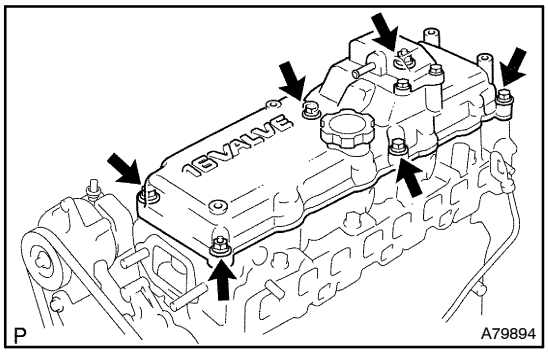
OIL PUMP ASSY (15B–FTE)

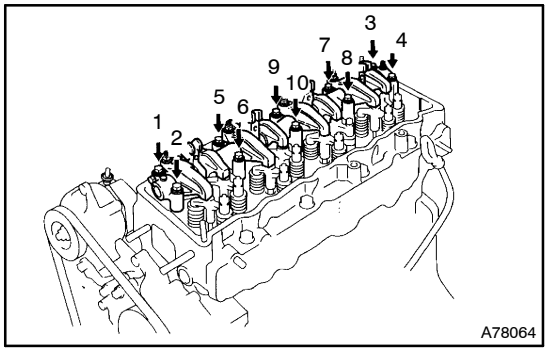
170EA–01

REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. DISCONNECT PCV HOSE
7. REMOVE FUEL PIPE SET (See page 11–60)



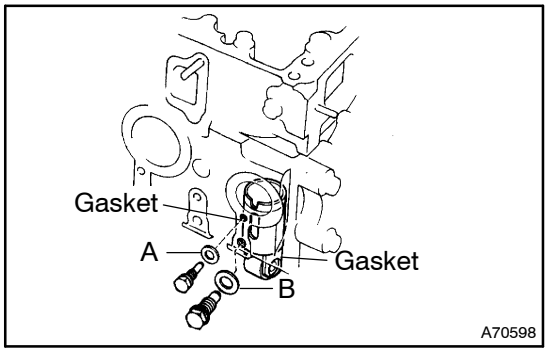
8. REMOVE CYLINDER HEAD COVER SUB–ASSY
(a) Remove the 4 bolts, 2 nuts, 6 cushions, cylinder head cover and gasket.

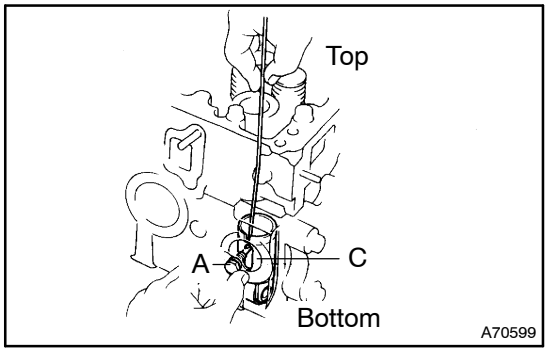


9. REMOVE VALVE ROCKER SHAFT ASSY
(a) Remove the nozzle leakage pipe (See page 11–60).
(b) Loosen the lock nuts and adjusting screws.
(c) Uniformly loosen and remove the 10 bolts, in several passes, in the order shown.
(d) Remove the valve rocker shaft assy.
(e) Remove the 8 push rods in order, beginning from the No. 1 push rod.

HINT:
Arrange the push rods in correct order.

(f) Remove bolts (A), (B) and the gaskets.





(g) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for bolt (A).

HINT:

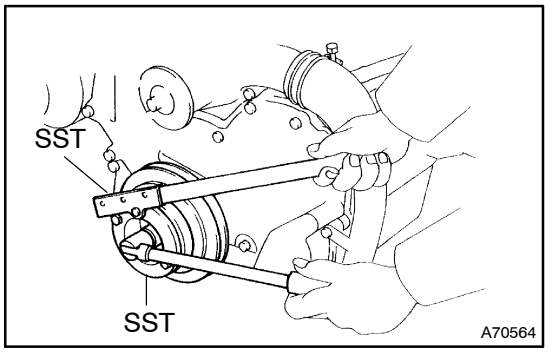
If the lifter is lifted up too high, it may miss the position.

(h) Install bolt (A).

(i) Check that bolt (A) prevents the valve lifter from falling.

