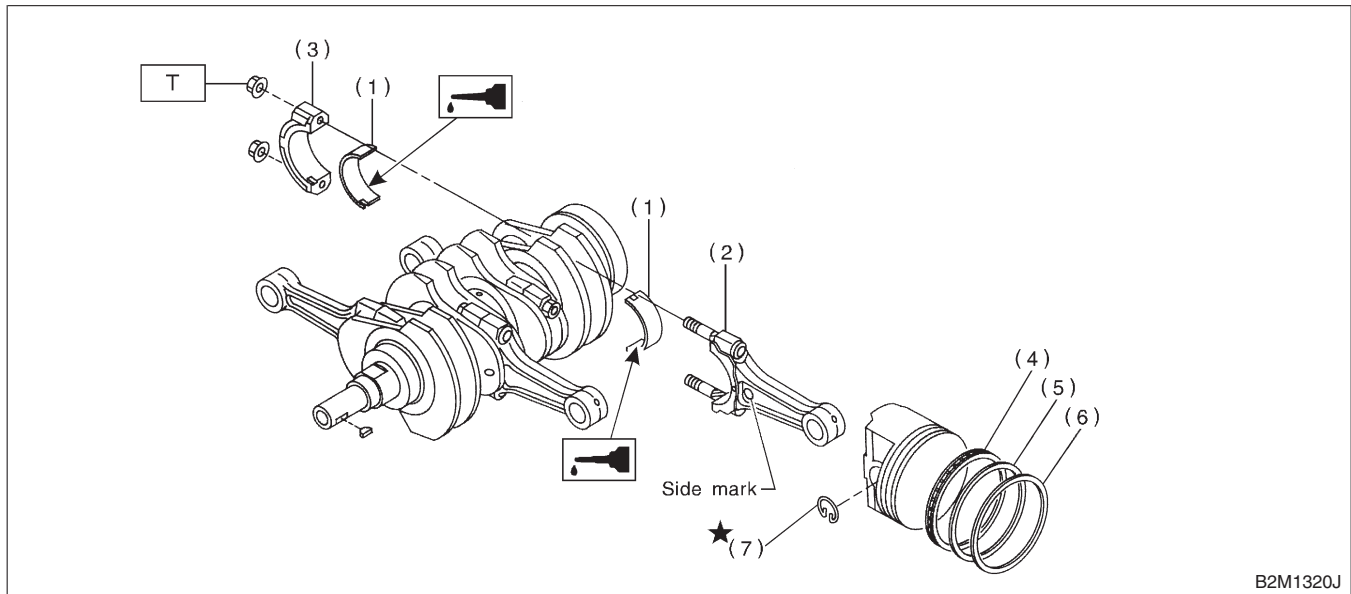


D: ASSEMBLY S173090A02



B2M1320J

- | | |
|----------------------------|-----------------|
| (1) Connecting rod bearing | (5) Second ring |
| (2) Connecting rod | (6) Top ring |
| (3) Connecting rod cap | (7) Circlip |
| (4) Oil ring | |

Tightening torque: N·m (kgf-m, ft-lb)
T: 44.6 (4.55, 32.9)

- 1) Install connecting rod bearings on connecting rods and connecting rod caps.

CAUTION:

Apply oil to the surfaces of the connecting rod bearings.

- 2) Install connecting rod on crankshaft.

CAUTION:

Position each connecting rod with the side marked facing forward.

- 3) Install connecting rod cap with connecting rod nut.

Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:

● Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.

● When tightening the connecting rod nuts, apply oil on the threads.

- 4) Install expander, lower rail and upper rail in this order by hand. Then install second ring and top ring with a piston ring expander.

E: INSPECTION S173090A10

1. CYLINDER BLOCK S173090A1001

- 1) Visually check for cracks and damage. Especially, inspect important parts by means of red lead check.

- 2) Check the oil passages for clogging.

