Haynes shows you how

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

3 Top Dead Center (TDC) for Number 1 piston - locating

Note:
Special tools are required to check the position of the camshafts by locking the engine in the TDC position and resetting the VANOS units. Obtain the special tools from a dealer parts department or specialty tool distributor. Some of the tools may be fabricated using shop tools. Read through the text prior to attempting the procedure.

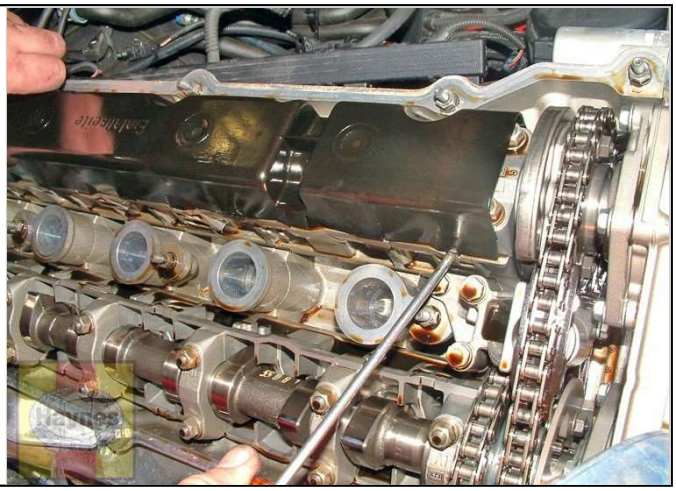
1 Top Dead Center (TDC) is the highest point in the cylinder that each piston reaches as it travels up and down when the crankshaft turns. Each piston reaches TDC at the end of the compression stroke and again at the end of the exhaust stroke, but TDC generally refers to piston position on the compression stroke. Number 1 piston is at the front (timing chain end) of the engine.

2 Positioning Number 1 piston at TDC is an essential part of many procedures, such as timing chain removal and camshaft removal.

3 Remove the valve cover as described in Section 4 .

4 Unclip the plastic cover from the intake camshaft **(see illustration)** .

3.4 Release the retaining clips and remove the cover from the intake camshaft



5 In order to accurately set the positions of the camshafts, the VANOS units must be set as follows. Unscrew the VANOS unit oil pressure pipe from the intake camshaft VANOS unit, and install special BMW tool 11 3 450 to the

port on the VANOS unit **(see illustration)** .

3.5 Install the BMW special tool to the VANOS oil port

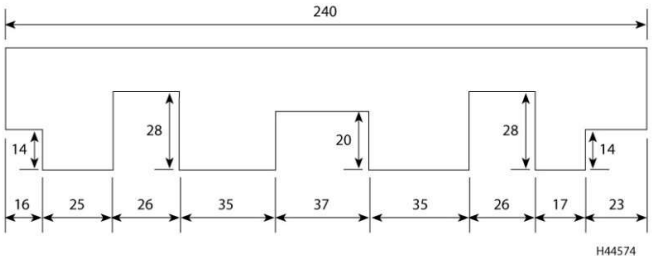
6 Using a clean cloth, cover the top of the VANOS unit as, when compressed air is applied, some oil will be sprayed out.

7 Connect a compressed air line to the union of the special tool, and apply a pressure of 28 to 86 psi (2.0 to 8.0 bar). This pressure will reset the VANOS units as the engine is rotated.

8 Using a socket and wrench on the crankshaft pulley bolt, turn the engine clockwise at least two complete revolutions until the tips of the front camshaft lobes on the exhaust and intake camshafts face one another. Note that the square flanges on the rear of the camshafts should be positioned with the sides of the flanges exactly at right-angles to the top surface of the cylinder head. BMW special tools 11 3 240 are available to lock the camshafts in this position. The tools slide over the square flanges of the camshafts and hold them at 90-degrees to the cylinder head upper surface, once the two outer valve cover studs have been removed. If the tools are not available, an alternative can be fabricated from steel or aluminum plate **(see illustrations)** .

3.8a With the No 1 piston at TDC, the tips of the front camshaft lobes face each other

3.8b A camshaft holding fixture can be made from a piece of metal plate (steel or aluminum), cut to these dimensions. The plate must be thick enough not to distort when valve spring pressure tries to turn the camshafts (All dimensions in mm)

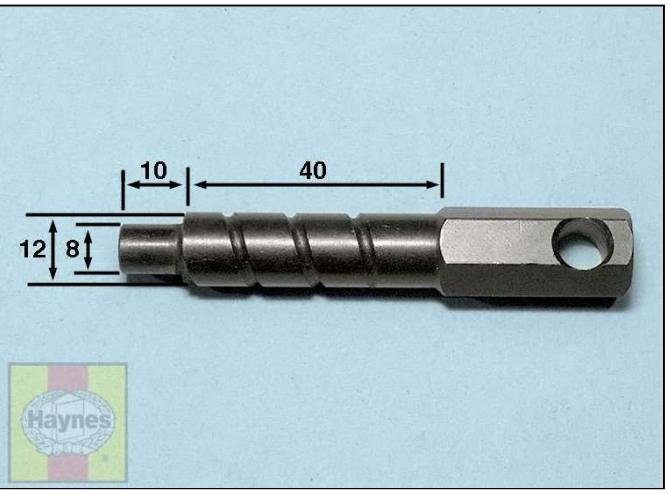


9 Pull the blanking plug from the timing hole in the left-hand, rear corner flange of the engine block. Access is improved if the starter motor is removed (see Chapter 5).

10 To lock the crankshaft in position, a special tool will now be required. BMW tool 11 2 300 can be used, but one can be made up by machining a length of steel rod **(see illustration)** .

3.10 Flywheel locking tool

All dimensions in mm



11 Insert the rod through the timing hole. If necessary, turn the crankshaft slightly until the rod enters the TDC hole in the flywheel **(see illustrations)** .

3.11a Insert the rod through the timing hole . . .

3.11b . . . until it enters the TDC hole in the flywheel - engine removed for clarity

12 The crankshaft is now locked in position with Number 1 piston at TDC. Disconnect the compressed air from the VANOS oil port. **Warning:** *If, for any reason, it is necessary to turn either or both of the camshafts with Number 1 piston positioned at TDC, and either of the timing chain tensioners slackened or removed (or the timing chains removed), the following precaution must be observed. Before turning the camshaft(s), the crankshaft must be turned approximately 30-degrees counterclockwise away from the TDC position (remove the locking rod from the TDC hole in the flywheel to do this) to prevent the possibility of piston-to-valve contact.*

13 Do not attempt to turn the engine with the flywheel or camshaft(s) locked in position, as engine damage may result. If the engine is to be left in the locked state for a long period of time, it is a good idea to disconnect the battery and to place suitable warning notices inside the vehicle, and in the engine compartment. This will reduce the possibility of the engine being cranked on the starter motor.