

20. Cylinder Block

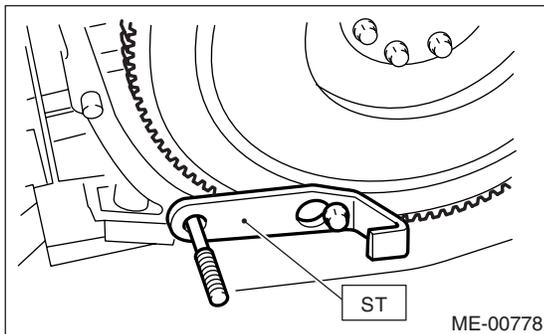
A: REMOVAL

NOTE:

Before conducting this procedure, drain engine oil completely.

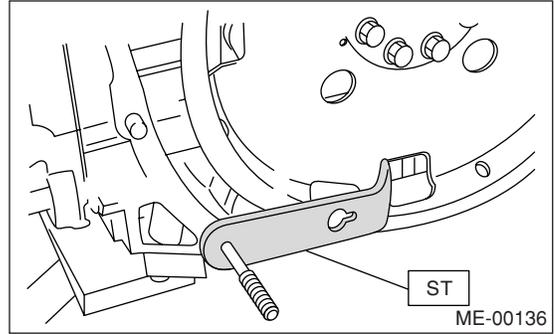
- 1) Remove the intake manifold.
<Ref. to FU(H4DOTC)-12, REMOVAL, Intake Manifold.>
- 2) Remove the V-belts. <Ref. to ME(H4DOTC)-37, REMOVAL, V-belt.>
- 3) Remove the crank pulley.
<Ref. to ME(H4DOTC)-39, REMOVAL, Crank Pulley.>
- 4) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-40, REMOVAL, Timing Belt Cover.>
- 5) Remove the timing belt.
<Ref. to ME(H4DOTC)-41, REMOVAL, Timing Belt.>
- 6) Remove the cam sprocket.
<Ref. to ME(H4DOTC)-49, REMOVAL, Cam Sprocket.>
- 7) Remove the crank sprocket.
<Ref. to ME(H4DOTC)-50, REMOVAL, Crank Sprocket.>
- 8) Remove the generator and A/C compressor with their brackets.
- 9) Remove the cylinder head.
<Ref. to ME(H4DOTC)-56, REMOVAL, Cylinder Head.>
- 10) Remove the clutch disc and cover. <Ref. to CL-9, REMOVAL, Clutch Disc and Cover.>
- 11) Remove the flywheel. (MT model)
<Ref. to CL-12, REMOVAL, Flywheel.>

ST 498497100 CRANKSHAFT STOPPER

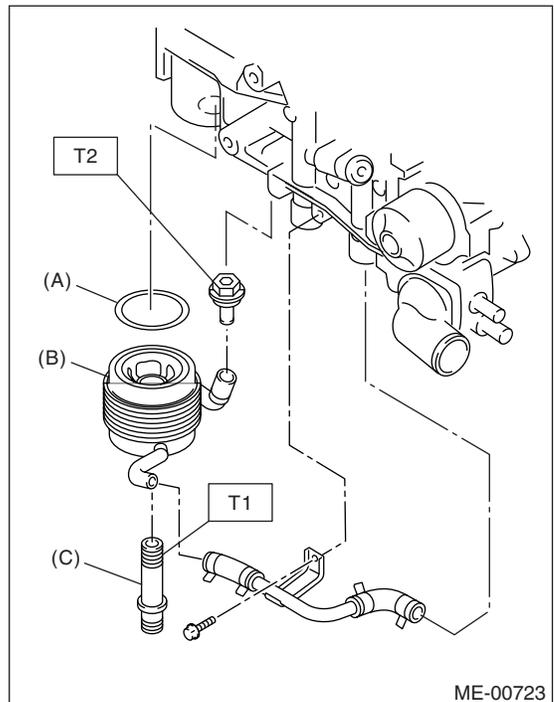


- 12) Remove the drive plate. (AT model)
To lock crankshaft, use ST.

ST 498497100 CRANKSHAFT STOPPER



- 13) Remove the oil separator cover.
- 14) Remove the water by-pass pipe for heater.
- 15) Remove the water pump.
- 16) Remove the oil filter. <Ref. to LU(H4DOTC)-20, REMOVAL, Engine Oil Filter.>
- 17) Remove the oil cooler.



- (A) O-ring
- (B) Oil cooler
- (C) Oil cooler connector

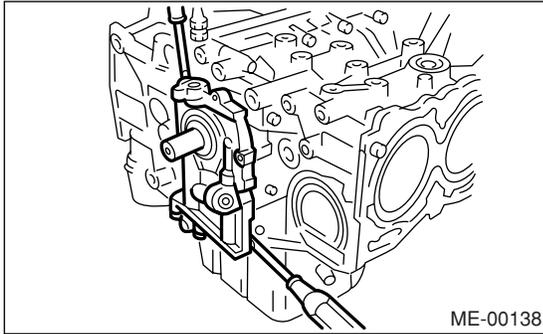
- 18) Remove the bolts which secure oil pump to cylinder block.
- 19) Remove the oil pump by using flat tip screwdriver.

Cylinder Block

MECHANICAL

CAUTION:

Be careful not to scratch the mating surface of cylinder block and oil pump.



20) Removal of oil pan:

(1) Place the cylinder block to face the #2 and #4 cylinder side upward.

(2) Remove the bolts which secure oil pan to cylinder block.

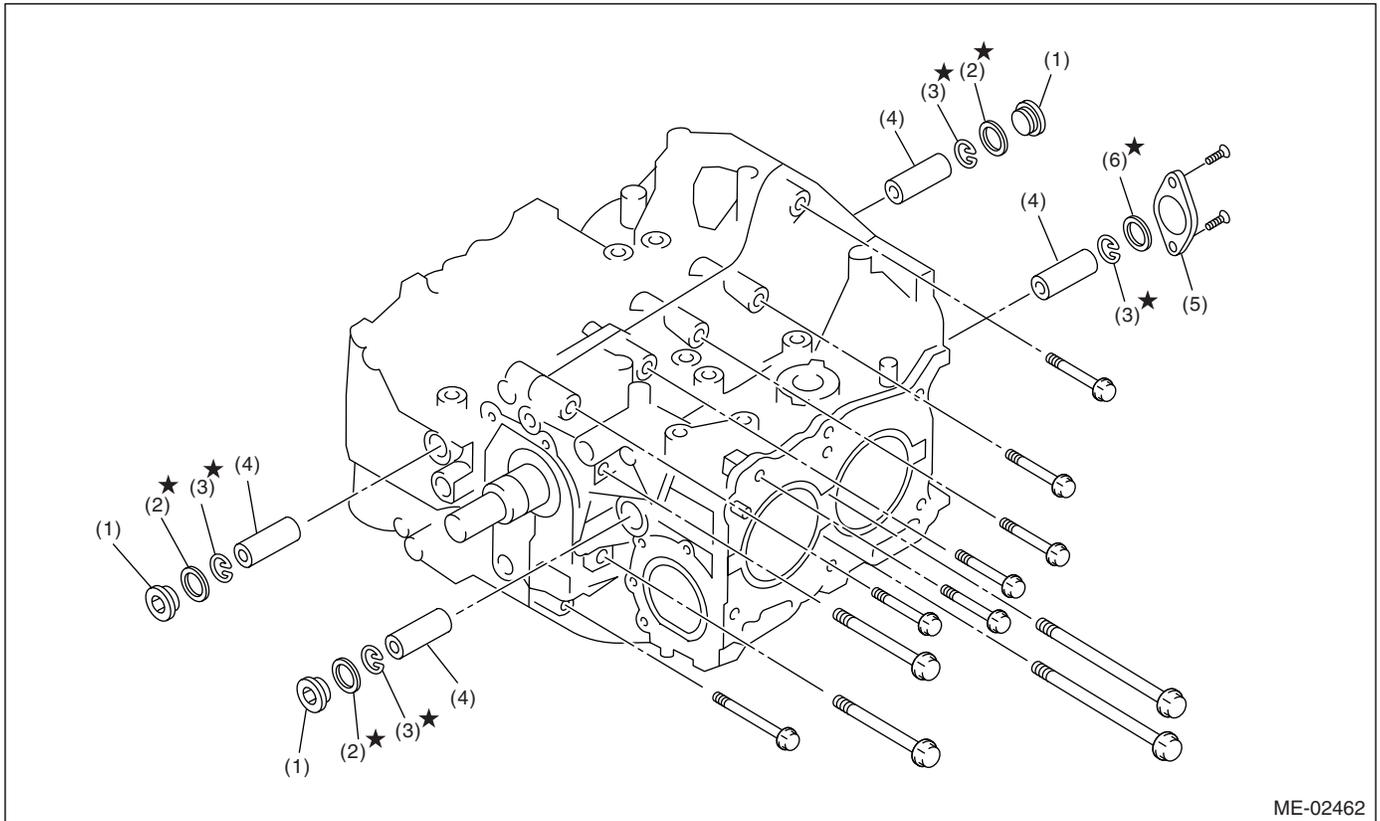
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan. Do not use a screwdriver or similar tools in place of oil pan cutter.

21) Remove the oil strainer stay.

22) Remove the oil strainer.

23) Remove the baffle plate.

24) Remove the water pipe.



