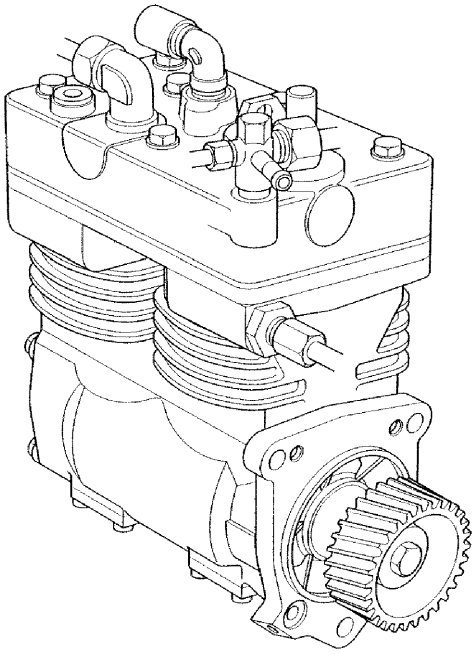
SCANIA

10:02-13

Issue 1.1 **en**

Air compressors

Description of operation and work description



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Contents

Description of operation

General

- This booklet replaces the section on air compressors in booklet 10:02-02.

Type of air compressor	Make	Air compressor displacement	Engine type
One-cylinder	Knorr	360 cc	D9
Two-cylinder	Knorr LP 48	440 cc	DSC11
Two-cylinder	Knorr LP 49	600 cc	D9, DC11, D12, D14, D16
Two-cylinder	Knorr	720 cc	D9

The air compressor drive is a gear wheel drive from the engine timing gears.

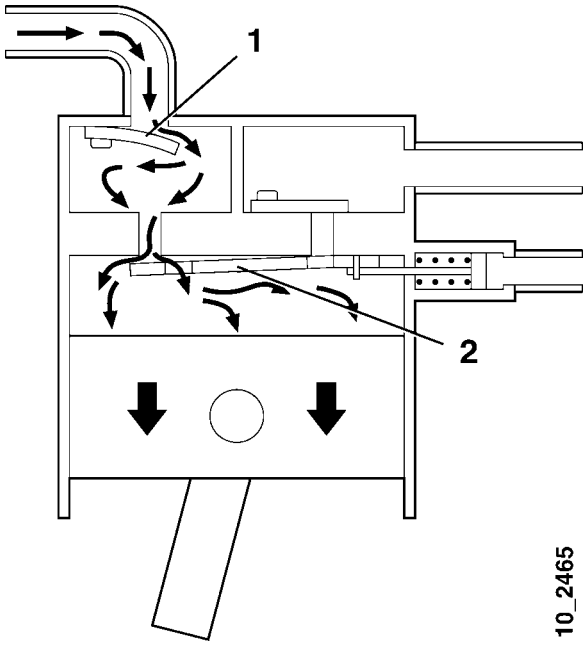
The cylinder block of the air compressor is air-cooled and has cooling fins while the cylinder head is liquid-cooled and connects to the engine cooling system.

Lubrication of the air compressor is performed by the engine lubrication system. The air compressor crankshaft is force-feed lubricated. All other surfaces and bearings are splash lubricated. Oil is fed to the air compressor via an oil way in the compressor's mounting flange, this applies to DC11, D12, DSC12, D14 and D16. On D9 and DSC11 oil is fed through an oil pipe to the compressor rear endplate.

The compressor relief pressure can be either 9.3 or 12.2 bar. The relief pressure selected depends on the vehicle's suspension and load management system.

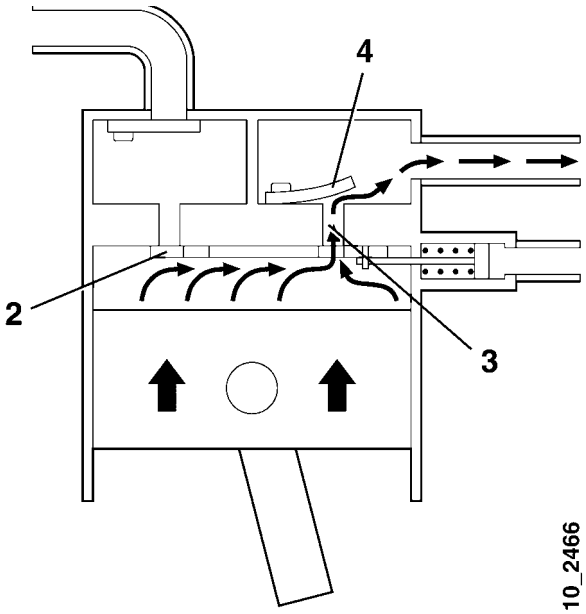
Work phase

When the piston moves downward, intake check valve 1 and intake valve 2 are forced open by the vacuum created in the cylinder. The intake ports open and air flows into the cylinder.



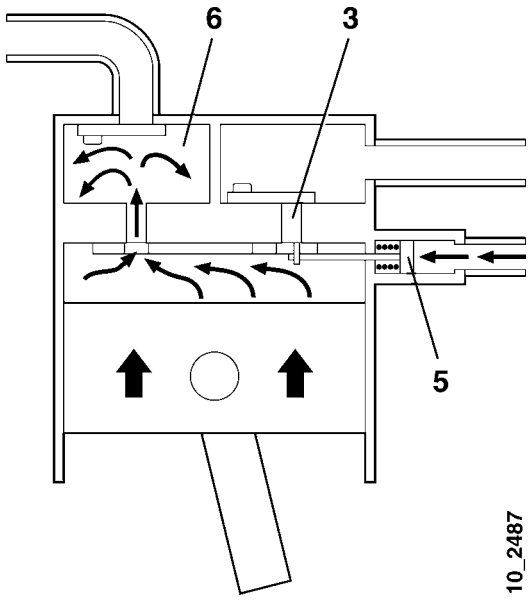
When the piston moves upwards, intake valve 2 is closed by the pressure in the cylinder.

