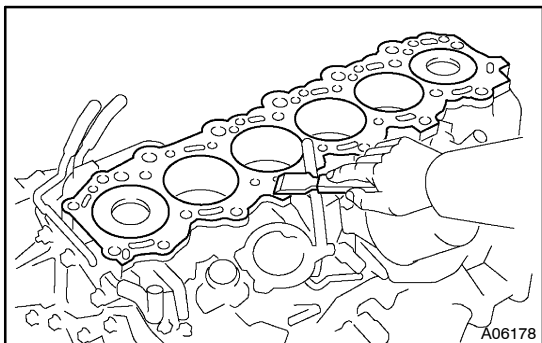


## INSPECTION

### 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.

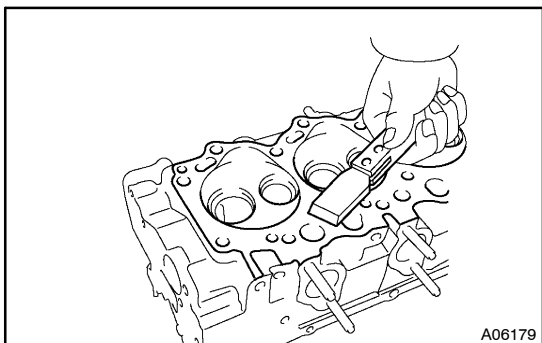
#### NOTICE:

**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.**

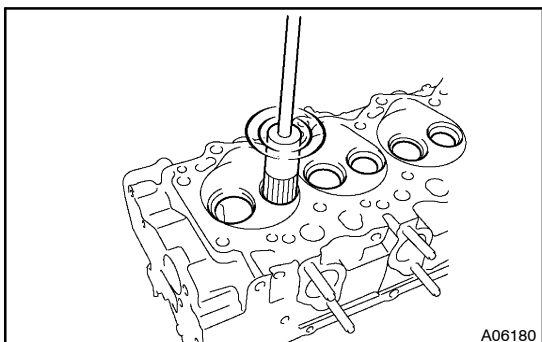


### 2. CLEAN CYLINDER HEAD

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

#### NOTICE:

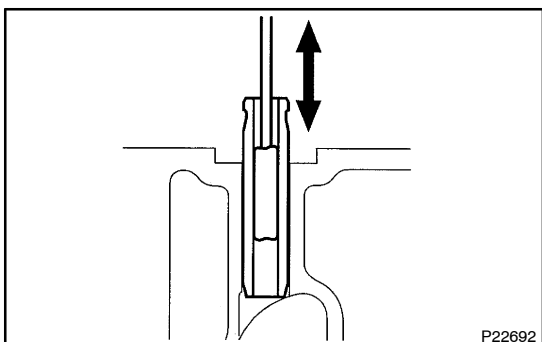
**Be careful not to scratch the cylinder block contact surface.**



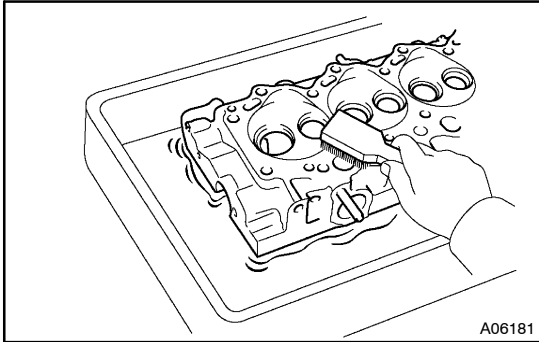
- (b) Clean intake and exhaust ports  
Using a wire brush, remove all the carbon from the intake and exhaust ports.

