

2004 Honda Element DX

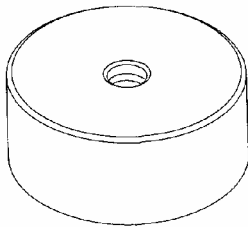
2003-06 ENGINE Engine Block - Element

2003-06 ENGINE

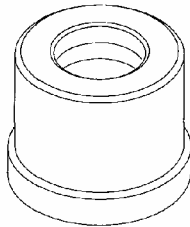
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SPECIAL TOOLS

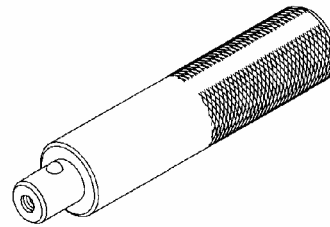
Ref. No.	Tool Number	Description	Qty
①	07ZAD-PNAA100	Oil Seal Driver Attachment 96	1
②	07746-0010700	Attachment, 24 x 26 mm	1
③	07749-0010000	Driver	1



①



②



③

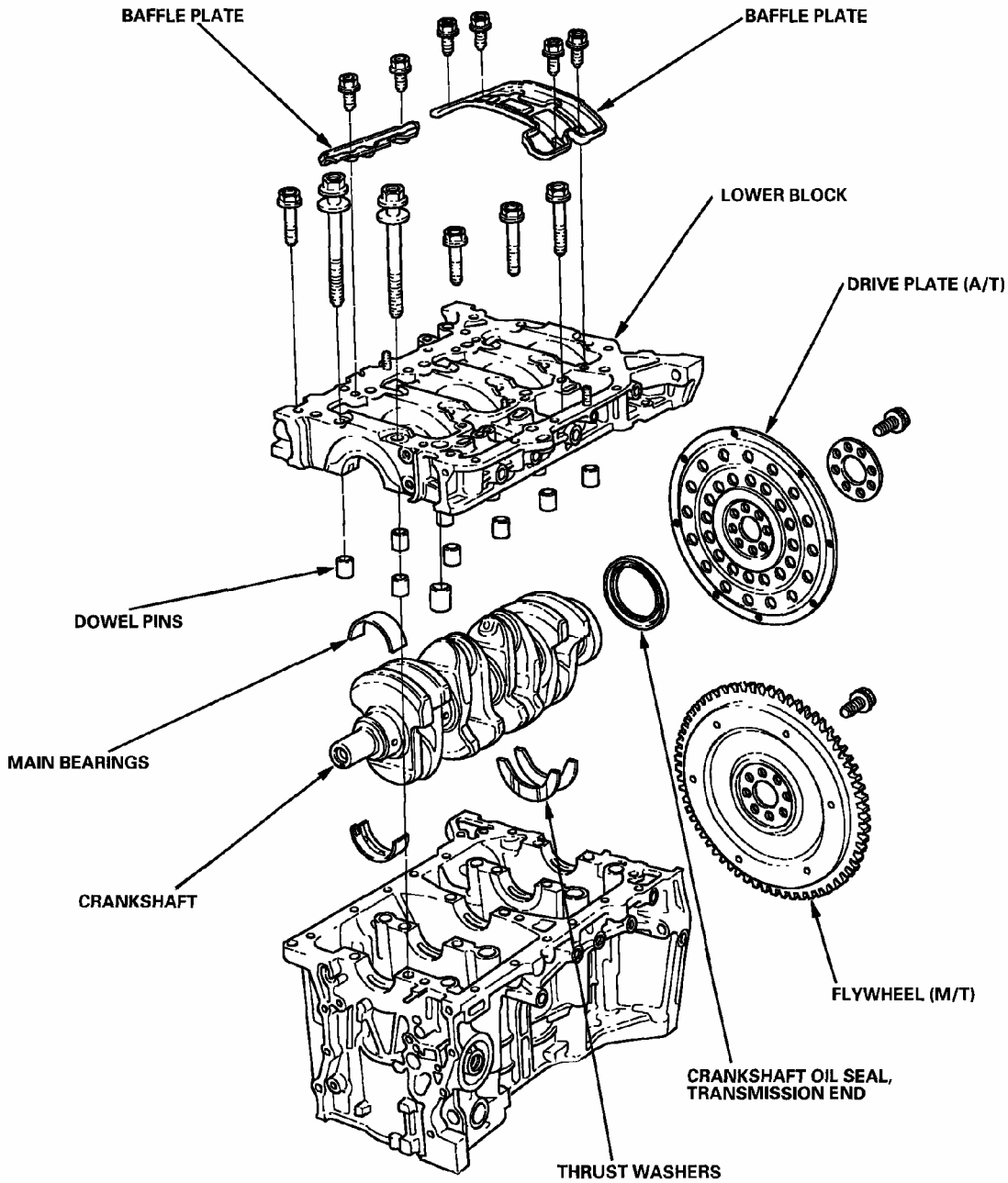
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Fig. 1: View Of Special Tools And Description Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

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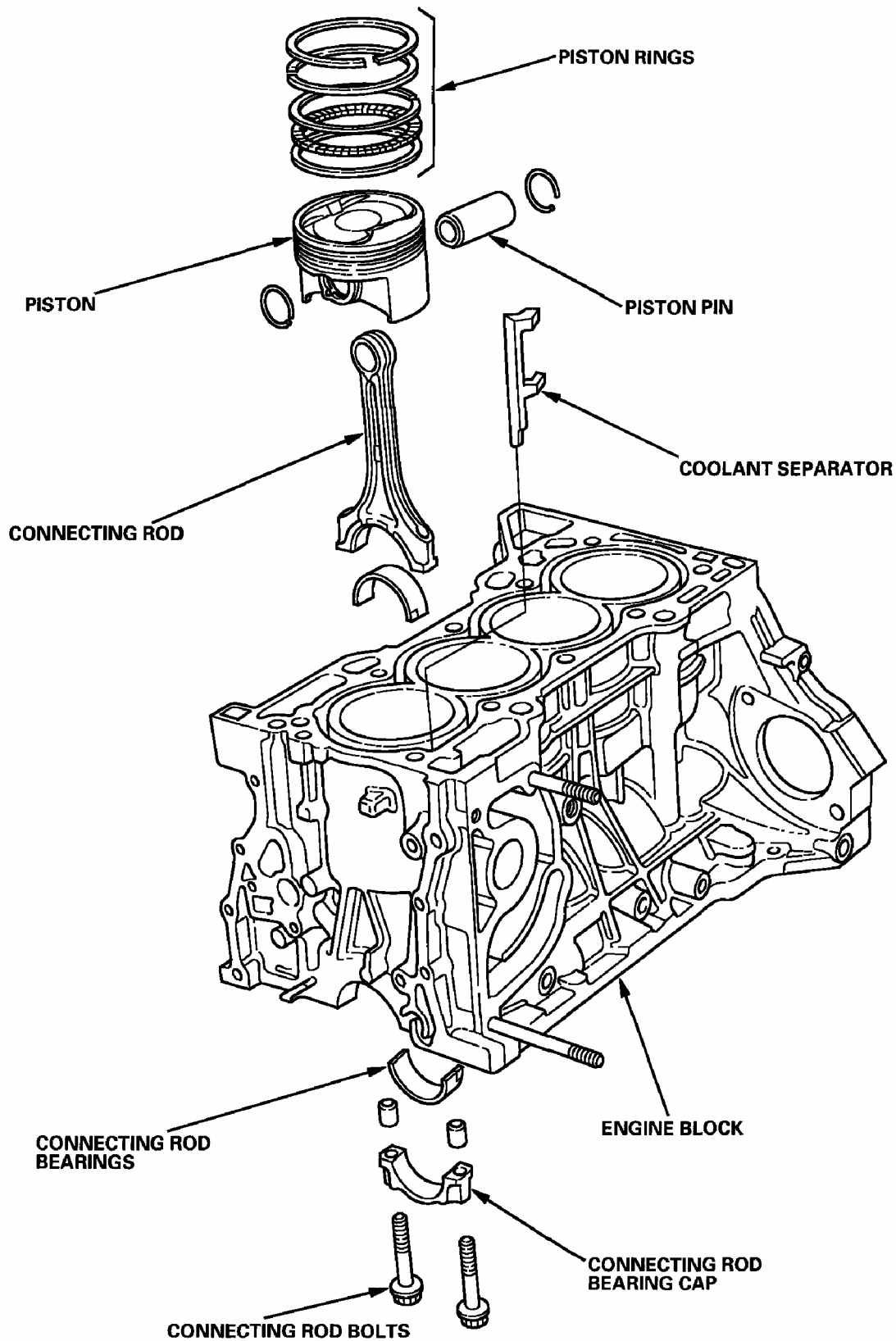


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Fig. 2: Identifying Cylinder Block And Related Components (1 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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Fig. 3: Identifying Cylinder Block And Related Components (2 Of 2)

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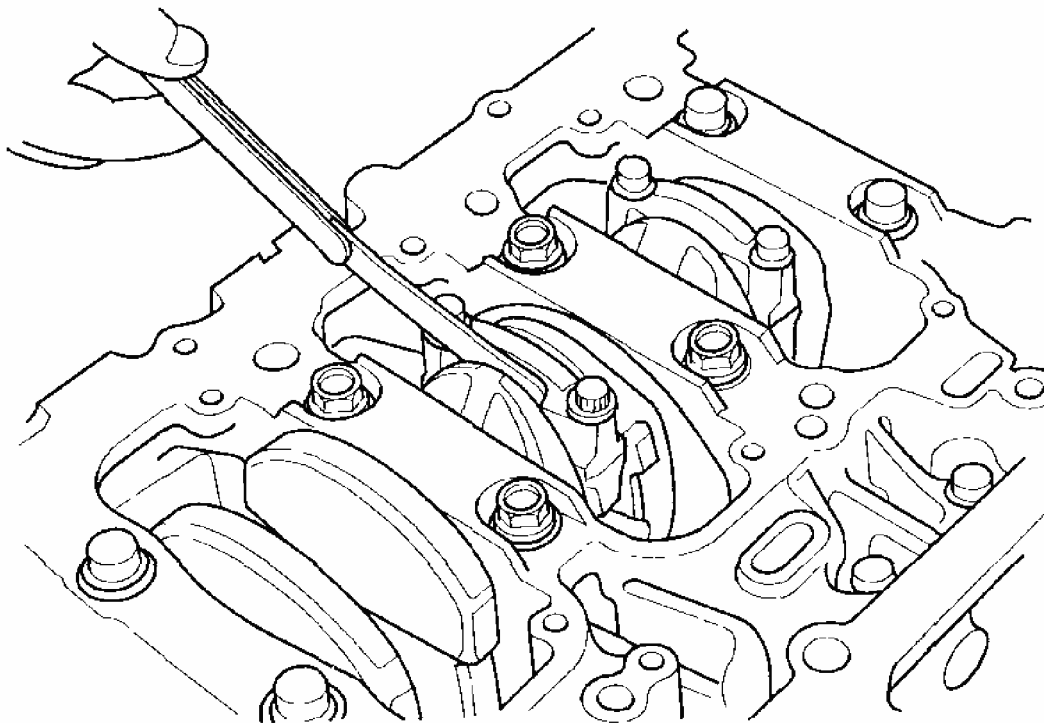
CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see OIL PUMP REMOVAL).
2. Remove the baffle plates (see step 8).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and crankshaft.

Connecting Rod End Play

Standard (New): 0.15-0.35 mm (0.006-0.014 in.)

Service Limit: 0.40 mm (0.016 in.)



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Fig. 4: Measuring Connecting Rod End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

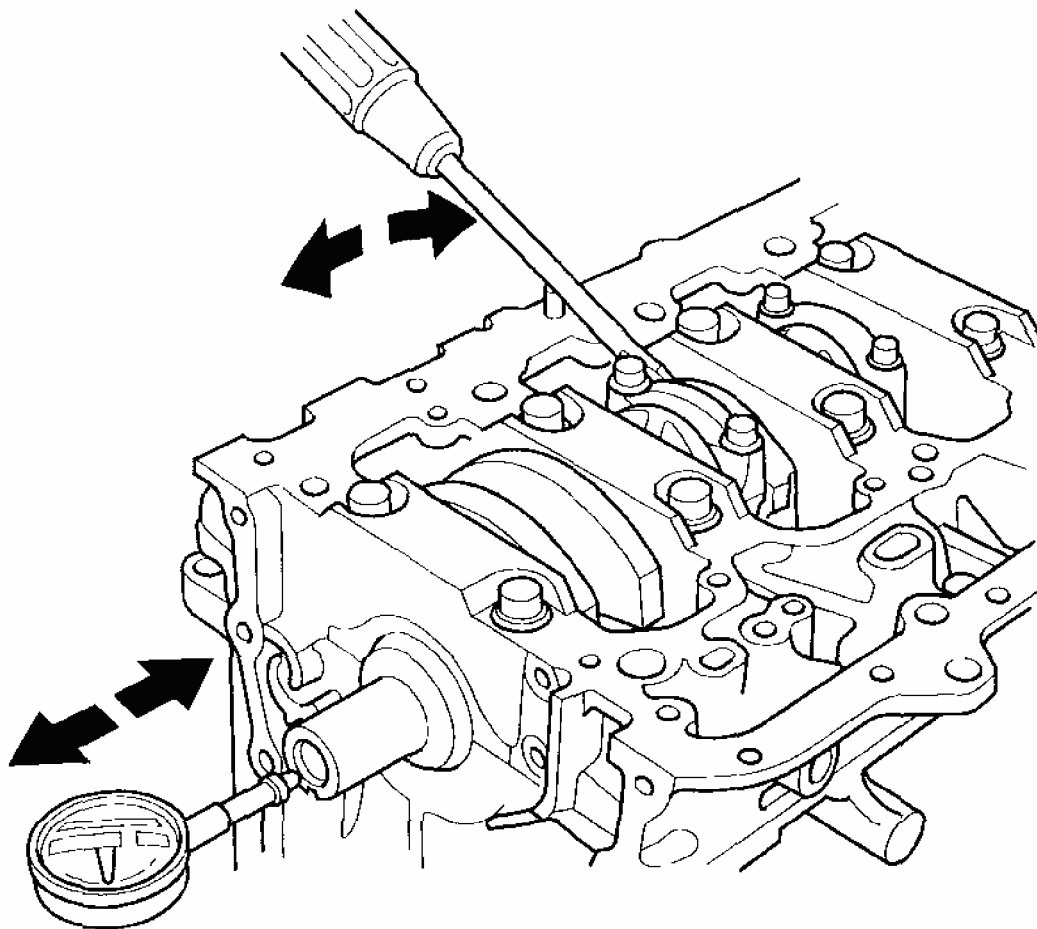
4. If the connecting rod end play is out-of-tolerance, install a new connecting rod, and recheck. If it is still out-of-tolerance, replace the crankshaft (see CRANKSHAFT AND PISTON REMOVAL).

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

Crankshaft End Play

Standard (New): 0.10-0.35 mm (0.004-0.014 in.)

Service Limit: 0.45 mm (0.018 in.)



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Fig. 5: Attaching Dial Indicator

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the crankshaft end play is out-of-tolerance, replace the thrust washers, and recheck. If it is still out-of-tolerance, replace the crankshaft (see **CRANKSHAFT AND PISTON REMOVAL**).

CRANKSHAFT MAIN BEARING REPLACEMENT

MAIN BEARING CLEARANCE INSPECTION

1. Remove the lower block and bearing halves (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and lower block, then torque the bolts to 29 N.m (3.0 kgf.m, 22 lbf.ft) + 56° using a commercially available torque angle gauge.

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

5. Remove the lower block and bearings again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

No. 1,2,4,5 Journals:

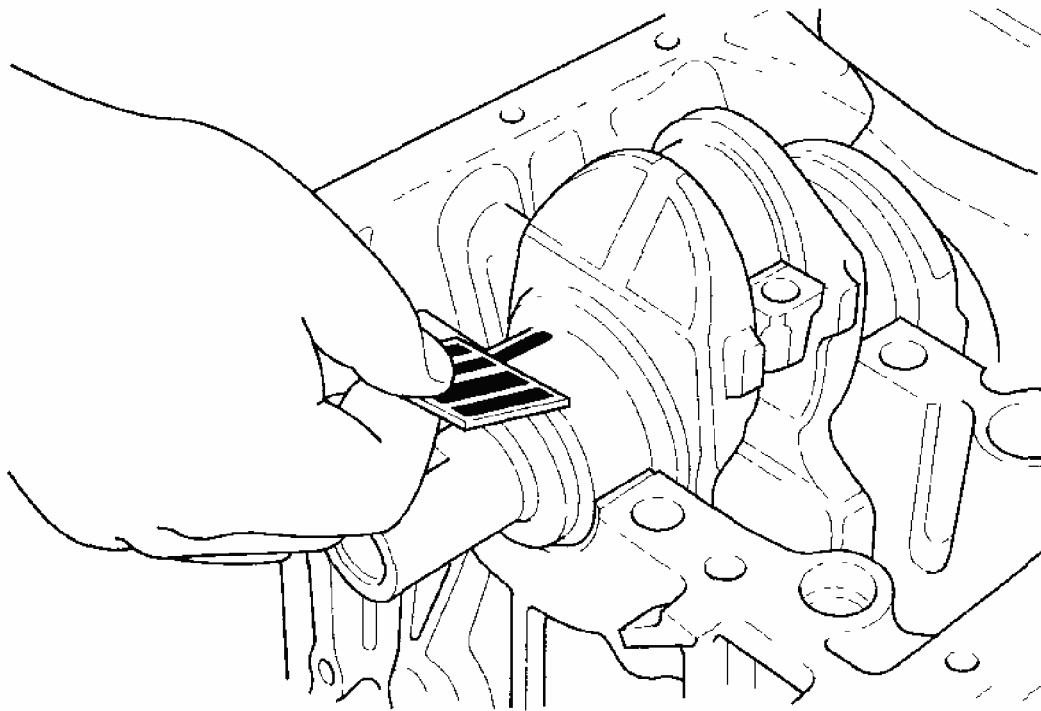
Standard (New): 0.017-0.041 mm (0.0007-0.0016 in.)

Service Limit: 0.050 mm (0.0020 in.)

No. 3 Journal:

Standard (New): 0.025-0.049 mm (0.0010-0.0019 in.)

Service Limit: 0.055 mm (0.0022 in.)



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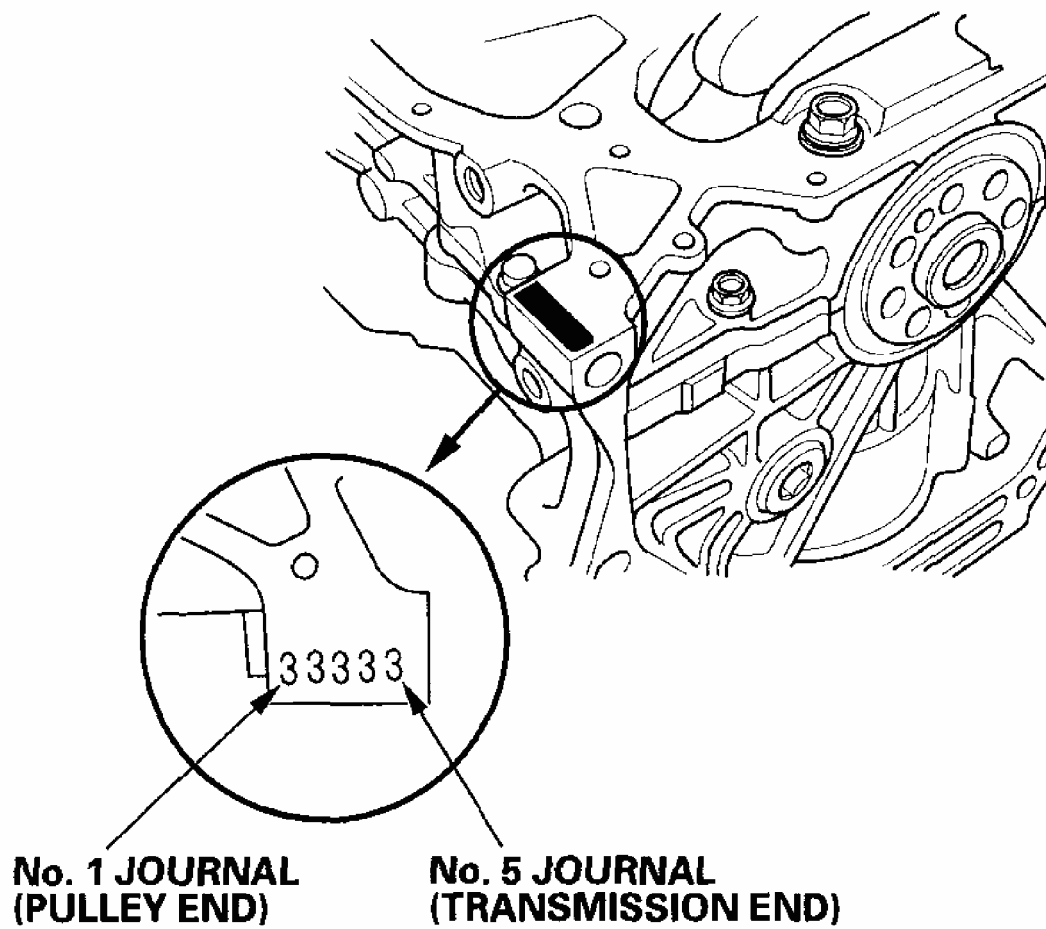
Fig. 6: Measuring Main Bearing Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code (s), and recheck the clearance. 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 again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

MAIN BEARING SELECTION

Crankshaft Bore Code Location

1. Numbers or letters or bars have been stamped on the end of the engine block as a code for the size of each of the five main journal bores. Write down the crank bore codes. If you can't read the codes because of accumulated dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



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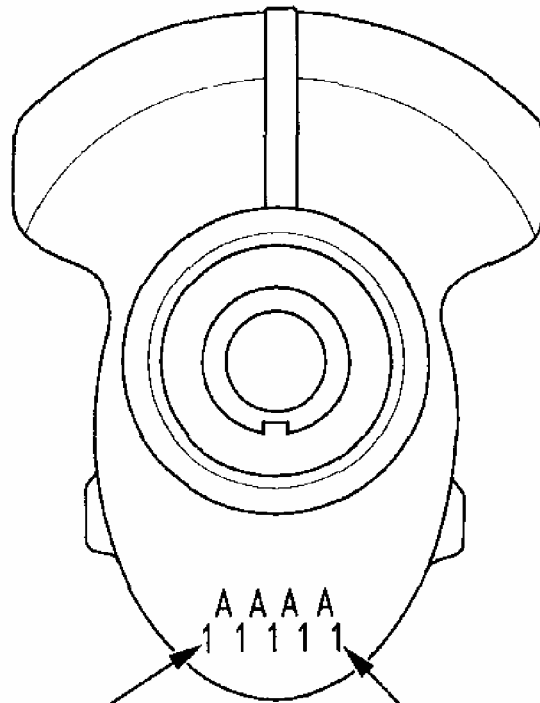
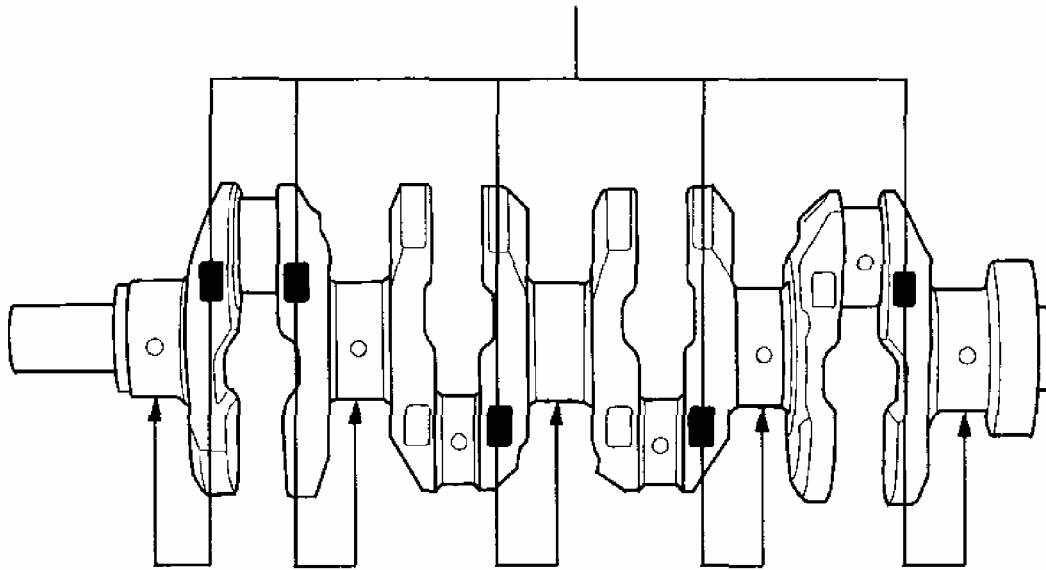
Fig. 7: Locating Crankshaft Bore Code
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

2. The main journal codes are stamped on the crankshaft in either location.

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No. 1 JOURNAL

No. 5 JOURNAL

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Fig. 8: Locating Main Journal Code

Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Use the crank bore codes and crank journal codes to select the appropriate replacement bearings from the following table.

NOTE:

- The color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

Main journal code	Crank bore code			
	1 or A or I	2 or B or II	3 or C or III	4 or D or IIII
1	Pink	Pink/Yellow	Yellow	Green
2	Pink/Yellow	Yellow	Green	Green/Brown
3	Yellow	Green	Green/Brown	Brown
4	Green	Green/Brown	Brown	Black
5	Green/Brown	Brown	Black	Black/Blue
6	Brown	Black	Black/Blue	Blue

Larger crank bore (indicated by an arrow pointing right above the table)
 Smaller bearing (Thicker) (indicated by an arrow pointing right below the table)
 Smaller main journal (indicated by a downward arrow on the left of the journal code column)
 Smaller bearing (Thicker) (indicated by a downward arrow on the right of the journal code column)

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Fig. 9: Crank Bore Codes And Crank Journal Codes Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROD BEARING CLEARANCE INSPECTION

1. Remove the oil pump (see **OIL PUMP REMOVAL**).
2. Remove the baffle plates (see step 8).
3. Remove the connecting rod cap and bearing half.
4. Clean the crankshaft rod journal and bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and cap, and torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) + 90° using a commercially available torque angle gauge.

NOTE: Do not rotate the crankshaft during inspection.

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.020-0.050 mm (0.0008-0.0020 in.)

Service Limit: 0.060 mm (0.0024 in.)

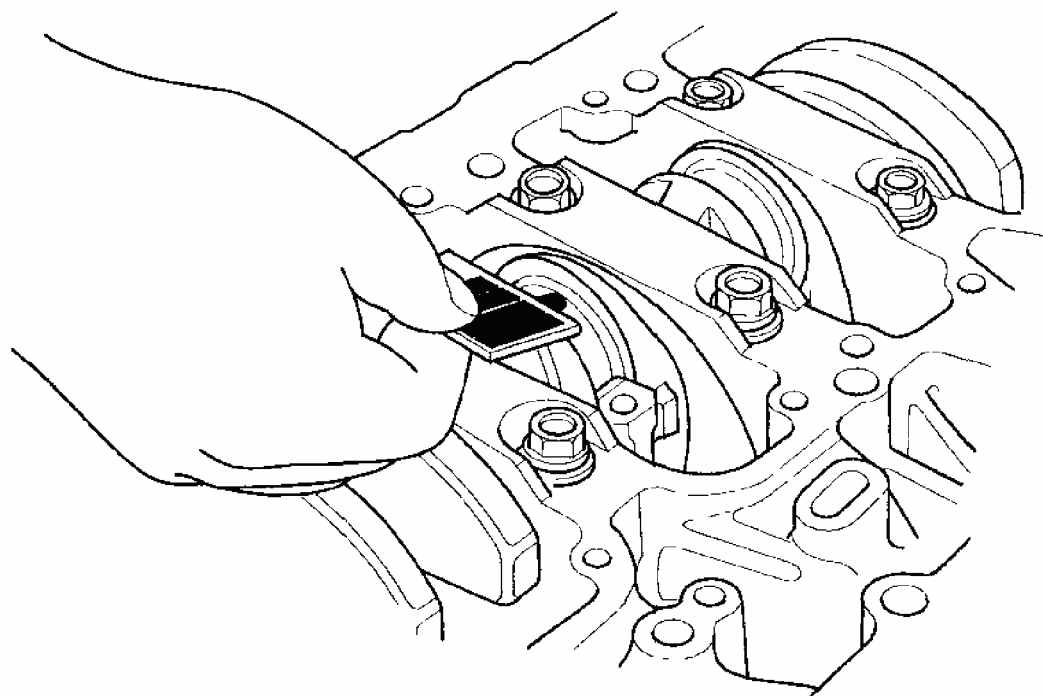


Fig. 10: Measuring Connecting Rod Bearing Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. 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(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
9. 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. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearing, replace the crankshaft and start over.

