1416M–01

OVERHAUL

HINT:

- Thoroughly clean all the parts to be assembled.
- Before installing the parts, apply fresh engine oil to all the sliding and rotating surfaces.
- Replace all the gaskets and oil seals with new ones.

1. REMOVE VALVE LIFTER PAD

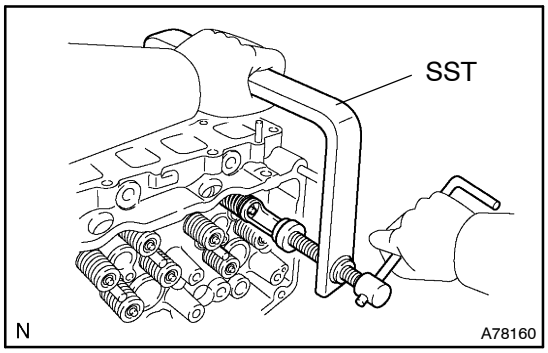
HINT:

Arrange the lifter pad in the correct order.

2. REMOVE VALVE BRIDGE

HINT:

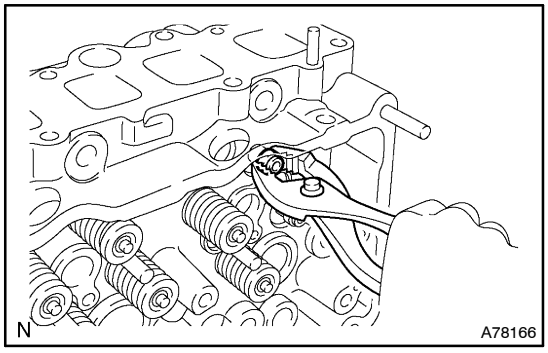
Arrange the valve bridge in the correct order.



3. REMOVE INTAKE VALVE

(a) Using SST, compress the compression springs and remove the 2 keepers.
SST 09202–70020 (09202–00010)

(b) Remove the spring retainer, 2 compression springs and valve.

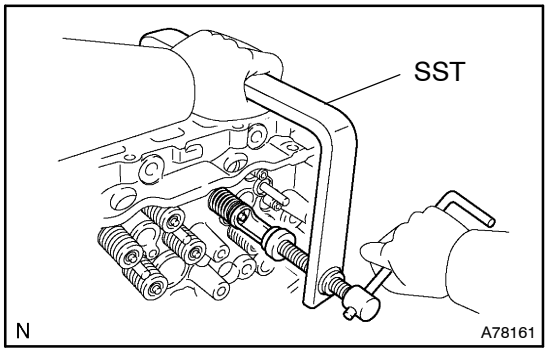


(c) Using needle–nose pliers, remove the oil seal.

(d) Remove the spring seat.

HINT:

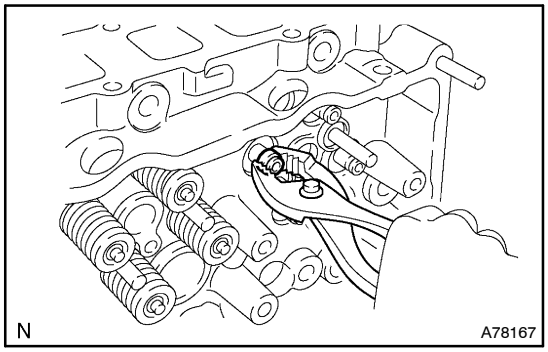
Arrange the valves, compression springs, spring seats and spring retainers in the correct order.



4. REMOVE EXHAUST VALVE

(a) Using SST, compress the compression springs and remove the 2 keepers.
SST 09202–70020 (09202–00010)

(b) Remove the spring retainer, 2 compression springs and valve.

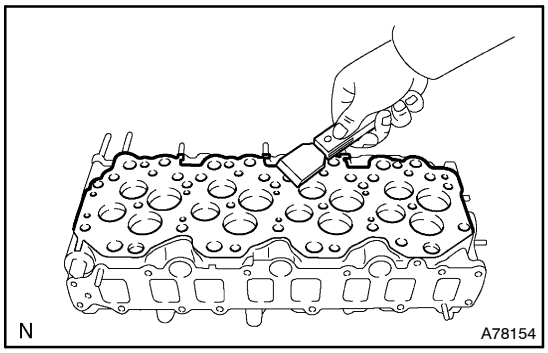


(c) Using needle–nose pliers, remove the oil seal.
(d) Remove the spring seat.

HINT:

Arrange the valves, compression springs, spring seats and spring retainers in the correct order.

5. REMOVE W/HEAD TAPER SCREW PLUG NO.1

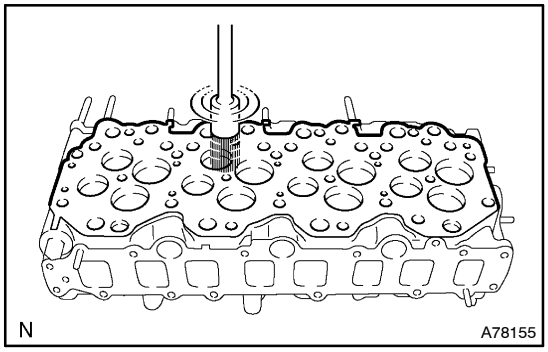


6. CLEAN CYLINDER HEAD SUB–ASSY

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

NOTICE:

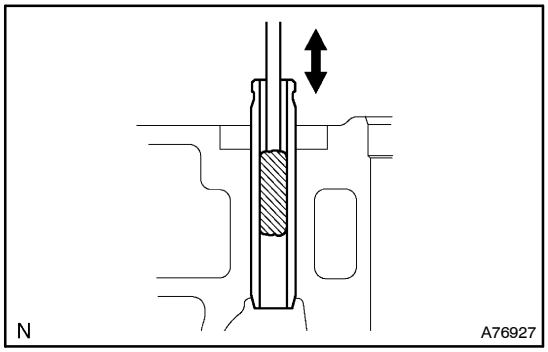
Be careful not to scratch the cylinder block contact surface.



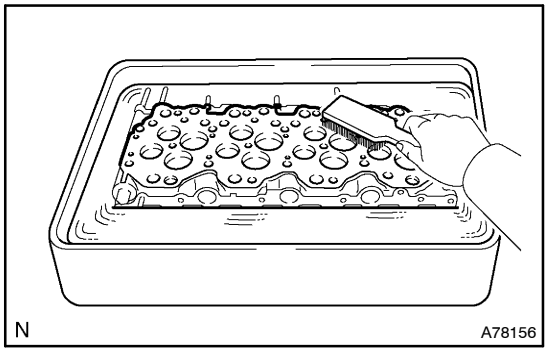
(b) Using a wire brush, remove all the carbons from the combustion chambers.

