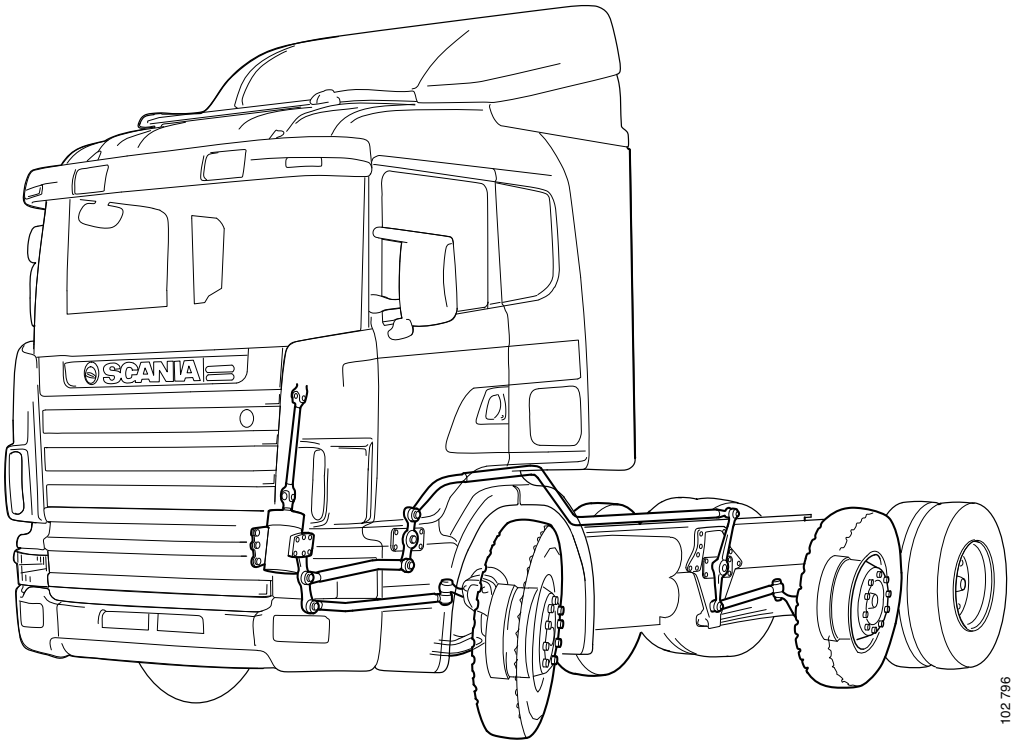
SCANIA

13:01-01

Issue 4.2 **en**

Linkage for double front axles and mechanically controlled tag axle

Function and work description



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Contents

Function description

General

Mechanically controlled tag axle in front of driving axle. The steering force is transferred mechanically to the tag axle by a steering linkage. Besides two intermediate droparms, the steering linkage includes a number of draglinks to transfer the steering force to the draglink arm of the tag axle.

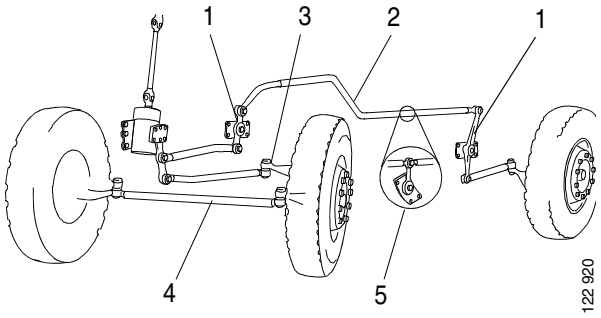
The linkage is always located on the left-hand side of the vehicle and transfers the steering force from the power steering gear to the left-hand wheel of the steered axle.

On right-hand drive vehicles, the power steering gear is located on the right-hand side, and the steering force is applied at the first axle right-hand wheel and transferred to the left-hand side by the track rod and by an additional draglink arm at the first axle left-hand wheel to the steering linkage which from there on is identical to the linkage on vehicles with left-hand drive.

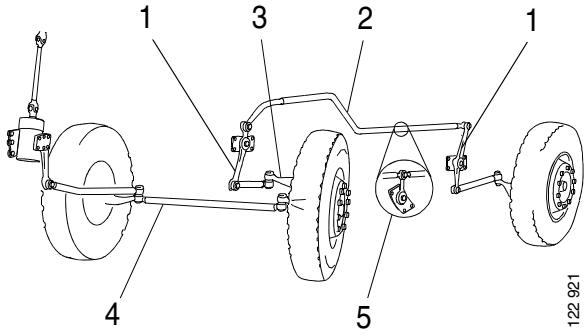
On vehicles with steered tag axle with an axle distance greater than 4,100 mm, there is also an intermediate droparm.

Since the tag axle is located close to the driving axle, it has a smaller wheel lock angle and therefore requires less steering force. On some vehicles, a hydraulic auxiliary cylinder is fitted to the steering system.

