Removing timing belt

Remove components

Caution! Remove the ignition key from the ignition switch before beginning work.

Note! Crankshaft or camshaft must not be rotated under any circumstances more than is listed below. Failure to follow these instructions may cause damage to the valves.

Remove:
- upper timing belt cover.
- servo reservoir and expansion tank.
- Lift up and place on top of engine.

Note! Take care not to spill servo oil from the bleed hole in the cap. Place paper wipe around the reservoir and then cover with a plastic bag as protection. Spilled servo oil is highly inflammable.

- auxiliaries belt.
- front camshaft belt cover.

Position engine according to marking

Raise the car.
- Remove right front wheel.
- Remove nut from fender liner cover.
- Place upper camshaft belt cover.
- Turn crankshaft clockwise until the markings on the crankshaft and camshaft pulley correspond.
- Remove upper camshaft belt cover.
Removing timing belt
Slacken off belt tensioner
- Slacken off belt tensioner center screw slightly.
- Hold the center screw still and turn the tensioner eccentric clockwise with a 6 mm (0.24 in) allen key to "10 o'clock".
- Remove the camshaft belt from the belt tensioner, camshaft pulley and idler pulley and the water pump.

Remove vibration damper
Raise the car
- Remove vibration damper. Use counterhold 999 5433. Work the vibration damper loose.
- Remove camshaft belt

Checking the belt tensioner and idler pulley
Check bearing wear:
- Replace if necessary.

Idler pulley:
- Spin the idler pulley and listen for noise.
- When replacing with a new idler pulley, tighten to 24 Nm (17.7 lb ft)
Belt tensioner:
- Screw the belt tensioner into place with the center screw.
- Screw in the center screw by hand.
- Ensure that the tensioner fork is centered over the cylinder block rib.

**Note!** Ensure that the allen hole on the eccentric is at "10 o'clock".

**Installing timing belt**

**Installing camshaft belt**
Install the new belt as follows:
- Install new camshaft belt over crankshaft pulley wheel.
- Install vibration damper. Tighten the center nut to 180 Nm (132.8 lb ft) Use counterhold 999 5433. Remove counterhold and install new screws. Tighten the screws to 25 Nm (18.44 lb ft) and angle tighten 30 degrees.

Then install the new belt in the following order:
1. crankshaft.
2. idler pulley.
3. intake camshaft pulley.
4. exhaust camshaft pulley.
5. water pump.
6. belt tensioner.

**Tighten timing belt**
This adjustment is always carried out on a cold engine.
Suitable temperature is approximately 20°C/68°F.
At higher temperatures, for example with engine at operating temperature or at higher ambient temperature, the needle is further to the right. The illustration shows the needle position when adjusting the camshaft belt tensioner at different engine temperatures.

Tighten the timing belt as follows:
- Turn crankshaft clockwise carefully until the camshaft belt is tensioned.
- The belt should be tight between intake camshaft pulley, idler pulley and crankshaft.
- Hold the belt tensioner center screw secure and turn the belt tensioner excenter counter clockwise until the tensioner needle passes the marked position.
- Then turn the eccentric back so that the needle reaches the marked position corresponding to the relevant temperature.
- At 20°C (68°F) the needle must be centered in the window.
- See figure above.
- Secure the eccentric and tighten the center screw to 20 Nm (14.75 lb ft)

Check that the needle is in the correct position.
If this is not the case a new alignment must be carried out.

Check
Checking markings:
- Press the belt to see that the indicator on the tensioner moves easily.
- Install the upper timing belt cover.
- Turn crankshaft 2 turns and check that the markings on the crankshaft and camshaft pulley correspond.
- Check that the indicator on the belt tensioner is within the marked area.
Install components

Reinstall
- Front camshaft belt cover. Tighten to 12 Nm (8.85 lb ft)
- Upper camshaft belt cover. Tighten to 8 Nm (5.9 lb ft)
- Auxiliaries belt.
- Servo reservoir.
  Wipe clean.
  Check the level and top up as necessary.
- Expansion tank.

Note! Ensure that hoses are correctly positioned.

