

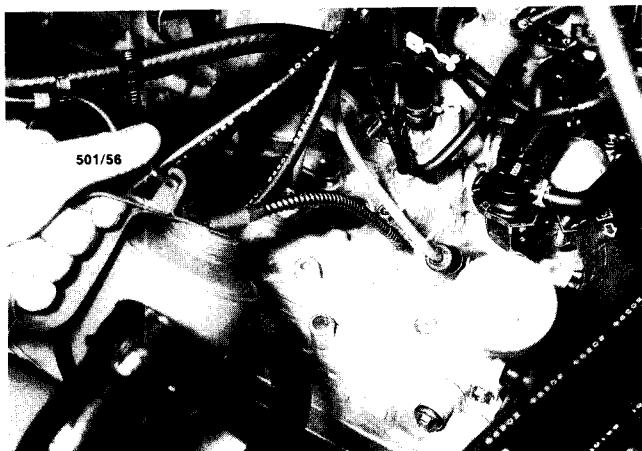
## PART 1. ENGINE MECHANICAL TROUBLE SHOOTING

### ENGINE MISSES AT IDLING SPEED

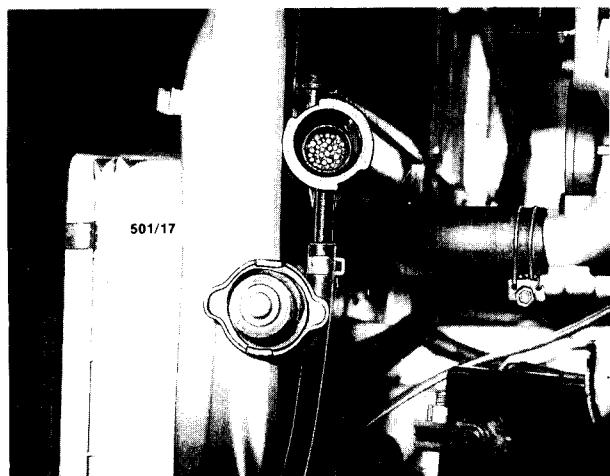
*NOTE: For other causes of engine misfire first see Electrical and Fuel sections.*

- (1) Blown head gasket(s): Check cylinder compression and renew head gasket(s) as necessary.
- (2) Burnt valves or seats in cylinder heads: Check cylinder compressions and overhaul cylinder head(s) as necessary.
- (3) Broken or worn piston rings: Check cylinder compression and renew piston rings as necessary.
- (4) Weak or broken valve springs: Remove rocker covers and check the condition of valve springs.
- (5) Air leak at inlet manifold gaskets: Check for air leak by applying oil around the manifold joints, renew gaskets if air leak is evident.

*NOTE: Use a compression tester to check the compression pressure in each cylinder. This should be done with the engine at normal operating temperature and with the throttle in the wide open position. Note the reading obtained and if variation between cylinders is more than 10 percent, add a small quantity of clean engine oil to each cylinder via the spark plug hole and crank the engine for two or three seconds with the starter motor. Retest the compressions and compare the readings with those obtained on the first test. If any cylinder that gave a low reading on the first test shows a substantial increase in compression on the second test, broken or worn piston rings are indicated. Little or no increase in the second test indicates a burnt valve. If two adjacent cylinders show lower readings than the others, a blown head gasket is indicated.*



Air leaks at the inlet manifold can be checked by running engine oil around the suspect joint.

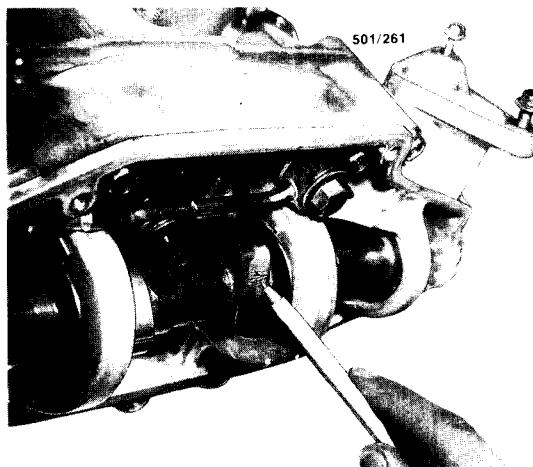


A blown head gasket is indicated by bubbles in the cooling system.

Incorrect valve clearance on OHV engine models may also cause low or uneven compression pressure figures. The valve clearance should therefore be checked prior to removal of the cylinder head(s). If the valve clearance is correct remove the cylinder head(s) for inspection of the gasket(s) and valve(s), or inspect the cylinder bores, pistons and rings, as indicated by the compression test.

