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BMW 3-Series and Z4 (99-05) Includes 2006 325ci/330ci Coupe and Convertible models Haynes Online Manual.

11 Cylinder head - removal and installation

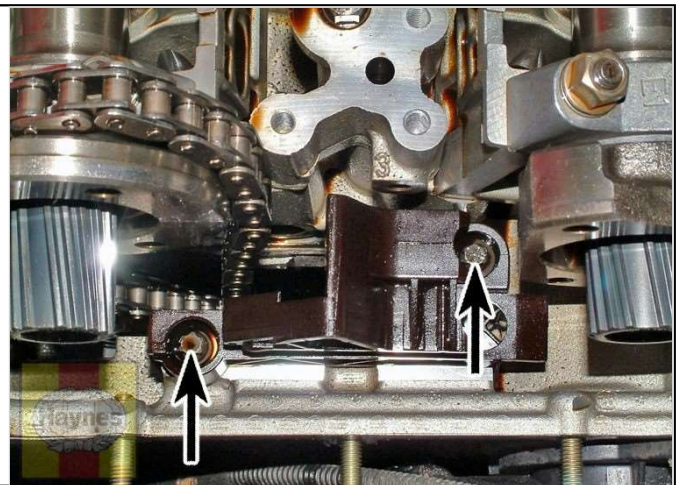
Note:

New cylinder head bolts and a new cylinder head gasket will be required on installation.

Removal

- 1 Drain the cooling system (see [Chapter 1](#)).
- 2 Remove the intake and exhaust manifolds (see [Chapter 4](#)).
- 3 Remove the camshafts and hydraulic lifters (see [Section 10](#)).
- 4 Trace the wiring back from the camshaft position sensors, then disconnect the sensor connectors. Unscrew the retaining bolts and remove the sensors from the cylinder head.
- 5 Remove the two Torx screws and remove the secondary timing chain guide from the cylinder head (see illustration) .

11.5 Remove the Torx bolts securing the secondary timing chain guide

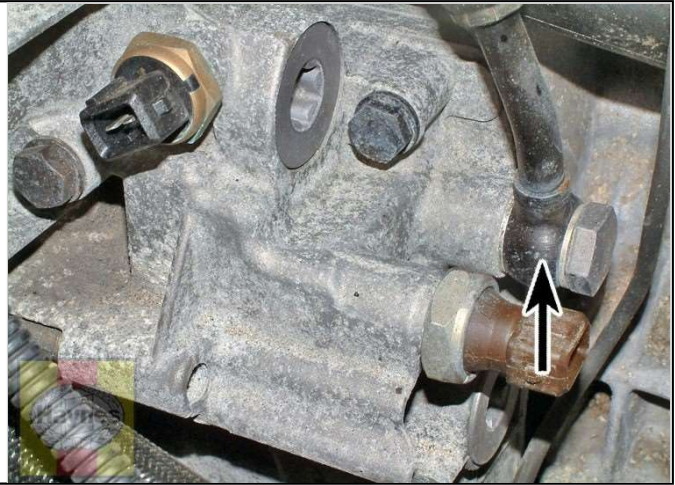


- 6 Unscrew the bolts retaining the lower timing chain cover to the cylinder head.

7 Remove the thermostat (see [Chapter 3](#)).

8 Remove the two bolts and separate the coolant pipe from the intake side of the cylinder head. To improve access, if necessary, remove the union bolt and disconnect the VANOS adjustment unit oil feed pipe from the rear of the oil filter housing (see illustration) . Recover the oil pipe sealing washers.

11.8 If necessary, remove the VANOS oil feed pipe from behind the oil filter housing



9 Disconnect the electrical connectors from the temperature sensor located in the left-hand side of the cylinder head.

10 Progressively loosen the cylinder head bolts, working in the reverse of the tightening sequence (see illustration 11.27) .

11 Remove the cylinder head bolts and washers. Note that some of the washers may be captive in the cylinder head, in which case they cannot be withdrawn.

12 Release the cylinder head from the engine block and locating dowels by rocking it. Do not pry between the mating faces of the cylinder head and block, as this may damage the gasket faces.

13 Ideally, two assistants will now be required to help remove the cylinder head. Have one assistant hold the timing chain up, clear of the cylinder head, making sure that tension is kept on the chain. With the aid of another assistant, lift the cylinder head from the block - be careful, as the cylinder head is heavy. As the cylinder head is removed, feed the timing chain through the aperture in the front of the cylinder head, and support it from the engine block using the wire.

