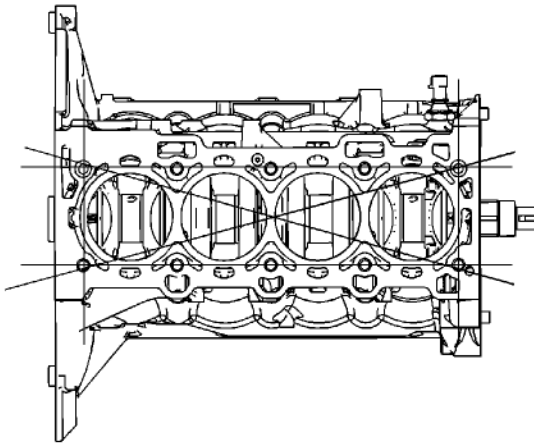
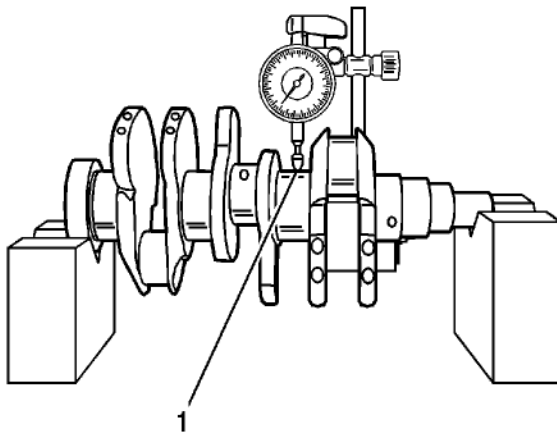


Crankshaft and Bearing Cleaning and Inspection

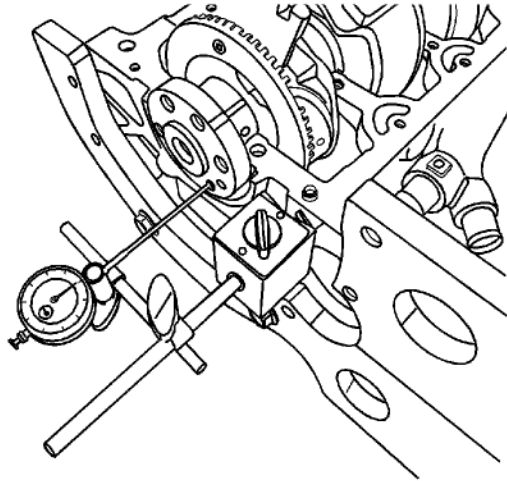
Inspection Procedure



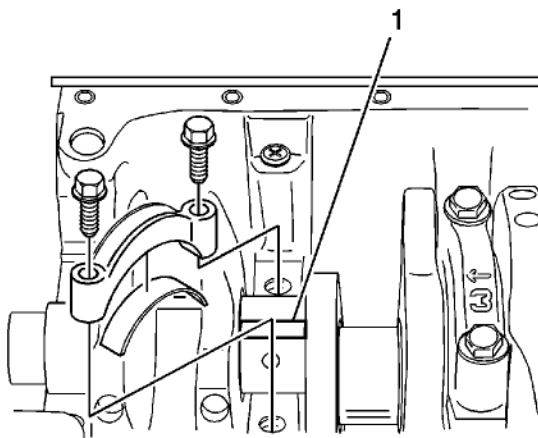
1. Measure the block flatness. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



2. Measure the crankshaft bending (1) (out-of-round). If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



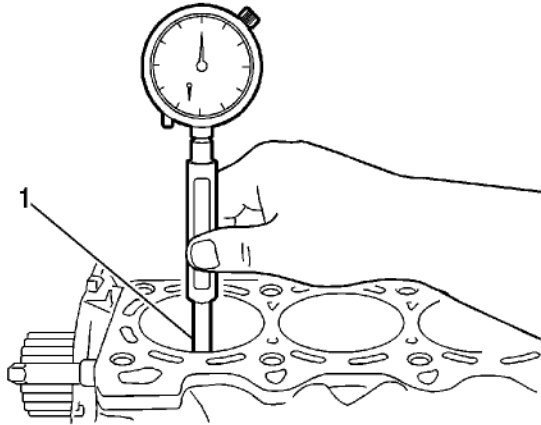
3. Measure the crankshaft end play. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



