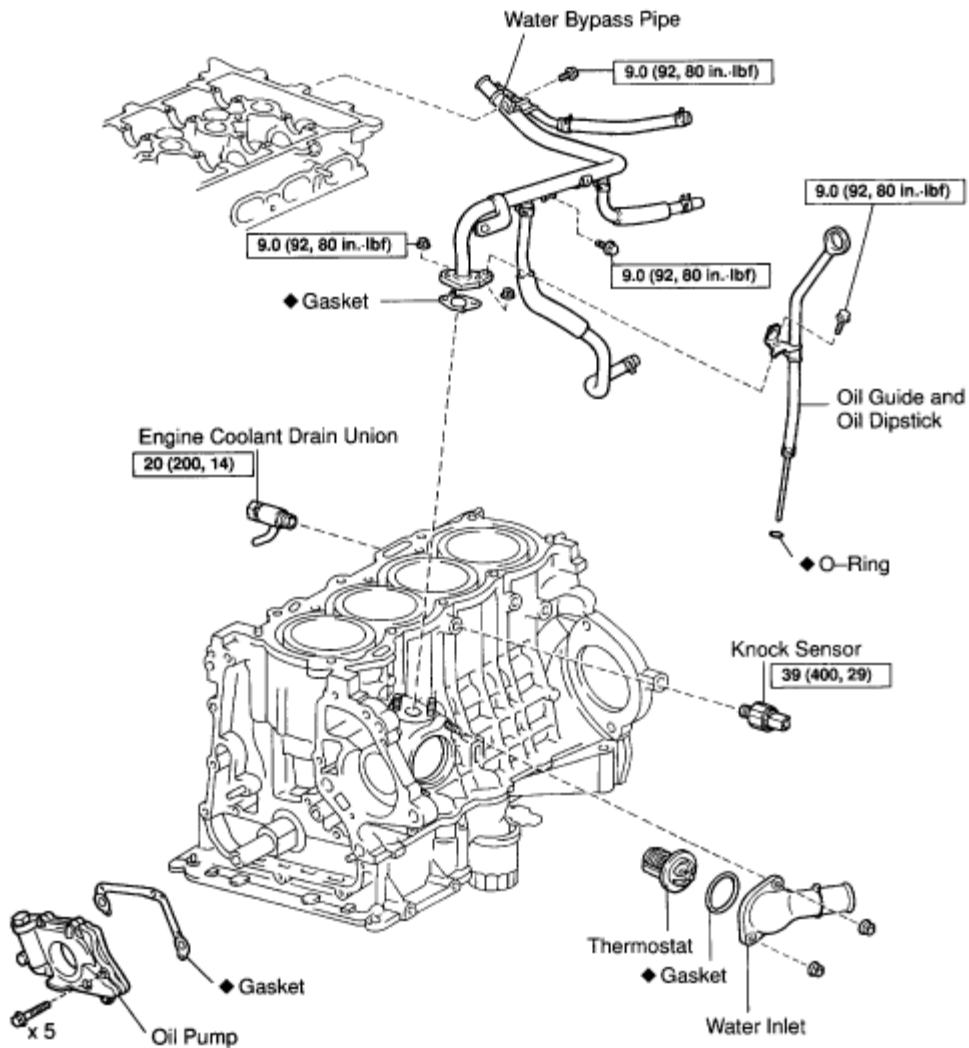


Reassembly

Part 1 Of 2

1ZZ-FE:



N·m (kgf·cm, ft·lbf) : Specified torque

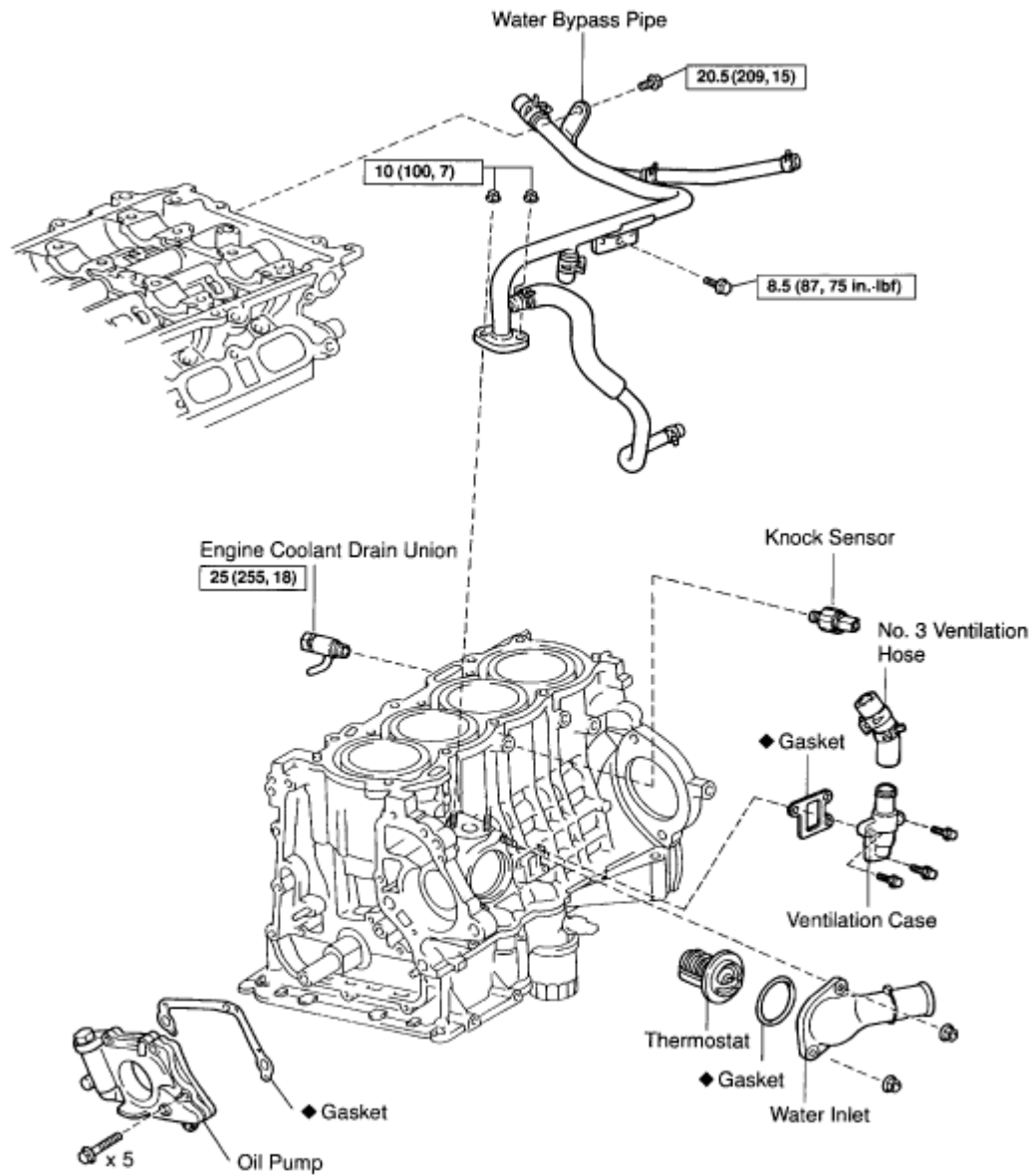
◆ Non-reusable part

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Part 1 Of 2

2ZZ-GE:



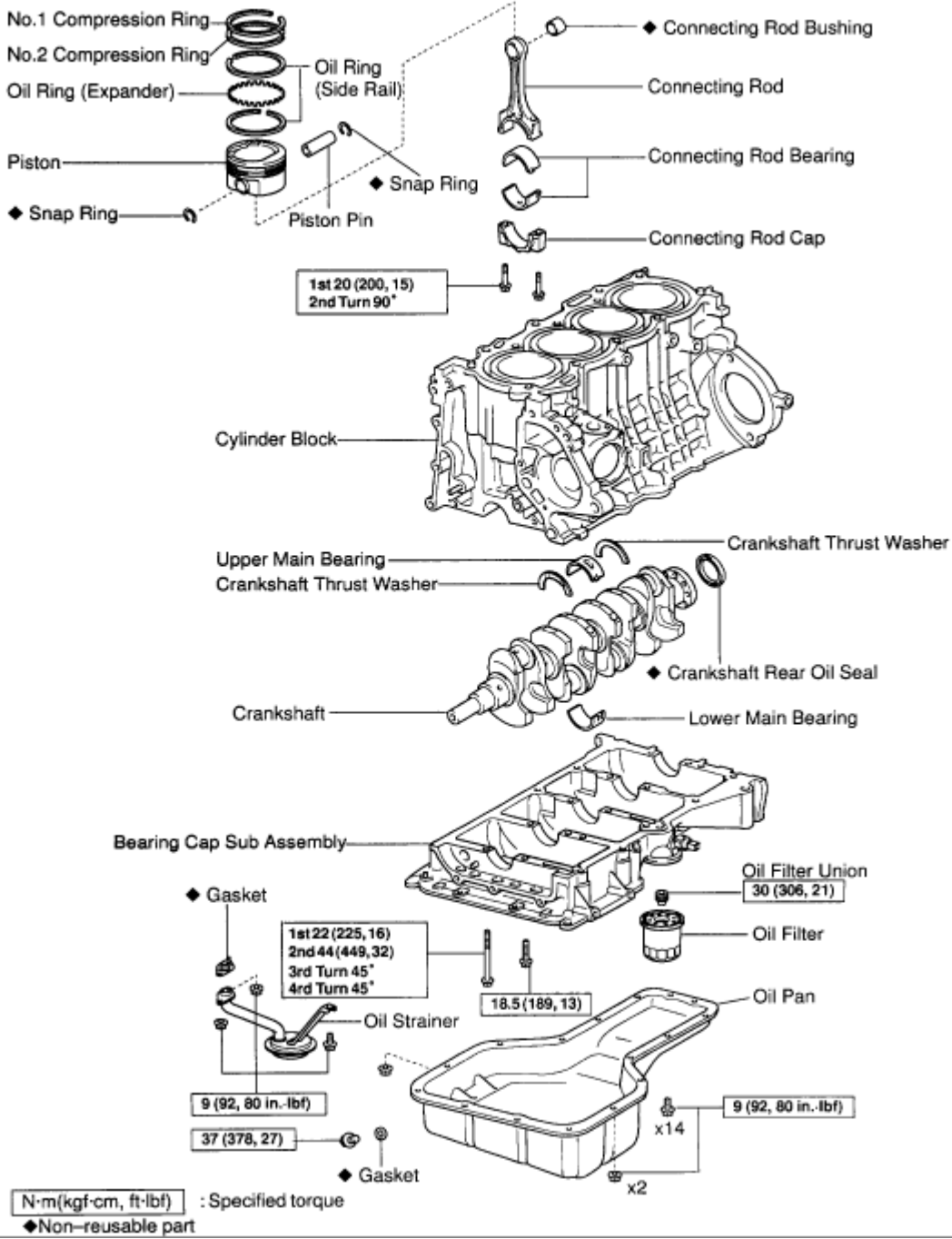
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

