

Engine Mechanical



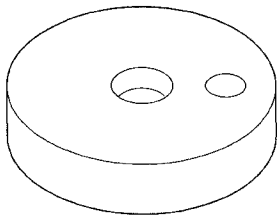
Engine Block

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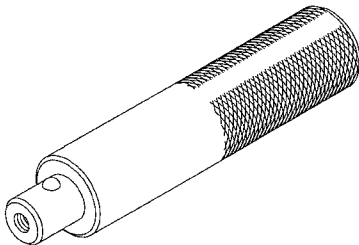
Engine Block

Special Tools

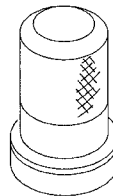
Ref.No.	Tool Number	Description	Qty
①	070AD-RCA0200	Oil Seal Driver Attachment, 106 mm	1
②	07749-0010000	Driver Handle, 15 x 135L	1
③	07OAD-RCAA100	Oil Seal Driver, 64 mm	1



①



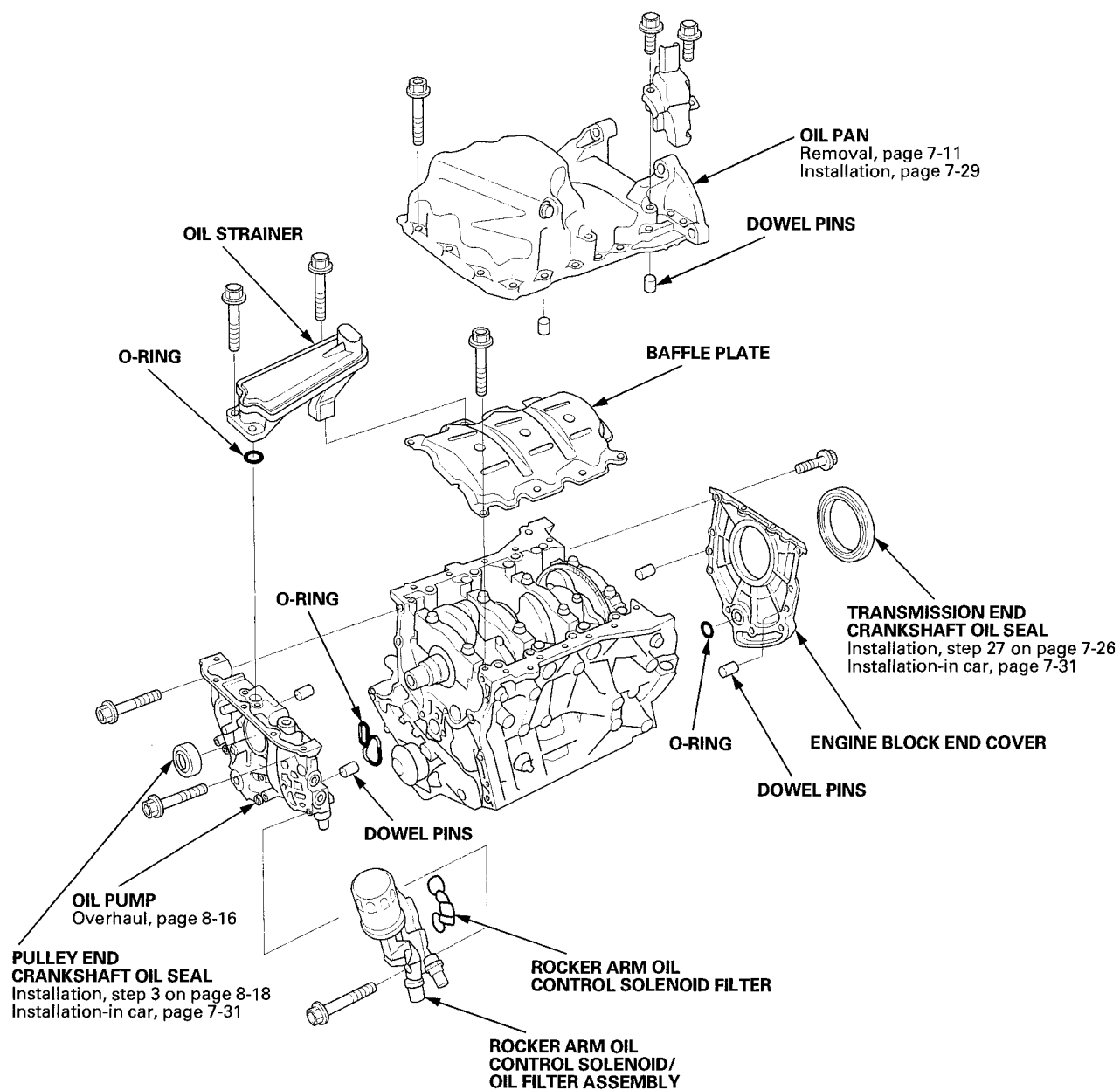
②



③



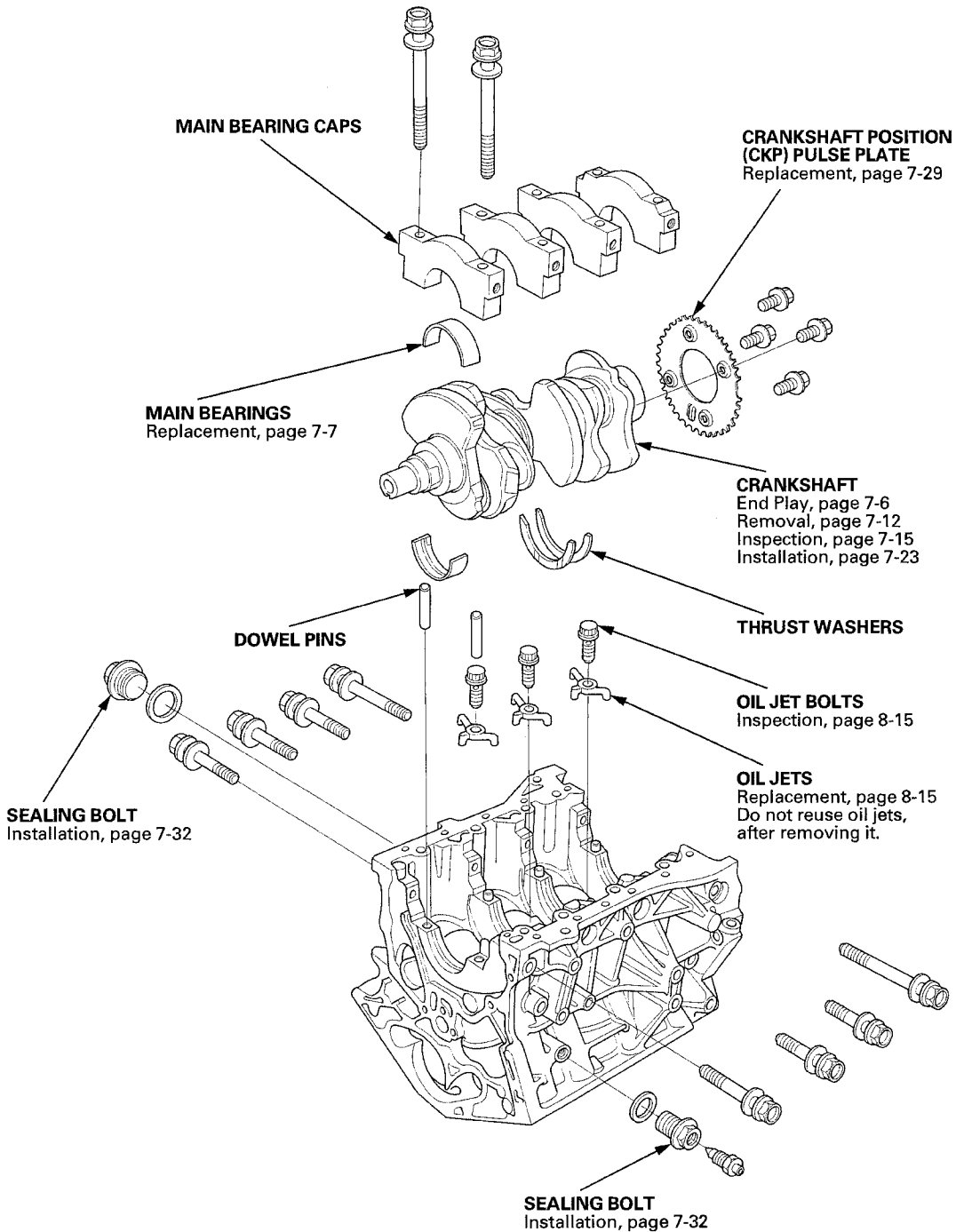
Component Location Index

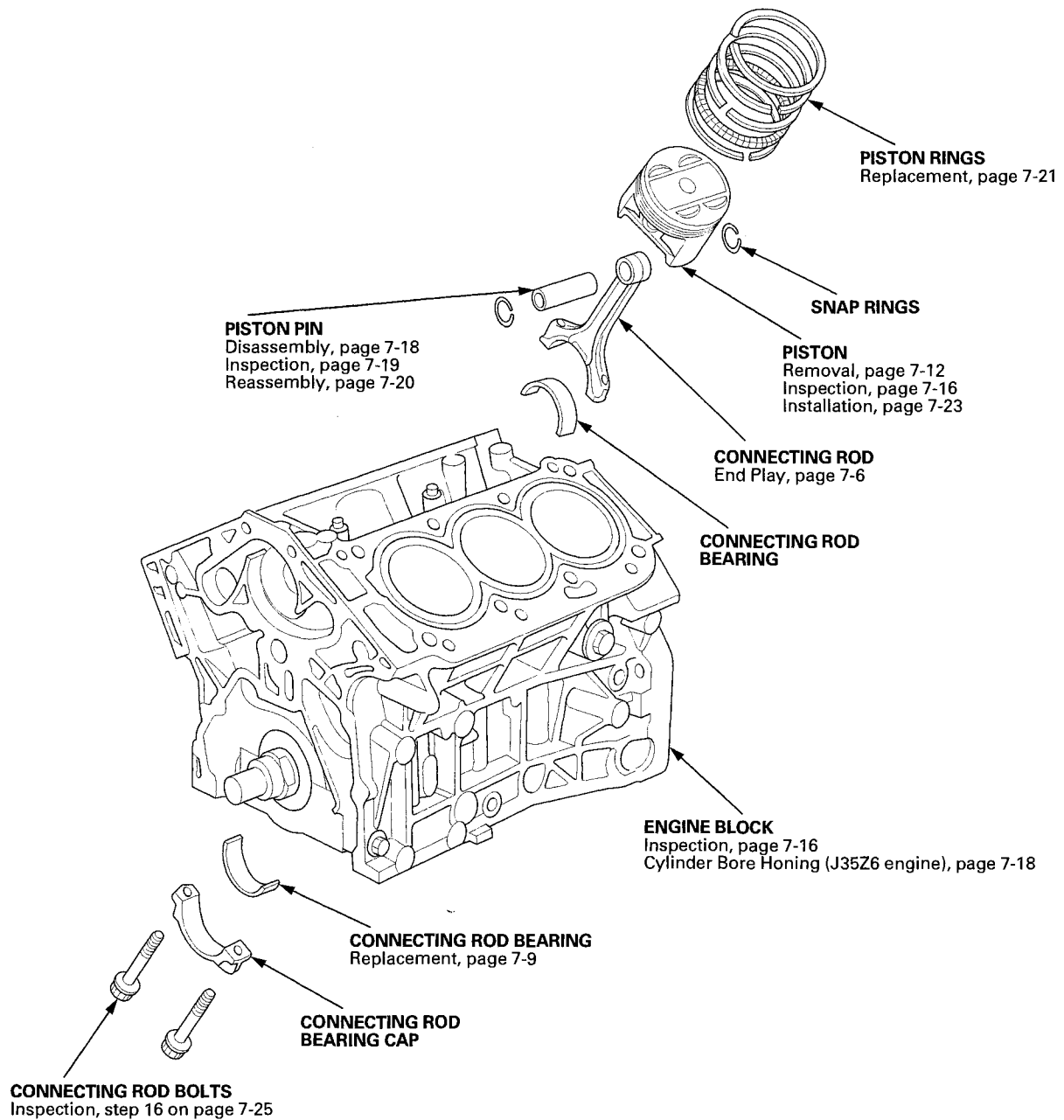


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Engine Block

Component Location Index (cont'd)





Engine Block

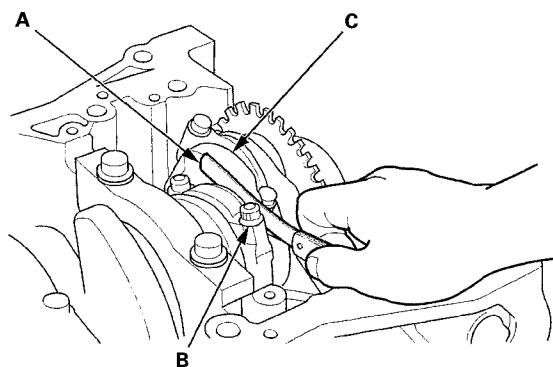
Connecting Rod and Crankshaft End Play Inspection

1. Remove the oil pump (see page 8-17).
2. Remove the baffle plate (see step 10 on page 7-12).
3. Measure the connecting rod end play with a feeler gauge (A) between the connecting rod (B) and the crankshaft (C).

Connecting Rod End Play

Standard (New): 0.15–0.35 mm (0.006–0.014 in)

Service Limit: 0.45 mm (0.018 in)



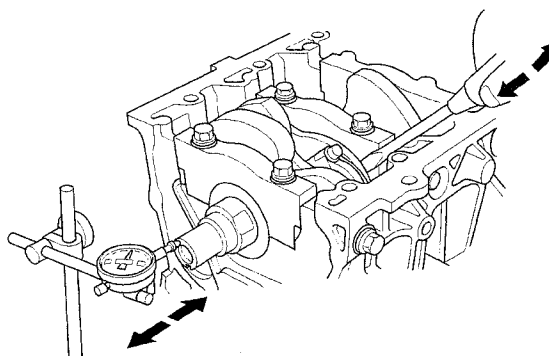
4. If the connecting rod end play is beyond the service limit, install a new connecting rod and recheck. If it is still beyond the service limit, replace the crankshaft (see page 7-12).

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 excessive, replace the thrust washers and recheck. If it is still beyond the service limit, replace the crankshaft (see page 7-12).



Crankshaft Main Bearing Replacement

Main Bearing Clearance Inspection

1. Remove the main bearing caps and the bearing halves (see page 7-12).
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

NOTE: If the engine is still in the vehicle when you bolt the main cap down to check the clearance, the weight of the crankshaft and the drive plate will flatten the plastigage further than just the torque on the cap bolt and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights, and check only one bearing at a time.

4. Reinstall the bearings and the bearing caps, then torque the bearing cap bolts to 74 N·m (7.5 kgf·m, 54 lbf·ft), and the bearing cap side bolts to 49 N·m (5.0 kgf·m, 36 lbf·ft) in the proper sequence (see step 23 on page 7-26).

NOTE:

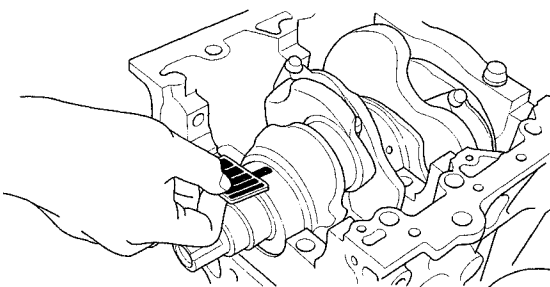
- Apply new engine oil to the bolt threads and flanges.
- Do not rotate the crankshaft during inspection.

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

Main Bearing-to-Journal Oil Clearance

