

2007 Acura RDX

2007-09 ENGINE Engine Block - RDX

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Engine Block - RDX

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1
②	07749-0010000	Handle Driver	1

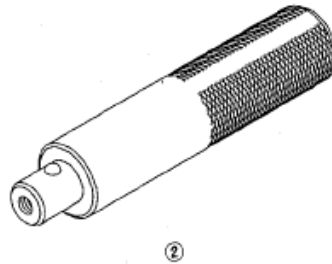
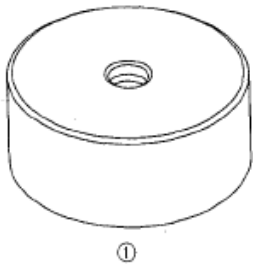


Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

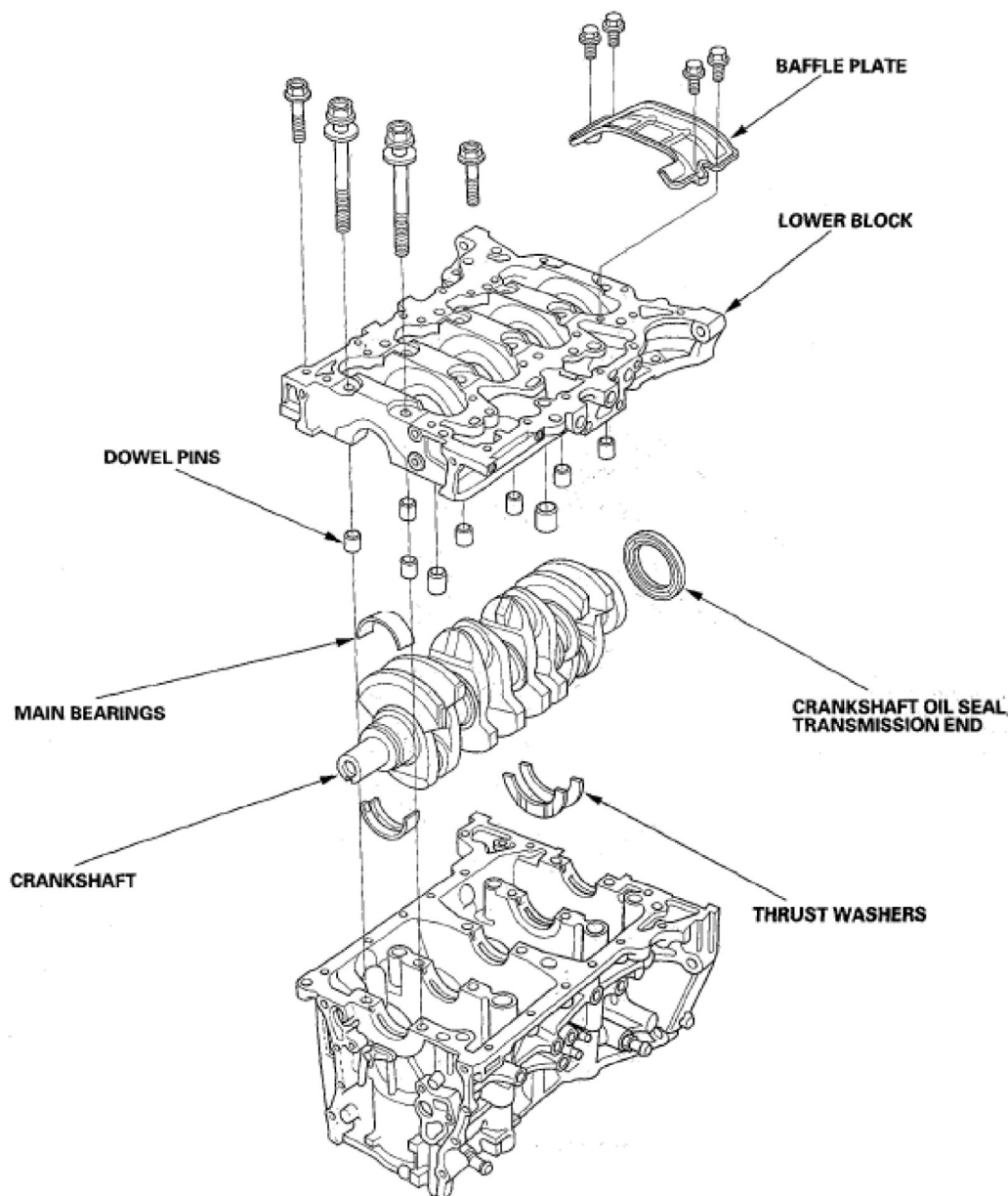


Fig. 2: Identifying Engine Block Components Location (1 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

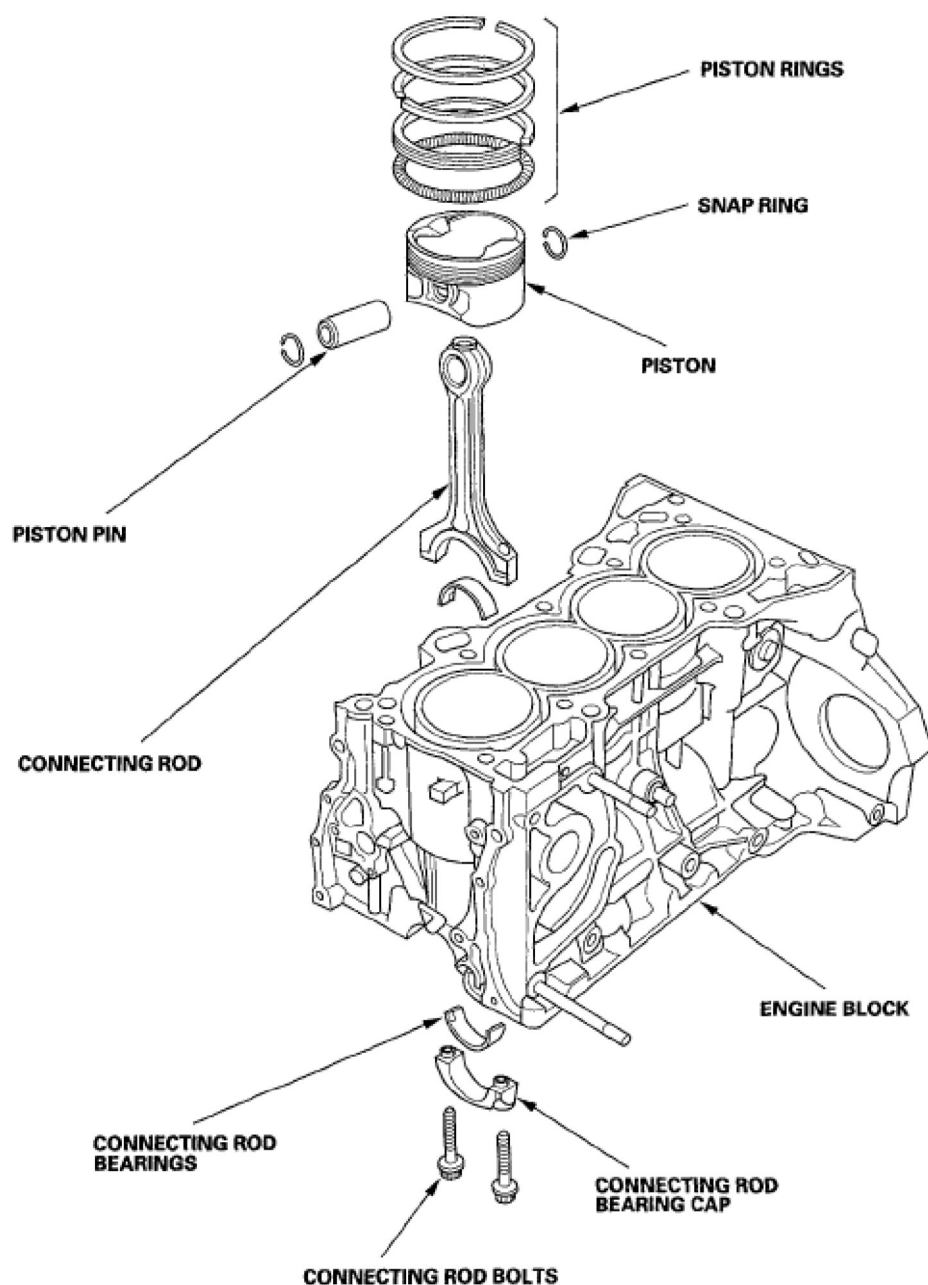


Fig. 3: Identifying Engine Block Components Location (2 Of 2)

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 plate (see step 7).
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.)

