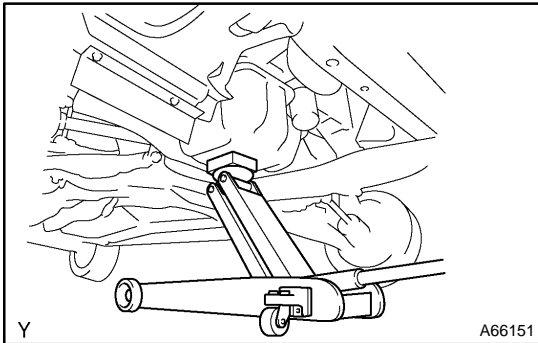


## REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH
2. REMOVE CYLINDER HEAD COVER NO.2
  - (a) Remove the 3 bolts and nut, then remove the cylinder head cover No. 2.
3. DISCONNECT BATTERY NEGATIVE TERMINAL
4. REMOVE WIRE HARNESS PROTECTOR (See page 14-161 )
5. SEPARATE SUCTION HOSE SUB-ASSY (See page 14-236 )
6. REMOVE AIR SWITCHING VALVE ASSY (See page 12-34 )
7. REMOVE FAN AND GENERATOR V BELT (See page 14-161 )
8. REMOVE GENERATOR BRACKET NO.1 (See page 19-20 )
9. REMOVE GENERATOR ASSY (See page 19-20 )

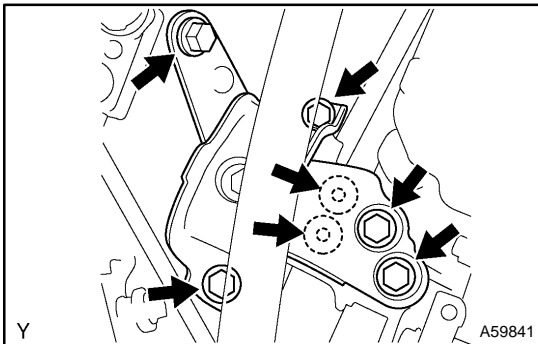


### 10. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

- (a) Set the jack underneath the engine, and jack up the engine.

HINT:

Place a wooden block between the jack and engine and jack up the engine.

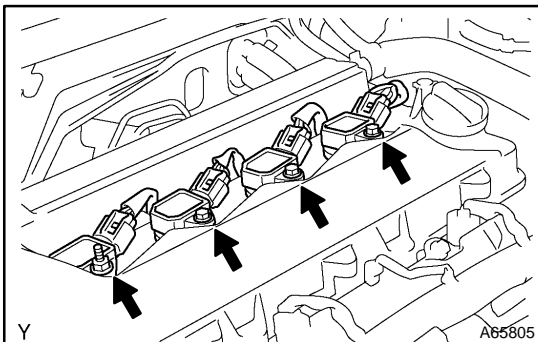


- (b) Remove the 5 bolts and 2 nuts, then remove the engine mounting insulator RH.

### 11. REMOVE V-RIBBED BELT TENSIONER ASSY

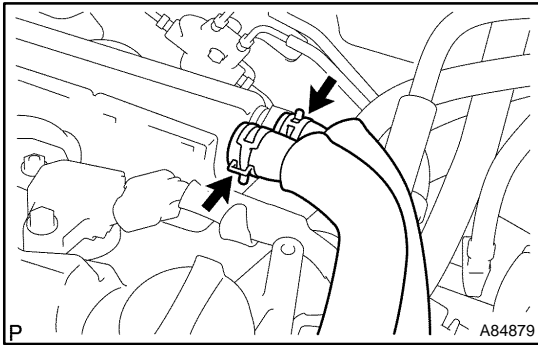
HINT:

Jack the engine up and down to remove the bolt.

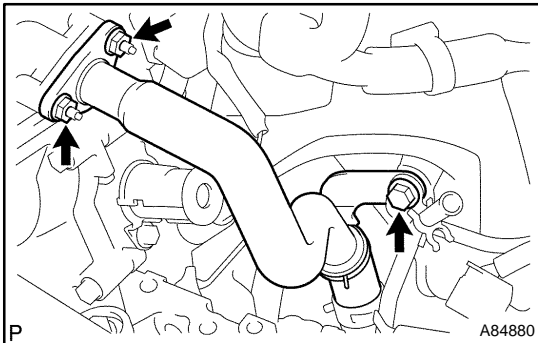


### 12. REMOVE IGNITION COIL ASSY

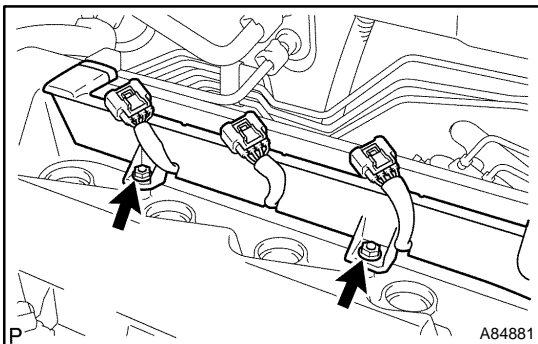
- (a) Disconnect the 4 ignition coil connectors.
- (b) Remove the 3 bolts and nut, then remove the 4 ignition coils.

