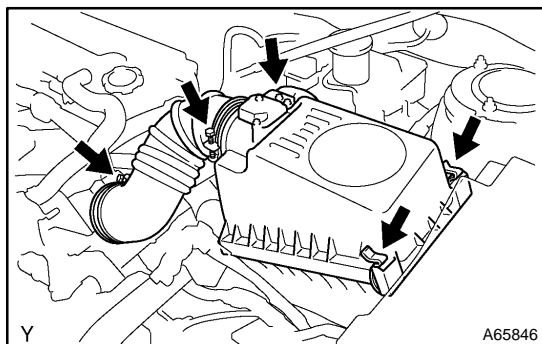


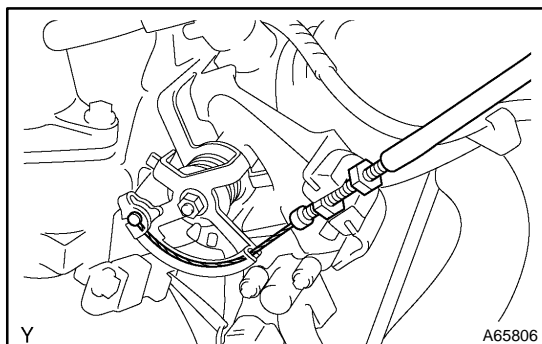
## REPLACEMENT

1. **WORK FOR PREVENTING GASOLINE FROM SPILLING OUT (See page 11-1)**
2. **REMOVE FRONT WHEEL RH**
3. **REMOVE ENGINE UNDER COVER RH**
4. **DRAIN COOLANT(See page 16-6)**
5. **REMOVE CYLINDER HEAD COVER NO.2**
  - (a) Remove the 3 bolts, the nut and the cylinder head cover No. 2.

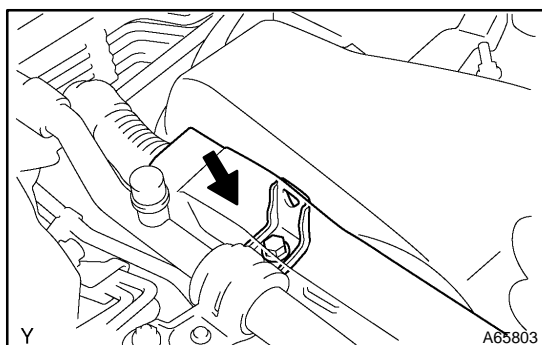


### 6. REMOVE AIR CLEANER ASSEMBLY WITH HOSE

- (a) Disconnect the MAF meter connector.
- (b) Place match marks on the vacuum hoses.
- (c) Disconnect the 5 vacuum hoses from the air cleaner cap.
- (d) Disconnect the 2 clamps, and disconnect the air cleaner cap from the air cleaner case.
- (e) Loosen the hose clamp bolt, and disconnect the air cleaner hose from the throttle body.
- (f) Remove the air cleaner assembly with hose.

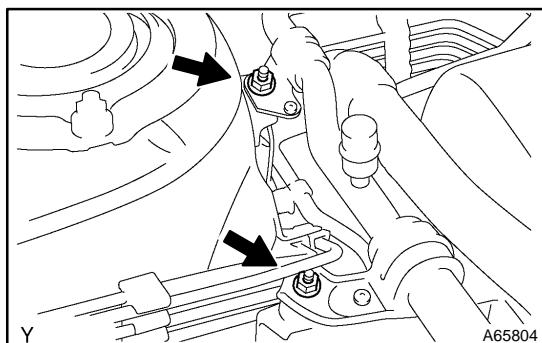


### 7. DISCONNECT ACCELERATOR CONTROL CABLE ASSY



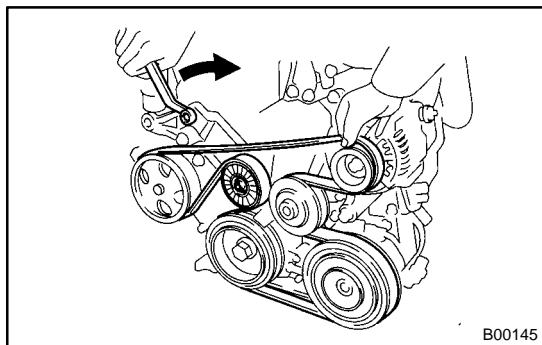
### 8. REMOVE WIRE HARNESS CLAMP

- (a) Disconnect engine wire harness.
- (b) Remove the bolt and wiring harness clamp bracket.



### 9. DISCONNECT SUCTION HOSE SUB-ASSY

- (a) Remove the 2 nuts installing the suction hose sub-assy.
- (b) Disconnect the suction hose sub-assy.

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

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

**11. REMOVE EFI FUEL PIPE CLAMP (See page 11-1)****12. DISCONNECT FUEL TUBE SUB-ASSY (See page 11-1)****13. SEPARATE RADIATOR HOSE INLET**

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

**14. DISCONNECT HEATER INLET WATER HOSE**

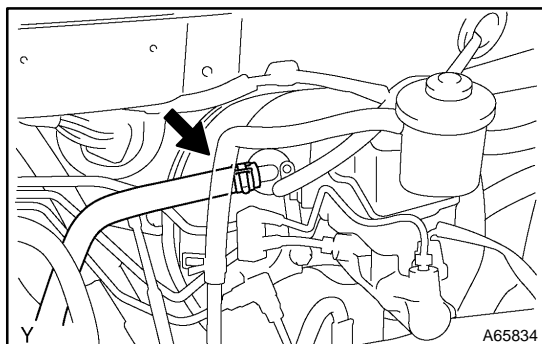
- (a) Disconnect the heater inlet water hose from the air conditioner tube.

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

- (a) Disconnect the water by-pass hose No. 2 from the throttle body.

**16. DISCONNECT WATER BY-PASS HOSE NO.3**

- (a) Disconnect the water by-pass hose No. 3 from the throttle body.

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

- (a) Disconnect the union to check valve hose from the brake booster.

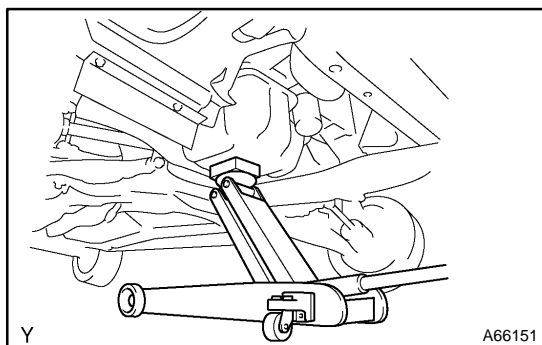
**18. REMOVE GENERATOR BRACKET NO.1 (See page 19-15)****19. REMOVE GENERATOR ASSY (See page 19-15)****20. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONER) (See page 55-34)**

HINT:

Hung up the hoses instead of detaching.

