

21: Cylinder head, B6294S2**S80 (-06), 2002, B6294S2, 4T65EV, L.H.D****22/9/2015****21: Cylinder head, B6294S2****PRINT****Cylinder head/gasket, replacing****Special tools:**

951 2050
951 2666
951 2767
999 5450
999 5451
999 5452
999 5454
999 5670
999 5718
999 5719

Removing the cylinder head/gasket

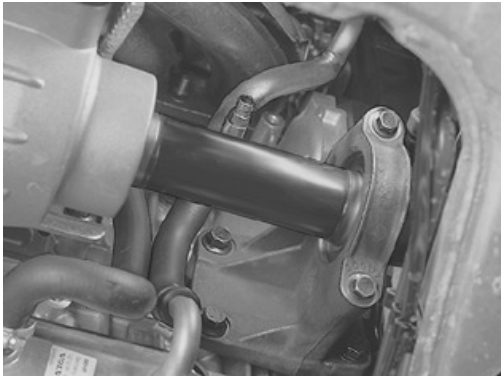
Note! As the illustrations in this service information are used for different model years and / or models, some variation may occur. However, the essential information in the illustrations is always correct.

Preparation

Remove:

- the radiator breather tube from the expansion tank.
- the battery negative lead. See: Battery, disconnecting .
- the right front wheel

**Draining coolant**



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

Separating the exhaust system

Remove:

- lower engine cover.
- the nuts at the manifold/front exhaust system branching.
- the screws of the front SIPS member.



Undo the brake pipe from the clips on the SIPS member.

Release the exhaust system from the manifold.

Let the exhaust system rest on the rear SIPS members.

Remove the gaskets.

Undo the connectors of the heated oxygen sensors.

Removing components

Remove the upper part of the intake manifold. See Intake pipe/gasket, replacement:Preparation .



Remove:

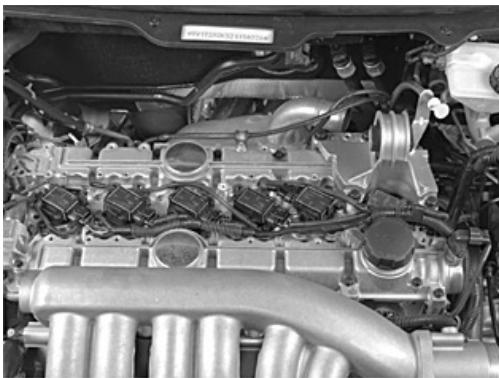
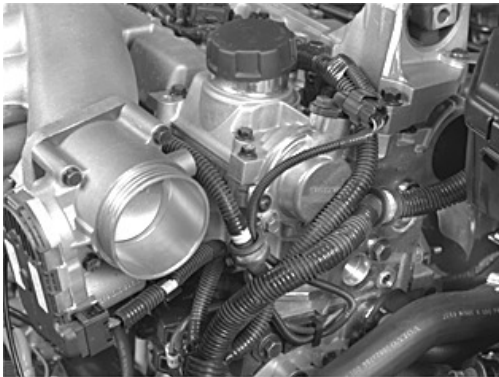
- the cross stay between the suspension turrets.
- the air cleaner inlet pipe from the connection on the front cover plate.

Remove the connector of the mass air flow sensor.

Mark up and remove the vacuum hoses from the air cleaner housing. Remove the air cleaner housing assembly.

Relieve the load from the belt tensioner. Remove the auxiliaries belt.

First remove the upper timing cover then the front timing cover.
Remove the cover over the ignition coils.



Remove:

- the clamps holding the cable harness to the rear edge of the cylinder head.
- the camshaft position sensor housing and trigger wheel.
- the cover at the rear edge of the intake camshaft.
- the air pre-heating hose

Remove the screws holding the ignition coils and the two ground terminals between the ignition coils.

Unplug the connectors of the variable valve timing solenoid and the coolant temperature sensor. Lift up and put the ignition coils with cable harness to one side.

Note! Mark up the ignition coils before removal.

Automatic only:

Remove the upper screw of the transmission dipstick tube.

