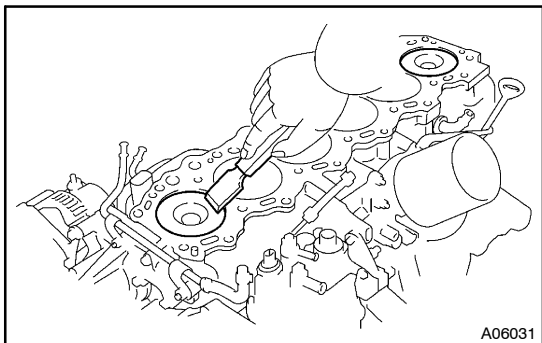
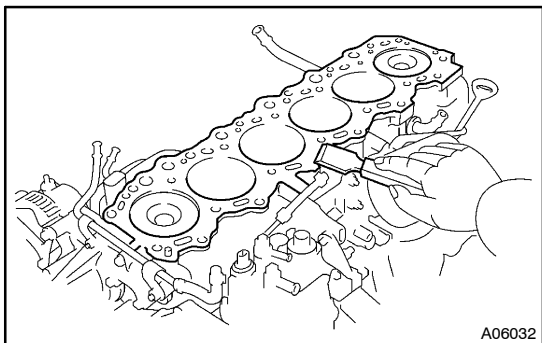




INSPECTION

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

- (a) Turn the crankshaft, and bring each piston to the top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



- (b) Remove all the gasket material from the top of the cylinder block.

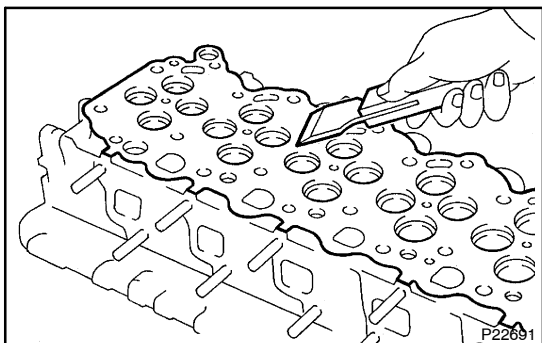
NOTICE:

Be careful not to scratch the surfaces.

- (c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION:

Protect your eyes when using high-compressed air.

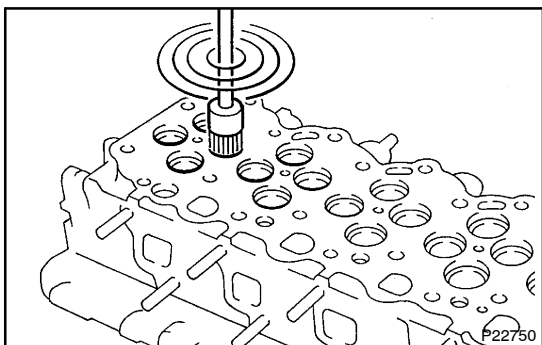


2. CLEAN CYLINDER HEAD

- (a) Remove gasket material
Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

NOTICE:

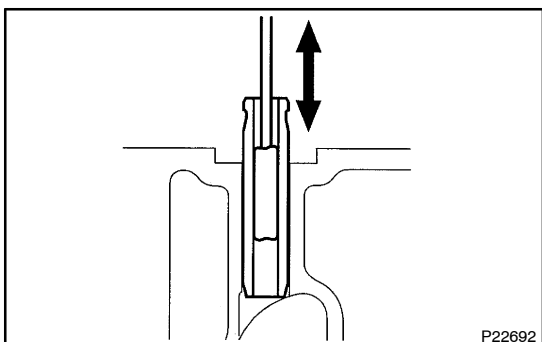
Be careful not to scratch the cylinder block contact surface.



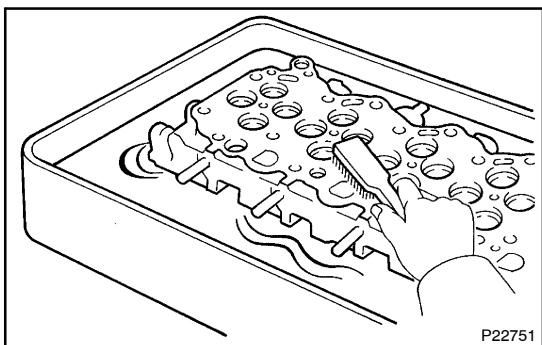
- (b) Clean intake and exhaust ports
Using a wire brush, remove all the carbon from the intake and exhaust ports.

