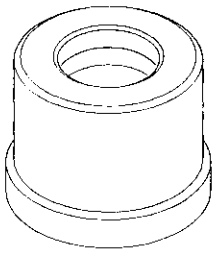
Engine Mechanical

Engine Block

Engine Block

Special Tools

Ref.No.	Tool Number	Description	Qty
①	07746-0010700	Attachment, 24 x 26 mm	1
②	07749-0010000	Driver Handle, 15 x 135L	1
③	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1



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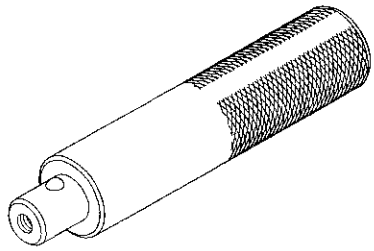

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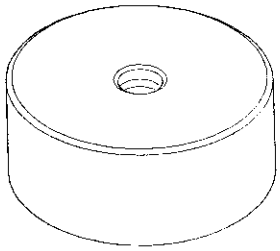
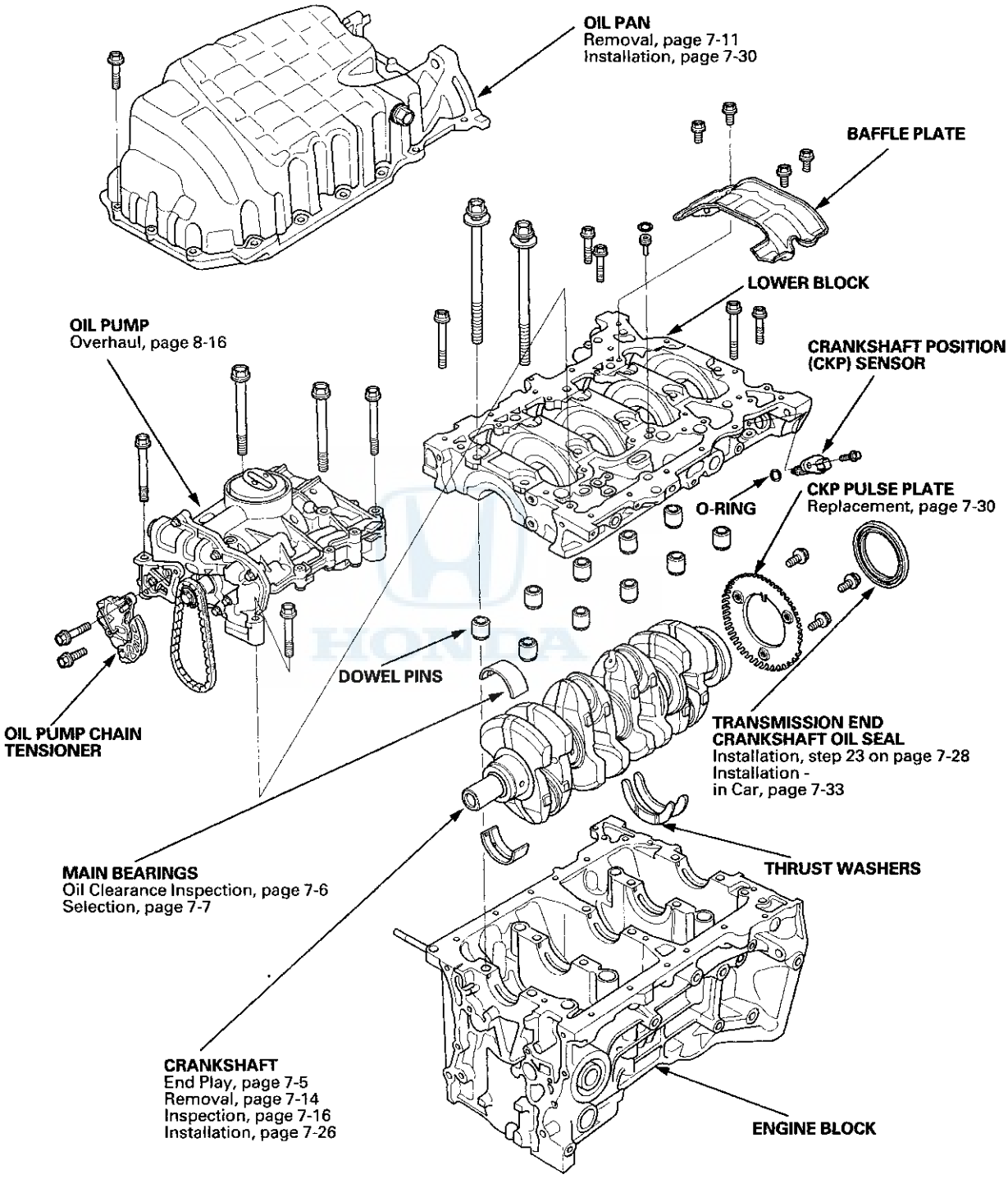


③

Component Location Index



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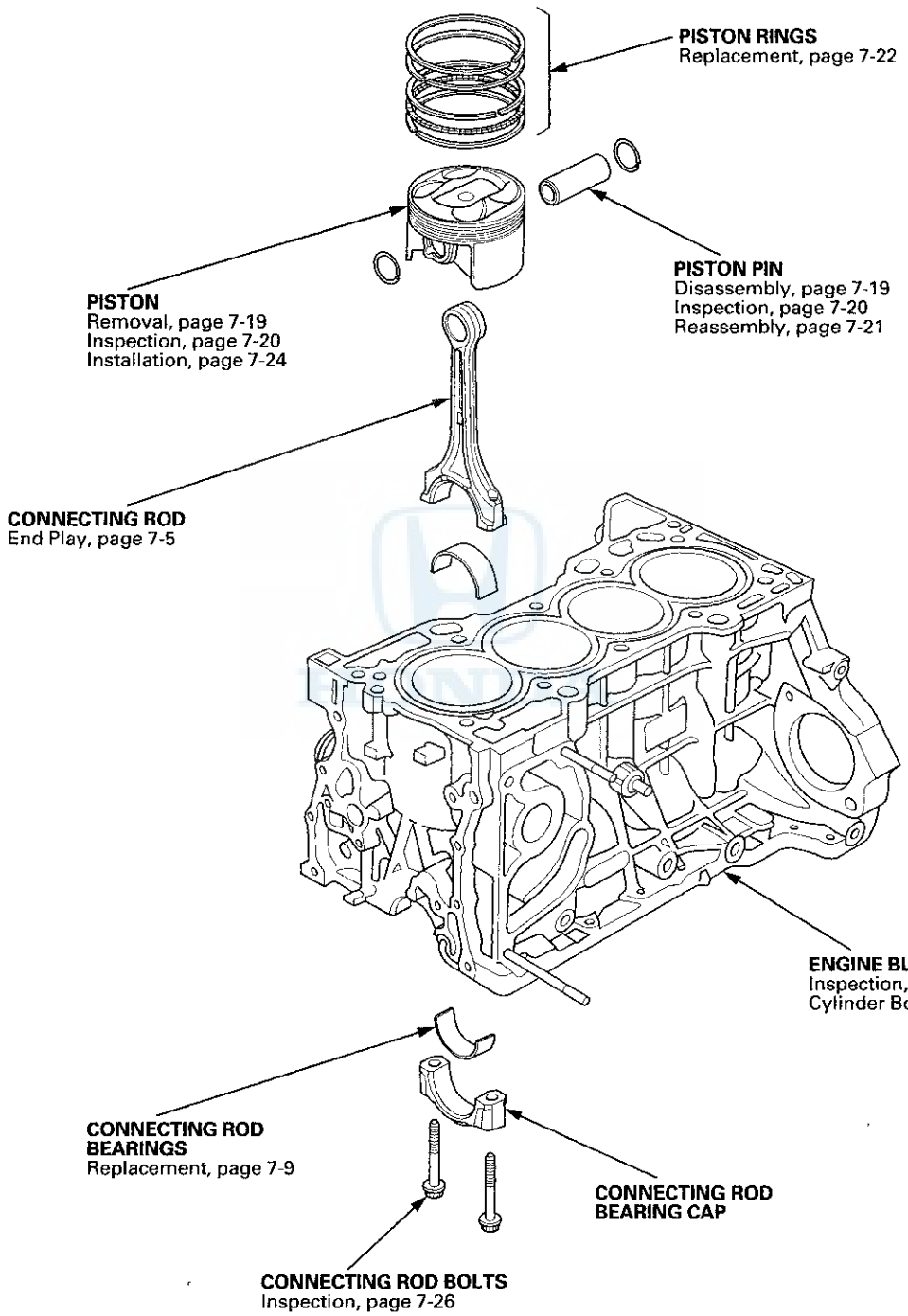
Component Location Index (cont'd)



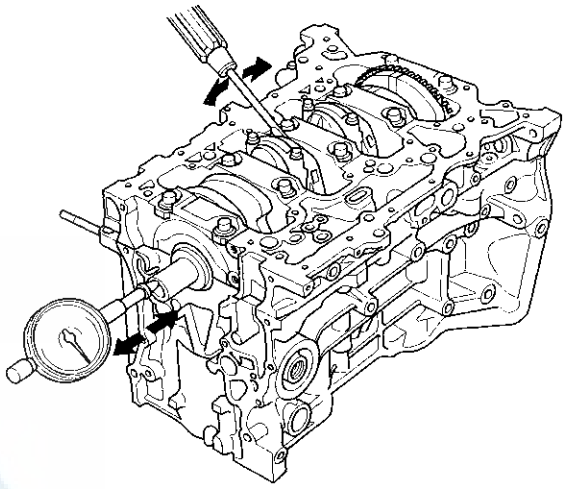
Connecting Rod and Crankshaft End Play Inspection

1. Remove the oil pump (see page 8-16).
2. Remove the baffle plate (see step 8 on page 7-14).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and the 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)

4. If the connecting rod end play is beyond the service limit, install a new connecting rod, and recheck. If it is still beyond the service limit, replace the crankshaft (see page 7-14).
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)



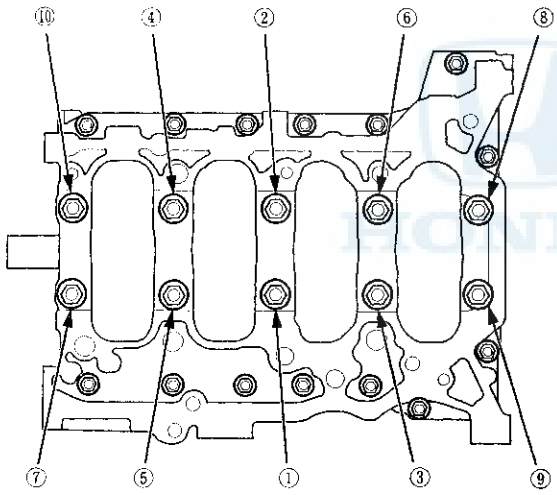
6. If the end play is beyond the service limit, replace the thrust washers and recheck, if it is still beyond the service limit, replace the crankshaft (see page 7-14).