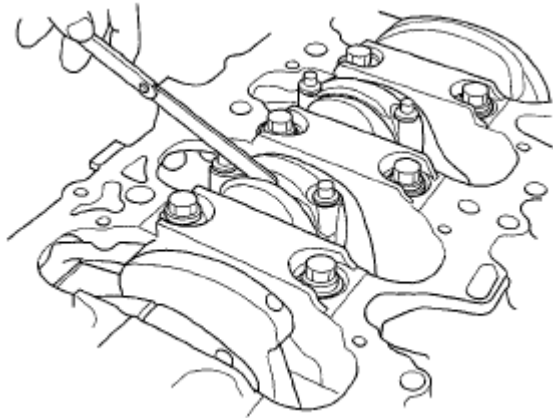


Fig. 4: Measuring Connecting Rod End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

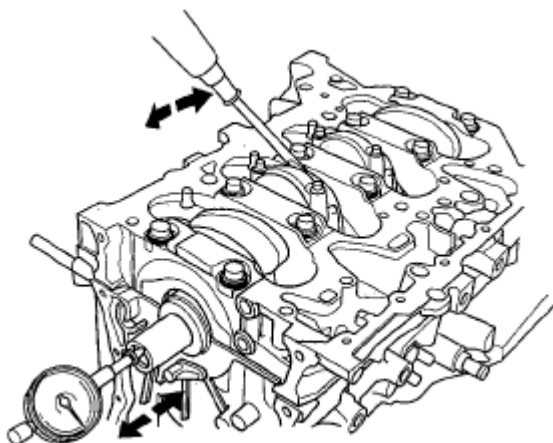


Fig. 5: Measuring Crankshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the end play is beyond service limit, replace the thrust washers and recheck, if it is still beyond 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 tower 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) + 67° in the proper sequence

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

5. Tighten the bearing cap bolts an additional 67 °.
6. Remove the lower block and bearings again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

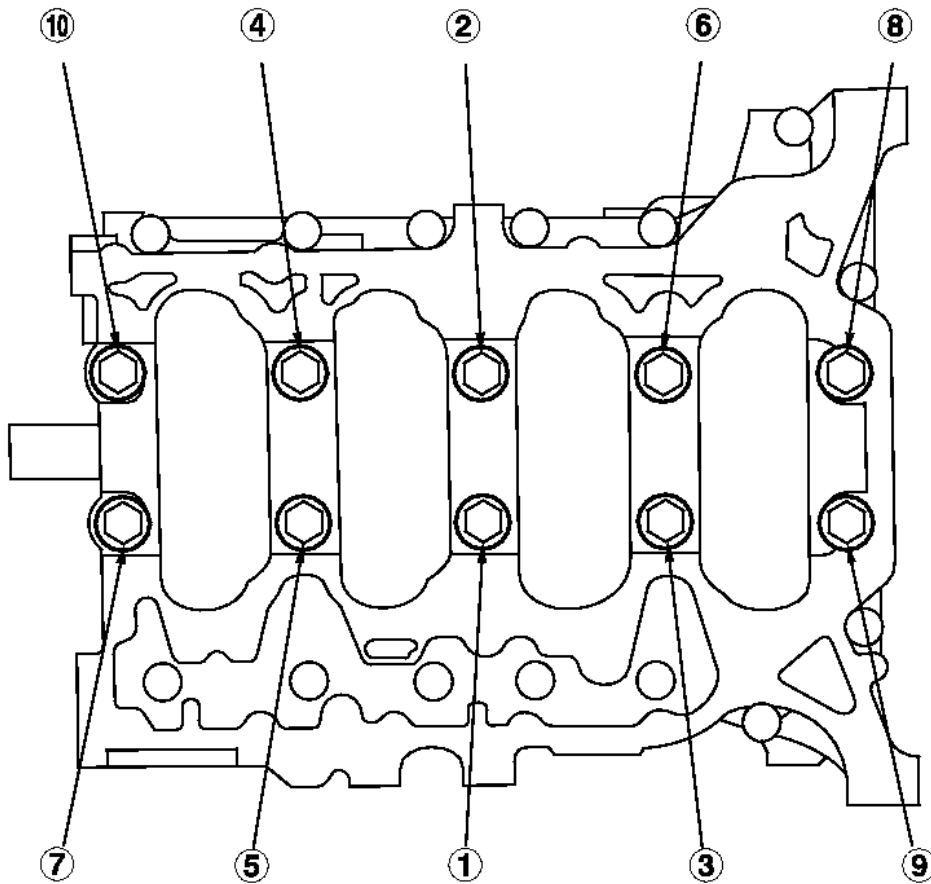


Fig. 6: Identifying Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)

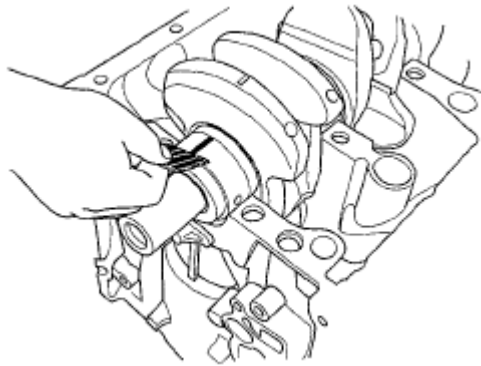


Fig. 7: Measuring Widest Part Of Plastigage

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. 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.
8. 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 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.

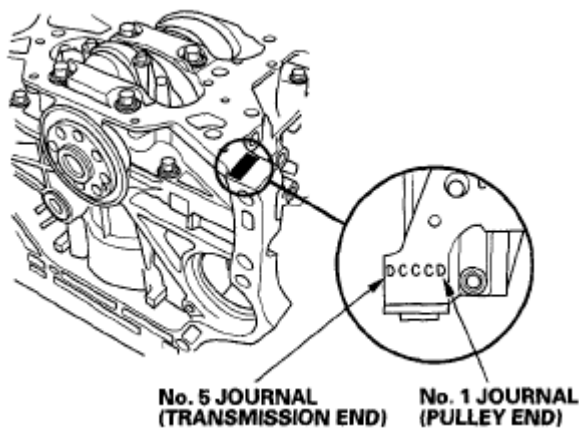


Fig. 8: Identifying Crankshaft Bore Code Location

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

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

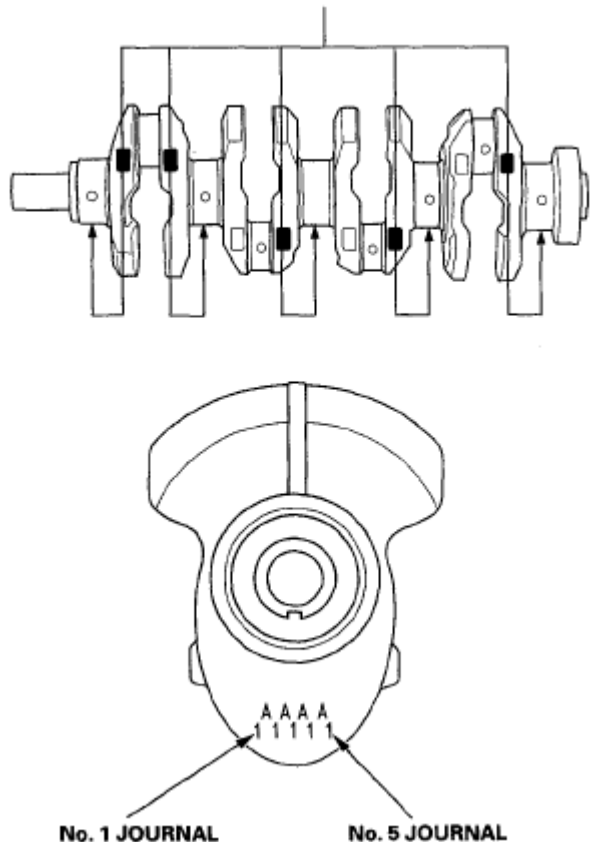


Fig. 9: Identifying Main Journal Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- 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	Larger crank bore			
		1 or A or I	2 or B or II	3 or C or III	4 or D or IIII
		Smaller bearing (Thicker)			
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
Smaller main journal	Smaller bearing (Thicker)				

Fig. 10: Bearings Replacement Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

ROD BEARING CLEARANCE INSPECTION

1. Remove the oil pump (see **OIL PUMP REMOVAL**).
2. Remove the baffle plate (see step 7).
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 29 N.m (3.0 kgf.m, 22 lbf.ft) + 90°

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): 0,033-0.064 mm (0.0013-0.0025 in.)

Service Limit: 0.077 mm (0.0030 in.)

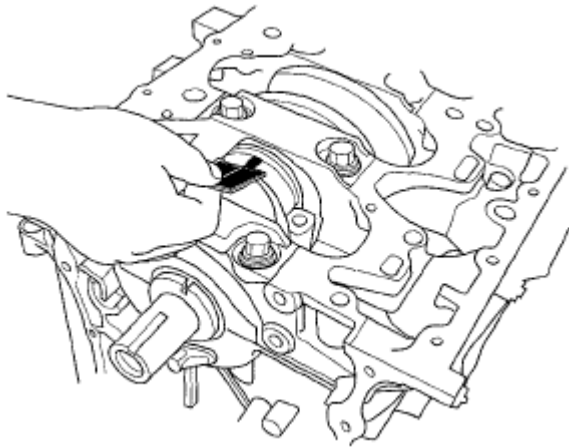


Fig. 11: Measuring Widest Part Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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 4/1, II, III, or IIII) 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.)

