EM0ED–03

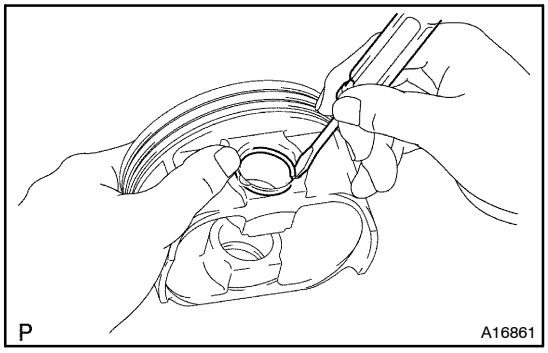
# REASSEMBLY

HINT:

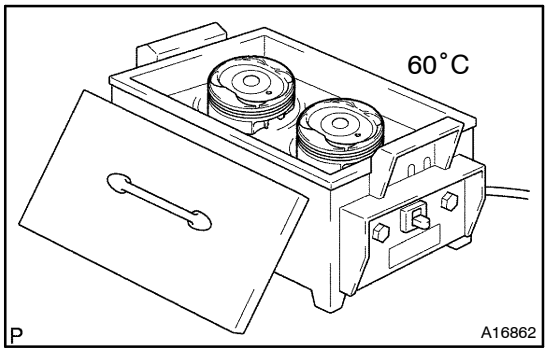
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O–rings and oil seals with new parts.

**1. ASSEMBLE PISTON AND CONNECTING ROD**

(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.




(b) Gradually heat the piston to about 60˚C (140˚F).



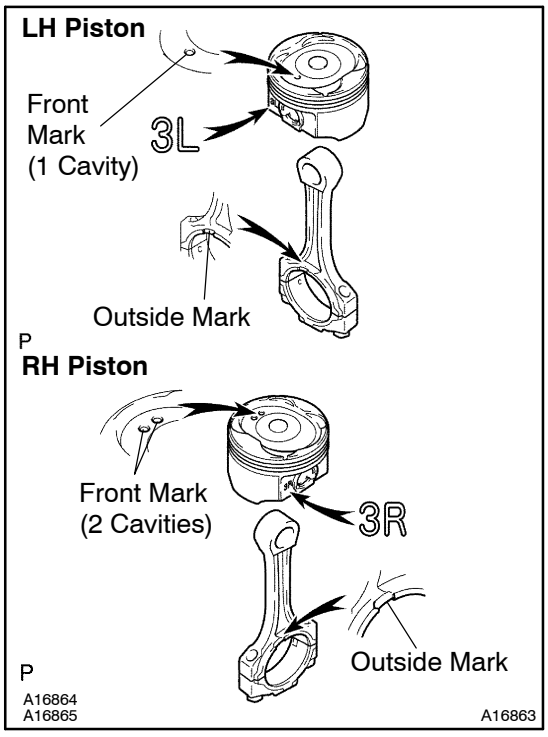

(c) Coat the piston pin with engine oil.

(d) Position the piston front mark with respect to the outside mark on the connecting rod as shown in the diagram.

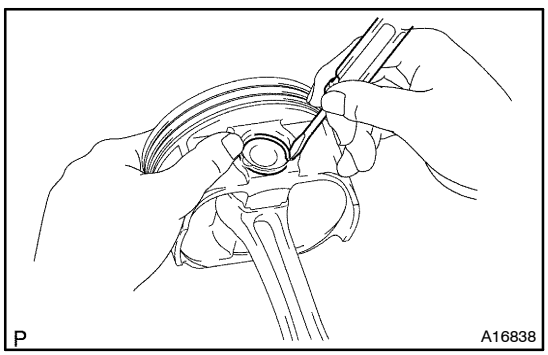
**NOTICE:**

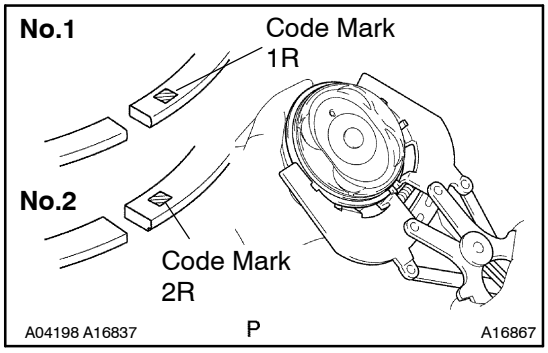
**The installation directions of the piston and connecting rod are different for the LH and RH banks. The LH piston is marked with ”3L”, the RH piston with ”3R”.**

(e) Align the piston pin holes of the piston and connecting rod, and push in the piston pin with your thumb.




