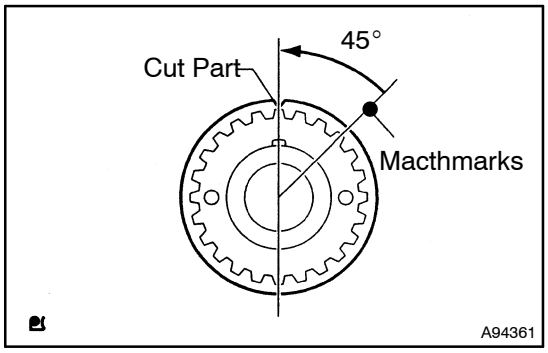
CAMSHAFT (RH BANK)

141MR–01

REPLACEMENT

1. REMOVE TIMING BELT (See page 14–71)
2. REMOVE CYLINDER HEAD COVER SUB–ASSY (See page 14–97)



3. PISTON & VALVE BREAK PREVENT WORK

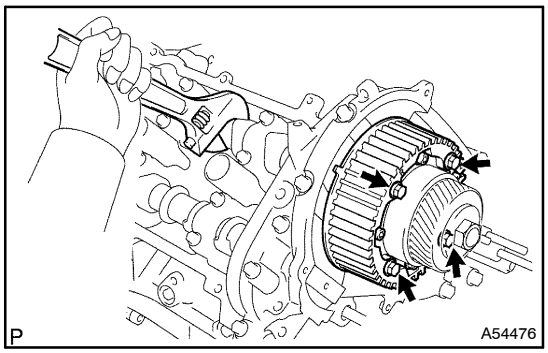
(a) Turn the crankshaft timing pulley counterclockwise by 45° and match the cut part with the illustrated position.

HINT:

When the No. 1 cylinder is positioned at 45° BTDC, the valve and piston do not interfere with each other even when the valve is fully open.

NOTICE:

Be sure to match the cut part by turning it counterclockwise.



4. REMOVE CAMSHAFT TIMING PULLEY

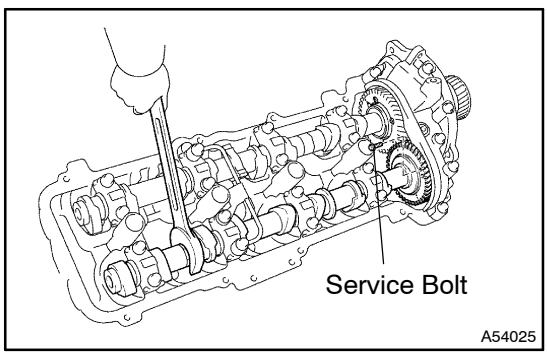
(a) Remove the 4 bolts and timing pulley.

5. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

6. REMOVE CAMSHAFT

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



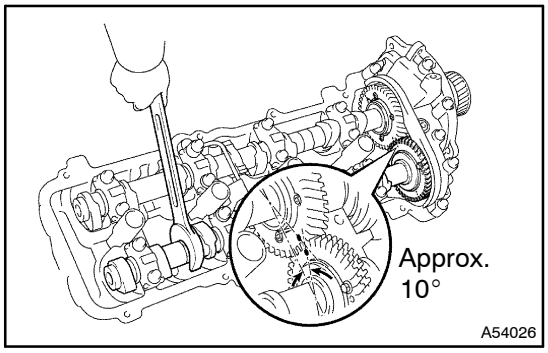
(a) Bring the service bolt hole of the sub gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

(b) Secure the sub gear to the main gear with a service bolt.

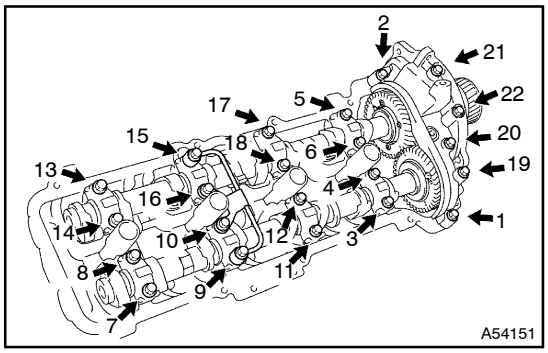
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 to 20 mm (0.63 to 0.79 in.)

HINT:
When removing the camshaft, make sure that the torsional spring force of the subgear has been eliminated by the above operation.