ROD BEARING SELECTION

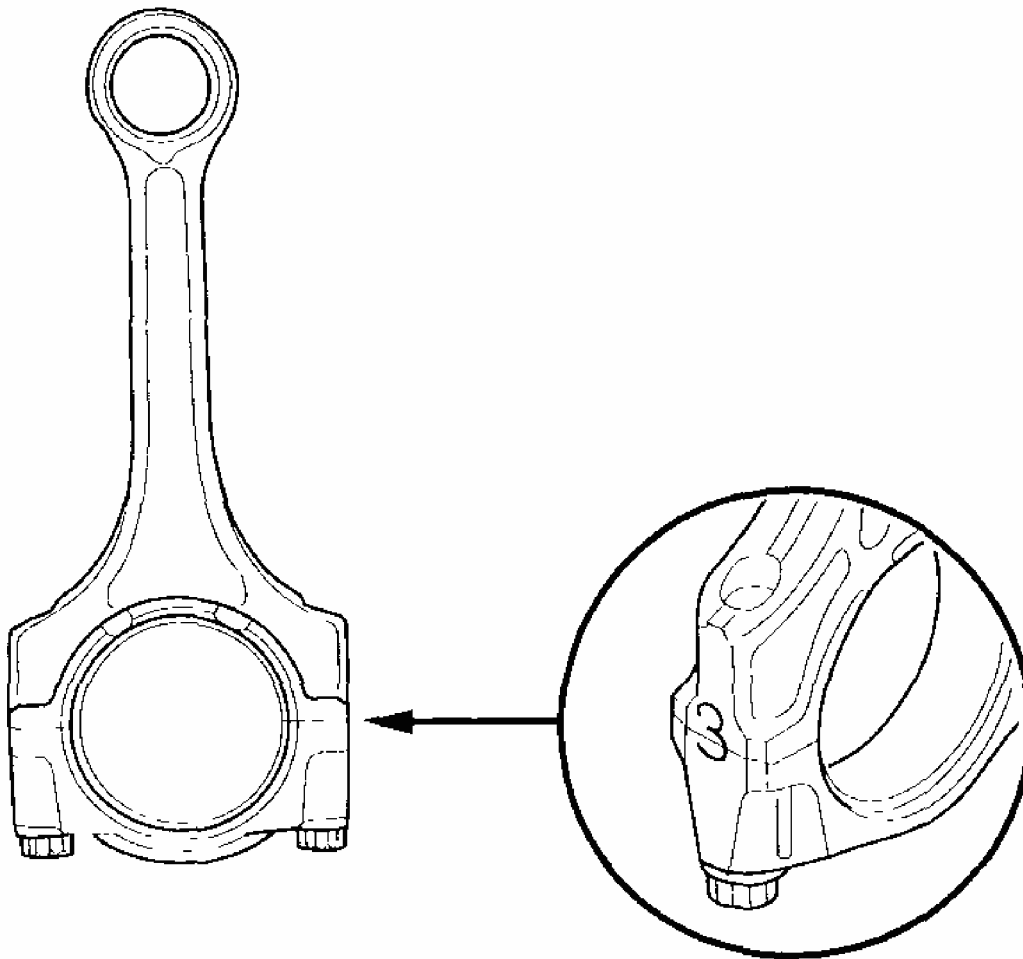
1. Inspect each connecting rod for cracks and heat damage.

Connecting Rod Big End Bore Code Locations

2. Each rod has a tolerance range from 0 to 0.024 mm (0.0009 in.), and in 0.006 mm (0.0002 in.) increments, depending on the size of its big end bore. It's then stamped with a number or bar (1, 2, 3, or 4/I, II, III, or IV) indicating the range. You may find any combination of numbers and bars in any engine. (Half the number or bar is stamped on the bearing cap, the other half is on the rod.)

If you can't read the code because of an accumulation of oil and varnish, do not scrub it with a wire brush or scraper. Clean it only with solvent or detergent.

Normal Bore Size: 51.0 mm (2.01 in.)



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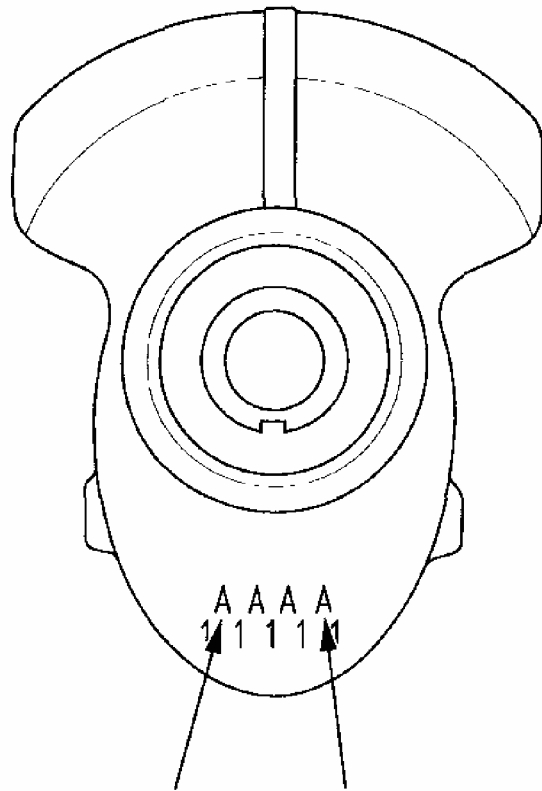
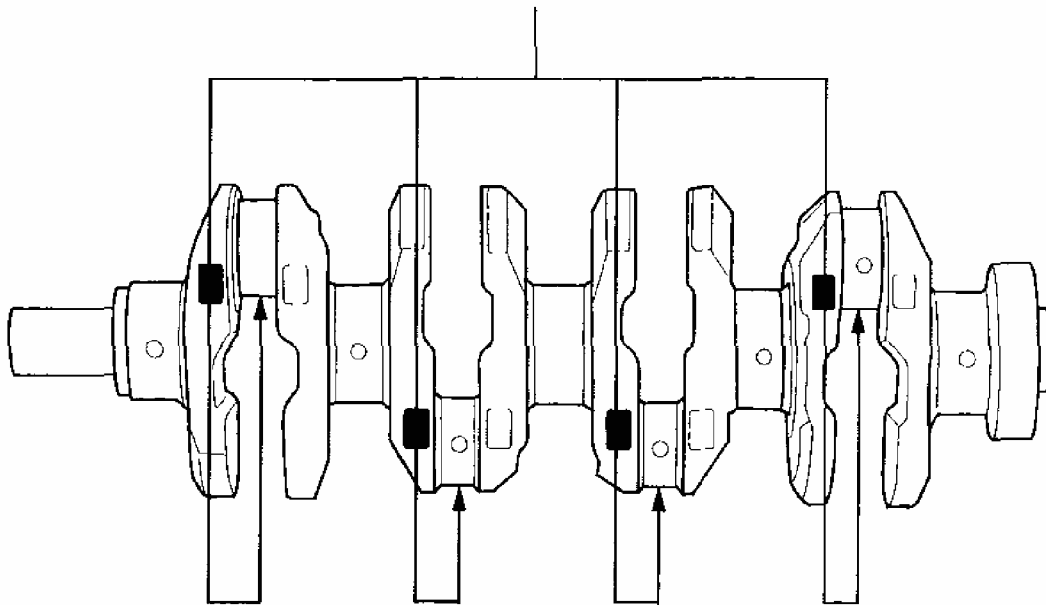
Fig. 11: Locating Connecting Rod Big End Bore Code
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Location

3. The connecting rod journal codes are stamped on the crankshaft in either location.

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No. 1 JOURNAL No. 4 JOURNAL

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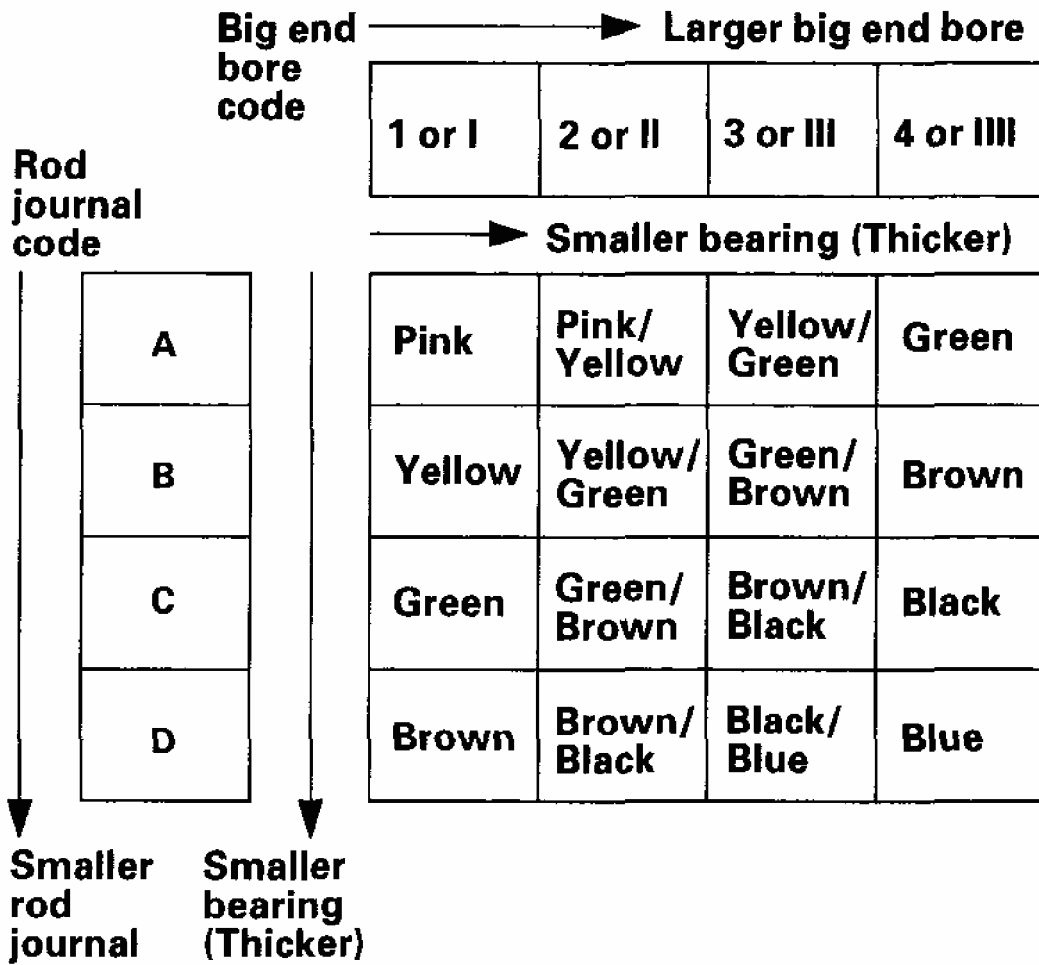
Fig. 12: Locating Connecting Rod Journal Code

Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Use the big end bore codes and rod journal codes to select appropriate replacement bearings from the following table.

NOTE:

- The color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.



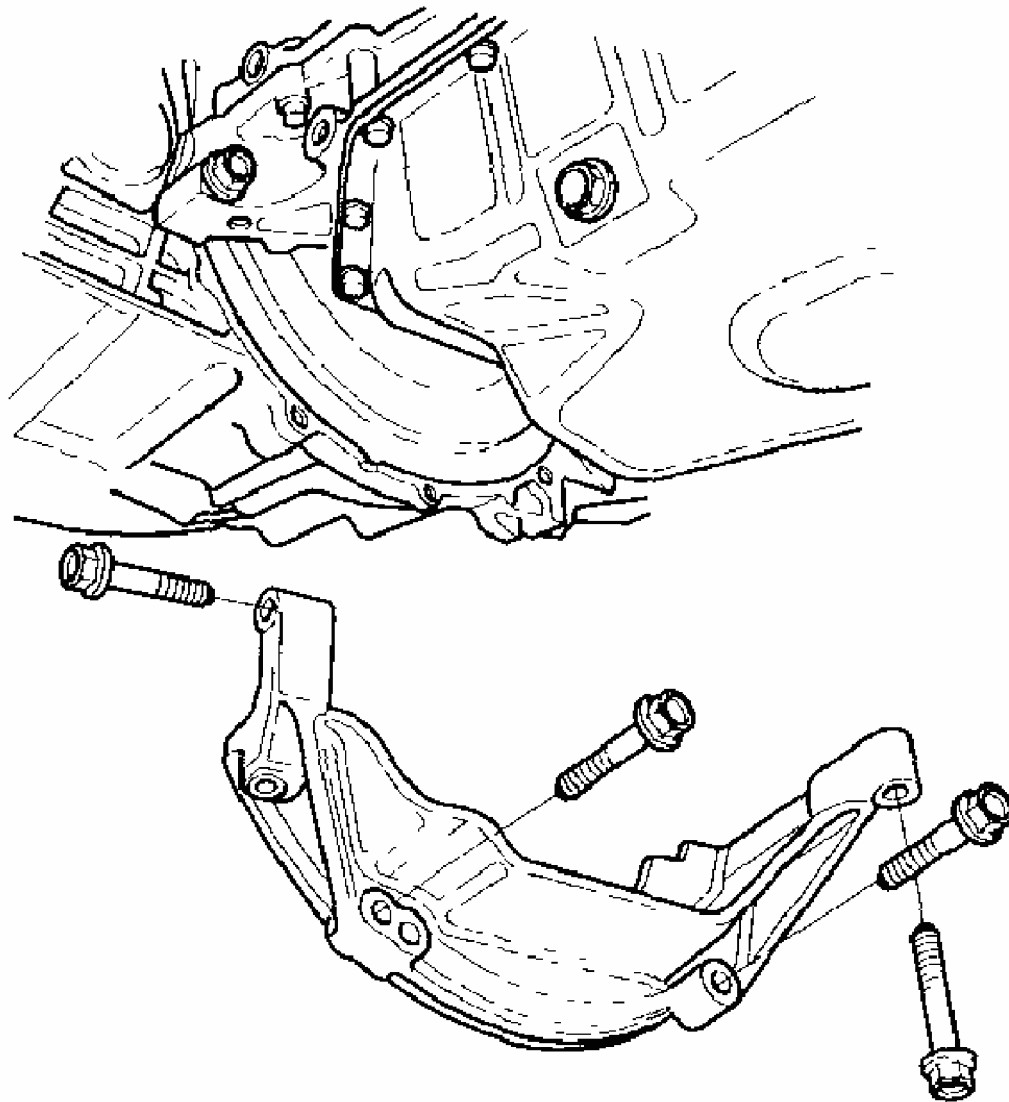
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Fig. 13: Big End Bore Codes And Rod Journal Codes Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

- Drain the engine oil (see '**ENGINE OIL REPLACEMENT**').

2. If the engine is still in the vehicle, remove the subframe.
 - 1 Attach the engine support hanger to the engine (see step 44 on **ENGINE REMOVAL**).
 - 2 Disconnect the suspension lower arm ball joints (see **LOWER ARM REPLACEMENT**).
 - 3 Remove the rear mount mounting bolts (see step 50 on **ENGINE REMOVAL**).
 - 4 Remove the front mount mounting bolt (see step 51 on **ENGINE REMOVAL**).
 - 5 A/T model: Remove the automatic transmission fluid (ATF) filter mounting bolt (see step 37 on **ENGINE REMOVAL**).
 - 6 Make the appropriate reference lines at positions A and B that line up with the center of the subframe mounting bolts (see step 52 on **ENGINE REMOVAL**).
 - 7 Attach the special tool to the subframe, then attach the jack to the special tool (see step 53 on **ENGINE REMOVAL**).
 - 8 Remove the front subframe mounting bolts, then lower the subframe (see step 55 on **ENGINE REMOVAL**).
3. M/T model: Remove the stiffener.

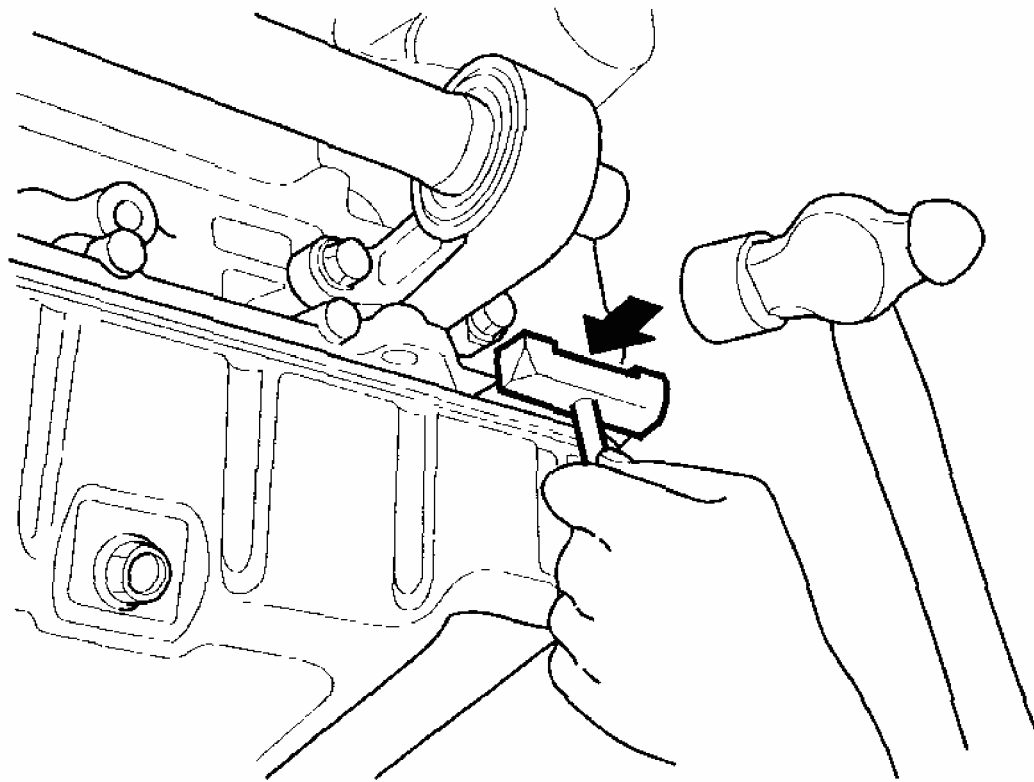


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Fig. 14: Removing Stiffener (M/T Model)

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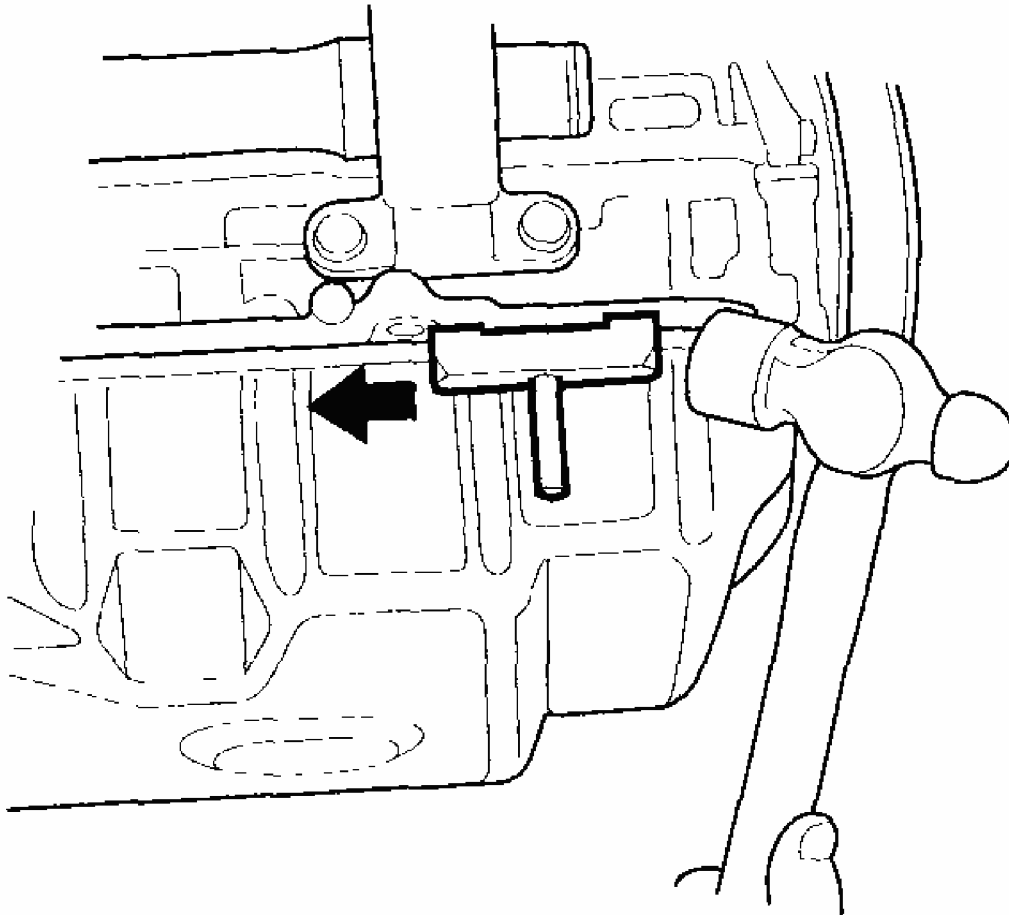
4. Remove the bolts/nuts securing the oil pan.
5. Drive an oil pan seal cutter between the oil pan and engine block.



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Fig. 15: Inserting Oil Pan Seal Cutter Between Oil Pan And Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Cut the oil pan seal by striking the side of the cutter to slide the cutter along the oil pan.



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Fig. 16: Cutting Oil Pan Seal

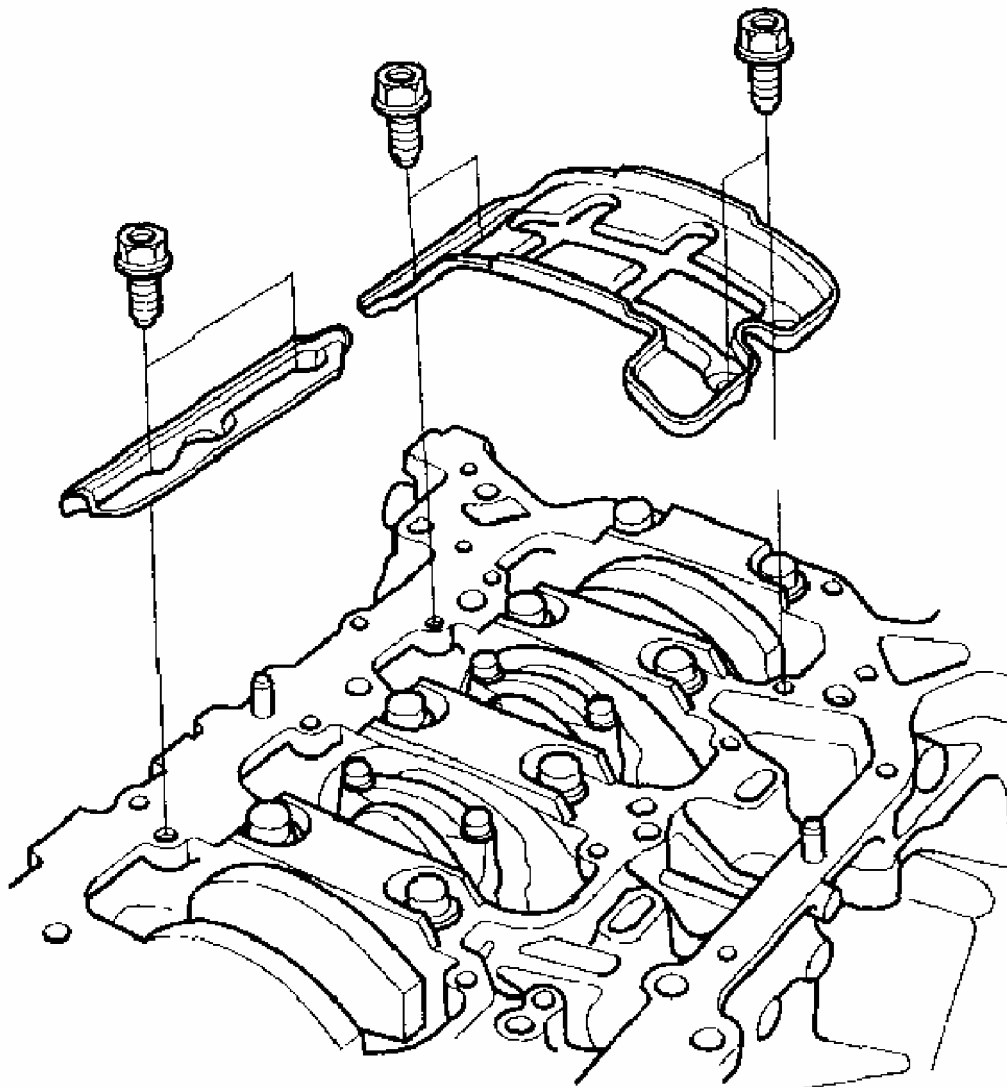
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the oil pan.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine assembly (see **ENGINE REMOVAL**).
2. Remove the transmission:
 - Manual transmission (see **TRANSMISSION REMOVAL**)
 - Automatic transmission (see **TRANSMISSION REMOVAL**)
3. M/T model: Remove the pressure plate (see **PRESSURE PLATE AND CLUTCH DISC REMOVAL**), clutch disc (see **PRESSURE PLATE AND CLUTCH DISC REMOVAL**), and flywheel (see **FLYWHEEL INSPECTION**).

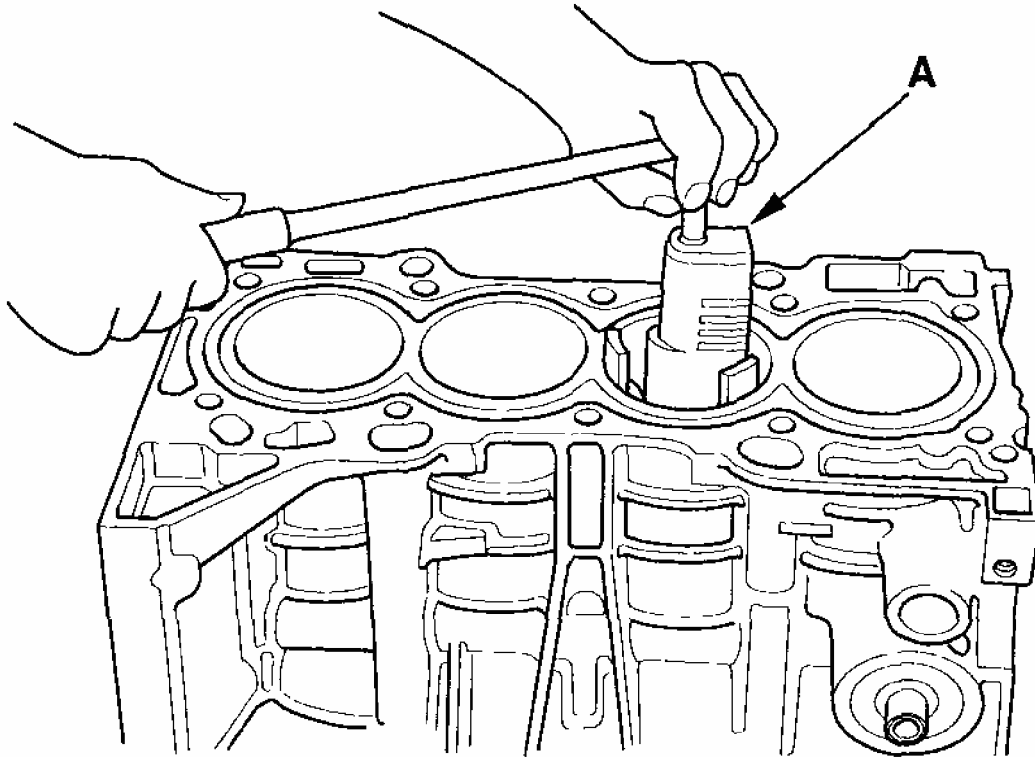
4. A/T model: Remove the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
5. Remove the oil pan (see **OIL PAN REMOVAL**).
6. Remove the oil pump (see **OIL PUMP REMOVAL**).
7. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
8. Remove the baffle plates.