NOTICE:

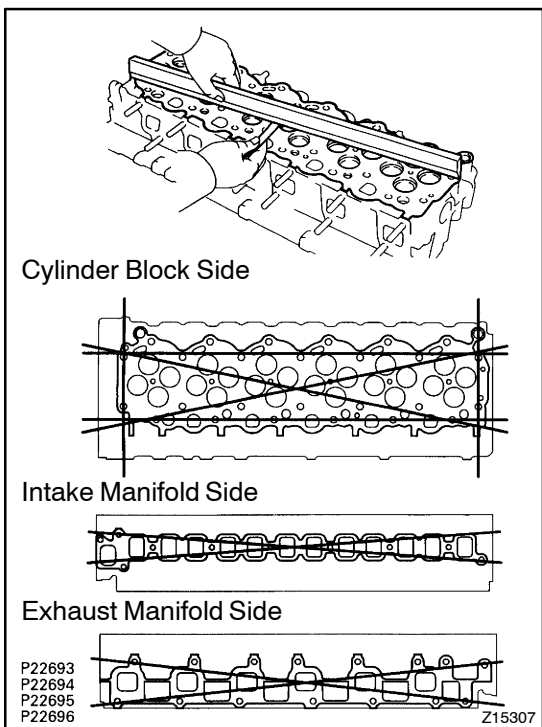
Be careful not to scratch the valve contact surface.



- (c) Clean valve guide bushings
Using a valve guide bushing brush and solvent, clean all the guide bushings.



- (d) Clean cylinder head
Using a soft brush and solvent, thoroughly clean the cylinder head.

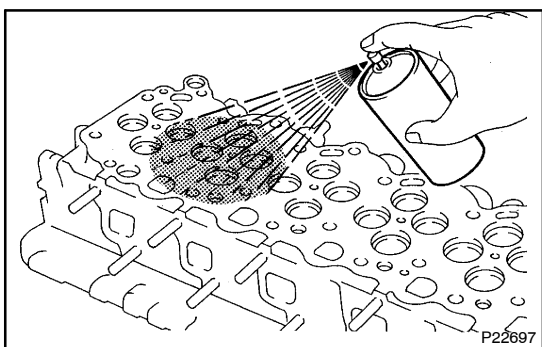


3. INSPECT CYLINDER HEAD

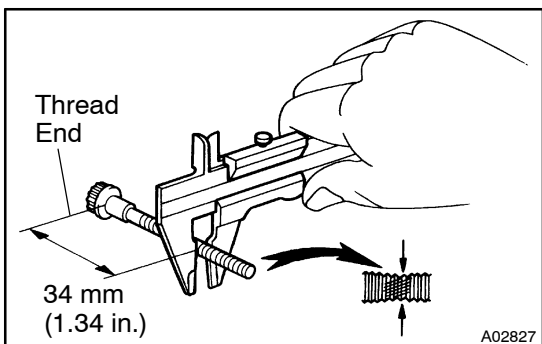
- (a) Inspect for flatness
Using a precision straight edge and thickness gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

Maximum warpage: 0.20 mm (0.0079 in.)

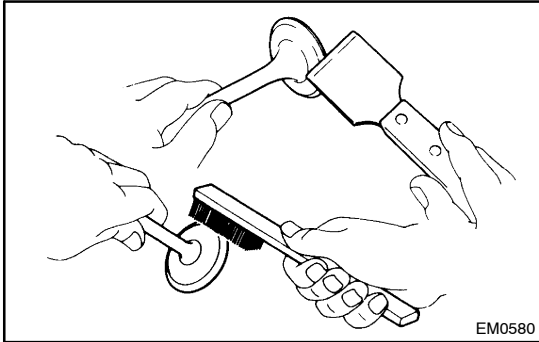
If warpage is greater than maximum, replace the cylinder head.



- (b) Inspect for cracks
Using a dye penetrant, check the intake ports, exhaust ports and surface contacting the cylinder block.
If cracked, replace the cylinder head.

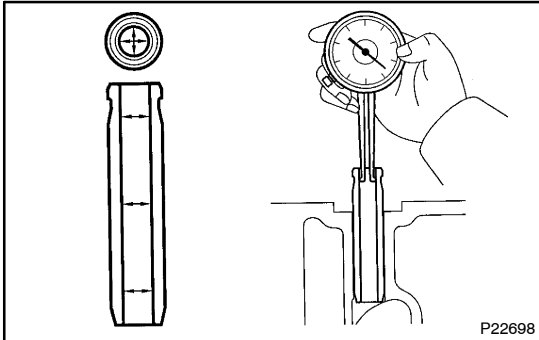


- (c) Inspect cylinder head bolts
Using vernier calipers, measure the minimum outer diameter of the compressed thread at the measuring point.
Standard outer diameter:
10.800 – 11.000 mm (0.4252 – 0.4331 in.)
Minimum outer diameter: 10.55 mm (0.4154 in.)
If the outer diameter is less than minimum, replace the bolt.