NOTICE:

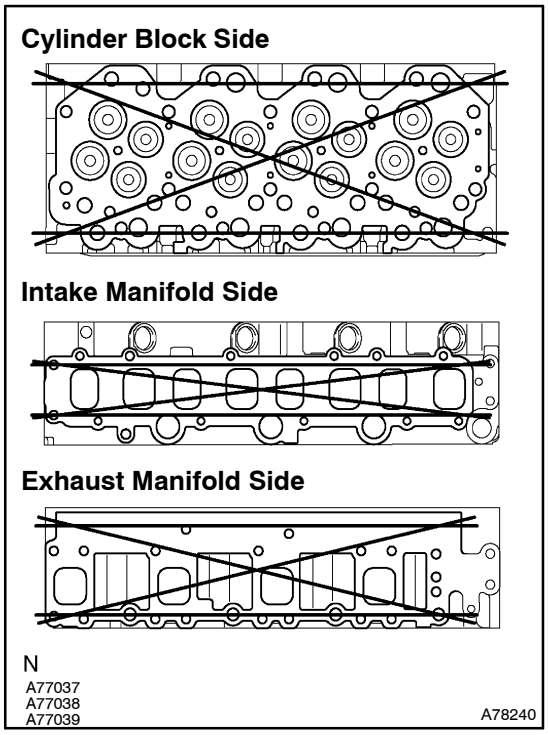
Be careful not to scratch the cylinder block contact surface.



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



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



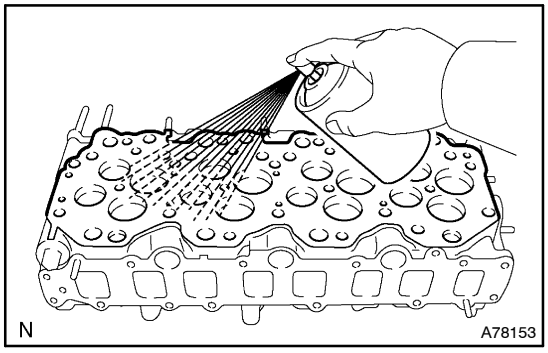
7. INSPECT CYLINDER HEAD SUB–ASSY

(a) Inspect the flatness.

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

Maximum warpage: 0.20 mm (0.0079 in.)

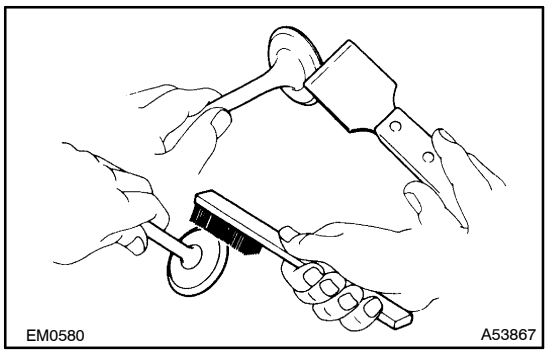
If the warpage is greater than the maximum, replace the cylinder head.



(b) Inspect for cracks.

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

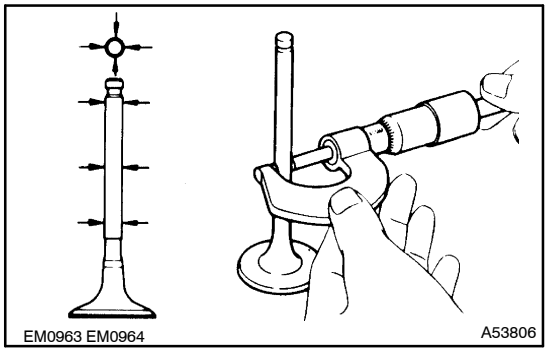
If cracked, replace the cylinder head.



8. CLEAN INTAKE VALVE

(a) Using a gasket scraper, chip off all the carbons from the valve head.

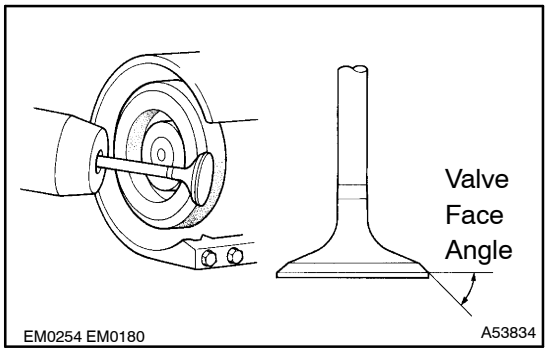
(b) Using a wire brush, thoroughly clean the valve.



9. INSPECT INTAKE VALVE

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

Valve stem diameter:
6.970 – 6.985 mm (0.2744 – 0.2750 in.)

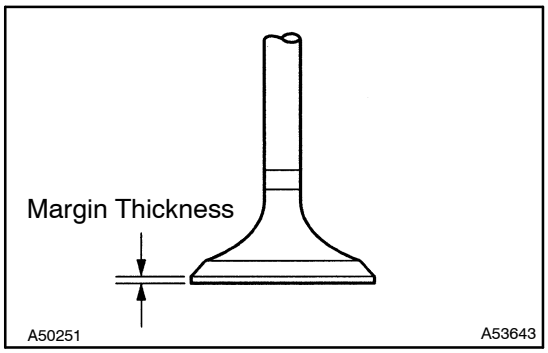


(b) Check the valve face angle.

(1) Grind the valve enough to remove the pits and carbons.

(2) Check that the valve is ground to the correct valve face angle.

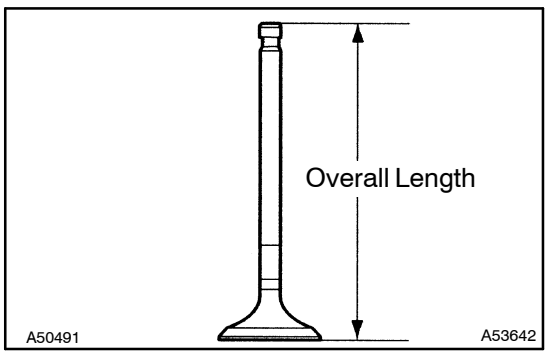
Valve face angle: 45°



(c) Check the valve head margin thickness.

Standard margin thickness: 1.26 mm (0.0496 in.)
Minimum margin thickness: 0.76 mm (0.0299 in.)

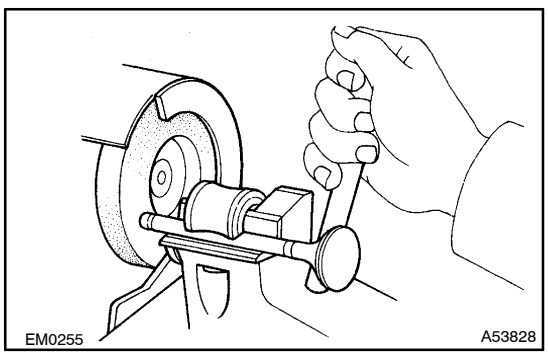
If the margin thickness is less than the minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:
126.30 – 126.70 mm (4.9724 – 4.9882 in.)
Minimum overall length: 126.00 mm (4.9606 in.)

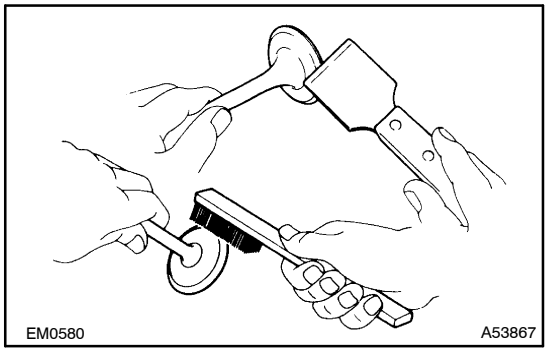
If the overall length is less than the minimum, replace the valve.