NOTICE:

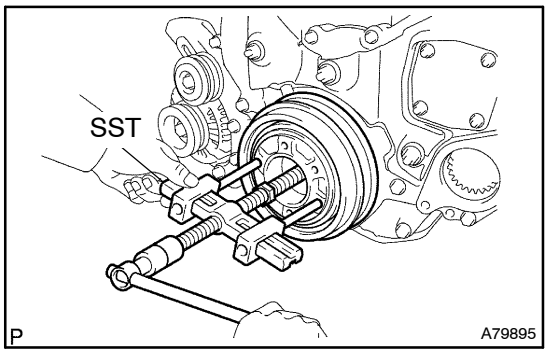
Be careful not to scratch the valve lifter.



10. REMOVE CRANKSHAFT PULLEY

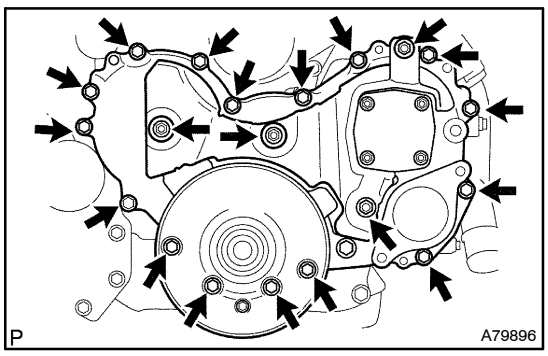
(a) Using SST, remove the mounting bolt.

SST 09213–58013 (90201–08131, 91111–50845), 09330–00021



(b) Using SST, remove the crankshaft pulley.

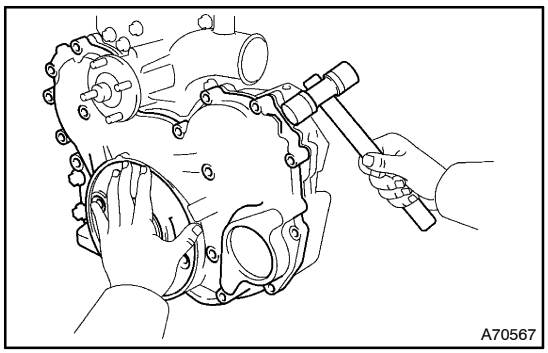
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05030)



11. REMOVE TIMING GEAR COVER

(a) Remove the 4 nuts and cover.

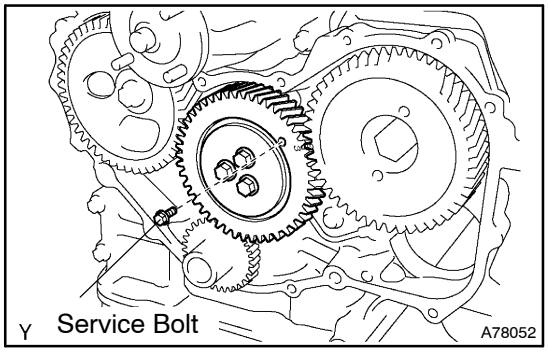
(b) Remove the 17 mounting bolts.



(c) Using a plastic–faced hammer, lightly tap out the timing gear cover.

(d) Remove the timing gear cover gasket.

(e) Using a plastic–faced hammer, lightly tap out the gear and remove the injection pump drive gear.



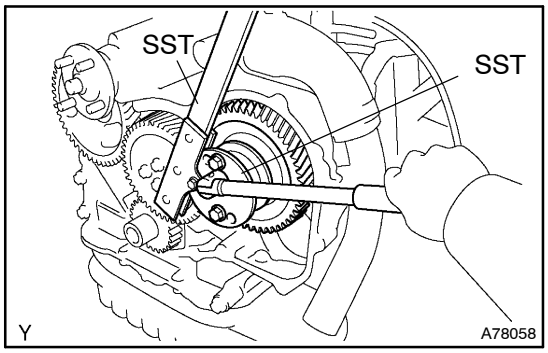
12. REMOVE IDLE GEAR NO.1

(a) Install a service bolt to the idle gear.
Torque 5.5 N·m (55 kgf·cm, 48 ft·lbf)
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	30.0 mm (1.18 in.)