(1) Service hole plug

(2) Gasket

(3) Snap ring

(4) Piston pin

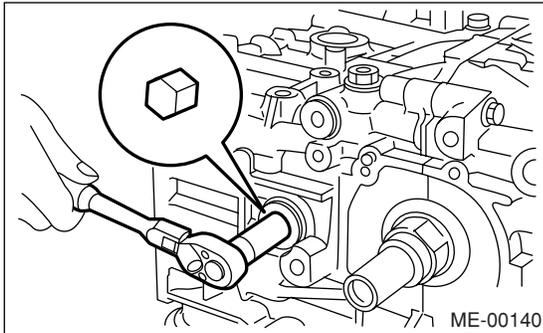
(5) Service hole cover

(6) O-ring

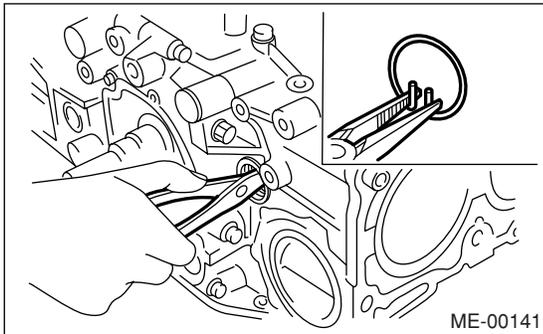
Cylinder Block

MECHANICAL

25) Remove the service hole cover and service hole plugs using a hexagon wrench [14 mm].



26) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston snap ring through service hole of #1 and #2 cylinders.

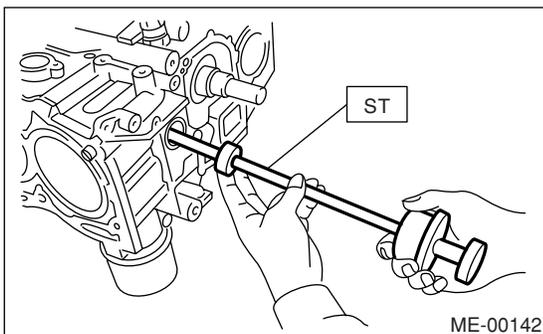


27) Draw out the piston pins from #1 and #2 pistons using ST.

ST 499097700 PISTON PIN REMOVER

NOTE:

Be careful not to confuse the original combination of piston, piston pin and cylinder.



28) Similarly remove the piston pins from #3 and #4 pistons.

29) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.

30) Back off the bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.

31) Place the cylinder block to face the #1 and #3 cylinder side upward, and remove cylinder block connecting bolts.

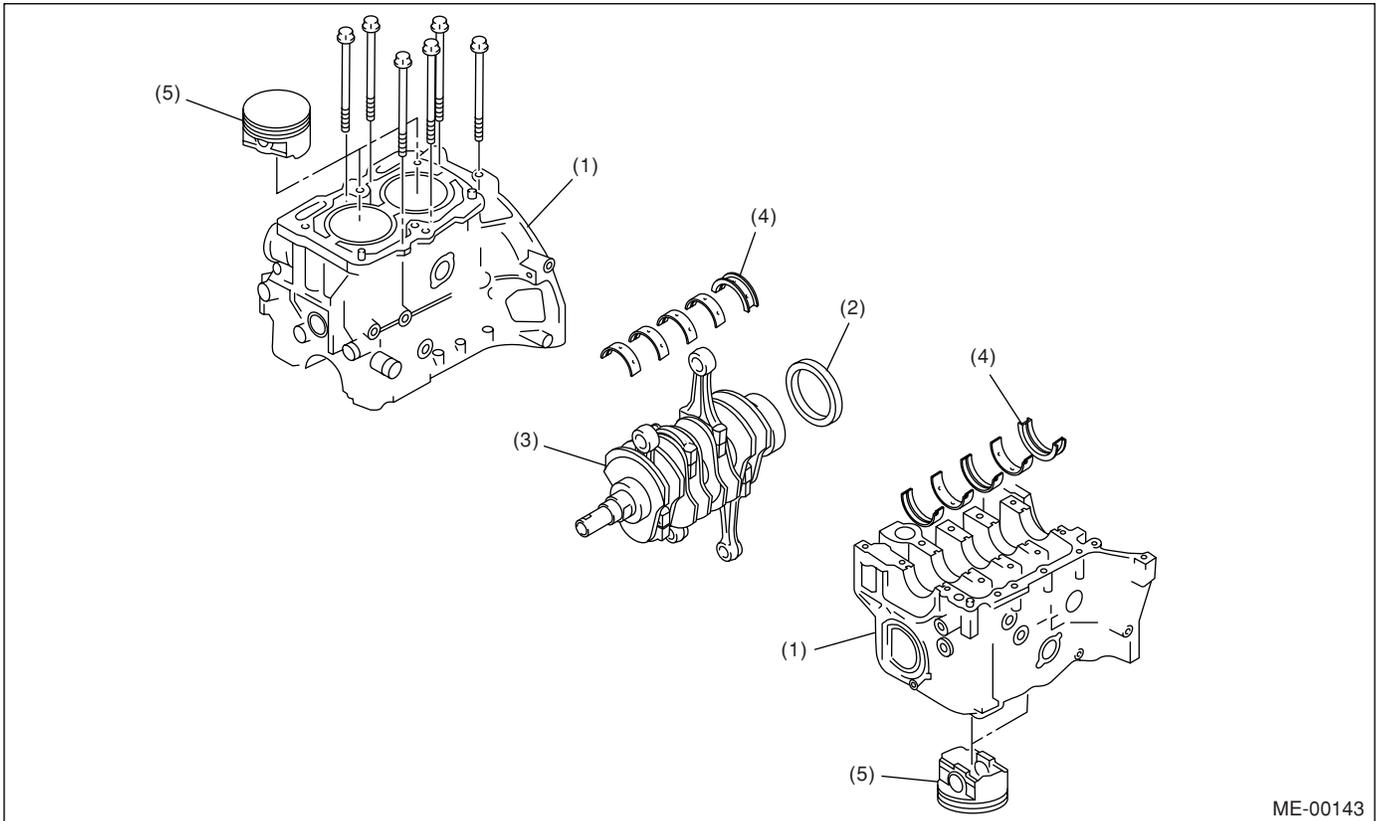
32) Separate the cylinder block (LH) and (RH).

NOTE:

When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

Cylinder Block

MECHANICAL



ME-00143

- | | | |
|--------------------|------------------------|------------|
| (1) Cylinder block | (3) Crankshaft | (5) Piston |
| (2) Rear oil seal | (4) Crankshaft bearing | |

33) Remove the rear oil seal.

34) Remove the crankshaft together with connecting rod.

35) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:

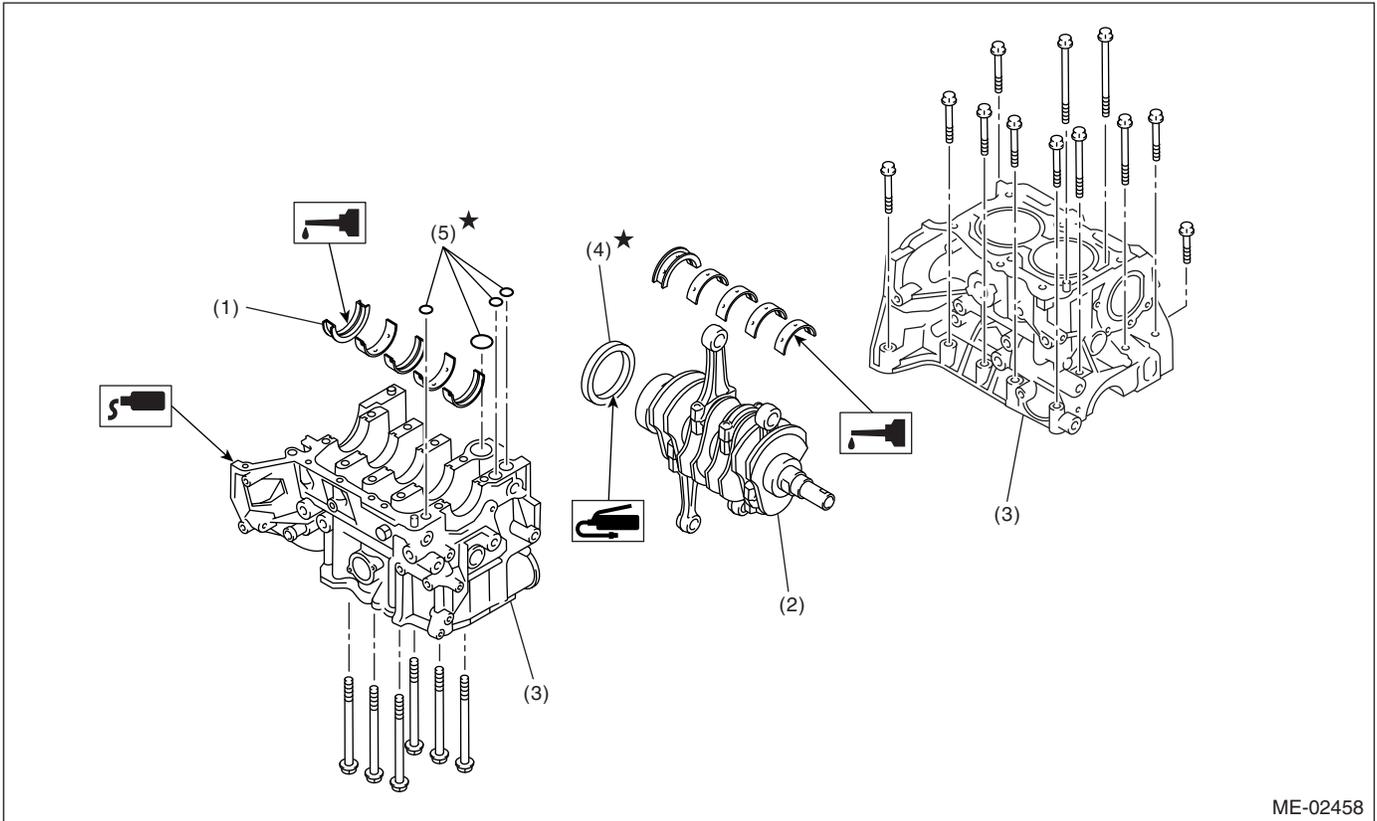
Do not confuse the combination of crankshaft bearings. Press the bearing at the end opposite to locking lip.

36) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:

Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION



ME-02458

- | | | |
|------------------------|--------------------|------------|
| (1) Crankshaft bearing | (3) Cylinder block | (5) O-ring |
| (2) Crankshaft | (4) Rear oil seal | |

1) Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.

2) Position the crankshaft on the #2 and #4 cylinder block.

3) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

Liquid gasket:

THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:

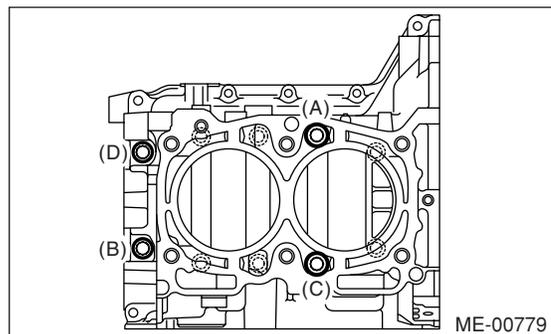
Do not allow liquid gasket to run over to O-ring grooves, oil passages, bearing grooves, etc.

4) Apply a coat of engine oil to washers and bolt threads.

5) Tighten the 10 mm cylinder block connecting bolts on LH side (A — D) in alphabetical sequence.

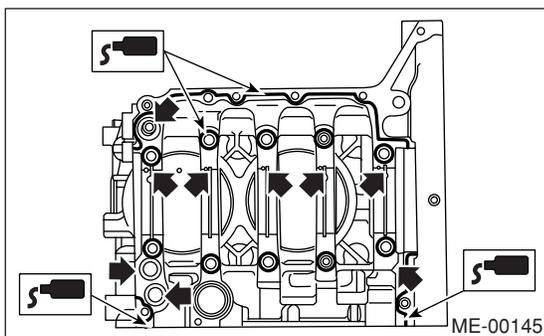
Tightening torque:

10 N·m (1.0 kgf-m, 7.2 ft-lb)



ME-00779

6) Tighten the 10 mm cylinder block connecting bolts on RH side (E — J) in alphabetical sequence.



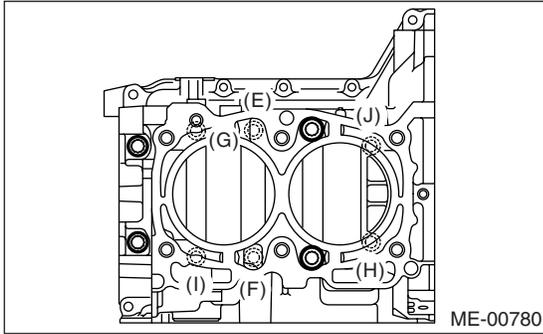
ME-00145

Cylinder Block

MECHANICAL

Tightening torque:

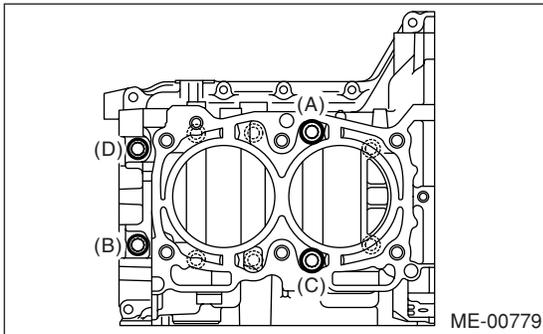
10 N·m (1.0 kgf-m, 7.2 ft-lb)



7) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:

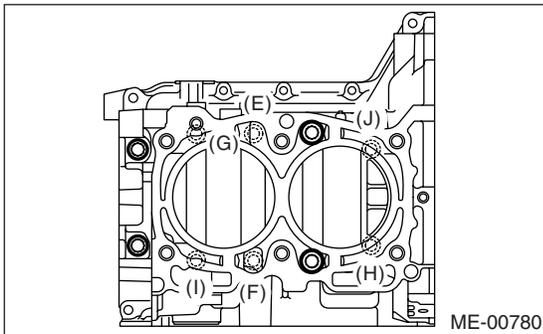
18 N·m (1.8 kgf-m, 13.0 ft-lb)



8) Further tighten the RH side bolts (E — J) in alphabetical sequence.

Tightening torque:

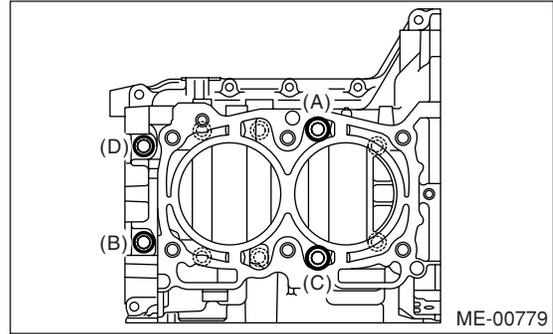
18 N·m (1.8 kgf-m, 13.0 ft-lb)



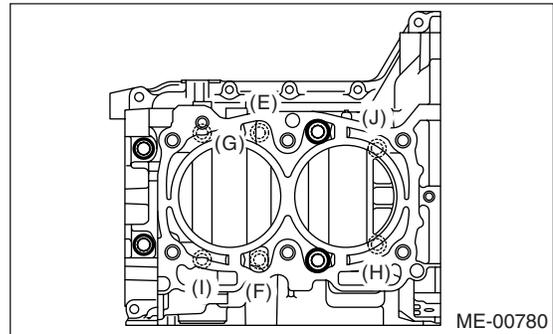
9) Further tighten the LH side bolts (A — D) in alphabetical sequence.

(A), (C): 90°

(B), (D): 40 N·m (4.1 kgf-m, 29.5 ft-lb)



10) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.

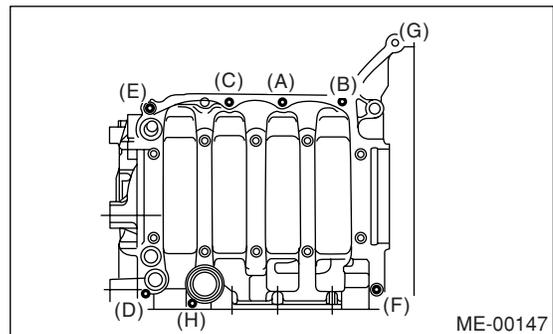


11) Tighten the 8 mm and 6 mm cylinder block connecting bolts on LH side (A — H) in alphabetical sequence.

Tightening torque:

(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)

(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

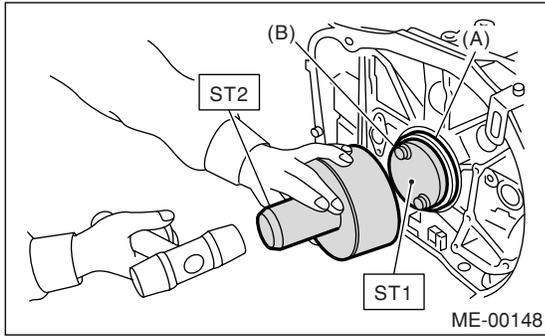


12) Install the rear oil seal using ST1 and ST2.
ST1 499597100 CRANKSHAFT OIL SEAL
GUIDE

Cylinder Block

MECHANICAL

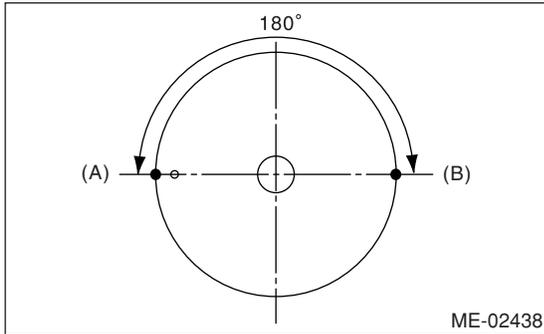
ST2 499587200 CRANKSHAFT OIL SEAL INSTALLER



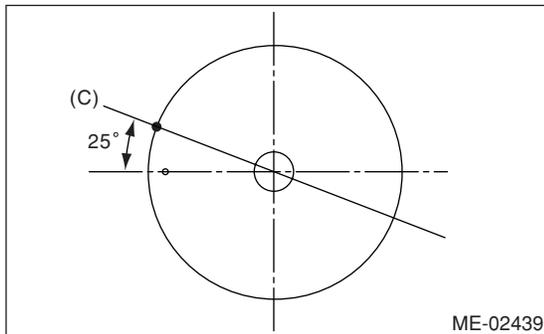
- (A) Rear oil seal
- (B) Flywheel attaching bolt

13) Position the top ring gap at (A) or (B) in the figure.

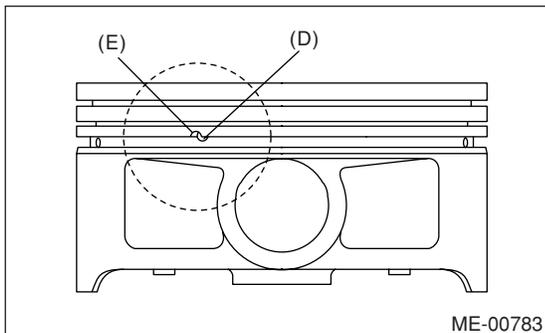
14) Position the second ring gap at 180° on the reverse side of the top ring gap.



