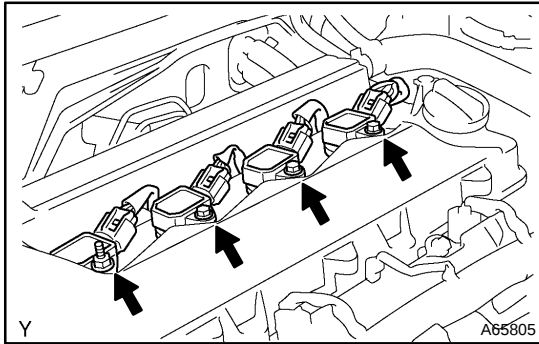


REPLACEMENT

1. REMOVE ENGINE UNDER COVER RH

2. REMOVE CYLINDER HEAD COVER NO.2

- (a) Remove the 3 bolts, the nut and the cylinder head cover No. 2.



3. REMOVE IGNITION COIL ASSY

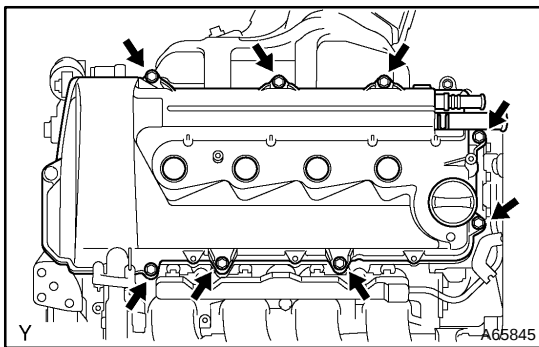
- (a) Remove the 4 bolts, and disconnect the 4 connectors, and remove the 4 ignition coils.

4. 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.

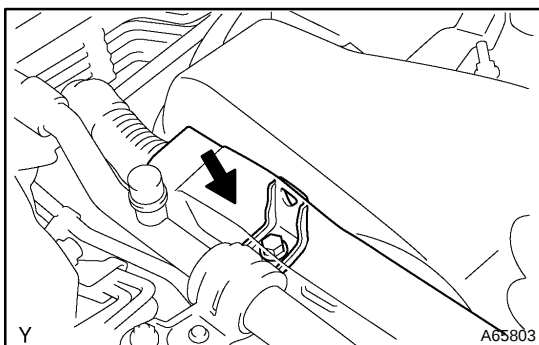


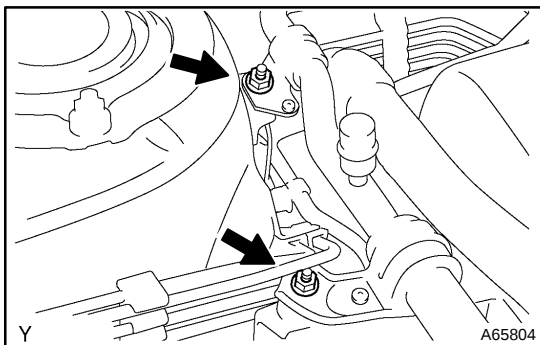
- (d) Remove the 8 bolts, wire harness protector, cylinder head cover and gasket.
- (e) Remove the O-ring from the cylinder head cover.



