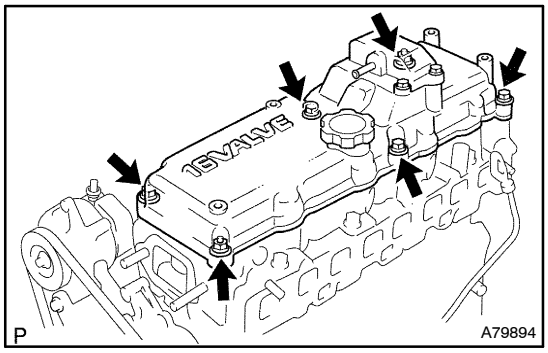
CAMSHAFT (15B–FTE)

1417F–01

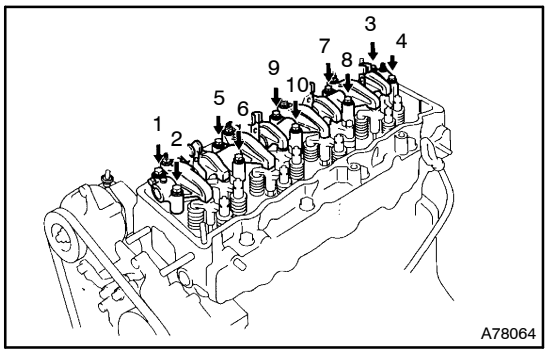
REPLACEMENT

1. DISCONNECT BATTERY NEGATIVE TERMINAL
2. DRAIN ENGINE COOLANT
3. DRAIN ENGINE OIL
4. REMOVE RADIATOR ASSY (See page 16–27)
5. SET NO. 1 CYLINDER TO TDC/COMPRESSION
6. REMOVE NOZZLE ASSY (See page 11–60)



7. REMOVE CYLINDER HEAD COVER SUB–ASSY

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

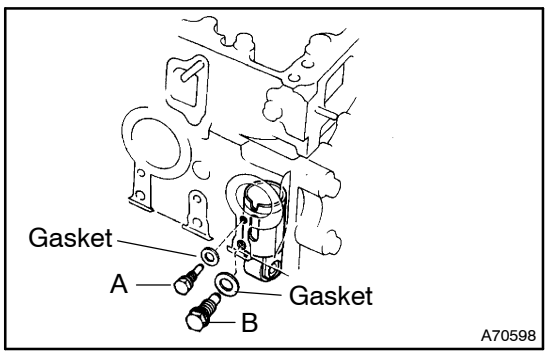


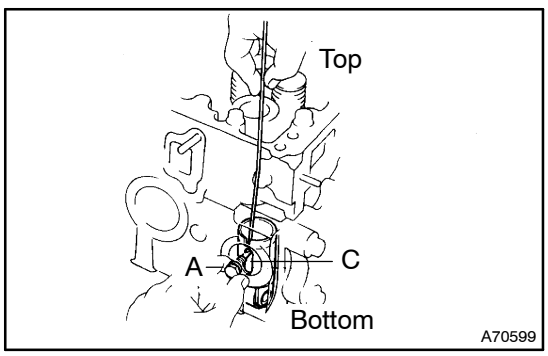
8. REMOVE VALVE ROCKER SHAFT ASSY

(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 gaskets.



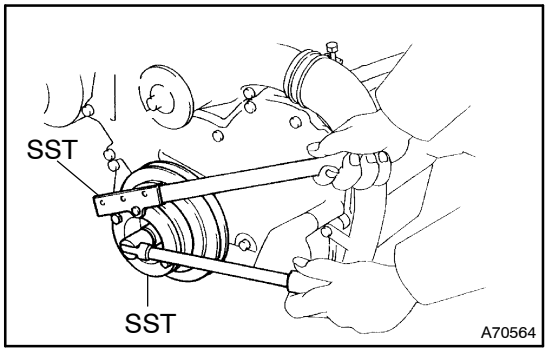


(g) Using a wire, lift up the valve lifter until long hole (C) of the valve lifter moves up to the position of the installation hole for bolt (A).

