

**Haynes**
shows you how

BMW 3-Series 320i & 320xi (12-14), 325i, 325xi, 330i & 330xi (06) & 328i & 328xi (07-14) Haynes Online Manual

8 Camshafts and followers - removal, inspection and installation

Caution:

Numerous special tools are required to safely complete the following procedures. Ensure suitable tools are available prior to commencement.

Removal

1 Remove the VANOS adjuster units (see [Section 7](#)).

Intake camshaft

2 In order to remove the intake camshaft, it's necessary to remove the Valvetronic intermediate levers as follows:

3 Remove the ignition coils (see [Chapter 5](#)).

4 Remove the fuel injectors (see [Chapter 4](#)), then remove the injector shaft tube fasteners and pull the shaft assemblies off the cylinder head. Once the shafts are out, remove the alignment dowels from the cylinder head.

5 Using an opened-end wrench on the slotted section, hold the shaft while adjusting the servo motor, using a 4 mm Allen wrench until the eccentric shaft is set to its lowest position (minimum lift).

6 Rotate the eccentric shaft so the lobes are in the middle between maximum and minimum stroke, insert a 6 mm Allen wrench into the Valvetronic servo motor located in the middle of the cylinder head, then remove the wrench from the eccentric shaft.

7 Remove the stop screw for the eccentric shaft from the cylinder head.

8 Remove the banjo bolt and remove the oil spray nozzle from cylinder No. 3.

9 Remove the minimum stroke stop from the cylinder head.

10 Place BMW special tool No 11 7 110 (or equivalent) over the return spring and against the cylinder head.

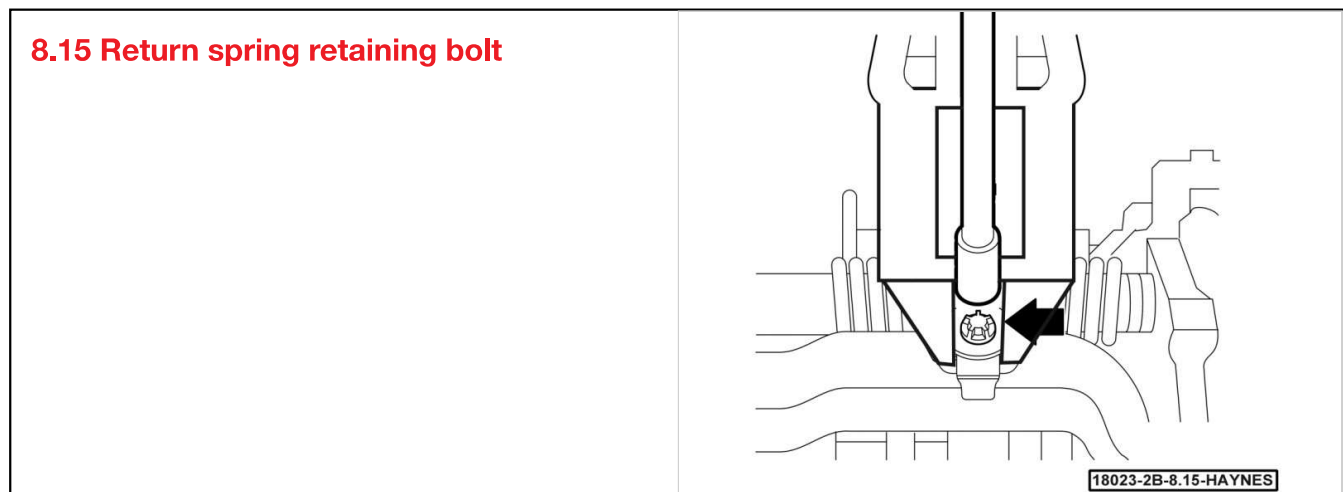
11 Rotating the knurled wheel on the special tool clockwise until both clamping arms in the tool lock the return spring in the gate of the tool.

12 The return spring is properly compressed when both clamping arms are parallel the top of the guide block.

13 Lift the first handle of the special tool, making sure both ends of the spring are in the lateral guides of the tool.

14 Rotate the second lever upwards, until the catch on the lever locks into the catch just below the first lever.

15 Remove the bolt securing the return spring to the cylinder head (see illustration) .



16 Compress the second lever slightly and unhook the catch the gradually release the spring tension by lowering the handle of the special tool.

