



3 Top Dead Center (TDC) for No. 1 piston - locating

Note:

To lock the engine in the TDC position, and to check the position of the camshafts, special tools will be required. These tools can easily be improvised - see text.

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. No. 1 piston is at the timing belt/chain end of the engine.

2 Positioning No. 1 piston at TDC is an essential part of many procedures, such as timing chain removal and camshaft removal.

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

4 Using a wrench or socket on the crankshaft pulley bolt (if desired, remove the viscous cooling fan and shroud, as described in [Chapter 3](#), to improve access), turn the crankshaft clockwise until the timing arrows on the camshaft sprockets are pointing vertically upwards, and the front cam lobes on the exhaust and intake camshafts are facing each other (see illustration) .

3.4 Timing arrows on the camshaft sprockets positioned with No. 1 piston at TDC - M42 engine



5 Pull the blanking plug from the timing hole in the left-hand rear corner flange of the cylinder block.

6 To “lock” the crankshaft in position, a special tool will now be required. BMW tool No. 11 2 300 can be used, but an alternative can be made up by machining a length of steel rod to the dimensions shown (see illustration)

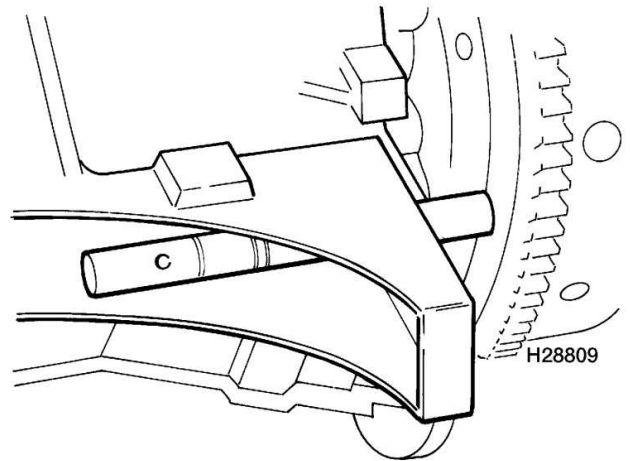
3.6 Dimensions of flywheel “locking” tool

All dimensions in mm



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

3.7 Flywheel locking tool engaged with TDC hole in flywheel

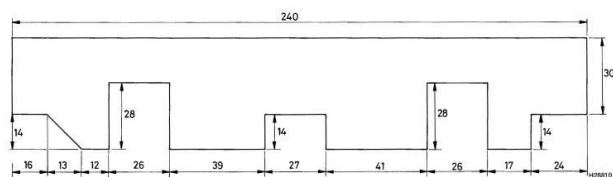


8 The crankshaft is now “locked” in position with No. 1 piston at TDC.

9 Note also 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 (this can be checked using a set-square), and the side of the flange with holes drilled into it uppermost.

10 For some operations it is necessary to lock the camshafts in position with No. 1 piston at TDC. This can be done by making up a template from sheet metal to the dimensions shown - when the camshafts are correctly positioned, the template will fit exactly over the flanges at the rear of the camshafts, and rest on the upper surface of the cylinder head (see illustrations) .

3.10a Make up a template from sheet metal to the dimensions shown



3.10b Camshaft locking template in position on the cylinder head



11 Do not attempt to turn the engine with the flywheel or camshaft 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 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.

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