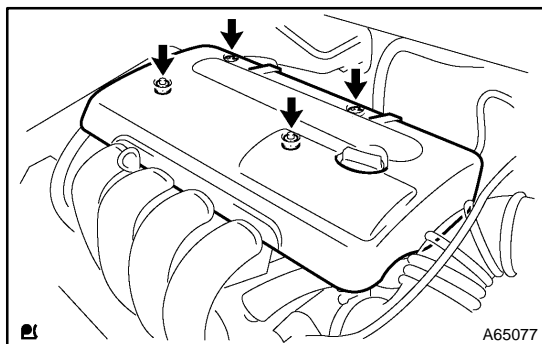


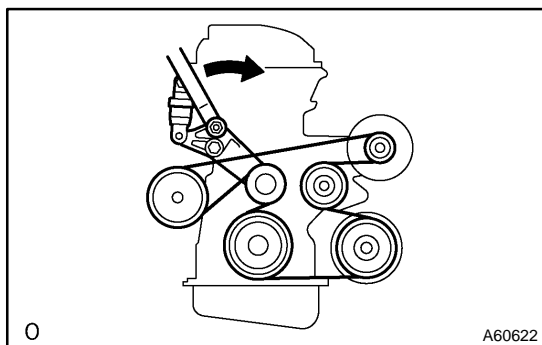
REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT** (See page 11-1)
2. **REMOVE ENGINE UNDER COVER RH**
3. **DRAIN COOLANT** (See page 16-6)
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 XX-XXX)
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.



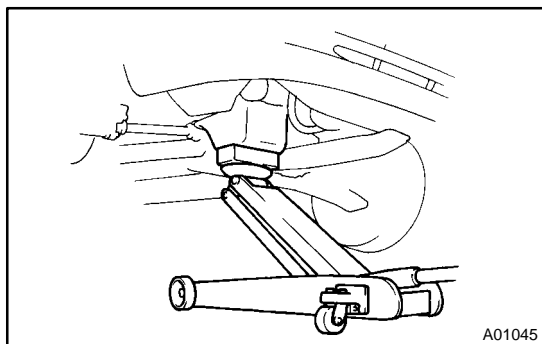
15. **REMOVE FAN AND GENERATOR V BELT**
 - (a) Turn the V-ribbed belt tensioner slowly clockwise and loosen it. Then, remove the fan and generator belt V and put back the V-ribbed belt tensioner little by little and fix it quietly.

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

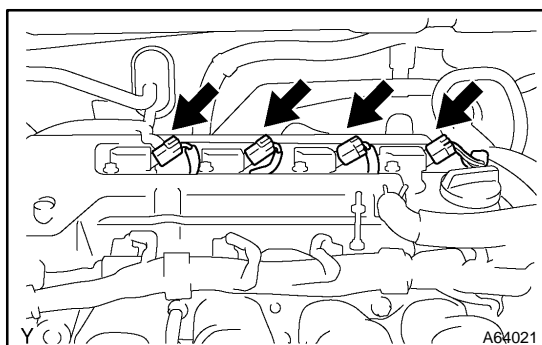
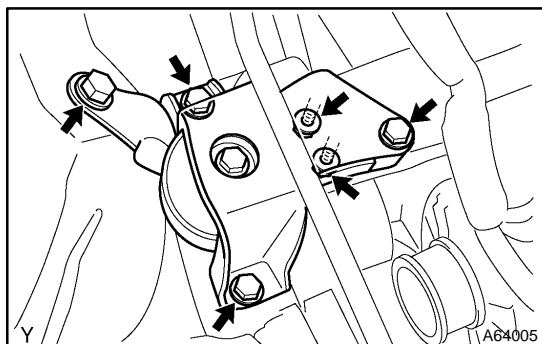
Do not disconnect the hose.

17. REMOVE GENERATOR ASSY (See page 19-15)**18. SEPARATE EXHAUST PIPE ASSY FRONT**

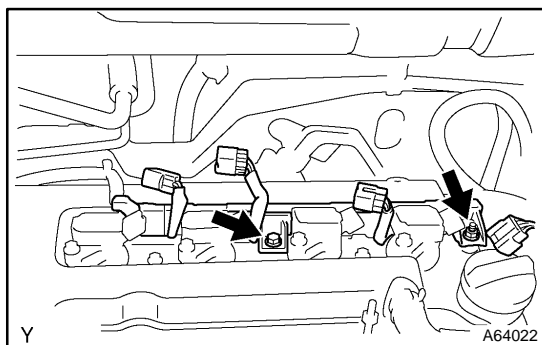
- (a) Remove the 2 bolts, 2 compression spring installing the front side of exhaust pipe.
- (b) Remove the gasket.

**19. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH**

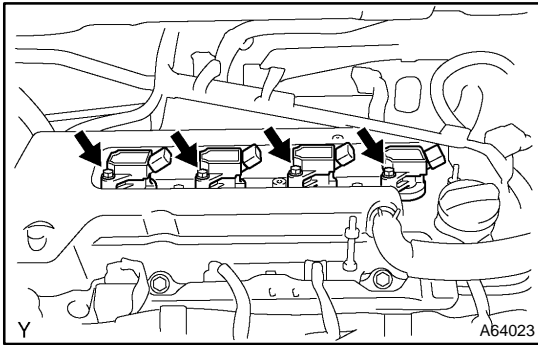
- (a) Remove the PS oil pump reservoir and put it aside.
- (b) Place a wooden block between the jack and engine, and set the jack, then remove the 4 bolts, the 2 nuts and engine mounting insulator RH.

**20. DISCONNECT ENGINE WIRE**

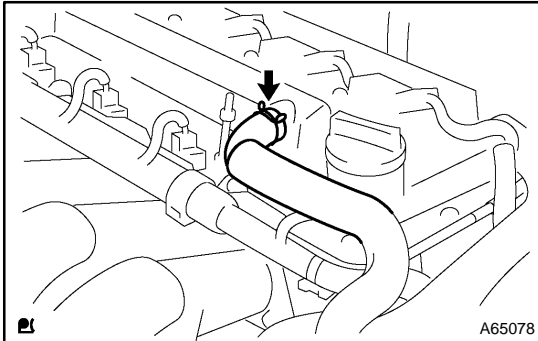
- (a) Remove the 5 clamps from the 5 clamp brackets.
- (b) Disconnect the 4 ignition coil connectors.



