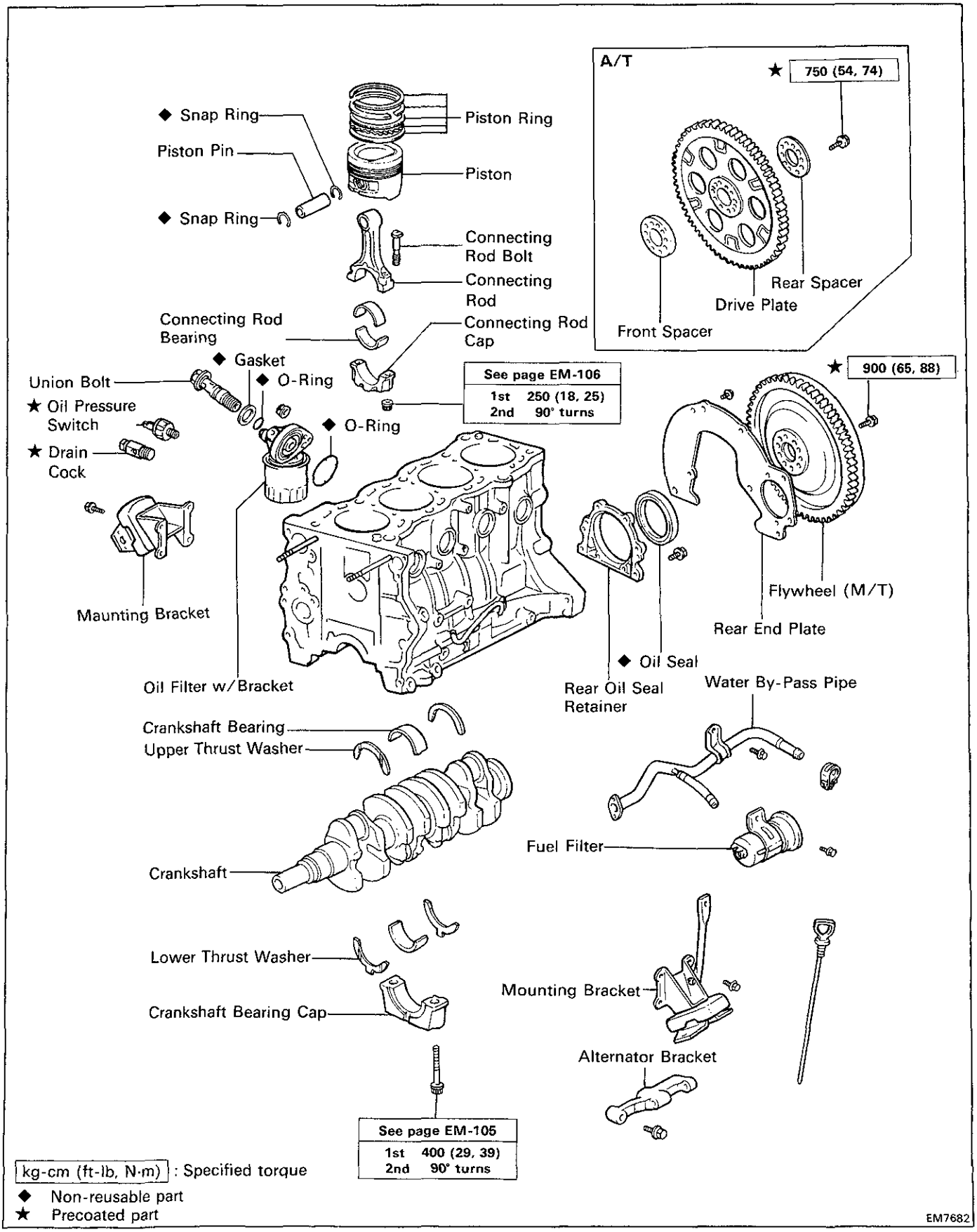
CYLINDER BLOCK

COMPONENTS

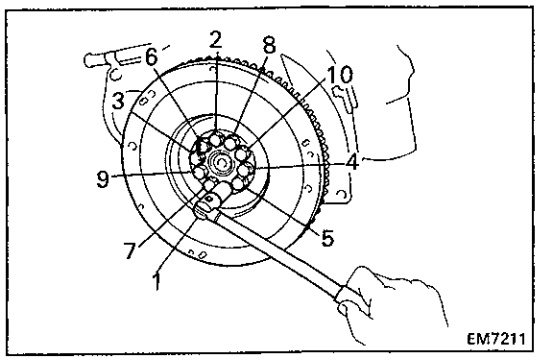


kg-cm (ft-lb, N·m) : Specified torque

◆ Non-reusable part

★ Precoated part

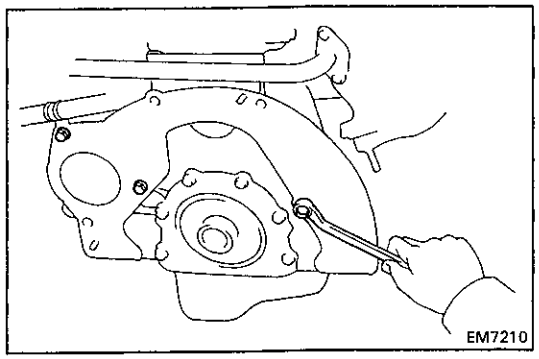
EM7682



PREPARATION FOR DISASSEMBLY

(See page EM-81)

1. (M/T)
REMOVE FLYWHEEL
Remove the ten bolts and flywheel.
(A/T)
REMOVE DRIVE PLATE
Remove the ten bolts, rear spacer, drive plate and front spacer.

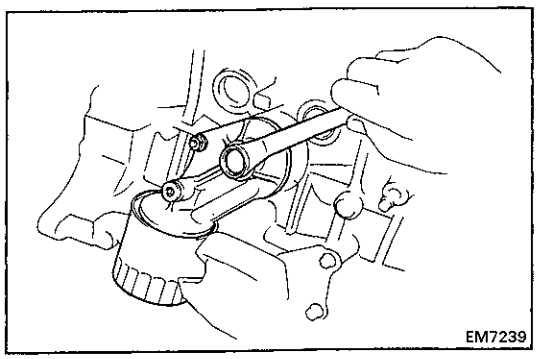


2. **REMOVE REAR END PLATE**
Remove the three bolts and rear end plate.

3. **INSTALL ENGINE STAND FOR DISASSEMBLY**

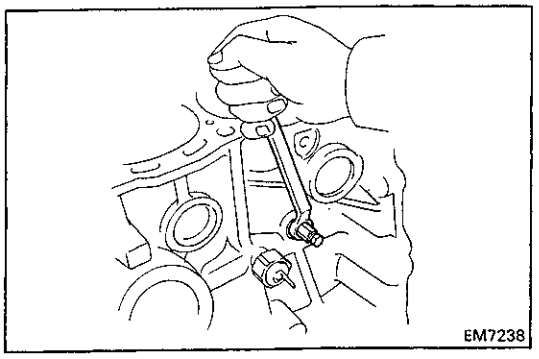
4. **REMOVE CYLINDER HEAD**
(1RZ, 2RZ: See steps 1 to 9 on pages EM-39 to 41)
(2RZ-E: See steps 1 to 9 on pages EM-65, 66)

5. **REMOVE TIMING CHAIN**
(See steps 2 to 11 on pages EM-73 to 75)

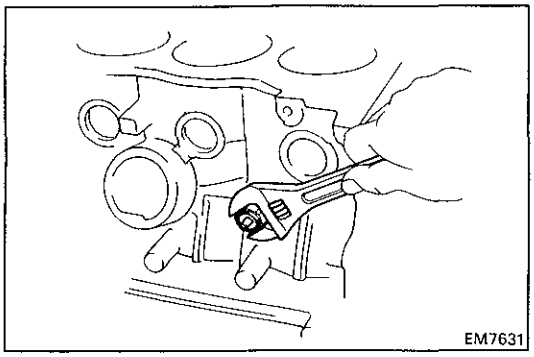


6. **REMOVE OIL FILTER BRACKET WITH OIL FILTER**
Remove the union bolt, nut and oil filter bracket with oil filter.

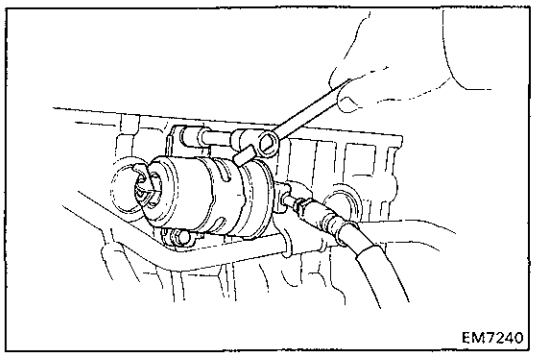
7. **REMOVE RH AND LH ENGINE MOUNTINGS**



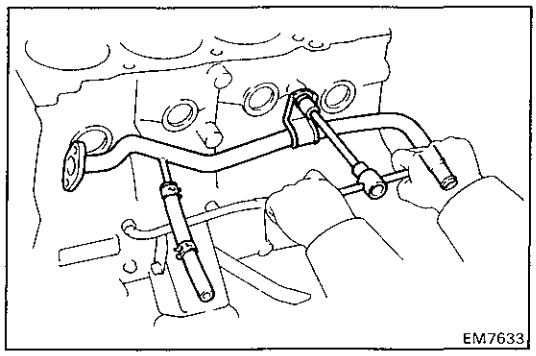
8. **REMOVE ENGINE COOLANT DRAIN COCK**



9. REMOVE OIL PRESSURE SWITCH

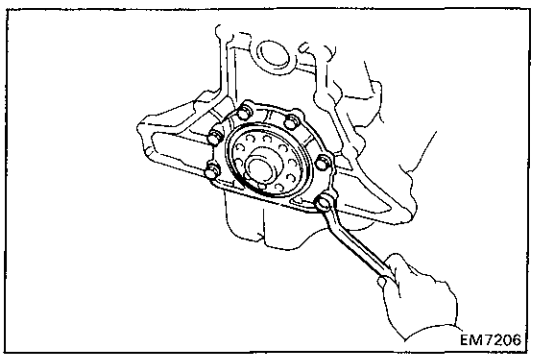


10. (2RZ-E)
REMOVE FUEL FILTER
Remove the two bolts and fuel filter.

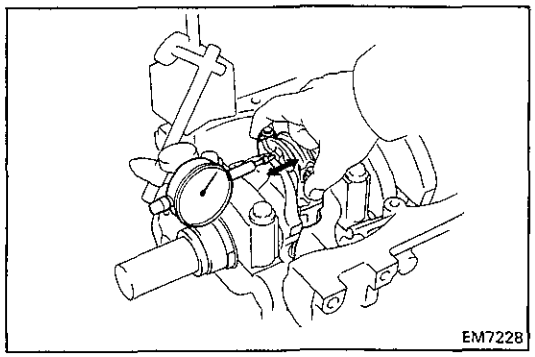


11. REMOVE WATER BY-PASS PIPE
Remove the bolt and water by-pass pipe.

12. REMOVE ALTERNATOR BRACKET



13. REMOVE REAR OIL SEAL RETAINER
Remove the six bolts and rear oil seal retainer.


EM7228

DISASSEMBLY OF CYLINDER BLOCK

(See page EM-81)

1. **MEASURE CONNECTING ROD THRUST CLEARANCE**

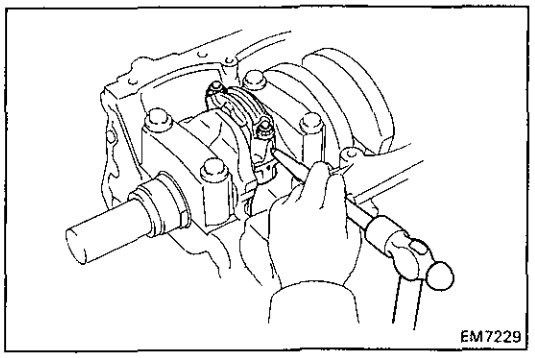
Using a dial gauge, measure the thrust clearance while moving the rod back and forth.