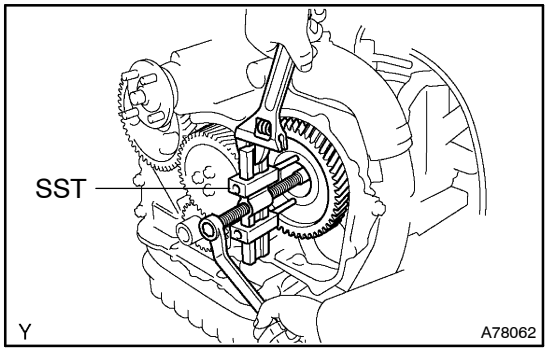
HINT:
Since there is spring force to be appied to the sub–gear when removing the idler gear, a service bolt should be used.

(b) Remove the 3 bolts, thrust plate and idle gear.



13. REMOVE INJECTION PUMP DRIVE GEAR

(a) Using SST, remove the pulley bolt.
SST 09213–58013 (90201–08131, 91111–50845), 09330–00021



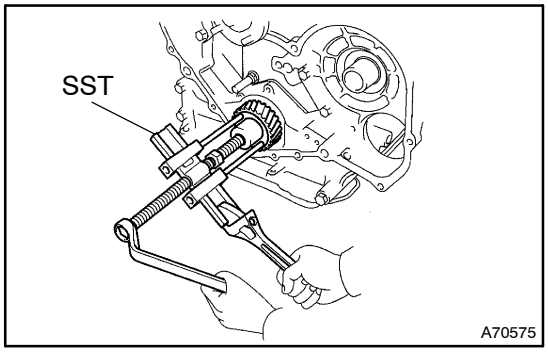
(b) Using SST, remove the drive gear.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09954–05030)

14. REMOVE VACUUM PUMP ASSY

(a) Disconnect the vacuum pump hose
(b) Remove the 2 bolts and vacuum pump.
(c) Remove the 2 O–rings.

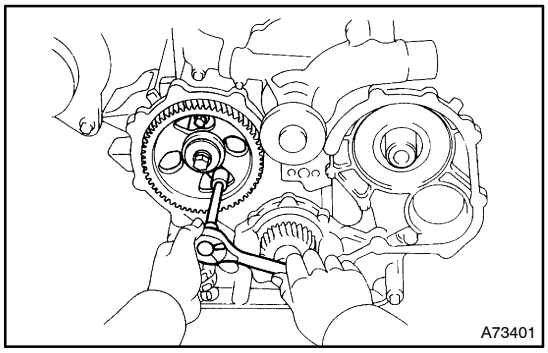
15. REMOVE IDLE GEAR SHAFT SUB–ASSY

(a) Remove the union bolt and idle gear shaft.



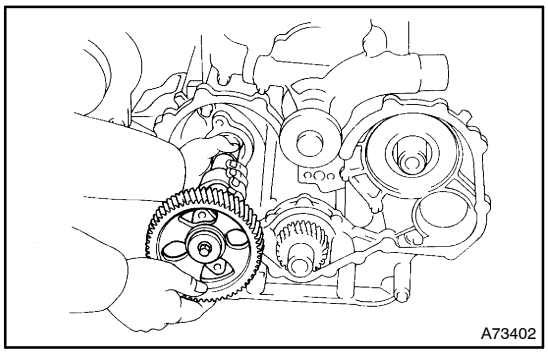
16. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Using SST, remove the timing gear or sprocket.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05030)



17. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

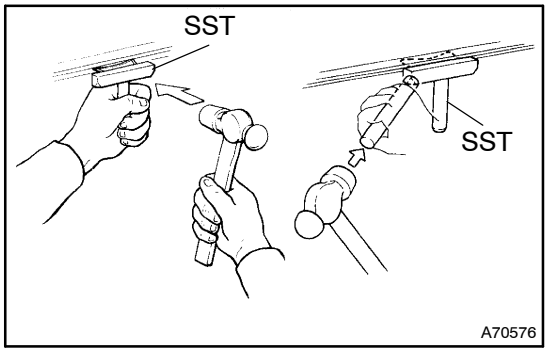
(a) Remove the 2 bolts holding the thrust plate to the cylinder block.



(b) Carefully pull out the camshaft and timing gear assembly.

NOTICE:
Be careful not damage the camshaft bearing.

