

TECHNICAL DATA	0
DIAGNOSTICS	1
STEERING GEAR, GENERAL	2
STEERING BOX	3
STEERING PUMP	4
RESERVOIR AND LINES	5
FRONT AXLE, F36/F48	6
FRONT AXLE, F60	7
FRONT AXLE, 152N	8
STEERED TRAILING SWIVEL AXLE	9



## CONTENTS

	Page	Date
<b>1. STEERING GEAR, GENERAL</b> .....	1-1	200322
1.1 General .....	1-1	200322
<b>2. STEERING BOX</b> .....	2-1	200322
2.1 General .....	2-1	200322
2.2 Tightening torques .....	2-2	200322
<b>3. STEERING PUMP/RESERVOIR</b> .....	3-1	200322
3.1 General .....	3-1	200322
3.2 Tightening torques .....	3-1	200322
<b>4. F36 AND F48 FRONT AXLE</b> .....	4-1	200322
4.1 General .....	4-1	200322
4.2 Tightening torques .....	4-3	200322
<b>5. F60 FRONT AXLE</b> .....	5-1	200322
5.1 General .....	5-1	200322
5.2 Tightening torques .....	5-3	200322
<b>6. 152N FRONT AXLE</b> .....	6-1	200322
6.1 General .....	6-1	200322
6.2 Tightening torques .....	6-7	200322
<b>7. STEERED TRAILING SWIVEL AXLE</b> .....	7-1	200322
7.1 General .....	7-1	200322
7.2 Tightening torques .....	7-3	200322



## 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.

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

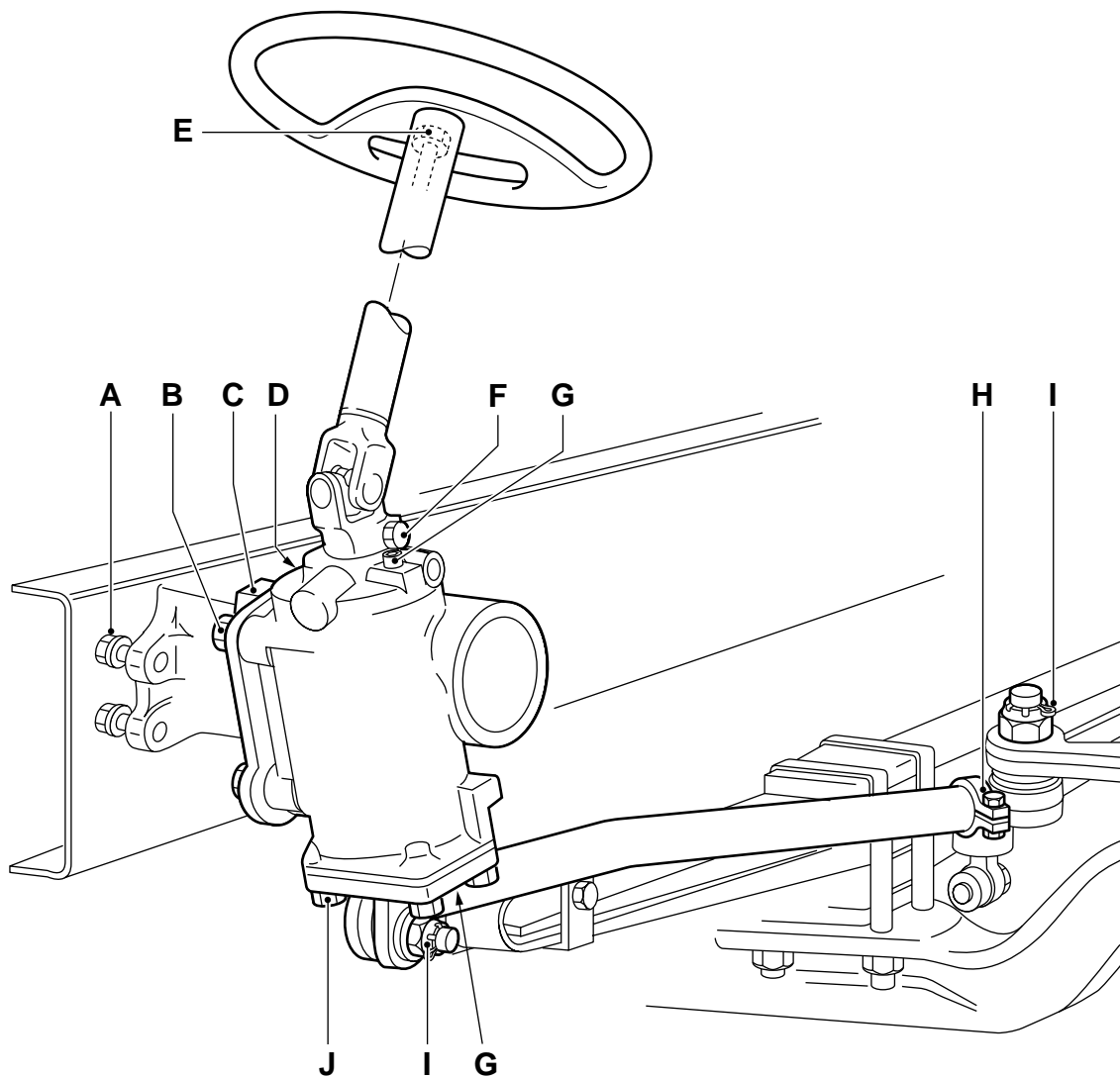
**2.2 TIGHTENING TORQUES**

**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 <sup>(1)</sup>
	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 <sup>(2)</sup>
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 <sup>(3)</sup>
J.	Cover attachment bolt	135 Nm

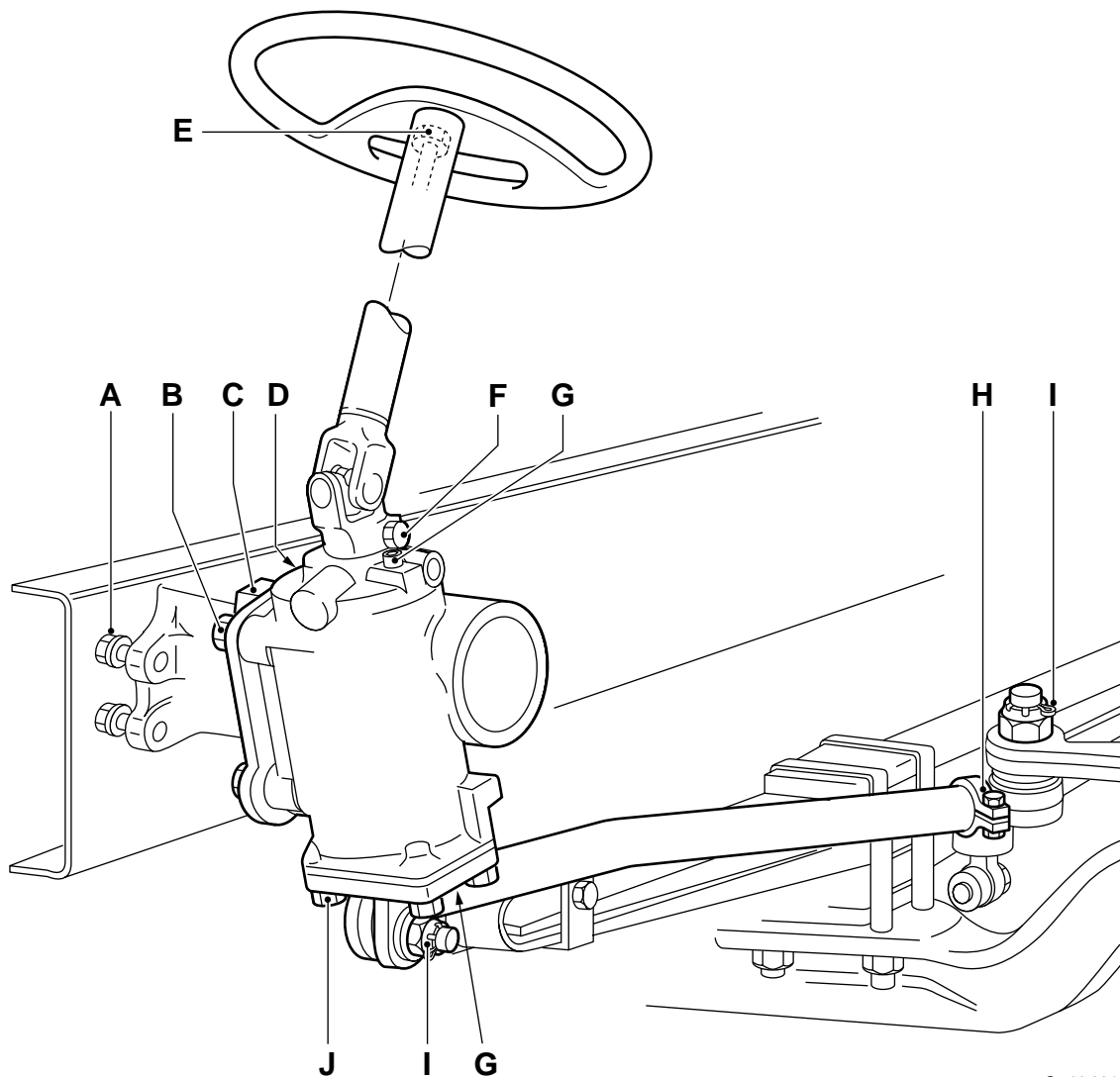
(1) Always use new attachment bolts.

(2) Use new original attachment bolt and nut.

(3) Tighten until the split pin fits (max. 60°).

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 <sup>(1)</sup>
	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 <sup>(2)</sup>
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 <sup>(3)</sup>
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°).



### 3. STEERING PUMP/RESERVOIR

#### 3.1 GENERAL

##### Steering pump

Design	vane pump
Type	ZF 7684, ZF 7685, ZF 7687
Maximum pressure (Pump does not have pressure-limiting valve.)	see steering box type plate

#### 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



## 4. F36 AND F48 FRONT AXLE

### 4.1 GENERAL

#### Axle journal

Anti-corrosion agent Gleitmo 805

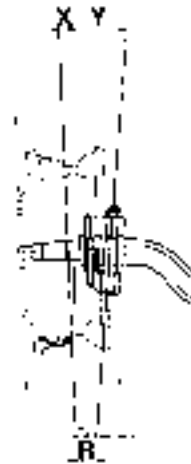
#### Wheel speed sensor

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)  $7^{\circ}$



S7 00 129

#### Wheel deflection

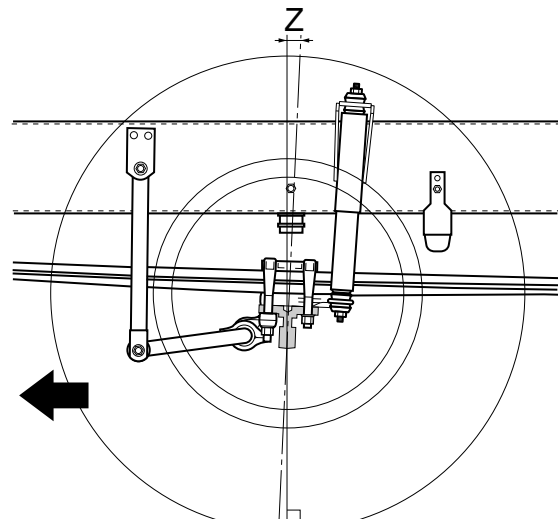
Maximum inner wheel deflection

- F36 axle  $53^{\circ}$
- F48 axle  $53^{\circ}$

#### Caster

Z = caster

- F36 axle  $4^{\circ}$
- F48 axle  $4^{\circ}$



S7 00 607



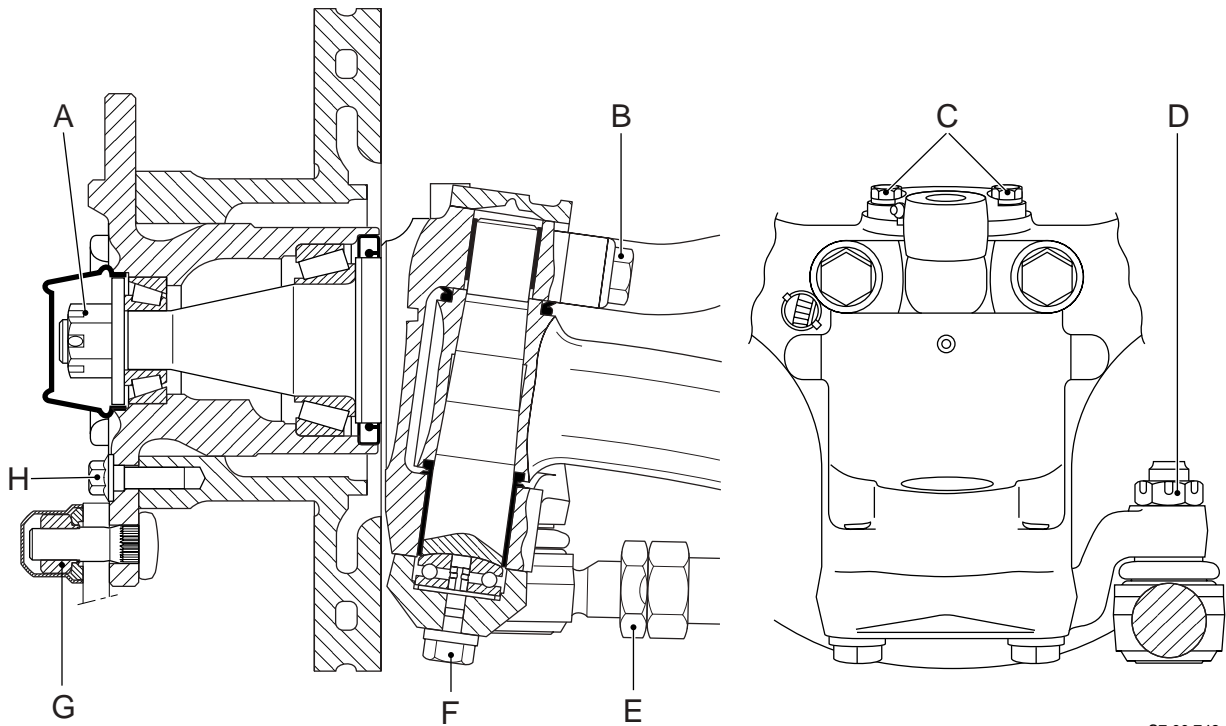


## 4.2 TIGHTENING TORQUES

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.

0



A.	Hub nut	75 Nm <sup>(1)</sup>
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 <sup>(2)</sup>
E.	Track rod lock nut	130 ± 10 Nm <sup>(3)</sup>
F.	Bottom attachment bolt for king-pin cover	120 ± 5 Nm
G.	Wheel nut	
	- F36 axle (M18 x 1.5)	370 ± 30 Nm <sup>(4)</sup>
	- F48 axle (M20 x 1.5)	485 ± 35 Nm <sup>(4)</sup>
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

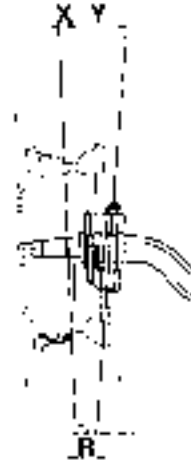
#### Wheel speed sensor

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)  $7^{\circ}15'$



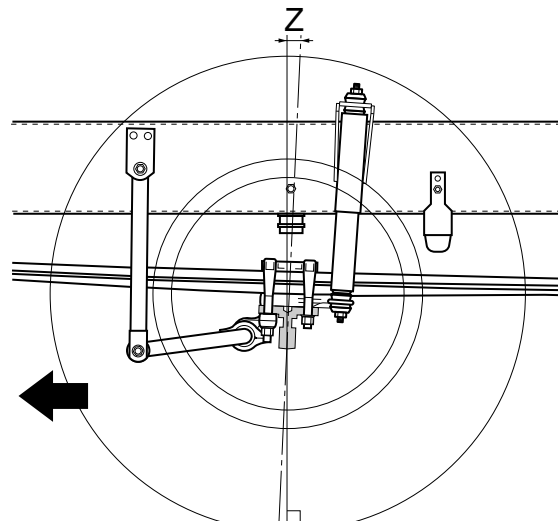
S7 00 129

#### Wheel deflection

Maximum inner wheel deflection  $50^{\circ}$

#### Caster

Z = caster  $3^{\circ}$



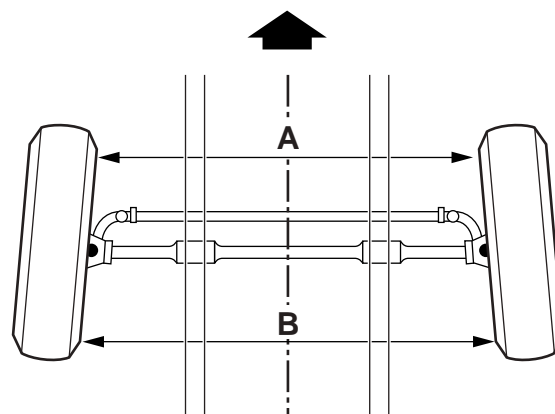
S7 00 607

**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

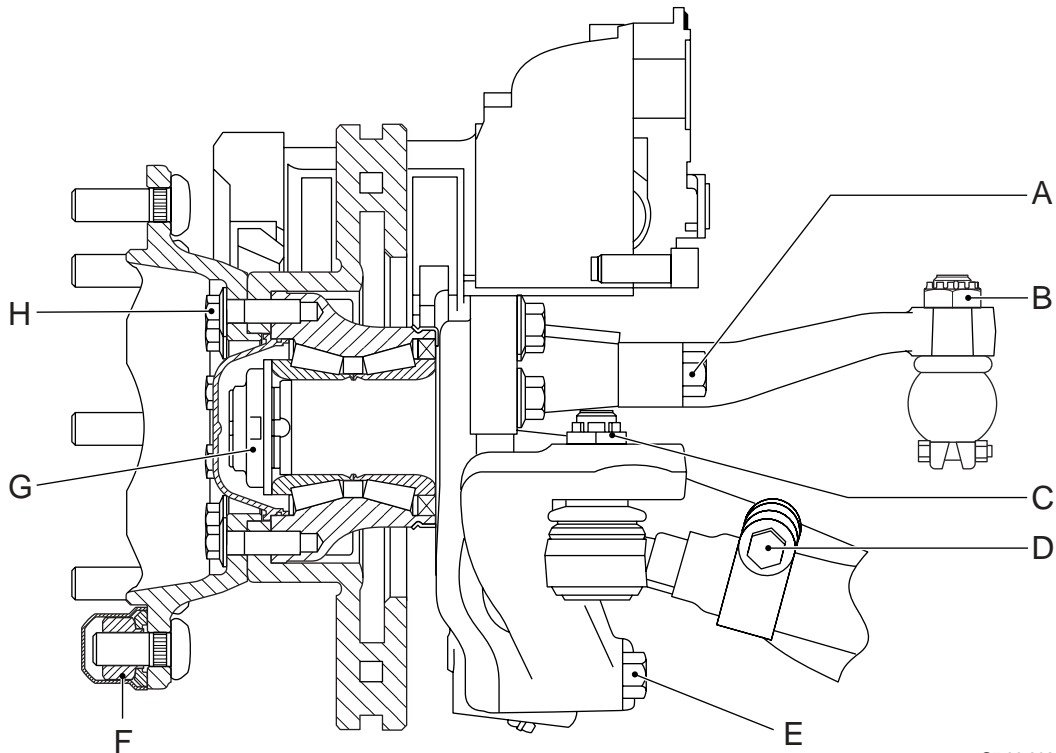
**King pin**

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.



S7 00 698

A.	Steering-rod arm attachment bolt	370 ± 35 Nm <sup>(1)</sup>
B.	Steering rod castle nut	220 Nm <sup>(2)</sup>
C.	Track rod castle nut	280 ± 25 Nm <sup>(2)</sup>
D.	Clamping bracket attachment bolt	80 ± 10 Nm <sup>(3)</sup>
E.	Track-rod arm attachment bolt	420 ± 40 Nm <sup>(1)</sup>
F.	Wheel nut (M20 x 1.5)	485 ± 35 Nm <sup>(4)</sup>
G.	Hub nut	
	- 1 <sup>st</sup> phase	300 Nm <sup>(5)</sup>
	- 2 <sup>nd</sup> phase	turn the hub through 10 rotations <sup>(6)</sup>
	- 3 <sup>rd</sup> phase	350 Nm
	- 4 <sup>th</sup> phase	turn the hub through 10 rotations <sup>(6)</sup>
	- 5 <sup>th</sup> 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

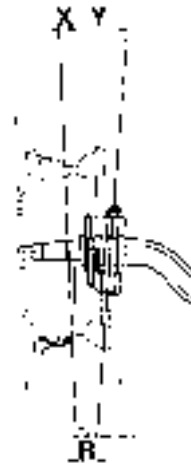
#### Wheel speed sensor

Anti-corrosion agent Molykote P37

#### Camber angle and kingpin inclination (KPI)

Camber angle (X) on an unloaded axle  $1^\circ$

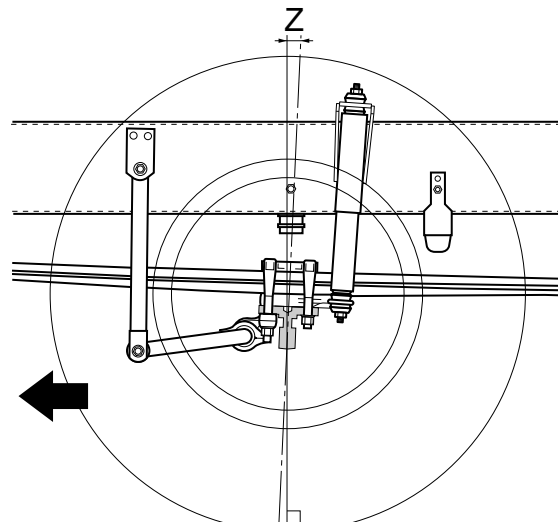
King-pin inclination (Y)  $7^\circ 30'$



S7 00 129

#### Caster

Z = caster  $3^\circ$

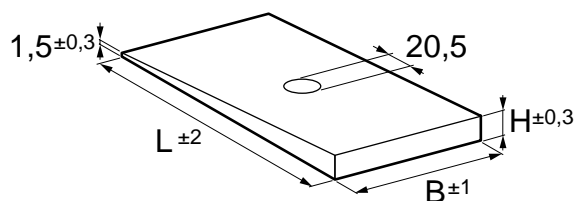


S7 00 607

List of keys that can be supplied for adjusting caster (Z)

Key angle	W <sup>(1)</sup>	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**

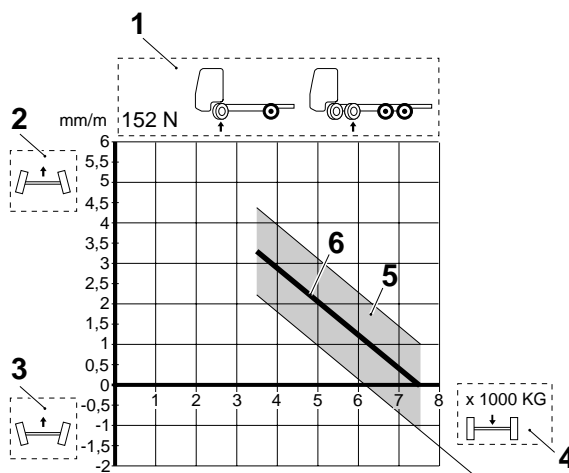
Toe values are shown in the graph.

**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**

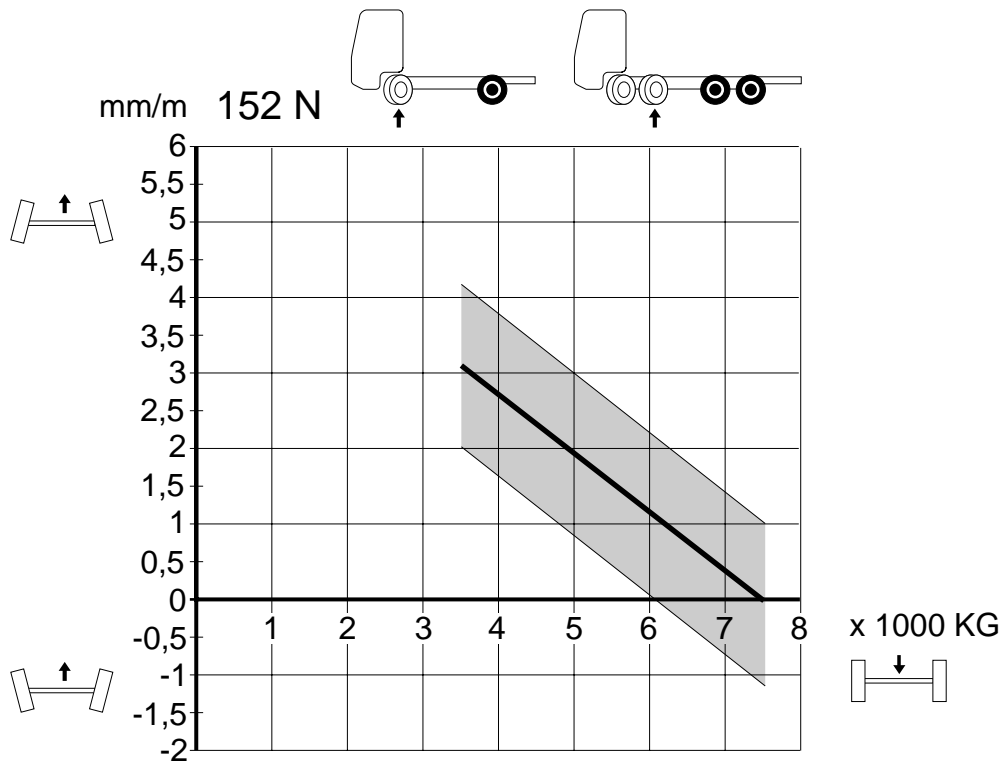
- At the top of the graph, the axle type and the axle configuration (1) is shown.
- The toe is shown in mm/m on the left-hand side of the graph. The values above the 0 line show toe-in values, indicated by the symbol (2). The values below the 0 line show toe-out values, indicated by the symbol (3). The 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



S7 00 414

**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

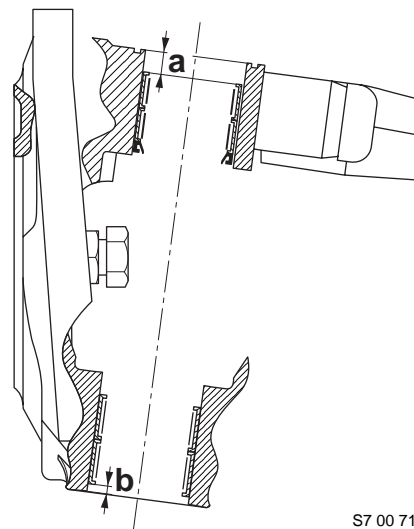
- 1.50 mm
- 1.75 mm
- 1.88 mm
- 2.00 mm
- 2.13 mm
- 2.25 mm
- 2.38 mm



0

Wheel offset of needle bearings

- dimension a: 12 - 13 mm
- dimension b: 3 - 4 mm



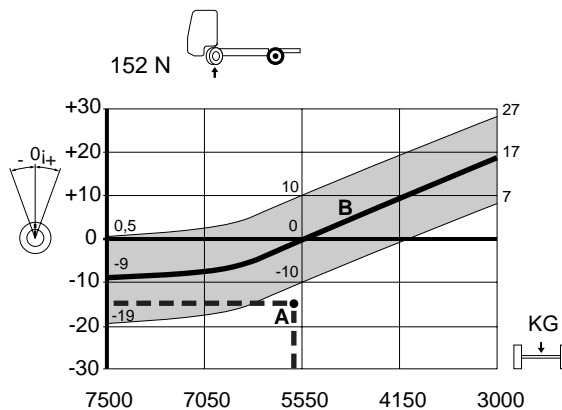
S7 00 710

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

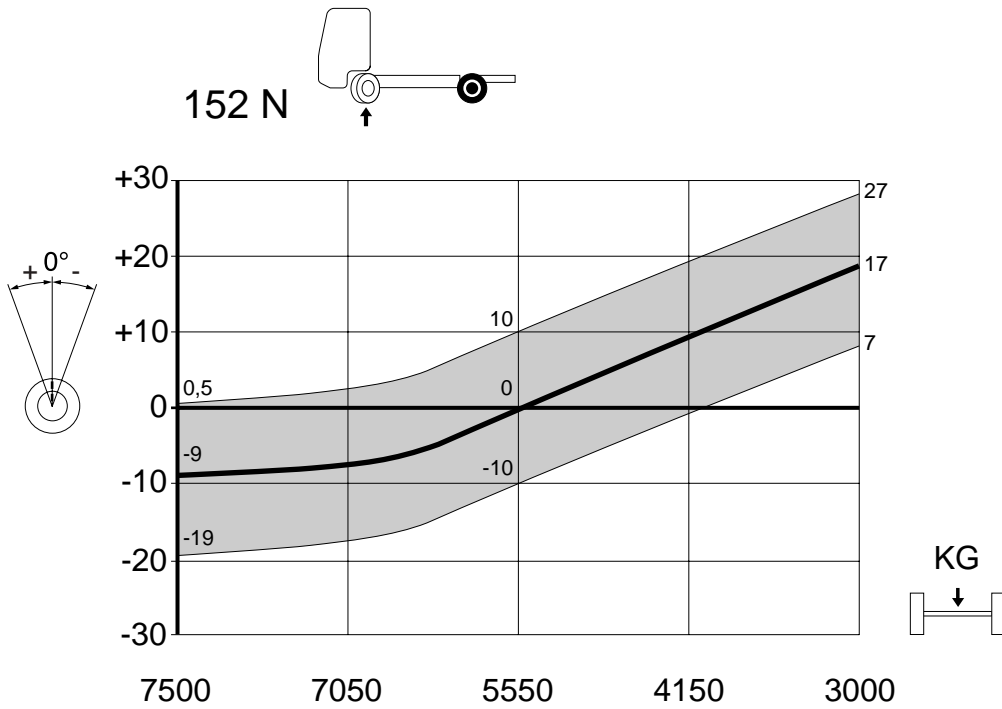
1. The axle type and the axle configuration (1) is shown at the top of the graph.
2. The angle between the marks on the steering box input shaft and the mark on the steering box (2) are shown on the left-hand side of the graph.  
**Note** that there are two different graphs for LHD and RHD vehicles.
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

0



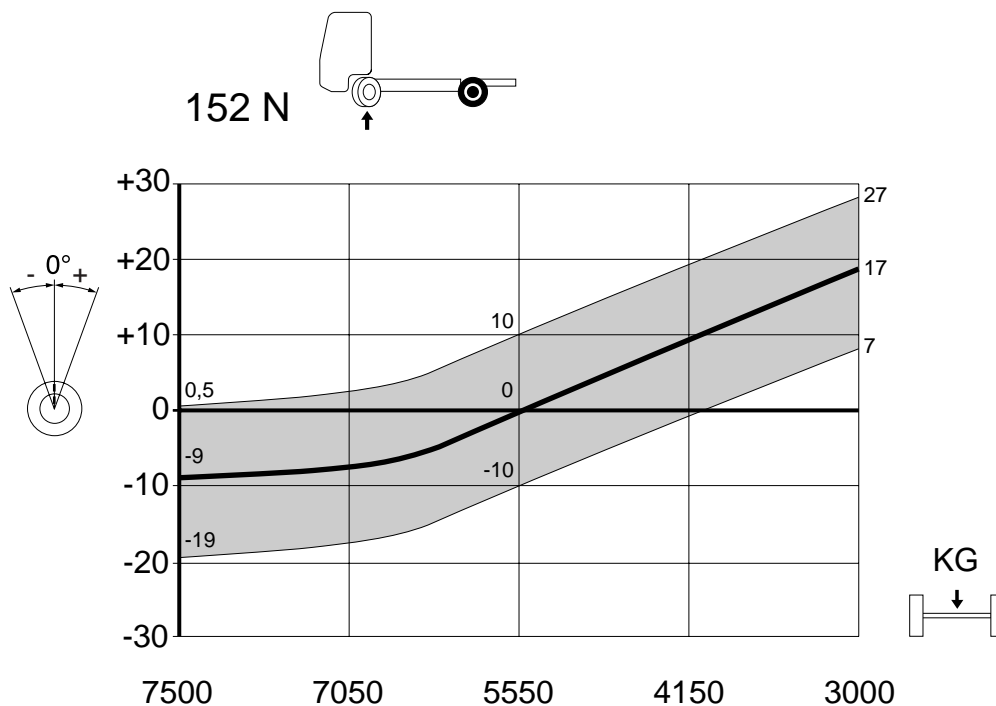
S7 00 886

**Note:**

“+” on the vertical axis of the graph indicates towards the driver’s side. “-” indicates towards the co-driver’s side.

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**

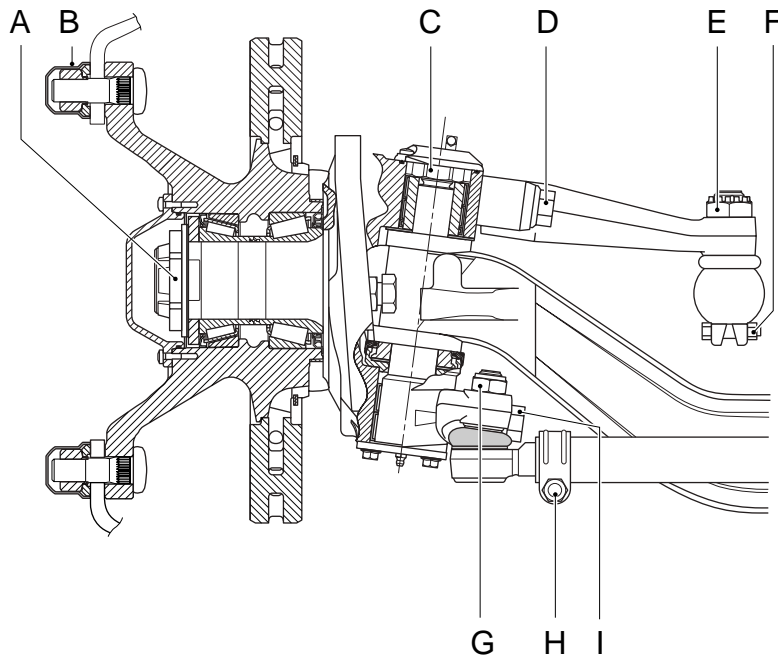
Axial end play

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.



S7 00 883

- |    |                                                 |                                                  |
|----|-------------------------------------------------|--------------------------------------------------|
| A. | Hub nut of wheel hub unit                       |                                                  |
| -  | 1 <sup>st</sup> phase                           | 400 Nm <sup>(1)</sup>                            |
| -  | 2 <sup>nd</sup> phase                           | turn the hub through 10 rotations <sup>(2)</sup> |
| -  | 3 <sup>rd</sup> phase                           | 450 Nm                                           |
| -  | 4 <sup>th</sup> phase                           | turn the hub through 10 rotations <sup>(2)</sup> |
| -  | 5 <sup>th</sup> phase                           | 950 Nm                                           |
| B. | Wheel nut                                       | 700 Nm <sup>(3)</sup>                            |
| C. | King-pin nut                                    | 595 Nm <sup>(4)</sup>                            |
| D. | Steering-rod arm attachment bolt                | 500 Nm + 90° angular displacement <sup>(5)</sup> |
| E. | Steering rod castle nut                         | 220 Nm <sup>(6)</sup>                            |
| F. | Attachment bolt, steering-rod clamping bracket  | 90 Nm <sup>(1)</sup>                             |
| G. | M20 attachment nut, track rod                   | 225 Nm <sup>(7)</sup>                            |
| H. | M12 attachment bolt, track rod clamping bracket | 80 Nm <sup>(1)</sup>                             |
| I. | Track rod arm attachment bolt                   | 500 Nm + 90° angular displacement <sup>(5)</sup> |

- (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

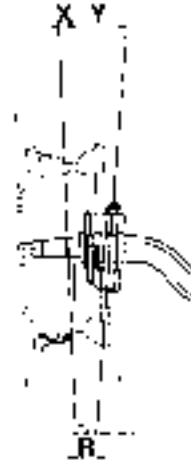
#### Wheel speed sensor

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)  $7^{\circ}15'$



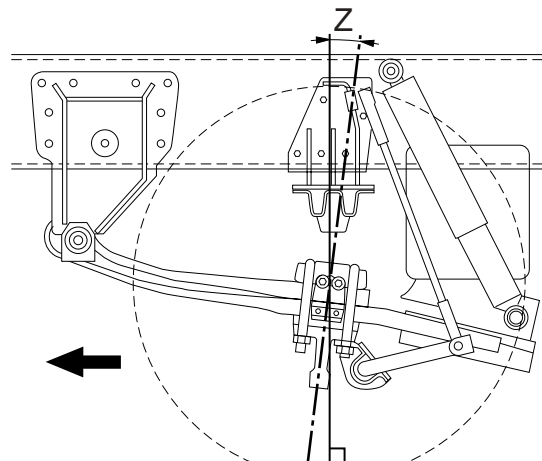
S7 00 129

#### Wheel deflection

Maximum inner wheel deflection  $20^{\circ}$

#### Caster

Z = caster  
 - unloaded  $3^{\circ}$   
 - loaded  $5.4^{\circ}$



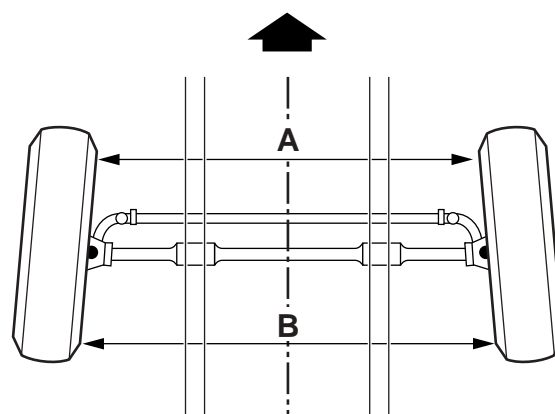
S7 00 835

**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

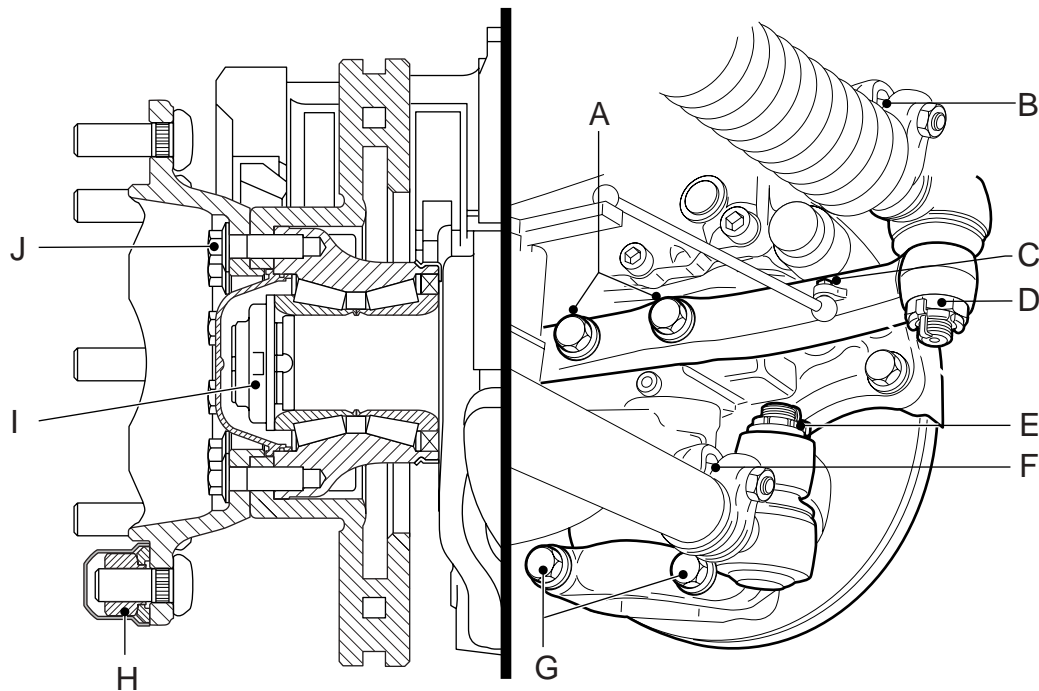


## 7.2 TIGHTENING TORQUES

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.

0



S7 00 891

A.	Steering cylinder arm attachment bolt	370 ± 35 Nm <sup>(1)</sup>
B.	Attachment bolt, steering cylinder clamping bracket	45 Nm <sup>(2)</sup>
C.	Attachment nut, trailing axle angle sensor control rod	23 Nm
D.	Steering cylinder castle nut	260 ± 20 Nm <sup>(3)</sup>
E.	Track rod castle nut	280 ± 25 Nm <sup>(3)</sup>
F.	Track rod clamping bracket attachment bolt	80 ± 10 Nm <sup>(2)</sup>
G.	Track rod arm attachment bolt	420 ± 40 Nm <sup>(1)</sup>
H.	Wheel nut (M20 x 1.5)	485 ± 35 Nm <sup>(4)</sup>
I.	Hub nut	
	- 1 <sup>st</sup> phase	300 Nm <sup>(5)</sup>
	- 2 <sup>nd</sup> phase	turn the hub through 10 rotations <sup>(6)</sup>
	- 3 <sup>rd</sup> phase	350 Nm
	- 4 <sup>th</sup> phase	turn the hub through 10 rotations <sup>(6)</sup>
	- 5 <sup>th</sup> 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. <b>STEERING GEAR, GENERAL</b> .....	1-1	200322
1.1 Fault-finding table .....	1-1	200322





## 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.

**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.

<b>SYMPTOM: HEAVY STEERING, OCCASIONALLY</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.

**SYMPTOM: WHEEL DEFLECTION TOO SMALL**

<b>Possible cause</b>	<b>Remedy</b>
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.



<b>SYMPTOM: VEHICLE PULLS TO ONE SIDE</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.

**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

<b>SYMPTOM: VEHICLE IS SEARCHING, TRACKING INSTABILITY</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.

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.

<b>SYMPTOM: STEERING WHEEL DOES NOT RETURN TO THE "STRAIGHT AHEAD" POSITION (OR ONLY VERY SLOWLY)</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.

**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.

<b>SYMPTOM: STEERING OIL LEAKAGE</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.	<p>On the steering box, check the following seals:</p> <ul style="list-style-type: none"> <li>- input shaft oil seal</li> <li>- cover O-ring on underside of steering box</li> <li>- pressure-limiting valve O-ring</li> <li>- wheel-deflection limiting valve stop bolts</li> <li>- various plugs and connection nipples</li> </ul> <p>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.</p> <p>Replace the steering box in the case of leaks other than those described above.</p>
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).

## 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.

<b>SYMPTOM: STEERING PUMP PRODUCES A SQUEALING NOISE WHILE STEERING</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.

<b>SYMPTOM: THE STEERING PUMP PRODUCES A DIFFERENT NOISE WHEN AT IDLING SPEED. THE NOISE LEVEL INCREASES WHEN THE ENGINE SPEED INCREASES</b>	
<b>Possible cause</b>	<b>Remedy</b>
Worn steering pump.	Replace steering pump. Replace steering oil. Clean the reservoir and pipes. Replace filter.



<b>SYMPTOM: WHEN STEERING THE SOUND OF METAL SCRAPING AGAINST METAL IS HEARD</b>	
<b>Possible cause</b>	<b>Remedy</b>
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.



## CONTENTS

	Page	Date
<b>1. SAFETY INSTRUCTIONS</b> .....	1-1	200322
<b>2. GENERAL</b> .....	2-1	200322
2.1 Overview drawing of steering gear, version without steered trailing swivel axle .....	2-1	200322
2.2 Overview drawing of steering gear, version with steered trailing swivel axle .....	2-2	200322
2.3 System description of steering gear, version without steered trailing swivel axle .....	2-3	200322
2.4 System description of steering gear, version with steered trailing swivel axle .....	2-5	200322
<b>3. INSPECTION AND ADJUSTMENT</b> .....	3-1	200322
3.1 Inspecting the steering gear using a pressure gauge .....	3-1	200322
3.2 Inspecting steering gear using the test case .....	3-4	200322
3.3 Checking the steering box attachment .....	3-12	200322
3.4 Checking hydraulic centre position .....	3-12	200322
<b>4. DRAINING, FILLING AND BLEEDING</b> .....	4-1	200322
4.1 Draining, filling and bleeding steering gear, version without steered trailing swivel axle .....	4-1	200322
4.2 Draining, filling and bleeding steering gear, version with steered trailing swivel axle .....	4-4	200322



## 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.

2

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.

