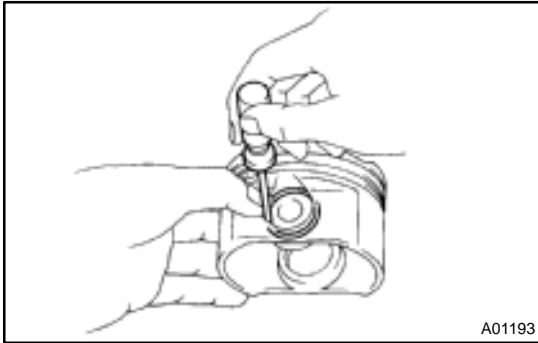


## REASSEMBLY

### HINT:

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

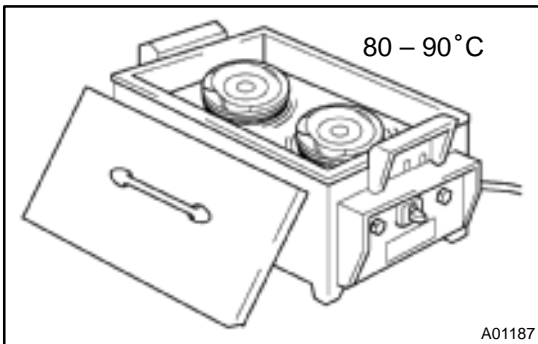


### 1. ASSEMBLE PISTON AND CONNECTING ROD

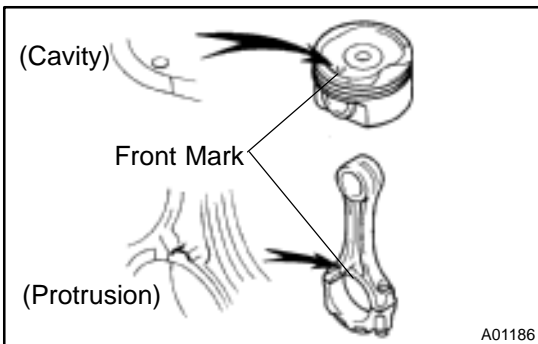
- (a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.

### HINT:

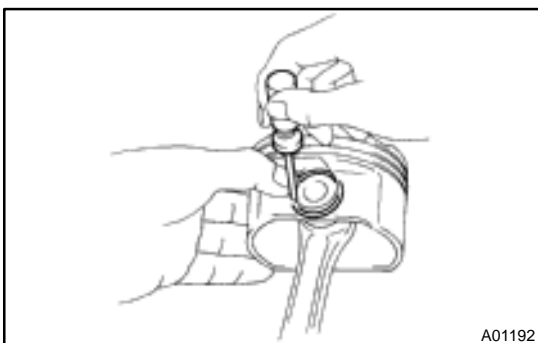
Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



- (b) Gradually heat the piston to 80 – 90°C (176 – 194°F).



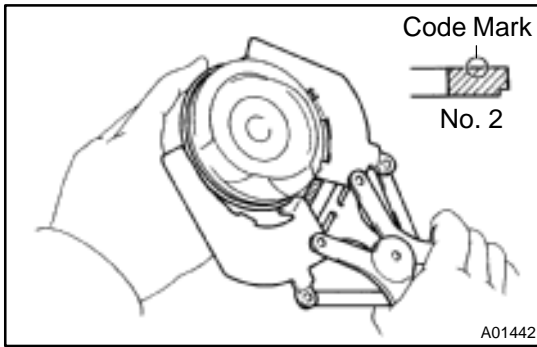
- (c) Coat the piston pin with engine oil.  
 (d) Align the front marks on the piston and connecting rod, and push in the piston with your thumb.



- (e) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.

### HINT:

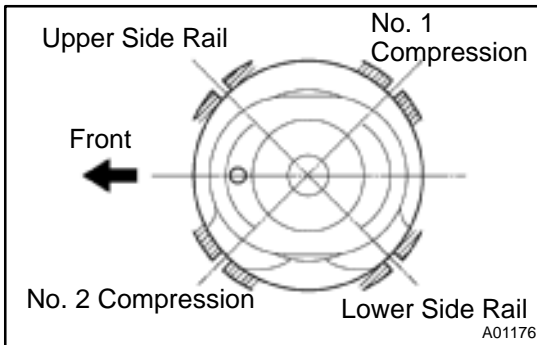
Be sure that end gap of the snap ring is not as aligned with the pin hole cutout portion of the piston.