(e) 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.

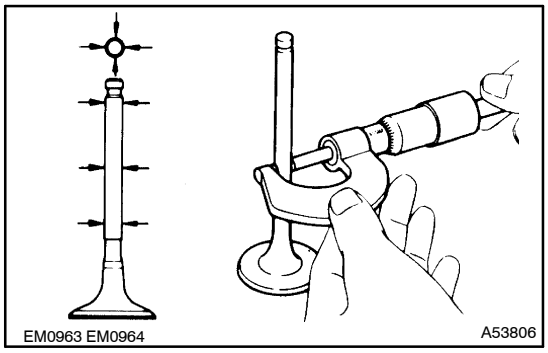
NOTICE:
Do not grind off more than the minimum overall length.



10. CLEAN EXHAUST VALVE

(a) Using a gasket scraper, chip off all the carbons from the valve head.

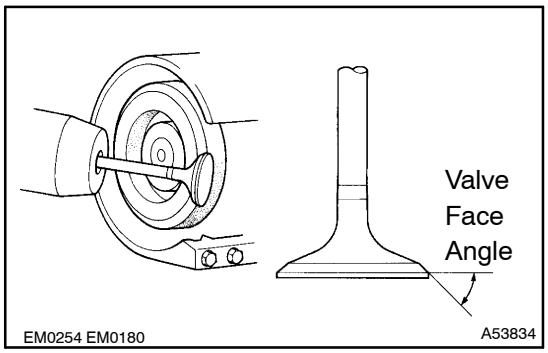
(b) Using a wire brush, thoroughly clean the valve.



11. INSPECT EXHAUST VALVE

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

Valve stem diameter:
6.955 – 6.970 mm (0.2738 – 0.2744 in.)

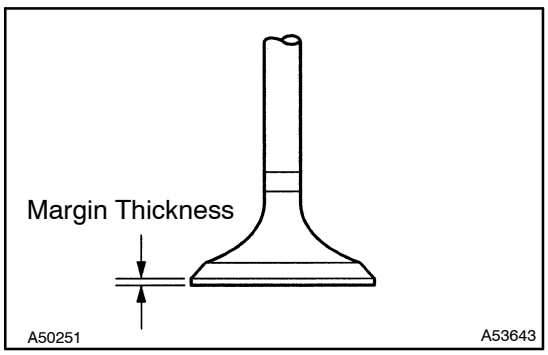


(b) Check the valve face angle.

(1) Grind the valve enough to remove the pits and carbons.

(2) Check that the valve is ground to the correct valve face angle.

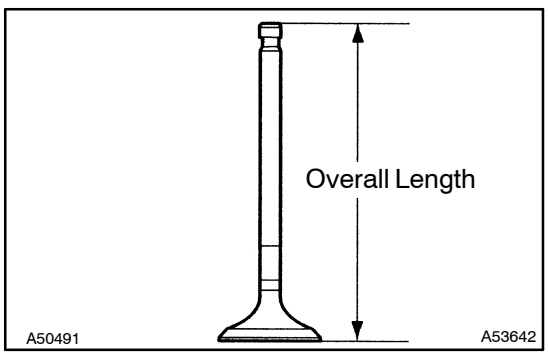
Valve face angle: 45°



(c) Check the valve head margin thickness.

Standard margin thickness: 0.97 mm (0.0382 in.)
Minimum margin thickness: 0.47 mm (0.0185 in.)

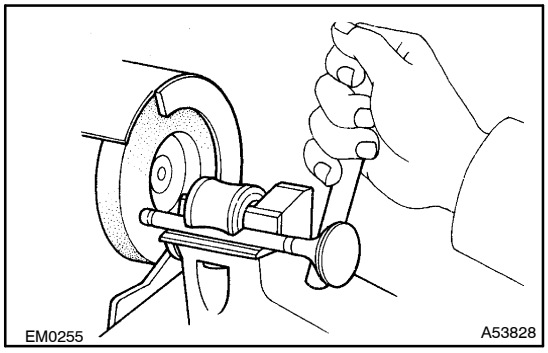
If the margin thickness is less than the minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:
126.25 – 126.65 mm (4.9705 – 4.9862 in.)
Minimum overall length: 125.95 mm (4.9587 in.)

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

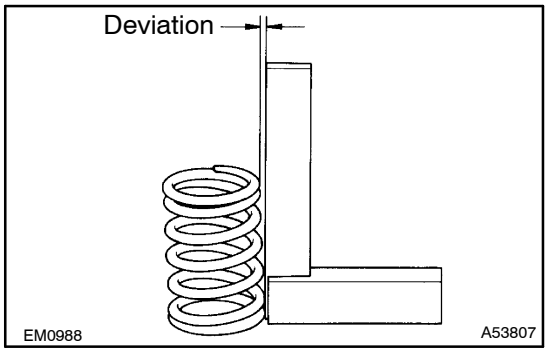


(e) Check the surface of the valve stem tip for wear.

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.

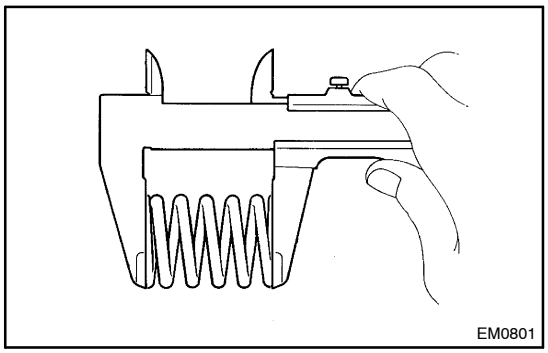


12. INSPECT COMPRESSION SPRING

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

Maximum deviation: 2.0 mm (0.079 in.)

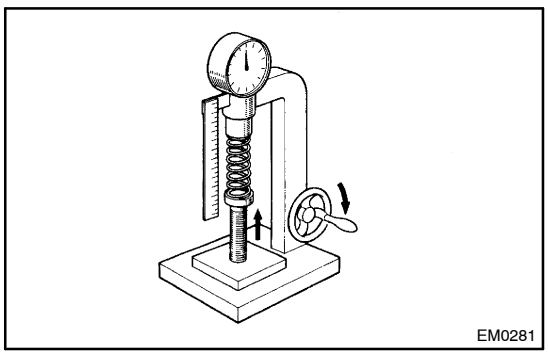
If the deviation is greater than the maximum, replace the spring.



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

Free length: 54.16 mm (2.1323 in.)

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



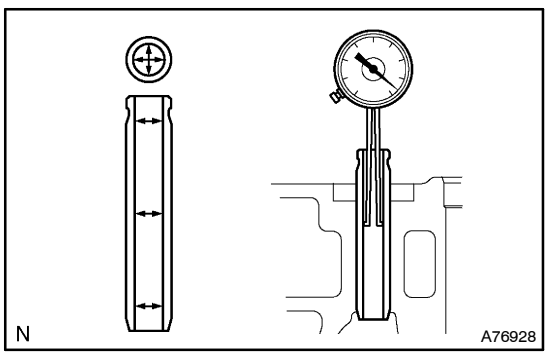
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Tension:

285 – 315 N (29.1 – 32.1 kgf, 64.2 – 70.8 lbf)

at 41.3 mm (1.626 in.)

