

Timing belt, replacing

Special tools: [999 5433](#)

Note! As the illustrations in this service information are used for different model years and / or models, some variation may occur. However, the essential information is always correct.

Remove components

Caution! Remove the ignition key.

Remove:

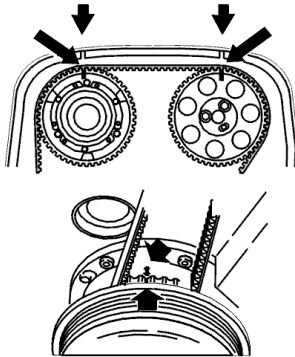
- the cross stay between the suspension turrets
- the upper timing belt cover
- the servo reservoir and the expansion tank.
Lift up and place on top of the engine.

Warning! Ensure that no power steering fluid is spilled. Extremely flammable.

- the auxiliaries belt
- the front timing belt cover.

Position the engine according to the marking

- Remove the right front wheel
- Remove the nut from the cover in the wing liner
- Install the upper timing belt cover
- Turn the crankshaft clockwise until the markings on the crankshaft and camshaft pulley correspond
- Turn the crankshaft a further 1/4 turn clockwise and then back again until the markings correspond.
The markings are illustrated
- Remove the upper timing belt cover.



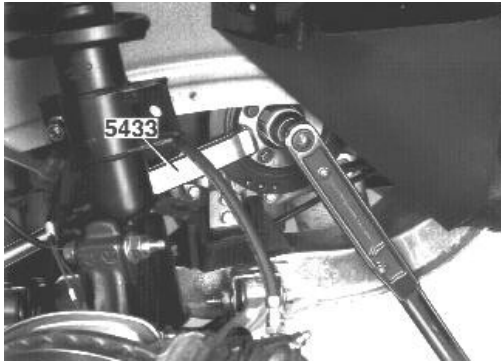
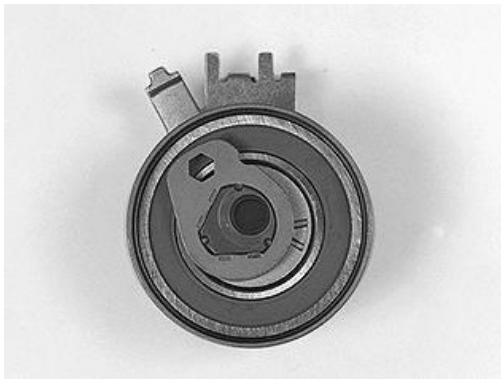
Removing the timing belt

Slacken off the belt tensioner.

Slacken off the centre screw for the belt tensioner slightly.

Hold the centre screw still. Turn the tensioner eccentric clockwise using a 6 mm Allen key to 10 o'clock.

Remove the timing belt from the tension pulley, camshaft pulley and water pump.



Remove the vibration damper.

Remove the vibration damper. Use counterhold [999 5433](#) . Work the vibration damper loose.

Remove the timing belt

Checking the tensioner pulley and idler pulley

Check bearing wear:

- spin the idler pulley and listen for noise.
If replacing with a new idler pulley, tighten to 24 Nm
- spin the tension pulley and listen for noise.
When replacing, screw the tension pulley into place using the centre screw.

Screw in the centre screw by hand.

Ensure that the tensioner fork is centred over the cylinder block rib.

Ensure that the Allen hole on the eccentric is at "10 o'clock".

Installing the timing belt

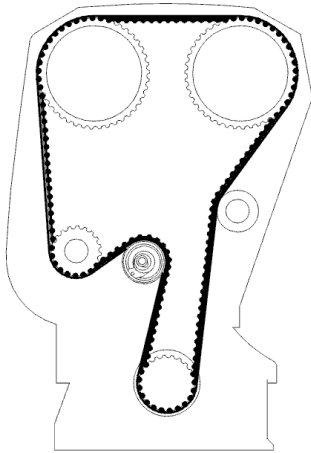
Install the timing belt over the pulley on the crankshaft.

Install the vibration damper. Tighten the centre nut. Tighten to 180 Nm. Use counterhold [999 5433](#) .