Remove:

- the ground strips between the engine and the firewall
- torque rod bracket.
- the upper engine coolant hose for the engine and radiator

Removing the manifold



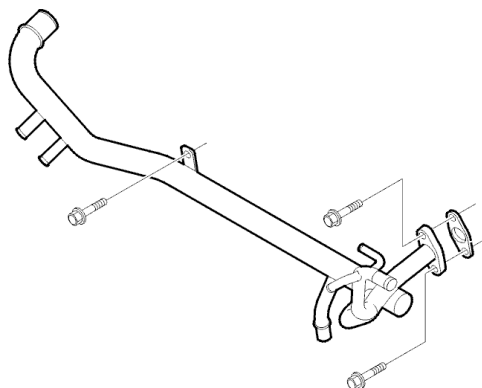
Undo the heated oxygen sensor cables from the clips and clamps. Remove the heat deflector plate above the manifold.

Note! Clean and spray rust removal oil on the free threads before removal.

Remove the nuts from the manifold mounting on the engine. Pull off and lift up the manifolds.

Remove the gaskets.

Releasing the coolant pump inlet pipe

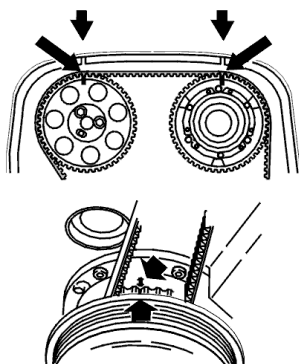


Remove:

- the screw that holds the coolant pump inlet pipe onto the cylinder block.
- the two screws for the connector between the coolant pipe and the bypass channel.

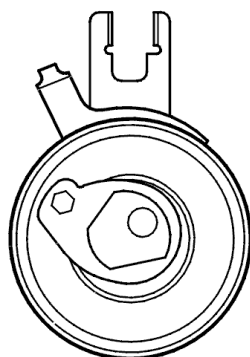
Carefully turn the pipe to remove it from the cylinder block.

Setting up the engine



Remove the nuts from the cover on the wing liner.
Position the upper timing cover.
Turn the crankshaft clockwise until the markings on the crankshaft and camshafts align.
Remove the upper timing cover.

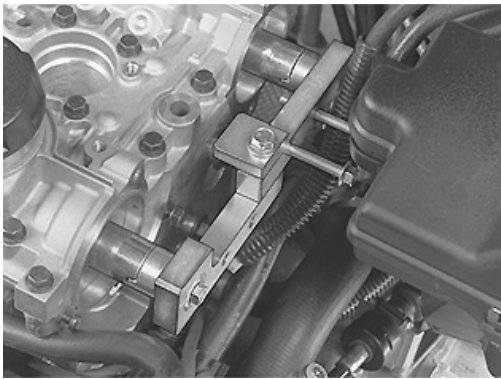
Removing the timing belt



Slacken off the centre screw for the belt tensioner slightly.
Hold the center screw in a fixed position. Turn the tensioner eccentric counterclockwise to 10 o'clock. Use a 6 mm Allen key.
Remove the timing belt.

Removing the timing gear pulley

Install tool 999 5452 at the rear of the camshafts.



Remove:

- the variable valve timing unit center plug.
- variable valve timing unit center screw.
Pull / pry off the variable valve timing unit and timing belt pulley.
- screws holding the timing belt (without the variable valve timing unit) to the camshaft.
- the timing belt pulley.
- tool 999 5452 .

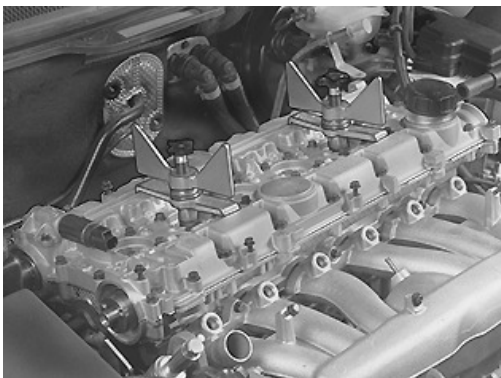
Removing the thermostat housing



Remove:

- the screw for the thermostat housing cable duct.
- the screws holding the thermostat housing to the cylinder head.
Lift out the thermostat housing, gasket and cable duct.
- screw holding the inner timing cover to the cylinder head.

