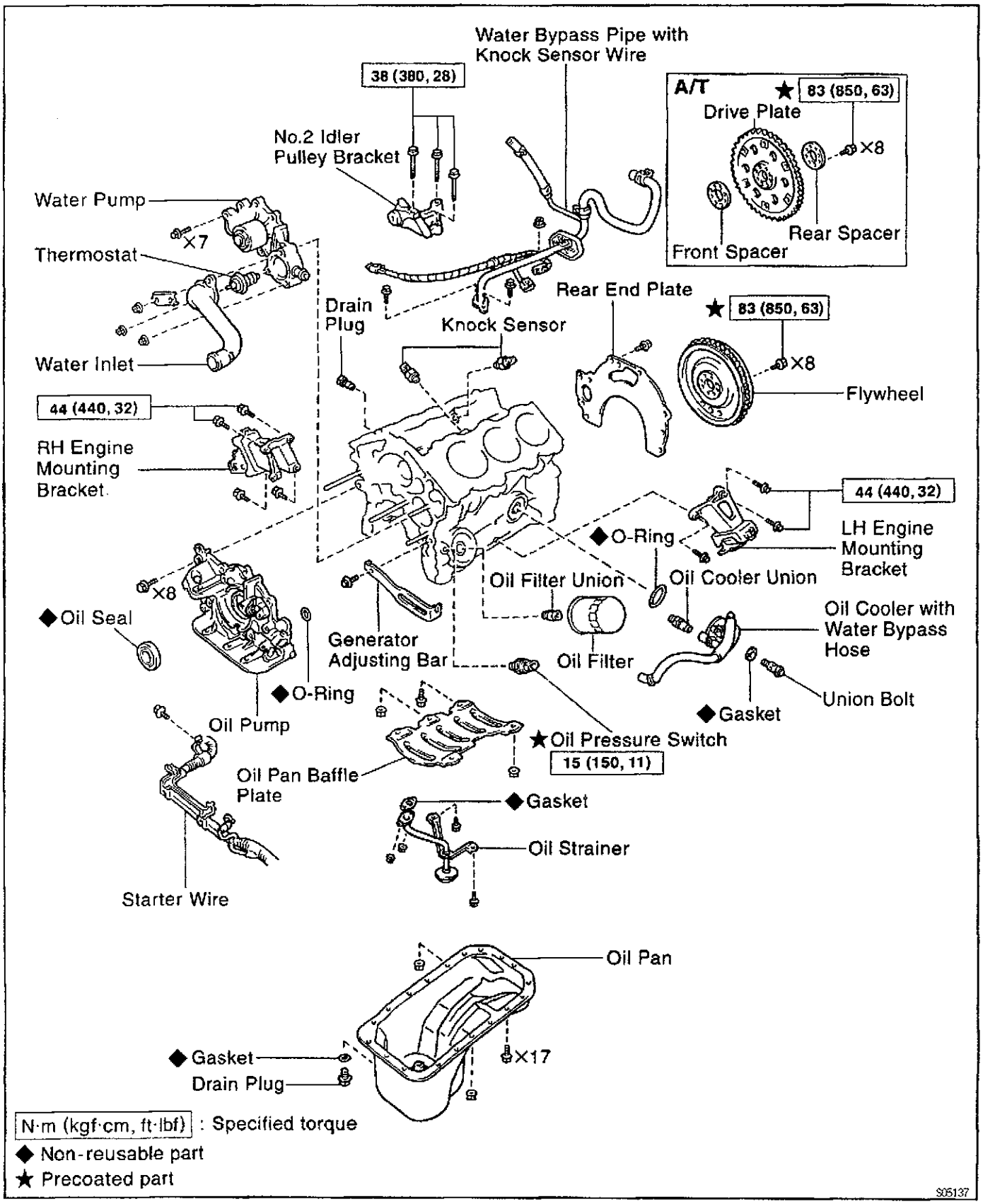
CYLINDER BLOCK

COMPONENTS FOR PREPARATION AND AFTER ASSEMBLY

EG0383-0F

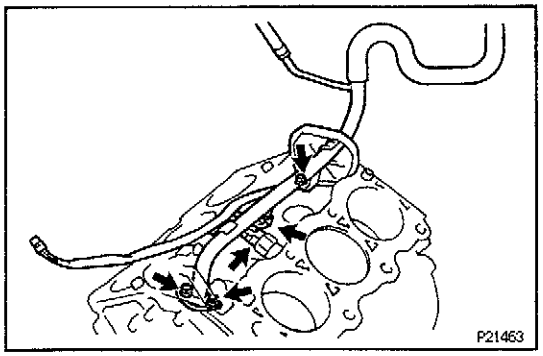


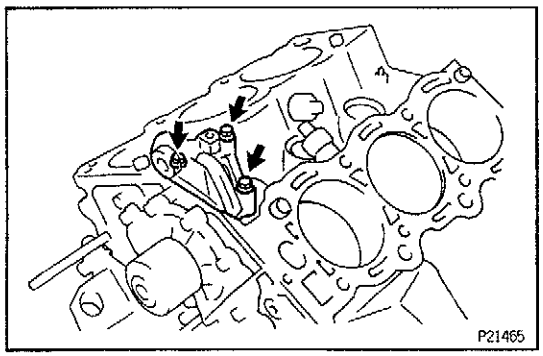
EG7C0-01

PREPARATION FOR DISASSEMBLY

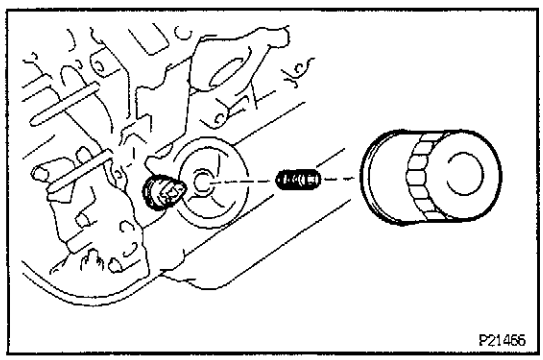
1. **M/T:**
   REMOVE FLYWHEEL
2. **A/T:**
   REMOVE DRIVE PLATE
3. **REMOVE REAR END PLATE**
4. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
5. **REMOVE TIMING BELT AND PULLEYS**
   (See timing belt removal)
6. **REMOVE CYLINDER HEADS**
   (See cylinder heads removal)
7. **REMOVE WATER BYPASS PIPE WITH KNOCK SENSOR WIRE**

(a) Disconnect the 2 knock sensor connectors.
(b) Remove the 2 bolts, nut and water bypass pipe.





8. **REMOVE NO.2 IDLER PULLEY BRACKET**
   Remove the 3 bolts and idler pulley bracket.
9. **REMOVE KNOCK SENSORS**
   (See knock sensor removal in EFI System)
10. **REMOVE WATER PUMP**
    (See water pump removal in Cooling System)
11. **REMOVE GENERATOR ADJUSTING BAR**
12. **REMOVE OIL PRESSURE SWITCH**
    Using SST, remove the oil pressure switch.
    SST 09816—30010

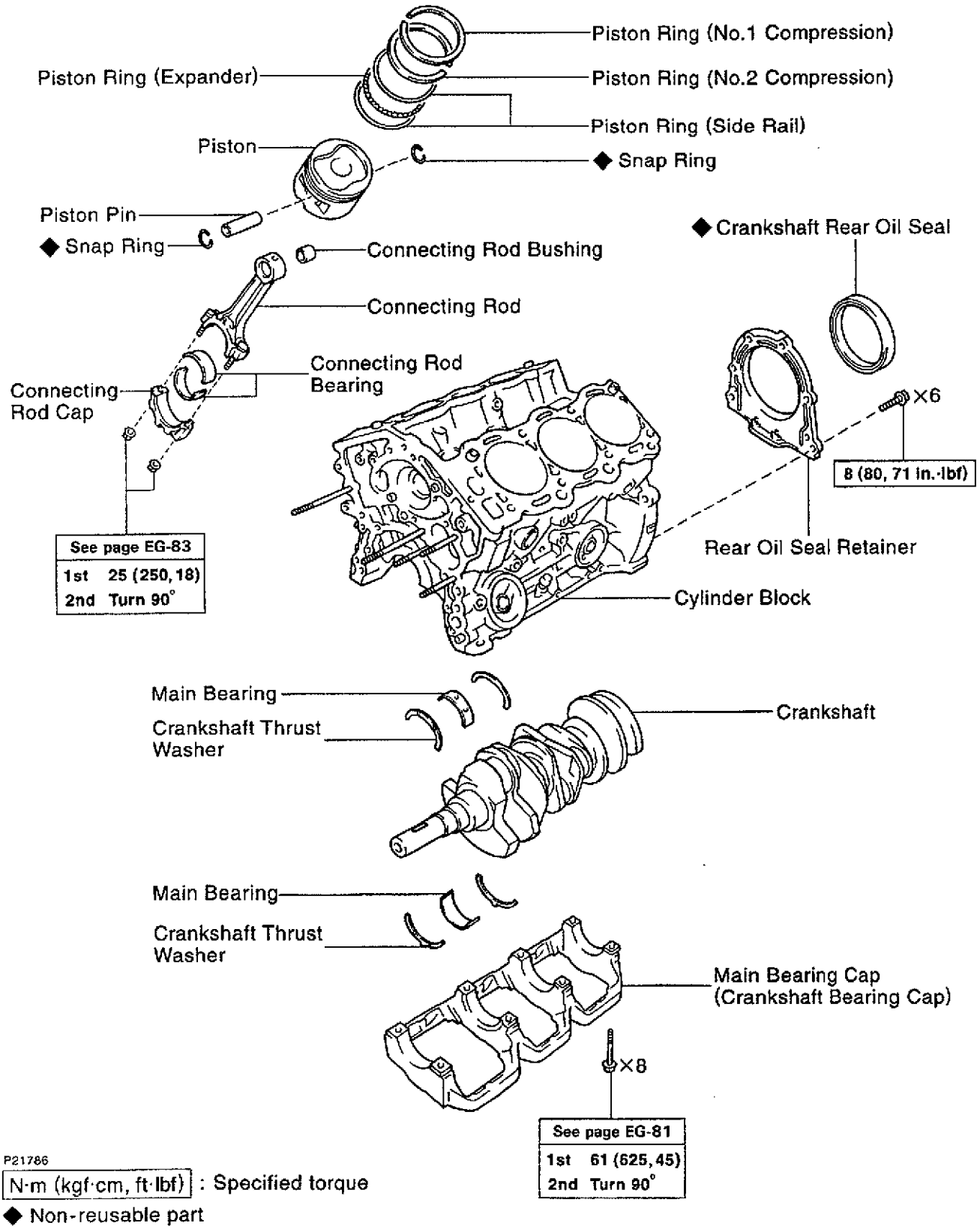


13. **REMOVE OIL FILTER**
    (See oil and filter replacement in Lubrication System)
14. **REMOVE OIL FILTER UNION**
    Using 12 mm hexagon wrench, remove the union.
15. **REMOVE RH AND LH ENGINE MOUNTING BRACKET**
16. **REMOVE COOLANT DRAIN PLUG**
17. **REMOVE OIL COOLER**
    (See oil and filter replacement in Lubrication System)
18. **REMOVE OIL PUMP**
    (See oil and filter replacement in Lubrication System)

