

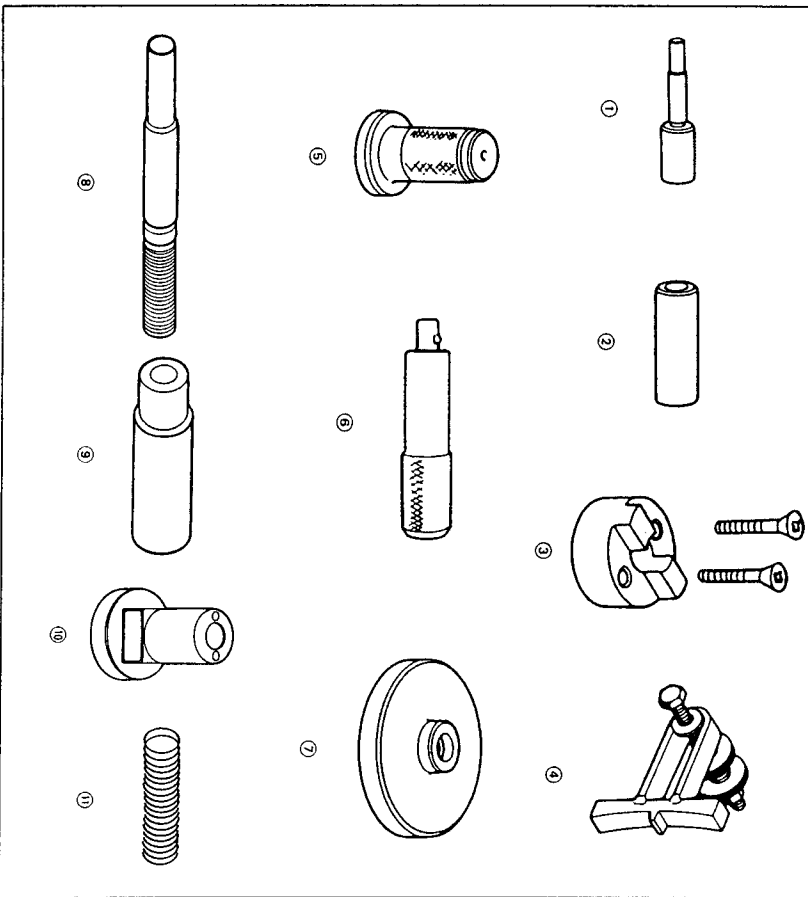


## Engine Block

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## Special Tools

| Ref. No. | Tool Number                    | Description                   | Qty | Page Reference |
|----------|--------------------------------|-------------------------------|-----|----------------|
| ①        | 07GAF-PH60300                  | Piston Pin Base Insert        | 1   | 7-14, 7-16     |
| ②        | 07GAF-PH70100                  | Pilot Collar                  | 1   | 7-14, 7-16     |
| ③        | 07HAF-PL20102 or 07HAF-PL20101 | Piston Base Head              | 1   | 7-14, 7-16     |
| ④        | 07LAB-PV00100                  | Ring Gear Holder              | 1   | 7-6            |
| ⑤        | 07LAD-PT3010A                  | Seal Driver                   | 1   | 7-22           |
| ⑥        | 07749-0010000                  | Driver                        | 1   | 7-18, 7-22     |
| ⑦        | 07948-SB00101                  | Driver Attachment, 76 x 80 mm | 1   | 7-18, 7-22     |
| ⑧        | 07973-PE00310                  | Piston Pin Driver Shaft       | 1   | 7-14, 7-16     |
| ⑨        | 07973-PE00320                  | Piston Pin Driver Head        | 1   | 7-14, 7-16     |
| ⑩        | 07973-6570500                  | Piston Base                   | 1   | 7-14, 7-16     |
| ⑪        | 07973-6570600                  | Piston Base Spring            | 1   | 7-14, 7-16     |

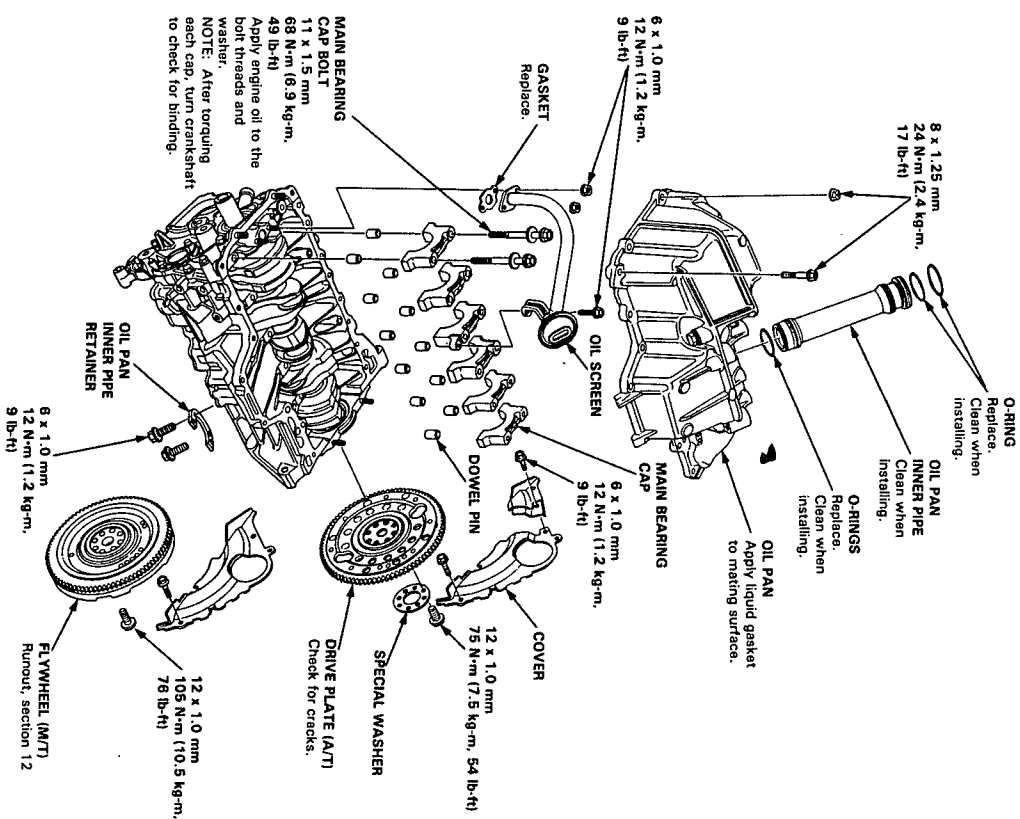


## Illustrated Index

Lubricate all internal parts with engine oil during reassembly.

