

Cylinder head gasket, replacement

Removal of cylinder head gasket

Drain the coolant off and loosen the front exhaust pipe

- Disconnect the battery negative lead. First read **Note when disconnecting/connecting the battery lead** ..
- Remove the expansion tank cover.
- Remove protection cover from under engine.
- Place a drainage receptacle under the engine drain cock and drain coolant.
- Move the receptacle to the radiator drainage cock and drain any remaining coolant.
- Close the nipples.
- Remove the nuts for the manifold/front exhaust pipe.

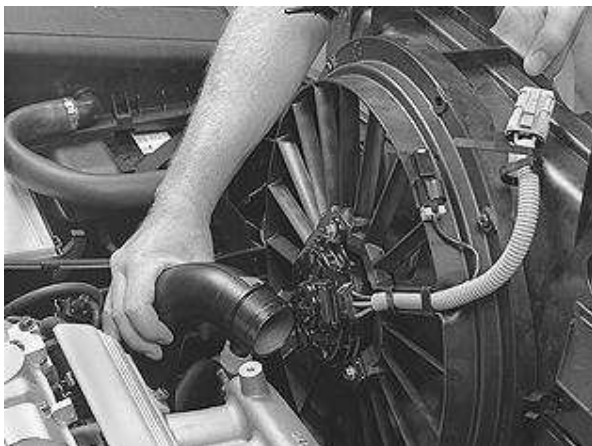
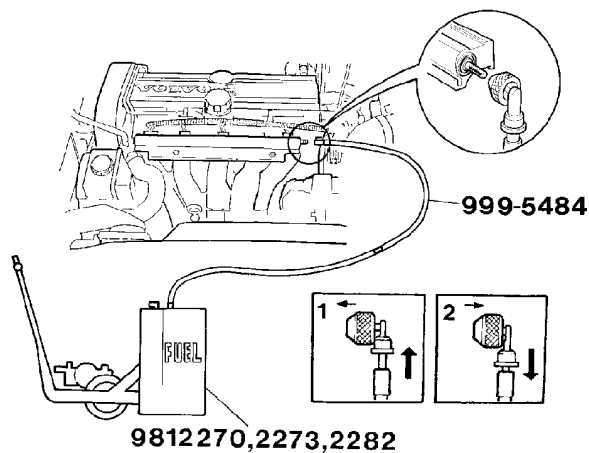
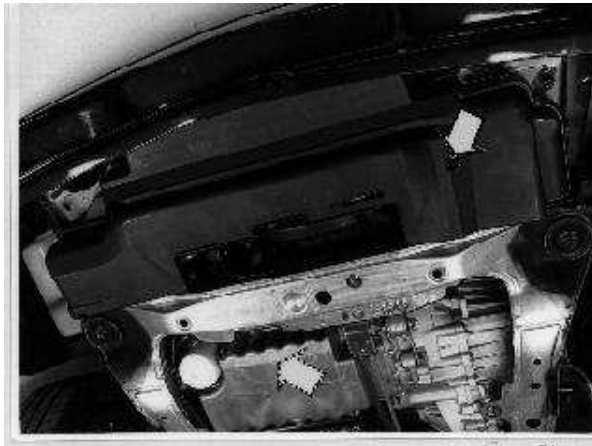
Empty the fuel line

This figure is not entirely correct as the servo oil tank now occupies a different position.

- Drain the fuel system as described in: **Draining the fuel system** .
- Disconnect the fuel line's quick coupling at the engine.

Note! Suitably protect the openings against dirt. Observe the cleanliness required when working with fuel systems.

- Put the cable to one side.
- Separate the EVAP cable at the quick coupling.



Removal of components

The figure shows a turbo engine.