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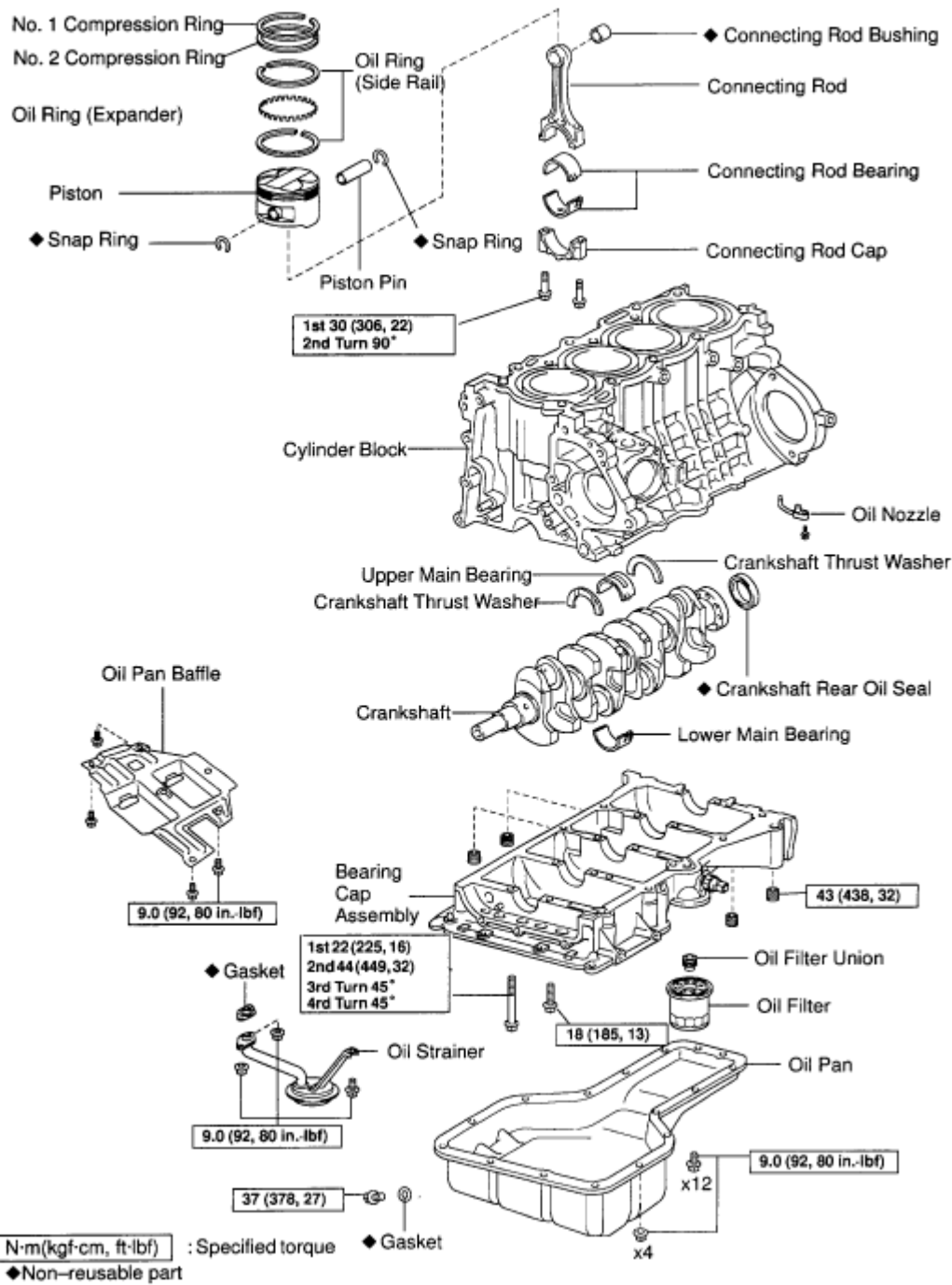
1ZZ-FE:



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**2ZZ-GE:**



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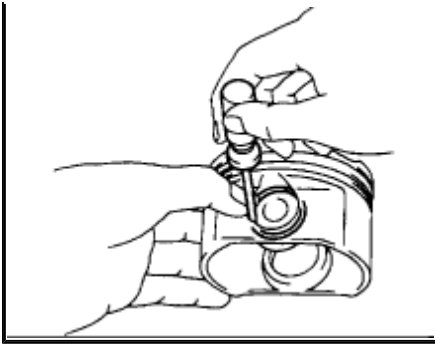
**REASSEMBLY**

**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

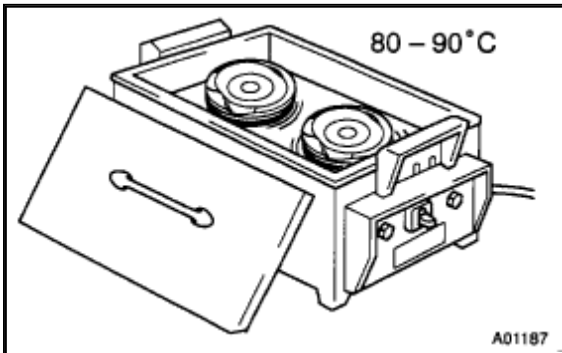




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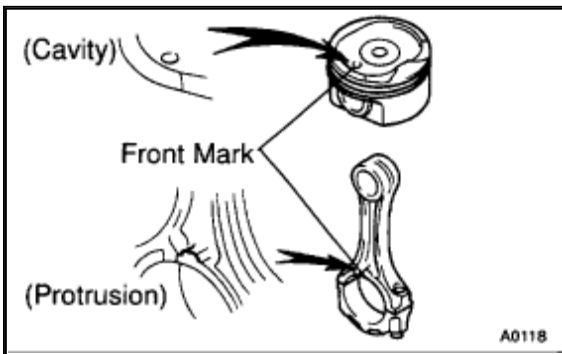
- a. Using a small screwdriver, install a new snap ring at one end of the piston pin hole. **HINT:** Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the [piston](#).



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- b. 1ZZ-FE: Gradually heat the [piston](#) to 80 - 90°C (176 - 194°F) .
- c. Coat the piston pin with engine oil.

