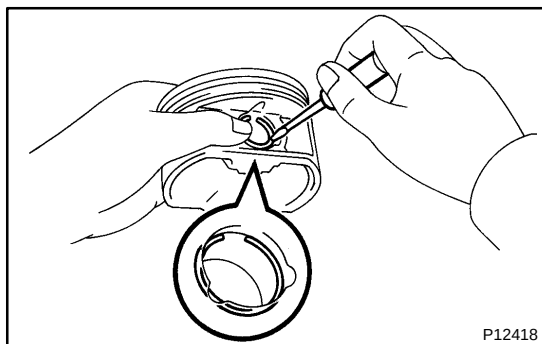


REASSEMBLY

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.

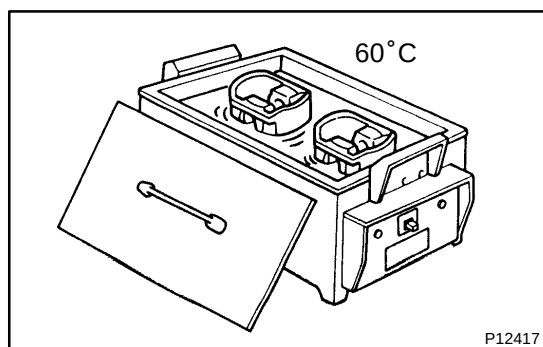


1. ASSEMBLE PISTON AND CONNECTING ROD

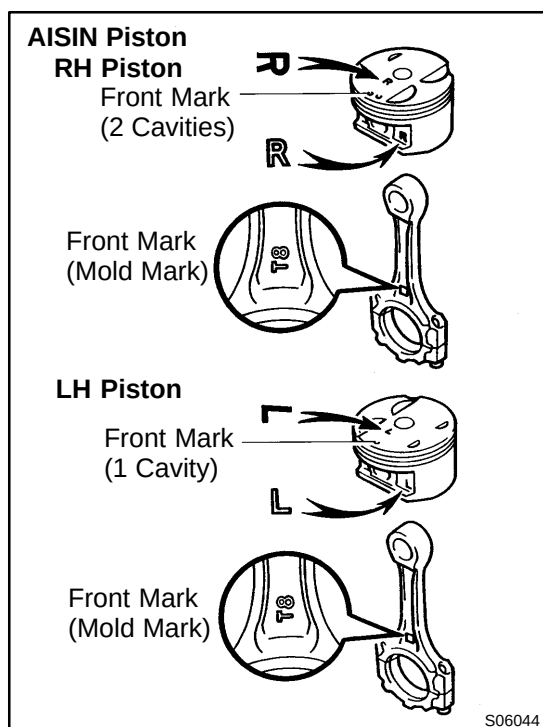
- (a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



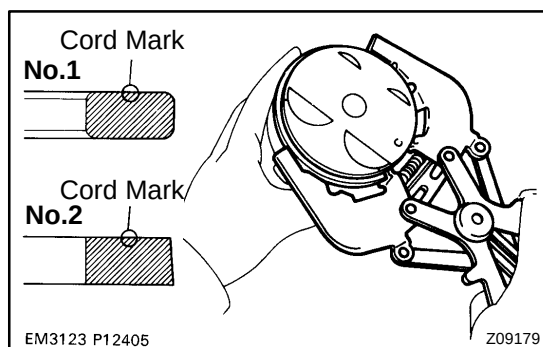
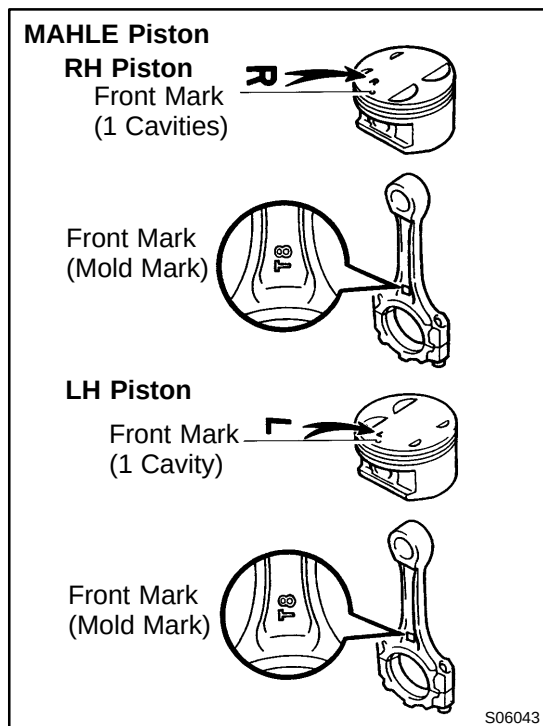
- (b) Gradually heat the piston to about 60°C (140°F).