**21. DISCONNECT EXHAUST PIPE ASSY FRONT**

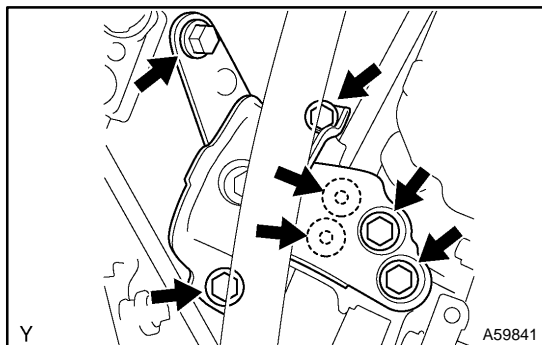
- (a) Remove the 2 bolts and 2 nuts compression springs installing the front side of exhaust pipe.  
(b) Remove the gasket.

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

- (a) Set the jack to the engine.

HINT:

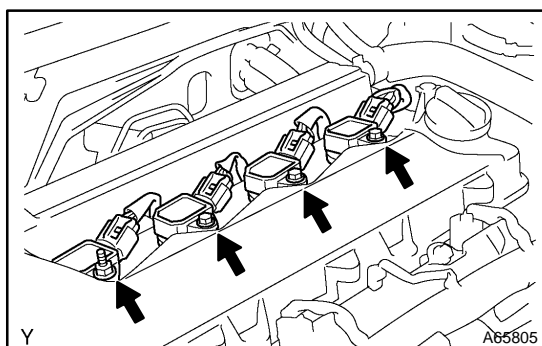
Place a wooden block between the jack and engine.



- (b) Remove the 5 bolts, 2 nuts and engine mounting insulator sub-assy RH.

### 23. DISCONNECT ENGINE WIRE

- (a) Disconnect the ignition coil connectors, oil control valve connector and crankshaft position sensor connector.
- (b) Remove the bolt and nut for the earth and put the engine wiring side.



### 24. INSTALL IGNITION COIL ASSY

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

### 25. DISCONNECT VENTILATION HOSE

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

### 26. DISCONNECT VENTILATION HOSE NO.2

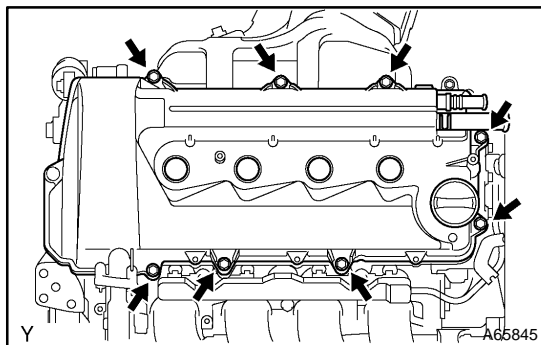
- (a) Disconnect the ventilation hose from the cylinder head cover.

### 27. REMOVE CYLINDER HEAD COVER SUB-ASSY

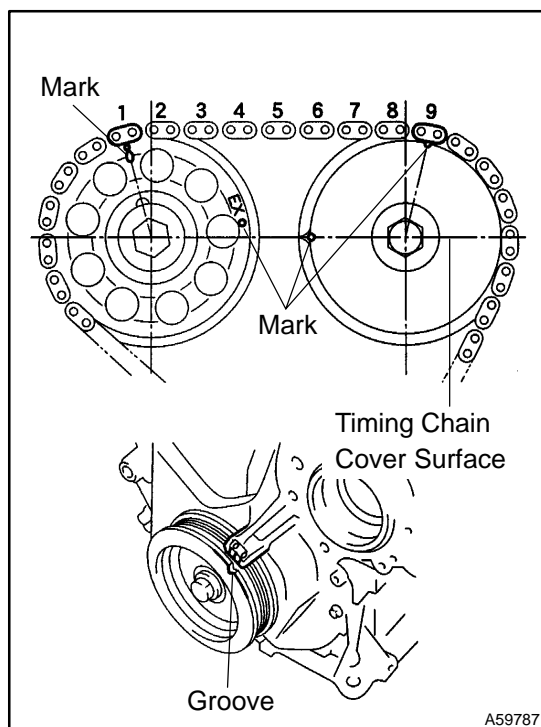
- (a) Disconnect the fuel hose clamp and 2 PCV hoses from the cylinder head cover.



- (b) Remove the 2 nuts, bolt and disconnect the No. 3 ventilation hose from the No. 1 ventilation pipe.
- (c) Disconnect the ventilation No. 1 tube and gasket.



- (d) Remove the 8 bolts, wire harness protector, cylinder head cover and gasket.
- (e) Remove the O-ring from the cylinder head cover.

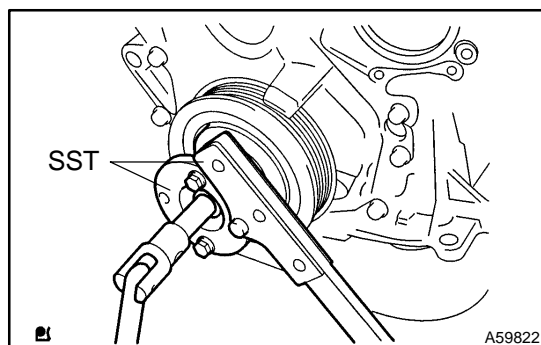


## 28. SET NO.1 CYLINDER TO TDC/COMPRESSION

- (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.

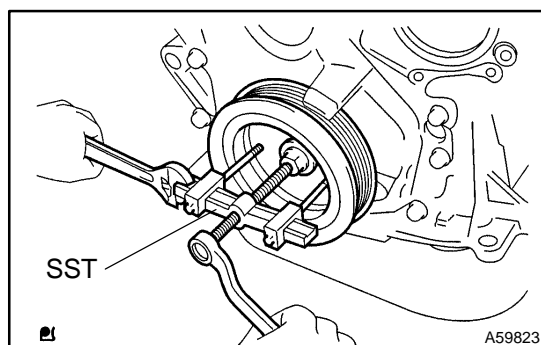
### HINT:

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



## 29. REMOVE CRANKSHAFT PULLEY

- (a) Using SST, remove the pulley bolt.  
SST 09213-70011 (09213-70020), 09330-00021

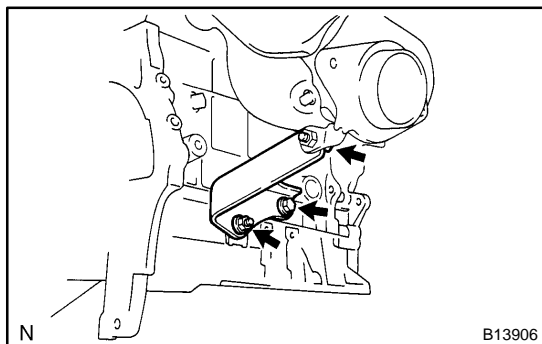


- (b) Using SST, remove the crankshaft pulley.  
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021, 09957-04010)