18. REMOVE INJECTION PUMP ASSY (See page 11–64)

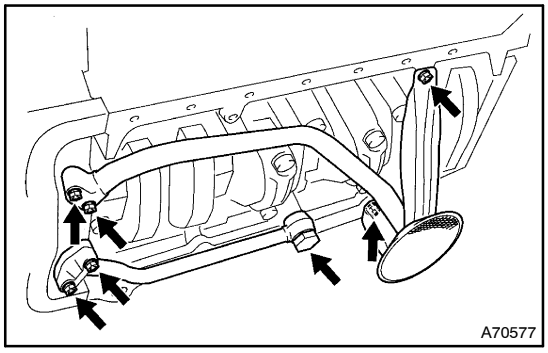


19. REMOVE OIL PAN SUB–ASSY

(a) Remove the 17 bolts and 7 nuts.

(b) Insert the blade of SST between the cylinder block and oil pan, and cut off the applied sealer and remove the oil pan.
SST 09032–00100

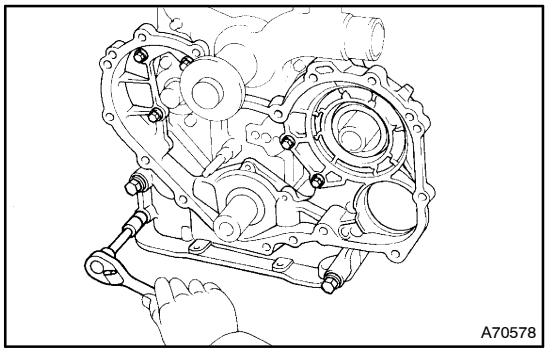
NOTICE:
- **Do not use SST on the timing gear case side and rear oil seal retainer side.**
- **Be careful not to damage the oil pan flange.**



20. REMOVE OIL STRAINER SUB–ASSY

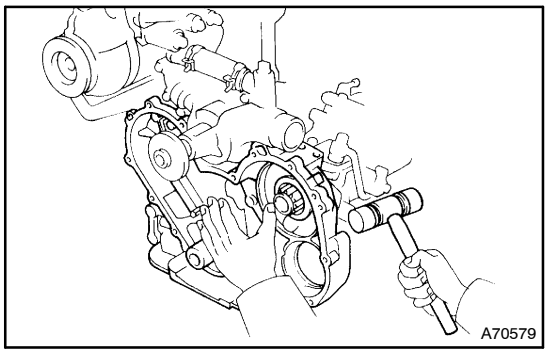
(a) Remove the 2 bolts, 2 nuts, oil strainer and gasket.

(b) Remove the union bolt, 2 nuts, oil pipe and 3 gaskets.

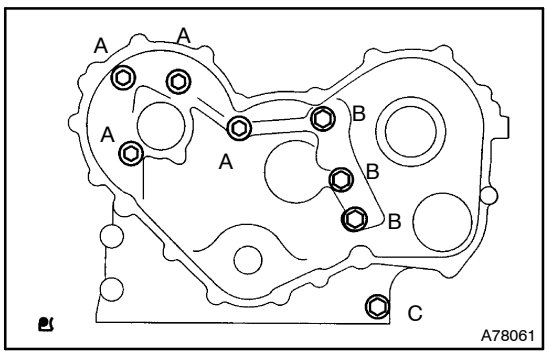


21. REMOVE OIL PUMP (TIMING GEAR CASE SUB–ASSY)

(a) Remove the 8 bolts holding the timing gear case to the cylinder block.



(b) Using a plastic–faced hammer, lightly tap out the timing gear case and gasket.



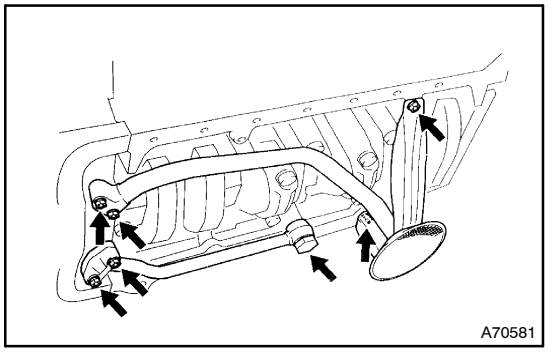
22. INSTALL OIL PUMP (TIMING GEAR CASE SUB–ASSY)

(a) Place a new gasket and the timing gear case in position.

(b) Install and uniformly tighten the 8 bolts in several passes.
Torque:
18.5 N·m (189 kgf·cm, 14 ft·lbf) for bolt A
52 N·m (530 kgf·cm, 38 ft·lbf) for bolt B
44 N·m (449 kgf·cm, 32 ft·lbf) for bolt C

(c) Align the matchmarks on the injection pump and timing gear case.