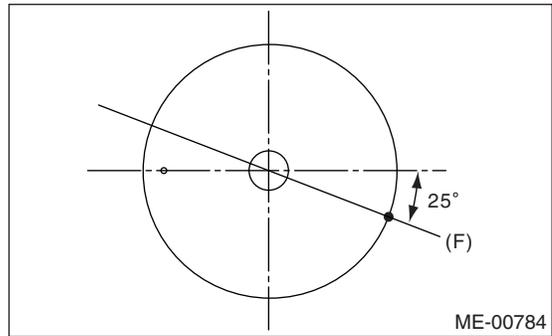
15) Position the upper rail gap at (C) in the figure.



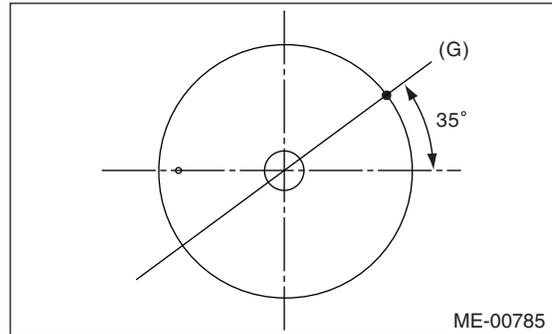
16) Align the upper rail spin stopper (D) to the side hole (E) on the piston.



17) Position the expander gap at 180° on the reverse side of (C) that shown (F) in the figure.



18) Position the lower rail gap at (G) in the figure.



CAUTION:

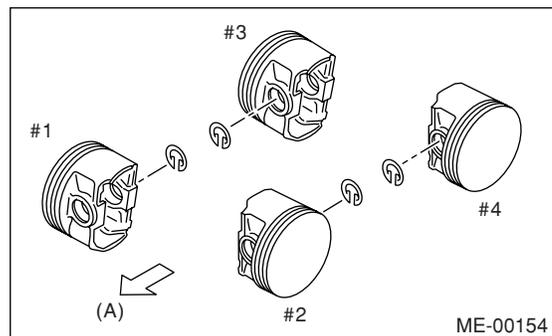
- Ensure ring gaps do not face the same direction.
- Ensure ring gaps are not within the piston skirt area.

19) Install the snap ring.

Install snap rings in the piston holes located opposite to the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:

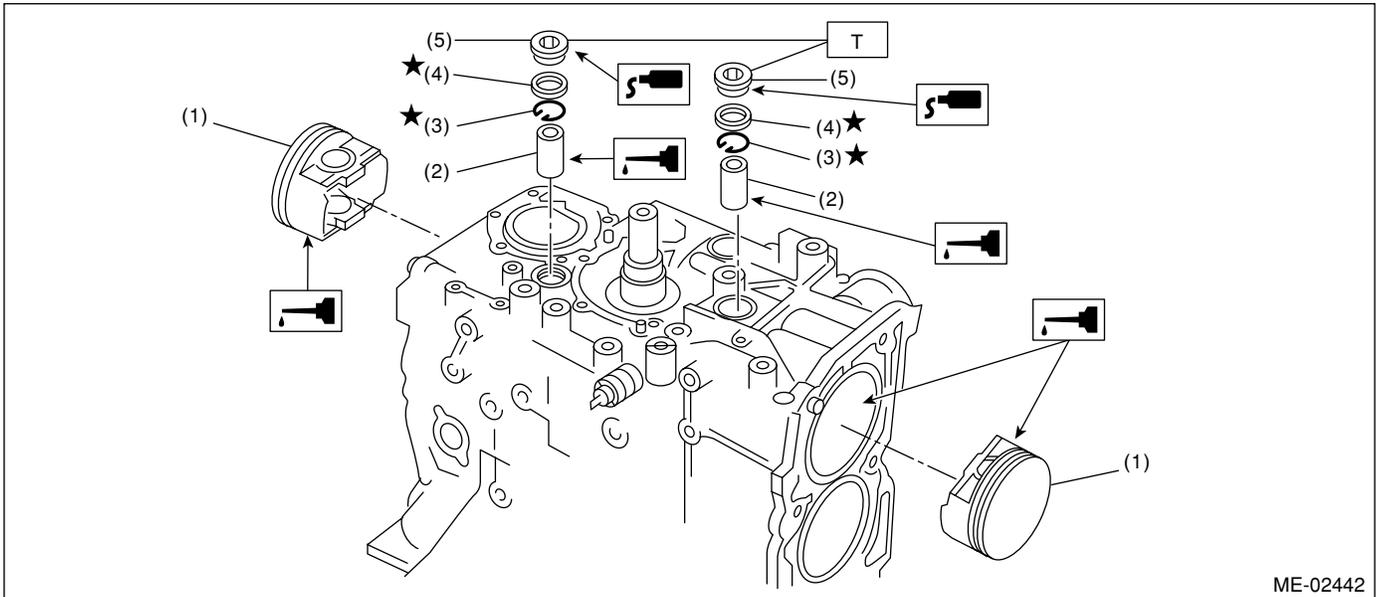
Use new snap rings.



(A) Front side

Cylinder Block

MECHANICAL



- | | |
|----------------|-----------------------|
| (1) Piston | (4) Gasket |
| (2) Piston pin | (5) Service hole plug |
| (3) Snap ring | |

Tightening torque: N·m (kgf·m, ft·lb)
T: 70 (7.1, 50.6)

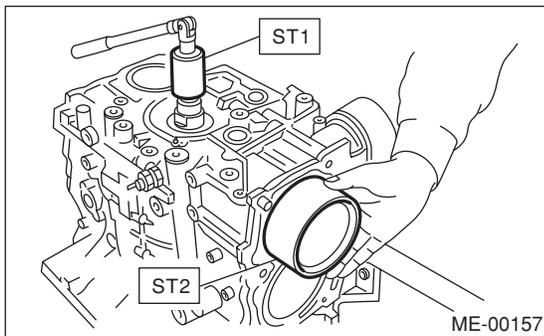
20) Installation of piston:

- (1) Place the cylinder block to face the #1 and #2 cylinder side upward.
- (2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

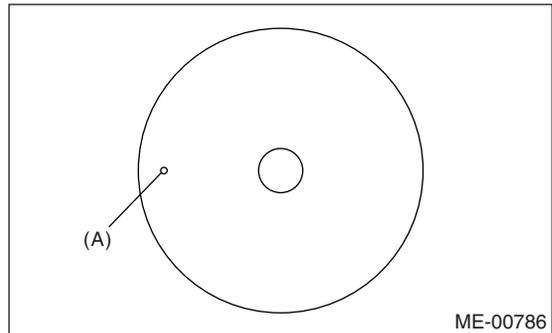
- (3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 498747300 PISTON GUIDE



NOTE:

Piston front mark faces towards the front of engine.

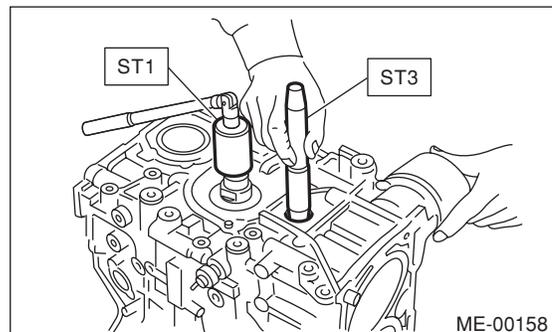


(A) Front mark

21) Installation of piston pin:

- (1) Apply a coat of engine oil to ST3 before insertion, and then insert it into the service hole to align piston pin hole with connecting rod small end.

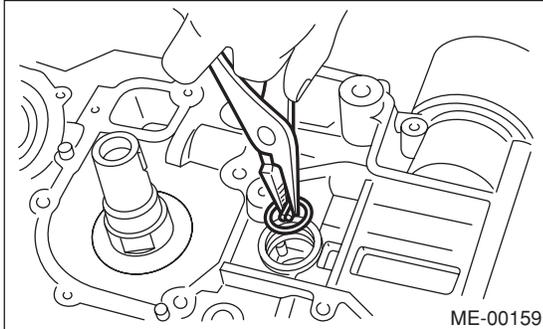
ST3 499017100 PISTON PIN GUIDE



- (2) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
- (3) Install the snap ring.

NOTE:

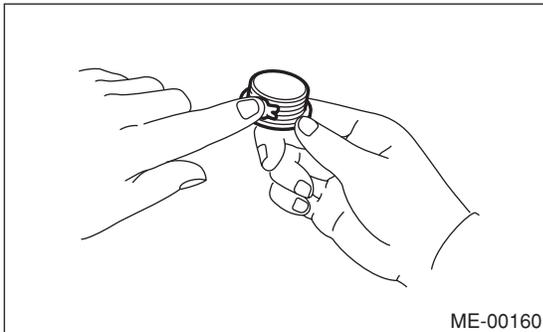
Use new snap rings.



- (4) Apply liquid gasket around the service hole plug.

Liquid gasket:

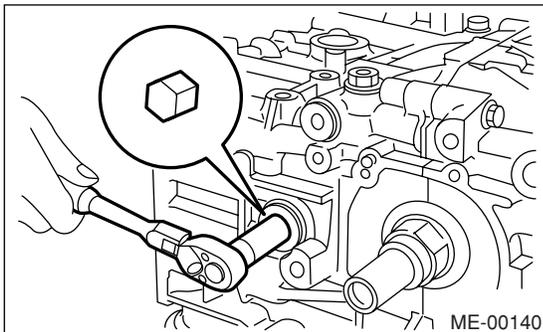
THREE BOND 1215 (Part No. 004403007) or equivalent



- (5) Install the service hole plug and gasket.