COMPONENTS FOR CYLINDER BLOCK DISASSEMBLY AND ASSEMBLY

EG0086-2J

EG



P21786

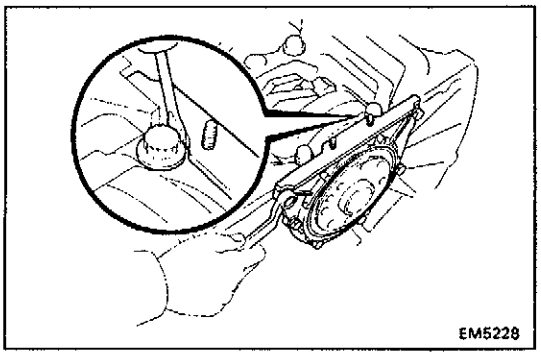
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

Z18940

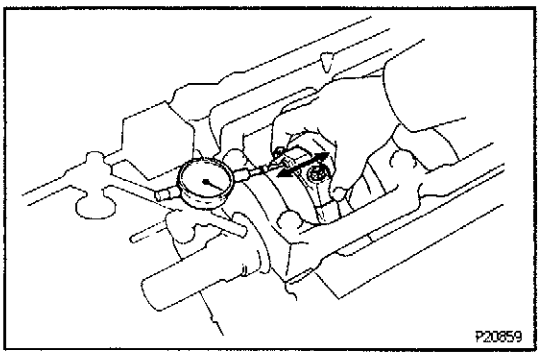
EG7C1-01

CYLINDER BLOCK DISASSEMBLY



1. REMOVE REAR OIL SEAL RETAINER

Remove the 6 bolts and retainer.



2. CHECK CONNECTING ROD THRUST CLEARANCE

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

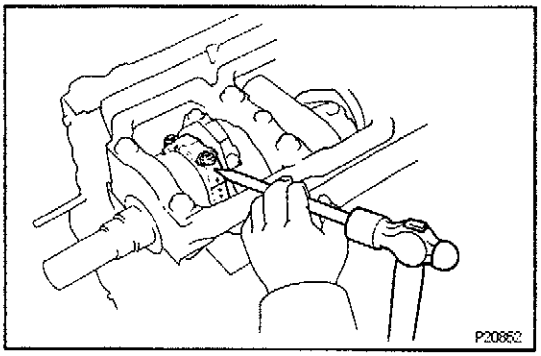
Standard thrust clearance:

0.150 — 0.330 mm (0.0059 — 0.0130 in.)

Maximum thrust clearance:

0.380 mm (0.0150 in.)

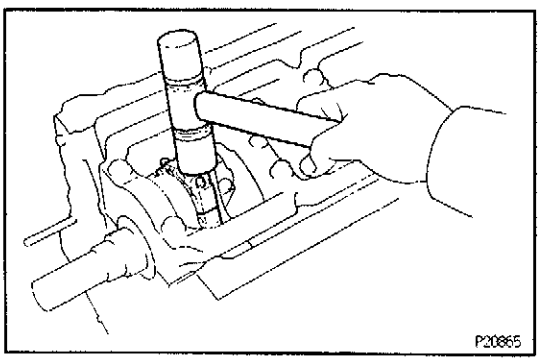
If the thrust clearance is greater than the maximum, replace the connecting rod assembly. If necessary, replace the crankshaft.



3. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

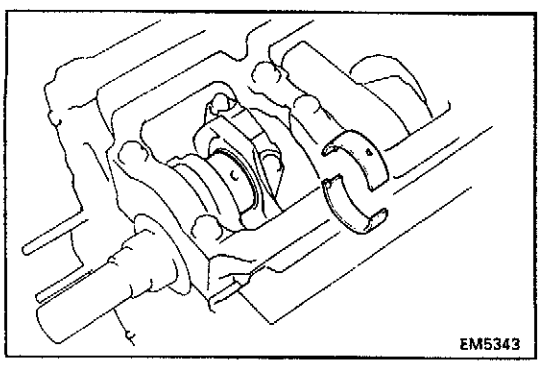
(a) Using a punch or numbering stamp, mark the connecting rod and cap to ensure correct reassembly.

(b) Remove the 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.

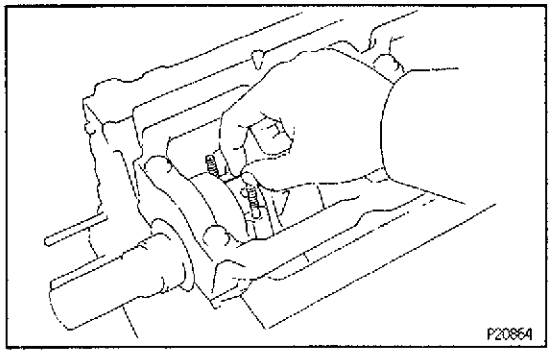


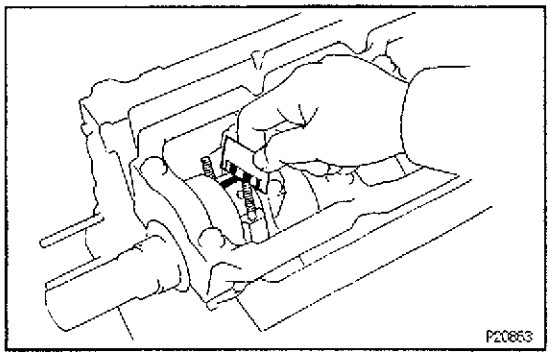
(e) Clean the crank pin and bearing.

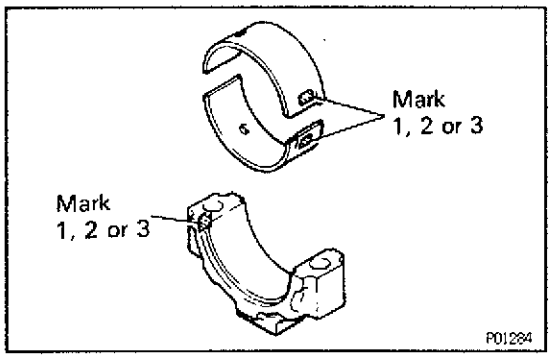
(f) Check the crank pin and bearing for pitting and scratches.

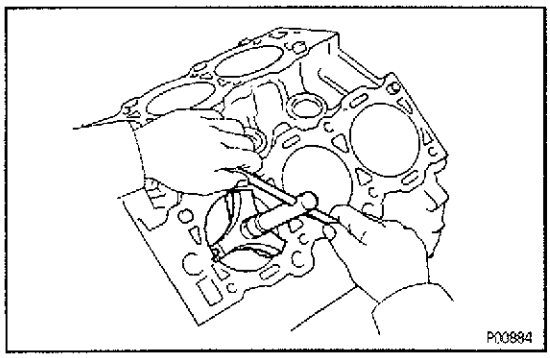
If the crank pin or bearing is damaged, replace the bearings. If necessary, grind or replace the crankshaft.

EG









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

(h) Install the connecting rod cap with the 2 nuts.
(See reassembly in cylinder block)
Torque:
1st 25 N·m (250 kgf·cm, 18 ft·lbf)
2nd Turn extra 90°
NOTICE: Do not turn the crankshaft.

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

(j) Measure the Plastigage at its widest point.
Standard oil clearance:
STD
0.024 – 0.053 mm (0.0009 – 0.0021 in.)
U/S 0.25
0.023 – 0.069 mm (0.0009 – 0.0027 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than the maximum, replace the bearings. If necessary, grind or replace the crankshaft.
HINT: If using a standard bearing, replace 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.
Reference
Standard bearing center wall thickness:

Mark "1"	1.484 – 1.488 mm (0.0584 – 0.0586 in.)
Mark "2"	1.488 – 1.492 mm (0.0586 – 0.0587 in.)
Mark "3"	1.492 – 1.496 mm (0.0587 – 0.0589 in.)

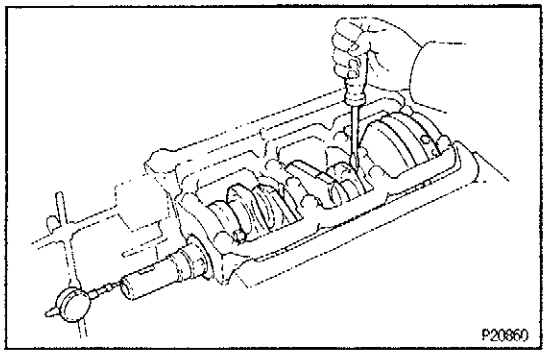
(k) Completely remove the Plastigage.

4. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(a) Using a ridge reamer, remove the all 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.



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:

0.020 — 0.220 mm (0.0008 — 0.0087 in.)

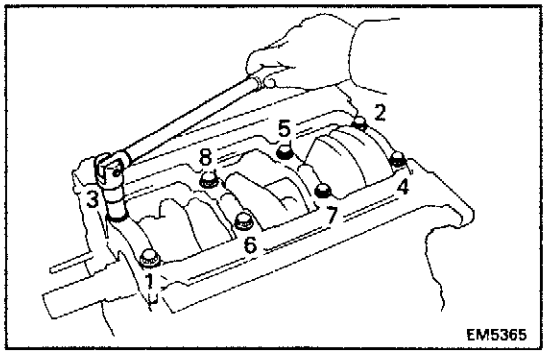
Maximum thrust clearance:

0.300 mm (0.0118 in.)

