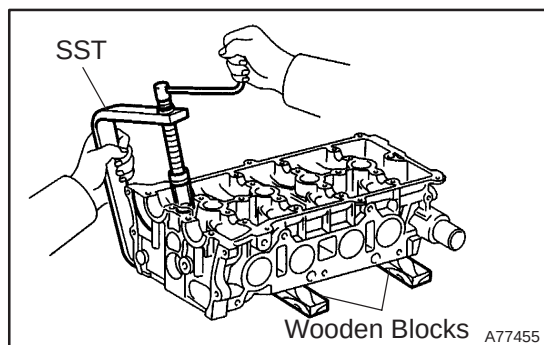


OVERHAUL

1. REMOVE VALVE LIFTER

HINT:

Store the valve lifters in correct order, so that they can be returned to the original locations when re-assembling.



2. REMOVE INTAKE VALVE

- (a) Using SST and wooden blocks, compress and remove the 8 valve spring retainer locks.

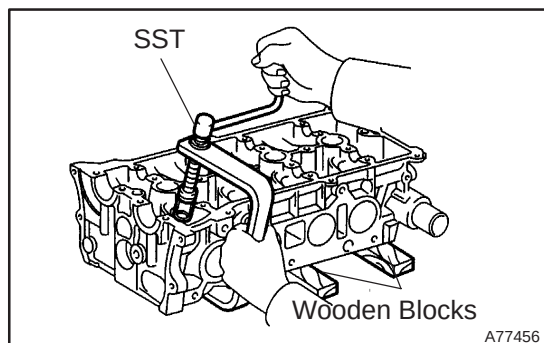
SST 09202-70020 (09202-00010)

- (b) Remove the parts below from the cylinder head.

1	Retainer
2	Valve spring
3	Intake valve

HINT:

Store the removed parts in correct order, so that they can be re-turned to the original locations when re-assembling.



3. REMOVE EXHAUST VALVE

- (a) Using SST and wooden blocks, compress and remove the 8 valve spring retainer locks.

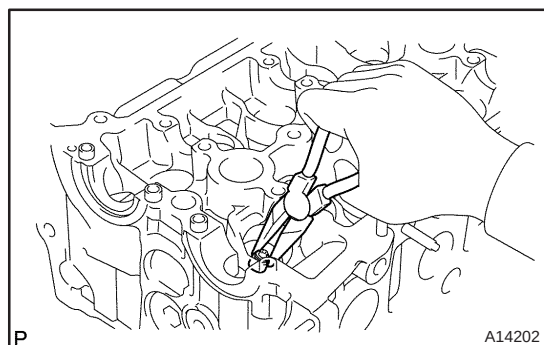
SST 09202-70020 (09202-00010)

- (b) Remove the parts below from the cylinder head.

1	Retainer
2	Valve spring
3	Intake valve

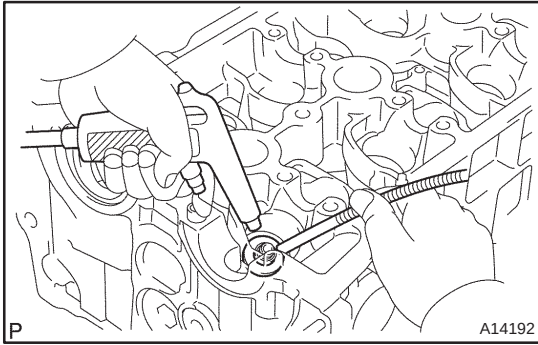
HINT:

Store the removed parts in correct order, so that they can be re-turned to the original locations when re-assembling.



4. REMOVE VALVE STEM OIL O SEAL OR RING

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



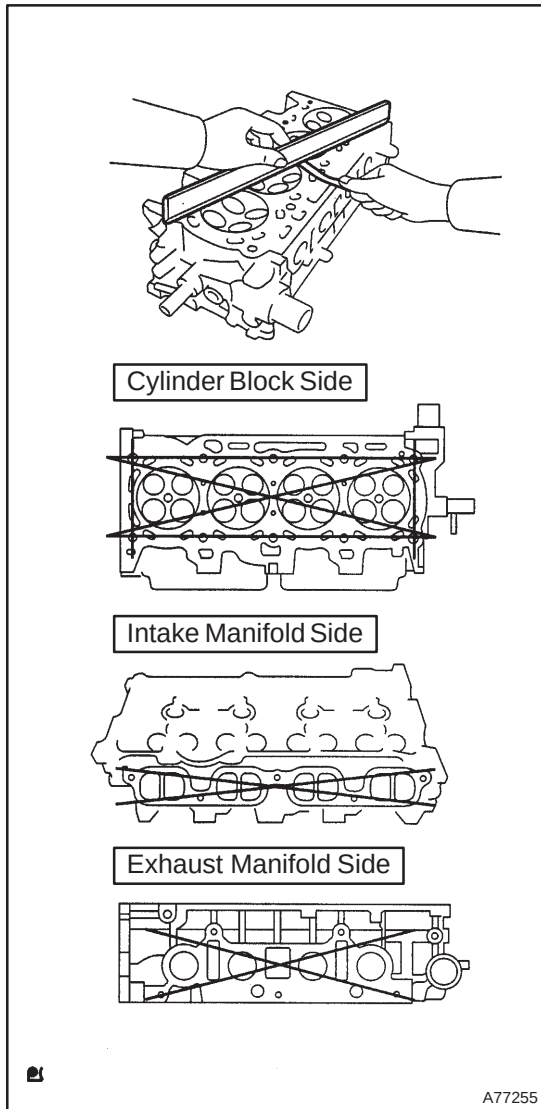
5. REMOVE VALVE SPRING SEAT

- (a) Using compressed air and a magnetic finger, remove the spring seat by blowing air.