Air then passes through port 3, past outlet valve 4 and out into the compressed air system.



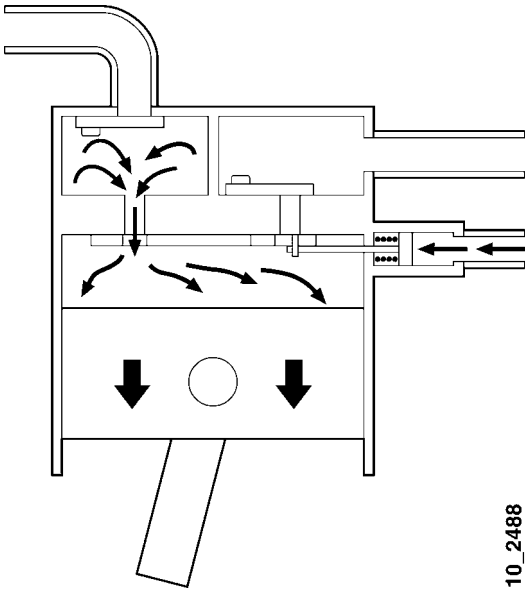
Load relief phase

When the pressure in the compressed air system has reached the desired level, the pressure regulator in the air dryer releases air to piston 5 of the relief mechanism (Energy Saving System, ESS). The piston is pushed in and acts on the intake valve, so that a connection opens up to intake chamber 6 in the top of the air compressor. Simultaneously, port 3 closes so that no air can escape into the system.



When the piston moves upwards, the air in the cylinder and in intake chamber 6 is compressed. The compressed air acts as a force on the piston in its downward motion.

With the exception of energy losses in the form of heat given off during the compression, the energy spent compressing the air is regained as downward force on the piston. For this reason, an air compressor with the ESS system uses less power in its load relief phase.



Work description

General

WARNING!

Always use a cab strut when working underneath a tilted cab.

Hot coolant can cause scalding.

Avoid contact with the skin. Coolant may cause skin irritation.

Specifications

Capacity at 2000 r/min	at 8 bar counter pressure
D9-engine	ca 640 l/min
DSC11-engine	ca 480 l/min
DC11, D12, D16 engines	ca 800 l/min
D14-engine	ca 800 l/min

Removing and fitting

The work description shows only twin cylinder air compressors. The principle is the same for single cylinder air compressors.

Preparatory work

- Drain the cooling system to a level below that of the air compressor, refer to booklet 02:01-01, *Cooling system (truck)* or booklet 02:01-11, *Cooling system (bus).*
- Evacuate the compressed air tanks.
- Remove the battery cable or use the battery master switch to disconnect the vehicle power supply (Applies to 11- and 12-litre engines with unit injectors).
- Tilt the cab or open the bonnet.

WARNING!

Always use a cab strut when working underneath a tilted cab.

- Clean the area around the air compressor.
- Remove the air compressor.
- Cover the opening in the clutch housing or the timing gear housing.
- Change all damaged O-rings or seals when the compressor is changed.

IMPORTANT! When the air compressor is removed it may still contain small amounts of oil and/or coolant.

Finishing operations

- Fill and bleed the cooling system, refer to service booklet 02:01-01 *Cooling system.*
- Re-connect the battery voltage.
- Fill the compressed air system.
- Check that there are no leaks of coolant, air or oil.
- Tilt the cab back or close the bonnet.

