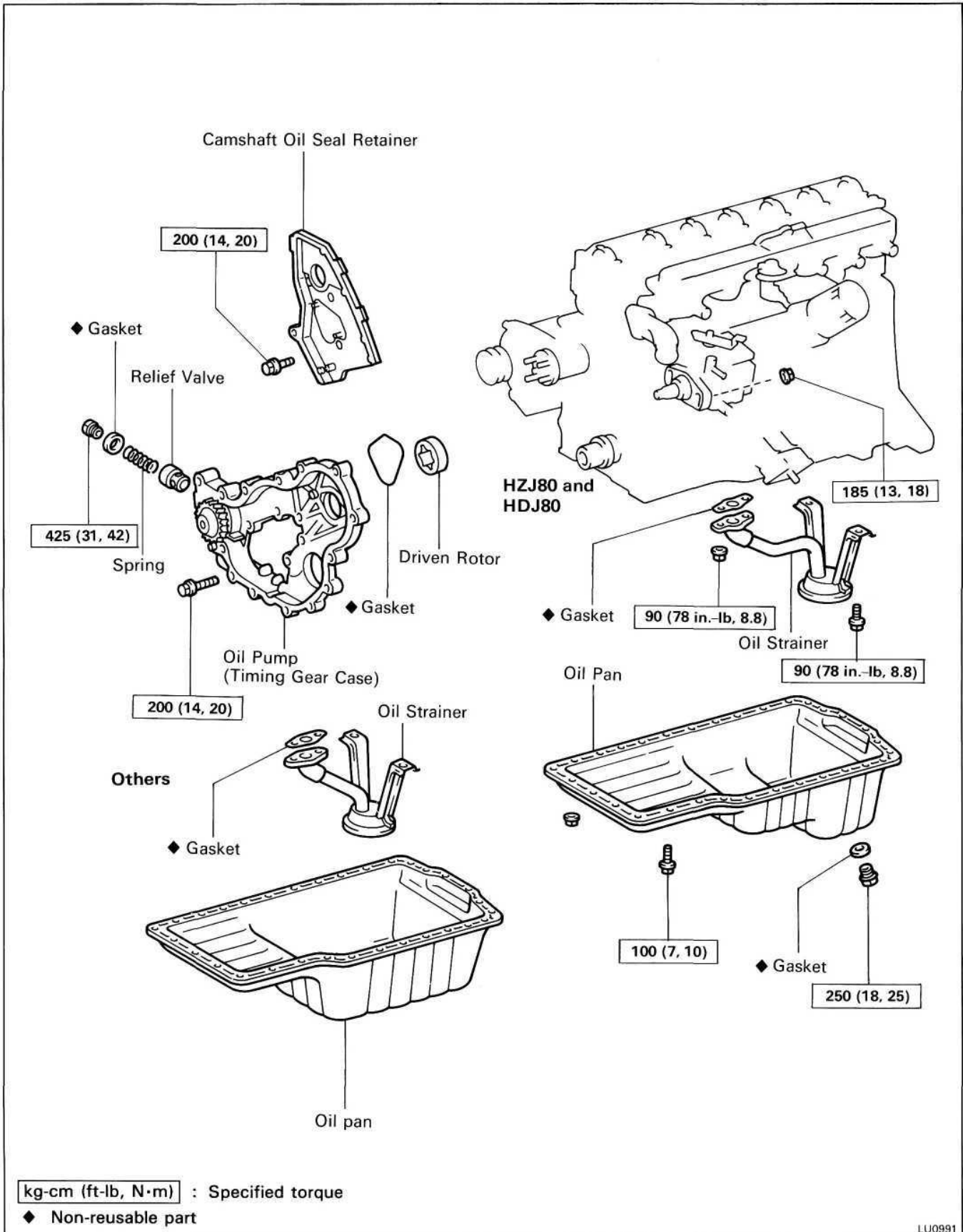


OIL PUMP COMPONENT

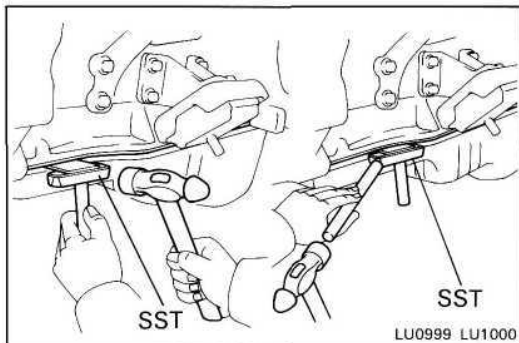
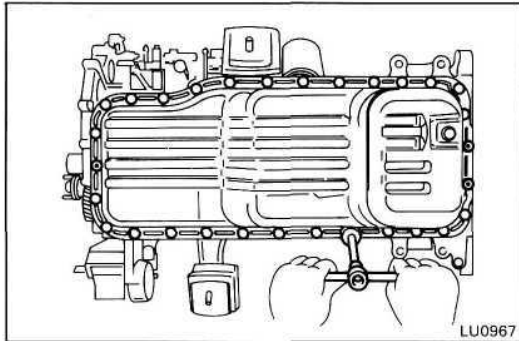


REMOVAL OF OIL PUMP

(See page LU-8)

HINT: When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. DRAIN ENGINE COOLANT (See page CO-4)
2. DRAIN ENGINE OIL (See page LU-6)
3. REMOVE TIMING GEARS
(See steps 1 to 12 on pages EM-43 to 45)
4. REMOVE OIL PAN



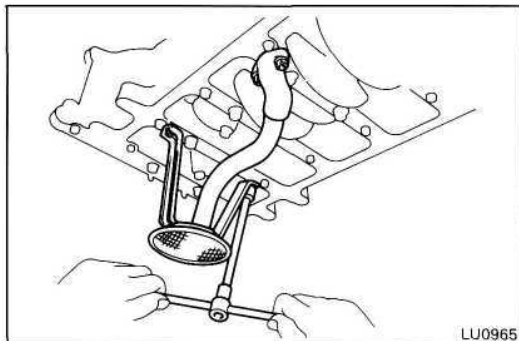
- (a) Remove the twenty-three bolts (1PZ) or twenty-seven bolts (1 HZ and IHD-T) and three nuts.