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

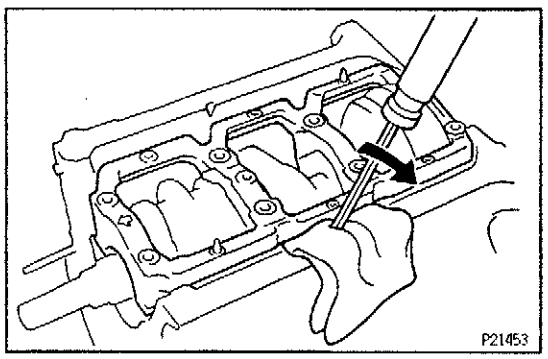
Thrust washer thickness:

2.440 — 2.490 mm (0.0961 — 0.0980 in.)



6. REMOVE MAIN BEARING CAP AND CHECK OIL CLEARANCE

(a) Uniformly loosen and remove the main bearing cap bolts, in several passes, in the sequence shown.

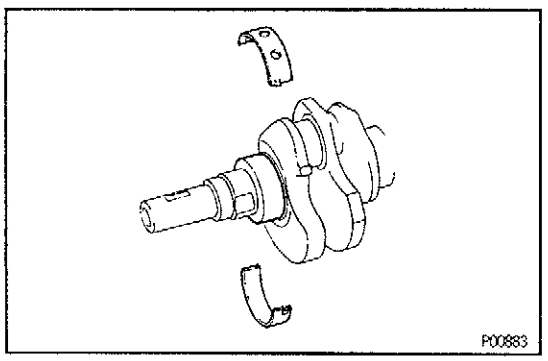


(b) Using a screwdriver, pry out the main bearing cap and remove the main bearing cap, lower main bearings and lower thrust washers (No.2 journal position of main bearing cap only).

HINT: Keep the lower main bearings and lower thrust washers together with the main bearing cap.

(c) Lift out the crankshaft.

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

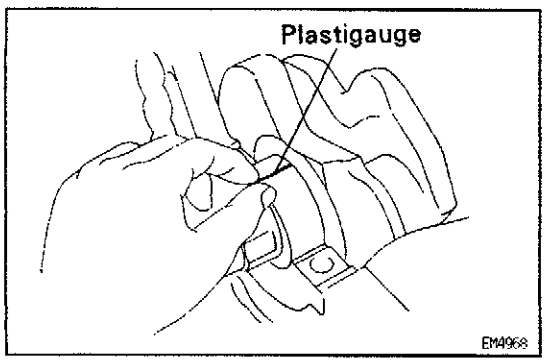


(d) Clean each main journal and bearing.

(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 main bearing cap with the 8 bolts.

(See assembly in cylinder block)

Torque:

1st 61 N·m (625 kgf·cm, 45 ft·lbf)

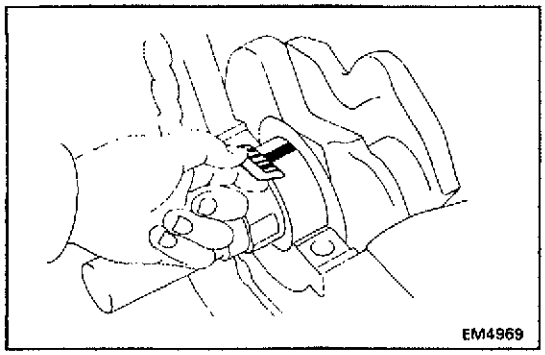
2nd Turn extra 90°

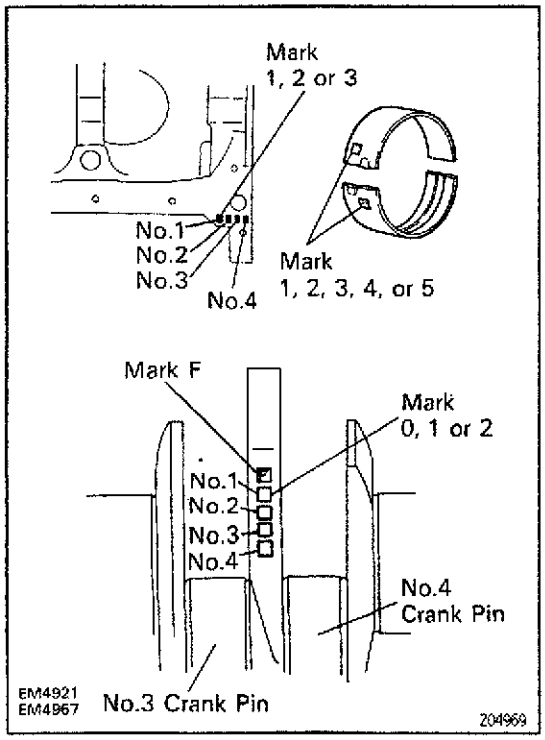
NOTICE: Do not turn the crankshaft.

(i) Remove the 8 bolts and main bearing cap.

(See procedure (a) and (b) above)

EG


EM4969



EM4921
EM4967
204969

(j) Measure the Plastigage at its widest point.

Standard clearance:

Item	STD mm (in.)	U/S 0.25 mm (in.)
No.1	0.020 — 0.038 (0.0008 — 0.0015)	0.019 — 0.059 (0.0007 — 0.0023)
Others	0.024 — 0.042 (0.0009 — 0.0017)	0.023 — 0.063 (0.0009 — 0.0025)

Maximum clearance:

0.08 mm (0.0031 in.)

HINT: If replacing the cylinder block subassembly, the bearing standard clearance will be:

No.1:

0.010 — 0.049 mm (0.0004 — 0.0020 in.)

Others:

0.014 — 0.053 mm (0.0006 — 0.0021 in.)

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

HINT: If using a standard bearing, replace with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then selecting the bearing with the same number as the total. There are 5 sizes of standard bearings, marked "1", "2", "3", "4" and "5" accordingly.

	Number marked								
Cylinder block	1			2			3		
Crankshaft	0	1	2	0	1	2	0	1	2
Use bearing	1	2	3	2	3	4	3	4	5

EXAMPLE: Cylinder block "2" + Crankshaft "1"
= Total number 3 (Use bearing "3")

V00240

Reference:

Standard sized bearing center wall thickness:

No.1

Mark "1"	1.991 — 1.994 mm (0.0784 — 0.0785 in.)
Mark "2"	1.994 — 1.997 mm (0.0785 — 0.0786 in.)
Mark "3"	1.997 — 2.000 mm (0.0786 — 0.0787 in.)
Mark "4"	2.000 — 2.003 mm (0.0787 — 0.0789 in.)
Mark "5"	2.003 — 2.006 mm (0.0789 — 0.0790 in.)

Others

Mark "1"	1.989 – 1.992 mm (0.0783 – 0.0784 in.)
Mark "2"	1.992 – 1.995 mm (0.0784 – 0.0785 in.)
Mark "3"	1.995 – 1.998 mm (0.0785 – 0.0787 in.)
Mark "4"	1.998 – 2.001 mm (0.0787 – 0.0788 in.)
Mark "5"	2.001 – 2.004 mm (0.0788 – 0.0789 in.)

Cylinder block main journal bore diameter:

Mark "1"	68.010 – 68.016 mm (2.6776 – 2.6778 in.)
Mark "2"	68.016 – 68.022 mm (2.6778 – 2.6780 in.)
Mark "3"	68.022 – 68.028 mm (2.6780 – 2.6783 in.)

Crankshaft main journal diameter:

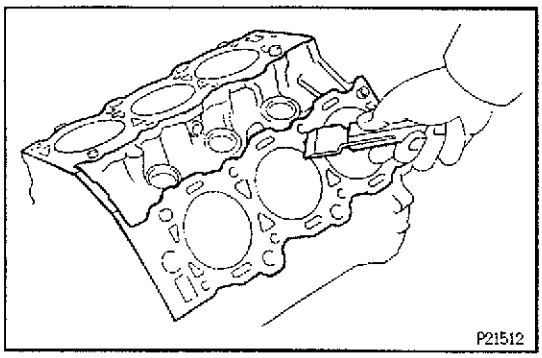
Mark "0"	63.996 – 64.000 mm (2.5195 – 2.5197 in.)
Mark "1"	63.990 – 63.996 mm (2.5193 – 2.5195 in.)
Mark "2"	63.985 – 63.990 mm (2.5191 – 2.5193 in.)

(k) Completely remove the Plastigage.

7. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the upper main bearings and upper thrust washers from the cylinder block.
HINT: Arrange the main bearings and thrust washers in correct order.


P21512

CYLINDER BLOCK INSPECTION AND REPAIR

EG7C2-01

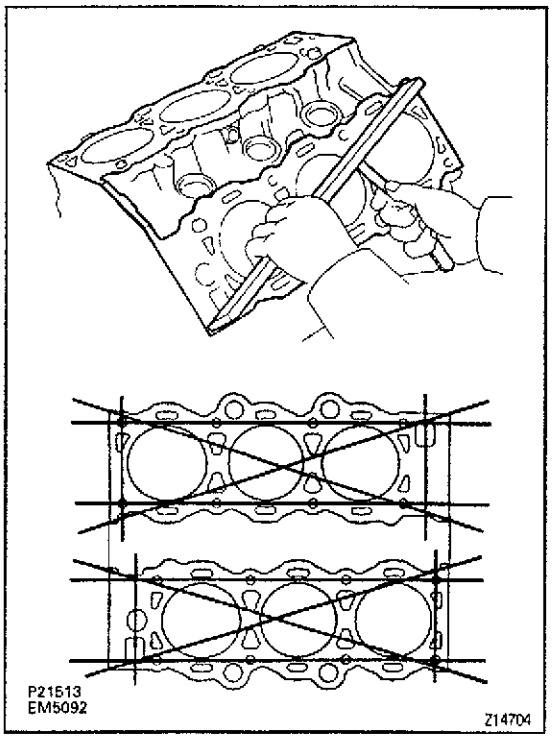
1. REMOVE GASKET MATERIAL

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

2. CLEAN CYLINDER BLOCK

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

EG



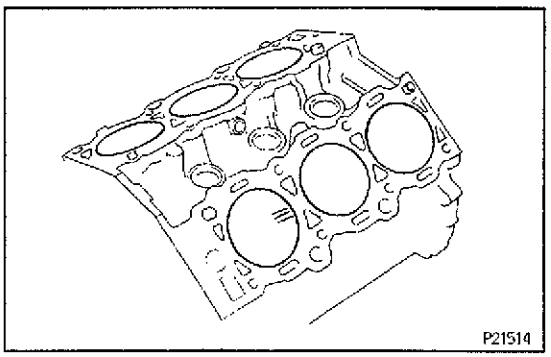
3. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

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

Maximum warpage:

0.05 mm (0.0020 in.)

