to the differential lock.
7. Fit the stub axles.
8. Fit the prop shaft to the drive flange.
9. Fill the differential with oil. See chapter "Draining and filling".



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SINGLE REAR AXLE 10.20**8**

Removal and installation

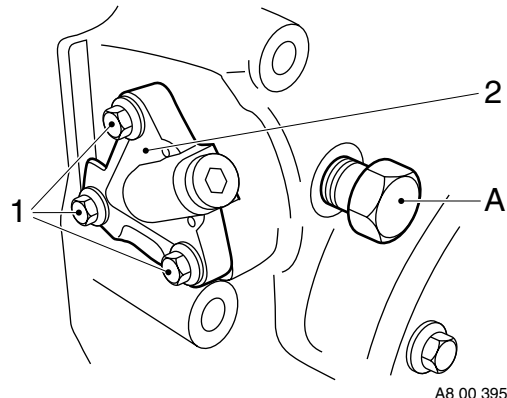
LF45/55 series**4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL LOCK****Removing differential lock**

1. Remove the differential.

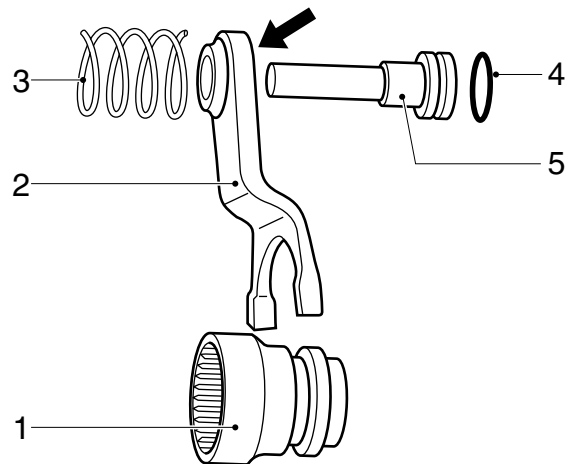


Do not come near the selector sleeve when de-aerating the differential lock.

2. Pressurise the air connection of the differential lock. Remove the special tool (A). Evenly de-aerate the differential lock.
3. Remove the attachment bolts (1) from the cylinder cover (2). Remove the cover.



4. Remove the piston (5).
5. Remove the shifting fork (2) and the selector sleeve (1) with the spring (3).

**Installing differential lock**

1. Install the shifting fork (2) and selector sleeve (1) with the spring (3).

Note:

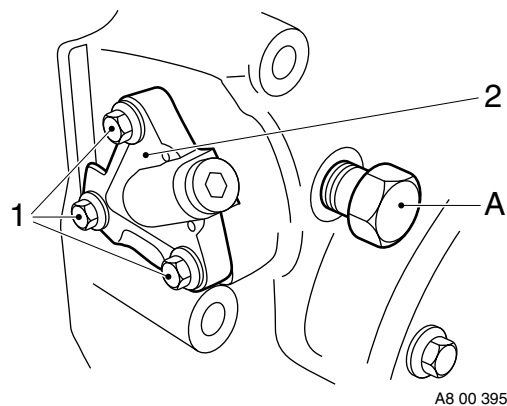
Make sure that the flat side (see arrow) of the shifting fork (2) points towards the piston (5).

2. Apply a small amount of oil to the seal (4) of the piston (5).
3. Install the piston (5).
4. Install the cylinder cover (2) and tighten the attachment bolts evenly. Tighten the attachment bolts (1) to the specified tightening torque. See main group "Technical data".



Do not come near the selector sleeve when de-aerating the differential lock.

5. Pressurise the air connection of the differential lock. Fit special tool (A) (DAF No. 1329447), so that the differential lock is blocked.
6. Install the differential.



5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



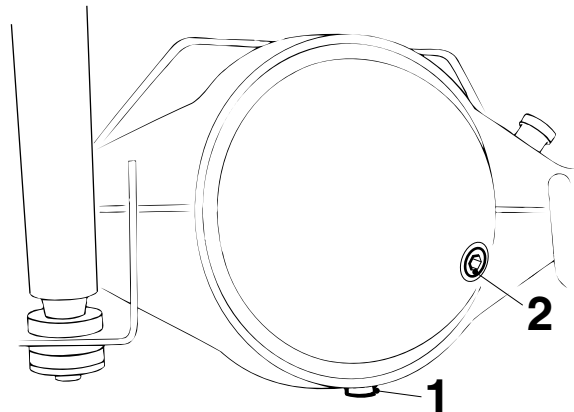
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



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SINGLE REAR AXLE 10.20

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Draining and filling

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1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

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Safety instructions

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2. GENERAL

2.1 DESCRIPTION OF 10.26 AXLE

Differential

The 10.26 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings is adjusted using shims which are placed between the bearing inner races.

The pinion housing can be removed using jacking bolts.

Differential lock

The 10.26 axle is equipped with a variable differential-gear lock.

The satellite gear housing flange is fitted with spline toothing on the right-hand side. The left-hand side of the selector sleeve is equipped with similar toothing.

The selector sleeve has internal splines similar to those on the stub axle.

There is a groove on outside of the selector sleeve accommodating a fork which is attached to the engaging cylinder.

If the engaging cylinder is pressurised using the pneumatic switch, the selector sleeve toothing will mesh with the toothing of the satellite gear housing.

If the engaging cylinder is vented via the pneumatic switch, the spring will ensure that the lock is disengaged.

SINGLE REAR AXLE 10.26

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General

LF45/55 series

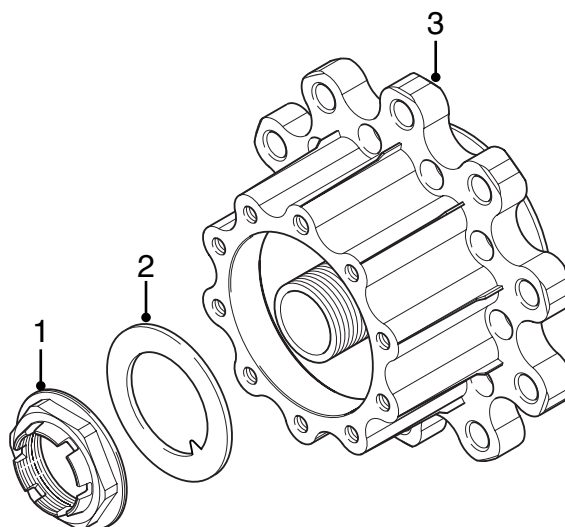
Wheel hub

The wheel hub (3) has a compact bearing. The compact bearing and hub oil seal are a single unit. The compact bearing is retained on the rear side with a spring washer.

The thrust washer (2), which is located between the hub nut (1) and compact bearing, has a lip on the inside. This lip fits into a recess on the axle journal. This prevents the hub nut from loosening if any problems arise with the compact bearing. The hub nut is of the self-locking type. The nut is locked by bending the lips on the hub nut outward.

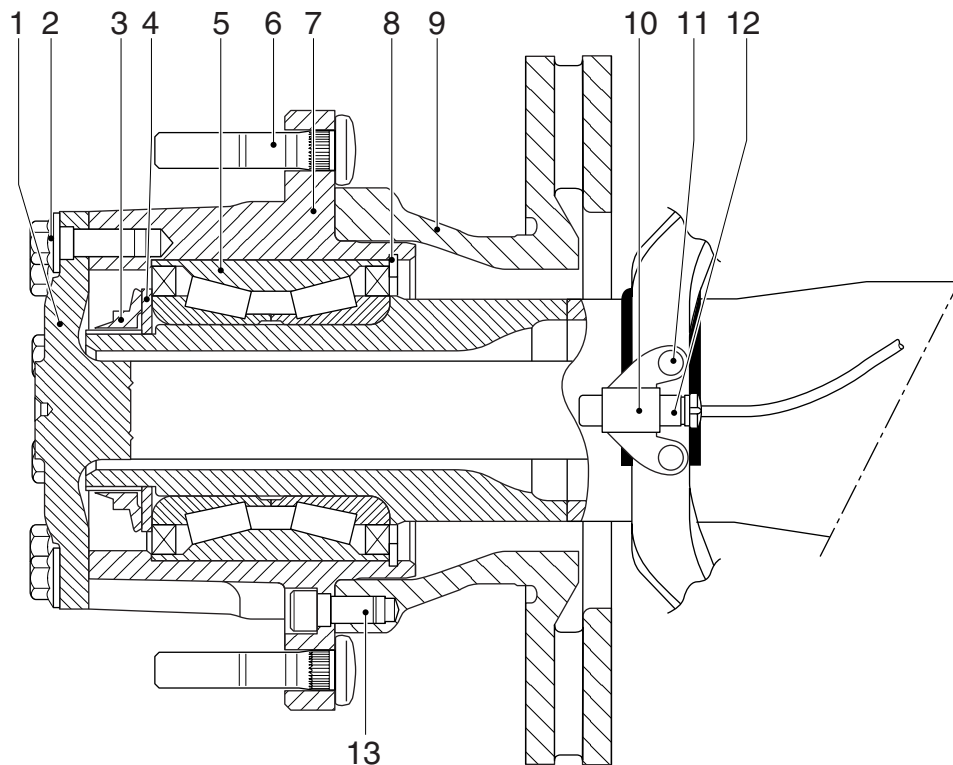
The compact bearing of the wheel hub is greased and is maintenance-free.

The correct wheel bearing pre-load is achieved by fitting the hub nut as specified. The stub axle and brake disc are attached to the wheel hub with bolts.



A8 00 376

2.2 OVERVIEW DRAWING, WHEEL HUB



A8 00 374

Legend

1. Stub axle
2. Stub axle attachment bolt
3. Hub nut
4. Thrust washer
5. Compact bearing
6. Wheel stud
7. Wheel hub
8. Spring washer
9. Brake disc
10. Wheel-speed sensor holder
11. Wheel-speed sensor holder attachment bolts
12. Wheel-speed sensor
13. Brake disc attachment bolt

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General

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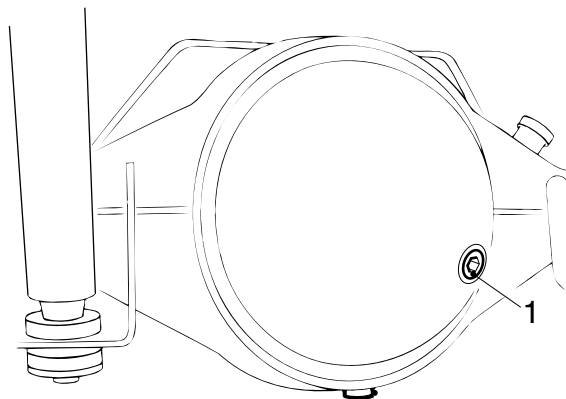
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



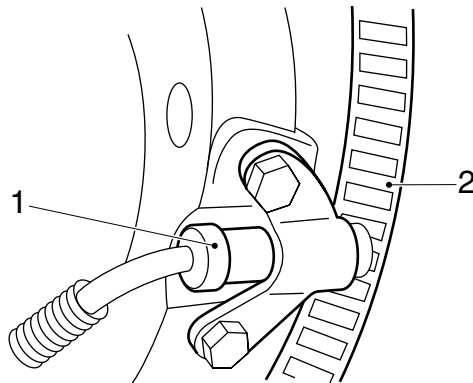
A8 00 375

3.2 CHECKING OPERATION OF DIFFERENTIAL LOCK

1. Jack up the rear axle and support it on stands.
2. Bring the air system to operating pressure.
3. Engage the differential lock. The warning indicator in the cab should now be activated.
4. Check whether there is a “rigid” connection between the driven wheels.
5. Disengage the differential lock. The warning indicator must no longer be activated and the “rigid” connection between the driven wheels should be interrupted.

3.3 INSPECTION, WHEEL-SPEED SENSOR RING

1. Remove the wheel hub.
2. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. If necessary, replace the wheel hub.
4. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



A8 00 379



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

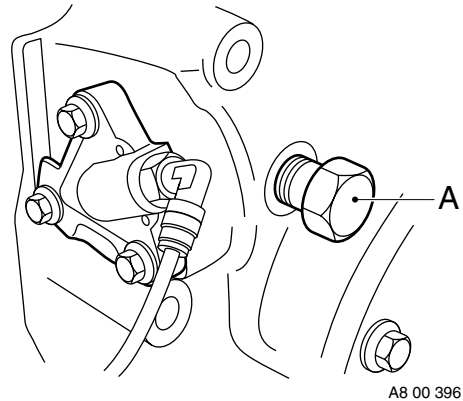
5. Check the ABS system for proper operation.

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

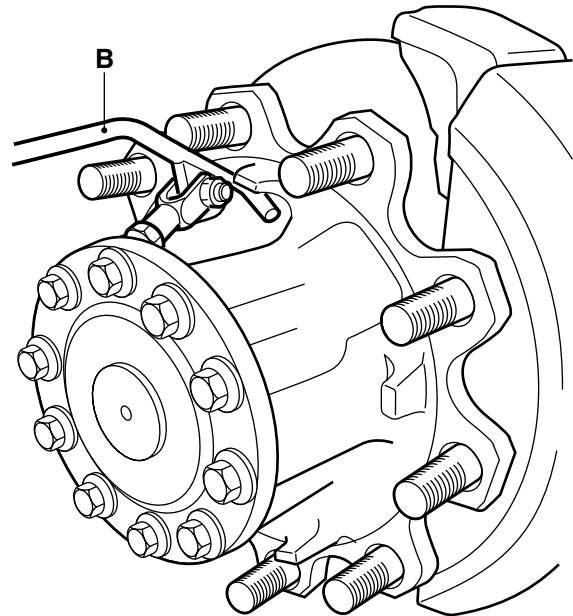
Removing stub axles

1. Jack up the rear axle and support it on stands.
2. Engage the differential lock. Check that the axle is blocked. Replace the switch by the special tool (DAF No. 1329447), see (A). This is to prevent the selector sleeve from falling into the differential when removing the stub axle.



A8 00 396

3. Remove the stub axle attachment bolts.
4. Remove the stub axle using special tool (DAF No. 0694980), if required, see (B), or with a copper punch. When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.



A8 00 382

Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment bolts to the specified tightening torque. See main group "Technical data".
4. Engage the differential lock and remove the special tool from the differential lock. Install the switch.

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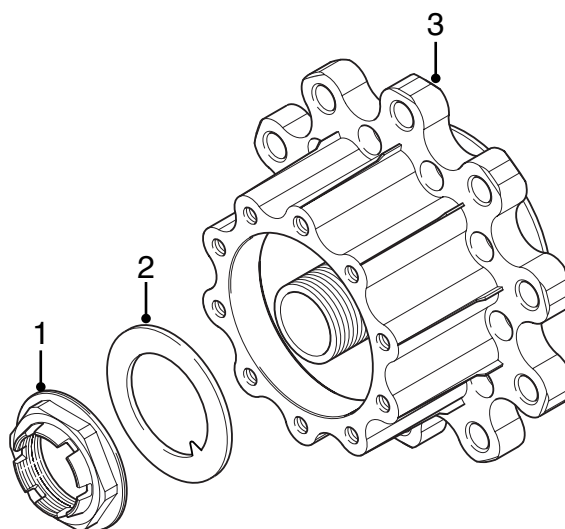
Removal and installation

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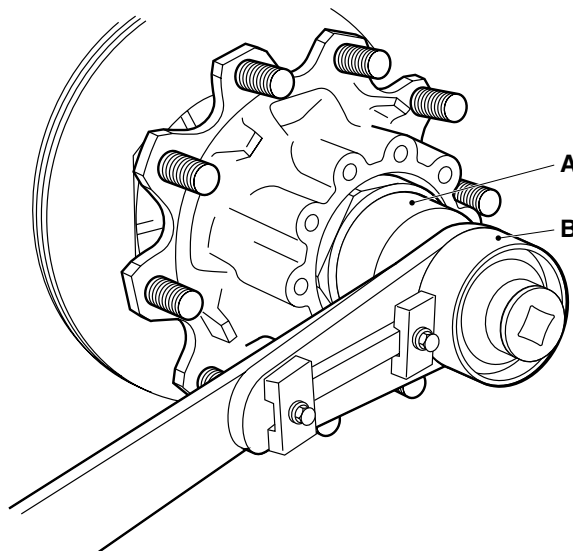
4.2 REMOVAL AND INSTALLATION, WHEEL HUB

Removing wheel hub

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle.
5. Remove the hub nut (1) using special tool (A) (DAF No. 0535266) and a torque amplifier (B).
6. Remove the thrust washer (2).

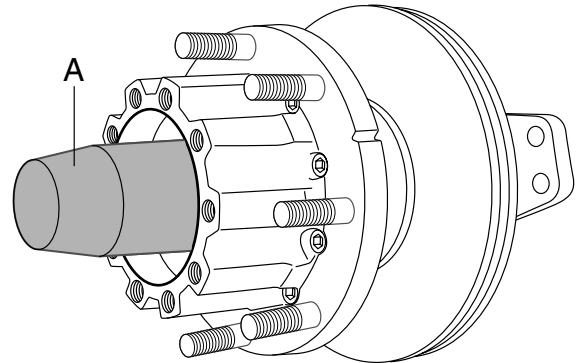


A8 00 376



A8 00 355

7. Install the guide sleeve (A), special tool (DAF No. 1329490), on the axle journal.
8. Attach the wheel hub securely to a movable lifting device.
9. Slide the wheel hub from the axle journal using the lifting device.
Take care that the wheel hub does not rest on the guide sleeve (A) as the latter is not strong enough to take the weight of the wheel hub.



A8 00 389

Installing wheel hub

1. Check the wheel-speed sensor ring and the oil seals in the wheel hub for damage.
2. Check the axle journal screw thread carefully for damage.

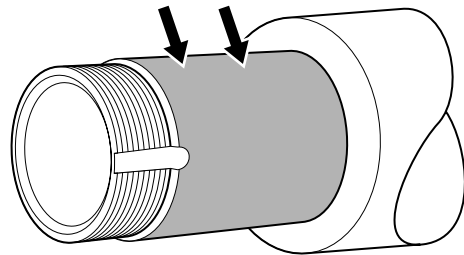


You must never fit a wheel hub on an axle journal with damaged screw thread.

3. Apply a thin and even layer of the specified anti-corrosion agent to the axle journal. See main group "Technical data".

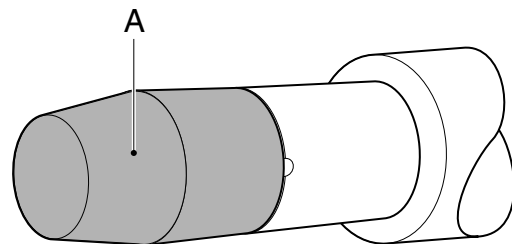
Note:

Do not apply too much anti-corrosion agent to the axle journal. When installing the wheel hub, the excess anti-corrosion agent will collect at the backside of the wheel hub. When the vehicle is used in daily operation, this anti-corrosion agent can leak out so that it looks as if the oil seal leaks.



A8 00 390

4. Install the guide sleeve (A), special tool (DAF No. 1329490), on the axle journal.
5. Attach the wheel hub securely to a movable lifting device.
6. Position the wheel hub exactly in front of the axle journal using the movable lifting device. Slide the wheel hub onto the axle journal.
Take care that the wheel hub does not rest on the guide sleeve (A) as the latter is not strong enough to take the weight of the wheel hub.



A8 00 397

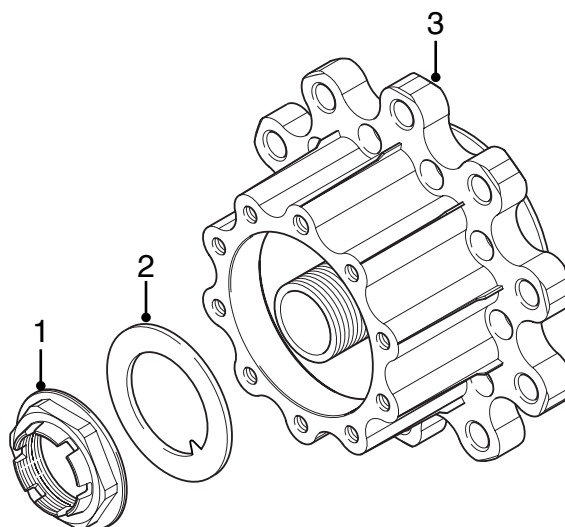
SINGLE REAR AXLE 10.26

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Removal and installation

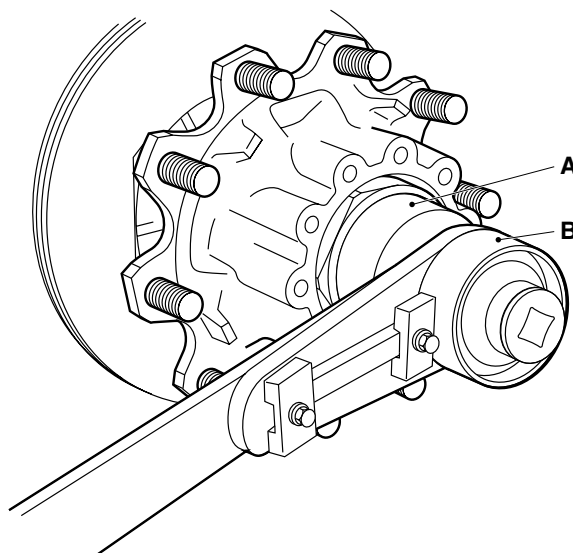
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7. Fit the thrust washer (2).
8. Replace the hub nut (1). Apply a few drops of oil to the abutting surface of the hub nut. Fit the hub nut.



A8 00 376

9. Tighten the hub nut in the specified manner. See main group "Technical data". Use special tool (A) (DAF No. 0535266) and a torque amplifier (B) to do so.

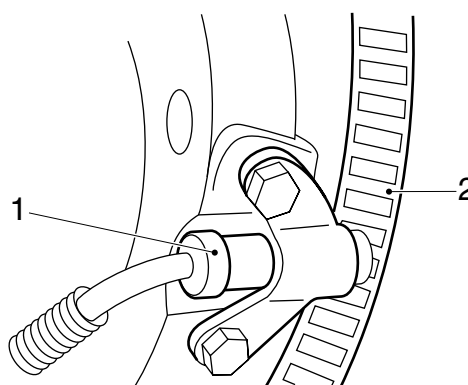


A8 00 355

10. Press the wheel-speed sensor (1) against the sensor ring (2).
When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.
If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



A8 00 379

11. Fit the stub axle.
12. Fit the brake caliper.
13. Put the wheels back on.
14. Check the ABS system for proper operation.

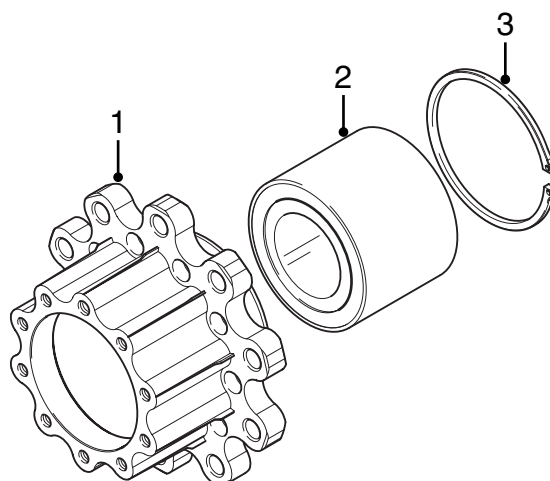
4.3 REMOVAL AND INSTALLATION, COMPACT BEARING

Removing compact bearing

1. Remove the wheel hub (1).
2. Remove the spring washer (3).
3. Remove the compact bearing (2) from the wheel hub using a press.

Installing compact bearing

1. Fit the compact bearing (2) to the wheel hub (1) using a press.
2. Fit the spring washer (3).
3. Install the wheel hub.



A8 00 377

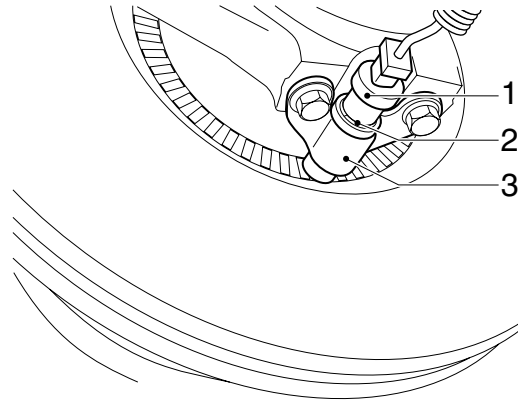
4.4 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel-speed sensor (1) from the holder (3).
2. Cut the clamping strips attaching the cable.
3. Unplug the connector and remove the wheel-speed sensor.

Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (1) and the clamping sleeve (2). If necessary, replace the clamping sleeve (2).
2. Apply the specified anti-corrosion agent to the circumference of the wheel-speed sensor (1). See main group "Technical data".
3. Fit the wheel-speed sensor (1) in the holder (3). Press it against the sensor ring manually.
While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



A8 00 435



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Fit the connector and secure the cable with clamping strips.
5. Check the ABS system for proper operation.

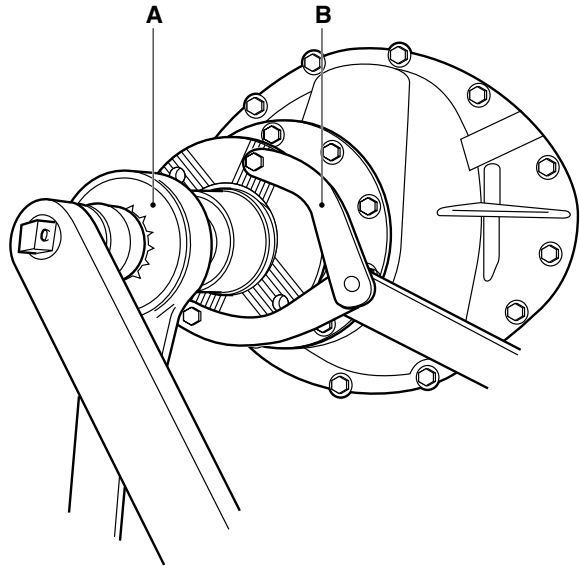
4.5 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Apply a small amount of oil to the abutting surface of the drive flange nut.
4. Apply locking compound to the screw thread. See main group "Technical data".
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Fit the drive flange nut. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



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Removal and installation

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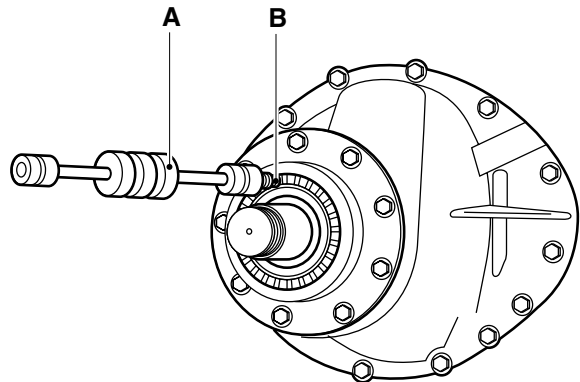
4.6 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 1310446) to fit the oil seal such that the marking "outside" is pointing outward.
2. Fit the drive flange.



