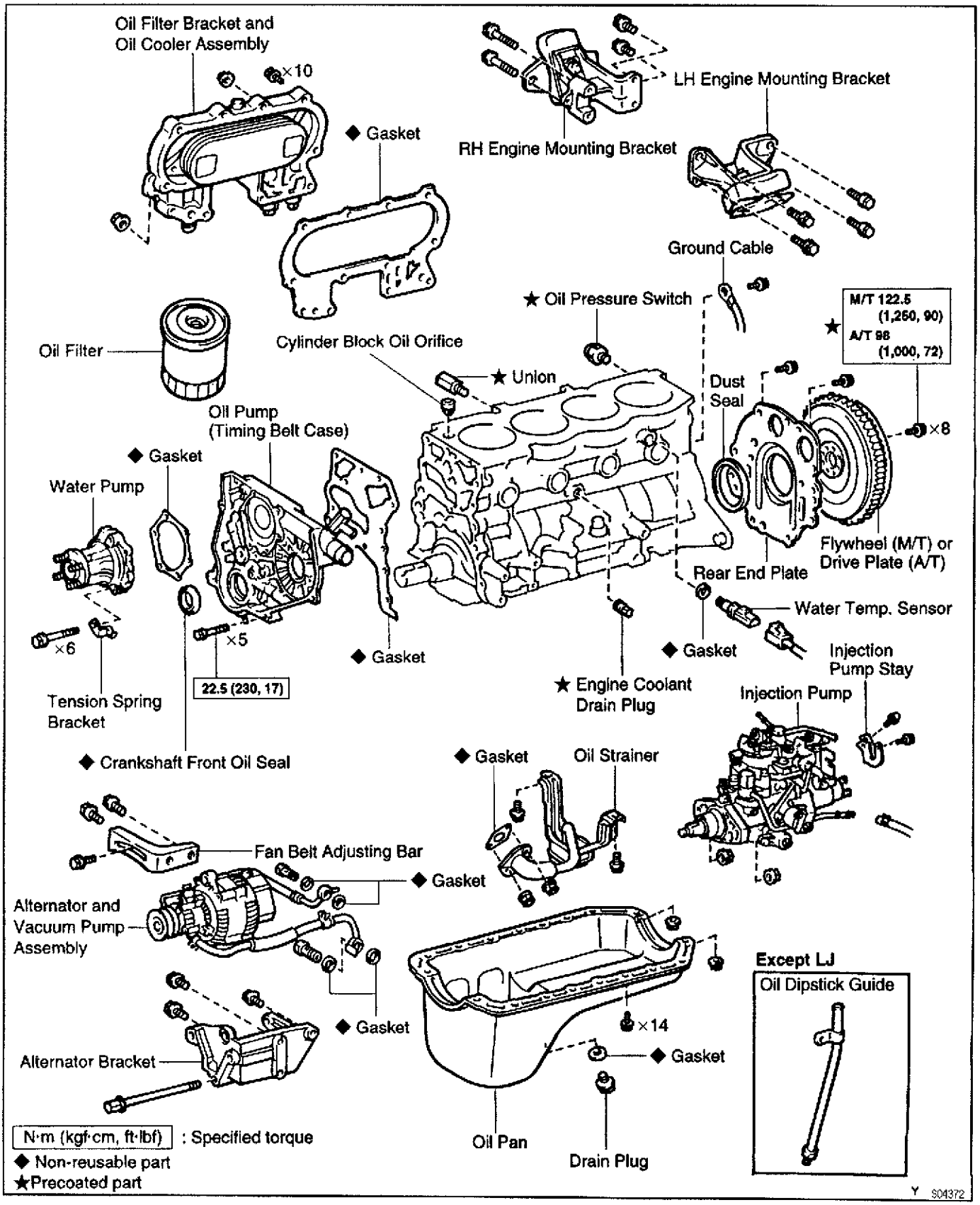
CYLINDER BLOCK

COMPONENTS FOR PREPARATION AND AFTER ASSEMBLY

E0690-07



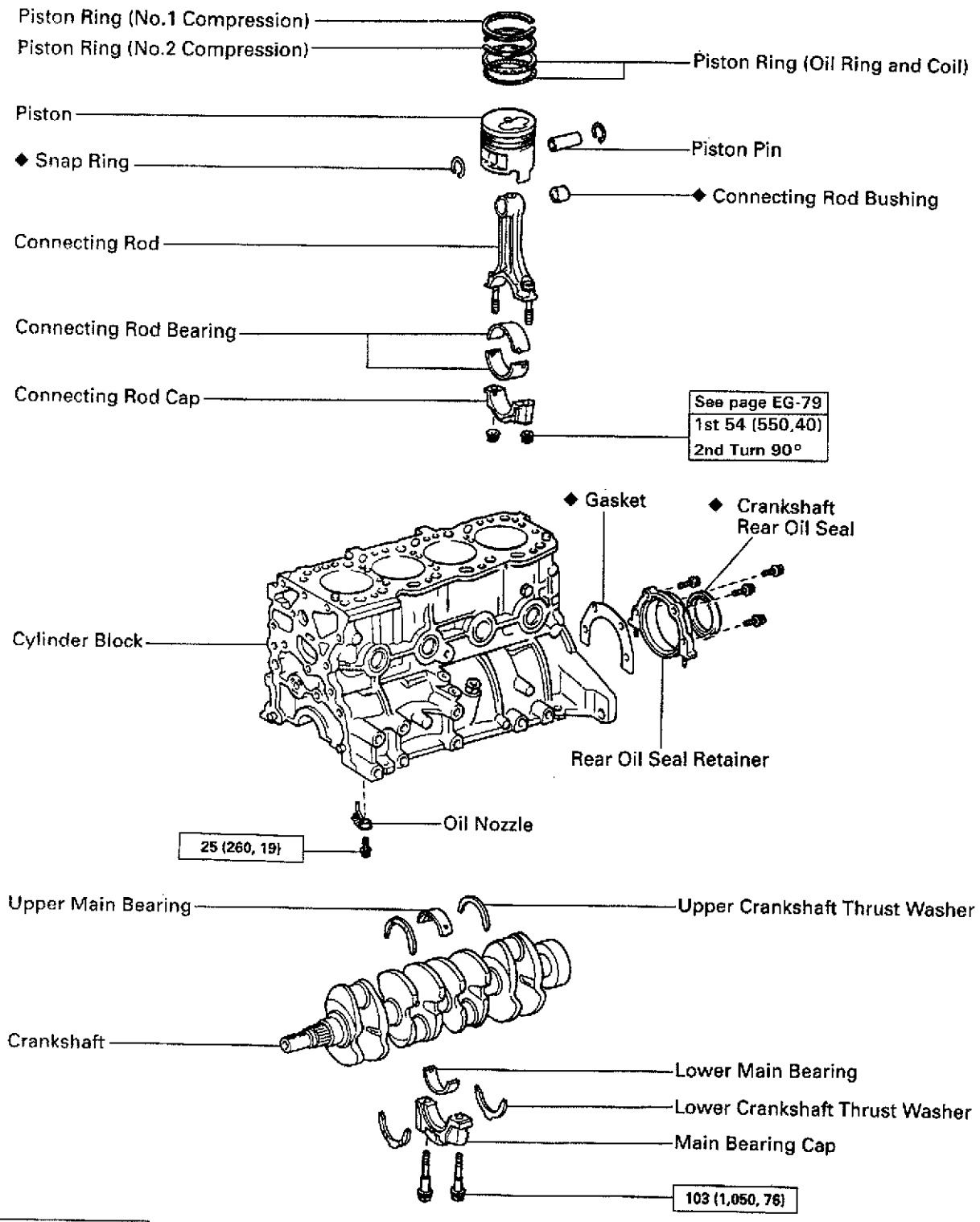
EG

PREPARATION FOR DISASSEMBLY

1. M/T:
   REMOVE FLYWHEEL
2. A/T:
   REMOVE DRIVE PLATE
3. REMOVE REAR END PLATE
   Remove the 2 bolts, end plate and dust seal.
4. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY
5. REMOVE TIMING BELT AND PULLEYS
   (See timing belt removal)
6. REMOVE WATER PUMP
   (See water pump removal in Cooling System)
7. REMOVE CYLINDER HEAD
   (See cylinder head removal)
8. REMOVE INJECTION PUMP AND STAY
   (See injection pump removal in Fuel System)
9. REMOVE OIL FILTER, OIL FILTER BRACKET AND OIL COOLER ASSEMBLY
   (See oil cooler removal in Lubrication System)
10. REMOVE ENGINE MOUNTING AND ALTERNATOR BRACKETS
11. REMOVE ALTERNATOR AND VACUUM PUMP ASSEMBLY (WITH HOSES)
12. REMOVE OIL PAN, OIL STRAINER AND TIMING BELT CASE (OIL PUMP)
    (See oil pump removal in Lubrication System)
13. REMOVE FAN BELT ADJUSTING BAR
14. Pre—Heating System (Super Glow Type):
    REMOVE WATER TEMPERATURE SENSOR
15. REMOVE OIL PRESSURE SWITCH
16. REMOVE ENGINE COOLANT DRAIN PLUG
17. REMOVE UNION FOR ALTTERNATOR HOSE
18. REMOVE OIL DIPSTICK GUIDE (PLUG)
19. 2L for Thailand:
    REMOVE CYLINDER BLOCK OIL ORIFICE
20. DISCONNECT GROUND CABLE

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

EG0066-2G



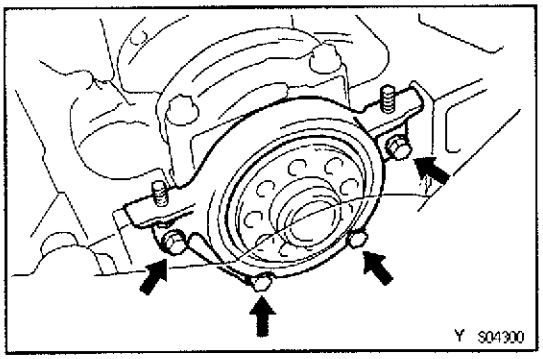
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

S04373

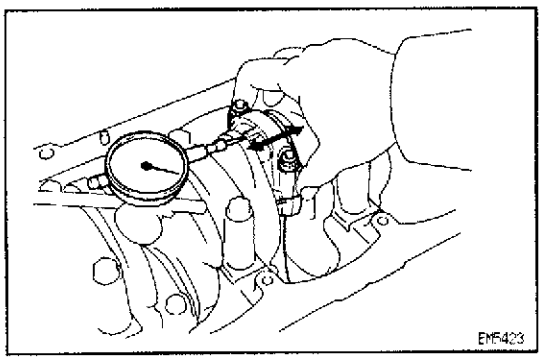
EG7AE-01

CYLINDER BLOCK DISASSEMBLY



1. REMOVE REAR OIL SEAL RETAINER

Remove the 4 bolts, oil seal retainer and gasket.