#### NOTICE:

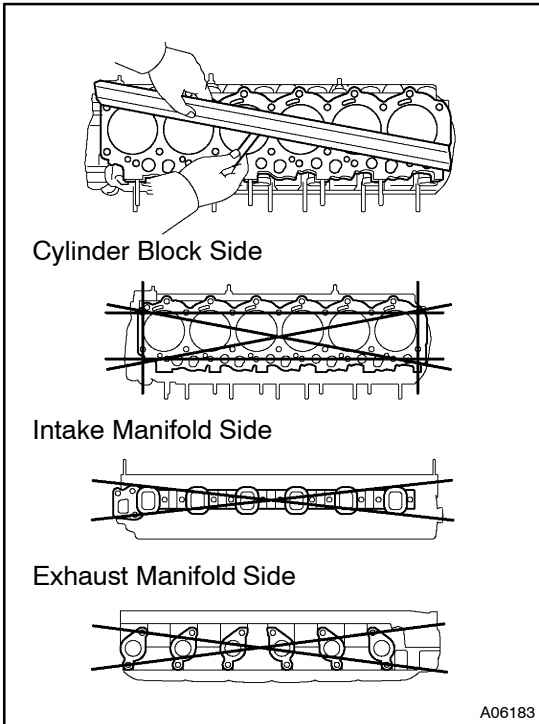
**Be careful not to scratch the valve contact surface.**



- (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.

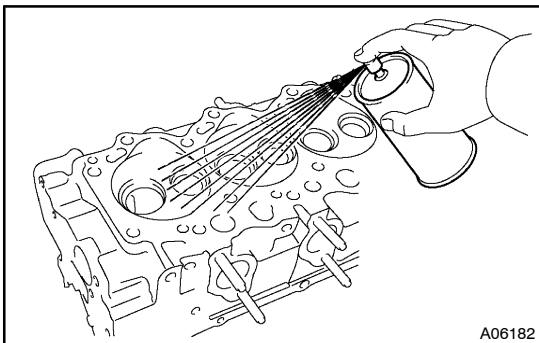


### 3. INSPECT CYLINDER HEAD

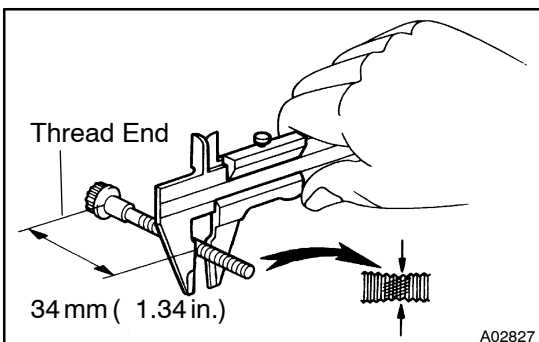
- (a) Inspect for flatness  
Using a precision straight edge and thickness gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

**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.



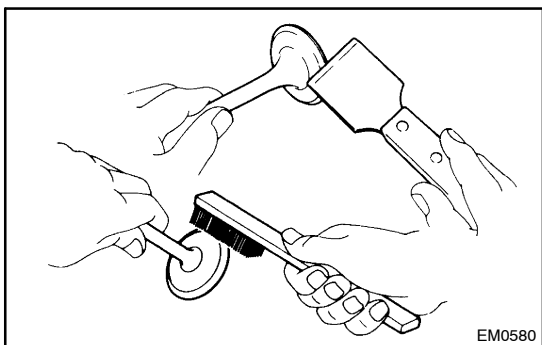
- (c) Inspect cylinder head bolts  
Using vernier calipers, measure the minimum outer diameter of the compressed thread at the measuring point.

**Standard outer diameter:**

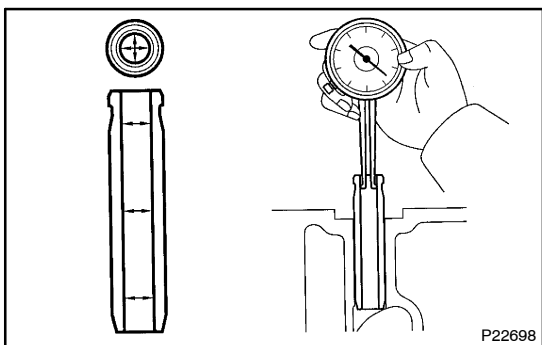
**10.800 – 11.000 mm (0.4252 – 0.4331 in.)**

**Minimum outer diameter: 10.55 mm (0.4154 in.)**

If the outer diameter is less than minimum, replace the bolt.

