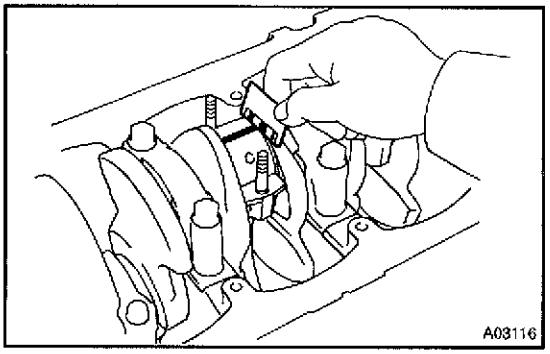


CYLINDER BLOCK

EM06E-01

DISASSEMBLY

REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

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, U/S 0.50	
2L	0.023 – 0.073 mm (0.0009 – 0.0029 in.)
2L–T, 3L, 5L	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.

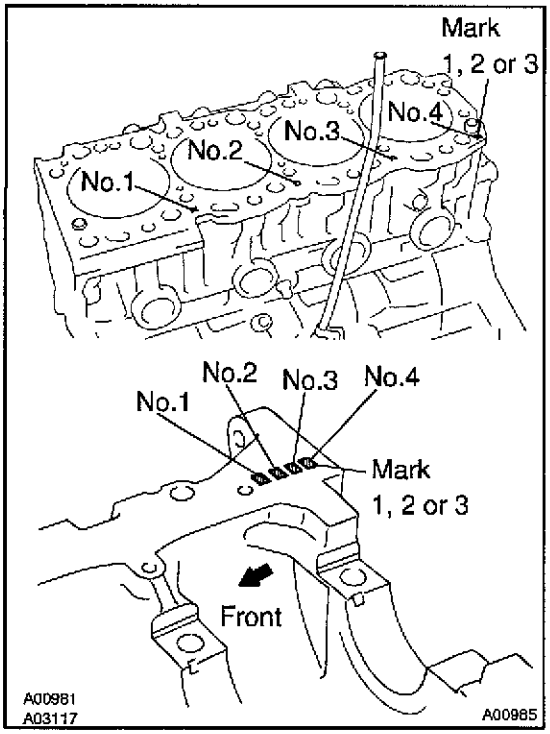
EM05F–01

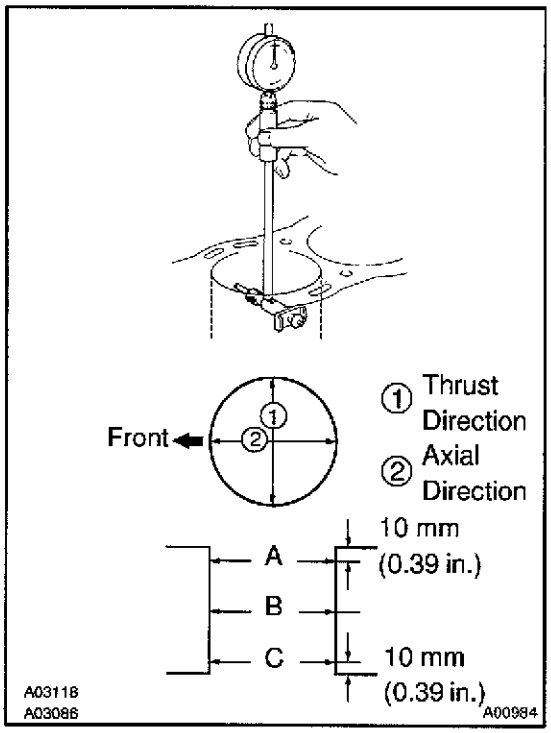
INSPECTION

1. 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 or under 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, 2L–T

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

3L

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

5L

Mark 1	99.500 – 99.510 mm (3.9173 – 3.9177 in.)
Mark 2	99.510 – 99.520 mm (3.9177 – 3.9181 in.)
Mark 3	99.520 – 99.530 mm (3.9181 – 3.9185 in.)