(d) Install the 2 nuts holding the injection pump flange to the timing gear case.
Torque 18.5 N·m (189 kgf·cm, 14 ft·lbf)



23. INSTALL OIL STRAINER SUB–ASSY

(a) Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

(b) Install 3 new gaskets and oil pipe with the union bolt and 2 nuts.

Torque:
50 N·m (510 kgf·cm, 37 ft·lbf) for Union bolt
18.5 N·m (189 kgf·cm, 14 ft·lbf) for Nut

24. INSTALL OIL PAN SUB–ASSY

(a) Remove any old packing (FIPG) materials.

NOTICE:

Be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

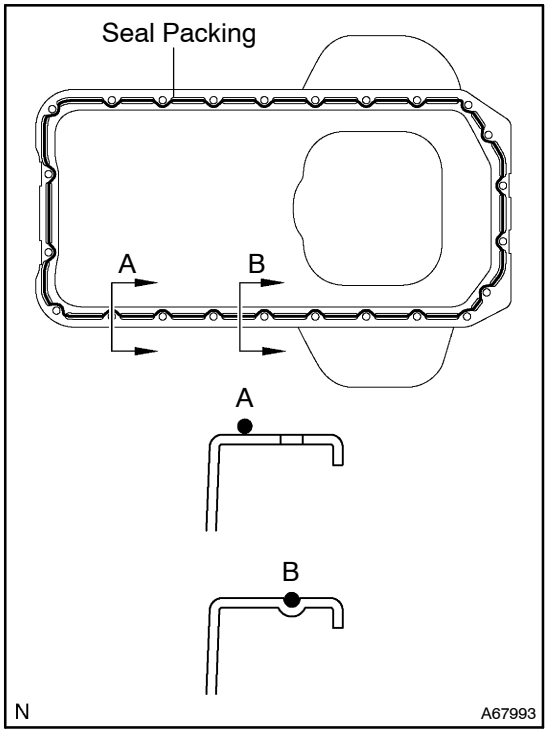
(1) Using a razor blade and gasket scraper, remove all the old packing (FIPG) materials from the gasket surfaces and sealing groove.

(2) Thoroughly clean all the components to remove all the loose materials.

(3) Using a non–residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.



(b) Apply seal packing to the oil pan as shown in the illustration.

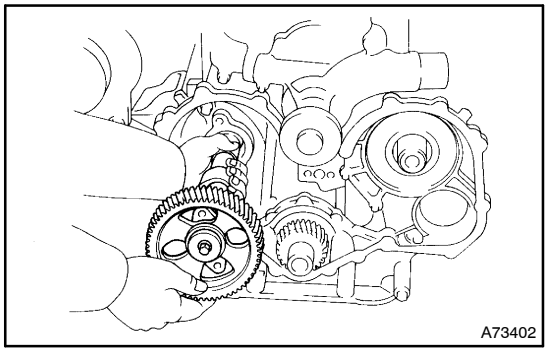
Seal packing: Part No. 08826–00080 or equivalent

- Install the nozzle which opening has been cut 4 – 5 mm (0.16 – 0.20 in.).
- The parts must be assembled within 5 minutes after seal packing is applied. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall cap.

(c) Install the oil pan with the 17 bolts and 7 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

25. INSTALL INJECTION PUMP ASSY (See page 11–64)



26. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET

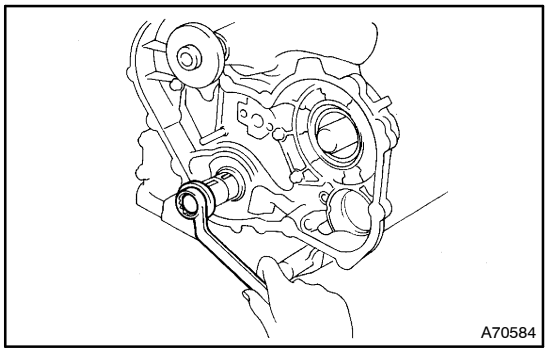
(a) Install the camshaft timing gear into the cylinder block.

NOTICE:

Be careful not to damage the camshaft bearing.

(b) Install the 2 bolts.