## 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.

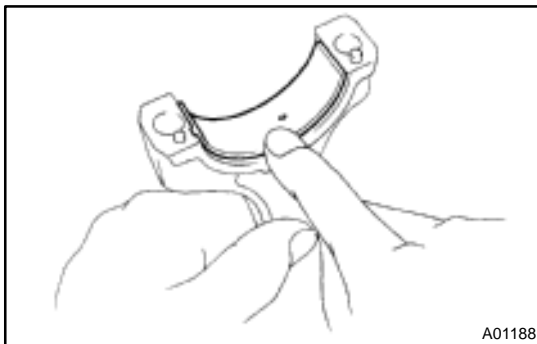
**Code mark (No. 2 only): T or 2R**



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

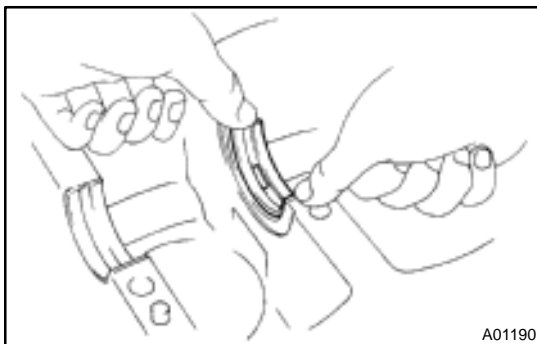
### NOTICE:

**Do not align the ring ends.**



## 3. INSTALL CONNECTING ROD 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

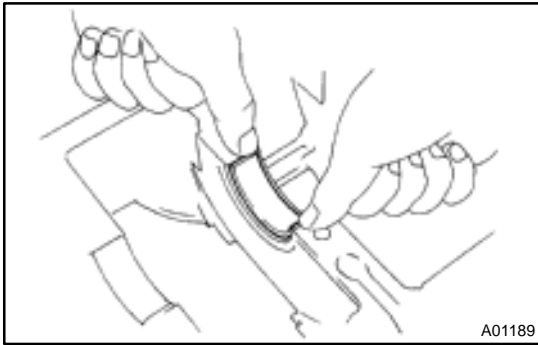
### HINT:

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.

### NOTICE:

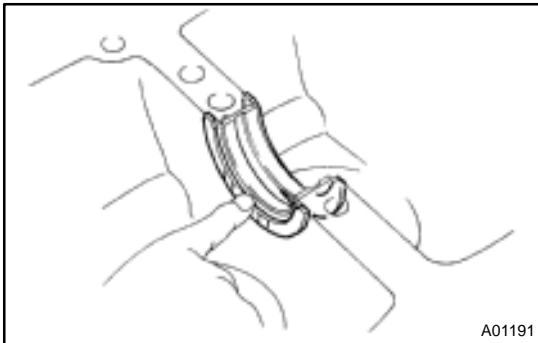
- **Install the bearing with the oil hole in the cylinder block.**
- **Clean the backside of the bearing and the bearing surface of the bearing cap and do not let the oils and fats stick.**



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

**NOTICE:**

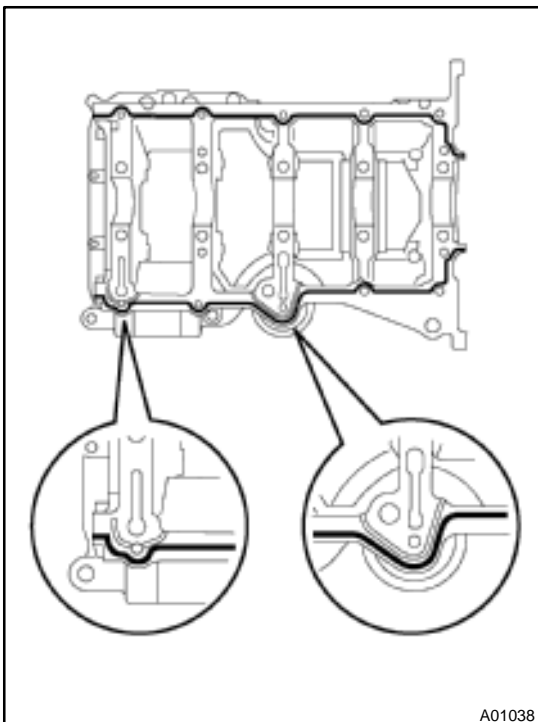
**Clean the backside of the bearing and the bearing surface of the bearing cap and do not let the oils and fats stick.**

**5. INSTALL 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 BEARING CAP SUBASSEMBLY ON CYLINDER BLOCK**

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap subassembly 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-reusable solvent, clean both sealing surfaces.