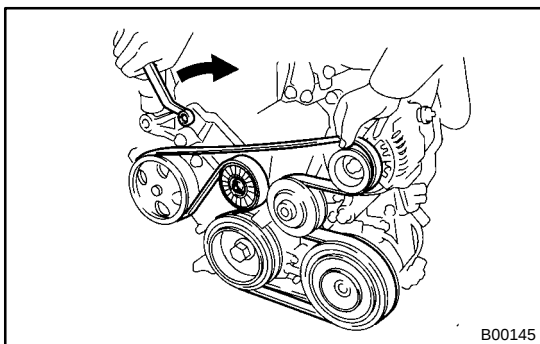
5. REMOVE WIRE HARNESS CLAMP

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

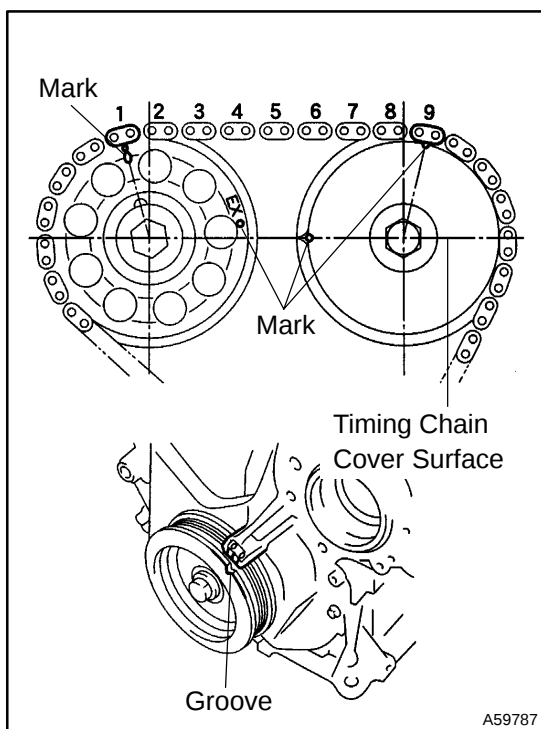


**6. DISCONNECT SUCTION HOSE SUB-ASSY**

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

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

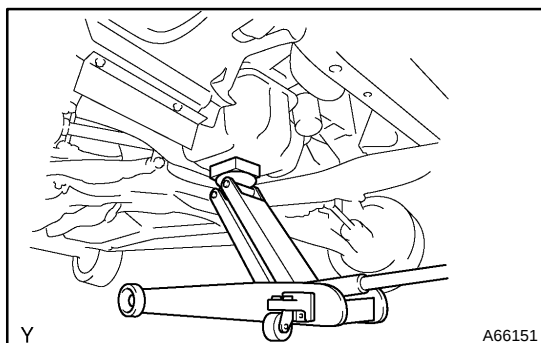
- (a) Turn the drive belt tensioner slowly clockwise and loosen it. Then, remove the drive belt and put back the drive belt tensioner little by little and fix it quietly.

**8. 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:

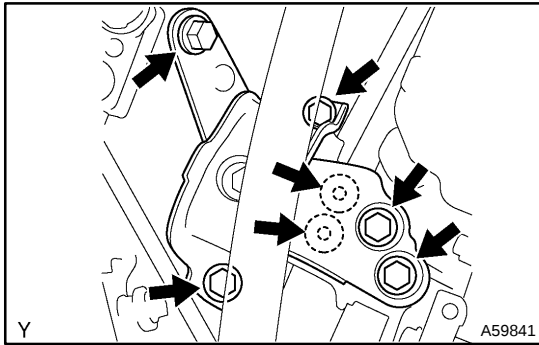
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

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

- (a) Set the jack to the engine.

HINT:

Place a wooden block between the jack and engine.

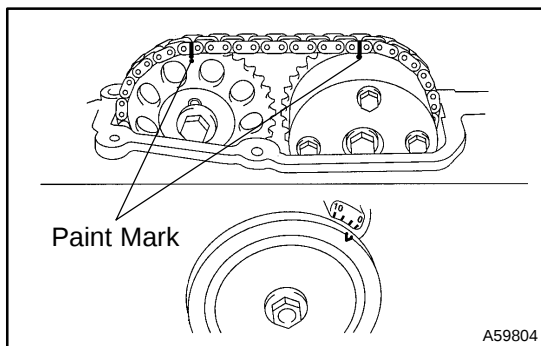


- (b) Remove the 5 bolts, 2 nuts and engine mounting insulator sub-assy RH.

10. REMOVE V-RIBBED BELT TENSIONER ASSY

HINT:

Handle a jack up and down to remove the bolt.

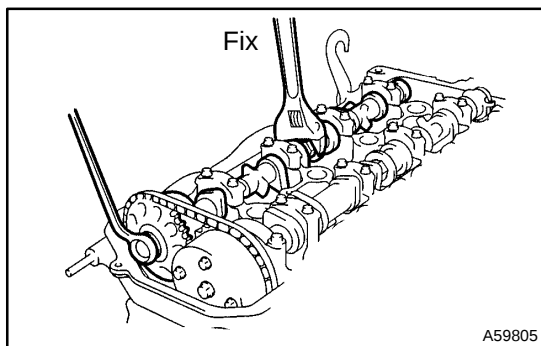


11. REMOVE CAMSHAFT

NOTICE:

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

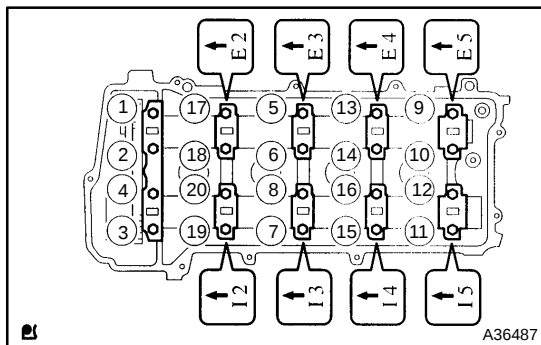
- Set the No. 1 cylinder to the TDC/compression.
- Place match marks on the timing chain and camshaft timing sprockets.
- Remove the 2 nuts and the chain tensioner.



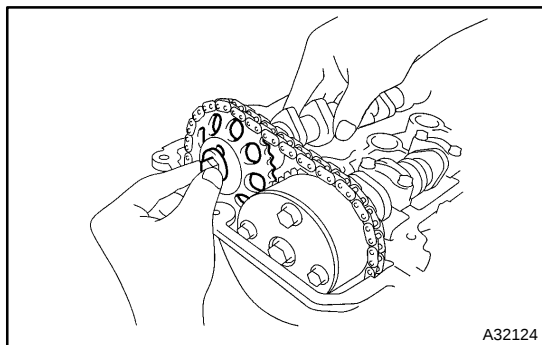
- Fix the camshaft with a wrench and so on, then loosen the camshaft timing gear set bolt.