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



13. INSPECT INTAKE VALVE GUIDE BUSH

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

Bush inside diameter:

7.010 – 7.030 mm (0.2760 – 0.2768 in.)

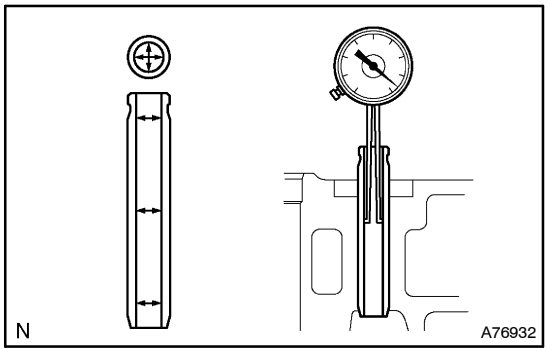
(b) Subtract the valve stem diameter measurement (See step 9) from the guide bush inside diameter measurement.

Standard oil clearance:

0.025 – 0.060 mm (0.0010 – 0.0024 in.)

Maximum oil clearance: 0.08 mm (0.0031 in.)

If the clearance is greater than the maximum, replace the valve and guide bush (See steps 15 and 17).



14. INSPECT EXHAUST VALVE GUIDE BUSH

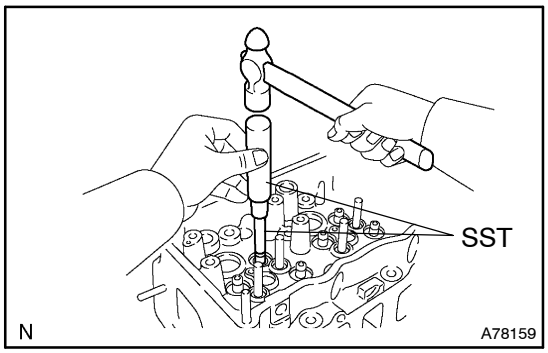
(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Bush inside diameter:
7.010 – 7.030 mm (0.2760 – 0.2768 in.)

(b) Subtract the valve stem diameter measurement (See step 10) from the guide bush inside diameter measurement.

Standard oil clearance:
0.040 – 0.075 mm (0.0016 – 0.0030 in.)
Maximum oil clearance: 0.10 mm (0.0039 in.)

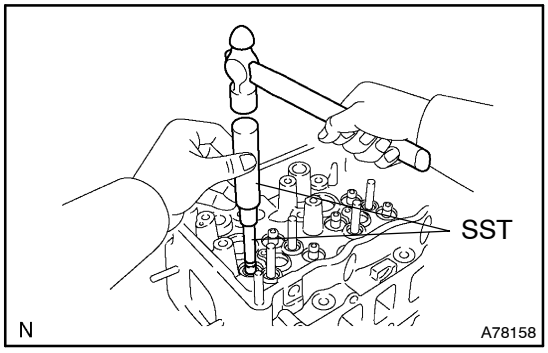
If the clearance is greater than the maximum, replace the valve and guide bush (See steps 16 and 18).



15. REMOVE INTAKE VALVE GUIDE BUSH

(a) Using SST and a hammer, tap out the valve guide bushing.

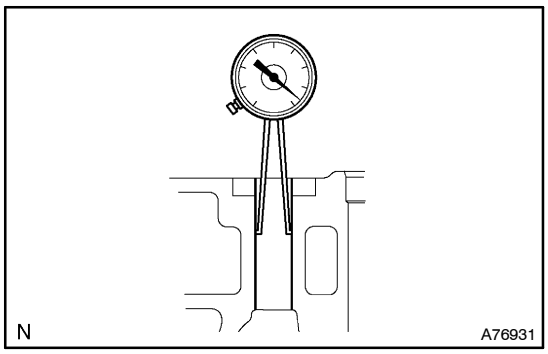
SST 09201–10000 (09201–01070), 09950–70010 (09951–07100)



16. REMOVE EXHAUST VALVE GUIDE BUSH

(a) Using SST and a hammer, tap out the valve guide bushing.

SST 09201–10000 (09201–01070), 09950–70010 (09951–07100)

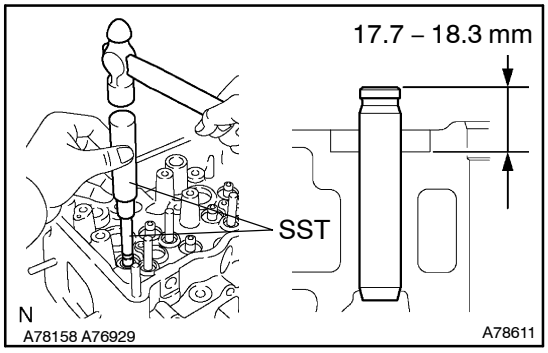


17. INSTALL INTAKE VALVE GUIDE BUSH

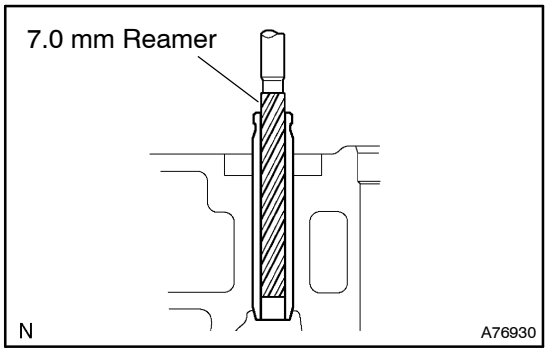
(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Bush bore diameter:
11.504 – 11.525 mm (0.4529 – 0.4537 in.)

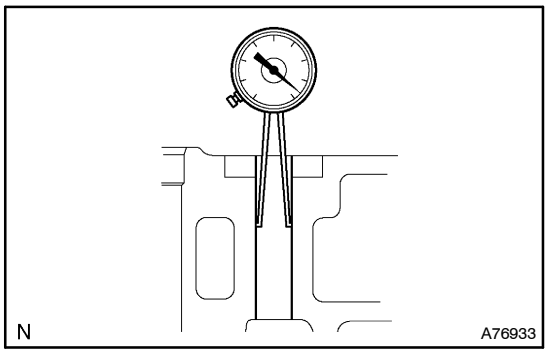
If the bush bore diameter of the cylinder head is greater than 11.525 mm (0.4537 in.), replace the cylinder head.



(b) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201–10000 (09201–01070), 09950–70010 (09951–07100)
Protrusion height: 17.7 – 18.3 mm (0.697 – 0.720 in.)



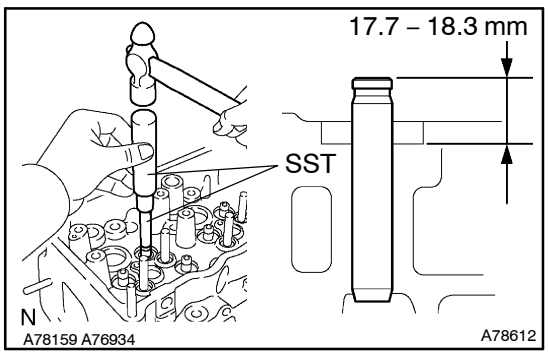
(c) Using a sharp 7.0 mm reamer, ream the guide bush to obtain the standard clearance (See step 13) between the guide bush and valve stem.



