7 Variable valve timing system (VANOS) components - removal and installation

VANOS adjustment units

Note:
To test the operation of the VANOS adjustment units, special equipment is required. Testing must therefore be entrusted to a BMW dealer.

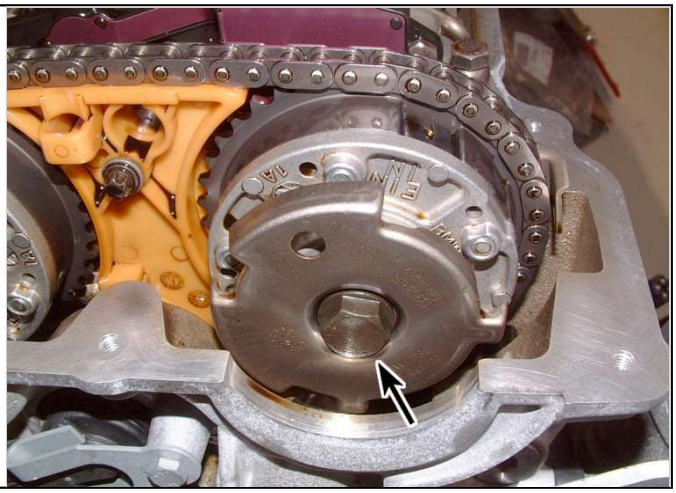
Removal

1 Position the crankshaft and camshafts at TDC for No 1 piston (see Section 3).

2 Unscrew the timing chain tensioner from the right-hand front corner of the cylinder head. Discard the sealing ring; a new one must be installed.

3 Remove the retaining bolt from the center of the VANOS adjustment unit **(see illustration)** .

7.3 VANOS adjustment unit retaining bolt



4 Rotate the sensor gears so the cut-outs are pointing downwards (to facilitate removal), then pull the unit from the end of each camshaft **(see illustration)** .

7.4 The VANOS units are marked AUS/EX for exhaust and EIN/IN for intake

5 Disengage the chains from the units as they are withdrawn.

Installation

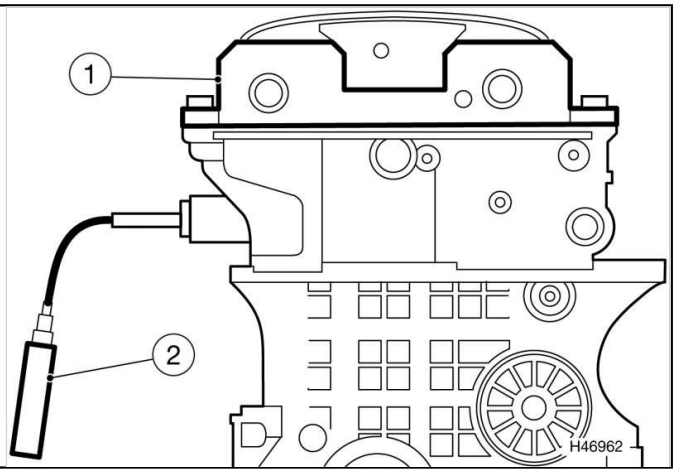
6 Ensure that the crankshaft and camshafts are still at TDC on No 1 cylinder (see Section 3).

7 Position the VANOS units on the ends of the camshafts, paying attention to the identifying marks **(see illustration 7.4)** . Note that although the VANOS units are marked IN and EX, the sensor rings are identical.

8 Install the VANOS unit retaining bolt on each unit, and tighten them by hand until they just touch the sensor ring surface without any play.

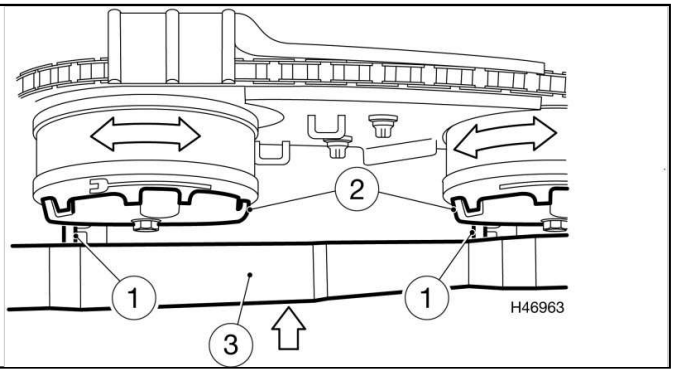
9 Ensure that the timing chain rests correctly against the tensioner blade. Install BMW tool No 11 9 340 into the tension piston hole, then turn the adjuster screw on the tool until the end of the screw just touches the tensioner rail without tensioning the chain **(see illustration)** .

7.9 Special BMW tool No 11 4 290 (1) and tensioner adjustment tool No 11 9 340 (2)



10 Attach BMW tool No 11 4 290 to the end of the cylinder head, ensuring that the locating pins of the tool engage correctly with the corresponding holes in the sensor ring gears **(see illustration)** . Screw the tool to the cylinder head using two old valve cover bolts.

