ALLDATA REPAIR

2004 Volvo C70 L5-2.4L Turbo VIN 63 B5244T7
Cylinder Head Assembly Service and Repair, Removal and Replacement: Cylinder Head/Gasket, Replacing

Cylinder head/gasket, replacement

Special tools:
999 5452 CAMSHAFT ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5452 Camshaft Adjustment Tool
999 5454 PRESS TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5454 Press Tool
999 5670 Pliers See: Vehicle > Electrical / Mechanical Repair > 999 5670 Pliers
999 5451 ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5451 Adjustment Tool
951 2050 BEVEL PROTRACTOR See: Vehicle > Electrical / Mechanical Repair > 951 2050 Bevel Protractor
951 2767 Roller See: Vehicle > Electrical / Mechanical Repair > 951 2767 Roller
999 5450 PUNCH See: Vehicle > Electrical / Mechanical Repair > 999 5450 Punch
999 5718 Drift See: Vehicle > Electrical / Mechanical Repair > 999 5718 Drift
999 5719 Drift See: Vehicle > Electrical / Mechanical Repair > 999 5719 Drift

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

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

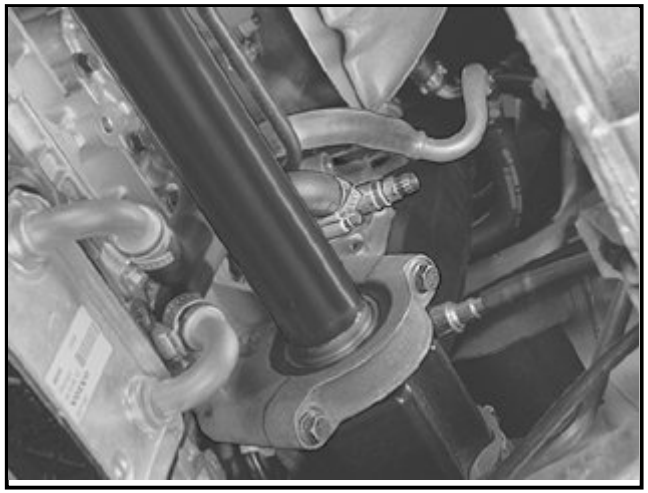
Removal

Preparation

Remove

- the radiator breather tube from the expansion tank. Install lock grip pliers
- the battery negative lead. First read Battery, disconnecting See: Battery > Procedures > Battery, Disconnecting
- the right front wheel.

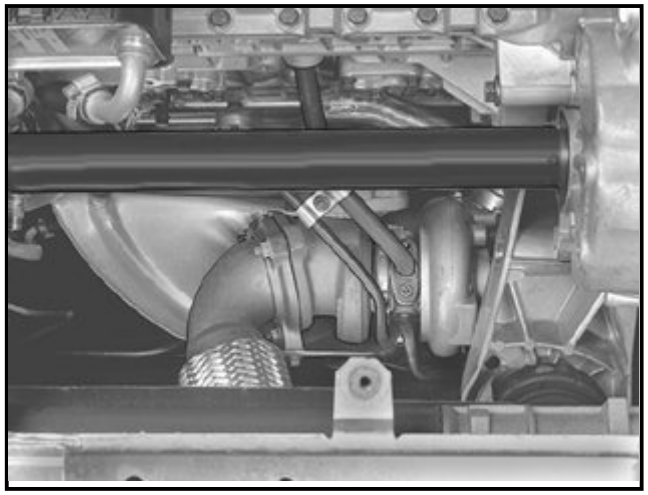
Draining coolant



Raise the car.
Remove the splash guard under the engine.
Open the engine nipple.
Drain the coolant into a container.

Close the nipple.

Removing components



Remove:

- the clamp between the oil pressure pipe and the oil return line at the turbocharger (TC)
- the pipe screw that holds the oil pressure pipe to the connector on the cylinder block
- the oil return line. Seal the opening in the cylinder block
- the lower screw that holds the heat deflector plate over the turbocharger (TC)
- the nuts for the front exhaust pipe connection to the turbocharger (TC). Lift off the exhaust pipe and tie it up. Seal the opening in the exhaust pipe

Note! The metal hose for the front exhaust pipe is easy to damage if it is twisted. Handle it with care to avoid leakage.

Depressurizing the fuel system

Lower the car.

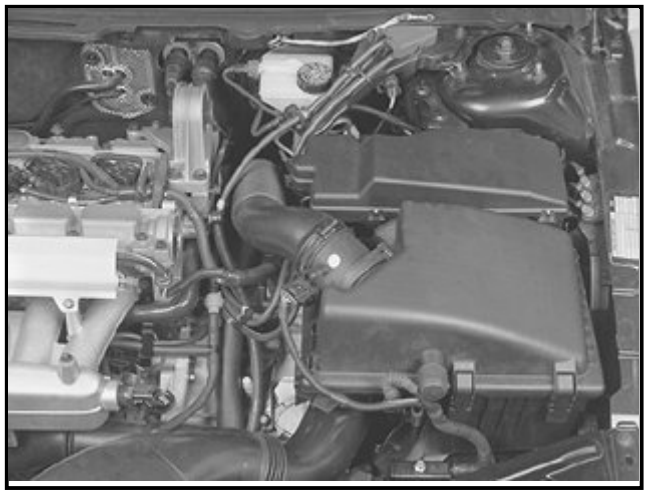
Depressurize the fuel system according to: Fuel system pressure release See: Fuel Pressure Release > Procedures > Fuel System Pressure Release.

Removing components

Remove

- the engine stabilizer brace between the suspension turrets
- the ground strips between the engine and the firewall
- the heat deflector plate above the turbocharger (TC)
- the plastic charge air pipe above the engine. Seal the openings
- the cover over the nozzle pipes
- the cover over the ignition coils
- the upper engine coolant hose for the engine and radiator
- the screw holding the dip stick pipe to the intake manifold
- the brake vacuum hose from the intake manifold.