The auxiliary cylinder is supplied with oil directly from the power steering gear and works together with the power steering gear as a part of the power steering system.



Steering design, steered tag axle (LHD vehicles)



Steering design, steered tag axle (RHD vehicles)

1 *Intermediate droparm*
2 *Draglink*
3 *Draglink arm*
4 *Track rod*
5 *Intermediate droparm*

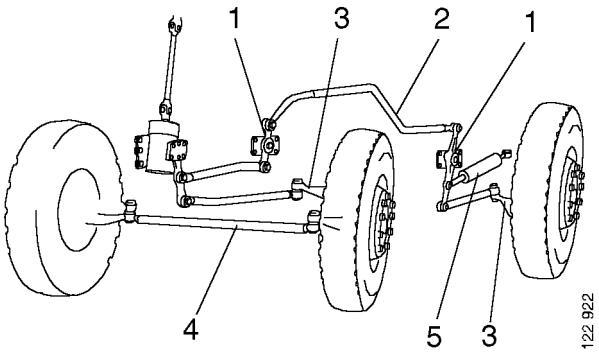
Double front axles

Apart from a hydraulic auxiliary cylinder which is always fitted at the second axle, vehicles with double front axles have a steering system similar to that of a mechanically controlled tag axle.

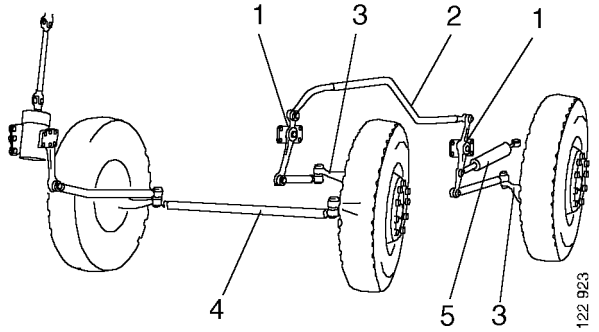
On vehicles with double front axles and a hydraulically controlled tag axle behind the driving axle, the hydraulic auxiliary cylinder is replaced with a master cylinder with two functions.

It serves as master cylinder for the hydraulically controlled tag axle and has an integrated auxiliary cylinder function for the rearmost front axle.

The auxiliary cylinder is supplied with oil directly from the power steering gear and is completely separated from the hydraulic circuit of the tag axle.



Steering design, double front axles (LHD vehicles)



Steering design, double front axles (RHD vehicles)

1 *Intermediate droparm*
2 *Draglink*
3 *Draglink arm*
4 *Track rod*
5 *Auxiliary cylinder*

Work description

General

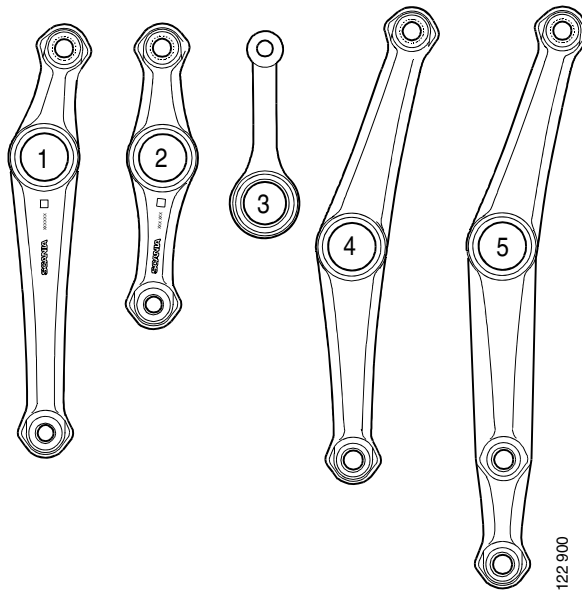
For repairs on front axles, for example king pin bearings, hubs and links, see Workshop Manual main group 7.

For repairs on the suspension system, see Workshop Manual main group 12.

After repairs on the steering system, it is often necessary to check and adjust wheel angles, straight-ahead position, axle alignment and axle weight distribution to avoid abnormal tyre wear on any of the wheels of the steered axles, especially on vehicles with double front axles. See Workshop Manual main group 13 "Measuring wheel angles" and "Axle weight distribution and axle alignment on vehicles with two steering axles in front of a driving axle".

The design of intermediate droparms may vary depending on the vehicle wheel configuration and whether the vehicle is right-hand or left-hand drive.

Before adjusting and when driving on poor road surfaces, check that the supporting journal of the intermediate droparms is fitted the right way round and at the correct position.



