2004-08 ENGINE

Engine Block - TSX

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07AAK-SNAA120	Universal Eyelet	1
②	07ZAD-PNAA100	Oil Seal Driver Attachment 96 mm	1
③	07746-0010700	Attachment, 24 x 26 mm	1
④	07749-0010000	Handle Driver	1

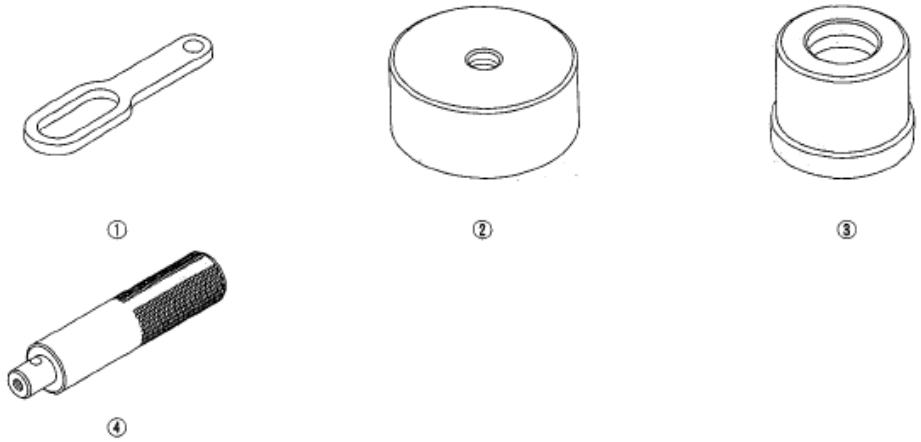


Fig. 1: Identifying Engine Block Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

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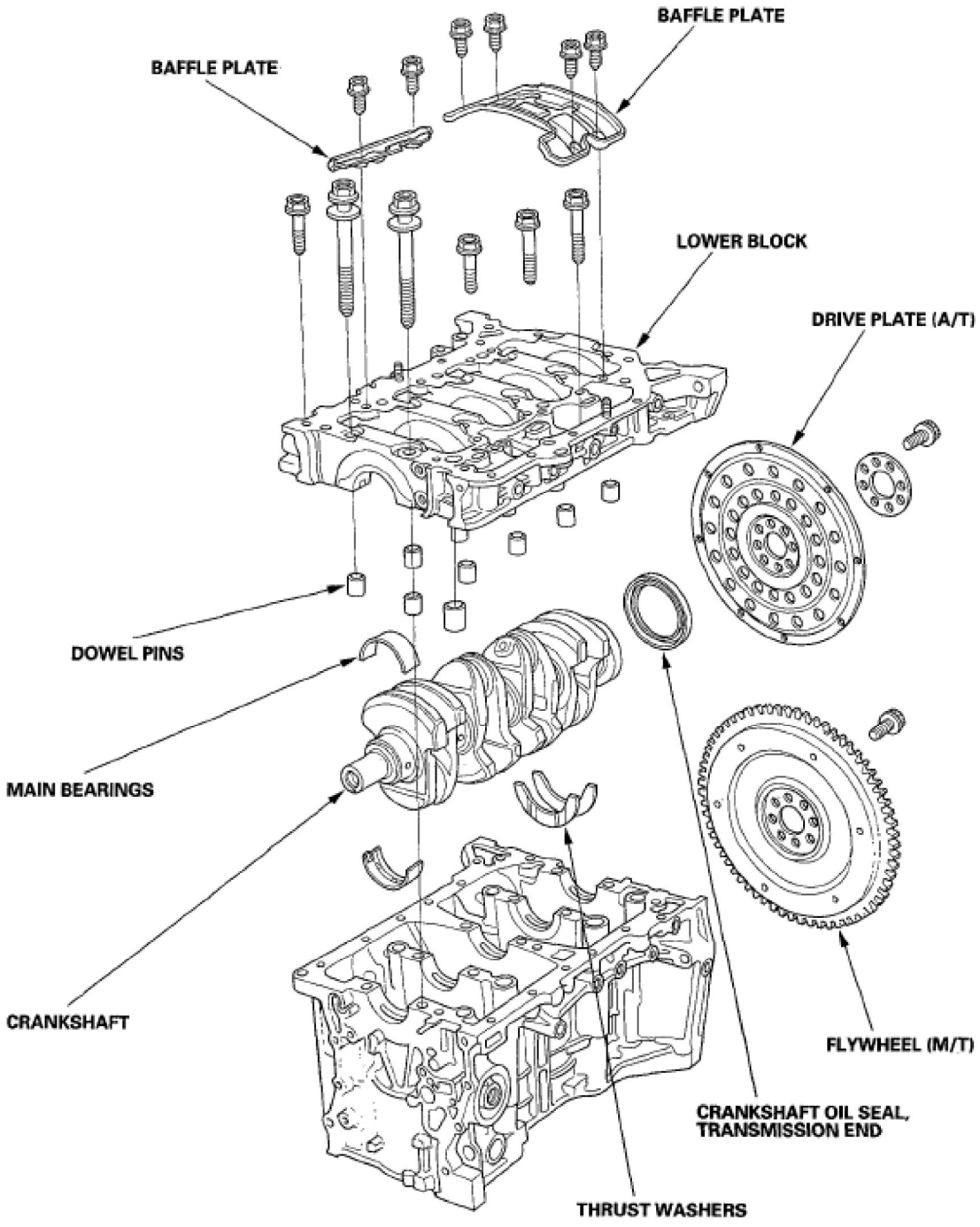


Fig. 2: Identifying Engine Block Component Location (1 Of 2)
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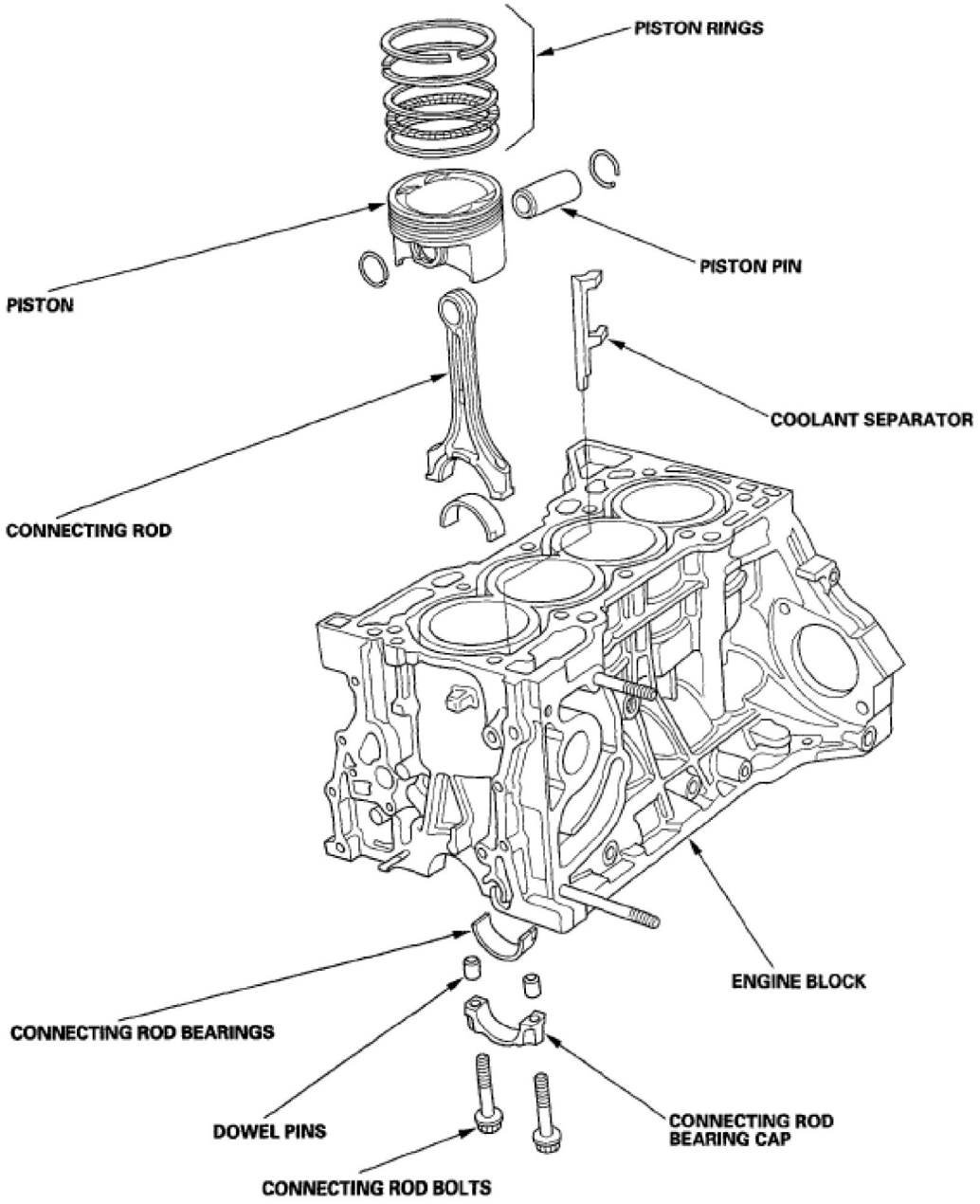


Fig. 3: Identifying Engine Block Component Location (2 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

Service Limit: 0.40 mm (0.016 in.)