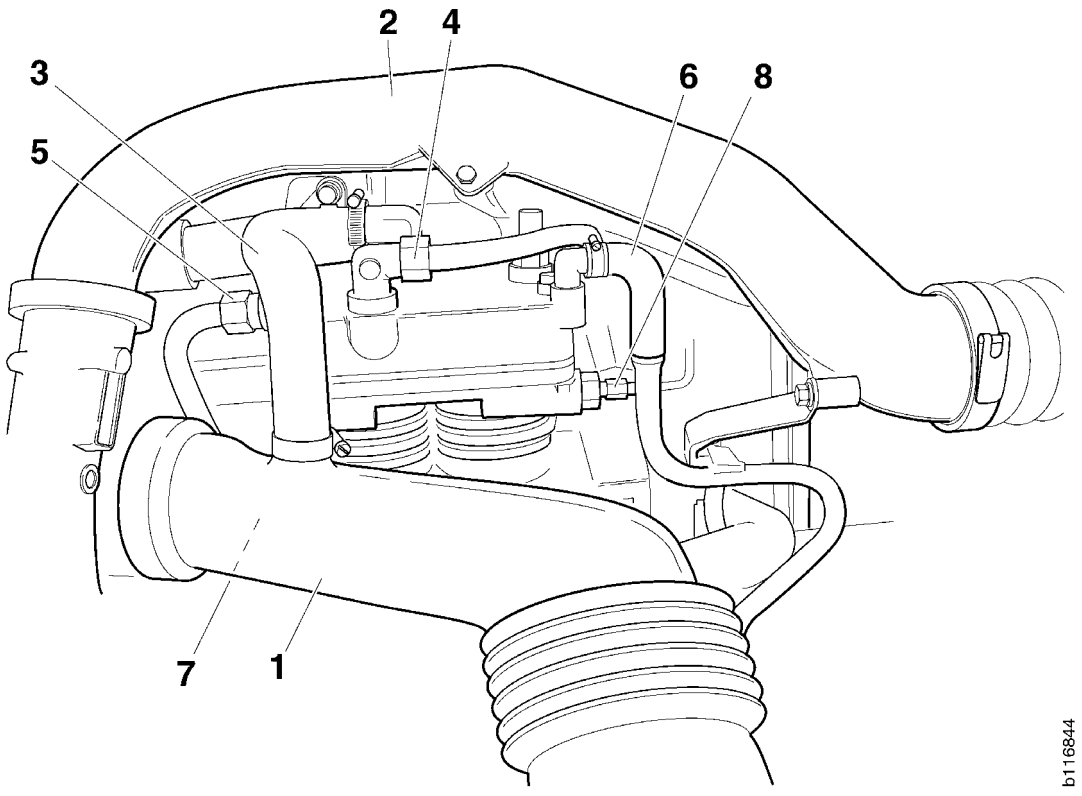
9-litre engine

Removal

Pos.	Remove	Remarks
1	the induction pipe of the turbocharger	With brackets.
2	the charge air cooler pipe	With brackets.
3, 4	the air connections	
5, 6	the coolant connections	
7	the air compressor oil pipe	
8	the air dryer relief pipe	
	the air compressor	Three bolts from the front.

Fitting

Fit in reverse order.



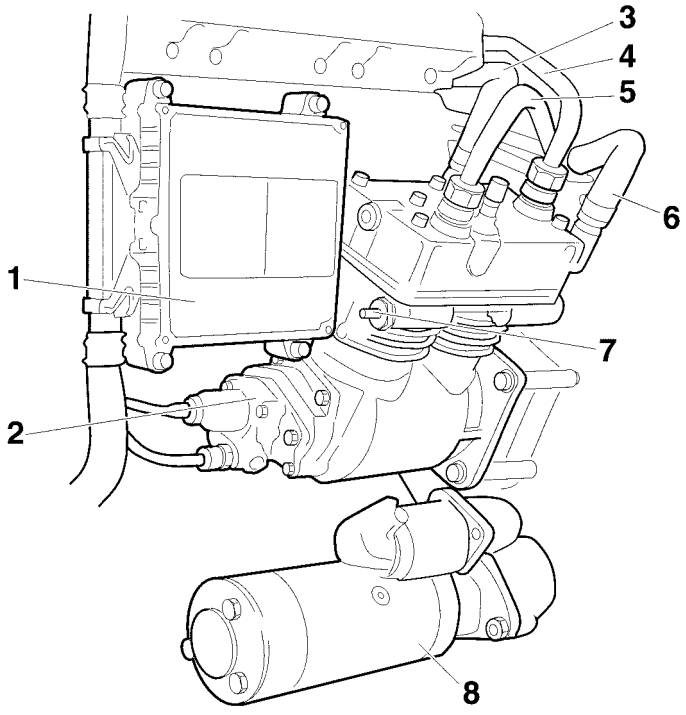
11 and 12 litre engines with unit injectors

Note: Use the battery master switch to disconnect the vehicle power supply or remove the battery cable.

Removal

Pos.	Remove	Remarks
1	EDC control unit	Complete with cooler.
2	the feed pump	
3, 4	the air connections	
5, 6	the coolant connections	
7	the air dryer ventilation pipe	
8	the starter motor	
	the air compressor	Three nuts from the front.

Pos.	Fitting	Remarks
	Fit in reverse order.	
	the air compressor	Tighten all three bolts once and then tighten the first bolt once more.

