

2011 Honda CR-Z

2011 - 12 ENGINE Cylinder Head - CR-Z

2011 - 12 ENGINE**Cylinder Head - CR-Z****SPECIAL TOOLS****SPECIAL TOOLS CHART**

Ref.No.	Tool Number	Description	Qty
(1)	070AJ-001A101	VCM Air Adapter	1
(2)	07742-0010100	Valve Guide Driver, 5.35 x 9.7 mm	1
(3)	07746-0010400	Bearing Driver Attachment, 52 x 55 mm	1
(4)	07749-0010000	Driver Handle, 15 x 135L	1
(5)	07757-PJ1010A	Valve Spring Compressor Attachment	1
(6)	07AAB-RJAA100	Crankshaft Pulley Holder	1
(7)	07AAJ-PNAA101	Air Pressure Regulator	1
(8)	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
(9)	07JAA-001020A	Socket, 19 mm	1
(10)	07JAB-001020B	Holder Handle	1
(11)	07PAD-0010000	Stem Seal Driver	1

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⑪	07PAD-0010000	Stem Seal Driver	1

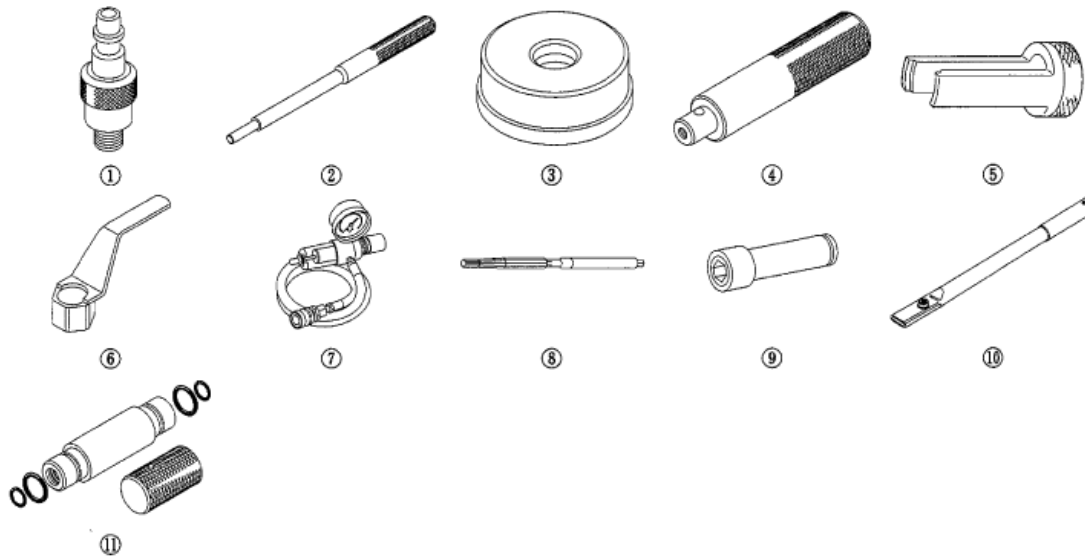


Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

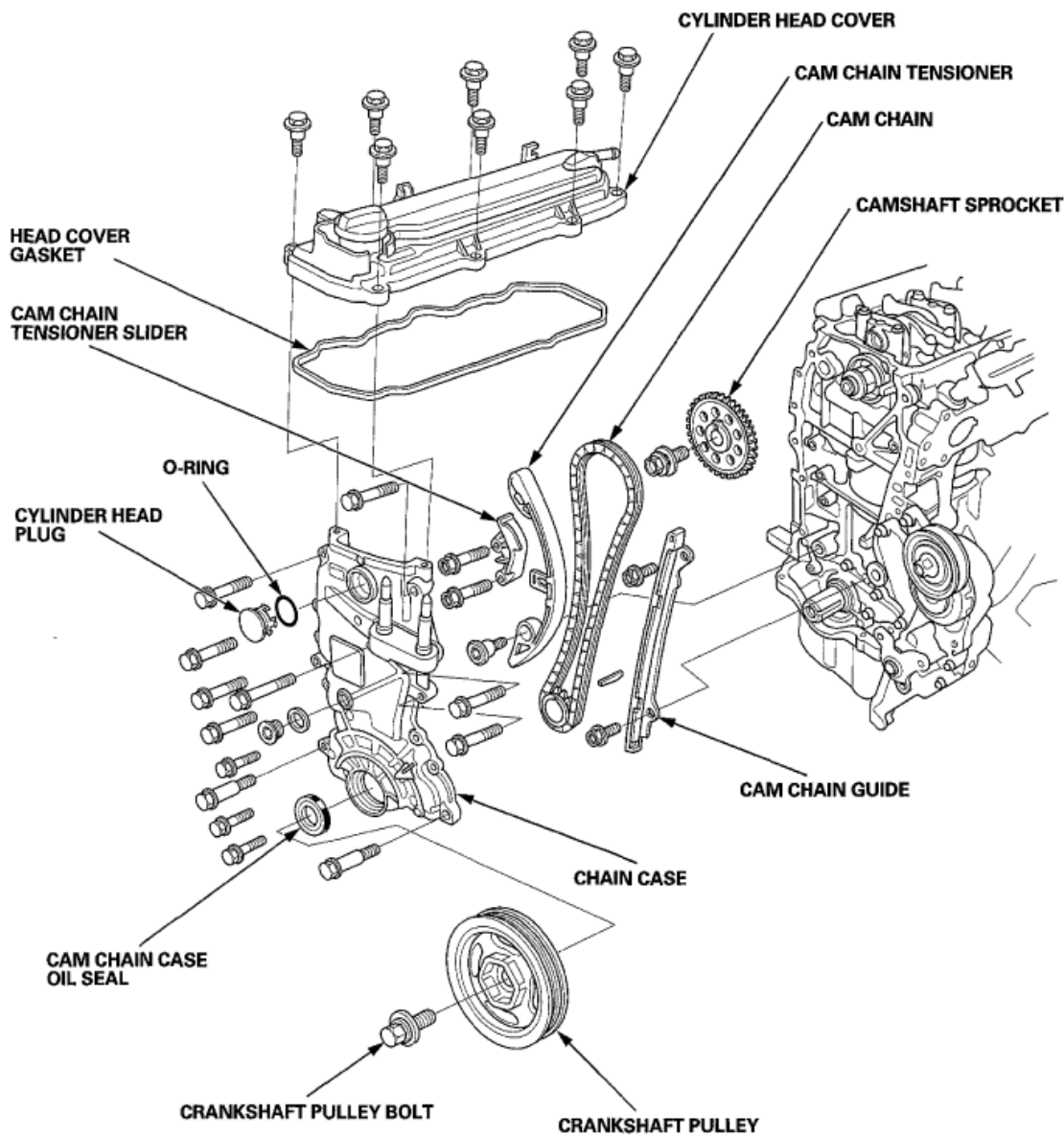


Fig. 2: Identifying Cylinder Head Component Location (1 Of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

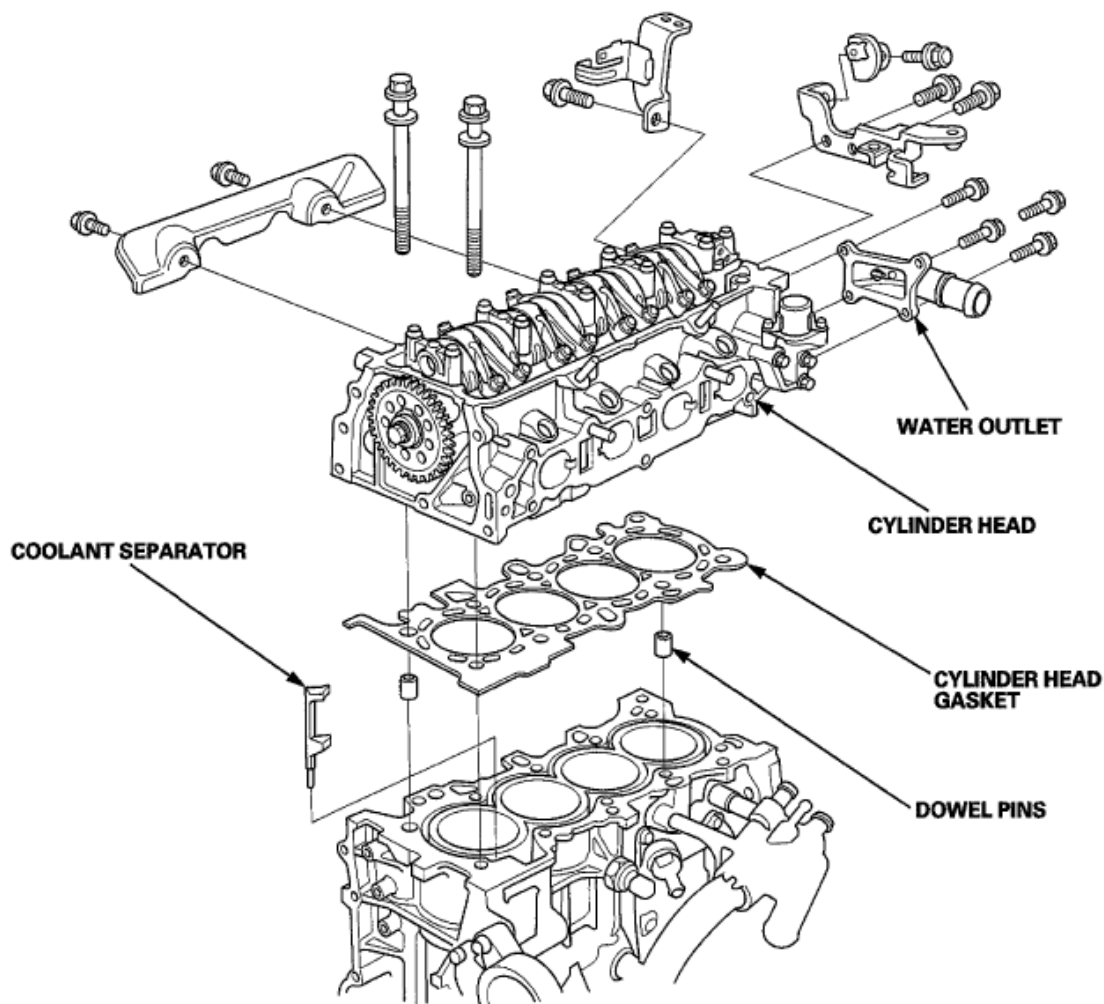


Fig. 3: Identifying Cylinder Head Component Location (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

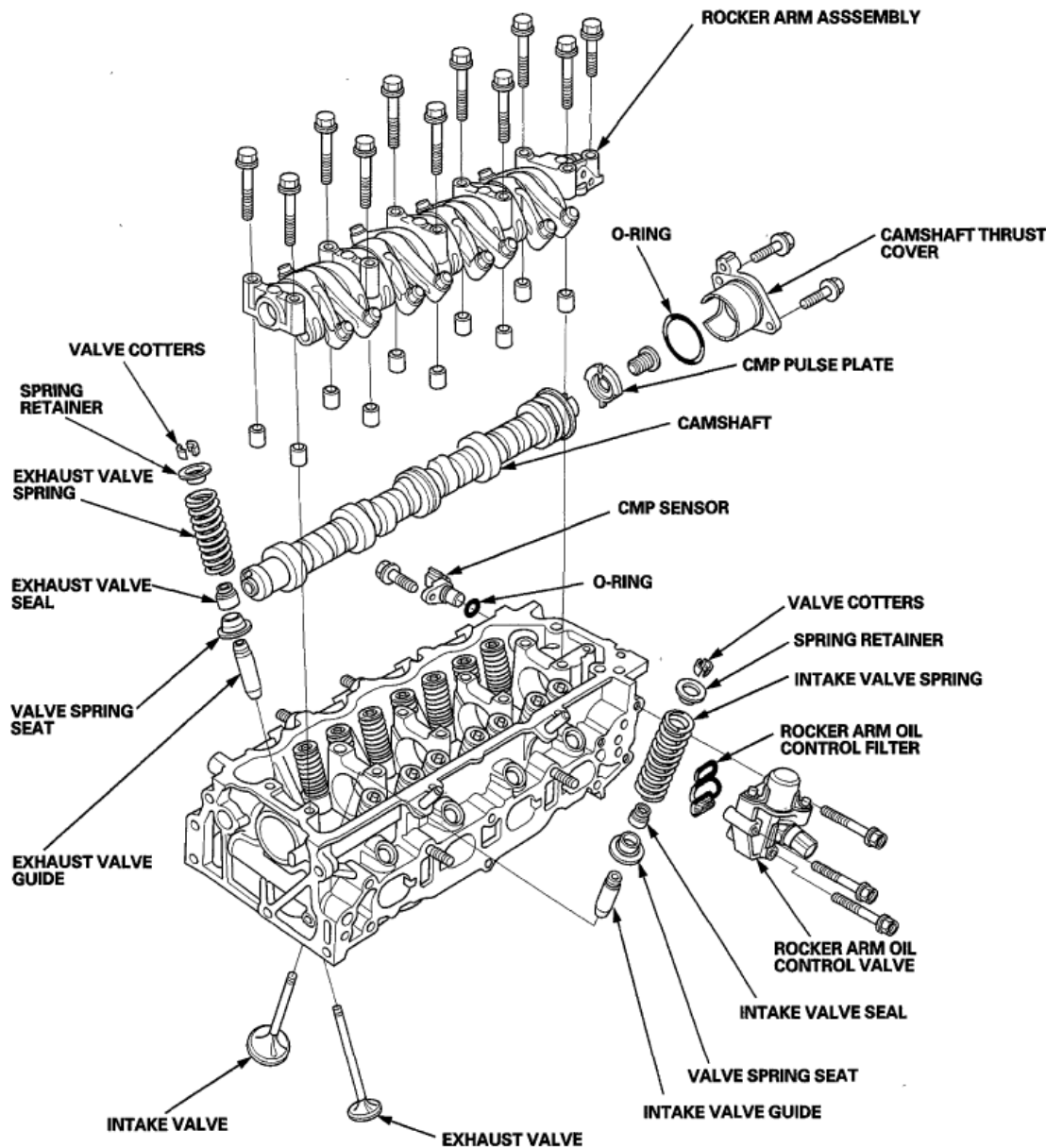


Fig. 4: Identifying Cylinder Head Component Location (3 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the ECM/PCM (see IF THE MIL DID NOT STAY ON). Otherwise the ECM/PCM will continue to stop the injectors from operating.

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0).

3. Connect the HDS to the DLC (see step 2 on **GENERAL TROUBLESHOOTING INFORMATION**).
4. Turn the ignition switch to ON (II).
5. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see **DLC CIRCUIT TROUBLESHOOTING**).
6. Select ALL INJECTORS STOP in the PGM-FI INSPECTION menu with the HDS.
7. Turn the ignition switch to LOCK (0).
8. Remove the four ignition coils and the four spark plugs (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
9. Attach the compression gauge to the spark plug hole.

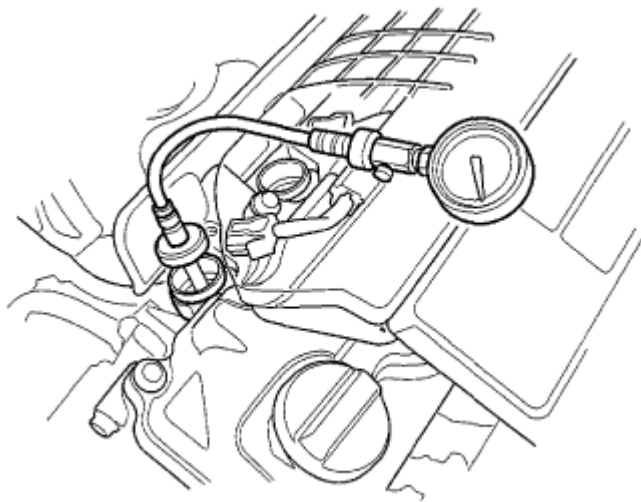


Fig. 5: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Turn the battery module switch OFF (see **DISCONNECTING THE IMA MOTOR POWER CABLE CONNECTOR FROM THE MOTOR STATOR**).
11. Step on the accelerator pedal to open the throttle fully, then crank the engine with the starter motor and measure the compression.

Compression Pressure

Above: 980 kPa (9.99 kgf/cm² , 142.1 psi)

12. Measure the compression on the remaining cylinders.

Maximum Variation:

Within 200 kPa (2.04 kgf/cm² , 29.0 psi)

13. If the compression is not within specifications, perform a cylinder leak down test to determine the problem area. Then check the following items, and remeasure the compression.

- Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats
 - Damaged cylinder head gasket
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore
14. Remove the compression gauge from the spark plug hole.
 15. Install the four spark plugs and the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
 16. Select ECM/PCM reset (see **IF THE MIL DID NOT STAY ON**) in the PGM-FI INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.
 17. Turn the battery module switch ON (see **DISCONNECTING THE IMA MOTOR POWER CABLE CONNECTOR FROM THE MOTOR STATOR**).

VTEC ROCKER ARM TEST

Special Tools Required

- Air Pressure Regulator 07AAJ-PNAA101
 - VCM Air Adapter 070AJ-001A101
1. Start the engine, and let it run for 5 minutes, then turn the ignition switch to LOCK (0).
 2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
 3. Rotate the crankshaft clockwise, and visually check that all the primary rocker arms (A) and secondary rocker arms (B) move freely.
 - If the primary rocker arm and secondary rocker arm move together, remove the primary and secondary rocker arms as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If all the primary rocker arms and secondary rocker arms move freely, go to step 4.

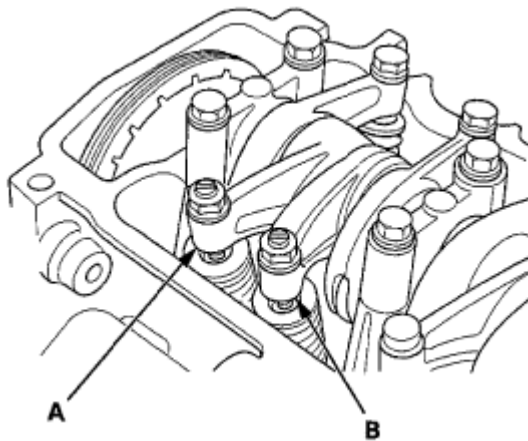


Fig. 6: Locating Primary Rocker Arms And Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Check that the air pressure on the shop air compressor gauge indicates over 340 kPa (3.47 kgf/cm² , 49.3 psi).
5. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
6. Install the VCM air adapter (A) to the inspection hole, then connect the air pressure regulator (B).

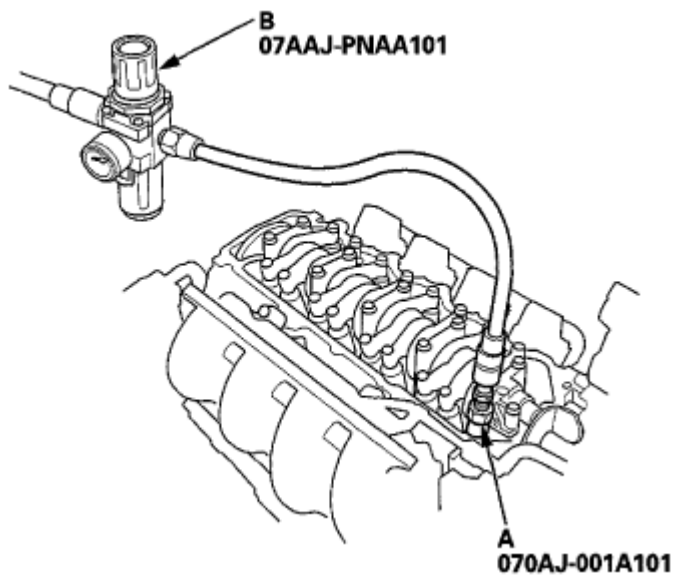


Fig. 7: Installing VCM Air Adapter To Inspection Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Loosen the valve on the regulator, and apply the specified air pressure.

Specified Air Pressure:

340 kPa (3.47 kgf/cm² , 49.3 psi)

8. With the specified air pressure applied, rotate the crankshaft clockwise, and visually check that all the primary rocker arms (A) and the secondary rocker arms (B) move together.

If the primary rocker arm and secondary rocker arm move freely and independently of each other, remove the primary and secondary rocker arms as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, and test.

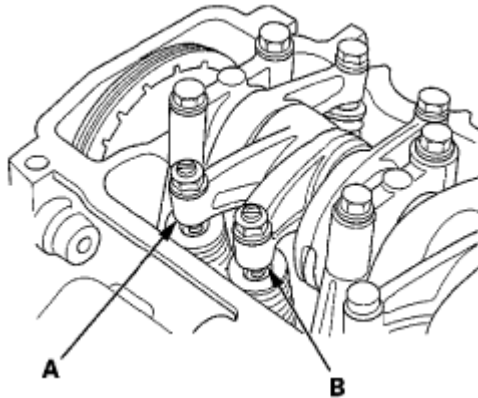


Fig. 8: Locating Primary Rocker Arms And Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the air pressure regulator and the VCM air adapter.
10. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

VALVE CLEARANCE ADJUSTMENT

NOTE: Connect the HDS to the DLC (see step 2 on **GENERAL TROUBLESHOOTING INFORMATION**), and monitor ECT sensor 1. Adjust the valve clearance only when the ECT is less than 100°F (38°C).

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

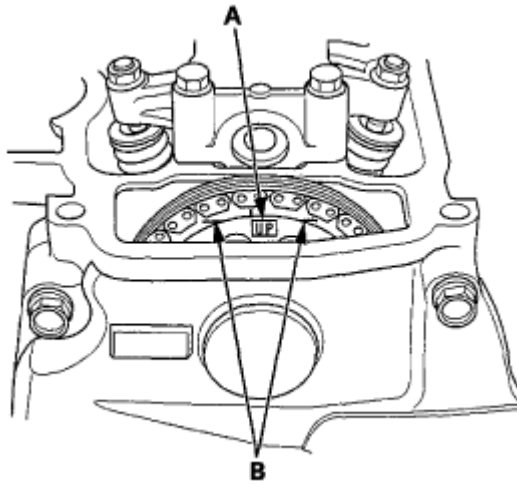


Fig. 9: Locating UP Mark On Camshaft Sprocket And TDC Grooves On Camshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the correct feeler gauge for the valve clearance you are going to check.

Valve Clearance

Intake: 0.15-0.19 mm (0.006-0.007 in)

Exhaust: 0.26-0.30 mm (0.010-0.011 in)

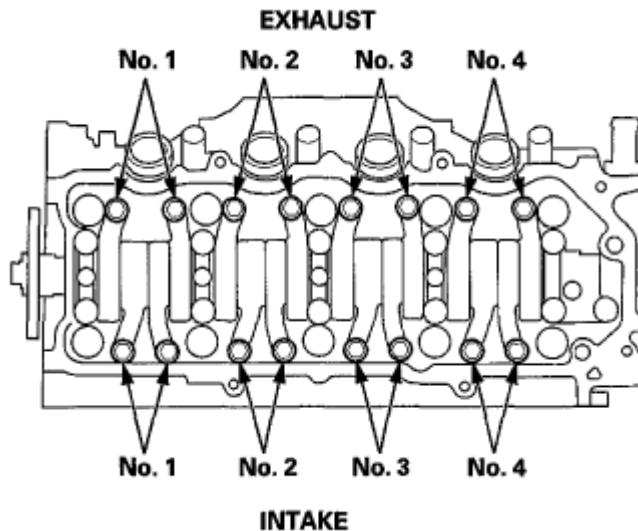


Fig. 10: Locating Valve Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the feeler gauge (A) between the adjusting screw and the end of the valve stem on No. 1 cylinder, and slide it back and forth; you should feel a slight amount of drag.

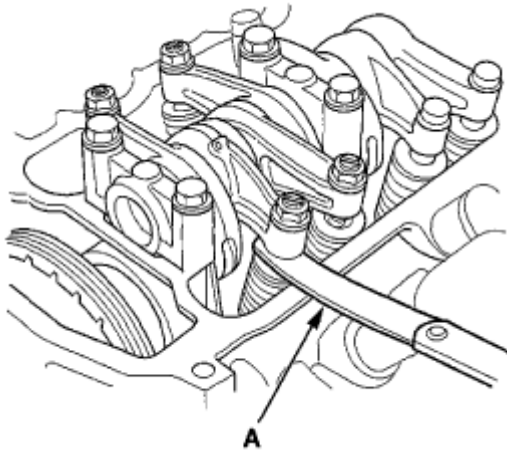


Fig. 11: Inserting Feeler Gauge Between Adjusting Screw And End Of Valve Stem On No. 1 Cylinder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. If you feel too much or too little drag, loosen the locknut, and turn the adjusting screw (A) until the drag on the feeler gauge is correct.

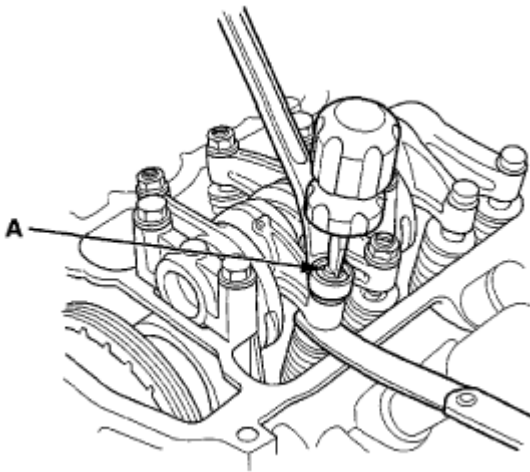


Fig. 12: Turning Adjusting Screw Until Drag On Feeler Gauge

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. While holding the adjusting screw with the screw driver, tighten the locknut, then recheck the clearance. Repeat the adjustment, if necessary.

Specified Torque

14 N.m (1.4 kgf.m, 10 lbf.ft)

Apply new engine oil to the nut threads.

7. Rotate the crankshaft clockwise. Align the No. 3 piston TDC groove (A) on the camshaft sprocket with

the top edge of the head.

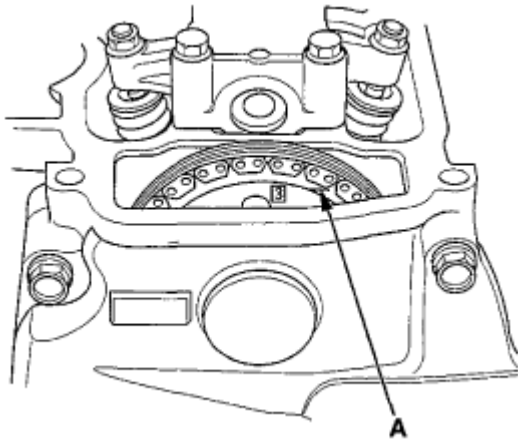


Fig. 13: Aligning No. 3 Piston TDC Groove On Camshaft Sprocket With Top Edge Of Head
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.
9. Rotate the crankshaft clockwise. Align the No. 4 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

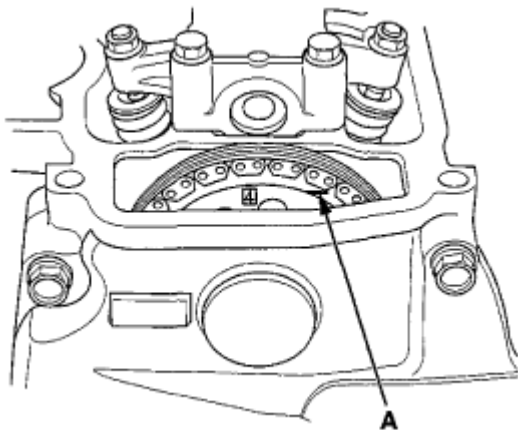


Fig. 14: Aligning No. 4 Piston TDC Groove On Camshaft Sprocket With Top Edge Of Head
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.
11. Rotate the crankshaft clockwise. Align the No. 2 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

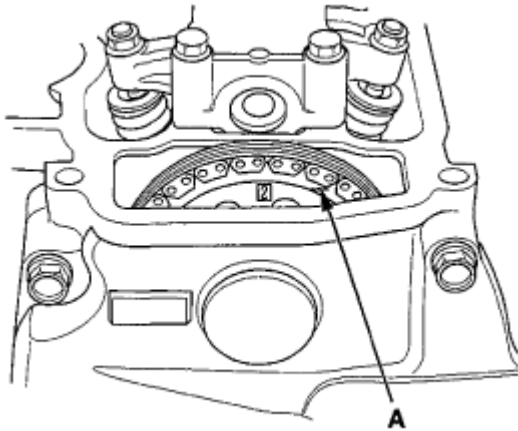


Fig. 15: Aligning No. 2 Piston TDC Groove On Camshaft Sprocket With Top Edge Of Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.
13. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder Handle 07JAB-001020B
- Crankshaft Pulley Holder 07AAB-RJAA100
- Socket, 19 mm 07JAA-001020A or equivalent

REMOVAL

1. Raise the vehicle on the lift.
2. Remove the right front wheel.
3. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
4. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
5. Hold the pulley with the holder handle (A) and the crankshaft pulley holder (B).

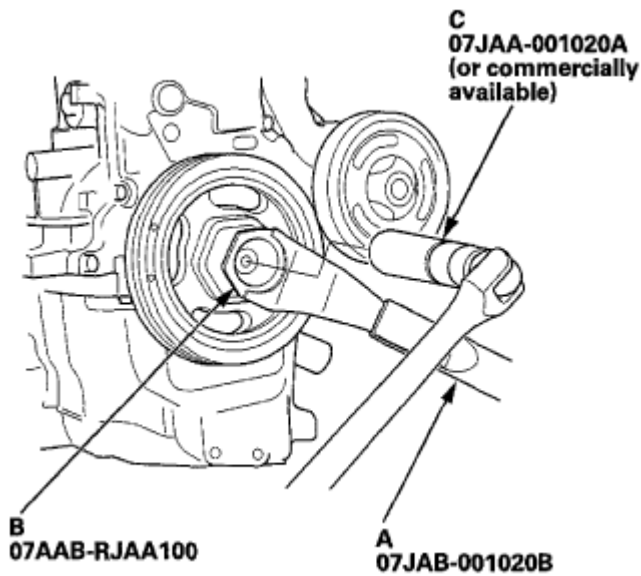


Fig. 16: Holding Pulley With Holder Handle And Crankshaft Pulley Holder
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the bolt with a socket, 19 mm (C) and a breaker bar, then remove the crankshaft pulley.

INSTALLATION

1. Remove any oil and clean the crankshaft pulley (A), the crankshaft (B), the bolt (C), and the washer (D). Lubricate with new engine oil as shown.

○: Clean

●: Lubricate with new engine oil

○: Clean
 ●: Lubricate with new engine oil

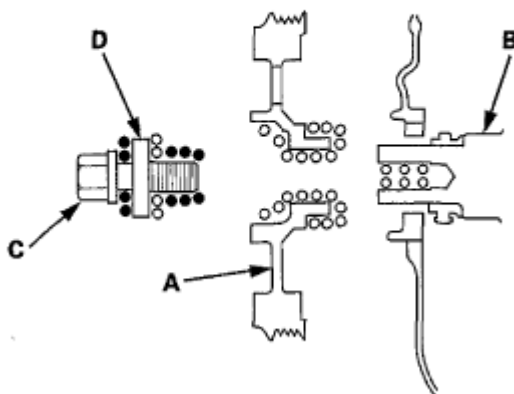


Fig. 17: Cleaning Crankshaft Pulley, Crankshaft, Bolt And Washer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley.
3. When a new crankshaft or a new pulley bolt is installed: Tighten the crankshaft pulley bolt. Do not use an impact wrench.
 1. Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), torque the bolt to 177 N.m (18.0 kgf.m, 130 lbf.ft) with a torque wrench and a socket (C), then remove the bolt.
 2. Torque the bolt to 39 N.m (4.0 kgf.m, 29 lbf.ft) with a torque wrench and a socket.
 3. Tighten the bolt an additional 94°.

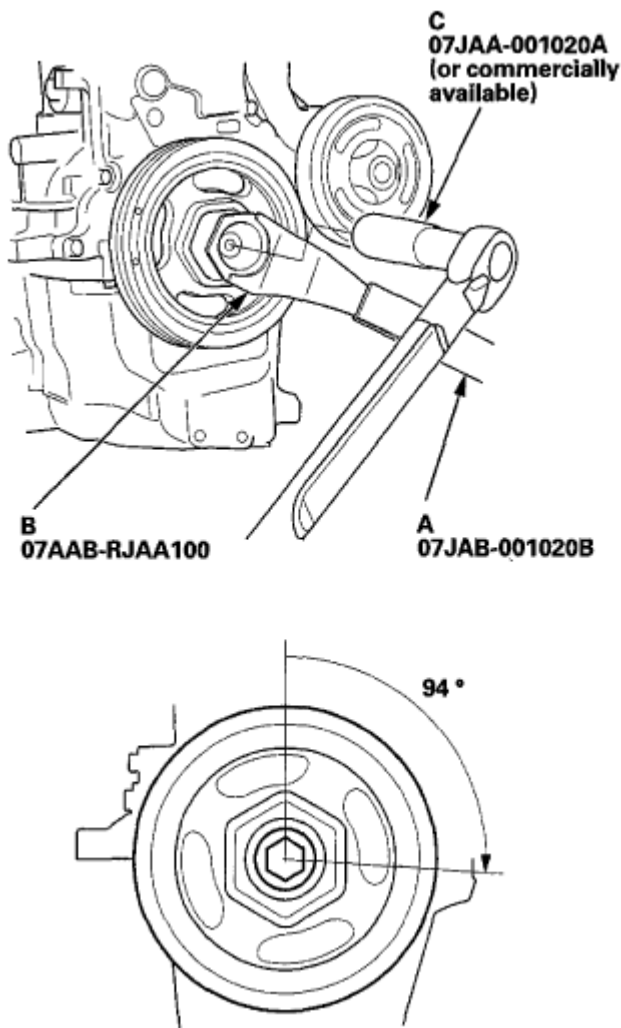


Fig. 18: Tightening Crankshaft Pulley Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. When the crankshaft or the pulley bolt is reused: Tighten the crankshaft pulley bolt. Do not use an impact wrench.
 1. Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), then torque the bolt to 37 N.m (3.8 kgf.m, 27 lbf.ft) with a torque wrench and a socket (C).

2. Mark the bolt head (D) and the crankshaft pulley (E) as shown, then tighten the bolt an additional 90° (the mark on the bolt head lines up with the mark on the crankshaft pulley).