Remove:

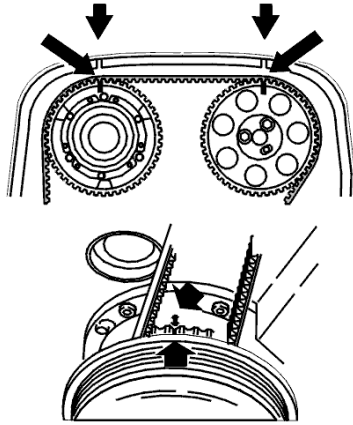
- exhaust manifold.
- ignition coil cover.
- the ignition coils.
Mark them and put them to one side without disconnecting the connectors.
- the upper and the front cam belt casing.
- the electric cooling fan.
Disconnect the screw of the terminal on the throttle housing (ETM module) so that the charge air pipe does not rupture.
Push the charge air pipe backwards and lift up the cooling fan with shroud.
- inlet pipe.
- screw for the inner cam belt casing.

Position the engine according to markings

The figure shows a turbo engine with VVT.

The markings are the same on both suction and turbo engines.

- Remove the RH front wheel.
- Loosen nut for wheel arch lining hatch.
- Install upper cam belt casing.
- Turn the crankshaft clockwise until the markings on



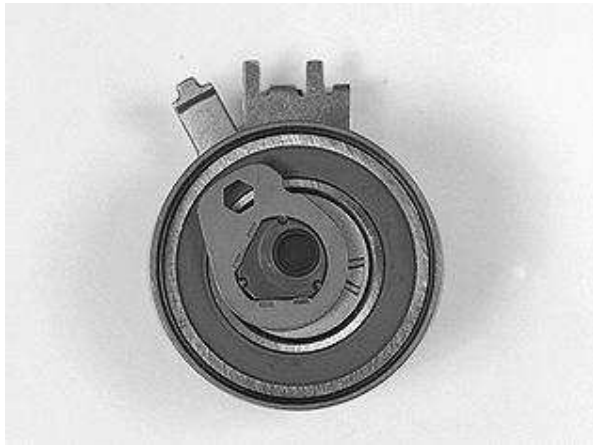
the crankshaft and camshaft gear are aligned.

Note! Turbo engine with VVT:

Turn the crankshaft a further 1/4 turn clockwise and then back anti-clockwise until the markings are aligned. This ensures that toothed belt pulley of the VVT unit is in its end position.

The markings are shown in the figure.

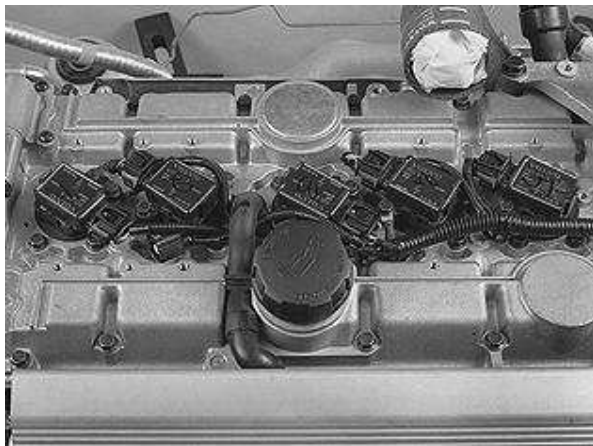
- Remove upper cam belt casing.



Removal of camshaft belt

Disconnect the belt tensioner

- Loosen the central screw of the belt tensioner a little.
- Keep the central screw in place and turn the eccentric of the tensioner clockwise using a 6mm Allen key to the 10 o'clock position.
- Remove the cam belt from the belt tensioner, camshaft gear and idler pulley.