2. CHECK CONNECTING ROD THRUST CLEARANCE

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

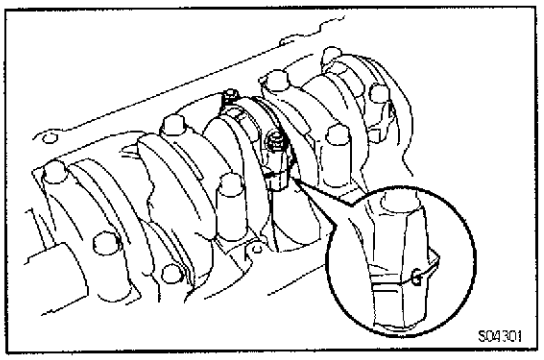
Standard thrust clearance:

0.080 — 0.300 mm (0.0031 — 0.0118 in.)

Maximum thrust clearance:

0.35 mm (0.0138 in.)

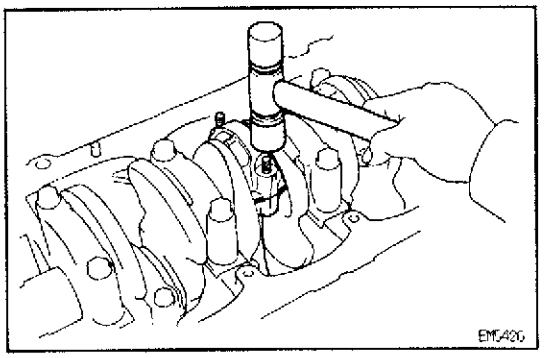
If the thrust clearance is greater than maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

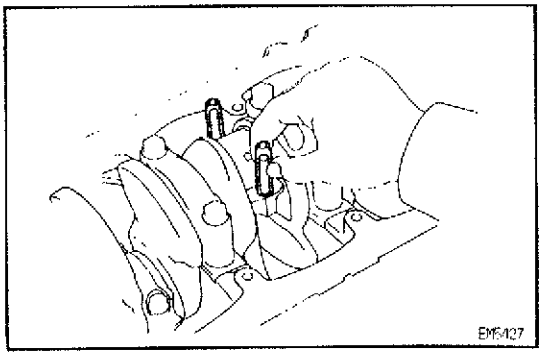
(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.

(b) Remove the 2 connecting rod cap nuts.



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

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

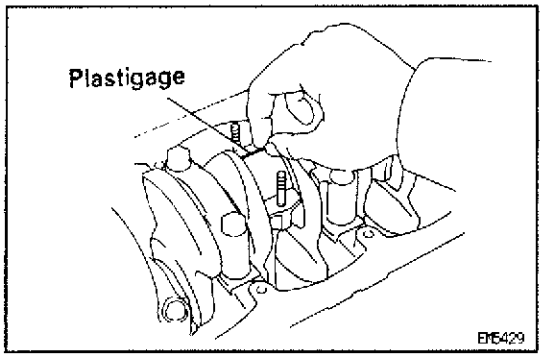


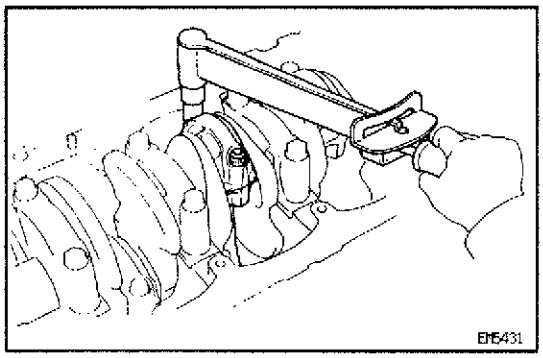
(d) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

(e) Clean the crank pin and bearing.

(f) 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.





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

(h) Install the connecting rod cap with the 2 nuts. (See step 8 in cylinder block assembly)

Torque:

1st

54 N·m (550 kgf·cm, 40 ft·lbf)

2nd

Turn 90°

NOTICE: Do not turn the crankshaft.

(i) Remove the 2 nuts, connecting rod cap and lower bearing. (See procedure (b) and (c) above)

(j) Measure the Plastigage at its widest point.

Standard oil clearance:

STD

0.036 — 0.064 mm (0.0014 — 0.0025 in.)

U/S 0.25 and U/S 0.50

2L

0.023 — 0.073 mm (0.0009 — 0.0029 in.)

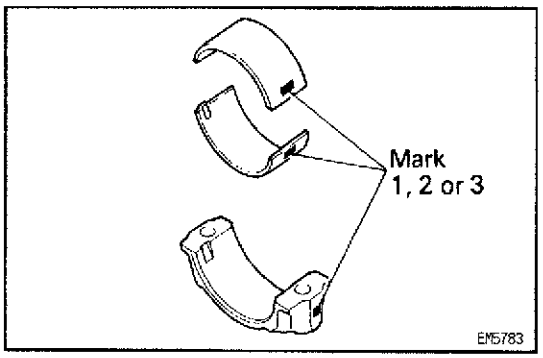
3L

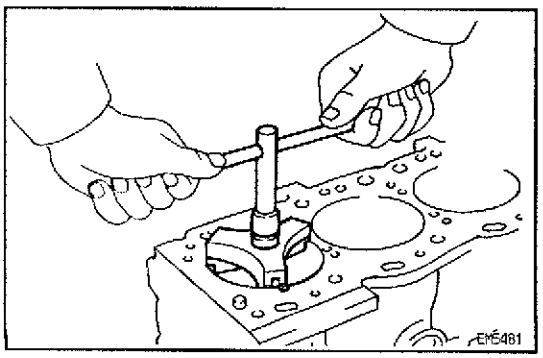
0.033 — 0.079 mm (0.0013 — 0.0031 in.)

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 it with one having the same number marked on the connecting rod cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.

Standard sized bearing center wall thickness:

Mark 1	1.478 — 1.482 mm (0.0582 — 0.0583 in.)
Mark 2	1.482 — 1.486 mm (0.0583 — 0.0585 in.)
Mark 3	1.486 — 1.490 mm (0.0585 — 0.0587 in.)

(k) Completely remove the Plastigage.

4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

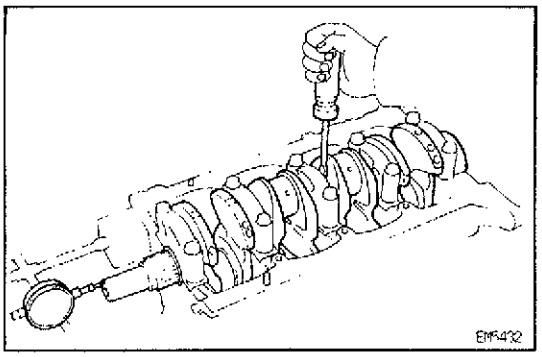
(b) Cover the connecting rod bolts with a short piece of hose to protect the crankshaft from damage.

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

HINT:

- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in correct order.

EG



5. CHECK CRANKSHAFT THRUST CLEARANCE

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

Standard thrust clearance:

0.040 – 0.250 mm (0.0016 – 0.0098 in.)

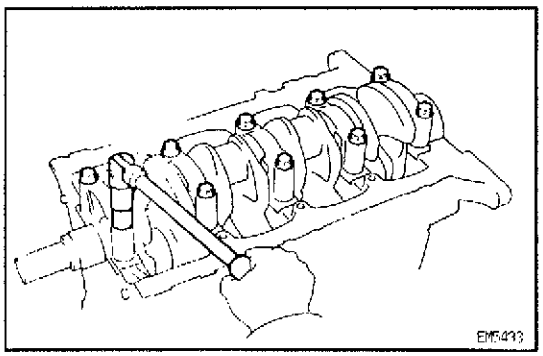
Maximum thrust clearance:

0.30 mm (0.0118 in.)

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

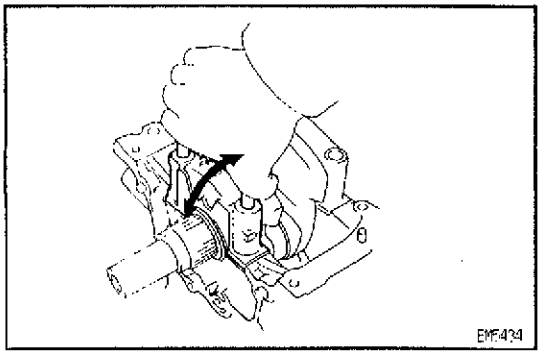
Thrust washer thickness:

STD	2.430 – 2.480 mm (0.0957 – 0.0976 in.)
O/S 0.125	2.493 – 2.543 mm (0.0981 – 0.1001 in.)
O/S 0.250	2.555 – 2.605 mm (0.1006 – 0.1026 in.)



6. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Remove the 10 main bearing cap bolts.



(b) Using the removed main bearing cap bolts, pry the cap back and forth, and remove the main bearing caps, lower main bearings and lower thrust washers (No.3 main bearing cap only).

HINT:

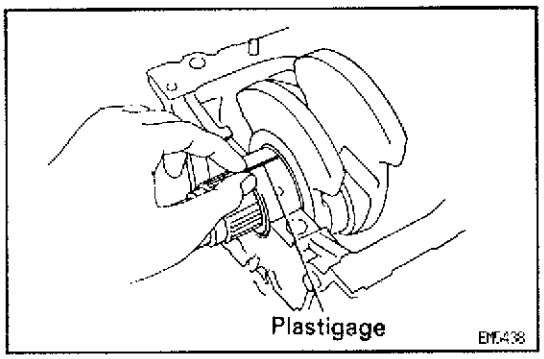
- Keep the lower bearing and main bearings cap together.
- Arrange the thrust washers in correct order.

(c) Lift out the crankshaft.