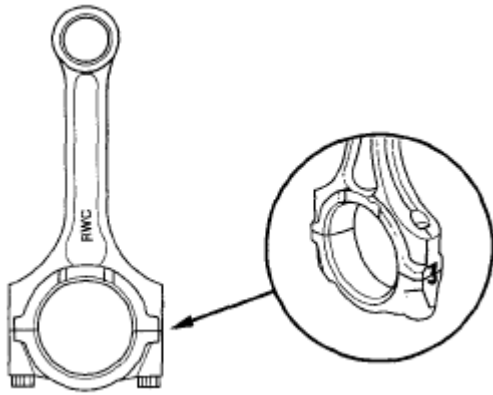


Fig. 12: Identifying Connecting Rod Big End Bore Code Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Location

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

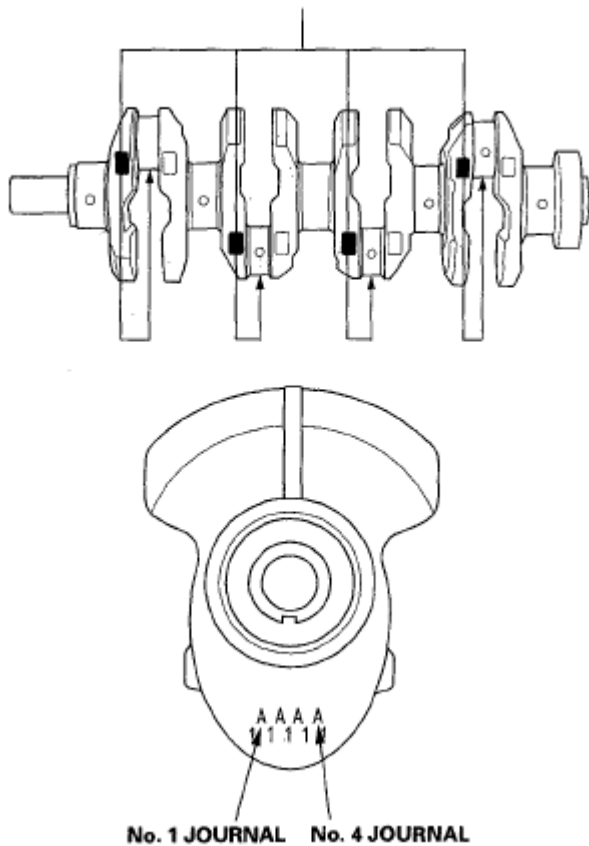


Fig. 13: Identifying Connecting Rod Journal Code Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

		Big end bore code	Larger big end bore			
			1 or I	2 or II	3 or III	4 or IIII
			Smaller bearing (Thicker)			
Rod journal code	A		Red	Pink	Yellow	Green
	B		Pink	Yellow	Green	Brown
	C		Yellow	Green	Brown	Black
	D		Green	Brown	Black	Blue
		Smaller rod journal	Smaller bearing (Thicker)			

Fig. 14: Bearings Replacement Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

Special Tools Required

Front subframe adapter VSB02C000016 (Available through the Honda Tool and Equipment Program, 1-888-424-6857)

1. If the engine is out of the vehicle, go to step 14.
2. Raise the vehicle on the lift to full height.
3. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
4. Remove the front wheels.
5. Remove the splash shield (see step 25 under **ENGINE REMOVAL**).
6. Remove the bolt securing the P/S fluid line bracket and unclamp the P/S fluid line clamps on the front subframe (see step 34 under **ENGINE REMOVAL**).
7. Remove the bolts securing the steering gearbox mounting brackets (see step 35 under **ENGINE REMOVAL**).
8. Remove the two bolts at the three way catalytic converter (TWC) front joint.

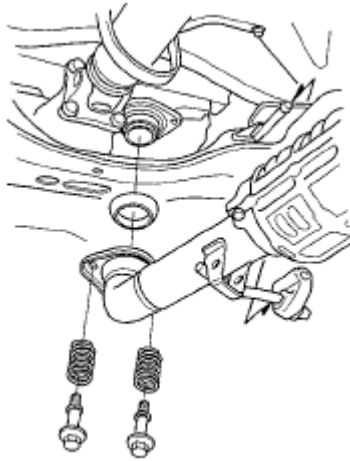


Fig. 15: Identifying Three Way Catalytic Converter Front Joint
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the lower torque rod (see step 45 under **ENGINE REMOVAL**).
10. Attach the subframe adapter (A) to the subframe and hang the belt of the subframe adapter over the front of the subframe, then secure the belt with its stop.

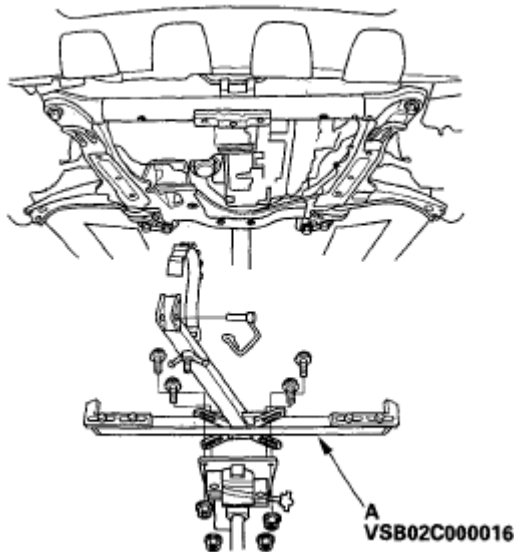


Fig. 16: Identifying Subframe Adapter
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Raise the jack and line up the slots in the arms with the bolt holes on the corner of the jack base, then attach them with bolts securely.
12. Remove the 12 x 1.25 mm bolts (A), then loosen the 14 x 1.5 mm bolts (B) on the subframe so they are about 30 mm (1.2 in.) from the mounting surface.

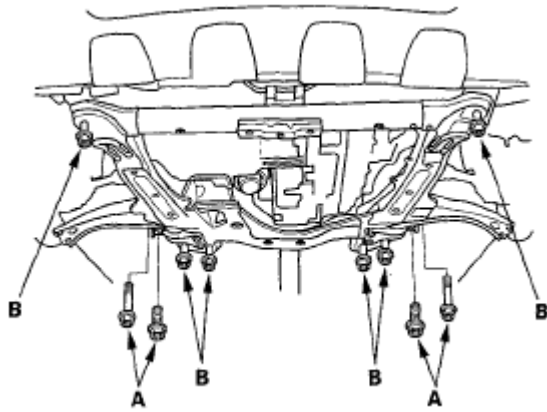


Fig. 17: Identifying Subframe Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the subframe adapter.
14. Remove the lower torque rod bracket.

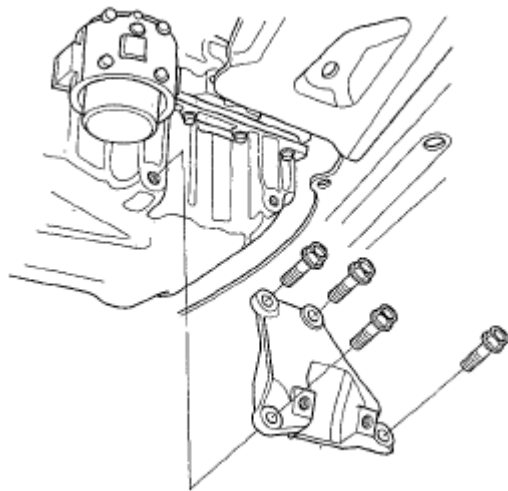


Fig. 18: Identifying Lower Torque Rod Bracket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the torque converter cover (A) and transmission mounting bolts (B).

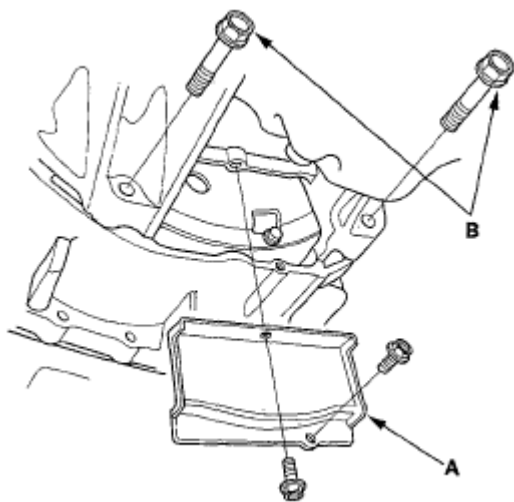


Fig. 19: Identifying Torque Converter Cover And Transmission Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Remove the bolts securing the oil pan.
17. Using a flat blade screwdriver, separate the oil pan from the block in the places shown.

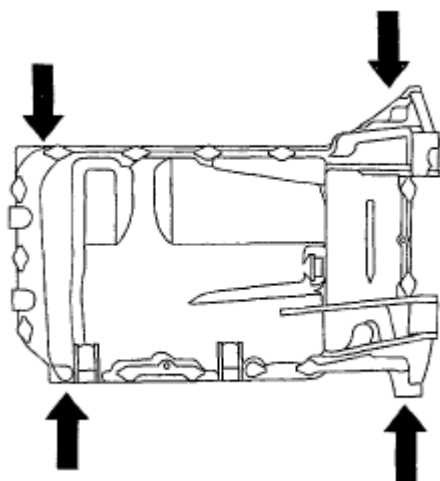


Fig. 20: Locating Oil Pan Separation Places
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine assembly (see ENGINE REMOVAL).
2. Remove the transmission (see TRANSMISSION REMOVAL).
3. Remove the drive plate (see DRIVE PLATE REMOVAL AND INSTALLATION).
4. Remove the oil pan (see OIL PAN REMOVAL).
5. Remove the oil pump (see OIL PUMP REMOVAL).
6. Remove the cylinder head (see CYLINDER HEAD REMOVAL).

7. Remove the baffle plate.

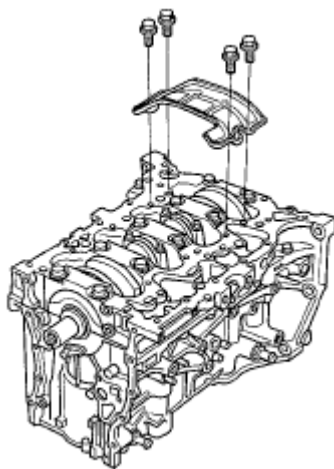


Fig. 21: Identifying Baffle Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the 8 mm bolts in sequence.

