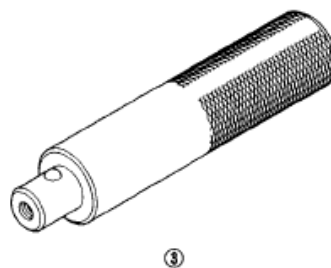
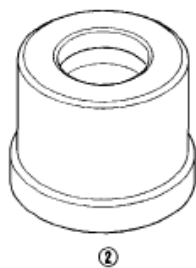
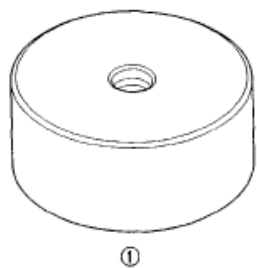


## 2006-09 ENGINE

## Engine Block - CSX

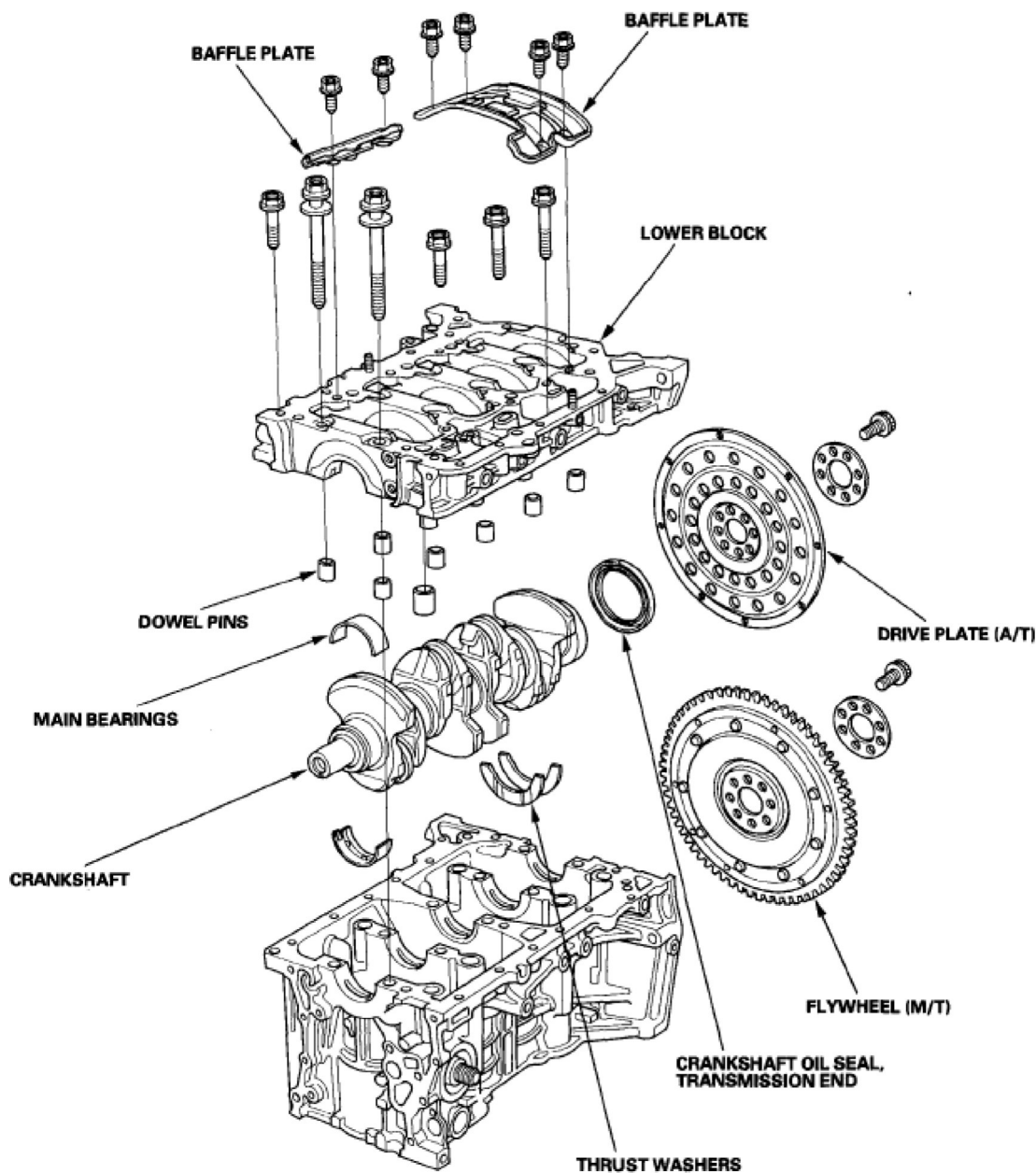
## SPECIAL TOOLS

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

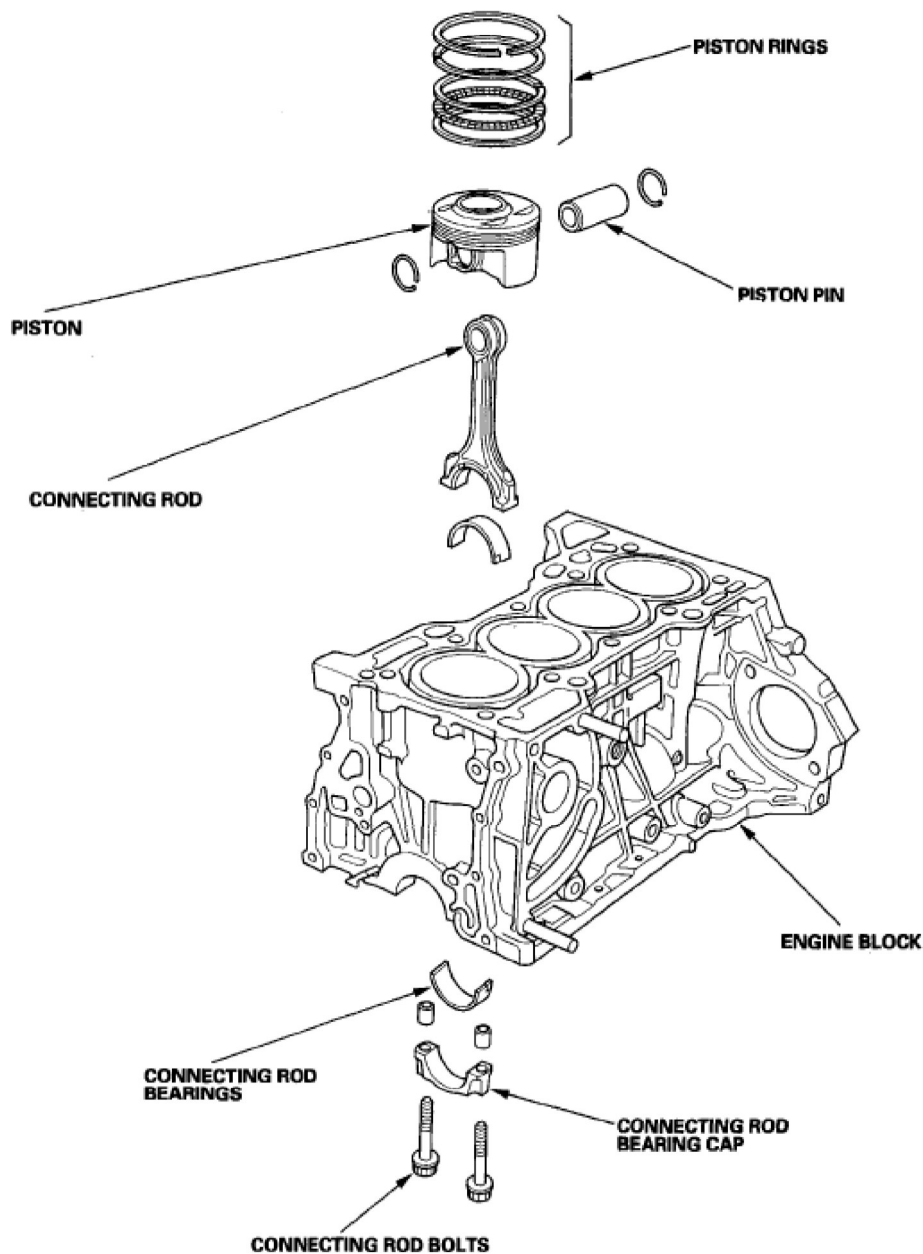
**Fig. 1: Identifying Special Tools**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

## COMPONENT LOCATION INDEX



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



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

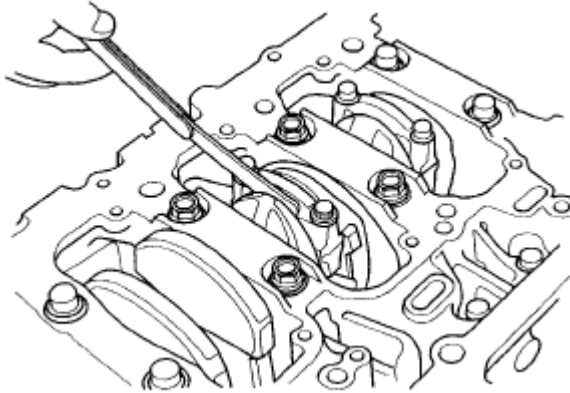
## CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

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

### Connecting Rod End Play

**Standard (New): 0.15-0.30 mm (0.006-0.012 in.)**

**Service Limit: 0.40 mm (0.016 in.)**



**Fig. 4: Measuring Connecting Rod End Play**

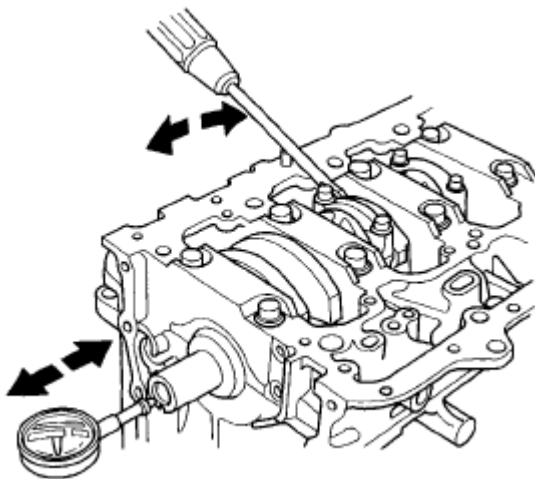
**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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 the 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 19 on ).