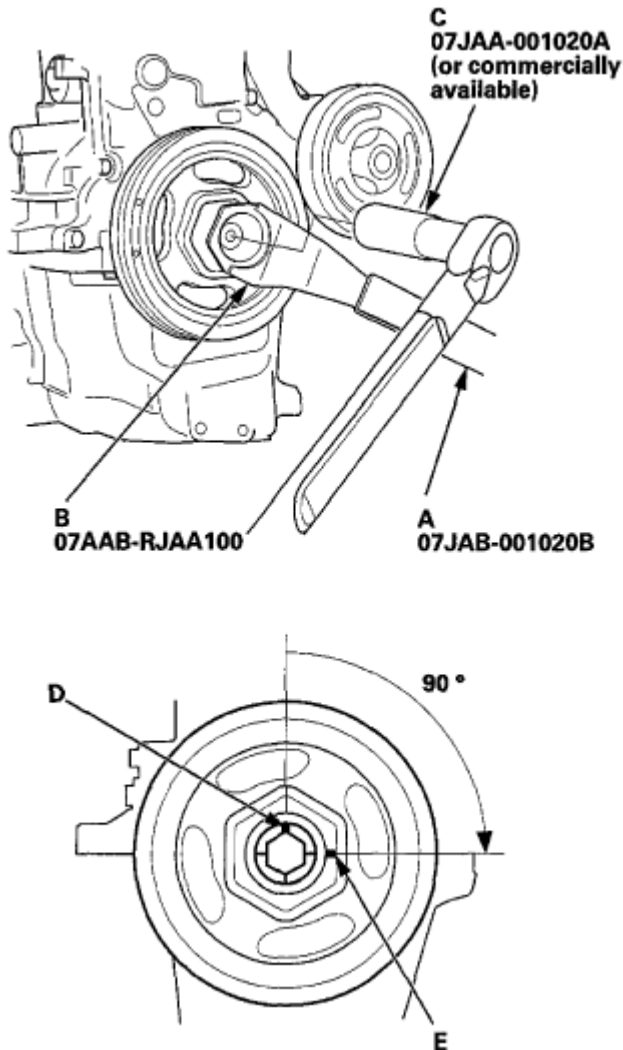


Fig. 19: Tightening Crankshaft Pulley Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
6. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
7. Install the right front wheel.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

1. Turn the crankshaft pulley so its top dead center (TDC) mark (A) lines up with the pointer (B).

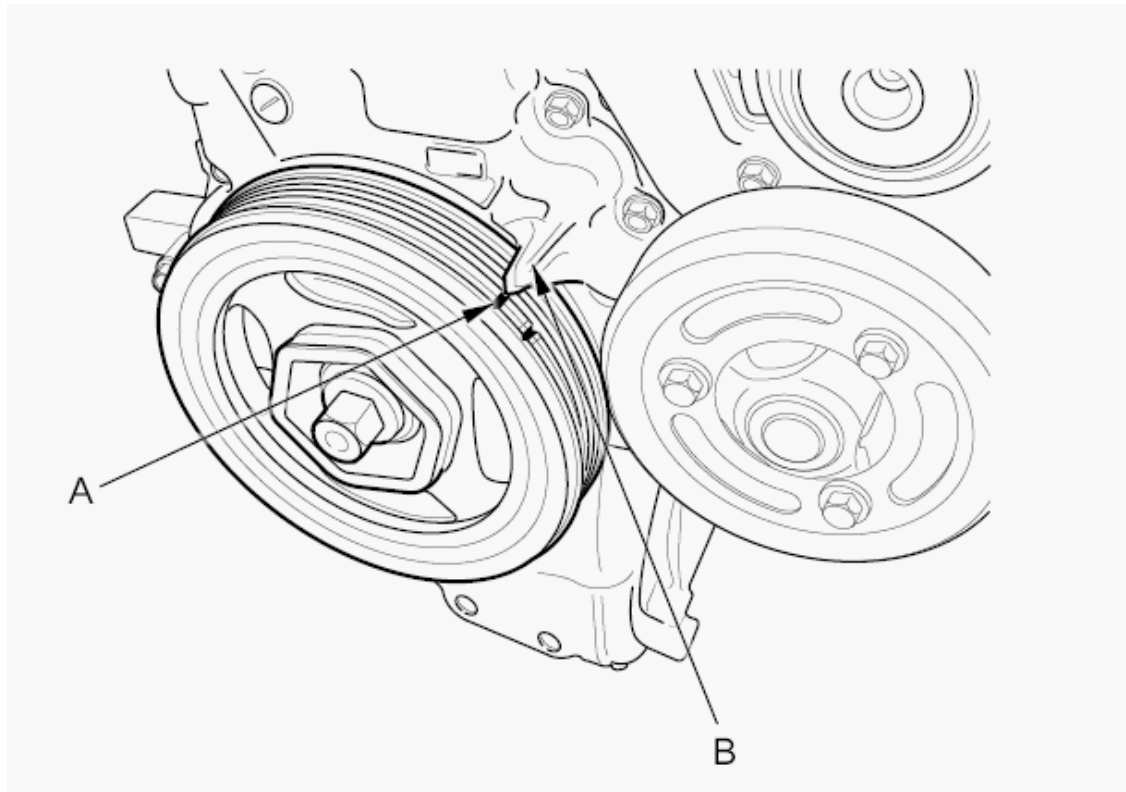


Fig. 20: Identifying Crankshaft Pulley To Top Dead Center (TDC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
3. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

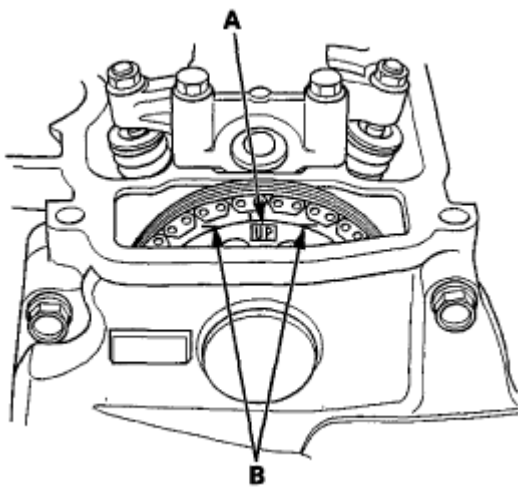


Fig. 21: Locating UP Mark On Camshaft Sprocket And TDC Grooves On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the right front wheel.

5. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
6. Loosen the water pump pulley mounting bolts.

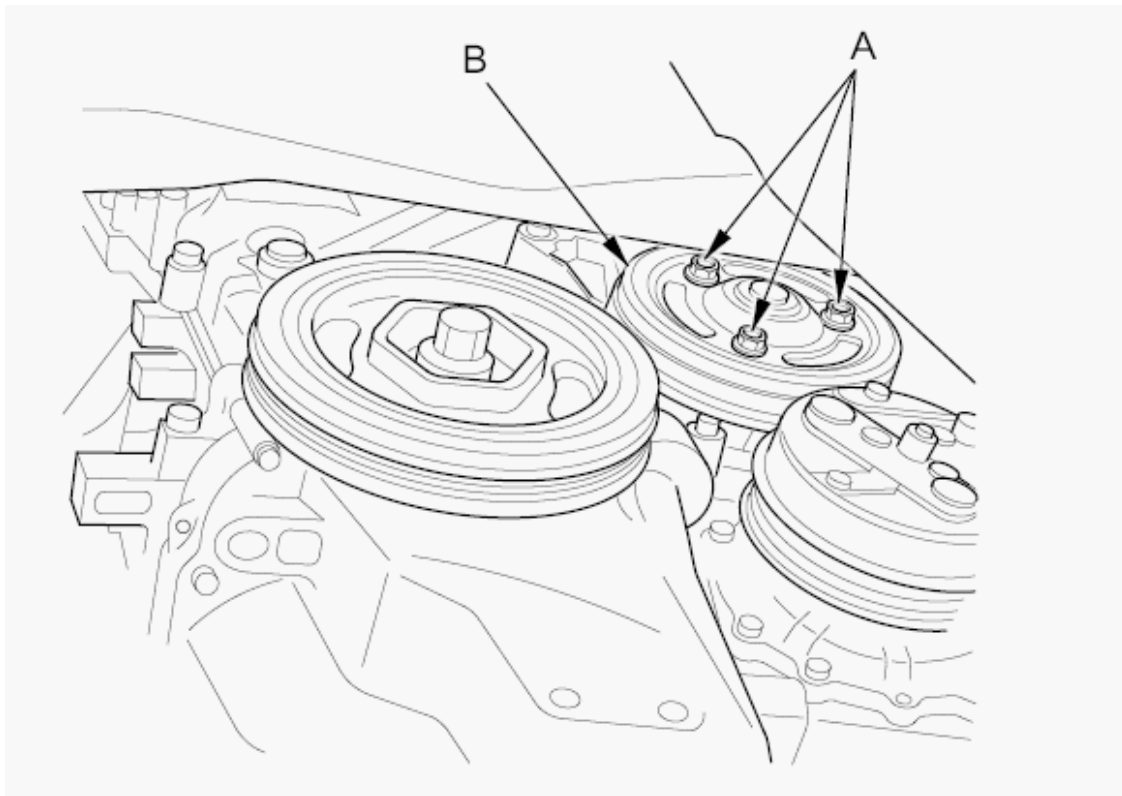


Fig. 22: Identifying Water Pump Pulley Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
8. Remove the water pump pulley (see step 6 on **WATER PUMP REPLACEMENT**).
9. Remove the crankshaft pulley (see **REMOVAL**).
10. Remove the A/C line bracket mounting bolt.

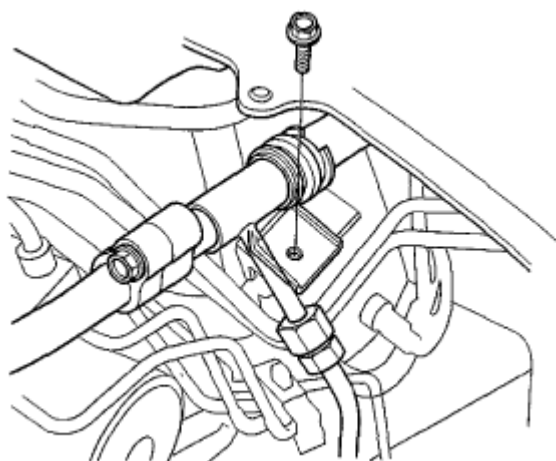


Fig. 23: Locating A/C Line Bracket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Support the engine with a jack and a wood block under the oil pan.
12. Remove the ground cable (A), then remove the side engine mount/bracket assembly (B).

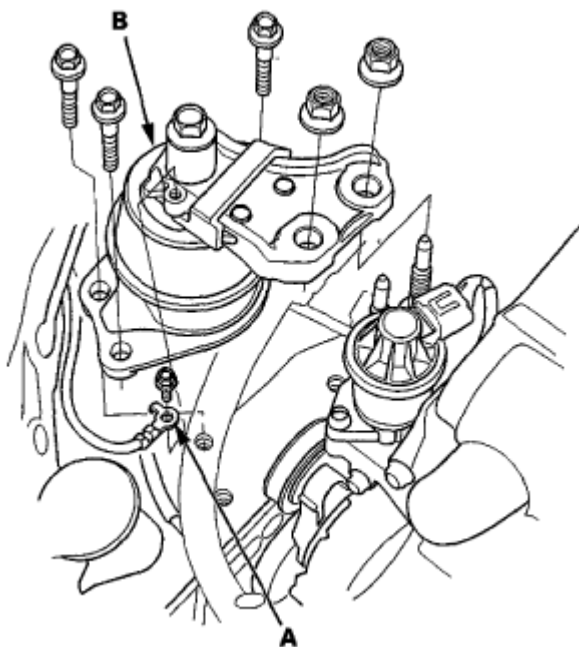


Fig. 24: Locating Ground Cable And Side Engine Mount/Bracket Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the cam chain case.

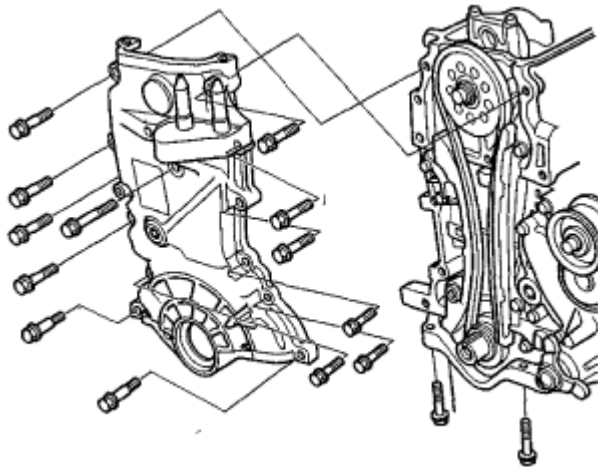


Fig. 25: Identifying Cam Chain Case

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Measure the cam chain separation. If the distance is less than the service limit, replace the cam chain and the cam chain tensioner.

Standard Distance: 19 mm (0.75 in)

Service Limit: 15 mm (0.59 in)

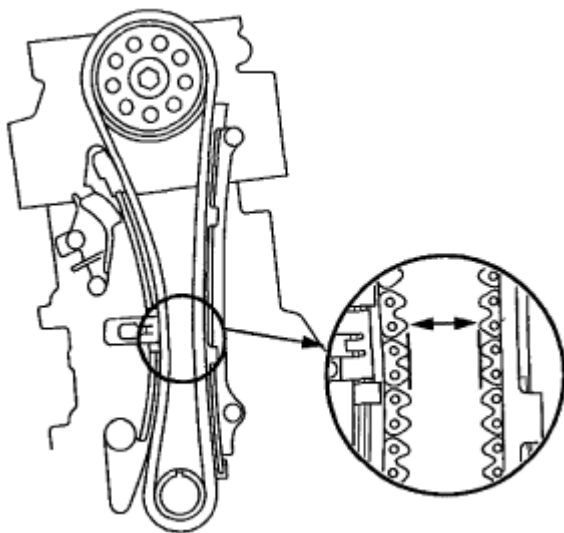


Fig. 26: Measuring Cam Chain Separation

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Apply new engine oil to the sliding surface of the cam chain tensioner slider (A).

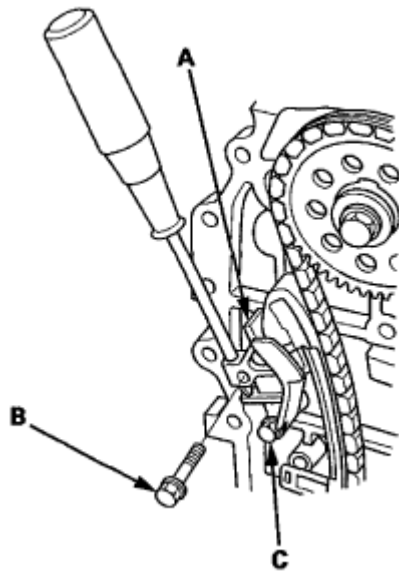


Fig. 27: Applying Engine Oil To Sliding Surface Of Cam Chain Tensioner Slider
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Hold the cam chain tensioner slider with a screwdriver, then remove the upper bolt (B), and loosen the lower bolt (C).
17. Remove the cam chain tensioner slider.

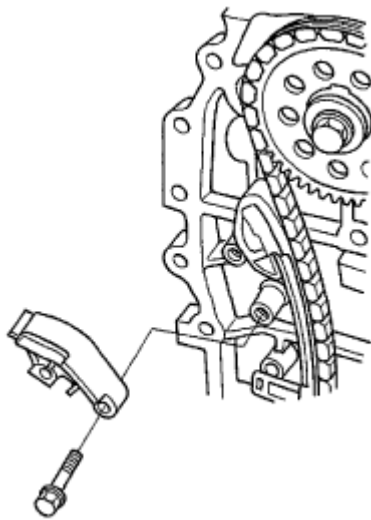


Fig. 28: Identifying Cam Chain Tensioner Slider
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the cam chain tensioner (A) and the cam chain guide (B).

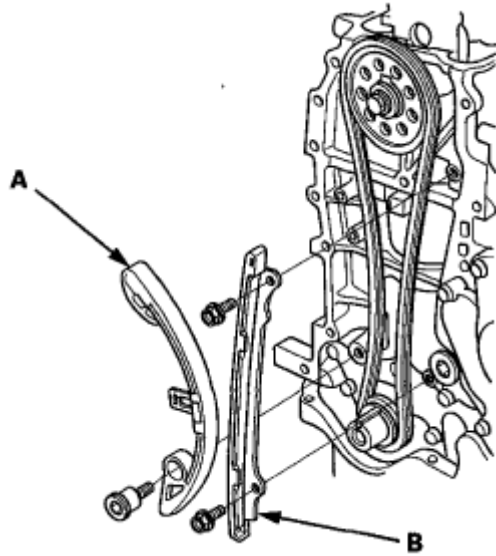


Fig. 29: Locating Cam Chain Tensioner And Cam Chain Guide
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the oil pump.

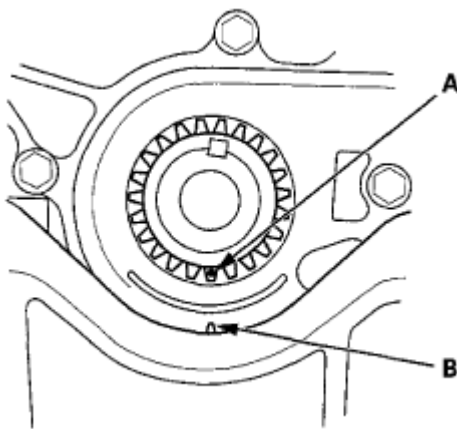


Fig. 30: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Oil Pump
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the crankshaft sprocket.
3. Set the camshaft to TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC

grooves (B) on the camshaft sprocket should line up with the top edge of the head.

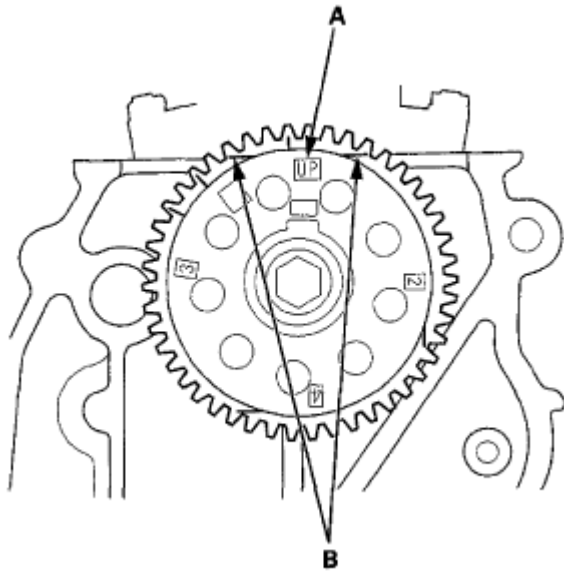


Fig. 31: Locating UP Mark On Camshaft Sprocket And TDC Grooves On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the TDC mark (B) on the crankshaft sprocket, then install the crankshaft sprocket with the special key (C) to the crankshaft.

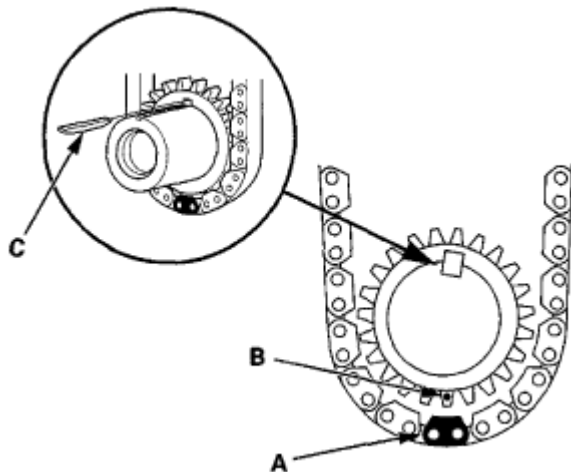


Fig. 32: Installing Crankshaft Sprocket With Special Key To Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cam chain on the camshaft sprocket with the pointers (A) aligned with the three colored pieces (B) as shown.

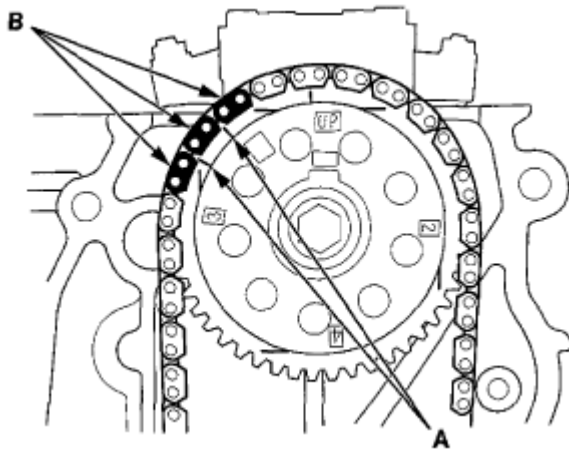


Fig. 33: Aligning Camshaft Sprocket With Pointers With Three Colored Pieces
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cam chain tensioner (A) and the cam chain guide (B).

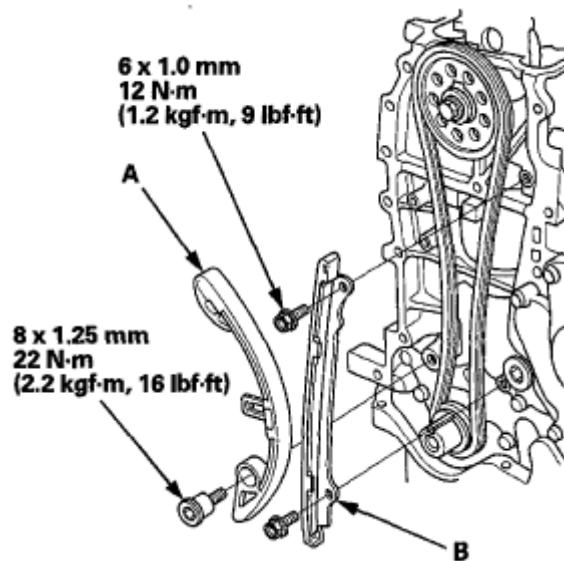


Fig. 34: Locating Cam Chain Tensioner And Cam Chain Guide With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cam chain tensioner slider, and loosely install the bolt.

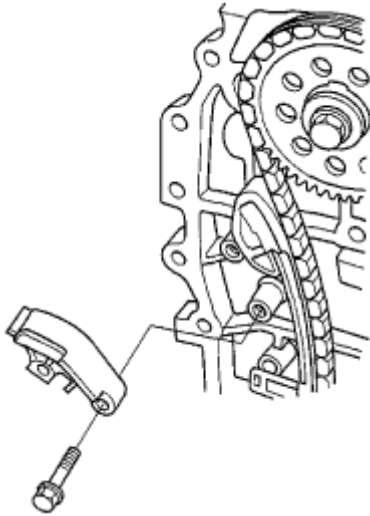


Fig. 35: Locating Cam Chain Tensioner Slider And Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Apply new engine oil to the sliding surface of the cam chain tensioner slider (A).

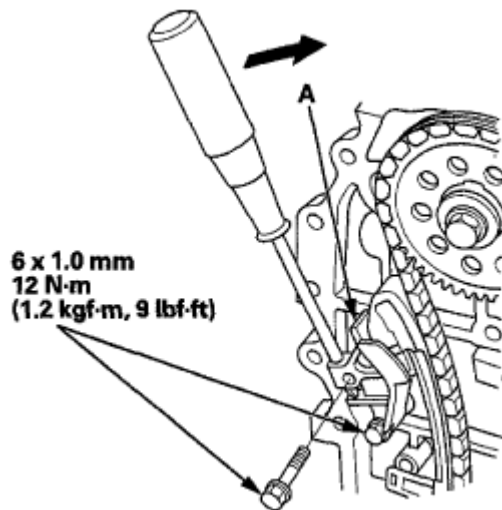


Fig. 36: Rotating Cam Chain Tensioner Slider Clockwise To Compress Cam Chain Tensioner With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Rotate the cam chain tensioner slider clockwise to compress the cam chain tensioner, and install the remaining bolt, then tighten the bolts to the specified torque.
10. Check the cam chain case oil seal for damage. If the oil seal is damaged, replace the cam chain case oil seal (see **CAM CHAIN CASE OIL SEAL INSTALLATION**).
11. Remove all of the old liquid gasket from the cam chain case mating surfaces, the bolts, and the bolt holes.
12. Clean and dry the cam chain case mating surfaces.
13. Apply liquid gasket (P/N 08718-0004) to the cylinder head and the engine block mating surfaces of the

chain case and to the inside edge of the 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).
- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket to the upper surface contact areas of the engine block (B).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

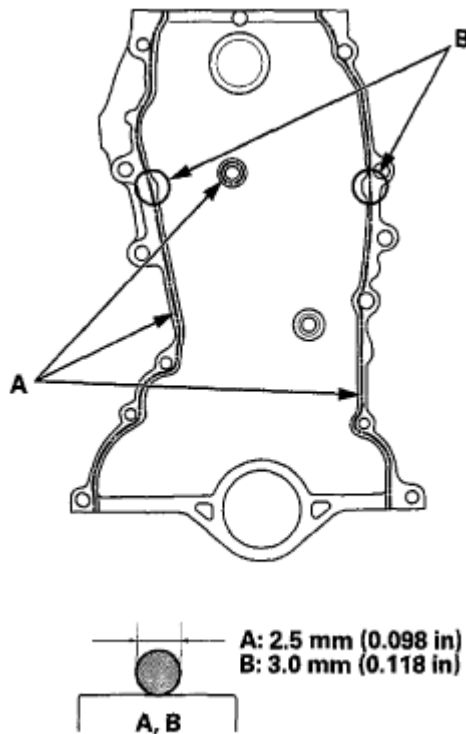


Fig. 37: Applying 3.0 mm (0.118 in) Diameter Bead Of Liquid Gasket To Upper Surface Contact Areas Of Engine Block
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Apply liquid gasket (P/N 08718-0004) to the oil pan mating surface of the chain case and to the inside edge of the 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).
- Apply a 5.0 mm (0.197 in) diameter bead of liquid gasket to the shaded area (B).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

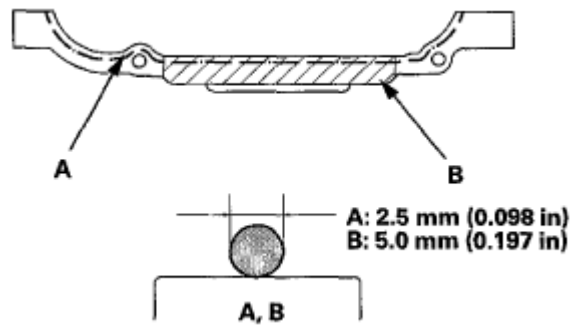


Fig. 38: Applying 2.5 mm (0.098 in) Diameter Bead Of Liquid Gasket Along Broken Line
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Set the edge of the chain case (A) on the edge of the oil pan (B), then install the chain case on the engine block (C).

NOTE:

- When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the chain case.

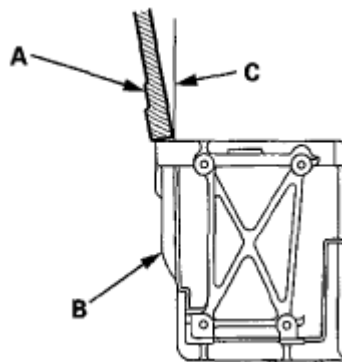


Fig. 39: Setting Edge Of Chain Case On Edge Of Oil Pan
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Tighten the chain case mounting bolts. Wipe off the excess liquid gasket from the oil pan and the chain case mating area.

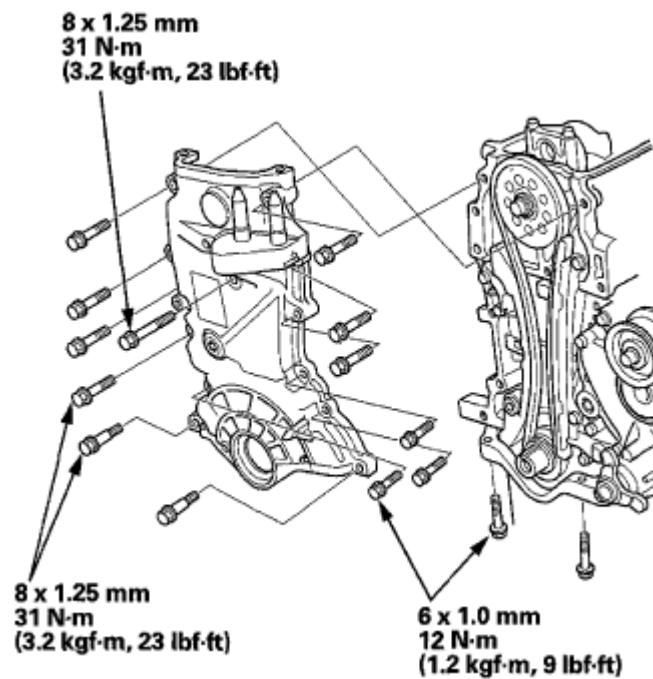


Fig. 40: Identifying Chain Case Mounting Bolts Tighten With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
18. Install the side engine mount/bracket assembly (A), then tighten the new side engine mount/bracket assembly mounting bolts (B).

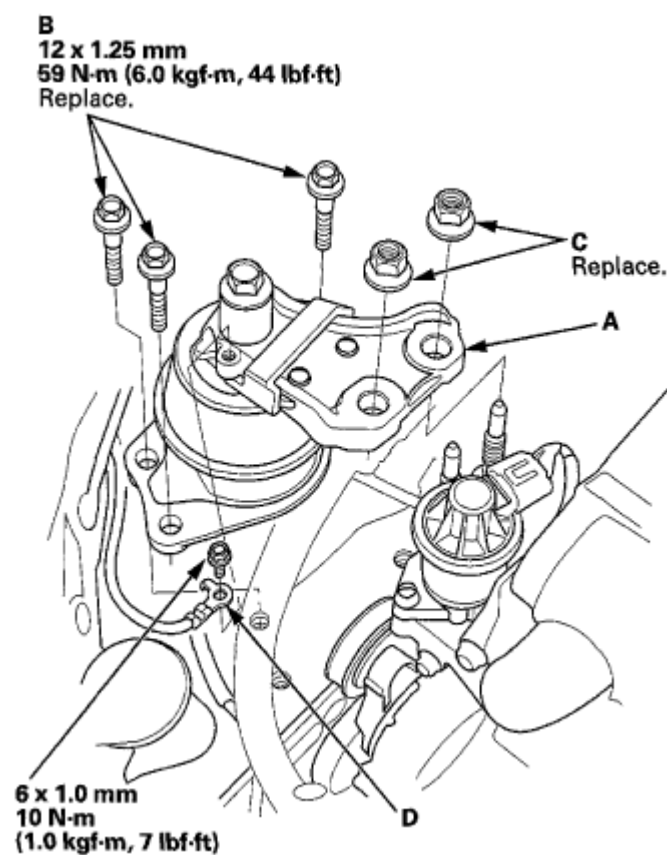


Fig. 41: Locating Side Engine Mount/Bracket Assembly And Side Engine Mount/Bracket Assembly Mounting Bolts With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Loosely install the new side engine mount/bracket assembly mounting nuts (C).
20. Install the ground cable (D).
21. Remove the jack and the wood block.
22. Remove the air cleaner (see **AIR CLEANER ELEMENT INSPECTION/REPLACEMENT**).
23. Loosen the transmission mount bracket mounting bolts and nuts (A).

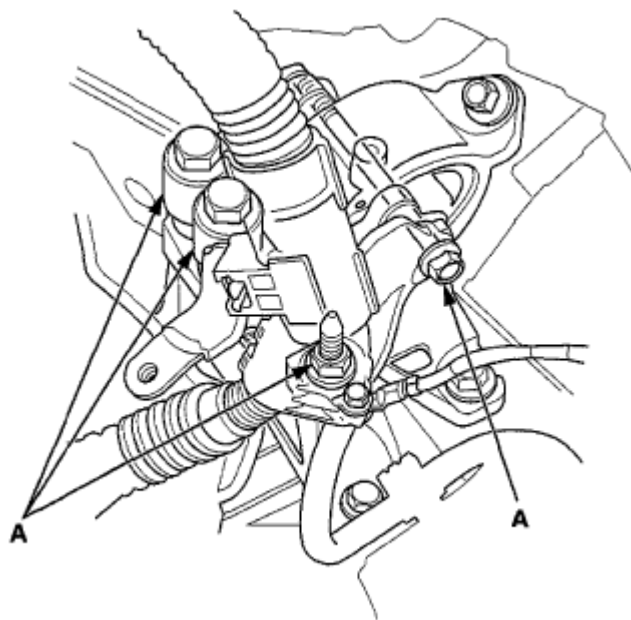


Fig. 42: Locating Transmission Mount Bracket Mounting Bolts And Nuts (M/T Model)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

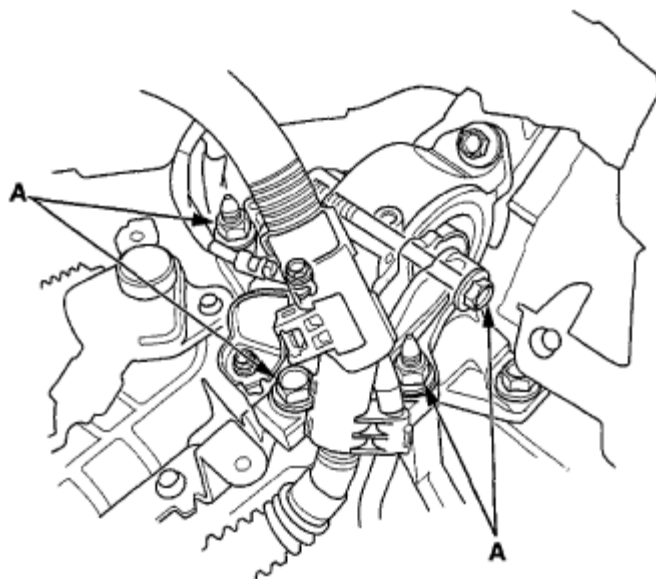


Fig. 43: Locating Transmission Mount Bracket Mounting Bolts And Nuts (CVT Model)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Raise the vehicle on the lift.
25. Loosen the torque rod mounting bolt and nut (A).

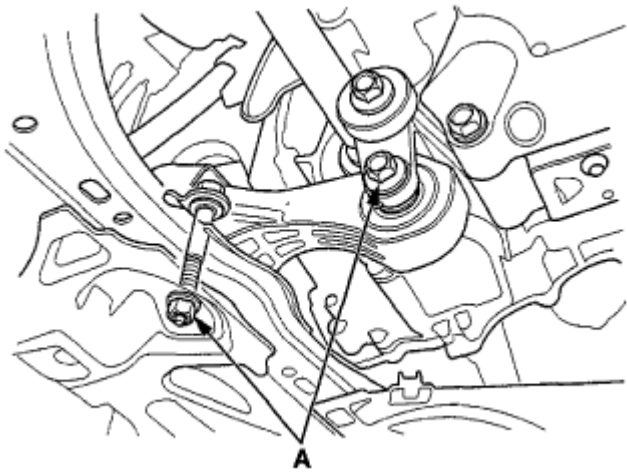


Fig. 44: Locating Torque Rod Mounting Bolt And Nut (M/T Model)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

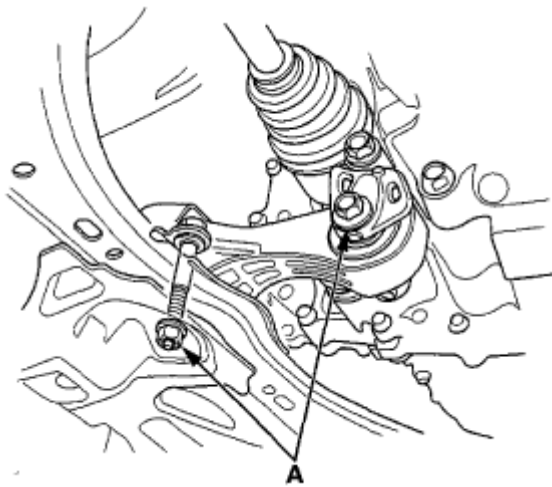


Fig. 45: Locating Torque Rod Mounting Bolt And Nut (CVT Model)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Lower the vehicle on the lift.
27. Tighten the side engine mount/bracket assembly mounting nuts.

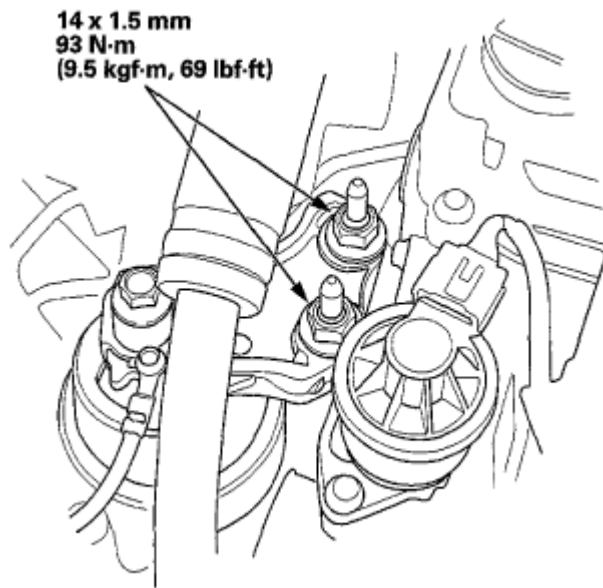


Fig. 46: Identifying Side Engine Mount/Bracket Assembly Mounting Nuts Tighten Torques
Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Tighten the transmission mount mounting bolts and nuts in the numbered sequence shown.