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

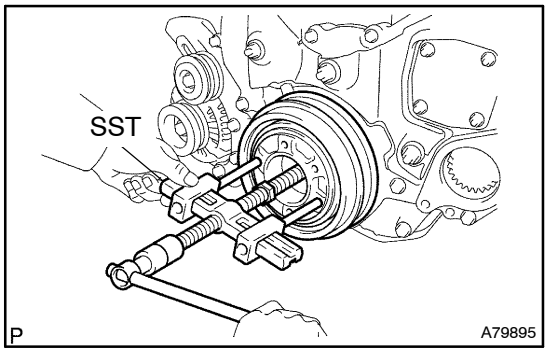
(h) Install bolt (A).
(i) Check that bolt (A) prevents the valve lifter from falling.

NOTICE:
Be careful not to scratch the valve lifter.

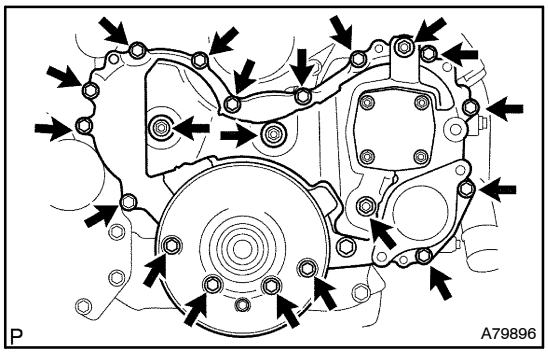


9. REMOVE CRANKSHAFT PULLEY

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

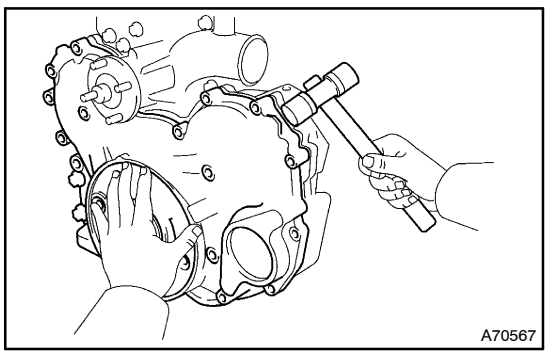


(b) Using SST, remove the crankshaft pulley.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05030)

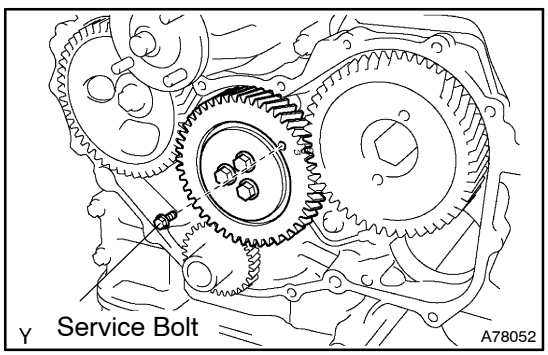


10. REMOVE TIMING GEAR COVER

(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.



11. REMOVE IDLE GEAR NO.1

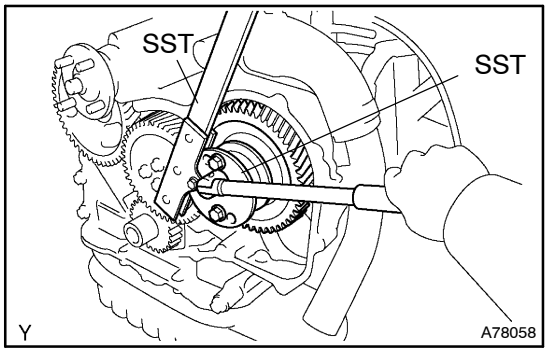
(a) Secure the idler sub–gear to the idler gear with a service bolt.

