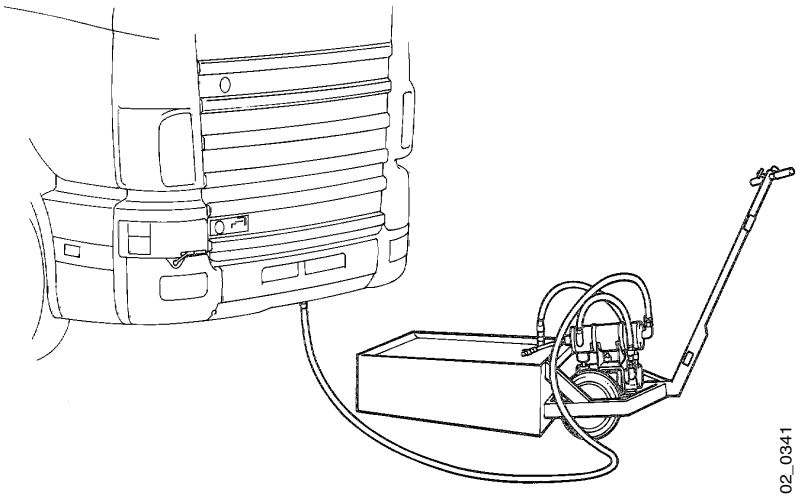
SCANIA

02:01-01

Issue 4 **en**

Cooling system

Work description



1 585 348

Contents

Cooling system

Important information

WARNING!

The cooling system works under pressure which can cause hot coolant to spray out if the system is opened when warm.

Hot coolant can cause scalding.

Avoid skin contact with coolant. Skin contact may cause irritation.

Always use protective goggles and rubber gloves when working with coolant.

Scania corrosion inhibitor, ethylene glycol and other coolant additives are toxic if ingested.

Do not damage the fan or the connections. Failure to follow this instruction can result in serious personal injury or major damage to vehicle components.

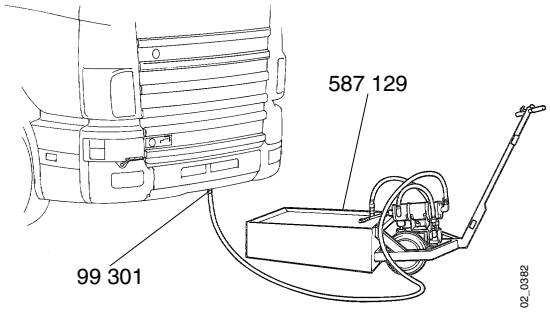
IMPORTANT! Use only coolant and coolant filters recommended by Scania.

Draining the coolant

Special tools

Number	Designation	Illustration	Tool board
99 301	Adapter		D5
587 129	Coolant tank		

Drain the coolant using adapter 99 301 and coolant tank 587 129.



Filling with coolant

Special tools

Number	Designation	Illustration	Tool board
99 301	Adapter		D5
587 129	Coolant tank		

Refer to Group 0, "Fuel, lubricants and fluids" for specifications and volumes.

When the cooling system has been drained, it is difficult to fill it entirely via the filler pipe on the expansion tank. Therefore, use coolant tank 587 129 and adapter 99 301 and connect to the connector. Connect the return hose to the expansion tank filler pipe. Start the engine once the cooling system has been filled. Allow the engine to run for a while. Then, check the coolant level and top up as necessary.

Even with this method, there may be air left in several "pockets" in the cooling system. This air will disappear after the vehicle is driven for some time. It is consequently necessary to top up several times.

Trucks with a Scania Retarder have a bleeder nipple beside the retarder radiator. Connect adapter 99 301 and the hose to the bleeder nipple of the retarder radiator. Collect the coolant in a suitable container.

Fill in the normal way as described above until an even flow of coolant runs out beside the retarder radiator. Remove the adapter from the retarder cooler and fill the rest of the system as above.

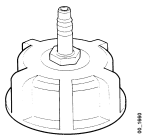
Test pressurising

Specifications

Pressure control valve

Opening pressure	0.6 - 0.9 bar

Special tools

Number	Designation	Illustration	Tool board
99 312	Adapter		MT1
587 048	Cooling system tester		MT1

Description

1 Remove the cover of the expansion tank.

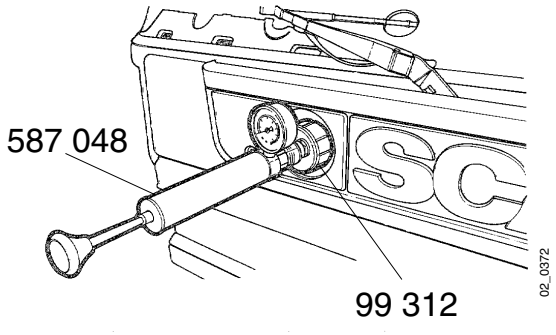
2 Check the sealing surface on the filler pipe and the cap seal for damage.

3 Check that the coolant level is correct. Top up if necessary.

4 Fit cooling system tester 587 048 with adapter 99 312 to filler pipe.

5 Pressurise the system until the pressure limiting valve opens. The correct opening pressure is 0.6 - 0.9 bar.

6 Stop pumping and allow the pressure limiting valve to close.



If the pressure drops, it may be due to external or internal leakage.

Refer to "Corrective action" in the section "Leakage, troubleshooting" for instructions on how to proceed in case of leakage.

High coolant temperature

Troubleshooting

1 Check the coolant temperature using Scania Diagnos.

2 Check the coolant temperature gauge. For a description of and inspection instructions for an instrument cluster with an integral coolant temperature gauge, refer to booklet 16:06-11, Electrical components.

3 Check that there is no blocked insect net or other extra equipment at the front obstructing the flow of air.

4 Check the radiator fins for obstructions.

5 Check for missing or damaged recirculation shields.

6 Check the coolant level. If the level is too low, top up using coolant according to specification and test drive the vehicle. If the level drops, it indicates internal or external leakage. Conduct a pressure test of the system according to the section "Test pressurising".

7 Check the fan according to the section "Checking the fan function".

8 Check the coolant for impurities.

Coolant that is incorrectly handled or applied in excessive dosages may lead to the build up of sludge and possible corrosion. The sludge may block the radiator, reducing the cooling system efficiency.

The coolant filter ensures that particles of rust and dirt are filtered off, which, amongst other things, reduces the risk of deposit attack.

The coolant filter operation can be checked by putting a hand on the filter when the engine has reached its normal operating temperature.

If the filter is not warm, it may be becoming blocked by sludge or it may be shut off.

Proceed as follows in case of sludge:

1 Drain the cooling system and remove the thermostat.

2 Clean the cooling system according to the section "Cooling system, cleaning internally" steps 8 - 12.

9 Check the thermostat according to the section "Checking the thermostat function".

10 Check the coolant pump according to the section "Coolant pump, inspection". Also check the poly-V belt and the belt tensioning to ensure that the coolant pump belt drive is operating properly.

Low coolant temperature

Trouble shooting

1 Check the coolant temperature using Scania Diagnos.

2 Check the coolant temperature gauge. For a description of and inspection instructions for an instrument cluster with integral coolant temperature gauge, refer to booklet 16:06-11, Electrical components.

3 Check the thermostat according to the section "Checking the thermostat function".

4 Check the fan according to the section "Checking the fan function".

5 Coolant must not flow from the expansion tank to the radiator. Vehicles manufactured from September, 1998, are equipped with a non-return valve at the expansion tank. Check the non-return valve.

Vehicles manufactured before September, 1998, may be fitted with a non-return valve as a service solution. Refer to TI 02-980909.

Leakage

Trouble shooting

Symptoms

- Coolant is disappearing from the system or has become contaminated.
- Water in the engine oil.
- White exhaust fumes.

Check

- Conduct a pressure test of the system according to the section "Test pressurising".

Result

- Coolant containing impurities indicates internal leakage, improper handling of coolant or too high concentration.
- Internal leakage may occur in the engine or in one of the oil coolers.

Corrective action

- In case of external leakage, check hose and pipe connections and coolant pump shaft seal.
- In case of coolant containing impurities, clean cooling system according to the section "Cooling system, cleaning internally".
- If there is internal leakage in the engine, it must be overhauled.
- Renew the oil cooler if there is an internal leak in the oil cooler.

High noise level

Trouble shooting

In case of high coolant pump noise level:

1 Check that the coolant pump rotates freely and that the shaft bearings are intact.

2 Check the poly-V belt and belt tensioning. Renewal of pulley, refer to the section "Pulley, renewal".

In case of high fan noise level:

1 Check the fan idling and operating speed according to the section "Checking the fan function".

Cooling system, cleaning internally

Cleaning from oil and grease

1 Use liquid detergent, intended for household dishwashers, or BASF Glycacorr G93 or Texaco Havoline XLI. The detergent should not foam.

2 If possible, run the engine until it reaches normal operating temperature.

3 Drain the cooling system.

4 Remove the thermostat.

5 Fill the cooling system with hot water mixed with dishwasher detergent (0.1 litre per 10 litres of water) or BASF Glycacorr G 93 or Texaco Havoline XLI.

6 Run the engine for 20 - 30 minutes until the cooling system reaches its operating temperature.

Note: Do not forget the cab heating system.

7 Drain the cooling system.

8 Fill the cooling system with clean, hot water.

9 Run the engine for 20 - 30 minutes until the cooling system reaches its operating temperature.

10 Drain the cooling system.

11 Fit the thermostat and a new coolant filter.

12 Refill the cooling system with coolant according to specification.

Cleaning the radiator and charge air cooler externally

Description

1 Remove the radiator and the charge air cooler.

2 Cover the inlet and outlet pipes to prevent degreasing agent or dirt from entering the radiator or charge air cooler.

3 Clean the radiator and charge air cooler.

IMPORTANT! Be careful when cleaning the radiator core. There is a risk of damaging the fins. When rinsing the radiator core, make sure that the water jet is at right angles (90°) to the radiator core.

IMPORTANT! If degreasing agent is used, make sure that components of plastic and rubber are carefully cleaned.

Radiator

P and R cabs with plastic bumper covers

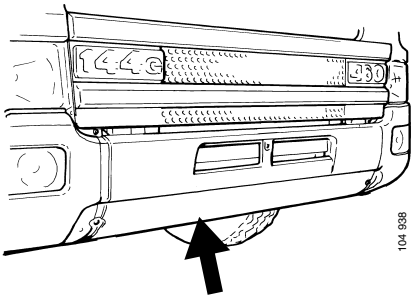
Removal of the charge air cooler and radiator

The following description applies to removing both the charge air cooler and the radiator.

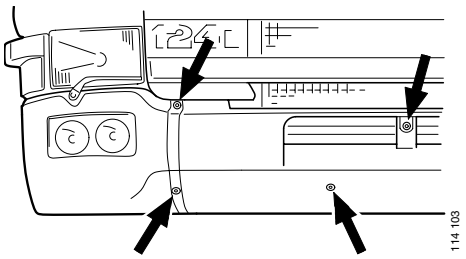
Description

1 Empty the cooling system as described in "Draining the coolant" if the radiator is to be removed.

2 Remove the bumper centre plastic cover and the centre bracket.

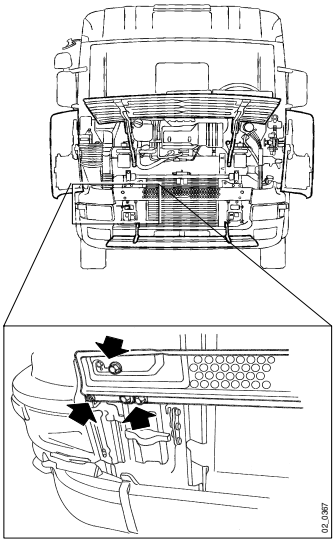


3 Open the front grille panels and the cab corners.



4 Remove the centre front grille.

5 Tilt the cab.

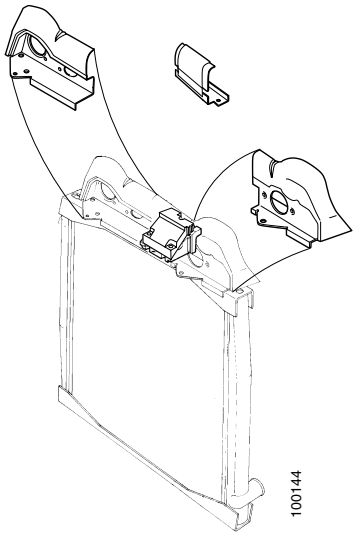


WARNING!

Do not open the AC hoses, as they contain pressurised refrigerant.

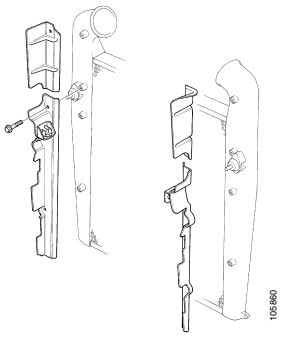
6 Undo the charge air and radiator hoses between the engine and the radiator assembly, or alternatively, only the charge air hoses if the charge air cooler alone is being removed.

7 Remove the upper recirculation shields, the pipes and hoses on top of the radiator.



8 Lower the cab.

9 Remove the recirculation shields on the charge air cooler.

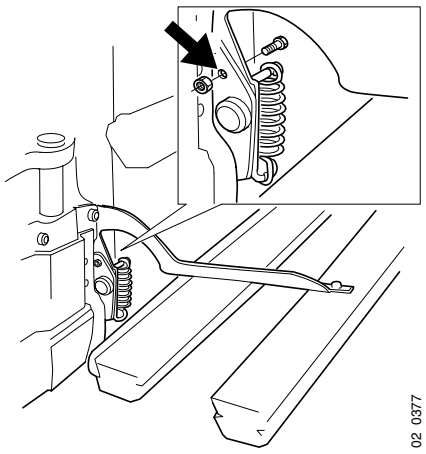


Removal of the lower front grille panel.

10 Tap out any remains of aluminium rivets from the holes in the hinges.

11 Lock the hinges using two M6 bolts and nuts in the holes.

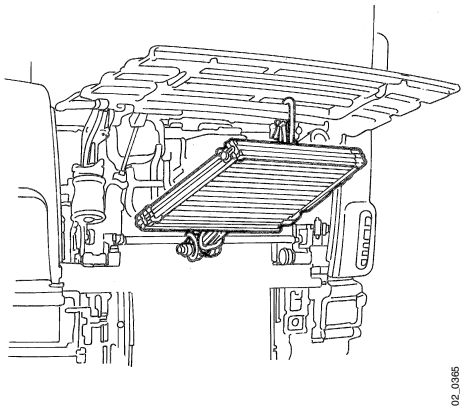
12 Remove the lower front grille panel with hinges.



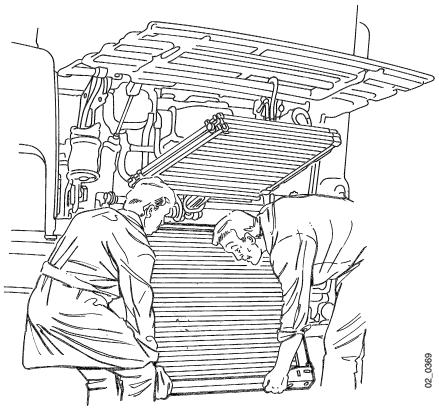
Trucks with AC

13 Detach the charge air cooler from the upper brackets so that it can be pushed rearwards.

14 Detach the AC condenser, pull it under the anti-roll bar and secure it to the upper front grille panel.



15 Remove the charge air cooler.



WARNING!

Injuries can occur when working on the cab suspension.

Note: On cabs with four-point air suspension, it is possible to raise the front of the cab using the cab suspension. Secure the levelling valve in the raised position using steel wire. Always secure the cab using a support, such as a wooden block, between cab and frame member.