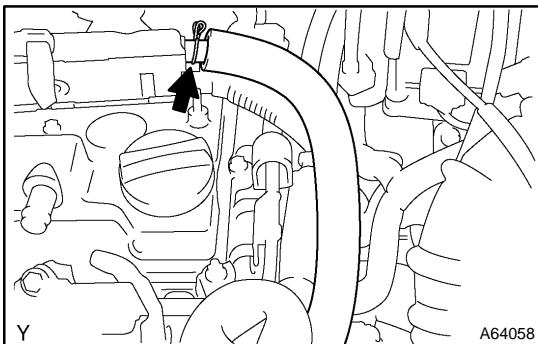
- (c) Remove the bolt and nut installing the engine wire.

**21. REMOVE IGNITION COIL ASSY**

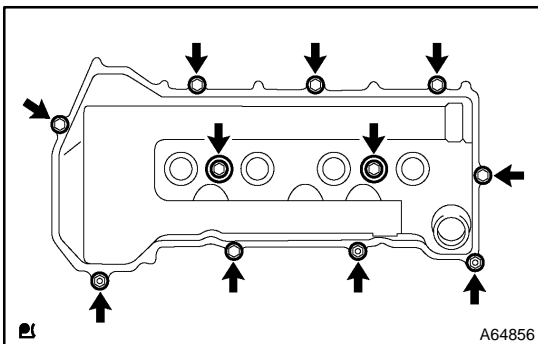
- (a) Remove the 4 bolts and 4 ignition coils.

**22. DISCONNECT VENTILATION HOSE**

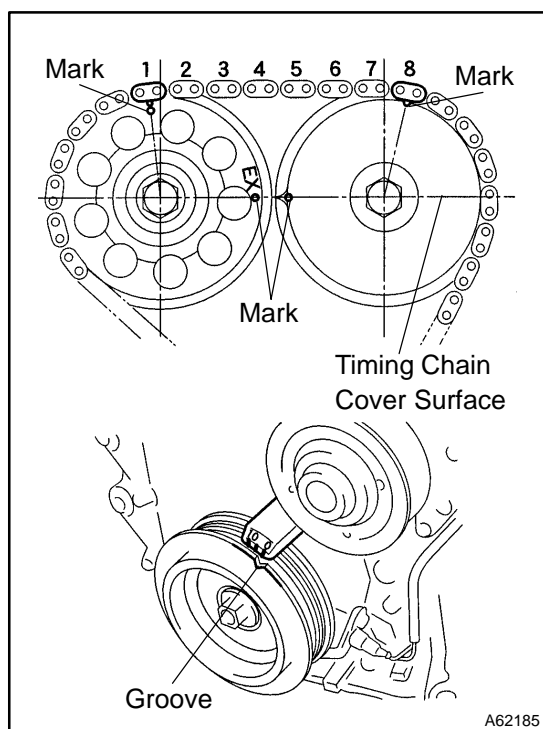
- (a) Disconnect the ventilation hose from the cylinder head cover.

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

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

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

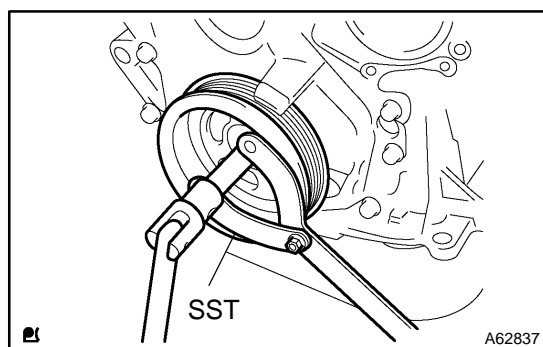
- (a) Remove the 9 bolts, 2 seal washers, 2 nuts, 3 clamp brackets and cylinder head cover.

**25. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

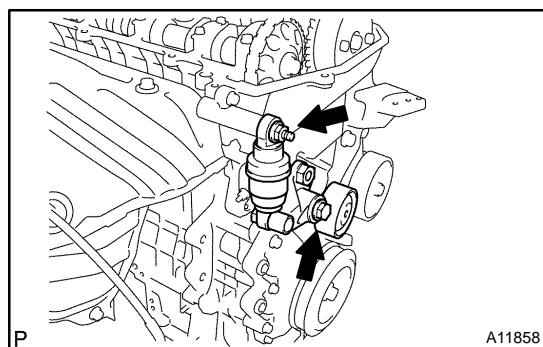
- (a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.
- (b) Check that the point marks of the camshaft timing sprocket and VVT timing sprocket are in straight line on the timing chain cover surface as shown in the illustration.

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.

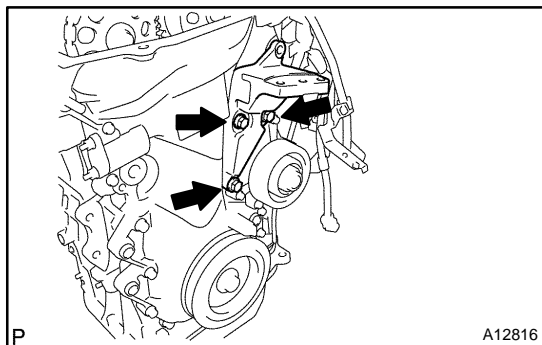
**27. REMOVE V-RIBBED BELT TENSIONER ASSY**

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

HINT:

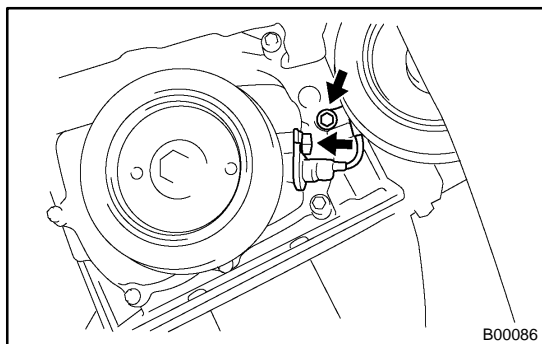
Handle a jack up and down to remove the bolt.

28. REMOVE WATER PUMP ASSY (See page 16-10)



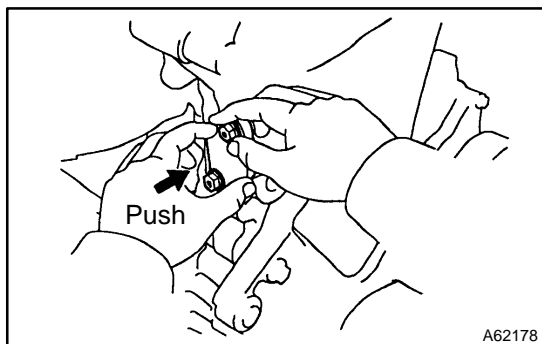
29. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

- (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.