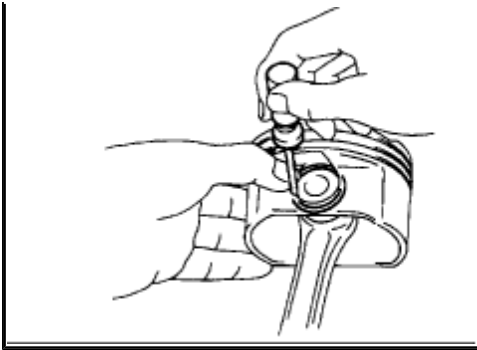


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- d. Align the front marks on the [piston](#) and [connecting rod](#), and push in the piston with your thumb.



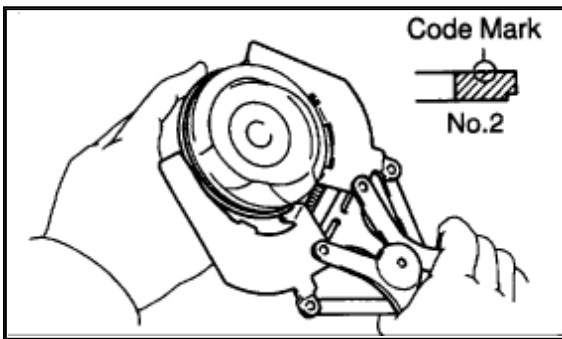


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- e. Using a small screwdriver, install a new snap ring on the other end of the piston pin hole. **HINT:** Be sure that end gap of the snap ring is not as aligned with the pin hole cutout portion of the piston.

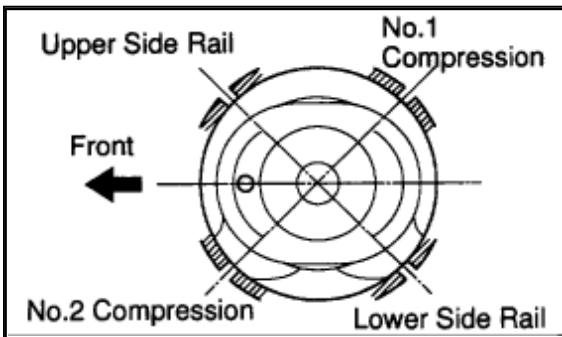
## 2. INSTALL PISTON RINGS

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



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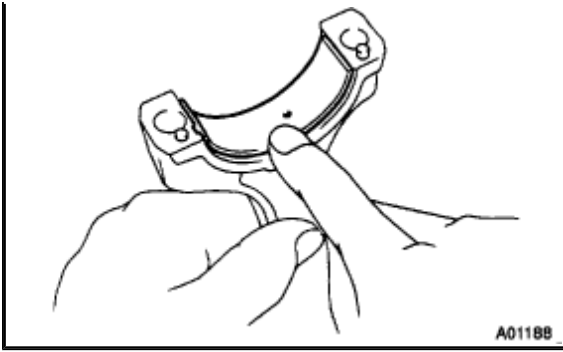
- b. Using a piston ring expander, install the 2 compression rings with the code mark facing upward. Code mark: 1ZZ-FE: T or 2R 2ZZ-GE: T



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- c. Position the piston rings so that the ring ends are as shown. **NOTICE:** Do not align the ring ends.





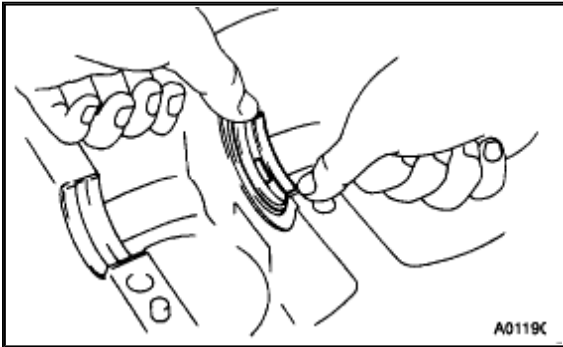
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### 3. INSTALL CONNECTING ROD BEARINGS

- 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.

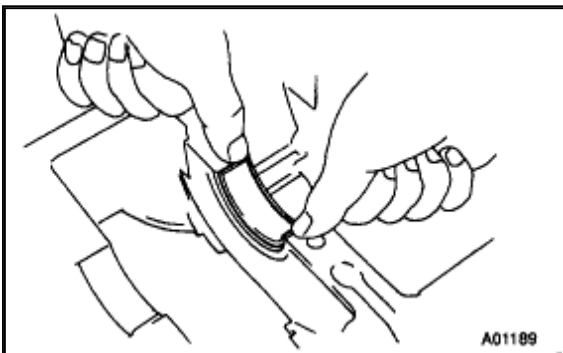
### 4. INSTALL MAIN BEARINGS **HINT:** Upper bearings have an oil groove and oil holes; Lower bearings do not.



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- 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.

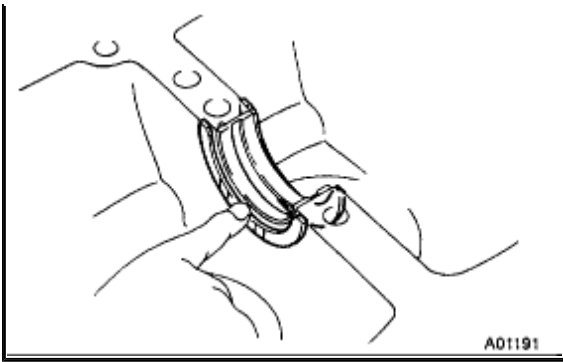


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- b. Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