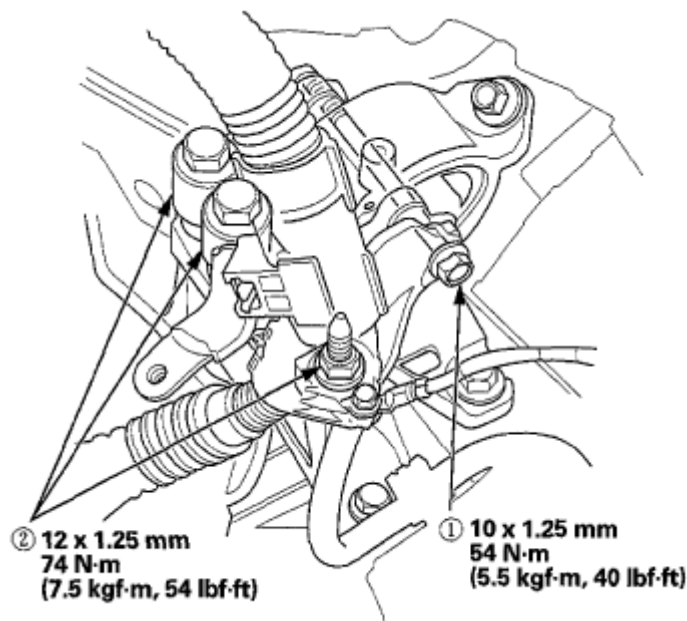


Fig. 47: Identifying Transmission Mount Mounting Bolts And Nuts Tightening Sequence (M/T Model) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

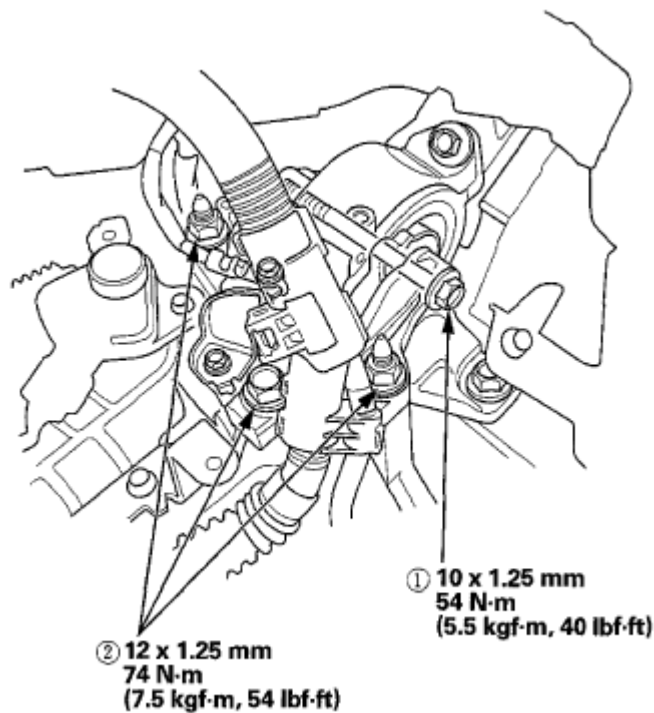


Fig. 48: Identifying Transmission Mount Mounting Bolts And Nuts Tightening Sequence (CVT Model) With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Raise the vehicle on the lift.
30. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

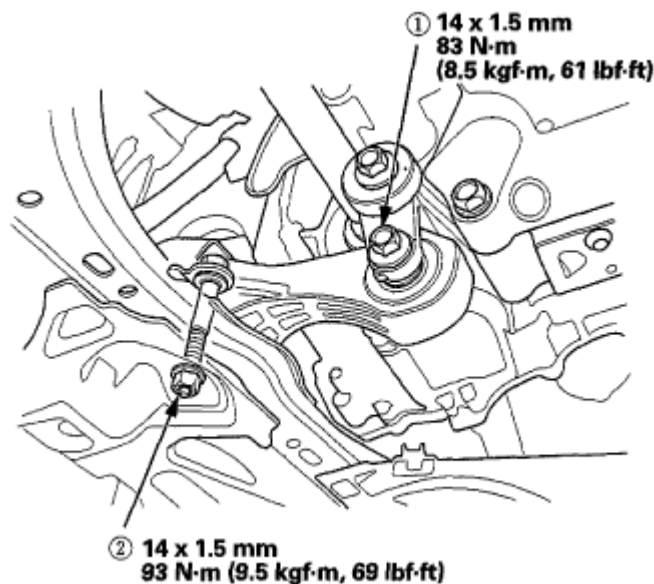


Fig. 49: Identifying Torque Rod Mounting Bolt And Nut Tightening Sequence (M/T Model) With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

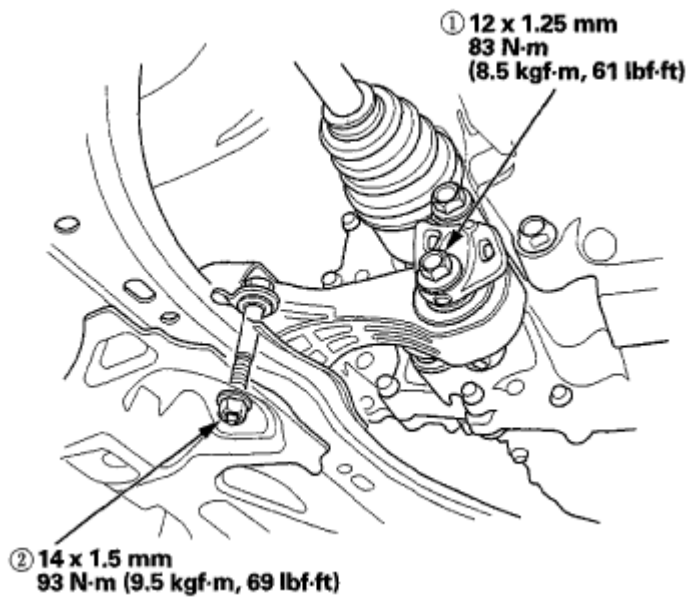


Fig. 50: Identifying Torque Rod Mounting Bolt And Nut Tightening Sequence (CVT Model) With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Lower the vehicle on the lift.
32. Install the air cleaner (see **AIR CLEANER ELEMENT INSPECTION/REPLACEMENT**).
33. Install the A/C line bracket mounting bolt.

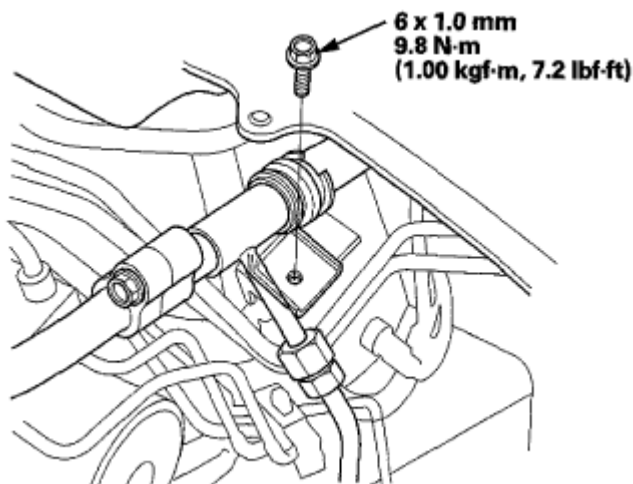


Fig. 51: Locating A/C Line Bracket Mounting Bolt With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

34. Install the crankshaft pulley (see **INSTALLATION**).
35. Install the water pump pulley, loosely install water pump bolts (see **WATER PUMP**).

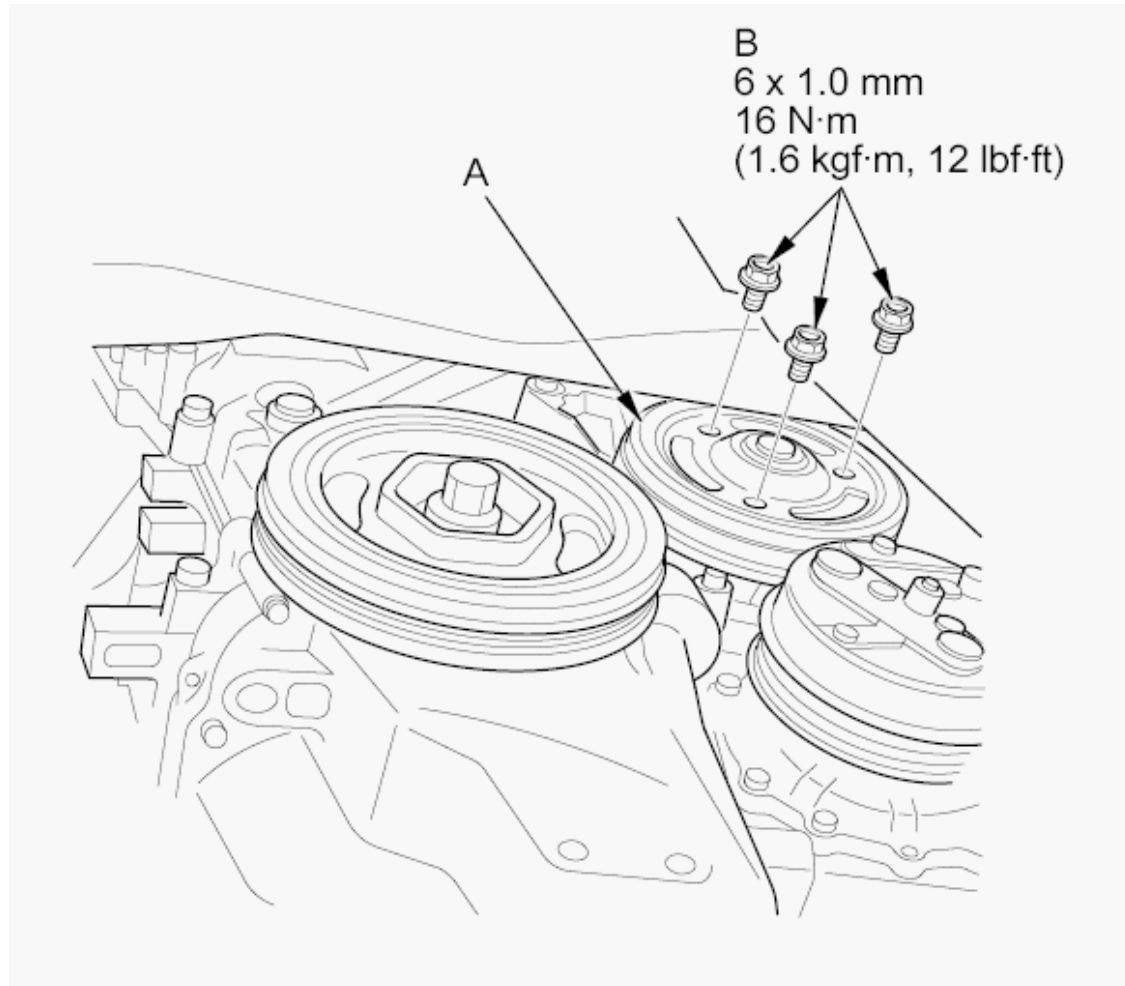
REPLACEMENT).

Fig. 52: Identifying Water Pump Pulley Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

36. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
37. Tighten the water pump pulley mounting bolts (see step 13 on **WATER PUMP REPLACEMENT**).
38. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
39. Install the right front wheel.
40. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

CAM CHAIN CASE OIL SEAL INSTALLATION

Special Tools Required

- Bearing Driver Attachment, 52 x 55 mm 07746-0010400
- Driver Handle, 15 x 135L 07749-0010000

1. Clean and dry the cam chain case oil seal housing.
2. Apply a light coat of new engine oil to the lip of the cam chain case oil seal.
3. Use the driver handle, 15 x 135 L, and the bearing driver attachment, 52 x 55 mm, to drive a new oil seal squarely into the cam chain case to the specified installed height.

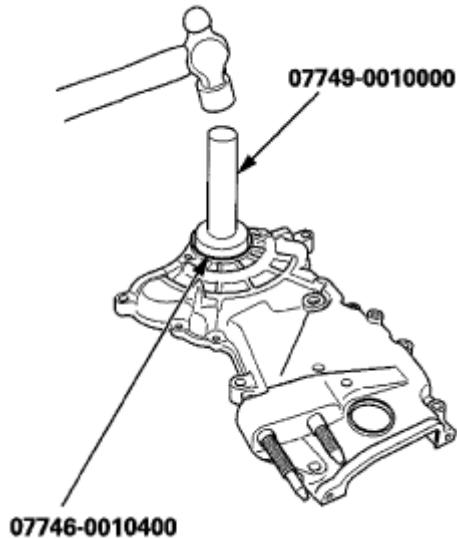


Fig. 53: Driving Oil Seal Squarely Into Cam Chain Case To Specified Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the distance between the cam chain case surface and the oil seal.

Oil Seal Installed Height:

30.3-31.0 mm (1.193-1.220 in)

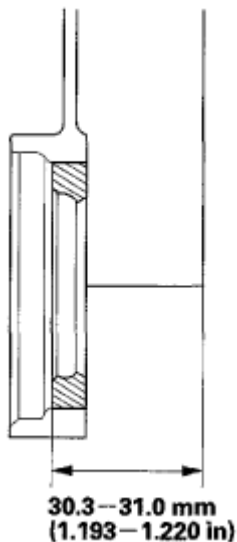


Fig. 54: Measuring Distance Between Cam Chain Case Surface And Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold chamber (see **REMOVAL**).
2. Disconnect the four ignition coil connectors (A).

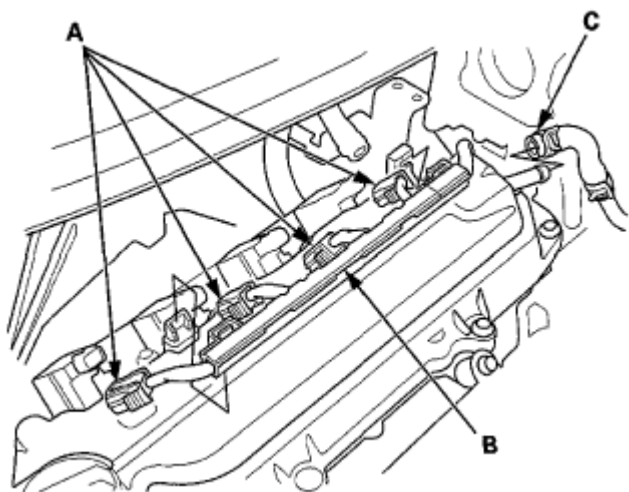


Fig. 55: Locating Ignition Coil Connectors

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the harness holder (B), and disconnect the breather hose (C).
4. Remove the cylinder head cover.

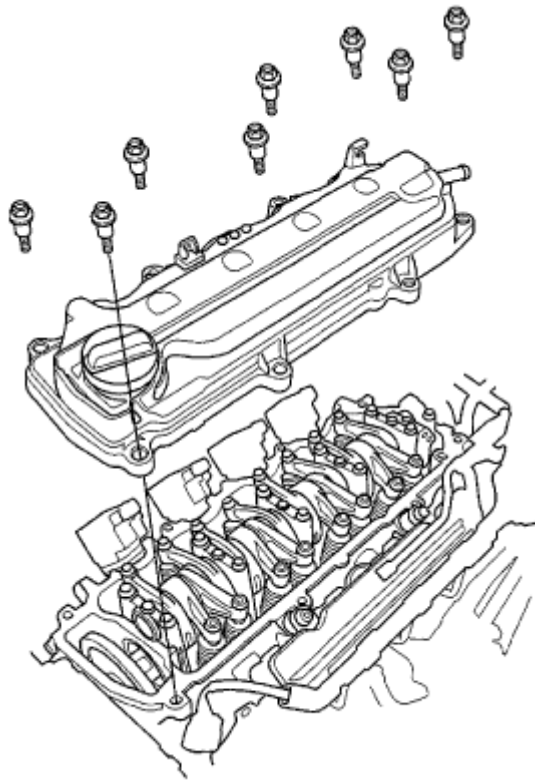


Fig. 56: Locating Harness Holder And Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Thoroughly clean the head cover gasket and the groove of the cylinder head cover.

NOTE: Check and if necessary, replace the head cover gasket.

2. Install the head cover gasket (A) in the groove of the cylinder head cover (B). Make sure the head cover gasket is seated securely.

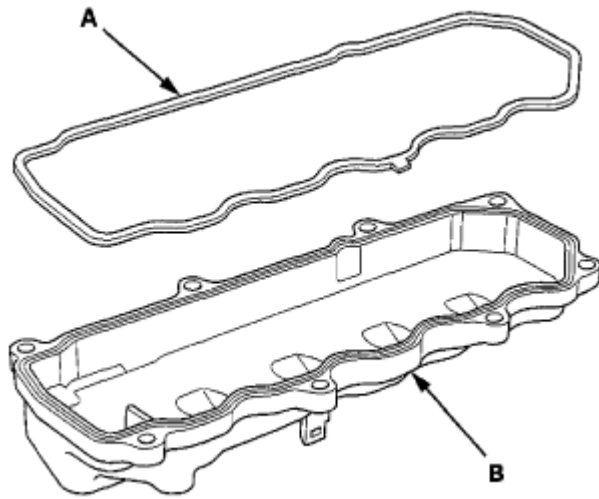


Fig. 57: Locating Head Cover Gasket And Groove Of Cylinder Head Cover
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove all of the old liquid gasket from the cylinder head.
4. Clean the head cover contacting surfaces with a shop towel.
5. Apply liquid gasket (P/N 08718-0004) to the chain case contact areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket to the chain case contact areas.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

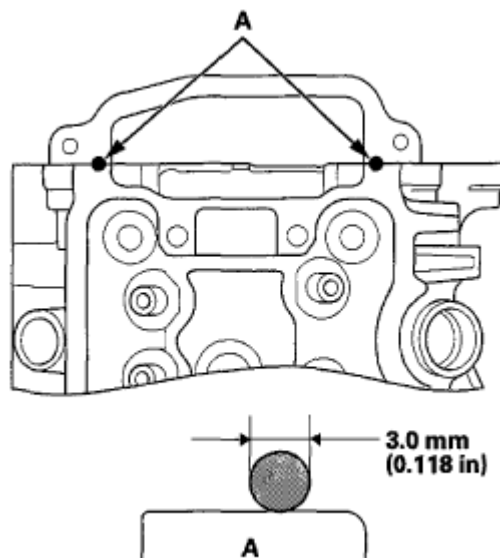


Fig. 58: Applying Liquid Gasket (P/N 08718-0004) To Chain Case Contact Areas

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Place the cylinder head cover (A) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.

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 head cover.

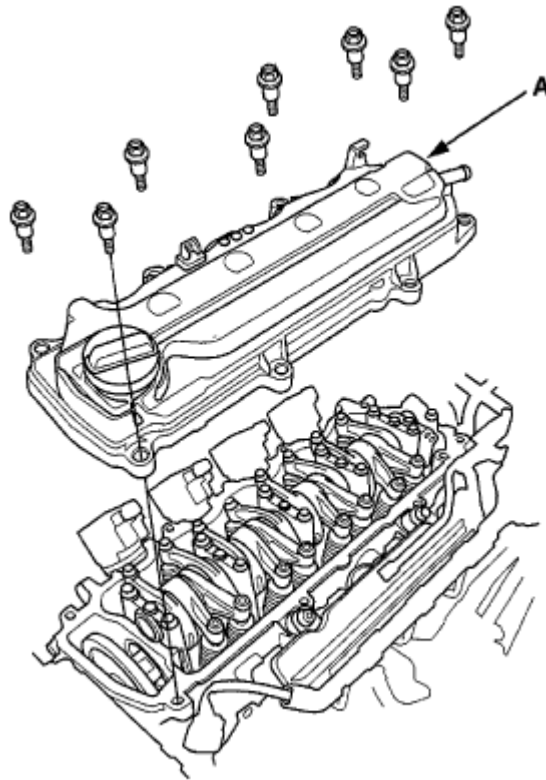


Fig. 59: Placing Cylinder Head Cover On Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the bolts in three steps. In the final step, torque all bolts, in sequence, to 10 N.m (1.0 kgf.m, 7 lbf.ft).

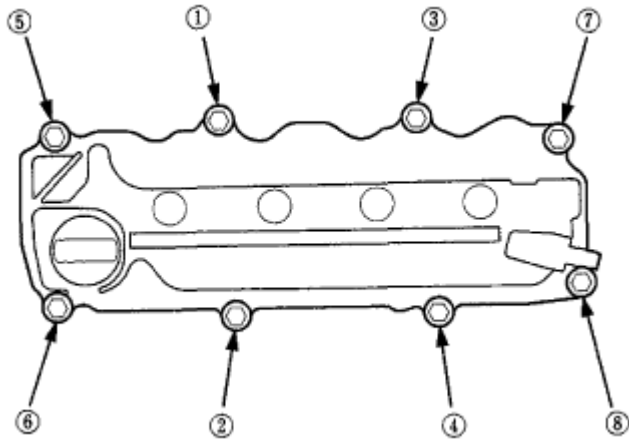


Fig. 60: Identifying Cylinder Head Cover Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Connect the breather hose (A), and install the harness holder (B).

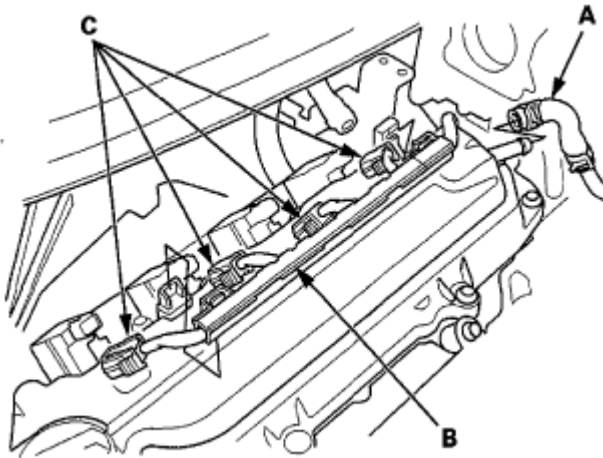


Fig. 61: Locating Breather Hose, Harness Holder And Ignition Coil Connectors
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Connect the four ignition coil connectors (C).
10. Install the intake manifold chamber (see **INSTALLATION**)

CYLINDER HEAD REMOVAL

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- Connect the HDS to the DLC (see step 2 on **GENERAL TROUBLESHOOTING INFORMATION**), and monitor ECT sensor 1. To avoid damaging the cylinder head, wait until the engine coolant

temperature drops below 100°F (38°C) before loosening the cylinder head bolts.

- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.
- Keep the cam chain away from magnetic fields.

1. Remove the cowl cover and the under-cowl panel (see COWL COVER REPLACEMENT).
2. Relieve the fuel pressure (see FUEL PRESSURE RELIEVING).
3. Drain the engine coolant (see COOLANT REPLACEMENT).
4. Do the 12 volt battery removal procedure (see 12 VOLT BATTERY REMOVAL AND INSTALLATION).
5. Remove the throttle body (see THROTTLE BODY REMOVAL/INSTALLATION).
6. Remove the intake manifold/chamber assembly (see REMOVAL).
7. Remove the injectors (see INJECTOR REPLACEMENT).
8. Remove the four ignition coils (see IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION).
9. Remove the warm-up TWC (see WARM UP TWC REMOVAL/INSTALLATION).
10. Disconnect the CMP sensor connector (A) and the secondary HO2S connector (B).

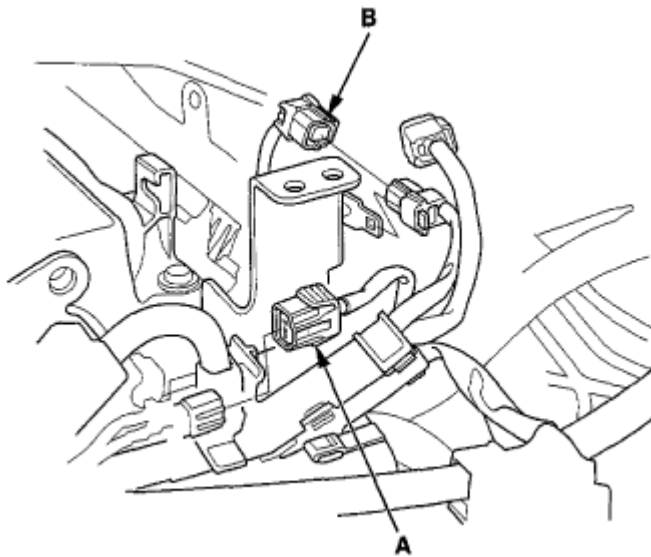


Fig. 62: Locating CMP Sensor Connector And Secondary HO2S Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Disconnect the oil pressure switch connector (A) and the knock sensor connector (B).

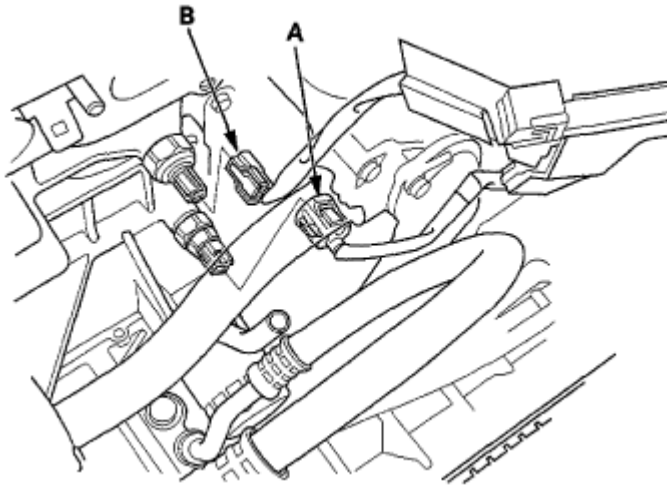


Fig. 63: Locating Oil Pressure Switch Connector And Knock Sensor Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the heater hose bracket (A) and the ground cable (B).

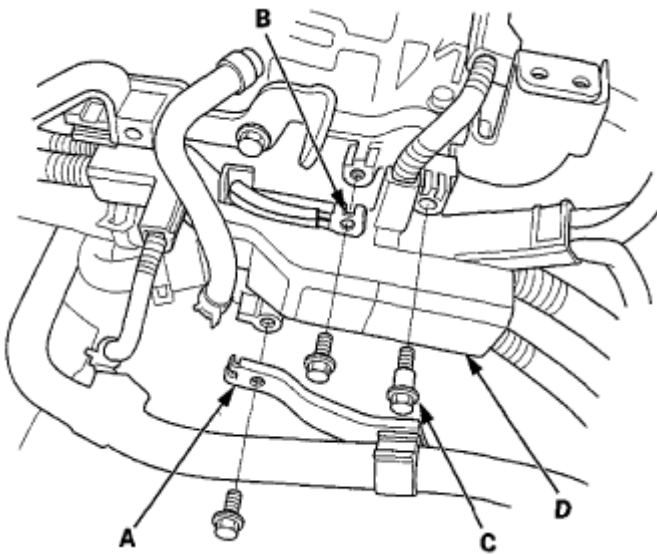


Fig. 64: Locating Heater Hose Bracket And Ground Cable
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the harness holder bolt (C), then remove the harness holder (D) from the bracket.
14. Disconnect the upper radiator hose (A), the water bypass hose (B), and the heater hose (C).

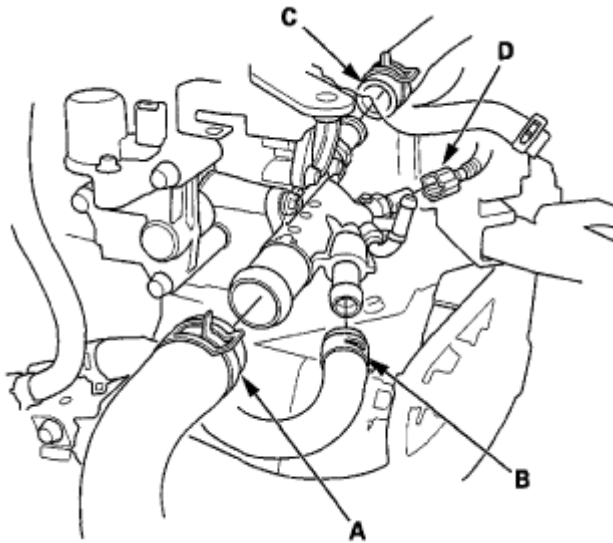


Fig. 65: Locating Upper Radiator Hose, Water Bypass Hose And Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Disconnect the ECT sensor 1 connector (D).
16. Remove the cylinder head cover (see CYLINDER HEAD COVER REMOVAL).
17. Remove the cam chain (see CAM CHAIN REMOVAL).
18. Remove the cylinder head bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

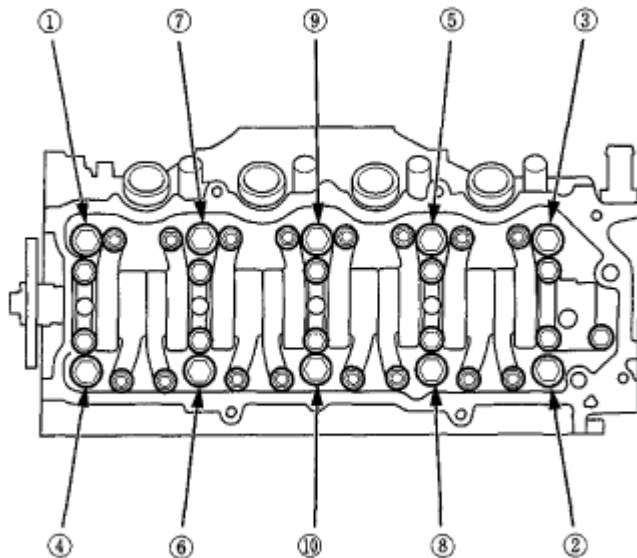


Fig. 66: Identifying Cylinder Head Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cylinder head.

CMP PULSE PLATE REMOVAL AND INSTALLATION

REMOVAL

1. Remove the throttle body (see THROTTLE BODY REMOVAL/INSTALLATION).

NOTE: Plug the water bypass hoses.

2. Remove the intake manifold/chamber assembly (see REMOVAL).
3. Disconnect the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector

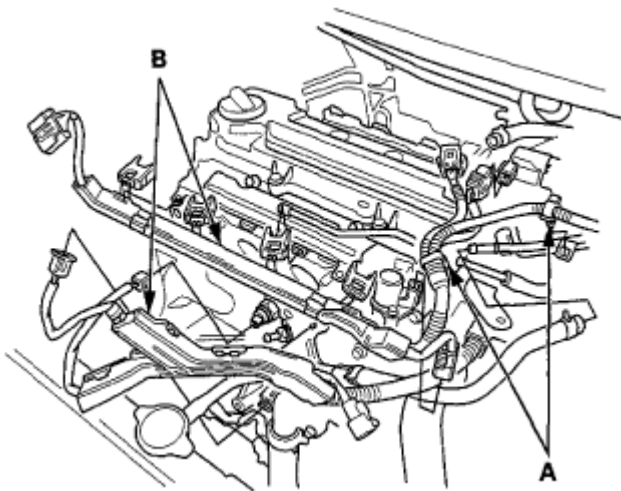


Fig. 67: Locating Harness Clamps And Harness Holders
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the harness clamps (A) with the harness holders (B).
5. Remove the heater hose bracket (A) and the ground cable bolt (B).

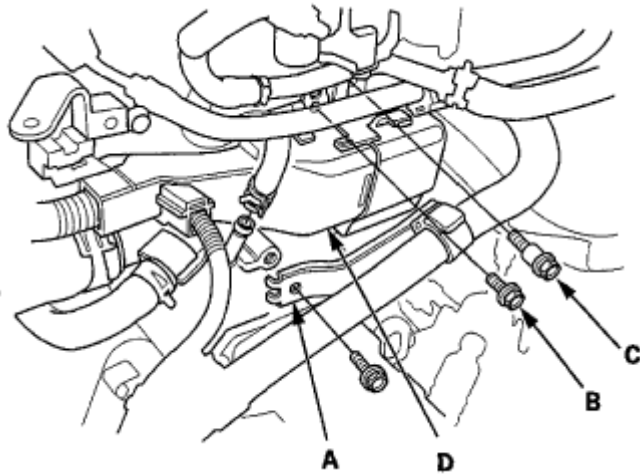


Fig. 68: Locating Heater Hose Bracket And Ground Cable Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the harness holder bolt (C), then remove the harness holder (D) from the bracket.
7. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
8. Remove the camshaft thrust cover.

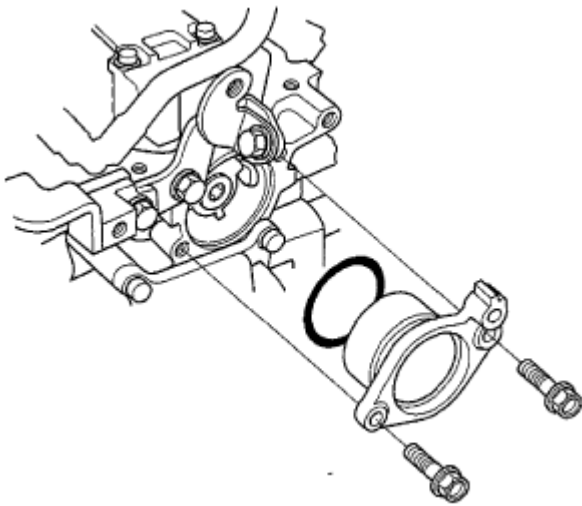


Fig. 69: Identifying Camshaft Thrust Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Hold the camshaft with an open-end wrench, then loosen the bolt.

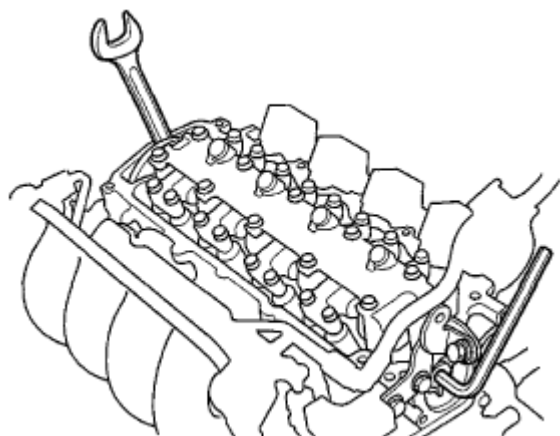


Fig. 70: Holding Camshaft With An Open-End Wrench, Then Loosen Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the CMP pulse plate (A).

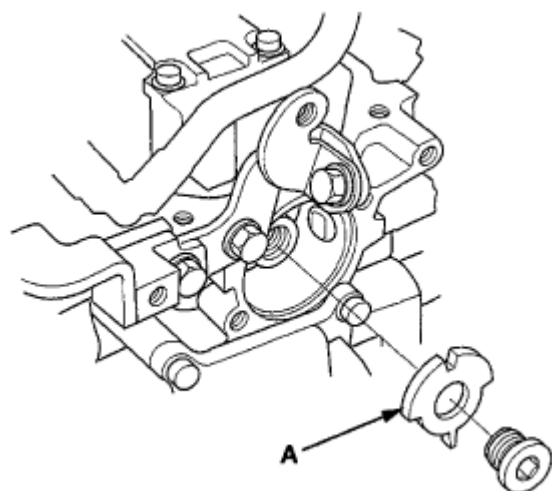


Fig. 71: Locating CMP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Install the CMP pulse plate (A).

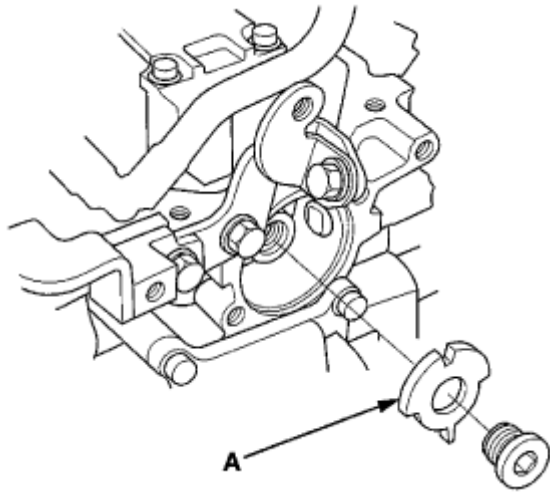


Fig. 72: Locating CMP Pulse Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Hold the camshaft with an open-end wrench, then tighten the bolt.

Specified Torque

14 x 1.5 mm

34 N.m (3.5 kgf.m, 25 lbf.ft)

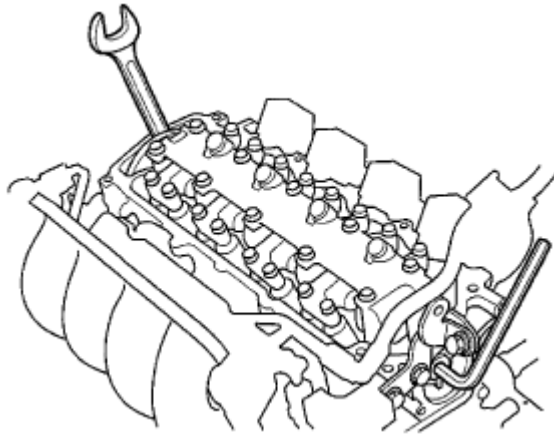


Fig. 73: Holding Camshaft With An Open-End Wrench, Then Tighten Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the camshaft thrust cover (A) with a new O-ring (B).

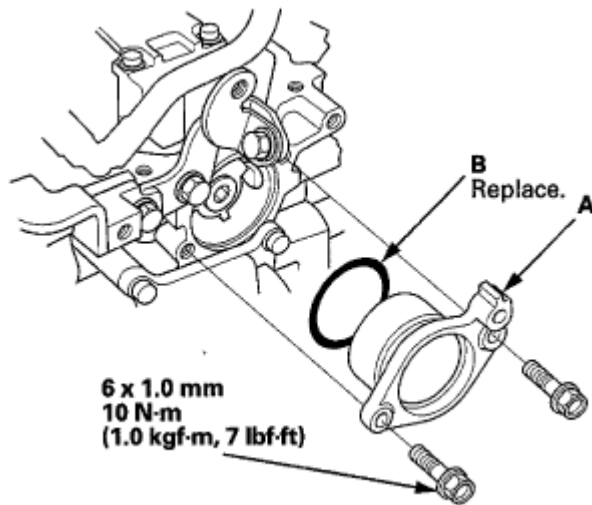


Fig. 74: Locating Camshaft Thrust Cover And O-Ring With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).
5. Install the harness holder (A).

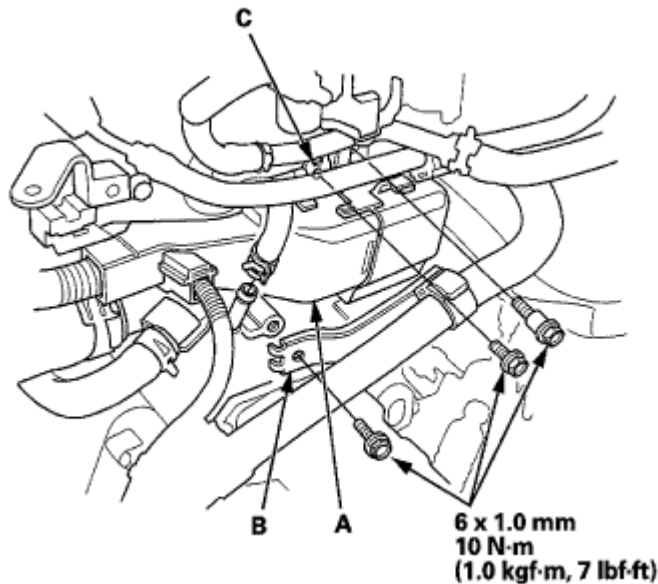


Fig. 75: Locating Harness Holder, Heater Hose Bracket And Ground Cable With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the heater hose bracket (B) and the ground cable (C).
7. Install the harness clamps (A) with the harness holders (B).