HINT: Keep the upper main bearings and upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

(e) Check each main journal and bearing for pitting and scratches.
If the journal or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.

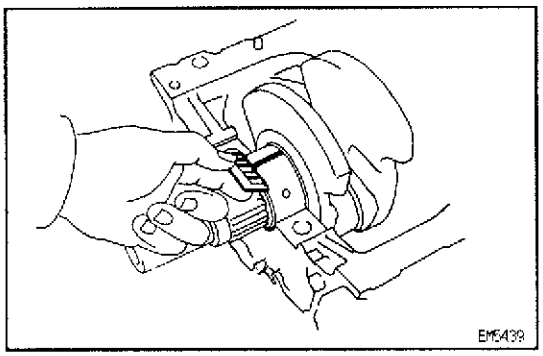


(f) Place the crankshaft on the cylinder block.

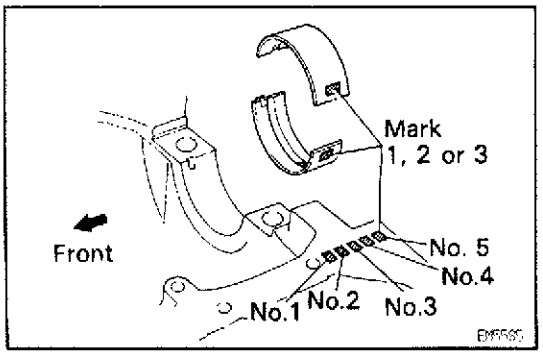
(g) Lay a strip of Plastigage across each journal.

(h) Install the 5 main bearing caps with the 10 bolts.
(See step 5 in cylinder block assembly)
Torque:
103 N·m (1,050 kgf·cm, 76 ft·lbf)
NOTICE: Do not turn the crankshaft.

(i) Remove the 10 bolts and 5 main bearing caps.
(See procedure (b) and (c) above)



(j) Measure the Plastigage at its widest point.
Standard oil clearance:
STD
0.034 — 0.065 mm (0.0013 — 0.0026 in.)
U/S 0.25 and U/S 0.50
0.033 — 0.079 mm (0.0013 — 0.0031 in.)
Maximum 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 it with one having the same number marked on the connecting rod cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.
Standard sized bearing center wall thickness:

Mark 1	1.979 — 1.983 mm (0.0779 — 0.0781 in.)
Mark 2	1.983 — 1.987 mm (0.0781 — 0.0782 in.)
Mark 3	1.987 — 1.991 mm (0.0782 — 0.0784 in.)

(k) Completely remove the Plastigage.

7. REMOVE CRANKSHAFT

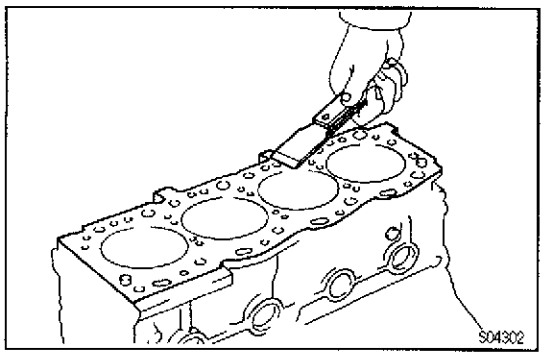
(a) Lift out the crankshaft.

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

HINT: Arrange the main bearing caps, bearings and thrust washers in correct order.

8. REMOVE CHECK VALVES AND OIL NOZZLES

(See step 3 in oil nozzles removal in Lubrication System)



CYLINDER BLOCK INSPECTION

EG7QU-01

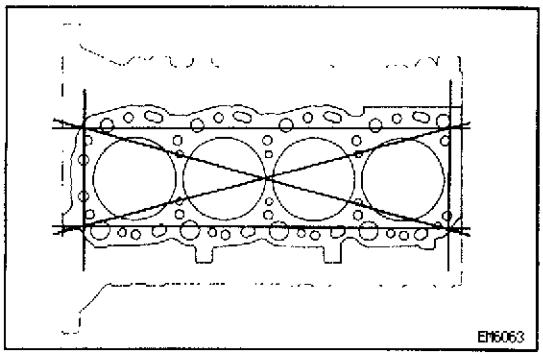
1. CLEAN CYLINDER BLOCK

A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

B. Clean cylinder block

Using a soft brush and solvent, thoroughly clean the cylinder block.



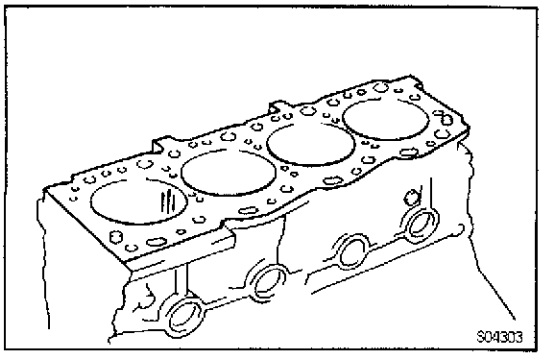
2. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder head gasket for warpage.

Maximum warpage:

0.20 mm (0.0079 in.)

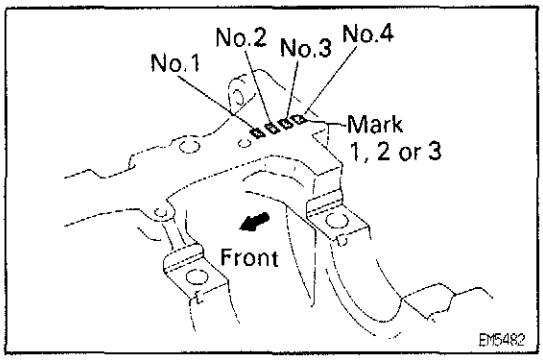
If warpage is greater than maximum, replace the cylinder block.



3. INSPECT CYLINDER FOR VERTICAL SCRATCHES

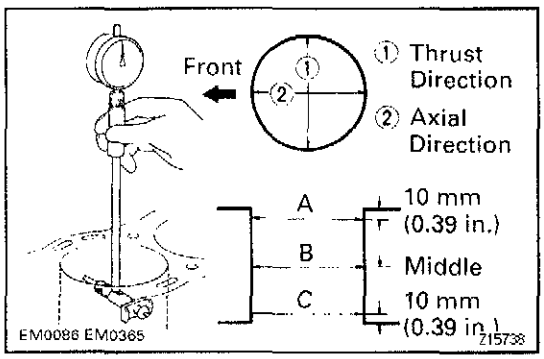
Visually check the cylinder for vertical scratches.

If deep scratches are present, rebore all the 4 cylinders. If necessary, replace the cylinder block.



4. INSPECT CYLINDER BORE DIAMETER

HINT: There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the lower left rear of the cylinder block.



Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

Standard diameter:

2L

92.000 — 92.030 mm (3.6220 — 3.6232 in.)

STD Mark 1	92.000 — 92.010 mm (3.6220 — 3.6224 in.)
STD Mark 2	92.010 — 92.020 mm (3.6224 — 3.6228 in.)
STD Mark 3	92.020 — 92.030 mm (3.6228 — 3.6232 in.)

3L

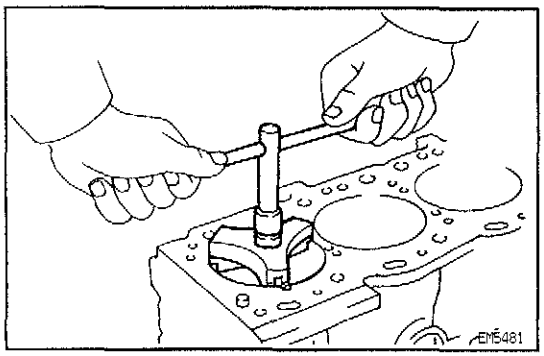
96.000 — 96.030 mm (3.7795 — 3.7807 in.)

STD Mark 1	96.000 — 96.010 mm (3.7795 — 3.7799 in.)
STD Mark 2	96.010 — 96.020 mm (3.7799 — 3.7803 in.)
STD Mark 3	96.020 — 96.030 mm (3.7803 — 3.7807 in.)

Maximum diameter:

2L STD
92.23 mm (3.6311 in.)
2L O/S 0.50
92.73 mm (3.6508 in.)
2L O/S 0.75
92.98 mm (3.6606 in.)
2L O/S 1.00
93.23 mm (3.6704 in.)
3L STD
96.23 mm (3.7886 in.)
3L O/S 0.50
96.73 mm (3.8083 in.)

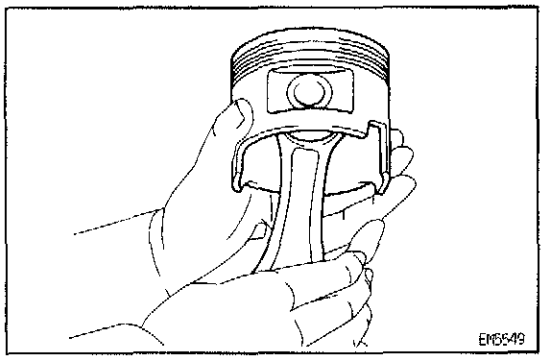
If the diameter is greater than maximum, rebore all the 4 cylinders. If necessary, replace the cylinder block.