### NOTE:

- Apply liquid gasket to the mating surfaces of the rear cover and oil pump case before installing them.
- Use liquid gasket, part No. 08718-0001.



## Illustrated Index

(cont'd)

### NOTE:

- Lubricate all internal parts with engine oil during reassembly.
- Use liquid gasket, Part No. 08718-0001.

### MAIN BEARINGS

Clearance, page 7-7  
Selection, page 7-8

NOTE: New main bearings must be selected by matching crank and block identification markings.

### CRANKSHAFT

End play, page 7-6  
Runout, Taper, and Out-of-Round, page 7-11  
Installation, page 7-19

### THRUST WASHERS

Grooved sides face outward.  
NOTE: Thrust washer thickness is fixed and must not be changed by grinding or shimming.

### RUBBER SEAL

Replace when damaged or deteriorated.

### CRANKSHAFT OIL SEAL

Replace.

### O-RING

Replace.

### O-RINGS

Replace.

### CRANKSHAFT OIL SEAL

Replace.

### THRUST WASHERS

Grooved sides face outward.

### RUBBER SEAL

Replace when damaged or deteriorated.

### CRANKSHAFT OIL SEAL

Replace.

### O-RING

Replace.

### O-RINGS

Replace.

### CRANKSHAFT OIL SEAL

Replace.

### THRUST WASHERS

Grooved sides face outward.

### RUBBER SEAL

Replace when damaged or deteriorated.

### CRANKSHAFT OIL SEAL

Replace.

NOTE: New rod bearings must be selected by matching connecting rod assembly and crankshaft identification markings (page 7-8).

Lubricate all internal parts with engine oil during reassembly.

### PISTON RINGS

Replacement, page 7-17  
Measurement, pages 7-16 and 17  
Alignment, page 7-18

### PISTON

Inspection, page 7-11  
NOTE:  
• Before removing piston, inspect the top of the cylinder bore for carbon build-up or ridge. Remove ridge if necessary, page 7-10.  
• To maintain proper piston clearance, match the letter on the piston top (no letter denotes A), with the letter for each cylinder stamped on the block.

### CYLINDER BLOCK

Cylinder bore inspection, page 7-12  
Warpage inspection, page 7-13  
Cylinder bore honing, page 7-13

### CONNECTING ROD BEARINGS

Clearance, page 7-7  
Selection, page 7-8

### CONNECTING ROD

End play, page 7-6  
Selection, page 7-14

### CONNECTING ROD BEARING CAP

Installation, page 7-19  
NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

### CONNECTING ROD CAP NUT

8 x 0.75 mm  
33 N·m (3.3 kg-m)  
24 lb-ft  
After torquing each bearing cap, rotate crankshaft to check for binding.

### CYLINDER BORE SIZES

NOTE: To maintain proper piston clearance, match these letters with the letters on the pistons.

### CONNECTING ROD BEARING CAP

Installation, page 7-19  
NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

### CONNECTING ROD CAP NUT

8 x 0.75 mm  
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24 lb-ft  
After torquing each bearing cap, rotate crankshaft to check for binding.

### CYLINDER BORE SIZES

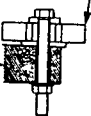
NOTE: To maintain proper piston clearance, match these letters with the letters on the pistons.

## Flywheel and Drive Plate

### Replacement

**Manual Transmission:**  
Remove the eight flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.

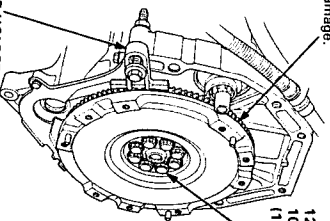
RING GEAR HOLDER  
07LAB-PV00100



RING GEAR  
Inspect ring gear teeth for wear or damage.

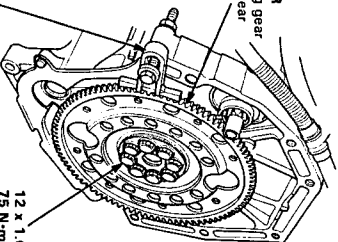
12 x 1.0 mm  
105 N·m  
(10.5 kg-m, 76 lb-ft)

RING GEAR HOLDER  
07LAB-PV00100



**Automatic Transmission:**  
Remove the eight drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.

RING GEAR  
Inspect ring gear teeth for wear or damage.



12 x 1.0 mm  
75 N·m  
(7.5 kg-m, 54 lb-ft)

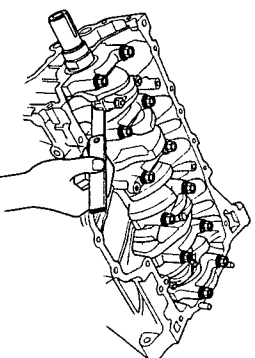
## Connecting Rod and Crankshaft

### End Play

**Connecting Rod End Play:**

Standard (New): 0.15–0.30 mm  
(0.006–0.012 in)

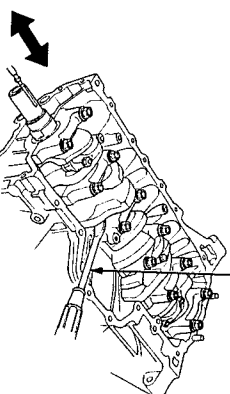
Service Limit: 0.40 mm (0.016 in)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft (pages 7-9 and 7-19).