(c) Set the timing mark (1 dot mark) of the camshaft main gear at an angle of approximately 10° by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.



(d) Uniformly loosen the 22 bearing cap bolts in several passes in the sequence shown in the illustration.
(e) Remove the 22 bearing cap bolts, 4 seal washers, oil feed pipe, 9 bearing caps, camshaft housing plug, oil control valve filter and 2 camshafts.

NOTICE:

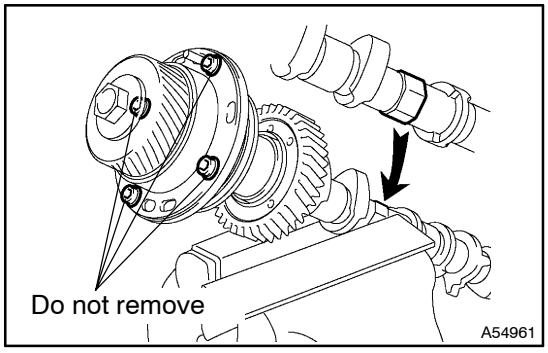
- **Do not pry the camshaft with a tool by applying excessive force to it.**
- **Do not damage the reception part of the thrust on the cylinder head side.**

7. REMOVE CAMSHAFT TIMING TUBE ASSY

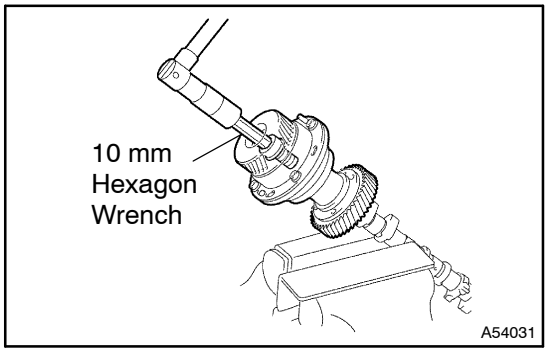
(a) Mount the hexagon wrench head portion of the intake camshaft in a vise.

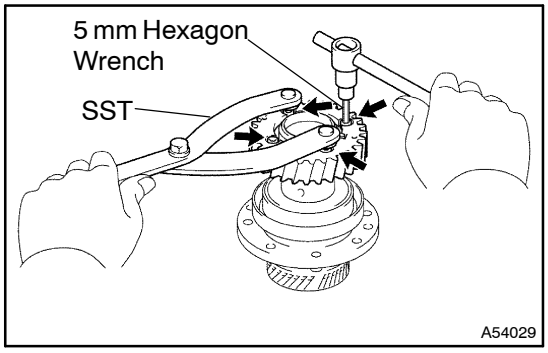
NOTICE:

- **Be careful not to damage the camshaft.**
- **Do not remove the 4 bolts shown in the illustration. The bolts determine the backlash of the gear in the timing tube. If any of the bolts are removed, install a new timing tube assembly.**



(b) Remove the screw plug and seal washer.
(c) Using a 10 mm hexagon wrench, remove the bolt.
(d) Pull out the timing tube and drive gear assembly from the camshaft.



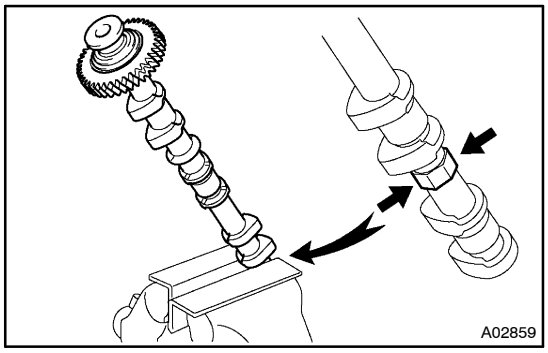


(e) Using SST and a 5 mm hexagon wrench, remove the 4 bolts, drive gear and oil seal.

NOTICE:

Be careful not to damage the timing tube.