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Fig. 17: Removing Baffle Plates
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the pistons as they are pushed out.



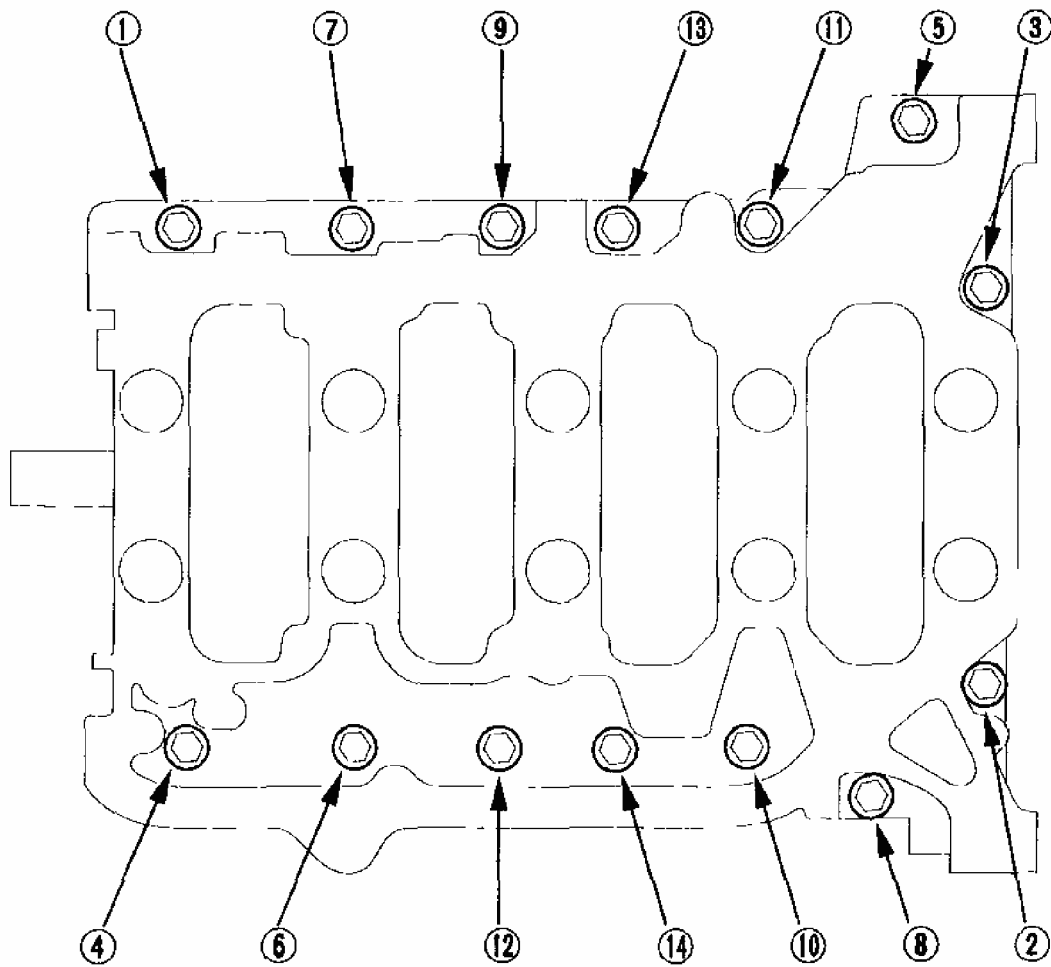
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Fig. 18: Removing Metal Ridge
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10. Remove the 8 mm bolts from the lower block in criss-cross pattern shown.

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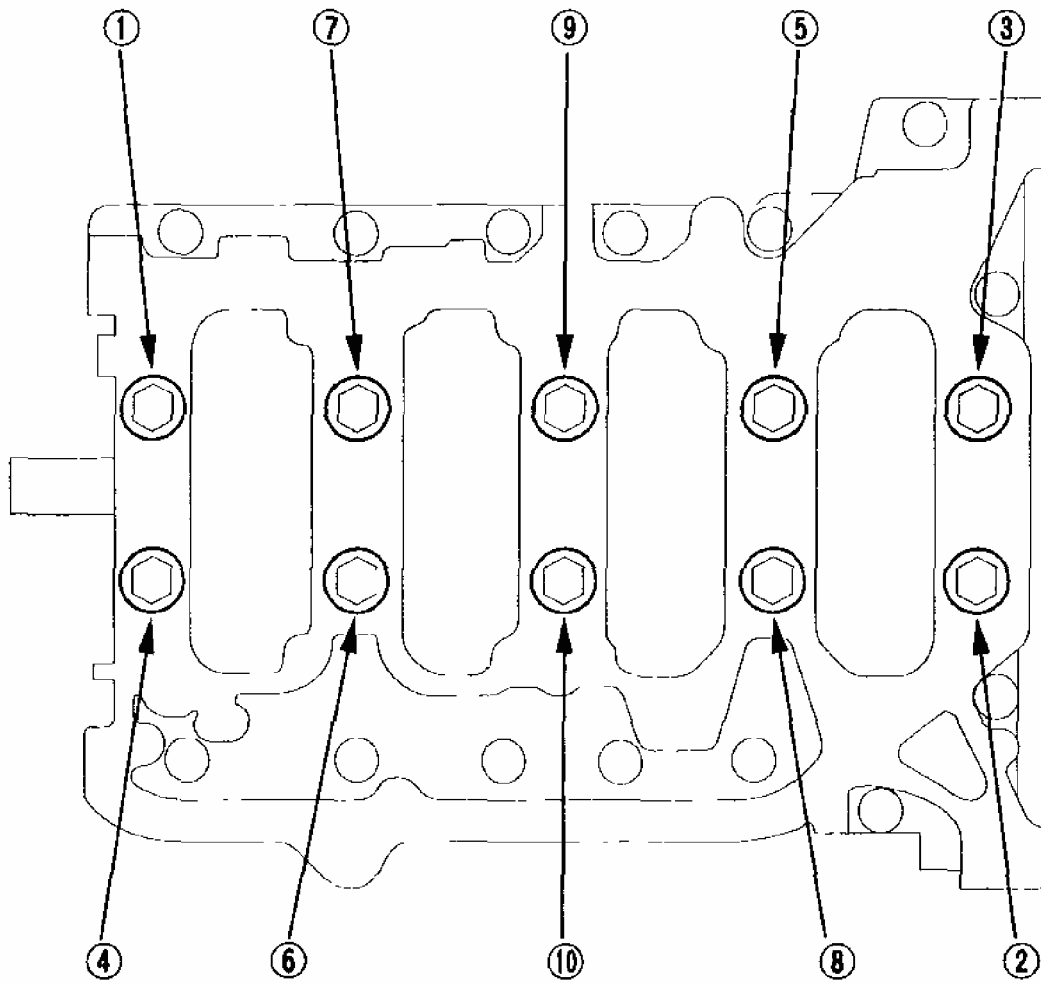
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Fig. 19: Removing Bolts From Lower Block In Crisscross Pattern
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11. Remove the bearing cap bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time. Repeat the sequence until all bolts are loosened.



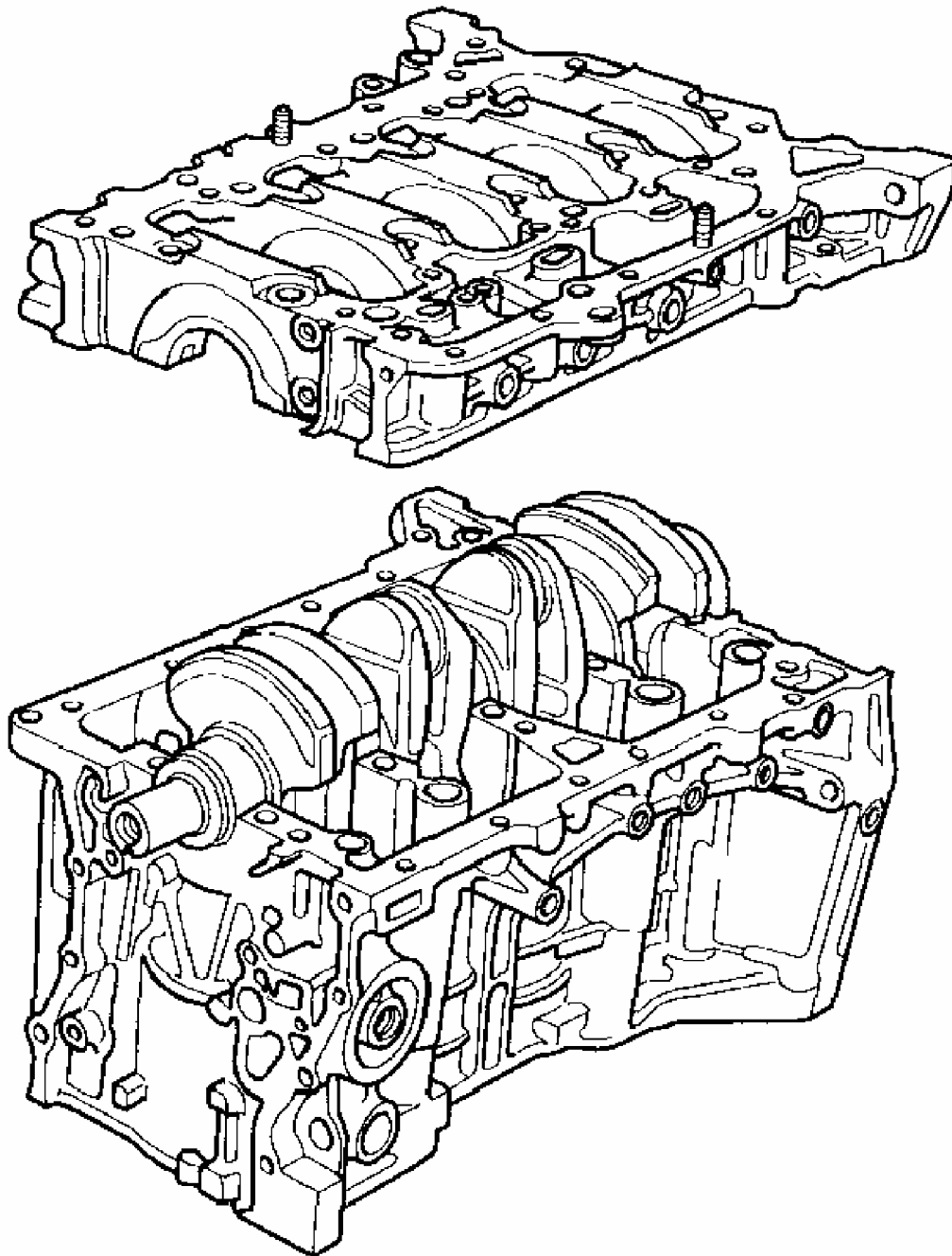
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Fig. 20: Removing Bearing Cap Bolts
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12. Remove the lower block and bearings. Keep all bearings in order.

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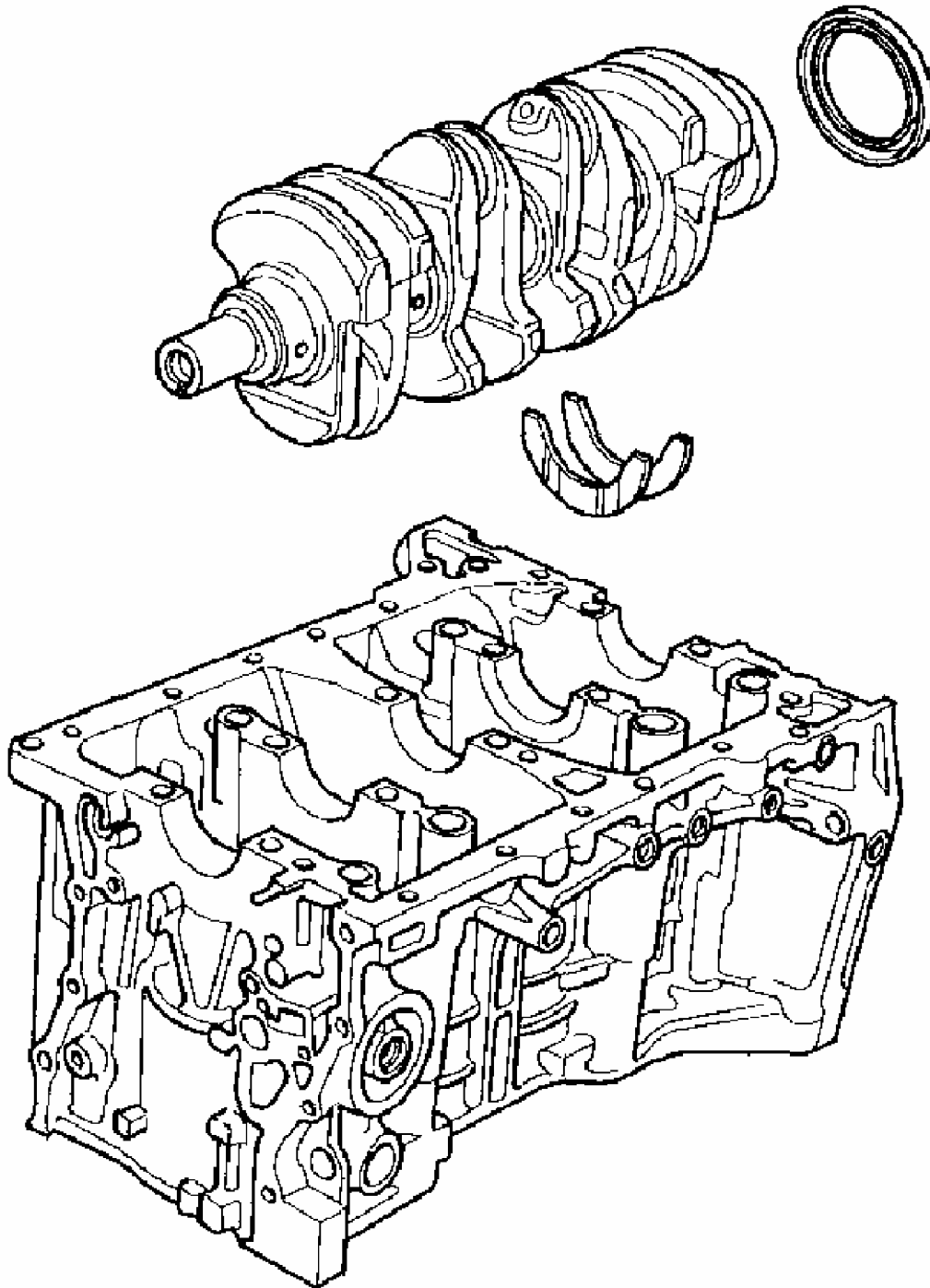
Fig. 21: Removing Lower Block And Bearings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the rod caps/bearings. Keep all caps/bearings in order.

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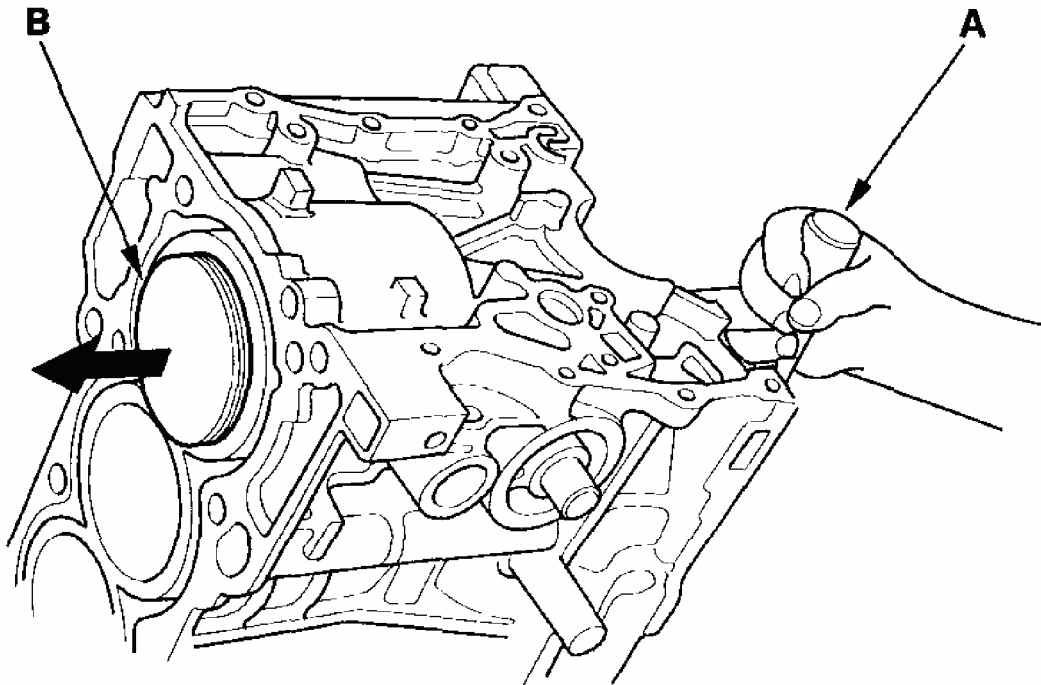
14. Lift the crankshaft out of the engine, being careful not to damage the journals.



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Fig. 22: Removing Crankshaft Out Of Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
16. Use the wooden handle of a hammer (A) to drive out the piston/connecting rod assembly (B).



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Fig. 23: Removing Piston/Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Reinstall the lower block and bearings on the engine in the proper order.
18. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
19. To avoid mix up on reassembly, mark each piston/connecting rod assembly with its cylinder number.

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

CRANKSHAFT INSPECTION

OUT-OF-ROUND AND TAPER

1. Remove the crankshaft from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Clean the keyway and threads.
4. 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.

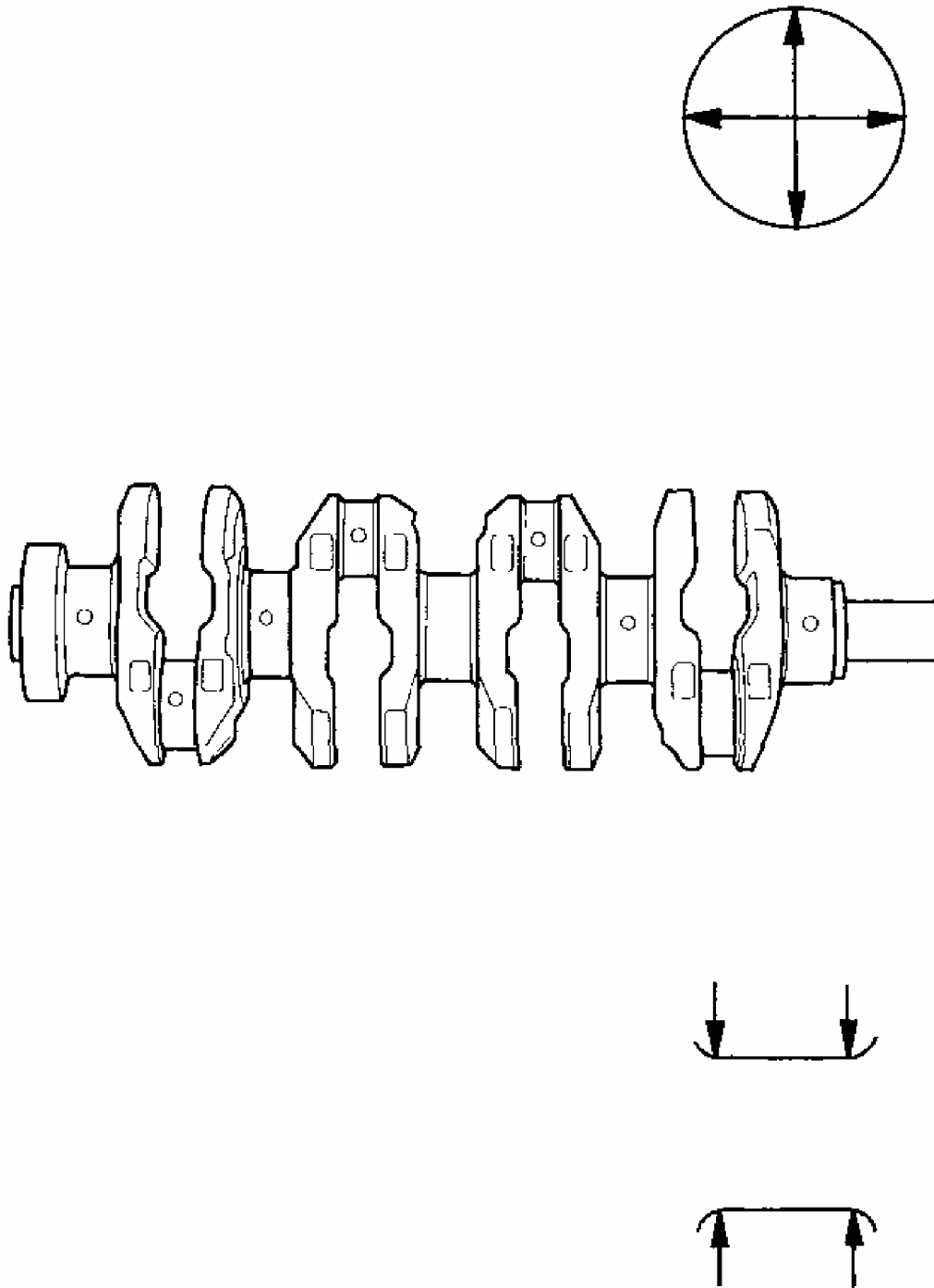
Journal Out-of-Round

Standard (New): 0.005 mm (0.0002 in.) max.

Service Limit: 0.010 mm (0.0004 in.)

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Fig. 24: Measuring Out-Of Round At Middle Of Connecting Rod And Main Journal

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5. Measure taper at the 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.)

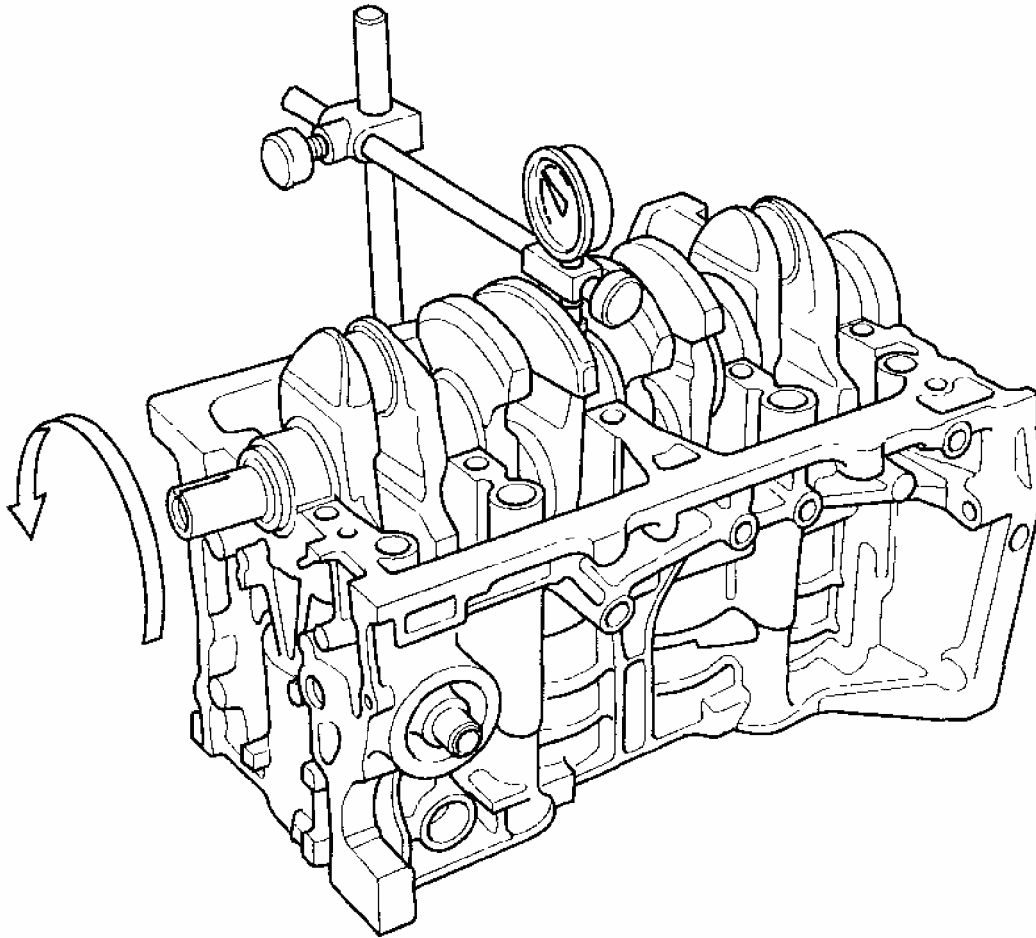
STRAIGHTNESS

1. 6) Place the engine block on the surface plate.
2. 7) Clean and install the bearings on the No. 1 and No. 5 journals of the engine block.
3. 8) Lower the crankshaft into the engine block.
4. 9) Measure the runout on all of the main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Runout

Standard (New): 0.03 mm (0.0012 in.) max.

Service Limit: 0.04 mm (0.0016 in.)



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Fig. 25: Measuring Main Journals Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK AND PISTON INSPECTION

1. Remove the crankshaft and pistons (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Check the piston for distortion or cracks.
3. Measure the piston diameter at a point 13 mm (0.5 in.) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the engine block as cylinder bore sizes.

Piston Diameter

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Standard (New):

No Letter (or A): 86.980-86.990 mm (3.4244-3.4248 in.)

B: 86.970-86.980 mm (3.4240-3.4244 in.)