(f) Using a small screwdriver, install a new snap ring on the other side of the piston pin hole.





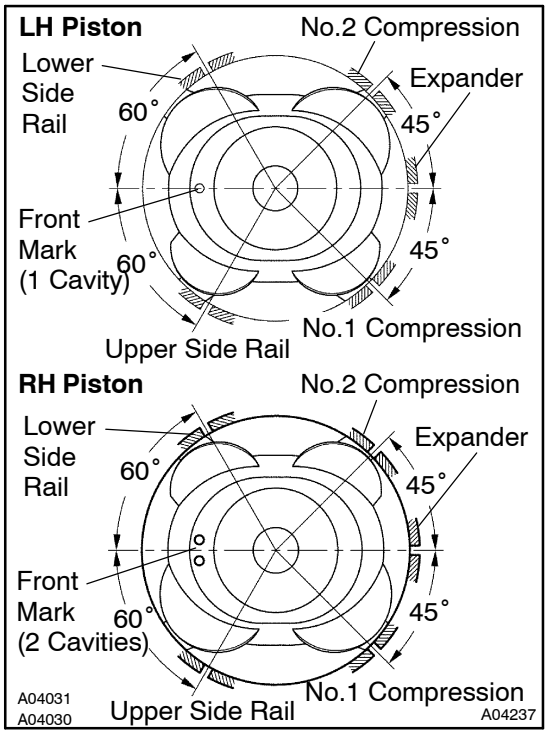

## 2. INSTALL PISTON RINGS

(a) Install the oil ring expander and 2 side rails by hand.

(b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

**Code mark:**

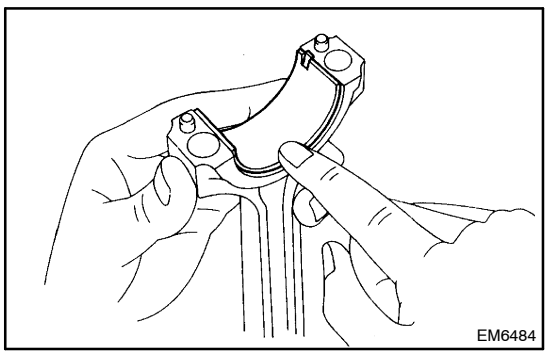
| | |
|---|---|
| No.1 | 1R |
| No.2 | 2R |




(c) Position the piston rings so that the ring ends are as shown.

**NOTICE:**

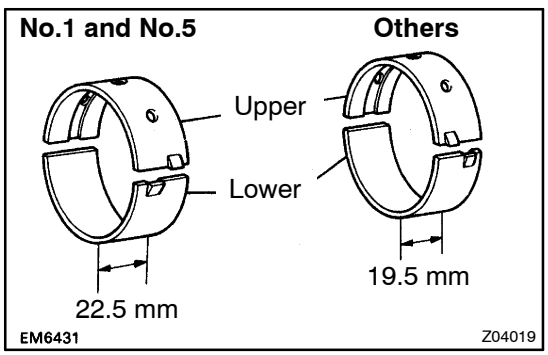
**Do not align the ring ends.**




## 3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

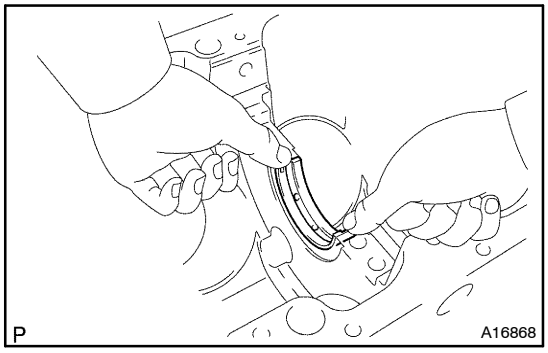
(b) Install the bearings in the connecting rod and connecting rod cap.