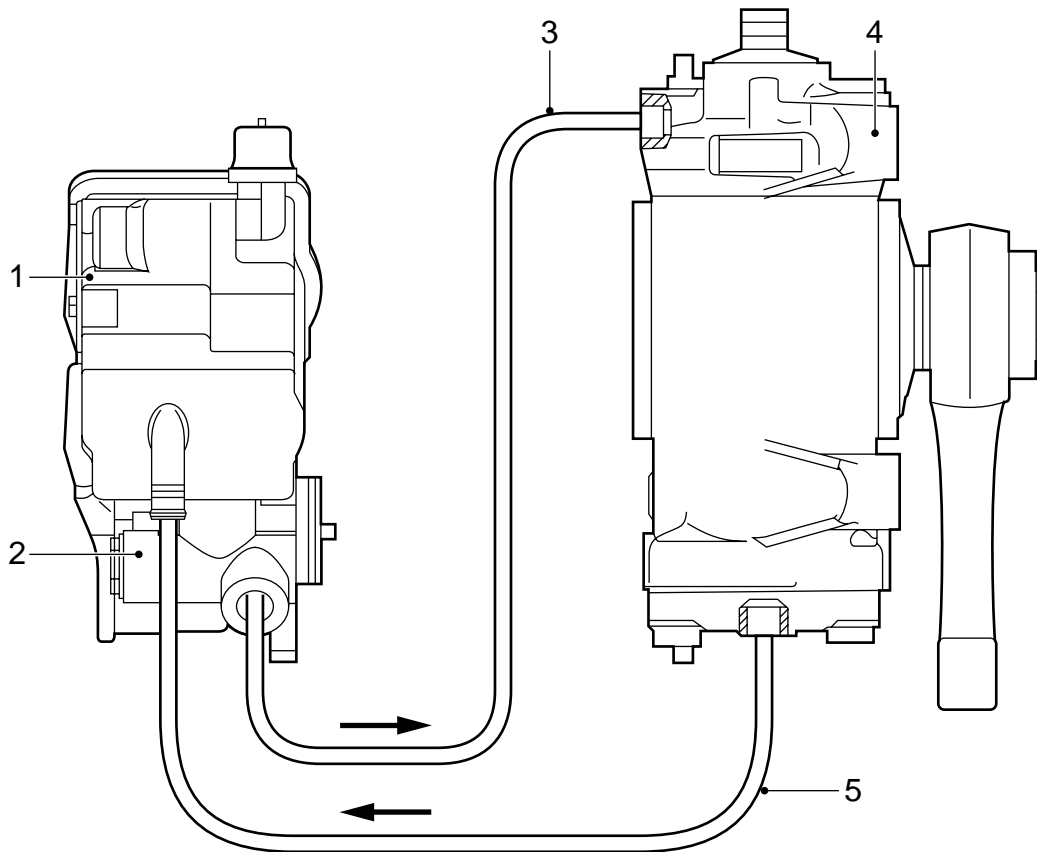


**Screwing a new castle nut or self-locking nut onto a ball end with a damaged screw thread can give rise to dangerous situations.**

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

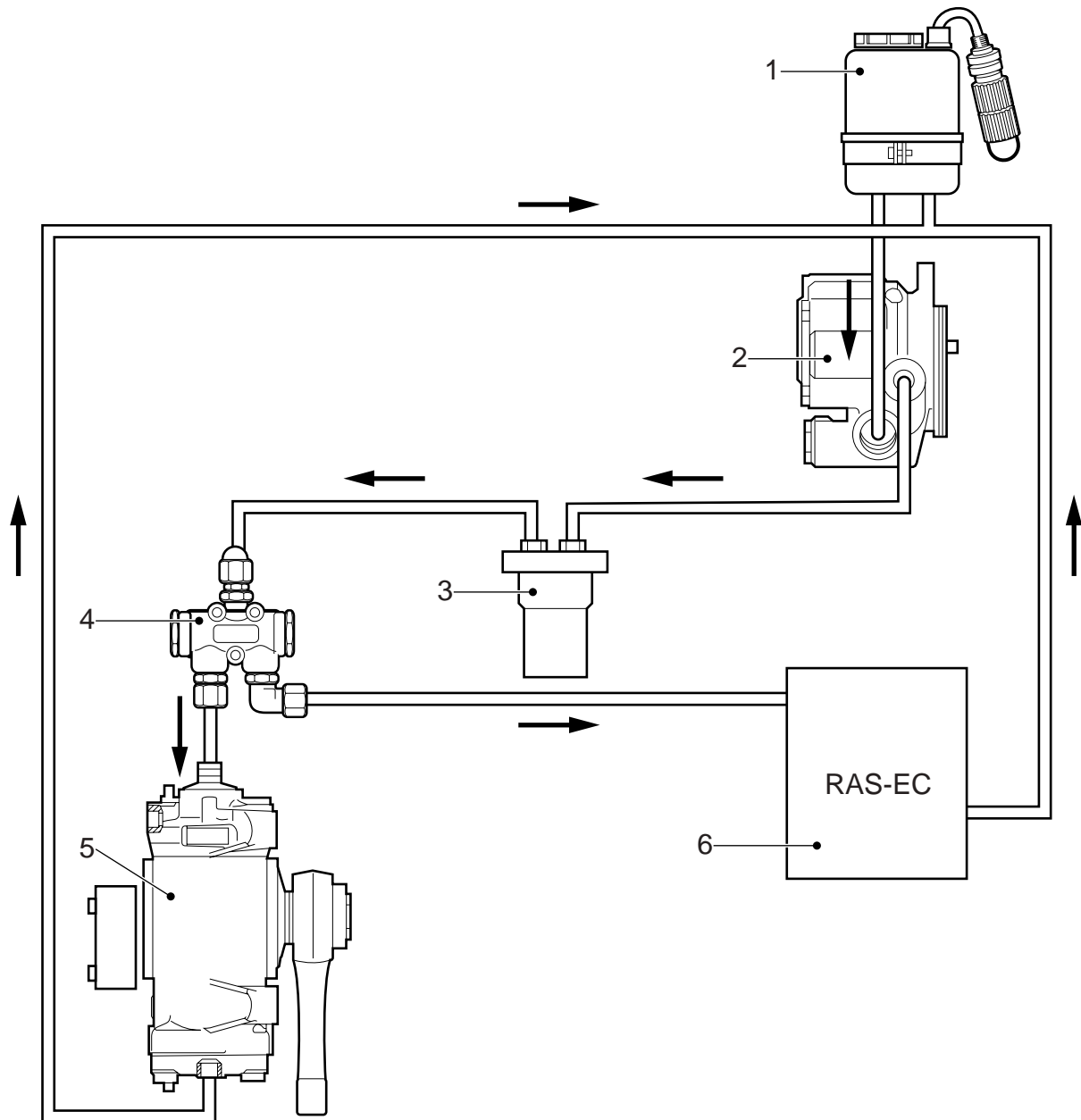


S7 00 536

1. Reservoir
2. Steering pump
3. Delivery pipe
4. Steering box
5. Return pipe

2.2 OVERVIEW DRAWING OF STEERING GEAR, VERSION WITH STEERED TRAILING SWIVEL AXLE

2

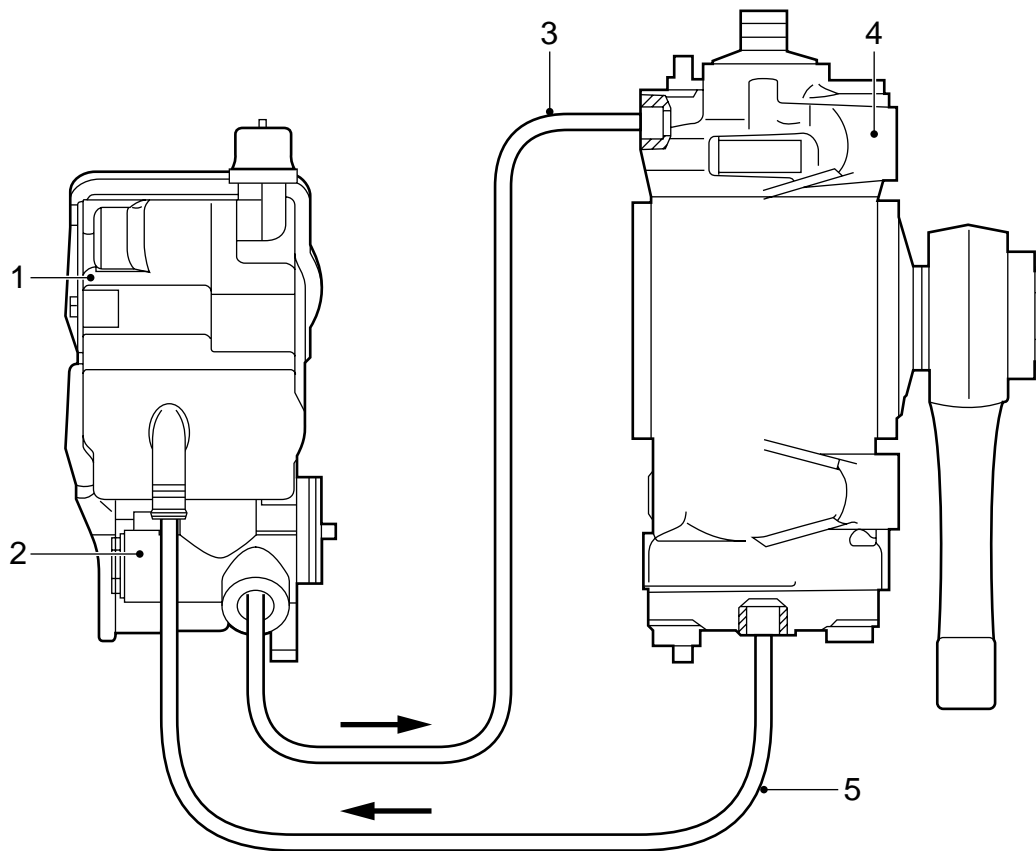


S7 00 836

- 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



2

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).

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.

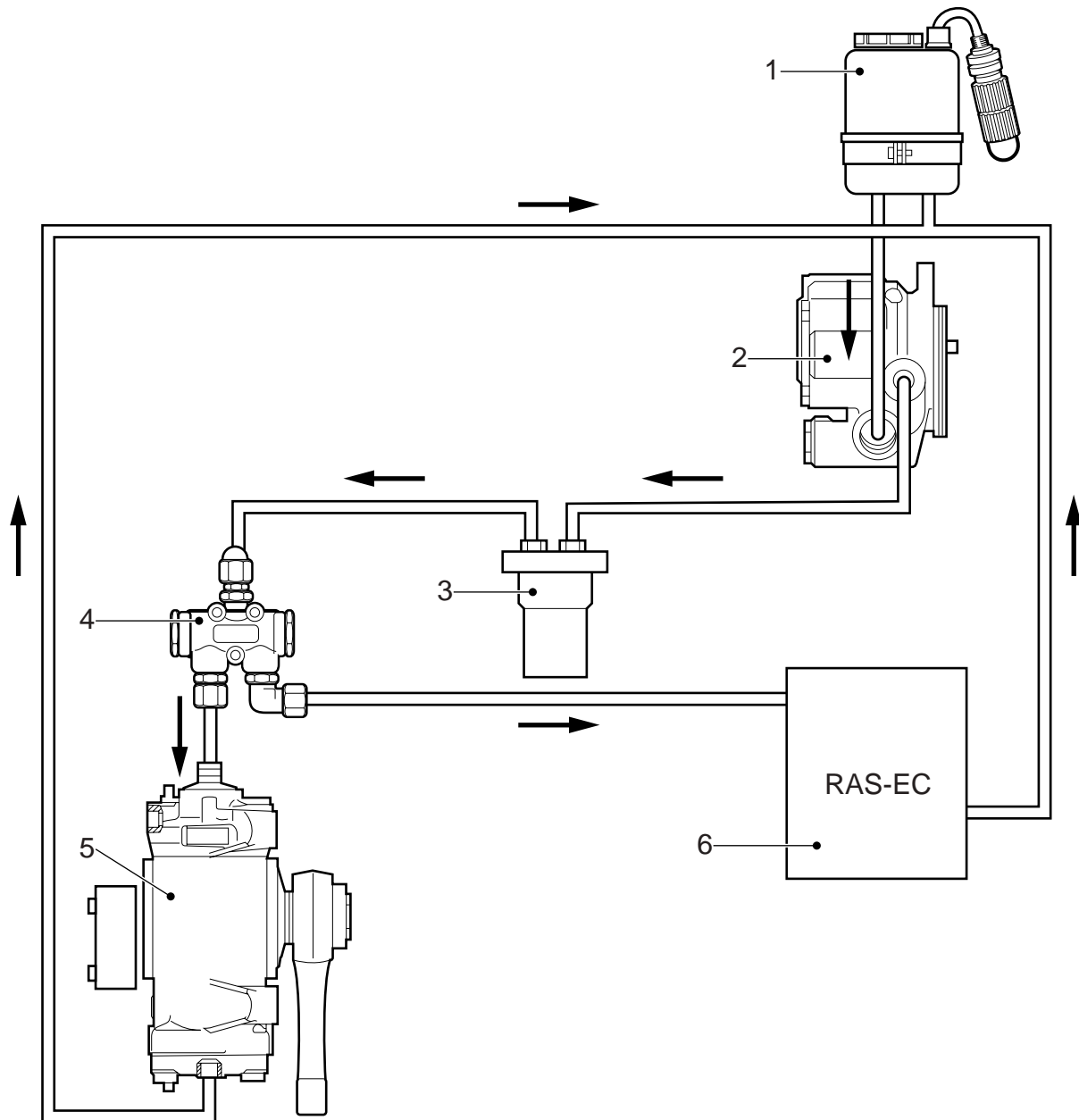
When at maximum pressure a major transmission of energy will take place, resulting in the release of much heat. If this situation lasts too long, the steering pump can be damaged by the heat development.

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



2

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.

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.

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.**



### 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.



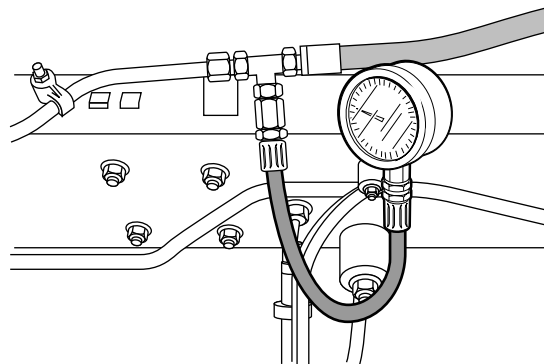
**Block the vehicle so that it cannot slide off the jack or the turning plates.**

### 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.

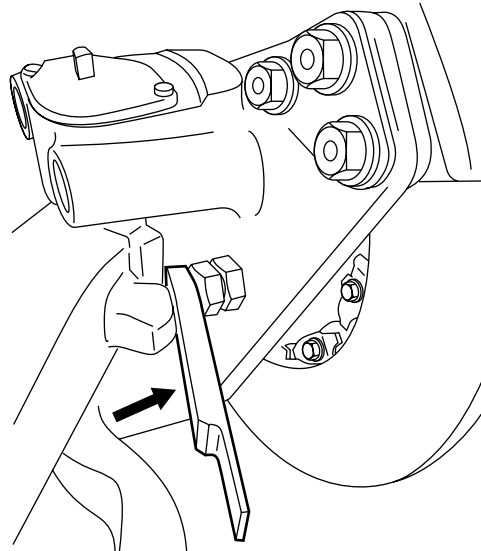


**Testing the maximum system pressure.**

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.**



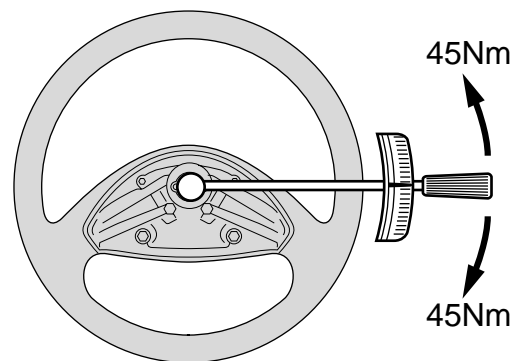
S7 00 598

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

### 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.

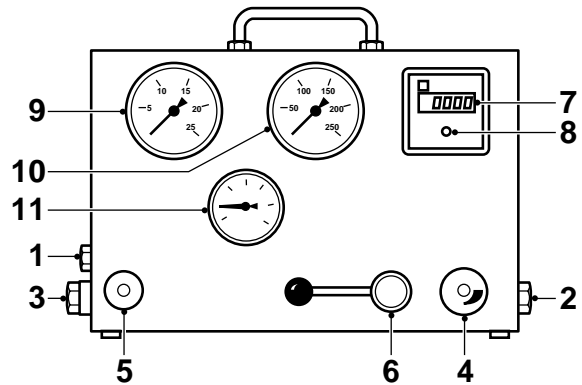
The “Eingang” (input) pipe connection is fitted with a filter, which should be cleaned regularly, depending on the amount of dirt in the oil.



**Always check the tightening torque of the steering wheel bolt after the steering wheel has been turned using a torque wrench.**

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.



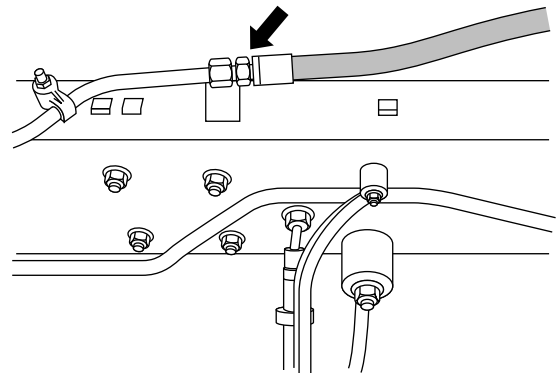
S7 00 020

#### 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

### 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.**

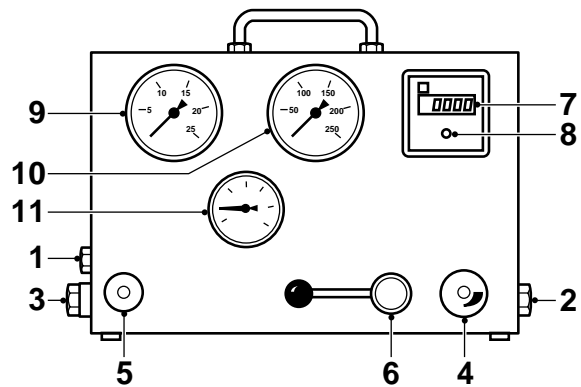
2

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.

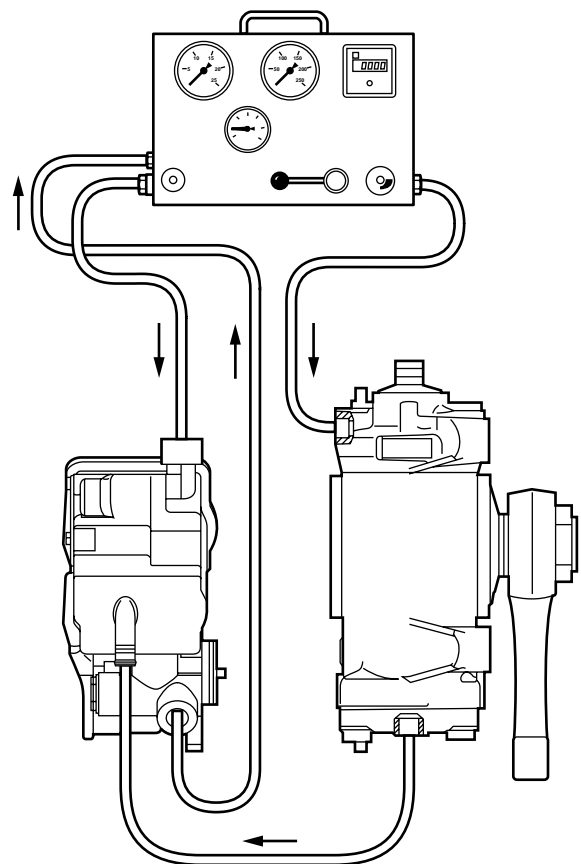
**Note:**

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



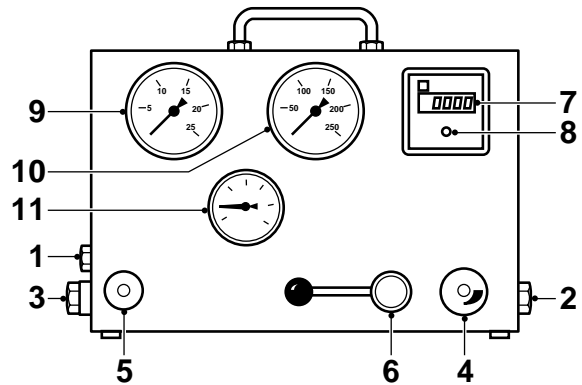
S7 00 535

**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.



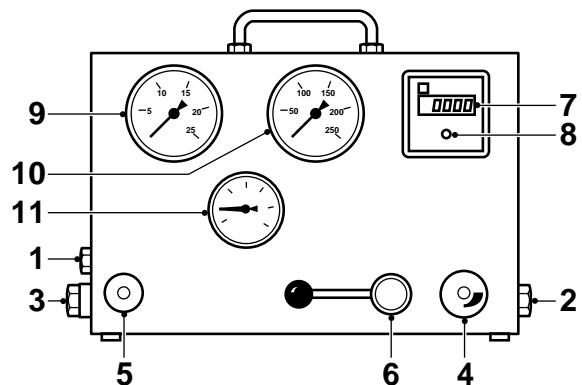
S7 00 020

**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.



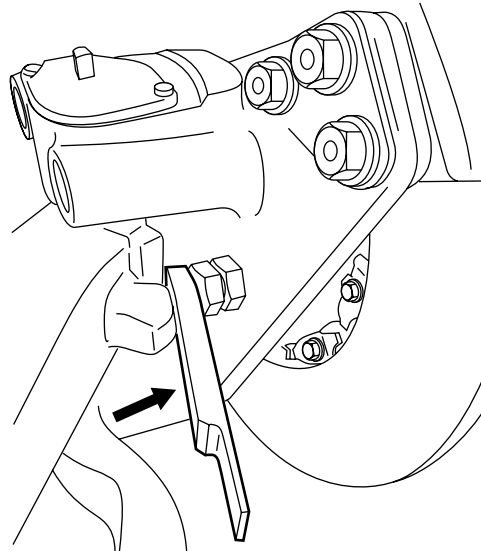
S7 00 020

### 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.

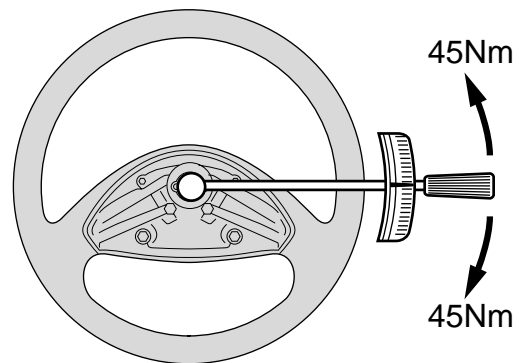


**Be careful when fitting the 15 mm filler piece between the adjusting bolt or the axle stop on the swivel axle and the axle stop, as there is a danger of limbs getting trapped.**



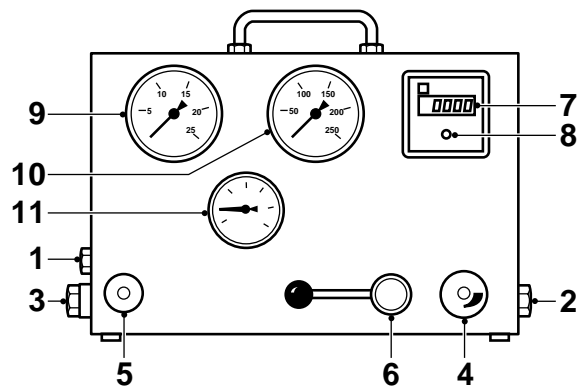
S7 00 598

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

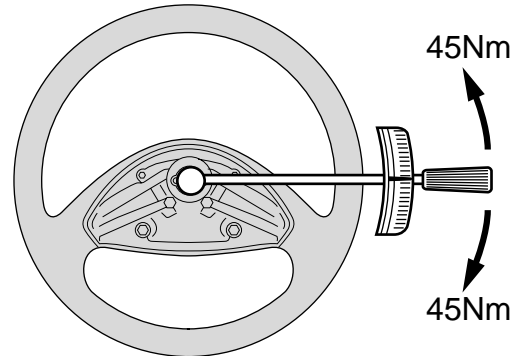
4. Take the pressure reading on the pressure gauge (10) (the maximum pressure must not be maintained for more than 5 seconds). Compare the reading with the specified value, see "Technical data".
5. Repeat the measurement using the 15 mm filler piece at the other end of the front axle.



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".

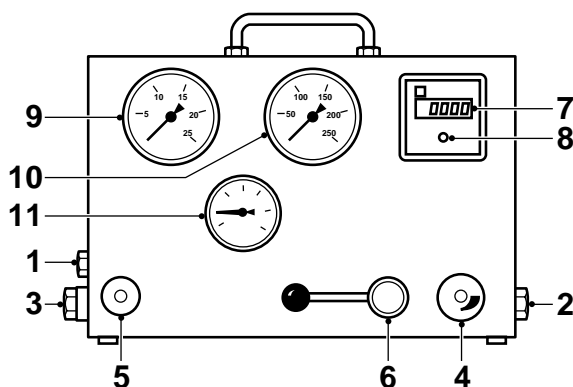
# 2

### 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.

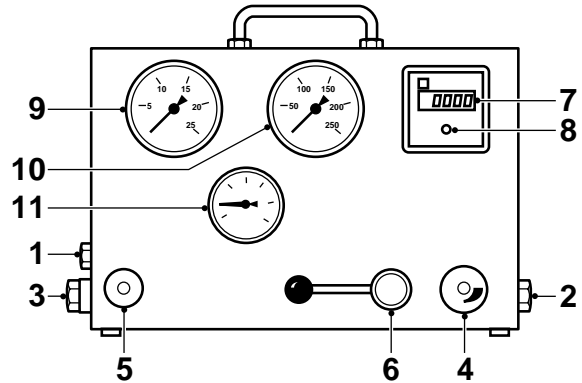


S7 00 020



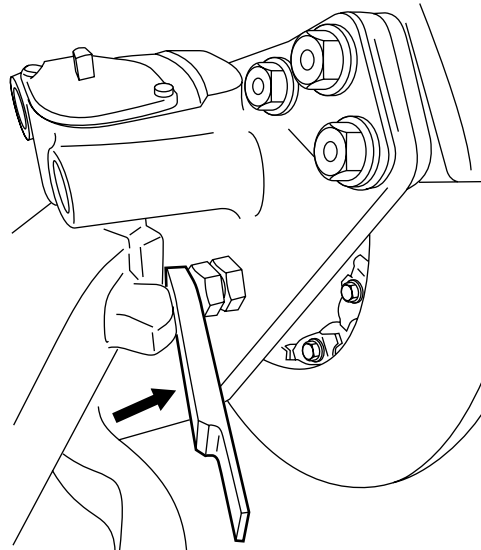
**Testing for internal steering box leaks**

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).



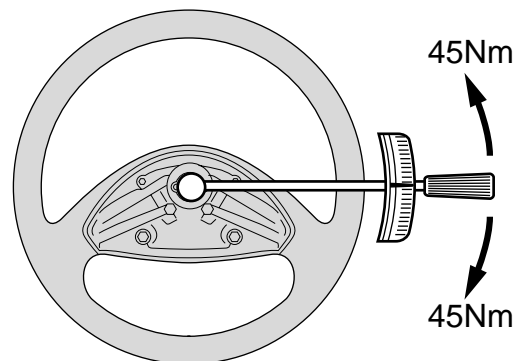
S7 00 020

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.



S7 00 611

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.

#### 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.**

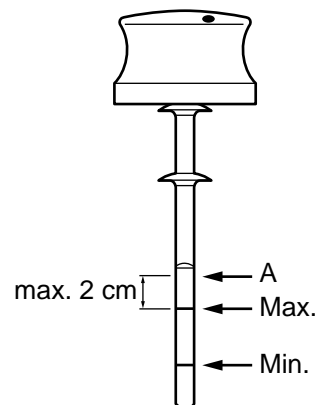
**If there is air in the hydraulic system, a squealing noise will be heard when the steering wheel is turned.**

**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.

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.



S7 00 023

### 4.2 DRAINING, FILLING AND BLEEDING STEERING GEAR, VERSION WITH STEERED TRAILING SWIVEL AXLE

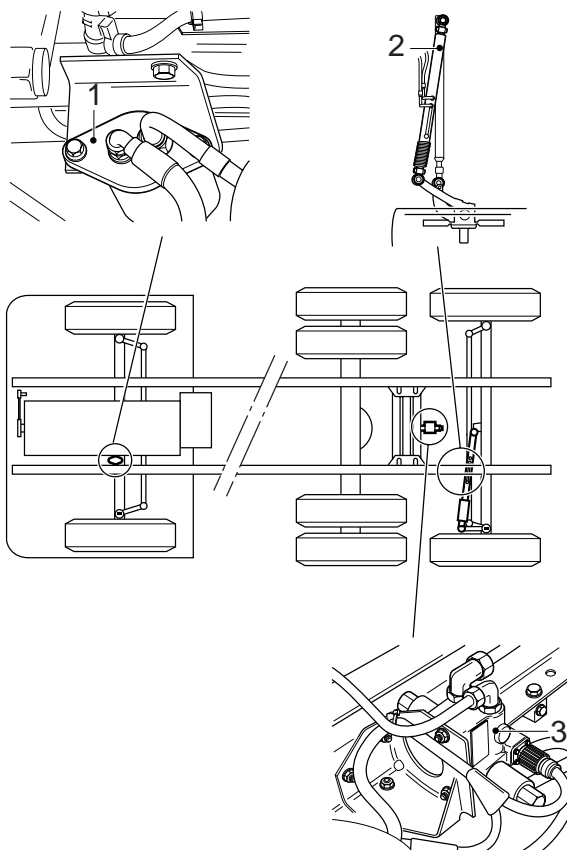
#### Draining steering gear, version with steered trailing swivel axle



**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.**

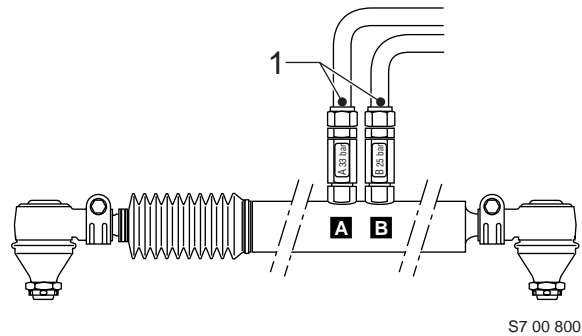
# 2

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

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.

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.



**CONTENTS**

	Page	Date
<b>1. SAFETY INSTRUCTIONS</b> .....	1-1	200322
<b>2. GENERAL</b> .....	2-1	200322
2.1 Overview drawing of steering box .....	2-1	200322
2.2 Overview drawing of wheel-deflection limiting valves .....	2-2	200322
2.3 Operation of the steering box .....	2-3	200322
<b>3. INSPECTION AND ADJUSTMENT</b> .....	3-1	200322
3.1 Inspection and adjustment, wheel-deflection limiting valves .....	3-1	200322
3.2 Inspecting the pressure point .....	3-6	200322
3.3 Inspection and adjustment, input shaft end play .....	3-8	200322
<b>4. REMOVAL AND INSTALLATION</b> .....	4-1	200322
4.1 Removal and installation of steering box assembly .....	4-1	200322
4.2 Removal and installation of steering bracket .....	4-5	200322
4.3 Removal and installation of pitman arm .....	4-7	200322
4.4 Removal and installation of pressure-limiting valve .....	4-11	200322
4.5 Removal and installation of piston .....	4-12	200322



## 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.

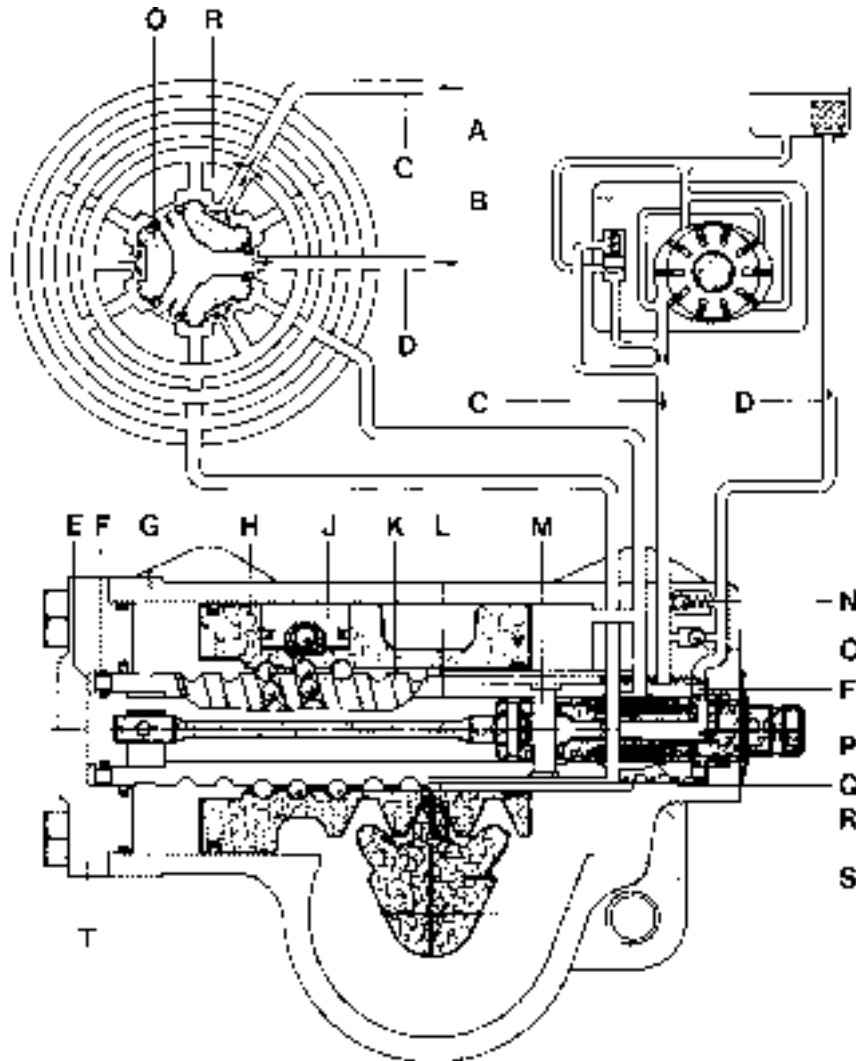
If the specified tools are not available, the pitman arm should under no circumstances be removed by dislodging it using a hammer or by heating.

This would result in the pitman arm becoming extremely unreliable and would also permanently damage the sector shaft.



## 2. GENERAL

### 2.1 OVERVIEW DRAWING OF STEERING BOX

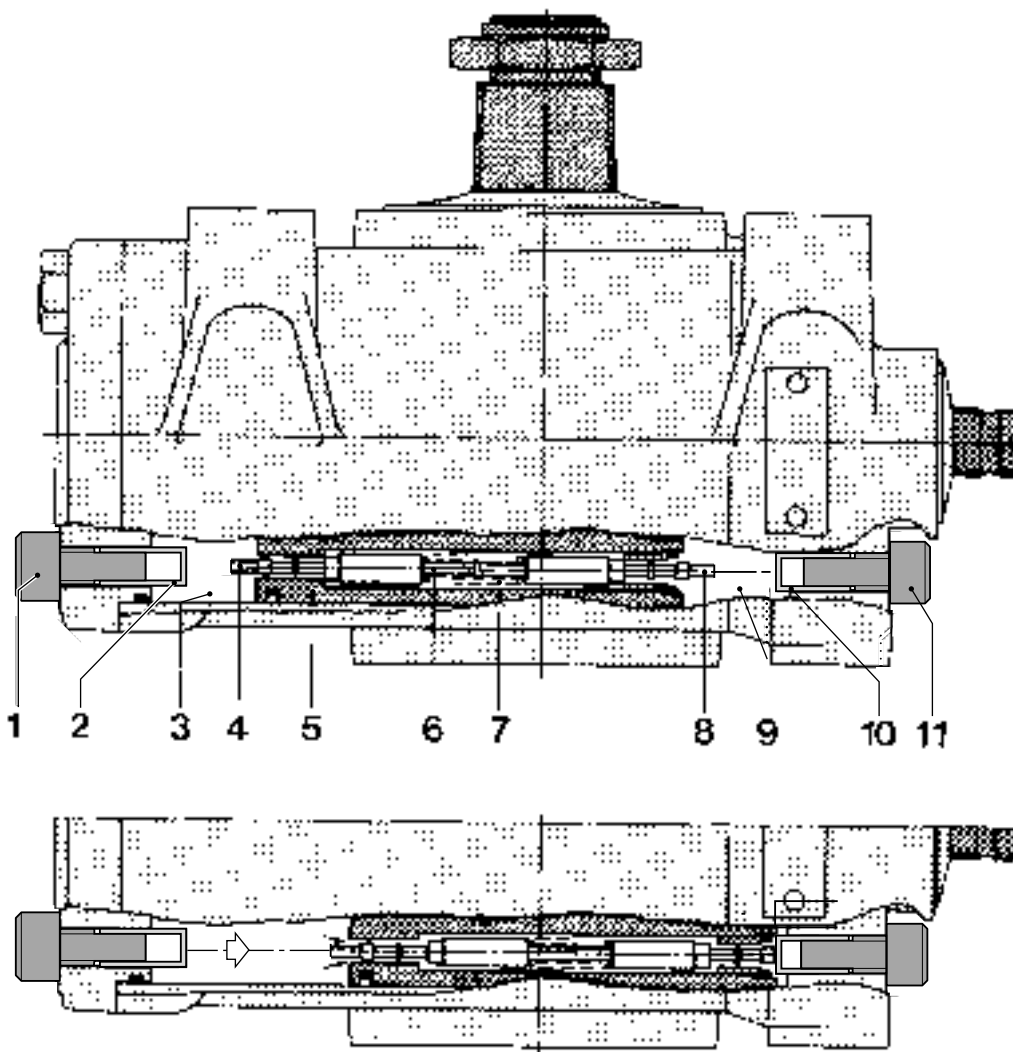


S7 00 265

- |    |               |    |                               |
|----|---------------|----|-------------------------------|
| A. | Reservoir     | L. | Torsion bar                   |
| B. | Steering pump | M. | Pin (with internal end stop)  |
| C. | Delivery pipe | N. | Pressure-limiting valve       |
| D. | Return pipe   | O. | Make-up valve (by-pass valve) |
| E. | Shim          | P. | Input shaft                   |
| F. | Pivot bearing | Q. | Control valve core            |
| G. | Box           | R. | Control valve casing          |
| H. | Piston        | S. | Sector shaft                  |
| J. | Ball nut      | T. | Cover                         |
| K. | Worm shaft    |    |                               |

2.2 OVERVIEW DRAWING OF WHEEL-DEFLECTION LIMITING VALVES

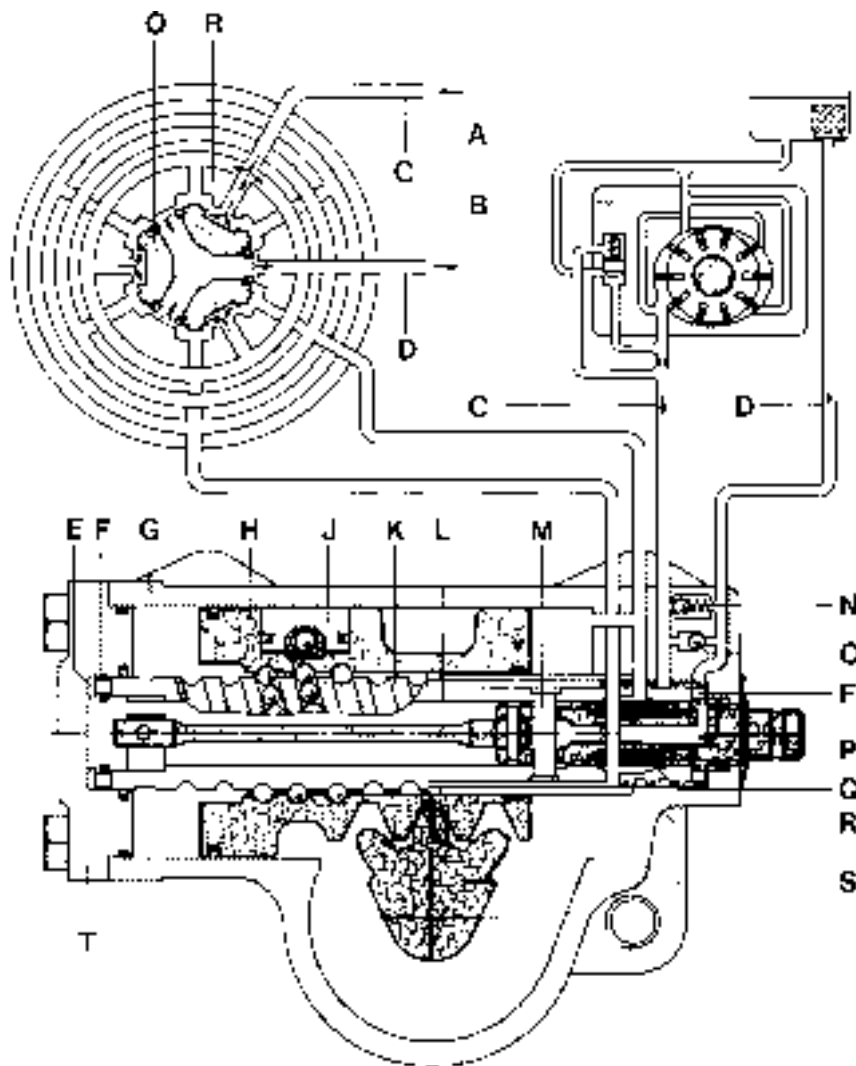
3



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.

### 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).

3

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.



**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.

3

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.

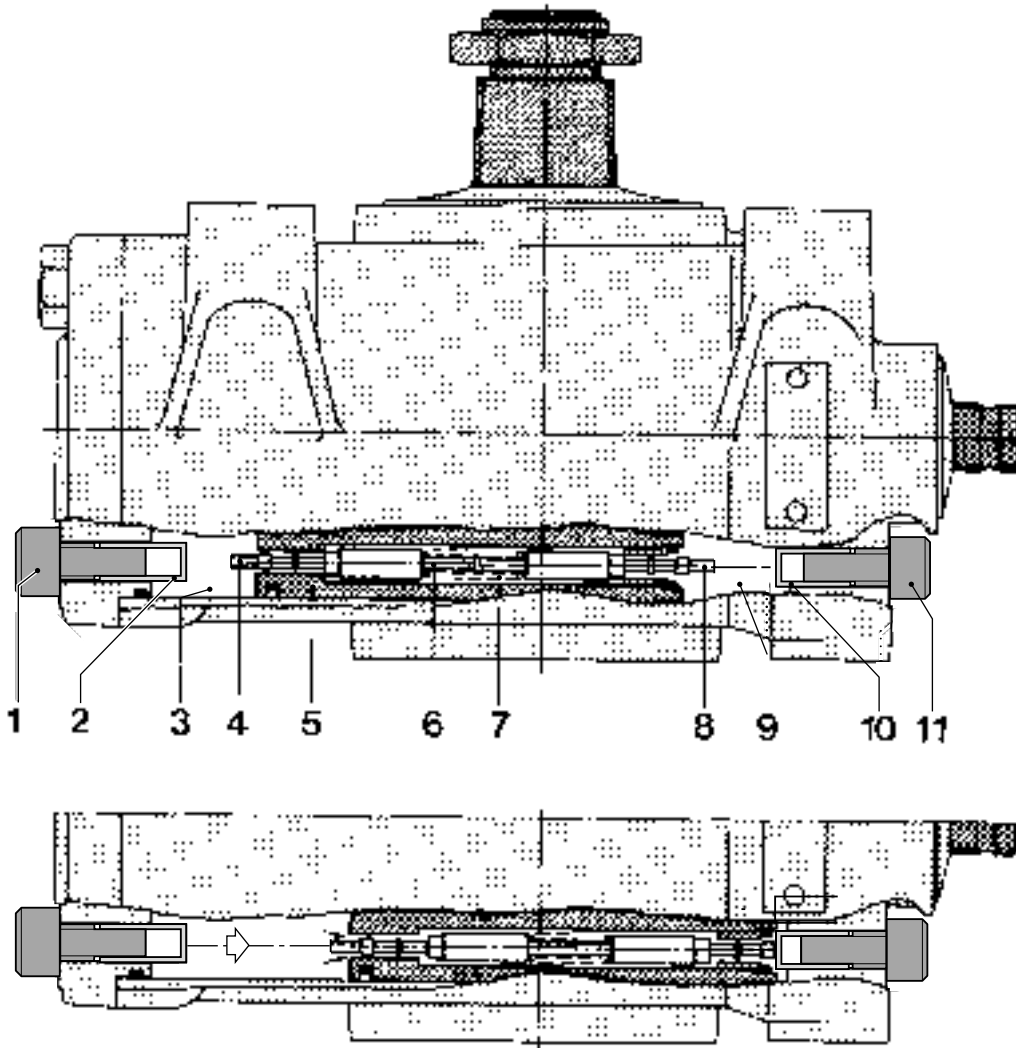
### **Pressure-limiting valve**

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.

**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.

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).

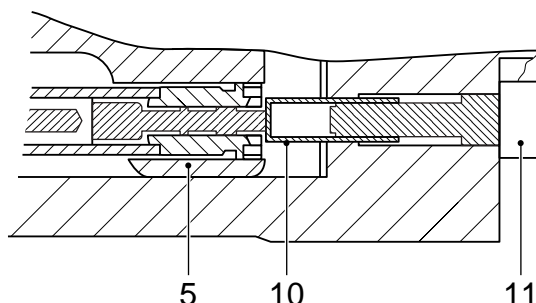
Valve (8) is now pushed off its seat.

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 tothing.

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 tothing correctly.

**Note:**

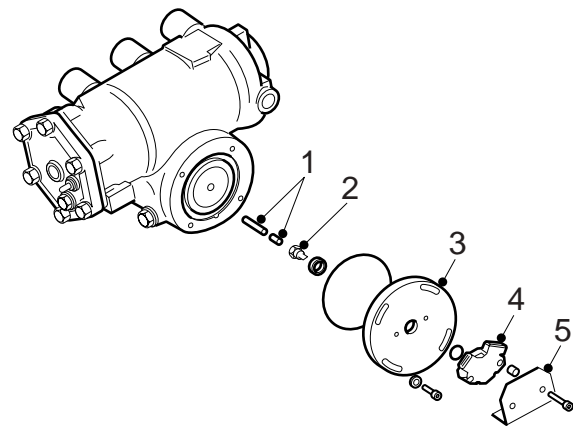
Adjustment of the pressure point should only take place in a workshop designed for this purpose and using the required special tools.

