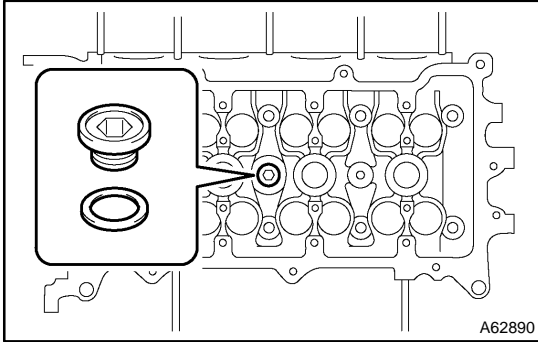
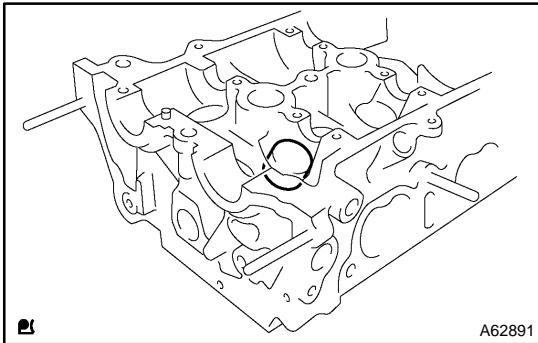


# OVERHAUL



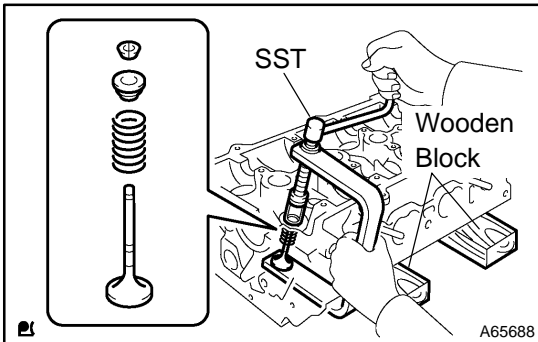
## 1. REMOVE W/HEAD TAPER SCREW PLUG NO.2

- (a) Using a socket hexagon wrench 10, remove the taper screw plug and gasket.



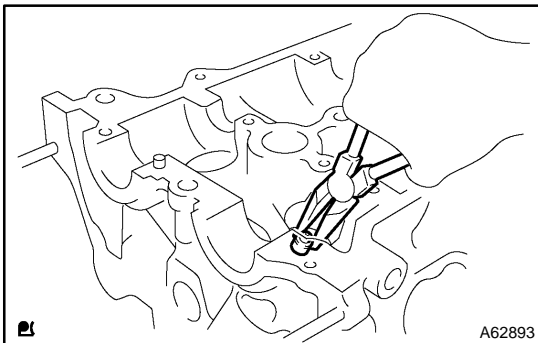
## 2. REMOVE VALVE LIFTER

- (a) Remove the valve lifters from the cylinder head.



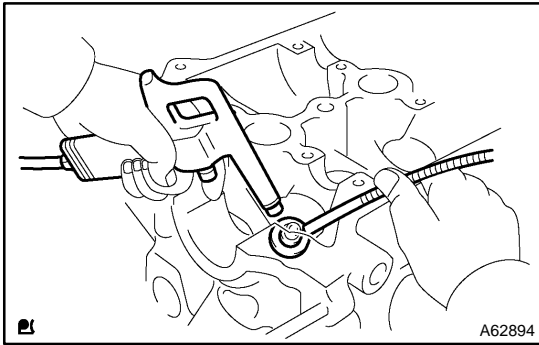
## 3. REMOVE VALVE

- (a) Place the cylinder head on wooden blocks.
- (b) Using SST, compress the inner compression spring and remove the 2 valve spring retainers locks.  
SST 09202-70020 (09202-00010, 09202-01010, 09202-01020)
- (c) Remove the valve spring retainers, inner compression springs and valves from the cylinder head.



## 4. VALVE STEM OIL O SEAL OR RING

- (a) Using a needle-nose pliers, remove the valve stem oil seals.