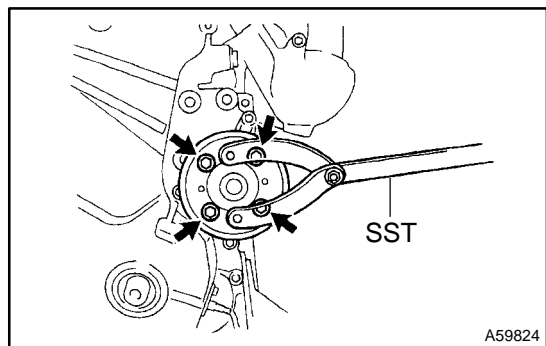
**30. REMOVE V-RIBBED BELT TENSIONER ASSY**

HINT:

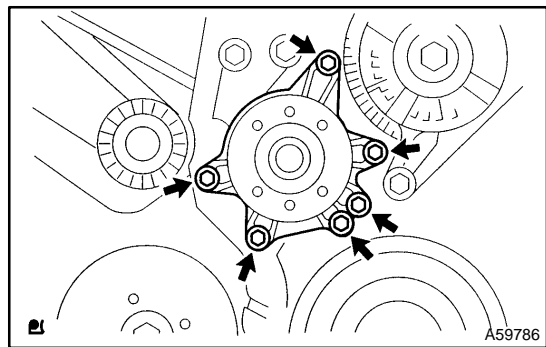
Handle a jack up and down to remove the bolt.

**31. REMOVE MANIFOLD STAY**

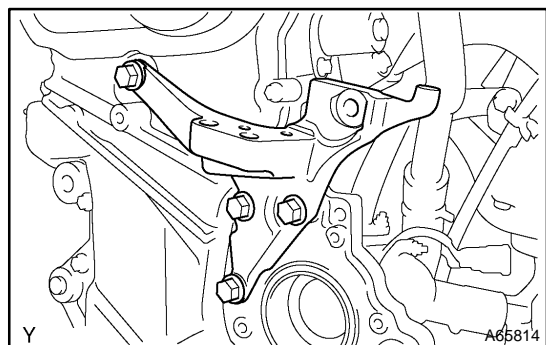
- (a) Remove the 2 bolts, nut and exhaust manifold stay.

**32. REMOVE EXHAUST MANIFOLD HEAT INSULATOR NO.1****33. REMOVE WATER PUMP PULLEY**

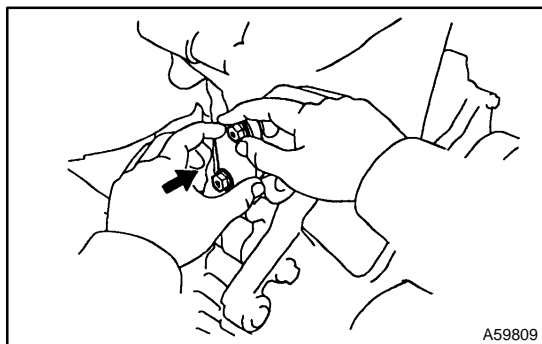
- (a) Using SST, remove the water pump pulley.  
SST 09960-10010

**34. REMOVE WATER PUMP ASSY**

- (a) Remove the 6 bolts and water pump.

**35. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET**

- (a) Remove the 4 bolts and the engine mounting bracket.

**36. REMOVE CRANK POSITION SENSOR**

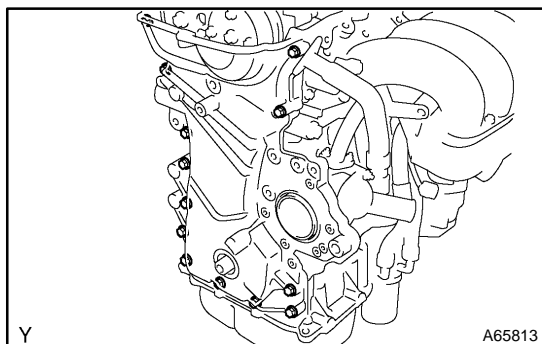
A59809

**37. REMOVE CHAIN TENSIONER ASSY NO.1**

- (a) Remove the 2 nuts and the chain tensioner assy No. 1.

**NOTICE:**

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



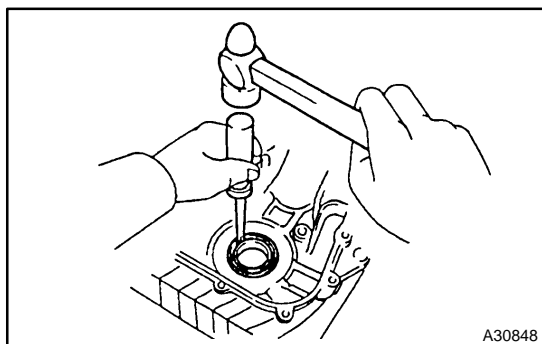
A65813

**38. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY**

- (a) Remove the 12 bolts.  
 (b) Using a torx wrench socket (E8), remove the stud bolt.  
 (c) Remove the timing chain cover and 2 gaskets.

**NOTICE:**

Be careful not to damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.



A30848

**39. REMOVE TIMING GEAR COVER OIL SEAL**

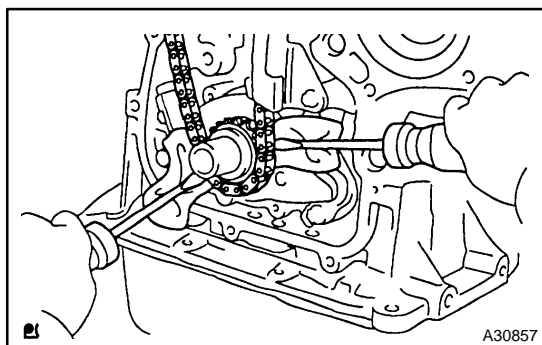
- (a) Using a screwdriver, remove the oil seal.

**40. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1****41. REMOVE CHAIN TENSIONER SLIPPER**

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

**42. REMOVE CHAIN VIBRATION DAMPER NO.1**

- (a) Remove the 2 bolts and chain vibration damper No. 1.



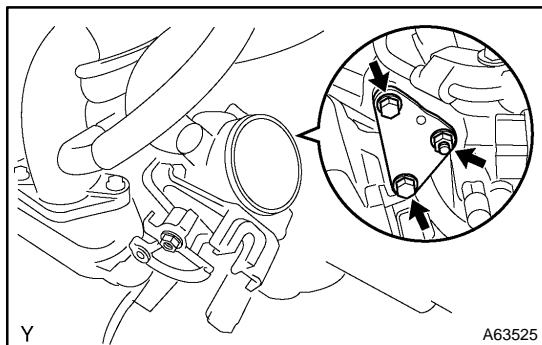
A30857

**43. REMOVE CHAIN SUB-ASSY**

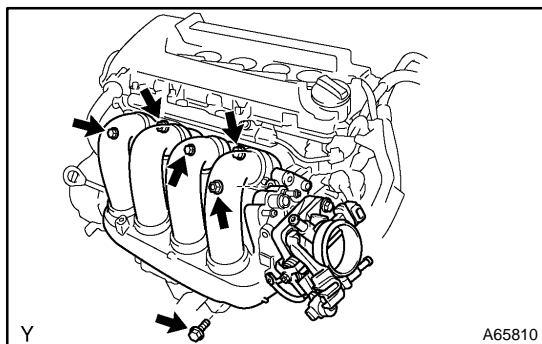
- (a) Remove the timing chain with the crankshaft timing gear using screwdrivers as shown in the illustration.