**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:

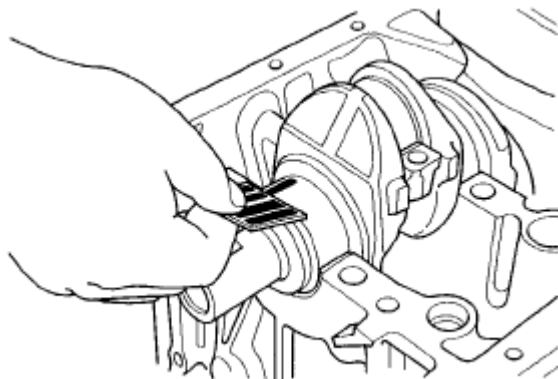
**Standard (New): 0.017-0.041 mm (0.0007-0.0016 in.)**

**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.)**



**Fig. 6: Checking Main Bearing-To-Journal Oil Clearance**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

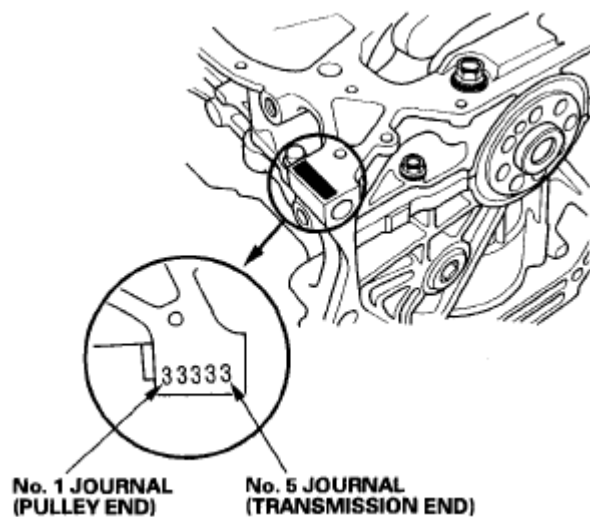
6. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below 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.

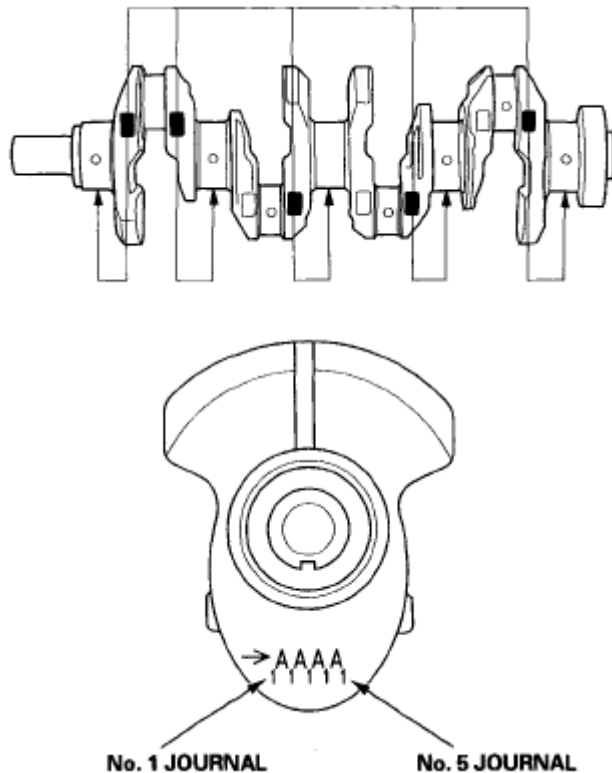
If you can't read the codes because of accumulated dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



**Fig. 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 in either location.



**Fig. 8: Identifying Main Journal Code Location**  
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:**

- 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. 9: Identifying Crank Bore Codes And Crank Journal Codes**  
 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 plates (see step 8 on ).
3. Remove the connecting rod cap and bearing half.
4. Clean the crankshaft rod journal and bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and cap, and torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) + 90° (K20Z2) or 29 N.m (3.0 kgf.m, 22 lbf.ft) + 90°(K20Z3).

**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 K20Z2

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

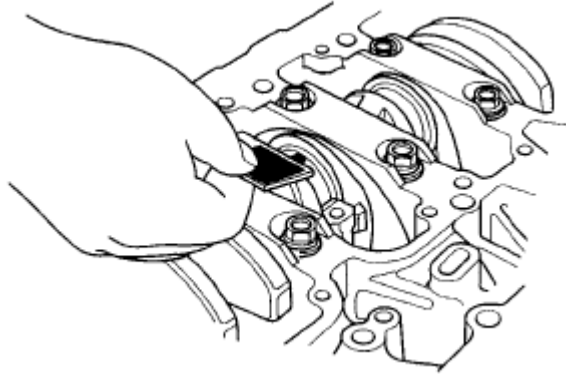
**Service Limit: 0.060 mm (0.0024 in.)**

**K20Z3**



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

**Service Limit: 0.077 mm (0.0030 in.)**



**Fig. 10: Checking Connecting Rod Bearing-To-Journal Oil Clearance (K20Z2)**  
**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**

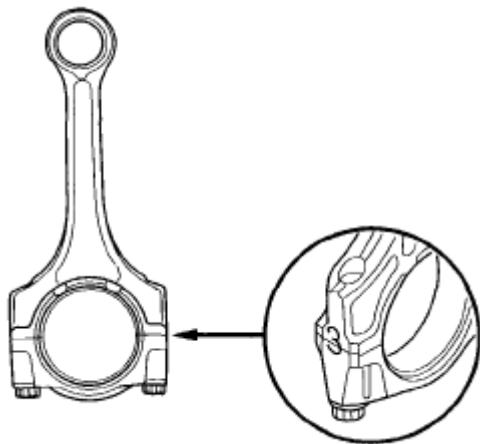
2. Each rod has a tolerance range from 0 to 0.024 mm (0.0009 in.), in 0.006 mm (0.0002 in.) increments, depending on the size of its big end bore. It is then stamped with a number or bar (1,2,3, or 4/I, II, III, or IIII) indicating the range. You may find any combination of numbers and bars in any engine.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

**K20Z2:48.0 mm (1.89 in.)**

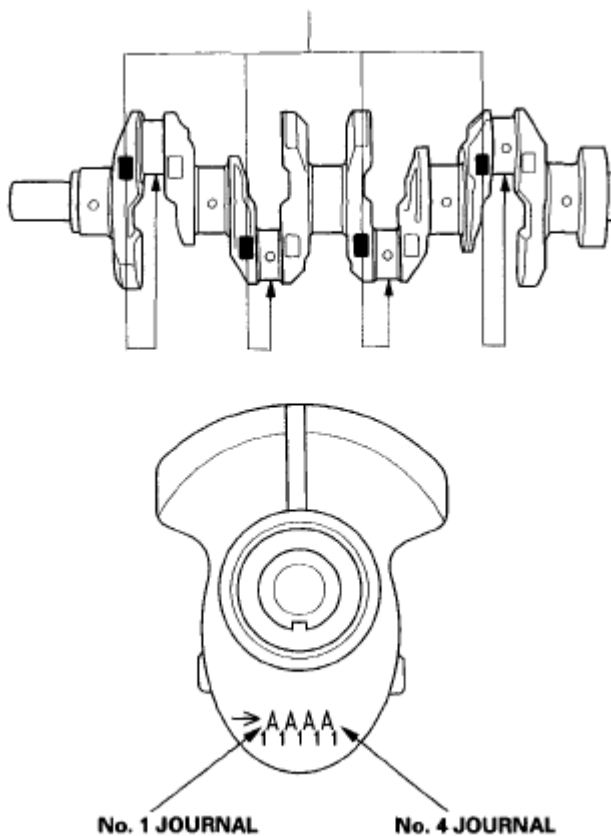
**K20Z3:51.0 mm (2.01 in.)**



**Fig. 11: Identifying Connecting Rod Big End Bore Code Locations**  
 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. 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 the appropriate replacement bearings from the following table.

**NOTE:**

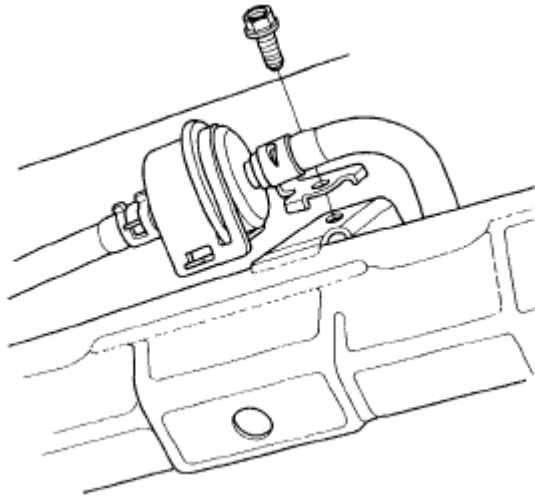
- Color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

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

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

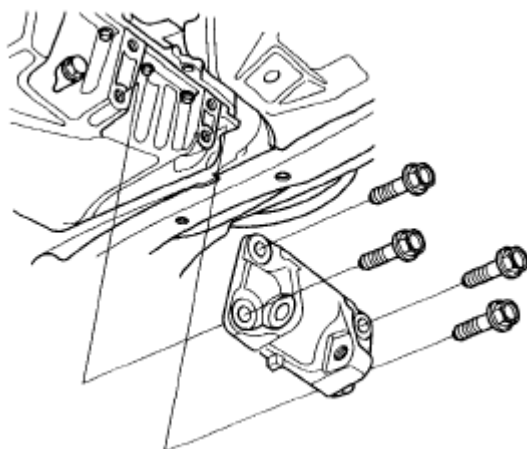
## OIL PAN REMOVAL

1. If the engine is out of the vehicle, go to step 18.
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 26 on ENGINE REMOVAL ).
6. Separate the stabilizer links (see STABILIZER LINK REMOVAL/INSTALLATION ).
7. Separate the knuckles from the lower arms (see KNUCKLE/HUB/WHEEL BEARING REPLACEMENT ).
8. Remove the steering gearbox bracket. Remove the steering gearbox mounting bolt, stiffener mounting bolt, and stiffener (see step 37 on ENGINE REMOVAL ).
9. Remove the steering gearbox mounting bolt, stiffener mounting bolt, and stiffener. Remove the harness clamp from the front subframe (see step 39 on ENGINE REMOVAL ).
10. A/T model: Remove the bolt securing the automatic transmission fluid (ATF) filter.