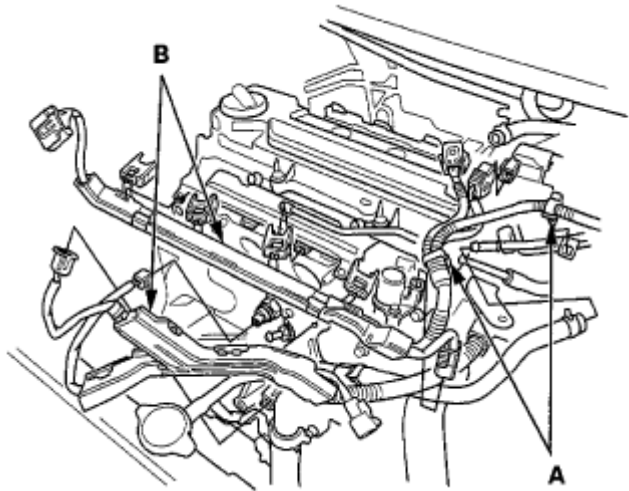


Fig. 76: Locating Harness Clamps And Harness Holders
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Connect the following engine wire harness connectors and wire harness clamps:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector
9. Install the intake manifold/chamber assembly (see **INSTALLATION**).
10. Install the throttle body (see **THROTTLE BODY REMOVAL/INSTALLATION**).
11. Refill the radiator with engine coolant, and bleed the air from the cooling system (see **COOLANT REPLACEMENT**).

CAMSHAFT SPROCKET REMOVAL

NOTE: **Keep the cam chain away from magnetic fields.**

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Make a reference mark (A) across the camshaft sprocket and the cam chain.

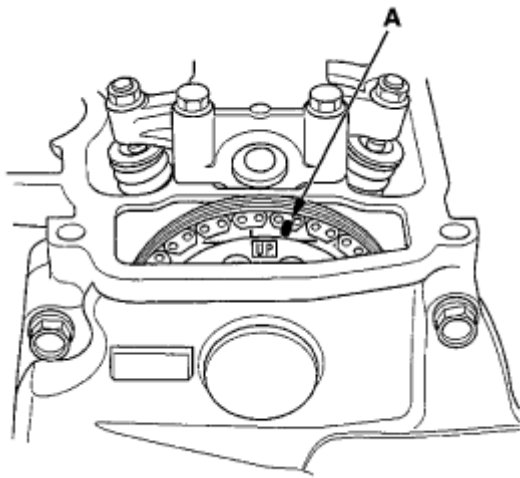


Fig. 77: Making Reference Mark Across Camshaft Sprocket And Cam Chain
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.

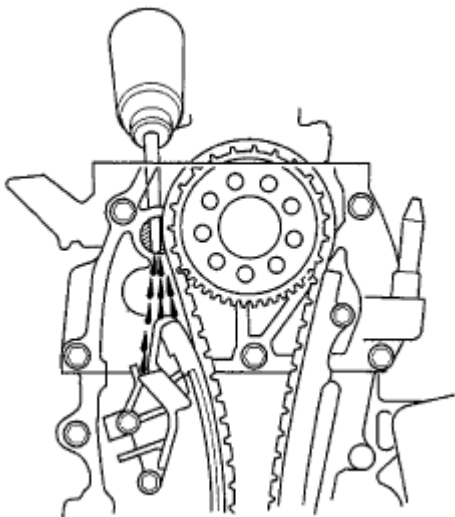


Fig. 78: Applying Engine Oil To Slider Surface Of Cam Chain Tensioner Slider Through Oil Return Hole In Cylinder Head
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the cylinder head plug.

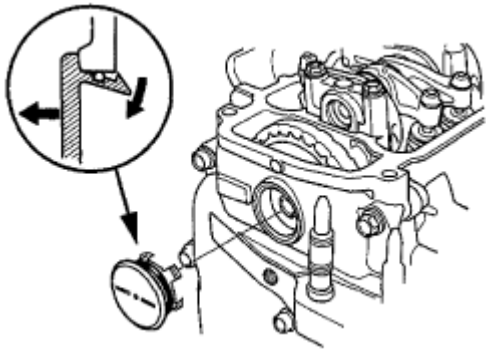


Fig. 79: Removing Cylinder Head Plug
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Hold the crankshaft pulley, and set the socket wrench (A) on the camshaft sprocket bolt.

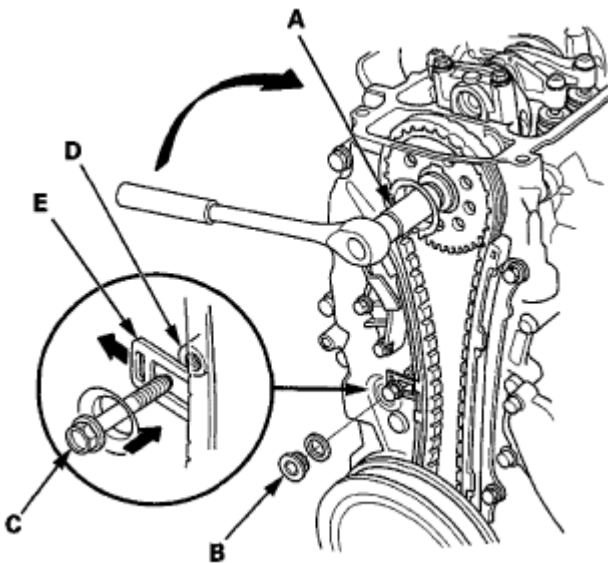


Fig. 80: Setting Socket Wrench On Camshaft Sprocket Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the maintenance bolt (B), and turn the camshaft clockwise to compress the cam chain tensioner, then install the 6 x 1.0 mm bolt (C) in the bolt hole (D) in the engine block through the maintenance hole and cam chain tensioner (E).

NOTE:

- The turning torque should not exceed 56 N.m (5.7 kgf.m, 41 lbf.ft) when turning the camshaft.
- Do not turn the camshaft counterclockwise.

7. Hold the camshaft with a 27 mm open-end wrench, then remove the camshaft sprocket.

NOTE:

Hang the cam chain with a wire.

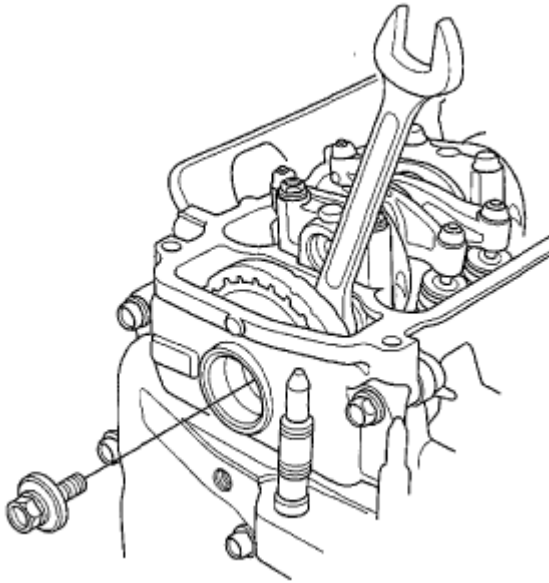


Fig. 81: Removing Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT SPROCKET INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

1. Install the cam chain to the camshaft sprocket by aligning the reference mark (A), then install the camshaft sprocket on the camshaft.

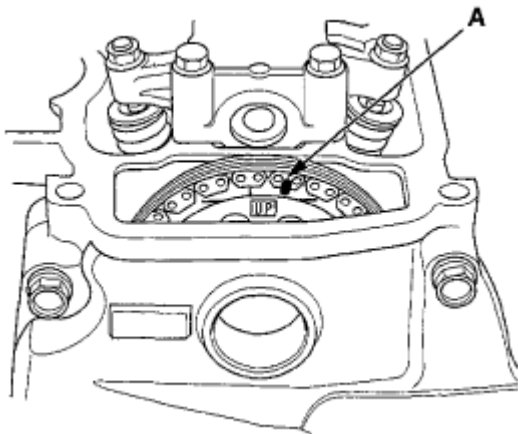


Fig. 82: Locating Reference Mark Cam Of Chain And Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Hold the camshaft with a 27 mm open-end wrench, then tighten the bolt.

Specified Torque: 56 N.m (5.7 kgf.m, 41 lbf.ft)

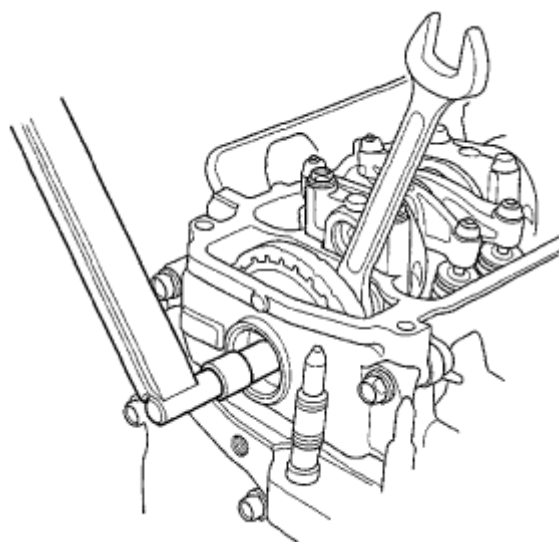


Fig. 83: Holding Camshaft With 27 mm Open-End Wrench, Then Tighten Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.

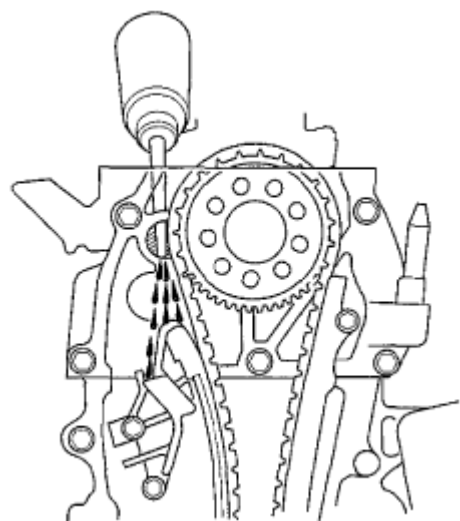


Fig. 84: Applying Engine Oil To Slider Surface Of Cam Chain Tensioner Slider Through Oil Return Hole In Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Hold the crankshaft pulley, and set the socket wrench (A) on the camshaft sprocket bolt.

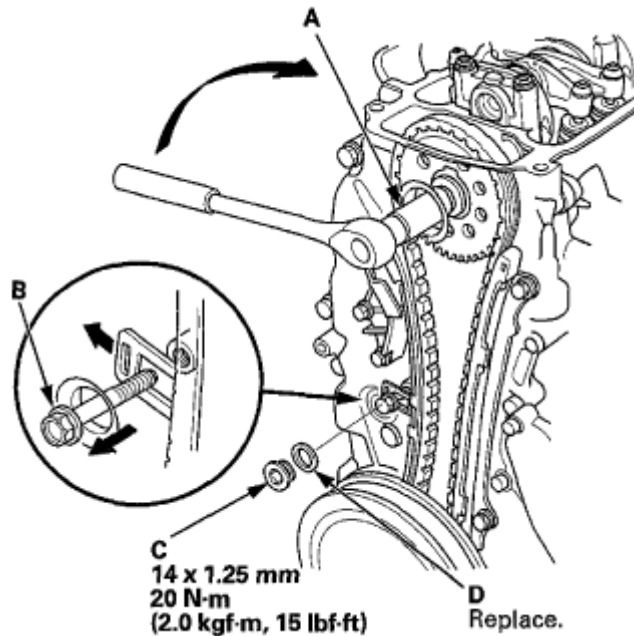


Fig. 85: Setting Socket Wrench On Camshaft Sprocket Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Turn the camshaft clockwise to compress the cam chain tensioner, then remove the 6 x 1.0 mm bolt (B).

NOTE:

- The turning torque should not exceed 56 N.m (5.7 kgf.m, 41 lbf.ft) when turning the camshaft.
- Do not turn the camshaft counterclockwise.

6. Install the maintenance bolt (C) with a new washer (D).
7. Install the new cylinder head plug.

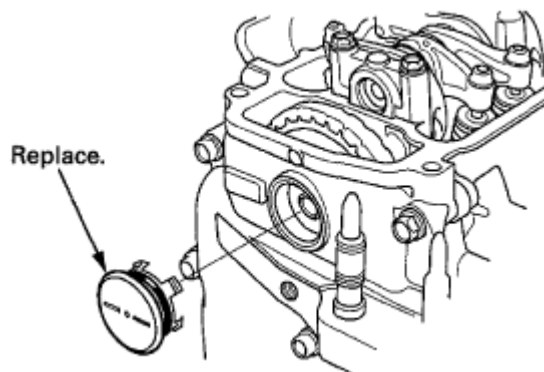


Fig. 86: Installing Cylinder Head Plug
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).

CYLINDER HEAD INSPECTION FOR WARPAGE

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Inspect the camshaft (see **CAMSHAFT INSPECTION**).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.

Warpage

Standard (New): 0.07 mm (0.0028 in) max.

Service Limit: 0.08 mm (0.0031 in)

- If warpage is less than 0.08 mm (0.0031 in) cylinder head resurfacing is not required.
- If warpage is between 0.08 mm (0.0031 in) and 0.2 mm (0.008 in), resurface the cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 120 mm (4.72 in).

Cylinder Head Height

Standard (New): 119.9-120.1 mm (4.720-4.728 in)

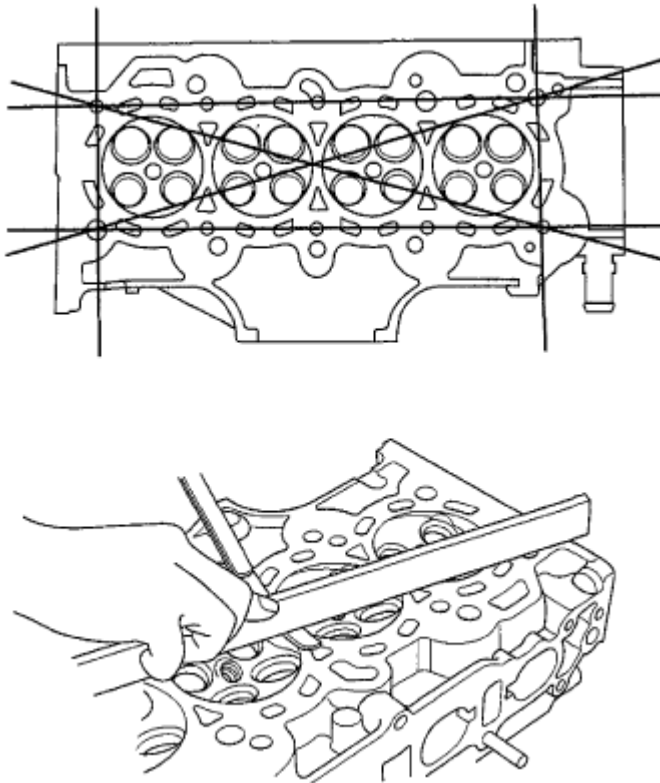


Fig. 87: Checking Cylinder Head For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

1. Remove the cylinder head cover (see CYLINDER HEAD COVER REMOVAL)
2. Loosen the rocker arm adjusting screws (A).

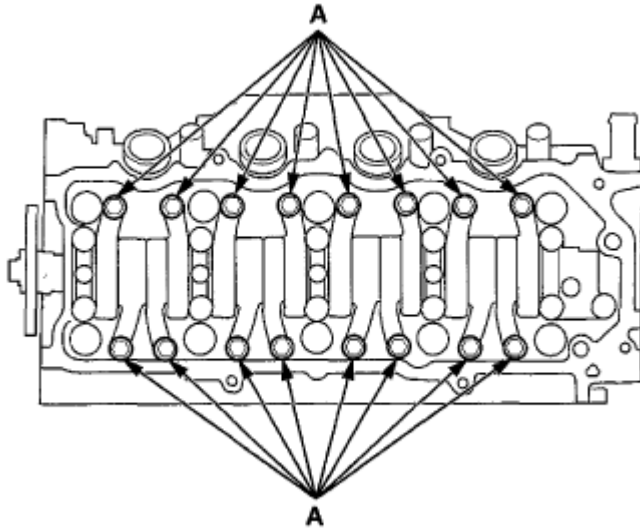


Fig. 88: Locating Rocker Arm Adjusting Screws
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Unscrew the rocker shaft mounting bolts two turns at a time, in the sequence below.

NOTE: Bundle the intake rocker arms with rubber bands (A) to keep them together as a set.

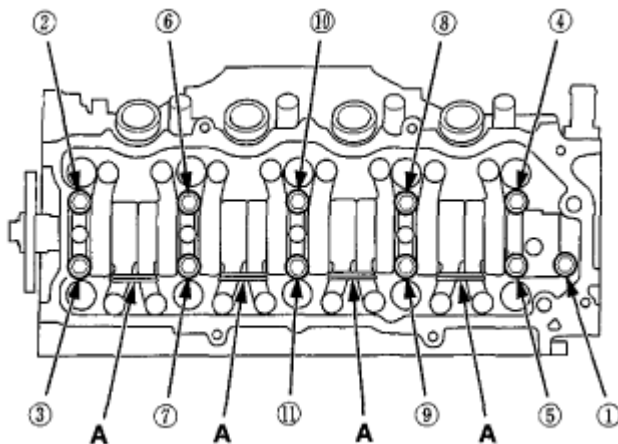


Fig. 89: Identifying Rocker Shaft Mounting Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the rocker shaft mounting bolts, then remove the rocker arm assembly (A).

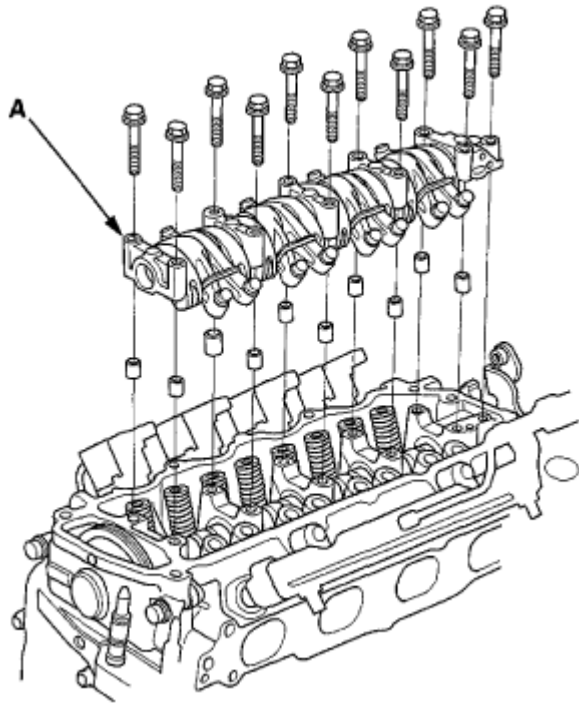


Fig. 90: Locating Rocker Shaft Mounting Bolts And Rocker Arm Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original location.
- Inspect the rocker arm shaft and the rocker arms (see ROCKER ARM AND SHAFT INSPECTION).
- If reused, the rocker arms must be installed in the their original locations.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Remove the rocker shaft bolt before removing the rocker shaft from the No. 5 rocker shaft holder.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points, the bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- When reassembling the rocker arm and shaft assembly, position the arrows on the rocker shaft holders facing the cam chain side.

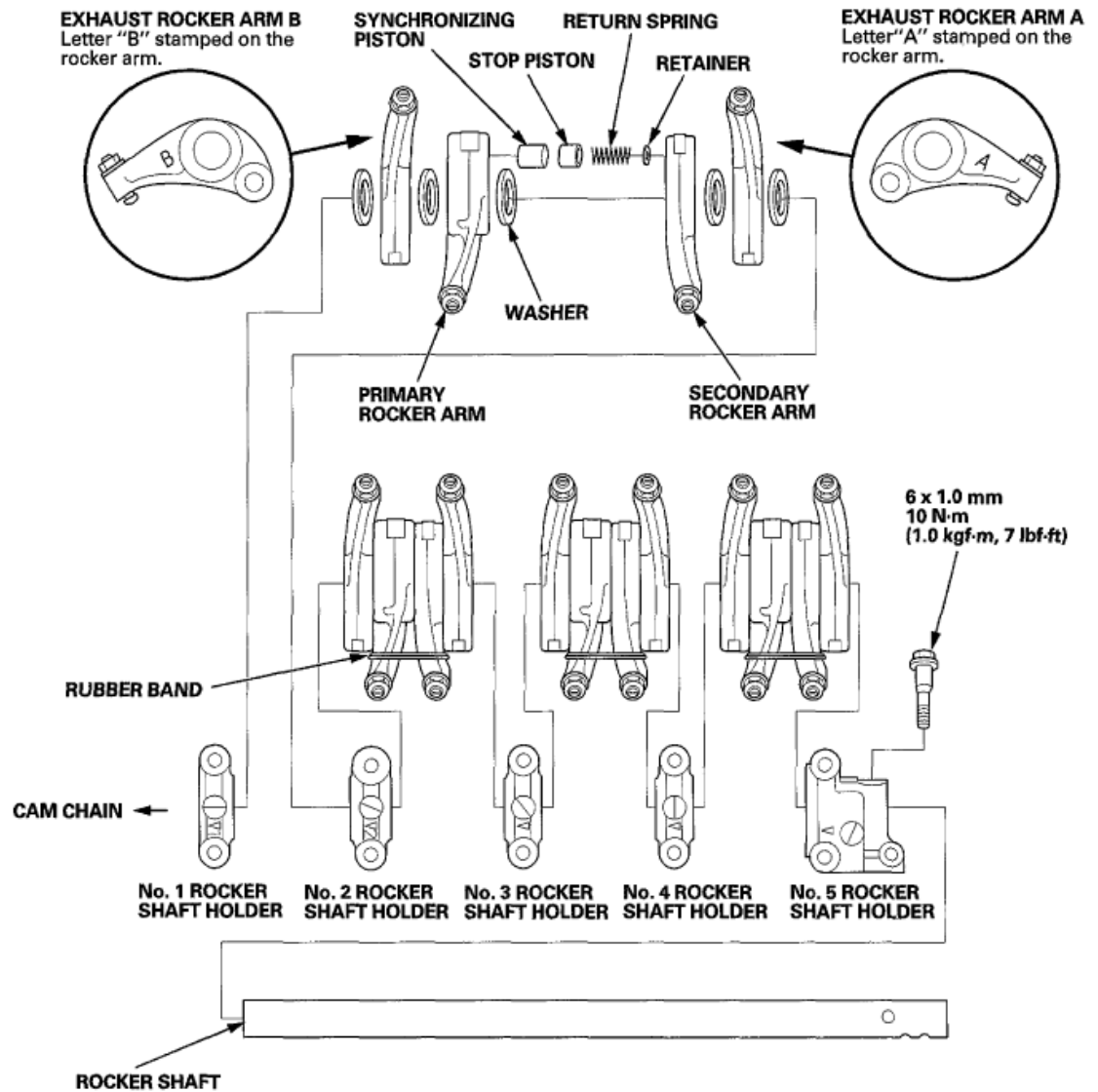


Fig. 91: Exploded View Of Rocker Arm And Shaft
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Disassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
3. Measure the diameter of the shaft at the first rocker location.

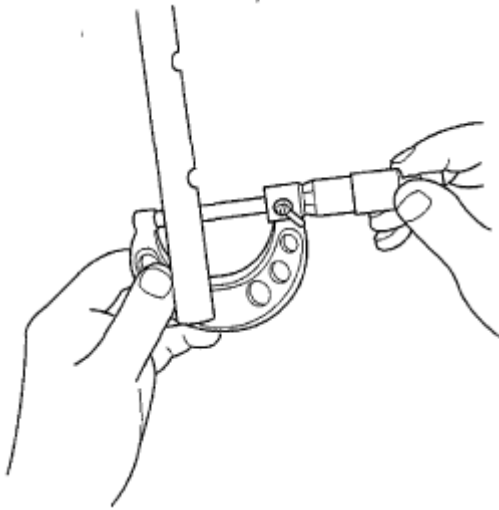


Fig. 92: Measuring Diameter Of Shaft At First Rocker Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Zero the gauge (A) to the shaft diameter.

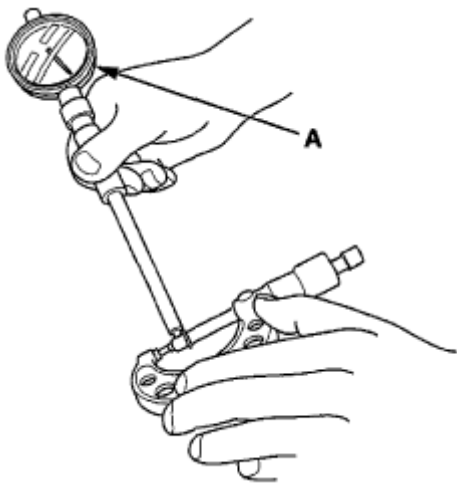


Fig. 93: Zero Gauge To Shaft Diameter
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the inside diameter of the rocker arm, and check it for an out-of-round condition.

Rocker Arm-to-Shaft Clearance

Standard (New): 0.019-0.050 mm (0.00075-0.00197 in)

Service Limit: 0.08 mm (0.0031 in)

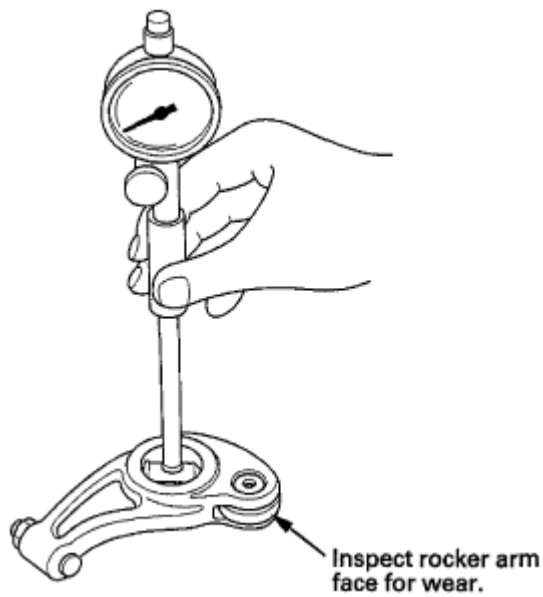


Fig. 94: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rockers and shaft. If the clearance is beyond the service limit, replace the rocker shaft and all out of service limit rocker arms. If any VTEC rocker arm needs replacement, replace the rocker arms as an assembly.

VTEC Rocker Arms

7. Inspect the rocker arm pistons (A). Push on them manually. If they do not move smoothly, replace the rocker arm set.

NOTE:

- Apply new engine oil to the rocker arm pistons when reassembling.
- When reassembling the secondary rocker arm A, carefully apply air pressure to the oil passage of the rocker arm.

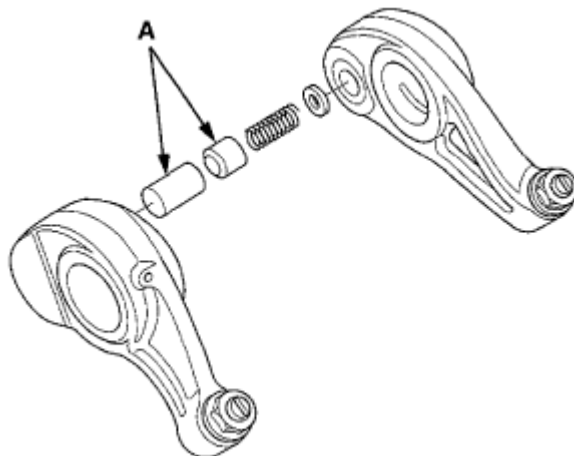


Fig. 95: Inspecting Rocker Arm Pistons
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Reassemble the rocker arm assembly (see ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY).
9. Install the rocker arm assembly (see ROCKER ARM ASSEMBLY INSTALLATION).

CAMSHAFT REMOVAL

1. Remove the throttle body (see THROTTLE BODY REMOVAL/INSTALLATION).

NOTE: Plug the water bypass hoses.

2. Remove the intake manifold/chamber assembly (see REMOVAL).
3. Disconnect the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector

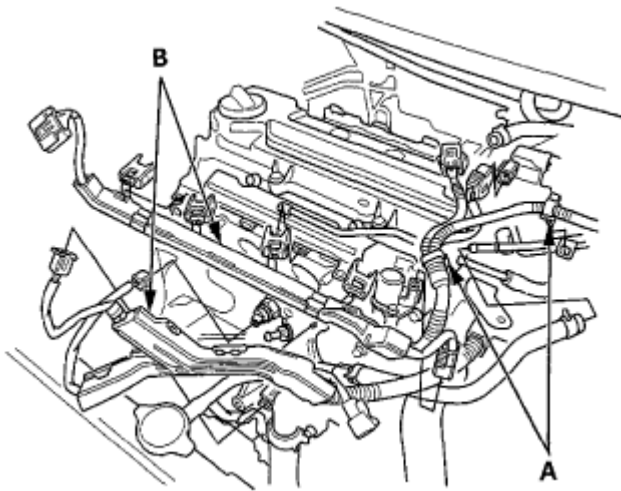


Fig. 96: Locating Harness Clamps And Harness Holders
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the harness clamps (A) with the harness holders (B).
5. Remove the heater hose bracket (A) and the ground cable bolt (B).

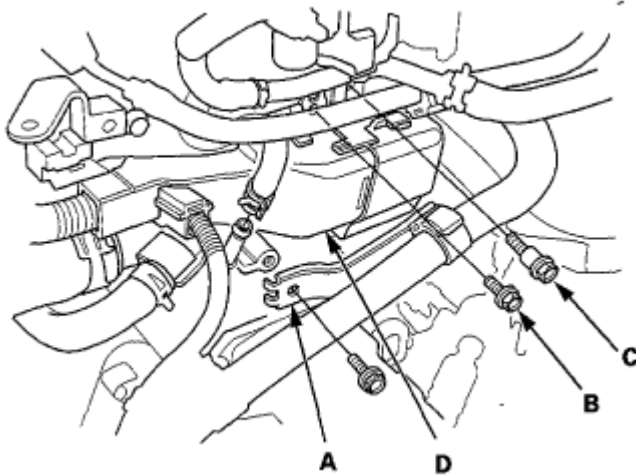


Fig. 97: Locating Harness Holder Bolt And Harness Holder
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the harness holder bolt (C), then remove the harness holder (D) from the bracket.
7. Remove the camshaft sprocket (see [CAMSHAFT SPROCKET REMOVAL](#)).
8. Remove the rocker arm assembly (see [ROCKER ARM ASSEMBLY REMOVAL](#)).
9. Remove the CMP sensor (see [CMP SENSOR REPLACEMENT](#)).
10. Remove the camshaft thrust cover (A), then remove the camshaft (B).

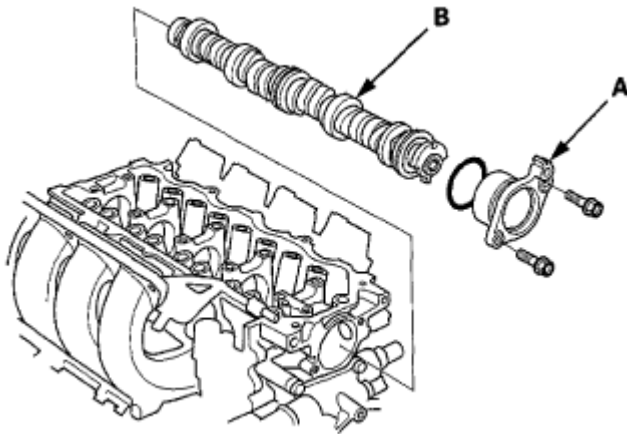


Fig. 98: Locating Camshaft Thrust Cover And Camshaft
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSPECTION

1. Remove the camshaft sprocket (see [CAMSHAFT SPROCKET REMOVAL](#)).

2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Disassemble the rocker arm (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
4. Put the rocker shaft holder bridge/rocker shaft holders on the cylinder head, then tighten the bolts to the specified torque.

Specified Torque

6 x 1.0 mm

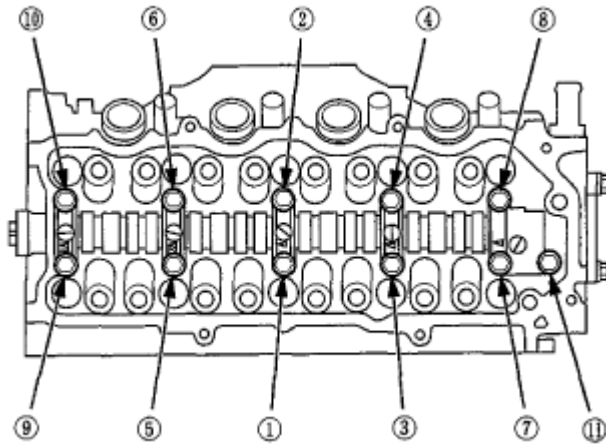


Fig. 99: Identifying Rocker Shaft Holder Bridge/Rocker Shaft Holders Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Seat the camshaft by pushing it toward the rear of the cylinder head.
6. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth, and read the end play. If the end play is beyond the service limit, replace the thrust cover and recheck. If it is still beyond the service limit, replace the cylinder head. If it is still beyond the service limit, replace the camshaft.

Camshaft End Play

Standard (New): 0.05-0.25 mm (0.0020-0.0098 in)

Service Limit: 0.5 mm (0.020 in)

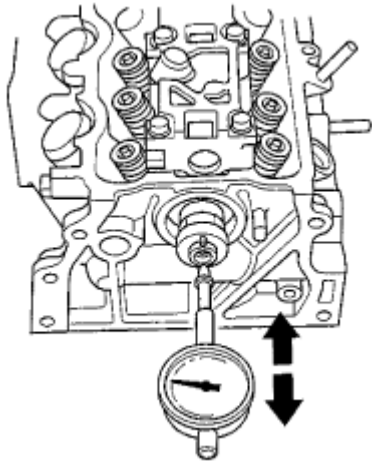


Fig. 100: Pushing Camshaft Back And Forth, And Read End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the camshaft (see **CAMSHAFT REMOVAL**).
8. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
9. Measure the diameter of each camshaft journal.

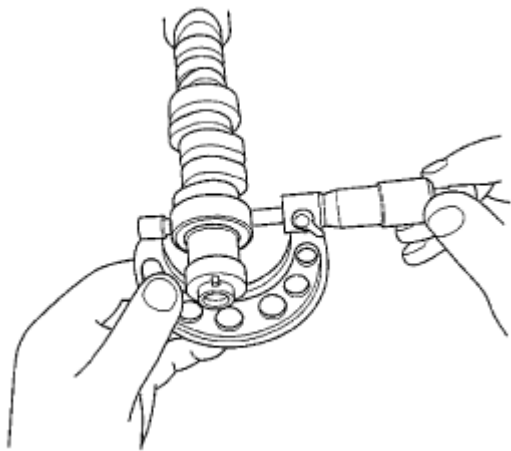


Fig. 101: Measuring Diameter Of Each Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Zero the gauge (A) to the journal diameter.

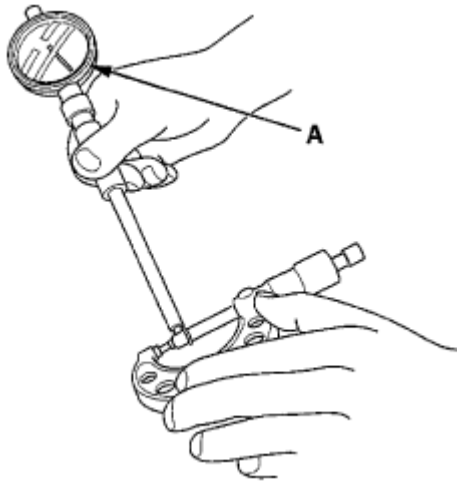


Fig. 102: Zero Gauge To Journal Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round condition.
- If the camshaft-to-holder clearance is within limits, go to step 13.
 - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has been replaced, replace the cylinder head.
 - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has not been replaced, go to step 12.

Camshaft-to-Holder Oil Clearance

Standard (New): 0.045-0.084 mm (0.00177-0.00331 in)

Service Limit: 0.100 mm (0.00394 in)

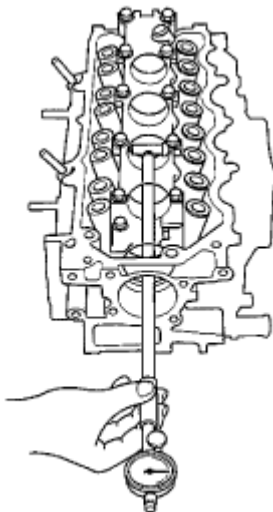


Fig. 103: Measuring Inside Diameter Of Each Camshaft Bearing Surface, And Check For An Out-Of-Round Condition
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Check the total runout with the camshaft supported on V-blocks.
- If the total runout of the camshaft is within the service limit, replace the cylinder head.
 - If the total runout is beyond the service limit, replace the camshaft and recheck the oil clearance. If the oil clearance is still out of tolerance, replace the cylinder head.