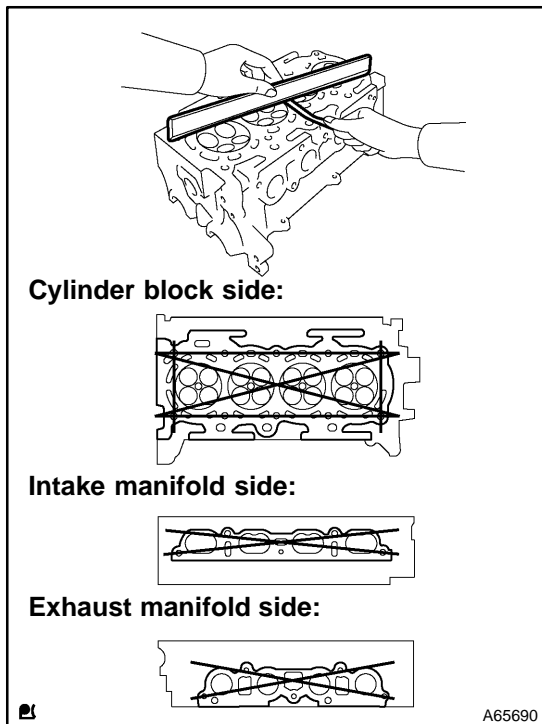
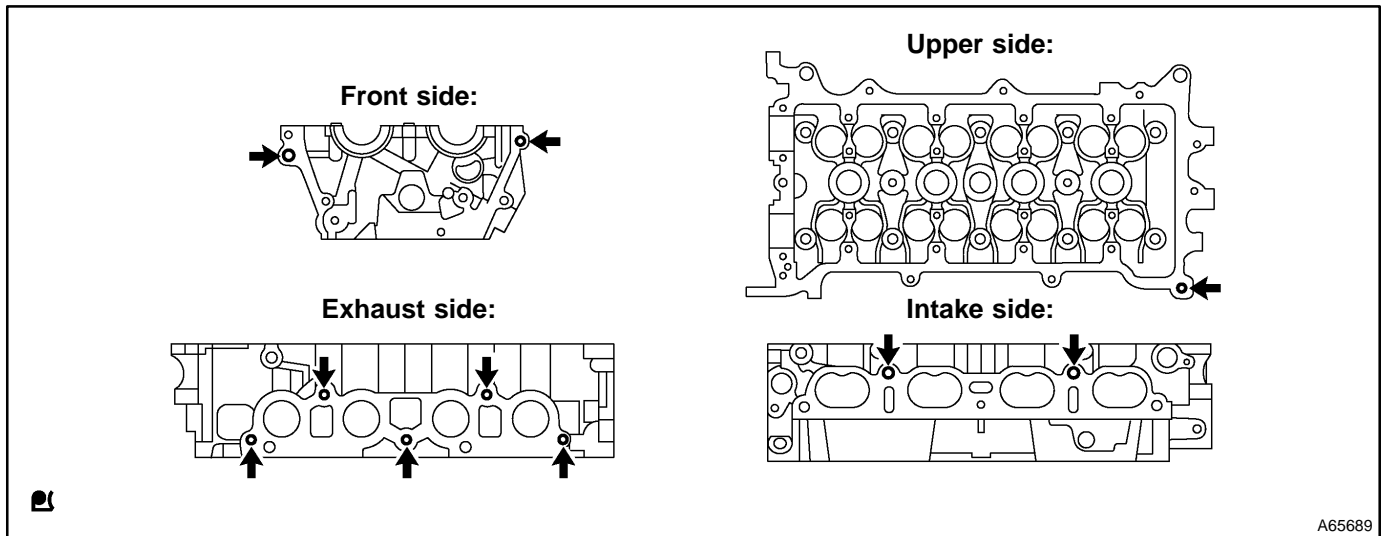


**5. REMOVE VALVE SPRING SEAT**

- (a) Using a compressed air and a magnetic finger, remove the valve spring seats.

**6. REMOVE STUD BOLT**

- (a) Using torx socket wrench E5 and E7, remove the 11 stud bolts.



**7. INSPECT CYLINDER HEAD FOR FLATNESS**

- (a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

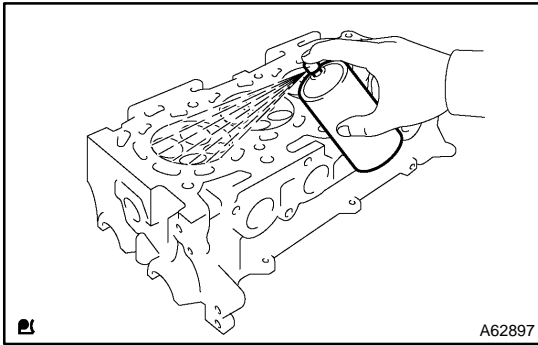
**Maximum warpage:**

**Cylinder block side 0.05 mm (0.0020 in.)**

**Intake manifold side 0.10 mm (0.0039 in.)**

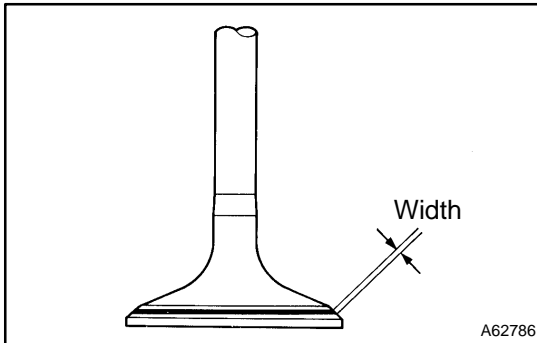
**Exhaust manifold side 0.10 mm (0.0039 in.)**

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



### 8. INSPECT CYLINDER HEAD FOR CRACKS

- (a) Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.



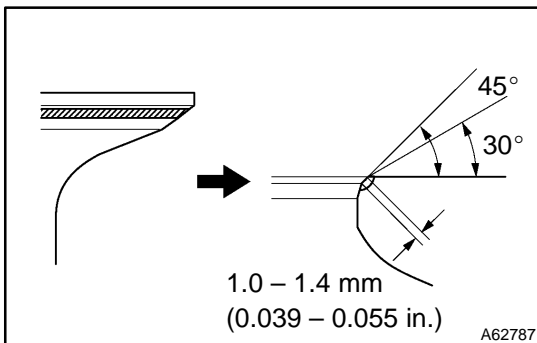
### 9. INSPECT VALVE SEATS

- (a) Apply a light coat of prussian blue (or white lead) to the valve face.  
 (b) Lightly press the valve against the seat.

**NOTICE:**

**Do not rotate valve.**

- (c) Check the valve face and seat according to the following procedure.
- (1) If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
  - (2) If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
  - (3) Check that the seat contact is in the middle of the valve face with the width between 1.0 – 1.4 mm (0.039 – 0.055 in.).

