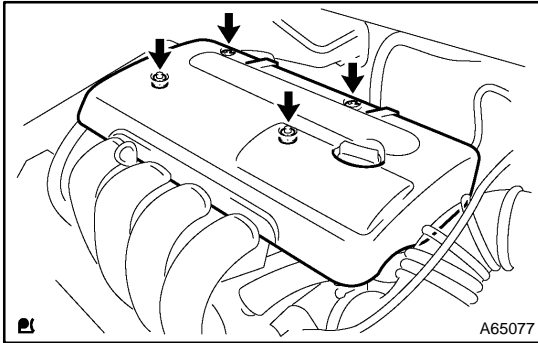


REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-1)**
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN COOLANT (See page 16-7)**
4. **REMOVE FRONT WHEEL RH**



5. **REMOVE CYLINDER HEAD COVER NO.2**
 - (a) Remove the 2 nuts, 2 clips and cylinder head cover.

6. **REMOVE AIR CLEANER HOSE NO.1**

- (a) Loosen the 2 air cleaner hose clamp bolts, and remove the air cleaner hose.

7. **SEPARATE ACCELERATOR CONTROL CABLE ASSY**

- (a) Loosen the nut, and remove the accelerator control cable from the accelerator control cable bracket.

8. **DISCONNECT WATER BY-PASS HOSE**

- (a) Disconnect the water by-pass hose from the throttle body.

9. **DISCONNECT WATER BY-PASS HOSE NO.2**

- (a) Disconnect the water by-pass hose from the throttle body.

10. **REMOVE EFI FUEL PIPE CLAMP (See page 11-10)**

11. **DISCONNECT FUEL TUBE SUB-ASSY (See page 11-10)**

SST 09268-21010

12. **DISCONNECT UNION TO CONNECTOR TUBE HOSE**

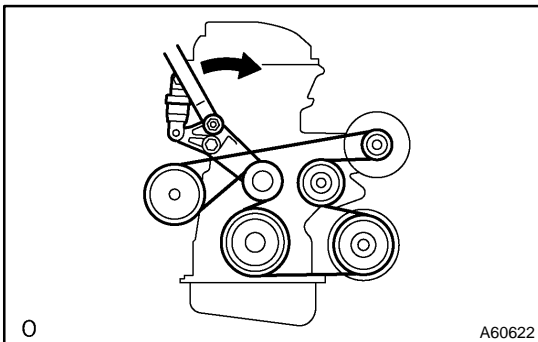
- (a) Disconnect the union to connector tube hose from the hose to hose tube.

13. **DISCONNECT RADIATOR HOSE INLET**

- (a) Disconnect radiator hose inlet from the cylinder head.

14. **DISCONNECT HEATER INLET WATER HOSE**

- (a) Disconnect the heater inlet water hose from the cylinder head.



15. **REMOVE FAN AND GENERATOR V BELT**

- (a) Turn the V-ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator V belt and put back the V-ribbed belt tensioner little by little and fix it quietly.

16. SEPARATE VANE PUMP ASSY (See page 51-8)

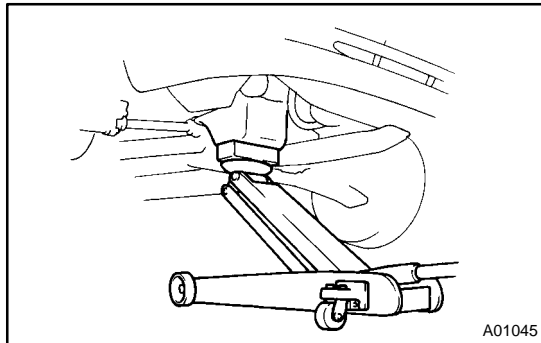
NOTICE:

Do not disconnect the hose.

17. REMOVE GENERATOR ASSY (See page 19-16)

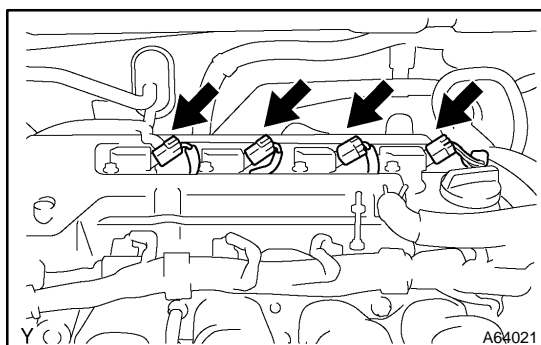
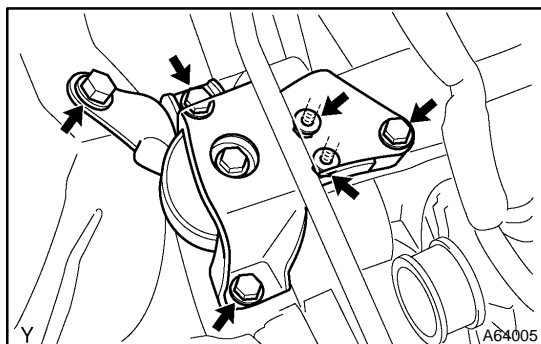
18. SEPARATE EXHAUST PIPE ASSY FRONT

- (a) Remove the 2 bolts, 2 compression spring installing the front side of exhaust pipe.
- (b) Remove the gasket.



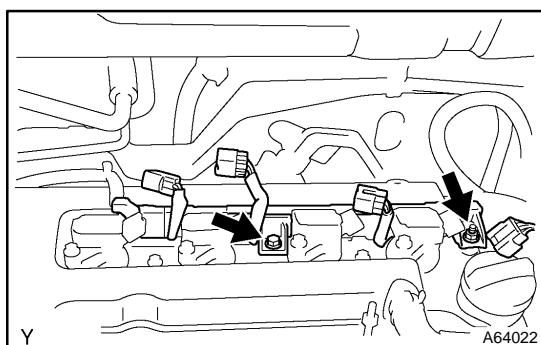
19. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

- (a) Remove the PS oil pump reservoir and put it aside.
- (b) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, the 2 nuts and engine mounting insulator RH.

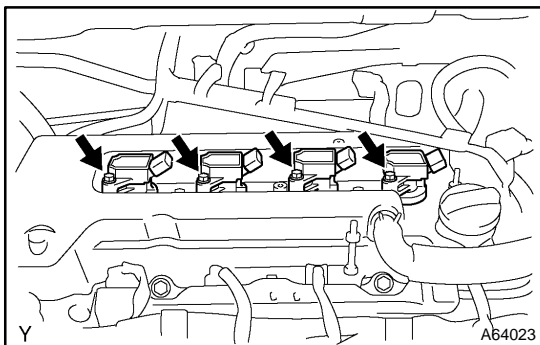


20. DISCONNECT ENGINE WIRE

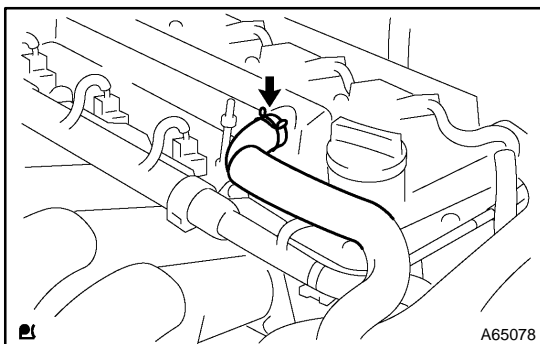
- (a) Remove the 5 clamps from the 5 clamp brackets.
- (b) Disconnect the 4 ignition coil connectors.