Recommended service bolt:

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

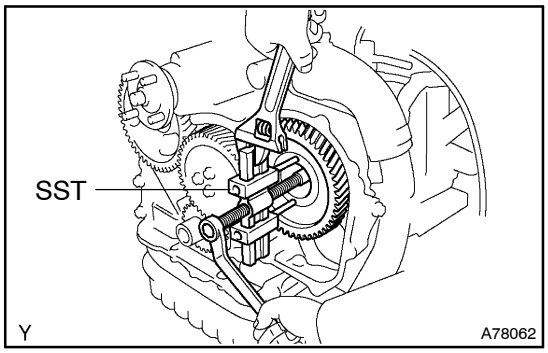
HINT:
Since there is spring force to be appied to the sub–gear when removing the idler gear, a service bolt should be used.

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

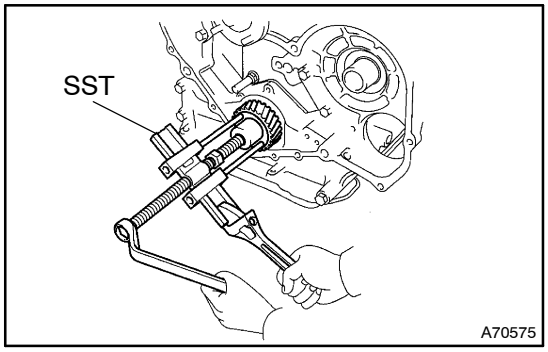


12. REMOVE INJECTION PUMP DRIVE GEAR

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

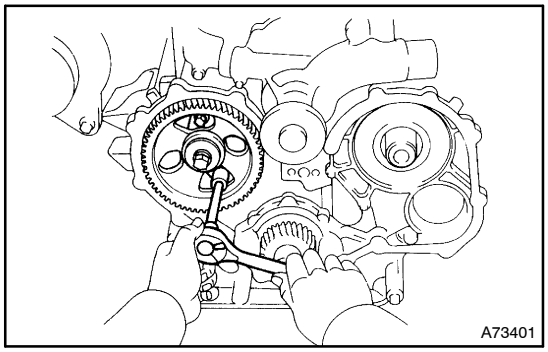


(b) Using SST, remove the drive gear.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09954–05030)

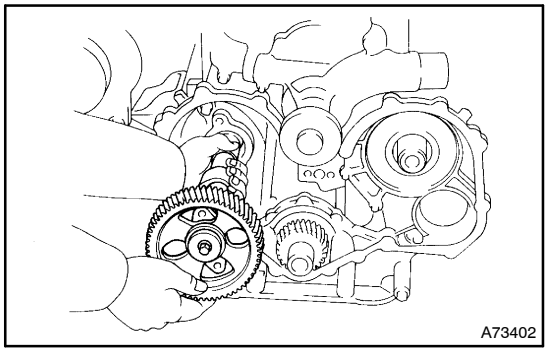


13. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

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



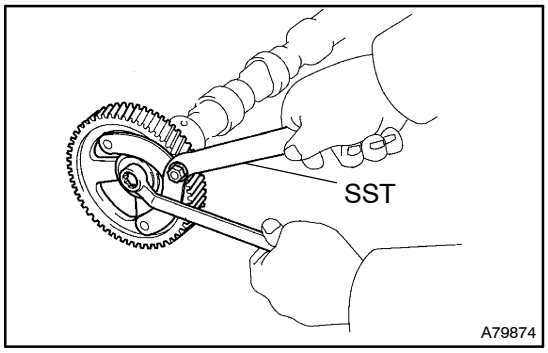
(b) Remove the 2 bolts holding the thrust plate to the cylinder block or sprocket.



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

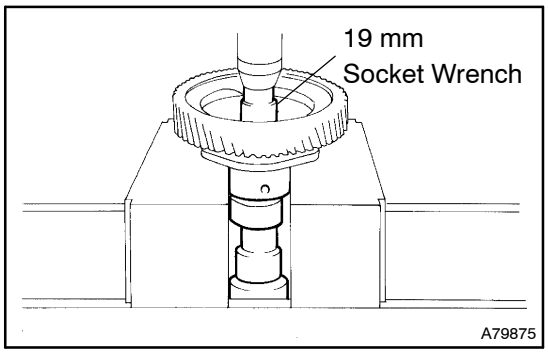
NOTICE:

Be careful not damage the camshaft bearing.