NOTICE:

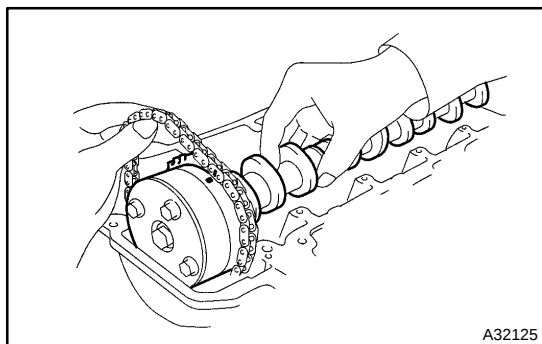
Be careful not to damage the valve lifter.



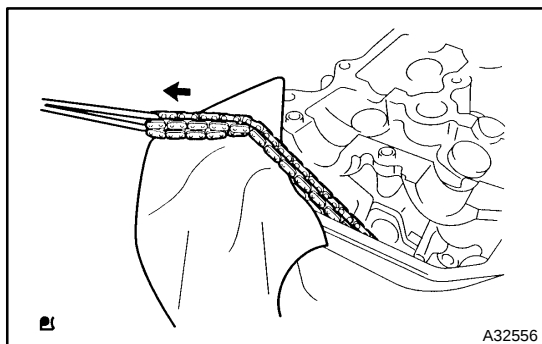
- Loosen the camshaft bearing cap bolts on No. 2 camshaft in the order as shown in the illustration in several passes, and remove the caps.



- (f) Remove the camshaft timing gear as shown in the illustration.



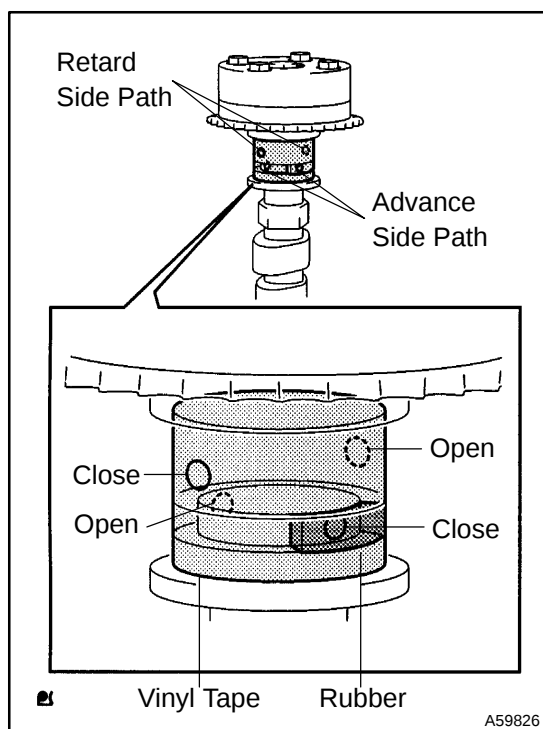
- (g) Remove the camshaft with holding the timing chain.



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

NOTICE:

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



12. INSPECT CAMSHAFT TIMING GEAR ASSY

- (a) Check the lock of camshaft timing gear.
(1) Grip the camshaft with a vice, and confirm the camshaft timing gear is locked.

NOTICE:

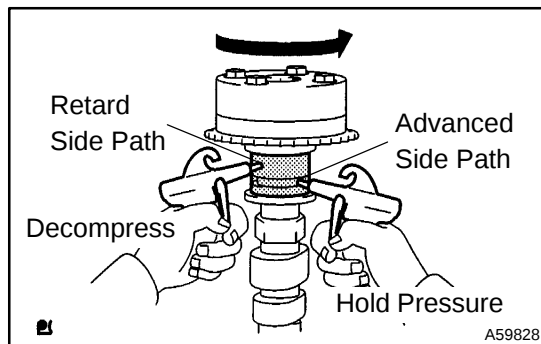
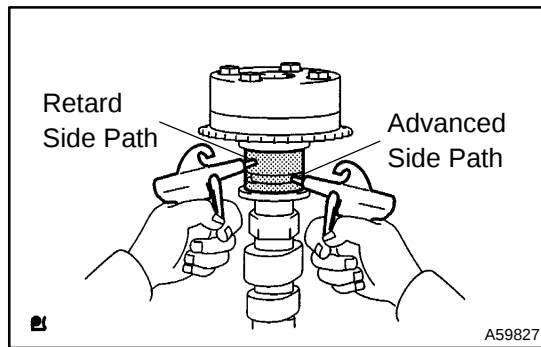
Be careful not to damage the camshaft.

- (b) Release lock pin.
(1) Cover 4 oil paths of cam journal with vinyl tape as shown in the illustration.

HINT:

Two advance side paths are provided in the groove of the camshaft. Plug one of the path with a rubber piece.

- (2) Break through the tapes of the advance side path and the retard side path on the opposite side of the groove.



- (3) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf/cm²}.

CAUTION:

Cover the paths with shop rag to avoid oil splashing.

- (4) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:

The lock pin is released, and camshaft timing gear, revolves in the advance direction.

- (5) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, take out that of timing advance side path.

CAUTION:

Camshaft timing assembly gear occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side path. It often causes the breakage of the lock pin.