A8 00 381

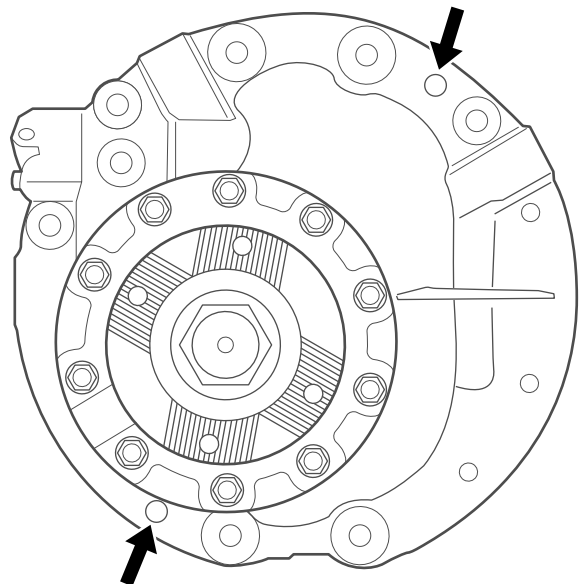
4.7 REMOVAL AND INSTALLATION, DIFFERENTIAL

Removing differential

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Remove the air connection for the differential lock, if applicable.
5. Attach the differential securely to a lifting device.
6. Remove the attachment bolts and nuts from the differential.
7. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating faces lightly. Do not damage the mating faces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the air connection to the differential lock.
7. Fit the stub axles.
8. Fit the prop shaft to the drive flange.
9. Fill the differential with oil. See chapter "Draining and filling".



A8 00 378

SINGLE REAR AXLE 10.26**8**

Removal and installation

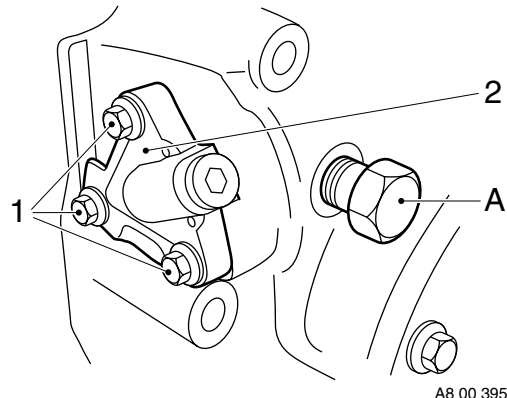
LF45/55 series**4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL LOCK****Removing differential lock**

1. Remove the differential.

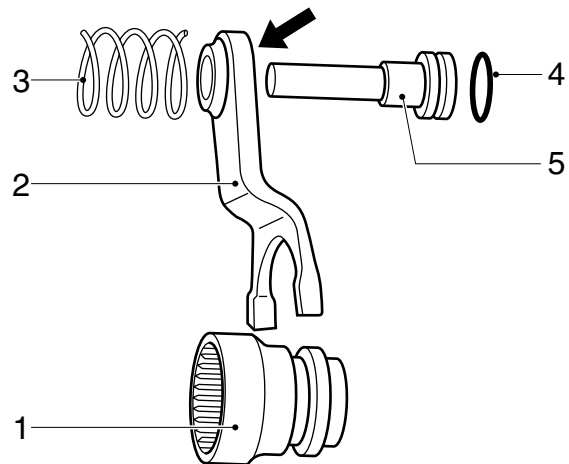


Do not come near the selector sleeve when de-aerating the differential lock.

2. Pressurise the air connection of the differential lock. Remove the special tool (A). Evenly de-aerate the differential lock.
3. Remove the attachment bolts (1) from the cylinder cover (2). Remove the cover.



4. Remove the piston (5).
5. Remove the shifting fork (2) and the selector sleeve (1) with the spring (3).

**Installing differential lock**

1. Install the shifting fork (2) and selector sleeve (1) with the spring (3).

Note:

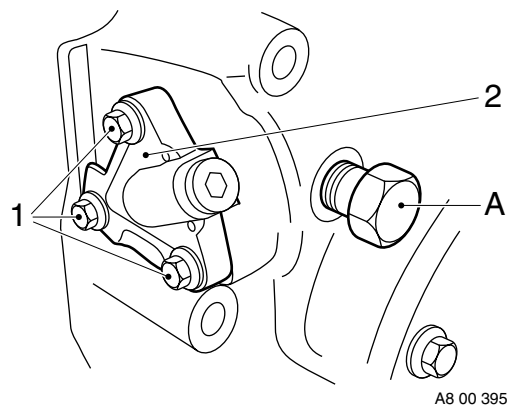
Make sure that the flat side (see arrow) of the shifting fork (2) points towards the piston (5).

2. Apply a small amount of oil to the seal (4) of the piston (5).
3. Install the piston (5).
4. Install the cylinder cover (2) and tighten the attachment bolts evenly. Tighten the attachment bolts (1) to the specified tightening torque. See main group "Technical data".



Do not come near the selector sleeve when de-aerating the differential lock.

5. Pressurise the air connection of the differential lock. Fit special tool (A) (DAF No. 1329447), so that the differential lock is blocked.
6. Install the differential.



5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



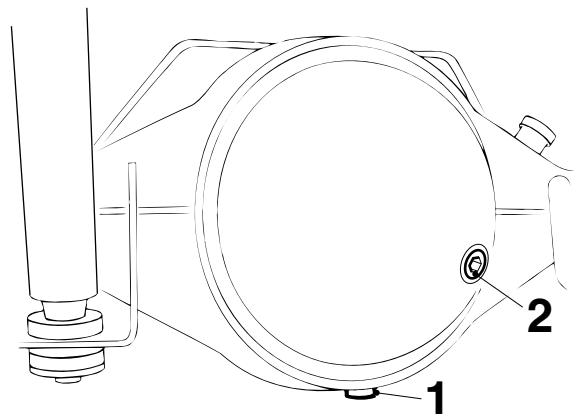
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



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Draining and filling

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1. SAFETY INSTRUCTIONS



Always use stands to support the chassis or components when working under the vehicle.

Always use the appropriate lifting gear or approved hoists to remove and install heavy components. Attach the component securely to the lifting or hoisting gear.

SINGLE REAR AXLE 11.26

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Safety instructions

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2. GENERAL

2.1 DESCRIPTION OF 11.26 AXLE

Differential

The 11.26 axle has a differential with hypoid gearing.

A single reduction is applied.

The bevelled gear-to-pinion backlash is achieved using adjusting nuts.

The pre-load of the pinion bearings is adjusted using shims which are placed between the bearing inner races.

The pinion housing can be removed using jacking bolts.

Differential lock

The 11.26 axle is equipped with a variable differential-gear lock.

The satellite gear housing flange is fitted with spline toothing on the right-hand side. The left-hand side of the selector sleeve is equipped with similar toothing.

The selector sleeve has internal splines similar to those on the stub axle.

There is a groove on outside of the selector sleeve accommodating a fork which is attached to the engaging cylinder.

If the engaging cylinder is pressurised using the pneumatic switch, the selector sleeve toothing will mesh with the toothing of the satellite gear housing.

If the engaging cylinder is vented via the pneumatic switch, the spring will ensure that the lock is disengaged.

SINGLE REAR AXLE 11.26

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General

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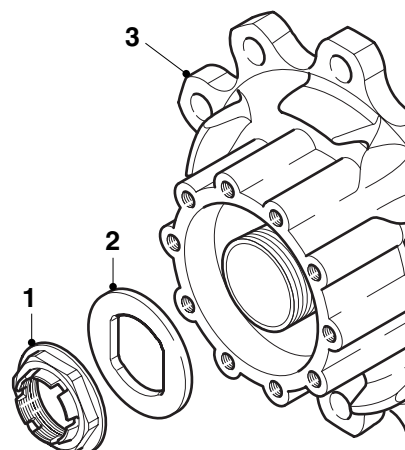
Wheel hub unit

The wheel hub has a compact bearing. The compact bearing and hub oil seal are integrated into a single unit with the wheel hub. This is called the wheel hub unit (3).

The thrust washer (2) installed between the hub nut (1) and wheel bearings, is fitted with two straight surfaces on the inside to prevent the washer from turning. This is to prevent the hub nut (1) from loosening in case of wheel bearing problems. The hub nut (1) is of the self-locking type. The nut is locked by bending the lips on the hub nut outward.

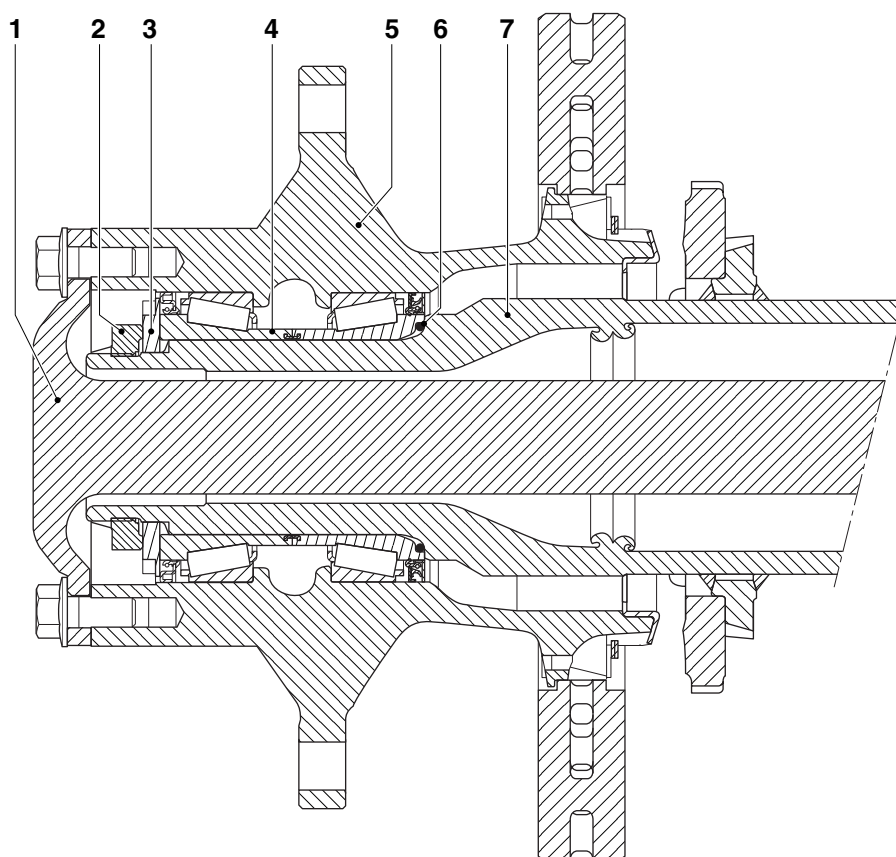
The wheel bearings of the wheel hub unit are greased and are maintenance free.

The correct wheel bearing pre-load is achieved by fitting the hub nut as specified. The stub axle and brake disc are attached to the wheel hub with bolts.



A8 00 356

2.2 OVERVIEW DRAWING, WHEEL HUB UNIT



A8 00 341

Legend

- 1. Stub axle
- 2. Hub nut
- 3. Thrust washer
- 4. Compact bearing
- 5. Hub
- 6. O-ring
- 7. Axle journal

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LF45/55 series

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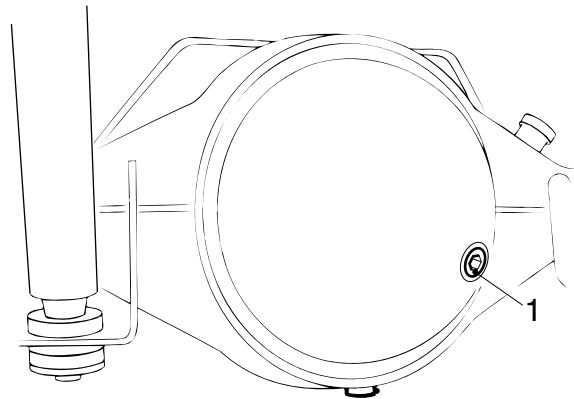
3. INSPECTION AND ADJUSTMENT

3.1 INSPECTING DIFFERENTIAL OIL LEVEL



To prevent skin injury, avoid unnecessary contact with the drained oil.

1. Position the vehicle on a level surface.
2. Remove the level check/filler plug (1). The oil level must reach the level check/filler opening (1).
3. Apply sealant to the plug. Secure the plug.



A8 00 375

3.2 CHECKING OPERATION OF DIFFERENTIAL LOCK

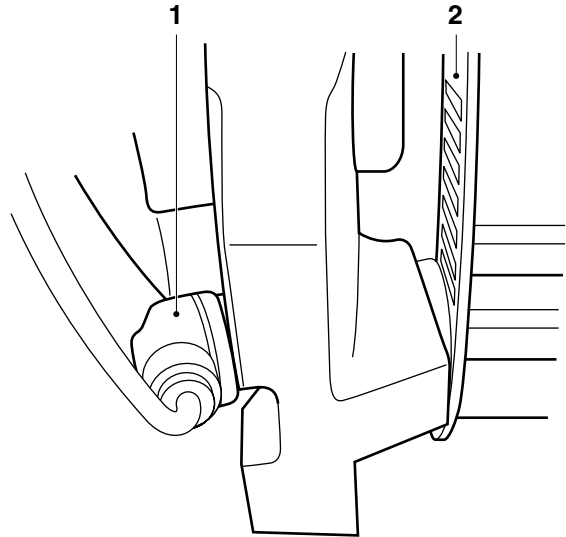
1. Jack up the rear axle and support it on stands.
2. Bring the air system to operating pressure.
3. Engage the differential lock. The warning indicator in the cab should now be activated.
4. Check whether there is a “rigid” connection between the driven wheels.
5. Disengage the differential lock. The warning indicator must no longer be activated and the “rigid” connection between the driven wheels should be interrupted.

3.3 INSPECTION, WHEEL-SPEED SENSOR RING

1. Remove the wheel hub unit.
2. Check the sensor ring (2) for deposits. Special attention should be paid to deposits between the teeth of the sensor ring. Clean the sensor ring if necessary.
3. Check the sensor ring (2) for damage. Even the slightest damage may cause a failure. Replace the sensor ring if necessary.
4. If possible, the sensor ring (2) should be checked for the maximum admissible axial end play. See "Technical data".
5. Check the sensor (1) for smooth operation. If necessary, clean the sensor (1) and re-apply the specified anti-corrosion agent. See main group "Technical data".



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.



A8 00 342

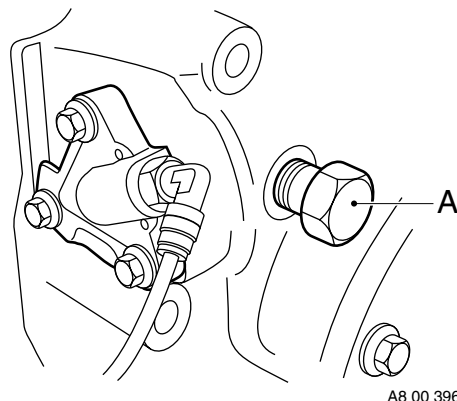
6. Check the ABS system for proper operation.

4. REMOVAL AND INSTALLATION

4.1 REMOVAL AND INSTALLATION, STUB AXLES

Removing stub axles

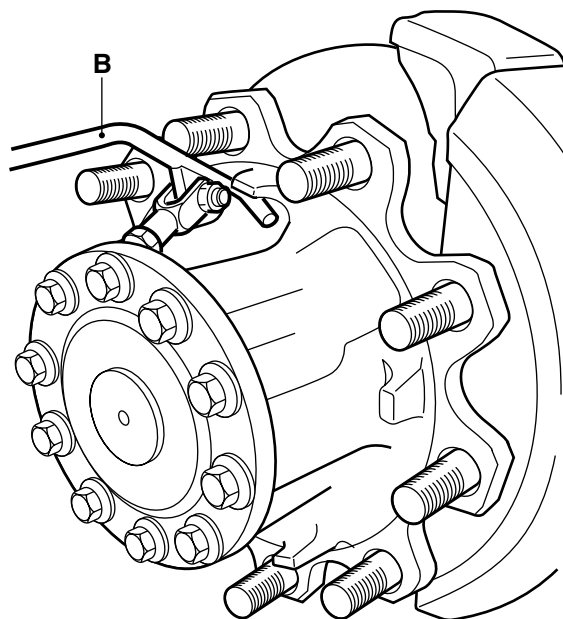
1. Jack up the rear axle and support it on stands.
2. Engage the differential lock. Check that the axle is blocked. Replace the switch by the special tool (DAF No. 1329447), see (A). This is to prevent the selector sleeve from falling into the differential when removing the stub axle.



3. Remove the stub axle attachment bolts.
4. Remove the stub axle using special tool (DAF No. 0694980), if required, see (B). When the stub axle comes loose, a small amount of oil may leak out. Collect this oil.

Installing stub axles

1. Clean the mating surfaces of the stub axle flange and wheel hub unit.
2. Apply the specified sealant to the mating surface of the stub axle flange. See main group "Technical data".
3. Fit the stub axle. Tighten the stub axle attachment bolts to the specified tightening torque. See main group "Technical data".
4. Engage the differential lock and remove the special tool from the differential lock. Install the switch.



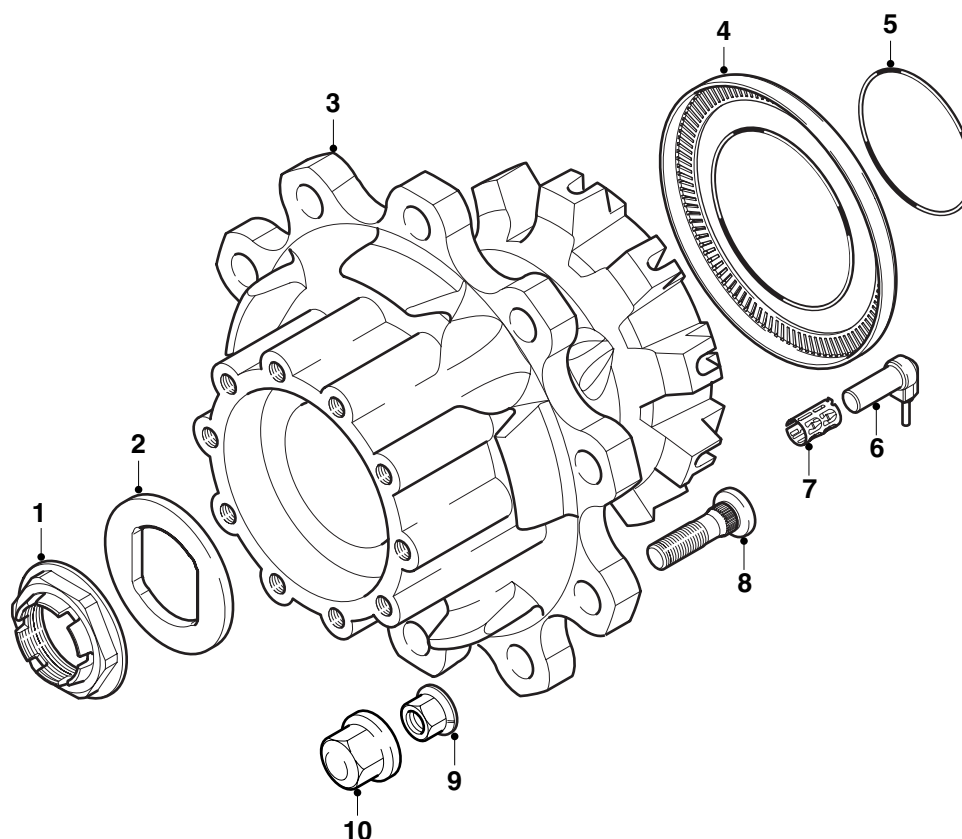
SINGLE REAR AXLE 11.26

8

Removal and installation

LF45/55 series

4.2 REMOVAL AND INSTALLATION, WHEEL HUB UNIT

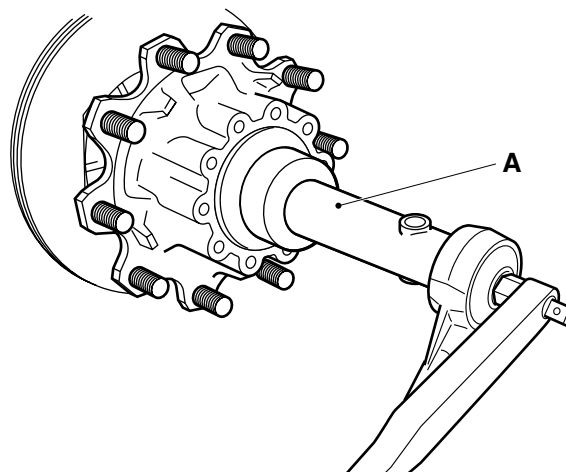


A8 00 348

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Removing the wheel hub unit

1. Jack up the rear axle and support it on stands.
2. Remove the wheels.
3. Remove the brake caliper.
4. Remove the stub axle.
5. Remove the hub nut (1) using the hub nut wrench (A), which is part of the special tool set (DAF No. 1329496). Loosen the hub nut (1), using a torque amplifier to do so.
6. Remove the thrust washer (2).



A8 00 405

7. Install the guide sleeve (A), which is part of the special tool set (DAF No. 1329496), on the axle journal.
8. Attach the wheel hub unit (3) securely to a movable lifting device.
9. Slide the wheel hub unit (3) from the axle journal using the lifting device.
Take care that the wheel hub unit (3) does not rest on the guide bush (A) as the latter is not strong enough to take the weight of the wheel hub unit (3).

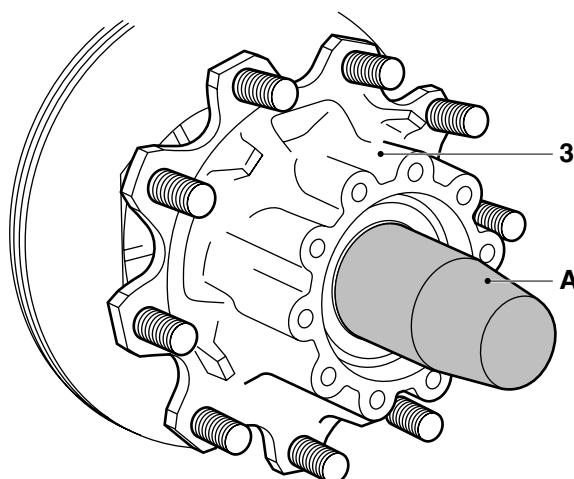
Installing the wheel hub unit

1. Check the wheel-speed sensor ring and the seals in the wheel hub unit (3) for damage.
2. Check the axle journal screw thread carefully for damage.

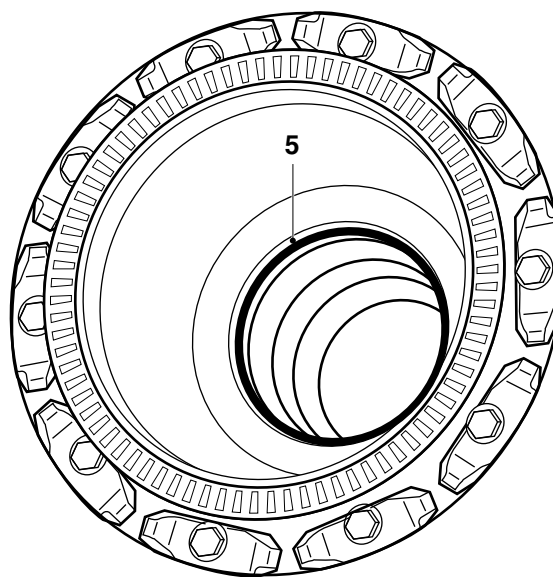


You must never fit a wheel hub unit on an axle journal with damaged screw thread.

3. Install the O-ring (5) in the wheel hub unit.



A8 00 345



A8 00 350

SINGLE REAR AXLE 11.26

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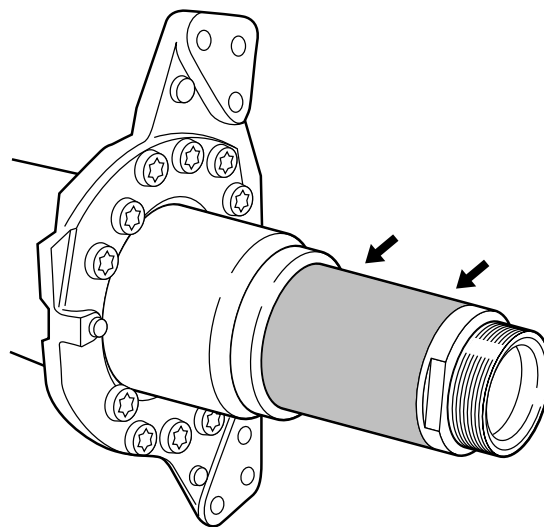
Removal and installation

LF45/55 series

4. Apply a thin and even layer of the specified anti-corrosion agent to the axle journal. See main group "Technical data".

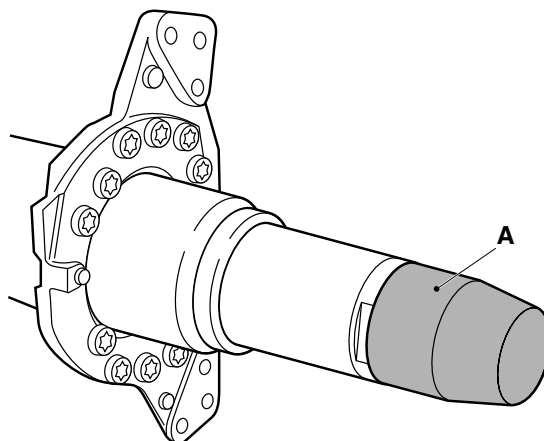
Note:

Do not apply too much anti-corrosion agent to the axle journal. When installing the wheel hub unit, the excess anti-corrosion agent will collect at the backside of the wheel hub. When the vehicle is used in daily operation, this anti-corrosion agent can leak out so that it looks as if the oil seal leaks.



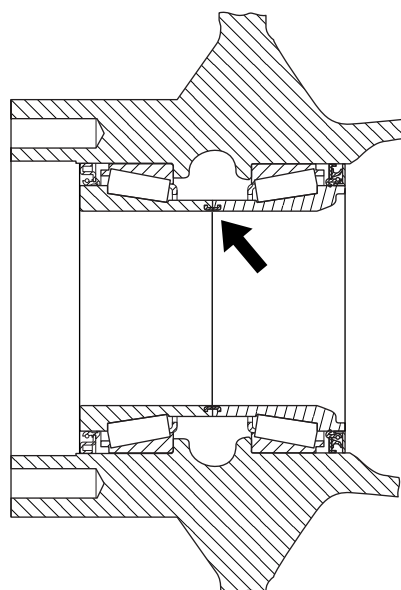
A8 00 344

5. Install the guide sleeve (A), which is part of the special tool set (DAF No. 1329496), on the axle journal.



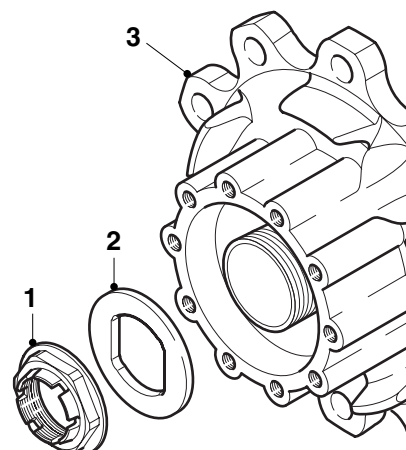
A8 00 343

6. Check that the spring clip, located between the inner bearing races, is positioned correctly.

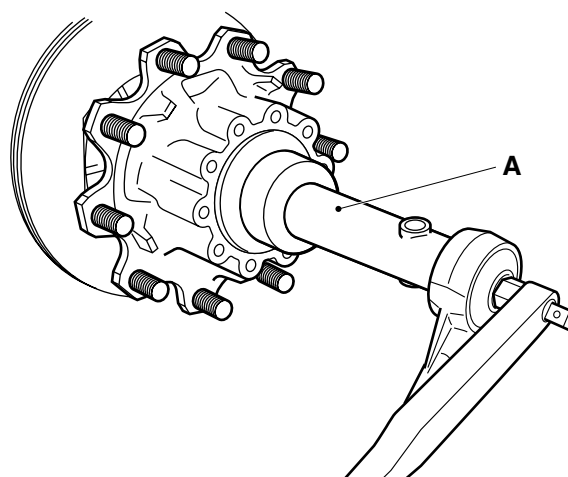


A8 00 434

7. Attach the wheel hub unit (3) securely to a movable lifting device.
8. Position the wheel hub unit (3) exactly in front of the axle journal using the movable lifting device. Slide the wheel hub unit (3) on the axle journal. Take care that the wheel hub unit (3) does not rest on the guide bush as the latter is not strong enough to take the weight of the wheel hub unit (3).
9. Fit the thrust washer (2).
10. Replace the hub nut (1). Apply a few drops of oil to the abutting surface of the hub nut (1). Fit the hub nut (1).
11. Tighten the hub nut (1) using the hub nut wrench (A), which is part of the special tool set (DAF No. 1329496). Tighten the hub nut (1) in the specified manner using a torque amplifier. See main group "Technical data".