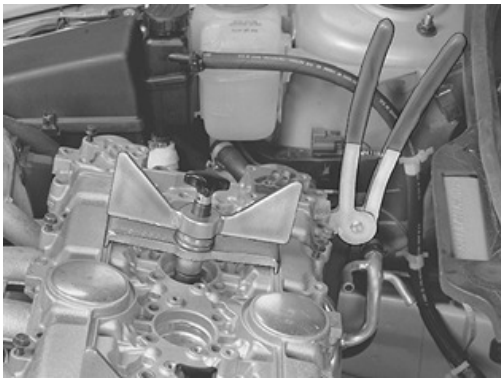
Removing the camshaft cover/cylinder head



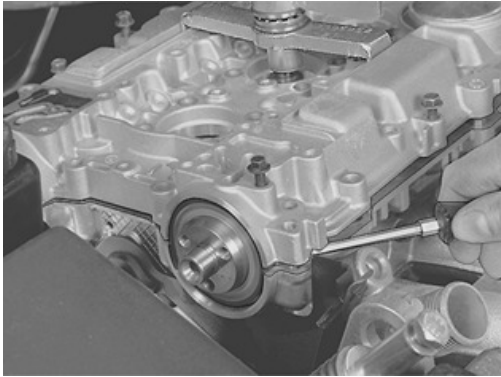
Remove:

- spark plugs for cylinders 2 and 5.
Install tool 999 5454 (x2).
Leave a **2-3 mm** gap to the camshaft cover. Ensure that the screw in the spark plug well is fully tightened.
- Variable valve timing solenoid.
- the screws holding the camshaft cover to the cylinder head.

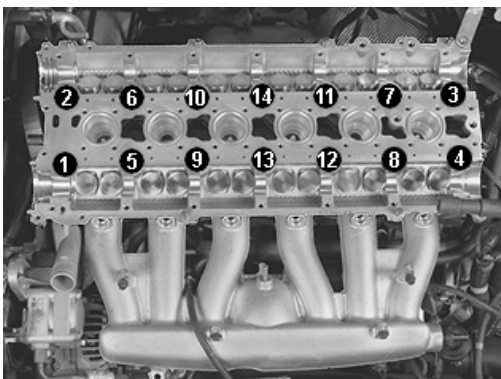
Use pliers 999 5670 to lift the cover from the cylinder head. Install the pliers at the stop lugs. Start with cylinder 1 and work alternately backward. Slacken off the wing nuts approximately 2 turns.



Repeat the procedure with the pliers.



Carefully press out the front and rear camshaft seals.
Remove the seals.



Remove:

- tools 999 5454 .
- the camshaft cover.
- the camshafts

Lift out the valve lifters. Use a suction cup.

Caution! Mark up and position the lifters so that their original positions can be established.

Remove the screws holding the cylinder head on the cylinder block. Start at the sides and work alternately towards the center (see illustration).
Get help to lift off the cylinder head.

Caution! Exercise extreme care so that the mating surfaces are not damaged.

**When
replacing/machining
the cylinder head**

Remove:

- the lower part of the intake manifold and

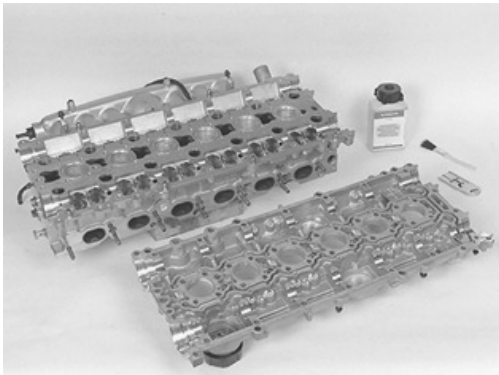
the gasket. See Intake pipe/gasket, replacement: Removing the intake manifold, lower section .

- coolant outlet pipe.

Caution! Do not damage the mating surfaces.

Cleaning

Cleaning the gasket faces



Clean the gasket faces for:

- the manifold. Check that the studs are tightened.
- the coolant bypass channel
- the coolant outlet pipe.
- intake pipe.
- engine block.
- camshaft cover.

Blow the oil ducts clean.

Note! Use a razor blade or a plastic scraper and gasket solvent 116 1440. Use a fume hood or extractor when using gasket solvent!

Installing the cylinder head gasket

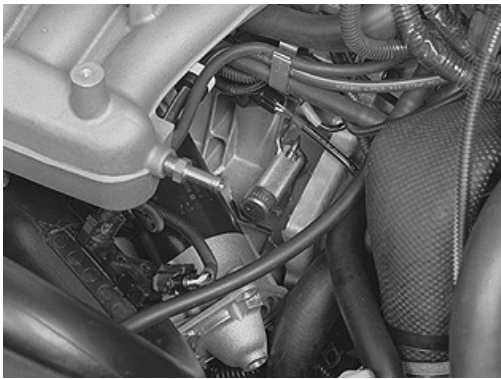
Note! For tightening torques, see: Tightening torque .

