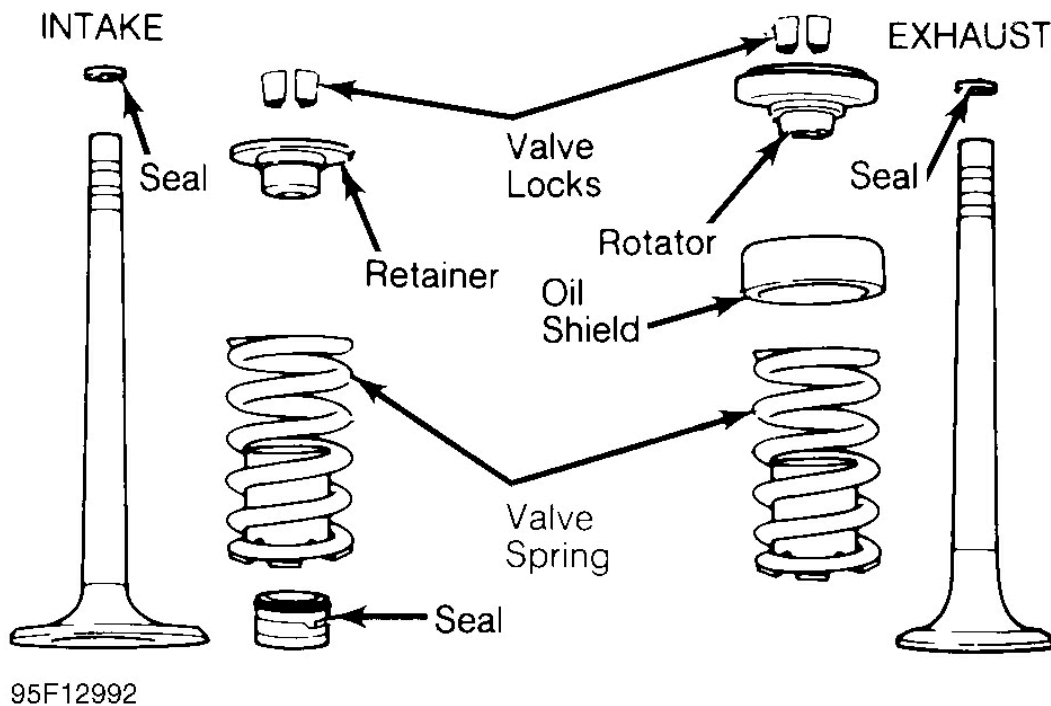


to a specific engine or system. Illustrations and procedures have been chosen to guide mechanic through engine overhaul process. Descriptions of processes of cleaning, inspection, assembly and machine shop practice are included.

Always refer to appropriate engine overhaul article, if available, in the **ENGINES** section for complete overhaul procedures and specifications for the vehicle being repaired.

Mark valves for location. Using valve spring compressor, compress valve springs. Remove valve locks. Carefully release spring compressor. Remove retainer or rotator, valve spring, spring seat and valve. See **Fig. 2**.