Push the crank firmly away from the dial indicator, and zero the dial against the end of the crank. Then pull the crank firmly back toward the indicator; dial reading should not exceed service limit.

SCREWDRIVER



**Crankshaft End Play:**

Standard (New): 0.10–0.35 mm  
(0.004–0.014 in)

Service Limit: 0.45 mm (0.018 in)

- If end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary.

**NOTE:** Thrust washer thickness is fixed and must not be changed either by grinding or shimming. Thrust washers are installed with grooved side facing outward.

## Main Bearings

### Clearance

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

**NOTE:** If the engine is still in the car when you bolt the main cap down to check clearance, the weight of the crankshaft and flywheel will flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crankshaft with a jack under the counterweights and check only one bearing at a time.

4. Reinstall the bearings and caps, then torque the bolts.

1st step: 30 N·m (3.0 kg-m, 22 lb-ft)  
Final step: 68 N·m (6.8 kg-m, 49 lb-ft)

5. Do not rotate the crankshaft during inspection.

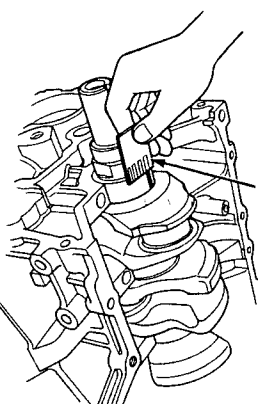
6. Remove the cap and bearings again, and measure the widest part of the plastigage.

**Main Bearing-to-Journal Oil Clearance:**

Standard (New): 0.018–0.048 mm  
(0.0007–0.0019 in)

Service Limit: 0.053 mm (0.0021 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again.

**NOTE:** If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

## Connecting Rod Bearings

### Clearance

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place the plastigage across the rod journal.

4. Reinstall the bearing half and cap, and torque the nuts to 33 N·m (3.3 kg-m, 24 lb-ft).

**NOTE:** Do not rotate the crankshaft during inspection.

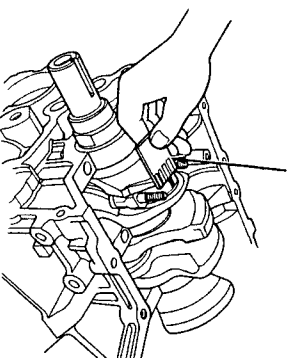
5. Remove the rod cap and bearing half and measure the widest part of the plastigage.

**Connecting Rod Bearing-to-Journal Oil Clearance:**

Standard (New): 0.015–0.043 mm  
(0.0006–0.0017 in)

Service Limit: 0.05 mm (0.002 in)

PLASTIGAGE STRIP



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing. Install a new, complete bearing with the same color code (select the color as shown on the next page), and recheck the clearance.

**CAUTION:** Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

**NOTE:** If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

## Main Bearings

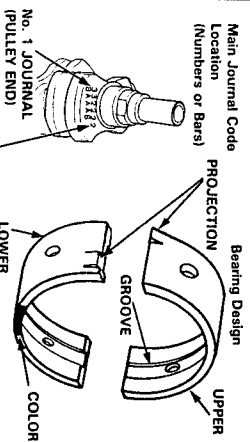
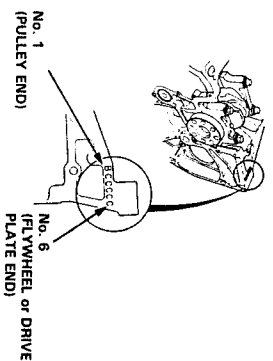
### Selection

**CAUTION:** If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

### Crankshaft Bore Code Location

Numbers Letters or Bars have been stamped on the end of the cylinder block as a code for the size of each of the 6 main journal bores.

Use them, and the numbers or bars stamped on the crank (codes for main journal size), to choose the correct bearings.



**Bearing Identification**  
Color code is on the edge of the bearing.

|        |         |          |           |
|--------|---------|----------|-----------|
| 1 or I | 2 or II | 3 or III | 4 or IIII |
| Red    | Pink    | Yellow   | Green     |
| Yellow | Green   | Brown    | Black     |
| Green  | Brown   | Black    | Blue      |

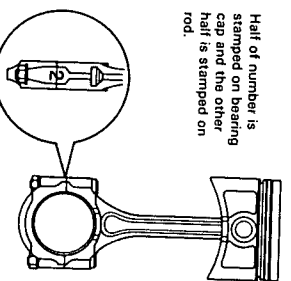
## Connecting Rod Bearings

### Selection

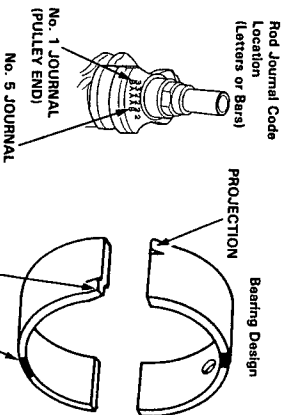
**CAUTION:** If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

### Connecting Rod Code Location

Numbers or Bars have been stamped on the side of each connecting rod as a code for the size of the big end. Use it, and the letters or bars stamped on the crank (codes for rod journal size), to choose the correct bearings.



Half of number is stamped on bearing cap and the other half is stamped on rod.



