

2011 Honda CR-V EX

2007-11 ENGINE Cylinder Head (K24Z6) - CR-V

2007-11 ENGINE

Cylinder Head (K24Z6) - CR-V

SPECIAL TOOLS

Ref.No.	Tool Number	Description	Qty
①	07742-0010100	Valve Guide Driver, 5.35 x 9.7	1
②	07746-0010400	Attachment, 52 x 55 mm	1
③	07749-0010000	Driver Handle, 15 x 135L	1
④	07757-PJ1010A	Valve Spring Compressor Attachment	1
⑤	07AAB-RJAA100	Crankshaft Pulley Holder	1
⑥	07AAB-RWCA120	Camshaft Lock Pin Set	1
⑦	07AAJ-PNAA101	Air Pressure Regulator	1
⑧	07AAJ-RWCA100	Cam Chain Inspection Gauge	1
⑨	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
⑩	07JAA-001020A	Socket, 19 mm	1
⑪	07JAB-001020B	Handle, 6-25-660L	1
⑫	07MAA-PR70110	Adjuster	1
⑬	07MAA-PR70120	Locknut Wrench	1
⑭	07PAD-0010000	Stem Seal Driver, 30	1
⑮	07ZAJ-PNAA101	VTEC Air Adapter	2
⑯	07ZAJ-PNAA200	VTEC Air Stopper	1
⑰	07ZAJ-PNAA300	Air Joint Adapter	1

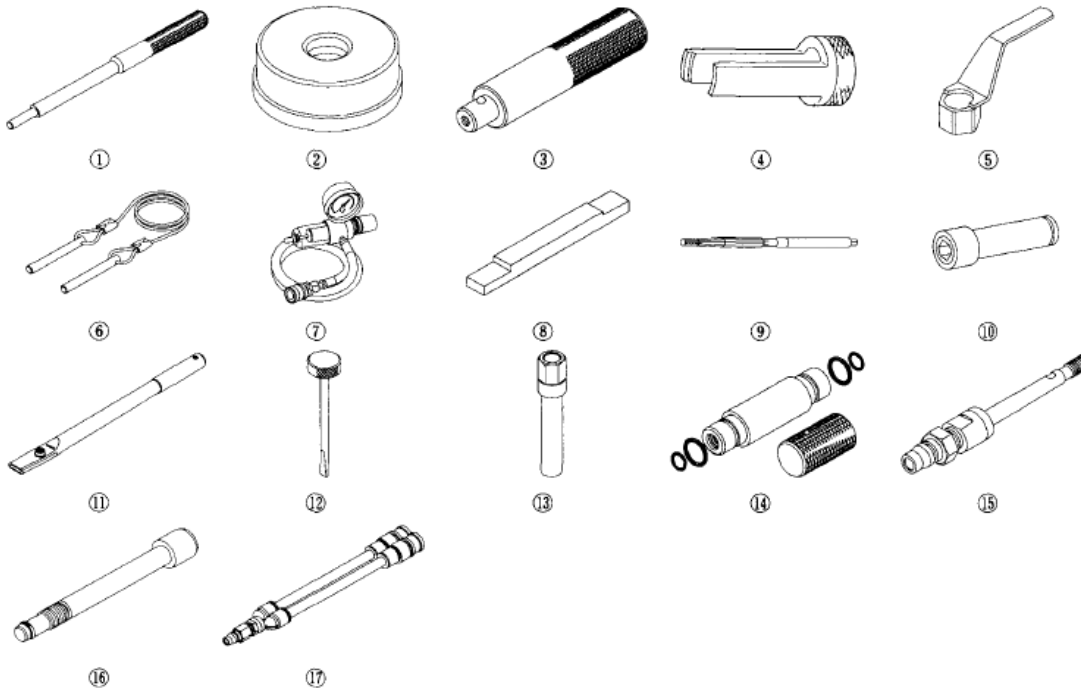


Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

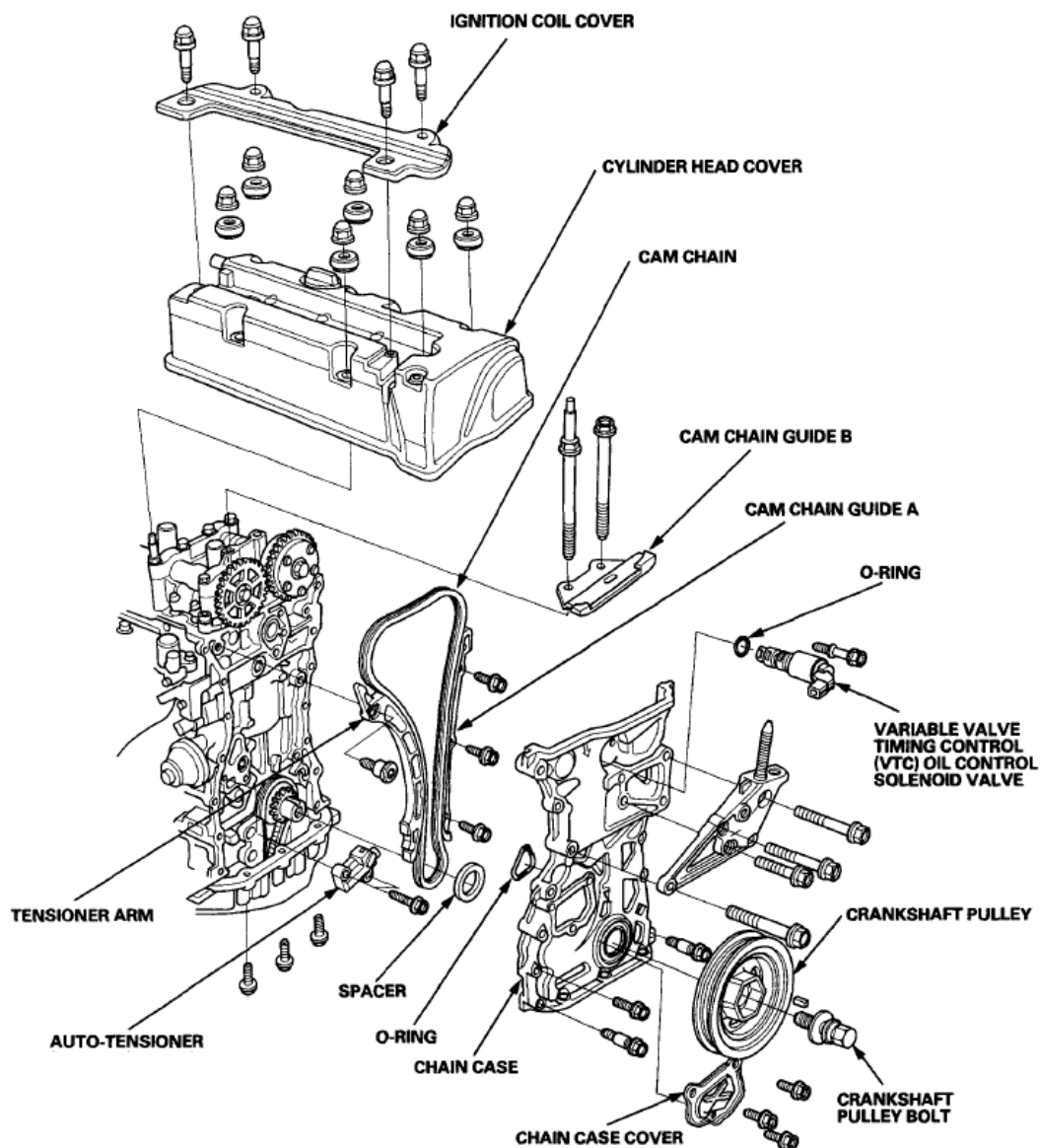


Fig. 2: Identifying Cylinder Head Component Location (1 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

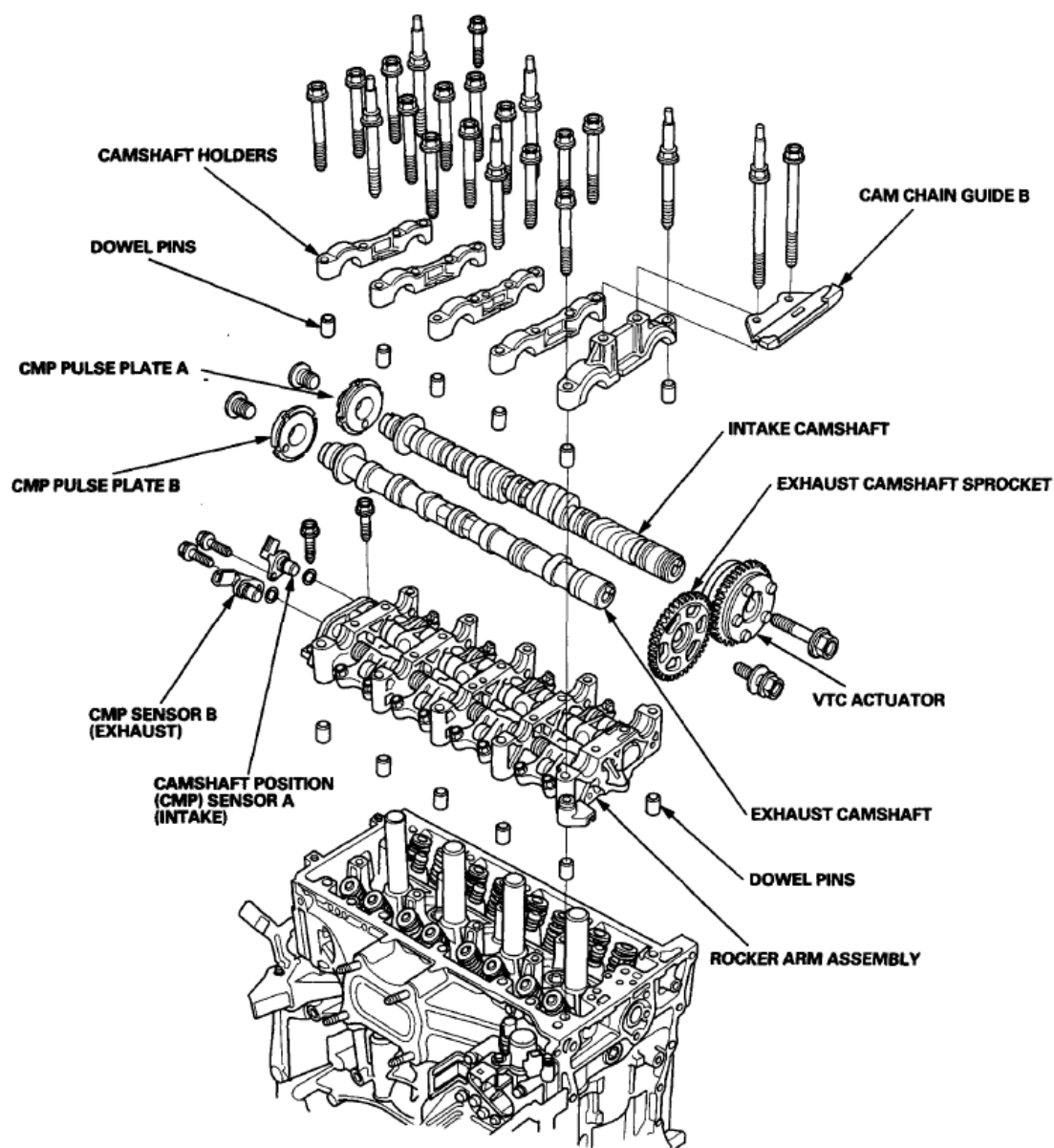


Fig. 3: Identifying Cylinder Head Component Location (2 Of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

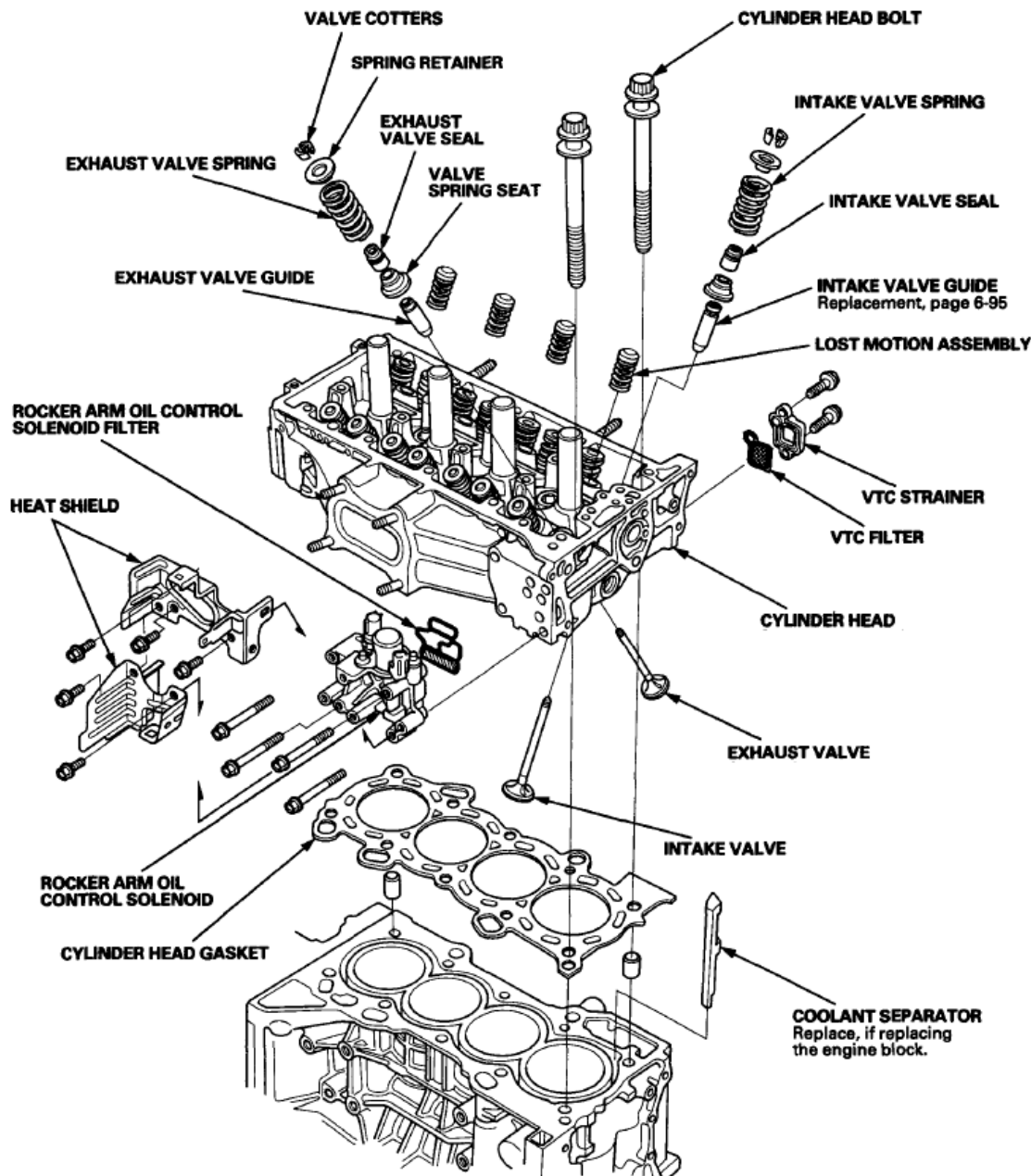


Fig. 4: Identifying Cylinder Head Component Location (3 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the powertrain control module (PCM), otherwise the PCM will continue to stop the fuel 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 Honda Diagnostic System (HDS) to the data link connector (DLC) (see **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**).
4. Turn the ignition switch to ON (II).
5. Make sure the HDS communicates with the vehicle and the PCM. If it does not communicate, troubleshoot the DLC circuit (see **GENERAL TROUBLESHOOTING INFORMATION**).
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 a compression gauge to the spark plug hole.

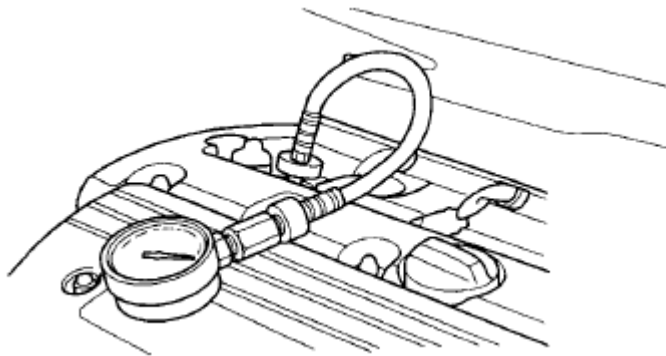


Fig. 5: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Step on the accelerator pedal to open the throttle fully, then crank the engine with the starter motor, and measure the compression.

Compression Pressure:

932 kPa (9.5 kgf/cm² , 135 psi)

11. Measure the compression on the remaining cylinders.

Maximum Variation:

196 kPa (2.0 kgf/cm² , 28 psi)

12. If the compression is not within specifications, check the following items, then 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
13. Remove the compression gauge from the spark plug hole.
 14. Install the four ignition coils and the four spark plugs (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
 15. Select PCM reset (see **GENERAL TROUBLESHOOTING INFORMATION**) in the PGM-FI, INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.

VTEC ROCKER ARM TEST

Special Tools Required

- VTEC Air Stopper 07ZAJ-PNAA200
 - VTEC Air Adapter 07ZAJ-PNAA101 (2)
 - Air Joint Adapter 07ZAJ-PNAA300
 - Air Pressure Regulator 07AAJ-PNAA101
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. Set the No. 1 piston at top dead center (TDC) (see **CAM CHAIN INSPECTION**).
 4. Move the secondary rocker arm (A) for the No. 1 cylinder. The secondary rocker arm should move independently of the mid rocker arm (B).
 - If the secondary rocker arm moves freely, go to step 5.
 - If the secondary rocker arm does not move independently, remove the mid, primary, and secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, then retest.

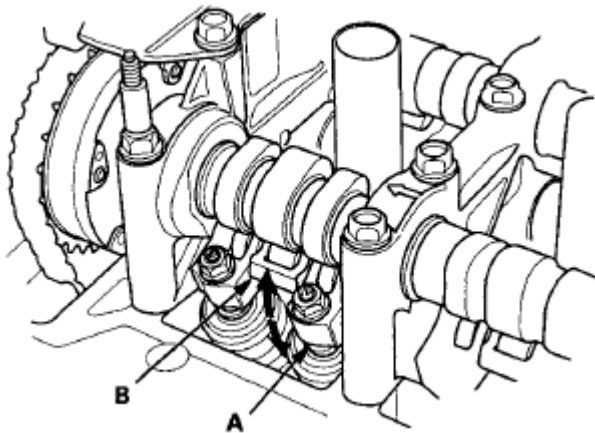


Fig. 6: Identifying Secondary Rocker Arm And Mid Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat step 4 on the remaining secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.0 kgf/cm², 57 psi).
7. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
8. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).