- (b) Insert the blade of SST between the cylinder block and oil pan, cut off applied sealer and remove the oil pan.

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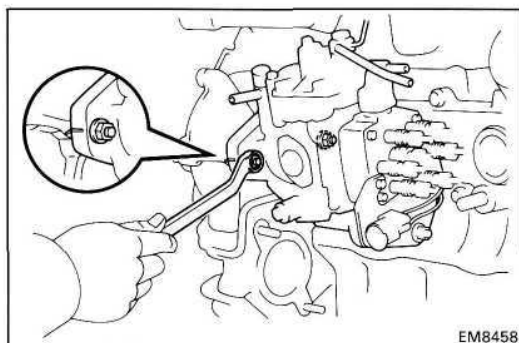
NOTICE:

- Do not use SST for the timing gear case side and rear oil seal retainer.
- Be careful not to damage the oil pan flange.



5. REMOVE OIL STRAINER

Remove the two bolts, two nuts, oil strainer and gasket.

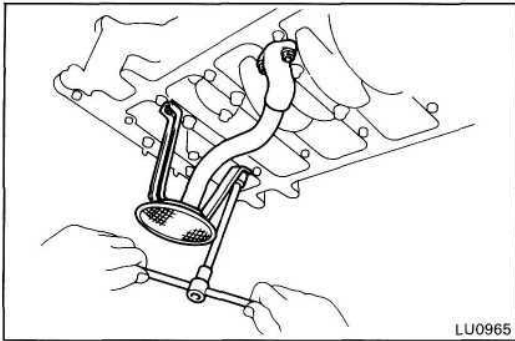


6. REMOVE OIL PUMP (TIMING GEAR CASE)

- (a) Before removing the two nuts holding the timing gear case to the injection pump, check if the injection pump period lines are aligned.