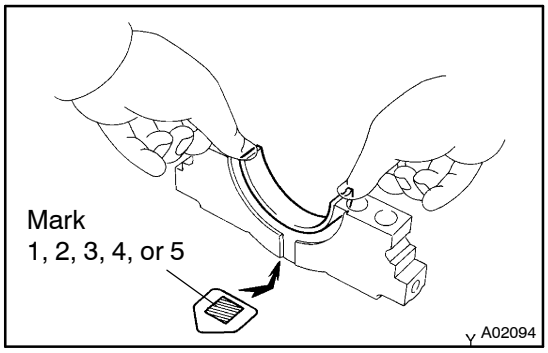

## 4. INSTALL MAIN BEARINGS

HINT:

- Main bearings come in widths of 19.5 mm (0.768 in.) and 22.5 mm (0.886 in.). Install the 22.5 mm (0.886 in.) bearings in the No.1 and No.5 cylinder block journal positions with the main bearing cap. Install the 19.5 mm (0.768 in.) bearings in the other positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.

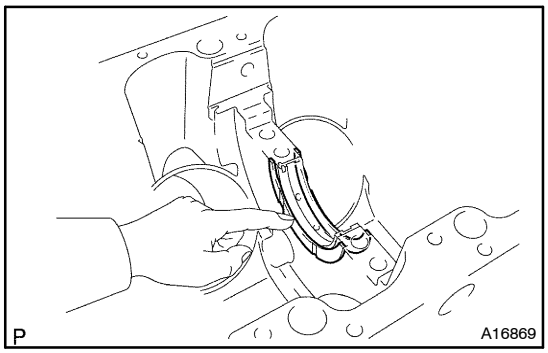



(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.




(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

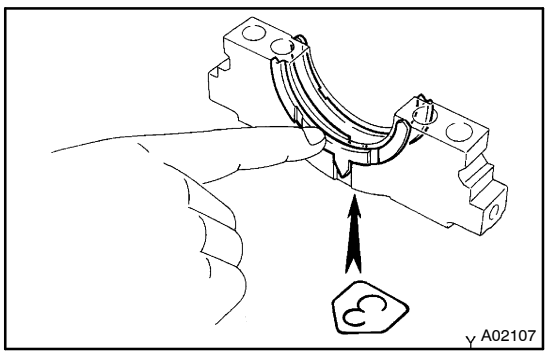
HINT:
A number is marked on each main bearing cap to indicate the installation position.




**5. INSTALL UPPER THRUST WASHERS**

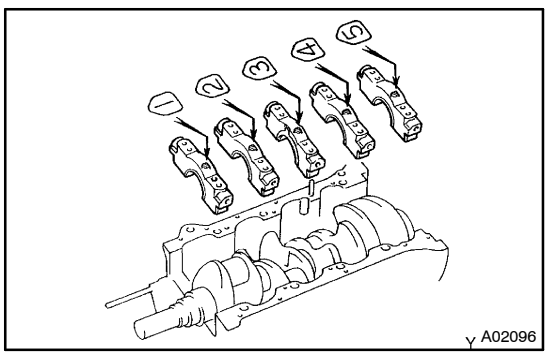
Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

**6. PLACE CRANKSHAFT ON CYLINDER BLOCK**

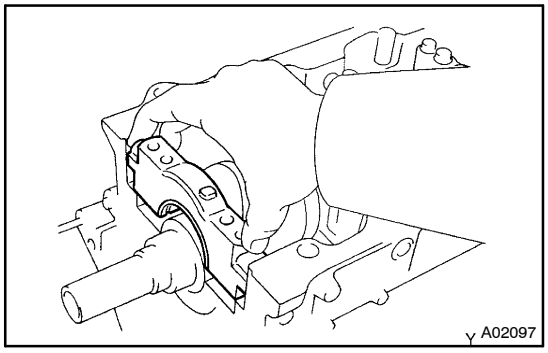



**7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK**

(a) Install the 2 thrust washers on the No.3 bearing cap with the grooves facing outward.




(b) Install the 5 main bearing caps in their proper locations.