1 Intermediate droparm (front, RHD)
2 Intermediate droparm (front, LHD)
3 Intermediate droparm
4 Intermediate droparm (rear)
5 Intermediate droparm (rear, double front axles)

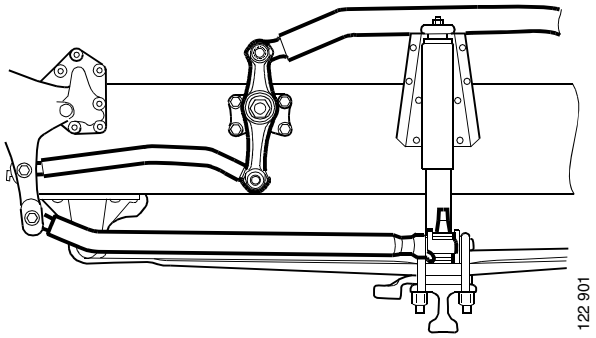
Front intermediate droparm

Applicable to double front axles as well as steered tag axles.

On vehicles with air suspension, check that the draglink is in parallel with the torque rods.

On vehicles with leaf spring suspension, check that the draglink has an equal amount of movement above and below the horizontal plane during upward and downward spring motion. If not, the draglink arm has to be renewed; see Workshop Manual main group 13 "Axle weight distribution and axle alignment on vehicles with two steering axles in front of a driving axle".

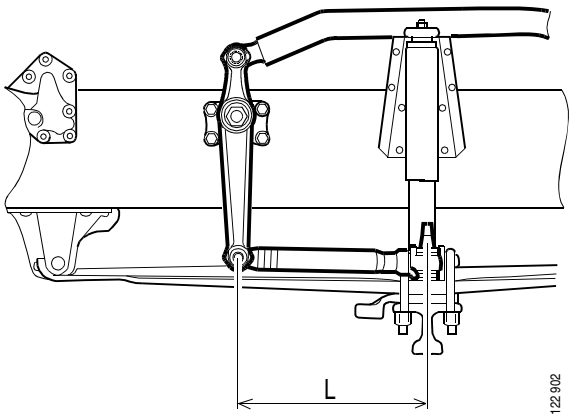
Check the position of the supporting journal; the grease nipple should be turned downwards.



Front intermediate droparm on LHD vehicle.

On right-hand drive vehicles, check that the length of the short draglink on the left-hand side is within the basic setting range.

IMPORTANT! Vehicles with a front axle with air suspension that are manufactured before April 2009 have an older draglink with setting dimension 438.5 mm. The older draglink could collide with the shock absorber and must therefore be replaced. The older draglink cannot be adjusted to 468 mm since the thread on the ball joint is too short and could release from the draglink pipe.



Front intermediate droparm on RHD vehicle.

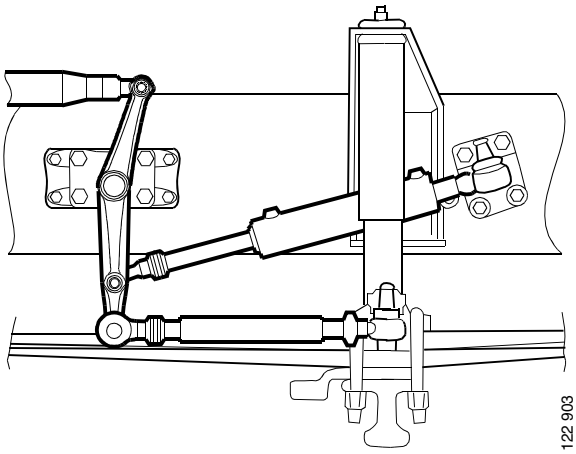
L = 444 +/- 2 mm for front axle with leaf spring suspension

L = 468 +/- 2 mm for front axle with air suspension

Rear intermediate droparm

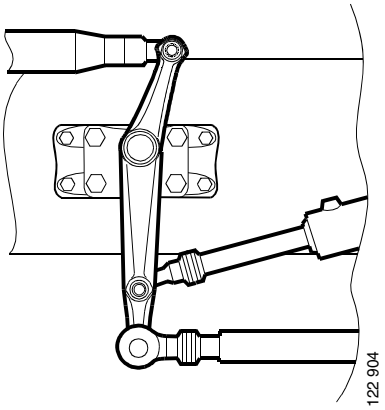
Standard version vehicles with double front axles and an axle distance of 1,940 mm should have the illustrated design.

On vehicles with air suspension, check that the hydraulic cylinder is fitted to the upper bracket on the frame and that the draglink is parallel with the torque rods.



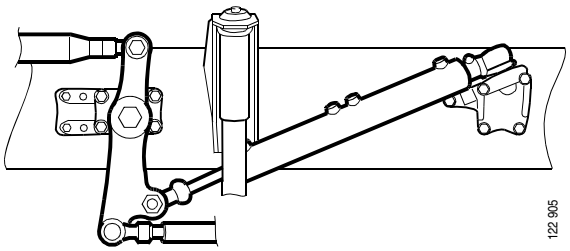
On vehicles with leaf spring suspension, check that the hydraulic cylinder is fitted to the lower bracket on the frame and that the draglink has an equal amount of movement above and below the horizontal plane during upward and downward spring motion. If not, the draglink arm has to be renewed; see Workshop Manual main group 13 "Axle weight distribution and axle alignment on vehicles with two steering axles in front of a driving axle".