**Fig. 2: Exploded View of Valve Assemblies**

### CYLINDER HEAD CLEANING & INSPECTION

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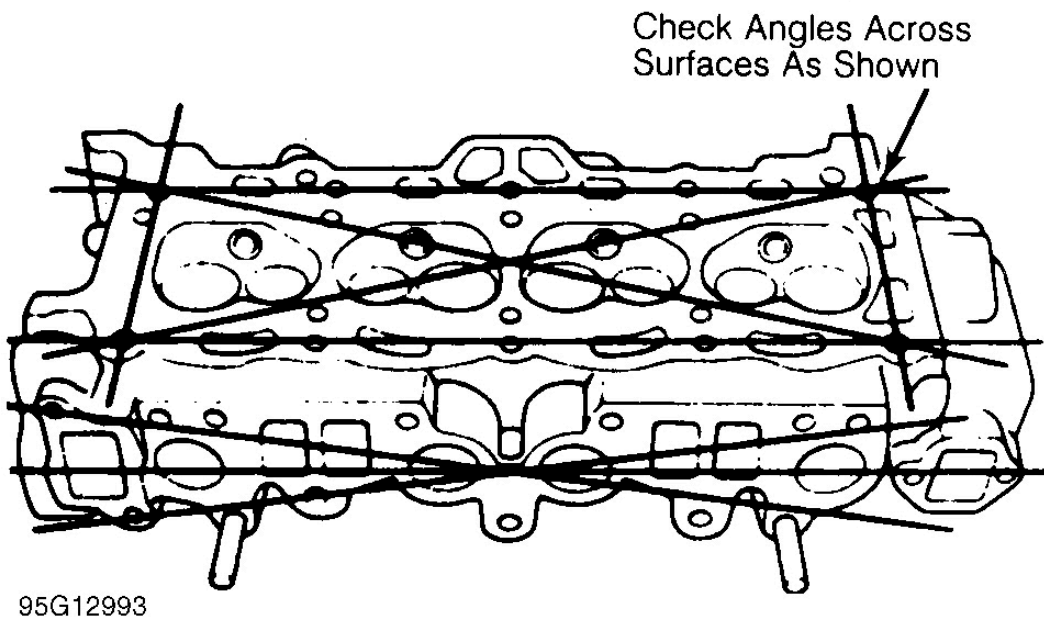
**being repaired.**

Clean cylinder head and valve components using approved cleaning methods. Inspect cylinder head for cracks, damage or warped gasket surface. Place straightedge across gasket surface. Determine clearance at center of straightedge. Measure across both diagonals, longitudinal center line and across cylinder head at several points. See **Fig. 3**.

On cast iron cylinder heads, if warpage exceeds .003" (.08 mm) in a 6" span, or .006" (.15 mm) over total length, cylinder head must be resurfaced. On most aluminum cylinder heads, if warpage exceeds .002" (.05 mm) in any area, cylinder head must be resurfaced. Warpage specification may vary by manufacturer. If warpage exceeds specification on some cylinder heads, cylinder head must be replaced.

Cylinder head thickness should be measured to determine amount of material which can be removed before replacement is required. Cylinder head thickness must not be less than the manufacturer's specification.

If cylinder head required resurfacing, it may not align properly with intake manifold. On "V" type engines, misalignment is corrected by machining intake manifold surface that contacts cylinder head. Cylinder head may be machined on surface that contacts intake manifold. Using oil stone, remove burrs or scratches from all sealing surfaces.