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

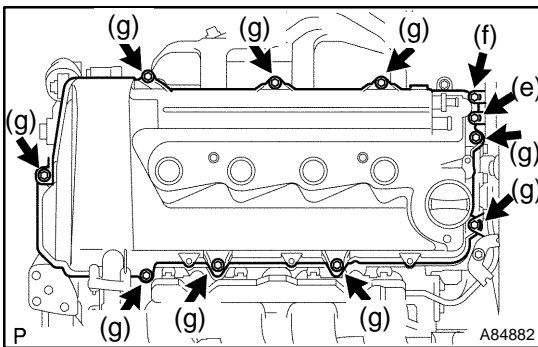
- (a) Disconnect the 2 ventilation hoses.



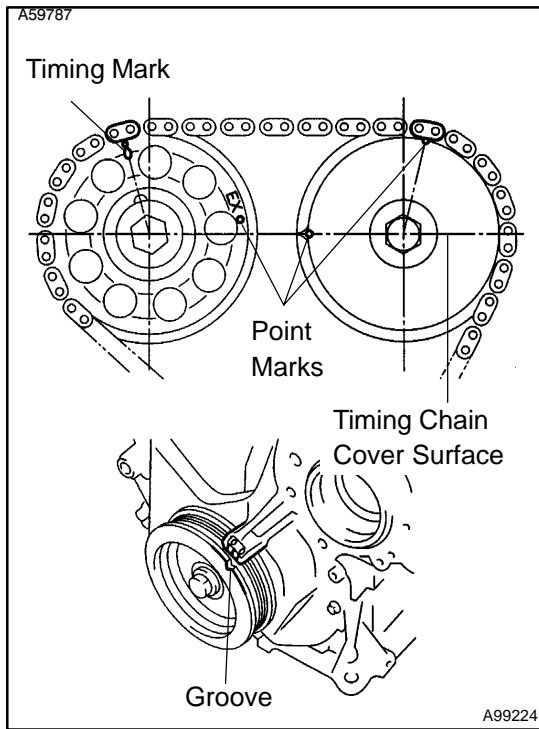
- (b) Remove the 2 nuts and bolt, then separate the ventilation tube No. 1.  
 (c) Remove the gasket from the cylinder head cover.



- (d) Remove the 2 nuts, then separate the wire harness protector.



- (e) Remove the bolt and fuel tube clamp.  
 (f) Remove the bolt and union to connector tube hose clamp.  
 (g) Remove the 9 bolts, bracket, wire harness protector, and cylinder head cover.  
 (h) Remove the O-ring from the cylinder head cover.

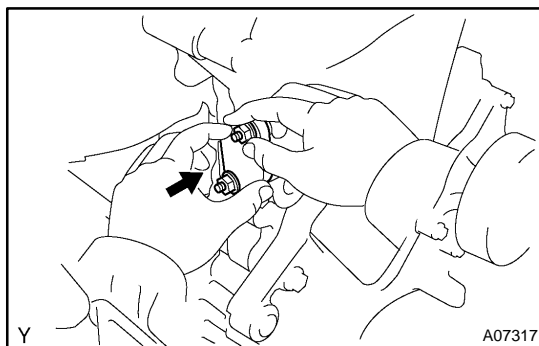


**14. SET NO. 1 CYLINDER TO TDC/COMPRESSION**

- (a) Turn the crankshaft pulley until its groove and the timing mark "0" of the timing chain cover are aligned.
- (b) Check that the point marks of the camshaft timing sprocket and the VVT timing sprocket are as shown in the illustration.

**HINT:**

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

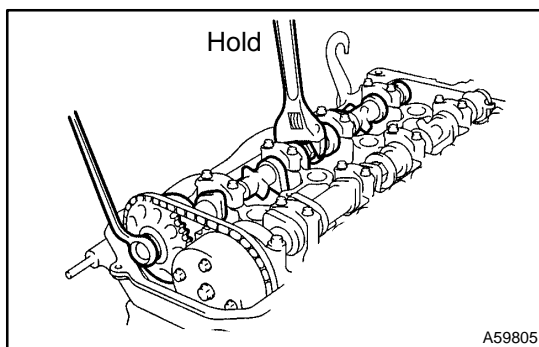


**15. REMOVE CHAIN TENSIONER ASSY NO.1**

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

**NOTICE:**

**Do not to turn the crankshaft without the chain tensioner.**

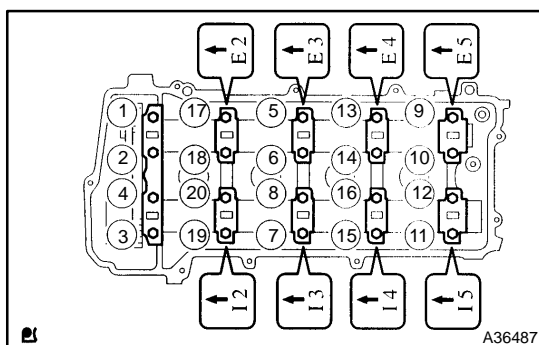


**16. REMOVE CAMSHAFT**

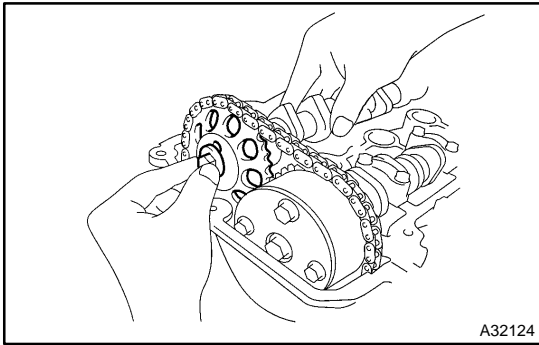
- (a) Hold the hexagonal lobe of the camshaft, then loosen the camshaft timing gear set bolt.