A8 00 356



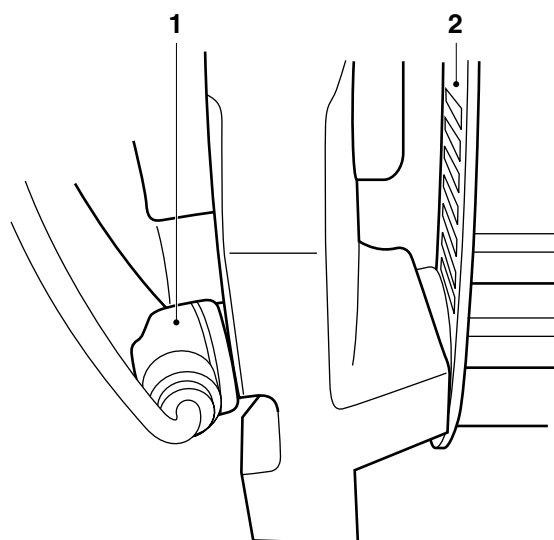
A8 00 405

12. Press the wheel-speed sensor (1) against the sensor ring (2). When the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically. If the sensor is stuck, remove, clean and refit it.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

13. Fit the stub axle.
14. Fit the brake caliper.
15. Put the wheels back on.
16. Check the ABS system for proper operation.



A8 00 342

SINGLE REAR AXLE 11.26**8**

Removal and installation

LF45/55 series**4.3 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR RING****Removing the wheel-speed sensor ring**

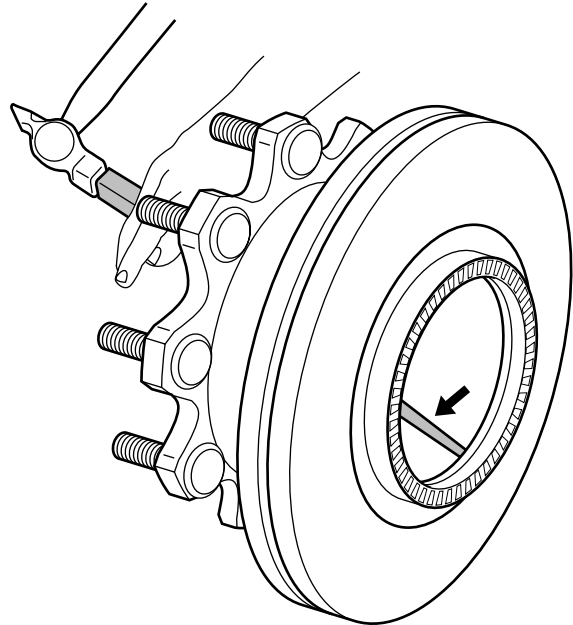
1. Remove the wheel hub unit from the axle journal.
2. Use a driving tool to carefully tap the sensor ring from the inside from the wheel hub unit. Make sure that the wheel hub unit is not damaged in the process.



Once removed, a sensor ring should not be reused.

Installing the wheel-speed sensor ring

1. Check the mating surface of sensor ring and wheel hub unit for damage.
2. Check the new sensor ring carefully for possible damage in transit.
3. Use a flat plate and a press to fit the sensor ring to the wheel hub unit. Press the sensor ring evenly on the wheel hub unit until it fully abuts.
4. Fit the wheel hub unit on the axle journal.



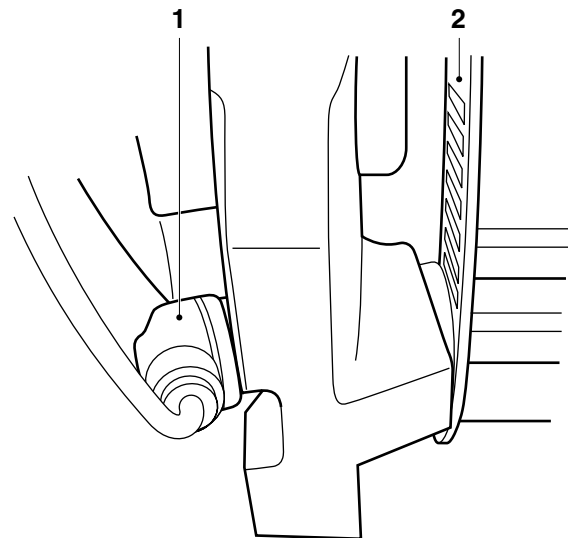
A8 00 359

5. Press the wheel-speed sensor (1) against the sensor ring (2). While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

6. Check the ABS system for proper operation.



A8 00 342

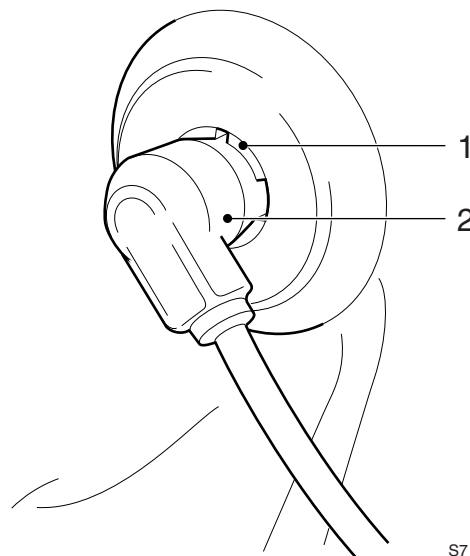
4.4 REMOVAL AND INSTALLATION, WHEEL-SPEED SENSOR

Removing the wheel-speed sensor

1. Remove the wheel speed sensor (2).

Installing the wheel-speed sensor

1. Clean the wheel-speed sensor (2) and its holder (1). If necessary, replace the holder sleeve (1).
2. Apply anti-corrosion agent to the circumference of the wheel-speed sensor (2). See main group "Technical data".



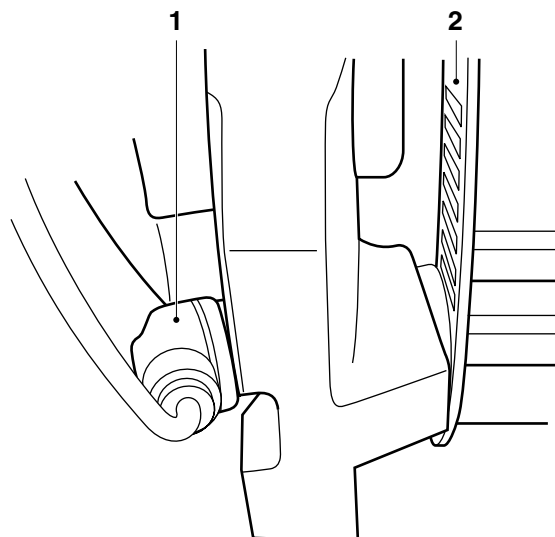
S7 00 796

3. Fit the wheel-speed sensor (1). Press it against the sensor ring (2) manually. While the vehicle is being driven, the air gap between the sensor and the sensor ring is adjusted automatically.



Never tap the sensor with a hammer. This may damage both the sensor and the sensor ring.

4. Check the ABS system for proper operation.



A8 00 342

SINGLE REAR AXLE 11.26

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Removal and installation

LF45/55 series

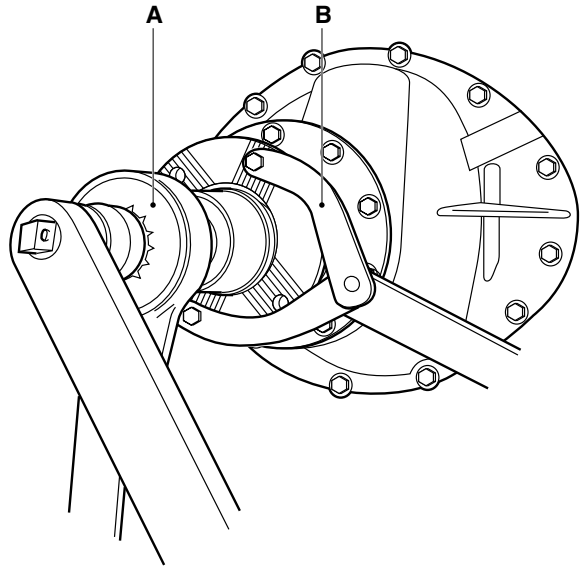
4.5 REMOVAL AND INSTALLATION, DRIVE FLANGE

Removing drive flange

1. Remove the prop shaft from the drive flange.
2. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Remove the drive flange nut using a torque amplifier (A).
3. Remove the drive flange. If necessary, use a puller.

Installing drive flange

1. Before installation check the drive flange along the oil seal running surface for grooves and/or sharp edges. If required, replace the drive flange.
2. Fit the drive flange.
3. Apply a small amount of oil to the abutting surface of the drive flange nut.
4. Apply locking compound to the screw thread. See main group "Technical data".
5. Fit the special tool (B) (DAF No. 0484977) on the drive flange to prevent it from turning. Fit the drive flange nut. Use a torque amplifier (A) to tighten the drive flange nut to the specified tightening torque. See main group "Technical data".
6. Fit the prop shaft to the drive flange.



A8 00 386

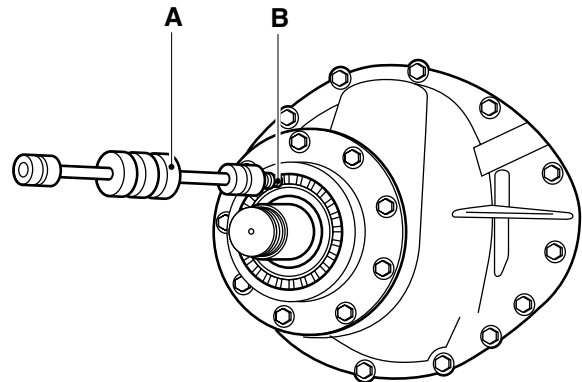
4.6 REMOVAL AND INSTALLATION, PINION OIL SEAL

Removing pinion oil seal

1. Remove the drive flange.
2. Drill two holes into the oil seal and screw the special tool (B) (DAF No. 0484899) into the oil seal. Pull the oil seal from the pinion housing using the special tool (A) (DAF No. 0694928).

Installing pinion oil seal

1. Use the special tool (DAF No. 1310446) to fit the oil seal such that the marking "outside" is pointing outward.
2. Fit the drive flange.



A8 00 381

SINGLE REAR AXLE 11.26**8**

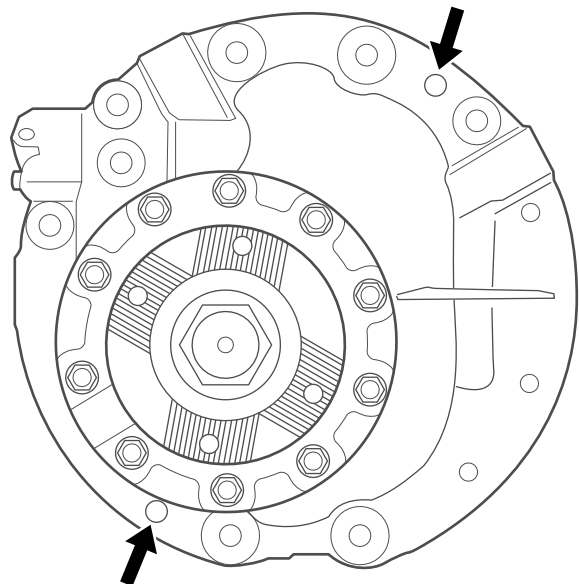
Removal and installation

LF45/55 series**4.7 REMOVAL AND INSTALLATION, DIFFERENTIAL****Removing differential**

1. Drain the oil from the differential. See chapter "Draining and filling".
2. Remove the prop shaft from the drive flange.
3. Remove the stub axles.
4. Remove the air connection for the differential lock, if applicable.
5. Attach the differential securely to a lifting device.
6. Remove the attachment bolts and nuts from the differential.
7. Remove the differential from the axle housing using two thrust bolts.

Installing differential

1. Clean the mating surfaces of the axle housing and the differential housing. Regrind the mating surfaces lightly. Do not damage the mating surfaces in the process.
2. Clean and degrease the bolts. Check the bolts and stud bolts for signs of damage.
3. Apply a thin, even layer of sealant to the mating surface and around the bolt holes of the axle housing.
4. Apply locking compound to the attachment bolts. See main group "Technical data".
5. Fit the differential into the axle housing. Fit the attachment bolts and nuts and tighten them evenly. Tighten the attachment bolts and nuts to the specified tightening torque. See "Technical data".
6. Fit the air connection to the differential lock.
7. Fit the stub axles.
8. Fit the prop shaft to the drive flange.
9. Fill the differential with oil. See chapter "Draining and filling".



A8 00 378

4.8 REMOVAL AND INSTALLATION, DIFFERENTIAL LOCK

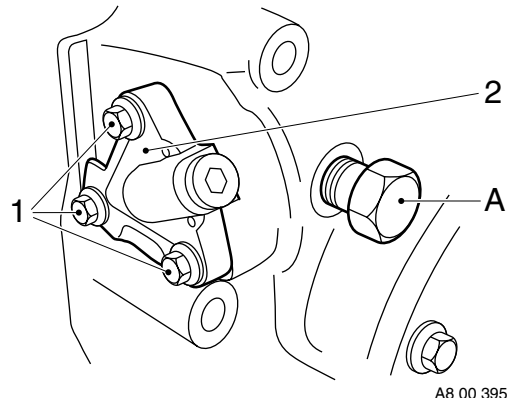
Removing differential lock

1. Remove the differential.

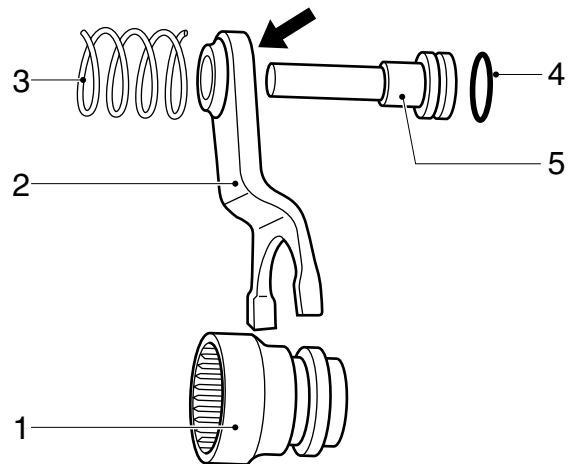


Do not come near the selector sleeve when de-aerating the differential lock.

2. Pressurise the air connection of the differential lock. Remove the special tool (A). Evenly de-aerate the differential lock.
3. Remove the attachment bolts (1) from the cylinder cover (2). Remove the cover.



4. Remove the piston (5).
5. Remove the shifting fork (2) and the selector sleeve (1) with the spring (3).



Installing differential lock

1. Install the shifting fork (2) and selector sleeve (1) with the spring (3).

Note:

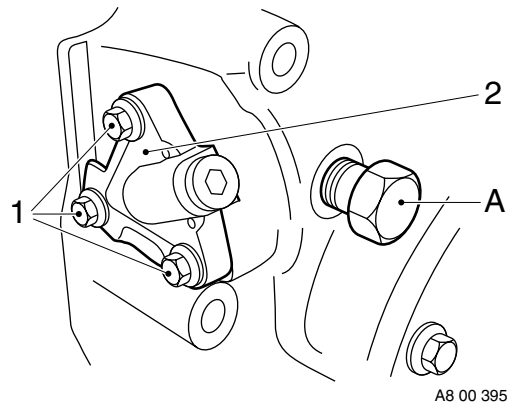
Make sure that the flat side (see arrow) of the shifting fork (3) points towards the piston (5).

2. Apply a small amount of oil to the seal (4) of the piston (5).
3. Install the piston (5).
4. Install the cylinder cover (2) and tighten the attachment bolts (1) evenly. Tighten the attachment bolts (1) to the specified tightening torque. See main group "Technical data".



Do not come near the selector sleeve when de-aerating the differential lock.

5. Pressurise the air connection of the differential lock. Fit special tool (A) (DAF No. 1329447), so that the differential lock is blocked.
6. Install the differential.



SINGLE REAR AXLE 11.26

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Removal and installation

LF45/55 series

5. DRAINING AND FILLING

5.1 DRAINING AND FILLING, DIFFERENTIAL



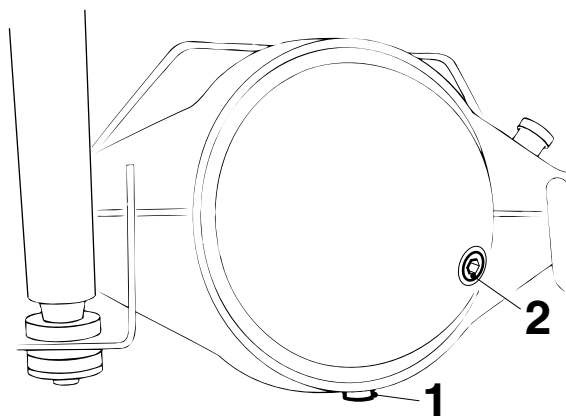
To prevent skin injury, avoid unnecessary contact with the drained oil.

Draining the differential

1. Position the vehicle on a level surface.
2. Place a suitable tray beneath the differential to collect the oil.
3. Remove the drain plug (1) and the level check/filler plug (2). Drain the oil.
4. Apply sealant to the screw thread of the drain plug (1). Install the drain plug (1) and tighten it to the specified tightening torque. See main group "Technical data".

Filling the differential

1. Fill the differential via the level check/filler plug (2) with the specified and correct quantity of oil. See main group "Technical data".
2. Check the oil level after 5 minutes; it should reach up to the level check/filler plug (2).
3. Apply sealant to the screw thread of the level check/filler plug (2). Fit the level check/filler plug (2).



A8 00 370

SINGLE REAR AXLE 11.26

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Draining and filling

LF45/55 series

8

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SHOCK ABSORBERS	3
STABILISERS AND TORQUE RODS	4
LEAF SUSPENSION	5

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1.1 General	1-1	0207
2. SHOCK ABSORBERS, STABILISERS, TORQUE RODS AND LEAF SUSPENSION	2-1	0207
2.1 General	2-1	0207
2.2 Tightening torques	2-3	0207

TECHNICAL DATA

9

Contents

LF45/55 series

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TECHNICAL DATA

LF45/55 series

Chassis

1. CHASSIS

1.1 GENERAL

Chassis materials

Type	Chassis type	Material
LF	All	KF 450

Note:

KF 450 is a “High Tensile Strength”-steel grade.

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TECHNICAL DATA

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Chassis

LF45/55 series

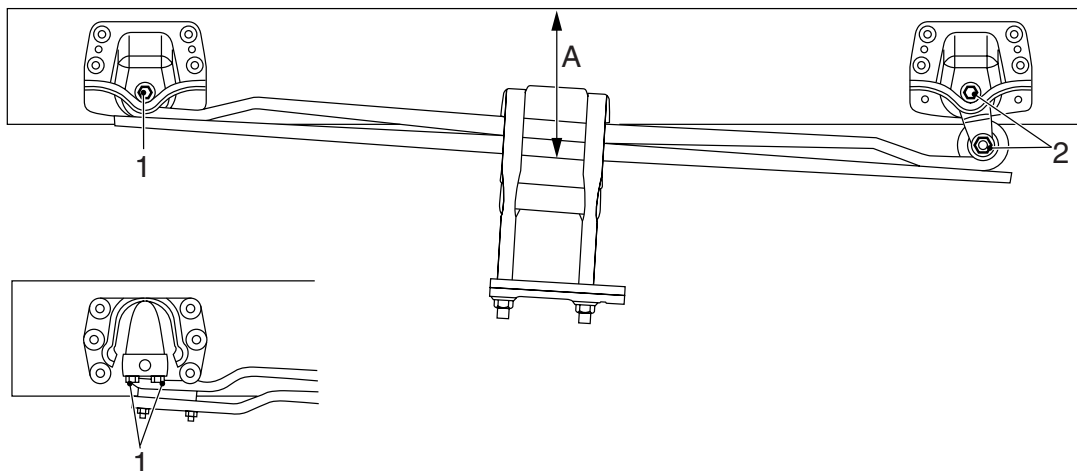
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2. SHOCK ABSORBERS, STABILISERS, TORQUE RODS AND LEAF SUSPENSION

2.1 GENERAL

Fixing the attachment bolts for the leaf spring

Ensure that when fixing the attachment bolts (1) for the leaf spring that the leaf spring is at the prescribed height (A). The height (A) is to be measured above the axle, between the top edge of the chassis cross member and the underside of the leaf spring.



C9 00 409

Front axle

MODEL	HEIGHT (A)	
	frontmost attachment point (1)	rearmost attachment point (2)
LF45 All models	404 mm	459 mm
LF45 All models	502 mm	566 mm

Rear axle

MODEL	HEIGHT (A)
LF45 7.5T GVW	295 mm
LF45 7.5T GVW A-symmetric	295 mm
LF45 10-12T GVW	327 mm
LF45 10-12T GVW A-symmetric	295 mm
LF55 13-15T GVW	391 mm
LF55 13-15T GVW A-symmetric	362 mm
LF55 16-18T GVW	414 mm
LF55 16-18T GVW type Kipper	391 mm
LF55 16-18T GVW A-symmetric	362 mm

Note:

With the rear axle height (A) applies to both the frontmost (1) and the rearmost attachment point (2) of the leaf spring.

TECHNICAL DATA

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Shock absorbers, stabilisers, torque rods and leaf suspension

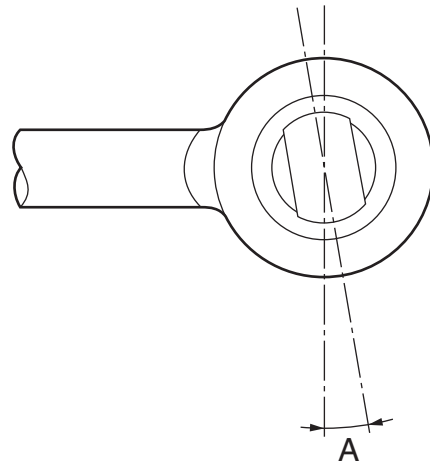
LF45/55 series

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Transverse guide torque rod, air sprung rear axle LF45

Fitting angle (A) for mounting rubber on rear axle side

8 - 12 °



C9 00 408

Torque rods stabiliser length (A)

A is the centre-to-centre-distance between the attachment points.

Front axle

LF45 all models

342 - 344 mm

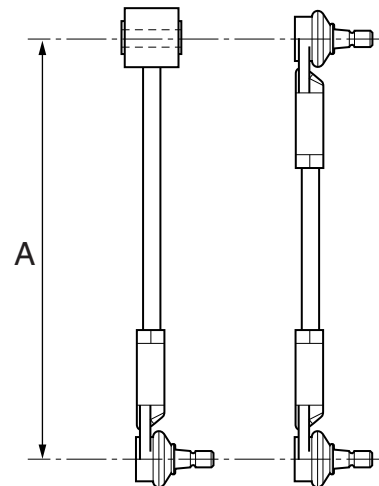
LF55 all models

348 - 352 mm

Rear axle

LF55 FAN steered rear axle

598 - 602 mm



C9 00 413

2.2 TIGHTENING TORQUES

The tightening torques stated in this paragraph are different from the standard tightening torques stated in the overview of the standard tightening torques. The other threaded connections which are not stated must therefore be tightened to the tightening torque stated in the overview of standard tightening torques.

When attachment bolts and nuts are to be replaced, it is important - unless stated otherwise - that these bolts and nuts are of exactly the same length and property class as the removed ones.

U-bolt nuts

MODEL	FRONT AXLE	REAR AXLE
LF45 all models	215 Nm*	468 Nm*
LF55 13 - 15 ton GVW	468 Nm*	468 Nm*
LF55 16-18 ton GVW Leaf suspension	537 Nm*	537 Nm*
LF55 16-18 ton GVW Air suspension	537 Nm*	880 Nm*
LF55 FAN steered rear axle		468 Nm*

* Tighten the U-bolt nuts evenly and alternately.