If not, place new matchmarks for reinstallation.

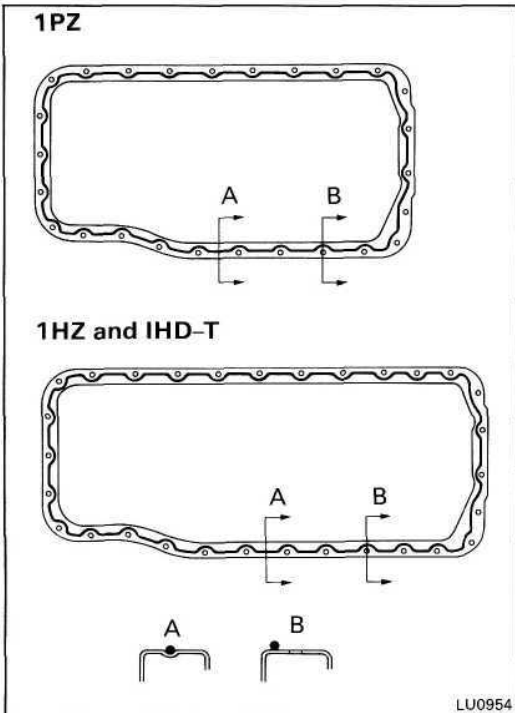
- (b) Remove the two nuts.



3. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the two bolts and two nuts.

Torque: 90 kg-cm (78 in.-lb, 8.8 Nm)



4. INSTALL OIL PAN

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

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

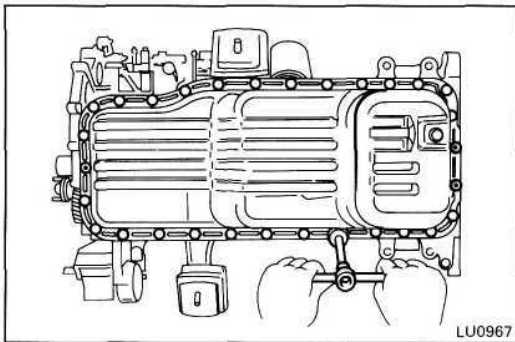
(b) Apply seal packing to the oil pan as shown in the illustration.

Seal packing: Part No.08826-00080 or equivalent

- Install a nozzle that has been cut to a 5 mm (0.20 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 oil pan with the twenty-three bolts (1 PZ) or twenty-seven bolts (1 HZ and 1 HD-T) and three nuts.

Torque: 100 kg-cm (7 ft-lb, 10 Nm)



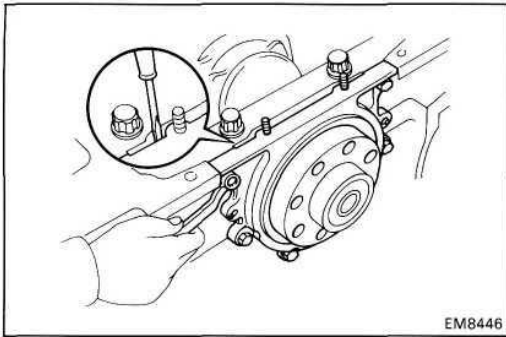
5. INSTALL TIMING GEARS

(See steps 2 to 12 on pages EM-50 to 53)

6. FILL WITH ENGINE OIL (See page LU-7)

7. FILL WITH ENGINE COOLANT (See page CO-5)

8. START ENGINE AND CHECK FOR LEAKS



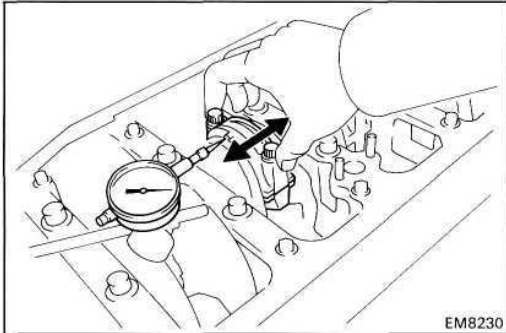
EM8446

DISASSEMBLY OF CYLINDER BLOCK

(See page EM-84)

1. REMOVE REAR OIL SEAL RETAINER

Remove the six bolts and retainer.