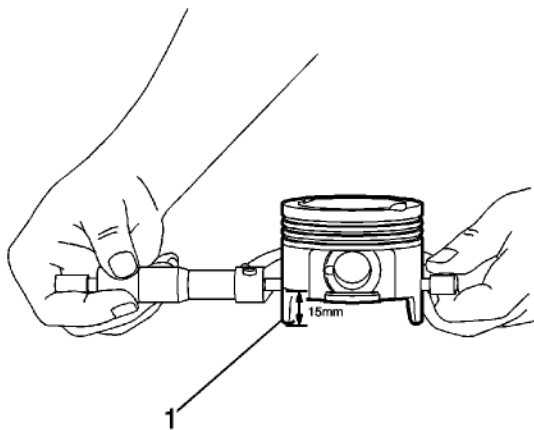
4. Cut the plastic gauge (1) the same length of the bearing width and put it on the crankshaft bearing. It should be parallel with the crankshaft.
5. Install the crankshaft journal bearing and cap.
6. Remove the connecting rod bearing and cap again.
7. Measure the clearance of the connecting rod bearing oil. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).

Piston, Connecting Rod, and Bearing Cleaning and Inspection

Inspection Procedure

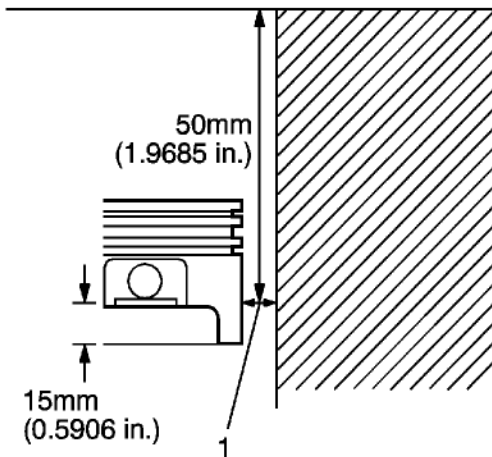


1. Clean the inner of the cylinder with a clean cloth.
2. Inspect the inner of the cylinder if it is damaged.
3. Measure the inner diameter of the cylinder (1). If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).

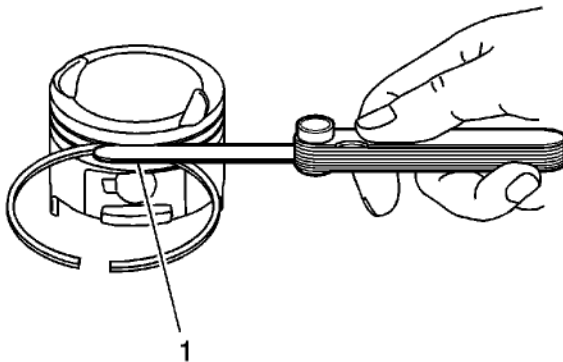




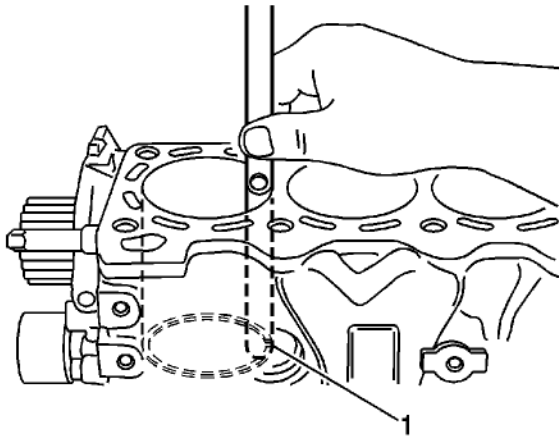
4. Clean the piston with a clean cloth.
5. Measure the outer diameter of the piston (1), 15 mm up from the bottom. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