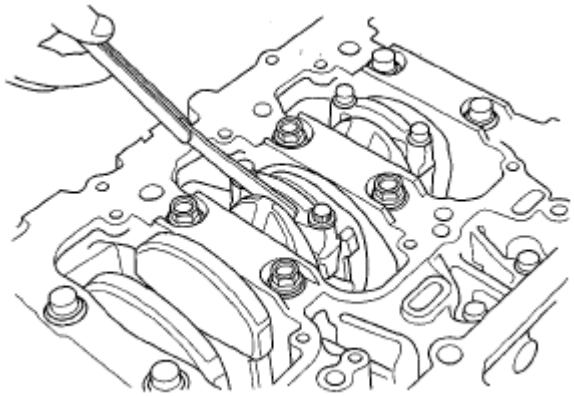


Fig. 4: Measuring Connecting Rod End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. If the connecting rod end play is beyond the service limit, install a new connecting rod, and recheck. If it is still beyond the service limit, 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.)

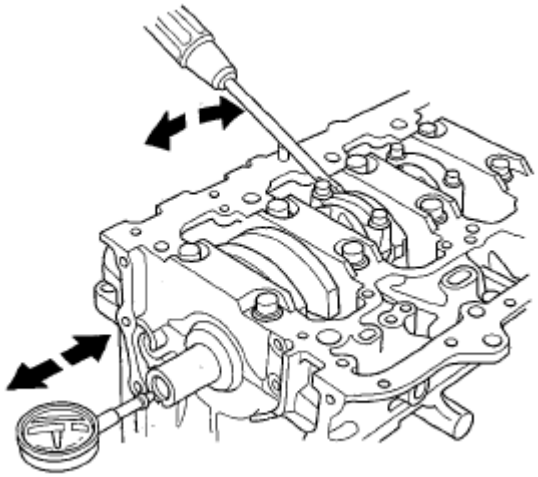


Fig. 5: Checking Crankshaft End Play

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Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the end play is beyond the service limit, replace the thrust washers and recheck, if it is still beyond the service limit, replace the crankshaft (see **CRANKSHAFT AND PISTON REMOVAL**).

CRANKSHAFT MAIN BEARING REPLACEMENT

MAIN BEARING CLEARANCE INSPECTION

1. To check main bearing-to-journal oil clearance, 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° in the proper sequence (see step 18).

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:

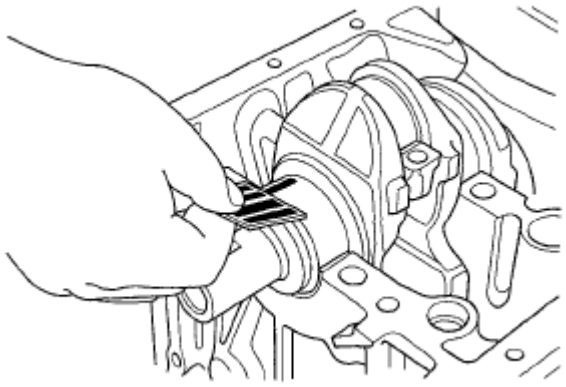
Standard (New): 0.017 - 0.041 mm 0.0007 - 0.0016 in.)

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 Widest Part Of Plastigage
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 appropriate 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 the current 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, 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.

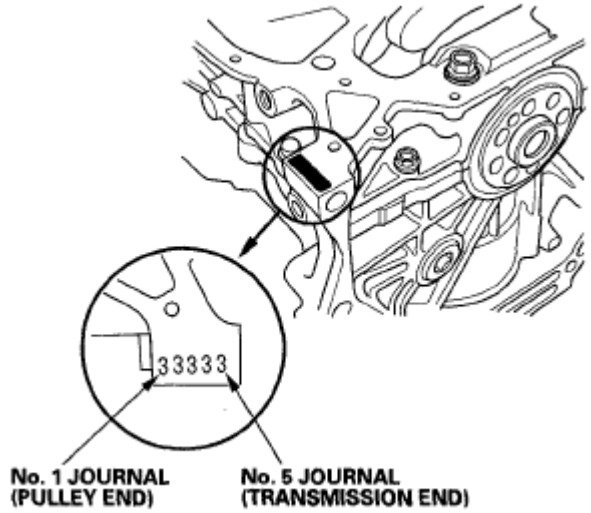


Fig. 7: Identifying Crankshaft Bore Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

2. The main journal codes are stamped on the crankshaft.

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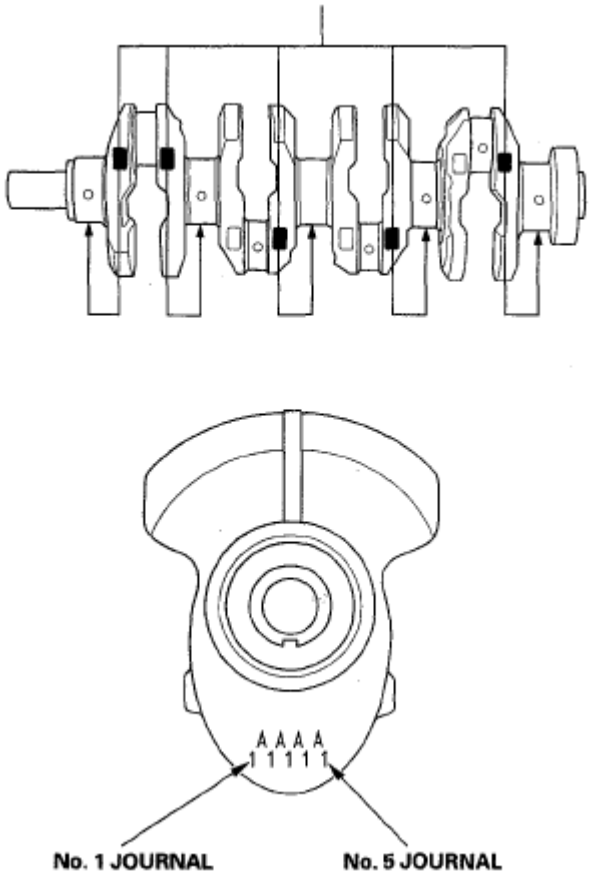


Fig. 8: Identifying Main Journal Codes On Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 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.**

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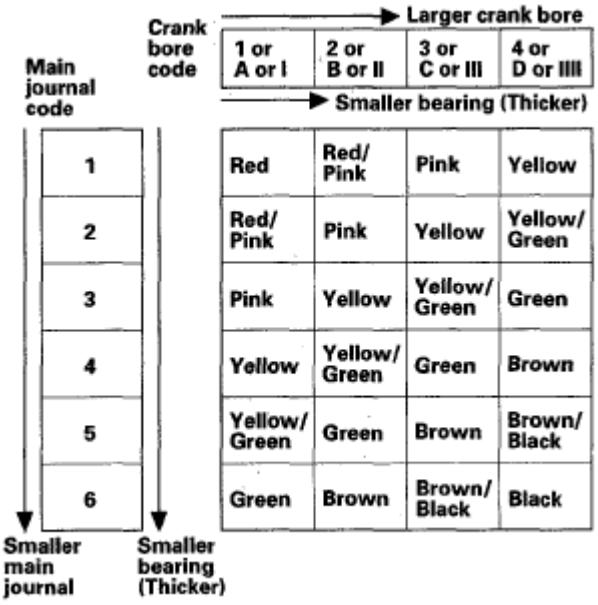


Fig. 9: Identifying Crank Bore Codes And Crank Journal Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

CONNECTING 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 connecting rod cap, and torque the bolts to 36 N.m (3.7 kgf.m, 27 lbf.ft) + 120°

NOTE: Do not rotate the crankshaft during inspection.

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.032-0.066 mm. 0.0013-0.0026 in.)

Service Limit: 6.077 mm (0.0030 in.)

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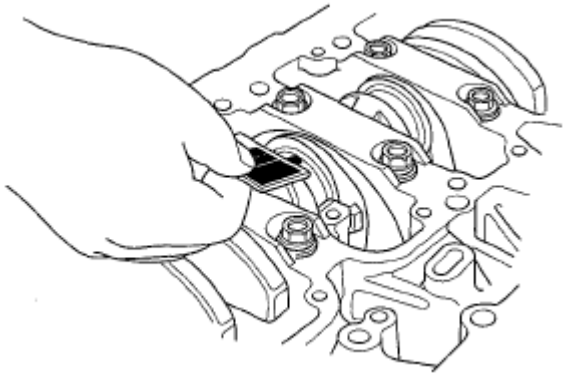


Fig. 10: Measuring Widest Part Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the appropriate 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 the current 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.