4. CLEAN VALVES

- (a) Using a gasket scraper, chip off any carbon from the valve head.
- (b) Using a wire brush, thoroughly clean the valve.

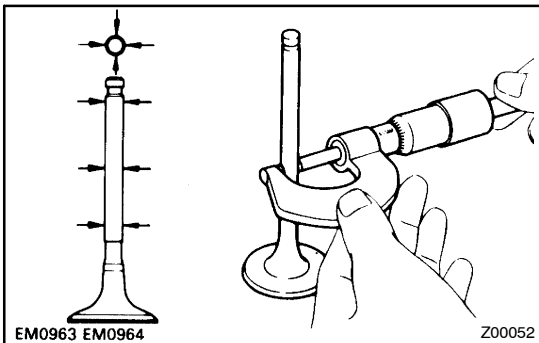


5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

- (a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Busing inside diameter:

7.010 – 7.030 mm (0.2760 – 0.2768 in.)



- (b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake

6.970 – 6.985 mm (0.2744 – 0.2750 in.)

Exhaust

6.960 – 6.975 mm (0.2740 – 0.2746 in.)

- (c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:

Intake

0.025 – 0.060 mm (0.0010 – 0.0024 in.)

Exhaust

0.035 – 0.070 mm (0.0014 – 0.0028 in.)

Maximum oil clearance:

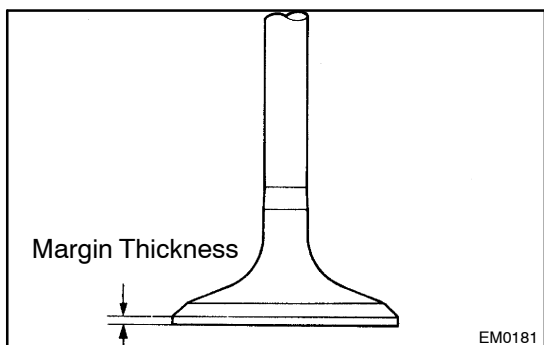
Intake

0.08 mm (0.0031 in.)

Exhaust

0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the valve and cylinder head.



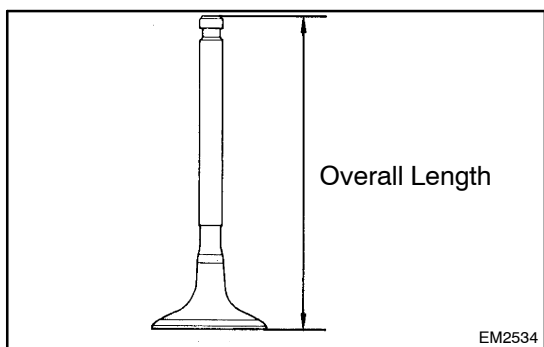
6. INSPECT VALVES

- (a) Check the valve face for wear.
If the valve face is worn, replace the valve.
- (b) Check the valve head margin thickness.

Standard margin thickness: 1.00 mm (0.0394 in.)

Minimum margin thickness: 0.83 mm (0.0327 in.)

If the margin thickness is less than minimum, replace the valve



- (c) Check the valve overall length.

Standard overall length:

Intake

126.85 – 127.45 mm (4.9941 – 5.0177 in.)

Exhaust

126.83 – 127.43 mm (4.9933 – 5.0169 in.)

Minimum overall length:

Intake

126.85 mm (4.9941 in.)

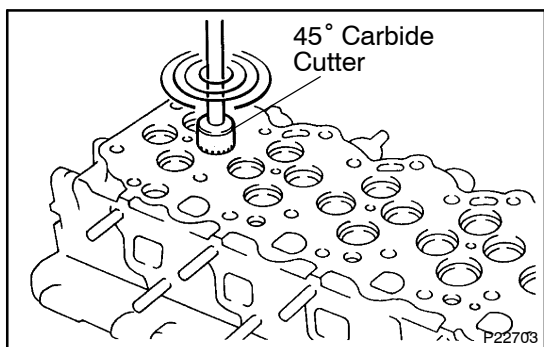
Exhaust

126.83 mm (4.9933 in.)

If the overall length is less than minimum, replace the valve.

