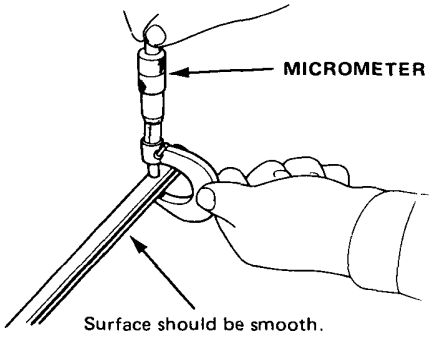
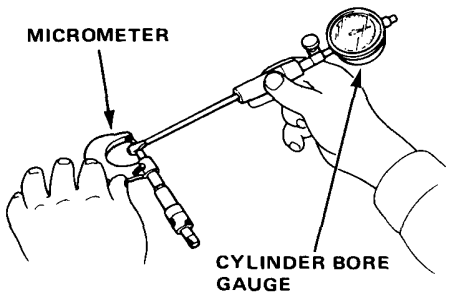
Rocker Arm Clearance

Measure both the intake/exhaust rocker shaft and auxiliary rocker shaft.

1. Measure diameter of shaft at first rocker location.

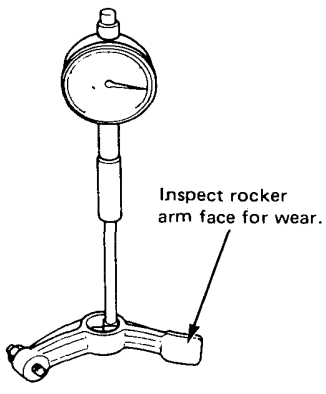


2. Zero gauge to shaft diameter.



3. Measure inside diameter of rocker arm and check for out-of-round condition.

Rocker Arm Radial Clearance:
Service Limit: 0.08 mm (0.003 in.)



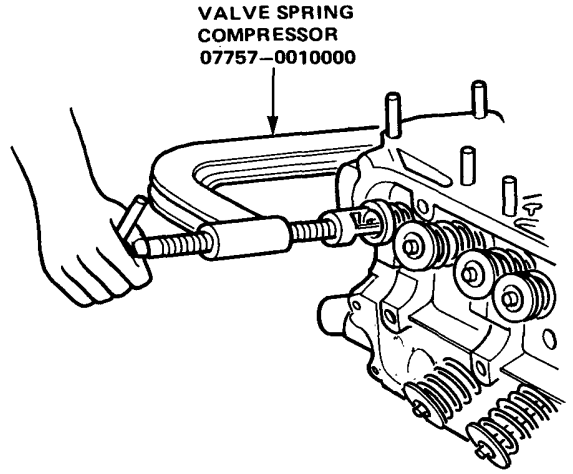
Repeat for all rockers. If over limit, replace rocker shaft and all over-tolerance rocker arms.

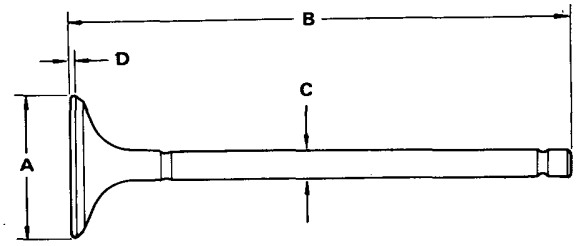
Intake and Exhaust Valve Replacement

NOTE: Identify valves and valve springs as they are removed so that each item can be reinstalled in its original position.

1. Tap each valve stem with a plastic mallet to loosen valve keepers before installing spring compressor.

2. Install spring compressor. Compress spring and remove valve keepers.





Intake Valve Dimensions

A Standard (New):	26.9–27.1 mm (1.059–1.067 in.)
B Standard (New):	112.56–112.86 mm (4.431–4.443 in.)
C Standard (New):	6.58–6.59 mm (0.2591–0.2594 in.)
C Service Limit:	6.55 mm (0.258 in.)
D Standard (New):	1.05–1.35 mm (0.041–0.053 in.)