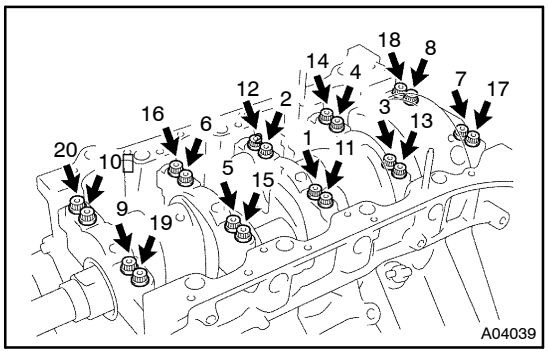



HINT:
Place the bearing caps level and let them return to their original position by their own weight.

**NOTICE:**
**Do not install the main bearing cap by tapping it.**

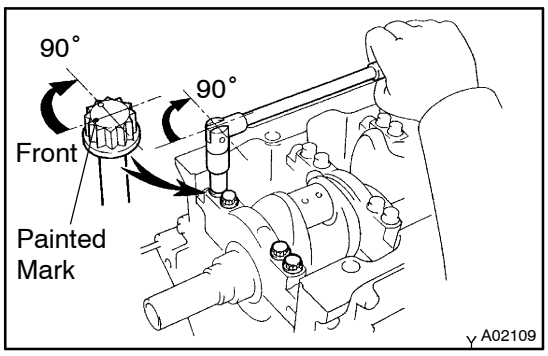
**8. INSTALL MAIN BEARING CAP BOLTS**

HINT:
- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any one of the main bearing cap bolts is broken or deformed, replace it.

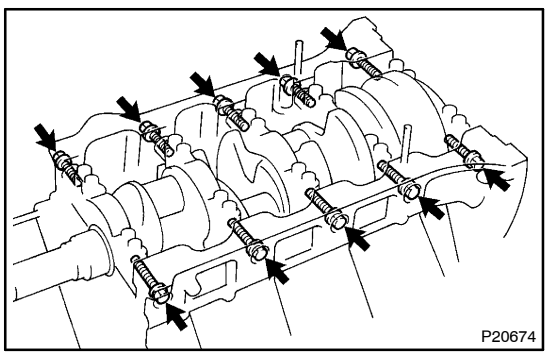



(a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.
(b) Install and uniformly tighten the 20 main bearing cap bolts in several passes, in the sequence shown.
**Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)**

If any one of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.

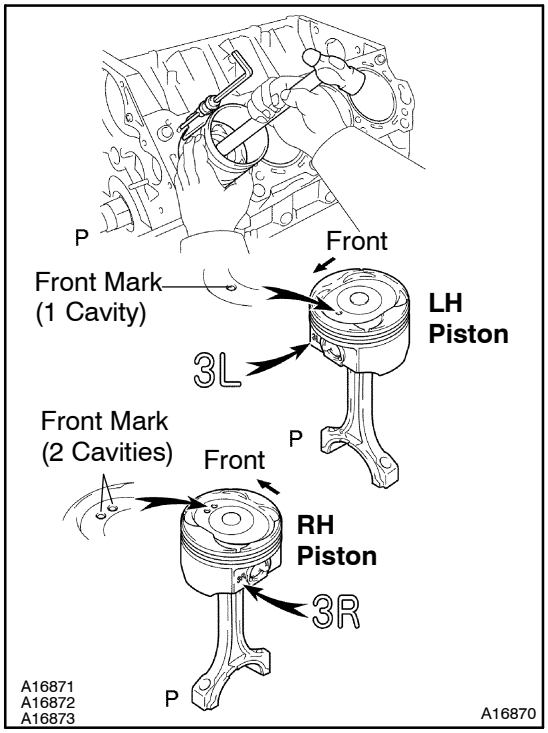



(c) Mark the front of the main bearing cap bolt with paint.
(d) Retighten the main bearing cap bolts by 90° in the numerical order shown.
(e) Check that the painted mark is now at a 90° angle to the front.




(f) Install a new seal washer to the main bearing cap bolt.
(g) Install and uniformly tighten the 10 main bearing cap bolts.
**Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)**
(h) Check that the crankshaft turns smoothly.