Maximum diameter:

2L, 2L–T

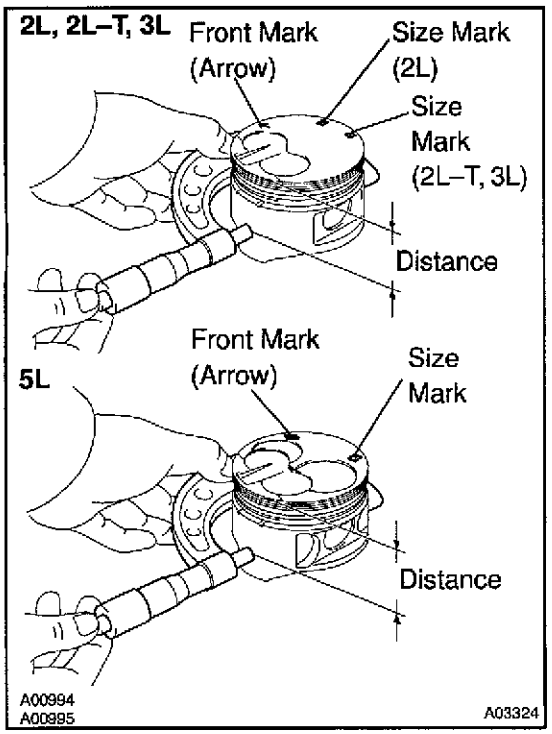
STD	92.23 mm (3.6311 in.)
O/S 0.50	92.73 mm (3.6508 in.)
O/S 0.75	92.98 mm (3.6606 in.)
O/S 1.00	93.23 mm (3.6705 in.)

3L

STD	96.23 mm (3.7886 in.)
O/S 0.50	96.73 mm (3.8083 in.)

5L

STD	99.73 mm (3.9264 in.)
O/S 0.50	100.23 mm (3.9461 in.)



2. INSPECT PISTON

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 center line, the indicated distance from the piston head.

Distance

2L, 2L–T	58.27 – 58.33 mm (2.2941 – 2.2965 in.)
3L	56.27 – 56.33 mm (2.2153 – 2.2177 in.)
5L	61.27 – 61.33 mm (2.4122 – 2.4146 in.)

Piston diameter:

2L, 2L–T

STD	Mark 1	91.940 – 91.950 mm (3.6197 – 3.6201 in.)
	Mark 2	91.950 – 91.960 mm (3.6201 – 3.6205 in.)
	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		92.690 – 92.720 mm (3.6492 – 3.6504 in.)
O/S 1.00		92.940 – 92.970 mm (3.6590 – 3.6602 in.)

3L

STD	Mark 1	95.940 – 95.950 mm (3.7772 – 3.7776 in.)
	Mark 2	95.950 – 95.960 mm (3.7776 – 3.7779 in.)
	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.)

5L

STD	Mark 1	99.450 – 99.460 mm (3.9153 – 3.9157 in.)
	Mark 2	99.460 – 99.470 mm (3.9157 – 3.9161 in.)
	Mark 3	99.470 – 99.480 mm (3.9161 – 3.9165 in.)
O/S 0.50		99.950 – 99.980 mm (3.9350 – 3.9362 in.)

(b) Measure the cylinder bore diameter in the thrust directions. (See step 1)

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

Standard oil clearance:

2L, 2L–T, 3L	0.050 – 0.070 mm (0.0020 – 0.0028 in.)
5L	0.040 – 0.060 mm (0.0016 – 0.0024 in.)

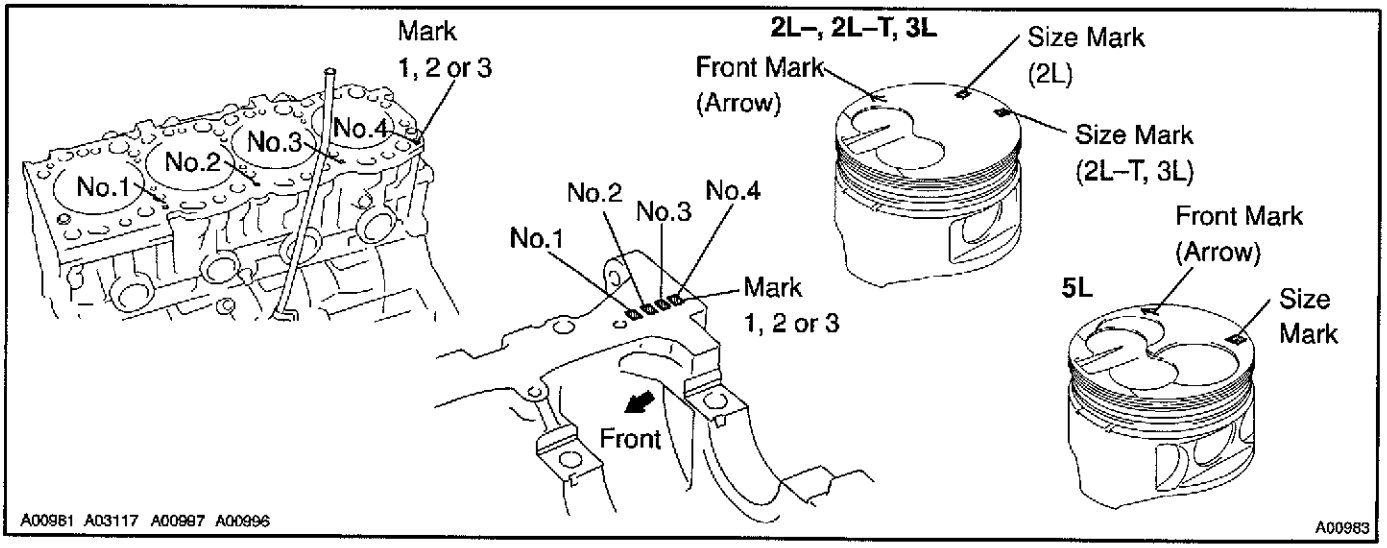
Maximum oil clearance:

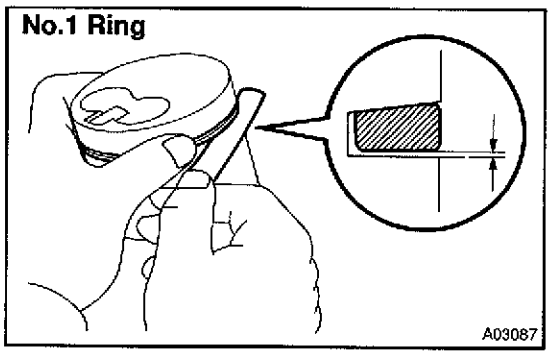
2L, 2L–T, 3L	0.14 mm (0.0055 in.)
5L	0.13 mm (0.0051 in.)

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.





3. INSPECT PISTON RING GROOVE CLEARANCE

(a) No.1 Ring:

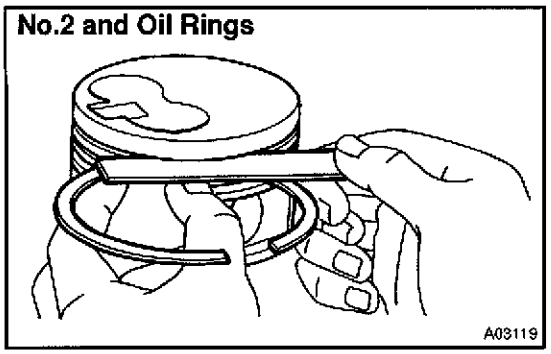
Install a new piston ring to the piston. Using a feeler gauge, measure the clearance between the piston ring and the wall of the ring groove.

Standard groove clearance:

2L	0.031 – 0.079 mm (0.0012 – 0.0031 in.)
2L–T	0.061 – 0.109 mm (0.0024 – 0.0043 in.)
3L	0.031 – 0.075 mm (0.0012 – 0.0030 in.)
5L	0.057 – 0.101 mm (0.0022 – 0.0040 in.)

Maximum groove clearance: 0.20 mm (0.0079 in.)

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



(b) 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	2L, 3L	0.060 – 0.105 mm (0.0024 – 0.0041 in.)
	2L–T	0.070 – 0.115 mm (0.0028 – 0.0045 in.)
	5L	0.060 – 0.100 mm (0.0024 – 0.0039 in.)
Oil		0.030 – 0.070 mm (0.0012 – 0.0028 in.)

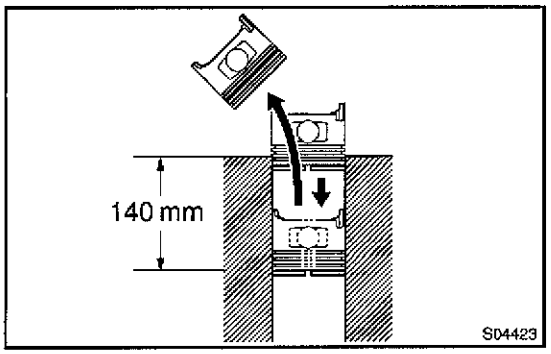
Maximum groove clearance: 0.20 mm (0.0079 in.)