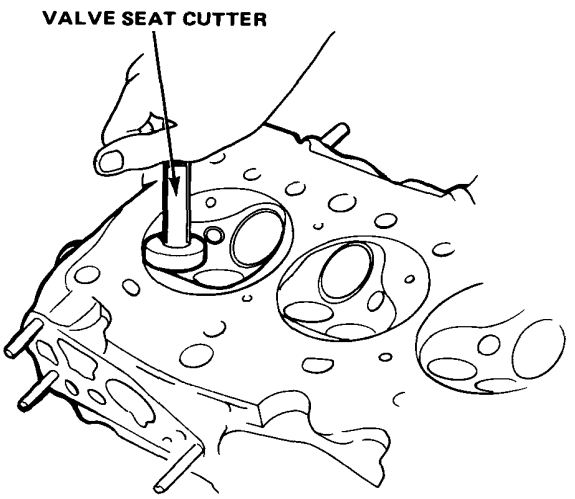
Exhaust Valve Dimensions

A Standard (New):	31.9–32.1 mm (1.138–1.146 in.)
B Standard (New):	113.66–113.96 mm (4.475–4.487 in.)
C Standard (New):	6.55–6.56 mm (0.2579–0.2583 in.)
C Service Limit:	6.52 mm (0.257 in.)
D Standard (New):	1.65–1.95 mm (0.065–0.077 in.)

Valve Seat Reconditioning

1. Renew the valve seats in cylinder head using a valve seat cutter.

   NOTE: If guides are worn (page 6-14), replace them (page 6-15) before cutting valve seats.



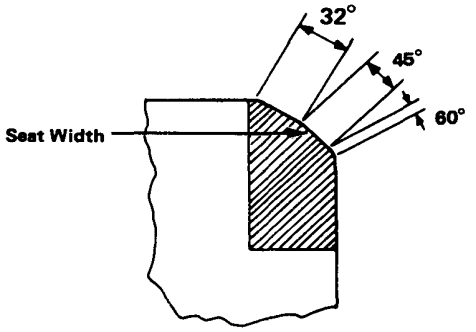
CUTTER	INTAKE	EXHAUST
32°	07780–0012900	07780–0012300
60°	07780–0014000	07780–0014100
45°	07780–0010800	07780–0010400
HOLDER	07781–0010201 and 07781–0010301	

2. Bevel the upper edge of seat with the 32° cutter until required seat width is obtained.

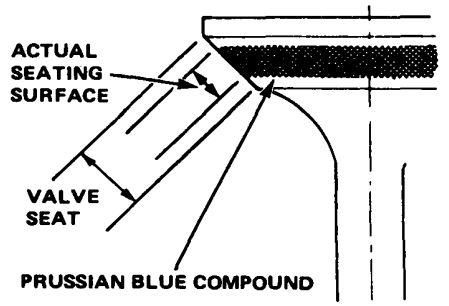
3. Bevel the inner edge of seat slightly with the 60° cutter.

4. Carefully center 45° cutter.
   Remove as little material as possible. (See measurement after reconditioning shown below.)

   Valve Seat Width:
   Standard: 1.25–1.55 mm (0.049–0.061 in.)
   Service Limit: 2.0 mm (0.08 in.)



5. After resurfacing seat, inspect for even valve seating: Apply Prussian blue compound to valve face, and insert valve in original location in head, then lift it and snap it closed against seat several times.

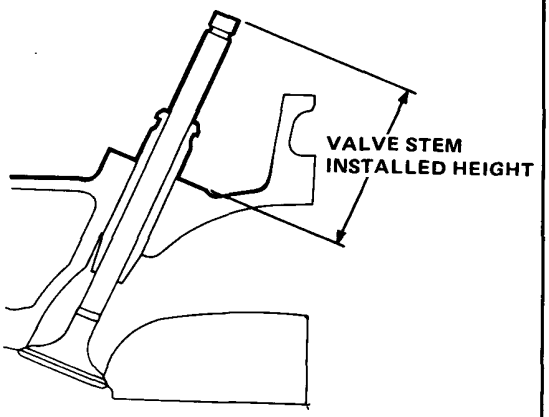


6. The actual valve seating surface, as shown by the blue compound, should be centered on the seat.
   - If it is too high (closer to the valve stem), you must make a second cut with the 60° cutter to move it down, then one more cut with the 45° cutter to restore seat width.
   - If it is too low (closer to valve edge), you must make a second cut with the 32° cutter to move it up, then one more cut with the 45° cutter to restore seat width.

   NOTE: The final cut should always be made with the 45° cutter.

7. Insert intake and exhaust valves in head and measure valve stem installed height.

   Intake Valve Stem Installed Height:
   Standard (New): 48.16 mm (1.896 in.)
   Service Limit: 48.95 mm (1.925 in.)
   Exhaust Valve Stem Installed Height:
   Standard (New): 48.16 mm (1.896 in.)
   Service Limit: 48.95 mm (1.925 in.)