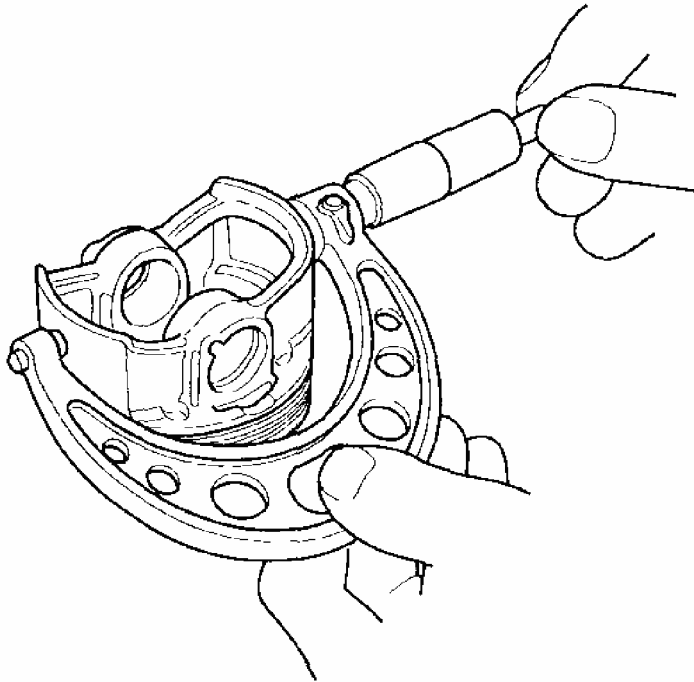
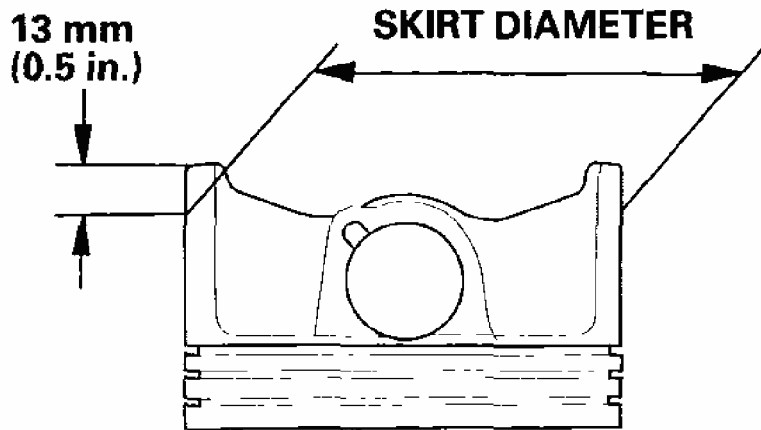
Service Limit:

No Letter (or A): 86.930 mm (3.4224 in.)

B: 86.920 mm (3.4220 in.)

Oversize Piston Diameter

0.25: 87.230-87.240 mm (3.4342-3.4346 in.)



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Fig. 26: Measuring Skirt Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure wear and taper in direction X and Y at three levels in each cylinder as shown. If measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the engine block. If the engine block is to be rebored, refer to step 7 after reboring.

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Cylinder Bore Size

Standard (New):

A or I: 87.010-87.020 mm (3.4256-3.4260 in.)

B or II: 87.000-87.010 mm (3.4252-3.4256 in.)

Service Limit: 87.070 mm (3.4279 in.)

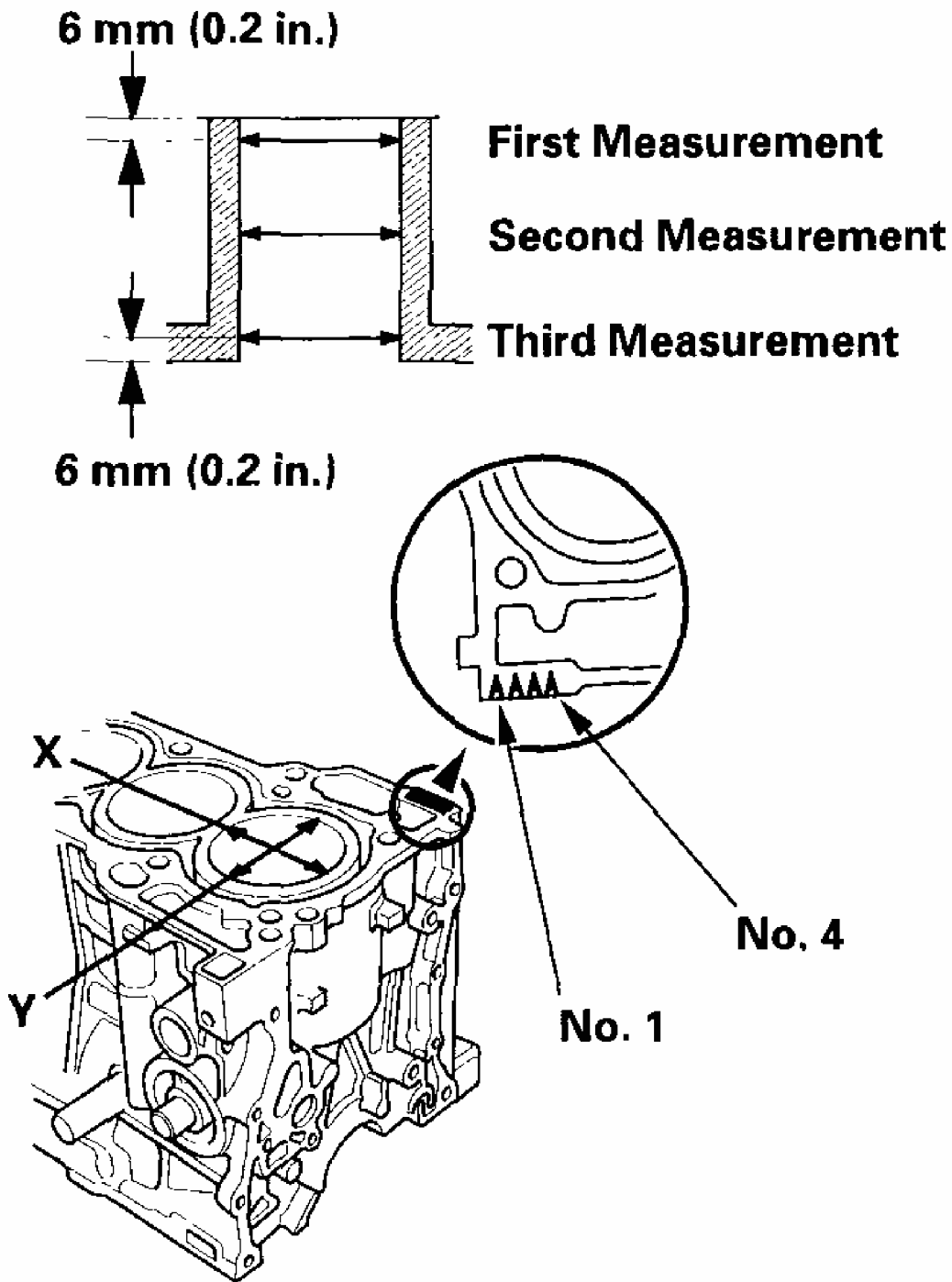
Oversize

0.25: 87.250-87.260 mm (3.4350-3.4354 in.)

Reboring Limit: 0.25 mm (0.01 in.) max.

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in.)



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Fig. 27: Measuring Cylinder Bore Size

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bores must be honed.

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6. Check the top of the engine block for warpage. Measure along the edges and across the center as shown.

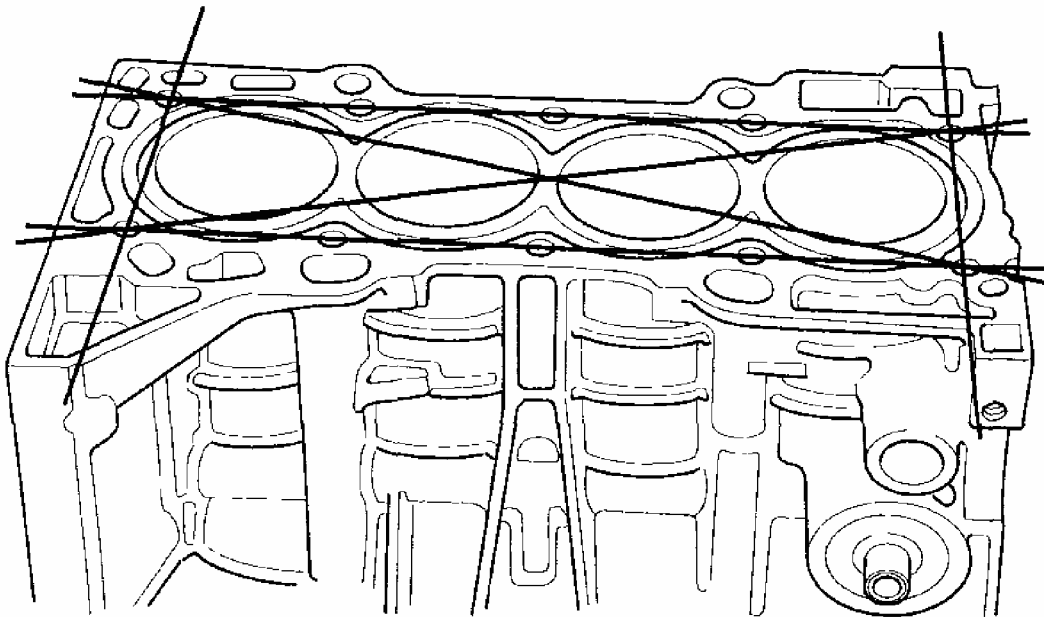
Engine Block Warpage

Standard (New): 0.07 mm (0.003 in.) max.

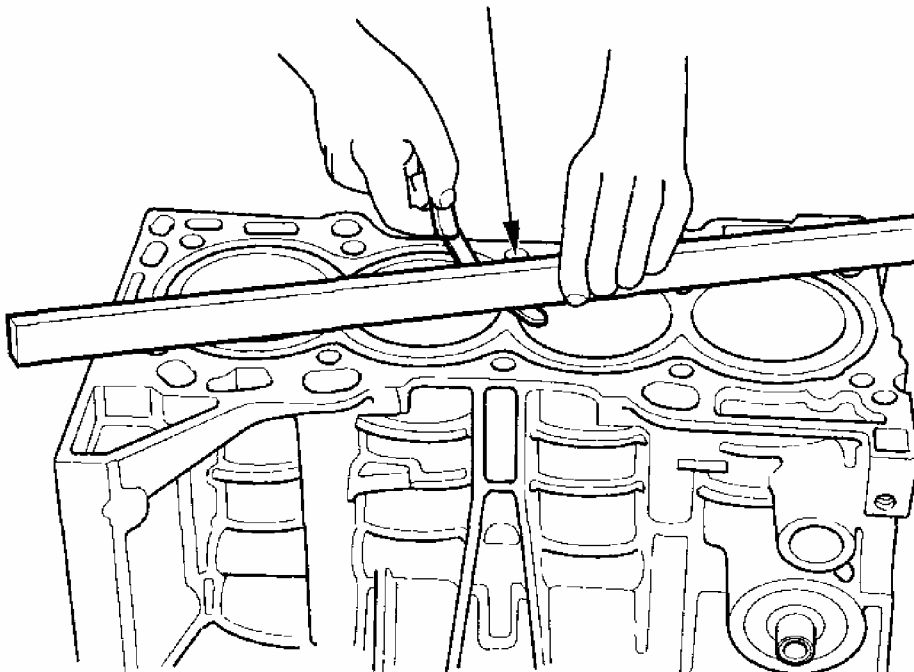
Service Limit: 0.10 mm (0.004 in.)

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PRECISION STRAIGHT EDGE



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Fig. 28: Measuring Engine Block Warpage
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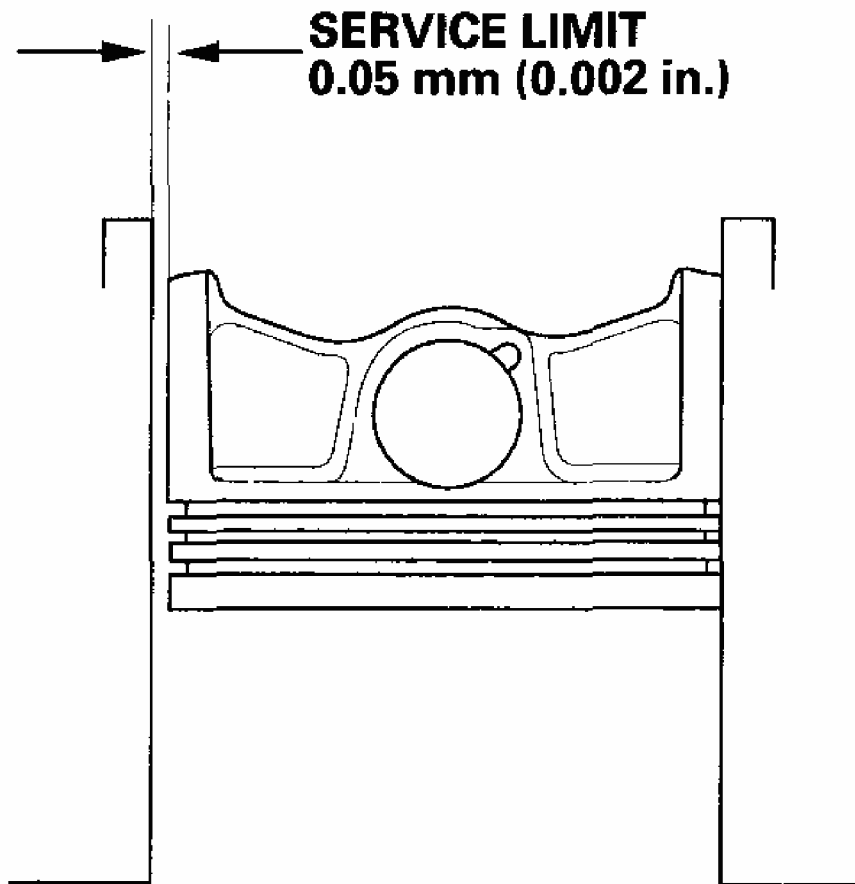
7. Calculate the difference between the cylinder bore diameter and the piston diameter. If the clearance is near or exceeds the service limit, inspect the piston and cylinder bore for excessive wear.

Piston-to-Cylinder Bore Clearance

Standard (New): 0.020-0.040 mm (0.0008-0.0016 in.)

Service Limit: 0.05 mm (0.002 in.)

Piston-to-Cylinder Bore Clearance
Standard (New): 0.020—0.040 mm
(0.0008—0.0016 in.)
Service Limit: 0.05 mm (0.002 in.)



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Fig. 29: Identifying Piston-To-Cylinder Bore Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BORE HONING

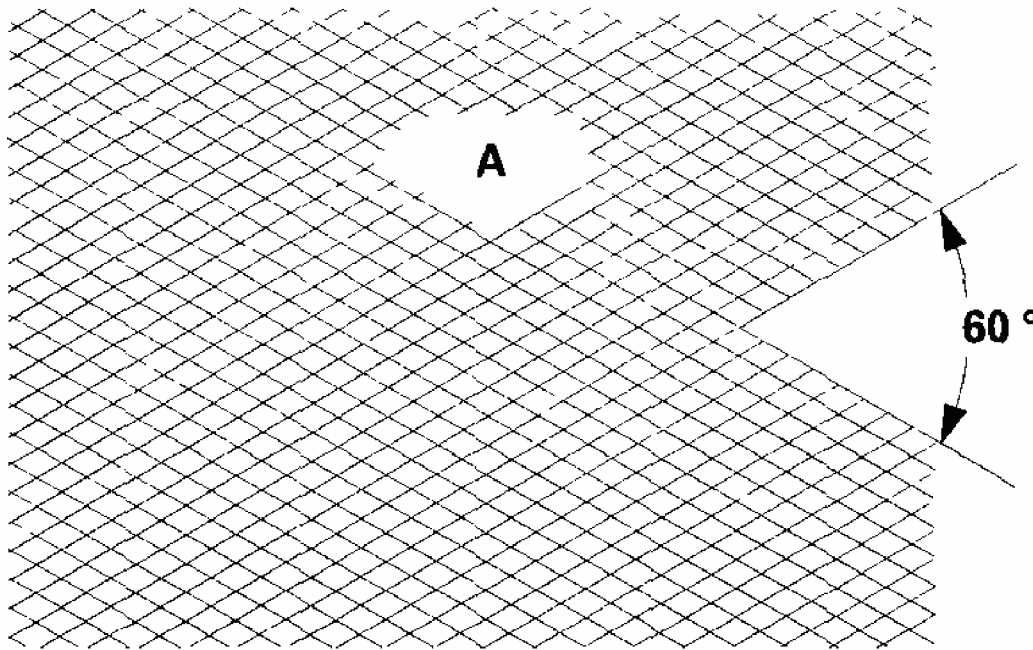
Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see **BLOCK AND PISTON INSPECTION**). If the

engine block is to be reused, hone the cylinders and remeasure the bores.

- Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern (A).

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



G03677279

Fig. 30: Identifying Cylinder Honing Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

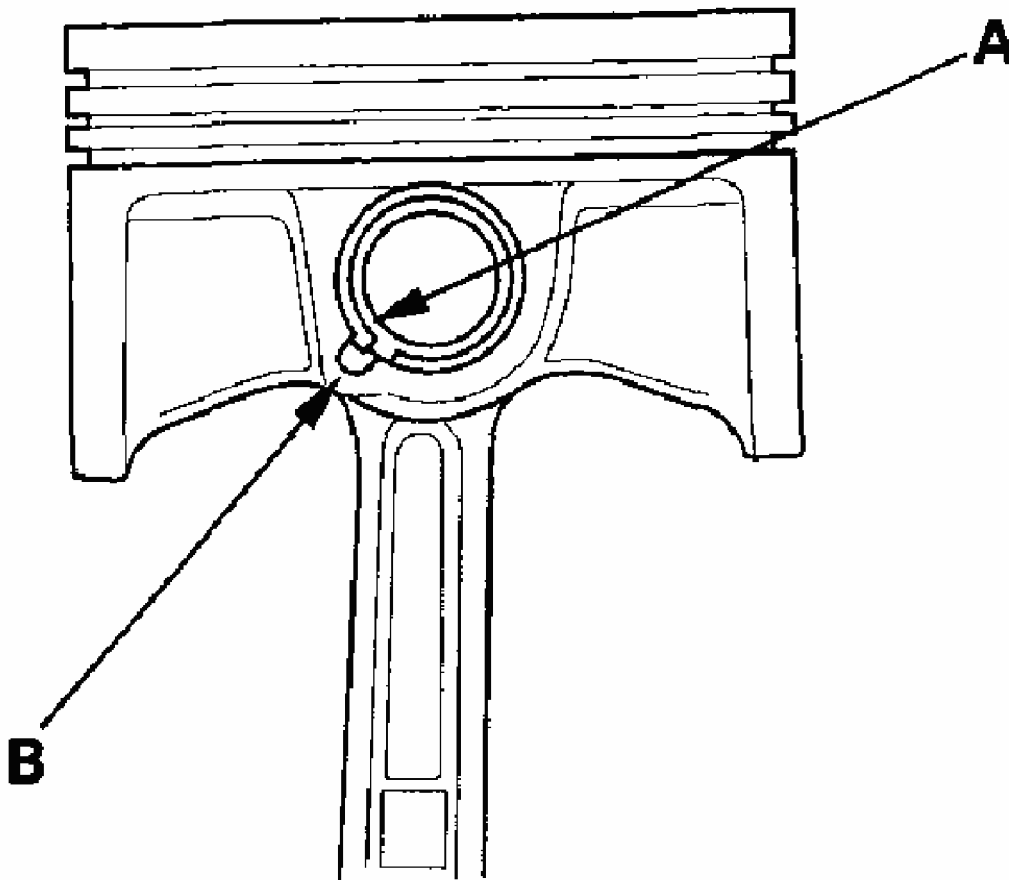
- When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting. Never use solvent, it will only redistribute the grit on the cylinder walls.
- If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the engine block. 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, PIN, AND CONNECTING ROD REPLACEMENT

DISASSEMBLY

1. Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Apply new engine oil to the piston pin snap rings (A), and turn them in the ring grooves until the end gaps are lined up with the cutouts in the piston pin bores (B).

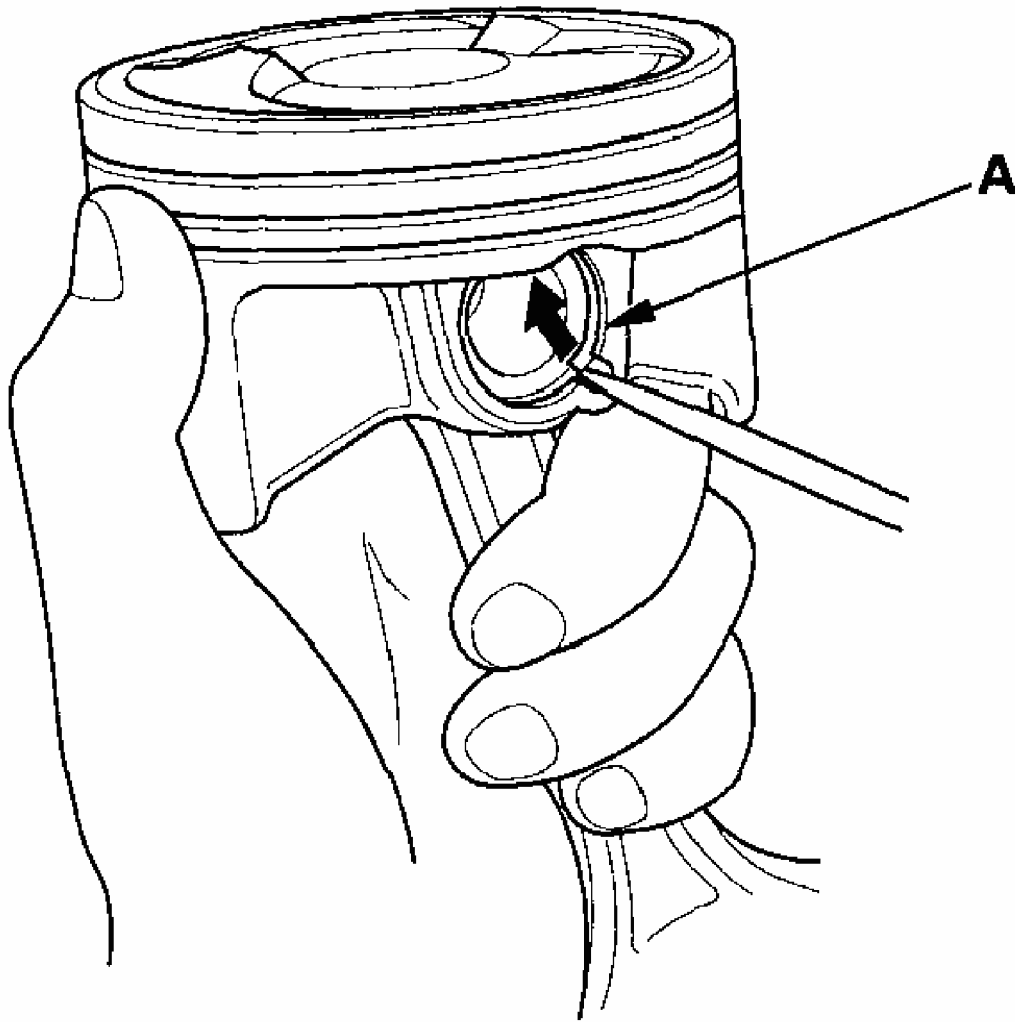
NOTE: Take care not to damage the ring grooves.



G03677280

Fig. 31: Locating Engine Oil Applying Point To Piston Pin Snap Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove both snap rings (A). Start at the cutout in the piston pin bore. Remove the snap rings carefully so they do not go flying or get lost. Wear eye protection.

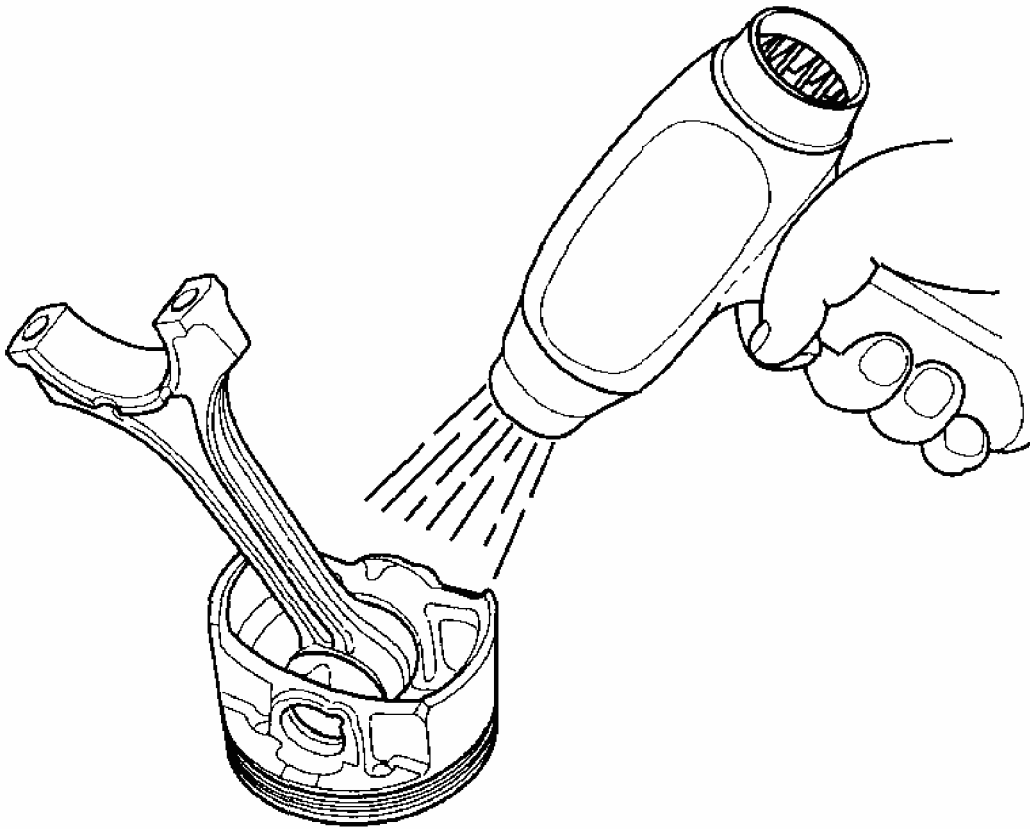


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Fig. 32: Removing Snap Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Heat the piston and connecting rod assembly to about 158°F (70°C), then remove the piston pin.



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Fig. 33: Heating Piston And Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSPECTION

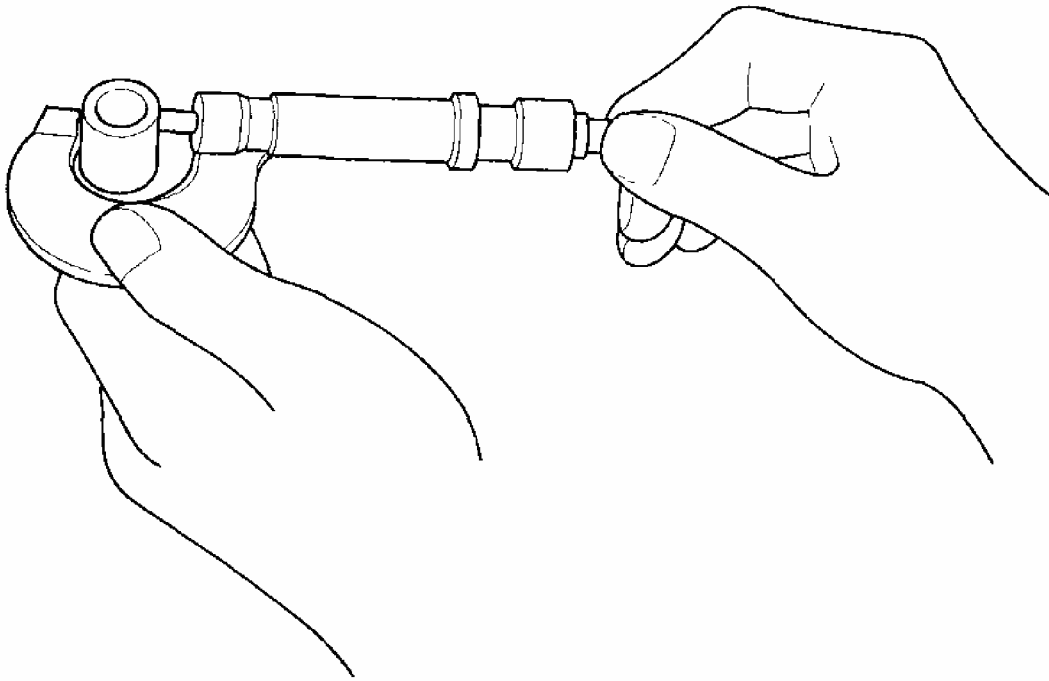
NOTE: Inspect the piston, piston pin, and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New): 21.961-21.965 mm (0.8646-0.8648 in.)