- (c) Check smooth revolution

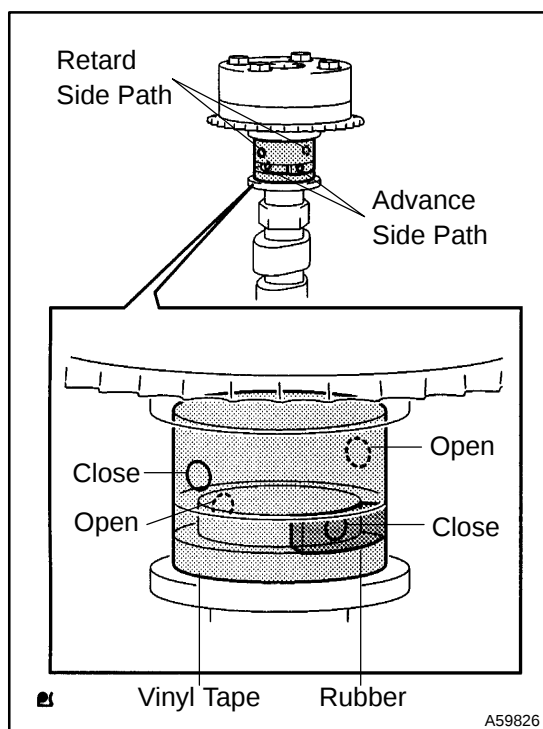
- (1) Revolve the camshaft timing gear assembly within the movable range except for the most retarded position several times, and check the smooth revolution.

CAUTION:

Be sure to perform this check by hand, instead of air pressure.

- (d) Check the lock in the most retarded position.

- (1) Confirm that the camshaft timing gear assembly is locked at the most retarded position.



13. REMOVE CAMSHAFT TIMING GEAR ASSY

- (a) Grip the camshaft with a vice, and confirm that the gear is locked.

CAUTION:

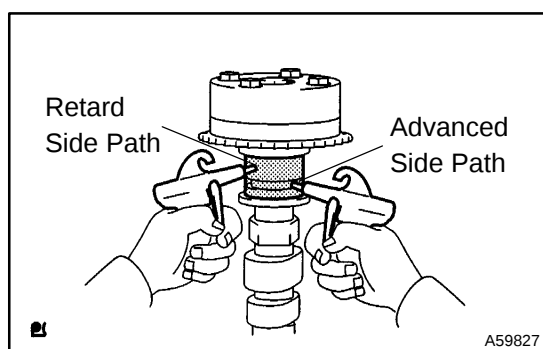
Be careful not to damage the camshaft.

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

HINT:

Two advance side paths are provided in the groove of the camshaft. Plug one of the path with a rubber piece.

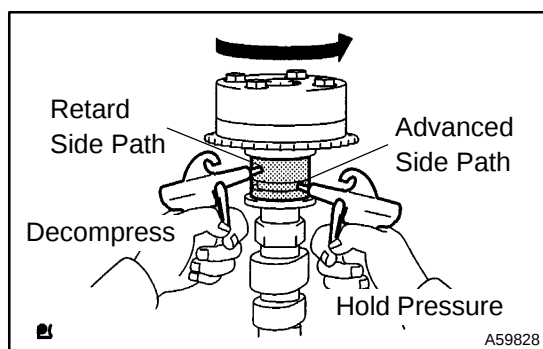
- (c) Break through the tapes of the advance side path and the retard side path on the opposite side of the groove.



- (d) Put air pressure into two broken paths (the advance side path and the retard side path) with about 150 kPa {1.5 kgf/cm²}.

CAUTION:

Cover the paths with shop rag to avoid oil splashing.



- (e) Confirm if the camshaft timing gear assembly revolves in the timing advance direction when weakening the air pressure of the timing retard path.

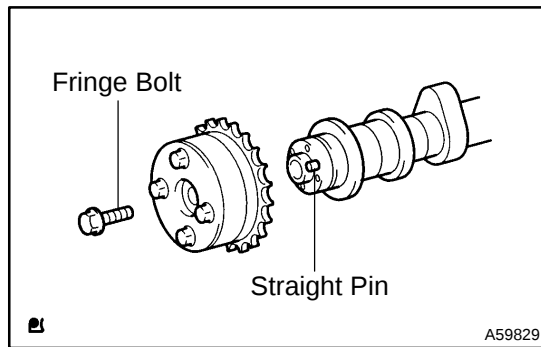
HINT:

The lock pin is released, and camshaft timing gear revolves in the advance direction.

- (f) When the camshaft timing gear comes to the most advanced position, take out the air pressure of the timing retard side path, and then, takeout that of timing advance side path.

CAUTION:

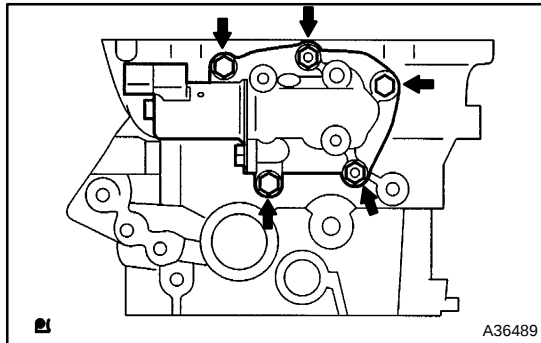
Camshaft timing gear assembly occasionally shifts to the retard side abruptly, if the air compression of the advanced side path is released before retard side paths. It often causes the breakage of the lock pin.