EM8230

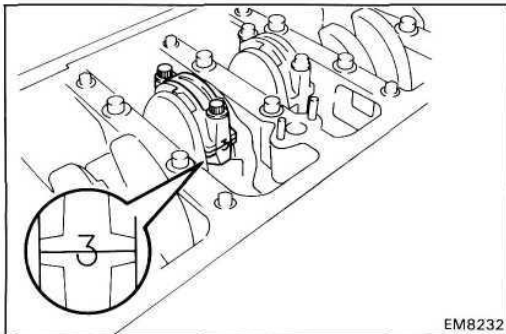
2. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance: 0.10-0.20 mm
(0.0038-0.0079 in.)

Maximum thrust clearance: 0.30 mm (0.0118 in.)

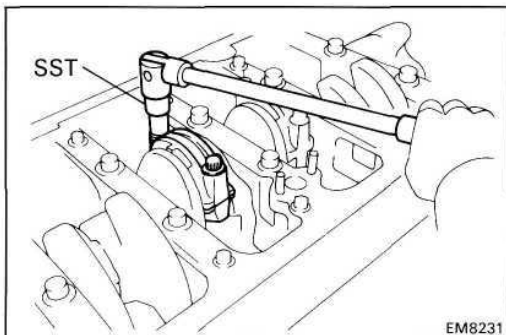
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



EM8232

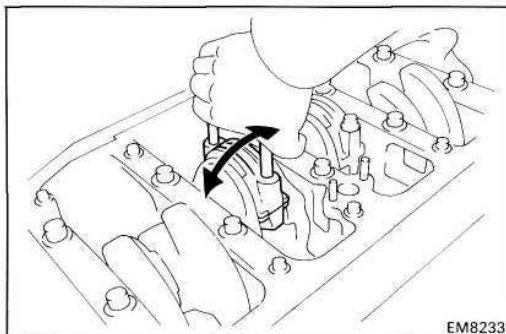
3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Using paint, place the matchmarks on the connecting rod and cap to ensure correct reassembly.



EM8231

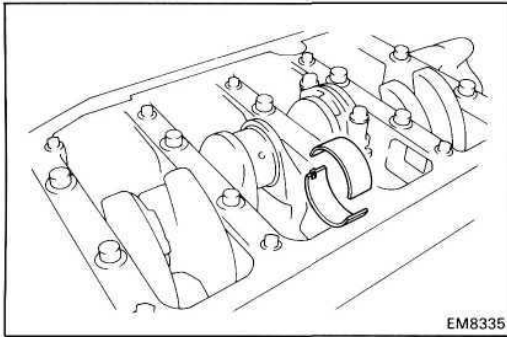
(b) Using SST, remove the connecting rod cap bolts.
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EM8233

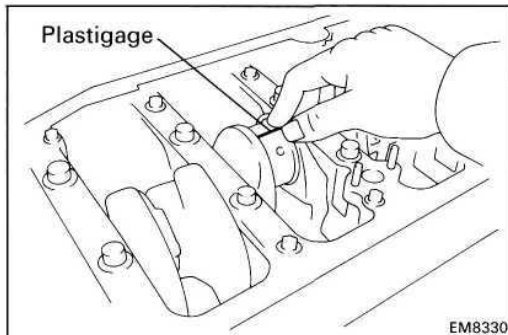
(c) Using the removed connecting rod cap bolts, pry the connecting rod cap back and forth, and remove the connecting cap.

HINT: Keep the lower bearing inserted with the connecting rod cap.