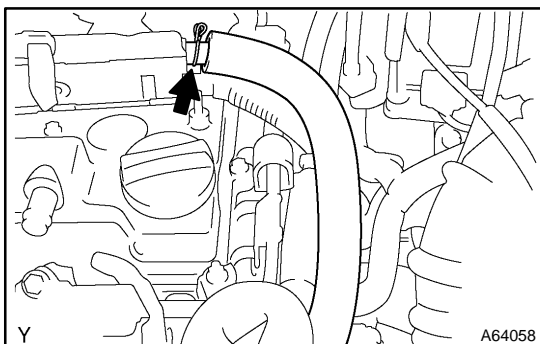
- (c) Remove the bolt and nut installing the engine wire.

**21. REMOVE IGNITION COIL ASSY**

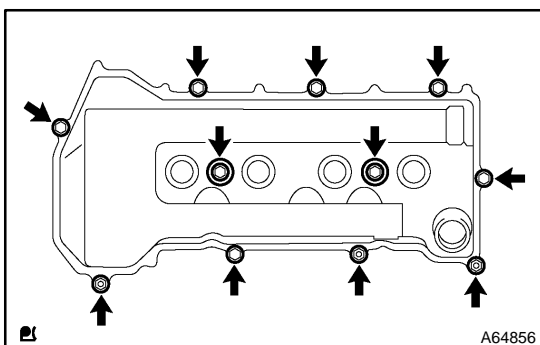
- (a) Remove the 4 bolts and 4 ignition coils.

**22. DISCONNECT VENTILATION HOSE**

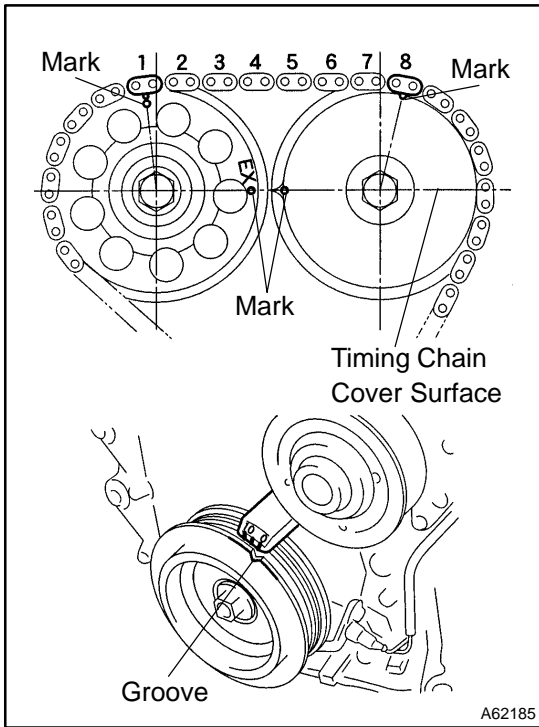
- (a) Disconnect the ventilation hose from the cylinder head cover.

**23. DISCONNECT VENTILATION HOSE NO.2**

- (a) Disconnect the ventilation hose from the cylinder head cover.

**24. REMOVE CYLINDER HEAD COVER SUB-ASSY**

- (a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.

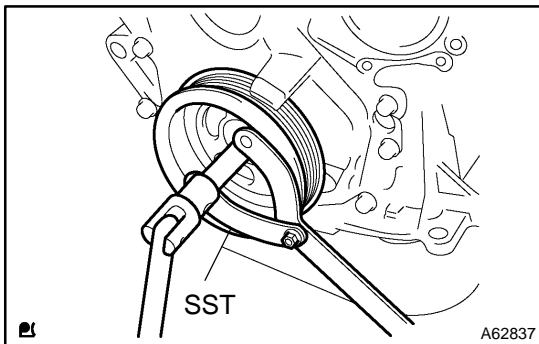


25. SET NO. 1 CYLINDER TO TDC/COMPRESSION

- (a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.
- (b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

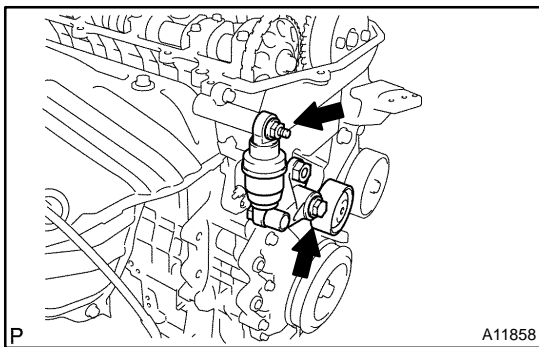
HINT:

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



26. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, remove the pulley bolt.
SST 09960-10010 (09962-01000, 09963-01000)
- (b) Remove the crankshaft pulley from the crankshaft.



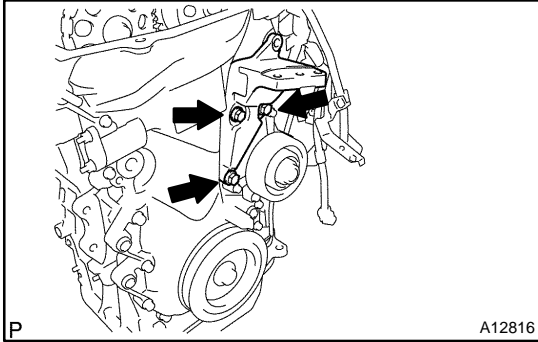
27. REMOVE V-RIBBED BELT TENSIONER ASSY

- (a) Remove the bolt, nut and V-ribbed belt tensioner.

HINT:

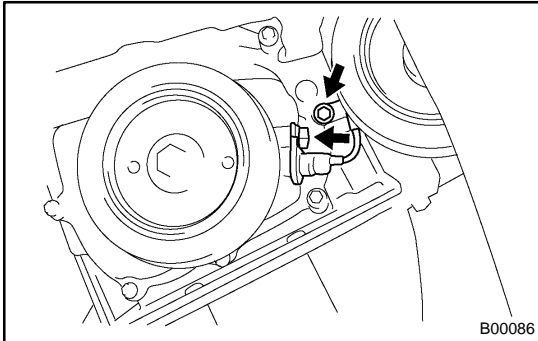
Handle a jack up and down to remove the bolt.

