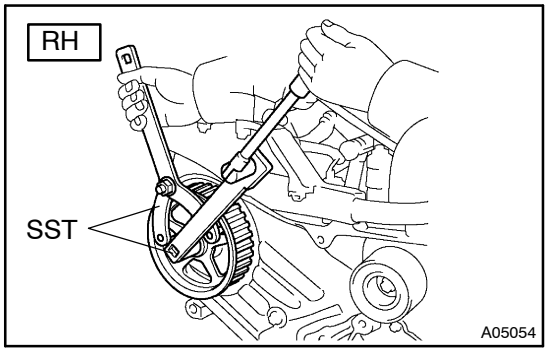
CAMSHAFT(RH BANK) (1MZ–FE)

REPLACEMENT

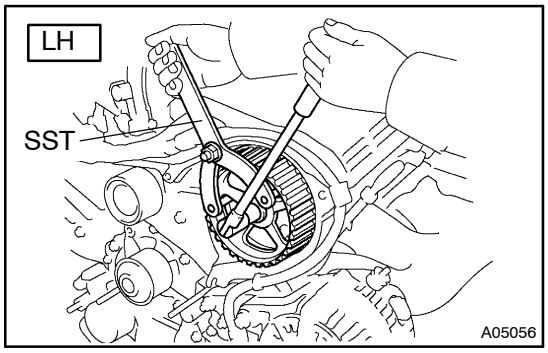
140I4–01

1. DRAIN COOLANT (See page 16–31)
2. REMOVE V–BANK COVER SUB–ASSY
   (See page 14–156)
3. REMOVE FRONT SUSPENSION UPPER BRACE CENTER
   (W/ FRONT SUSPENSION BRACE UPPER CENTER)
4. REMOVE AIR CLEANER ASSEMBLY WITH HOSE (See page 10–18)
5. REMOVE INTAKE AIR SURGE TANK
   (See page 14–143)
6. REMOVE IGNITION COIL ASSY
7. REMOVE CYLINDER HEAD COVER SUB–ASSY
8. REMOVE FRONT WHEEL RH
9. REMOVE FRONT FENDER APRON SEAL RH
10. REMOVE V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1
    (See page 14–141)
11. REMOVE VANE PUMP V BELT
    (See page 14–141)
12. REMOVE ENGINE MOVING CONTROL ROD
    (See page 14–156)
13. REMOVE ENGINE MOUNTING STAY NO.2 RH
    (See page 14–156)
14. REMOVE GENERATOR BRACKET NO.2
15. REMOVE CRANKSHAFT PULLEY
    (See page 14–174)
    SST 09213–54015 (91651–60855), 09330–00021, 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09954–05030)
16. REMOVE TIMING BELT NO.1 COVER
17. REMOVE TIMING BELT NO.2 COVER
    (See page 14–174)
18. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET
19. REMOVE TIMING BELT GUIDE NO.2
20. REMOVE TIMING BELT
    (See page 14–211)
21. REMOVE TIMING BELT IDLER SUB–ASSY NO.2



22. REMOVE CAMSHAFT TIMING PULLEY

(a) Using SST, remove the bolt and RH timing pulley.
SST 09960–10010 (09962–01000, 09963–01000), 09249–63010



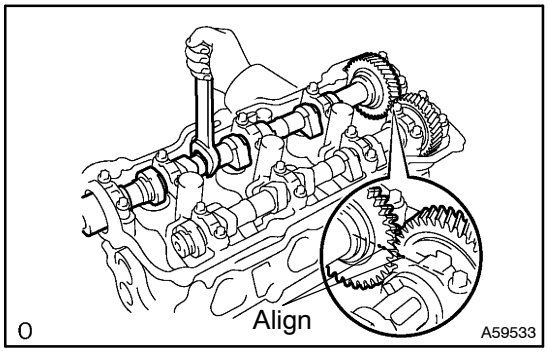
(b) Using SST, remove the LH timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)

HINT:
Arrange the camshaft timing pulleys (RH and LH sides).