Undo the clamp holding the plastic charge air pipe to the electronic throttle module.



Remove

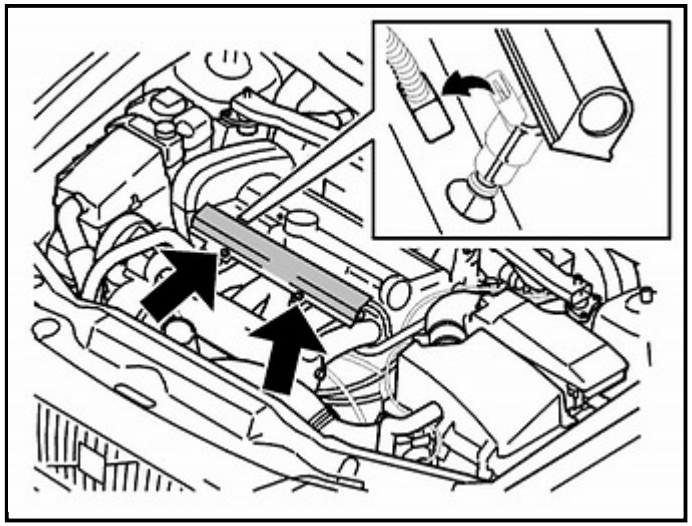
- the connector from the mass air flow (MAF) sensor
- the intake hose from the mass air flow (MAF) sensor. Seal the opening.

Release the hoses from the bracket at the rear of the cylinder head. Remove the bracket.

Remove

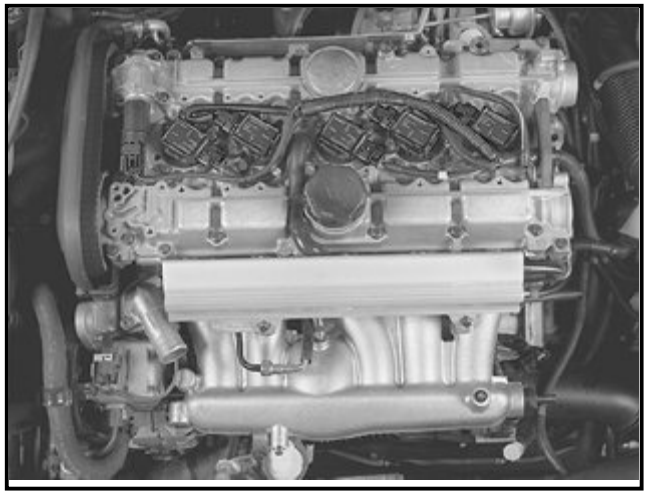
- the clamp for the positive lead at the rear of the cylinder head
- the torque bracket
- the pipe screw for the water-heated crankcase ventilation.

Removing the fuel rail



- Remove the clamp for the injector wiring at the rear of the cylinder head
- Detach the wiring from the injectors
- Remove the fuel rail mounting screws
- Spray universal oil or similar around the injector connectors on the intake manifold
- Gently work the fuel rail and injectors loose
- Separate the quick-release connector for the fuel line. See Fuel line, lock See: Fuel Rail > Removal and Replacement > Fuel Line, Lock.
- Carefully put the fuel rail to one side.

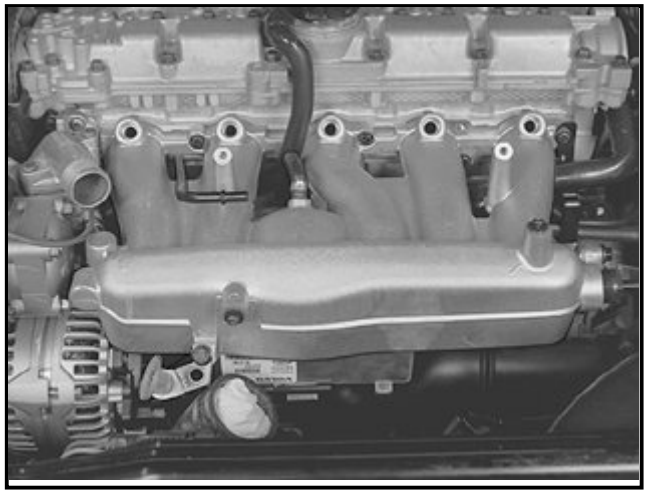
Removing ignition coils



- Mark up the ignition coils so that their original positions can be established
- Remove the mounting screws for the ignition coils and the screws at the two ground terminals
- Disconnect the connector for the variable valve timing solenoid
- Lift up and place the ignition coils and wiring to one side.

Remove:
- the crankcase ventilation hose from the top of the camshaft cover
- the camshaft position sensor (CMP) housing and trigger wheel.

Removing intake manifold



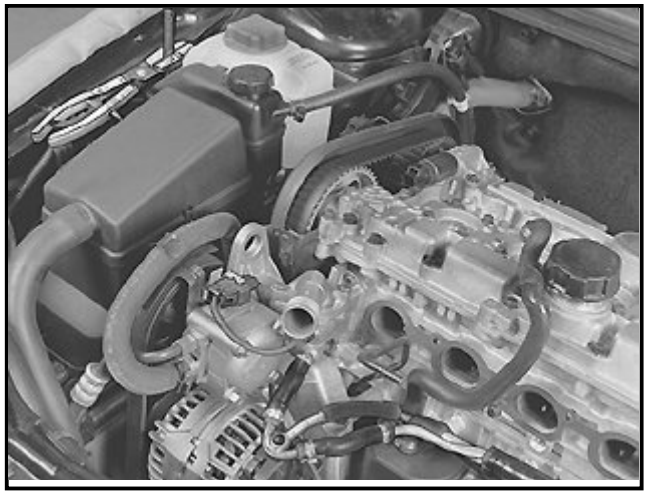
Remove:

- The EVAP hose from the intake manifold
- the by-pass valve vacuum hose. Disconnect the connector for the electronic throttle module (ETM)
- the upper row of screws holding the intake manifold to the cylinder head. Slacken off the lower screws. Lift up the intake manifold. Remove the pipe screw for the water heated crankcase ventilation underneath the intake manifold
- the pipe screw for the crankcase ventilation from the underside of the intake manifold.