28. REMOVE WATER PUMP ASSY (See page 16-8)



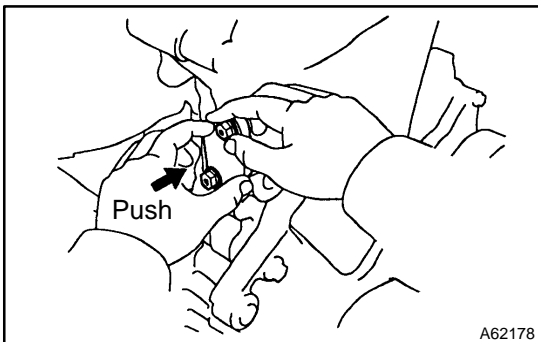
29. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

- (a) Remove the 3 bolts and transverse engine engine mounting bracket.



30. REMOVE CRANK POSITION SENSOR

- (a) Remove the 2 bolts installing the crank position sensor.

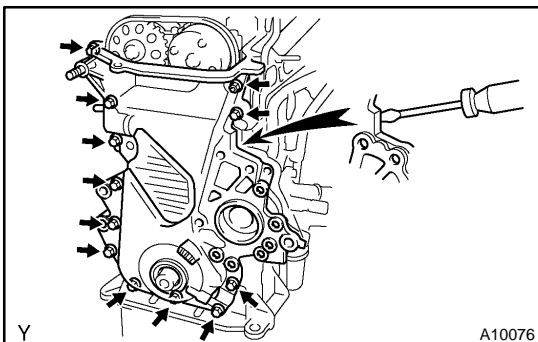


31. REMOVE CHAIN TENSIONER ASSY NO.1

- (a) Remove the 2 nuts and chain tensioner.

NOTICE:

Be sure not to revolve the crankshaft without the chain tensioner.



32. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

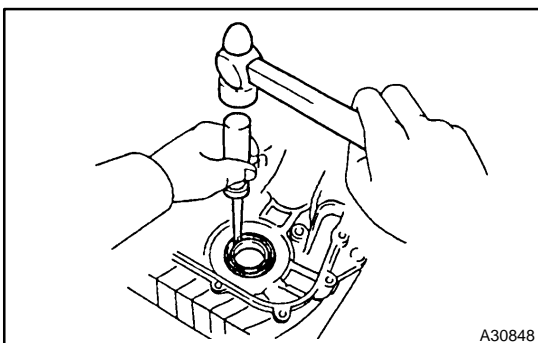
- (a) Remove the 11 bolts and nuts.
 (b) Using a torx wrench socket (E8), remove the stud bolt.
 (c) Remove the timing chain cover by prying the portions between the cylinder head and cylinder block with a screwdriver.

NOTICE:

Be careful no tot damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.

33. REMOVE TIMING GEAR COVER OIL SEAL

- (a) Using a screwdriver, remove the oil seal.

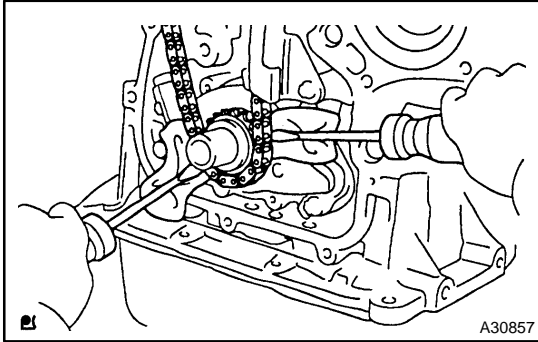


34. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1**35. REMOVE CHAIN TENSIONER SLIPPER**

- (a) Remove the bolt and chain tensioner slipper.

36. REMOVE CHAIN VIBRATION DAMPER NO.1

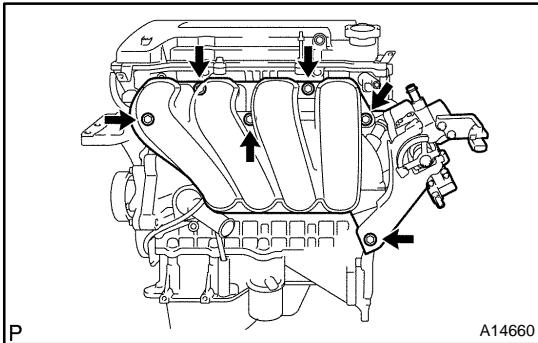
- (a) Remove the 2 bolt and chain vibration damper.

**37. REMOVE CHAIN SUB-ASSY**

- (a) Remove the timing chain with the crankshaft timing gear plying screwdrivers as shown in the illustration.

NOTICE:

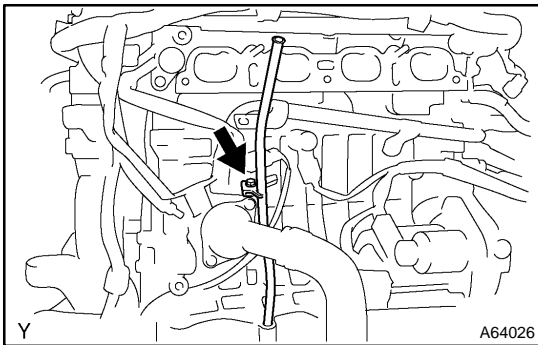
- Put shop rag to protect the engine.
- In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.

**38. REMOVE INTAKE MANIFOLD**

- (a) Disconnect the 2 water hoses from the throttle body.
 (b) Disconnect the 2 vacuum hoses from the intake manifold.
 (c) Remove the 4 bolts, 2 nuts, 2 wire brackets, the intake manifold and throttle body assembly.
 (d) Remove the gasket from the intake manifold and throttle body assembly.

39. REMOVE OIL LEVEL GAGE SUB-ASSY

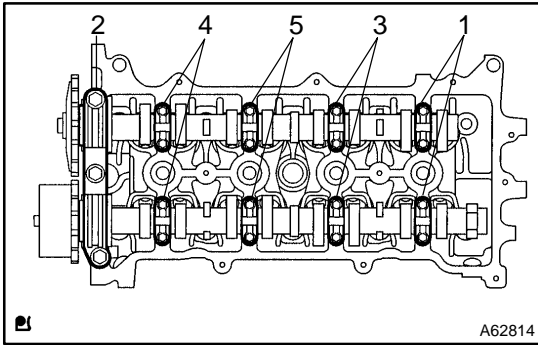
- (a) Remove the oil level gage from the oil level gage guide.

**40. REMOVE OIL LEVEL GAGE GUIDE**

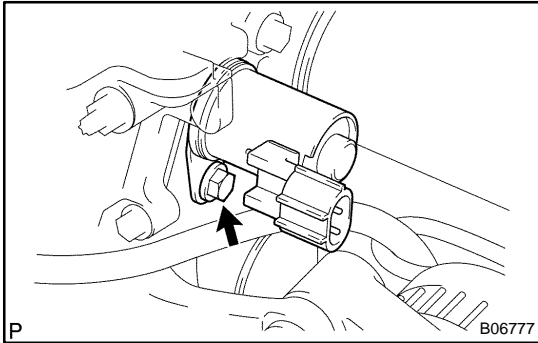
- (a) Remove the bolt and oil level gage guide.