HINT:

Store the removed parts in correct order, so that they can be returned to the original locations when re-assembling.

6. REMOVE STUD BOLT



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.

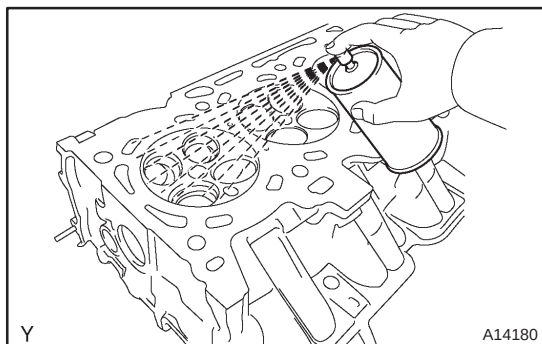
Maximum warpage:

Cylinder block side 0.05 mm (0.0020 in.)

Intake manifold side 0.08 mm (0.0031 in.)

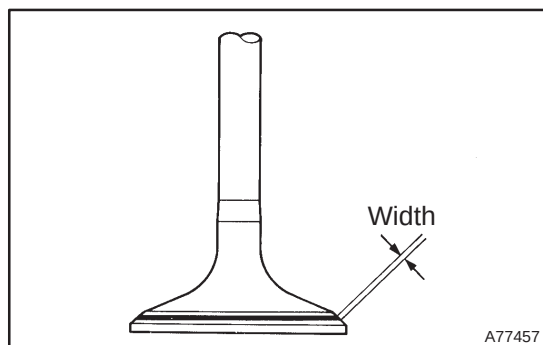
Exhaust manifold side 0.08 mm (0.0031 in.)

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



8. INSPECT CYLINDER HEAD FOR CRACKS

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



9. INSPECT VALVE SEATS

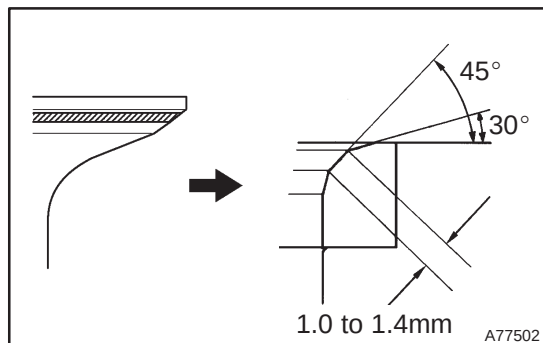
- (a) Apply a light coat of prussian blue (or white lead) to the valve face.
- (b) Lightly press the valve against the seat.
- (c) Check the valve face and seat according to the following procedure.
 - (1) If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
 - (2) 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 to 1.4 mm (0.039 to 0.055 in.).

10. REPAIR VALVE SEATS

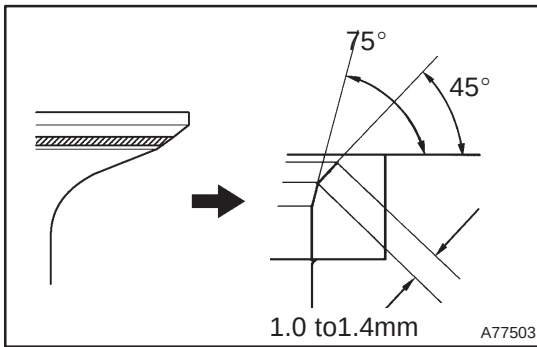
NOTICE:

Releasing the seat-cutter pressure gradually helps to make smoother valve seat faces.

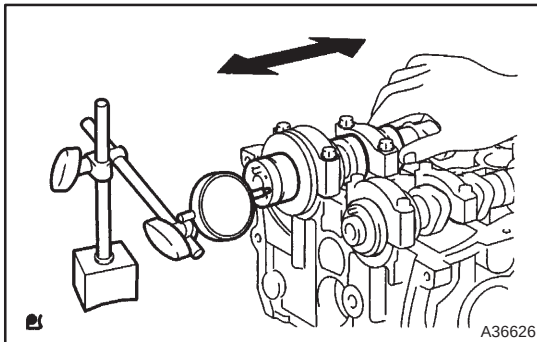
- (a) Using a 45° cutter, cut valve face of the cylinder head a little wider than the specified valve seating width.
- (b) Confirm that the valve fits the valve seat center portion. If not, re-cut the valve face with the 45° cutter.
- (c) Adjust valve face with a 30° or 60° cutter to accurately fit the valve seat center portion.



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



- (2) 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) Recheck the valve seating position.



11. INSPECT CAMSHAFT THRUST CLEARANCE

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

Standard thrust clearance:

Intake 0.040 to 0.095 mm (0.0016 to 0.0037 in.)

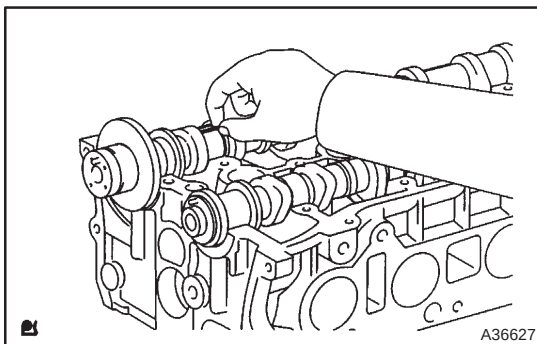
Exhaust 0.080 to 0.135 mm (0.0032 to 0.0053 in.)

Maximum thrust clearance:

Intake 0.11 mm (0.0043 in.)