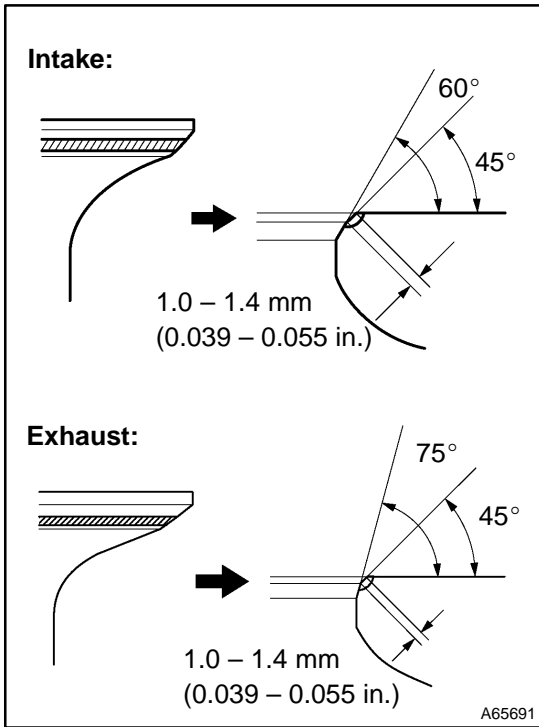


### 10. REPAIR VALVE SEATS

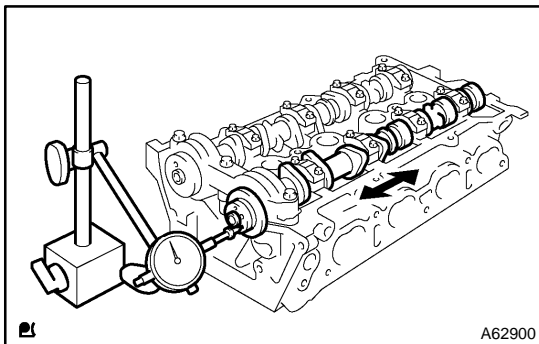
**NOTICE:**

**Take off a cutter gradually to make smooth valve seats.**

- (a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



- (b) Intake:
  - (1) If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.
- (c) Exhaust:
  - (1) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.
- (d) Hand-lap the valve and valve seat with an abrasive compound.
- (e) Check the valve seating position.



**11. INSPECT CAMSHAFT THRUST CLEARANCE**

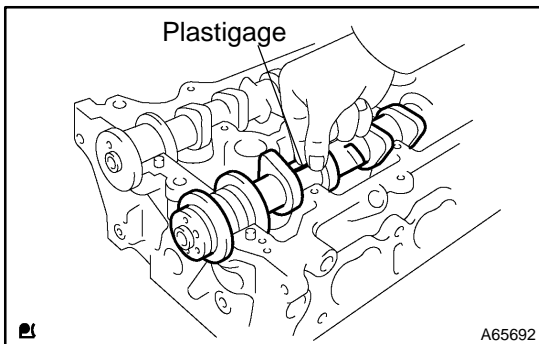
- (a) Install the 2 camshafts.
- (b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

**Standard thrust clearance:**

**0.040 - 0.095 mm (0.0016 - 0.0037 in.)**

**Maximum thrust clearance: 0.110 mm (0.0043 in.)**

If the thrust clearance is greater than maximum, replace the cylinder head. If damages are found on the camshaft thrust surfaces, the camshaft also has to be replaced.



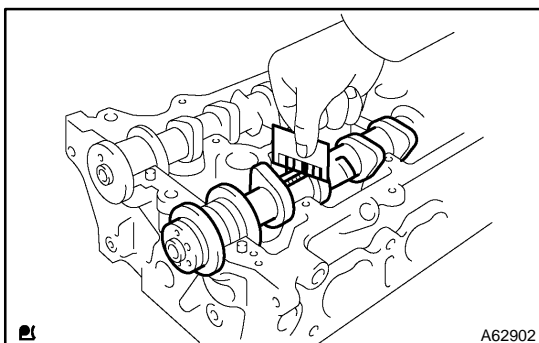
**12. INSPECT CAMSHAFT OIL CLEARANCE**

- (a) Clean the bearing caps and camshaft journals.
- (b) Place the camshafts on the cylinder head.
- (c) Lay a strip of plastigage across each of the camshaft journal.
- (d) Install the bearing caps. (See page 14-45)

**NOTICE:**

**Do not turn the camshaft.**

- (e) Remove the bearing caps. (See page 14-45)



- (f) Measure the plastigage at its widest point.

**Standard oil clearance:**

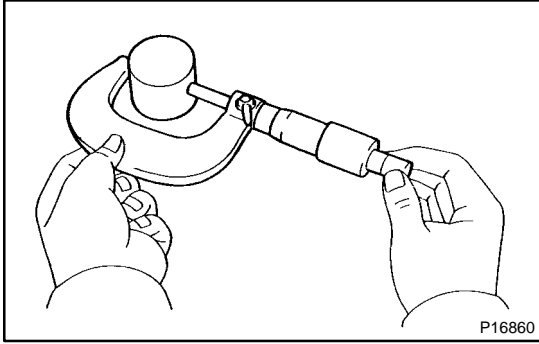
**0.035 - 0.072 mm (0.0014 - 0.0028 in.)**