Standard (New): 0.019—0.045 mm (0.0007—0.0018 in)

Service Limit: 0.050 mm (0.0020 in)



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, and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over (see page 7-12).

(cont'd)

Engine Block

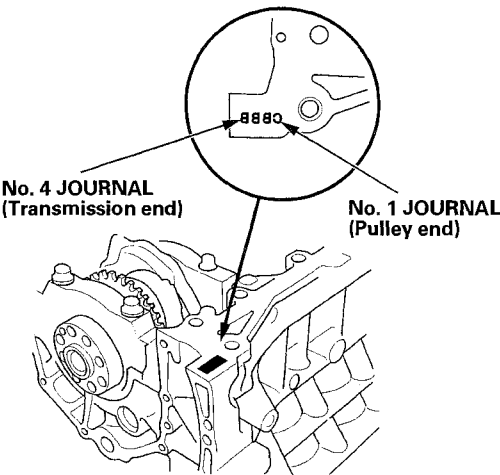
Crankshaft Main Bearing Replacement (cont'd)

Main Bearing Selection

Block Bore Code Location

Letters or bars have been stamped on the end of the engine block as a code for the size of each of the four main journal bores.

Use them, and the numbers or bars stamped on the crankshaft (codes for main journal size), to choose the correct bearings. If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



Bearing Identification

Color code is on the edge of the bearing

Larger block bore			
A or I	B or II	C or III	D or IIII

Smaller bearing (Thicker)			
Red/Pink	Pink	Pink/Yellow	Yellow
Pink	Pink/Yellow	Yellow	Yellow/Green
Pink/Yellow	Yellow	Yellow/Green	Green
Yellow	Yellow/Green	Green	Green/Brown
Yellow/Green	Green	Green/Brown	Brown
Green	Green/Brown	Brown	Brown/Black

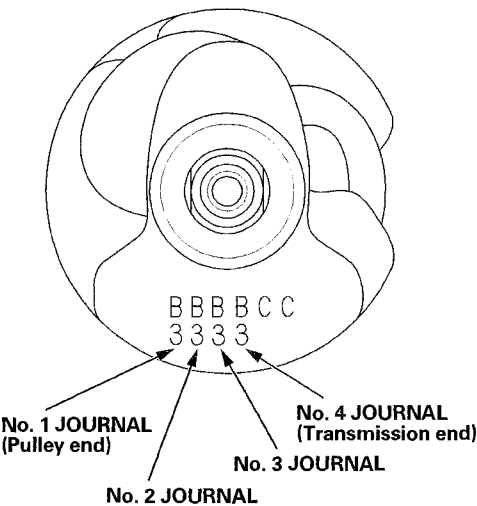
1 or I
2 or II
3 or III
4 or IIII
5 or IIIII
6 or IIIIII

Smaller main journal

Smaller bearing (Thicker)

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

Main Journal Code Locations (Numbers or Bars)





Connecting Rod Bearing Replacement

Connecting Rod Bearing Clearance Inspection

1. Remove the connecting rod cap and the bearing half (see page 7-12).
2. Clean the connecting rod journal and the bearing half with a clean shop towel.
3. Place a strip of plastigage across the rod journal.
4. Reinstall the bearing half and the rod cap, and tighten the bolts.

NOTE:

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

Tightening Torque:

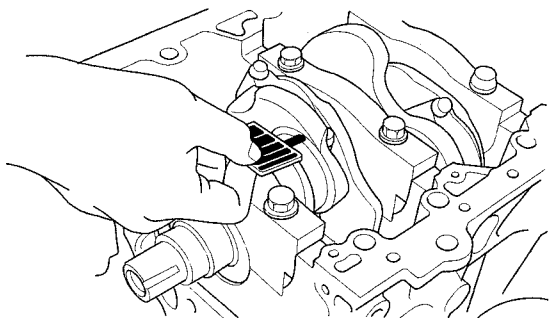
20 N·m (2.0 kgf·m, 14 lbf·ft) + 90°

5. 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): 0.020—0.044 mm (0.0008—0.0017 in)

Service Limit: 0.050 mm (0.0020 in)



6. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, then install a new, complete bearing with the same color code, and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over (see page 7-12).

Engine Block

Connecting Rod Bearing Replacement (cont'd)

Connecting Rod Bearing Selection

Each connecting rod falls into one of four tolerance ranges (from 0 to 0.024 mm (0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore.

It's then stamped with a number or bar (1, 2, 3, or 4/I, II, III, or IIII) indicating the range. You may find any combination of 1, 2, 3, or 4/I, II, III, or IIII in any engine.