**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



### 3. INSPECTION AND ADJUSTMENT

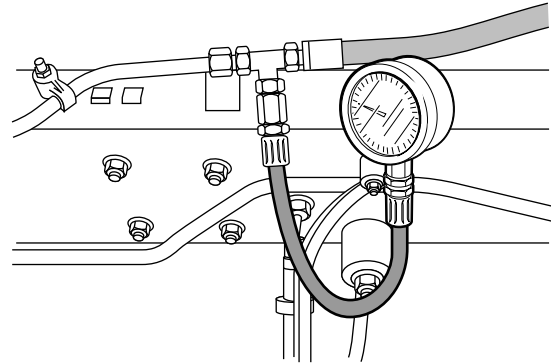
#### 3.1 INSPECTION AND ADJUSTMENT, WHEEL-DEFLECTION LIMITING VALVES

##### 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:**

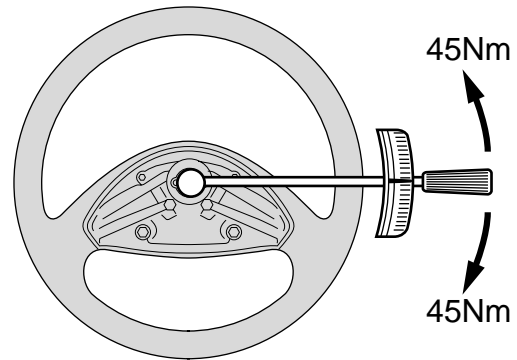
If the steering oil is too cold, considerably higher pressures will be measured.

6. Turn the steering wheel fully to the left.
7. Set the engine speed at 1200 - 1400 rpm.

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.

## 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.

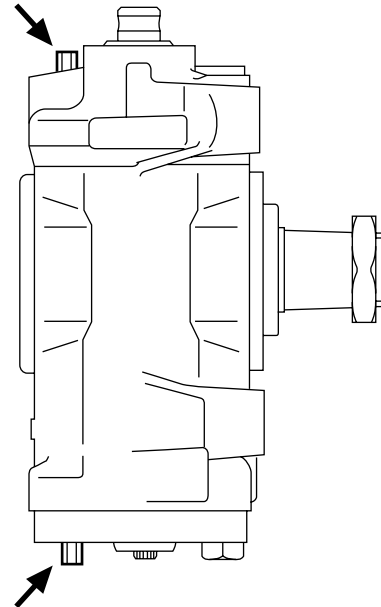
**Adjustment following procedure C**

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

### 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.

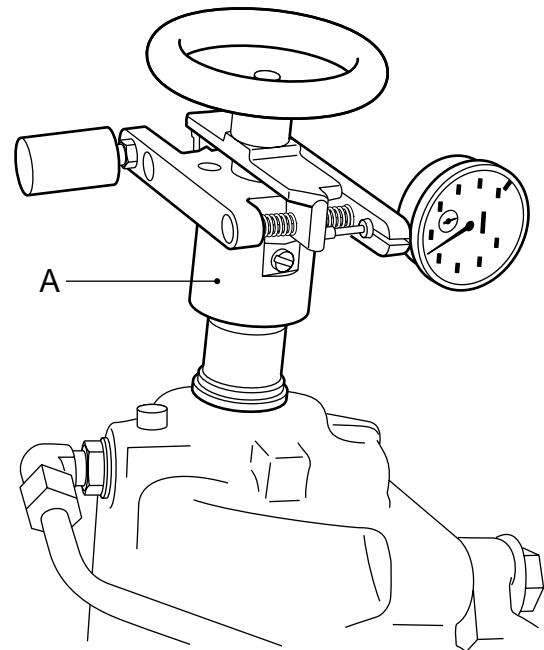
3. Place the sector shaft in the central position, by aligning the marks on the sector shaft and the steering box.
4. Take the universal joint off the input shaft.
5. If the vehicle has an airbag, use adhesive tape or some other means to prevent the steering wheel from turning.



**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).

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".



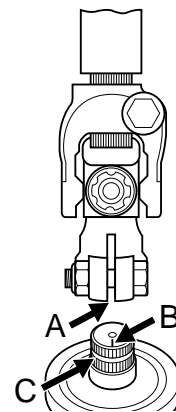
S7 00 624

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.



S7 00 594

## 3.3 INSPECTION AND ADJUSTMENT, INPUT SHAFT END PLAY

### Inspecting input shaft end play

1. Take the steering rod off the pitman arm.

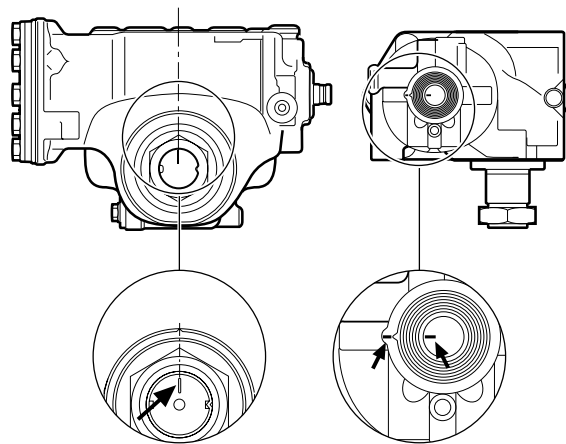
**Note:**

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.

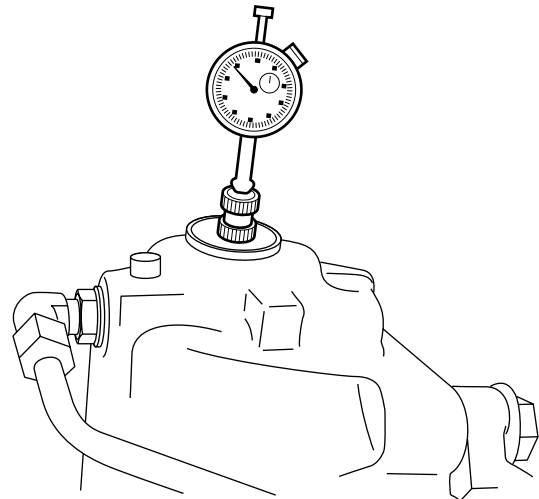


**If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.**



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.



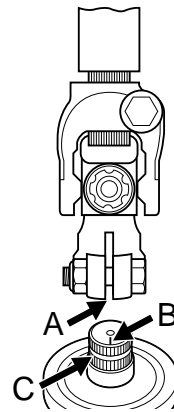
S7 00 881

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.

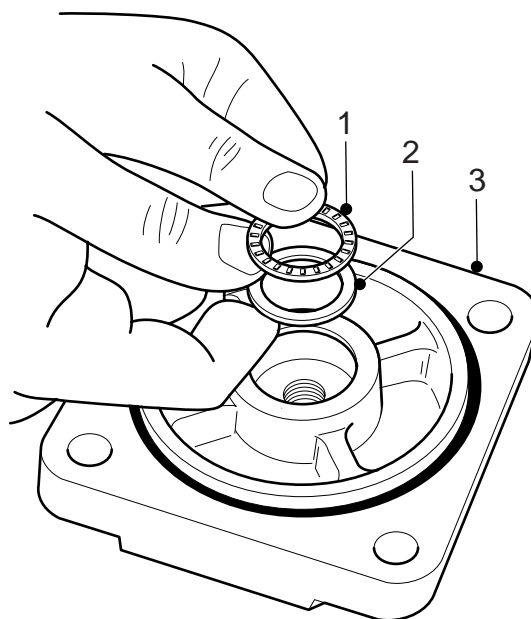


S7 00 594

### 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.

3



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.

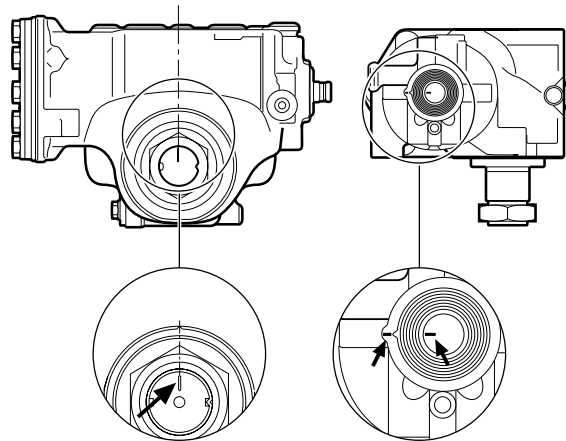
#### Removing steering box assembly

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.



S7 00 623



**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.**

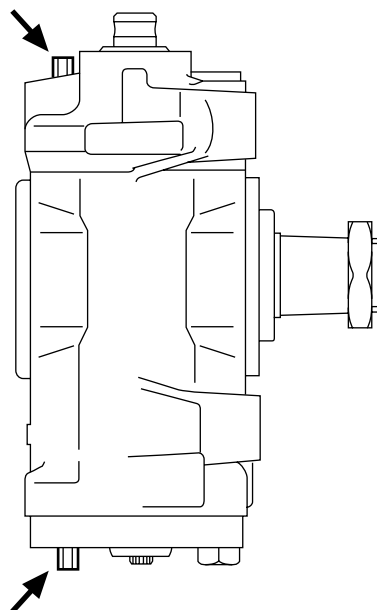
8. Remove the steering box attachment bolts/nuts the on the steering bracket. Take the steering box off the vehicle.

**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

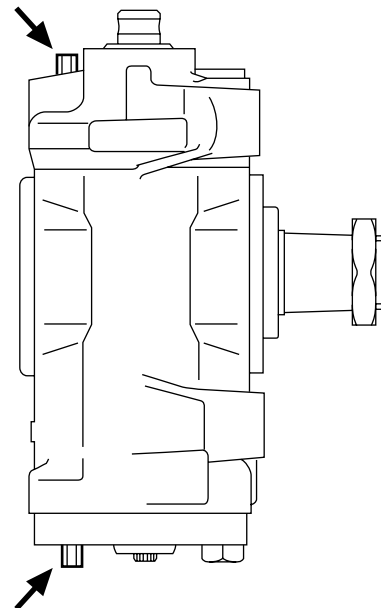
**Installing steering box assembly**

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

**Note:**

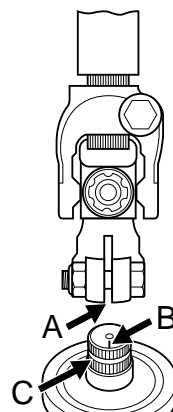
If the vehicle has a steered trailing swivel axle, the angle of rotation of the pitman arm must not be greater than 45°. If the pitman arm needs to rotate further, the steering box angle sensor should be removed first.

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.**

### 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.

### 4.3 REMOVAL AND INSTALLATION OF PITMAN ARM

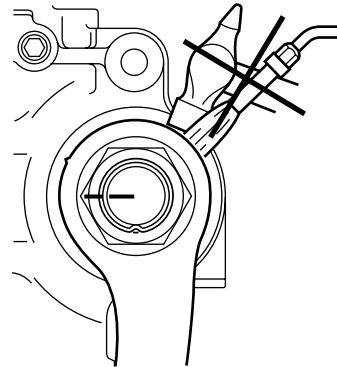


If the pitman arm has been subjected to extremely high loads (in an accident), it should be magnaflux tested, even if no faults are visible to the naked eye. If it is not possible to carry out this test, the pitman arm should be replaced immediately.

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.

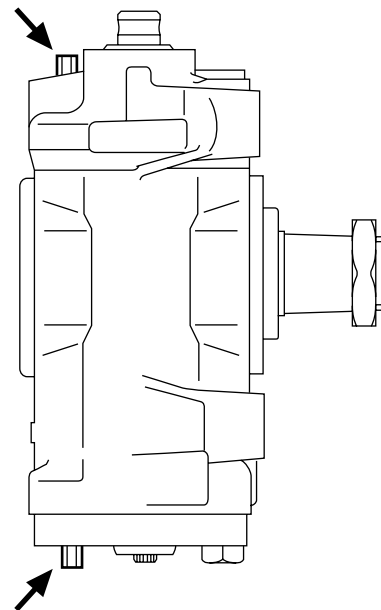
This would result in the pitman arm becoming extremely unreliable and would also permanently damage the sector shaft.



S7 00 617

#### Removing pitman arm, 8090 steering box.

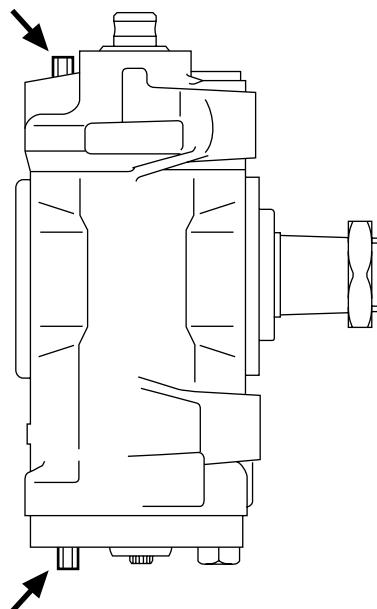
1. Take the steering box off the vehicle.
2. Mark the position of the stop bolts for the wheel-deflection limiting valves. Remove the stop bolts and plug the openings. While the steering box is being screwed in to allow the attachment nut to be removed, the stop bolts will change position.
3. Clean the 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

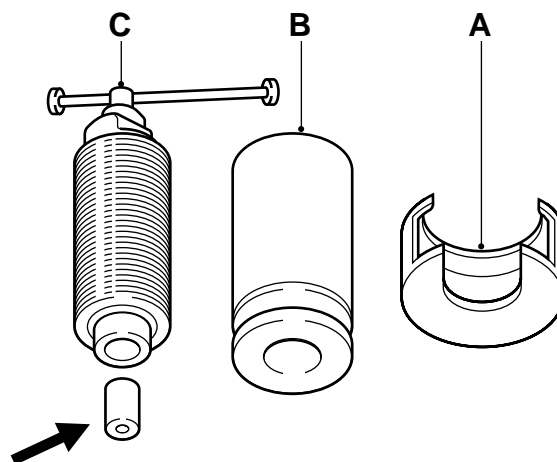
## Removing pitman arm, 8095 and 8098 steering box

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).

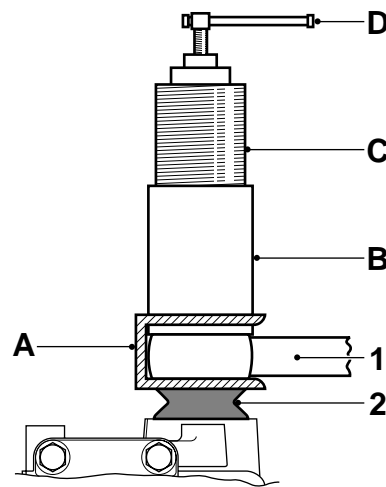


S7 00 029

3



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

3

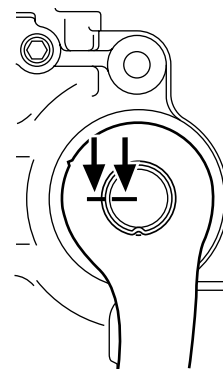
#### Installing pitman arm

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:

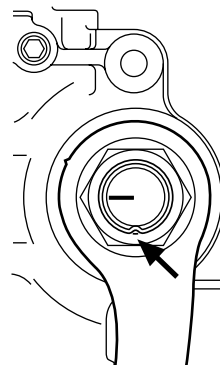
As the sector shaft nut normally has to be locked in the same position, the sector shaft nut can only be locked twice. After that, the nut must be replaced. The nut must not be locked in the same place again.

4. Fit the nut on the sector shaft and tighten it to the specified torque, see "Technical data".



S7 00 619

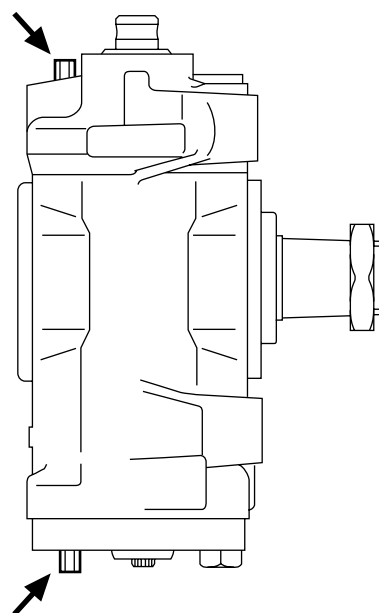
5. Lock the sector shaft nut by tapping the locking ring of the attachment nut at least 2.5 mm into one of the recesses of the sector shaft.  
Always use a part of the locking ring that has not been used before.



S7 00 618

**3**

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

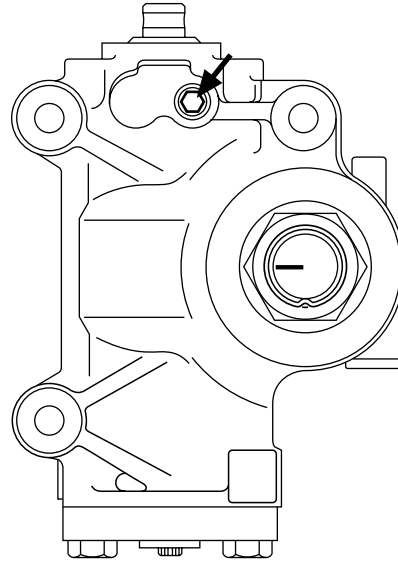
1. Remove the steering box.
2. Clean the pressure-limiting valve and the surrounding area.
3. Remove the pressure-limiting valve.

##### 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

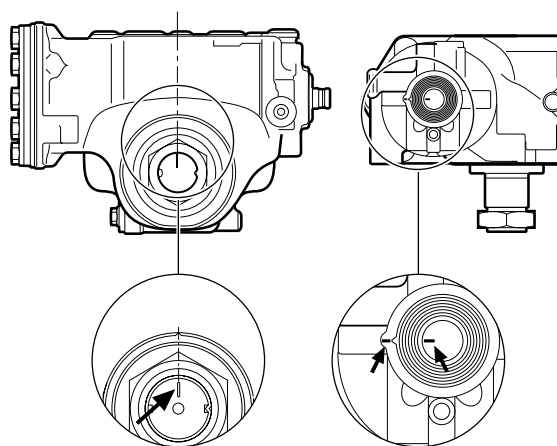
## 4.5 REMOVAL AND INSTALLATION OF PISTON

**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.



S7 00 623

3

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.

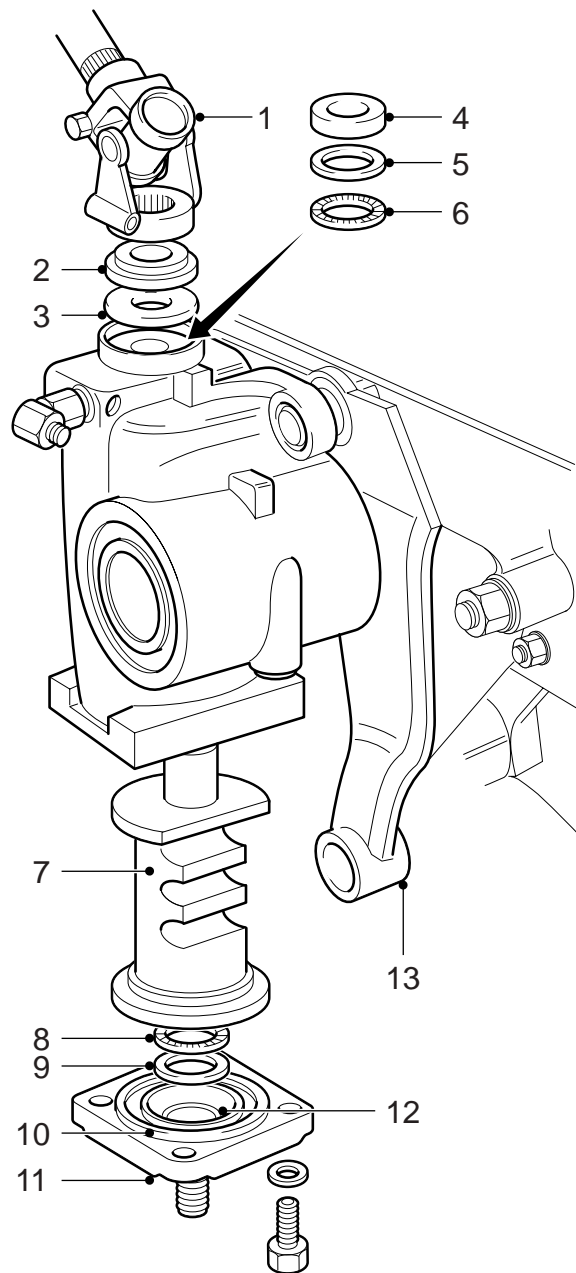


**If the steering wheel is rotated more than 3 turns to the left or right from the central position, this will damage the airbag contact unit.**

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.

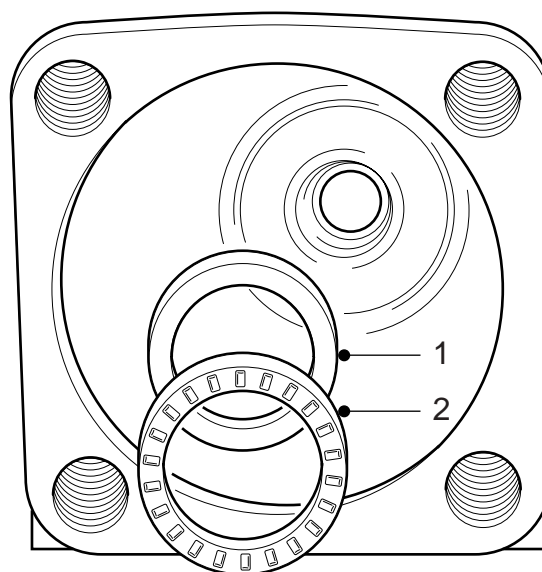
**Note:**

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.



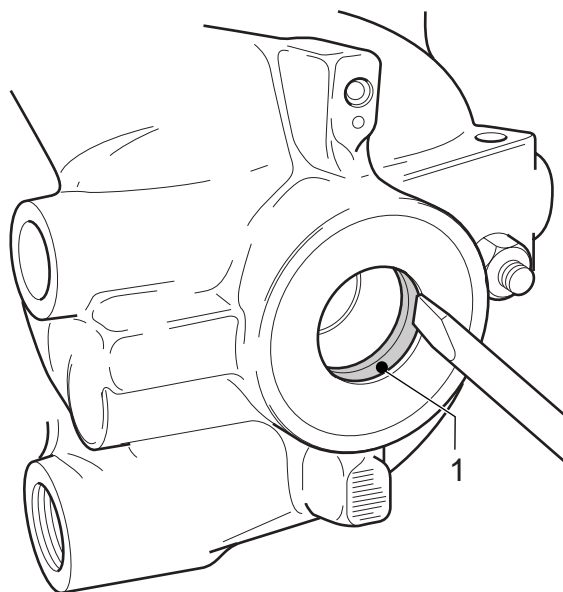
S7 00 837

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.

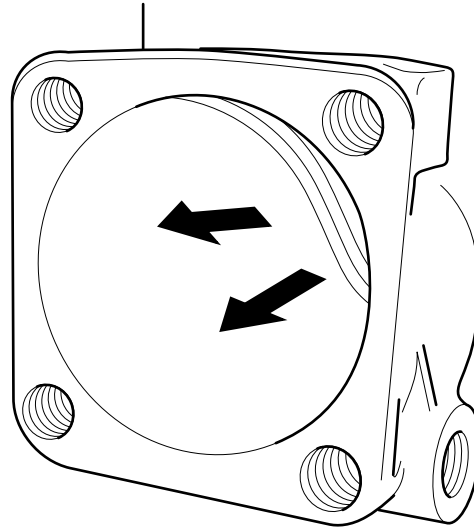


S7 00 864

**Checking piston and steering box****Note:**

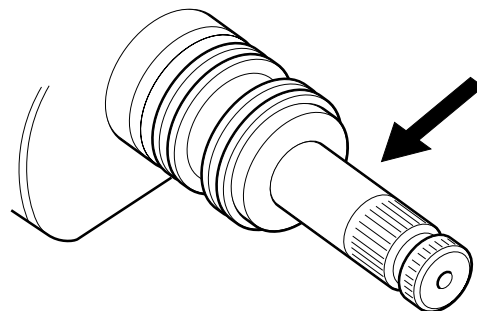
If steering box components are damaged or worn, replace the steering box assembly or have the steering box overhauled in a specialist workshop.

1. Inspect the inside of the steering box for wear and damage.



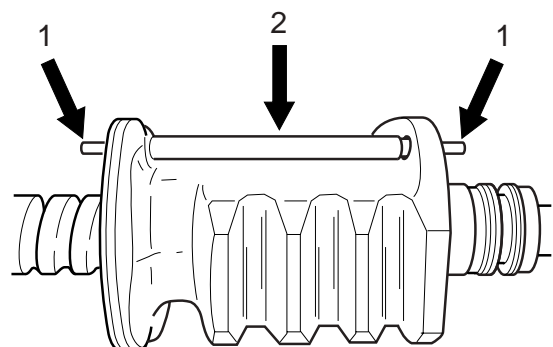
S7 00 865

2. Check the running surface of the oil seal on the input shaft.



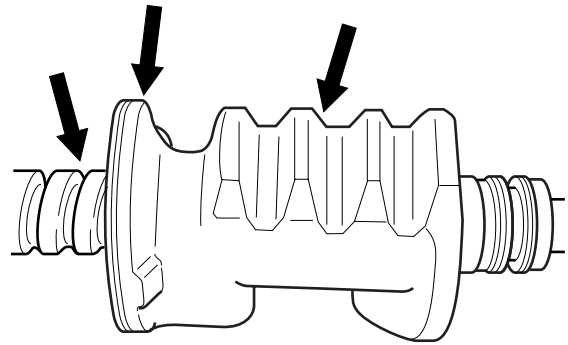
S7 00 866

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

4. Inspect the worm shaft raceway, the piston running surface and the toothing.

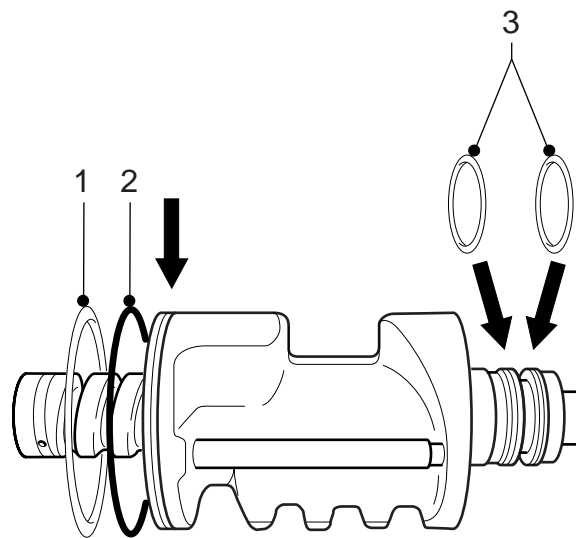


S7 00 868

## 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).

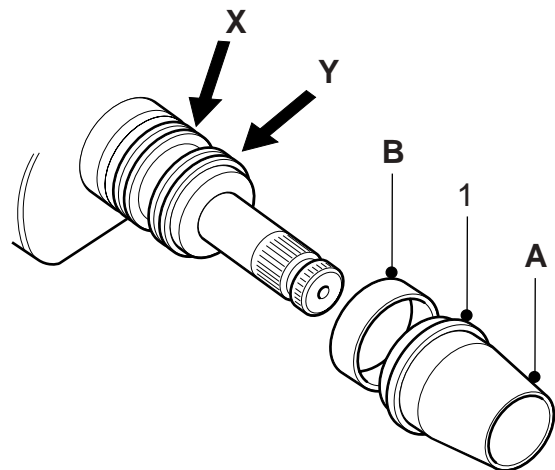


S7 00 869

#### Note:

If the sealing rings (3) need to be replaced, follow the procedure below:

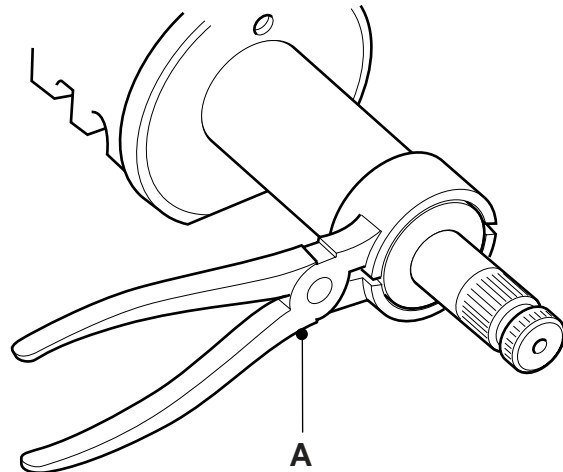
- Slide both parts (A and B) of the assembly sleeve, special tool (DAF no. 0485243) for a 8090 steering box and special tool (DAF no. 0192507) for a 8095/8098 steering box, over the worm shaft and grease them sparingly.
- First slide the sealing ring (1) over the assembly sleeve into groove X and then slide the other sealing ring into groove Y.



S7 00 870



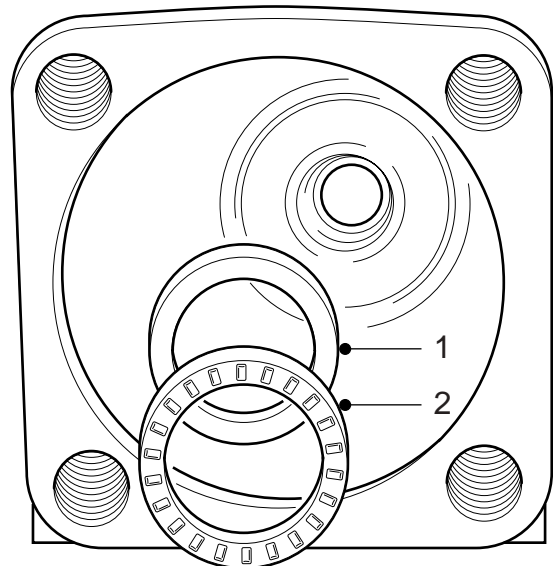
- The sealing rings become stretched out while they are being fitted. The sealing rings must be compressed using the pliers A, special tool (DAF no. 0485245) for a 8090 steering box and special tool (DAF no. 0192508) for a 8095/8098 steering box.



S7 00 871

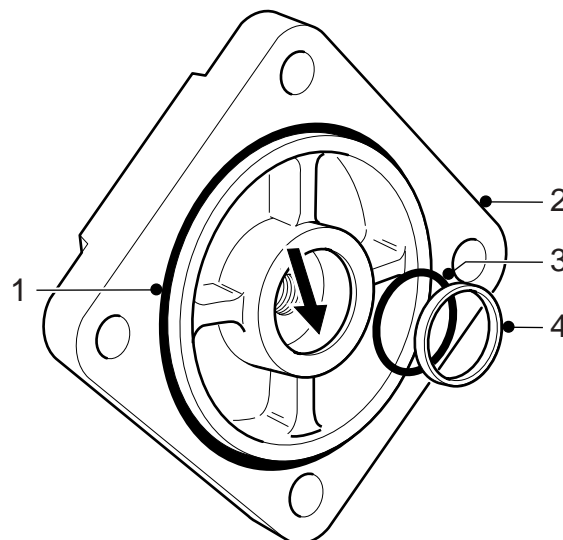
3

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.



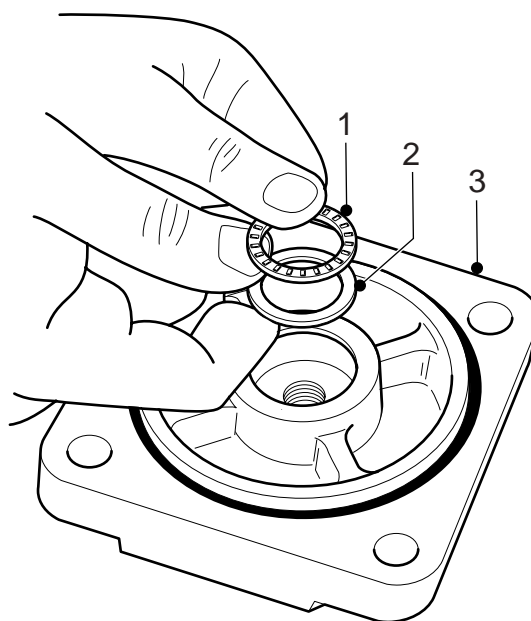
S7 00 873

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.

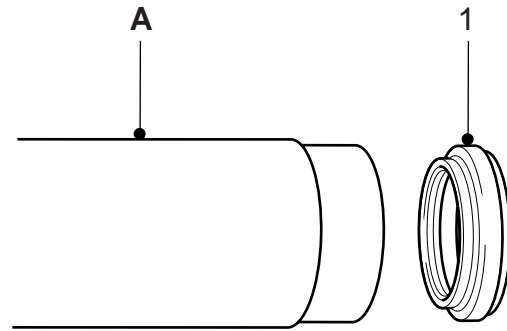
**Note:**

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.



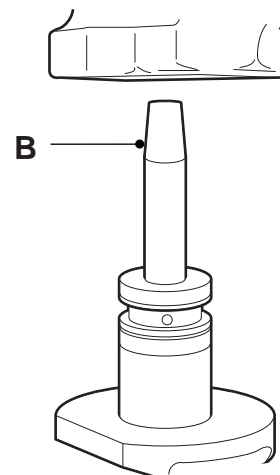
S7 00 874

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.



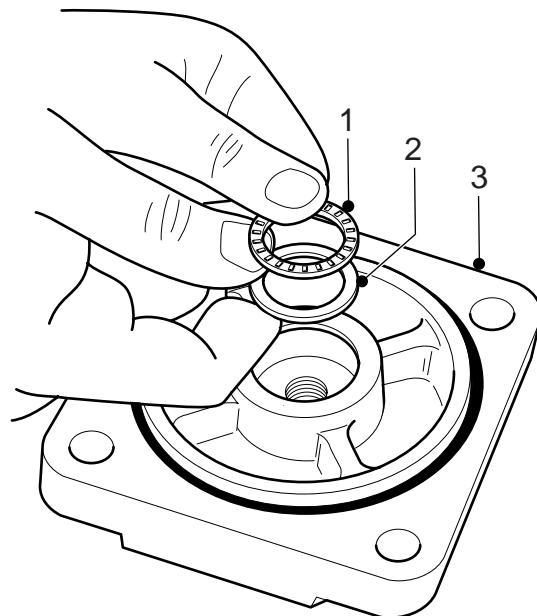
S7 00 872

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.



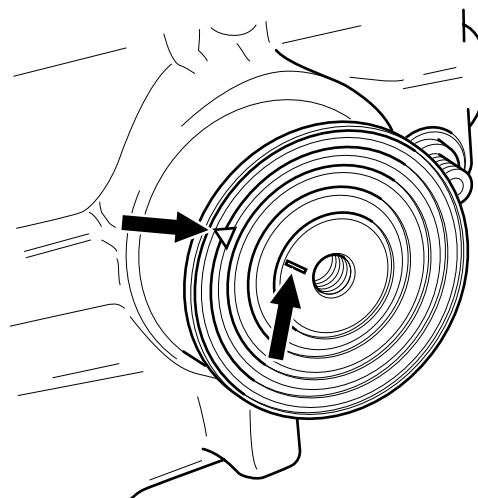
S7 00 892

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.



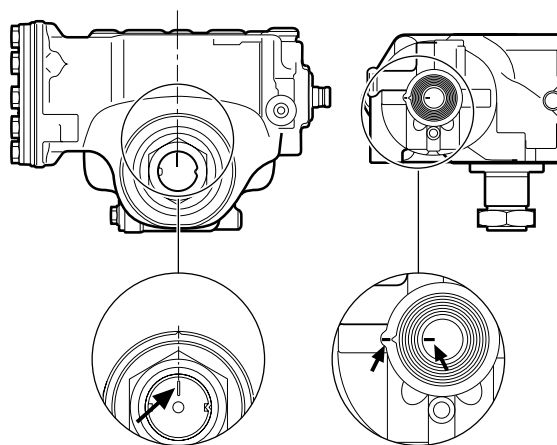
S7 00 874

- 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.



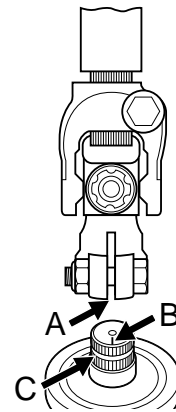
S7 00 623

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



**CONTENTS**

	<b>Page</b>	<b>Date</b>
<b>1. INSPECTION AND ADJUSTMENT</b> .....	1-1	200322
1.1 Checking flow-control valve, version without steered trailing swivel axle ..	1-1	200322
1.2 Checking flow-control valve, version with steered trailing swivel axle .....	1-3	200322
<b>2. REMOVAL AND INSTALLATION</b> .....	2-1	200322
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

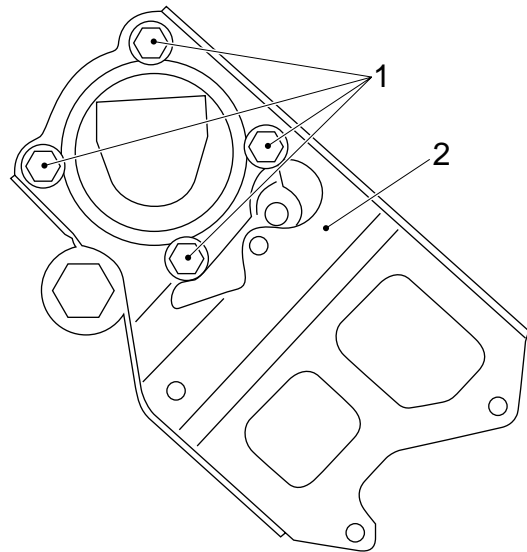




## 1. INSPECTION AND ADJUSTMENT

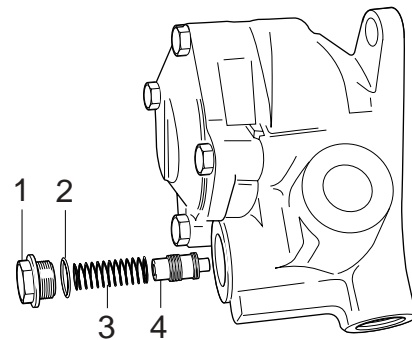
### 1.1 CHECKING FLOW-CONTROL VALVE, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

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).



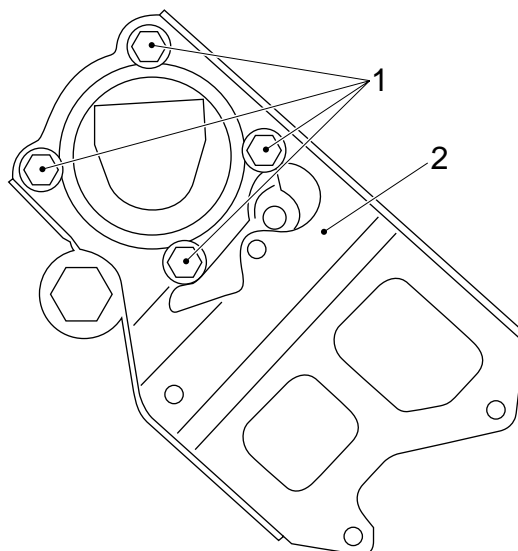
S7 00 609

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

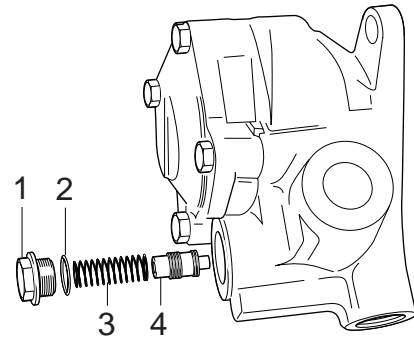
13. Attach the bracket (2) to the pump. Tighten the attachment bolts (1) evenly to the specified torque, see "Technical data".
14. Fit the reservoir to the pump.
15. Fit the pump to the engine.
16. Fill and bleed the steering gear hydraulic system.
17. Take a test drive and check the plug and pump cover 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.



S7 00 613



## 2. REMOVAL AND INSTALLATION

### 2.1 REMOVING AND INSTALLING STEERING PUMP, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

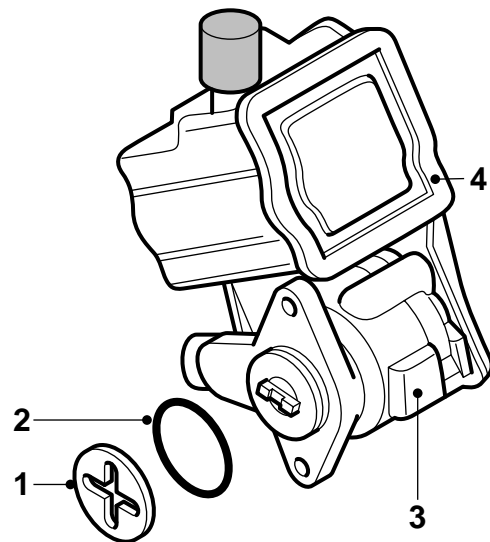
#### Removing steering pump, version without steered trailing swivel axle

**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.

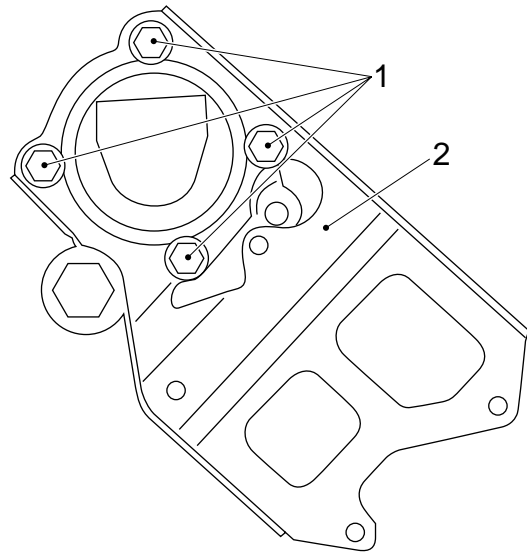
1. Clean the pipe connections.
2. Place a receptacle under the steering pump.
3. Take the pipes off the steering pump and plug the pipe and pump openings. The filter is fitted in the return pipe, which means that if any dirt enters, it will immediately get into the system.
4. Remove the electronic unit 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).



S7 00 575

### 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".



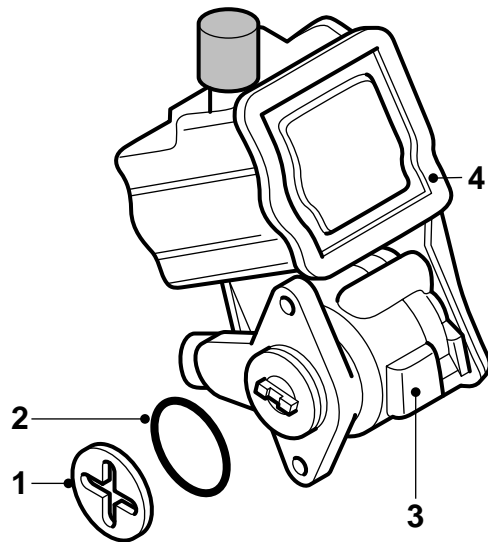
S7 00 609

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

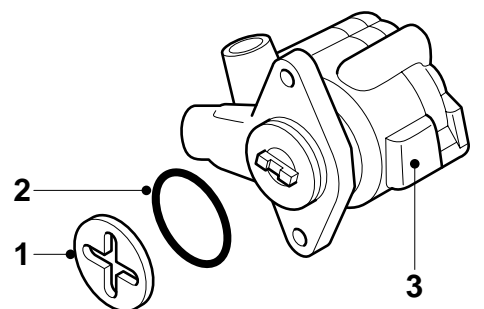
### Removing steering pump, version with steered trailing swivel axle

#### 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.



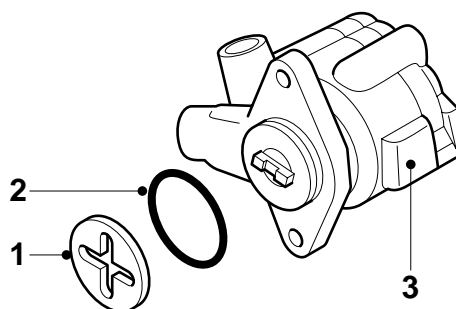
S7 00 834

### 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

4

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.



**CONTENTS**

	Page	Date
<b>1. GENERAL</b> .....	1-1	200322
1.1 Pipes, version without steered trailing swivel axle .....	1-1	200322
1.2 Pipes, version with steered trailing swivel axle .....	1-2	200322
1.3 Operation of reservoir, version without steered trailing swivel axle .....	1-3	200322
1.4 Operation of reservoir, version with steered trailing swivel axle .....	1-4	200322
<b>2. INSPECTION AND ADJUSTMENT</b> .....	2-1	200322
2.1 Checking steering oil level .....	2-1	200322
2.2 Checking pipes .....	2-2	200322
<b>3. REMOVAL AND INSTALLATION</b> .....	3-1	200322
3.1 Removing and installing reservoir, version without steered trailing swivel axle .....	3-1	200322
3.2 Removing and installing reservoir, version with steered trailing swivel axle .....	3-2	200322
3.3 Removing and installing reservoir filter element, version with steered trailing swivel axle .....	3-3	200322
3.4 Removal and installation, pipes .....	3-4	200322



## 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.



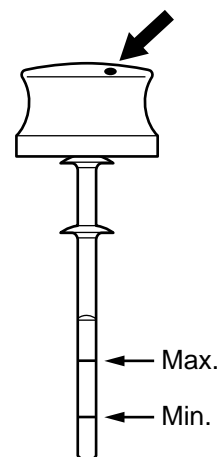
**When working on the steering gear, prevent dirt from entering the reservoir and the pipes. When the steering oil is drawn in it is unfiltered, freely allowing dirt to enter the steering gear.**

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.



S7 00 051

## 1.4 OPERATION OF RESERVOIR, VERSION WITH STEERED TRAILING SWIVEL AXLE

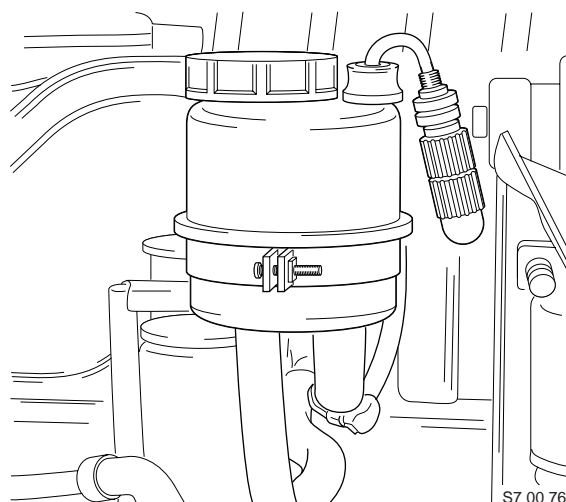
### General

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.