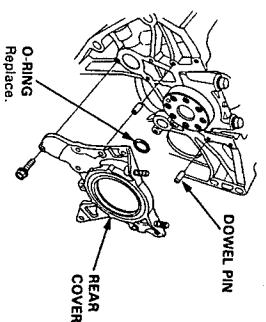
**Bearing Identification**  
Color code is on the edge of the bearing.

|        |         |          |           |
|--------|---------|----------|-----------|
| A or I | B or II | C or III | D or IIII |
| Red    | Pink    | Yellow   | Green     |
| Yellow | Green   | Brown    | Black     |
| Green  | Brown   | Black    | Blue      |

## Pistons and Crankshaft

### Removal

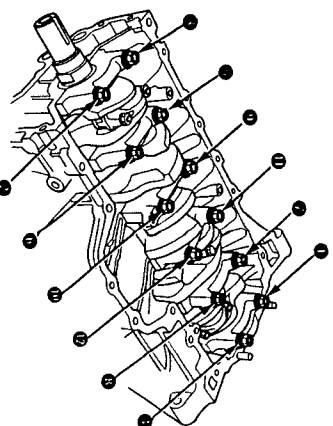
1. Remove the set plate, then remove the oil pan inner pipe.
2. Remove the oil pan assembly.
3. Remove the rear cover.



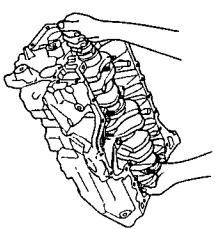
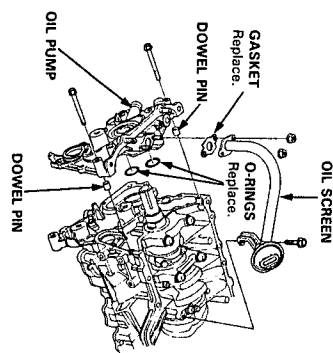
6. Remove the bolts and the bearing caps.

**CAUTION:** To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

### MAIN BEARING CAP BOLTS LOOSENING SEQUENCE



4. Remove the oil screen.
5. Remove the oil pump.
7. Remove the rod caps/bearings and main caps/bearings. Keep all caps/bearings in order.
8. Lift the crankshaft out of the engine, being careful not to damage journals.

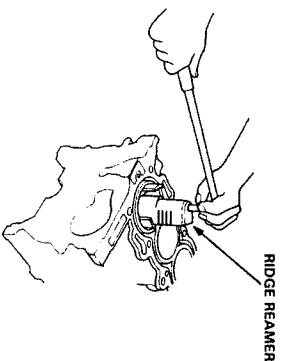


## Pistons and Crankshaft

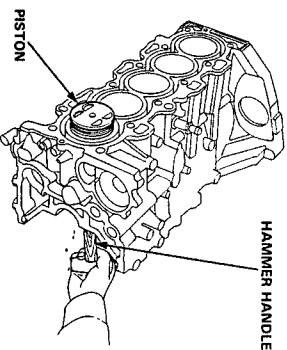
### Removal (cont'd)

9. Remove the upper bearing halves from the connecting rods and set them aside with their respective caps.
10. Reinstall the main caps and bearings on the engine in proper order.
11. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer. Follow the reamer manufacturer's instructions.

**CAUTION:** If the ridge is not removed, it may damage the pistons as they are pushed out.



12. Use the wooden handle of a hammer to drive the pistons out.



13. Reinstall the rod bearings and caps after removing each piston/connecting rod assembly.
14. Mark each piston/connecting rod assembly with its cylinder number to avoid mixup on reassembly.

**NOTE:** The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

## Crankshaft

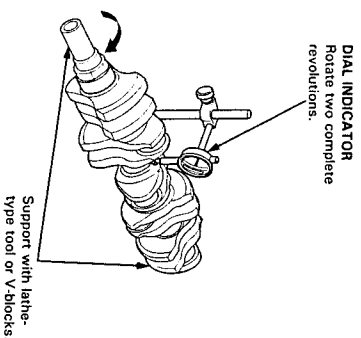
### Inspection

- Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
- Check the keyway and threads.

#### Alignment

- Measure runout on all main journals to make sure the crankshaft is not bent.
- The difference between measurements on each journal must not be more than the service limit.

**Crankshaft Total Indicated Runout:**  
Standard (New): 0.03 mm (0.001 in) max.  
Service Limit: 0.04 mm (0.002 in)



## Pistons

### Inspection

1. Check the piston for distortion or cracks.

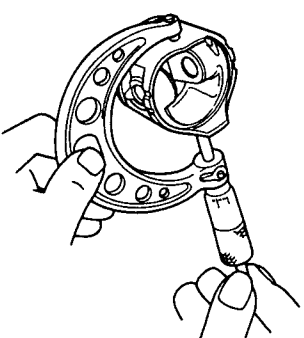
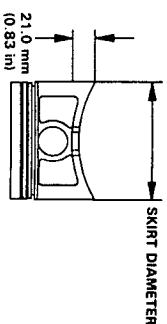
**NOTE:** If cylinder is bored, an oversized piston must be used.

2. Measure piston diameter at a point 21.0 mm (0.83 in) from bottom of skirt.

**NOTE:** There are two standard-size pistons (No letter (A) or B). The letter is stamped on the top of the piston. These letters are also stamped on the cylinder block as cylinder bore sizes (page 7-5).

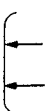
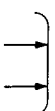
#### Piston Diameter

|           | Standard (New)                         | Service Limit            |
|-----------|--|--------------------------|
| No Letter | 84.980–84.990 mm<br>(3.3457–3.3461 in) | 84.970 mm<br>(3.3453 in) |
| (A)       | 84.970–84.980 mm<br>(3.3453–3.3457 in) | 84.960 mm<br>(3.3449 in) |
| B         |  |                          |

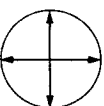


- Measure taper at edges of each rod and main journal.
- The difference between measurements on each journal must not be more than the service limit.

**Journal Taper:**  
Standard (New): 0.005 mm (0.0002 in) max.  
Service Limit: 0.010 mm (0.0004 in)



Measure out-of-round at middle.



- **Out-of-Round and Taper**
- Measure out-of-round at the middle of each rod and main journal in two places.
- The difference between measurements on each journal must not be more than the service limit.