- (c) Coat the piston pin with engine oil.
- (d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.
- (e) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



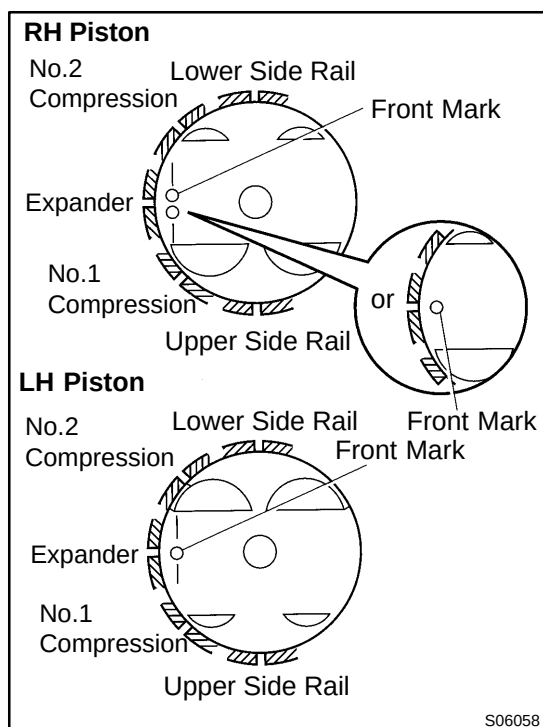
2. INSTALL PISTON RINGS

- Install the oil ring expander and 2 side rails by hand.
- Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

Code mark:

No.1: 1R, T or G1

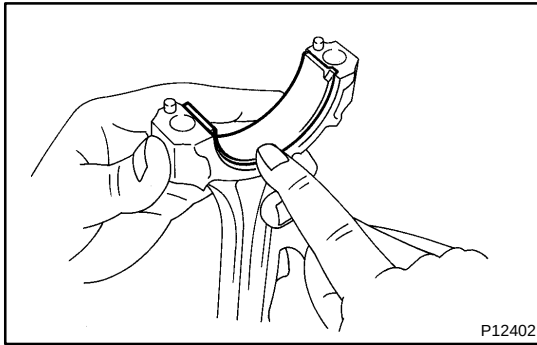
No.2: 2R, 2T or G2



- Position the piston rings so that the ring ends are as shown.

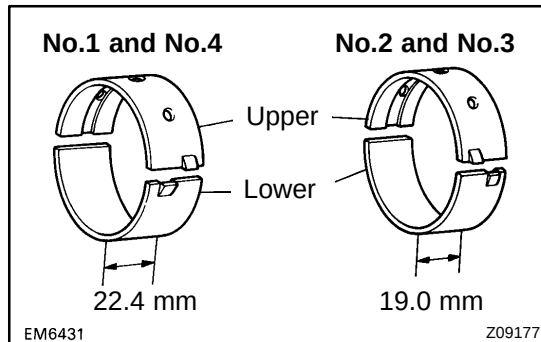
NOTICE:

Do not align the ring ends.



3. INSTALL CONNECTING ROD BEARINGS

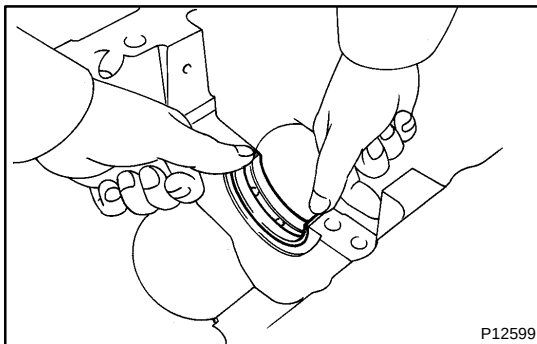
- Align the bearing claw with the groove of the connecting rod or connecting cap.
- Install the bearings in the connecting rod and connecting rod cap.