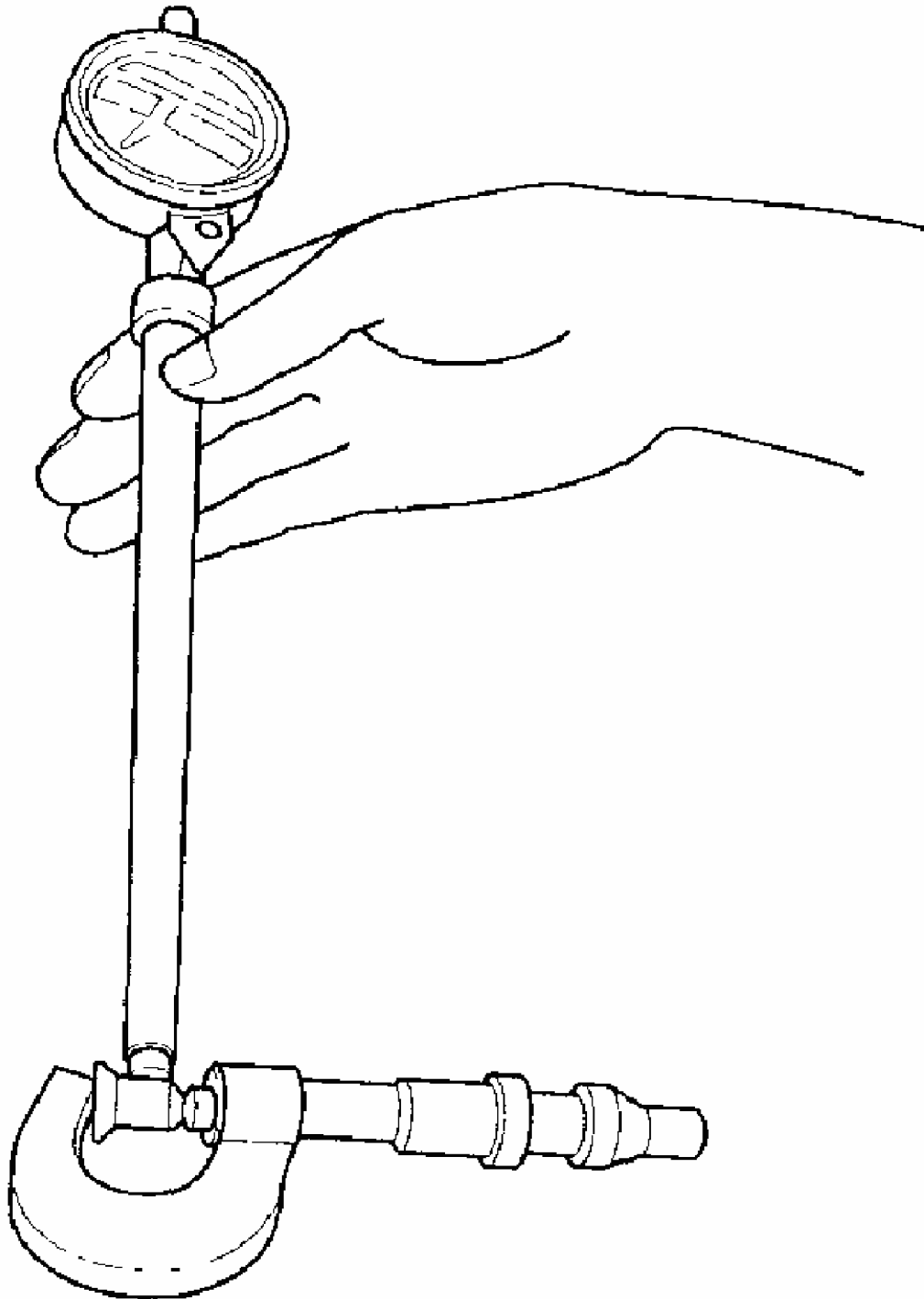
Service Limit: 21.953 mm (0.8643 in.)



G03677283

Fig. 34: Measuring Piston Pin Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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Fig. 35: Attaching Dial Indicator To Piston Pin Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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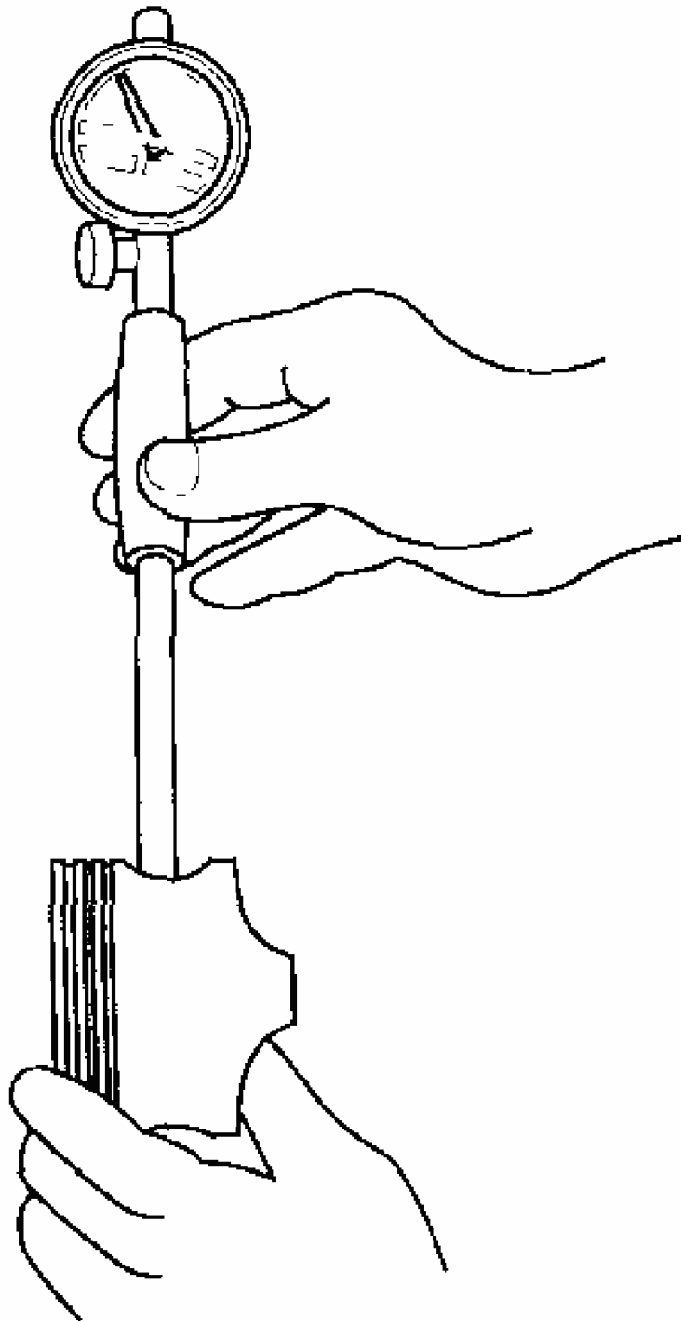
2003-06 ENGINE Engine Block - Element

3. Check the difference between the piston pin diameter and piston pin hole diameter in the piston.

Piston Pin-to-Piston Clearance

Standard (New): -0.005 to +0.002 mm (-0.00020 to +0.00008 in.)

Service Limit: 0.005 mm (0.0002 in.)



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Fig. 36: Checking Difference Between Piston Pin Diameter And Piston Pin Hole Diameter In Piston

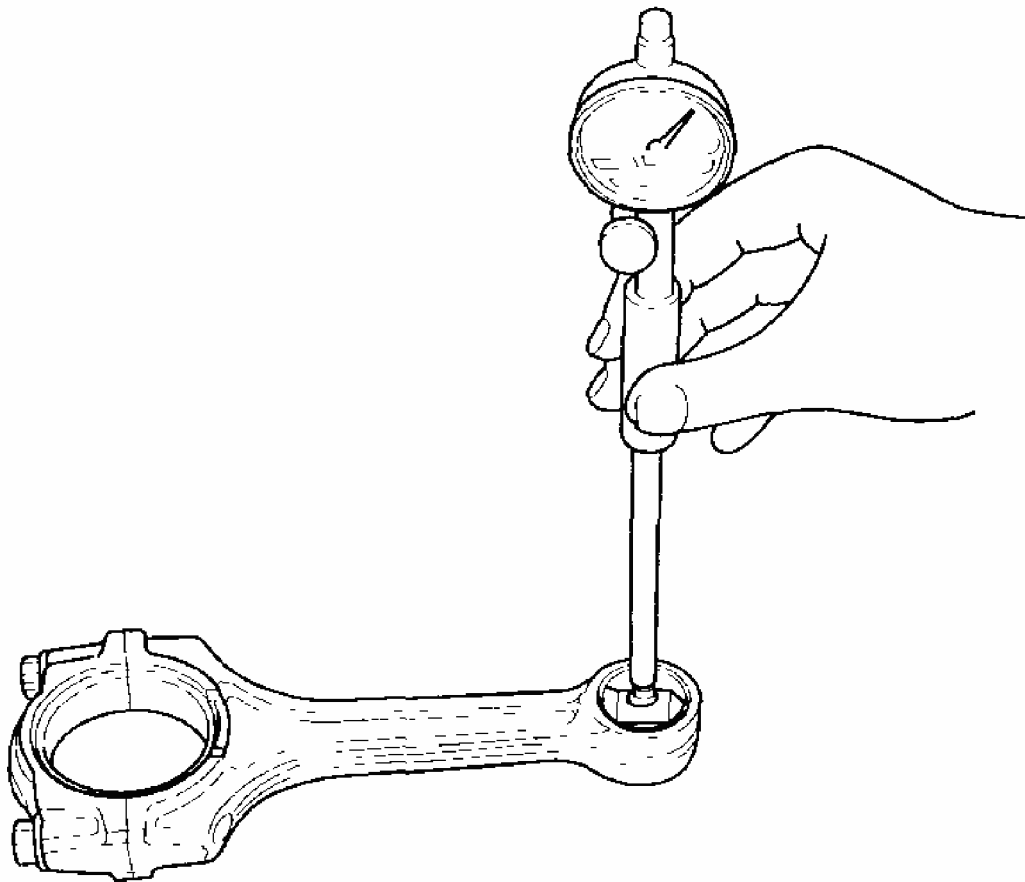
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the piston pin-to-connecting rod clearance.

Piston Pin-to-Connecting Rod Clearance

Standard (New): 0.005-0.015 mm (0.0002-0.0006 in.)

Service Limit: 0.02 mm (0.0008 in.)

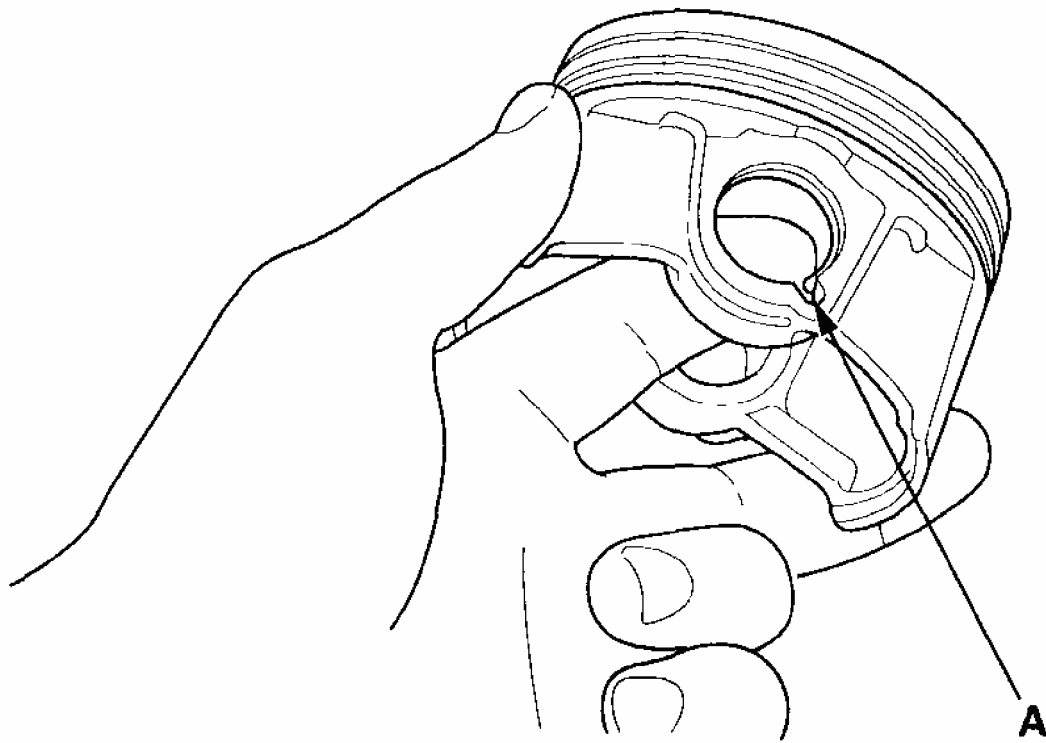


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Fig. 37: Measuring Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REASSEMBLY

1. Install a piston pin snap ring (A) only one side.

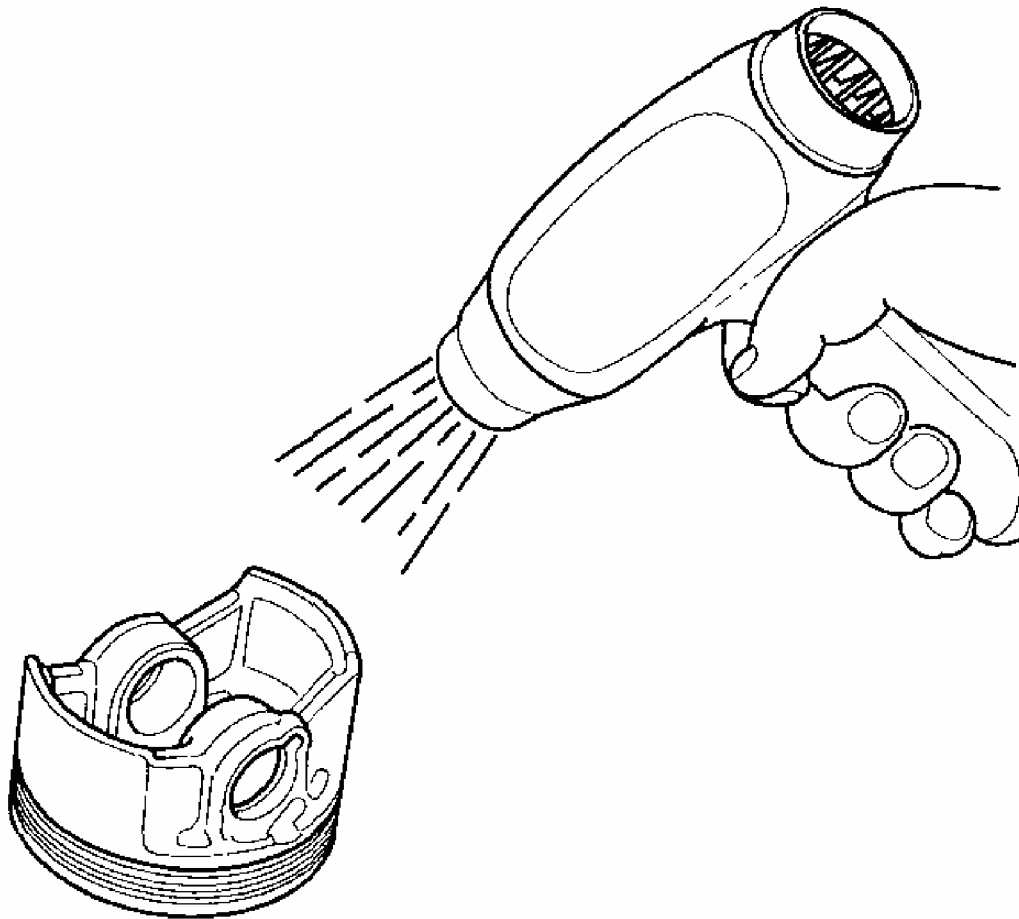


G03677287

Fig. 38: Installing Piston Pin Snap Ring

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Coat the piston pin bore in the piston, the bore in the connecting rod, and the piston pin with new engine oil.
3. Heat the piston to about 158°F (70°C).

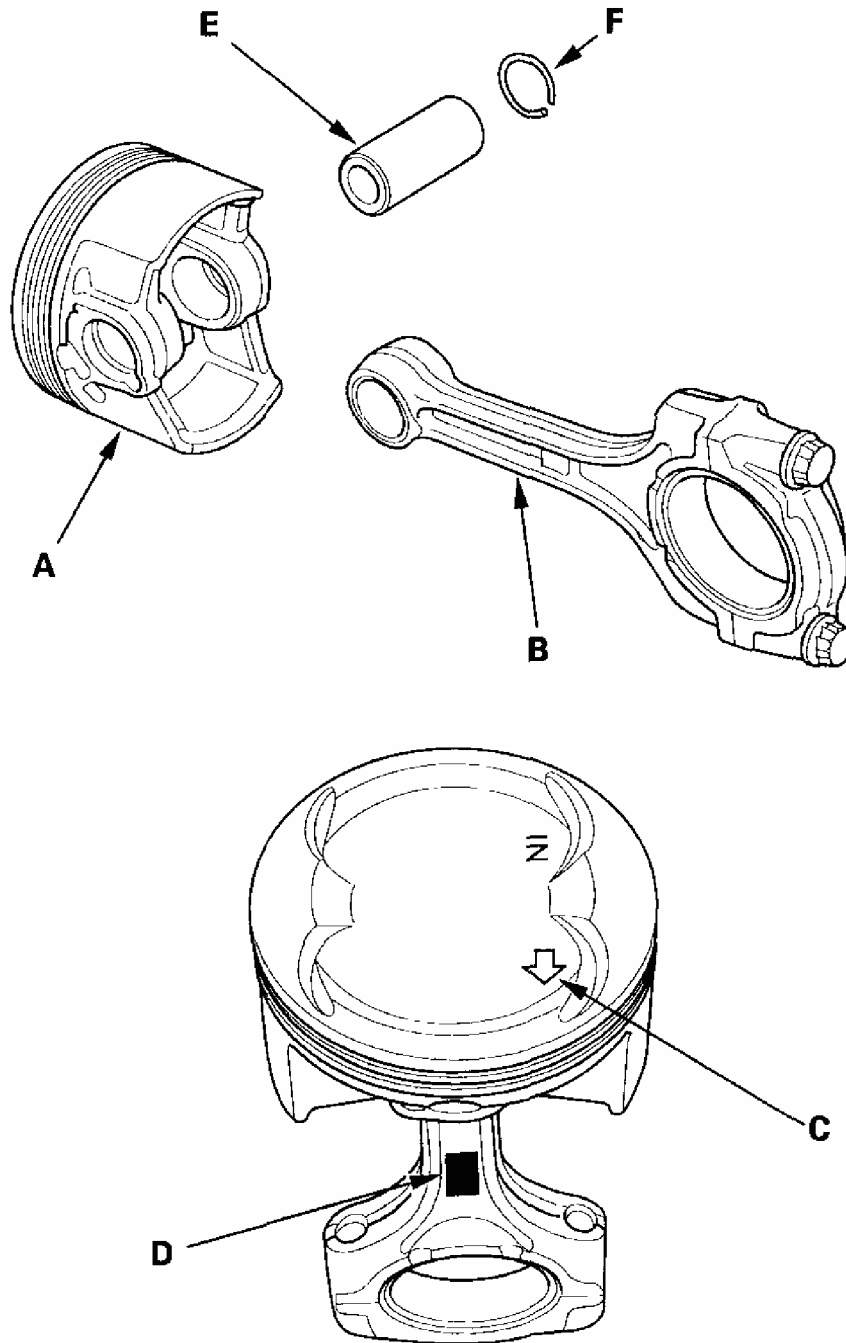


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Fig. 39: Heating Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Assemble the piston (A) and connecting rod (B) with the arrow (C) and the embossed mark (D) on the same side. Install the piston pin (E).



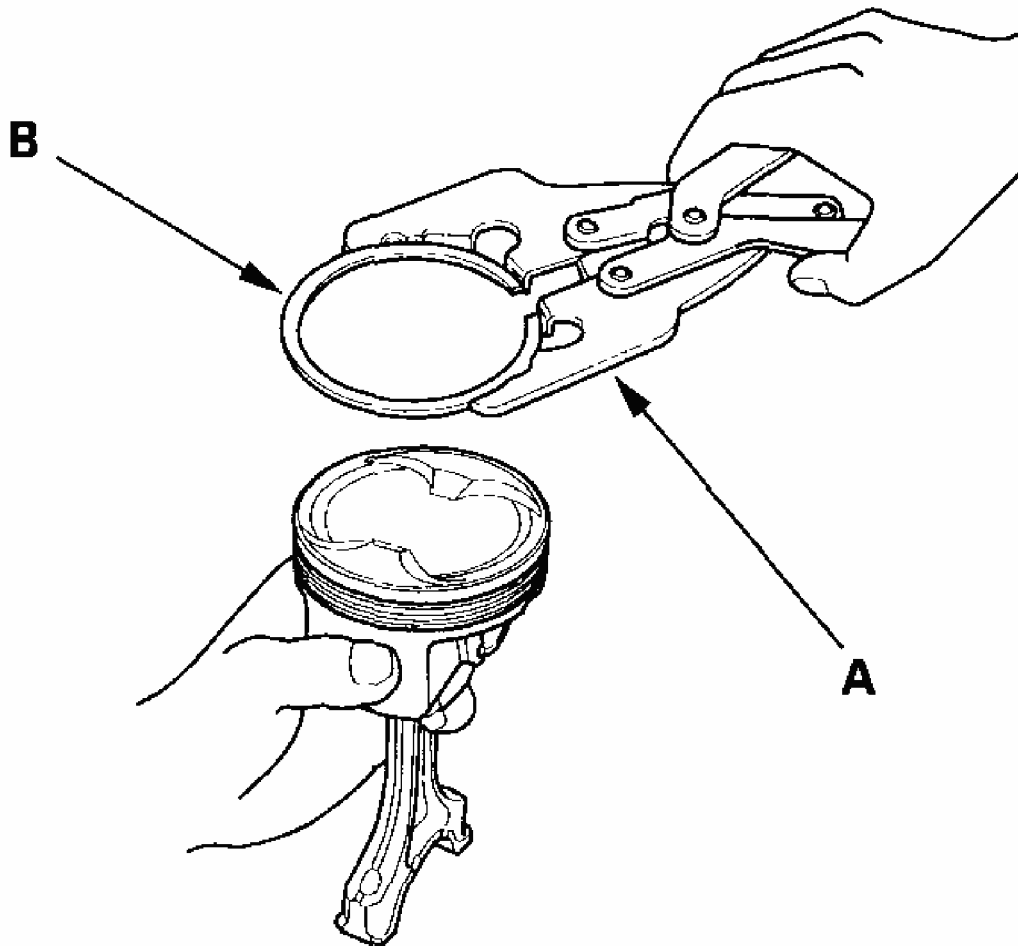
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Fig. 40: Assembling Piston And Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the remaining snap ring (F).
6. Turn the snap rings in the ring grooves until the end gaps are positioned at the bottom of the piston.

PISTON RING REPLACEMENT

1. Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Using a ring expander (A), remove the old piston rings (B).



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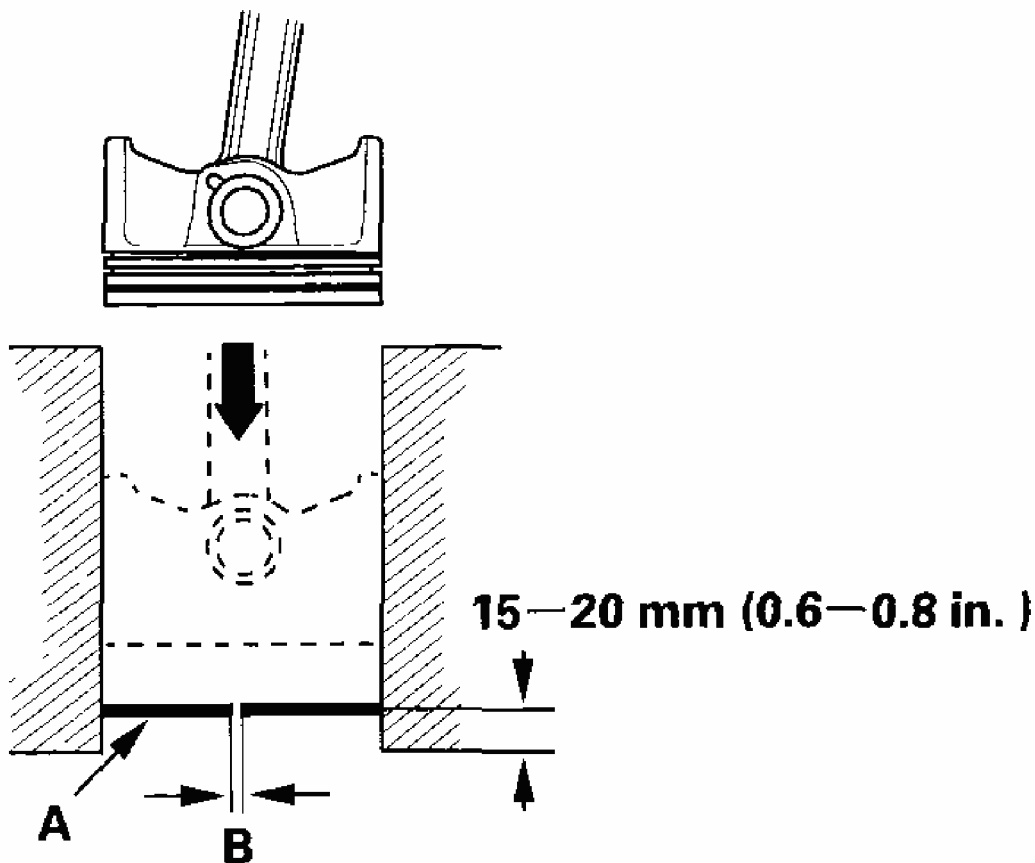
Fig. 41: Removing Piston Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Clean all ring grooves thoroughly with a squared-off broken ring or ring groove cleaner with a blade to fit the piston grooves. The top and 2nd ring grooves are 1.2 mm (0.05 in.) wide. The oil ring groove is 2.0 mm (0.08 in.) wide. File down a blade if necessary. Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tools.

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

- Using a piston, push a new ring (A) into the cylinder bore 15-20 mm (0.6-0.8 in.) from the bottom.



G03677291

Fig. 42: Pushing Ring Into Cylinder Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Measure the piston ring end-gap (B) 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 (see **BLOCK AND PISTON INSPECTION**). If the bore is over the service limit, the engine block must be rebored.

Piston Ring End-Gap

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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.)

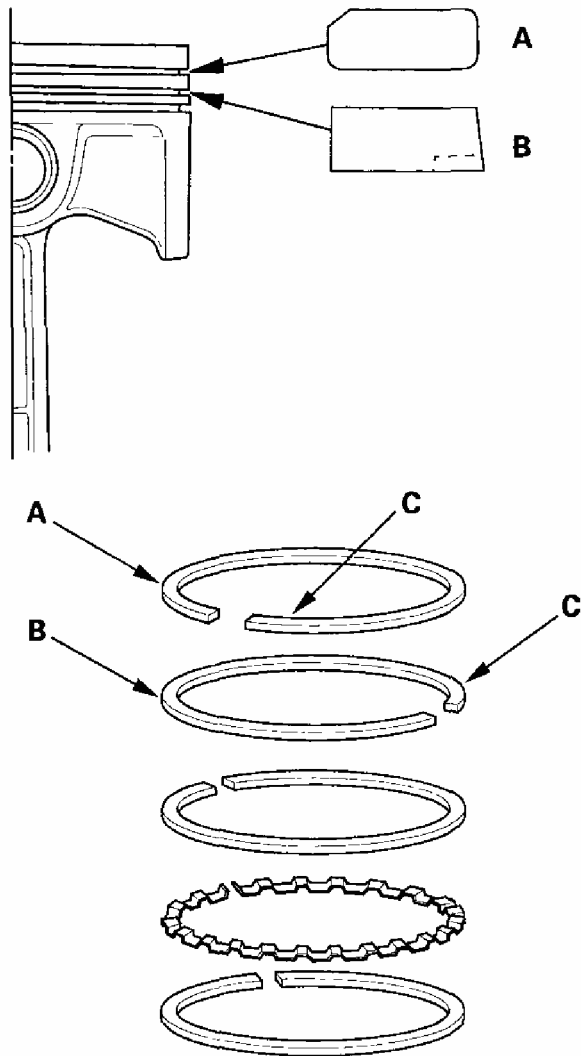
Service Limit: 0.70 mm (0.028 in.)