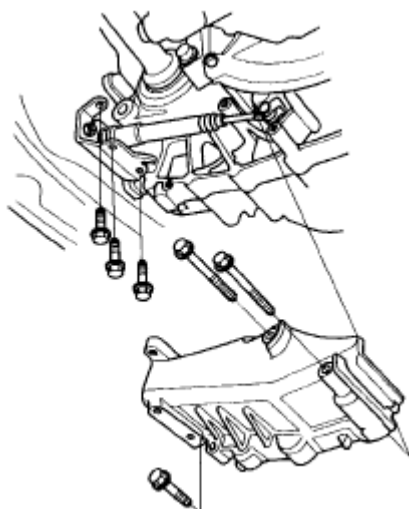
**Fig. 14: Identifying Automatic Transmission Fluid (ATF) Filter Bolt**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the front leg assembly, the hook, and the wing nut to an A and Reds engine support hanger (AAR-T1256) onto the 2006 Civic engine hanger (VSB02C000025). Carefully position the engine hanger on the vehicle, and attach the hook to the slotted hole in the support eyelet. Tighten the wing nut by hand to lift and support the engine/ transmission (see step 47 on ENGINE REMOVAL ).
12. Remove the lower torque rod (see step 50 on ENGINE REMOVAL ).
13. M/T model: Remove the front mount mounting bolt (see step 51 on ENGINE REMOVAL ).
14. Note the reference marks on the both sides of the front subframe that line up with the body (see step 52 on ENGINE REMOVAL ).
15. Loosen the front subframe body mount bracket mounting bolts on both sides (see step 53 on ENGINE REMOVAL ).
16. Attach the front subframe adapter (VSB02C000016) to the subframe by looping the strap over the front of the subframe, then secure the strap with the stop, then tighten the wing nut. Raise the jack and line up the slots in the arms with the bolt holes on the corner of the jack base, then tighten the bolts (see step 54 on ENGINE REMOVAL ).
17. Remove the front subframe (see step 56 on ENGINE REMOVAL ).
18. Remove the lower torque rod bracket.



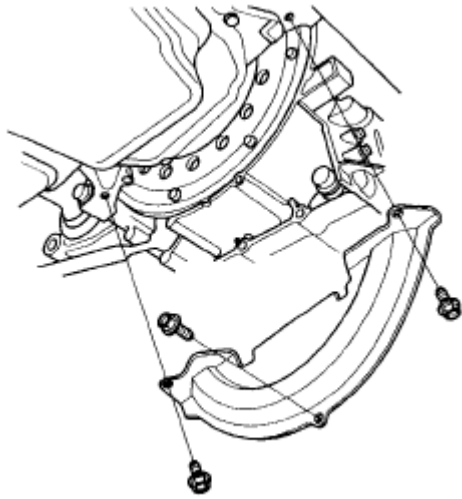
**Fig. 15: Identifying Lower Torque Rod Bracket**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. A/T model: Remove the shift cable cover.



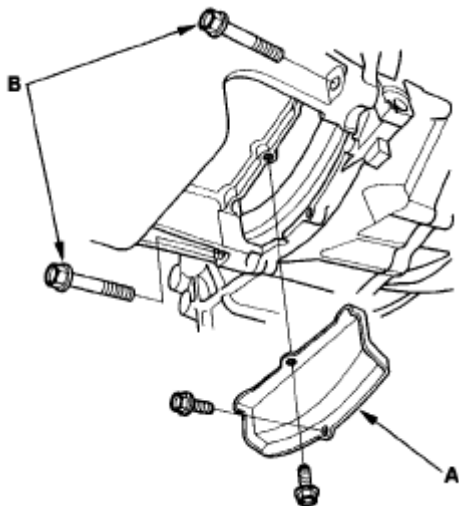
**Fig. 16: Identifying Shift Cable Cover (A/T Model)**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. K20Z2: Remove the torque converter cover/clutch cover.



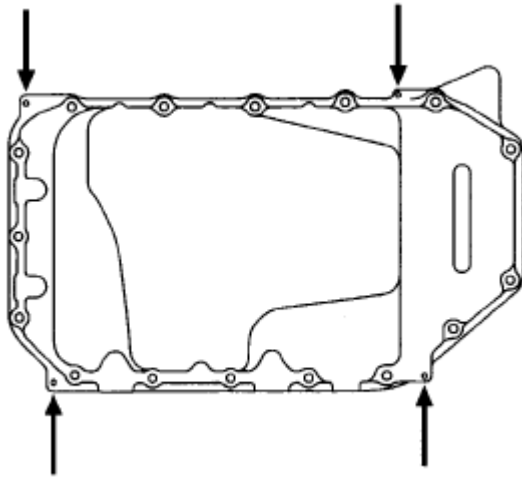
**Fig. 17: Identifying Torque Converter Cover/Clutch Cover**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. K2023: Remove the clutch cover (A) and transmission mounting bolts (B).



**Fig. 18: Identifying Clutch Cover And Transmission Mounting Bolts**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



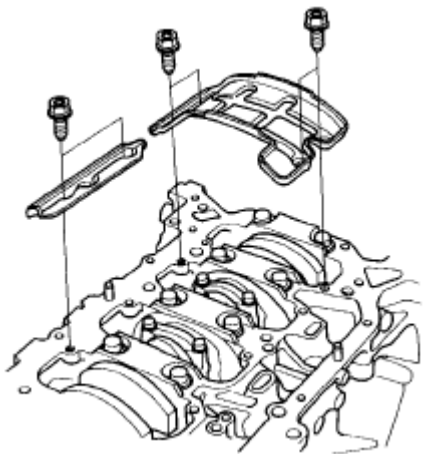
**Fig. 19: Locating Oil Pan Blocks**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Remove the oil pan.

## CRANKSHAFT AND PISTON REMOVAL

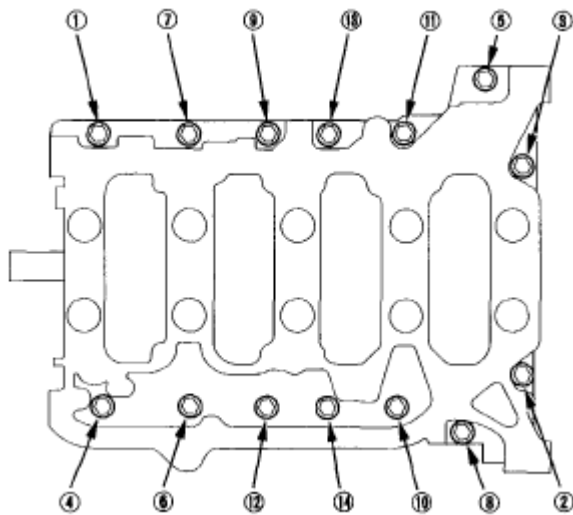
1. Remove the engine assembly (see ENGINE REMOVAL ).
2. Remove the transmission:
  - Manual transmission (see TRANSMISSION REMOVAL )
  - Automatic transmission (see TRANSMISSION REMOVAL )
3. M/T model: Remove the pressure plate (see CLUTCH REPLACEMENT ), clutch disc (see CLUTCH REPLACEMENT ), and flywheel (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. 20: Identifying Baffle Plates**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the 8 mm bolts in sequence.

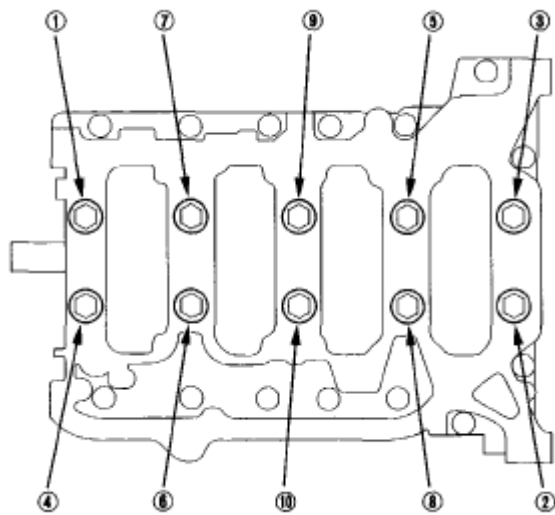


**Fig. 21: Identifying Bolts Loosening Sequence**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

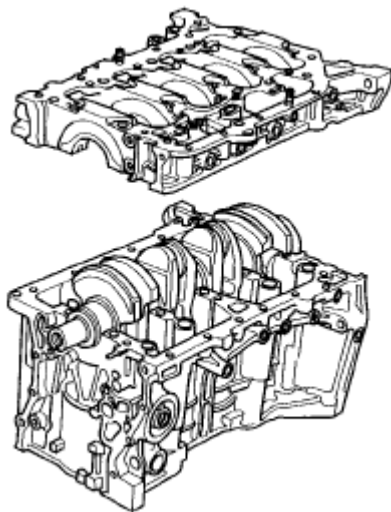
10. Remove the bearing cap bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.





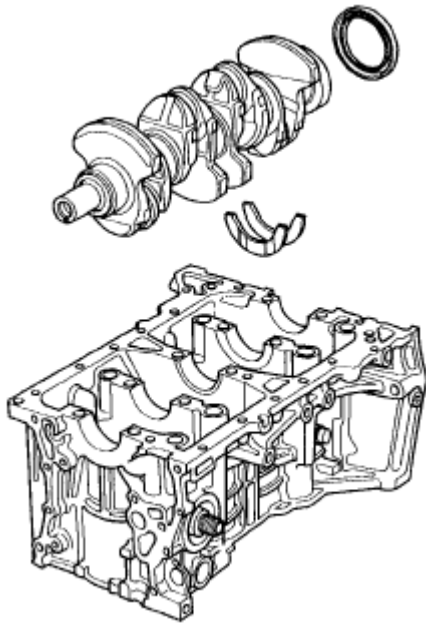
**Fig. 22: Identifying Bearing Cap Bolts Loosening Sequence**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 23: Identifying Lower Block And Bearings**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

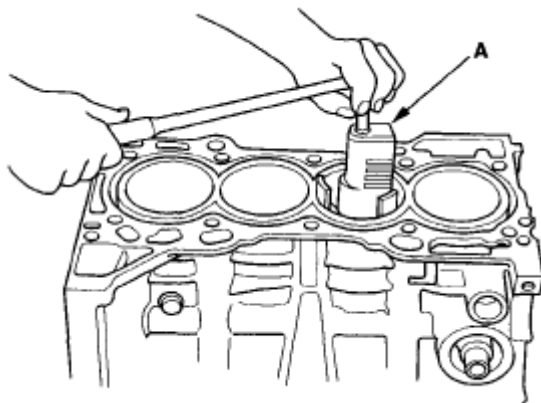
12. Remove the rod caps/bearings. Keep all caps/bearings in order.
13. Lift the crankshaft out of the engine. Be careful not to damage the journals.



