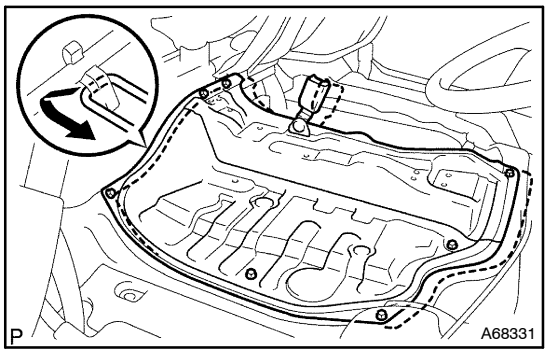
1417E–01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT
4. DISCONNECT RADIATOR RESERVE TANK HOSE OR PIPE
5. REMOVE FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72–2)
6. REMOVE PARKING BRAKE HOLE COVER (W/O TILT CAB CAB TYPE) (See page 33–3)
7. REMOVE PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33–3)
8. REMOVE FLOOR SHIFT SHIFT LEVER KNOB SUB–ASSY (W/O TILT CAB CAB TYPE) (See page 41–11)
9. REMOVE SHIFTING HOLE COVER SUB–ASSY AND SHIFT LEVER BOOT COVER (W/O TILT CAB CAB TYPE)

(a) Remove the 3 clips and shift lever boot cover.

10. REMOVE SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41–19)
11. REMOVE FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41–11)

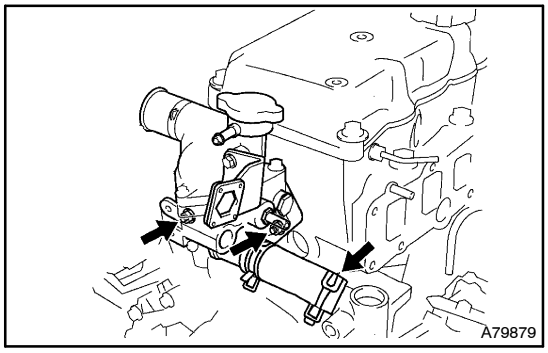


12. REMOVE ENGINE SERVICE HOLE SUB COVER SUB–ASSY (W/O TILT CAB CAB TYPE)

(a) Remove the floor mat.
(b) Remove the 7 bolts and the engine service hole sub cover .

HINT:
As shown in the illustration, slide and remove the engine service hole sub cover, because there is a hook inside.

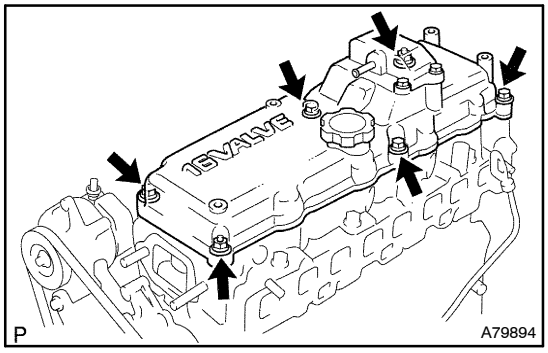
13. DISCONNECT ENGINE WIRE
14. SEPARATE A/C COMPRESSOR (See page 55–33)



15. REMOVE WATER OUTLET HOUSING

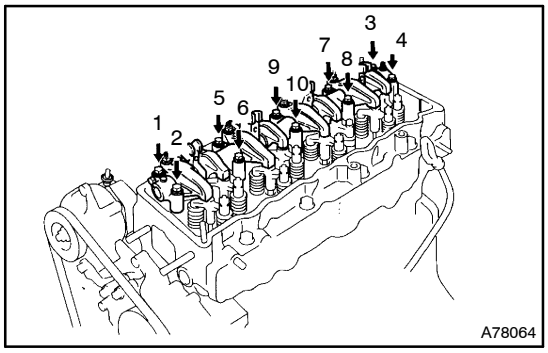
(a) Remove the 2 nuts holding the water outlet housing to the cylinder head.
(b) Disconnect the water bypass hose from the water pump, and remove the water outlet housing.

16. REMOVE FUEL PIPE SET (See page 11–60)
17. REMOVE OIL LEVEL GAUGE GUIDE
18. REMOVE INTAKE MANIFOLD (See page 13–4)
19. REMOVE EXHAUST MANIFOLD (See page 15–2)



20. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.



21. REMOVE CYLINDER HEAD SUB–ASSY

(a) Remove the nozzle leakage pipe (See page 11–60).

(b) Loosen the lock nuts and adjusting screws.