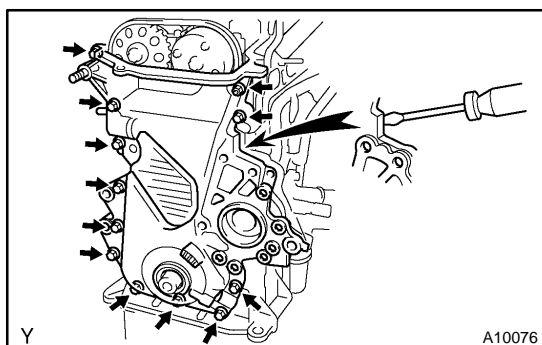


31. REMOVE CHAIN TENSIONER ASSY NO.1

- (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

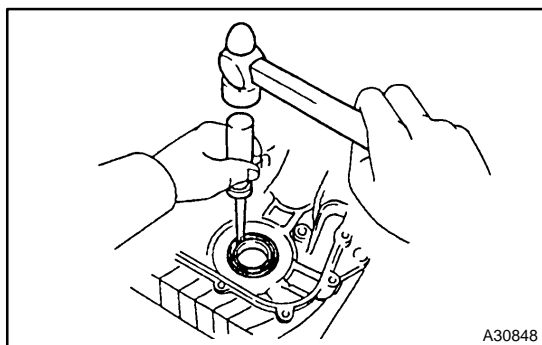
- (a) Remove the 11 bolts and nuts.
 (b) Using a torx wrench socket (E8), remove the stud bolt.
 (c) Remove the timing chain cover by prying the portions between the cylinder head and cylinder block with a screwdriver.

NOTICE:

Be careful not to 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.

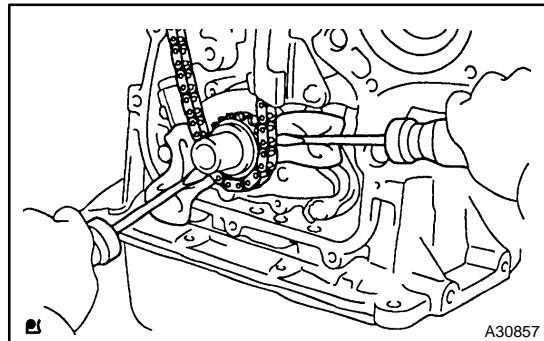


34. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1**35. REMOVE CHAIN TENSIONER SLIPPER**

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

36. REMOVE CHAIN VIBRATION DAMPER NO.1

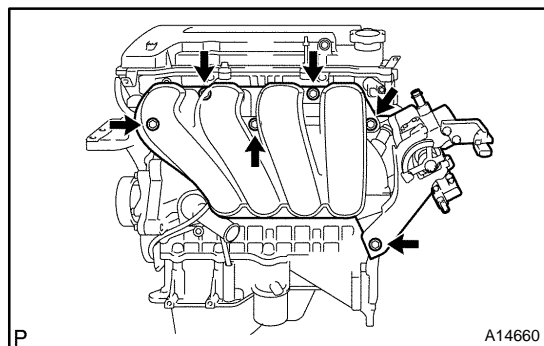
- (a) Remove the 2 bolt and chain vibration damper.

**37. REMOVE CHAIN SUB-ASSY**

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

NOTICE:

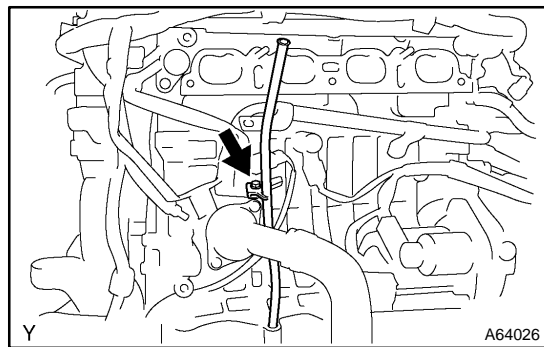
- Put shop rag to protect the engine.
- In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.

**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

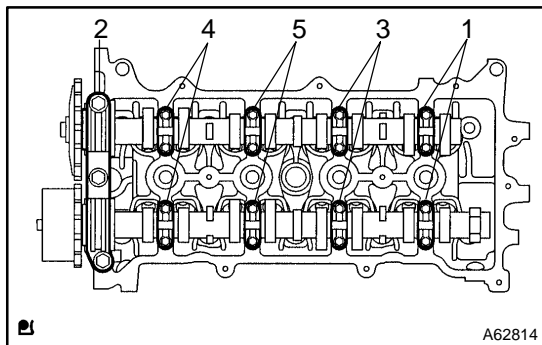
- (a) Remove the oil level gage from the oil level gage guide.

**40. REMOVE OIL LEVEL GAGE GUIDE**

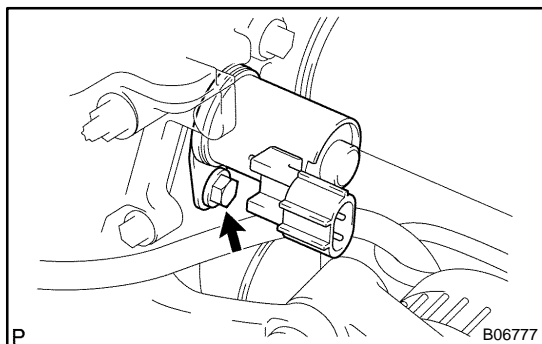
- (a) Remove the bolt and oil level gage guide.

41. SEPARATE WATER BY-PASS PIPE NO.1

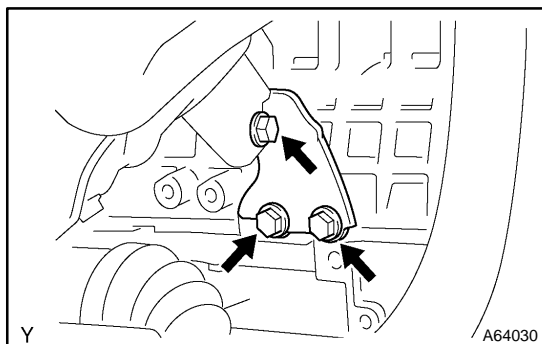
- (a) Remove the 2 bolts installing the water by-pass pipe.