**9. CHECK CRANKSHAFT THRUST CLEARANCE**
**(See page EM–96)**

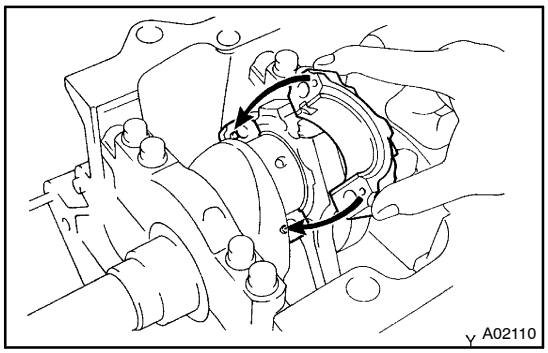



**10. INSTALL PISTON AND CONNECTING ROD ASSEMBLES**

Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

**NOTICE:**

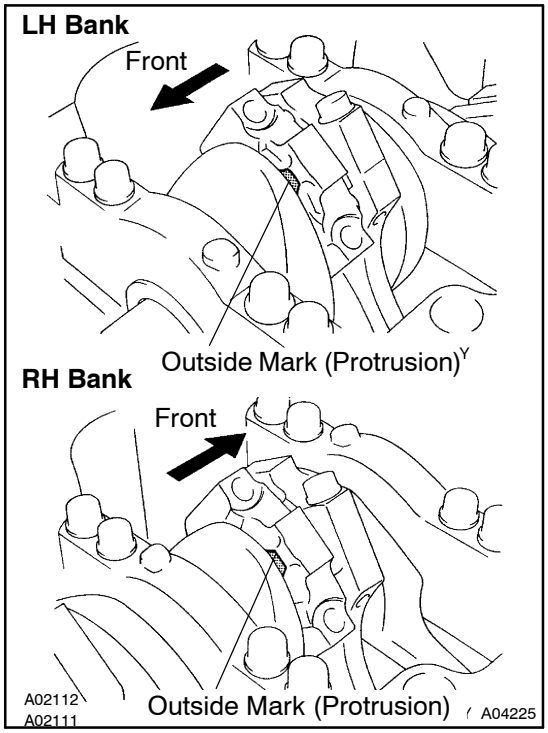
**The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”3L”, the RH piston with ”3R”.**




**11. PLACE CONNECTING ROD CAP ON CONNECTING ROD**

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin groove of the connecting rod cap with the pins of the connecting rod, and install the connecting rod cap.

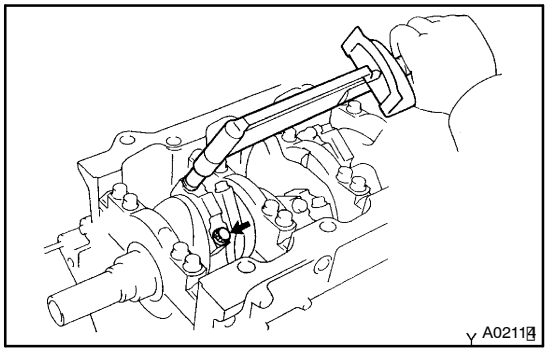



(c) Check that the outside mark of the connecting rod cap is facing in correct direction.

**12. INSTALL CONNECTING ROD CAP BOLTS**

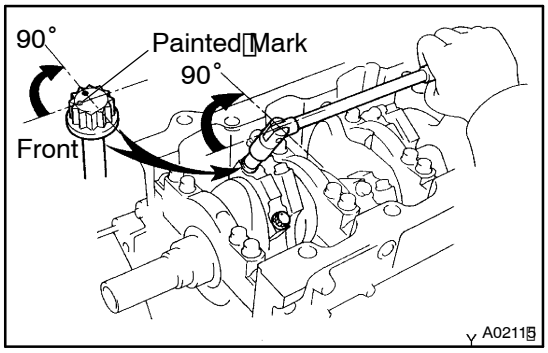
HINT:

- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any one of the connecting rod cap bolts is broken or deformed, replace it.




(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.
(b) Install and alternately tighten the 2 connecting rod cap bolts in several passes.
**Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)**

If any one of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.