Check the position of the supporting journal; the grease nipple should be turned upward.



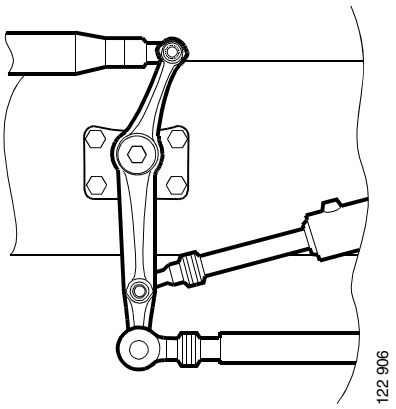
If the vehicle is fitted with the "Big wheels" alternative, 14.00 R 20, 395/85 R20, and all dimensions with 24 inch rim, the grease nipple of the supporting journal should be turned downward.

Vehicles with double front axles and hydraulically controlled tag axle behind the driving axle have an intermediate droparm of a different design and the supporting journal is fitted further to the rear in its bracket. The grease nipple should be turned upward; apart from that, the same applies as for standard version vehicles.



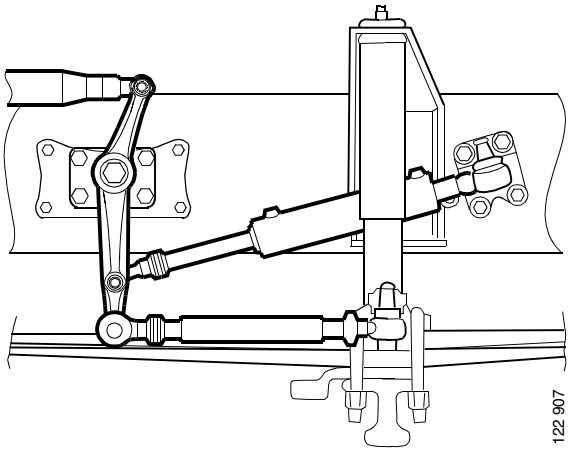
On all-wheel driven vehicles with double front axles, the supporting journal should be fitted with the grease nipple downwards. Also, on all-wheel driven vehicles, there is no mounting plate for the supporting journal; instead, the supporting journal is mounted directly on the frame.

There are no exchangeable draglink arms for all-wheel driven vehicles.



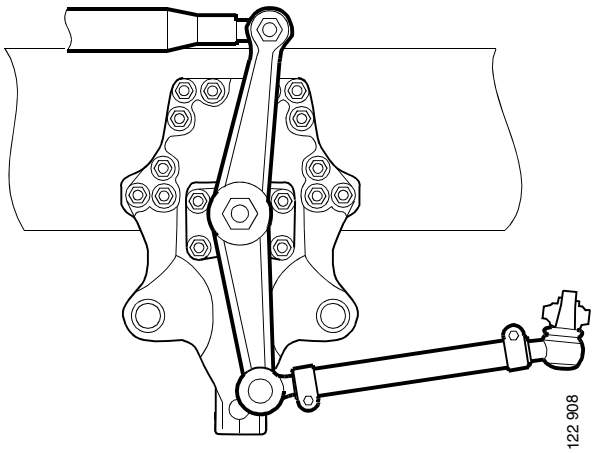
Vehicles with double front axles and an axle distance of 1,795 mm have a different mounting plate for the supporting journal but are, apart from that, identical to vehicles with the longer axle distance.

The mounting plate for the supporting journal should be turned according to the illustration with the text "TOP" facing upwards. The supporting journal should be turned with the grease nipple downwards.



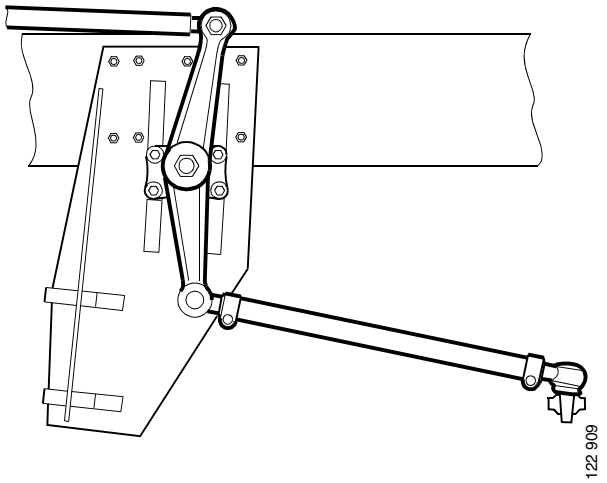
Vehicles with a mechanically controlled tag axle in front of the driving axle, without driven front axle, should have the supporting journal turned with the grease nipple downwards.