- (b) Apply seal packing to the bearing cap subassembly as shown in the illustration.

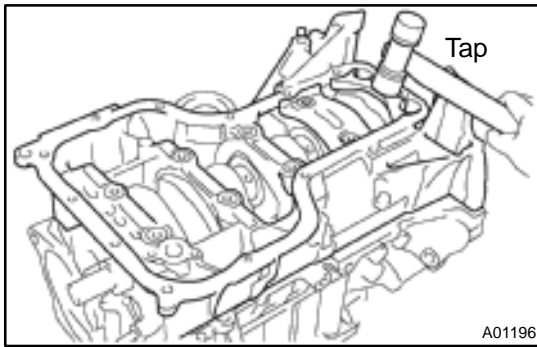
**Seal packing: Part No. 08826-00080 or equivalent**

- Install a nozzle that has been cut to an 1 – 2 mm (0.004 – 0.08 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 the nozzle from the tube and reinstall cap.

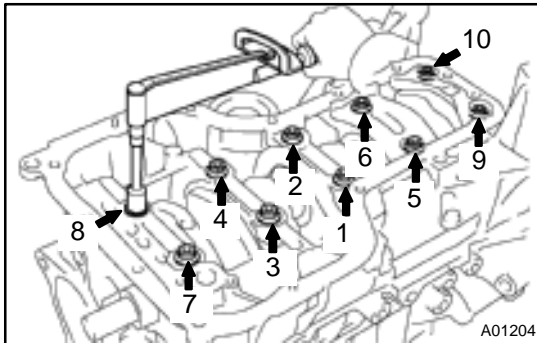


- (c) Using a plastic-faced hammer, lightly tap the bearing cap subassembly to ensure a proper fit.

## 8. INSTALL 12 POINTED HEAD BEARING CAP SUB-ASSEMBLY BOLTS

### HINT:

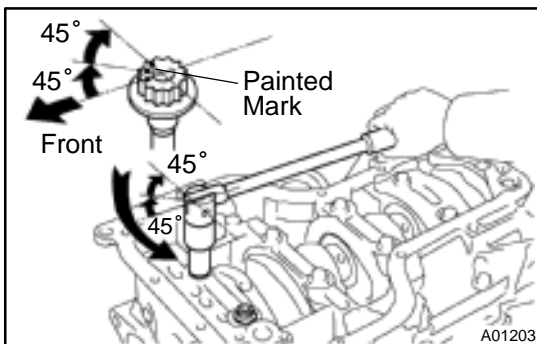
- The bearing cap subassembly bolts are tightened in 3 steps (steps (b), (c) and (e)).
- If any of the bearing cap subassembly bolts is broken or deformed, replace it.



- (a) Apply a light coat of engine oil on the threads and under the bearing cap subassembly bolts.
- (b) Install and uniformly tighten the 10 bearing cap subassembly bolts in several passes, in the sequence shown.
- Torque: 22 N·m (225 kgf-cm, 16 ft-lbf)**
- (c) Tighten the bearing cap subassembly bolts in several passes, in the sequence shown.

**Torque: 44 N·m (449 kgf-cm, 32 ft-lbf)**

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



- (d) Mark the front of the bearing cap subassembly bolts with paint.
- (e) Retighten the bearing cap subassembly bolts by 45° and additional 45° in the numerical order shown.
- (f) Check that the painted mark is now at a 90° angle to the front.

## 9. INSTALL HEXAGON HEAD BEARING CAP SUB-ASSEMBLY BOLTS

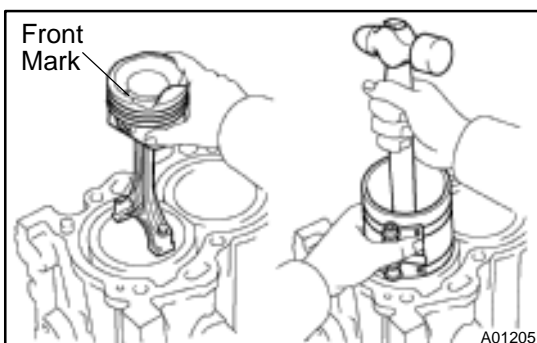
- (a) Install and uniformly tighten the 10 bearing cap subassembly bolts in several passes.

**Torque: 18.5 N·m (189 kgf-cm, 14 ft-lbf)**

- (b) Check that the crankshaft turns smoothly.