- Wipe clean and check engine compartment.
- Cover in fender liner.
- Front wheel.

Checking work

Note! Write the date and mileage on the decal and stick it on the camshaft belt cover.

Function test:
- Test drive engine.
- Wipe dry steering wheel and gear selector lever.
Exhaust Manifold: Service and Repair

Exhaust Manifold/Gasket, Replacing

Special Tools: 999 5543

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.

Preparation

Remove
- the right front wheel
- the splash guard under the engine
- the right drive shaft.

Remove
- the heat deflector plate above the coolant pipes and hoses for the oil cooler
- the support bracket between the cylinder block and the manifold and three-way catalytic converter (TWC)
- the nuts where the front exhaust pipe and three-way catalytic converter (TWC) join.

Remove the brake pipe from the holders at the front SIPS member.

Remove the screws holding the SIPS member to the bodywork.

Unhook the rubber mountings for the rear exhaust system from the holders.

Pull the exhaust system back so that it releases from the flange at the manifold and three-way catalytic converter (TWC). Put it to one side.
- the engine stabilizer brace between the suspension turrets
- the air preheating hose between the air cleaner (ACL) and the heat deflector plate.

Disconnect the connector for the front heated oxygen sensor (HO2S).

Remove the heated oxygen sensor (HO2S) wiring from the rear engine mounting.

Remove the front heated oxygen sensor (HO2S).

Seal the opening for the heated oxygen sensor (HO2S).

Remove the upper heat deflector plate over the manifold.

**Removing the exhaust manifold and three-way catalytic converter (TWC)**

Remove

- the nuts securing the manifold and the three-way catalytic converter (TWC) to the cylinder head
- lift the manifold and three-way catalytic converter (TWC) off the studs at the cylinder head
- the gaskets.

**Installing the exhaust manifold and three-way catalytic converter (TWC)**
NOTE: Ensure that there is no exhaust leakage.

- Clean the gasket faces. Check that the studs are tightened.
- Install new gaskets.
- Lubricate the studs. Use paste 116 1408.

**WARNING:** Avoid skin contact with the paste.

- Seal the thread for the upper heated oxygen sensor (HO2S).

- Lift and install the manifold and three-way catalytic converter (TWC). Check that the gaskets are correctly positioned.

Install

- the nuts securing the manifold to the cylinder head. Use new nuts. Tighten to 25 Nm
- the heat deflector plate above the manifold.

Install the upper heated oxygen sensor (HO2S). Lubricate the threads. Use paste 116 1408.

**WARNING:** Avoid skin contact with the paste.

Tighten the heated oxygen sensor (HO2S). Tighten to 45 Nm. Use tool 999 5543.
Connect the connectors for the heated oxygen sensor (HO2S) to the wiring at the rear edge of the transmission.

Secure the heated oxygen sensor (HO2S) wiring at the rear engine mounting (2 mounting points).

**Finishing**

**Install**

- the air preheating hose between the heat deflector plate and the air cleaner (ACL)
- the engine stabilizer brace between the suspension turrets.

- the front exhaust pipe on the manifold and three-way catalytic converter (TWC). Use a new gasket and new nuts. Lubricate the threads with paste 116 1408. Tighten the nuts. Tighten to **25 Nm**.

**WARNING:** Avoid skin contact with the paste.

- the rubber mounting for the rear exhaust system
- the front SIPS member. Tighten to **25 Nm**
- the brake pipe on the plastic holders at the front SIPS member
- the support bracket between the cylinder block and the manifold and three-way catalytic converter (TWC). Tighten the screws
- the heat deflector plate above the coolant pipes and hoses
- the right drive shaft.
- the splash guard under the engine
- the right front wheel.

**Check**
Test run the engine. Check for any leakage from the exhaust system and manifold.
Note! The intake manifold is stocked complete with Throttle Body (TB) and damper spindles for engines with damper spindles.

Replacing intake manifold
See also Intake Manifold Gasket, Service and Repair for replacement

Disconnect fuel rail with the injectors.