Oil Ring:

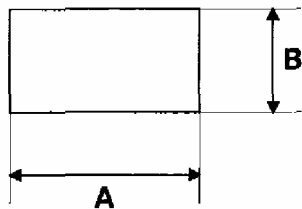
Standard (New): 0.20-0.70 mm (0.008-0.028 in.)

Service Limit: 0.80 mm (0.031 in.)

6. Install the top ring and second ring as shown. The top ring (A) has a 1R or 1Z mark and the second ring (B) has a 2R mark. The manufacturing marks (C) must be facing upward.



Piston Ring Dimensions:



Top Ring (Standard)

A: 3.1 mm (0.12 in.)
B: 1.2 mm (0.05 in.)

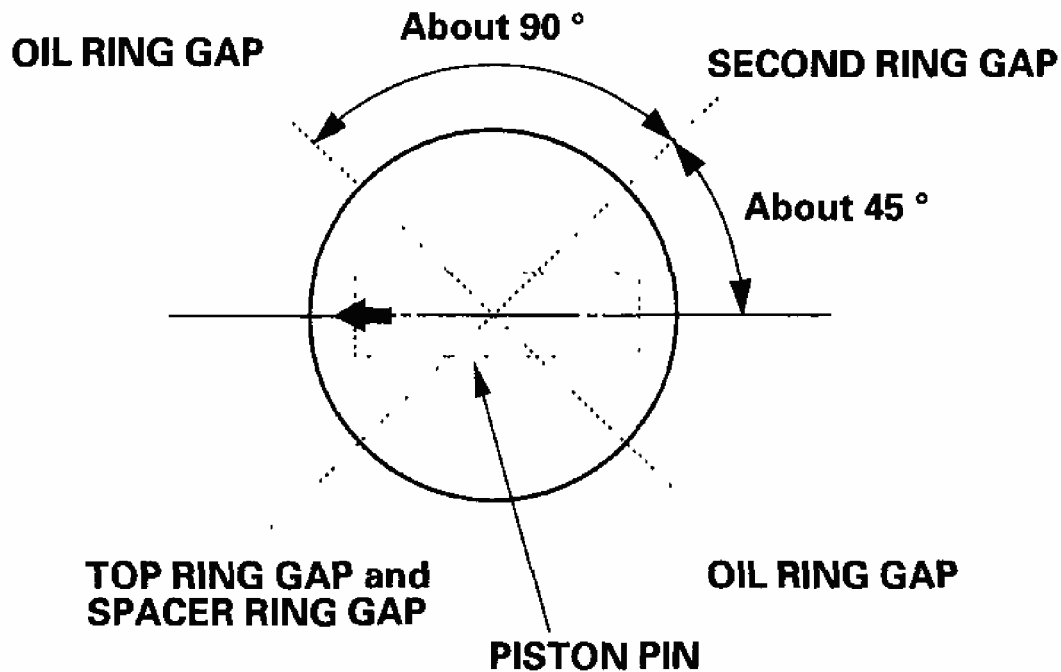
Second Ring (Standard)

A: 3.4 mm (0.13 in.)
B: 1.2 mm (0.05 in.)

G03677292

Fig. 43: Installing Top Ring And Second Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Rotate the rings in their grooves to make sure they do not bind.
8. Position the ring end gaps as shown:



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Fig. 44: Positioning Ring End Gaps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. After installing a new set of rings, measure the ring-to-groove clearances:

Top Ring Clearance

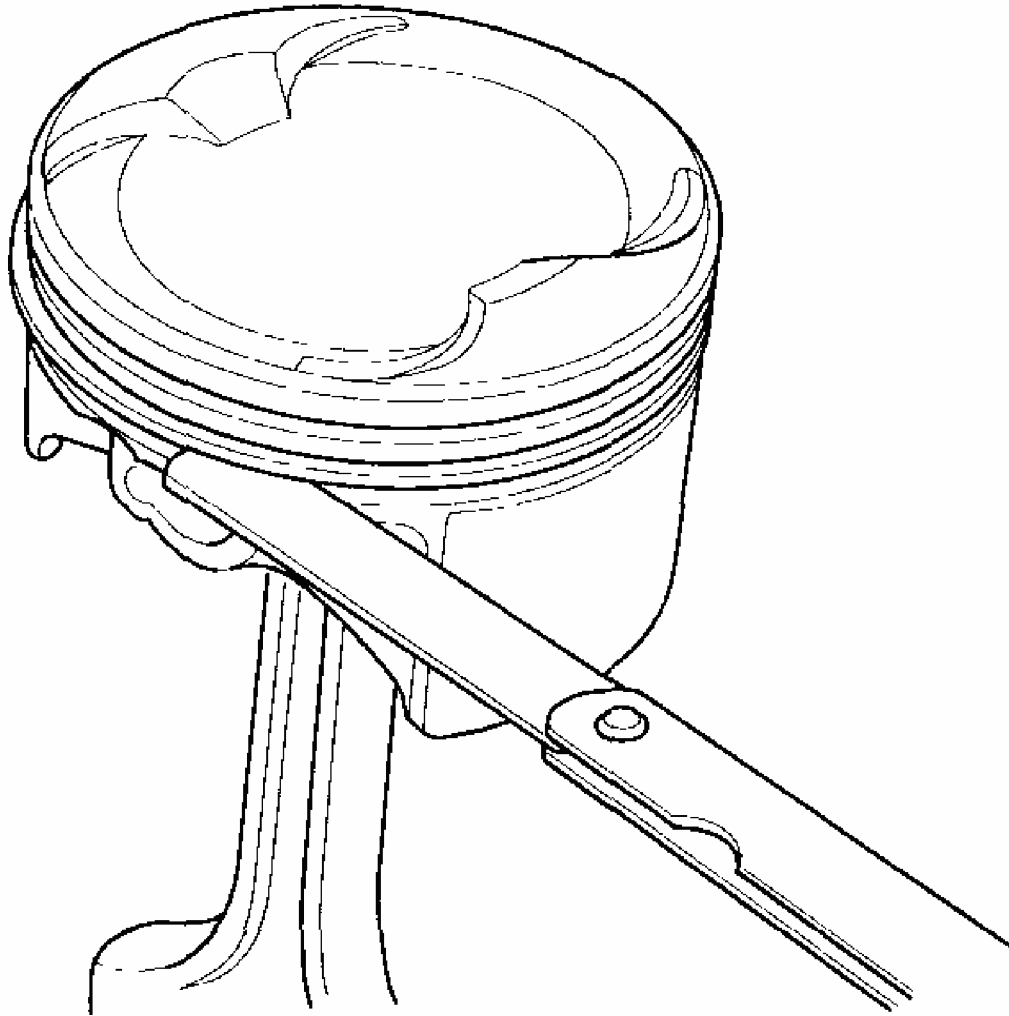
Standard (New): 0.045-0.070 mm (0.0018-0.0028 in.)

Service Limit: 0.13 mm (0.005 in.)

Second Ring Clearance

Standard (New): 0.050-0.075 mm (0.0020-0.0030 in.)

Service Limit: 0.13 mm (0.005 in.)



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Fig. 45: Measuring Ring-To-Groove Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION

IF THE CRANKSHAFT IS ALREADY INSTALLED

1. Set the crankshaft to bottom dead center (BDC) for the cylinder you are installing the piston in.
2. Remove the connecting rod caps. Check that the bearing is securely in place.
3. Apply new engine oil to the piston, inside of the ring compressor, and cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.

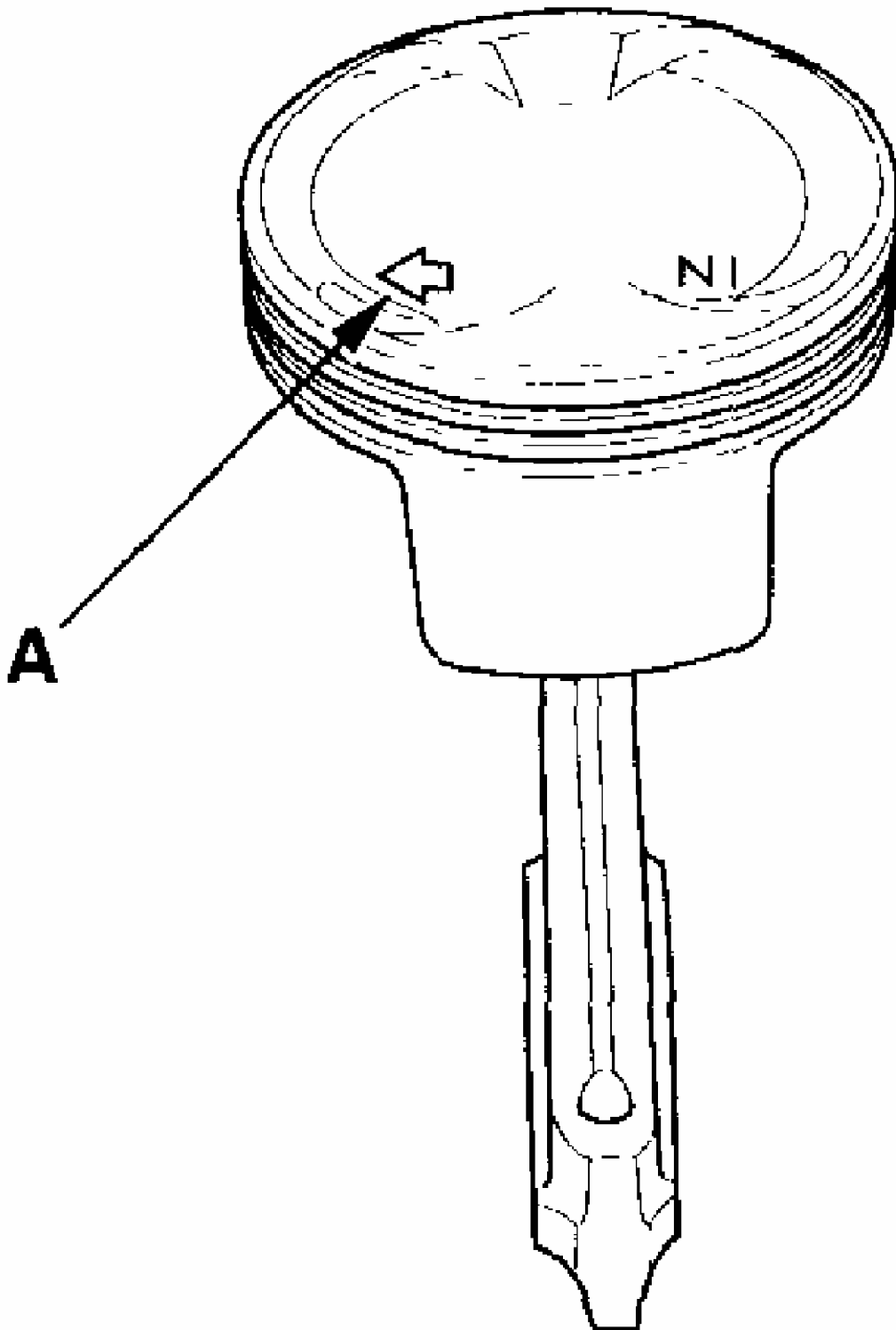
2004 Honda Element DX

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4. Position the mark (A) to face the cam chain side of the engine.

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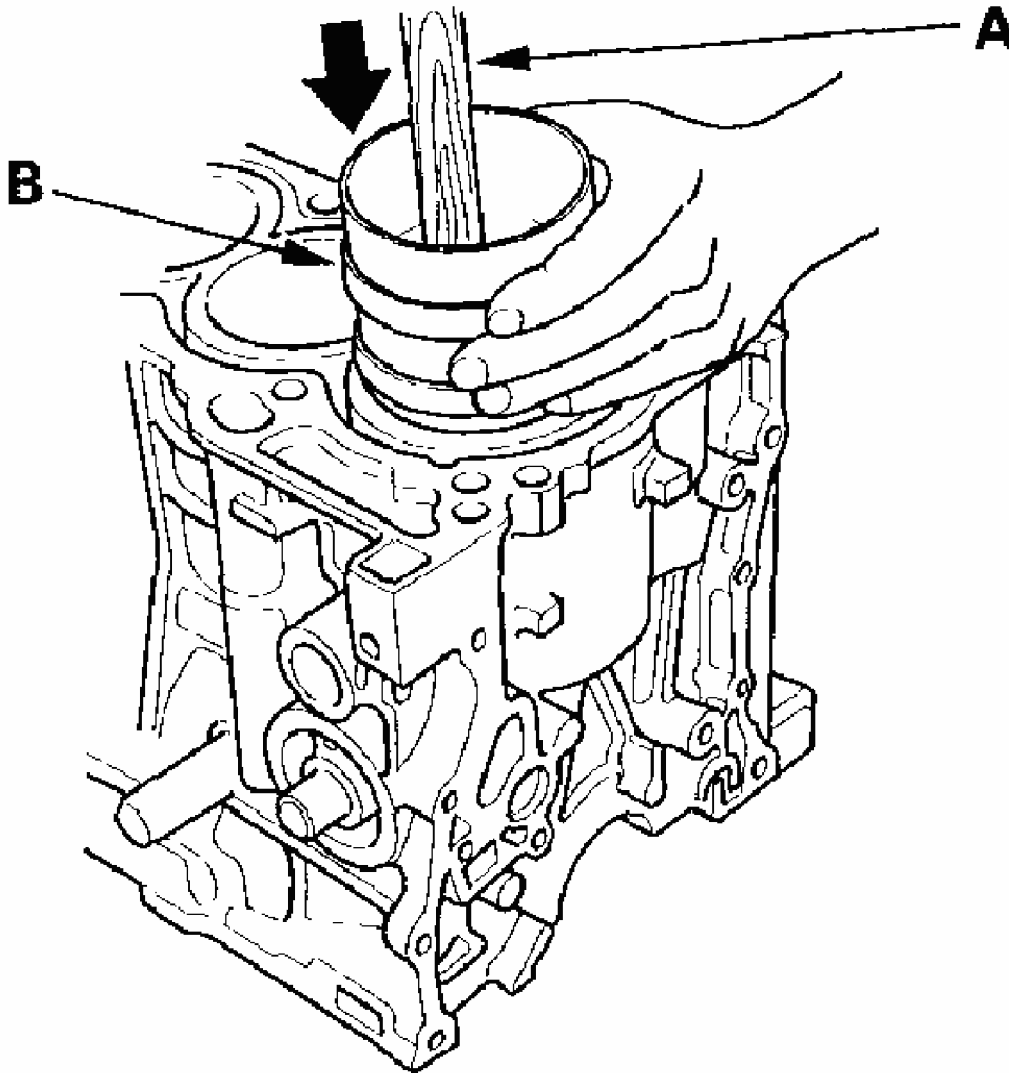
2003-06 ENGINE Engine Block - Element



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Fig. 46: Positioning Mark To Face Cam Chain Side Of Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



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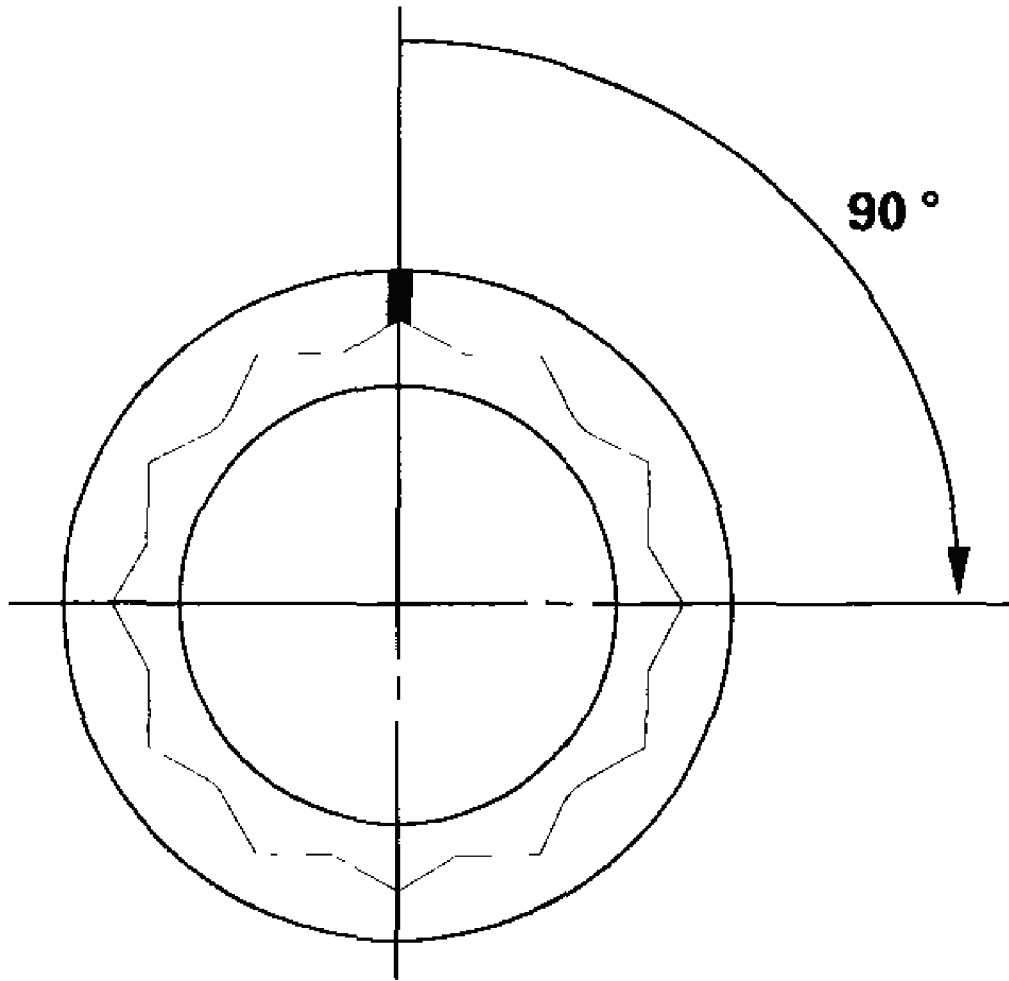
Fig. 47: Positioning Piston/Connecting Rod Assembly In Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Stop after the ring compressor pops free, and check the connecting rod-to-crank journal

alignment before pushing the piston into place.

7. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
8. Inspect the connecting rod bolts (see **IF THE CRANKSHAFT IS NOT INSTALLED**).
9. Apply new engine oil to the bolt threads, then install the rod caps with bearings. Torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft).
10. Tighten the connecting rod bolts an additional 90°.

NOTE: **Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 8 of the procedure. Do not loosen it back to the specified angle.**



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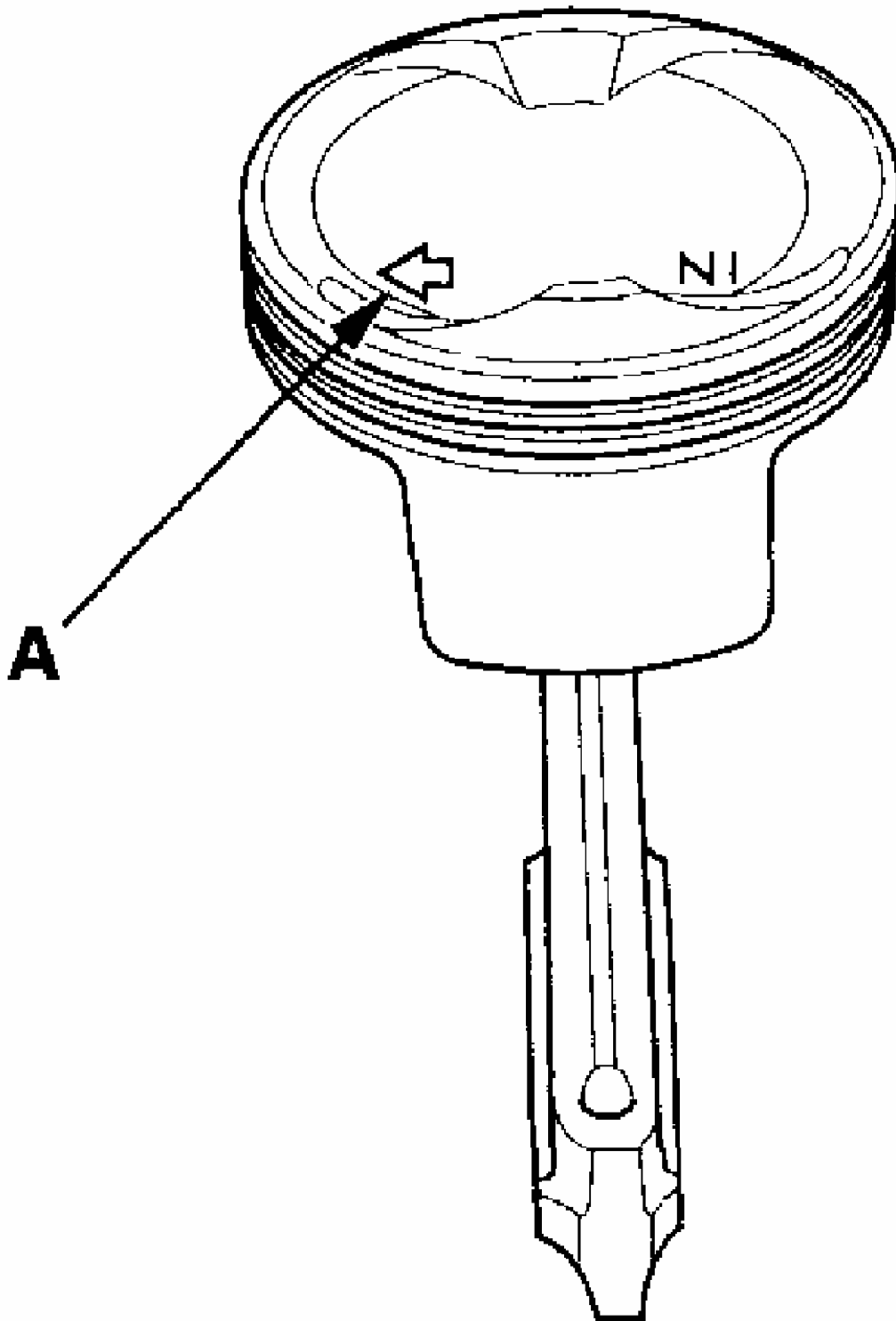
Fig. 48: Connecting Rod Bolts Tightening Directions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

IF THE CRANKSHAFT IS NOT INSTALLED

1. Remove the connecting rod caps. Check that the bearing is securely in place.
2. Apply new engine oil to the piston, inside of the ring compressor, and cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
3. Position the mark (A) to face the cam chain side of the engine.

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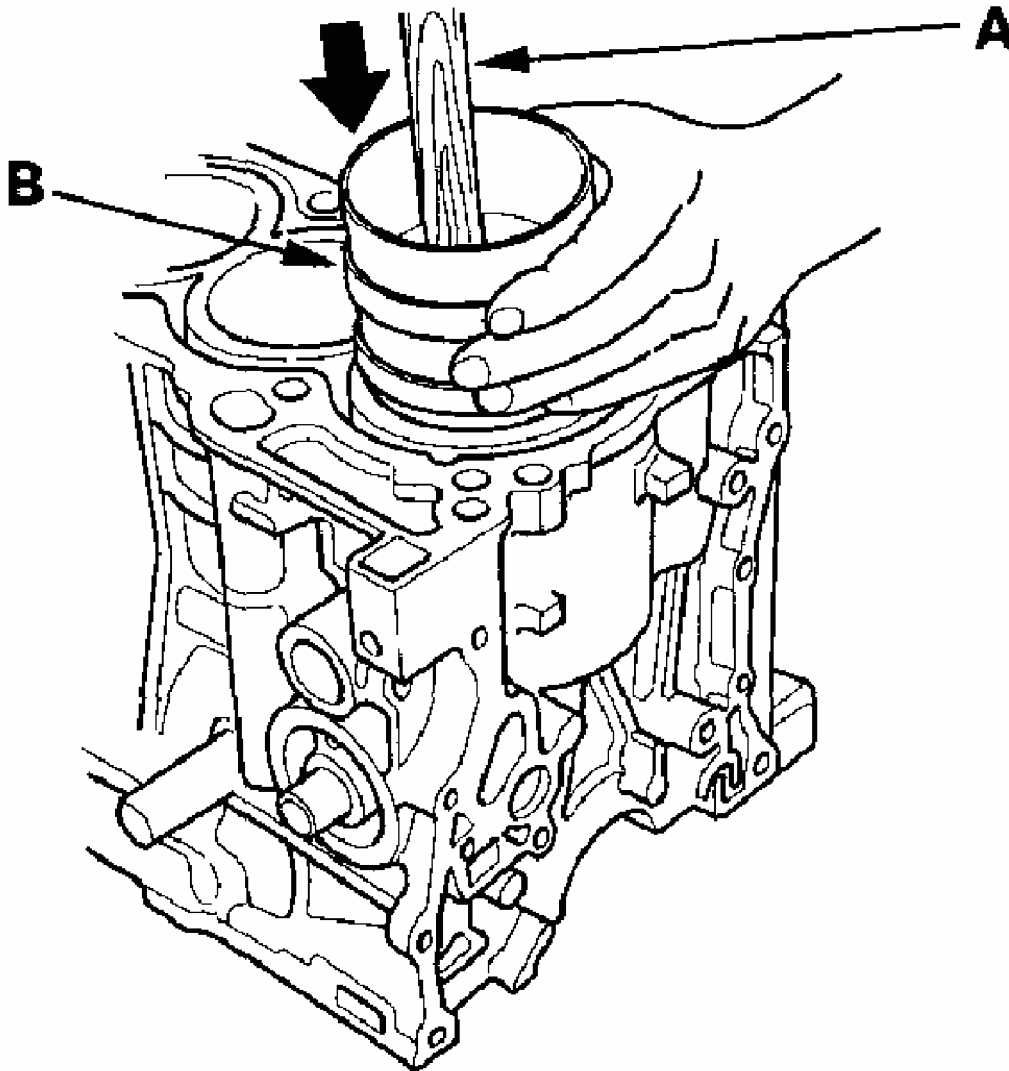
2003-06 ENGINE Engine Block - Element



G03677298

Fig. 49: Positioning Mark To Face Cam Chain Side Of Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



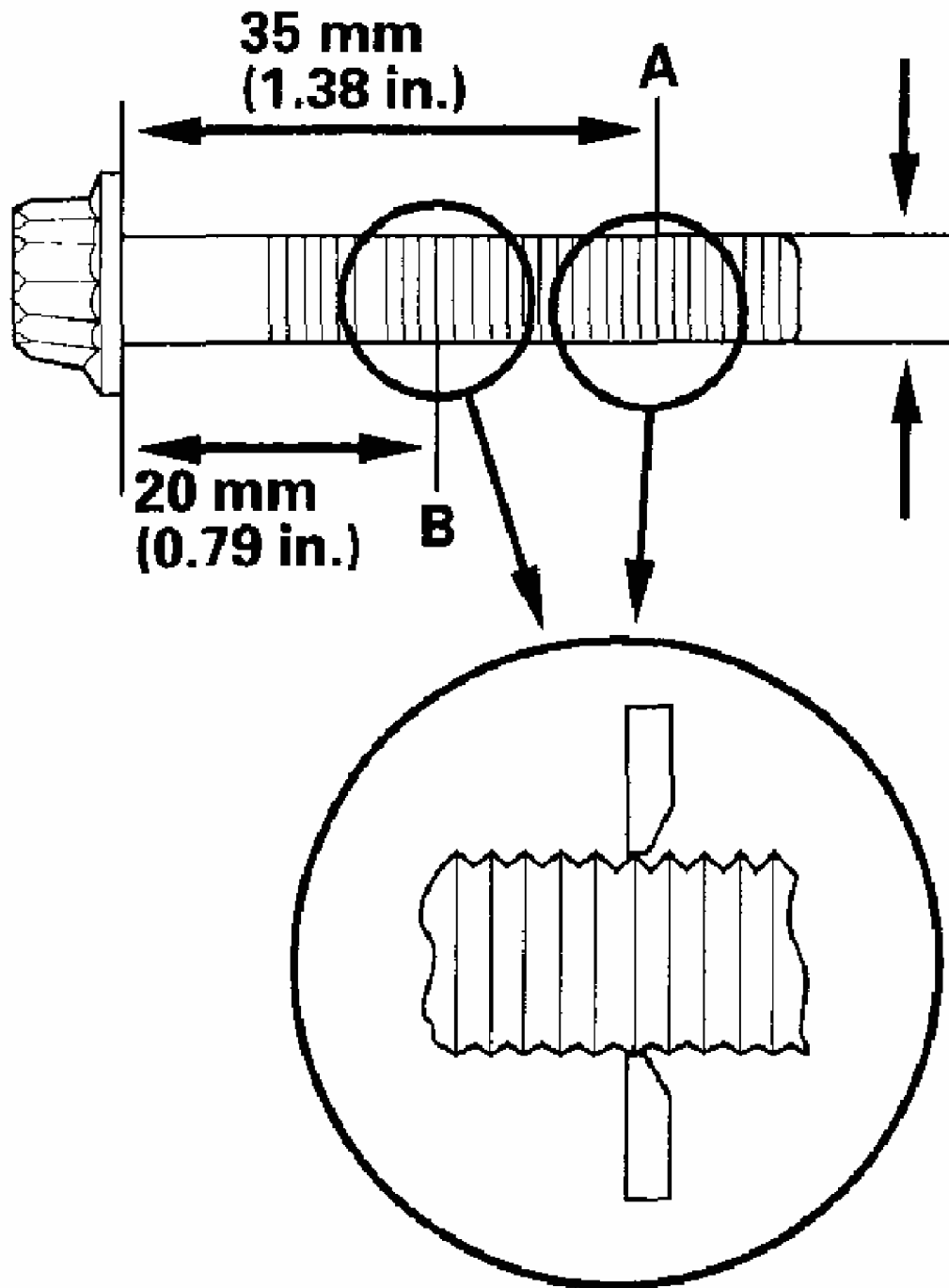
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Fig. 50: Positioning Piston/Connecting Rod Assembly In Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Position all pistons at top dead center (TDC).