On these axles, the draglink should not be horizontal, but it should lean slightly upwards and rearwards.

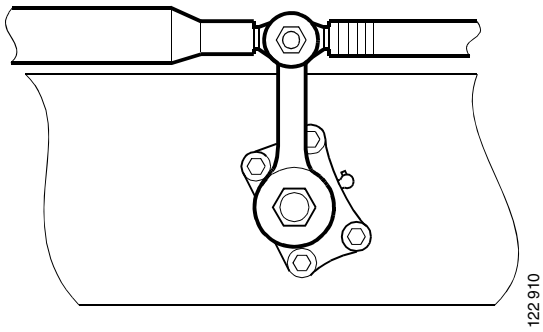


Vehicles with mechanically controlled tag axle in front of the driving axle, with driven front axle, should have the supporting journal turned with the grease nipple downwards.

On these axles too, the draglink should not be horizontal, but it should lean downwards and rearwards.



Vehicles with mechanically controlled tag axle in front of the driving axle and an axle distance greater than 4,100 mm have an intermediate droparm which should be fitted with the grease nipple turned rearwards.



Checking intermediate droparm play

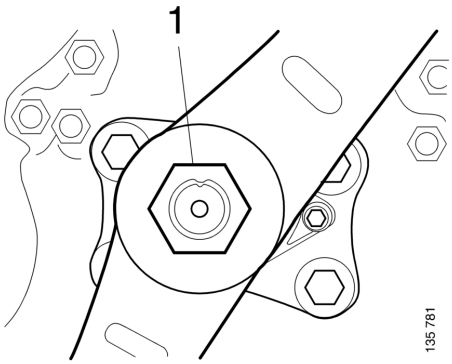
Tools

Number	Designation	Illustration	Tool board
98 075	Dial gauge with magnetic stand		D2

1 Support the vehicle on stands and remove the wheel.

2 Check that the lock nut is tightened to the correct torque, 170 Nm.

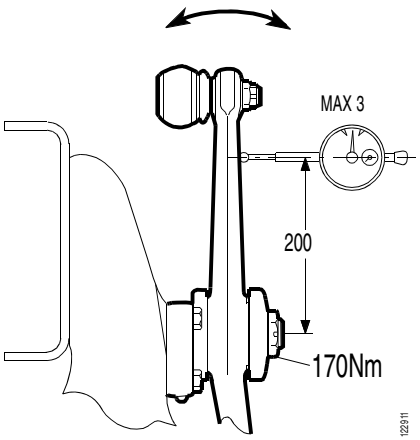
Note: If the lock nut moves, it must be locked again.



1 Lock nut

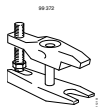
3 Measure the play 200 mm from the bearing centre using a dial gauge. See picture. Make sure you measure the play and not the axial clearance.

If the play is greater than 3 mm, the arm must be removed and the bearing bushes must be renewed.



Removal

Tools

Number	Designation	Illustration	Tool board
99 372	Puller		AM3

Intermediate droparm

1 Lift up the tag axle.

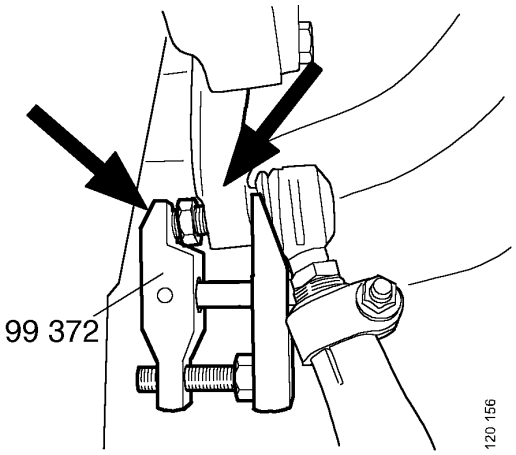
2 Support the vehicle on stands and remove the wheel.

3 Mark the position of the intermediate droparm before removal. The arm must be turned in the same direction when fitting.

4 Remove the split pin and loosen the castle nut on the upper draglink ball joint but let the nut remain on the outermost part of the thread.

5 Fit puller 99 372 and set it on the ball joint so that the upper and lower parts are parallel.

IMPORTANT! The tool must not push the ball joint apart, only place the ball joint under tension.



6 Tighten the puller by hand with an open end spanner.

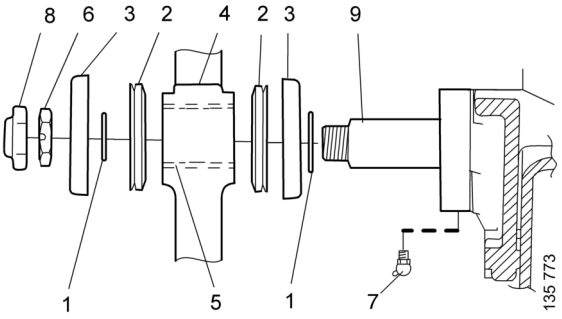
7 Tap the puller until the ball joint comes loose. It is also possible to tap the outside of the intermediate droparm (see arrows on illustration). Use a counterhold if necessary.