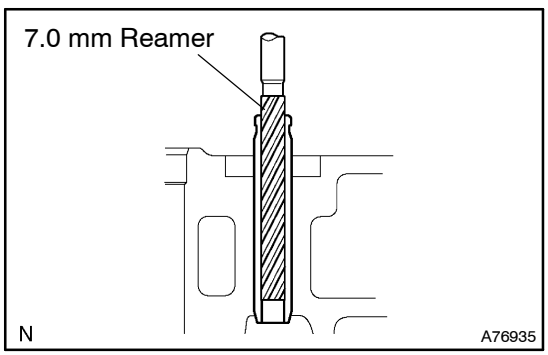
18. INSTALL EXHAUST VALVE GUIDE BUSH

(a) Using a caliper gauge, measure the bush bore diameter of the cylinder head.
Bush bore diameter:
11.504 – 11.525 mm (0.4529 – 0.4537 in.)

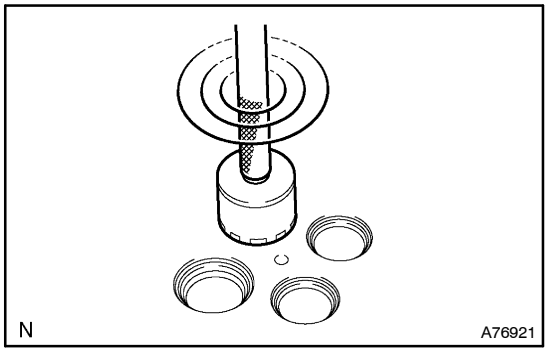
If the bush bore diameter of the cylinder head is greater than 11.525 mm (0.4537 in.), replace the cylinder head.



(b) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.
SST 09201–10000 (09201–01070), 09950–70010 (09951–07100)
Protrusion height: 17.7 – 18.3 mm (0.697 – 0.720 in.)



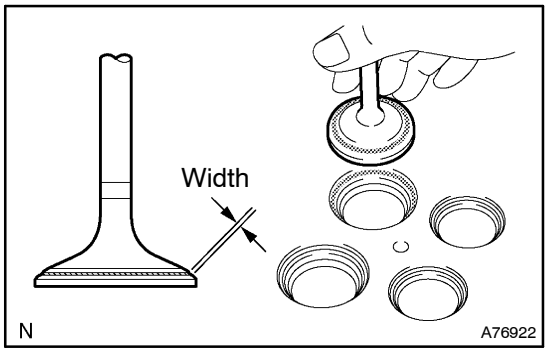
(c) Using a sharp 7.0 mm reamer, ream the guide bush to obtain the standard clearance (See step 14) between the guide bush and valve stem.
SST 09201–10000 (09201–01070), 09950–70010 (09951–07100)



19. INSPECT INTAKE VALVE SEAT

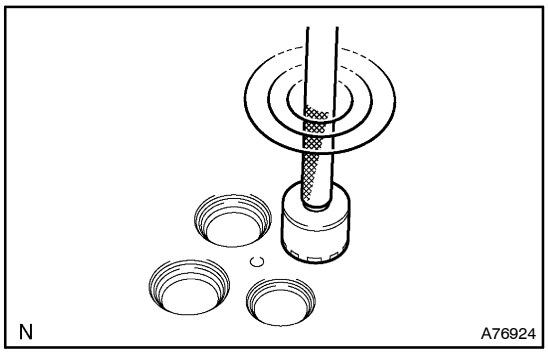
(a) Using a 45˚ carbide cutter, resurface the valve seats. Remove as little metals essential to cleaning the seats as possible.

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



(c) Check the valve face and seat in the following items:
  (1) If the blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.
  (2) If the 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 by the specified width.

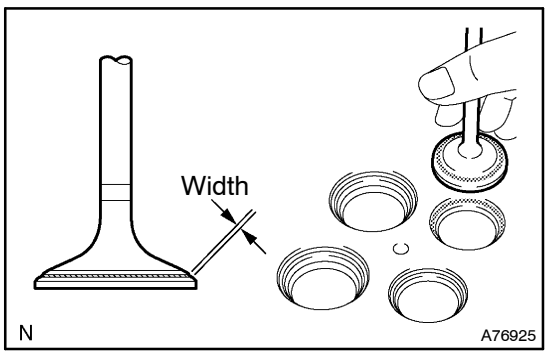
Width: 1.3 – 1.9 mm (0.051 – 0.075 in.)



20. INSPECT EXHAUST VALVE SEAT

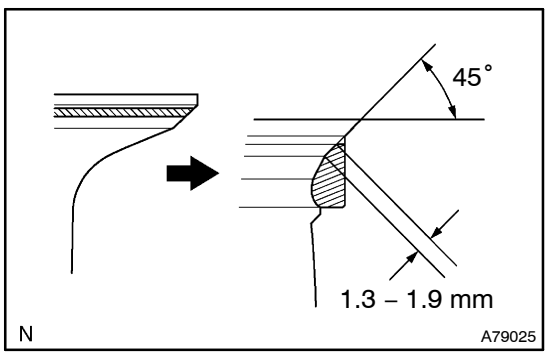
(a) Using a 45˚ carbide cutter, resurface the valve seats. Remove as little metals essential to cleaning the seats as possible.

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



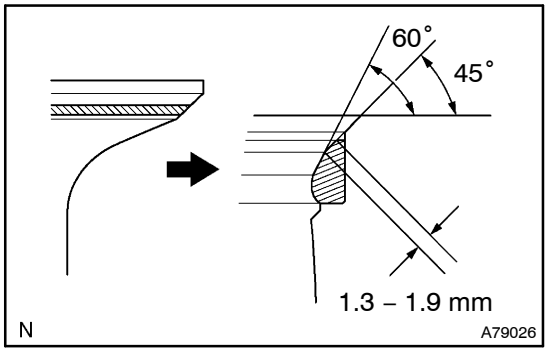
(c) Check the valve face and seat in the following items:
  (1) If the blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.
  (2) If the blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.
  (3) Check that the seat contact is in the middle of the valve face by the specified width.

Width: 1.6 – 2.4 mm (0.063 – 0.094 in.)

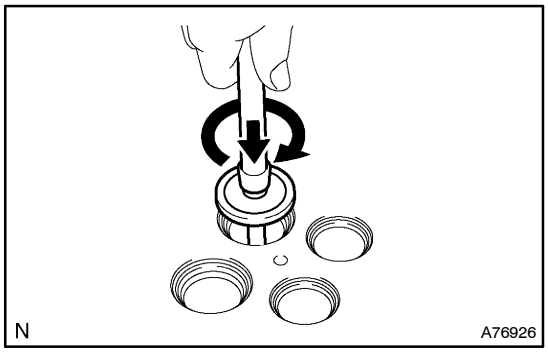


21. REPAIR INTAKE VALVE SEAT

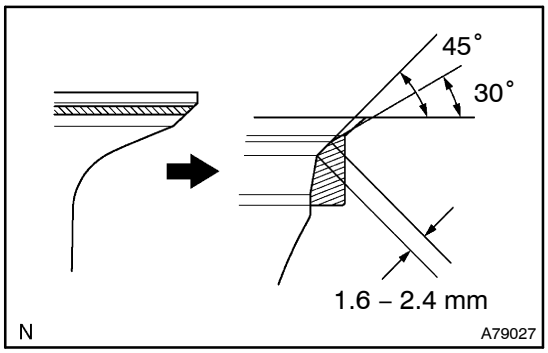
(a) If the seating is too high on the valve face, use 45˚ cutter to correct the seat.