Big End Bore Size

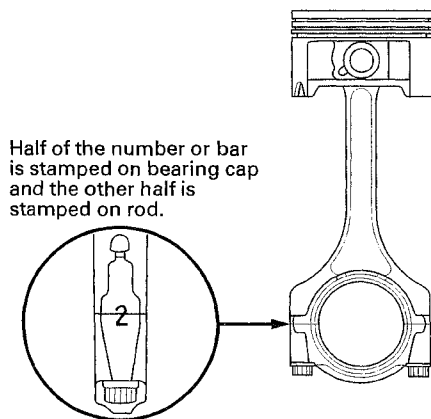
J35Z6 engine: 58.0 mm (2.28 in)

J37A4 engine: 60.0 mm (2.36 in)

Inspect the connecting rod for cracks and heat damage.

Big End Bore Code Locations

Numbers or bars have been stamped on the side of each connecting rod as a code for the size of the big end. Use them, and the letters or bars stamped on the crank (codes for rod journal size), to choose the correct bearings. If the codes are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



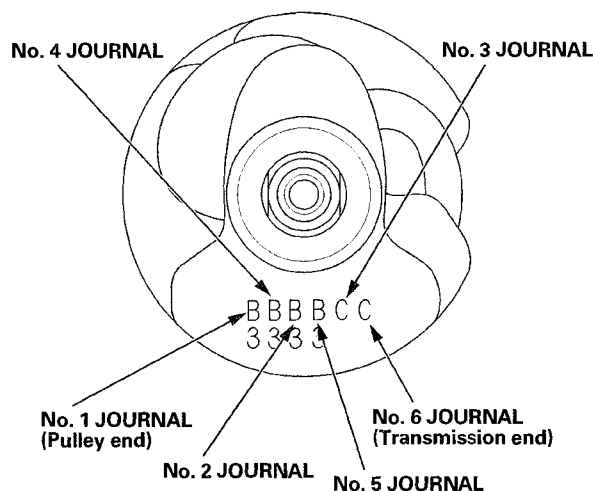
Bearing Identification
Color code is on the edge of the bearing

	Larger big end bore			
	1 or I	2 or II	3 or III	4 or IIII
	Smaller bearing (Thicker)			
A or I	Pink	Pink/Yellow	Yellow	Yellow/Green
B or II	Pink/Yellow	Yellow	Yellow/Green	Green
C or III	Yellow	Yellow/Green	Green	Green/Brown
D or IIII	Yellow/Green	Green	Green/Brown	Brown
E or IIIII	Green	Green/Brown	Brown	Brown/Black
F or IIIIII	Green/Brown	Brown	Brown/Black	Black

Smaller rod journal Smaller bearing (Thicker)

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

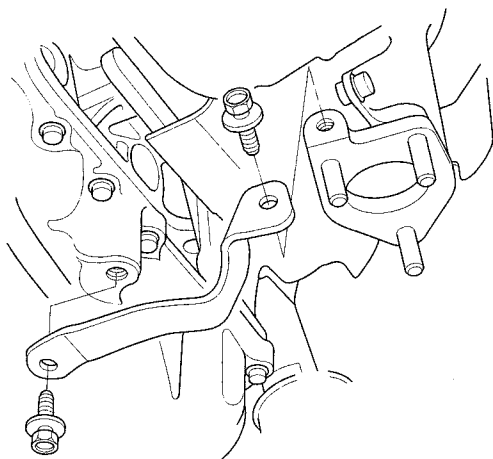
Connecting Rod Journal Code Locations (Letters or Bars)



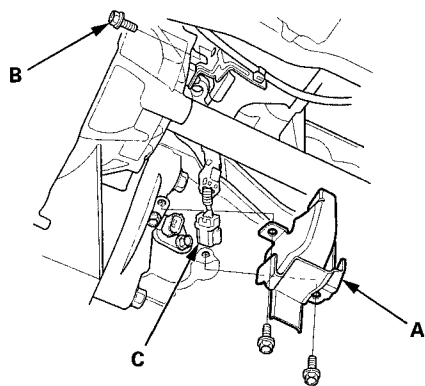


Oil Pan Removal

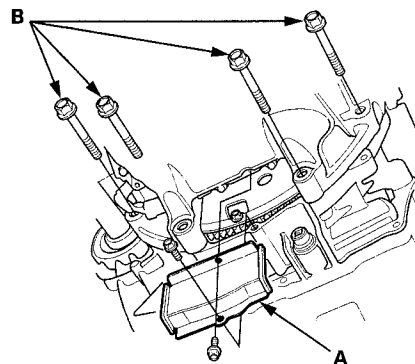
1. If the engine is already out of the vehicle, go to step 6.
2. Raise the vehicle on the lift.
3. Drain the engine oil (see page 8-12).
4. Remove the splash shield (see page 20-205).
5. Remove exhaust pipe A (see step 38 on page 5-7).
6. Remove the rear warm up three way catalytic converter (rear WU-TWC) bracket.



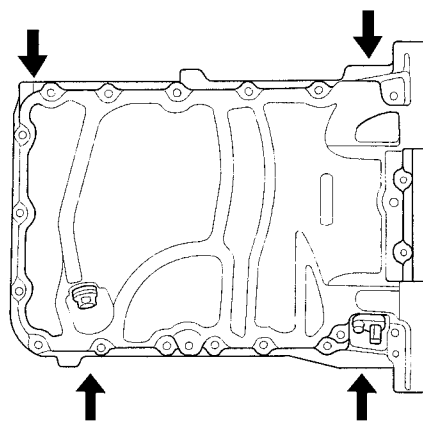
7. Remove the crankshaft position (CKP) sensor cover (A) and the bolt (B), then disconnect the CKP sensor connector (C).



8. Remove the clutch/torque converter cover (A) and the four bolts (B) securing the transmission.



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

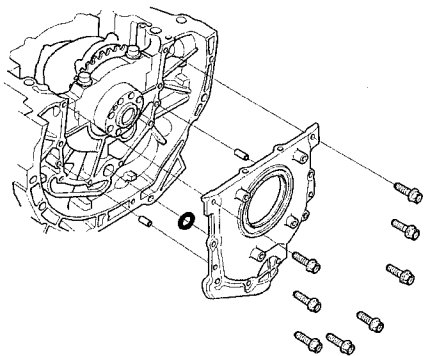


11. Remove the oil pan.

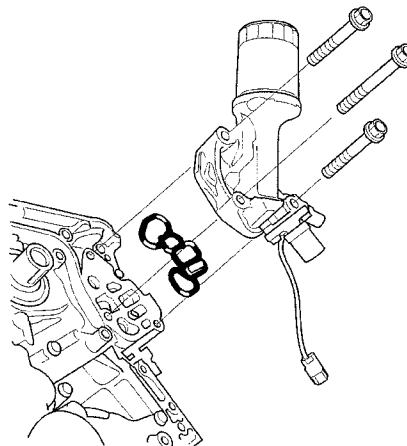
Engine Block

Crankshaft and Piston Removal

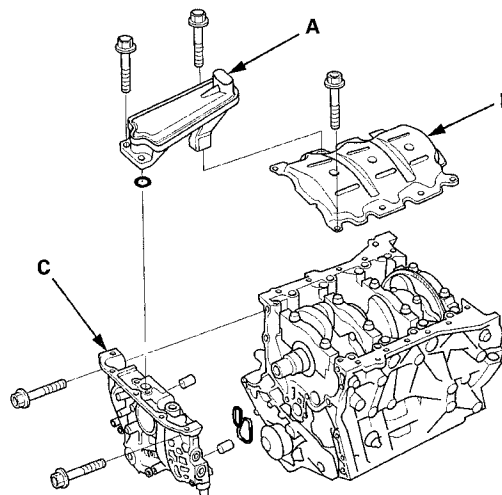
1. Remove the engine/transmission (see page 5-3).
2. Remove the transmission:
 - Manual transmission (see page 13-18)
 - Automatic transmission (see page 14-211)
3. M/T model: Remove the flywheel (see page 12-19).
4. A/T model: Remove the drive plate (see page 14-223).
5. Remove the cylinder heads:
 - J35Z6 engine (see page 6-33)
 - J37A4 engine (see page 6-96)
6. Remove the timing belt drive pulley from the crankshaft:
 - J35Z6 engine (see page 6-27)
 - J37A4 engine (see page 6-90)
7. Remove the oil pan (see page 7-11).
8. Remove the engine block end cover.



9. Remove the rocker arm oil control solenoid/oil filter assembly.

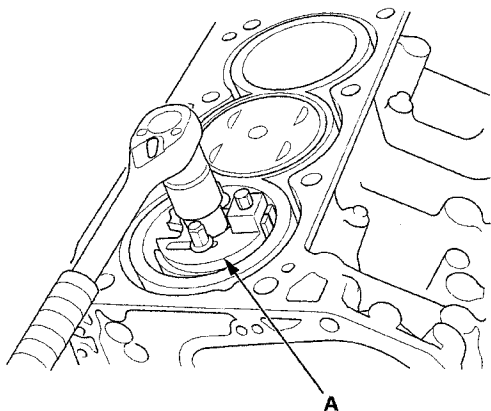


10. Remove the oil strainer (A), the baffle plate (B), and the oil pump (C).



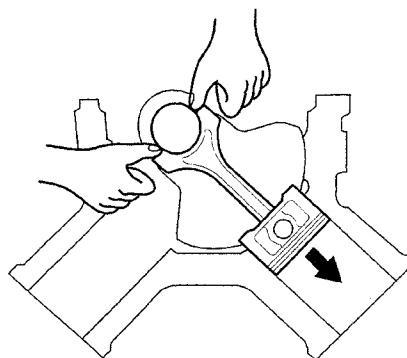


11. J35Z6 engine: If you can feel a ridge of metal or hard carbon around the top of any cylinder, remove it with a ridge reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the piston as it's pushed out.

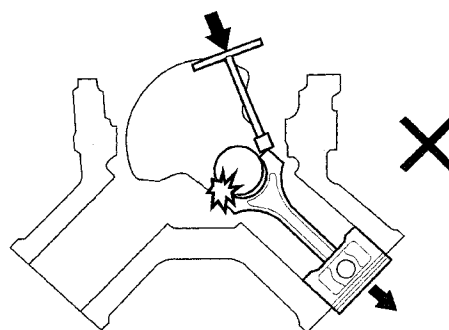


12. Remove the connecting rod caps after setting the connecting rod journal at bottom dead center (BDC) for each cylinder. Remove the piston/connecting rod assembly by pushing on the connecting rod. Take care not to damage the oil jets, the connecting rod journal, or the cylinder with the connecting rod.