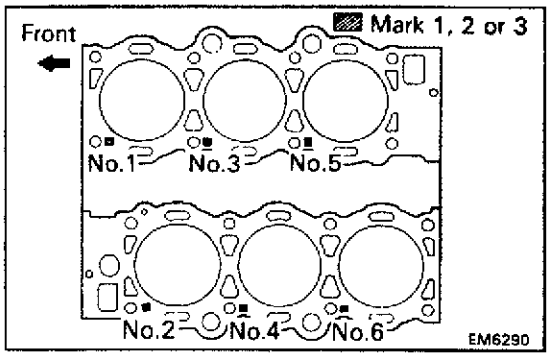
If warpage is greater than the maximum, replace the cylinder block.



4. INSPECT CYLINDER FOR VERTICAL SCRATCHES

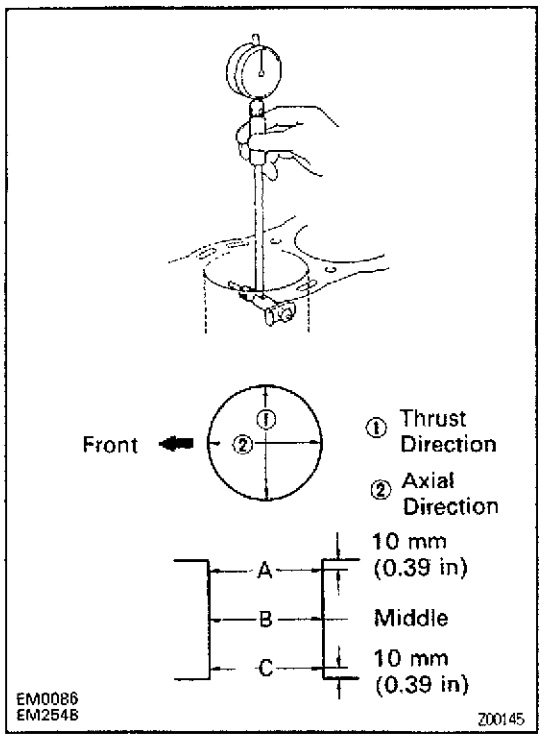
Visually check the cylinder for vertical scratches.

If deep scratches are present, rebore all the 6 cylinders. If necessary, replace the cylinder block.



5. 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 top 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:

STD

Mark "1"	93.500 — 93.510 mm (3.6811 — 3.6815 in.)
Mark "2"	93.510 — 93.520 mm (3.6815 — 3.6819 in.)
Mark "3"	93.520 — 93.530 mm (3.6819 — 3.6823 in.)

EG

Maximum diameter:

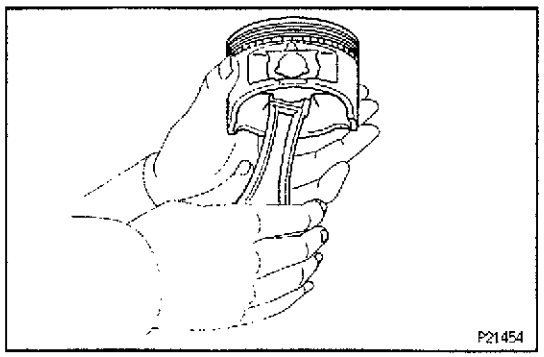
STD: 93.730 mm (3.6902 in.)

O/S 0.50: 94.230 mm (3.7098 in.)

If the diameter is greater than the maximum, rebore all the 6 cylinders. If necessary, replace the cylinder block.

6. 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.



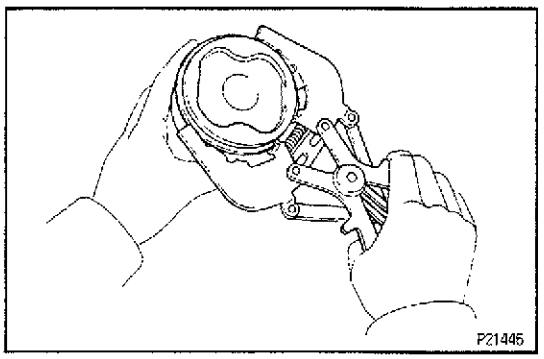
E0SOM-05

PISTON AND CONNECTION 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.

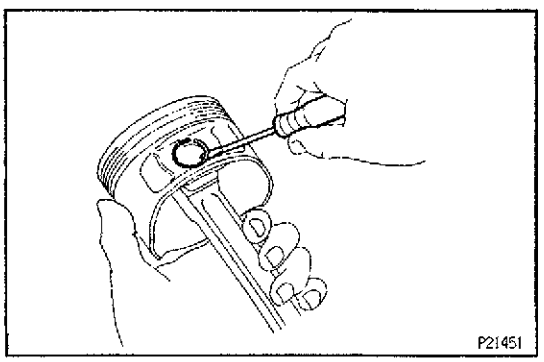


2. REMOVE PISTON RINGS

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

(b) Remove the 2 side rails and oil ring by hand.

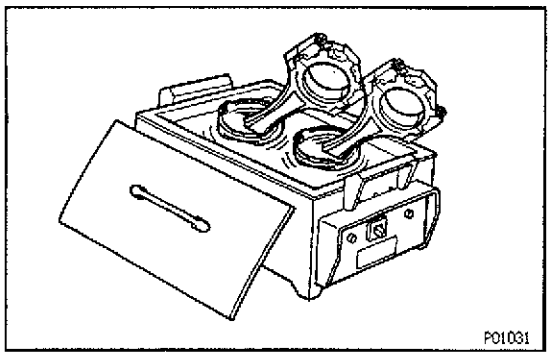
HINT: Arrange the piston rings in the correct order only.



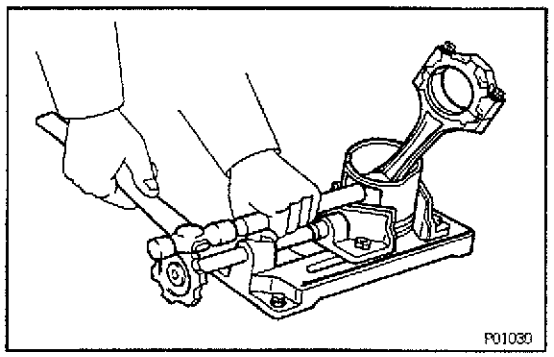
3. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.

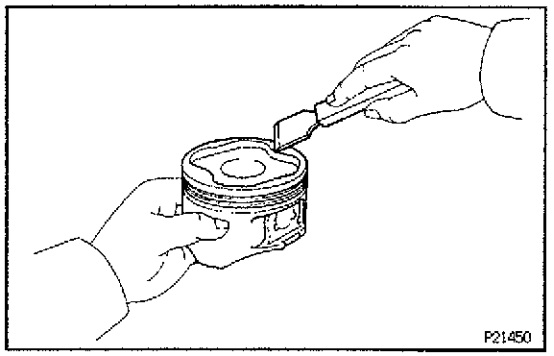
EG



(b) Gradually heat the piston to about 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 the correct order.

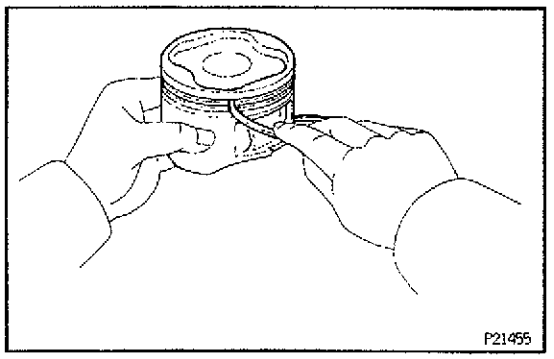


EG7C3-01

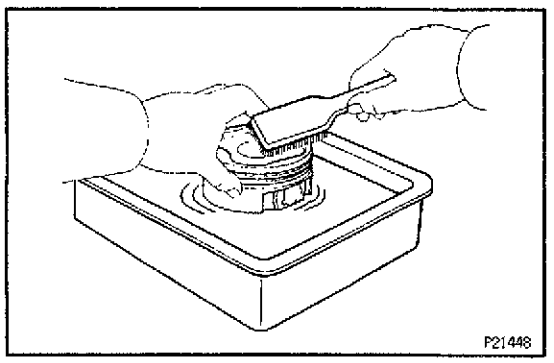
PISTON AND CONNECTION ROD INSPECTION

1. CLEAN PISTON

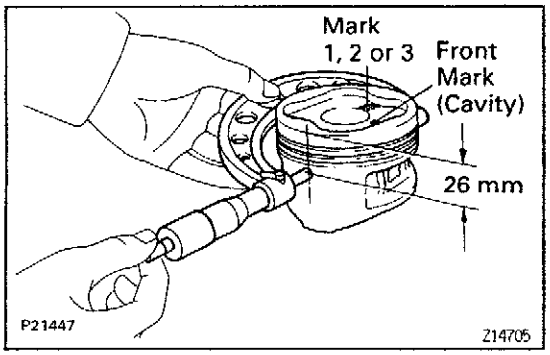
(a) Using a gasket scraper, remove the carbon from the piston top.



(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 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, 26 mm (1.02 in.) from the piston head.

Piston diameter:

STD

Mark "1"	93.356 – 93.666 mm (3.6754 – 3.6758 in.)
Mark "2"	93.367 – 93.376 mm (3.6759 – 3.6762 in.)
Mark "3"	93.377 – 93.386 mm (3.6763 – 3.6766 in.)

O/S 0.50

93.856 – 93.886 mm (3.6951 – 3.6963 in.)

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

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

Standard oil clearance:

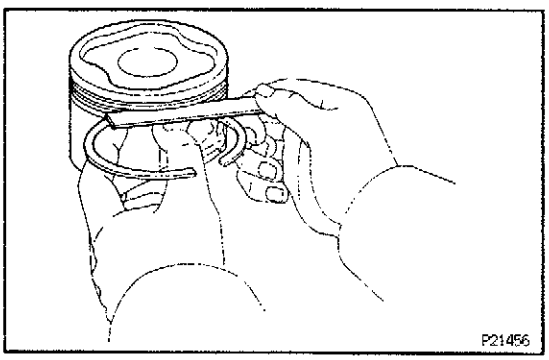
0.134 – 0.154 mm (0.0053 – 0.0060 in.)

