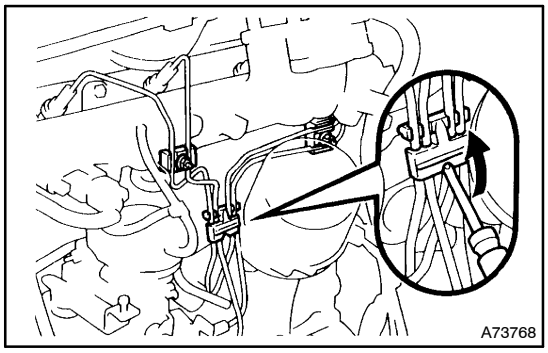
1410W–01

REPLACEMENT

1. REMOVE INTERCOOLER ASSY(See page 13–11)
2. REMOVE VENTURI ASSY(See page 10–24)
3. REMOVE TIMING BELT(See page 14–152)

4. REMOVE INJECTION PIPE SET

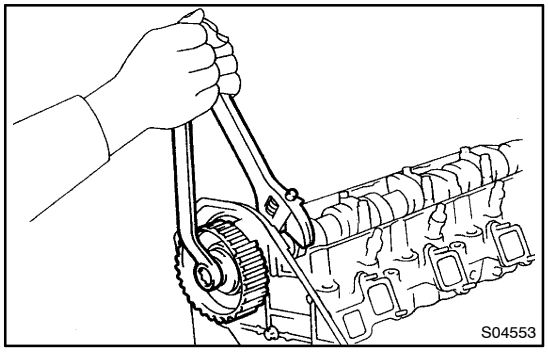
(a) Remove the 2 nuts holding the clamps to the intake manifold.



(b) Using a screwdriver, pry out the clamp.
(c) Loosen the 8 union nuts of the injection pipes.
(d) Remove the 4 injection pipes and 2 clamps.

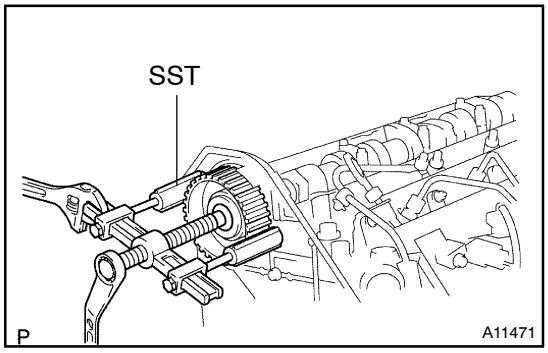
5. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 10 bolts, 2 nuts, cylinder head cover and gasket.

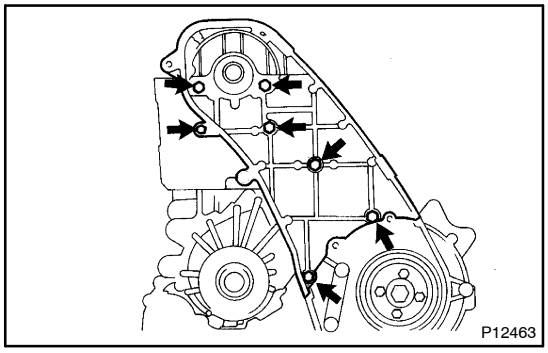


6. REMOVE CAMSHAFT TIMING PULLEY

(a) Hold the hexagon wrench head portion of the camshaft with a wrench, and remove the No. 1 camshaft timing pulley bolt.



(b) Using SST, remove the No. 1 camshaft timing pulley.
SST 09950–40011 (09951–04010, 09952–04010, 09953–04020, 09954–04010, 09955–04061)
(c) Remove the set key.



7. REMOVE CAMSHAFT OIL SEAL RETAINER

(a) Remove the 7 bolts and camshaft oil seal retainer.

