9 Variable valve timing (VANOS) components - removal, inspection and installation

VANOS adjustment unit

Removal

1 Remove the viscous cooling fan/electric cooling fan and fan cowl assembly (see Chapter 3).

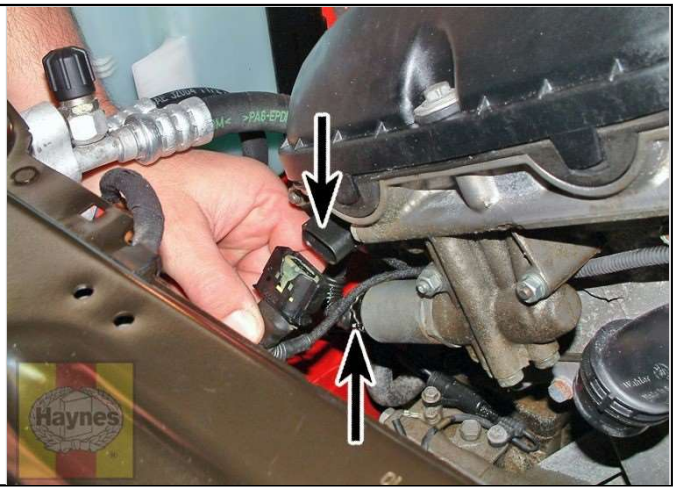
2 Remove the valve cover (see Section 4).

3 Unscrew the union bolt, and disconnect the oil feed pipe from the front of the VANOS adjustment unit **(see illustration)** . Recover the sealing rings.

9.3 Disconnect the oil feed pipe from the VANOS unit

4 Disconnect the exhaust camshaft position sensor and solenoid valve electrical connectors **(see illustration)** .

9.4 Disconnect the camshaft position sensor and the solenoid valve



5 Unscrew the retaining nut and bolt, and remove the engine lifting bracket from the front of the engine.

6 Unclip the plastic cover from the intake camshaft.

7 Position the crankshaft and camshafts at TDC on Number 1 piston (see Section 3).

8 Unscrew the two cover plugs from the front of the VANOS adjustment unit **(see illustration)** . Be prepared for oil spillage and discard the sealing rings (new ones must be installed).

9.8 Unscrew the cover plugs from the VANOS unit

9 Using a pair of needle-nose pliers, pull the sealing caps from the end of the camshafts **(see illustration)** .

9.9 Use a pair of needle-nose pliers to remove the sealing caps

10 Using a Torx bit, unscrew the setscrews from the end of the camshafts **(see illustration) . Note:** *The setscrews have left-hand threads (turn clockwise to loosen).*

9.10 The setscrews in the end of the camshafts have a left-hand thread

11 Remove the retaining nuts and remove the VANOS adjustment unit from the front of the engine. Remove the gasket.

12 Do not rotate the crankshaft, camshafts or move the splined shaft in the end of the camshafts with the VANOS unit removed, otherwise the pistons may come in contact with the valves.

Inspection

13 To test the operation of the VANOS adjustment unit, special equipment is required. Testing must therefore be entrusted to a BMW dealer service department or other repair facility with the proper equipment.

Installation

14 Ensure that the crankshaft and camshafts are still at TDC on Number 1 cylinder (see Section 3).

15 Make sure that the dowel sleeves are in position on the top VANOS adjustment unit retaining studs in the

cylinder head.

16 Apply a thin film of sealant to the corners of the joint surfaces between the cylinder head and the VANOS adjustment unit, then install a new gasket over the studs on the cylinder head **(see illustration)** .

9.16 Apply a little sealant to the top of the gasket surface on each side of the cylinder head

17 Reinstall the VANOS adjustment unit and tighten the nuts to the torque listed in this Chapter's Specifications .

18 Reinstall the setscrews into the ends of the camshafts and tighten them to the torque listed in this Chapter's Specifications . Note that the setscrews are **left-hand thread** (turn counterclockwise to tighten). Check the condition of the O-ring seals and reinstall the sealing caps into the ends of the camshafts.

19 The remainder of the installation procedure is a reversal of removal, bearing in mind the following points.

A. Use new sealing rings when reconnecting the oil feed pipe to the VANOS adjustment unit.

B. Reinstall the valve cover (see Section 4).

C. Reinstall the viscous cooling fan and cowl assembly (see Chapter 3).

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

VANOS solenoid valve

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

Removal

20 Ensure that the ignition is switched off.

21 Disconnect the solenoid valve electrical connector, which is clipped to the engine wiring harness behind the oil filter assembly.

22 Using an open-ended wrench, unscrew the solenoid valve and recover the seal **(see illustration)** .

9.22 Unscrew the VANOS solenoid valve

Inspection

23 Check that the solenoid plunger can be pulled freely back and forth by hand **(see illustration)** . If not, the solenoid must be replaced.

9.23 Check that the solenoid plunger moves freely

Installation

24 Installation is a reversal of removal, but use a new sealing ring. Tighten the solenoid valve to the torque listed in this Chapter's Specifications .