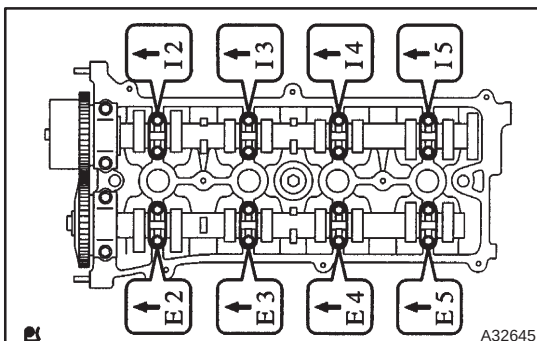
Exhaust 0.15 mm (0.0059 in.)

- (c) If the thrust clearance is greater than maximum, replace the cylinder head. If the thrust surface is damaged, replace the camshaft.



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.

Torque:

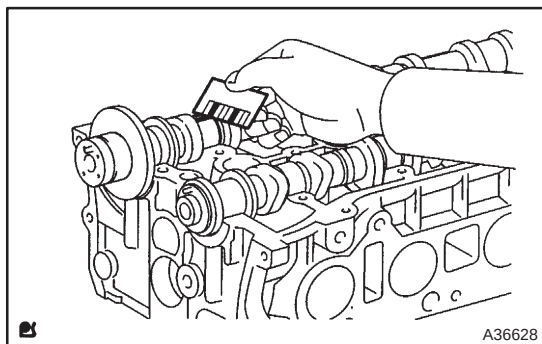
No. 1 30 N·m (301 kgf·cm, 22 ft·lbf)

No. 2 30 N·m (301 kgf·cm, 22 ft·lbf)

No. 3 9 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

Do not turn the camshaft.



- (e) Remove the bearing cap, and measure the Plastigage at its widest point.

Standard oil clearance:

Intake No. 1 journal bearing mark 1

0.007 to 0.038 mm (0.0028 to 0.00150 in.)

Intake No. 1 journal bearing mark 2

0.008 to 0.038 mm (0.0031 to 0.00150 in.)

Intake No. 1 journal bearing mark 3

0.008 to 0.038 mm (0.0031 to 0.00150 in.)

Other journals

0.025 to 0.062 mm (0.00098 to 0.00244 in.)

Exhaust No. 1 journal

0.015 to 0.054 mm (0.0006 to 0.0021 in.)

Other journals

0.025 to 0.062 mm (0.00098 to 0.00244 in.)

Maximum oil clearance:

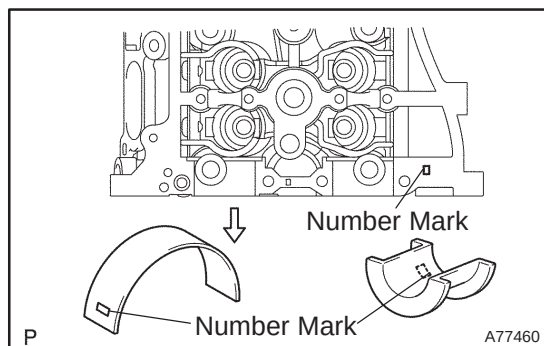
Intake No. 1 journal 0.07 mm (0.0028 in.)

Other journals 0.10 mm (0.0039 in.)

NOTICE:

Completely remove the Plastigage after the inspection.

- (f) If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the cylinder head.



- (g) If the oil clearance on No. 1 journal is greater than maximum, replace the bearing.

HINT:

Cylinder head journal bore diameter:

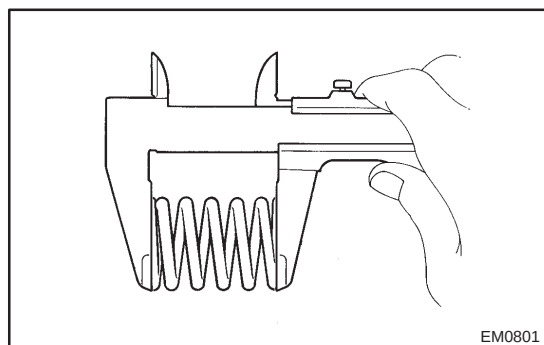
Mark "1"	40.000 to 40.008 mm (1.57480 to 1.57511 in.)
Mark "2"	40.009 to 40.017 mm (1.57515 to 1.57547 in.)
Mark "3"	40.018 to 40.025 mm (0.57551 to 1.57578 in.)

Standard bearing center wall thickness:

Mark "1"	2.000 to 2.004 mm (0.07874 to 0.07890 in.)
Mark "2"	2.005 to 2.008 mm (0.07894 to 0.07905 in.)
Mark "3"	2.009 to 2.012 mm (0.07909 to 0.07921 in.)

Camshaft journal diameter:

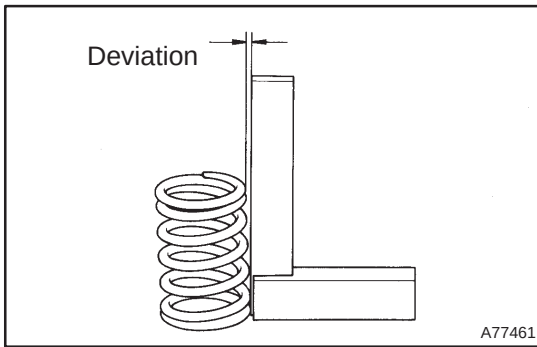
35.971 to 35.985 mm (1.41648 to 1.41673 in.)



13. INSPECT INNER COMPRESSION SPRING

- (a) Check the free length.
 (1) Using vernier calipers, measure the free length of the valve spring.