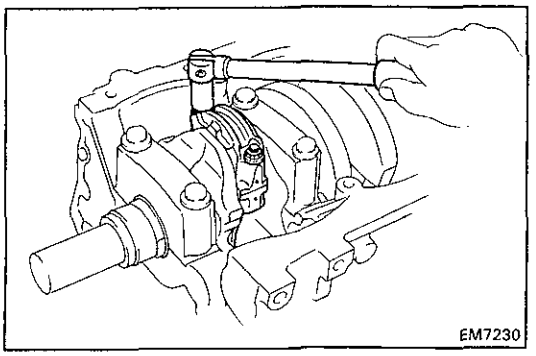
Standard clearance: **0.160 – 0.312 mm (0.0063 – 0.0123 in.)**
Maximum clearance: **0.35 mm (0.014 in.)**

If clearance is greater than maximum, replace the connecting rod assembly and/or crankshaft.

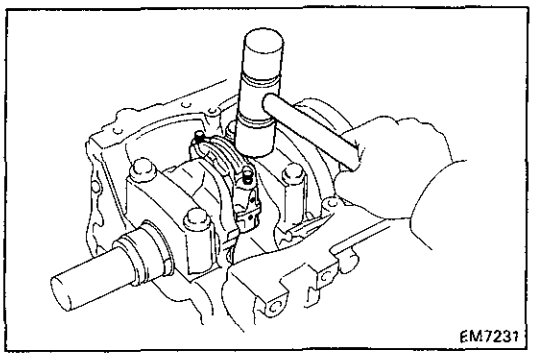
2. **MEASURE CONNECTING ROD OIL CLEARANCE**

(a) Using a punch or numbering stamp, Place the match mark on the connecting rod and cap to ensure correct reassembly.


EM7229

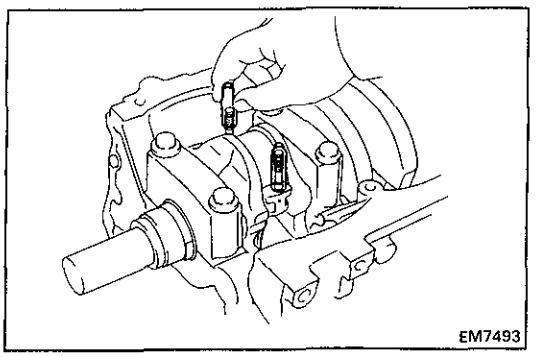

EM7230

(b) Using a 12-sided socket wrench, remove the rod cap nuts.


EM7231

(c) Using a plastic-faced hammer, lightly tap the rod bolts and lift off the rod cap.

HINT: Keep the lower bearing inserted with the cap.


EM7493

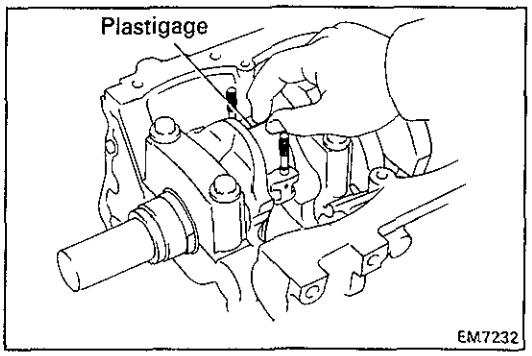
(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

(e) Clean the bearings and crank pins.

(f) Inspect each bearing for pitting and scratches.

If crank pin or bearing is damaged, replace the crankshaft and bearing.

(g) Remove the short piece of hose.



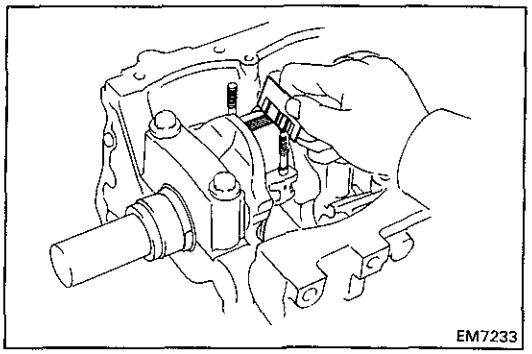
(h) Lay a strip of Plastigage across the crank pin.

(i) Align the rod and cap marks and fit on the cap. Torque the rod cap nuts.

(See step 9 on pages EM-106, 107)

HINT:

- Do not turn the crankshaft.
- Apply a light coating of engine oil on the nut threads and under the nut before installation.



(j) Remove the rod cap.

(k) Measure the Plastigage at its widest point.

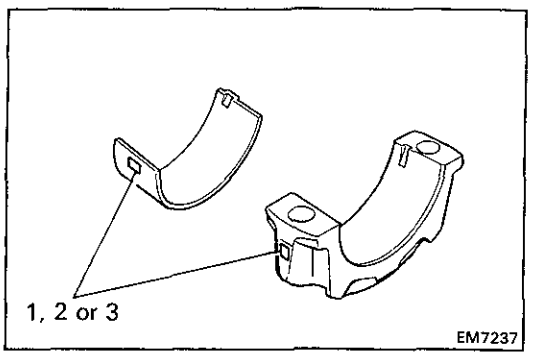
Standard clearance: 0.030 – 0.059 mm (0.0012 – 0.0023 in.)

Maximum clearance: 0.1 mm (0.004 in.)

If the clearance is greater than maximum, replace the bearings and/or grind the crank pins.

Undersized bearing: U/S 0.25

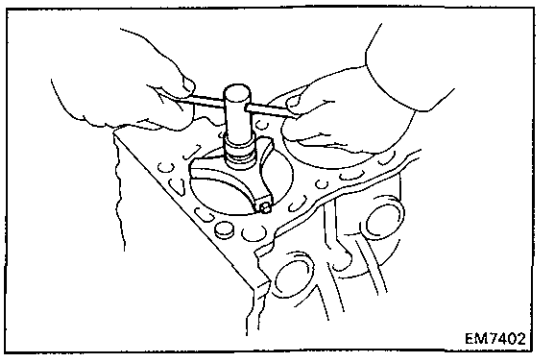
(l) Completely remove the Plastigage.



HINT: If using standard bearing, replace with one having the same number as marked on the bearing cap. There are three sizes of standard bearings, marked 1, 2, 3 accordingly.

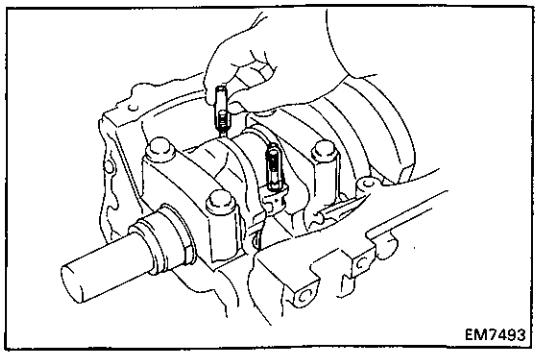
mm (in.)

Size	Big End Inner Diameter	Crank Pin Diameter	Bearing Center Wall Thickness
1	56.000 – 56.008 (2.2047 – 2.2050)	52.987 – 53.000 (2.0861 – 2.0866)	1.481 – 1.485 (0.0583 – 0.0585)
2	56.009 – 56.016 (2.2051 – 2.2053)		1.486 – 1.489 (0.0585 – 0.0586)
3	56.017 – 56.024 (2.2054 – 2.2057)		1.490 – 1.493 (0.0587 – 0.0588)
U/S 0.25	56.000 – 56.024 (2.2047 – 2.2057)	52. 745 – 52. 755 (2.0766 – 2.0770)	1.601 – 1.607 (0.0630 – 0.0633)



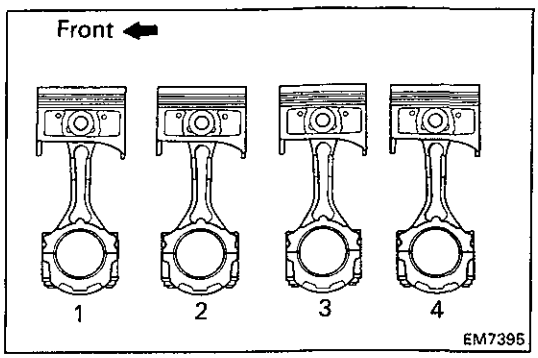
3. PUSH OUT PISTON AND CONNECTING ROD ASSEMBLY

(a) Remove all the carbon from top of the cylinder.



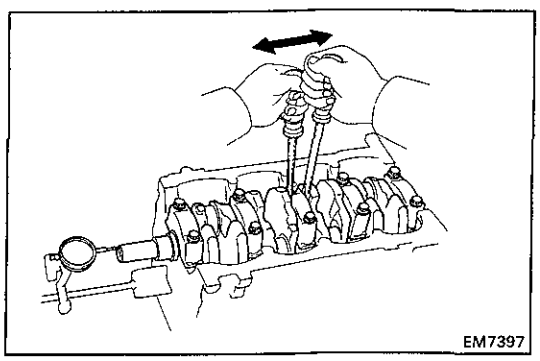
(b) Cover the rod bolts with a short piece of hose to protect the crank pin from damage.

(c) Push out the piston and connecting rod assembly and the upper bearing through the top of the cylinder block.



HINT:

- Keep the inserted bearing, connecting rod cap together.
- Arrange the piston and connecting rod caps in order.



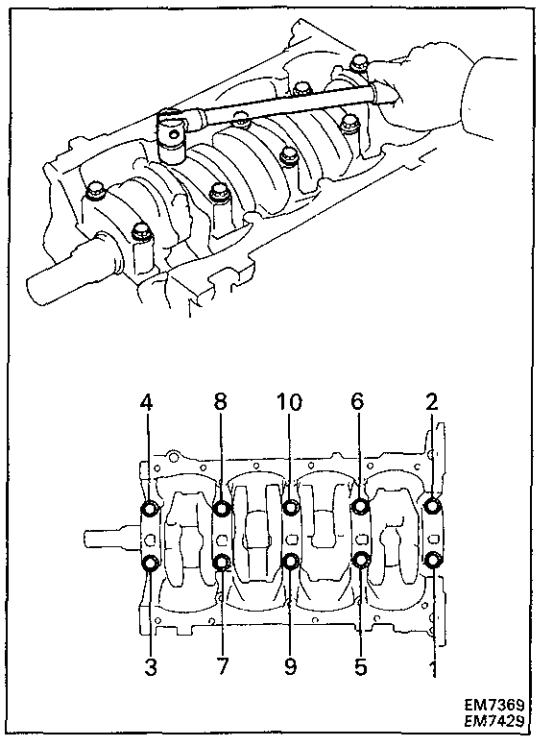
4. MEASURE CRANKSHAFT THRUST CLEARANCE

Using a dial gauge, measure the crankshaft thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard clearance: **0.02 – 0.22 mm (0.0008 – 0.0087 in.)**
Maximum clearance: **0.3 mm (0.0012 in.)**

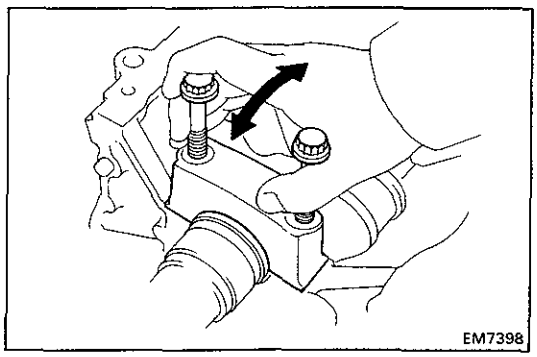
If the clearance is greater than maximum, replace the thrust washer as a set.

HINT: Thrust washer thickness: 2.400 – 2.440 mm (0.0945 – 0.0961 in.)



5. MEASURE MAIN JOURNAL OIL CLEARANCE

(a) Using a 12-sided socket wrench, gradually loosen and remove the bearing cap bolts in three passes and in the numerical order shown.



(b) Using the removed bearing cap bolts, pry the bearing cap fore and aft, and remove it with the lower bearing and thrust washers (No.3 journal only).

HINT:

- Keep the lower bearing inserted with the cap.
- Arrange the caps and lower thrust washers in correct order.