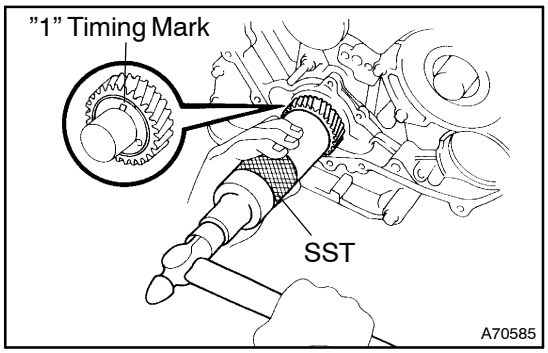
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



27. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Check that the set key on crankshaft timing gear or sprocket faces upward.

If not, turn the crankshaft with a crankshaft pulley mount bolt.

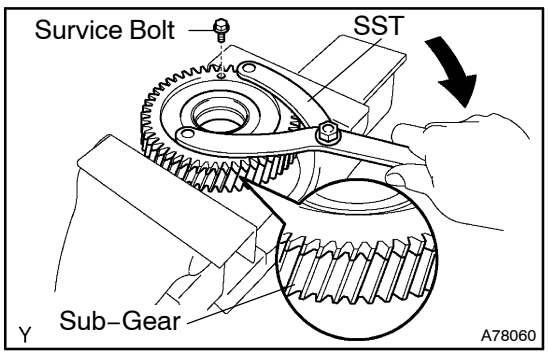


(b) Put the timing gear on the crankshaft with the ”4” timing mark of the timing gear facing forward.

(c) Align the timing gear set key with the key groove of the crankshaft timing gear.

(d) Using SST and a hammer, tap in the crankshaft timing gear.

SST 09608–06041



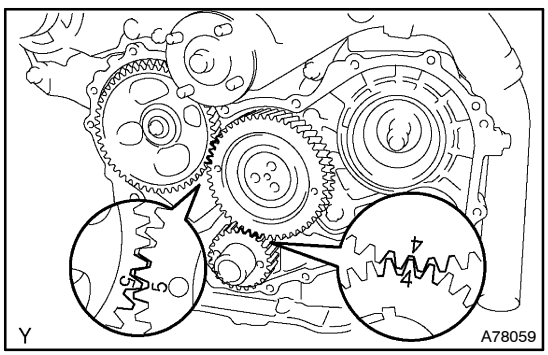
28. INSTALL IDLE GEAR SHAFT SUB–ASSY

(a) When the sub–gear and the idle gear have shifted, do the following work (1) and (2).

(1) Using SST, align the holes of the idle gear and sub–gear by turning the sub–gear clockwise, and install a service bolt.

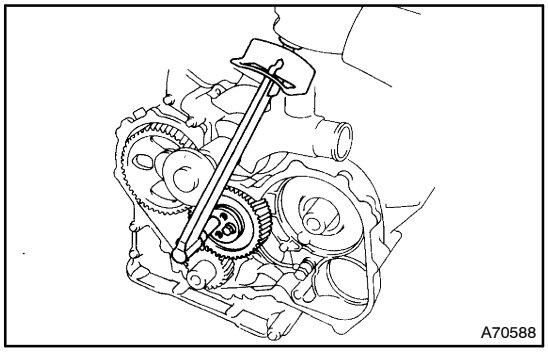
SST 09960–10010 (09962–01000, 09963–00500)

(2) Align the gear teeth of the idle gear and sub–gear, and tighten the service bolt.



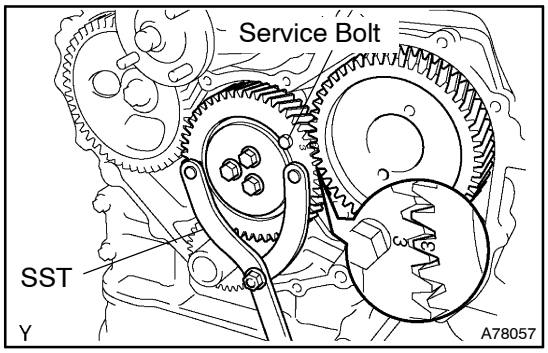
29. INSTALL IDLE GEAR NO.1

(a) Align the idle gear timing marks ”4” and ”5” with the crankshaft gear timing mark ”4” and camshaft gear timing mark ”5” respectively, and mesh the gears.