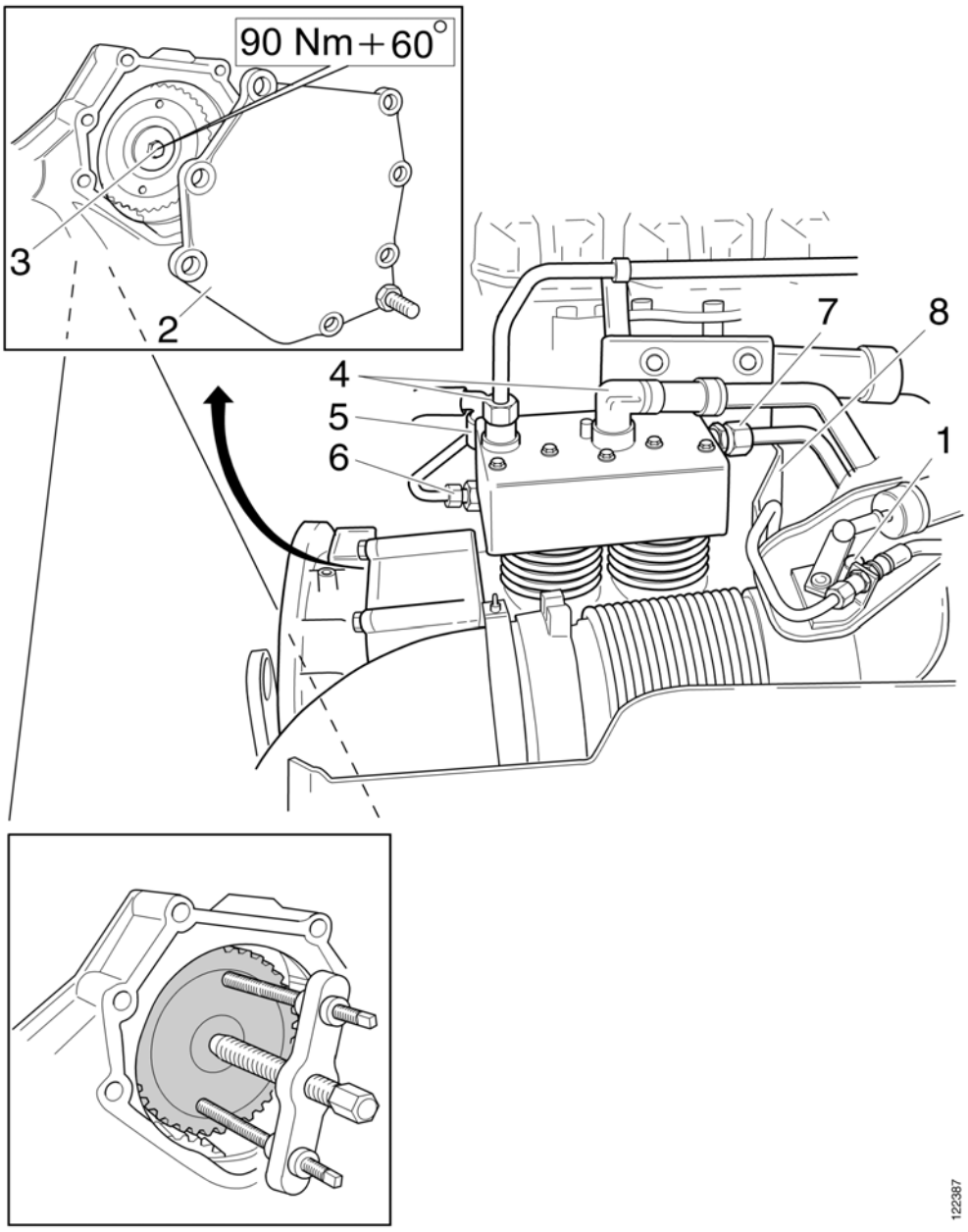


11 and 12 litre engines with injection pump

Removal

Pos.	Remove	Remarks
1	the exhaust brake	Also remove the exhaust brake bracket 8.
2	the cover on the timing gear housing	
3	the air compressor gear	Lock the gear and remove the bolt using an air tool. Then remove the gear using puller 587 519.
4	the air connections	
5, 7	the coolant connections	
6	the air dryer ventilation pipe	
	the air compressor	

Pos.	Fitting	Remarks
	Fit in reverse order.	Clean the gear and the cone on the crankshaft before fitting.
3	the air compressor gear	Tighten to 90 Nm + 60 °.
	the air compressor	Tighten all three bolts once, and then tighten the first bolt once more.



Remove the gear using puller 587 519.

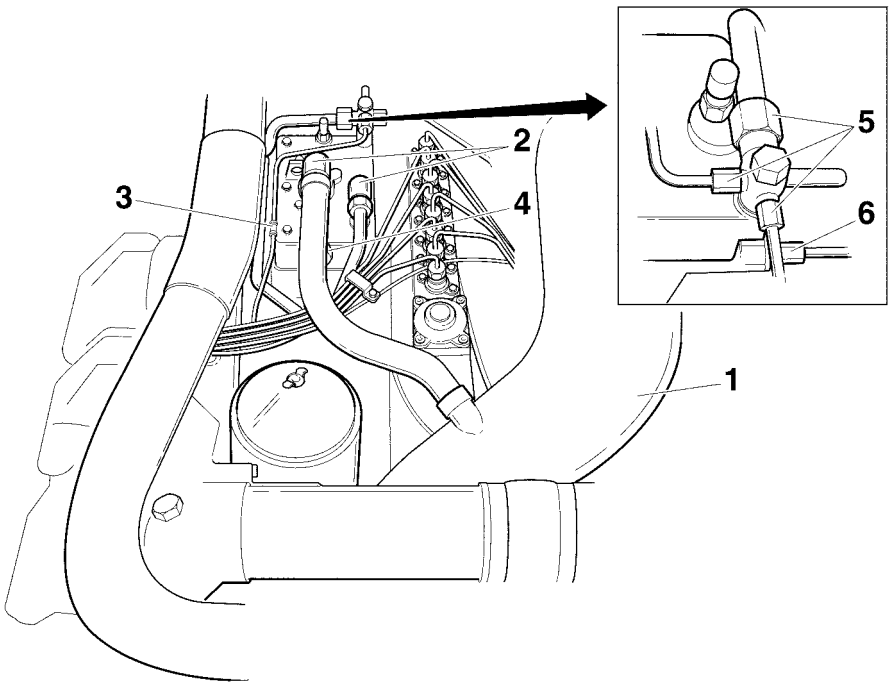
14-litre engine

Removal

Pos.	Remove	Remarks
1	the turbocharger induction pipe	
2	the air connections	
4, 5	the coolant connections	Also remove bracket 3.
6	the air dryer relief pipe	
	the air compressor	Two upper bolts from the rear and one lower bolt from the front. The lower bolt goes through the timing gear housing and screws into the alternator bracket. Carefully pull out the compressor. Cover the timing gear flange to prevent contamination from entering the timing gear housing.

Fitting

Fit in reverse order.