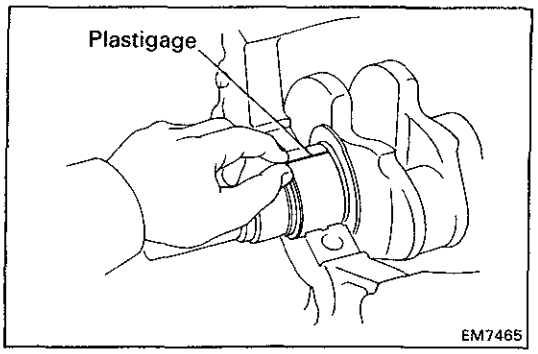
(c) Lift off the crankshaft.

HINT: Keep the upper bearings and upper thrust washers (for the No.3 journal only) inserted in the cylinder block.

(d) Clean the journals and bearings.

(e) Check the journals and bearings for pitting and scratches.

If the journal or bearing is damaged, grind or replace the crankshaft and replace the bearing.



(f) Place the crankshaft on the cylinder block

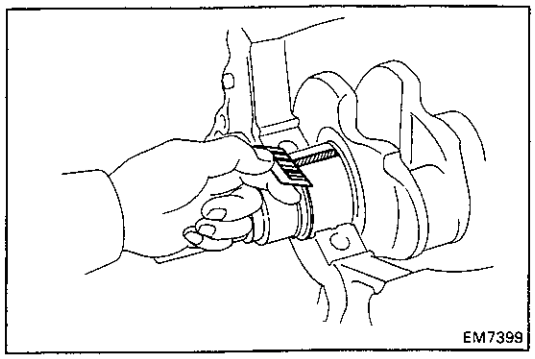
(g) Lay a strip of Plastigage across the each journals.

(h) Install the crankshaft bearing caps with the lower bearing and lower thrust washers.

Install and torque the cap bolts.

(See step 5 on page EM-105)

HINT: Do not turn the crankshaft.



(i) Remove the crankshaft bearing caps.

(j) Measure the Plastigage at its widest point.

Standard clearance: 0.020 – 0.049 mm (0.0008 – 0.0019 in.)

Maximum clearance: 0.1 mm (0.004 in.)

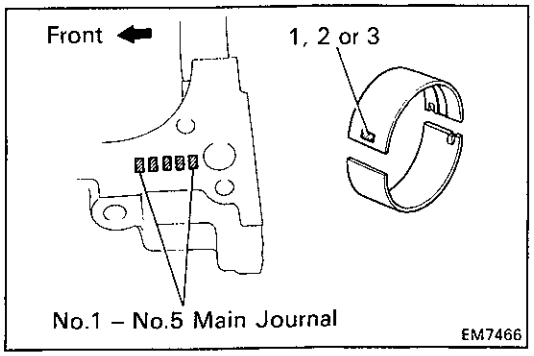
If the clearance is greater than maximum, replace the bearings and/or grind the main journals.

Undersized bearing: U/S 0.25

(k) Completely remove the Plastigage from the bearings and journals.

HINT: If using a standard bearing, replace with one having the same number as marked on the cylinder block.

There are three sizes of standard bearings, marked 1, 2 or 3 accordinly.



mm (in.)

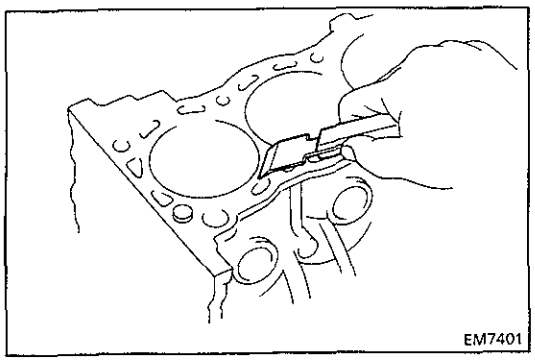
Size	Cylinder Block Main Journal Bore	Main Journal Diameter	Bearing Center Wall Thickness
1	64.000 – 64.008 (2.5197 – 2.5200)	59.987 – 60.000 (2.3617 – 2.3622)	1.986 – 1.990 (0.0782 – 0.0783)
2	64.009 – 64.016 (2.5200 – 2.5203)		1.991 – 1.994 (0.0784 – 0.0785)
3	64.017 – 64.024 (2.5203 – 2.5206)		1.995 – 1.998 (0.0785 – 0.0787)
U/S 0.25	64.000 – 64.024 (2.5197 – 2.5206)	59.745 – 59.755 (2.3522 – 2.3526)	2.106 – 2.112 (0.0829 – 0.0831)

6. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the upper crankshaft bearings and upper thrust washers from the cylinder block.

(c) Arrange the caps, bearings and thrust washers in correct order.



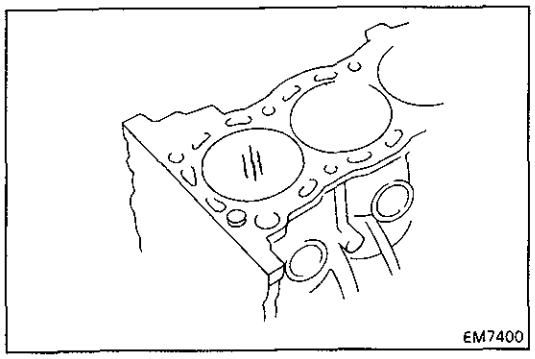
INSPECTION OF CYLINDER BLOCK

1. REMOVE GASKET MATERIAL

Using a gasket scraper, remove all gasket material from cylinder block surfaces.

2. CLEAN CYLINDER BLOCK

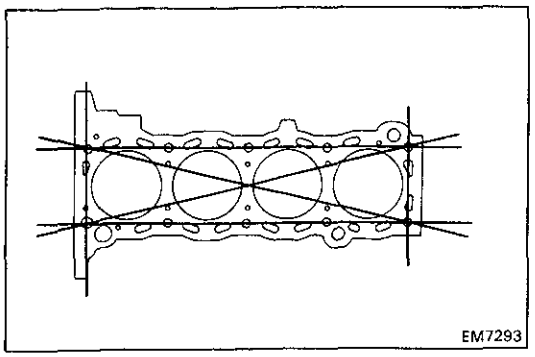
Using a soft brush and solvent, clean the block.



3. INSPECT CYLINDERS

Visually inspect cylinders for vertical scratches.

If deep scratches are present, rebore all four cylinders. (See page EM-101)

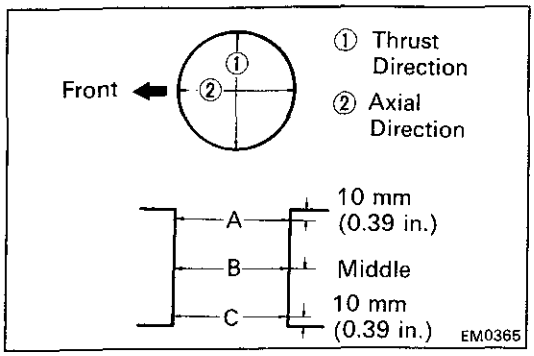


4. INSPECT CYLINDER BLOCK WARPAGE

Using a precision straight edge and thickness gauge, check the surface contacting the cylinder head gasket for warpage.

Maximum warpage: 0.05 mm (0.0020 in.)

If warpage is greater than maximum, replace the cylinder block.



5. MEASURE CYLINDER BORE

(a) Using a cylinder micrometer, measure the cylinder bore at positions A, B and C in the thrust and axial directions.

Standard diameter:

1RZ	**85.99 – 86.00 mm (3.3854 – 3.3858 in.)**
2RZ, 2RZ-E	**94.99 – 95.00 mm (3.7398 – 3.7402 in.)**

Maximum diameter:

1RZ	**86.06 mm (3.3882 in.)**
2RZ, 2RZ-E	**95.06 mm (3.7425 in.)**

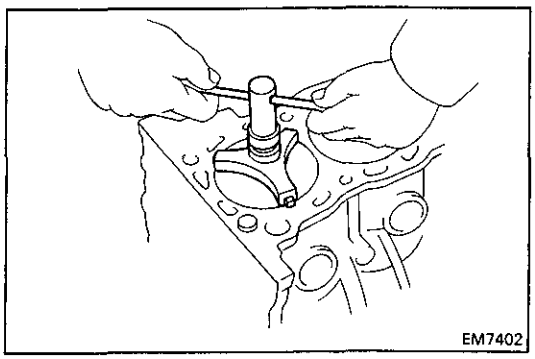
If the diameter is greater than maximum, rebore all four cylinder. If necessary, replace cylinder block.

(b) Difference between measurements A, B, and C is greater than taper limit.

Taper limit: 0.01 mm (0.0004 in.)

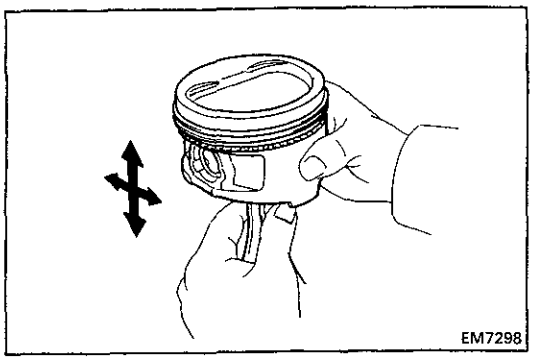
(c) Difference between the thrust and axial measurements is greater than out-of-round limit.

Out-of-round limit: 0.02 mm (0.0008 in.)



6. REMOVE CYLINDER RIDGE

If wear is less than 0.2 mm (0.008 in.), use a ridge reamer to machine the top of the cylinder.

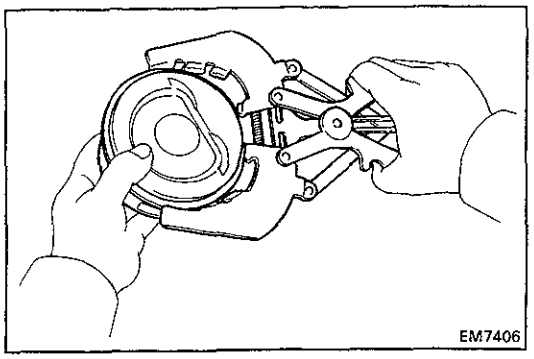


DISASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLY

1. CHECK FIT BETWEEN PISTON AND PIN

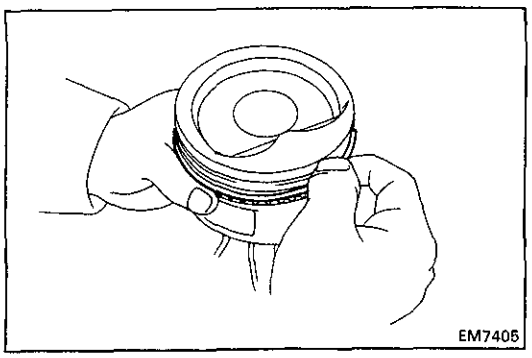
Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin.



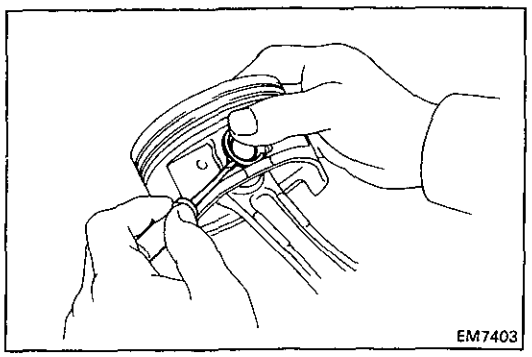
2. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the No.1 and No.2 piston rings.



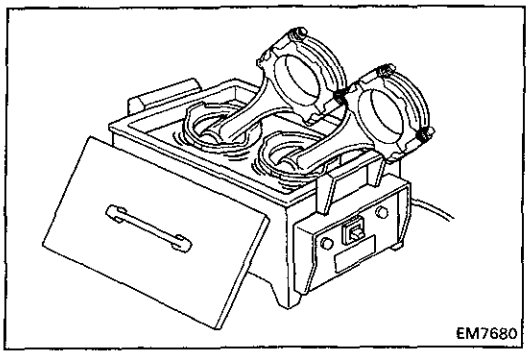
(b) Remove the two side rails and oil ring expander by hand.

HINT: Arrange the rings in the correct order.

