1420J–01

REPLACEMENT

1. REMOVE FAN AND GENERATOR V BELT (SEE PAGE 14–9)

HINT:

Loosen the 4 nuts for the fluid coupling in advance.

2. SEPARATE FAN SHROUD (SEE PAGE 14–19)

3. REMOVE FLUID COUPLING ASSY

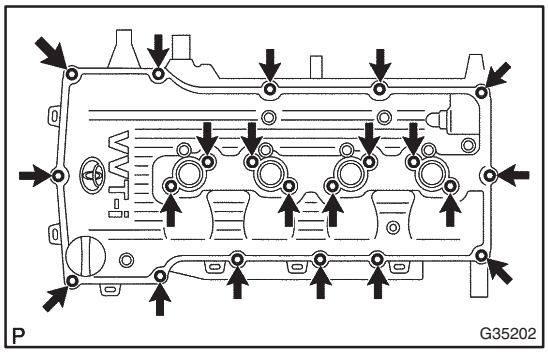
(a) Remove the 4 nuts with the coupling from the water pump pulley .

(b) Remove the fluid coupling together with the fan shroud.

4. REMOVE AIR CLEANER CAP W/INTAKE AIR CONNECTOR (SEE PAGE 14–19)

5. REMOVE IGNITION COIL ASSY

(a) Remove the bolt and ignition coil.



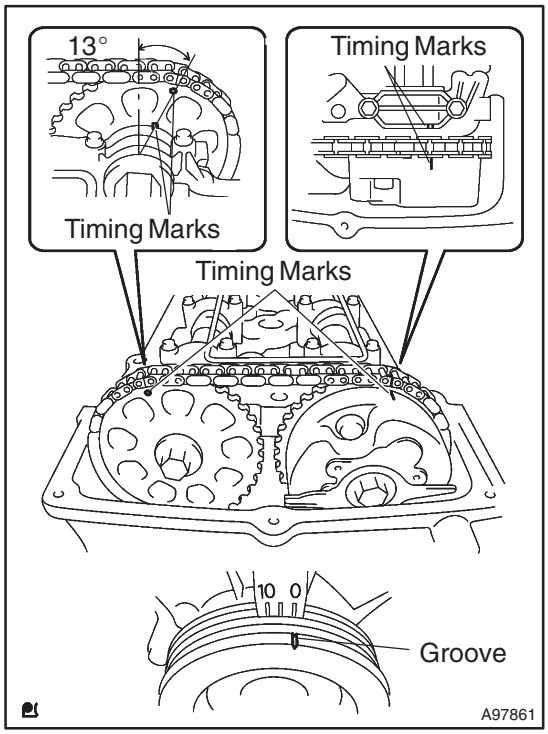
6. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Disconnect the wire harness from the 6 clamps.

(b) Remove the 19 bolts, 2 nuts, cylinder head cover and 2 gaskets.

7. REMOVE TIMING CHAIN GUIDE

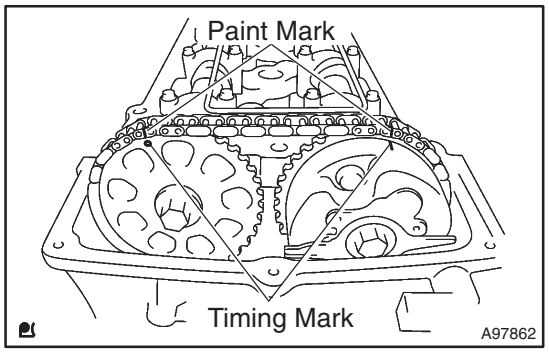
(a) Remove the 2 bolts and chain guide.