- 3) Inspect crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:

0.05 mm (0.0020 in)

Grinding limit:

0.1 mm (0.004 in)

Standard height of cylinder block:

201.0 mm (7.91 in)

CYLINDER BLOCK

2. CYLINDER AND PISTON S173090A1002

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

CAUTION:

Measurement should be performed at a temperature 20°C (68°F).

NOTE:

Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:

2000 cc model

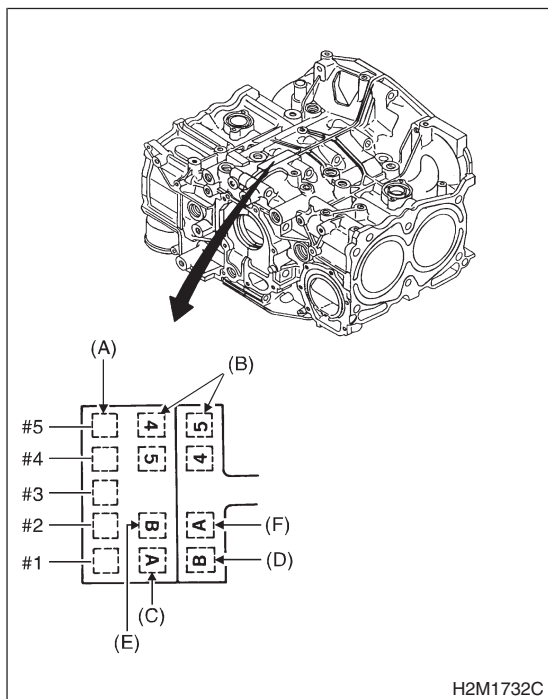
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)

B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)

2500 cc model

A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)

B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)



- (A) Main journal size mark
- (B) Cylinder block RH-LH combination mark
- (C) #1 cylinder bore size mark
- (D) #2 cylinder bore size mark
- (E) #3 cylinder bore size mark
- (F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder

Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

CAUTION:

Measurement should be performed at a temperature 20°C (68°F).

Taper:

Standard

0.015 mm (0.0006 in)

Limit

0.050 mm (0.0020 in)

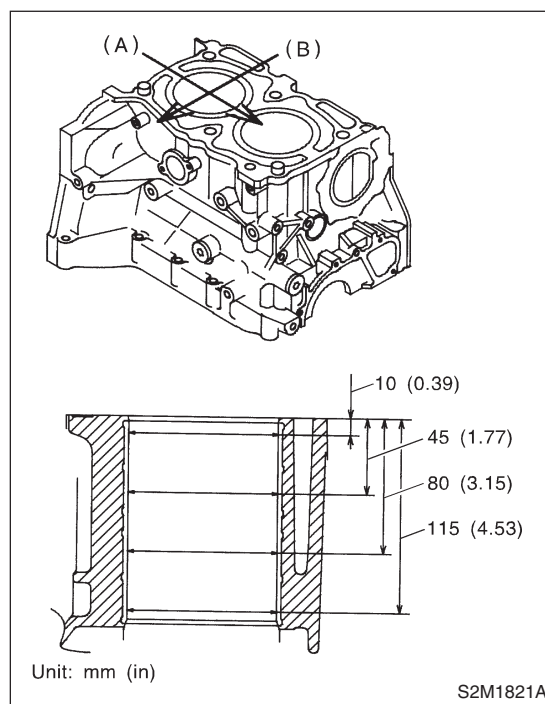
Out-of-roundness:

Standard

0.010 mm (0.0004 in)

Limit

0.050 mm (0.0020 in)



- (A) Piston pin direction
- (B) Thrust direction

3) When piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.

