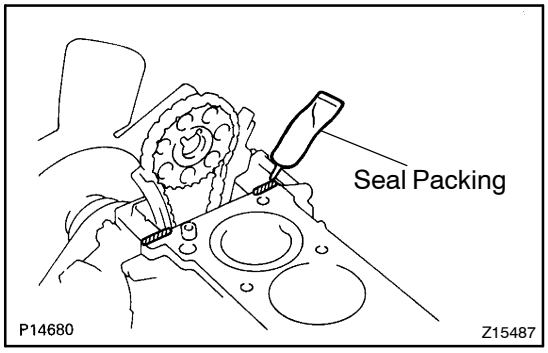
EM153–02

INSTALLATION



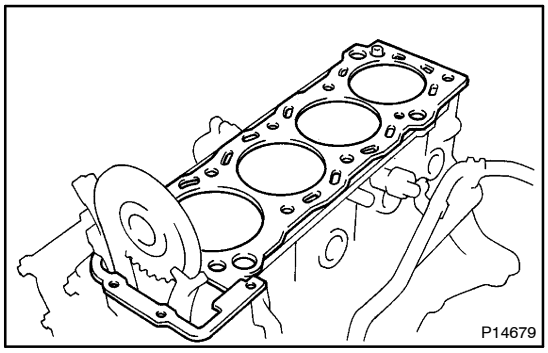
1. PLACE CYLINDER HEAD ON CYLINDER BLOCK

(a) Apply seal packing to the 2 locations as shown.

Seal packing: Part No. 08826–00080 or equivalent

NOTICE:

Do not apply too much seal packing.

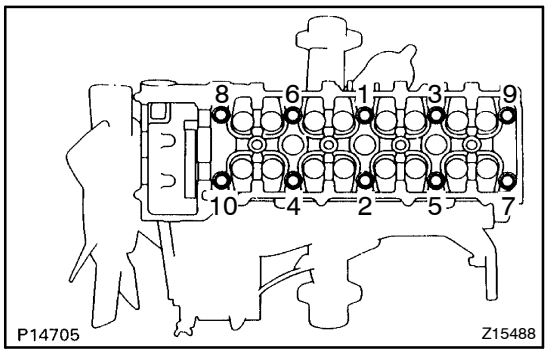


(b) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

(c) Place the cylinder head in position on the cylinder head gasket.



2. INSTALL CYLINDER HEAD BOLTS

HINT:

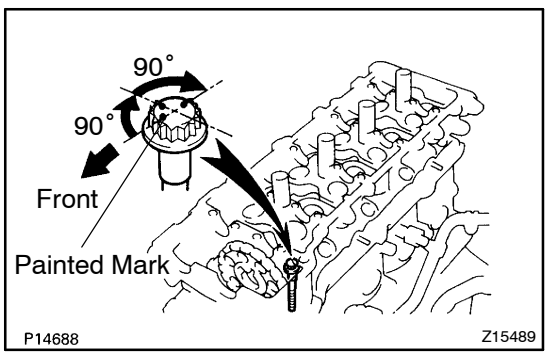
- The cylinder head bolts are tightened in 3 progressive steps (steps (b) and (d)).
- If any cylinder head bolt is broken or deformed, replace it.

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install and uniformly tighten the 10 cylinder head bolts and plate washers, in several passes, in the sequence shown.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

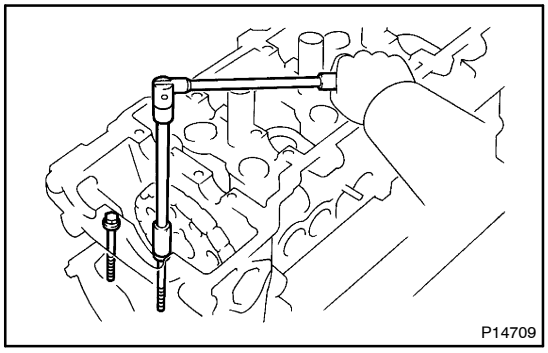


(c) Mark the front of the cylinder head bolt head with paint.