**Fig. 24: Identifying Crankshaft**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

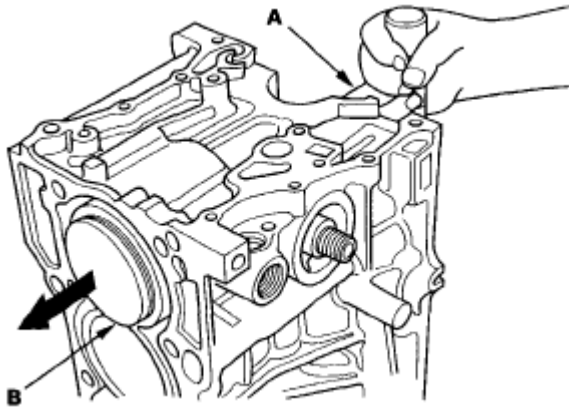
14. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
15. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the pistons as they are pushed out.



**Fig. 25: Removing Hard Carbon Around Top Of Cylinder Using 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. 26: Driving Out Piston/Connecting Rod Assembly Using Hammer**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Reinstall the lower block and the 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

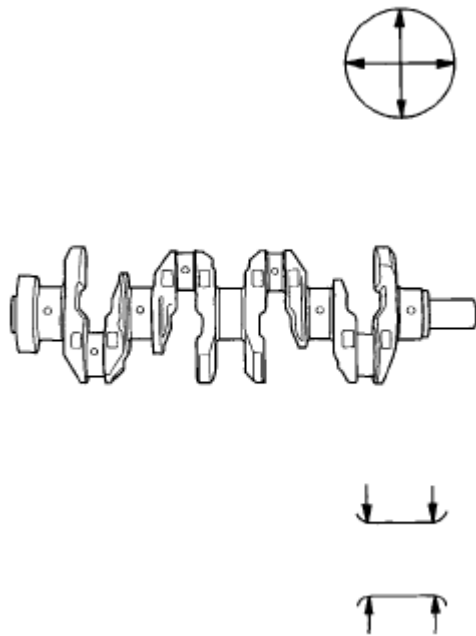
### OUT-OF-ROUND AND TAPER

1. Remove the crankshaft from the engine block (see **CRANKSHAFT AND PISTON REMOVAL** ).
2. Clean the crankshaft oil passages with pipe cleaners or suitable brush.
3. Clean the keyway and the 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. 27: 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 measurement 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.)**

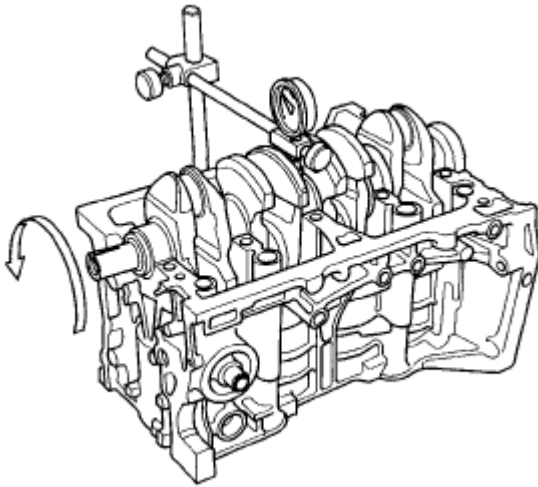
#### **STRAIGHTNESS**

6. Place the engine block on the surface plate.
7. Clean and install the bearings on the No. 1 and No. 5 journal of the engine block.
8. Lower the crankshaft into the engine 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): 0.03 mm (0.0012 in.) max.**

**Service Limit: 0.04 mm (0.0016 in.)**



**Fig. 28: Measuring Crankshaft Total 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 11 mm (0.4 in.) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the engine block as cylinder bore sizes.

### Piston Diameter

#### Standard (New):

**No Letter (or A):** 85.980-85.990 mm (3.3850-3.3854 in.)

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

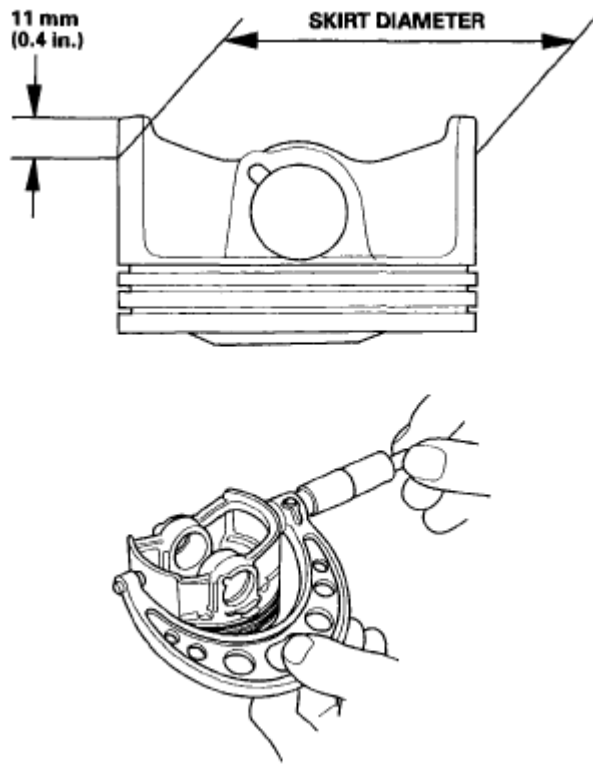
#### Service Limit:

**No Letter (or A):** 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. 29: Measuring Piston Diameter**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the wear and taper in direction X and Y at three levels inside each cylinder as shown. If the measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the engine block. If the engine 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.)

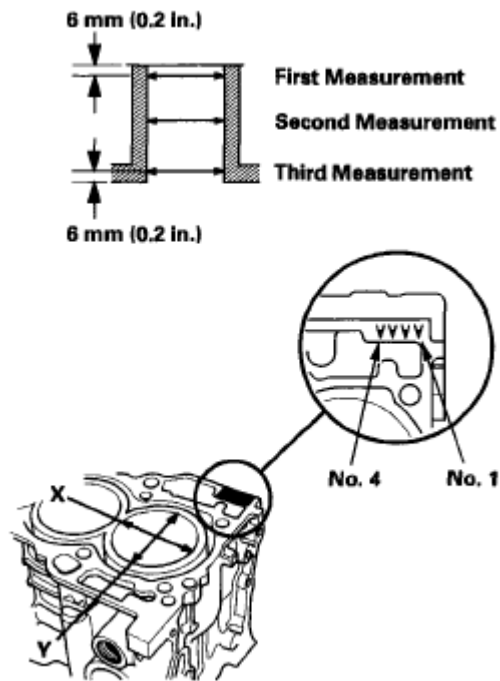
#### Oversize Bore

**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.)**



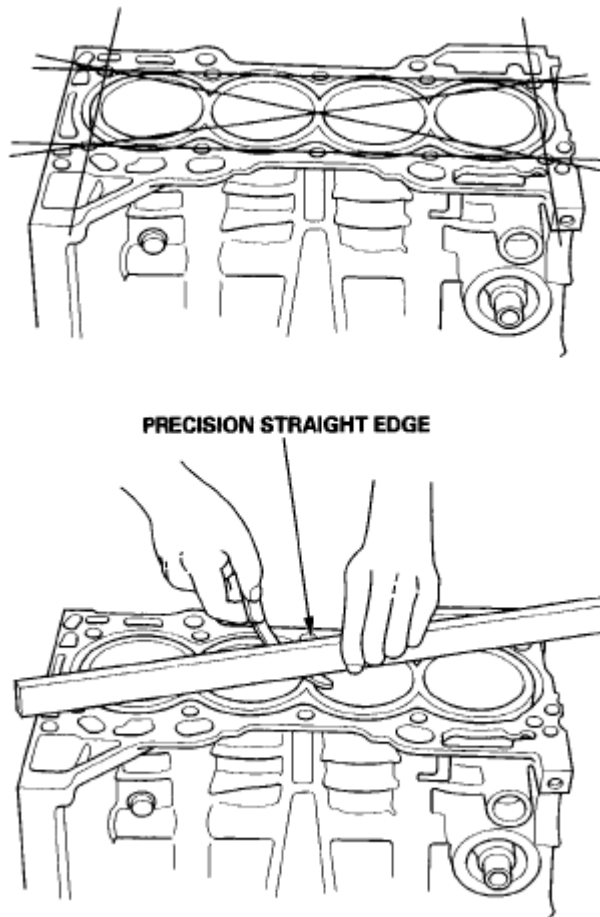
**Fig. 30: Measuring Wear And Taper Of Cylinder Bore**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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. 31: Checking Top Of Engine Block For Warpage**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

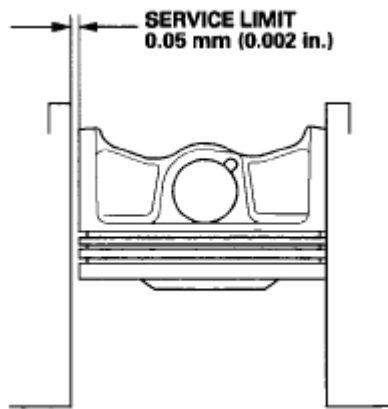
7. Calculate the difference between the cylinder bore diameter and the piston diameter. If the clearance is near, or exceeds the service limit, inspect the piston and cylinder bore for excessive wear.

**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.)**



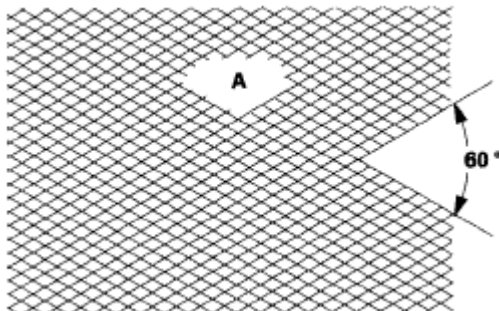


**Fig. 32: Identifying Piston-To-Cylinder Bore Clearance**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

## CYLINDER BORE HONING

Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see **BLOCK AND PISTON INSPECTION** ). If the engine block is to be reused, hone the cylinders, and remeasure the bores.
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. 33: Identifying Cylinder Bore Honing Angle**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

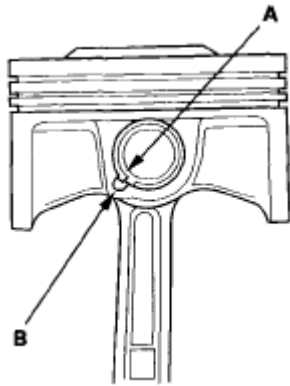
3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting. Never use solvent, it will only redistribute the grit on the cylinder walls.
4. If scoring or scratches are still present 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**

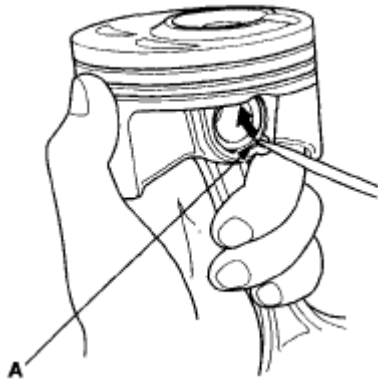
1. Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL** ).
2. Apply new engine oil to the piston pin snap rings (A), and turn them in the ring grooves until the end gaps are lined up with the cutouts in the piston pin bores (B).