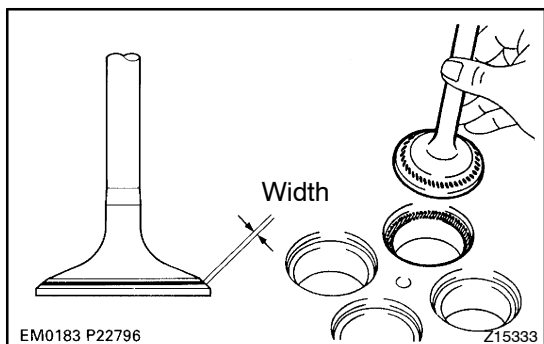
- (d) Check the valve stem tip for wear.

If the valve stem tip is worn, replace the valve.



7. INSPECT AND CLEAN VALVE SEATS

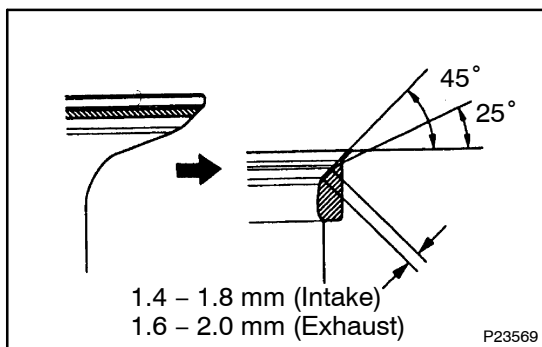
- (a) Using a 45° carbide cutter, resurface the valve seats.
Remove only enough metal to clean the seats.



- (b) Check the valve seating position.

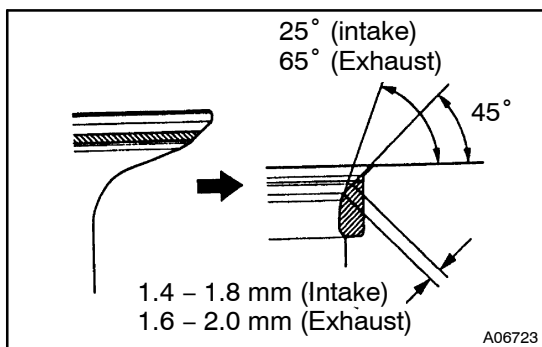
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

- (c) Check the valve face and seat for the following:
- If blue appears 360° around the valve face, the valve is concentric. If not, replace the valve.
 - If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
 - Check that the seat contact is in the middle of the valve face with the following width:

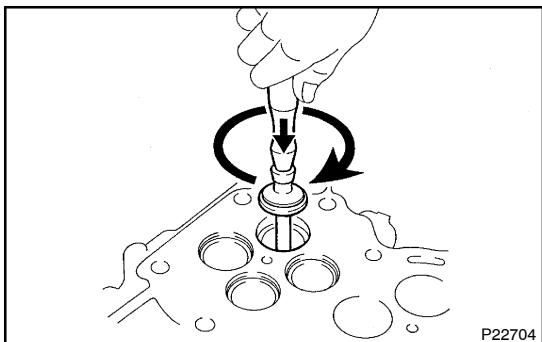
Intake**1.4 – 1.8 mm (0.055 – 0.071 in.)****Exhaust****1.6 – 2.0 mm (0.063 – 0.079 in.)**

If not, correct the valve seats as follows:

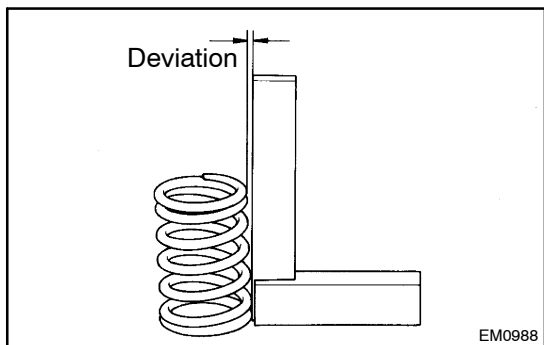
- (1) If the seating is too high on the valve face, use 25° and 45° cutters to correct the seat.



- (2) If the seating is too low on the valve face, use 70° (intake) or 65° (exhaust) and 45° cutters to correct the seat.



- (d) Hand-lap the valve and valve seat with an abrasive compound.
- (e) After hand-lapping, clean the valve and valve seat.

