

7. Cylinder Head/Cylinder/Piston

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Service Information

- Camshaft service can be done with the engine in the frame.
- The engine uses hydraulic tappets that eliminate manual valve adjustments. The hydraulic tappets have de-foaming chambers. Before assembling, fill the chambers with clean engine oil.
- When adjusting the valve timing, do not turn the camshaft before installing camshaft holders and filling the de-foaming chambers with engine oil.
- Whenever the camshaft is removed, bleed air from the tappets thoroughly (page 7-7).
- Camshaft lubricating oil is fed through oil passages in the cylinder head. Clean the oil passages before assembling the cylinder head.
- Clean all disassembled parts with clean, non-flammable or high flash-point solvent and dry them with compressed air before inspection.
- Before reassembly, lubricate the camshaft journals and cam lobes with a 50-50 solution of disulfide grease and engine oil.
- When disassembling, mark and store the disassembled parts to ensure that they are reinstalled in their original locations.

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Troubleshooting

- Engine top-end problems usually affect engine performance. These can be diagnosed by a compression or leak down test, or by tracing noises in the top-end with a sounding rod or stethoscope.
- If performance is poor at low speeds, check for white smoke in crankcase breather tube. If the tube is smoky, check for a seized piston ring.

Compression Too Low, Hard Starting Or Poor Performance At Low Speed

- Valves
 - Faulty hydraulic tappet
 - Burned or bent valves
 - Incorrect valve timing
 - Broken valve spring
 - Uneven valve seating
- Cylinder head
 - Leaking or damaged head gasket
 - Warped or cracked cylinder head
- Cylinder, piston
 - Leaking cylinder headgasket
 - Loose spark plug
 - Worn, stuck or broken piston ring
 - Worn or damaged cylinder and piston
 - Worn or damaged cylinder and piston

Compression Too High, Overheating Or Knocking

- Excessive carbon build-up in cylinder head or on top of piston

Rough Idle

- Low cylinder compression

Excessive Noise

- Hydraulic valve tappet system
 - Low engine oil level
 - Contaminated oil
 - Low oil pressure
 - Damaged hydraulic tappet
- Cylinder head
 - Sticking valve or broken valve spring
 - Damaged or worn camshaft
 - Loose or worn cam chain
 - Worn or damaged cam chain
 - Worn or damaged cam chain tensioner
 - Worn cam sprocket teeth
 - Worn rocker arm and/or shaft
- Cylinder, piston
 - Worn cylinder and piston
 - Worn cylinder and piston
 - Worn piston pin and piston pin hole

Excessive Smoke

- Cylinder head
 - Worn valve stem or valve guide
 - Damaged stem seal
- Cylinder, piston
 - Worn cylinder, piston, or piston rings
 - Improper installation of piston rings
 - Scored or scratched piston or cylinder wall