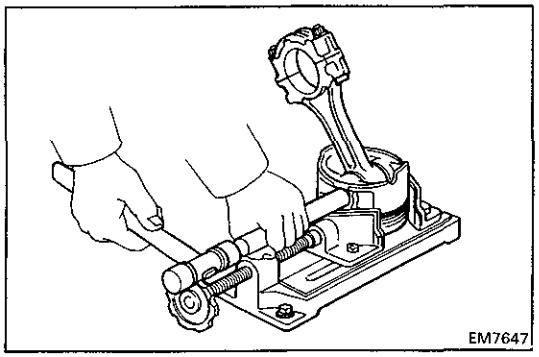


3. DISCONNECT CONNECTING ROD FROM PISTON

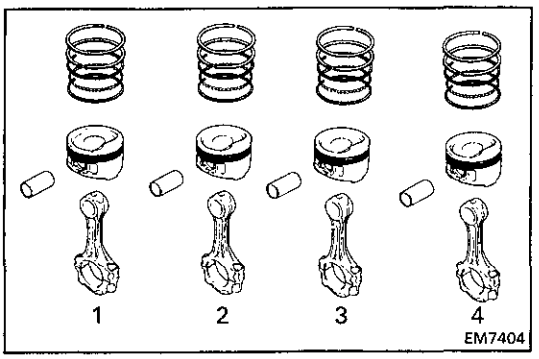
(a) Using small screwdriver, pry off the snap ring from the piston.



(b) Heat the piston in hot water approx. 80°C (176°F).

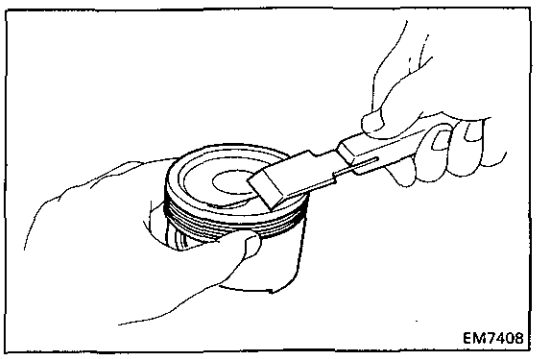


(c) Using a plastic-faced hammer and brass bar, lightly tap out the piston pin from the piston.



HINT:

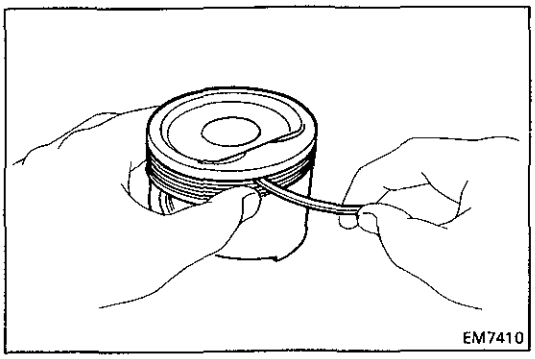
- The piston and pin are a matched set.
- Arrange the piston, pin, rings, connecting and bearing in correct order.



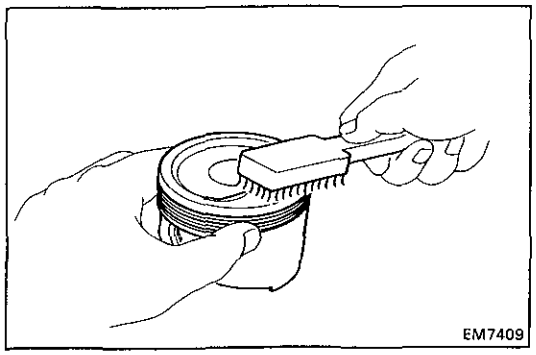
INSPECTION OF PISTON AND CONNECTING ROD ASSEMBLY

1. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.

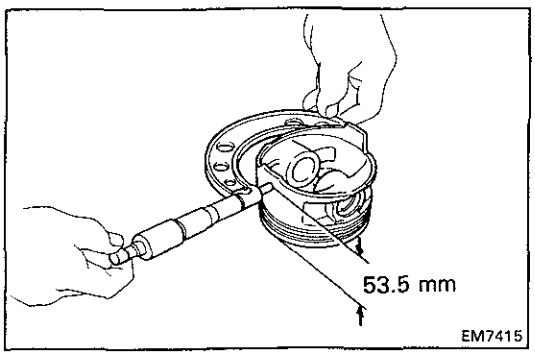


(b) Using a groove cleaning tool or broken ring, clean the ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE: Do not use a wire brush.



2. MEASURE PISTON CLEARANCE

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 53.5 mm (2.106 in.) from the piston head.

Standard piston diameter:

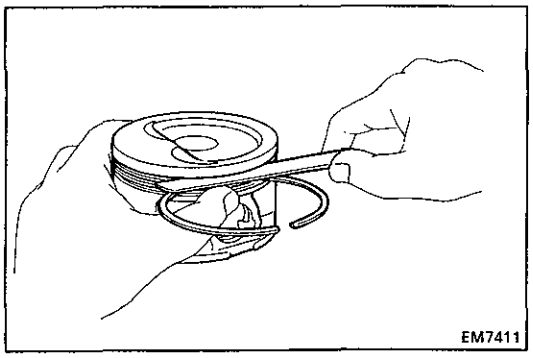
1RZ	**85.95 – 85.96 mm (3.3839 – 3.3842 in.)**
2RZ, 2RZ-E	**94.95 – 94.96 mm (3.7382 – 3.7386 in.)**

(b) Measure cylinder bore diameter in thrust directions. (See step 5 on page EM-89)

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard piston clearance: 0.03 – 0.05 mm (0.0012 – 0.0020 in.)

If the piston clearance is greater than maximum, replace all four pistons and/or rebore all four cylinders.

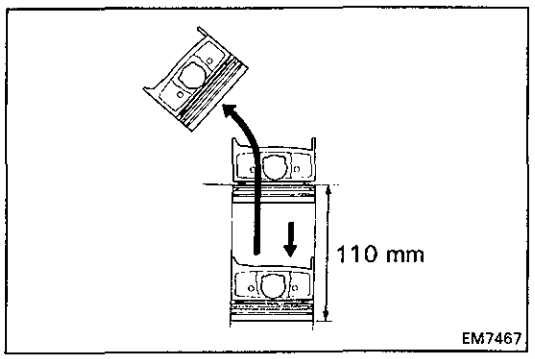


3. **MEASURE CLEARANCE BETWEEN PISTON GROOVE AND PISTON RING**

Using a thickness gauge, measure the clearance between the new piston ring and the ring land.

Standard ring groove clearance:
No.1 0.03 – 0.08 mm (0.0012 – 0.0031 in.)
No.2 0.03 – 0.07 mm (0.0012 – 0.0028 in.)
Maximum ring groove clearance: 0.2 mm (0.008 in.)

If the clearance is greater than maximum, replace the piston.

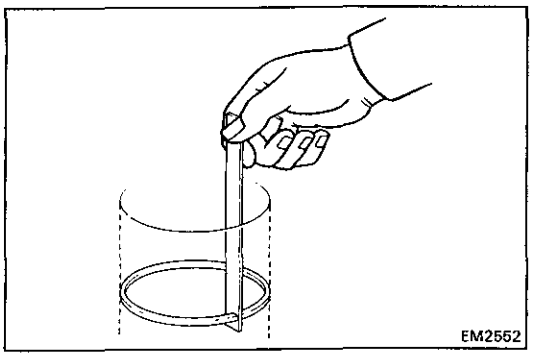


4. **INSPECT RING END GAP**

(a) Insert the piston ring into the cylinder.

(b) Using a piston, push the ring a little beyond the bottom of the ring travel to the following depth from the top of the cylinder block.

Depth 110 mm (4.33 in.)



(c) Using a thickness gauge, measure the end gap.

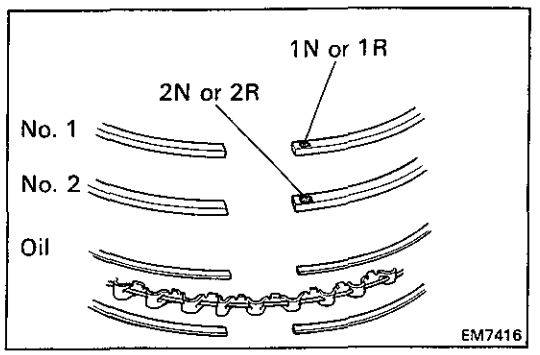
Ring end gap:

Standard	**No.1**	**1RZ**	**0.22 – 0.35 mm (0.0087 – 0.0138 in.)**
		2RZ, 2RZ-E	**0.30 – 0.43 mm (0.0118 – 0.0169 in.)**
	No.2		**0.45 – 0.60 mm (0.0177 – 0.0236 in.)**
	Oil		**0.13 – 0.38 mm (0.0051 – 0.0150 in.)**
Maximum	**No.1**	**1RZ**	**0.95 mm (0.0374 in.)**
		2RZ, 2RZ-E	**1.03 mm (0.0406 in.)**
	No.2		**1.20 mm (0.0472 in.)**
	Oil		**0.98 mm (0.0386 in.)**

If the clearance is greater than maximum, replace the ring.

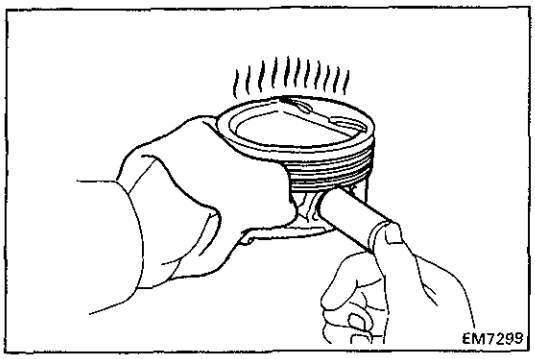
If the clearance is greater than maximum, even with a new piston ring, rebore the cylinder and use O/S piston ring.

NOTICE: Do not file the ring end.



HINT:

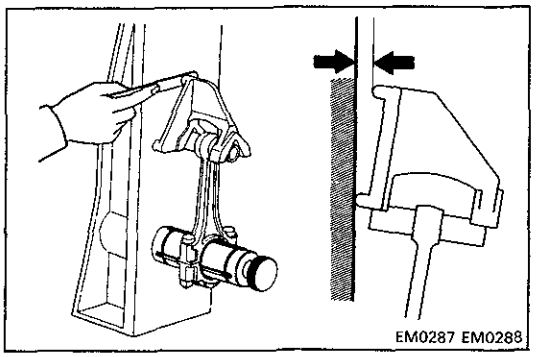
- There are two types of No.1 piston ring, marked "1N" for the 1RZ engine and "1R" for the 2RZ and 2RZ-E engines.
- There are two types of No.2 piston ring, marked "2N" for the 1RZ engine and "2R" for the 2RZ and 2RZ-E engines.
- There are two types of oil ring, one for the 1RZ engine and one for the 2RZ and 2RZ-E engines. The two types have no distinguishing marks.



5. INSPECT PISTON PIN FIT

At 80°C (176°C), you should be able to push the pin into the piston with your thumb.

If the pin can be installed at a lower temperature, replace it and the piston.



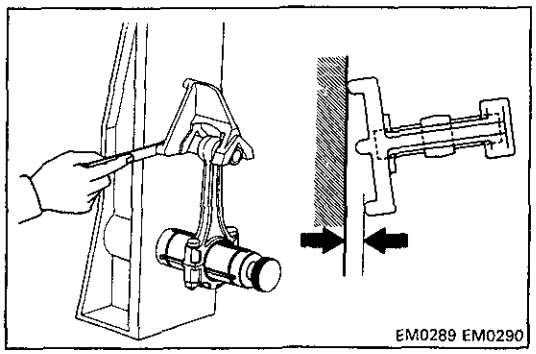
6. INSPECT CONNECTING RODS

(a) Using a rod aligner, check the connecting rod alignment.

- Check for bend.

Maximum bend:
0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

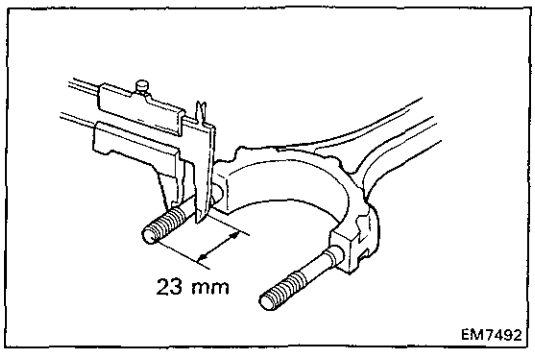


- Check for twist.