**NOTE:** Take care not to damage the ring grooves.



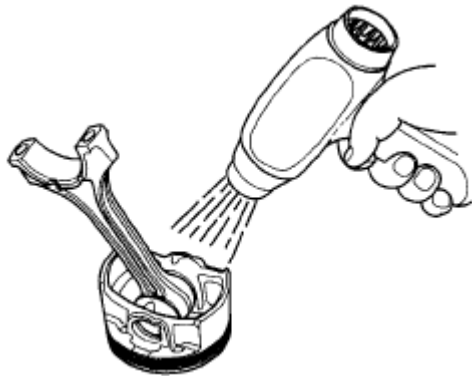
**Fig. 34: Identifying Piston Pin Snap Rings And Piston Pin Bores**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 70 °C (158 T), then remove the piston pin.



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

## INSPECTION

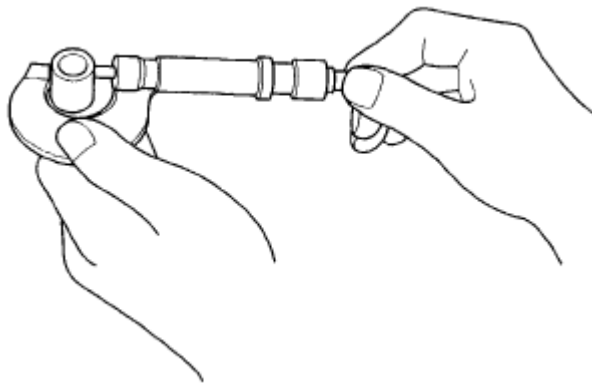
**NOTE:** Inspect the piston, piston pin, and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

### **Piston Pin Diameter**

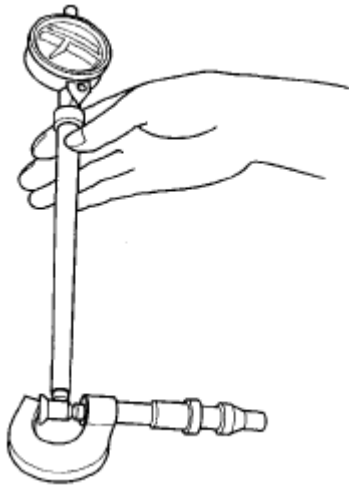
**Standard (New): 21.961-21.965 mm (0.8646-0.8648 in.)**

**Service Limit: 21.953 mm (0.8643 in.)**



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

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



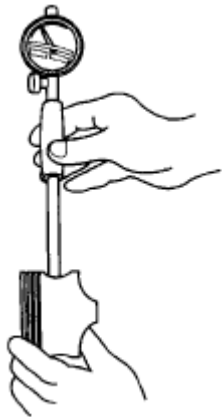
**Fig. 38: Identifying Dial Indicator On Piston Pin Diameter**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)**



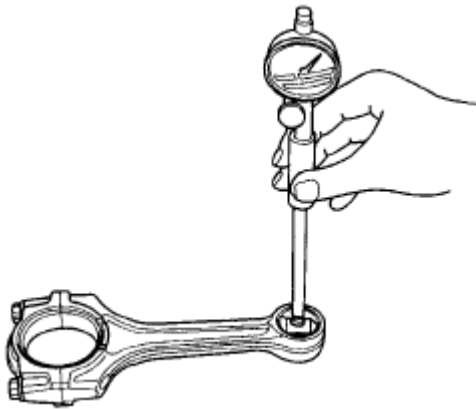
**Fig. 39: Checking Piston Pin-To-Piston Clearance**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)**

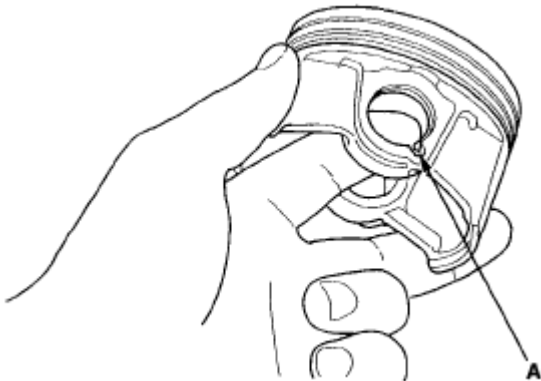
**Service Limit: 0.02 mm (0.0008 in.)**



**Fig. 40: Measuring Piston Pin-To-Connecting Rod Clearance**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

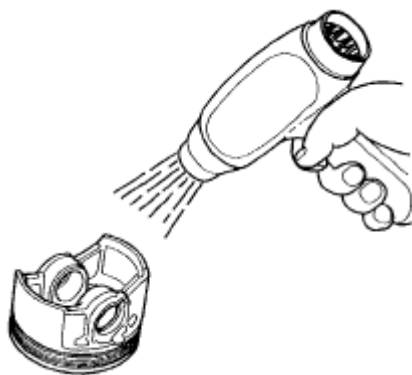
## REASSEMBLY

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



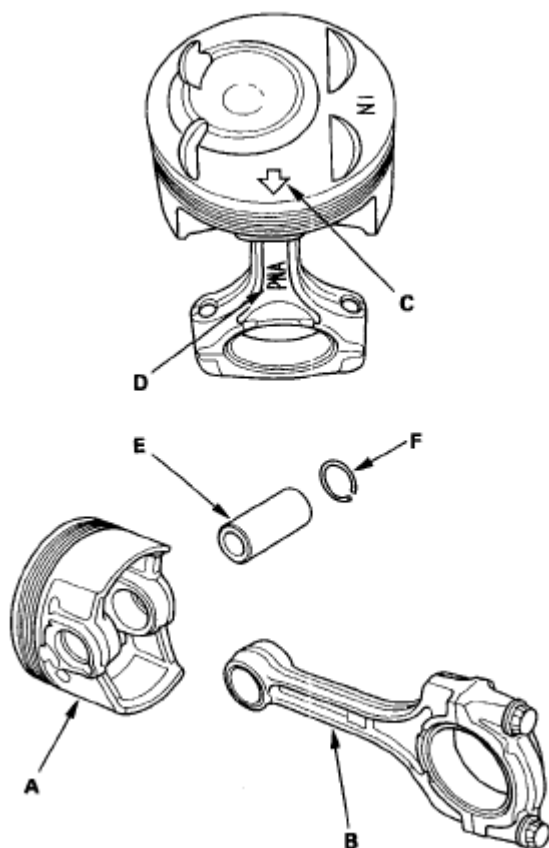
**Fig. 41: Identifying Piston Pin Snap Ring**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 70 °C (158 °F).

**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).

**Fig. 43: Identifying Piston And Connecting Rod**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

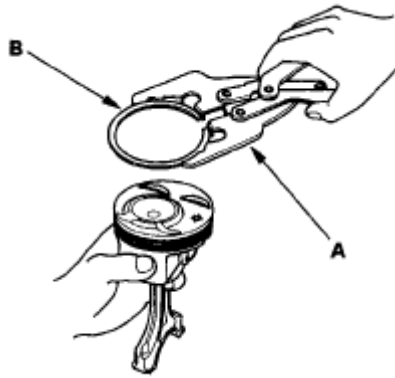
This illustration shows K20Z2.

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. 44: Removing Old Piston Rings**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

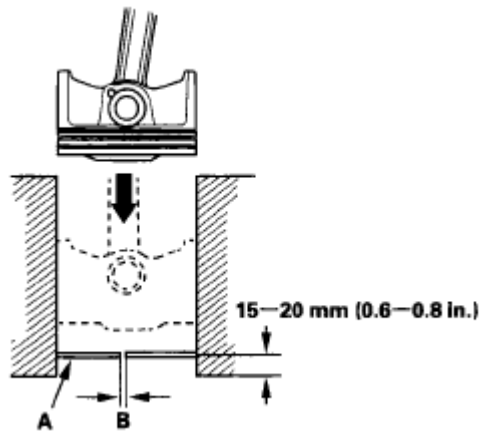
3. Clean all ring grooves thoroughly with a squared-off broken ring or ring groove cleaner with a blade to fit the piston grooves.

The top and 2nd ring grooves are 1.2 mm (0.05 in.) wide. The oil ring groove is 2.0 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. 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.
  - 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:

##### K20Z2:

**Standard (New): 0.40-0.55 mm (0.016-0.022 in.)**

**Service Limit: 0.70 mm (0.028 in.)**

##### K20Z3:

**Standard (New): 0.50-0.65 mm (0.020-0.026 in.)**

**Service Limit: 0.75 mm (0.030 in.)**

#### Oil Ring:

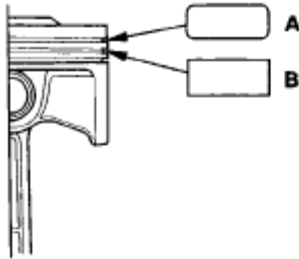
**Standard (New): 0.20-0.70 mm (0.008-0.028 in.)**



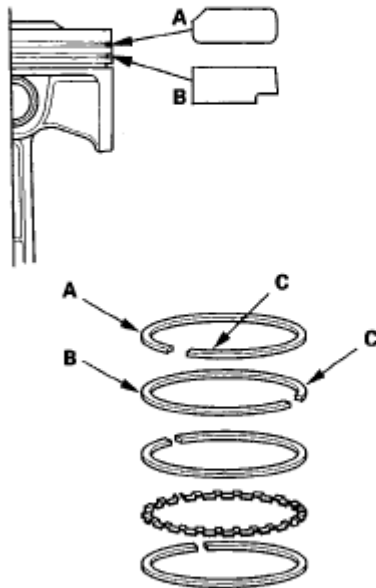
**Service Limit: 0.80 mm (0.031 in.)**

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

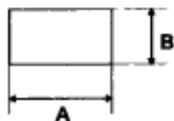
**K20Z2:**



**K20Z3:**



**Piston Ring Dimensions**



**Top Ring (Standard):**

A: 3.1 mm (0.12 in.)