Lift up and remove the intake manifold.

Note! Make sure that the fuel pressure pipe is not damaged.

Removing components



Disconnect the connectors for the ABS sensor and level sensor in the expansion tank.
Lift up the expansion tank and servo oil reservoir. Place them on top of the engine.

Note! Make sure that oil does not leak from the breather hole in the filler cap.

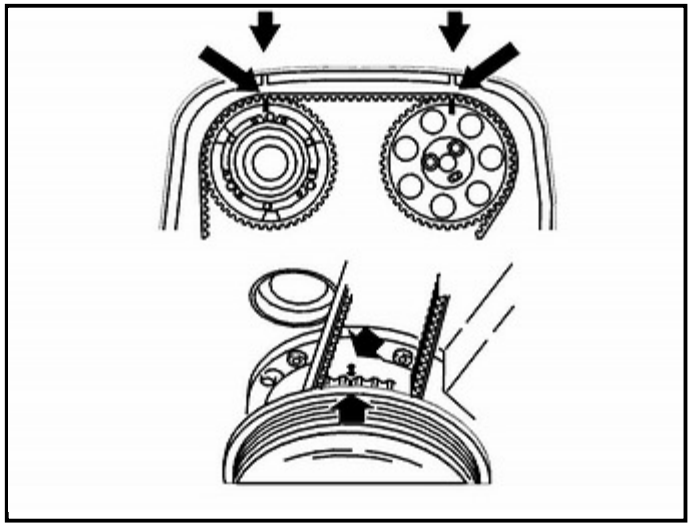
Remove the auxiliaries belt.

Remove:

- front timing cover
- the hose for the water-heated crankcase ventilation from the thermostat housing.

Separate the connector for the engine coolant temperature (ECT) sensor.

Setting up the engine



Remove the nuts from the cover on the fender liner.
Turn the crankshaft clockwise until the markings on the crankshaft and camshafts correspond.
Remove the upper timing cover.

Removing the timing belt
Slacken off the center screw for the belt tensioner slightly.
Hold the center screw secure and turn the tensioner eccentric clockwise with a 6 mm Allen key to 10 o'clock.

Remove:
- the timing belt from the timing gear pulley
- the screw that holds the inner timing cover to the cylinder head.

Install tool 999 5452 CAMSHAFT ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5452 Camshaft Adjustment Tool at the rear of the camshafts.

Removing the timing gear pulley
Remove the cable duct from its mountings on the right-hand suspension turret.

Note! Do not damage the paint work.

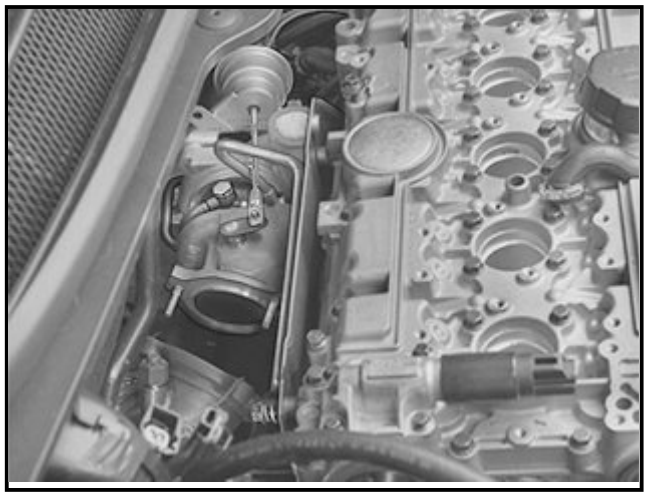
Hold the cable duct out of the way and remove:
- the plug at the front of the variable valve timing unit (TX55).

Note! Use paper or similar to absorb oil that drains.

- the center screw in the variable valve timing unit (TX55).

Carefully pull out the timing gear pulley with the variable valve timing (VVT) unit.
Remove tool 999 5452 CAMSHAFT ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5452 Camshaft Adjustment Tool.

Removing components from turbocharger (TC)

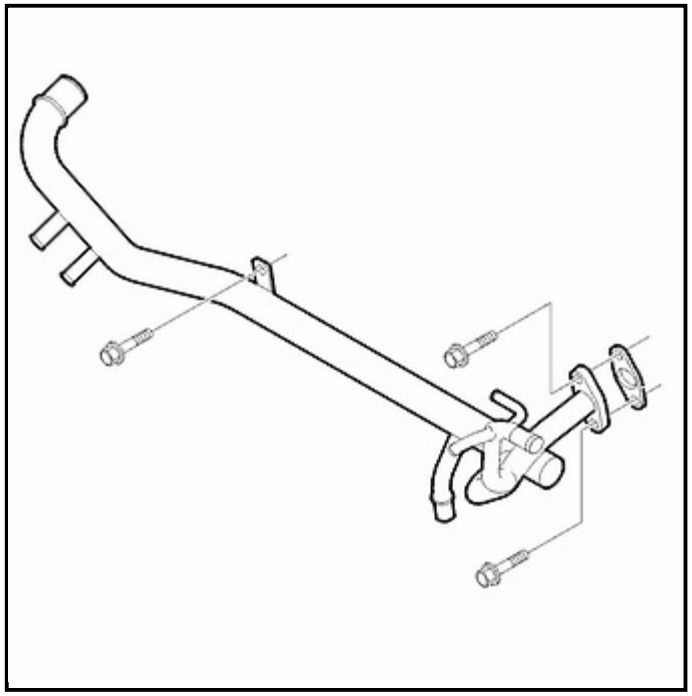


Remove:

- the heat deflector plate above the manifold
- the upper engine coolant pipe. Place it to one side
- the oil pressure pipe for the turbocharger (TC)
- the pipe screw at the lower coolant pipe for the turbocharger (TC). Put the pipe to one side
- the nuts and washers holding the manifold to the cylinder head.