CONNECTING ROD BOLT INSPECTION

1. Measure the diameter of each connecting rod bolt at point A and point B.



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Fig. 51: Measuring Connecting Rod Bolt Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Calculate the difference in diameter between point A and point B.

Point A-Point B = Difference in Diameter

Difference in Diameter:

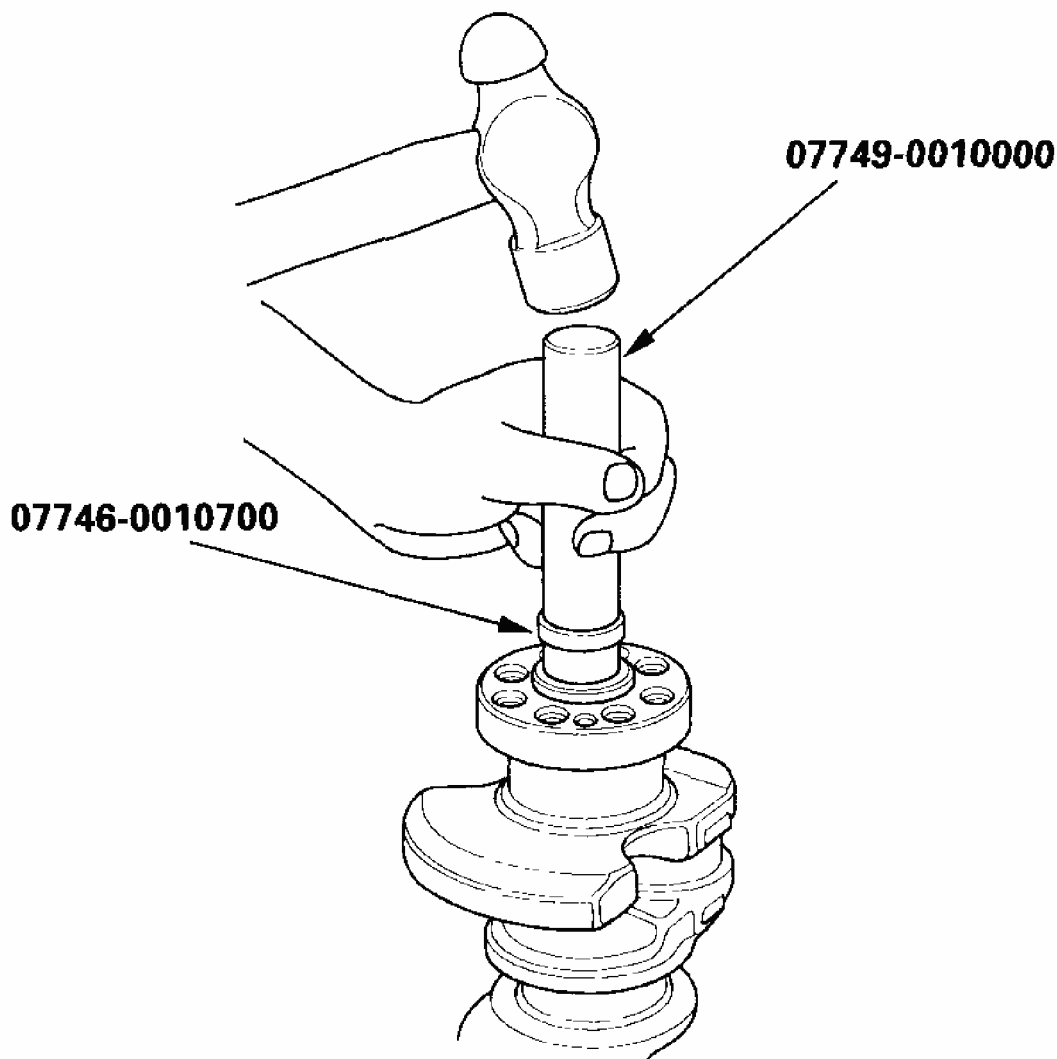
Specification: 0-0.1 mm (0-0.004 in.)

3. If the difference in diameter is out of tolerance, replace the connecting rod bolt.

CRANKSHAFT INSTALLATION

Special Tools Required

- Driver 07749-0010000
 - Attachment, 24 x 26 mm 07746-0010700
 - Oil seal driver attachment 96 07ZAD-PNAA100
1. M/T model: Install the crankshaft end bushing when replacing the crankshaft. Using the special tools, drive in the crankshaft end bushing until the special tools bottom against the crankshaft.

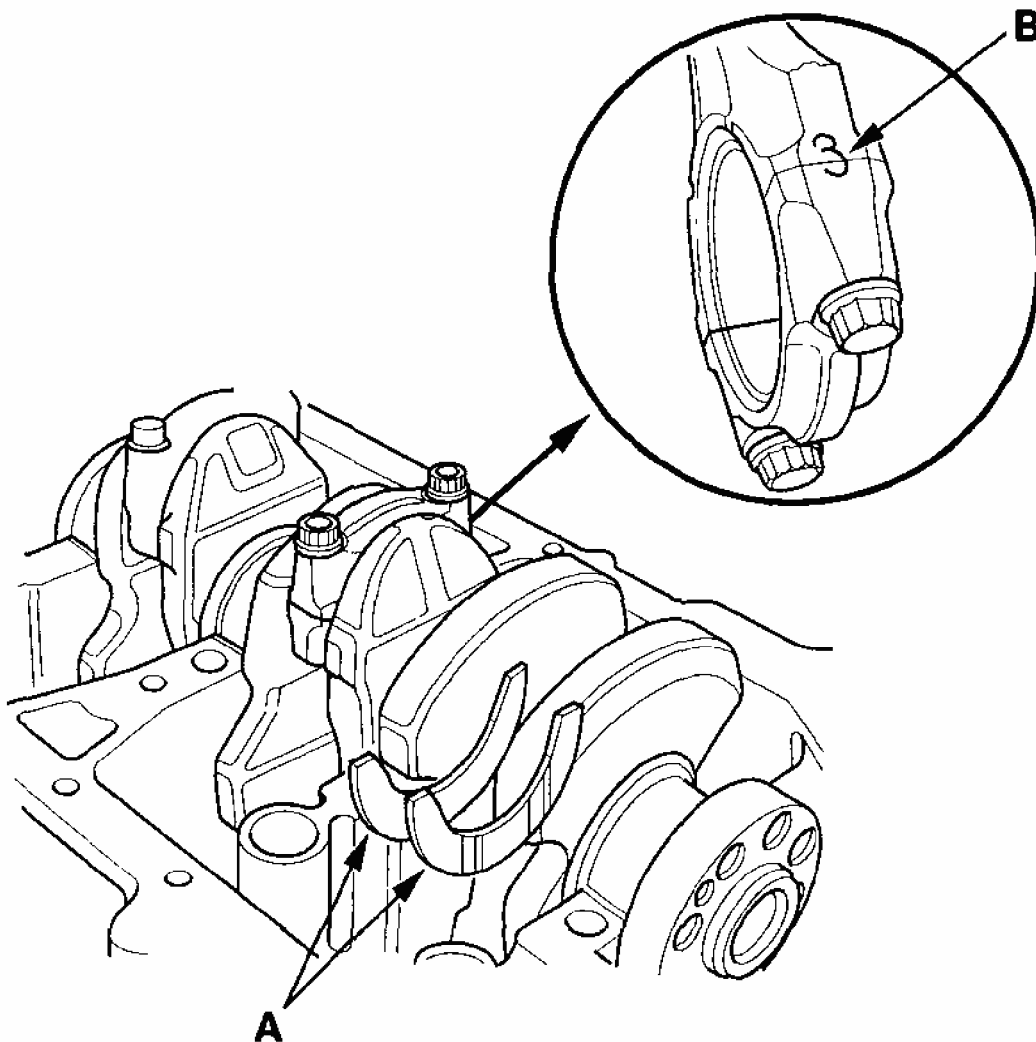


G03677301

Fig. 52: Installing Crankshaft End Bushing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
3. Check the main bearing clearance with plastigage (see **CRANKSHAFT MAIN BEARING REPLACEMENT**).
4. Install the bearing halves in the engine block and connecting rods.
5. Apply a coat of new engine oil to the main bearings and rod bearings.
6. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the engine block.
7. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the

No. 4 journal of the engine block.



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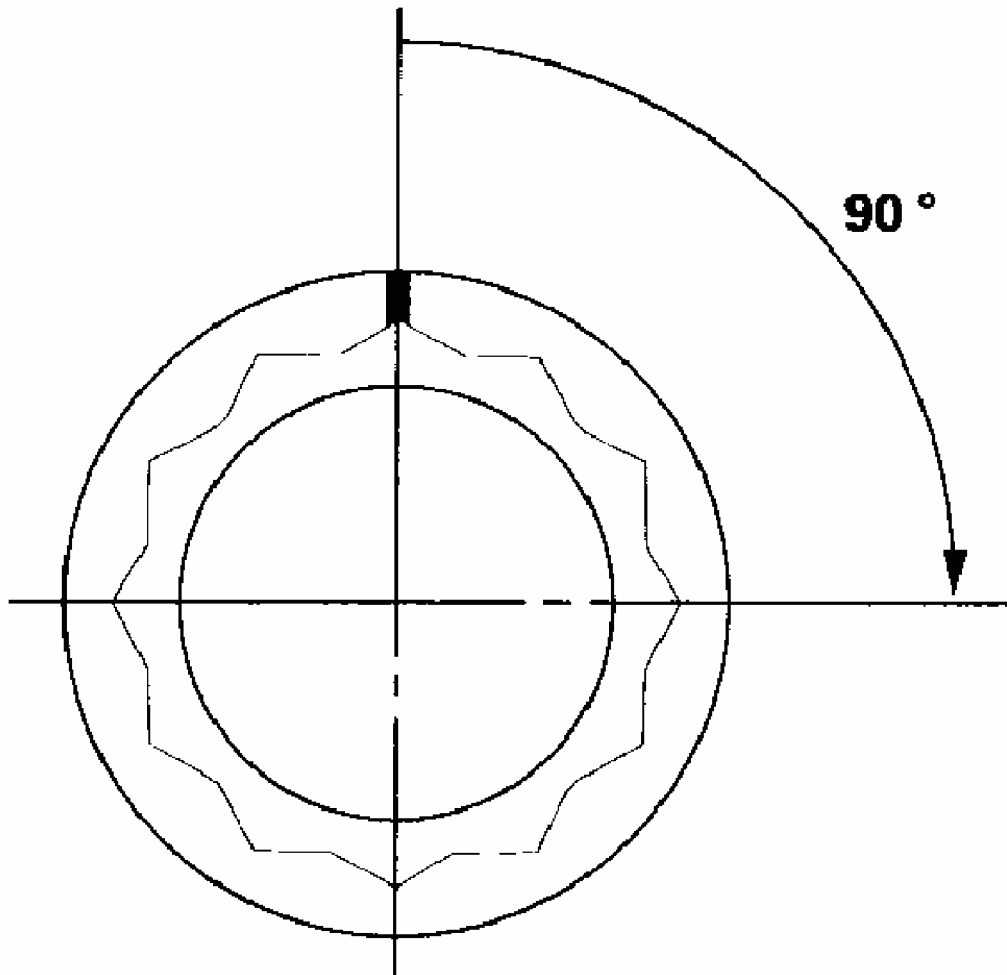
Fig. 53: Installing Thrust Washers In Engine Block No. 4 Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the connecting rod bolts (see **IF THE CRANKSHAFT IS NOT INSTALLED**).
9. Apply new engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and cap, then install the caps and bolts finger-tight.
11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and cap, then install the

caps and bolts finger-tight.

12. Tighten the connecting rod bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft).
13. Tighten the connecting rod bolts an additional 90°.

NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 8 of the procedure. Do not loosen it back to the specified angle.



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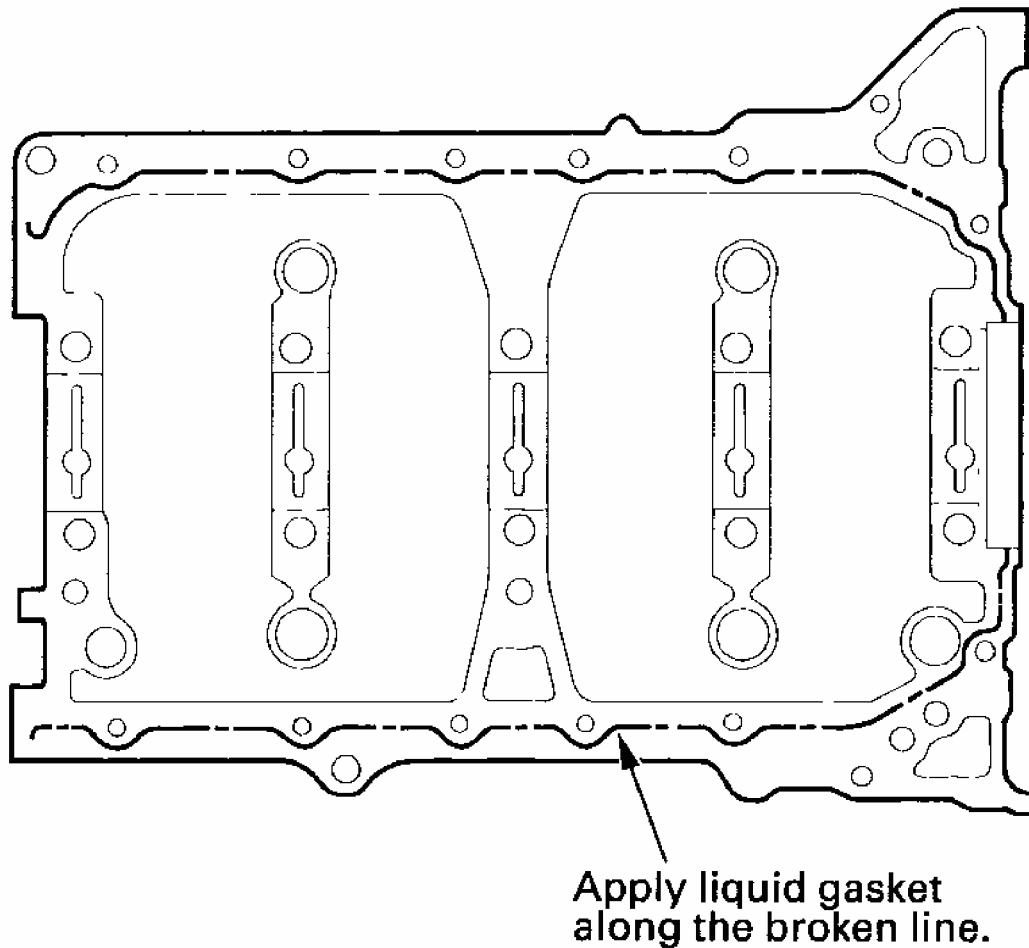
Fig. 54: Connecting Rod Bolts Tightening Directions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove all of the old liquid gasket from the lower block mating surfaces, bolts, and

bolt holes.

15. Clean and dry the lower block mating surfaces.
16. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the lower block.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.

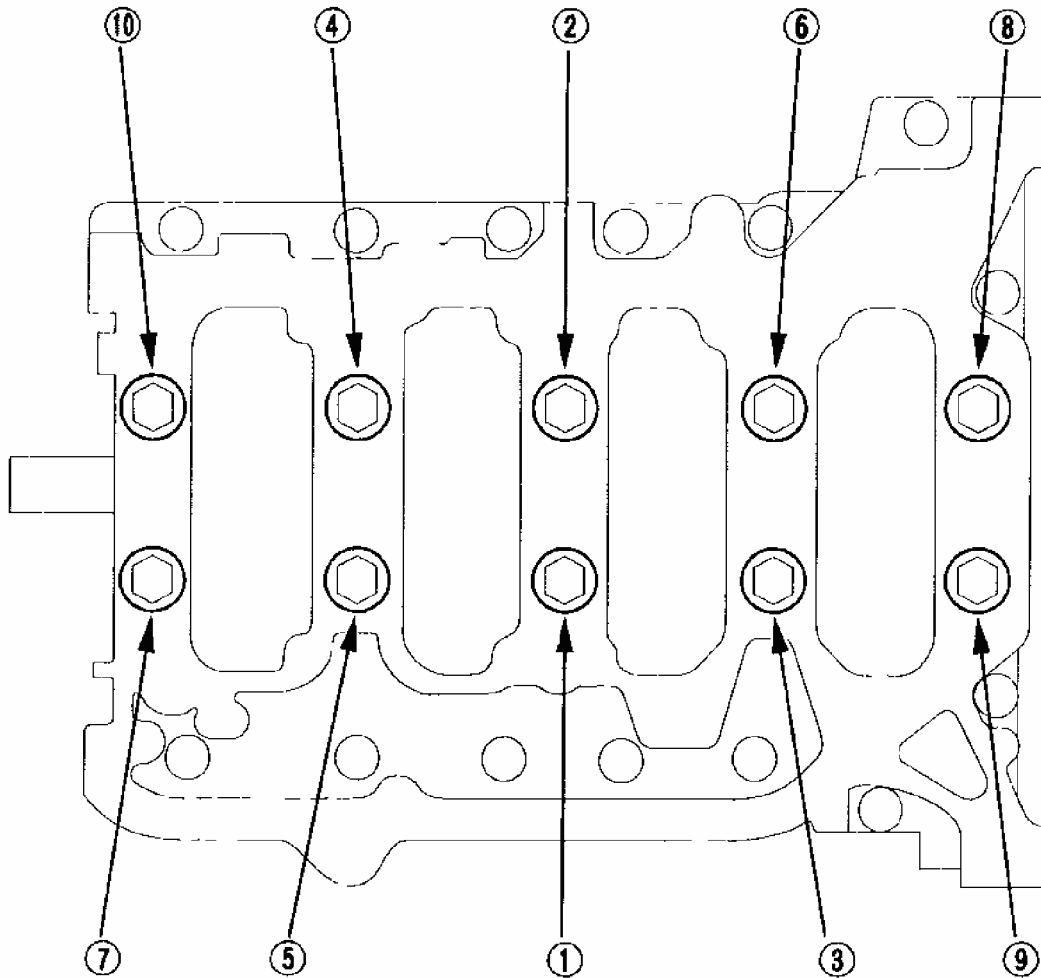


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Fig. 55: Locating Liquid Gasket Applying Point
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Put the lower block on the engine block.

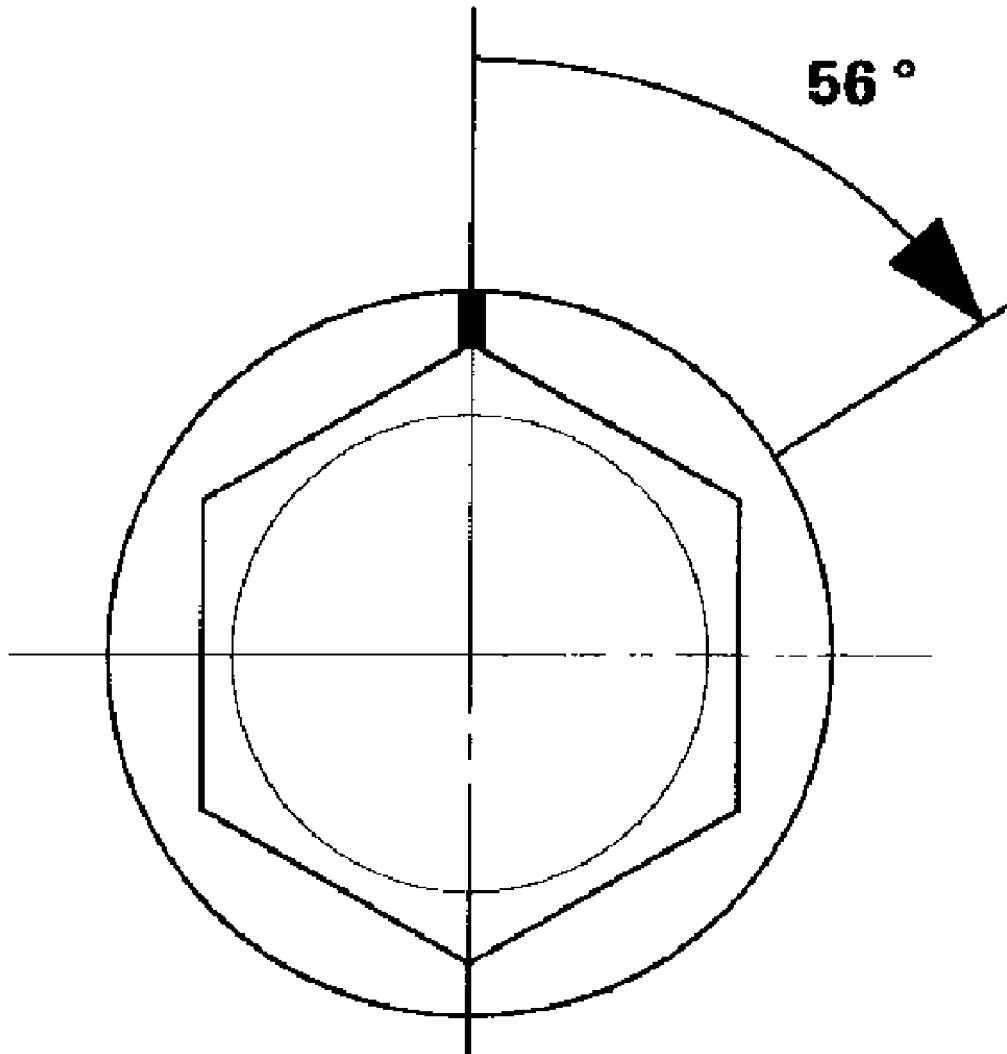
18. Apply new engine oil to the bearing cap bolts. Tighten the bearing cap bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft).



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Fig. 56: Tightening Bearing Cap Bolts In Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Tighten the bearing cap bolts an additional 56°.



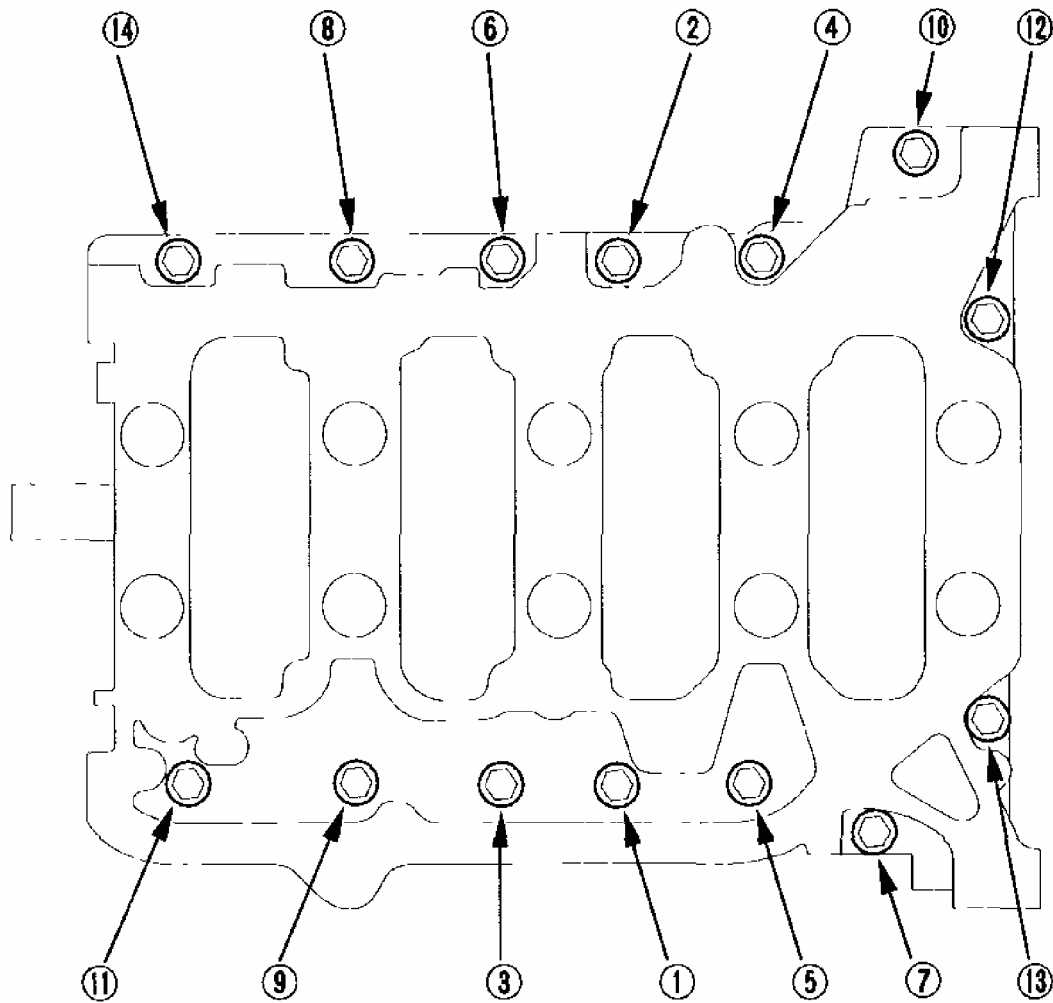
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Fig. 57: Bearing Cap Bolts Tightening Directions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Tighten the 8 mm bolts in sequence to 22 N.m (2.2 kgf.m, 16 lbf.ft).