B: 1.2 mm (0.05 in.)

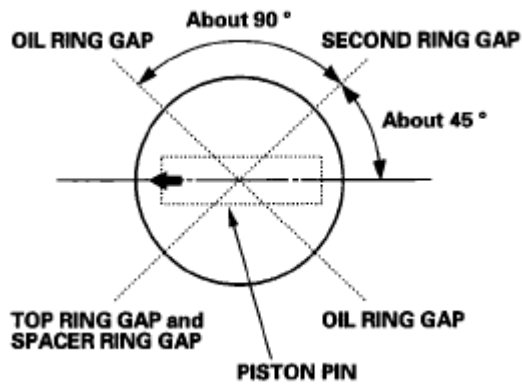
**Second Ring (Standard):**

A: 3.4 mm (0.13 in.)

B: 1.2 mm (0.05 in.)

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

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



**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**

##### **K20Z2**

**Standard (New): 0.035-0.060 mm (0.0014-0.0024 in.)**

**Service Limit: 0.13 mm (0.005 in.)**

##### **K20Z3**

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

**Service Limit: 0.13 mm (0.005 in.)**

#### **Second Ring Clearance**

##### **K20Z2**

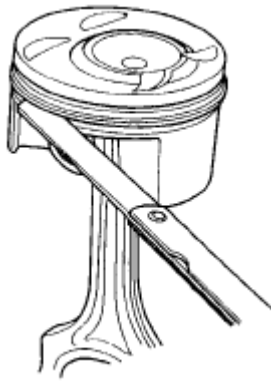
**Standard (New): 0.030-0.055 mm (0.0012-0.0022 in.)**

**Service Limit: 0.13 mm (0.005 in.)**

##### **K20Z3**

**Standard (New): 0.040-0.065 mm (0.0016-0.0026 in.)**

**Service Limit: 0.13 mm (0.005 in.)**

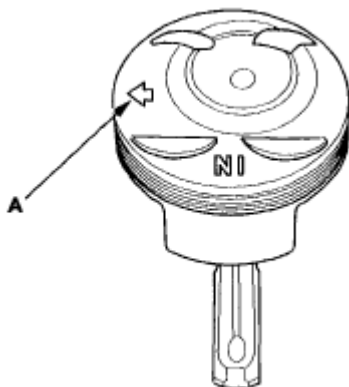


**Fig. 48: Measuring Ring-To-Groove Clearances**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

## PISTON INSTALLATION

### IF THE CRANKSHAFT IS ALREADY INSTALLED

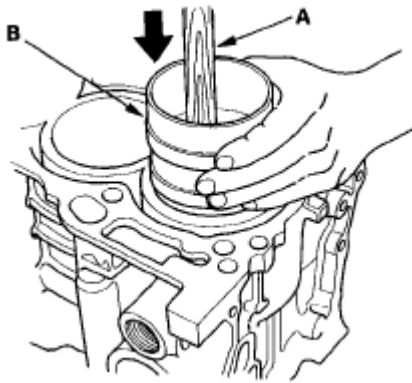
1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Remove the connecting rod caps, then install the ring compressor. Check that the bearing is securely in place.
3. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, 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. 49: Identifying Mark On Cam Chain**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

This illustration shows K20Z2.

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.

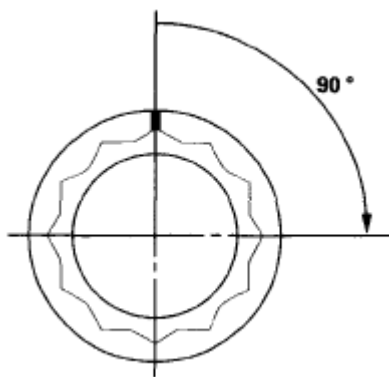


**Fig. 50: Pushing Down On Ring Compressor**

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 **ROD BEARING CLEARANCE INSPECTION** ).
8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION** ).
9. Install the rod caps with bearings. Torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) (K20Z2) or 29 N.m (3.0 kgf.m, 22 lbf.ft) (K20Z3).
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.



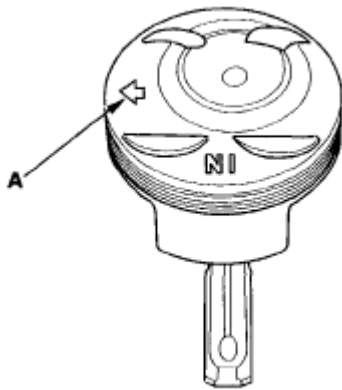
**Fig. 51: Identifying Connecting Rod Bolts Angle**

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.

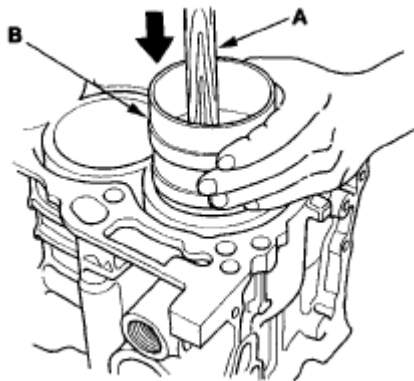
2. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
3. Position the mark (A) to face the cam chain side of the engine.



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

This illustration shows K20Z2.

4. 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.

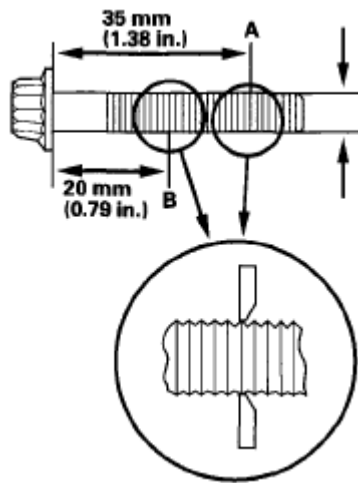


**Fig. 53: Pushing Down On Ring Compressor**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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**

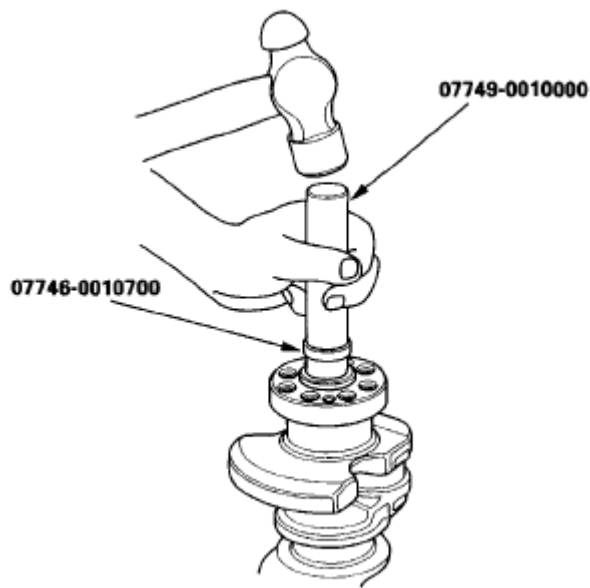
**Specification: 0-0.1 mm (0-0.004 in.)**

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

## CRANKSHAFT INSTALLATION

### Special Tools Required

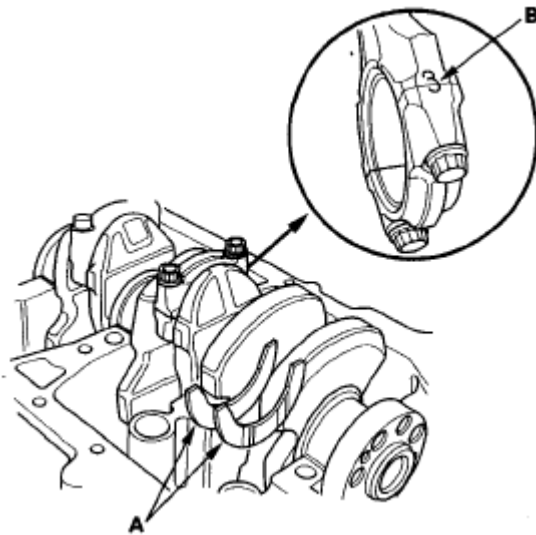
- Driver 07749-0010000
  - Attachment, 24 x 26 mm 07746-0010700
  - Oil seal driver attachment, 96 mm 07ZAD-PNAA100
1. With a manual transmission, install the crankshaft end bushing when replacing the crankshaft. Using the special tools, drive in the crankshaft end bushing until the special tools bottom against the crankshaft.



**Fig. 55: Installing Crankshaft End Bushing**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check the connecting rod bearing clearance with plastigage (see **ROD BEARING CLEARANCE INSPECTION** ).
3. Check the main bearing clearance with plastigage (see **MAIN BEARING CLEARANCE INSPECTION** ).
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 that rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the engine block.
7. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the No. 4 journal of the engine block.

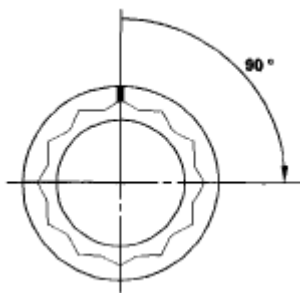


**Fig. 56: Identifying Thrust Washers**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION** ).
9. Apply engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and cap, then install the caps and bolts finger-tight.
11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and cap, then install the caps and bolts finger-tight.
12. Tighten the connecting rod bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) (K20Z2) or 29 N.m (3.0 kgf.m, 22 lbf.ft) (K20Z3).
13. Tighten the connecting rod bolts an additional 90°

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



**Fig. 57: Identifying Connecting Rod Bolts Angle**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

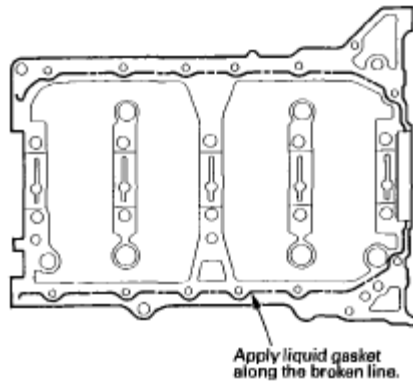
14. Remove all of the old liquid gasket from the lower block mating surfaces, bolts, and bolt holes.