**NOTICE:**

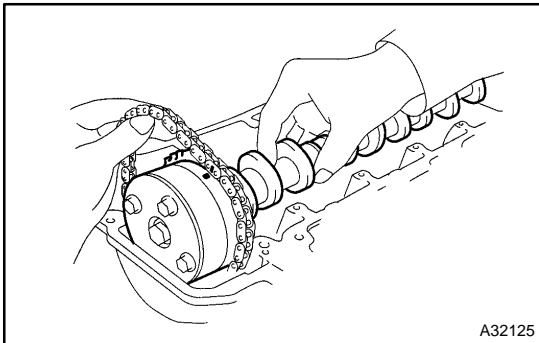
**Do not to turn the crankshaft without the chain tensioner.**



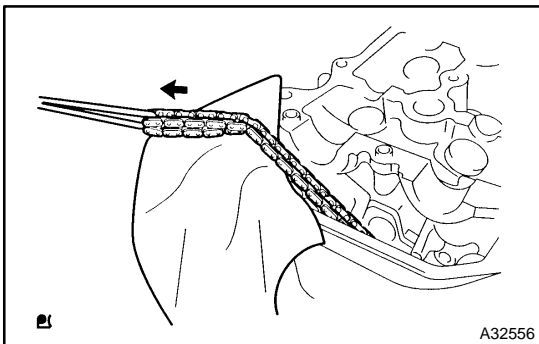
- (b) Using several steps, uniformly loosen and remove the camshaft bearing cap bolts in the sequence shown, then remove the caps.



(c) Lift up the camshaft slightly and remove the bolt.



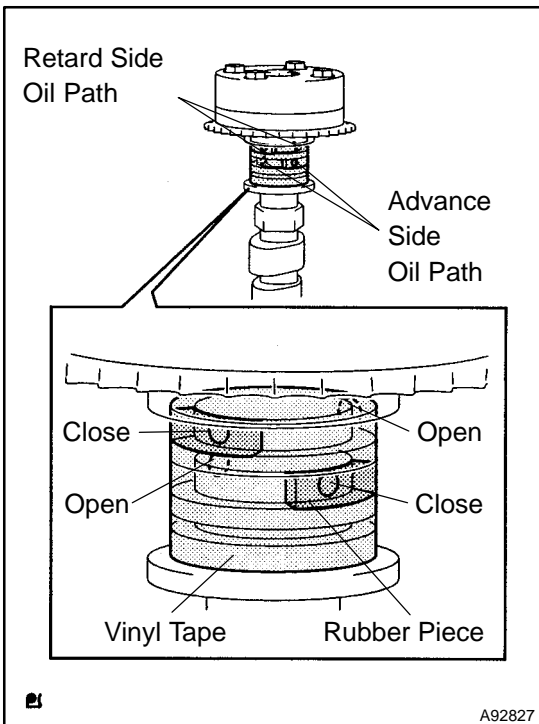
(d) Hold the timing chain by hand, then remove the camshaft.



(e) Tie the timing chain with a string as shown in the illustration.

**NOTICE:**

**Be careful not to drop anything inside the timing chain cover.**



**17. REMOVE CAMSHAFT TIMING GEAR ASSY**

- (a) Check the lock of camshaft timing gear.
  - (1) Clamp the camshaft in a vise, then confirm the camshaft timing gear is locked.

**NOTICE:**

**Be careful not to damage the camshaft.**

- (b) Check that the camshaft timing gear assembly does not turn.

**NOTICE:**

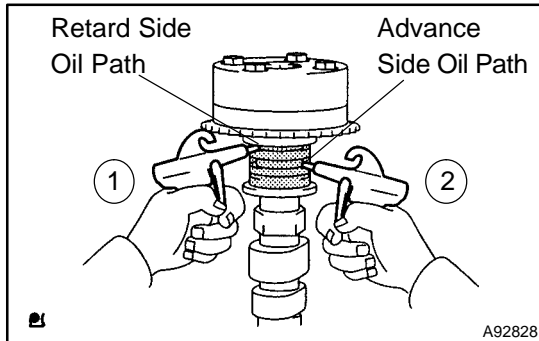
**Do not damage the camshaft by clamping it in a vise too tightly.**

- (c) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

**HINT:**

One of the 2 grooves located on the cam journal is for retarding cam timing (upper) and the other is for advance cam timing (lower). Each groove has 2 oil paths. Plug one of the 2 oil paths for each groove with a pieces of rubber before wrapping the cam journal with the tape.