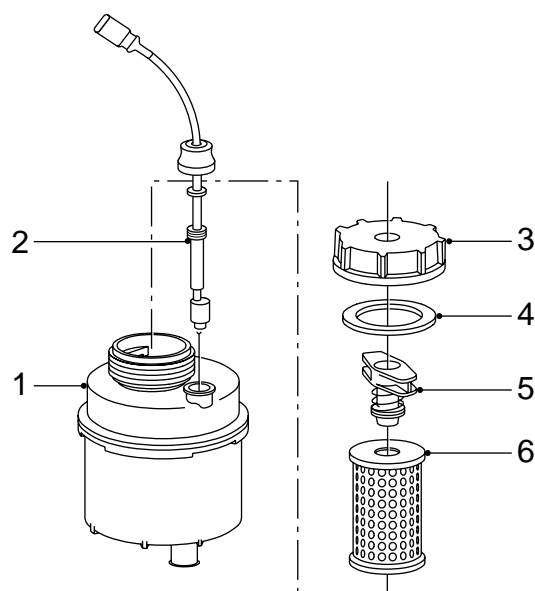


**When working on the steering gear, prevent dirt from entering the reservoir and the pipes. When the steering oil is drawn in it is unfiltered, freely allowing dirt to enter the steering gear.**



5

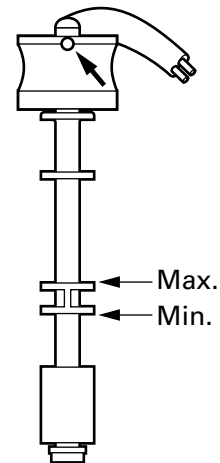
The filter element (6) is kept in place by the filter holder (5). If the resistance in the filter is too great (e.g. because the oil is cold or the filter is dirty), the filter element is partially pushed off its seat. This causes some of the steering oil to pass along the underside of the filter element 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.



S7 00 199





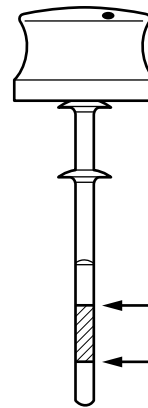
## 2. INSPECTION AND ADJUSTMENT

### 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

## 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

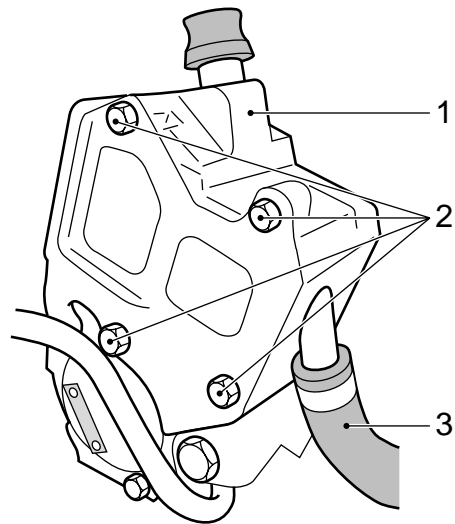
#### 3.1 REMOVING AND INSTALLING RESERVOIR, VERSION WITHOUT STEERED TRAILING SWIVEL AXLE

##### 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.



S7 00 608

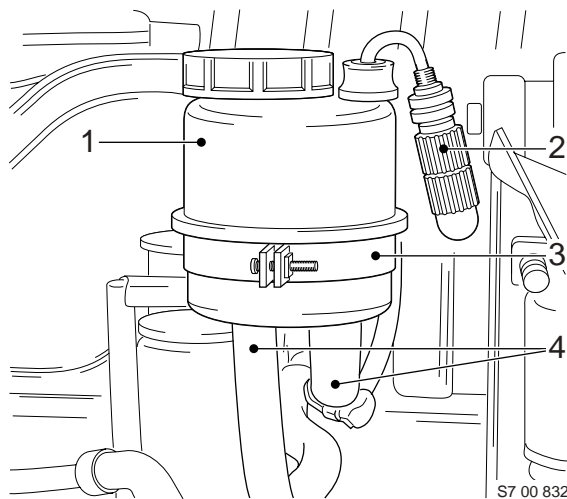
### 3.2 REMOVING AND INSTALLING RESERVOIR, VERSION WITH STEERED TRAILING SWIVEL AXLE

#### 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.



### 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).

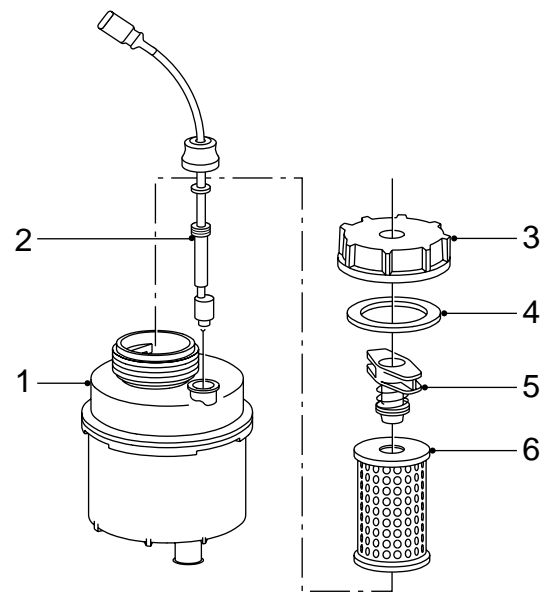
**Note:**

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.

## CONTENTS

	Page	Date
<b>1. GENERAL</b> .....	1-1	200322
1.1 Overview drawing of wheel hub .....	1-1	200322
1.2 Overview drawing of swivel axle .....	1-2	200322
1.3 Description of the wheel settings .....	1-3	200322
<b>2. INSPECTION AND ADJUSTMENT</b> .....	2-1	200322
2.1 Inspection and adjustment of swivel axle play .....	2-1	200322
2.2 Inspection and adjustment of wheel bearing play .....	2-3	200322
2.3 Checking the caster .....	2-5	200322
2.4 Checking camber angle .....	2-6	200322
2.5 Inspection and adjustment of toe .....	2-7	200322
2.6 Checking wheel deflection .....	2-9	200322
2.7 Inspection and adjustment of steering rod .....	2-10	200322
2.8 Checking steering ball joint .....	2-12	200322
2.9 Checking front axle housing .....	2-14	200322
2.10 Checking wheel rim .....	2-16	200322
2.11 Checking the hub, axle journal and wheel bearings .....	2-17	200322
2.12 Checking wheel-speed sensor ring .....	2-18	200322
<b>3. REMOVAL AND INSTALLATION</b> .....	3-1	200322
3.1 Removal and installation of wheel .....	3-1	200322
3.2 Removal and installation of steering rod .....	3-4	200322
3.3 Removal and installation of track rod .....	3-5	200322
3.4 Removal and installation of steering-rod arm .....	3-6	200322
3.5 Removal and installation of track-rod arm .....	3-7	200322
3.6 Removal and installation of hub .....	3-9	200322
3.7 Removal and installation of wheel bearings .....	3-11	200322
3.8 Removal and installation of hub oil seal .....	3-12	200322
3.9 Removal and installation of wheel-speed sensor .....	3-13	200322
3.10 Removal and installation of thrust bearing .....	3-14	200322
3.11 Removal and installation of swivel axle .....	3-15	200322
3.12 Removal and installation of bearing bushes, F36 front axle .....	3-18	200322
3.13 Removal and installation of bearing bush/needle bearing, F48 front axle .....	3-19	200322

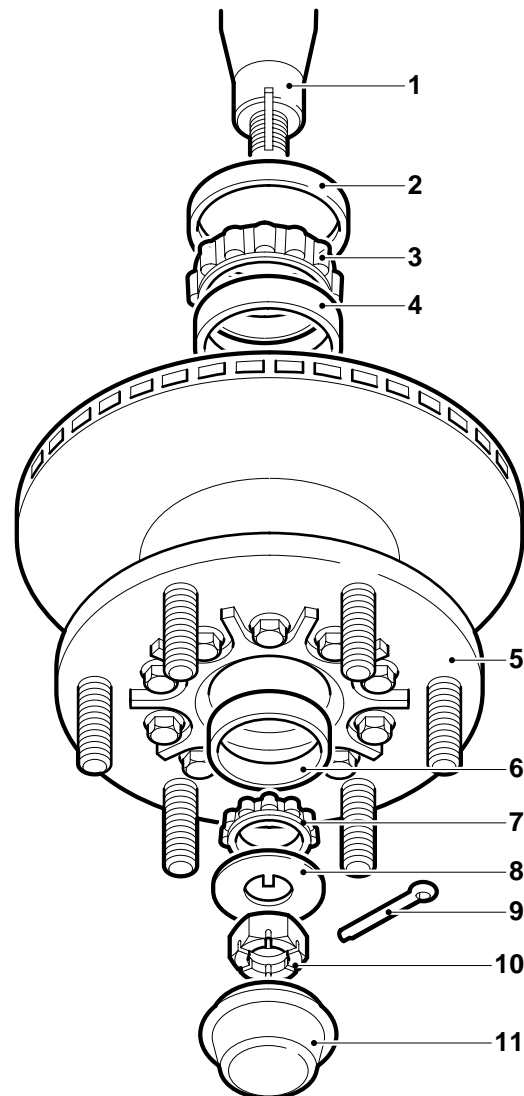




## 1. GENERAL

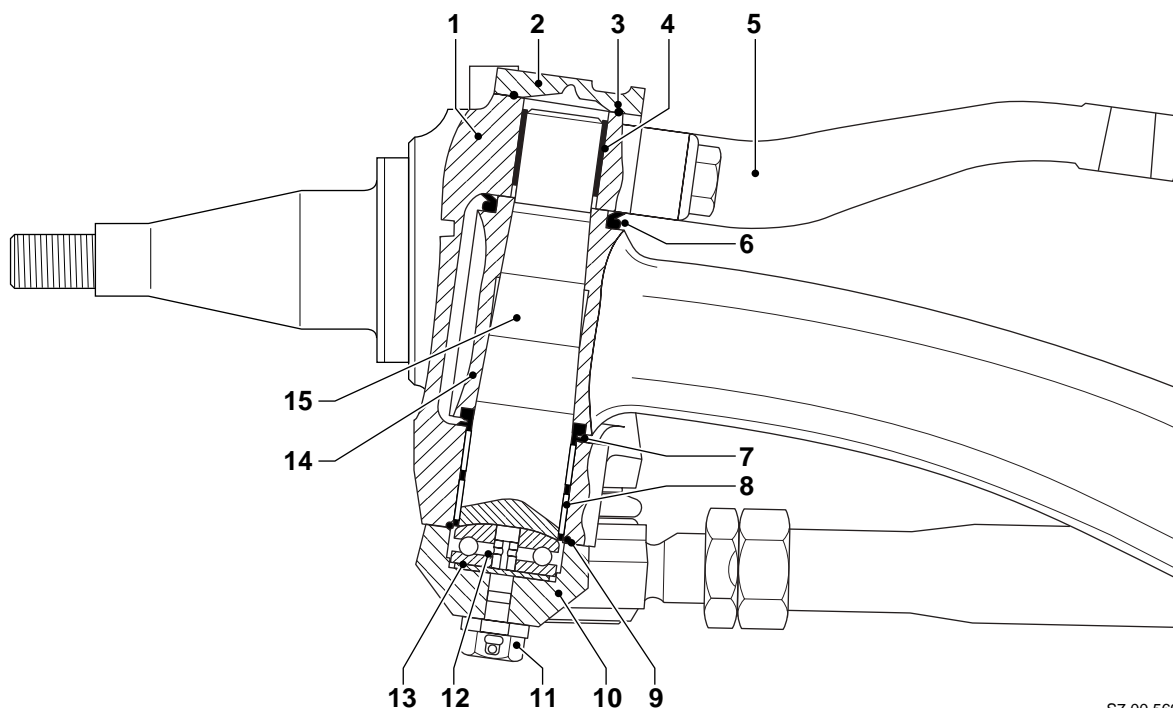
### 1.1 OVERVIEW DRAWING OF WHEEL HUB

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

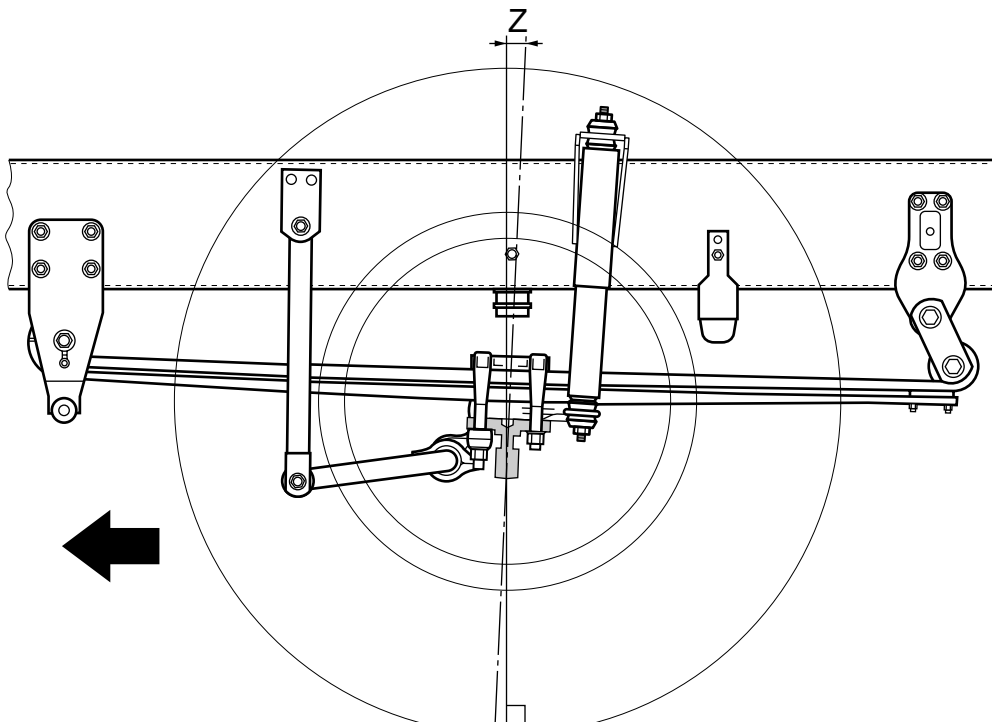


S7 00 569

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.

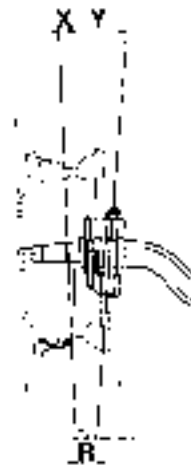
**Camber angle and king-pin inclination**

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.

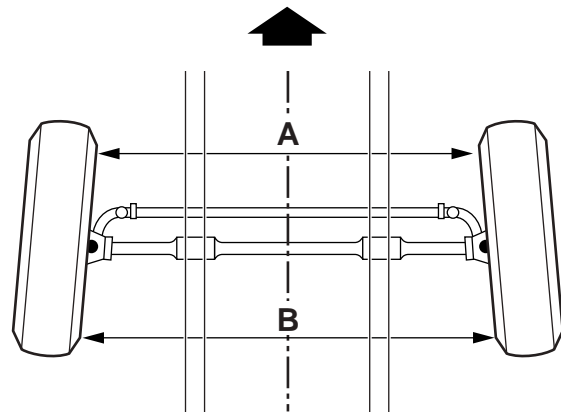
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

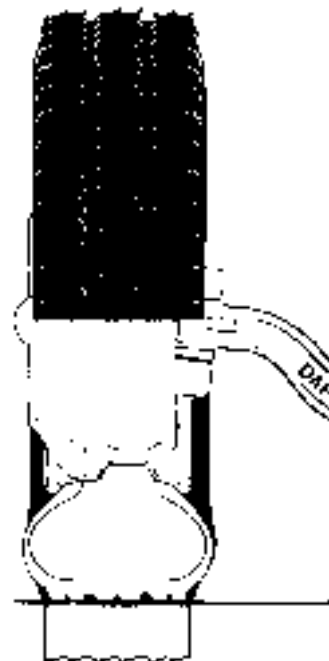
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.

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



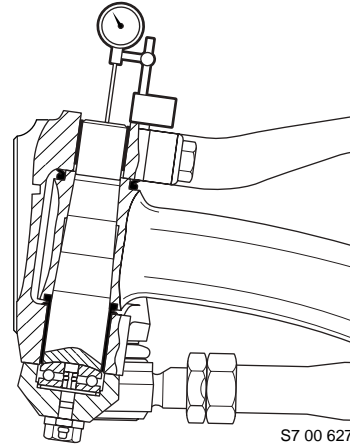
S7 00 126

## 2. INSPECTION AND ADJUSTMENT

### 2.1 INSPECTION AND ADJUSTMENT OF SWIVEL AXLE PLAY

#### Checking swivel axle play

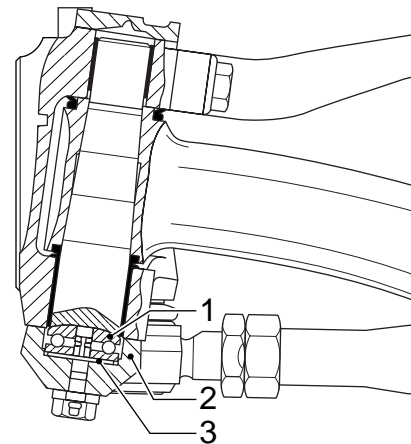
1. Take the top cover off the swivel axle.
2. Fit the dial gauge to the swivel axle with the stylus on the king pin.
3. Load and unload the swivel axle. Measure swivel axle play when loaded and unloaded. Compare the reading with the permissible play, see "Technical data".



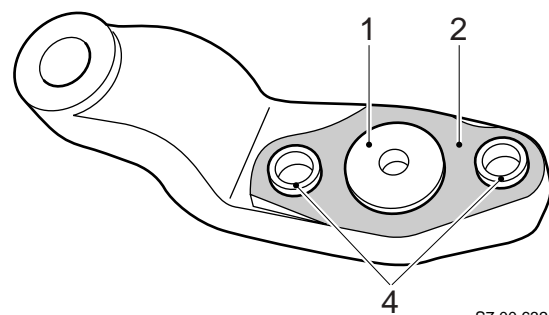
S7 00 627

#### 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".



S7 00 629



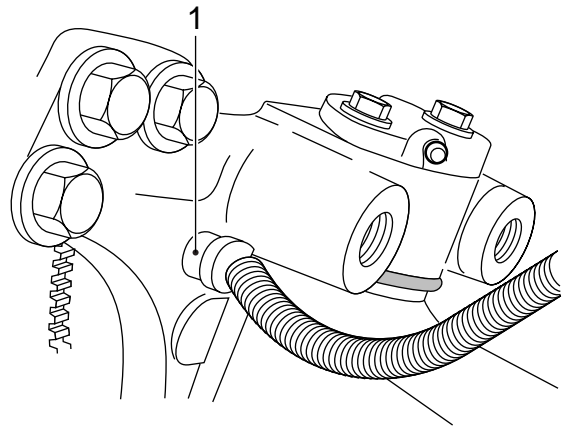
S7 00 632

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

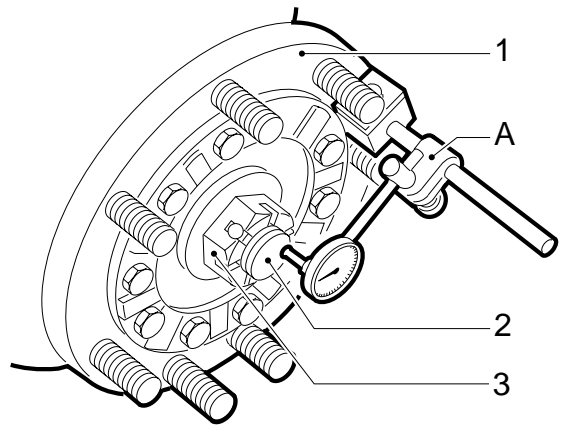
### Checking wheel bearing play

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

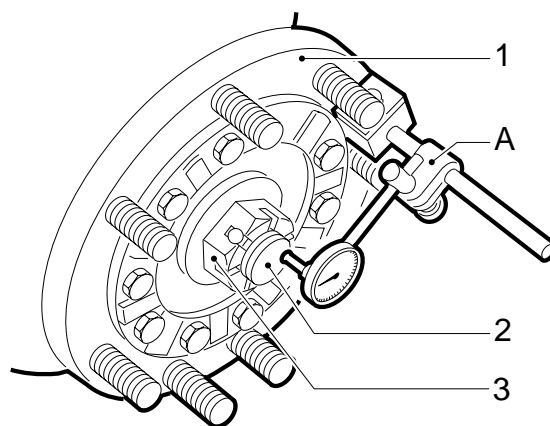
6. Fit a dial gauge (A) to the wheel hub (1) with the stylus on the end of the axle end (2).
7. Push and pull the wheel hub (1). Check the wheel bearing play and compare it to the specified value, see "Technical data".
8. Fit the hub cap.
9. Fit the brake calliper.
10. Set the brake pad clearance.
11. 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

**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



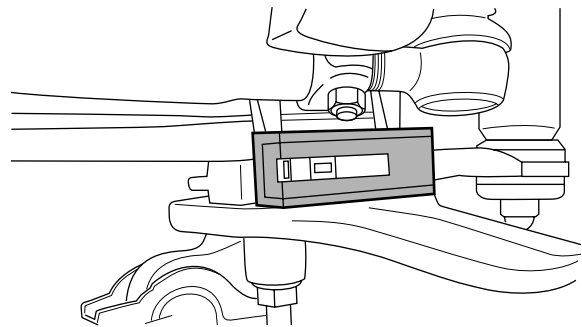
## 2.3 CHECKING THE CASTER

### 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

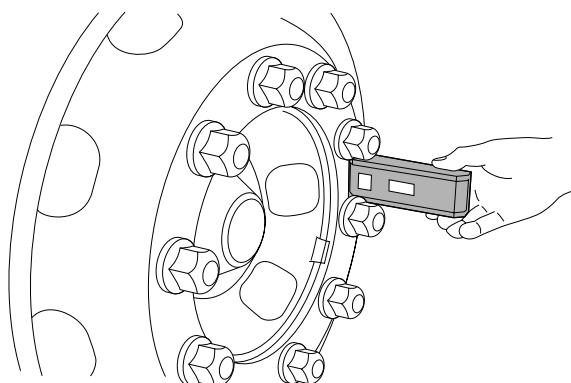
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See "Technical data" for the correct angle.

### 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.

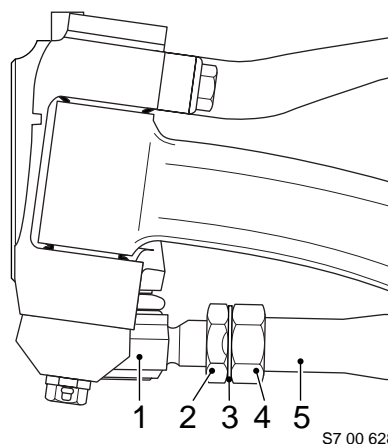
**Adjusting toe**

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



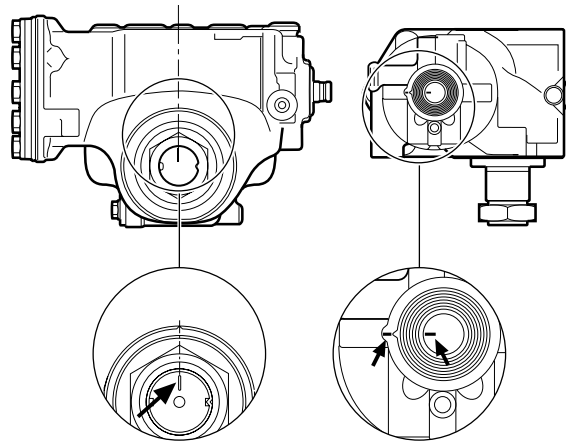
**Work safely and block the vehicle so that it cannot slide off the turning plates.**

### 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

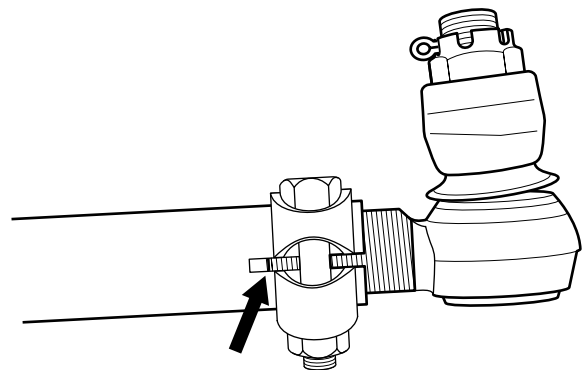
**Adjusting steering rod**

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.

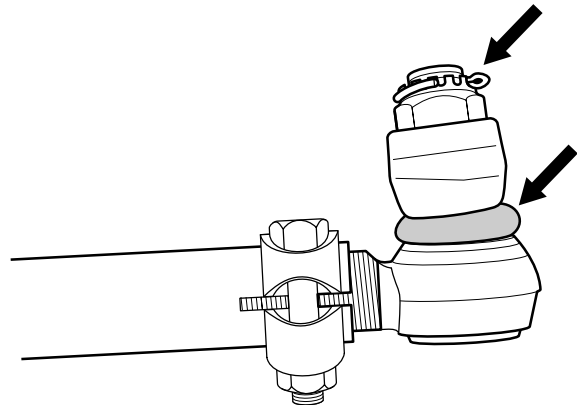


**If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.**

## 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.

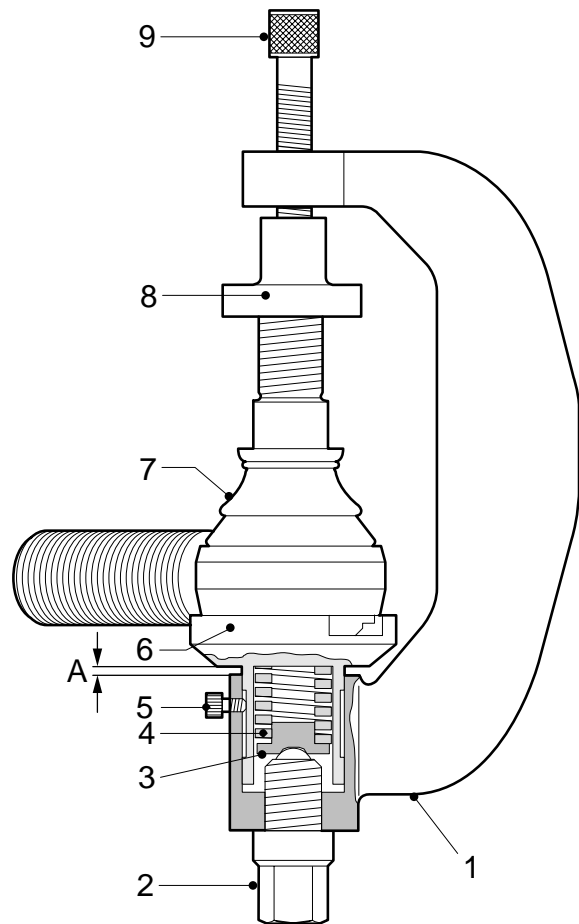


4. Screw the thrust washer (8) onto the threaded spindle.
5. Fit the spring retainer (3), spring (4) and thrust sleeve (6) in the bracket (1). Fit the locking screw (5). It should be possible to move the thrust sleeve (6) freely.

**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.



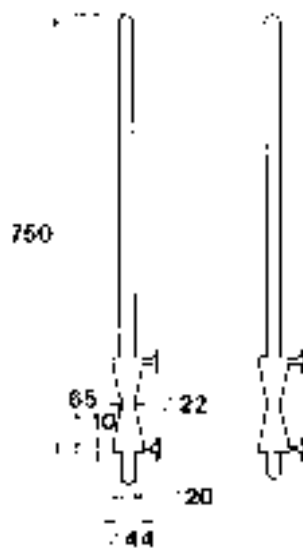
**2.9 CHECKING FRONT AXLE HOUSING**

**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.

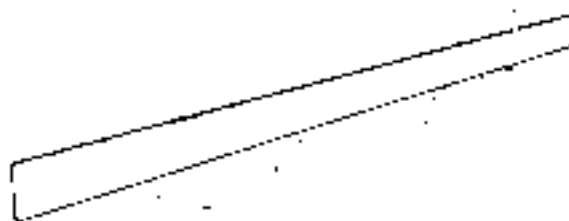
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

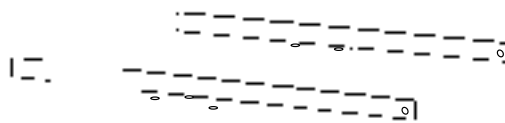
**Checking front axle housing**

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.



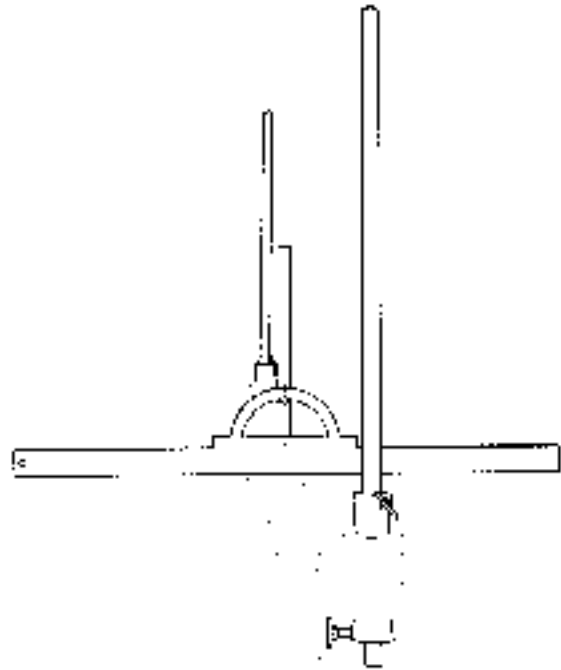
S7 00 151

3. Place a straight edge across both spring seats and check whether they are parallel with each other.



S7 00 152

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  $90^\circ$ .

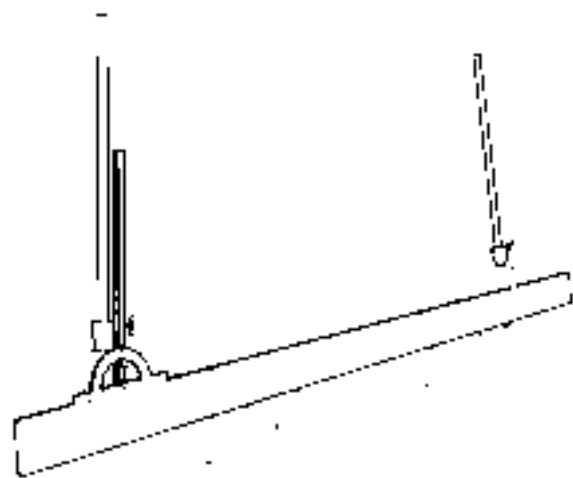


S7 00 149

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.

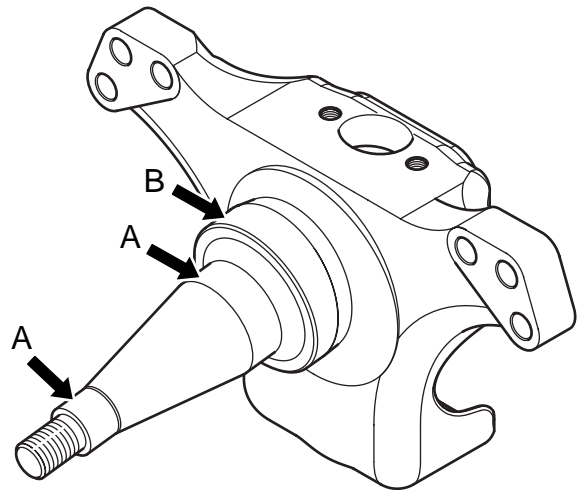
### Checking axle journal

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.



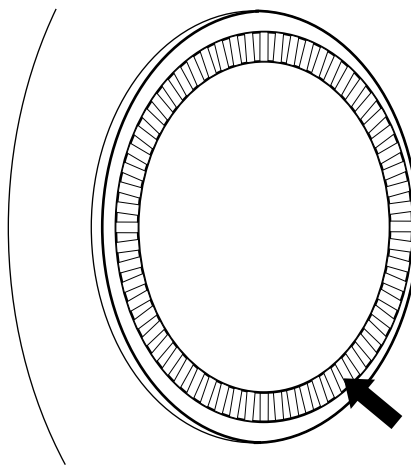
S7 00 625

## 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

**6**

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:

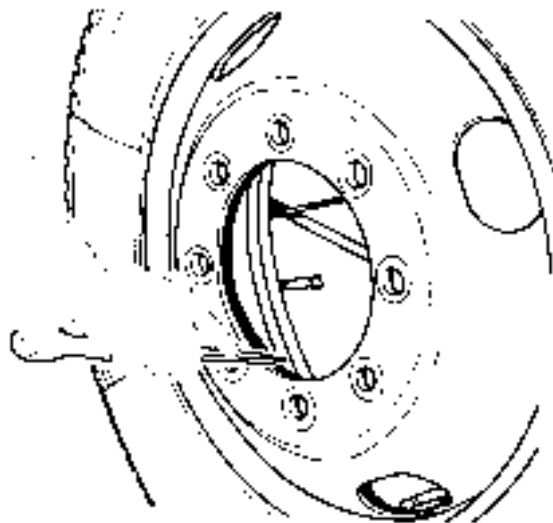
If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

##### 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.

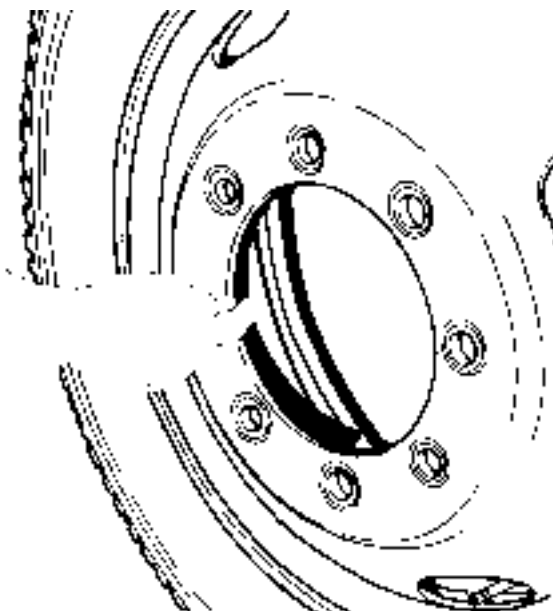
**Installing wheel**

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



S7 00 096

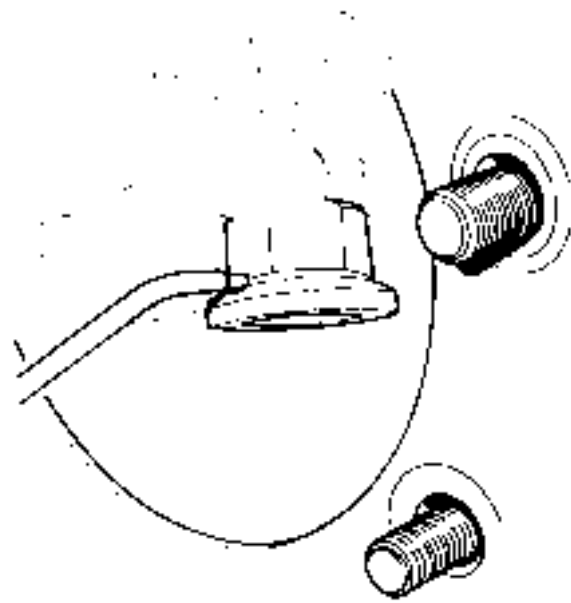
2. Apply a thin layer of grease to the fitting edge of the wheel hub.
3. Also apply a thin layer of grease to the fitting edge of the wheel rim. This layer of grease is to prevent the wheel rim and the wheel hub from becoming "rust-bound".
4. Check that the contact surfaces of the wheel rim and hub are clean. Clean these if necessary.



S7 00 097

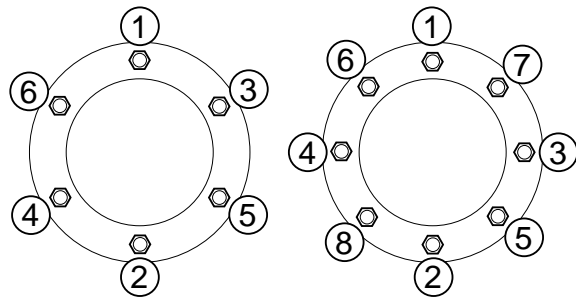


5. Clean the wheel nuts and then apply a drop of oil between the thrust washer and the nut.
6. Also apply a drop of oil to the first turn of the wheel-stud threads.



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".

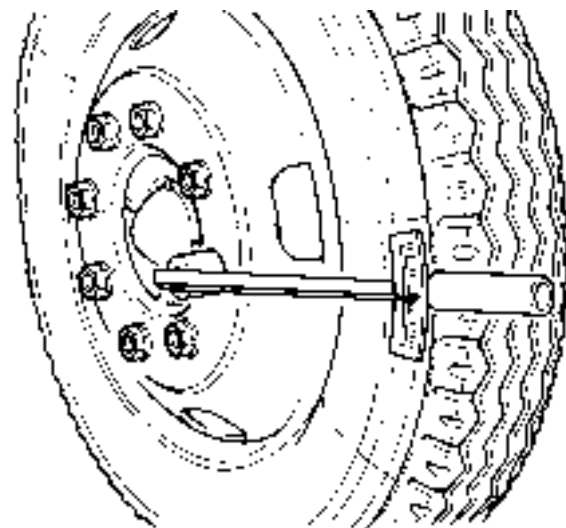


S7 00 631

**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 using a torque wrench after 100 km. If new wheel studs are fitted, they need additional retorquing after 500 km.



S7 00 099

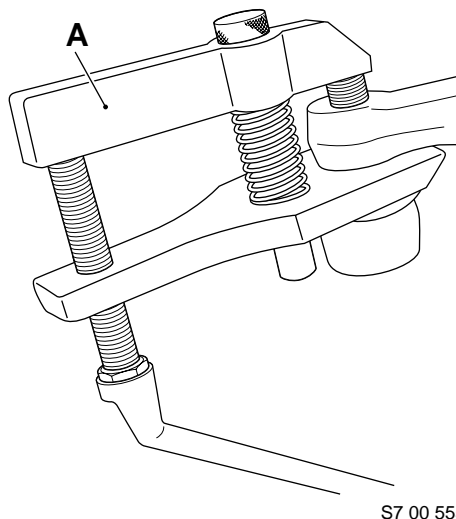
### 3.2 REMOVAL AND INSTALLATION OF STEERING ROD

#### Removing steering rod

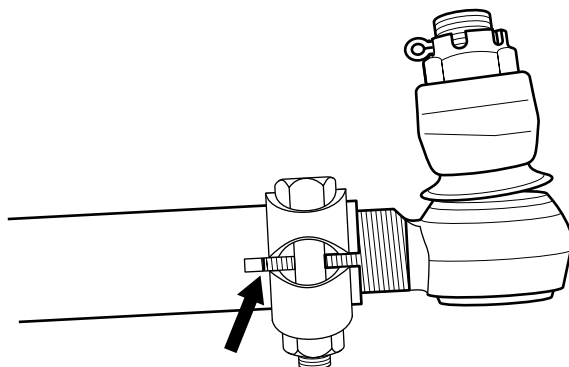
1. Remove the nuts at both ends of the steering rod.
2. Take the ball ends off the steering-rod arm and the pitman arm using a ball-end puller (A).

#### 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.



S7 00 555



S7 00 026

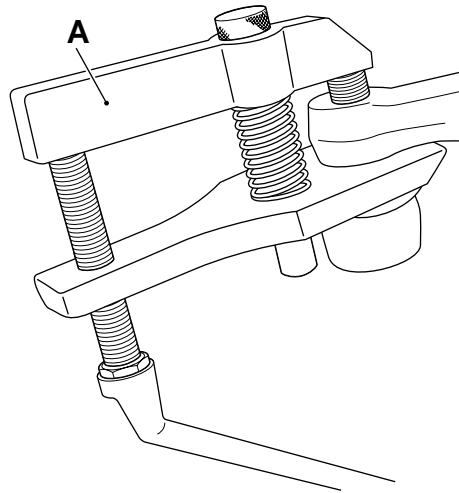
### 3.3 REMOVAL AND INSTALLATION OF TRACK ROD

#### Removing track rod

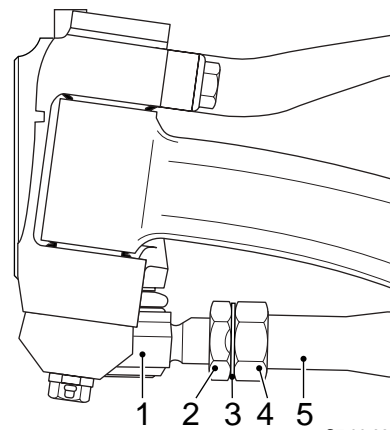
1. Remove the castle nuts.
2. Take the ball ends out of the track-rod arms using a ball-end puller (A).

#### 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". 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.



S7 00 555



S7 00 628

### 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).

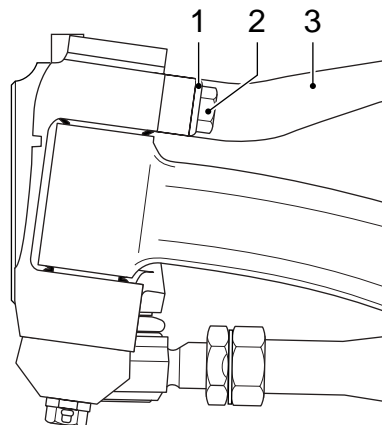
**Note:**

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



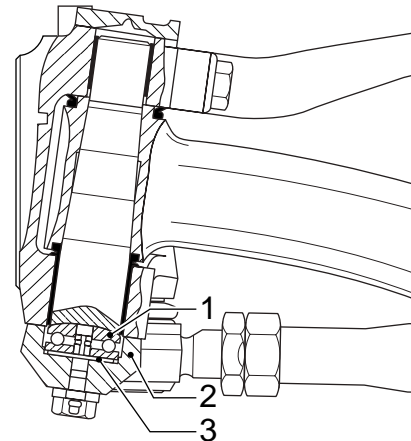
These instructions must be followed to the letter. The attachment of the track-rod arms is one of the most critical factors in terms of vehicle safety. Always use new attachment bolts when fitting the track-rod arm. Always use original attachment bolts of the prescribed length supplied by DAF.

#### 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).

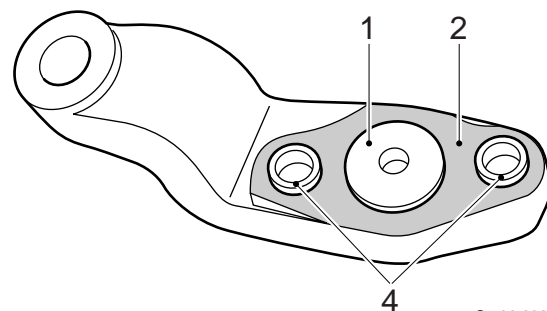


S7 00 629

4. Take the adjusting bushes (4) out of the bottom cover/track-rod arm (2).

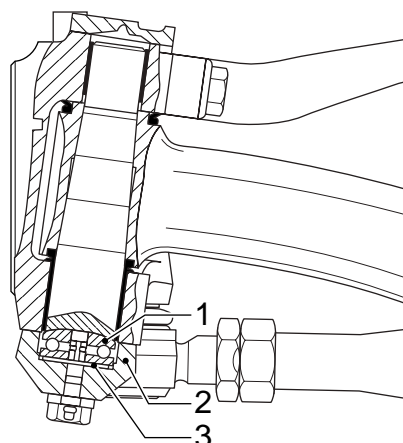
#### Installing track-rod arm

1. Fit the adjusting bushes (4) in the bottom cover/track-rod arm (2).



S7 00 632

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.

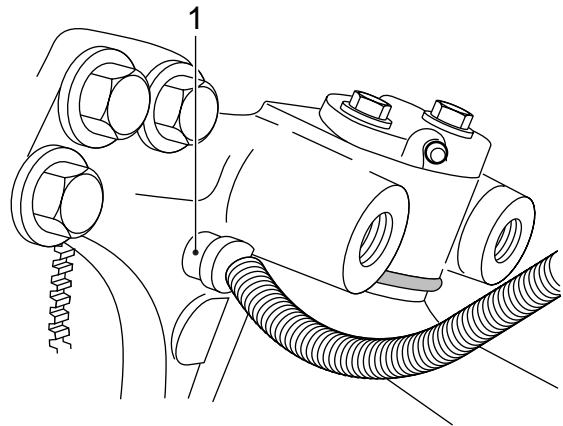


S7 00 629

### 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.

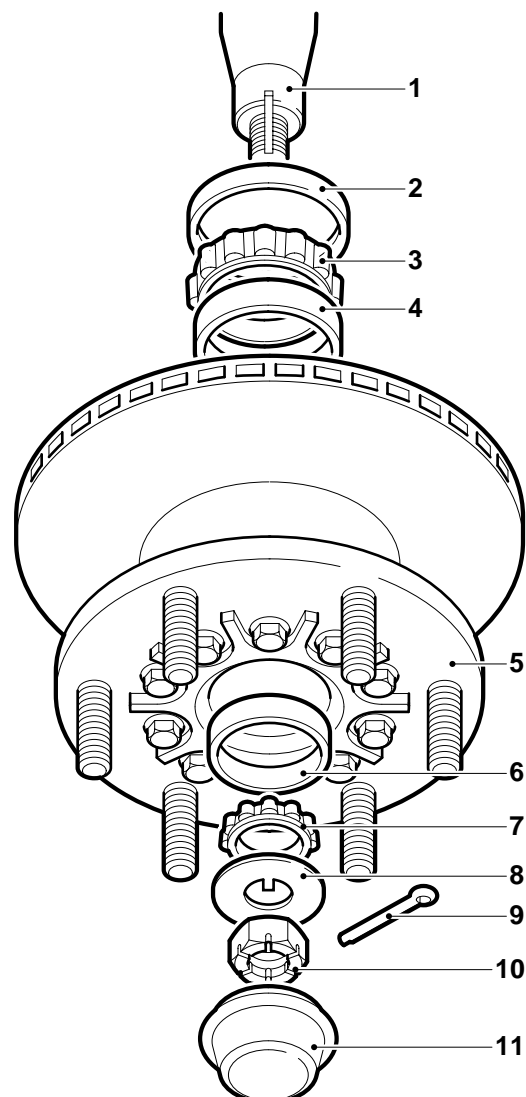


S7 00 589

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).