8. REMOVE EGR PIPE SUB–ASSY NO.1 (W/ EGR)(See page 12–22)

9. DISCONNECT EXHAUST PIPE ASSY FRONT(See page 15–8)

10. REMOVE TURBO INSULATOR NO.1

(a) Remove the 3 bolts and heat insulator.

11. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1

(a) Remove the 4 bolts and heat insulator.

12. REMOVE TURBO WATER PIPE SUB–ASSY NO.1

(a) Disconnect the 2 water by–pass hoses from the turbo water pipe.

(b) Remove the 2 nuts, bolt, water pipe and gasket.

13. REMOVE TURBINE OUTLET ELBOW

(a) Remove the 4 nuts, outlet elbow and gasket.

14. REMOVE TURBOCHARGER STAY

(a) Remove the bolt, nut and turbocharger stay.

15. REMOVE EXHAUST MANIFOLD ASSY W/ TURBOCHARGER ASSY

(a) Remove the 2 bolts and union bolt from the turbo oil pipe.

(b) Remove the 6 nuts, plate washers, 2 bolts, the turbocharger, exhaust manifold assembly and 3 gaskets.

16. SEPARATE VANE PUMP OIL RESERVOIR ASSY

(a) Remove the 3 bolts and vane pump oil reservoir assy.

HINT:

Disconnect the vane pump oil reservoir assy with the hose connected, and then it should be hung with rope.

17. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING)

(a) Disconnect the connector.

(b) Remove the 4 bolts and compressor and magnetic clutch.

HINT:

Disconnect the compressor and magnetic clutch with the high and low pressure hoses connected, and it should be hung with rope.

18. REMOVE COMPRESSOR MOUNTING BRACKET NO.1 (W/ AIR CONDITIONING)

(a) Remove the 5 bolts and compressor mounting bracket.

19. DISCONNECT RADIATOR HOSE NO.1

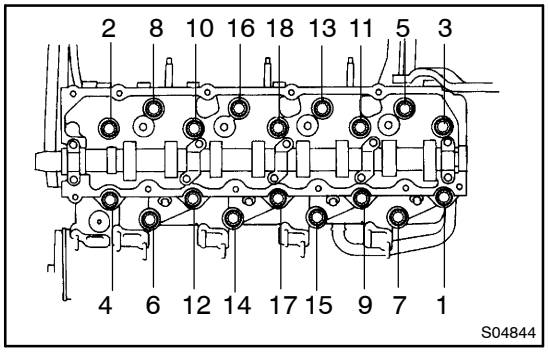
20. REMOVE OIL LEVEL GAGE GUIDE

(a) Remove the oil level gage, bolt, O–ring and oil level gage guide.

21. SEPARATE WIRE HARNESS

22. DISCONNECT INJECTION PUMP TO FUEL FILTER FUEL HOSE OR PIPE

23. DISCONNECT INJECTION PUMP TO FUEL PIPE FUEL HOSE

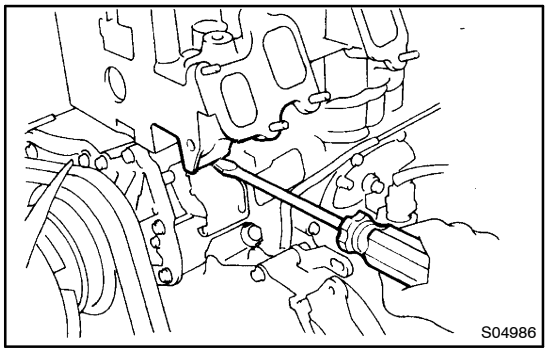


24. REMOVE CYLINDER HEAD SUB–ASSY

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

NOTICE:

Head warpage or cracking could result from removing bolts in incorrect order.