**4. CLEAN VALVES**

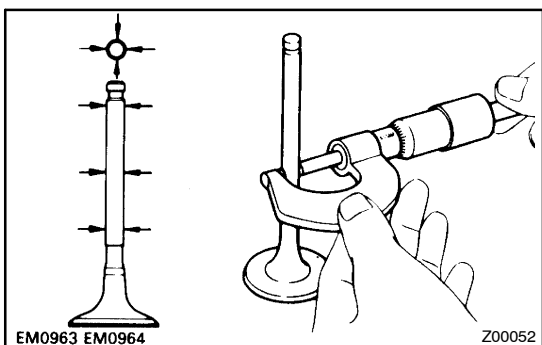
- (a) Using a gasket scraper, chip off any carbon from the valve head.
- (b) Using a wire brush, thoroughly clean the valve.

**5. INSPECT VALVE STEMS AND GUIDE BUSHINGS**

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

**Busing inside diameter:**

**8.010 – 8.030 mm (0.3154 – 0.3161 in.)**



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

**Valve stem diameter:**

**Intake**

**7.975 – 7.990 mm (0.3140 – 0.3146 in.)**

**Exhaust**

**7.960 – 7.975 mm (0.3134 – 0.3140 in.)**

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

**Standard oil clearance:**

**Intake**

**0.020 – 0.055 mm (0.0008 in.)**

**Exhaust**

**0.035 – 0.070 mm (0.0014 – 0.0028 in.)**

**Maximum oil clearance:**

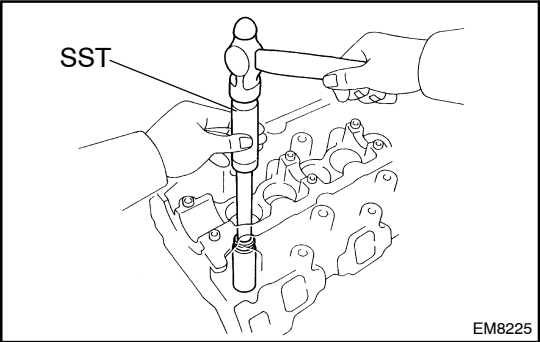
**Intake**

**0.08 mm (0.0031 in.)**

**Exhaust**

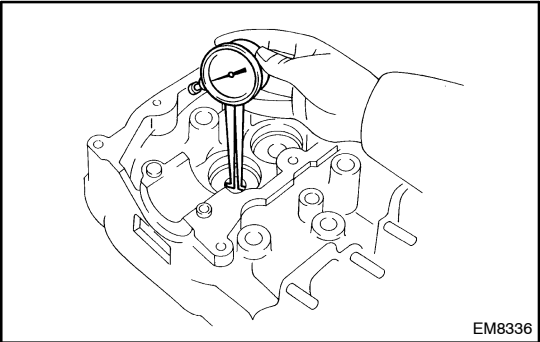
**0.10 mm (0.0039 in.)**

If the clearance is greater than maximum, replace the valve and guide bushings.



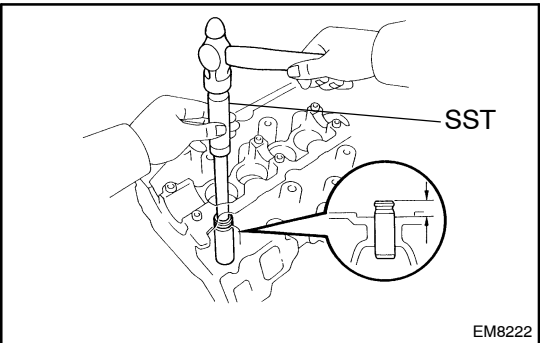
6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

- (a) Using SST and a hammer, tap out the guide bushing.  
SST 0920 1-10000 (0920 1-01060)
- (b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