Crankshaft Main Bearing Replacement

Main Bearing Clearance Inspection

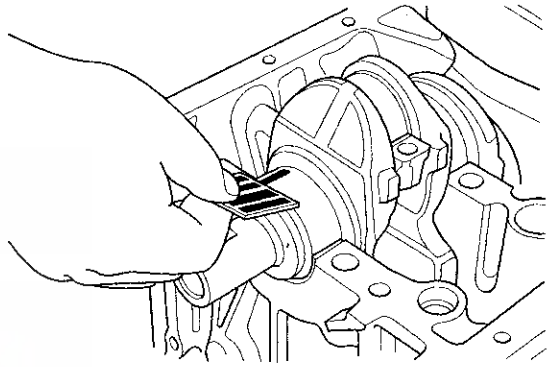
1. To check the main bearing-to-journal oil clearance, remove the lower block and the bearing halves (see page 7-14).
2. Clean each main journal and the bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and the lower block, then torque the bolts to 29 N·m (3.0 kgf·m, 22 lbf·ft).

   NOTE:
   - Apply new engine oil to the bolt threads and flanges.
   - Do not rotate the crankshaft during inspection.



5. Tighten the bearing cap bolts an additional 48 °.
6. Remove the lower block and the 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)**



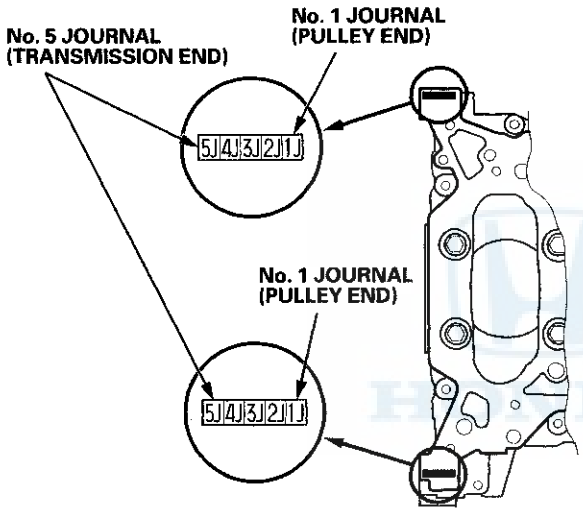
7. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the appropriate color code(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
8. If the plastigage 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

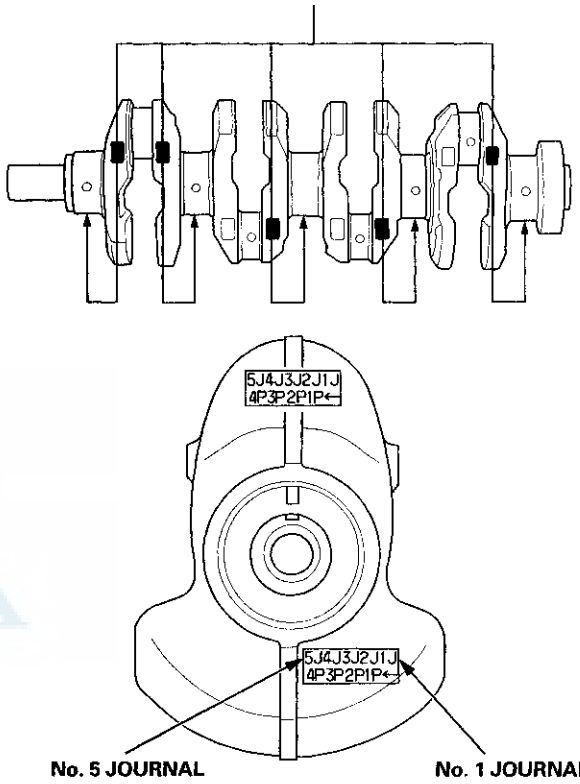
1. Numbers, letters, or bars have been stamped on the end of the lower block as a code for the size of each of the five main journal bores. Write down the crank bore codes.

   If you cannot 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.



Main Journal Code Location

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



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Crankshaft Main Bearing Replacement (cont'd)

3. Use the crank bore codes and the 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.

K24Z2 engine

Main joinal code	Crank bore code: 1 or A or I	2 or B or II	3 or C or III	4 or D or IIII
	Larger block bore →			
	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) ↓			

K24Z3 engine

Main joinal code	Crank bore code: 1 or A or I	2 or B or II	3 or C or III	4 or D or IIII
	Larger block bore →			
	Smaller bearing (Thicker) →			
1	Red	Red/ Pink	Pink	Yellow
2	Red/ Pink	Pink	Yellow	Yellow/ Green
3	Pink	Yellow	Yellow/ Green	Green
4	Yellow	Yellow/ Green	Green	Brown
5	Yellow/ Green	Green	Brown	Brown/ Black
6	Green	Brown	Brown/ Black	Black
Smaller main journal ↓	Smaller bearing (Thicker) ↓			

Connecting Rod Bearing Replacement

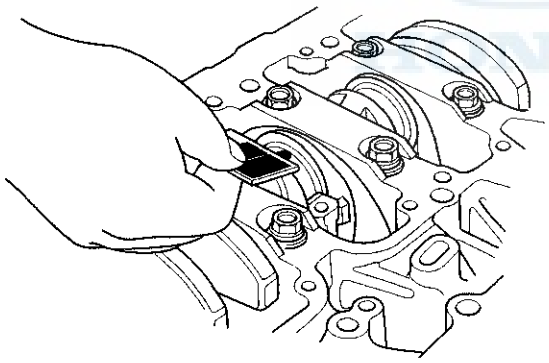
Connecting Rod Bearing Clearance Inspection

1. Remove the oil pump (see page 8-17).
2. Remove the baffle plate (see step 8 on page 7-14).
3. Remove the connecting rod cap and the bearing half.
4. Clean the crankshaft rod journal and the bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and the cap, and torque the bolts to 41 N·m (4.2 kgf·m, 30 lbf·ft) +120 °.

   NOTE:
   - Apply new engine oil to the bolt threads and flanges.
   - Do not rotate the crankshaft during inspection.
7. Remove the rod cap and the bearing half, and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New):	**0.032–0.066 mm (0.0013–0.0026 in)**
Service Limit:	**0.077 mm (0.0030 in)**



8. If the plastigage measures too wide or too narrow, remove the cap, and the upper half of the bearing, install a new, complete bearing with the appropriate color code(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
9. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below the current one), and check clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearing, replace the crankshaft and start over.

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Connecting Rod Bearing Replacement (cont'd)

Connecting Rod Bearing Selection

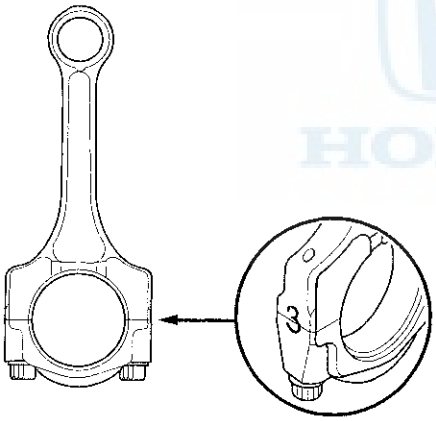
1. Inspect each connecting rod for cracks and heat damage.

Connecting Rod Big End Bore Code Locations

2. Each connecting 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.)

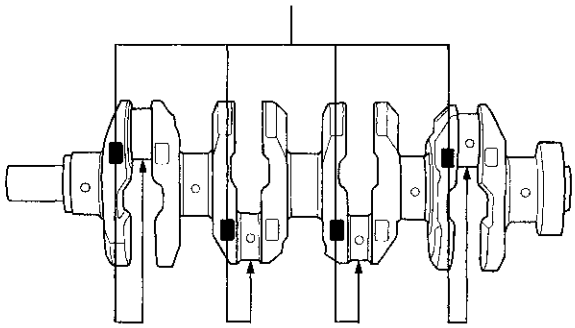
   If you cannot read the code because of an accumulation of oil and varnish, do not scrub it with a wire brush or scraper. Clean it only with solvent or detergent.