Maximum oil clearance:

0.174 mm (0.0069 in.)

If the oil clearance is greater than the maximum, replace all the 6 pistons. If necessary, rebore all 6 cylinders or replace the cylinder block.

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



3. INSPECT PISTON RING GROOVE CLEARANCE

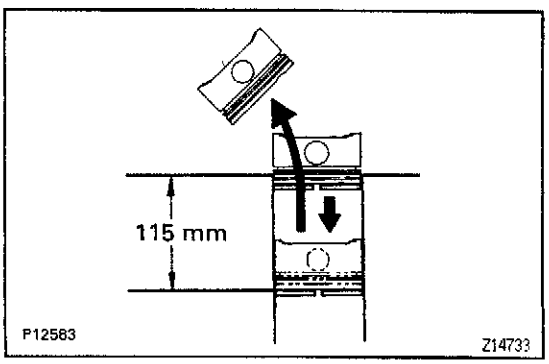
Using a feeler gauge, measure the clearance between new piston ring and the wall of the piston ring groove.

Standard ring groove clearance:

No.1: 0.040 – 0.080 mm (0.0016 – 0.0031 in.)

No.2: 0.030 – 0.070 mm (0.0012 – 0.0028 in.)

If the clearance is not as specified, replace the piston.

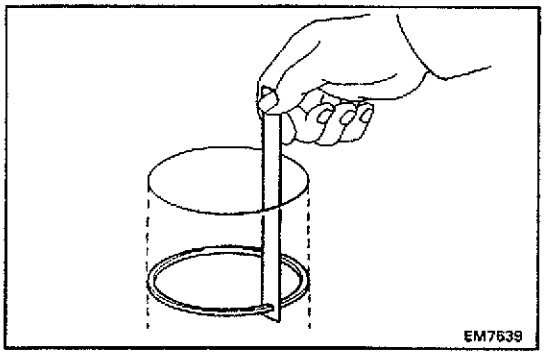


4. INSPECT PISTON RING END GAP

(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, 115 mm (4.53 in.) from the top of the cylinder block.

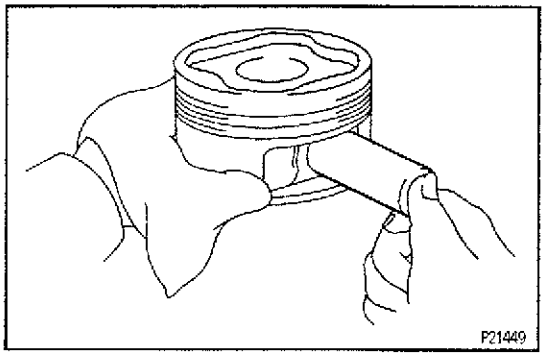
EG



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

Ring end gap:

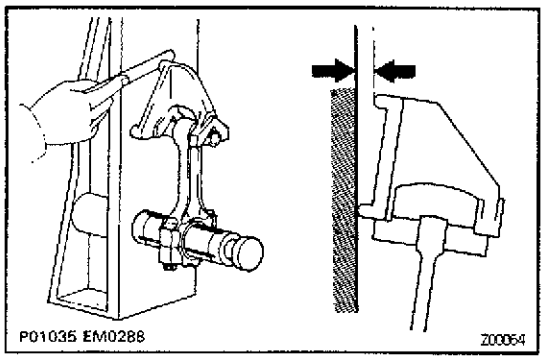
Piston ring	STD mm (in.)	Maximum mm (in.)
No.1	0.300 — 0.500 (0.0118 — 0.0197)	1.100 (0.0433)
No.2	0.400 — 0.600 (0.0157 — 0.0236)	1.200 (0.0472)
Oil (Side rail)	0.150 — 0.550 (0.0059 — 0.0217)	1.150 (0.0453)



If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, rebore all the 6 cylinders or replace the cylinder block.

5. 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.



6. INSPECT CONNECTING ROD ALIGNMENT

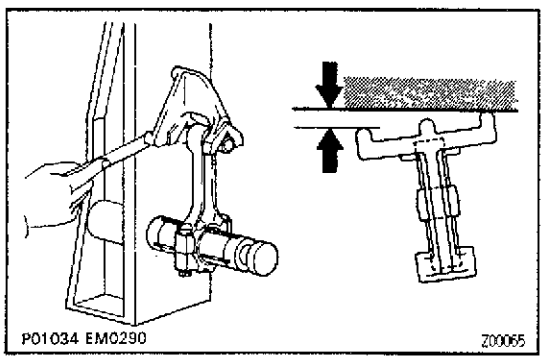
Using a rod aligner and feeler gauge, check the connecting rod alignment.

- Check for bend.

Maximum bend:

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

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

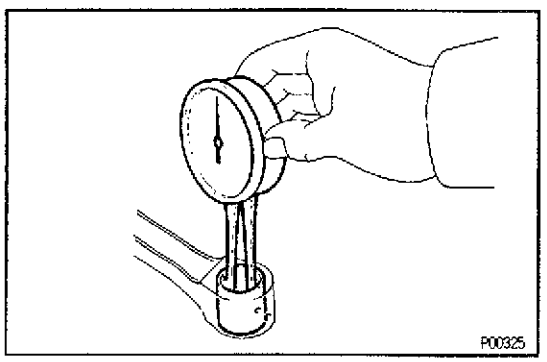


- Check for twist.

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

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

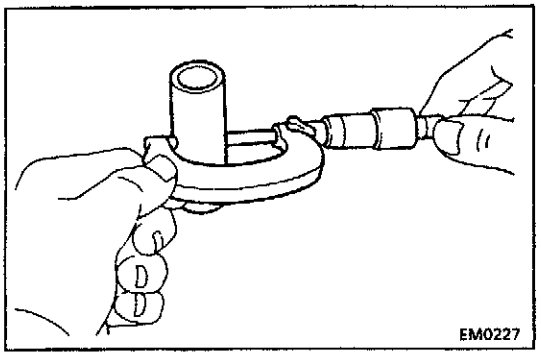


7. INSPECT PISTON PIN OIL CLEARANCE

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

Bushing inside diameter:

22.005 — 22.017 mm (0.8663 — 0.8668 in.)

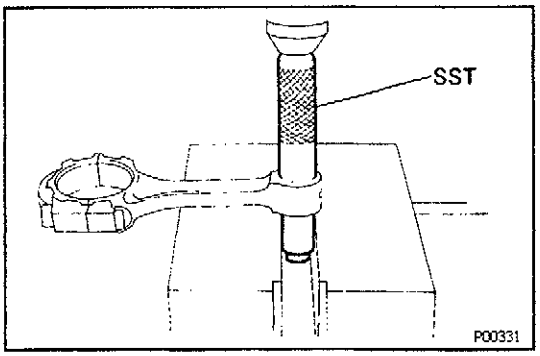


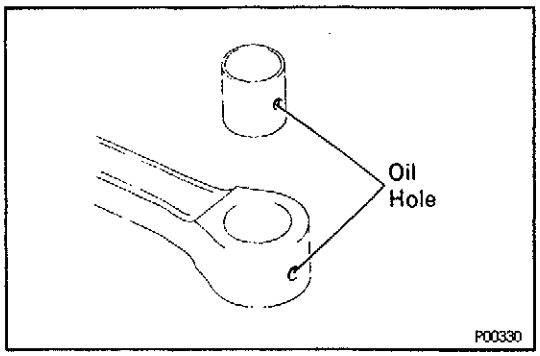
(b) Using a micrometer, measure the piston pin diameter.
Piston pin diameter:
21.997 — 22.009 mm (0.8660 — 0.8665 in.)

(c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.
Standard oil clearance:
0.005 — 0.011 mm (0.0002 — 0.0004 in.)
Maximum oil clearance:
0.05 mm (0.0020 in.)
If the oil clearance is greater than the maximum, replace the bushing. If necessary, replace the piston and piston pin as a set.

8. IF NECESSARY, REPLACE CONNECTING ROD BUSHING

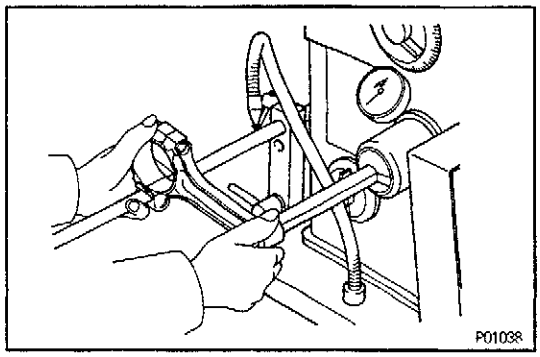
(a) Using SST and a press, press out the bushing.
SST 09222—30010



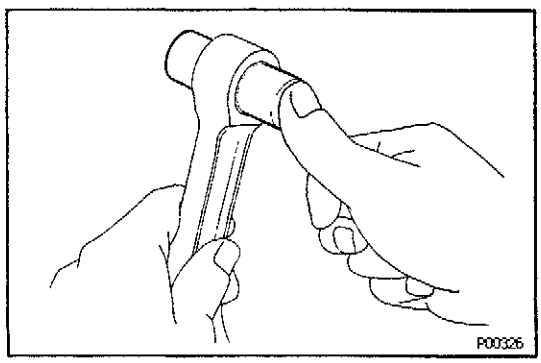


(b) Align the oil holes of a new bushing and the connecting rod.

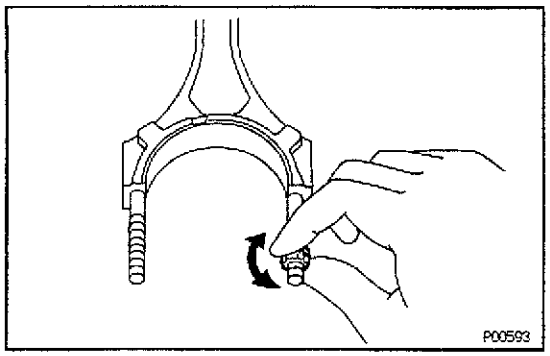
(c) Using SST and a press, press in the bushing.
SST 09222—30010



(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (see step 13 above) between the bushing and piston pin.