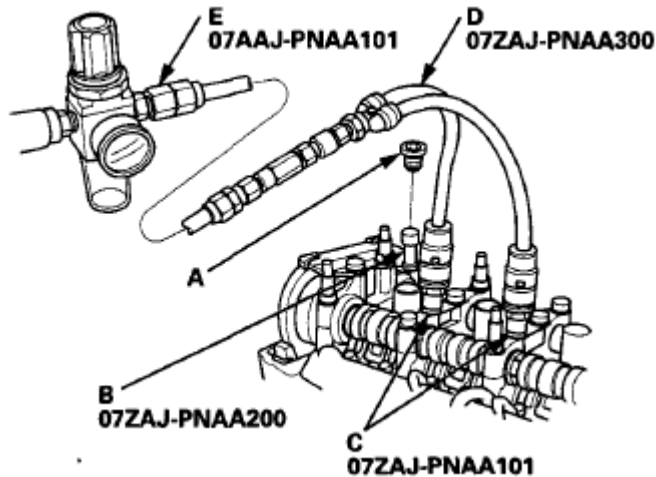


Fig. 7: Identifying Sealing Bolt And VTEC Air Stopper
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the No. 2 and No. 3 camshaft holder bolts, and install the VTEC air adapters (C) finger-tight.
10. Connect the air joint adapter (D) and the air pressure regulator (E).
11. Loosen the valve on the air pressure regulator, and apply the specified air pressure.

Specified Air Pressure:

290 kPa (3.0 kgf/cm², 42 psi)

NOTE: If the rocker arm piston does not move after applying air pressure; move the rocker arm up and down manually by rotating the crankshaft clockwise.

12. With the specified air pressure applied, move the secondary rocker arm (A) for the No. 1 cylinder. The mid rocker arm (B), the primary rocker arm (C), and the secondary rocker arm should move together.
 - If the mid, primary, and secondary rocker arms move together, go to step 13.
 - If the mid and primary rocker arms do not move together with the secondary rocker arm, remove the mid, primary, and the secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, the primary, and the secondary rocker arms as an assembly, then retest.

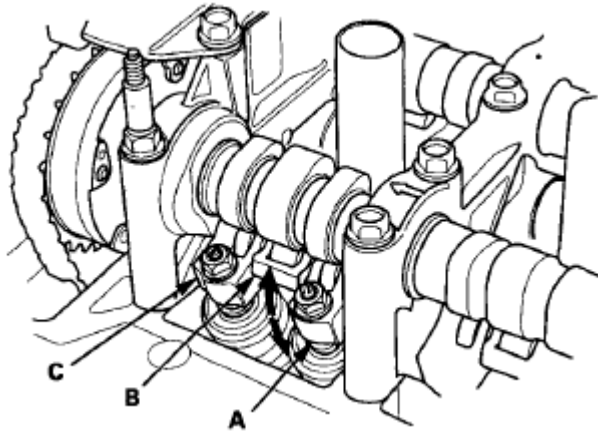


Fig. 8: Identifying Secondary Rocker Arm, Mid Rocker Arm And Primary Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Repeat step 12 on the remaining secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 14.
14. Remove the air pressure regulator, the air joint adapter, the VTEC air adapters, and the VTEC air stopper.
15. Tighten the camshaft holder mounting bolts to 22 N.m (2.2 kgf.m, 16 lbf.ft).
16. Tighten the sealing bolt to 10 N.m (1.0 kgf.m, 7.2 lbf.ft).
17. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

VTC ACTUATOR INSPECTION

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Loosen the rocker arm adjusting screws (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
3. Remove the camshaft holder (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If it is not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.
6. Seal the advance holes (A) in the No. 1 camshaft journal with tape and a wire tie.

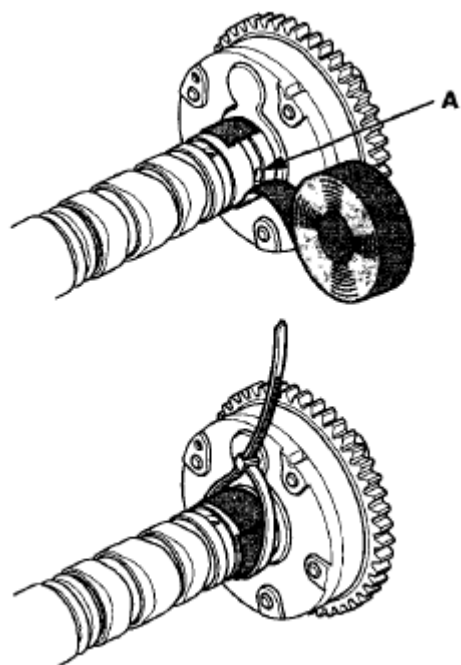


Fig. 9: Sealing Advance Holes In No. 1 Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Seal one of the advance holes (A) with tape.

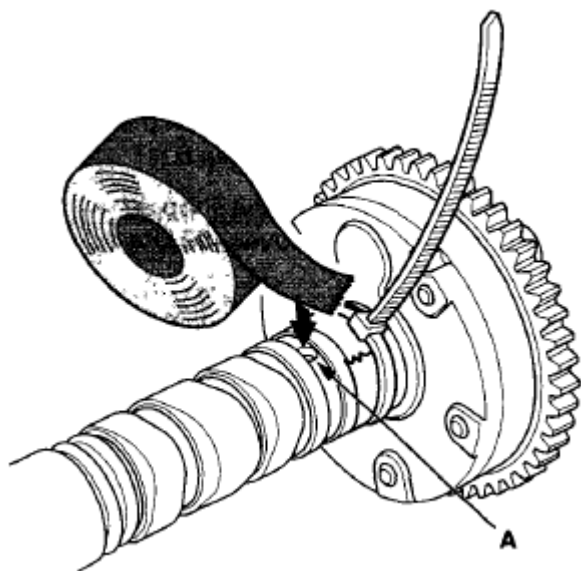


Fig. 10: Sealing Advance Holes With Tape
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Apply air to the unsealed advance hole to release the lock.

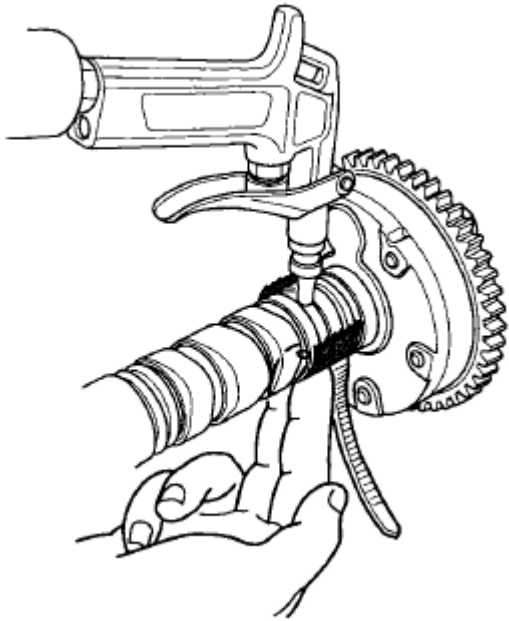


Fig. 11: Applying Air To Unsealed Advance Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check that the VTC actuator moves smoothly. If the VTC actuator does not move smoothly, replace the VTC actuator.

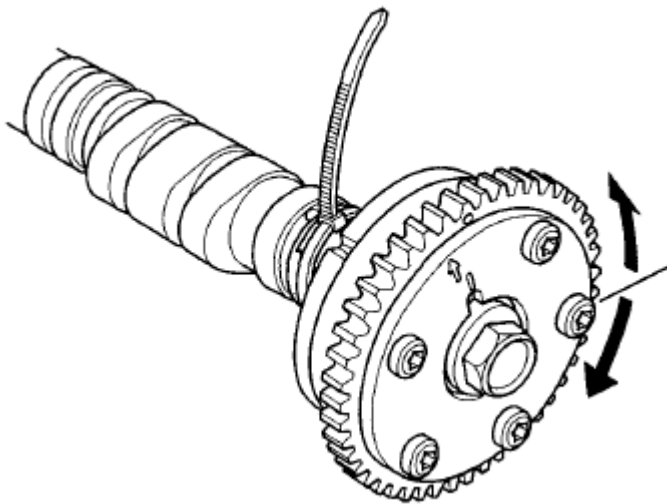


Fig. 12: Checking VTC Actuator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the wire tie, the tape, and adhesive residue from the camshaft journal.
11. Make sure the punch marks on the VTC actuator and the exhaust camshaft sprocket are facing up, then set the camshafts in the head (see **ROCKER ARM ASSEMBLY INSTALLATION**).
12. Set the camshaft holders and cam chain guide B in place (see **ROCKER ARM ASSEMBLY INSTALLATION**).

13. Tighten the camshaft holder bolts to the specified torque (see **ROCKER ARM ASSEMBLY INSTALLATION**).
14. Hold the camshaft, and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
15. Install the cam chain (see **CAM CHAIN INSTALLATION**).
16. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

VALVE CLEARANCE ADJUSTMENT

Special Tools Required

- Locknut Wrench 07MAA-PR70120
- Adjuster 07MAA-PR70110

NOTE: Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) and monitor the engine coolant temperature (ECT) sensor 1 with the HDS. Adjust the valve clearance only when the ECT sensor 1 temperature 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 punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

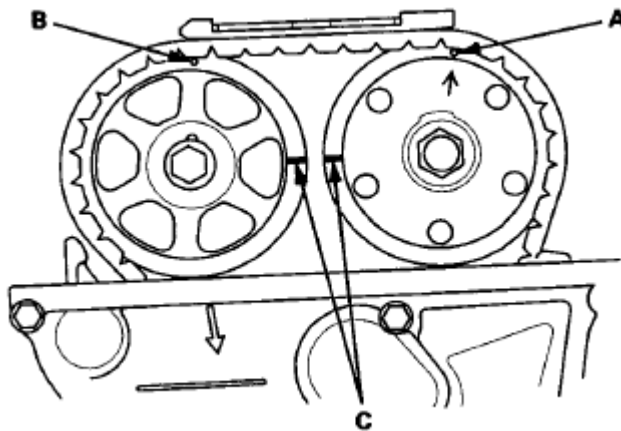


Fig. 13: Punching Mark On Variable Valve Timing Control Actuator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Clearance

Intake: 0.21-0.25 mm (0.008-0.010 in)

Exhaust: 0.25-0.29 mm (0.010-0.011 in)

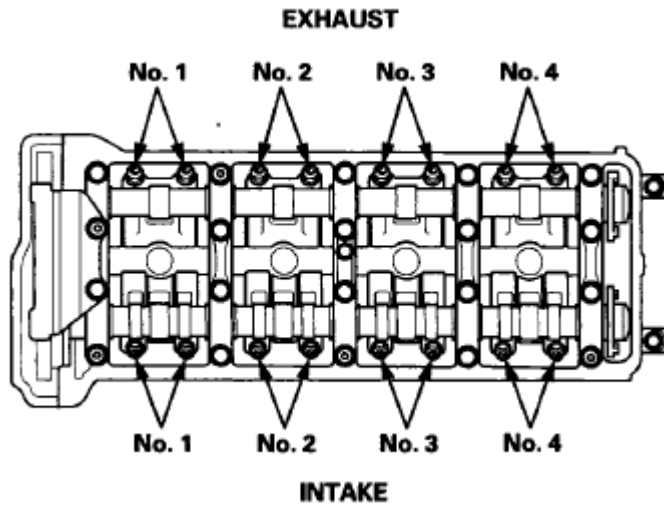


Fig. 14: Identifying Intake And Exhaust Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the feeler gauge (A) between the adjusting screw (B) and the end of the valve stem, and slide it back and forth; you should feel a slight amount of drag.

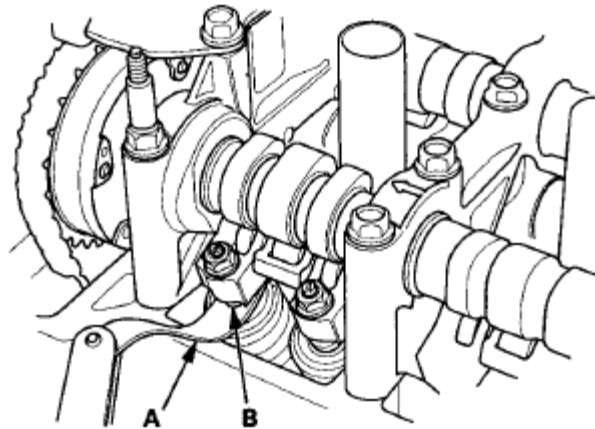


Fig. 15: Inserting Feeler Gauge Between Adjusting Screw And Valve Stem
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

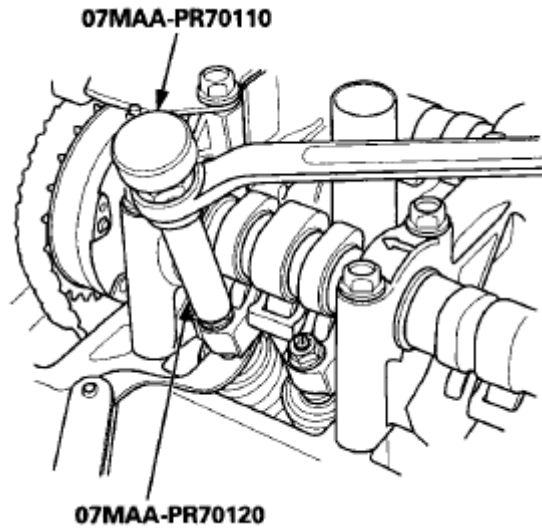


Fig. 16: Loosening Locknut With Locknut Wrench And Adjuster
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Tighten the locknut to the specified torque, and recheck the clearance. Repeat the adjustment if necessary.

Specified Torque

Intake:

7 x 0.75 mm

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

Apply new engine oil to the nut threads.

Exhaust:

7 x 0.75 mm

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

Apply new engine oil to the nut threads.

7. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90 °).

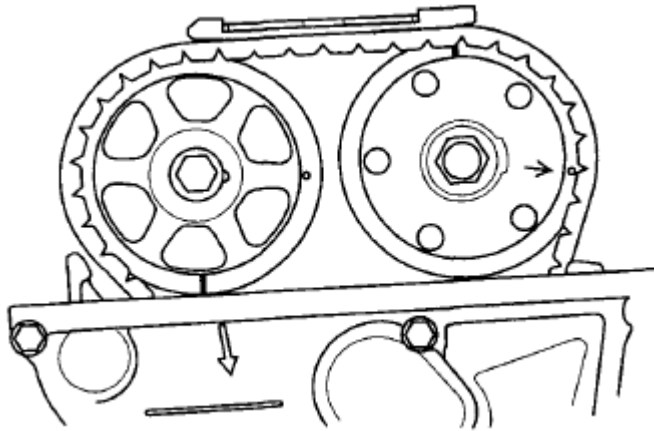


Fig. 17: Identifying Crankshaft Aligning Position (1 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.
9. Rotate the crankshaft 180 ° clockwise (camshaft pulley turns 90 °).

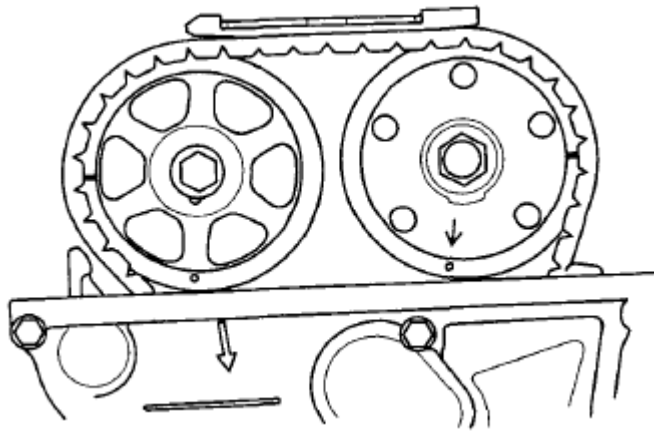


Fig. 18: Identifying Crankshaft Aligning Position (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.
11. Rotate the crankshaft 180 ° clockwise (camshaft pulley turns 90 °).

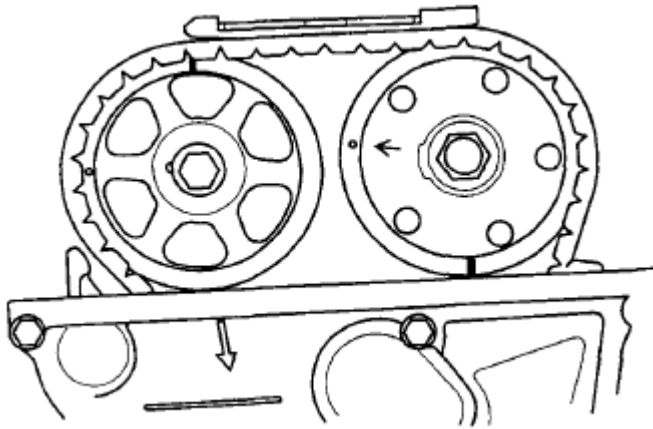


Fig. 19: Identifying Crankshaft Aligning Position (3 Of 3)

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

- Handle, 6-25-660L 07JAB-001020B
- Crankshaft Pulley Holder 07AAB-RJAA100
- Socket, 19 mm 07JAA-001020A or equivalent

REMOVAL

1. Raise the vehicle on the lift, and remove the front wheels.
2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
4. Hold the pulley with the holder handle (A) and the crankshaft pulley holder (B).

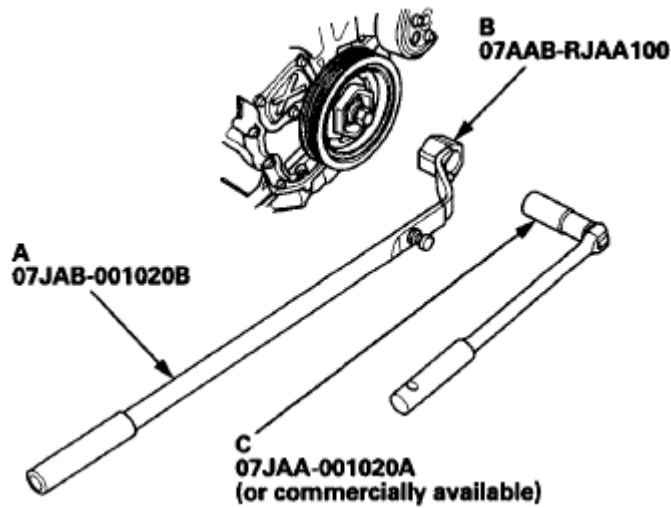


Fig. 20: Identifying Holder Handle And Crankshaft Pulley Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

INSTALLATION

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

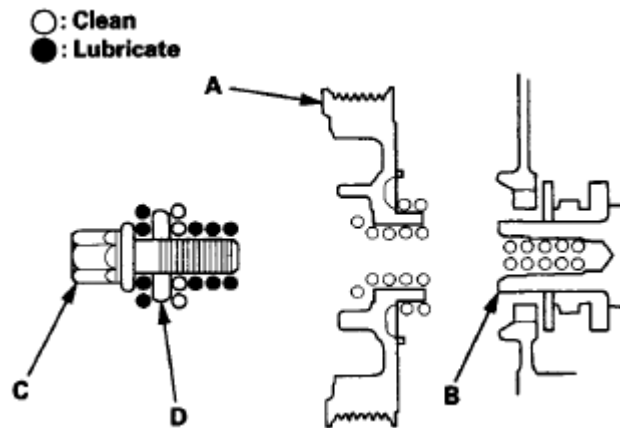


Fig. 21: Identifying Crankshaft Pulley, Crankshaft, Bolt And Washer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and hold the pulley with the holder handle (A) and the crankshaft pulley holder (B).