Lift off the turbocharger and manifold. Carefully put them on top of the transmission.

Releasing the inlet pipe for the coolant pump



Remove:

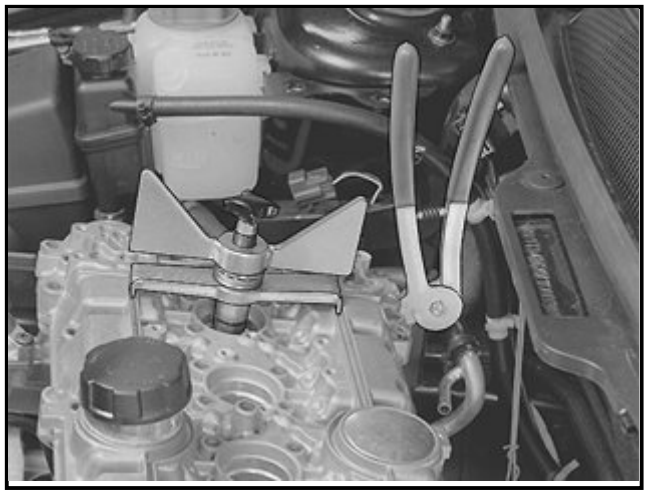
- the screw that holds the coolant pump intake pipe to the engine block a few turns. Leave the screw in place
- the two screws for the connection between the coolant pipe and the bypass channel. Carefully turn the pipe to remove it from the cylinder block.

Removing the camshaft cover and cylinder head

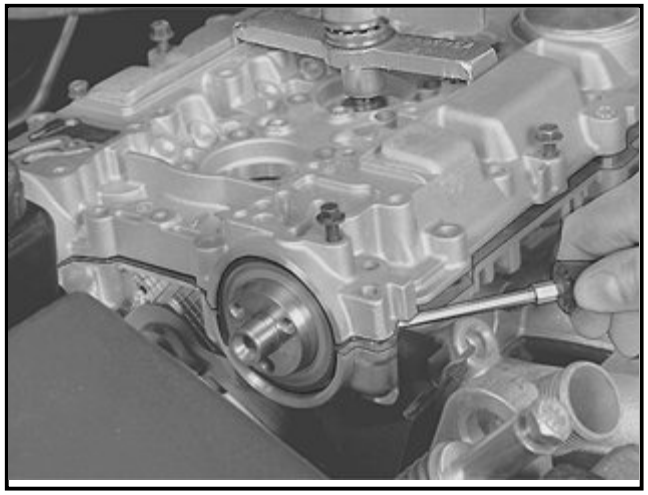
- Remove the spark plugs from cylinders 1 and 5
- Install 2 tools 999 5454 PRESS TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5454 Press Tool. Leave a 2-3 mm gap to the camshaft cover.

Note! Make sure that the screw in the sparkplug thread is fully tightened. VVT-solenoid (variable valve timing).

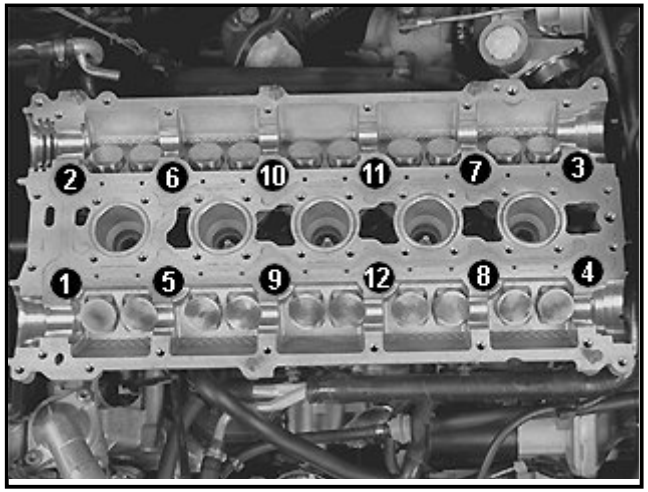
- The variable valve timing solenoids.
- Remove all the screws securing the camshaft cover to the cylinder head.



- Use pliers 999 5670 Pliers See: Vehicle > Electrical / Mechanical Repair > 999 5670 Pliers to lift the cover from the cylinder head.
- Install the pliers at the stop lugs. Start with cylinder 1 and work alternately backwards
- Slacken off the wing nuts approximately 2 turns. Repeat the procedure.



Carefully press out the front and rear camshaft seals.



Remove:

- tools 999 5454 PRESS TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5454 Press Tool
- the camshaft cover
- the camshafts
- the screws holding the cylinder head onto the cylinder block. Start at the sides and work alternately towards the center.

Get some help and lift of the cylinder head. Place the cylinder head on two wooden blocks.

Note! Work carefully to avoid damaging the contact faces.

When replacing or working on the cylinder head
Lift out the valve lifters. Use a magnet or suction cup.
Remove the thermostat housing and transfer it to the new cylinder head.

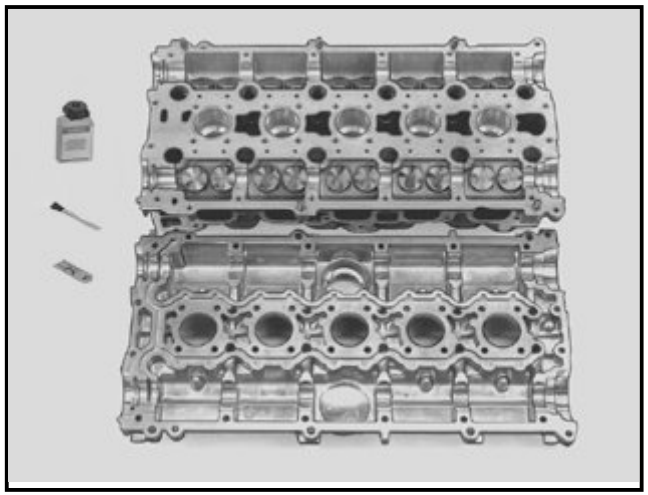
Note! Work carefully to avoid damaging the contact faces.