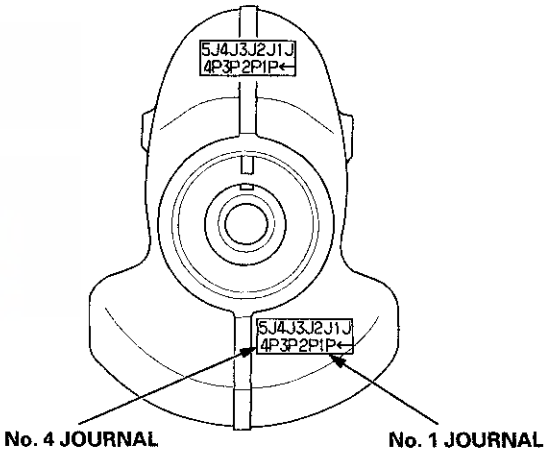
   Large-end Bore Size: 51.0 mm (2.01 in)



Connecting Rod Journal Code Location

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





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

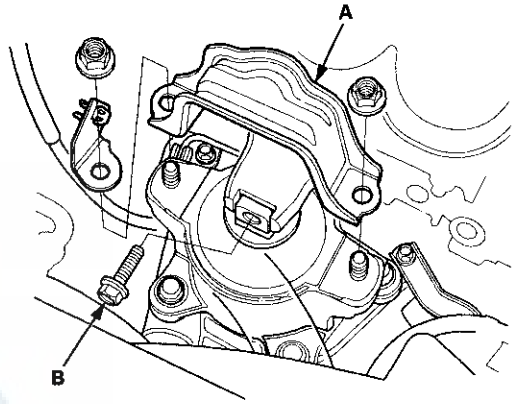
   NOTE:
   - The color code is on the edge of the bearing.
   - When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

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

Smaller rod journal

Smaller bearing (Thicker)

1. If the engine is already out of the vehicle, go to step 19.
2. Remove the strut brace (if equipped) (see page 20-306).
3. Do the battery removal procedure (see page 22-92).
4. Remove the air cleaner assembly (see page 11-332).
5. Remove the harness clamps, then remove the battery base (see step 8 on page 5-3).
6. Remove the front engine mount stop (A), then remove the front engine mount bolt (B).



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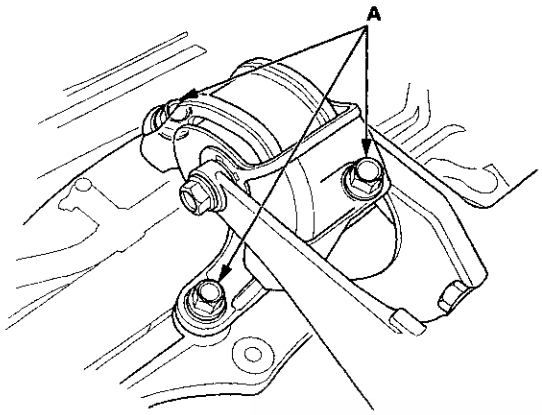
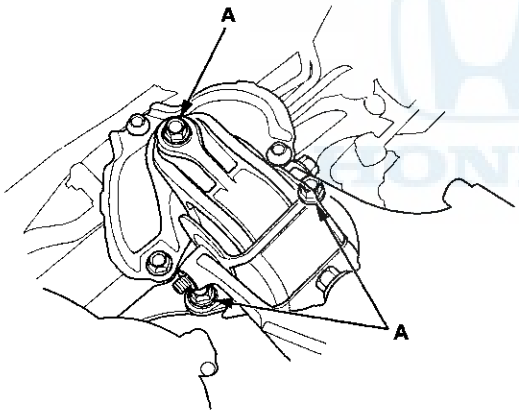
Oil Pan Removal (cont'd)

7. Loosen the rear engine mount mounting bolts (A).

M/T model

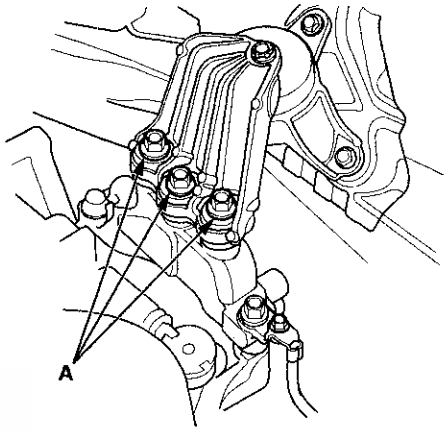


A/T model

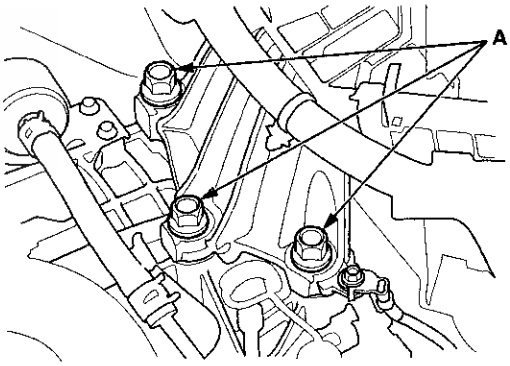


8. Loosen the upper transmission mount bracket mounting bolts (A).

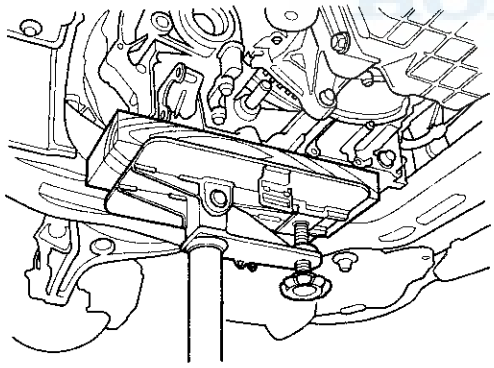
M/T model



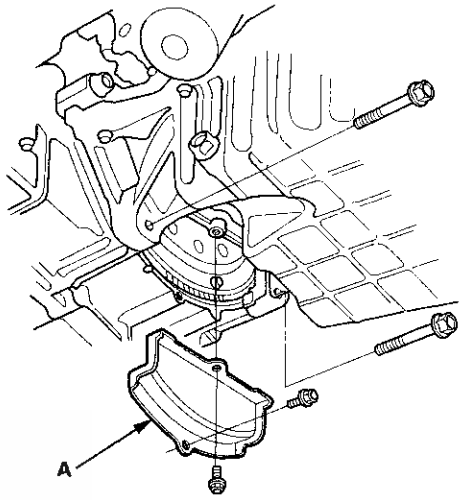
A/T model



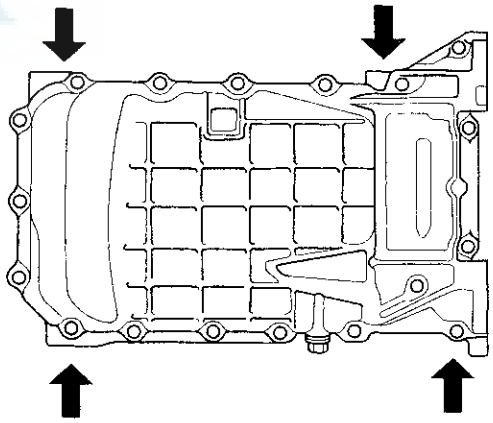
9. Raise the vehicle on the lift.
10. Remove the left front wheel.
11. Remove the splash shield (see step 25 on page 5-5).
12. Drain the engine oil (see page 8-11).
13. Separate the left side knuckle from the lower arm (see step 5 on page 18-21).
14. Remove the left side damper fork (see step 3 on page 18-21).
15. Remove the left side driveshaft (see page 16-4). Coat all precision-finished surface with new engine oil. Tie a plastic bag over the driveshaft end.
16. Remove the nuts securing the lower transmission mount (see step 49 on page 5-9).
17. A/T model: Remove the shift cable bracket.
    - Vlehicles with JHM VINs (see step 46 on page 14-200).
    - Vehicles with 1HG VINs (see step 48 on page 14-200).
18. Use a transmission jack to lift the transmission 30—40 mm (1.2—1.6 in).



19. Remove the clutch/torque converter cover (A), and remove the two bolts securing the transmission.



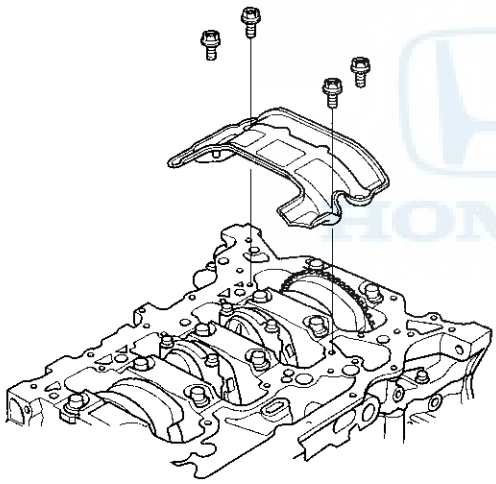
20. Remove the bolts securing the oil pan.
21. Using a flat blade screwdriver, separate the oil pan from the engine block in the places shown.



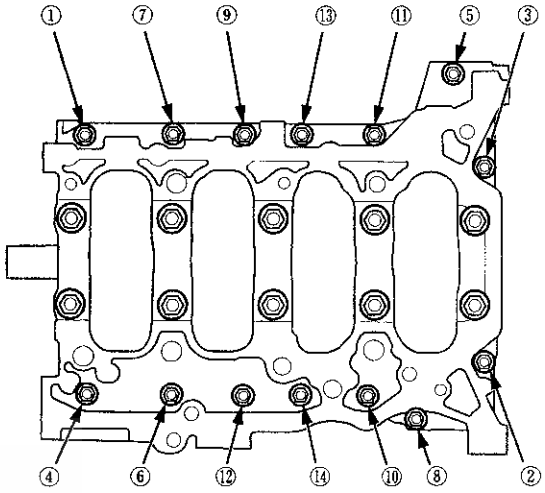
22. Remove the oil pan.

Crankshaft and Piston Removal

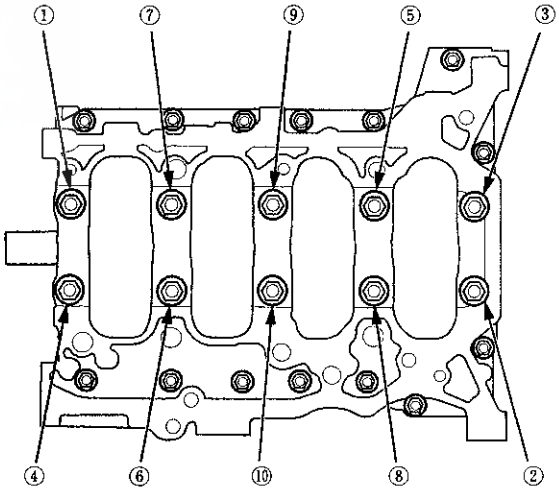
1. Remove the engine/transmission (see page 5-3).
2. Remove the transmission:
   - Manual transmission (see page 13-7)
   - Automatic transmission (see page 14-194)
3. M/T model: Remove the flywheel (see step 17 on page 12-18).
4. A/T model: Remove the drive plate (see page 14-204).
5. Remove the oil pan (see page 7-11).
6. Remove the oil pump (see page 8-17).
7. Remove the cylinder head:
   - All models except PZEV (see page 6-27)
   - PZEV model (see page 6-76)
8. Remove the baffle plate.