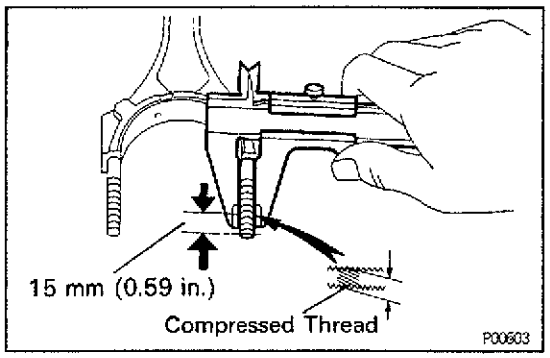
(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.



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9. INSPECT CONNECTING ROD BOLTS

(a) Install the cap nut to the connecting rod bolt. Check that the rod cap nut can be turned easily by hand to the end of the thread.



(b) If the cap nut cannot be turned easily, measure the outer diameter of the compressed thread with a vernier caliper.

Standard outer diameter:

7.860 — 8.000 mm (0.3094 — 0.3150 in.)

Minimum outer diameter:

7.600 mm (0.2992 in.)

HINT: If the location of this area cannot be judged by visual inspection, measure the outer diameter at the location shown in the illustration.

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

10. CYLINDER BORING

HINT:

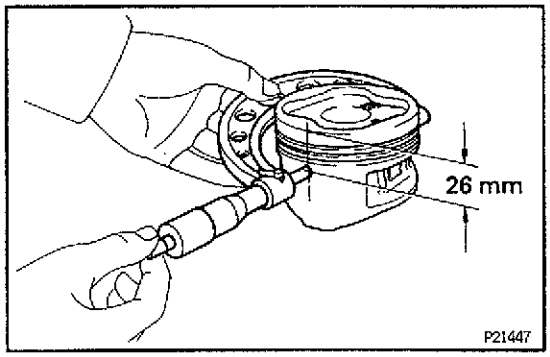
- Bore all the 6 cylinders for the oversized piston outside diameter.
- Replace all the piston rings with ones to match the oversized pistons.

A. Keep oversized pistons

Oversized piston diameter:

O/S 0.50

93.856 — 93.886 mm (3.6951 — 3.6963 in.)



B. Calculate amount to bore cylinders

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 26 mm (1.02 in.) from the piston head.

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

Size to be rebored = P + C — H

P = Piston diameter

C = Piston oil clearance

0.134 — 0.154 mm (0.0053 — 0.0060 in.)

H = Allowance for honing

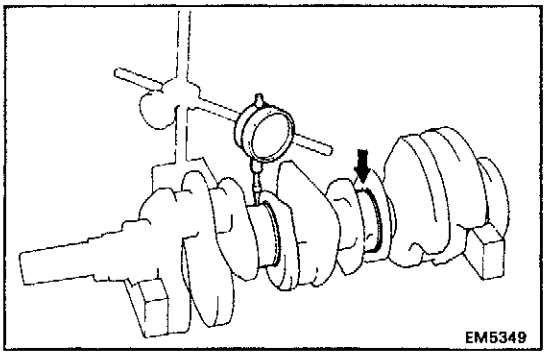
0.02 mm (0.0008 in.) or less

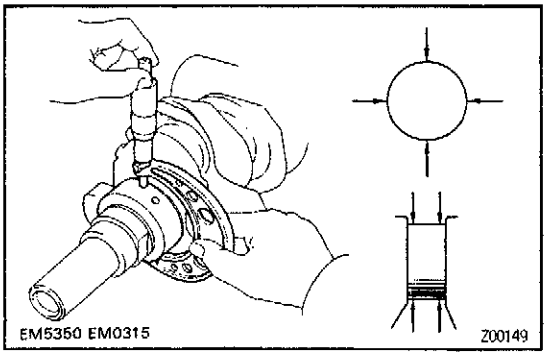
C. Bore and hone cylinder to calculated dimensions

Maximum honing:

0.02 mm (0.0008 in.)

NOTICE: Excess honing will destroy the finished roundness.





CRANKSHAFT INSPECTION

EG08Y-22

1. INSPECT CRANKSHAFT FOR RUNOUT

(a) Place the crankshaft on V—blocks.

(b) Using a dial indicator, measure the circle runout at the No.2 and No.3 journals.

Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than the 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.

Diameter:

Item	STD mm (in.)	U/S 0.25 mm (in.)
Main journal	63.985 — 64.000 (2.5191 — 2.5197)	63.745 — 63.755 (2.5096 — 2.5100)
Crank pin	54.987 — 55.000 (2.1648 — 2.1654)	54.745 — 54.755 (2.1553 — 2.1557)

If the diameter is not as specified, check the oil clearance.

(See disassembly in cylinder block)

(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.)

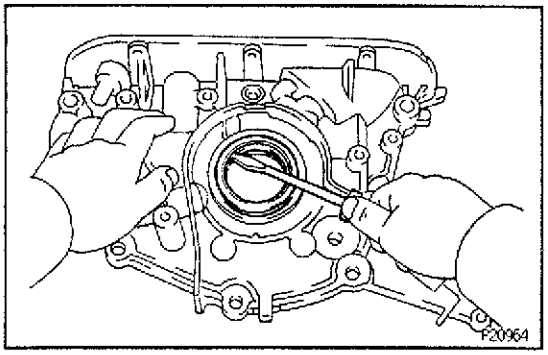
If the taper or out—of—round is greater than the maximum, grind or replace the crankshaft.

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 step 2).

Install a new main journal and/or crank pin undersized bearings.

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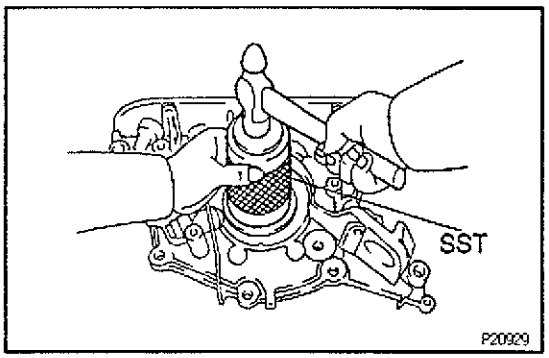
CRANKSHAFT OIL SEALS REPLACEMENT EG0C0-1X

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

1. **REPLACE CRANKSHAFT FRONT OIL SEAL**

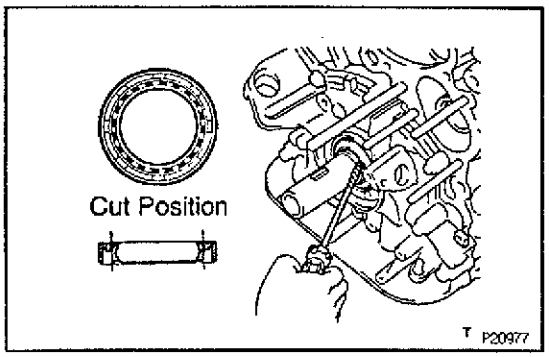
A. If oil pump is removed from cylinder block:

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



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.
SST 09309–37010

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

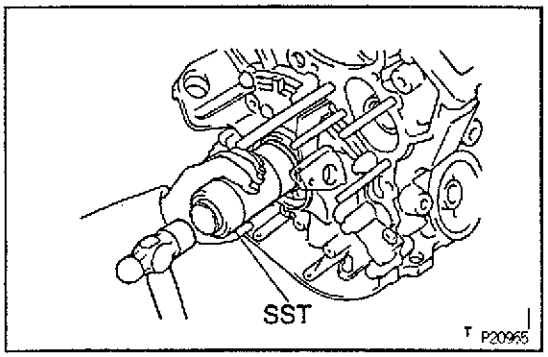


B. If oil pump is installed to the cylinder block:

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

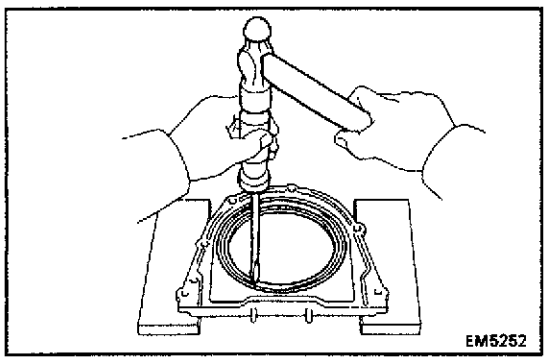
(b) Using a screwdriver, pry out the oil seal.

NOTICE: Be careful not to damage the crankshaft. Tape the screwdriver tip.



(c) Apply MP grease to a new oil seal lip.

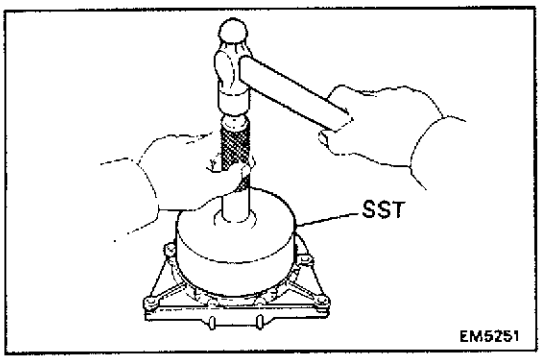
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09306–37010



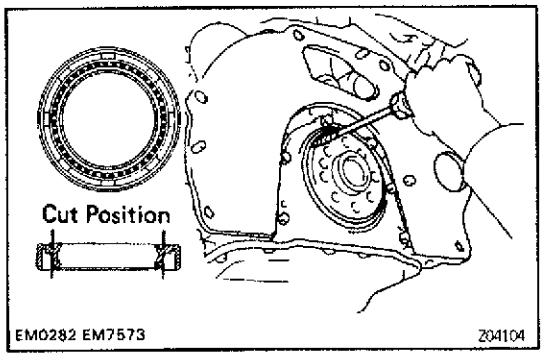
2. **REPLACE CRANKSHAFT REAR OIL SEAL**

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

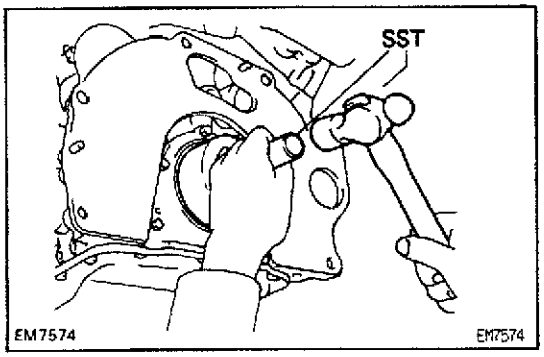
(a) Using a screwdriver and hammer, tap out the oil seal.