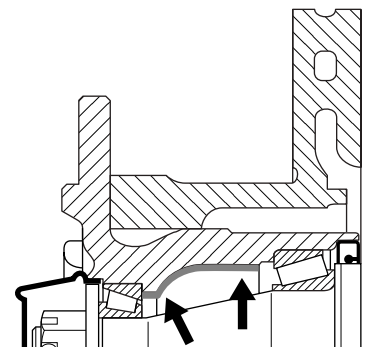
#### Installing hub

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).



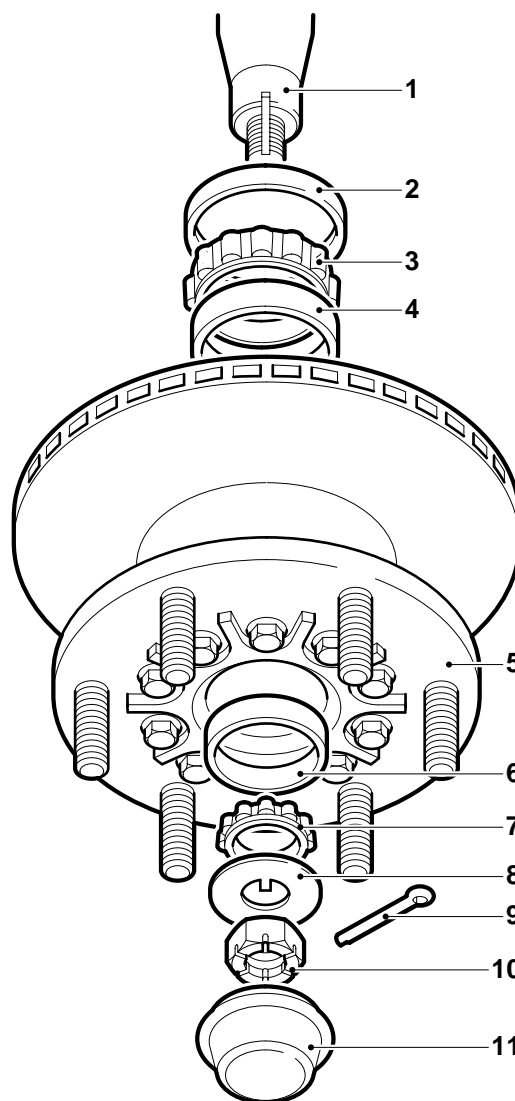
S7 00 573

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.



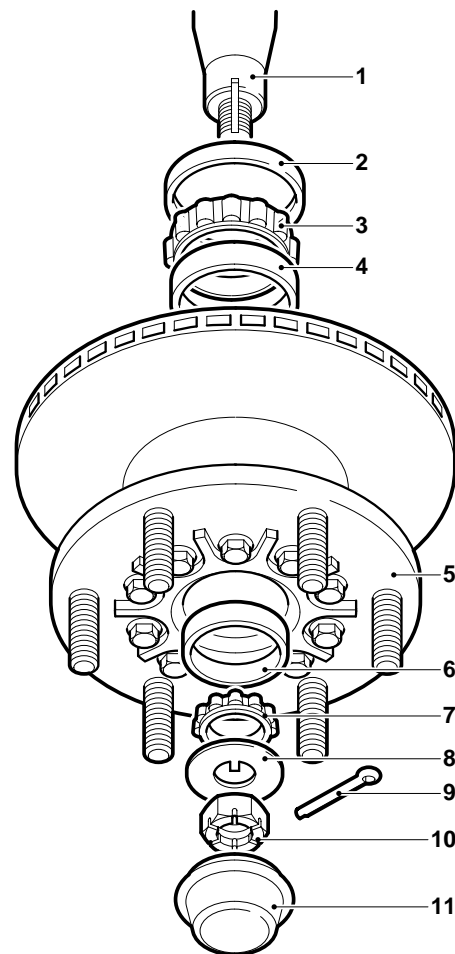
S7 00 573



### 3.7 REMOVAL AND INSTALLATION OF WHEEL BEARINGS

#### Removing wheel bearings

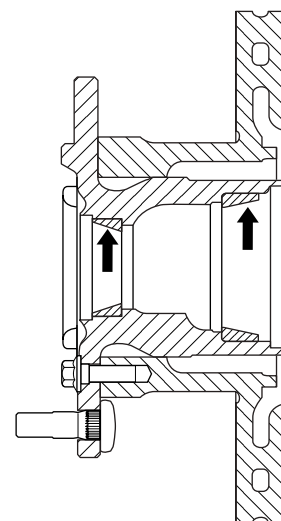
1. Take the hub (5) off the axle end (1).
2. Take the oil seal (2) out of the hub.
3. Take the wheel bearing ball races (4 and 6) out of the hub.



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

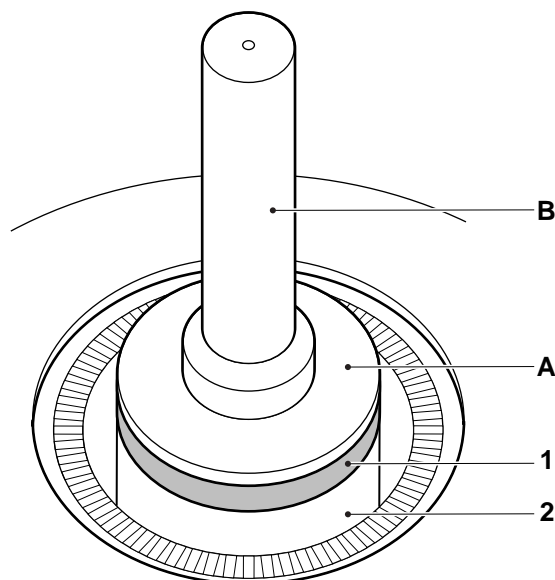
### 3.8 REMOVAL AND INSTALLATION OF HUB OIL SEAL

#### 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

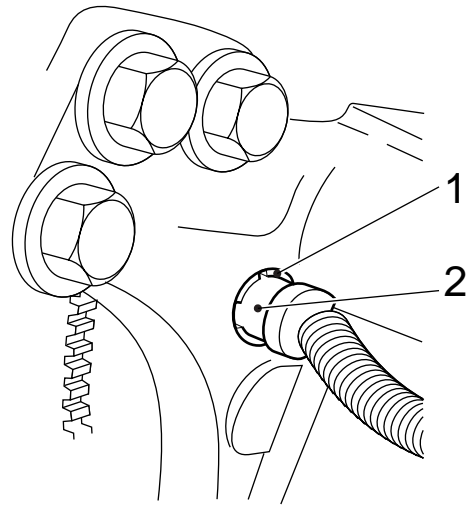
### 3.9 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

#### 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



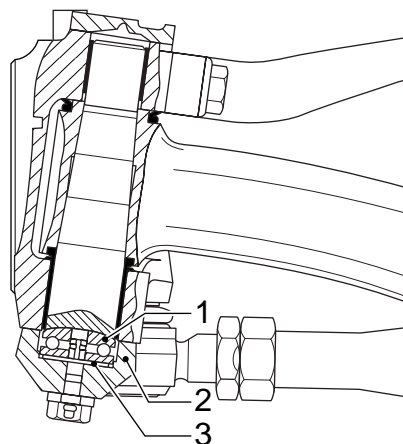
**Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.**

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**

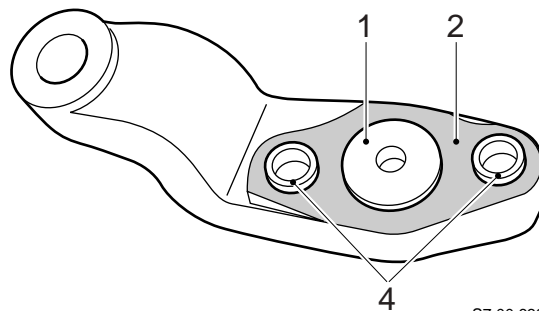
1. Take the bottom cover/track-rod arm (2) off the swivel axle.
2. Take the thrust bearing (1) and the adjusting ring (3) off the bottom cover/track-rod arm (2).
3. Take the O-ring off the bottom of the swivel axle.



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".

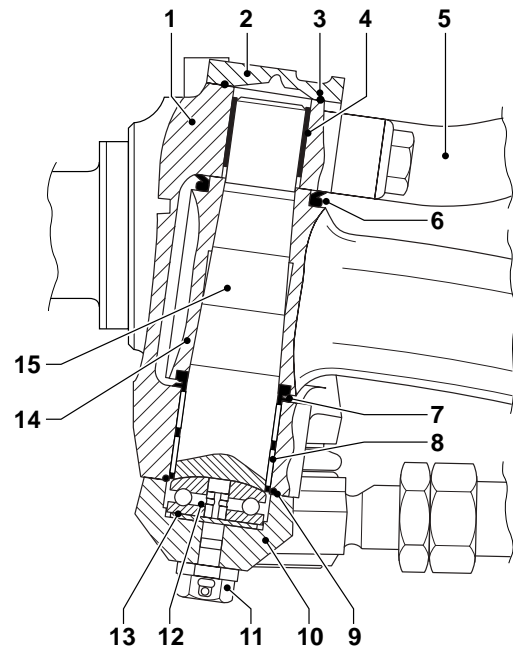


S7 00 632

### 3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE

#### Removing swivel axle

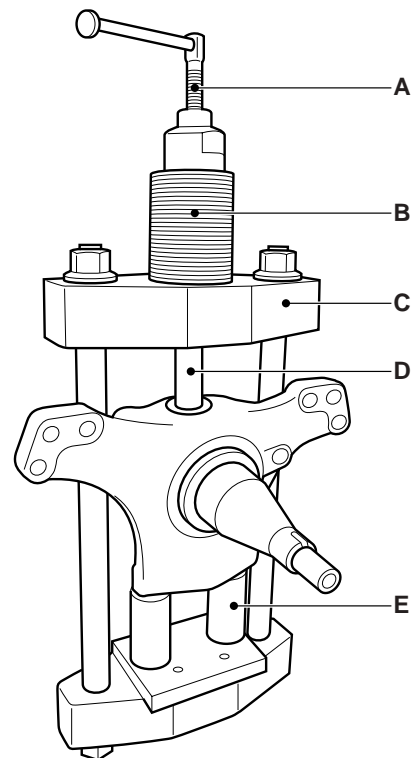
1. Remove the hub.
2. If applicable, take the steering rod out of the steering-rod arm (5).
3. Remove the top cover (2).
4. Remove the bottom cover (10). Take the two adjusting bushes out of the bottom cover.
5. Take the O-ring (9) out of the swivel axle (1).



S7 00 882

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.



S7 00 888

- 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.

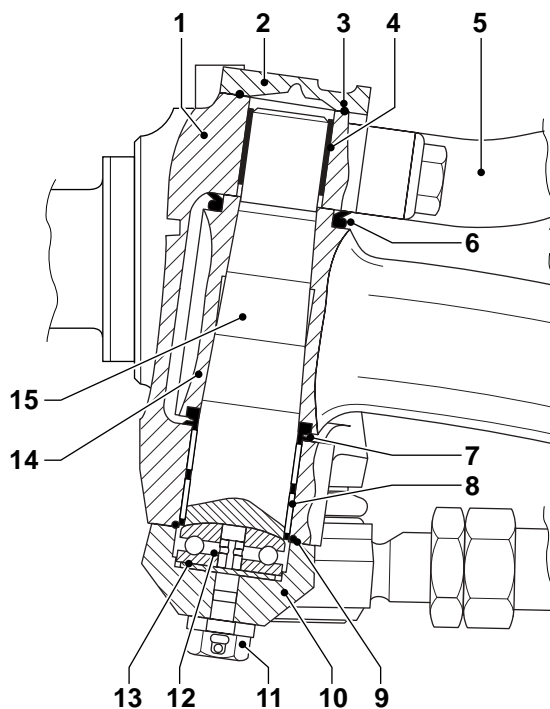
**Note:**

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).

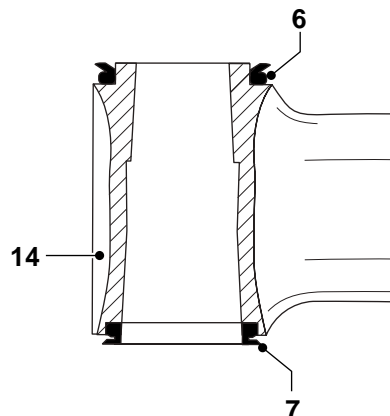
**Installing swivel axle**

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.



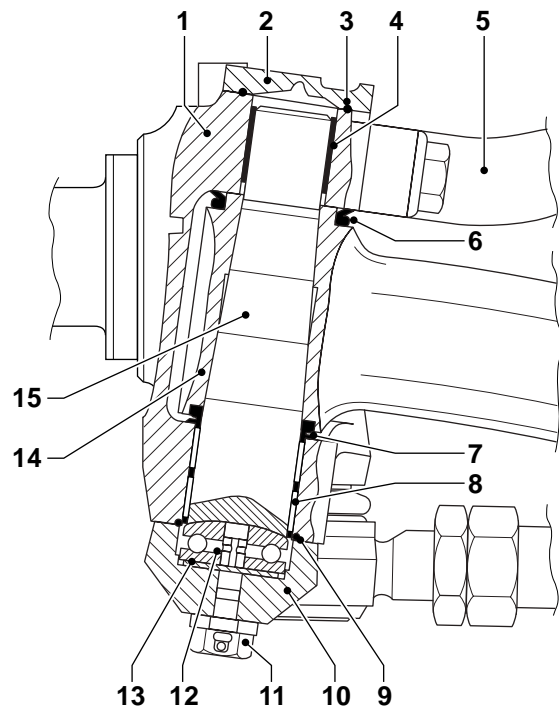
S7 00 882

6



S7 00 570

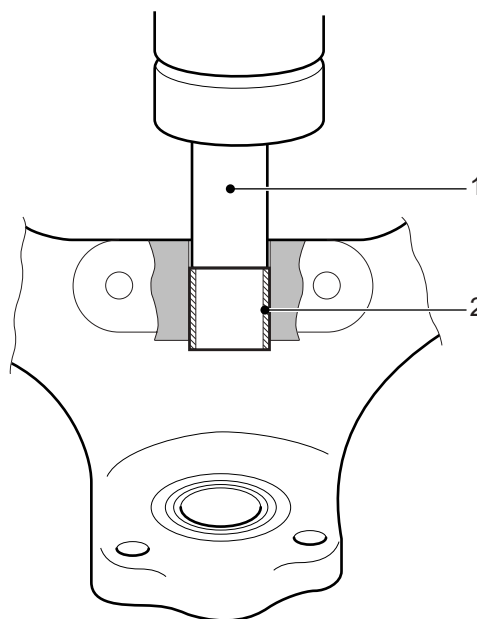
6. Apply grease to the bearing bushes/needle bearing (4 and 8).
7. Fit the swivel axle (1) to the axle end (14).
8. Fit the king pin (15)
9. Tap the king pin (15) gently with a copper punch to keep the axle end (14) in place.
10. Fit the adjusting bushes in the bottom cover.
11. Fit the thrust bearing (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.



S7 00 882

**3.12 REMOVAL AND INSTALLATION OF BEARING BUSHES, F36 FRONT AXLE****Removing bearing bushes, F36 front axle**

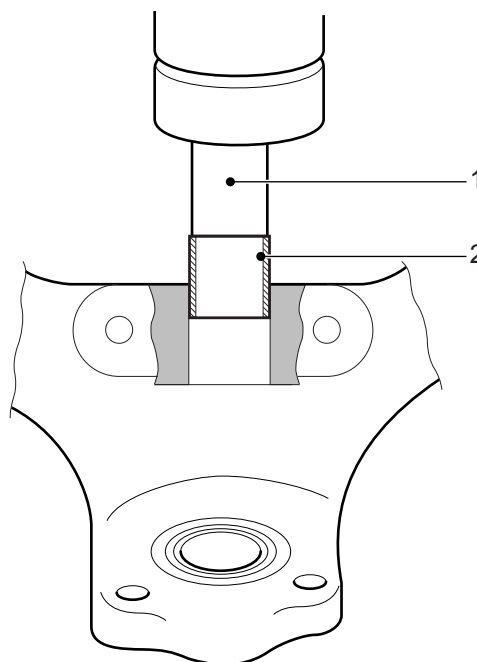
1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the top bearing bush facing upwards.
3. Fit the special tool (DAF no. 1453123C) (1) to the bearing bush (2) and force the bearing bush out of the swivel axle.
4. Turn the swivel axle around and fit 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.



S7 00 889

**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.



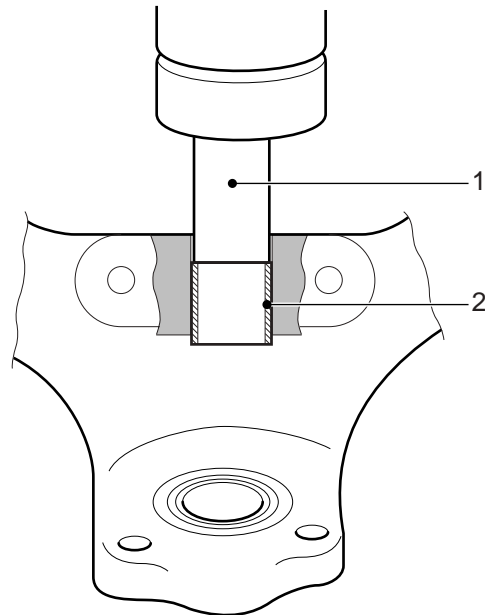
S7 00 890



### 3.13 REMOVAL AND INSTALLATION OF BEARING BUSH/NEEDLE BEARING, F48 FRONT AXLE

#### Removing bearing bush/needle bearing, F48 front axle

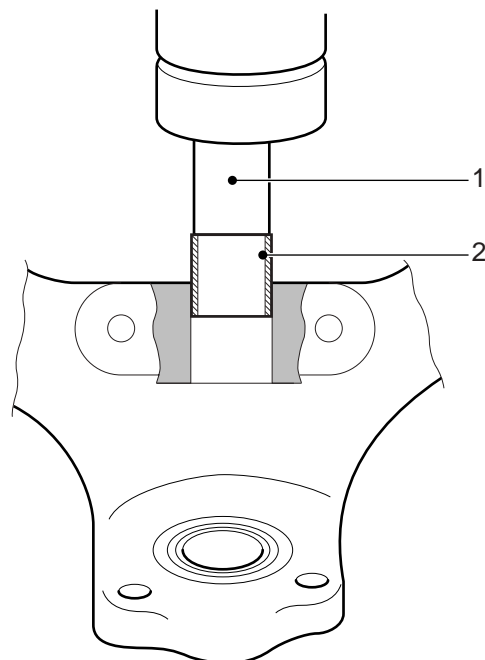
1. Take the swivel axle off the axle end.
2. Position the swivel axle underneath a suitable press with the bearing bush facing upwards.
3. Fit the special tool (DAF no. 1451993C) (1) to the bearing bush (2) and force the bearing bush out of the swivel axle.
4. Turn the swivel axle around and fit the special tool (DAF no. 1451993A) to the needle bearing. Force the needle bearing out of the swivel axle.
5. Clean the swivel axle.



S7 00 889

#### 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.



S7 00 890



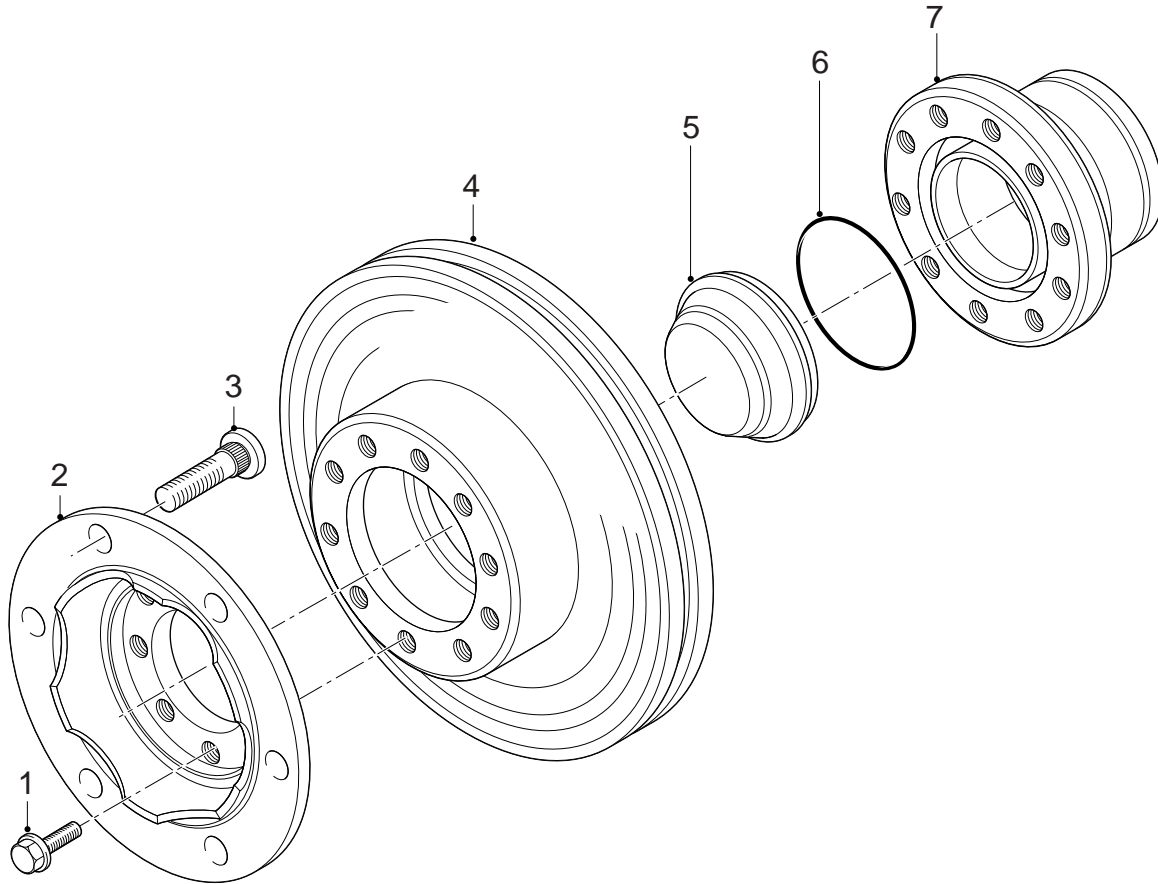
## CONTENTS

	Page	Date
<b>1. GENERAL</b> .....	1-1	200322
1.1 Overview drawing of wheel hub unit .....	1-1	200322
1.2 Overview drawing of swivel axle .....	1-2	200322
1.3 Description of wheel hub unit .....	1-3	200322
1.4 Description of the wheel settings .....	1-4	200322
<b>2. INSPECTION AND ADJUSTMENT</b> .....	2-1	200322
2.1 Checking the caster .....	2-1	200322
2.2 Checking camber angle .....	2-2	200322
2.3 Inspection and adjustment of toe .....	2-3	200322
2.4 Inspection and adjustment of wheel deflection .....	2-5	200322
2.5 Inspection and adjustment of steering rod .....	2-6	200322
2.6 Checking steering ball joint .....	2-9	200322
2.7 Checking front axle housing .....	2-10	200322
2.8 Checking wheel rim .....	2-12	200322
2.9 Checking wheel-speed sensor ring .....	2-13	200322
<b>3. REMOVAL AND INSTALLATION</b> .....	3-1	200322
3.1 Removal and installation of wheel .....	3-1	200322
3.2 Removal and installation of steering rod .....	3-4	200322
3.3 Removal and installation of track rod .....	3-5	200322
3.4 Removal and installation of track-rod arm .....	3-6	200322
3.5 Removal and installation of steering-rod arm .....	3-7	200322
3.6 Removal and installation of wheel hub .....	3-8	200322
3.7 Removal and installation of compact bearing housing .....	3-9	200322
3.8 Removal and installation of wheel-speed sensor ring .....	3-11	200322
3.9 Removal and installation of wheel-speed sensor .....	3-12	200322
3.10 Removal and installation of axle assembly .....	3-13	200322
3.11 Removal and installation of swivel axle .....	3-14	200322
3.12 Removal and installation of swivel axle bearings .....	3-18	200322



## 1. GENERAL

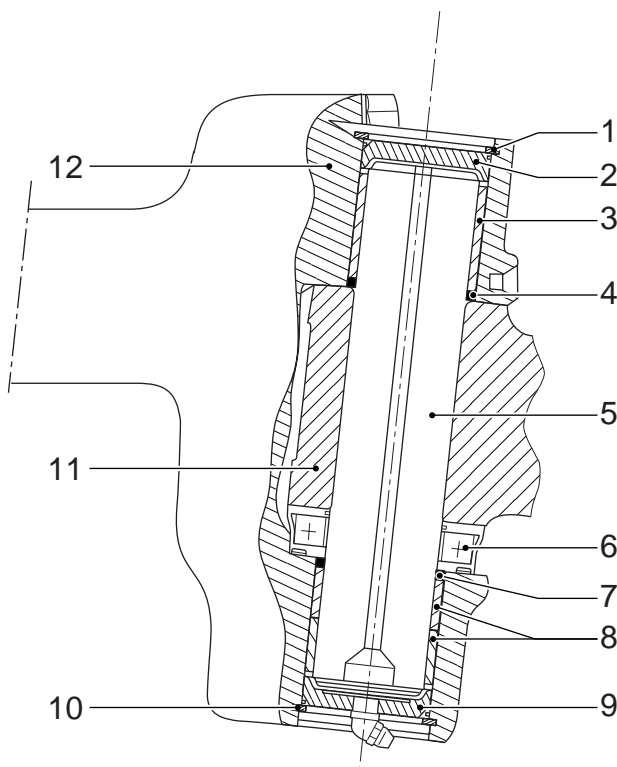
### 1.1 OVERVIEW DRAWING OF WHEEL HUB UNIT



1. Attachment bolt
2. Wheel hub
3. Wheel stud
4. Brake disc
5. Hub cap
6. O-ring
7. Compact bearing housing

C9 00 354

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

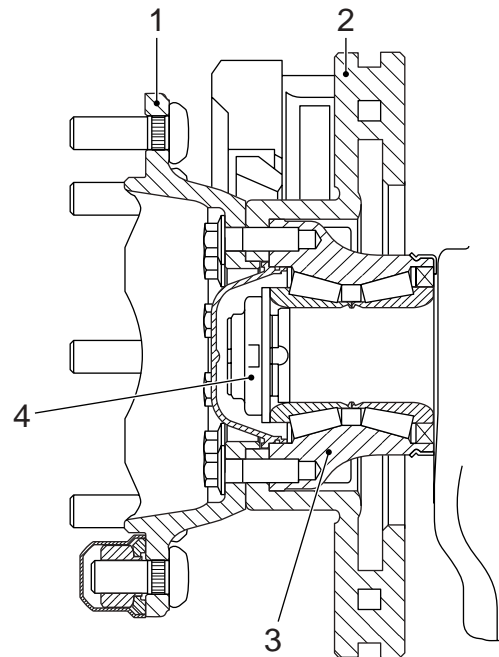
### 1.3 DESCRIPTION OF WHEEL HUB UNIT

#### 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.

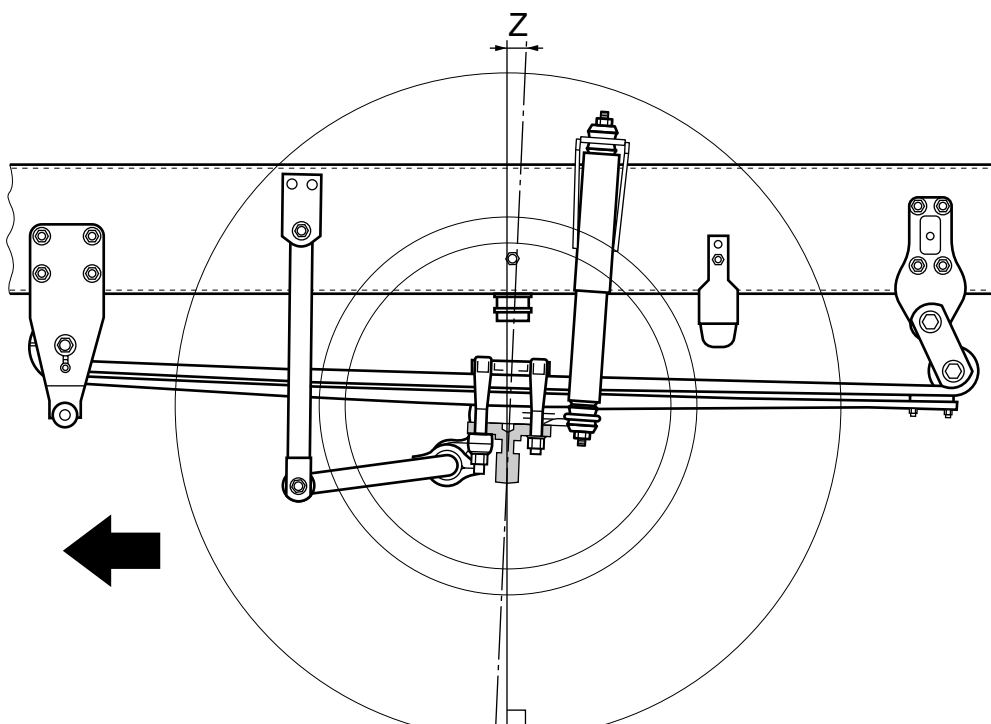
The hub nut (4) is secured by tapping the locking ring into the groove of the axle journal. The bearings in the compact bearing housing are greased and are maintenance-free.

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

## 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.



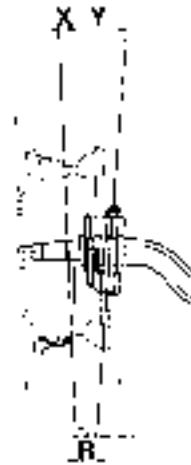
**Camber angle and king-pin inclination**

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

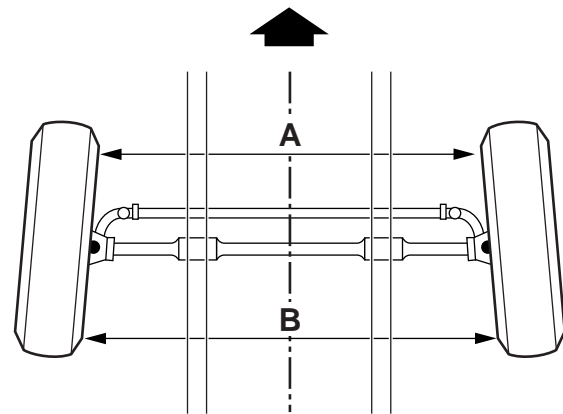
**Toe**

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.

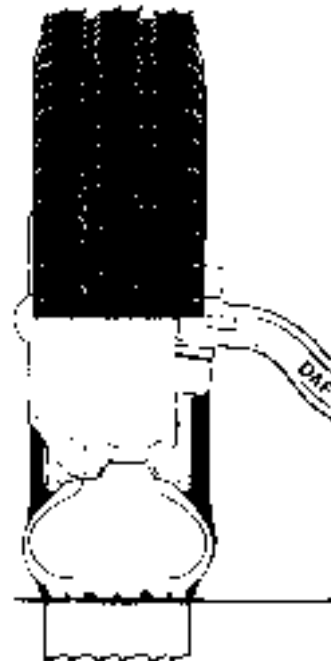
Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

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



## 2. INSPECTION AND ADJUSTMENT

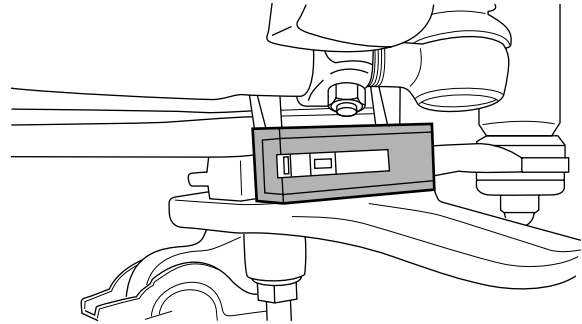
### 2.1 CHECKING THE CASTER

#### 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.



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".

## 2.2 CHECKING CAMBER ANGLE

### General

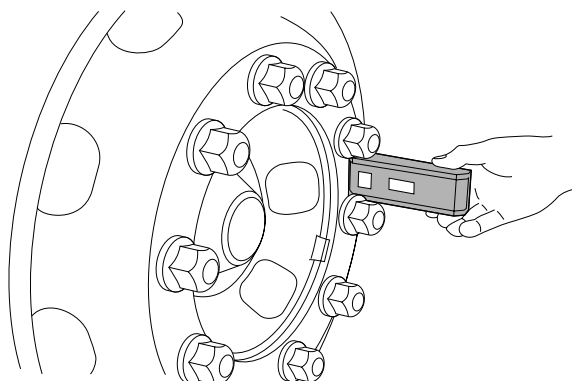
- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

### 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.



S7 00 566

If the angle is incorrect this may be caused by the following:

- excessive swivel axle bearing play
- bent front axle.

## 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".

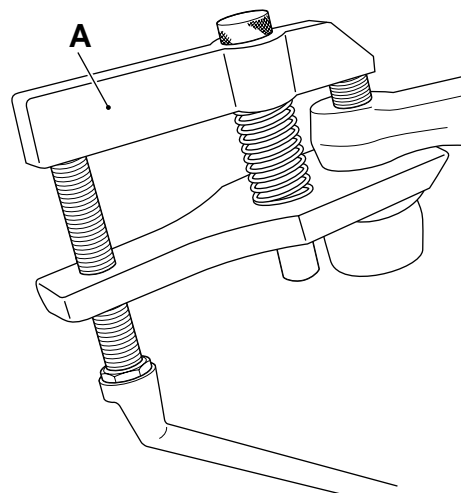
### Note:

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.

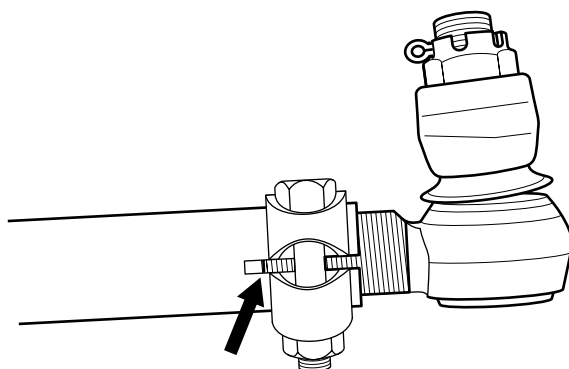


S7 00 555

**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".

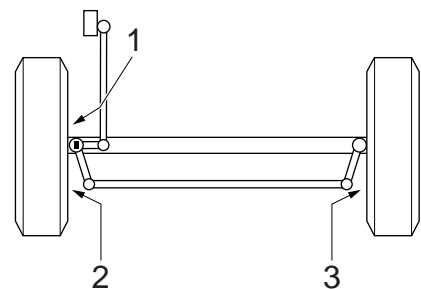
### Adjusting wheel deflection

1. The wheel deflection is adjusted by changing the length of the stop bolts on the swivel axle.

#### Note:

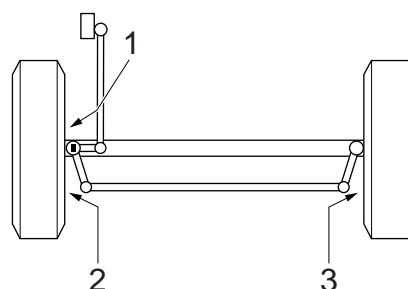
There are two stop bolts (1 and 2) on the swivel axle on the steering box side.

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

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.



S7 00 895

## 2.5 INSPECTION AND ADJUSTMENT OF STEERING ROD



**Work safely and block the vehicle so that it cannot slide off the turning plates.**

### Note:

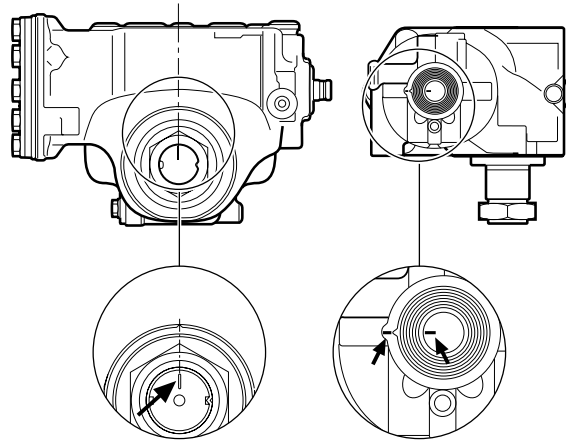
If faults are found, carry out the inspection with at least 40% vehicle load (as far as possible).

### 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.

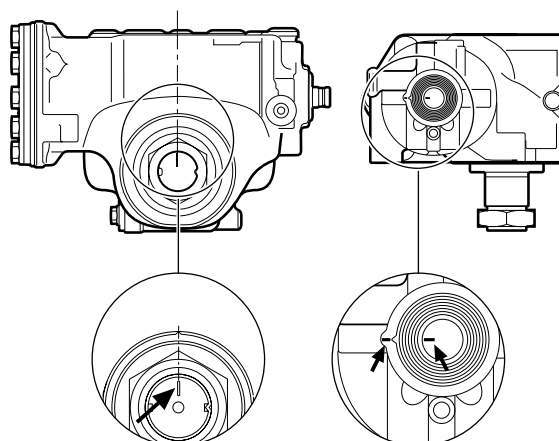


S7 00 623

#### 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".

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.

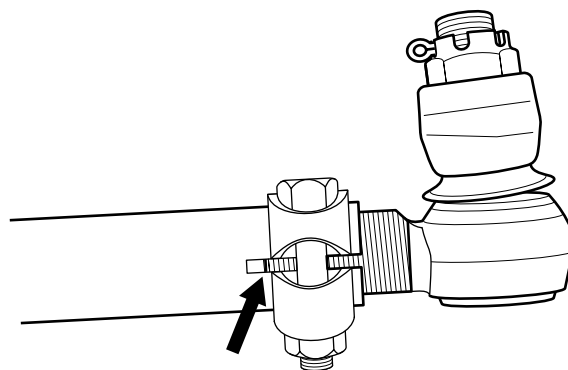


S7 00 623

**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

7



**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.

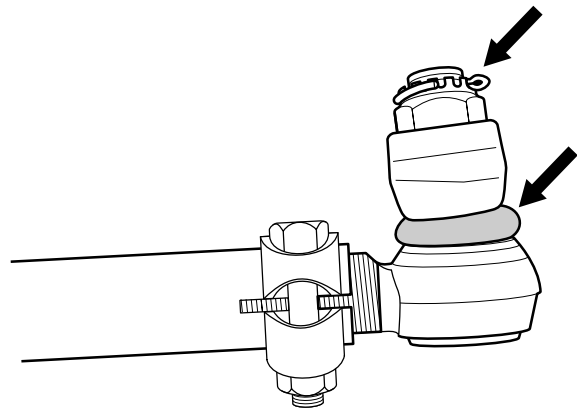
### Checking axial steering ball joint play

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.

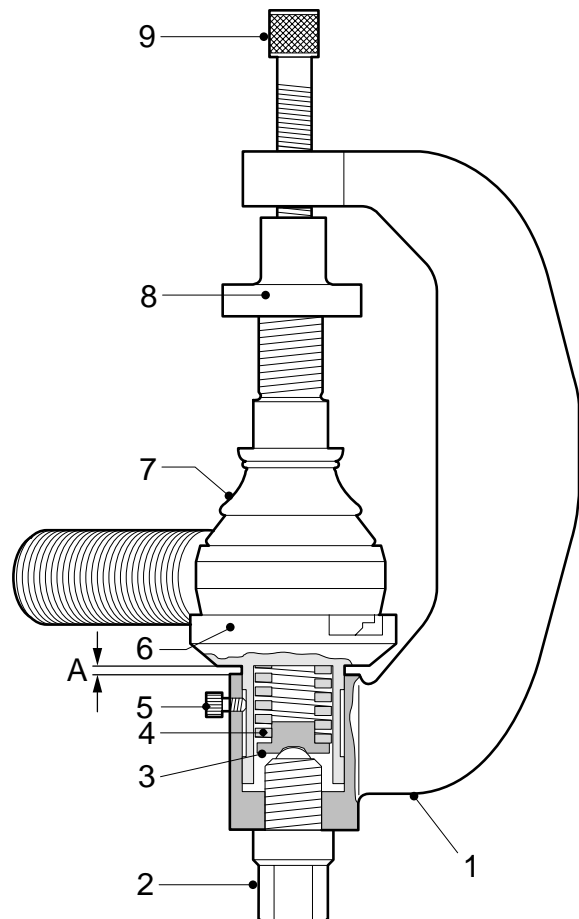
#### Note:

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

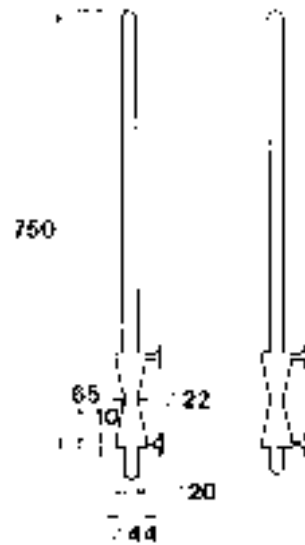
**2.7 CHECKING FRONT AXLE HOUSING**

**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.

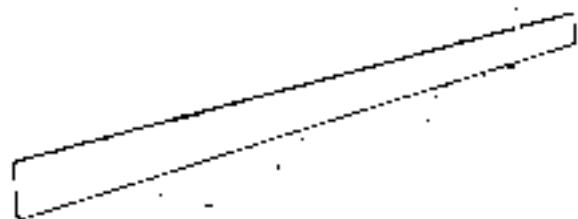
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

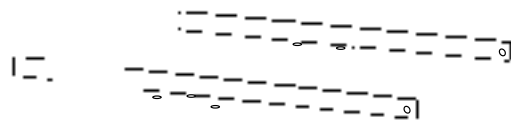
**Checking front axle housing**

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.



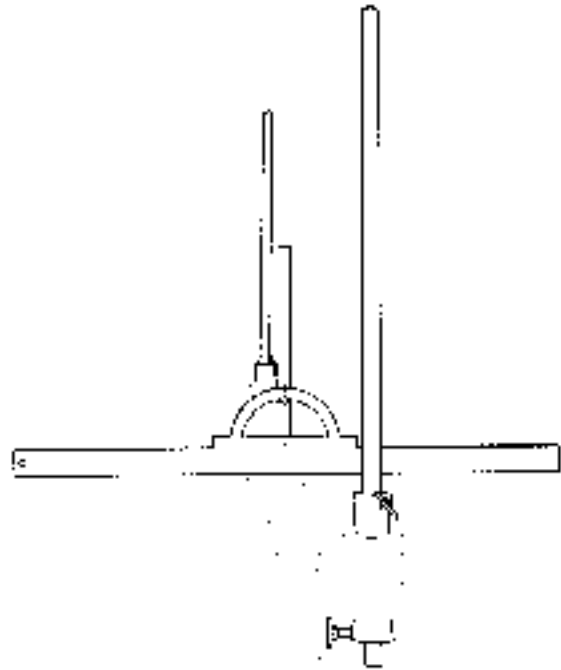
S7 00 151

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  $90^\circ$ .

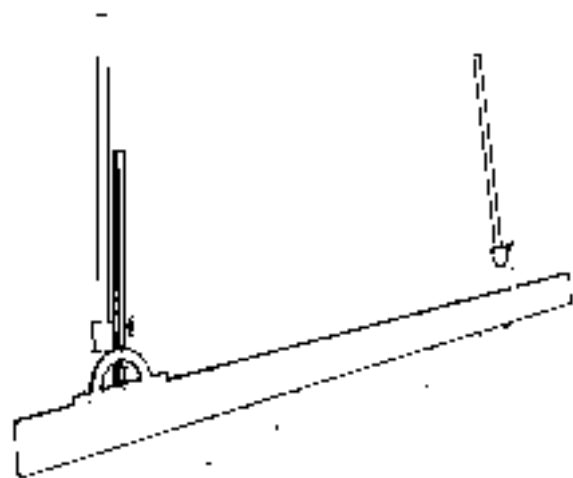


S7 00 149

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.