8 Move the hub so that the lower ball joint is released and there is space for the puller. Remove the lower draglink ball joint; refer to steps 4-6.

9 Remove the protective cap, lock nut, sealing washer, O-ring and V-ring seal.

10 Remove the intermediate droparm from the supporting journal.

11 Remove the inner seal and the O-ring from the supporting journal. Wipe the supporting journal clean and check it for damage and wear. In case of damage or wear it must be renewed, part number 1 515 668.



1 *O-ring*
2 *V-ring seal*
3 *Sealing washer*
4 *Intermediate droparm*
5 *Slide bearing*
6 *Lock nut*
7 *Grease nipple*
8 *Protective cap*
9 *Supporting journal*

Intermediate droparm on vehicles with an axle distance greater than 4,100 mm

1 Mark the position of the intermediate droparm before removal. The arm must be turned in the same direction when fitting.

2 Also mark the positions of the draglinks in relation to each other.

3 Remove the split pin, the castle nut and the through bolt from the draglinks.

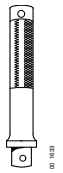
4 Remove the protective cap, lock nut, sealing washer, O-ring and V-ring seal.

5 Remove the intermediate droparm from the supporting journal.

6 Remove the inner seal and the O-ring from the supporting journal. Wipe the supporting journal clean and check it for damage and wear. In case of damage or wear it must be renewed, part number 1 515 668.

Renewing the supporting journal

Tools

Number	Designation	Illustration	Tool board
98 450	Shank	 98 450	R2, AD2, AM1
99 415	Drift		AM3

Renewing the front supporting journal

Note: On vehicles up to the following chassis numbers:

Scania Södertälje	2 017 605
Scania Zwolle	5 148 685
Scania Angers	9 110 724
Scania Latin America	3 588 192

The supporting journal is secured with 14 mm bolts. On vehicles after these chassis numbers, the supporting journal is secured with 16 mm bolts.

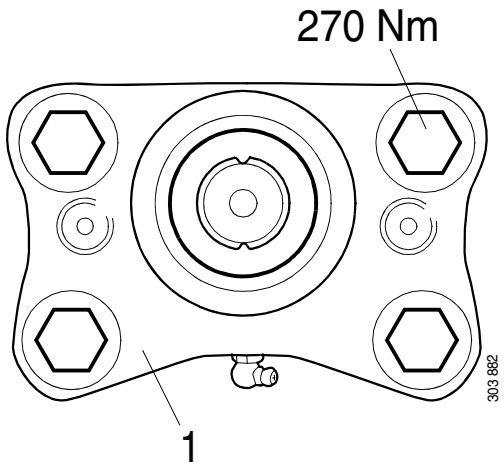
When renewing the supporting journal on vehicles manufactured up to the chassis numbers specified above, the frame holes must be drilled or reamed in order to fit the new supporting journal. If the supporting journal is secured with 14 mm bolts, there is a risk that the bolted joints will lose clamping force and the supporting journal will come loose.

1 Loosen the four bolts.

2 If the frame holes are made for 14 mm bolts, drill or ream the holes to 16 mm.

IMPORTANT! Do not change the position of the supporting journal. Use the old supporting journal as a drilling template.

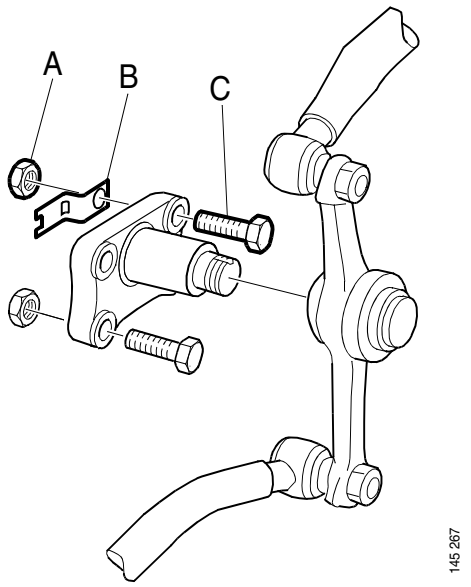
3 Fit the new supporting journal. Tightening torque 270 Nm (M16).



1. New supporting journal for 16 mm bolts

4 Screw the connection hose bracket onto the inside of the frame.

Note: The old connection hose bracket is too soft, which could cause the bolted joint to lose clamping force. If the old type of bracket is fitted, it must be replaced with the new type of harder material; see the table below.