Remove the counterhold and install new screws. Tighten the screws. Tighten to 25 Nm and angle-tighten 30°

Install the new belt in the following order:

- crankshaft
the idler pulley



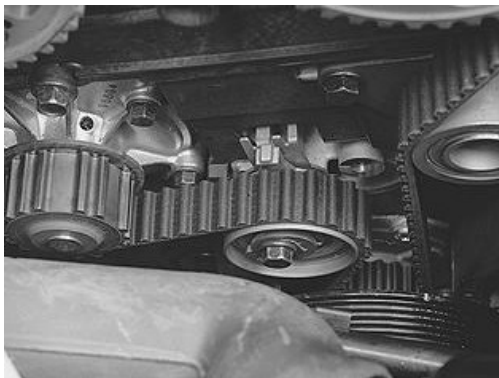
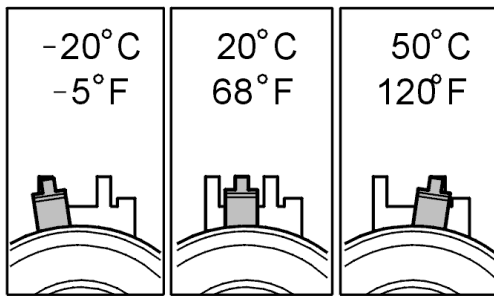
- the idler pulley
- intake camshaft pulley
- exhaust camshaft pulley
- water pump
- belt tensioner.

Tighten the timing belt

This adjustment is carried out on a cold engine. A suitable temperature is approximately 20°C/68°F.

At higher temperatures, for example with the engine at operating temperature or at higher ambient temperature, the needle is further to the right.

The illustration shows the position of the indicator when aligning the timing belt tensioner at different temperatures.



Tension the timing belt as follows:

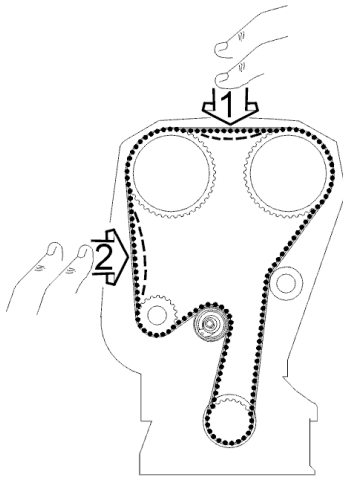
- turn the crankshaft clockwise carefully until the timing belt is tensioned. The belt must be tensioned between the intake camshaft pulley, the idler pulley and the crankshaft
- hold the centre screw on the belt tensioner secure. Turn the belt tensioner eccentric counter-clockwise until the tensioner indicator passes the marked position. Then turn the eccentric back so that the indicator reaches the marked position in the centre of the window
- Hold the eccentric secure and tighten the centre screw. Tighten to 20 Nm.

Check that the indicator is in the correct position.

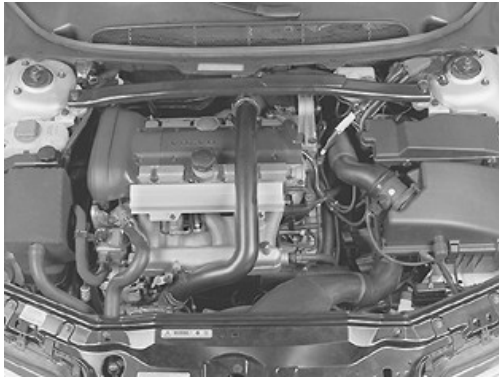
Check

Checking markings:

- press the belt to check that the indicator on the tensioner moves easily



- install the upper timing belt cover
- turn the crankshaft 2 turns. Check that the markings on the crankshaft and camshaft pulley correspond
- check that the indicator on the belt tensioner is within the marked area.



Reinstall

Reinstall the removed components:

- the front timing belt cover.
Tighten to 12 Nm
- the upper timing belt cover
- install the auxiliaries belt
- the servo reservoir
- the expansion tank.

Note! Ensure that the hoses are correctly positioned.