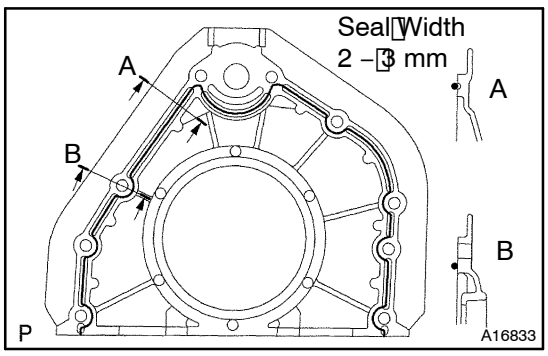



(c) Mark the front of the connecting cap bolt with paint.
(d) Retighten the cap bolts 90° as shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

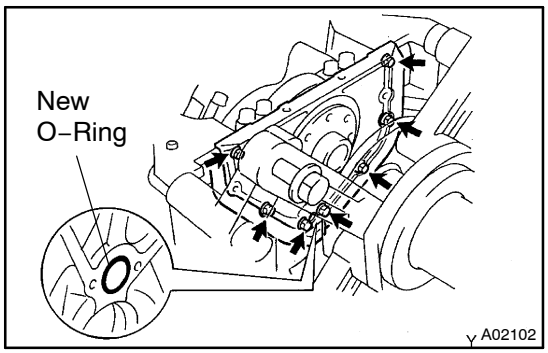
**13. CHECK CONNECTING ROD THRUST CLEARANCE**
**(See page EM–96)**

**14. INSTALL REAR OIL SEAL RETAINER**

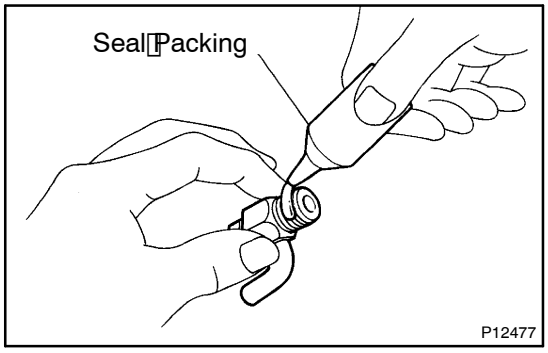
(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil seal retainer and cylinder block.
- Using a razor blade and gasket scraper, remove all the oil packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.




(b) Apply seal packing to the oil seal retainer as shown in the illustration.
**Seal packing: Part No. 08826–00080 or equivalent**
- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



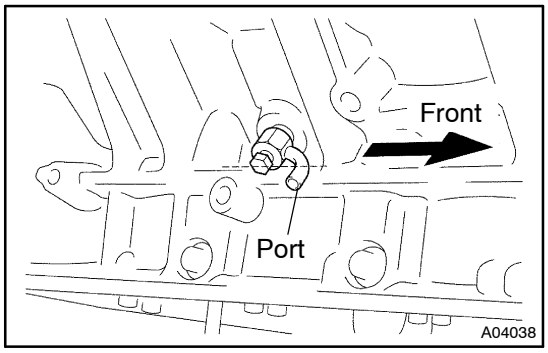

(c) Install a new O–ring to the cylinder block.
(d) Install the oil seal retainer with the 7 bolts.
**Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)**




**15. INSTALL ENGINE COOLANT DRAIN UNIONS**

(a) Apply seal packing to 2 or 3 threads.

**Seal packing: Part No. 08826–00100 or equivalent**




(b) Install the RH and LH drain unions.

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

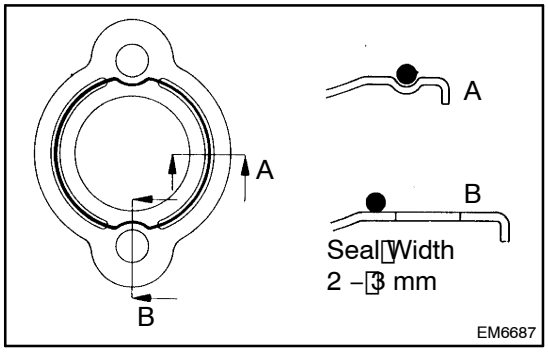
HINT:

After applying the specified torque, rotate the drain union clockwise until its drain port is facing forward.

**16. INSTALL WATER SEAL PLATE**

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the seal plate and cylinder block.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.




(b) Apply seal packing to the seal plate as shown in the illustration.

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

- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the seal plate with the 2 nuts. Alternately tighten the nuts in several passes.