### NOISY VALVE OPERATION

- (1) Incorrectly adjusted valve clearance, OHV engine models: Check and adjust the valve clearance as described in the Engine Tune-up section.
- (2) Loose camshaft drive belts, OHC engine models: Adjust camshaft drive belts.



Camshaft lobe wear is also a cause of noisy valve operation. OHC engine shown.

- (3) Defective hydraulic tappets, OHC engine models: Renew hydraulic tappet assemblies.
- (4) Worn or damaged rocker arm assemblies: Renew any excessively worn parts.
- (5) Weak or broken valve springs: Remove the rocker covers and check the condition of valve springs.
- (6) Worn valve guides: Overhaul the cylinder heads.
- (7) Camshaft lobe wear: Inspect the camshaft(s) for wear and repair as necessary.

*NOTE: OHC engine models have hydraulic tappets which may be noisy during initial start up or when the engine has remained idle for extended periods. This condition should rectify itself after a short period.*

*When noisy valve operation is suspected on OHC engine models always check the camshaft drive belt adjustment first.*

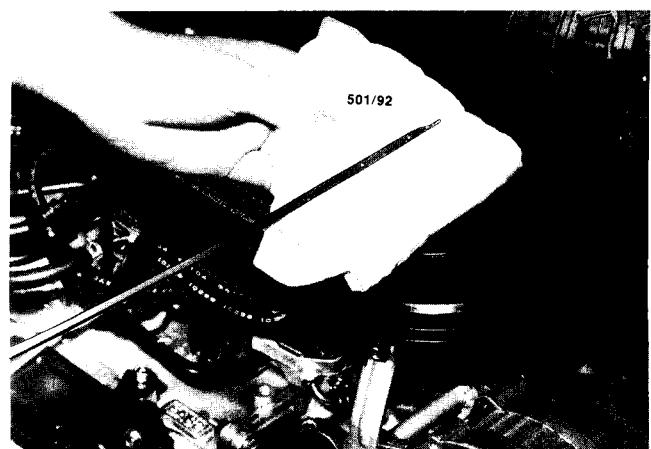
## BIG END BEARING NOISE

- (1) Inadequate oil supply: Check oil level in sump and check condition of oil pump and relief valve, renew oil filter.
- (2) Excessive bearing clearance: Renew bearing shells, check and regrind big end journals if oval.
- (3) Thin oil or oil diluted by petrol or water: Change to correct oil grade, check for source of oil dilution and rectify.
- (4) Low oil pressure: Check pressure relief valve and spring, oil filter by-pass valve.
- (5) Misaligned big end bearings: Align connecting rods and renew big end bearings if necessary.

*NOTE: Big end bearing noise is indicated by a metallic knock which is usually loudest at approximately 60 kph with the throttle closed. Before dismantling the engine to inspect the big ends check the engine oil for correct level and dilution on the dipstick. Also remove the oil pressure sender unit and connect an oil pressure gauge into the oil gallery to check the oil pressure readings.*

## MAIN BEARING NOISE (APPARENT)

- (1) Loose flywheel: Tighten flywheel securing bolts to specified torque.
- (2) Low oil pressure: Check bearing to journal clearance, check condition of oil pump and pressure relief valve, recondition oil pump as necessary.
- (3) Excessive crankshaft end play: Renew main bearings.
- (4) Crankshaft journals out of round and excessive bearing to journal clearance: Regrind journals and renew bearings (undersize).
- (5) Insufficient oil supply: Replenish oil in sump to correct level.



**Check the oil for correct level and dilution on the dipstick.**

*NOTE: Main bearing noise is indicated by a heavy but dull knock when the engine is under load.*

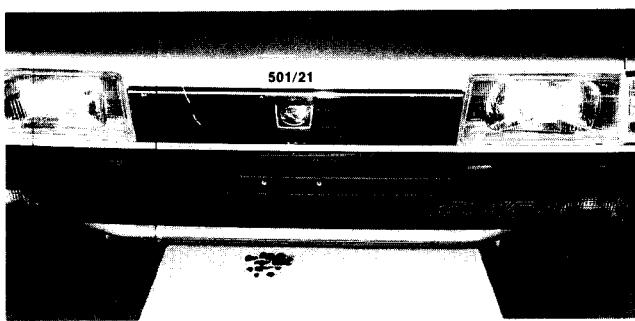
*A loose flywheel is indicated by a thud or dull click when the ignition is turned off. It is usually accompanied by vibration.*

*Crankshaft end play noise is indicated by a sharp rap at idle speed. The crankshaft can be readily checked for excessive end float by levering the crankshaft backwards and forwards.*