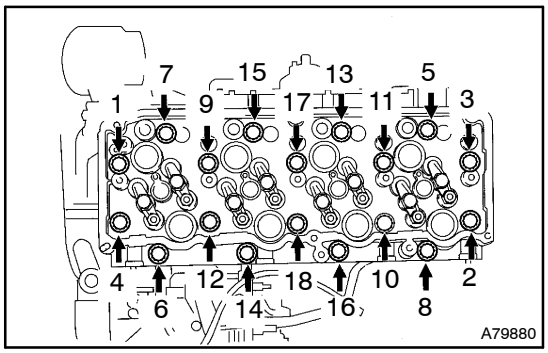
(c) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.

(d) Remove the valve rocker shaft assy.

(e) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:

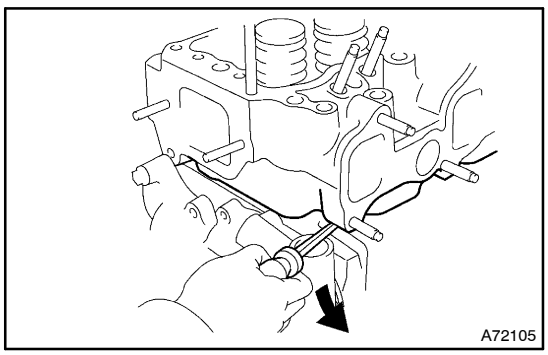
Arrange the push rods in correct order.



(f) Uniformly loosen and remove the 18 cylinder head bolts, in several passes, in the order shown.

NOTICE:

Removing the bolts in the incorrect order will result in warpage or cracks on the head.



(g) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

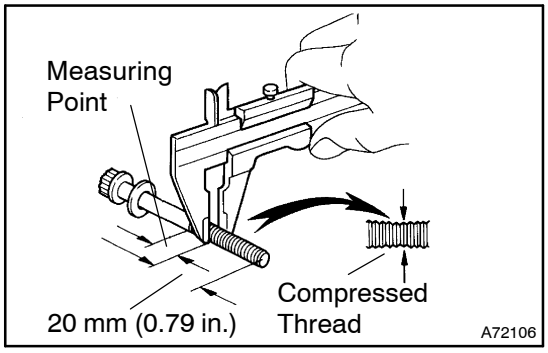
HINT:

If the cylinder head is difficult to be lifted off, insert a screwdriver between the cylinder head and block to pry it up.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

22. REMOVE CYLINDER HEAD GASKET

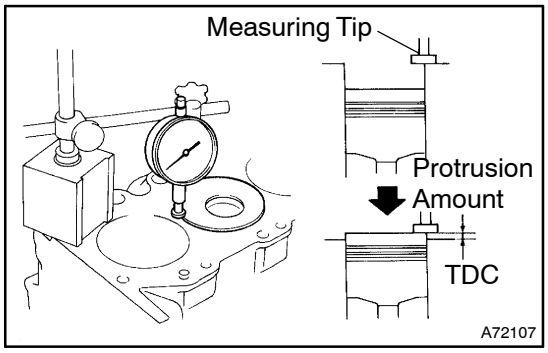


23. INSPECT CYLINDER HEAD SET BOLT

(a) Using vernier calipers, measure the minimum outer diameter of the compressed threads at the measuring point.

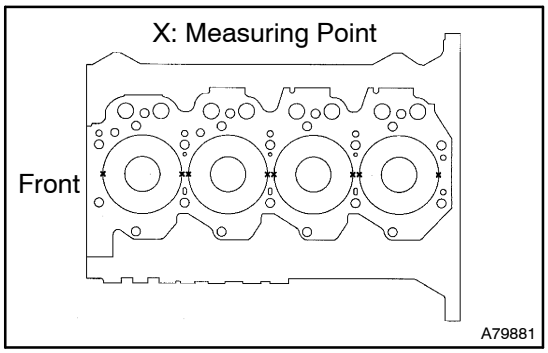
Standard outer diameter:
11.800 – 12.000 mm (0.4646 – 0.4724 in.)
Minimum outer diameter: 11.60 mm (0.4567 in.)

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



24. INSTALL CYLINDER HEAD GASKET

(a) Check the piston protrusions for each cylinder.
(1) Clean the cylinder block with solvent.
(2) Set the piston of the cylinder to be measured to slightly before TDC.
(3) Place a dial indicator on the cylinder block, and set the dial indicator at 0 mm (0 in.).