41. SEPARATE WATER BY-PASS PIPE NO.1

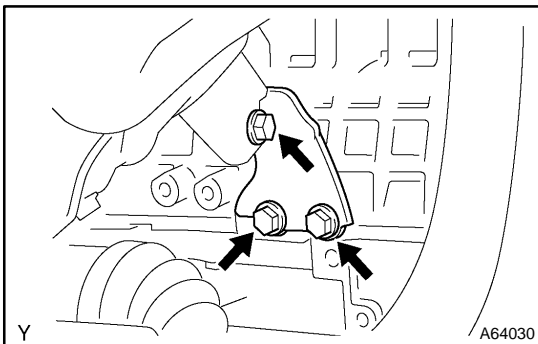
- (a) Remove the 2 bolts installing the water by-pass pipe.

**42. REMOVE CAMSHAFT**

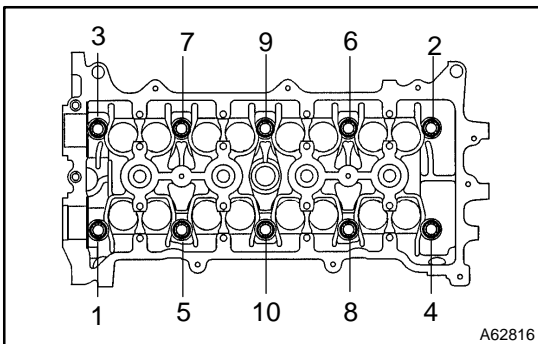
- (a) Uniformly loosen and remove the 19 bearing cap bolts, in several passes, in the sequence shown, and remove the 9 bearing caps, intake and exhaust camshafts.

**43. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

- (a) Remove the bolt and camshaft timing oil control valve.

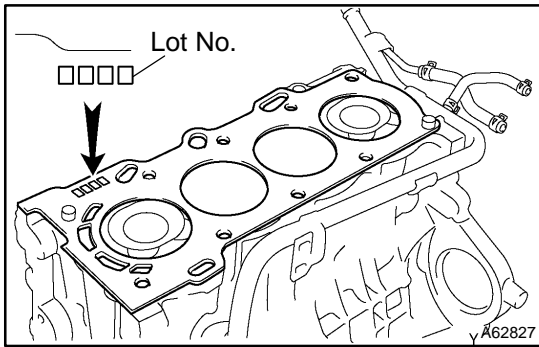
**44. REMOVE MANIFOLD STAY**

- (a) Remove the 3 bolts and manifold stay.

**45. REMOVE CYLINDER HEAD SUB-ASSY**

- (a) Using a 10 mm bi-hexagon wrench, uniformly loosen and remove the 10 cylinder head bolts, in several passes, in the sequence shown, and remove the 10 cylinder head bolts and 10 plate washers.
- (b) Remove the cylinder head.

46. REMOVE CYLINDER HEAD GASKET

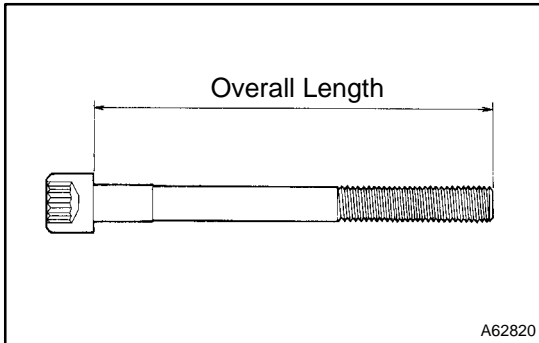


47. INSTALL CYLINDER HEAD GASKET

- (a) Place a new cylinder head gasket on the cylinder block surface with the Lot No. stamp upward.

NOTICE:

- Pay attention to the installation direction.
- Place the cylinder head quietly in order not to damage the gasket with the bottom part of the head.



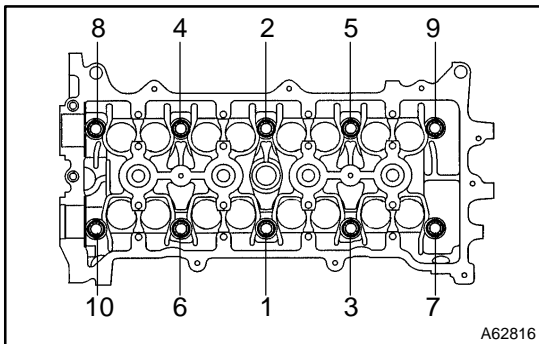
48. INSPECT CYLINDER HEAD SET BOLT

- (a) Using a vernier calipers, measure the length of cylinder head bolt from the seat to the end.

Standard length: 146.8 – 148.2 mm (5.780 – 5.835 in.)

Maximum length: 148.5 mm (5.846 in.)

If the length surpasses the maximum, replace the bolt.



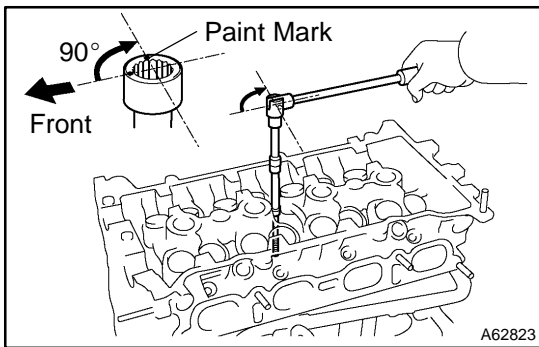
49. INSTALL CYLINDER HEAD SUB-ASSY

HINT:

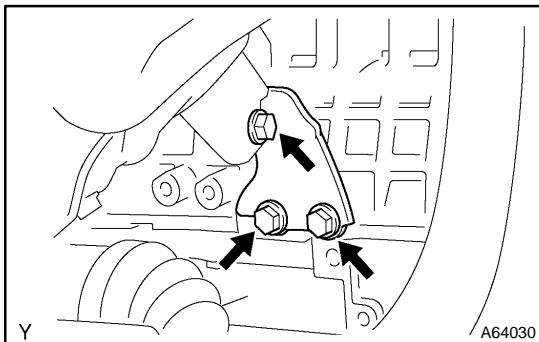
The cylinder head bolts are tightened in 2 progressive steps.

- (a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
- (b) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 10 cylinder head bolts and plate washers, in several passes, in the sequence shown.

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



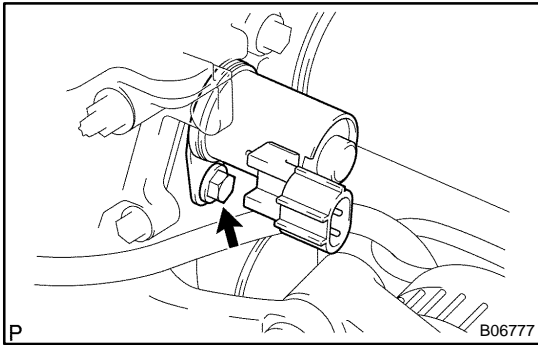
- (c) Make the front of the cylinder head bolt with paint.
- (d) Retighten the cylinder head bolts 90° in the numerical order shown.
- (e) Check that the point marked bolts are moved at 90° angle.