- (d) Puncture the tape which covers the advance side path and retard side path on the opposite side.

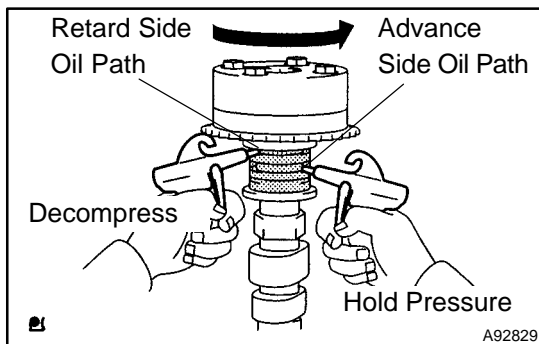


- (e) Apply approximately 150 kPa (1.5 kgf/cm<sup>2</sup>) of air pressure to the retard side oil path.

**NOTICE:**

**When applying air pressure, cover the paths with a shop rag to prevent oil splashes.**

- (f) Apply approximately 150 kPa (1.5 kgf/cm<sup>2</sup>) of air pressure to the advance side oil path.



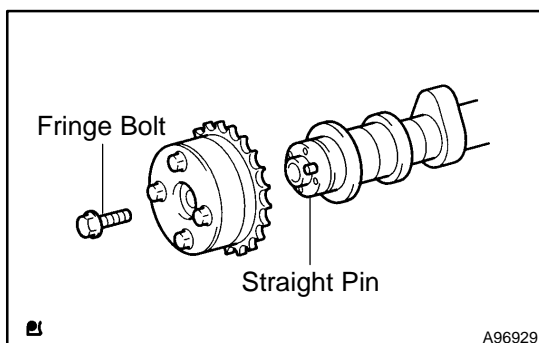
- (g) Confirm that the camshaft timing gear assembly revolves in the advance direction when reducing the air pressure on the retard side path.

**HINT:**

- If the timing gear assembly does not revolve in the advance direction by air pressure, turn it forcibly by hand after air pressure is applied to both oil paths. When revolving, first turn it in the retard direction, then in the advance direction.
  - The lock pin is released, and the camshaft timing gear revolves in the advance direction.
- (h) When the camshaft timing gear assembly comes to the most advanced position, release the air pressure of the retard side path, then release the air pressure of the advance side path.

**NOTICE:**

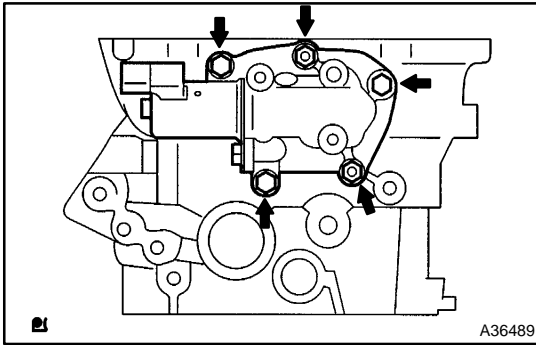
**If the air pressure of the advance side path is released first, the camshaft timing gear assembly occasionally shifts abruptly in the retard direction. It may cause the breakage of the lock pin. Be sure to release the air pressure on the retard side path first.**



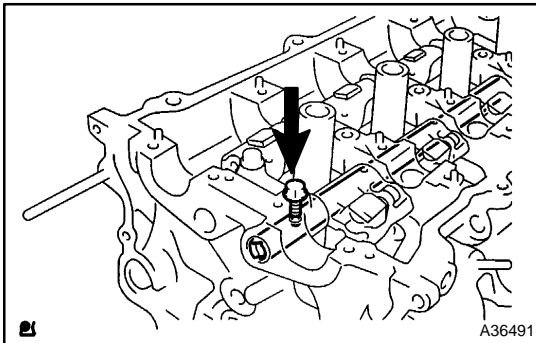
- (i) Remove the bolt and camshaft timing gear assembly.

**NOTICE:**

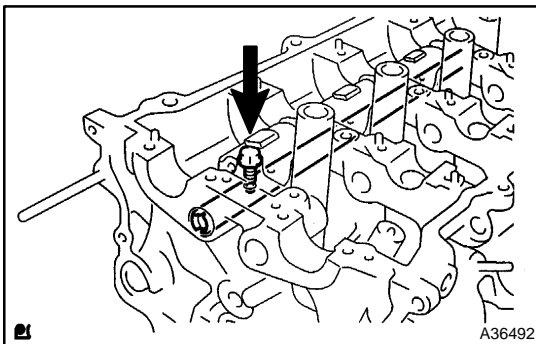
- **Do not remove the other 4 bolts.**
- **When reusing the camshaft timing gear assembly, unlock the lock pin inside the camshaft timing gear first.**