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

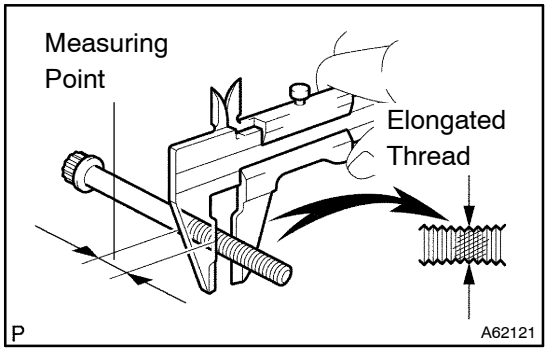
HINT:

If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block.

NOTICE:

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

25. REMOVE CYLINDER HEAD GASKET



26. INSPECT CYLINDER HEAD SET BOLT

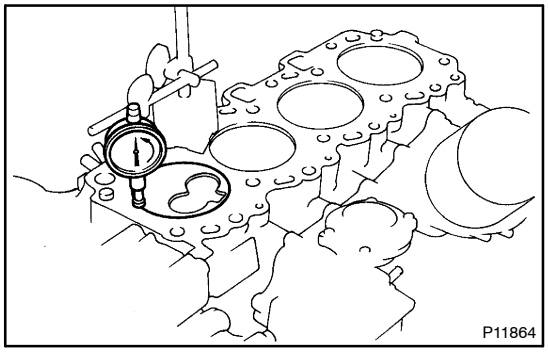
(a) Using vernier calipers, measure the minimum outer diameter of the compressed thread at the measuring point.

Standard outer diameter:

13.500 – 14.000 mm (0.5315 – 0.5512 in.)

Minimum outer diameter: 12.60 mm (0.4961 in.)

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



27. INSTALL CYLINDER HEAD SUB–ASSY

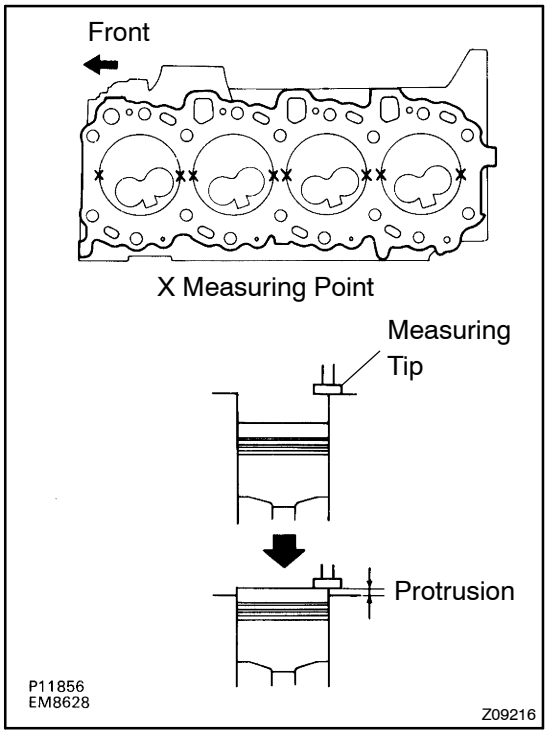
(a) Check the piston protrusions for each cylinder.

(1) Find where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.

(2) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurement.

(3) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion: 0.08 – 0.33 mm (0.0031 – 0.0130 in.)



(b) Select a new cylinder head gasket.

HINT:

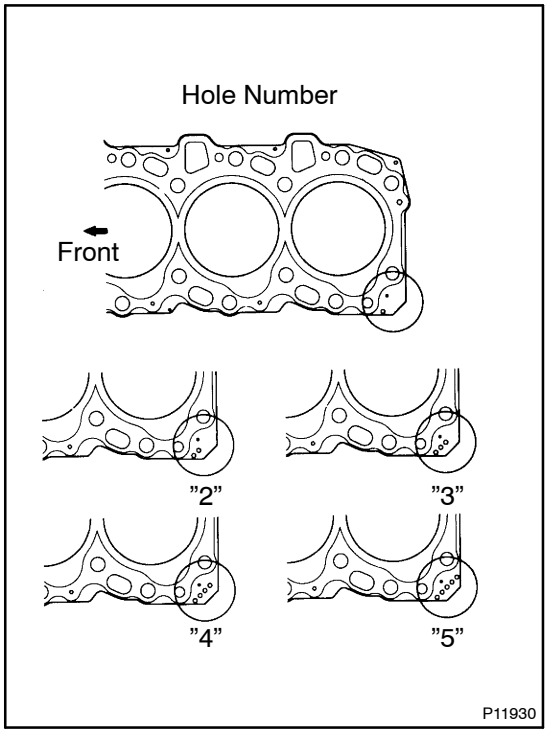
There are 5 types of cylinder head gasket (hole number 1 to 5) installed at factory, but only 3 types for supply parts (hole number ”1”, ”3” and ”5”), so when replacing the gasket select from one of 3 types above.

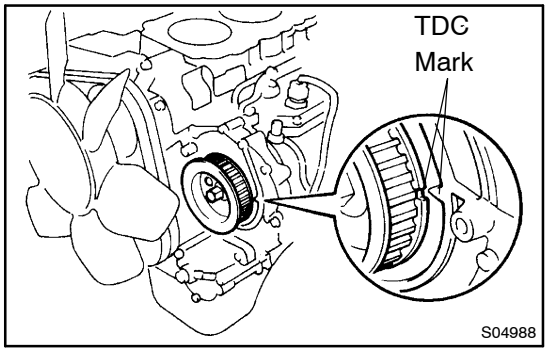
Installed cylinder head gasket thickness:

Hole number ”1”	0.80 – 0.90 mm (0.0315 – 0.0354 in.)
Hole number ”3”	0.90 – 1.00 mm (0.0354 – 0.0394 in.)
Hole number ”5”	1.00 – 1.10 mm (0.0394 – 0.0433 in.)

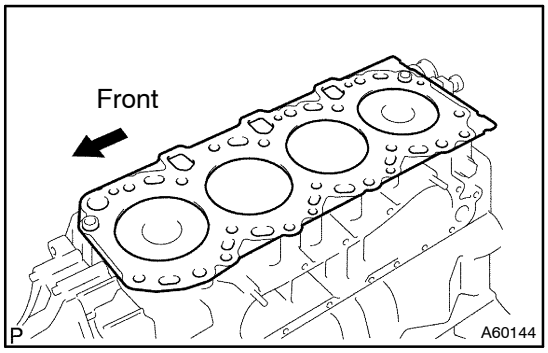
Select the largest piston protrusion value from the measurements made, then select the appropriate cylinder head gasket according to the table below.

Piston protrusion mm (in.)	Gasket size
0.08 – 0.12 (0.0031 – 0.0047)	Use ”1”
0.13 – 0.22 (0.0051 – 0.0087)	Use ”3”
0.23 – 0.33 (0.0091 – 0.0130)	Use ”5”





(c) Turn the crankshaft pulley, and align the TDC mark of the timing gear cover with the No. 2 camshaft timing pulley.



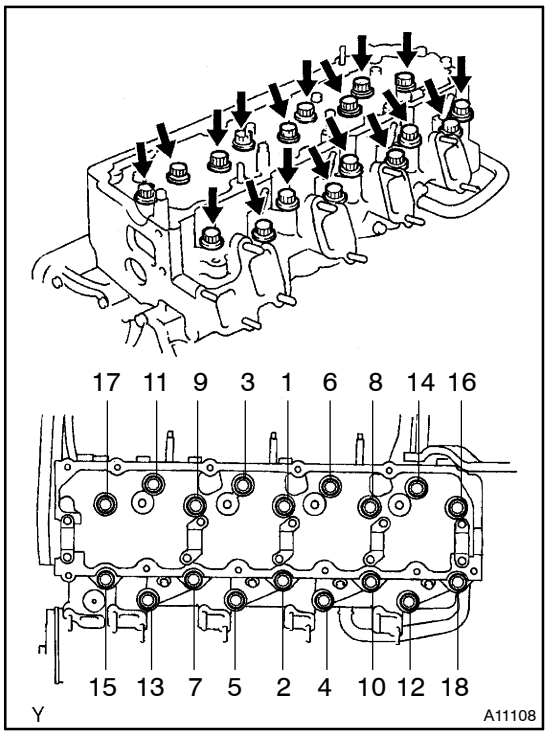
(d) Place the cylinder head on the cylinder block.