CONNECTING 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.), 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 Mil) 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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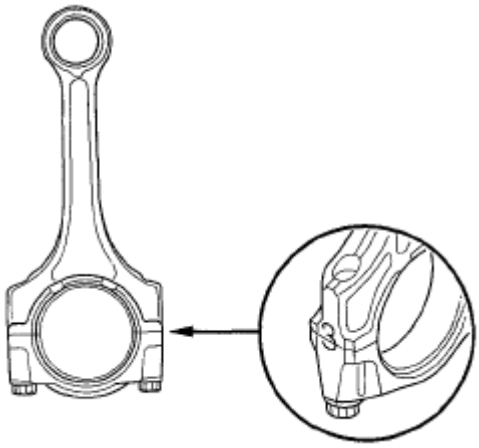
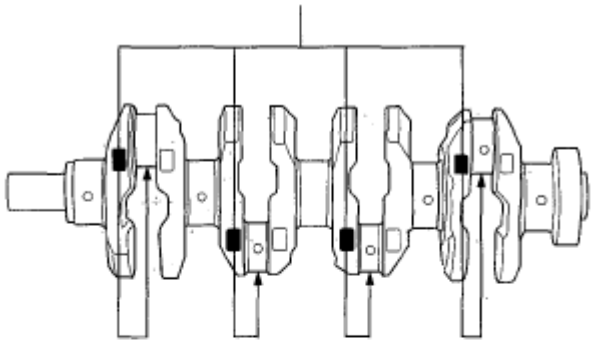


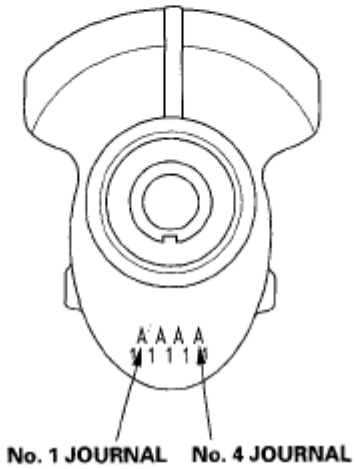
Fig. 11: Identifying Connecting Rod Big End Bore Code Locations
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Connecting Rod Journal Code Location

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

Connecting Rod Journal Code Location (Letters or Bars)





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Fig. 12: Identifying Connecting Rod Journal Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. 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.**

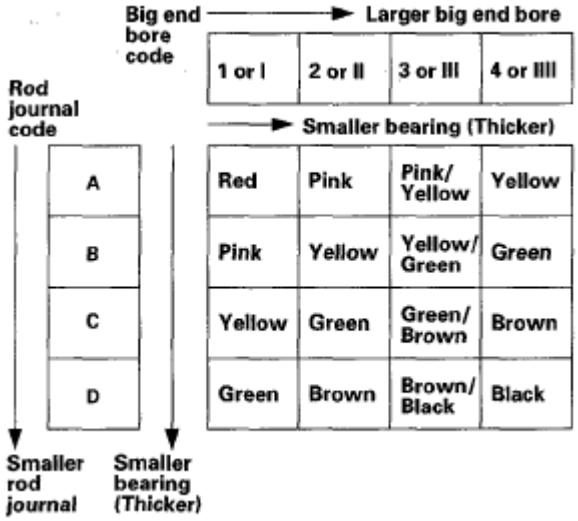


Fig. 13: Identifying Big End Bore Codes And Rod Journal Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

Special Tools Required

- Universal eyelet 07AAK-SNAA120
- Engine support hanger, A and Reds AAR-T-12566 (available through the Honda Tool and Equipment program, 1-888-424-6857)

1. If the engine is out of the vehicle, go to step 17.
2. Raise the vehicle on the lift to full height.
3. Drain the engine oil, '04-05 models (see **ENGINE OIL REPLACEMENT**), '06-08 models (see **'06-08 MODELS**).
4. Remove the front wheels.
5. Remove the splash shield (see **TRANSMISSION REMOVAL**).
6. Disconnect the stabilizer links (see **STABILIZER LINK REPLACEMENT**).
7. Remove the right side damper fork (see **LOWER ARM REMOVAL/INSTALLATION**).

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8. Disconnect the right side suspension lower arm ball joint (see **LOWER ARM REMOVAL/INSTALLATION**).
9. Remove the right side driveshaft (see **DRIVESHAFT REMOVAL**). Coat all precision-finished surfaces with clean engine oil. Tie a plastic bag over the driveshaft end.
10. Lower the vehicle on the lift.
11. Remove the ground cable, then remove the upper bracket (see **ENGINE REMOVAL** .
12. Remove a bolt securing the side engine mount bracket, then attach the universal eyelet as shown.

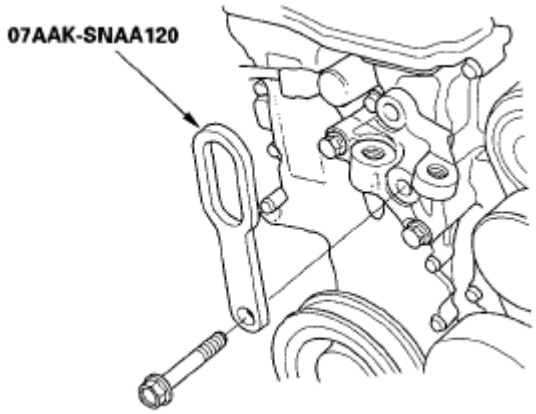


Fig. 14: Identifying Engine Mount Bracket And Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the engine support hanger (A) onto the vehicle, and attach the hook to the universal eyelet.

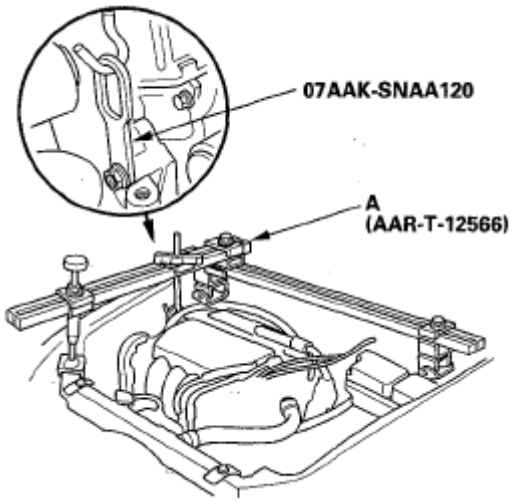


Fig. 15: Identifying Engine Support Hanger
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the front mount stop, then remove the front mount bolt (see **ENGINE REMOVAL**).
15. Remove the rear mount stop, then remove the rear mount bolt (see **ENGINE REMOVAL**).

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16. Lift the engine to 30-60 mm (1.2-2.4 in.).
17. Remove the stiffener.

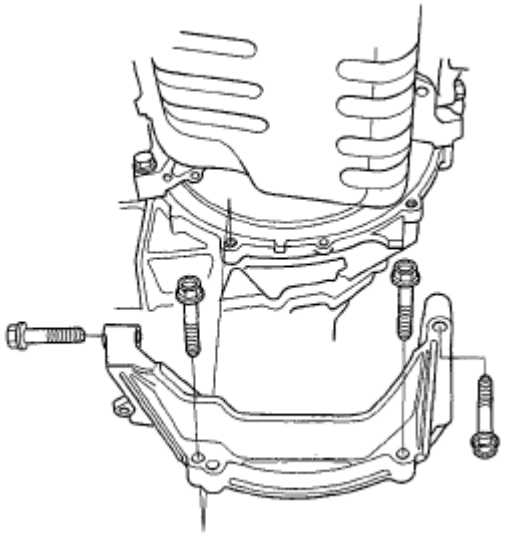


Fig. 16: Identifying Stiffener
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

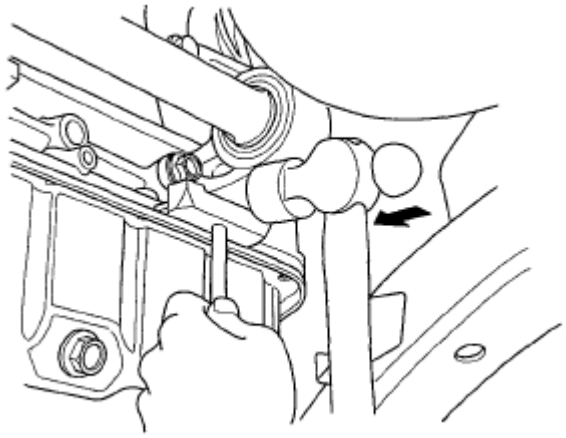


Fig. 17: Driving Oil Pan Seal Cutter Between Oil Pan And Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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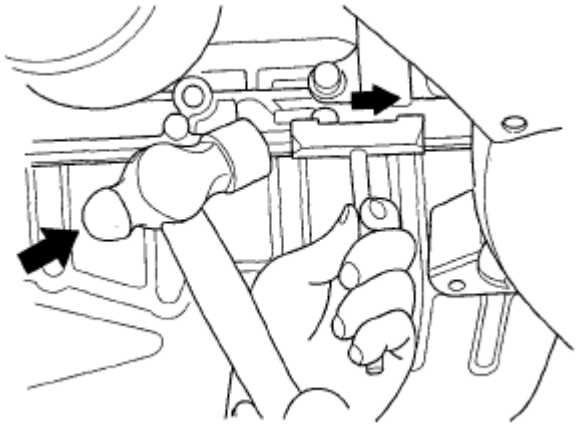


Fig. 18: Cutting Oil Pan Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Remove the oil pan.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine/transmission (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, clutch disc (see **PRESSURE PLATE AND CLUTCH DISC REMOVAL**), and flywheel (see **FLYWHEEL REPLACEMENT**).
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.

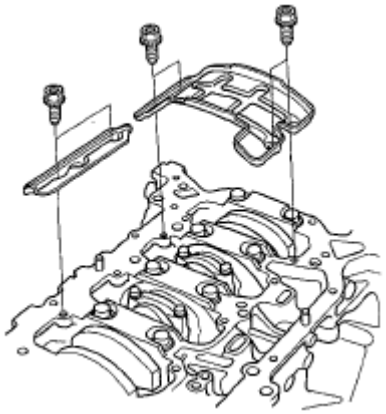


Fig. 19: Identifying Baffle Plates

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9. Remove the 8 mm bolts in sequence.