Note! To ensure that there is no exhaust leakage, see Flanged joint, assembling .

Aligning the crankshaft

Remove:

- the mounting screws for the starter motor. Pull out the



starter motor and place to one side.

- the blind cover plug.

Turn the crankshaft slightly **clockwise**.

Install the crankshaft stop 999 5451 . Ensure that it bottoms out against the engine block.

Turn the crankshaft

counterclockwise until it stops against the crankshaft stop.

Check that the marking on the crankshaft timing belt pulley aligns with the marking on the oil pump.

Installing the cylinder head

Install a new cylinder head gasket. Install the cylinder head. Use new screws.

Lubricate and install all the screws. Tighten the screws in the order illustrated.

Tighten the screws in the following order.

1. **20 Nm**
2. **60 Nm**
3. Angle tighten **130°**. Use bevel protractor 951 2050 .

If the cylinder head has been replaced or machined:

Install:

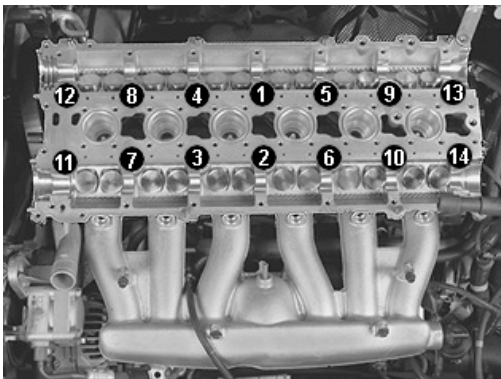
- coolant outlet pipe.
- **new** gasket with the two center screws in the lower row.
- the lower part of the intake manifold. See Intake pipe/gasket, replacement:Installing the intake manifold, lower section .

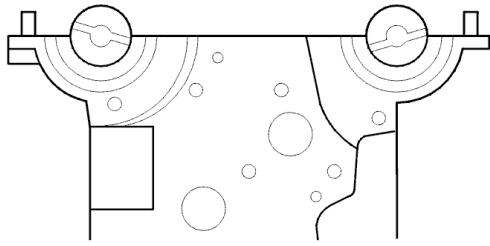
Installing valve lifters and camshafts

When installing a new cylinder head, the valve clearance must be set. See Valve clearance, setting / adjusting .

Lubricate the valve guide wells.

Install all valve lifters





Caution! Make sure that the lifters are in the same position as before.

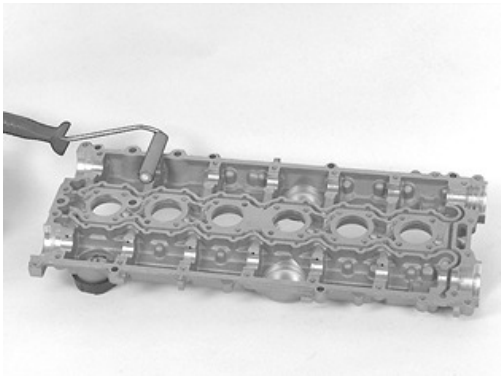
Lubricate the camshaft bearing seats.

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

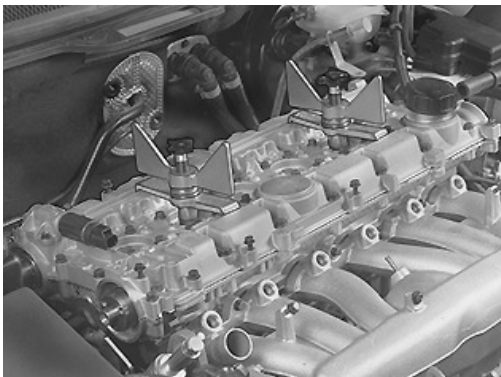


Install new O-rings around the spark plug wells at the cylinder head.

Apply liquid gasket **116 1059** to the camshaft cover. The surface must be completely covered without any excess. Use roller 951 2767 .

Caution! Ensure that no liquid gasket gets into the oil ducts.

Installing the camshaft covers



Lubricate the camshaft lobes, the camshaft bearing surfaces and the valve lifters.

Install the camshaft cover.

Install press tool 999 5454 (2x).

Tighten the camshaft cover screws alternately, keeping it parallel to the cylinder head with the press tools.

Install all the screws and tighten.

Install the variable valve timing solenoid with a new gasket.

Remove the press tools.