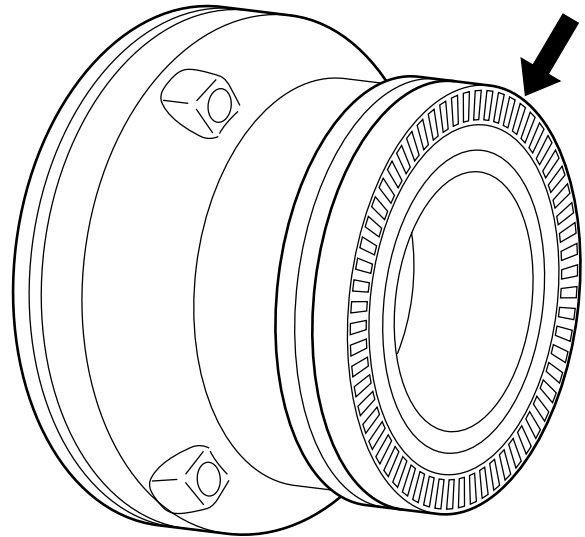
**If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.**

## 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.





### 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:

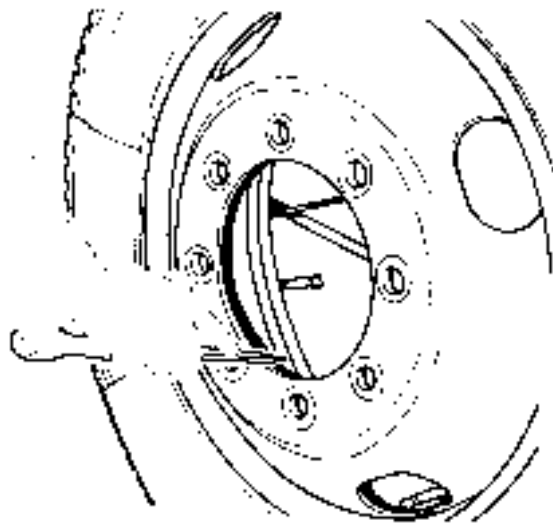
If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

##### 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.

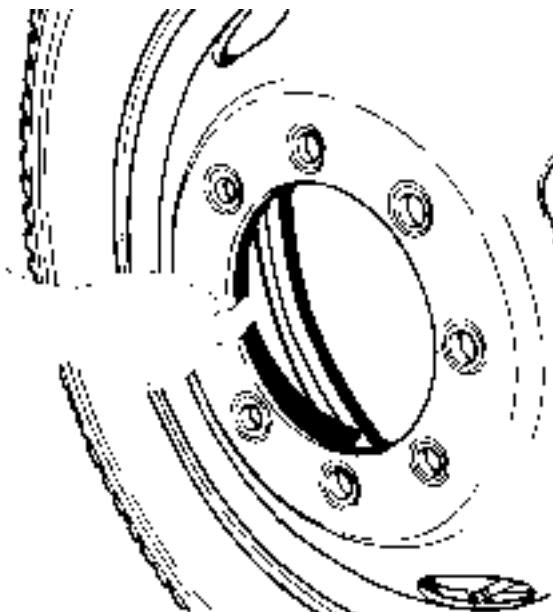
**Installing wheel**

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



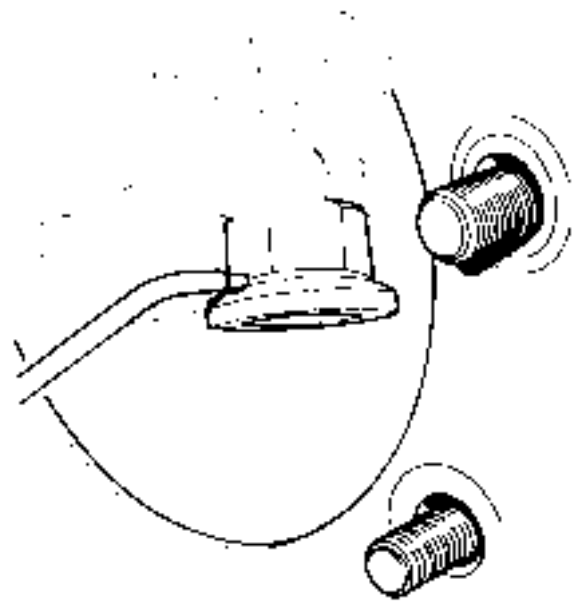
S7 00 096

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.



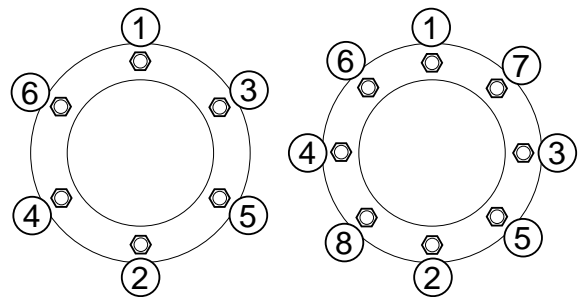
S7 00 097

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".

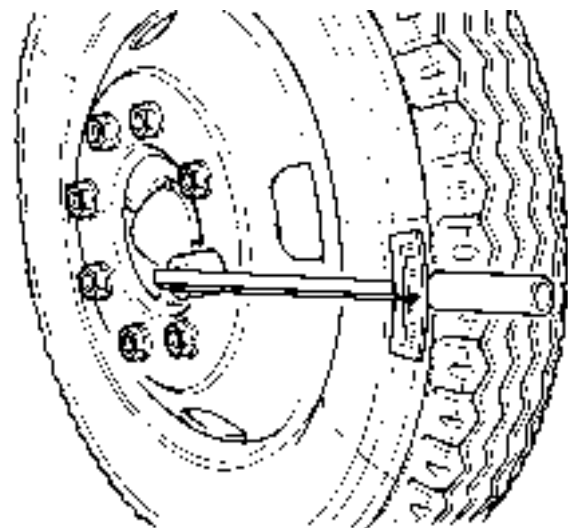


S7 00 631

**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).

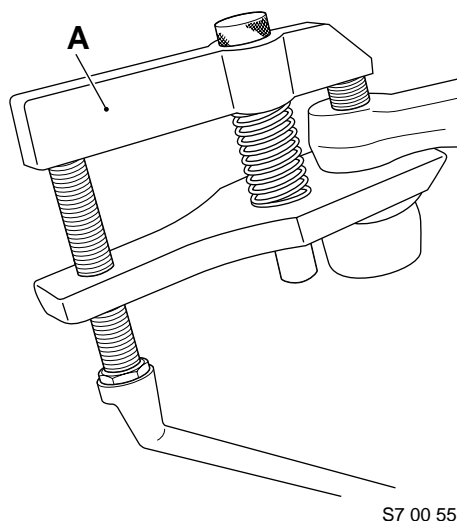
#### Installing steering rod

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".

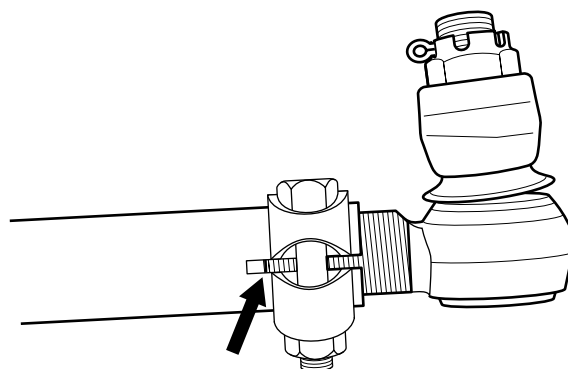
#### Note:

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).

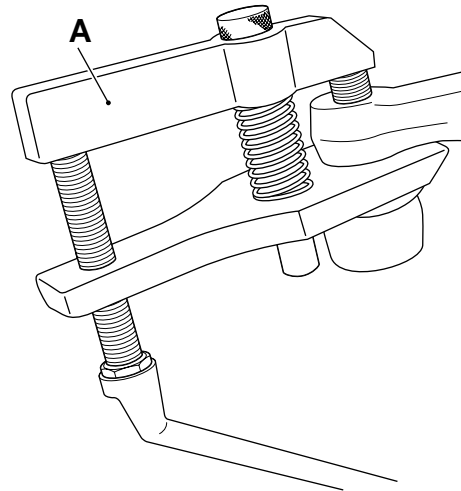
#### Installing track rod

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".

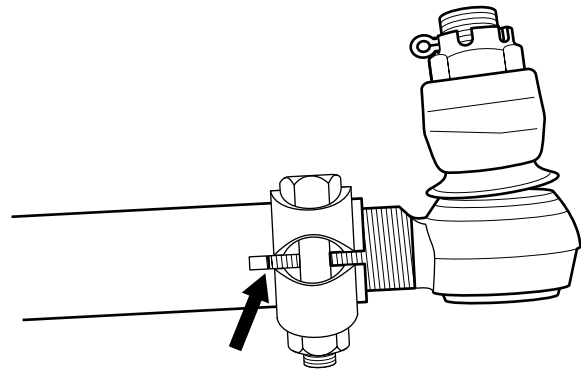
**Note:**

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



S7 00 026

### 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.

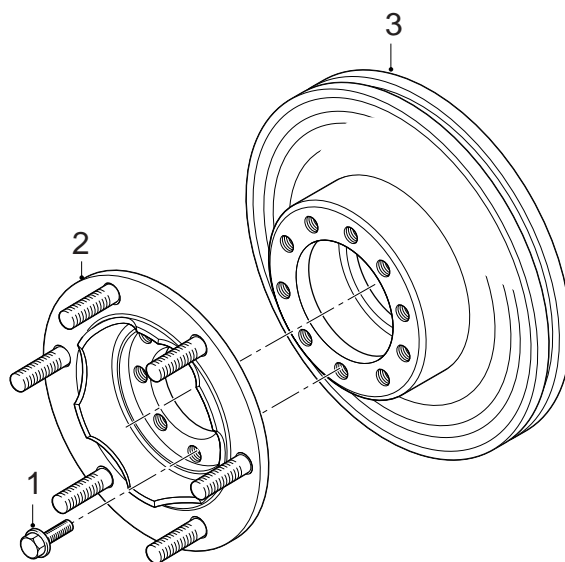
### 3.6 REMOVAL AND INSTALLATION OF WHEEL HUB

#### 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.



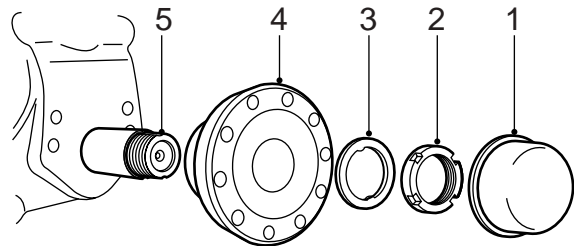
S7 00 802



### 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.

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.

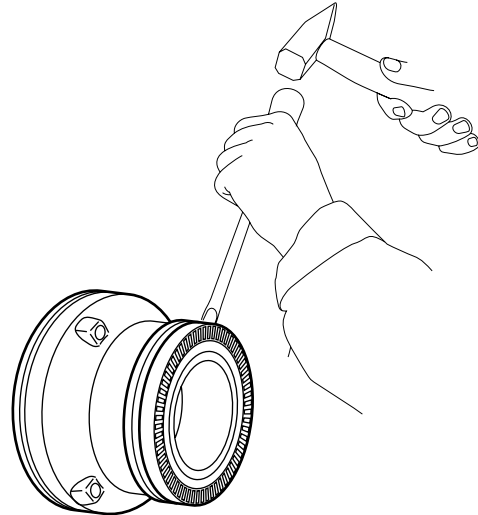
### 3.8 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR RING

#### 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.

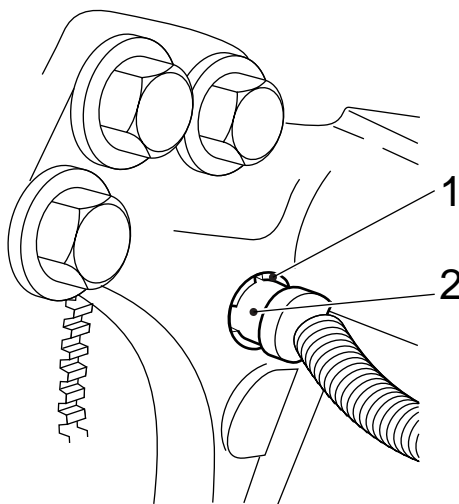
### 3.9 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

#### 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.



S7 00 880



**Never tap the sensor with a hammer. This could damage both the sensor and the sensor ring.**

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.

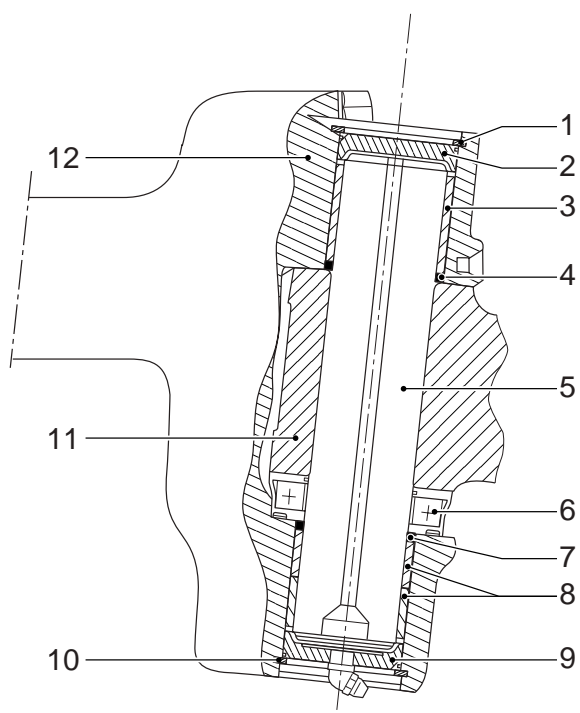
**3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE**



**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.



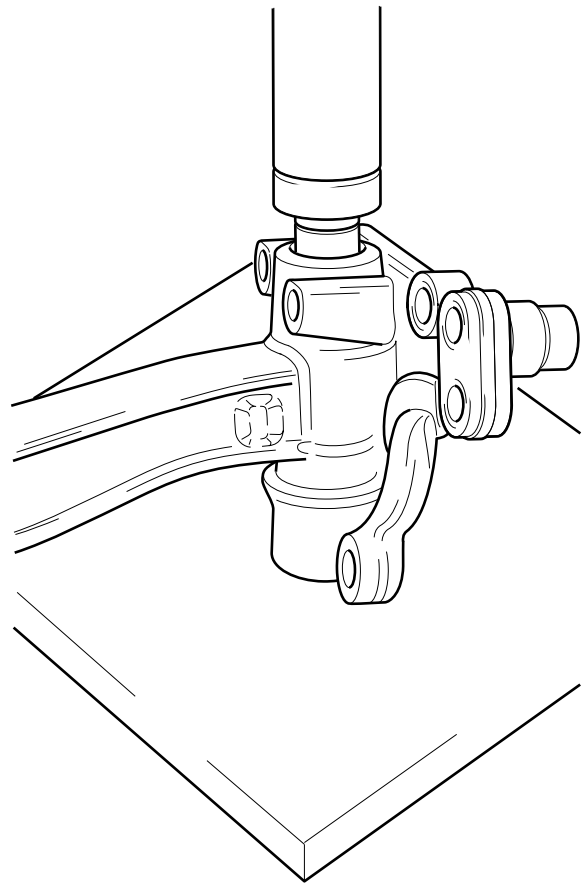
S 700 659

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.

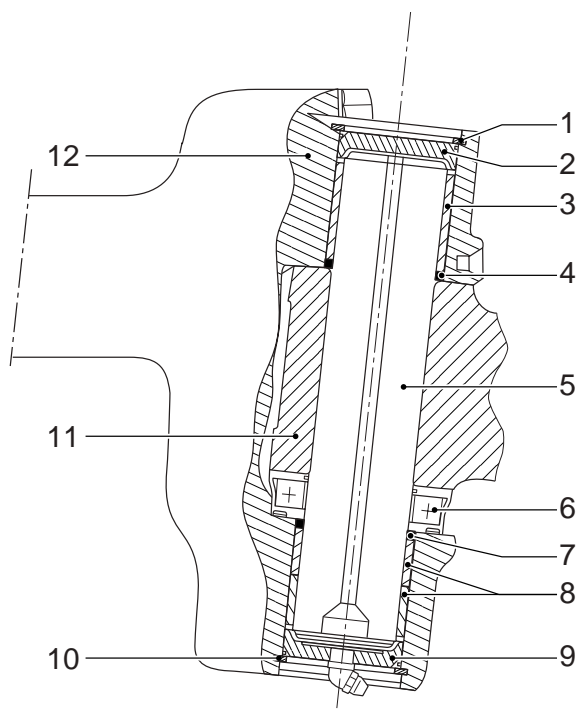


S7 00 730

**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:**

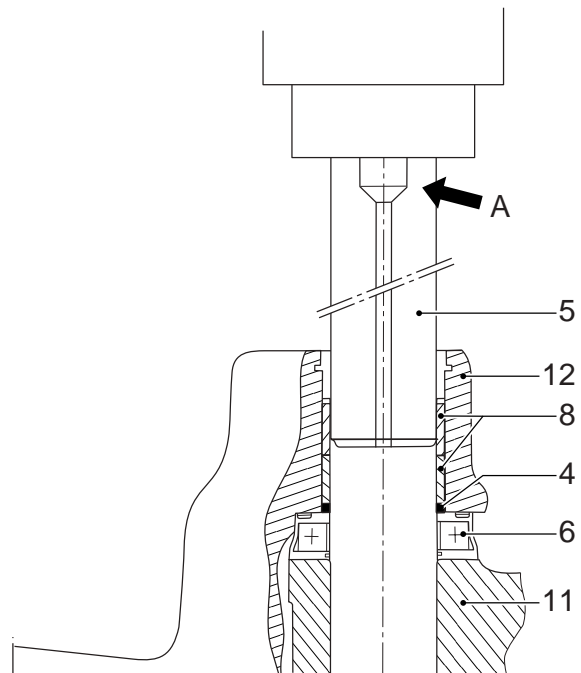
The large bore (A) in the king pin must be at the top.

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.



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.

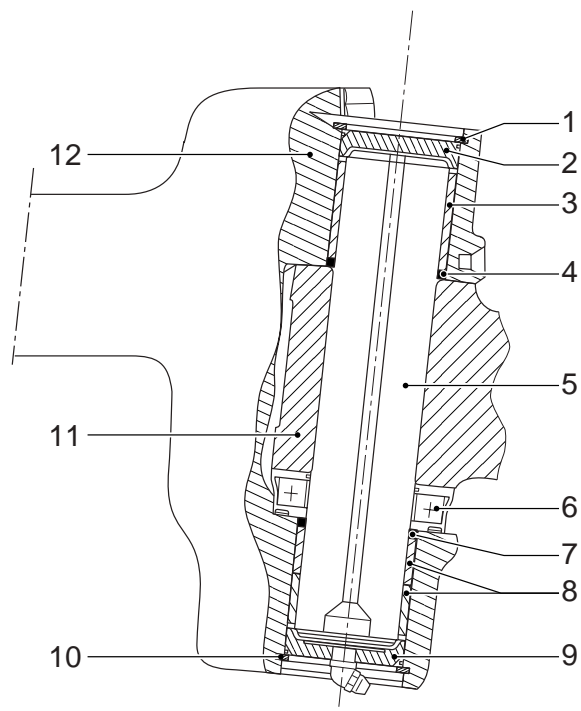
19. Fit the wheel speed sensor.

20. Fit the compact bearing housing

21. Fit the track rod.

22. Install the axle assembly.

23. Check the ABS system for correct operation.

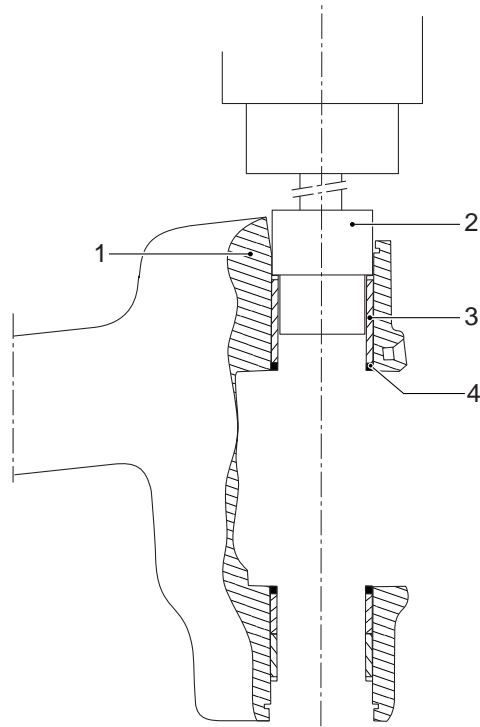


S 700 659

**3.12 REMOVAL AND INSTALLATION OF SWIVEL AXLE BEARINGS**

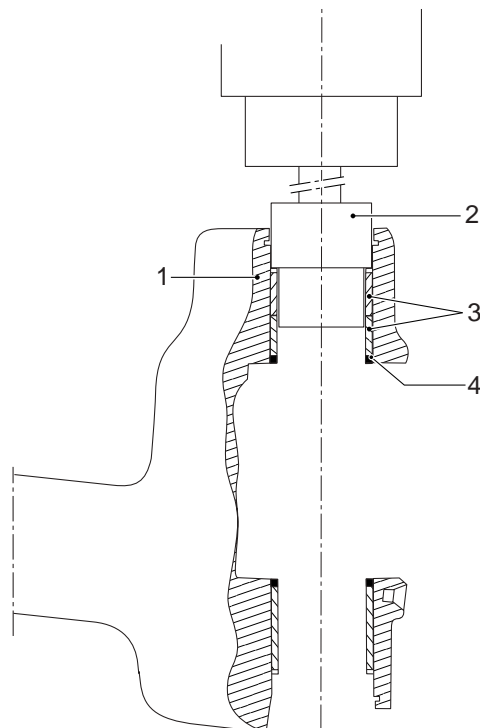
**Removing swivel axle bearings**

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

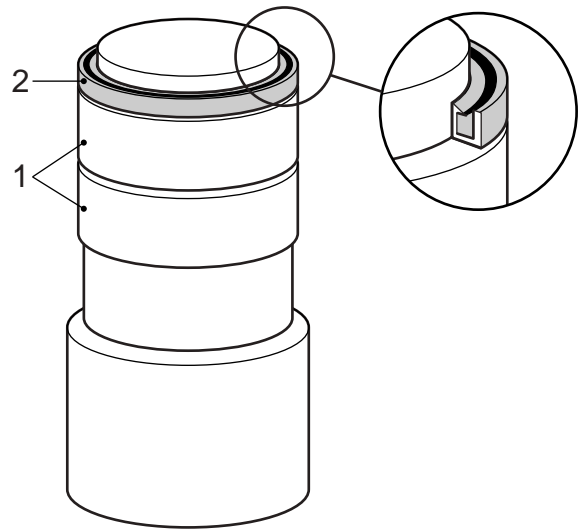
**Installing swivel axle bearings**

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.



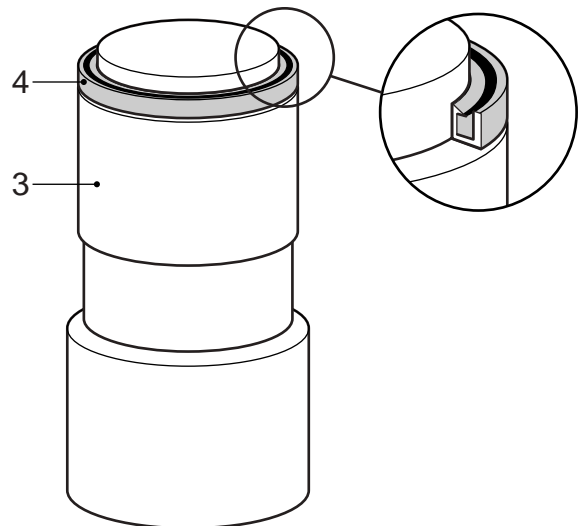
S7 00 701

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.



S7 00 702



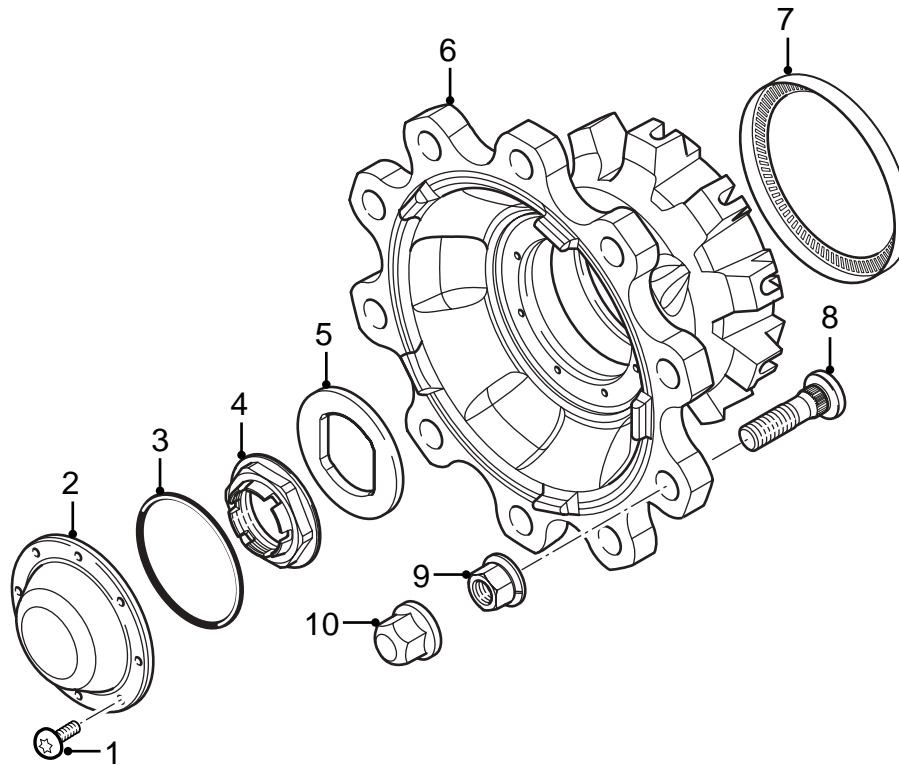
## CONTENTS

	Page	Date
<b>1. GENERAL</b> .....	1-1	200322
1.1 Overview drawing of wheel hub .....	1-1	200322
1.2 Overview drawing of swivel axle .....	1-2	200322
1.3 Description of wheel hub unit .....	1-4	200322
1.4 Description of the wheel settings .....	1-5	200322
<b>2. INSPECTION AND ADJUSTMENT</b> .....	2-1	200322
2.1 Inspection and adjustment of swivel axle play .....	2-1	200322
2.2 Inspection and adjustment of caster .....	2-5	200322
2.3 Inspecting camber angle and king-pin inclination .....	2-6	200322
2.4 Inspection and adjustment of toe .....	2-7	200322
2.5 Inspection and adjustment of wheel deflection .....	2-10	200322
2.6 Inspection and adjustment of steering rod .....	2-11	200322
2.7 Checking steering ball joint .....	2-14	200322
2.8 Checking front axle housing .....	2-16	200322
2.9 Checking wheel rim .....	2-18	200322
2.10 Checking wheel-speed sensor ring .....	2-19	200322
<b>3. REMOVAL AND INSTALLATION</b> .....	3-1	200322
3.1 Removal and installation of wheel .....	3-1	200322
3.2 Removal and installation of steering rod .....	3-4	200322
3.3 Removal and installation of track rod .....	3-5	200322
3.4 Removal and installation of track arm and steering rod arm .....	3-7	200322
3.5 Removal and installation of wheel hub unit .....	3-9	200322
3.6 Removal and installation of wheel-speed sensor ring .....	3-12	200322
3.7 Removal and installation of wheel-speed sensor .....	3-13	200322
3.8 Removal and installation of swivel axle .....	3-14	200322
3.9 Removal and installation of split thrust bearing .....	3-17	200322
3.10 Removal and installation of compound thrust bearing .....	3-19	200322
3.11 Removal and installation of needle bearings .....	3-20	200322



## 1. GENERAL

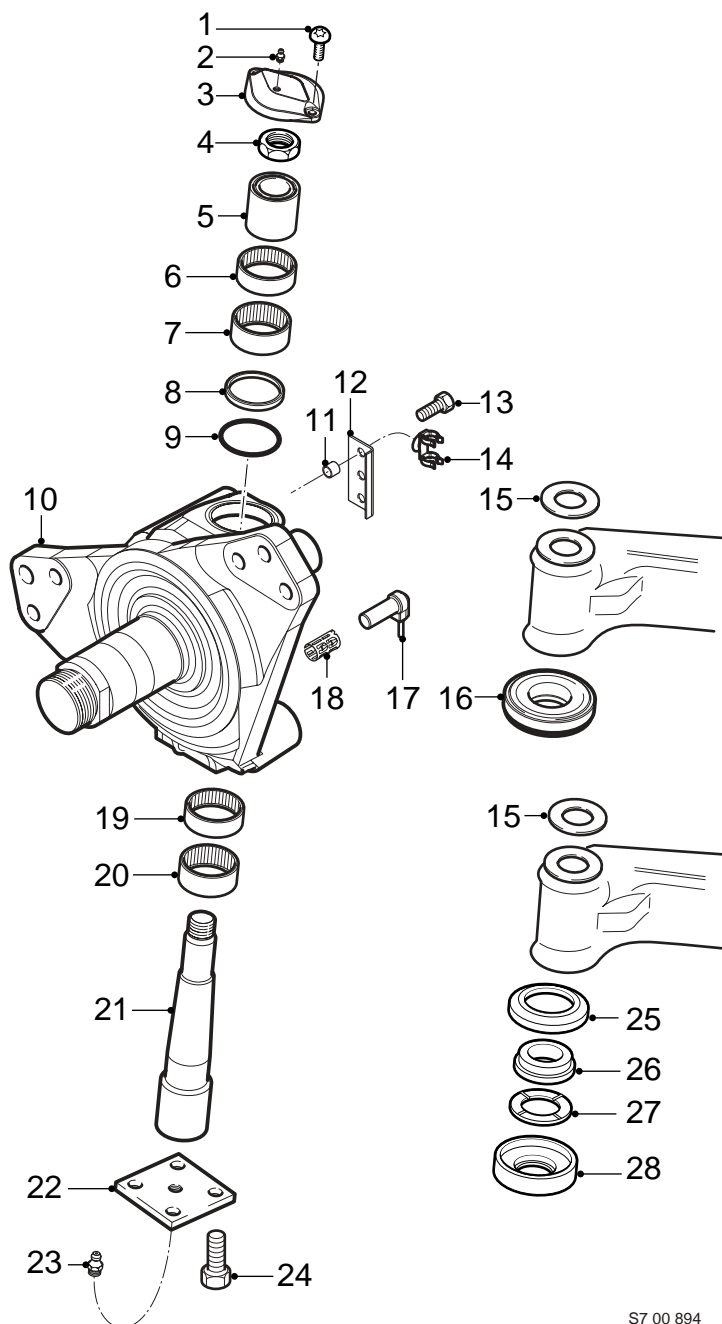
### 1.1 OVERVIEW DRAWING OF WHEEL HUB



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

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)

1.3 DESCRIPTION OF WHEEL HUB UNIT

**Wheel hub unit**

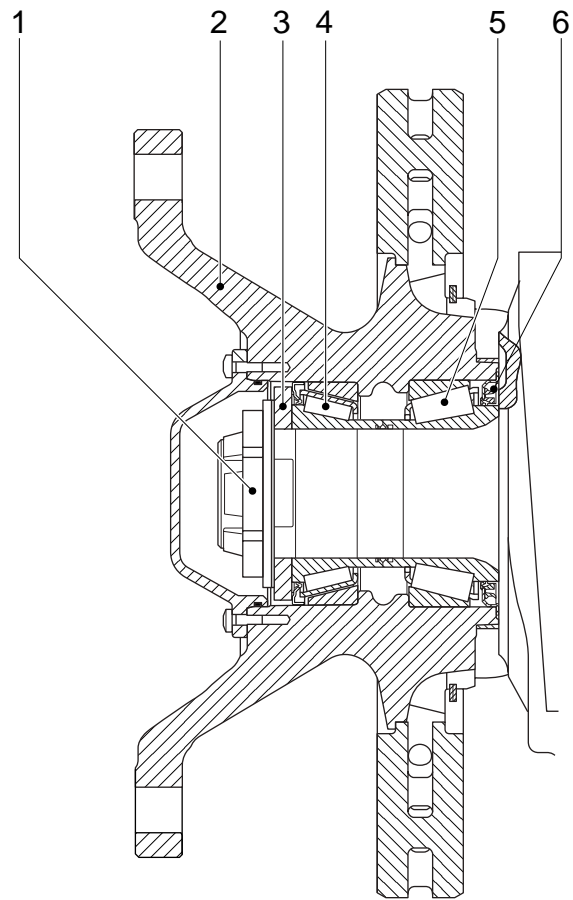
The wheel hub (2), wheel bearings (4 and 5) and oil seal (6) form an assembly which is referred to as the wheel hub unit.

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.

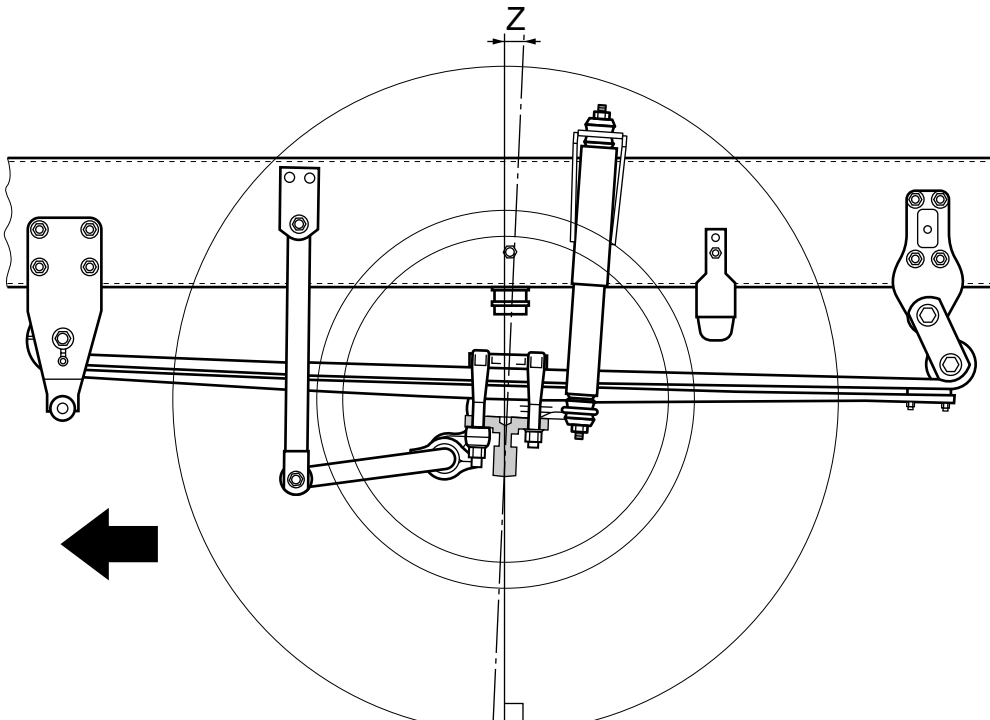
The correct wheel bearing pre-load is achieved by installing the hub nut (1) as specified.

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.

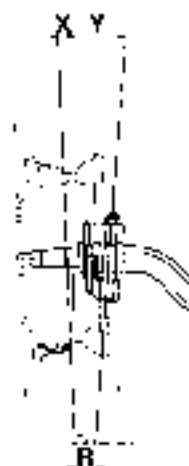
The caster can be checked and adjusted very easily and this does not require any complicated equipment.

**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.

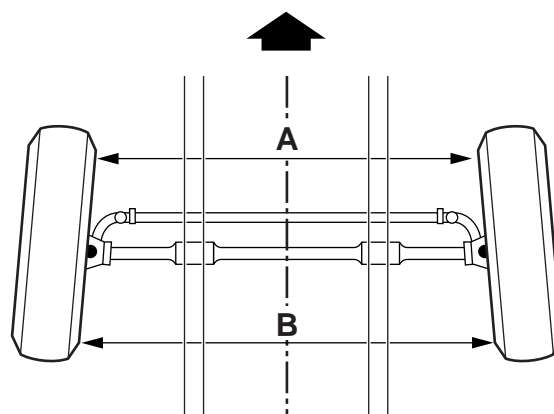
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

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:**

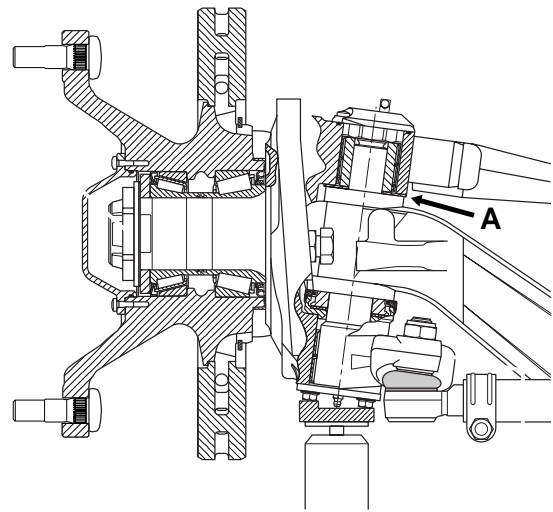
If the wheels have been taken off the front axle (to be overhauled, for example), the swivel axle will hang loose on the axle end. In that case, place a jack under the swivel axle so that the swivel axle is pushed against the underside of the axle end.

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".

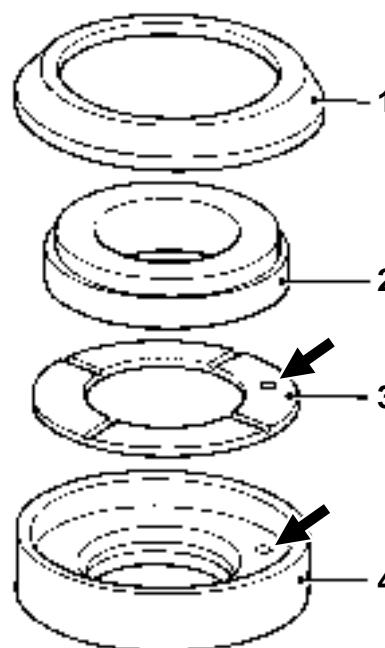
If excessive axial play is measured around the entire circumference of the axle end, the swivel axle thrust bearing is probably worn.



S7 00 579

**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".

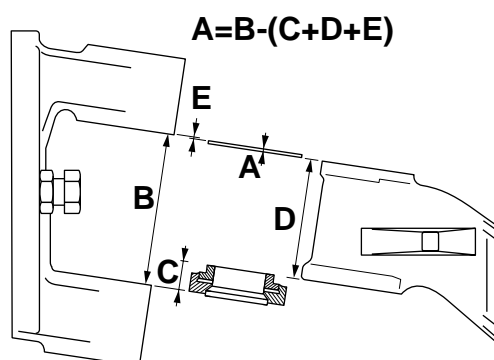


S7 00 114

**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

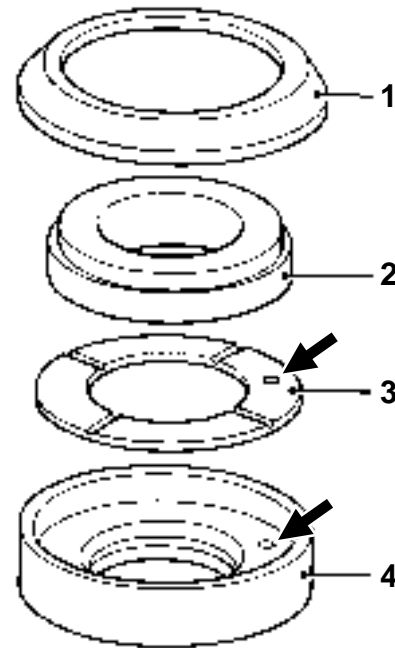


S7 00 815

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".

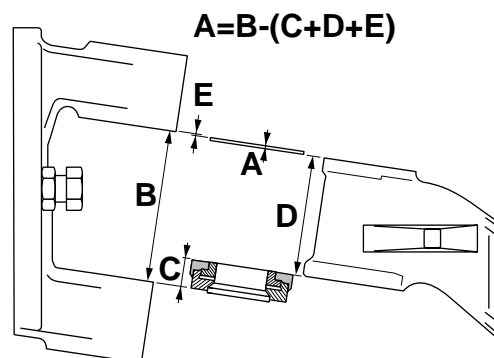


S7 00 114

**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.



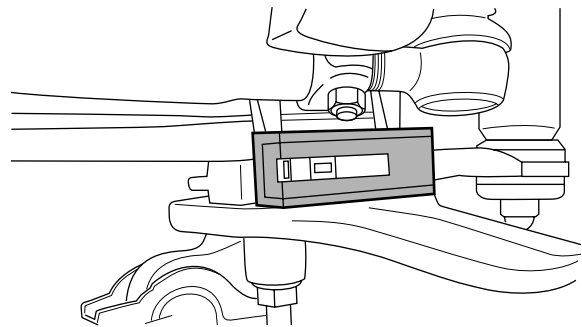
## 2.2 INSPECTION AND ADJUSTMENT OF CASTER

### 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.



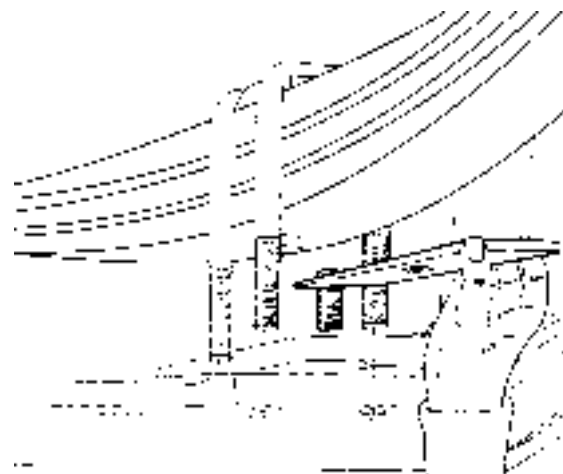
S7 00 560

### 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**

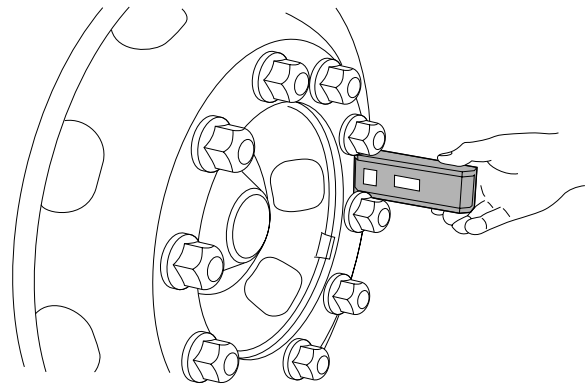
- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The tyre pressure must be correct.
- The vehicle must be unladen.
- The caster can be measured using an angle gauge or wheel alignment equipment.
- Carry out the measurement on both wheels.

**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.



S7 00 566

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.

## 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.

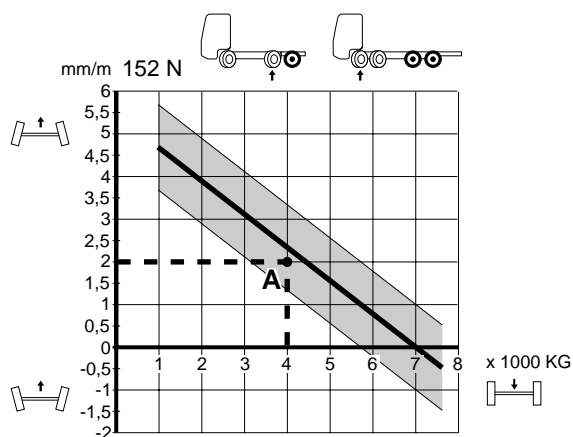
**Example 1**

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.



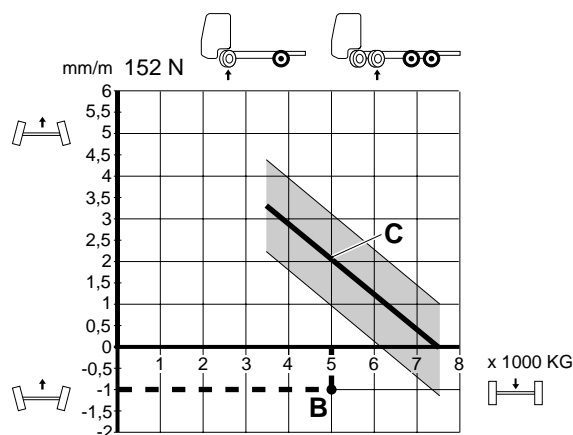
S7 00 421

**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).



S7 00 420

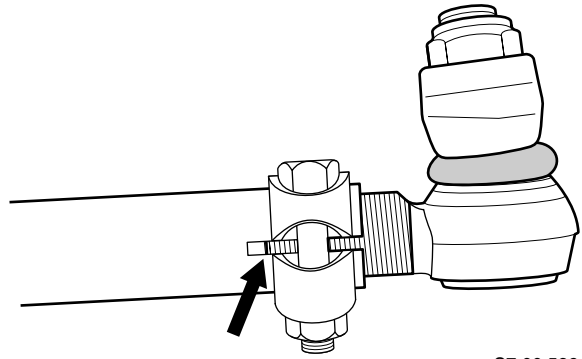
**Adjusting toe**

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



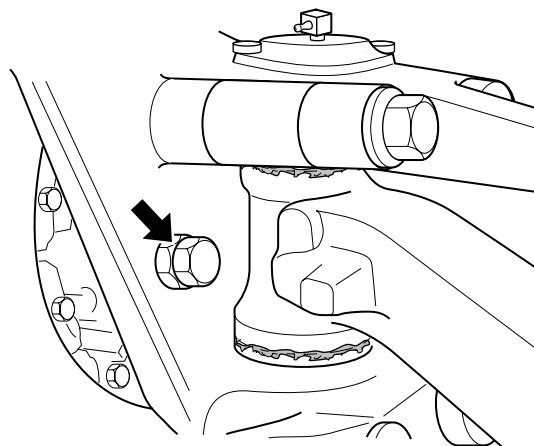
**Work safely and block the vehicle so that it cannot slide off the turning plates.**

### 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.**

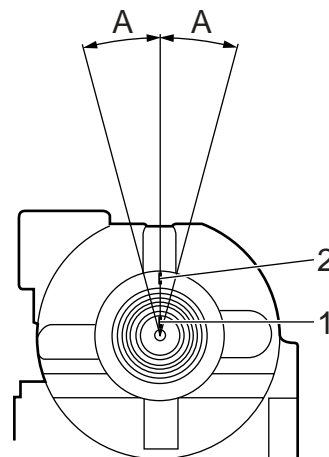
### Checking adjustment of steering rod

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.**

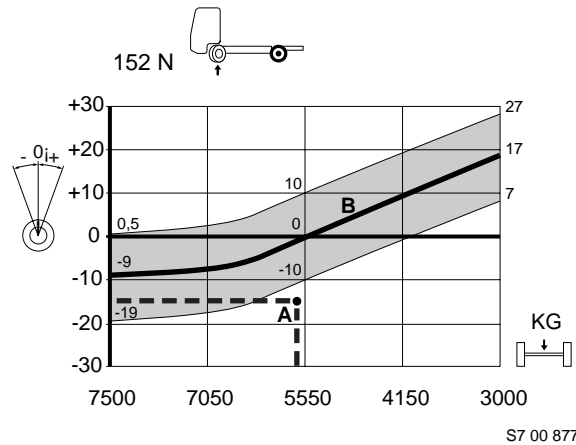
7. Measure the angle A between the mark on the input shaft (1) and the mark on the steering box (2).
8. Using the graph, check whether the measured angle is correct or must be corrected (see "Technical data").  
The example below explains how to use the graph in "Technical data".