**42. REMOVE CAMSHAFT**

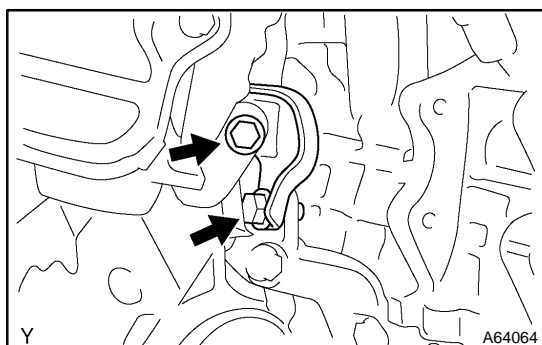
- (a) Uniformly loosen and remove the 19 bearing cap bolts, in several passes, in the sequence shown, and remove the 9 bearing caps, intake and exhaust camshafts.

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

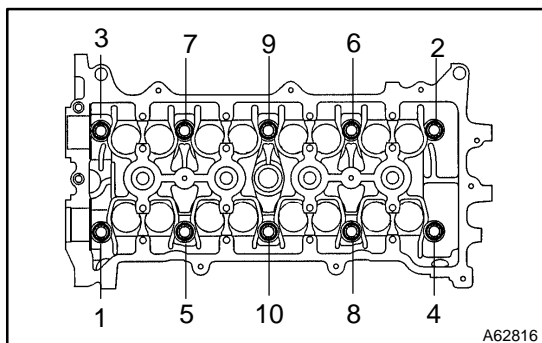
- (a) Remove the bolt and camshaft timing oil control valve.

**44. REMOVE MANIFOLD STAY**

- (a) 2WD Drive Type
(1) Remove the 3 bolts and manifold stay.

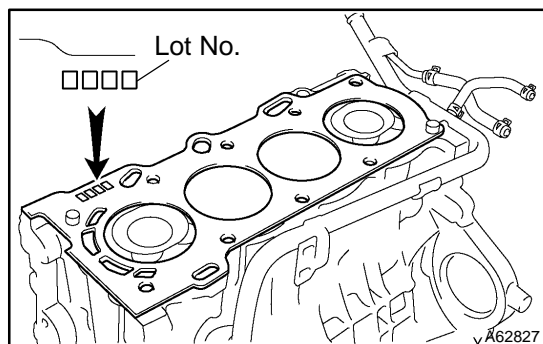


- (b) 4WD Drive Type
(1) Remove the 2 bolts and manifold stay.

**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

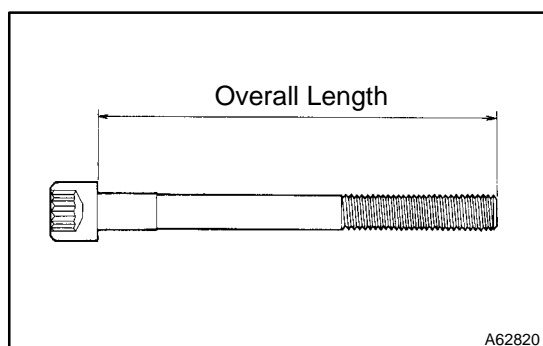


47. INSTALL CYLINDER HEAD GASKET

- (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.



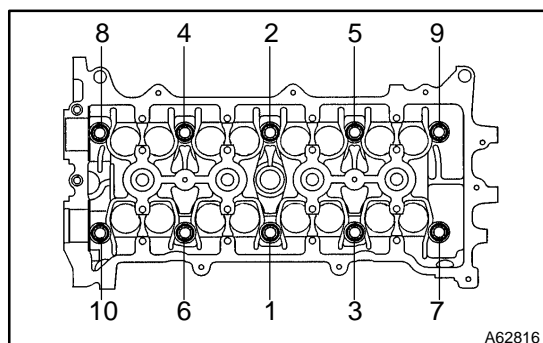
48. INSPECT CYLINDER HEAD SET BOLT

- (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.



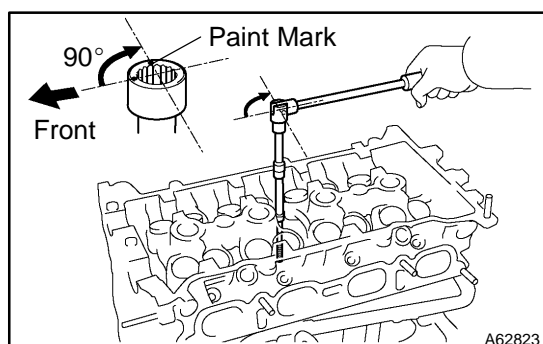
49. INSTALL CYLINDER HEAD SUB-ASSY

HINT:

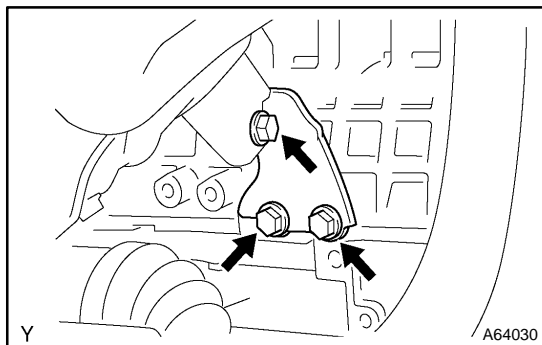
The cylinder head bolts are tightened in 2 progressive steps.

- (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.

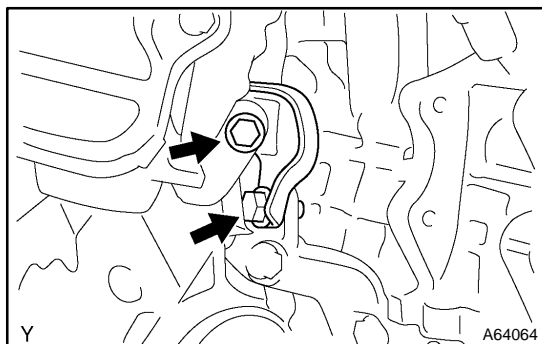
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



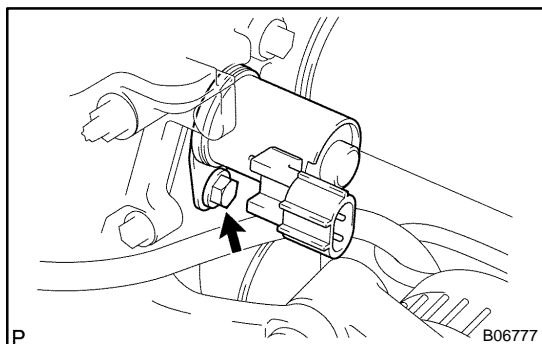
- (c) Make the front of the cylinder head bolt with paint.
- (d) Retighten the cylinder head bolts 90° in the numerical order shown.
- (e) Check that the point marked bolts are moved at 90° angle.