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in)

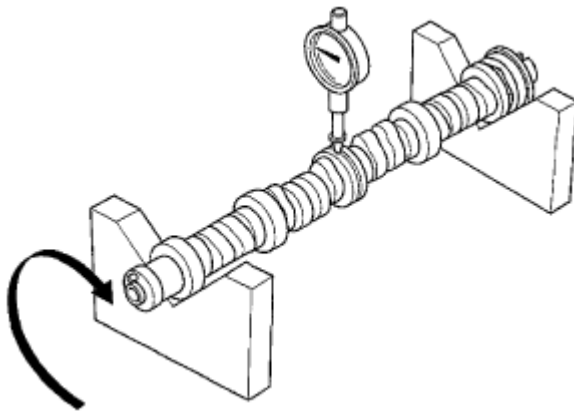


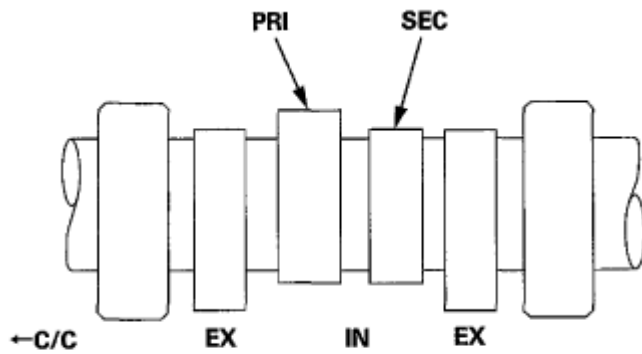
Fig. 104: Checking Total Runout With Camshaft Supported On V-Blocks
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Measure the cam lobe height.

Cam Lobe Height Standard (New):

CAM LOBE HEIGHT STANDARD

	INTAKE	EXHAUST
PRI	34.945 mm (1.37578 in)	35.614 mm (1.40212 in)
SEC	30.529 mm (1.20193 in)	



PRI: Primary
EX: Exhaust

SEC: Secondary
C/C: Cam Chain

IN: Intake

Fig. 105: Measuring Cam Lobe Height

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve Spring Compressor Attachment 07757-PJ1010A

Identify the valves and the valve springs as they are removed so that each item can be reinstalled in its original position.

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Remove the camshaft (see **CAMSHAFT REMOVAL**).
4. Using an appropriate-sized socket (A), and a plastic mallet (B), lightly tap the valve retainer to loosen the valve cotters.

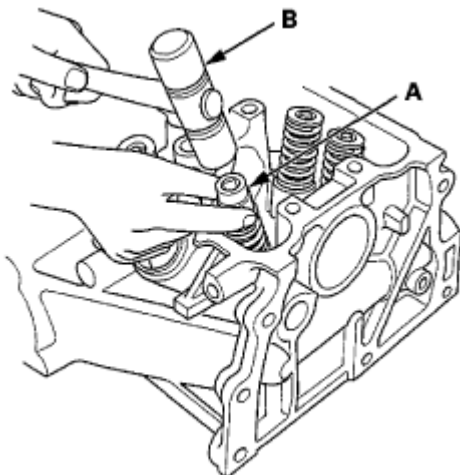


Fig. 106: Taping Valve Retainer To Loosening Valve Cotters Using Appropriate-Sized Socket And Plastic Mallet

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the valve spring compressor and the attachment. Compress the valve spring, and remove the valve cotters.

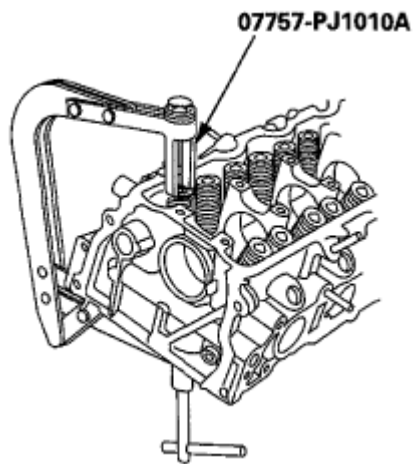


Fig. 107: Compressing Valve Spring, And Remove Valve Cotters

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve spring compressor and the attachment, then remove the spring retainer, the valve spring and the valve.
7. Install the valve guide seal remover.

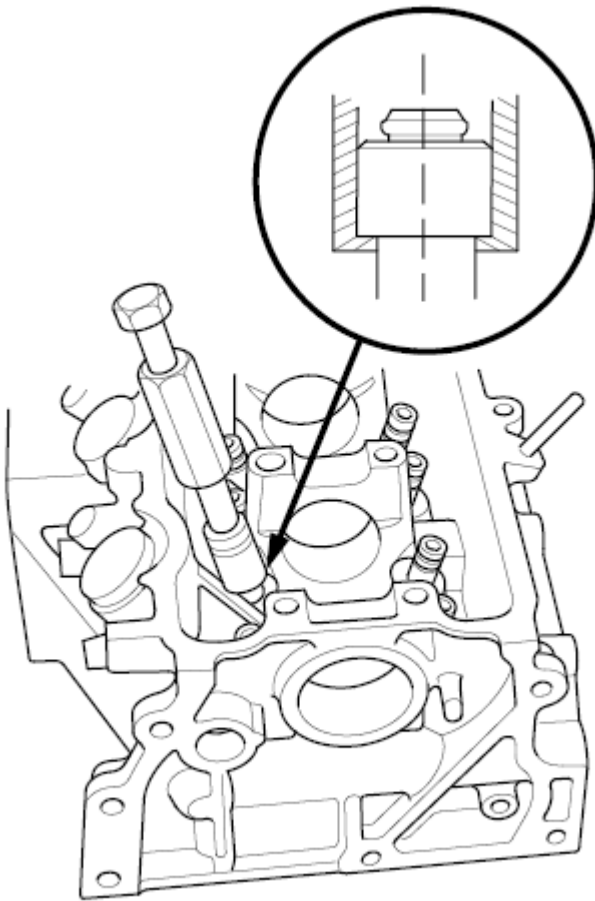


Fig. 108: Identifying Valve Guide Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the valve seal.

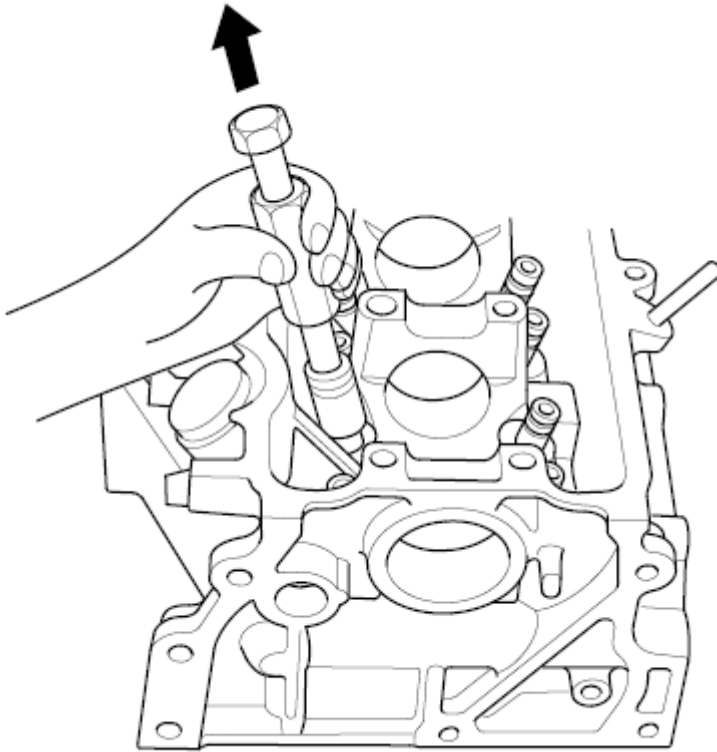


Fig. 109: Removing Valve Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the valve spring seat.

VALVE INSPECTION

1. Remove the valves (see VALVE, SPRING, AND VALVE SEAL REMOVAL).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 118.55-119.15 mm (4.6673-4.6910 in)

B Standard (New): 27.85-28.15 mm (1.0965-1.1083 in)

C Standard (New): 5.48-5.49 mm (0.2157-0.2161 in)

C Service Limit: 5.45 mm (0.2146 in)

Exhaust Valve Dimensions

A Standard (New): 117.25-117.85 mm (4.6161-4.6398 in)

B Standard (New): 22.85-23.15 mm (0.8996-0.9114 in)

C Standard (New): 5.45-5.46 mm (0.2146-0.2150 in)

C Service Limit: 5.42 mm (0.2134 in)

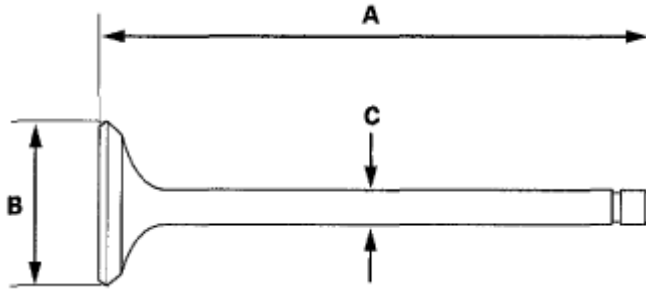


Fig. 110: Measuring Valve In These Areas

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Remove the valves (see VALVE, SPRING, AND VALVE SEAL REMOVAL).
2. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide.

The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.02-0.05 mm (0.0008-0.0020 in)

Service Limit: 0.08 mm (0.0031 in)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.05-0.08 mm (0.0020-0.0031 in)

Service Limit: 0.11 mm (0.0043 in)

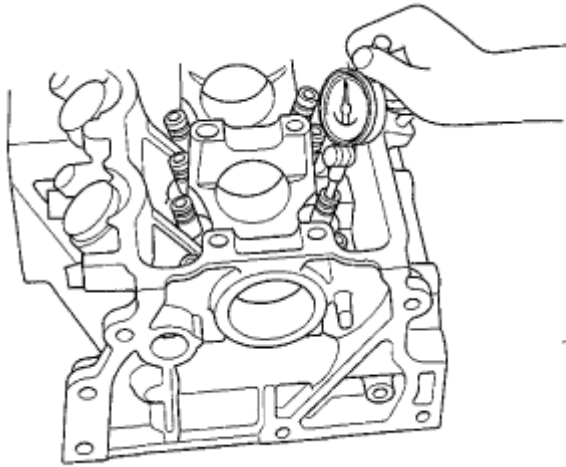


Fig. 111: Inspecting Valve Stem-To-Guide Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve Guide Driver, 5.35 x 9.7 mm 07742-0010100
- Valve Guide Reamer, 5.5 mm 07HAH-PJ7A100

1. Inspect valve stem-to-guide clearance (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**).
2. As illustrated below, use a commercially available air-impact valve guide driver, 5.35 x 9.7 mm (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver and a conventional hammer.

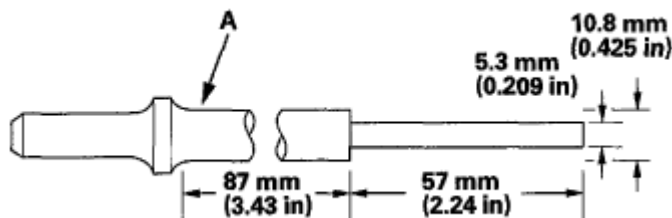


Fig. 112: Identifying Air-Impact Valve Guide Driver
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for at least an hour.
4. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer. Do not get the head hotter than 300°F (150°C); excessive heat may loosen the valve seats.

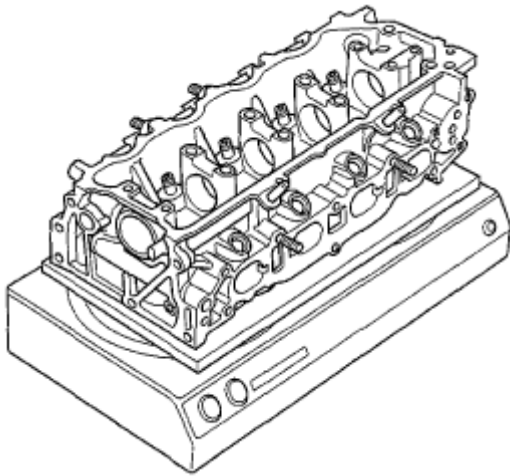


Fig. 113: Heating Cylinder Head To 300°F (150°C) Using Hot Plate Or Oven
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Working from the camshaft side, use the valve guide driver and an air hammer to drive the guide about 2 mm (0.08 in) towards the combustion chamber. This will knock off some of the carbon and make removal easier. Hold the air hammer directly in line with the valve guide to prevent damaging the driver. Wear safety goggles or a face shield.
6. Turn the head over, and drive the guide out toward the camshaft side of the head.

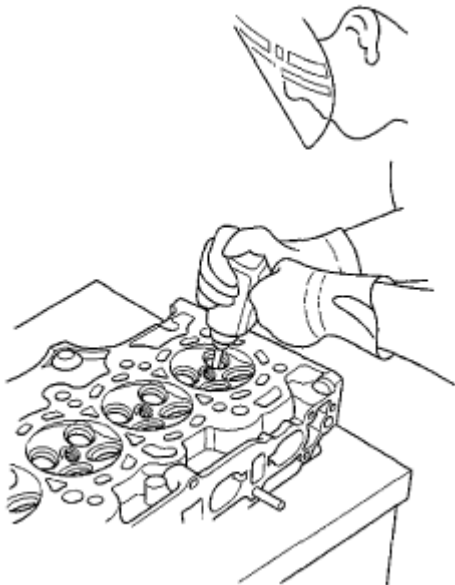


Fig. 114: Driving Guide About 2 mm (0.08 in) Towards Combustion Chamber
Courtesy of AMERICAN HONDA MOTOR CO., INC.

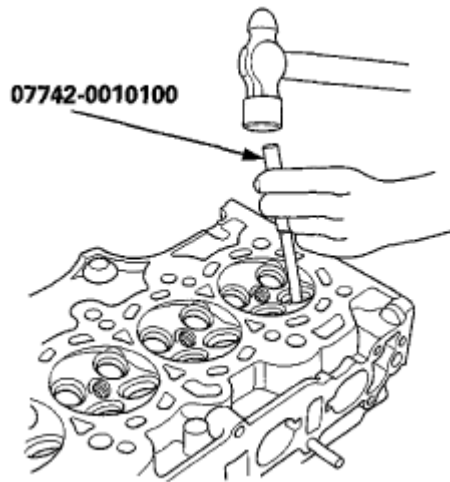


Fig. 115: Driving Guide Out Toward Camshaft Side Of Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If a valve guide will not move, drill it out with an 8 mm (5/16 in) bit, then try again.

NOTE: **Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.**

8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the valve guide driver to drive the guide in to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

Valve Guide Installed Height: 15.85-16.35 mm (0.6240-0.6437 in)

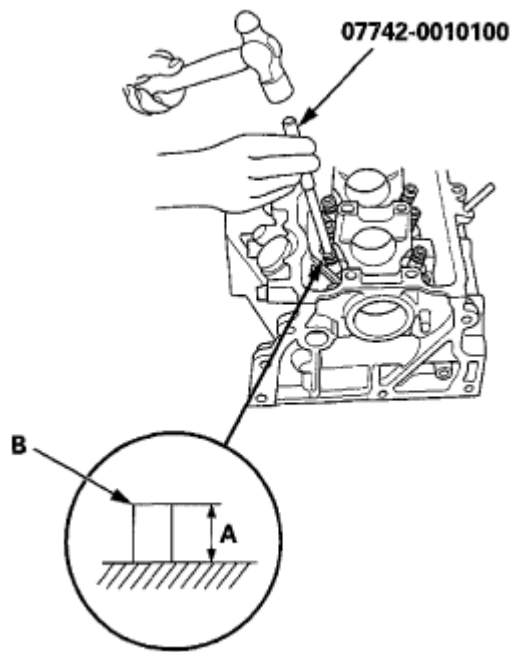


Fig. 116: Driving Guide In To Specified Installed Height Of Guide
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Coat both the reamer and the valve guide with cutting oil.
11. Rotate the reamer clockwise the full length of the valve guide bore.



Fig. 117: Rotating Reamer Clockwise Full Length Of Valve Guide Bore
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the valve guide reamer, 5.5 mm clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearances with a valve (see **VALVE INSPECTION**). Verify that a valve slides in the intake and exhaust valve guides without sticking.

15. Inspect the valve seat. If necessary renew the valve seat using a valve seat cutter (see **VALVE SEAT RECONDITIONING**).

VALVE SEAT RECONDITIONING

1. Inspect valve stem-to-guide clearance (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**). If the valve guides are worn, replace them (see **VALVE GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.

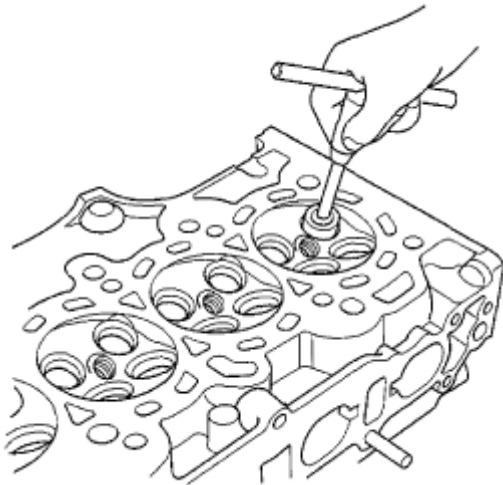


Fig. 118: Renewing Valve Seats In Cylinder Head Using Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
4. Bevel the upper and lower edges at the angles shown in the illustration. Check the width of the seat and adjust accordingly.

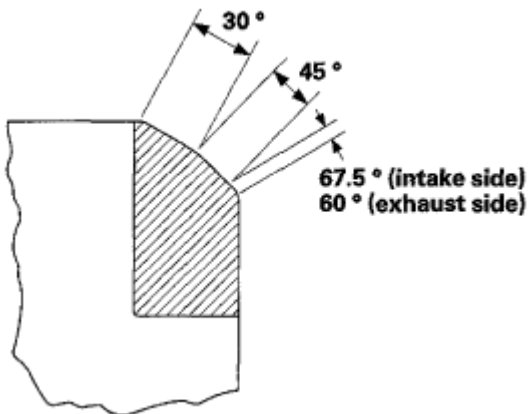


Fig. 119: Checking Width Of Seat
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width

Intake:

Standard (New): 0.850-1.150 mm (0.03346-0.04528 in)

Service Limit: 1.60 mm (0.0630 in)

Exhaust:

Standard (New): 1.250-1.550 mm (0.04921-0.06102 in)

Service Limit: 2.00 mm (0.0787 in)

6. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound (A) to the valve face. Insert the valve in its original location in the head, then lift it and snap it closed against the seat several times.

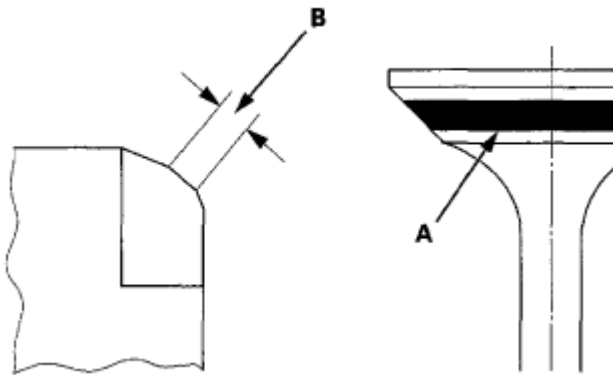


Fig. 120: Applying Prussian Blue Compound To Valve Face
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. The actual valve seating surface (B), as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 67.5° cutter (intake seat) or 60° cutter (exhaust seat) to move it down, then one more cut with the 45° cutter to restore seat width.
 - If it is too low (close to the valve edge), you must make a second cut with the 30° cutter to move it up, then make one more cut with the 45° cutter to restore seat width.

NOTE: The final cut should always be made with the 45° cutter.

8. Insert the intake and exhaust valves in the head, and measure valve stem installed height (A).

Intake Valve Stem Installed Height

Standard (New): 46.1-46.5 mm (1.815-1.831 in)

Service Limit: 46.8 mm (1.843 in)

Exhaust Valve Stem Installed Height

Standard (New): 46.2-46.6 mm (1.819-1.835 in)

Service Limit: 46.9 mm (1.846 in)

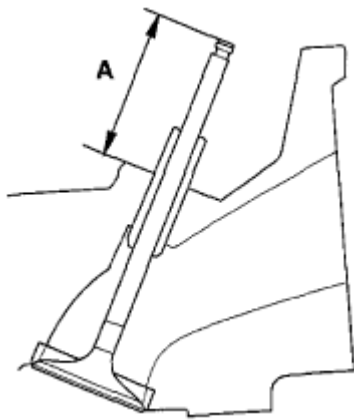


Fig. 121: Measuring Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

VALVE, SPRING, AND VALVE SEAL INSTALLATION

Special Tools Required

- Stem Seal Driver 07PAD-0010000
 - Valve Spring Compressor Attachment 07757-PJ1010A
1. Coat the valve stems with new engine oil. Install the valves in the valve guides.
 2. Check that the valves move up and down smoothly.
 3. Install the spring seats on the cylinder head.
 4. Install the new valve seals (A) using the 5.5 mm side of the stem seal driver (B).

NOTE: The exhaust valve seal (C) has a black spring (D), and the intake valve seal (E) has a white or silver spring (F). They are not interchangeable.

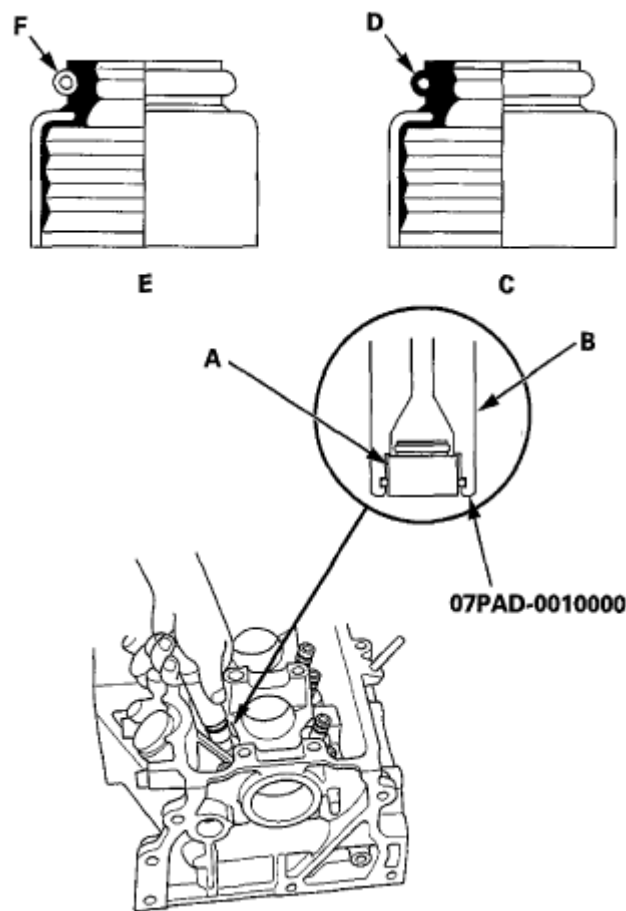


Fig. 122: Installing Valve Seals Using 5.5 mm Side Of Stem Seal Driver
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the valve spring. Place the end of the valve spring with the closely wound coils toward the cylinder head.
6. Install the spring retainer.
7. Install the valve spring compressor and the attachment. Compress the spring, and install the valve cotters.

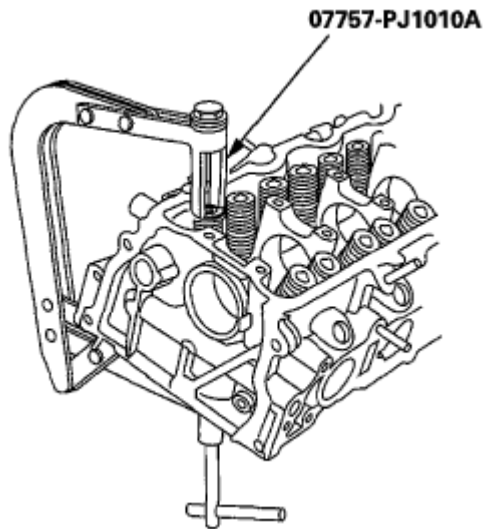


Fig. 123: Compressing Spring, And Install Valve Cotters
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the valve spring compressor and the attachment.
9. Lightly tap the end of each valve stem two or three times with a plastic mallet (A) to ensure proper seating of the valve and the valve cotters. Tap the valve stem only along its axis so you do not bend the stem.

NOTE: Be sure to raise the head off the work bench so the valve is not possibly damaged.

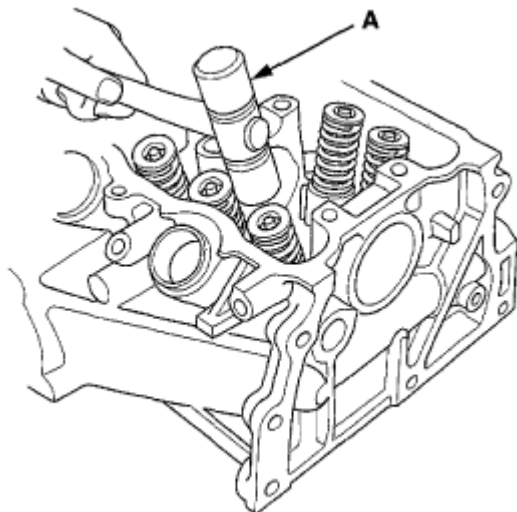


Fig. 124: Tapping Valve Stem With Plastic Mallet To Ensure Proper Seating Of Valve And Valve Cotters
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSTALLATION

1. Install the camshaft (A), then install the camshaft thrust cover (B) with a new O-ring (C).

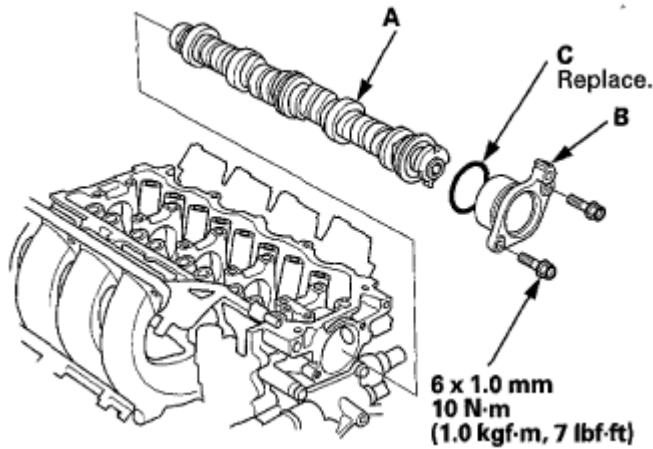


Fig. 125: Locating Camshaft, Camshaft Thrust Cover And O-Ring With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the CMP sensor (see [CMP SENSOR REPLACEMENT](#)).
3. Install the rocker arm assembly (see [ROCKER ARM ASSEMBLY INSTALLATION](#)).
4. Install the camshaft sprocket (see [CAMSHAFT SPROCKET INSTALLATION](#)).
5. Install the cylinder head cover (see [CYLINDER HEAD COVER INSTALLATION](#)).
6. Install the harness holder (A).

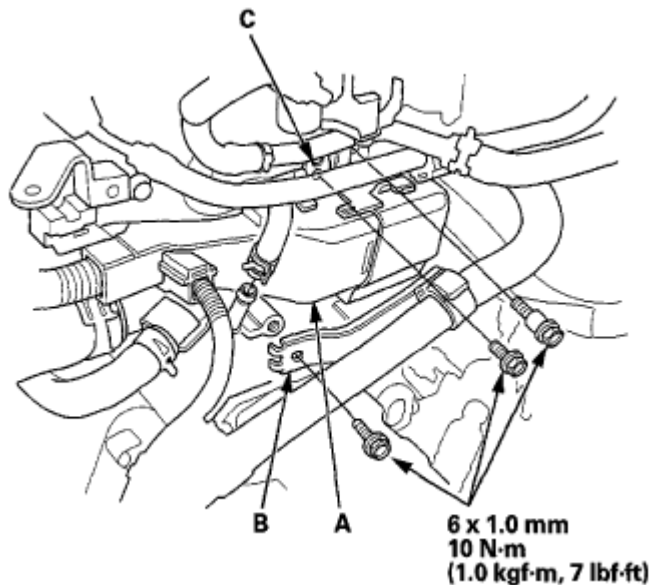


Fig. 126: Locating Harness Holder, Heater Hose Bracket And Ground Cable With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the heater hose bracket (B) and the ground cable (C).
8. Install the harness clamps (A) with the harness holders (B).

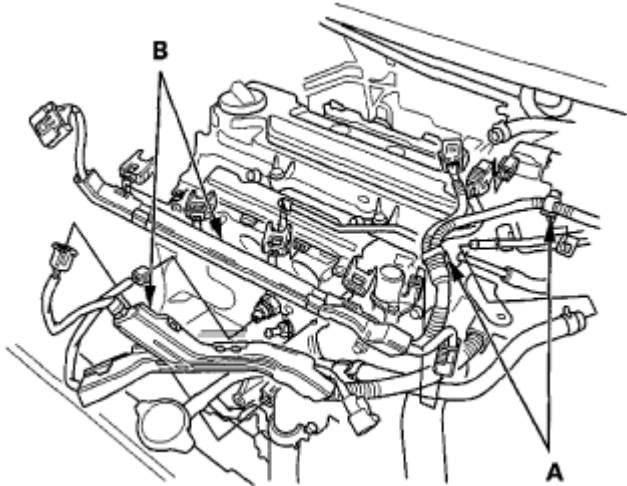


Fig. 127: Locating Harness Clamps And Harness Holders
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Connect the following engine wire harness connectors and wire harness clamps:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector
10. Install the intake manifold/chamber assembly (see **INSTALLATION**).
11. Install the throttle body (see **THROTTLE BODY REMOVAL/INSTALLATION**).
12. Refill the radiator with engine coolant, and bleed the air from the cooling system (see **COOLANT REPLACEMENT**).

ROCKER ARM ASSEMBLY INSTALLATION

1. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see **Rocker Arm and Shaft Disassembly/Reassembly**).
2. Apply engine oil to the end of the valve stem.
3. Install the rocker arm assembly (A), then remove the rubber bands (B).

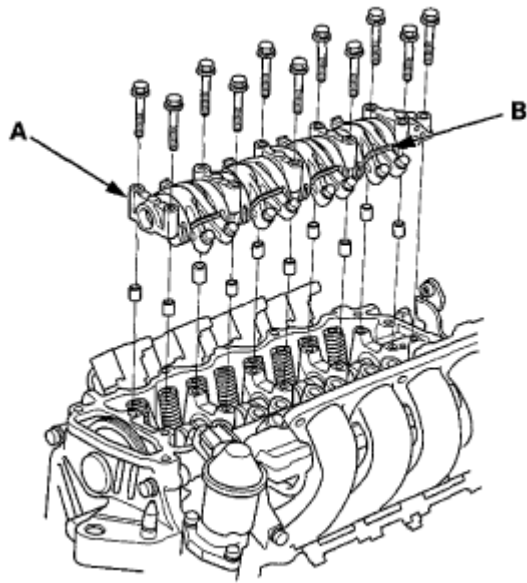


Fig. 128: Locating Rocker Arm Assembly And Rubber Bands
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Tighten each bolt two turns at a time in sequence.

Specified Torque

6 x 1.0 mm

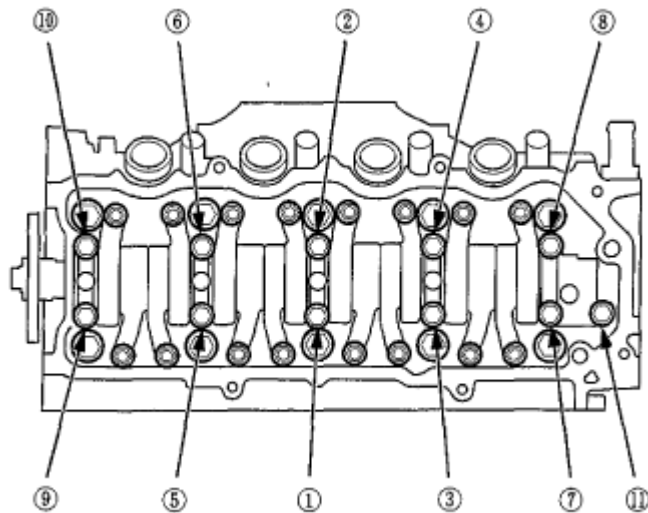


Fig. 129: Identifying Rocker Arm Assembly Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Adjust the valve clearance (see VALVE CLEARANCE ADJUSTMENT).
6. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).

CYLINDER HEAD INSTALLATION

1. Clean the cylinder head and the engine block surface.
2. Install a new coolant separator (A) in the engine block whenever the engine block is replaced.

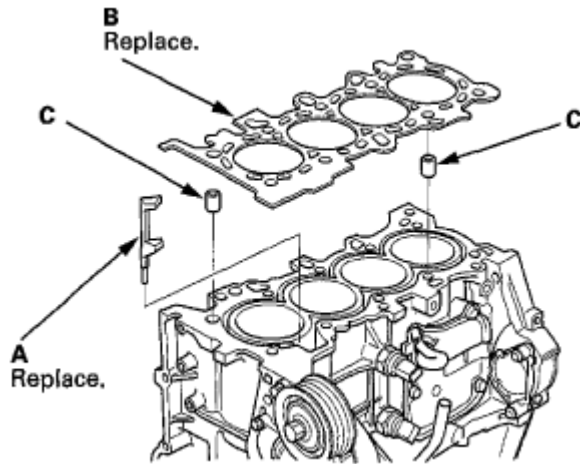


Fig. 130: Locating Coolant Separator, Cylinder Head Gasket And Dowel Pins
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the new cylinder head gasket (B) and the dowel pins (C) on the engine block. Always use a new cylinder head gasket.
4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the oil pump.

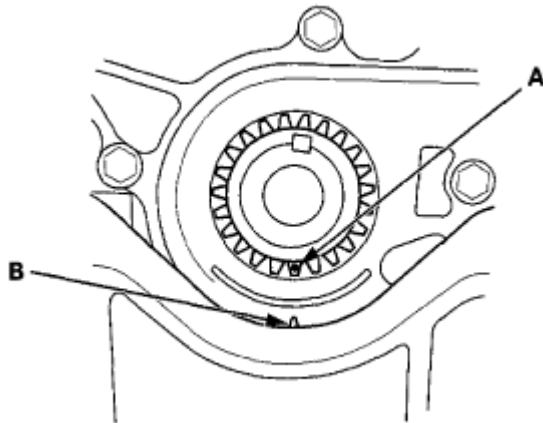


Fig. 131: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Oil Pump
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Set the camshaft TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

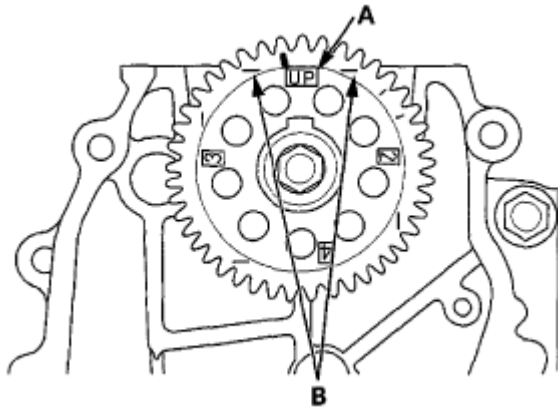


Fig. 132: Locating UP Mark On Camshaft Sprocket And TDC Grooves On Camshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cylinder head on the engine block.
7. Apply new engine oil to the threads and flange of all cylinder head bolts.
8. Torque the cylinder head bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft) with a beam-type torque wrench if possible. When using a preset-click-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

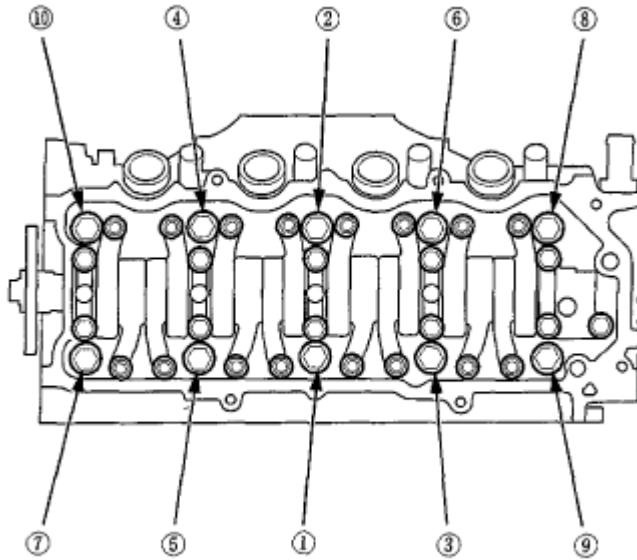


Fig. 133: Identifying Cylinder Head Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Tighten all cylinder head bolts an additional 130°.