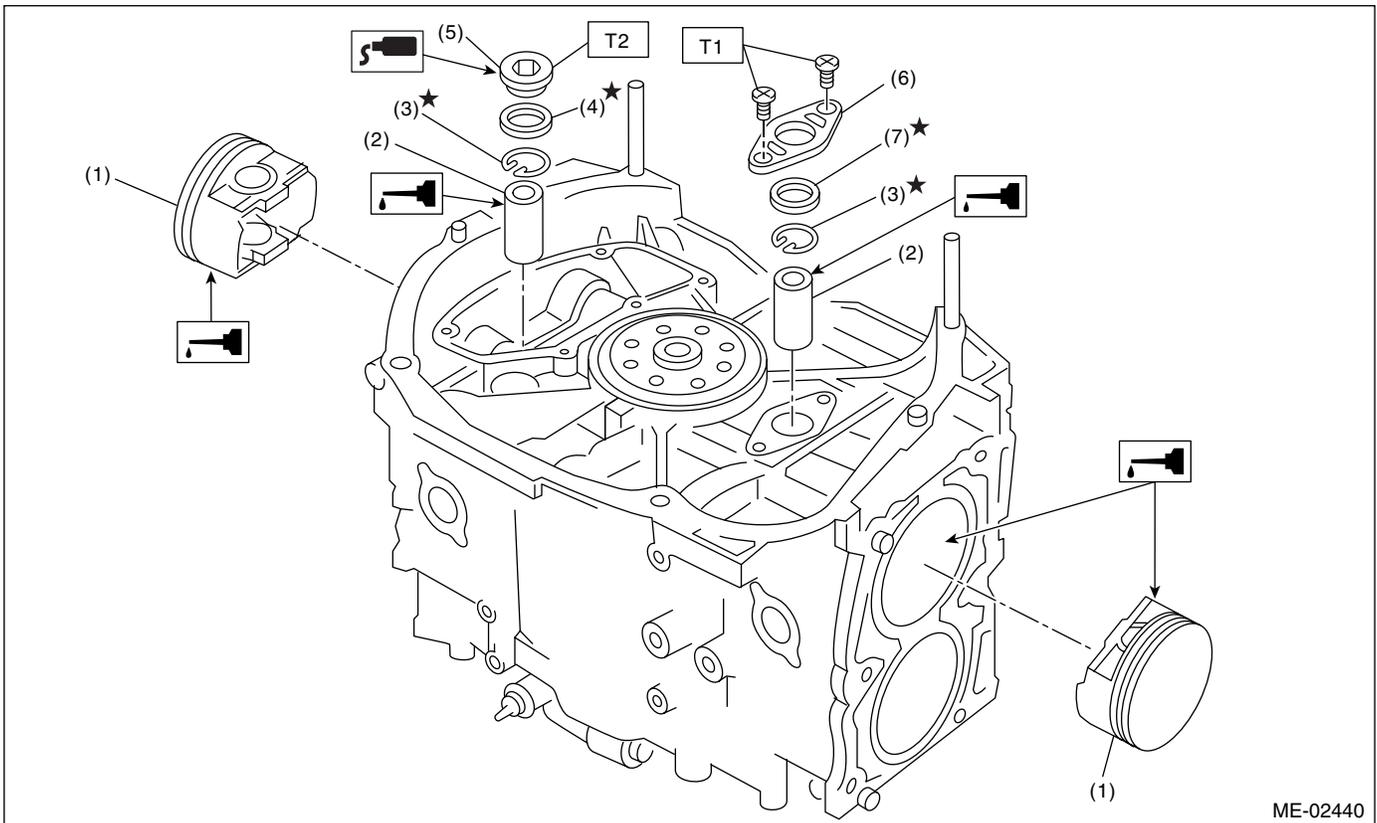
NOTE:

Use a new gasket.



Cylinder Block

MECHANICAL



- | | |
|----------------|------------------------|
| (1) Piston | (5) Service hole plug |
| (2) Piston pin | (6) Service hole cover |
| (3) Snap ring | (7) O-ring |
| (4) Gasket | |

Tightening torque: N·m (kgf·m, ft·lb)

T1: 6.4 (0.65, 4.7)

T2: 70 (7.1, 50.6)

(6) Place the cylinder block to face the #3 and #4 cylinder side upward. Following the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

22) Install the water pipe.

23) Install the baffle plate.

Tightening torque:

6.4 N·m (0.65 kgf·m, 4.7 ft·lb)

24) Install the oil strainer and O-ring.

Tightening torque:

10 N·m (1.0 kgf·m, 7.2 ft·lb)

25) Install the oil strainer stay.

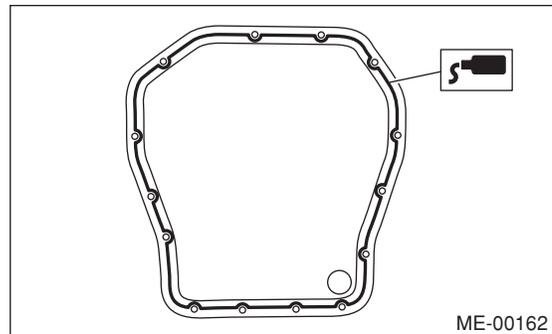
26) Apply liquid gasket to mating surfaces and install the oil pan.

Liquid gasket:

THREE BOND 1207C (Part No. 004403012) or equivalent

Tightening torque:

5 N·m (0.5 kgf·m, 3.6 ft·lb)



27) Apply liquid gasket to the mating surfaces and threaded portion of bolt (A) as shown in the figure, and install the oil separator cover.

NOTE:

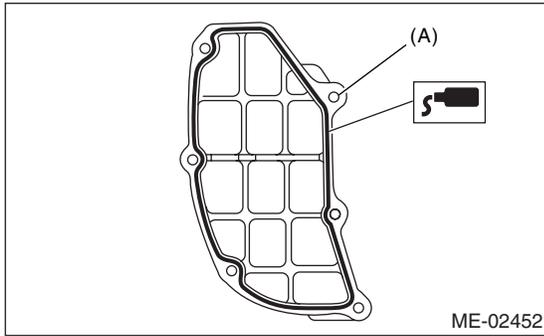
Install them within 20 min. from applying liquid gasket.

Liquid gasket:

THREE BOND 1207C (Part No. 004403012) or equivalent

Tightening torque:

6.4 N-m (0.65 kgf-m, 4.7 ft-lb)



28) Install the flywheel. (MT model) <Ref. to CL-12, INSTALLATION, Flywheel.>

29) Install the clutch disc and cover. (MT model) <Ref. to CL-9, INSTALLATION, Clutch Disc and Cover.>

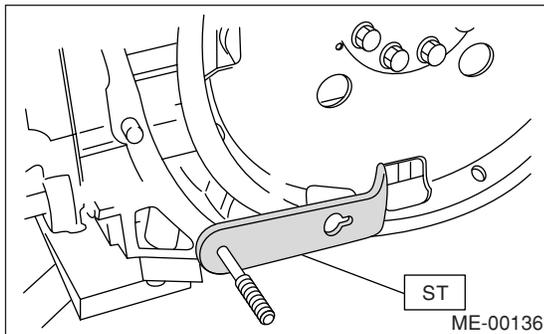
30) Install the drive plate. (AT model)

To lock the crankshaft, use ST.

ST 498497100 CRANKSHAFT STOPPER

Tightening torque:

72 N-m (7.3 kgf-m, 52.8 ft-lb)



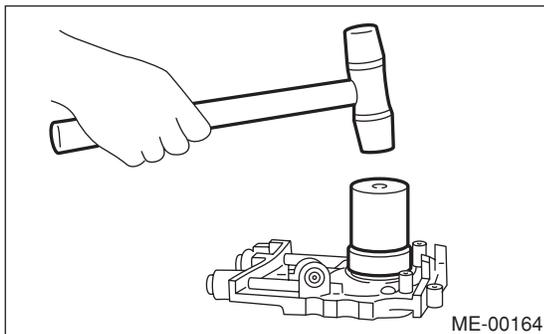
31) Installation of oil pump:

(1) Install the front oil seal by using ST.

ST 499587100 OIL SEAL INSTALLER

NOTE:

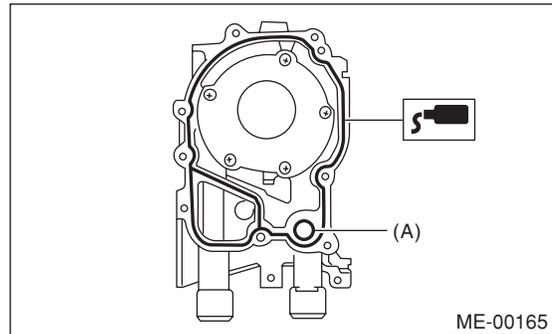
Use a new front oil seal.



(2) Apply liquid gasket to the matching surface of oil pump.

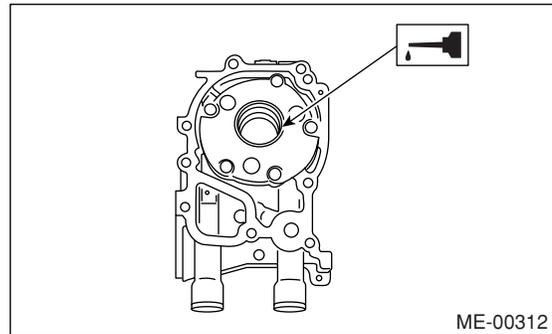
Liquid gasket:

THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of oil seal.