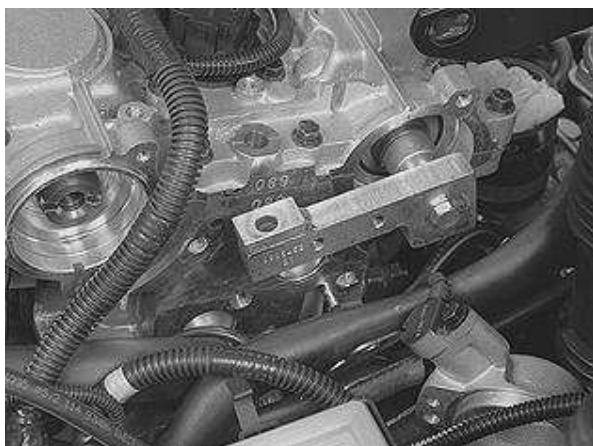


Removal of components at rear edge of the engine

Remove

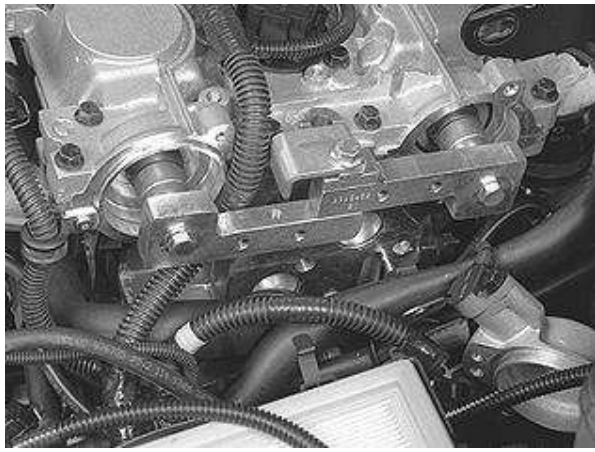
- air-filter housing with hoses.
- camshaft sensor with diaphragm.
- the torque arm with bracket.
- spark plugs.

Note! Ensure that no waste matter is able to fall into the combustion chamber.



Removal of toothed belt pulley using the VVT unit Applies to turbo engines.

- Install gauge **999 5452** at the rear edge of the camshafts.
First screw in the part of the tool belonging to the exhaust camshaft.
Then, carefully turn the exhaust camshaft clockwise with the gauge until it is possible to install the intake camshaft gauge.
- Screw gauges together.
- Remove the plug at the front edge of the VVT unit (TORX 55).
- Remove the central screw in the VVT unit (TORX 55).
- Carefully pull the toothed belt pulley out with the VVT unit.
- Toothed belt pulley without VVT:
Remove the screws and the toothed belt pulley



Removal of toothed belt pulley Applies to suction engines.

- Mark the toothed belt pulley.
Intake and exhaust, respectively.
- Install gauge [999 5452](#) at the rear edge of the camshafts.

Note! The following applies to turbo engines:

First screw in the part of the tool belonging to the exhaust camshaft.

Then, carefully turn the exhaust camshaft clockwise with the gauge until it is possible to install the intake camshaft gauge.

- Remove the screws.
- Remove the toothed belt pulley.

Loosen camshaft cover

Install:

- tool [999 5454](#) allowing 2-3 mm clearance to camshaft cover.

Note! Make sure that screws are tightened to bottom of spark plug thread.

Unfasten

- all the screws that retain the camshaft cover.
- camshaft cover using pliers [999 5670](#) at break points.
Start at cylinder 1 and alternate backwards.
- the wing nuts approximately 2 turns.
Repeat the procedure using pliers.

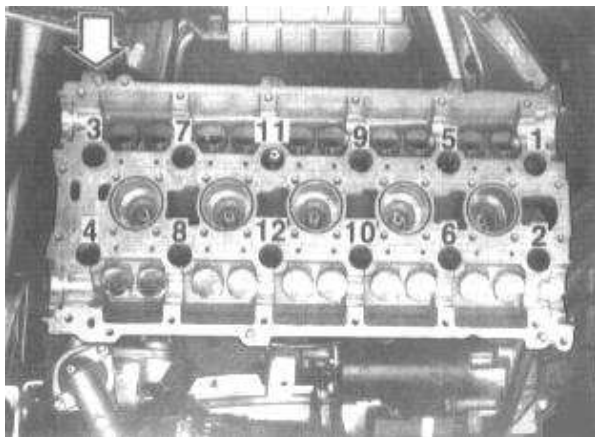
Remove the tool.