16 Remove the radiator.

Fitting the charge air cooler and radiator

The following description applies to fitting both the charge air cooler and the radiator.

Description

1 Fit the radiator.

2 Stick new sealing strips to the radiator.

3 Fit the charge air cooler.

Note: Do not damage the O-rings of the charge air cooler.

4 Fit the recirculation shields on the charge air cooler and refit the AC condenser.

5 If the cab has been raised using the air suspension, the drive level of the levelling valve must be adjusted. The levelling valve is available in two configurations. Adjust the drive level according to the following alternatives:

WARNING!

Injuries can occur when setting the drive level.

Alternative procedure for vehicles with chassis numbers prior to Scania Södertälje 1 218 254.

1 Remove the securing device from the cab and set the levelling valve to the drive position.

2 Detach the valve.

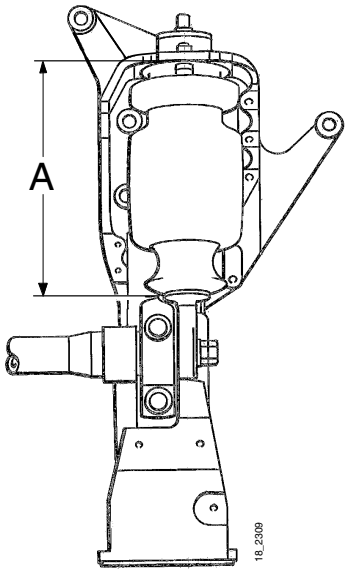
3 Turn the valve forwards or backwards according to whether the suspension is to be raised or lowered.

4 Make adjustments until there are 282-288 mm between the cap of the anti-roll bar and the cab suspension bracket.

5 Secure the valve.

6 Test-drive the truck after the adjustments have been made. Check again and adjust the levelling valves as necessary.

Levelling valve for vehicles with chassis numbers prior to Scania Södertälje 1 218 254.



A = 282-288 mm

Alternative procedure for vehicles with chassis numbers Scania Södertälje 1 218 254 and onward.

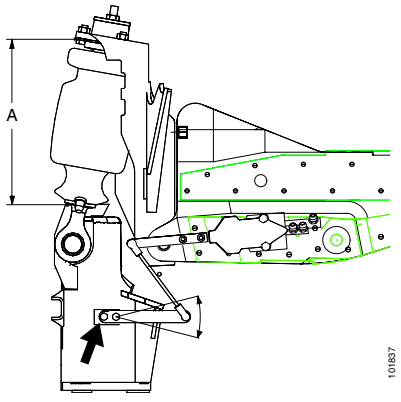
1 Loosen the forwardmost of the two bolts in the bracket on the cab tower. Refer to illustration.

2 Turn the bracket until there are 282-288 mm between the cap of the anti-roll bar and the cab suspension bracket.

3 Tighten the forwardmost bolt.

4 Test-drive the truck after the adjustments have been made. Check again and adjust the levelling valves as necessary.

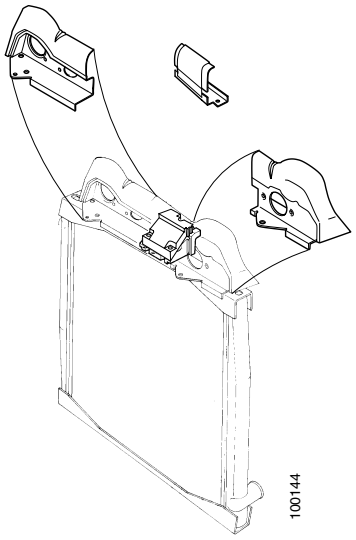
Levelling valve for vehicles with chassis numbers Scania Södertälje 1 218 254 and onward.



A = 282-288 mm

6 Tilt the cab.

7 Fit the upper recirculation shields, the pipes and the hoses on top of the radiator.

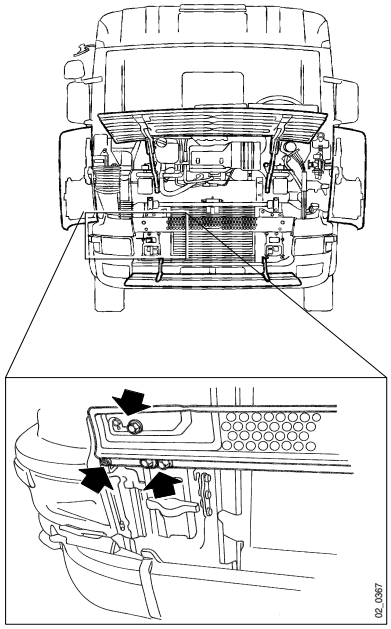


8 Fit the charge-air and radiator hoses between the engine and the radiator.

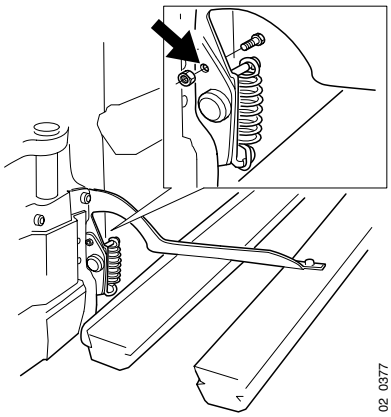
Note: Do not damage the O-rings of the charge air cooler.

9 Lower the cab.

10 Fit the centre front grille.

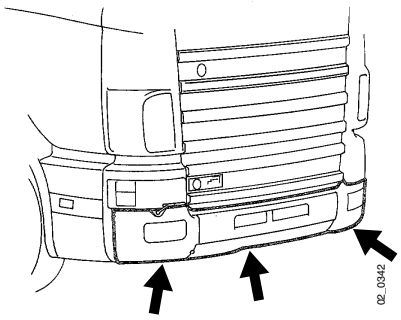


11 Fit the lower front grille panel and remove the M6 bolts.



12 Fit the plastic bumper covers.

13 Close the cab corners and front grille panels.



14 Fill with coolant as described in "Filling with coolant" if the radiator has been removed.

P and R cabs with metal bumpers

Removal of the charge air cooler and radiator

The following description applies to removing both the charge air cooler and the radiator.

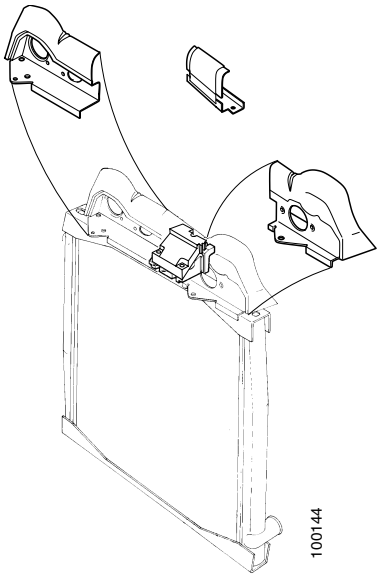
Description

1 Empty the cooling system as described in "Draining the coolant" if the radiator is to be removed.

2 Tilt the cab.

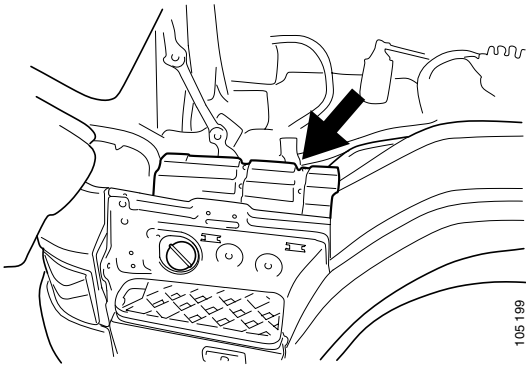
WARNING!

Do not open the AC hoses as they contain pressurised refrigerant.



3 Undo the charge air and radiator hoses between the engine and the radiator assembly, or alternatively, only the charge air hoses if the charge air cooler alone is being removed.

4 Remove the upper recirculation shields, the pipes and hoses on top of the radiator.



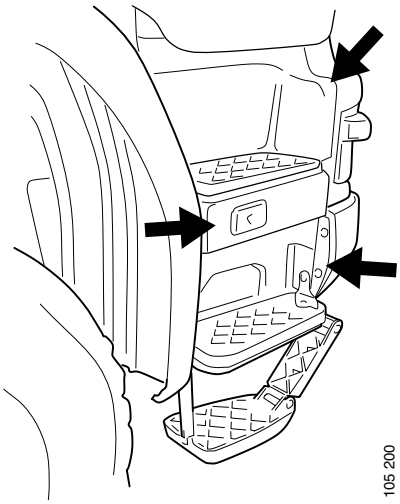
5 Remove the step-guard from over the wiring at the left-hand step.

6 Cut the strap holding the headlamp wiring so that the wires can be drawn out to their full length.

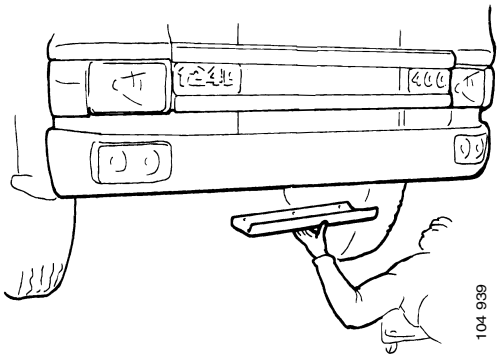
7 Lower the cab. Do not close the front grille panels.

8 Separate the washer hose for the windscreen at the check valve. The non-return valve is located behind the left cab corner.

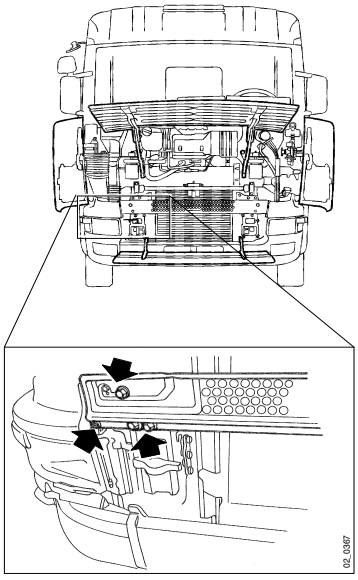
9 Remove the plastic protection by the step and on the bumper.



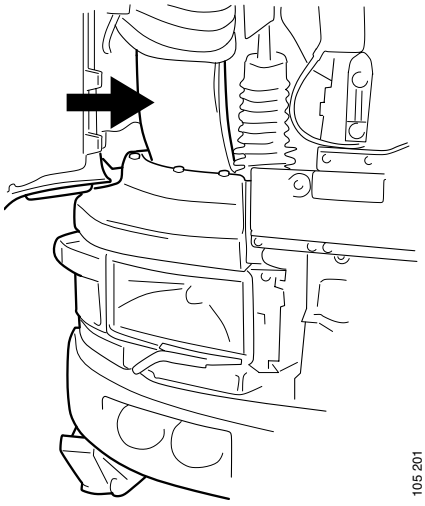
10 Remove the protection plate beneath the radiator assembly.



11 Remove the centre front grille.



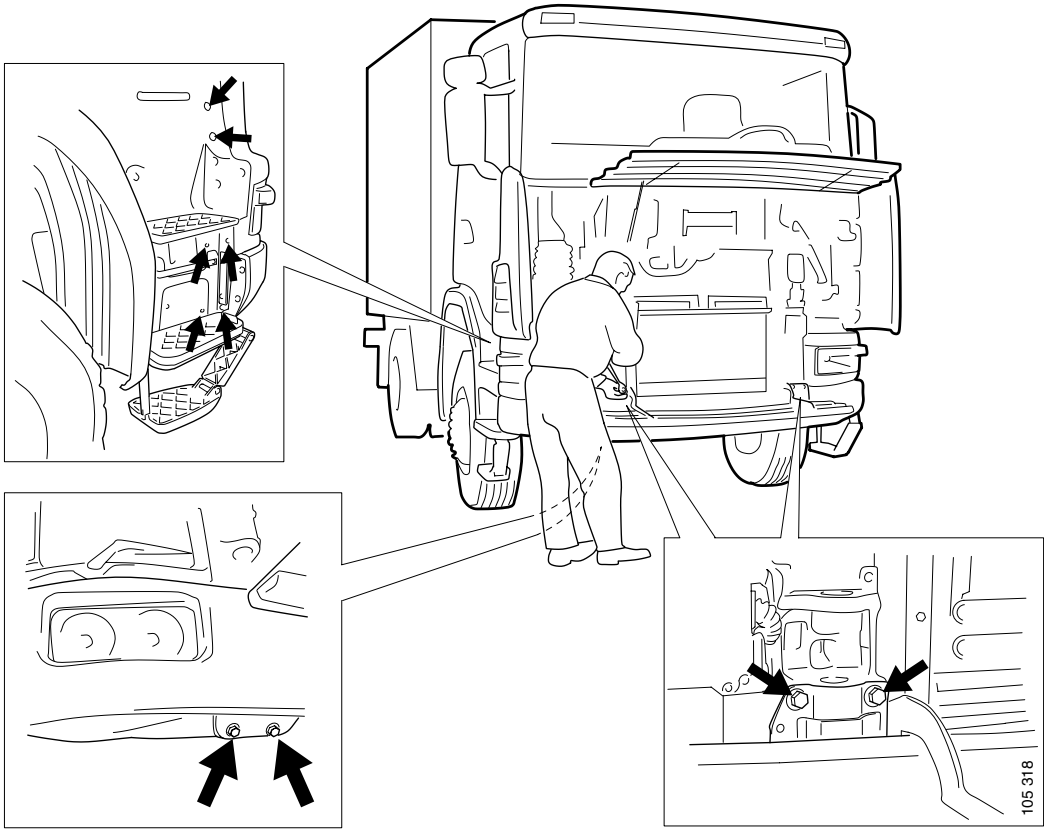
12 Detach the air filter inlet pipe from the plastic cover above the headlamp.



13 Remove the cover of the washer-fluid reservoir.

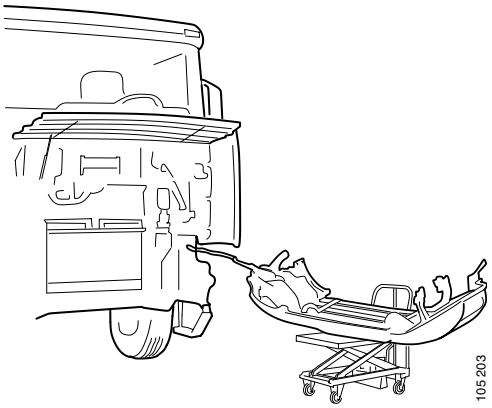
14 Place a lifting table under the bumper.

15 Remove all the bolts in the bumper and lower it together with the lamp housing.

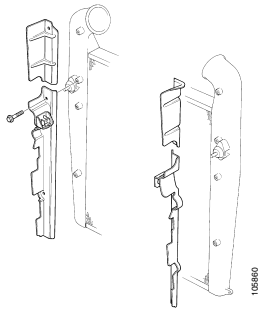


16 Separate the connectors to the washer-fluid pumps.

17 Place the bumper to one side.

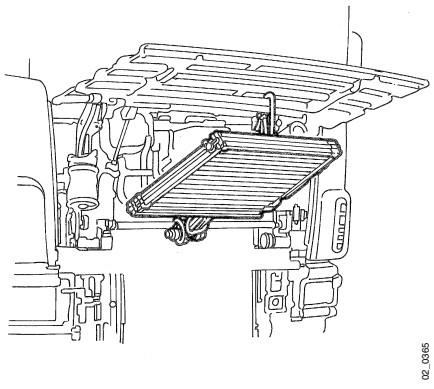


18 Remove the recirculation shields on the charge air cooler.



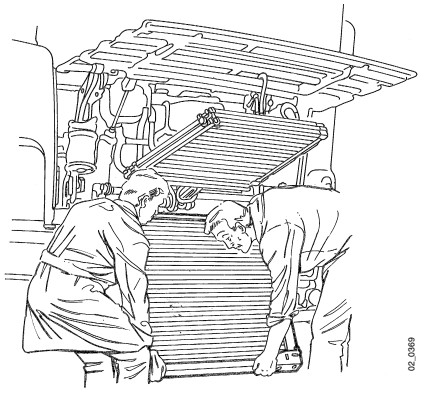
19 Detach the charge air cooler from the upper brackets so that it can be pushed rearwards.