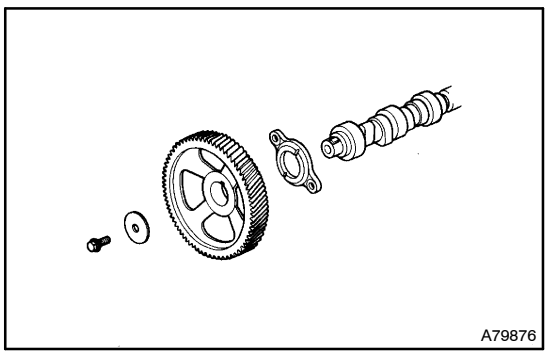


14. REMOVE CAMSHAFT

(a) Using SST, remove the mount bolt and plate washer.
SST 09960–10010 (09962–01000, 09963–01000)



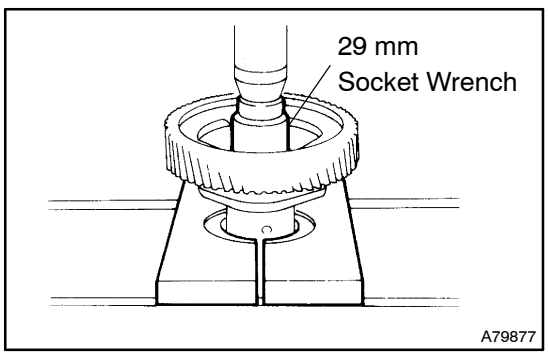
(b) Using a 19 mm socket wrench and press, press out the camshaft.



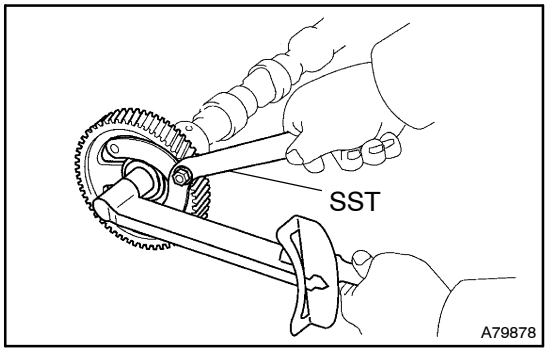
15. INSTALL CAMSHAFT

(a) Install the timin g gear set key to the camshaft.

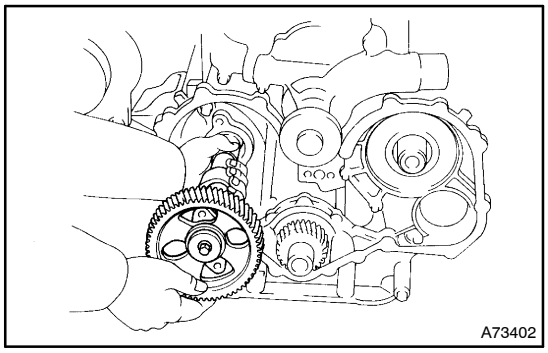
(b) Asembly the camshaft, thrust plate and timing gear as shown.



(c) Using 29 mm socket wrench and press, align the timing gear set key with the key groove of the timing gear, and press in the camshaft timing gear.



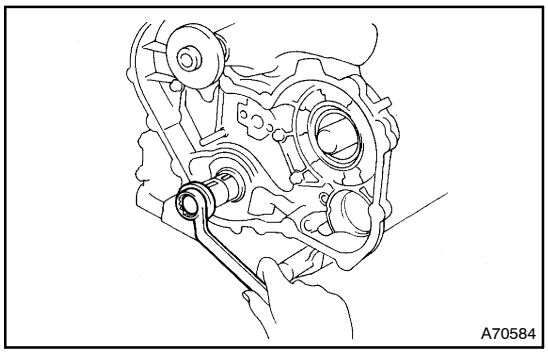
(d) Using SST, install the plate washer and bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque 57 N·m (581 kgf·cm, 42 ft·lbf)



(e) Install the camshaft timing gear or sprocket into the cylinder block.