Remove the camshaft cover.

Mark and remove the camshafts.

Removal of cylinder head

- Remove both screws of the coolant pipe.
- Remove the cylinder head screws, from the outside and the inside.
As shown in the figure.
- Remove the cylinder head.
- Remove the cylinder head gasket.



Installation of cylinder head gasket

Clean gasket surfaces

Clean:

- exhaust connections at manifold/cylinder head.
- the engine block gasket surfaces.
- the coolant pipe gasket surfaces.
- the gasket surfaces between the upper and lower halves of the cylinder head.

Note! Use a soft spatula and, if necessary, gasket remover, component number:116 1440



A metal scraper may not be used.

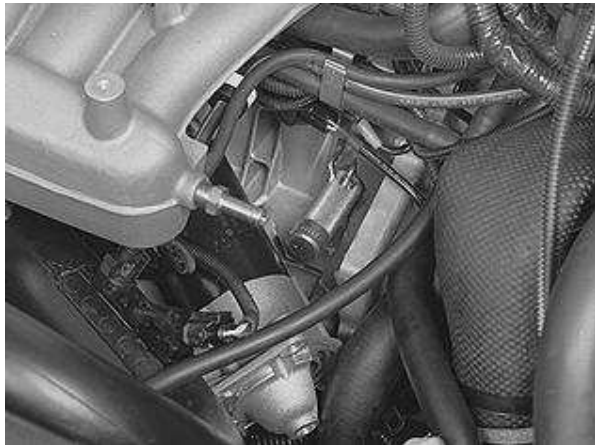
If using gasket remover, you must use a fume cupboard or extractor.

The surfaces must be completely clean.

Fix the crankshaft into position

Install gauge

- Applies to turbo engines: Pull charge air pipe forwards.
- Remove retaining screws (3) from starter motor.
- Put the starter motor to one side.
- Remove cover plug and sealing washer.
- Turn the crankshaft clockwise a little to avoid putting the gauge in the wrong position.
- Install gauge **999 5451** ..
Ensure that it touches the bottom of the engine block.
- Turn the crankshaft **anti-clockwise** until it stops against the mandrel.

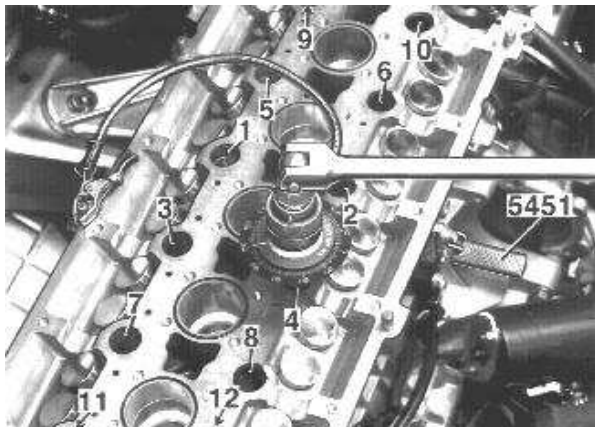


Note! Check that the marking on the crankshaft pulley aligns with the marking on the oil pump.

Replacement of cylinder head gasket

Install:

- a **new** cylinder head gasket.
- the cylinder head.
Lubricate and tighten the screws in three steps as follows.
See figure.
Start at the center and work outwards:
- 1. Tighten to: **20 Nm**.
- 2. Tighten to: **60 Nm**.
- 3. Tighten through an angle of: **130°**.
Use angle gauge **951 2050** ..
- Install the coolant pipe with a **new** gasket.
- Install **new** O-rings around spark plug wells.