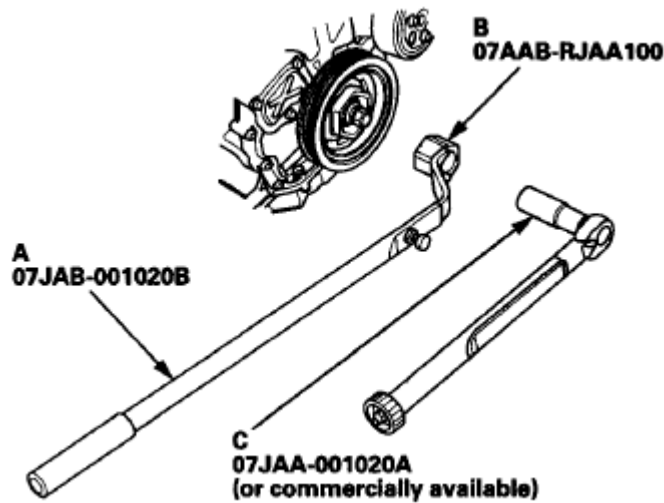


Fig. 22: Identifying Holder Handle And Crankshaft Pulley Holder
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Tighten the bolt to 49 N.m (5.0 kgf.m, 36 lbf.ft) with a torque wrench and socket, 19 mm (C). Do not use an impact wrench. If the pulley bolt or crankshaft are new, tighten the bolt to 177 N.m (18.0 kgf.m, 130 lbf.ft), then remove the bolt and tighten it to 49 N.m (5.0 kgf.m, 36 lbf.ft).
4. Tighten the pulley bolt an additional 90 °.
5. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
6. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
7. Install the front wheels.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

1. Raise the vehicle on a lift, and remove the front wheels.
2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
5. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

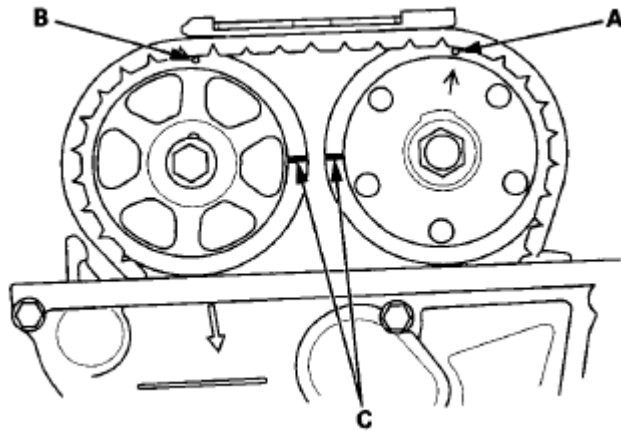


Fig. 23: Aligning TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Disconnect the VTC oil control solenoid valve connector (A) and remove the harness clamp (B).

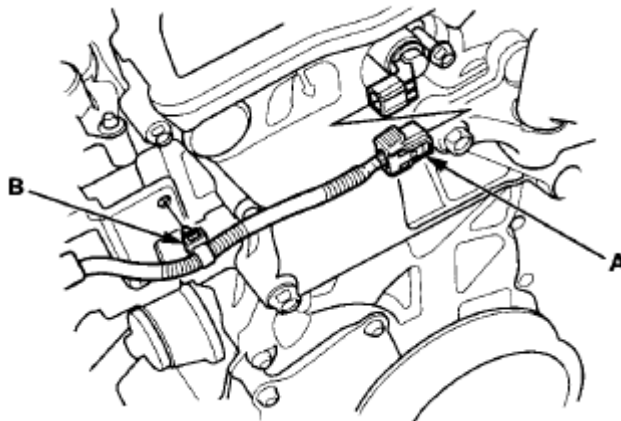


Fig. 24: Identifying VTC Oil Control Solenoid Valve Connector And Harness Clamp
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
8. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the torque rod.

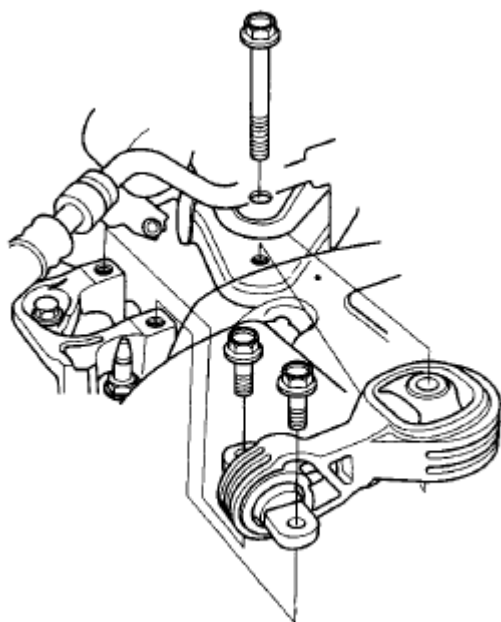


Fig. 25: Identifying Torque Rod

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the ground cable (A), then remove the side engine mount bracket (B).

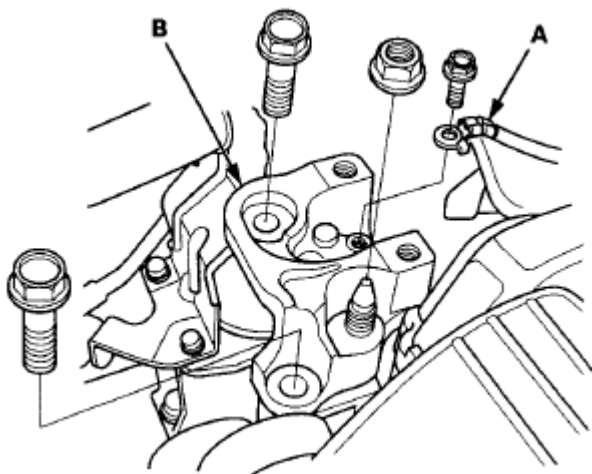


Fig. 26: Identifying Ground Cable And Side Engine Mount Bracket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the side engine mount bracket mounting bolts.

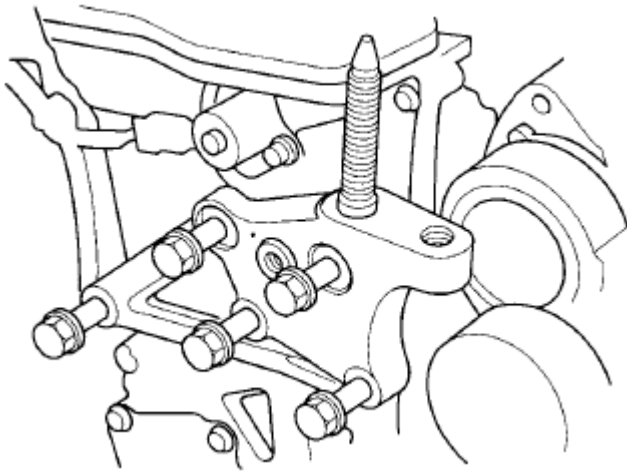


Fig. 27: Identifying Side Engine Mount Bracket Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the cam chain case (A) and the side engine mount bracket (B).

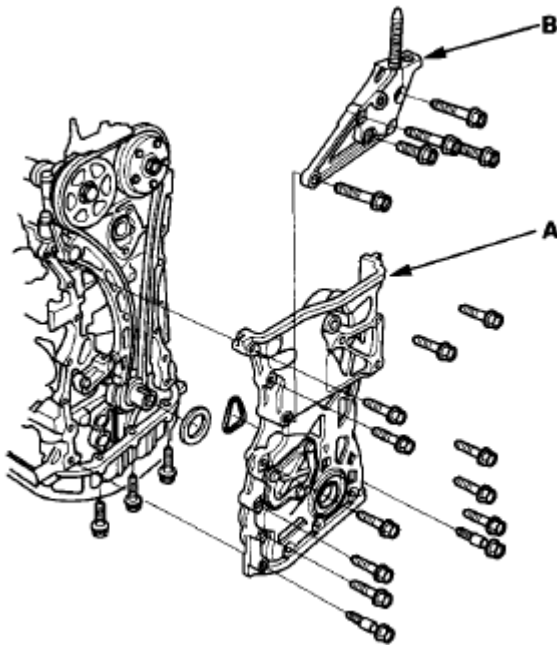


Fig. 28: Identifying Cam Chain Case And Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Loosely install the crankshaft pulley.
15. Turn the crankshaft counterclockwise to compress the auto-tensioner.

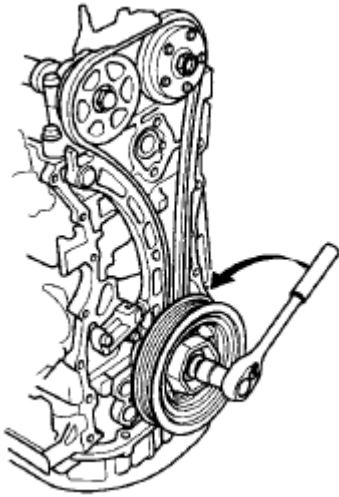


Fig. 29: Turning Crankshaft Counterclockwise
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.

NOTE: Check the auto-tensioner cam position. If the position are not aligned, set the first cam to the first edge of the rack.

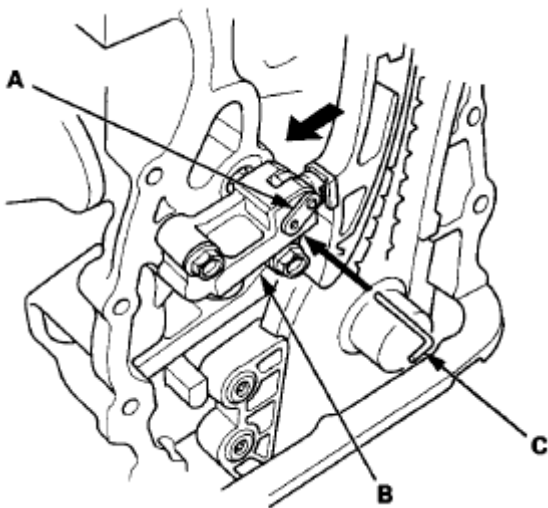


Fig. 30: Aligning Holes On Lock And Auto-Tensioner
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the auto-tensioner.

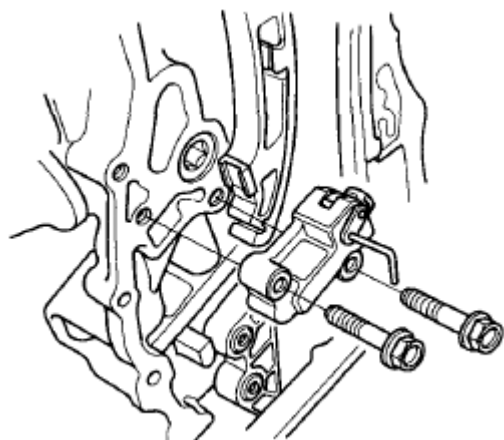


Fig. 31: Identifying Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove cam chain guide B.

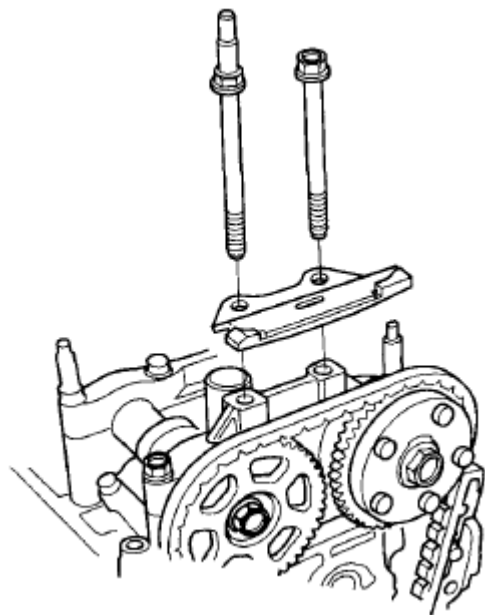


Fig. 32: Identifying Cam Chain Guide B

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

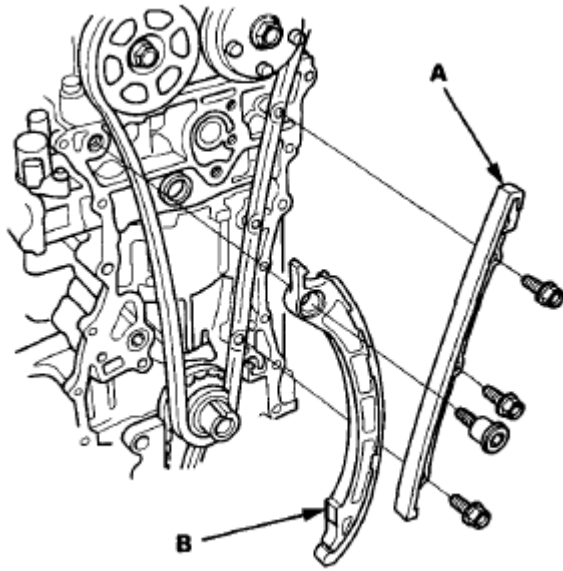


Fig. 33: Identifying Cam Chain Guide And Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the cam chain.

CAM CHAIN INSTALLATION

Special Tools Required

Camshaft Lock Pin Set 07AAB-RWCA120

NOTE:

- Keep the cam chain away from magnetic fields.
- Before doing this procedure, check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.

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

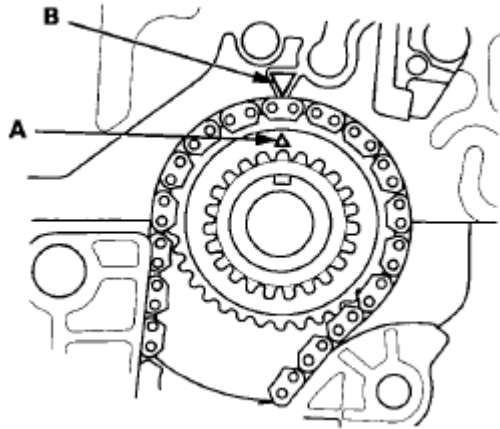


Fig. 34: Identifying Mark On Crankshaft Sprocket With Pointer
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Set the camshafts to TDC. The punch mark (A) on the VTC actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

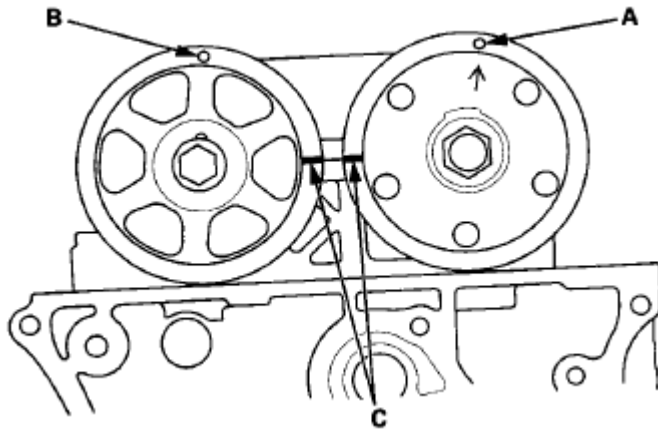


Fig. 35: Identifying Punch Mark On VTC Actuator
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. To hold the intake camshaft, insert a camshaft lock pin (07AAB-RWCA120) (A) into the maintenance hole in camshaft position (CMP) pulse plate A (B) and through the No. 5 rocker shaft holder (C).

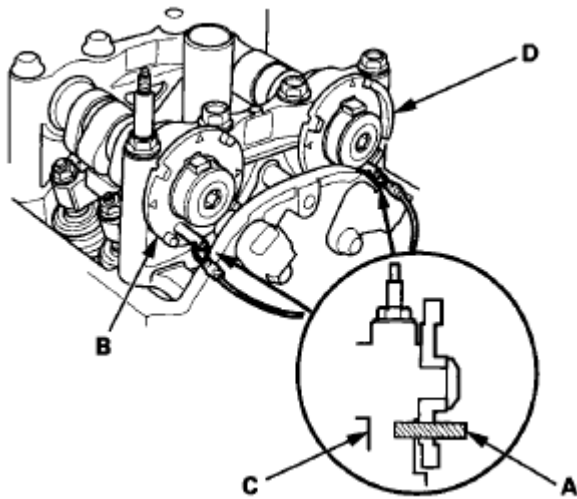


Fig. 36: Identifying Camshaft Position Pulse Plate And No. 5 Rocker Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. To hold the exhaust camshaft, insert a camshaft lock pin (A) into the maintenance hole in CMP pulse plate B (D) and through the No. 5 rocker shaft holder (C).
5. Install the cam chain on the crankshaft sprocket with the colored link plate (A) aligned with the mark (B) on the crankshaft sprocket.

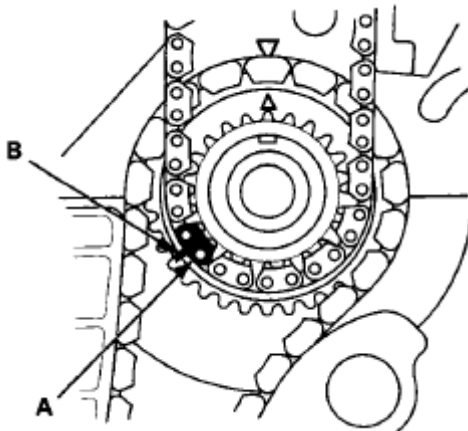


Fig. 37: Identifying CMP Pulse Plate And No. 5 Rocker Shaft Holder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cam chain on the VTC actuator and the exhaust camshaft sprocket with the punch marks (A) aligned with the center of the two colored link plates (B).

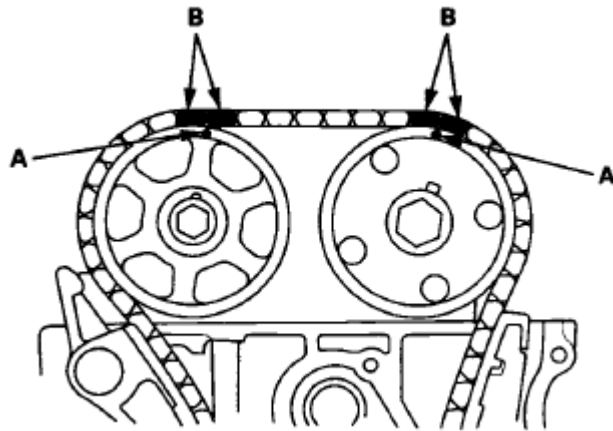


Fig. 38: Identifying Exhaust Camshaft Sprocket And Link Plates
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Apply new engine oil to the threads of the cam chain tensioner mounting bolt.