HINT:

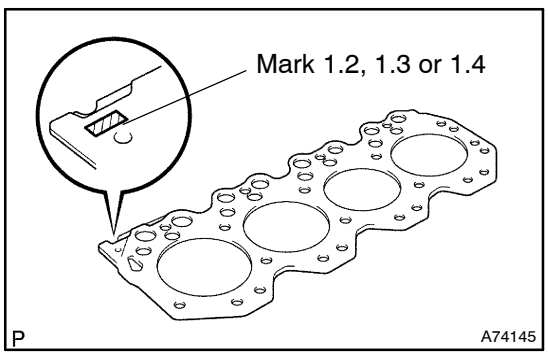
- Use a dial indicator measuring tip as shown in the illustration.
- Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.

(4) Find the point where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.
(5) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurements.
(6) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion: 0.255 – 0.705 mm (0.0100 – 0.0278 in.)

When removing piston and connecting rod assembly:

If the protrusion is not as specified, remove the piston and connecting rod assembly and reinstall it.



(b) Select a new cylinder head gasket.

HINT:

There are 3 sizes of new cylinder head gaskets, marked 1.2, 1.3 or 1.4 accordingly.

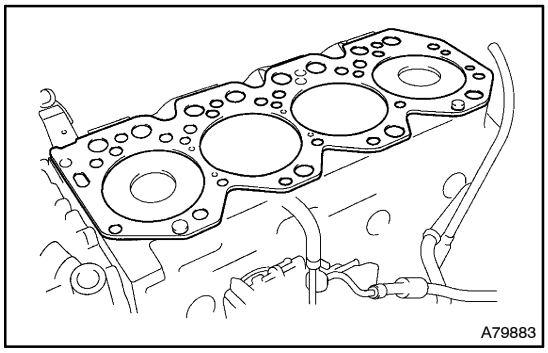
New installed cylinder head gasket thickness:

Mark 1.2	1.17 – 1.23 mm (0.0461 – 0.0484 in.)
Mark 1.3	1.27 – 1.33 mm (0.0500 – 0.0524 in.)
Mark 1.4	1.37 – 1.43 mm (0.0539 – 0.0563 in.)

Select the largest piston protrusion value from the measurements made, then select a new appropriate gasket from the table below.

Protrusion:

Piston protrusion mm (in.)	Gasket size
0.255 – 0.505 (0.0100 – 0.0199)	Use 1.2
0.506 – 0.605 (0.0200 – 0.0238)	Use 1.3
0.606 – 0.705 (0.0240 – 0.0278)	Use 1.4



25. INSTALL CYLINDER HEAD SUB–ASSY

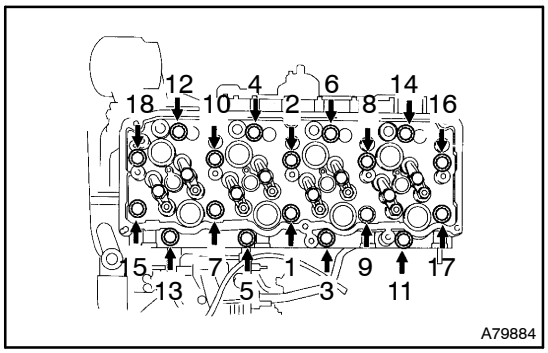
(a) Place the cylinder head on the cylinder block.

(1) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

(2) Place the cylinder head in position on the cylinder head gasket.



(b) Install the cylinder head bolts.

HINT:

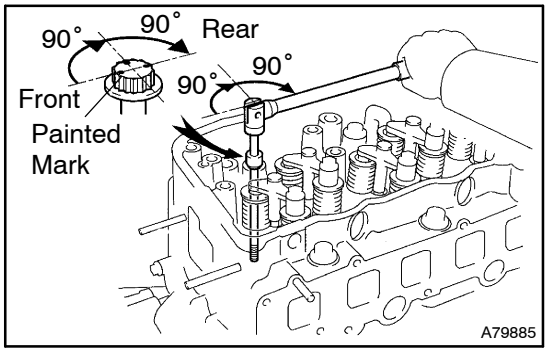
- The cylinder head bolts are tightened in 3 progressive steps (steps (2), (4) and (5)).
- If any bolts is broken or deformed, replace it.

(1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(2) Install and uniformly tighten the 18 cylinder head bolts, in several passes, in the order shown.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



(3) Mark the front of the cylinder head bolt with paint.

(4) Retighten the cylinder head bolts by 90° in the numerical order shown.

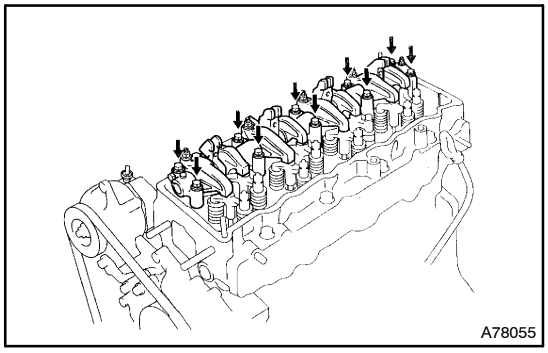
(5) Retighten the cylinder head bolts by an additional 90°.

