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

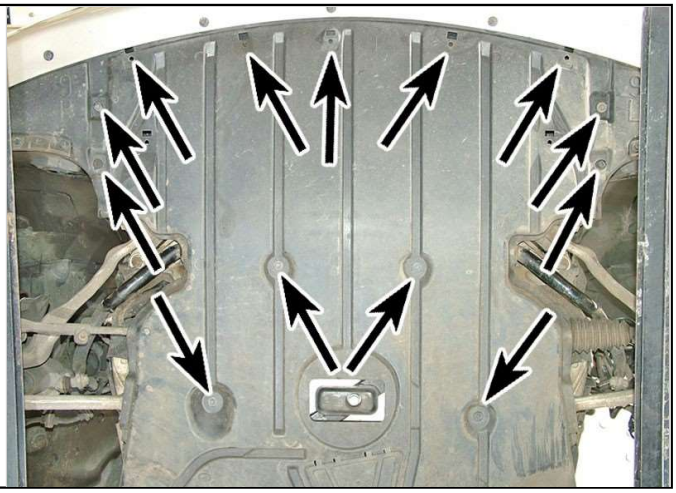
1 Top Dead Center (TDC) is the highest point in the cylinder that each piston reaches as it travels up and down when the crankshaft turns. Each piston reaches TDC at the end of the compression stroke and again at the end of the exhaust stroke, but TDC generally refers to piston position on the compression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

2 Positioning the number one 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 Raise the front of the vehicle and support it securely on jackstands. Remove the fasteners and remove the engine splash shield **(see illustration)** .

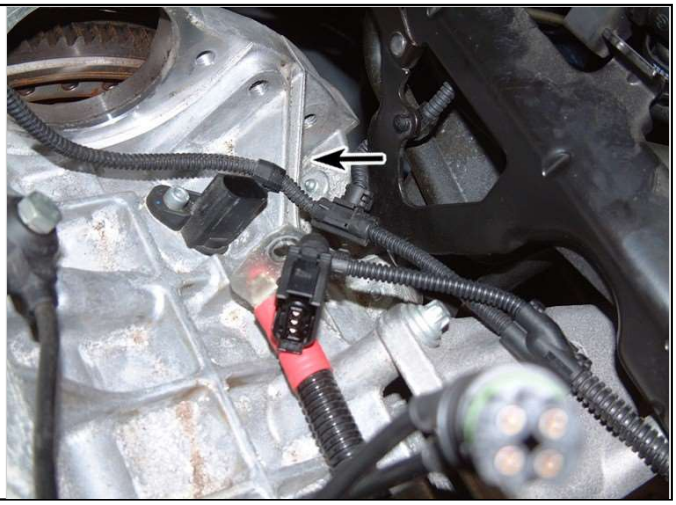
3.4 Engine splash shield fasteners



5 Using a socket or wrench on the crankshaft pulley bolt, turn the engine clockwise at least two complete revolutions until the tips of the front cam (number one cylinder) lobes on the intake camshaft begin pointing to the left-hand side.

6 Pull the plug (where installed) from the timing hole in the left-hand rear corner flange of the cylinder block **(see illustration)** .

3.6 Pull the blanking plug from the cylinder block



7 To lock the crankshaft in position, a special tool will be required. BMW tool No 11 0 300 can be used, but alternatives are available.

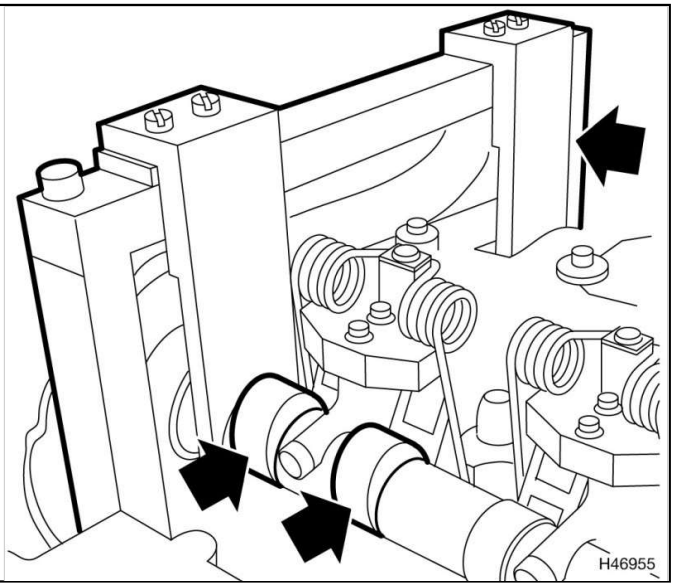
8 Insert the tool through the timing hole. Turn the crankshaft clockwise until the rod enters the TDC hole in the flywheel/driveplate **(see illustration)** . **Note:** *On models equipped with an automatic transmission, it is possible to mistakenly insert the rod into a larger hole in the driveplate. Ensure that when the rod is inserted, it is not possible to rotate the crankshaft at all.*

3.8 Insert the crankshaft setting tool through the timing hole into the indent in the flywheel/driveplate

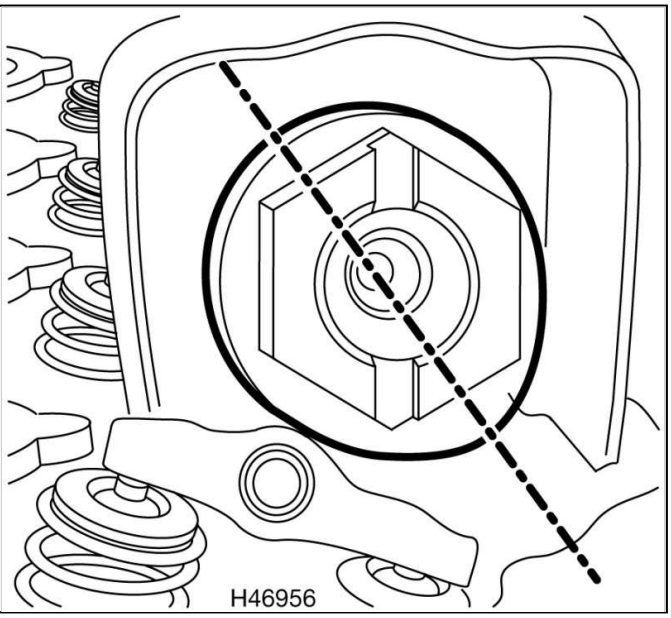
9 The crankshaft is now locked in position with No 1 piston at TDC.

10 In this position, it should be possible to place BMW special tools No. 11 4 283, 11 4 282 and 11 4 281 (or equivalents) over the parallel flats of the camshafts. With the camshaft correctly positioned, the tools should contact the cylinder head upper surface with no clearance below them **(see illustrations)** . Essentially, these tools hold the flat-sided ends of the camshafts at exactly 90-degrees to the cylinder head upper gasket face. In this position, the lobes of No. 1 cylinder intake camshaft should be pointing upwards at an angle, the lobes of No. 6 cylinder exhaust camshaft should be pointing downwards at an angle, and the part number on the camshaft should be visible from above. 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.

3.10a Fit the special tools over the parallel flats on the camshafts, touching the cylinder head upper surface - the intake camshaft lobes of No 1 cylinder should be pointing upwards



3.10b The No 6 cylinder exhaust camshaft lobes should be pointing downwards at an angle



11 **Do not** attempt to turn the engine with the flywheel/driveplate or camshaft locked in position, as engine damage may result.