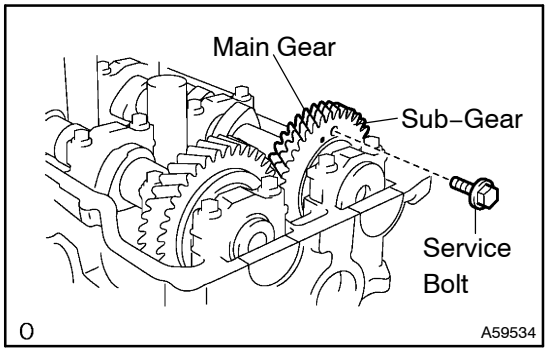
23. REMOVE TIMING BELT NO.3 COVER

24. REMOVE CAMSHAFT

NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be held level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Align the timing marks (2 dot marks) of the camshaft drive and driven gears by turning the camshaft with a wrench.



(b) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.

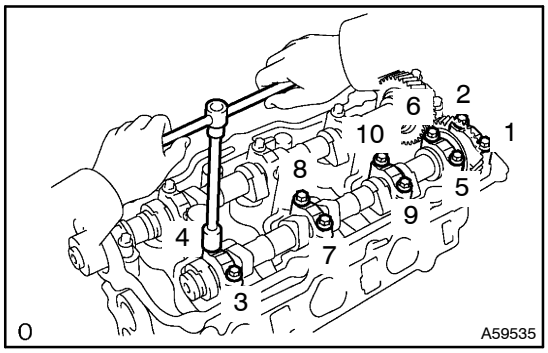
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

Recommended service bolt

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm

HINT:

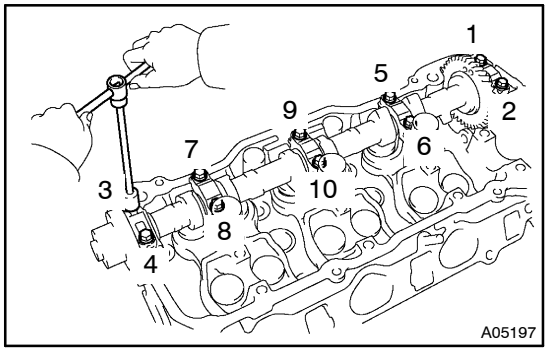
When removing the camshaft, make certain that the torsional spring force of the sub–gear has been eliminated by the above operation.



(c) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown, and remove the 5 bearing caps and camshaft.

NOTICE:

- **Do not pry out the camshaft.**
- **Be careful no to damage the portion of the cylinder head receiving the shaft thrust.**



25. REMOVE NO.2 CAMSHAFT

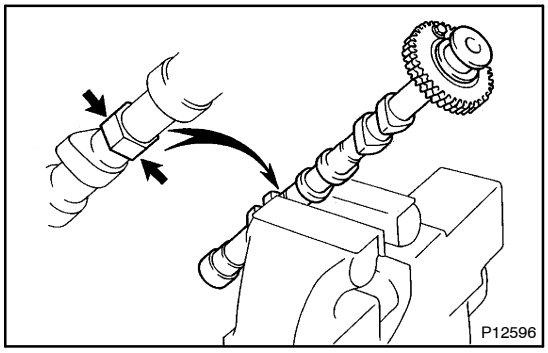
(a) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown, and remove the 5 bearing caps and No. 2 camshaft.

NOTICE:

- **Do not pry out the camshaft.**
- **Be careful not to damage the portion of the cylinder head receiving the shaft thrust.**

(b) Remove the oil seal from the No. 2 camshaft.