CORRECT



INCORRECT

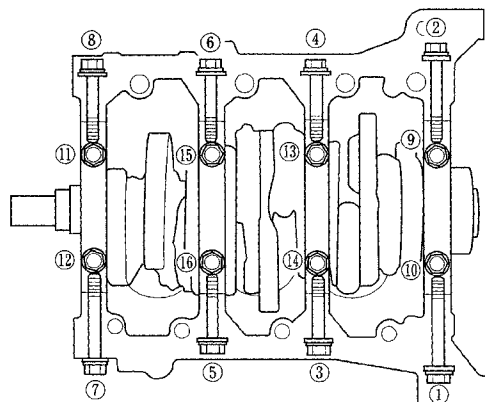


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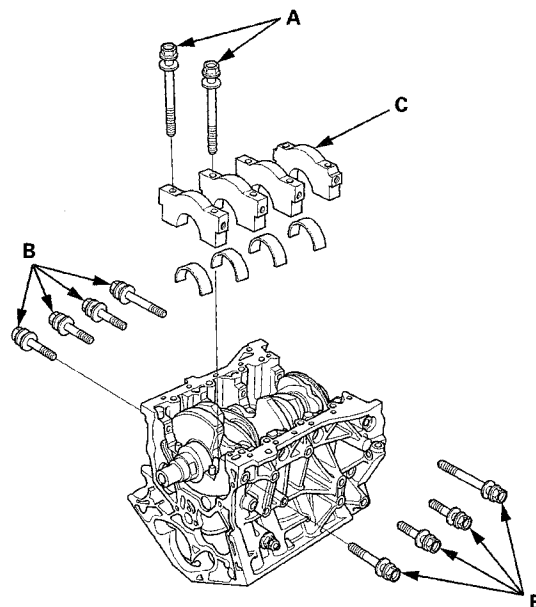
Engine Block

Crankshaft and Piston Removal (cont'd)

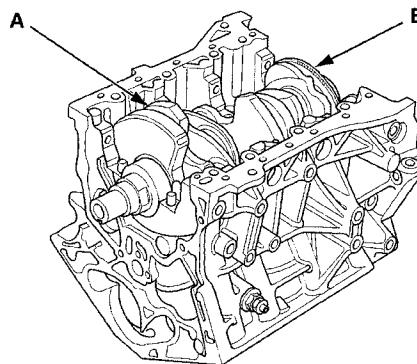
13. Remove the bearing from the rod cap. Keep all caps/bearings in order.
14. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
15. After removing a piston/connecting rod assembly, reinstall the rod cap on the rod.
16. To avoid confusion during reassembly, mark each piston/connecting rod assembly with its cylinder number.
17. Loosen the bearing cap bolts and the bearing cap side bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



18. Remove the bearing cap bolts (A) and the bearing cap side bolts (B), then remove the main bearing caps (C).



19. Lift the crankshaft (A) out of the engine block, being careful not to damage the journals and the crankshaft position (CKP) pulse plate (B).



20. Remove the CKP pulse plate from the crankshaft (see page 7-29).
21. Reinstall the main caps and the bearings on the engine block in the proper order.



Crankshaft Inspection

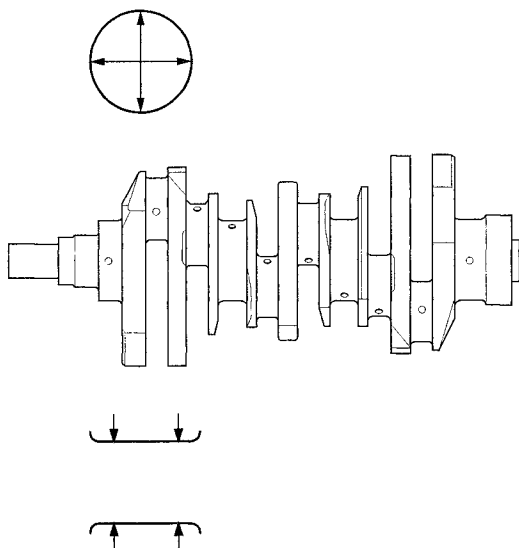
Out-of-Round and Taper

1. Remove the crankshaft from the engine block (see page 7-12).
2. Remove the crankshaft position (CKP) pulse plate from the crankshaft (see page 7-29).
3. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
4. Check the keyway slot and the threaded holes 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): 0.005 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)



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

Journal Taper

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

Service Limit: 0.010 mm (0.0004 in)

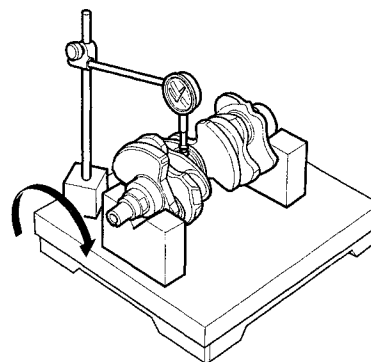
Straightness

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 of the main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Runout

Standard (New): 0.025 mm (0.0010 in) max.

Service Limit: 0.030 mm (0.0012 in)



Engine Block

Block and Piston Inspection

1. Remove the pistons from the engine block (see page 7-12).
2. Check the pistons for distortion or cracks.
3. Measure the piston skirt diameter at a point 16.0 mm (0.63 in) from the bottom of the skirt.

J35Z6 engine

Piston Skirt Diameter

Standard (New): 88.975—88.985 mm
(3.5029—3.5033 in)

Service Limit: 88.965 mm (3.5026 in)

Oversize Piston Skirt Diameter

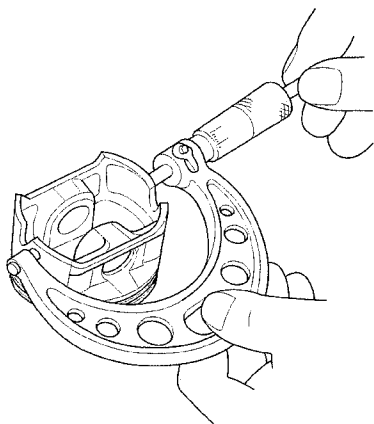
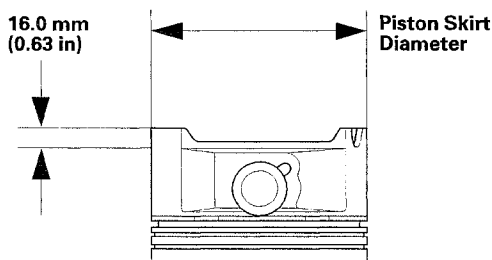
0.25: 89.225—89.235 mm (3.5128—3.5132 in)

J37A4 engine

Piston Skirt Diameter

Standard (New): 89.983—89.996 mm
(3.5426—3.5431 in)

Service Limit: 89.975 mm (3.5423 in)



4. Measure the wear and taper in direction X and Y at three levels in each cylinder as shown.

5. J35Z6 engine: If the measurements in any cylinder are beyond the oversize bore service limit, replace the engine block. If the engine block has to be rebored, refer to step 8 after reboring.

J37A4 engine: If the measurements in any cylinder are beyond the service limit, replace the engine block. The J37A4 engine block can not be rebored.

J35Z6 engine

Cylinder Bore Size

Standard (New): 89.000—89.015 mm
(3.5039—3.5045 in)

Service Limit: 89.065 mm (3.5065 in)

Oversize

0.25: 89.250—89.265 mm (3.5138—3.5144 in)

Reboring Limit: 0.25 mm (0.010 in)

Bore Taper

Limit: (Difference between first and third measurement) 0.015 mm (0.0006 in)

J37A4 engine

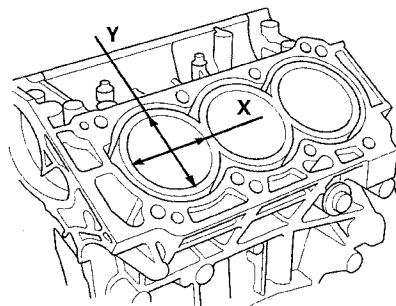
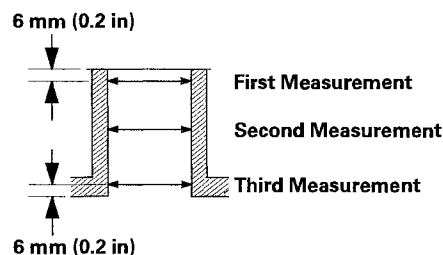
Cylinder Bore Size

Standard (New): 90.000—90.015 mm
(3.5433—3.5439 in)

Service Limit: 90.065 mm (3.5459 in)

Bore Taper

Limit: (Difference between first and third measurement) 0.015 mm (0.0006 in)





6. J35Z6 engine: Hone any scored or scratched cylinder bores (see page 7-18).

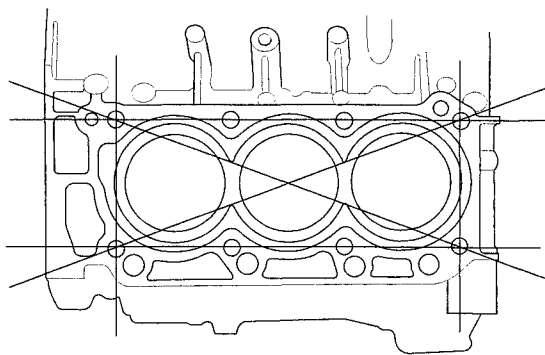
NOTE: The J37A4 engine can not be honed. If the cylinders are damaged, the engine block must be replaced.

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

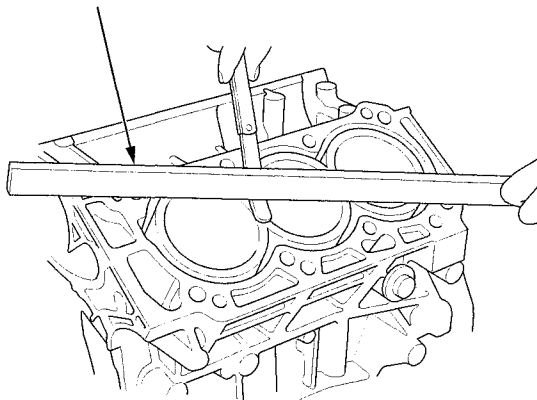
Engine Block Warpage

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

Service Limit: 0.10 mm (0.004 in)



PRECISION STRAIGHT EDGE



8. 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.