4. INSTALL MAIN BEARINGS

HINT:

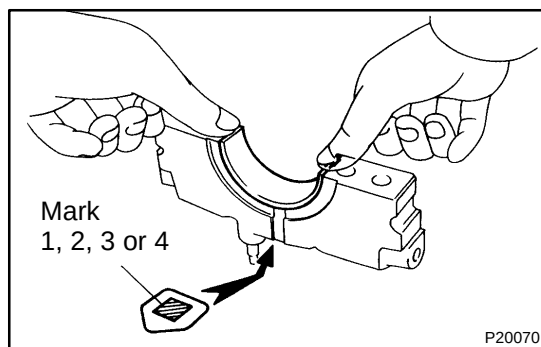
- Main bearings come in widths of 19.0 mm (0.748 in.) and 22.4 mm (0.882 in.). Install the 22.4 mm (0.882 in.) bearings in the No.1 and No.4 cylinder block journal positions with the main bearing cap. Install the 19.0 mm (0.748 in.) bearings in the No.2 and No.3 positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.



- Align the bearing claw with the claw groove of the cylinder block, and push in the 4 upper bearings.

NOTICE:

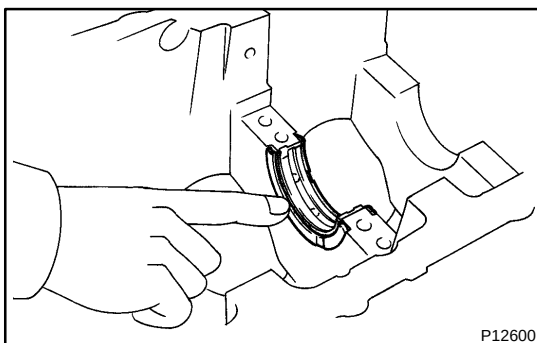
Install the bearing with the oil hole in the cylinder block.



- Align the bearing claw with the claw groove of the main bearing cap, and push in the 4 lower bearings.

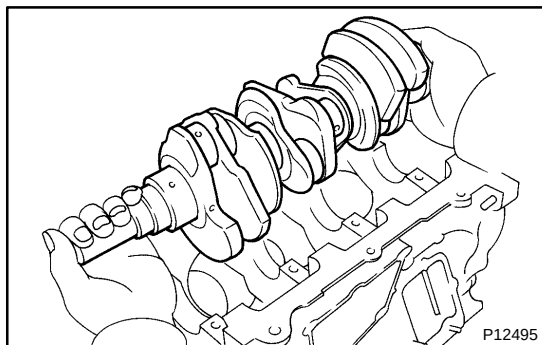
HINT:

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

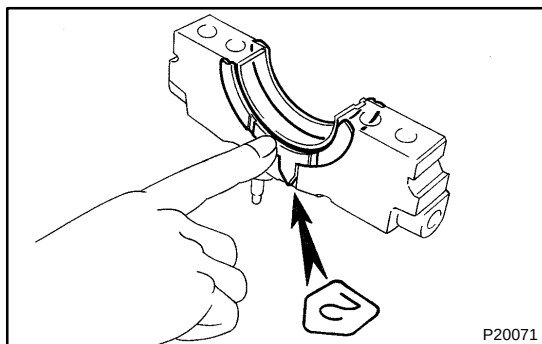


5. INSTALL UPPER THRUST WASHERS

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

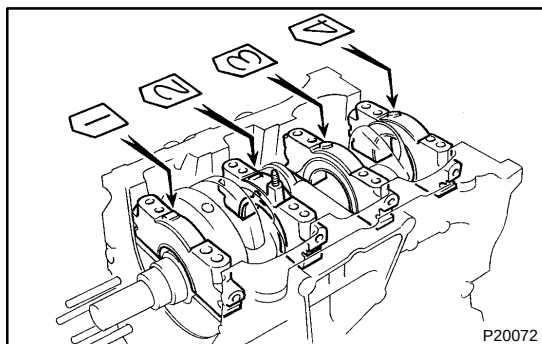


6. PLACE CRANKSHAFT ON CYLINDER BLOCK

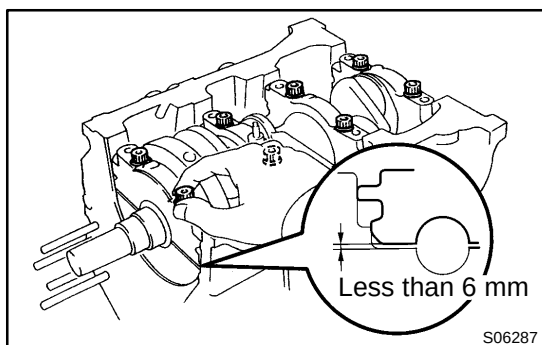


7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK

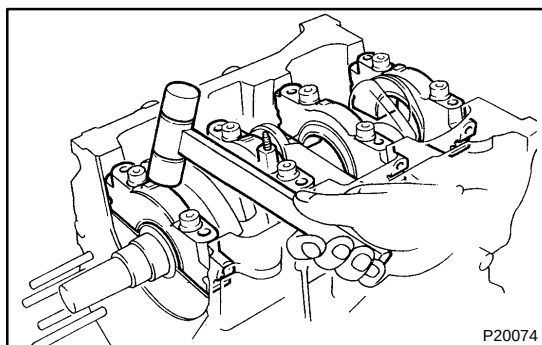
- (a) Install the 2 thrust washers on the No.2 bearing cap with the grooves facing outward.



- (b) Temporarily place the 4 main bearing caps level and let them in their proper locations.



- (c) Apply a light coat of engine oil on the threads and under the main bearing cap bolts for the 12 pointed head.
- (d) Temporarily install the 8 main bearing cap bolts to the inside positions.
- (e) Insert the main bearing cap with your hand until the clearance between the main bearing cap and the cylinder block will become less than 6 mm (0.23 in.) by making the 2 internal main bearing cap bolts as a guide.

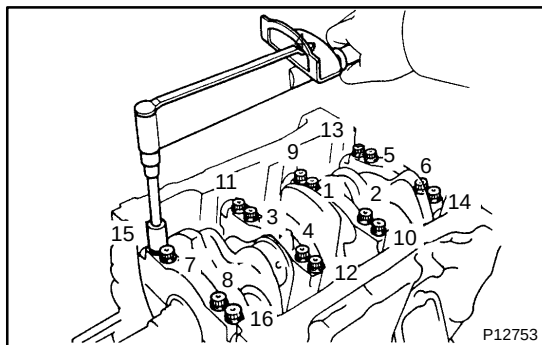


- (f) Using a plastic-faced hammer, lightly tap the bearing cap to ensure a proper fit.

8. INSTALL 12 POINTED HEAD MAIN BEARING CAP BOLTS

HINT:

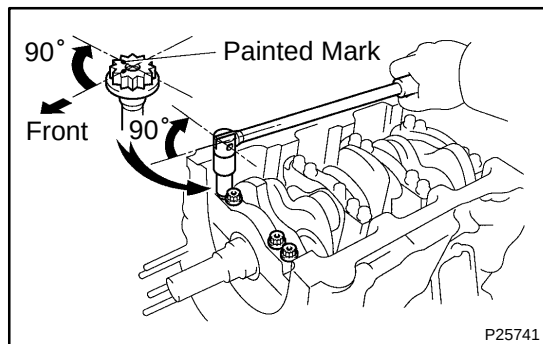
- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the main bearing cap bolts is broken or deformed, replace it.



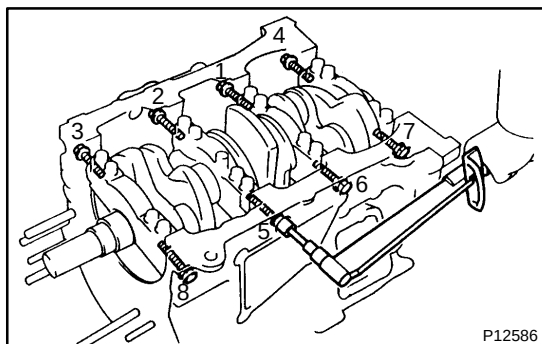
- (a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.
- (b) Install and uniformly tighten the 16 main bearing cap bolts in several passes, in the sequence shown.

Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)

If any 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 bolts 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.



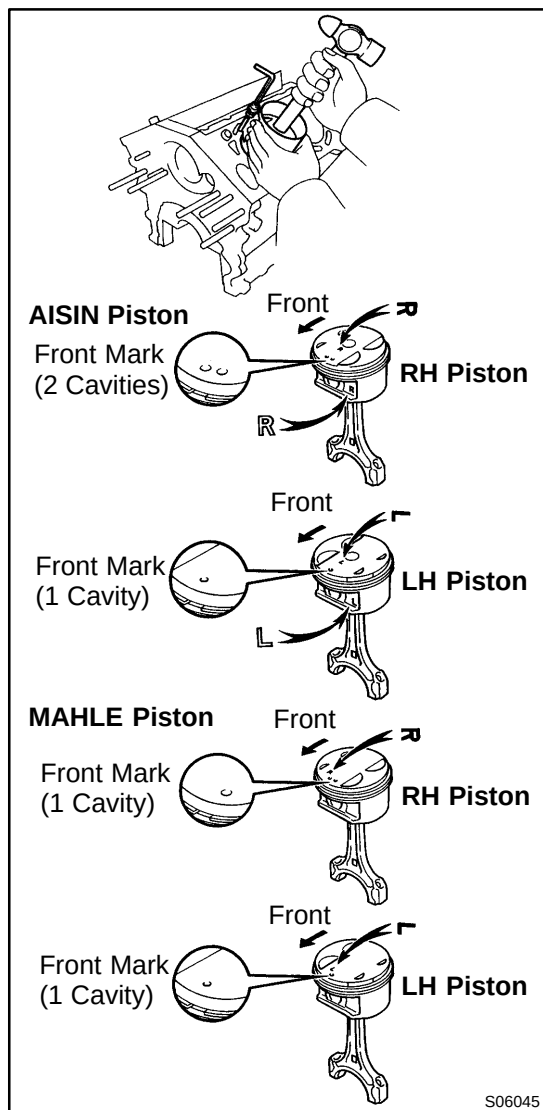
9. INSTALL HEXAGON HEAD MAIN BEARING CAP BOLTS

- (a) Install a new seal washer to the main bearing cap bolt.
- (b) Install and uniformly tighten the 8 main bearing cap bolts in several passes, in the sequence shown.

Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

- (c) Check that the crankshaft turns smoothly.

10. CHECK CRANKSHAFT THRUST CLEARANCE (See page [EM-90](#))

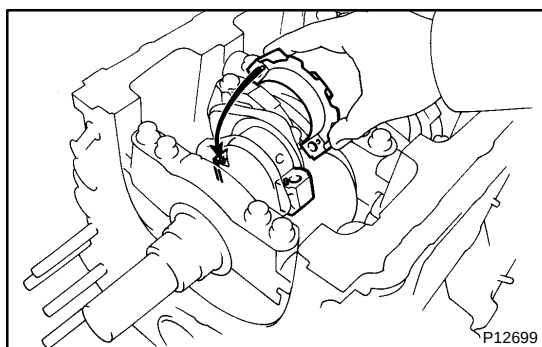


11. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

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.

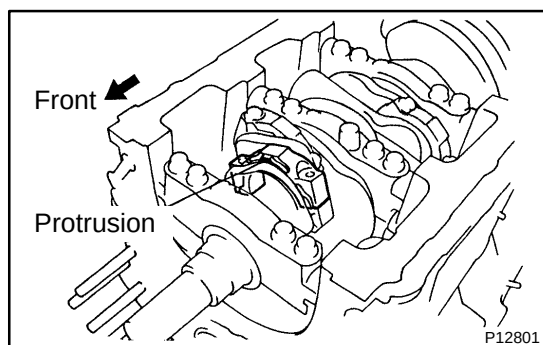
HINT:

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



12. PLACE CONNECTING ROD CAP ON CONNECTING ROD

- Match the numbered connecting rod cap with the connecting rod.
- Align the pin dowels of the connecting rod cap with the pins of the connecting rod, and install the connecting rod.