**Fig. 3: Checking Cylinder Head for Warpage**

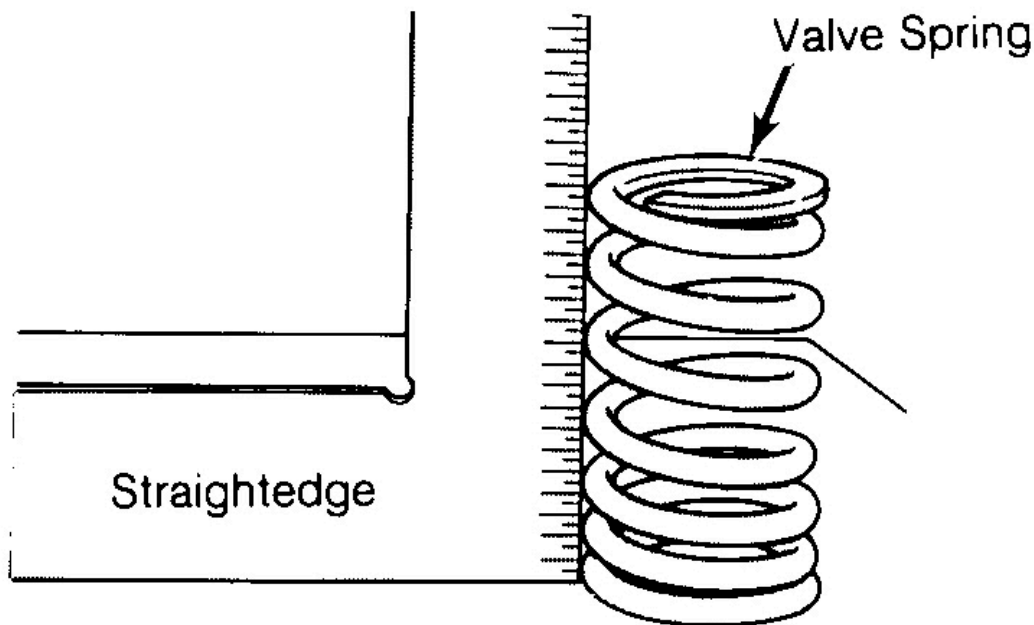
## VALVE SPRINGS

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Inspect valve springs for corroded or pitted valve spring surfaces which may lead to breakage. Polished spring ends caused by a rotating spring indicate that spring surge has occurred. Replace springs showing evidence of these conditions.

Inspect valve springs for squareness using a 90-degree straightedge. See **Fig. 4**. Replace valve spring if out-of-square exceeds manufacturer's specification.



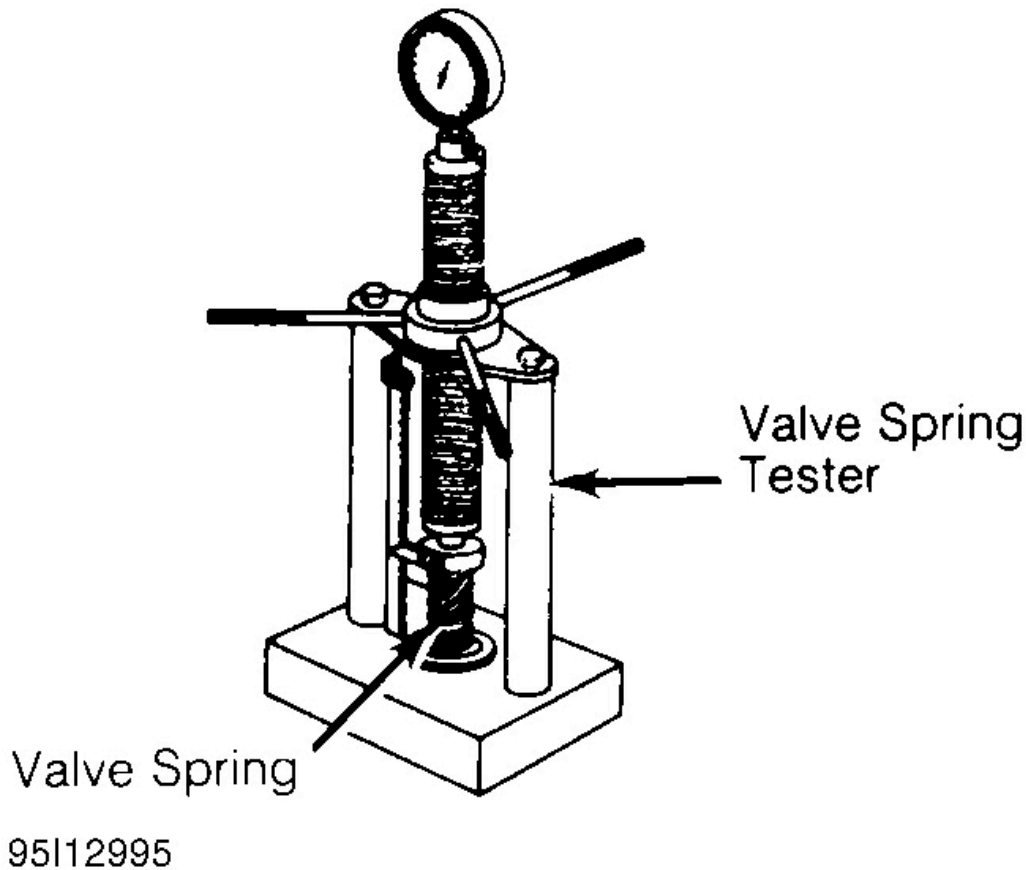
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**Fig. 4: Checking Valve Spring Squareness**

Using vernier caliper, measure free length of all valve springs. Replace springs if not within specification. Using valve spring tester, test valve spring pressure at installed and compressed heights. See **Fig. 5**.

Usually compressed height is installed height minus valve lift. Replace valve spring if not within specification.