J35Z6 engine

Piston-to-Cylinder Bore Clearance

Standard (New): 0.015—0.040 mm (0.0006—0.0016 in)

Service Limit: 0.08 mm (0.003 in)

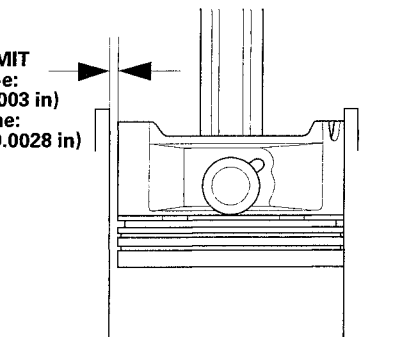
J37A4 engine

Piston-to-Cylinder Bore Clearance

Standard (New): 0.004—0.032 mm (0.0002—0.0013 in)

Service Limit: 0.070 mm (0.0028 in)

SERVICE LIMIT
J35Z6 engine:
0.08 mm (0.003 in)
J37A4 engine:
0.070 mm (0.0028 in)



Engine Block

Cylinder Bore Honing

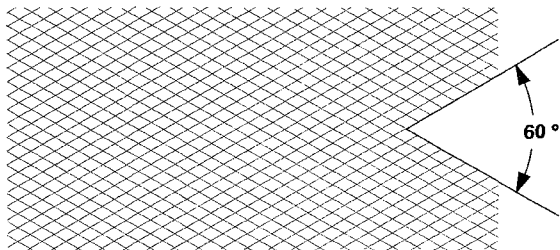
J35Z6 engine

NOTE: The J37A4 engine can not be honed. If the cylinders are damaged, the engine block must be replaced.

1. Measure the cylinder bores (see step 4 on page 7-16). If the engine block is to be reused, hone the cylinders and remeasure the bores. Only scored or scratched cylinder bores must be honed.
2. Remove the oil jets (see page 8-15).
3. Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree crosshatch pattern.

NOTE:

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



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.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

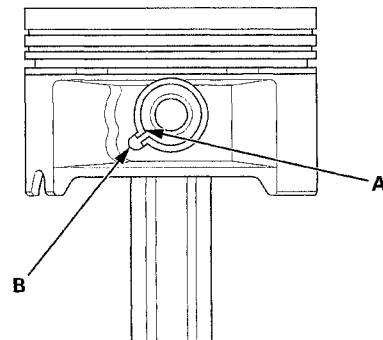
5. If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the engine block. Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.
6. Install the oil jets (see page 8-15).

Piston, Pin, and Connecting Rod Replacement

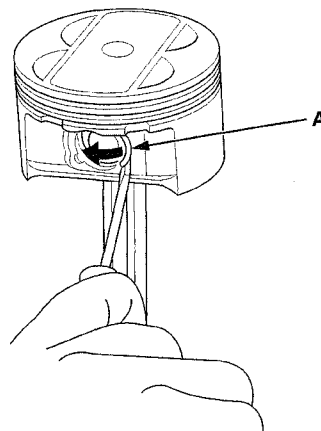
Disassembly

1. Remove the pistons from the engine block (see page 7-12).
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.

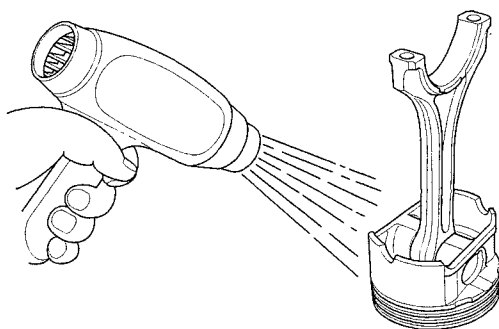


3. Remove the snap rings (A) from both sides of each piston. Start at the cutout in the piston pin bore. Remove the snap rings carefully so they do not go flying or get lost. Wear eye protection.





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

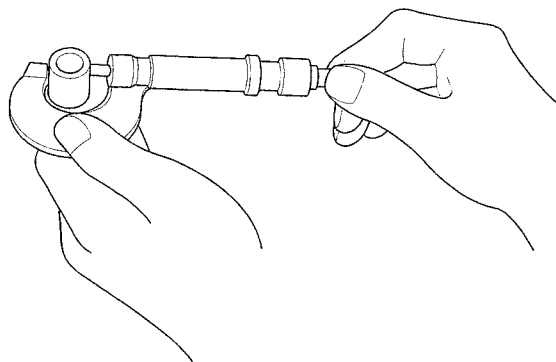


Inspection

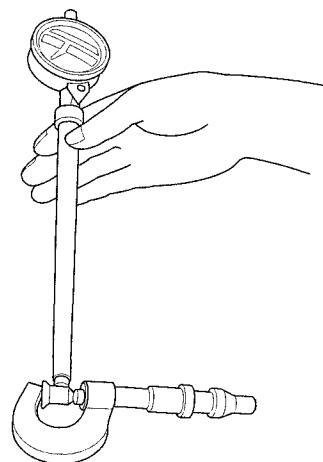
NOTE: Inspect the piston, the piston pin, and the connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

Piston Pin Diameter
Standard (New): 21.962–21.965 mm
(0.8646–0.8648 in)
Service Limit: 21.954 mm (0.8643 in)



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



(cont'd)

Engine Block

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

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

J35Z6 engine

Piston Pin-to-Piston Clearance

Standard (New): -0.005—0.001 mm
(-0.0002—0.0000 in)

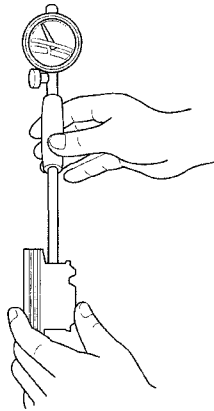
Service Limit: 0.004 mm (0.0002 in)

J37A4 engine

Piston Pin-to-Piston Clearance

Standard (New): -0.005—0.003 mm
(-0.0002—0.0001 in)

Service Limit: 0.004 mm (0.0002 in)

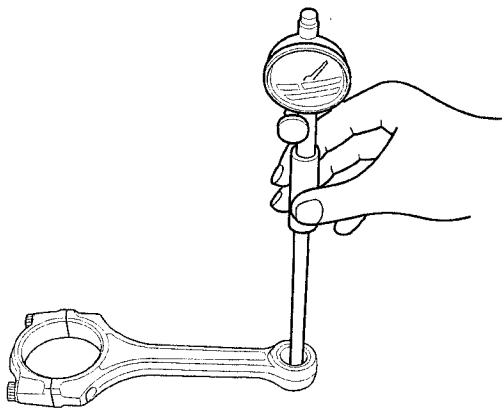


4. Measure the piston pin-to-connecting rod clearance.

Piston Pin-to-Connecting Rod Clearance

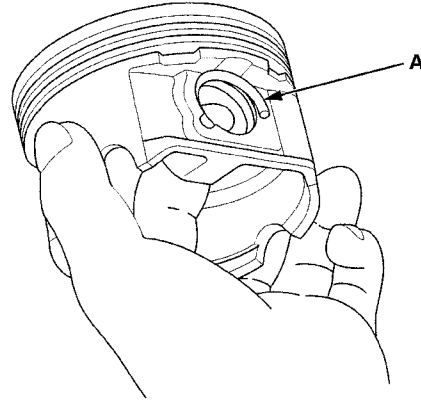
Standard (New): 0.005—0.014 mm (0.0002—0.0006 in)

Service Limit: 0.019 mm (0.0007 in)



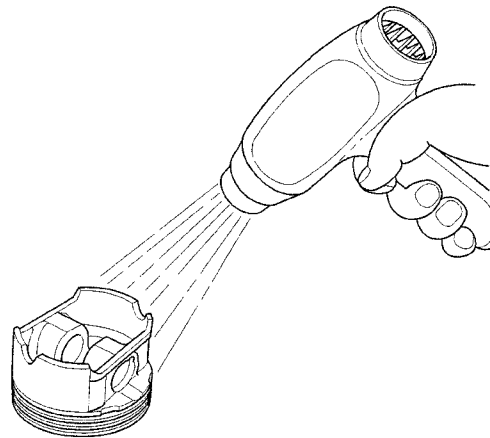
Reassembly

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



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).

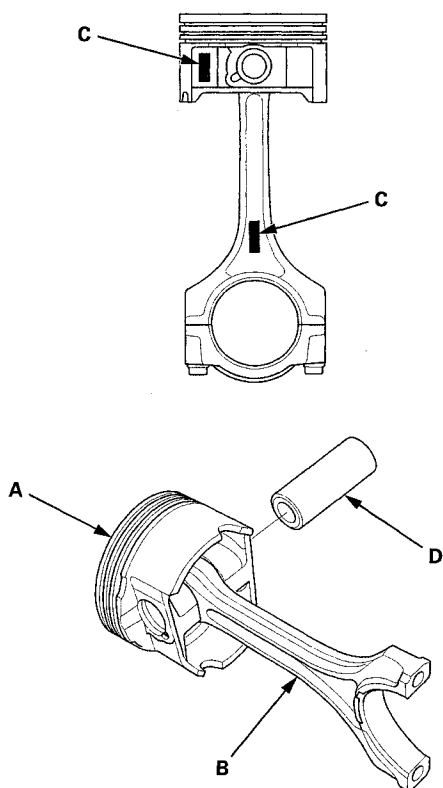




Piston Ring Replacement

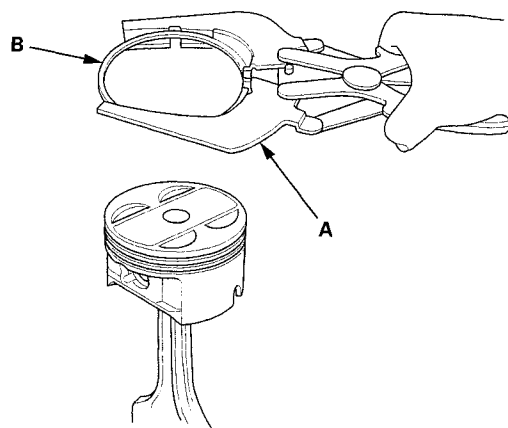
4. Assemble the piston (A) and the connecting rod (B) with the embossed marks (C) on the same side. Install the piston pin (D).