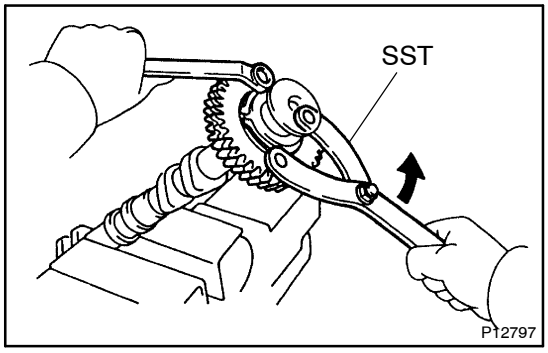
26. REMOVE CAMSHAFT SUB GEAR



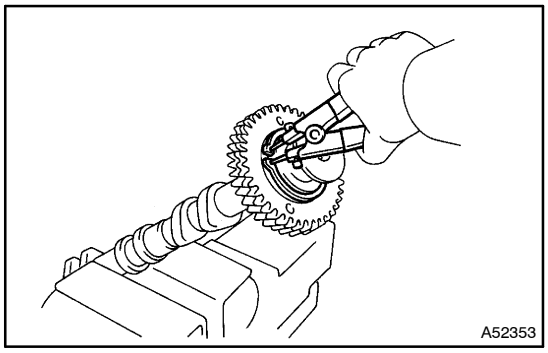
(a) Fix the hexagonal wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



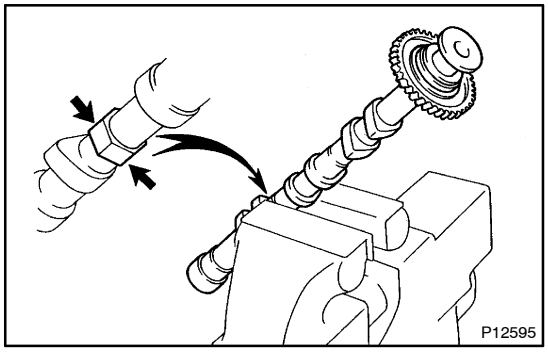
(b) Using SST, turn the sub–gear counterclockwise, and remove the service bolt.
SST 09960–10010 (09962–01000, 09963–00500)



(c) Using snap ring pliers, remove the snap ring.
(d) Remove the wave washer, camshaft sub–gear and camshaft gear spring.

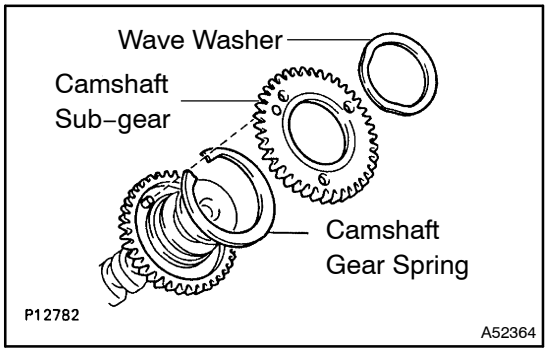
27. REPLACE NO.2 CAMSHAFT

28. INSTALL CAMSHAFT SUB GEAR

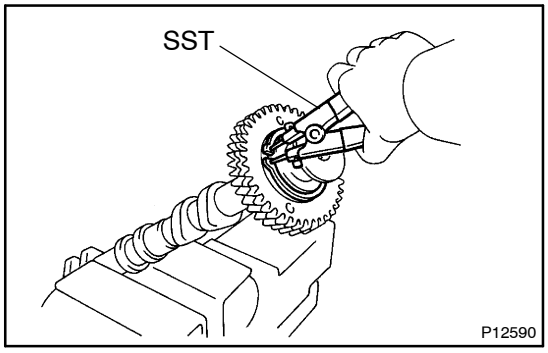


(a) Fix the hexagonal wrench head portion of the camshaft in a vise.

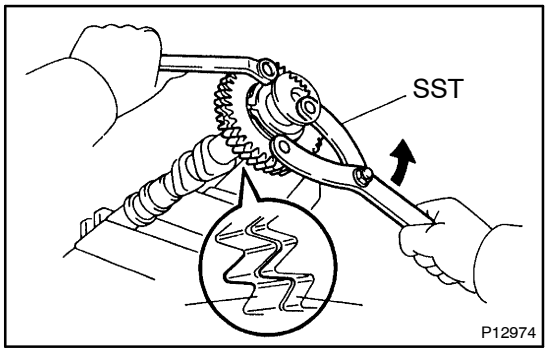
NOTICE:
Be careful not to damage the camshaft.