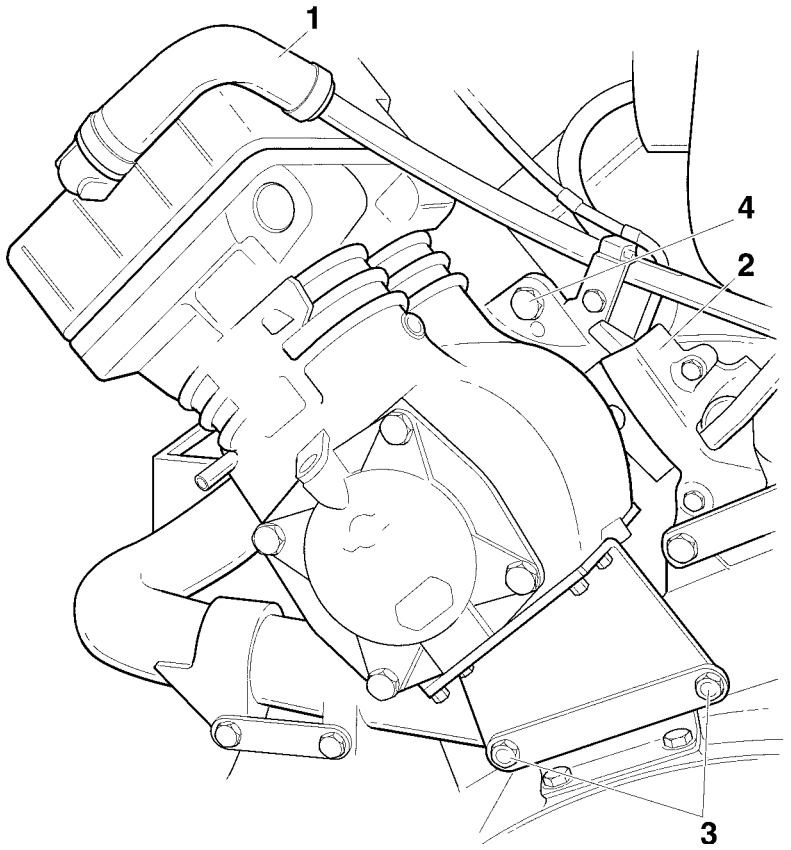


16-litre engine

Removal

Pos.	Remove
1	coolant connections and air connections
2	the heat shield
3	the nuts for the compressor rear bracket
4	the retaining nuts to the flywheel housing
	the air compressor.

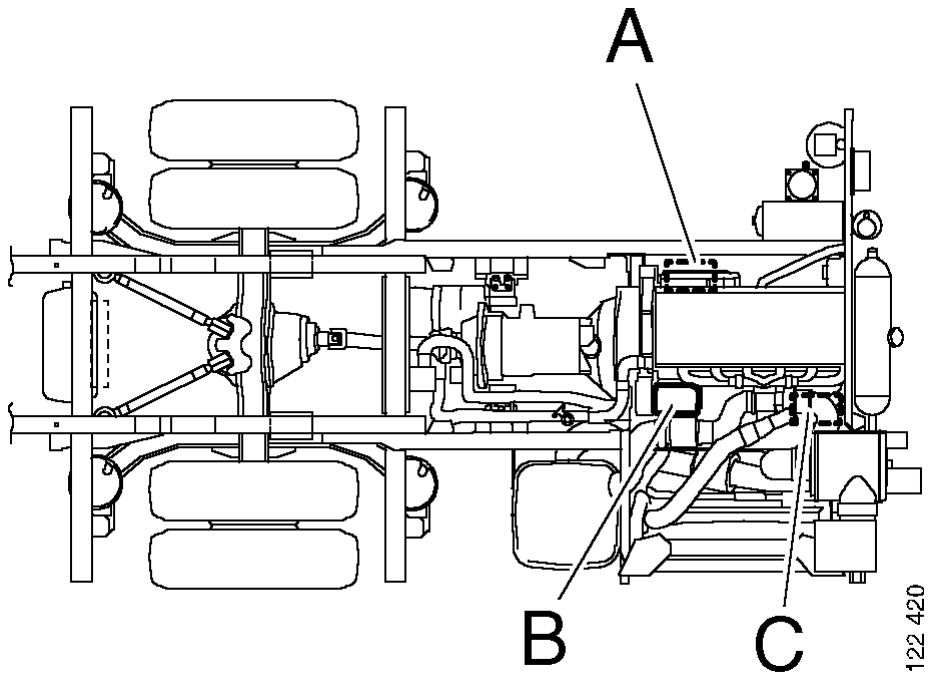
Pos.	Fitting	Remarks
	Fit in reverse order.	
3		
	the air compressor	Tighten all three bolts once, and then tighten the first bolt once more.