50. INSTALL MANIFOLD STAY

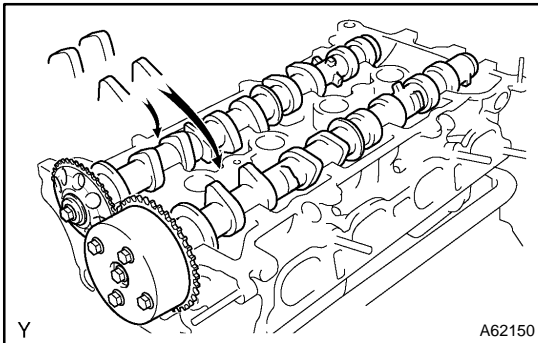
- (a) Install the manifold stay with 3 bolts.

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



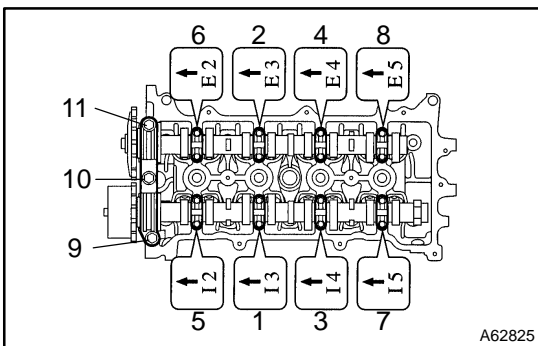
51. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY

- (a) Apply a light coat of engine oil on a new O-ring, and install it to the camshaft timing oil control valve.
 - (b) Install the camshaft timing oil control valve with the bolt.
- Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**



52. INSTALL CAMSHAFT

- (a) Apply a light coat of engine oil on the camshaft journals.
- (b) Place the 2 camshafts on the cylinder head with the No. 1 cam lobes facing as shown the illustration.



- (c) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.

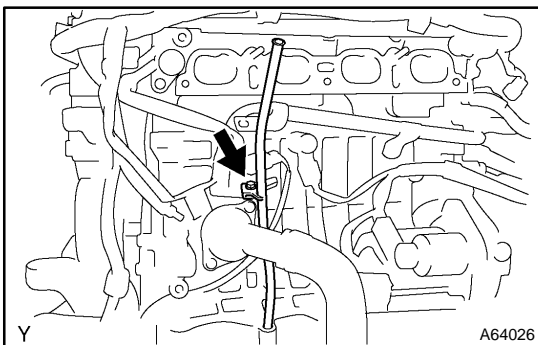
Torque:

Bearing cap No. 1 23 N·m (235 kgf·cm, 17 ft·lbf)

Bearing cap No. 3 13 N·m (133 kgf·cm, 10 ft·lbf)

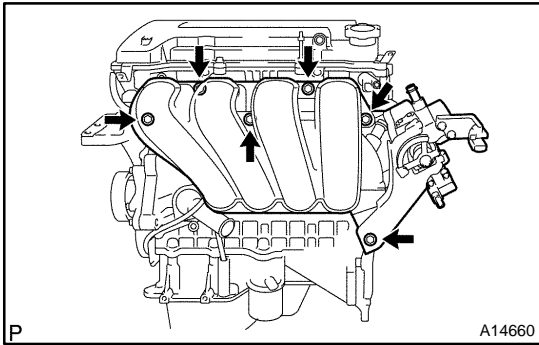
53. INSTALL WATER BY-PASS PIPE NO.1

- (a) Install the water by-pass pipe with the 2 bolts.
- Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**



54. INSTALL OIL LEVEL GAGE GUIDE

- (a) Apply a light coat of engine oil on a new O-ring, and install it to the oil level gage guide.
 - (b) Install the oil level gage guide with the bolt.
- Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)**

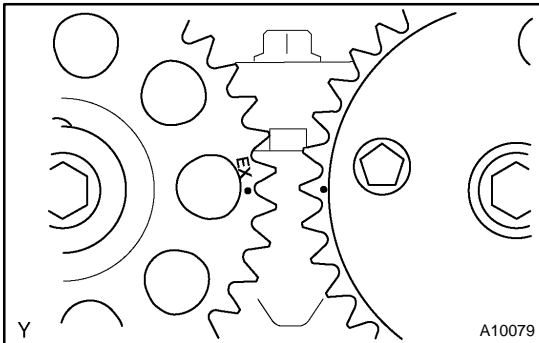


55. INSTALL INTAKE MANIFOLD

- (a) Install a new gasket to the intake manifold.
- (b) Install the intake manifold and throttle body assembly with the 2 brackets, 4 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

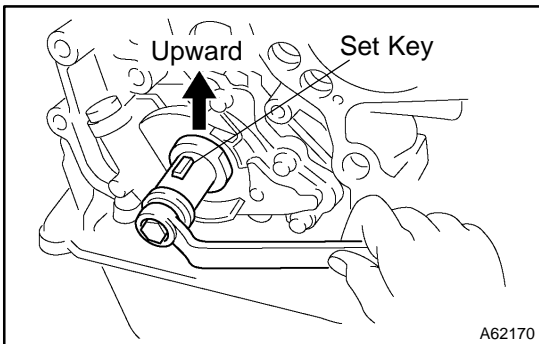
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

- (c) Connect the 2 vacuum hoses to the intake manifold.
- (d) Connect the 2 water hoses to the throttle body.

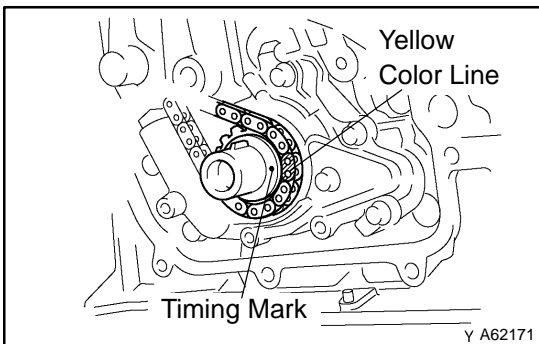


56. INSTALL CHAIN SUB-ASSY

- (a) Set No. 1 cylinder to TDC/compression.
 - (1) Turn the hexagonal wrench head portion of the camshafts, and align the point marks of the camshaft timing sprockets.



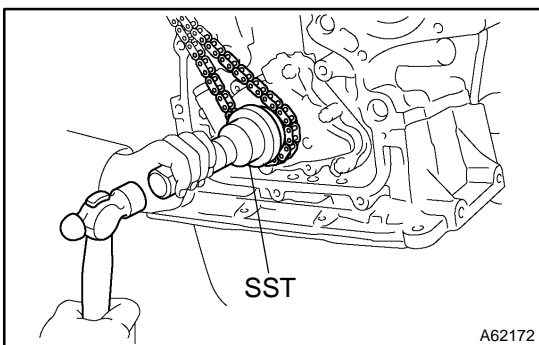
- (2) Using a crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



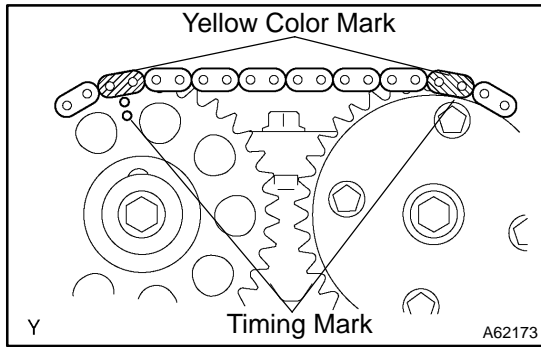
- (b) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:

Three yellow color links are on the chain.