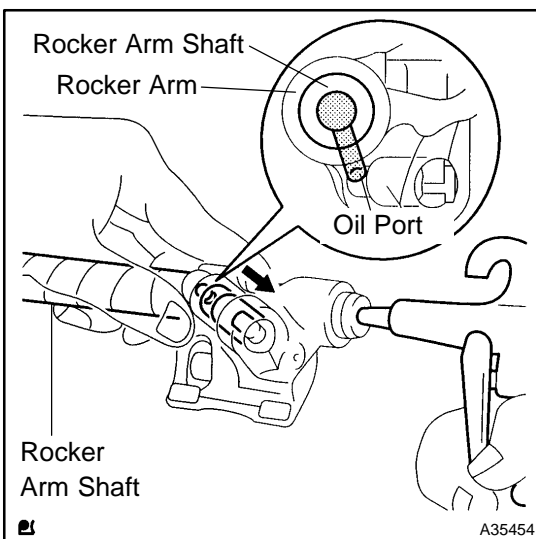
- 18. REMOVE CAM TIMING CONTROL VALVE HOUSING**
- Remove the 3 bolts and 2 nuts, then remove the cam timing control valve housing.
  - Remove the gasket.



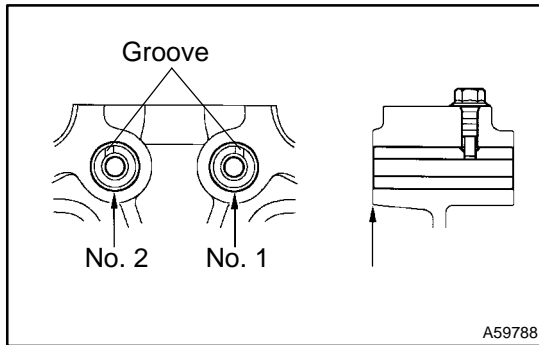
- 19. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.1**
- Remove the bolt and rocker shaft No. 1.
  - Remove the valve rocker arm.



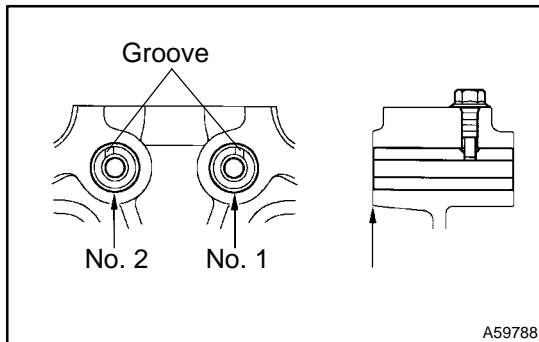
- 20. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.2**
- Remove the bolt and rocker shaft No. 2
  - Remove the valve rocker arm.



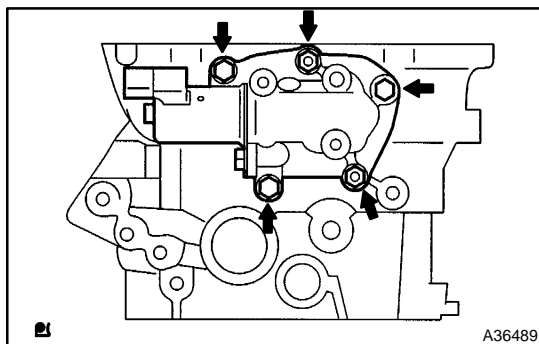
- 21. INSPECT VALVE ROCKER ARM**
- Cover the oil paths of the rocker arm shaft except the 2 paths covered with vinyl type.
  - Align the oil path of the rocker arm shaft with the oil path of the rocker arm.
  - Check that the piston inside of the rocker arm moves when 180 kpa {1.8 kgf/cm<sup>2</sup>, 25.6 psi} of air pressure is applied to the oil paths.



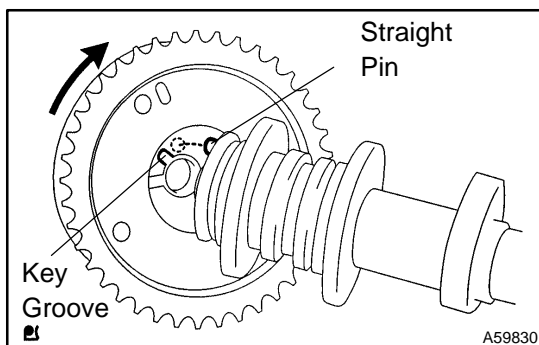
- 22. INSTALL VALVE ROCKER SHAFT SUB-ASSY NO.2**
- Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, then check that the groove is at the right direction as shown.
  - Install the bolt to fix the rocker shaft No. 2.  
**Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)**



- 23. INSTALL VALVE ROCKER SHAFT SUB-ASSY NO.1**
- Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, then check that the groove is at the right direction as shown.
  - Install the bolt to fix the rocker shaft No.1.  
**Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)**



- 24. INSTALL CAM TIMING CONTROL VALVE HOUSING**
- Install a new gasket and the control valve housing with the 3 bolts and 2 nuts.  
**Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**

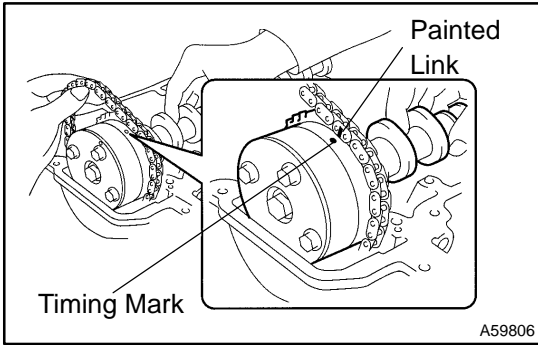


- 25. INSTALL CAMSHAFT TIMING GEAR ASSY**
- Put the camshaft timing gear together with the camshaft with the straight pin off the key groove.
  - Turn the camshaft timing gear to the left as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.