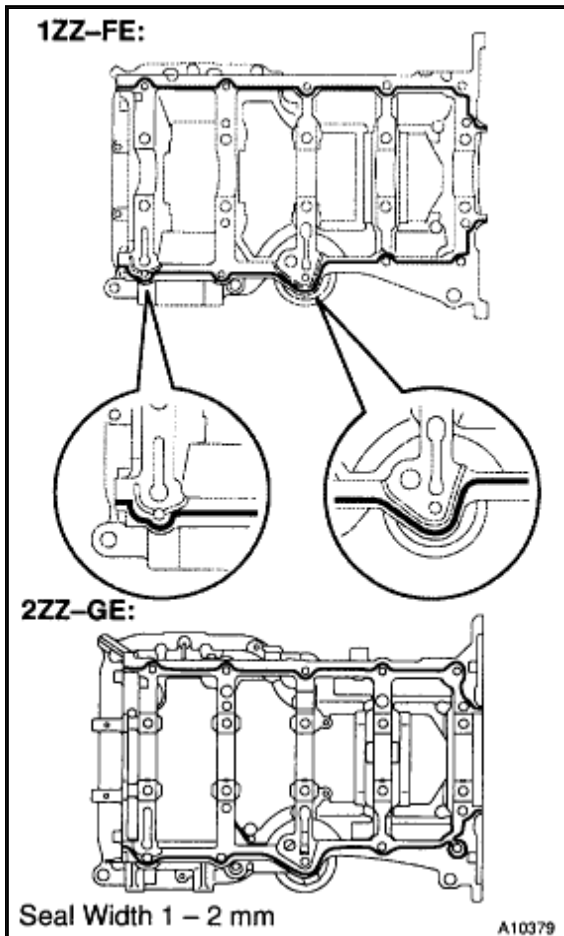




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5. **INSTALL THRUST WASHERS** Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.
6. **PLACE [CRANKSHAFT](#) ON CYLINDER BLOCK**
7. **PLACE BEARING CAP SUB-ASSEMBLY ON CYLINDER BLOCK**
  - a. Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the bearing cap sub-assembly 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.



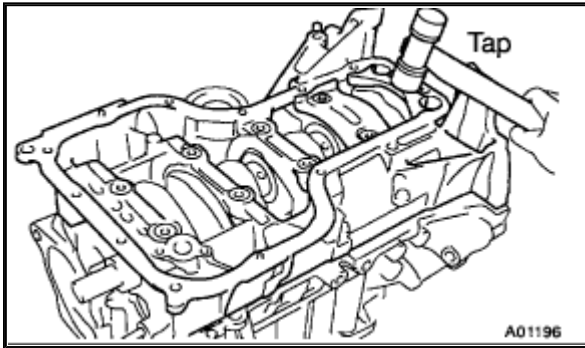
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- b. Apply seal packing to the bearing cap sub-assembly as shown in the illustration. Seal packing: Part No. 08826-00080 or equivalent
  - o Install a nozzle that has been cut to a **1 - 2 mm (0.004 - 0.08 inch)** opening.

**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.



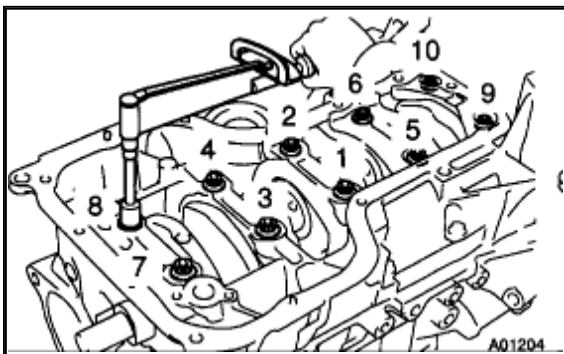
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- c. Using a plastic-faced hammer, lightly tap the bearing cap subassembly to ensure a proper fit.

**8. INSTALL 12 POINTED HEAD BEARING CAP SUB-ASSEMBLY BOLTS HINT:**

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

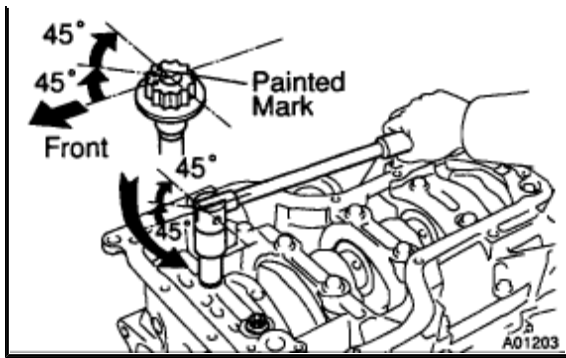
- a. Apply a light coat of engine oil on the threads and under the bearing cap sub-assembly bolts.



ZOOM      SIZED FOR PRINT

- b. Install and uniformly tighten the 10 bearing cap sub-assembly bolts, in several passes, in the sequence shown. Torque: **22 Nm (225 kgf-cm, 16 ft. lbs.)**
- c. Retighten the bearing cap subassembly bolts, in several passes, in the sequence shown. Torque: **44 Nm (449 kgf-cm, 32 ft. lbs.)** If any of the bearing cap sub-assembly bolts does not meet the torque specification, replace the bearing cap sub-assembly bolt.





ZOOM

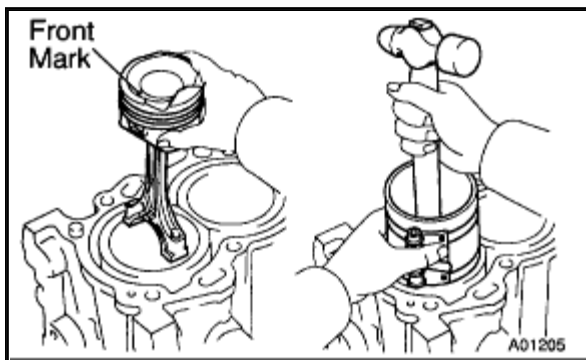
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- d. Mark the front of the bearing cap sub-assembly bolts with paint.
- e. Retighten the bearing cap sub-assembly bolts by **45° and 45°** in the numerical order shown.
- f. Check that the painted mark is now at a **90°** angle to the front.