Remove throttle pulley and injector cover. Remove throttle cable.
Disconnect connectors and mountings from injectors.
Remove the two fuel line brackets and two fuel rail mounting screws.
Install the five holders 999 5533. Carefully pull up the injectors with the fuel rail.
Disconnect hose from Canister Purge (CP) valve.
Carefully place fuel rail with injectors on engine.

Caution: Injector nozzles with fuel needles must not be damaged.

Remove

- throttle linkage from pulley
- intake air hose to the throttle body
- multi-nipple
- throttle pulley with bracket and idle speed control valve
- Throttle Body (TB)
- clamp for EGR hose (Turbocharger (TC)).
- pressure hose to Turbocharger (TC) instruments/EGR valve control vacuum hose
- brake servo hoses

Remove
- dipstick bracket
- intake manifold screw in lower bracket
- lower intake manifold screws a few turns.

**Remove**

- remove three upper intake manifold screws
- intake manifold by lifting it approximately 20 mm. (Allow the crankcase ventilation hose run through the intake manifold without disconnecting it from the flame trap, does not apply to Turbocharger (TC) models.

**Install**

- a new gasket held in position by the lower intake manifold screws. Do not forget the clamp on the fourth socket turbocharged engines.)

- intake manifold. (Do not forget the crankcase ventilation hose which comes up through the gap on the 2nd and 3rd ducts on the S engines.)
- the three upper screws and tighten all the screws from the middle to 20 Nm.

**Part 1 Of 2**

- EGR valve with new gasket if necessary
- throttle body with new gasket
- throttle pulley with bracket
- multi-nipple and connect hoses
- fuel rail and two brackets
- injectors wiring and cover the bracket screw under the intake manifold
- dip stick bracket screw
- brake servo hoses
- air intake hoses
- Idle Air Control (IAC) valve
- throttle linkage and throttle cable
- throttle pulley cover
Cylinder Head Assembly: Service and Repair

Cylinder Head and/or Gasket Replacement

Cylinder head gasket, replacement

Special Tools: 951 2050, 999 5199, 999 5449, 999 5450, 999 5451, 999 5452, 999 5453, 999 5454, 999 5533

Drain coolant and remove front exhaust pipe
- Disconnect battery negative lead.
- Remove expansion tank cap.
- Remove splash-guard under engine.
- Open engine and radiator nipples, use hose to collect coolant.
- Close nipples.
- Remove exhaust manifold/headpipe nuts.

Remove exhaust manifold and fuel distribution manifold
Remove:
- exhaust manifold, according to operation Check/replacing exhaust system
- belt transmission, according to operation Replacing timing belt See: Timing Components/Timing Belt/Service and Repair

Lift fuel distribution manifold and injectors and put to one side. Use 999 5533 for the injectors.
Remove the two ground strips from engine.

NOTE: Take care not to damage injector nozzles and fuel needles.

Remove:
- Engine coolant fan and intake manifold
- Upper radiator hose from thermostat housing
- camshaft pulleys, use counterhold 999 5199, mark up pulleys (intake/exhaust)
- inner timing cover screw
Remove rear components
- air cleaner (ACL) with hoses
- camshaft position (CMP) sensor and trigger wheel
- distributor cap, HT leads and rotor
- torque control arm with brackets

Remove upper half of cylinder head
- Install tool 999 5453 (4-valve engine) or 999 5508 (2-valve engine) to fix the camshafts at the front edge.
- Install tool 999 5454 to camshaft housing cover allowing a few mm play.
- Slacken off the screws (from outside and in) from the upper half, remove all screws.
- Remove the camshaft cover at the stop lugs with tool 999 5670. Start with cylinder 1 and work alternately backward
- Open and remove the tools 999 5454 step for step so that parallel movement is ensured when removing the camshaft cover.
- Mark up and remove camshafts

Remove cylinder head
- Remove two coolant pipe screws.
- Slacken off cylinder head screws (from the outside).
- Remove cylinder head.
- Remove cylinder head gasket.
Clean
- exhaust joints exhaust manifold/cylinder head
- cylinder block gasket face
- coolant pipe gasket face
- gasket face between upper and lower cylinder head halves

NOTE: Do not use a metal scraper. Use a soft putty knife and if necessary gasket solvent p/n 1 161 340-3. Surfaces must be completely clean in order to form a seal. When using gasket solvent a fume hood or extractor must be used.