5. REMOVE CYLINDER RIDGE

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

EG



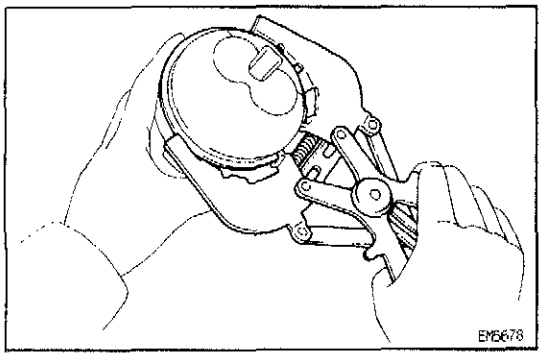
EG62R–02

PISTON AND CONNECTING ROD DISASSEMBLY

1. CHECK FIT BETWEEN PISTON AND PISTON PIN

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

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

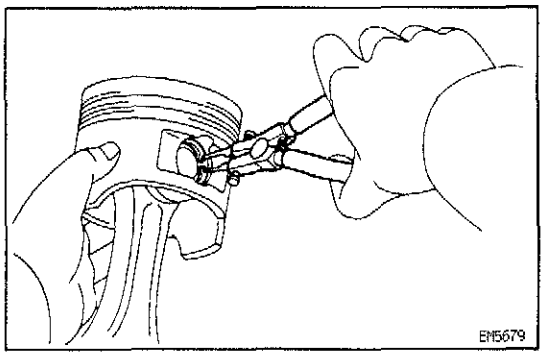


2. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

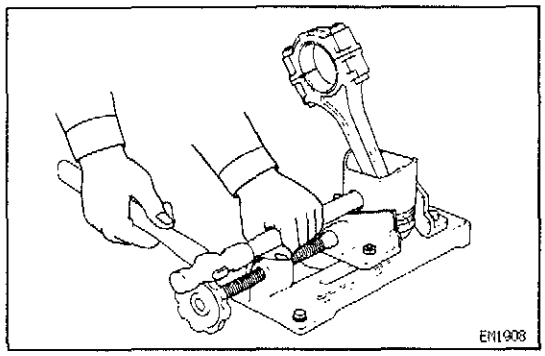
(b) Remove the oil ring and coil by hand.

HINT: Arrange the rings in correct order only.



3. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using needle–nose pliers, remove the snap rings.

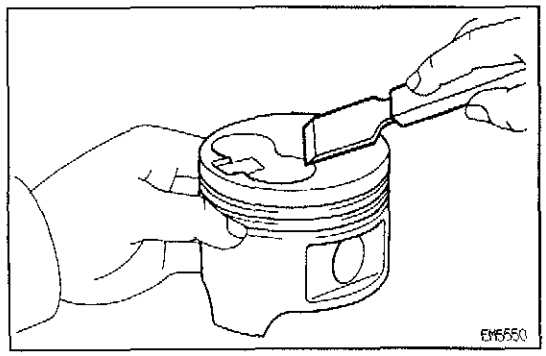


(b) Gradually heat the piston to approx. 60°C (140°F).

(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in correct order.

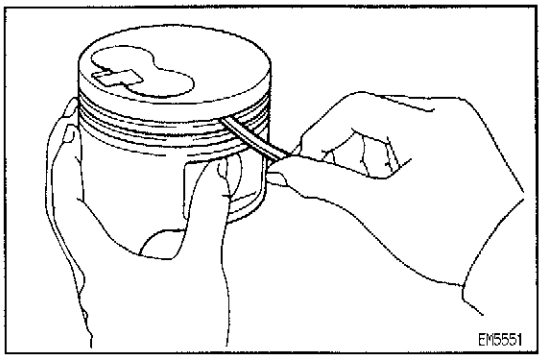


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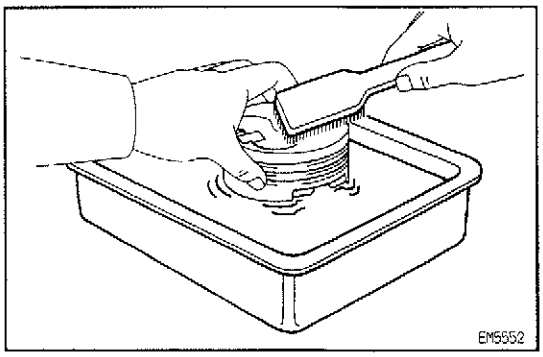
PISTON AND CONNECTING ROD INSPECTION

1. CLEAN PISTON

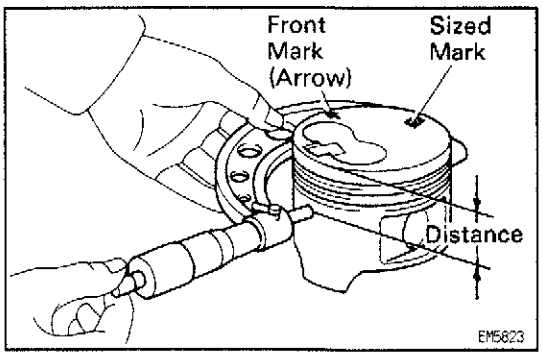
(a) Using a gasket scraper, remove the carbon from the piston top.



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



(c) Using solvent and a brush, thoroughly clean the piston.
NOTICE: Do not use a wire brush.



2. INSPECT PISTON AND PISTON RING

A. Inspect piston diameter and oil clearance

HINT: There are 3 sizes of the standard piston diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the piston top.

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, the indicated distance from the piston head.
Distance:

2L	58.27 — 58.33 mm (2.2941 — 2.2965 in.)
3L	56.27 — 56.33 mm (2.2153 — 2.2177 in.)

Piston diameter:

2L

STD Mark 1	91.940 — 91.950 mm (3.6197 — 3.6201 in.)
STD Mark 2	91.950 — 91.960 mm (3.6201 — 3.6205 in.)
STD Mark 3	91.960 — 91.970 mm (3.6205 — 3.6209 in.)
O/S 0.50	92.440 — 92.470 mm (3.6394 — 3.6405 in.)
O/S 0.75	92.640 — 92.720 mm (3.6472 — 3.6504 in.)
O/S 1.00	92.940 — 92.970 mm (3.6591 — 3.6602 in.)

3L

STD Mark 1	95.940 — 95.950 mm (3.7772 — 3.7776 in.)
STD Mark 2	95.950 — 95.960 mm (3.7776 — 3.7779 in.)
STD Mark 3	95.960 — 95.970 mm (3.7779 — 3.7783 in.)
O/S 0.50	96.440 — 96.470 mm (3.7968 — 3.7980 in.)

(b) Measure the cylinder bore diameter in the thrust directions. (See step 4 in cylinder block inspection)

EG

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

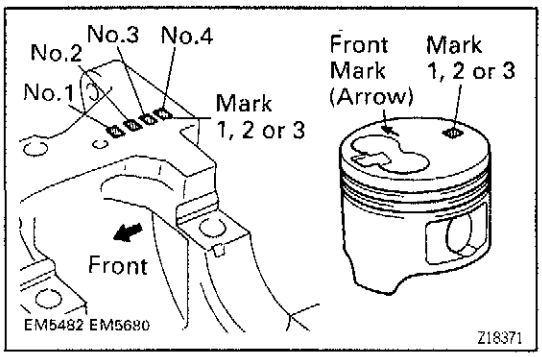
Standard oil clearance:

0.050 — 0.070 mm (0.0020 — 0.0028 in.)

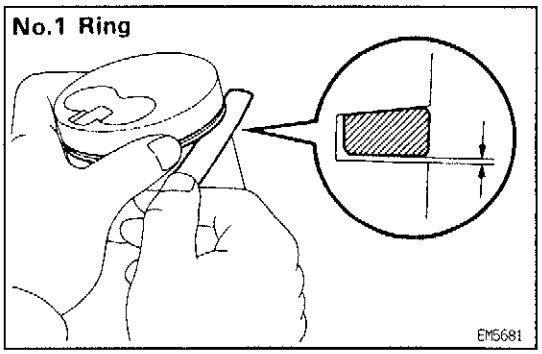
Maximum oil clearance:

0.14 mm (0.0055 in.)

If the oil clearance is greater than maximum, replace all the 4 pistons and rebore all the 4 cylinders. If necessary, replace the cylinder block.



HINT (Use new cylinder block): Use a piston with the same number mark as the cylinder bore diameter marked on the cylinder block.



B. Inspect piston ring groove clearance

No.1 Ring:

Install a new piston ring to the piston. Using a feeler gauge, measure the clearance between the piston ring and the wall of the ring groove.

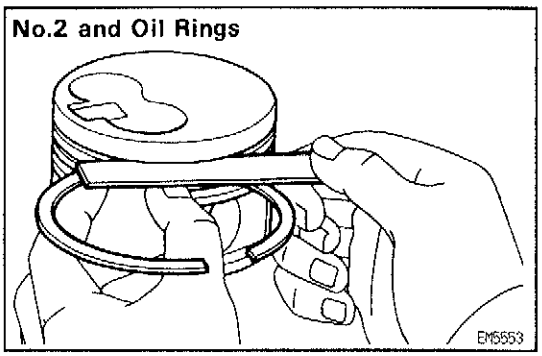
Standard groove clearance:

0.031 — 0.079 mm (0.0012 — 0.0031 in.)

Maximum groove clearance:

0.20 mm (0.0079 in.)

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



No.2 and Oil Rings:

Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Standard groove clearance:

No.2

0.060 — 0.105 mm (0.0024 — 0.0041 in.)

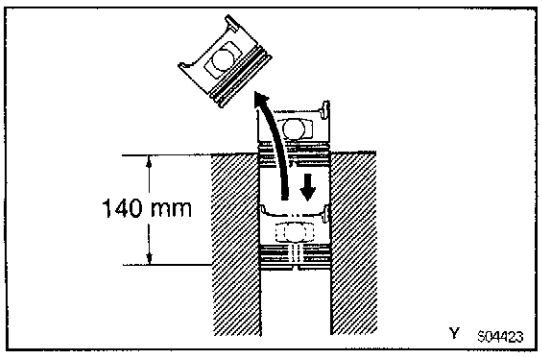
Oil

0.030 — 0.070 mm (0.0012 — 0.0028 in.)

Maximum groove clearance:

0.20 mm (0.0079 in.)

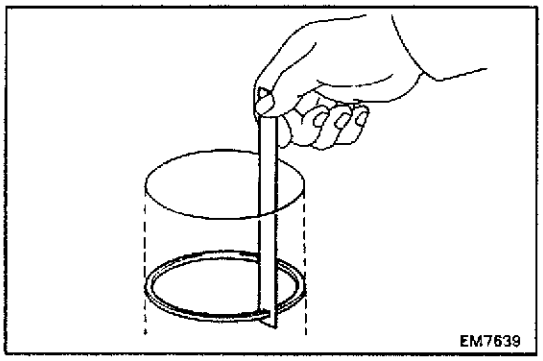
If the clearance is greater than maximum, replace the piston.



C. Inspect piston ring end gap

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 140 mm (5.51 in.) from the top of the cylinder block.



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

Standard end gap:

No.1

0.350 — 0.590 mm (0.0138 — 0.0232 in.)

No.2

0.400 — 0.720 mm (0.0118 — 0.0283 in.)

Oil

0.200 — 0.520 mm (0.0079 — 0.0205 in.)