- the engine stabiliser brace. Tighten the screws at the suspension turrets. Tighten to 50 Nm. Tighten the engine bracket screw. Tighten to 80 Nm.
Wipe clean and check the engine compartment
- the cover in the wing liner
- the front wheel. See [Installing wheels](#) .

Checking work

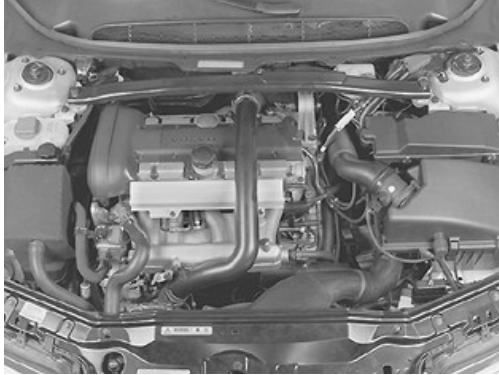
Function test:

- Test drive the engine.

Camshaft seal/variable valve timing (VVT) unit, replacing

Special tools: [999 5452](#) , [999 5651](#) , [999 5719](#) , [999 5718](#) , [999 5474](#) , [999 5451](#) , [999 5919](#) , [999 5450](#)

Note! As the illustrations in this service information are used for different model years and / or models, some variation may occur. However, the essential information is always correct.



Removal

Caution! There are a number of versions of the variable valve timing unit. Therefore it is extremely important to always read the information referring to the engine variant/model year to be remedied.

Removing the camshaft seal

Note! Crankshaft and camshafts must not be turned more than is stated in the method description!

If the shafts are turned in any other way the valves may be damaged.

Remove:

- the cable from the battery negative terminal.
First read [Note when disconnecting/connecting the battery lead](#) .
- the cross stay between the suspension turrets
- the air intake hose for the turbocharger (TC) from the air cleaner (ACL) cover. Put to one side
- the upper timing belt cover
- the cover over the ignition coils
- the upper engine stabiliser brace
- the camshaft position (CMP) sensor housing
- the trigger wheel
- the servo reservoir and the expansion tank.
Lift up and place on top of the engine.

Warning! Ensure that no power steering fluid is spilled. Extremely flammable.

- the auxiliaries belt
- the front timing belt cover.

Aligning the engine according to the marking

Raise the car.

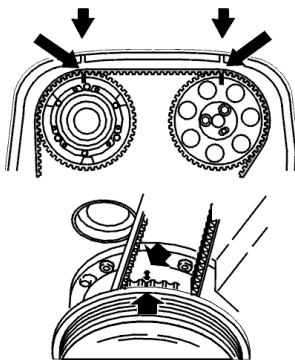
Remove:

- the right front wheel
- the nuts for the cover in the wing liner.

Install the upper timing belt cover.

Turn the crankshaft clockwise until the markings on the crankshaft and camshaft pulley correspond.

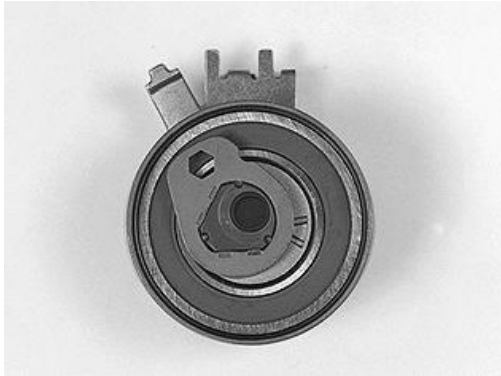
Turn the crankshaft a further 1/4 of a turn clockwise, then turn back counter-clockwise



until the markings correspond.
The markings are illustrated.
Remove the upper timing belt cover.

Removing the timing belt

- Slacken off the belt tensioner
- Slacken off the centre screw for the belt tensioner slightly
- Hold the centre screw still. Turn the tensioner eccentric clockwise to 10 o'clock using a 6 mm Allen key
- Remove the timing belt from the camshaft pulleys.