(b) Install the camshaft gear spring and camshaft sub–gear.
HINT:
Attach the pins on the gears to the gear spring ends.
(c) Install the wave washer.



(d) Using snap ring pliers, install the snap ring.



(e) Using SST, align the holes of the camshaft main gear and sub–gear by turning camshaft sub–gear counterclockwise, and temporarily install a service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

(f) Align the gear teeth of the main gear and sub–gear, and tighten the service bolt.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

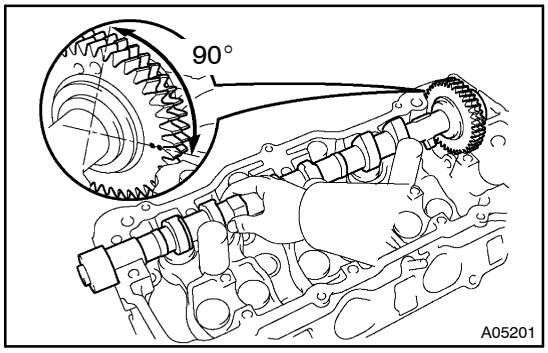
NOTICE:
Be careful not to damage the camshaft journals.

HINT:
When installing the camshaft, make certain that the torsional spring force of the sub–gear has been eliminated by the above operation.

29. INSTALL NO.2 CAMSHAFT

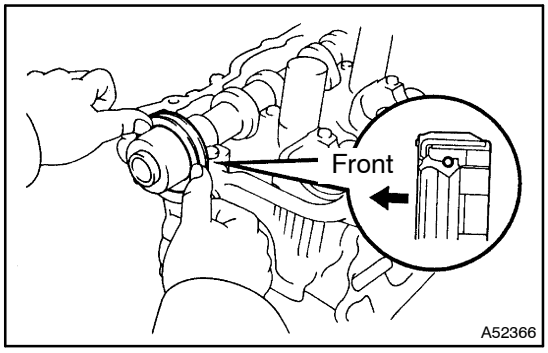
NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be held level while it is being installed. If the camshaft is not level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

(a) Apply new engine oil to the thrust portion and journal of the camshaft.



(b) Place the No. 2 camshaft at a 90° angle of timing mark (2 dot marks) on the cylinder head.

(c) Apply MP grease to a new oil seal lip.

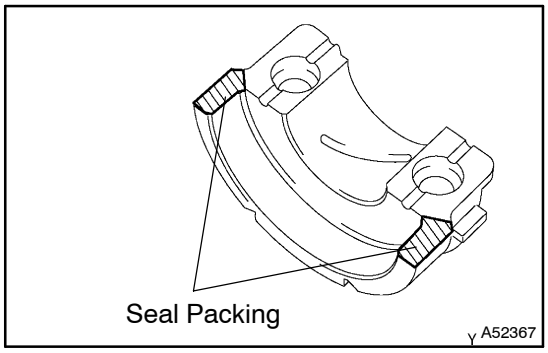


(d) Install the oil seal to the camshaft.

NOTICE:

- **Do not turn over the oil seal lip.**
- **Insert the oil seal until it stops.**

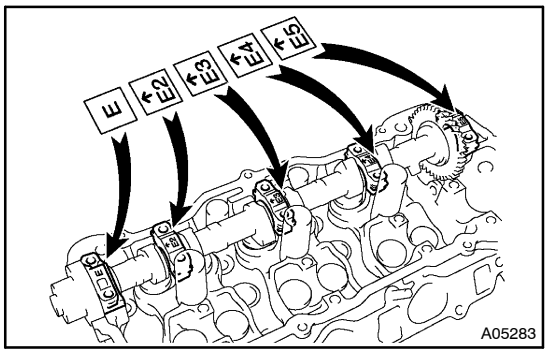
(e) Remove any old packing material from the contact surface.