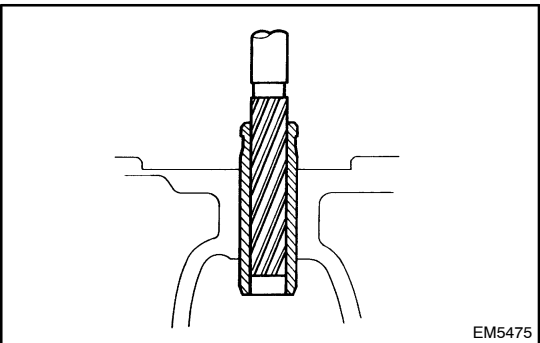


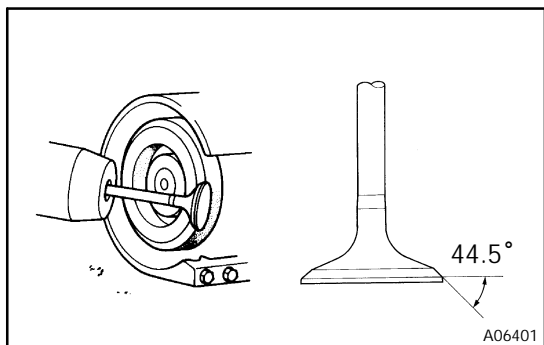
Bushing bore diameter mm (in.)	Bushing size
13.004 – 13.025 (0.5112 – 0.5128)	Use STD
13.054 – 13.075 (0.5139 – 0.5148)	Use O/S 0.05

- (c) Select a new guide bushing (STD size or O/S 0.05).  
If the bushing bore diameter of the cylinder head is greater than 13.025 mm (0.5 128 in.), machine the bushing bore to the following dimension:  
**Rebored cylinder head bushing bore dimension:  
13.054 – 13.075 mm (0.5 139–0.5148 in.)**  
If the bushing bore diameter of the cylinder head is greater than 13.075 mm (0.5 148 in.), replace the cylinder head.



- (d) Using SST and a hammer, tap in a new guide bushing to where there is 11.8 – 12.2 mm (0.465 – 0.480 in.) protruding from the cylinder head.  
SST 0920 1-10000 (0920 1-01060)
- (e) Using a sharp 8 mm reamer, ream the guide bushing to obtain the standard specified clearance between the guide bushing and valve stem.

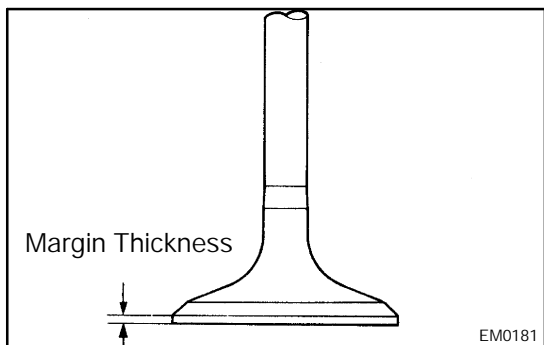




## 7. INSPECT AND GRIND VALVES

- (a) Grind the valve enough to remove pits and carbon.
- (b) Check that the valve is ground to the correct valve face angle.

**Valve face angle: 44.5°**



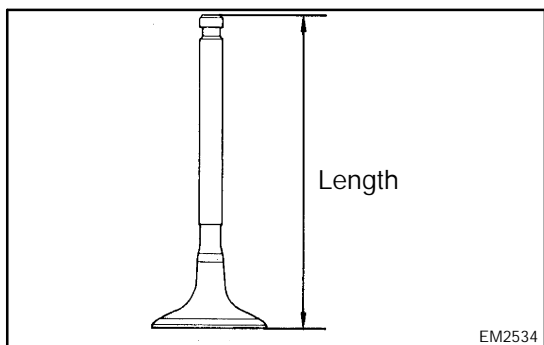
- (c) Check the valve face for wear.  
If the valve face is worn, replace the valve.

- (d) 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



- (e) Check the valve overall length.