Maximum end gap:

No.1

1.29 mm (0.0508 in.)

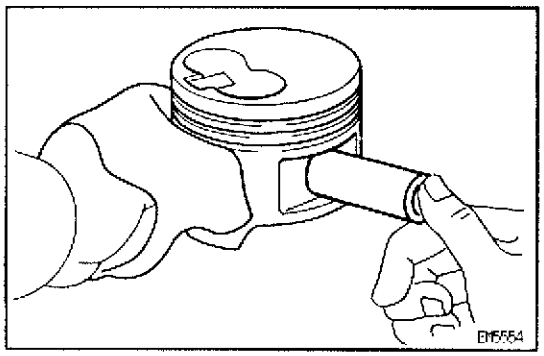
No.2

1.42 mm (0.0559 in.)

Oil

1.22 mm (0.0480 in.)

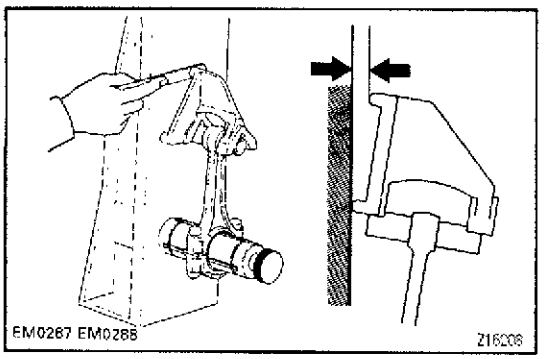
If the end gap is greater than maximum, replace the piston ring. If the end gap is greater than maximum, even with a new piston ring, rebore all the 4 cylinders or replace the cylinder block.



3. INSPECT PISTON PIN FIT

At 60°C (140°F), you should be able to push the piston pin into the piston pin hole with your thumb.

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



4. INSPECT CONNECTING ROD

A. Inspect connecting rod alignment

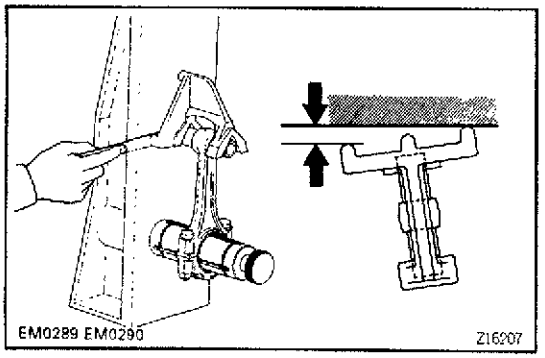
Using a rod aligner and feeler gauge, check the connecting rod alignment.

- Check for out—of—alignment.

Maximum out—of—alignment:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If out—of—alignment is greater than maximum, replace the connecting rod assembly.

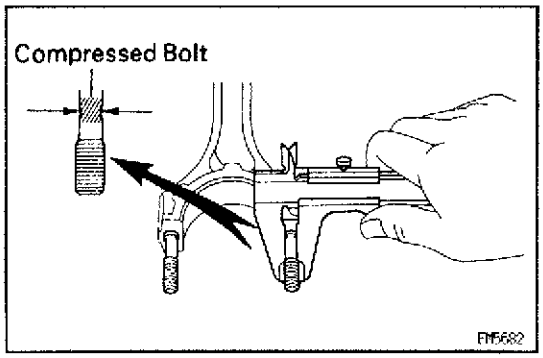


- Check for twist

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.



B. Inspect connecting rod bolts

Using vernier calipers, measure the tension portion diameter.

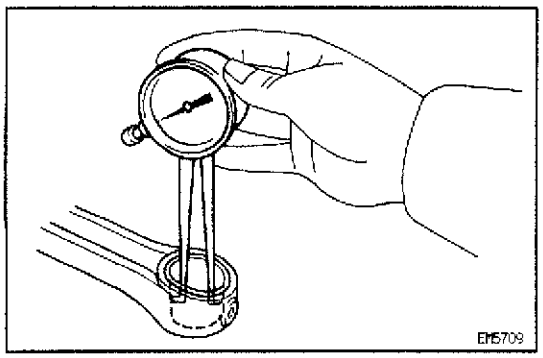
Standard diameter:

8.400 — 8.600 mm (0.3307 — 0.3386 in.)

Minimum diameter:

8.20 mm (0.3228 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.

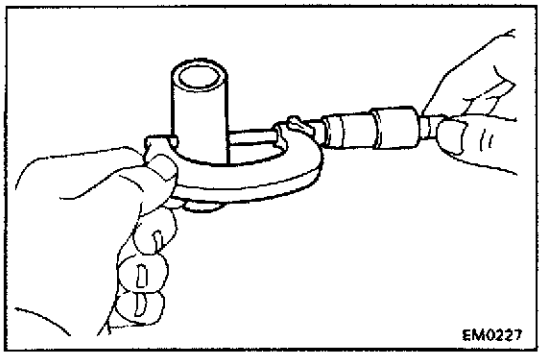
Bushing inside diameter:

2L

27.008 — 27.020 mm (1.0633 — 1.0638 in.)

3L

29.008 — 29.020 mm (1.1420 — 1.1425 in.)



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

Piston pin diameter:

2L

27.000 — 27.012 mm (1.0630 — 1.0635 in.)

3L

29.000 — 29.012 mm (1.1417 — 1.1422 in.)

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

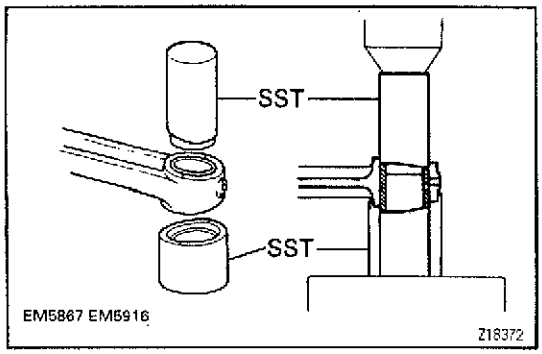
Standard oil clearance:

0.004 — 0.012 mm (0.0002 — 0.0005 in.)

Maximum oil clearance:

0.05 mm (0.0020 in.)

If the oil clearance is greater than maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.



D. If necessary, replace connecting rod bushing

(a) Using SST and a press, press out the bushing.

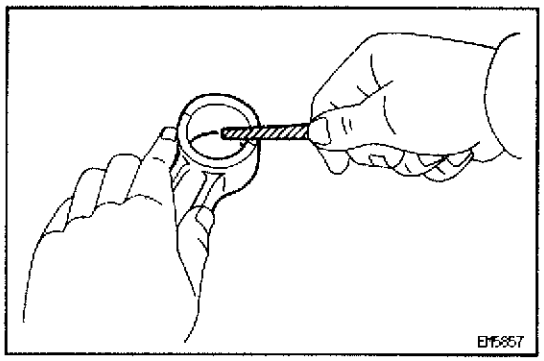
SST

2L:

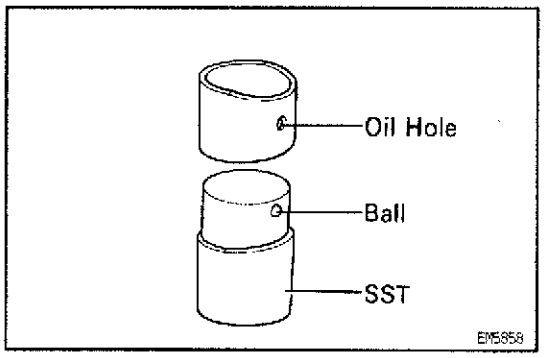
09222—64012 (09222—02022, 09222—02041)

3L:

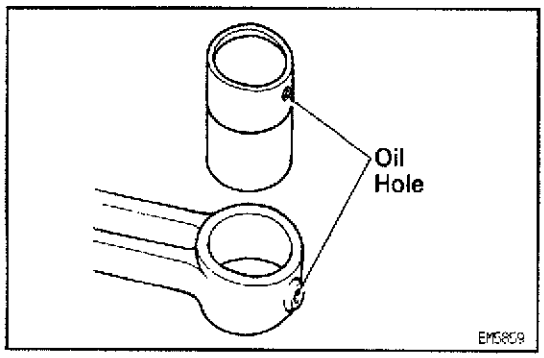
09222—54011 (09222—03016, 09222—03026)



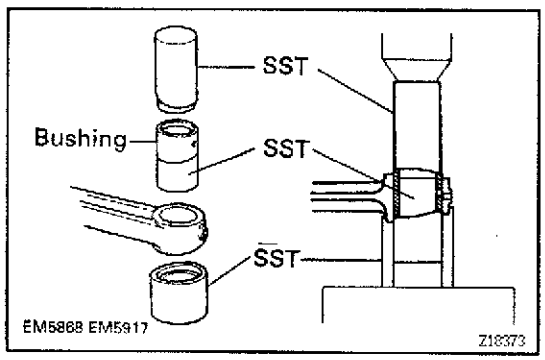
(b) Using a round file, lightly file off any roughness from the small end of the connecting rod.



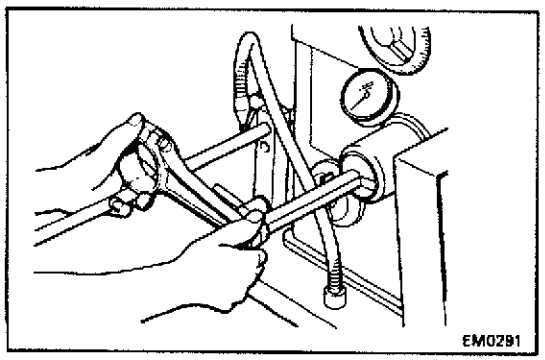
(c) Attach the bushing to SST with the ball of SST inside the oil hole of the bushing.
SST
2L:
09222–64012 (09222–02031)
3L:
09222–54011 (09222–03021)



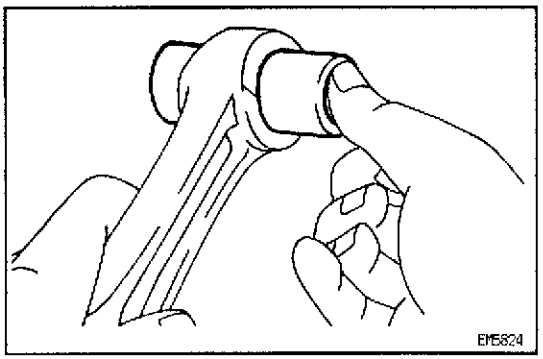
(d) Align the oil holes of a new bushing and the connecting rod.