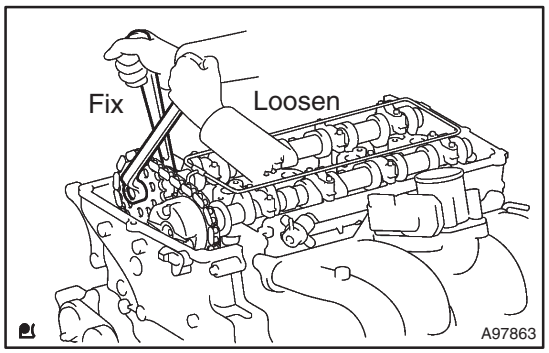
8. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

(a) Turn the crankshaft pulley, and align its groove with timing mark 0 of the timing chain cover.

(b) Check that the timing marks of the camshaft timing gear and sprocket are aligned with the timing marks of bearing cap No.1, as shown in the illustration.



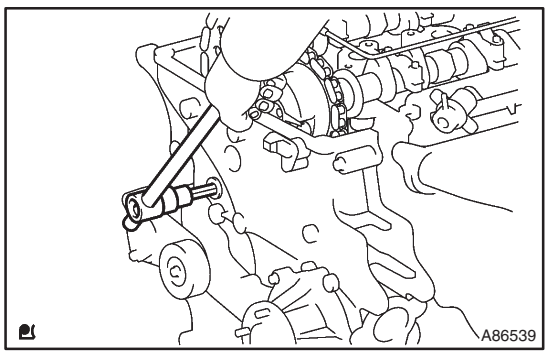
(c) Place paint marks on the timing chain and camshaft timing gear/sprocket.



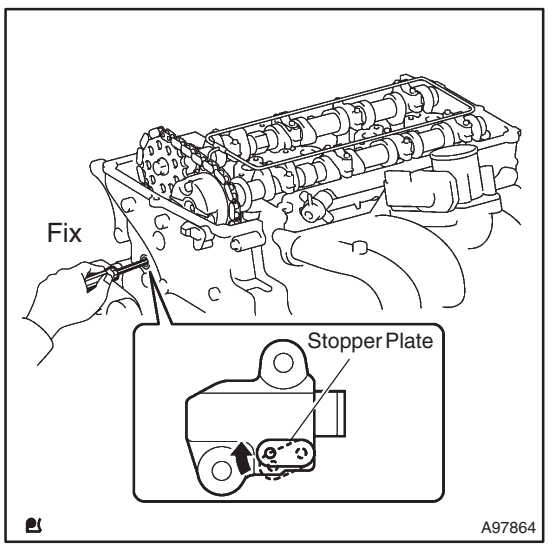
(d) Fix the camshaft with a wrench and then loosen the sprocket bolt.

NOTICE:

Be careful not to damage the oil delivery pipe.



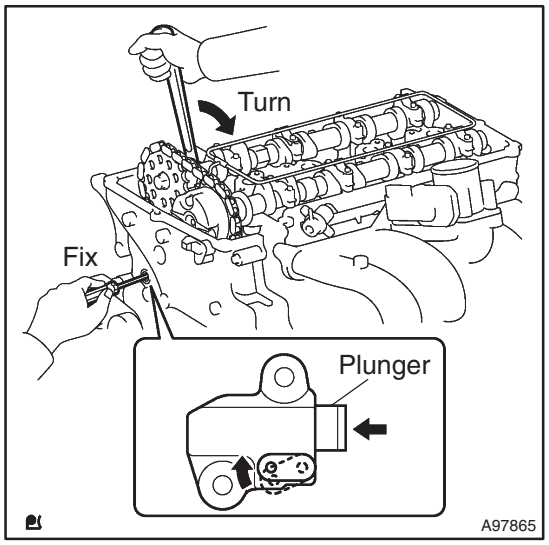
(e) Using a 10 mm socket hexagon wrench, remove the timing chain cover plug.



(f) Using a screwdriver, access the tensioner stopper plate through the chain tensioner service hole. Move the stopper plate upward to release the lock. Then hold the plate in that position as shown in the illustration.