**Standard overall length:**

**Intake**

**103.49 mm (4.0744 in.)**

**Exhaust**

**103.34 mm (4.0685 in.)**

**Minimum overall length:**

**Intake**

**102.79 mm (4.0468 in.)**

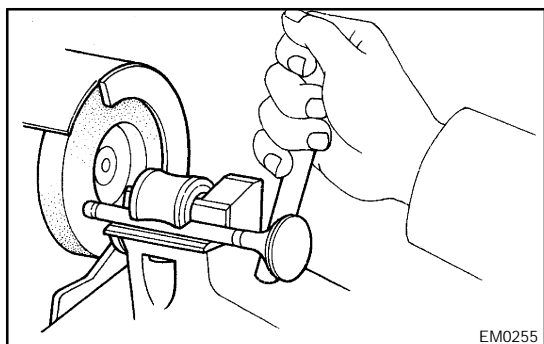
**Exhaust**

**102.64 mm (4.0409 in.)**

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

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

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

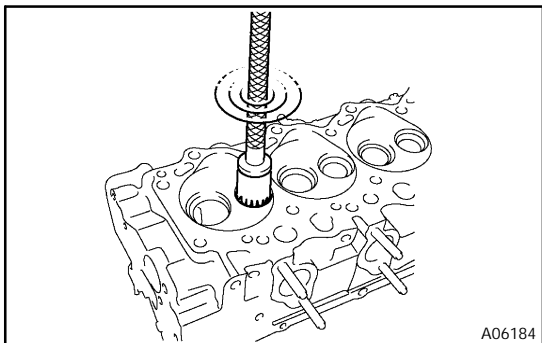


- (g) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

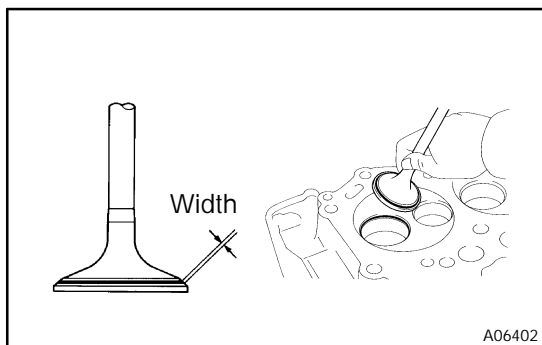
**NOTICE:**

**Do not grind off more than the minimum overall length.**



## 8. INSPECT AND CLEAN VALVE SEATS

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



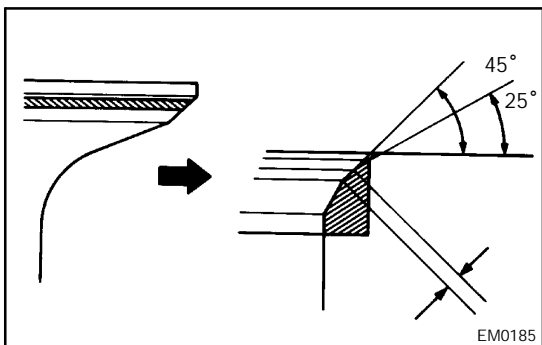
- (b) Check the valve seating position. Apply a light coat of Prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.
- (c) Check the valve face and seat for the following:
- If blue appears 360° around the valve face, the valve is concentric. If 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

1.5 – 1.9 mm (0.059 – 0.075 in.)

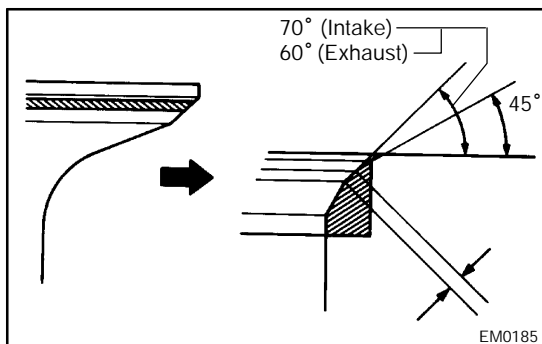
### Exhaust

1.8 – 2.2 mm (0.071 – 0.087 in.)

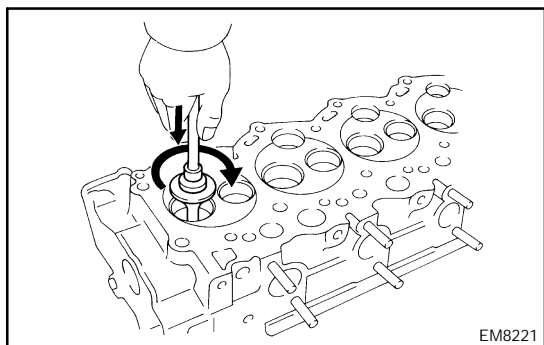


If not, correct the valve seats as follows:

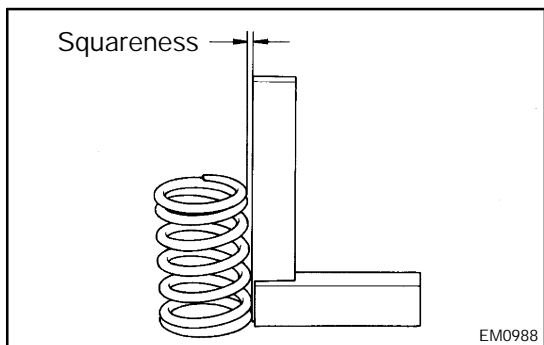
- (1) If the seating is too high on the valve face, use 25° and 45° cutters to correct the seat.