Maximum twist:
0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.

HINT: If replacing the connecting rods, replace the same number of connecting rod bearings as that of new connecting rod caps.

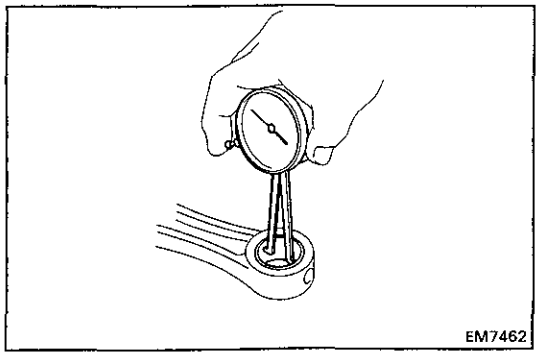


(b) Inspect connecting rod bolts.

- Fix a nut to the shaft of each connecting rod bolt and check that the nut can be turned by hand to the end of the threads.
- If a nut cannot be removed all the way down the threads, measure the compressed shaft outer diameter with a measuring gauge.
- If the location of this area cannot be judged by visual inspection, use the dimension locations in the illustration and measure the outer diameter.

Standard diameter: **7.4 – 7.6 mm (0.291 – 0.299 in.)**
Minimum diameter: **7.2 mm (0.283 in.)**

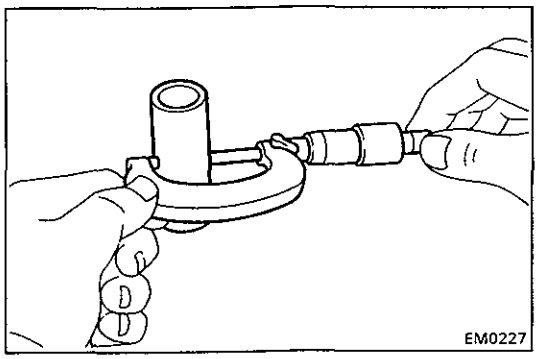
If the measurement is less than minimum, replace connecting rod bolt and cap nut as a set.


EM7462

(c) Measure the oil clearance between the rod bushing and piston pin.

- Using a dial gauge, measure the inside diameter of the rod bushing.

Standard diameter: 24.008 – 24.017 mm (0.9452 – 0.9455 in.)


EM0227

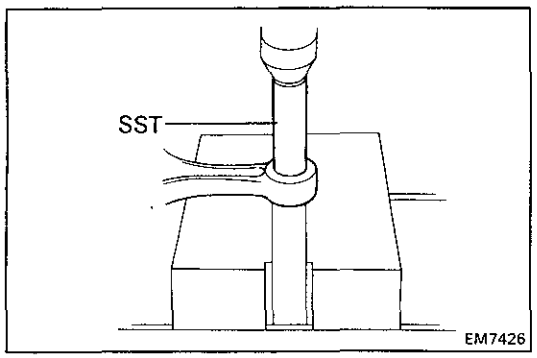
- Using a micrometer, measure the diameter of the piston pin.

Standard diameter: 24.000 – 24.009 mm (0.9449 – 0.9452 in.)

- Subtract the piston pin diameter from the diameter of the rod bushing measurement.

Standard oil clearance: 0.005 – 0.011 mm (0.0002 – 0.0004 in.)
Maximum oil clearance: 0.015 mm (0.0006 in.)

If the clearance is greater than maximum, replace the rod bushing.

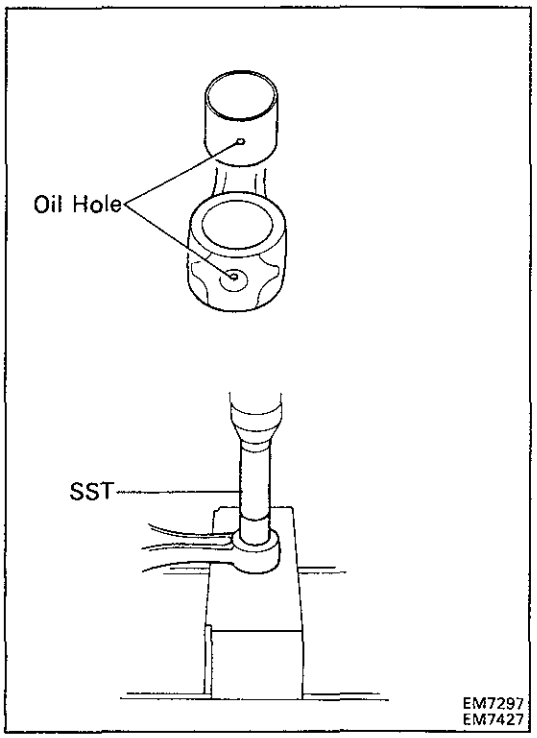


REPLACEMENT OF ROD BUSHING

1. REMOVE ROD BUSHING

Using SST, remove the rod bushing from the connecting rod.

SST 09207-76010

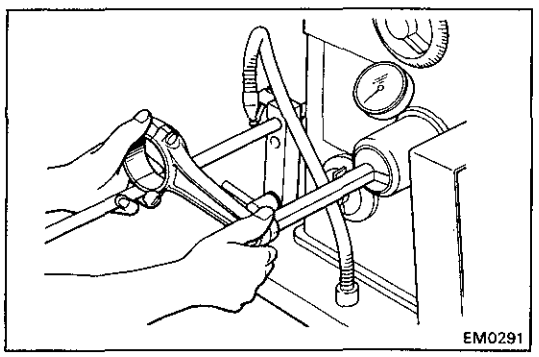


2. INSTALL NEW ROD BUSHING

Using SST, install the rod bushing to the connecting rod.

SST 09207-76010

HINT: Align the bushing oil hole with the connecting rod oil hole.

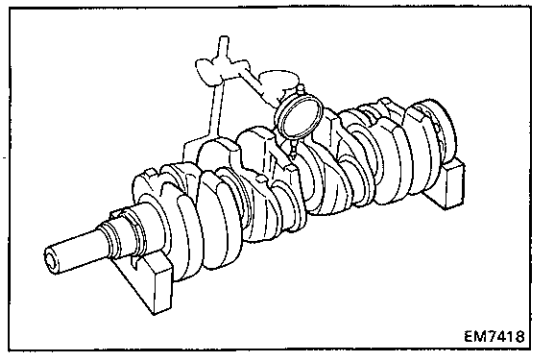


3. HONE NEW BUSHING AND CHECK PIN FIT IN CONNECTING ROD

(a) Hone the new bushing and check that the oil clearance is within standard specification.

Standard oil clearance: 0.005 – 0.011 mm (0.0002 – 0.0004 in.)

(b) Check the pin fits at the normal room temperature. Coat the pin with engine oil and push the pin into the rod with your thumb pressure.


EM7418

INSPECTION OF CRANKSHAFT

1. MEASURE CRANKSHAFT FOR RUNOUT

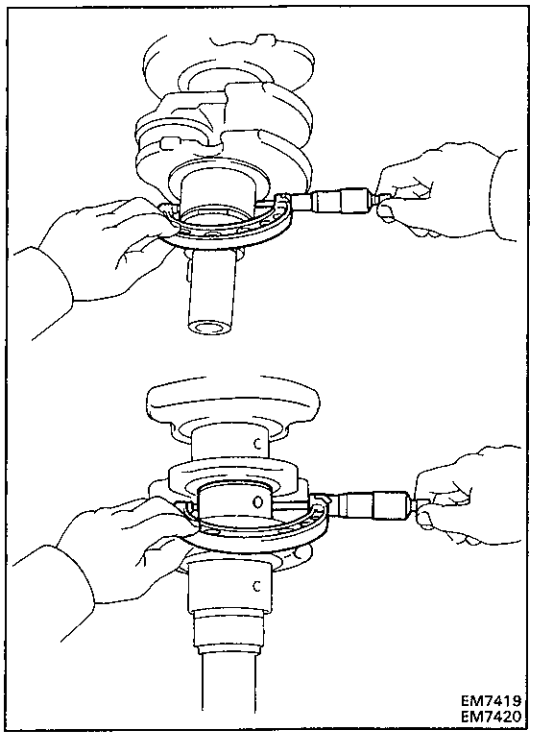
(a) Place the crankshaft on V-blocks.

(b) Using a dial gauge, measure the runout at the center journal.

Maximum circle runout: 0.03 mm (0.0012 in.)

If the runout is greater than maximum, replace the crankshaft.

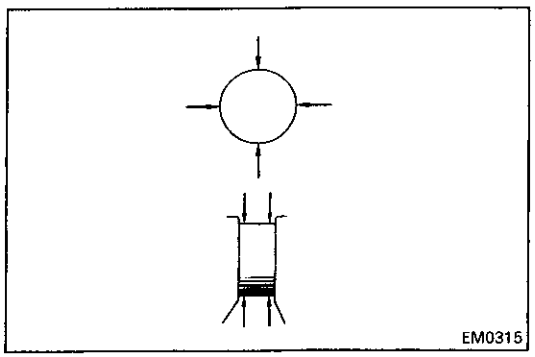
HINT: Use a long spindle on the dial gauge.


EM7419
EM7420

2. INSPECT MAIN JOURNAL AND CRANK PINS

(a) Using a micrometer, measure the diameter of the main and crank pin journal.

Main journal diameter: 59.987 – 60.000 mm (2.3617 – 2.3622 in.)
Crank pin diameter: 52.987 – 53.000 mm (2.0861 – 2.0866 in.)


EM0315

(b) Measure the journals for out-of-round and taper as shown.

Maximum taper: 0.005 mm (0.0002 in.)
Maximum out-of-round: 0.005 mm (0.0002 in.)

If taper and out-of-round are greater than maximum, re-grind and/or replace the crankshaft.

3. GRIND CRANK PIN AND/OR MAIN JOURNAL, IF NECESSARY

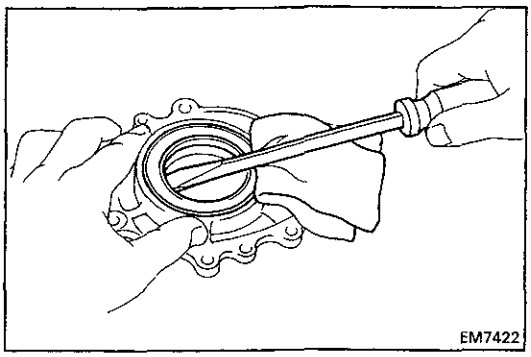
(a) Grind the crank pins and/or main journals to the undersized finished diameter.

Bearing size (U/S 0.25)
Main journal finished diameter:
59.745 – 59.755 mm (2.3522 – 2.3526 in.)
Crank pin finished diameter:
52.745 – 52.755 mm (2.0766 – 2.0770 in.)

(b) Install a new pin and/or main undersize bearings.

REPLACEMENT OF OIL SEALS

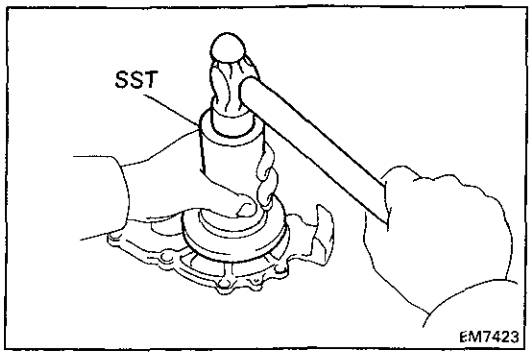
HINT: There are two methods to replace the oil seal depending on whether the oil pump cover or rear oil seal retainer is assembled to the engine or not.



1. REPLACEMENT OF FRONT OIL SEAL

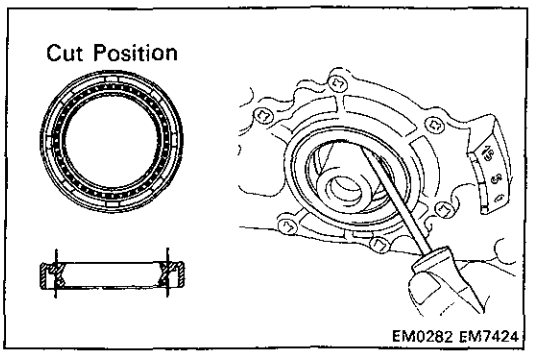
(a) If the oil pump is not installed to the cylinder block.