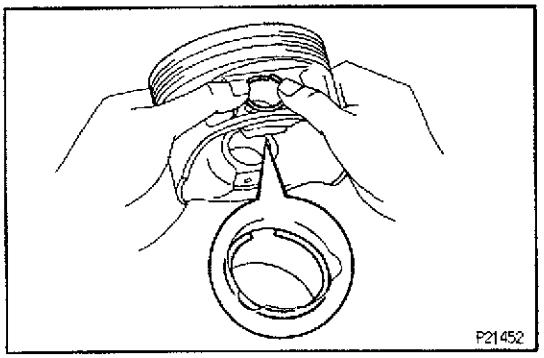
(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223–15030, 09950–70010 (09951–07150)
(c) Apply MP grease to the oil seal lip.



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)

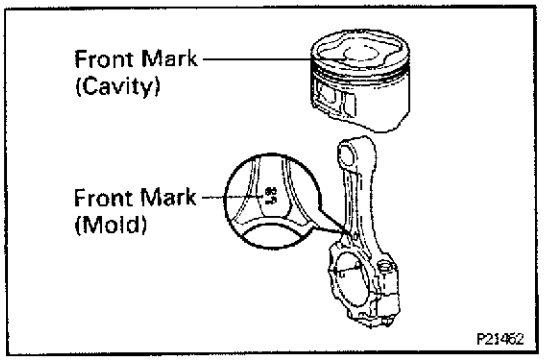


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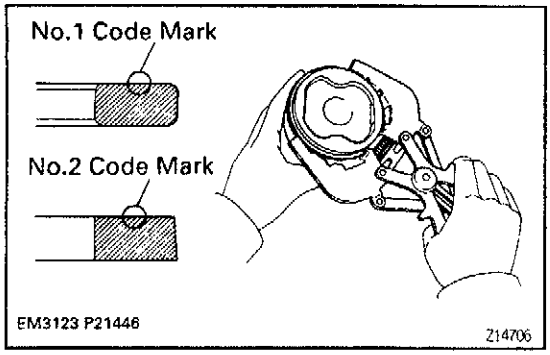
PISTON AND CONNECTION ROD ASSEMBLY

1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.
HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.
(b) Gradually heat the piston to about 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) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.
HINT: Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



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2. INSTALL PISTON RINGS

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

(b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

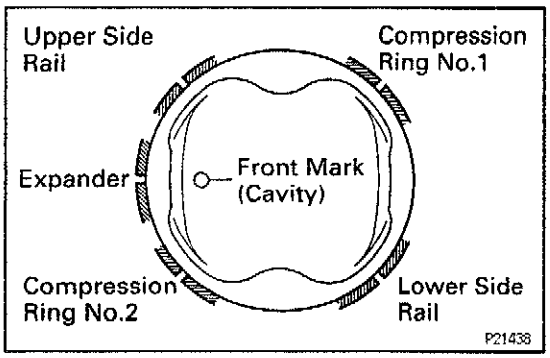
Code mark:

No.1

1R or T

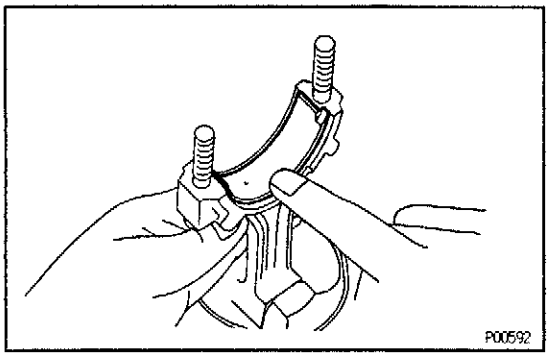
No.2

2R or T



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

NOTICE: Do not align the ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

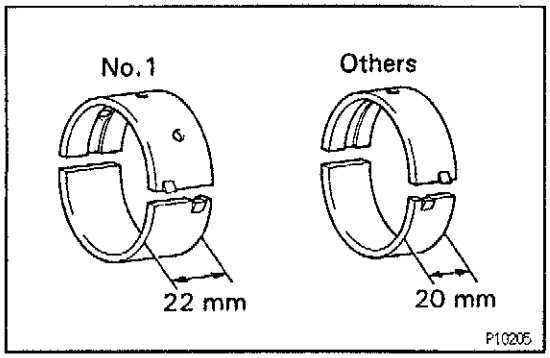
(b) Install the bearings in the connecting rod and connecting rod cap.

CYLINDER BLOCK ASSEMBLY

E07C6-01

HINT:

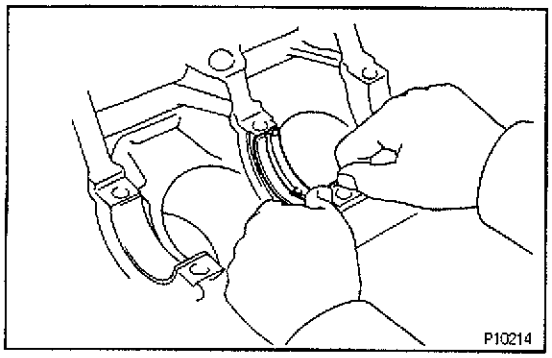
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O–rings and oil seals with new parts.



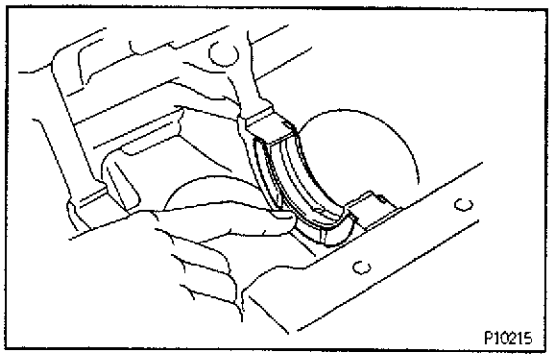
1. INSTALL MAIN BEARINGS

HINT:

- Main bearings come in widths of 20 mm (0.79 in.) and 22 mm (0.87 in.). Install the 22 mm (0.87 in.) bearings in the No.1 cylinder block journal position with the main bearing caps. Install the 20 mm (0.79 in.) bearings in the other positions.
- Upper bearings have an oil holes; lower bearings do not.

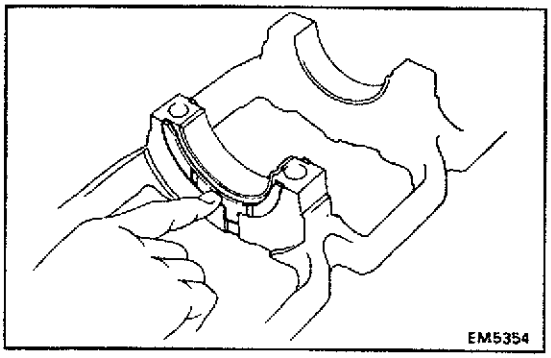


(a) Align the bearing claw with the claw groove of the main bearing cap or cylinder block.
(b) Install the bearings in the cylinder block and main bearing cap.

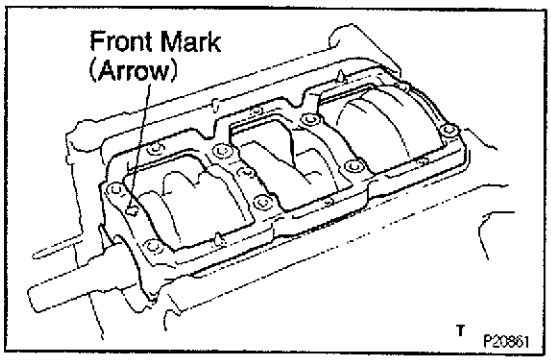


2. INSTALL UPPER THRUST WASHERS
Install the thrust washers under the No.2 journal position of the cylinder block with the oil grooves facing outward.

3. PLACE CRANKSHAFT ON CYLINDER BLOCK

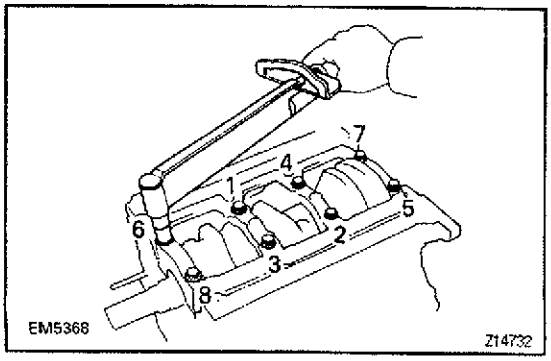


4. PLACE MAIN BEARING CAP AND LOWER THRUST WASHERS ON CYLINDER BLOCK
(a) Install the thrust washers on the No.2 journal position of the bearing cap with the grooves facing outward.

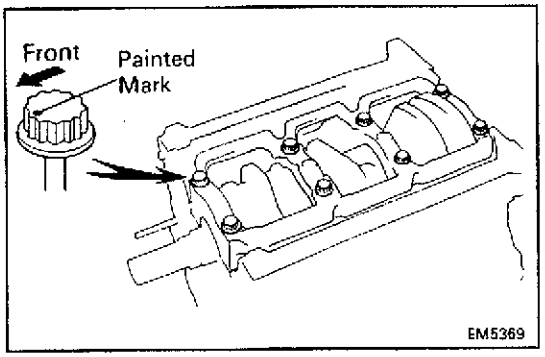


(b) Install the main bearing cap with the front mark facing forward.

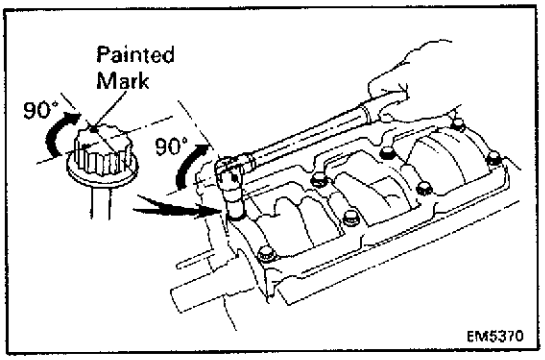
5. INSTALL MAIN BEARING CAP BOLTS
HINT:
- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any main bearing cap bolt is broken or deformed, replace it.