- (c) Using SST, install the crankshaft timing sprocket.
SST 09223-22010



- (d) Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

57. INSTALL CHAIN VIBRATION DAMPER NO.1

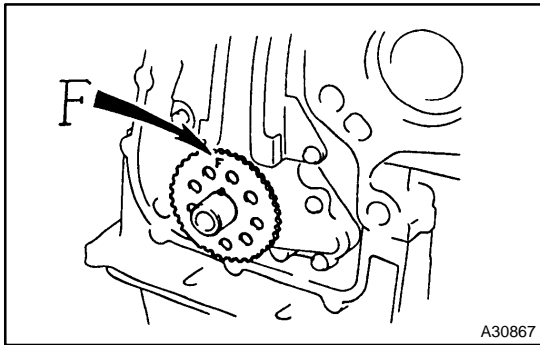
- (a) Install the chain vibration damper with the 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

58. INSTALL CHAIN TENSIONER SLIPPER

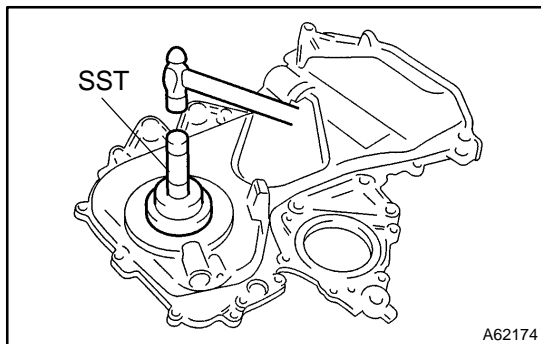
- (a) Install the chain tensioner slipper with the bolt.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



59. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

- (a) Install the plate with the "F" mark facing forward.



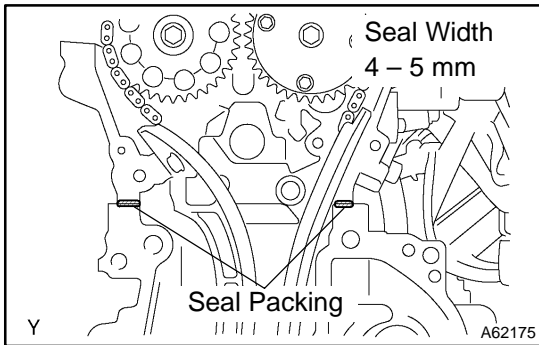
60. INSTALL TIMING GEAR COVER OIL SEAL

- (a) Apply MP grease to a new oil seal lip.
 (b) Using SST, tap in the oil seal until its surface is flush with the timing chain cover edge.

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NOTICE:

Keep the lip off foreign materials.



61. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

- (a) Remove any old packing material from the contact surface.
- (b) Apply seal packing in the shape of bead (Diameter 3.5 mm – 4.5 mm (0.1379 – 0.177 in.)) consequently as shown in the illustration.

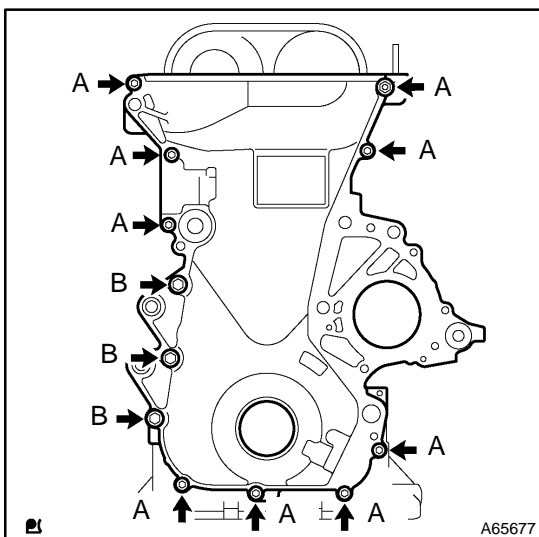
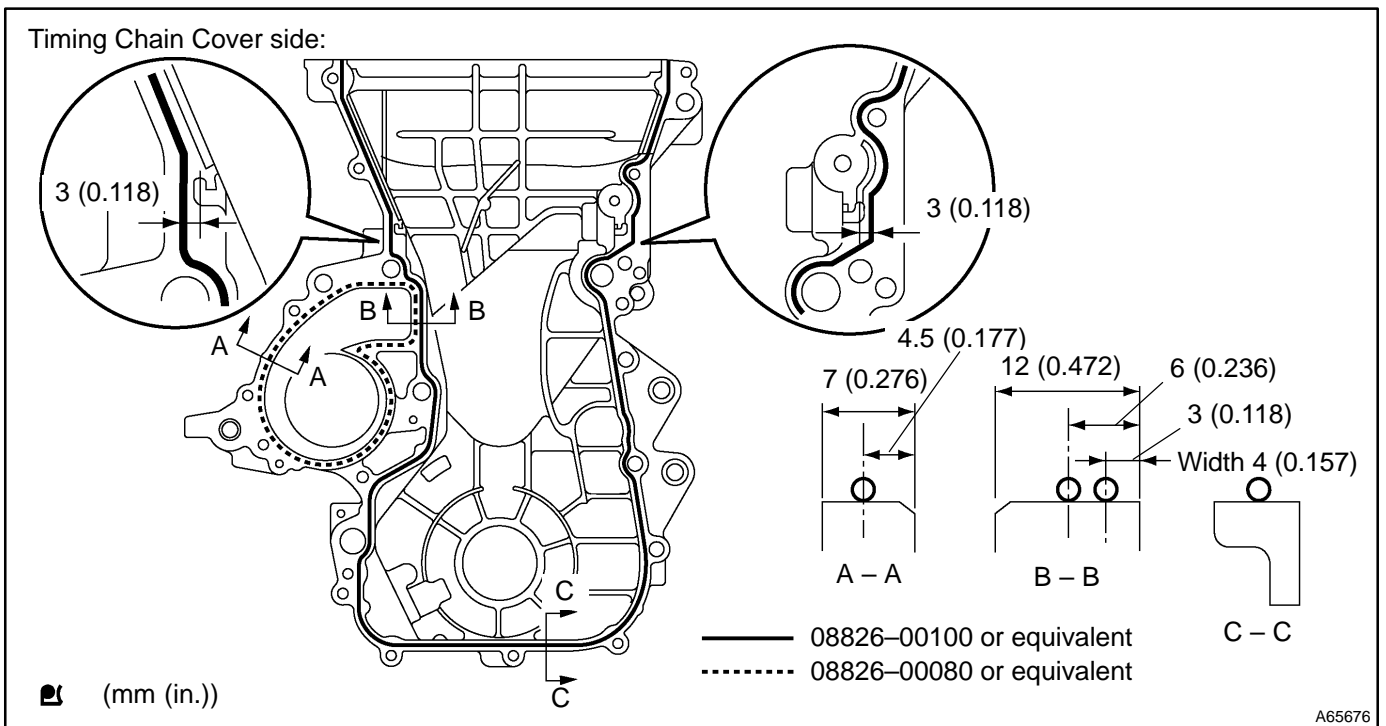
Seal packing:

Water pump part part No. 08826-00100 or equivalent

Other part part No. 08826-00080 or equivalent.