Install the spark plugs. Tighten to

30 Nm.

Installing the rear camshaft seal

Use drift 999 5450 .

Lubricate the surface of the seal that the camshaft rotates against.



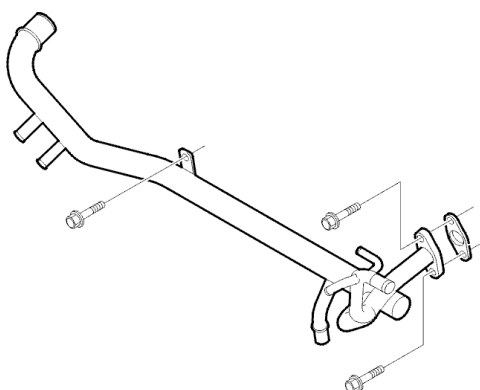
Press in the seal until the drift bottoms out.

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

Checking the variable valve timing (VVT) unit

Check the variable valve timing unit.
See: Variable valve timing unit, checking and adjusting .

Installing the coolant pump intake pipe



Install:

- the coolant pump intake pipe to the cylinder head. Use a new gasket.

Note! Apply thread sealant, 116 1056, to the screw threads.

- the screw for mounting the coolant pump intake pipe to the cylinder block.

Installing the manifold



Install **new** gaskets.
Lubricate the threads of the studs and heated oxygen sensors with paste **116 1408** before installation.

Install

- the manifolds. Use **new** nuts. Tighten to **25 Nm**.
- the heat deflector plate.
- the heated oxygen sensors. Tighten to **45 Nm**.

Plug in the heated oxygen sensor connectors.

Install the heated oxygen sensor cables with clips and clamps.

Installing components

Install:

- the screw holding the engine dipstick tube to the intake pipe.
- the upper engine coolant hose for the engine and radiator.
Tighten the clamp
- the ignition coils according to the earlier markings
- the screws for the two ground terminals between ignition coils 1 and 2 and 5 and 6
- the water temperature sensor connector.
- the connector for the variable valve timing solenoid.
- torque rod bracket.
- the ground strips between the engine and the firewall
- the upper part of the intake manifold. See Intake pipe/gasket, replacement:Installing the fuel rail .

Automatic only:

Install the upper screw of the transmission dipstick tube.

Install:

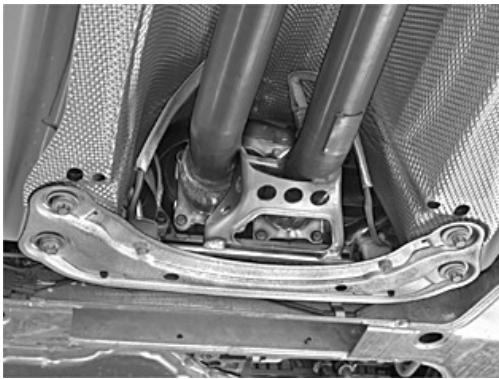
- the air pre-heating hose
- the vacuum hoses to the intake pipe.
- the camshaft position sensor (CMP) housing and trigger wheel
- the cover at the rear of the exhaust camshaft
- the clamps holding the cable harness to the rear edge of the cylinder head.

Installing the exhaust system

Install new gaskets.

Lift up and connect the exhaust system to the manifold.



**Install:**

- the screws holding the front SIPS member.
- new nuts at the connection between the exhaust system and manifold.

Tighten the nuts at the exhaust system branching. Tighten the screws on the front and rear SIPS members.

Installing components

**Install:**

- the cover over the ignition coils
- the front timing cover.
- the upper timing cover
- expansion tank. Connect the connector to the engine coolant level sensor
- the hose to the expansion tank from the radiator. Tighten the clamp.

Install:

- the servo oil reservoir. Ensure that the hoses are correctly positioned
- the air cleaner (ACL) housing assembly
- the connectors of the mass air flow sensor and electronic throttle module (ETM).

Tighten the clamp holding the hose between the electronic throttle body (ETM) and the air cleaner housing.

Install:

- the air cleaner housing's intake pipe to the connection in the front cover plate.
- the engine stabilizer brace between the suspension turrets.
Clamp the servo hose to the right mounting on the cross stay.
- the plastic nuts for the hatch in the right fender liner
- the right front wheel. See Installing wheels .

- the battery negative lead. Also read Battery, disconnecting .

Checking and filling media

Change the oil and replace the oil filter as 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
- the fluid level in the transmission
- the coolant level.

Top up as necessary.

22/9/2015

PRINT