(b) If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.

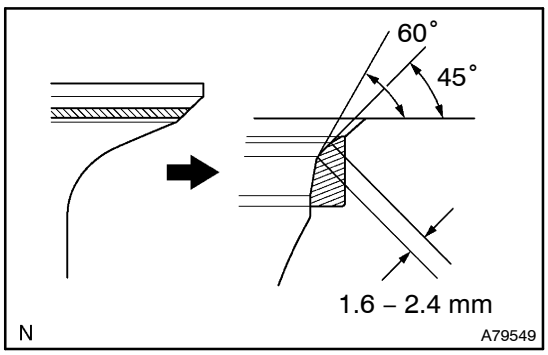


(c) Hand–lap the valve and valve seat with an abrasive compound.
(d) After hand–lapping, clean the valve and valve seat.

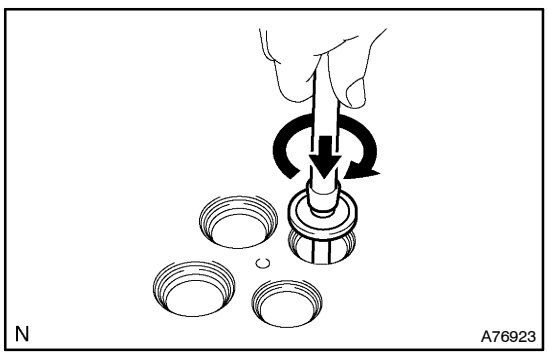


22. REPAIR EXHAUST VALVE SEAT

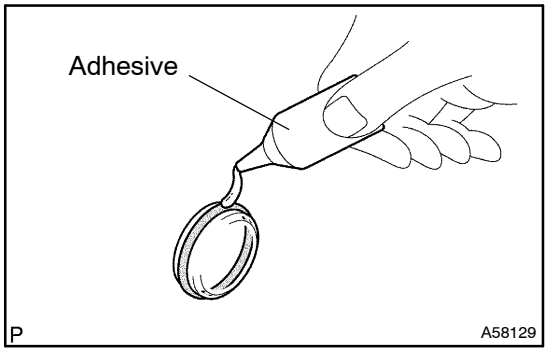
(a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



(b) If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.