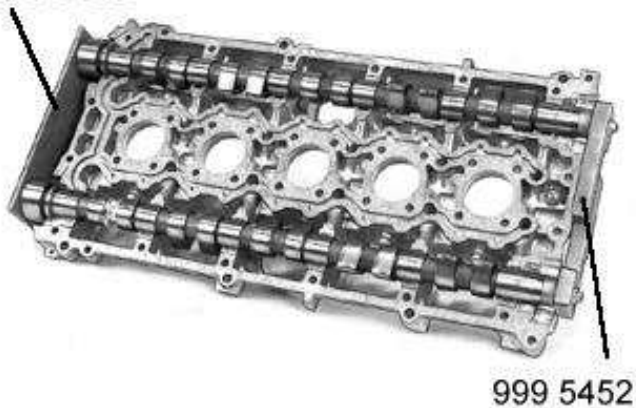


Apply liquid gasket

Roll on sealing compound:

- Apply liquid gasket, component number: **116 1059** on the camshaft cover.
Use roller **951 1205** ..
Ensure that the sealing compound does not end up in the oil channels.
A thin layer is sufficient to create a seal.
- Lubricate the slots for the camshaft bearings in the camshaft cover.
- Install camshafts.
Check the markings.
- Attach camshafts at front edge using retainer

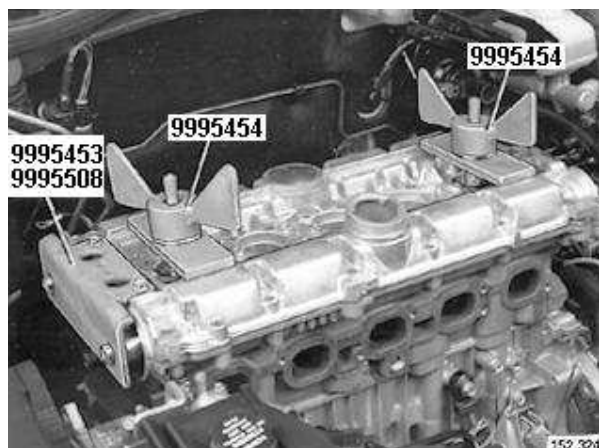
999 5508
999 5453



999 5453 and at rear edge using gauge 999 5452 ..

Installation of camshaft cover

- Put the camshaft cover into position.
- Pull down the camshaft cover against the cylinder head using pressure tools 999 5454 , (x 2). As shown in the figure.
- Tighten the camshaft cover screws. Start from the inside and work outwards. Tighten to **17 Nm**.
- Remove tools 999 5453 and 999 5452 .
- Install the spark plugs.
- Install the ignition coils.



Install front camshaft seal.

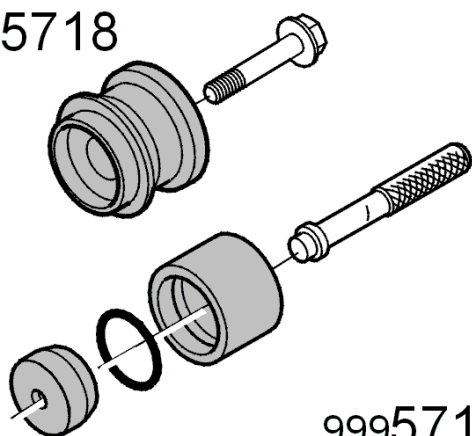
The following applies to turbo engines:

- Lubricate and install the camshaft seal.
- For camshaft with VVT, use mandrel 999 5718 .
- For camshaft without VVT, use mandrel 999 5719 ..

The following applies to suction engines:

- Lubricate and install the camshaft seals. Use mandrel 999 5719 ..

9995718



9995719

Install toothed belt pulley with VVT unit. Applies to turbo engines.

