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BMW 3-Series 320i & 320xi (12-14), 325i, 325xi, 330i & 330xi (06) & 328i & 328xi (07-14) Haynes Online Manual

1 General information

How to use this Chapter

This Part of [Chapter 2](#) describes the repair procedures that can reasonably be carried out on the engine while it remains in the vehicle. If the engine has been removed from the vehicle and is being disassembled (see [Chapter 2C](#)), any preliminary disassembly procedures can be ignored.

Note:

While it may be possible physically to overhaul items such as the piston/connecting rod assemblies while the engine is in the vehicle, such tasks are not usually carried out as separate operations. Usually, several additional procedures are required (not to mention the cleaning of components and oilways); for this reason, all such tasks are classed as major overhaul procedures, and are described in Part C of this Chapter.

Part C describes the removal of the engine/transmission from the vehicle, and the full overhaul procedures that can then be carried out.

Engine description

General

These engines are of 6-cylinder double-overhead-cam design, mounted inline, with the transmission bolted to the rear of the engine.

The cylinder block and the camshaft cover are made from a magnesium-aluminum composite. Aluminum bolts are used extensively, as steel bolts/studs would react poorly with the magnesium. Aluminum bolts must never be re-used.

A timing chain from the crankshaft drives both the exhaust and intake camshafts. Hydraulic cam followers are installed between the camshafts and the valves. Each camshaft is supported by bearing caps bolted to the cylinder head.

The timing of both the exhaust and intake valves is variable by means of an adjustable hydraulic sprocket or “adjustment unit” on the end of each camshaft - BMW refers to this as a VANOS system. These units vary the relationship of the timing chain and sprockets to the camshafts. The duration and lift of the intake camshaft is also variable by means of an electric motor-driven eccentric shaft which effectively varies the pivot point of a

lever acting between the camshaft and the rocker arm - BMW refers to this as a Valvetronic system. Engine load is controlled by varying valve lift and duration, rather than throttle valve position. This virtually eliminates pumping losses, improves engine output and reduces emissions.

The crankshaft rides on seven insert type main bearings. The endplay is controlled by thrust bearing shells located on the No. 4 main bearing.

The pistons are selected to be of matching weight, and incorporate fully-floating wrist pins retained by snap-rings.

The oil pump and vacuum pump are chain-driven from the front of the crankshaft.

VANOS variable camshaft timing control

On all models, a variable camshaft timing control system, known as VANOS, is installed. The VANOS system uses data supplied by the ECM engine management system (see [Chapter 6](#)) to adjust the timing of both the intake and exhaust camshafts independently via a hydraulic control system (using engine oil as the hydraulic fluid). The camshaft timings are varied according to engine speed, retarding the timing (opening the valves later) at low speeds to improve low-speed driveability and high engine speeds for maximum power. At medium engine speeds, the camshaft timings are advanced (opening the valves earlier) to increase mid-range torque and to improve exhaust emissions.