A. Nut
B. Connection hose bracket
C. Bolt

Designation	Discontinued part	New part
Connection hose bracket	377 624	1 772 808

Renewing rear supporting journal located in centre of attaching plate

Note: Only applies to vehicles with double front axles and an axle distance of 1,940 mm with the supporting journal located at the centre of the attaching plate.

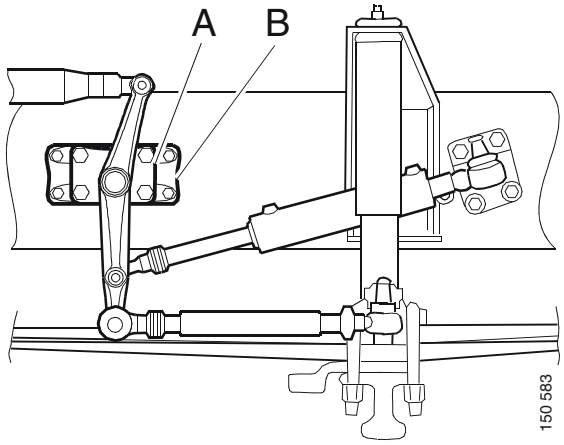
Note: On vehicles up to the following chassis numbers

Scania Södertälje	2 027 764
Scania Zwolle	5 178 471
Scania Angers	9 121 842
Scania Latin America	3 609 217

The supporting journal is secured with 14 mm bolts. On vehicles after these chassis numbers, the supporting journal is secured with 16 mm bolts.

When renewing the supporting journal on vehicles manufactured up to the chassis numbers specified above, the attaching plate must be renewed in order to fit the new supporting journal.

Also renew the bracket for the auxiliary cylinder hydraulic pipes that sits on two of the bolts. As an alternative, the holes in the existing bracket can be drilled to 16.5 mm.

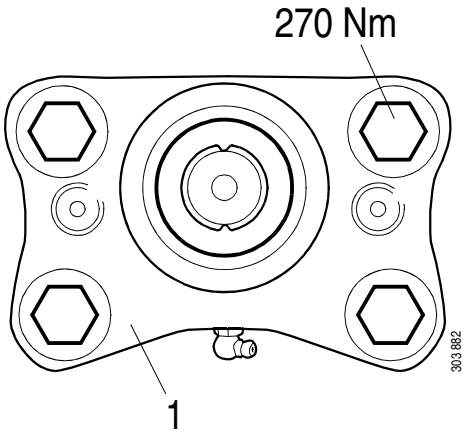


A. Supporting journal

B. Attaching plate

1 Loosen the four bolts.

2 Fit the new supporting journal. Tightening torque 270 Nm (M16).

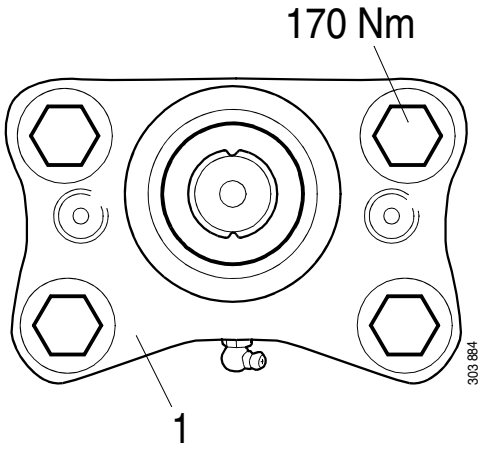


1 New supporting journal for 16 mm bolts

Renewing the rear supporting journal, other versions

1 Loosen the four bolts.

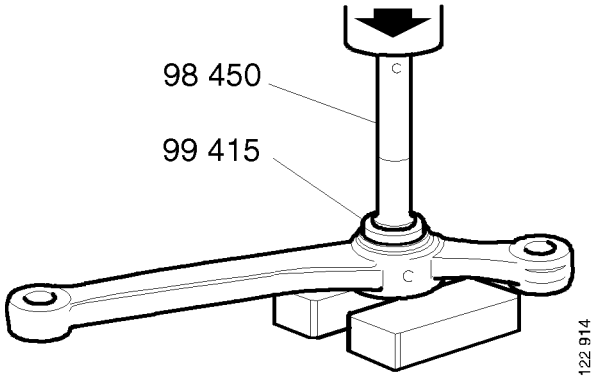
2 Fit the new supporting journal. Tightening torque 170 Nm (M14 10.9).



1 New supporting journal for 14 mm bolts

Renewing bearings

1 Press out the slide bearings using drift 99 415 and shank 98 450.



Pressing out the slide bearings.

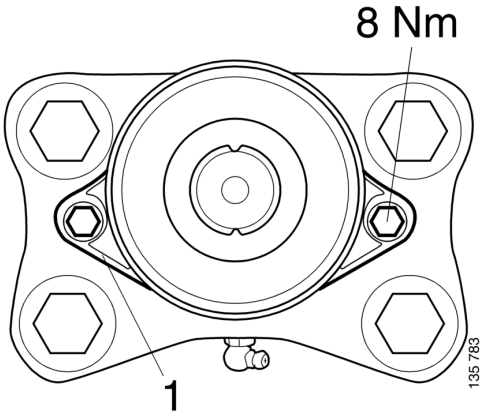
2 Clean the contact surfaces for the bushes inside the hole in the arm(s).