**50. INSTALL MANIFOLD STAY****(a) 2WD Drive Type**

(1) Install the manifold stay with 3 bolts.

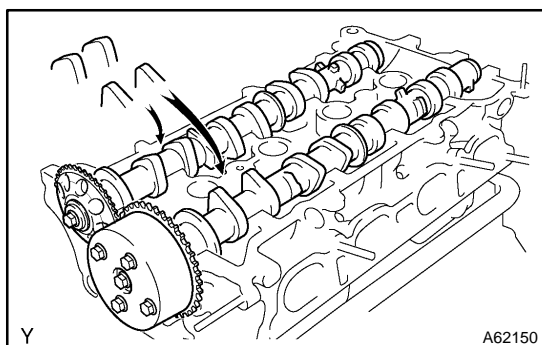
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)**(b) 4WD Drive Type**

(1) Install the manifold stay with 2 bolts.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)**51. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

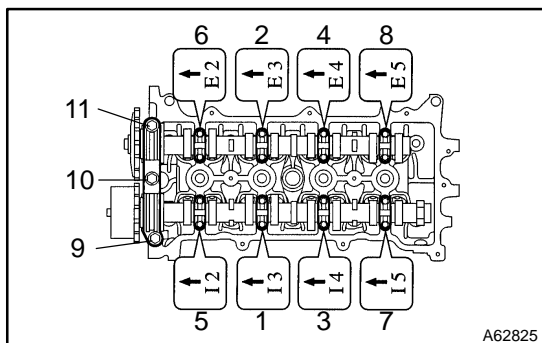
(a) Apply a light coat of engine oil on a new O-ring, and install it to the camshaft timing oil control valve.

(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.



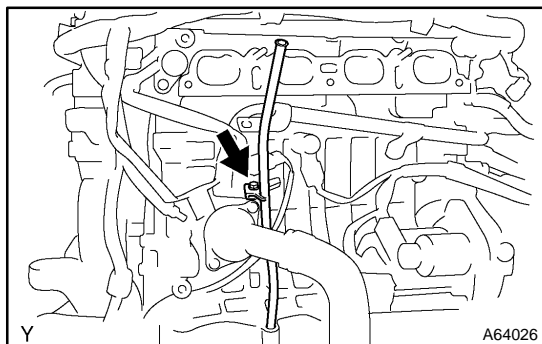
(c) Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.

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

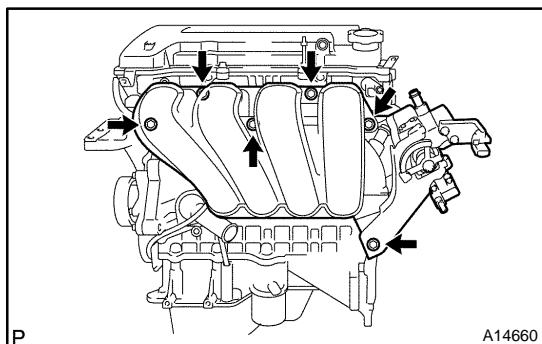
- (a) Install the water by-pass pipe with the 2 bolts.

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.

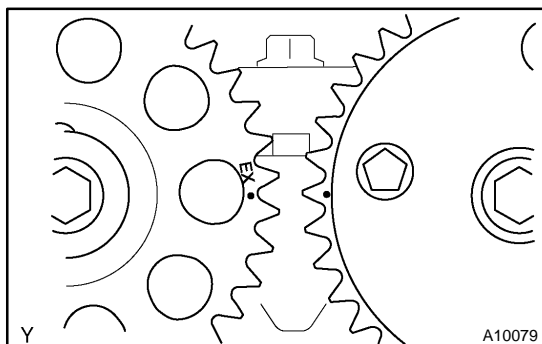
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

**55. INSTALL INTAKE MANIFOLD**

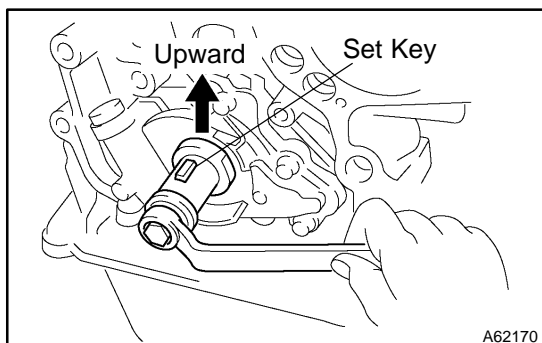
- (a) Install a new gasket to the intake manifold.
(b) Install the intake manifold and throttle body assembly with the 2 brackets, 4 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

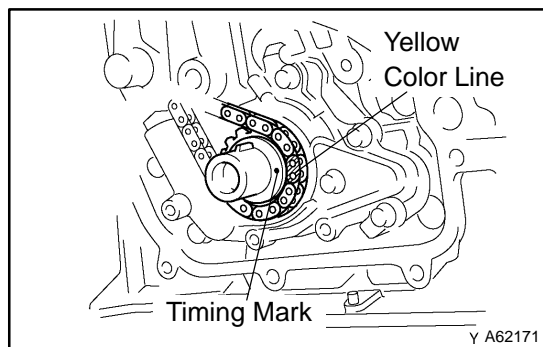
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

- (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.