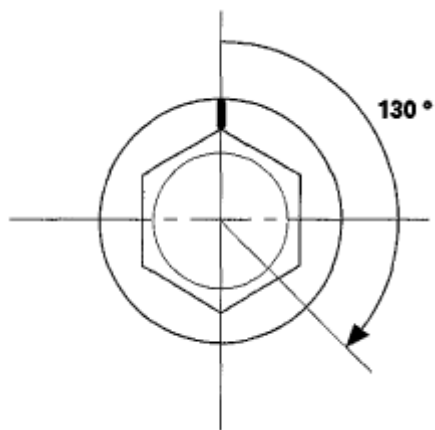


Fig. 134: Tightening All Cylinder Head Bolts An Additional 130°
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the cam chain (see **CAM CHAIN INSTALLATION**).
11. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
12. Connect the upper radiator hose (A), the water bypass hose (B), and the heater hose (C).

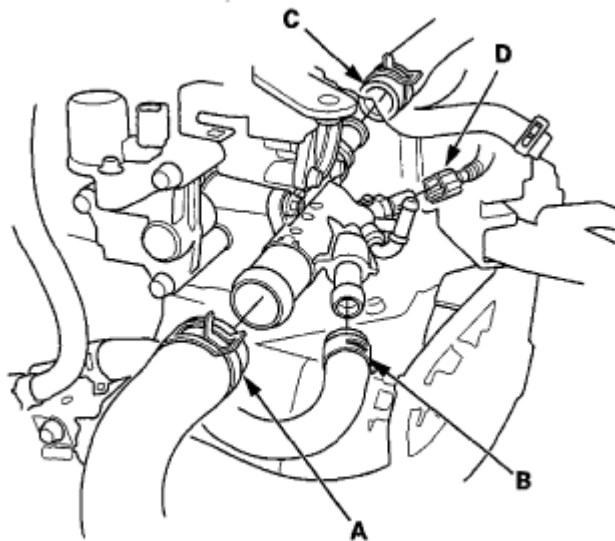


Fig. 135: Locating Upper Radiator Hose, Water Bypass Hose And Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Connect the ECT sensor 1 connector (D).
14. Install the harness holder (A).

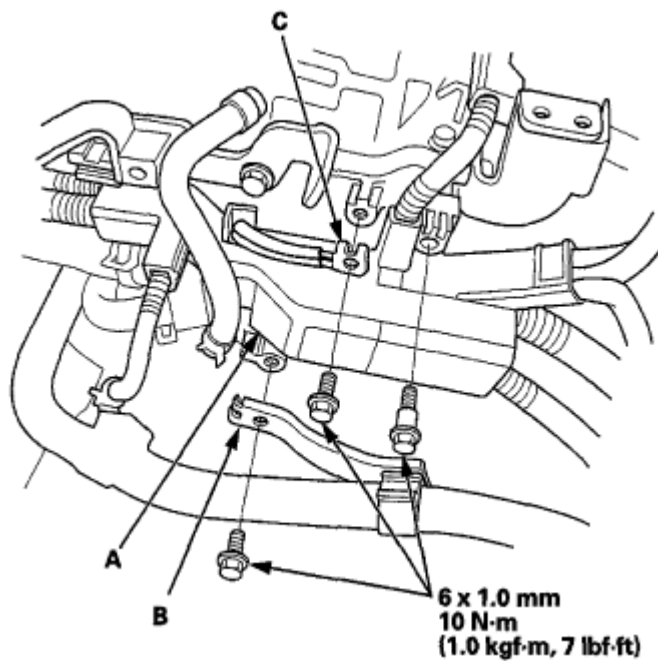


Fig. 136: Locating Harness Holder With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the heater hose bracket (B) and the ground cable (C).
16. Connect the oil pressure switch connector (A) and the knock sensor connector (B).

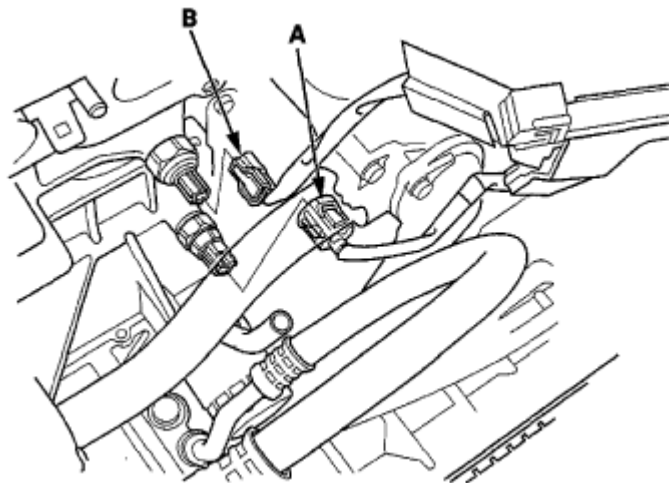


Fig. 137: Locating Oil Pressure Switch Connector And Knock Sensor Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Connect the CMP sensor connector (A) and the secondary HO2S connector (B).

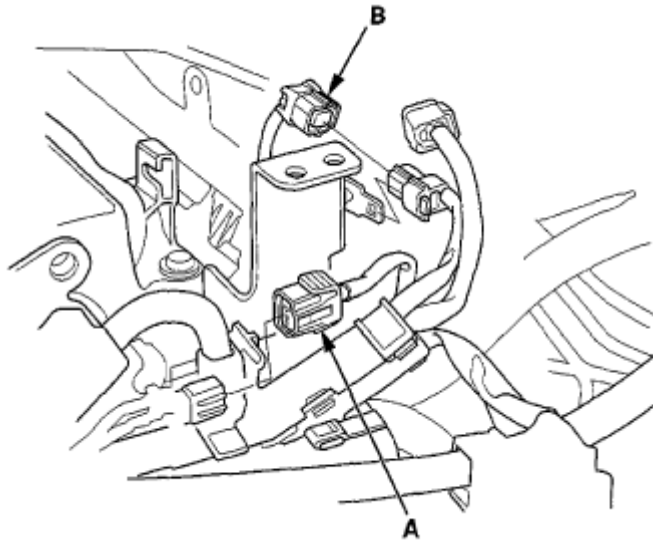


Fig. 138: Locating CMP Sensor Connector And Secondary HO2S Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

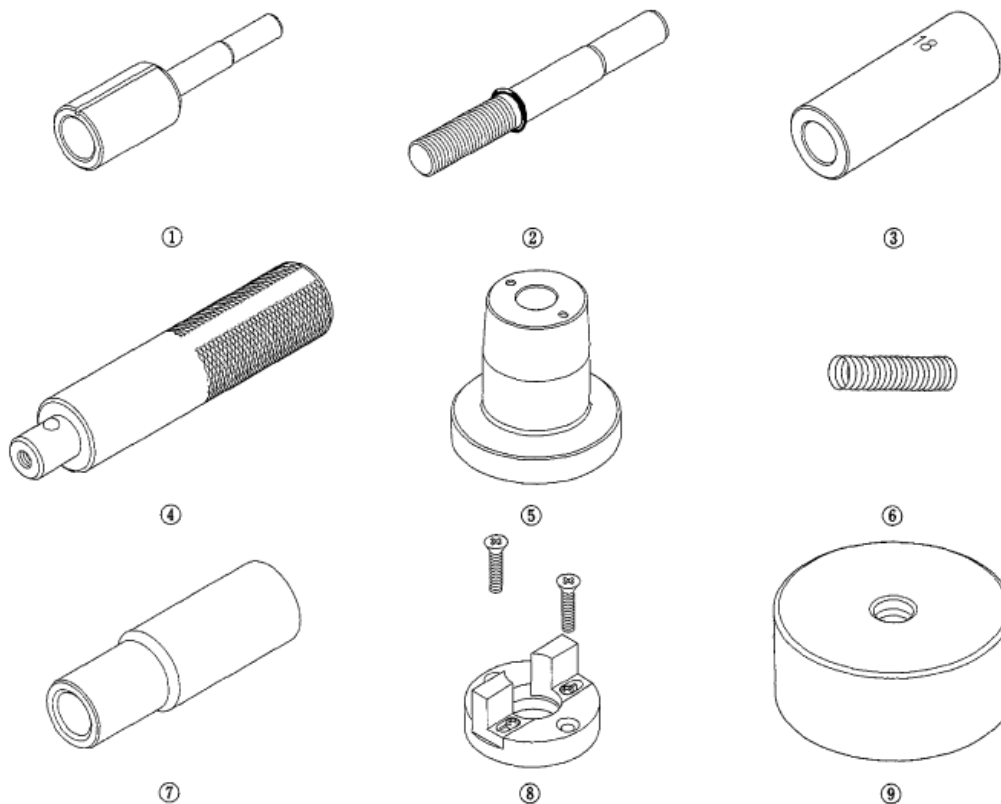
18. Install the warm-up TWC (see **WARM UP TWC REMOVAL/INSTALLATION**).
19. Install the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
20. Install the injectors (see **INJECTOR REPLACEMENT**).
21. Install the intake manifold/chamber assembly (see **INSTALLATION**).
22. Install the throttle body (see **THROTTLE BODY REMOVAL/INSTALLATION**).
23. After installation, check that all tubes, hoses, and connectors are installed correctly.
24. Do the 12 volt battery installation procedure (see **12 VOLT BATTERY REMOVAL AND INSTALLATION**).
25. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
26. Refill the radiator with engine coolant, and bleed the air from the cooling system (see **COOLANT REPLACEMENT**).
27. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).
28. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
29. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).

2011 - 12 ENGINE

Engine Block - CR-Z

SPECIAL TOOLS

Ref.No.	Tool Number	Description	Qty
①	070AF-PWC0110	Pilot Pin	1
②	070AF-PWC0120	Insert Adjust	1
③	070AF-PWC0130	Pilot Collar, O.D. 18 mm	1
④	07749-0010000	Driver Handle, 15 x 135L	1
⑤	07973-6570500	Piston Base	1
⑥	07973-6570600	Piston Base Spring	1
⑦	07PAF-0010700	Insert Pin	1
⑧	07TGF-001000A	Piston Base Head	1
⑨	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1

**Fig. 1: Identifying Special Tools**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

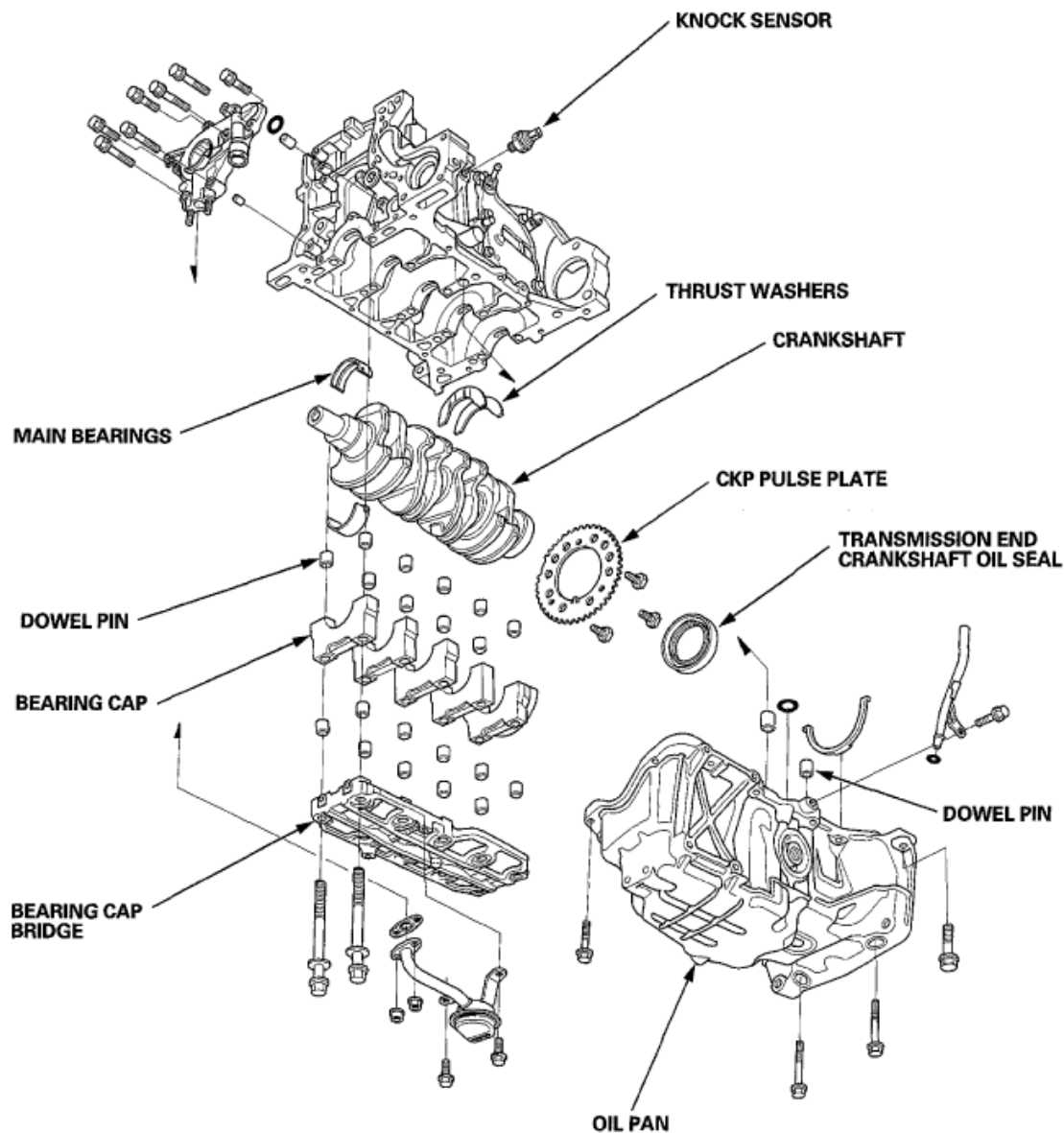


Fig. 2: Identifying Engine Block Components Location Index (1 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

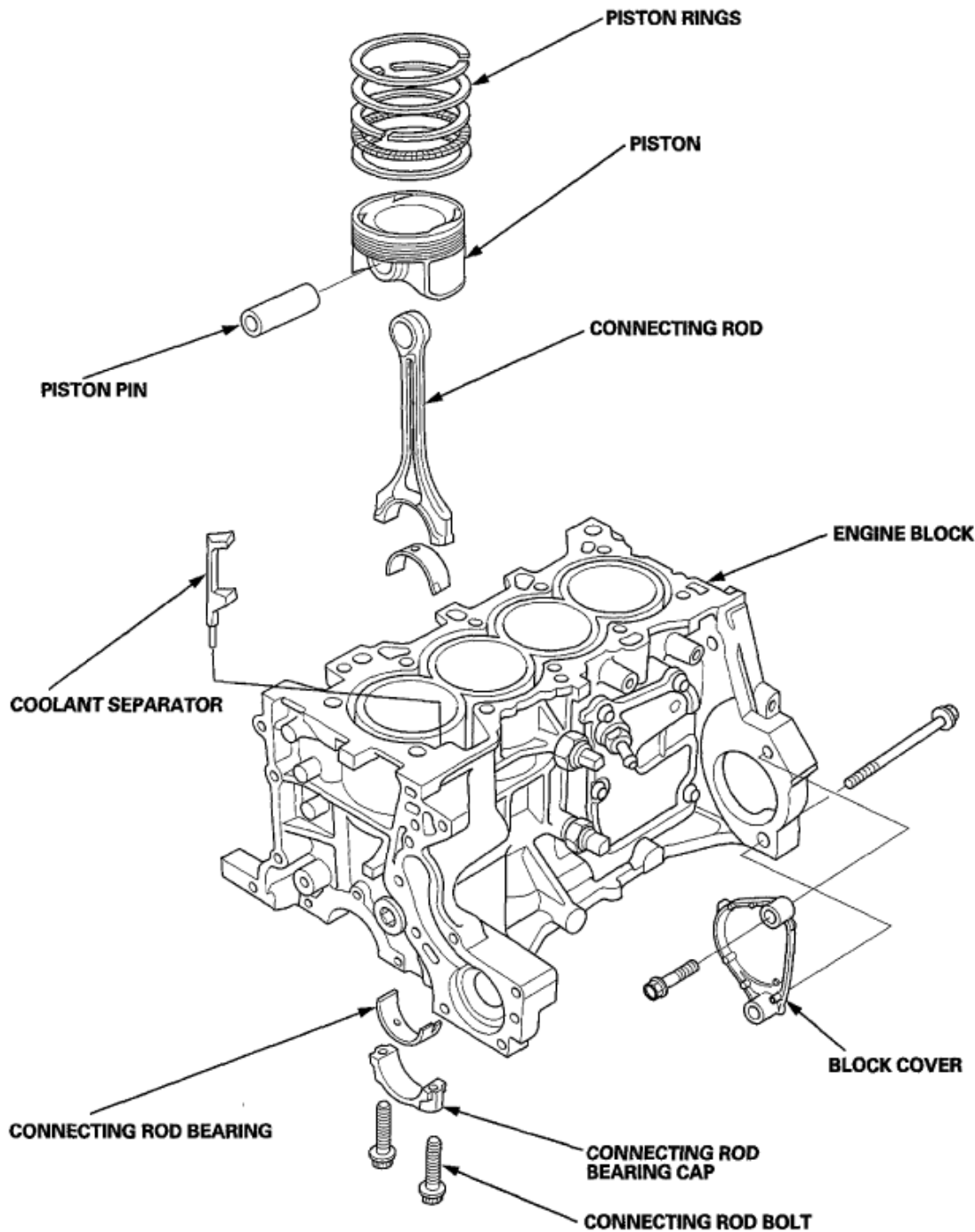


Fig. 3: Identifying Engine Block Component Location Index (2 Of 2)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see **REMOVAL**).
2. 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 (0.0059-0.0138 in)

Service Limit: 0.40 mm (0.0157 in)

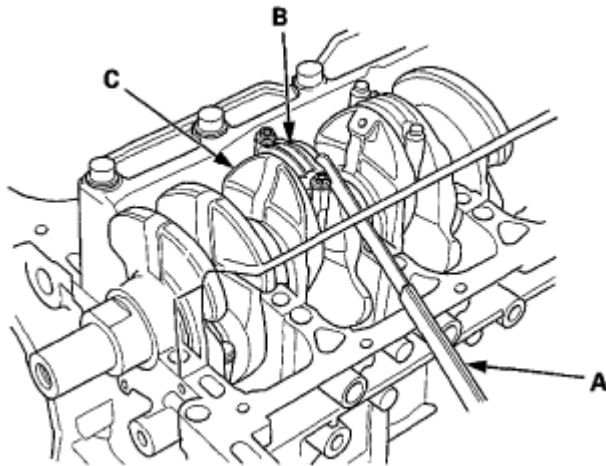


Fig. 4: Measuring Connecting Rod End Play Between Connecting Rod And Crankshaft Using Feeler Gauge

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. If the connecting rod end play is beyond the service limit, install a new connecting rod, and recheck. If it is still beyond the service limit, replace the crankshaft (see **CRANKSHAFT AND PISTON REMOVAL**).
4. To check crankshaft end play, push the crankshaft firmly away from the dial indicator by prying, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator by prying; the dial reading should not exceed the service limit.

Crankshaft End Play

Standard (New): 0.10-0.35 mm (0.0039-0.0138 in)

Service Limit: 0.45 mm (0.0177 in)

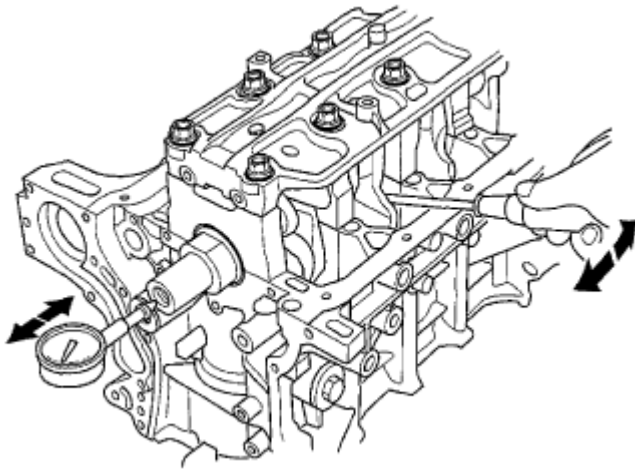


Fig. 5: Checking Crankshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CRANKSHAFT MAIN BEARING REPLACEMENT

MAIN BEARING CLEARANCE INSPECTION

1. Remove the bearing cap bridge, the bearing caps, and the bearing halves (see CRANKSHAFT AND PISTON REMOVAL).
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings, the bearing caps, and bearing cap bridge, then torque the bearing cap bolts to 25 N.m (2.5 kgf.m, 18 lbf.ft) in the proper sequence.

NOTE:

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

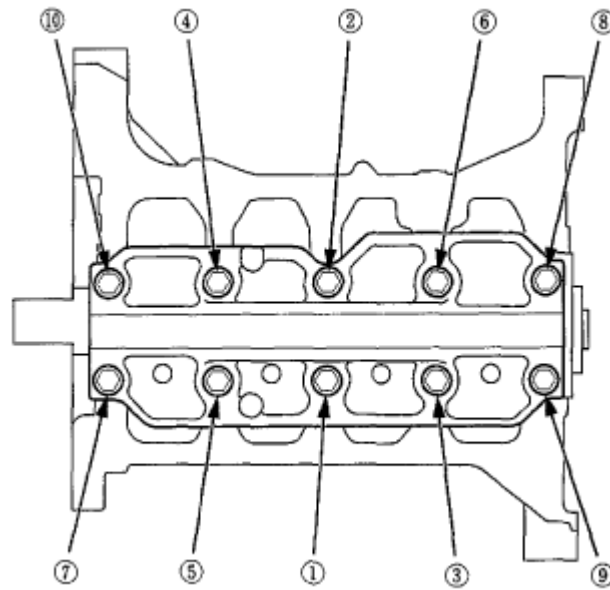


Fig. 6: Bearing Cap Bolts Removing Order
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Tighten the bearing cap bolts an additional 40'

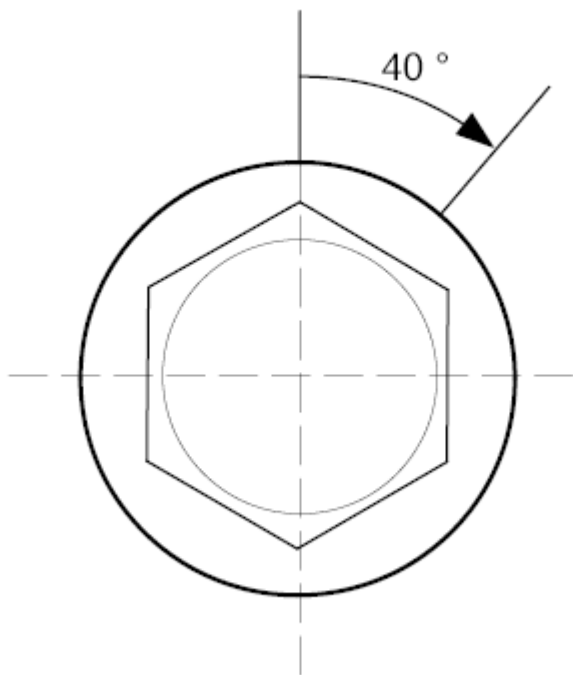


Fig. 7: Identifying Bearing Cap Bolts Angle
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the bearing cap bridge, the bearing caps, and the bearings halves, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

Standard (New): 0.018-0.036 mm (0.00071-0.00142 in)

Service Limit: 0.050 mm (0.00197 in)

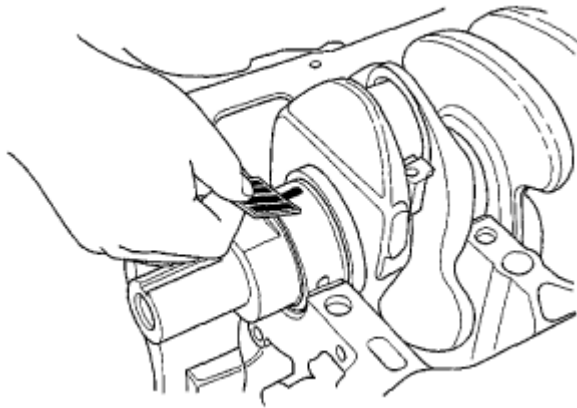


Fig. 8: Measuring Main Bearing To Journal Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

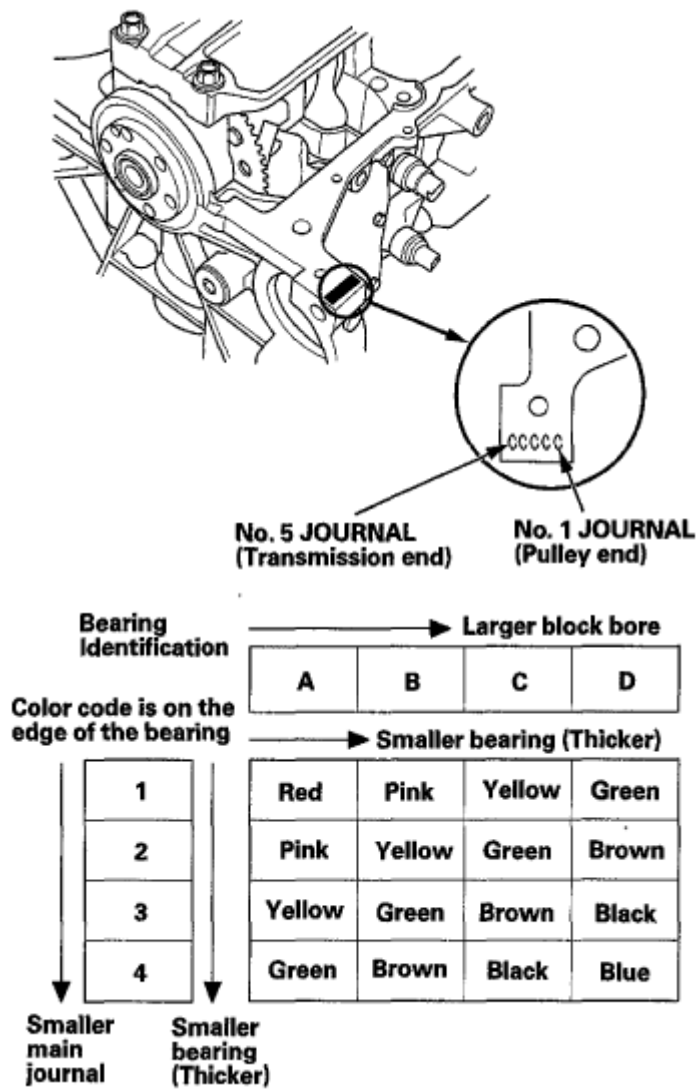
7. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code, and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
8. If the plastigage shows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

MAIN BEARING SELECTION

Block Bore Code Location

Letters have been stamped on the end of the engine block as a code for the size of each of the five 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.

**Fig. 9: Identifying Block Bore Code**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

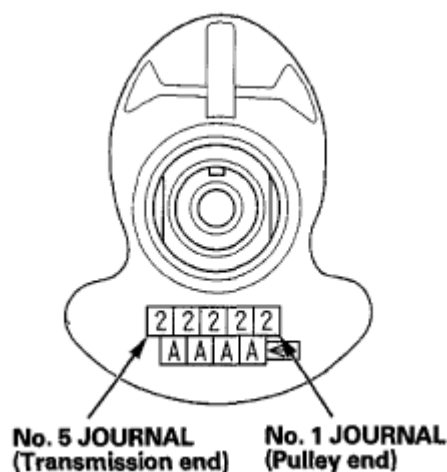


Fig. 10: Identifying Main Journal Code

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

CONNECTING ROD BEARING CLEARANCE INSPECTION

1. Remove the bearing cap bridge (see CRANKSHAFT AND PISTON REMOVAL).
2. Remove the connecting rod cap and the bearing half.
3. Clean the connecting rod journal and the bearing half with a clean shop towel.
4. Place one strip of plastigage across the rod journal.
5. Reinstall the bearing half and connecting rod cap, and torque the bolts to 10 N.m (1.0 kgf.m, 7 lbf.ft) +90°.

NOTE:

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

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.020-0.038 mm (0.00079-0.00150 in)

Service Limit: 0.050 mm (0.00197 in)

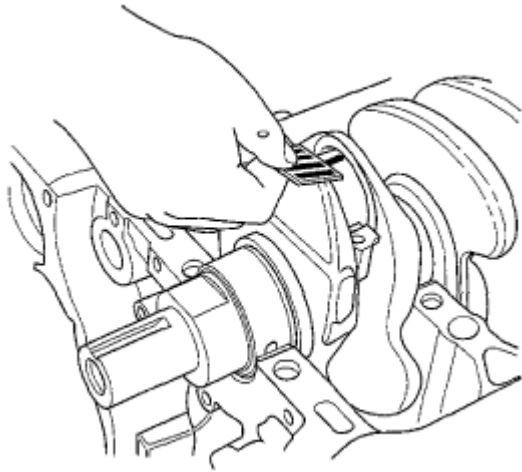


Fig. 11: Measuring Connecting Rod Bearing To Journal Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color code, 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 that one), and check clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearing, replace the crankshaft (see **CRANKSHAFT AND PISTON REMOVAL**) and start over.

CONNECTING ROD BEARING SELECTION

Each 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) indicating the range. You may find any combination of 1, 2, 3, or 4 in any engine.

Big End Bore Size: 43.0 mm (1.693 in)

Inspect each connecting rod for cracks and heat damage.

Connecting Rod 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.

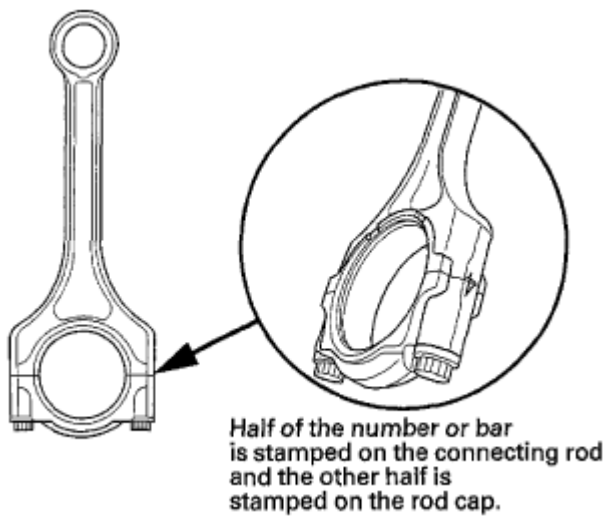


Fig. 12: Identifying Connecting Rod Big End Bore Code
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Bearing Identification		→ Larger big rod bore			
Color code is on the edge of the bearing		1	2	3	4
		→ Smaller bearing (Thicker)			
↓	A	Red	Pink	Yellow	Green
	B	Pink	Yellow	Green	Brown
	C	Yellow	Green	Brown	Black
	D	Green	Brown	Black	Blue
↓					
Smaller rod journal	Smaller bearing (Thicker)				

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

Connecting Rod Journal Code Locations

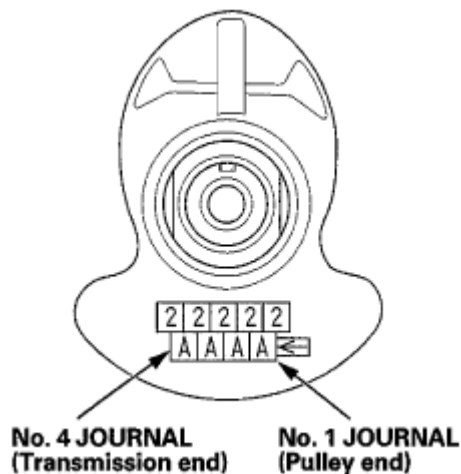


Fig. 14: Identifying Connecting Rod Journal Code
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

1. If the engine is already out of the vehicle, go to step 6.
2. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
3. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
4. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
5. Remove the A/C compressor without disconnecting the A/C hoses (see step 41 on **ENGINE REMOVAL**).
6. Remove the dipstick, then remove the dipstick tube.

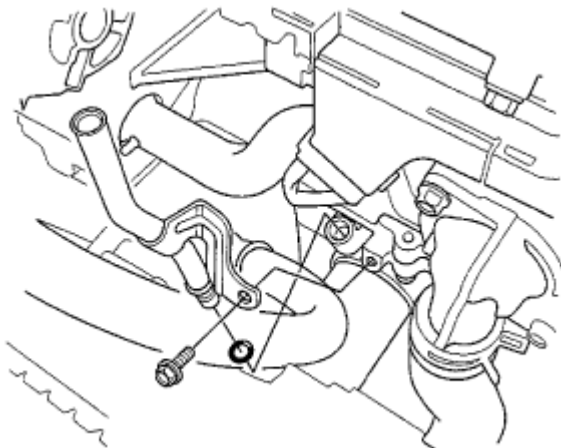


Fig. 15: Identifying Dipstick
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the CKP sensor cover (A), then disconnect the CKP sensor connector (B).

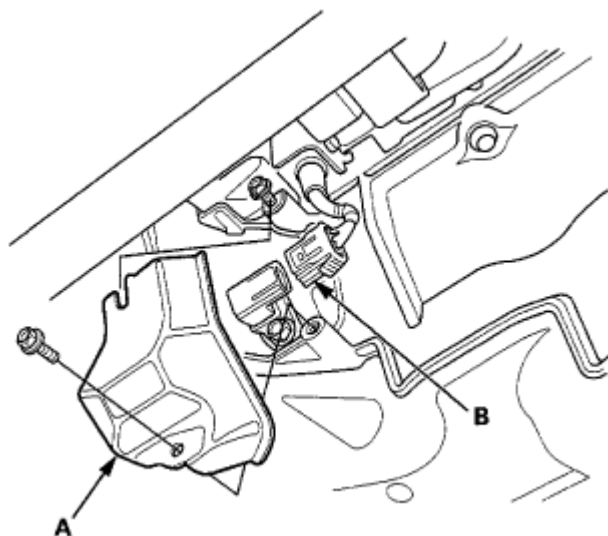


Fig. 16: Identifying CKP Sensor With Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. CVT model: Remove the driveshaft heat shield.



Fig. 17: Identifying Driveshaft Heat Shield Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the torque rod (see **TORQUE ROD REPLACEMENT**).
10. Remove the torque rod bracket (see **TORQUE ROD BRACKET REPLACEMENT**).
11. Remove the transmission mounting bolts.

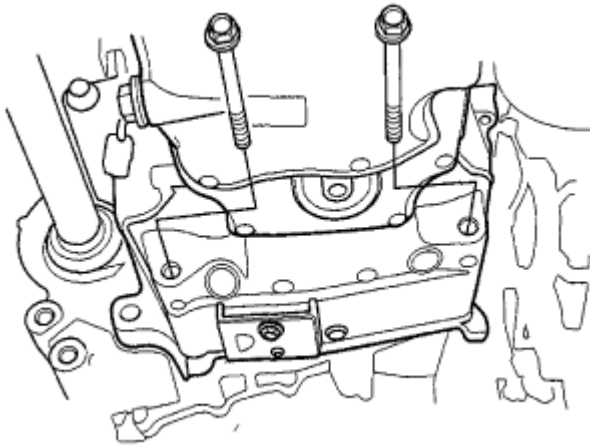


Fig. 18: Identifying Transmission Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the oil pan bolts.

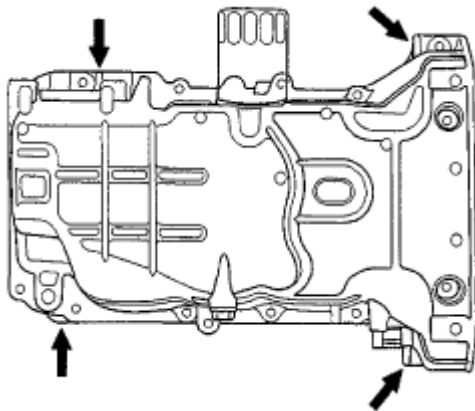


Fig. 19: Locating Oil Pan Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Using a flat blade screwdriver, separate the oil pan from the engine block in the places shown.
14. Remove the oil pan.

NOTE: Lower the oil pan carefully so as not to damage the IMA motor (resolver stator).

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine/IMA motor/transmission assembly (see ENGINE REMOVAL).
2. Remove the transmission.
 - M/T model (see NEUTRAL POSITION SWITCH REPLACEMENT)
 - CVT model (see TRANSMISSION REMOVAL)

3. Remove the IMA motor rotor (see **IMA MOTOR ROTOR REMOVAL/INSTALLATION**), the IMA motor housing (see **DRAIN COVER REMOVAL/INSTALLATION**), and the IMA motor rotor position sensor (see **IMA MOTOR ROTOR POSITION SENSOR REMOVAL/INSTALLATION**).
4. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
5. Remove the oil pan (see **OIL PAN REMOVAL**).
6. Remove the oil screen (A), then remove the oil pump (B).