Shock absorbers

If using self-locking nut M14x2

52 Nm

Front axle torque rod locking nut

LF45

135 Nm

LF55

80 Nm

TECHNICAL DATA

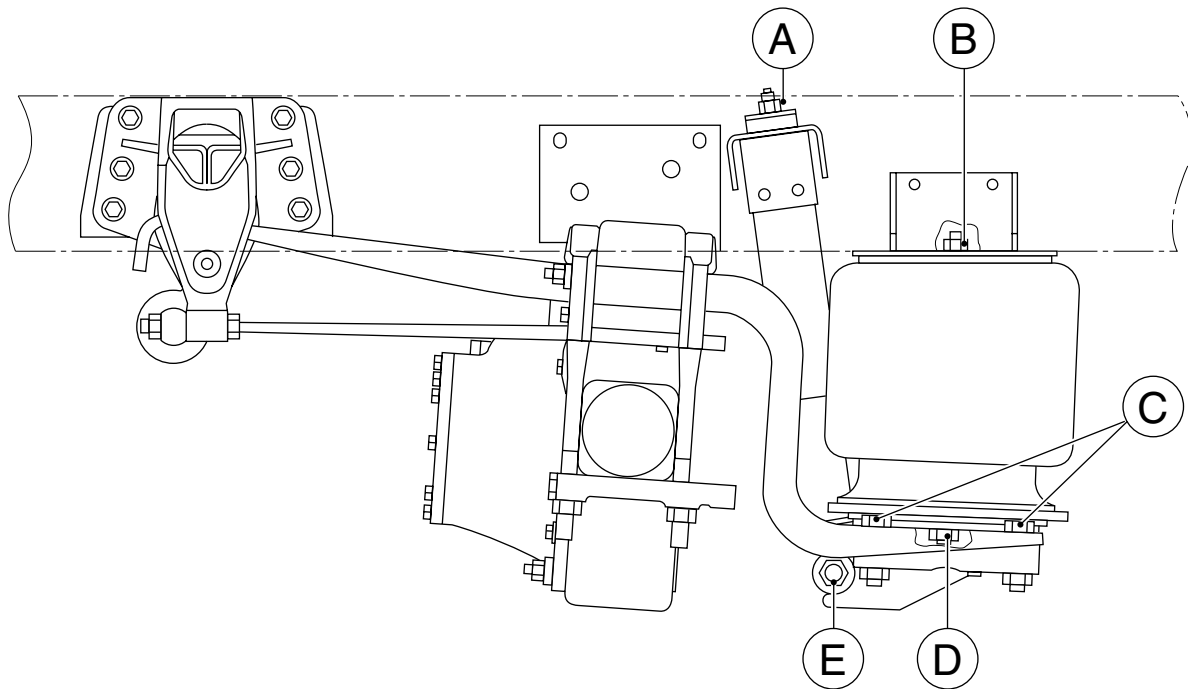
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Shock absorbers, stabilisers, torque rods and leaf suspension

LF45/55 series

LF45 rear axle, air suspension

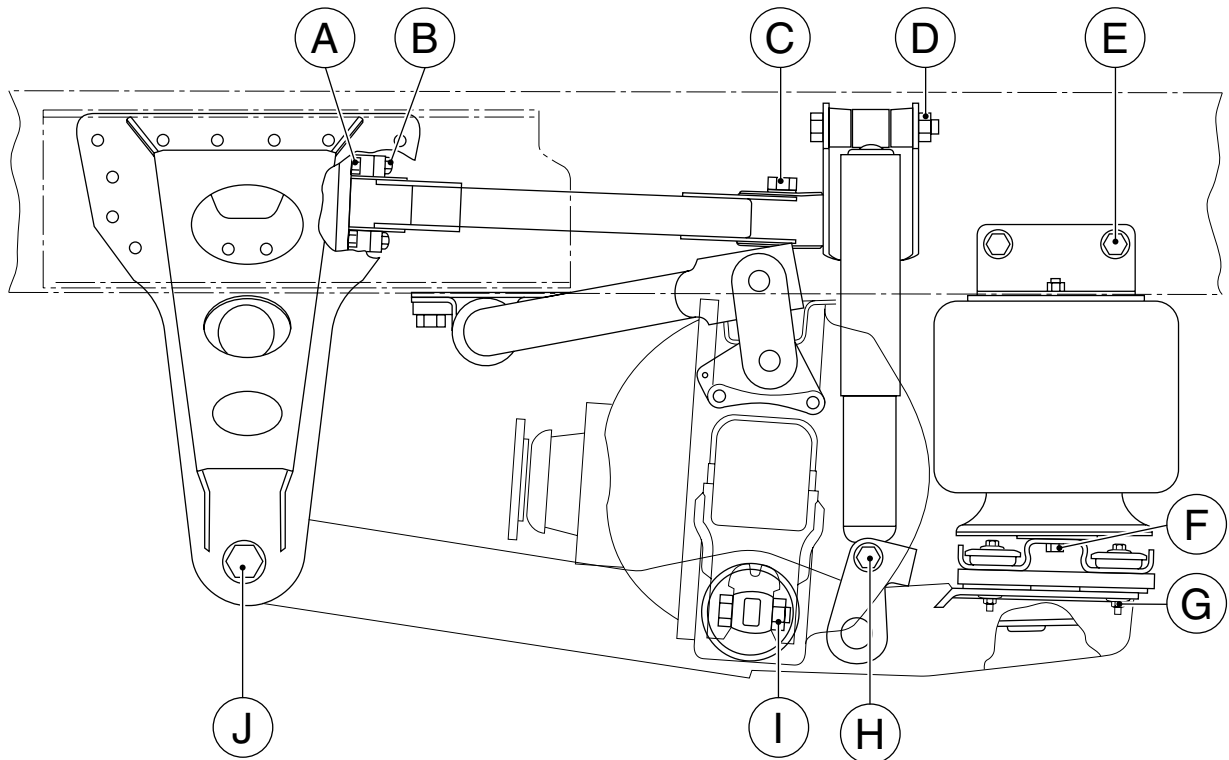
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C9 00 323

A	M14 shock absorber attachment nut	52 Nm
B	M12 air bellows attachment nut	31 Nm
C	M20 bolt	525 Nm
D	M12 air bellows attachment nut	60 Nm
E	M20 shock absorber attachment bolt	525 Nm

Rear axle, air suspension LF55 13- 15 ton
GVW



C9 00 324

A	M16 triangular adjustment block attachment bolt	360 Nm
B	M20 triangle attachment bolt	475 Nm
C	Attachment nut for triangle on differential M22	235 Nm
D	M20 shock absorber attachment bolt	525 Nm
E	M20 air bellows support attachment bolt	465 Nm
F	M12 air bellows attachment bolt	31 Nm
G	M16 attachment bolt	285 Nm
H	M20 shock absorber attachment bolt	525 Nm
I	Attachment bolt	385 Nm
J	M22 bolt with break nut, breakpoint nut	+/- 750 Nm

TECHNICAL DATA

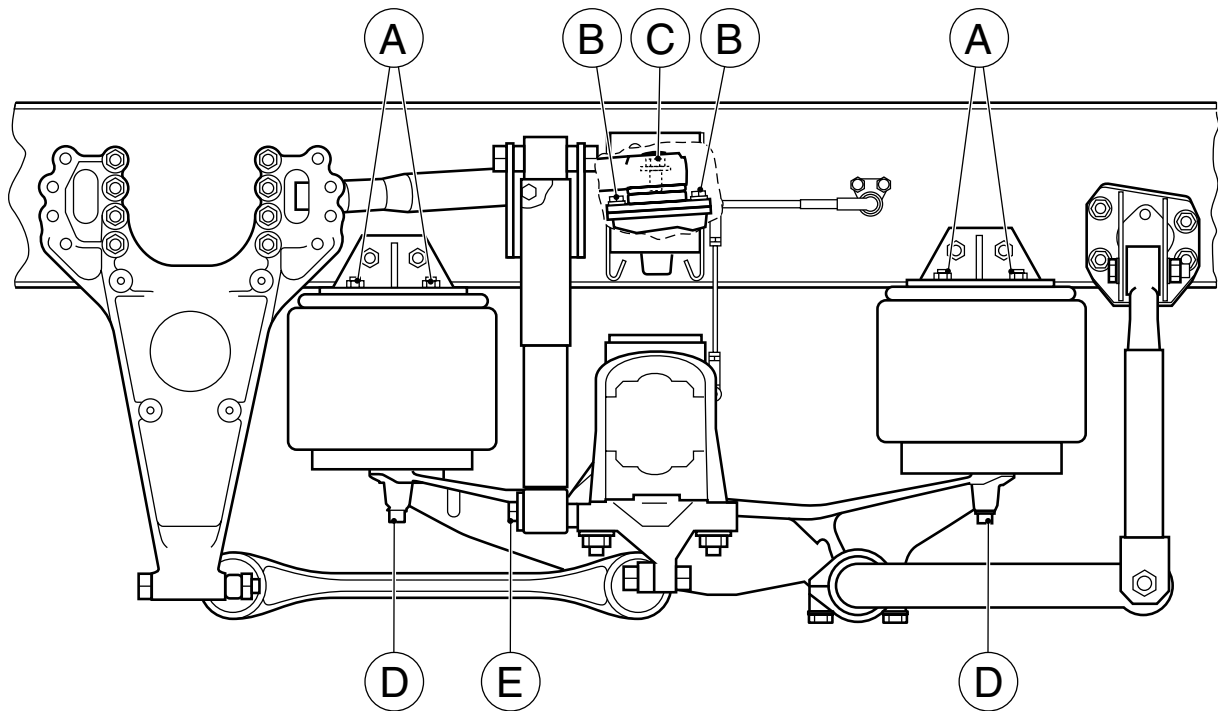
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Shock absorbers, stabilisers, torque rods and leaf suspension

LF45/55 series

**Rear axle, air suspension LF55 16- 18 ton
GVW**

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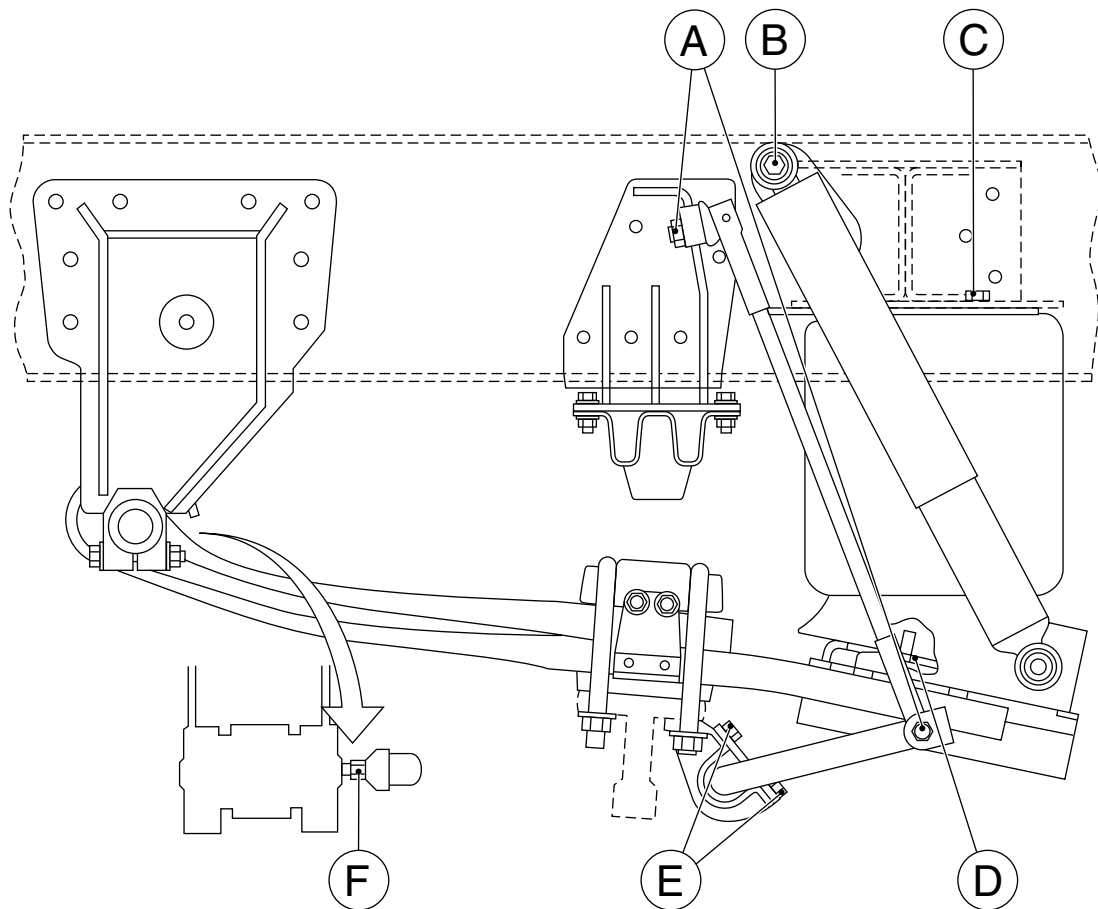


C9 00 325

A	M10 air bellows attachment nut	46 Nm
B	Clamping flange bolt M18	460 Nm
C	M14 attachment bolt, property class 10.9	135 Nm
D	M16 air bellows attachment bolt	195 Nm
E	M20 attachment bolt, property class 10.9, shock absorber	520 Nm

Steered rear axle, air suspension LF55 FAN

0



C9 00 397

A	Self-locking nut, torque rod ball joint	88 Nm
B	M20 shock absorber attachment bolt	250 Nm
C	M10 air bellows attachment bolt	32 Nm
D	M12 air bellows attachment bolt	34 Nm
E	M12 attachment bolt, stabiliser bar retaining plate	25 Nm
F	Automatic lubricating nipple	5 Nm

TECHNICAL DATA

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Shock absorbers, stabilisers, torque rods and leaf suspension

LF45/55 series

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2. LEAF SUSPENSION	2-1	0207
2.1 Fault-finding table	2-1	0207

DIAGNOSTICS

9

Contents

LF45/55 series

1

1. SHOCK ABSORBERS

1.1 FAULT-FINDING TABLE

COMPLAINT: SHOCK ABSORBER PRODUCES NOISE (CHATTERING, BUMPING ETC.)	
Possible cause	Remedy
Shock absorber is loose.	Tighten.
Attachment rubbers too soft.	Fit new rubbers.
Shock absorber comes into contact with other components.	Remove components or fasten them.
Shock absorber cover is loose.	Tighten cover or replace shock absorber.

COMPLAINT: SHOCK ABSORBER DOES NOT FUNCTION	
Possible cause	Remedy
Internal defect.	Replace shock absorber.
Loss of oil.	Replace shock absorber.

COMPLAINT: LEAKY SHOCK ABSORBER	
Possible cause	Remedy
Defective piston rod sealing. Caution: a thin, greasy layer is normal.	Replace shock absorber.

COMPLAINT: SHOCK ABSORBER TOO HARD	
Possible cause	Remedy
Incorrect shock absorber type fitted.	Fit correct type.
Internal shock absorber defect.	Check shock absorber using a test bench and replace, if required.

DIAGNOSTICS**9**

Shock absorbers

LF45/55 series**COMPLAINT: SHOCK ABSORBER TOO SOFT**

Possible cause	Remedy
Incorrect shock absorber type fitted.	Fit correct type.
Internal wear.	Check shock absorber using a test bench and replace, if required.
Loss of oil due to leakage.	See under Leaky shock absorber.
Vehicle overloaded.	Adjust vehicle loading.

COMPLAINT: POOR DRIVING CHARACTERISTICS/FLAT WEAR SPOTS ON THE TYRES

Possible cause	Remedy
Incorrect damping.	Check shock absorbers using a test bench and replace, if required.
Vehicle overloaded.	Adjust vehicle loading.

COMPLAINT: SHOCK ABSORBER HITS END STOP

Possible cause	Remedy
Defective stop rubber.	Replace rubber.
Insufficient damping.	See under Shock absorber too soft.
Vehicle overloaded.	Adjust vehicle loading.

1

2. LEAF SUSPENSION

2.1 FAULT-FINDING TABLE

COMPLAINT: LOOSE U-BOLTS	
Possible cause	Remedy
Use of a U-bolt or nut of an incorrect property class.	Use U-bolts and nuts of the correct property class.
The tightening torque used for the U-bolt nut was too low.	Tighten the U-bolt to the specified torque.
Reuse of a U-bolt with corroded or damaged thread.	Fit new U-bolt.
No or inadequate cleaning of the thread (which includes removal of paint) before reuse of the U-bolt.	Clean the thread thoroughly before re-use.
No oil or faulty application of oil on the thread and the bearing surface of the nut.	Apply the oil as prescribed.
Coating (i.e. paint) on the contact faces of the connection.	Clean the contact faces before assembly.
Inadequate retorquing of the U-bolt nut or no retorquing.	Tighten the U-bolt nut as specified.

COMPLAINT: BROKEN SPRING	
Possible cause	Remedy
Regular overloading.	Adjust vehicle loading.
Driving too fast over bad roads.	Adjust speed when the road is bad.
Notching effect due to welding or grinding activities.	Cover spring assembly when welding or grinding.
Spring damaged due to impact of a steel hammer.	Never hit the springs using a steel hammer or some other hard tool.
Incorrect repair of a spring leaf which has broken before.	When replacing a broken spring leaf, always replace the leaf on top and under the broken leaf; better yet, replace the entire spring assembly.
Spring has been heated.	Replace spring assembly. Springs should never be heated.

DIAGNOSTICS**9**

Leaf suspension

LF45/55 series**1****COMPLAINT: SPLAYING OF THE SPRING ASSEMBLY (BROKEN SPRING CLAMPS)**

Possible cause	Remedy
Incorrect pre-tension of the U-bolts.	See under complaint Loose U-bolts.

COMPLAINT: SPRING HITS END STOP

Possible cause	Remedy
Overloading.	Adjust vehicle loading.
Sagged spring assembly.	Check height of both spring assemblies. Replace spring assemblies.
Broken spring.	Repair spring assembly or replace.

COMPLAINT: SHIFTING OR BREAKING OF CENTRE BOLT

Possible cause	Remedy
Incorrect pre-tension of the U-bolts.	See under complaint Loose U-bolts.

COMPLAINT: BUMPING OR CHATTERING OF THE SPRING

Possible cause	Remedy
Loose U-bolts.	See under complaint Loose U-bolts.
Spring bracket is loose.	Secure the spring bracket.
Spring comes into contact with other components during spring action.	Check freedom of movement of spring.

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1. GENERAL	1-1	0207
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1.2 Drilling in the chassis	1-4	0207
1.3 Replacing the rivets by bolts	1-5	0207

CHASSIS

9

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LF45/55 series

2

1. GENERAL

1.1 REPAIRS TO THE CHASSIS

- Any welding, aligning, drilling and wheelbase alteration activities that are not described in this workshop manual or in any of the latest releases of DAF's Chassis Guidelines must be authorised by DAF.
- Following chassis repair, the cause of the chassis damage should be rectified.

Welding

- Chassis welding may only be carried out by welders holding a valid EN 287-1 certificate.
- Slag inclusions and other contamination in the welds are totally unacceptable.

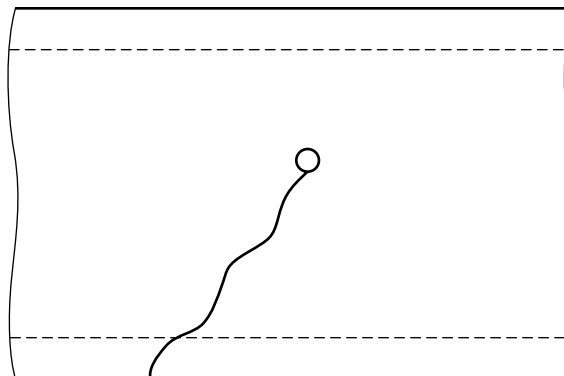
Note:

Welding a chassis made from High Tensile Strength steel KF 450 is strongly advised against. If, however, you do wish to weld a High Tensile Strength steel chassis, contact DAF always first.

The welding electrode must meet the standard: EN 757: EY 4666 MNB.

To repair cracks in the chassis, proceed as follows, taking account of the guidelines given above:

1. Remove all parts restricting a clear working area.
2. Thoroughly clean the crack so that the course of the crack is clearly visible.
3. Drill a small hole at the end of the crack. This will prevent the crack from continuing.



W9 01 001

CHASSIS

9

General

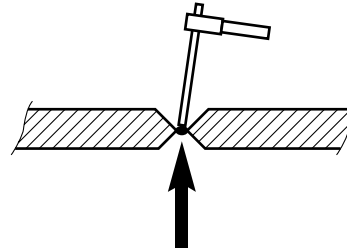
LF45/55 series

4. Thoroughly grind out the crack on both sides.
5. Take the necessary precautions to prevent damage to electronic components. Place the earth clamp as close as possible to the weld and avoid bridges.



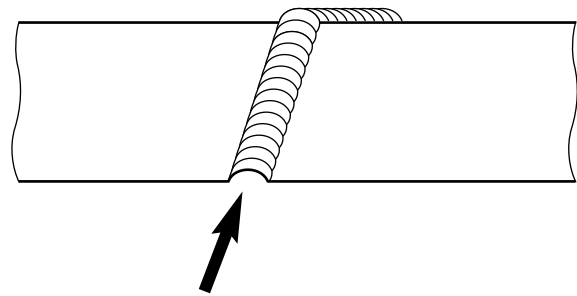
W9 01 002

6. Lay a bead on one side of the ground-out crack.
7. Gouge or grind off the material at the back of the bead (see the arrow) so that the new weld material is clearly visible.
8. Finish-weld the X-seam in the usual manner.
9. Fill in the drilled hole.

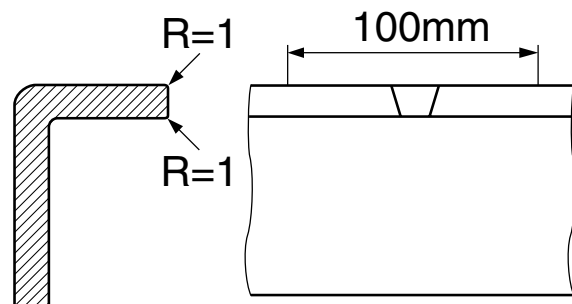


W9 01 003

10. Grind down the new weld so that it is flush. Take care not to grind the chassis flange in the process.
11. The beginning and end of a weld should not curve inwards (see the arrow).
12. Round off the weld at the edge of the chassis member.



W9 01 004



W9 01 005

Straightening



Do not forget your own safety during straightening operations. When working with presses, take care that parts cannot fly out.

The straightening of a chassis demands a high degree of craftsmanship as in every case of damage, an individual assessment must be made to establish whether or not straightening would be a sensible measure.

Deformations found after accidents will mainly be of the following 6 types:

- chassis is bent sideways
- chassis has a double bend sideways ("S-bend")
- chassis sags
- chassis bulges upwards
- chassis is twisted
- chassis is out of square.

In many cases, the damage will be a combination of two or more of these basic deformations. In general, the deformations should be dealt with in the sequence shown above, although some combinations can be dealt with in one straightening operation. When deciding whether or not to straighten a chassis, you must consider not only the degree of chassis bending but also the angle of a bend. If there is a sharp angular bend or fold in the chassis, the material in that area is likely to be severely deformed. If such a chassis were to be realigned to its original form, there would be a high risk of overstretching the already weakened material and causing a crack to develop.

"Warm" straightening

DAF chassis should not be warm straightened. Heating can cause grains in the material which will adversely affect the material properties.

General

For every straightening operation, all stresses in the stiffer parts of the chassis, for example in the tandem axle attachment cross member, should be relieved. If this is not done, these stresses will later cause new distortions or cracks in the chassis.

It is obvious from the above points that straightening is a highly specialised job for which the specialist involved bears full responsibility. Always contact DAF when in doubt about complicated "straightening operations".

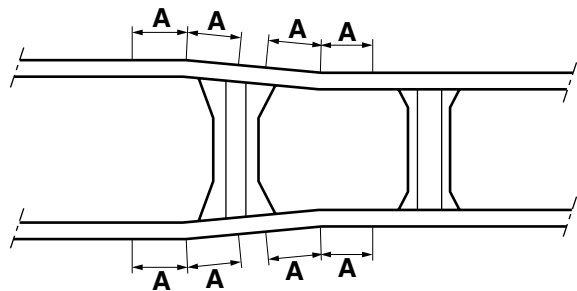
1.2 DRILLING IN THE CHASSIS**Note:**

There are several stress zones in a chassis. Working on the chassis without the appropriate knowledge (and not according to DAF instructions) may cause irreversible damage to the chassis. The repair shop or bodybuilder would be held fully responsible for such work and for any superstructure fitted.

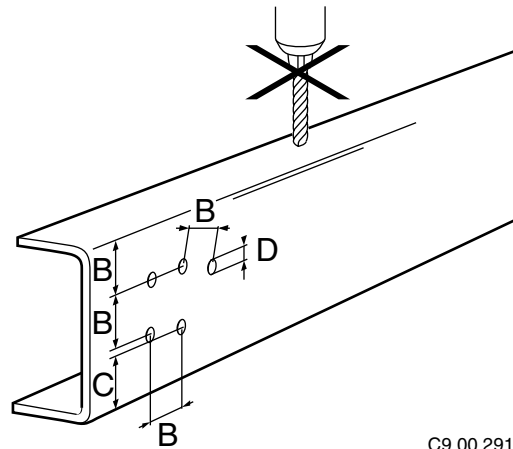
If holes must be drilled in the chassis frame, note the following points:

Drilling holes within a distance of 70 mm (distance A) from a bend in the chassis is not permitted.

- It is on no account permitted to drill holes in the tapered ends at the rear of a tractor chassis.
- Drilling holes in the flanges of the chassis side members is not permitted.
- The maximum diameter for drilled holes is 17 mm (dimension D in the drawing).
- The distance between the holes, and between the holes and the side member flange, must be at least $3 \times D$ - with a minimum of 30 mm (dimension B in the drawing).
- The distance between the lower stud hole and the chassis underside should at least be equal to distance C.
Distance C is > 70 mm for a tractor chassis.
Distance C is > 50 mm for all other chassis.
- Deburr (at an angle of 45°) and lacquer coat the drilled hole.



C9 00 304



C9 00 291

Wheelbase alteration

Any alteration to the wheelbase or changes to the rear overhang should be done in accordance with the latest DAF Trucks Bodybuilders' Guidelines.

Note:

When using the Bodybuilders' Guidelines, you are advised to first read the "General" section.

1.3 REPLACING THE RIVETS BY BOLTS

Note:

A rivet may either be replaced by a flange bolt M14 x 2, property class 8.8 (DIN 6921), or a flange bolt M16 x 2, property class 10.9.

Removing the rivet

1. Remove the rivet head. Make sure not to damage the chassis during this procedure.
2. Use a 10 mm drill to drill a hole in the rivet. Remove the rivet from the chassis.

Installing flange bolt M14

1. Ream the rivet hole to fit 14 H7 (14 + .000 - 14 + .018 mm). Make sure not to damage any lines running behind the rivet hole. Deburr the edges.
2. Repair the chassis lacquer coating. The new paintwork should be no thicker than 50 microns.
3. It is important that part of the bolt shank is not threaded. Determine the length (L) of the non-threaded shank part using the formula below.

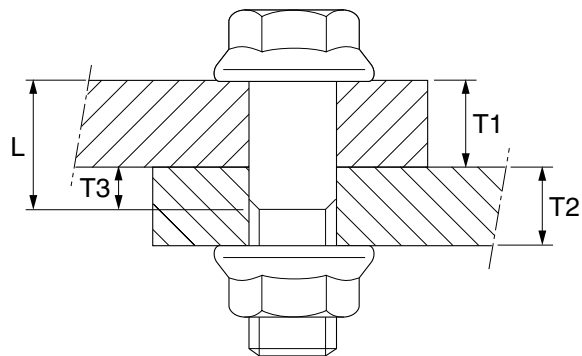
$$L = T1 + T3, \text{ in which } T3 \text{ must be } > \frac{1}{2} T2.$$

L = shank length without thread

T1 = part to be clamped

T2 = part to be clamped

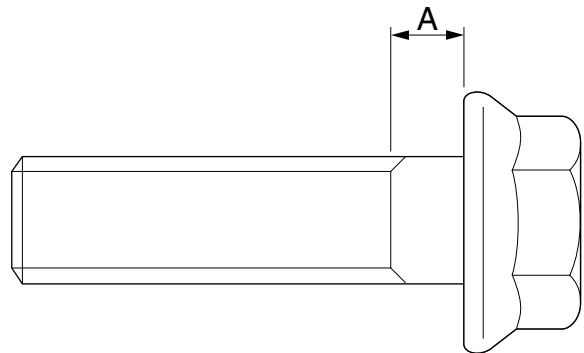
4. Tighten the flange bolt to the standard tightening torque for bolts, property class 8.8.



C9 00 295

Installing M16 flange bolt

1. Drill the rivet hole out to $\varnothing 17$ mm. Make sure not to damage any lines running behind the rivet hole. Deburr the edges.
2. Repair the chassis lacquer coating. The new paintwork should be no thicker than 50 microns.
3. Install a flange bolt M16 x 2, property class 10.9, with a non-threaded shank (A) of 6 mm.
4. Tighten the flange bolt to the standard tightening torque for bolts, property class 10.9.



C9 00 296

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SHOCK ABSORBERS

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LF45/55 series

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1. GENERAL

1.1 OPERATION OF SHOCK ABSORBER

The function of the shock absorber is twofold:

- to control the movements of chassis and superstructure in relation to the axle. Optimum comfort is achieved when the chassis and superstructure remain truly horizontal and are not subjected to any vertical accelerations when moving;
- to control the movements of the wheels on the road. Optimum handling is achieved when all wheels remain in constant contact with the road surface.

The rate of the above-mentioned movements depends on the available spring travel. The available spring travel is the difference in height between an unloaded spring and a fully loaded spring.