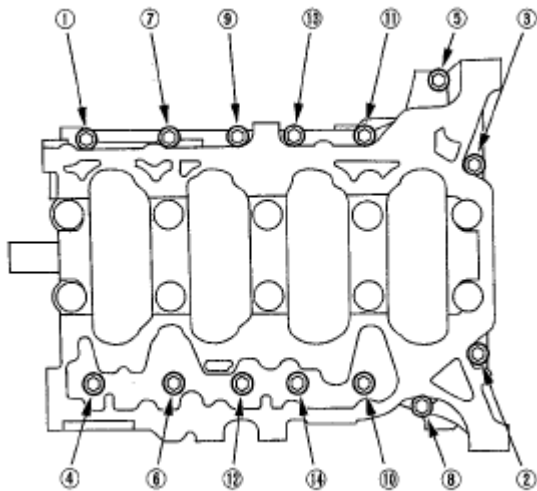


Fig. 22: Identifying Removal Sequence Of Cylinder Head Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. 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.

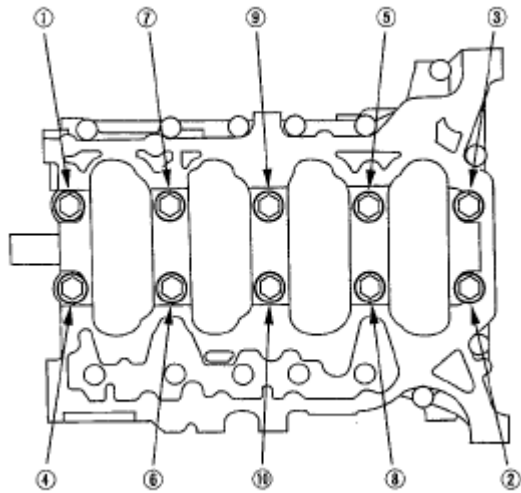


Fig. 23: Identifying Removal Sequence Of Bearing Cap Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Using a flat blade screwdriver, separate the lower block from the engine block in the places shown.

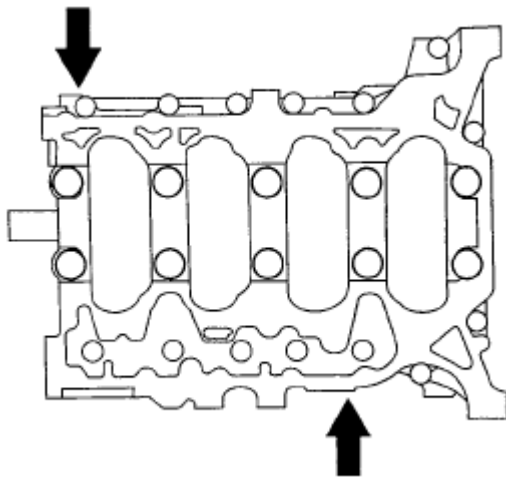
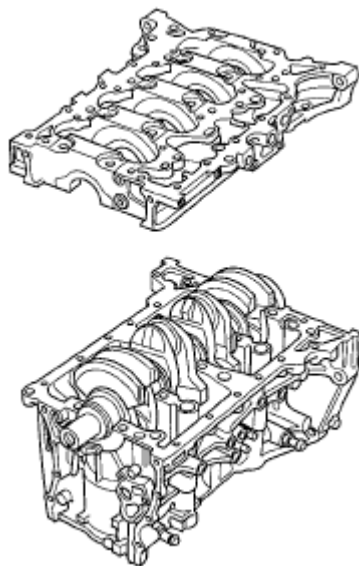


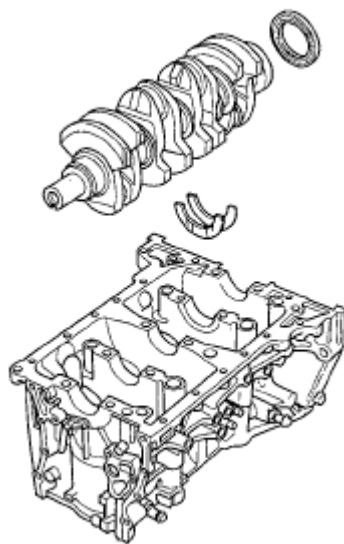
Fig. 24: Locating Lower Block Separation Places
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**Fig. 25: Identifying Lower Block**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the rod caps/bearings. Keep all caps/ bearings in order.
13. Lift the crankshaft out of the engine. Being careful not to damage the journals.
14. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.

**Fig. 26: Identifying Crankshaft**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

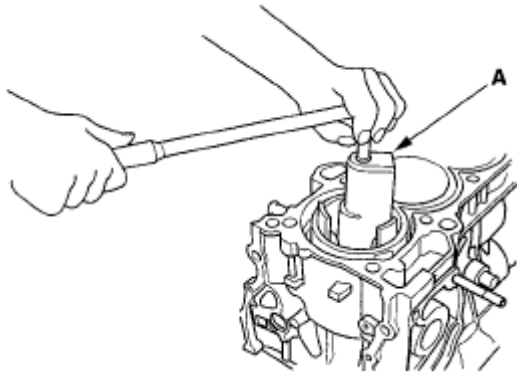


Fig. 27: Removing Hard Carbon With Ridge Reamer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Use the wooden handle of a hammer (A) to drive out the piston/connecting rod assembly (B).

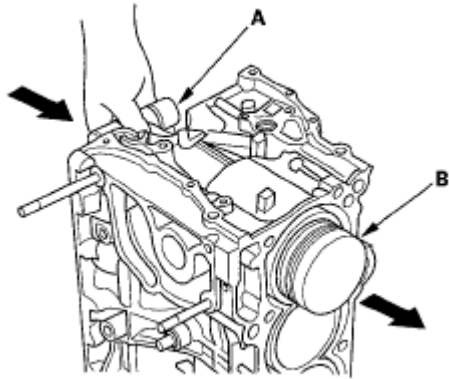


Fig. 28: Removing Piston/Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 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.

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 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): 0.004 mm (0.0002 in.) max.

Service Limit: 0.010 mm (0.0004 in.)

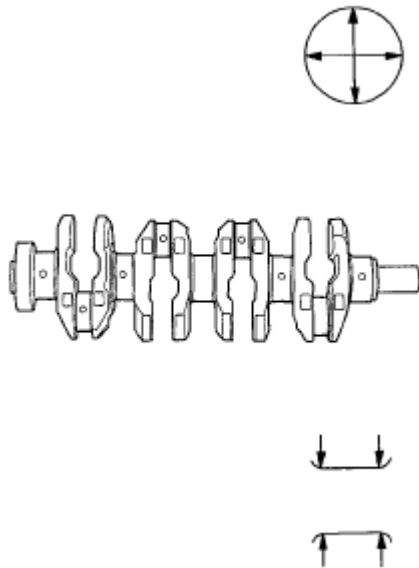


Fig. 29: Identifying Journal Out-Of-Round
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 runout on all 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): 0.02 mm (0.0008 in.) max.

Service Limit: 0.04 mm (0.0016 in.)

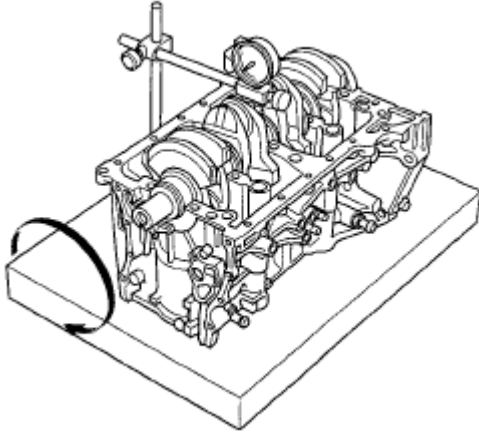


Fig. 30: Measuring Main Journals Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 10 mm (0.4 in.) from the bottom of the skirt. There are two standard-size pistons (/ (slash) and B). The letter is stamped on the top of the piston. Letters are also stamped on the block as cylinder bore sizes.

Piston Diameter

Standard (New): /(slash): 85.980-85.990 mm (3.3850-3.3854 in.)

B: 85.970-85.980 mm (3.3846-3.3850 in.)

Service Limit: /(slash): 85.930 mm (3.3831 in.)

B: 85.920 mm (3.3827 in.)

Oversize Piston Diameter

0.25: 86.230-86.240 mm (3.3949-3.3953 in.)

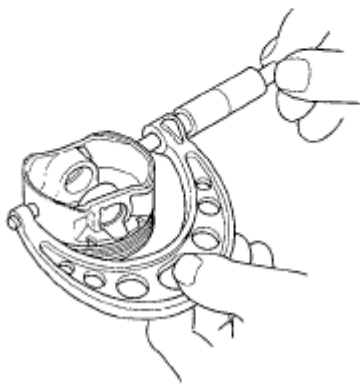
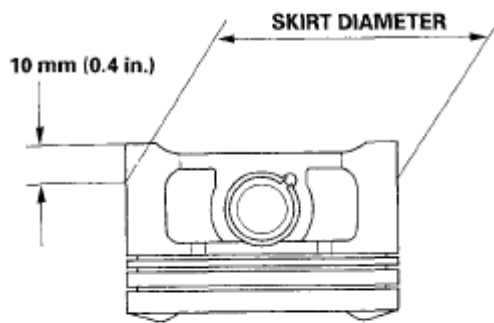


Fig. 31: Measuring Piston Diameter

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 the measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the block. If the block is being rebored, refer to step 7 after reboring.