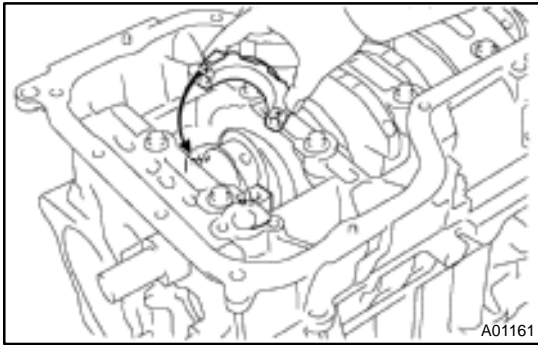
## 10. CHECK CRANKSHAFT THRUST CLEARANCE

(See page [EM-74](#))



## 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.

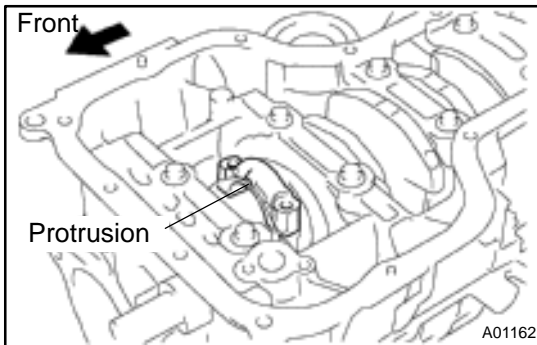


## 12. PLACE CONNECTING ROD CAP ON CONNECTING ROD

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

### NOTICE:

**Clean the backside of the bearing and the bearing surface of the bearing cap and do not let the oils and fats stick.**



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

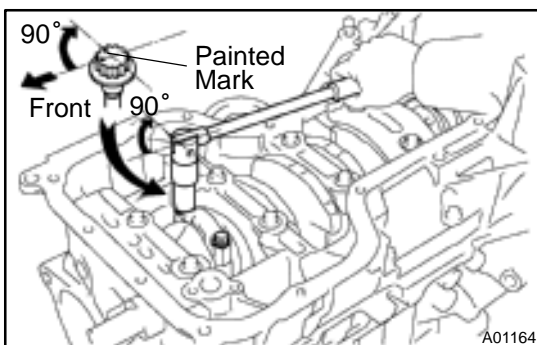
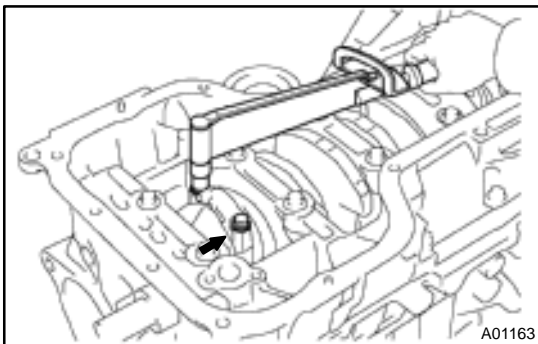
## 13. INSTALL CONNECTING ROD CAP BOLTS

### HINT:

- The connecting rod cap bolts are tightened in 2 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: 20 N·m (204 kgf-cm, 15 ft-lbf)**

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



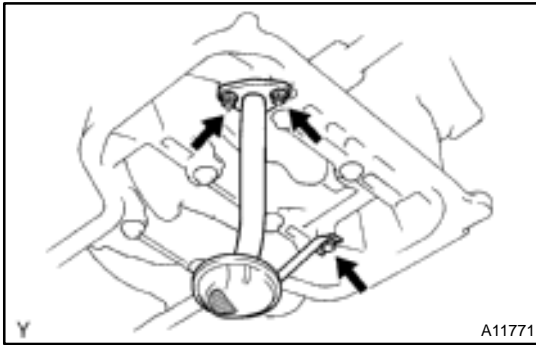
- (c) Mark the front of the connecting cap bolts with paint.
- (d) Retighten the cap bolts by 90° as shown.
- (e) Check that the painted mark is now at a 90° angle to the front.
- (f) Check that the crankshaft turns smoothly.

## 14. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM-74)

## 15. INSTALL REAR CRANKSHAFT OIL SEAL (See page EM-80)

### HINT:

Wipe seal packing away from the contact surface of the cylinder block assembly and oil seal.

**16. INSTALL OIL STRAINER**

Install a new gasket and the oil strainer with the 2 nuts and bolt.