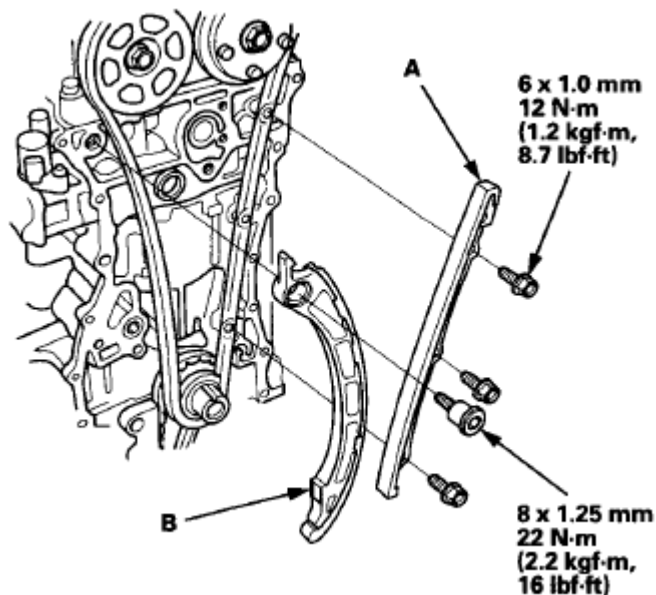


Fig. 39: Identifying Cam Chain Tensioner Mounting Bolt With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install cam chain guide A and the tensioner arm (B).
9. Compress the auto-tensioner when replacing the cam chain. Remove the pin from the auto-tensioner. Turn the plate (A) counterclockwise, to release the lock, then press the rod (B), and set the first cam (C) to the first edge of the rack (D). Insert the 1.2 mm (0.05 in) diameter pin or lock pin (P/N 14511-PNA-003) (E) into the holes (F).

NOTE: If the chain tensioner is not set up as described, the tensioner will become damaged.



- Fig. 41: Identifying Cam Chain Guide B With Torque Specification**
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- NOTE:** Check the auto-tensioner cam position. If the position is not aligned, set the first cam to the first edge of the rack.

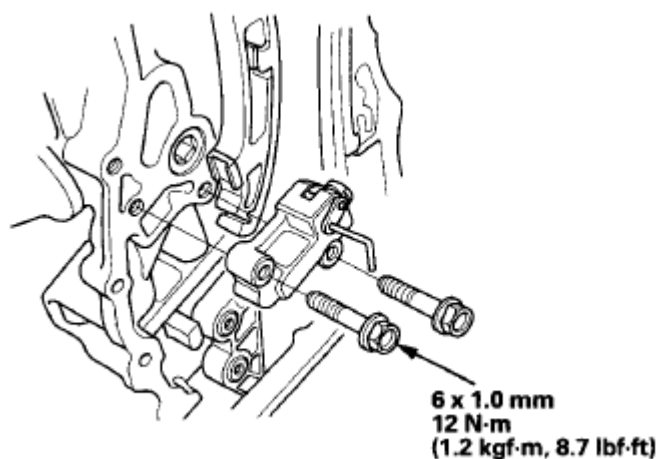


Fig. 42: Checking Auto-Tensioner Cam Position With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the pin or lock pin from the auto-tensioner.

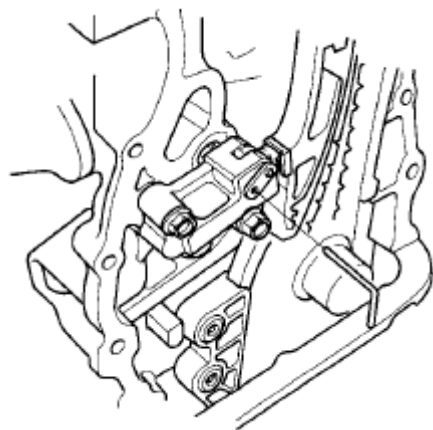


Fig. 43: Identifying Auto-Tensioner And Lock Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the camshaft lock pin set.

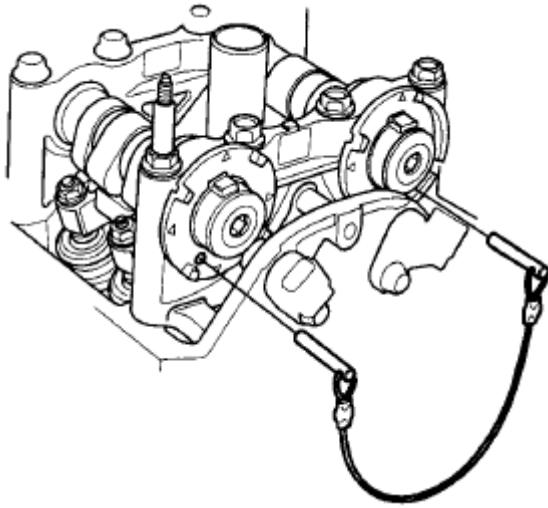


Fig. 44: Removing Camshaft Lock Pin Set

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CAM CHAIN CASE OIL SEAL INSTALLATION**).
15. Remove the old liquid gasket from the chain case mating surfaces, the bolts, and the bolt holes.
16. Clean and dry the chain case mating surfaces.
17. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 3 x 11 mm (0.12 x 0.43 in) or 2.5 x 11 mm (0.098 x 0.43 in) bead of liquid gasket to the engine block upper surface contact areas (B) and the lower block upper surface contact areas (C) on the chain case.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

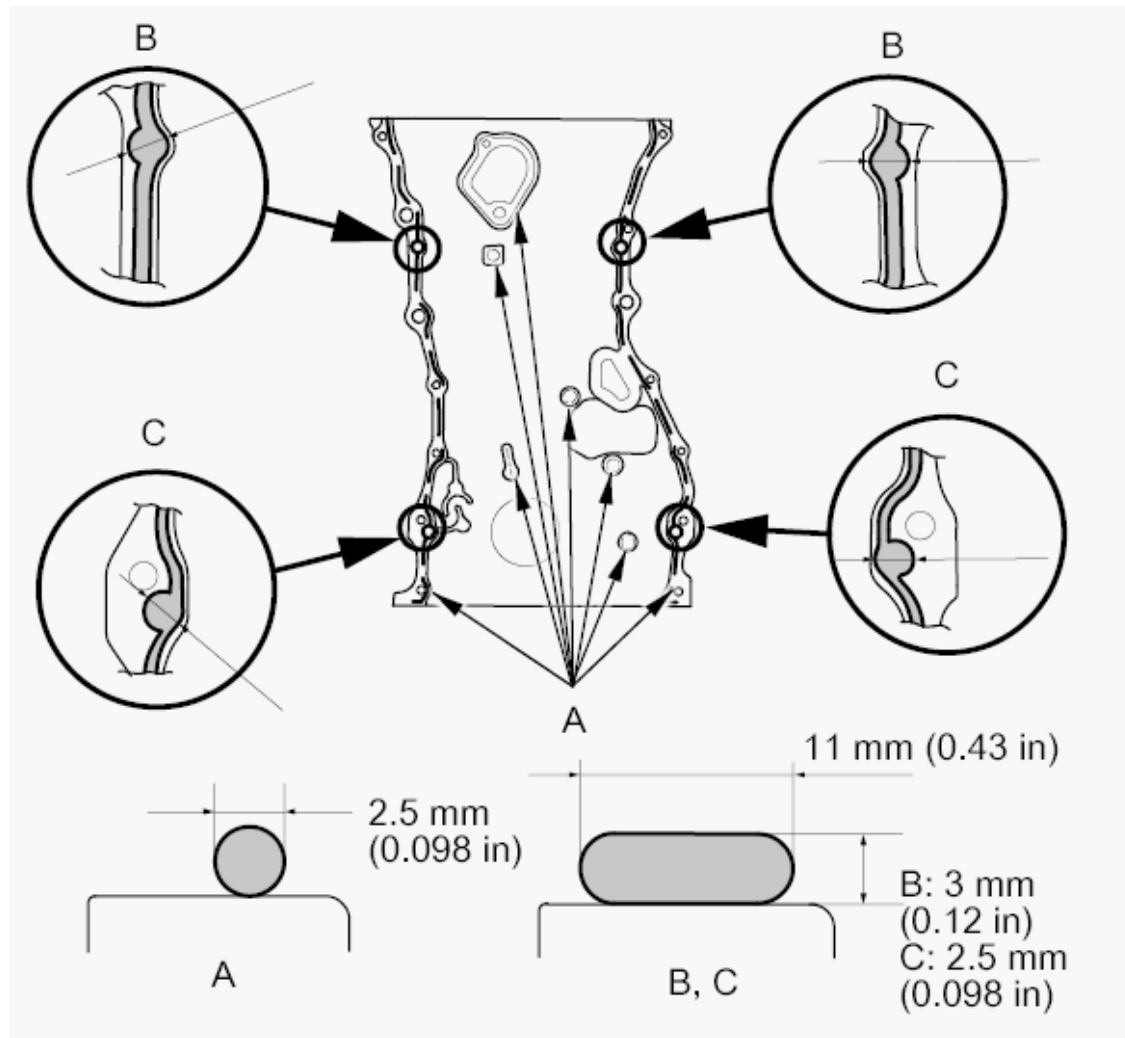


Fig. 45: Identifying Engine Block Upper Surface Contact Areas And Chain Case
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Apply liquid gasket to the engine block upper surface contact areas (B) on the chain case and lower block upper surface contact areas (C) on the chain case.
19. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 3 mm (0.12 in) 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.

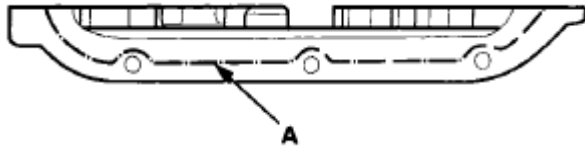


Fig. 46: Identifying Cylinder Head Sealant Area (Broken Line)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Install the new O-ring (A), the side engine mount bracket (B), and the mounting bolts (C) on the chain case. Set the edge of the chain case (D) to the edge of the oil pan (E), then install the chain case on the engine block (F). Wipe off the excess liquid gasket on the oil pan and chain case mating area.

NOTE:

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

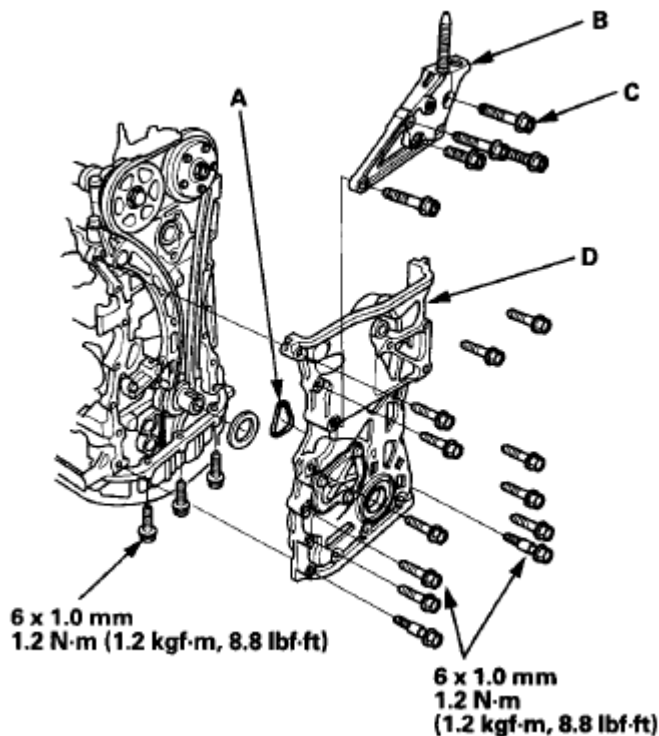


Fig. 47: Identifying O-Ring, Side Engine Mount Bracket And Mounting Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

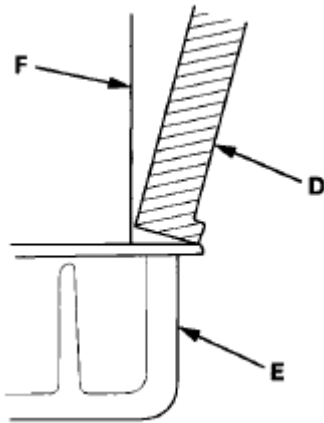


Fig. 48: Identifying Chain Case, Engine Block And Oil Pan
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Tighten the side engine mount bracket mounting bolts.

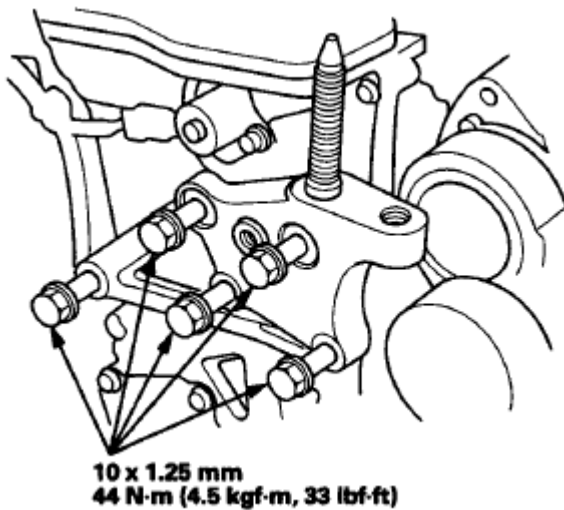


Fig. 49: Identifying Engine Mount Bracket Mounting Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the side engine mount bracket (A), then loosely tighten the new bolt and nut (B), and loosely tighten the bolt (C).

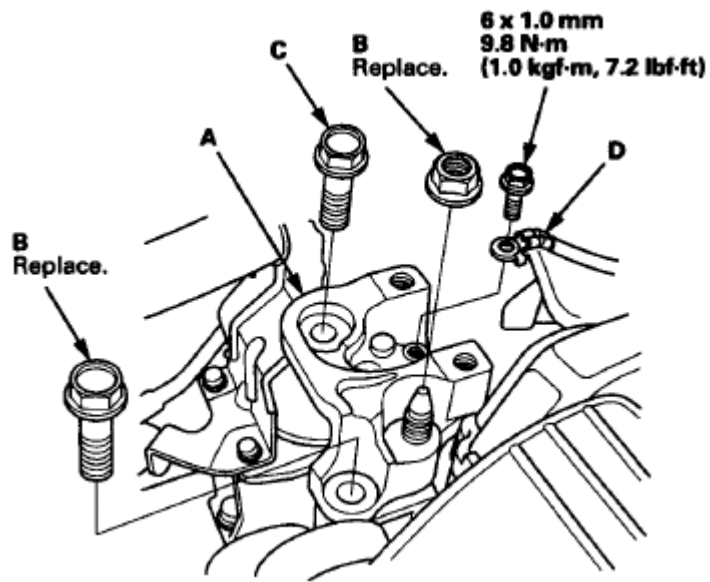


Fig. 50: Identifying Engine Mount Bracket, Bolt And Nut With Torque Specification
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the ground cable (D).
24. Remove the air cleaner housing assembly.
25. Loosen the transmission mounting bolt and nuts (A).

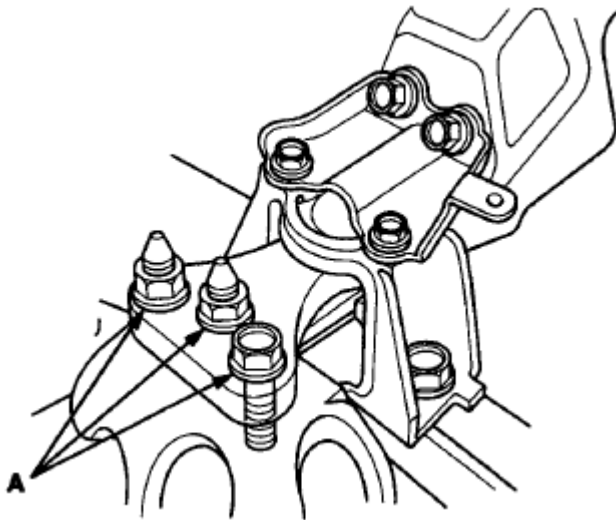


Fig. 51: Identifying Transmission Mounting Bolt, Nuts And Ground Cable
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Raise the vehicle on the lift.
27. Loosen the lower torque rod mounting bolt (A).

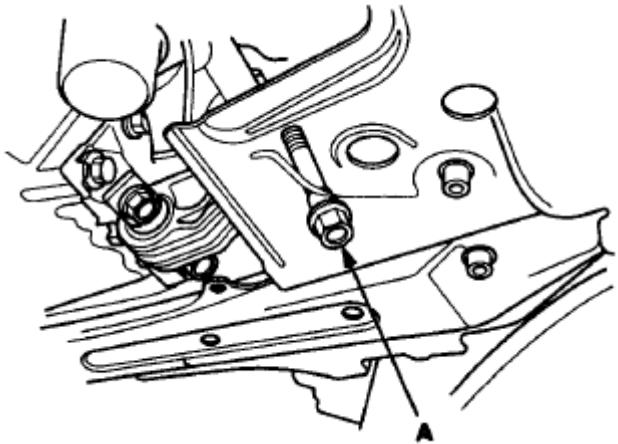


Fig. 52: Identifying Lower Torque Rod Mounting Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Lower the vehicle on the lift.
29. Tighten the side engine mount mounting bolts and nut.

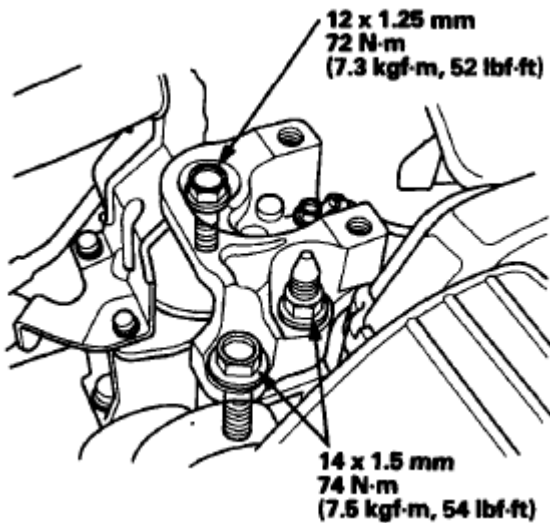


Fig. 53: Identifying Side Engine Mount Mounting Bolts And Nut With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Tighten the transmission mounting bolt and nuts.