7.10 Fit the special tool No 11 4 290 (3) to the cylinder head and engage the pins (1) with the corresponding holes in the sensor ring gears (2)



11 Pre-tension the chain tensioner guide by screwing in the tool adjusting screw with a torque wrench to a value of 5.3 in-lbs (0.6 Nm). If no suitable torque wrench is available, turn in the adjusting screw by hand just enough to eliminate all freeplay in the chain.

12 Tighten both VANOS adjuster unit retaining bolts to the specified torque.

13 Remove the retaining bolts and remove tool No 11 4 290 from the end of the cylinder head.

14 Loosen the adjusting screw, and remove tool No 11 9 340 from the tensioner piston aperture.

15 Ensure the timing chain tensioner piston has been drained completely, then install it to the aperture in the cylinder head with a new sealing ring. Tighten it to the specified torque.

16 The remainder of installation is the reverse of removal, noting the following points:

A. Install the valve cover (see Section 4).

B. Ensure the crankshaft locking tool is removed prior to starting the engine.

VANOS solenoid valves

Note:
A new sealing ring will be required on replacement.

17 Remove the plastic cap from the center of the cowl trim panel. Two different types of the cap are installed: one with a central slot, removed by rotating it 45-degrees counterclockwise, and one without a central slot, which is pried out **(see illustration 4.1)** . **Note:** *If the cap or seal are damaged, they must be replaced. Failure to do so may result in a water leak.*

18 Remove the bolt in the center of the cowl, exposed by the cap removal. Discard the bolt; a new one must be installed.

19 Remove the bolt at each outer end of the supports, then hold the rubber grommet in place and slide the supports outwards **(see illustration 4.3)** . Do not allow the grommet to be dropped. Discard the bolts - new ones must be installed.

20 Working at the rear of the engine compartment, turn the fasteners 90-degrees counterclockwise and remove the cabin air filter cover. Slide the filter from the housing **(see illustration 4.4)**

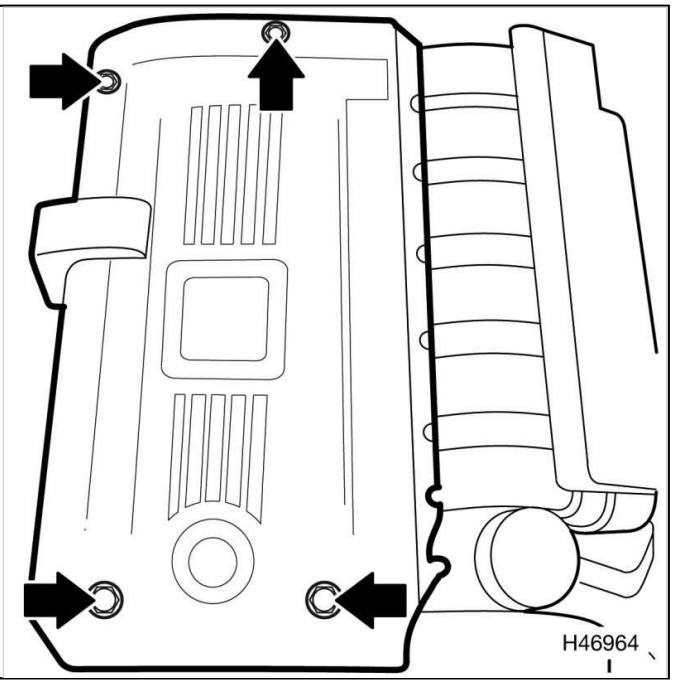
21 Release the catches and remove the left- and right-hand plastic covers from behind the suspension turret on each side of the engine compartment. Unclip the hose from the left-hand cover **(see illustration 4.5)** .

22 Depress the clips and pull the cable guide forwards from the cabin air filter lower housing **(see illustration 4.6)** .

23 Release the catch and remove the bolt on each side, then slide the cabin air filter lower housing forwards and maneuver it out **(see illustrations 4.7a, 4.7b and 4.7c)** .

24 Remove the retaining screws and lift off the engine cover from the top of the engine **(see illustration)** . As the screws are aluminum, they must be replaced. **Note:** *Examine the screws carefully - on some engines they are fake - the screw heads are part of the plastic casting, and the cover can simply be pulled up.*

7.24 Remove the bolts and remove the cover from the top of the engine



25 Disconnect the solenoid valve wiring connectors. Note their positions; they must be installed to their original positions.

26 Remove the retaining brackets bolts and remove the solenoids **(see illustration)** . Replace the sealing rings.

7.26 VANOS solenoid wiring plugs and brackets

27 Installation is the reverse of removal, but use new sealing rings. **Note:** *Prior to installation, hold the chain tensioner upright and compress the piston a few times to evacuate any oil* **(see illustration) .**

7.27 Hold the tensioner upright and compress the piston a few times to evacuate the oil