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

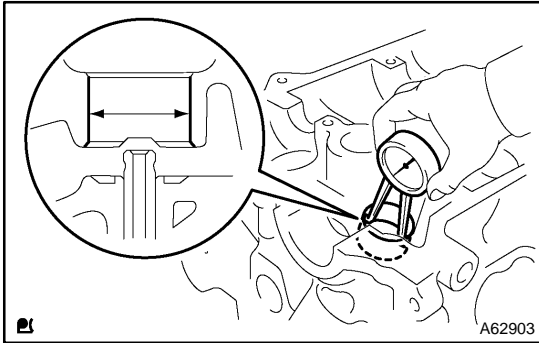
**NOTICE:**

**Completely remove the plastigage after the measuring.**

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

**13. INSPECT VALVE LIFTER**

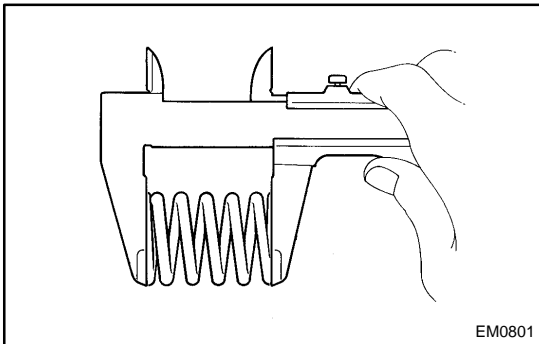
- (a) Using a micrometer, measure the valve lifter diameter.  
**Lifter diameter:**  
**30.966 – 30.976 mm (1.2191 – 1.2195 in.)**

**14. INSPECT VALVE LIFTER OIL CLEARANCE**

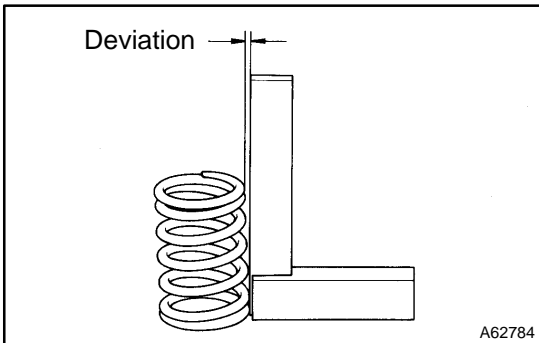
- (a) Using a caliper gauge, measure the valve lifter bore diameter of the cylinder head.  
**Lifter bore diameter:**  
**31.000 – 31.025 mm (1.2205 – 1.2215 in.)**
- (b) Subtract the valve lifter diameter measurement from the valve lifter bore diameter measurement.  
**Standard oil clearance:**  
**0.024 – 0.059 mm (0.0009 – 0.0023 in.)**  
**Maximum oil clearance: 0.079 mm (0.0031 in.)**

If the oil clearance is greater than maximum, replace the valve lifter.

If necessary, replace the cylinder head.

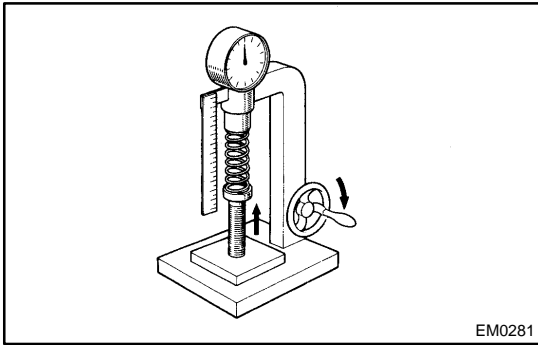
**15. INSPECT INNER COMPRESSION SPRING**

- (a) Using a vernier caliper, measure the free length of the inner compression spring.  
**Free length: 43.40 mm (1.7087 in.)**



- (b) Using a steel square, measure the deviation of the inner compression spring.  
**Maximum deviation: 1.6 mm (0.063 in.)**  
**Maximum angle (reference): 2°**

If the deviation is greater than maximum, replace the inner compression spring.



EM0281

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

**Installed tension:**

**158.6 – 175.4 N (16.2 – 17.9 kgf, 35.7 – 39.5 lbf)**

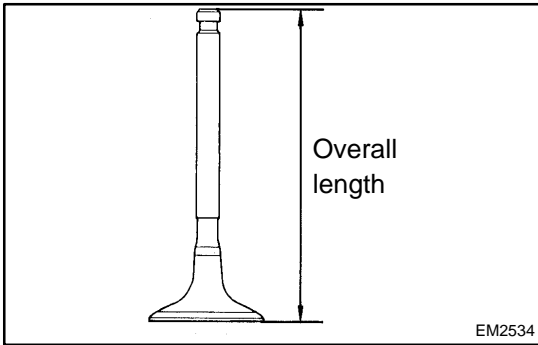
**at 33.6 mm (1.323 in.)**

**Maximum working tension:**

**335.3 – 370.7 N (34.2 – 37.8 kgf, 75.4 – 83.3 lbf)**

**at 24.1 mm (0.949 in.)**

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



EM2534

**16. INSPECT VALVE**

- (a) Using a vernier calipers, check the valve overall length.