**CAUTION:**

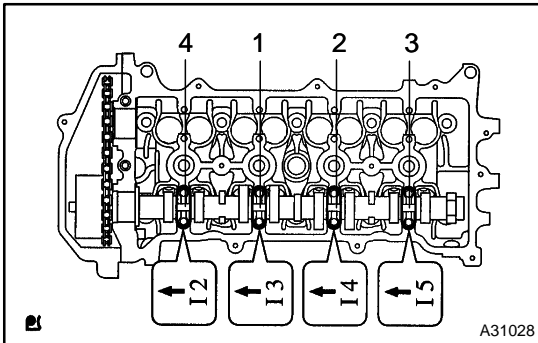
**Be sure not to turn the camshaft timing gear to the retard angle side (the right angle).**

- Check that there is no clearance between the gear fringe and camshaft.
- Tighten the fringe bolt with the camshaft timing gear fixed.  
**Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)**
- Check that the camshaft timing gear can move to the retard angle side (the right angle), and is locked in the most retarded position.



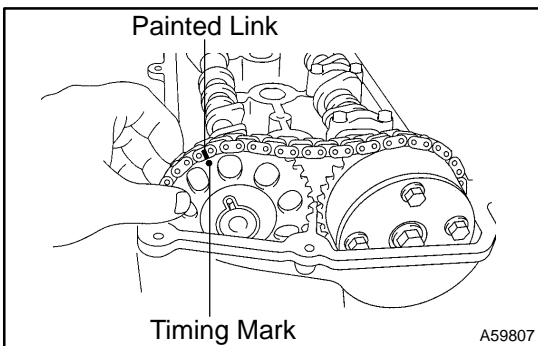
**26. INSTALL CAMSHAFT**

- (a) Apply engine oil to the camshaft journal parts.
- (b) Install the timing chain onto the camshaft timing gear with the painted link aligned with the timing mark of the camshaft timing sprocket as shown in the illustration.

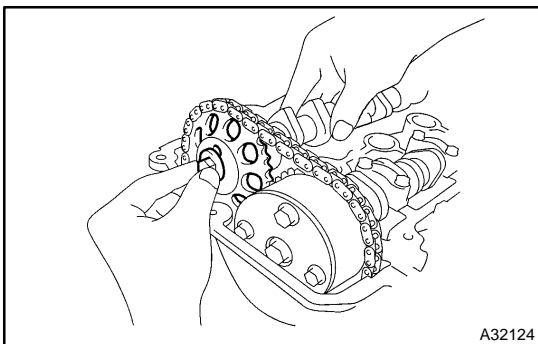


- (c) Examine the front marks and numbers and check that the sequence order is as shown in the illustration. Then check the bolt.

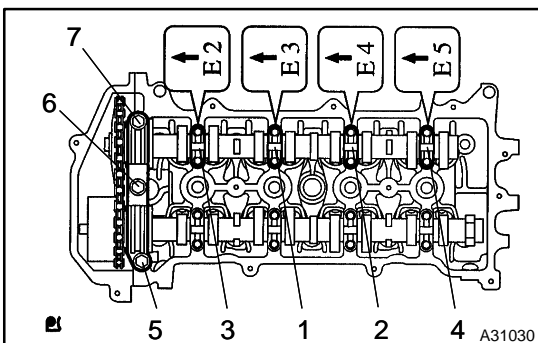
**Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)**



- (d) Put the No. 2 camshaft on the cylinder head with the painted links of the chain aligned with the timing mark on the camshaft timing sprockets.

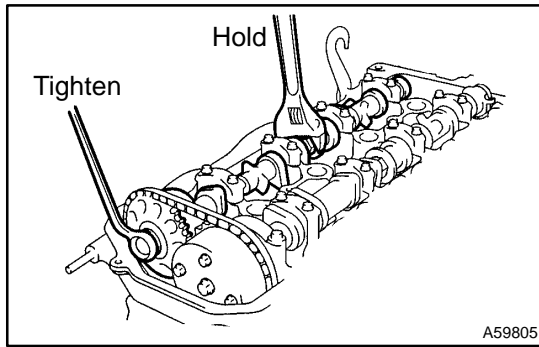


- (e) Tighten the set bolt temporarily.



- (f) Examine the front marks and numbers and check the sequence order is as shown in the illustration. Then check the bolts.