(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

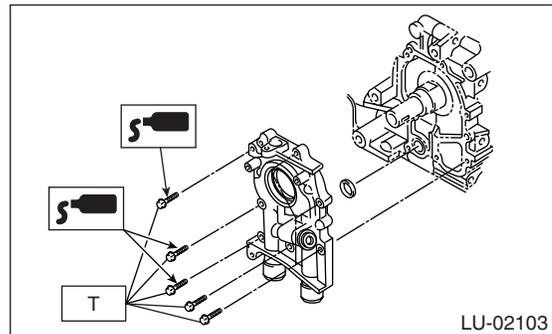
(5) Apply liquid gasket to the threaded portion of three bolts.

Fluid packing:

THREE BOND 1215 (Part No. 004403007) or equivalent

Tightening torque:

6.4 N-m (0.65 kgf-m, 4.7 ft-lb)



CAUTION:

• Do not forget to install the O-ring and seal when installing the oil pump.

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- **Align the flat surface of oil pump's inner rotor with crankshaft before installation.**

32) Install the water pump and gasket.

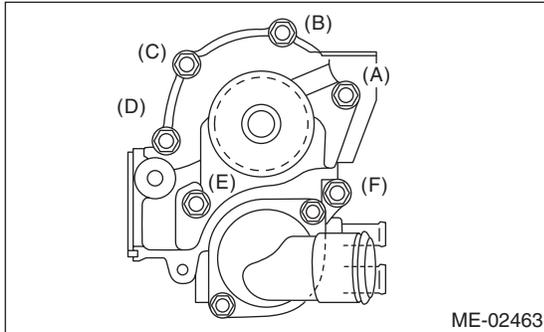
Tightening torque:

First: 12 N·m (1.2 kgf-m, 8.9 ft-lb)

Second: 12 N·m (1.2 kgf-m, 8.9 ft-lb)

CAUTION:

- **Be sure to use a new gasket.**
- **When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.**



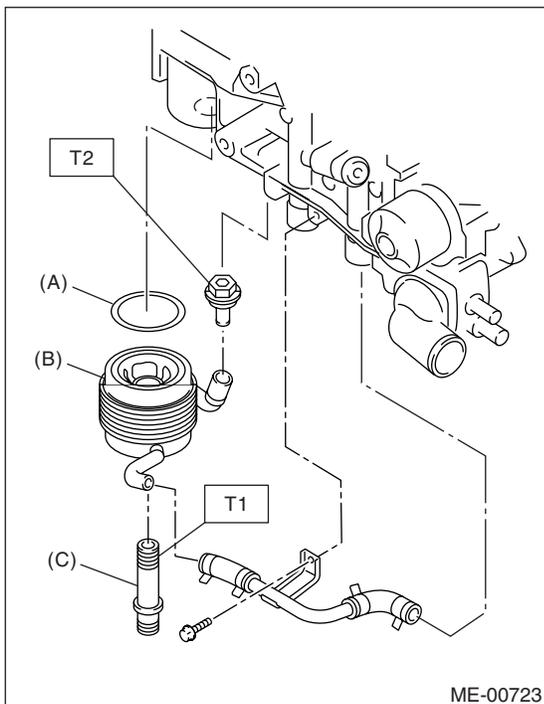
33) Install the water by-pass pipe for heater.

34) Install the oil cooler.

Tightening torque:

T1: 54 N·m (5.5 kgf-m, 40 ft-lb)

T2: 70 N·m (7.1 kgf-m, 50.6 ft-lb)



- (A) O-ring
- (B) Oil cooler
- (C) Oil cooler connector

35) Install the oil filter. <Ref. to LU(H4DOTC)-20, INSTALLATION, Engine Oil Filter.>

36) Install the water by-pass pipe between oil cooler and water pump.

37) Install the water pipe.

NOTE:

Always use new O-rings.

38) Install the cylinder head.

<Ref. to ME(H4DOTC)-56, INSTALLATION, Cylinder Head.>

39) Install the oil level gauge guide. (LH side)

40) Install the rocker cover and rocker cover gasket.

NOTE:

Use a new rocker cover gasket.

41) Install the crank sprocket.

<Ref. to ME(H4DOTC)-50, INSTALLATION, Crank Sprocket.>

42) Install the cam sprocket.

<Ref. to ME(H4DOTC)-49, INSTALLATION, Cam Sprocket.>

43) Install the timing belt.

<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt.>

44) Install the timing belt cover.

<Ref. to ME(H4DOTC)-40, INSTALLATION, Timing Belt Cover.>

45) Install the crank pulley.

<Ref. to ME(H4DOTC)-39, INSTALLATION, Crank Pulley.>

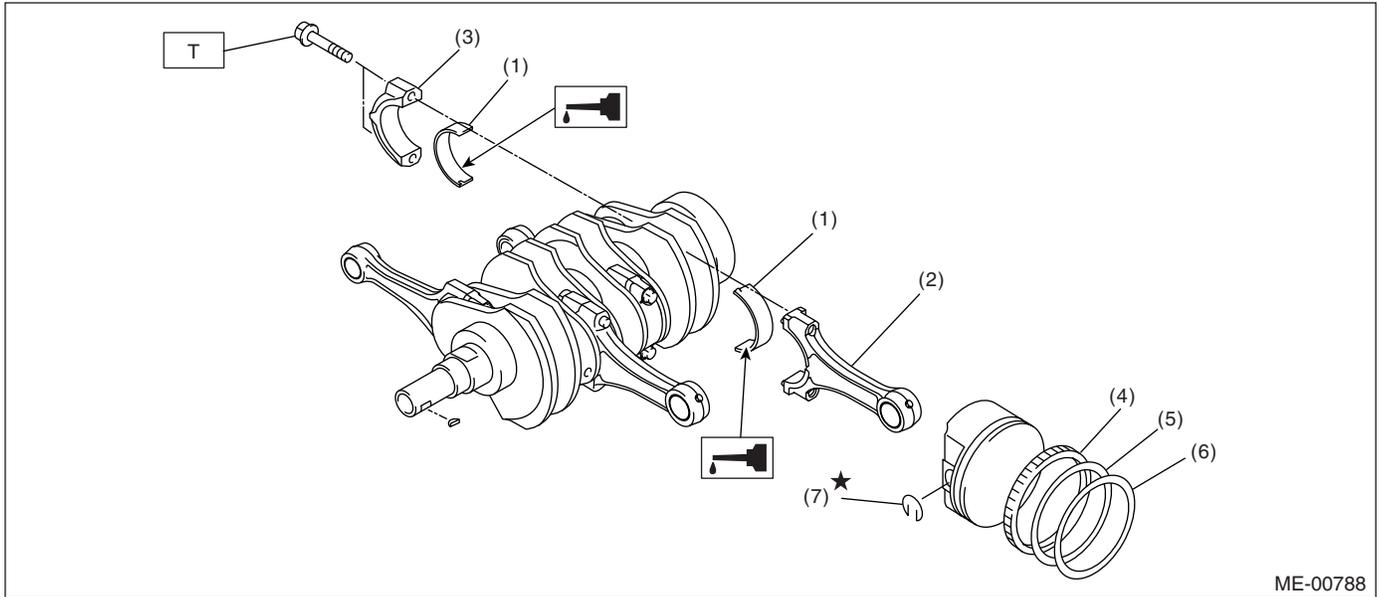
46) Install the generator and A/C compressor brackets on cylinder head.

47) Install the V-belts. <Ref. to ME(H4DOTC)-37, INSTALLATION, V-belt.>

48) Install the intake manifold.

<Ref. to FU(H4DOTC)-14, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY



ME-00788

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

Tightening torque: N·m (kgf-m, ft-lb)

T: 52 (5.3, 38.4)

- 1) Remove the connecting rod cap.
- 2) Remove the connecting rod bearing.

NOTE:

Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

- 3) Remove the piston rings using a piston ring expander.
- 4) Remove the oil ring by hand.

NOTE:

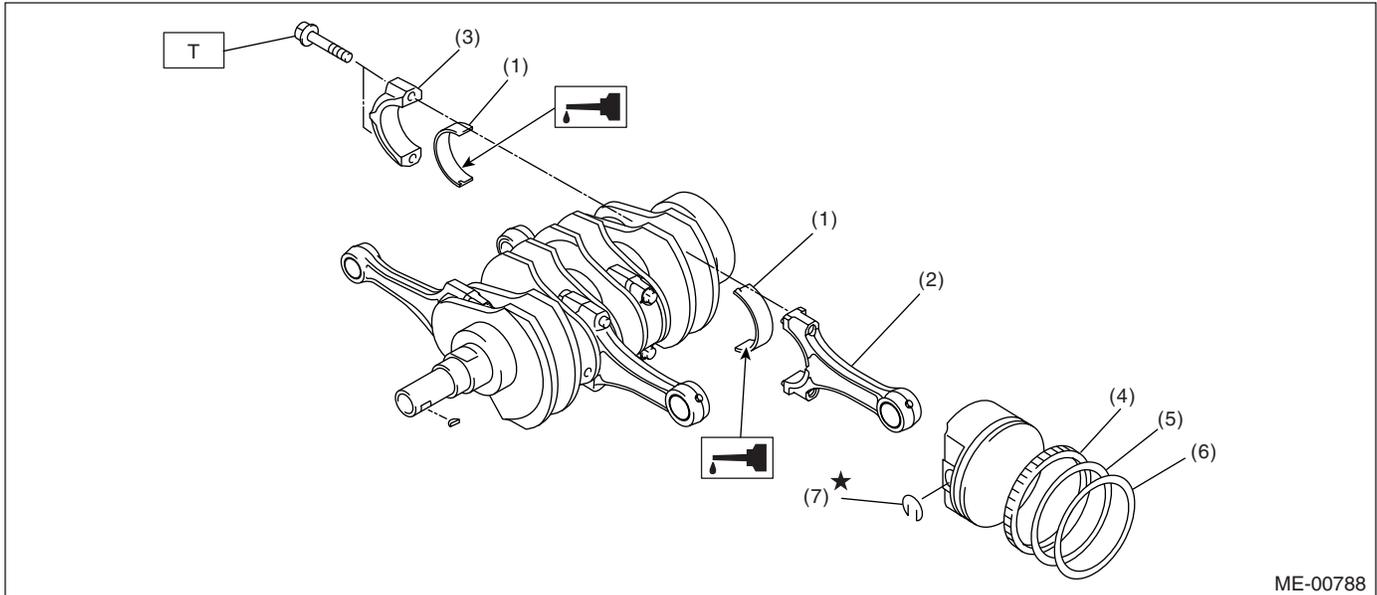
Arrange the removed piston rings in proper order to prevent confusion.