NOTICE:
Be careful not to damage the camshaft bearing.

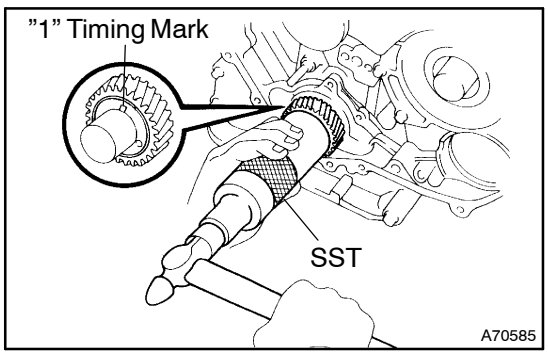
(f) Install and torque the 2 bolts.
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



16. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

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

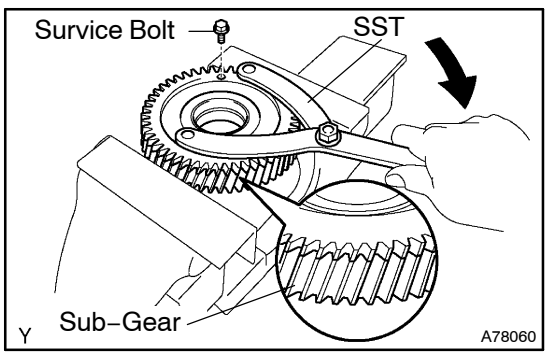
If not, turn the crankshaft with a crankshaft pulley mount bolt.



(b) Put the timing gear on the crankshaft with timing mark 4 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

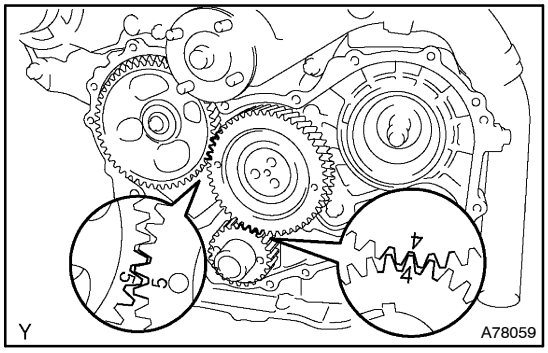


17. INSTALL IDLE GEAR NO.1

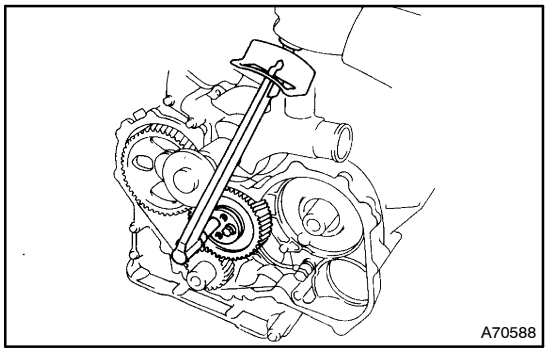
(a) When the sub–gear and the idle gear have shifted, do the following work (1) and (2).

(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.



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



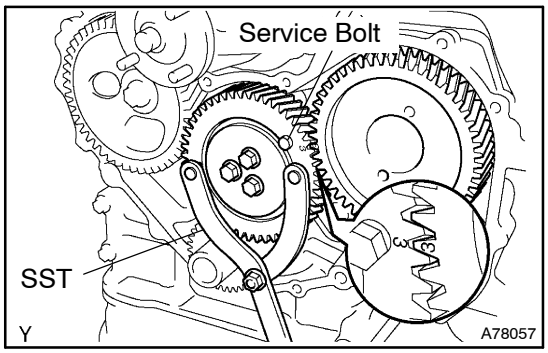
(c) Apply a light coat of engine oil on the threads and under the bolt heads.

(d) Install the thrust plate with the 3 bolts.