NOTE: Apply new engine oil to the piston pin.



5. Install the remaining snap ring.
6. Reassemble the other pistons the same way.

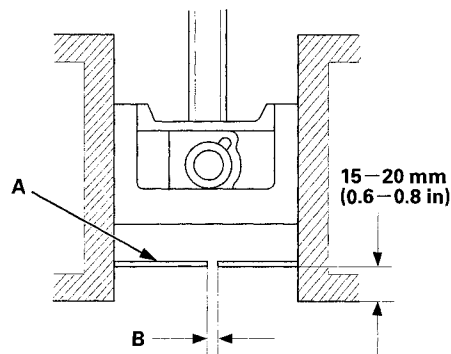
1. Remove the pistons from the engine block (see page 7-12).
2. Using a ring expander (A), remove the old piston rings (B).



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

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

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



(cont'd)

Engine Block

Piston Ring Replacement (cont'd)

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 step 4 on page 7-16).
6. J35Z6 engine: If the bore is over the service limit, the engine block must be rebored.

J35Z6 engine

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): 0.40–0.55 mm (0.016–0.022 in)

Service Limit: 0.70 mm (0.028 in)

Oil Ring:

Standard (New): 0.20–0.70 mm (0.008–0.028 in)

Service Limit: 0.80 mm (0.031 in)

J37A4 engine

Piston Ring End-Gap

Top Ring:

Standard (New): 0.30–0.40 mm (0.012–0.016 in)

Service Limit: 0.60 mm (0.024 in)

Second Ring:

Standard (New): 0.40–0.55 mm (0.016–0.022 in)

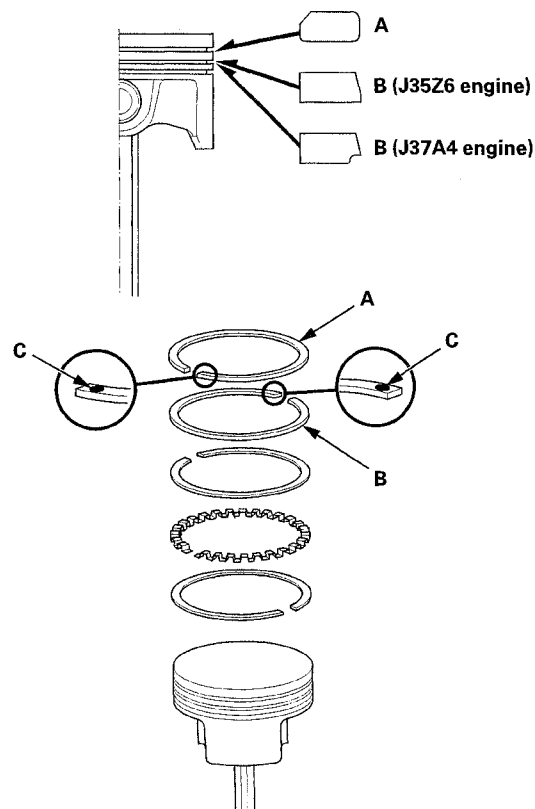
Service Limit: 0.70 mm (0.028 in)

Oil Ring:

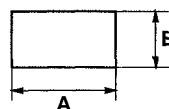
Standard (New): 0.20–0.35 mm (0.008–0.014 in)

Service Limit: 0.45 mm (0.018 in)

7. Install the rings as shown. The top ring (A) has a 1D mark (J35Z6 engine) or 1E mark (J37A4 engine) and the second ring (B) has a 2X mark (J35Z6 engine) or 2E mark (J37A4 engine). The manufacturing marks (C) must be facing upward.



Piston Ring Dimensions:



Top Ring (Standard)

A: 3.1 mm (0.12 in)

B: 1.2 mm (0.05 in)

J35Z6 engine

Second Ring (Standard)

A: 3.6 mm (0.14 in)

B: 1.2 mm (0.05 in)

J37A4 engine

Second Ring (Standard)

A: 3.4 mm (0.13 in)

B: 1.2 mm (0.05 in)



Crankshaft and Piston Installation

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

J35Z6 engine

Top Ring Clearance

Standard (New): 0.055—0.080 mm (0.0022—0.0031 in)

Service Limit: 0.15 mm (0.006 in)

Second Ring Clearance

Standard (New): 0.030—0.055 mm (0.0012—0.0022 in)

Service Limit: 0.13 mm (0.005 in)

J37A4 engine

Top Ring Clearance

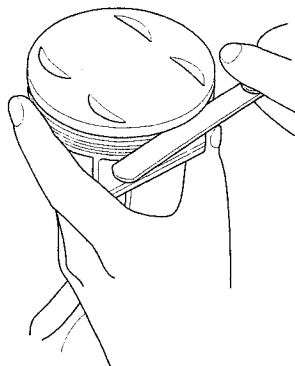
Standard (New): 0.055—0.085 mm (0.0022—0.0033 in)

Service Limit: 0.15 mm (0.006 in)

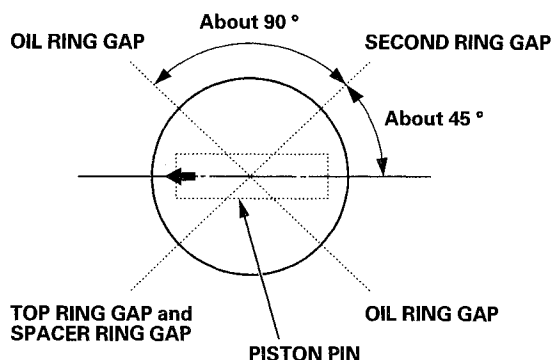
Second Ring Clearance

Standard (New): 0.030—0.060 mm (0.0012—0.0024 in)

Service Limit: 0.13 mm (0.005 in)



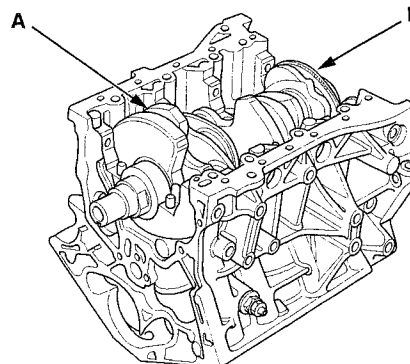
9. Rotate the rings in their grooves to make sure they do not bind.
10. Position the ring end gaps as shown:



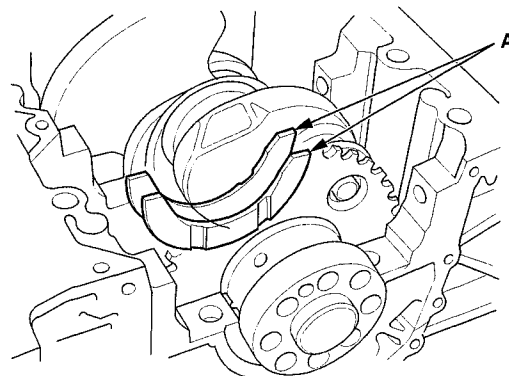
Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Oil Seal Driver Attachment, 106 mm 070AD-RCA0200

1. Check the connecting rod bearing clearance with plastigage (see page 7-9).
2. Check the main bearing clearance with plastigage (see page 7-7).
3. Install the bearing halves in the engine block and the connecting rods.
4. Apply new engine oil to the inside of the main bearings and the rod bearings.
5. Install the crankshaft position (CKP) pulse plate to the crankshaft (see page 7-29).
6. Lower the crankshaft (A) into the engine block, being careful not to damage the journals and the CKP pulse plate (B).



7. Apply new engine oil to the side with the thrust washer groove. Install the thrust washers (A) in the No. 3 journal.

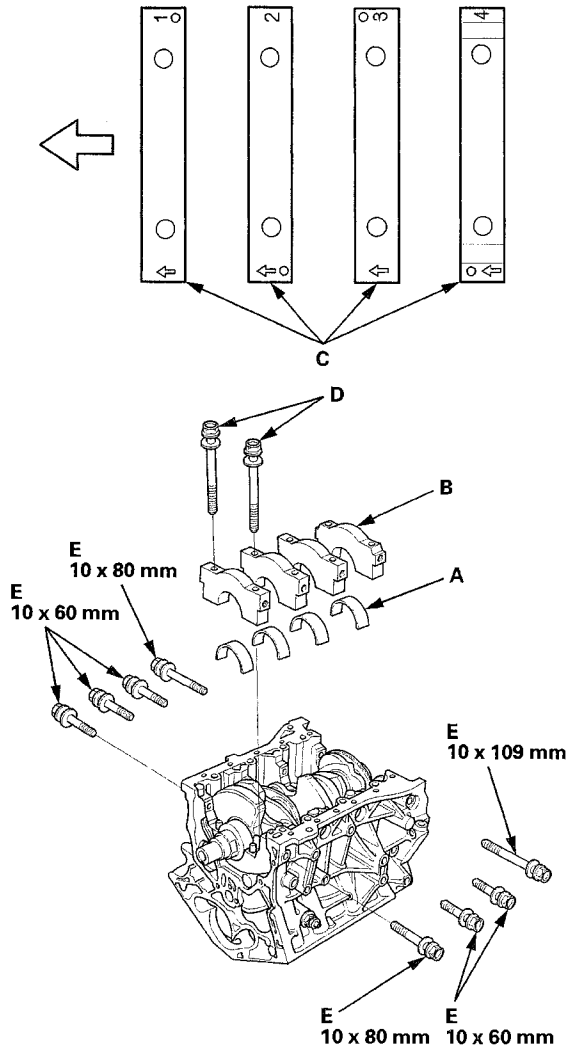


(cont'd)

Engine Block

Crankshaft and Piston Installation (cont'd)

8. Install the bearings (A) and the main bearing caps (B) with the arrow (C) facing the timing belt side of the engine block.