A well-functioning shock absorber with characteristics appropriate to the operating conditions will be the best possible compromise to fulfil the above-mentioned functions.

DAF only uses double acting type shock absorbers.

On vehicles with air suspension, hydraulic stroke limitation is used.

The shock absorber consists of:

- an operating cylinder, in which the actual damping is done by a piston with piston rod of which the valve unit damps the rebound stroke;
- a bottom valve which, in combination with the piston valve unit, damps the bump stroke.
- a reservoir tube which draws in oil surplus (result of the volume taken up by the piston rod) via the bottom valve;
- a dust cover, attached to the piston rod.

SHOCK ABSORBERS

9

General

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Double acting shock absorbers

The operation of the shock absorber is as follows:

the bump stroke moves the cylinder (1) down in relation to the operating cylinder (2).

Subsequently, oil flows from the bottom chamber of the piston (1) through the piston holes and valves to the top chamber where the volume increases. The oil pressure is equal on either side of the piston (1).

To compensate for the volume taken up by piston rod (3), oil flows from under the piston (1), via the bottom valve (4), to the reservoir tube (5).

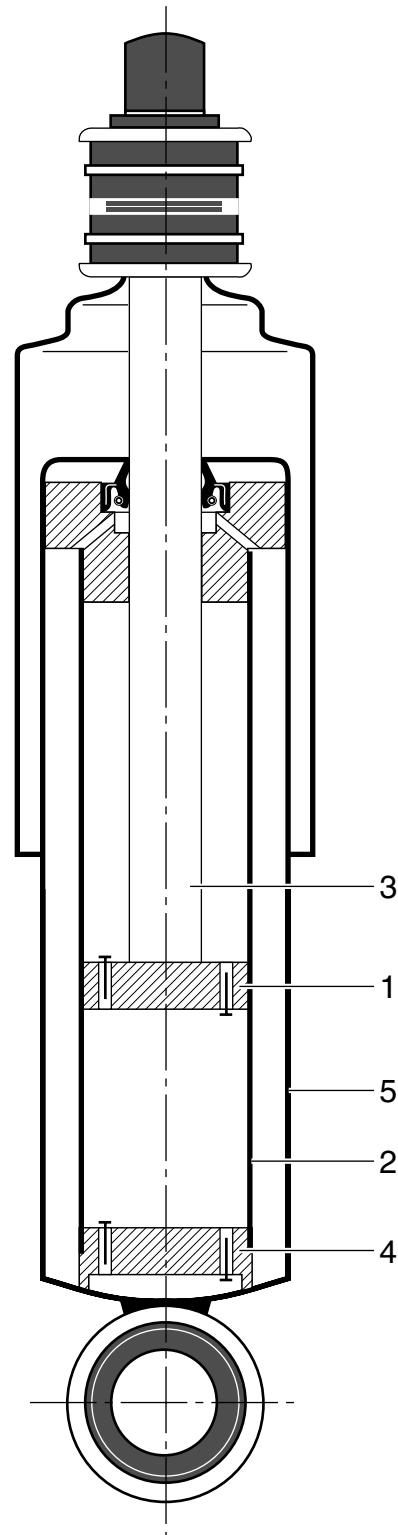
The resistance met by the oil during this movement dampens the bump stroke of the shock absorber.

The rebound stroke moves the piston (1) up in relation to the operating cylinder (2).

Subsequently, pressure is exerted on the oil in the upper chamber of the piston (1) causing the oil to flow to the bottom chamber under the piston (1), via the piston holes and valves.

The resistance met by the oil during this movement dampens the bump stroke of the shock absorber.

To compensate for the volume taken up by the piston rod (3) in the upper chamber, oil flows via bottom valve (4) from the reservoir tube (5) to the bottom chamber under the piston (1).



W9 02 001

2. REMOVAL AND INSTALLATION

2.1 REMOVAL AND INSTALLATION OF SHOCK ABSORBERS

Remving the shock absorber

1. Remove the attachment nuts and/or bolts.
2. Mark the exact positions and location of the mounting rubbers.
3. Remove the shock absorber from under the vehicle.

Installing the shock-absorber

1. Check the shock absorber mountings for hair-line cracks.
2. If the old rubbers are to be reused, check them for hair-line cracks and ageing. Install the rubbers in the original locations and positions.
3. When replacing the rubbers, use only the specified types.
4. Replace any self-locking nuts. Tighten the attachment bolts to the specified tightening torque, see "Technical data".

SHOCK ABSORBERS

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Removal and installation

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STABILISERS AND TORQUE RODS

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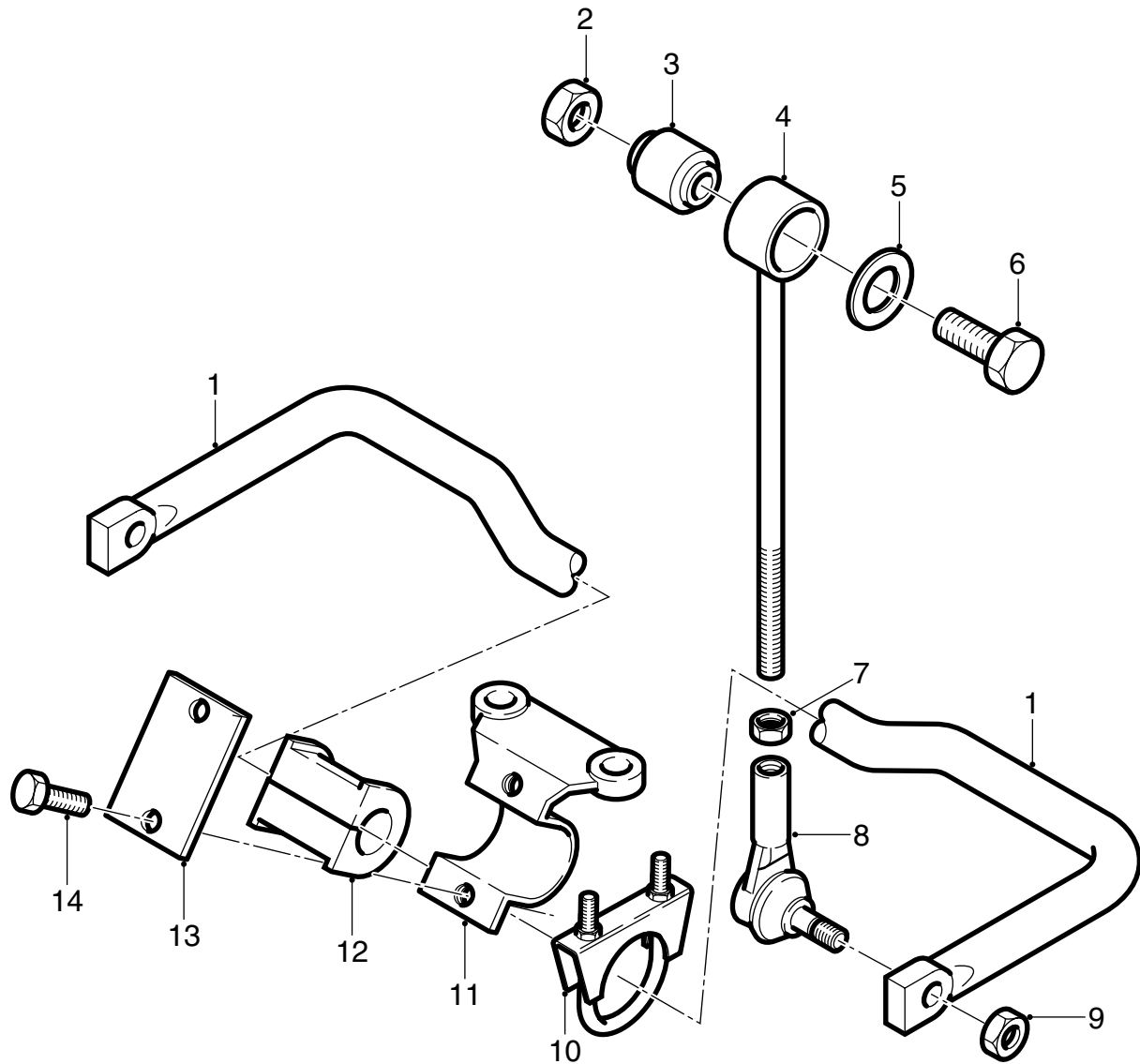
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1. GENERAL

1.1 OVERVIEW DRAWING, FRONT-AXLE STABILISER



C9 00 400

1. Stabiliser bar
2. Attachment bolt
3. Silentblock
4. Torque rod
5. Shim
6. Attachment bolt
7. Lock nut
8. Torque rod ball joint
9. Attachment bolt
10. Clamp
11. Stabiliser bracket
12. Bearing bush
13. Retaining plate
14. Attachment bolt

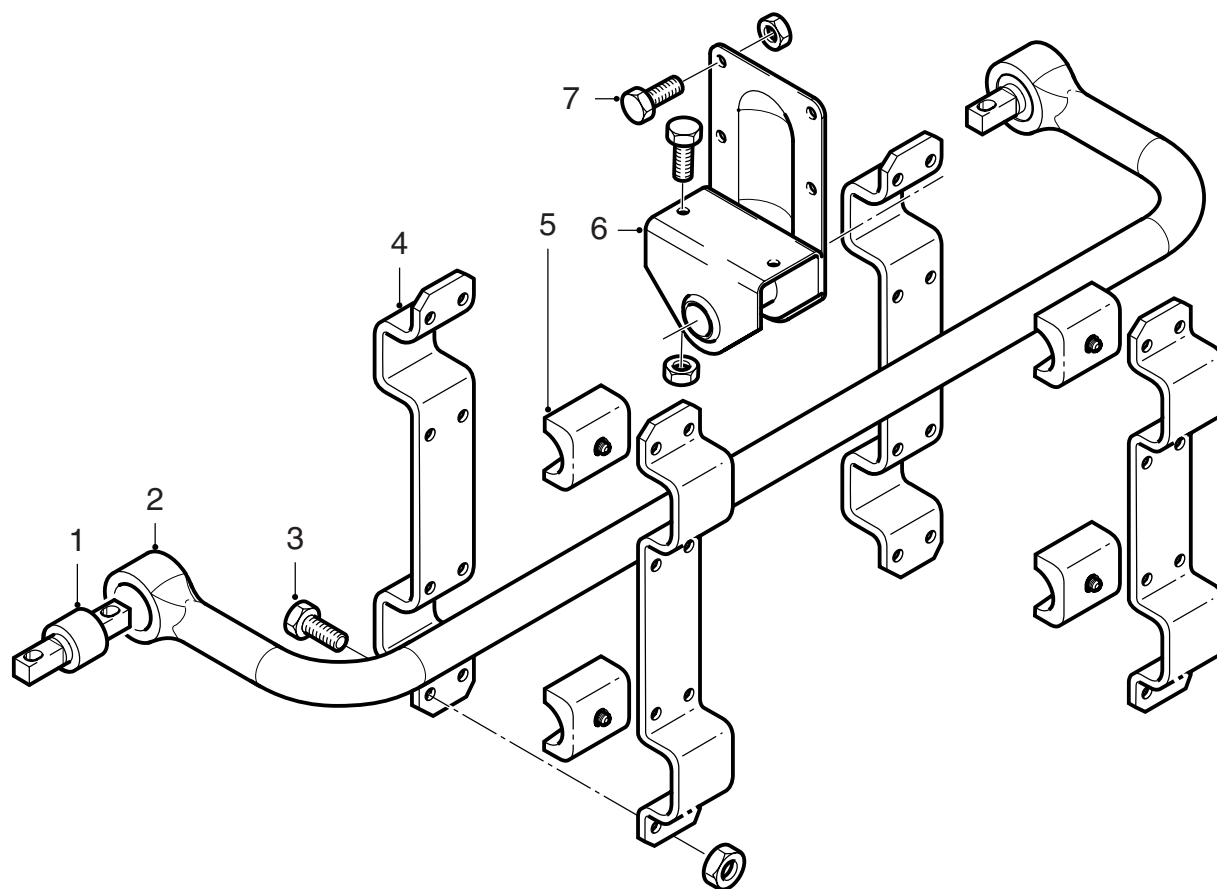
STABILISERS AND TORQUE RODS

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General

LF45/55 series

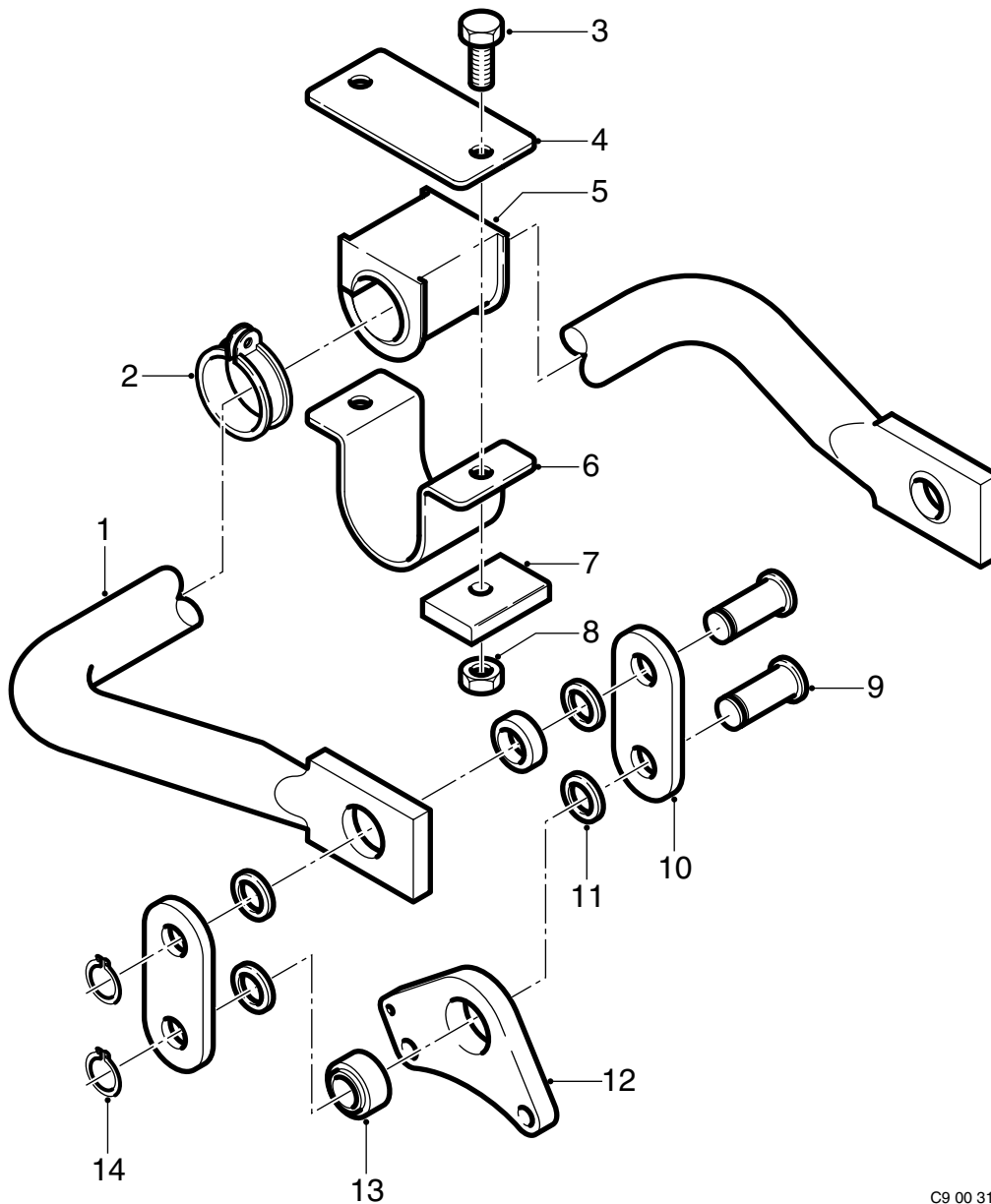
1.2 OVERVIEW DRAWING, LEAF-SPRUNG REAR AXLE STABILISER



C9 00 401

1. Silentblock
2. Stabiliser bar
3. Attachment bolt
4. Bearing bush cover
5. Bearing bush
6. Bearing-bush cover

1.3 OVERVIEW DRAWING, AIR-SPRUNG REAR AXLE STABILISER LF55
13-15 TON GVW



C9 00 319

1. Stabiliser bar
2. Clamp
3. Bolt
4. Retaining plate
5. Bearing bush
6. Bearing bush cover
7. Stiffener
8. Nut
9. Connecting pin
10. Shackle
11. Spacer ring
12. Shackle bracket
13. Bush
14. Circlip

STABILISERS AND TORQUE RODS

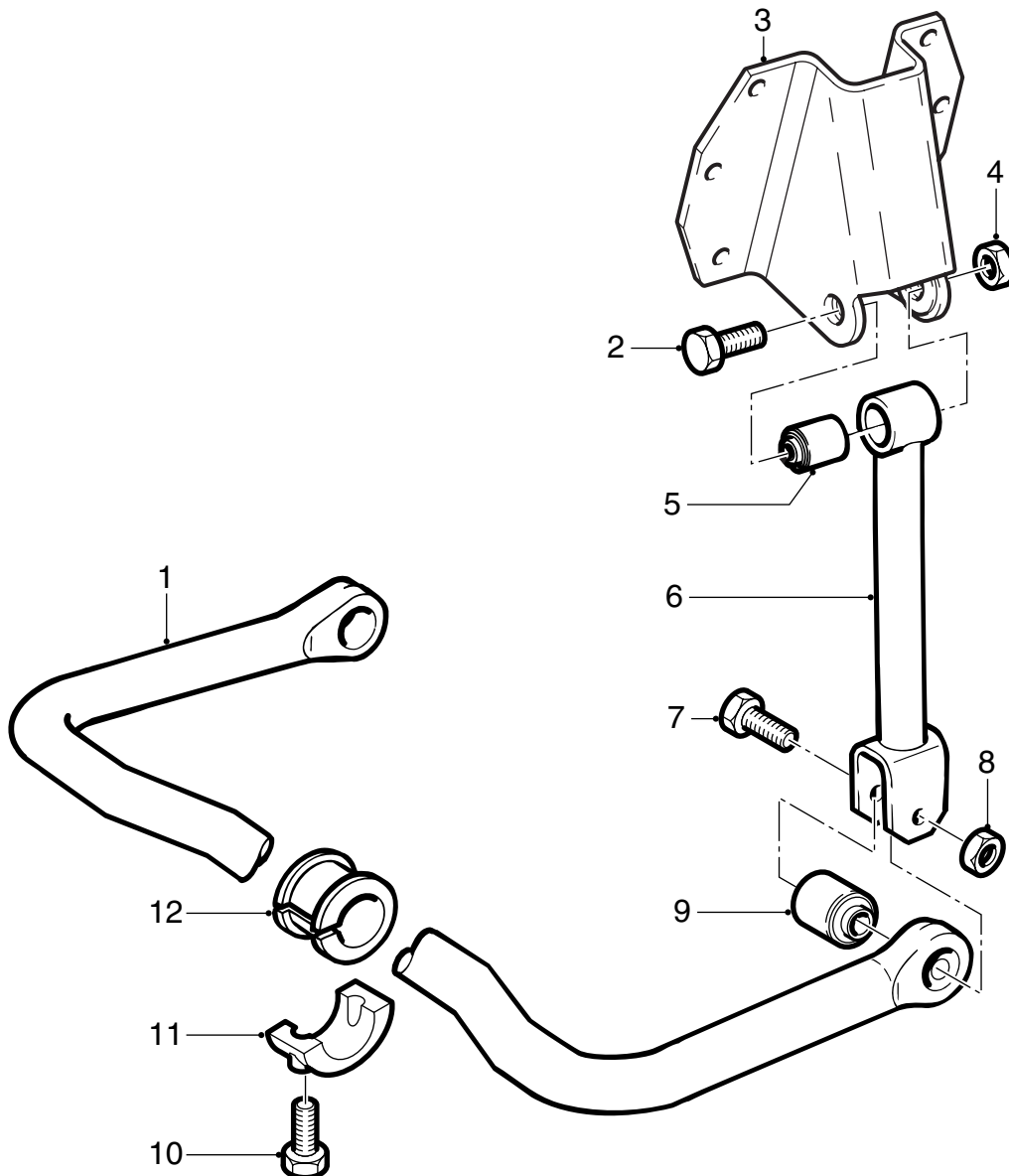
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General

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1.4 OVERVIEW DRAWING, AIR-SPRUNG REAR AXLE STABILISER LF55 16-18 TON GVW

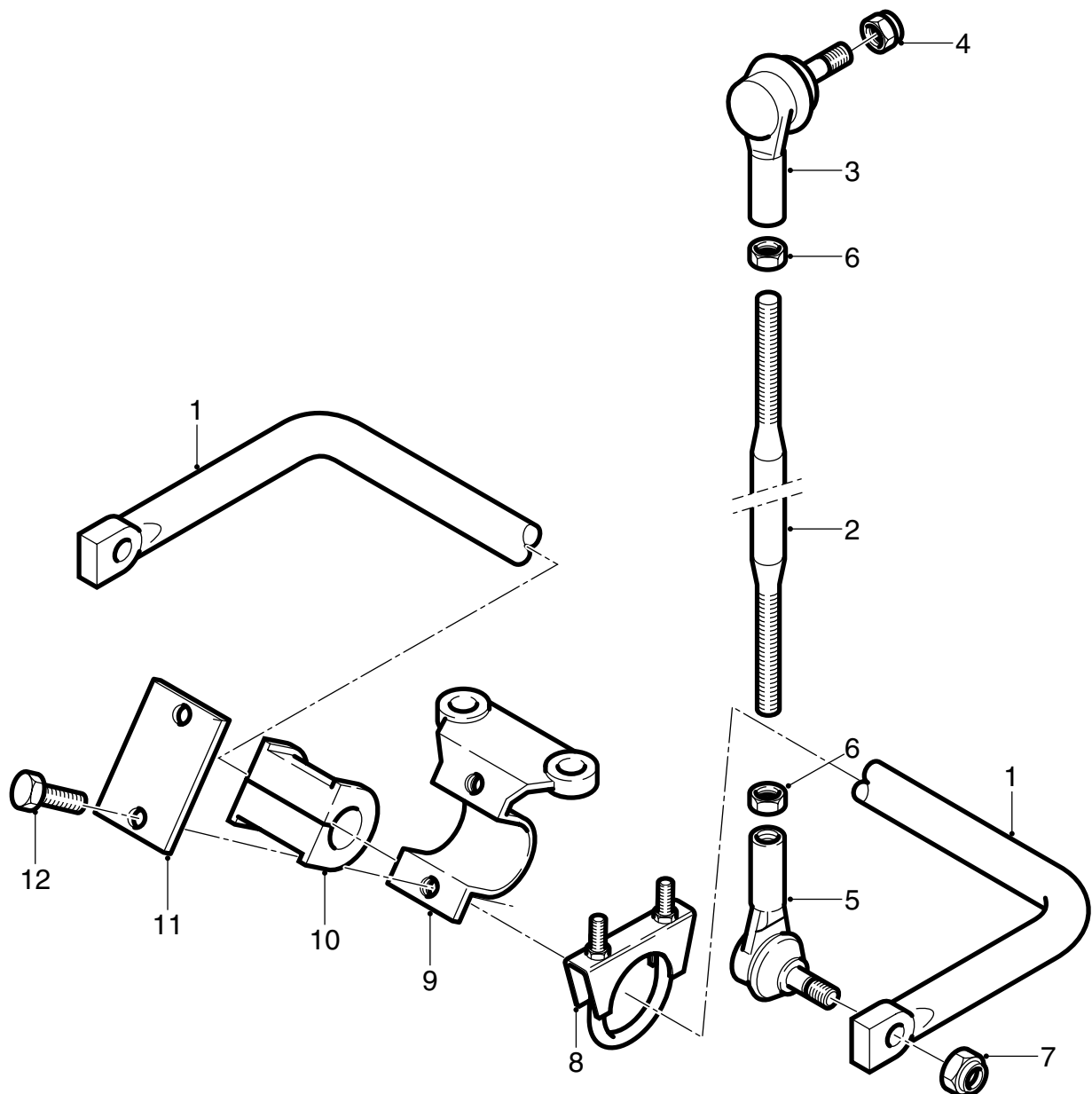
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C9 00 320

1. Stabiliser bar
2. Bolt
3. Bracket
4. Nut
5. Silentblock
6. Shackle
7. Bolt
8. Nut
9. Silentblock
10. Nut
11. Bearing bush cover
12. Bearing bush

1.5 OVERVIEW DRAWING, STEERED REAR AXLE STABILISER LF55 FAN



C9 00 399

1. Stabiliser bar
2. Torque rod
3. Torque rod ball joint
4. Lock nut
5. Torque rod ball joint
6. Nut
7. Lock nut
8. Clamp
9. Stabiliser bracket
10. Bearing bush
11. Retaining plate
12. Attachment bolt

STABILISERS AND TORQUE RODS

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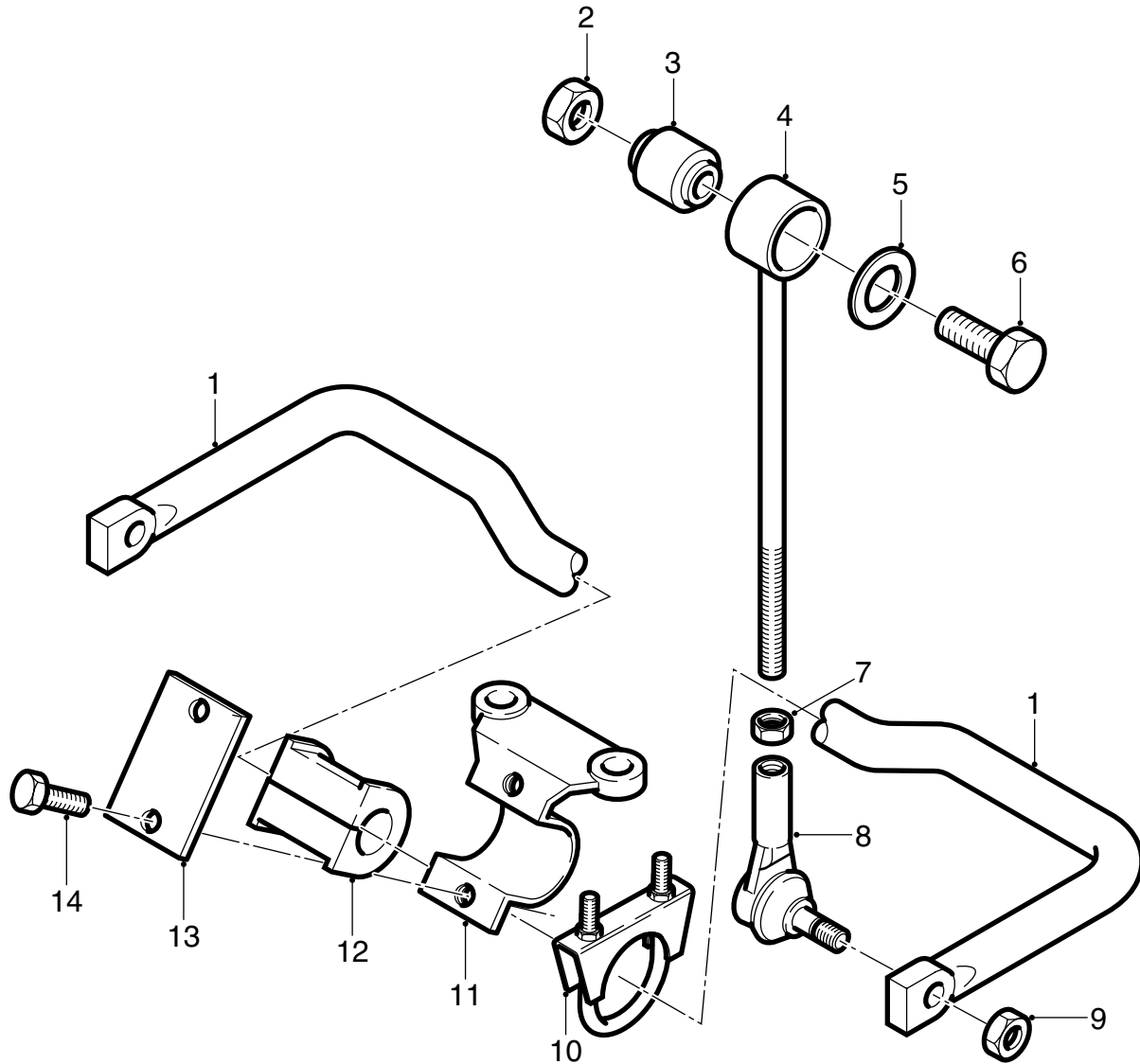
General

LF45/55 series

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2. REMOVAL AND INSTALLATION

2.1 REMOVAL AND INSTALLATION, FRONT-AXLE STABILISER



C9 00 400

Removal, front-axle stabiliser

1. Remove the lock nut (9) from the ball joint (8).
2. Press the ball joint (8) out of the stabiliser bar (1).
3. Remove the attachment bolts (14) together with the retaining plates (13) that are mounted to the stabiliser brackets (11) of the stabiliser bar.