Installation

Note! For tightening torques, see: Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque.

Note! To ensure that there is no exhaust leakage, see: Flanged joint, assembling See: Exhaust Pipe > Removal and Replacement > Flanged Joint, Assembling.

Cleaning



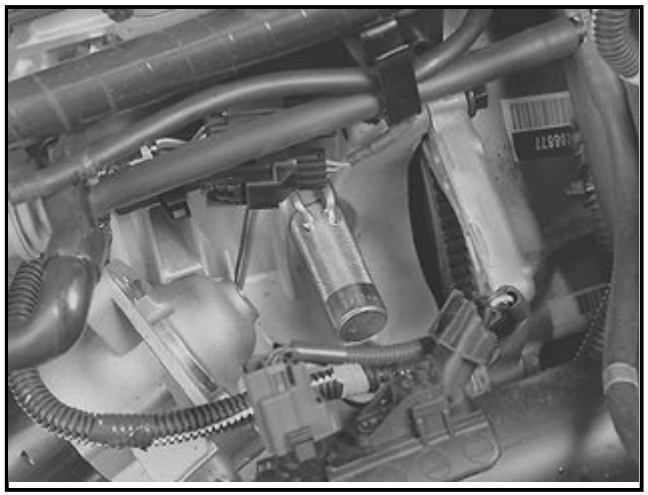
Warning! Use a fume hood or extractor when using gasket solvent!

Clean the gasket faces for:
- the manifold. Check that the studs are tightened
- the coolant bypass channel
- the thermostat housing
- the intake manifold
- the cylinder block
- camshaft cover.

Blow the oil ducts clean.

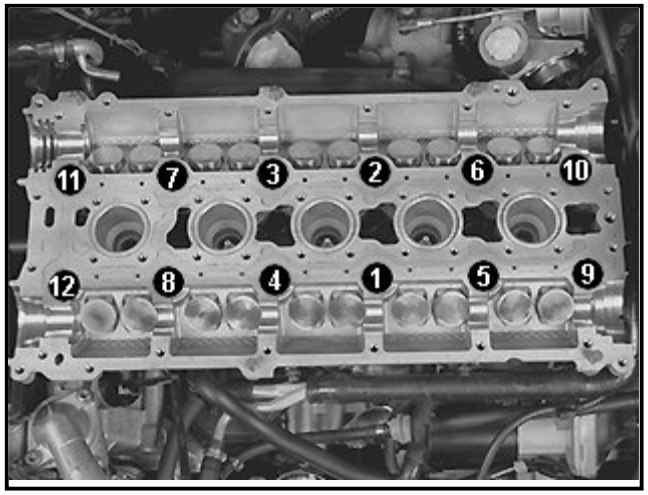
Note! Use a razor blade or a gasket scraper and gasket solvent P/N 1161 440.

Setting up the engine



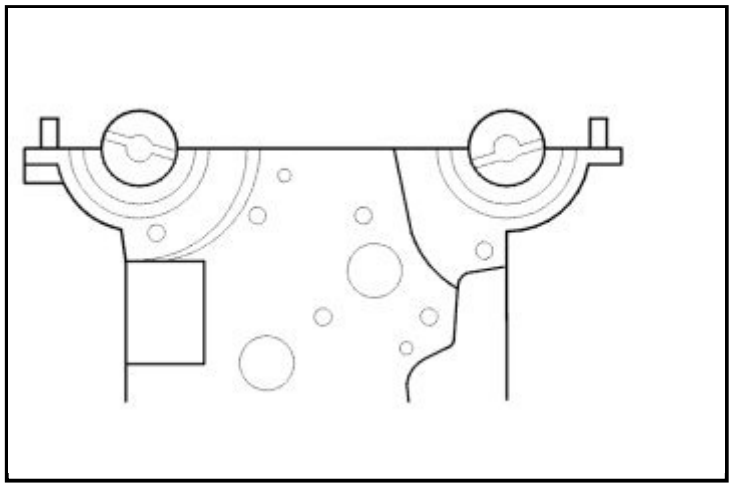
- Position the crankshaft
- Remove the starter motor mounting screws. Pull out the starter motor and place it to one side
- Remove the blind cover plug
- Turn the crankshaft slightly **clockwise** .
- Install crankshaft stop 999 5451 ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5451 Adjustment Tool. Ensure that it bottoms out against the cylinder block.
- Turn the crankshaft **counter-clockwise** until it stops against the crankshaft stop
- Check that the marking on the crankshaft timing gear pulley corresponds with the marking on the oil pump.

Installing the cylinder head



- Ensure that all studs at the exhaust ports are tightened
- Lubricate the studs with paste **116 1408.**
- Install a new cylinder head gasket
- Install the cylinder head
- Lubricate and install all the screws (use new screws).
- Tighten the screws as illustrated. Tighten. See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque. Use protractor 951 2050 BEVEL PROTRACTOR See: Vehicle > Electrical / Mechanical Repair > 951 2050 Bevel Protractor.