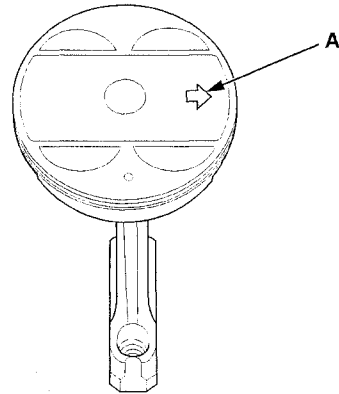
9. Apply new engine oil to the bolt threads and flanges, then loosely install the bearing cap bolts (D) and the bearing cap side bolts (E).

10. Set the crankshaft to bottom dead center (BDC) for the cylinder you are installing the piston in.

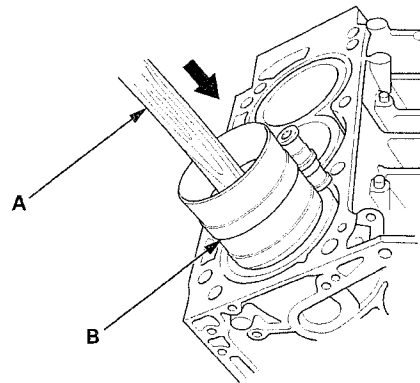
11. Apply new engine oil to the piston, the inside of the ring compressor, and the cylinder bore.

12. Attach the ring compressor to the piston/connecting rod assembly, and check that the bearing is securely in place.

13. Position the piston/connecting rod assembly with the arrow (A) facing the timing belt side of the engine block.



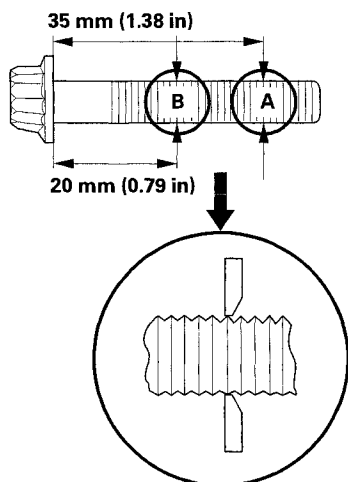
14. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



15. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.



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



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

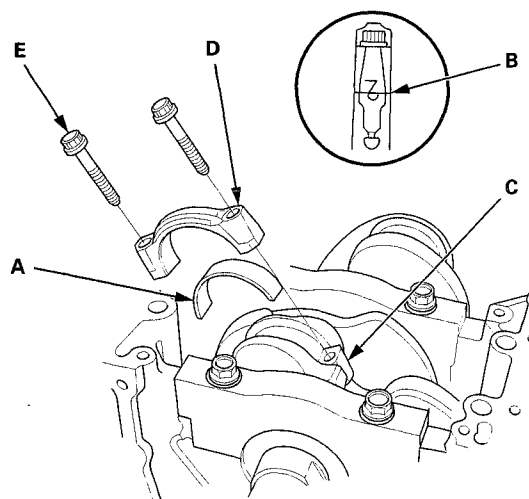
Point A — Point B = Difference in Diameter

Difference in Diameter

Specification: 0—0.1 mm (0—0.004 in)

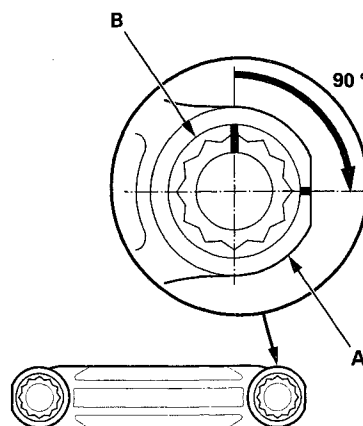
18. If the difference in diameter is out of tolerance, replace the connecting rod bolt.

19. Install the bearing (A), then line up the mark (B) on the connecting rod (C) and the rod cap (D).



20. Apply new engine oil to the bolt threads and flanges. Torque the bolts (E) to 20 N·m (2.0 kgf·m, 14 lbf·ft).

21. Mark the connecting rod (A) and the bolt head (B) as shown.



22. Tighten the bolt until the mark on the bolt head lines up with the mark on the connecting rod (turn the bolt 90°).

NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 16 of the procedure. Do not loosen it back to the specified angle. Repeat step 10 to 22 for the remaining cylinders.

(cont'd)

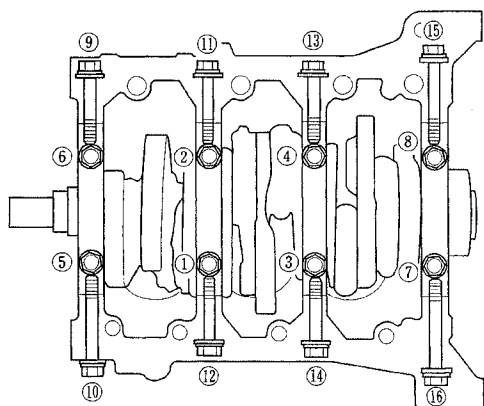
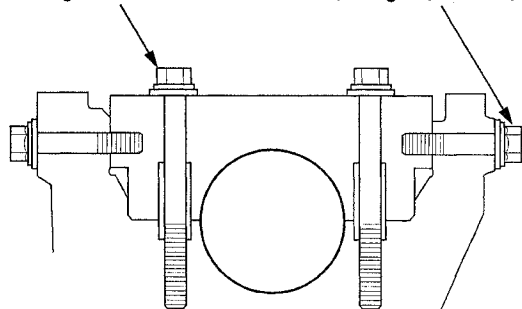
Engine Block

Crankshaft and Piston Installation (cont'd)

23. Tighten the bearing cap bolts, and then the bearing cap side bolts to the specified torque in the sequence as shown. Repeat the torque sequence again to ensure the bolts are properly torqued.

11 x 1.5 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

10 x 1.25 mm
49 N·m
(5.0 kgf·m, 36 lbf·ft)



24. Remove all of the old liquid gasket from the engine block end cover mating surfaces, the bolts, and the bolt holes.

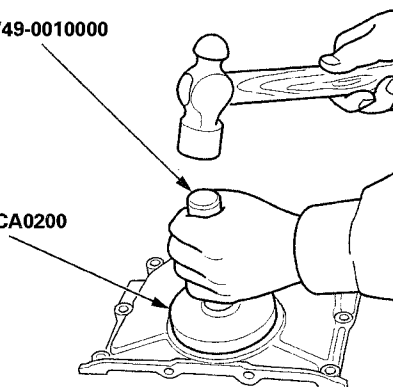
25. Clean and dry the engine block end cover mating surfaces.

26. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.

27. Using the driver handle, 15 x135 L and the oil seal driver attachment, 106 mm, drive in the new crankshaft oil seal until the oil seal driver attachment bottoms on the engine block end cover.

07749-0010000

070AD-RCA0200

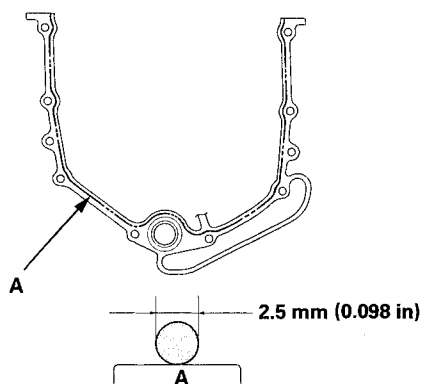




28. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the engine block mating surface of the engine block end cover and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

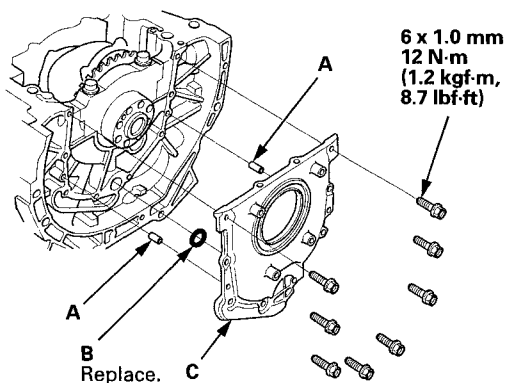
- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.



29. Install the dowel pins (A), a new O-ring (B), and the engine block end cover (C) on the engine block.

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 engine block end cover.



30. Clean the excess grease off the crankshaft, and check the seal for distortion.

31. Install a new crankshaft oil seal in the oil pump (see step 3 on page 8-18).

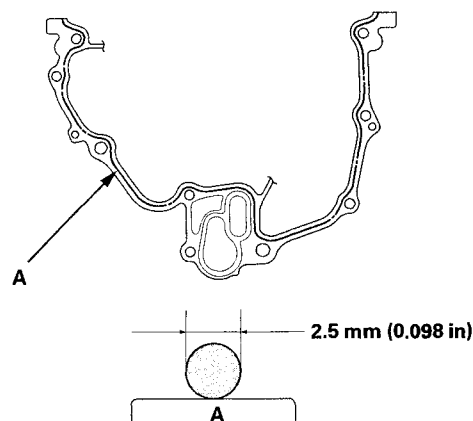
32. Remove all of the old liquid gasket from the oil pump mating surfaces, the bolts, and the bolt holes.

33. Clean and dry the oil pump mating surfaces.

34. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the engine block mating surface of the oil pump and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.

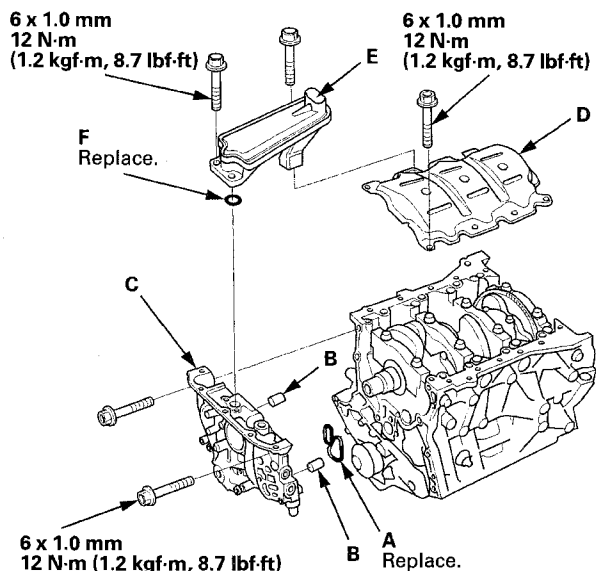


(cont'd)

Engine Block

Crankshaft and Piston Installation (cont'd)

35. Apply a light coat of new engine oil to the lip of the crankshaft oil seal, and apply new engine oil to the new O-ring (A).