#### 9. INSTALL HEXAGON HEAD BEARING CAP SUBASSEMBLY BOLTS

- a. Install and uniformly tighten the 10 bearing cap sub-assembly bolts in several passes. Torque: 1ZZ-FE: **18.5 Nm (189 kgf-cm, 14 ft. lbs.)** 2ZZ-GE: **18 Nm (185 kgf-cm, 13 ft. lbs.)**
- b. Check that the [crankshaft](#) turns smoothly.
- c. 2ZZ-GE: Apply adhesive to 2 or 3 threads, and install the 4 screw plugs. Adhesive: Part No.08833-00070, THREE BOND 1324, or equivalent Torque: **43 Nm (438 kgf-cm, 32 ft. lbs.)**

#### 10. CHECK [CRANKSHAFT](#) THRUST CLEARANCE



ZOOM

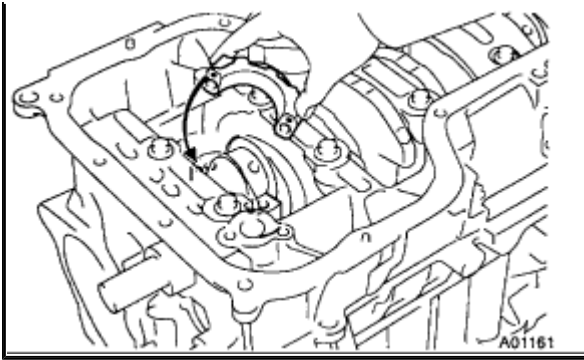
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11. INSTALL [PISTON](#) AND [CONNECTING ROD](#) ASSEMBLES Using a [piston ring](#) compressor, push the correctly numbered [piston](#) and [connecting rod](#) assemblies into each cylinder with the front mark of the piston facing forward.

#### 12. PLACE [CONNECTING ROD](#) CAP ON CONNECTING ROD

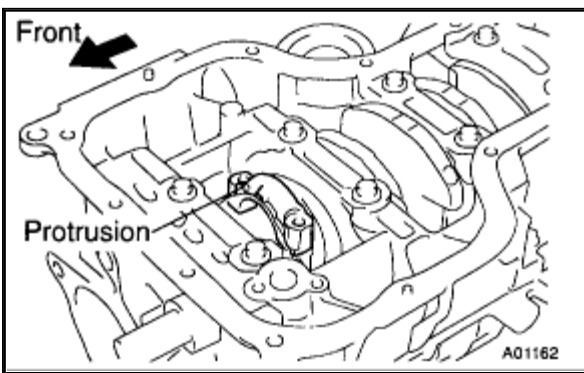
- a. Match the numbered connecting rod cap with the connecting rod.





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- b. Align the pin dowels of the [connecting rod](#) cap with the pins of the connecting rod, and install the connecting rod.

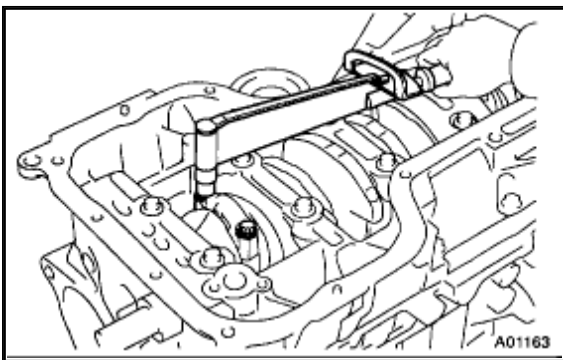


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- c. Check that the protrusion of the [connecting rod](#) cap is facing in the correct direction.

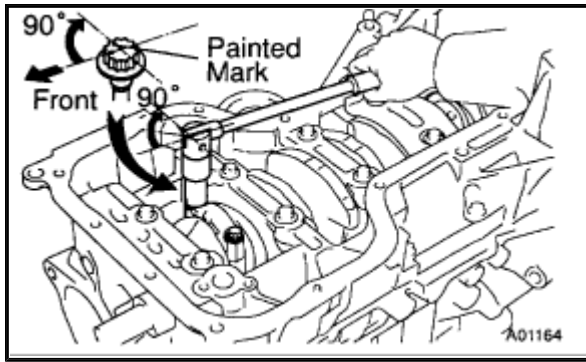
### 13. INSTALL CONNECTING ROD CAP BOLTS **HINT:**

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



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- 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: 1ZZ-FE: **20 Nm (204 kgf-cm, 15 ft. lbs.)** 2ZZ-GE: **30 Nm (306 kgf-cm, 22 ft. lbs.)** If any of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



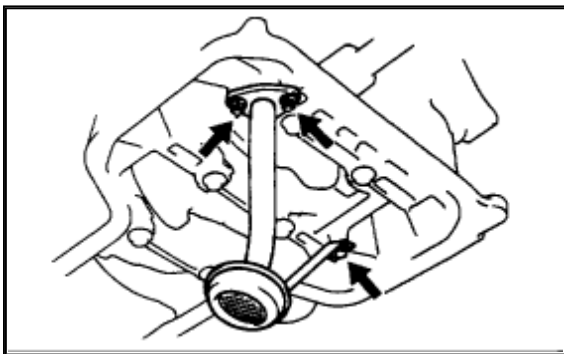
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- c. Mark the front of the connecting cap bolts with paint.
- d. Retighten the cap bolts by  $90^\circ$  as shown.
- e. Check that the painted mark is now at a  $90^\circ$  angle to the front.
- f. Check that the [crankshaft](#) turns smoothly.