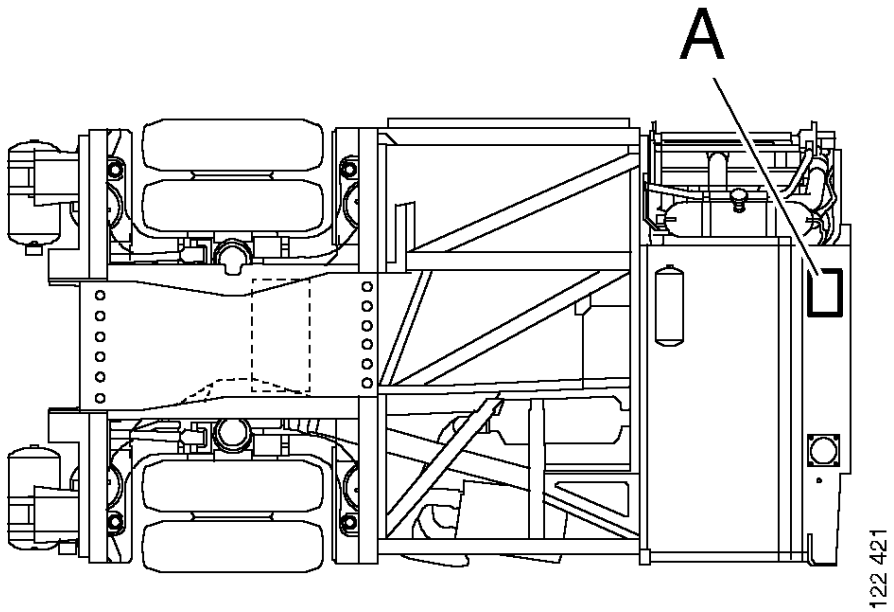
Air compressor in bus

The position of the air compressor in the bus varies. The different positions are shown in the illustrations below.

Rear end, K and L bus



Rear end, N bus

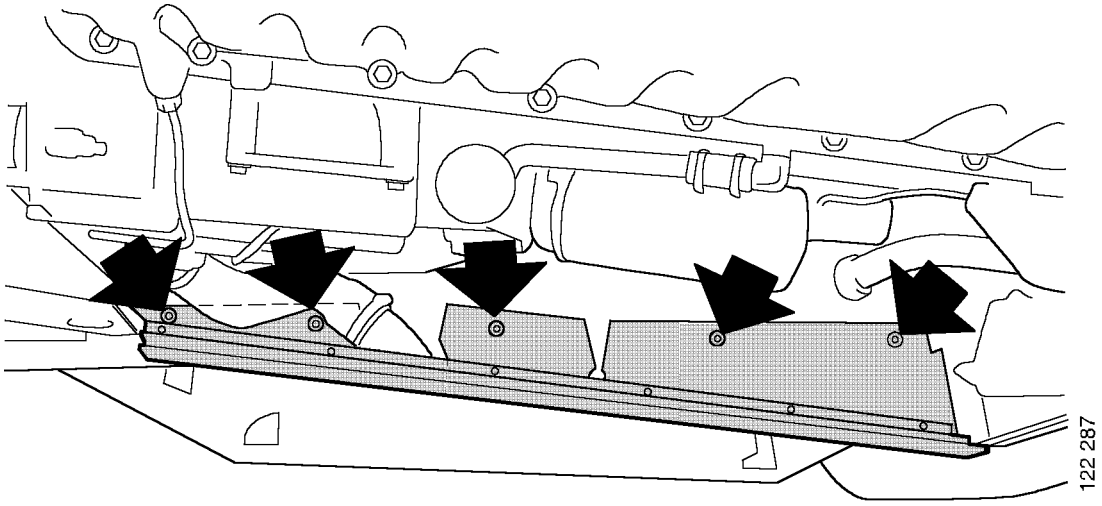


L bus

This description covers air compressors on 9-litre engines in L-buses, since this model differs slightly from the other models. On bus types (K and N) the air compressor position is such that the description is largely the same as for trucks.

Preparatory work

- Evacuate the cooling system to a level below the air compressor, refer to booklet 02:01-11 *Cooling system.*
- Evacuate the compressed air system.
- Raise the bus.
- Remove the cover plates.
- Remove the rail, 5 screws.