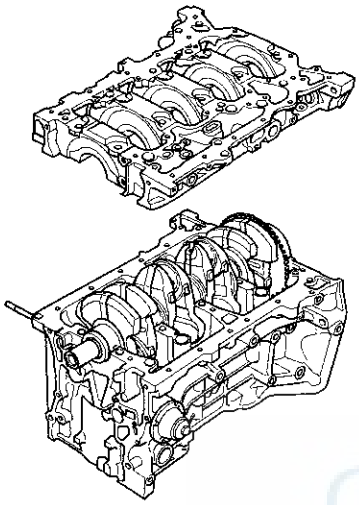
9. Remove the 8 mm bolts.



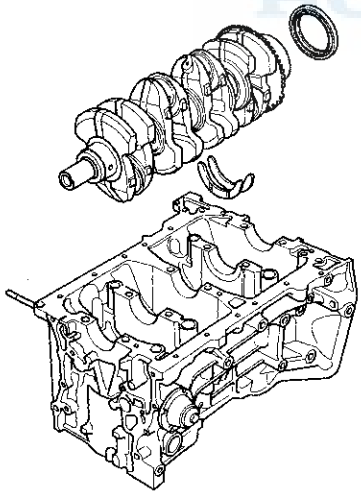
10. Remove the bearing cap bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



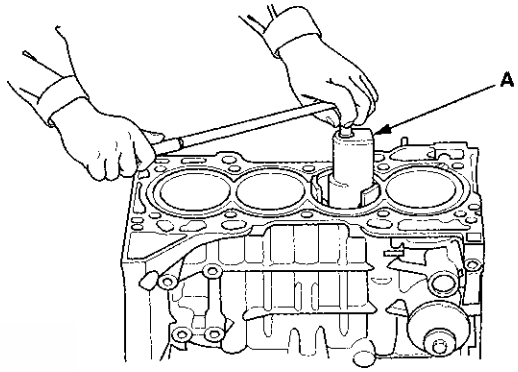
11. Remove the lower block and the bearings. Keep all the bearings in order.



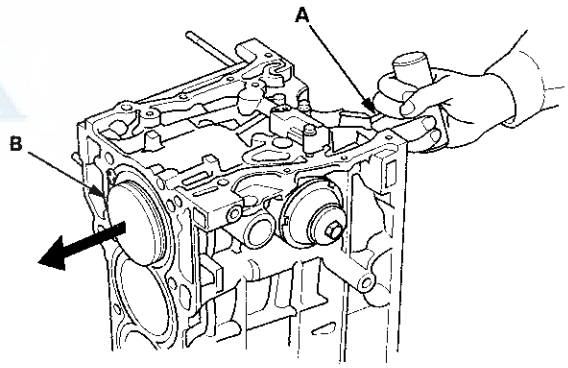
12. Remove the rod caps/bearings. Keep all the caps/bearings in order.
13. Lift the crankshaft out of the engine. Be careful not to damage the journals and the CKP pulse plate.



14. Remove the CKP pulse plate from the crankshaft (see page 7-30).
15. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
16. 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.



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



18. Reinstall the lower block and the bearings on the engine block in the proper order.
19. Reinstall the connecting rod bearings and the caps after removing each piston/connecting rod assembly.
20. Mark each piston/connecting rod assembly with its cylinder number to make sure they are reinstalled in the original order.

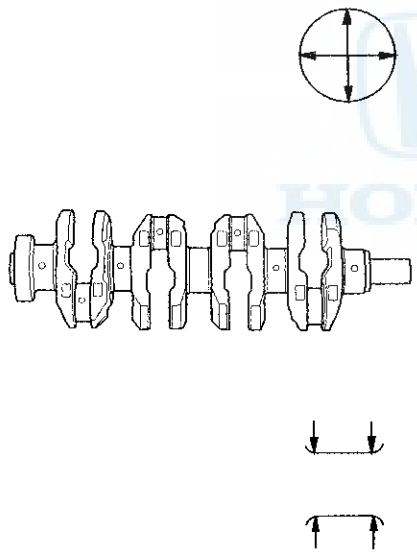
    NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

Crankshaft Inspection

Out-of-Round and Taper

1. Remove the crankshaft from the engine block (see page 7-14).
2. Remove the crankshaft position (CKP) pulse plate from the crankshaft (see page 7-30).
3. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
4. Clean the keyway and threads, and check for damage.
5. Measure the out-of-round at the middle of each rod and the 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)



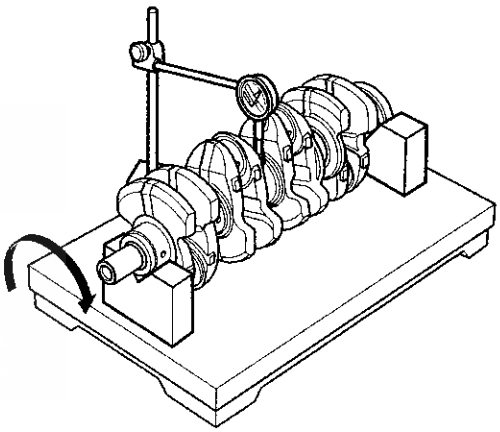
6. Measure the taper at the edges of each rod and the main journal. The difference between measurements on each journal must not be more than the service limit.

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

Straightness

7. Place the V-blocks on a flat surface.
8. Check the total runout with the crankshaft supported on V-blocks.
9. Measure the 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 (0.001 in) max.
   Service Limit: 0.04 mm (0.002 in)



Block and Piston Inspection

1. Remove the crankshaft and the pistons (see page 7-14).
2. Check the piston for distortion or cracks.
3. Measure the piston diameter at a point 13 mm (0.5 in) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the engine block as the cylinder bore sizes.

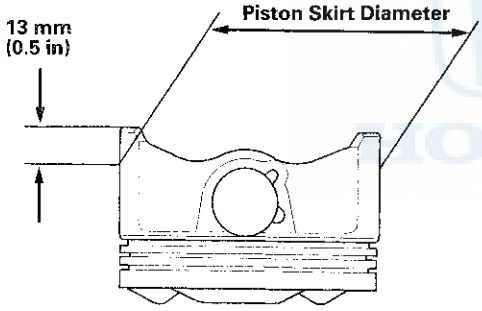
Piston Skirt Diameter
Standard (New):

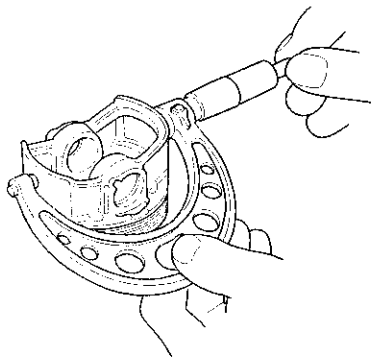
No Letter (or A):	**86.980—86.990 mm (3.4244—3.4248 in)**
B:	**86.970—86.980 mm (3.4240—3.4244 in)**

Service Limit:

No Letter (or A):	**86.930 mm (3.4224 in)**
B:	**86.920 mm (3.4220 in)**

Oversize Piston Skirt Diameter
0.25: 87.230—87.240 mm (3.4342—3.4346 in)





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.

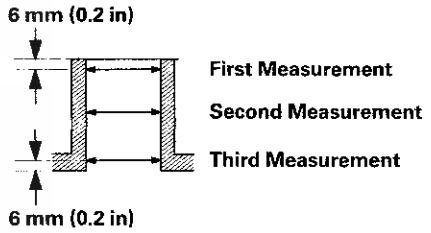
Cylinder Bore Size
Standard (New):

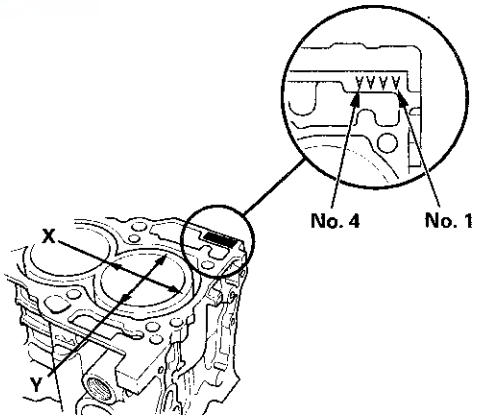
A or I:	**87.010—87.020 mm (3.4256—3.4260 in)**
B or II:	**87.000—87.010 mm (3.4252—3.4256 in)**
Service Limit:	**87.070 mm (3.4279 in)**

Oversize Bore
0.25: 87.250—87.260 mm (3.4350—3.4354 in)

Reboring Limit: 0.25 mm (0.010 in) max.

Bore Taper
Limit (Difference between first and third measurement): 0.02 mm (0.001 in)



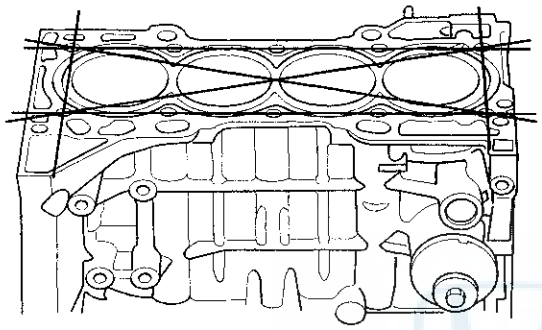


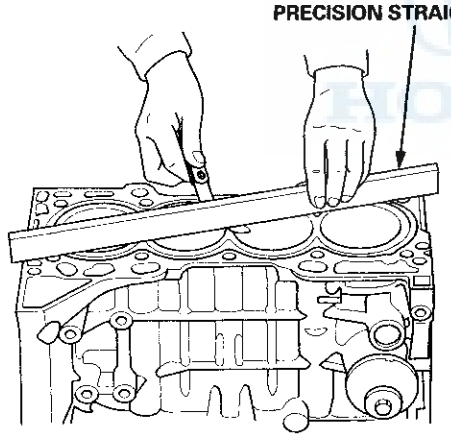
(cont'd)

Block and Piston Inspection (cont'd)

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.