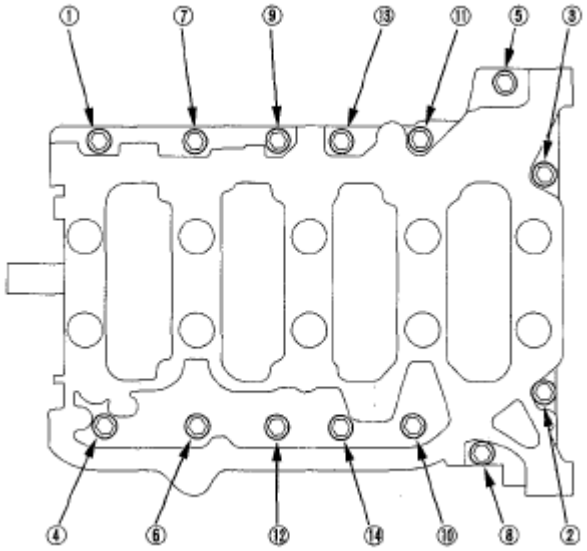


Fig. 20: Identifying Cylinder Head Bolts Removing Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the bearing cap bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

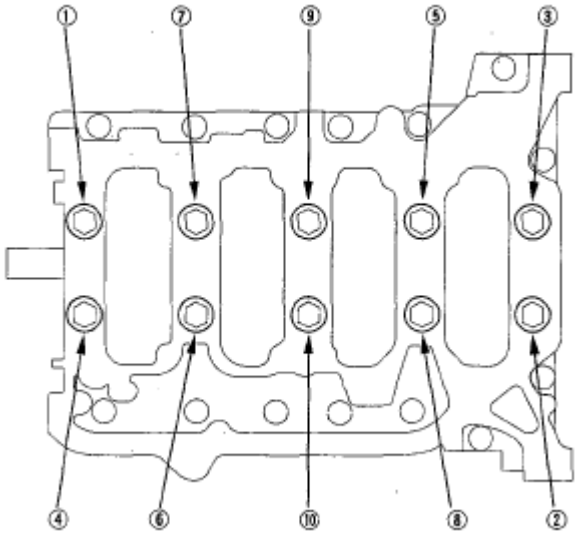


Fig. 21: Identifying Bearing Cap Bolts Removing Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the lower block and bearings. Keep all bearings in order.

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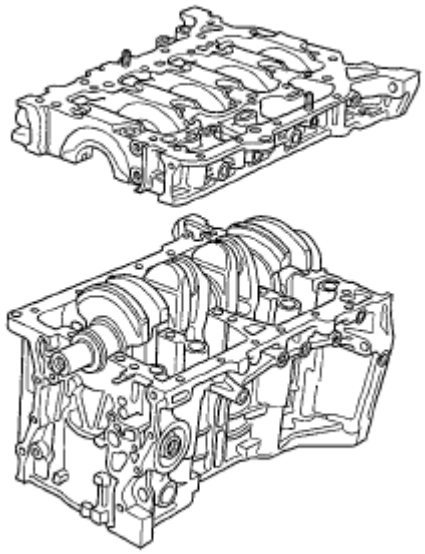


Fig. 22: Identifying Lower Block And Bearings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the connecting rod caps/bearing halfs. Keep all connecting rod caps/bearing halfs in order.
13. Lift the crankshaft out of the engine, being careful not to damage the journals.

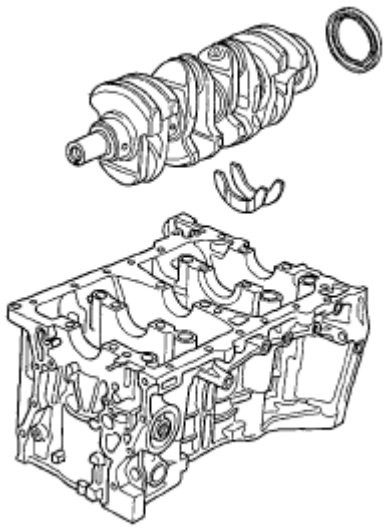


Fig. 23: Lifting Crankshaft Out Of Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
15. 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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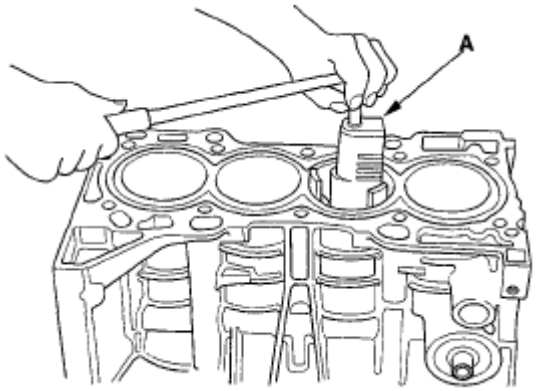


Fig. 24: Removing Hard Carbon Around Top Of Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Use the wooden handle of a hammer (A) to drive out the pistons (B).

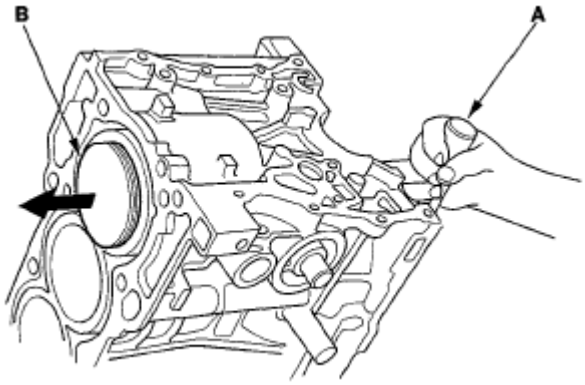


Fig. 25: Removing Pistons
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Mark each piston/connecting rod assembly with its cylinder number to make sure they are reused in the original order.

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

18. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
19. Reinstall the lower block and bearings on the engine in the proper order.

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.

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3. Clean the keyway and threads.
4. Measure the 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.)

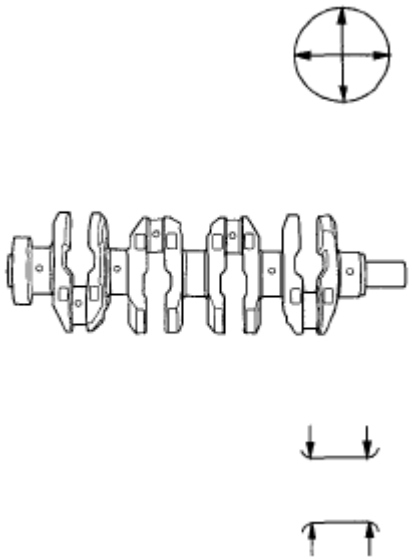


Fig. 26: Measuring Out-Of Round At Middle Of Rod And Main Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the 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

6. Place the engine block on the surface plate.
7. Clean and install the bearings on the No. 1 and No. 5 journals of the engine block.
8. Lower the crankshaft into the block.
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.

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Crankshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in.)

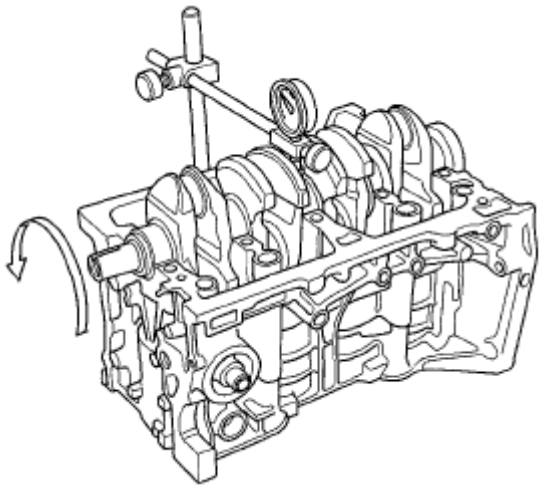


Fig. 27: Measuring Runout On Main Journals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 11 mm (0.4 in.) from the bottom of the skirt. There are two standard-size pistons (No Letter and B). The letter is stamped on the top of the piston.

Piston Diameter

Standard (New):

No Letter: 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: 86.930 mm (3.4224 in.)

B: 86.920 mm (3.4220 in.)

Oversize Piston Diameter

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

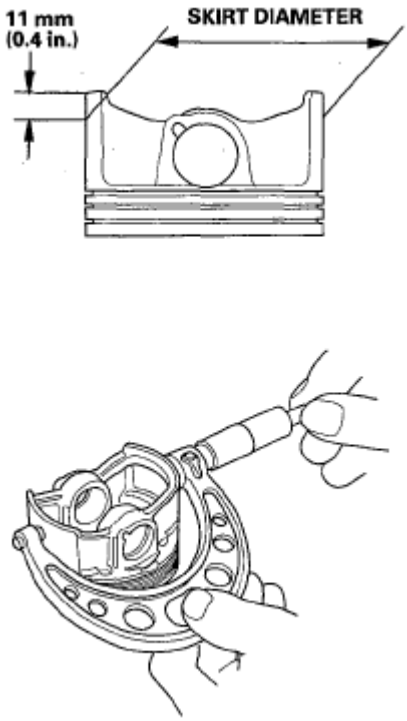


Fig. 28: Measuring Piston Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the 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. Cylinder boar sizes can be found stamped (A or I and B or II) on the engine block.

   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.

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Bore Taper

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

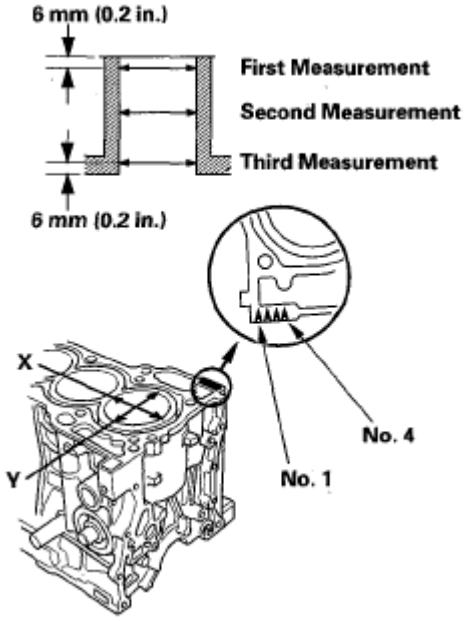


Fig. 29: Measuring Wear And Taper Of Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bores must be honed.
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.)