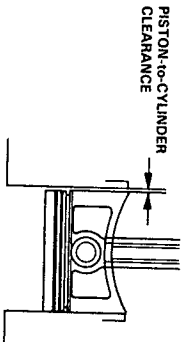
**Journal Out-of-Round:**  
Standard (New): 0.005 mm (0.0002 in) max.  
Service Limit: 0.010 mm (0.0004 in)

## Pistons

### Inspection (cont'd)

- Calculate difference between cylinder bore diameter in right column and piston diameter.

**Piston-to-Block Clearance**  
**Standard (New):** 0.010–0.040 mm  
 (0.0004–0.0016 in)  
**Service Limit:** 0.05 mm (0.002 in)

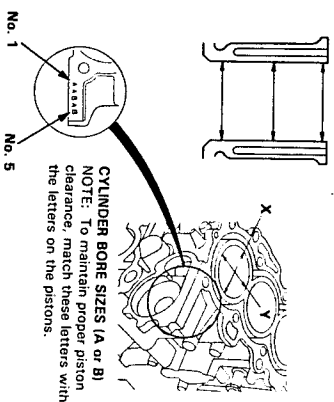


**Overize Piston Diameter**  
 0.25: 85.230–85.240 mm (3.3555–3.3559 in)  
 0.50: 85.480–85.490 mm (3.3653–3.3657 in)

## Cylinder Block

### Inspection

- Measure wear and taper in directions X and Y at three levels in each cylinder as shown.



### Cylinder Bore Size

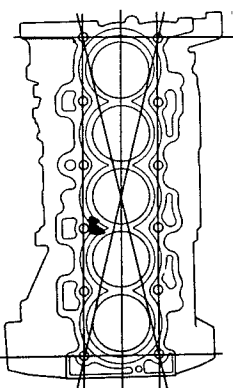
|   | Standard (New)                         | Service Limit            |
|---|--|--------------------------|
| A | 85.010–85.020 mm<br>(3.3468–3.3472 in) | 85.070 mm<br>(3.3492 in) |
| B | 85.000–85.010 mm<br>(3.3465–3.3468 in) | 85.070 mm<br>(3.3492 in) |

**Overize**  
 0.25: 85.250–85.270 mm (3.3563–3.3571 in)  
 0.50: 85.500–85.520 mm (3.3661–3.3669 in)

**Bore Taper**  
 Limit: (Difference between first and third measurement) 0.05 mm (0.002 in)

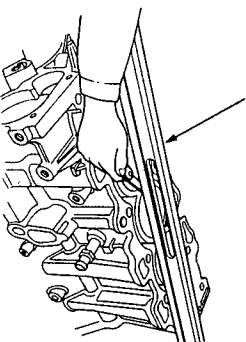
- If measurements in any cylinder are beyond oversize bore service limit, replace the cylinder block.
  - If block is to be rebored, refer to Piston Clearance Inspection (page 7-11) after reboring.
- NOTE:** Scored or scratched cylinder bores must be honed.
- Reboring Limit:** 0.5 mm (0.02 in)
- Check the top of the cylinder block for warpage. Measure along the edges and across the center as shown.

### SURFACES TO BE MEASURED



**Cylinder Block Warpage:**  
**Standard (New):** 0.07 mm (0.003 in) max.  
**Service Limit:** 0.10 mm (0.004 in)

### PRECISION STRAIGHT EDGE



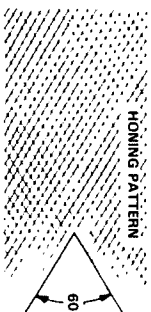
## Bore Honing

**NOTE:** Only scored or scratched cylinder bores must be honed.

- Measure cylinder bores as shown on page 7-12. If the cylinder block is to be re-used, hone the cylinders and remeasure the bores.
- Hone cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern.

### NOTE:

- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Armco, or equivalent.
- Do not use stones that are worn or broken.

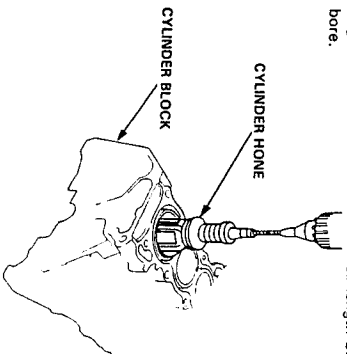


- When honing is complete, thoroughly clean the cylinder block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil immediately to prevent rusting.

**NOTE:** Never use solvent. It will only redistribute the grit on the cylinder walls.

- If scoring or scratches are still present in cylinder bores after honing to service limit, rebore the cylinder block.

**NOTE:** Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



## Piston Pins

### Removal

1. Assemble the special tool as shown.

PISTON BASE HEAD  
07HAF-PL20102 or  
07HAF-PL20101

PISTON PIN BASE INSERT  
07GAF-PH60300

PISTON BASE  
07973-6570500

PISTON BASE SPRING  
07973-6570600

2. Adjust the length of piston pin driver to 51.5 mm (2.03 in) as shown.

PISTON PIN DRIVER HEAD  
07973-PE00320

PISTON PIN DRIVER  
SHAFT  
07973-PE00310

PILOT COLLAR  
07GAF-PH70100

Embossed mark facing up

NOTE: Use hydraulic press. When pressing pin in or out, make sure that the recessed portion of the piston aligns with the lips on the collar.

3. Place the piston on the special tool and press the pin out with a hydraulic press.

## Connecting Rods

### Selection

Each rod is sorted into one of four tolerance ranges (from 0 to 0.024 mm (0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3, 4 or 5) indicating that tolerance. You may find any combination of 1, 2, 3, 4 or 5 in any engine.

Normal Bore Size: 48.0 mm (1.89 in)

#### NOTE:

- Reference numbers are for big end bore size and do NOT indicate the position of rod in engine.
- Inspect connecting rod for cracks and heat damage.

#### CONNECTING ROD BORE REFERENCE NUMBER

Half of number is stamped on bearing cap, the other half on connecting rod.

Inspect bolts and nuts for stress cracks.