(1) Place the 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.



(e) 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.

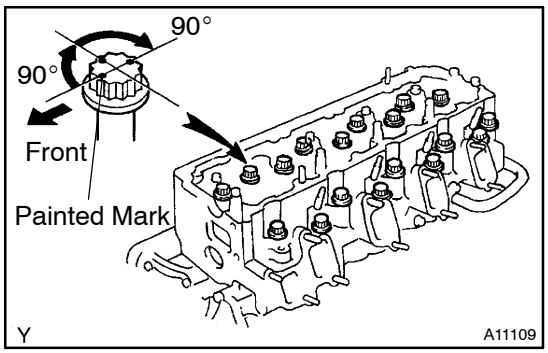
(1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

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

Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)

HINT:

If any one 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 90° in the numerical order shown.

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

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

28. CONNECT INJECTION PUMP TO FUEL PIPE FUEL HOSE

29. CONNECT INJECTION PUMP TO FUEL FILTER FUEL HOSE OR PIPE

30. CONNECT WIRE HARNESS

31. INSTALL OIL LEVEL GAGE GUIDE

(a) Install a new O–ring, oil level gage guide and oil level gage with bolt.
Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)

32. CONNECT RADIATOR HOSE NO.1

33. INSTALL COMPRESSOR MOUNTING BRACKET NO.1 (W/ AIR CONDITIONING)

(a) Install the compressor mounting bracket with 5 bolts.
Torque:25 N·m (250 kgf·cm, 18 ft·lbf)

34. INSTALL COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONING)

(a) Install the compressor and magnetic clutch with the 4 bolts.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(b) Connect the connector.

35. INSTALL VANE PUMP OIL RESERVOIR ASSY

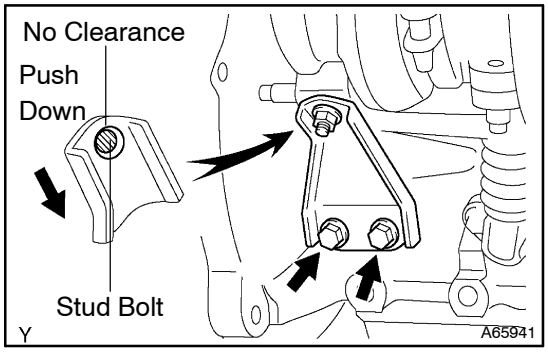
(a) Install the 2 new O–rings and vane pump assy with 2 nuts.
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

36. INSTALL EXHAUST MANIFOLD ASSY W/ TURBOCHARGER ASSY

(a) Install 2 new gaskets to the turbo oil pipe.

(b) Install a new gasket, the turbocharger and exhaust manifold assembly with the 6 plate washers, 6 new nuts and the 2 bolts. Uniformly tighten the nuts and bolts in several passes.
Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

(c) Install the union bolt and 2 bolts holding the oil pipe to the cylinder block.
Torque:
Union bolt 26 N·m (260 kgf·cm, 19 ft·lbf)
Bolt 12 N·m (125 kgf·cm, 9 ft·lbf)



37. INSTALL TURBOCHARGER STAY

(a) Temporarily install the turbocharger stay with the bolt and a new nut.