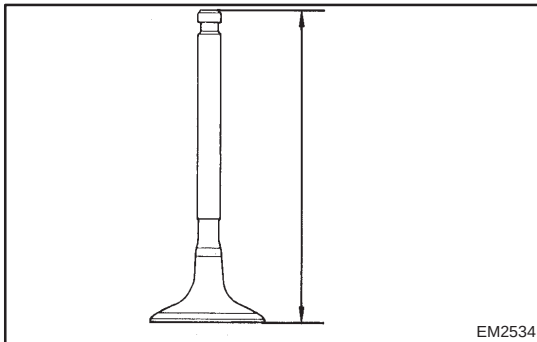
Free length: 45.7 mm (1.799 in.)



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

Maximum deviation: 1.6 mm (0.063 in.)

Maximum angle (reference): 2°

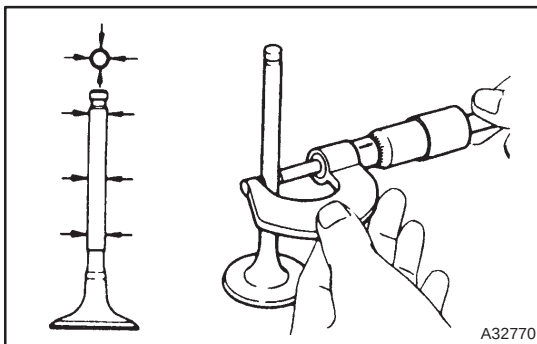


14. INSPECT INTAKE VALVE

- (a) Check the valve overall length.
 (1) Using vernier calipers, measure the valve overall length.

Standard overall length: 101.71 mm (4.0043 in.)

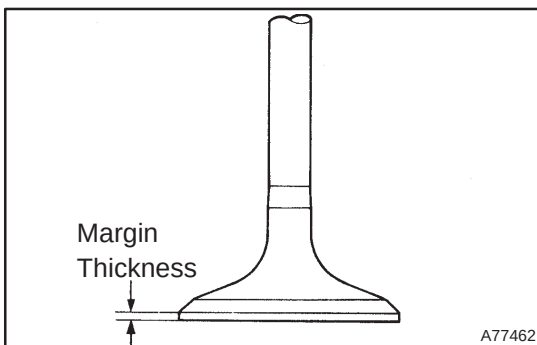
Minimum overall length: 101.21 mm (3.9846 in.)



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

Valve stem diameter:

5.470 to 5.485 mm (0.2154 to 0.2159 in.)

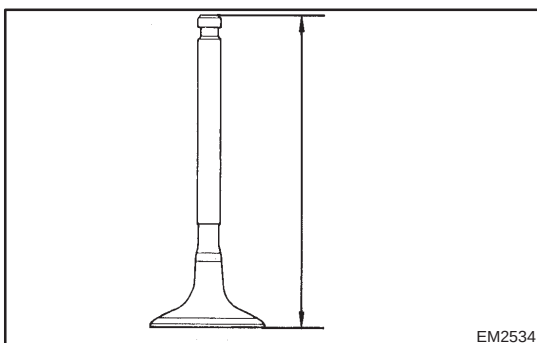


- (c) Check the valve head margin thickness.
 (1) Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness:

1.05 to 1.45 mm (0.041 to 0.057 in.)

Minimum margin thickness: 0.75 mm (0.030 in.)

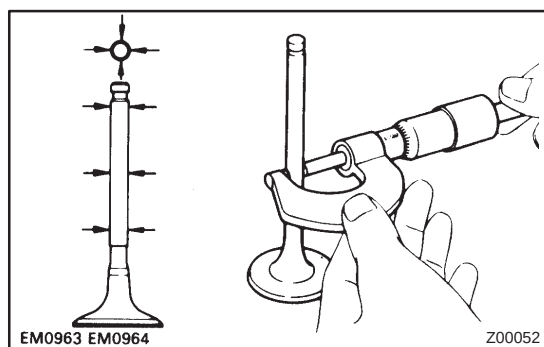


15. INSPECT EXHAUST VALVE

- (a) Check the valve overall length.
 (1) Using vernier calipers, measure the valve overall length.

Standard overall length: 101.15 mm (3.9823 in.)

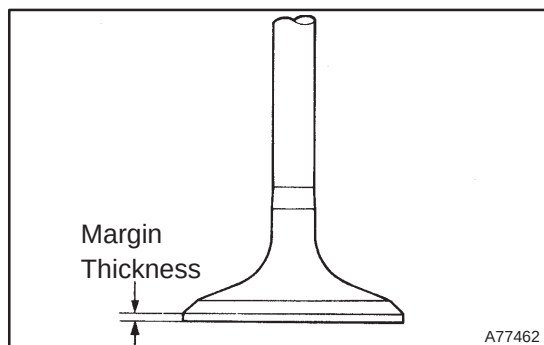
Minimum overall length: 100.70 mm (3.9646 in.)



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

Valve stem diameter:

5.465 to 5.480 mm (0.2152 to 0.2157 in.)

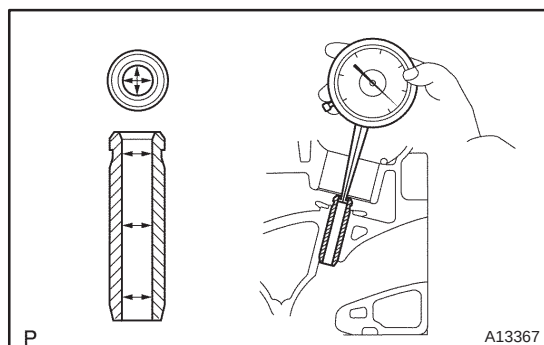


- (c) Check the valve head margin thickness.
 (1) Using vernier calipers, measure the valve head margin thickness.