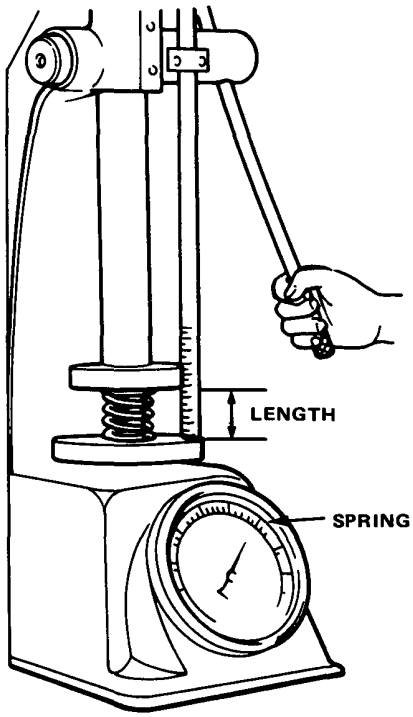


8. If valve stem installed height is over service limit, replace valve and recheck. If still over service limit, replace cylinder head; the valve seat in the head is too deep.

Spring Length and Force Check

1. Compress spring to specified length.
2. Note reading of spring force.

   NOTE: *Inspect springs for obvious distortion.*



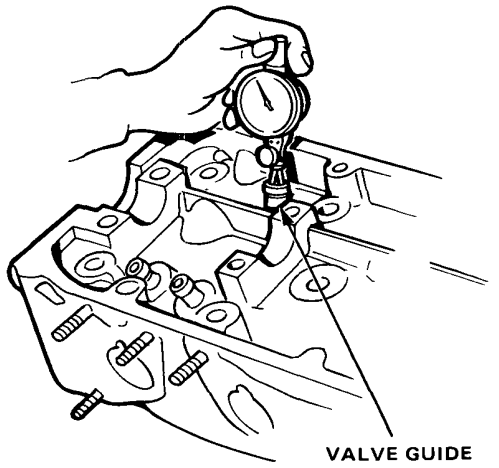
INTAKE and EXHAUST SPRING

Free Length:	**47.6 mm (1.89 in.)**
Installed Length:	**43.0 mm (1.69 in.)**
Spring Force:	**18.0–21.0 kg (39.7–47.3 lb)**
Compressed Length:	**34.0 mm (1.34 in.)**
Spring Force:	**67.6–75.6 kg (149.1–166.7 lb)**

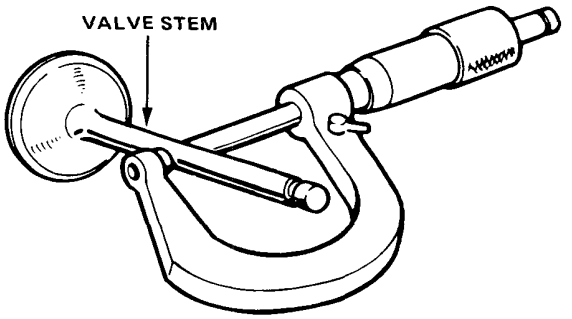
Cylinder Head/Valve Train

Valve Guide-to-Valve Stem Clearance

1. Measure the I.D. of the intake and exhaust valve guides with an inside micrometer or ball gauge.



2. Using a micrometer, measure the diameter of valve stem.



3. Now subtract each stem diameter from its guide I.D.

4. The difference between the largest measurement in the guide and the smallest measurement on the valve stem should not exceed the service limit.

Intake Valve Guide I.D.
Standard (New): 6.61–6.63 mm (0.260–0.261 in.)
Service Limit: 6.65 mm (0.262 in.)

Exhaust Valve Guide I.D.
Standard (New): 6.61–6.63 mm (0.260–0.261 in.)
Service Limit: 6.65 mm (0.262 in.)

Intake Valve Stem-to-Guide Clearance
Standard (New): 0.02–0.05 mm (0.001–0.002 in.)
Service Limit: 0.08 mm (0.003 in.)

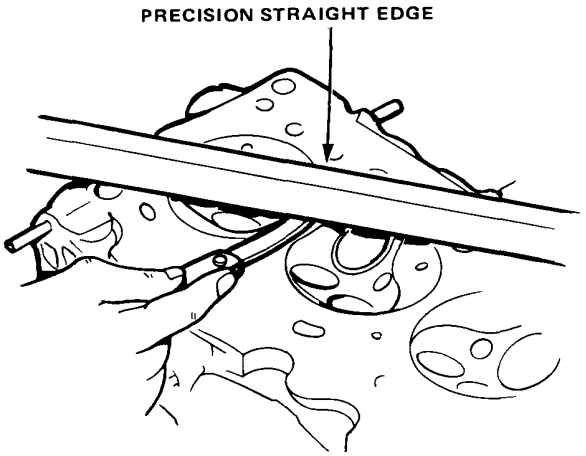
Exhaust Valve Stem-to-Guide Clearance
Standard (New): 0.05–0.08mm (0.002–0.003 in.)
Service Limit: 0.11 mm (0.004 in.)