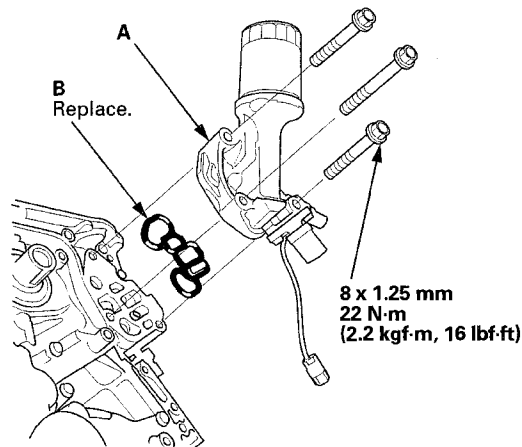


36. Install the dowel pins (B), then align the inner rotor with the crankshaft, and install the oil pump (C).
37. Clean the excess grease off the crankshaft, and check the seal for distortion.
38. Install the baffle plate (D), then install the oil strainer (E) with a new O-ring (F).

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 pump.

39. Install the rocker arm oil control solenoid/oil filter assembly (A), with a new rocker arm oil control solenoid filter (B).



40. Install the oil pan (see page 7-29).
41. Install the timing belt drive pulley to the crankshaft:
- J35Z6 engine (see page 6-27)
 - J37A4 engine (see page 6-90)
42. Install the cylinder heads:
- J35Z6 engine (see page 6-57)
 - J37A4 engine (see page 6-120)
43. M/T model: Install the flywheel (see page 12-19).
44. A/T model: Install drive plate (see page 14-223).
45. Install the transmission:
- Manual transmission (see page 13-28)
 - Automatic transmission (see page 14-223)
46. Install the engine/transmission (see page 5-12).

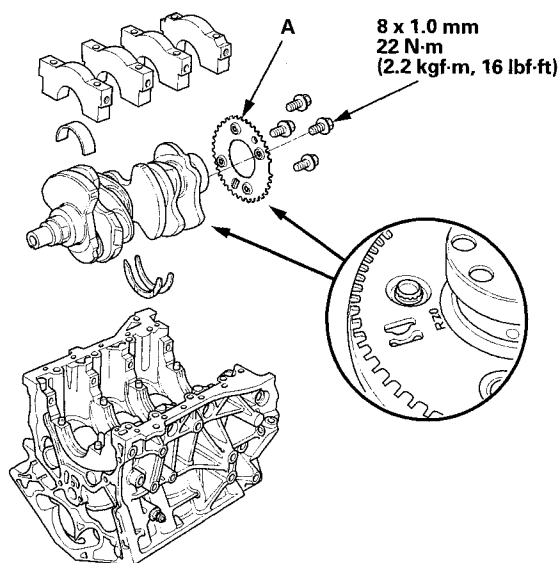
NOTE: When any crankshaft main or connecting rod bearing is replaced, run the engine at idle until it reaches normal operating temperature, then continue to run it for about 15 minutes.



CKP Pulse Plate Replacement

1. Remove the crankshaft from the engine block (see page 7-12).
2. Remove the crankshaft position (CKP) pulse plate (A) from the crankshaft.

NOTE: Be careful not to damage the journals and the CKP pulse plate.



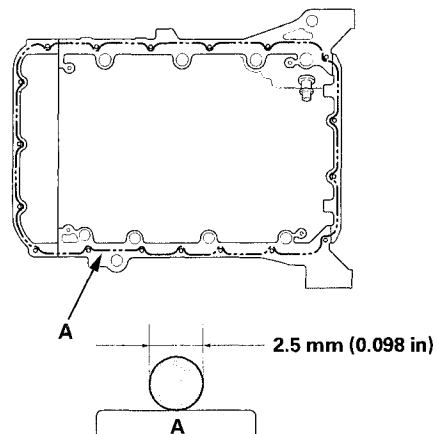
3. Install the CKP pulse plate in the reverse order of removal.

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 oil pan mating surface of the engine 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 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.



4. Install the oil pan on the engine block.

(cont'd)

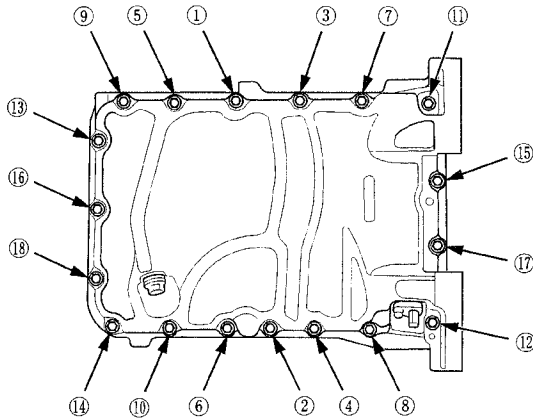
Engine Block

Oil Pan Installation (cont'd)

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).

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.

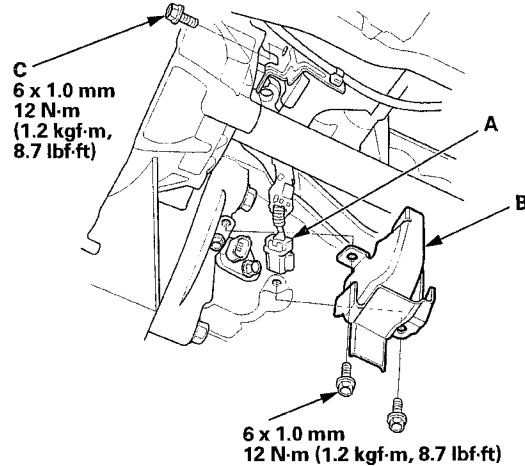


6. Tighten the four bolts (A) securing the transmission, then install the clutch/torque converter cover (B).

A
12 x 1.25 mm
74 N·m (7.5 kgf-m, 54 lbf-ft)

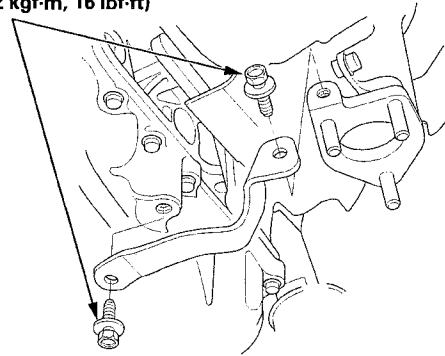
B
6 x 1.0 mm
12 N·m (1.2 kgf-m, 8.7 lbf-ft)

7. Connect the crankshaft position (CKP) sensor connector (A), then install the CKP sensor cover (B) and the bolt (C).



8. Install the rear warm up three way catalytic converter (rear WU-TWC) bracket.

8 x 1.25 mm
22 N·m
(2.2 kgf-m, 16 lbf-ft)



9. If the engine is still in the vehicle, do the following steps.
10. Install exhaust pipe A using new gaskets and new self-locking nuts (see step 40 on page 5-20).
11. Install the splash shield (see page 20-205).
12. Refill the engine with the recommended engine oil (see step 4 on page 8-12).

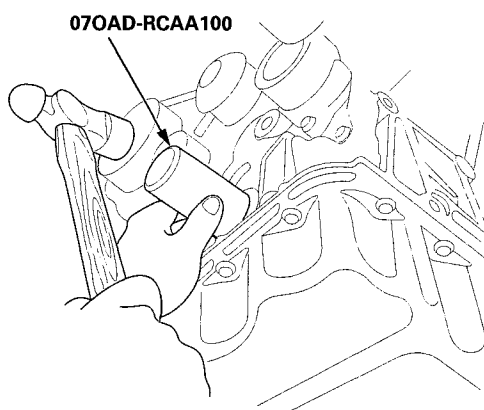


Pulley End Crankshaft Oil Seal Installation - In Car

Special Tools Required

Oil Seal Driver, 64 mm 07OAD-RCAA100

1. Remove the timing belt drive pulley:
 - J35Z6 engine (see page 6-27)
 - J37A4 engine (see page 6-90)
2. Remove the pulley end crankshaft oil seal.
3. Clean and dry the crankshaft oil seal housing.
4. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
5. Using the oil seal driver, 64 mm, drive in the new crankshaft oil seal until the oil seal driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft, and check that the oil seal lip is not distorted.



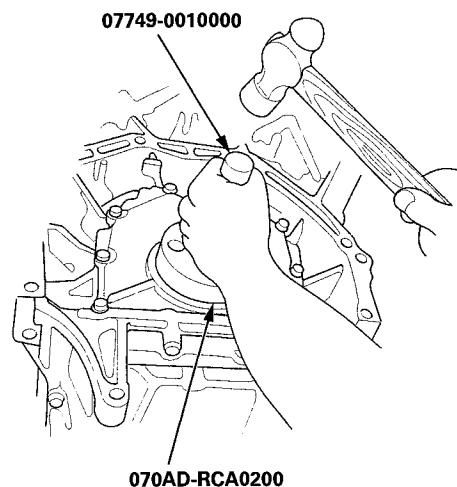
6. Install the timing belt drive pulley:
 - J35Z6 engine (see page 6-27)
 - J37A4 engine (see page 6-90)

Transmission End Crankshaft Oil Seal Installation - In Car

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Oil Seal Driver Attachment, 106 mm 070AD-RCA0200

1. M/T model: Remove the transmission (see page 13-18), and the flywheel (see page 12-19).
2. A/T model: Remove the transmission (see page 14-211), and the drive plate (see page 14-223).
3. Remove the transmission end crankshaft oil seal.
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. Using the driver handle, 15 x 135 L and the oil seal driver attachment, 106 mm, drive in the new crankshaft oil seal until the oil seal driver attachment bottoms against the engine block end cover. Align the hole in the oil seal driver attachment with the pin on the crankshaft.



7. Clean any excess grease off the crankshaft, and check that the oil seal lip is not distorted.
8. M/T model: Install the flywheel (see page 12-19), and the transmission (see page 13-28).
9. A/T model: Install the drive plate (see page 14-223), and the transmission (see page 14-223).

Engine Block

Sealing Bolt Installation

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