SST 09960–10010 (09962–01000, 09963–00500)

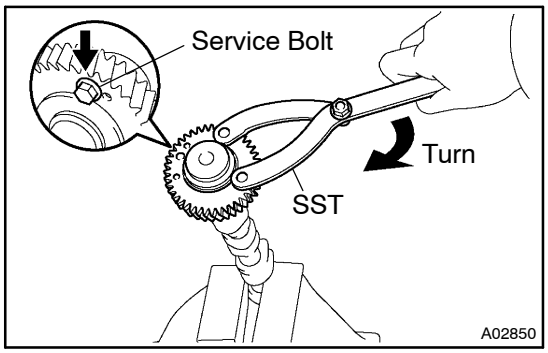


8. REMOVE CAMSHAFT SUB GEAR

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

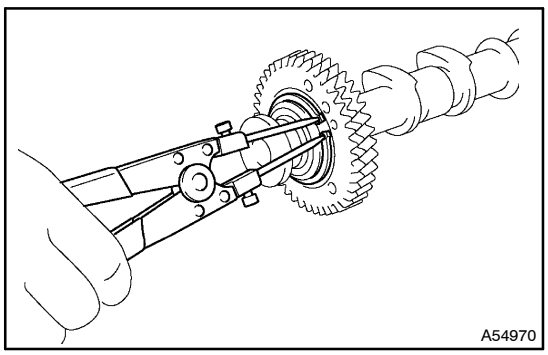
NOTICE:

Be careful not to damage the camshaft.



(b) Using SST, turn the sub gear clockwise and remove the service bolt.

SST 09960–10010 (09962–01000, 09963–00500)

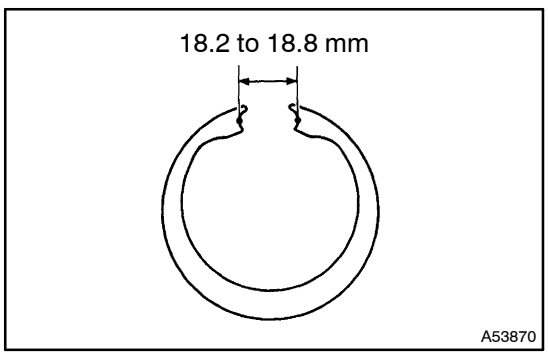


(c) Using snap ring pliers, remove the snap ring.

(d) Remove the wave washer, sub gear and bolt washer.

HINT:

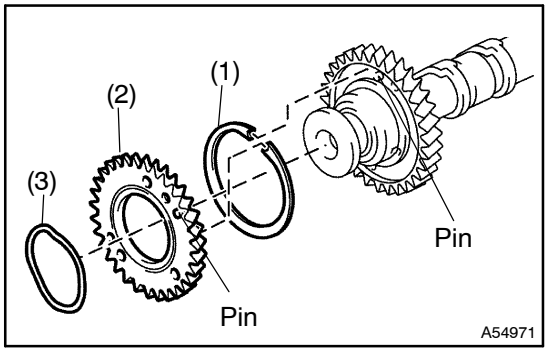
Arrange the driven sub gears and bolt washers (RH and LH sides).



(e) Using a vernier caliper, measure the gap between the washer ends.

Gap: 18.2 to 18.8 mm (0.712 to 0.740 in.)

If the gap is not as specified, replace the bolt washer.

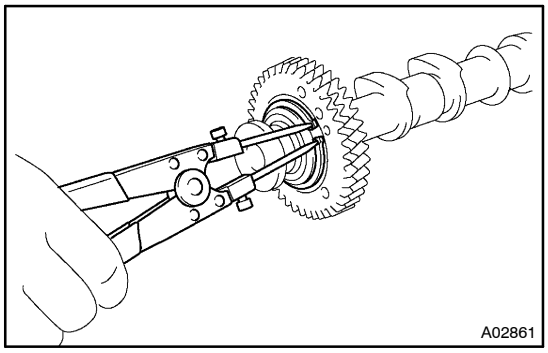


9. INSTALL CAMSHAFT SUB GEAR

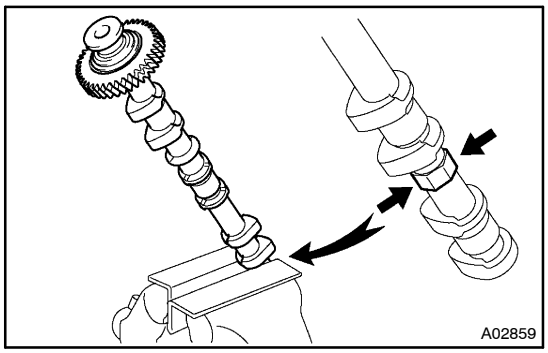
(a) Install the bolt washer (1), sub gear (2) and wave washer (3).