- (2) (Intake)  
If the seating is too low on the valve face, use 70° and 45° cutters to correct the seat.
- (3) (Exhaust)  
If the seating is too low on the valve face, use 60° 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.

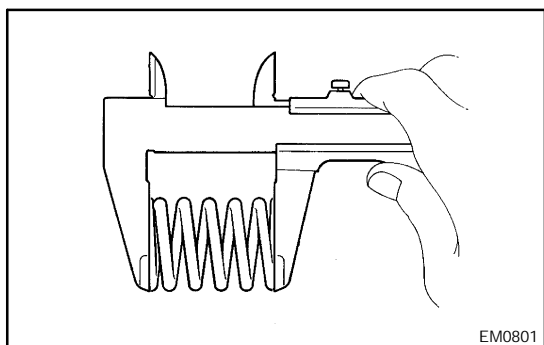


## 9. INSPECT VALVE SPRINGS

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

**Maximum deviation: 2.0 mm (0.079 in.)**

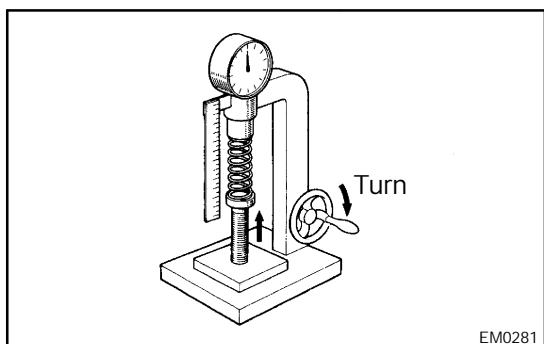
If the deviation is greater than maximum, replace the valve spring.



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

**Free length: 46.20 mm (1.8189 in.)**

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



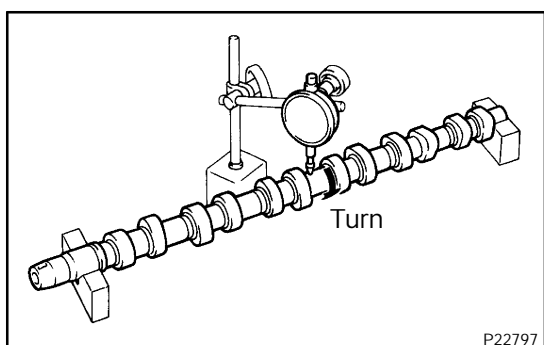
- (c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

**Installed tension:**

**301 – 332 N (30.7 – 33.9 kgf, 67.7 – 74.7 lbf)**

**at 37.0 mm (1.457 in.)**

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

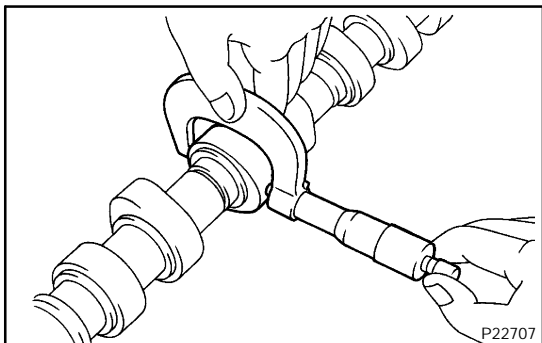


## 10. INSPECT CAMSHAFTS AND BEARINGS

- (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:**

**1HZ:**

55.090 – 55.110 mm (2.1689 – 2.1697 in.)

**1HD-T:**

54.440 – 54.460 mm (2.1433 – 2.1441 in.)

**Exhaust:**

55.940 – 55.960 mm (2.2024 – 2.2031 in.)

**Minimum cam lobe height:**

**Intake**

**1HZ:**

54.59 mm (2.1492 in.)

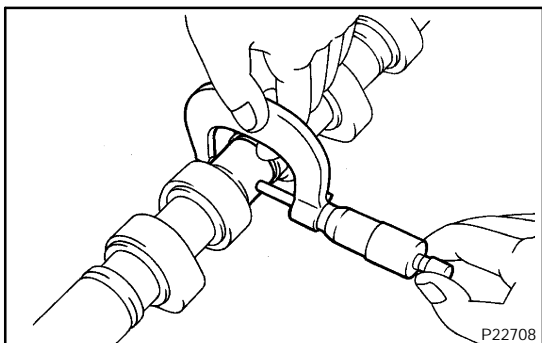
**1HD-T:**

53.94 mm (2.1236 in.)