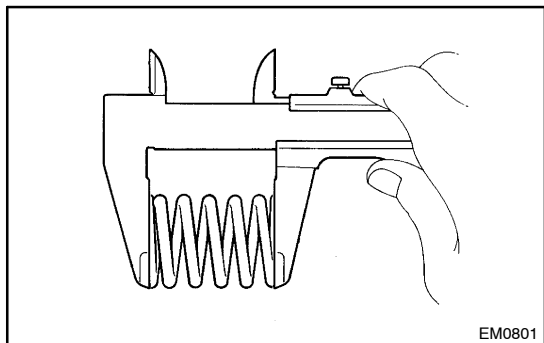


8. INSPECT VALVE SPRINGS

- (a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation: 2.0 mm (0.079 in.)

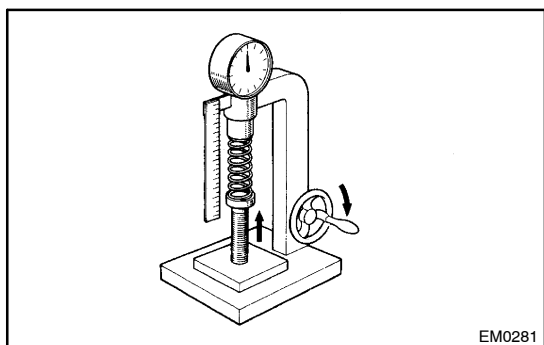
If the deviation is greater than maximum, replace the valve spring.



- (b) Using vernier calipers, measure the free length of the valve spring.

Free length: 49.6 mm (1.9527 in.)

If the free length is not as specified, replace the valve spring.



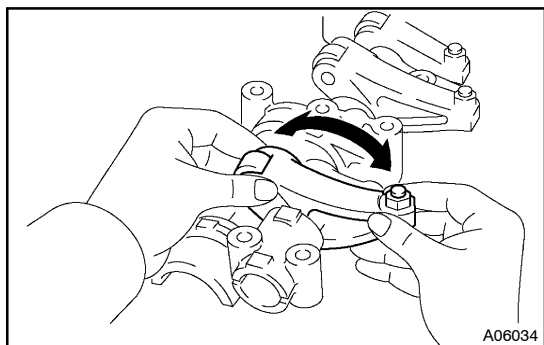
- (c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

237 – 263 N (24.2 – 26.8 kgf, 53.4 – 59.1 lbf)

at 39.5 mm (1.555 in.)

If the installed tension is not as specified, replace the valve spring.

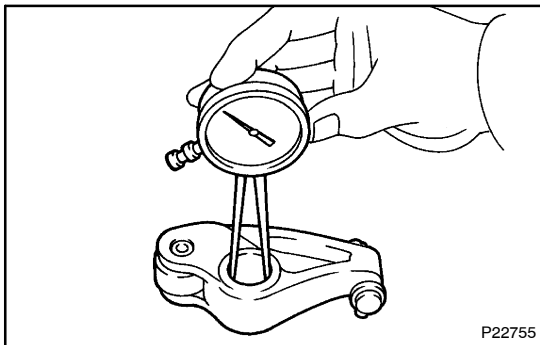
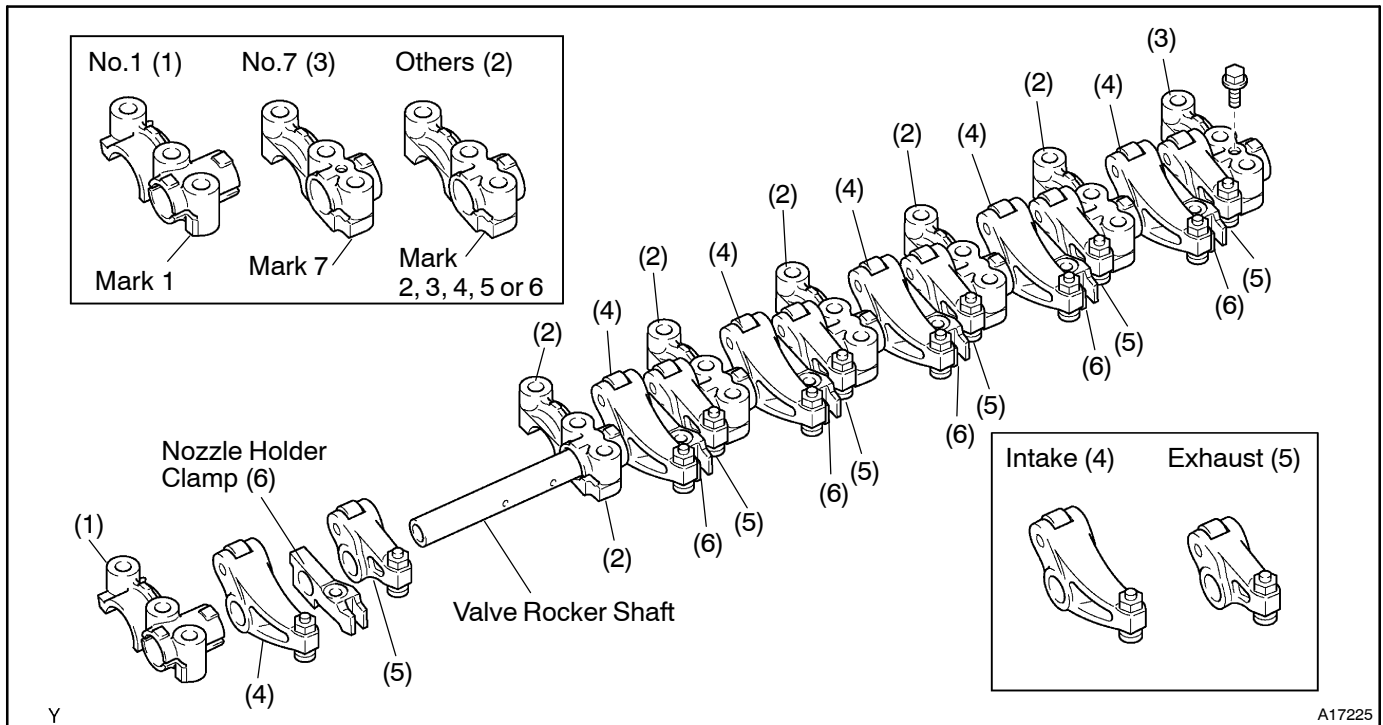