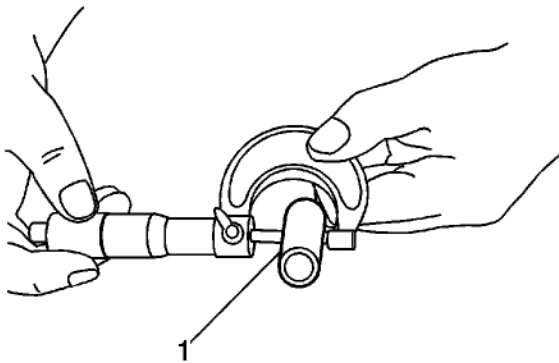
6. Measure the inner diameter of the cylinder, 50 mm below from the surface of the cylinder head, and the clearance of the piston (1), 15 mm up from the end of the piston skirt. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



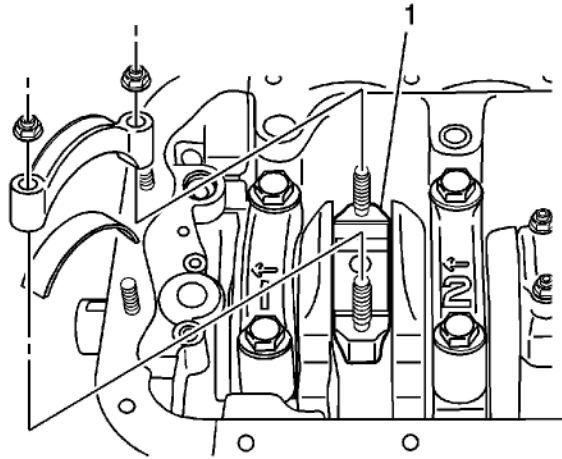
7. Measure the piston ring groove clearance (1). If the piston ring groove clearance is out of specification, replace the piston and rings. Refer to [Engine Mechanical Specifications](#).



8. Measure the piston ring gap (1). If the piston ring gap is out of specification, replace the piston ring. Refer to [Engine Mechanical Specifications](#).



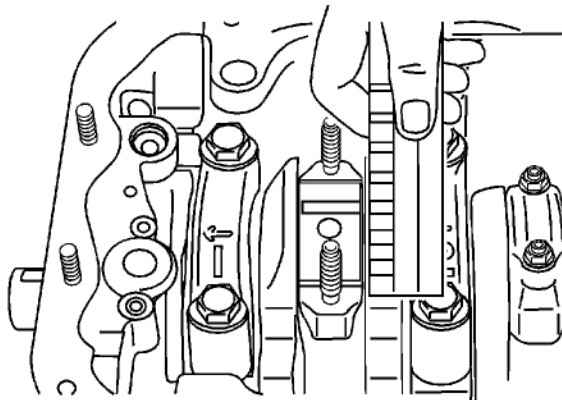
9. Measure the piston pin (1). If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



10. Cut the plastic gauge (1) the same length as the bearing width and put it on the crankshaft bearing. It should be parallel with the crankshaft.
11. Install the connecting rod bearing and caps.

Tighten

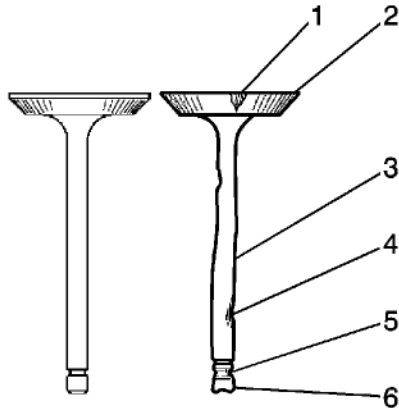
Tighten the connecting rod caps bolts to $35+45^{\circ}+15^{\circ}$ N·m (25.8+45°+15° lb ft)



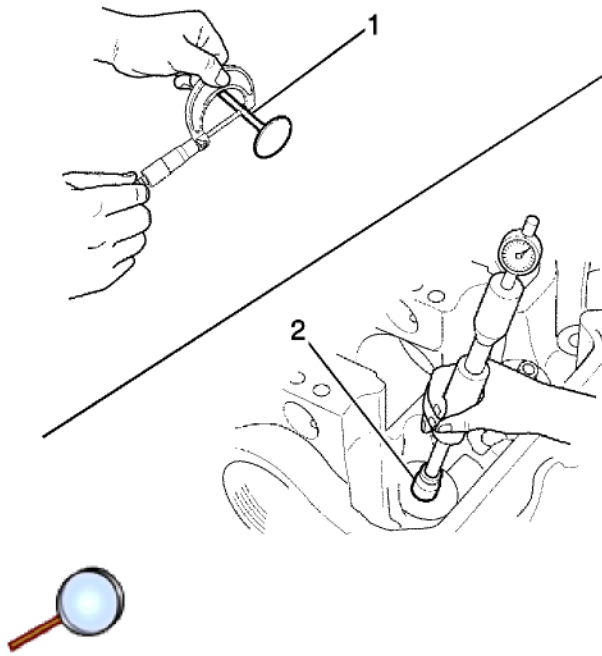
12. Remove the connecting rod bearing and caps again.
13. Measure the clearance of the connecting rod bearing oil. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).