4) How to measure the outer diameter of each piston

Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

CAUTION:

Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:

2000 cc model

40.0 mm (1.575 in)

2500 cc model

37.0 mm (1.457 in)

Piston outer diameter:

2000 cc model

Standard

A: 91.985 — 91.995 mm

(3.6214 — 3.6218 in)

B: 91.975 — 91.985 mm

(3.6211 — 3.6214 in)

0.25 mm (0.0098 in) oversize

92.225 — 92.235 mm

(3.6309 — 3.6313 in)

0.50 mm (0.0197 in) oversize

92.475 — 92.485 mm

(3.6407 — 3.6411 in)

2500 cc model

Standard

A: 99.485 — 99.495 mm

(3.9167 — 3.9171 in)

B: 99.475 — 99.485 mm

(3.9163 — 3.9167 in)

0.25 mm (0.0098 in) oversize

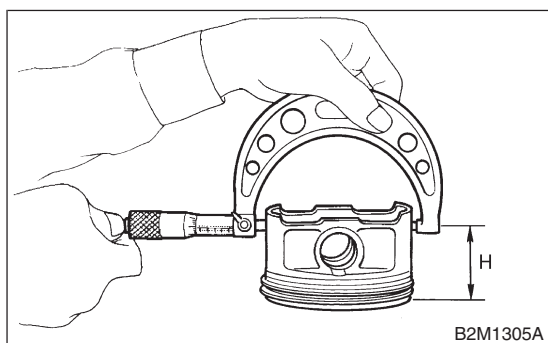
99.725 — 99.735 mm

(3.9262 — 3.9266 in)

0.50 mm (0.0197 in) oversize

99.975 — 99.985 mm

(3.9360 — 3.9364 in)



5) Calculate the clearance between cylinder and piston.

CAUTION:

Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):

Standard

0.010 — 0.030 mm (0.0004 — 0.0012 in)

Limit

0.050 mm (0.0020 in)

6) Boring and honing

(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:

When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

CAUTION:

Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

Limit of cylinder enlarging (boring):

0.5 mm (0.020 in)

3. PISTON AND PISTON PIN S173090A1003

1) Check pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.

2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME-88, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.

CYLINDER BLOCK

3) Make sure that piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

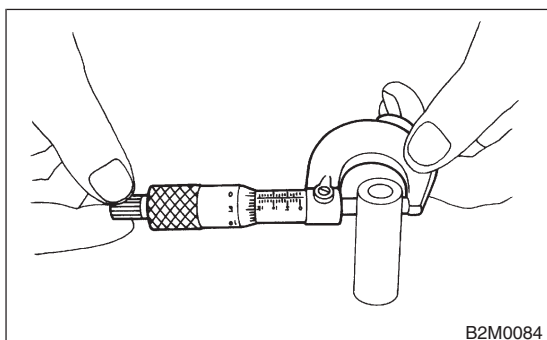
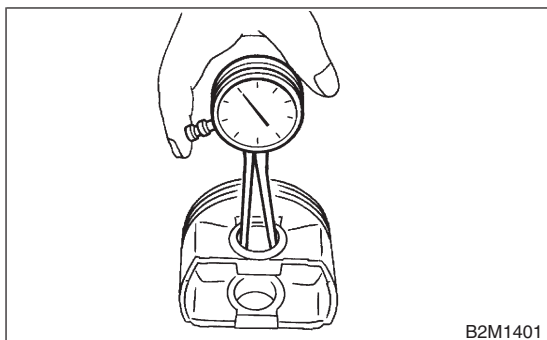
Standard clearance between piston pin and hole in piston:

Standard

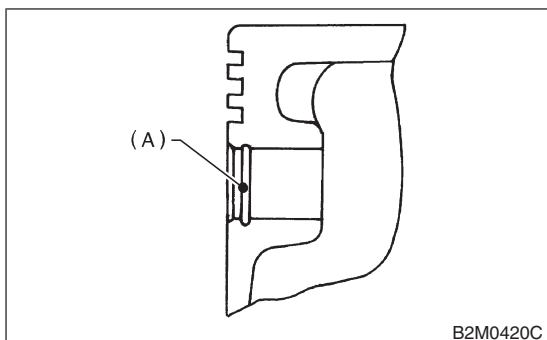
0.004 — 0.008 mm (0.0002 — 0.0003 in)

Limit

0.020 mm (0.0008 in)



4) Check circlip installation groove on the piston for burr (A). If necessary, remove burr from the groove so that piston pin can lightly move.