9. INSPECT VALVE ROCKER ARM AND SHAFT

- (a) Check that each rocker arm turns smoothly.
If movement is felt, disassemble and check.
- (b) Remove the bolt, and disassemble the parts.

HINT:

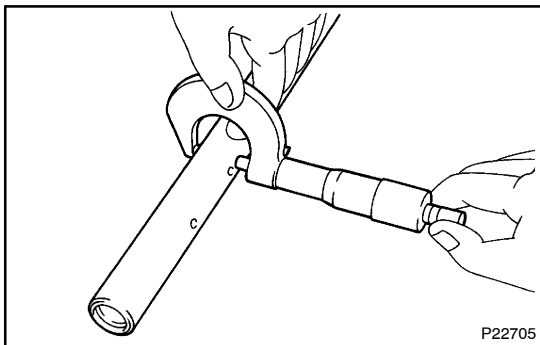
Arrange the disassembled parts in correct order.



- (c) Using a caliper gauge, measure the inside diameter of the rocker arm.

Rocker arm inside diameter:

20.012 – 20.033 mm (0.7879 – 0.7887 in.)



- (d) Using a micrometer, measure the diameter of the rocker arm shaft.

Shaft diameter:

19.972 – 19.993 mm (0.7863 – 0.7871 in.)

- (e) Subtract the rocker arm shaft measurement from the rocker arm measurement.

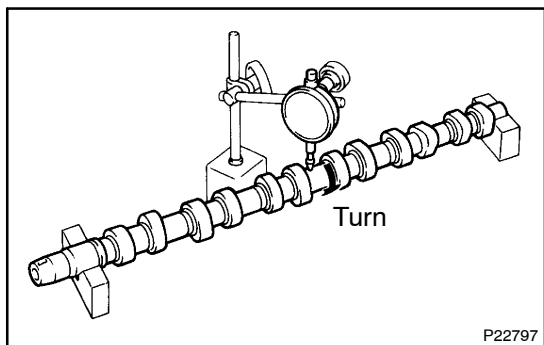
Standard oil clearance:

0.019 – 0.061 mm (0.0007 – 0.0024 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

If the clearance is greater than maximum, replace the rocker shaft and shaft.

- (f) Assemble the parts as shown in the illustration (See step (b) above).

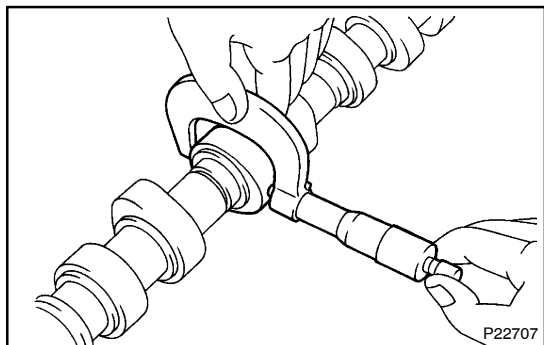


10. INSPECT CAMSHAFTS AND BEARINGS

- (a) Inspect camshaft for runout
- (1) Place the camshaft on V-blocks.
 - (2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.10 mm (0.0039 in.)