14. CHECK [CONNECTING ROD](#) THRUST CLEARANCE

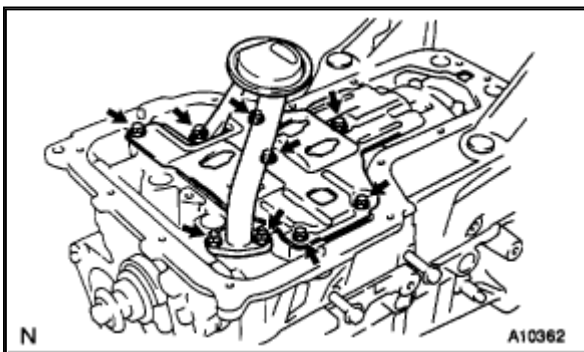
15. INSTALL REAR CRANKSHAFT OIL SEAL **HINT:** Wipe seal packing away from the contact surface of the cylinder block assembly and oil seal.



ZOOM

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16. 1ZZ-FE: INSTALL OIL STRAINER Install a new gasket and the oil strainer with the 2 nuts and bolt. Torque: **9.0 Nm (92 kgf-cm, 80 inch lbs.)**



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17. 2ZZ-GE: INSTALL [OIL PAN BAFFLE](#) AND OIL STRAINER

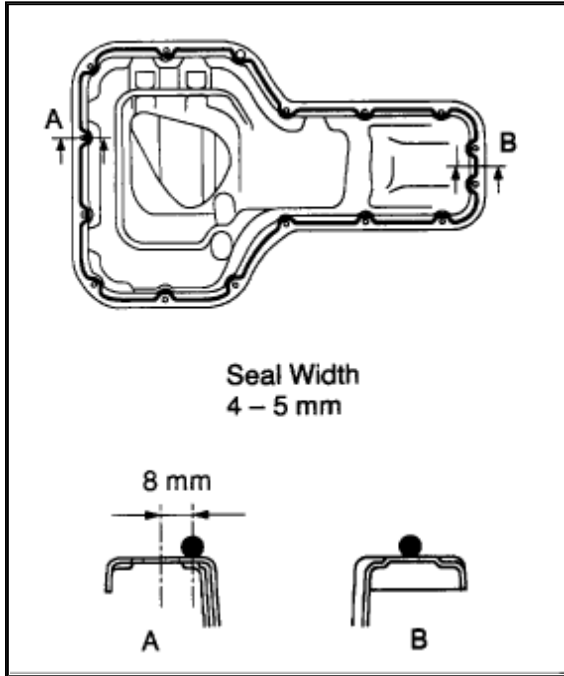
- a. Install the oil pan baffle with the 4 bolts and 2 nuts. Torque: **9.0 Nm (92 kgf-cm, 80 inch lbs.)**

- b. Install a new gasket and oil strainer with the 2 nuts and bolt. Torque: **9.0 Nm (92 kgf-cm, 80 inch lbs.)**

18. 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.



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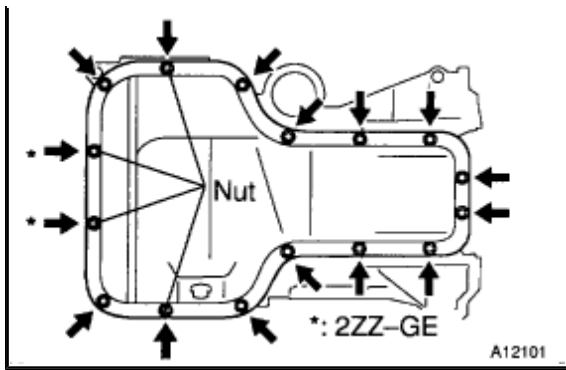
- b. Apply seal packing to the [oil pan](#) as shown in the illustration. Seal packing: Part No. 08826-00080 or equivalent

- Install a nozzle that has been cut to a **4 - 5 mm (0.16 - 0.20 inch)** 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.

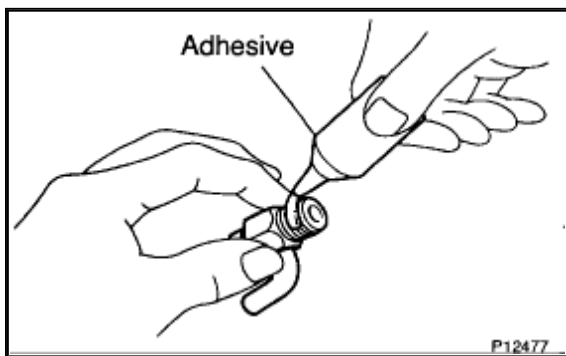




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- c. 1ZZ-FE: Install the [oil pan](#) with the 14 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
- d. 2ZZ-GE: Install the [oil pan](#) with the 12 bolts and 4 nuts. Uniformly tighten the bolts and nuts in several passes. Torque: **9.0 Nm (92 kgf-cm, 80 inch lbs.)**

- 19. INSTALL [OIL FILTER UNION](#) Torque: **30 Nm (306 kgf-cm, 21 ft. lbs.)**
- 20. INSTALL [OIL FILTER](#)
- 21. INSTALL [OIL PUMP](#) See: [Engine Lubrication](#)



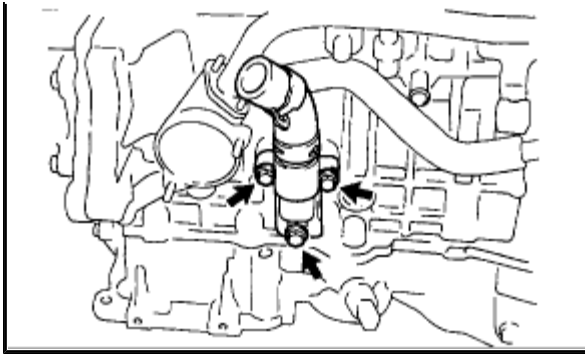
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22. INSTALL ENGINE COOLANT DRAIN UNION

- 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: 1ZZ-FE:**20 Nm (200 kgf-cm, 14 ft. lbs.)** 2ZZ-GE:**25 Nm (255 kgf-cm, 18 ft. lbs.)** **HINT:** After applying the specified torque, rotate the drain union clock wise until its drain port is facing downward.