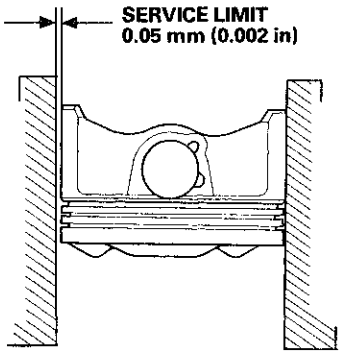
Engine Block Warpage
Standard (New): 0.07 mm (0.003 in) max.
Service Limit: 0.10 mm (0.004 in)





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 the 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)



Cylinder Bore Honing

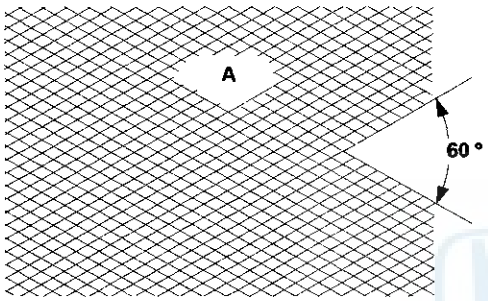
Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see page 7-17).

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

2. Remove the oil jets (see page 8-14).

3. 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.



4. 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.

5. 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.

6. Install the oil jets (see page 8-14).

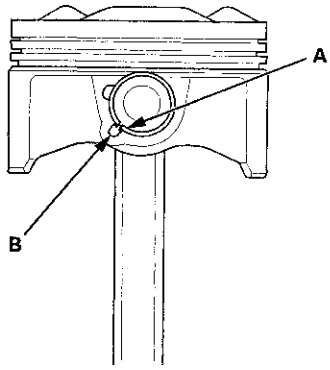
Piston, Pin, and Connecting Rod Replacement

Disassembly

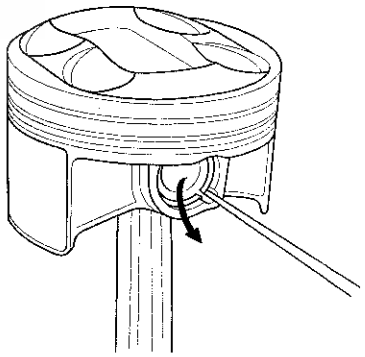
1. Remove the piston from the engine block (see page 7-14).

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.



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



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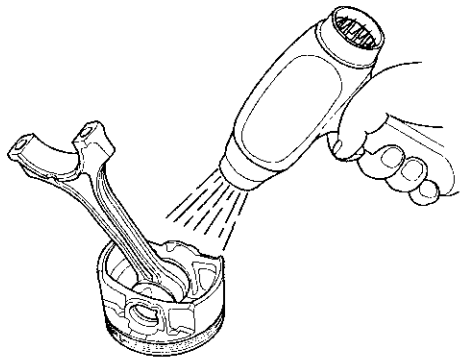
Piston, Pin, and Connecting Rod Replacement (cont'd)

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



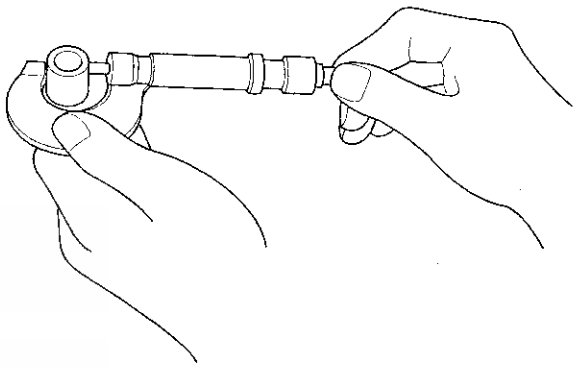
Inspection

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

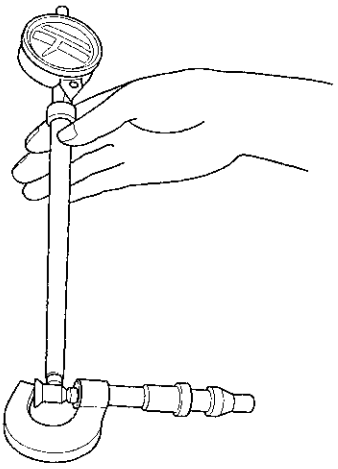
1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New):	**21.961—21.965 mm (0.8646—0.8648 in)**
Service Limit:	**21.953 mm (0.8643 in)**

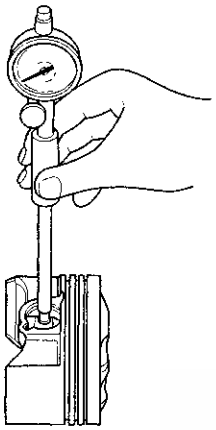


2. Zero the dial indicator to the piston pin diameter.



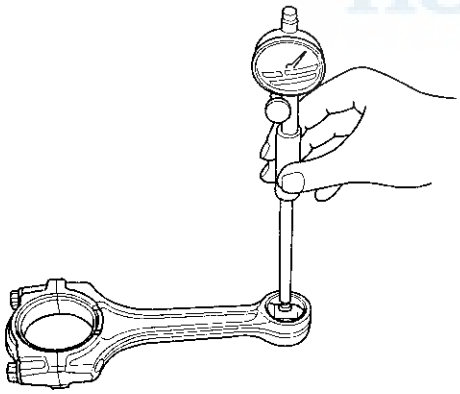
3. Check the difference between the piston pin diameter and the piston pin hole diameter in the piston.

Piston Pin-to-Piston Clearance
Standard (New): -0.005—0.002 mm (-0.0002—0.0001 in)
Service Limit: 0.005 mm (0.0002 in)



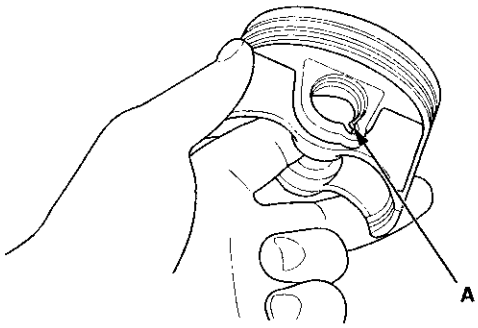
4. Measure the piston pin-to-connecting rod clearance.

Piston Pin-to-Connecting Rod Clearance
Standard (New): 0.005—0.015 mm (0.0002—0.0006 in)
Service Limit: 0.02 mm (0.001 in)

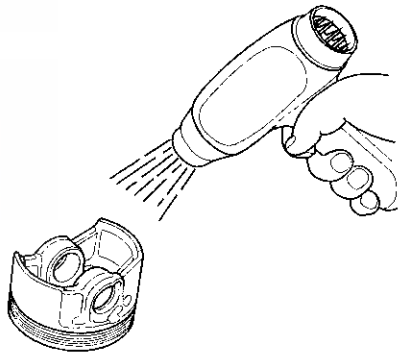


Reassembly

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



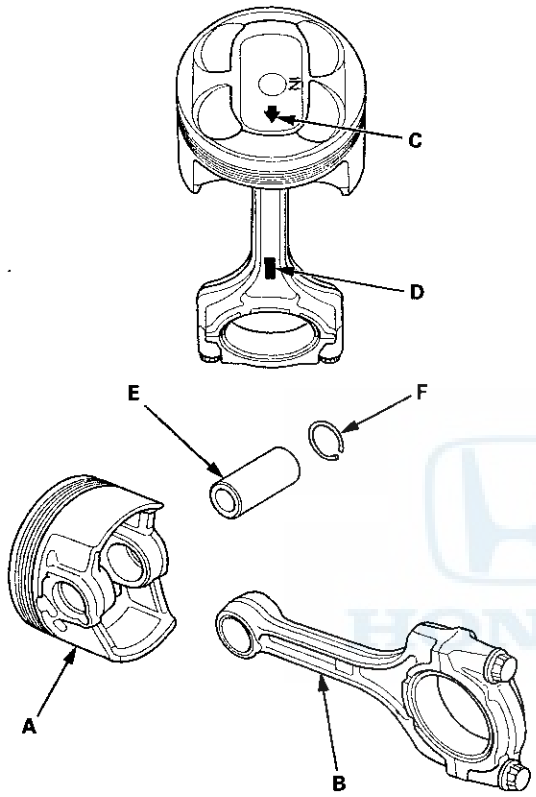
2. Coat the piston pin bore in the piston, the bore in the connecting rod, and the piston pin with new engine oil.
3. Heat the piston to about 158 °F (70 °C).



(cont'd)

Piston, Pin, and Connecting Rod Replacement (cont'd)

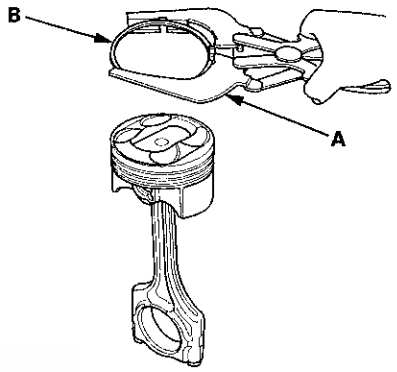
4. Assemble the piston (A) and the connecting rod (B) with the arrow (C) and the embossed mark (D) on the same side. Install the piston pin (E).



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 page 7-14).
2. Using a ring expander (A), remove the old piston rings (B).