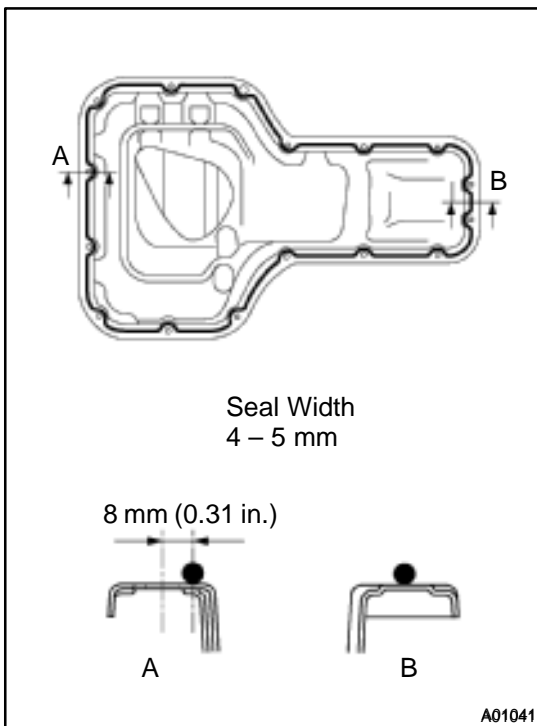
**Torque: 9 N·m (92 kgf·cm, 80 in.-lbf)**

**17. INSTALL OIL PAN**

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the main bearing cap and oil pan.
- 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.

**NOTICE:**

**Do not use a solvent which will affect the painted surfaces.**



- (b) Apply seal packing to the oil pan as shown in the illustration.

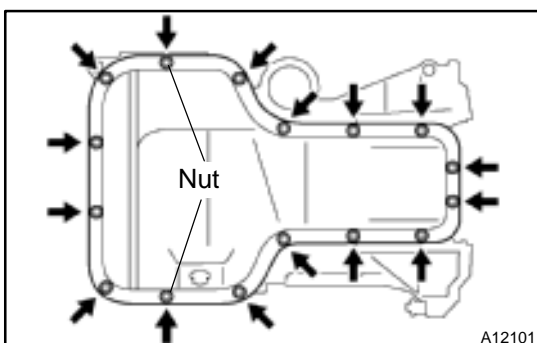
**Seal packing: Part No. 08826-00080 or equivalent**

- Install a nozzle that has been cut to a 4 – 5 mm (0.16 – 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 the nozzle from the tube and reinstall the cap.



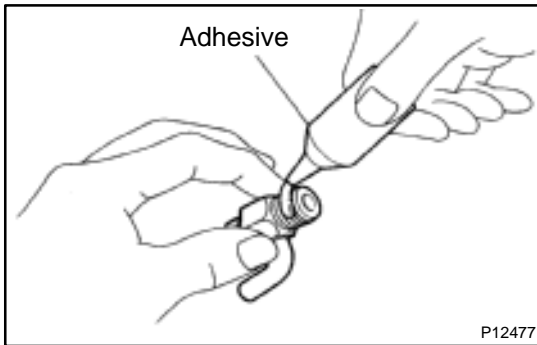
- (c) Install the oil pan with the 14 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

**Torque: 9 N·m (92 kgf·cm, 80 in.-lbf)**

**18. INSTALL OIL FILTER UNION**

**Torque: 30 N·m (306 kgf·cm, 21 ft-lbf)**

**19. INSTALL OIL FILTER (See page LU-3)****20. INSTALL OIL PUMP (See page LU-12)**

**21. INSTALL ENGINE COOLANT DRAIN UNION**

- (a) Apply adhesive to 2 or 3 threads.

**Adhesive:**

**Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent**

- (b) Install the drain union.

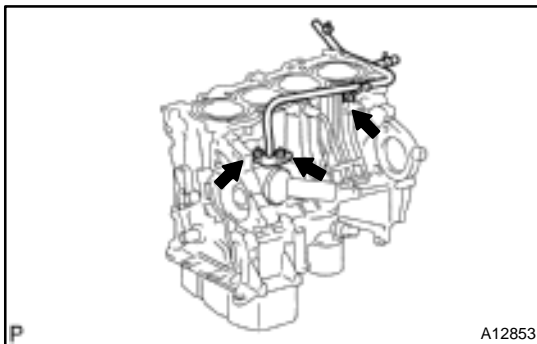
**Torque: 20 N·m (204 kgf-cm, 15 ft-lbf)**

**HINT:**

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

**22. INSTALL KNOCK SENSOR**

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

**23. INSTALL THERMOSTAT (See page [CO-13](#))****24. INSTALL WATER BYPASS PIPE**

**Torque: 9 N·m (92 kgf-cm, 80 in.-lbf)**

**25. INSTALL CYLINDER HEAD (See page [EM-46](#))****26. INSTALL TIMING SPROCKETS AND TIMING CHAIN (See page [EM-20](#))****27. REMOVE ENGINE STAND**