Installing valve lifters and camshafts

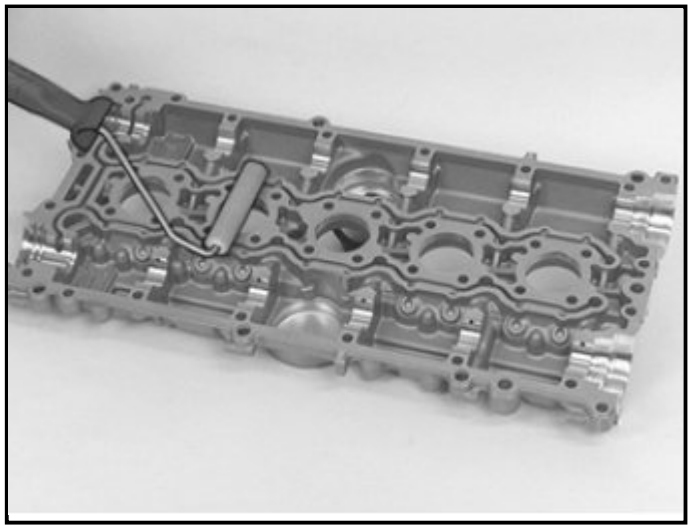


- Lubricate the valve lifter wells.

Note! If the cylinder head has been replaced, the valve clearance must be adjusted. See Valve clearance, B5234T9, B5244T7 See: Valve Clearance > Adjustments > Valve Clearance.

- Install all valve lifters
- Lubricate the camshaft bearing positions
- Install the intake camshaft. Ensure that the groove at the back of the camshaft is **above** an imaginary center line
- Position the exhaust camshaft. Ensure that the groove at the back of the camshaft is **below** an imaginary center line.

Applying liquid gasket

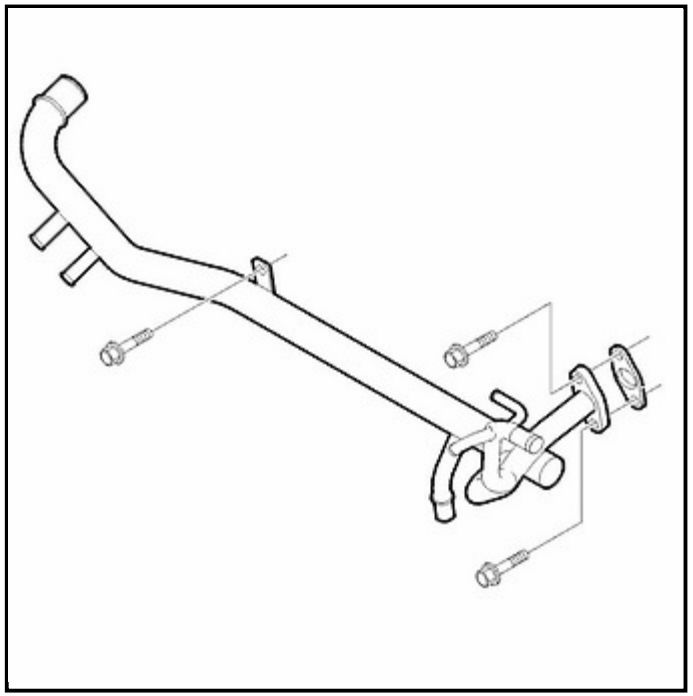


Install new O-rings around the spark plug wells at the cylinder head.
Apply liquid gasket **1161 059** to the camshaft cover.
Use roller 951 2767 Roller See: Vehicle > Electrical / Mechanical Repair > 951 2767 Roller. The surface must be **covered without any excess** .

Note! Make sure that no liquid gasket ends up in the oil channels.

Installing the camshaft cover

- Lubricate the camshaft lobes, the camshaft bearing surfaces and the valve lifters
- Install the camshaft cover
- Install press tool 999 5454 PRESS TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5454 Press Tool (2x).
- Tighten the camshaft cover screws alternately, keeping it parallel to the cylinder head using the press tools
- Install all the screws. Tighten the screws from the middle and outwards
- Remove the press tools.



Install:

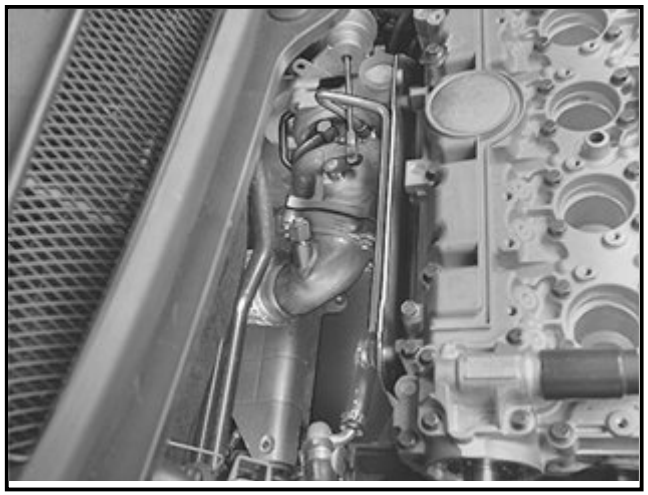
- the variable valve timing (VVT) solenoid. Use a new gasket.
- the spark plugs. Tighten. See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque
- the hose for water-heated crankcase ventilation to the thermostat housing. Tighten the clamp.

Connect the connector for the engine coolant temperature (ECT) sensor.
Install the inlet pipe for the coolant pump on the cylinder head. Use a new gasket.

Note! Apply thread sealant, 116 056 to the screw threads.

Tighten the screw for securing the coolant pump inlet pipe to the cylinder block.