## Piston Pins

### Inspection

1. Measure the diameter of the piston pin.

Piston Pin Diameter:

Standard (New): 21.994–22.000 mm

(0.8659–0.8661 in)

Oversize: 21.997–22.003 mm

(0.8660–0.8663 in)

NOTE: All replacement piston pins are oversize.

3. Measure the piston pin-to-piston clearance.

NOTE: Check the piston for distortion or cracks.

If the piston pin clearance is greater than 0.024 mm (0.0009 in), remeasure using an oversize piston pin.

Piston Pin-to-Piston Clearance:

Standard (New): 0.012–0.024 mm

(0.0005–0.0009 in)

2. Zero the dial indicator to the piston pin diameter.

4. Check the difference between piston pin diameter and connecting rod small end diameter.

Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.013–0.032 mm

(0.0005–0.0013 in)



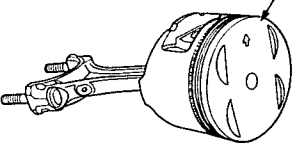
## Piston Pins

### Installation

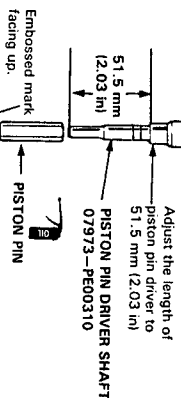
1. Use a hydraulic press for installation.

- When pressing pin in or out, be sure you position the recessed flat on the piston against the lugs on the base attachment.

The arrow must face the timing belt side of the engine and the connecting rod oil hole must face the left side of the engine.



PISTON PIN DRIVER HEAD  
07973-PE00320



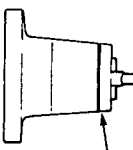
Adjust the length of piston pin driver to 51.5 mm (2.03 in)

PISTON PIN DRIVER SHAFT  
07973-PE00310

PISTON PIN  
07GAF-PH70100

PILOT COLLAR  
07GAF-PH60300

PISTON PIN BASE INSERT  
07HAF-PL20102 or  
07HAF-PL20101



NOTE: Install the assembled piston and rod with the oil hole facing the left side of the engine.

## Piston Rings

### End Gap

1. Using a piston, push a new ring into the cylinder bore 15–20 mm (0.6–0.8 in) from the bottom.
2. Measure the piston ring end-gap with a feeler gauge:

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits on page 7-12. If the bore is over limit, the cylinder block must be rebored.

#### Piston Ring End-Gap:

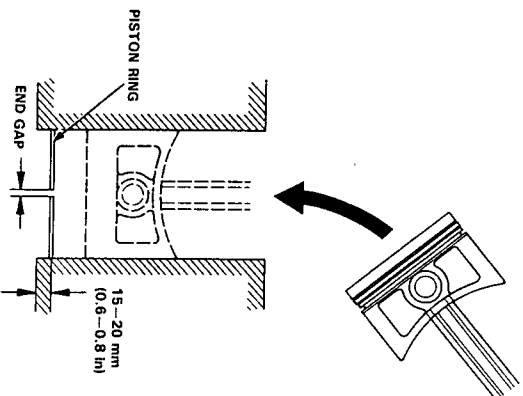
Top Ring  
Standard (New): 0.20–0.35 mm  
(0.008–0.014 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring  
Standard (New): 0.40–0.55 mm  
(0.016–0.022 in)

Service Limit: 0.70 mm (0.028 in)

Oil Ring  
Standard (New): 0.20–0.70 mm  
(0.008–0.028 in)  
Service Limit: 0.80 mm (0.031 in)



### Replacement

1. Using a ring expander, remove the old piston rings.
2. Clean all ring grooves thoroughly.

#### NOTE:

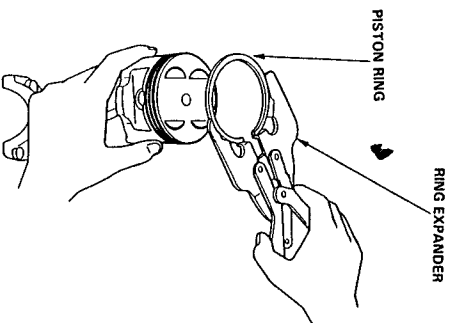
- Use a squared-off broken ring or ring groove cleaner with blade to fit piston grooves. File down blade if necessary.
- Compression ring grooves are 1.2 mm (0.05 in) wide and oil ring groove is 2.8 mm (0.11 in) wide.

CAUTION: Do not use a wire brush to clean ring lands, or cut ring lands deeper with cleaning tool.

NOTE: If piston is to be separated from connecting rod, do not install new rings yet.

3. Install new rings in proper sequence and position (page 7-18).

NOTE: Do not reuse old piston rings.



### Ring-to-Groove Clearance

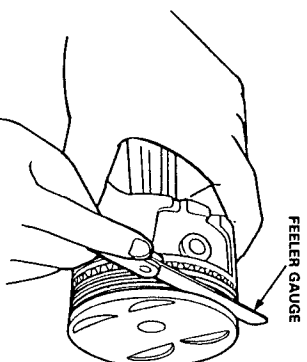
After installing a new set of rings, measure ring-to-groove clearance:

Top Ring Clearance  
Standard (New): 0.035–0.060 mm  
(0.0014–0.0024 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance  
Standard (New): 0.030–0.055 mm  
(0.0012–0.0022 in)

Service Limit: 0.13 mm (0.005 in)



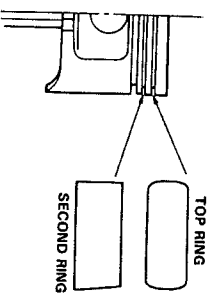
## Piston Rings

### Alignment

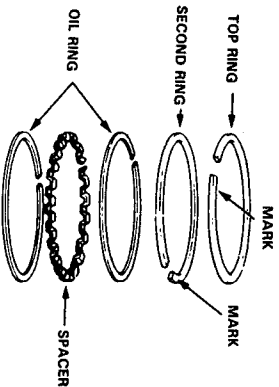
1. Install the rings as shown on page 7-17.