**Standard overall length:**

**Intake 88.65 mm (3.4902 in.)**

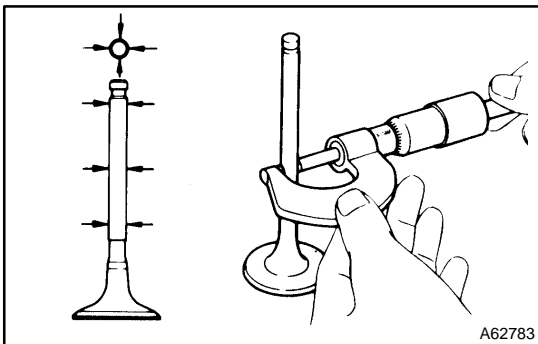
**Exhaust 88.69 mm (3.4917 in.)**

**Minimum overall length:**

**Intake 88.35 mm (3.4784 in.)**

**Exhaust 88.39 mm (3.4799 in.)**

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



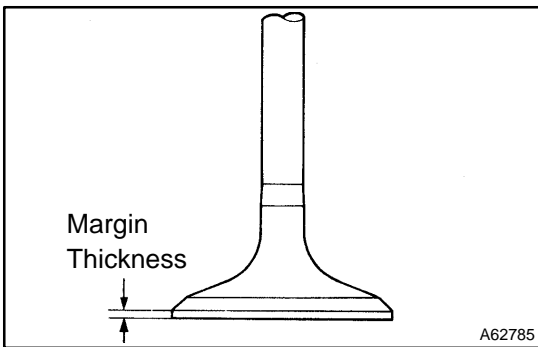
A62783

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

**Valve stem diameter:**

**Intake 5.470 – 5.485 mm (0.2154 – 0.2159 in.)**

**Exhaust 5.465 – 5.480 mm (0.2152 – 0.2158 in.)**



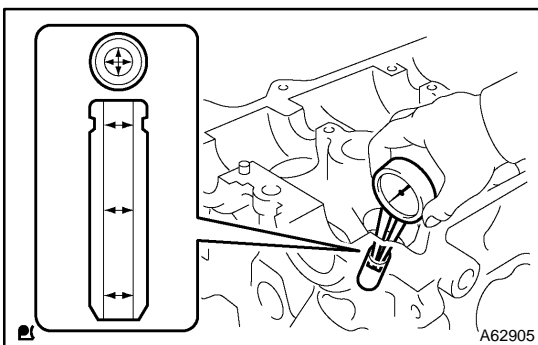
A62785

- (c) Using a vernier calipers, check the valve head margin thickness.

**Standard margin thickness: 1.0 mm (0.039 in.)**

**Minimum margin thickness: 0.7 mm (0.028 in.)**

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



A62905

**17. INSPECT VALVE GUIDE BUSHING OIL CLEARANCE**

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

**Busing inside diameter:**

**5.510 – 5.530 mm (0.2169 – 0.2177 in.)**

- (b) 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 0.030 – 0.065 mm (0.0012 – 0.0026 in.)**

**Maximum oil clearance:**

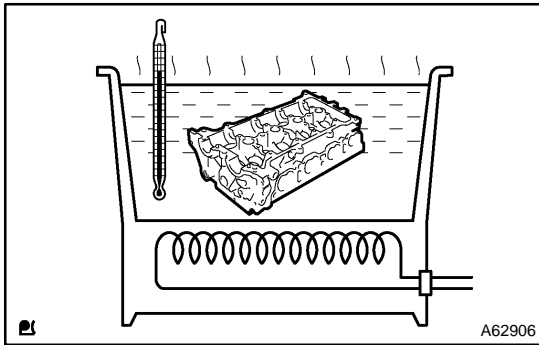
**Intake 0.08 mm (0.0032 in.)**

**Exhaust 0.10 mm (0.0039 in.)**

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

**18. REPLACE VALVE GUIDE BUSHING**

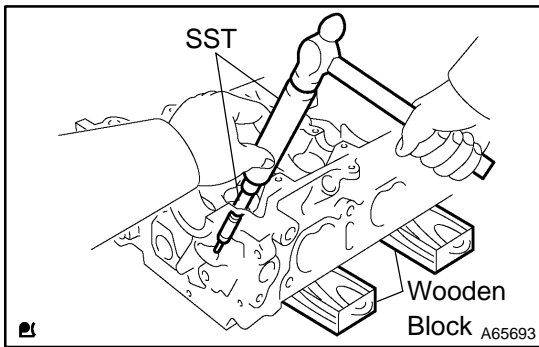
- (a) Heat the cylinder head to 80 – 100°C (176 – 212°F).



- (b) Place the cylinder head on the wooden blocks.

- (c) Using SST, tap out the valve guide bushing.

SST 09201-10000, 09201-01055, 09950-70010  
(09951-07100)

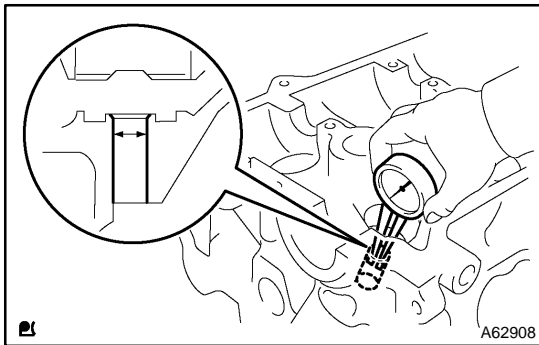


- (d) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

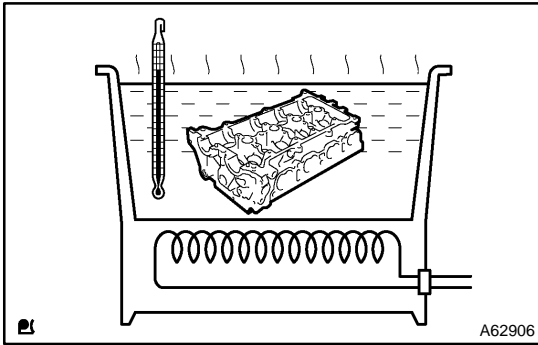
**Diameter: 10.285 – 10.306 mm (0.4049 – 0.4058 in.)**

If the bushing bore diameter of the cylinder head is greater than 10.306 mm (0.4058 in.), machine the bushing bore to the dimension of 10.335 – 10.356 mm (0.4069 – 0.4077 in.) to install a over size valve guide bushing.