HINT:

Attach the pins on the gears to the gear bolt washer ends.



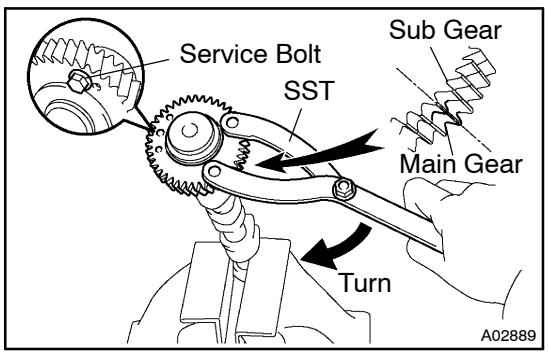
(b) Using snap ring pliers, install the snap ring.



(c) Mount the hexagon wrench head portion of the camshaft in a vise.

HINT:

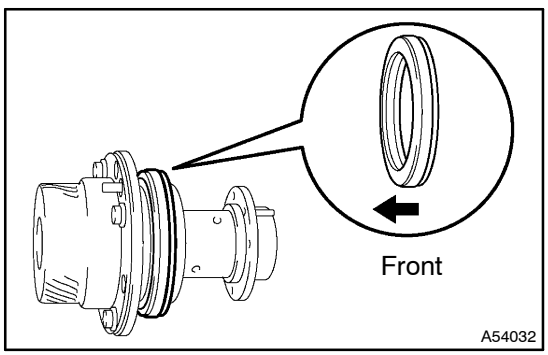
Be careful not to damage the camshaft.



(d) Using SST, align the holes of the driven main gear and sub gear by turning the sub gear clockwise. Temporarily install a service bolt.

SST 09960–10010 (09962–01000, 09963–00500)

(e) Align the gear teeth of the driven main gear and sub gear, and tighten the service bolt.

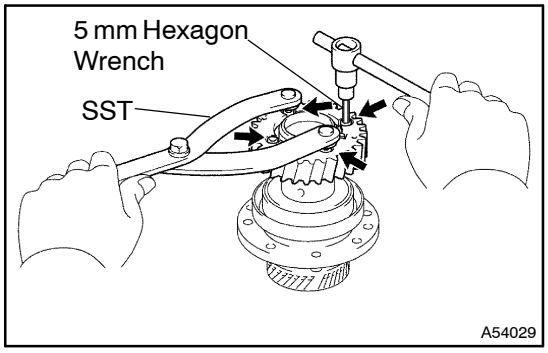


10. INSTALL CAMSHAFT TIMING TUBE ASSY

(a) Insert a new oil seal into the camshaft timing tube until it reaches the stopper.

NOTICE:

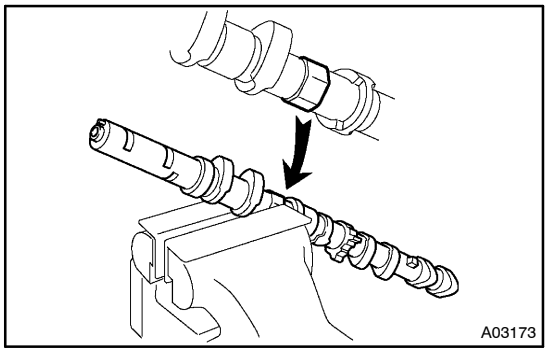
- **Be careful of the installation direction.**
- **Do not turn over the oil seal lip.**



(b) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.

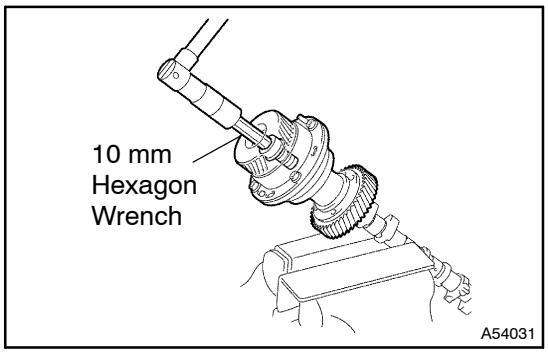
(c) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several passes.
SST 09960–10010 (09962–01000, 09963–00500)
Torque: 7.5 N·m (77 kgf·cm, 66 in.·lbf)

NOTICE:
Be careful not to damage the timing tube.