Removing the timing gear pulley with the variable valve timing unit

Use camshaft adjustment tool:

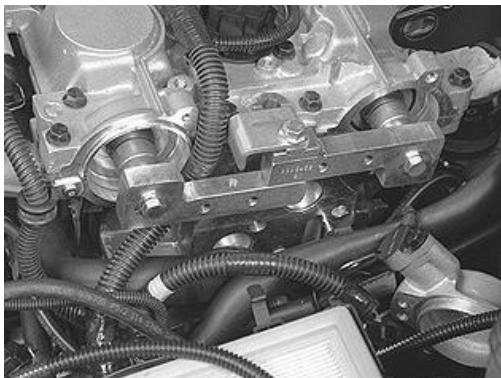
- Install camshaft adjustment tool [999 5452](#) at the rear of the camshafts
- First screw in the part of the tool intended for the exhaust camshaft (drilled hole)
- Then carefully turn the exhaust camshaft clockwise with the camshaft adjustment tool until the intake camshaft tool can be applied (threaded hole)
- Install the intake camshaft adjustment tool.



Screw the camshaft adjustment tools together.

Remove:

- the plug at the front edge of the variable valve timing unit (TORX 55)
- the centre screw in the variable valve timing unit (TORX 55). Carefully pull out the timing gear pulley with the variable valve timing (VVT) unit.



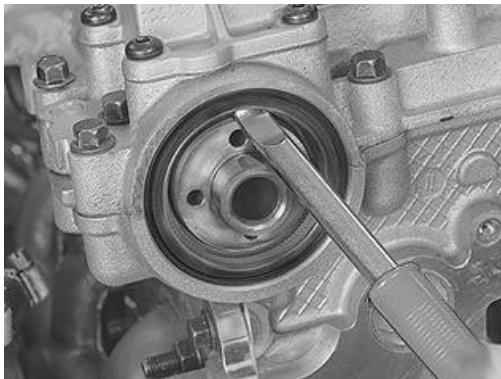
Note! Use paper to collect any spilled oil under the variable valve timing units.

Replacing the camshaft seal

Carefully press in tool [999 5651](#) between the sealing ring and the camshaft. Carefully pry out the seal.

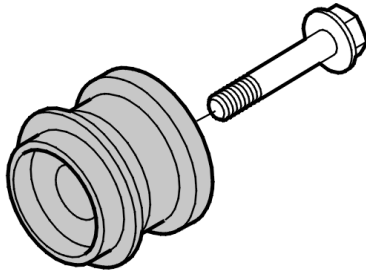
Cleaning

To clean the shaft journal and mating surface,



use emery cloth P/N 951 1024.

Note! When cleaning work around the shaft journal, not in and out. It is essential that any residue from the emery cloth and any other contaminants are completely removed before the new sealing ring is installed.



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Oil the new seal. Install the new seal for the exhaust camshaft. Use drift [999 5718](#).

Installation

Note! The purpose of the section, "Installing the VVT unit/timing gear pulley", described here is to ensure that the VVT unit is correctly positioned and to reset the camshaft timing gear pulley to the correct position using the markings made at the factory. This is to ensure that the conditions are correct for any later fault-tracing.

Setting the crankshaft position

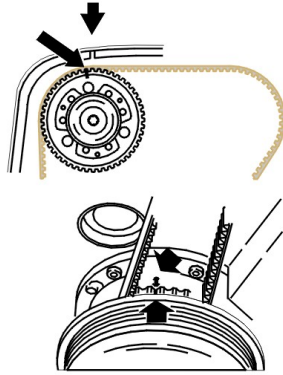


- Install camshaft adjustment tool
- Remove the charge air pipe between the throttle body (TB) and the charge air cooler
- Remove the 3 mounting screws for the starter motor. Place the starter motor to one side
- Remove the blind cover plug and the sealing washer
- Turn the crankshaft clockwise slightly to avoid the adjustment tool being in the wrong position
- Install adjustment tool: [999 5451](#). Ensure that the camshaft adjustment tool bottoms out against the cylinder block
- Turn the crankshaft counter-clockwise as far as it will go against the camshaft adjustment tool

Check that the marking on the crankshaft

- Check that the marking on the crankshaft timing gear pulley corresponds with the marking on the oil pump.