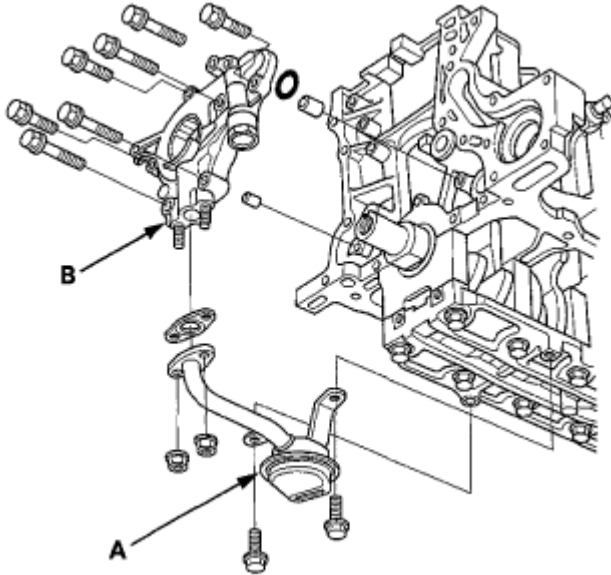


Fig. 20: Identifying Oil Screen And Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

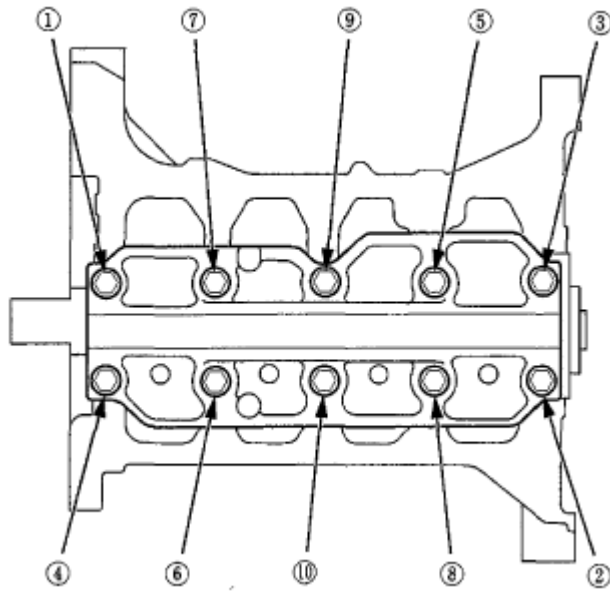


Fig. 21: Bearing Cap Bolts Removing Order

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the bearing cap bridge and the bearing caps.
9. Remove the connecting rod caps/bearings. Keep all caps/bearings in order.
10. Lift crankshaft (A) out of the engine block, being careful not to damage the journals and the CKP pulse plate (B).

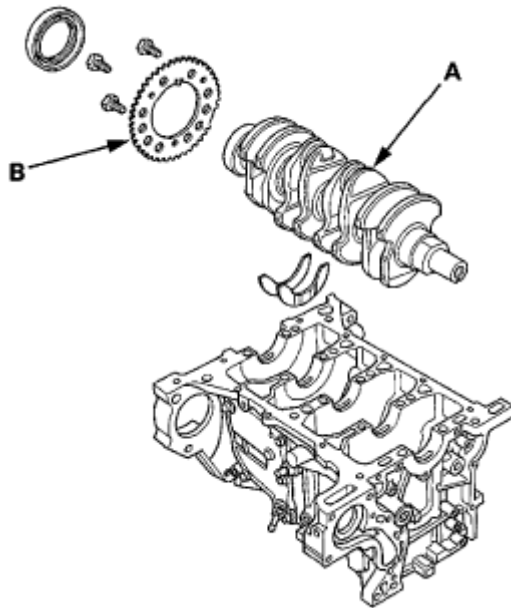


Fig. 22: Identifying Crankshaft And CKP Pulse Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the CKP pulse plate.

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

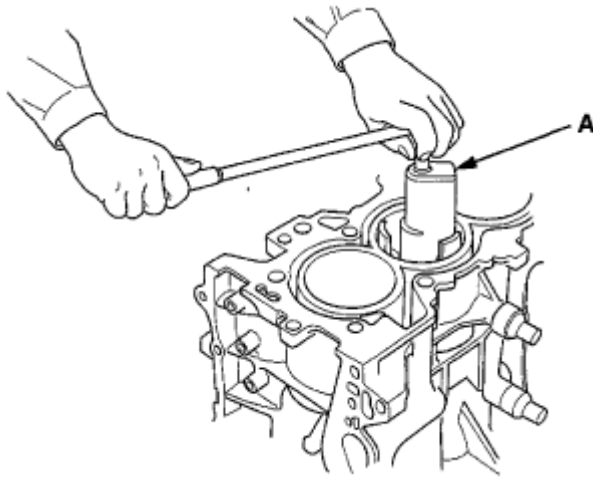


Fig. 23: Removing Ridge Of Metal From Top Of Cylinder Using Ridge Reamer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Use the wooden handle of a hammer (A) to drive out the piston/connecting rod assembly (B). Take care not to damage the cylinder with the connecting rod.

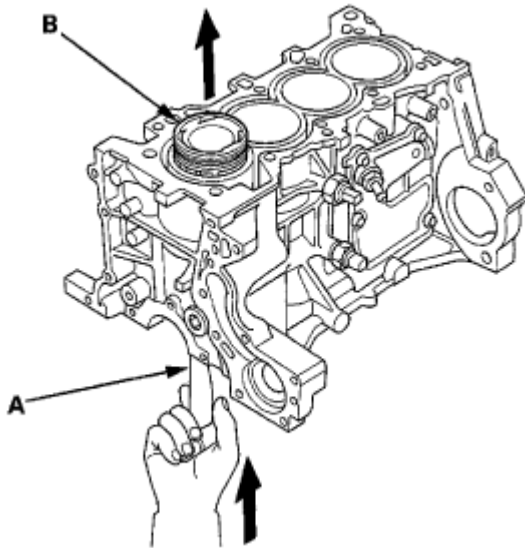


Fig. 24: Removing Piston/Connecting Rod Assembly Using Hammer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Reinstall the bearing cap bridge, the bearing caps, and the bearings on the engine block in the proper order.

16. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
17. Mark each piston/connecting rod assembly with its cylinder number to make sure they are reused in original order.

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

CRANKSHAFT INSPECTION

OUT-OF-ROUND AND TAPER

1. Remove the crankshaft from the engine block (see CRANKSHAFT AND PISTON REMOVAL).
2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Check the keyway slot and threaded holes for damage.
4. 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 (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)

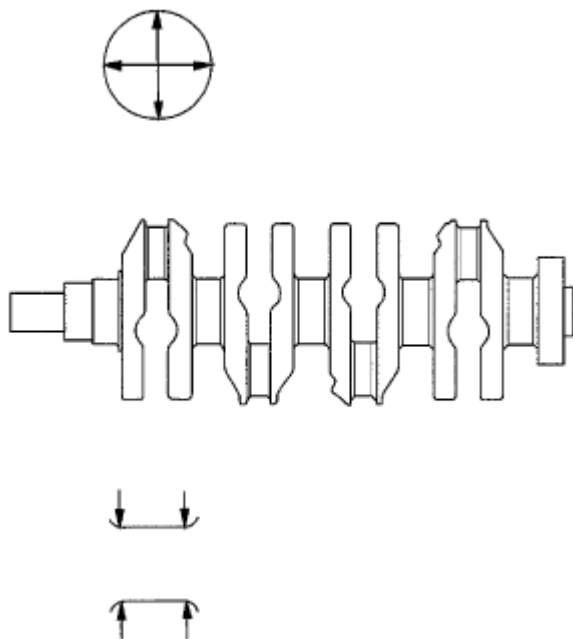


Fig. 25: Identifying Journal Out-Of-Round

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. 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 (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)

STRAIGHTNESS

6. Place the V-blocks on a flat surface.
7. Check the total runout with the crankshaft supported on V-blocks.
8. 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): 0.03 mm (0.0012 in) max.

Service Limit: 0.04 mm (0.0016 in)

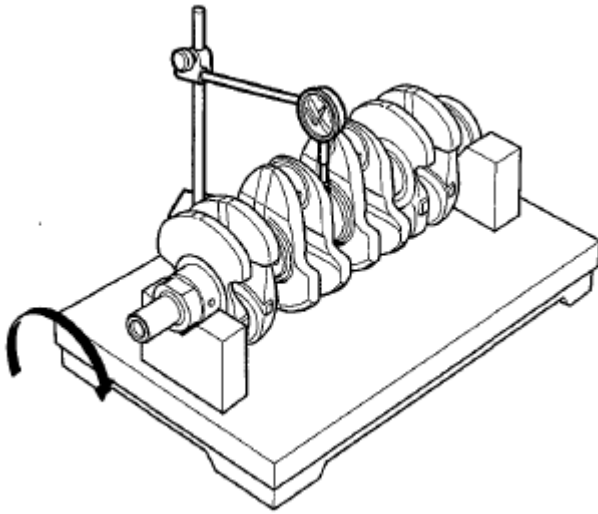


Fig. 26: Measuring Crankshaft Total Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK AND PISTON INSPECTION

1. Remove the crankshaft and the pistons (see CRANKSHAFT AND PISTON REMOVAL).
2. Check the piston for distortion or cracks.
3. Measure the piston skirt diameter (A) at a point 16.0 mm (0.630 in) from the bottom of the skirt.

Piston Diameter

Standard (New): 72.98-72.99 (2.8732-2.8736)

Service Limit: 72.97 mm (2.8728 in)

Oversize Piston Diameter

0.25: 73.23-73.24 mm (2.8831-2.8835 in)

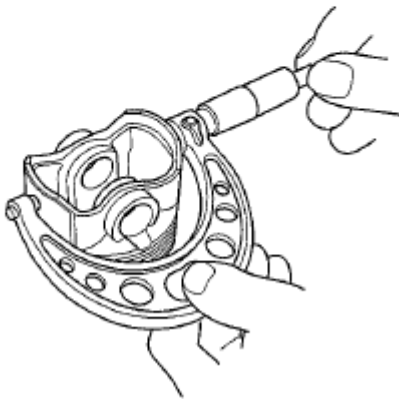
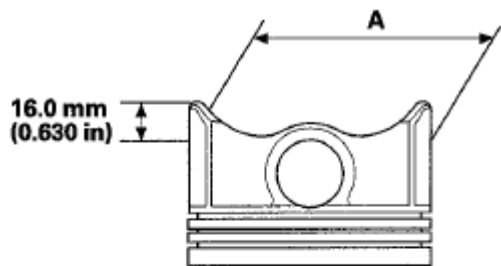


Fig. 27: Measuring Piston Skirt Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure wear and taper in direction Y at three levels in each cylinder as shown. If measurements in any cylinder are beyond the oversize bore service limit, replace the engine block. If the engine block is to be rebored, refer to step 7 after reboring.

Cylinder Bore Size

Standard (New): 73.000-73.015 mm (2.87401-2.87460 in)

Service Limit: 73.065 mm (2.87657 in)

Oversize

0.25: 73.250-73.265 mm (2.8839-2.8844 in)

Reboring limit: 0.25 mm (0.0098 in) max.

Bore Taper

Limit: (Difference between first and third measurement)

0.05 mm (0.0020 in)

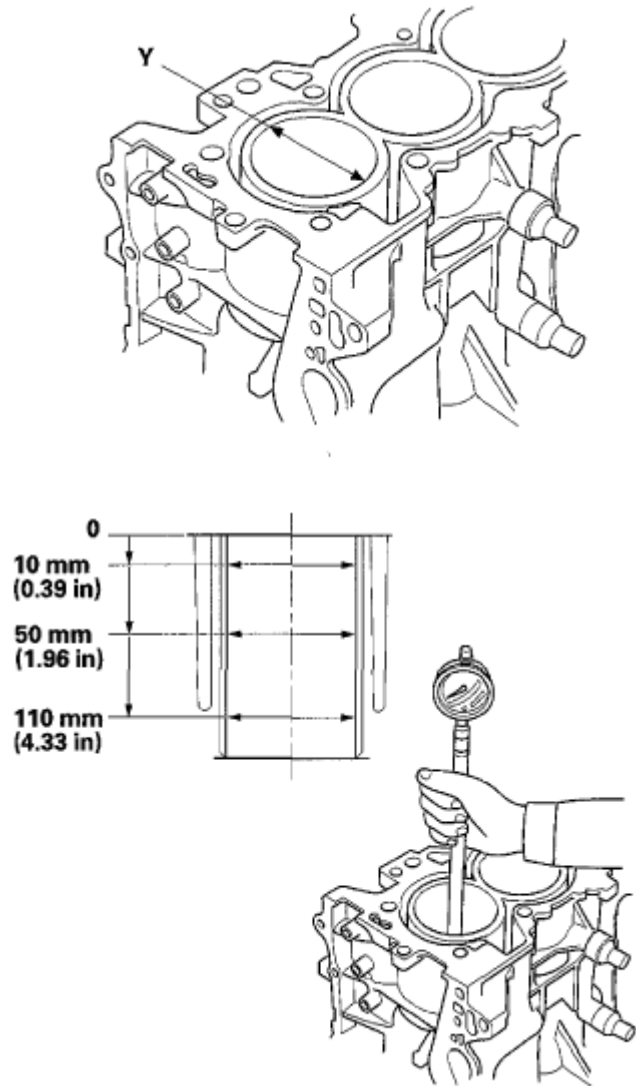


Fig. 28: Measuring Cylinder Wear And Taper
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bore 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 (0.0028 in) max.

Service Limit: 0.10 mm (0.0039 in)

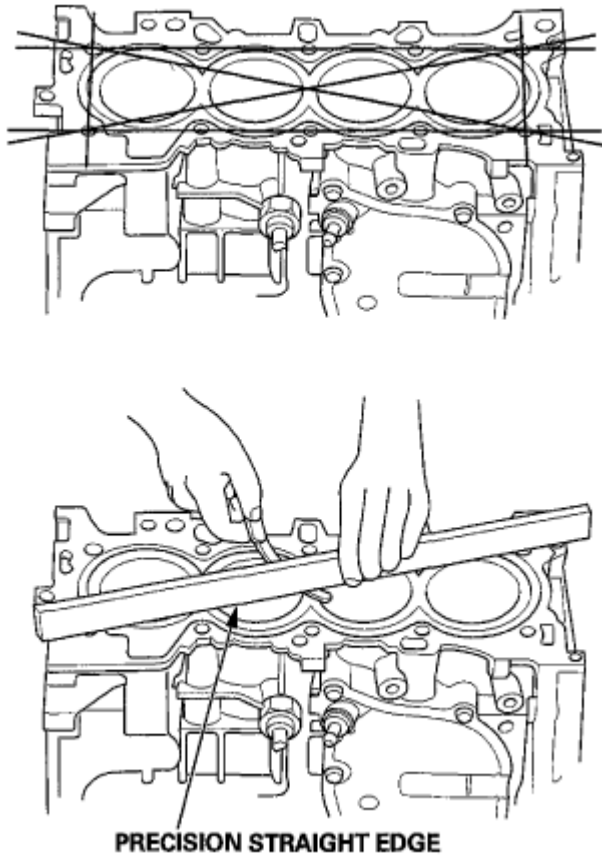


Fig. 29: Checking Engine Block Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-to-Cylinder Clearance

Standard (New): 0.010-0.035 mm (0.00039-0.00138 in)

Service Limit: 0.05 mm (0.0020 in)

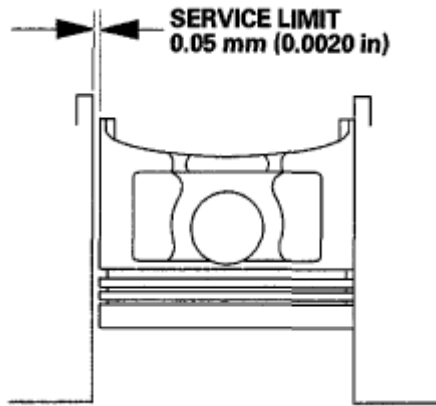


Fig. 30: Identifying Piston And Cylinder Clearance
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BORE HONING

1. Measure the cylinder bores (see **STRAIGHTNESS**).

If the engine block is to be reused, hone the cylinders and remeasure the bores. Only scored or scratched cylinder bore must be honed.

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

NOTE:

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

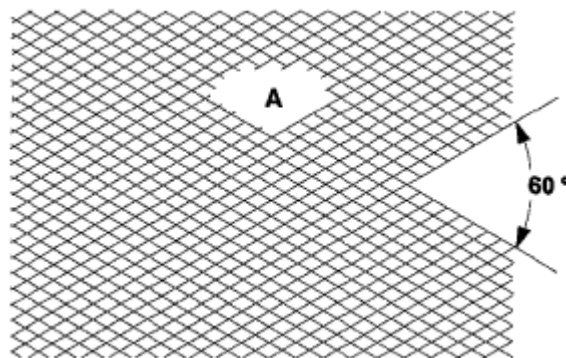


Fig. 31: Identifying Cylinder Bore Honing In Cross-Hatch Pattern
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting.

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

4. If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the engine block. Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.

PISTON, PIN, AND CONNECTING ROD REPLACEMENT

Special Tools Required

- Piston Base Head 07TGF-001000A
- Insert Pin 07PAF-0010700
- Pilot Pin 070AF-PWC0110
- Insert Adjust 070AF-PWC0120
- Pilot Collar, O.D. 18 mm 070AF-PWC0130
- Piston Base 07973-6570500
- Piston Base Spring 07973-6570600

DISASSEMBLY

1. Assemble the special tool as shown.

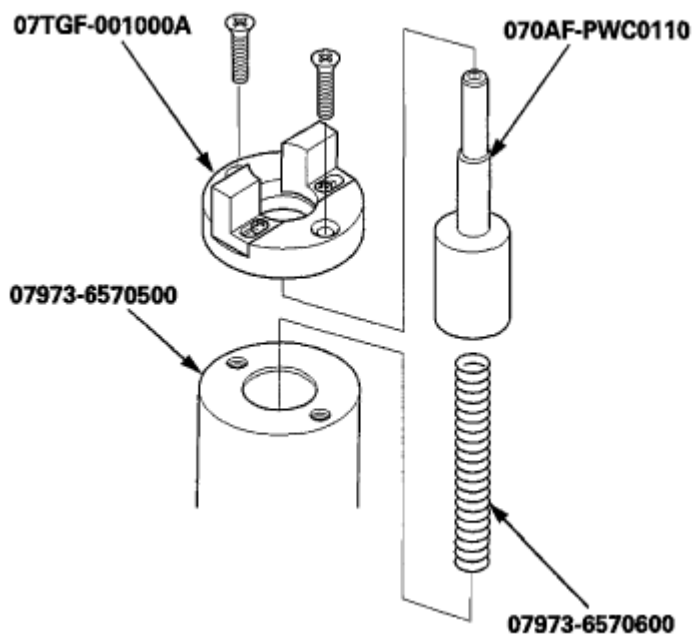


Fig. 32: Exploded View Of Special Tool

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Temporarily install the pilot collar, O.D. 18 mm over the pilot pin (A), and adjust the piston base head as shown, then tighten the screws (B). Remove the pilot collar.

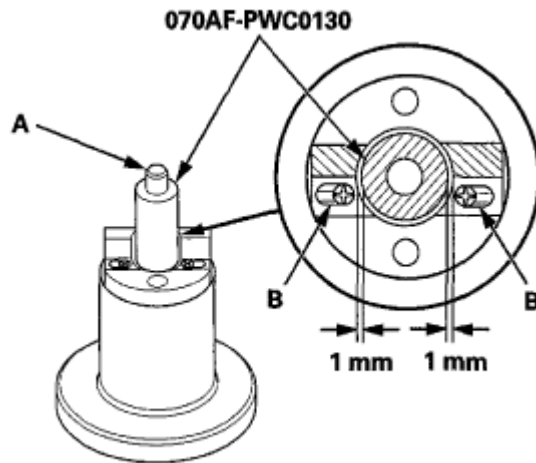


Fig. 33: Identifying Pilot Collar Installing Dimensions
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Assemble and adjust the length of the insert pin and the insert adjust to 45 mm (1.77 in).

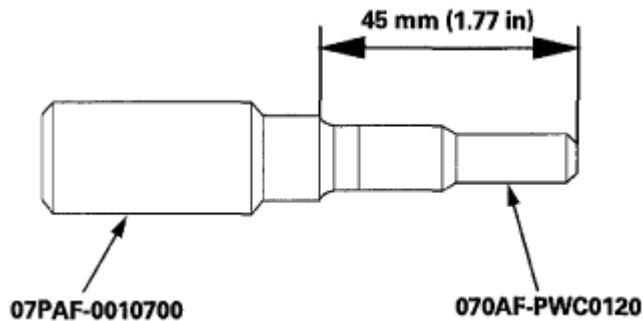


Fig. 34: Identifying Insert Pin Adjusting Length
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. With the arrow on top of the piston pointing up, place the piston assembly (A) on the piston base head (B). Be sure you position the recessed flat area of the piston against the area of the piston base head (C) as shown.

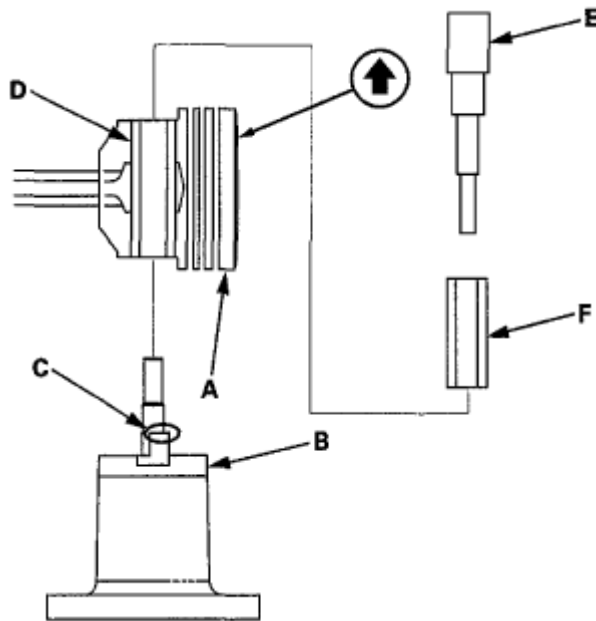


Fig. 35: Identifying Piston Assembly On Piston Base Head

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Press the pin (D) out with the insert pin and the insert adjust (E), the pilot collar (F), and a hydraulic press.

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): 17.996-18.000 mm (0.70850-0.70866 in)

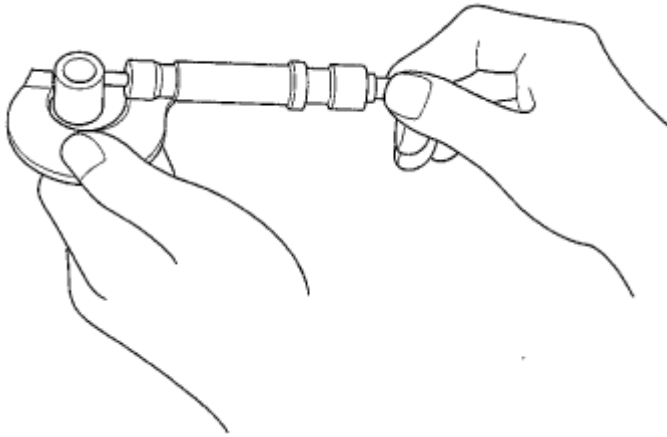


Fig. 36: Measuring Piston Pin Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

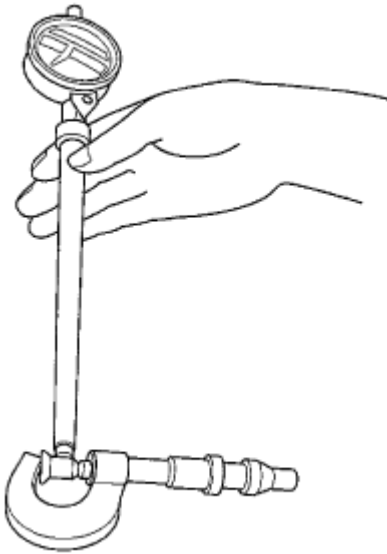


Fig. 37: Adjusting Dial Indicator To Piston Pin Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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): 0.010-0.017 mm (0.00039-0.00067 in)

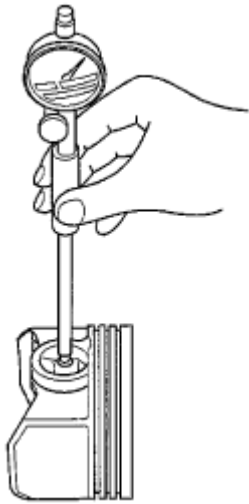


Fig. 38: Checking Difference Between Piston Pin Diameter And Piston Pin Hole Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Connecting Rod Clearance

Standard (New): -0.036 - -0.019 mm (-0.00142 - -0.00075 in)

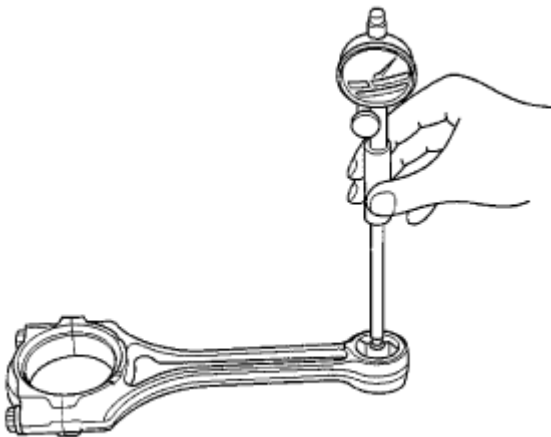


Fig. 39: Measuring Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REASSEMBLY

1. Assemble the piston and the connecting rod with the arrow (A) and the embossed mark (B) on the same side.

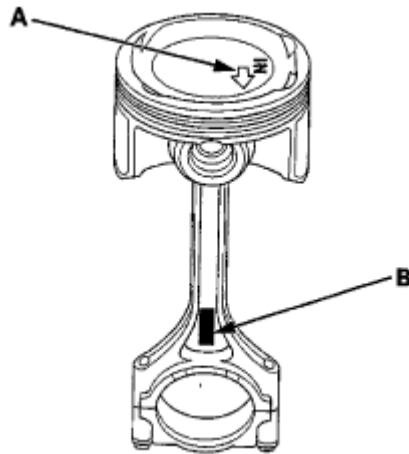


Fig. 40: Identifying Arrow On Piston And Embossed Mark On Connecting Rod
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Insert the pilot collar (A) into the piston and the connecting rod.

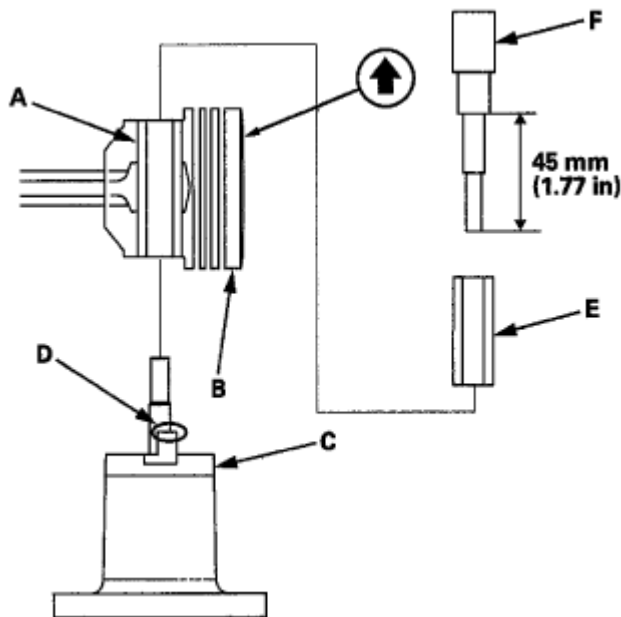


Fig. 41: Identifying Piston Assembly On Piston Base Head
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. With the arrow on top of the piston and the embossed mark on the connecting rod facing up, place the piston assembly (8) on the piston base head (C).

Be sure you position the recessed flat area of the piston against the area of the piston base head (D) as shown.

4. Press the pin (E) in with the insert pin and the insert adjust (F) and a hydraulic press.

PISTON RING REPLACEMENT

1. Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Using a ring expander (A), remove the old piston rings (B).

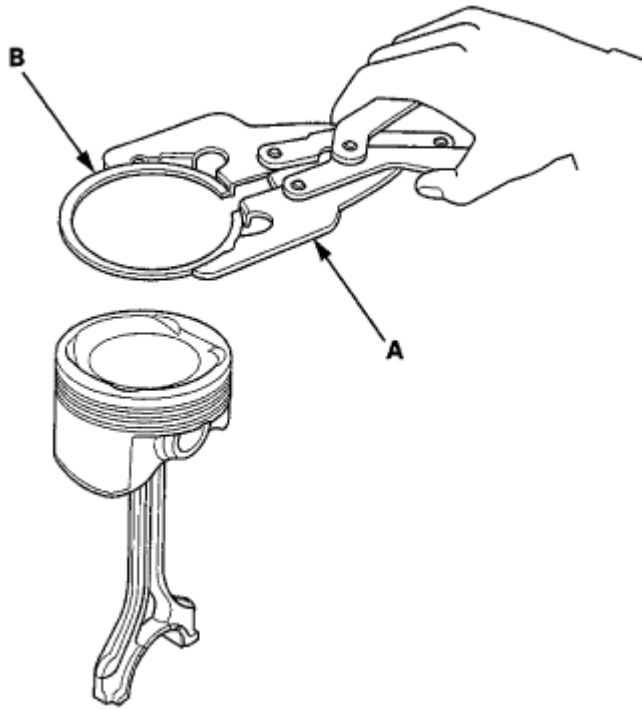


Fig. 42: Removing Piston Rings Using Ring Expander
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 and second ring grooves are 1.0 mm (0.039 in) wide, and the oil ring groove is 2.0 mm (0.079 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 (0.59-0.78 in) from the bottom.

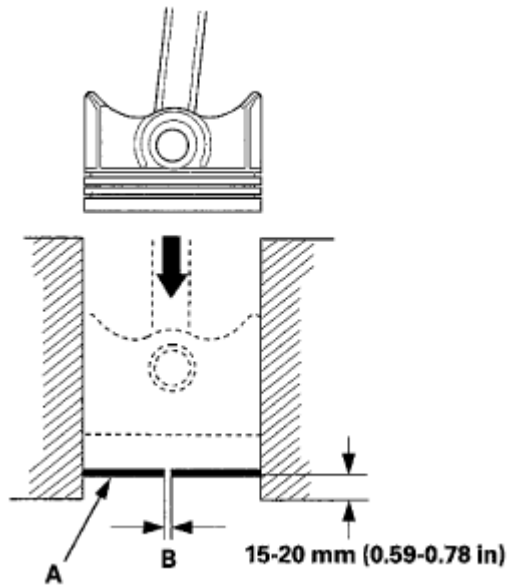


Fig. 43: Identifying Piston Ring Installing Dimensions
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the piston ring end-gap (B) with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits (see STRAIGHTNESS).

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

Piston Ring End-Gap

Top Ring:

Standard (New): 0.15-0.30 mm (0.0059-0.0118 in)

Service Limit: 0.60 mm (0.0236 in)

Second Ring:

RIKEN

Standard (New): 0.30-0.42 mm (0.0118-0.0165 in)

Service Limit: 0.65 mm (0.0256 in)

NIPPON

Standard (New): 0.35-0.50 mm (0.0138-0.0197 in)

Service Limit: 0.65 mm (0.0256 in)

Oil Ring:

Standard (New): 0.20-0.70 mm (0.0079-0.0276 in)

Service Limit: 0.80 mm (0.0315 in)

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

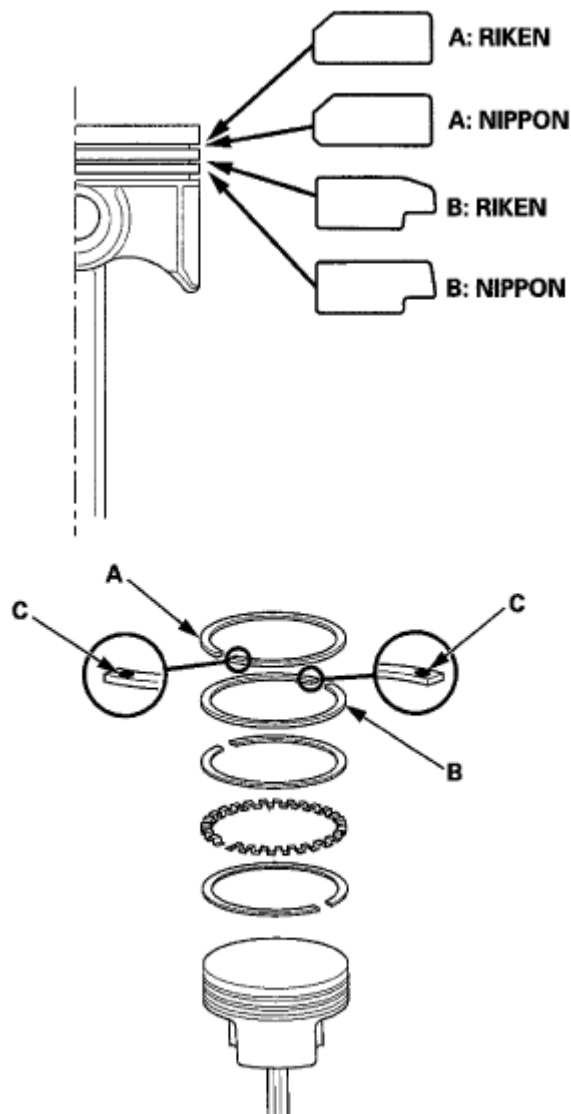


Fig. 44: Identifying Piston Rings Positions

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Top Ring Clearance**RIKEN**

Standard (New): 0.065-0.090 mm (0.00256-0.00354 in)

Service Limit: 0.15 mm (0.0059 in)

NIPPON

Standard (New): 0.061-0.090 mm (0.00240-0.00354 in)

Service Limit: 0.15 mm (0.0059 in)

Second Ring Clearance

Standard (New): 0.030-0.055 mm (0.00118-0.00217 in)

Service Limit: 0.12 mm (0.0047 in)

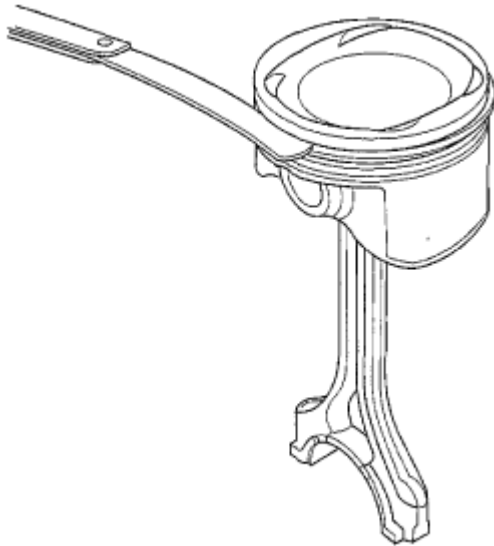


Fig. 45: Measuring Piston Ring Groove Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

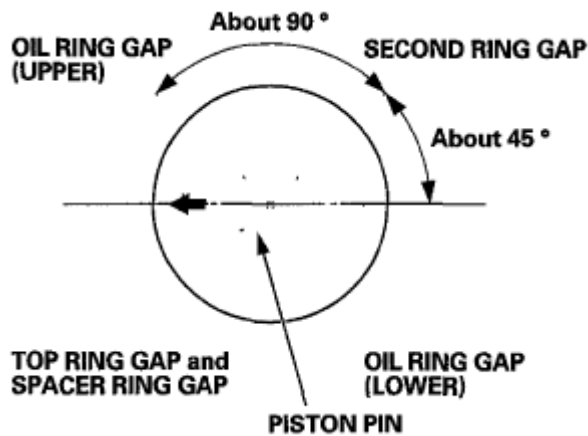


Fig. 46: Ring End Gaps Positioning Diagram

Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION

IF THE CRANKSHAFT IS ALREADY INSTALLED

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
3. Position the piston/connecting rod assembly with the arrow (A) facing the cam chain side of the engine block.

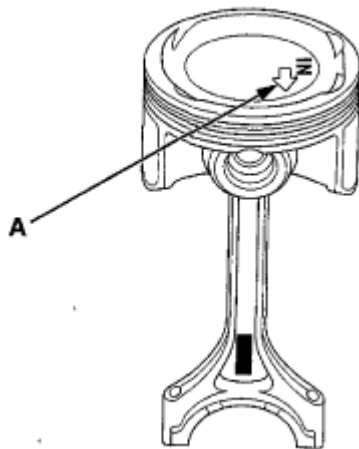


Fig. 47: Identifying Arrow On Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering

the cylinder bore.

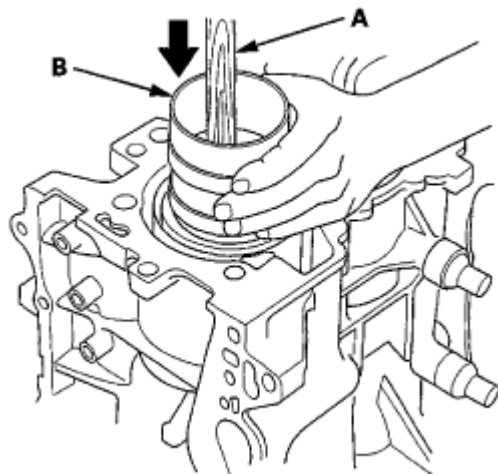


Fig. 48: Positioning Piston/Connecting Rod Assembly Cylinder Using Hammer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.
6. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING CLEARANCE INSPECTION**).
7. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
8. Apply new engine oil to the bolt threads, then install the rod caps with bearings. Torque the bolts to 10 N.m (1.0 kgf.m, 7 lbf.ft).
9. Tighten the connecting rod bolts an additional 90°.