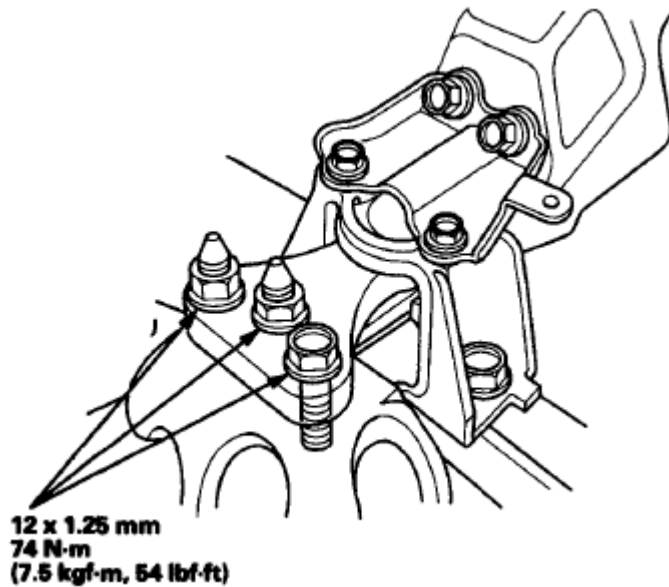


Fig. 54: Identifying Transmission Mounting Bolt And Nuts With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Raise the vehicle on the lift.
32. Tighten the lower torque rod mounting bolt.

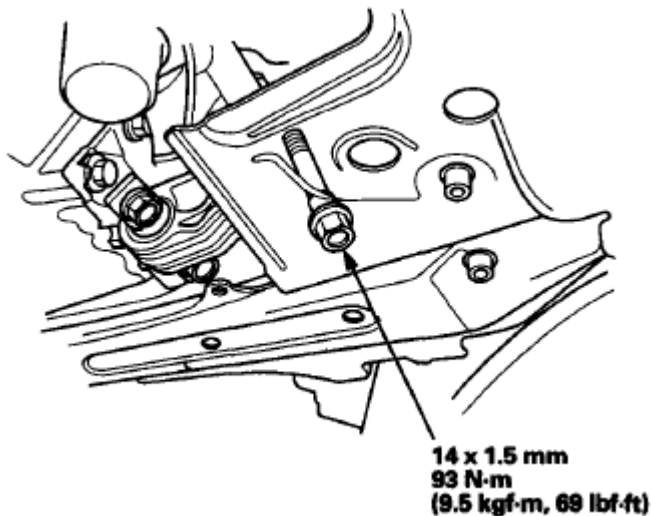


Fig. 55: Identifying Lower Torque Rod Mounting Bolt With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

33. Lower the vehicle on the lift.
34. Install the air cleaner housing assembly.
35. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.

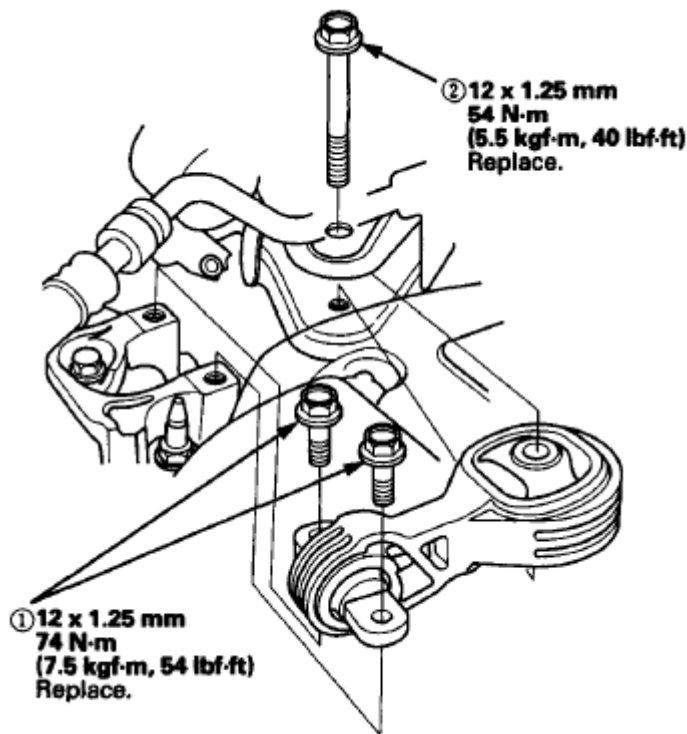


Fig. 56: Identifying Upper Torque Rod And Upper Torque Rod Mounting Bolts With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

36. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
37. Install the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
38. Connect the VTC oil control solenoid valve connector (A) and install the harness clamp (B).

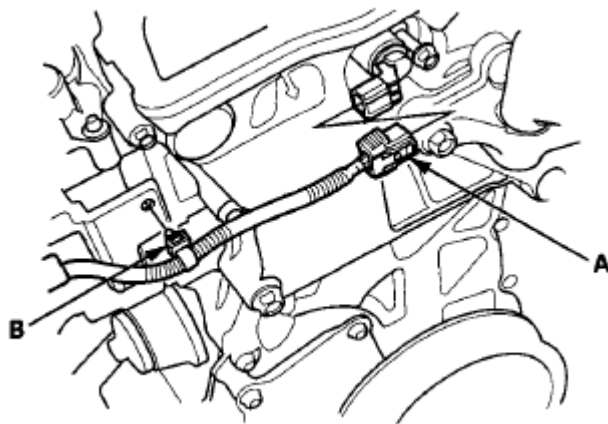


Fig. 57: Identifying VTC Oil Control Solenoid Valve Connector And Harness Clamp

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

40. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
41. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
42. Install the front wheels.
43. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

CAM CHAIN AUTO-TENSIONER REMOVAL AND INSTALLATION

REMOVAL

1. Remove the chain case cover.

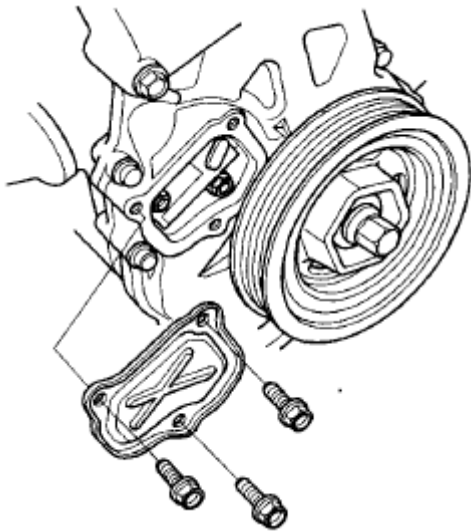


Fig. 58: Identifying Chain Case Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Turn the crankshaft counterclockwise to compress the auto-tensioner.

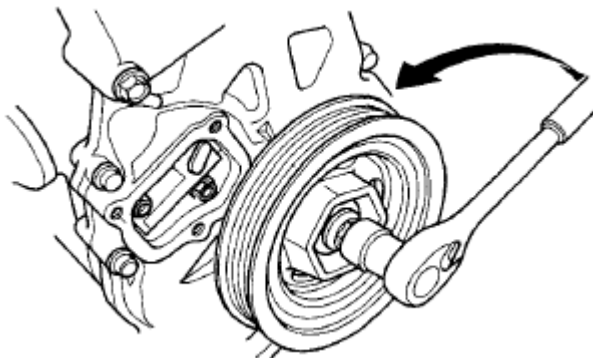


Fig. 59: Turning Crankshaft Counterclockwise

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.

NOTE: Check the auto-tensioner cam position. If the position is not aligned, set the first cam to the first edge of the rack (see step 9).

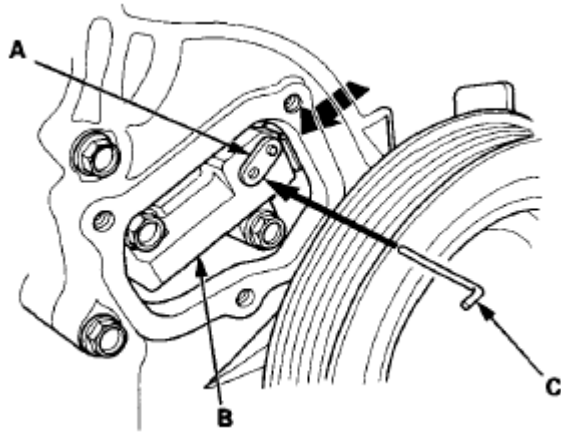


Fig. 60: Aligning Holes On Lock And Auto-Tensioner
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the auto-tensioner.

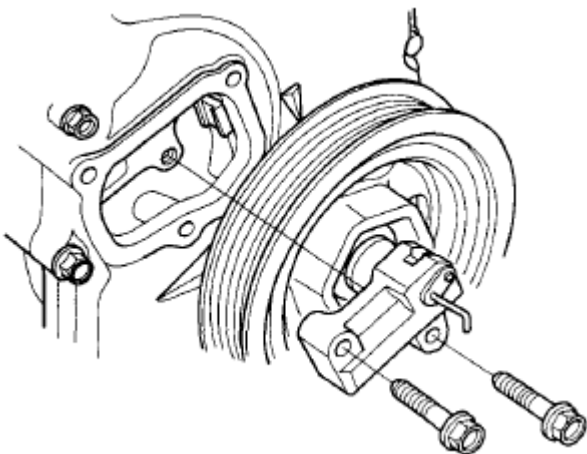


Fig. 61: Identifying Auto-Tensioner
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Install the auto-tensioner.

NOTE: Check the auto-tensioner cam position. If the position is not aligned, set the first cam to the first edge of the rack.

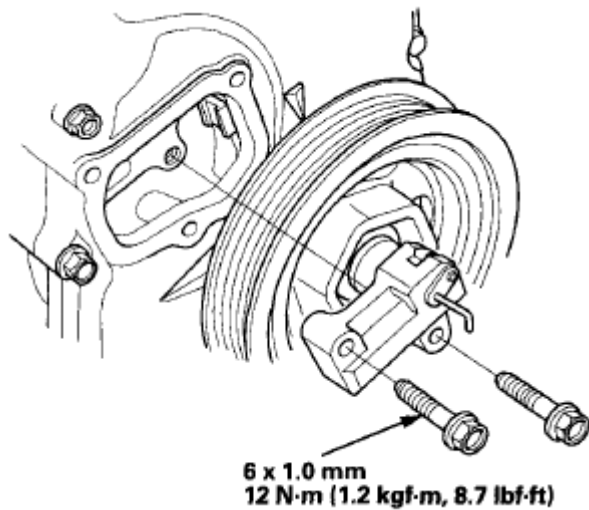


Fig. 62: Identifying Auto-Tensioner Cam Position With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the 1.2 mm (0.05 in.) diameter pin or lock pin (P/N 14511- PNA-003) from the auto-tensioner.

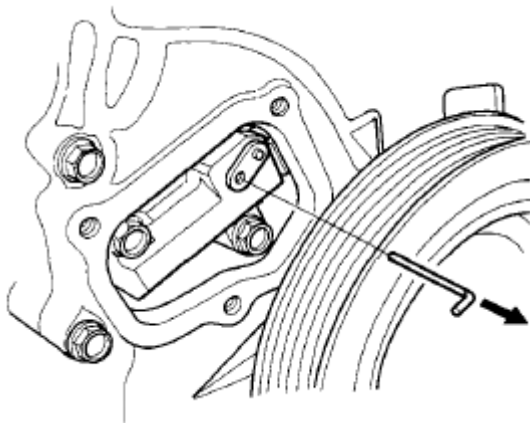


Fig. 63: Identifying Lock Pin And Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove all of the old liquid gasket from the chain case cover mating surfaces, the bolts, and the bolt holes.
4. Clean and dry the chain case cover mating surfaces.
5. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009, evenly to the chain case mating surface of the chain case cover, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 3 mm (0.12 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.

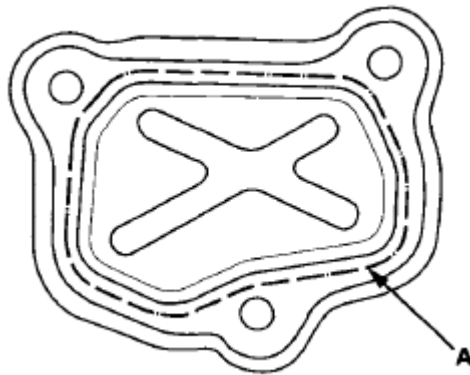


Fig. 64: Identifying Cam Chain Auto-Tensioner Broken Line
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.

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 chain case cover.

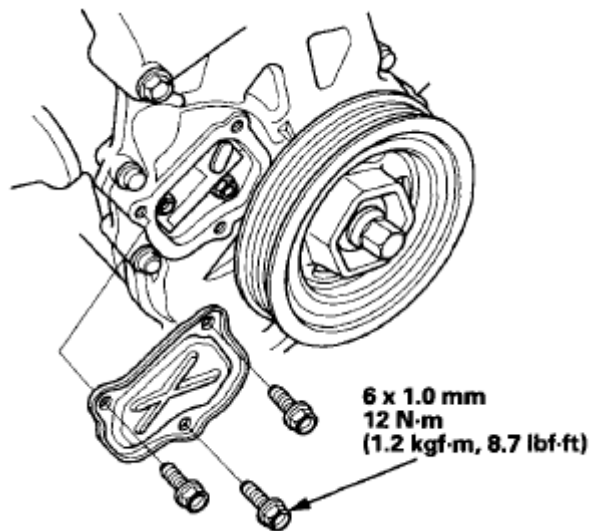


Fig. 65: Identifying Chain Case Cover And Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAM CHAIN CASE OIL SEAL INSTALLATION

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000

- Attachment, 52 x 55 mm 07746-0010400

1. Apply a light coat of new engine oil around the crankshaft.
2. Apply a light coat of new engine oil to the lip of the chain case oil seal.
3. Use the handle driver and attachment, 52 x 55 mm to drive a new oil seal squarely into the chain case to the specified installed height.

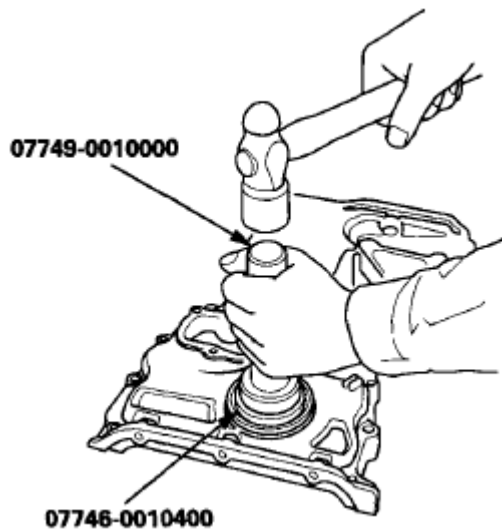


Fig. 66: Installing Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the distance between the chain case surface (A) and the oil seal (B).

Oil Seal Installed Height:

32.4-33.1 mm (1.28-1.30 in)

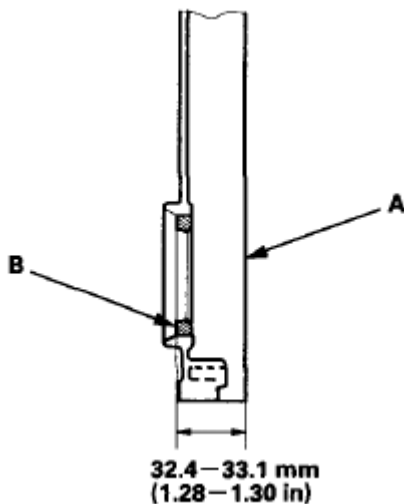


Fig. 67: Identifying Distance Between Chain Case Surface And Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAM CHAIN INSPECTION

Special Tools Required

Cam Chain Inspection Gauge 07AAJ-RWCA100

1. Raise the vehicle on the lift, and remove the front wheels.
2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
3. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
4. Rotate the crankshaft pulley two turns clockwise.
5. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

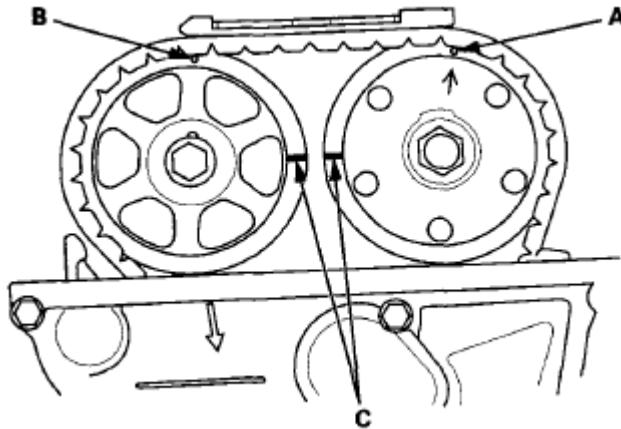


Fig. 68: Aligning TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Measure the clearance between the cam chain (A) and the tensioner arm (B) with the cam chain inspection gauge (07AAJ-RWCA100).
 - If the clearance is OK, go to step 17.
 - If the clearance is more than the service limit, go to step 7.

Chain-to-Arm Clearance

Service Limit:

MIL on with P0341: 4.3 mm (0.17 in)

Without MIL: 5.5 mm (0.22 in)

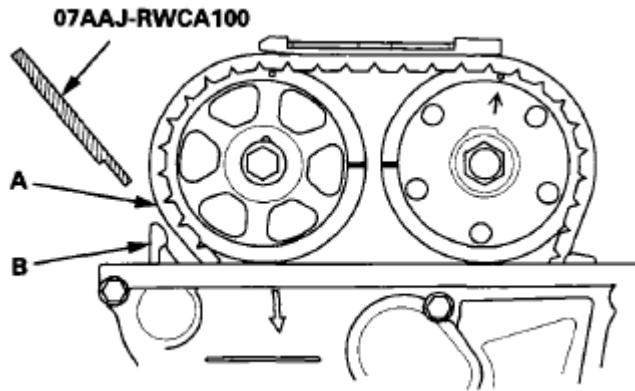


Fig. 69: Measuring Clearance Between Cam Chain And Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the oil pan (see **OIL PAN REMOVAL**).
8. Support the engine with a jack and a wood block under the engine block.

NOTE: Do not hit the oil pump and the baffle plate when placing the jack on the edge of the engine block.

9. Remove the cam chain (see **CAM CHAIN REMOVAL**), and check the teeth on the crankshaft sprocket, the VTC actuator, and the exhaust camshaft sprocket for wear and damage. If any of them are worn or damaged, replace if necessary.
10. Check the oil passage on the auto-tensioner for clogs. If the auto-tensioner is clogged, replace it.
11. Measure the length of the oil pump chain auto-tensioner rod.

