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 air filter housing top and the spark plugs (see Chapter 1).

4 Remove the valve cover (see Section 4).

5 Raise the front of the vehicle and support it securely on jackstands (see *Jacking and towing*). Remove the fasteners and remove the engine splash shield.

6 Using a socket or wrench on the crankshaft center bolt, turn the engine clockwise at least two complete revolutions until the tips of the front cam (number one cylinder) lobes on the intake and exhaust camshafts are pointing upwards and slightly to the left-hand side.

7 Using a screwdriver, pull the seal plug from the timing hole in the left-hand rear corner flange of the cylinder block.

8 To lock the crankshaft in position, a special tool will be required. BMW tool No 2 219 548 can be used, but alternatives are available.

9 Lightly oil the tool then insert it through the timing hole. Turn the crankshaft clockwise until the rod enters the TDC hole in the flywheel/driveplate.

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

11 In this position, it should be possible to place BMW special tool No. 83 30 2 212 830 (or equivalent) 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 Chapter 2A , **illustration 3.10a)** . 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.

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

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