Standard margin thickness:

1.2 to 1.6 mm (0.047 to 0.063 in.)

Minimum margin thickness: 0.9 mm (0.035 in.)



16. INSPECT INTAKE VALVE GUIDE BUSH

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

Bushing inside diameter:

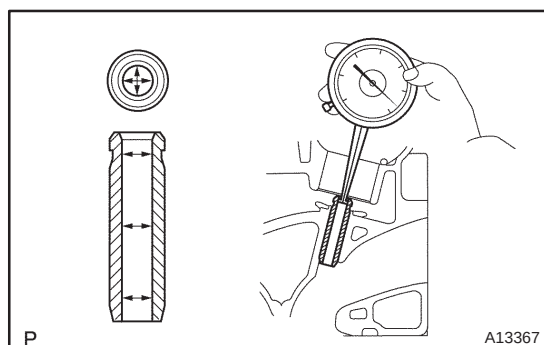
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

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

Standard oil clearance:

0.025 to 0.060 mm (0.00098 to 0.00236 in.)

Maximum oil clearance: 0.08 mm (0.0031 in.)



17. INSPECT EXHAUST VALVE GUIDE BUSH

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

Bushing inside diameter:

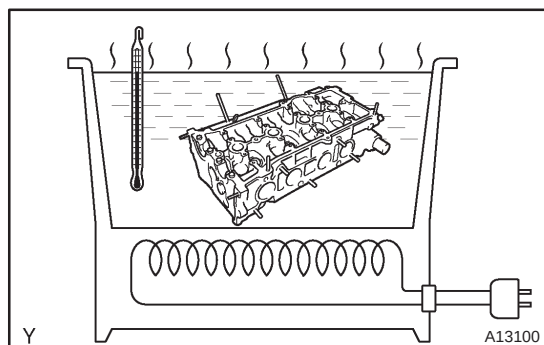
5.510 to 5.530 mm (0.2169 to 0.2177 in.)

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

Standard oil clearance:

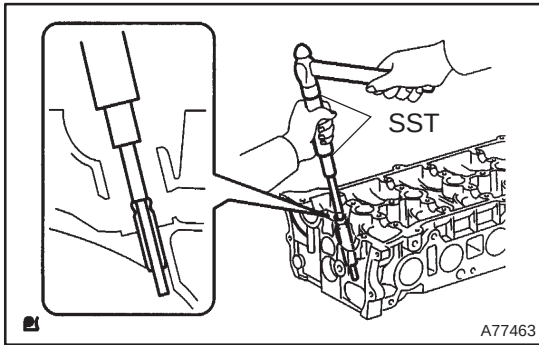
0.030 to 0.065 mm (0.0012 to 0.0026 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

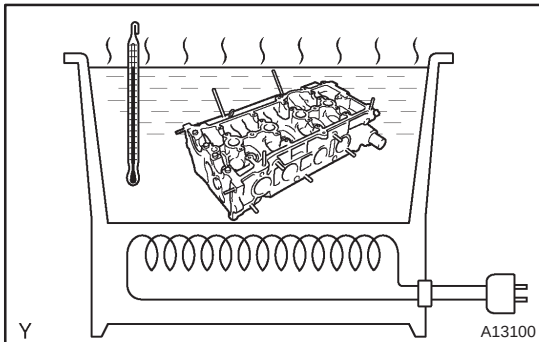


18. REMOVE INTAKE VALVE GUIDE BUSH

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

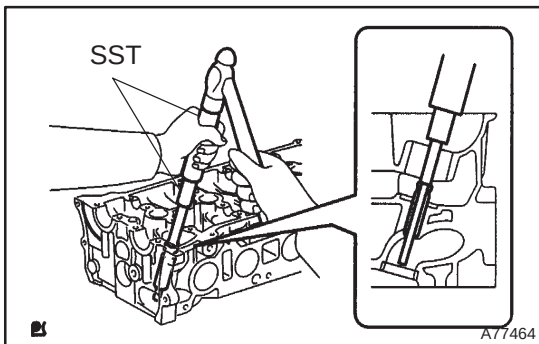


- (b) Using SST and a hammer, tap out the guide bushing.
 SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)



19. REMOVE EXHAUST VALVE GUIDE BUSH

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



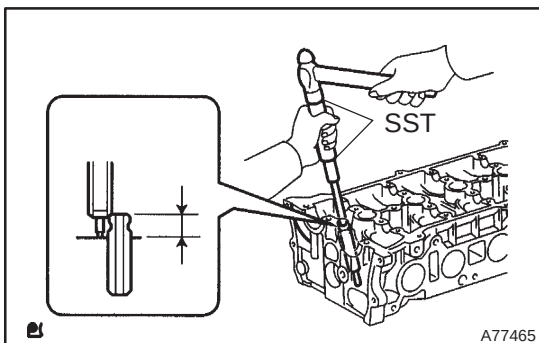
- (b) Using SST and a hammer, tap out the guide bushing.
 SST 09201-10000 (09201-01050), 09950-70010 (09951-07100)

20. INSTALL INTAKE VALVE GUIDE BUSH

- (a) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.
Diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)
 (b) Install the STD bushing if the diameter is within specified diameter.

HINT:

STD	10.333 to 10.344 mm (0.4068 to 0.4072 in.)
-----	--



- (c) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
Protrusion height: 9.6 to 10.0 mm (0.3779 to 0.3937 in.)

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100), 23801

- (d) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance between the guide bushing and valve stem.

Standard oil clearance:

0.025 to 0.060 mm (0.00098 to 0.00236 in.)