Valve Rocker Arm Cleaning and Inspection

Valve Inspection Procedure

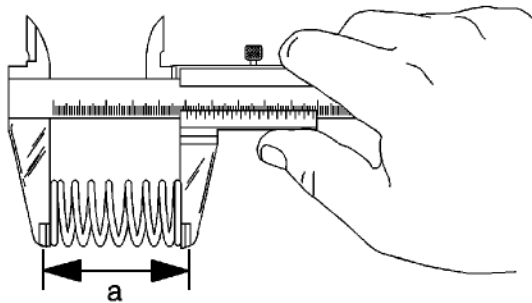


1. Inspect the valve for damage from the head to tip for the following conditions:
 - Pitting in the valve seat area (1)
 - Lack of valve margin (2)
 - Bending in the valve stem (3)
 - Pitting or excessive wear in the stem (4)
 - Worn valve key grooves (5)
 - Worn valve tip (6)
2. Replace the valve if any of these conditions exist.
3. Inspect the valve springs. If the valve spring ends are not parallel, replace the valve spring.
4. Inspect the valve spring seating surface of the valve rotators for wear or gouges. Replace as required.

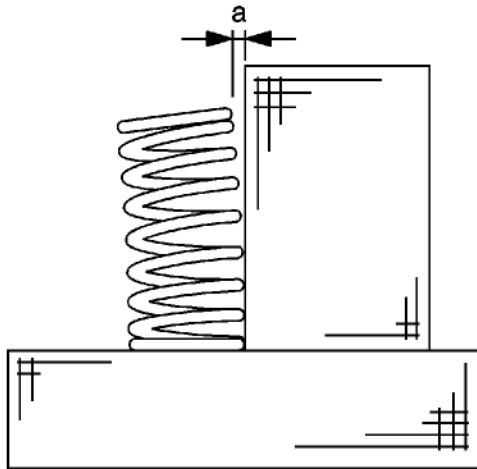


Note: Valve guide is not movable. Replace the cylinder head if it is out of specification.

5. Measure the valve stem diameter (1) and valve guide inside diameter (2). If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



6. Measure the valve spring free length. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).



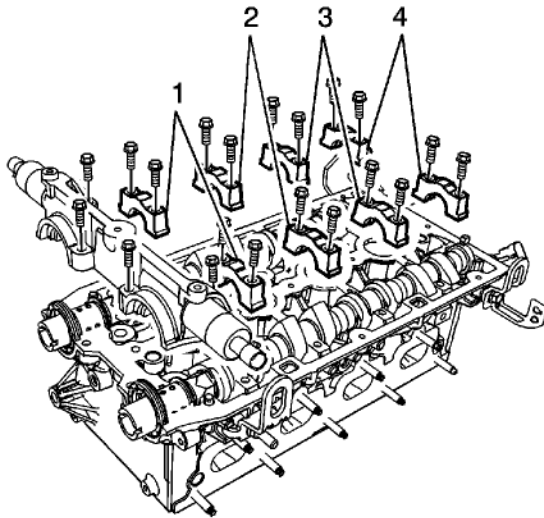
7. Measure the valve spring right angles. If it is out of specification, replace it. Refer to [Engine Mechanical Specifications](#).