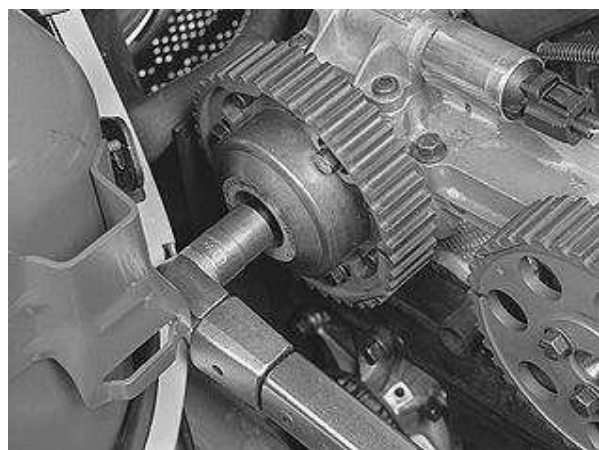
- Install toothed belt pulley with VVT unit on the exhaust camshaft.

Note! Check that the markings align.

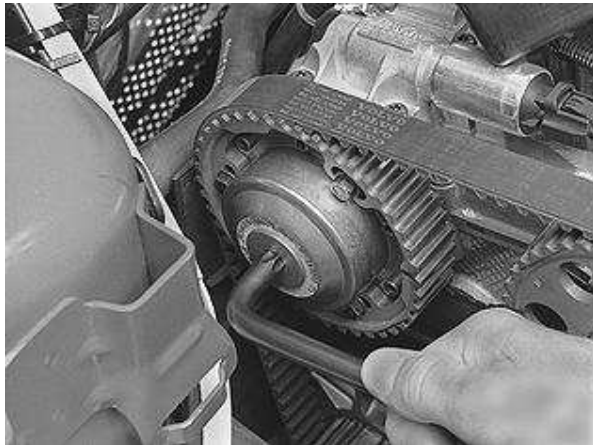
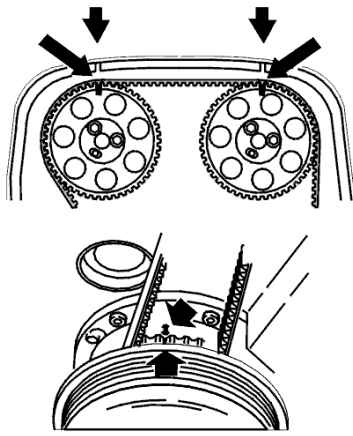
- Install the upper cam belt casing to verify that the markings align.
- Tighten the centre screw to **120 Nm**..
- Tighten the centre plug to **35 Nm**..
- Loosen the screws that retain the toothed belt pulley in the VVT unit.
- Install the toothed belt pulley on the intake camshaft with two screws, but do not tighten.

Install the toothed belt pulley. Applies to suction engines.

- Install the toothed belt pulley with two screws so that



they just touch the wheel.

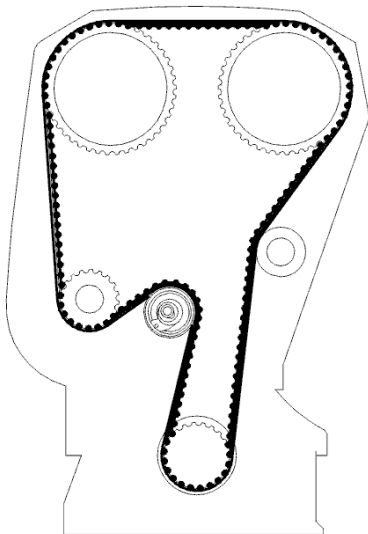


Install the camshaft belt.

- Tighten the central screw to the cam belt tensioner to 5 Nm..

Note! Applies to cars with turbo engine:

- Turn the VVT unit clockwise until stop.
As shown in the figure.
Keep the VVT unit fixed in the end position.



Installation of cam belt

Attach the cam belt in the following order:

- crankshaft.
- idler pulley.
- intake camshaft gear.
- exhaust camshaft gear.
- water pump.
- belt tensioner.

Note! Adjust the toothed belt pulley so that the screws are not in the end position in the oval holes.