3 Press in the new slide bearing.

Note: There used to be two slide bearings, but they have been replaced by a single slide bearing.

Fitting

1 Grease the supporting journal. Fit a new O-ring and screw on the sealing washer. Tightening torque 8 Nm.

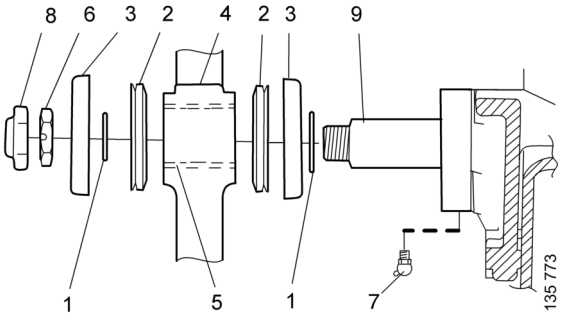


1 Sealing washer

2 Fit new V-ring seals on the intermediate droparm and fit the arm on the supporting journal.

IMPORTANT! The lips of the V-ring seals should face outwards; otherwise they will not seal.

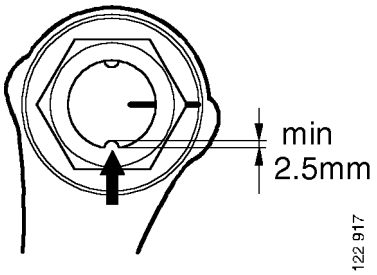
3 Fit a new O-ring, sealing washer and lock nut.



1 O-ring
2 V-ring seal
3 Sealing washer
4 Intermediate droparm
5 Slide bearing
6 Lock nut
7 Grease nipple
8 Protective cap
9 Supporting journal

4 Tighten the lock nut to 170 Nm and secure the nut by upsetting the nut flange at least 2.5 mm toward the groove in the supporting journal (as illustrated). Fit the protective cap.

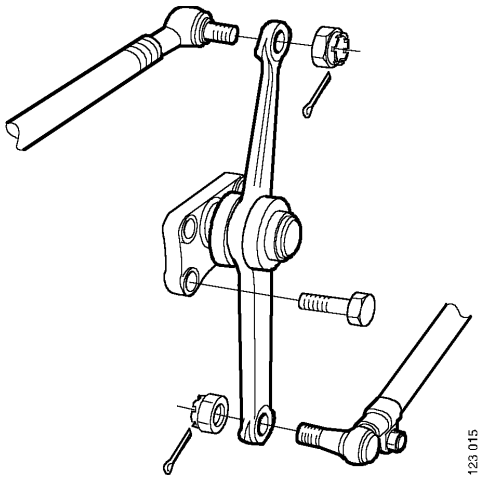
5 Lubricate the bearing through the grease nipple until grease comes out of the bearing.



Intermediate droparm

6 Fit the draglink ball joints to the intermediate droparm. Start with the lowest ball joint and tighten the castle nut. Tightening torque 250 Nm and then to the closest split pin hole.

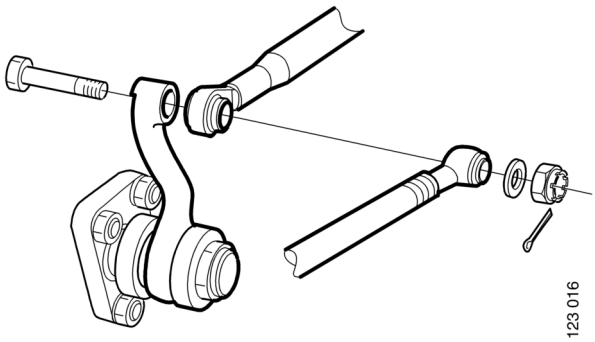
7 Secure with a new split pin.



Intermediate droparm on vehicles with an axle distance greater than 4,100 mm

1 Fit the draglinks according to the previous markings and fit the through bolt. Torque tighten the castle nut to 250 Nm and then to the closest split pin hole.

2 Secure with a new split pin.



Specifications

Tightening torques

Supporting journal, M14 10.9	170 Nm
Supporting journal, M16 10.9	270 Nm
Ball joint castle nut, M24	250 Nm*)
Ball joint castle nut, M20	210 Nm*)
Castle nut on intermediate droparm through bolt	250 Nm*)
Lock nut on intermediate droparm supporting journal	170 Nm
Sealing washer	8 Nm
Basic setting length for left-hand front draglink on right-hand drive vehicle	L = 438.5 +/- 2 mm

*) Then tighten to the nearest split pin hole and secure with a split pin.