Cylinder Head Warpage

NOTE: If camshaft bearing clearances are not within specification, the head cannot be resurfaced (page 6-8).

If camshaft bearing radial clearances are within specifications, check head for warpage.

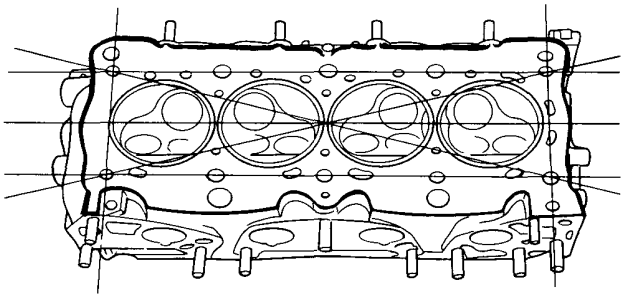
- If warpage is less than 0.05 mm (0.002 in.) cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in.) based on height of 90.0 mm (3.54 in.)



Cylinder Head Height:

New:	**90.0 mm (3.54 in.)**
Service Limit:	**89.8 mm (3.53 in.)**

Measure along edges, and 3 ways across center.

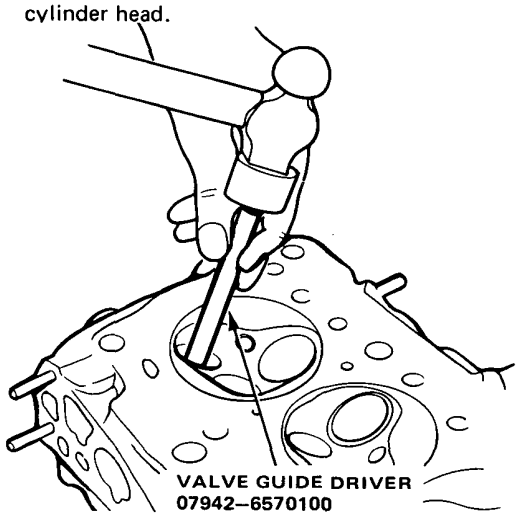


Valve Guide Replacement

NOTE:
- For best results, heat cylinder head to 150°C (300°F) before removing or installing guides.
- It may be necessary to use an air hammer to remove some valve guides.

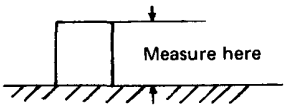
CAUTION: To avoid burns, use heavy gloves when handling heated cylinder head.

1. Drive the valve guide out from the bottom of the cylinder head.

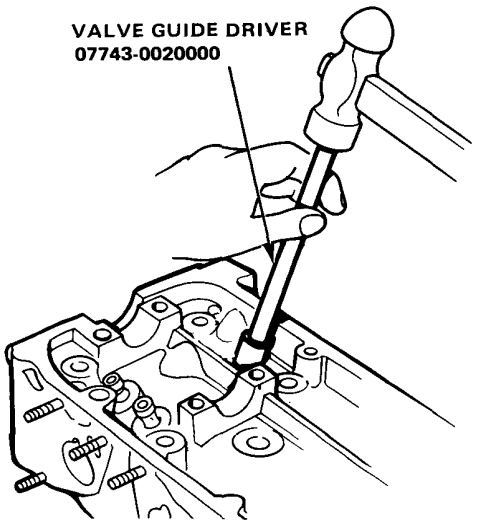


2. Drive in a new valve guide to the specified depth.

Intake: 17.5 mm (0.69 in.)
Exhaust: 16.0 mm (0.63 in.)