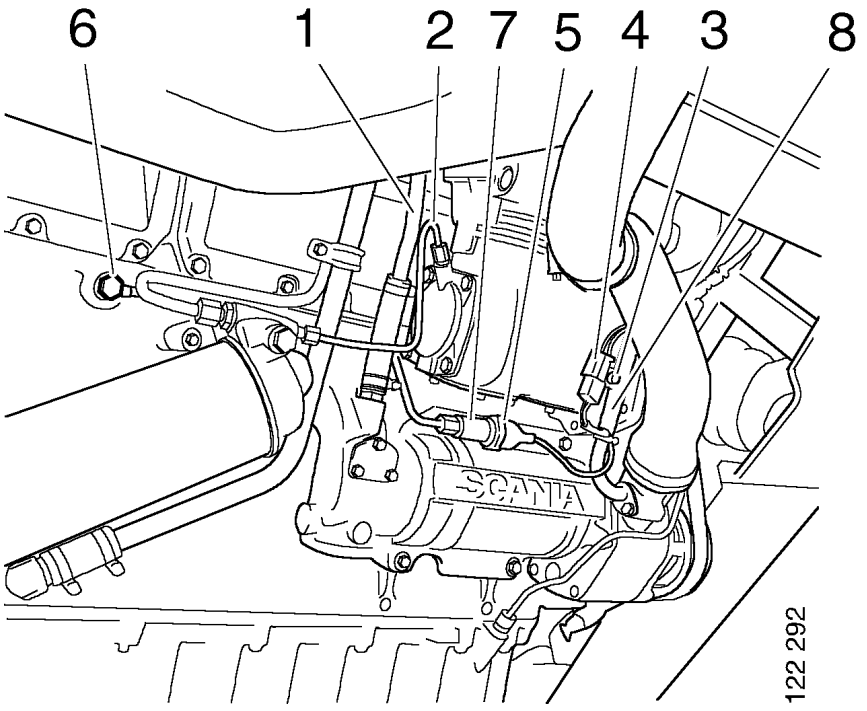


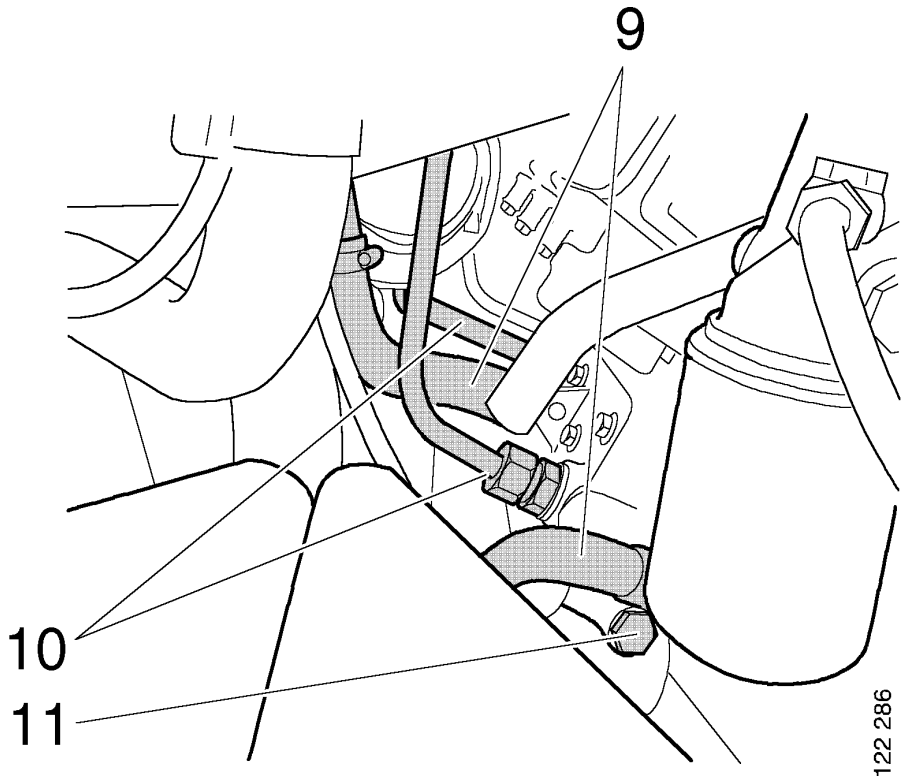
Removal

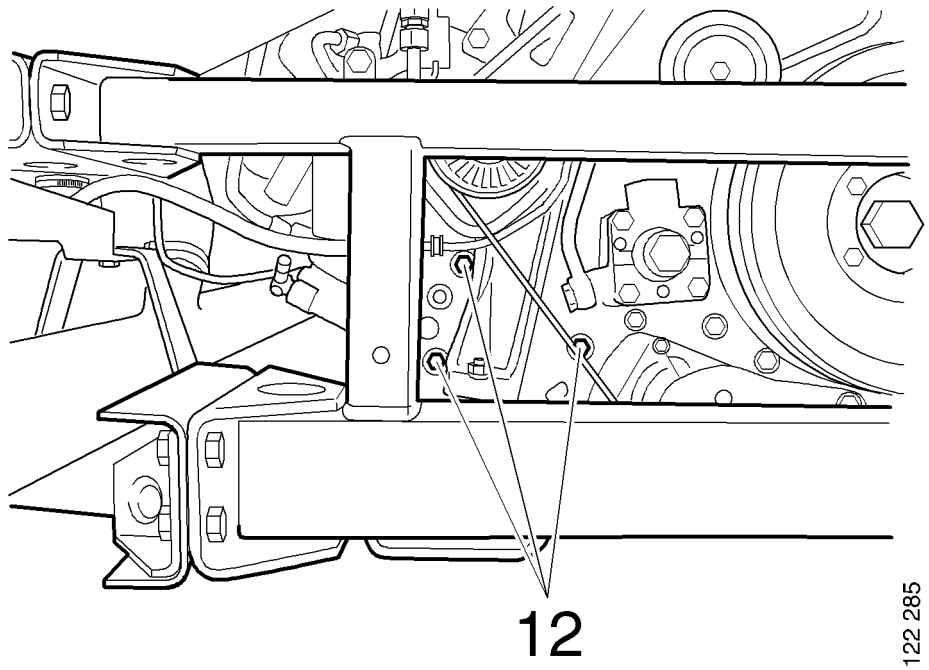
Pos.	Remove	Remarks
1	the cooling pipe	
2	the oil pipe (between the oil filter and the compressor)	
3, 4, 5	the screw 3 and disconnect the connector 4. Disassemble the oil pressure sensor 5.	
6	the banjo screw, plug the hole to prevent oil from leaking out.	
7	the bolt for the oil pressure sensor bracket and then remove the remaining part of the oil pressure sensor.	
8	the cable ties that hold the oil pressure sensor wiring against the air compressor cooling pipe. Remove the cooling pipe.	
9, 10, 11	the coolant connections 9, the air connections 10 and the relief pipe 11 from the air compressor.	
12, 13	the bolts 12, and the air compressor 13.	

Fitting

Fit in reverse order.







Reconditioning

Compressor 440/600cc

Dismantling

1 Remove the cylinder head bolts.

2 Remove the cylinder head 7 with gasket 8.

3 Remove the valve plate 9 with gasket 10.

4 Remove the intake discs 1, levers 2 and pins 6.

5 Remove the union for the relief pipe on one side and remove the retaining ring on the other side.

6 Pull out the pins 4 from the pistons 3.

7 Remove the pistons 3 and the springs 5.

Note: Always use new gaskets between cylinder and valve plate and between valve plate and cylinder head.

Cleaning

- Carefully scrape off any carbon deposits.
- Make sure the mating faces of the cylinder head are clean.