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

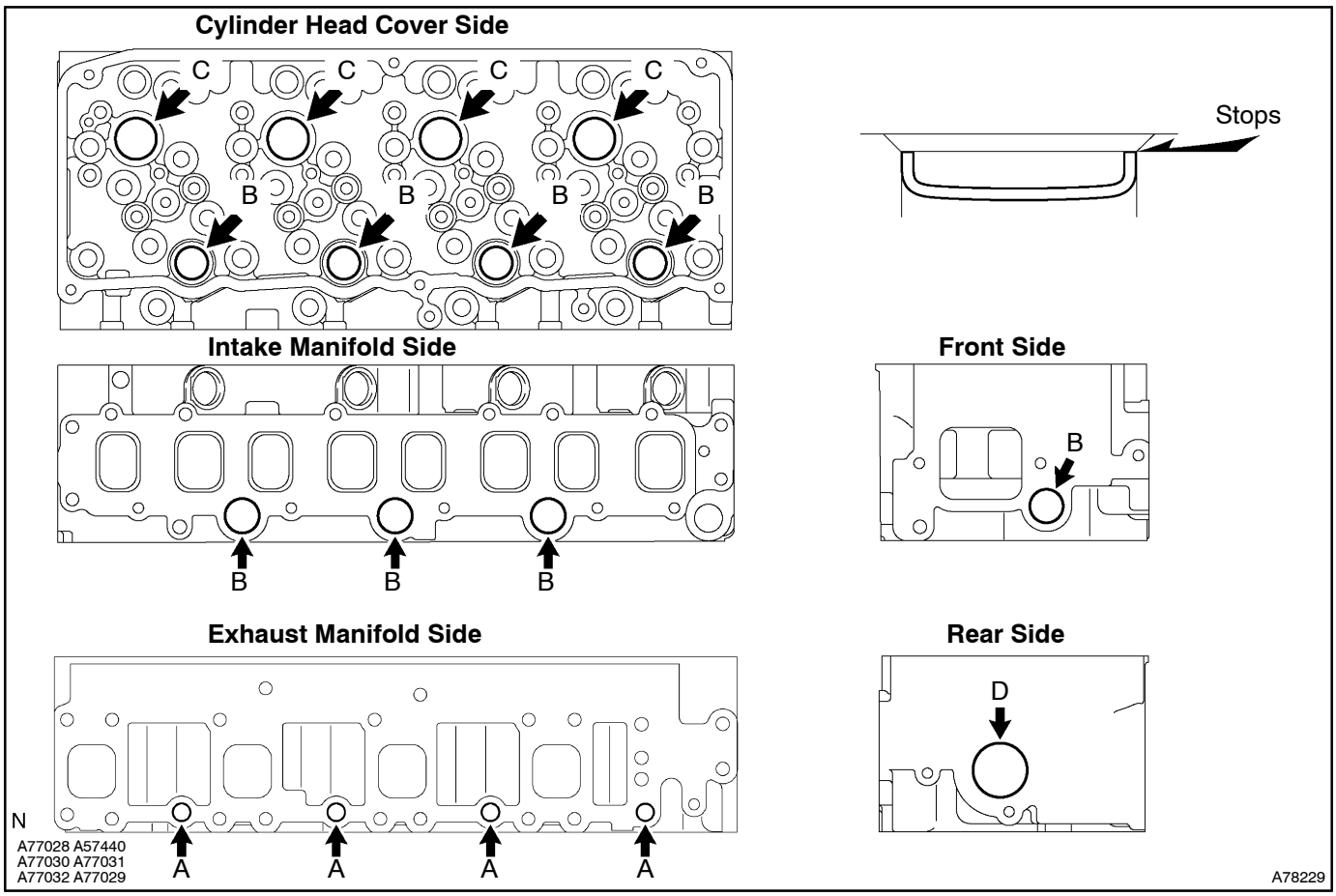


23. INSTALL TIGHT PLUG

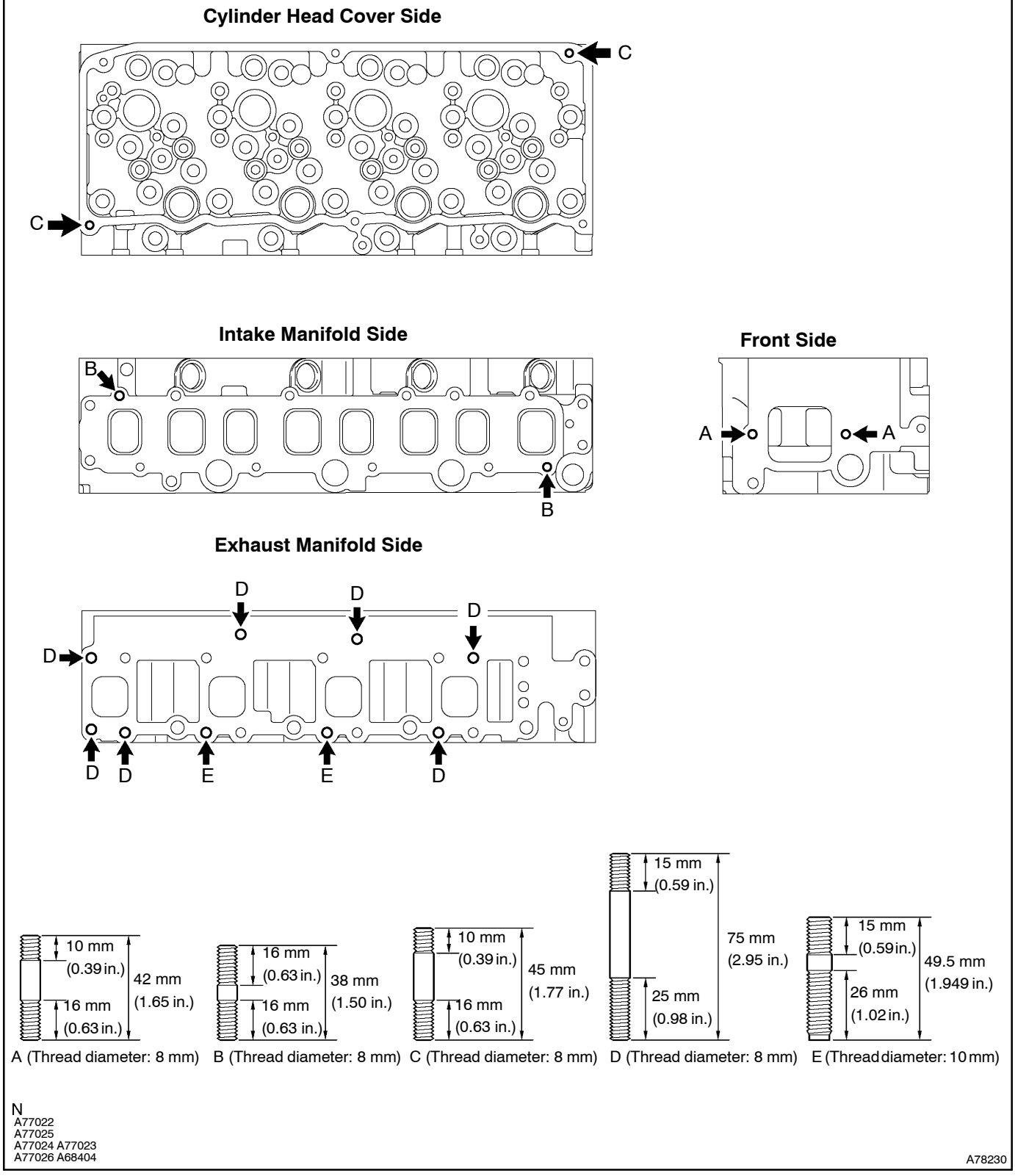
(a) Apply adhesive to a new tight plug.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent

(b) Position A:
Using 14 mm (0.55 in.) steel bar and a hammer, tap in the tight plug

(c) Using SST and a hammer, tap in a new tight plug.
SST Position B:
09950–60010 (09951–00250), 09950–70010 (09951–07100)
Position C:
09950–60010 (09951–00300), 09950–70010 (09951–07100)
Position D:
09950–60010 (09951–00400), 09950–70010 (09951–07100)