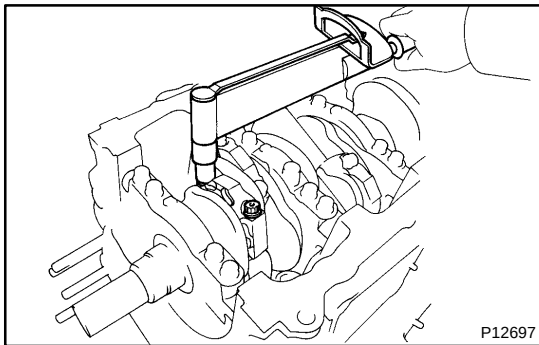


- Check that the protrusion of the connecting rod cap is facing in the correct direction.

13. INSTALL CONNECTING ROD CAP BOLTS

HINT:

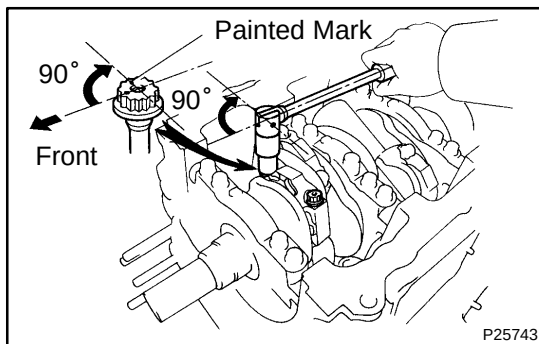
- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the connecting rod cap bolts is broken or deformed, replace it.



- (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.

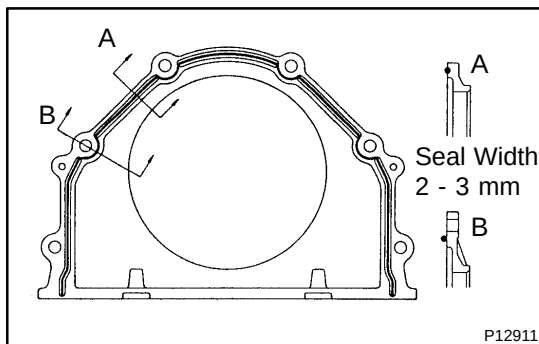
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any 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 bolts with paint.
- (d) Retighten the cap bolts by 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.

14. CHECK CONNECTING ROD THRUST CLEARANCE (See page [EM-90](#))



15. 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

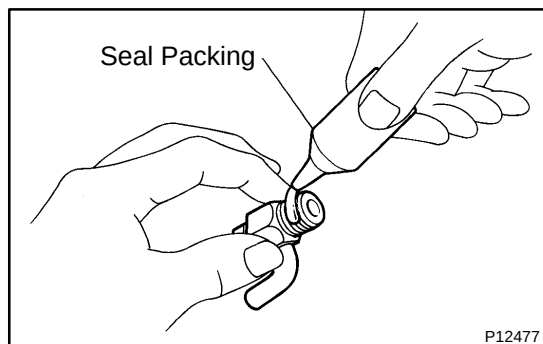
- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
 - Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
 - Immediately remove nozzle from the tube and reinstall cap.
- (c) Install the oil seal retainer with the 6 bolts Uniformly tighten the bolt in several passes, in the sequence shown.

Torque: 8 N·m (80 kgf·cm, 69 in·lbf)

16. INSTALL CYLINDER BLOCK SIDE COVER

Install a new gasket and the cylinder block side cover with the 3 bolts and 2 nuts.

Torque: 9 N·m (90 kgf·cm, 78 in·lbf)

**17. INSTALL ENGINE COOLANT DRAIN UNION**

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

Seal packing: Part No. 08826-00100 or equivalent

- (b) Install the drain union.