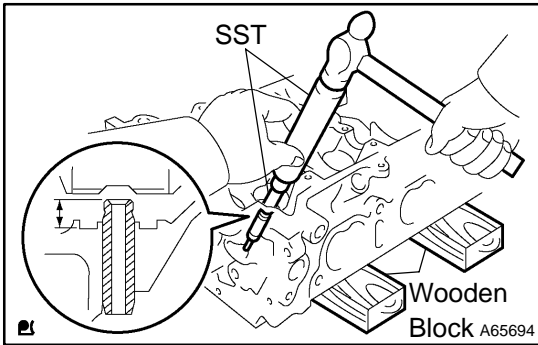
**HINT:**



Valve guide bushing size	Bushing bore diameter mm (in.)
STD	10.285 – 10.306 (0.4049 – 0.4058)
O/S 0.05	10.335 – 10.356 (0.4069 – 0.4077)



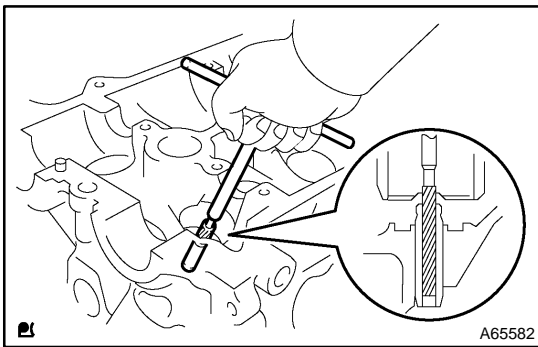
(e) Heat the cylinder head to 80 – 100°C (176 – 212°F).



(f) Place the cylinder head on wooden blocks.  
 (g) Using SST, tap in a new valve guide bushing to the specified protrusion height.

SST 09201-10000, 09201-01055, 09950-70010  
 (09951-07100)

**Protrusion height: 8.7 – 9.1 mm (0.343 – 0.358 in.)**

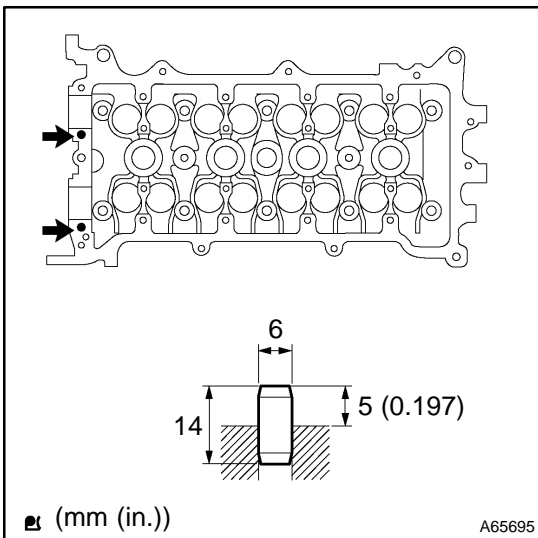


(h) Using a sharp 5.5 mm reamer, ream the valve guide bushing to obtain the standard specified clearance.

**Standard oil clearance:**

**Intake 0.025 – 0.060 mm (0.0010 – 0.0024 in.)**

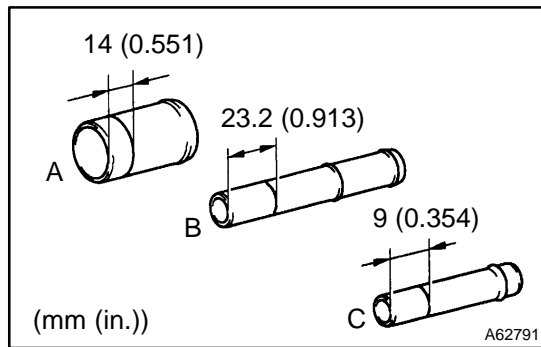
**Exhaust 0.030 – 0.065 mm (0.0012 – 0.0026 in.)**



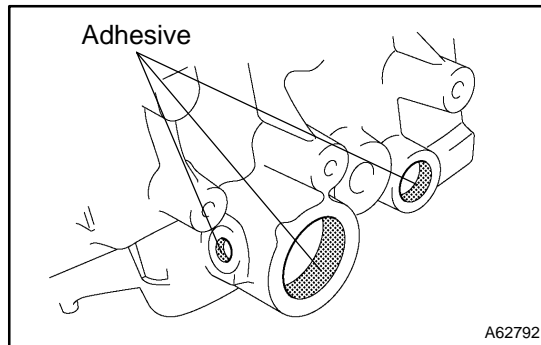
**19. INSTALL STRAIGHT PIN**

(a) Using a plastic hammer, install the new 2 straight pins.  
**Standard protrusion: 5 mm (0.197 in.)**



**20. INSTALL UNION**

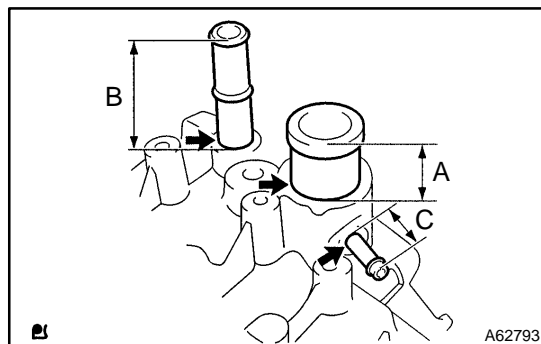
- (a) Mark the standard position away from the edge, onto the water hose union as shown in the illustration.