NOTICE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes after applying seal packing.
- Do not put into engine oil within 2 hours after installing.



- (c) Install the timing chain cover with the 11 bolts and nut.

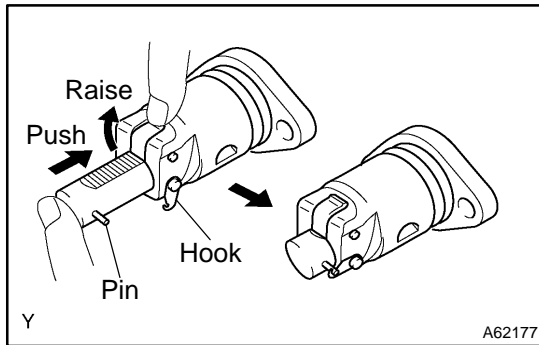
Torque:

A 13 N·m (133 kgf·cm, 10 ft·lbf)

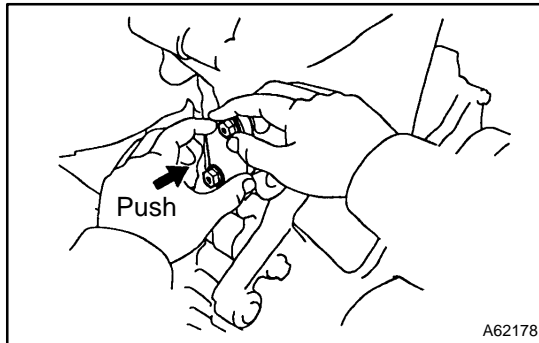
B 19 N·m (194 kgf·cm, 14 ft·lbf)

- (d) Using a torx wrench socket (E8), install the stud bolt.

Torque: 9.5 N·m (97 kgf·cm, 84 in·lbf)

**62. INSTALL CHAIN TENSIONER ASSY NO.1**

- (a) Check the O-ring is clean, and set the hook as shown in the illustration.

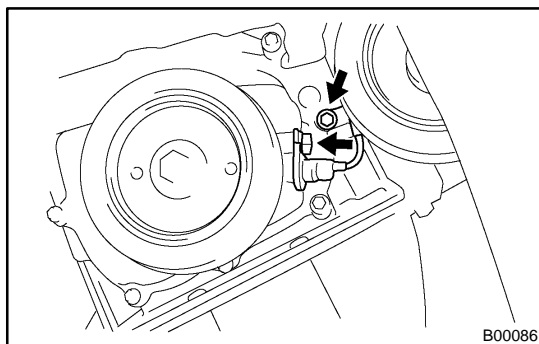


- (b) Apply engine oil to the chain tensioner and install it with 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)

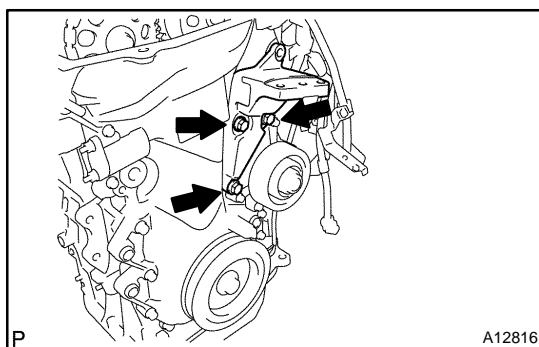
NOTICE:

When installing the tensioner, set the hook again if the hook release the plunger.

**63. INSTALL CRANK POSITION SENSOR**

- (a) Install the crank position sensor with the 2 bolts.

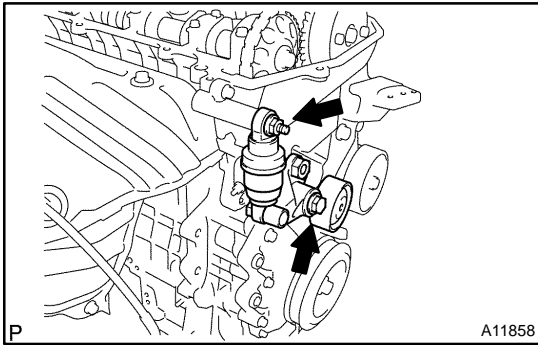
Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)

**64. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET**

- (a) Install the transverse engine engine mounting bracket with the 3 bolts.

Torque: 47 N·m (479 kgf·cm, 35 ft.-lbf)

65. INSTALL WATER PUMP ASSY (See page 16-8)



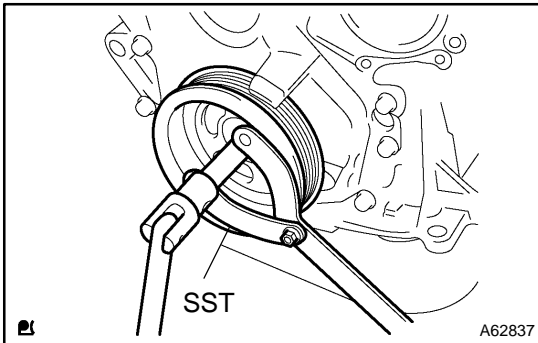
66. INSTALL V-RIBBED BELT TENSIONER ASSY

- (a) Install the V-ribbed belt tensioner with the nut and bolt.

Torque:

Nut 29 N·m (296 kgf·cm, 21 ft·lbf)

Bolt 69 N·m (704 kgf·cm, 51 ft·lbf)



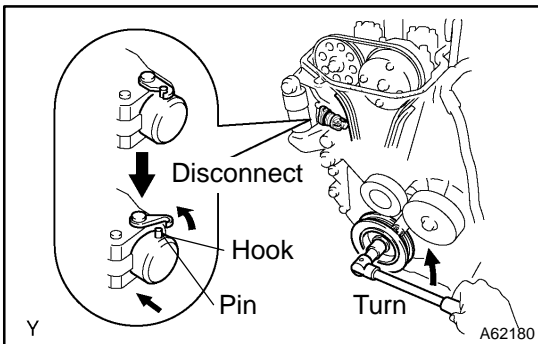
67. INSTALL CRANKSHAFT PULLEY

- (a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

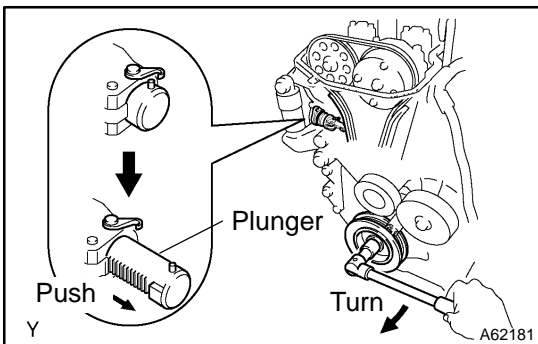
- (b) Using SST, install the crankshaft pulley bolt.