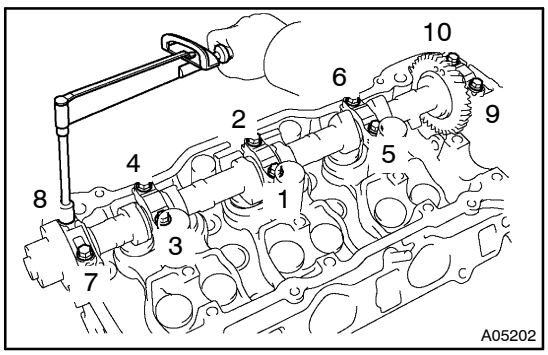
(f) Apply seal packing to the No. 1 bearing cap as shown.
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

- **Install the No. 1 bearing cap within 5 minutes after applying seal packing.**
- **Do not put into engine oil within 2 hours after installing.**



(g) Install the 5 bearing caps in their proper locations.
(h) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.



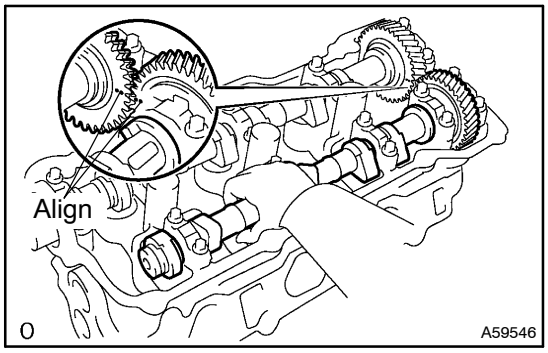
(i) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)

30. INSTALL CAMSHAFT

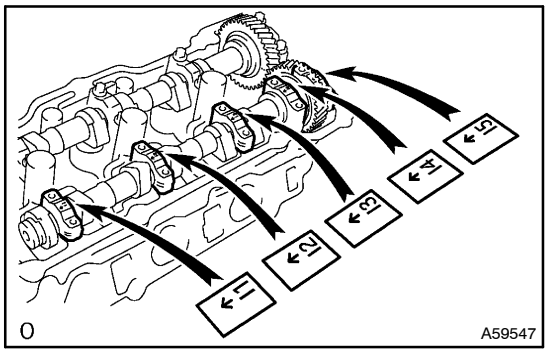
NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be held level while it is being installed. If the camshaft is not level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

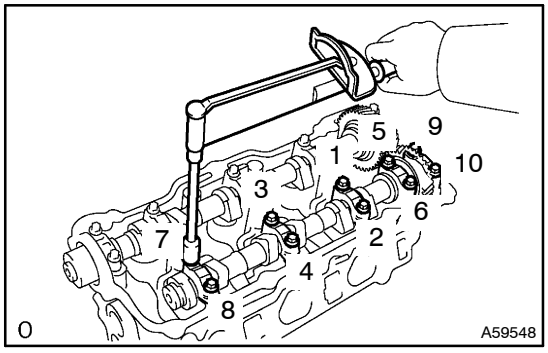
(a) Apply new engine oil to the thrust portion and journal of the camshaft.



(b) Align the timing marks (2 dot marks) of the camshaft drive with driven gears.
(c) Place the camshaft on the cylinder head.



(d) Install the 5 bearing caps in their proper locations.
(e) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

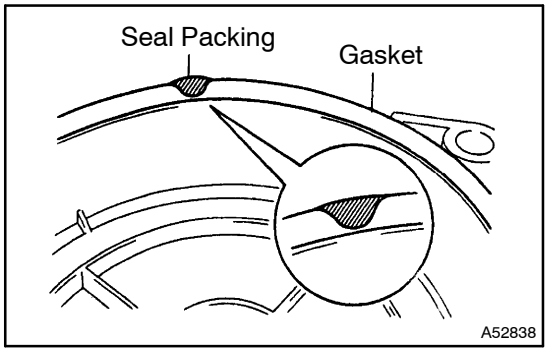


(f) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.
Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)
(g) Remove the service bolt.