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

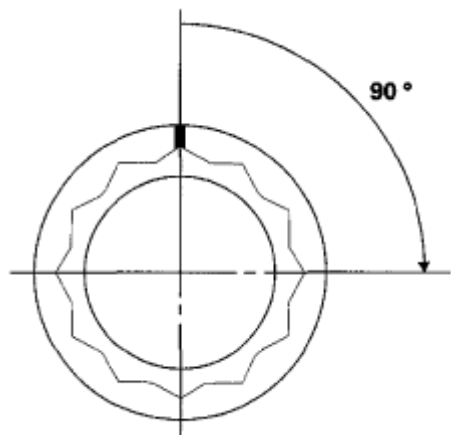


Fig. 49: Connecting Rod Bolt Tightening Diagram

Courtesy of AMERICAN HONDA MOTOR CO., INC.

IF THE CRANKSHAFT IS NOT INSTALLED

1. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
2. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
3. Position the piston/connecting rod assembly with the arrow (A) facing the cam chain side of the engine block.

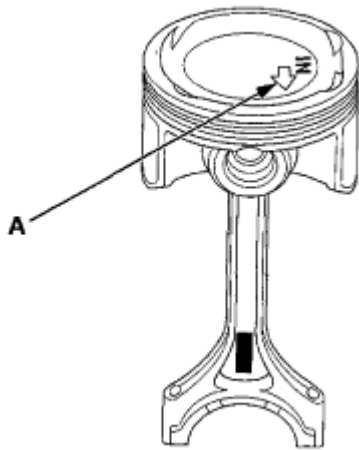


Fig. 50: Identifying Arrow On Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.

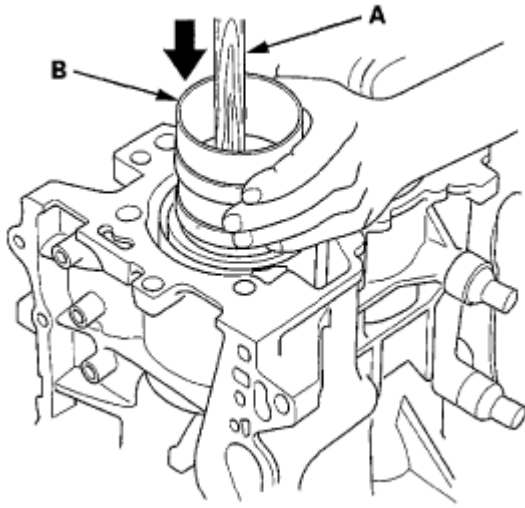


Fig. 51: Positioning Piston/Connecting Rod Assembly Cylinder Using Hammer
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CONNECTING ROD BOLT INSPECTION

1. Measure the diameter of each connecting rod bolt at point A and point B with a micrometer.

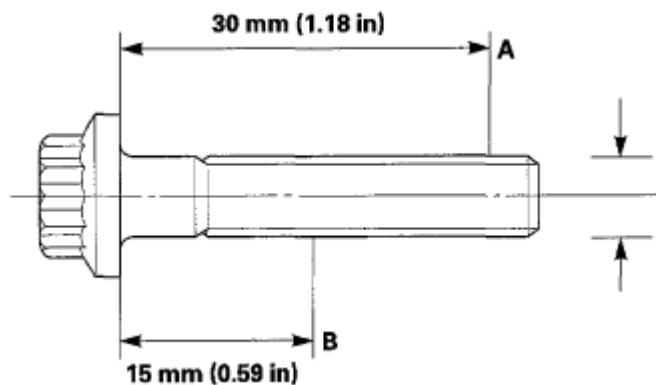


Fig. 52: Identifying Connecting Rod Bolt Diameter At Point A And Point B
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Point A-Point B = Difference in Diameter

Difference in Diameter:

Specification: 0-0.05 mm (0-0.0019 in)

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

CRANKSHAFT INSTALLATION

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
 - Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100
1. Check the main bearing clearance with plastigage (see MAIN BEARING CLEARANCE INSPECTION).
 2. Check the connecting rod bearing clearance with plastigage (see CONNECTING ROD BEARING CLEARANCE INSPECTION).
 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 CKP pulse plate (A) on the crankshaft (B); face the marked side (C) opposite the crankshaft, and align the tab (D) on the CKP pulse plate with the groove (E) on the crankshaft.

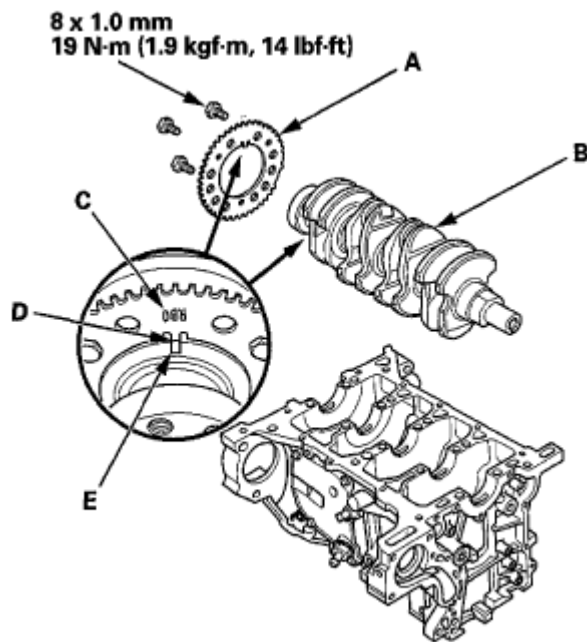


Fig. 53: Identifying Tab On CKP Pulse Plate And Groove On Crankshaft With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the engine block.
7. Apply new engine oil to the side with the thrust washer groove. Install the thrust washers (A) in the No. 4 journal.

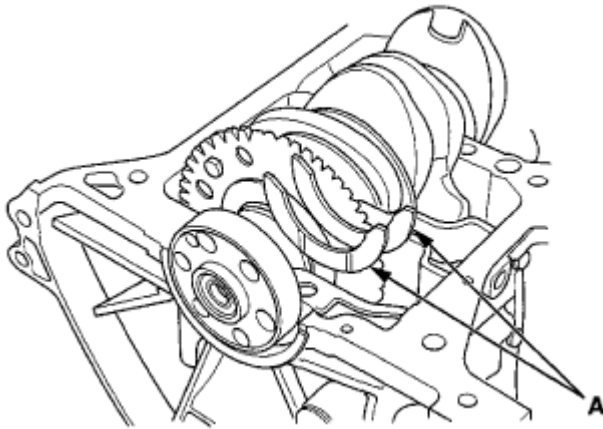


Fig. 54: Identifying Thrust Washer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
9. Apply new engine oil to the threads and flanges of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (A) on the connecting rod and cap, then install the caps and the bolts finger-tight.

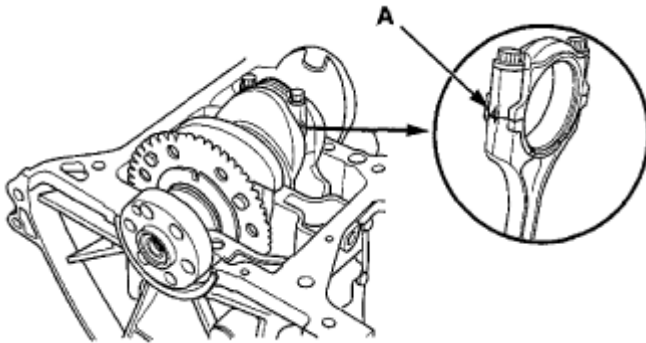


Fig. 55: Identifying Mark On Connecting Rod

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and the cap, then install the caps and the bolts finger-tight.
12. Torque the connecting rod bolts to 10 N.m (1.0 kgf.m, 7 lbf.ft).

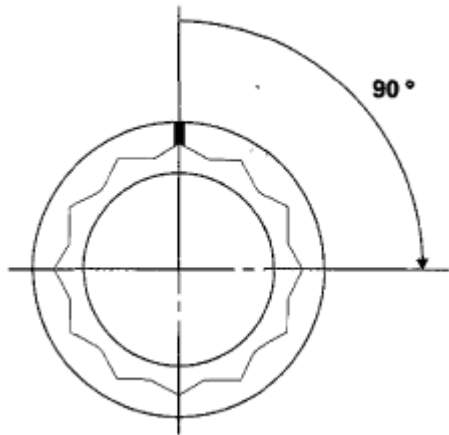


Fig. 56: Connecting Rod Bolt Tightening Diagram
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Tighten the connecting rod bolts an additional 90°.

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

14. Install the bearing caps with the arrows facing (A) the cam chain side on the bearing cap bridge.

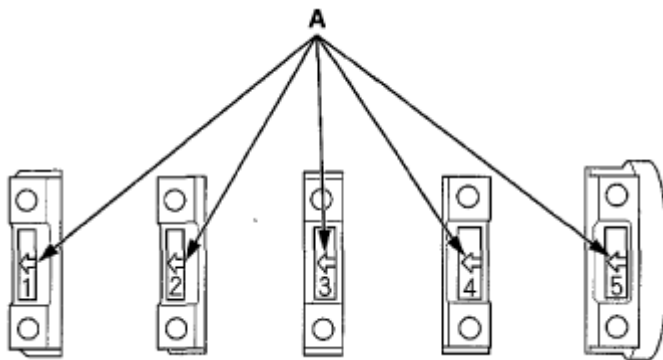


Fig. 57: Identifying Bearing Caps With Arrows
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove old liquid gasket from the bearing cap bridge/No. 5 bearing cap mating surfaces.
16. Clean and dry the bearing cap bridge/No. 5 bearing cap mating surfaces.
17. Apply liquid gasket (P/N 08718-0004) to the engine block mating surface of the bearing cap bridge/No. 5 bearing cap. 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 too much time has passed after applying the liquid gasket, remove

the old liquid gasket and residue, then reapply new liquid gasket.

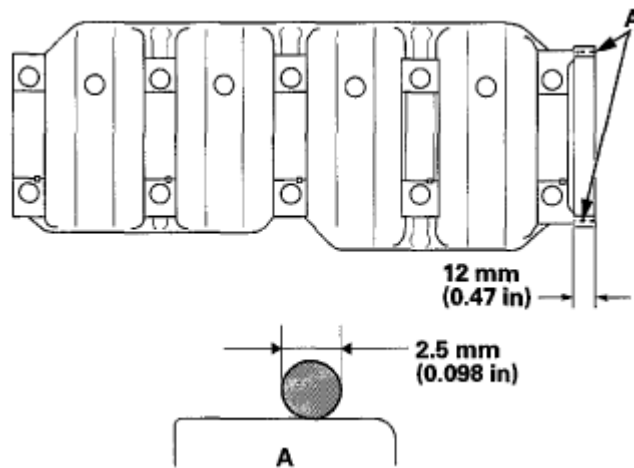


Fig. 58: Identifying Diameter Bead Of Liquid Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Put the bearing cap bridge on the engine block.
19. Apply new engine oil to the threads and flange of the bearing cap bolts.
20. Torque the bearing cap bolts in sequence to 25 N.m (2.5 kgf.m, 18 lbf.ft).

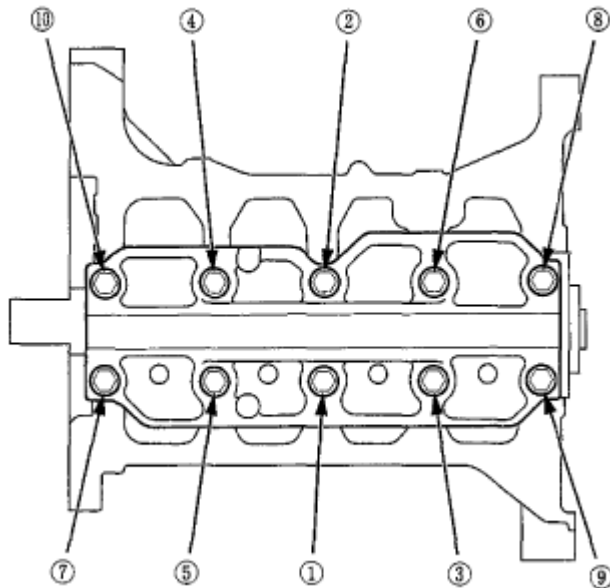


Fig. 59: Bearing Cap Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Tighten the bearing cap bolts an additional 40°.

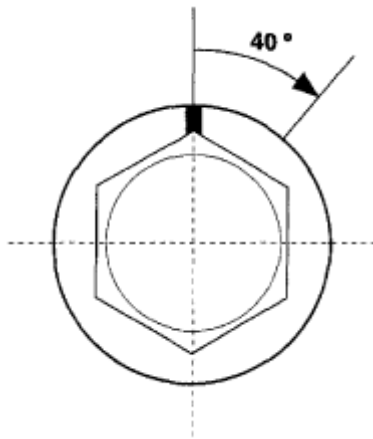


Fig. 60: Bearing Cap Bolt Tightening Diagram
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Clean the excess liquid gasket off the engine block.
23. Clean and dry the crankshaft oil seal housing.
24. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
25. Use the driver handle, 15 X 135 L, and the oil seal driver attachment, 96 mm, to drive a new crankshaft oil seal squarely into the block to the specified installed height.

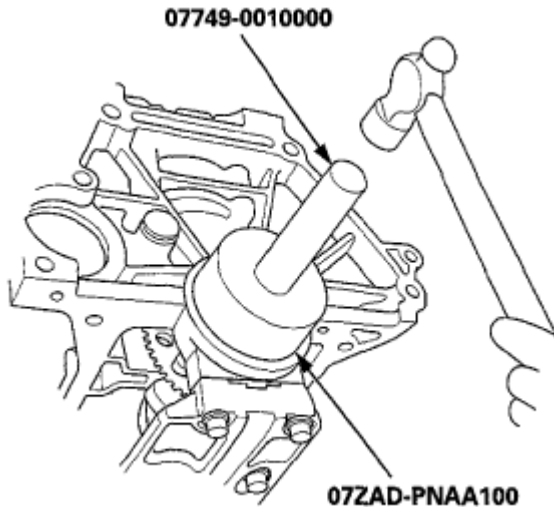


Fig. 61: Installing Crankshaft Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Measure the distance between the cylinder block (A) and the oil seal (B).

Oil Seal Installed Height:

0.2-1.2 mm (0.008-0.047 in)

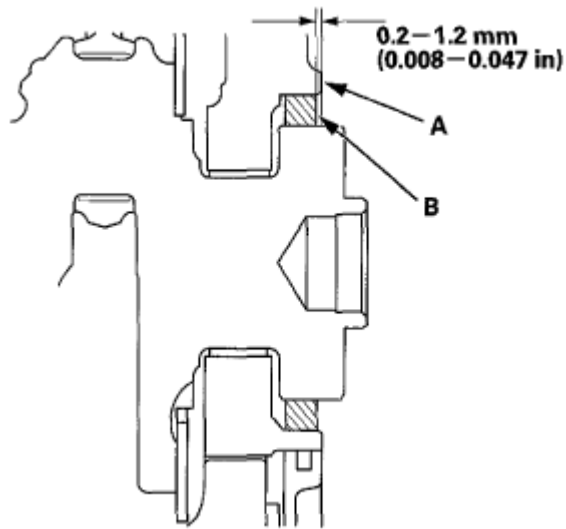


Fig. 62: Identifying Oil Seal Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Install the cylinder head (see **CYLINDER HEAD INSTALLATION**).
28. Install the oil pump (A) with a new O-ring (B).

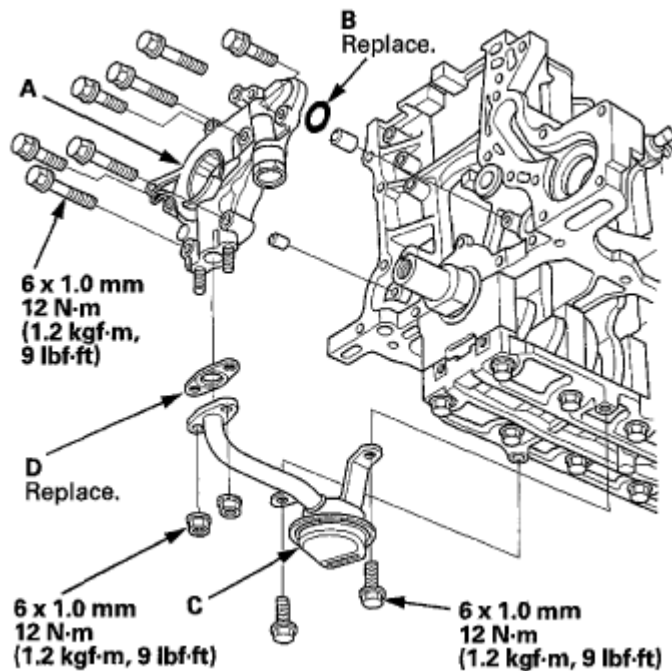


Fig. 63: Identifying Oil Pump, O-Ring, Oil Screen And Gasket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Install the oil screen (C) with a new gasket (D).
30. Install the oil pan (see **OIL PAN INSTALLATION**).

31. Install the cam chain (see CAM CHAIN INSTALLATION).
32. Install the IMA motor rotor position sensor (see IMA MOTOR ROTOR POSITION SENSOR REMOVAL/INSTALLATION), the IMA motor housing (see DRAIN COVER REMOVAL/INSTALLATION), and the IMA motor rotor (see IMA MOTOR ROTOR REMOVAL/INSTALLATION).
33. Install the transmission.
 - M/T model (see TRANSMISSION INSTALLATION)
 - CVT model (see DRIVE PLATE REMOVAL/INSTALLATION)
34. Install the engine/IMA motor/transmission (see ENGINE INSTALLATION).

NOTE: When any crankshaft or connecting rod bearing is replaced, run the engine at idle speed 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 CRANKSHAFT AND PISTON REMOVAL).
2. Remove the CKP pulse plate (A).

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

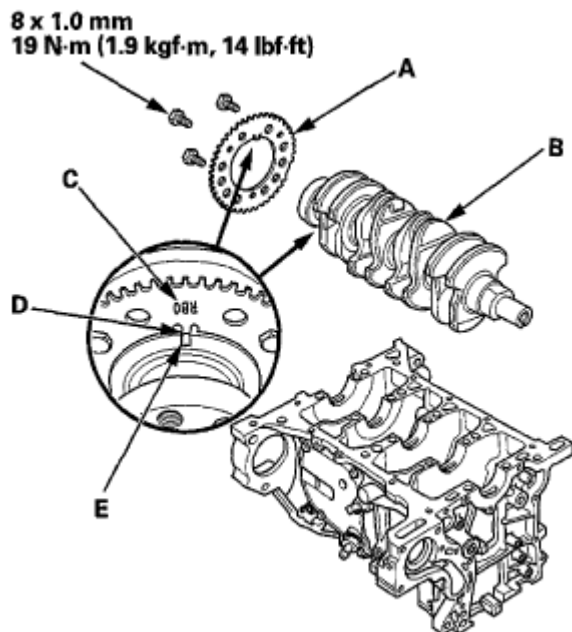


Fig. 64: Identifying Tab On CKP Pulse Plate And Groove On Crankshaft With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the CKP pulse plate on the crankshaft (B); face the marked side (C) toward the transmission, and

align the tab (D) on the CKP pulse plate with the groove (E) on the crankshaft.

4. Install the crankshaft (see **CRANKSHAFT INSTALLATION**).

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 and the O-ring groove.
3. Install the new oil pan gasket (A), the new O-ring (B), and the dowel pins (C) on the oil pan.

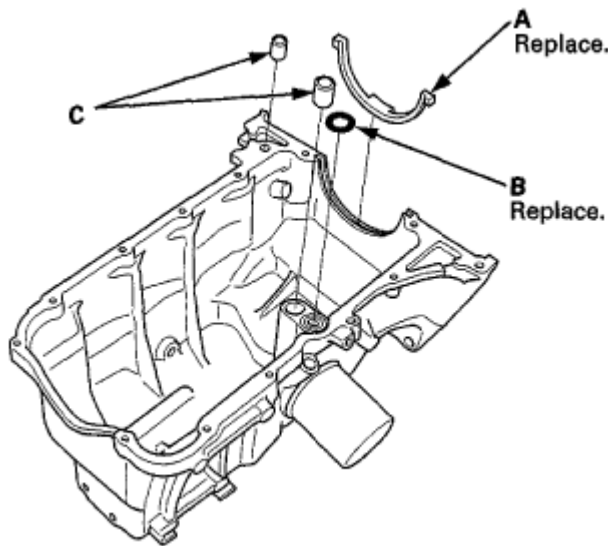


Fig. 65: Identifying Oil Pan Gasket, O-Ring And Dowel Pins
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Apply liquid gasket (P/N 08718-0004) to the engine block mating surface of the oil pan and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 3.0 mm (0.12 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 5.0 mm (0.20 in) diameter bead of liquid gasket to the shaded area (B).
- Apply a 3.0 mm (0.12 in) diameter bead of liquid gasket along the broken line (C).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

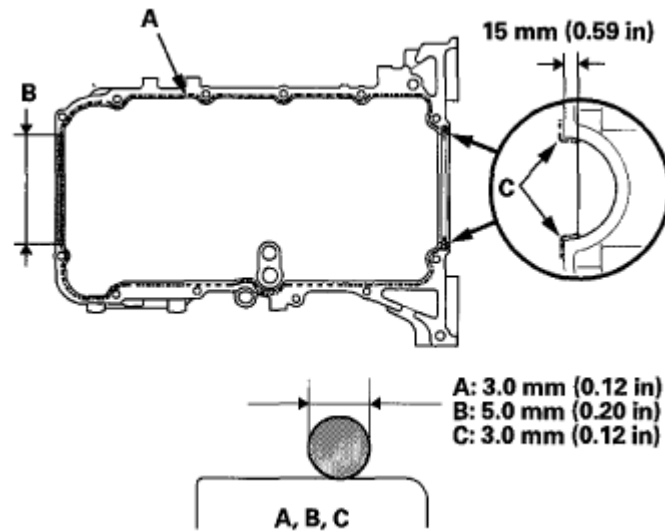


Fig. 66: Identifying Diameter Bead Of Liquid Gasket On Broken Lines
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the oil pan.

NOTE:

- Raise the oil pan carefully not to damage IMA motor rotor position sensor.
- 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.
- Make sure to install the bolts in the correct locations according to size.

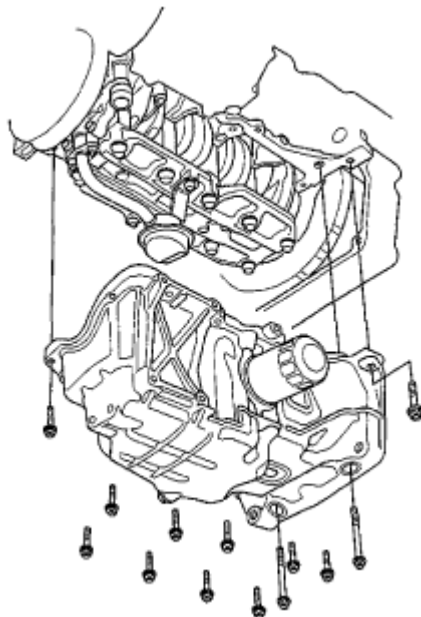


Fig. 67: Identifying Oil Pan Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Tighten the bolts in three steps. Wipe off the excess liquid gasket from crankshaft pulley end and the drive plate end.

Specified torque

(1): 24 N.m (2.4 kgf.m, 18 lbf.ft)

(2) - (13): 12 N.m (1.2 kgf.m, 9 lbf.ft)

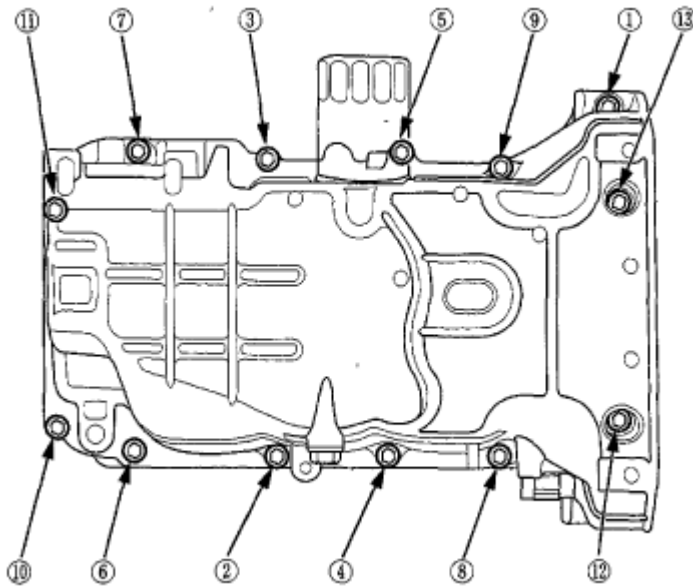


Fig. 68: Oil Pan Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the transmission mounting bolts.

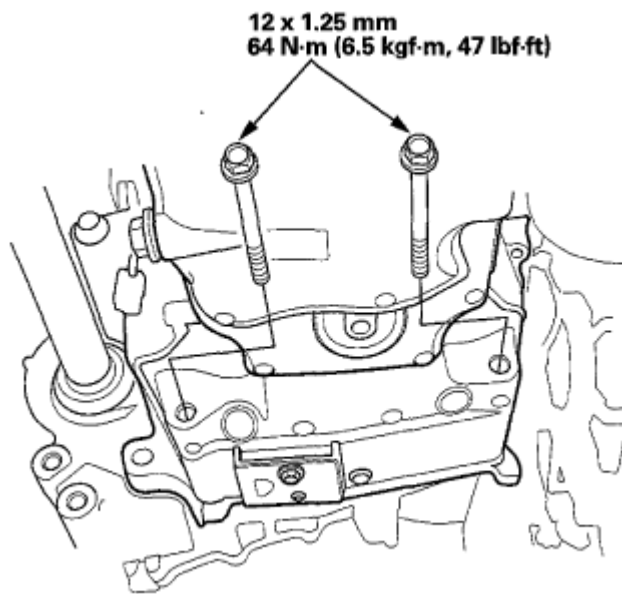


Fig. 69: Identifying Transmission Mounting Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the torque rod bracket (see **TORQUE ROD BRACKET REPLACEMENT**).
9. Install the torque rod (see **TORQUE ROD REPLACEMENT**).
10. CVT model: Install the driveshaft heat shield.

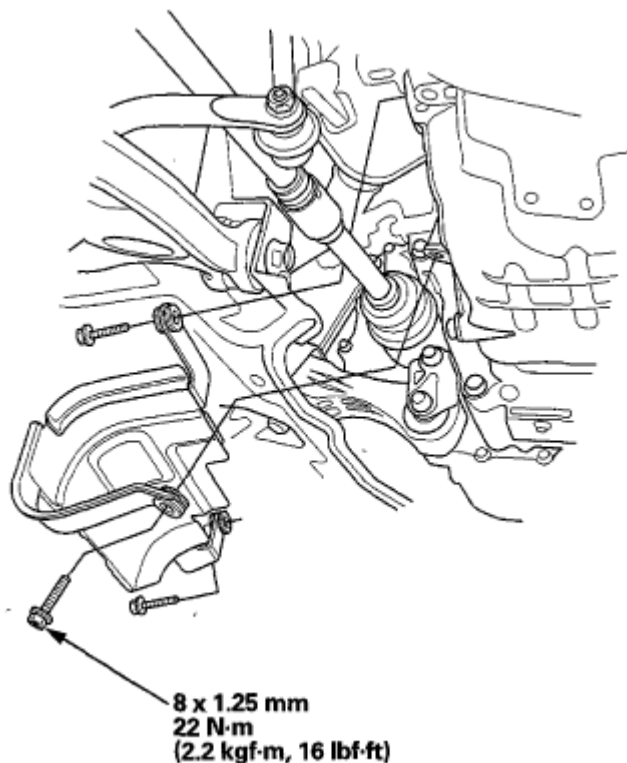


Fig. 70: Identifying Driveshaft Heat Shield And Bolt With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Connect the CKP sensor connector (A), then install the CKP sensor cover (B).

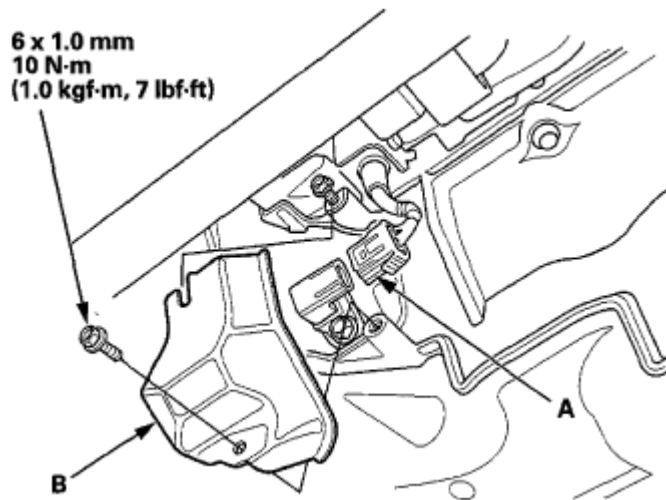


Fig. 71: Identifying CKP Sensor Connector And Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the dipstick tube (A) with a new O-ring (B), then install the dipstick.

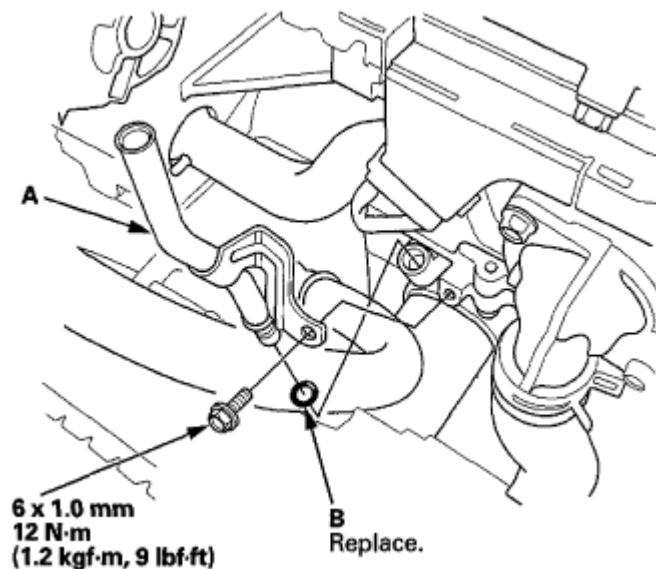


Fig. 72: Identifying Dipstick Tube And O-Ring With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. If the engine is still in the vehicle, do steps 14 through 17.
14. Install the A/C compressor (see step 24 on **ENGINE INSTALLATION**).

15. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
16. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
17. Refill the engine with engine oil (see **ENGINE OIL REPLACEMENT**).

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.
 - M/T model (see **NEUTRAL POSITION SWITCH REPLACEMENT**)
 - CVT model (see **TRANSMISSION REMOVAL**)
2. Remove the IMA motor rotor (see **IMA MOTOR ROTOR REMOVAL/INSTALLATION**), the IMA motor housing (see **DRAIN COVER REMOVAL/INSTALLATION**), and the IMA motor rotor position sensor (see **IMA MOTOR ROTOR POSITION SENSOR REMOVAL/INSTALLATION**).
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. Use the driver handle, 15 X 135 L, and the oil seal driver attachment, 96 mm, to drive a new crankshaft oil seal squarely into the block to the specified installed height.

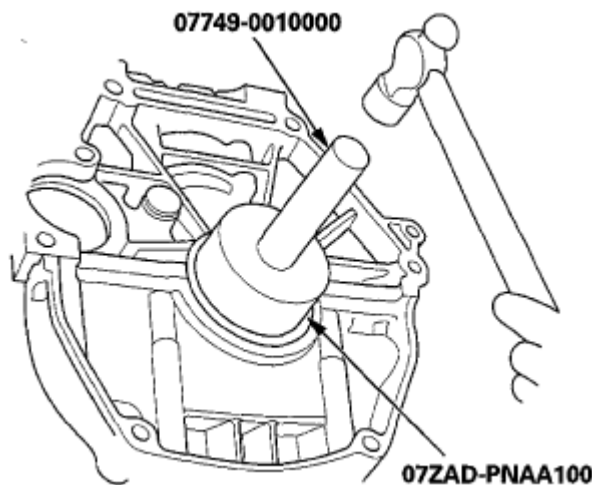


Fig. 73: Installing Crankshaft Oil Seal Into Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Measure the distance between the cylinder block (A) and the oil seal (B).

Oil Seal Installed Height:

0.2-1.2 mm (0.008-0.047 in)

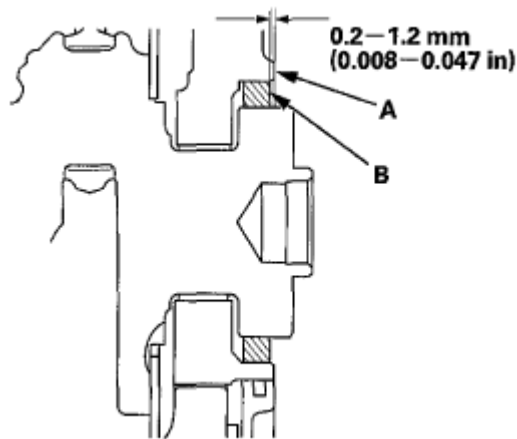


Fig. 74: Identifying Oil Seal Installed Height

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the IMA motor rotor position sensor (see **IMA MOTOR ROTOR POSITION SENSOR REMOVAL/INSTALLATION**), the IMA motor housing (see **DRAIN COVER REMOVAL/INSTALLATION**), and the IMA motor rotor (see **IMA MOTOR ROTOR REMOVAL/INSTALLATION**).
8. Install the transmission.
 - M/T model (see **TRANSMISSION INSTALLATION**)
 - CVT model (see **DRIVE PLATE REMOVAL/INSTALLATION**)

DRAIN BOLT/SEALING BOLT INSTALLATION

NOTE: When installing the drain bolt and/or sealing bolt, always use a new washer.

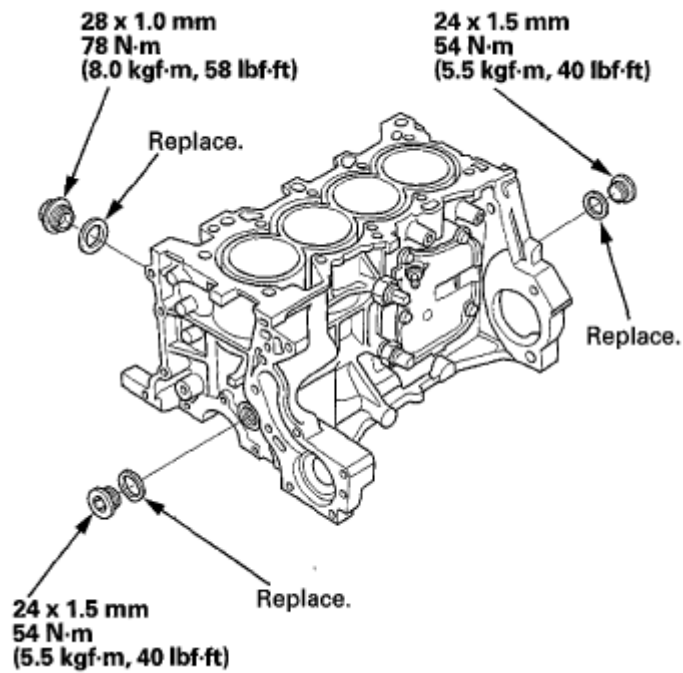


Fig. 75: Identifying Drain Bolt/Sealing Bolts And Washers With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK COVER REMOVAL AND INSTALLATION

1. Remove the block cover (A).

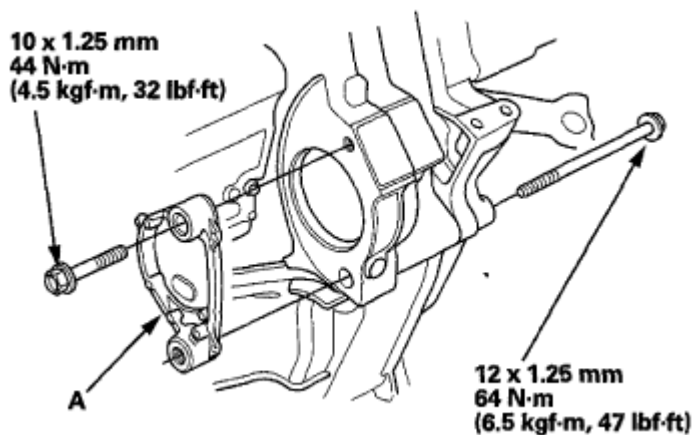


Fig. 76: Identifying Block Cover And Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the block cover in the reverse order of removal.