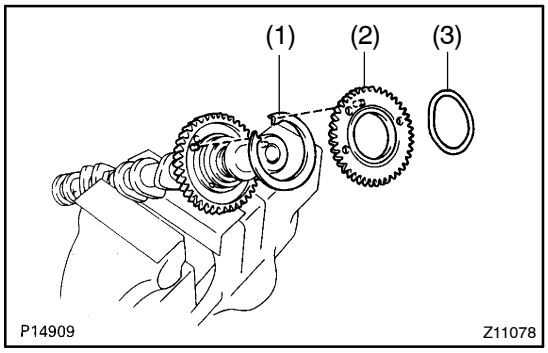
(d) Retighten the cylinder head bolts by 90° in the numerical order shown.

(e) Retighten the cylinder head bolts by an additional 90°.

(f) Check that the painted mark is now facing rearward.



(g) Install and torque the 2 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)



3. ASSEMBLE EXHAUST CAMSHAFT

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

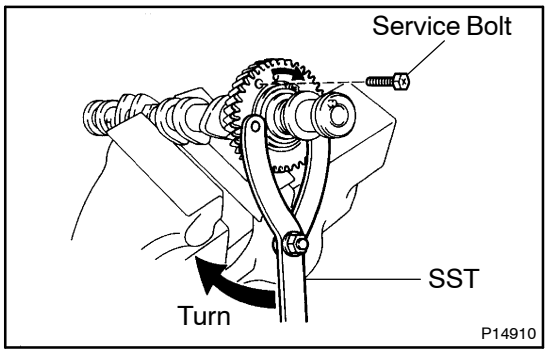
NOTICE:

Be careful not to damage the camshaft.

(b) Install the camshaft gear spring, camshaft sub–gear and wave washer.

HINT:

Align the pins on the gears with the spring ends.



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

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

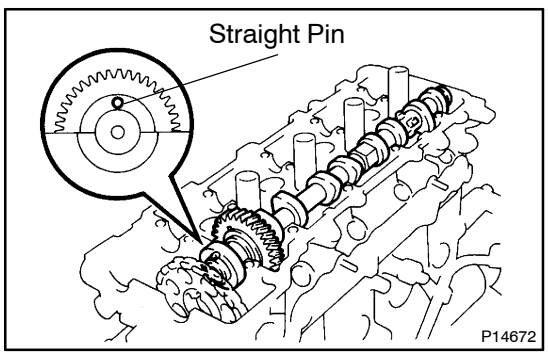
SST 09960–10010 (09962–01000, 09963–00500)

4. INSTALL CAMSHAFTS

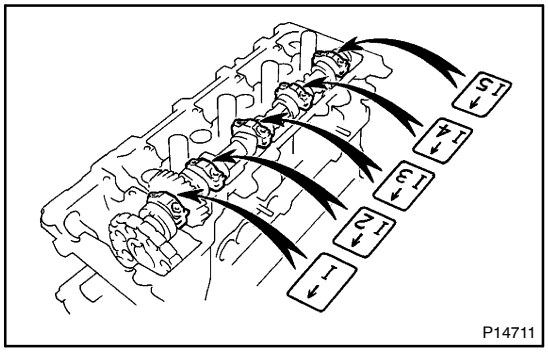
NOTICE:

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, these steps should be carried out.

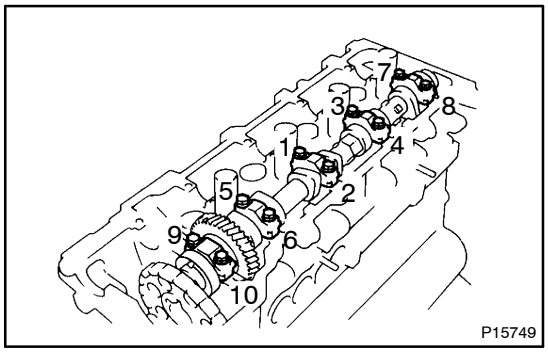
(a) Apply MP grease to the thrust portion of the intake camshaft.



(b) Place the intake camshaft with knock pin facing upward of camshaft angle on the cylinder head.



(c) Install the bearing caps in their proper locations.

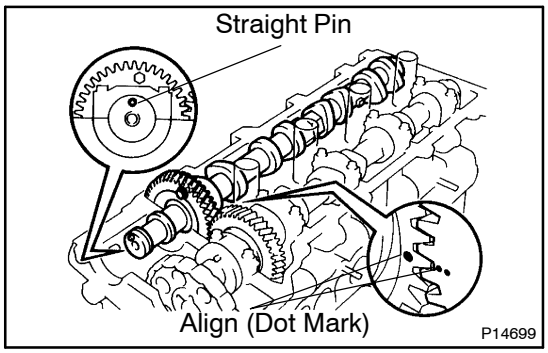


(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(e) Install and uniformly tighten the 10 bearing cap bolts in the sequence shown.