(e) Using SST and a press, press in the bushing.
SST
2L:
09222–64012 (09222–02022,
09222–02031, 09222–02041)
3L:
09222–54011 (09222–03016,
09222–03021, 09222–03026)



(f) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see item C above) between the bushing and piston pin.



EG

(g) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.

CYLINDER BORING

EG7DE-01

HINT:

- Bore all the 4 cylinders to the oversized piston outside diameter.
- Replace all the piston rings with ones to match the oversized pistons.

1. KEEP OVERSIZED PISTONS

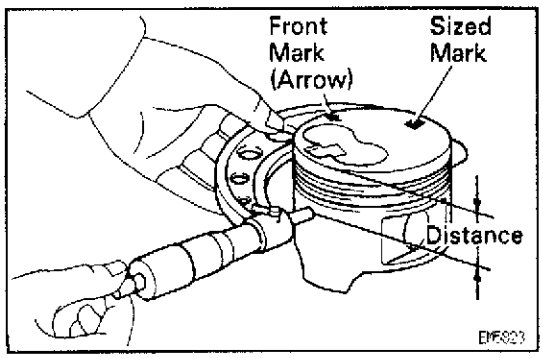
Oversized (O/S 0.50) piston diameter:

2L

92.440 – 92.470 mm (3.6394 – 3.6405 in.)

3L

96.440 – 96.470 mm (3.7968 – 3.7980 in.)



2. CALCULATE AMOUNT TO BORE CYLINDERS

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, the indicated distance from the piston head.

Distance:

2L	58.27 – 58.33 mm (2.2941 – 2.2965 in.)
3L	56.27 – 56.33 mm (2.2153 – 2.2177 in.)

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

Size to be rebored = P + C – H

P = Piston diameter

C = Piston clearance

0.050 – 0.070 mm (0.0020 – 0.0028 in.)

H = Allowance for honing

0.02 mm (0.0008 in.) or less

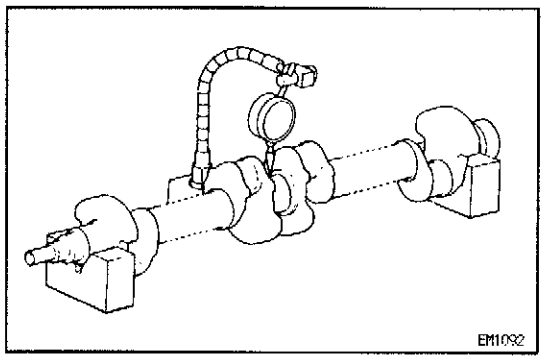
3. **BORE AND HONE CYLINDER TO CALCULATED DIMENSIONS**

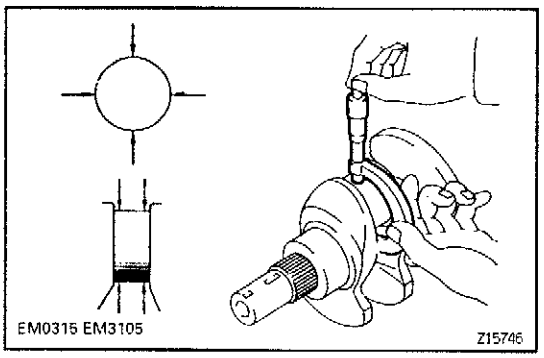
Maximum honing:

0.02 mm (0.0008 in.)

NOTICE: Excess honing will destroy the finished roundness.

EG





CRANKSHAFT INSPECTION AND REPAIR EG08Y-21

1. **INSPECT CRANKSHAFT FOR RUNOUT**

(a) Place the crankshaft on V—blocks.

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

Maximum circle runout:

0.06 mm (0.0024 in.)

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

2. **INSPECT MAIN JOURNALS AND CRANK PINS**

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

Main journal diameter:

STD

61.985 — 62.000 mm (2.4403 — 2.4409 in.)

U/S 0.25

61.745 — 61.755 mm (2.4309 — 2.4313 in.)

U/S 0.50

61.495 — 61.505 mm (2.4211 — 2.4215 in.)

Crank pin diameter:

2L

STD

52.988 — 53.000 mm (2.0861 — 2.0866 in.)

U/S 0.25

52.745 — 52.755 mm (2.0766 — 2.0770 in.)

U/S 0.50

52.495 — 52.505 mm (2.0667 — 2.0671 in.)

3L

STD

54.988 — 55.000 mm (2.1649 — 2.1654 in.)

U/S 0.25

54.745 — 54.755 mm (2.1553 — 2.1557 in.)

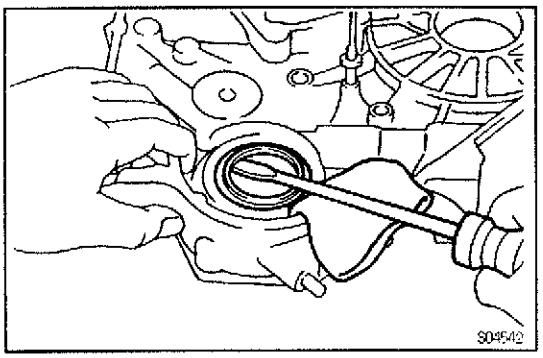
U/S 0.50

54.495 — 54.505 mm (2.1455 — 2.1459 in.)

If the diameter is not as specified, check the oil clearance. (See steps 5 and 8 in cylinder block assembly)
If necessary, grind or replace the crankshaft.

(b) Check each main journal and crank pin for taper and out–of–round as shown.
Maximum taper and out–of–round:
0.02 mm (0.0008 in.)
If the taper and out–of–round is greater than maximum, replace the crankshaft.

3. IF NECESSARY, GRIND AND HONE MAIN JOURNALS AND/OR CRANK PINS
Grind and hone the main journals and/or crank pins to the finished undersized diameter (See procedure in step 2).
Install new main journal and/or crankshaft pin undersized bearing.



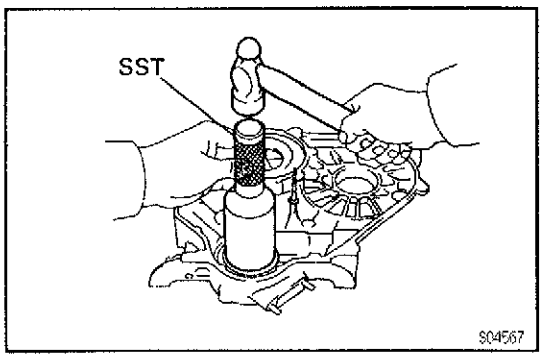
CRANKSHAFT OIL SEALS REPLACEMENT EG7AQ–01

HINT: There are 2 methods (A and B) to replace the oil seal which are as follows:

1. REPLACE CRANKSHAFT FRONT OIL SEAL

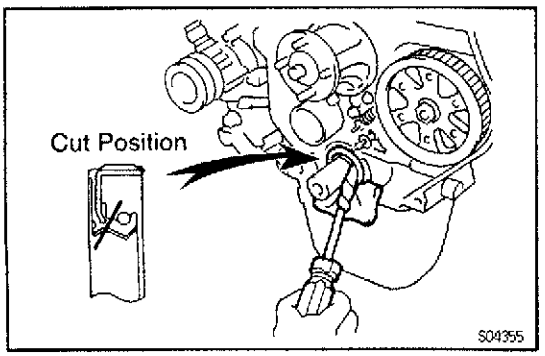
A. If oil pump is removed from cylinder block:

(a) Using a screwdriver, pry out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal to the depth of 0.5 mm (0.020 in.) from the oil pump case edge.
SST 09223–60010

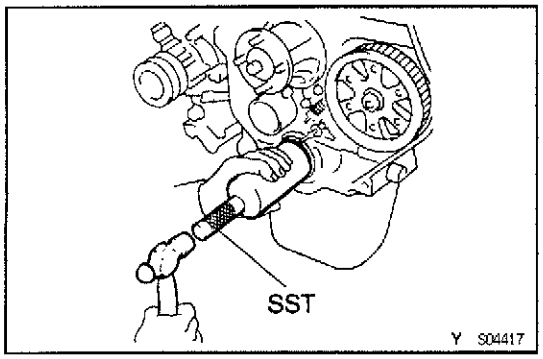
(c) Apply MP grease to the oil seal lip.



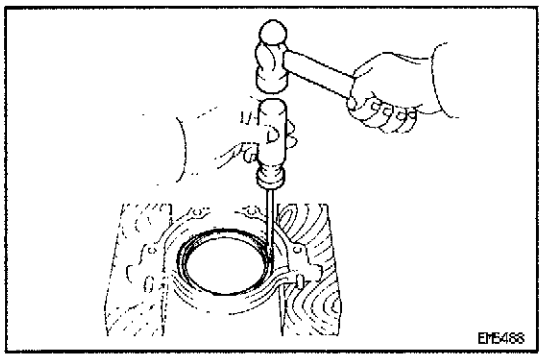
B. If oil pump is installed to cylinder block:

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft.
Tape the screwdriver tip.



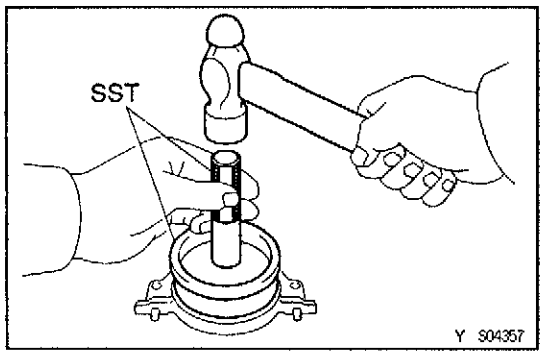
(c) Apply MP grease to a new oil seal lip.
(d) Using SST and a hammer, tap in the oil seal to the depth of 0.5 mm (0.020 in.) from the oil pump case edge.
SST 09223–60010



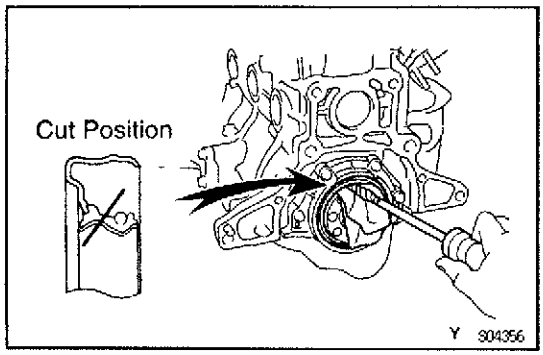
1. REPLACE CRANKSHAFT REAR OIL SEAL

A. If rear oil seal retainer is removed from cylinder block:

(a) Using a screwdriver and hammer, tap out the oil seal.