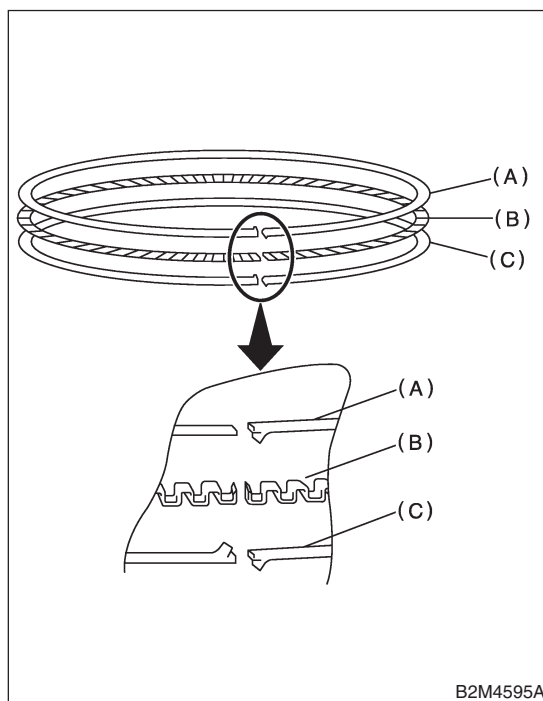
5) Check piston pin circlip for distortion, cracks and wear.

4. PISTON RING S173090A1004

1) If piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace piston ring with a new one of the same size as the piston.

CAUTION:

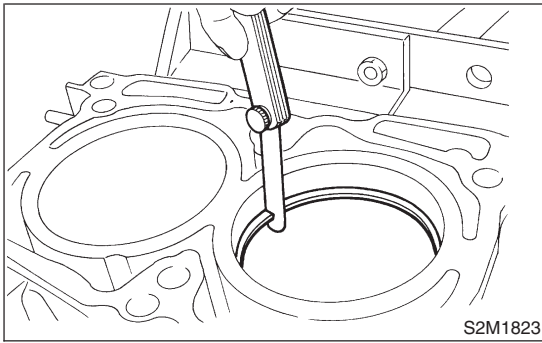
- Marks are shown on the end of the top and second rings. When installing the rings to the piston, face these marks upward.
- Oil ring is composed of upper rail, expander and lower rail. Be careful of the rail direction when installing oil ring to the piston.



- (A) Upper rail
(B) Expander
(C) Lower rail

2) Squarely place piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

		Unit: mm (in)	
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.5 (0.059)

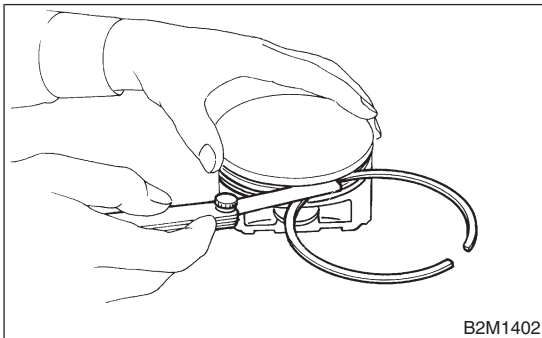


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

CAUTION:

Before measuring the clearance, clean the piston ring groove and piston ring.

Unit: mm (in)			
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)