31. INSTALL TIMING BELT NO.3 COVER

(a) Visually check the crack and break in the gasket of the timing belt cover.

NOTICE:
If it is judged that water is entering at the visual check, repair it with seal packing when the crack length is within 2 – 3 cm (0.79 – 1.18 in.). Change the gasket when the crack length is 3 – 4 cm (1.18 – 1.57 in.) and more.



(b) In case of repairing the timing belt cover gasket, follow the procedure below.

(1) Repair the crack and break portion applying the seal packing.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

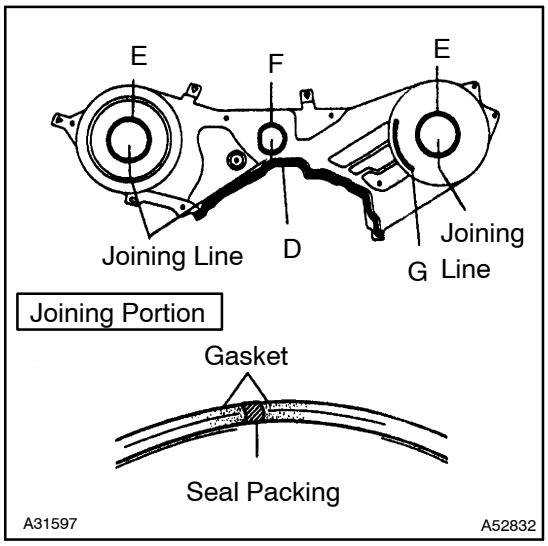
In case of applying the seal packing, apply it as wide and high as the gasket.

(c) In case of replacing the timing belt cover gasket, follow the procedure below.

(1) Using a screwdriver and gasket scraper, remove the remained gasket.

NOTICE:

Be careful not to damage the timing belt cover.



(2) Remove the backing paper from a new gasket, and affix the gasket along the groove of the timing belt cover as shown in the illustration.

NOTICE:

- **Affix the gasket in the center of the groove.**
- **At the corner, affix it without making the thickness of the gasket less.**

HINT:

Gasket	D	E	F	G
Length	335 mm (13.19 in.)	180 mm (7.09 in.)	133 mm (5.24 in.)	72 mm (2.83 in.)

(3) In case of having clearance at the joining portion of the gasket, apply the seal packing.

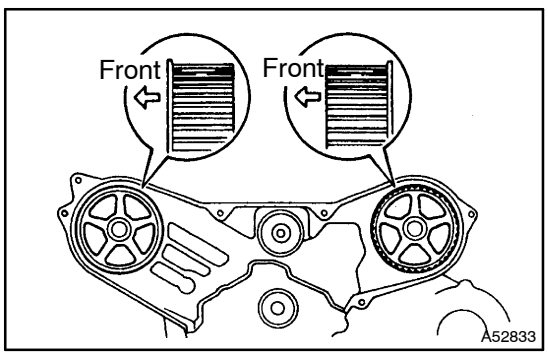
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

In case of applying the seal packing, apply it as wide and high as the gasket.

(d) Install the timing belt cover with the 6 bolts.

Torque: 8.5 N·m (87 kgf·cm, 76 in.·lbf)

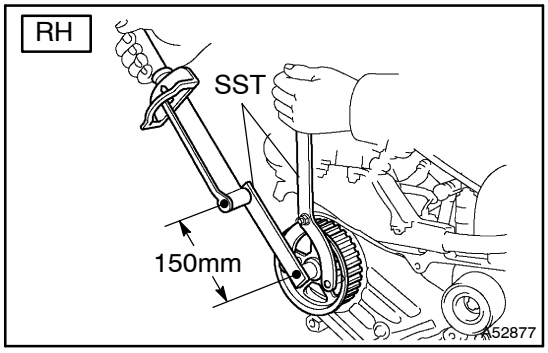


32. INSTALL CAMSHAFT TIMING PULLEY

(a) Pay attention to the direction of the belt guide, install the camshaft timing pulley and tighten the bolt temporally.