Cylinder Head Disassemble

Disassemble Procedure

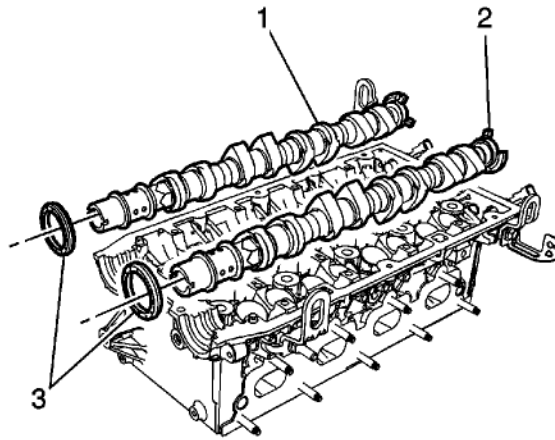
Special Tools

- EN-49074 Universal Valve Spring Compressor
- EN-49155 Valve Spring Compressing Adapter
- KM-845 Suction Device

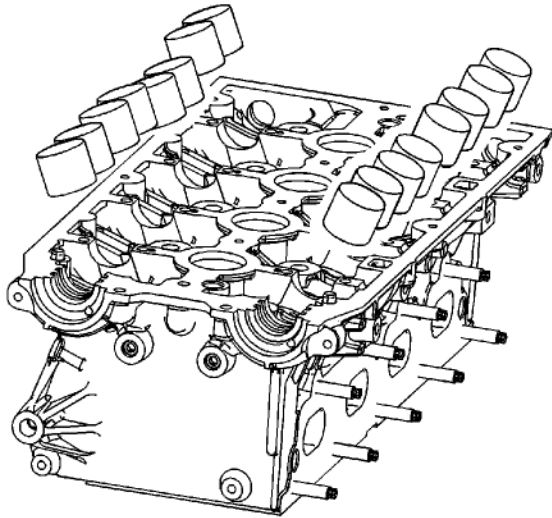


Note: Take extreme care to prevent any scratches, nicks or damage to the camshaft surfaces.

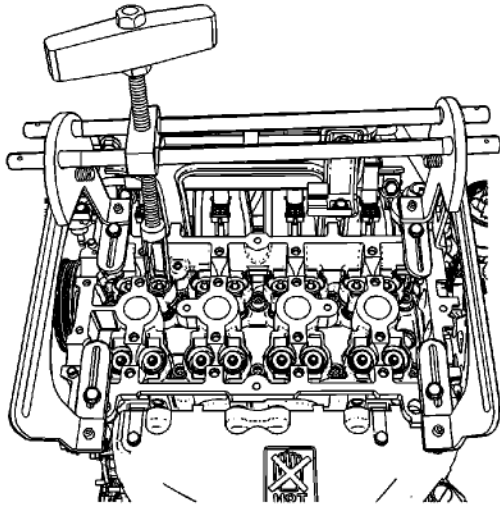
1. Remove the camshaft position solenoid valve housing.
2. Remove the camshaft cap bolts in this sequence (1)-(4)-(2)-(3).
3. Remove the camshaft caps.



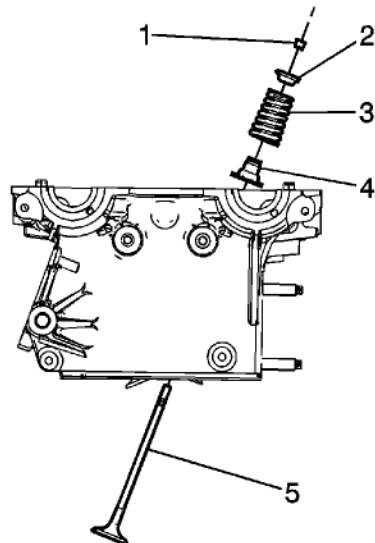
4. Remove the camshafts (1, 2) and oil seal rings (3).



5. Remove the valve tappet using the KM-845 suction device .



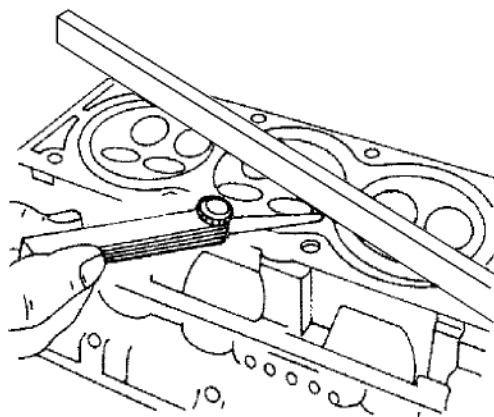
6. Install the *EN-49074* compressor and *EN-49155* adapter .
7. Remove the valve key.