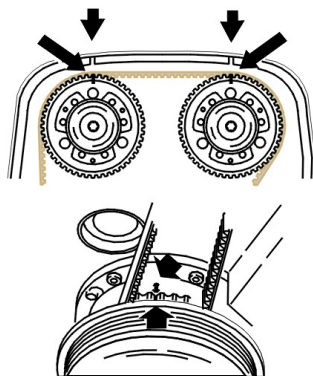
Installing the variable valve timing (VVT) unit on the exhaust camshaft



- Slacken off, but do not remove the screws which secure the timing gear pulley to the variable valve timing unit
- Press the timing gear pulley and variable valve timing (VVT) unit on to the camshaft
- Install the centre screw which secures the variable valve timing unit to the camshaft. Tighten slightly
- Turn the variable valve timing unit anti-clockwise as far as it will go
- Slacken off the centre screw
- Position the upper timing cover
- Turn the timing gear pulley clockwise until the screws at the oval holes are in the limit position
- Continue turning clockwise until the timing gear pulley marking is 1 tooth before the marking on the upper timing cover.

Note! Do not turn anti-clockwise during this procedure.

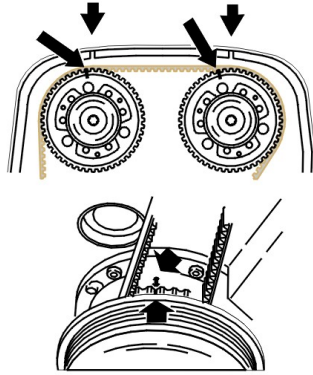
- Check that the timing gear pulley is still in the limit position in the oval holes
- Tighten the centre screw in the variable valve timing unit. See [Tightening torque](#)
- Check that the variable valve timing unit does not rotate when tightening
- Tighten the centre plug. See [Tightening torque](#).



Turn the variable valve timing unit clockwise to the limit position.

Turn the timing gear pulley so that the markings correspond.

Installing the variable valve timing (VVT) unit on



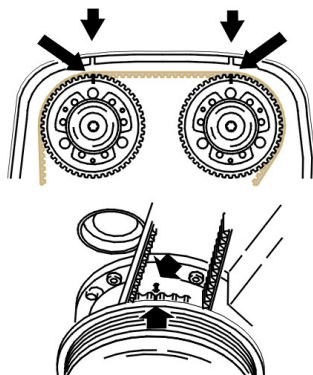
the intake camshaft

Note! Do not turn anti-clockwise during this procedure.

- Slacken off, but do not remove the screws which secure the timing gear pulley to the VVT unit
- Press the variable valve timing unit / timing gear onto the camshaft
- Install the centre screw which secures the variable valve timing unit to the camshaft. Tighten slightly
- Turn the variable valve timing unit counter-clockwise as far as it will go. Slacken off the centre screw
- Turn the timing gear pulley clockwise until the screws at the oval holes are in the limit position. Continue turning clockwise until the timing gear pulley marking is 2 cogs before the marking on the upper timing cover.

Check that the timing gear pulley is still in the limit position in the oval holes. Tighten the centre screw in the VVT unit. See [Tightening torque](#).

Check that the variable valve timing unit does not rotate when tightening. Install and tighten the centre plug. See [Tightening torque](#).



Turn the variable valve timing unit clockwise to the limit position.

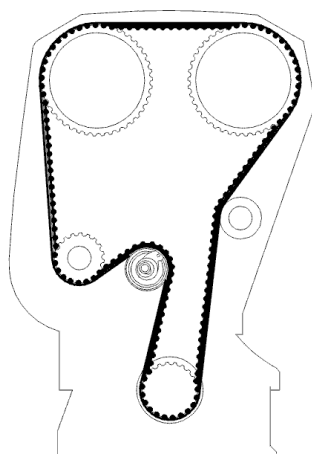
Turn the timing gear pulley so that the markings correspond. Remove the upper timing belt cover.

Installing the timing belt

Tighten the centre screw in the timing belt tensioner. Tighten to 5 Nm in the 10 o'clock position.