It is recommended to replace all valve springs when overhauling cylinder head. Valve springs may need to be installed with color coded end or small coils at specified area according to manufacturer.



**Fig. 5: Checking Valve Spring Pressure**

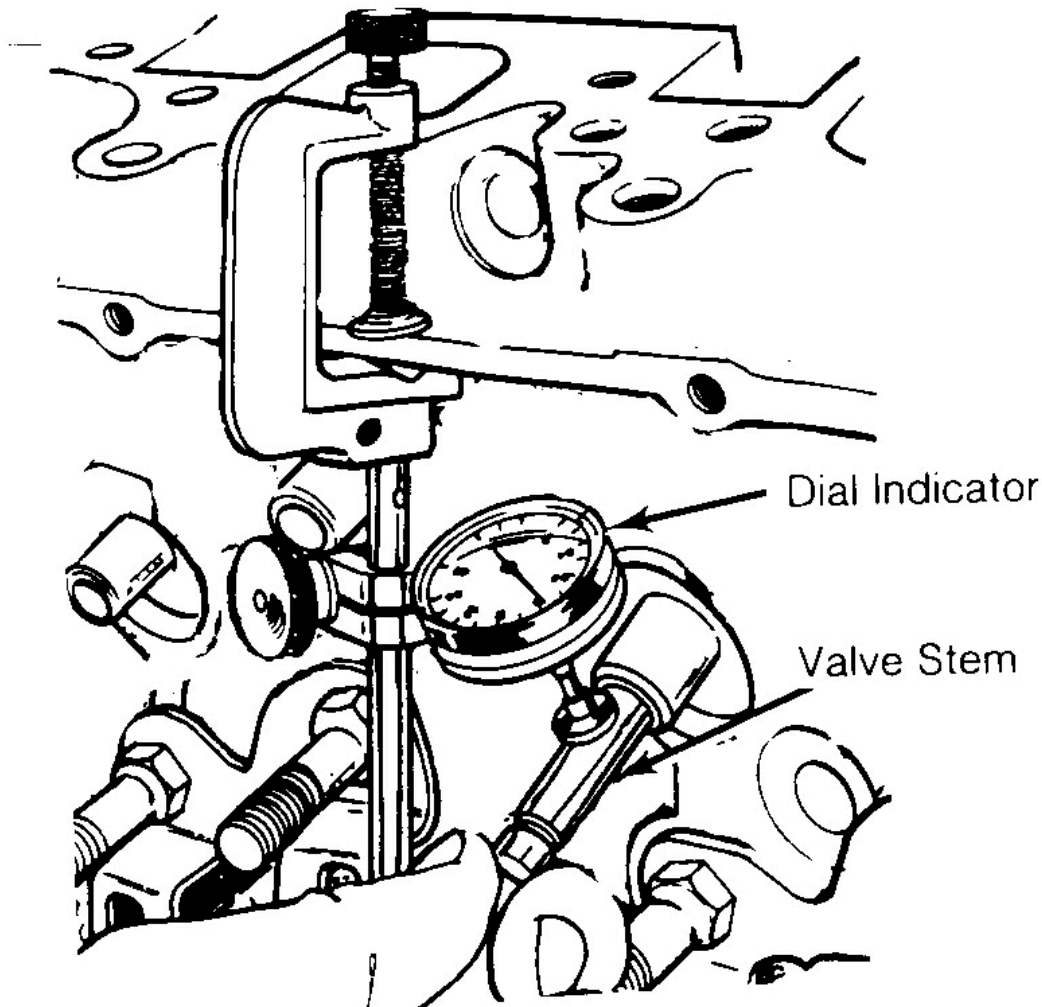
**VALVE GUIDE**

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### Measuring Valve Guide Clearance

Check valve stem-to-guide clearance. Ensure valve stem diameter is within specification. Install valve in valve guide. Install dial indicator assembly on cylinder head with tip resting against valve stem just above valve guide. See **Fig. 6**.



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**Fig. 6: Measuring Valve Stem-to-Guide Clearance**

Lower valve approximately 1/16" below valve seat. Push valve stem against valve guide as far as possible. Adjust dial indicator to zero. Push valve stem in opposite direction and note reading. Clearance must be within specification.