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

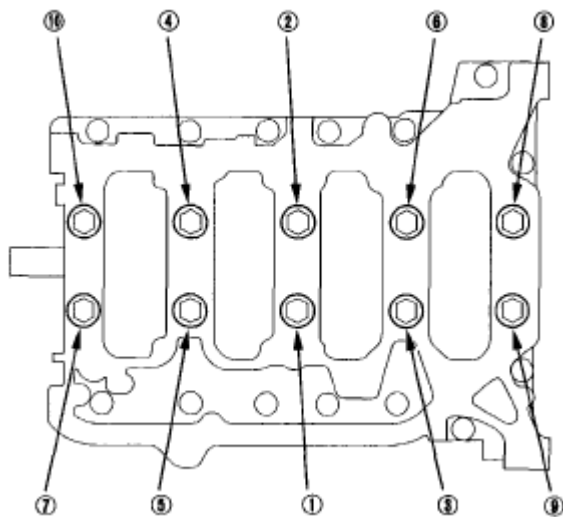
**NOTE:**

- If you apply liquid gasket P/N 08718-0012, the component must be install 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. 58: Applying Liquid Gasket To Engine Block Mating Surface Of Lower Block**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

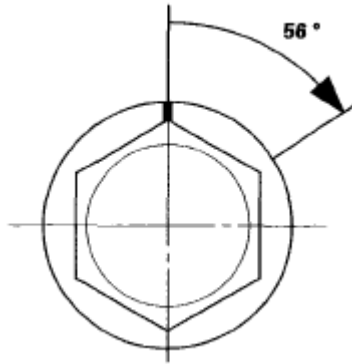
17. Put the lower block on the engine block.
18. Apply new engine oil to the threads of the bearing cap bolts.
19. Tighten the bearing cap bolts, in sequence, to 29 N.m (3.0 kgf.m, 22 lbf.ft).



**Fig. 59: Identifying Bearing Cap Bolts Tightening Sequence**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

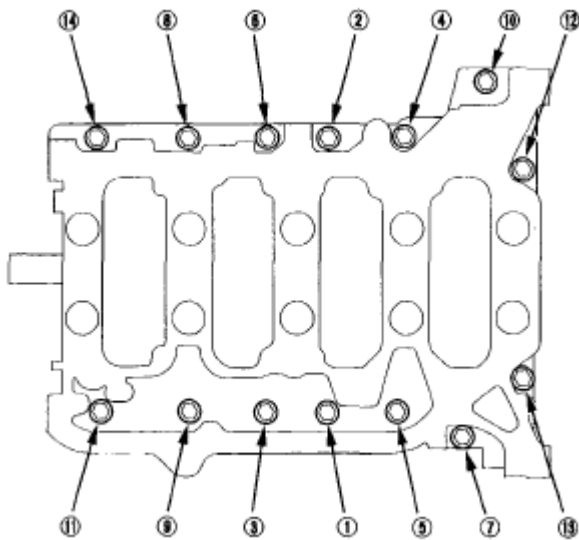
20. Tighten the bearing cap bolts an additional  $56^{\circ}$ .



**Fig. 60: Identifying Bearing Cap Bolts Angle**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

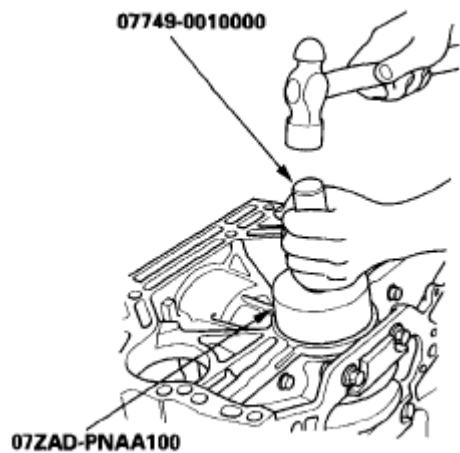
21. Tighten the 8 mm bolts, in sequence, to 22 N.m (2.2 kgf.m, 16 lbf.ft).



**Fig. 61: Identifying Bearing Cap Bolts Tightening Sequence**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

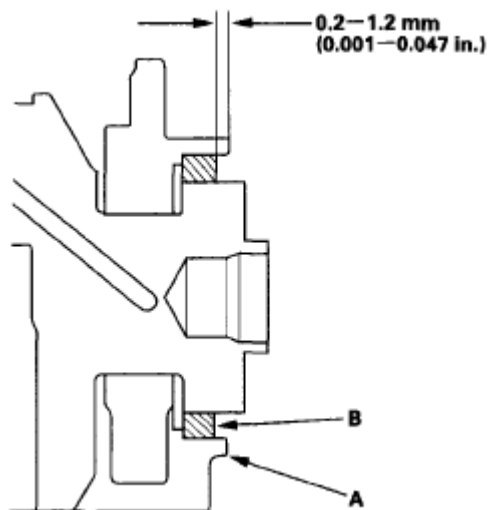
22. Use the special tools to drive a new oil seal squarely into the engine block to the specified installed height.



**Fig. 62: Driving Oil Seal Squarely Into Engine Block**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

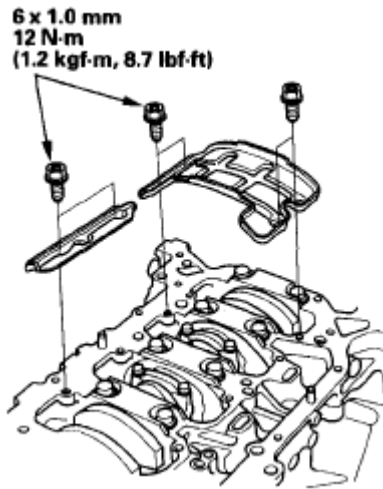
23. Measure the distance between the engine block (A) and oil seal (B).

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



**Fig. 63: Identifying Oil Seal Installed Height**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the baffle plates.



**Fig. 64: Identifying Baffle Plates With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Install the oil pump (see [OIL PUMP INSTALLATION](#) ).
26. Install the oil pan (see [OIL PAN INSTALLATION](#) ).
27. Install the cylinder head (see [CYLINDER HEAD INSTALLATION](#) ).
28. M/T model: Install the flywheel (see [FLYWHEEL INSPECTION](#) ), clutch disc (see [CLUTCH DISC AND PRESSURE PLATE INSTALLATION](#) ), and pressure plate (see [CLUTCH DISC AND PRESSURE PLATE INSTALLATION](#) ).
29. A/T model: Install the drive plate (see [DRIVE PLATE REMOVAL AND INSTALLATION](#) ).
30. Install the transmission:
  - Manual transmission (see [TRANSMISSION INSTALLATION](#) )
  - Automatic transmission (see [TRANSMISSION INSTALLATION](#) )
31. 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 to running it for about 15 minutes.

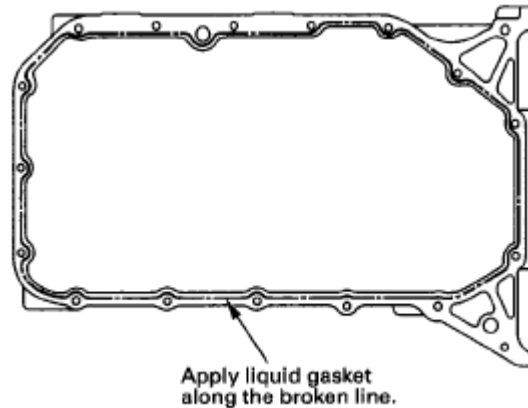
## OIL PAN INSTALLATION

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 lower engine block mating surface. 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 install 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.



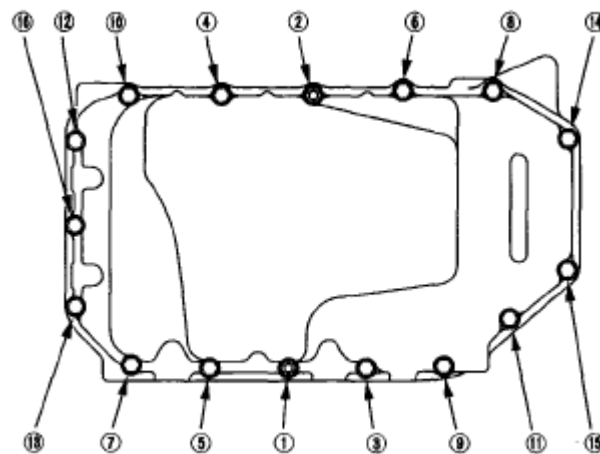
**Fig. 65: Applying Liquid Gasket To Lower Engine Block Mating Surface**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan.
5. Tighten the bolts in two or three steps. In the final step, tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 lbf.ft). Wipe off the excess liquid gasket on the each side of crankshaft pulley and flywheel/drive plate.

**NOTE:**

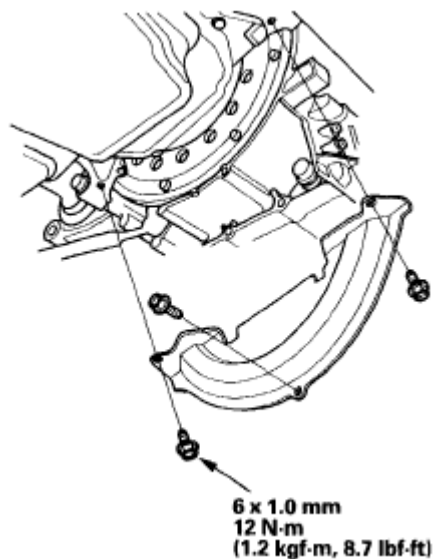
- Wait at least 30 minutes to allow liquid gasket to cure before filling the engine with oil.
- Do not run the engine for at least 3 hours to allow liquid gasket to cure after installing the oil pan.



**Fig. 66: Identifying Oil Pan Bolts Tightening Sequence**

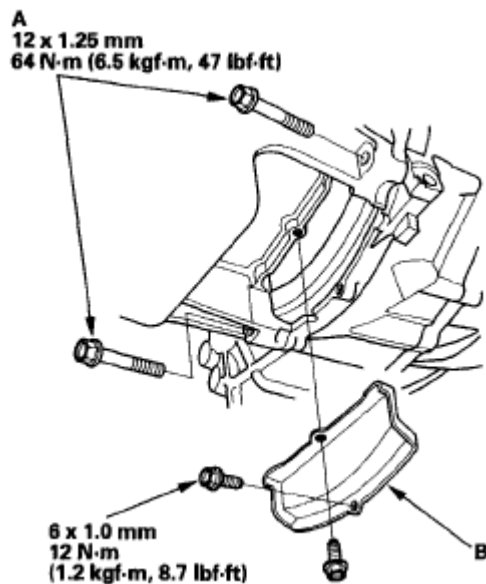
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. K20Z2: Install the torque converter cover/clutch cover.