- (b) Apply adhesive to the water hose union hole of the cylinder head.

**Adhesive:**

**Part No. 08833-00070, THREE BOND 1324 or equivalent.**



- (c) Using a press, press in a new water hose union until the standard marks come to the level of the cylinder head surface.

**Standard protrusion:**

**A 29 mm (1.142 in.)**

**B 66.5 mm (2.618 in.)**

**C 24 mm (0.945 in.)**

**NOTICE:**

- Install the water hose union within 3 minutes after applying adhesive.
- Do not put into coolant within an hour after installing.

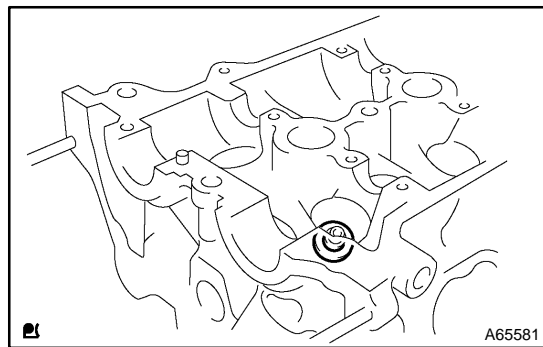
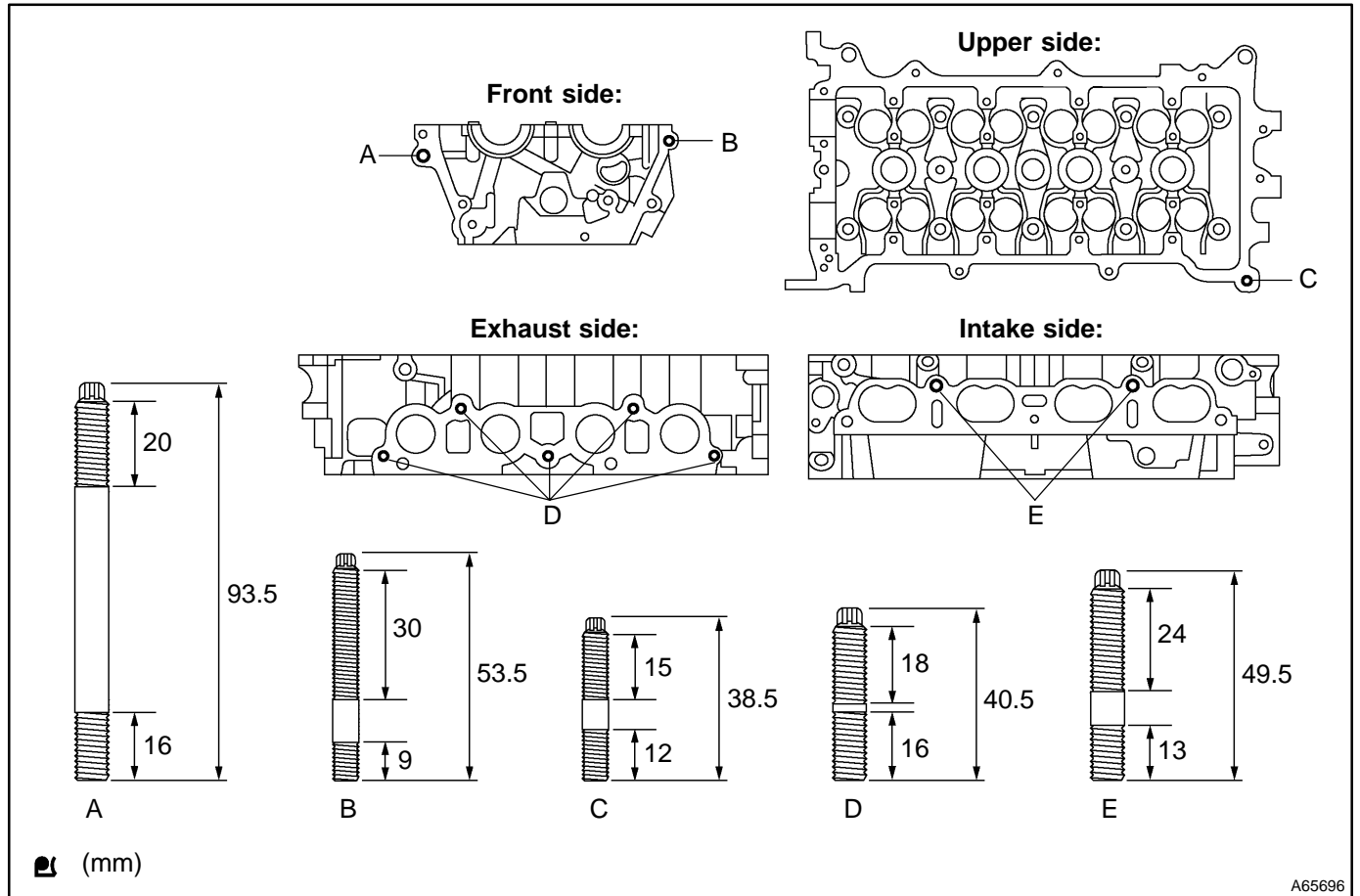
**21. INSTALL STUD BOLT**