SST 09960-10010 (09962-01000, 09963-01000)

Torque: 138 N·m (1,407 kgf·cm, 102 ft·lbf)



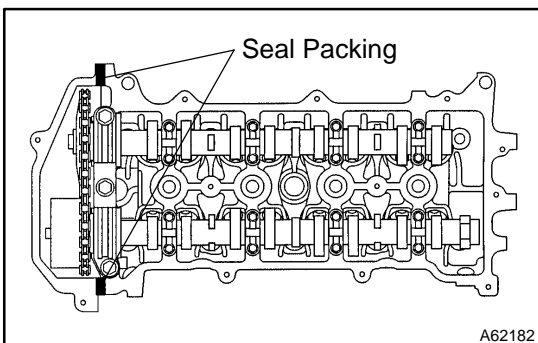
- (c) Turn the crankshaft counter clockwise, and disconnect the plunger knock pin from the hook.



- (d) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.

HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver so that the hook is released from the knock pin and the plunger springs out.



68. INSTALL CYLINDER HEAD COVER SUB-ASSY

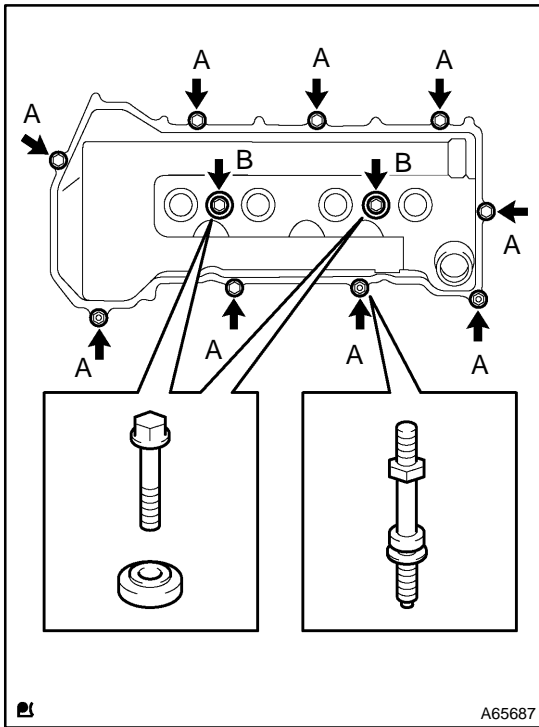
- (a) Remove any old pacing (FIPG) material.

- (b) Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 3 minutes after applying seal packing.**
- **Do not put into engine oil 2 hours after installing.**

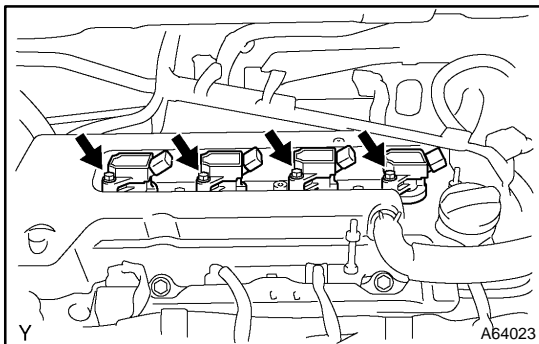


- (c) Install the cylinder head cover and 3 cable brackets with the 9 bolts, 2 seal washers and 2 nuts. Uniformly tighten the bolts and nuts, in the several passes.

Torque:

A 11 N·m (112 kgf·cm, 8 ft·lbf)

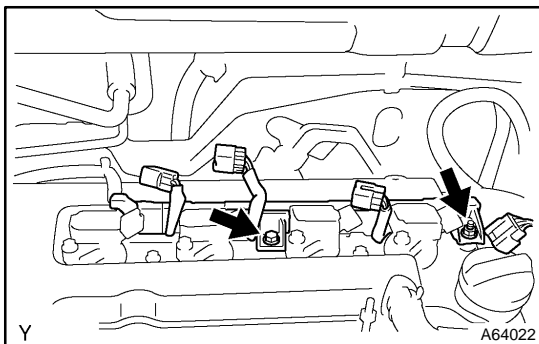
B 9.0 N·m (92 kgf·cm, 80 in·lbf)



69. INSTALL IGNITION COIL ASSY

- (a) Install the 4 ignition coils with the 4 bolts.

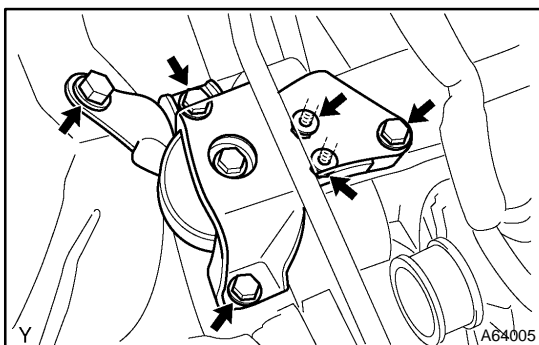
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)



70. INSTALL ENGINE WIRE

- (a) Install the engine wire with the bolt and nut.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

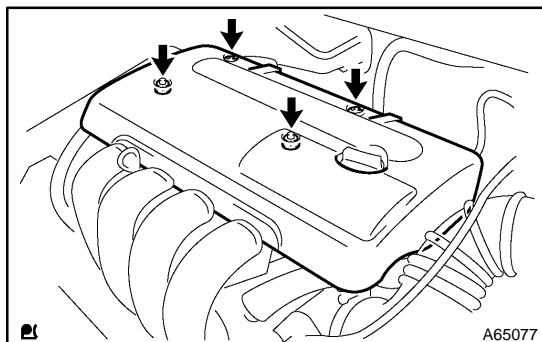


71. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

- (a) Install the engine mounting insulator with the 4 bolts and 2 nuts.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

72. INSTALL EXHAUST PIPE ASSY FRONT (See page 15-2)
73. INSTALL VANE PUMP ASSY (See page 51-8)
74. INSTALL GENERATOR ASSY (See page 19-16)



75. INSTALL CYLINDER HEAD COVER NO.2
 - (a) Install the cylinder head cover with the 2 nuts and 2 clips.
Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)

76. INSTALL FRONT WHEEL RH
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)
77. ADD COOLANT (See page 16-7)
78. INSPECT COMPRESSION (See page 14-1)
SST 09992-00500
79. INSPECT CO/HC (See page 14-1)
80. INSPECT IGNITION TIMING (See page 14-1)
SST 09843-18040
81. CHECK ENGINE COOLANT LEAK (See page 16-7)
82. CHECK ENGINE OIL LEAK