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

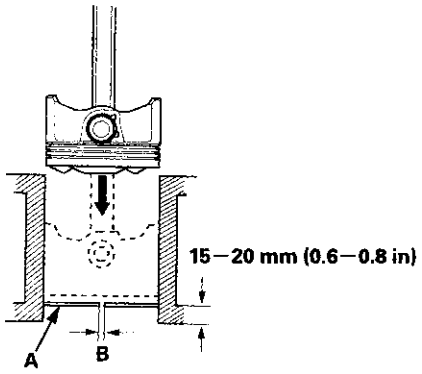
   The top and 2nd ring grooves are 1.2 mm (0.05 in) wide. The oil ring groove is 2.0 mm (0.08 in) wide.

   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 the 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.



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 page 7-17).

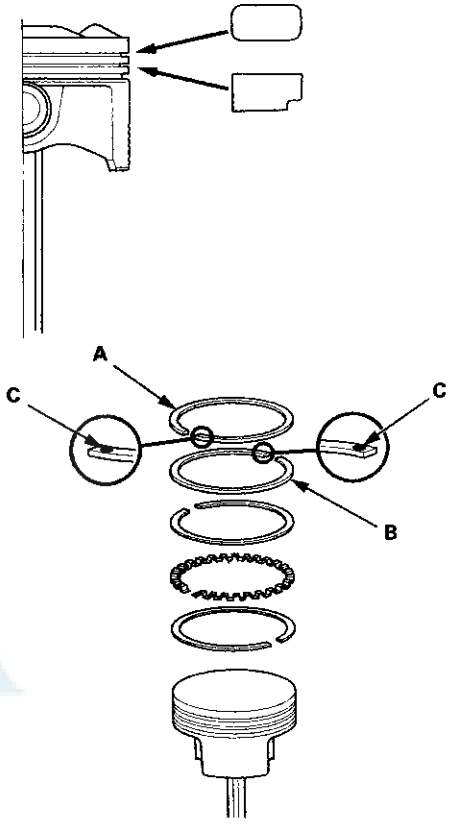
   If the bore is beyond the service limit, the engine block must be rebored.

Piston Ring End-Gap
Top Ring:
Standard (New): 0.20—0.35 mm (0.008—0.014 in)
Service Limit: 0.60 mm (0.024 in)

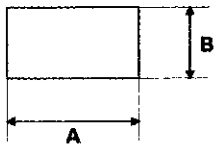
Second Ring:
Standard (New): 0.50—0.65 mm (0.020—0.026 in)
Service Limit: 0.70 mm (0.028 in)

Oil Ring:
Standard (New): 0.20—0.70 mm (0.008—0.028 in)
Service Limit: 0.75 mm (0.030 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 2RN mark. The manufacturing marks (C) must face upward.



Piston Ring Dimensions



Top Ring (Standard):
A: 2.7 mm (0.11 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)

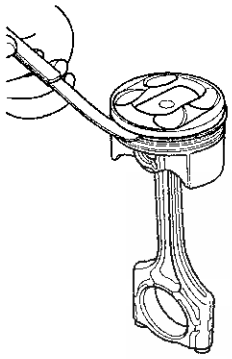
(cont'd)

Piston Ring Replacement (cont'd)

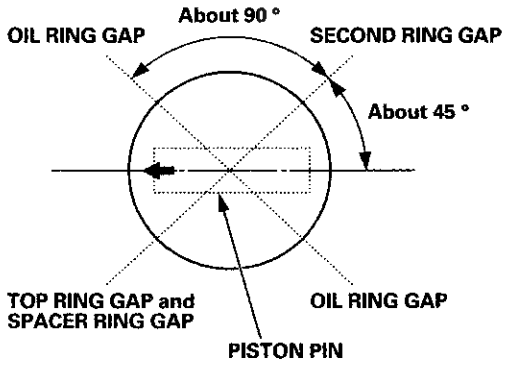
7. After installing a new set of rings, measure the ring-to-groove clearances:

Top Ring Clearance
Standard (New): 0.060—0.085 mm (0.0024—0.0033 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)



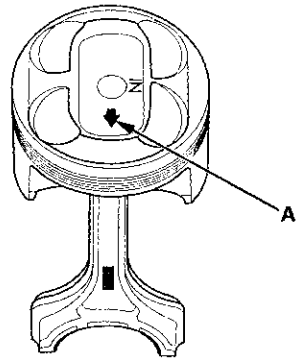
8. Rotate the rings in their grooves to make sure they do not bind.
9. Position the ring end gaps as shown.



Piston Installation

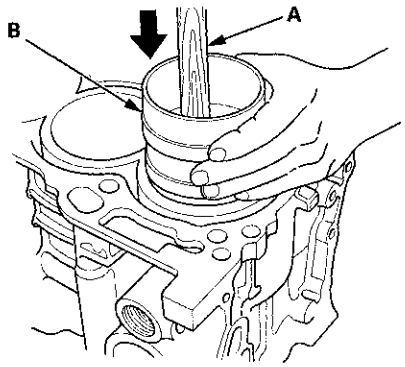
If the Crankshaft is Already Installed

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, and check that the bearing is securely in place.
3. Apply new engine oil to the piston, the 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 block.



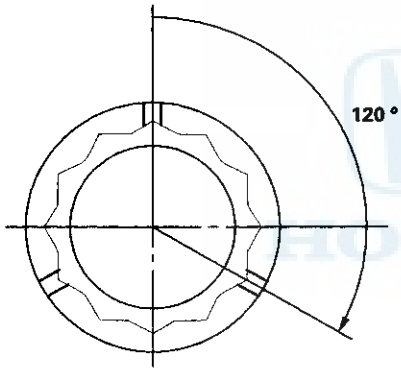
5. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer (A).

   Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



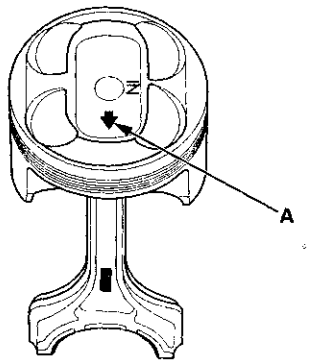
6. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.
7. Check the connecting rod bearing clearance with plastigage (see page 7-9).
8. Inspect the connecting rod bolts (see page 7-26).
9. Apply new engine oil to the bolt threads, then install the connecting rod caps with bearings. Torque the bolts to 41 N·m (4.2 kgf·m, 30 lbf·ft).
10. Tighten the connecting rod bolts an additional 120 °.

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



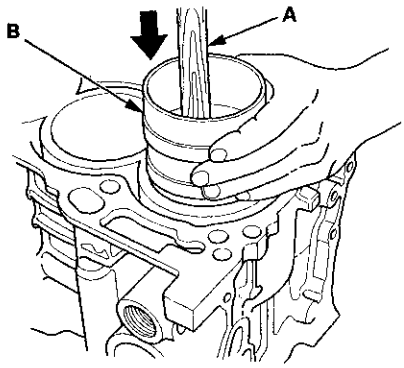
If the Crankshaft is Not Installed

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, the 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 block.



4. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer (A).

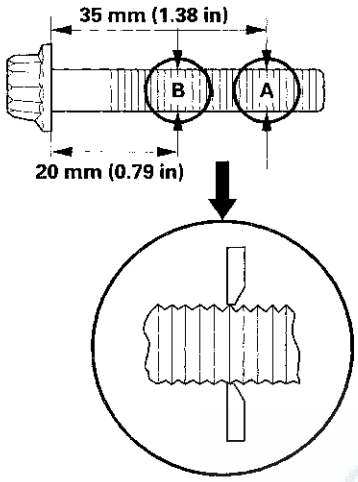
   Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



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.



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

   Point A − Point B = Difference in Diameter

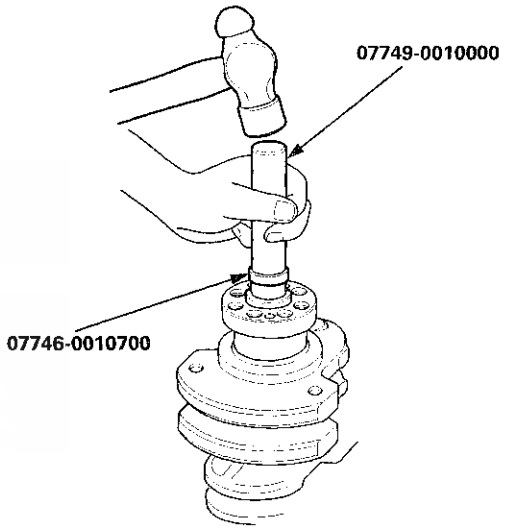
   Difference in Diameter
   Specification: 0 − 0.1 mm (0 − 0.004 in)

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

Crankshaft Installation

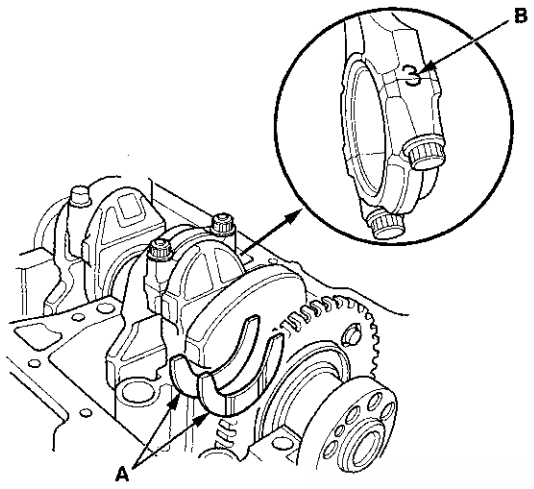
Special Tools Required
- Driver Handle, 15 x 135L 07749-0010000
- Attachment, 24 x 26 mm 07746-0010700
- Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100

1. M/T model: Install the crankshaft end bushing when replacing the crankshaft. Using the driver and the bearing driver attachment, 24 x 26 mm, drive in the crankshaft end bushing until the driver handle, 15 x 135L and the attachment bottom against the crankshaft.