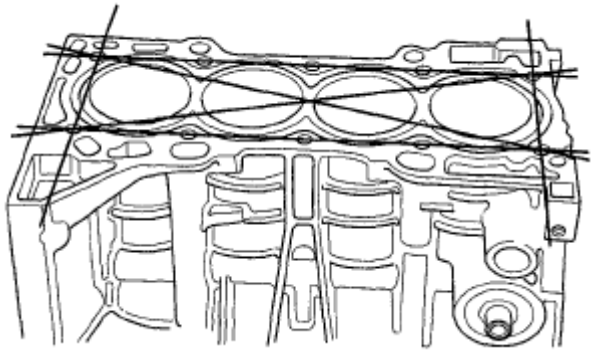


Fig. 30: Checking Top Of Block For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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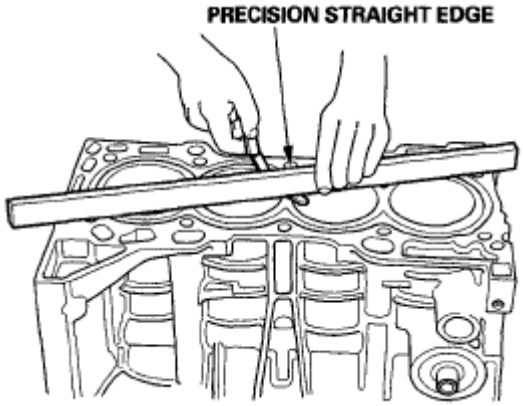


Fig. 31: Measuring Engine Block Edges And Across Center
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 engine block 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.)

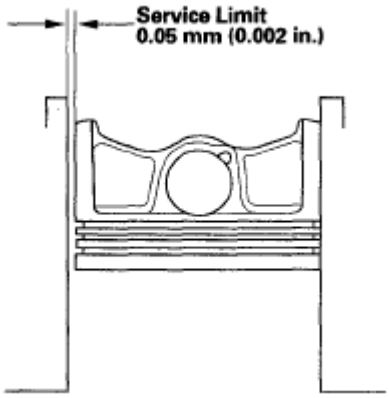


Fig. 32: Identifying Cylinder Bore And Piston Diameter Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BORE HONING

Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see step 4).

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

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2. 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.**

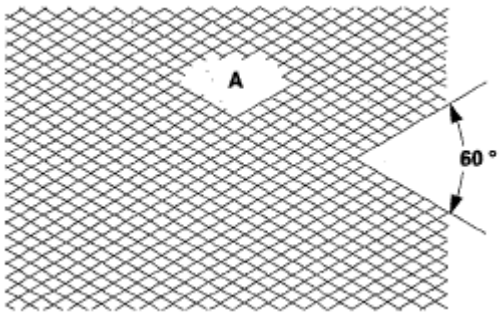


Fig. 33: Identifying Cylinder Bores Honing Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 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.
4. If scoring or scratches are still present in the cylinder bores after honing the engine block 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.**

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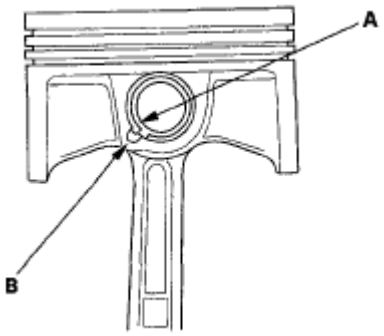


Fig. 34: Identifying Piston Pin Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

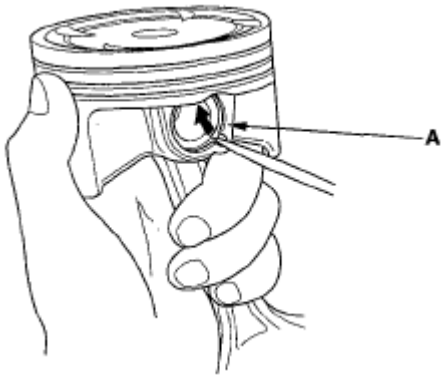


Fig. 35: Removing Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

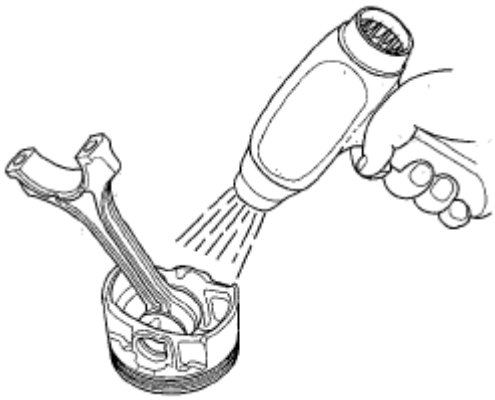


Fig. 36: Heating Piston And Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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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.)

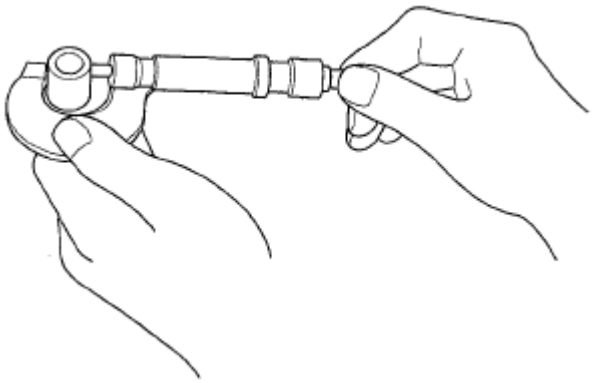


Fig. 37: Measuring Diameter Of Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

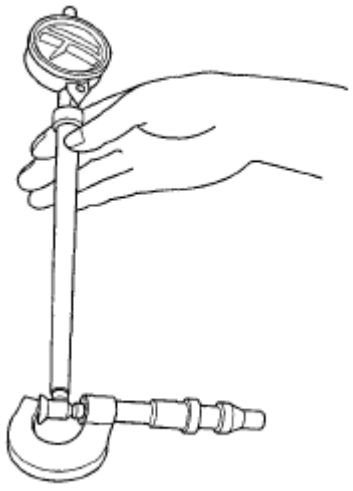


Fig. 38: Identifying Piston Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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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.)

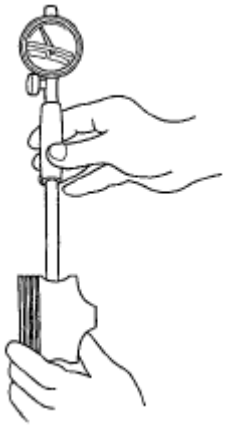


Fig. 39: Checking Piston Pin Hole Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)

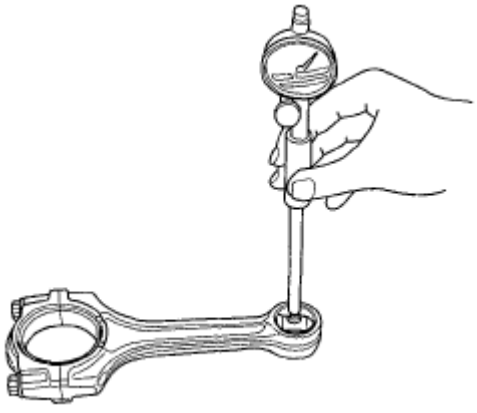


Fig. 40: Measuring Piston Pin-To-Connecting Rod Clearance
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REASSEMBLY

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

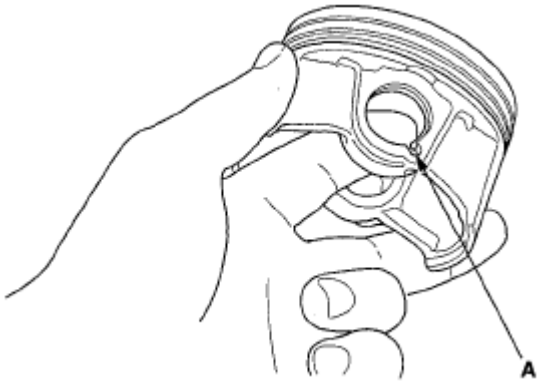


Fig. 41: Identifying Piston Pin Snap Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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).