20 Detach the AC condenser, pull it under the anti-roll bar and secure it to the upper front grille panel.



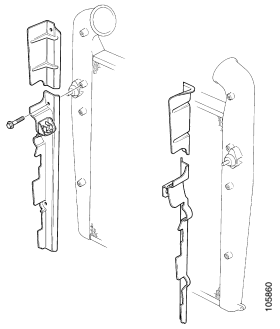
21 Remove the charge air cooler.

22 Remove the radiator.



Fitting the charge air cooler and radiator

The following description applies to fitting both the charge air cooler and the radiator.



Description

1 Fit the radiator.

2 Stick new sealing strips to the radiator.

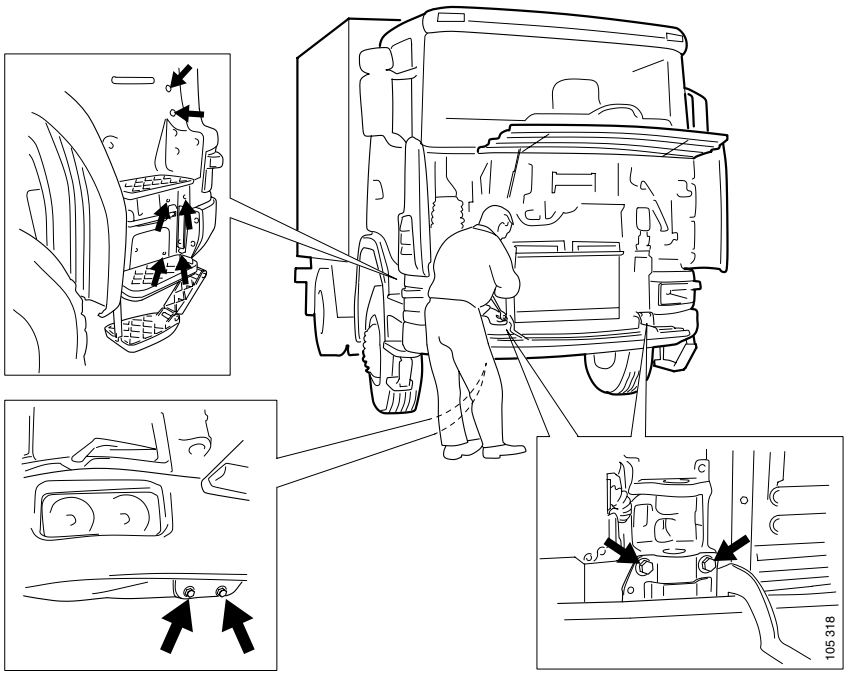
3 Refit the charge air cooler.

4 Fit the recirculation shields on the charge air cooler and refit the AC condenser.

5 Turn the bumper and lamp housing to their previous position.

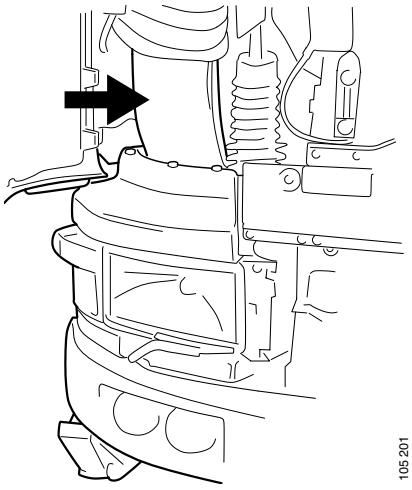
6 Reconnect the connectors to the washer-fluid pumps.

7 Lift up the bumper and fit it back into position using all the bolts.



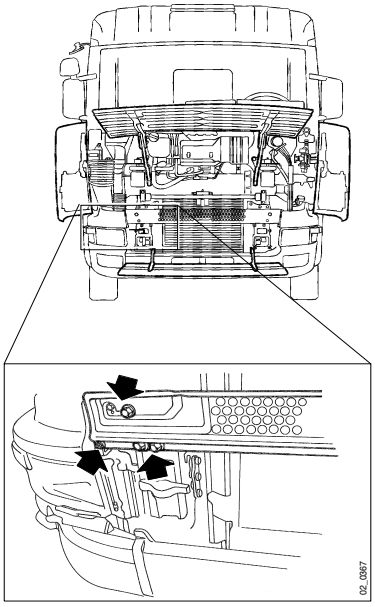
8 Replace the cover of the washer-fluid reservoir.

9 Bolt on the air filter inlet pipe to the plastic cover above the headlamp.



10 Fit the centre front grille.

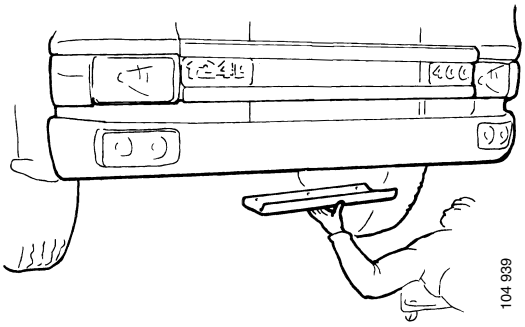
11 Reconnect the windscreen washer hose.



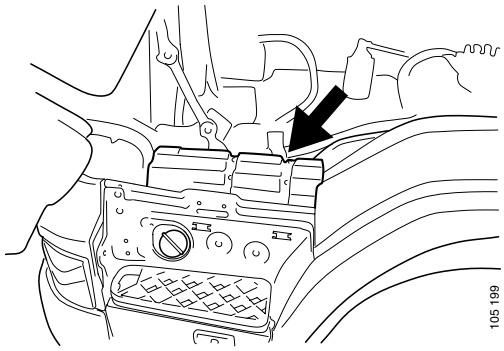
12 Replace the protection plate under the radiator assembly.

13 Tilt the cab.

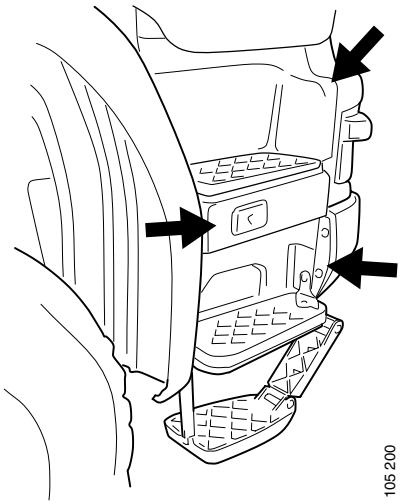
14 Shorten and then bind the headlamp wiring with a strap.



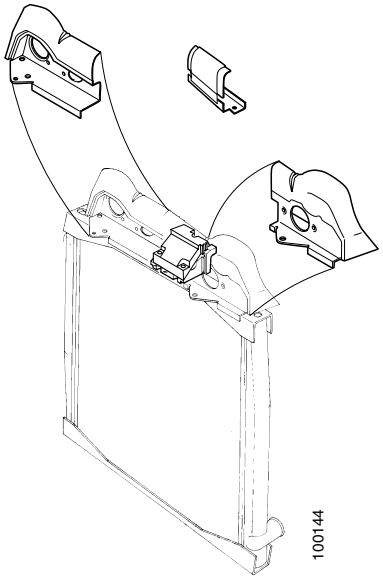
15 Replace the step-guard over the wiring.



16 Refit the plastic protection by the step.



17 Fit the upper recirculation shields, the pipes and the hoses on top of the radiator.



Note: Do not damage the O-rings of the charge air cooler.

18 Fit the charge air cooler and radiator hoses between the engine and the radiator assembly.

19 Lower the cab.

20 Fill the cooling system as described in "Filling with coolant" if the radiator has been removed.

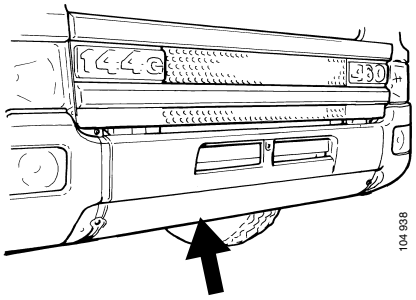
T cab

Removal of the radiator assembly

Description

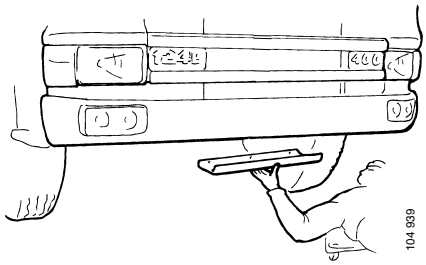
Vehicles with plastic bumper covers.

1 Remove the bumper centre plastic cover.



Vehicles with metal bumpers.

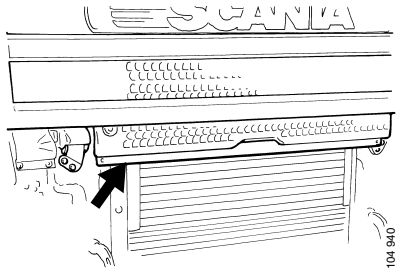
1 Remove the protection plate beneath the radiator assembly.



All vehicles

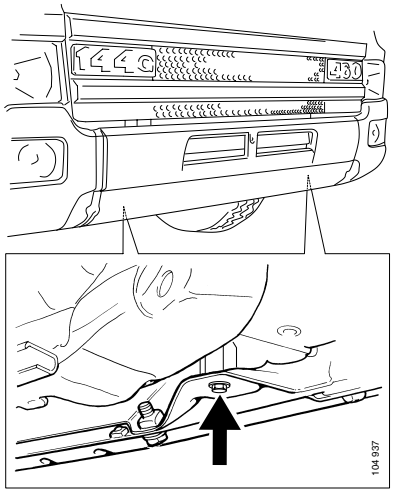
2 Drain the cooling system according to the section "Draining the coolant".

3 Remove the centre front grille.

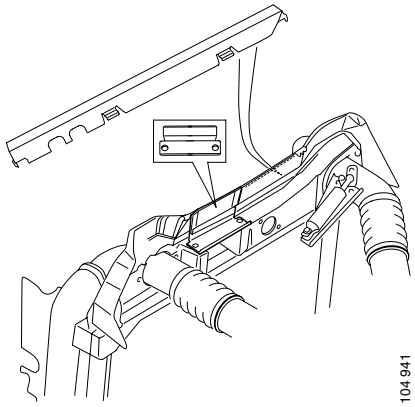


4 Remove the lower radiator assembly bolts.

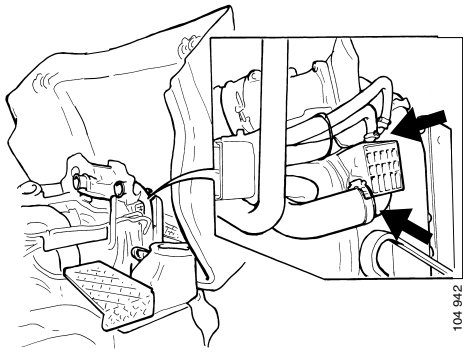
5 Detach the coolant hose from the radiator outlet.



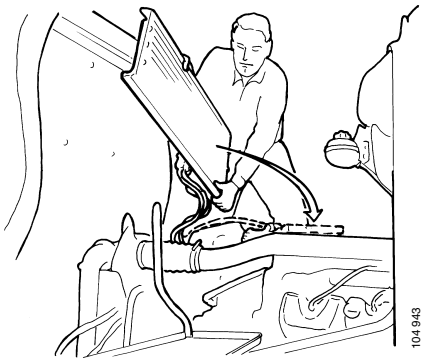
6 Remove the recirculation shield according to the illustration.



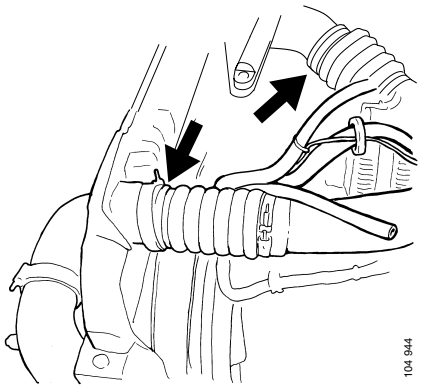
7 Detach the coolant hoses for venting the engine and radiator and the hose to the radiator inlet.



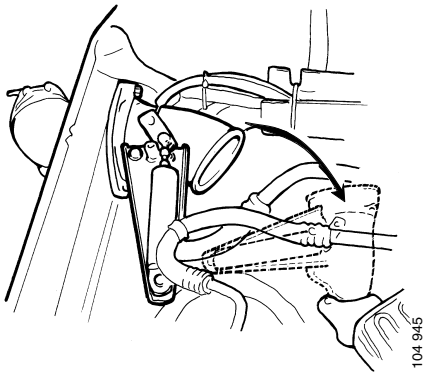
8 Detach the condenser, lift it up and place it on the engine.



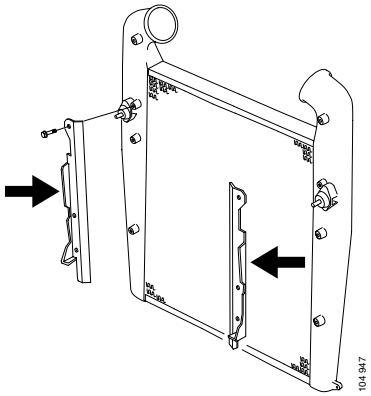
9 Remove the hoses between the charge air cooler and the engine.



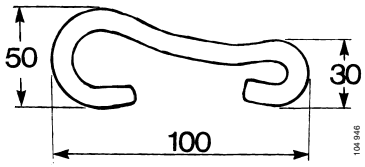
10 If the truck is equipped with a noise damper, unscrew it and place it on the engine.



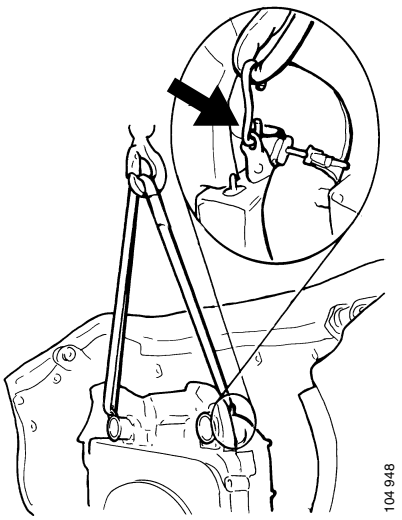
11 Remove the recirculation shields on the charge air cooler as illustrated.



12 To make it easy to lift up the radiator assembly, we suggest that you make two lifting eyes of iron rod, each with a diameter of 8 mm.



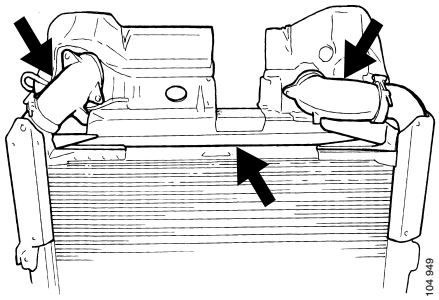
13 Remove the upper bolts of the radiator assembly and lift it up using the lifting eyes.