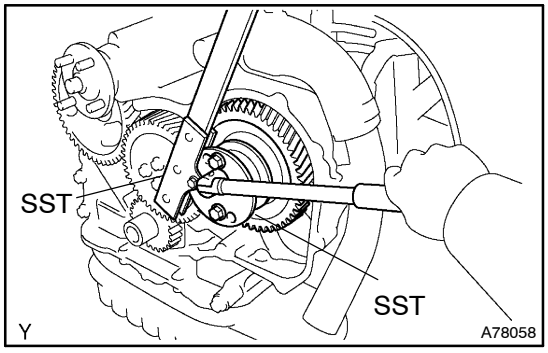


(b) Apply a light coat of engine oil on the threads and under the bolt heads.
(c) Install the thrust plate with the 3 bolts.
Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)
(d) Tighten the union bolt.
Torque: 13 N·m (132 kgf·cm, 9.5 ft·lbf)

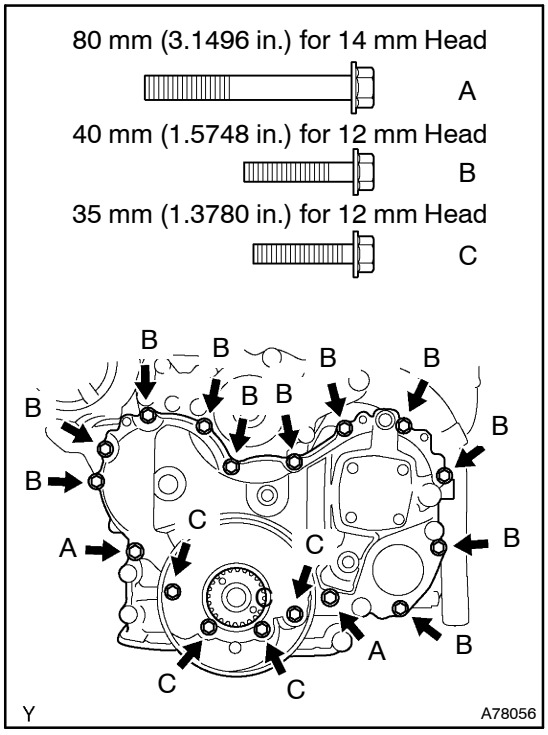
30. INSTALL VACUUM PUMP ASSY
(a) Install 2 new O–rings to the vacuum pump.
(b) Install the vacuum pump with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(c) Connect the vacuum pump hose.



31. INSTALL INJECTION PUMP DRIVE GEAR
(a) Align the drive gear set key with the key groove of the drive gear.
(b) Using SST, align the idle gear timing mark 3 with the drive gear timing mark 3, and mesh the gears.
SST 09960–10010 (09962–01000, 09963–01000)



(c) Using SST, install the drive gear nut.
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)
(d) Remove the service bolt.
SST 09213–58013 (90201–08131, 09963–01000, 91111–50845), 09330–00021



32. INSTALL TIMING GEAR COVER

(a) Install a new gasket and the timing gear cover with the 17 bolts.

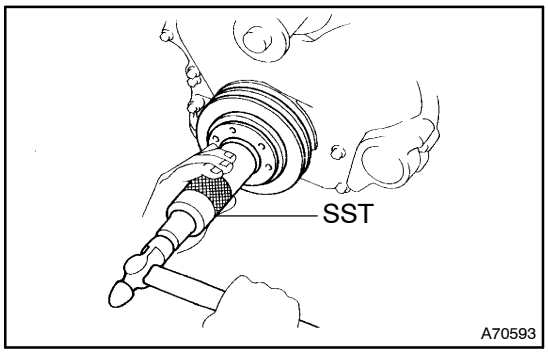
Torque:
44 N·m (449 kgf·cm, 32 ft·lbf) for bolt A
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B, C

HINT:
Each bolt length is indicated in the illustration.

(b) Connect the radiator hose to the water pump.

(c) Install the radiator pipe with the 2 bolts.

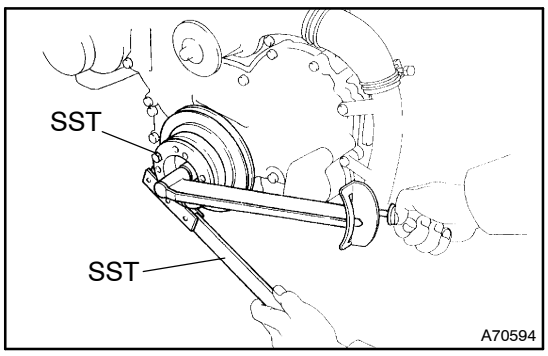
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



33. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley.