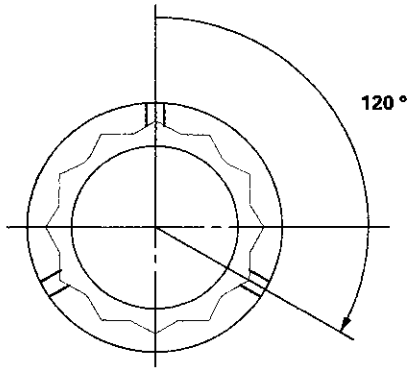
2. Check the connecting rod bearing clearance with plastigage (see page 7-9).
3. Check the main bearing clearance with plastigage (see page 7-6).
4. Install the bearing halves in the engine block and the connecting rods.
5. Apply a coat of new engine oil to the main bearings and the rod bearings.
6. Install the crankshaft position (CKP) pulse plate to the crankshaft (see page 7-30).
7. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the engine block. Be careful not to damage the journals and the CKP pulse plate.

8. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the No. 4 journal of the engine block.



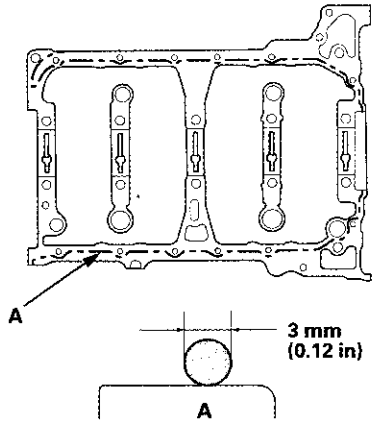
9. Inspect the connecting rod bolts (see page 7-26).
10. Apply new engine oil to the threads of the connecting rod bolts.
11. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and the cap, then install the caps and bolts finger-tight.
12. 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 the cap, then install the caps and bolts finger-tight.
13. torque the connecting rod bolts to 41 N·m (4.2 kgf·m, 30 lbf·ft).
14. Tighten the connecting rod bolts an additional 120 °.

    NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 9 of the procedure. Do not loosen it back to the specified angle.



15. Remove all of the old liquid gasket from the lower block mating surfaces, the bolts, and the bolt holes.
16. Clean and dry the lower block mating surfaces.
17. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the engine block mating surface of the lower block, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

    NOTE:
    - Apply a 3 mm (0.12 in) diamete bead of liquid gasket along the broken line (A).
    - If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



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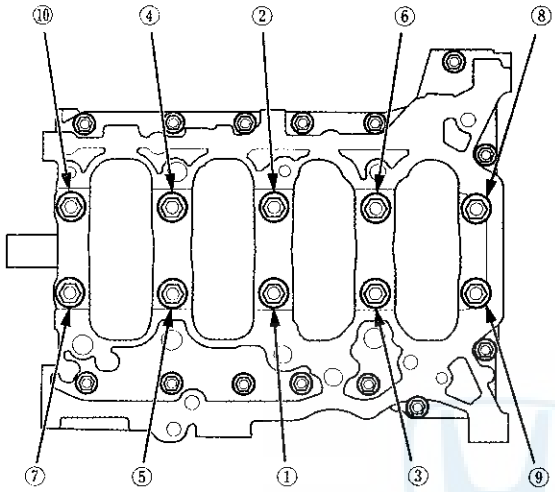
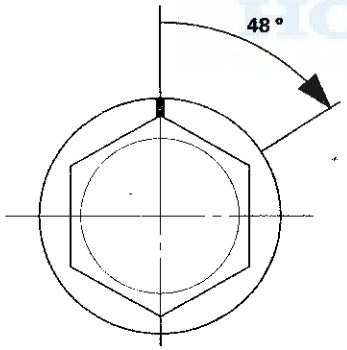
Crankshaft Installation (cont'd)

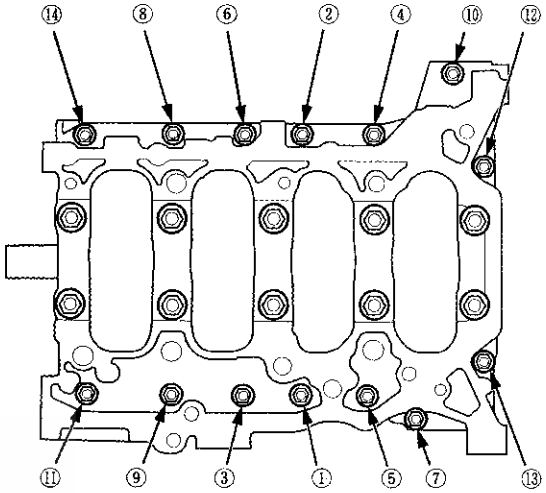
18. Put the lower block on the engine block.
19. Apply new engine oil to the threads of the bearing cap bolts. Torque the bearing cap bolts in sequence, to 29 N·m (3.0 kgf·m, 22 lbf·ft).



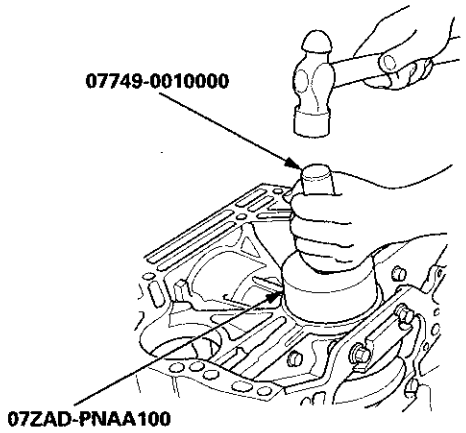
20. Tighten the bearing cap bolts an additional 48 °.



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

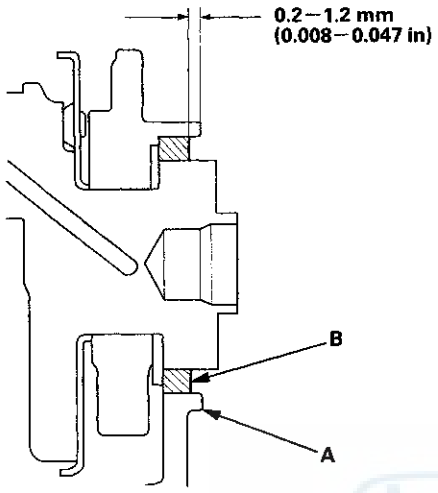


22. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
23. Use the driver handle and the oil seal driver attachment 96 mm to drive a new crankshaft oil seal squarely into the engine block to the specified installed height.

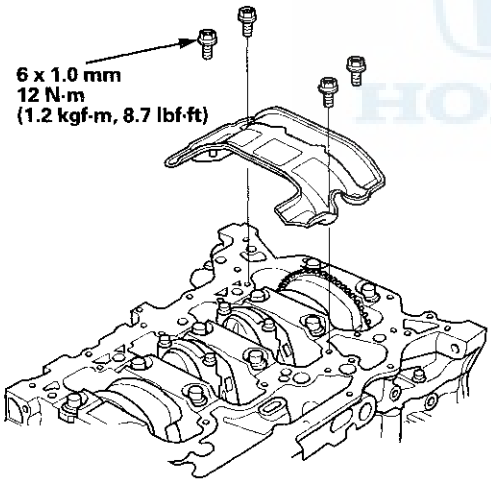


24. Measure the distance between the engine block (A) and the crankshaft oil seal (B).

Crankshaft Oil Seal Installed Height
0.2—1.2 mm (0.008—0.047 in)



25. Install the baffle plate.

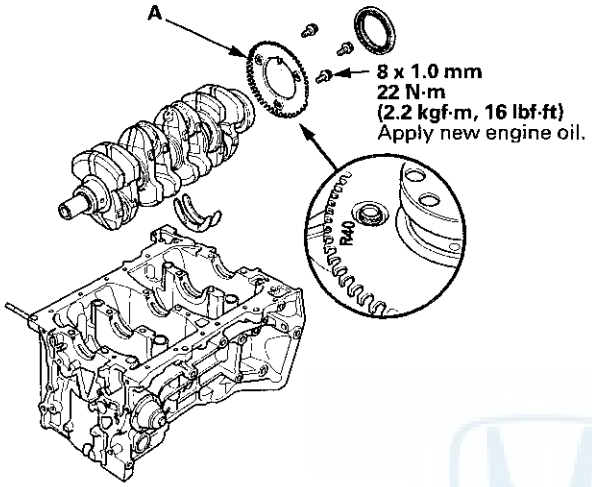


26. Install the oil pump (see page 8-23).
27. Install the oil pan (see page 7-30).
28. Install the cylinder head:
    - All models except PZEV (see page 6-44)
    - PZEV model (see page 6-94)
29. M/T model: Install the flywheel (see step 18 on page 12-18), the clutch disc (see step 26 on page 12-19), and the pressure plate (see step 27 on page 12-19).
30. A/T model: Install the drive plate (see page 14-204).
31. Install the transmission:
    - Manual transmission (see page 13-15)
    - Automatic transmission (see page 14-205)
32. Install the engine/transmission (see page 5-12).