**Exhaust**

55.44 mm (2.1827 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:**

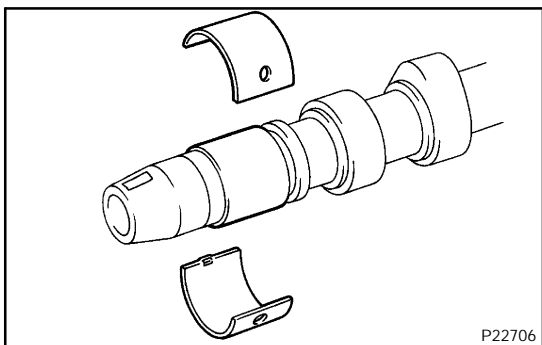
**No.1**

34.969 – 34.985 mm (1.3767 – 1.3774 in.)

**others**

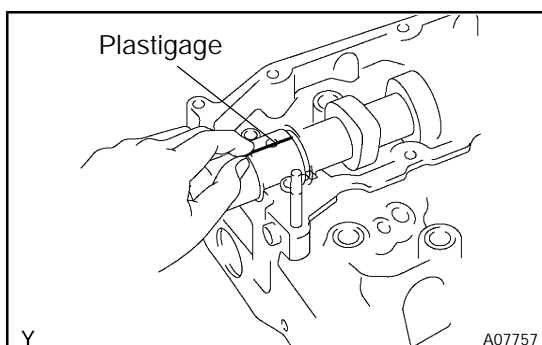
27.986 – 28.002 mm (1.1018 – 1.1024 in.)

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



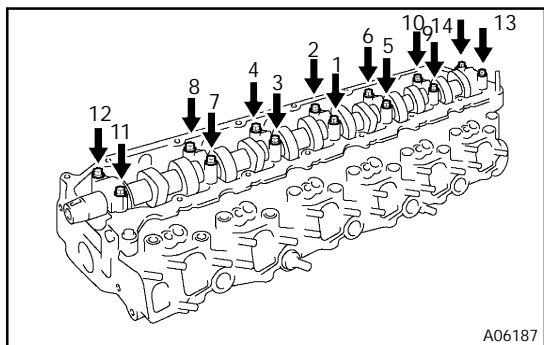
- (d) Inspect camshaft bearings  
Check the bearings for flaking and scoring.

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.



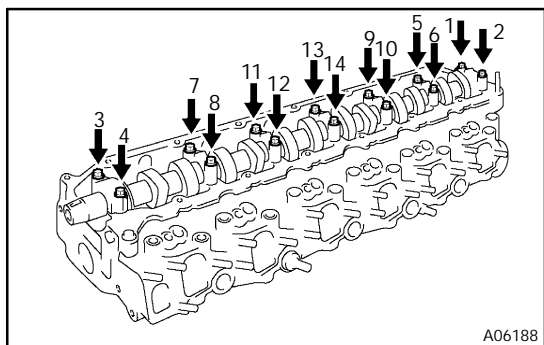


- (4) Install the 7 bearing caps with the 14 bolts. Uniformly tighten the bolts in several passes, in the sequence shown.

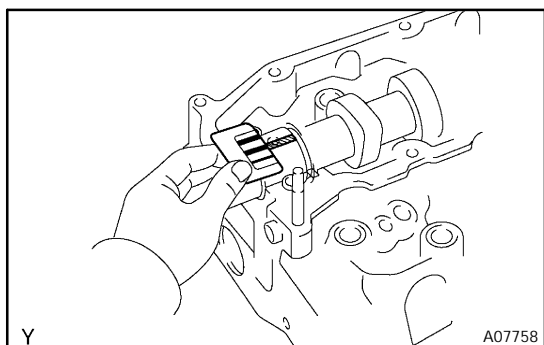
**Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)**