(6) Check that the painted mark is now facing rearward.

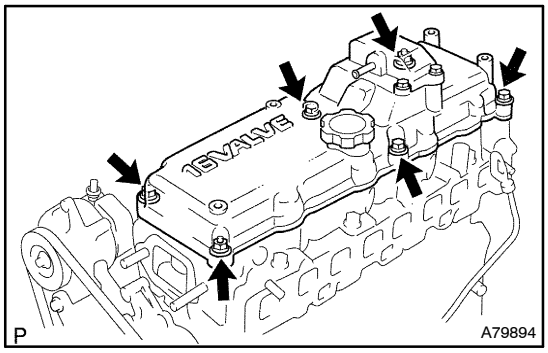
26. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Install the push rods.

(b) Place the rocker arm adjusting screws with the heads of the push rods.

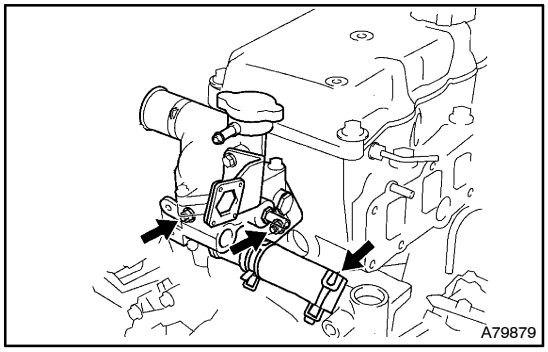


(c) Instal and uniformly tighten the 10 bolts, in several passes, in the sequence shown.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



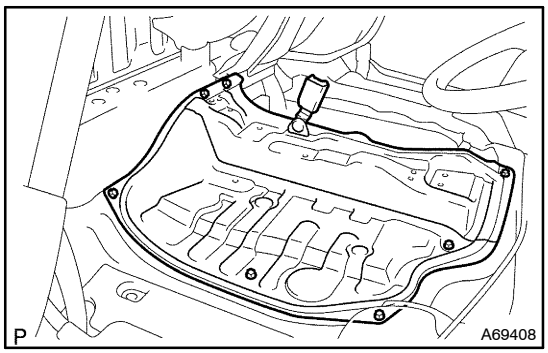
27. INSTALL CYLINDER HEAD COVER SUB–ASSY
(a) Install nozzle leakage pipe (See page 11–60).
(b) Install the gasket to the cylinder head cover.
(c) Install the cylinder head cover and uniformly tighten them with the 6 cushions, 4 bolts and 2 nuts, in several passes, in the order shown.
Torque: 10.5 N·m (107 kgf·cm, 8 ft·lbf)

28. INSTALL EXHAUST MANIFOLD (See page 15–2)
29. INSTALL INTAKE MANIFOLD (See page 13–4)
30. INSTALL OIL LEVEL GAUGE GUIDE
(a) Install the oil level gauge guiode with the bolt.
31. INSTALL FUEL PIPE SET (See page 11–60)



32. INSTALL WATER OUTLET HOUSING
(a) Connect the water bypass hose to the water pump.
(b) Install the water outlet housing with the 2 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

33. INSTALL A/C COMPRESSOR (See page 55–33)
34. INSTALL ENGINE WIRE



35. INSTALL ENGINE SERVICE HOLE SUB COVER SUB–ASSY (W/O TILT CAB CAB TYPE)
(a) Install the engine service hole sub cover with the 7 bolts.
Torque: 11.5 N·m (115 kgf·cm, 8.5 ft·lbf)
(b) Install the floor mat.

36. INSTALL FLOOR SHIFT ASSY (W/O TILT CAB CAB TYPE) (See page 41–11)
37. INSTALL SHIFT AND SELECT TRANSMISSION CONTROL CABLE ASSY (W/O TILT CAB CAB TYPE) (See page 41–19)
38. INSTALL PARKING BRAKE LEVER ASSY (W/O TILT CAB CAB TYPE) (See page 33–3)
39. INSTALL FRONT SEAT ASSEMBLY (DRIVER SEAT) (W/O TILT CAB CAB TYPE) (See page 72–2)
40. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33–2)
41. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33–2)
42. REFILL ENGINE COOLANT
43. CONNECT BATTERY NEGATIVE TERMINAL
44. ADD FUEL
45. BLEED FUEL (See page 11–57)
46. CHECK FOR ENGINE COOLANT LEAKS
47. INSPECT FOR FUEL LEAKS