Tightening the camshaft belt

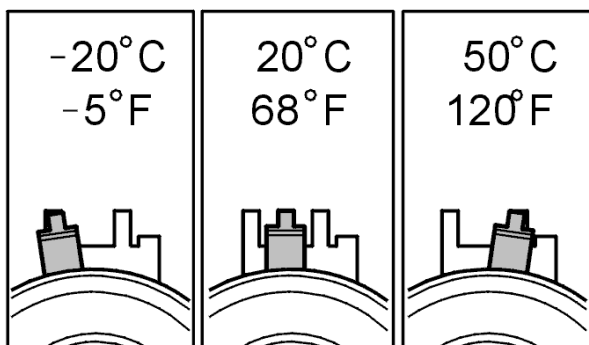
Tighten camshaft belt

Note! This setting is for cold engines.

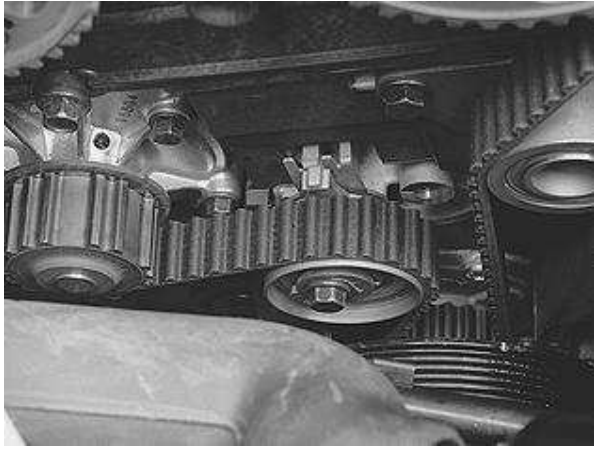
Suitable temperature is approximately 20° C/68° F

At higher temperatures, such as when the engine is warm or when ambient temperatures are higher, the dial will assume a position further to the right.

The figure shows the position of the dial at various engine temperatures during belt tensioner setting.



Tighten the camshaft belt as follows:



Keep the central screw of the belt tensioner fixed and turn the eccentric of the belt tensioner anti-clockwise until the tensioner dial passes the marked position and reaches its end position.

Tighten the 3 screws on the toothed belt pulley of the exhaust camshaft to **10 Nm**.

Tighten the 3 screws on the toothed belt pulley of the inlet camshaft to **20 Nm**.

Note! Once the toothed belt pulley is tightened, the end position fixing point of the VVT unit can be released.

Then turn the eccentric back so that the dial reaches the marked position in the centre of the window.

Hold the eccentric fixed and tighten the central screw to **20 Nm**.

Check that the dial needle is in the correct position.

If this is not the case, a new setting must be made.

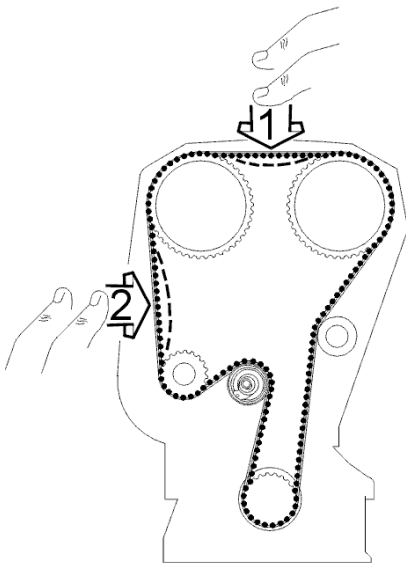
Remove:

- camshaft gauges.
- crankshaft stop.

Install the plug with a new sealing washer and tighten to **40 Nm**.

Check

- Press on the belt to check that the dial needle on the tensioner moves easily.
- Install upper cam belt casing.
- Turn the crankshaft 2 revolutions and check that the markings on the crankshaft and camshaft gear are in alignment.
- Check that the dial needle on the belt tensioner is within the marked area.