(d) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:
Be careful not to damage the camshaft.



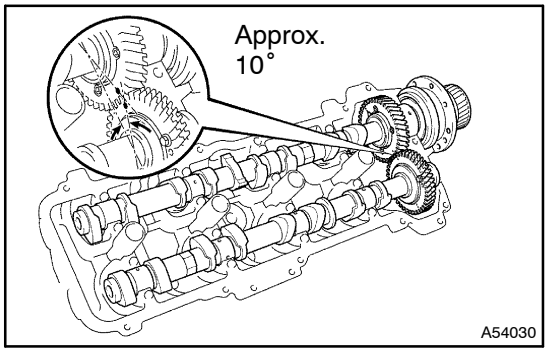
(e) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until it touches the bottom.

(f) Using a 10 mm hexagon wrench, install the bolt.
Torque: 78 N·m (795 kgf·cm, 58 ft·lbf)

(g) Install the seal washer and screw plug.
Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

11. INSTALL CAMSHAFT

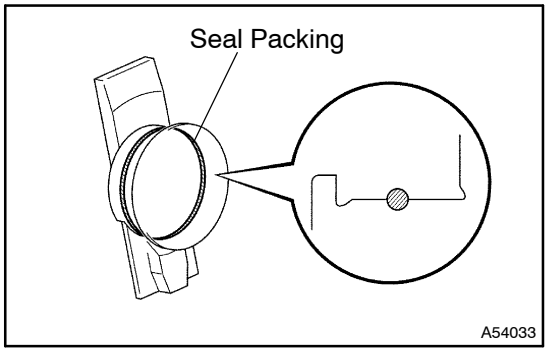
NOTICE:
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(1) Apply engine oil to the cam and gear of the camshaft and also the journal of the cylinder head.

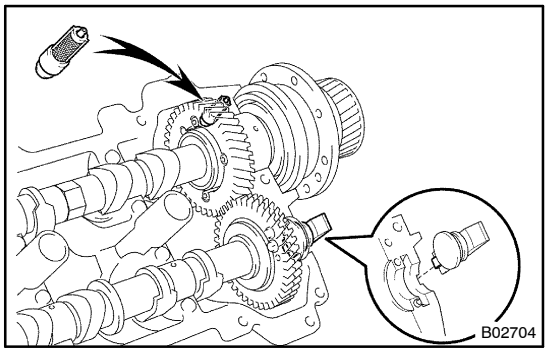
(2) Align the timing marks (1 dot mark each) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.

(3) Set the timing mark (1 dot mark each) of the camshaft drive and driven main gears at an angle of approximately 10°.



(4) Apply seal packing to the camshaft housing plug.
- Remove the old packing (FIPG) material.
- Apply seal packing to the housing plug.

Seal packing: Part No. 08826–00080 or equivalent

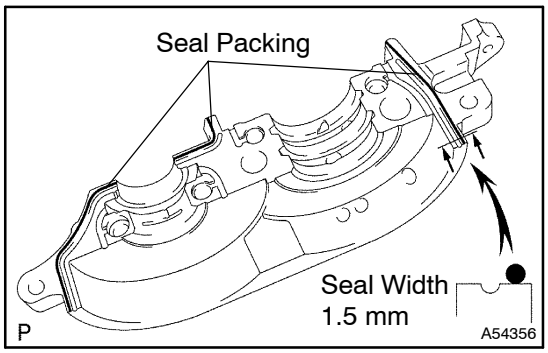


(5) Install the camshaft housing plug to the cylinder head as shown in the illustration.

(6) Install the oil control valve filter to the cylinder head.

NOTICE:

Be careful of the installation direction.

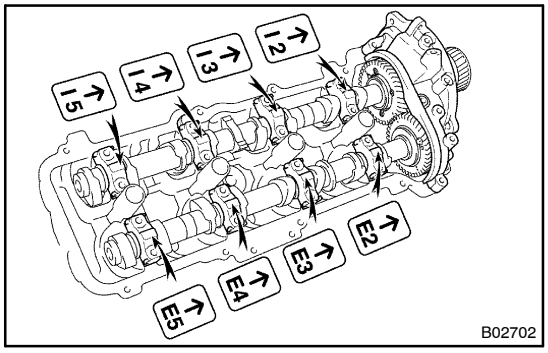


(7) Apply seal packing to the front bearing cap.
- Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and groove.
- Thoroughly clean all components to remove all loose material.
- Using a non–residue solvent, clean both sealing surfaces.
- Apply seal packing to the bearing cap as shown in the illustration.
- Install a nozzle that has been cut to a 1.5 mm (0.059 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove the nozzle from the tube and reinstall the cap.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

Do not apply seal packing to the front bearing cap grooves.