S7 00 878

**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  $-15^\circ$ . 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).

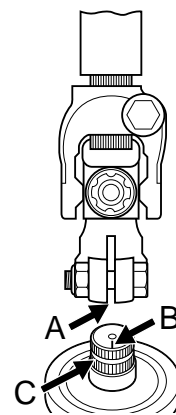


- Fit the universal joint to the steering box input shaft. The groove (A) in the coupling must be aligned with the mark (B) on the steering-box input shaft.



**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).**

- 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



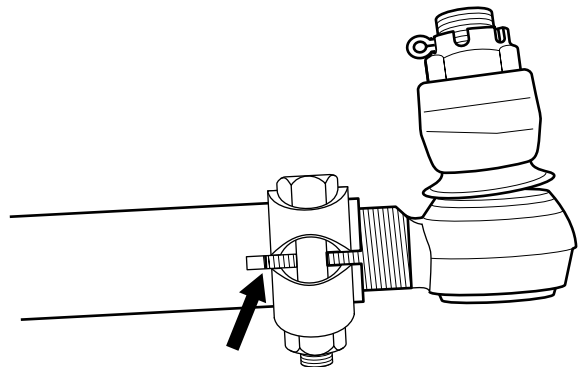
**Adjusting steering rod**

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".



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.

**Note:**

If the vehicle is unloaded or fully loaded, the steering wheel may not be in the central position.

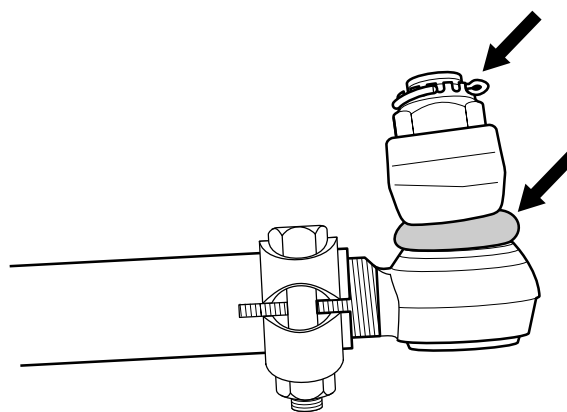


**If the vehicle is fitted with an airbag, observe the warnings and safety instructions applicable to working on an airbag system.**

## 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**

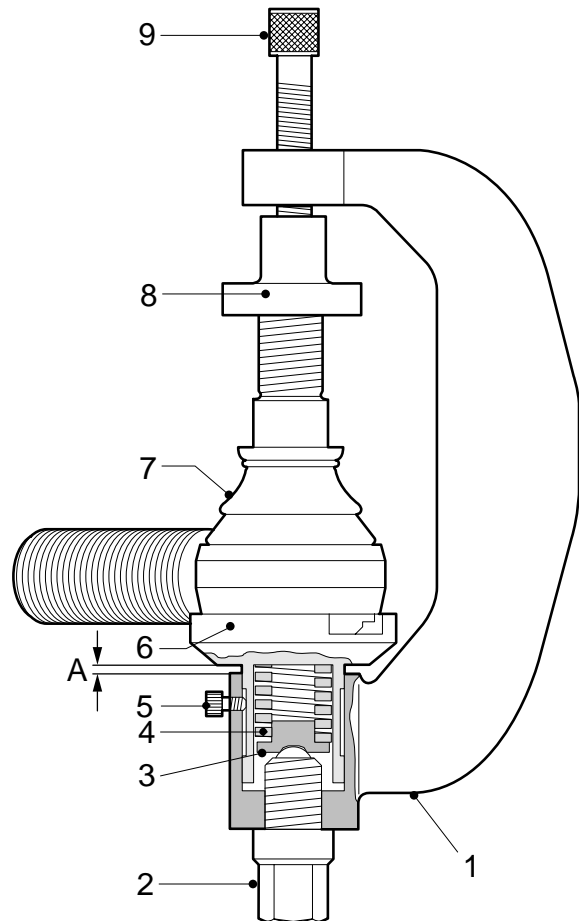
1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.
4. Screw the 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 (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.

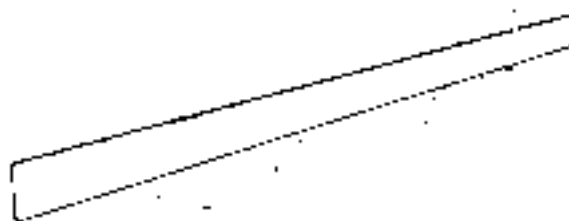
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



S7 00 119

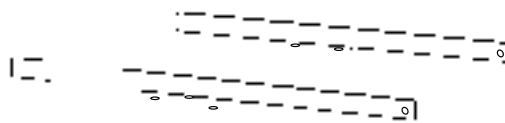
**Checking front axle housing**

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.



S7 00 151

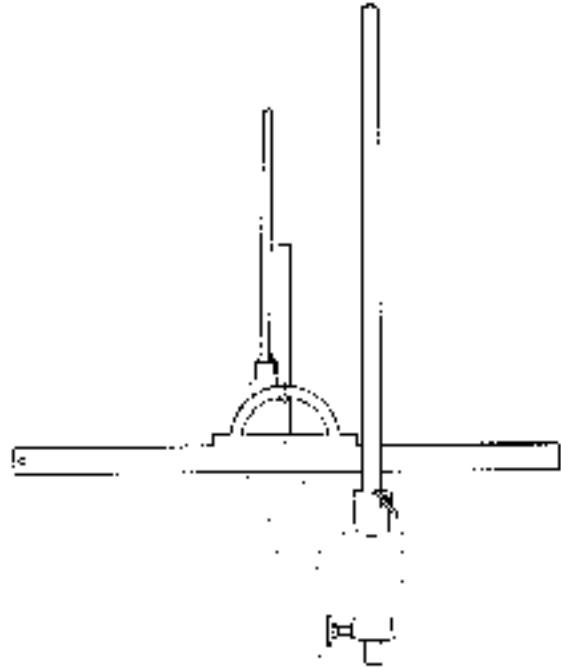
3. Place a straight edge across both spring seats and check whether they are parallel with each other.



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  $90^\circ$ .

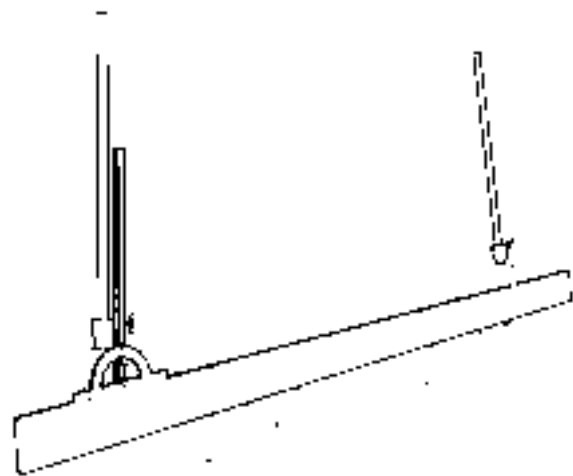


S7 00 149

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.**

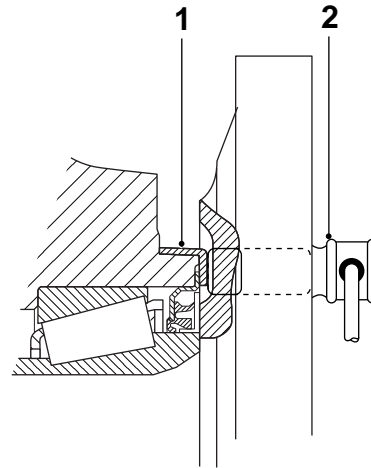
3. To prevent damage to the tyre due to corrosion and/or indirect tension cracks (due to notching), the anti-corrosion treatment of the wheel rim must not be damaged in any way.  
For removal of corrosion and repairing the paint layer, see "Paint treatment".  
Before re-spraying, remove the old layer 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.





### 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:

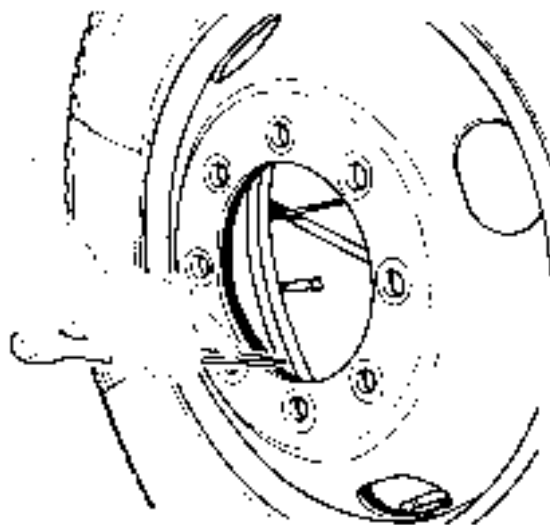
If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

##### 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.

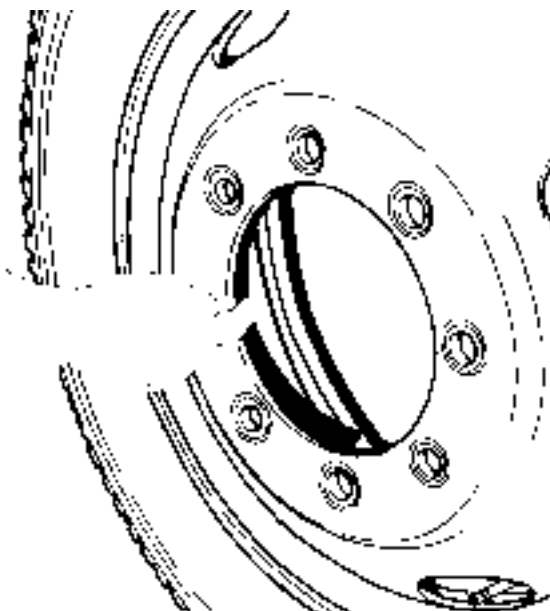
**Installing disc wheel**

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



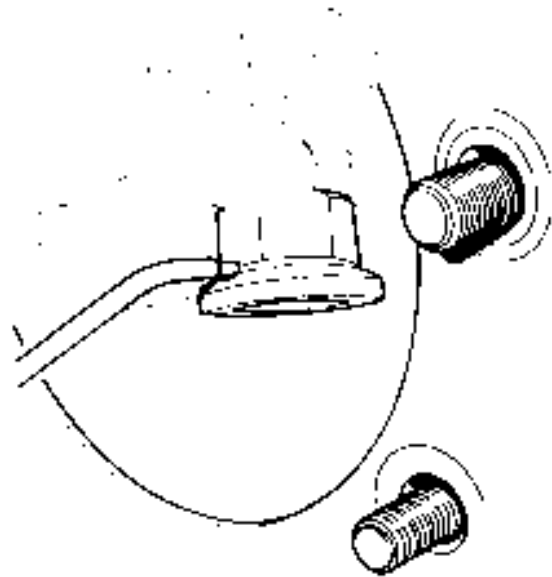
S7 00 096

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.



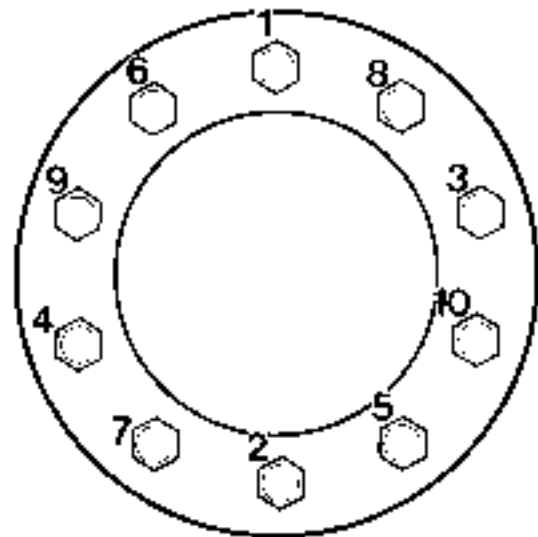
S7 00 097

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.

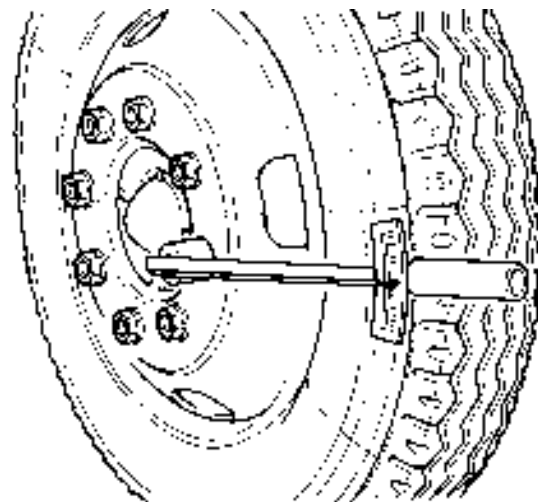


S7 00 095

**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

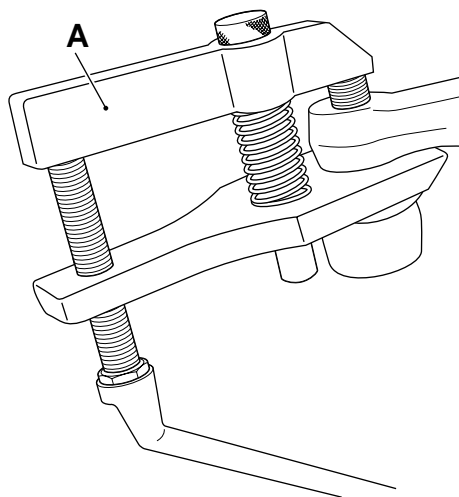
### 3.2 REMOVAL AND INSTALLATION OF STEERING ROD

#### Removing steering rod

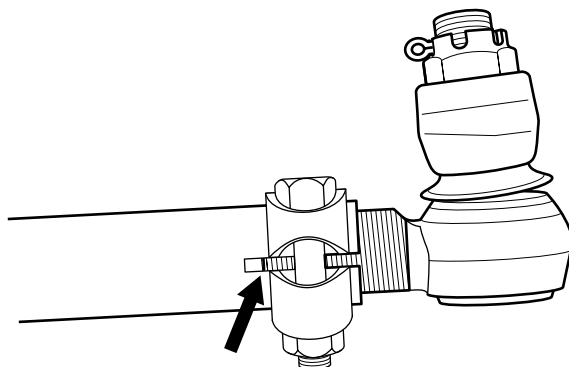
1. Remove the nuts at both ends of the steering rod.
2. Take the ball ends off the steering-rod arm and the pitman arm using a ball-end puller (A).

#### 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.



S7 00 555



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).

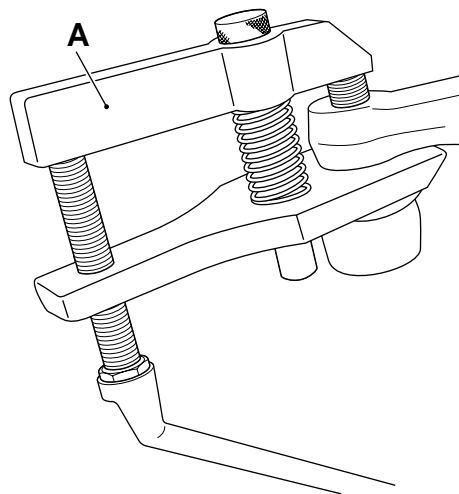
#### Installing track rod

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.



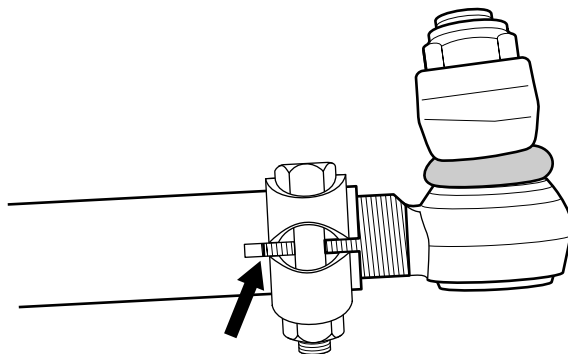
**If a new self-locking nut is onto a ball end with a damaged thread, this can give rise to dangerous situations.**



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".

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

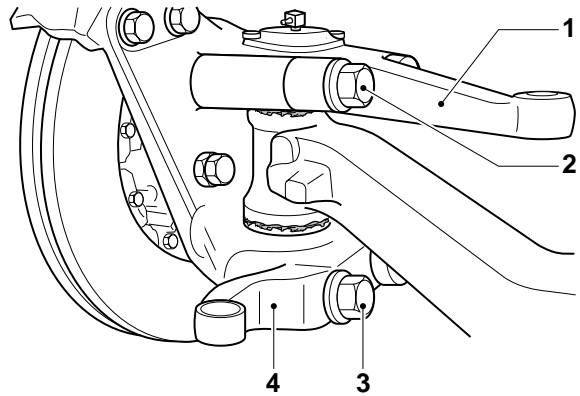
1. Take the track rod and steering rod off the track-rod arm and steering rod arm.

2. Remove the attachment bolts (2 and 3).

**Note:**

The attachment bolts must not be reused.

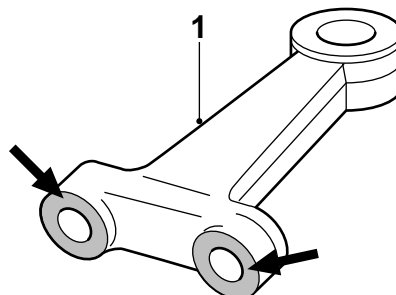
3. Take the track-rod arm (4) and the steering rod arm (1) off the swivel axle. A plastic mallet can need to be used to remove the steering rod arm, as locking agent has been applied between the arm and the swivel axle.



S7 00 582

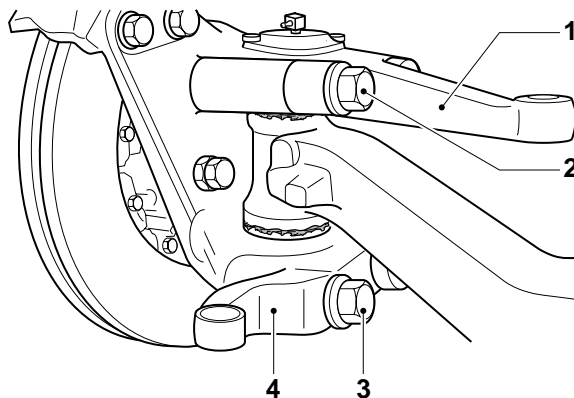
**Installing track-rod arm and steering rod arm**

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.



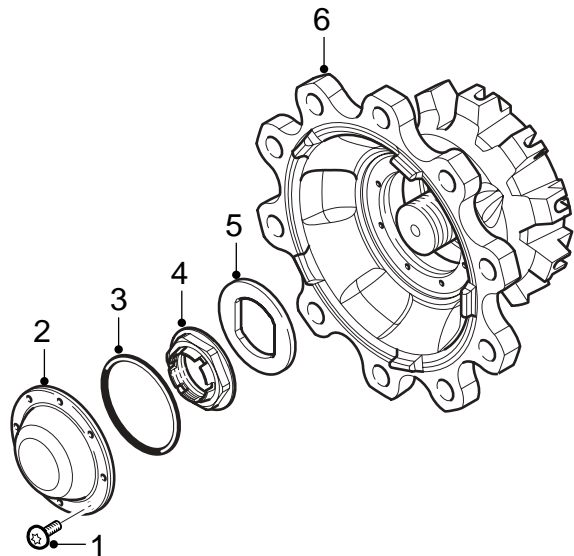
S7 00 582



### 3.5 REMOVAL AND INSTALLATION OF WHEEL HUB UNIT

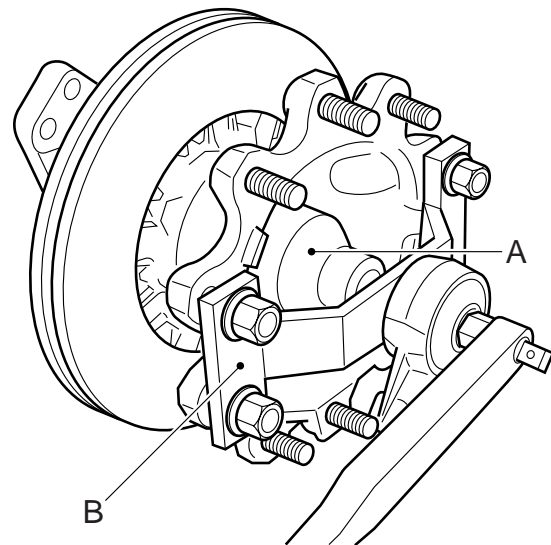
#### Removing wheel hub unit

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).



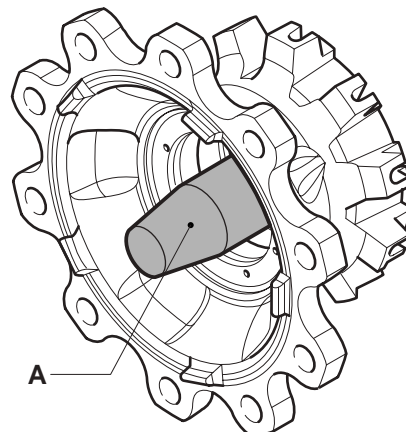
S7 00 581

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

### Installing wheel hub unit

1. Check the wheel speed sensor ring, see "Inspection and adjustment".
2. Check the axle journal thread carefully for damage.

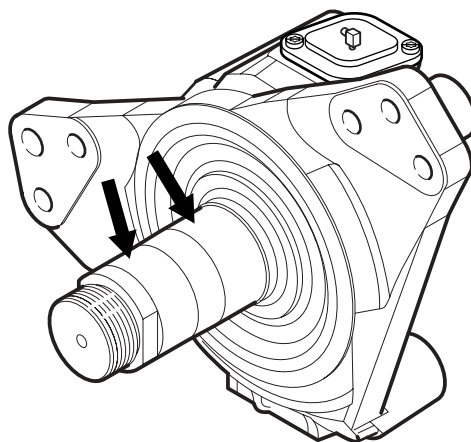


**The wheel hub unit must never be fitted to an axle journal with a damaged thread.**

3. Apply a thin, even layer of the prescribed anti-corrosion agent to the entire circumference of the axle journal, see "Technical data".

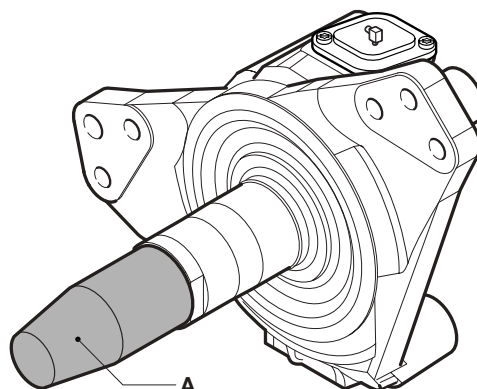
### Note:

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.



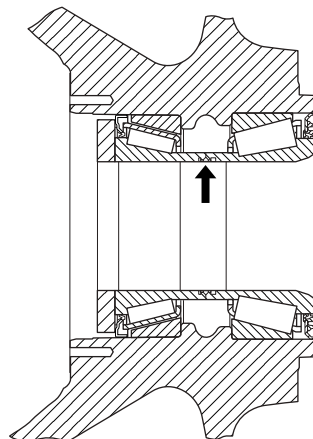
S7 00 547

4. Fit the guide sleeve (A), which is part of the special tool set (DAF no. 1329496), to the axle journal.



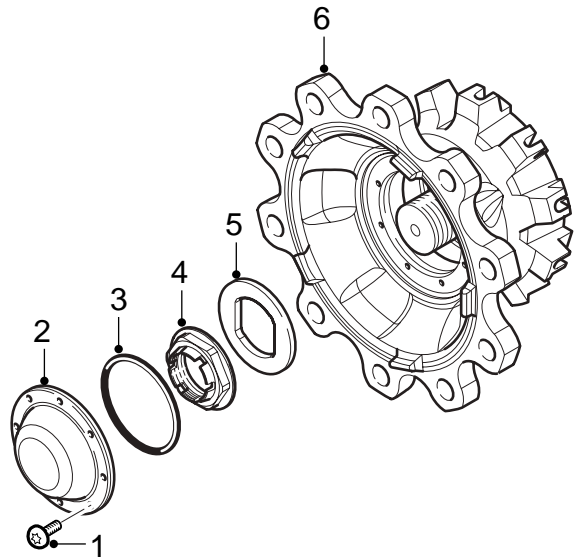
S7 00 561

5. Check that the spring clip, located between the inner bearing races, is positioned correctly.



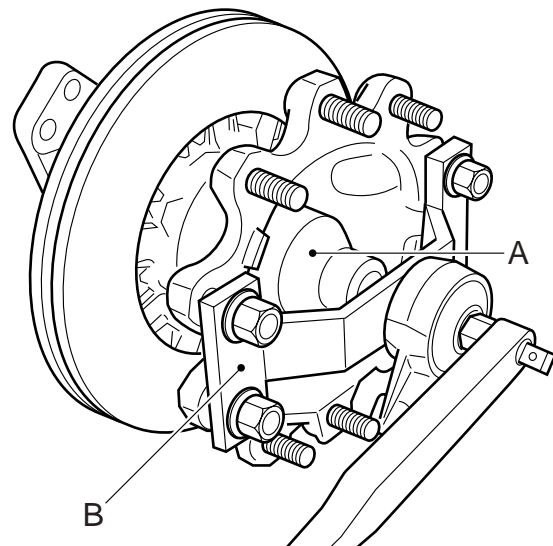
S7 00 747

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.



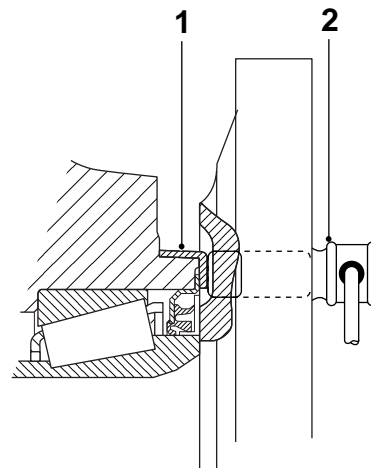
S7 00 641

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.

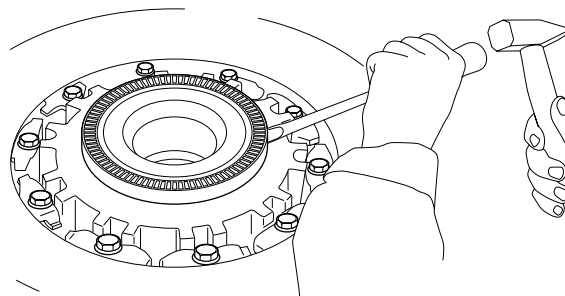


S7 00 543

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.



S7 00 554



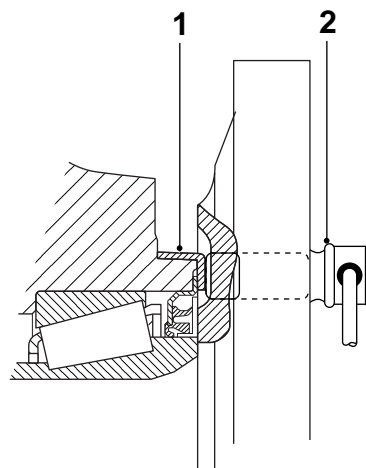
Once removed, the sensor ring must not be reused.

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.



S7 00 543

7. Check the ABS system for correct operation.

8

### 3.7 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR

#### Removing wheel-speed sensor

1. Remove the wheel-speed sensor (2).

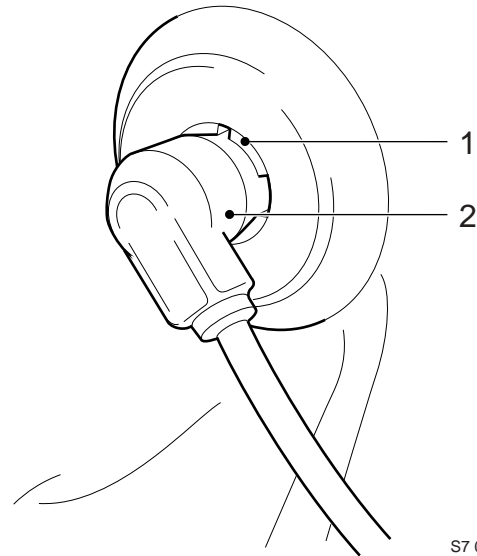
#### Installing wheel-speed sensor

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.

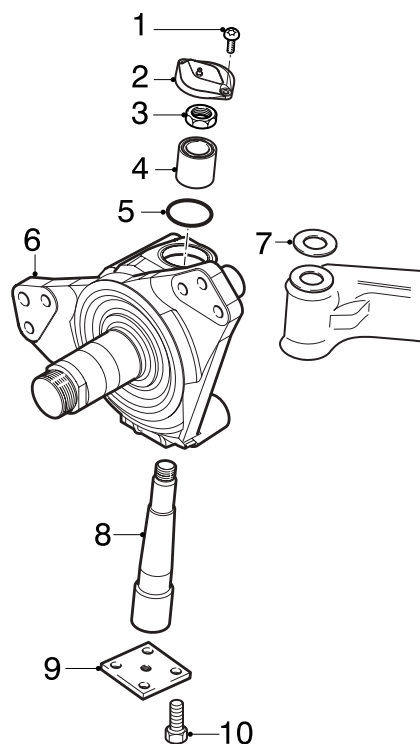


S7 00 796

3.8 REMOVAL AND INSTALLATION OF SWIVEL AXLE

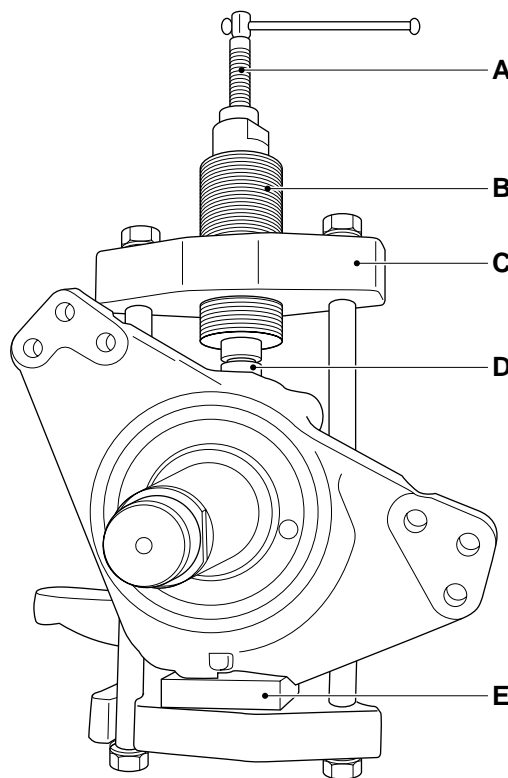
Removing swivel axle

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

- 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:**

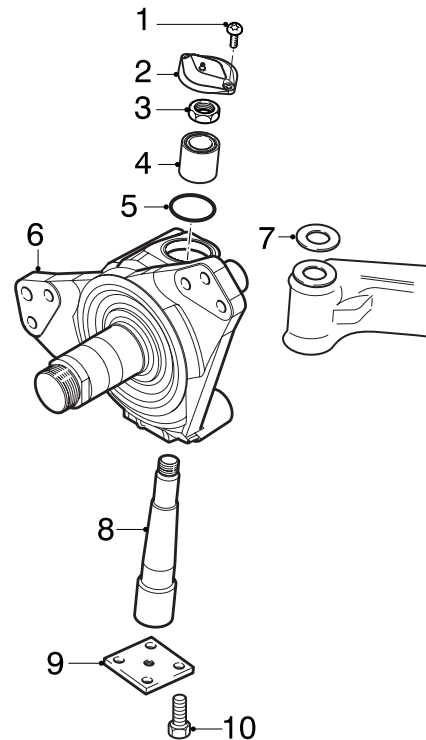
If the king pin (8) is not released, it can be "knocked out". Tap on the unused axle-end stop with a mallet.

- Take the king pin (8) out of the swivel axle (6). Make sure that none of the needles fall out of the needle bearings.
- Take the bearing bush (4) out of the swivel axle. Make sure that none of the needles fall out of the needle bearings.
- Take the swivel axle (6) off the axle end. Ensure that the adjusting ring (7) is kept safely and does not get lost.

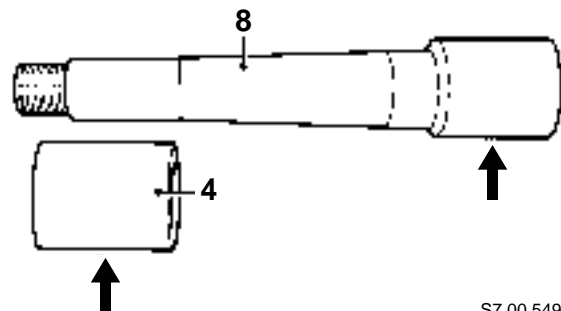
**Installing swivel axle**

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.

- Check the condition of the needle bearings.
- 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).
- Check the thrust bearing for wear.

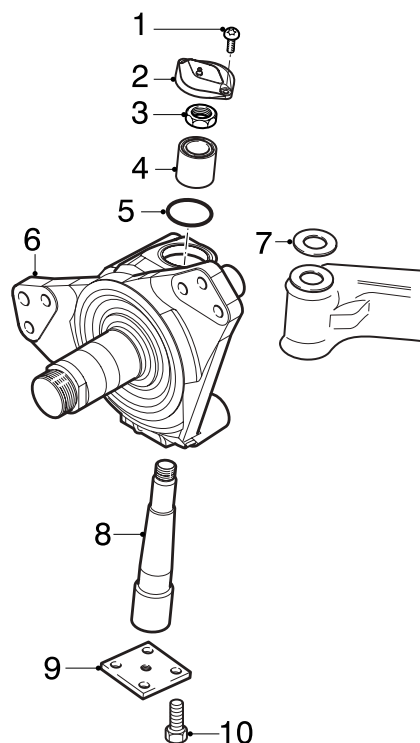


S7 00 538



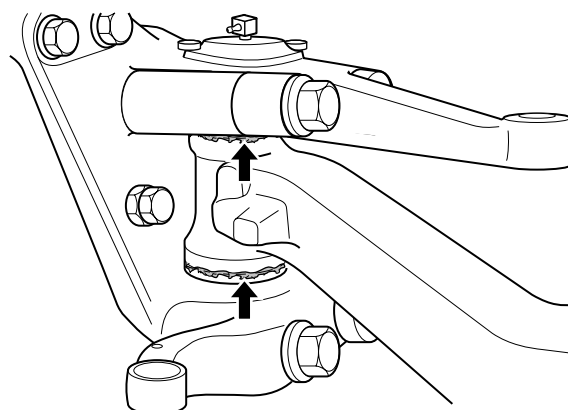
S7 00 549

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

8



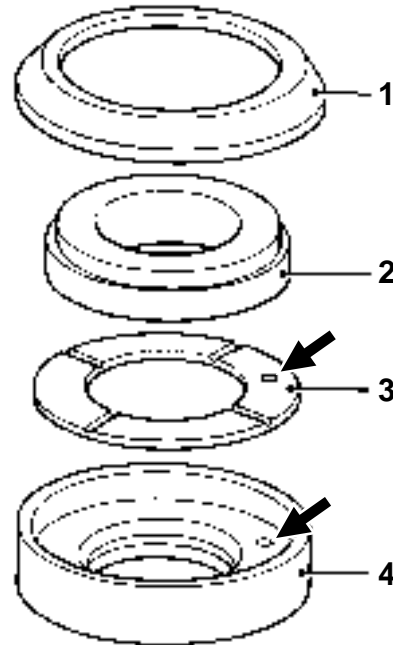
S7 00 545



### 3.9 REMOVAL AND INSTALLATION OF SPLIT THRUST BEARING

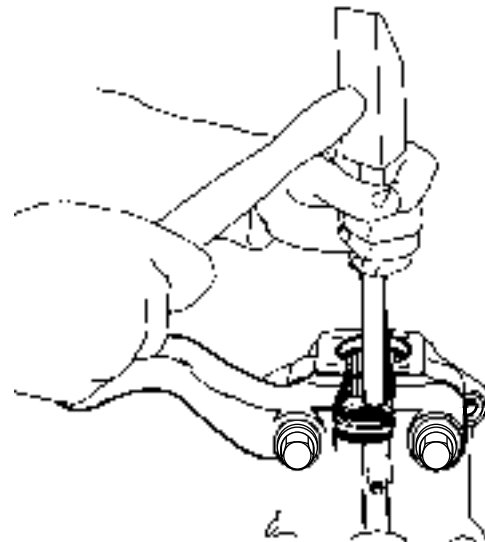
#### Removing split thrust bearing

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

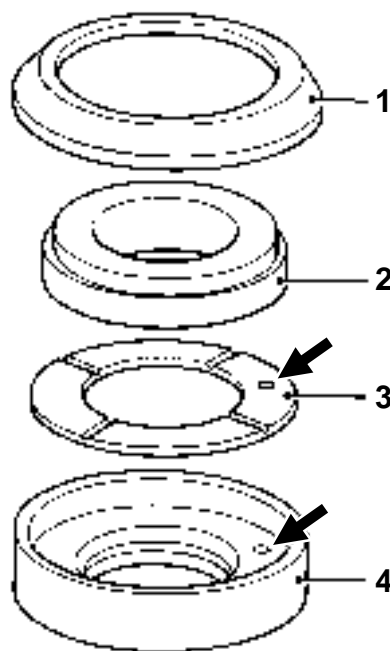
3. Tap the shoulder ring (4) out of the swivel axle using a driver. Make sure that none of the needles fall out of the needle bearings.



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.

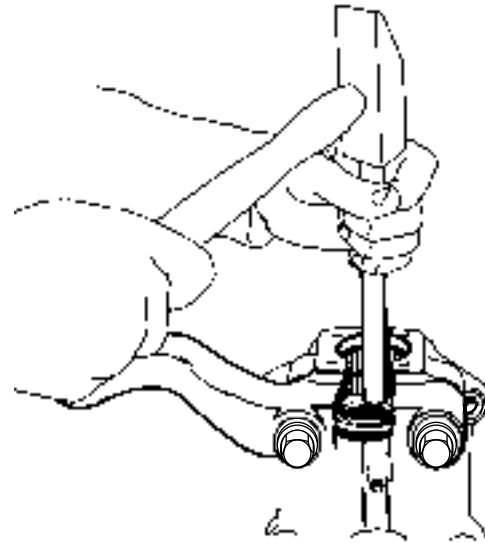


S7 00 114

### 3.10 REMOVAL AND INSTALLATION OF COMPOUND THRUST BEARING

#### Removing compound thrust bearing

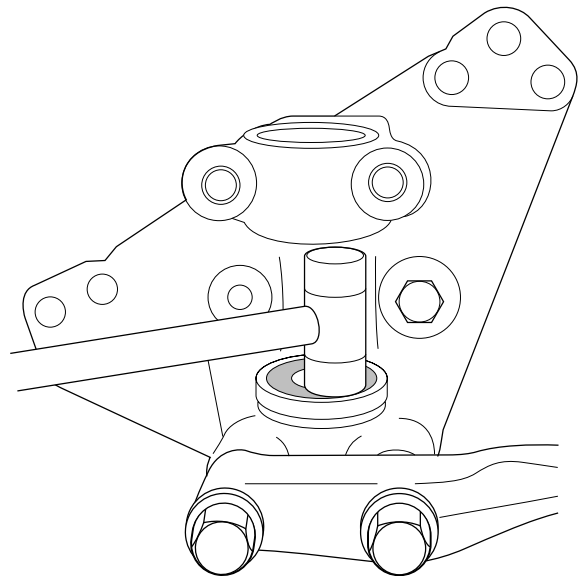
1. Take the swivel axle off the axle end.
2. Tap the entire thrust bearing out of the swivel axle using a driver. Make sure that none of the needles fall out of the needle bearings.



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).

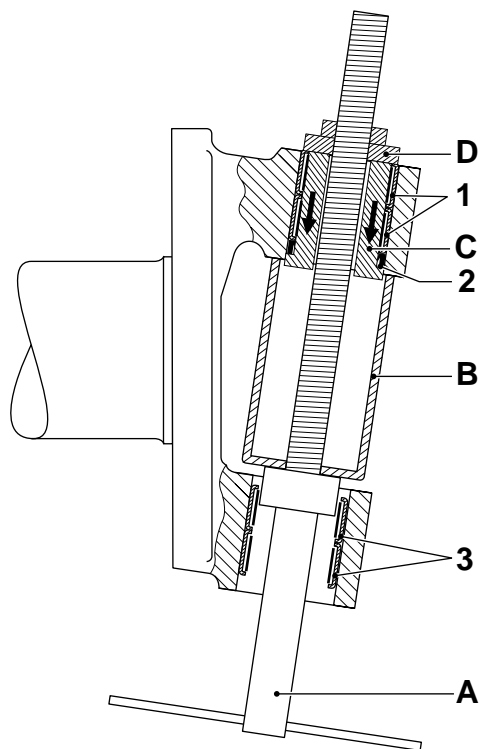
#### Installing needle bearings

1. To prevent the needle bearings from becoming damaged when they are inserted, use the special tool (DAF no. 0694827).

**Note:**

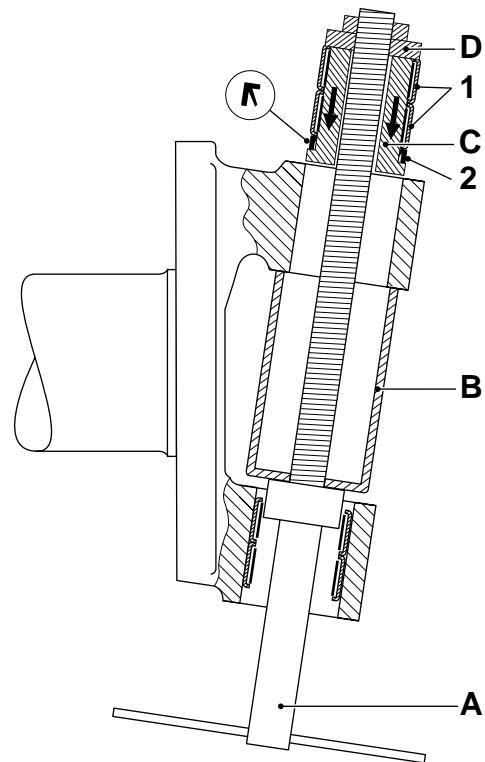
The needle bearings have different lengths. The longest needle bearings must be fitted in the bottom part of the swivel axle.

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.