Install the belt in the following order:

- crankshaft
- the idler pulley
- intake cam pulley
- exhaust cam pulley



- exhaust cam pulley
- water pump
- tension pulley.

Install the upper belt guard.

The variable valve timing units do not have a return spring and are easily dislodged when reinstalling the timing belt. Check that the markings correspond.

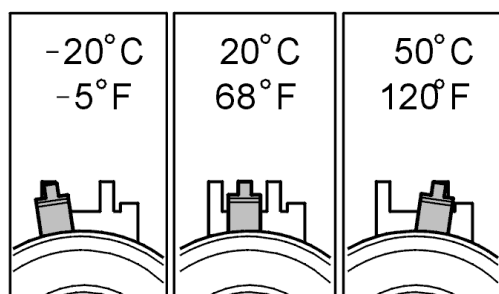
Note! Adjust the timing gear pulleys so that the screws are not at a limit position in the oval holes.

Adjusting the timing belt

This adjustment is always carried out on a cold engine. A suitable temperature is approximately 20°C/68°F.

At higher temperatures (with the engine at operating temperature or a high outside temperature for example) the indicator is further to the right.

The illustration shows the position of the indicator when aligning the timing belt tensioner at different temperatures.



Hold the centre screw secure and turn the belt tensioner eccentric counter-clockwise until the tensioner indicator passes the marked position. Tighten the screws on the exhaust camshaft timing gear pulley to 10 Nm.

Turn the eccentric back so that the indicator reaches the marked position in the centre of the window. Remember to hold the centre screw secure at the same time.

Install the screw missing on the intake camshaft timing belt pulley.

Hold the eccentric secure and tighten the centre screw. Tighten to 25 Nm. Check that the indicator is in the correct position

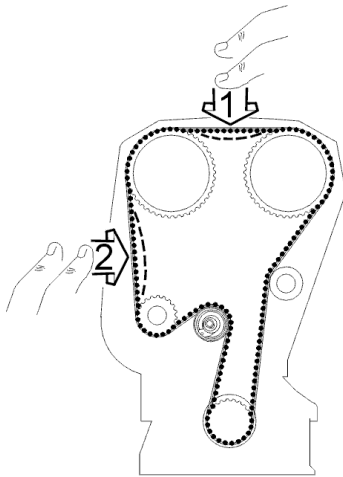
Remove:

- the camshaft adjustment tools
- the crankshaft stop.

Install the plug with a new sealing washer.

Tighten. See [Tightening torque](#).

Checking the markings and belt tension



Check:

- Press the toothed belt to check that the indicator on the tensioner moves easily
- Install the upper timing belt cover
- Turn the crankshaft 2 rotations and check that the markings on the crankshaft and camshaft pulleys correspond
- Check that the indicator on the belt tensioner is within the marked position.

Installing components

Install:

- the front timing belt cover
- the torque rod bracket
- the cover over the ignition coils
- the upper timing belt cover
- the auxiliaries belt
- the expansion tank
- the servo reservoir. Check that the hoses are correctly positioned
- the starter motor. Tighten the screws at the gearbox to 40 Nm. Tighten the support bracket screw to 25 Nm
- the charge air pipe between the throttle body (TB) and the charge air cooler (CAC).

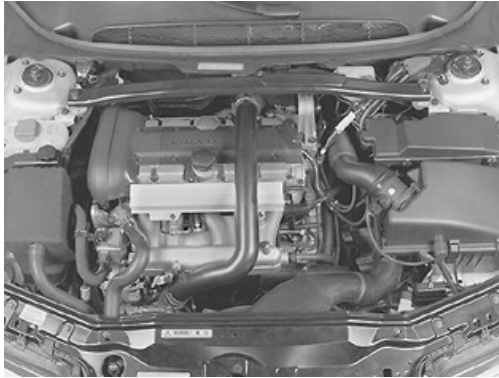


Install:

- the trigger wheel
- the camshaft position (CMP) sensor housing and a new cover
- the intake air hose between the turbocharger (TC) and the air cleaner (ACL) cover
- the engine stabiliser brace. Tighten the screws at the suspension turrets and the screw for motor bracket
- the cable to the battery negative terminal.
First read [Note when disconnecting/connecting the battery lead](#) .