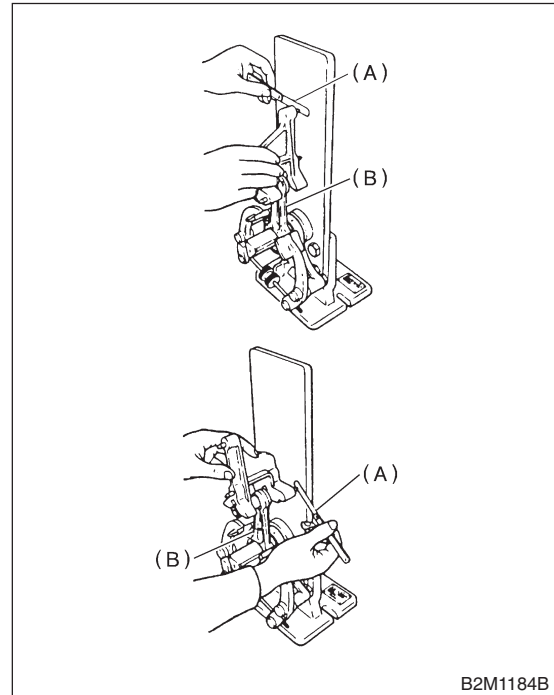


5. CONNECTING ROD S173090A1005

- 1) Replace connecting rod, if the large or small end thrust surface is damaged.
- 2) Check for bend or twist using a connecting rod aligner. Replace connecting rod if the bend or twist exceeds the limit.

Limit of bend or twist per 100 mm (3.94 in) in length:

0.10 mm (0.0039 in)



(A) Thickness gauge

(B) Connecting rod

- 3) Install connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). Replace connecting rod if the side clearance exceeds the specified limit.

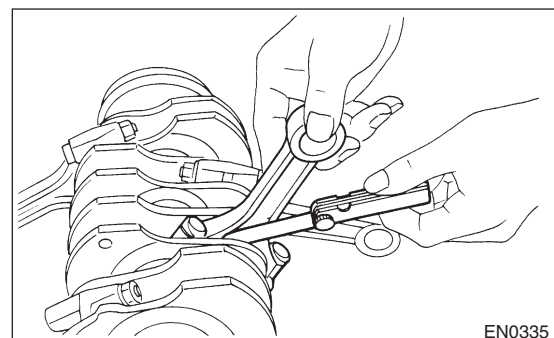
Connecting rod side clearance:

Standard

0.070 — 0.330 mm (0.0028 — 0.0130 in)

Limit

0.4 mm (0.016 in)



CYLINDER BLOCK

Mechanical

4) Inspect connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

Connecting rod oil clearance:

● 2000 cc model

Standard

0.010 — 0.038 mm (0.0004 — 0.0015 in)

Limit

0.05 mm (0.0020 in)

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

Connecting rod oil clearance:

● 2500 cc model

Standard

0.012 — 0.037 mm (0.0005 — 0.0015 in)

Limit

0.050 mm (0.0020 in)

Unit: mm (in)		
Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.490 — 1.502 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

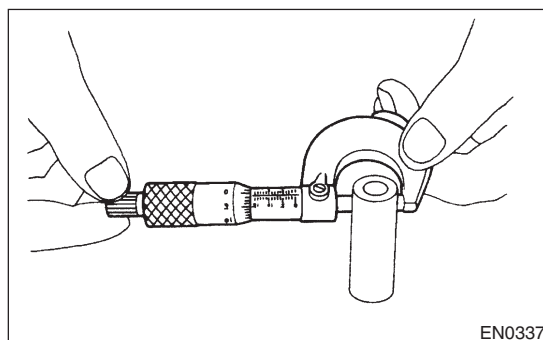
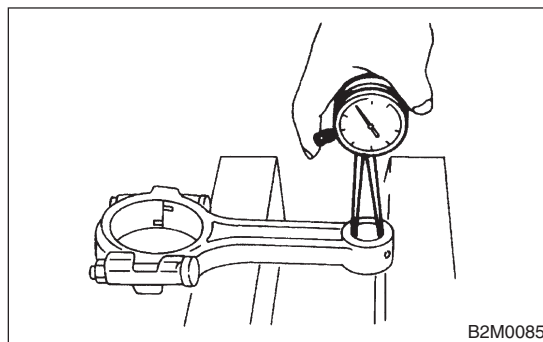
Clearance between piston pin and bushing:

Standard

0 — 0.022 mm (0 — 0.0009 in)

Limit

0.030 mm (0.0012 in)

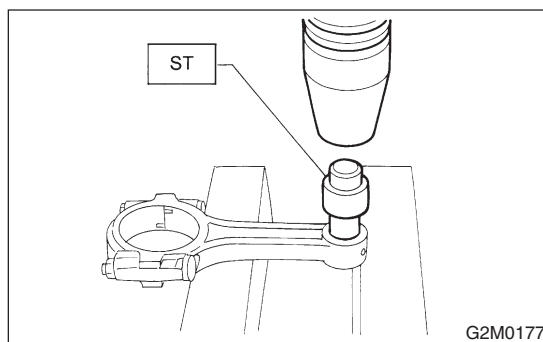


7) Replacement procedure is as follows.