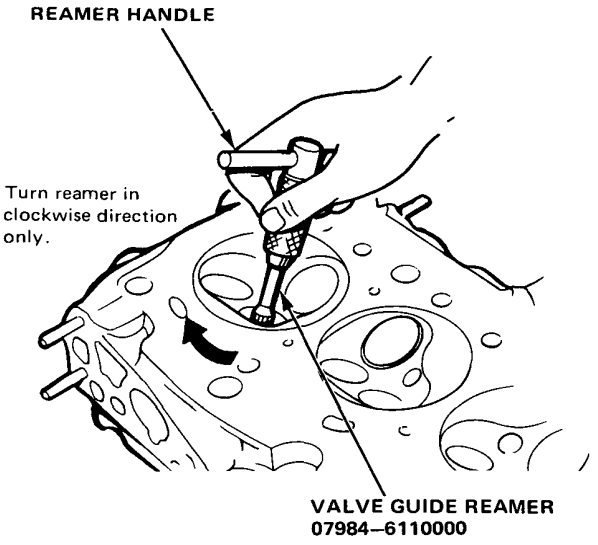
NOTE: If using adjustable valve guide driver 07743 –0020000, adjust the collar depth to correspond with the measurements given above.



Valve Guide Reaming

NOTE: For new valve guides only.

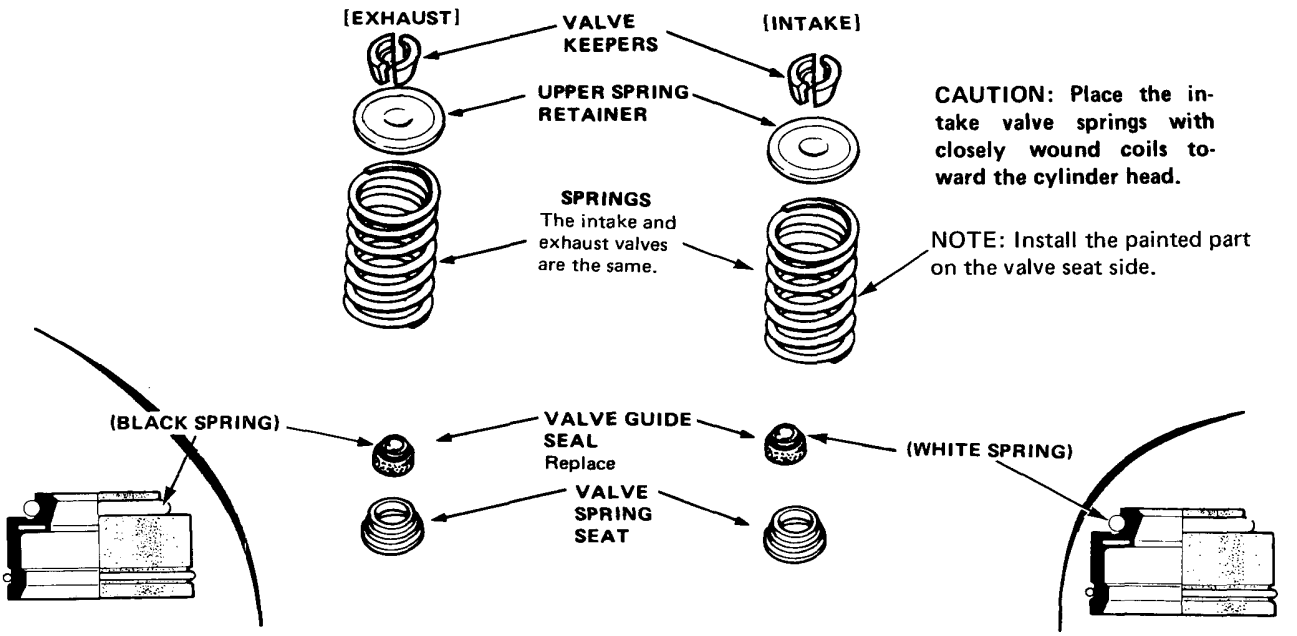
1. Coat reamer and valve guide with cutting oil.
2. Rotate reamer clockwise the full length of the valve guide bore.
3. Continue to rotate reamer clockwise while removing.
4. Thoroughly wash the guide in detergent and water to remove any cutting residue.
5. Check clearance with valve (page 6-14).



Cylinder Head/Valve Train

Valve Spring Installation Sequence

NOTE: Exhaust and intake valve guide seals are NOT interchangeable.