(g) Remove the fringe bolt of camshaft timing gear assembly.

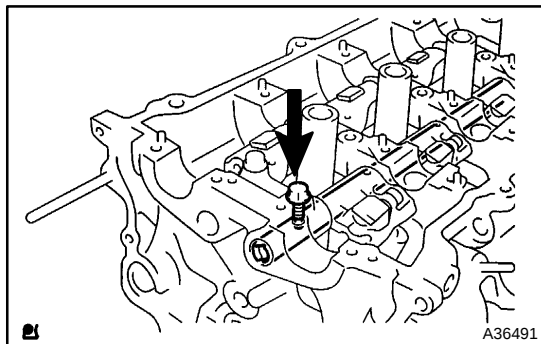
NOTICE:

Be sure not to remove the other 4 bolts.



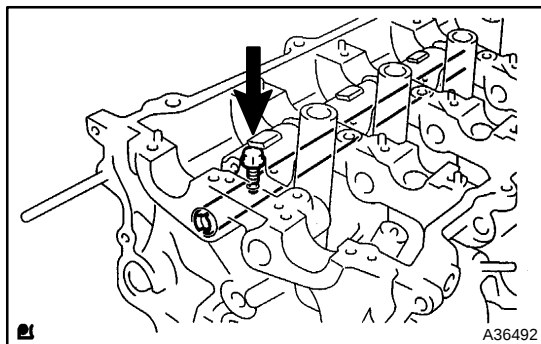
14. REMOVE CAM TIMING CONTROL VALVE HOUSING

(a) Remove the 3 bolts, 2 nuts and cam timing oil control valve housing.



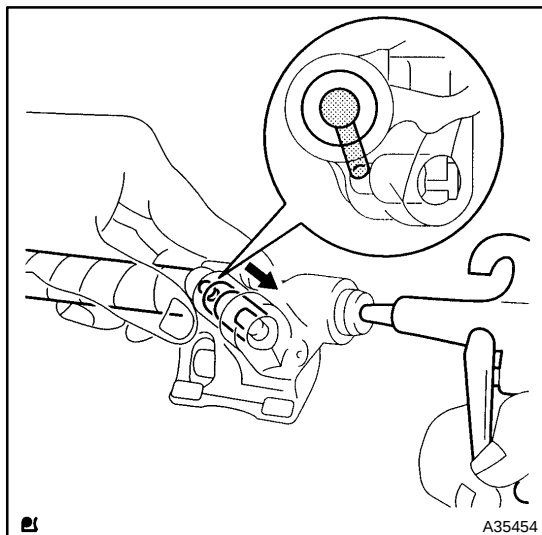
15. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.1

(a) Remove the bolt and the rocker shaft No.1.
(b) Remove the valve rocker arm.

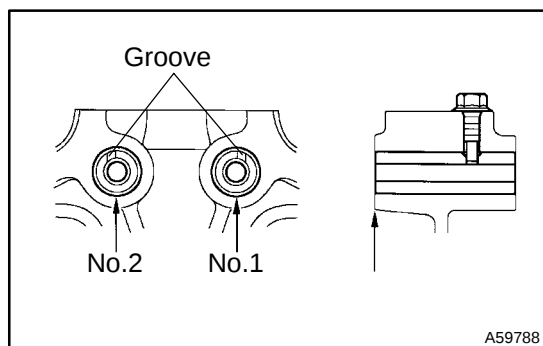


16. REMOVE VALVE ROCKER SHAFT SUB-ASSY NO.2

(a) Remove the bolt and the rocker shaft No.2
(b) Remove the valve rocker arm.

**17. INSPECT VALVE ROCKER ARM**

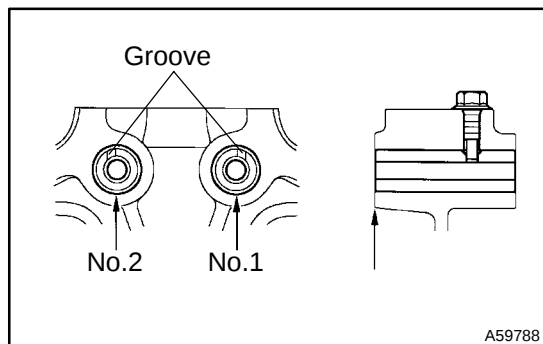
- (a) Cover oil paths of the rocker arm shaft except 2 paths with vinyl type.
- (b) Align the oil path of the rocker arm shaft to the oil path of the rocker arm.
- (c) Check that the piston inside of the rocker arm moves when air pressure 150 kpa {1.5kgf/cm²} is put to the oil paths.

**18. INSTALL VALVE ROCKER SHAFT SUB-ASSY NO.2**

- (a) Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, and check the direction of the groove.

- (b) Install a bolt to fix the rocker shaft No.2.