- Using a screwdriver, remove the oil seal.



- Apply MP grease to a new oil seal lip.
- Using SST, install the new oil seal.

SST 09309-36010

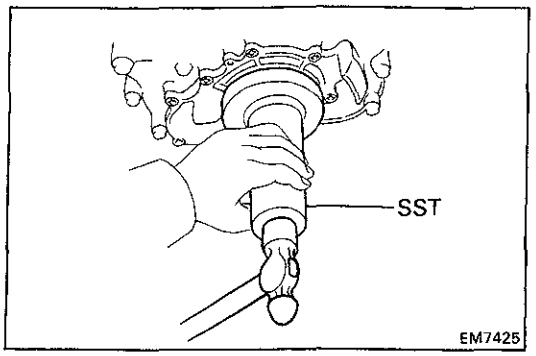


(b) If the oil pump is installed on the cylinder block.

- Using a knife, cut off the lip of the oil seal as shown in the figure.
- Using a screwdriver, pry out the oil seal.

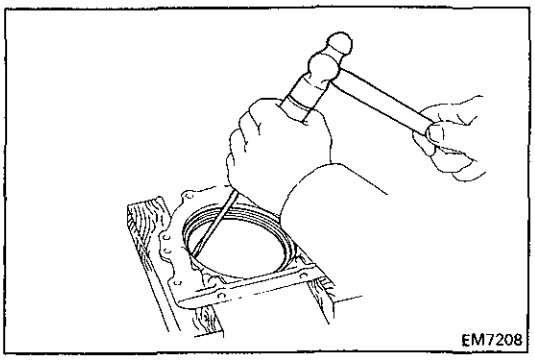
HINT: Tape the screwdriver to avoid damaging the crankshaft.

- Check the oil seal lip contact surface of the crankshaft for cracks or damage.



- Apply MP grease to a new oil seal lip.
- Using SST, install the new oil seal.

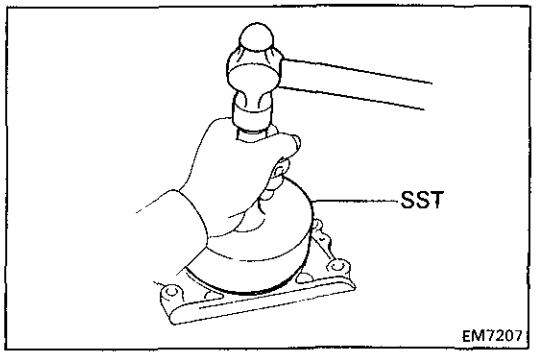
SST 09309-36010



2. REPLACEMENT REAR OIL SEAL

(a) If the rear oil seal retainer is not installed to the cylinder block.

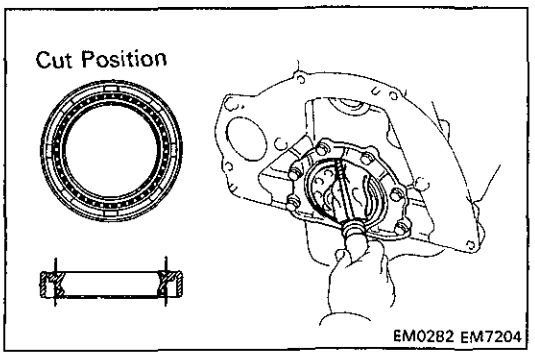
- Using a screwdriver and hammer, remove the oil seal.



- Apply MP grease to a new oil seal lip.
- Using SST, install the new oil seal.

SST 09223-56010

HINT: Be careful not to install the oil seal slantwise.

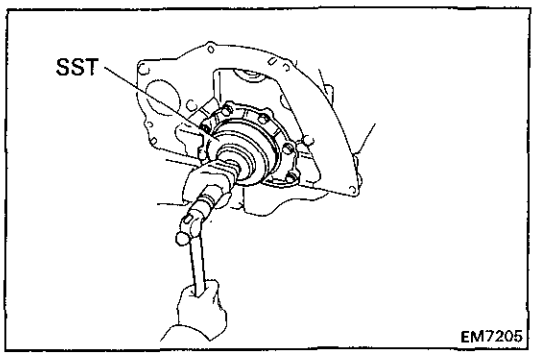


(b) If the rear oil seal retainer is installed on the cylinder block.

- Using a knife, cut off the lip of oil seal.
- Using a screwdriver, pry out the oil seal.

HINT: Tape the screwdriver to avoid damaging the crankshaft.

- Check the oil seal lip contacting surface of the crankshaft for cracks or damage.



- Apply MP grease to a new oil seal lip.
- Using SST, install the new oil seal.

SST 09223-56010

HINT: Be careful not to install the oil seal slantwise.

BORING OF CYLINDERS

HINT:

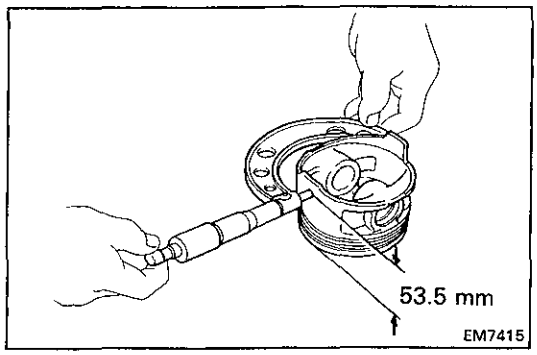
- Bore all four cylinders for the oversized piston outside diameter.
- Replace the piston rings with ones matching the pistons.

1. SELECT OVERSIZED PISTON

Oversized piston diameter:

O/S 0.50

1RZ	**86.45 – 86.46 mm (3.4036 – 3.4039 in.)**
2RZ, 2RZ-E	**95.45 – 95.46 mm (3.7579 – 3.7583 in.)**



2. CALCULATE DIMENSION TO BORE CYLINDERS

(a) Using a micrometer, measure the piston diameter at a right angle to the piston pin center line, 53.5 mm (2.106 in.) the piston head.

(b) Calculate the size each cylinder is to be rebored as follows:

Size to be rebored = P + C – H
P = piston diameter
C = piston clearance

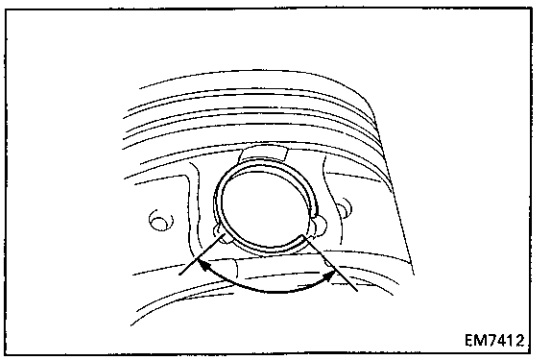
0.03 – 0.05 mm (0.0012 – 0.0020 in.)

H = allowance for honing
Less than 0.02 mm (0.0008 in.)

3. BORE AND HONE CYLINDERS TO CALCULATED DIMENSIONS

Honing amount: 0.02 mm (0.0008 in.) maximum

NOTICE: Excess honing will destroy the finished roundness.

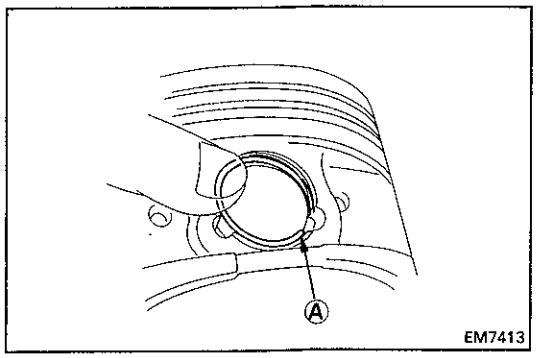

EM7412

ASSEMBLY OF PISTON AND CONNECTING ROD ASSEMBLY

1. ASSEMBLY PISTON AND CONNECTING ROD

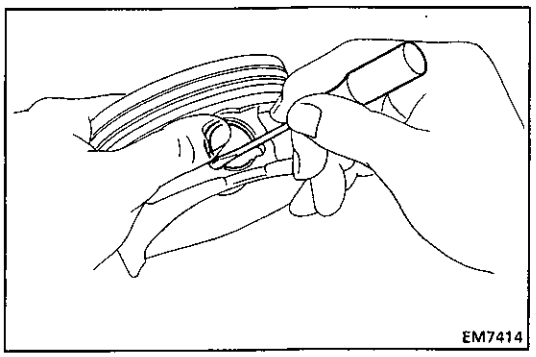
(a) Install a new snap ring on one side of the piston pin hole.

- Align about 1/3 of the snap ring with the indentations at the edge of the piston pin hole.

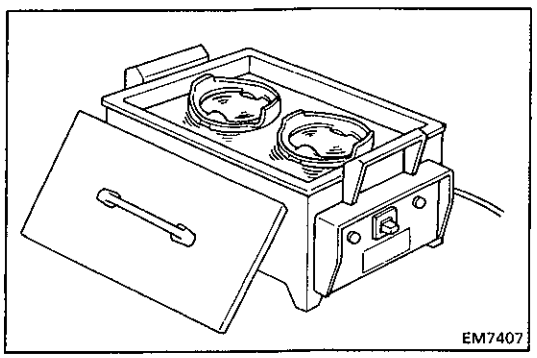


EM7413

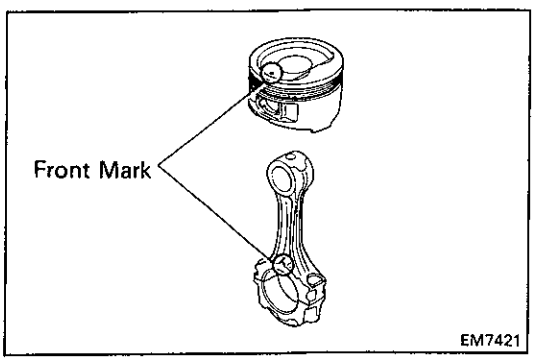
- Insert section Ⓐ of the snap ring into the ring groove and push the snap ring in with a finger.


EM7414

- Insert the tip of a screwdriver into the indentation at the edge of the piston pin hole and push down on the snap ring to insert it.


EM7407

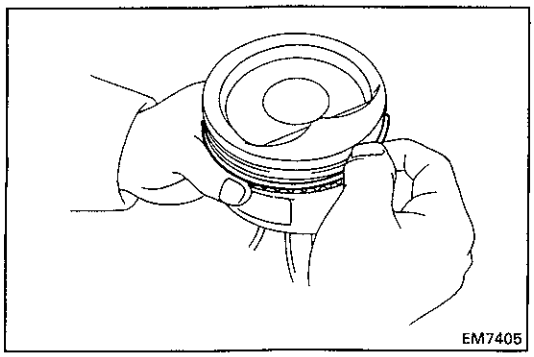
(b) Heat the piston in hot water to approx. 80°C (176 °F).



EM7421

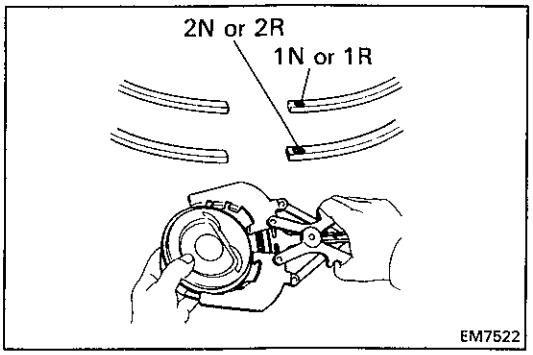
(c) Align the notch on the piston with the mark on the rod and push the piston pin in with your thumb.

(d) Install a new snap ring on the other side of the pin.

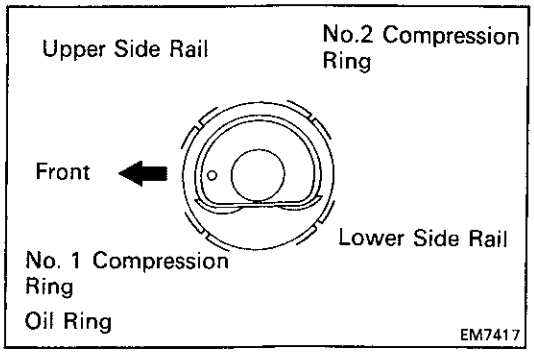


2. PLACE RINGS ON PISTON

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



(b) Using a ring expander, install the two compression rings with the code marks facing upward.