Align the crankshaft as marked
- Remove starter motor.
- Remove blind cover plug.
- Install camshaft adjustment tool 999 5451
- Turn crankshaft anti-clockwise to stop.

Install lower cylinder head half
- Install new cylinder head gasket
- Lubricate screws.
- Tighten screws in three stages from the middle and working out according to:
  1. 20 Nm (15 ft lb)
  2. 60 Nm (44 ft lb)
  3. 130°, use bevel protractor 951 2050
- Install coolant pipe with a new gasket.
- Install new O-rings around spark plug wells.
- Remove spark plugs 1 and 5.
Apply liquid gasket
- Apply liquid gasket p/n 1 161 059-9, on the upper half of the cylinder head, using a short-bristle roller.

Caution! Ensure that no liquid gasket enters the oil channels. A thin layer is enough to form a seal.
- Install camshafts. Secure front of camshaft using holder 999 5453 and rear of camshafts using camshaft adjustment tool 999 5452 (without extensions).

Install upper half of cylinder head
- Position upper half.
- Pull down towards cylinder head using press tool 999 5454 (two).
- Torque the upper section from the inside outwards, tighten to 17 Nm
- Remove camshaft adjustment tool 999 5453 and tool 999 5454.

Install front camshaft seals
- Use drift 999 5449.
- Grease seal.
- Tap in seal.
- The new version drift tool 999 5449 is made in plastic.
Install camshaft pulleys
- Position the upper timing cover
- Install camshaft pulleys, align according to marking.
- Tighten the two screws until they just come into contact with the camshaft pulleys.
- Lift out the upper timing cover.

NOTE: Check that the camshaft screw holes are centered, as illustrated.

Adjusting the mechanical belt tensioner
If a mechanical belt tensioner is being used, adjust according to "Adjusting the mechanical belt tensioner" See: Timing Components/Timing Belt Tensioner/Adjustments

Install camshaft belts
- Install tension damping unit, tighten to 25 Nm
- Place belt over camshaft pulley, around coolant pump and press belt over the tensioner pulley.
- Slacken off the two camshaft pulley screws.
- Pull the lock pin out of the tensioner/damping unit.
- Press hard or knock the belt twice in the direction of arrow (1) and twice in the direction of arrow (2) using a plastic mallet.

Tighten camshaft pulleys
- Install third screw and tighten screws to 20 Nm
- Install inner timing cover screw.
- Install timing cover.

Remove holders
- Remove gauge 999 5451 and install blind cover plug.
- Install starter motor.
- Remove camshaft adjustment tool 999 5452.

Check markings
- Turn engine crankshaft two turns.
- Check that markings line up on crankshaft and the timing gear pulley.
- Install outer timing cover.

Install rear camshaft seal
- **4 valve engines:**
  Use drift 999 5450.
- **2 valve engines:**
  Use drift 999 5509.
- Grease seal.
- Press in seal.

**Hint:** Normally the seal is positioned flush with the internal bevel. If there are grooves on the shaft journal the seal can be pressed in a further 2 mm by reversing the sleeve.
Install
- torque arm, with brackets
- rotor with holder
- camshaft position (CMP) sensor with trigger wheel
- spark plugs
- distributor cap and HT leads
- Air cleaner (ACL) with all hoses and connectors

Install
- exhaust manifold according to operation Check/replacing exhaust system
- intake manifold and engine cooling fan (FC) according to operation Replacing instake manifold
- fuel rail
- ground strip on engine
- exhaust pipe
- splashguard under engine

Top up coolant/Change oil & oil filter
- Install battery negative lead
- Top up with oil.

Oil capacity
  including filter 4.75 liters
  excluding filter 4.25 liters

- Fill cooling system.
- Run the engine until the thermostat opens and top up if necessary.
- Check for leaks.