HINT:

If the stopper plate's lock is difficult to release, slightly rotate the camshaft's hexagon–shaped part to the left and right.



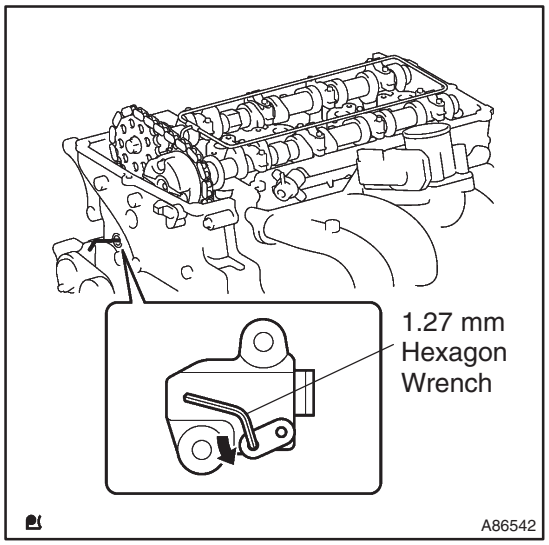
(g) With the stopper plate's lock released, slightly rotate the camshaft to the right. Then maintain it in that position.

NOTICE:

Be careful not to damage the oil delivery pipe.

HINT:

Rotating the camshaft to the right will cause pressure to be applied to the tensioner plunger.

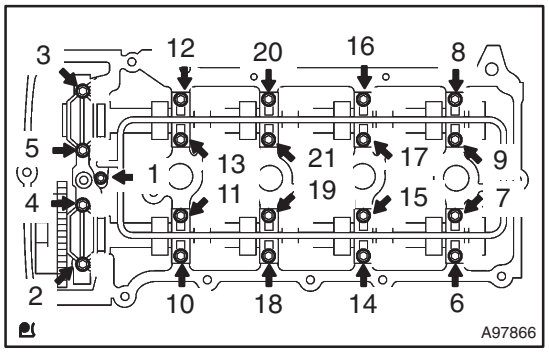


(h) Remove the screwdriver from the chain tensioner service hole. Move the stopper plate to the position shown in the illustration. Then insert a hexagon wrench into the hole.

HINT:

- If the wrench cannot fit into the hole, slightly rotate the camshaft to the left and then to the right. Then insert the wrench.
- To prevent the wrench from falling out, use tape to fix the wrench in place.

(i) Remove the camshaft timing sprocket from the camshaft.



9. REMOVE CAMSHAFT BEARING CAP

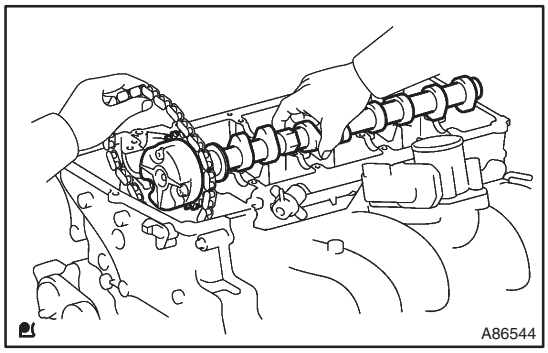
(a) Uniformly loosen the 21 bearing cap bolts in several steps in the sequence shown in the illustration.

(b) Remove the 9 bearing caps, oil delivery pipe, O–ring and camshaft.