8. Remove the valves (5), springs (3), retainers (2), and seals (4).

Cylinder Head Cleaning and Inspection

Inspection Procedure



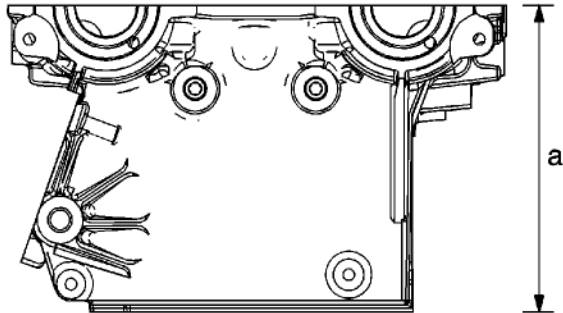
Note: Take extreme care to prevent any scratches, nicks or damage to the cylinder head surface.

1. Clean the sealing surfaces.
2. Inspect the cylinder head for the following:
 - Cracks, damage or pitting in the combustion chambers.
 - Debris in the oil galleries. Continue to clean the galleries until all debris is removed.
 - Coolant leaks or damage to the deck face sealing surface.
 - Damage to any gasket surfaces.
 - Damage to any threaded bolt holes.
 - Burnt or eroded areas in the combustion chamber.
 - Cracks in the exhaust ports and combustion chambers.
 - External cracks in the water passages.
 - Restrictions in the intake or exhaust passages.
 - Restrictions in the cooling system passages.
 - Rusted, damaged or leaking core plugs.
3. If the cylinder head is cracked or damaged, it must be replaced. No welding or patching of the cylinder head is recommended.
4. Measure the clearance between the straight-edge and the cylinder head deck face using a feeler gauge at four points along the straight-edge.
5. Check the sealing surfaces for deformation and warping. The cylinder head sealing surfaces

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(include the intake and exhaust sealing surfaces) must be flat within the specification. Refer to [Engine Mechanical Specifications](#).

6. Remove the intake and exhaust camshafts. Refer to [Camshaft Replacement](#).



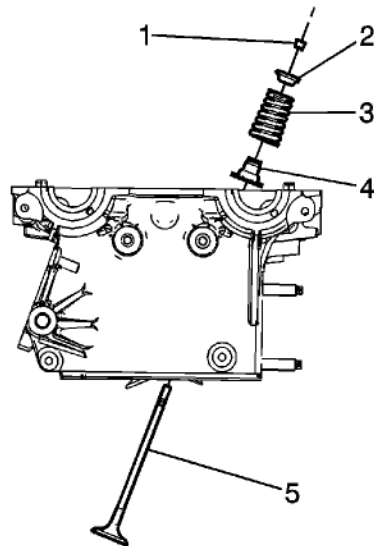
7. Measure the height of the cylinder head from sealing surface to sealing surface. The cylinder head height should be within specifications. Replace the cylinder head. If the cylinder head height is out of specifications, replace the cylinder head. Refer to [Engine Mechanical Specifications](#).

Cylinder Head Assemble

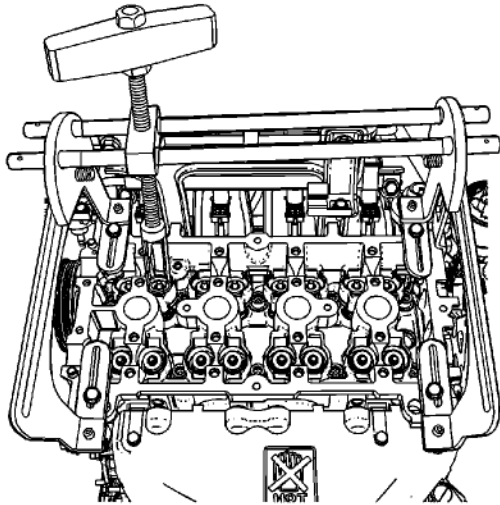
Special Tools

- EN-49074 Universal Valve Spring Compressor
- EN-49155 Valve Spring Compressing Adapter
- KM-422 Installer