STABILISERS AND TORQUE RODS

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Removal and installation

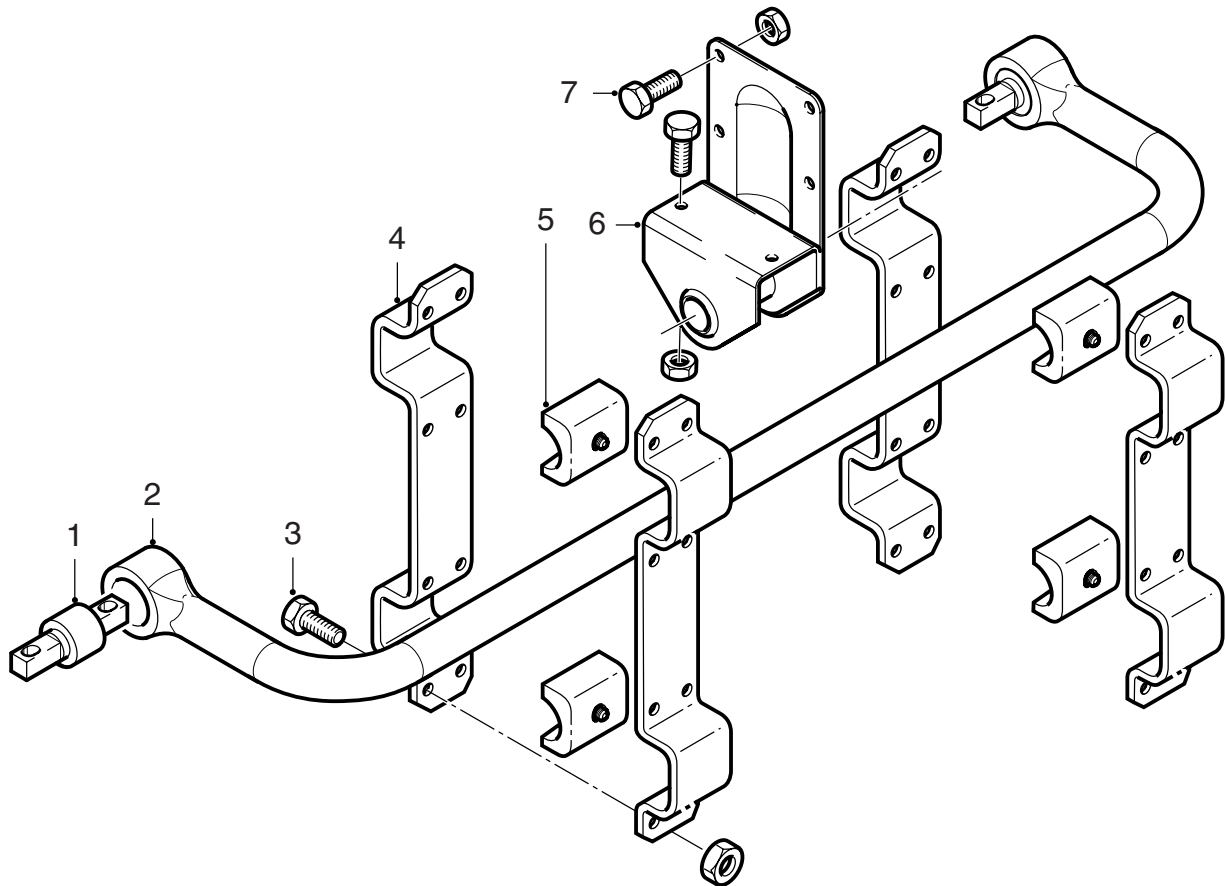
LF45/55 series

4. Remove the stabiliser together with the bearing bushes (12) out of the vehicle supports (11).
5. Remove the attachment bolts (6) and remove the torque rods (4).

Installation, front-axle stabiliser

1. Check the condition of the silentblocks (3), the bearing bushes (12) and the ball joints (8).
2. Fit the torque rod (4) with the attachment bolt (6) to the chassis.
3. Turn the bearing bushes (12) on the stabiliser bar (1), so that the bearing bushes (12) can be positioned in the brackets (11).
4. Fit the stabiliser bar (1).
5. Check whether the stabiliser bar is situated in the centre of the vehicle. Move the positioning clamps (10), if necessary.
6. Fit the retaining plates (13), using the attachment bolts (14). Tighten the attachment bolts evenly to the specified torque.
7. Fit the ball joint (8) to the stabiliser bar (1). Tighten the lock nuts (9) to the specified tightening torque, see "Technical data".

2.2 REMOVAL AND INSTALLATION, LEAF-SPRUNG REAR AXLE STABILISER



C9 00 401

Removal, leaf-sprung rear axle stabiliser

1. Remove the U-bolt nuts by means of which the mounting rubbers (1) of the stabiliser bar (2) are attached to the rear axle.
2. Remove the attachment bolts (3) from the bearing bush covers (4).
3. Remove the stabiliser (2) from under the vehicle.
4. Remove the bearing bushes (5) from the stabiliser bar (2).

STABILISERS AND TORQUE RODS

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Removal and installation

LF45/55 series

Installation, leaf-sprung rear axle stabiliser

1. Check the condition of the silentblocks (1) and the bearing bushes (5).
2. Clean the threaded ends of the U-bolts.
3. Fit the bearing bushes (5) in the bearing bush covers (4).
4. Fit the bearing caps (4) and the stabiliser bar (2) simultaneously to the stabiliser bracket (5).
5. Fit the attachment bolts (12) with the heads facing towards the front of the vehicle and hand-tighten them.
6. Fit the mounting rubber to the U-bolts. Tighten the U-bolts to the specified tightening torque, see "Technical data".
7. Apply grease to the threaded ends of the U-bolts.
8. Tighten the attachment bolts (12).

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STABILISERS AND TORQUE RODS

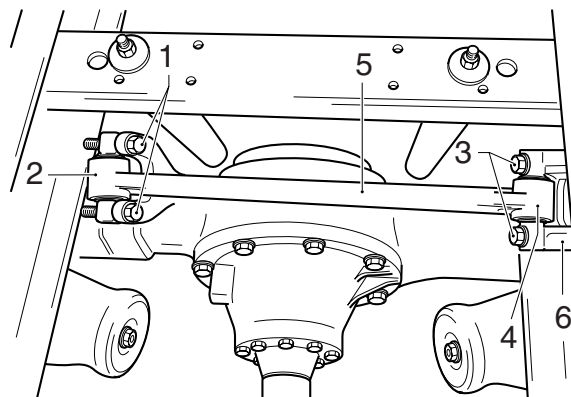
LF45/55 series

Removal and installation

2.3 REMOVAL AND INSTALLATION, TRANSVERSE GUIDE TORQUE ROD, AIR SPRUNG REAR AXLE LF45

Removal, transverse guide torque rod

1. Remove the attachment bolts (1) on the side (2) at which the torque rod (5) is attached to the rear axle.
2. Remove the attachment bolts (3) on the side (4) at which the torque rod (5) and the attachment bracket (6) are attached to the chassis.
3. Remove the torque rod (5) together with the attachment bracket (6).



Installation, transverse guide torque rod

Caution: on one side of the torque rod, the mounting rubber is fitted into the eye of the torque rod at an angle. This side must be fitted to the rear axle.

1. Fit the torque rod (5) with the attachment bolt (6) to the chassis. Hand-tighten the attachment bolts (3).
2. Position the other side (2) of the torque rod (5) on the attachment point of the rear axle and fit the attachment bolts (1).
3. Tighten all attachment bolts (1 and 3).

STABILISERS AND TORQUE RODS

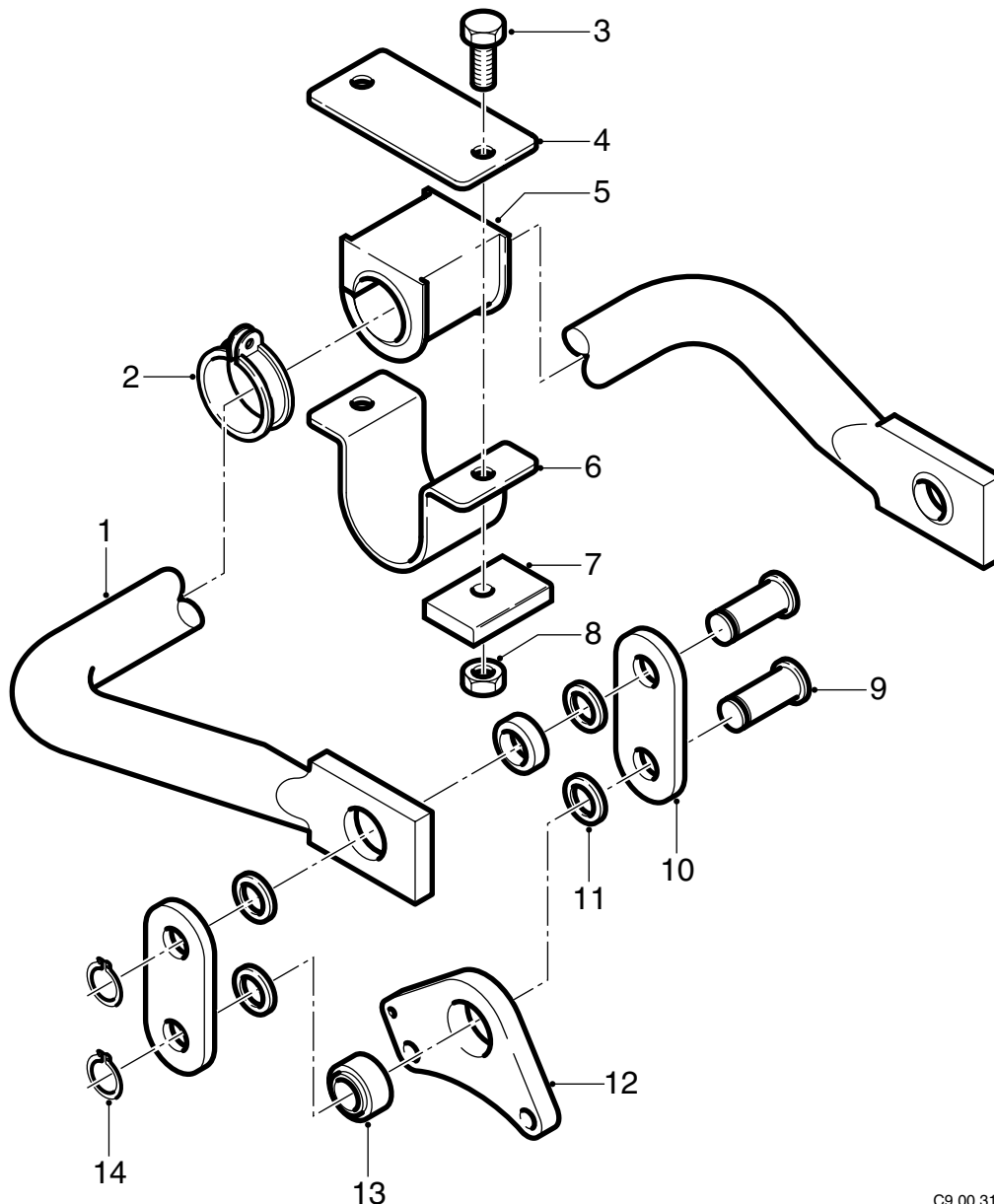
9

Removal and installation

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2.4 REMOVAL AND INSTALLATION, AIR-SPRUNG REAR AXLE STABILISER LF55 13-15 TON GVW

4



C9 00 319

Removal, air-sprung rear axle stabiliser bar LF55 13-15 ton GVW

1. Remove the attachment bolts (3) and nuts (8) from the bearing bush covers (6) and stiffeners (7).
2. Remove the bearing bush covers (6) from the stiffeners (7).

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STABILISERS AND TORQUE RODS

LF45/55 series

Removal and installation

3. Remove the attachment bolts and nuts from the shackle brackets (12) in the differential.
4. Remove the stabiliser bar.

Installation, air-sprung rear axle stabiliser bar LF55 13-15 ton GVW

1. Check the condition of all the rubbers and hinge points.
2. Fit the stabiliser bar (1) under the chassis.
3. Fit the shackle brackets (12) of the stabiliser bar in the hinge points on the differential.
4. Fit the attachment nuts and bolts of the shackle brackets (12) and tighten them.
5. Fit the bearing bush cover (6) together with the stiffeners (7) over the silentblocks (5) and the retaining plates (4). Tighten the attachment bolts (3) and nuts (8).

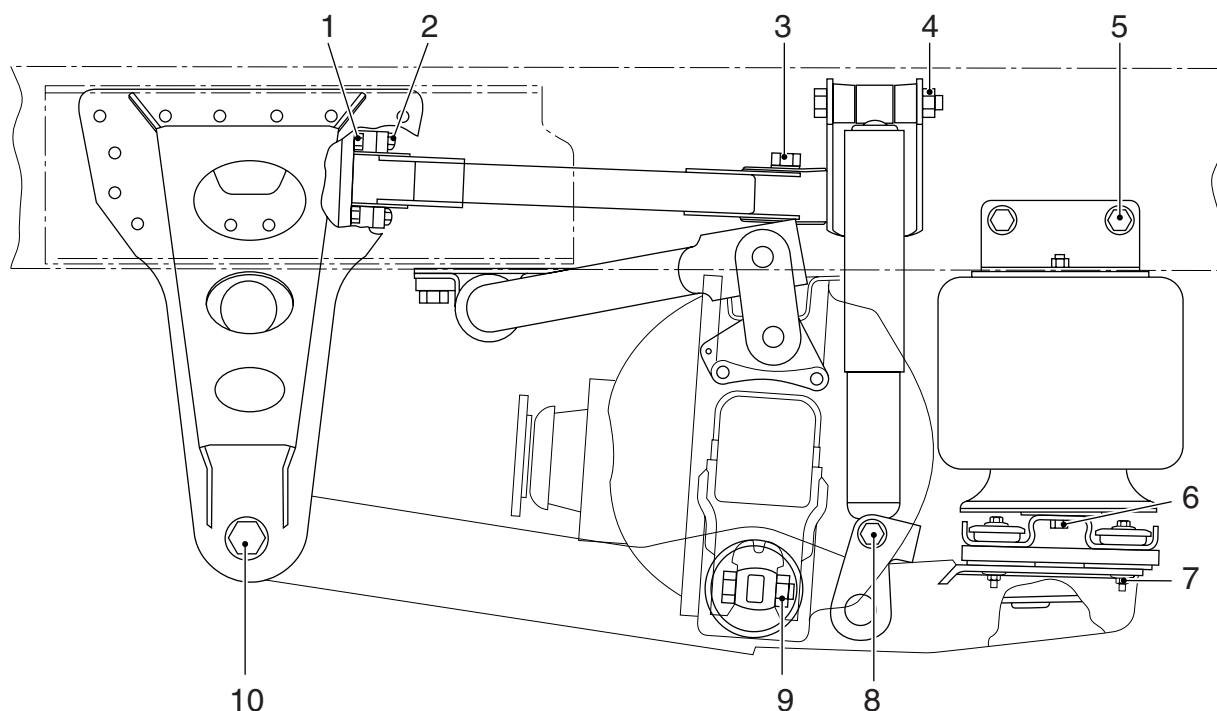
STABILISERS AND TORQUE RODS

9

Removal and installation

LF45/55 series

2.5 REMOVAL AND INSTALLATION, TRIANGULAR LINK, AIR-SPRUNG REAR AXLE LF55 13-15 TON GVW



C9 00 410

Removal, triangular link, air-sprung rear axle LF55 13-15 ton GVW

1. Detach any valves on the inside of the chassis that may hinder removal of the triangular link.
2. Remove the attachment nut (3) of the silentblock on the differential.
3. Remove the attachment bolts (2) and nuts (1) of the mounting rubbers on the triangle legs.
4. Jack up the chassis until the triangle is free of stress.
5. Remove the triangle from the differential. Use a pulley puller if the silentblock does not come off the attachment pin on the differential.

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STABILISERS AND TORQUE RODS

LF45/55 series

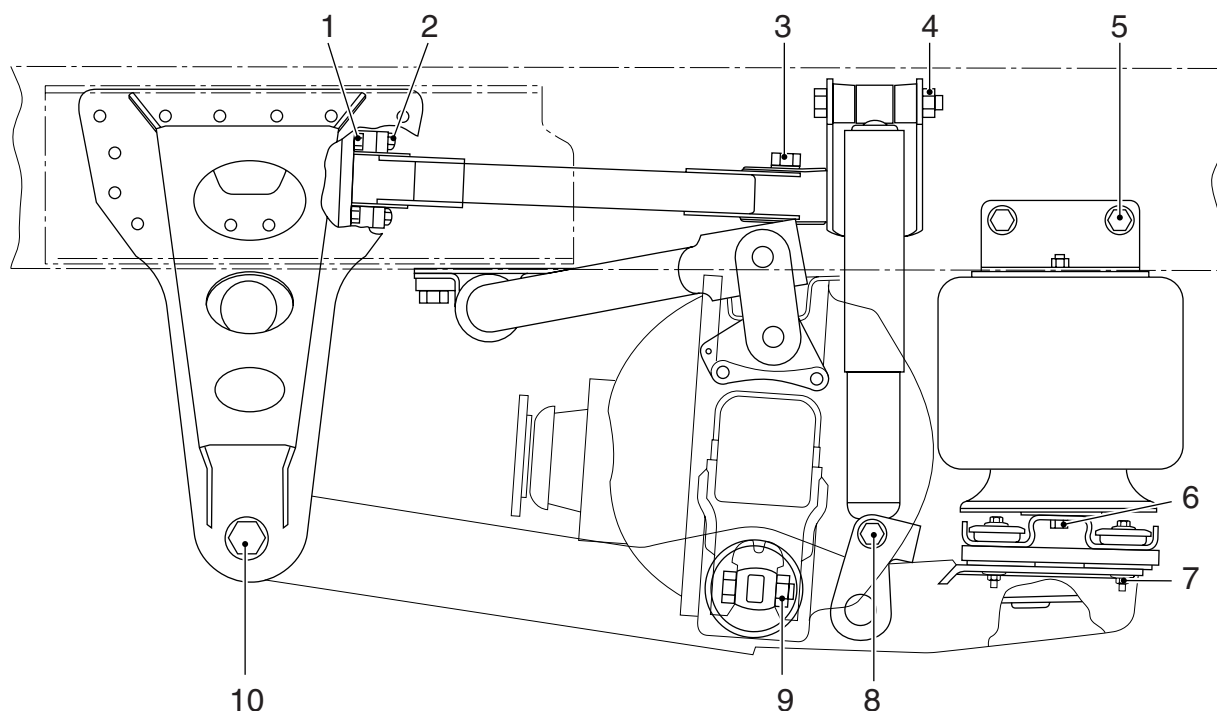
Removal and installation

Installation, triangular link, air-sprung rear axle LF55 13-15 ton GVW

1. Check the condition of the mounting rubbers and the silentblock in the triangle.
2. Apply Copaslip to the silentblock attachment pin on the differential.
3. Position the triangle on the attachment pin and check that the mounting rubbers are positioned straight against the support points on the chassis. Hand-tighten the attachment nut.
4. Lower the chassis and fit the attachment bolts (2) and nuts (1) for the mounting rubbers. Tighten the bolts to the specified tightening torque, see "Technical data".
5. Tighten the attachment nut (3) to the specified tightening torque, see "Technical data".
6. Fix any detached valves on the inside of the chassis.

STABILISERS AND TORQUE RODS**9**

Removal and installation

LF45/55 series**2.6 REMOVAL AND INSTALLATION, AIR-SPRUNG REAR AXLE YOKE LF55
13-15 TON GVW**

C9 00 410



Support the vehicle securely and work safely.
Make sure that the axle cannot tilt if both yokes are removed at the same time.

**Removal, air-sprung rear axle yoke LF55
13-15 ton GVW**

1. Support the chassis with a jack.
2. Remove the lower attachment bolt (8) of the shock absorber.
3. Support the yoke at the centre.
4. Support the fixing bar for the air bellows using a jack. Remove the attachment bolts (7) by means of which the fixing bar for the air bellows is attached to the yoke.
5. Remove attachment bolt (10) from the silentblock.
6. Remove the attachment bolts (9) from the mounting rubber.
7. Remove the yoke.

9

STABILISERS AND TORQUE RODS

LF45/55 series

Removal and installation

Installation, air-sprung rear axle yoke LF55 13-15 ton GVW

1. Check the condition of the mounting rubber and the silentblock of the yoke.
2. Position the yoke using a jack underneath the axle.
3. Fit the attachment bolts (9) for the mounting rubber. Tighten the attachment bolts to the specified tightening torque, see "Technical data".
4. Fit the attachment bolt (10) together with the lock washer, centring ring, jack support and plastic rings in the torque rod support and the silentblock. **Caution:** Fit a **new** break nut. For the breaking torque of the break nut, see "Technical data".
5. Position the attachment bolts of the fixing bar for the air bellows in the yoke.
6. Fit the attachment nuts (7). Tighten the nuts to the specified tightening torque, see "Technical data".
7. Fit the shock absorber on the yoke. Tighten the attachment bolt (8) to the specified tightening torque, see "Technical data".

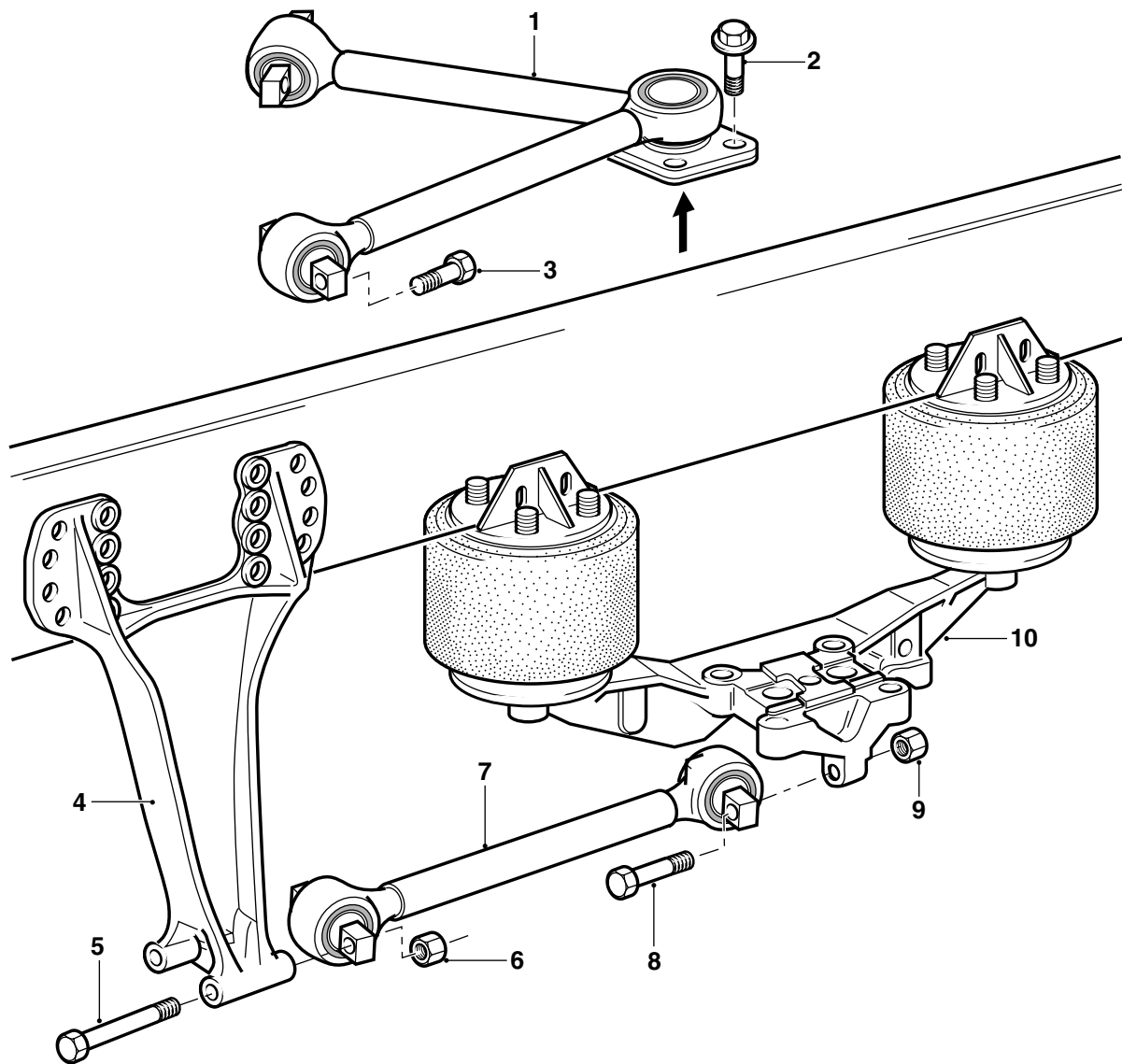
STABILISERS AND TORQUE RODS

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Removal and installation

LF45/55 series

2.7 REMOVAL AND INSTALLATION, TRIANGULAR LINK AND AIR-SPRUNG REAR AXLE TORQUE ROD LF55 13-18 TON GVW



C9 00 299

Removal, triangular link, air-sprung rear axle LF55 16-18 ton GVW, axle top

1. Remove the bolts (2).
2. Remove the bolts (3) and remove the torque rod (1). This can only be done by two persons working together.

Installation, triangular link, air-sprung rear axle LF55 16-18 ton GVW, axle top

1. Before installation, check the rubber bushes of the triangular link and the silentblock for hair-line cracks and wear.
Check to see if the contact surface of the triangular link flange (1) (see arrow) and the contact surface on the axle housing are free from grease and paint.
2. Install the triangular link (1) to the vehicle.
This can only be done by two persons working together. Fit the bolts (2 and 3).
Tighten the bolts (2) evenly to the specified torque. See "Technical data".