(a) Using torx socket wrench E5 and E7, install the 11 stud bolts,

**Torque:**

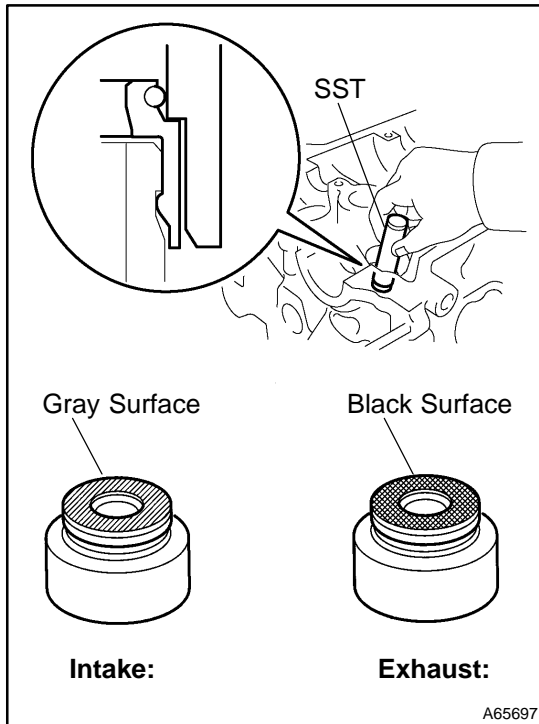
**Stud bolt A, D and E 9.5 N·m (97 kgf·cm, 84 in·lbf)**

**Stud bolt B and C 5.0 N·m (51 kgf·cm, 44 in·lbf)**



**22. INSTALL VALVE SPRING SEAT**

(a) Install the valve spring seats to the cylinder head.

**23. INSTALL VALVE STEM OIL SEAL OR RING**

- (a) Apply a light coat of engine oil to a new valve stem oil seals.

**NOTICE:**

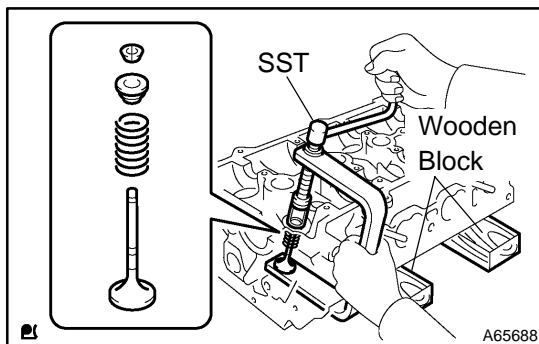
**Be very careful to assemble the oil seal for intake and exhaust. Assembling the wrong one may cause a failure.**

**HINT:**

The intake valve stem oil seal is gray and exhaust valve stem oil seal is black.

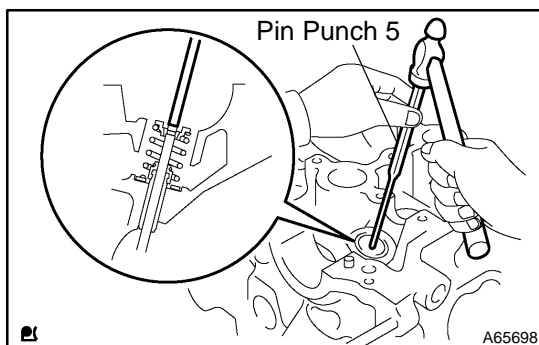
- (b) Using SST, push in the valve stem oil seals.

SST 09201-41020

**24. INSTALL VALVE**

- (a) Place the cylinder head on wooden blocks.
- (b) Install the valves, inner compression springs and valve spring retainers to the cylinder head.
- (c) Using SST, compress the inner compression spring, and place the 2 valve spring retainer locks around the valve stem.

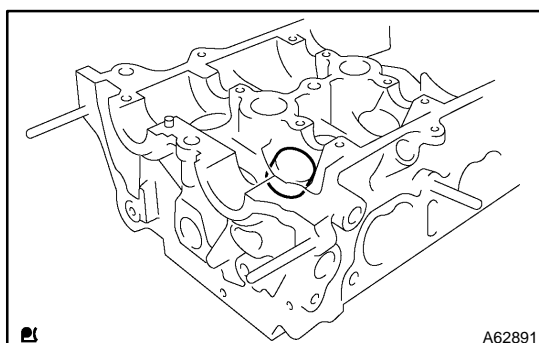
SST 09202-70020 (09202-00010, 09202-01010, 09202-01020)



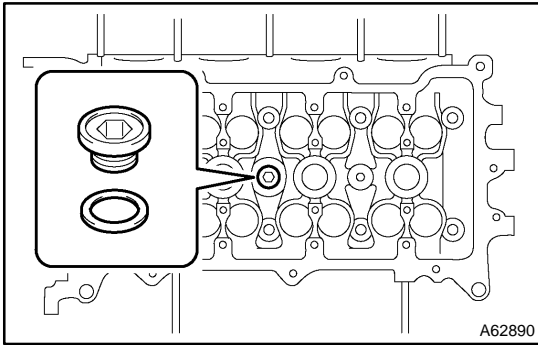
- (d) Using a pin punch 5, lightly tap the valve stem tip to ensure a proper fit.

**NOTICE:**

**Be careful not to damage the valve stem tip.**

**25. INSTALL VALVE LIFTER**

- (a) Apply a light coat of engine oil to the valve lifters.
- (b) Install the valve lifters to the cylinder head.

**26. INSTALL W/HEAD TAPER SCREW PLUG NO.2**

- (a) Using a socket hexagon wrench 10, install the taper screw plug with a new gasket.

**Torque: 44 N·m (449 kgf·cm, 33 ft·lbf)**