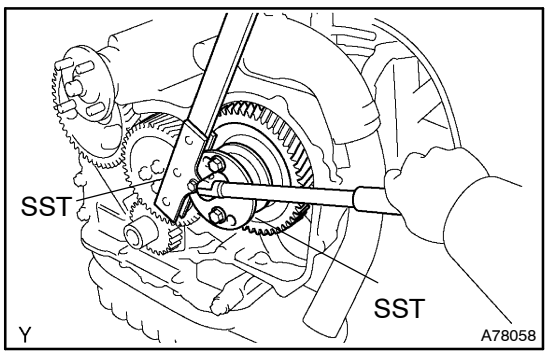
Torque: 47.5 N·m (484 kgf·cm, 35 ft·lbf)

18. INSTALL INJECTION PUMP DRIVE GEAR

(a) Align the drive gear set key with the key groove of the drive gear.

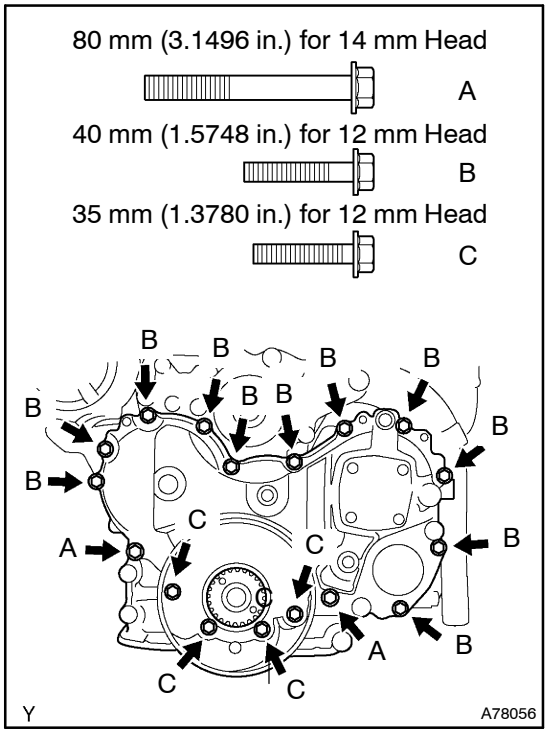


(b) Using SST, align idle gear timing mark 3 with drive gear timing mark 3, and mesh the gears.
SST 09960–10010 (09962–01000, 09963–01000),



(c) Using SST, install the drive gear nut.
SST 09330–00021
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

(d) Remove the service bolt.



19. INSTALL TIMING GEAR COVER

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

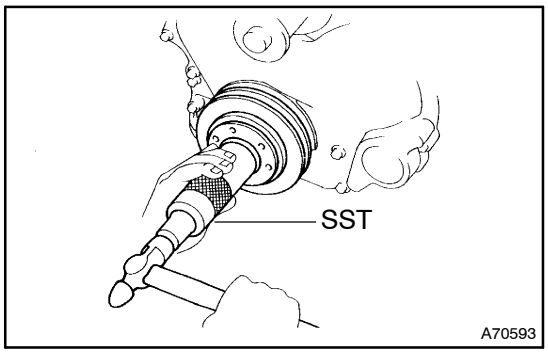
Torque:
44 N·m (449 kgf·cm, 32 ft·lbf) for bolt A
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B, C

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.

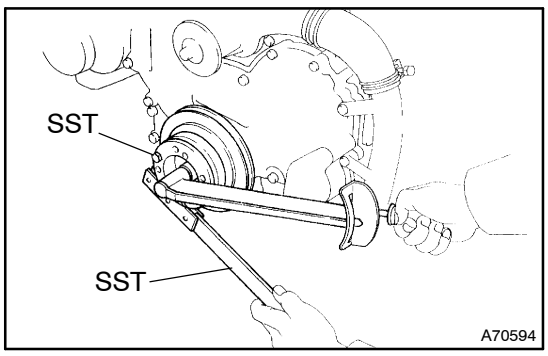
Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)