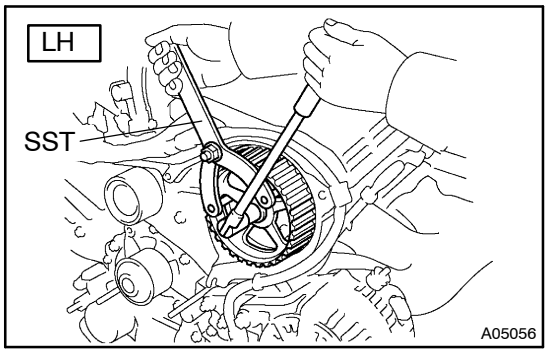
HINT:

- Face the belt guide of the RH timing pulley toward the engine front.
- Face the belt guide of the LH timing pulley toward the engine rear.



(b) Using SST, tighten the RH pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000), 09249–63010
Torque: 125 N·m (1,275 kgf·cm, 92 ft·lbf)

NOTICE:
The torque indicated above is used without SST on extension tool. In case of using those extension tools, find the reading of the torque wrench by the formula.
(See page 01–5)
Extended length:
SST (09249–63010) 150mm (5.91 in.)



(c) Using SST, tighten the LH pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 125 N·m (1275 kgf·cm, 92 ft·lbf)

33. INSTALL TIMING BELT IDLER SUB–ASSY NO.2

Torque: 43 N·m (438 kgf·cm, 32 ft·lbf)

34. INSPECT TIMING BELT
(See page 14–174)

35. INSTALL TIMING BELT
(See page 14–211)
SST 09960–10010 (09962–01000, 09963–01000)

36. INSTALL CHAIN TENSIONER ASSY NO.1
(See page 14–174)

37. INSTALL TIMING BELT GUIDE NO.2
(See page 14–174)

38. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

39. INSTALL TIMING BELT NO.2 COVER
(See page 14–174)

40. INSTALL TIMING BELT NO.1 COVER
(See page 14–174)

41. INSTALL CRANKSHAFT PULLEY
(See page 14–174)
SST 09213–54015 (91651–60855), 09330–00021

42. INSTALL GENERATOR BRACKET NO.2

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

43. **INSTALL ENGINE MOUNTING STAY NO.2 RH**
(See page 14–156)
44. **INSTALL ENGINE MOVING CONTROL ROD**
(See page 14–156)
45. **INSPECT VALVE CLEARANCE (See page 14–143)**
46. **ADJUST VALVE CLEARANCE (See page 14–143)**
SST 09248–55040 (09248–05410, 09248–05420)
47. **INSTALL VANE PUMP V BELT**
(See page 14–141)
48. **INSTALL V (COOLER COMPRESSOR TO CRANKSHAFT PULLEY) BELT NO.1**
(See page 14–141)
49. **INSPECT DRIVE BELT DEFLECTION AND TENSION(REFERENCE) (See page 14–137)**
50. **INSTALL CYLINDER HEAD COVER SUB–ASSY**
(See page 14–143)
51. **INSTALL IGNITION COIL ASSY**

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
52. **INSTALL INTAKE AIR SURGE TANK**
(See page 14–143)
53. **INSTALL AIR CLEANER ASSEMBLY WITH HOSE (See page 10–18)**
54. **CONNECT VACUUM HOSE (See page 14–156)**
55. **INSTALL FRONT SUSPENSION UPPER BRACE CENTER**
(W/ FRONT SUSPENSION BRACE UPPER CENTER)

Torque: 80 N·m (816 kgf·cm, 59 ft·lbf)
56. **INSTALL V–BANK COVER SUB–ASSY**
(See page 14–156)
57. **INSTALL FRONT WHEEL RH**
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
58. **ADD COOLANT (See page 16–31)**
59. **CHECK ENGINE COOLANT LEAK (See page 16–31)**