Checking the engine

Test drive the car to check the function of the engine.



Replacing the rear seal

The following components must be removed when replacing the rear seal:

- the cross stay between the suspension turrets
- the air hose from the air cleaner (ACL) to the turbocharger (TC). Place to one side. Seal the openings
- place the air cleaner (ACL) cover to one side
- the charge air pipe over the engine. Seal the openings
- the cover over the ignition coils
- the upper torque rod bracket
- the camshaft position sensor (CMP) housing and trigger wheel.

Replacing the rear camshaft seal

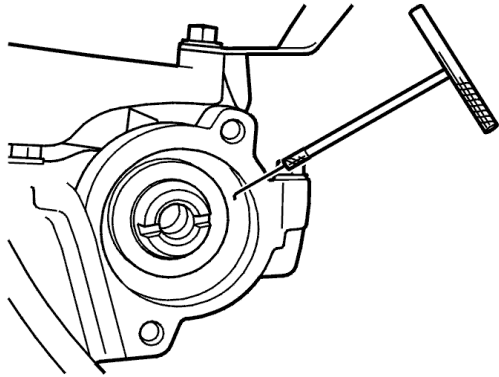
Pull out the seal. Use puller [999 5919](#) . Use emery cloth 951 1024 to clean the shaft journal and mating surface.

Note! When cleaning work around the shaft journal, not in and out. It is essential that any residue from the emery cloth and any other contaminants are completely removed before the new sealing ring is installed.

Lubricate the surface of the seal that the camshaft rotates against. Install the camshaft seal. Use drift [999 5450](#) .

Note! The seal is normally pressed in so that it is level with the internal bevelled edge.

If the shaft journal is showing signs of wear, the seal can be pressed in 2 mm deeper by turning the drift socket.



Installing components

Install:

- the trigger wheel
- the camshaft position (CMP) sensor housing and a new cover
- the torque rod bracket. Tighten
- the cover over the ignition coils
- the charge air pipe over the engine. Remove the seals
- the air cleaner (ACL) cover and the intake air hose
- the engine stabiliser brace. Tighten the



screws at the suspension turrets and the screw for the engine bracket.

Check the engine compartment. Wipe the engine compartment clean.

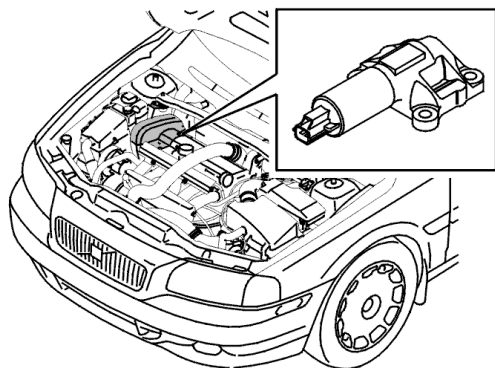
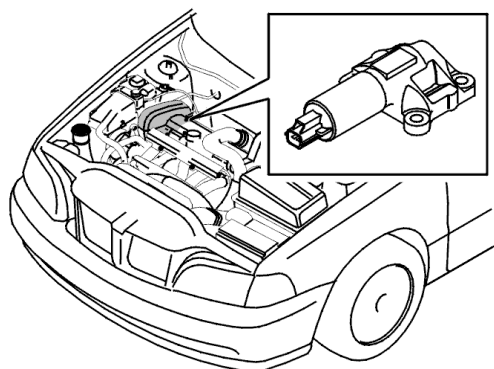
Variable valve timing solenoid, replacing

Removing the variable valve timing (VVT) control valve

Remove

- the upper timing belt cover.

Note! Clean the area around the variable valve timing (VVT) valve thoroughly to avoid contaminated oil entering the ducts / the variable valve timing (VVT) valve.