**NOTICE:**

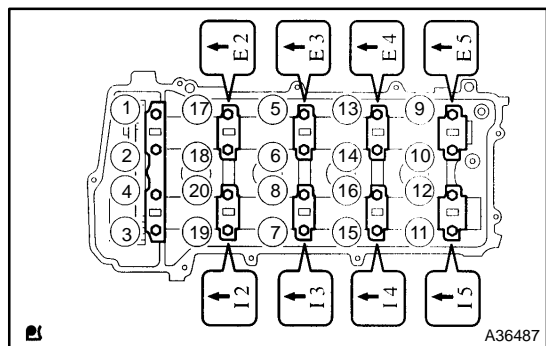
- Put shop rag to protect the engine.
- In case of revolving the camshafts with the chain off the sprockets, turn the crankshaft 1/4 revolution for valves not to touch the pistons.

**44. REMOVE SURGE TANK STAY NO.1**

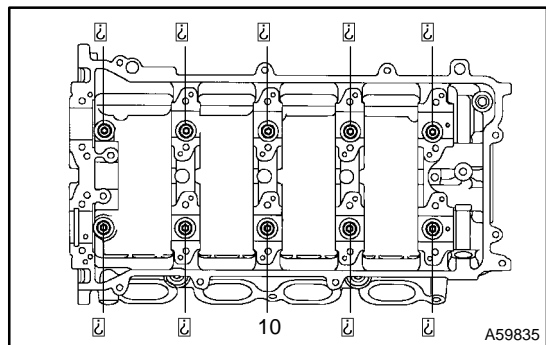
- (a) Remove the 2 bolts, nut and surge tank stay No. 1.

**45. REMOVE INTAKE MANIFOLD**

- (a) Remove the 4 bolts, the 2 nuts, the intake manifold and the gasket.

**46. REMOVE OIL LEVEL GAGE GUIDE****47. REMOVE OIL LEVEL GAGE SUB-ASSY****48. REMOVE CAMSHAFT**

- (a) Uniformly loosen and remove the 20 bearing cap bolts, in several passes, in the sequence shown, and remove the 9 bearing caps, of the intake and exhaust camshafts.

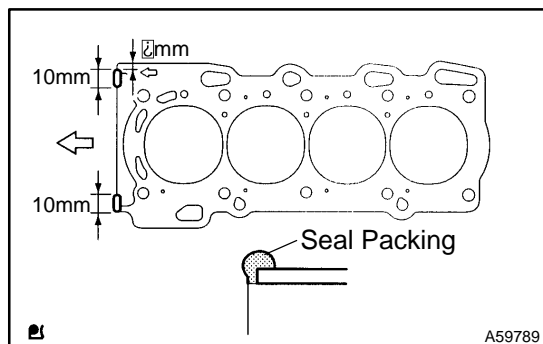
**49. REMOVE CYLINDER HEAD SUB-ASSY**

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

**NOTICE:**

- Be careful not to drop washers into the cylinder head.
- Head warpage or cracking could result from removing bolts in and incorrect order.

**50. REMOVE CYLINDER HEAD GASKET**

**51. INSTALL CYLINDER HEAD GASKET**

- (a) Place a new cylinder head gasket on the cylinder block.

**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.
- (b) Apply seal packing to the cylinder head gasket as shown in the illustration.

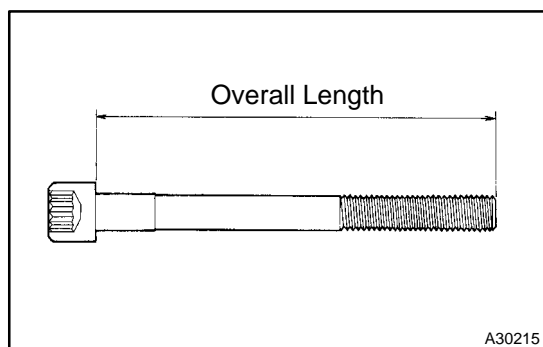
**Seal packing:**

**Part No. 08826-00080 or equivalent**

**HINT:**

avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

**52. INSPECT CYLINDER HEAD SET BOLT**

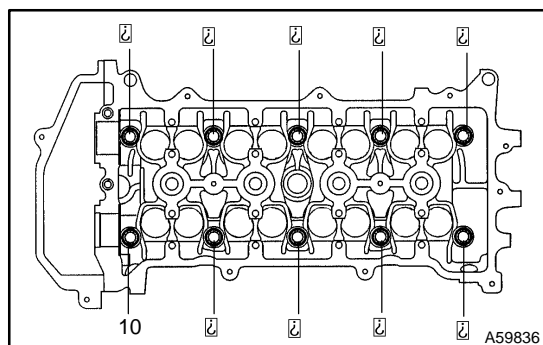
- (a) Using vernier calipers, measure the length of head bolts from the seat to the end.

**Standard bolt length:**

**146.0 – 148.2 mm (5.780–5.835 in.)**

**Maximum bolt length: 148.5 mm (5.846 in.)**

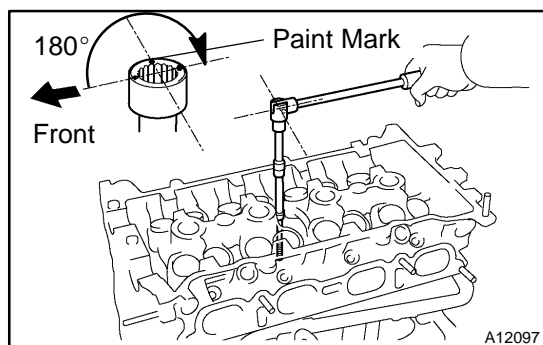
- (b) If the length surpasses the maximum, replace the bolt.