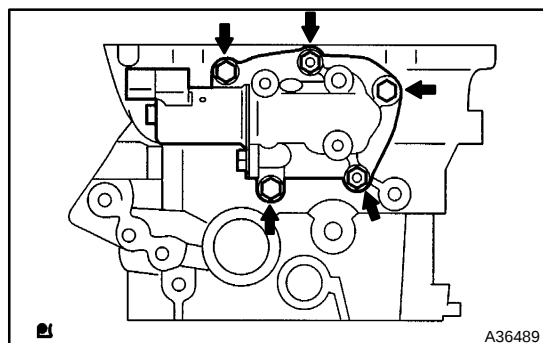
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

**19. INSTALL VALVE ROCKER SHAFT SUB-ASSY NO.1**

- (a) Put the valve rocker shaft through the cylinder head and the hole of the valve rocker arm, and check the direction of the groove.

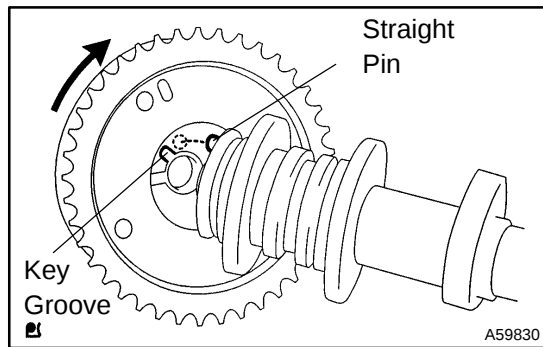
- (b) Install a bolt to fix the rocker shaft No.1.

Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

**20. INSTALL CAM TIMING CONTROL VALVE HOUSING**

- (a) Install the new gasket and the oil control valve housing with the 3 bolts and 2 nuts.

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



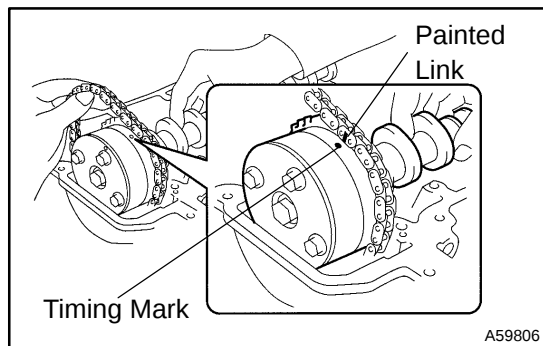
21. INSTALL CAMSHAFT TIMING GEAR ASSY

- Put the camshaft timing gear assembly and the camshaft together with the straight pin off the key groove.
- Turn the camshaft timing gear assembly to the left direction (as shown in the illustration) with pushing it lightly against the camshaft. Push further at the position where the pin gets into the groove.

CAUTION:

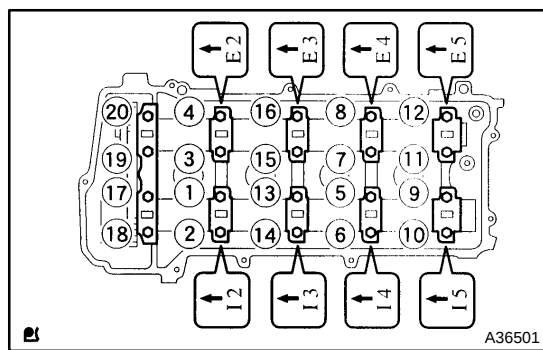
Be sure not to turn the camshaft timing gear to the retard angle side (to the right angle).

- Check that there is no clearance between the gear's fringe and the 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 assembly can move to the retard angle side (the right angle), and is locked at the most retarded position.

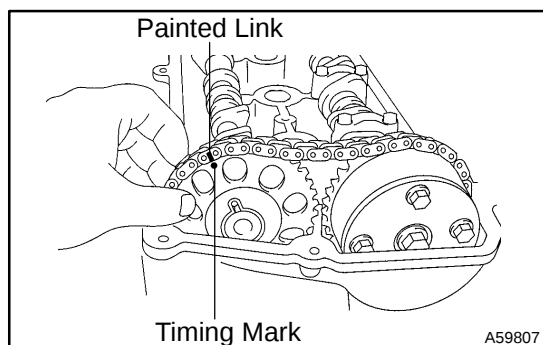


22. INSTALL CAMSHAFT

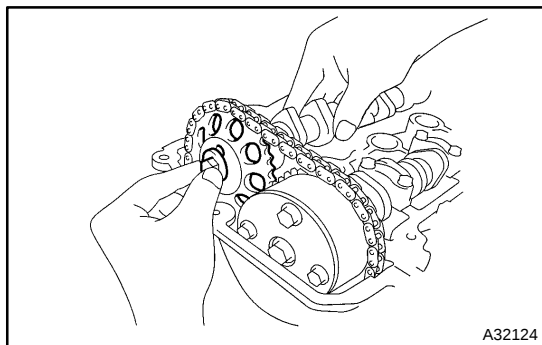
- As shown in the illustration, install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing sprockets.



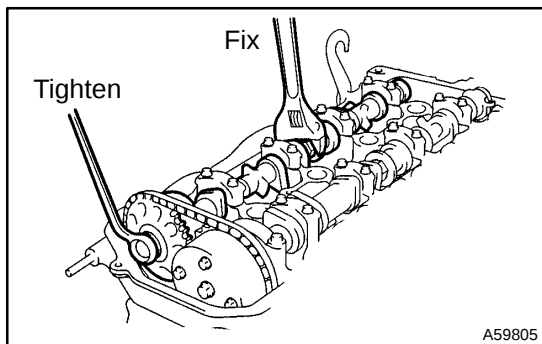
- Examine the front marks and numbers and tighten the bolts in the order shown in the illustration.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



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



(d) Tighten the set bolt temporarily.