Assembly

8 Push in the springs 5 and the pistons 3. Tap the pins 4 into the pistons.

9 Fit the pins 6, levers 2 and intake discs 1.

10 Push in the pistons 3 with a large screwdriver, to check that the intake discs move easily.

11 Fit the valve plate 9 with a new gasket 10.

12 Fit the cylinder head bolts. Tightening torque 30 Nm.

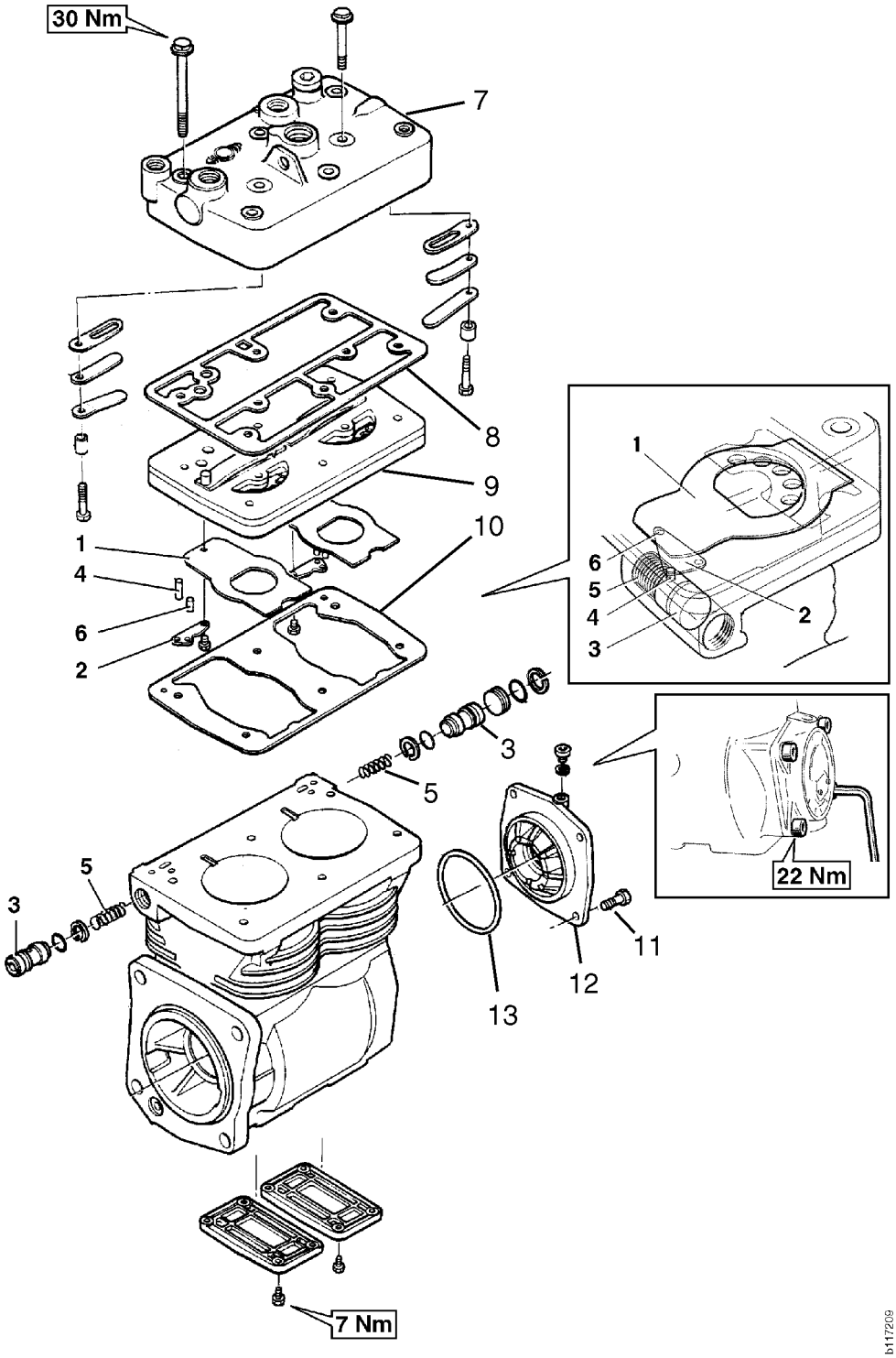
13 Fit the cylinder head 7 with a new gasket 8.

Changing O-ring in the rear endplate

1 Remove the bolts 11 for the rear endplate.

2 Pull the endplate straight out or gently tap the endplate 12 off.

3 Change the O-ring 13 and re-fit the endplate with the piston recess pointing upwards. Tightening torque 22 Nm.



Troubleshooting

Air compressor

Symptoms of the fault

The air compressor does not maintain sufficient pressure in the system.

Possible causes

Excessive carbon formation in the air compressor cylinder head or in the feed pipe.

Excessive wear of pistons and cylinders in the air compressor.

Leaks at the intake or outlet valves.

Compression rings or oil scraper rings incorrectly fitted.

Overpressure in the engine crankcase due to oil coating in the crankcase ventilation. Refer to Fitting plastic tube in the air compressor intake pipe.

Symptoms of the fault

Noise

Possible causes

The air compressor gear is loose on the axle.

Excessive carbon formation in the air compressor cylinder head or in the feed pipe.

Worn out bearings.

Excessive wear of pistons and cylinders in the air compressor.

Symptoms of the fault

The air compressor allows excessive oil to pass.

Possible causes

Excessive wear of pistons and cylinders in the air compressor.