20. INSTALL CRANKSHAFT PULLEY

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

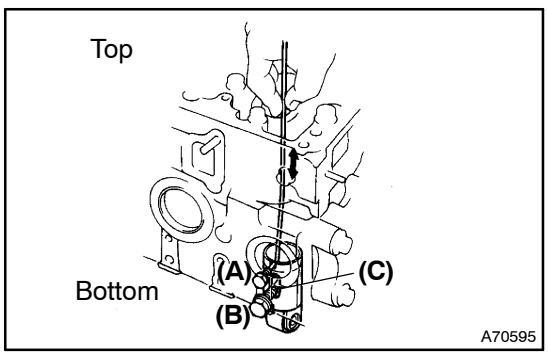
(b) Using SST and a hammer, tap in the pulley.
SST 09608–06041



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

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

Torque: 403 N·m (4,110 kgf·cm, 297 ft·lbf)



21. INSTALL VALVE ROCKER SHAFT ASSY

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

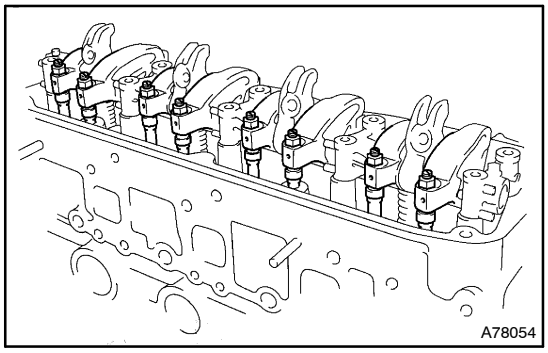
(b) Install bolts (A) and (B) with new gaskets.

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)

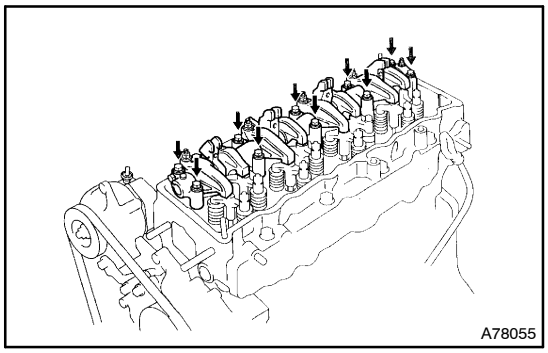
HINT:
When installing bolt (B), check that the hole for bolt (B) is aligned with long hole (C) of the valve lifter.

(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.

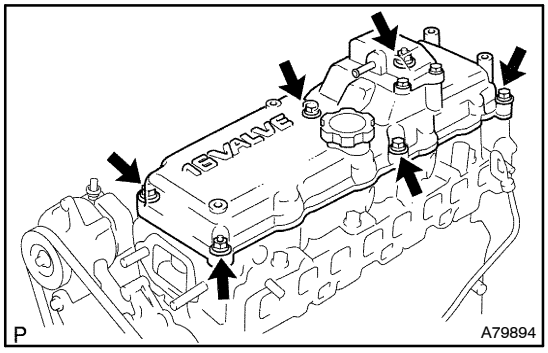


(d) Place the rocker shaft assembly on the cylinder head.
(e) Align the rocker arm adjusting screws with the heads of the push rods.



(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)

22. INSPECT VALVE CLEARANCE (See page 14–49)
23. ADJUST VALVE CLEARANCE (See page 14–49)



24. 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)

25. CONNECT PCV HOSE
26. INSTALL FUEL PIPE SET (See page 11–60)
27. INSTALL RADIATOR ASSY (See page 16–27)
28. ADJUST PARKING BRAKE SHOE CLEARANCE (CENTER PARKING BRAKE) (See page 33–2)
29. INSPECT AND ADJUST PARKING BRAKE LEVER TRAVEL (See page 33–2)
30. ADD ENGINE OIL
31. REFILL ENGINE COOLANT
32. BLEED FUEL (See page 11–57)
33. CONNECT BATTERY NEGATIVE TERMINAL

34. CHECK ENGINE OIL LEVEL
35. CHECK FOR ENGINE COOLANT LEAKS
36. CHECK FOR ENGINE OIL LEAKS
37. INSPECT FOR FUEL LEAKS
38. INSPECT VALVE CLEARANCE (See page 14–49)