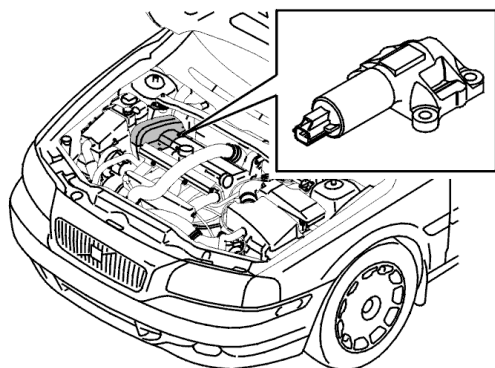
- the connector for the check valve
- the screws holding the valve
- the control valve and the gasket.

Installing the variable valve timing (VVT) control valve

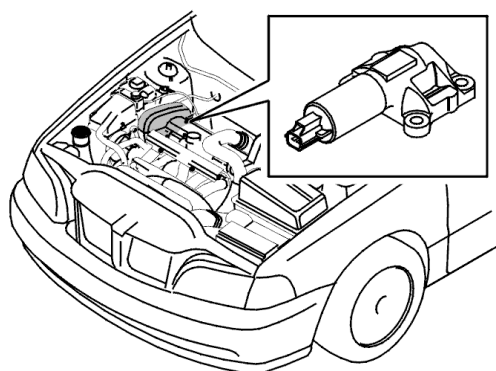
Clean the gasket faces. Note the cleanliness requirements above.

Install a new gasket.

Install a new control valve. Tighten the control valve crosswise. Tighten to 10 Nm
Connect the connector.



Install the upper timing belt cover.



Auxiliaries belt / belt tensioner, replacing

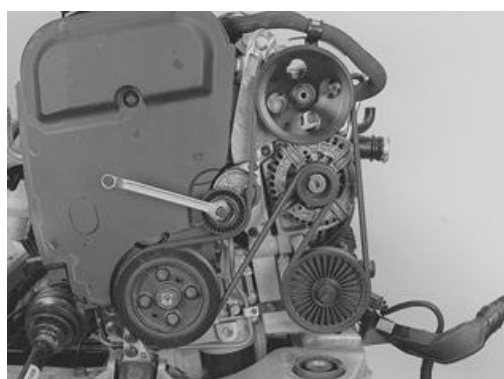
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Removal

Removing the auxiliaries belt

Remove:

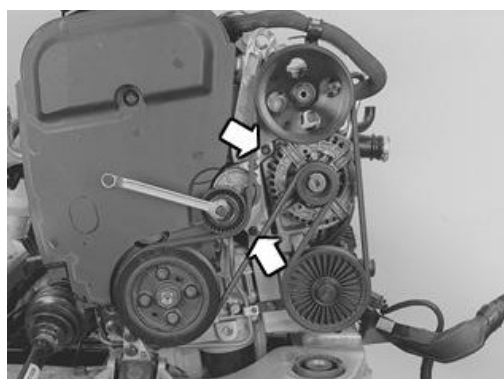
- * the plastic cover on the belt tensioner using a small screwdriver. Use a spanner and turn clockwise as far as possible to relieve the load on the belt
- * the belt.



Replacing the belt tensioner

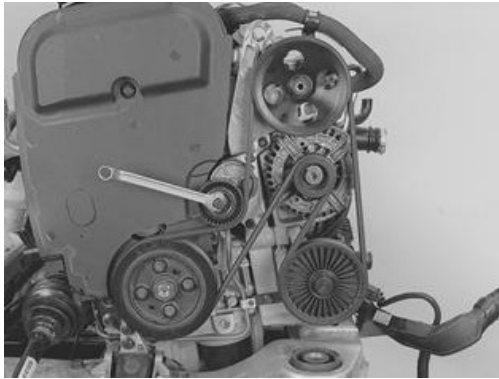
Remove:

- * both mounting screws from the auxiliaries belt bracket for the belt tensioner
- * the belt tensioner. Install the new belt tensioner. Tighten.



Installation

Note! For tightening torques, see [Tightening torque](#) .



Installing the auxiliaries belt

Caution! Ensure that the belt is correctly seated in all the grooves on each pulley.

Use a spanner and turn the belt tensioner clockwise as far as possible.

Install the belt as illustrated.

Install the plastic cover on the belt tensioner.

Checking work

Start the engine.

Check the rotation of the belt and the function of the belt tensioner.