NOTICE:

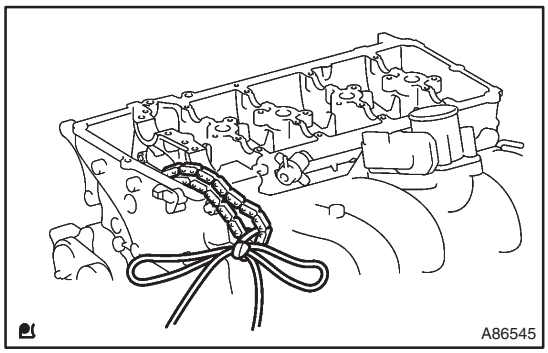
- **Place the camshaft on a flat surface and loosen the bolts uniformly.**
- **Do not pry the camshaft with a tool by applying excessive force to it.**
- **Do not damage the part to intake exhaust on the cylinder head side.**

10. REMOVE NO.2 CAMSHAFT



11. REMOVE CAMSHAFT

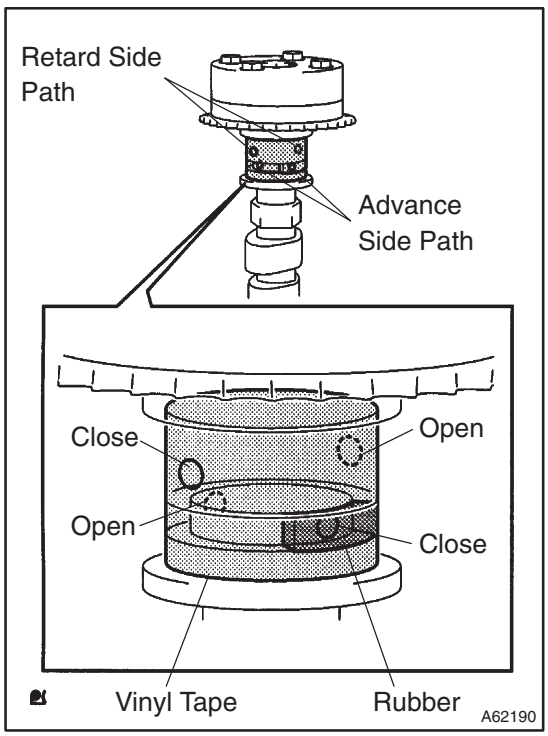
(a) Remove the camshaft while holding the timing chain.



(b) 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 the camshaft timing gear.

(1) Clamp the camshaft in a vise, and confirm that the camshaft timing gear is locked.

NOTICE:

Be careful not to damage the camshaft.

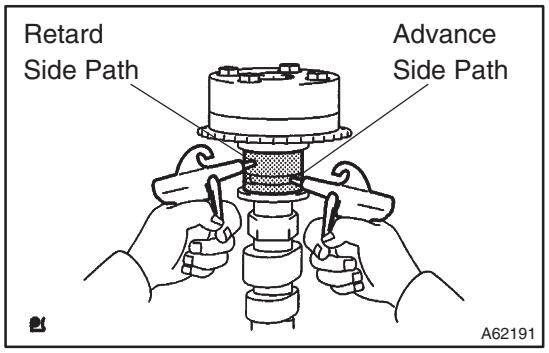
(b) Release the lock pin.

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

HINT:

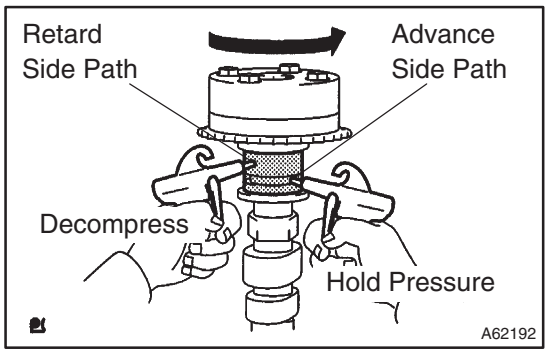
2 advance side paths are provided in the groove of the camshaft. Plug one of the paths with a rubber piece.

(2) Break through the tape of the advance side path and the retard side path on the opposite side to the hole of the advance side path.



(3) Apply approximately 200 kPa (2.0 kgf/cm^2, 28 psi) of air pressure to the two broken paths.

CAUTION:
Some oil splashing will occur. Cover the paths with a shop rag.