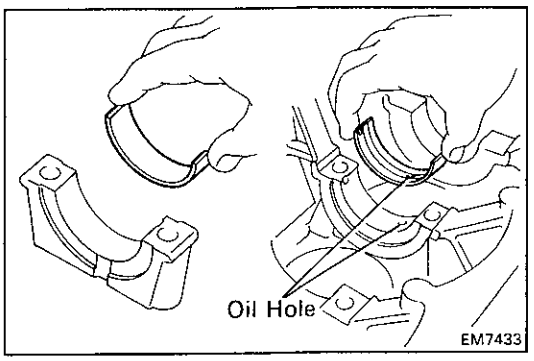


(c) Position the piston rings so that the ring end are as shown.

NOTICE: Do not align the end gaps.

GENERAL ASSEMBLY HINT:

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



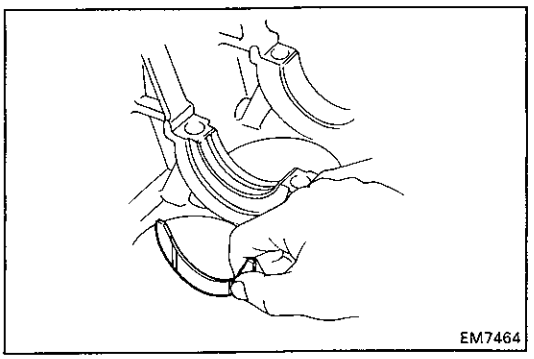
ASSEMBLY OF CYLINDER BLOCK

(See page EM-81)

1. INSTALL CRANKSHAFT BEARINGS

Install the bearing in the cylinder block and bearing caps.

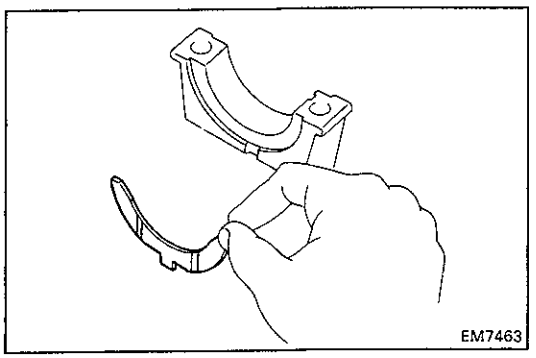
NOTICE: Install the upper bearing with the oil hole in the block.



2. INSTALL UPPER THRUST WASHERS

Install the upper thrust washers on the No.3 main bearing cap position of the block with the oil grooves facing outward.

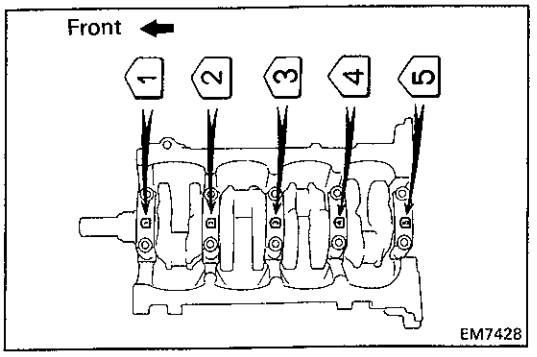
3. PLACE CRANKSHAFT IN CYLINDER BLOCK



4. INSTALL MAIN BEARING CAPS

HINT: Each bearing cap is numbered.

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

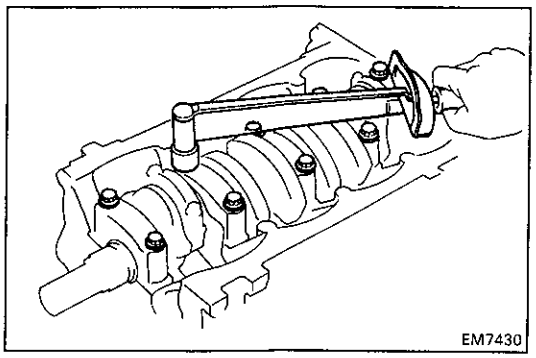


(b) Install the bearing caps in their proper location.

5. **TORQUE CRANKSHAFT BOLTS**

HINT:

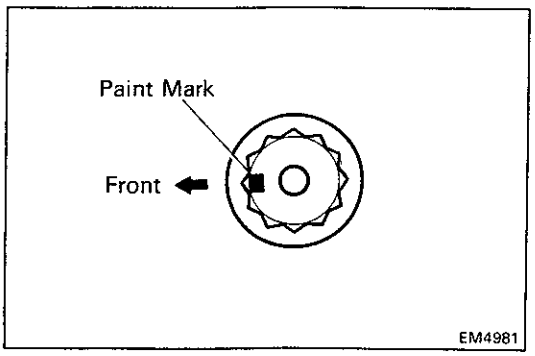
- The crankshaft bearing cap bolts are tight in two progressive steps.
- If any of the cap bolts break or deform, replace them.



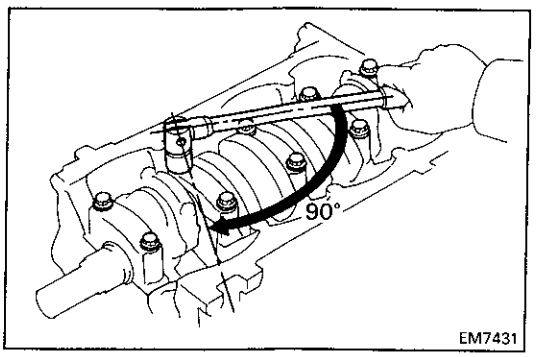
(a) Apply a light coat of the engine oil on the threads and under the can bolt heads.

(b) Using a 12-sided socket wrench, first, alternately torque the cap bolts in several passes.

Torque: 400 kg-cm (29 ft-lb, 39 N·m)



(c) Make the front side of the top of bolt with paint.

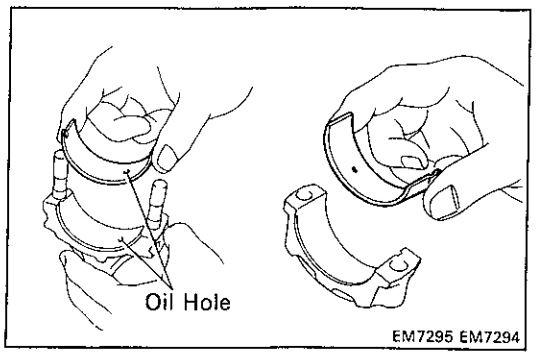


(d) Torque the bolts by an additional 90°.

(e) Check that the paint mark is now facing sideward.

(f) Check that the crankshaft turns smoothly.

(g) Check the crankshaft thrust clearance.
(See step 4 on page EM-86)

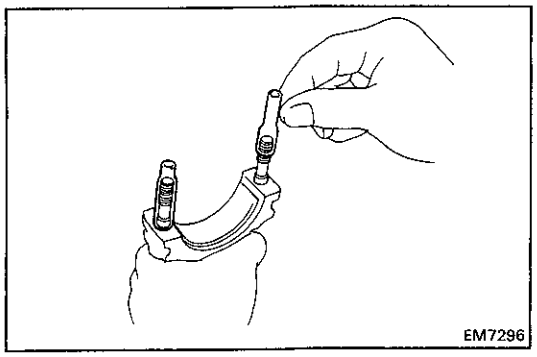


6. **INSTALL CONNECTING ROD BEARING**

(a) Install the bearing inserts in the connecting rods and rod caps.

(b) Lubricate the face of the bearings with engine oil.

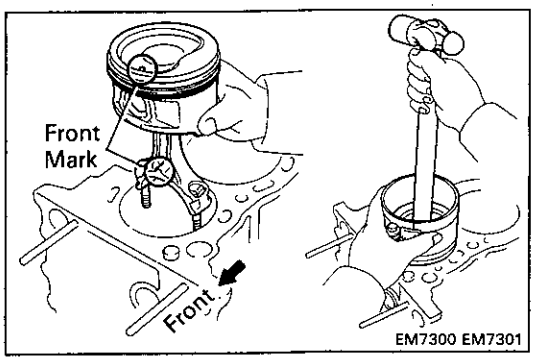
HINT: Install the bearing with the oil hole in the connecting rod.



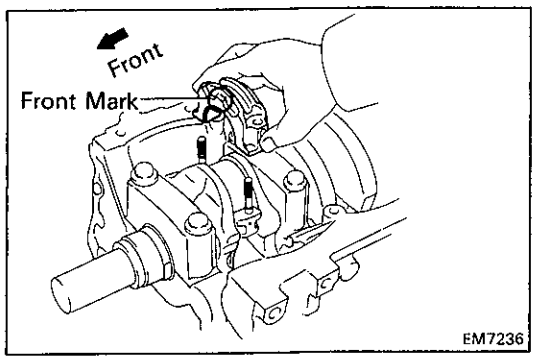
7. INSTALL PISTON AND CONNECTING ROD ASSEMBLY

(a) Cover the rod bolts with a short piece of hose to protect the crankshaft from damage.

(b) Lubricate the cylinder bore and rod journal with clean engine oil.



(c) Tighten the compressor snugly but NOT tightly against the piston and gently tap the correctly numbered piston and rod assembly into its cylinders with a wooden hammer handle or like object. Make sure the notch



8. INSTALL CONNECTING ROD CAPS

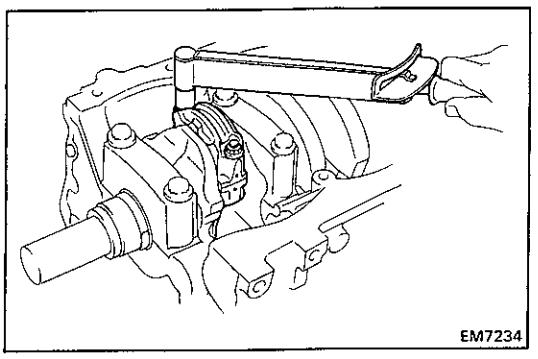
(a) Match the numbered cap with the numbered rod.

(b) Install the rod caps with the front mark facing forward.

9. TORQUE CONNECTING ROD CAP NUTS

HINT:

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

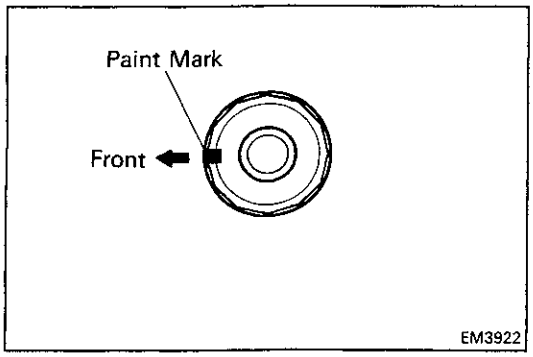


(a) Apply a light coat of the engine oil on the threads and under of the rod nuts.

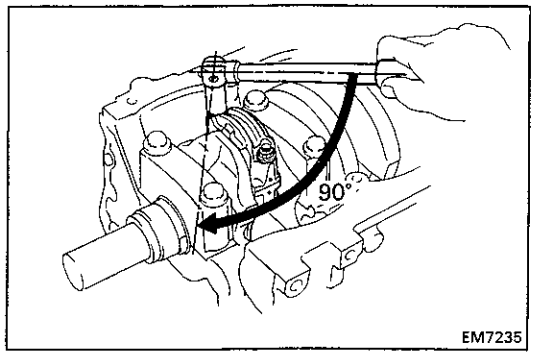
(b) Using a 12-sided socket wrench, first, alternately torque the cap bolts in several passes.

Torque: 300 kg-cm (22 ft-lb, 29 N·m)

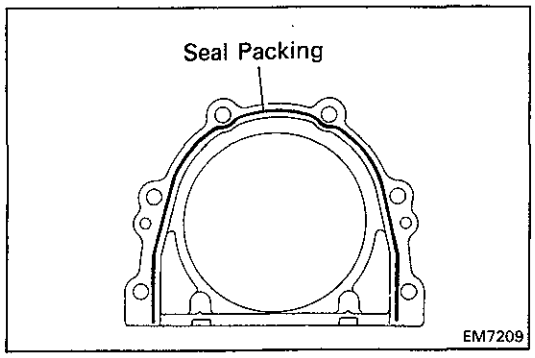
If any one of the nuts does not meet the torque specification, replace the bolt and nut as a set.