- 5) Remove the snap ring.

Cylinder Block

MECHANICAL

D: ASSEMBLY



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

Tightening torque: N·m (kgf-m, ft-lb)
T: 52 (5.3, 38.4)

- 1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
- 2) Install the connecting rod on crankshaft.

NOTE:

Position each connecting rod with the side marked facing forward.

- 3) Install the connecting rod cap. Ensure the arrow mark on connecting rod cap facing 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 the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring using a piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

- 1) Visually check for cracks and damage. Especially, inspect the important parts by means of red lead check.
- 2) Check the oil passages for clogging.
- 3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:

0.025 mm (0.00098 in)

Grinding limit:

0.1 mm (0.004 in)

Standard height of cylinder block:

201.0 mm (7.91 in)

2. CYLINDER AND PISTON

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

NOTE:

- Measurement should be performed at a temperature of 20°C (68°F).
- Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines in selecting a standard piston.

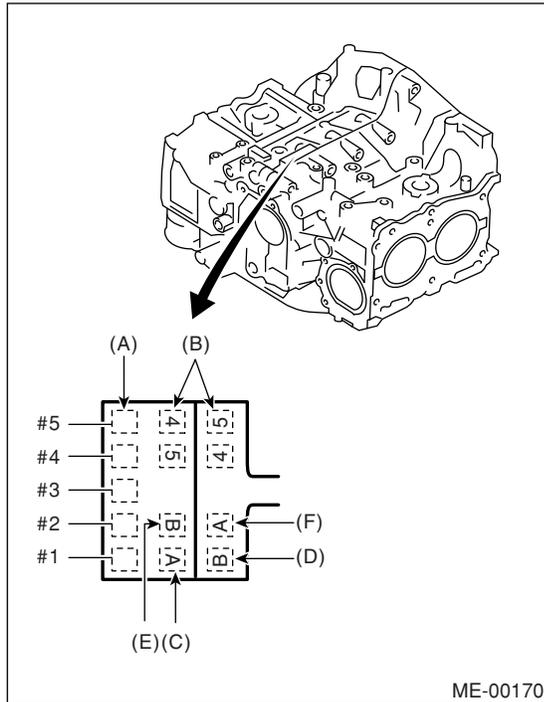
Cylinder Block

MECHANICAL

Standard diameter:

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 as shown in the figure, using a cylinder bore gauge.

NOTE:

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

Taper:

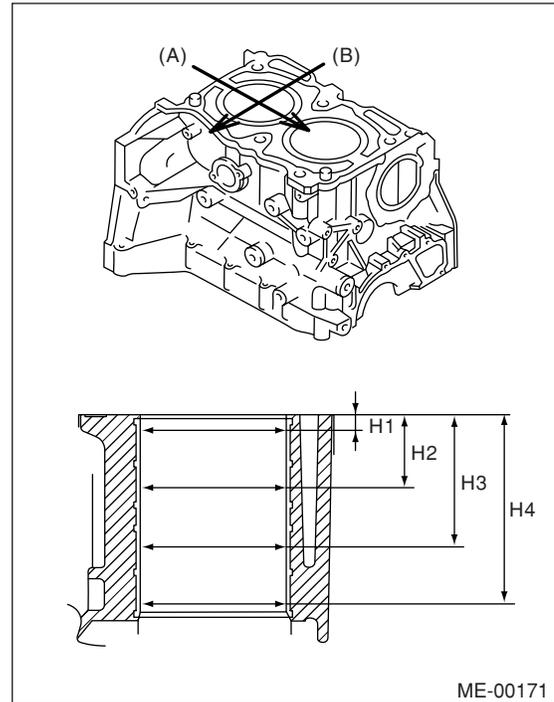
Standard

0.015 mm (0.0006 in)

Out-of-roundness:

Standard

0.010 mm (0.0004 in)



- (A) Piston pin direction
- (B) Thrust direction
- H1: 10 mm (0.39 in)
- H2: 45 mm (1.77 in)
- H3: 80 mm (3.15 in)
- H4: 115 mm (4.53 in)

3) When the 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 as shown in the figure. (Thrust direction)

NOTE:

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

Piston grade point H:

38.2 mm (1.50 in)

Cylinder Block

MECHANICAL

Piston outer diameter:

Standard

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

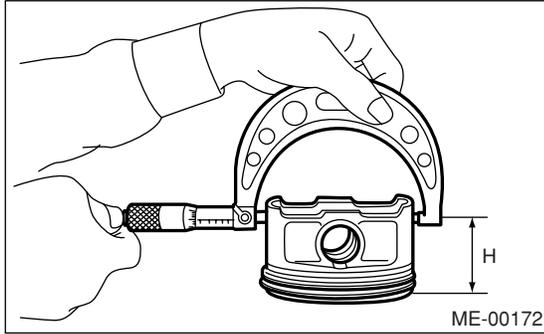
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)

0.25 mm (0.0098 in) oversize

99.745 — 99.765 mm (3.9270 — 3.9278 in)

0.50 mm (0.0197 in) oversize

99.995 — 100.015 mm (3.9368 — 3.9376 in)



5) Calculate the clearance between cylinder and piston.

NOTE:

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

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

Standard

-0.010 — 0.010 mm (-0.00039 — 0.00039 in)

6) Boring and honing:

(1) If one of the values of taper, out-of-roundness, or cylinder-to-piston clearance exceeds the specified limit or is out of standard, 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 100.015 mm (3.9376 in) after boring and honing, replace the crankcase.

NOTE:

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.

3. PISTON AND PISTON PIN

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

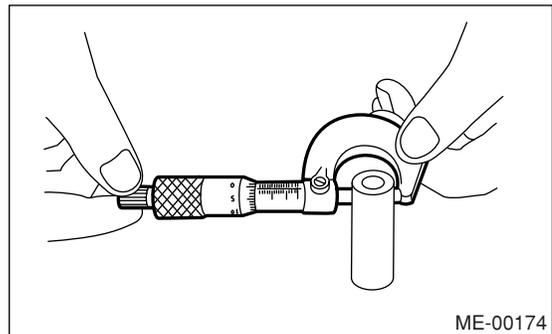
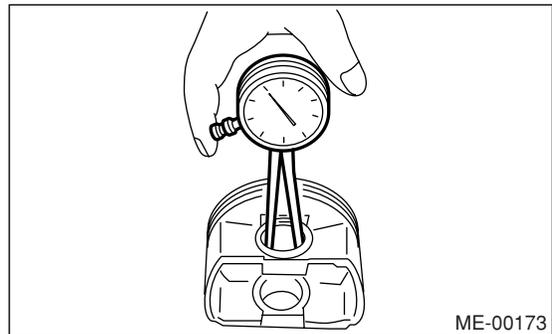
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4DOTC)-76, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is out of specification, replace the piston or bore the cylinder to use an oversize piston.

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

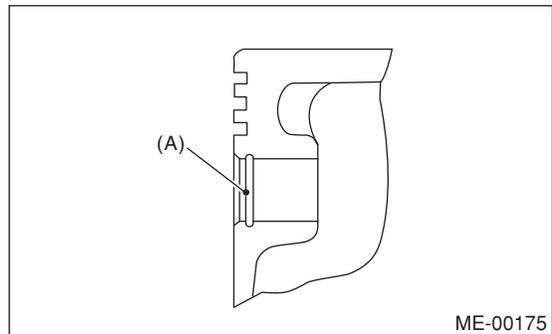
Standard clearance between piston pin and hole in piston:

Standard

0.004 — 0.008 mm (0.0002 — 0.0003 in)



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



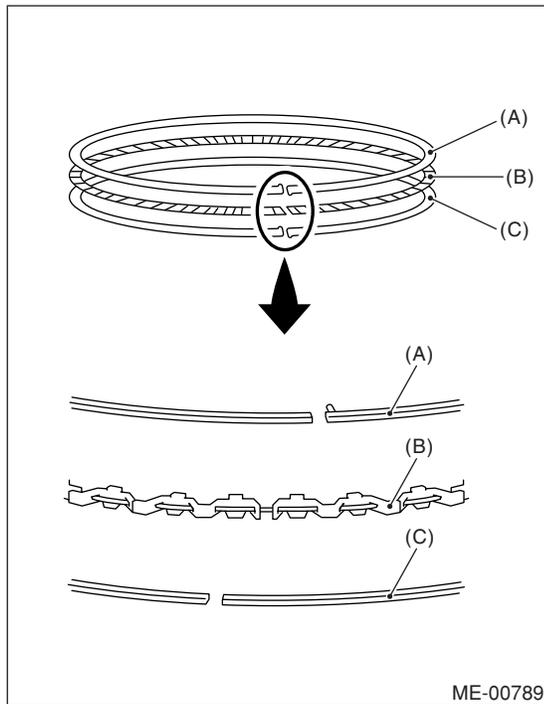
5) Check the piston pin snap ring for distortion, cracks and wear.