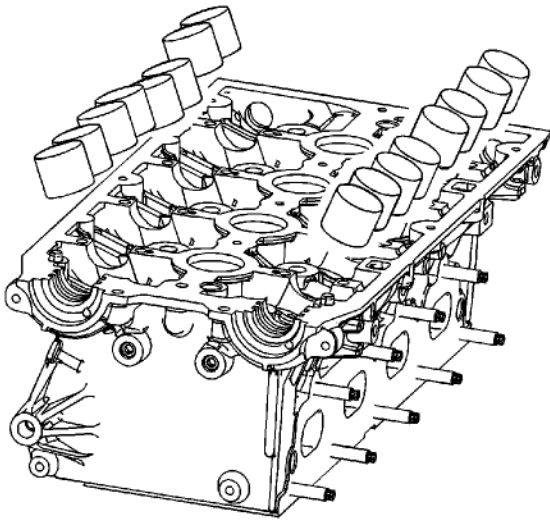
Assemble Procedure



1. Install the valve spring (3), retainer (2), and seal (4).

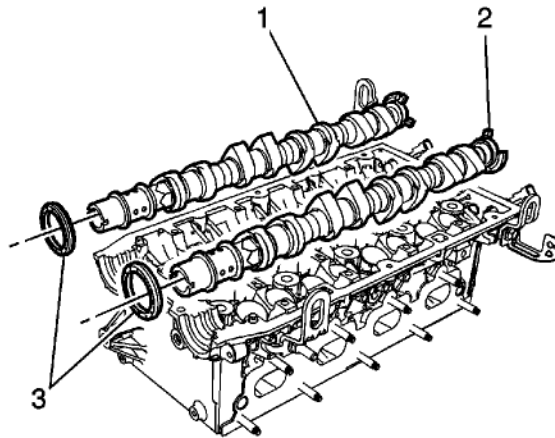


2. Install the *EN-49074* compressor and *EN-49155* adapter .
3. Install the valve key.

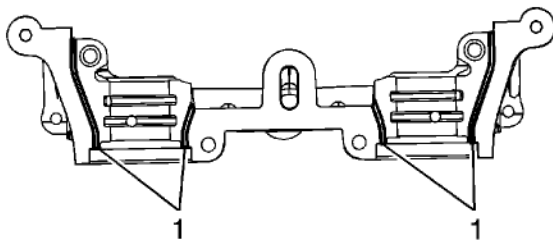


Note: Do not scratch the valve tappet. Do not use gloves or tools, except special service tools.

4. Install the valve tappet.

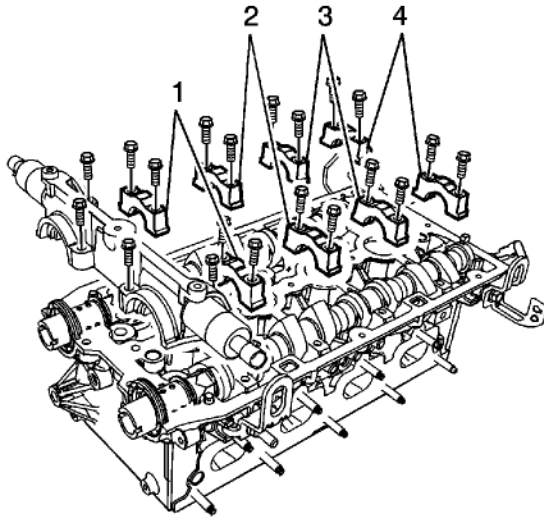


5. Coat and lubricate the camshaft bearing and cam surfaces with clean engine oil.
6. Install the camshafts (1, 2) on the cylinder head.

**Note:**

- The grooves (1) adjacent to the sealing surfaces must remain free from sealant.
- It is essential to ensure that no sealant is applied outside the marked sealing areas.

7. Apply surface sealant LOCTITE 574 to sealing surfaces (1) of the 1st camshaft bearing cap thinly and evenly.



8. Install the camshaft bearing caps in this sequence (2)-(3)-(1)-(4).
9. Install the camshaft position solenoid valve housing.

Tighten

Tighten the camshaft bearing cap bolts to 8 N·m (70.8 lb in).

10. Install the new camshaft oil seal rings using *KM-422* installer. Refer to [Camshaft Front Oil Seal Replacement](#).