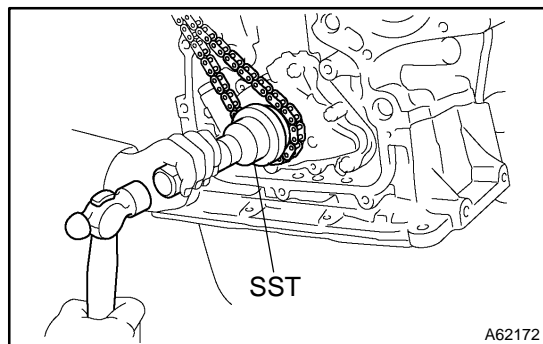




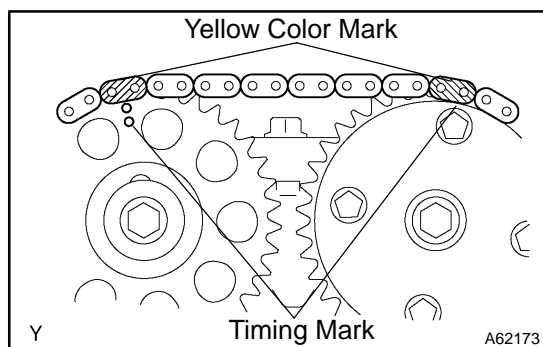
- (b) Install the timing chain on the crankshaft timing sprocket with the yellow color link aligned with the timing mark on the crankshaft timing sprocket.

HINT:

Three yellow color links are on the chain.



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



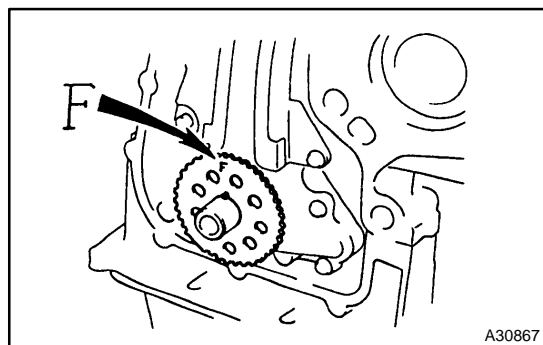
- (d) Install the timing chain on the camshaft timing sprockets with the yellow color links aligned with the timing marks on the camshaft timing sprockets.

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)

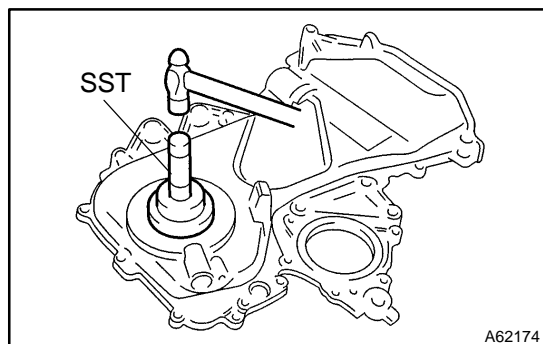
58. INSTALL CHAIN TENSIONER SLIPPER

- (a) Install the chain tensioner slipper with the bolt.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



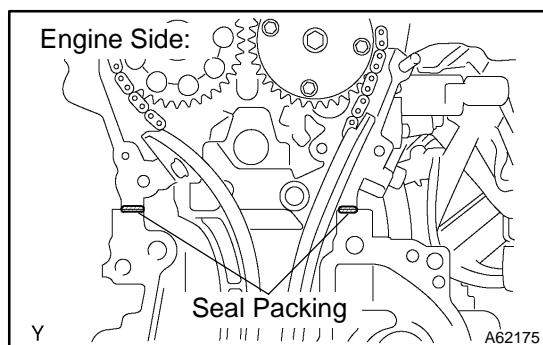
59. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