21. INSTALL EXHAUST VALVE GUIDE BUSH

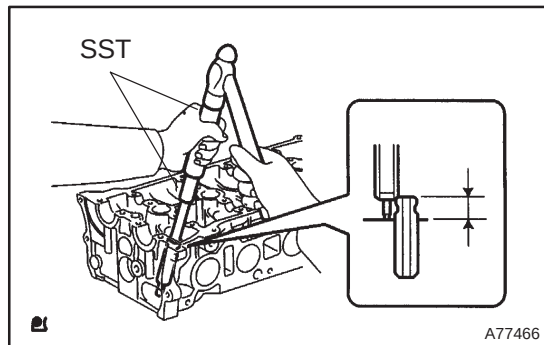
- (a) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Diameter: 10.285 to 10.306 mm (0.4049 to 0.4057 in.)

- (b) Install the STD bushing if the diameter is within specified diameter.

HINT:

STD	10.333 to 10.344 mm (0.4068 to 0.4072 in.)
-----	--



- (c) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.

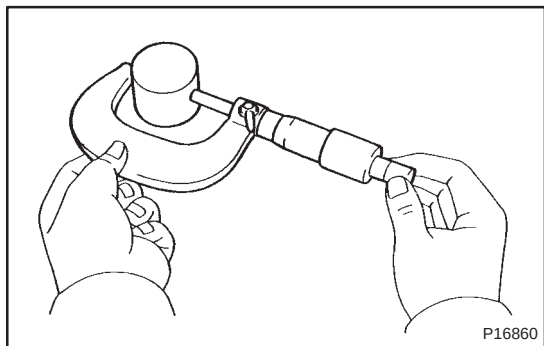
Protrusion height: 9.6 to 10.0 mm (0.3779 to 0.3937 in.)

- (d) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance between the guide bushing and valve stem.

SST 09201-10000 (09201-01050), 09950-70010 (09951-07100), 23801

Standard oil clearance:

0.030 to 0.065 mm (0.00118 to 0.00256 in.)



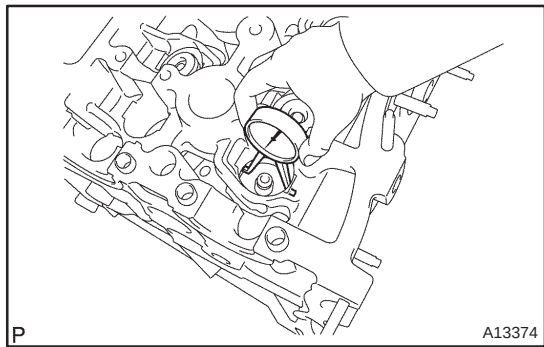
22. INSPECT VALVE LIFTER

- (a) Check the lifter diameter.

(1) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.966 to 30.976 mm (1.2191 to 1.2195 in.)



- (b) Check the valve lifter oil clearance.

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

Lifter bore diameter:

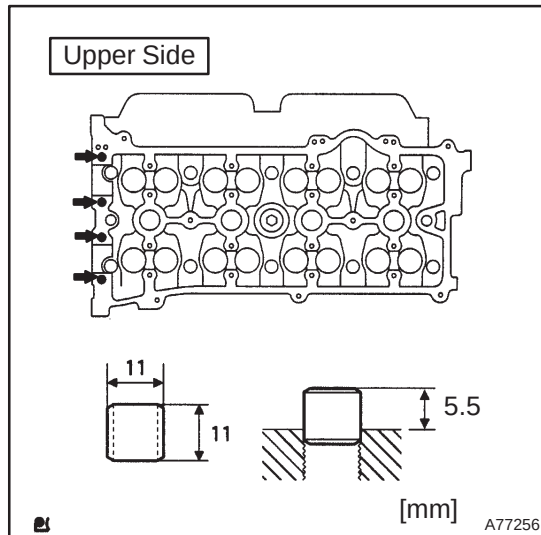
31.009 to 31.025 mm (1.2208 to 1.2215 in.)

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

Standard oil clearance:

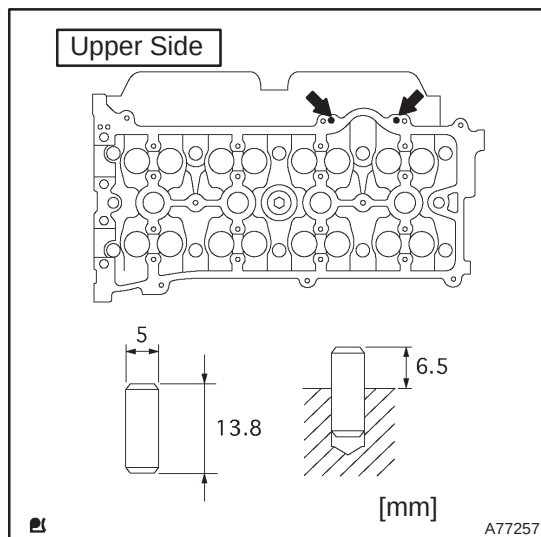
0.033 to 0.059 mm (0.0013 to 0.0023 in.)

Maximum oil clearance: 0.08 mm (0.0032 in.)

**23. INSTALL RING W/HEAD PIN**

- (a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

Protrusion height: 5.5 mm (0.217 in.)