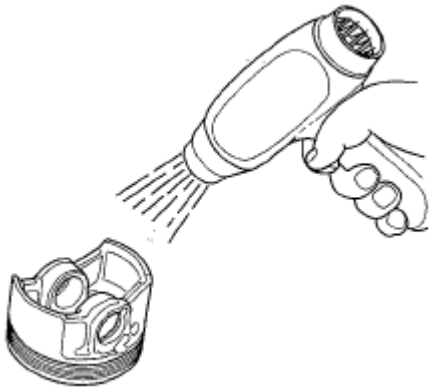


Fig. 42: Heating Piston
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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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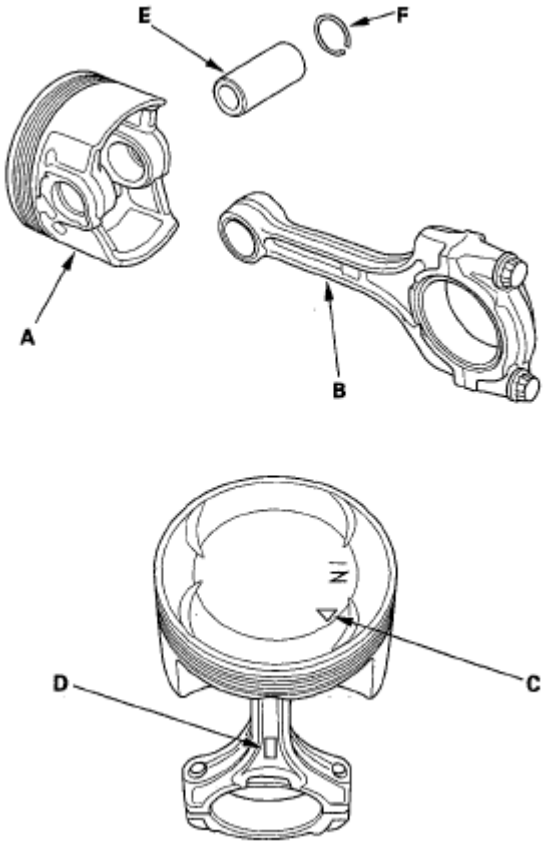


Fig. 43: Identifying Piston And Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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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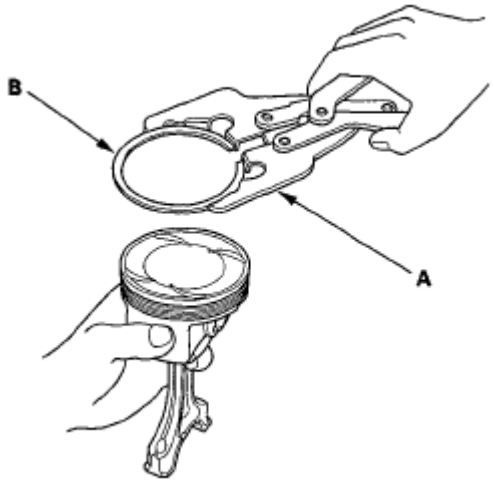


Fig. 44: Removing Old Piston Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 2.5 mm (0.10 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.

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

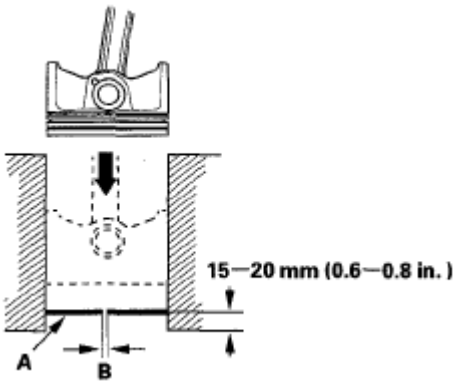


Fig. 45: Pushing Ring Into Cylinder Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. 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.

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- If the gap is too large, recheck the cylinder bore diameter against the wear limits (see **BLOCK AND PISTON INSPECTION**). If the bore is beyond the service limit, the engine 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): 0.50-0.65 mm 0.020-0.026 in.)

Service Limit: 0.75 mm (0.030 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 1N mark and the second ring (B) has a 2RN or 2N mark. The manufacturing marks (C) must be facing upward.

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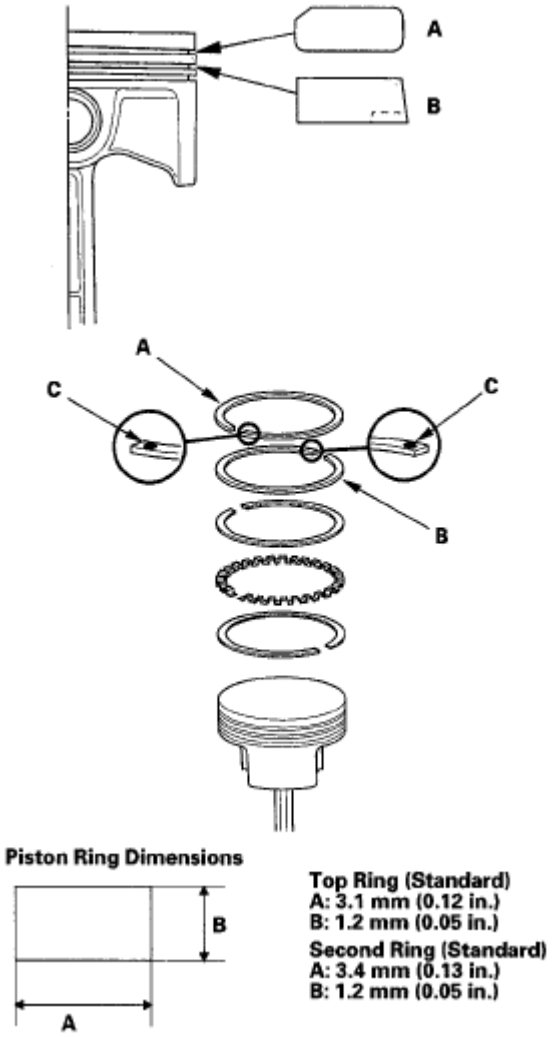
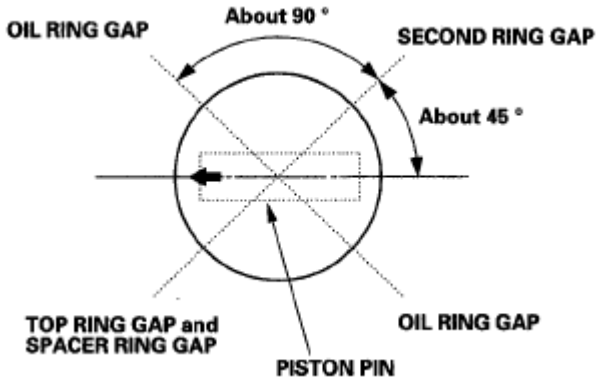


Fig. 46: Identifying Top Ring And Second Ring Grooves
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 47: 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): 0.040-0.065 mm 0.0016-0.0026 in.)

   Service Limit: 0.13 mm (0.005 in.)

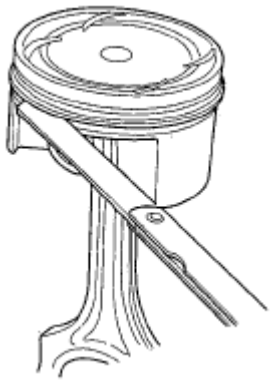


Fig. 48: Measuring Ring-To-Groove Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION

IF THE CRANKSHAFT IS ALREADY INSTALLED

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
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. Remove the connecting rod caps, then install the ring compressor. Check that the bearing is securely in place.
4. Position the mark (A) to face the cam chain side of the engine.

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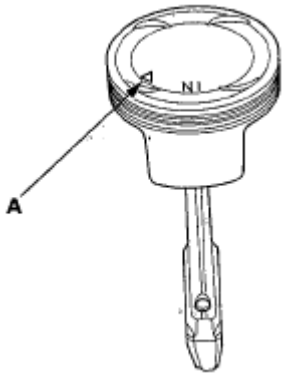


Fig. 49: Locating Mark On Cam Chain
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

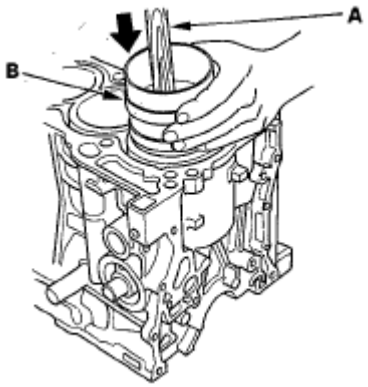


Fig. 50: Installing Piston In Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 **CONNECTING ROD BOLT INSPECTION**).
9. Apply new engine oil to the bolt threads, then install the rod caps with bearings. Torque the bolts to 36 N.m (3.7 kgf.m, 27 lbf.ft).
10. Tighten the connecting rod bolts an additional 120°.

NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 7 of the procedure. Do not loosen it back to the specified angle.

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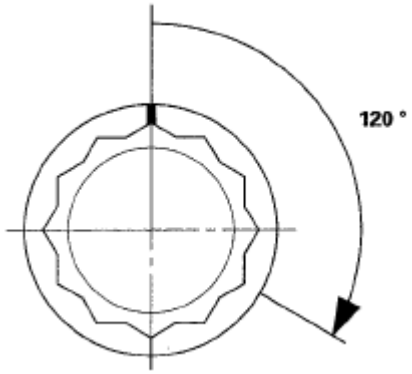


Fig. 51: Identifying Connecting Rod Bolt Tightening Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

IF THE CRANKSHAFT IS NOT INSTALLED

1. Remove the connecting rod caps, then install the ring compressor, and 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.