Installation of rear camshaft seal

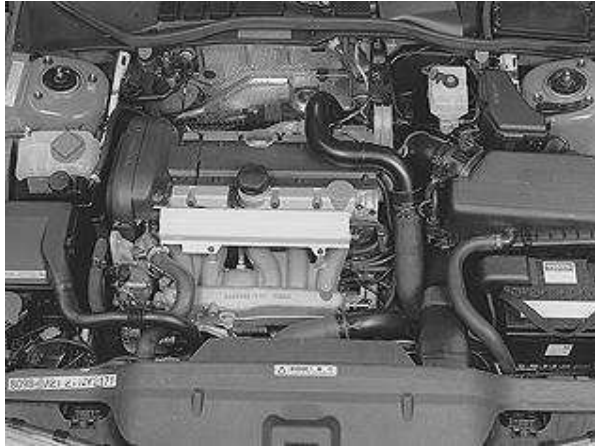
- Lubricate the seals.
- Press in the seals using mandrel: **999 5450**

Note! Normally a seal is pressed onto the same face as the inwardly facing edge.

In the case of wear tracks on the axle, the seal can be pressed in a further 2 mm by turning the tool's socket round.

Installation of components

This figure is not entirely correct as the air pump is no



longer present.

Install:

- diaphragm.
Tighten to **17 Nm**.
- camshaft sensor housing and a new cover.
Tighten to **17 Nm**.
- the torque rod bracket.
Tighten to **50 Nm**.
- torque rod.
Tighten to **35 Nm** and tighten at angle of **90°**.
Use angle gauge **951 2050** ..
- ignition coil cover.
Tighten to **8 Nm**.
- the air filter cover with supply air hose.

Note! Applies to cars with turbo engine:

- Install charge air hose above the engine.
Remove the seals.
- Install the solenoid valves on the air filter cover.

Installation of components

Install:

- front cam belt casing.
Tighten to **12 Nm**.
- upper cam belt casing.
Tighten to **8 Nm**.
- auxiliary belt.
- starter motor.
Tighten to **40 Nm**.

Note! Applies to cars with turbo engine:

- The charge air hose.
Remove the seals.
- relay bracket and electric cooling fan with fan shroud.
Screw the clamp at the throttle housing (ETM module).
- the EVAP valve, relays, connectors.
- air ducts and, if relevant, brake vacuum hose.

Install and fill up

The figure shows the engine compartment of a car with a turbo engine.

This figure is not entirely correct as the air pump is no longer present.

Check the oil level and top up to the correct level.
Do not overfill.

Fill up the cooling system.

Connect the battery negative lead. **Note when disconnecting/connecting the battery lead**

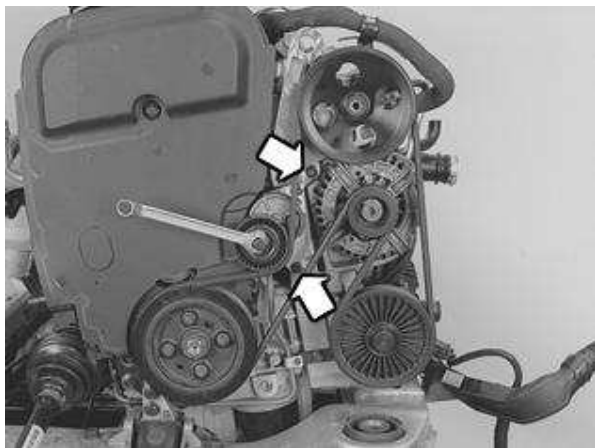
Warm the engine until the thermostat opens and top up with coolant as required.

Check the seal.

Checking the engine

Check engine function by test driving the car.

- Wipe the engine compartment clean.





- Wipe clean the steering wheel and gear lever.
- Do a final check to ensure that no leakage occurs.