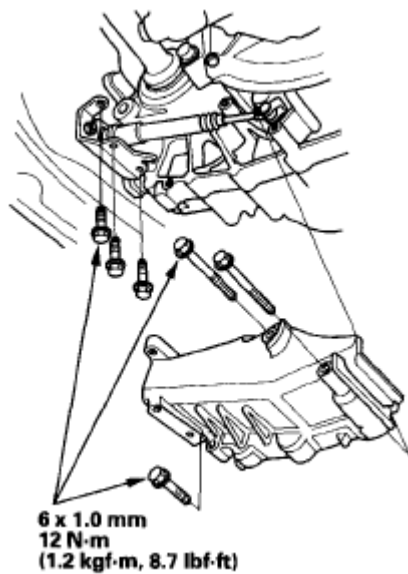
**Fig. 67: Identifying Torque Converter Cover/Clutch Cover With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. K20Z3: Install the transmission mounting bolts (A) and clutch cover (B).



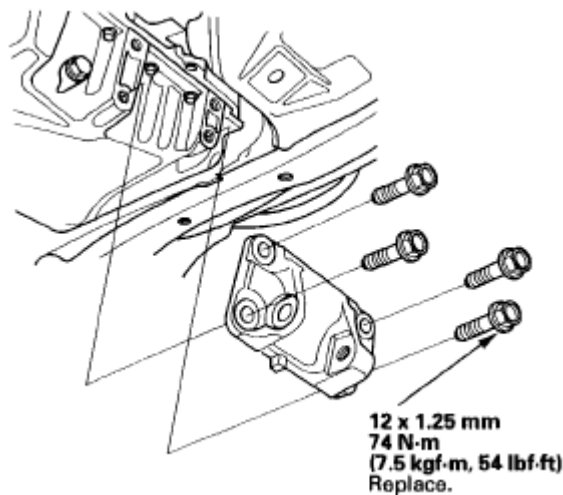
**Fig. 68: Identifying Transmission Mounting Bolts And Clutch Cover With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. A/T model: Install the shift cable cover.



**Fig. 69: Identifying Shift Cable Cover With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the lower torque rod bracket.

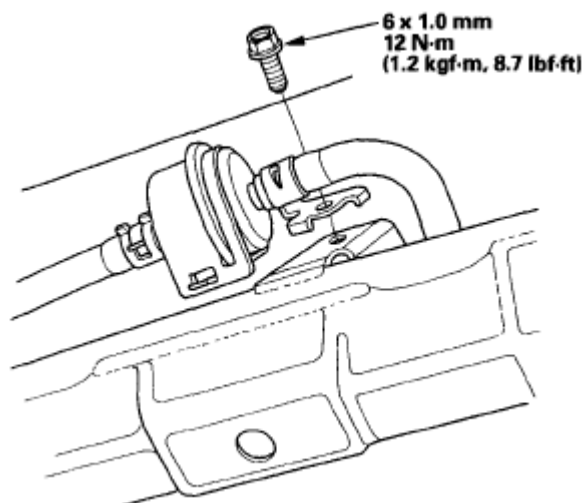


**Fig. 70: Identifying Lower Torque Rod Bracket With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. If the engine is still in the vehicle, do the following steps.
11. Support the front subframe with the front subframe adapter and a jack, and lift it up to the body.
12. Loosely install the new front subframe mounting bolts (see step 17 on ENGINE INSTALLATION ).
13. Align all reference marks on the front subframe with the body, then tighten the bolts on the front subframe to the specified torque (see step 18 on ENGINE INSTALLATION ).
14. Remove the jack and front subframe adapter.
15. Tighten the new mid-stiffener mounting bolts on both sides (see step 20 on ENGINE

**INSTALLATION** ).

16. Lower the vehicle on the lift.
17. Loosen the upper torque rod mounting bolt (see step 5 on **ENGINE INSTALLATION** ).
18. Raise the vehicle on the lift.
19. Install the lower torque rod, then tighten the new lower torque rod mounting bolts in the numbered sequence shown (see step 21 on **ENGINE INSTALLATION** ).
20. M/T model: Loosely tighten the new front mount mounting bolt (see step 22 on **ENGINE INSTALLATION** ).
21. Lower the vehicle on the lift.
22. Tighten the upper torque rod mounting bolt (see step 25 on **ENGINE INSTALLATION** ).
23. Raise the vehicle on the lift to full height.
24. M/T model: Tighten the front mount mounting bolt (see step 27 on **ENGINE INSTALLATION** ).
25. A/T model: Remove the bolt securing the automatic transmission fluid (ATF) filter.



**Fig. 71: Identifying Automatic Transmission Fluid (ATF) Filter Bolt With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

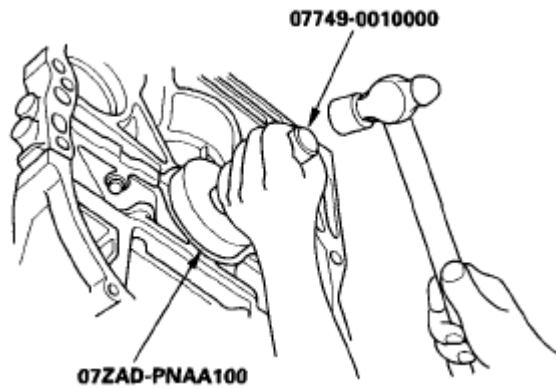
26. Install the stiffener, then tighten the steering gearbox mounting bolt and stiffener mounting bolt. Install the harness clamp from the front subframe (see step 29 on **ENGINE INSTALLATION** ).
27. Install the steering gearbox bracket. Install the stiffener, then tighten the steering gearbox mounting bolt and stiffener mounting bolt (see step 31 on **ENGINE INSTALLATION** ).
28. Connect the lower arms to the knuckles (see **KNUCKLE/HUB/WHEEL BEARING REPLACEMENT** ).
29. Connect the stabilizer links (see **STABILIZER LINK REMOVAL/INSTALLATION** ).
30. Install the splash shield (see step 40 on **ENGINE INSTALLATION** ).

## TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

### Special Tools Required



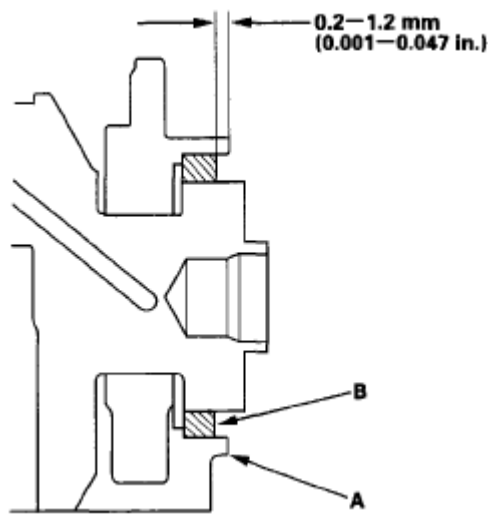
- Driver 07749-0010000
  - Oil seal driver attachment 96 mm 07ZAD-PNAA100
1. Remove the transmission:
    - Manual transmission (see **TRANSMISSION REMOVAL** )
    - Automatic transmission (see **TRANSMISSION REMOVAL** )
  2. M/T model: Remove the pressure plate (see **CLUTCH REPLACEMENT** ), clutch disc (see **CLUTCH REPLACEMENT** ), 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. Use the special tools to drive a new oil seal squarely into the engine block to the specified installed height.



**Fig. 72: Driving Oil Seal Squarely Into Engine Block**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. 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.

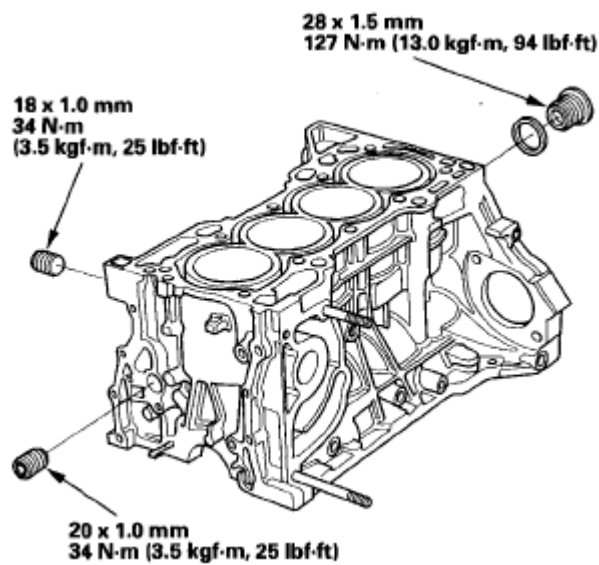
7. M/T model: Install the flywheel (see **FLYWHEEL REPLACEMENT** ), clutch disc (see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION** ), and pressure plate (see **CLUTCH DISC AND PRESSURE PLATE INSTALLATION** ).
8. A/T model: Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION** ).
9.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

## SEALING BOLT INSTALLATION

### NOTE:

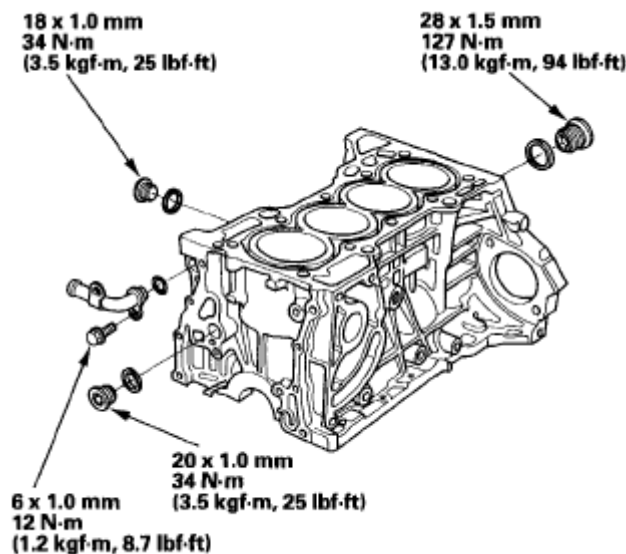
- When installing the sealing bolt, always use a new washer.
- When installing the joint pipe, always use a new O-ring.

K20Z2



**Fig. 74: Identifying Sealing Bolt, Washer And O-Ring (K20Z2) With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

### K20Z3



**Fig. 75: Identifying Sealing Bolt, Washer And O-Ring (K20Z3) With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.