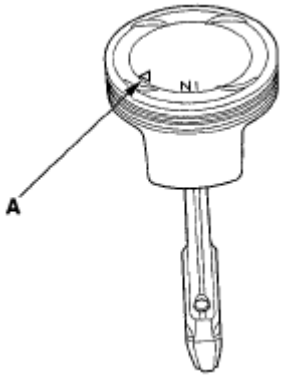


Fig. 52: Locating Mark On Cam Chain
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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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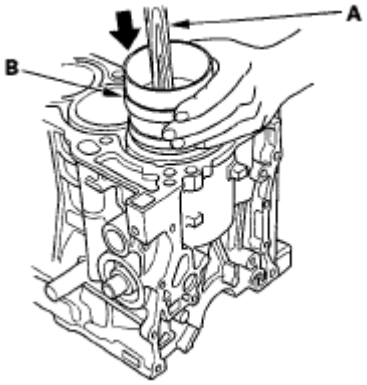


Fig. 53: Installing Piston In Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

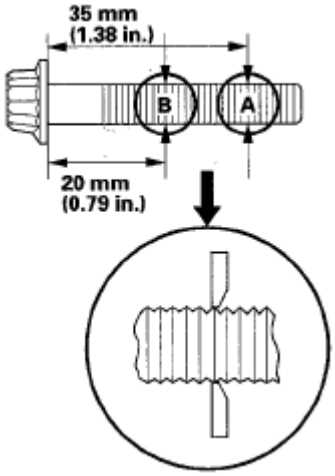


Fig. 54: Measuring Diameter Of Connecting Rod Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

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CRANKSHAFT INSTALLATION

Special Tools Required

- Handle driver 07749-0010000
- Attachment, 24 x 26 mm 07746-0010700
- Oil seal driver attachment, 96 mm 07ZAD-PNAA100

1. M/T model: Install the crankshaft end bushing when replacing the crankshaft. Using the handle driver and oil seal driver attachment, drive in the crankshaft end bushing until the oil seal driver attachment bottoms against the crankshaft.

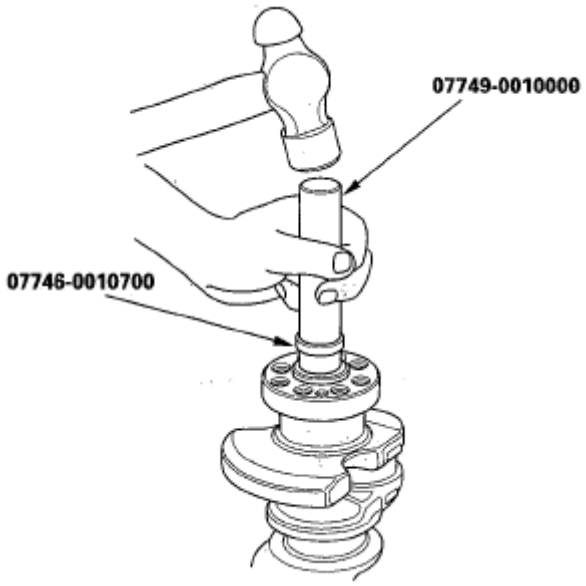


Fig. 55: Installing Crankshaft End Bushing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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, then lower the crankshaft into the engine block.
7. Apply new engine oil to the thrust washer surface. Install the thrust washers (A) in the No. 4 journal of the engine block.

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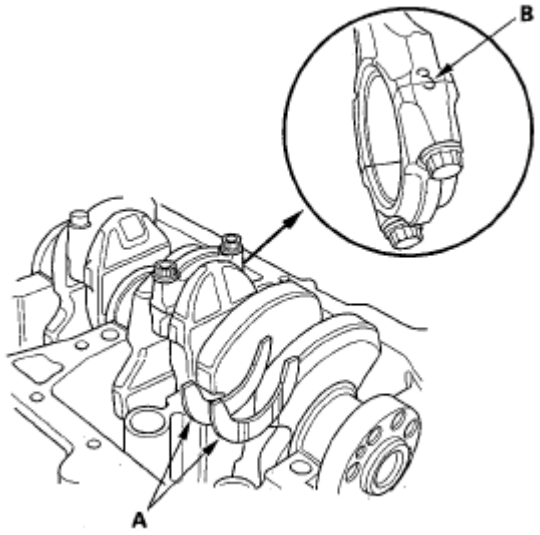


Fig. 56: Identifying Thrust Washers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
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 36 N.m (3.7 kgf.m, 27 lbf.ft).
13. Tighten the connecting rod bolts an additional 120°.

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

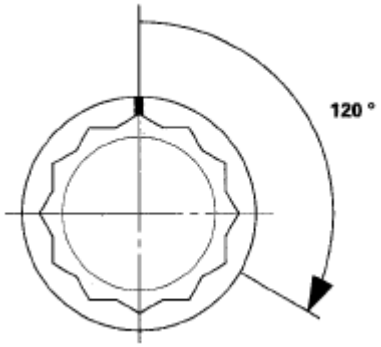


Fig. 57: Identifying Connecting Rod Bolt Tightening Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

    Install the component within 5 minutes of applying the liquid gasket.

NOTE: If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

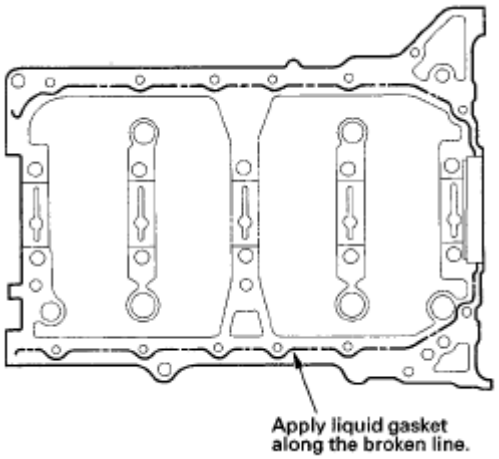


Fig. 58: Identifying Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 30 N.m (3.0 kgf.m, 22 lbf.ft).

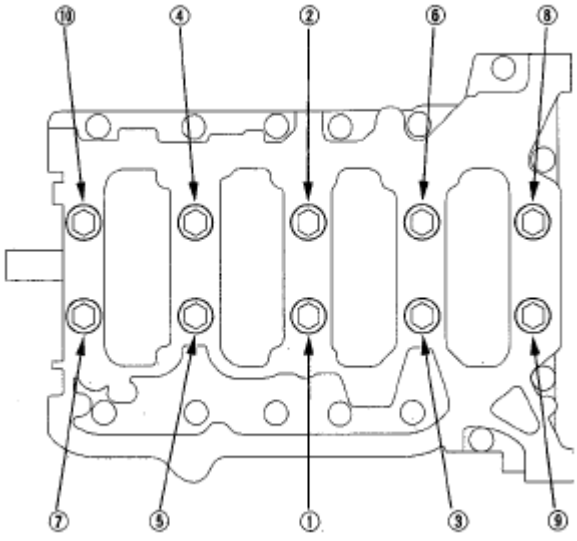


Fig. 59: Identifying Tightening Sequence Of Bearing Cap Bolts

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

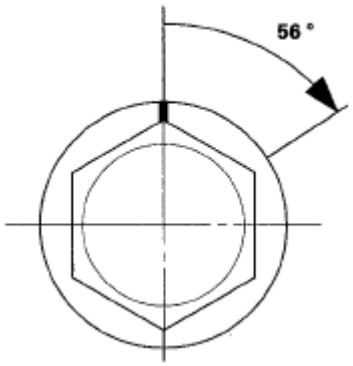


Fig. 60: Identifying Bearing Cap Bolts Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

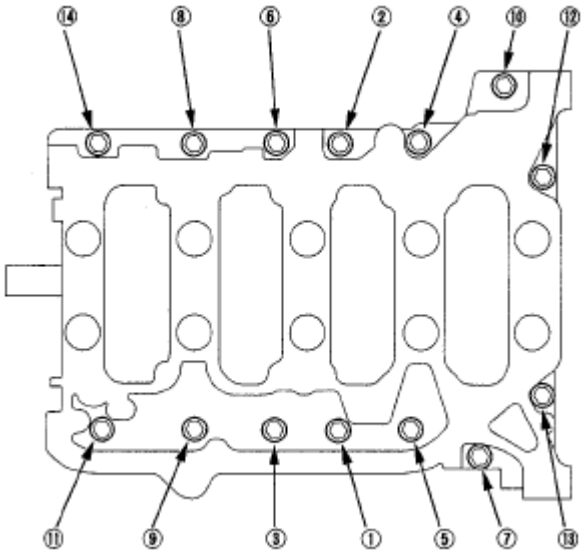


Fig. 61: Identifying Tightening Sequence Of Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Use the handle driver and oil seal driver attachment to drive a new oil seal squarely into the engine block to the specified installed height.

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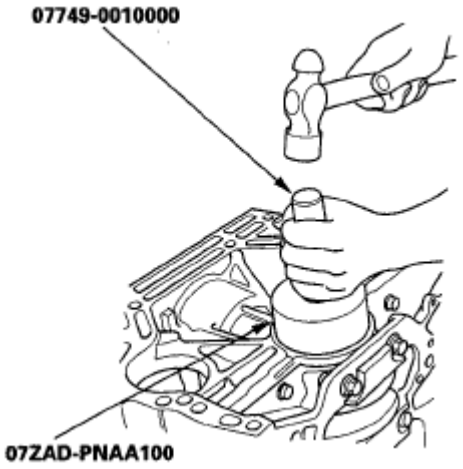


Fig. 62: Installing Oil Seal Into Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)

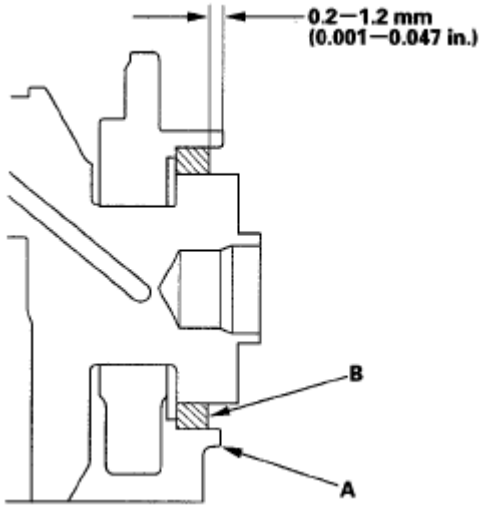


Fig. 63: Measuring Distance Between Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the baffle plates.