If the circle runout is greater than maximum, replace the camshaft.



- (b) Inspect cam lobes
Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

Intake

48.203 – 48.303 mm (1.8978 – 1.9017 in.)

Exhaust

50.734 – 50.834 mm (1.9974 – 2.0013 in.)

Minimum cam lobe height:

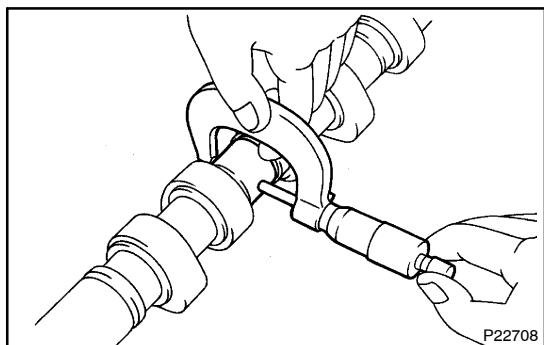
Intake

47.998 mm (1.8897 in.)

Exhaust

50.234 mm (1.9777 in.)

If the cam lobe height is less than minimum, replace the camshaft.



- (c) Inspect camshaft journals
Using a micrometer, measure the journal diameter.

Journal diameter:

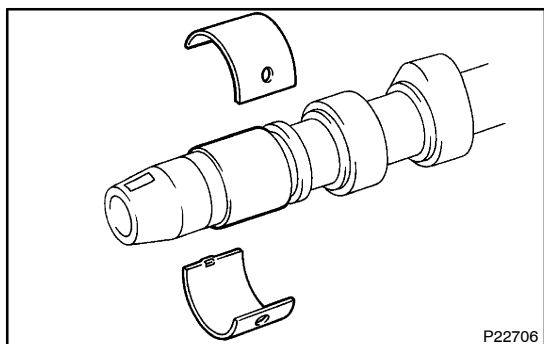
No.1

34.969 – 34.985 mm (1.3767 – 1.3774 in.)

others

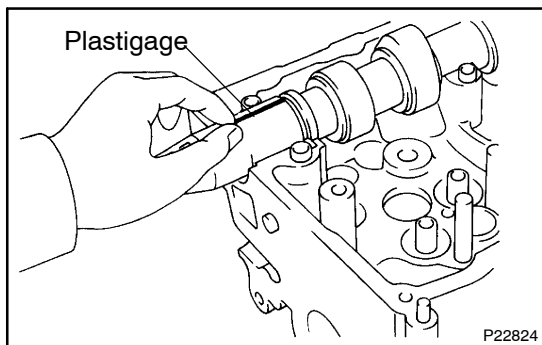
27.986 – 28.002 mm (1.1018 – 1.1024 in.)

If the journal diameter is not as specified, check the oil clearance.

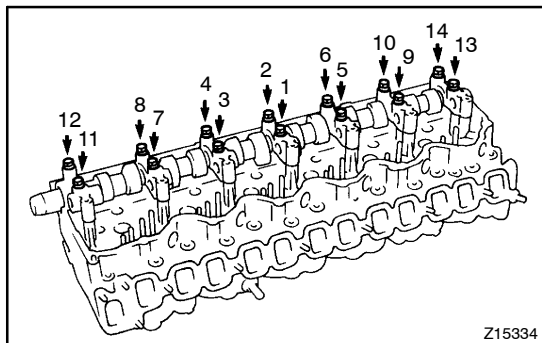


- (d) Inspect camshaft bearings
Check the bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



- (e) Inspect camshaft journal oil clearance
- (1) Clean the bearing caps and camshaft journals.
 - (2) Place the camshaft on the cylinder head.
 - (3) Lay a strip of Plastigage across each of the camshaft journals.
 - (4) Remove the 7 bearing caps from the valve rocker shaft. (See step 9)

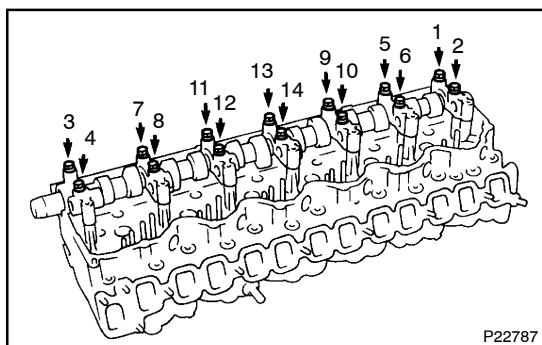


- (5) Install the 7 bearing caps with the 14 bolts. Uniformly tighten the bolts in several passes, in the sequence shown.