Identify top and second rings by the chamfer on the edge, and make sure they are in proper grooves on piston.

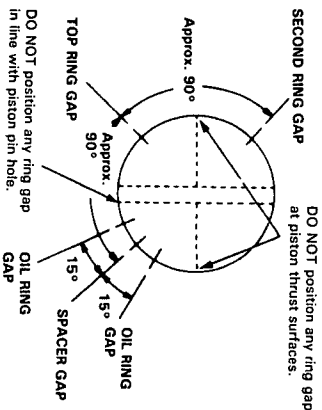
NOTE: The manufacturing marks must be facing upward.



2. Rotate the rings in grooves to make sure they do not bind.



3. Position the ring end gaps as shown:

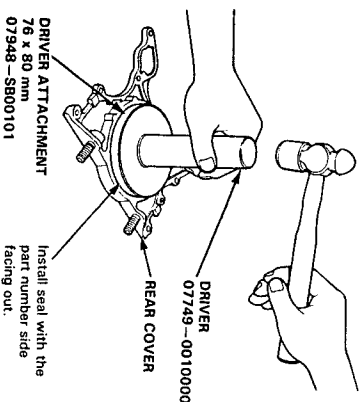


## Crankshaft Oil Seal

### Installation

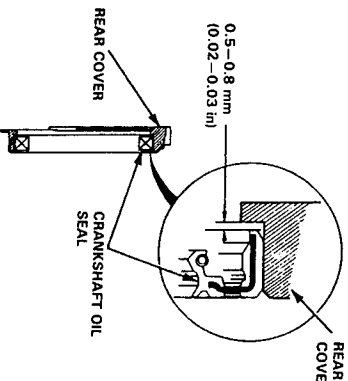
The seal surface on the block should be dry.  
Apply a light coat of oil to the crankshaft and to the lip of seal.

1. Drive the crankshaft oil seal into the rear cover.



2. Confirm clearance is equal all the way around with a feeler gauge.

Clearance: 0.5–0.8 mm (0.02–0.03 in)



NOTE: Refer to page 8-14 for installation of the oil pump side crankshaft oil seal.

## Pistons

### Installation

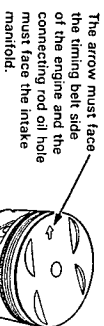
Before installing the piston, apply a coat of engine oil to the ring grooves and cylinder bores.

1. If the crankshaft is already installed:

- Remove the connecting rod caps and slip short sections of rubber hose over the threaded ends of the connecting rod bolts.
- Install the ring compressor, check that the bearing is securely in place, then position the piston in the cylinder and tap it in using the wooden handle of a hammer.
- Stop after the ring compressor pops free and check the connecting rod-to-crank journal alignment before putting piston into place.
- Install the rod caps with bearings, and torque the nuts to 33 N·m (3.3 kg·m, 24 lb·ft)

2. If the crankshaft is not installed:

- Remove the rod caps and bearings, install the ring compressor, then position the piston in the cylinder and tap it in using the wooden handle of a hammer.
- Position all pistons at top dead center.

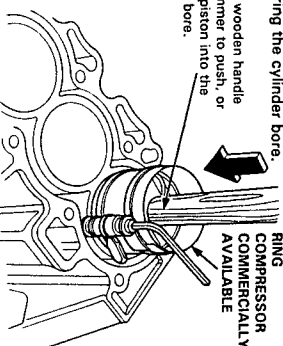


CONNECTING ROD OIL HOLE

RUBBER HOSES

NOTE: Maintain downward force on the ring compressor to prevent rings from expanding before entering the cylinder bore.

Use the wooden handle of a hammer to push, or tap the piston into the cylinder bore.



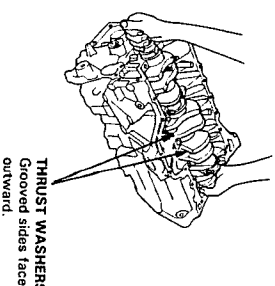
## Crankshaft

### Installation

Before installing the crankshaft, apply a coat of engine oil to the main bearings and rod bearings.

1. Insert bearing halves in the cylinder block and connecting rods.

2. Lower the crankshaft into the cylinder block, seating the rod journals into connecting rods No. 1, No. 2 and No. 5. Install the rod caps and nuts finger-tight.



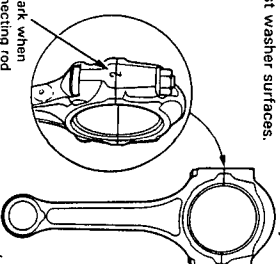
3. Rotate the crankshaft clockwise, seat journals into connecting rods No. 3 and No. 4, and install the rod caps and nuts finger-tight.

NOTE: Install caps so the bearing recess is on the same side as the recess in the rod.

4. Check rod bearing clearance with plastigage (page 7-7), then torque the capnuts.  
33 N·m (3.3 kg·m, 24 lb·ft)

NOTE: Reference numbers on connecting rod are for big-end bore tolerance and do not indicate the position of piston in the engine.

5. Install the thrust washers on the No. 4 journal. Oil the thrust washer surfaces.



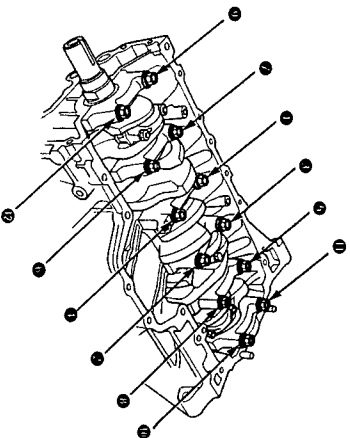
(cont'd)

# Crankshaft

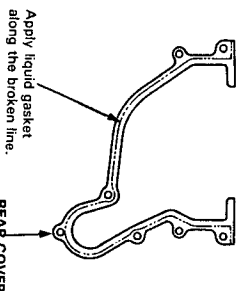
## Installation (cont'd)

6. Install the main bearing caps. Check clearance with plastigage (page 7-7), then tighten the bearing cap bolts in 2 steps. In the first step, tighten all bolts in sequence to about 30 N·m (3.0 kg·m, 22 lb·ft); in the final step, tighten in same sequence to 68 N·m (6.8 kg·m, 49 lb·ft).