Renewing the radiator

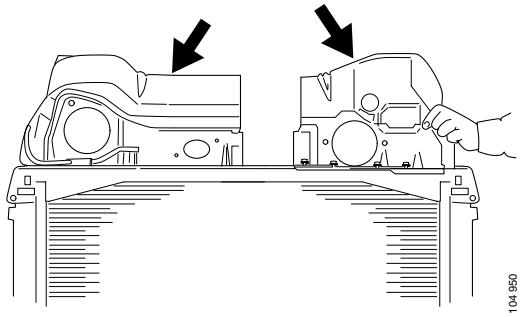
Description

1 Remove the charge air pipes and recirculation shields as shown.



2 Remove the remaining bolt and separate the charge air cooler from the radiator.

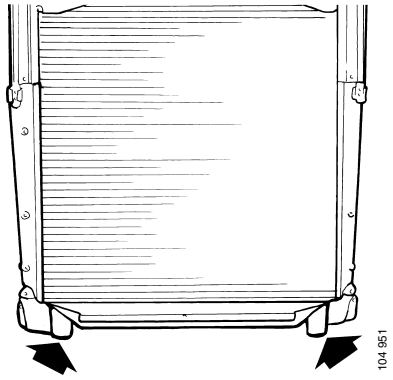
3 Move the recirculation shields as per the illustration.



4 Move the lower brackets of the fluid cooler and the fan housing.

5 Stick new seal strips on to the fluid cooler.

6 Assemble the charge air cooler and the radiator fitting spacers in between.



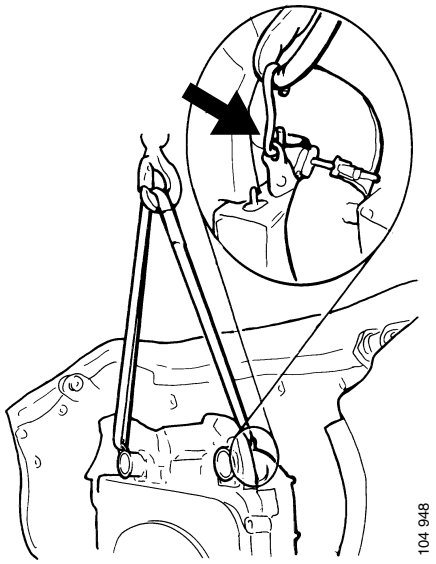
7 Fit the charge air pipes and the recirculation shield.

Note: Do not damage the O-rings of the charge air cooler.

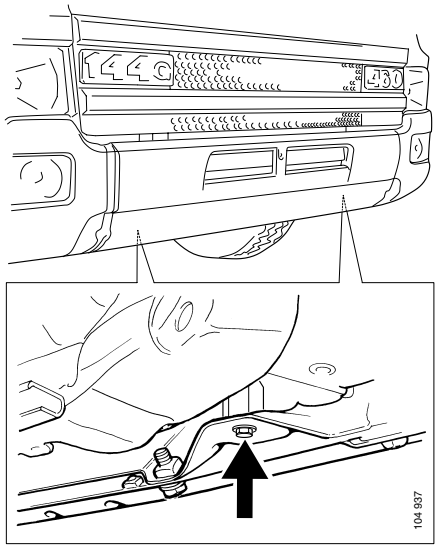
Fitting the radiator assembly

Description

1 Lower the radiator assembly into position in the engine compartment.



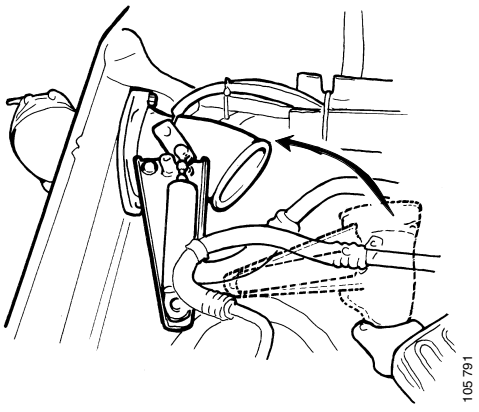
2 Secure the radiator assembly with the lower bolts.



3 Fit the coolant hose to the radiator outlet.

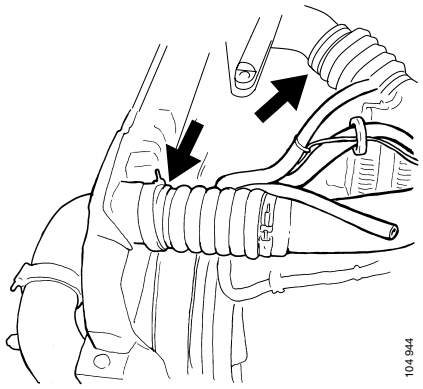
4 Secure the radiator assembly with the upper bolts.

5 Replace the noise damper if the truck is equipped with one.

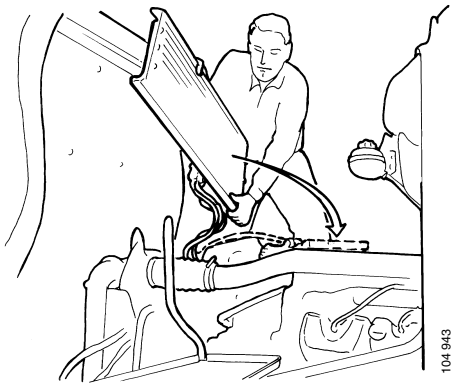


Note: Do not damage the O-ring. Apply rubber grease to O-ring to facilitate fitting.

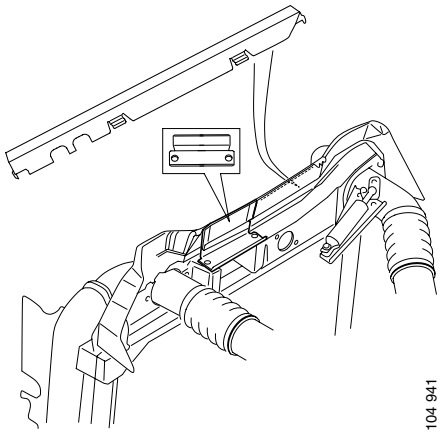
6 Fit the charge air hoses between the charge air cooler and the engine.



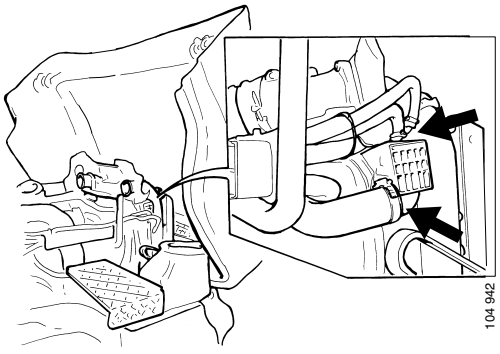
7 Reposition the AC condenser and secure it into place.



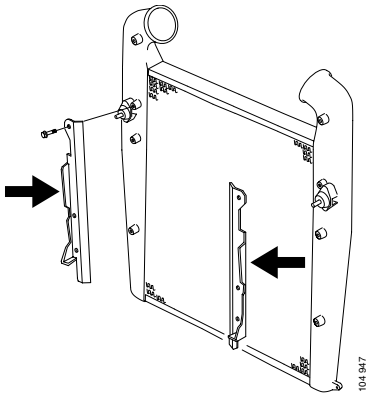
8 Fit the recirculation shields as shown.



9 Fit the coolant hoses for venting the engine and radiator and the hose to the radiator inlet.



10 Fit the recirculation shields on the charge air cooler.

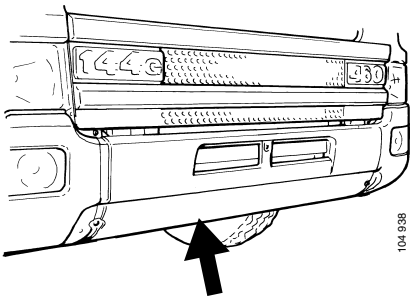


11 Fit the centre front grille.

12 Refill the cooling system according to the section "Filling with coolant".

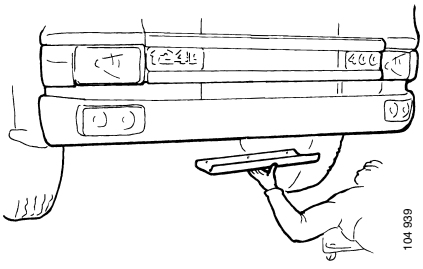
Vehicles with plastic bumper covers.

13 Fit the bumper centre plastic cover.



Vehicles with metal bumpers.

14 Fit the protection plate under the radiator assembly.



Expansion tank

Removal

Description

1 Drain the cooling system according to the section "Draining the coolant", but only until the expansion tank is empty.

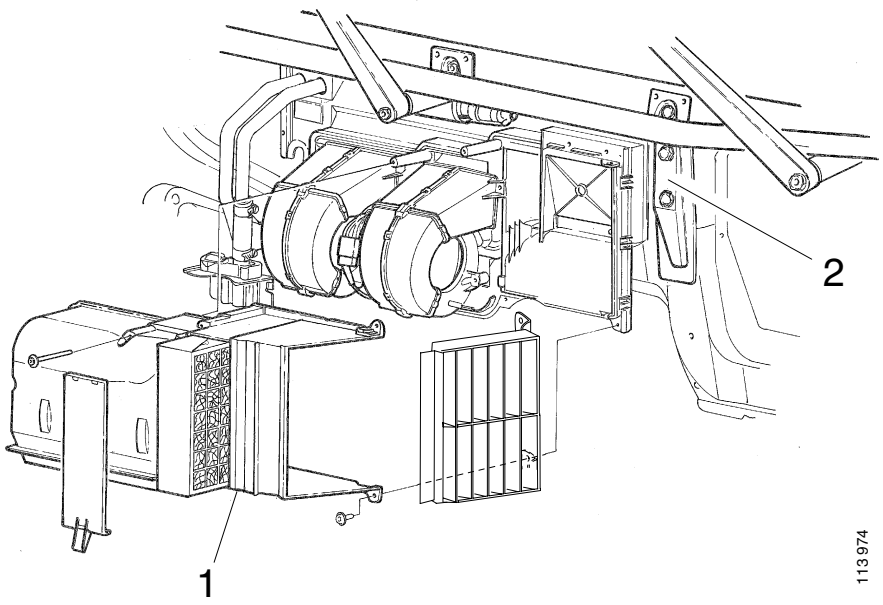
2 Detach all the hoses on the underside of the expansion tank.

3 Unplug the connector to the water-level sensor.

4 Remove the front grille panel.

5 Remove the outer air duct 1.

6 Remove the windscreen wiper holder and the windscreen wiper assembly 2.



Trucks with ETC/AC

1 Disconnect and detach the electrical wiring to the fan resistor unit, fan motor, wiper motor and control motor.

2 Detach the water valve bracket 3. Disconnect the electric connector on water valve 4.

3 Remove the bracket 5 securing the water pipes.

4 Empty the AC system. Refer to the AC booklet, Group 18.

5 Remove the water pipe 6. Undo the AC pipe with the bracket 7 by the dehydrator and plug the pipe. Refer to the AC booklet, Group 18.

6 Undo the AC pipe 8 and plug the pipe.

7 Remove the dehydrator 9.

8 Remove the expansion valve 10.

9 Remove the heat exchanger cover 11.

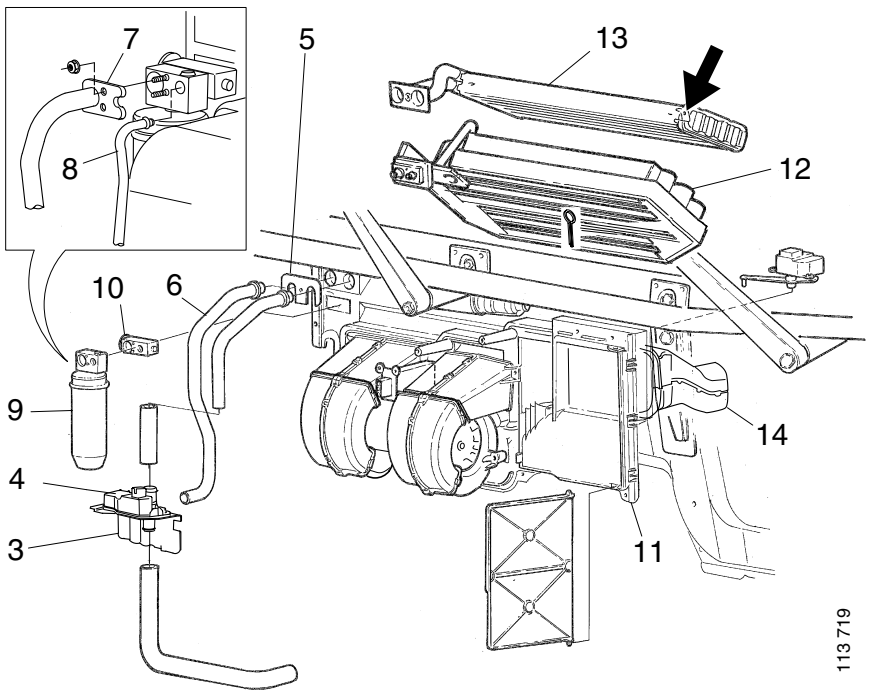
10 Remove the AC evaporator 12 and plug the connections. Refer to the AC booklet, Group 18.

11 Unscrew the bolt securing the heat exchanger 13 in the heater housing, see arrow at position 13.

12 Remove the recirculation duct 14. The recirculation duct is located in the cab under the instrument panel.

13 Detach the heater housing and move it to one side.

14 Detach and remove the expansion tank.



Trucks without ETC/AC

1 Disconnect and detach the electrical wiring to the fan resistor unit, fan motor, wiper motor and control motor.

2 Undo the water valve bracket 3. Remove the cable on the water valve 4.

3 Remove the bracket 5 securing the water pipes.

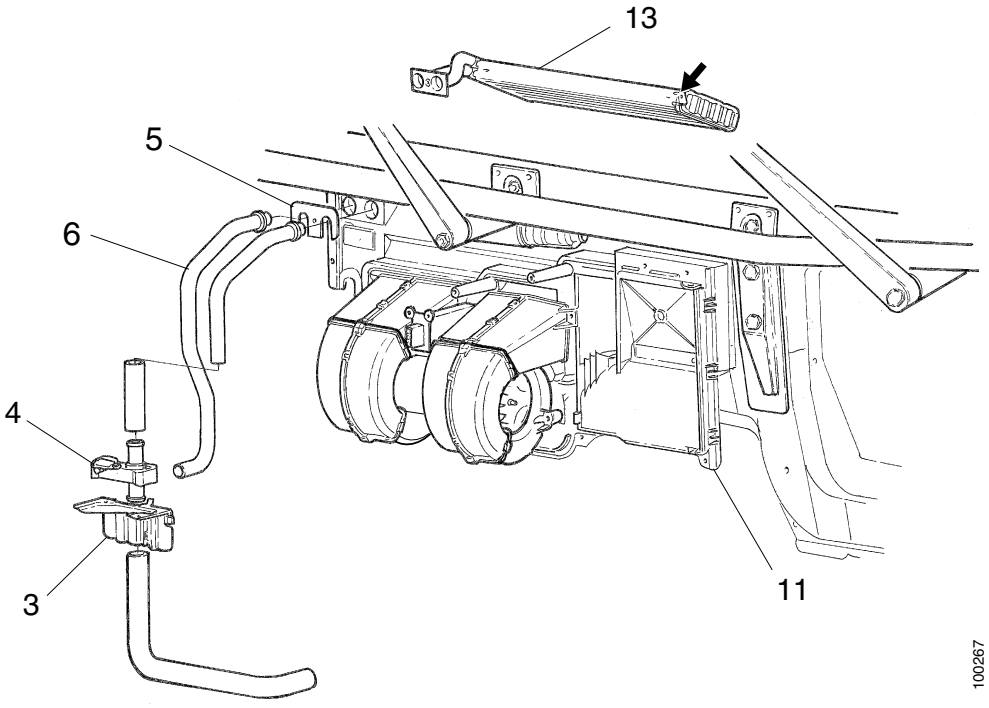
4 Remove the water pipe 6.