Cylinder Bore Size

Standard (New):

A or I: 86.010-86.020 mm (3.3862-3.3866 in.)

B or II: 86.000-86.010 mm (3.3858-3.3862 in.)

Service Limit: 86.070 mm (3.3886 in.)

Oversize 0.25: 86.250-86.260 mm (3.3957-3.3961 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.)

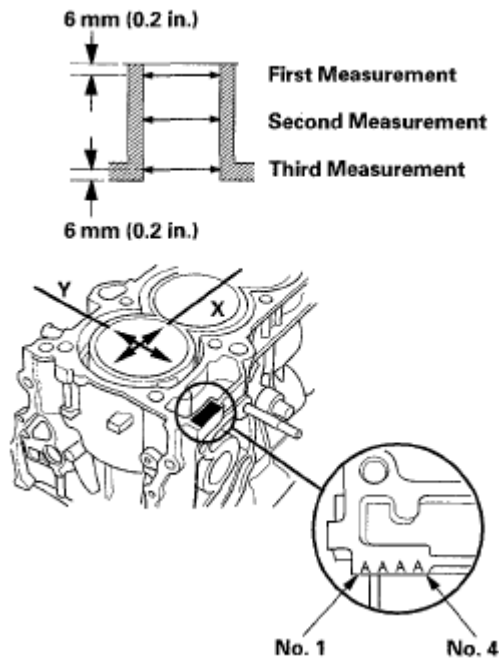


Fig. 32: Identifying Cylinder Wear And Taper Measurement Direction
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bores must be honed.
6. Check the top of the 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.)

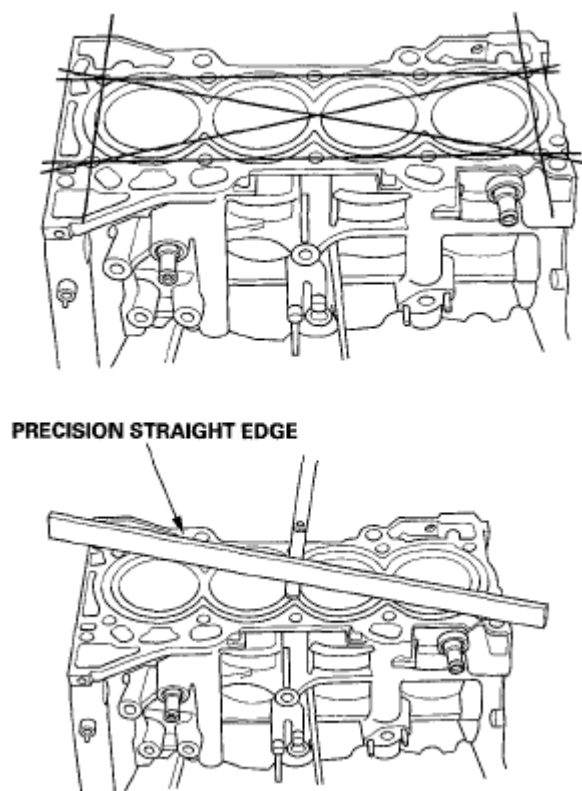


Fig. 33: Checking Engine Block Warpage

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 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.)

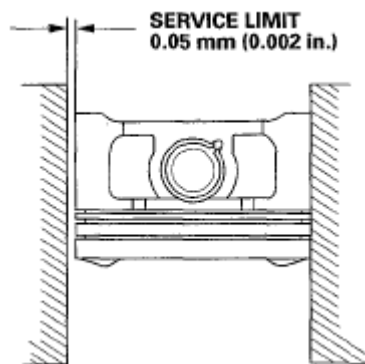


Fig. 34: Identifying Difference Between Cylinder Bore Diameter And Piston Diameter

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

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

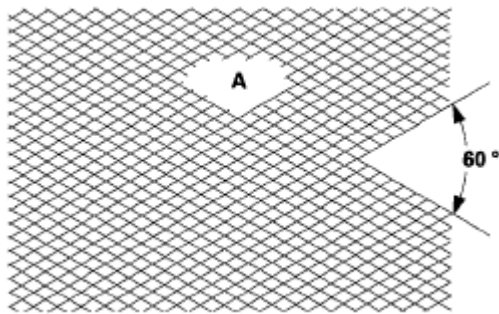


Fig. 35: Identifying Cylinder Bore Honing Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

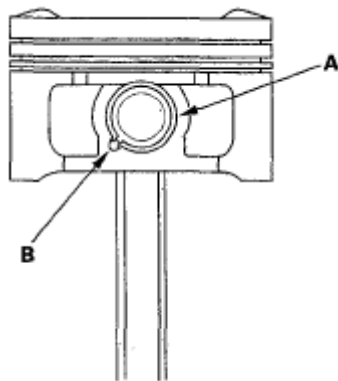


Fig. 36: Identifying Piston Pin Snap Ring

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

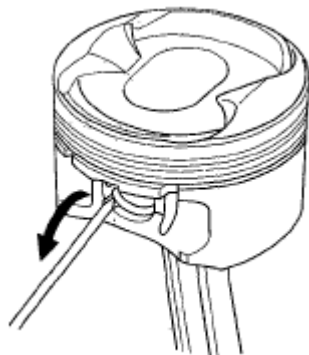


Fig. 37: Removing Snap Rings

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. 38: Heating Piston And Connecting Rod Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON, PIN, AND CONNECTING ROD REPLACEMENT (CONT'D)

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): 21.962-21.965 mm (0.8646-0.8648 in.)

Service Limit: 21.953 mm (0.8643 in.)

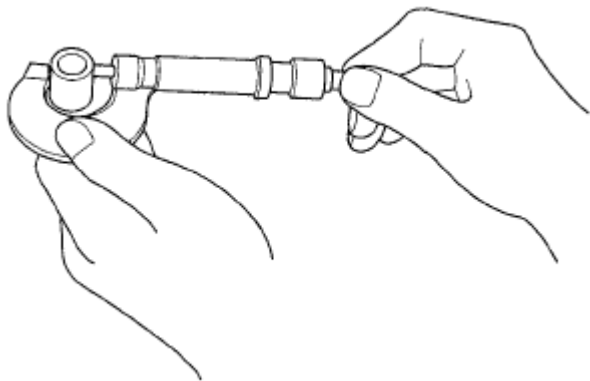


Fig. 39: Measuring Diameter Of Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

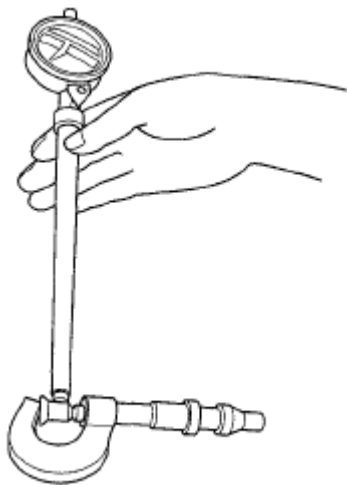


Fig. 40: Measuring Piston Pin Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 41: Checking Difference Between Piston Pin Diameter And 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): 0.005-0.014 mm (0.0002-0.0006 in.)

Service Limit: 0.02 mm (0.0008 in.)

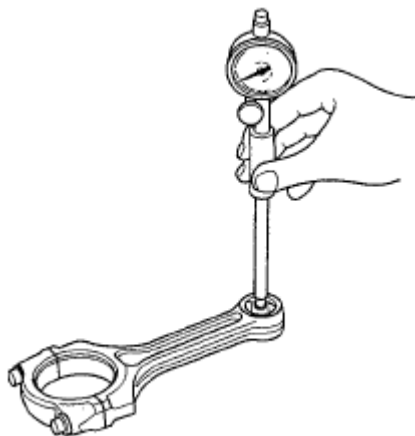


Fig. 42: Measuring Piston Pin-To-Connecting Rod Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REASSEMBLY

1. Install a piston pin snap ring (A).

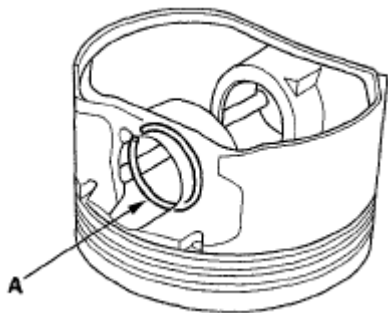


Fig. 43: Identifying Piston Pin Snap Ring
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 44: 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).

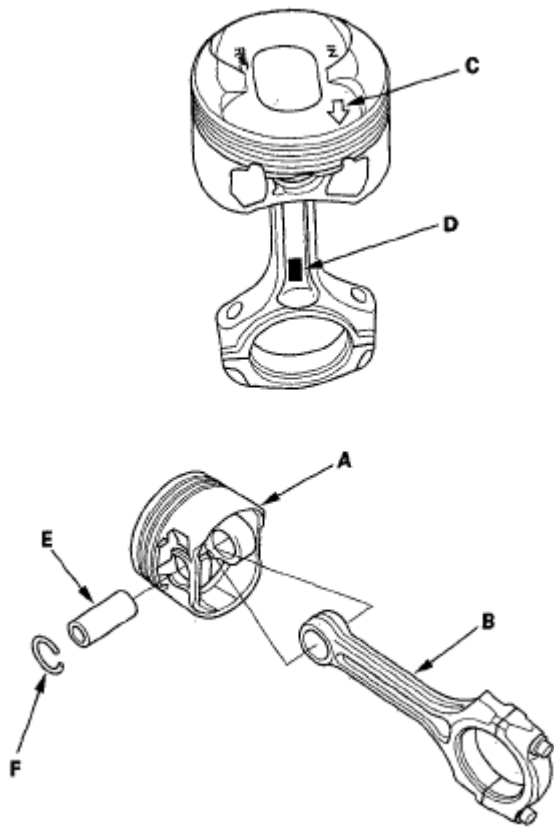


Fig. 45: Identifying Arrow Mark On Piston And Embossed Mark On Connecting Rod
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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).