**53. 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.

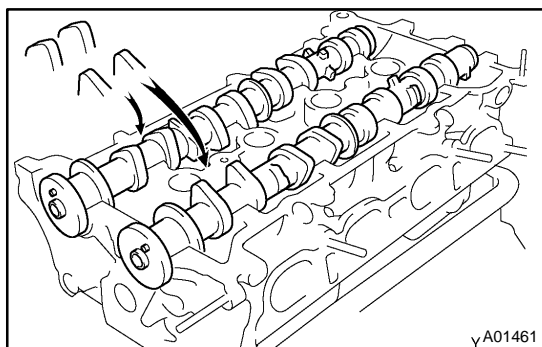
**Torque: 35 N·m (357 kgf·cm, 26 ft·lbf)**



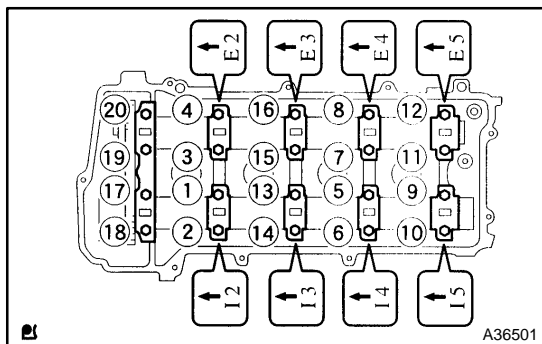
- (c) Make the front of the cylinder head bolt with paint.
- (d) Retighten the cylinder head bolts 180° in the numerical order shown.
- (e) Check that the point marked bolts are moved at 90° angle.
- (f) Install the water by-pass pipe.

**Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)**



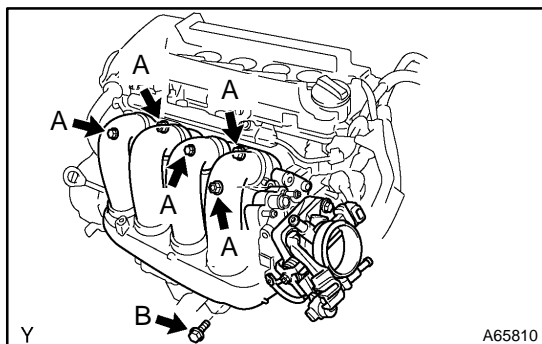
**54. INSTALL CAMSHAFT**

- (a) Apply 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: 19 N·m (194 kgf·cm, 14 ft·lbf)**

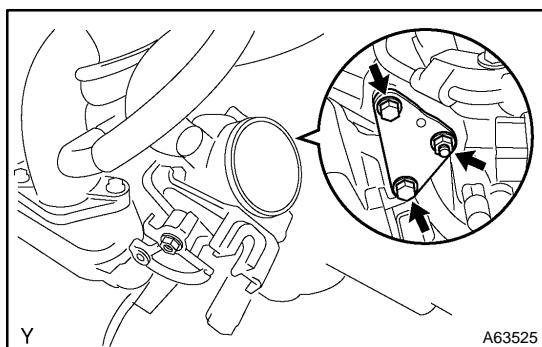
**55. INSTALL INTAKE MANIFOLD**

- (a) Install a new gasket, the intake manifold with the 4 bolts and 2 nuts.

**Torque:**

**A: 34 N·m (347 kgf·cm, 25 ft·lbf)**

**B: 46 N·m (469 kgf·cm, 34 ft·lbf)**

**56. INSTALL SURGE TANK STAY NO.1**

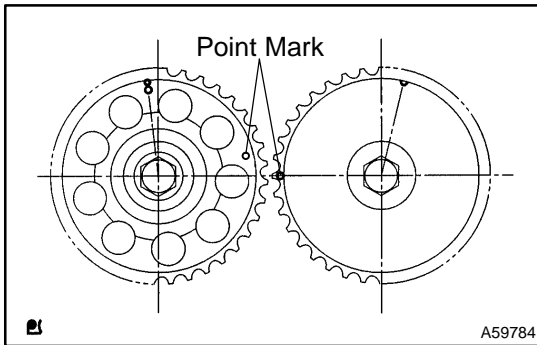
- (a) Install the surge tank stay with the 2 bolts and nut.

**Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)**

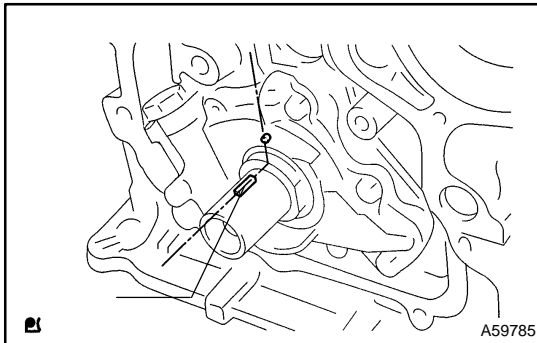
**57. INSTALL OIL LEVEL GAGE GUIDE**

- (a) Apply a light coat of engine oil to the new O-ring, install it to the oil level gage guide.
- (b) Install the oil level gage and guide with the bolt.

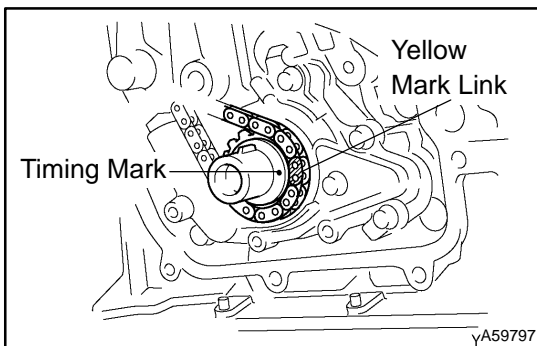
**Torque: 24 N·m (245 kgf·cm, 18 ft·lbf)**

**58. 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.



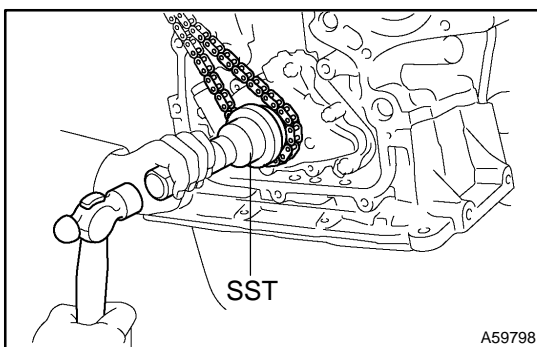
- (2) Turn the crankshaft and set the set key on the crankshaft upward.



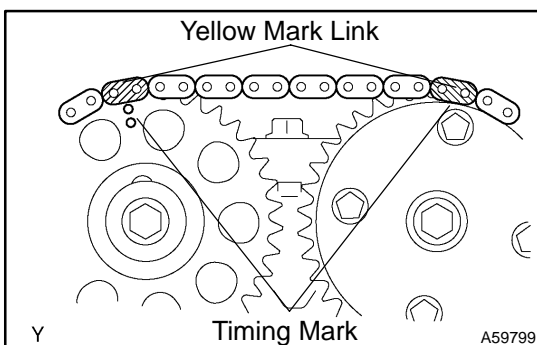
- (b) Install the timing chain on the crankshaft timing sprocket with the yellow mark link aligned with the timing mark on the crankshaft timing sprocket.

**HINT:**

Three yellow color links are on the chain.