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

HINT:

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

18. 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. 08826-00100 or equivalent

- Install a nozzle that has been cut to a 3 - 5 mm (0.12 - 0.20 in.) opening.
- Parts must be assembled within 3 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.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

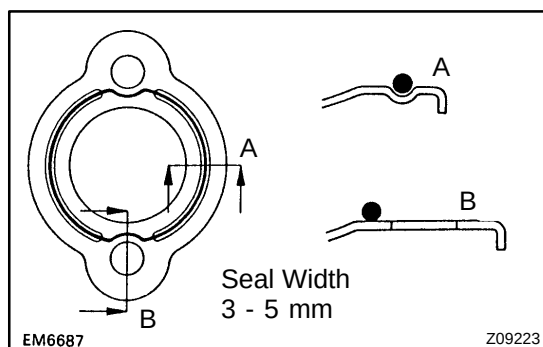
19. INSTALL OIL FILTER UNION

Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

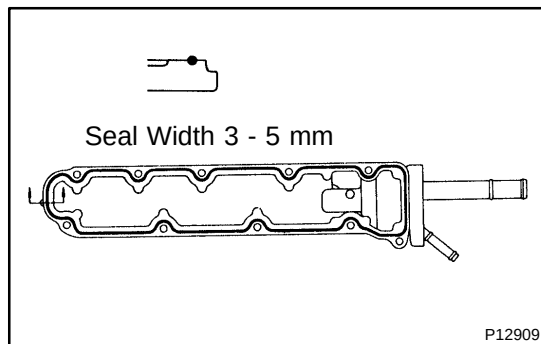
20. INSTALL OIL FILTER (See page [LU-3](#))**21. INSTALL OIL PUMP (See page [LU-16](#))****22. INSTALL NO.1 OIL PAN (See page [LU-16](#))****23. INSTALL OIL STRAINER (See page [LU-16](#))****24. INSTALL NO.2 OIL PAN (See page [LU-16](#))****25. INSTALL WATER PUMP (See page [CO-9](#))****26. INSTALL WATER INLET HOUSING**

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

- Using a razor blade and gasket scraper, remove all the old 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 water inlet housing as shown in the illustration.

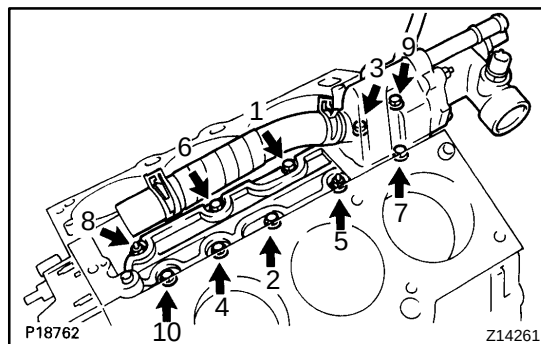
Seal packing: Part No. 08826-00100 or equivalent

- Install a nozzle that has been cut to a 3 - 5 mm (0.12 - 0.20 in.) opening.

HINT:

Avoid applying an excessive amount to the surface.

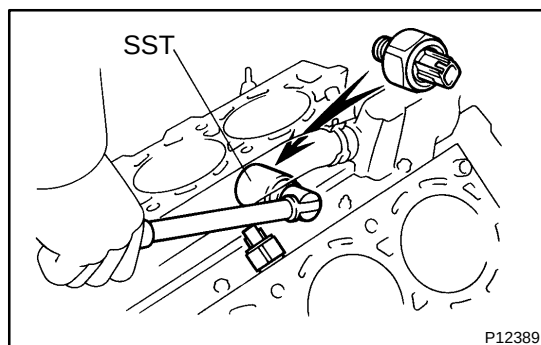
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



- (c) Install the water inlet housing with the 8 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes, in the sequence shown.

Torque: 8 N·m (80 kgf·cm, 69 in·lbf)

- (d) Install the engine wire band.
(e) Install the engine wire clamp.



27. INSTALL KNOCK SENSORS

- (a) Using SST, install the 2 knock sensors.
SST 09816-30010

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

- (b) Connect the 2 knock sensor connectors.

28. INSTALL NO.2 IDLER PULLEY BRACKET

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

29. INSTALL A/C COMPRESSOR HOUSING BRACKET

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

30. INSTALL OIL PRESSURE SWITCH (See page LU-1)

31. INSTALL GENERATOR, BRACKET AND ADJUSTING BAR ASSEMBLY

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

32. INSTALL CYLINDER HEAD (See page EM-60)

33. INSTALL TIMING PULLEYS AND BELT (See page EM-22)

34. REMOVE ENGINE STAND