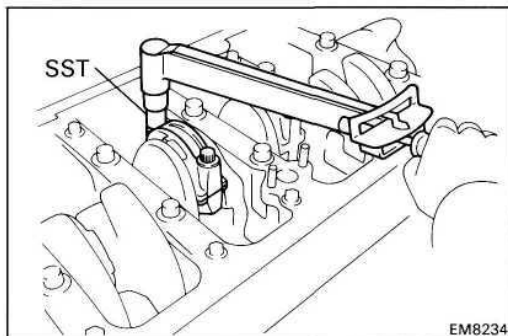


- (d) Clean crank pin and bearing.
- (e) Check the crank pin and bearing for pitting and scratches.

If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.



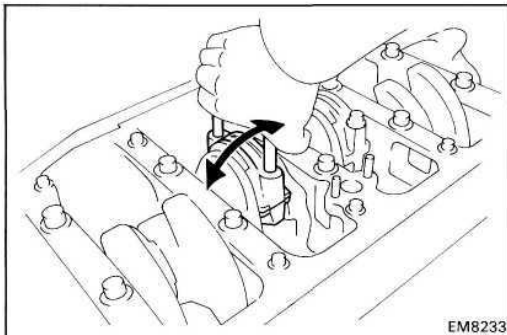
- (f) Lay a strip of Plastigage across the crank pin.



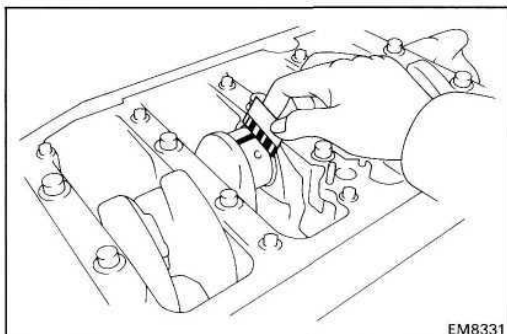
- (g) Install the connecting rod cap.
(See step 8 on page EM-111)

Torque: 1st 375 kg-cm (27 ft-lb, 37 Nm)
2nd turn 90°

HINT: Do not turn the crankshaft.



- (h) Remove the connecting rod cap.
(See procedure (b) and (c) above)



- (i) Measure the Plastigage at widest point.

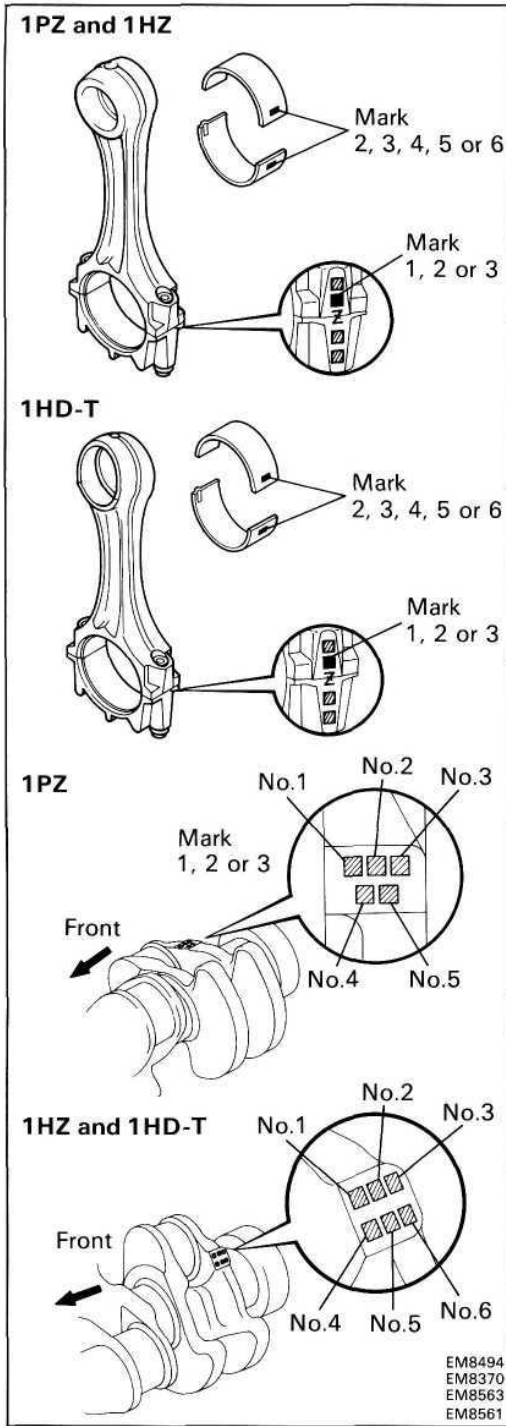
Standard oil clearance:

STD 0.036-0.054 mm
(0.0014-0.0021 in.)

US 0.25 and US 0.50
0.037 - 0.077 mm
(0.0015 - 0.0030 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.



HINT: If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers inprinted on the crankshaft and connecting rod, then selecting the bearing with the same number as the total. There are five sizes of standard bearings, marked "2", "3", "4", "5" and "6" accordingly.

Connecting rod	Number marked								
	1			2			3		
Crankshaft	1	2	3	1	2	3	1	2	3
Bearing	2	3	4	3	4	5	4	5	6

EXAMPLE: Connecting rod "2" + Crankshaft "1"
= Total number (Use bearing "3")

(Reference)

Connecting rod big end inner diameter:

- Mark "1" 62.014-62.020 mm (2.4415-2.4417 in.)
- Mark "2" 62.020-62.026 mm (2.4417-2.4420 in.)
- Mark "3" 62.026-62.032 mm (2.4420-2.4422 in.)

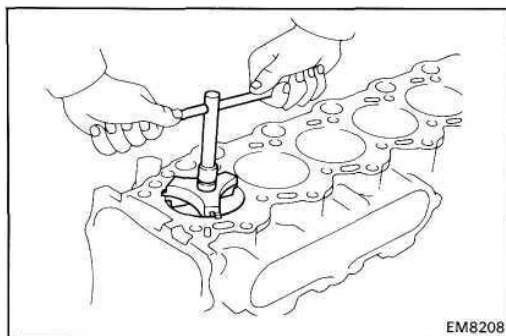
Crankshaft pin diameter:

- Mark "1" 58.994-59.000 mm (2.3226-2.3228 in.)
- Mark "2" 58.988 - 58.994 mm (2.3224-2.3226 in.)
- Mark "3" 58.982 - 58.988 mm (2.3221-2.3224 in.)

Standard sized bearing center wall thickness:

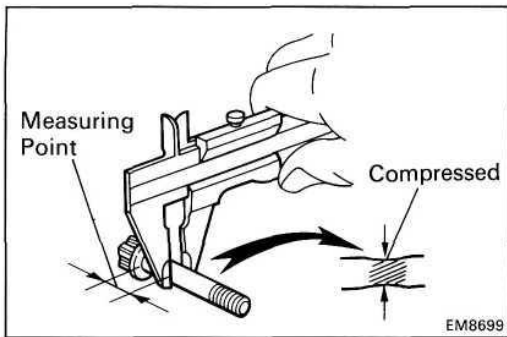
- Mark "2" 1.486-1.489 mm (0.0585-0.0586 in.)
- Mark "3" 1.489-1.492 mm (0.0586-0.0587 in.)
- Mark "4" 1.492-1.495 mm (0.0587-0.0589 in.)
- Mark "5" 1.495-1.498 mm (0.0589-0.0590 in.)
- Mark "6" 1.498-1.501 mm (0.0590-0.0591 in.)

(j) Completely remove the Plastigage.