5 Remove the heat exchanger cover 11.

6 Unscrew the bolt securing the heat exchanger 13 in the heater housing. Refer to the arrow at position 13.

7 Detach the heater housing and move it to one side.

8 Detach and remove the expansion tank.



Fitting

Description

Trucks with ETC/AC

1 Fit the expansion tank.

2 Push the heater housing into position and screw it tight.

3 Fit the recirculation duct 14.

4 Fit the heat exchanger 13 with a bolt in the heater housing. Refer to the arrow at position 13.

5 Fit the AC evaporator 12.

6 Fit the heat exchanger cover 11.

7 Fit the expansion valve 10.

8 Fit the dehydrator 9.

9 Renew the O-rings on the AC pipes and lubricate them with PAG oil.

10 Fit the AC pipe 8. Refer to the AC booklet, Group 18.

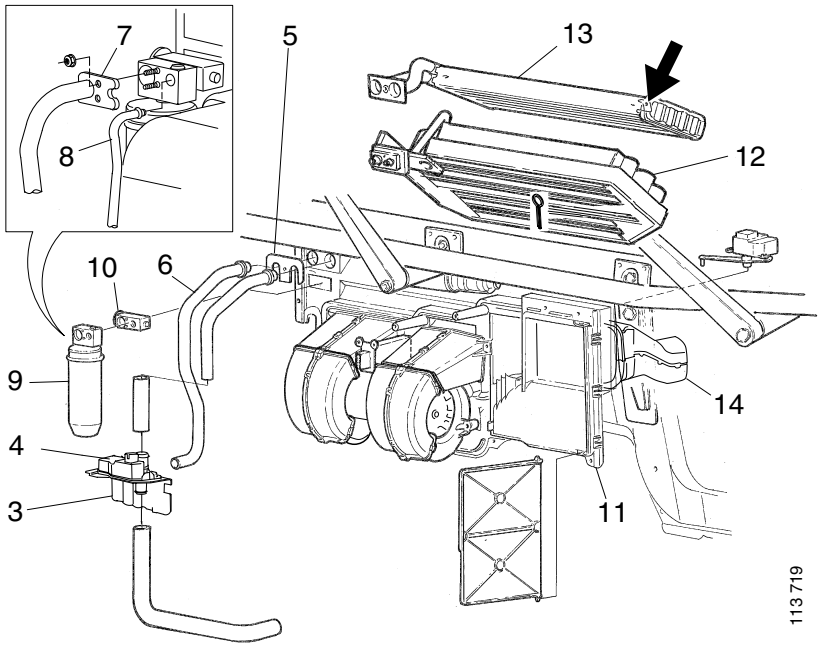
11 Fit the AC pipe with bracket 7.

12 Fit the water pipe 6.

13 Fit the bracket 5 securing the water pipes.

14 Fit the electric connector on the water valve 4.

15 Fit the water valve bracket 3.



16 Connect the wiring to the fan resistor unit, fan motor, wiper motor and control motor.

17 Fit the windscreen wiper holder and windscreen wiper assembly 2.

18 Fit the outer air duct 1.

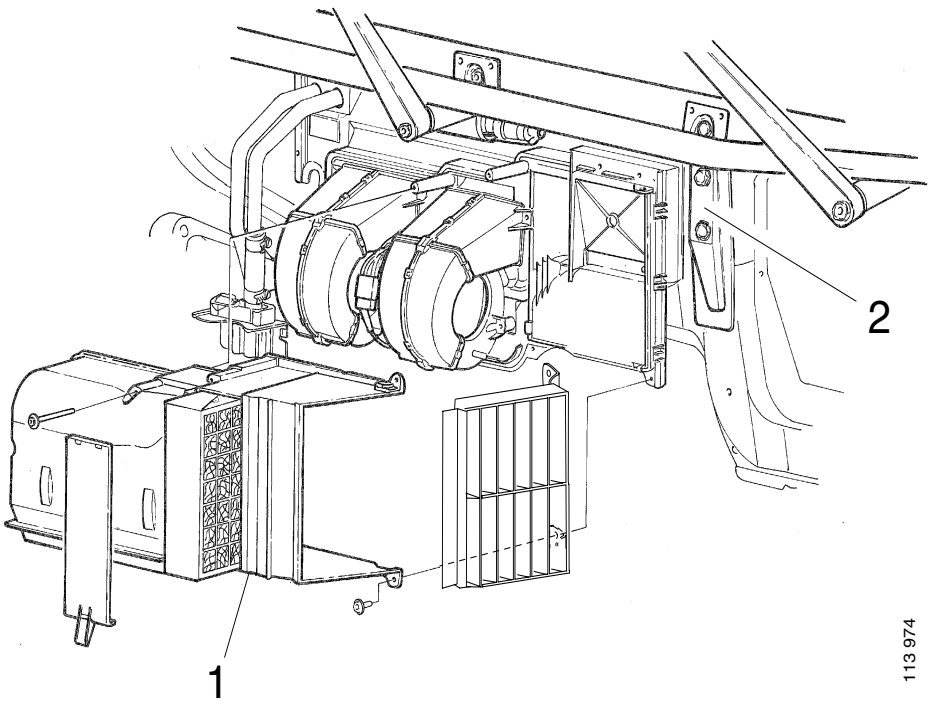
19 Fit the front grille panel.

20 Fit the connector to the water level sensor.

21 Fit all the hoses to the underside of the expansion tank.

22 Refill the cooling system according to the section "Filling with coolant".

23 Charge the AC system. Refer to the AC booklet, Group 18.



Trucks without ETC/AC

1 Refit the expansion tank.

2 Push the heater housing into position and screw it tight.

3 Fit the heat exchanger 13 with bolts in the heater housing. Refer to the arrow at position 13.

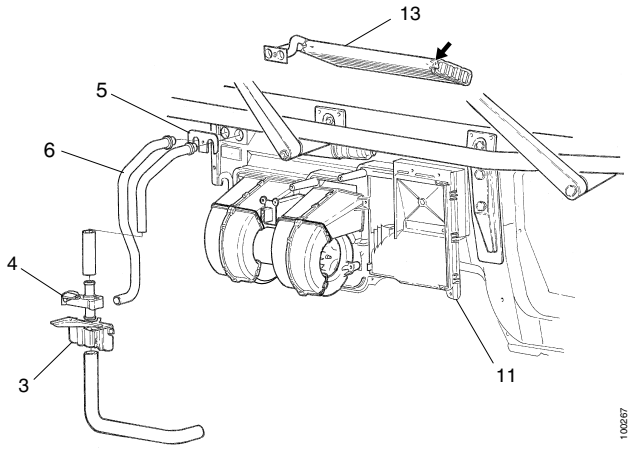
4 Fit the heat exchanger cover 11.

5 Fit the water pipe 6.

6 Fit the bracket 5 securing the water pipes.

7 Fit the cable on the water valve 4.

8 Fit the water valve bracket 3.



9 Connect the wiring to the fan resistor unit, fan motor, wiper motor and control motor.

10 Fit the windscreen wiper holder and windscreen wiper assembly (2).

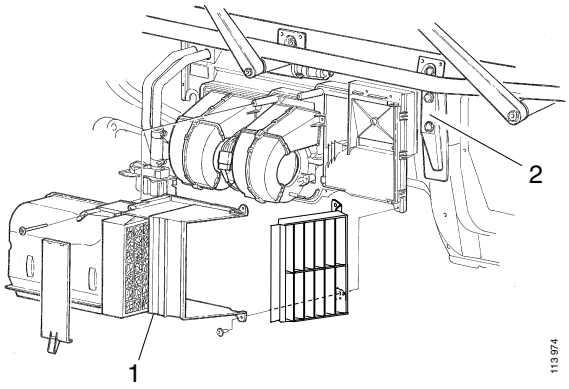
11 Fit the outer air duct 1.

12 Fit the front grille panel.

13 Fit the connector to the water level sensor.

14 Fit all the hoses to the underside of the expansion tank.

15 Refill the cooling system according to the section "Filling with coolant".

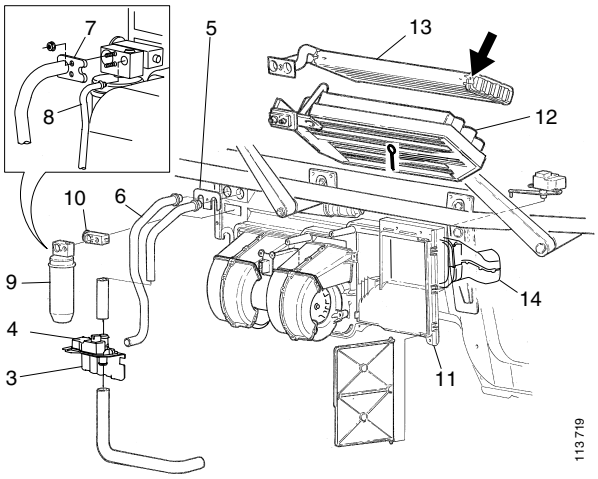


Pressure limiting valve

Removal

Description

First, check that the coolant in the expansion tank is cold. The coolant level must be below the MAX level before the pressure limiting valve is removed.



1 Depressurise the system by opening the filler cap on the expansion tank.

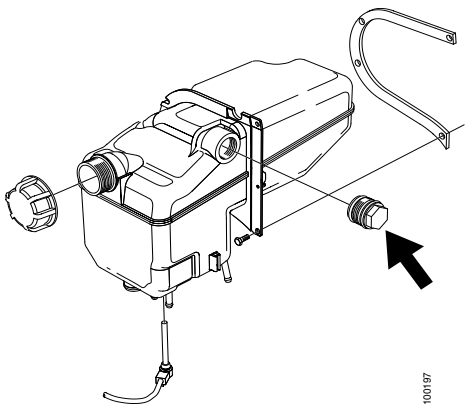
2 Remove the front grille panel.

3 Remove the windscreen wiper holder and windscreen wiper assembly.

4 Trucks with ETC/AC; empty the AC system, refer to AC booklet group 18.

5 Undo the AC pipe with the bracket 7 by the dehydrator and plug the pipe. Refer to the AC booklet, Group 18.

6 In trucks with ETC/AC, detach the AC pipe 8 and plug the pipe.



7 Remove the pressure limiting valve.

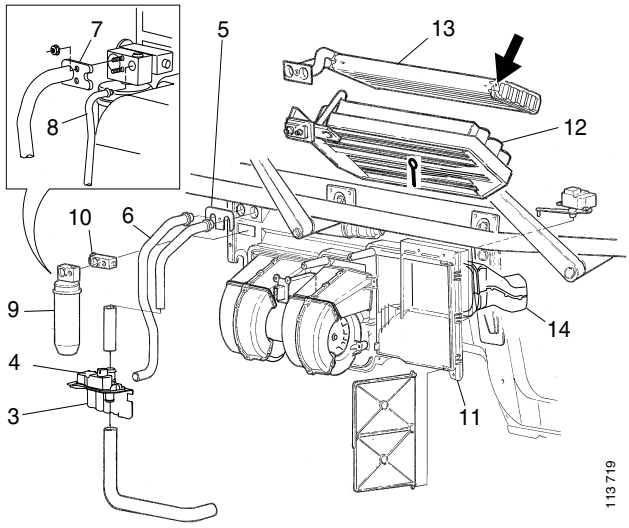
Fitting

Description

1 Fit the pressure limiting valve.

2 In trucks with ETC/AC: Renew and lubricate the O-rings on the AC pipe using PAG oil.

3 In trucks with ETC/AC: Fit the AC pipe 8. Read about the AC in Group 18.



4 In trucks with ETC/AC: Fit the AC pipes with bracket 7.

5 Fit the windscreen wiper holder and windscreen wiper assembly.

6 Fit the front grille panel.

7 In trucks with ETC/AC: Charge the AC system, refer to AC booklet Group 18.

Fan

Removal

Description

1 Tilt the cab.

2 Remove the charge air pipes and charge air hoses between the engine and the charge air cooler.

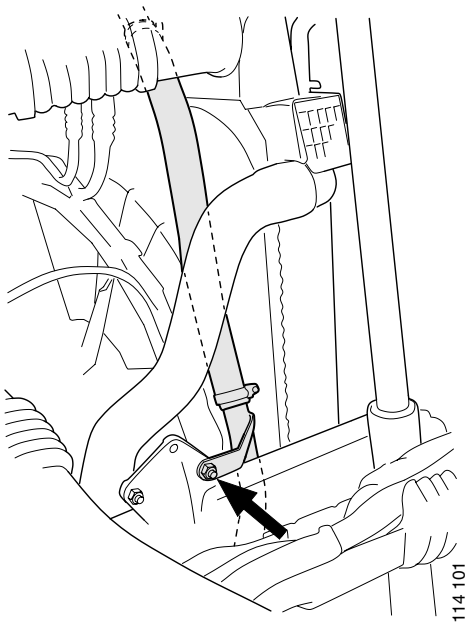
3 Detach the AC compressor from the engine and place it to one side.

WARNING!

Do not open the AC hoses, as they contain pressurised refrigerant.

4 On P124, the coolant pump must be removed.

5 Detach the expansion tank pipe (static line) from the frame. Refer to the illustration.



6 Detach and lift up the fan ring and the fan.

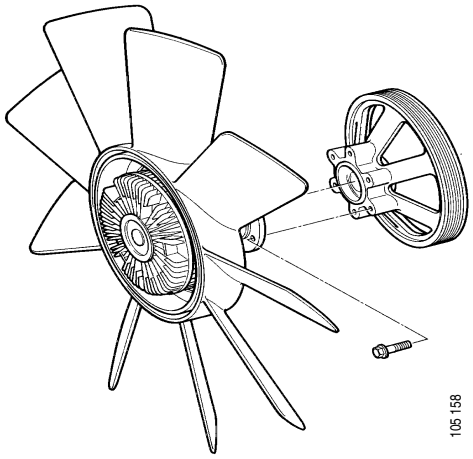
Fitting

Specifications

Tightening torque

Fan	30 Nm

Description



1 Fit the fan ring and the fan and torque tighten to 30 Nm.

2 Refit the expansion tank pipe (static-line) to the frame.

3 On P124, refit the coolant pump.

4 Refit the AC compressor.

5 Refit the charge air pipes and charge air hoses between the engine and the charge air cooler.

6 Lower the cab.

Checking the thermostat-controlled fan function

Special tools

Number	Designation	Illustration	Tool board
587 304	Electronic tachometer		MT1

Description

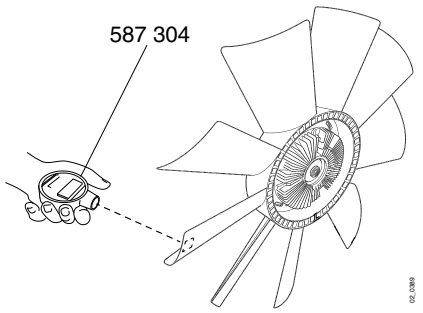
WARNING!

Rotating fan. Keep hands away.

If the fan shows signs of leaking silicone oil, i.e. if the bimetallic strip in the centre of the fan is damp and dirty, it must be renewed.

Checking the fan slippage

- If a fan fault is suspected, the speed of the temperature-controlled fan can be compared to that of the crankshaft.
- Use electronic tachometer 587 304 when performing this check.



- Make a mark with white chalk, or stick a reflective label on to one of the fan blades and on to the crankshaft pulley or hub. The chalk marks/labels will serve as reference points when measuring the fan/crankshaft speed.

Checking of fan slippage in case of too low coolant temperature.

1 Start the engine and run at idle for a while (2 - 5 minutes) until the fan speed stabilises. It is normal for the fan to follow engine speed when starting, i. e. low slippage.

2 Increase engine speed to 2,000 rpm.

3 First, measure the crankshaft speed and then measure the fan speed.

4 Calculate the fan slippage according to the formula below:

5 The slippage should be at least 40% if the engine temperature is low (temperature control has not been affected). If slippage is less than the value stated, the fan should be renewed.