(b) Push down the turbocharger stay and tighten the bolt and nut.
Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)

38. INSTALL TURBINE OUTLET ELBOW

(a) Install a new gasket and the outlet elbow with 4 new nuts. Uniformly tighten the nuts in several passes.
Torque: 39 N·m (390 kgf·cm, 28 ft·lbf)

39. INSTALL TURBO WATER PIPE SUB–ASSY NO.1

(a) Place a new gasket on the turbocharger with the protrusion facing upward.

NOTICE:
Be careful of the gasket installation direction.

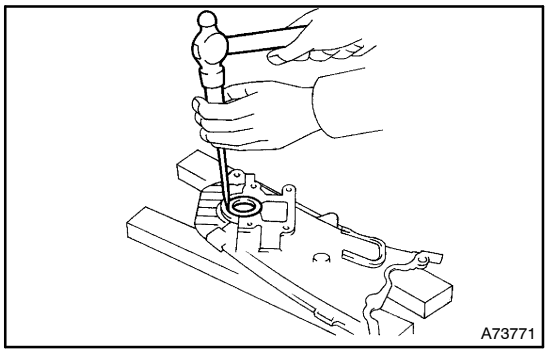
(b) Install the water pipe with the 2 nuts and bolt.
Torque:
Nut 12 N·m (120 kgf·cm, 9 ft·lbf)
Bolt 8 N·m (80 kgf·cm, 69 in.·lbf)
(c) Connect the 2 water by–pass hoses to the turbo water pipe.

40. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1
(a) Install the heat insulator with the 4 bolts.
Torque: 6 N·m (65 kgf·cm, 56 in.·lbf)

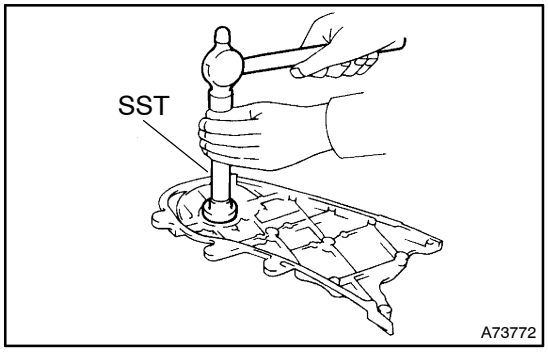
41. INSTALL TURBO INSULATOR NO.1
(a) Install the heat insulator with the 4 bolts.
Torque: 6 N·m (65 kgf·cm, 56 in.·lbf)

42. CONNECT EXHAUST PIPE ASSY FRONT(See page 15–8)

43. INSTALL EGR PIPE SUB–ASSY NO.1 (W/ EGR)(See page 12–22)

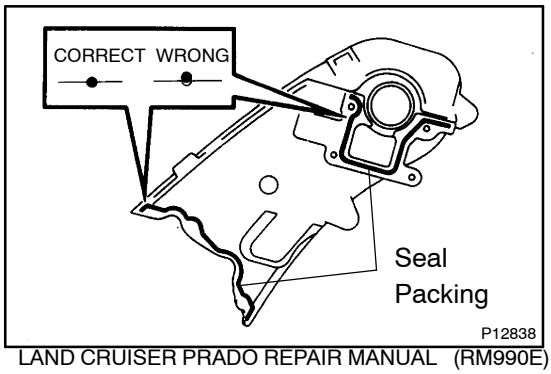

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44. INSTALL CAMSHAFT OIL SEAL RETAINER
(a) Using a screw driver, remove the camshaft oil seal.