**NOTICE:**

**Do not turn the camshaft.**



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



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

**Standard oil clearance:**

**No.1**

**0.022 – 0.074 mm (0.0009 – 0.0029 in.)**

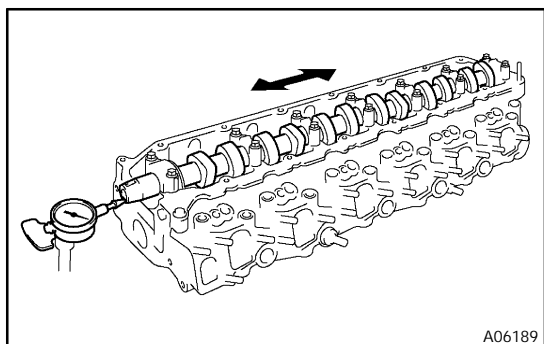
**Others**

**0.030 – 0.066 mm (0.0012 – 0.0026 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.

- (8) Completely remove the Plastigage.



- (f) Inspect camshaft thrust clearance

- (1) Install the camshaft.

(See procedure in item (4) above)

- (2) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

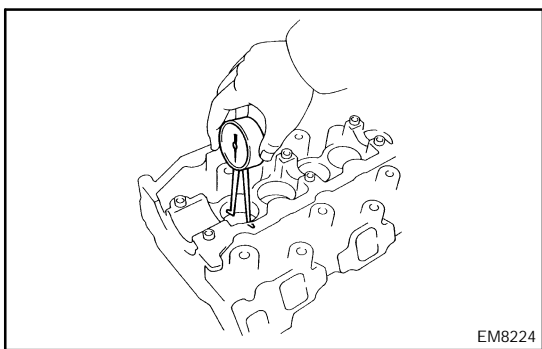
**Standard thrust clearance:**

**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.

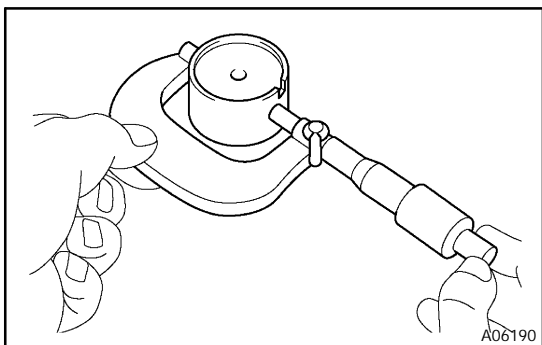


### 11. INSPECT VALVE LIFTERS AND LIFTER BORES

- (a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

**Lifter bore diameter:**

**40.960 – 40.980 mm (1.6126 – 1.6134 in.)**



- (b) Using a micrometer, measure the lifter diameter.

**Lifter diameter:**

**40.892 – 40.902 mm (1.6099 – 1.6103 in.)**

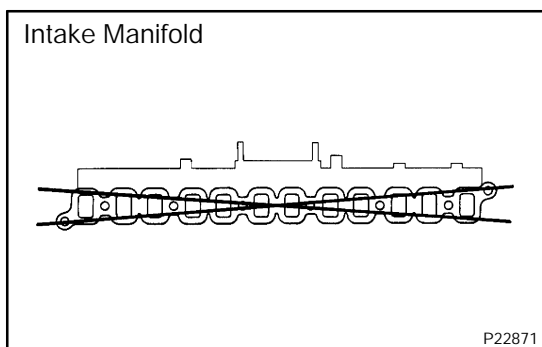
- (c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

**Standard oil clearance:**

**0.058 – 0.083 mm (0.0023 – 0.0033 in.)**

**Maximum oil clearance: 0.10 mm (0.0039 in.)**

If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.

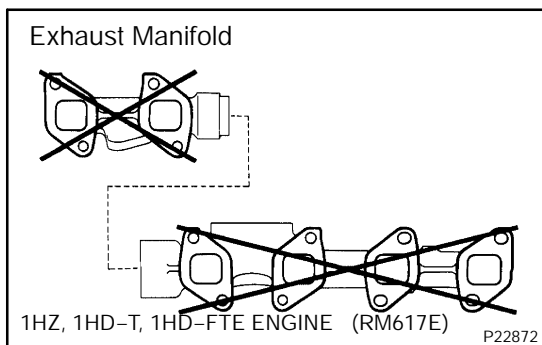


### 12. INSPECT INTAKE MANIFOLD

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.



### 13. 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.