Formula for calculating fan slippage:

$$\frac{\text{crankshaft speed - fan speed}}{\text{crankshaft speed}} \times 100$$

Inspection of fan slippage in case of too high coolant temperature.

1 Run the engine until the coolant reaches so high a temperature that the thermostat opens fully and full flow through the radiator is obtained (approximately 90°C temperature gauge reading).

2 Increase engine speed to 2,000 rpm.

3 First, measure the crankshaft speed and then measure the fan speed.

4 Calculate the fan slippage according to the formula below:

5 The slippage should be no more than 10% if the coolant temperature is high. If slippage exceeds the value stated, the fan should be renewed.

Formula for calculating fan slippage:

$$\frac{\text{crankshaft speed - fan speed}}{\text{crankshaft speed}} \times 100$$

Electrically-controlled fan

Checking the fan functions

Checking the fan idling speed

Check the fan idling speed if the coolant temperature is too low, i.e. when the fan is not engaged.

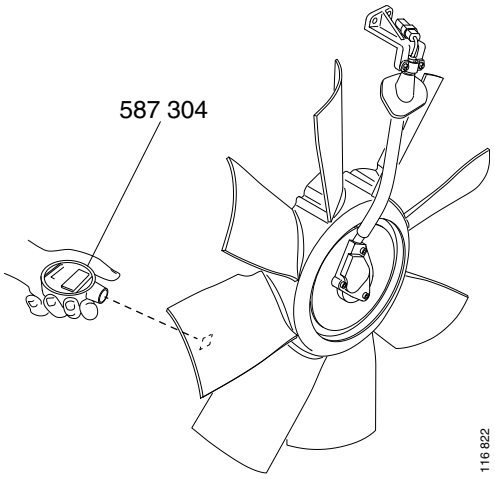
The check must be conducted when the truck is cold, as the fan will then rotate at idling speed.

6 Start the engine and run at idle for a while (2 - 5 minutes) until the fan speed stabilises. It is normal for the fan to follow the engine speed when starting. In other words, the slippage is low.

7 Increase engine speed to 1200-1500 rpm.

8 Measure the speed of the fan using tachometer 587 304. fan housing. Make a chalk mark on one of the fan blades or affix a piece of reflective tape. The marks/pieces of tape will act as a sensor when measuring the speed of the fan.

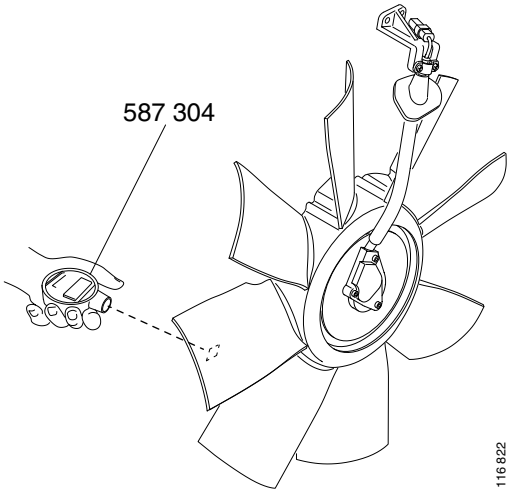
9 The fan idling speed should be between 200-300 rpm irrespective of the engine speed.



Checking the speed when the fan is fully engaged

If the fan is not cooling sufficiently despite the absence of a fault code, the fan slippage can be checked when it is fully engaged, i.e. when the fan speed follows the engine speed.

The fan is fully engaged when the current connection to the fan is broken.



1 Break the current to the fan by separating the connector.

2 Rev up the engine to 1500 rpm.

3 Measure the speed of the fan using tachometer 587 304. fan housing. Make a chalk mark on one of the fan blades or affix a piece of reflective tape. The marks/pieces of tape will act as a sensor when measuring the speed of the fan.

4 Calculate the fan slippage according to the formula below:

5 The slippage must be max. 10%. If slippage exceeds the value stated, the fan should be renewed.

Formula for calculating fan slippage:

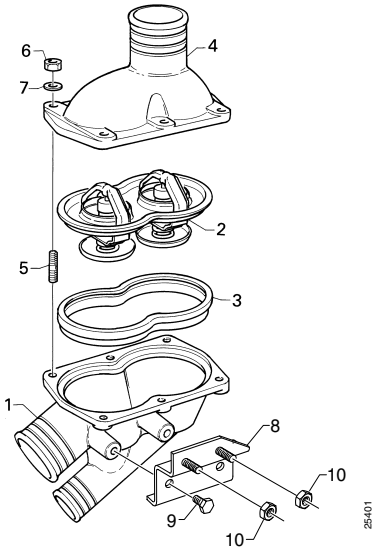
$$\frac{\text{engine speed x 1.1 - fan speed}}{\text{engine speed x 1.1}} \text{ x } 100$$

Factor 1.1 is the gear ratio between the speed of the fan and the engine speed.

A fault code is generated when the current is broken. Delete the fault code using Scania Diagnos.

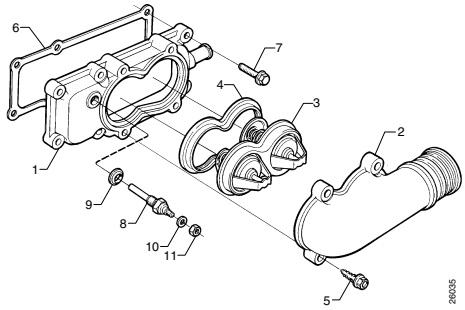
Thermostat housing

Thermostat housing for:
All engines with retarder and
9, 11 (DSC) and 16 litre engines without retarder.



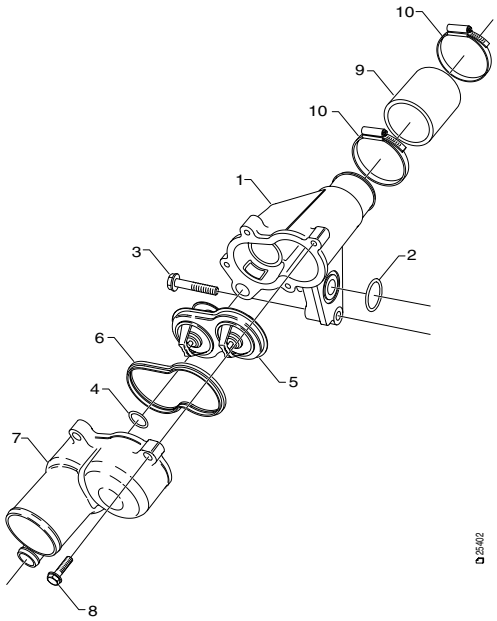
1 *Thermostat housing*
2 *Thermostat*
3 *Gasket*
4 *Cover*
5 *Stud*
6 *Nut*
7 *Washer*
8 *Bracket*
9 *Bolt*
10 *Nut*

Thermostat housing for 11 (DC) and 12 litre engines without retarder.



1 *Thermostat housing*
2 *Cover*
3 *Thermostat*
4 *Gasket*
5 *Bolt*
6 *Gasket*
7 *Flange screw*
8 *Temperature sensor*
9 *Seal*
10 *Washer*
11 *Nut*

Thermostat housing for 14 litre engine without retarder.



1 *Thermostat housing*
2 *O-ring*
3 *Flange screw*
4 *O-ring*
5 *Thermostat*
6 *Gasket*
7 *Thermostat cover*
8 *Flange screw*
9 *Hose*
10 *Hose clip*

Removal

Description

All engines with retarder and 9, 11 (DSC) and 16 litre engines without retarder.

1 Drain the cooling system according to the section "Draining the coolant".

2 Detach the thermostat housing from the frame.

3 Unscrew the thermostat housing and remove the thermostat.

11 (DC) and 12 litre engines without retarder.

1 Drain the cooling system according to the section "Draining the coolant".

2 Unscrew the thermostat housing and remove the thermostat.

14 litre engine without retarder.

1 Drain the cooling system according to the section "Draining the coolant".

2 Remove the air pipe between the air filter and the turbocharger.

3 Remove the coolant filter and crankcase ventilation pipe.

4 Detach the junction box bracket.

5 Unscrew the thermostat housing and remove the thermostat.

Fitting

Specifications

Tightening torque

Thermostat housing	28 Nm

Description

1 Clean the thermostat housing and check that nothing is present which could interfere with the proper functioning of the thermostat.

2 Fit a new gasket. Place the thermostat in the housing and screw the thermostat housing together with 28 Nm.

All engines with retarder and 9, 11 (DSC) and 16 litre engines without retarder.

1 Refit the thermostat housing into the frame.

14 litre engine without retarder.

1 Fit the junction box bracket.

2 Fit the coolant filter and crankcase ventilation pipe.

3 Fit the air pipe between the air filter and the turbocharger.

All engines

1 Refill the cooling system according to the section "Filling with coolant".

2 Start the engine and check that there are no leaks. Check the coolant level and top up if necessary.

Checking thermostat operation

1 Unscrew the thermostat housing and remove the thermostat.

2 Submerge the thermostat in boiling water. It should hang freely without touching the sides or bottom of the vessel containing the water.

3 Check that the thermostat opens fully without jamming within three minutes.

4 Check that the thermostat closes fully when it is cooled down.

5 If it does not function properly as described in points 3 and 4 or if it jams, renew the thermostat.

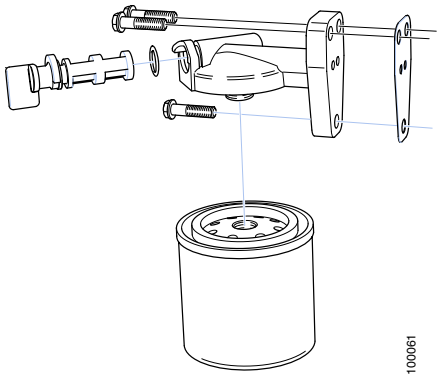
Coolant filter

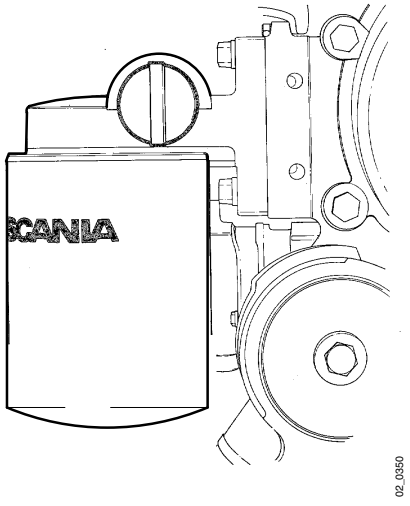
Renewal

The shut-off cock must be closed when renewing the coolant filter to prevent the coolant from running out of the system.

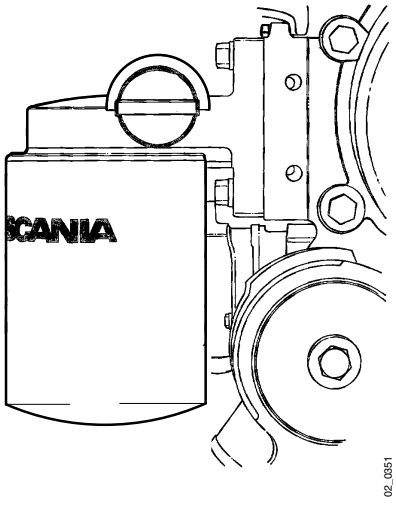
After renewing the coolant filter, check the coolant level in the expansion tank and top up as necessary.

Note: Do not forget to open the shut-off cock after renewing the coolant filter.





Shut-off cock open



Shut-off cock closed

Coolant pump

Removal

1 Drain the cooling system according to the section "Draining the coolant".

2 Tilt the cab.

3 Remove the coolant hose, fan ring bracket and release the belt tensioner.

4 Remove the coolant pump.

Fitting

1 Fit the coolant pump without damaging the gasket.

2 Fit the drive belt, the fan ring bracket and the coolant hose.

3 Lower the cab.

4 Refill the cooling system according to the section "Filling with coolant".

Checking

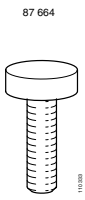
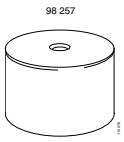
Clean all the parts and check:

- That the sealing surface against the engine block is flat.
- That the bearings rotate easily and that balls and races are intact.

Pulley

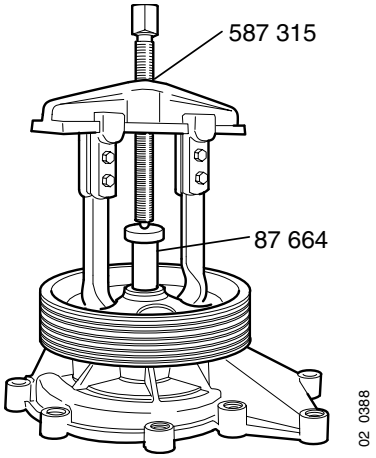
Renewal

Special tools

Number	Designation	Illustration	Tool board
587 315	Puller		XA3
87 664	Drift		G2
98 257	Drift		G2

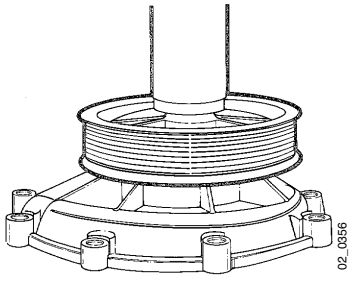
Description

1 Remove the pulley using puller 587 315 and drift 87 664.



2 Press the pulley on so that it is level with the shaft end.

Note: Drift 98 257 must be placed between the centre of the pump wheel and the surface of the press bench when pressing on the pump pulley for 14 and 16 litre engines.



Seal

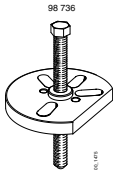
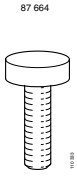
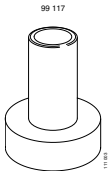
Renewal

Specifications

Distance between the pump housing sealing surface and the impeller shaft seal surface

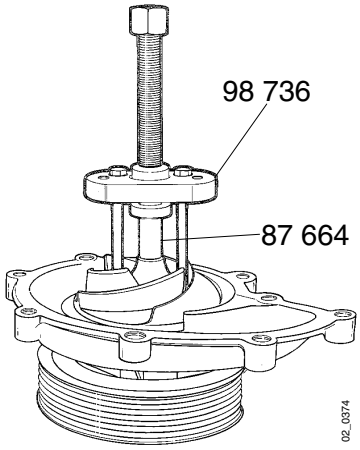
9 litre engine	9.35 - 9.75 mm
11 litre engine	13.3 - 13.7 mm
12 litre engine	13.3 - 13.7 mm
14 litre engine	13.3 - 13.7 mm
16 litre engine	13.3 - 13.7 mm

Special tools

Number	Designation	Illustration	Tool board
98 736	Puller		AM2
87 664	Drift		G2
99 117	Drift		D4

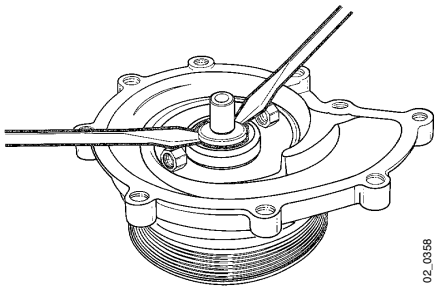
Description

1 Pull the impeller off using puller 98 736 and drift 87 664.



2 Break off the old seal using two screwdrivers and a spacer.

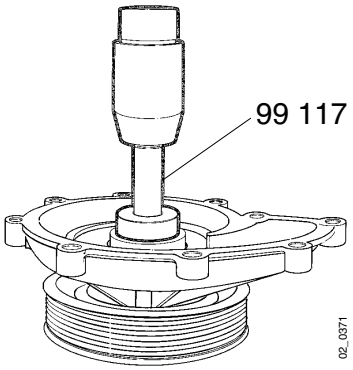
Note: Take care not to damage the gasket surface of the pump housing.