4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

- (a) Remove the all carbon from the top of the cylinder.
- (b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

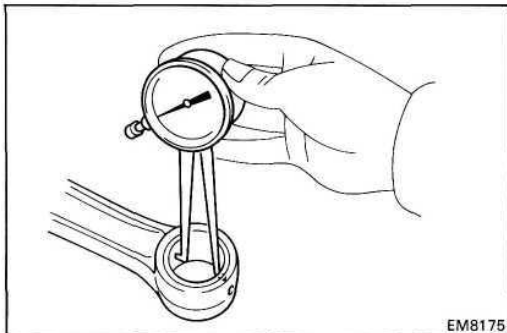
**B. Inspect connecting rod bolts**

Using vernier calipers, measure the minimum diameter of the compressed bolt at the measuring point.

**Standard diameter: 8.300-8.400 mm
(0.3268-0.3307 in.)**

Minimum diameter: 7.95 mm (0.3130 in.)

If the diameter is less than minimum, replace the connecting rod bolt.

**C. Inspect piston pin oil clearance**

- (a) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

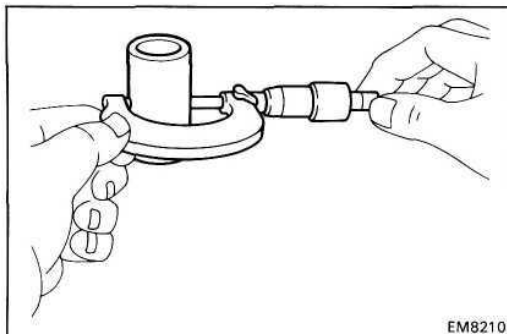
Bushing inside diameter:

IPZ and 1HZ

29.008-29.020 mm (1.1420-1.1425 in.)

1HD-T

33.008-33.020 mm (1.2995-1.3000 in.)



- (b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

1PZ and 1HZ

29.000-29.012 mm (1.1417-1.1422 in.)

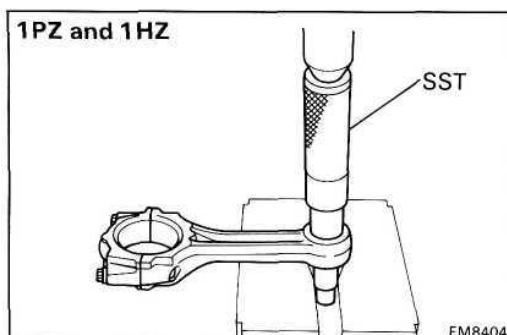
1HD-T

33.000-33.012 mm (1.2992-1.2997 in.)

- (c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

**Standard oil clearance: 0.004-0.012 mm
(0.0002-0.0005 in.)**

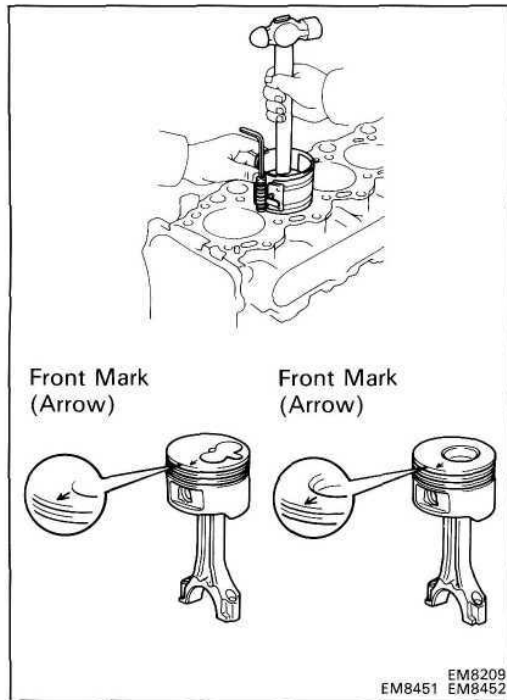
Maximum oil clearance: 0.03 mm (0.0012 in.)

**7. IF NECESSARY, REPLACE CONNECTING ROD BUSHINGS****A. Remove connecting rod bushings**

Using SST and a press, press out the bushing.