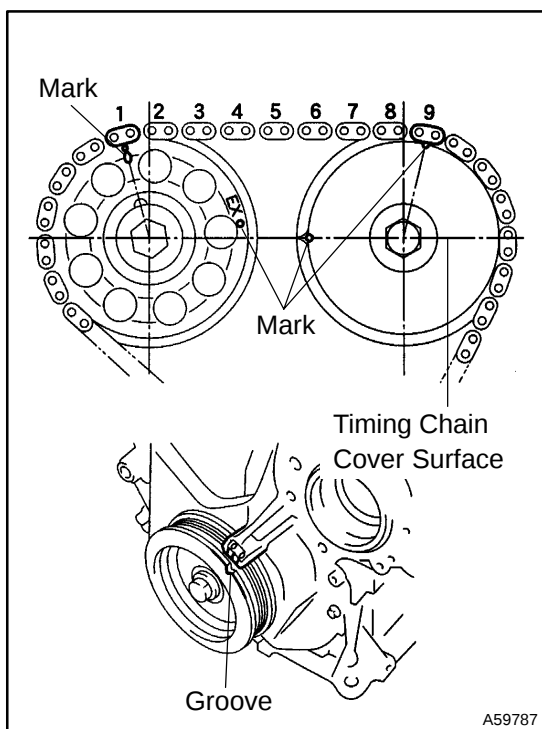


(e) Fix the camshaft with a wrench and so on, then tighten the camshaft timing gear set bolt.

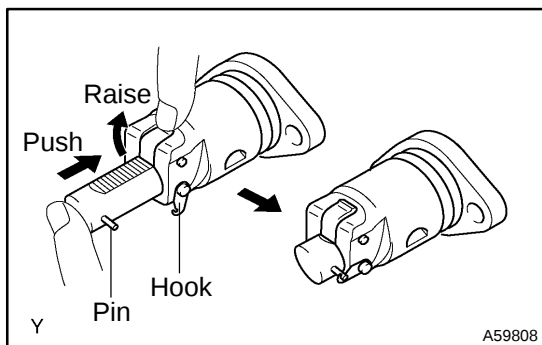
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:

Be careful not damage the valve lifter.

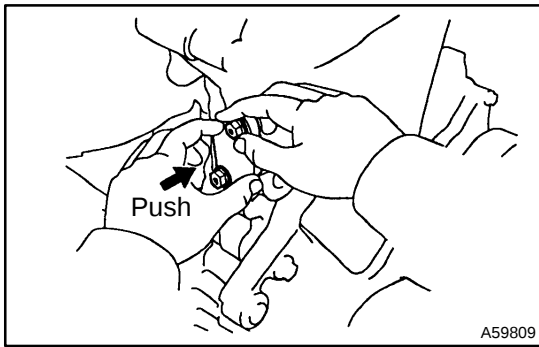


(f) Check the match marks on the timing chain and camshaft timing sprockets, and then the alignment of the pulley groove with timing mark of the chain cover as shown in the illustration.



(g) Install chain tensioner.

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

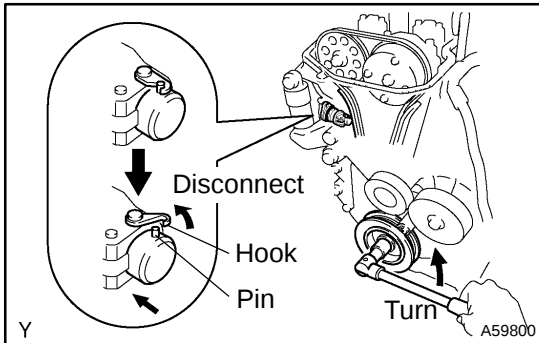


- (2) Apply engine oil to the chain tensioner and install it.

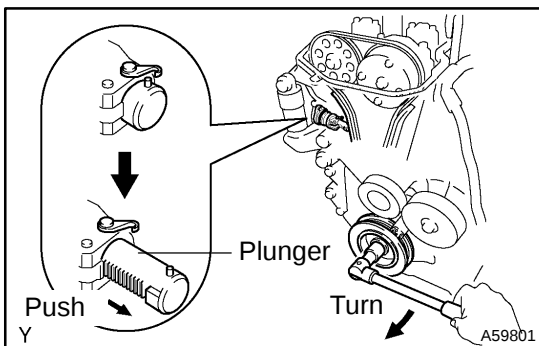
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

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



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



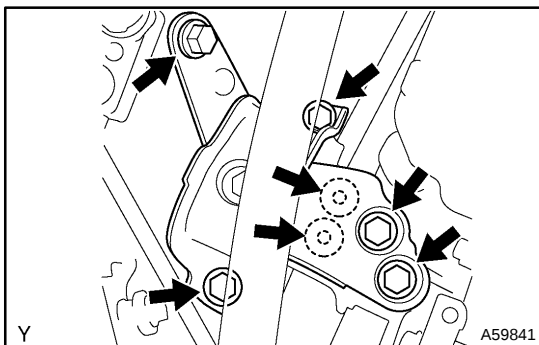
- (4) Turn the crankshaft clockwise, and check that the slipper is pushed by the plunger.