Oil Pump Chain Auto-Tensioner Rod Length

Service Limit: 13 mm (0.51 in)

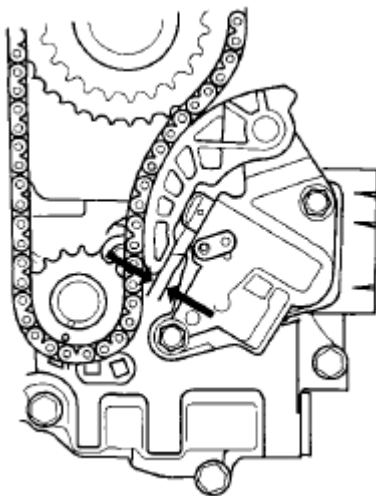


Fig. 70: Identifying Oil Pump Chain Auto-Tensioner Rod Length

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. If the length is over the service limit, replace the oil pump chain (see **OIL PUMP CHAIN REPLACEMENT**). When replacing, check the teeth on the crankshaft sprocket and oil pump sprocket for wear and damage. If any of them are worn or damaged, replace if necessary.
13. Check the oil passage on the oil pump chain auto-tensioner for clogs. If the auto-tensioner is clogged, replace it.
14. Install the new cam chain (see **CAM CHAIN INSTALLATION**).
15. Remove the jack and the wood block.
16. Install the oil pan (see **OIL PAN REMOVAL**).
17. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
18. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
19. Install the front wheels.

CYLINDER HEAD COVER REMOVAL

1. Remove the engine cover.

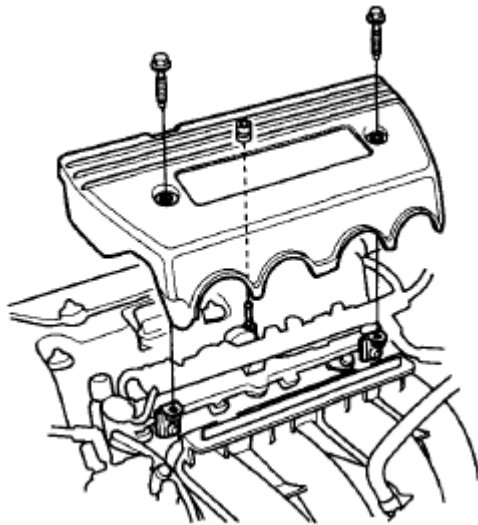


Fig. 71: Identifying Engine Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
3. Remove the dipstick (A) and the power steering (P/S) hose bracket (B) and disconnect the breather hose (C) and the brake booster vacuum hose (D).

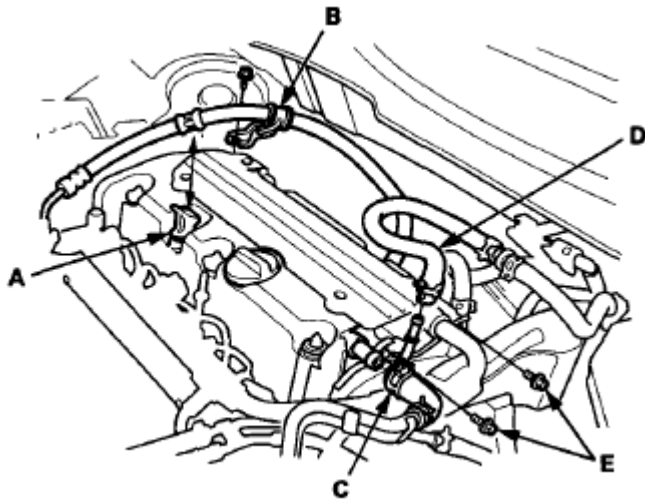


Fig. 72: Identifying Dipstick, Power Steering (P/S) Hose Bracket, Breather Hose And Brake Booster Vacuum Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the two bolts (E) securing the install pipe component.
5. Remove the cylinder head cover.

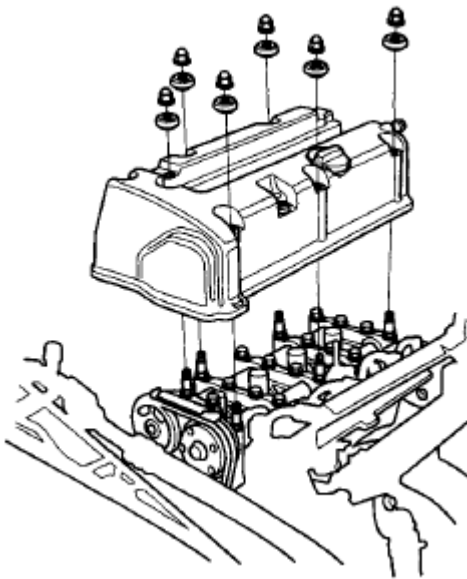


Fig. 73: Identifying Cylinder Head Cover And Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Thoroughly clean the head cover gasket and the groove.
2. Install the head cover gasket (A) in the groove of the cylinder head cover (B).

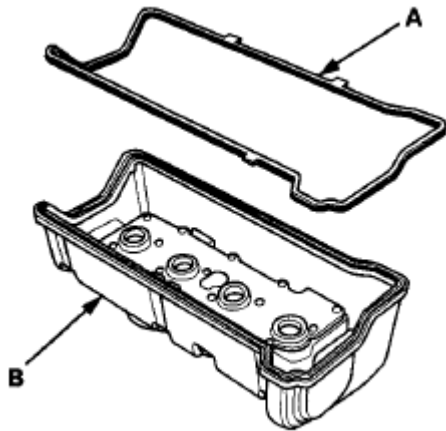


Fig. 74: Identifying Head Cover Gasket And Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009, on the chain case and the No. 5 rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE: If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

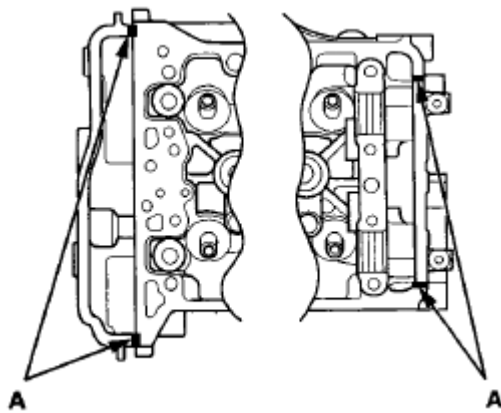


Fig. 75: Identifying Chain Case And No. 5 Rocker Shaft Holder Mating Areas
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Set the spark plug seals (A) on the spark plug tubes. Place the cylinder head cover (B) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.

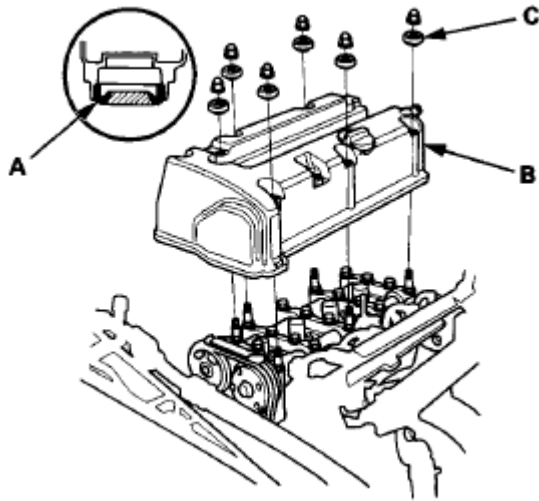


Fig. 76: Identifying Spark Plug Seals And Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in three steps. In the final step tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 lbf.ft).

NOTE:

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

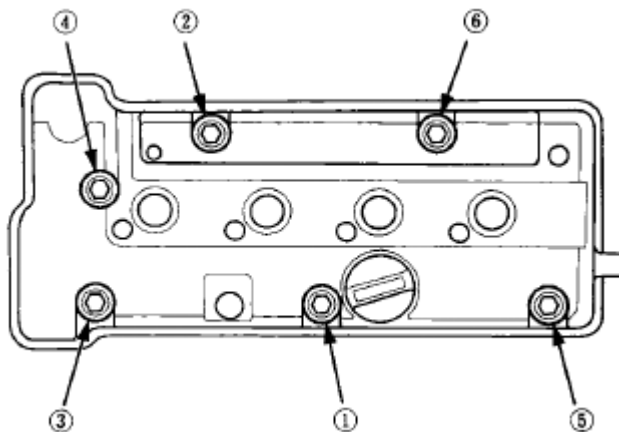


Fig. 77: Identifying Head Cover Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the two bolts (A) securing the install pipe component.

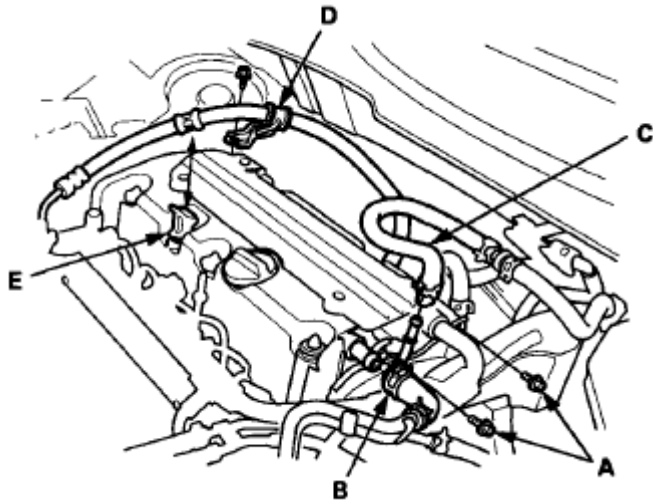


Fig. 78: Identifying Pipe Component And Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Connect the breathe hose (B) and the brake booster vacuum hose (C) and install the power steering (P/S) hose bracket (D), and the dipstick (E).
10. Install the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
11. Install the engine cover.

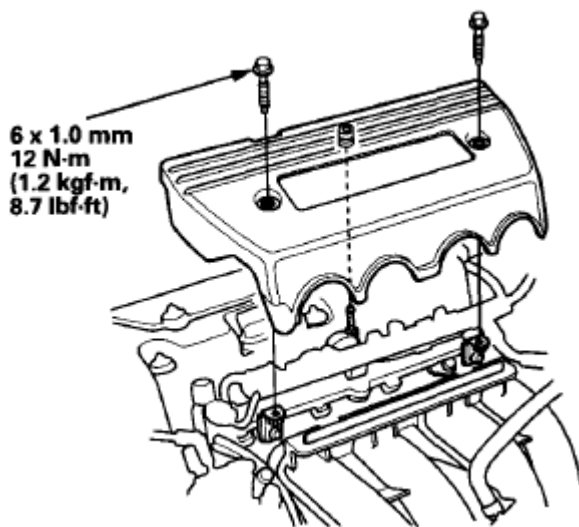


Fig. 79: Identifying Engine Cover With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 Honda Diagnostic System (HDS) to the data link connector (DLC), and monitor the engine coolant temperature (ECT) sensor 1. To avoid damaging the cylinder head, wait until the ECT sensor 1 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.

1. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
2. Drain the engine coolant (see **COOLANT CHECK**).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
4. Remove the intake manifold (see **INTAKE MANIFOLD REMOVAL AND INSTALLATION**).
5. Remove the warm up TWC (see **WARM UP TWC REMOVAL/INSTALLATION**).
6. Disconnect the evaporative emission (EVAP) canister hose (A).

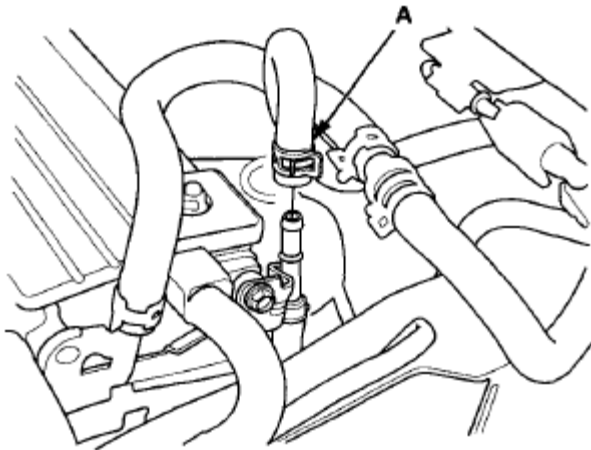


Fig. 80: Identifying Evaporative Emission Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).

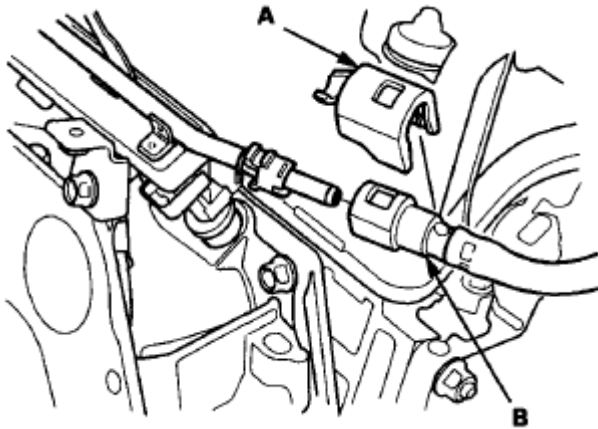


Fig. 81: Identifying Quick-Connect Fitting Cover And Fuel Feed Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Disconnect the four fuel injector connectors (A), remove the ground cables (B).

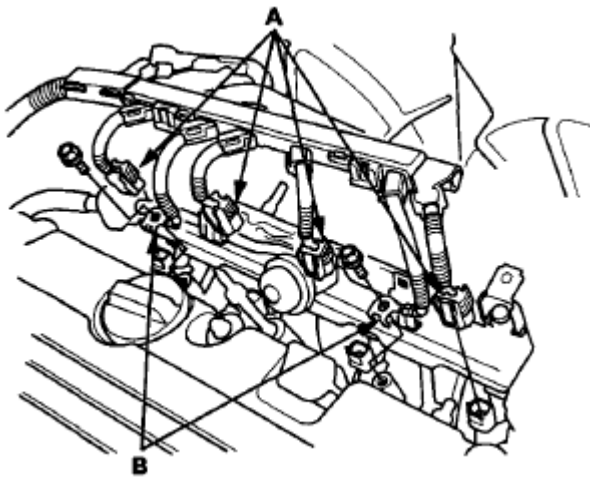


Fig. 82: Identifying Fuel Injector Connectors And Ground Cables
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the four bolts securing the EVAP canister purge valve bracket.

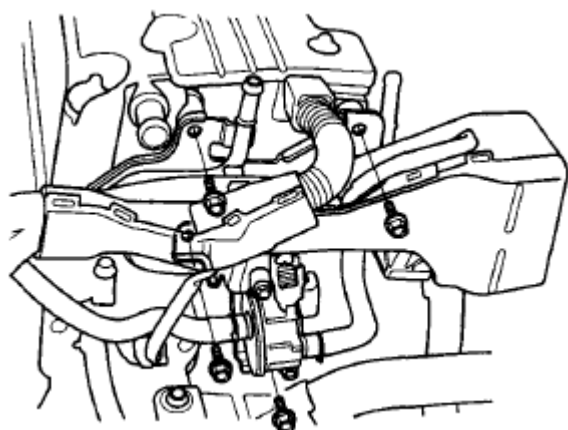


Fig. 83: Identifying EVAP Canister Purge Valve Bracket And Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Disconnect the upper radiator hose (A), the heater hoses (B), and the water bypass hose (C).

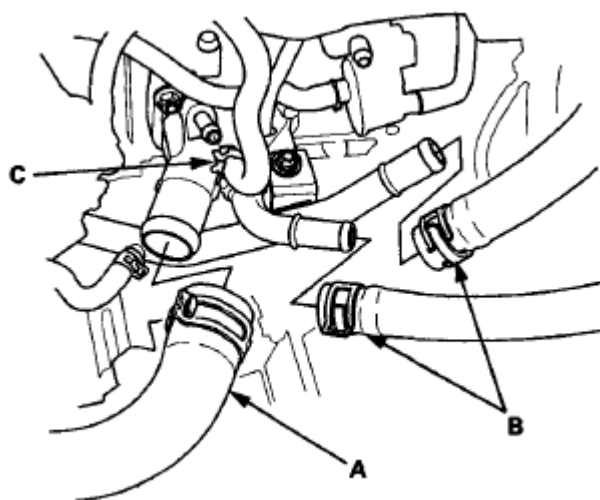


Fig. 84: Identifying Upper Radiator Hose, Heater Hoses And Water Bypass Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the two bolts (A) securing the connecting pipe.

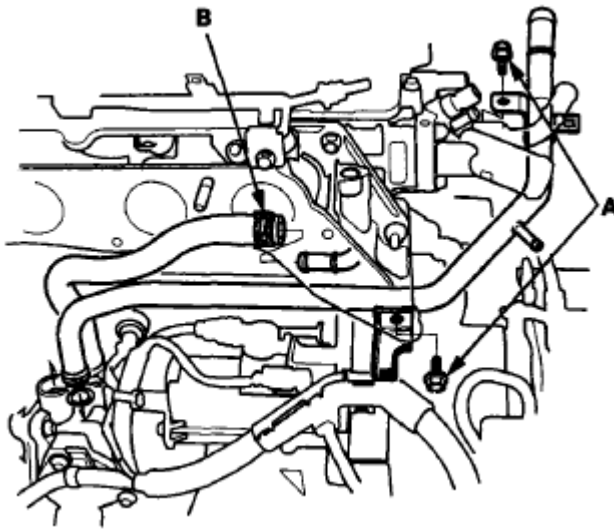


Fig. 85: Identifying Connecting Pipe And Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Disconnect the water bypass hose (B).
13. Disconnect the following engine wire harness connectors and remove the wire harness clamps from the cylinder head:
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor A (Intake) connector
 - Camshaft position (CMP) sensor B (Exhaust) connector
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - EVAP canister purge valve connector
 - Variable valve timing control (VTC) oil control solenoid valve connector
 - Engine oil pressure switch connector
14. Remove the cam chain (see **CAM CHAIN REMOVAL**).
15. Remove the rocker arm assembly (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
16. 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.

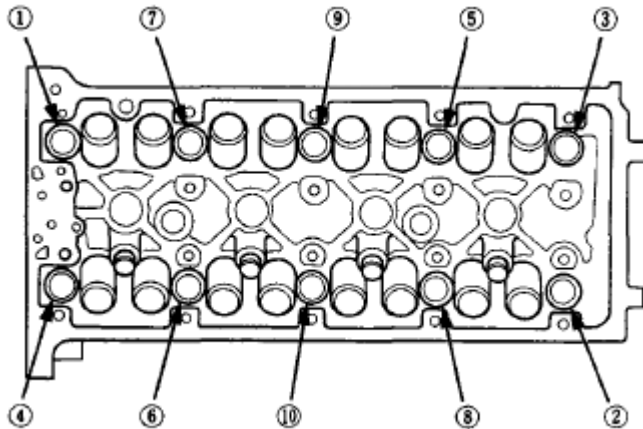


Fig. 86: Identifying Cylinder Head Bolts Remove Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the cylinder head.

CMP PULSE PLATE A REPLACEMENT

1. Remove the cylinder head cover (see CYLINDER HEAD COVER REMOVAL).
2. Remove camshaft position (CMP) sensor A (see CMP SENSOR A REPLACEMENT).
3. Hold the camshaft with an open-end wrench, then loosen the bolt.