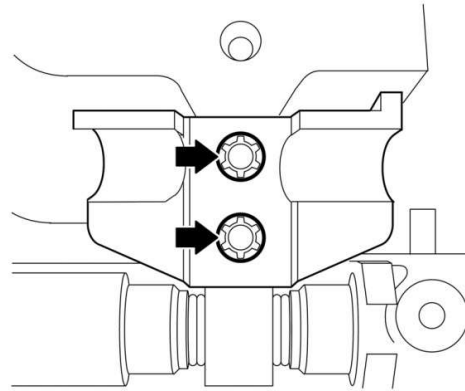
Caution:

Release the spring tension gradually as there is a risk of personal injury.

17 Force the coils apart and remove the return spring from the tool. Repeat this procedure on all the return springs. It's absolutely vital that the Valvetronic springs, lever and guide blocks, etc, are reinstalled to their original positions. Lay out the components in order on a clean, dry surface, so they can be identified and reinstalled to their original positions.

18 Remove the mounting bolts and each guide block (see illustration) . Again, lay the guide blocks out on a clean surface in order. It is essential they are reinstalled in their original positions.

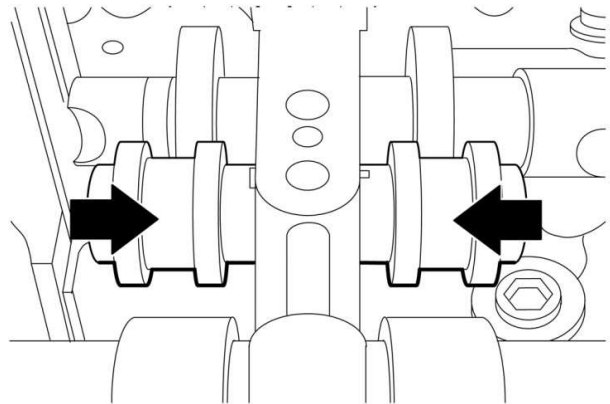
8.18 Unscrew the bolts and remove the guide blocks



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19 Lift out the intermediate levers (see illustration) . Again, lay the intermediate levers out on a clean surface in order. It's essential they are reinstalled to their original positions.

8.19 Lift out the intermediate levers



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20 Remove the PCM/DME control unit (see [Chapter 6](#)).

21 Gradually and evenly remove the retaining bolts, remove the bearing caps, and lift out the camshaft. Note that No 1 bearing cap incorporates a thrust washer. Lay the bearing caps out on a clean surface in order; it's essential they are reinstalled to their original positions. Check the camshaft bearing caps for identification marks. The caps are numbered from the timing chain end of the engine, and the marks can normally be read from the exhaust side of the engine. The intake camshaft caps are marked E1 to E7.

22 If required, remove the compression ring on the end of the camshaft by pressing one end of the ring into the groove, pulling up the other ring, and unhooking it. Take care as the ring is easily broken.

23 Lift the rocker arms from their locations and lay them out on a clean surface. Pull the hydraulic adjusters out and lay them on a clean surface. It is absolutely essential that the components are reinstalled to their original locations.

Exhaust camshaft

24 Remove the valve cover (see [Section 4](#)).

25 Check and adjust the valve timing if necessary (see [Section 7](#)).

26 Remove the timing chain module mounting bolts, then lift the chain module up and off of the cylinder head.

27 Remove the roller tappet from the center of the high-pressure fuel pump adapter then remove the pump adapter fasteners from the cylinder head.

Note:

The bottom half of the high-pressure fuel pump adapter is the center two exhaust camshaft caps.

28 Loosen the two remaining cap bolts a few turns at a time until the bolts are loose.

29 Working from the outside inwards, gradually and evenly remove the bolts securing the upper and lower camshaft bearing castings. Lift out the castings and camshaft as an assembly.

30 Carefully separate the upper and lower castings, then remove the camshaft.

31 If required, remove the compression ring on the end of the camshaft, by pressing one end of the ring into the groove, pulling up the other ring, and unhooking it. Take care as the ring is easily broken.

32 Lift the rocker arms from their locations, and lay them out on a clean surface. Pull the hydraulic adjusters out and lay them out on a clean surface. It's absolutely essential that the components are reinstalled in their original locations.