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

CKP Pulse Plate Replacement

1. Remove the crankshaft from the engine block (see page 7-14).
2. Remove the CKP pulse plate (A) from the crankshaft.

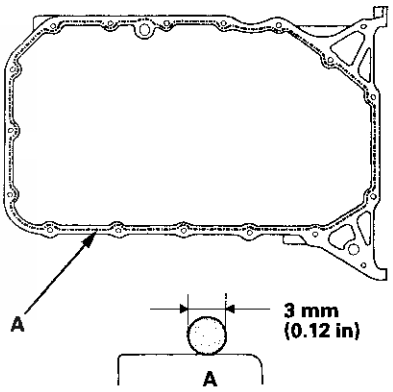


3. Install the CKP pulse plate in the reverse order of removal.

Oil Pan Installation

1. Remove all of the old liquid gasket from the oil pan mating surfaces, the bolts, and the bolt holes.
2. Clean and dry the oil pan mating surfaces.
3. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the engine block mating surface of the oil pan, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

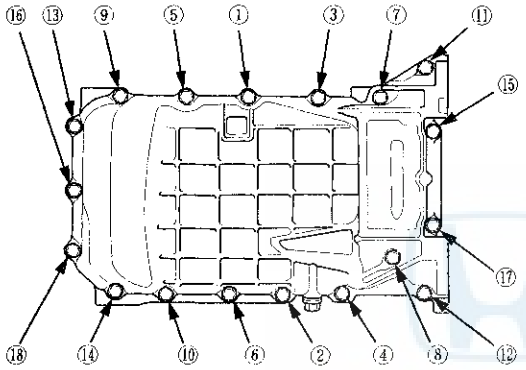
   NOTE:
   - Apply a 3 mm (0.12 in) diamete bead of liquid gasket along the broken line (A).
   - If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



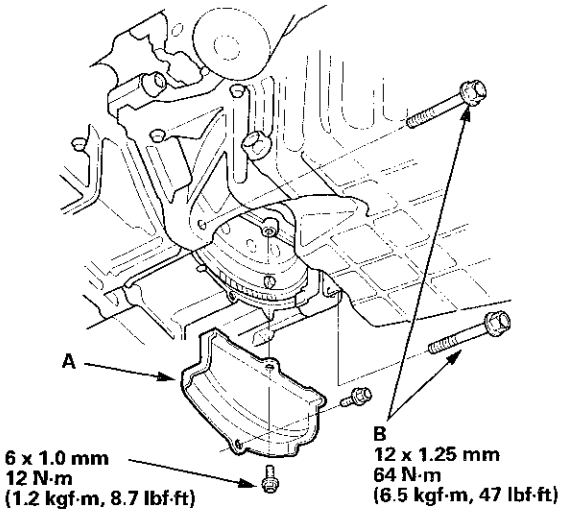
4. Install the oil pan.

5. Tighten the bolts in three steps. In the final step, torque 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 the flywheel/drive plate.

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



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



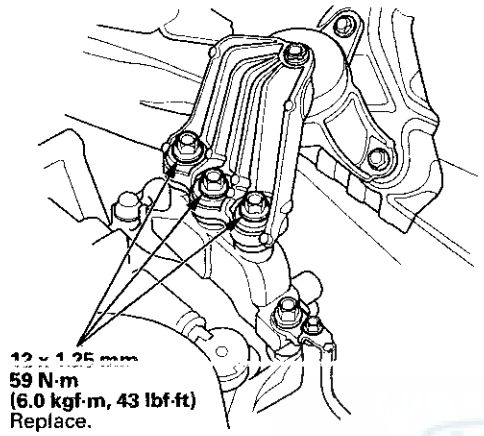
7. If the engine is still in the vehicle, do steps 8 through 24.
8. Lower the transmission jack from the transmission.
9. A/T model: Install the shift cable bracket.
   - Vehicles with JHM VINs (see step 34 on page 14-209).
   - Vehicles with 1HG VINs (see step 37 on page 14-210).
10. Tighten the nuts securing the lower transmission mount (see step 24 on page 5-16).
11. Install a new set ring on the end of driveshaft, then install the driveshaft (see page 16-19). Make sure the ring "clicks" into place in the differential.
12. Connect the lower arm to the left side knuckle (see step 5 on page 18-21).
13. Install the left side damper fork (see step 3 on page 18-21).
14. Install the splash shield (see step 47 on page 5-20).
15. Install the left front wheel.
16. Lower the vehicle on the lift.

(cont'd)

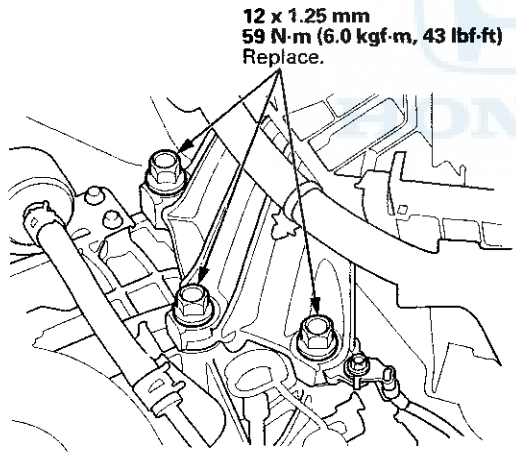
Oil Pan Installation (cont'd)

17. Tighten the upper transmission mount bracket mounting bolts to the specified torque.

M/T model

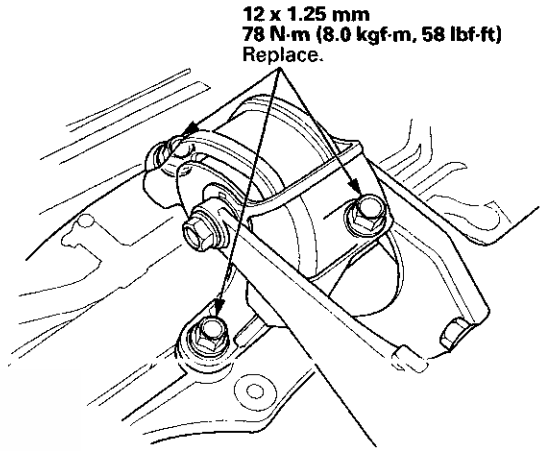


A/T model

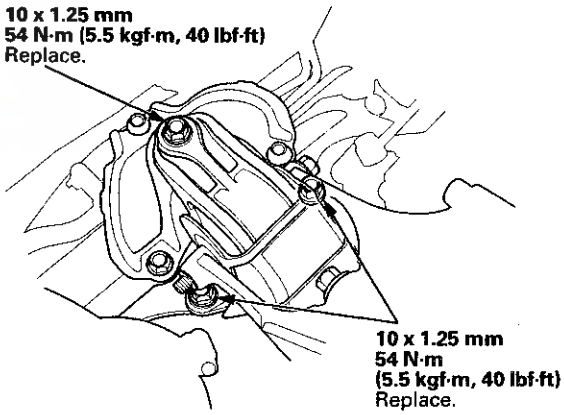


18. Tighten the rear engine mount mounting bolts to the specified torque.

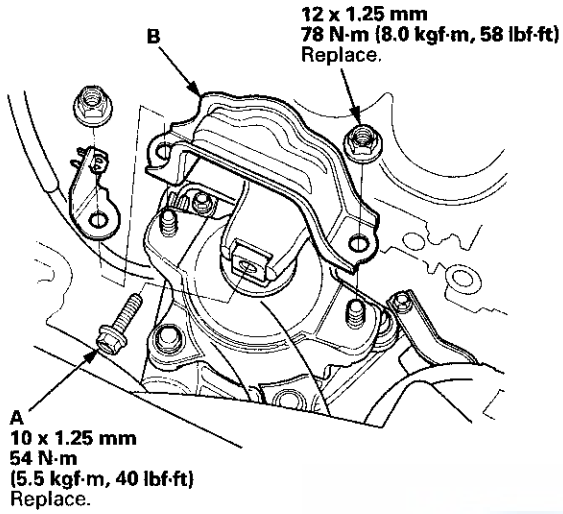
M/T model



A/T model



19. Tighten the front engine mount bolt (A), then install the front engine mount stop (B).

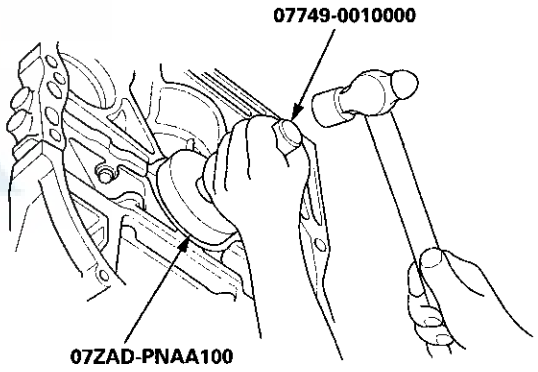


20. Install the battery base, then install the harness clamps (see step 63 on page 5-22).
21. Install the air cleaner assembly (see page 11-332).
22. Do the battery installation procedure (see page 22-92).
23. Install the strut brace (if equipped) (see page 20-306).
24. Refill the engine with the recommended engine oil (see page 8-10).

Transmission End Crankshaft Oil Seal Installation - In Car

Special Tools Required
- Driver Handle, 15 x 135L 07749-0010000
- Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100

1. Remove the transmission:
   - Manual transmission (see page 13-7)
   - Automatic transmission (see page 14-194)
2. M/T model: Remove the flywheel (see step 17 on page 12-18), the clutch disc (see step 8 on page 12-16), and the pressure plate (see step 3 on page 12-15).
3. A/T model: Remove the drive plate (see page 14-204).
4. Clean and dry the crankshaft oil seal housing.
5. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
6. Use the driver handle, 15 x 135L and the oil seal driver attachment 96 mm to drive a new crankshaft oil seal squarely into the engine block to the specified installed height.

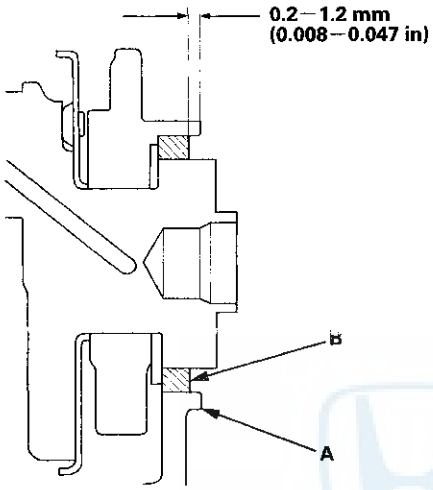


(cont'd)

Transmission End Crankshaft Oil Seal Installation - In Car (cont'd)

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

Oil Seal Installed Height: 0.2—1.2 mm (0.008—0.047 in)



8. M/T model: Install the flywheel (see step 18 on page 12-18), the clutch disc (see step 26 on page 12-19), and the pressure plate (see step 27 on page 12-19).
9. A/T model: Install the drive plate (see page 14-204).
10. Install the transmission:
    - Manual transmission (see page 13-15)
    - Automatic transmission (see page 14-205)

Sealing Bolt Installation

NOTE: When installing the sealing bolt (A), always use a new washer.