**Torque: 14 N·m (145 kgf·cm, 10 ft·lbf)**

**17. INSTALL OIL PUMP (See page LU–15)**

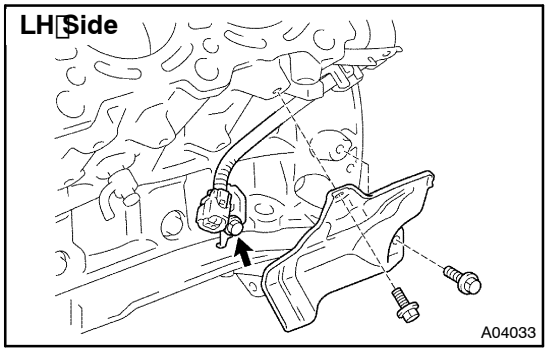
**18. INSTALL OIL STRAINER (See page LU–15)**

**19. INSTALL NO.1 OIL PAN (See page LU–15)**

**20. INSTALL OIL PAN BAFFLE PLATE (See page LU–15)**

**21. INSTALL NO.2 OIL PAN (See page LU–15)**

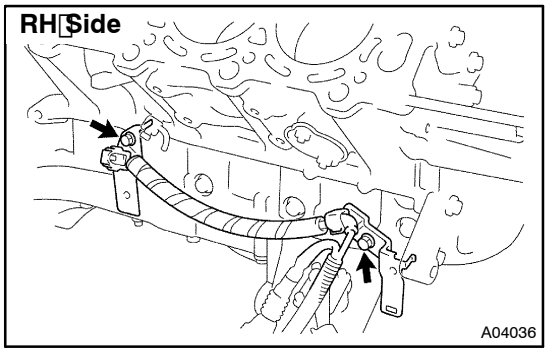
**22. INSTALL WATER PUMP (See page CO–9)**




**23. INSTALL ENGINE WIRE**

(a) Install the engine wire to the LH side of the cylinder block with the 4 bolts.

(b) Install the engine wire cover with the 2 bolts.

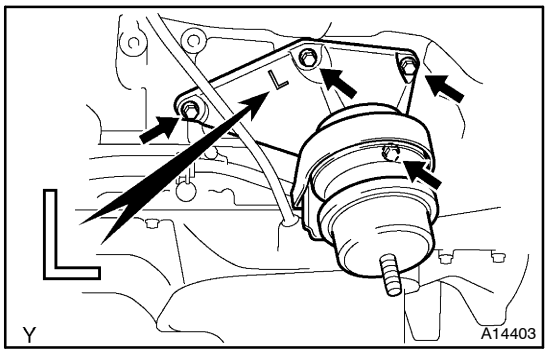



(c) Install the 2 brackets on the engine wire to the RH side of the cylinder block with the 2 bolts.

(d) Connect the crankshaft position sensor connector.

**24. INSTALL KNOCK SENSORS (See page FI–76)**

**25. INSTALL STARTER (See page ST–17)**



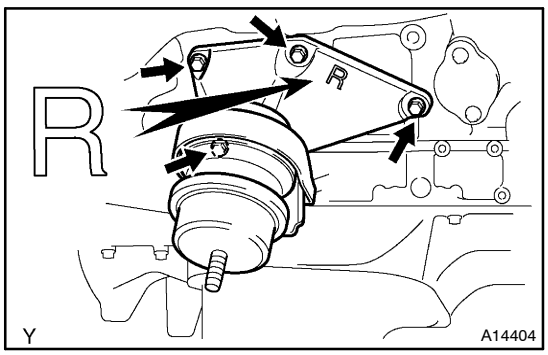

**26. INSTALL LH ENGINE MOUNTING BRACKET**

Install the mounting bracket with the 4 bolts.

**Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)**

HINT:

The LH mounting bracket is marked with "L".




**27. INSTALL RH ENGINE MOUNTING BRACKET**

Install the mounting bracket with the 4 bolts.

**Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)**

HINT:

The RH mounting bracket is marked with "R".

**28. INSTALL CYLINDER HEADS (See page EM–65)**

**29. INSTALL TIMING BELT AND PULLEYS (See page EM–26)**

**30. DISCONNECT ENGINE FROM ENGINE STAND**