**24. INSTALL RING PIN**

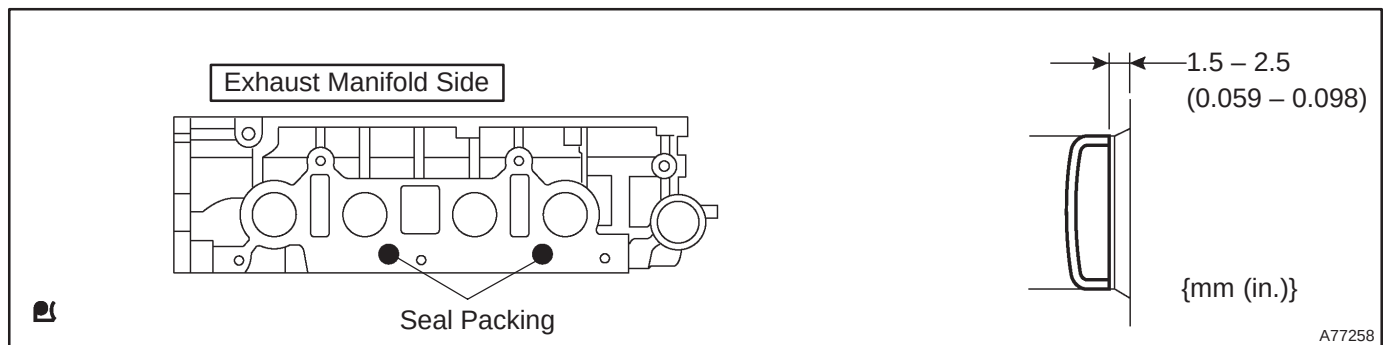
- (a) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

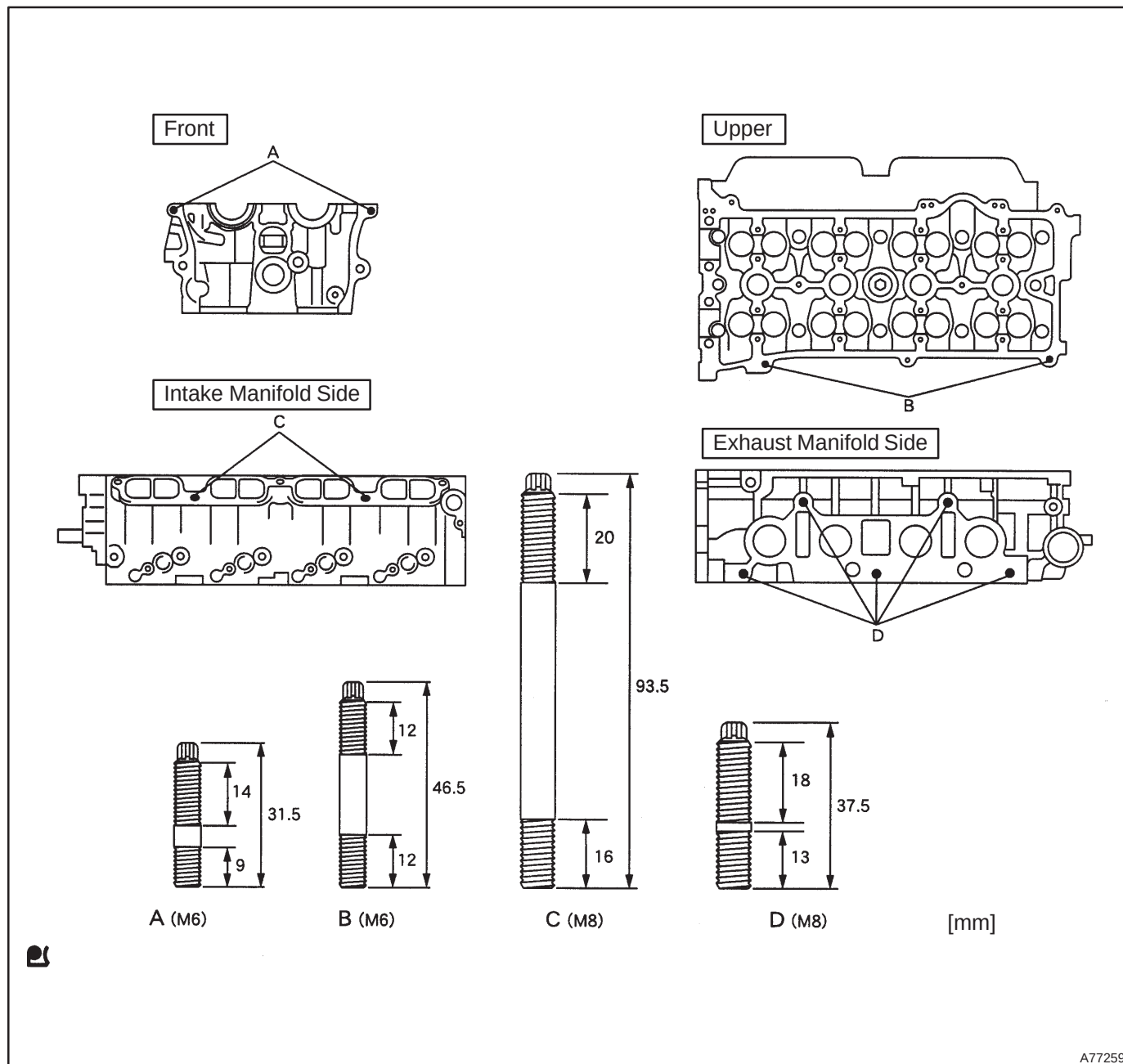
Protrusion height: 6.5 mm (0.256 in.)

25. INSTALL TIGHT PLUG

- (a) Apply seal packing to the cylinder head as shown in the illustration.
- (b) Using SST, tap in plug to the specified protrusion height.
SST 09950-60010 (09951-00180), 09950-70010 (09951-07100)

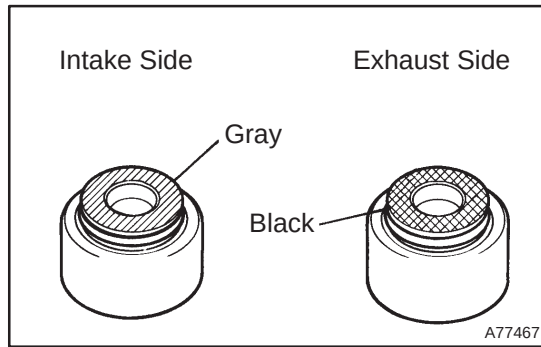
Protrusion height: 1.5 to 2.5 mm (0.059 to 0.098 in.)