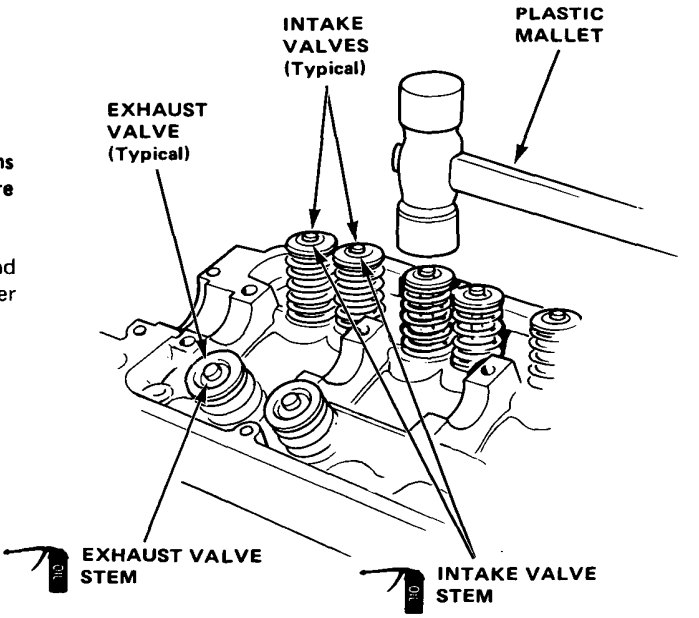
CAUTION: Place the intake valve springs with closely wound coils toward the cylinder head.

NOTE: Install the painted part on the valve seat side.

Intake and Exhaust Valve Installation

When installing valves in cylinder head, coat valve stems with oil before inserting into valve guides, and make sure valves move up and down smoothly.

When valves and springs are in place, lightly tap the end of each valve stem two or three times to ensure proper seating of valve and valve keepers (use plastic mallet).



Cam/Rocker Arm and Camshaft Seal/Pulley Installation

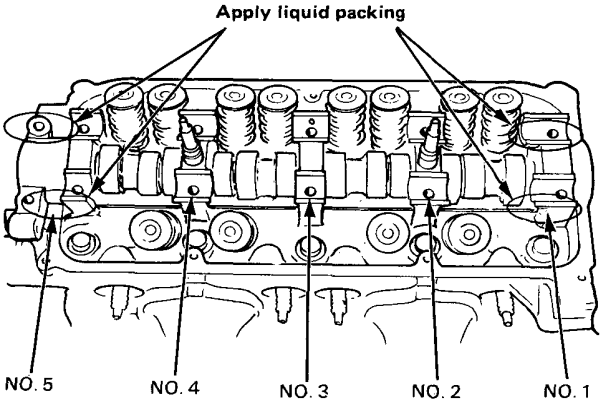
CAUTION:

- **Make sure that all rockers are in alignment with valves when torquing rocker assembly bolts.**
- **Valve locknuts should be loosened and adjusting screws backed off before installation.**

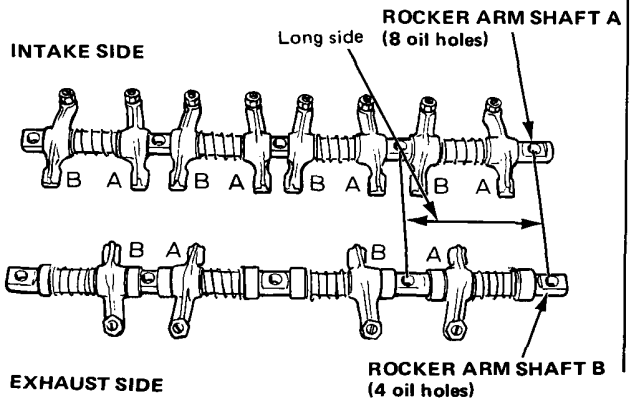
1. After wiping down cam and journals in cylinder head, lubricate both surfaces and install camshaft.
2. Turn camshaft until its keyway is facing up. (No. 1 cylinder TDC).
3. Install the camshaft seal with the open side (spring) facing in.

OIL Lubricate cam lobes after reassembly.

4. Apply liquid gasket to the head mating surfaces of the Nos. 1 and 5 camshaft holders, and place them on top of the cylinder along with the Nos. 2, 3 and 4.