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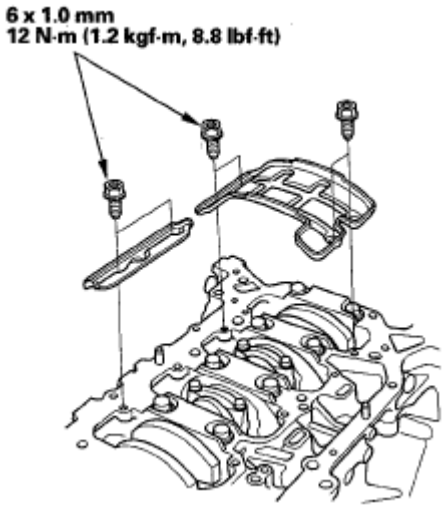


Fig. 64: Identifying Baffle Plates w/Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 REPLACEMENT**), clutch disc, 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/transmission (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

Special Tools Required

- Universal eyelet 07AAK-SNAA120
- Engine support hanger, A and Reds AAR-T-12566 (available through the Honda Tool and Equipment program, 1-888-424-6857)

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.

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3. Apply liquid gasket, P/N 08717-0004,08718-0001, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the lower block.

   Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- **If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

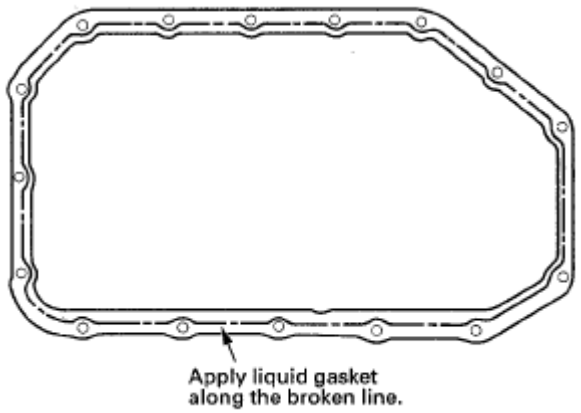


Fig. 65: Identifying Liquid Gasket Applying Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan.
5. Tighten the bolts/nuts in three steps. In the final step, tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.8 lbf.ft). Wipe off all of the excess liquid gasket on the each side of crankshaft pulley and flywheel/drive plate.

NOTE:

- **Wait at least 30 minutes before filling the engine with oil.**
- **Do not run the engine for at least 3 hours after installing the oil pan.**

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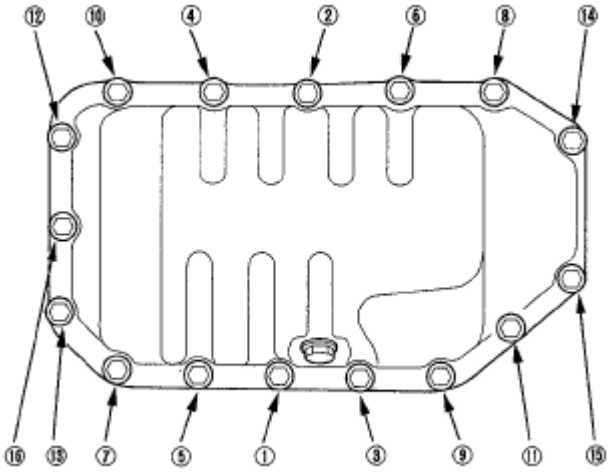


Fig. 66: Identifying Tightening Sequence Of Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the stiffener.

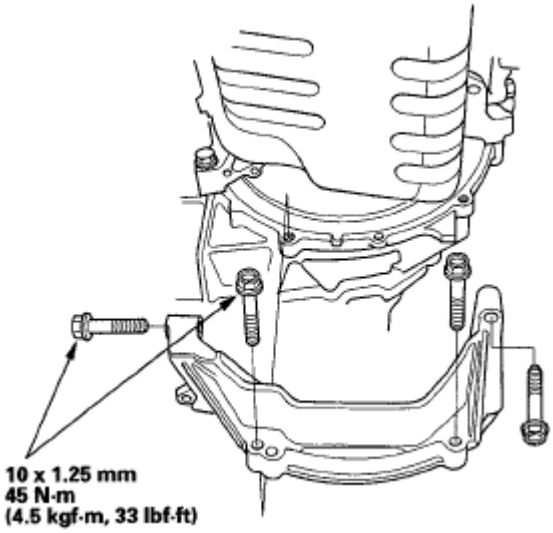


Fig. 67: Identifying Stiffener w/Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If the engine is still in the vehicle, do the following steps.
8. Lower the engine to original position.
9. Tighten the front mount bolt, then install the front mount stop (see **ENGINE INSTALLATION**).
10. Tighten the rear mount bolt, then install the rear mount stop (see **ENGINE INSTALLATION**).
11. Remove the universal eyelet, then tighten the bolt securing the side engine mount bracket.

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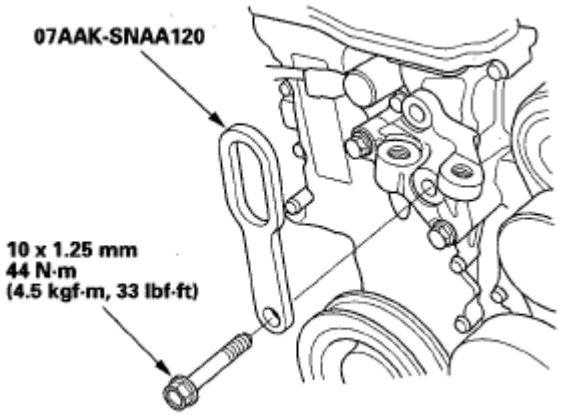


Fig. 68: Identifying Side Engine Mount Bracket Bolts w/Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the upper bracket, then install the ground cable (see **ENGINE INSTALLATION**).
13. Remove the engine support hanger, then raise the vehicle on the lift to full height.
14. Install a new set ring on the end of right side driveshaft, then install the driveshaft (see **DRIVESHAFT INSTALLATION**). Make sure each ring clicks into place in the differential.
15. Connect the right side suspension lower arm ball joint (see **KNUCKLE/HUB REPLACEMENT**).
16. Install the right side damper fork (see **LOWER ARM REMOVAL/INSTALLATION**).
17. Connect the stabilizer links (see **STABILIZER LINK REPLACEMENT**).
18. Install the splash shield (see **TRANSMISSION INSTALLATION**).
19. Install the front wheels.
20. Lower the vehicle on the lift.
21. Refill the engine with oil, '04-05 models (see **ENGINE OIL REPLACEMENT**), '06-08 models (see **'06-08 MODELS**).

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

- Handle driver 07749-0010000
- Oil seal driver attachment 96 07ZAD-PNAA100

1. Remove the transmission:
   - Manual transmission (see **TRANSMISSION REMOVAL**)
   - Automatic transmission (see **TRANSMISSION REMOVAL**)
2. M/T model: Remove the pressure plate, clutch disc (see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION**), and flywheel (see **FLYWHEEL REPLACEMENT**).
3. A/T model: Remove the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
4. Clean and dry the crankshaft oil seal housing.
5. Apply a light coat of multipurpose grease to the crankshaft and to the lip of the seal.

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6. Use the handle driver and oil seal driver attachment to drive a new oil seal squarely into the engine block to the specified installed height.

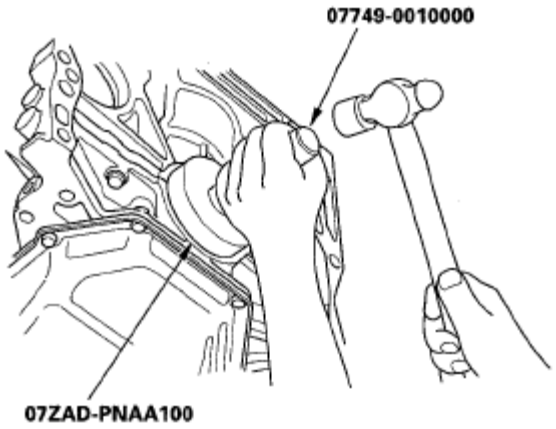


Fig. 69: Installing Oil Seal Into Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. 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.)

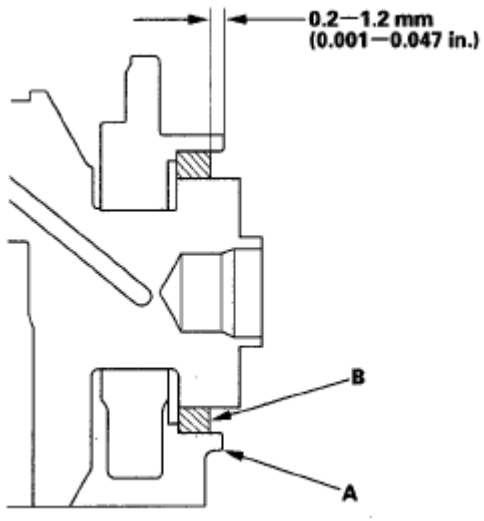


Fig. 70: Measuring Distance Between Engine Block And Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. M/T model: Install the flywheel (see **FLYWHEEL REPLACEMENT**), clutch disc, and pressure plate (see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION**).
9. A/T model: Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
10. Install the transmission:
    - Manual transmission (see **TRANSMISSION INSTALLATION**)

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- Automatic transmission (see **TRANSMISSION INSTALLATION**)

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