3 Apply a thin layer of Loctite 270 to the sealing surface between the pump housing and the sealing ring on 11, 12, 14 and 16 litre engines.

4 Press a new seal into place using drift 99 117.

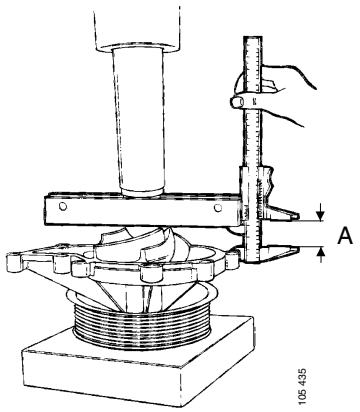
IMPORTANT! It is very important that drift 99 117 is used. It has been designed to provide the correct pre-load for the seal retaining spring.



5 Press the impeller on to the shaft. The distance A between the pump housing sealing surface and the impeller shaft end surface must be:

- 13.3-13.7 mm on 11, 12, 14 and 16 litre engines.
- 9.35 - 9.75 mm on 9 litre engines.

Note: The shaft position in the pump housing must not change since this may cause the seal position to change.



Measurement of dimension A on 9, 11 and 12 litre engines.

Dimension A cannot be measured as illustrated on 14 and 16 litre engines. Proceed as follows on pumps for these engines:

6 Use a cylindrical spacer with flat and parallel end faces. The diameter should be 25-50 mm and the height 15-30 mm.

7 Place the cylinder on to the shaft surface of the impeller.

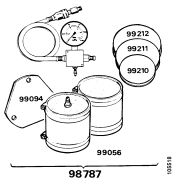
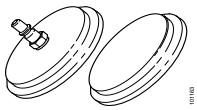
8 Measure the distance separating the upper surface of the cylinder from the gasket surface of the pump housing.

9 Dimension A is obtained by reducing the measured distance with the height of the cylinder. Dimension A must be 13.3 - 13.7 mm.

Charge air cooler

Test pressurising

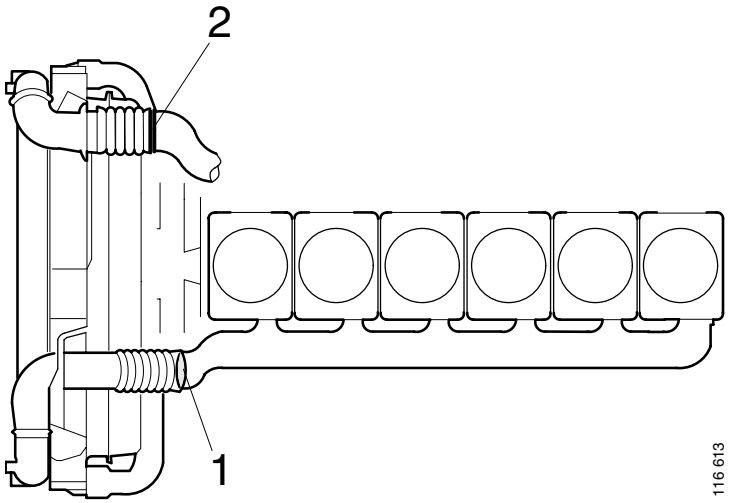
Special tools

Number	Designation	Illustration	Tool board
98 787	Test pressurising kit		-
99 334	Additional kit	99 334 	-

Test pressurising is conducted in the same manner irrespective of engine type. The difference is the side of the charge air cooler on which the cover or cover with air connection union is fitted.

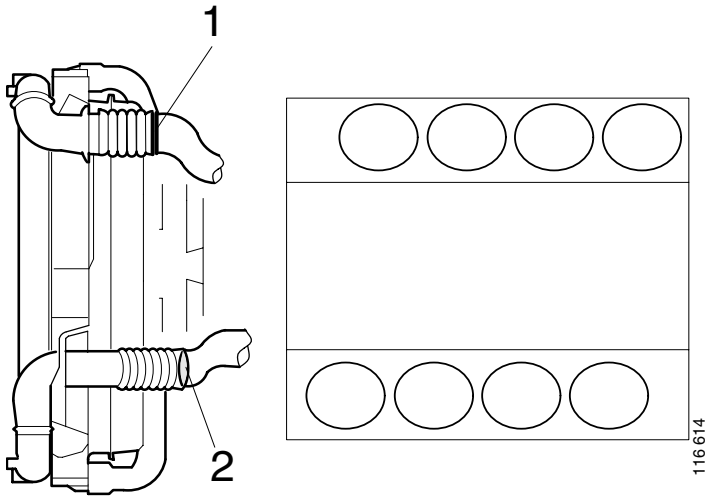
Connecting test equipment

Connecting test equipment to a 6 cylinder engine



1 Cover
2 Cover with air connection

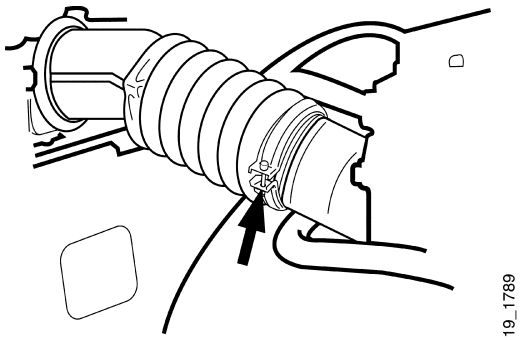
Connecting test equipment to an 8 cylinder engine



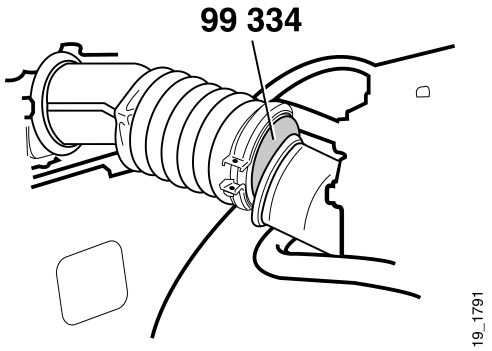
1 Cover
2 Cover with air connection

The illustrations show the connection of the test equipment on a 12 litre engine.

1 Undo the V-clamp between the hose and the intake manifold. On 6 cylinder engines, the V-clamp is located on the left-hand side and on 8 cylinder engines on the right-hand side.

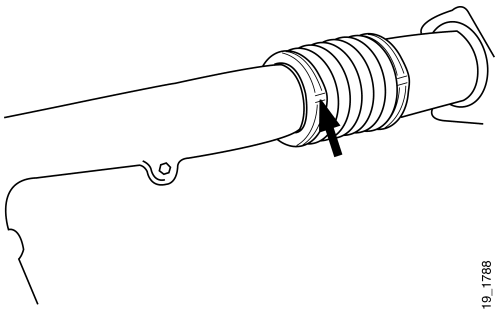


2 Fit the cover 99 334 and tighten the V-clamp. Tightening torque: 8 Nm.



Cover

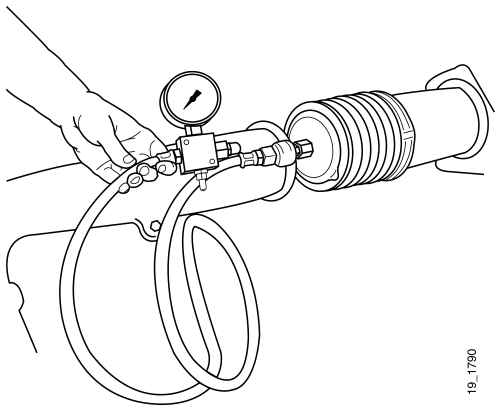
3 Loosen the clamp that is located closest to the turbocharger between the hose and the charge air pipe.



4 Fit the cover with the air connection union and tighten the V-clamp. Tightening torque: 8 Nm.

Note: If poorly fitted, the cover may come off.

5 Connect the measuring equipment to the cover.

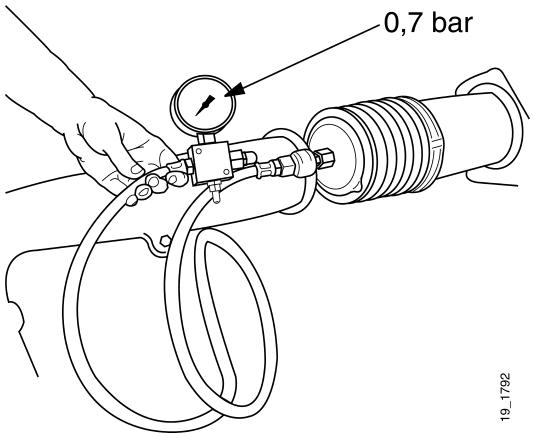


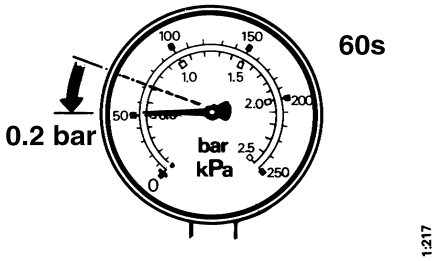
Test pressurising

1 Apply compressed air to the test equipment and pressurise the charge air cooler to 0.7 bar.

2 During 60 seconds the pressure must not fall more than 0.2 bar.

3 If the pressure falls more, look for the cause and rectify the fault. Leakage spray can be useful when looking for leaks.





Checking pipes

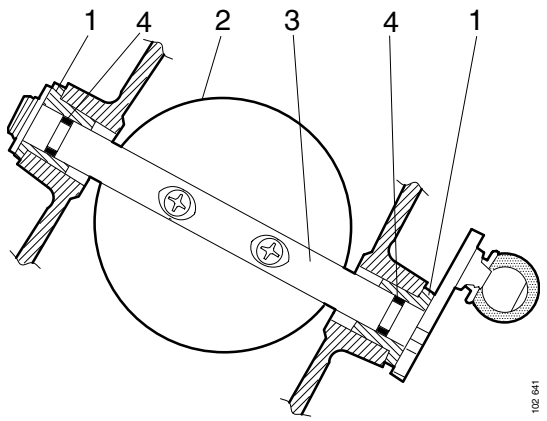
- Make sure there are no cracks in the parts of the intake system that are not test pressurised.

Noise damper

Checking

Refer to Workshop Manual group 10, booklet 10:05-04, Exhaust brake and white smoke limiter, for a functional inspection of the damper, since it is controlled by the exhaust brake control unit.

The damper shaft is mounted in bushings and sealed with O-rings. Play or leaks are rectified by renewing the bushings and O-rings.



1 Bushing
2 Damper
3 Damper shaft
4 O-ring

Belt transmission

Belt tensioner

The belt tensioner must not be adjusted, opened, repaired or modified in any way. If the belt tensioner does not provide proper tensioning of the poly-V belt, it must be renewed.

The poly-V belt must be removed before the belt tensioner retaining bolt is slackened, The index pin (restricting the belt tensioner angular movement) is not designed to withstand the spring force and may thus break unless the belt tensioner retaining bolt is tightened.

WARNING!

If the index pin breaks, the belt tensioner arm will move out. There is a risk of personal injury since the spring force on the tensioner is great.

Noise in the belt transmission

Checking

Run the engine with full load on the belt transmission, i.e. with the fan, generator and, if fitted, the AC switched on. Run the engine at idling speed, full speed and with rapid acceleration.

Proceed as follows in case of noise

1 Slacken the poly-V belt.

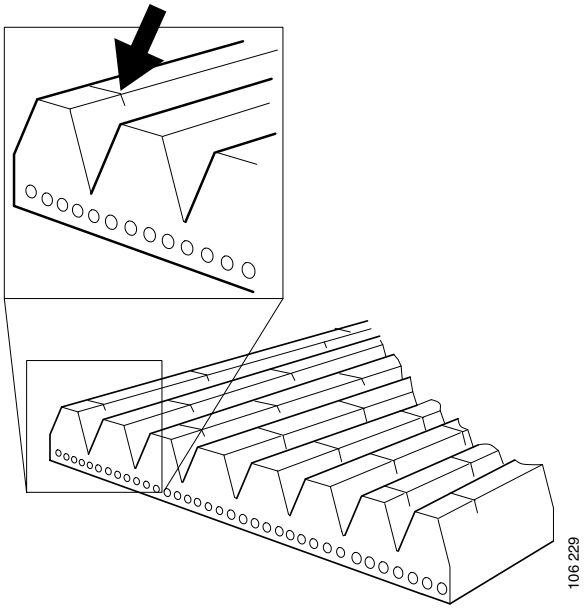
2 Check the poly-V belt for cracks and wear according to the section "Inspection of poly-V belt".

3 Check the rollers in the belt transmission by rotating them. The rollers must rotate easily without jamming or noise.

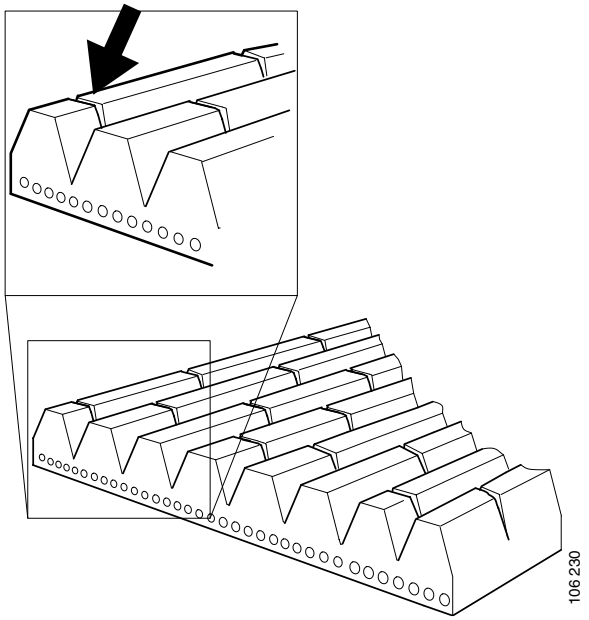
4 Check the belt tensioner by slowly pressing it from the belt until it stops. Then, slowly bring the belt tensioner back into the initial position. Repeat 2-3 times. No jamming or jerking of the belt tensioner is permissible.

Checking the poly-V-belt

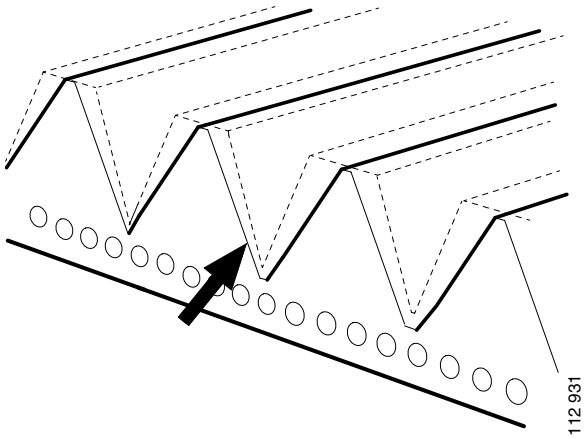
Check the poly-V belts for cracks and wear as follows.



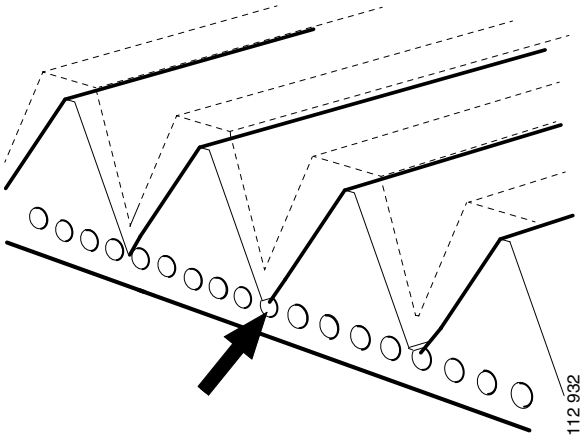
Poly-V belt with superficial cracks. Poly-V belt may be refitted.