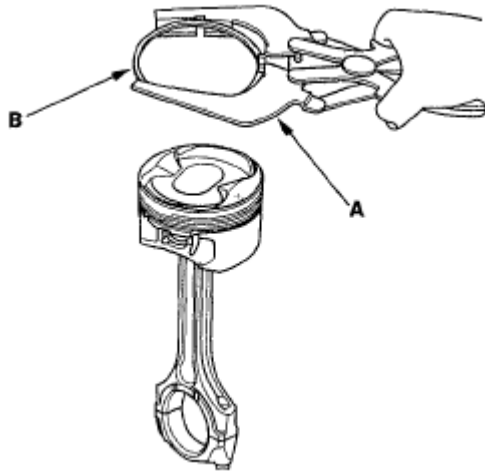


Fig. 46: Removing Old Piston Rings

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 that fits the piston grooves.

The top ring groove is 1.5 mm (0.06 in.) wide. The 2nd ring groove is 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.

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.

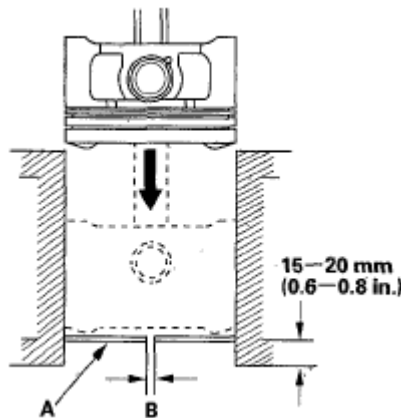


Fig. 47: Pushing Ring Into Cylinder Bore

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.
 - 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): 0.20-0.30 mm (0.008-0.012 in.)

Service Limit: 0.60 mm (0.024 in.)

Second Ring:

Standard (New): 0.40-0.50 mm (0.016-0.020 in.)

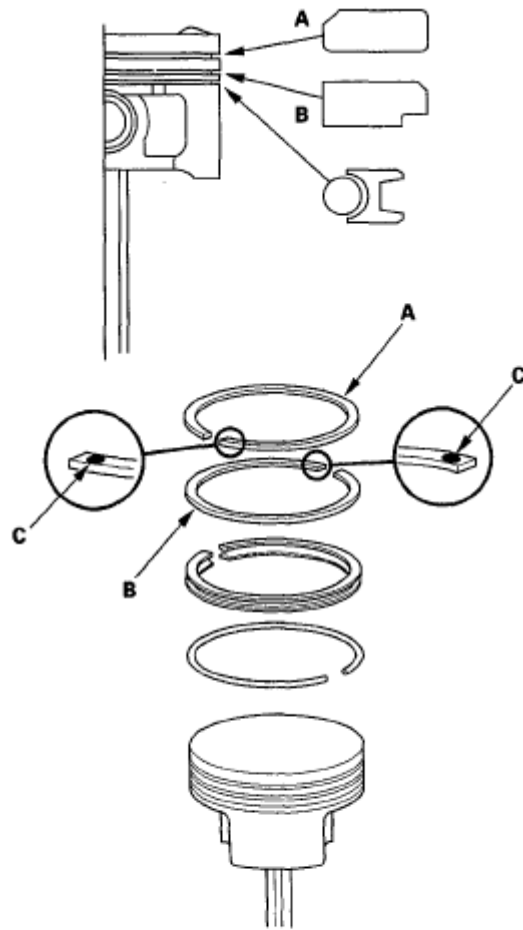
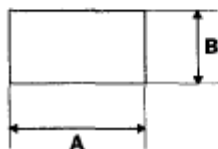
Service Limit: 0.75 mm (0.030 in.)

Oil Ring:

Standard (New): 0.10-0.30 mm (0.004-0.012 in.)

Service Limit: 0.80 mm (0.031 in.)

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

**Piston Ring Dimensions:**

Top Ring (Standard):
A: 3.1 mm (0.12 in.)
B: 1.5 mm (0.06 in.)

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

Fig. 48: Identifying Installation Position Of Piston Rings
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:

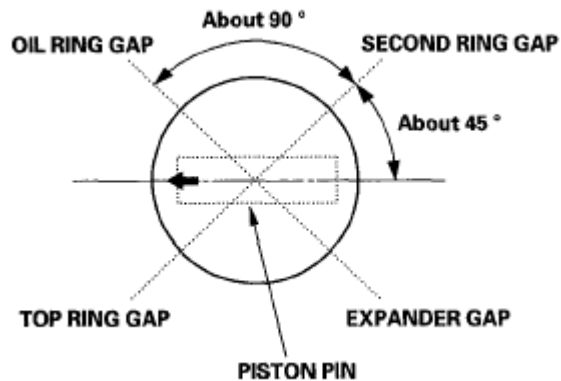


Fig. 49: Identifying Ring End Gaps

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): 0.045-0.090 mm(0.0018-0.0035 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.)

Oil Ring Clearance

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

Service Limit: 0.08 mm (0.003 in.)

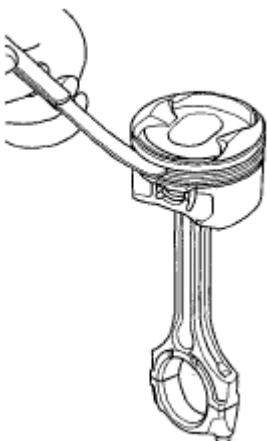


Fig. 50: Measuring Ring-To-Groove Clearances

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

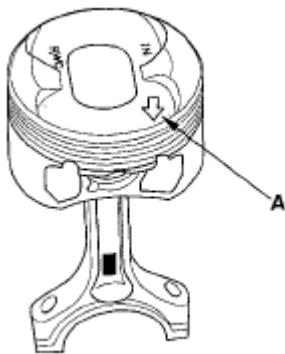


Fig. 51: Identifying Arrow Mark On Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer (A). Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.

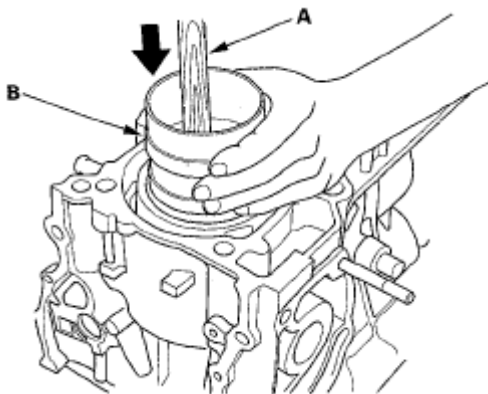


Fig. 52: Tapping Piston In Cylinder Using Wooden Handle Of Hammer

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. Install the rod caps with bearings. Torque the bolts to 29 N.m (3.0 kgf.m, 22 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.

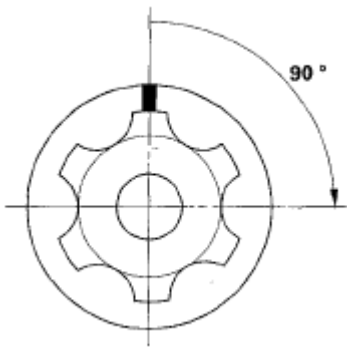


Fig. 53: Identifying Tightening Angle Of Connecting Rod Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 the 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.

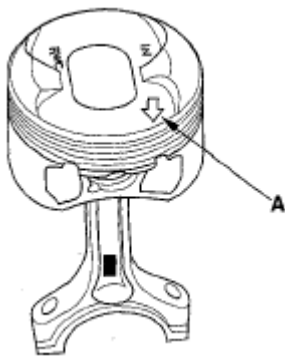


Fig. 54: Identifying Arrow Mark On Piston
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Position the piston in the cylinder, and tap it in using the wooden handle of a hammer (A). Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.

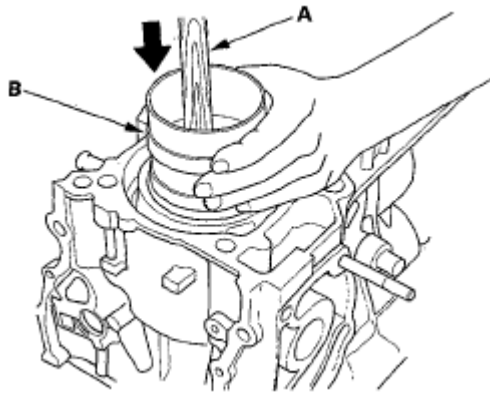


Fig. 55: Tapping Piston In Cylinder Using Wooden Handle Of Hammer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CONNECTING ROD BOLT INSPECTION

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

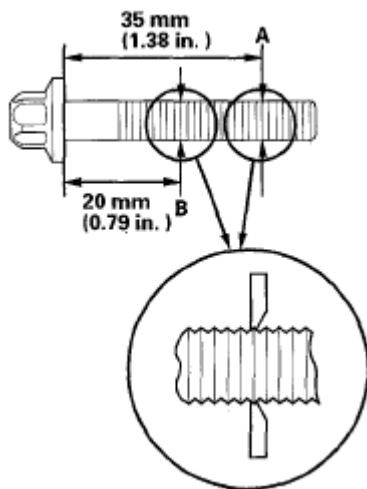


Fig. 56: Identifying Connecting Rod Bolt Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- 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 specification, replace the connecting rod bolt.