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

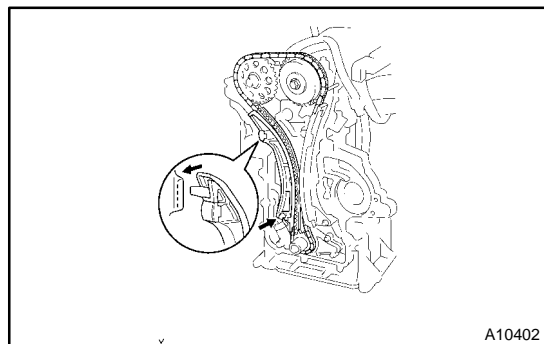


- (d) Install the timing chain on the camshaft timing sprockets with the yellow mark links aligned with the timing marks on the camshaft timing sprockets.

**59. INSTALL CHAIN VIBRATION DAMPER NO.1**

- (a) Install the chain vibration damper No. 1 with the 2 bolts.

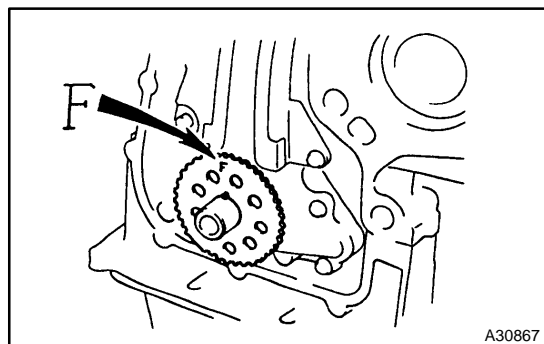
**Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)**

**60. INSTALL CHAIN TENSIONER SLIPPER**

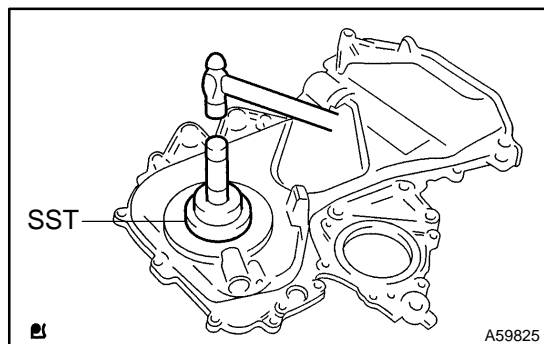
- (a) Install the chain tensioner slipper with the bolt.  
**Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)**  
 (b) Check that the chain tensioner slipper moves is caught on the cylinder head stopper.

**NOTICE:**

**Do not turn the crankshaft.**

**61. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1**

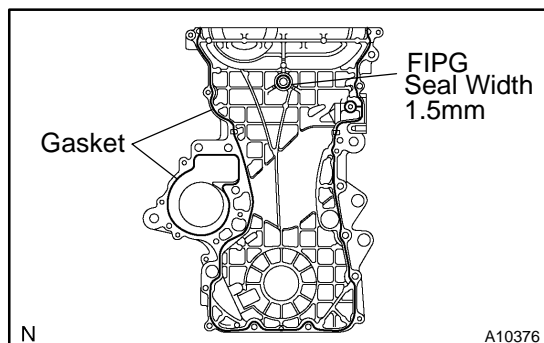
- (a) Install the plate with the "F" mark facing forward.

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

- (a) Apply MP grease to the oil seal lip.  
 (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.  
 SST 09223-22010

**NOTICE:**

**Keep the lip off foreign materials.**

**63. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY**

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the timing chain cover, cylinder head and cylinder block.
- Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
  - Thoroughly clean all components to remove all the loose material.
  - Using a non-residue solvent, clean both sealing surfaces.

- (b) Apply seal packing to the timing chain cover as shown in the illustration.

**Seal packing:**

**Part No. 08826-00100 or equivalent**

- Install a nozzle that has been cut to a 1.5 mm opening.

**HINT:**

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

- (c) Install the 2 gaskets to the timing chain cover as shown in the illustration.

- (d) Apply seal packing to 4 locations as shown in the illustration.

**Seal packing:**

**Part No. 08826-00080 or equivalent**

- Install a nozzle that has been cut to a 4 – 5 mm (0.16 – 0.20 in.) opening.

**HINT:**

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

**NOTICE:**

**Do not put into engine oil within 2 hours after installing.**

- (e) Install the timing chain cover, with the 12 bolts and nut.

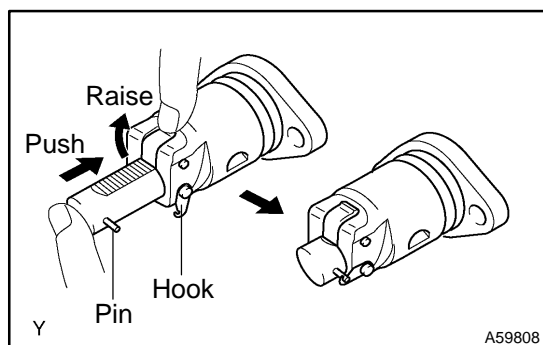
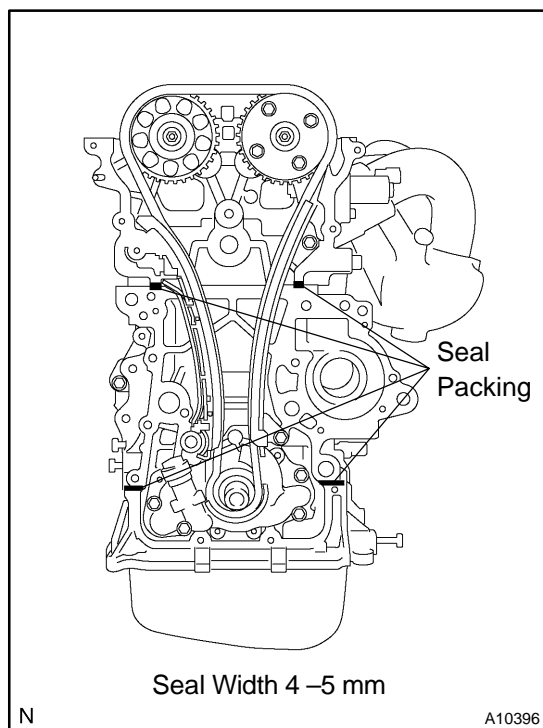
**Torque:**

**21 N·m (214 kgf·cm, 15 ft·lbf) (M8)**

**11 N·m (112 kgf·cm, 8 ft·lbf) (M6)**

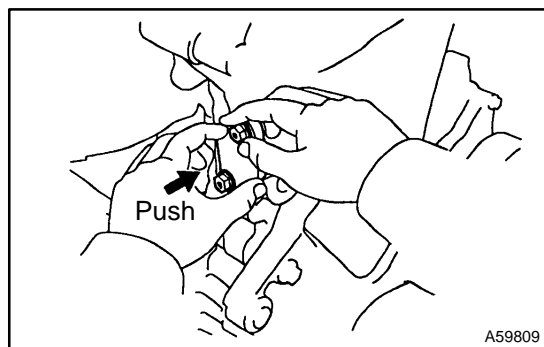
- (f) Install the stud bolt.