4. PISTON RING

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

CAUTION:

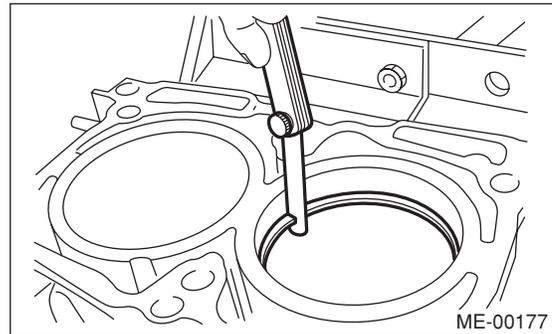
- Marks are displayed on the end of top and second rings. When installing the rings to the piston, face those marks upward.
- Oil ring consists of the upper rail, expander and lower rail. When installing on piston, be careful of each rail's direction.



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

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

		Standard mm (in)
Piston ring gap	Top ring	0.20 — 0.25 (0.0079 — 0.0098)
	Second ring	0.37 — 0.52 (0.015 — 0.020)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)

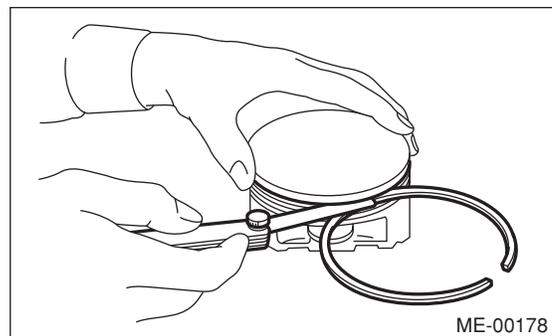


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

NOTE:

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

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



5. CONNECTING ROD

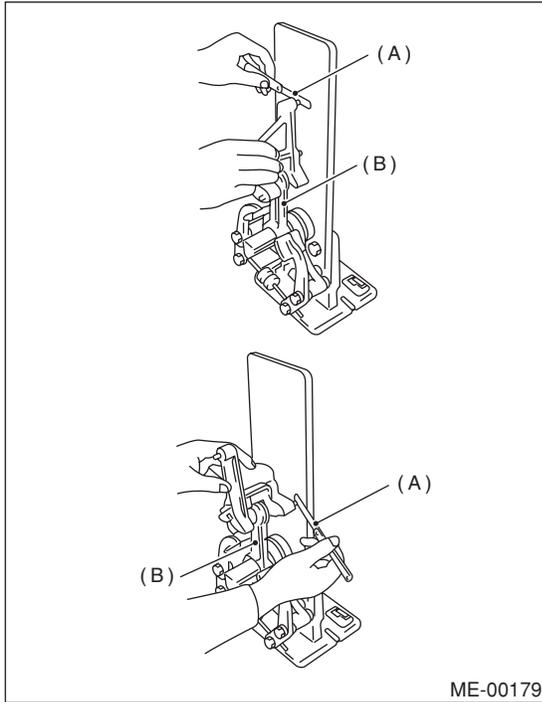
- 1) Replace the connecting rod, if the large or small end thrust surface is damaged.
- 2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

Cylinder Block

MECHANICAL

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

0.10 mm (0.0039 in)



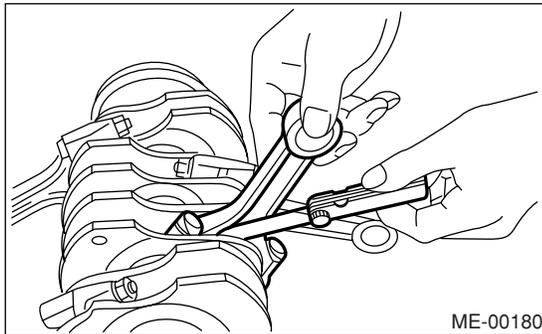
- (A) Thickness gauge
- (B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). If side clearance exceeds the limit or has partial wear, replace the connecting rod.

Connecting rod side clearance:

Standard

0.070 — 0.330 mm (0.0028 — 0.0130 in)



- 4) Inspect the 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 the specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

Connecting rod oil clearance:

Standard

0.017 — 0.045 mm (0.0007 — 0.0018 in)

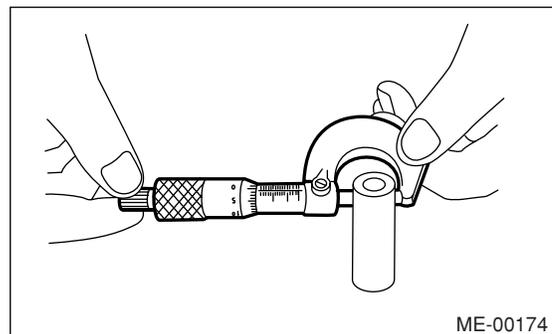
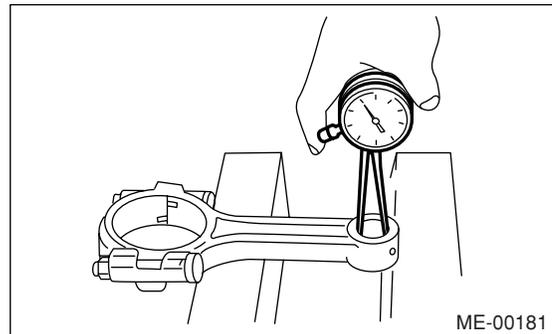
Unit: mm (in)		
Bearings	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.490 — 1.502 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0447 — 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 the 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:

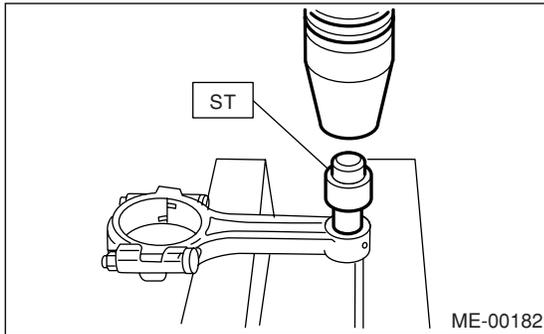
Standard

0 — 0.022 mm (0 — 0.0009 in)



- 7) Replacement procedure is as follows.
 - (1) Remove the bushing from connecting rod with ST and press.
 - (2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSH-
ING REMOVER AND IN-
STALLER



- (3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
- (4) After completion of reaming, clean the bushing to remove chips.

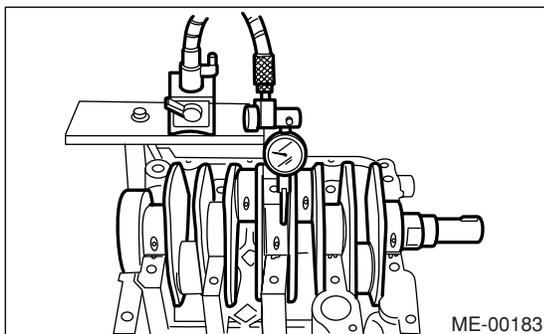
6. CRANKSHAFT AND CRANKSHAFT BEARING

- 1) Clean the crankshaft completely, and check it for cracks using red lead. Replace if defective.
- 2) Measure the bend of crankshaft. If it exceeds the limit, repair or replace it.

NOTE:

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

Crankshaft bend limit:
0.035 mm (0.0014 in)



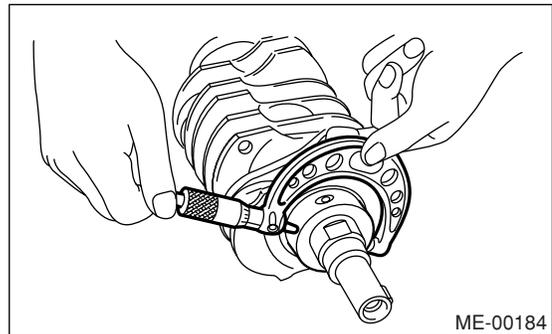
- 3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to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

Crank pin:

Out-of-roundness
0.003 mm (0.0001 in)
Cylindricality
0.004 mm (0.0002 in)
Grinding limit (dia)
To 51.750 mm (2.0374 in)

Crank journal:

Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)
Grinding limit (dia)
To 59.750 mm (2.3524 in)



Cylinder Block

MECHANICAL

		Crank journal diameter		Unit: mm (in)
		#1, #3	#2, #4, #5	Crank pin diameter
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)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.486 — 1.498 (0.0585 — 0.0590)
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)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	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 (2.0447 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	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)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.614 — 1.622 (0.0635 — 0.0639)

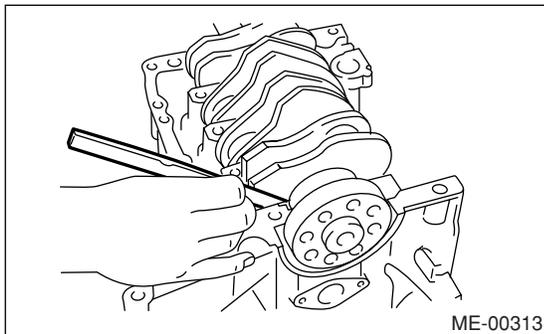
O.D. : Outer Diameter

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

Crankshaft side clearance:

Standard

0.030 — 0.115 mm (0.0012 — 0.0045 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 the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:

Standard

0.010 — 0.030 mm (0.0004 — 0.0012 in)