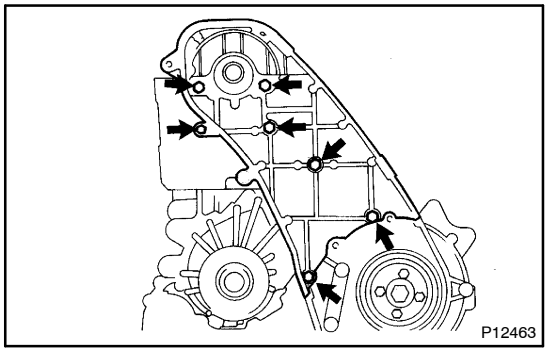
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(b) Apply MP grease to a new oil seal lip.
NOTICE:
Keep the lip off of foreign materials.
(c) Using SST, tap in the oil seal until its surface is flush with the camshaft oil seal retainer edge.
SST 09223–46011
(d) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of timing gear cover and camshaft oil seal retainer.
(1) Using a razor blade and basket scraper, remove all the old packing (FIPG) material form the gasket surfaces and sealing groove.
(2) Thoroughly clean all components to remove all the loose material.
(3) Using a non–residue solvent, clean both sealing surfaces.

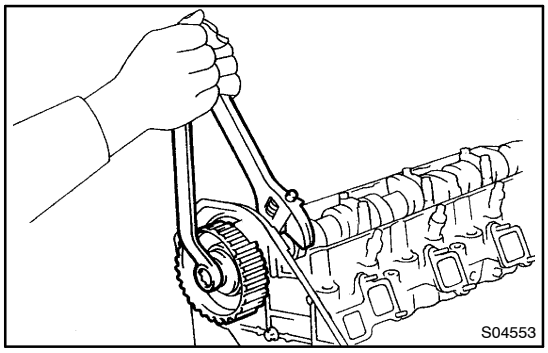


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(e) Apply seal packing to the camshaft oil seal retainer as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent
(1) Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
(2) Immediately remove nozzle from the tube and reinstall cap.



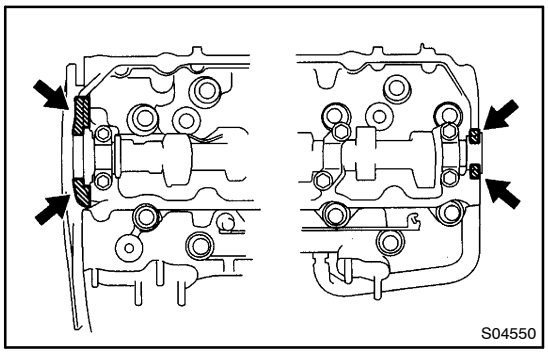
(f) Install the camshaft oil seal retainer with the 7 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



45. INSTALL CAMSHAFT TIMING PULLEY

(a) Install the set key to the key groove of the camshaft.
(b) Align the set key with the key groove of the timing pulley.
(c) Hold the hexagon wrench head portion of the camshaft, and install the timing pulley with the bolt.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

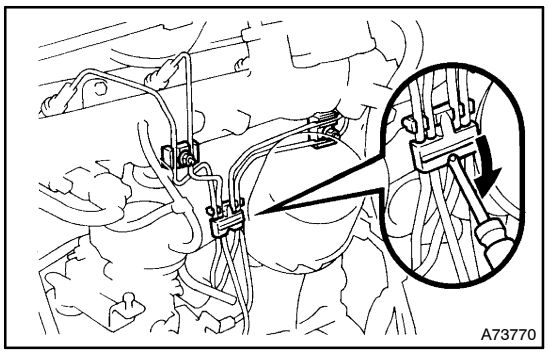
46. INSTALL CYLINDER HEAD COVER SUB–ASSY



(a) Apply seal packing to the cylinder head as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent
(1) Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
(2) Immediately remove nozzle from the tube and reinstall cap.
(b) Install the gasket to the cylinder head cover.
(c) Install the cylinder head cover with 10 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

47. INSTALL INJECTION PIPE SET

(a) Install a flare nut in the nozzle side temporarily but tighten one in the pump side.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)
(b) Install the injection pipe clamp to the injection pipe.
Torque: 6 N·m (65 kgf·cm, 53 in.·lbf)



(c) Using a screwdriver, attach the clamp.

48. INSTALL TIMING BELT(See page 14–152)
49. INSTALL VENTURI ASSY(See page 10–24)
50. INSTALL INTERCOOLER ASSY(See page 13–11)