(1) Remove bushing from connecting rod with ST and press.

(2) Press bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.

(4) After completion of reaming, clean bushing to remove chips.

CYLINDER BLOCK

Mechanical

6. CRANKSHAFT AND CRANKSHAFT BEARING

S173090A1006

1) Clean crankshaft completely and check for cracks by means of red lead check etc., and replace if defective.

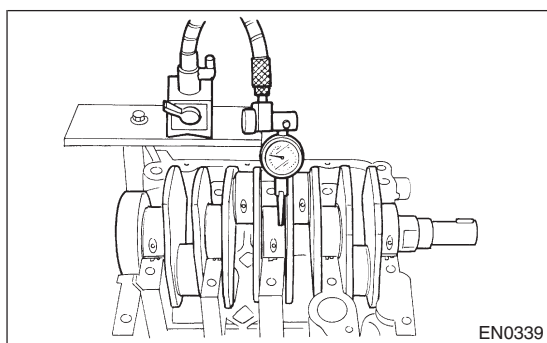
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

CAUTION:

If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position crankshaft on these bearings and measure crankshaft bend using a dial gauge.

Crankshaft bend limit:

0.035 mm (0.0014 in)



EN0339

3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:

Out-of-roundness

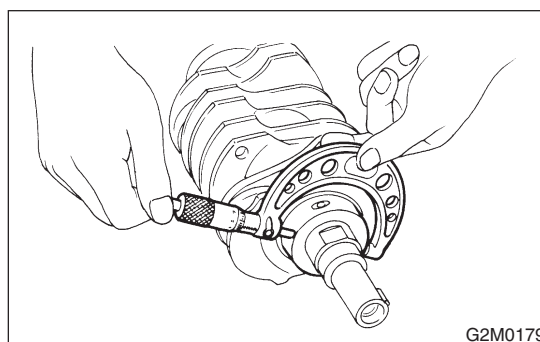
0.020 mm (0.0008 in) or less

Taper limit

0.07 mm (0.0028 in)

Grinding limit

0.250 mm (0.0098 in)



G2M0179

Unit: mm (in)					
		Crank journal diameter		Crank pin diameter	
		#1, #3	#2, #4, #5	2000 cc	2500 cc
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)	1.490 — 1.502 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)	1.504 — 1.512 (0.0592 — 0.0595)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)	1.514 — 1.522 (0.0596 - 0.0599)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)	1.614 — 1.622 (0.0635 — 0.0639)

O.D. ... Outer Diameter

CYLINDER BLOCK

Mechanical

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

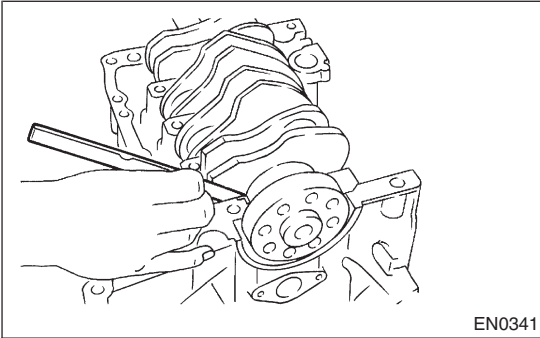
Crankshaft thrust clearance:

Standard

0.030 — 0.115 mm (0.0012 — 0.0045 in)

Limit

0.25 mm (0.0098 in)



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace defective bearing with an undersize one, and replace or recondition crankshaft as necessary.

Unit: mm (in)	
Crankshaft oil clearance	
Standard	0.010 — 0.030 (0.0004 — 0.0012)
Limit	0.040 (0.0016)