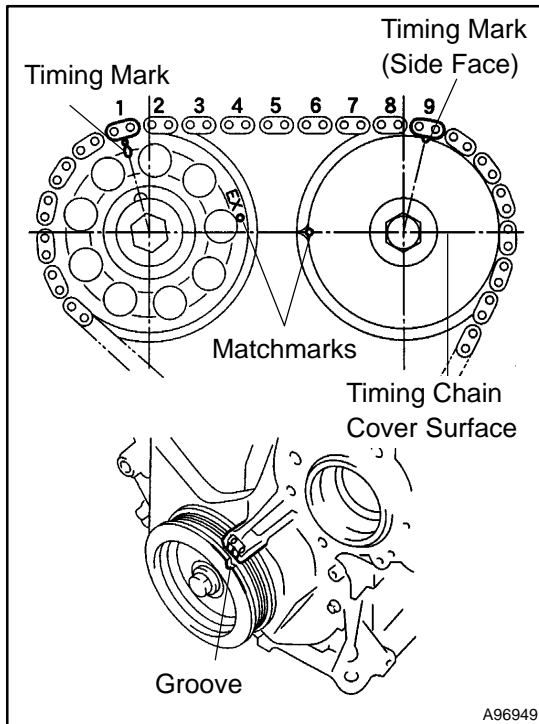




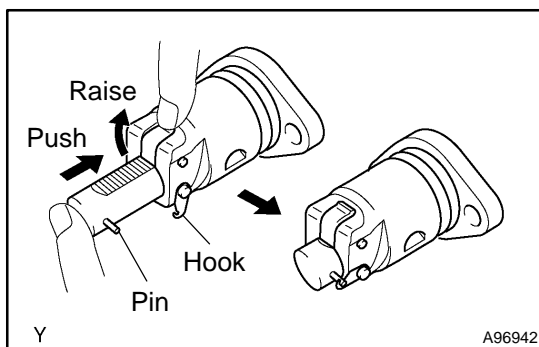
- (g) Hold the hexagonal lobe of the camshaft, then tighten the camshaft timing gear set bolt.  
**Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)**

**NOTICE:**

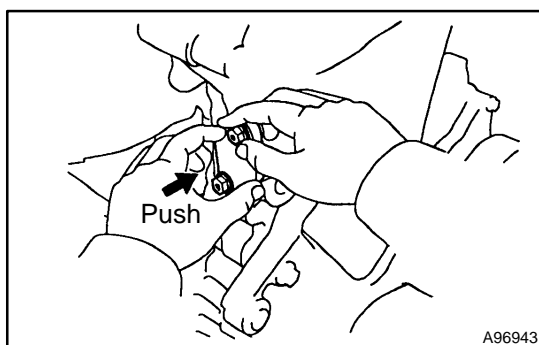
**Be careful not to damage the valve lifter.**



- (h) Check that the 2 matchmarks are aligned on the timing chain cover surface. Also check that each timing mark is aligned with its corresponding painted link on the timing chain as shown in the illustration.

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

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

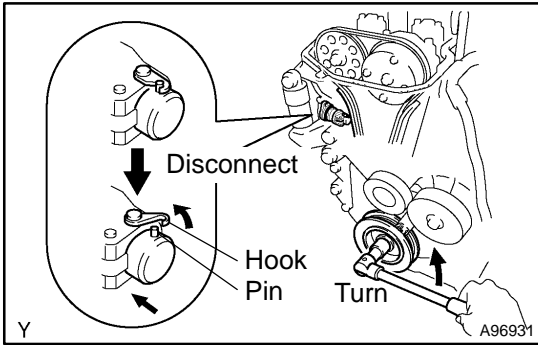


- (b) Apply engine oil to the chain tensioner, then install it.

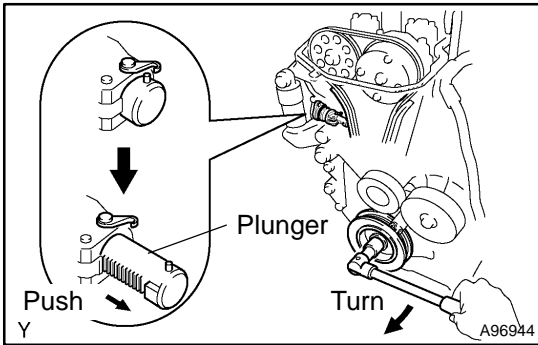
**Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**

**NOTICE:**

**When installing the tensioner, set the hook again if the hook releases the plunger.**



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



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

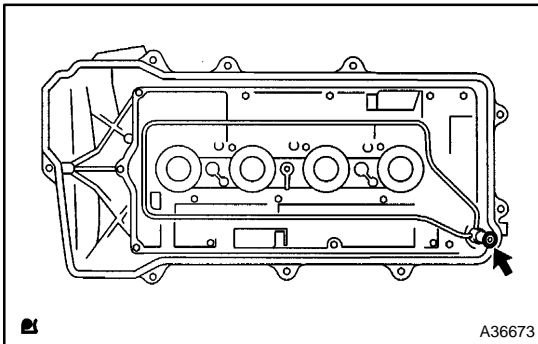
**HINT:**

If the plunger is not expanded, push the slipper into the chain tensioner with a screwdriver so that the hook is released from the knock pin and the plunger can be extended.