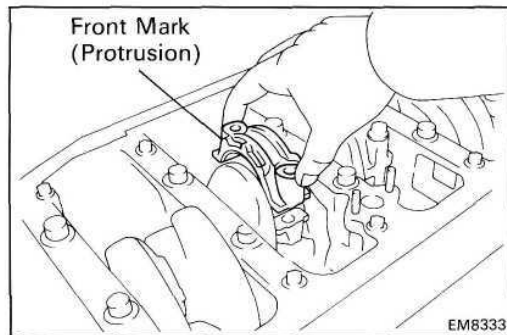
SST1PZand1HZ 09222-66010

**1HD-T 09222-17010(09222-05020,
09222-05040)**



8. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

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.



9. INSTALL CONNECTING ROD CAPS

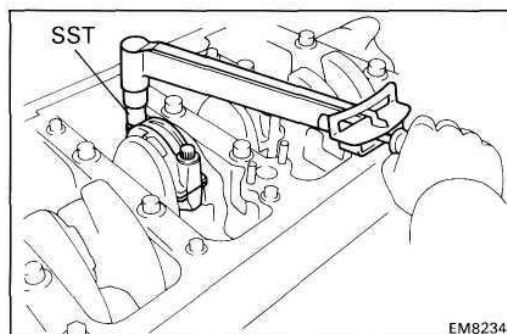
A. Place connecting rod cap on connecting rod

- Match the numbered connecting rod cap with the connecting rod.
- Install the connecting rod cap with the front mark facing forward.

B. Install connecting rod cap bolts

HINT:

- The connecting rod cap bolts are tightened in two progressive steps.
- If any of the connecting rod bolts break or deform, replace them.

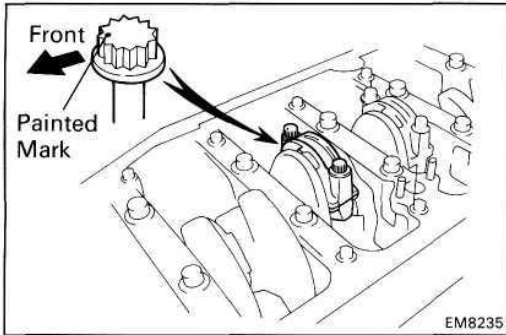


- Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.
- 1 st, using SST, install and alternately tighten the bolts of the connecting rod cap in several passes.

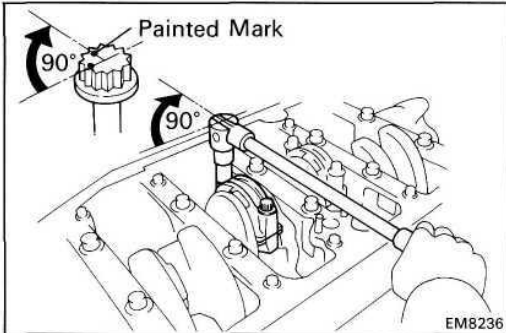
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Torque: 375 kg-cm (27 ft-lb, 37 N·m)

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



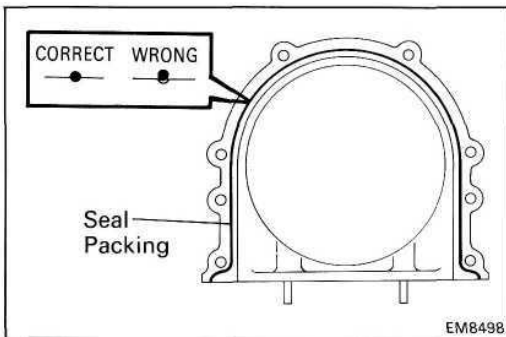
- (c) Mark the front of the connecting rod cap bolt with paint.



- (d) 2nd, retighten the connecting rod cap bolts by an additional 90°.
- (e) Check that the painted mark is now at a 90° angle to the front.
- (f) Check that the crankshaft turns smoothly.
- (g) Check the connecting rod thrust clearance. (See step 2 on page EM-86)

10. 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 rear oil seal retainer 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 rear 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 the retainer with the six bolts.

Torque: 65 kg-cm (56 in.-lb, 6.4 N-m)