23. INSTALL KNOCK SENSOR Torque: **39 Nm (400 kgf-cm, 29 ft. lbs.)**





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24. 2ZZ-GE: INSTALL VENTILATION CASE

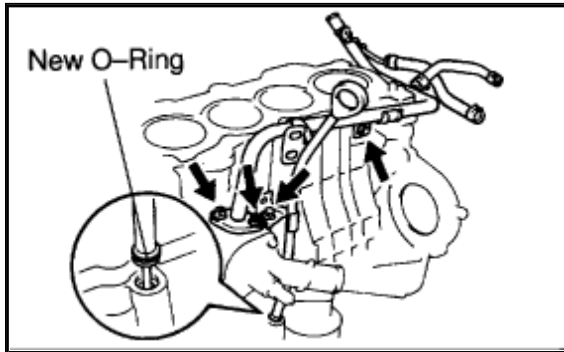
- a. Install a new gasket and ventilation case with the 3 bolts. Torque: **8.5 Nm (87 kgf-cm, 75 inch lbs.)**
- b. Install the No. 3 ventilation hose and connect the clip.

25. INSTALL THERMOSTAT [See: Cooling System](#)

26. INSTALL WATER BYPASS PIPE Torque: 1ZZ-FE:**9.0 Nm (92 kgf-cm, 80 inch lbs.)** 2ZZ-GE:

Bolt: **8.5 Nm (87 kgf-cm, 75 inch lbs.)**

Nut: **10 Nm (100 kgf-cm, 7 ft. lbs.)**



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27. 1ZZ-FE: INSTALL OIL DIPSTICK AND GUIDE

- a. Install a new O-ring on the dipstick guide.
- b. Apply soapy water on the O-ring.
- c. Connect the dipstick guide end to the main bearing cap.
- d. Install the dipstick guide with the bolt. Torque: **11 Nm (113 kgf-cm, 8 ft. lbs.)**

28. INSTALL CYLINDER HEAD [See: Cylinder Head Assembly](#)

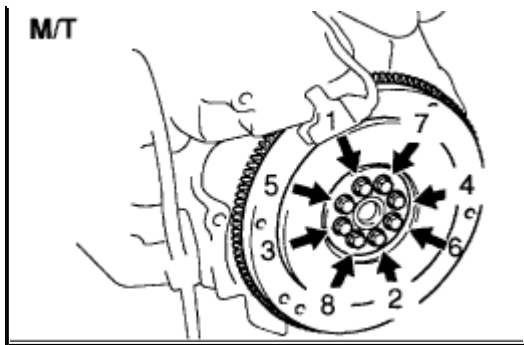
29. INSTALL ENGINE WIRE

30. INSTALL TIMING SPROCKETS AND [TIMING CHAIN](#) [See: Engine](#)

31. REMOVE ENGINE STAND

32. M/T: INSTALL FLYWHEEL **HINT:** The flywheel bolts are tightened in 2 progressive steps, a. and c.

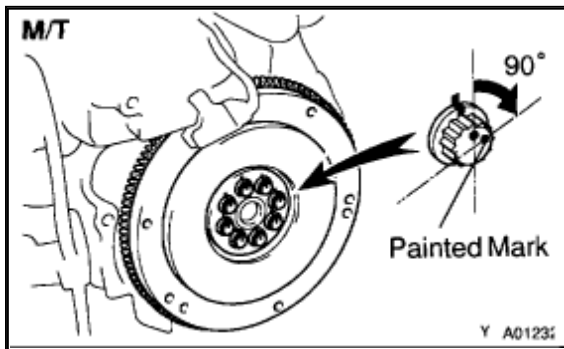




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- a. Install and uniformly tighten the 8 mounting bolts, in several passes, in the sequence shown. Torque: **49 Nm (500 kgf-cm, 36 ft. lbs.)**



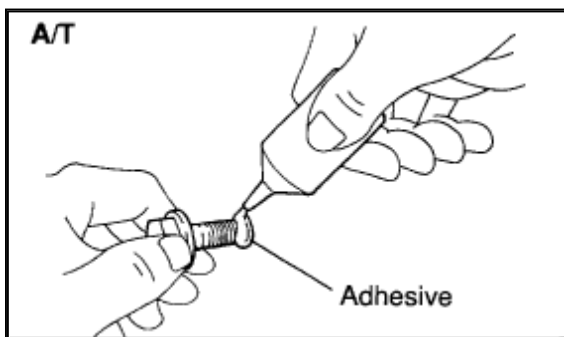
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- b. Mark the flywheel bolt with paint.
- c. Retighten the flywheel bolts by an **additional 90°**.
- d. Check that the painted mark is now at a **90°** angle to b.

### 33. A/T: INSTALL DRIVE PLATE

- a. Install the front spacer, drive plate and rear plate on the [crankshaft](#).

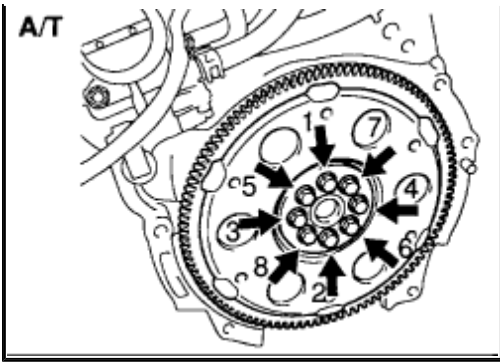


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- b. Apply adhesive to 2 or 3 threads of the mounting bolt end. Adhesive: Part No. 08833-00070, THREE BOND or equivalent





ZOOM

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- c. Install and uniformly tighten the 8 mounting bolts, in several passes, in the sequence shown. Torque:  
**88 Nm (897 kgf-cm, 65 ft. lbs.)**