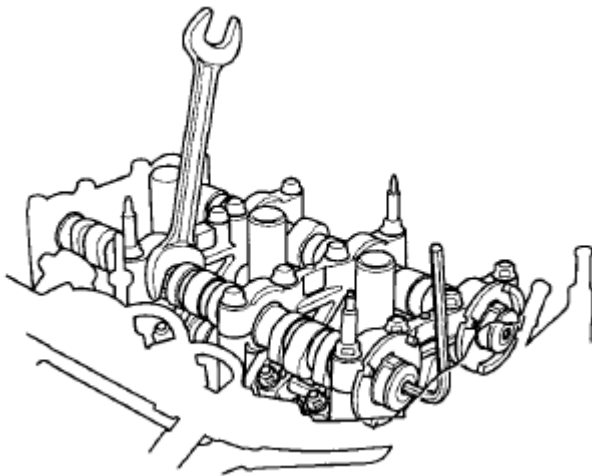


Fig. 87: Loosening Camshaft Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove CMP pulse plate A.

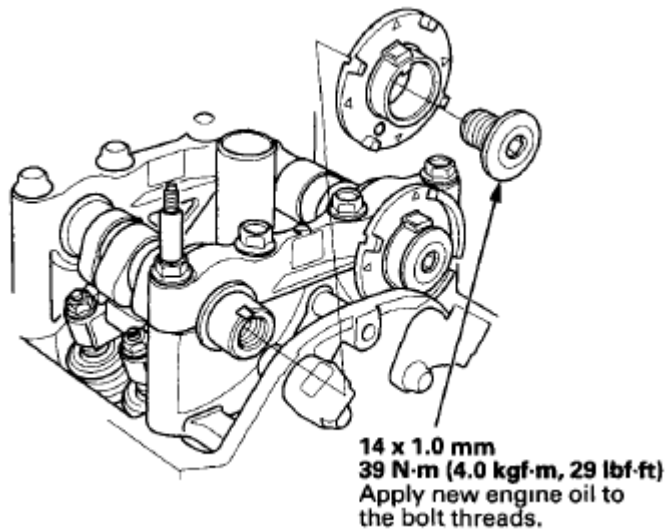


Fig. 88: Identifying CMP Pulse Plate A With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install CMP pulse plate A in the reverse order of removal.

CMP PULSE PLATE B REPLACEMENT

1. Remove the cylinder head cover (see CYLINDER HEAD COVER REMOVAL).
2. Remove camshaft position (CMP) sensor B (see CMP SENSOR B REPLACEMENT).
3. Hold the camshaft with an open-end wrench, then loosen the bolt.

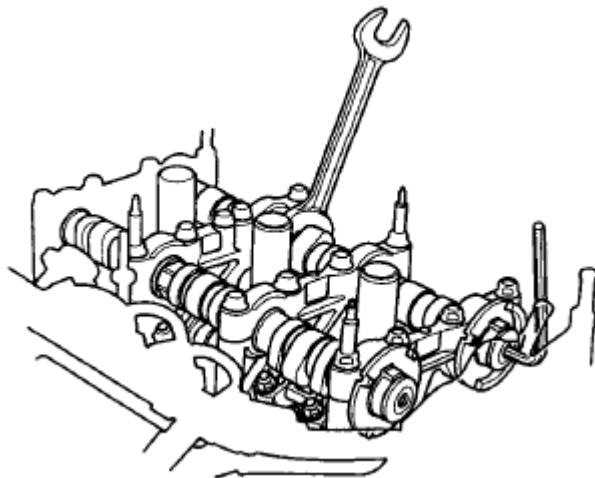


Fig. 89: Loosening Camshaft Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove CMP pulse plate B.

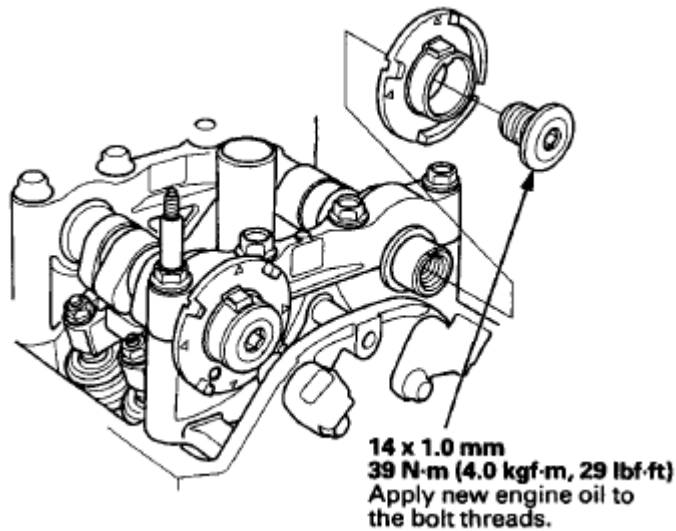


Fig. 90: Identifying CMP Pulse Plate With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install CMP pulse plate B in the reverse order of removal.

VTC ACTUATOR, EXHAUST CAMSHAFT SPROCKET REPLACEMENT

1. Remove the cylinder head cover Cylinder Head Cover Removal.
2. Hold the camshaft with an open-end wrench, then loosen the VTC actuator mounting bolt and the exhaust camshaft sprocket mounting bolt.

NOTE: Do not remove the VTC actuator and the exhaust camshaft sprocket mounting bolts.

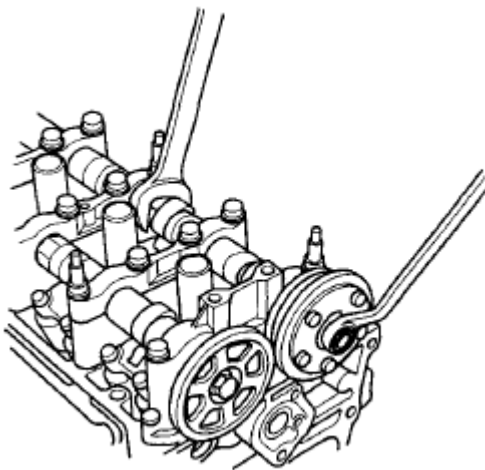


Fig. 91: Holding Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the VTC actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

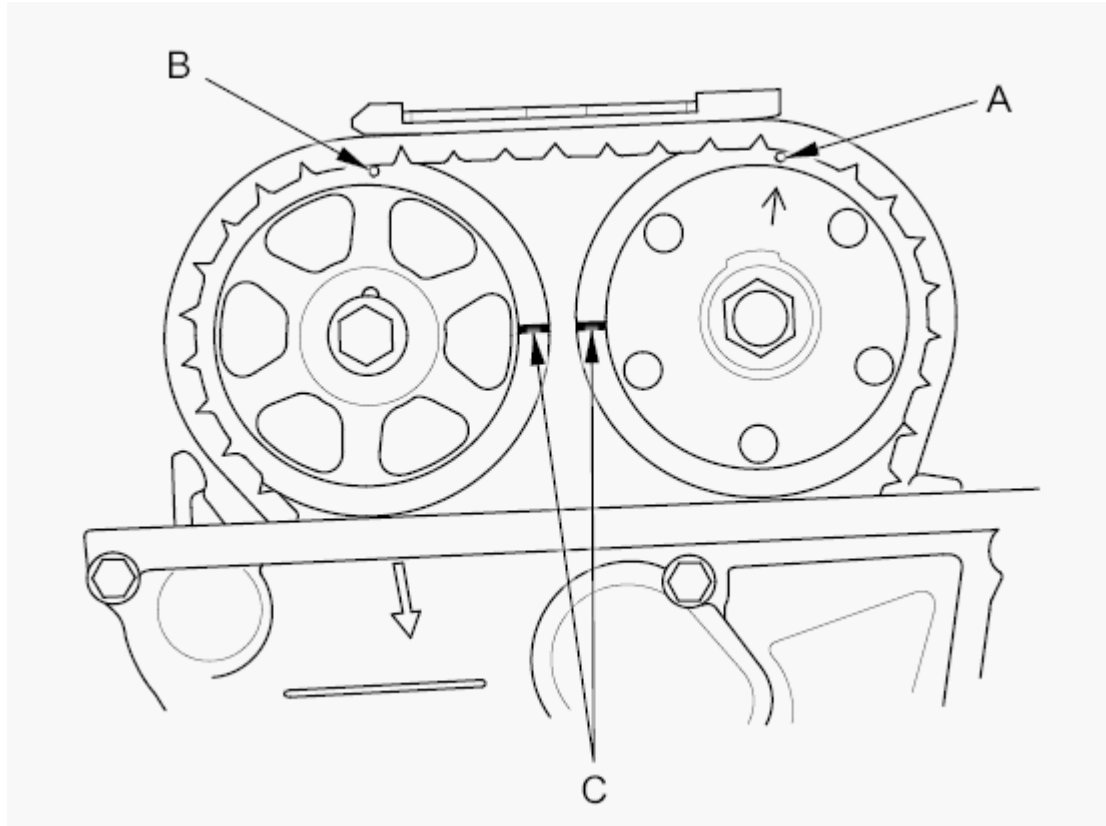


Fig. 92: Aligning the TDC Marks On The VTC Actuator And The Exhaust Camshaft Sprocket.
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the chain case cover.

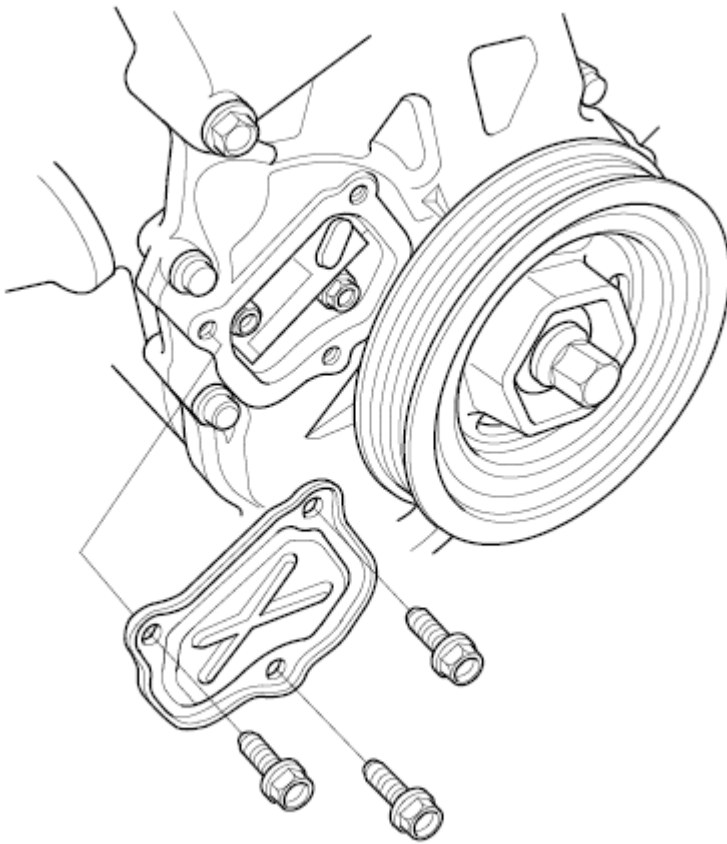


Fig. 93: Chain Case Cover And Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Rotate the crankshaft counterclockwise and align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (3/64 in) diameter pin (C) into the holes.

NOTE: If the holes in the lock and the auto-tensioner do not align, continue to rotating the crankshaft counterclockwise until the holes align, then install the pin.

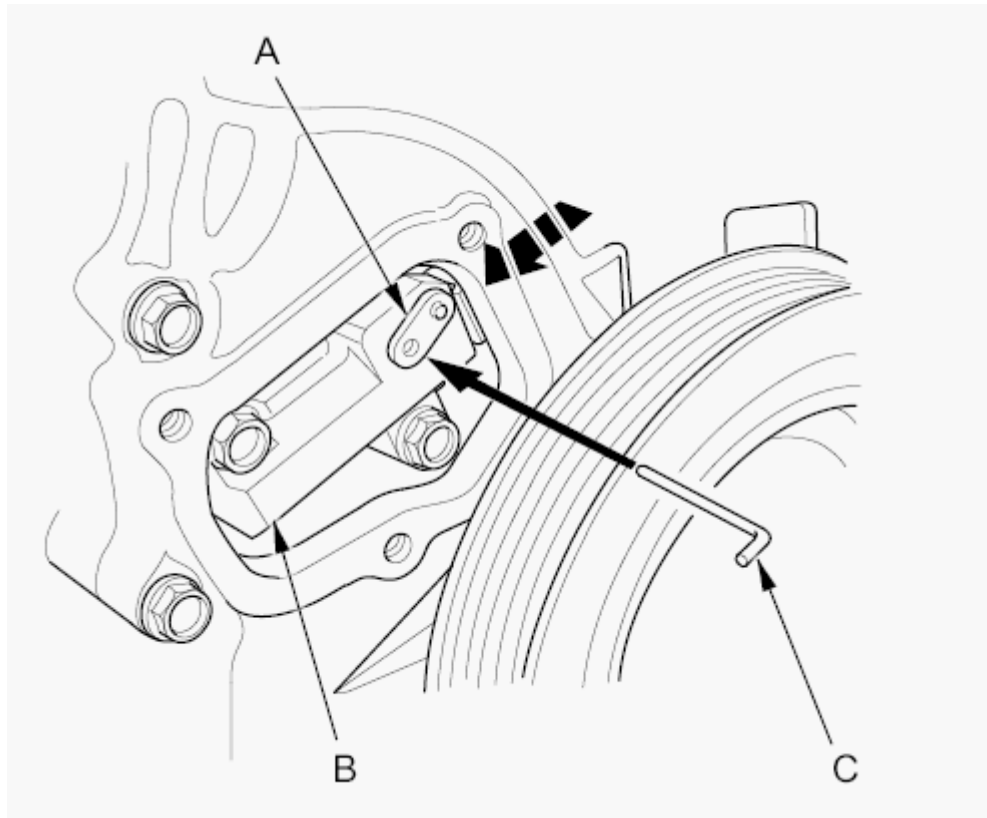


Fig. 94: Aligning The Holes On The Lock And The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Turn the crankshaft clockwise to secure the pin and the TDC on the No. 1 cylinder.
7. Loosen the rocker arm adjusting screws 2.
8. Remove the camshaft holder bolts 3.
9. Remove the five camshaft holders and cam chain guide B.
10. Carefully tip up the intake camshaft on the transmission side of the engine until there is enough slack in the chain to lift the chain off of the VTC actuator's teeth.
11. Remove the intake and exhaust camshafts while keeping some tension on the cam chain.
12. Secure the cam chain to the A/C compressor suction hose or the power steering hose with a wire tie to prevent the chain from falling down into the chain case.
13. Remove the VTC actuator and the exhaust camshaft sprocket.
14. Install the VTC actuator and the exhaust camshaft sprocket.

NOTE: Install the VTC actuator while in the unlocked position.

15. Apply new engine oil to the threads of the VTC actuator and the exhaust camshaft sprocket mounting bolts, then loosely install them.
16. Turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
17. Remove the wire tie while keeping light tension on the cam chain.

18. Slide the intake and exhaust camshafts in at an angle to allow the cam chain to slip over the VTC actuator's teeth and the exhaust sprocket's teeth.
19. Line up the marks made in step 3 for each cam.
20. Apply new engine oil to the camshaft journals and lobes on both cams, and reinstall the five camshaft holders and cam chain guide B in place.
21. Tighten the camshaft holder bolts to the specified torque 9.
22. Hold the camshaft with an open-end wrench, then tighten the bolts.

Specified Torque**VTC Actuator Mounting Bolt:**

12 x 1.25 mm

113 N.m (11.5 kgf.m, 83 lbf.ft)

Exhaust Camshaft Sprocket Mounting Bolt:

10 x 1.25 mm

72 N.m (7.3 kgf.m, 53 lbf.ft)

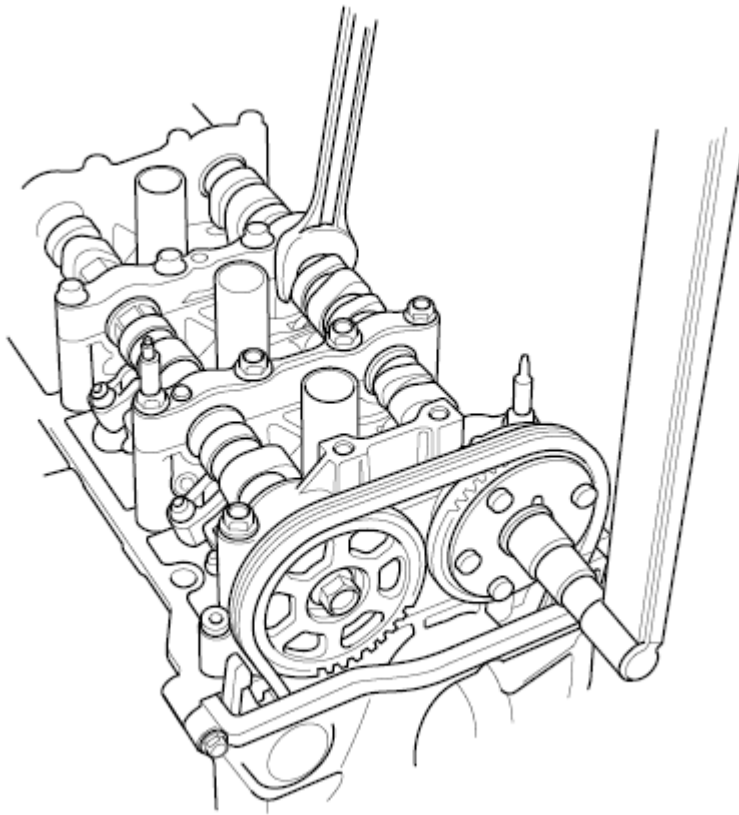


Fig. 95: Holding Camshaft With An Open-End Wrench
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Remove the 1.2 mm (3/64 in) diameter pin from the auto-tensioner.