**28. INSPECT VALVE CLEARANCE (See page 14-163 )**

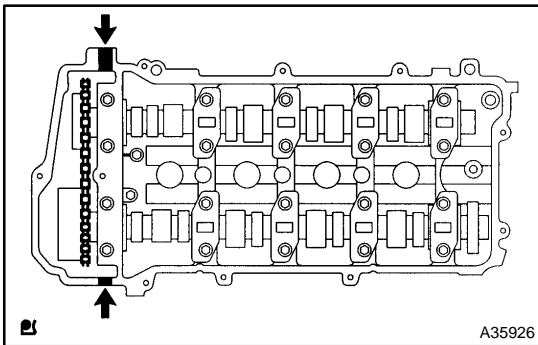
**29. ADJUST VALVE CLEARANCE (See page 14-163 )**

SST 09248-77010 (09248-07010)



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

- (a) Install a new O-ring onto the cylinder head cover.  
 (b) Remove any old packing (FIPG) material.

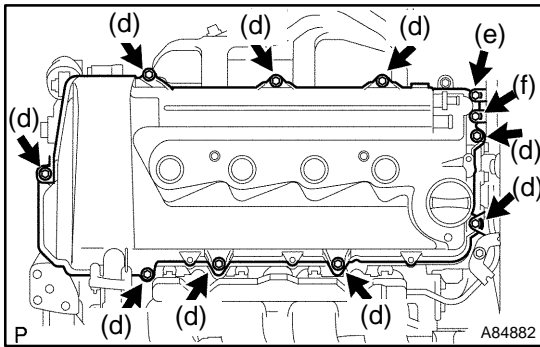


- (c) Apply seal packing to 2 locations as shown in the illustration.

**Seal packing: Part No. 08826-00080 or equivalent**

**NOTICE:**

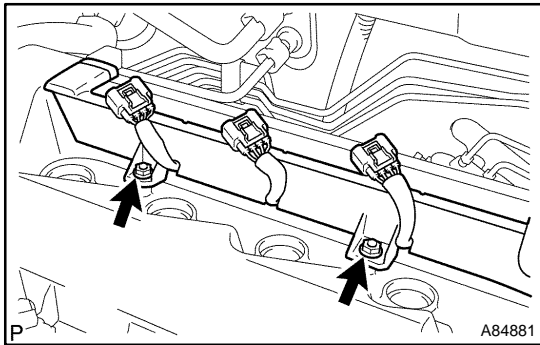
- Remove any oil from the contact surface.
- Install the cylinder head cover within 3 minutes of applying seal packing.
- Do not put in engine oil for at least 2 hours after installation.



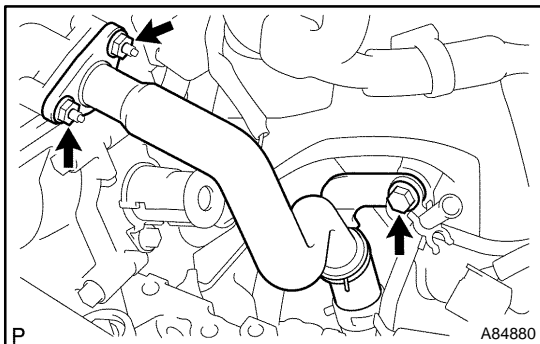
- (d) Install the cylinder head cover, wire harness protector and bracket with the 9 bolts. Uniformly tighten the bolts, in the several passes in the sequence shown.  
**Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)**

- (e) Install the union to connector tube hose clamp with the bolt.  
**Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)**

- (f) Install the fuel tube clamp with the bolt.  
**Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)**



- (g) Install the wire harness protector with the 2 nuts.  
**Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**



- (h) Install a new gasket and ventilation tube No. 1 with the 2 nuts and bolt.  
**Torque:**

**10 N·m (102 kgf·cm, 7 ft·lbf) for nut**  
**24 N·m (245 kgf·cm, 18 ft·lbf) for bolt**

### 31. INSTALL IGNITION COIL ASSY

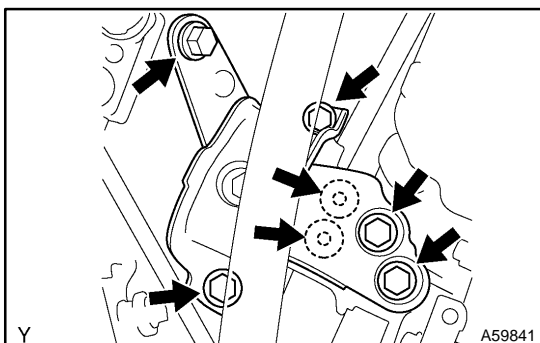
**Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**

### 32. INSTALL V-RIBBED BELT TENSIONER ASSY

**Torque:**

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

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



### 33. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH

- (a) Install the engine mounting insulator RH with the 5 bolts and 2 nuts.  
**Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)**

34. **INSTALL GENERATOR ASSY (See page 19-20 )**
35. **INSTALL GENERATOR BRACKET NO.1 (See page 19-20 )**
36. **INSTALL AIR SWITCHING VALVE ASSY (See page 12-34 )**
37. **INSTALL SUCTION HOSE SUB-ASSY**  
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)
38. **CONNECT BATTERY NEGATIVE TERMINAL**  
Torque: 3.5 N·m (36 kgf·cm, 31 in·lbf)
39. **CHECK FOR ENGINE OIL LEAKAGE**
40. **INSTALL CYLINDER HEAD COVER NO.2**  
Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)