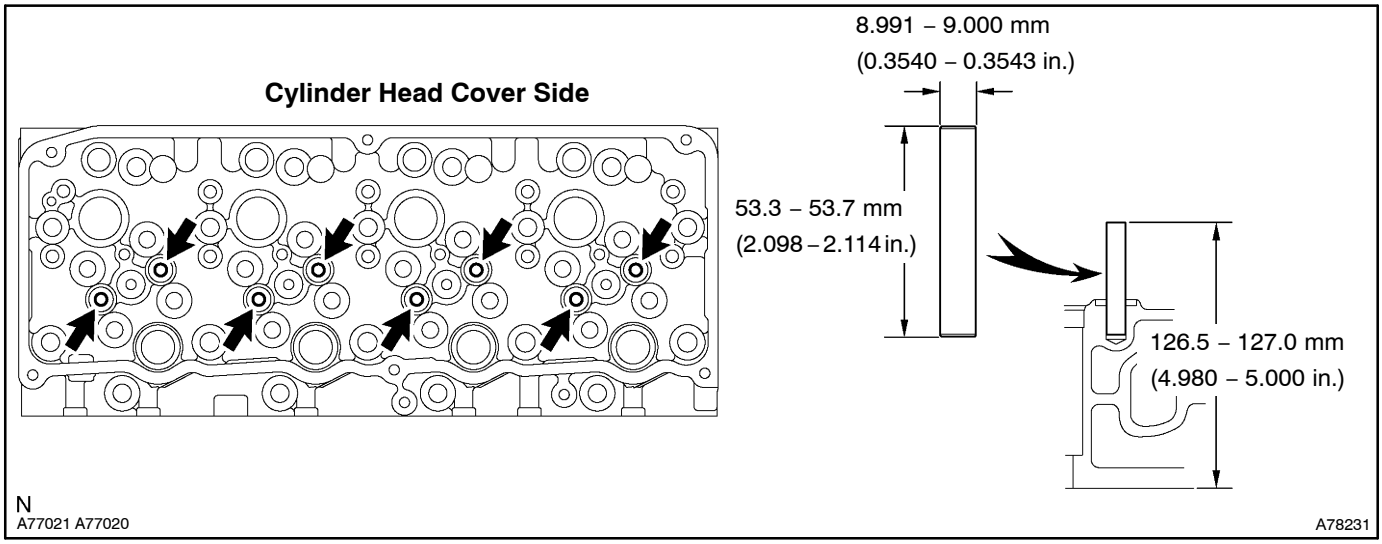
24. INSTALL STUD BOLT

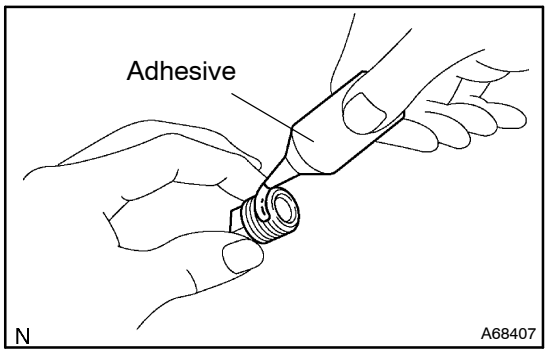


N
A77022
A77025
A77024 A77023
A77026 A68404

A78230

25. INSTALL STRAIGHT PIN

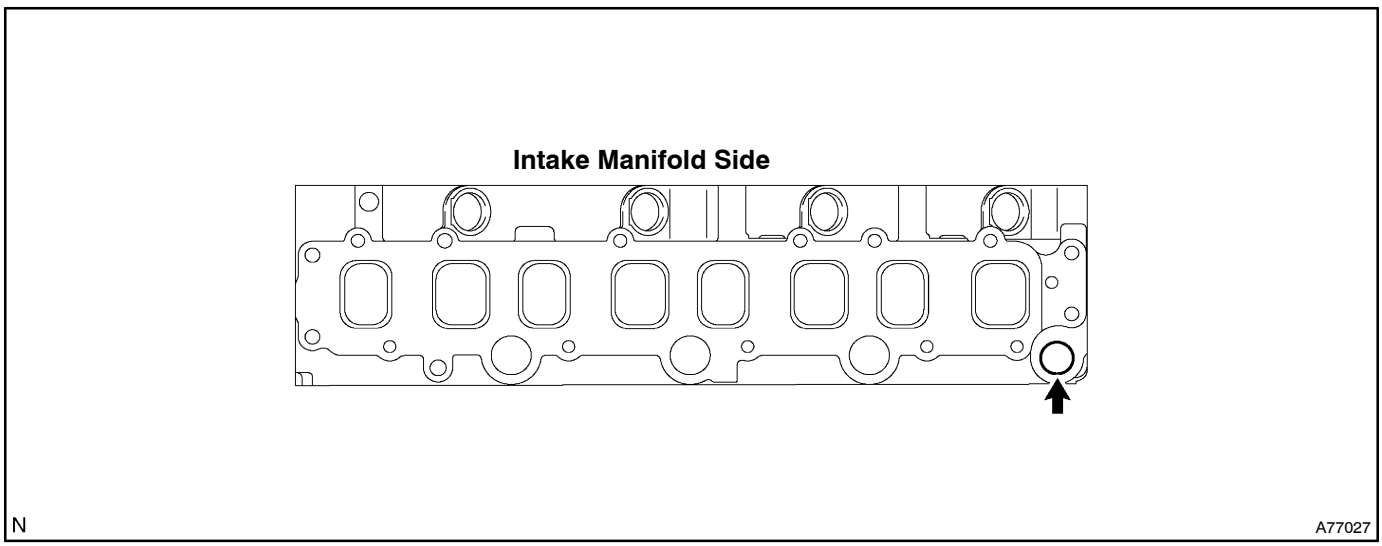


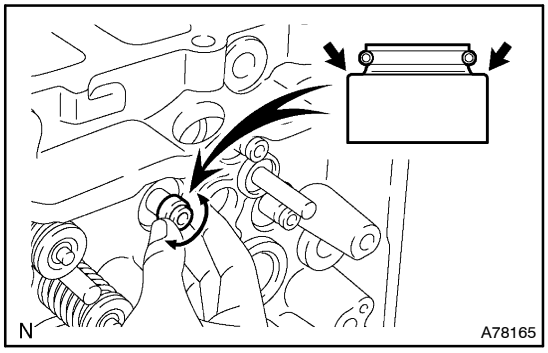


26. INSTALL W/HEAD TAPER SCREW PLUG NO.1

(a) Apply adhesive to the 2 or 3 threads of the screw plug.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent

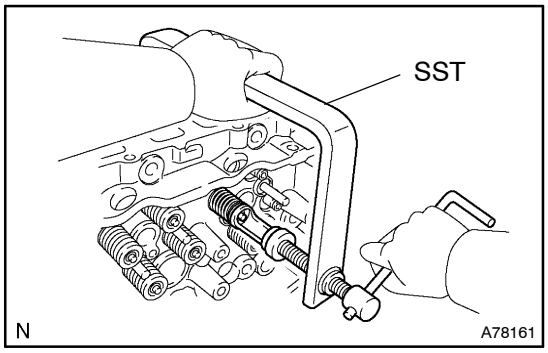
(b) Install the screw plug.
Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)



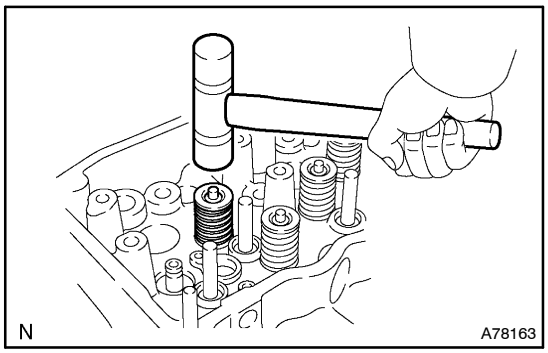


27. INSTALL EXHAUST VALVE

(a) Place the spring seat on the cylinder head.
(b) Push a new oil seal on the valve guide bush.
(c) Rotate the oil seal to check that it is firmly installed.
(d) Install the valve, 2 compression springs and spring retainer.

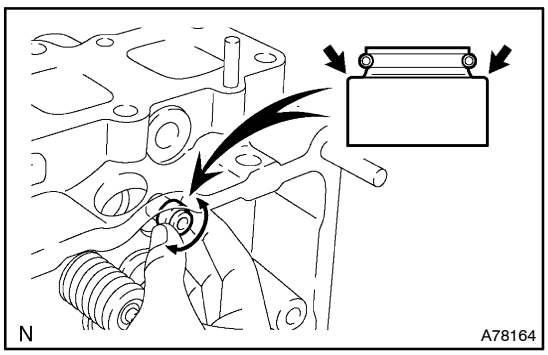


(e) Using SST, compress the compression springs and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00010)



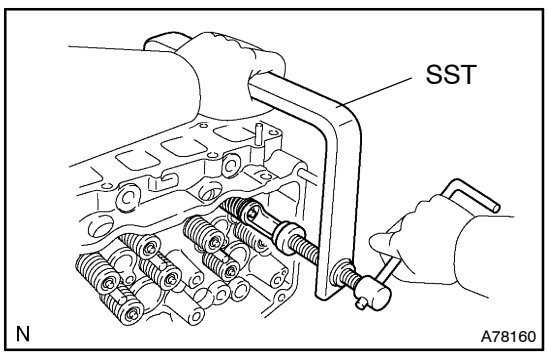
(f) Using a plastic–faced hammer, lightly tap the valve stem tip to assure a proper fit.

NOTICE:
Be careful not to damage the valve stem tip.

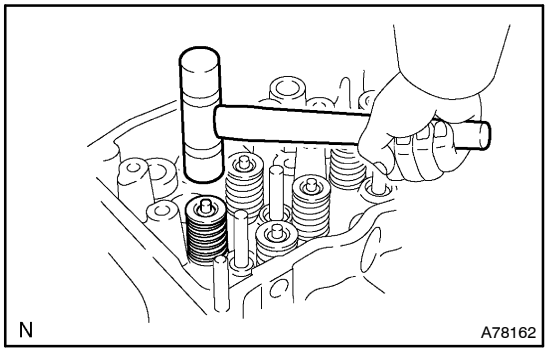


28. INSTALL INTAKE VALVE

(a) Place the spring seat on the cylinder head.
(b) Push a new oil seal on the valve guide bush.
(c) Rotate the oil seal to check that it is firmly installed.
(d) Install the valve, 2 compression springs and spring retainer.



(e) Using SST, compress the compression springs and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00010)



(f) Using a plastic–faced hammer, lightly tap the valve stem tip to assure a proper fit.

NOTICE:

Be careful not to damage the valve stem tip.

29. INSTALL VALVE BRIDGE

(a) Install the valve bridge.

(b) Check that the valve bridge smoothly move.

30. INSTALL VALVE LIFTER PAD