There are deep cracks through the ribs of the poly-V-belt. Poly-V belt must be renewed.



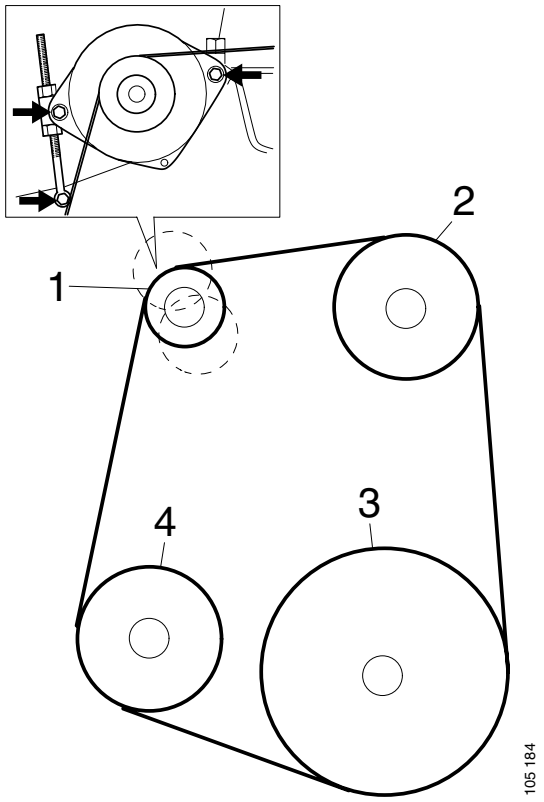
Poly-V belt beginning to show signs of wear. Poly-V belt may be refitted.



Belt is worn down to the cords. Poly-V belt must be renewed.

9 litre engine with AC

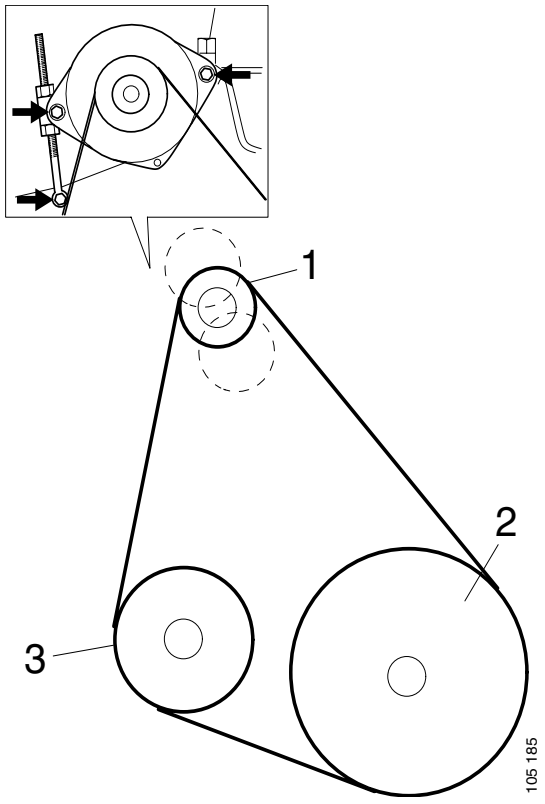
Both the V belts should be renewed at the same time. For V belt pre-load, refer to the 3 series literature, Group 1, booklet 1-871228.



1 Alternator and belt tensioner
2 AC compressor
3 Crankshaft
4 Coolant pump

9 litre engine without AC

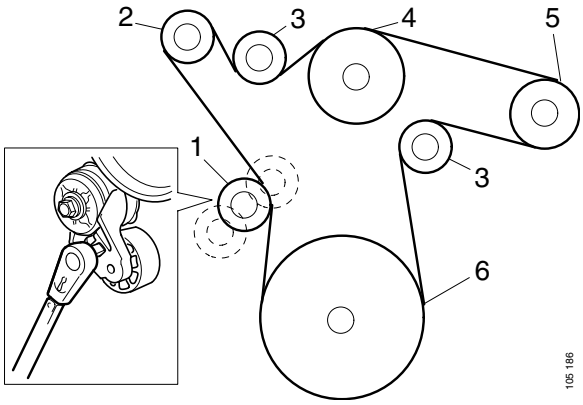
Both the V belts should be renewed at the same time. For V belt pre-load, refer to the 3 series literature, Group 1, booklet 1-871228.



1 Alternator and belt tensioner
2 Crankshaft
3 Coolant pump

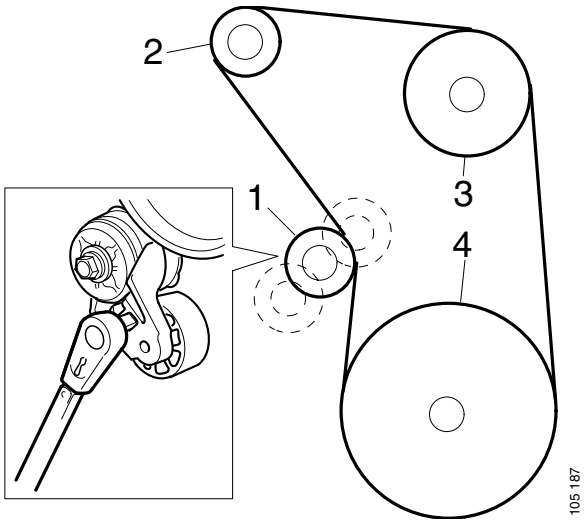
11 litre engine (DSC) with AC and two idler rollers

1 *Automatic belt tensioner*
2 *Alternator*
3 *Idler roller*
4 *Coolant pump*
5 *AC compressor*
6 *Crankshaft*



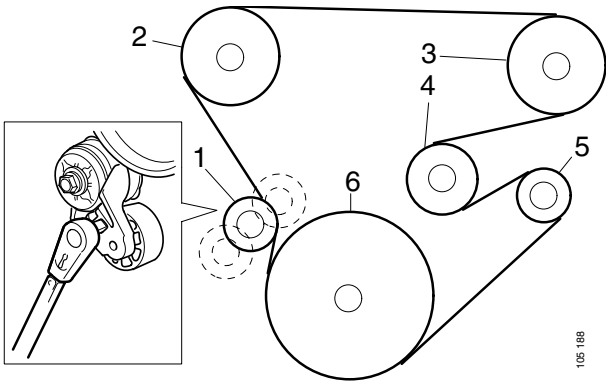
11 litre engine (DSC) without AC and idler roller

1 *Automatic belt tensioner*
2 *Alternator*
3 *Coolant pump*
4 *Crankshaft*



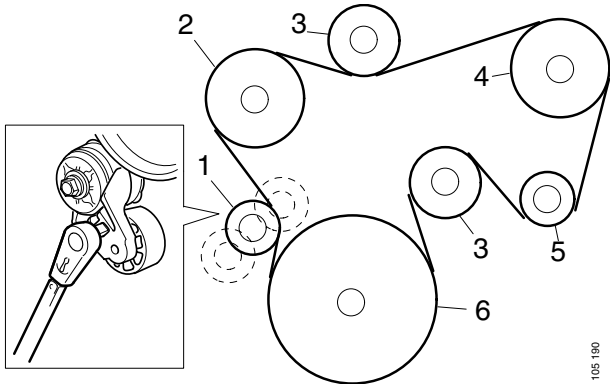
11 litre engine (DC) and 12 litre engine with AC and one idler roller

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *AC compressor*
4 *Idler roller*
5 *Alternator*
6 *Crankshaft*



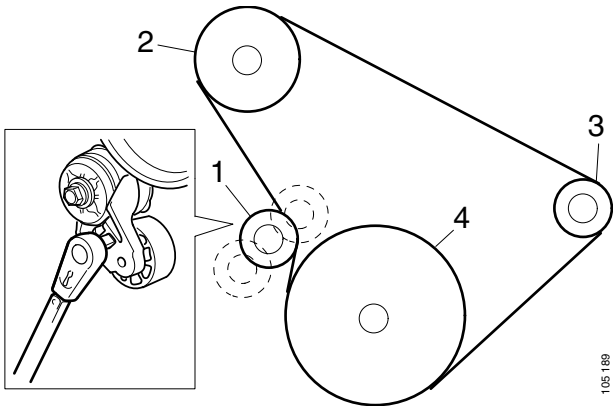
11 litre engine (DC) and 12 litre engine with AC and two idler rollers

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *Idler roller*
4 *AC compressor*
5 *Alternator*
6 *Crankshaft*



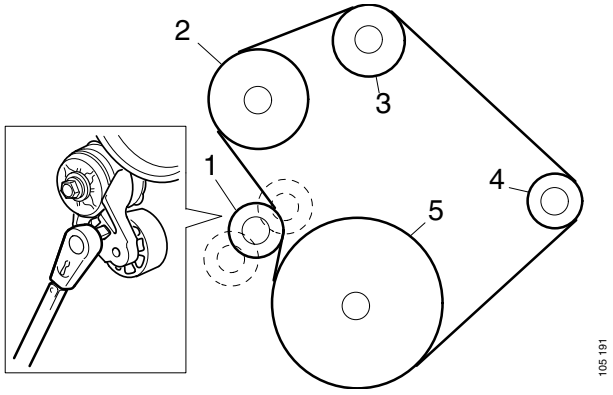
11 litre engine (DC) and 12 litre engine without AC and idler roller

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *Alternator*
4 *Crankshaft*



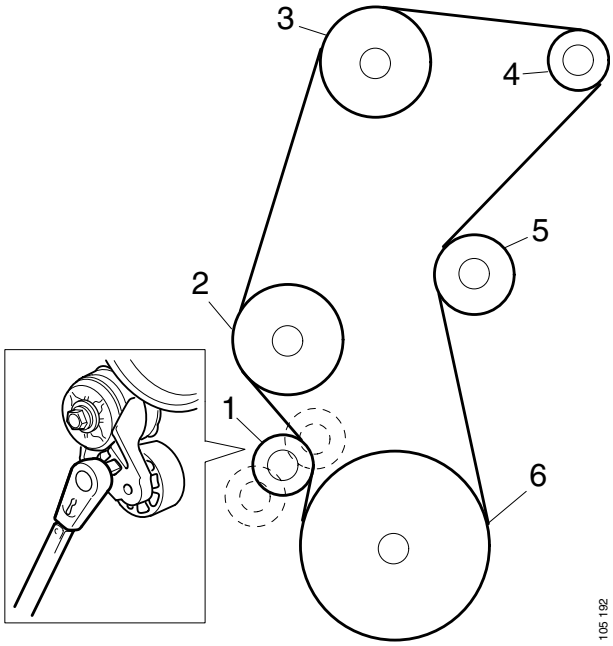
11 litre engine (DC) and 12 litre engine without AC with one idler roller

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *Idler roller*
4 *Alternator*
5 *Crankshaft*



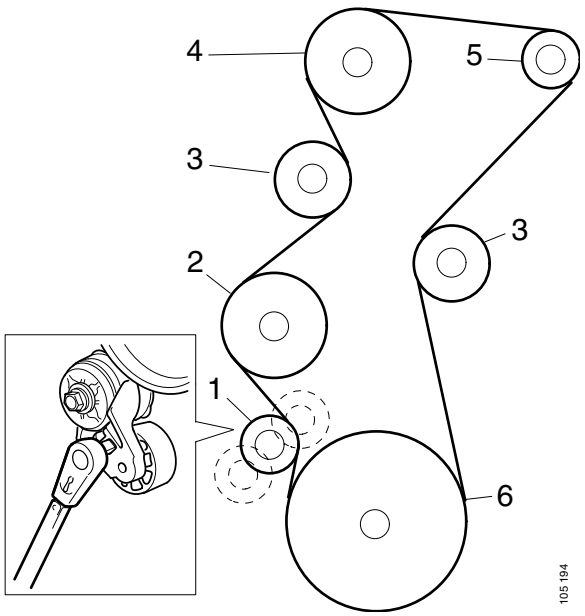
14 litre engine with AC and one idler roller

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *AC compressor*
4 *Alternator*
5 *Idler roller*
6 *Crankshaft*



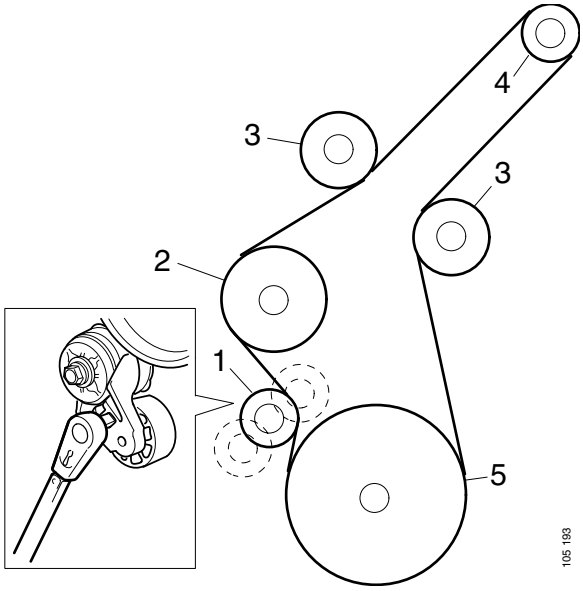
14 litre engine with AC and two idler rollers

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *Idler roller*
4 *AC compressor*
5 *Alternator*
6 *Crankshaft*



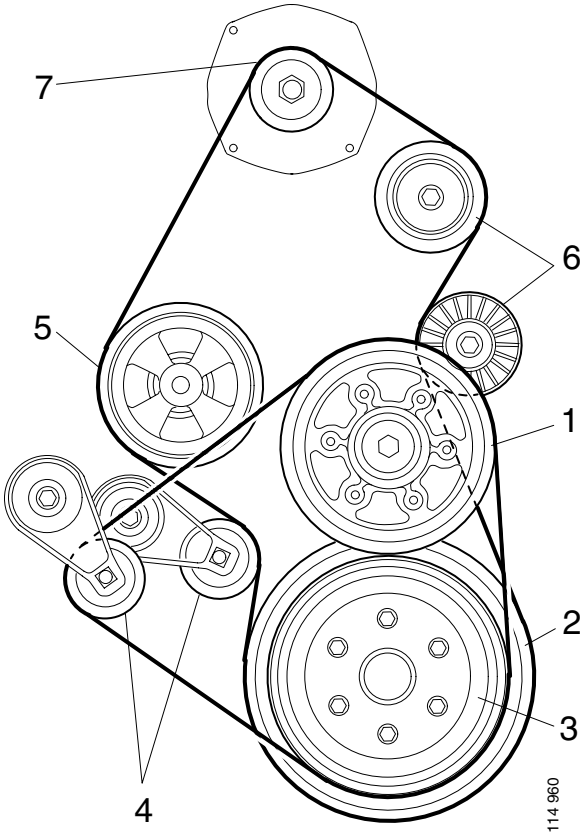
14 litre engine without AC with two idler rollers

1 *Automatic belt tensioner*
2 *Coolant pump*
3 *Idler roller*
4 *Alternator*
5 *Crankshaft*



16 litre engine without AC

1 *Fan drive*
2 *Crankshaft, inner pulley*
3 *Crankshaft, outer pulley*
4 *Automatic belt tensioner*
5 *Coolant pump*
6 *Idler roller*
7 *Alternator*



16 litre engine with AC

1 *Fan drive*
2 *Crankshaft, inner pulley*
3 *Crankshaft, outer pulley*
4 *Automatic belt tensioner*
5 *Coolant pump*
6 *Idler roller*
7 *Alternator*
8 *AC compressor*