Inspection

33 Clean all the components, including the bearing surfaces in the bearing castings and bearing caps. Examine the components carefully for wear and damage. In particular, check the bearing and cam lobe surfaces of the camshaft(s) for scoring and pitting. Examine the surfaces of the cam followers for signs of wear or damage. Replace components as necessary.

Installation

Intake camshaft

34 Install the hydraulic adjusters and rocker arms in their original positions.

35 Ensure the flywheel/driveplate is still locked in the TDC position.

36 Lubricate the camshaft bearing surfaces with clean engine oil.

37 Install the intake so that the data code on the mounting flat is pointing upwards.

38 Position the camshaft so that the cam lobes point downward and slightly to the left as viewed from the back end of the camshaft. Install special tool No. 83 30 2 212 830 (or equivalent) on the camshaft (see [Section 3](#)).

39 Install the camshaft bearing caps to their original positions. Working evenly, tighten the retaining bolts to the specified torque listed in [this Chapter's Specifications](#) .

40 Install the intermediate levers to their original positions.

41 Install the guide blocks to their original positions. Install the retaining bolts, tighten them by hand, then loosen them 90-degrees.

42 Attach special tool No 11 4 450 (or equivalent) to the bolt connection of the Valvetronic eccentric shaft, and lift up the lever on the tool to tension the guide blocks (see illustration) . Tighten the block retaining bolts to their specified torque. Repeat this procedure on the remaining guide blocks.

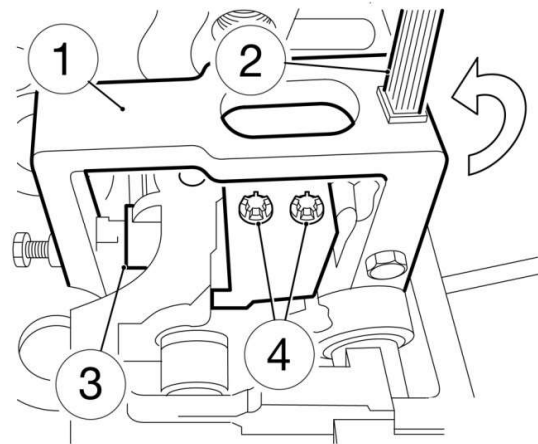
8.42 Guide block special tool mounting details

(1) Special tool No. 11 4 450

(2) Tool arm

(3) Bolt connection

(4) Guide block bolts



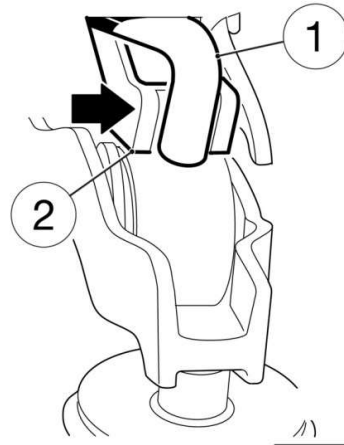
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Note:

The guide block at cylinder No 3 can only be installed with one bolt until the return spring has been reinstalled later in the procedure.

43 Install the return springs to their original locations. Ensure the springs engage correctly with the intermediate levers (see illustration) .

8.43 Check that the return spring (1) engages correctly with the intermediate lever (2)



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44 Secure special tool No 11 7 110 (or equivalent) to the guide block, repeat Steps 10 through 14 and pull up the tool arm to tension the spring. Install the spring retaining bolt, then tighten the bolt to the torque listed in [this Chapter's Specifications](#) . Repeat this procedure on the remaining return springs.

45 Install the oil spray nozzle for cylinder No 3, then tighten the bolt to the torque listed in [this Chapter's Specifications](#) . Ensure the nozzle points exactly at the actuator drive.

Exhaust camshaft

46 Install the hydraulic adjusters and rocker arms to their original positions.

47 Install the exhaust camshaft into the lower bearing casting. The camshaft lobes for cylinder No. 4 must be pointing down towards the 4 o'clock position and the part number on the camshaft must face upwards.

48 Place the outer bearing caps over the camshaft ends then place the high-pressure fuel pump adapter over the middle of the camshaft. Insert the retaining bolts and tighten them finger-tight.

37 With the bearing caps seated, tighten the bolts gradually and evenly to the torque listed in [this Chapter's Specifications](#) .

Both camshafts

38 Install the VANOS intake and exhaust adjuster units (see [Section 7](#)).