(4) Check that the camshaft timing gear revolves in the advance direction when reducing the air pressure applied to the retard side path.

OK: Gear rotates in the advance direction.

HINT:
This operation releases the lock pin for the most retarded position.

(5) When the camshaft timing gear reaches the most advanced position, release the air pressure from the retard side path and advance side path, in that order.

NOTICE:
Do not release the air pressure from the advance side path first. The gear may abruptly shift in the retard direction and break the lock pin.

(c) Check for smooth rotation.

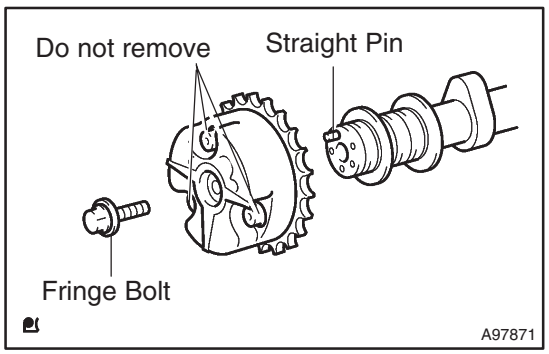
(1) Rotate the camshaft timing gear within its movable range several times, but do not turn it to the most retarded position. Check that the gear rotates smoothly.

OK: Gear rotates in the advance direction.

CAUTION:
Do not use air pressure to perform the smooth operation check.

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

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

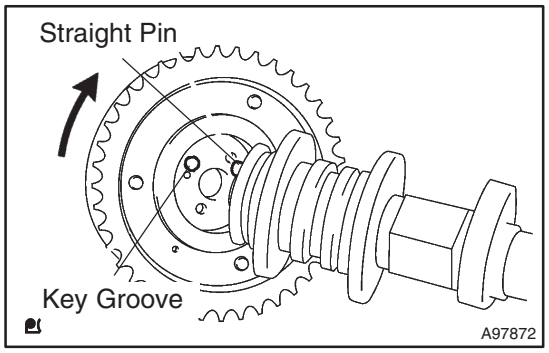


13. REMOVE CAMSHAFT TIMING GEAR ASSY

(a) Remove the fringe bolt and camshaft timing gear.

NOTICE:

- **Be sure not to remove the other 3 bolts.**
- **If planning to reuse the gear, be sure to release the straight pin lock before installing the gear.**



14. INSTALL CAMSHAFT TIMING GEAR ASSY

(a) Put the camshaft timing gear and camshaft together by aligning the key groove and straight pin.

(b) Lightly press the gear against the camshaft, and turn the gear. Push further at the position where the pin enters the groove.

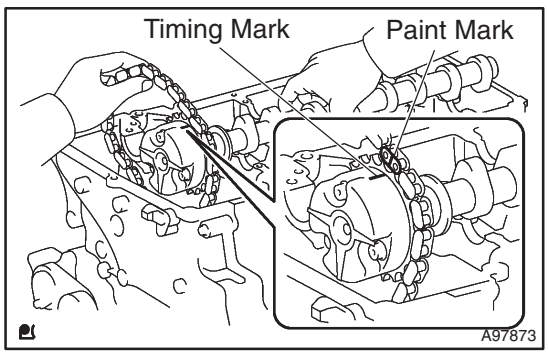
CAUTION:

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

(c) Check that there is no clearance between the gear's fringe and the camshaft.