14 Remove the cylinder head gasket.

Inspection

15 Cylinder head dismantling and reassembly should be performed by a qualified automotive machinist.

16 The mating surfaces of the cylinder head and block must be perfectly clean before installing the head. Use a scraper to remove all traces of gasket and carbon, and also clean the tops of the pistons. Take particular care with the aluminum cylinder head, as the soft metal is easily damaged. Make sure that debris is not allowed to

enter the oil and water passages. Using adhesive tape and paper, seal the water, oil and bolt holes in the engine block. To prevent carbon entering the gap between the pistons and bores, smear a little grease in the gap. After cleaning each piston, rotate the crankshaft so that the piston moves down the bore, then wipe out the grease and carbon with a cloth rag.

17 Check the block and head for nicks, deep scratches and other damage. If slight, they may be removed from the engine block carefully with a file. More serious damage may be repaired by machining, but this is a specialist job.

18 If warpage of the cylinder head is suspected, use a straight-edge to check it for distortion. Compare your measurements with the warpage limit listed in [this Chapter's Specifications](#) . Have the cylinder head resurfaced by a machine shop if necessary.

19 Clean out the bolt holes in the block using a pipe cleaner or thin rag and a screwdriver. Make sure that all oil and water is removed, otherwise there is a possibility of the block being cracked by hydraulic pressure when the bolts are tightened.

20 Examine the threads in the engine block for damage. If necessary, use the correct size tap to chase out the threads in the block.

Installation

Caution:

Since the camshafts have been removed from the cylinder head, note the cautions given in [Section 10](#) , regarding expanded camshaft hydraulic lifters.

21 To minimize the possibility of piston-to-valve contact after installing the camshaft(s), observe the following delays before installation the cylinder head.

Temperature	Delay
Room temperature	
68 degrees F	4 minutes
50 to 68 degrees F	11 minutes
32 to 50 degrees F	30 minutes

22 Ensure that the mating faces of the engine block and head are spotlessly clean, that the cylinder head bolt threads are clean and dry, and that they screw in and out of their locations. Check that the cylinder head locating dowels are correctly positioned in the engine block. **Caution:** *To avoid any possibility of piston-to-valve contact when installing the cylinder head, it is necessary to ensure that none of the pistons are at TDC. Before proceeding further, if not already done, turn the crankshaft to position No 1 piston at TDC (check that the locking rod can be engaged with the flywheel, then remove the locking rod and turn the crankshaft approximately 30-degrees counterclockwise using a wrench or socket on the crankshaft pulley hub bolt.*

23 Apply a thin bead of RTV sealant to the area where the engine block meets the timing cover.

24 Install a new cylinder head gasket to the block, locating it over the dowels. Make sure that it is positioned with the correct side up (see illustration) . The word OBEN should face up. Note that thicker-than-standard gaskets are available for use if the cylinder head has been machined (see [Chapter 2B](#)). Consult with a machine shop for the correct thickness cylinder head gasket.

11.24 Install a new cylinder head gasket

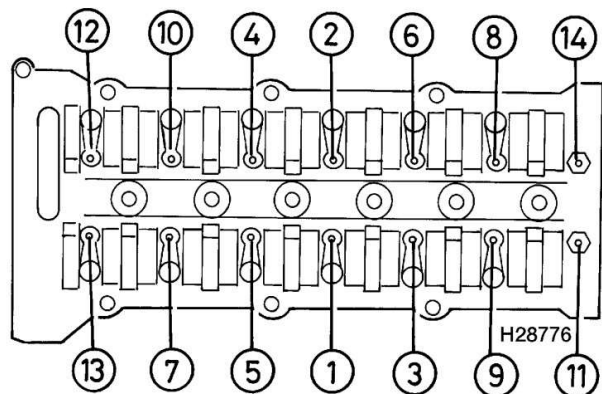


25 Lower the cylinder head onto the block, engaging it over the dowels.

26 Apply a light coat of clean engine oil to the threads and washer contact areas then install the new cylinder head bolts, complete with new washers, where necessary, and tighten the bolts as far as possible by hand. Ensure that the washers are correctly seated in their locations in the cylinder head. **Note:** *Do not install washers to any bolts which are installed to locations where there are already captive washers in the cylinder head. If a new cylinder head is installed (without captive washers), ensure that new washers are installed to all the bolts.*

27 Tighten the bolts in the correct sequence (see illustration) and the correct torque as listed in [this Chapter's Specifications](#).

11.27 Cylinder head bolt tightening sequence



28 Reinstall and tighten the bolts securing the lower timing chain cover to the cylinder head.

29 Reinstall the secondary timing chain guide to the cylinder head and tighten the Torx screws securely.

30 Reinstall the camshafts and hydraulic lifters as described in Section 10 .

31 Turn the crankshaft 30-degrees clockwise back to the TDC position, then re-engage the locking rod with the flywheel to lock the crankshaft in position.

32 The remainder of installation is a reverse of removal. On completion, refill the cooling system as described in Chapter 1 .

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