*If the oil pressure is satisfactory, dismantle the engine block and assess bearing clearance using the Plastigage method as outlined in this section. Ovality and wear on the main bearing journals can only be checked with a micrometer after the crankshaft has been removed.*

## EXCESSIVE OIL CONSUMPTION

- (1) Oil leaks: Check and renew engine gaskets or seals as necessary. Check crankshaft pulley and flywheel/driveplate retaining bolt sealing on OHV engine models.
- (2) Damaged or worn valve stem oil seals: Dismantle cylinder heads and renew damaged or worn oil seals.
- (3) Excessive clearance, valve stem to valve guide: Renew valve guides and/or valves.
- (4) Worn or broken rings: Renew piston rings on all pistons.
- (5) Rings too tight or stuck in grooves: Renew piston rings and clean out ring grooves.
- (6) Excessive wear in cylinders, pistons and rings: Recondition cylinders and renew pistons and rings.
- (7) Compression rings incorrectly installed, oil rings clogged or broken: Renew piston rings.



**Run the vehicle over white paper to check for oil leaks.**

*NOTE: Before checking the engine for oil leaks, the engine should be completely degreased and cleaned. Run the engine at operating temperature for a period and then visually check for oil leakage. By placing white paper on the floor directly beneath the engine any excessive leak can be pinpointed.*

*Damaged or worn valve stem oil seals which allow oil to be drawn down past the valve stems into the combustion chamber can be diagnosed by allowing the engine to idle for a few minutes and then opening the throttle. If oil is being drawn down past the valve stems a heavy discharge of blue smoke will be seen at the tail pipe.*

*Piston, rings and cylinder bore troubles are usually accompanied by a loss of compression. Cylinder compression can only be accurately assessed by using a compression gauge.*

## DROP IN OIL PRESSURE

- (1) Oil level low in sump: Check and replenish oil to full mark in sump.
- (2) Thin or diluted oil: Change to correct oil grade and rectify source of dilution.
- (3) Oil pump relief valve stuck or spring broken: Free up relief valve or renew broken relief valve spring.
- (4) Excessive bearing clearance: Renew bearing shells or recondition crankshaft journals as necessary.
- (5) Excessive wear of oil pump components: Renew or recondition oil pump.

*NOTE: If the vehicle is not fitted with an oil pressure gauge remove the oil sender unit and connect a pressure gauge into the oil gallery. Check the oil pressure with the engine cold and hot. If the oil pump or relief valve are faulty low pressure will be indicated with the engine both hot and cold. However if the bearings are at fault a fairly high pressure will be indicated when the engine is cold but a marked fall of pressure will be noted when the engine is hot.*

## ENGINE WILL NOT ROTATE

(1) Starter motor drive jammed: Remove starter motor, check and renew damaged drive plate or flywheel ring gear.

(2) Engine overheated and seized: Remove and dismantle engine, check and renew damaged components. See following note.

(3) Water in cylinder due to blown head gasket or cracked engine block or cylinder heads: Remove cylinder heads if gasket is blown, check for cylinder head or engine block distortion, reface if necessary. Renew the cylinder head and/or engine block if cracked.

(4) Broken crankshaft, connecting rod, piston, etc. due to overheating, fatigue, etc: Remove and dismantle engine, examine and renew components as necessary.

(5) Valve head broken off due to overheating, fatigue, etc: Remove cylinder head, check head, piston and cylinder for damage and repair or renew as necessary.

*NOTE: Frequent jamming of the starter motor drive with the flywheel ring gear can be due to a bent starter armature shaft, damaged teeth on the drive and/or ring gear. With the starter motor removed, the flywheel ring gear teeth can be examined through the starter motor mounting aperture. Replacement of the ring gear requires removal of the transaxle, clutch and flywheel on manual transaxle models. The checking for a bent armature shaft can be done by rotating the shaft by hand while the end is held in close proximity to a fixed object.*

*Invariably when an engine seizes, because of overheating due to lack of oil and/or water, damage is done to the bearings, pistons, etc. Although there may be instances where an engine will restart and run after it has cooled down and the oil and water replenished, it will generally be found that oil consumption increases, oil pressure drops and the engine will be noisier, depending upon the degree of damage.*

*When a cylinder head gasket blows allowing water into the cylinders, or compression loss between cylinders, it is essential to check the gasket faces on the engine block and cylinder head for distortion. Sufficient water can enter a cylinder because of a blown gasket, cracked cylinder or head to prevent an engine from rotating, normally this is preceded by difficult starting, misfiring, excessive steam from the exhaust and loss of water from the radiator.*