CRANKSHAFT INSTALLATION

Special Tools Required

- Handle driver 07749-0010000
 - Oil seal driver attachment, 96 mm 07ZAD-PNAA100
1. Check the connecting rod bearing clearance with plastigage (see CONNECTING ROD BEARING REPLACEMENT).
 2. Check the main bearing clearance with plastigage (see CRANKSHAFT MAIN BEARING REPLACEMENT).
 3. Install the bearing halves in the engine block and connecting rods.
 4. Apply a coat of new engine oil to the main bearings and rod bearings.
 5. Hold the crankshaft so that rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the block.
 6. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the No. 4 journal of the engine block.

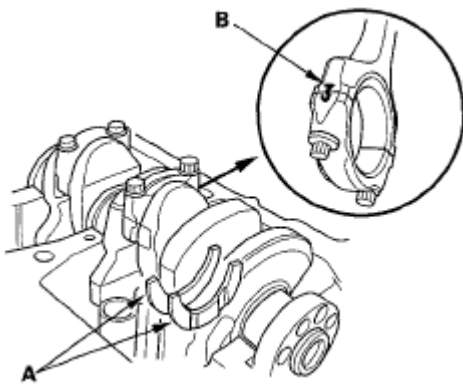


Fig. 57: Identifying Thrust Washers

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Inspect the connecting rod bolts (see CONNECTING ROD BOLT INSPECTION).
8. Apply engine oil to the threads of the connecting rod bolts.
9. 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.
10. 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.
11. Tighten the connecting rod bolts to 29 N.m (3.0 kgf.m, 22 lbf.ft).
12. 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 7 of the procedure. Do not loosen it back to the specified angle.

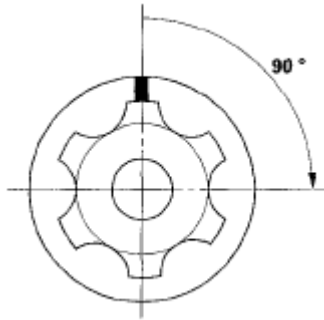


Fig. 58: Identifying Tightening Angle Of Connecting Rod Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove all of the old liquid gasket from the lower block mating surfaces, bolts, and bolt holes.
14. Clean, and dry the lower block mating surfaces.
15. 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.

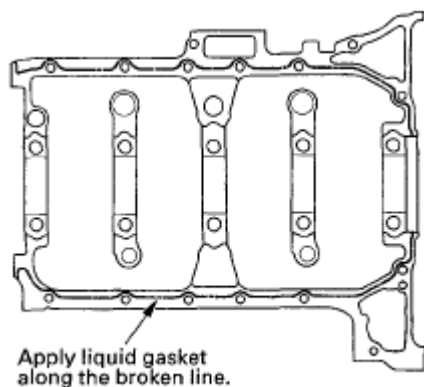


Fig. 59: Identifying Liquid Gasket Applying Area Of Engine Block Mating Surface
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Put the lower block on the engine block.
17. Apply new engine oil to the threads of the bearing cap bolts.
18. Tighten the bearing cap bolts, in sequence, to 29 N.m (3.0 kgf.m, 22 lbf.ft).

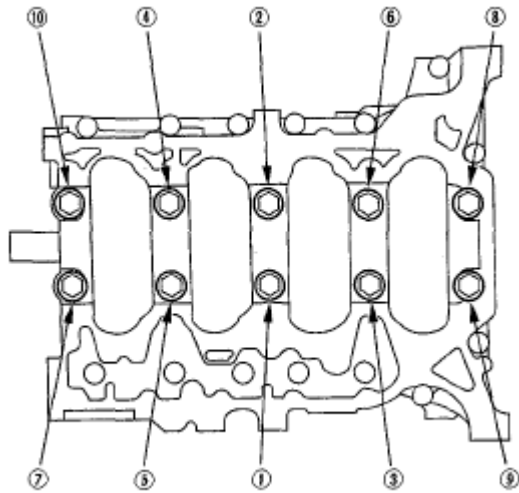


Fig. 60: Identifying Tightening Sequence Of Bearing Cap Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Tighten the bearing cap bolts an additional 67°.

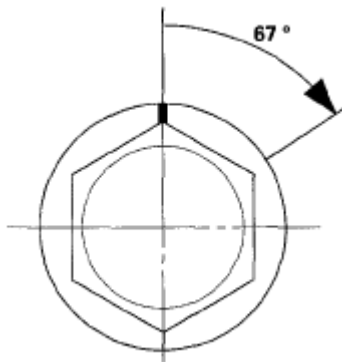


Fig. 61: Identifying Tightening Angle Of Bearing Cap Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

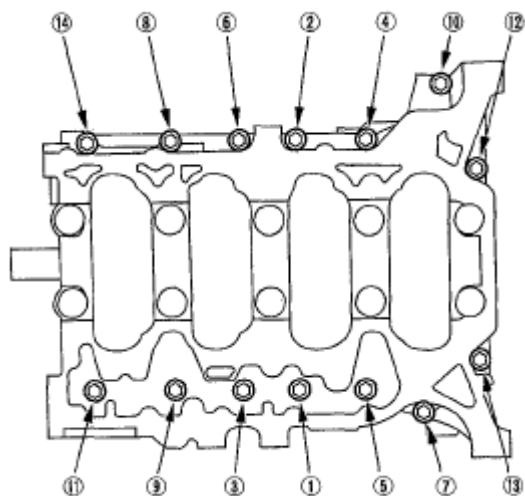


Fig. 62: Identifying Tightening Sequence Of Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

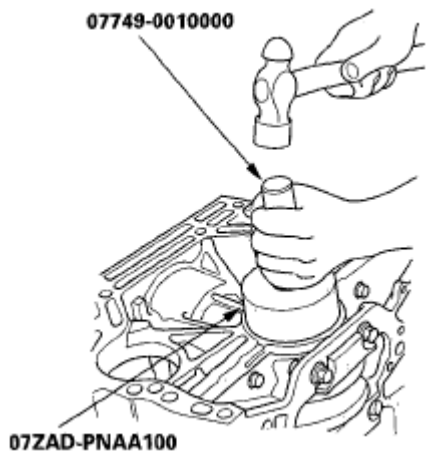


Fig. 63: Installing Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**Oil Seal Installed Height: 0.2—1.2 mm
(0.001—0.047 in.)**

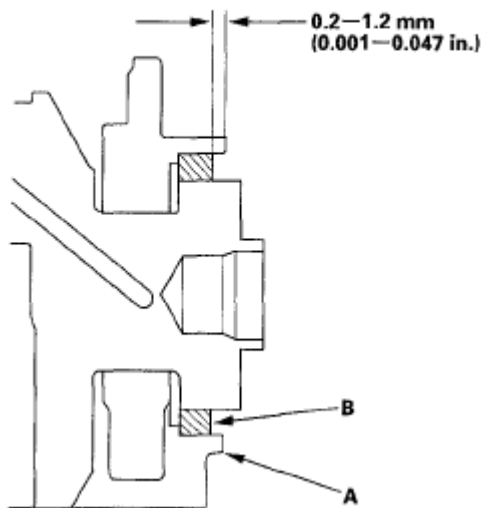


Fig. 64: Identifying Distance Between Engine Block And Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the baffle plate.

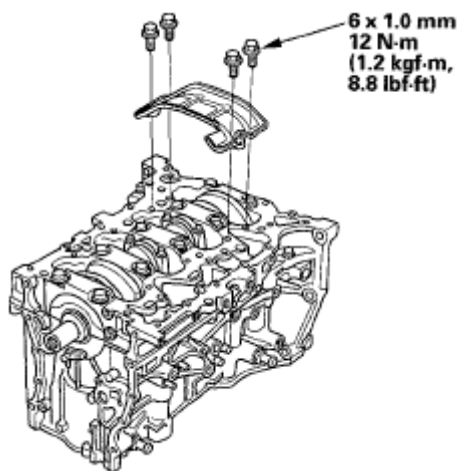


Fig. 65: Identifying Baffle Plate With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
28. Install the transmission (see **TRANSMISSION INSTALLATION**).
29. 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 idle speed until it reaches normal operating temperature, then continue running 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, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the oil pan and to the inside edge of the bolt holes. 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.

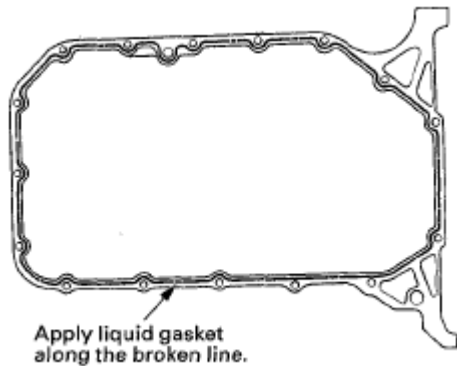


Fig. 66: Identifying Liquid Gasket Applying Area Of Engine Block Mating Surface Of Oil Pan
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan.
5. Tighten the bolts 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 the excess liquid gasket on the each side of crankshaft pulley and drive plate.

NOTE:

- Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the oil pan.