(d) Tighten the fringe bolt with the camshaft timing gear fixed.
Torque: 78 N·m (795 kgf·cm 59 ft·lbf)

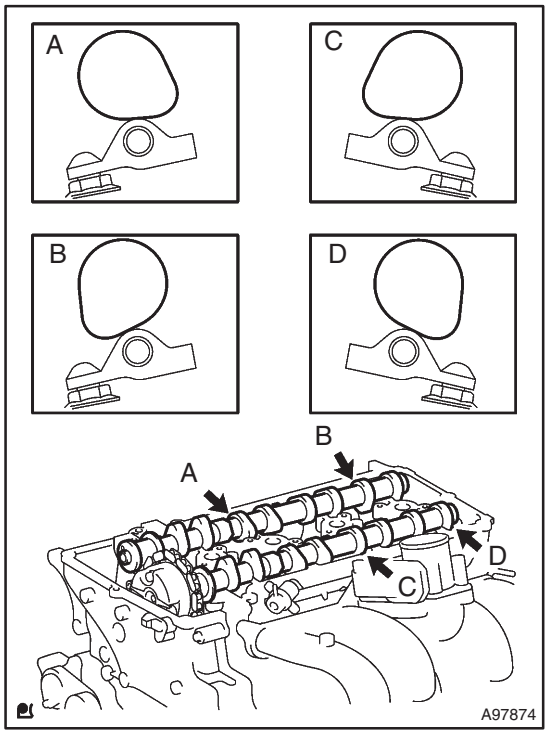
(e) Check that the camshaft timing gear assembly can move in the retard direction (the right angle), and is locked at the most retarded position.



15. INSTALL CAMSHAFT

(a) Apply clean engine oil to the camshaft's cam portion and the cylinder head journals.

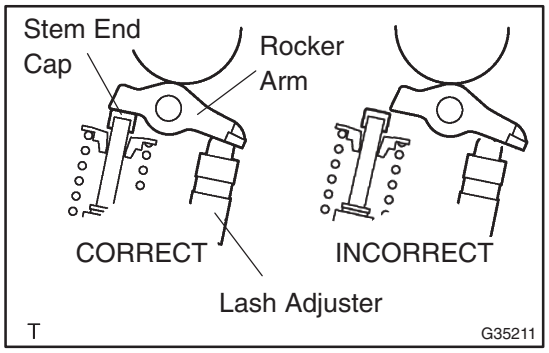
(b) Install the timing chain on the camshaft timing gear, with the painted mark of the link aligned with the timing mark of the camshaft timing gear.



(c) Set the 2 camshafts as shown in the illustration.

NOTICE:

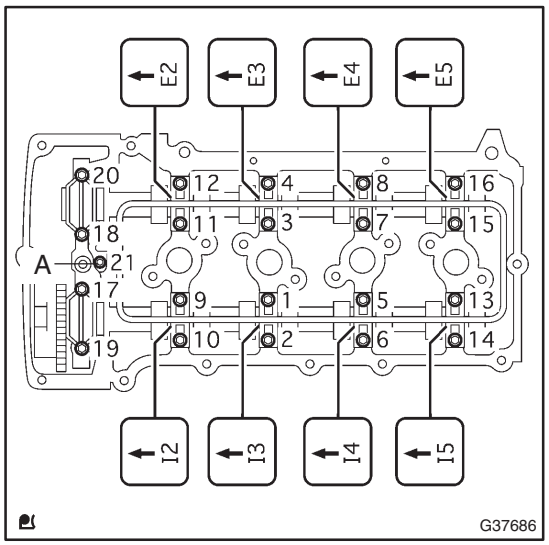
Align the paint mark and timing mark before setting the camshaft.



16. INSTALL NO.2 CAMSHAFT

NOTICE:

Before and after setting the camshaft and No.2 camshaft, check that the rocker arm is firmly set to the lash adjuster.



17. INSTALL CAMSHAFT BEARING CAP

(a) Temporarily install the camshaft bearing cap No.1.

(b) Check the proper location of each camshaft bearing cap and install them.

(c) Install a new O–ring to the camshaft bearing cap No.1.