26. INSTALL STUD BOLT**Torque:****Bolt A 5.0 N·m (51 kgf·cm, 44 in.·lbf)****Bolt B 5.0 N·m (51 kgf·cm, 44 in.·lbf)****Bolt C 9.5 N·m (97 kgf·cm, 84 in.·lbf)****Bolt D 9.5 N·m (97 kgf·cm, 84 in.·lbf)**

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27. INSTALL VALVE SPRING SEAT



28. INSTALL VALVE STEM OIL O SEAL OR RING

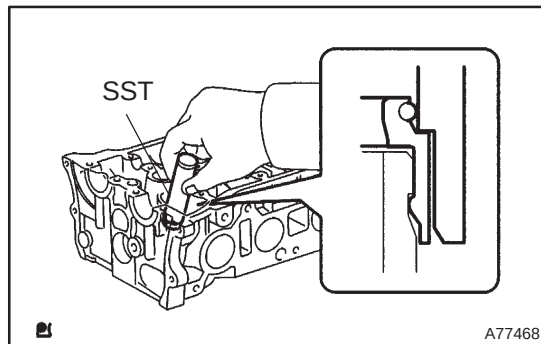
(a) Apply a light coat of engine oil on new valve stem seals.

NOTICE:

Pay much attention assembling the oil seal for intake and exhaust. Installing the wrong one may cause improper installation.

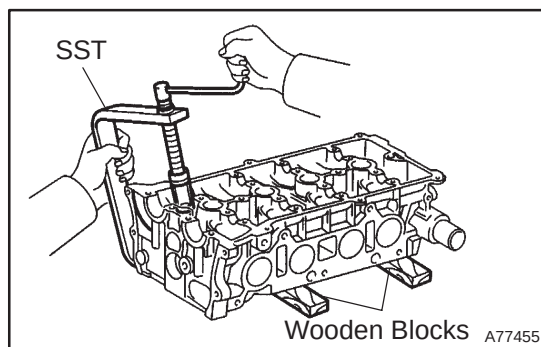
HINT:

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



(b) Using SST, push in the oil seal.

SST 09201-41020



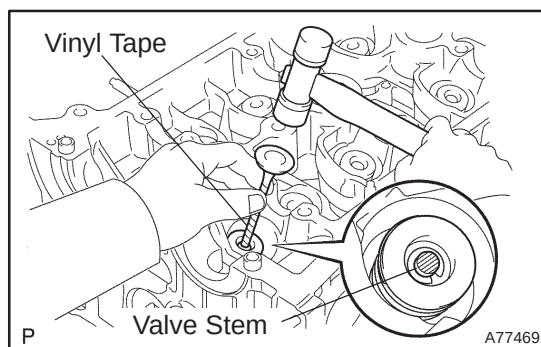
29. INSTALL INTAKE VALVE

(a) Install the parts below to the cylinder head.

1	Intake valve
2	Spring
3	Retainer

(b) Using SST and wooden blocks, compress and install 2 valve spring retainer locks.

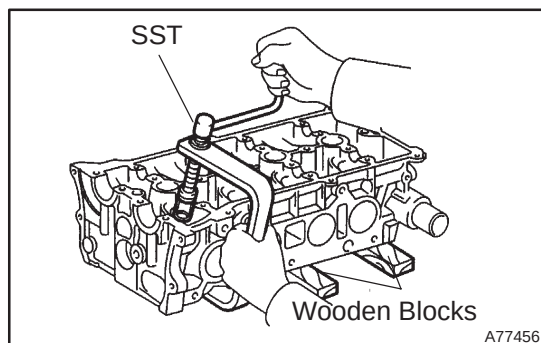
SST 09202-70020 (09202-00010)



(c) Wrap the tip of a discarded valve with vinyl tape, place the discarded valve tip on the installed valve. Using a plastic-faced hammer, lightly tap the discarded valve head to ensure proper fitting of the installed valve.

NOTICE:

Be careful not to damage the valve stem tip.



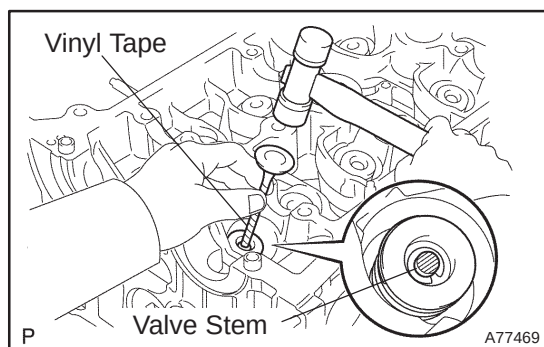
30. INSTALL EXHAUST VALVE

(a) Install the parts below to the cylinder head.

1	Exhaust valve
2	Spring
3	Retainer

(b) Using SST and wooden blocks, compress and install 2 valve spring retainer locks.

SST 09202-70020 (09202-00010)



- (c) Wrap the tip of a discarded valve with vinyl tape, place the discarded valve tip on the installed valve. Using a plastic-faced hammer, lightly tap the discarded valve head to ensure proper fitting of the installed valve.

NOTICE:

Be careful not to damage the valve stem tip.

31. INSTALL VALVE LIFTER

- (a) Apply a light coat of engine oil on the valve lifter.

NOTICE:

Install the valve lifters to the original locations.