Installing the manifold and turbocharger (TC)

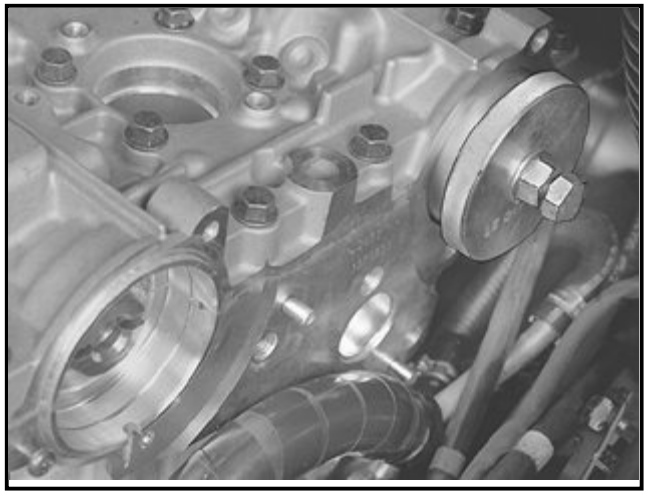


Install:

- new gaskets. Lift and install the manifold and turbocharger (TC)
- the nuts and washers holding the manifold to the cylinder head
- the upper and lower turbocharger (TC) coolant pipes. Tighten the clamp on the rubber hose
- the pipe screws for the coolant pipes. Use new seal washers. Tighten
- the oil pressure pipe
- the pipe screw holding the oil pressure pipe to the turbocharger (TC). Use new seal washers. **Do not tighten!**

Lubricate the studs on the turbocharger (TC). Use paste **116 1408** .
Install the front exhaust pipe onto the turbocharger (TC). Use new nuts. **Do not tighten!** Install the heat deflector plate over the manifold.

Installing the rear camshaft seal



To clean the shaft journal and mating surface, use emery cloth P/N 951 1024.

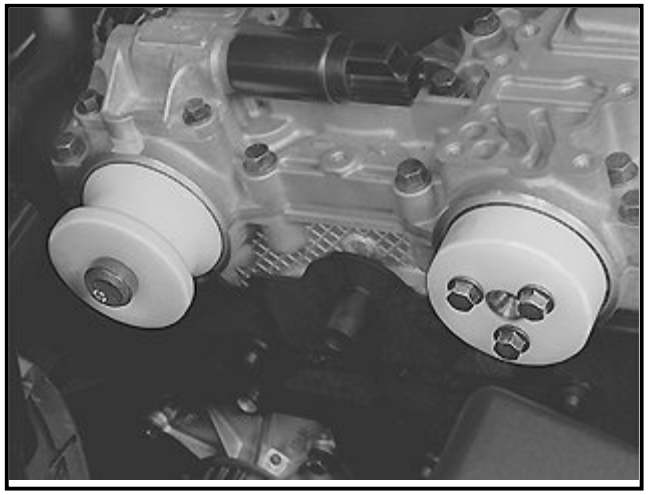
Note! For cleaning, work around the shaft journal - not in and out. It is essential that any residue from the emery cloth and any other contaminants are completely removed before the new seal ring is installed.

Use drift 999 5450 PUNCH See: Vehicle > Electrical / Mechanical Repair > 999 5450 Punch.
Lubricate the surface of the seal that the camshaft rotates against.
Press in the seal until the drift bottoms out.

Note! If there are grooves on the camshaft, the seal can be pressed in a further 2 mm: Reverse the sleeve.

Install camshaft adjustment tool 999 5452 CAMSHAFT ADJUSTMENT TOOL See: Vehicle > Electrical / Mechanical Repair > 999 5452 Camshaft Adjustment Tool at the rear of the camshafts.
Ensure that the screws retaining the adjustment tool to the camshafts and the screws holding the tool together are well tightened.

Installing the front camshaft seals



- Use drift 999 5718 Drift See: Vehicle > Electrical / Mechanical Repair > 999 5718 Drift.
- Lubricate the surface of the seal that the camshaft rotates against.
- Use the variable valve timing unit / timing belt pulley mounting screws. Tighten the screws until the drift bottoms out
- Remove the drift
- Install the screw holding the inner timing cover to the cylinder head.

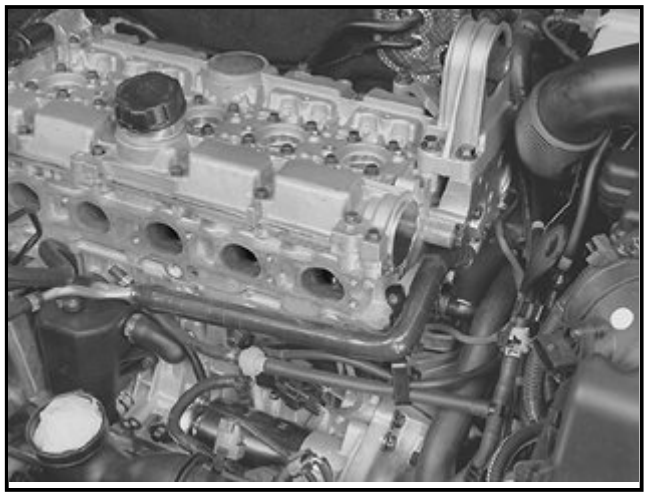
Checking and adjusting the variable valve timing unit
Check and adjust the variable valve timing unit. See

Installing components

Install:

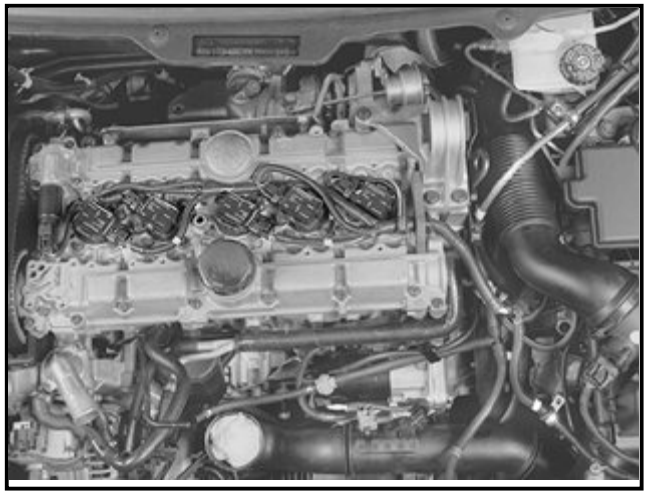
- front timing cover
- the cable duct to the mountings on the right suspension turret
- the auxiliaries belt
- the expansion tank
- the servo oil reservoir
- the bleed hose to the expansion tank. Tighten the clamp.