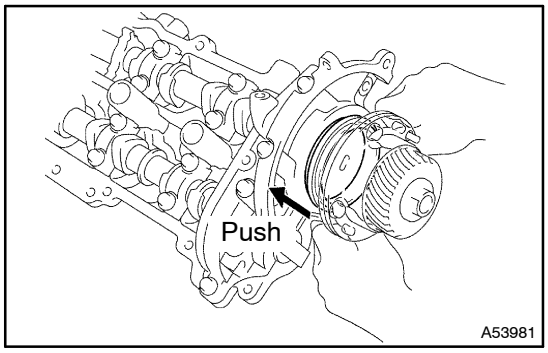


(8) Install the front bearing cap.

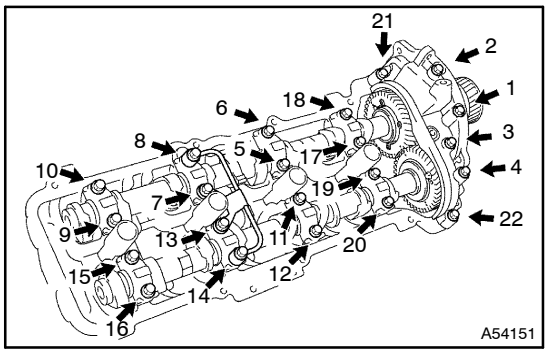
HINT:

Installing the front bearing cap will determine the thrust portion of the camshaft.

(9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



(10) Push in the camshaft oil seal.



(11) Install 4 new seal washers to the bearing cap bolts (1 to 4).

(12) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts (5 to 22).

NOTICE:

Do not apply engine oil under the heads of the bearing cap bolts (1 to 4).

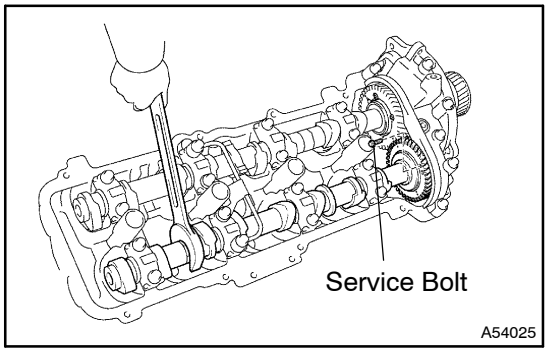
(13) Install the oil feed pipe with the 22 bearing cap bolts.

(14) Uniformly tighten the 22 bearing cap bolts in several passes in the sequence shown in the illustration.

Torque:

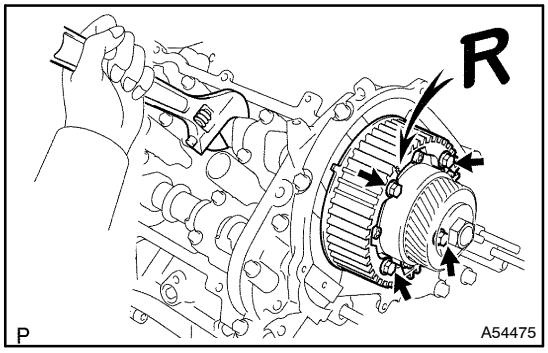
7.5 N·m (77 kgf·cm, 66 in.·lbf) for bolts 21 and 22

16 N·m (163 kgf·cm, 12 ft·lbf) for others



(15) Remove the service bolt.

12. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY



13. INSTALL CAMSHAFT TIMING PULLEY

(a) Align the camshaft timing tube knock pin with the knock pin groove of the timing pulley.

(b) Attach the timing pulley to the camshaft timing tube. Face the timing pulley's "R" mark forward.

(c) Hold the hexagon wrench head portion of the camshaft, and install the 4 pulley bolts.

Torque: 7.5 N·m (77 kgf·cm, 66 in.·lbf)

14. INSTALL CYLINDER HEAD COVER SUB–ASSY (See page 14–97)

15. INSTALL TIMING BELT (See page 14–71)