Removal, air-sprung rear axle torque rod LF55 16-18 ton GVW, axle bottom

1. Remove the bolts (5 and 8) and remove the torque rod (7).

Installation, air-sprung rear axle torque rod LF55 16-18 ton GVW, axle bottom

1. Before installation, check the rubber bushes of the torque rod (7) for hair-line cracks and wear.
2. Clean the contact surfaces if necessary.
These should be free from dirt and grease.
3. Fit the torque rod (7) between the torque rod support (4) and the yoke (10).
4. Fit the bolts (5 and 8) with the heads facing towards the front of the vehicle. Tighten the bolts (5 and 8).

STABILISERS AND TORQUE RODS

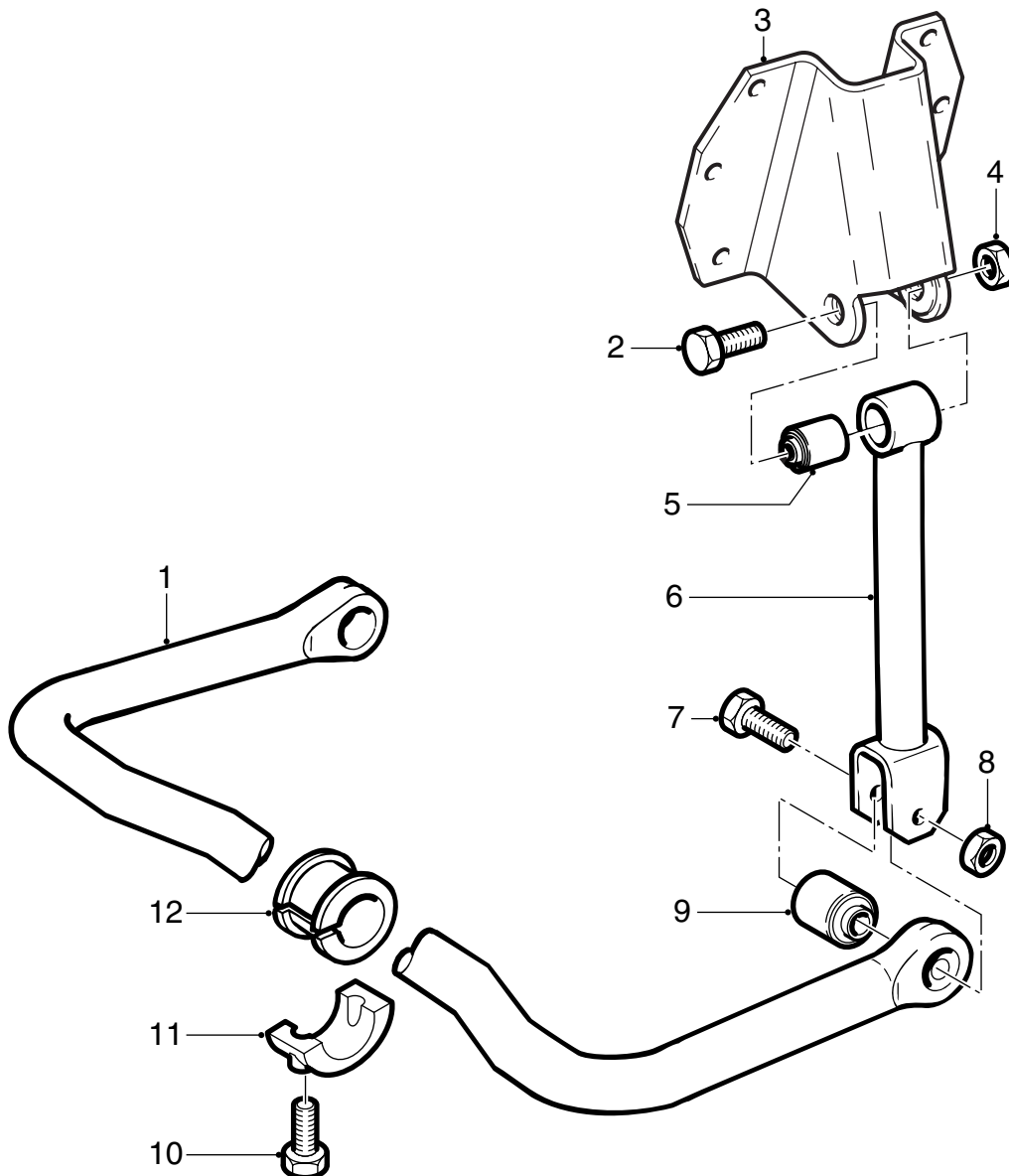
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Removal and installation

LF45/55 series

2.8 REMOVAL AND INSTALLATION, AIR-SPRUNG REAR AXLE STABILISER LF55 16-18 TON GVW

4



C9 00 320

Removal, air-sprung rear axle stabiliser bar LF55 16-18 ton GVW

1. Remove the attachment nuts (10) from the bearing bush covers (11).
2. Remove the attachment bolts (7) and the attachment nuts (8) from the silentblocks (9).
3. Remove the stabiliser bar (1).

9

STABILISERS AND TORQUE RODS

LF45/55 series

Removal and installation

Installation, air-sprung rear axle stabiliser bar LF55 16-18 ton GVW

1. Position the stabiliser bar (1) together with the bearing bushes (12) in the bearing bush cover halves underneath the differential.
2. Fit the bearing bush covers (11) using the attachment bolts (10), but do not yet tighten the bolts.
3. Install the stabiliser bar (1) together with the silentblocks (9) in the shackles (6).
4. Fit the attachment bolts (7) and nuts (8) and tighten the bolts and nuts to the specified tightening torque, see "Technical data".
5. Tighten the attachment bolts (10) of the bearing bush covers (11) to the specified tightening torque, see "Technical data".

STABILISERS AND TORQUE RODS

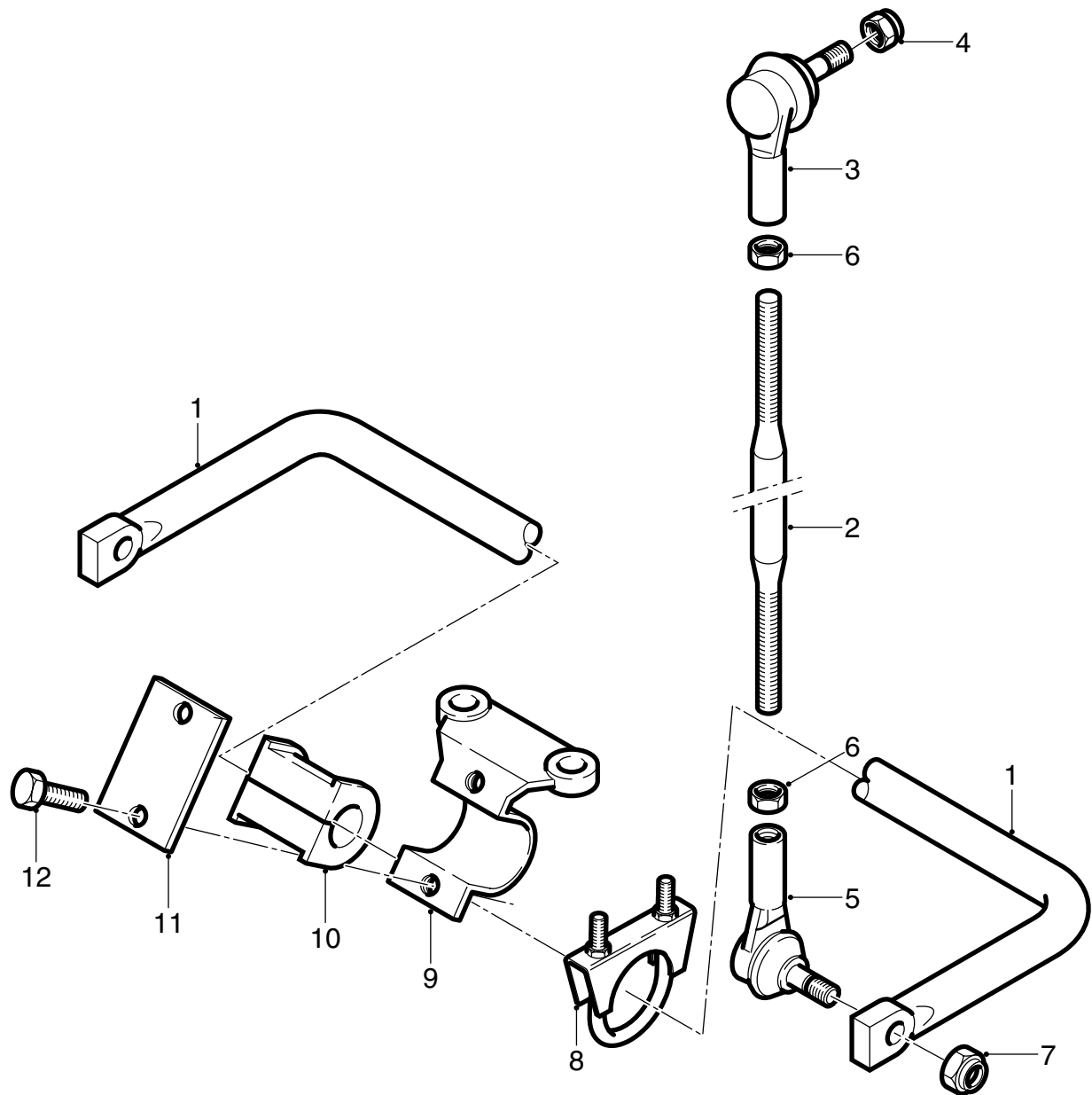
9

Removal and installation

LF45/55 series

2.9 REMOVAL AND INSTALLATION, STEERED REAR AXLE STABILISER LF55 FAN

4



C9 00 399

Removal, steered rear axle stabiliser bar LF55 FAN

1. Remove the lock nuts (7) from the torque rod balls (5) on the side of the stabiliser bar (1) and press the balls out of the stabiliser bar.

9

STABILISERS AND TORQUE RODS

LF45/55 series

Removal and installation

2. Remove the attachment bolts (12) together with the retaining plates (11) that are mounted to the stabiliser brackets (9) of the stabiliser bar.
3. Remove the stabiliser together with the bearing bushes (10) out of the supports (9).
4. Remove the lock nuts (4) from the torque rods on the chassis side and press the torque rods out of the spring stop brackets.

Installation, steered rear axle stabiliser bar LF55 FAN

1. Check the condition of the bearing bushes (10) and the torque rod ball joints (3 and 5).
2. Install the torque rods to the spring stop brackets. Tighten the lock nuts (4) to the specified tightening torque, see "Technical data".
3. Turn the bearing bushes (10) on the stabiliser bar (1), so that the bearing bushes (10) can be positioned in the brackets (9).
4. Fit the stabiliser bar (1).
5. Check whether the stabiliser bar is situated in the centre of the vehicle. Move the positioning clamps, if necessary.
6. Fit the retaining plates (11), using the attachment bolts (12). Screw in the attachment bolts evenly and tighten them to the specified torque. See "Technical data".
7. Fit the torque rod balls (5) to the stabiliser bar (1). Tighten the lock nuts (7) to the specified tightening torque, see "Technical data".

STABILISERS AND TORQUE RODS

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Removal and installation

LF45/55 series

4

3. DISASSEMBLY AND ASSEMBLY

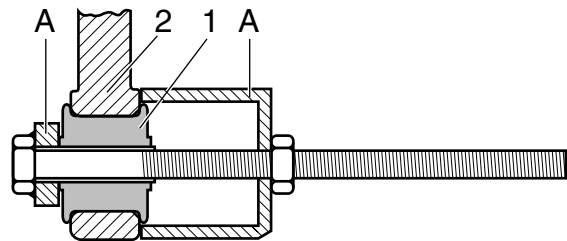
3.1 DISASSEMBLY AND ASSEMBLY, STABILISER BAR / TORQUE ROD SILENTBLOCK WITH RUBBER CASING

Notes

- The silentblocks for the stabiliser bar and the stabiliser bar shackle are identical to one another.
- The silentblock should be fitted using special tool (DAF no. 1310476). It is not possible to install the silentblock undamaged, without using this puller.
- The stabiliser bar need not be removed when replacing the silentblocks on the stabiliser bar.

Removing silentblock with rubber casing

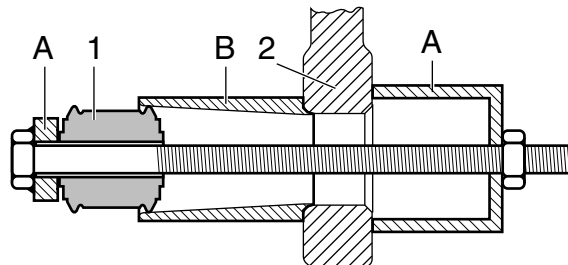
1. Force the silentblock (1), using the puller (A), special tool (DAF no. 1310476) from the stabiliser bar (2) or the stabiliser bar shackle (2).
Before fitting the puller, apply a lubricant to the contact surface of the puller or the silentblock, for example tyre grease or a soap solution.



C9 00 308

Installing silentblock with rubber casing

1. Before fitting the puller, apply plenty of lubricant to the outer circumference of the new silentblock (1) and the contact surface of the puller/silentblock, for example tyre grease. Never apply any grease or oil product to the new silentblock.
2. Place the guide sleeve (B), which forms part of the puller, on the stabiliser bar or the shackle.
3. Place the new silentblock (1) on guide sleeve (B) and, using puller (A), special tool (DAF no. 1310476), pull the silentblock (1) into the stabiliser bar (2) or the shackle (2).



C9 00 135

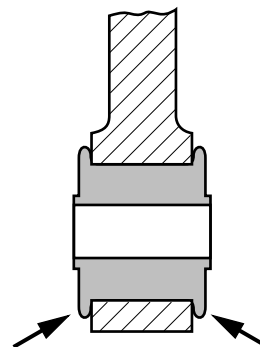
STABILISERS AND TORQUE RODS

9

Disassembly and assembly

LF45/55 series

4. Pull the silentblock into the eye until the collar of the silentblock has been pulled fully through the eye.
Remove the guide sleeve (B) and, if necessary, slightly force the silentblock backwards so that the collars of the silentblock protrude from both sides of the stabiliser bar or the shackle. See arrows in drawing.



C9 00 307

4

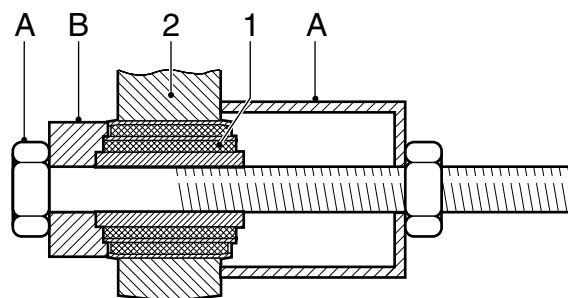
3.2 DISASSEMBLY AND ASSEMBLY, STABILISER BAR / TORQUE ROD SILENTBLOCK WITH STEEL CASING

Notes

- The silentblocks with steel casing should be fitted using special tool (DAF no. 1310479). It is not possible to install the silentblock undamaged, without using this puller.
- The stabiliser bar need not be removed when replacing the silentblocks.

Removing silentblock with steel casing

1. Fit the thrust piece with the smallest diameter (B in the drawing) on the puller (A), special tool (DAF no. 1310479).
2. Apply a lubricant to the thrust piece, for example tyre grease, and fit the puller.
3. Using the puller, force the silentblock from the stabiliser bar.



C9 00 149

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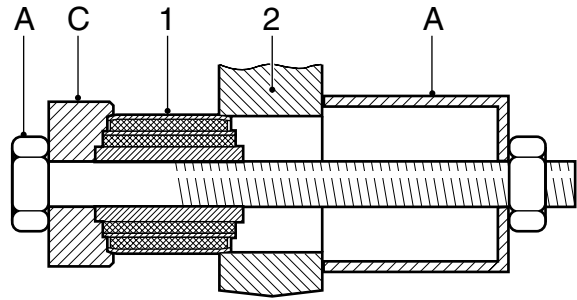
STABILISERS AND TORQUE RODS

LF45/55 series

Disassembly and assembly

Installing silentblock with steel casing

1. Place the thrust piece with the largest diameter (C in the drawing) on the puller (A).
2. Apply for example tyre grease to the thrust piece, and place the puller (A) with the silentblock (1) on the stabiliser bar (2).
3. Force the silentblock into the stabiliser bar using the puller. The thrust piece (C) must just touch the stabiliser bar.
4. Check whether the two sides of the silentblock protrude equally out of the stabiliser bar.



C9 00 150

3.3 DISASSEMBLY AND ASSEMBLY, TRANSVERSE GUIDE TORQUE ROD MOUNTING RUBBER, AIR-SPRUNG REAR AXLE LF45

4

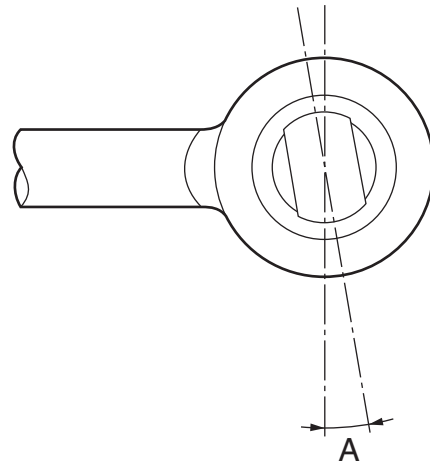
Disassembling the transverse guide torque rod mounting rubber, air-sprung rear axle LF45, rear axle side
Note:

The mounting rubber is fitted at an angle (A) in the eye of the torque rod, on the side of the rear axle.

1. Remove the torque rod from the vehicle.
2. Drive the pin and rubber bush unit from the eye of the torque rod.

Assembling the transverse guide torque rod mounting rubber, air-sprung rear axle LF45, rear axle side

1. Apply a thin film of acid-free petroleum jelly or tyre grease to the rubber.
2. Force the mounting rubber at the right mounting angle (A) in the eye of the torque rod. See "Technical data" for the correct mounting angle (A).
3. Force the mounting rubber so far until the rubber collars protrude an equal distance on both sides of the eye.
4. Fit the torque rod to the vehicle.



C9 00 408

STABILISERS AND TORQUE RODS

9

Disassembly and assembly

LF45/55 series

Disassembling the transverse guide torque rod mounting rubber, air-sprung rear axle LF45, chassis side

1. Remove the torque rod from the vehicle.
2. Drive the pin and rubber bush unit from the eye of the torque rod.

Assembling the transverse guide torque rod mounting rubber, air-sprung rear axle LF45, chassis side

1. Apply a thin film of acid-free petroleum jelly or tyre grease to the rubber.
2. Force the pin in the eye of the torque rod. Make sure that the bolt holes are parallel with the torque rod.
3. Force the mounting rubber so far until the rubber collars protrude an equal distance on both sides of the eye.
4. Fit the torque rod to the vehicle.

4

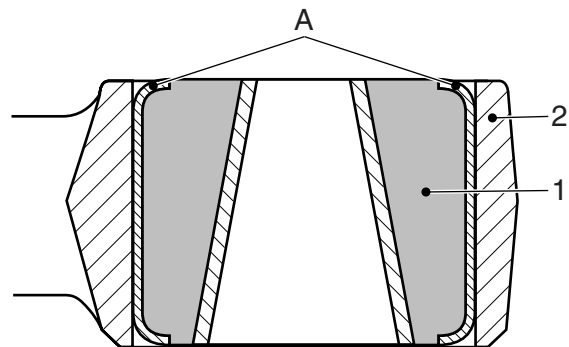
3.4 DISASSEMBLY AND ASSEMBLY, TRIANGULAR LINK SILENTBLOCK, AIR-SPRUNG REAR AXLE LF55 13-15 TON GVW

Disassembly, triangular link silentblock, air-sprung rear axle LF55 13-15 ton GVW

1. Remove the triangular link from the vehicle.
2. Remove the silentblock (1) from the triangular link (2) using a puller. Make sure that the puller rests on the outer rim (A) of the silentblock (1).

Assembly, triangular link silentblock, air-sprung rear axle LF55 13-15 ton GVW

1. Clean the chamber in the triangular link.
2. Apply a thin layer of acid-free petroleum jelly to the outer shell of the new silentblock.
3. Force the silentblock into the triangular link. Make sure that the puller rests on the outer rim (A) of the silentblock.
4. Force the silentblock into the triangular link so that both sides of the silentblock are equally far into the triangle chamber.
5. Fit the triangular link to the vehicle.



C9 00 407

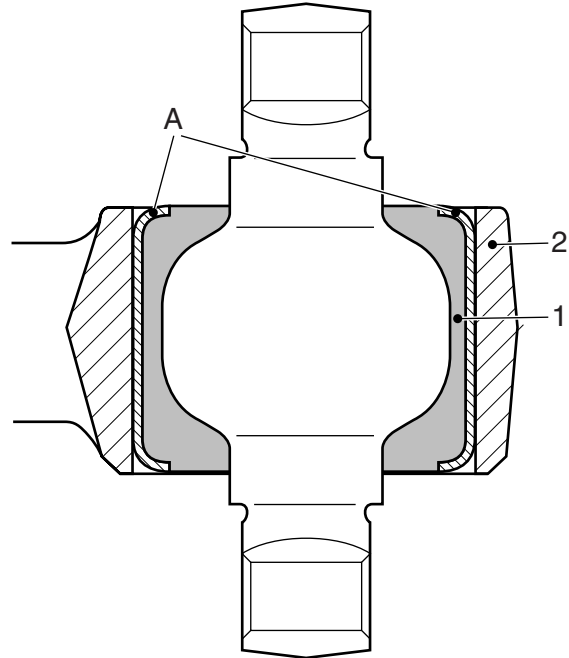
3.5 DISASSEMBLY AND ASSEMBLY, TRIANGULAR LINK MOUNTING RUBBER, AIR-SPRUNG REAR AXLE LF55 13-15 TON GVW

Disassembly, triangular link mounting rubber

1. Remove the triangular link from the vehicle.
2. Remove the mounting rubber (1) from the triangular link (2) using a puller. Make sure that the puller rests on the outer rim (A) of the mounting rubber (1).

Assembly, triangular link mounting rubber, air-sprung rear axle LF55 13-15 ton GVW

1. Apply a thin film of acid-free petroleum jelly or tyre grease to the rubber.
2. Force the mounting rubber into the triangular link. Make sure that the puller rests on the outer rim (A) of the mounting rubber. Make sure that the bolt holes are parallel with the triangle rod.
3. Force the mounting rubber into the triangular link so that both sides of the mounting rubber are equally far into the triangle chamber.
4. Fit the triangular link to the vehicle.



C9 00 406

STABILISERS AND TORQUE RODS

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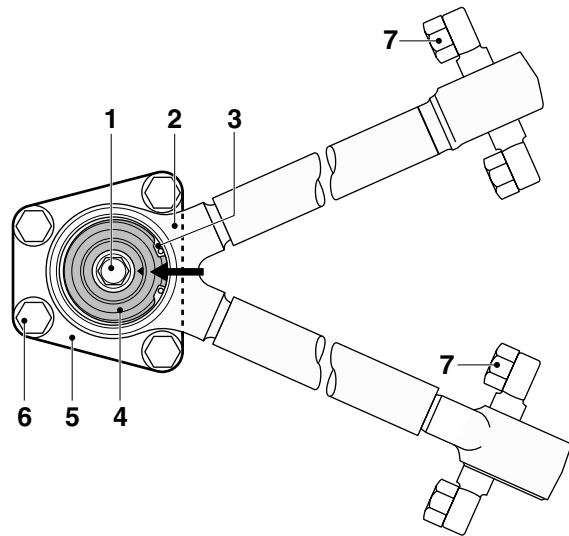
Disassembly and assembly

LF45/55 series

3.6 DISASSEMBLY AND ASSEMBLY, TRIANGULAR LINK SILENTBLOCK, AIR-SPRUNG REAR AXLE LF55 16-18 TON GVW

Disassembly, triangular link silentblock, air-sprung rear axle LF55 16-18 ton GVW

1. Loosen the attachment bolts (7) a few turns.
2. Remove the bolt (1).
3. Screw an M24 x 1.5 bolt into the silentblock ((4)). This will remove the triangular link (2) from the tapered attachment pin. If the triangular link (2) cannot be removed, the flange (5) must be removed from the axle housing and be forced from the triangular link (2) using a puller.
4. Remove the attachment bolts (7). Remove the triangular link from under the vehicle. This can only be done by two persons working together.
5. Remove the circlip (3).
6. Remove the silentblock (4) from the triangular link (2) using a puller. Make sure that the puller rests on the outer rim of the silentblock (4).



C9 00 300

Assembly, triangular link silentblock, air-sprung rear axle LF55 16-18 ton GVW

1. Clean the chamber in the triangular link (2).
2. Remove all rust and grease from the tapered part of the flange (5).
3. Apply a thin layer of acid-free petroleum jelly to the outer shell of the new silentblocks (4).
4. Position the new silentblock (4) such that the marking (see arrow) is positioned in between the torque rods as indicated.
5. Force the silentblock (4) into the triangular link (2). Make sure that the puller rests on the outer rim of the silentblock (4).

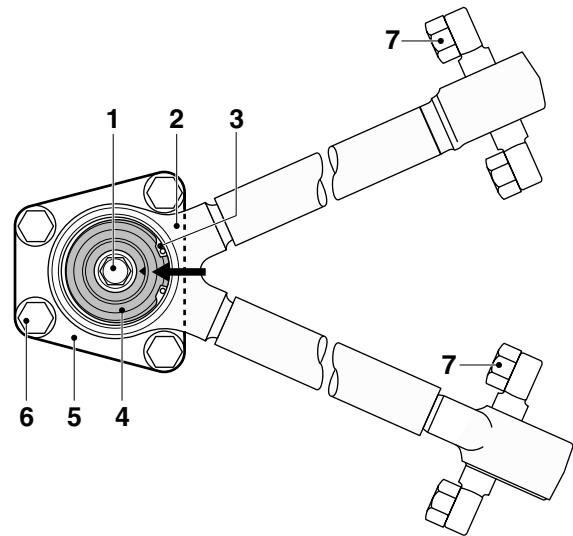
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STABILISERS AND TORQUE RODS

LF45/55 series

Disassembly and assembly

6. Fit the circlip (3) as indicated. Make sure that the entire circlip (3) is positioned correctly in the groove.
7. Install the flange (5), if removed, on the axle housing. Check to see if the contact surface of the flange (5) and the contact surface on the axle housing are free from grease and paint. Tighten the attachment bolts (6) to the specified tightening torque, see "Technical data".
8. Install the triangular link (2) under the vehicle. This will take two persons working together. Tighten the attachment bolts (7) by hand.
9. Fit the bolt (1). Tighten the bolt (1) to the specified tightening torque, see "Technical data".
10. Tighten the attachment bolts (7).



C9 00 300

STABILISERS AND TORQUE RODS

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Disassembly and assembly

LF45/55 series

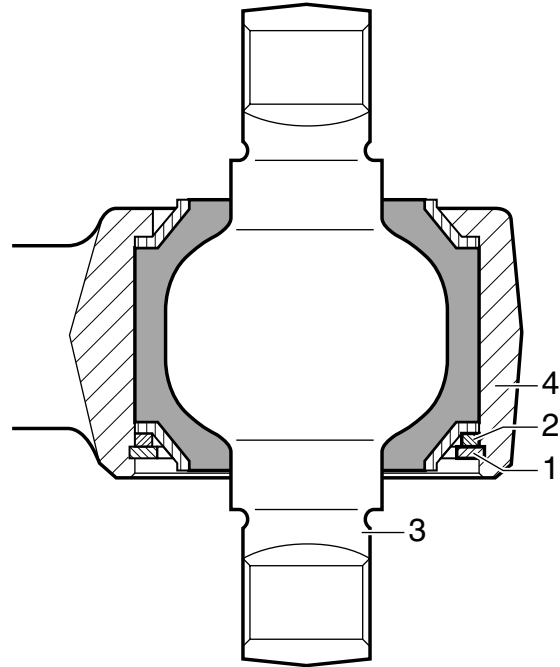
3.7 DISASSEMBLY AND ASSEMBLY, TRIANGULAR LINK/TORQUE ROD MOUNTING RUBBER, AIR-SPRUNG REAR AXLE LF55 16-18 TON GVW

Note:

Disassembly and assembly of the mounting rubbers are identical for the triangular link and the torque rod.