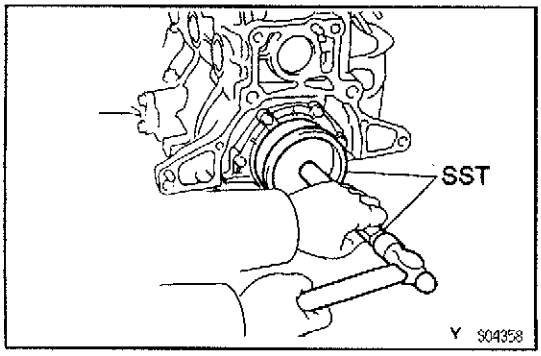


(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–15030, 09950–70010 (09951–07150)
(c) Apply MP grease to the oil seal lip.



B. If rear oil seal retainer is installed to cylinder block:

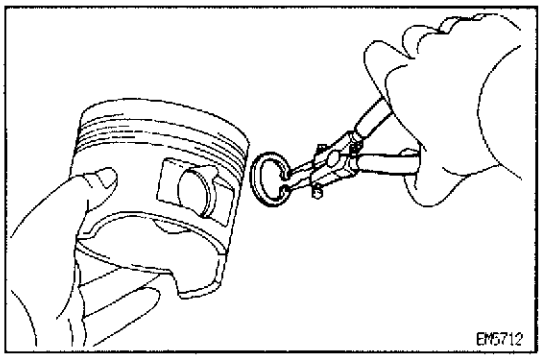
(a) Using a knife, cut off the oil seal lip.
(b) Using a screwdriver, pry out the oil seal.
NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



(c) Apply MP grease to a new oil seal lip.
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–15030, 09950–70010 (09951–07150)

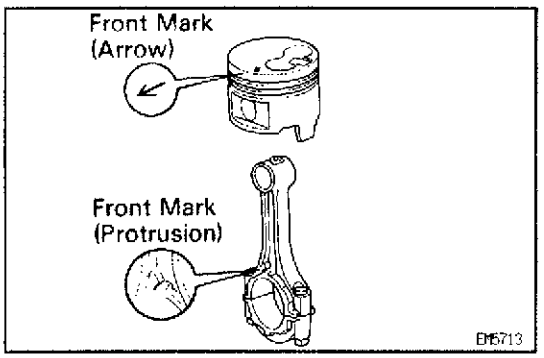
EG7AH-01

PISTON AND CONNECTING ROD ASSEMBLY

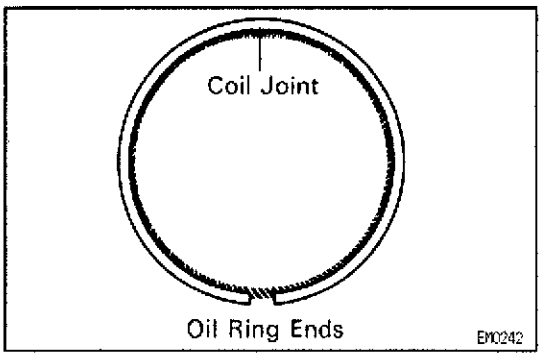


1. ASSEMBLE PISTON AND CONNECTING ROD

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

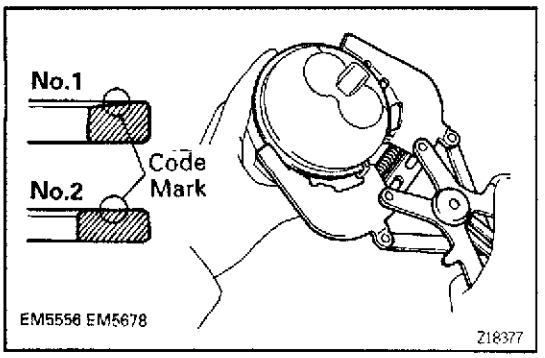


(b) Gradually heat the piston to 60°C (140°F).
(c) Coat the piston pin with engine oil.
(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.
(e) Install a new snap ring on the other side of the piston pin hole.



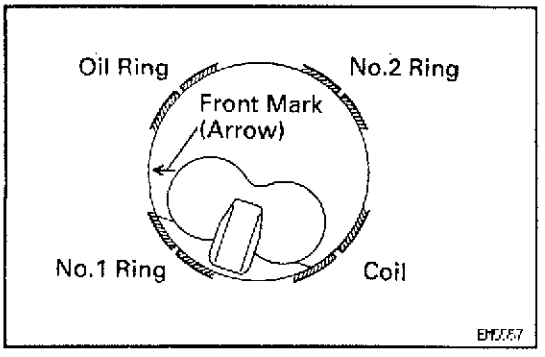
2. INSTALL PISTON RINGS

(a) Install the coil and oil ring by hand.
HINT: Face the end gap of the oil ring in the opposite direction coil joint.

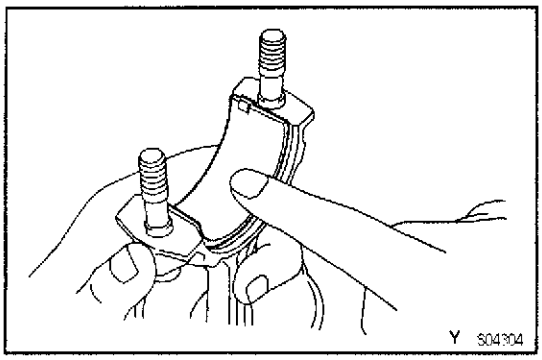


(b) Using a piston ring expander, install the No.1 and No. 2 piston rings with the code mark facing upward.
Code mark:

Item	2L	3L
No.1	T1 or 1N	T1 or N1
No.2	2T or 2N	T or 2N



(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 rod cap.

(b) Install the bearings in the connecting rod and connecting rod cap.

EG

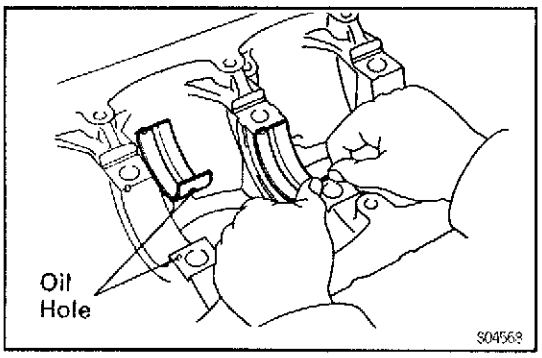
CYLINDER BLOCK ASSEMBLY

EG7AJ-01

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 and oil seals with new ones.

1. INSTALL OIL NOZZLES AND CHECK VALVES
(See step 1 in oil nozzles installation in Lubrication System)

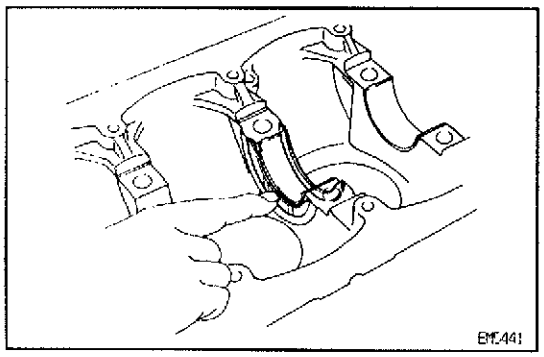


2. INSTALL MAIN BEARINGS

HINT: Upper bearings have an oil groove and oil hole; lower bearings do not.

(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.

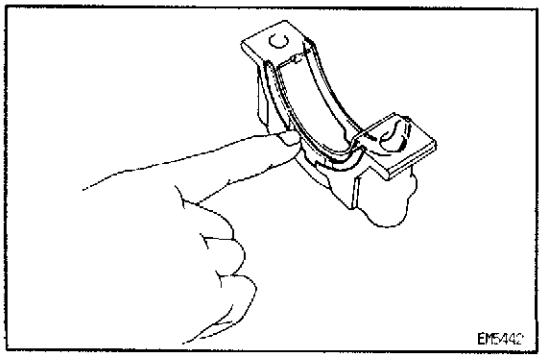
(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.



3. INSTALL UPPER THRUST WASHERS

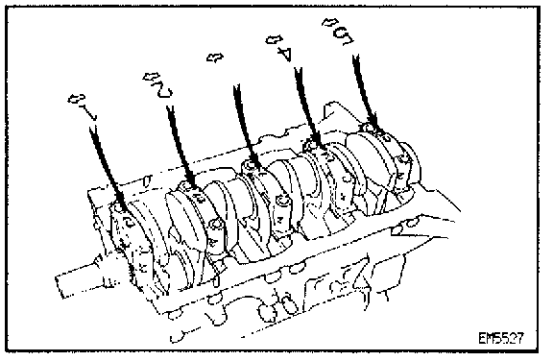
Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

4. PLACE CRANKSHAFT ON CYLINDER BLOCK

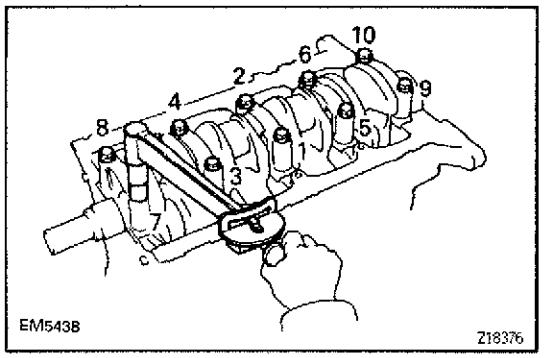


5. INSTALL MAIN BEARING CAPS AND LOWER THRUST WASHERS

(a) Install the 2 lower thrust washers on the No.3 main bearing cap with the grooves facing outward.



(b) Install the 5 main bearing caps in their proper locations.