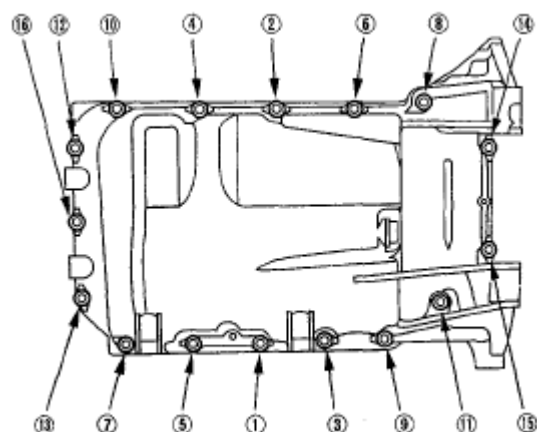


Fig. 67: Identifying Tightening Sequence Of Oil Pan Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the transmission mounting bolts (A) and torque converter cover (B).

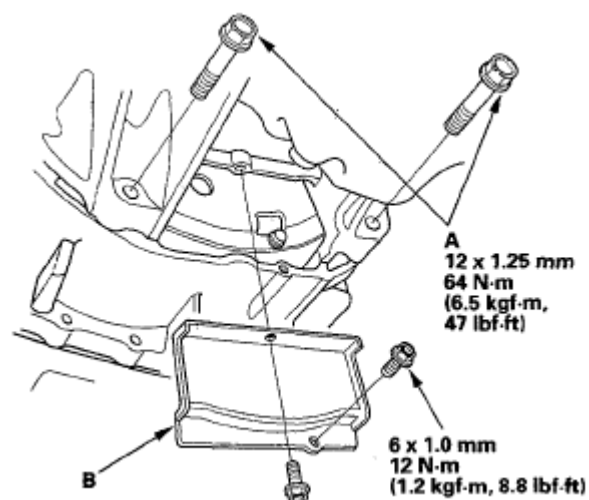


Fig. 68: Identifying Transmission Mounting Bolts And Torque Converter Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the lower torque rod bracket.

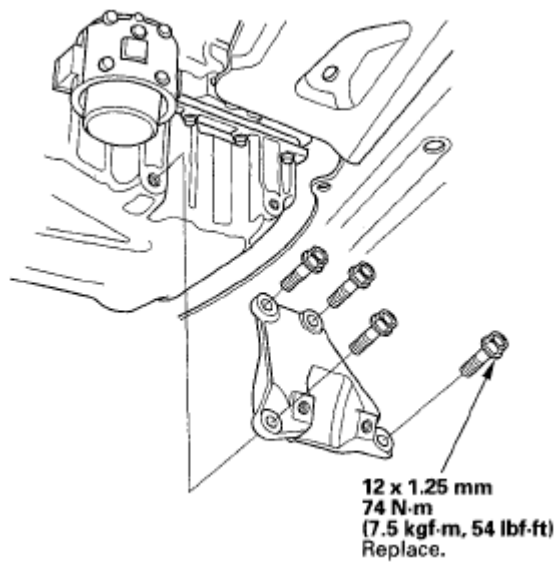


Fig. 69: Identifying Lower Torque Rod Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. If the engine is still in the vehicle, do the following steps.
9. Tighten the 14 x 1.5 mm bolts (A), then tighten the new 12 x 1.25 mm bolts (B) and 12 x 1.25 mm bolts (C).

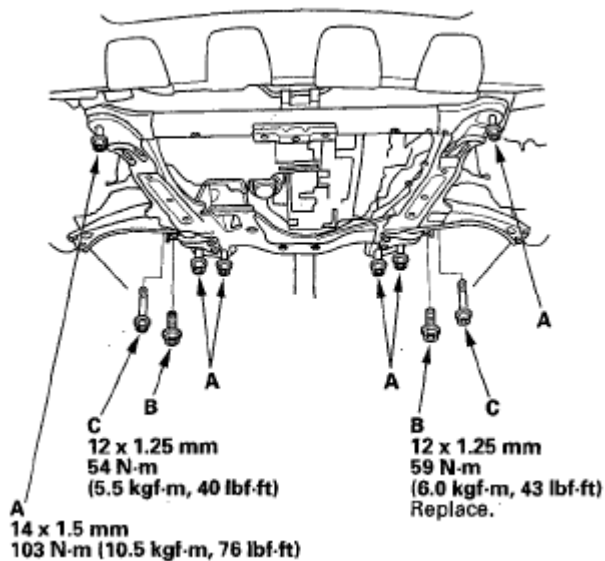


Fig. 70: Identifying Subframe Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Lower the vehicle on the lift.
11. Loosen the upper torque rod mounting bolt (see step 1 under **LOWER TORQUE ROD REPLACEMENT**).
12. Raise the vehicle on the lift to full height.

13. Tighten the lower torque rod mounting bolts (see step 18 under **ENGINE INSTALLATION**).
14. Lower the vehicle on the lift.
15. Tighten the upper torque rod mounting bolt (see step 6 under **UPPER TORQUE ROD REPLACEMENT**).
16. Raise the vehicle on the lift to full height.
17. Using the new gasket (A), tighten the two bolts at the three way catalytic converter (TWO front joint).

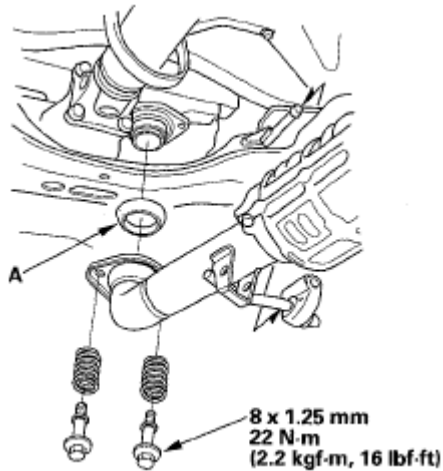


Fig. 71: Identifying Three Way Catalytic Converter Front Joint With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the bolts securing the steering gearbox mounting brackets (see step 23 under **ENGINE INSTALLATION**).
19. Install the power steering (P/S) fluid line bracket and secure the hose with the hose clamps (see step 24 under **ENGINE INSTALLATION**).
20. Install the splash shield (see step 30 under **ENGINE INSTALLATION**).
21. Install the front wheels.
22. Refill the engine with engine oil (see step 4 under **ENGINE OIL REPLACEMENT**).

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

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

1. Remove the transmission (see **TRANSMISSION REMOVAL**).
2. Remove the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
3. Clean, and dry the crankshaft oil seal housing.
4. Use the driver and attachment to drive a new oil seal squarely into the block to the specified installed height.

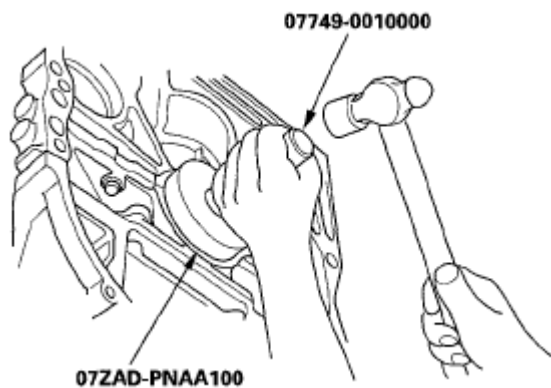


Fig. 72: Installing Transmission End Crankshaft Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Oil Seal Installed Height: 0.2—1.2 mm
 (0.001—0.047 in.)

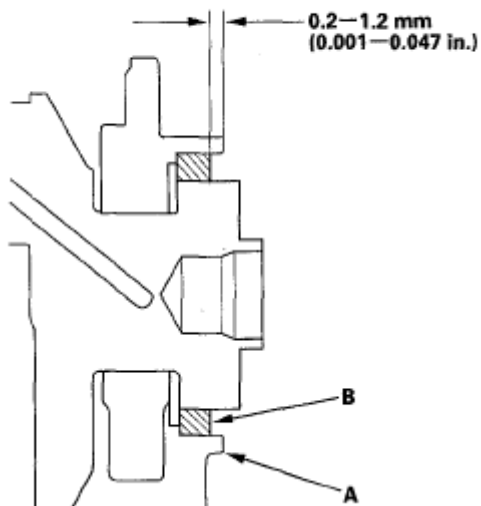


Fig. 73: Identifying Distance Between Engine Block And Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the drive plate (see [DRIVE PLATE REMOVAL AND INSTALLATION](#)).
7. Install the transmission (see [TRANSMISSION INSTALLATION](#)).

SEALING BOLT INSTALLATION

NOTE: When installing the sealing bolts (A), (B), and (C), always use a new washer (except for the bolt (D)).

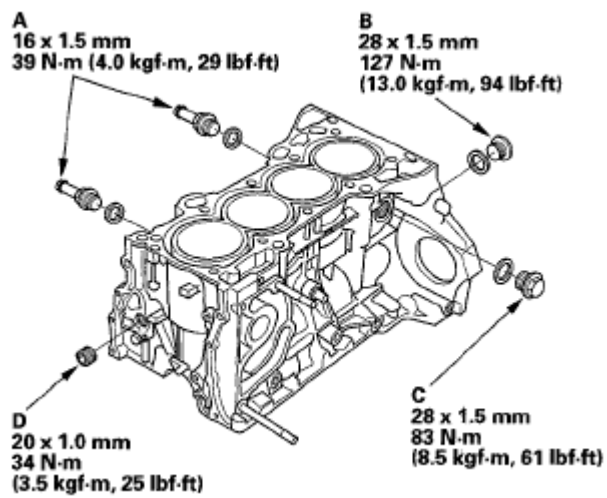


Fig. 74: Identifying Sealing Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.