Check that the hoses are installed correctly.
Connect the connectors for the ABS sensor at the right suspension turret and for the coolant level sensor in the expansion tank.



Install:

- the starter motor
- the pipe screw for the water heated crankcase ventilation at the rear of the cylinder head. Use new seal washers. Tighten to **26 Nm**
- the camshaft position sensor (CMP) housing and trigger wheel
- the lower engine stabilizer brace bracket in the cylinder head
- the upper engine stabilizer brace.



Install:

- the bracket and lifting eyelet for the engine stabilizer brace bracket
- the ignition coils and ground terminals according to earlier markings. Connect the connector for the variable valve timing solenoid
- the clamp for the positive lead at the lifting eyelet bracket
- the plastic intake pipe to the mass air flow (MAF) sensor. Tighten the clamp.

Connect the connector to the mass air flow (MAF) sensor. Use a clamp on the wiring at the front of the air cleaner (ACL).

Installing intake manifold

Clean the intake manifold gasket face to the cylinder head.
Install a new gasket on the cylinder head. Secure with the two screws in the lower row.

Lower and twist the intake manifold so that the fuel pressure line goes through the cavity in the intake manifold.

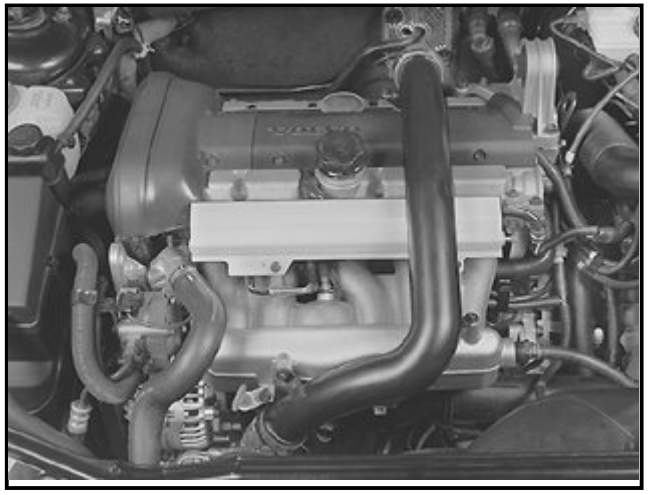
Note! Work carefully to avoid damaging the fuel pressure pipe.

Route the crankcase ventilation hose through the cavity in the intake manifold.

Install:

- the pipe screw for the crankcase ventilation on the underside of the intake manifold. Use new seal washers. Tighten to **26 Nm**
- the rest of the screws holding the intake manifold to the cylinder head. Tighten to **19 Nm**
- the hose to the canister purge (CP) valve
- the control hose for the turbocharger (TC) by-pass valve
- the brake vacuum hose
- the crankcase ventilation hose to the top of the camshaft cover. Use a new clamp
- the cover over the ignition coils
- the upper timing cover
- the upper engine coolant hose for the engine and radiator. Tighten the clamp
- the screw holding the dip stick pipe to the intake manifold. Connect the connector to the electronic throttle module (ETM)
- the charge air pipe between the throttle body (TB) and the charge air cooler (CAC). Remove the seal. Tighten the clamp.

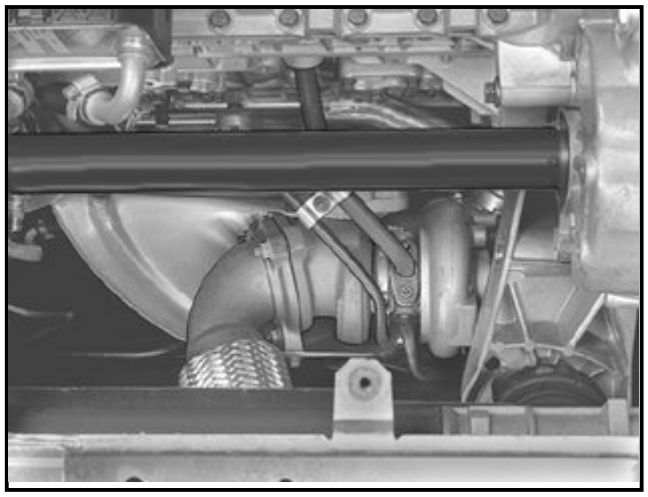
Installing the fuel rail



Install:

- the fuel rail. Use new screws. Press the quick-release connector for the fuel pressure line until it clicks. See Fuel line, lock See: Fuel Rail > Removal and Replacement > Fuel Line, Lock
- the clamp for the injector wiring at the rear of the cylinder head
- the protective cover over the injector connectors
- the charge air pipe over the engine. Tighten the pipe using the three screws on the engine. Tighten the clamps.

Installing components



Raise the car. Install:

- the pipe screw that holds the turbocharger (TC) oil pressure pipe to the engine. Use new seal washers. Tighten. See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque
- the turbocharger (TC) oil return line. Use a new gasket and sealing ring. Tighten. See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque
- the clamp between the oil pressure pipe and the oil return line. Tighten the three nuts that hold the front exhaust pipe to the turbocharger (TC). See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque.
- the lower screw for the heat deflector plate over the turbocharger (TC)
- the splash guard under the engine
- the plastic nuts for the hatch in the right fender liner
- the right front wheel.

Lower the car.
Tighten the pipe screw for the turbocharger (TC) oil pressure pipe. See Tightening torque, B5234T9 See: Engine > Mechanical > Tightening Torque.

Install:
- the ground strips between the cylinder head and the firewall
- the engine stabilizer brace between the suspension turrets Clamp the servo hose at the right-hand engine stabilizer brace mounting
- the negative battery lead. First read Battery, disconnecting See: Battery > Procedures > Battery, Disconnecting.

Check
Replace the oil and oil filter if necessary.

Check:
- the engine oil level
- the servo oil level
- the coolant level.

Warm up the engine until the thermostat opens.
Check the engine for leaks.
Top up the coolant if necessary.