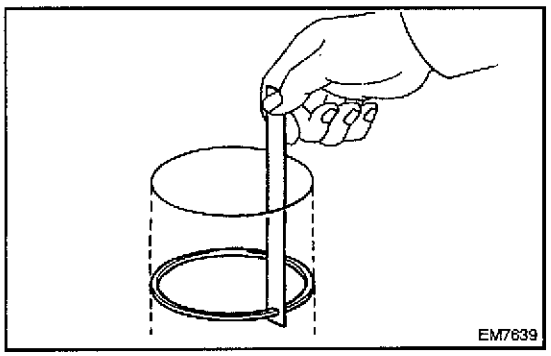
If the clearance is greater than maximum, replace the piston.

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, 140 mm (5.51 in.) from the top of the cylinder block.





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

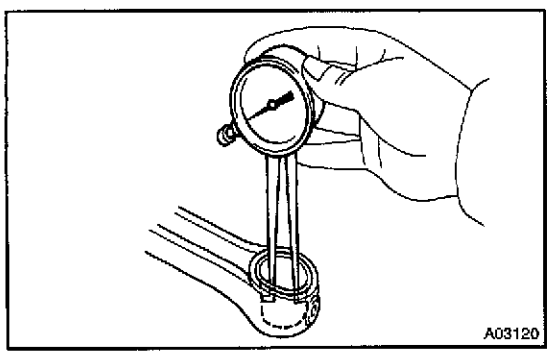
Standard end gap:

No.1		0.350 – 0.590 mm (0.0138 – 0.0232 in.)
No.2	2L, 2L–T	0.450 – 0.720 mm (0.0177 – 0.0283 in.)
	3L	0.400 – 0.670 mm (0.0157 – 0.0264 in.)
	5L	0.470 – 0.720 mm (0.0185 – 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	2L, 2L–T, 5L	1.42 mm (0.0559 in.)
	3L	1.37 mm (0.0539 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.

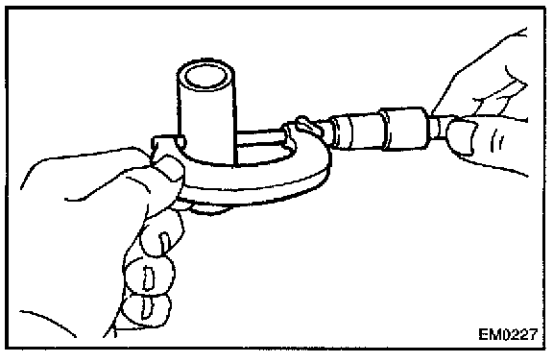


5. INSPECT PISTON PIN OIL CLEARANCE

(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.)
2L–T, 3L, 5L	29.008 – 29.020 mm (1.1420 – 1.1425 in.)



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

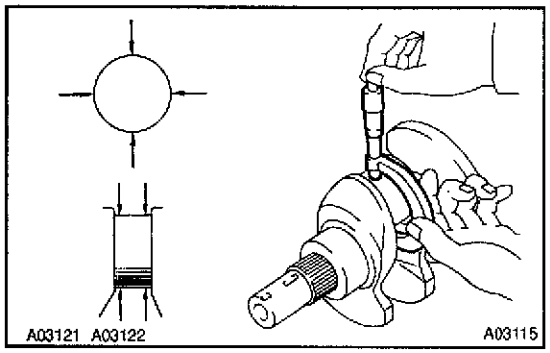
Piston pin diameter;

2L	27.000 – 27.012 mm (1.0630 – 1.0635 in.)
2L–T, 3L, 5L	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 busing. If necessary, replace the piston and piston pin as a set.



6. INSPECT CRANK PINS

Using a micrometer, measure the diameter of each crank pin.

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.)

2L–T, 3L, 5L

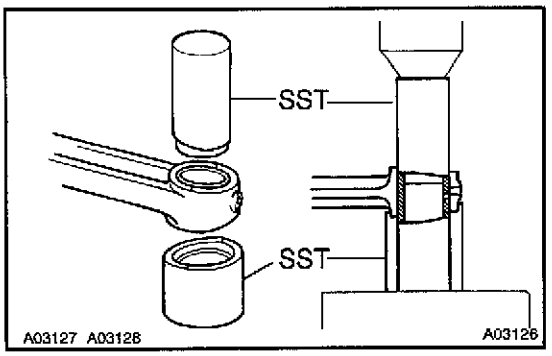
STD	54.988 – 55.000 mm (2.1649 – 2.1654 in.)
U/S 0.25	54.745 – 54.755 mm (2.1553 – 2.1557 in.)
U/S 0.50	54.495 – 54.505 mm (2.1455 – 2.1459 in.)