23. INSTALL 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)



24. 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)

25. 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.

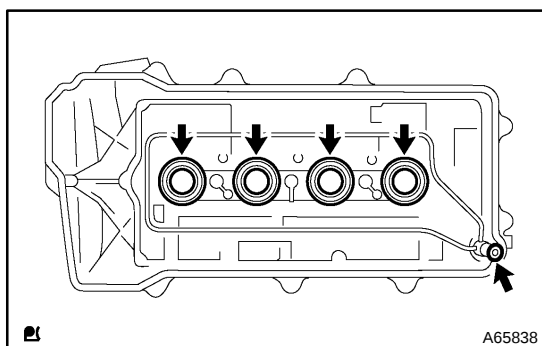
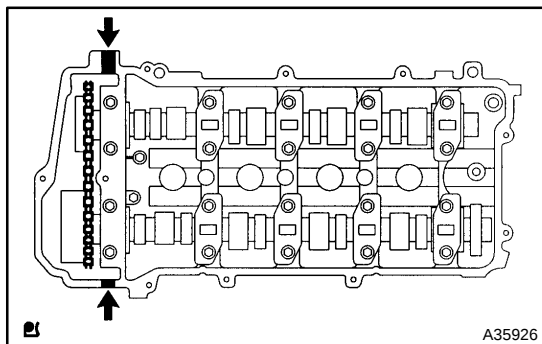
Seal packing:

Part No. 08826-00080 or equivalent

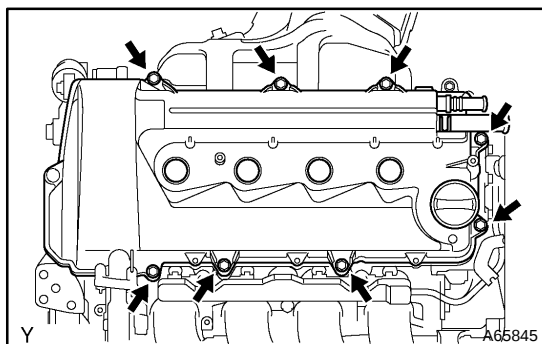
- (c) Install the cylinder head cover gasket to the cylinder head cover.

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.



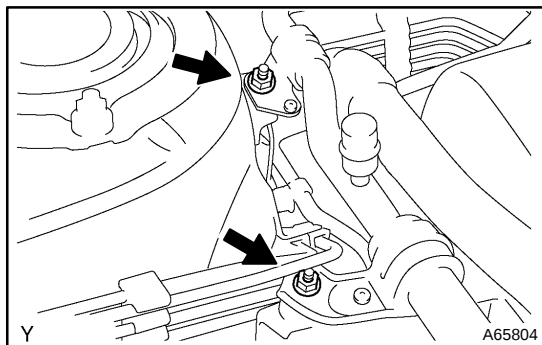
- (g) Install a new gasket and No. 1 ventilation pipe with 2 nuts and bolt.

Torque:

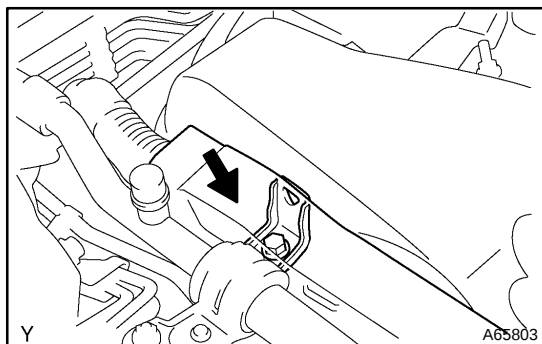
Nut 10 N·m (102 kgf·cm, 7 ft·lbf)

Bolt 24 N·m (245 kgf·cm, 18 ft·lbf)

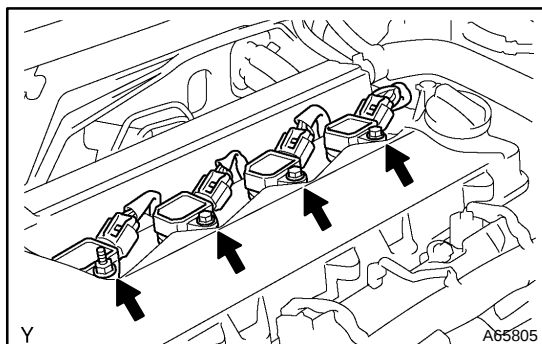
- (h) Connect the No. 3 ventilation hose to the No. 1 ventilation pipe.



- 26. INSTALL SUCTION HOSE SUB-ASSY**
Torque: 9.8 N·m (100 kgf·cm, 87 in·lbf)



- 27. INSTALL WIRE HARNESS CLAMP**
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



- 28. INSTALL IGNITION COIL ASSY**
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

- 29. INSTALL CYLINDER HEAD COVER NO.2**
Torque: 7.0 N·m (71 kgf·cm, 62 in·lbf)
- 30. CHECK ENGINE OIL LEAK**