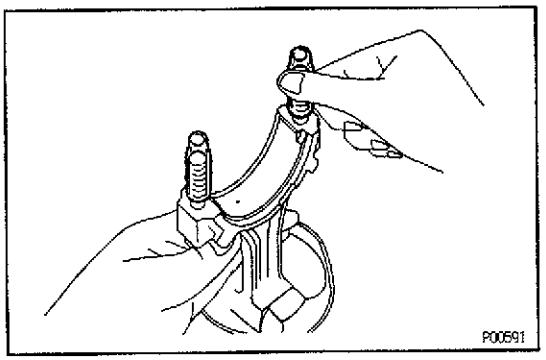
(a) Apply a light coat of engine oil on the threads and under the heads of the main bearing cap bolts.
(b) Install and uniformly tighten the 8 main bearing cap bolts in several passes, in the sequence shown.
Torque: 61 N·m (625 kgf·cm, 45 ft·lbf)
If any one of the main bearing cap bolts does not meet the torque specification, replace the cap bolt.



(c) Mark the front of the main bearing cap bolt with paint.

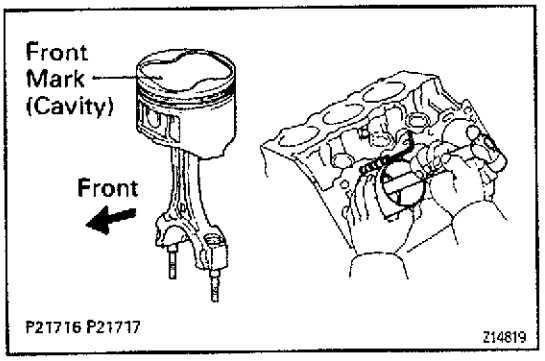


(d) Retighten the main bearing cap bolts by 90° in the numerical order as shown in the former page.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.
(g) Check crankshaft thrust clearance.
(See inspection in cylinder block)

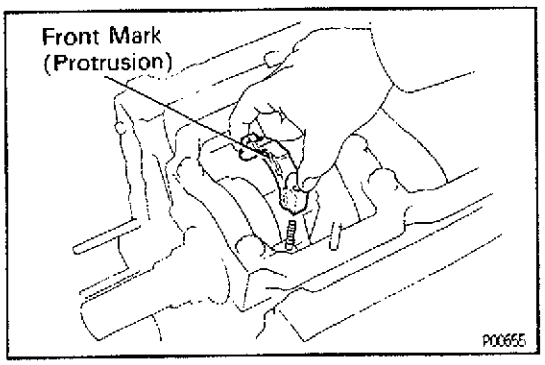


6. INSTALL PISTON AND CONNECTING ROD ASSEMBLIES

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



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



7. PLACE CONNECTING ROD CAP ON CONNECTING ROD

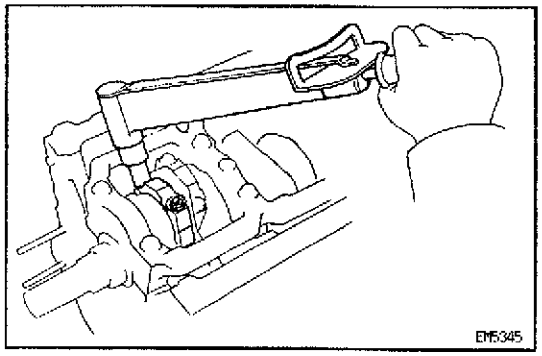
(a) Match the numbered connecting rod cap with the connecting rod.
(b) Install the connecting rod cap with the front mark facing forward.

8. 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.

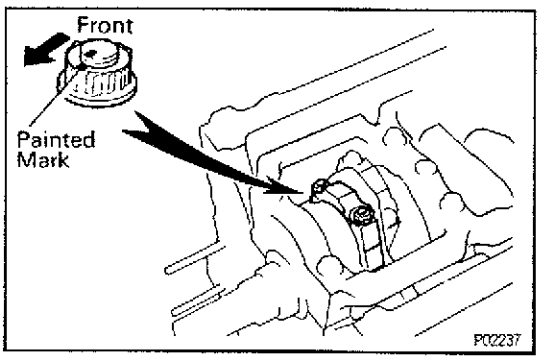
(a) Apply a light of engine oil on the threads and under the nuts of the connecting rod cap.



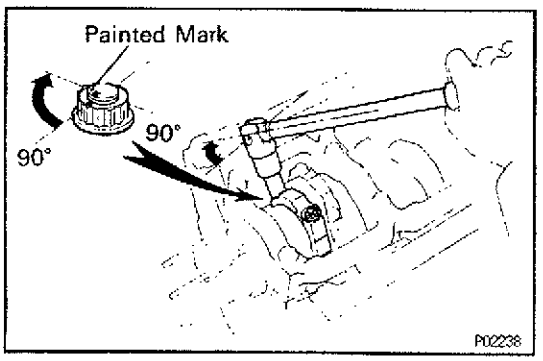
(b) Install and alternately tighten the nuts of the connecting rod cap in several passes.

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

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



(c) Mark the front of the connecting rod cap nut and bolt 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.

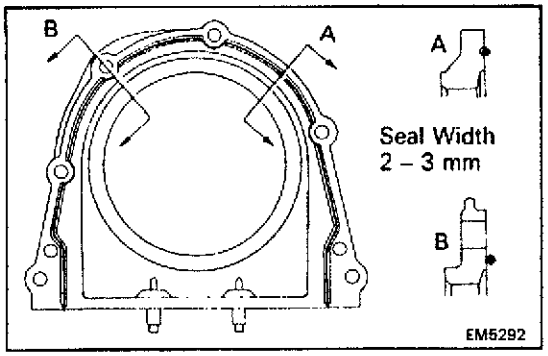
(f) Check that the crankshaft turns smoothly.

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

10. INSTALL REAR OIL SEAL RETAINER

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

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non—residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the oil seal retainer as shown in the illustration.
Seal packing:
Part No.08826–00080 or equivalent
- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the oil seal retainer with the 6 bolts.
Torque: 8 N·m (80 kgf·cm, 71 in.·lbf)

AFTER ASSEMBLY

EG50P–05

1. INSTALL OIL PUMP
(See oil pump installation in Lubrication System)

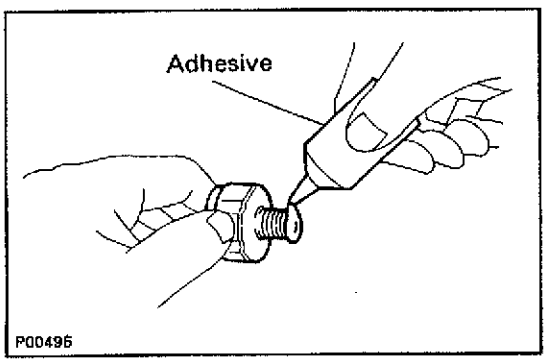
2. INSTALL OIL COOLER
(See oil cooler installation in Lubrication System)

3. INSTALL COOLANT DRAIN COCK
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

4. INSTALL RH AND LH ENGINE MOUNTING BRACKET
Torque: 44 N·m (440 kgf·cm, 32 ft·lbf)

5. INSTALL OIL FILTER UNION
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

6. INSTALL OIL FILTER
(See oil and filter replacement in Lubrication System)



7. INSTALL OIL PRESSURE SWICH

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

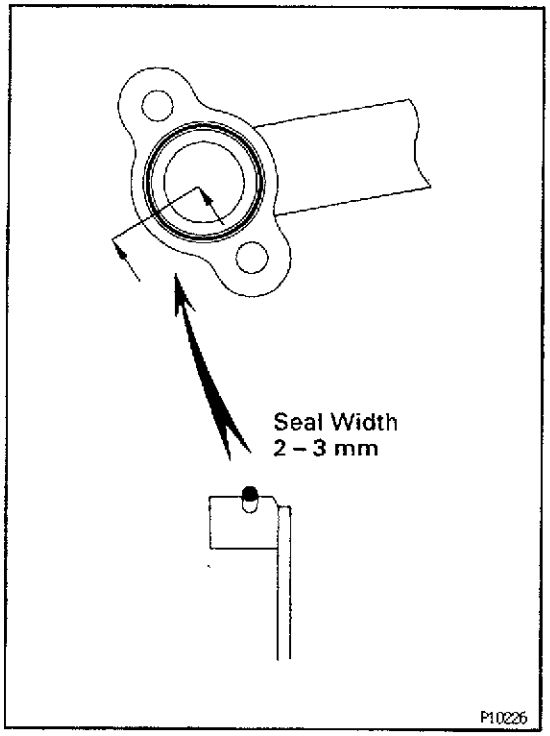
(b) Using SST, install the oil pressure switch.
SST 09816–30010
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

8. INSTALL ALTERNATOR ADJUSTING BAR
Torque: 42 N·m (420 kgf·cm, 31 ft·lbf)

9. INSTALL WATER PUMP
(See water pump installation in Cooling System)

10. INSTALL KNOCK SENSORS
(See knock sensor installation in EFI System)

11. INSTALL NO.2 IDLER PULLEY BRACKET
Torque: 38 N·m (380 kgf·cm, 28 ft·lbf)



12. INSTALL WATER BYPAS PIPE WITH KNOCK SENSOR WIRE

(a) Remove any oid packing (FIPG) material and be careful not drop any oil on the contact surfaces of the bypass and cylinder block.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loosen material.
- Using a non—residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the groove of the bypass pipe.
Seal packing:
Part No. 08826—00100 or equvalent
- Install a nozzle that has been cut to a 2—3 mm (0.08—0.12 in.) opening.

HINT: Avoid applying an excessive amount to the surface.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the bypass pipe with the 2 bolts and nut.
Torque: 8.5 N·m (85 kgf·cm, 75 in.·lbf)

(d) Connect the 2 knock sensor connectors.

13. INSTALL CYLINDER HEADS
(See cylinder head installation)

14. INSTALL PULLEYS AND TIMING BELT
(See timing belt installation)

15. REMOVE ENGINE STAND

16. INSTALL REAR END PLATE
Torque: 7.5 N·m (75 kgf·cm, 66 in.·lbf)

17. A/T
INSTALL DRIVE PLATE

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

(b) Install the front spacer, drive plate and rear spacer on the crankshaft.

(c) Install and uniformly tighten the 8 mount bolts in several passes, in the sequence shown.
Torque: 83 N·m (850 kgf·cm, 63 ft·lbf)

18. M/T
INSTALL FLYWHEEL (See procedure step 17)
Torque: 83 N·m (850 kgf·cm, 63 ft·lbf)