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

**60. INSTALL TIMING GEAR COVER OIL SEAL**

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

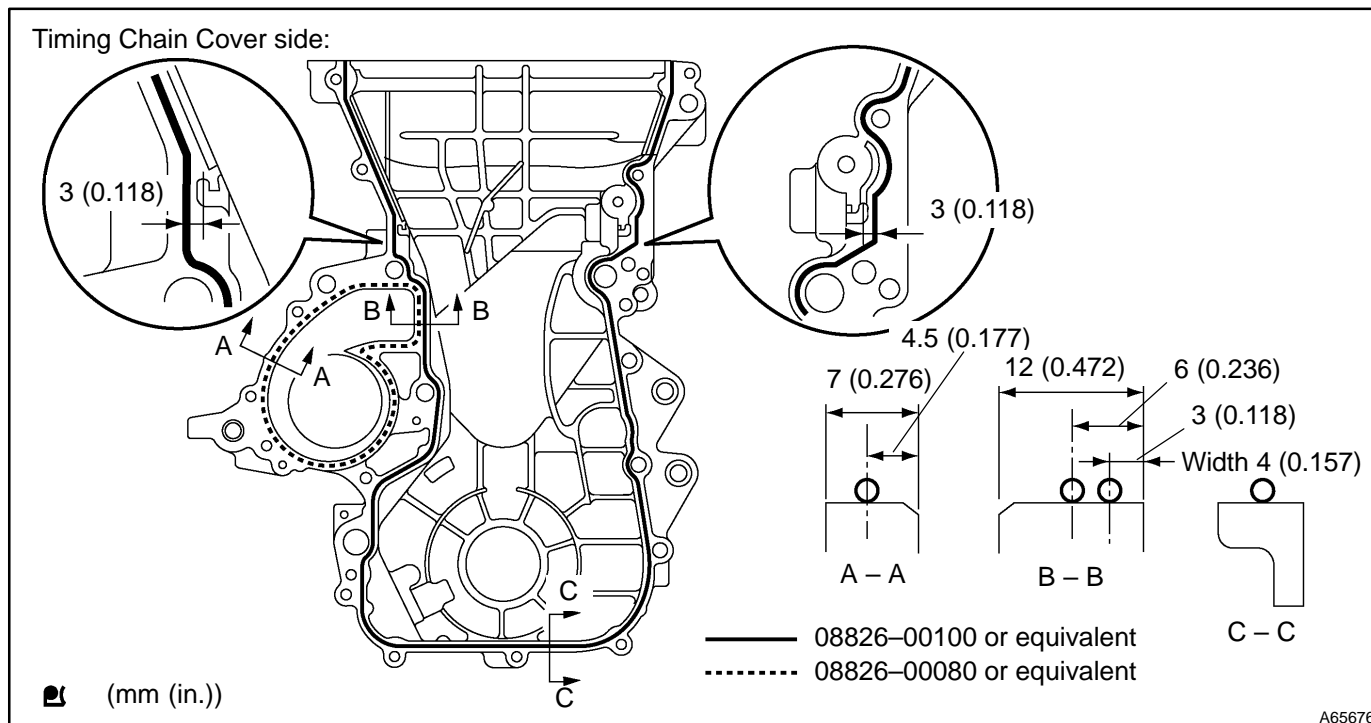
SST 09223-22010

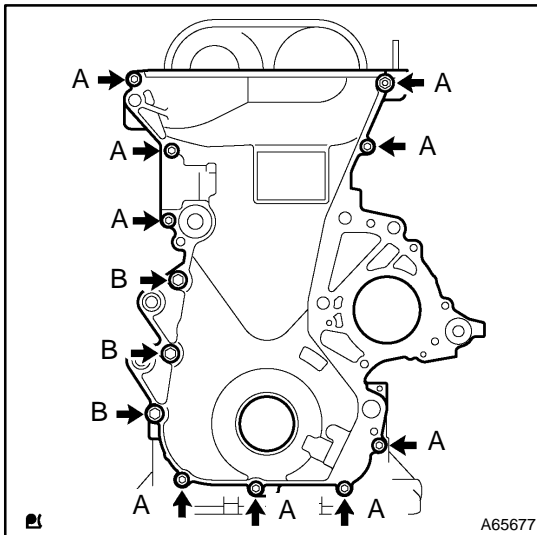
NOTICE:**Keep the lip off foreign materials.****61. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY**

- Remove any old packing material from the contact surface.
- 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.

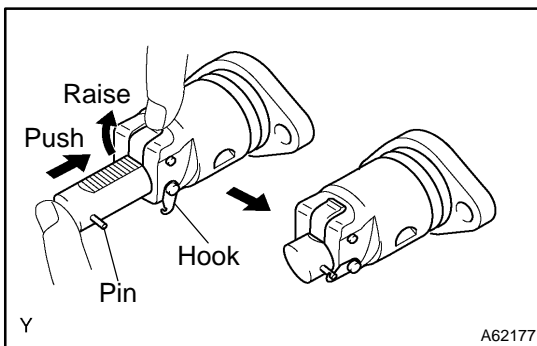
Seal packing:**Water pump part part No. 08826-00100 or equivalent****Other part part No. 08826-00080 or equivalent.****NOTICE:**

- 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.



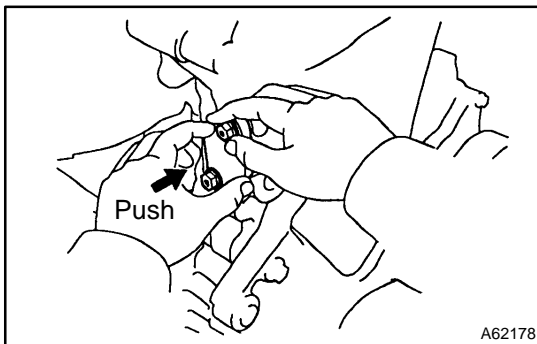


- (c) Install the timing chain cover with the 11 bolts and nut.
Torque:
A 13 N·m (133 kgf·cm, 10 ft·lbf)
B 19 N·m (194 kgf·cm, 14 ft·lbf)
- (d) Using a torx wrench socket (E8), install the stud bolt.
Torque: 9.5 N·m (97 kgf·cm, 84 in·lbf)



62. INSTALL CHAIN TENSIONER ASSY NO.1

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

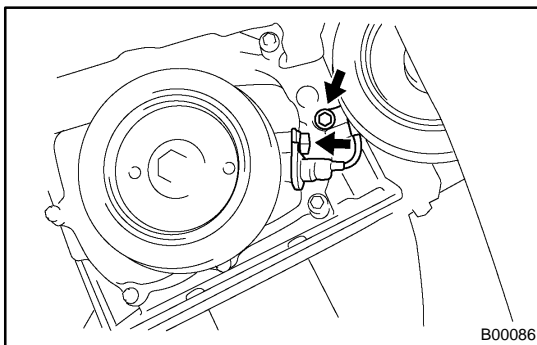


- (b) Apply engine oil to the chain tensioner and install it with 2 nuts.

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

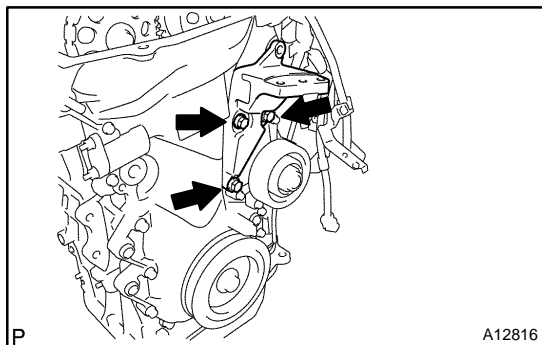
NOTICE:

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)

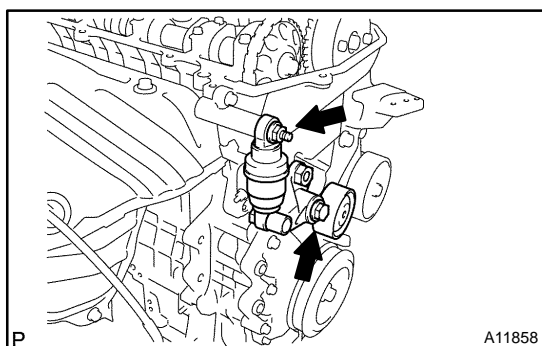


64. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

- (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 16-7)



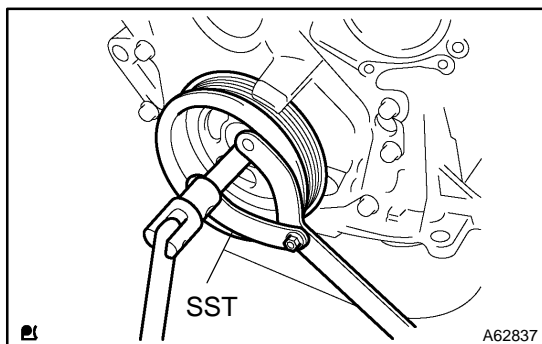
66. INSTALL V-RIBBED BELT TENSIONER ASSY

- (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)