Disassembly, triangular link/torque rod mounting rubber, air-sprung rear axle LF55 16-18 ton GVW

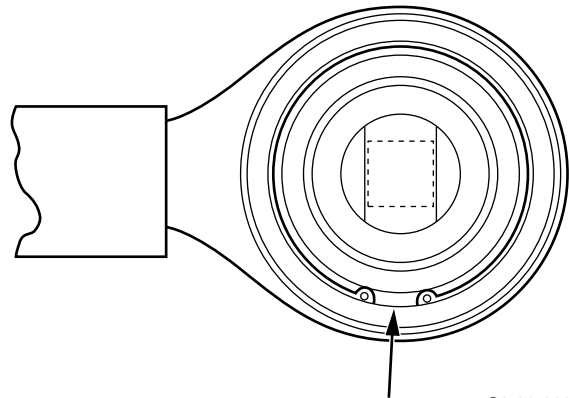
1. Remove the triangular link or torque rod from the vehicle.
2. Remove the circlip (1) and the shim (2).
3. Drive the pin and rubber bush unit (3) from the torque rod housing (4).



W9 03 009

Assembly, triangular link/torque rod mounting rubber, air-sprung rear axle LF55 16-18 ton GVW

1. Apply a thin film of acid-free petroleum jelly or tyre grease to the rubber.
2. Push the pin (3) into the housing (4). Make sure that the bolt holes are parallel with the torque rod.
3. Fit the shim (2).
4. Fit the circlip (1) as indicated. Ensure that the circlip (1) is correctly fitted into the groove of the housing.
5. Fit the triangular link or torque rod to the vehicle.



C9 00 133

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LEAF SUSPENSION

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Contents

LF45/55 series

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1. SAFETY INSTRUCTIONS

Spring leaves

- Spring leaves should not be subjected to blasting. Blasting will cause indentations in the leaf spring which could initiate pitting corrosion.
- Corrosion should be prevented as this will considerably shorten the service life of the spring.
- Any type of damage should be prevented. Damage will considerably shorten the service life.
- Spring leaves should not be heated.
- Bear this in mind when welding on the vehicle. Take precautionary measures against weld and fire damage (notching effect).
- Never hit a parabolic spring leaf with a hammer. This could cause the leaf to break.
- Never replace a single broken leaf within a spring assembly, because this will substantially shorten the service life of the other spring leaves.

Spring brackets

Spring brackets should be removed, if:

- there is doubt about the dimensional accuracy after having been subjected to a heavy load (e.g. a collision). The spring bracket should be magnaflux tested. If cracks are detected, the spring bracket should be replaced. If it is not possible to magnaflux test the spring bracket, the spring bracket should always be replaced.
- such a degree of wear has occurred that it must be replaced.

LEAF SUSPENSION

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Safety instructions

LF45/55 series

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2. GENERAL

2.1 DESCRIPTION OF LEAF SUSPENSION

Parabolic springs are used on the LF series

In a parabolic spring all the leaves are approximately the same length but the thickness of each leaf varies parabolically along its length. Except at the centre clamping and at the spring leaf ends, the spring leaves of a parabolic leaf spring assembly should not come into contact with each other. To that end spacer plates have been fitted between the spring leaves. Because the leaves of a parabolic spring do not move over each other, the vehicle is more comfortable.

Apart from the spring function, the leaf spring assemblies also have the task of guiding the axle. This means that braking, driving and lateral forces are passed on to the chassis via the spring assembly and the front spring bracket.

During fierce braking on a rough road surface, the leaf spring and the spring bracket have to deal with the forces of the weight of the vehicle (which is increased by driving over holes) and with the braking forces at the same time. This results in a considerable total force exerted on the leaf spring and the spring bracket.

Spring opening

The spring opening (P in the drawing) indicates the deflection of the spring.

The spring assembly is tailored to the optimum spring opening for a laden vehicle. If possible, check the spring opening on both sides of an evenly laden vehicle.

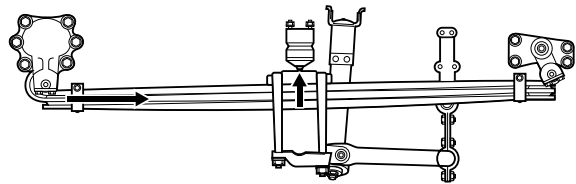
As a result of tolerances in the manufacturing process, the spring openings may differ from each other when the springs are unloaded, but are equal when the springs are loaded.

When spring assemblies are new, the difference in spring opening is small. As a result of settling of the spring assembly, the difference in spring opening may increase.

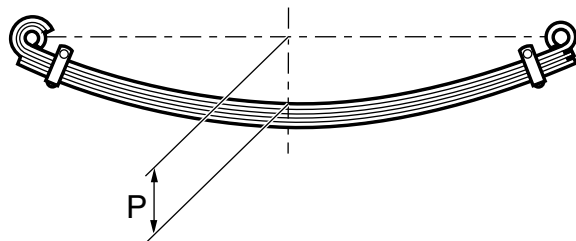
When the springs are loaded they become longer and the axle will move backwards. If the left and right spring openings of one axle differ too much, the result will be misalignment of both the vehicle and the axle.



w9 04 002



w9 04 004



W9 04 005

LEAF SUSPENSION

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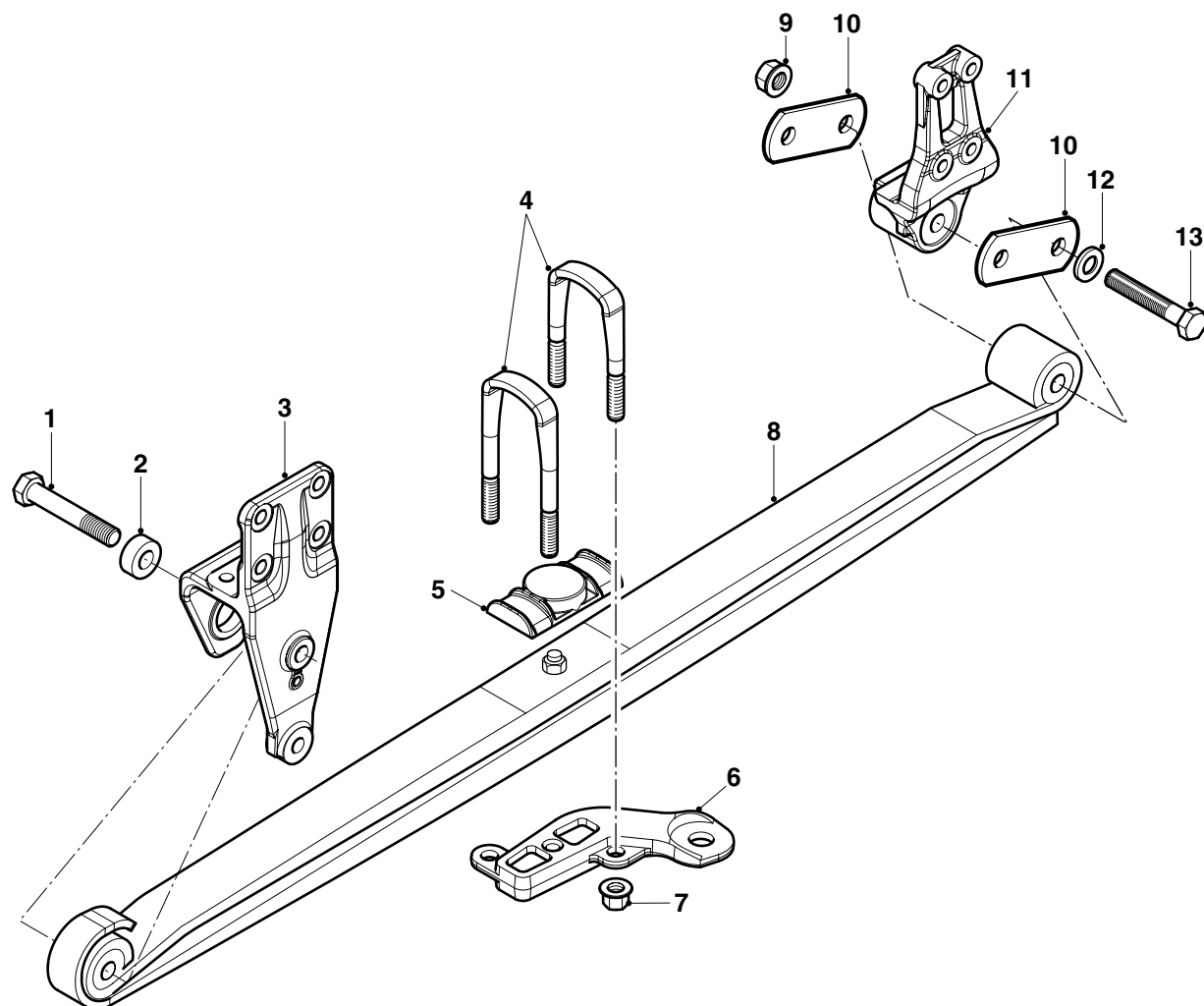
General

LF45/55 series

2.2 OVERVIEW DRAWING, SPRING ASSEMBLY WITH BOLT ATTACHMENT

Note:

This drawing gives a general view and may differ from the actual situation on the vehicle.



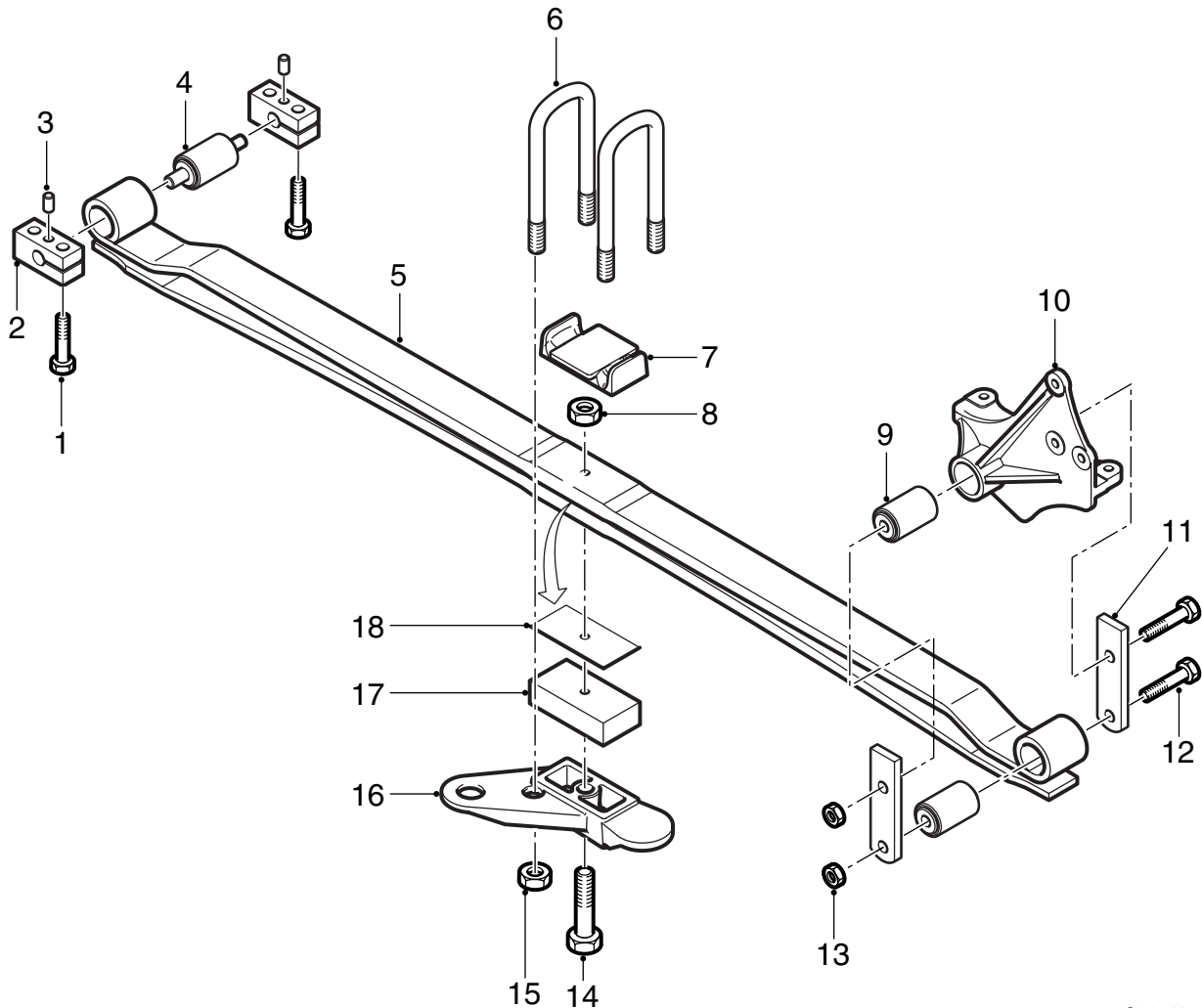
C9 00 305

1. Attachment bolt
2. Centring sleeve
3. Spring bracket
4. U-bolt
5. Upper spring seat
6. Shock absorber support
7. U-bolt nut
8. Spring assembly
9. Attachment nut
10. Shackle seat
11. Spring bracket
12. Ring
13. Attachment bolt

2.3 OVERVIEW DRAWING, SPRING ASSEMBLY WITH PIN ATTACHMENT

Note:

This drawing gives a general view and may differ from the actual situation on the vehicle.



1. Attachment bolt
2. Mounting bracket
3. Centring pin
4. Silentblock
5. Spring assembly
6. U-bolt
7. Upper spring seat
8. Insert nut for centre bolt
9. Silentblock

10. Spring bracket
11. Shackle seat
12. Attachment bolt
13. Attachment nut
14. Centre bolt
15. U-bolt nut
16. Shock absorber support
17. Lower block
18. Spacer

C9 00 326

LEAF SUSPENSION

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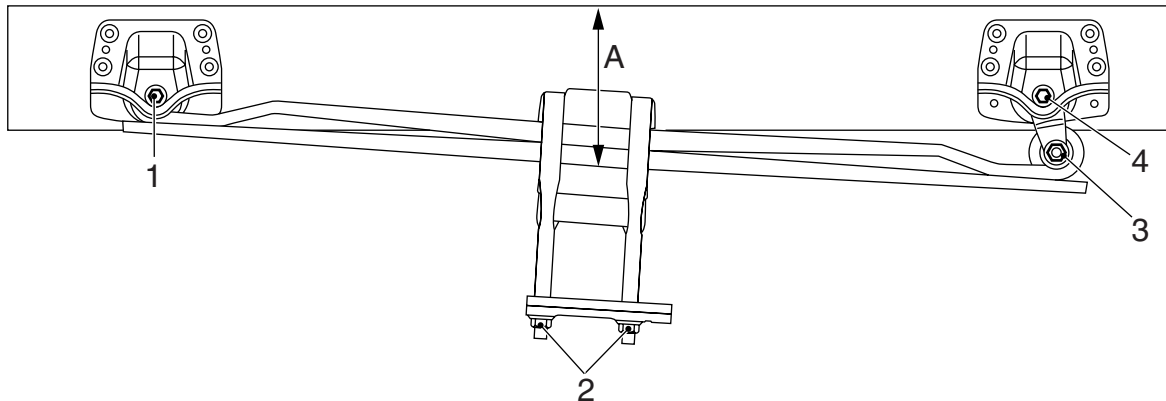
General

LF45/55 series

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3. REMOVAL AND INSTALLATION

3.1 REMOVAL AND INSTALLATION, SPRING ASSEMBLY WITH BOLT ATTACHMENT



C9 00 411



**Support the vehicle securely and work safely.
Make sure that the axle cannot tilt if both spring assemblies are removed at the same time.**

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Removal, spring assembly with bolt attachment

1. Remove all components which are in the way when removing the attachment bolts.
2. Remove the U-bolt nuts (2).
3. Loosen the attachment bolts (1, 3 and 4) of the spring assembly.
4. Jack up the chassis until the spring assembly is free of stress.
5. Mark the position of the bolt heads (3). Remove the attachment bolts (1 and 3).
6. Jack up the chassis until the spring assembly is released from the spring bracket.
7. Make sure that the spring assembly cannot tilt after the U-bolts have been removed.
8. Remove the U-bolts.
9. Mark the position of any wedge (if present).
10. Remove the spring assembly safely. This can only be done by two persons working together.

LEAF SUSPENSION

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Removal and installation

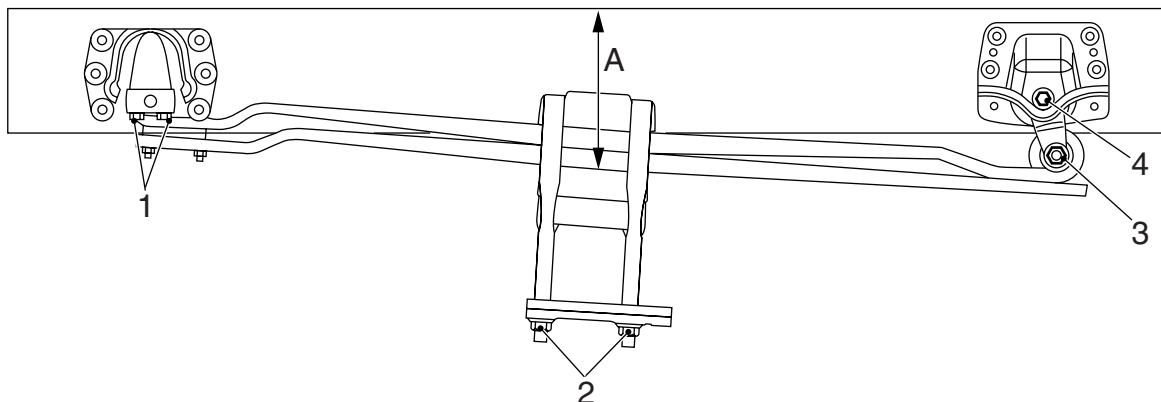
LF45/55 series

Installation, spring assembly with bolt attachment

1. Check that all contact faces are free of dirt, grease and paint.
2. If applicable, fit the wedge in the correct position.
3. Install the spring assembly to the spring plate/shock absorber plate. This can only be done by two persons working together. Make sure that the centre bolt, if present, fits into the centring hole.
4. When reusing the U-bolts, check for corrosion and damage. Replace them if necessary. If they are to be re-used, thoroughly clean the thread and remove any paint.
If hexagonal U-bolt nuts are used, fit a hardened steel ring under the U-bolt nut.
5. Fit the U-bolts and hand-tighten the U-bolt nuts (2).
6. Lower the chassis or raise the axle such that the attachment bolts can be installed. Press the centring sleeve partly back, if necessary. Fit the attachment bolts (1 and 3) and hand-tighten them.
7. Lower the chassis. Tighten the U-bolt nuts (2) evenly to the specified tightening torque, see "Technical data".
8. Apply grease to the threaded ends of the U-bolts.
9. Adjust the chassis to the prescribed height (A), see "Technical data". **Note**, when tightening the frontmost and rearmost blade spring bracket of the **front axle**, that height (A) differs.
10. Tighten the attachment bolts (1, 3 and 4).
11. Fit all removed parts, if applicable.

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3.2 REMOVAL AND INSTALLATION, SPRING ASSEMBLY WITH PIN ATTACHMENT



C9 00 412



**Support the vehicle securely and work safely.
Make sure that the axle cannot tilt if both spring assemblies are removed at the same time.**

Removal, spring assembly with pin attachment

1. Remove all components which are in the way when removing the attachment bolts.
2. Remove the U-bolt nuts (2).
3. Loosen the attachment bolts (1, 3 and 4) of the spring assembly.
4. Jack up the chassis until the spring assembly is free of stress.
5. Mark the position of the bolt heads (3). Remove the attachment bolts (1 and 3).
6. Jack up the chassis until the mounting brackets at the front of the spring assembly are clear of the support. If necessary, use a rim tool to detach the mounting brackets.
7. Make sure that the spring assembly cannot tilt after the U-bolts have been removed.
8. Remove the U-bolts and the upper spring seat.
9. Mark the position of any wedge (if present).
10. Remove the spring assembly safely. This can only be done by two persons working together.

LEAF SUSPENSION

9

Removal and installation

LF45/55 series

Installation, spring assembly with pin attachment

1. Check that all contact faces are free of dirt, grease and paint.
2. If applicable, fit the wedge in the correct position.
3. Install the spring assembly to the spring plate/shock absorber plate. This can only be done by two persons working together. Make sure that the centre bolt, if present, fits into the centring hole.
4. When reusing the U-bolts, check for corrosion and damage. Replace them if necessary. If they are to be re-used, thoroughly clean the thread and remove any paint.
If hexagonal U-bolt nuts are used, fit a hardened steel ring under the U-bolt nut.
5. Fit the upper spring seat and the U-bolts and hand-tighten the U-bolt nuts (3).
6. Lower the chassis or raise the axle such that the mounting brackets and attachment bolts (1 and 3) can be installed. Ensure that the centring pins at the front are located exactly in front of the centring holes in the mounting brackets.
7. Lower the chassis. Tighten the U-bolt nuts (2) evenly to the specified tightening torque, see "Technical data".
8. Apply grease to the threaded ends of the U-bolts.
9. Adjust the chassis to the prescribed height (A), see "Technical data". **Note**, when tightening the frontmost and rearmost blade spring bracket of the **front axle**, that height (A) differs.
10. Tighten the attachment bolts (1, 3 and 4).
11. Fit all removed parts, if applicable.

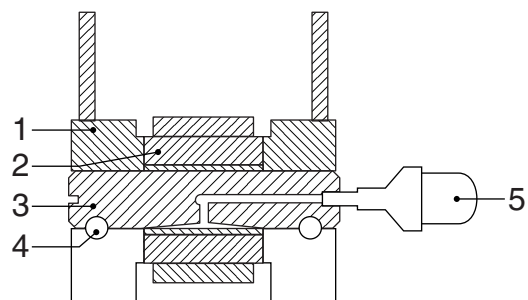
3.3 REMOVAL AND INSTALLATION, STEERED REAR AXLE SPRING ASSEMBLY LF55 FAN



**Support the vehicle securely and work safely.
Make sure that the axle cannot tilt if both spring assemblies are removed at the same time.**

Removal, steered rear axle spring assembly LF55 FAN

1. Remove the stabiliser bar together with the torque rods.
2. Jack up the chassis, until the spring package is clear of the spring stop.
3. Remove the spring stop.
4. Remove the U-bolt nuts.
5. Remove the attachment bolts by means of which both spring packages are attached to the fixing bar for the air bellows.
6. Jack up the fixing bar for the air bellows.
7. Remove the U-bolts and the upper spring seat.
8. Remove the two clamp bolts from the lower spring seat.
9. Check that the spring package is not under stress.
10. Remove the automatic lubricating nipple (5) from the shackle pin (3).
11. Remove the clamp bolts from the shackle pin (3) and press the shackle pin (3) out of the spring bracket (1) and the leaf spring (2). Prevent the spring assembly from tilting after removal of the shackle pin.
12. Remove the spring assembly safely. This can only be done by two persons working together.



C9 00 398

LEAF SUSPENSION

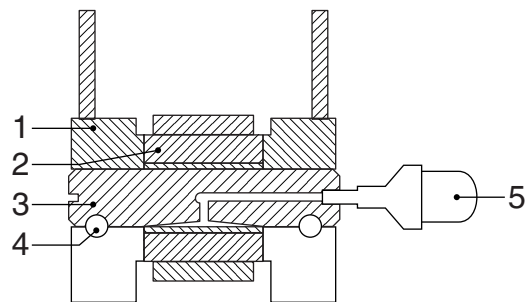
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Removal and installation

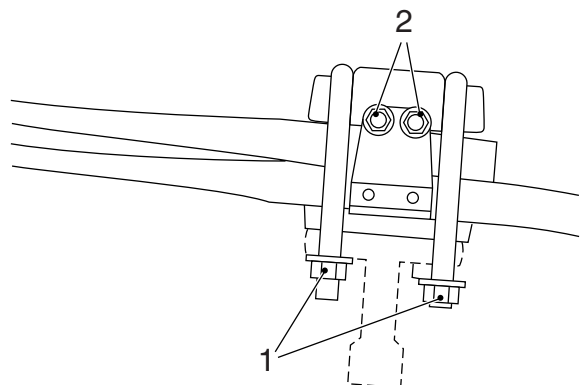
LF45/55 series

Installation, steered rear axle spring assembly LF55 FAN

1. Check that all contact faces are free of dirt, grease and paint.
2. Install the spring assembly to the lower spring seat. This can only be done by two persons working together. Make sure that the centre bolt fits properly into the centring hole.
3. Fit the two clamp bolts in the lower spring seat and hand-tighten them.
4. Put the U-bolts in place, preferably use new ones. When reusing the U-bolts, check for corrosion and damage. Thoroughly clean the threads and remove any paint from them.
5. Fit the upper spring seat and the U-bolts. Hand-tighten the U-bolts.
6. Apply a thin layer of grease to the shackle pin.
7. Fit the shackle pin (3) in the spring bracket (1) and the leaf spring (2) so that the connection for the automatic lubricating nipple (5) is on the inside of the chassis and the notches (4) for the clamp bolts are on the underside.
8. Fix the clamp bolts of the shackle pin.
9. Fit the automatic lubricating nipple (5) in the shackle pin (3).
10. Lower the fixing bar for the air bellows onto the leaf springs. Install the attachment bolts and tighten them.
11. Fit the spring stop.
12. Lower the chassis. First tighten the U-bolt nuts (1) evenly to the specified tightening torque, see "Technical data". Then tighten the two clamp bolts (2) in the lower spring seat of the spring assembly.
13. Apply grease to the threaded ends of the U-bolts.
14. Fit the stabiliser bar with the torque rods.



C9 00 398



C9 00 402

3.4 REMOVAL AND INSTALLATION, SPRING BRACKET



Support the vehicle, axle or spring assembly securely and work safely.

Removal, spring bracket

1. Jack up the chassis until the spring or the yoke is free of stress.
2. Remove the spring or yoke bracket.
3. Jack up the chassis further until the spring assembly or the yoke has been released from the spring bracket.
4. Watch the position of the attachment bolts (in view of the difference in length). Remove the attachment bolts. Remove the spring bracket from the chassis.

Installation, spring bracket

1. Install the spring bracket in the same position as before removing it. Place the spring bracket on the spring-bracket outline on the chassis.
2. Check the contact surfaces of spring bracket, chassis and stiffening plates. These should be absolutely free from dirt and grease.
3. Fit the attachment bolts in the correct position and the correct location.
4. Tighten the attachment bolts of the spring bracket.
5. Fit the spring or yoke bracket. **Caution:** use a **new** break nut to attach the yoke. For the breaking torque of the break nut, see "Technical data".

LEAF SUSPENSION

9

Removal and installation

LF45/55 series

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