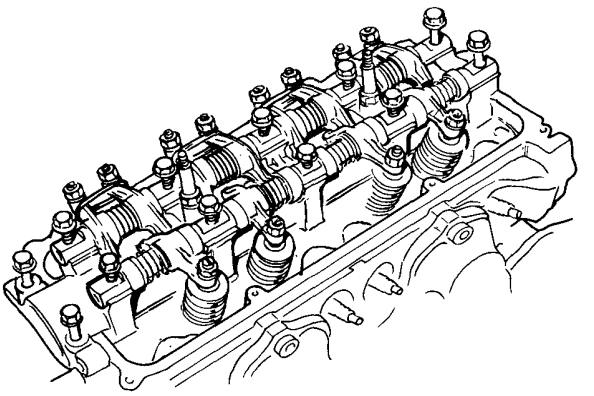


5. Temporarily assemble the rocker arms.
   To ease assembly, use rubber bands to hold the rocker arms in position.



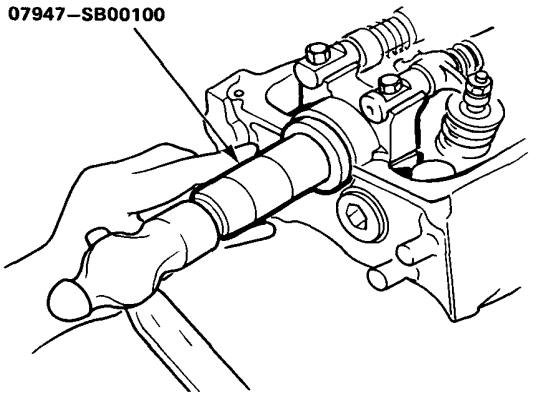
6. Set rocker arm assembly in place, loosely install the bolts, then remove the rubber bands.

   NOTE: Do not allow the collars to ride over the camshaft holders.



7. Press in the cam shaft oil seal securely with the special tool.

CAMSHAFT SEAL DRIVER
07947–SB00100

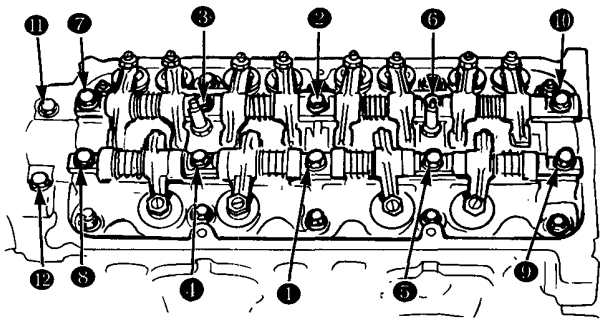


(cont'd)

Cylinder Head/Valve Train

Cam/Rocker Arm and Camshaft Seal/Pulley Installation (cont'd)

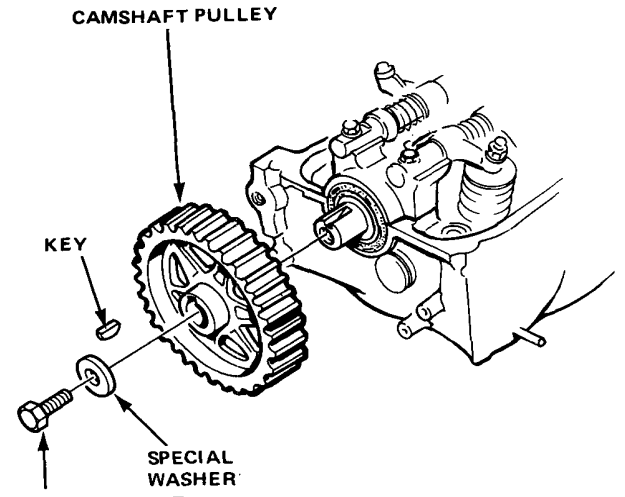
8. Tigthen each bolt two turns at a time in the sequence shown below to insure that the rockers do not bind on the valves.



8 x 1.25 mm
22 N·m (2.2 kg-m, 16 lb-ft)