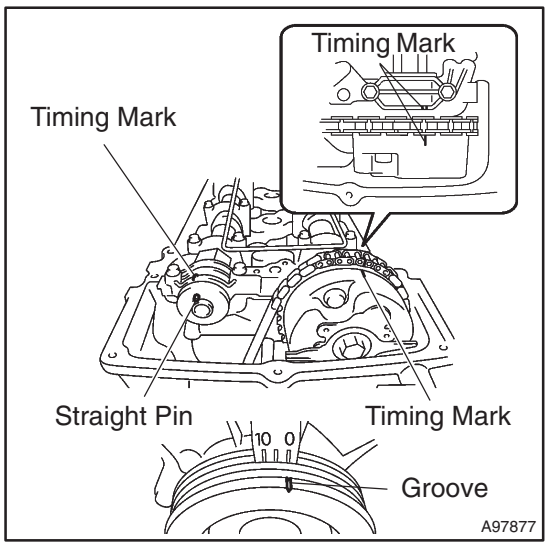
(d) Temporarily install the oil delivery pipe.

(e) Tighten the bolts in the order shown in the illustration.

Torque:

12 N·m (122 kgf·cm, 9 ft·lbf) for bolt A

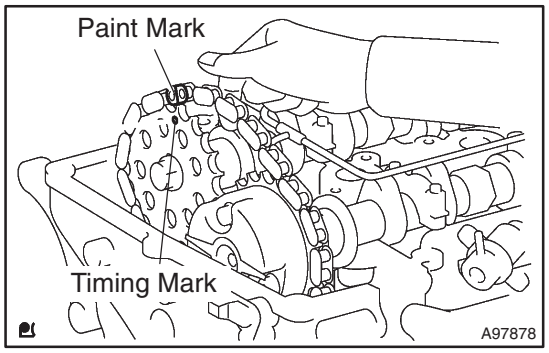
16 N·m (158 kgf·cm, 11 ft·lbf) for bolts except bolt A



18. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET

(a) Rotate the camshaft so that the camshaft's timing mark and the camshaft No.2 knock pin are positioned as shown in the illustration.

(b) Turn the crankshaft pulley, and align its groove with timing mark 0 of the timing chain cover.

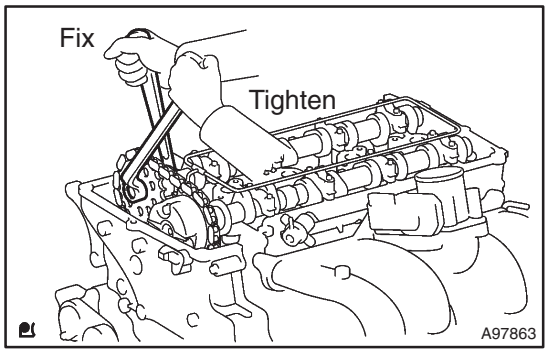


(c) Install the timing chain on the camshaft timing sprocket, with the paint mark aligned with the timing marks on the camshaft timing sprocket.

(d) Align the camshaft No.2 knock pin and the camshaft timing sprocket's pin hole. Then install the camshaft timing sprocket to the camshaft No.2.

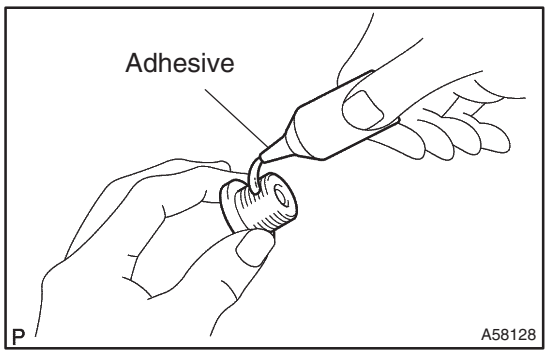
NOTICE:

If the knock pin and pin hole are difficult to align, slightly rotate the camshaft No.2 to the left and right using the camshaft's hexagon–shaped part. Then attempt alignment again.