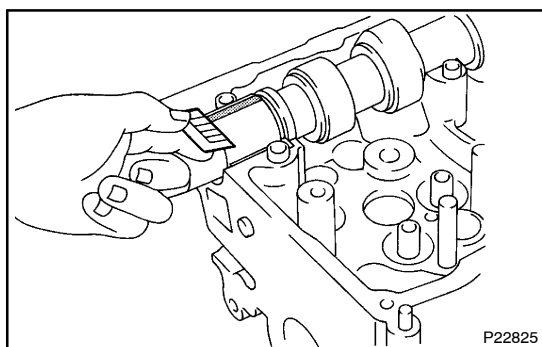
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Do not turn the camshaft.



- (6) Uniformly loosen and remove the 14 bolts in several passes, in the sequence shown.
- (7) Remove the 7 bearing caps.



- (8) Measure the Plastigage at its widest point.

Standard oil clearance:

No.1

0.022 – 0.074 mm (0.0009 – 0.0029 in.)

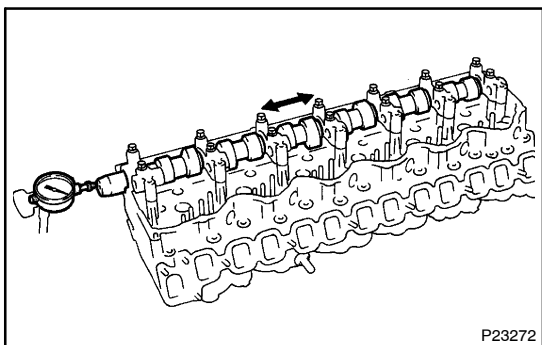
Others

0.023 – 0.075 mm (0.0009 – 0.0030 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

- (9) Completely remove the Plastigage.
- (10) Install the 7 bearing caps to the valve rocker shaft (See item 9 (b) above).



P23272

- (f) Inspect camshaft thrust clearance
- (1) Install the camshaft.
(See procedure in item e above)
 - (2) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:

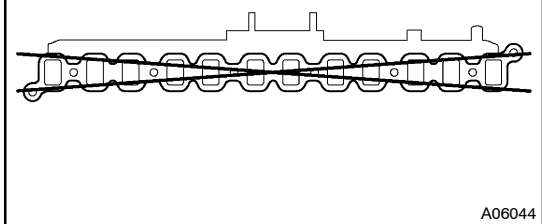
0.10 – 0.20 mm (0.0039 – 0.0079 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

- (3) Remove the camshaft.

Intake Manifold



A06044

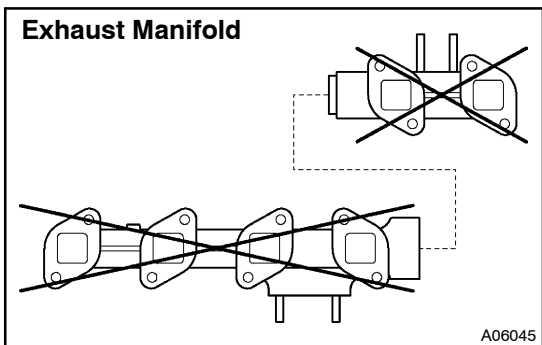
11. INSPECT INTAKE MANIFOLD

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage: 0.40 mm (0.0157 in.)

If warpage is greater than maximum, replace the manifold.

Exhaust Manifold



A06045

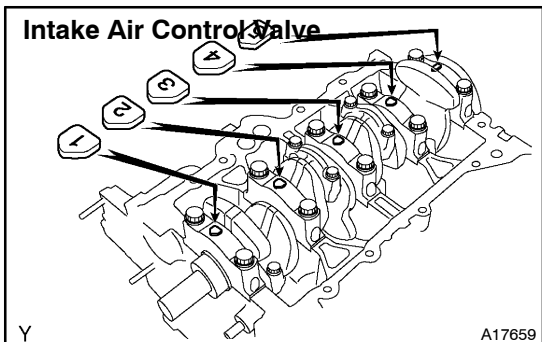
12. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage: 0.40 mm (0.0157 in.)

If warpage is greater than maximum, replace the manifold.

Intake Air Control Valve



A17659

13. INSPECT INTAKE AIR CONTROL VALVE

Using a precision straight edge and feeler gauge, measure the surface contacting the intake air control valve.

Maximum warpage: 0.40 mm (0.0157 in.)

If warpage is greater than maximum, replace the intake air control valve.