9. Install key into groove in camshaft.

10. Push camshaft pulley onto camshaft, then tighten retaining bolt to torque shown.



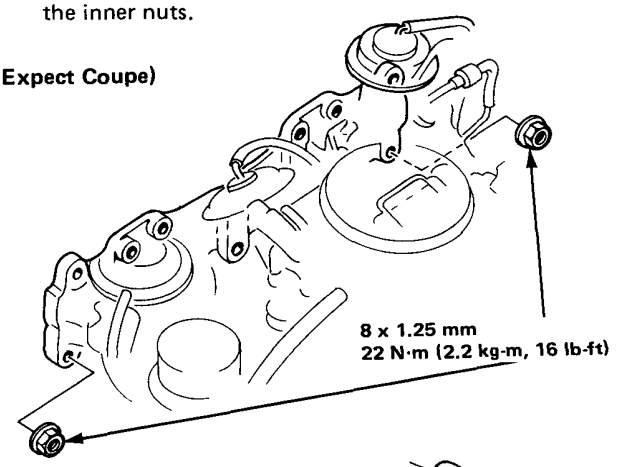
Cylinder Head Installation

1. Install the cylinder head in reverse order of removal:

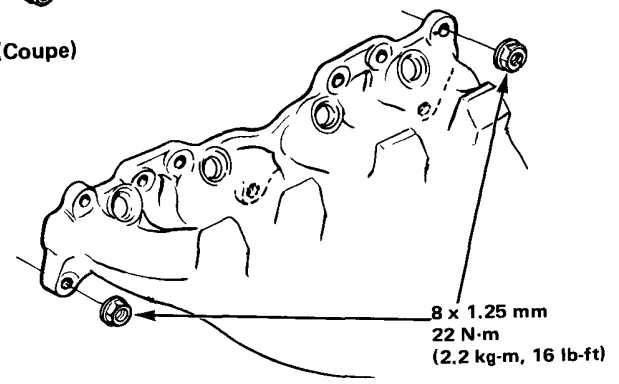
- Always use a new head gasket.
- Cylinder head and engine block surface must be clean.
- "UP" mark on timing belt pulley should be at the top.

2. Install the intake manifold and tighten the nuts in a criss-cross pattern in 2 or 3 steps, beginning with the inner nuts.

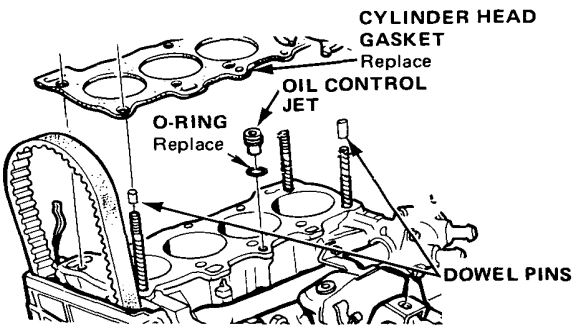
(Expect Coupe)



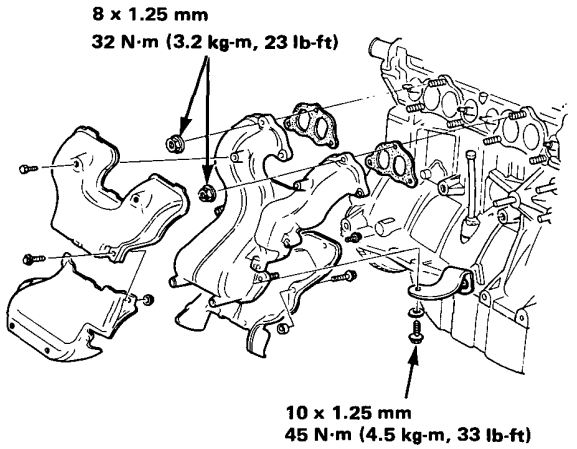
(Coupe)

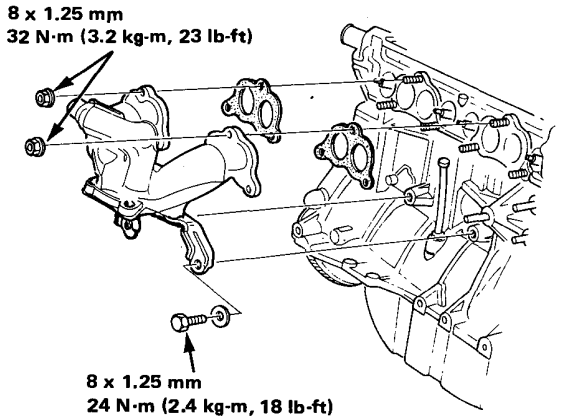


NOTE: Cylinder head dowel pins and oil control jet must be aligned.



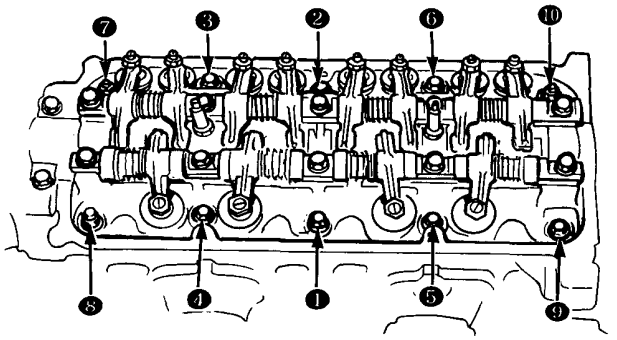
3. Install the exhaust manifold and bracket.





4. Adjust the valve timing (page 6-21).
5. Tighten cylinder head bolts and nuts in two steps. In the first step tighten all bolts and nuts, in sequence, to about 30 N.m (3.0 kg-m, 22 lb-ft); in the final step tighten, in same sequence, to 60 N.m (60 kg-m, 43 lb-ft).

CYLINDER HEAD TORQUE SEQUENCE



6. After installation, check that all tubes hoses and connectors are installed correctly.