(e) Fix the camshaft with a wrench, and then tighten the sprocket bolt.
Torque: 78 N·m (795 kgf·cm, 58 ft·lbf)

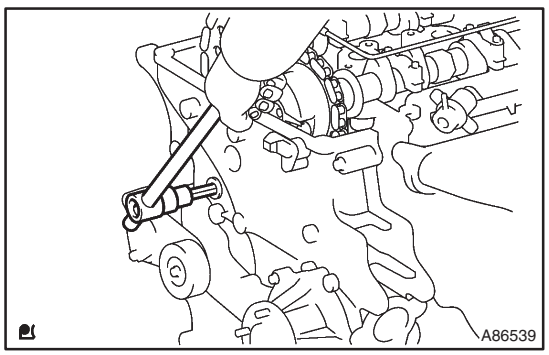
(f) Remove the hexagon wrench from the chain tensioner.



(g) Apply adhesive to 2 or 3 threads of the timing chain cover plug.
Adhesive:
Part No.08833–00070, THREE BOND 1324 or equivalent

NOTICE:

Remove any oil from the bolt hole.

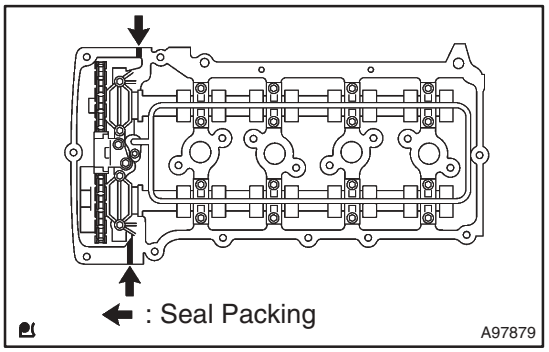


(h) Using a 10 mm socket hexagon wrench, install the timing gear case plug.
Torque: 17 N·m (170 kgf·cm, 12 ft·lbf)

19. INSTALL TIMING CHAIN GUIDE

(a) Install a new O–ring to the camshaft bearing cap.

(b) Install the timing chain guide with the 2 bolts.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



20. INSTALL CYLINDER HEAD COVER SUB–ASSY

(a) Install the cylinder head cover gasket and cylinder head gasket No.2 to the cylinder head cover.

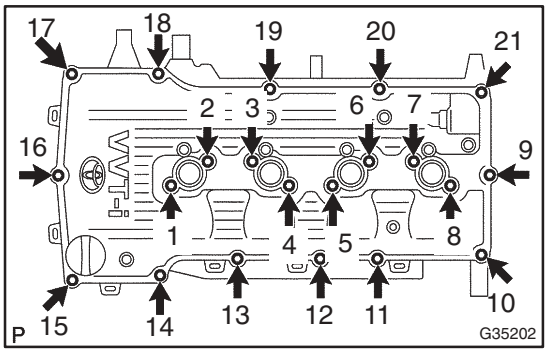
(b) Remove any old packing (FIPG) material.

(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 after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



(d) Temporarily install the head cover with the 19 bolts and 2 nuts.

(e) Uniformly tighten the 19 bolts and 2 nuts in the sequence shown in the illustration.

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

(f) After tightening the 19 bolts and 2 nuts at the specified torque, retighten 1–8 bolts at the torque.

(g) Connect the wire harness to the 6 clamps.

21. INSTALL IGNITION COIL ASSY

(a) Install the ignition coil with the bolt.

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

22. INSTALL AIR CLEANER CAP W/INTAKE AIR CONNECTOR (SEE PAGE 14–19)

23. INSTALL FAN PULLEY

24. INSTALL FLUID COUPLING ASSY

(a) Temporarily place the fan shroud together with the fluid coupling to the correct location inside the engine room first.

(b) Install the coupling to the fun pulley with the 4 nuts.

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

25. CONNECT FAN SHROUD (SEE PAGE 14–19)

26. INSTALL FAN AND GENERATOR V BELT (SEE PAGE 14–9)

27. CHECK FOR ENGINE OIL LEAKS