

Warpage, burning and pitting of valves is mainly directed against the exhaust valves which are exposed to the high temperature flow of exhaust gases. Such defects are generally caused by valves failing to seat tightly and evenly, permitting exhaust blow-by. This, in turn, can generally be traced to hard particles of carbon being present on the slopes of the valve seats. It may, however, be due to weak springs, insufficient valve clearance, or warpage and misalignment of the valve stem or guide.

Warpage, chiefly occurs on the valve stem due to its exposure to heat. Out-of-round wear occurs when the seat has been pounded by a valve head which is not in line with its stem or guide.

Misalignment is a result of wear, warpage, and distortion. Wear, when accentuated by insufficient lubrication, will eventually create sloppy clearances with resultant misalignment.

Warpage of the valves, and in known extreme instances, that of the crankcase, can result from the engine overheating due to a blocked, dirty or insufficiently filled cooling system.

Most frequently, however, warpage of a valve stem or a guide is due to uneven temperatures being applied along its length. The lower part of the guide and stem is near the combustion heat, and the upper portions are closer to cylinder head water passages. Valve materials are carefully chosen to withstand such varying temperatures. However, an engine that is allowed to operate continually in an overheated condition is definitely open to valve stem and guide distortion and warpage. Distortion can also be caused by failure to tighten

cylinder head bolts to the specified foot-pounds torque and in the sequence recommended. Valve clearances are also affected in this manner. Thus any abnormal wear, warpage or distortion affecting a valve guide will destroy its function as an accurate bearing to maintain the valve head concentric with its seat, and will prevent leak-proof seating.

Oil and air sucked past worn intake valve stems and guides into the combustion chamber, cause excessive oil consumption, form excessive carbon, and dilute fuel.

Examine the engine for signs which may indicate the reason for the need of valve reconditioning. Dry and rusted valve springs are an indication that the oil passages to the valve levers may be blocked, causing wear on the valves and guides, and resulting in improper valve action. A defective gasket under the valve cover will permit the entrance of dirt which will cause undue wear on the valve stems and guides and damage to the valve springs.

## Valves

1. Remove all carbon from the valve head and stem. Valve stems should be lightly polished with an extremely fine abrasive cloth sufficiently to remove the carbon deposits only. Because of the nature of the valve deposits, solvent cleaning ordinarily will not remove all the deposits from the valves. Wire brushes will do this job satisfactorily, but only brass wire brushes should be used since steel brushes may scratch the surface. Such scratches are likely to cause localized stresses in an operating valve and may eventually result in fatigue fractures of the valve. For similar reasons the use of coarse emery paper should be avoided.