NOTE: Coat the bolt threads with oil.

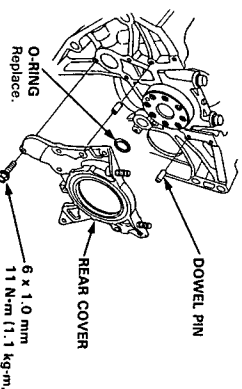


7. Apply liquid gasket to the engine block mating surface of the rear cover, then install it on the engine block.



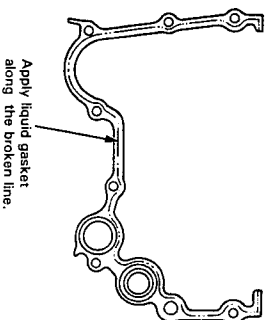
NOTE:  
● Use liquid gasket, Part No. 08718-0001.  
● Check that the mating surfaces are clean and dry before applying liquid gasket.

- Apply liquid gasket as an even bead, centered between edges of the mating surface.
- To prevent leakage of oil, apply liquid gasket to the inner threads of the bolt holes.
- Do not apply liquid gasket to O-ring grooves.
- Do not install the parts if 20 minutes or more have elapsed since applying liquid gasket.
- Instead, reapply liquid gasket after removing old residue.
- After assembly, wait at least 30 minutes before filling the engine with oil.
- Apply a light coat of oil to the crankshaft and to the lip of seal.
- Use a new O-ring and apply oil when installing it.



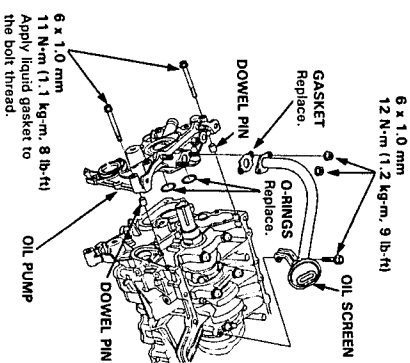
8. Apply liquid gasket to the engine block mating surface of the oil pump, then install it on the engine block.

NOTE: Do not apply liquid gasket to O-ring grooves.

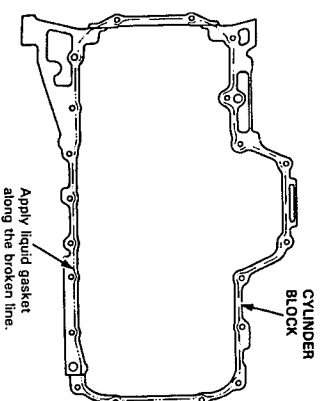


- NOTE:  
● Apply a light coat of oil to the crankshaft and to the lip of seal.  
● Use new O-rings and apply oil when installing them.

9. Install the oil screen



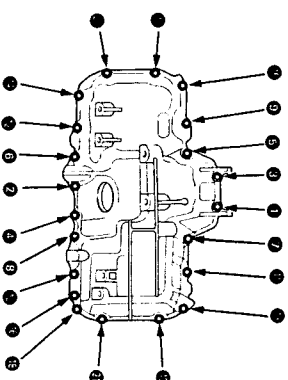
10. Apply liquid gasket to the cylinder block, then install the oil pan.



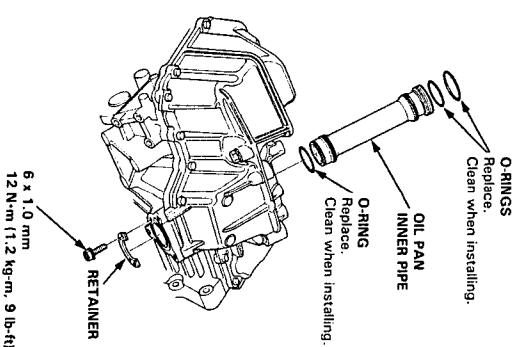
11. Tighten the oil pan bolts and nuts as shown.

8 x 1.25 mm  
2.4 N·m (2.4 kg·m, 17 lb·ft)

### OIL PAN BOLT TORQUE SEQUENCE



12. Install the oil pan inner pipe, then install the retainer.



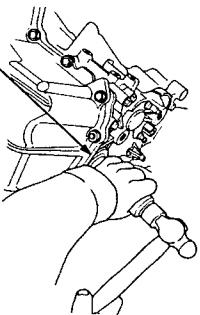
## Crankshaft Oil Seals

### Installation (Engine removal not required)

**NOTE:** The crankshaft oil seal housing surface should be dry.

Apply a light coat of grease to the crankshaft and to the lips of the seals.

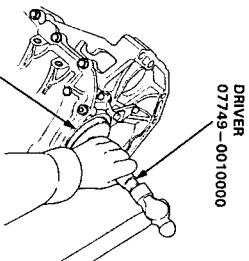
1. Using the special tool, drive in the crankshaft oil seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft and check that the crankshaft oil seal lip is not distorted.



**SEAL DRIVER**  
07LAD-PT3010A  
Install seal with the part number side facing out.

2. Measure the flywheel-end seal thickness and the oil seal housing depth. Using the special tool, drive the crankshaft oil seal into the rear cover to the point where the clearance between the bottom of the crankshaft oil seal and the rear cover is 0.5–0.8 mm (0.02–0.03 in) (page 7-18).

**NOTE:** Align the hole in the driver attachment with the pin on the crankshaft.



**DRIVER**  
07749-0010000

**DRIVER ATTACHMENT**  
76 x 80 mm  
07948-SB00101  
Install seal with the part number side facing out.

## Engine Lubrication

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