(c) Mark the front side of the top of nuts with paint.



(d) Torque the nuts by an additional 90°.
(e) Check that the paint mark is now facing sideward.
(f) Check that the crankshaft turns smoothly.
(g) Check the rod thrust clearance.
(See step 1 on page EM-84)



POST ASSEMBLY

(See page EM-81)

1. **INSTALL REAR OIL SEAL RETAINER**

   (a) Apply seal packing to the oil seal retainer as shown in the figure.

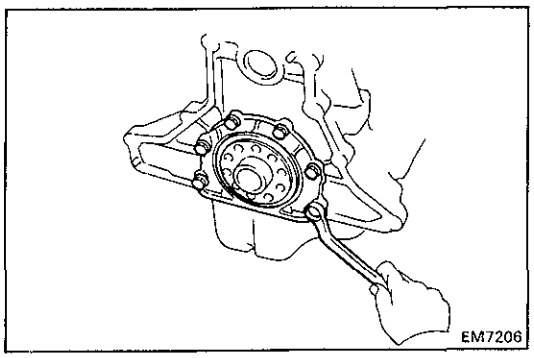
   Seal packing: Part No. 08826-00080 or equivalent

   HINT: Cleaning and application of seal packing to the installation surface is the same as for the oil pan.

   However, use a nozzle cut to 2 mm (0.08 in.).

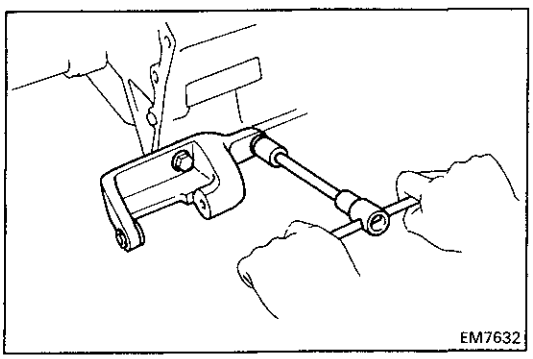
   (b) Install the oil seal retainer with the six bolts.

   Torque: 200 kg-cm (14 ft-lb, 20 N·m)



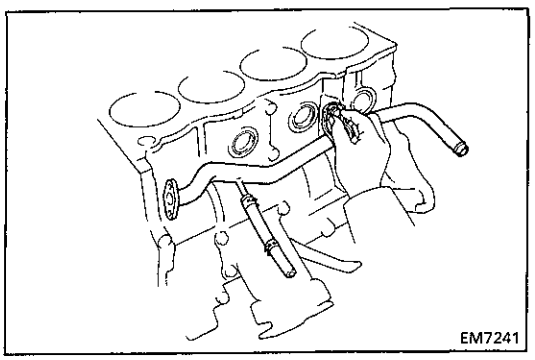
2. **INSTALL ALTERNATOR BRACKET**

   Torque: 420 kg-cm (30 ft-lb, 41 N·m)



3. **INSTALL WATER BY-PASS PIPE**

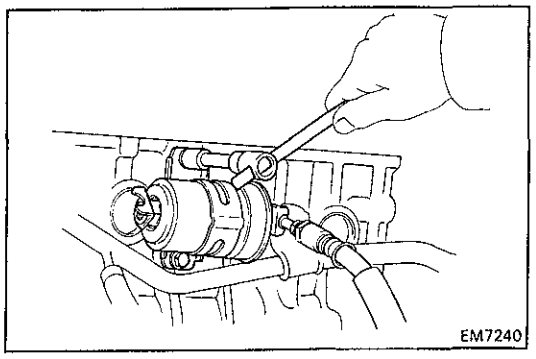
   Temporarily install the water by-pass pipe and bolt.

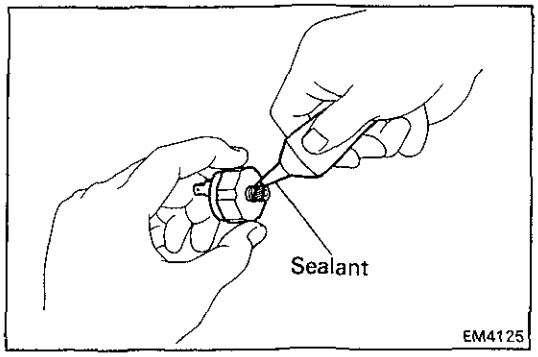


4. **(2RZ-E)**
   INSTALL FUEL FILTER

   Install the fuel filter with the two bolts.

   Torque: 200 kg-cm (14 ft-lb, 20 N·m)





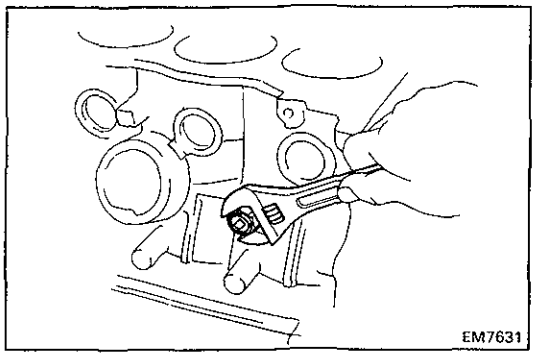
5. **INSTALL OIL PRESSURE SWITCH**

(a) Clean the threads of sealant foreign material.

(b) Apply sealant to 2 or 3 threads of the switch end.

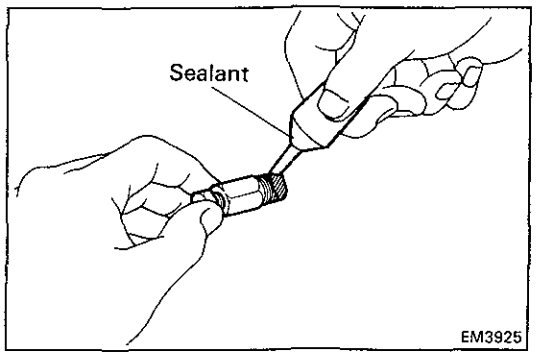
Sealant: Part No. 08833-00080, adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent

HINT: This adhesive will not harden while exposed to air. It will act as a sealer or binding agent only when applied to threads, etc. and air is cut off.



(c) Install the oil pressure switch.

Torque: 150 kg-cm (11 ft-lb, 15 N·m)



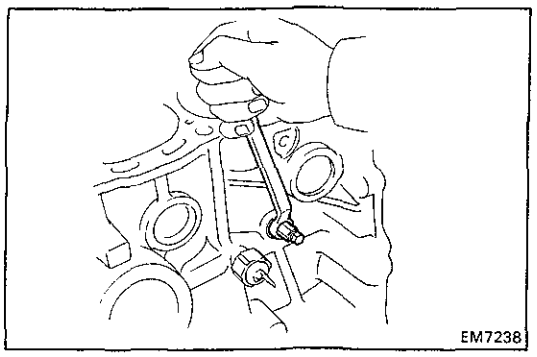
6. **INSTALL ENGINE COOLANT DRAIN COCK**

(a) Clean the threads of sealant foreign material.

(b) Apply sealant to 2 or 3 threads of the drain cock end.

Sealant: Part No. 08833-00080, adhesive 1344, THREE BOND 1344, LOCTITE 242 or equivalent

HINT: This adhesive will not harden while exposed to air. It will act as a sealer or binding agent only when applied to threads, etc. and air is cut off.



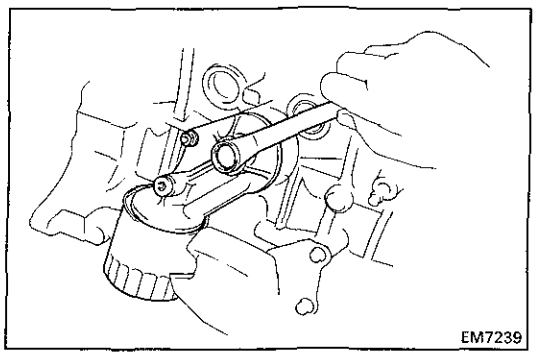
(c) Install the coolant drain plug.

Torque: 150 kg-cm (11 ft-lb, 15 N·m)

7. ***INSTALL RH AND LH ENGINE MOUNTINGS***

Torque:

To Cylinder block	**380 kg-cm (27 ft-lb, 37 N·m)**
To oil dipstick gauge guide	**130 kg-cm (9 ft-lb, 13 N·m)**



8. **INSTALL OIL FILTER BRACKET WITH OIL FILTER**

(a) Replace the two O-rings with a new part.

(b) Install the oil filter bracket with oil filter, union bolt and nut. Torque the union bolt and bolt.

Torque:

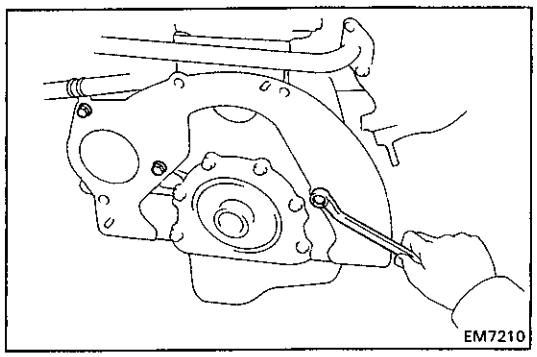
Union bolt	**700 kg-cm (51 ft-lb, 67 N·m)**
Nut	**120 kg-cm (9 ft-lb, 12 N·m)**

9. **INSTALL TIMING CHAIN**
(See steps 1 to 11 on pages EM-77 to 80)

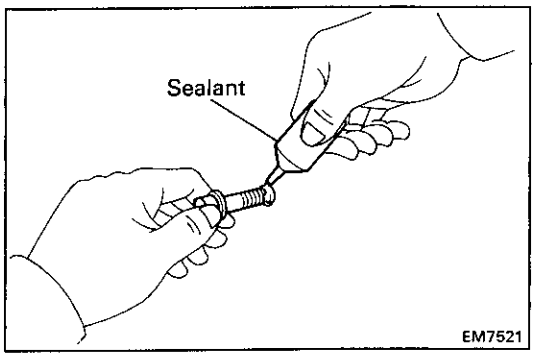
10. **TORQUE WATER BY-PASS PIPE MOUNTING BOLT**
Torque: 380 kg-cm (27 ft-lb, 37 N·m)

11. **INSTALL CYLINDER HEAD**
(1RZ, 2RZ: See steps 1 to 11 on pages EM-59 to 63)
(2RZ-E: See steps 1 to 11 on pages EM-70, 71)

12. **REMOVE ENGINE STAND**
Remove the engine from the engine stand.

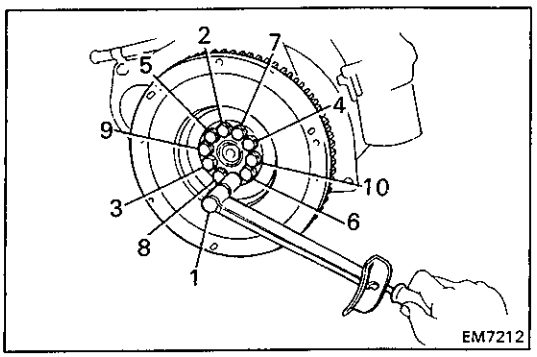

EM7210

13. **INSTALL REAR END PLATE**
Install the rear end plate with the three bolts.
Torque: 185 kg-cm (13 ft-lb, 18 N·m)



EM7521

14. **INSTALL FLYWHEEL(M/T) OR DRIVE PLATE(A/T)**
(a) Apply sealant to 2 or 3 threads of the bolt end.
Sealant: Part No. 08833-00070, adhesive 1324, THREE BOND 1324 or equivalent
HINT: This adhesive will not harden while exposed to air. It will act as a sealant or binding agent only when applied to threads, etc., where air is cut off.



EM7212

(b) (M/T)
Install flywheel with the ten bolts.
Torque: 900 kg-cm (65 ft-lb, 88 N·m)
(A/T)
Install the front plate, drive plate and rear plate with the ten bolts.
Torque: 750 kg-cm (54 ft-lb, 74 N·m)