If the diameter is not as specified, check the oil clearance. If necessary, grind or replace the crankshaft.

EM05G–01

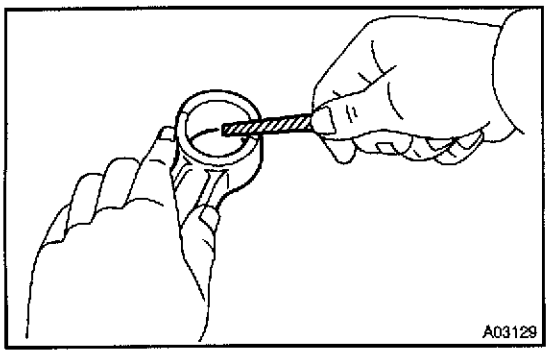
REPLACEMENT

1. REPLACE CONNECTING ROD BUSHINGS

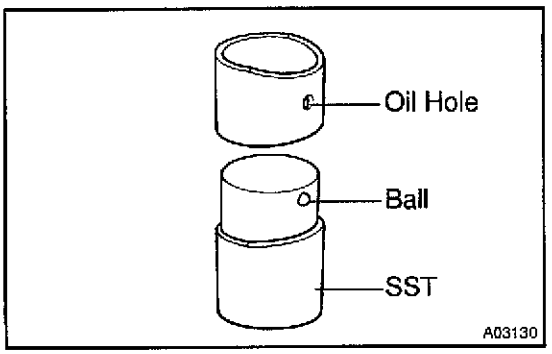


(a) Using SST and a press, press out the bushing.

SST 2L
09222–64012 (09222–02022, 09222–02041)
2L–T, 3L, 5L
09222–54011 (09222–03016, 09222–03026)

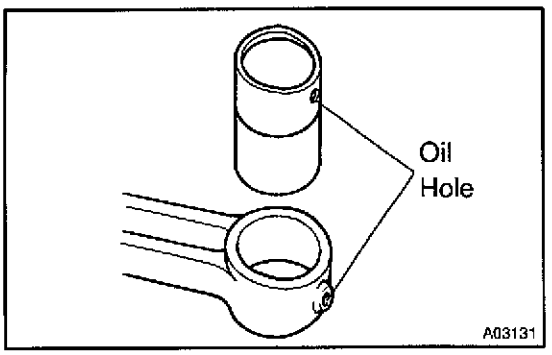


(b) Using a round file, lightly file off any roughness from the small end of the connecting rod.

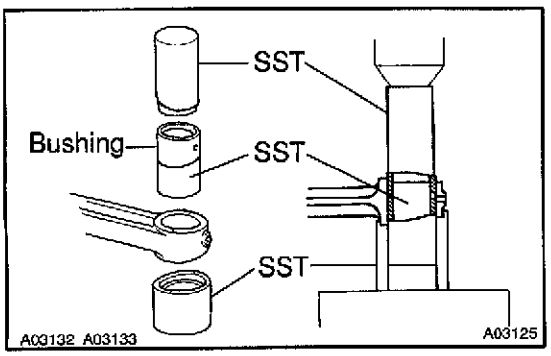


(c) Attach the bushing to SST with the ball of SST inside the oil hole of the bushing.

SST 2L
09222–64012 (09222–02031)
2L–T, 3L, 5L
09222–54011 (09222–03021)

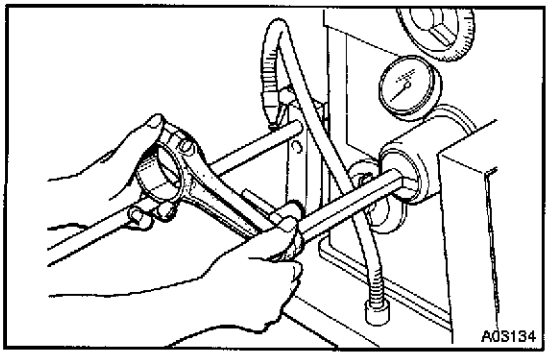


(d) Align the oil holes of a new bushing and the connecting rod.

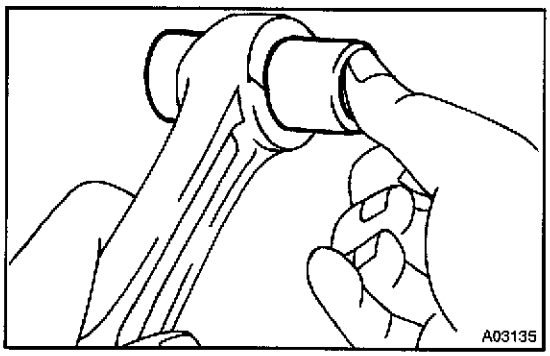


(e) Using SST and a press, press in the bushing.