(c) Apply a light coat of the engine oil on the threads and under the bolt heads of the main bearing caps.

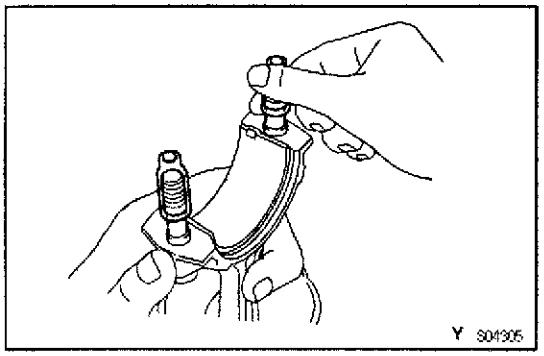
(d) Install and uniformly tighten the 10 bolts of the main bearing caps, in several passes, in the sequence shown.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(e) Check that the crankshaft turns smoothly.

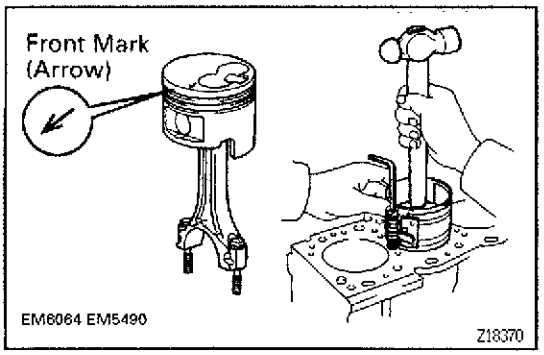
6. CHECK CRANKSHAFT THRUST CLEARANCE

(See step 5 in cylinder block disassembly)

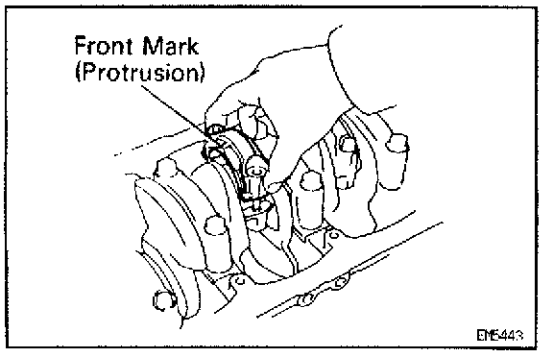


7. INSTALLATION PISTON AND CONNECTING ROD ASSEMBLIES

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



(b) Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.

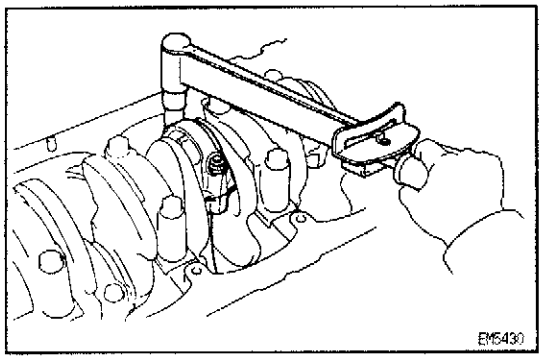


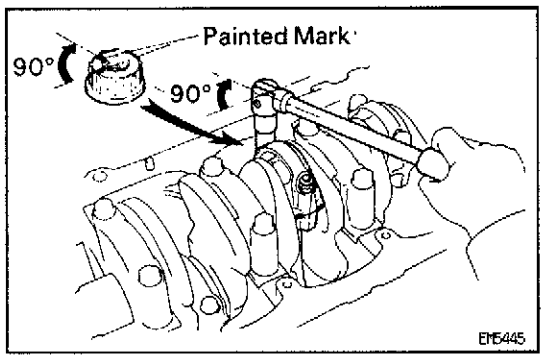
8. INSTALL CONNECTING ROD CAPS

A. Place connecting rod cap on connecting rod

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

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





B. Install connecting rod cap nuts

HINT:

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

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

(b) Install and alternately tighten the nuts of the connecting rod cap in several passes.

Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)

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

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

(d) Retighten the connecting rod cap nuts 90° as shown.

(e) Check that the painted mark is now at a 90° angle to the front.

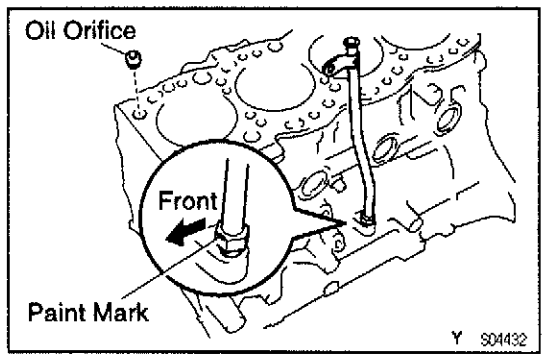
(f) Check that the crankshaft turns smoothly.

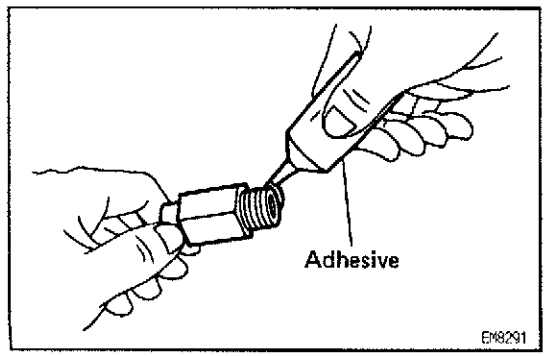
9. CHECK CONNECTING ROD THRUST CLEARANCE (See step 2 in cylinder block disassembly)

10. INSTALL REAR OIL SEAL RETAINER

Install a new gasket and the retainer with the 4 bolts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)





AFTER ASSEMBLY

1. CONNECT GROUND CABLE

2. 2L for Thailand:
INSTALL CYLINDER BLOCK OIL ORIFICE

3. INSTALL OIL DIPSTICK GUIDE (PLUG)

Using a bass bar and hammer, tap in the dipstick guide end into the guide hole of the cylinder block, facing the paint mark front.

4. INSTALL UNION FOR ALTERNATOR HOSE

(a) Apply adhesive to 2 or 3 threads of the union.

Adhesive:

Part No. 08833–00070, THREE BOND 1324 or equivalent

(b) Install the union.

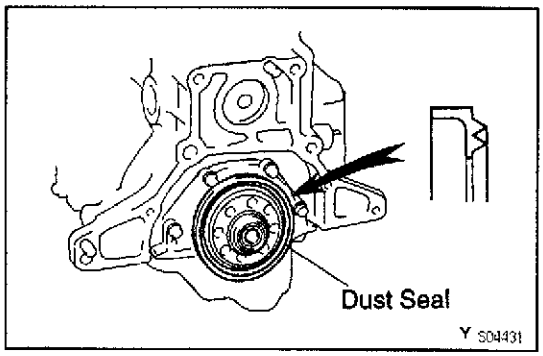
Torque: 32 N·m (320 kgf·cm, 24 ft·lbf)

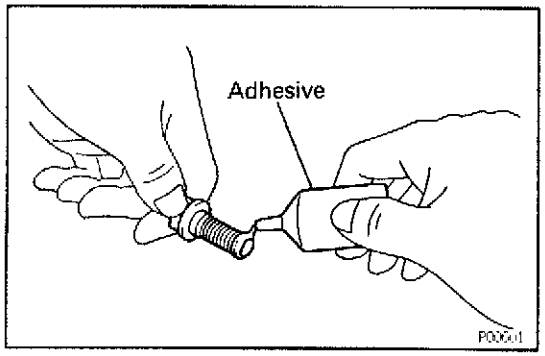
EG

5. **INSTALL ENGINE COOLANT DRAIN PLUG**
   (See step 1 (c) and (d) in coolant check in Cooling System)
6. **INSTALL OIL PRESSURE SWITCH**
   (See step 8 in oil pressure check in Lubrication System)
7. **Pre–Heating System (Super Glow Type):**
   INSTALL WATER TEMPERATURE SENSOR
8. **INSTALL FAN BELT ADJUSTING BAR**
   Torque: 45 N·m (460 kgf·cm, 33 ft·lbf)
9. **INSTALL TIMING BELT CASE (OIL PUMP), OIL STRAINER AND OIL PAN**
   (See oil pump installation in Lubrication System)
10. **INSTALL OIL COOLER, OIL FILTER BRACKET ASSEMBLY AND OIL FILTER**
    (See oil cooler installation in Lubrication System)
11. **INSTALL ALTERNATOR AND VACUUM PUMP ASSEMBLY (WITH HOSES)**
12. **INSTALL ENGINE MOUNTING AND ALTERNATOR BRACKETS**
    Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
13. **INSTALL INJECTION PUMP AND STAY**
    (See injection pump installation in Fuel System)
14. **INSTALL CYLINDER HEAD**
    (See cylinder head installation)
15. **INSTALL WATER PUMP**
    (See water pump installation in Cooling System)
16. **INSTALL PULLEYS AND TIMING BELT**
    (See timing belt installation)
17. **DISCONNECT ENGINE FROM ENGINE STAND**
18. **INSTALL REAR END PLATE**

(a) Install the dust seal to the crankshaft.

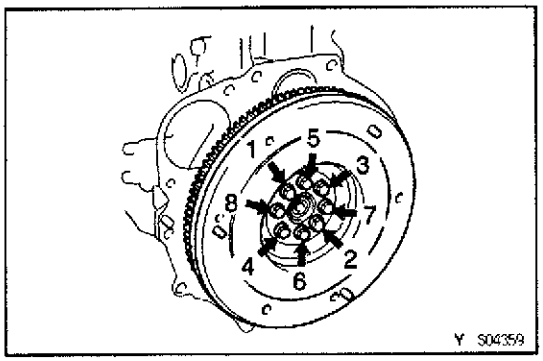
(b) Install the rear end plate with the 2 bolts.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)





19. **M/T:**
    INSTALL FLYWHEEL

(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Install the flywheel on the crankshaft.
(c) Apply a light of engine oil on the threads and under the heads of the flywheel bolts.
(d) Install and uniformly tighten the bolts, in several passes, in the sequence shown.
Torque: 122.5 N·m (1,250 kgf·cm, 90 ft·lbf)

20. A/T:
INSTALL DRIVE PLATE
(See procedure step 19)
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

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