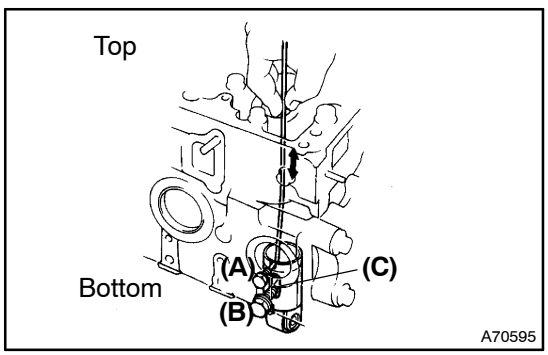
(b) Using SST and a hammer, tap in the pulley.
SST 09608–06041



(c) Apply a light coat of engine oil on the threads and under the bolt head.

(d) Using SST, install and torque the pulley mount bolt.
SST 09213–58013 (90201–08131, 91111–50845), 09330–00021

Torque: 403 N·m (4,110 kgf·cm, 298 ft·lbf)



34. INSTALL VALVE ROCKER SHAFT ASSY

(a) Remove bolt (A) and let the lifter slide down.

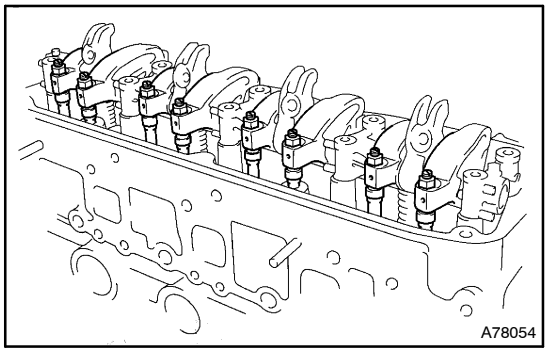
(b) Install bolts (A) and (B) with new gaskets.

Torque:
9.4 N·m (96 kgf·cm, 6.8 in.·lbf) for bolt (A)
37.5 N·m (382 kgf·cm, 28 ft·lbf) for bolt (B)

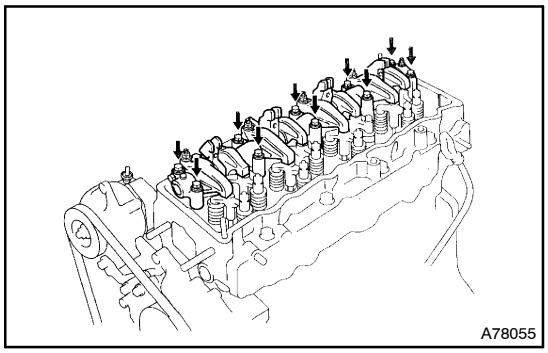
HINT:
When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

(c) Check that the valve lifter can move up and down within the limit of long hole (C).

NOTICE:
Be careful not to scratch the valve lifter.

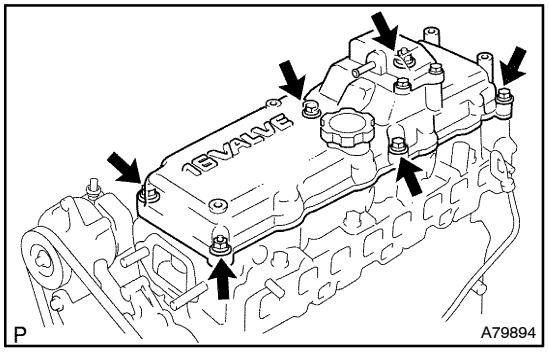


(d) Place the rocker shaft assembly on the cylinder head.
(e) Align the rocker arm adjusting screws with the heads of the push rods.



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

35. INSPECT VALVE CLEARANCE (See page 14–49)
36. ADJUST VALVE CLEARANCE (See page 14–49)



37. 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)

38. INSTALL PCV HOSE
39. INSTALL FUEL PIPE SET (See page 11–60)
40. INSTALL RADIATOR ASSY (See page 16–27)
41. ADJUST FAN AND GENERATOR V BELT (See page 14–47)
42. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33–2)
43. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33–2)
44. ADD ENGINE OIL
45. REFILL ENGINE COOLANT
46. BLEED FUEL (See page 11–57)

47. CONNECT BATTERY NEGATIVE TERMINAL
48. CHECK ENGINE OIL LEVEL
49. CHECK FOR ENGINE COOLANT LEAKS
50. CHECK FOR ENGINE OIL LEAKS
51. INSPECT FOR FUEL LEAKS