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



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

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



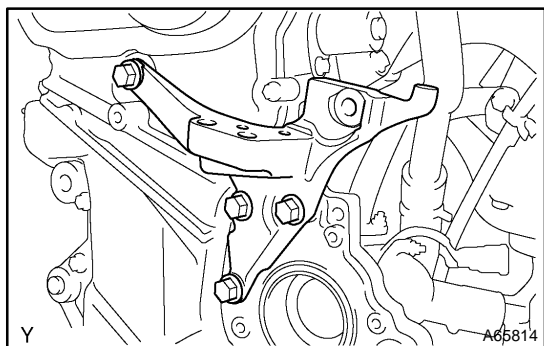
- (b) Apply engine oil to the chain tensioner and install it.  
Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)

**NOTICE:**

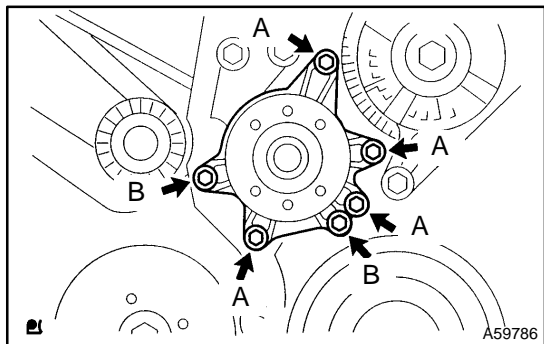
When installing the tensioner, set the hook again if the hook release the plunger.

**65. INSTALL CRANK POSITION SENSOR**

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

**66. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET**

- (a) Install the engine mounting bracket with the 4 bolts.  
Torque: 49 N·m (500 kgf·cm, 36 ft.-lbf)

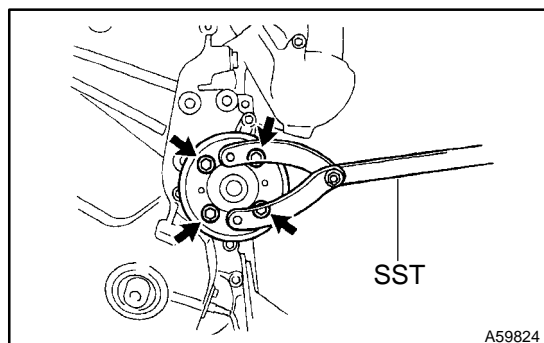
**67. INSTALL WATER PUMP ASSY**

- (a) Place a new O-ring on the timing chain cover.  
(b) Install the water pump with the 6 bolts.  
Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)

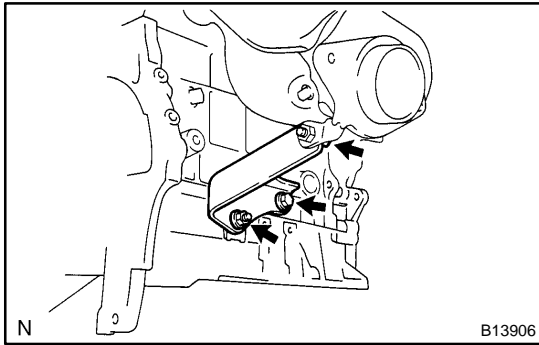
**HINT:**

Each bolt length is indicated in the illustration.

Bolt A	35 mm (1.38 in.)
Bolt B	28 mm (1.10 in.)

**68. INSTALL WATER PUMP PULLEY**

- (a) Using SST, install the water pump pulley.  
Torque: 15 N·m (153 kgf·cm, 11 ft.-lbf)  
SST 09960-10010

**69. INSTALL MANIFOLD STAY**

- (a) Install the exhaust manifold stay with the 2 bolts and nut  
**Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)**

**70. INSTALL EXHAUST MANIFOLD HEAT INSULATOR NO.1**

**Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)**

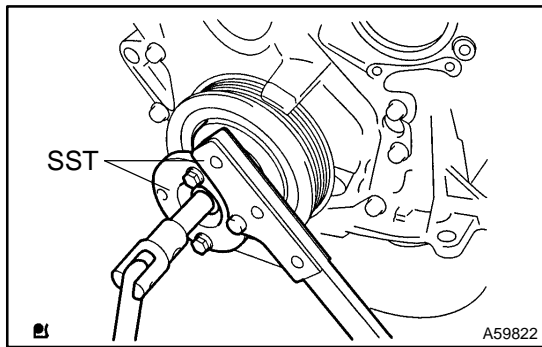
**71. INSTALL V-RIBBED BELT TENSIONER ASSY**

- (a) Install the bolt, the nut and v-ribbed belt tensioner assy.

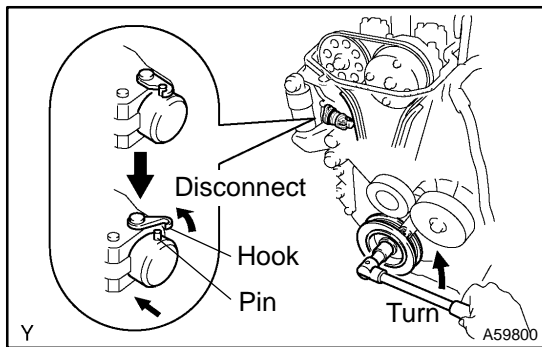
**Torque:**

**Nut 29 N·m (296 kgf·cm, 21 ft·lbf)**

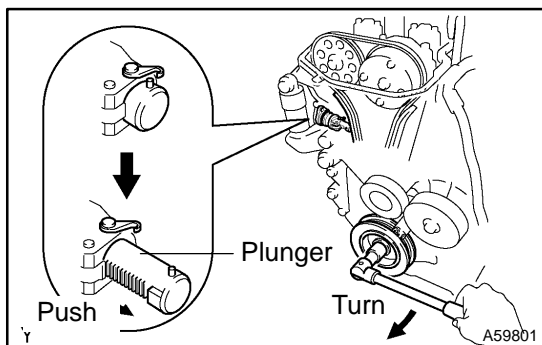
**Bolt 100 N·m (1,020 kgf·cm, 74 ft·lbf)**

**72. 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 pulley bolt.  
 SST 09213-70011 (09213-70020), 09330-00021  
**Torque: 118 N·m (1,203 kgf·cm, 87 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.

**73. INSTALL CYLINDER HEAD COVER SUB-ASSY**

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

HINT:

When FIPG on the head cover gasket side cannot be eliminated completely, replace the gasket.