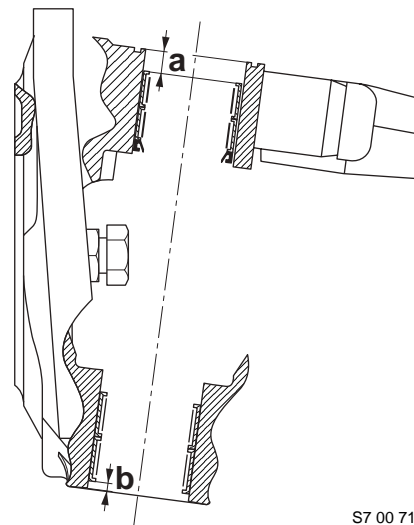
S7 00 548

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



## CONTENTS

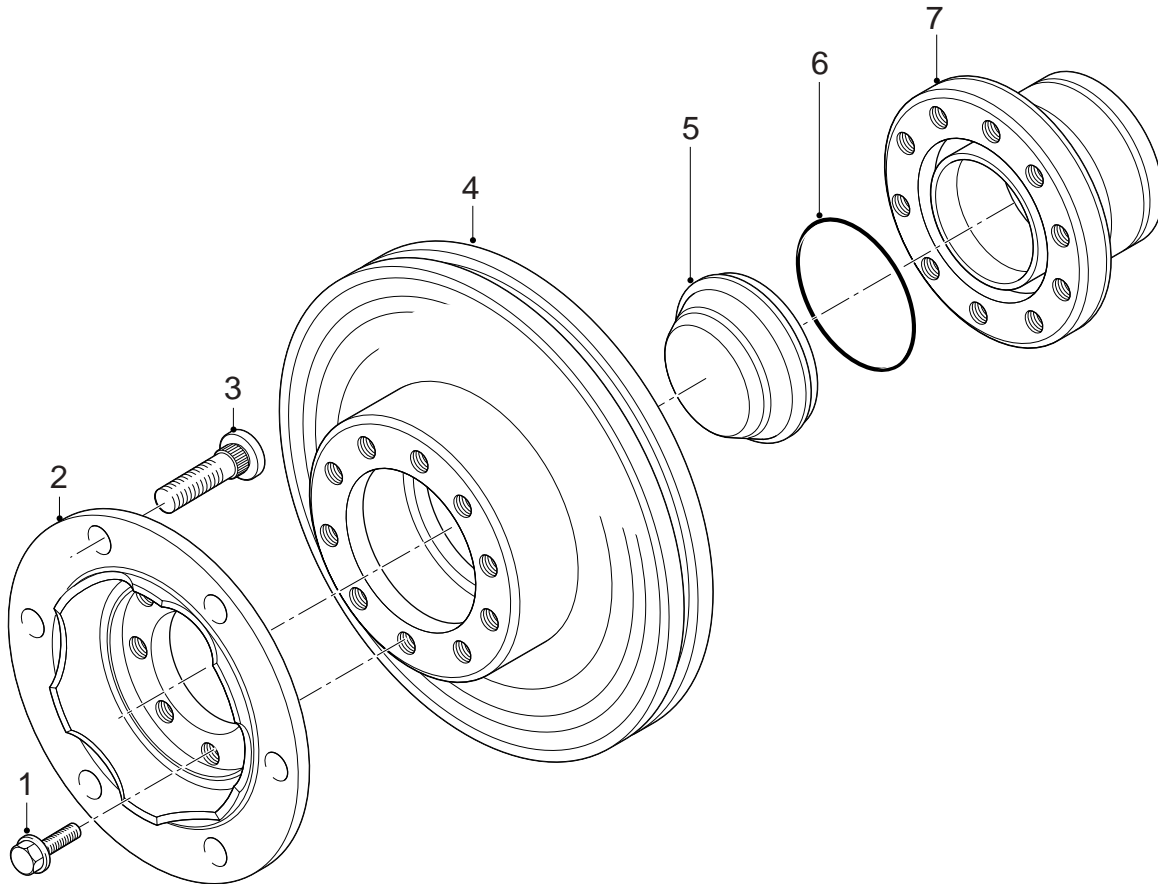
	Page	Date
<b>1. GENERAL</b> .....	1-1	200322
1.1 Overview drawing of wheel hub unit .....	1-1	200322
1.2 Overview drawing of swivel axle .....	1-2	200322
1.3 Description of wheel hub unit .....	1-3	200322
1.4 Description of the wheel settings .....	1-4	200322
<b>2. INSPECTION AND ADJUSTMENT</b> .....	2-1	200322
2.1 Checking the caster .....	2-1	200322
2.2 Checking camber angle .....	2-2	200322
2.3 Inspection and adjustment of toe .....	2-3	200322
2.4 Inspection and adjustment of wheel deflection .....	2-4	200322
2.5 Inspection and adjustment of steering cylinder .....	2-6	200322
2.6 Checking steering ball joint .....	2-7	200322
2.7 Checking trailing axle housing .....	2-9	200322
2.8 Checking wheel rim .....	2-11	200322
2.9 Checking wheel-speed sensor ring .....	2-12	200322
<b>3. REMOVAL AND INSTALLATION</b> .....	3-1	200322
3.1 Removal and installation of wheel .....	3-1	200322
3.2 Removal and installation of track rod .....	3-4	200322
3.3 Removal and installation of track-rod arm .....	3-5	200322
3.4 Removal and installation of steering cylinder .....	3-6	200322
3.5 Removal and installation of steering cylinder arm .....	3-8	200322
3.6 Removal and installation of wheel hub .....	3-9	200322
3.7 Removal and installation of compact bearing housing .....	3-10	200322
3.8 Removal and installation of wheel-speed sensor ring .....	3-12	200322
3.9 Removal and installation of wheel-speed sensor .....	3-13	200322
3.10 Removal and installation of trailing axle assembly .....	3-14	200322
3.11 Removal and installation of swivel axle .....	3-16	200322
3.12 Removal and installation of swivel axle bearings .....	3-20	200322





## 1. GENERAL

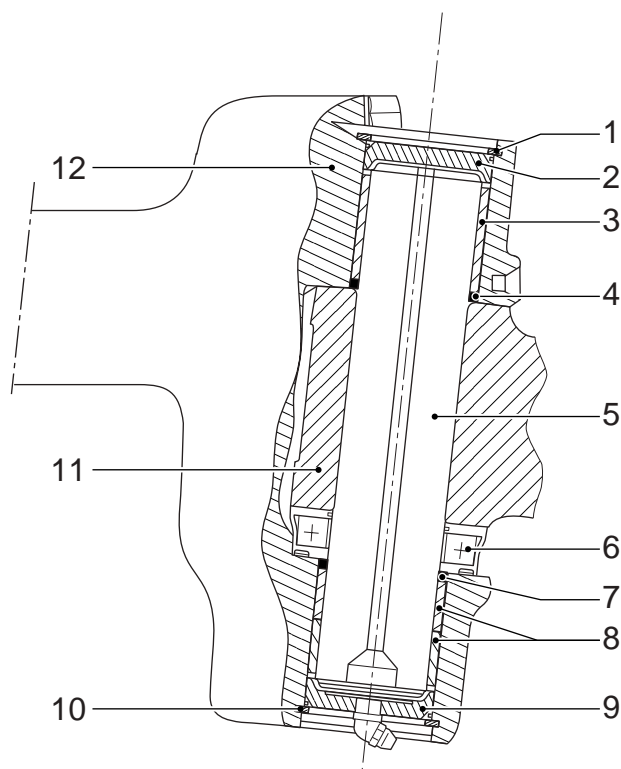
### 1.1 OVERVIEW DRAWING OF WHEEL HUB UNIT



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

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

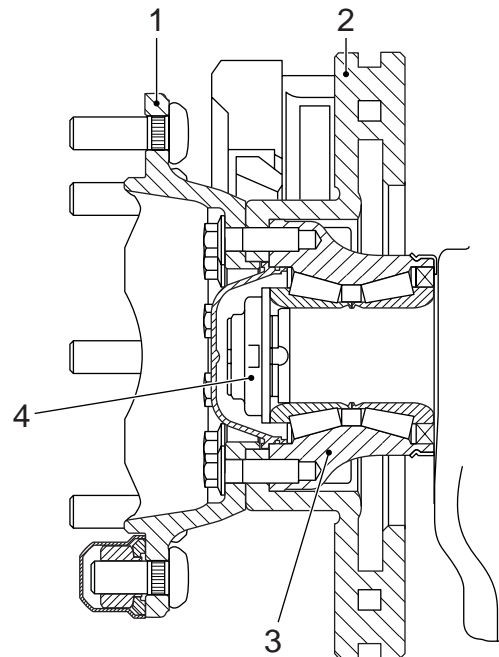
#### Wheel hub unit

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

## 1.4 DESCRIPTION OF THE WHEEL SETTINGS

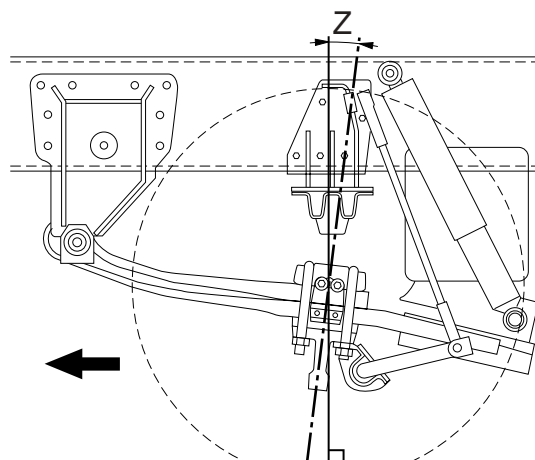
### Caster

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

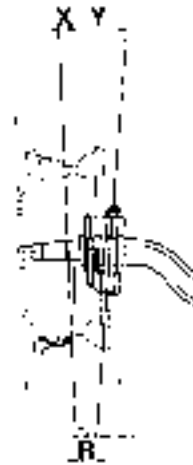
**Camber angle and king-pin inclination**

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.

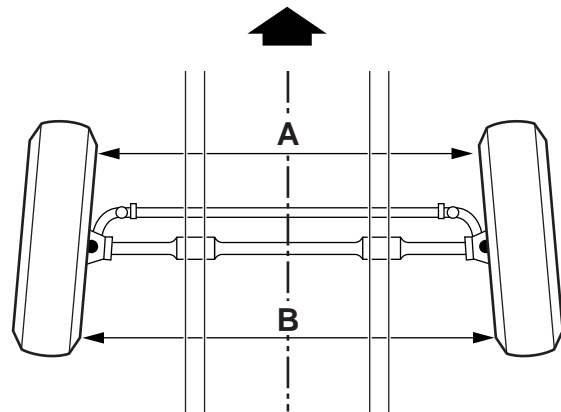
If distance A is smaller than B, this is called toe-in. If, however, distance A exceeds distance B, this is called toe-out.

Whether a vehicle should have toe-in or toe-out is determined by the manufacturer of the vehicle.

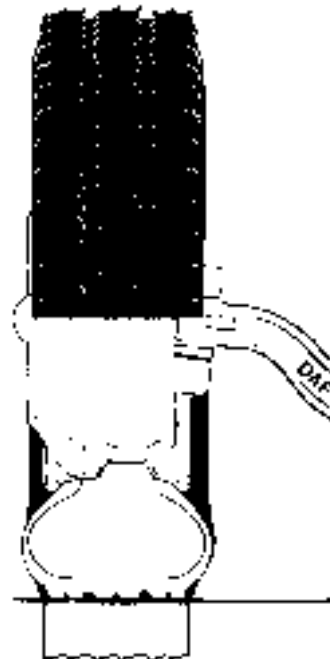
Toe-in or toe-out is required to ensure that the wheels have perfect rolling characteristics when the vehicle is driving straight ahead.

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



S7 00 126



## 2. INSPECTION AND ADJUSTMENT

### 2.1 CHECKING THE CASTER

#### General

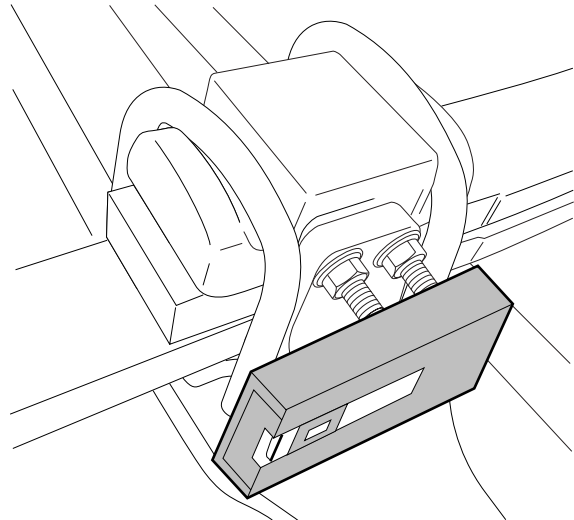
- The vehicle must be on a level and horizontal surface with the steering gear in the "straight ahead" position.
- The caster can be measured using an angle gauge or wheel alignment equipment.

#### 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

## 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

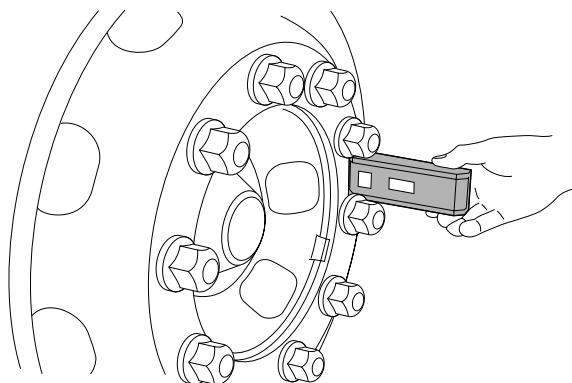
1. Thoroughly clean the side of the wheel hub and place the angle gauge against the surface. Keep the angle gauge vertical.
2. Read off the angle. See "Technical data" for the correct angle.

### 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".

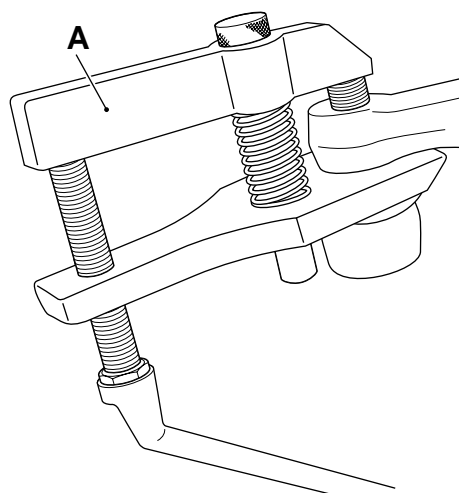
### Note:

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.

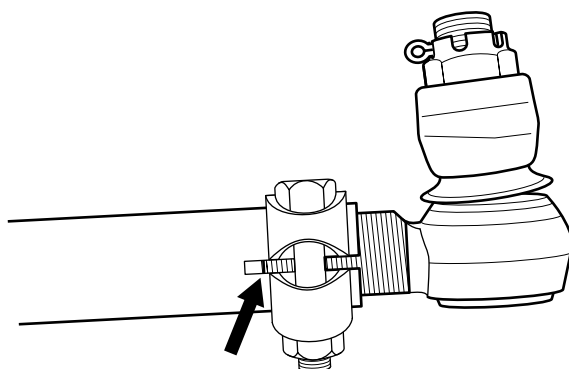


S7 00 555

**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. 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".

## 2.5 INSPECTION AND ADJUSTMENT OF STEERING CYLINDER

### Checking steering cylinder

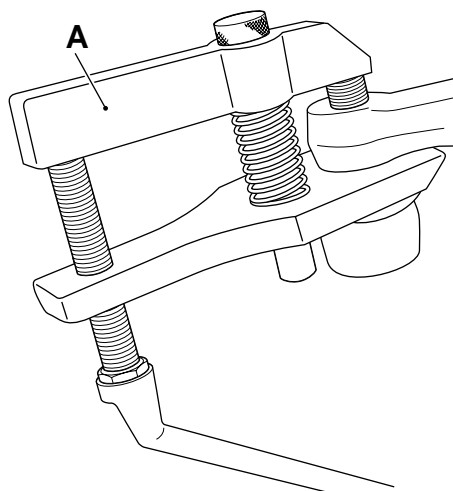
1. Check the steering cylinder for traces of external leaks.
2. Check the piston rod for damage.
3. Position turntables under the wheels of the front axle and trailing axle.
4. Fit alignment equipment.
5. Check the toe. If necessary, adjust the toe.
6. Check the wheel turning angle. If necessary, adjust 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).



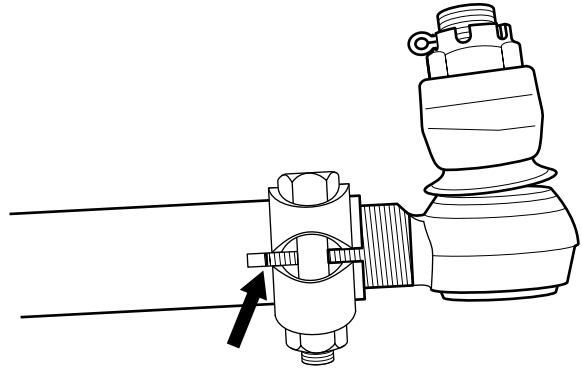
S7 00 555

- 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.

- Clean and check the clamping-bracket bolts. If the bolt is corroded or damaged, it must be replaced. Replace the self-locking nut.
- Tighten the clamping bracket bolts to the specified tightening torque, see "Technical data".
- Fit the ball ends to the steering cylinder arms. Tighten the castle nuts to the specified tightening torque, see "Technical data".
- Lock the castle nuts using new split pins.
- Check the operation of the RAS-EC system.

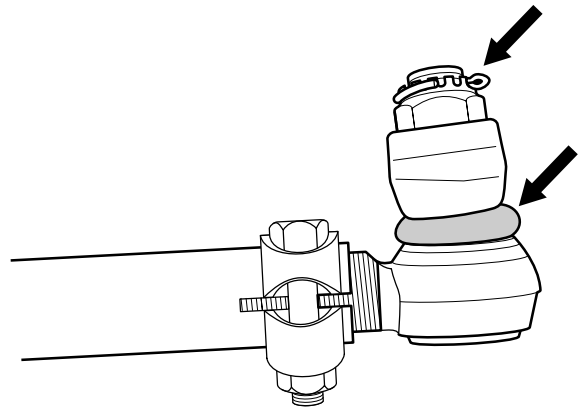


S7 00 026

## 2.6 CHECKING STEERING BALL JOINT

### Checking steering ball joint

- 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.
- Check for the presence of the split pin and its condition.



S7 00 540

### Checking axial steering ball joint play

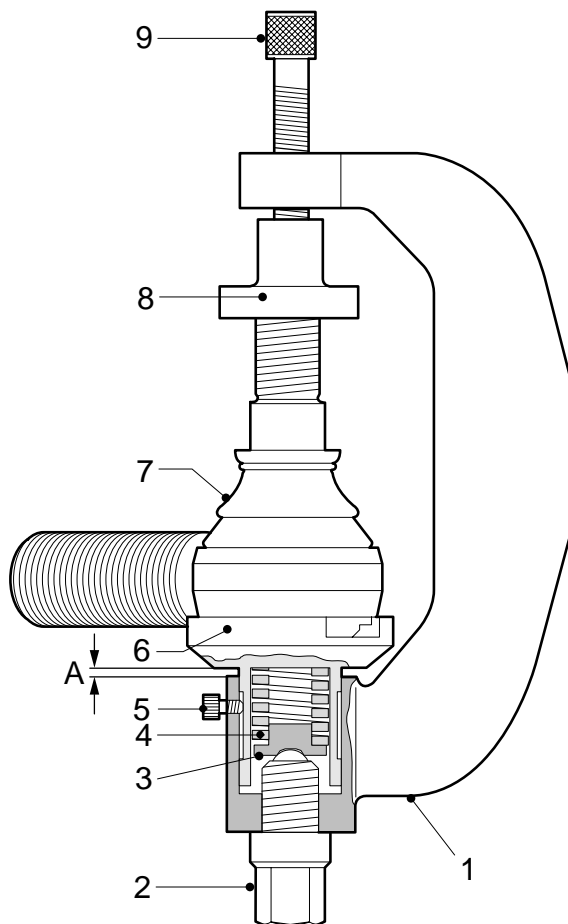
1. Check the axial steering ball joint play using the special tool (DAF no. 1329426).
2. Jack up the trailing axle until the wheels are clear of the floor. Put the axle on stands.
3. Make sure that the castle nut split pin (if present) does not come into contact with the ends of the threaded end.

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 (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

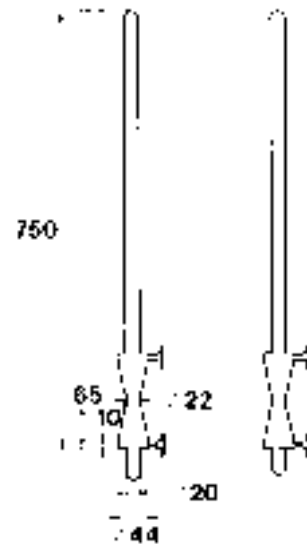
## 2.7 CHECKING TRAILING AXLE HOUSING

### 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.

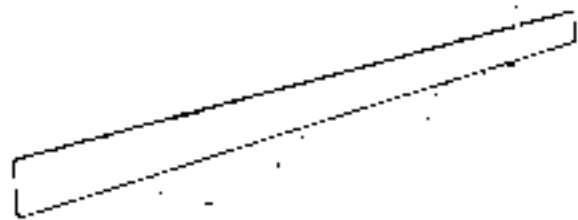
The special tools required cannot be obtained from DAF and must be manufactured by yourself.



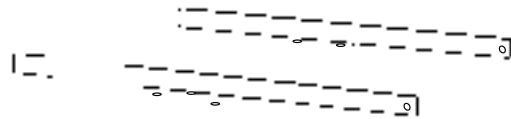
S7 00 119

### 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.



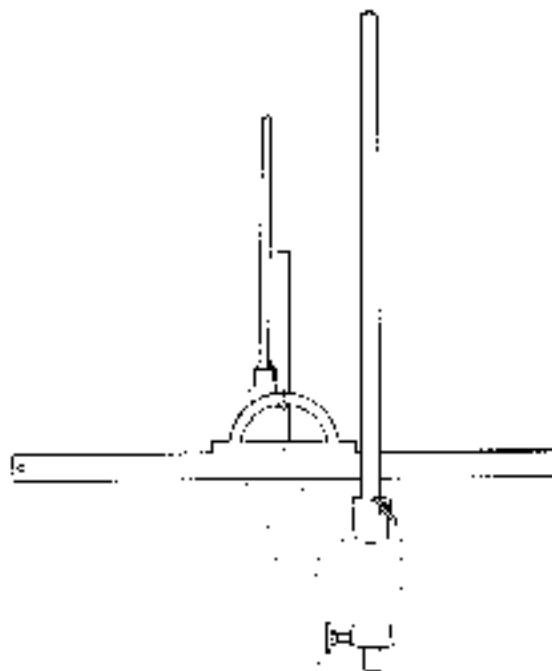
S7 00 151



S7 00 152

- 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  $90^\circ$ .



S7 00 149

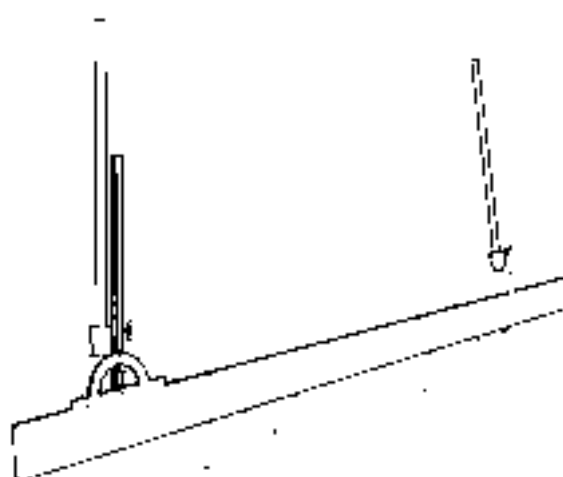
- Measure the king pin inclination (KPI) by placing a straight edge with a protractor on the spring seats.

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.

- 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.



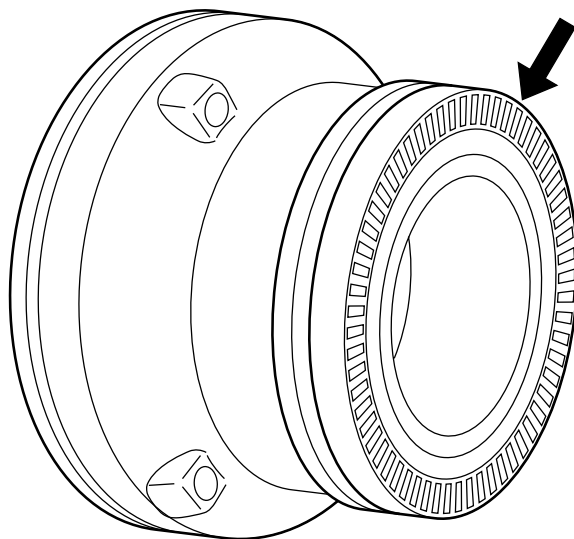
**If the paint layer is more than 50 microns thick in total (wash primer and finishing paint), the pre-tension of the wheel studs could be reduced if this layer were to be crushed. This could result in the wheel nuts coming loose.**

## 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:

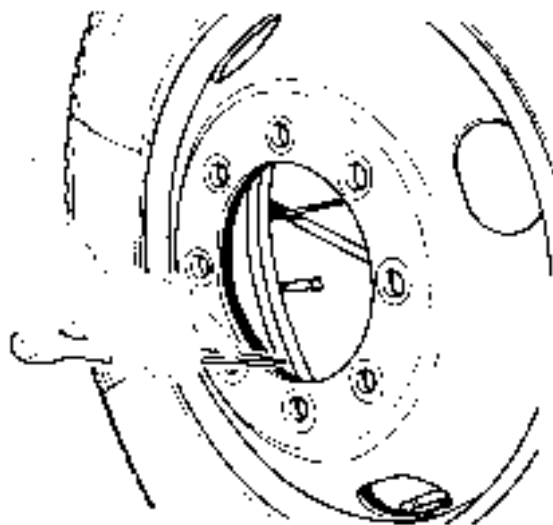
If a wheel stud is replaced, the other wheel studs on this wheel must also be replaced.

##### 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.

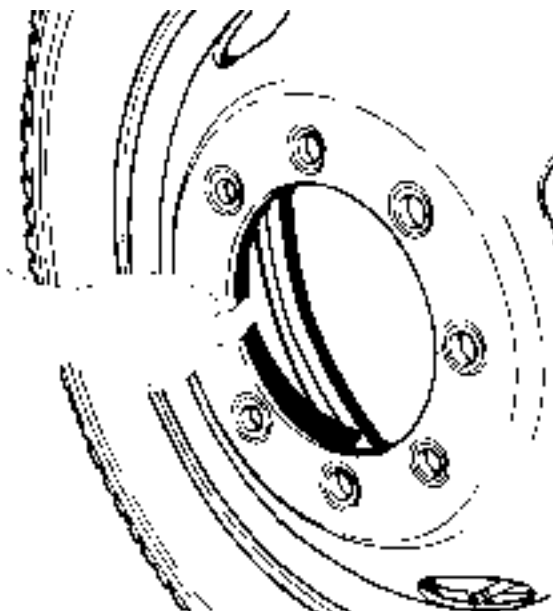
### Installing wheel

1. Clean the fitting edge of the wheel rim by scraping off dirt and corrosion with a scraper.



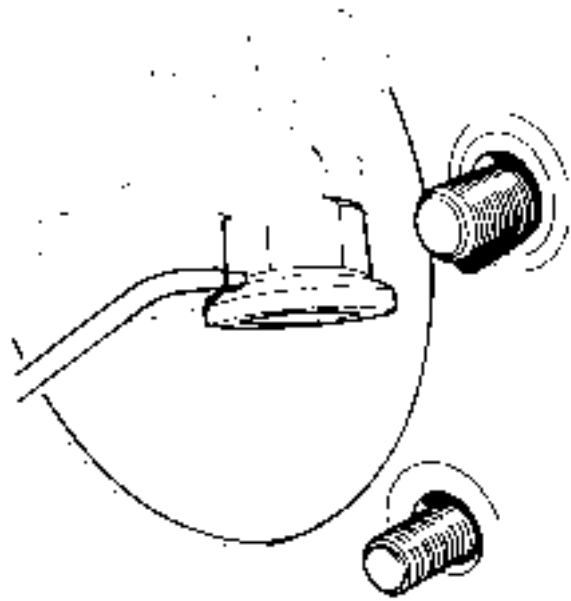
S7 00 096

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.



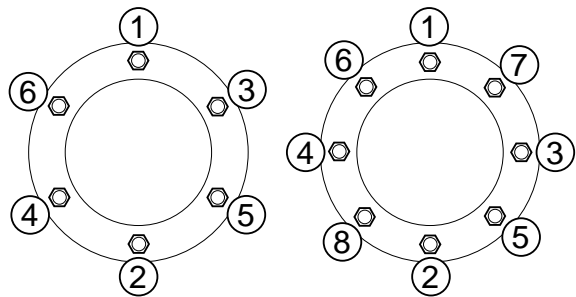
S7 00 097

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. See "Technical data" for the specified torque.

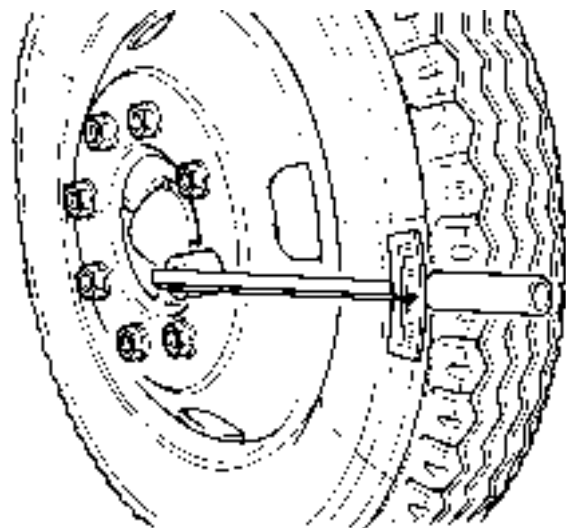


S7 00 631

**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.



S7 00 099

### 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).

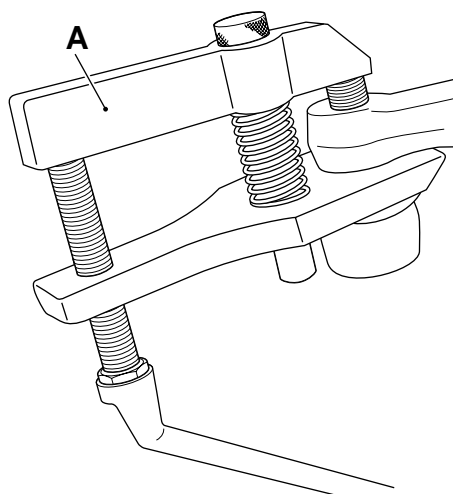
#### Installing track rod

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".

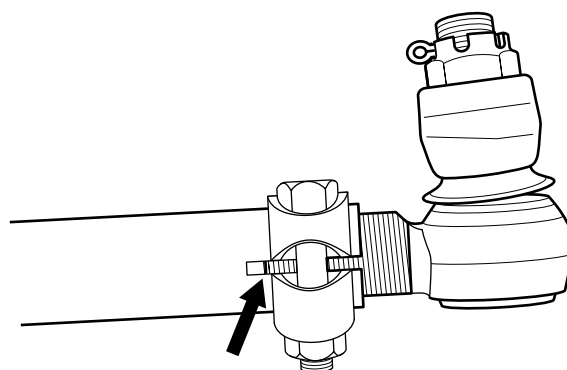
**Note:**

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".



S7 00 555



S7 00 026

### 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.

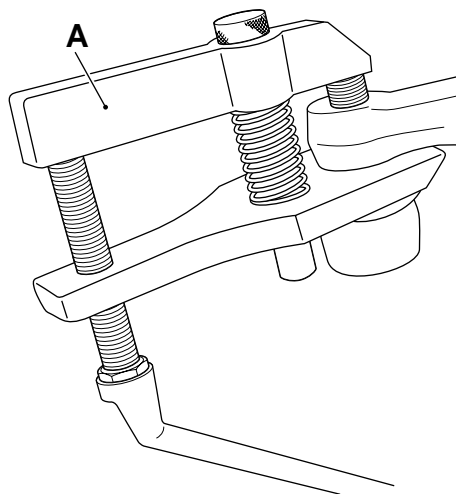
### 3.4 REMOVAL AND INSTALLATION OF STEERING CYLINDER

#### 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).



S7 00 555



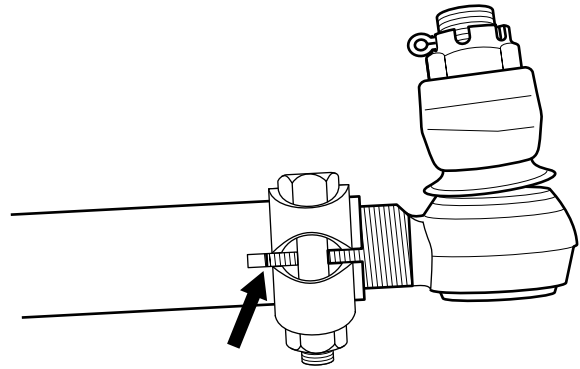
**Installing steering cylinder**

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.



S7 00 026

### 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.

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.

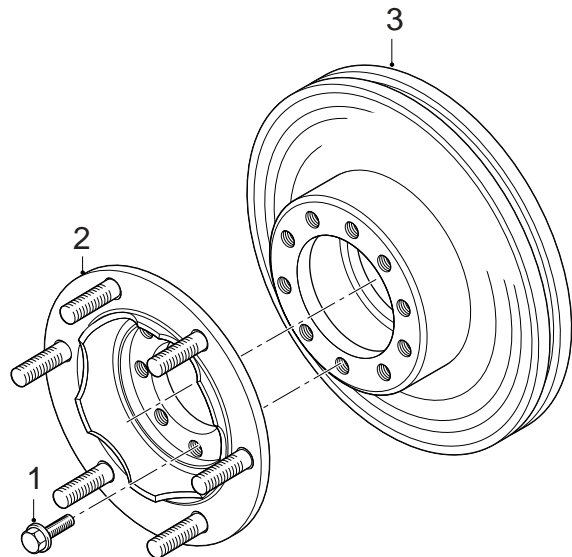
### 3.6 REMOVAL AND INSTALLATION OF WHEEL HUB

#### 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.

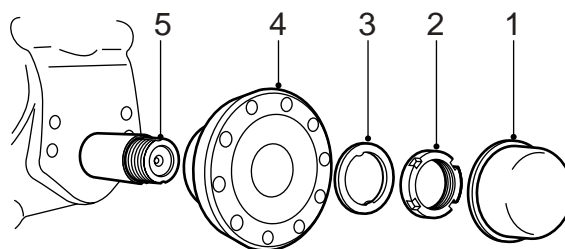


S7 00 802

### 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).



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.




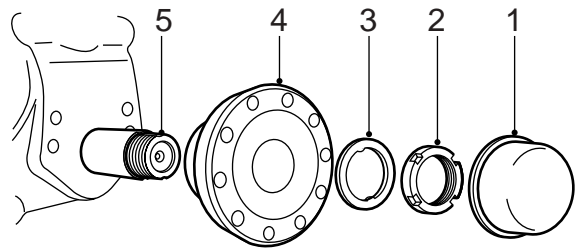
**Never fit the compact bearing housing to an axle journal with a damaged thread.**

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.

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 operation of the RAS-EC system.



S7 00 699

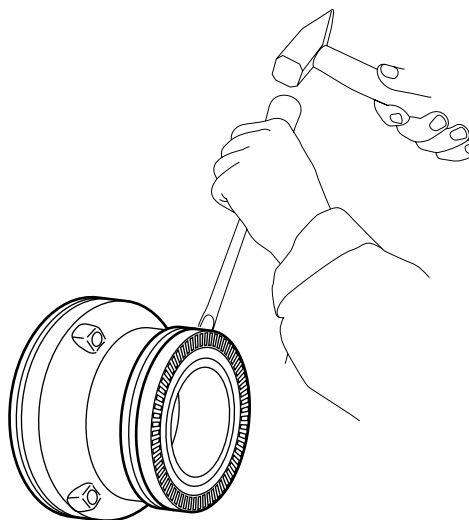
### 3.8 REMOVAL AND INSTALLATION OF WHEEL-SPEED SENSOR RING

#### 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).

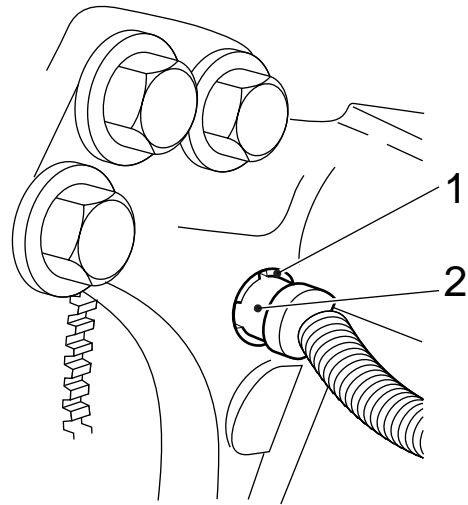
#### Installing wheel-speed sensor

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.**

5. Check the operation of the RAS-EC system.



S7 00 880

**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.

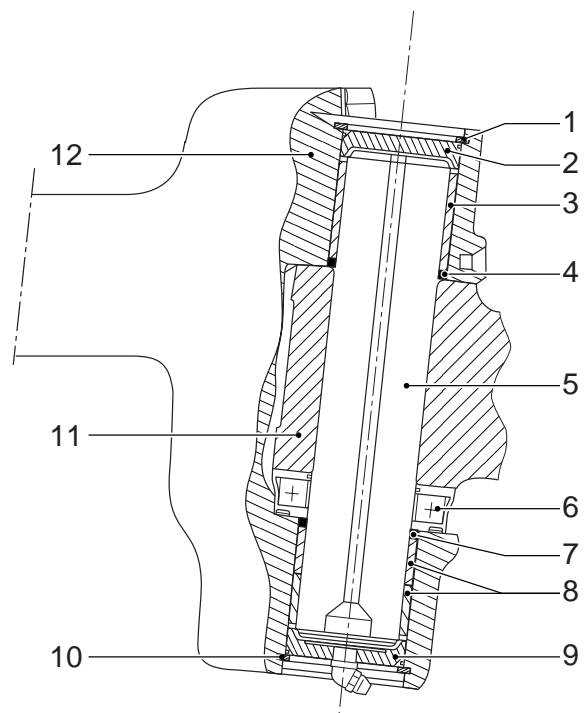
## 3.11 REMOVAL AND INSTALLATION OF SWIVEL AXLE



**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.



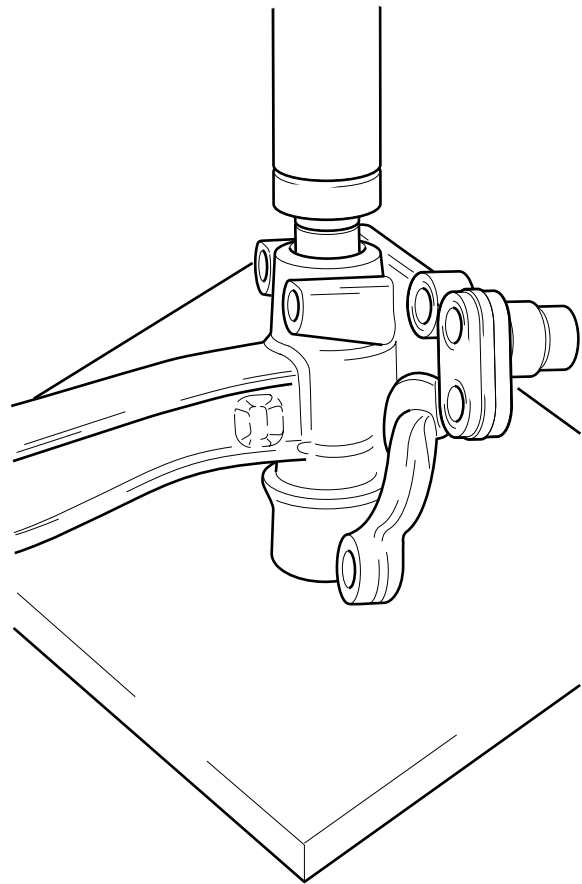
S 700 659

7. 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.



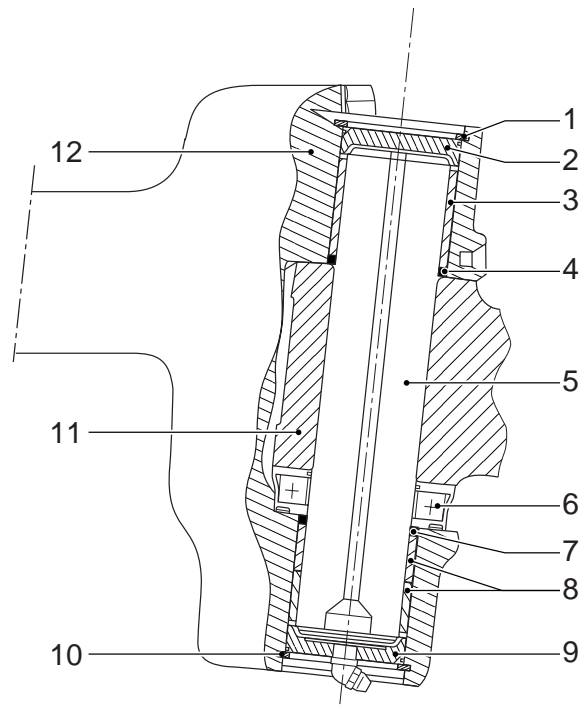
S7 00 730

### 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:**

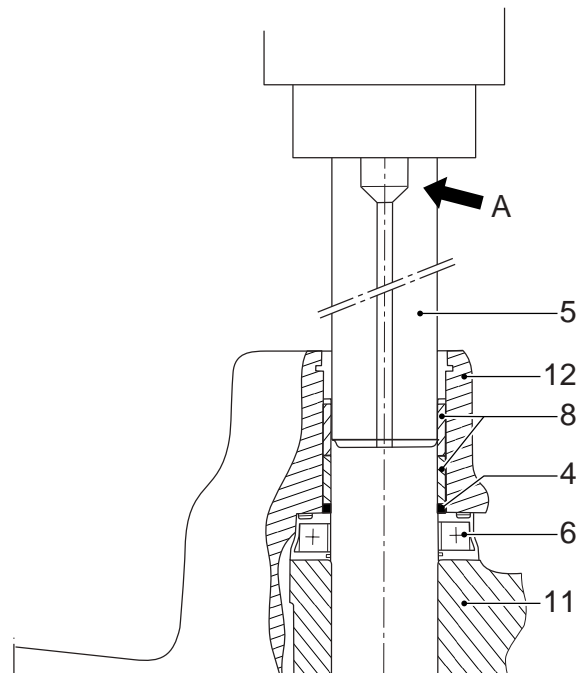
The large bore (A) in the king pin must be at the top.

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.



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.

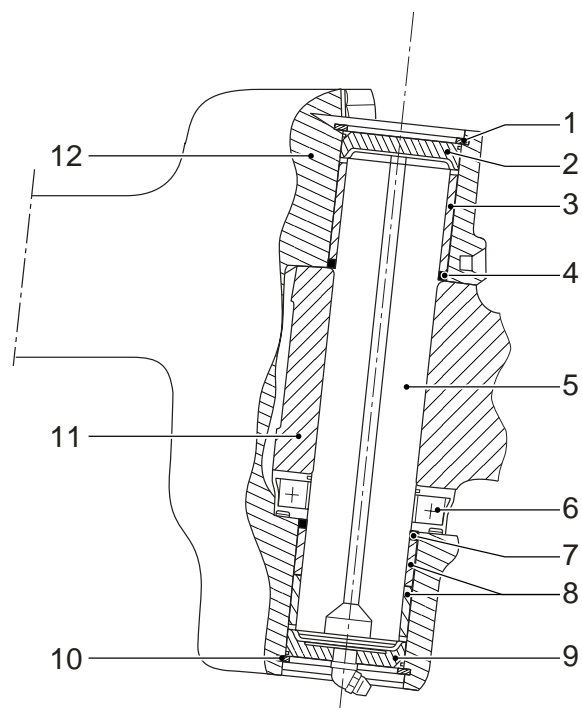
19. Fit the wheel speed sensor.

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.

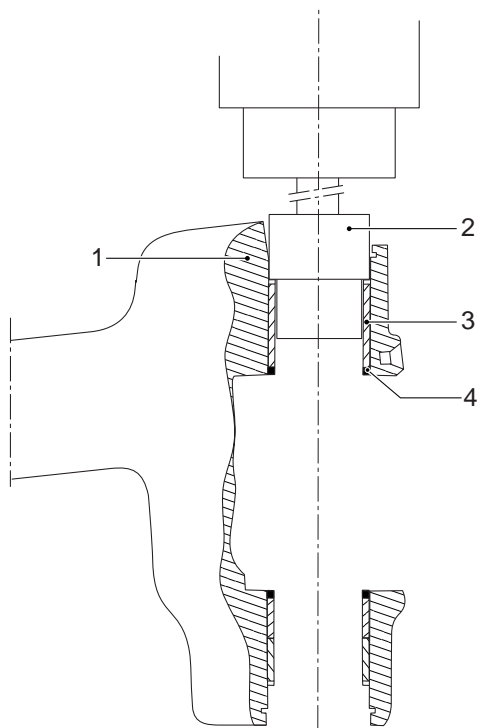


S 700 659

### 3.12 REMOVAL AND INSTALLATION OF SWIVEL AXLE BEARINGS

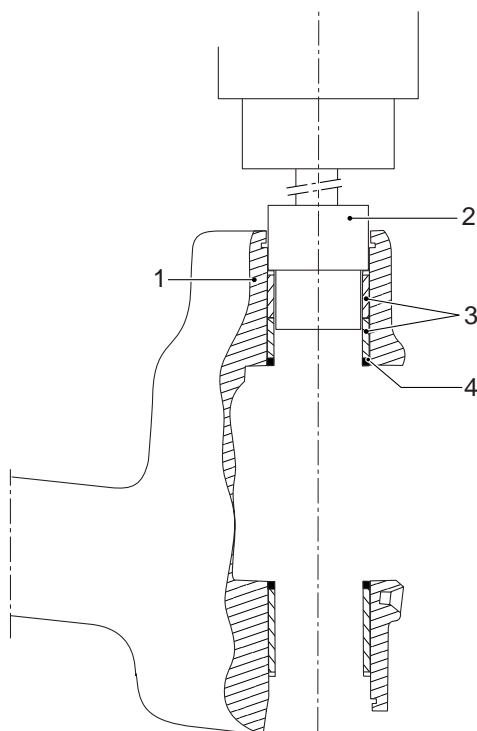
#### Removing swivel axle bearings

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

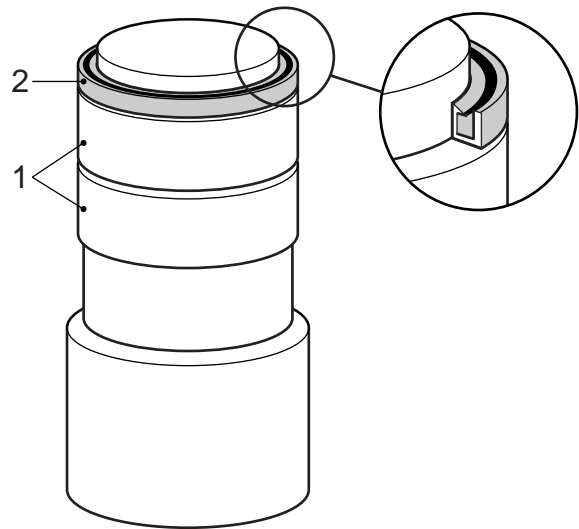
**Installing swivel axle bearings**

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.



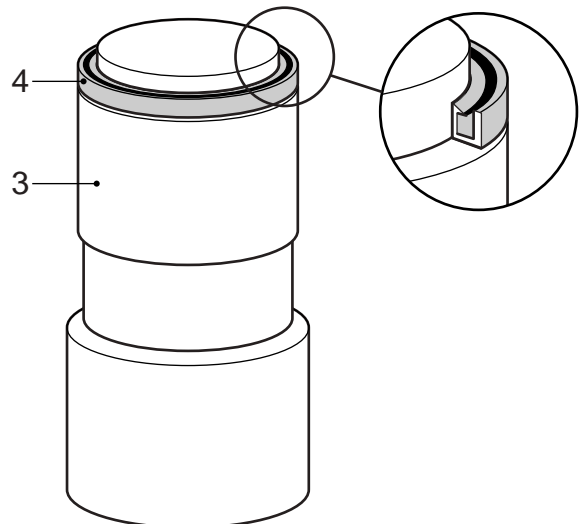
S7 00 701

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.



S7 00 702