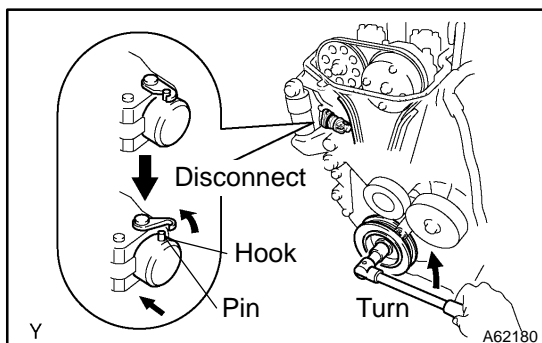
67. INSTALL CRANKSHAFT PULLEY

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

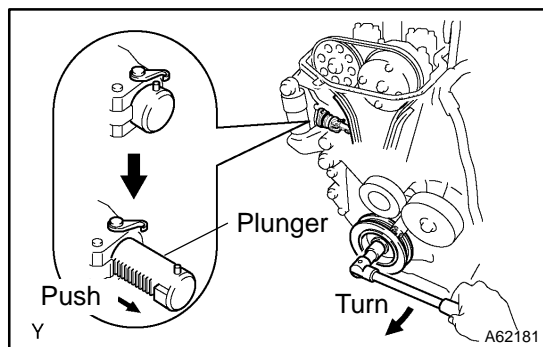
- (b) Using SST, install the crankshaft pulley bolt.

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

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



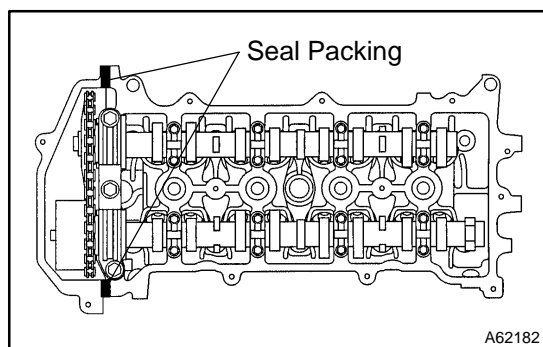
- (c) Turn the crankshaft counterclockwise, and disconnect the plunger knock pin from the hook.



- (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**

- Remove any old packing (FIPG) material.
- Apply seal packing to 2 locations as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

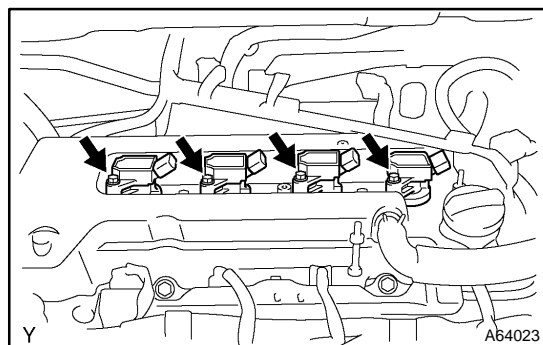
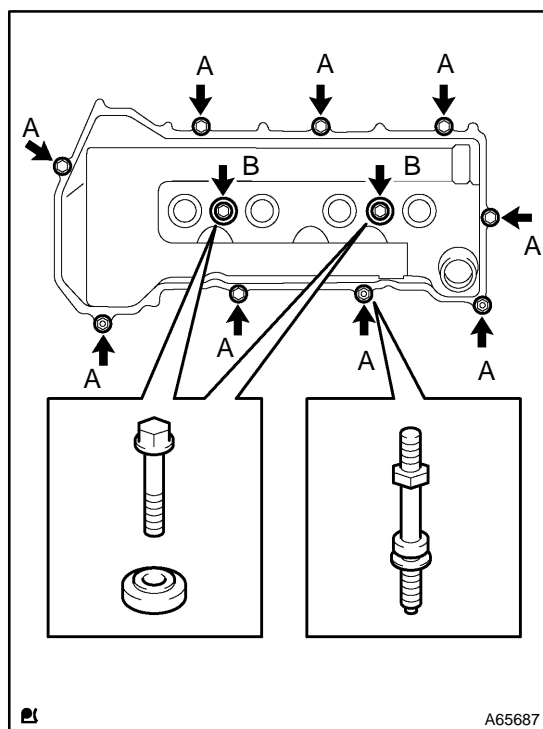
NOTICE:

- 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.

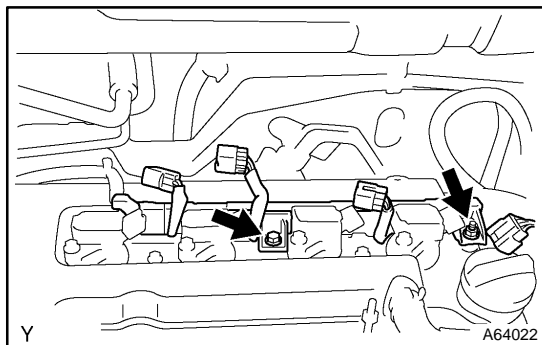
Torque:

A 11 N·m (112 kgf·cm, 8 ft·lbf)

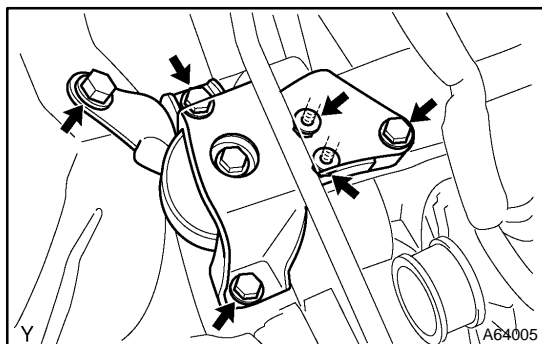
B 9.0 N·m (92 kgf·cm, 80 in·lbf)

**69. INSTALL IGNITION COIL ASSY**

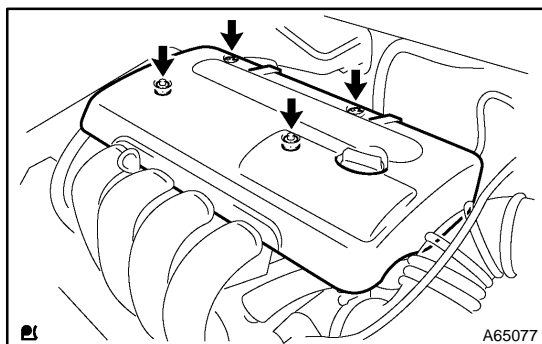
- Install the 4 ignition coils with the 4 bolts.
- Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**

**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 15-4)**73. INSTALL VANE PUMP ASSY (See page 51-8)****74. INSTALL GENERATOR ASSY (See page 19-15)****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 16-6)**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 16-6)**82. CHECK ENGINE OIL LEAK**