Torque: 15.5 N·m (160 kgf·cm, 12 ft·lbf)

(f) Apply MP grease to the thrust portion of the exhaust camshaft.

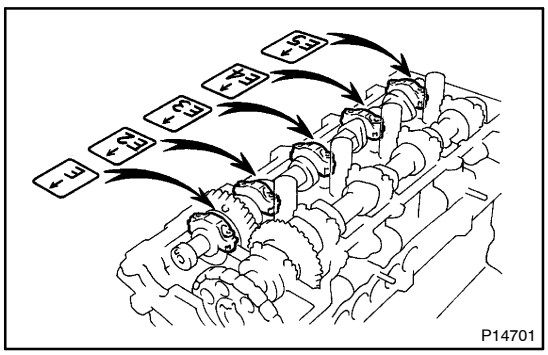


(g) Engage the exhaust camshaft gear to the intake camshaft gear by matching the timing marks (1 and 2 dots) on each gear.

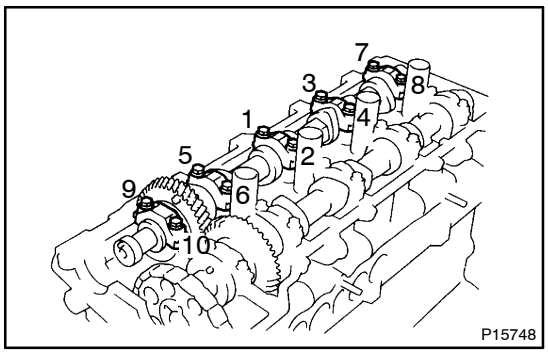
NOTICE:

There are also timing marks (for TDC) on each gear as shown in the illustration. Do not use these marks.

(h) Roll down the exhaust camshaft onto the bearing journals while engaging gears with each other.



(i) Install the bearing caps in their proper locations.



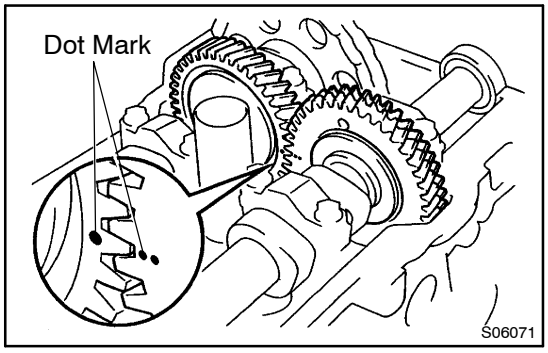
(j) Apply light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(k) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.

Torque: 15.5 N·m (160 kgf·cm, 12 ft·lbf)

(l) Remove the service bolt.

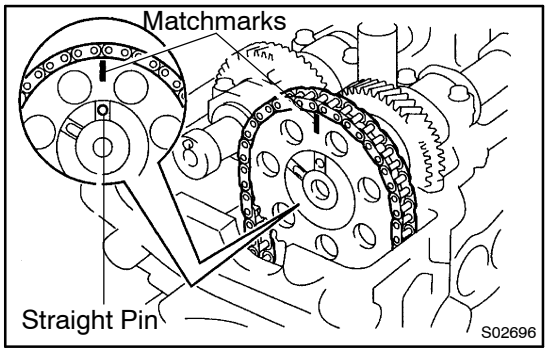
(m) Check that the intake and exhaust camshafts turn smoothly.



5. SET NO.1 CYLINDER TO TDC/COMPRESSION

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

(b) Turn the camshafts so that the timing marks with 1 and 2 dots will be in straight line on the cylinder head surface as shown in the illustration.



6. INSTALL CAMSHAFT TIMING GEAR

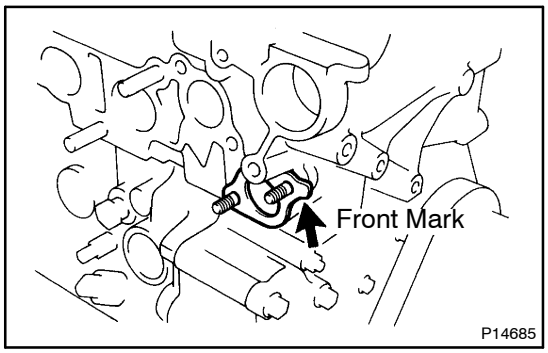
HINT:

Check that the matchmarks on the camshaft timing gear and timing chain are aligned.