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

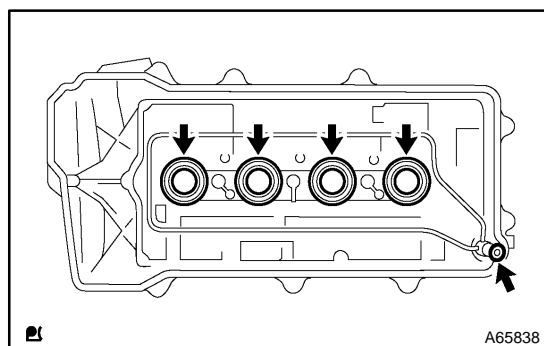
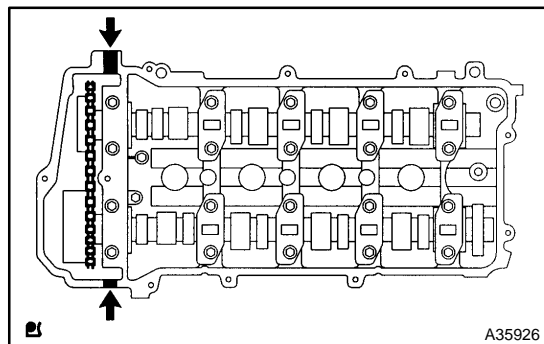
**Seal packing:**

**Part No. 08826-00080 or equivalent**

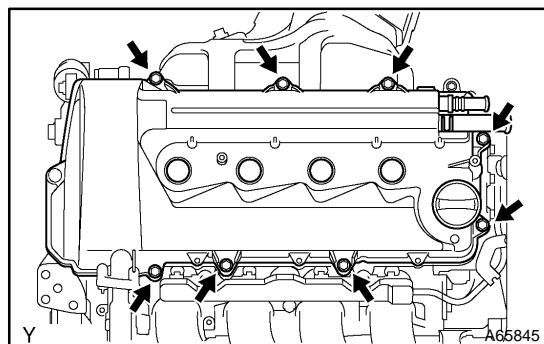
- (c) Install the cylinder head cover gasket to the cylinder head cover.

HINT:

Part must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.



- (d) Install the spark plug tube gasket and a new O-ring to the cylinder head cover.



- (e) Install the cylinder head cover and wire harness protector with the 8 bolts. Uniformly tighten the bolts, in the several passes, in the sequence shown.

**Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)**

- (f) Connect the 2 PCV hoses to the cylinder head cover.



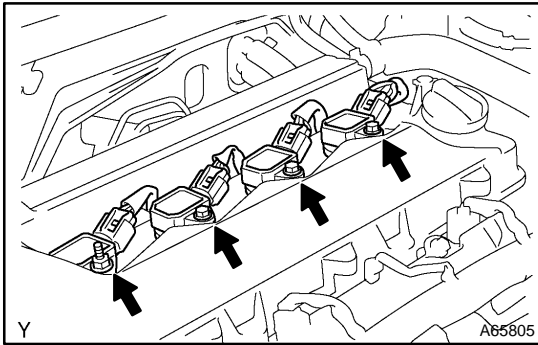
- (g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and bolt.

**Torque:**

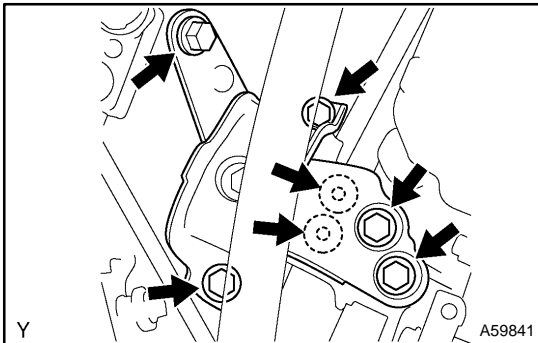
**Nut 10 N·m (102 kgf·cm, 7 ft·lbf)**

**Bolt 24 N·m (245 kgf·cm, 18 ft·lbf)**

- (h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.

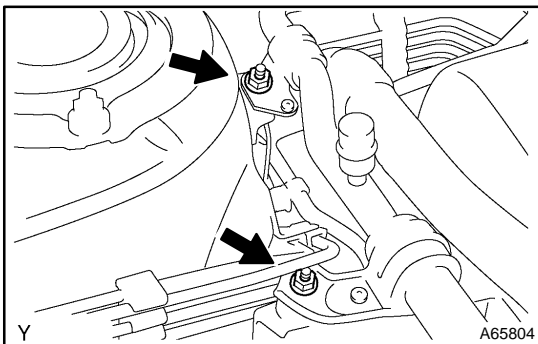
**74. INSTALL IGNITION COIL ASSY**

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

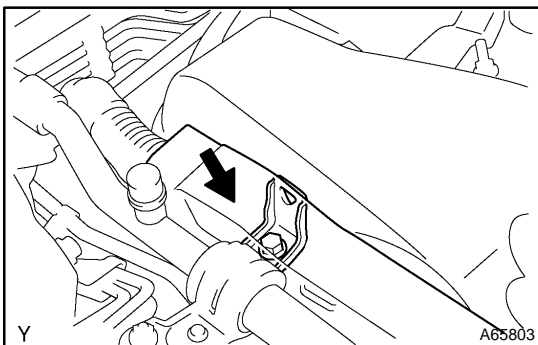
**75. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH**

- (a) Install the engine mounting insulator sub-assy RH with the 5 bolts and the 2 nuts.

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

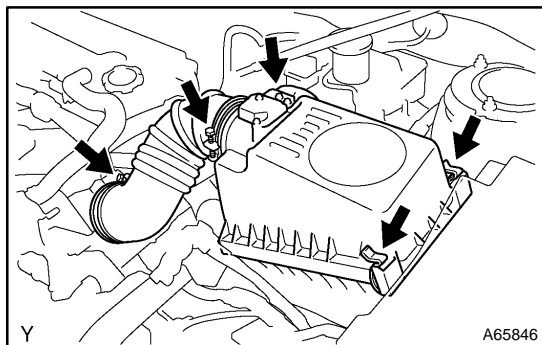
**76. INSTALL EXHAUST PIPE ASSY FRONT (See page 15-9)****77. INSTALL COMPRESSOR AND MAGNETIC CLUTCH (W/ AIR CONDITIONER) (See page 55-34)****78. INSTALL GENERATOR ASSY (See page 19-15)****79. INSTALL GENERATOR BRACKET NO.1 (See page 19-15)****80. INSTALL SUCTION HOSE SUB-ASSY**

Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

**81. INSTALL WIRE HARNESS CLAMP**

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



**82. INSTALL AIR CLEANER ASSEMBLY WITH HOSE**

- (a) Connect the air cleaner hose to the throttle body.
- (b) Attach the air cleaner cap to the air cleaner case, and install the 2 clamps.
- (c) Tighten the air cleaner hose clamp.
- (d) Connect the 5 vacuum hoses for the air cleaner cap.
- (e) Connect the MAF meter connector.

**83. INSTALL CYLINDER HEAD COVER NO.2**

Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)

**84. INSTALL FRONT WHEEL RH**

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

**85. ADD COOLANT (See page 16-6)****86. CHECK ENGINE COOLANT LEAK****87. CHECK ENGINE OIL LEAK****88. CHECK IDLE SPEED AND IGNITION TIMING (See page 14-174)**

SST 09843-18040

**89. INSPECT COMPRESSION (See page 14-174)**

SST 09992-00500

**90. INSPECT CO/HC (See page 14-174)**