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2003-06 ENGINE Engine Block - Element



G03677307

Fig. 58: Tightening Bolts In Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Use the special tools to drive a new crankshaft oil seal squarely into the engine block to the specified installed height.

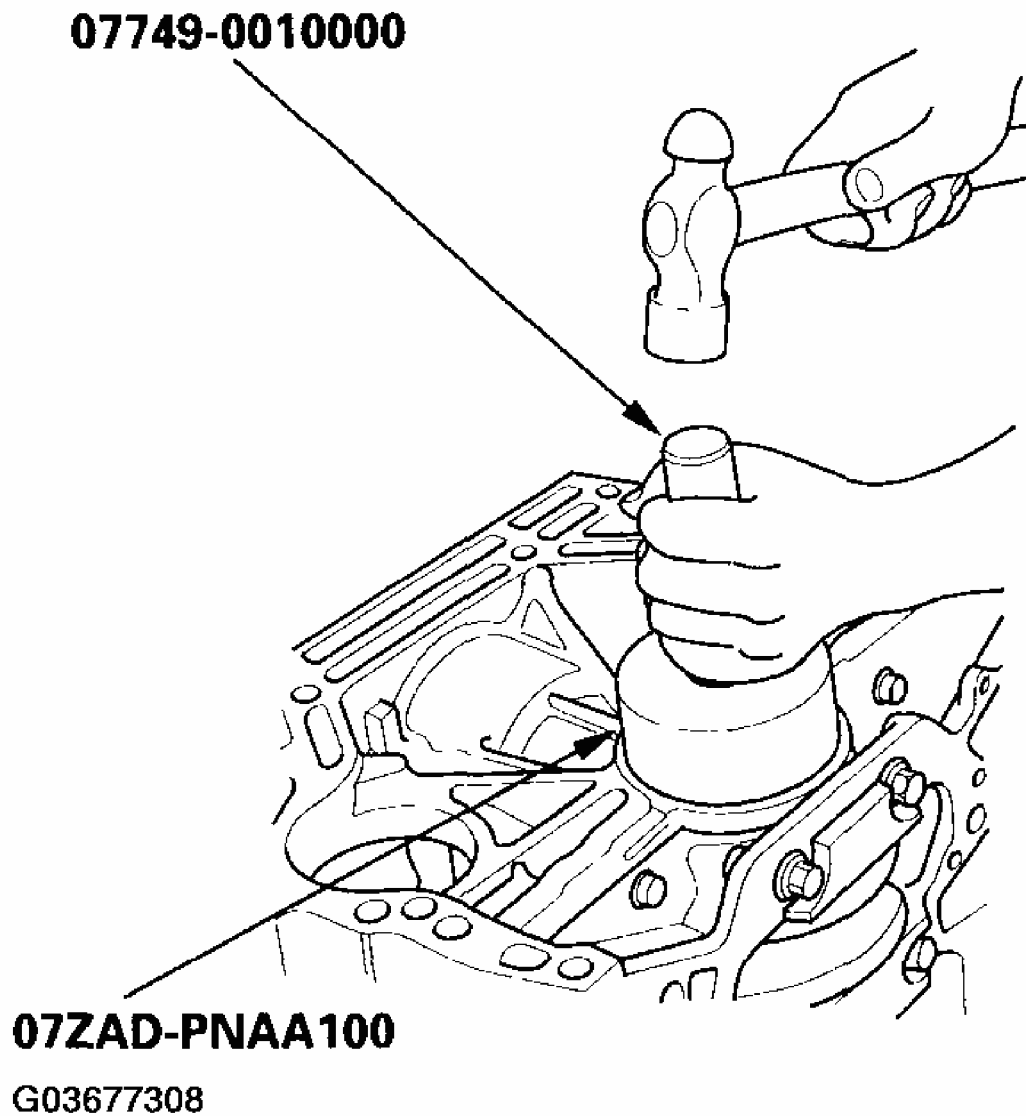


Fig. 59: Installing Crankshaft Oil Seal Into Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Measure the distance between the engine block (A) and crankshaft oil seal (B).

Crankshaft Oil Seal Installed Height:

0.2-1.2 mm (0.001-0.047 in.)

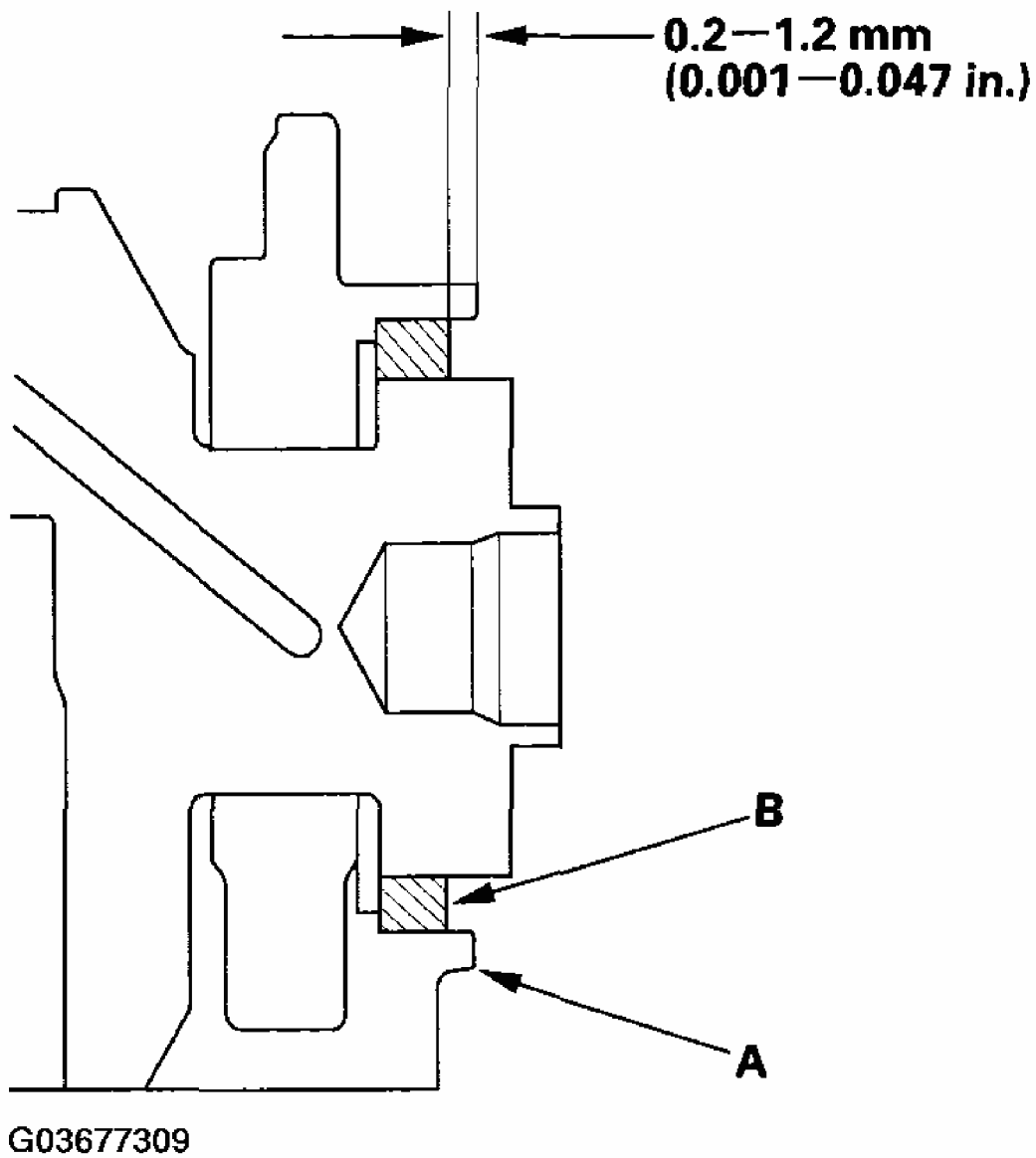
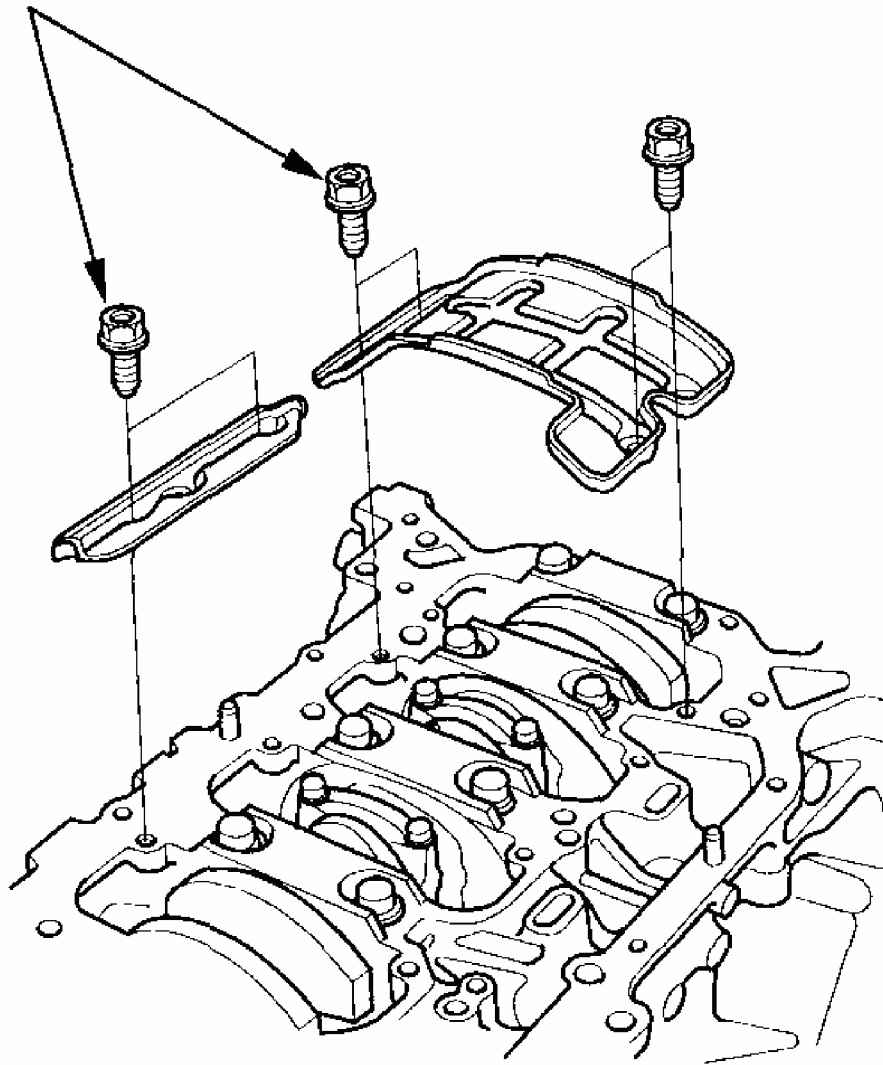


Fig. 60: Measuring Distance Between Engine Block And Crankshaft Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the baffle plates.

**6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)**



G03677310

Fig. 61: Installing Baffle Plates And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the oil pump (see **OIL PUMP INSTALLATION**).
25. Install the oil pan (see **OIL PAN INSTALLATION**).
26. Install the cylinder head (see **CYLINDER HEAD INSTALLATION**).
27. M/T model: Install the flywheel (see **FLYWHEEL INSPECTION**) clutch disc (see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION**), and pressure plate

(see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION**).

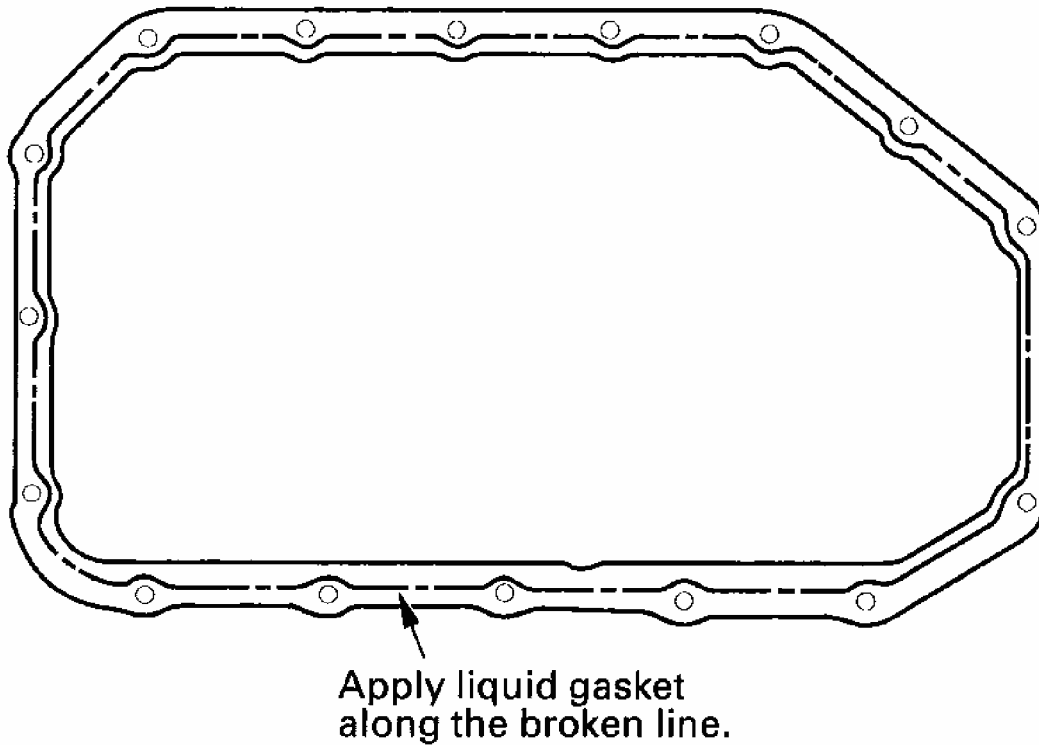
28. A/T model: Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
29. Install the transmission:
 - Manual transmission (see **TRANSMISSION INSTALLATION**)
 - Automatic transmission (see **TRANSMISSION INSTALLATION**)
30. Install the engine assembly (see **ENGINE INSTALLATION**).

NOTE: Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for about 15 minutes.

OIL PAN INSTALLATION

1. Remove all of the old liquid gasket from the oil pan mating surfaces, bolts, and bolt holes.
2. Clean and dry the oil pan mating surfaces.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the oil pan.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.



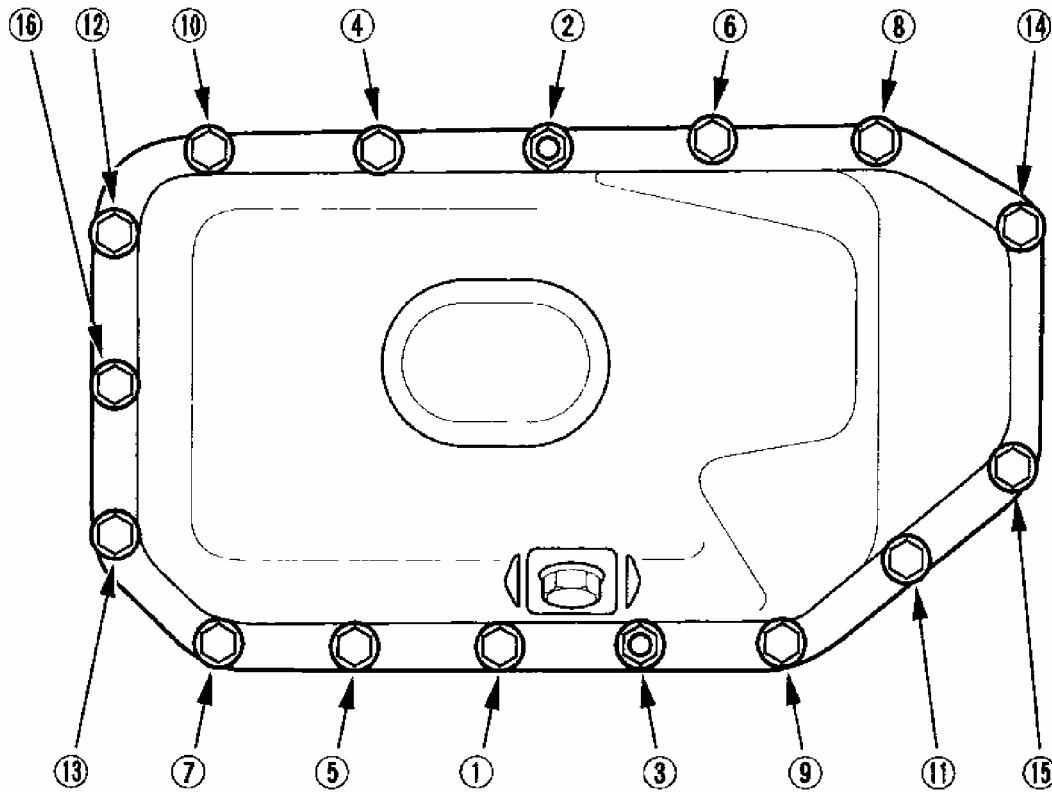
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Fig. 62: Locating Liquid Gasket Applying Point
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan.
5. Tighten the bolts/nuts in two or three steps. In the final step, tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 lbf.ft).

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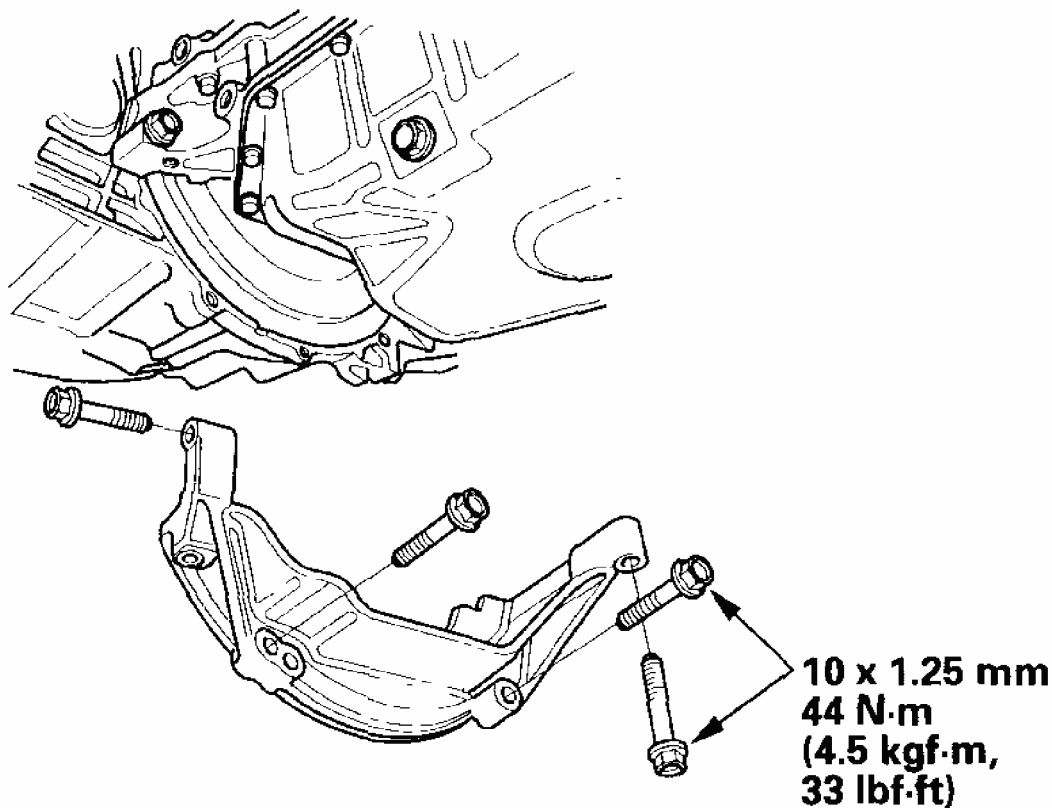
2003-06 ENGINE Engine Block - Element



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Fig. 63: Tightening Bolts/Nuts In Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. M/T model: Install the stiffener.



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Fig. 64: Installing Stiffener (M/T Model) And Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If the engine is still in the vehicle, install the subframe.
 - 1 Support the subframe with the special tool and a jack, and lift it up to body, then loosely install the new subframe mounting bolts (see step 4 on **ENGINE INSTALLATION**).
 - 2 Align the reference marks with the center of the subframe mounting bolts, then tighten the bolts to the specified torque (see step 6 on **ENGINE INSTALLATION**).
 - 3 A/T model: Install the automatic transmission fluid (ATF) filter mounting bolt (see step 37 on **ENGINE INSTALLATION**).
 - 4 Tighten the rear mount mounting bolts (see step 8 on **ENGINE INSTALLATION**).
 - 5 Tighten the front mount mounting bolt (see step 18 on **ENGINE INSTALLATION**).
 - 6 Connect the suspension lower arm ball joints (see **LOWER ARM**

REPLACEMENT).

8. After assembly, wait at least 30 minutes before filling the engine with oil.

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

- Driver 07749-0010000
 - Oil seal driver attachment 96 07ZAD-PNAA100
1. Clean and dry the crankshaft oil seal housing.
 2. Apply a light coat of multipurpose grease to the crankshaft and to the lip of the seal.
 3. Use the special tools to drive a new oil seal squarely into the engine block to the specified installed height.

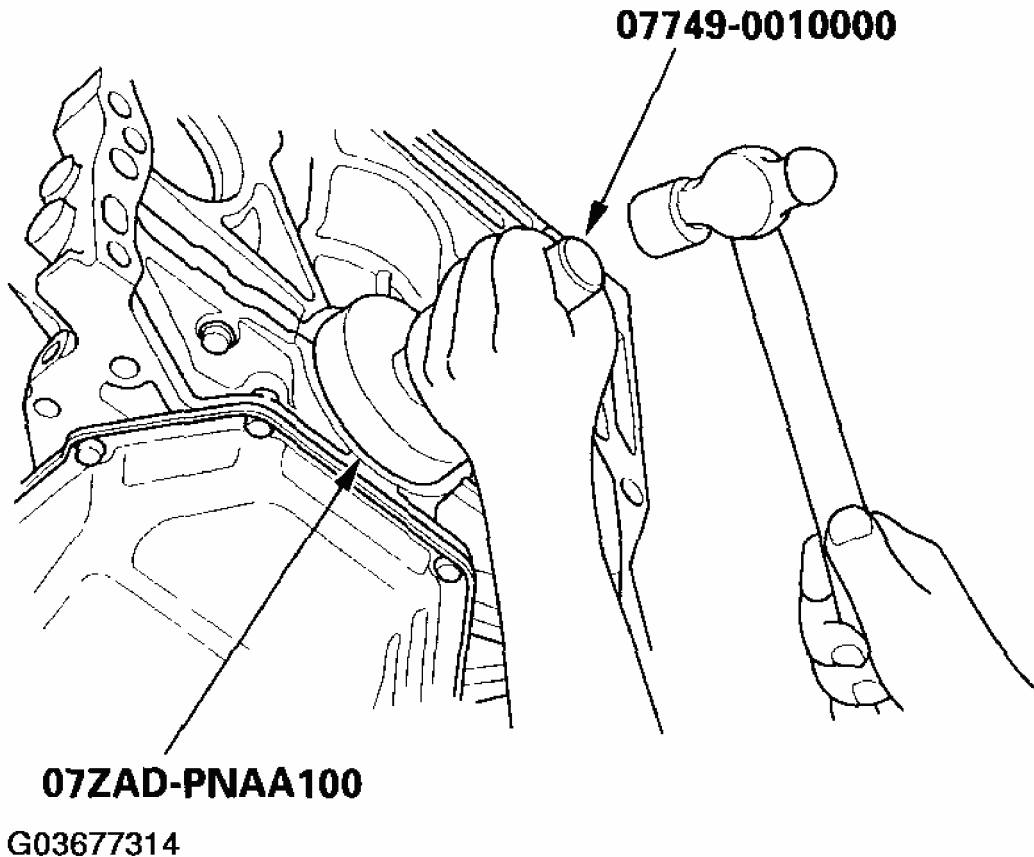
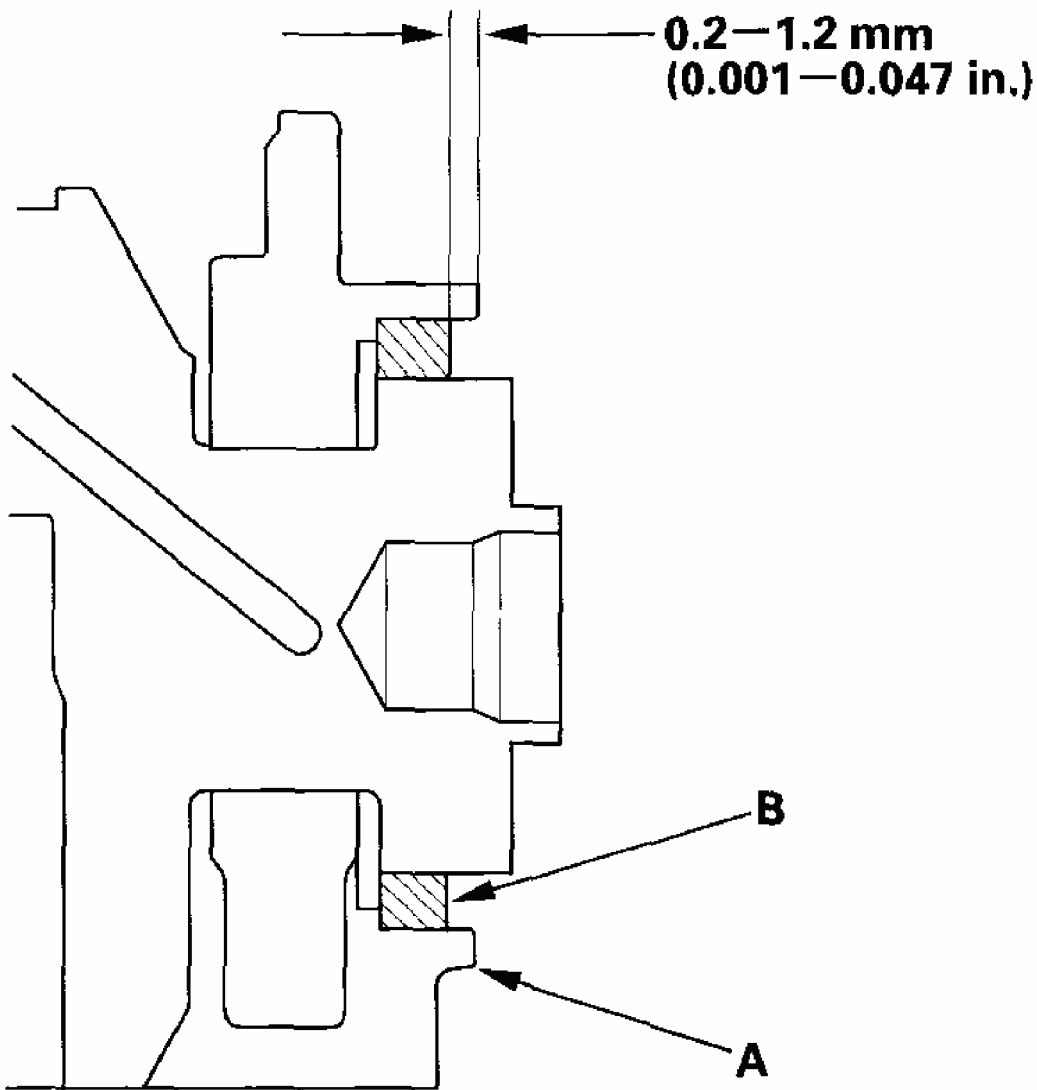


Fig. 65: Installing Oil Seal Into Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the distance between the engine block (A) and crankshaft oil seal (B).

Crankshaft Oil Seal Installed Height:

0.2-1.2 mm (0.001-0.047 in.)



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Fig. 66: Identifying Distance Between Engine Block And Crankshaft Oil Seal
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