(a) Place the gear over the straight pin of the intake camshaft.

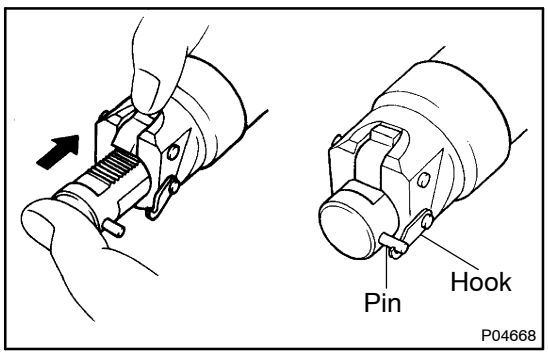
(b) Hold the intake camshaft with a wrench, install and torque the bolt.

Torque: 73.5 N·m (750 kgf·cm, 54 ft·lbf)



7. INSTALL CHAIN TENSIONER

(a) Place a new gasket so that the front mark is toward the front side.

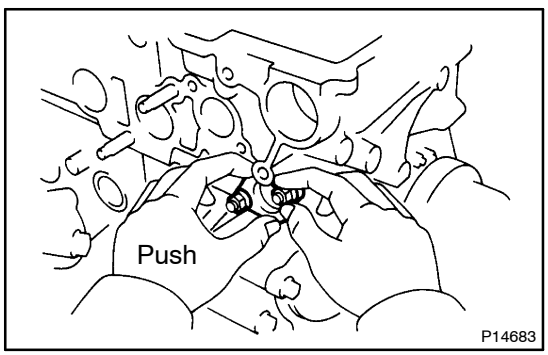


(b) Release the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.

(c) Turn the crankshaft pulley clockwise to provide some slack for the chain on the tensioner side.

NOTICE:

Do not turn the pulley counterclockwise.



(d) Push the tensioner by hand until it touches the head installation surface, then install the 2 nuts.

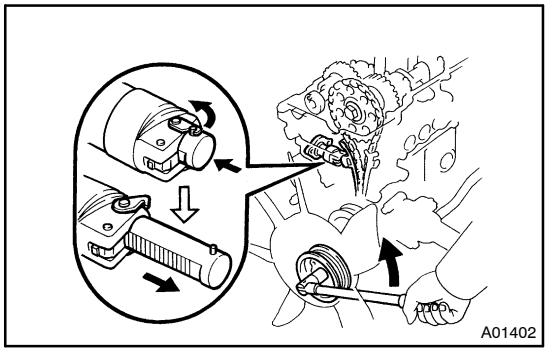
(e) Tighten the 2 nuts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(f) Check that the hook of the tensioner is not released.

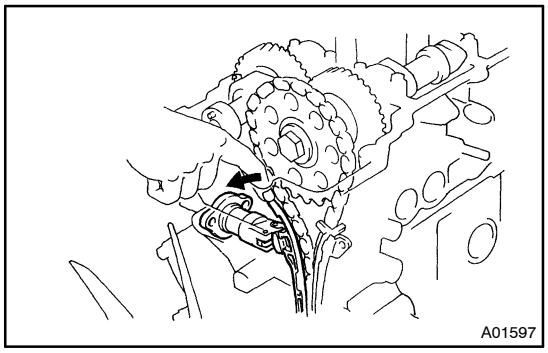
NOTICE:

If the plunger springs out during installation of the chain tensioner, repeat the operation in step (b) before installing the tensioner.



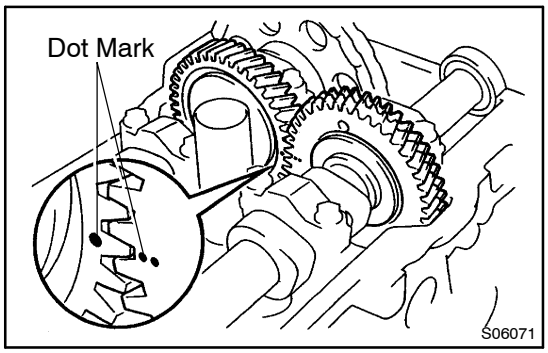
8. SET CHAIN TENSIONER

Turn the crankshaft to the left so that the hook of the chain tensioner is released from the pin of the plunger, causing the plunger to spring out and the slipper to be pushed in to the chain.