SST 2L
09222–64012 (09222–02022, 09222–02031, 09222–02041)
2L–T, 3L, 5L
09222–54011 (09222–03016, 09222–03021, 09222–03026)



(f) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See page) between the bushing and piston pin.



(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.

2. REPLACE OVERSIZED (O/S) PISTONS FOR CYLINDER BORING

HINT:

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

(a) Keep 4 new O/S pistons.

O/S piston diameter:

2L, 2L–T

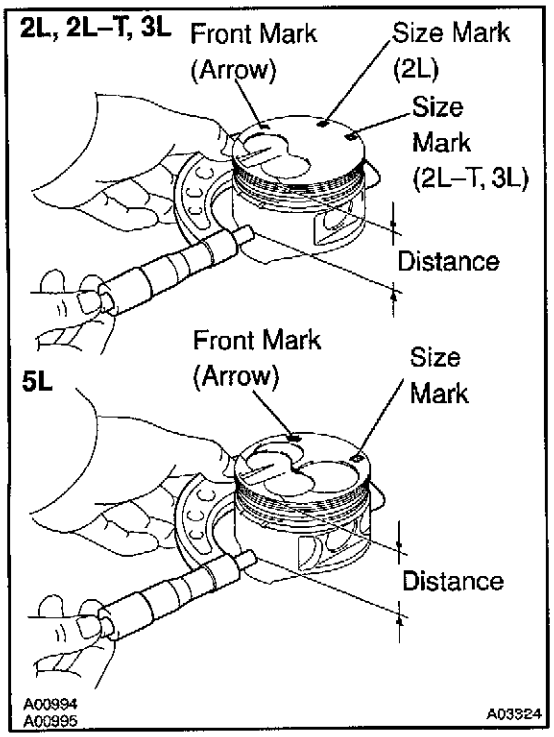
O/S 0.50	92.440 – 92.470 mm (3.6394 – 3.6405 in.)
O/S 0.75	92.690 – 92.720 mm (3.6492 – 3.6504 in.)
O/S 1.00	92.940 – 92.970 mm (3.6590 – 3.6602 in.)

3L

O/S 0.50	96.440 – 96.470 mm (3.7968 – 3.7980 in.)

5L

O/S 0.50	99.950 – 99.980 mm (3.9350 – 3.9362 in.)



(b) 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, 2L–T	58.27 – 58.33 mm (2.2941 – 2.2965 in.)
3L	56.27 – 56.33 mm (2.2153 – 2.2177 in.)
5L	61.27 – 61.33 mm (2.4122 – 2.4146 in.)

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

Size to be rebored = P + C – H

P = Piston diameter

C = Piston clearance:

2L, 2L–T, 3L	0.050 – 0.070 mm (0.0020 – 0.0028 in.)
5L	0.040 – 0.060 mm (0.0016 – 0.0024 in.)

H = Allowance for honing: 0.02 mm (0.0008 in.) or less

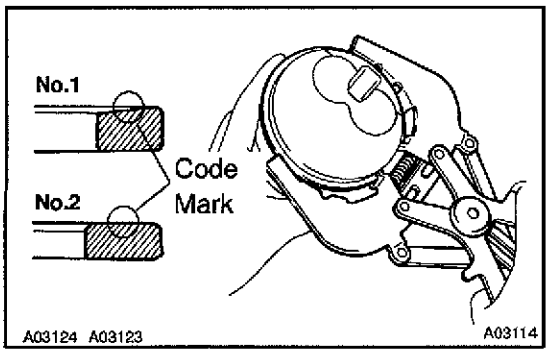
(d) Bore and hone the cylinders to calculated dimensions.

Maximum honing: 0.02 mm (0.0008 in.)

NOTICE:

Excess honing will destroy the finished roundness.

EM05H-01



REASSEMBLY

INSTALL PISTON RINGS

Using a piston ring expander, install the No.1 and No.2 piston rings with the code mark facing upward.

Code mark:

No.1	2L, 2L–T	T1 or 1N
	3L	T1 or N1
	5L	1N
No.2	2L, 2L–T	2T or 2N
	3L	T or 2N
	5L	2N