HINT:

If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released and the plunger springs out.



9. CHECK VALVE TIMING

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

NOTICE:

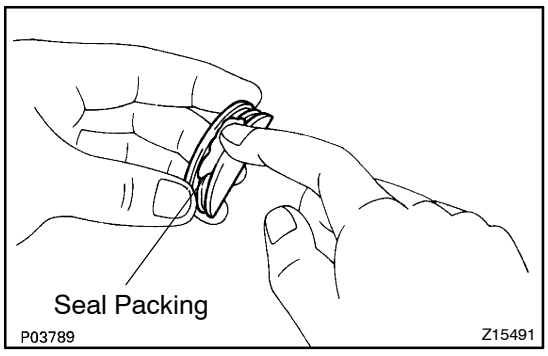
Always turn the crankshaft clockwise.

(b) Check that the timing marks (1 and 2 dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration.
If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

10. CHECK AND ADJUST VALVE CLEARANCE

Valve clearance (Cold):
Intake: 0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust: 0.25 – 0.35 mm (0.010 – 0.014 in.)

11. INSTALL SPARK PLUGS



12. INSTALL SEMI–CIRCULAR PLUGS

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

(b) Apply seal packing to the cylinder head installation surface of the semi–circular plugs.
Seal packing: Part No. 08826–00080 or equivalent

(c) Install the semi–circular plug to the cylinder head.

13. INSTALL CYLINDER HEAD COVER

14. INSTALL ENGINE WIRE BRACKETS

15. INSTALL FRONT ENGINE HANGER
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)

16. INSTALL CYLINDER HEAD REAR COVER

Install a new gasket and the rear cover with the 3 bolts.

Torque: 13.5 N·m (135 kgf·cm, 10 ft·lbf)

17. INSTALL WATER OUTLET

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

18. INSTALL EXHAUST MANIFOLD

(a) Install a new gasket and the exhaust manifold with the 6 nuts.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

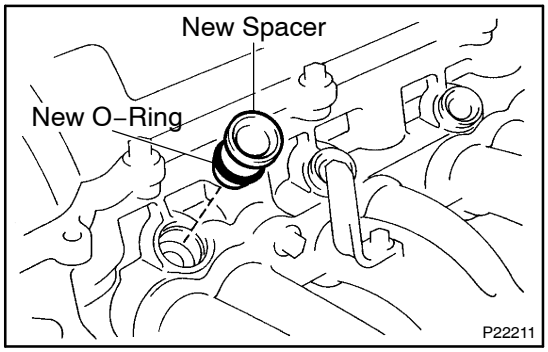
(b) Install the heat insulator with the 2 bolts and 2 nuts.

Torque: 5.5 N·m (55 kgf·cm, 48 in.·lbf)

19. INSTALL INTAKE MANIFOLD

Install a new gasket and the intake manifold with the 3 bolts and 2 nuts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



20. INSTALL INJECTORS AND DELIVERY PIPE

HINT:

When using a new cylinder head, spacers must be installed.

Apply a light coat of gasoline to a new O–ring and install it to a new spacer.

21. INSTALL FUEL RETURN PIPE

22. INSTALL FUEL INLET PIPE

Install the fuel inlet pipe and 4 new gaskets with the 2 union bolts.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

23. CONNECT INJECTOR CONNECTORS

24. INSTALL AIR INTAKE CHAMBER ASSEMBLY

(a) Install a new gasket and the air intake chamber assembly with the 3 bolts and 2 nuts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Connect the brake booster vacuum hose to union

(c) Connect the water bypass hose to water bypass pipe

(d) Connect the water bypass hose to cylinder head rear cover

25. INSTALL INTAKE CHAMBER STAY

Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

26. CONNECT ENGINE WIRE

27. INSTALL IGNITION COILS

28. INSTALL PCV HOSES

29. INSTALL OIL DIPSTICK GUIDE

Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

30. FILL WITH ENGINE COOLANT

31. RECHECK ENGINE COOLANT LEVEL