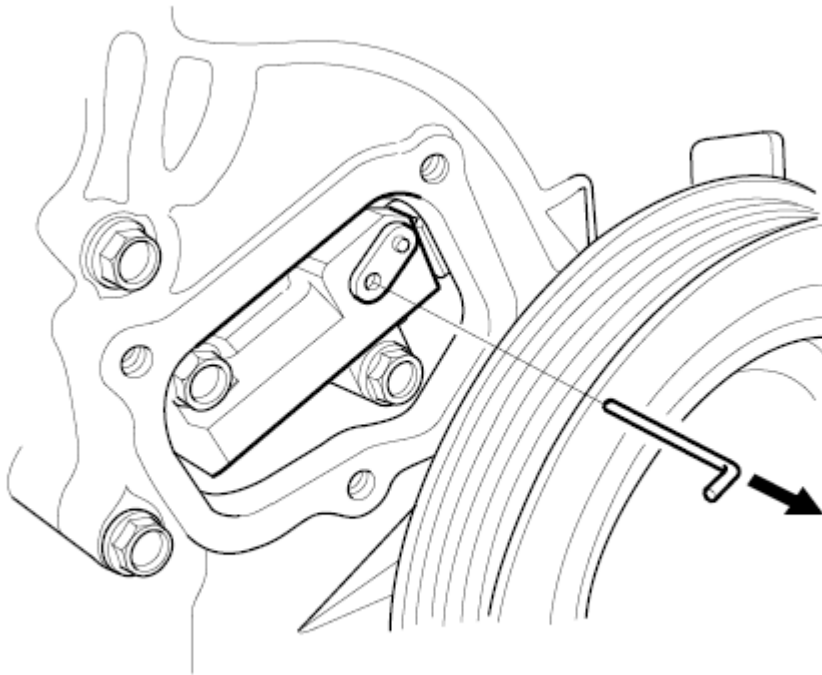


Fig. 96: Removeing Pin From The Auto-Tensioner.
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Remove all of the old liquid gasket from the chain case cover mating surfaces, the bolts, and the bolt holes.
25. Clean and dry the chain case cover mating surfaces.
26. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) evenly to the chain case mating surface of the chain case cover, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- **Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

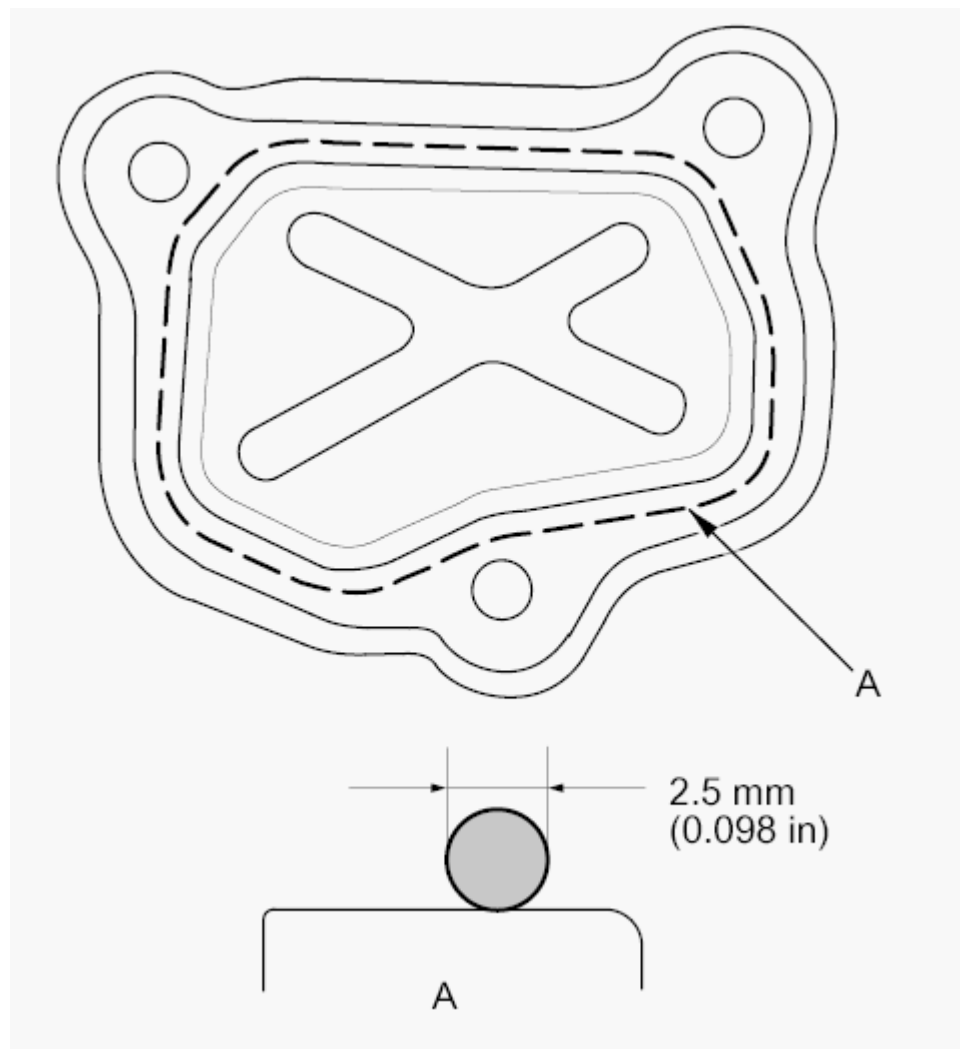


Fig. 97: Identifying Bead Of Liquid Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Install the chain case cover.

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 chain case cover.

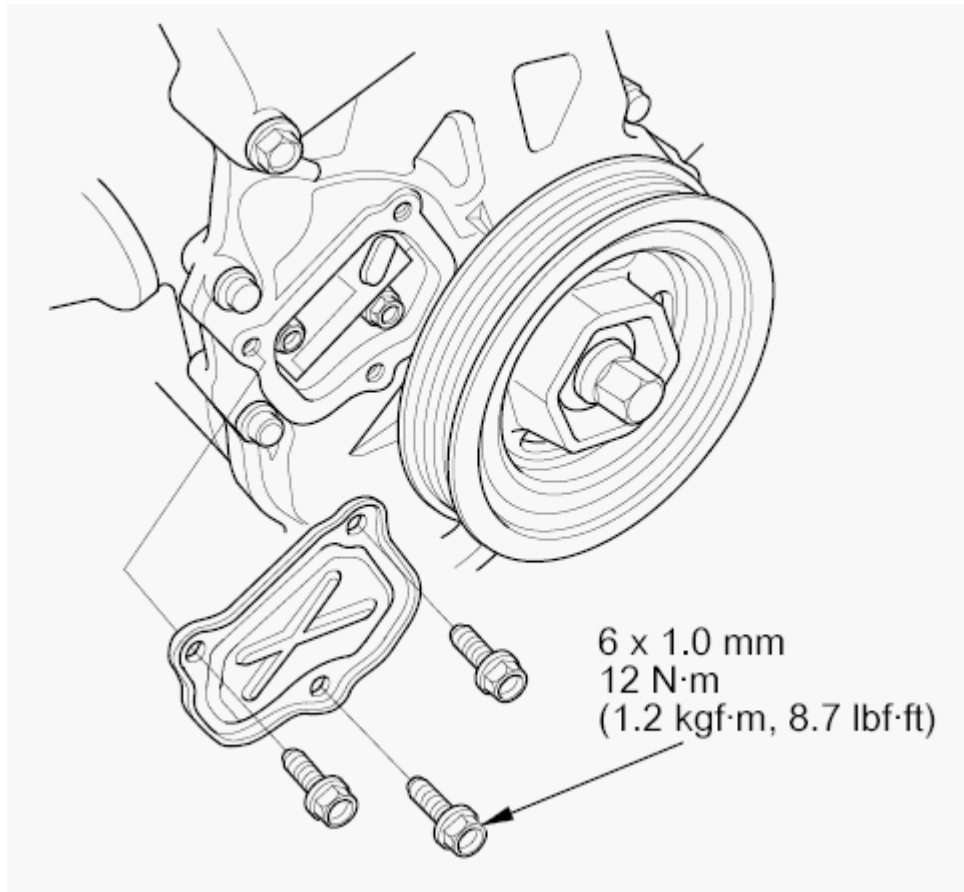


Fig. 98: Chain Case Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Adjust the valve clearance **Valve Clearance Adjustment**.
29. Install the cylinder head cover **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.
 - If warpage is less than 0.05 mm (0.002 in) cylinder head resurfacing is not required.
 - If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface the cylinder head.
 - The maximum resurface limit is 0.2 mm (0.008 in) based on a height of 104 mm (4.09 in).

Cylinder Head Height

Standard (New): 103.95-104.05 mm (4.093-4.096 in)

Service Limit: 103.8 mm (4.09 in)

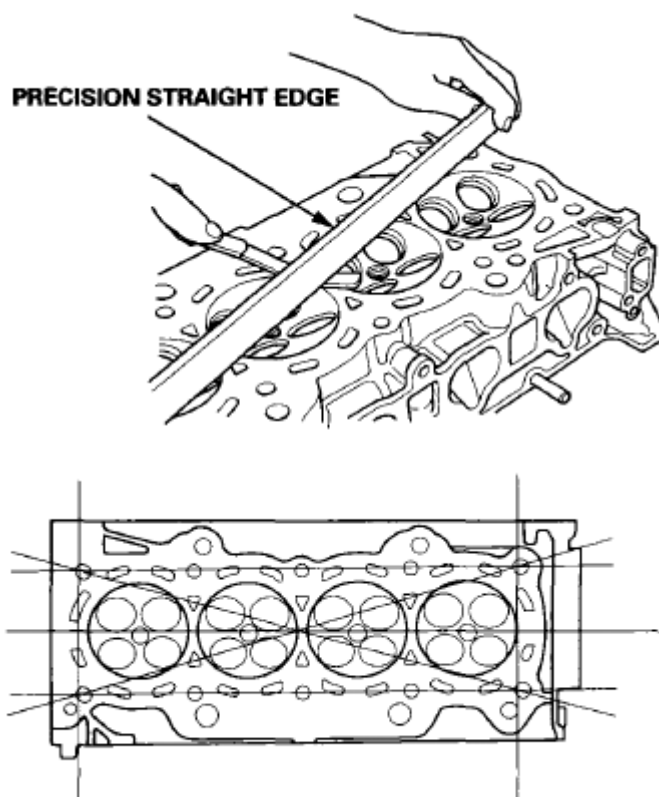


Fig. 99: Inspecting Cylinder Head Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

1. Remove the cam chain (see [CAM CHAIN REMOVAL](#)).
2. Loosen the rocker arm adjusting screws (A).

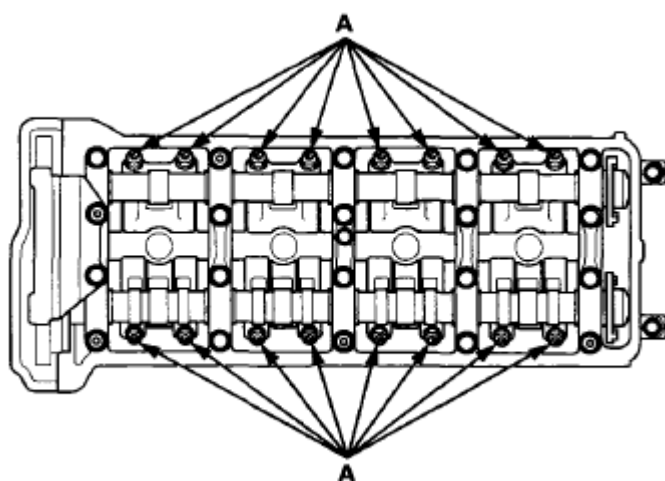


Fig. 100: Identifying Rocker Arm Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft holder bolts. To prevent damaging the camshafts, loosen the bolts, in sequence, two turns at a time.

NOTE: Bolt 1 is not on all engines.

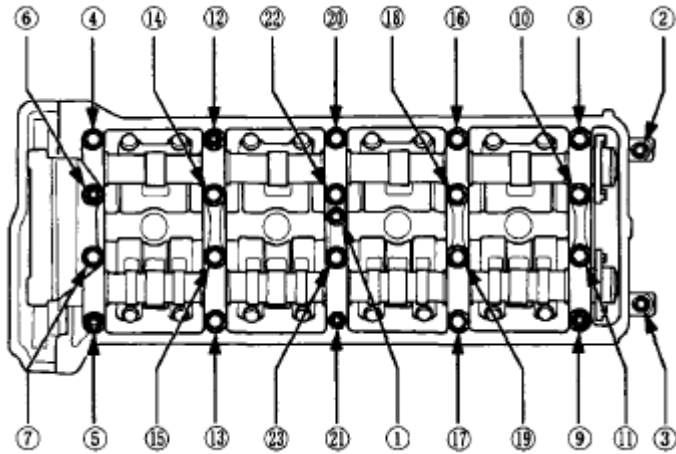


Fig. 101: Identifying Camshaft Holder Bolts Remove Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove cam chain guide B (A), the camshaft holders (B), and the camshafts (C).

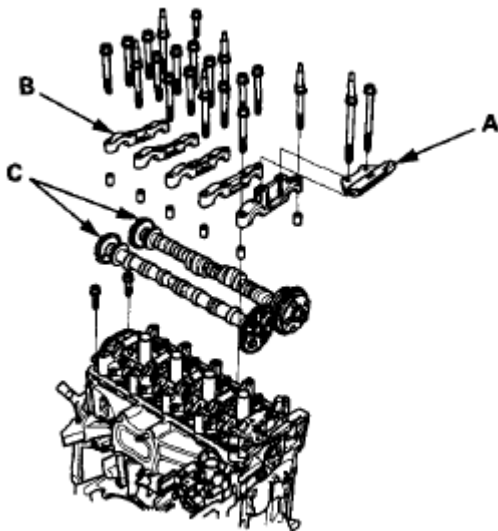


Fig. 102: Identifying Cam Chain Guide, Camshaft Holders And Camshafts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Insert the bolts (A) into the rocker shaft holder, then remove the rocker arm assembly (B).

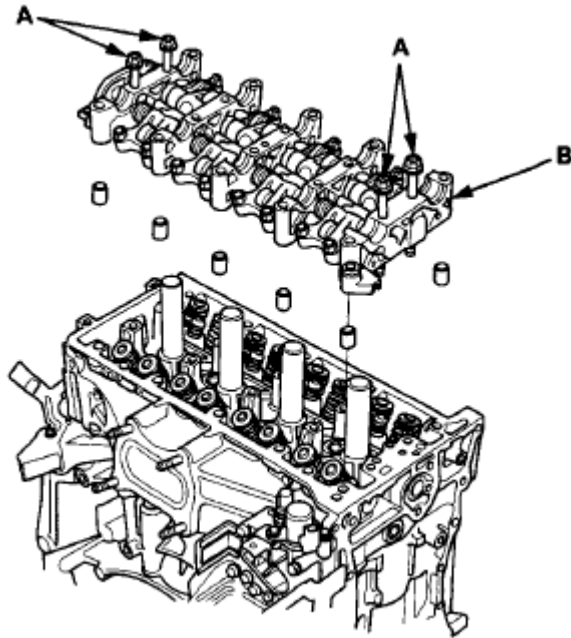


Fig. 103: Identifying Rocker Arm Assembly And Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original locations.
- Inspect the rocker arm shaft and rocker arms (see ROCKER ARM AND SHAFT INSPECTION).
- If reused, the rocker arms must be installed in the original locations.
- When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points.
- Bundle the intake rocker arms with rubber bands to keep them together as a set.
- When replacing the intake rocker arm assembly, remove the fastening hardware from the new intake rocker arm assembly.

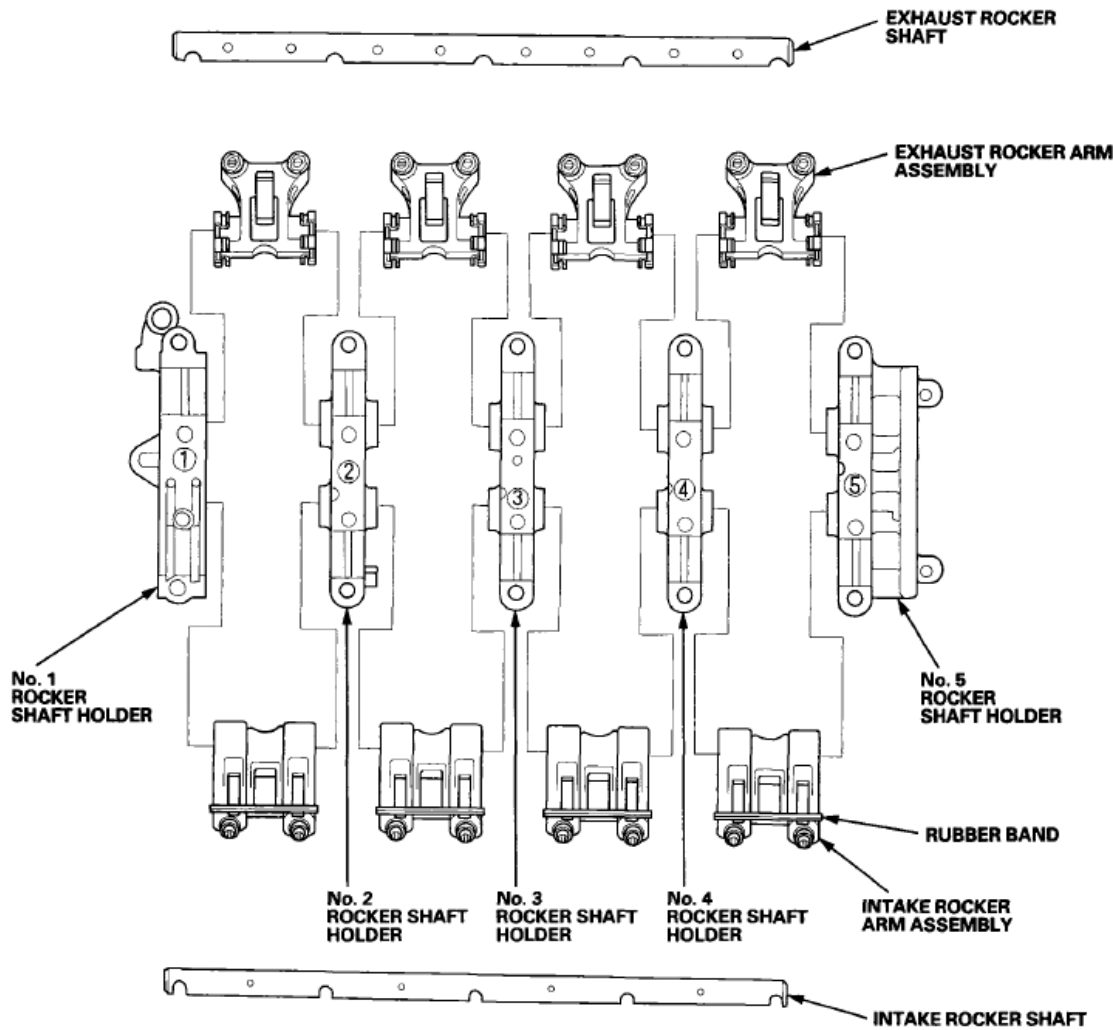


Fig. 104: Identifying Rocker Arm And Shaft Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

1. Remove the rocker arm assembly (see CYLINDER HEAD INSPECTION FOR WARPAGE).
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.

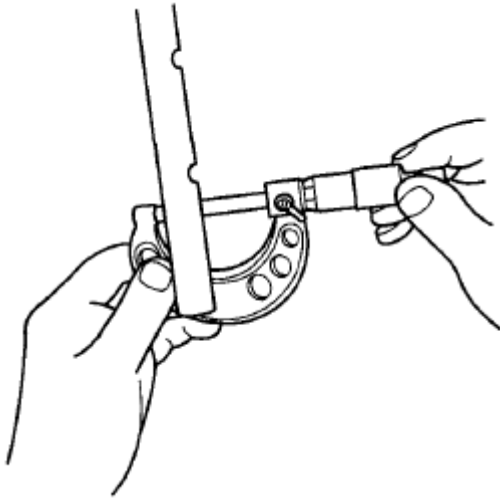


Fig. 105: Measuring Diameter Of Shaft At First Rocker
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

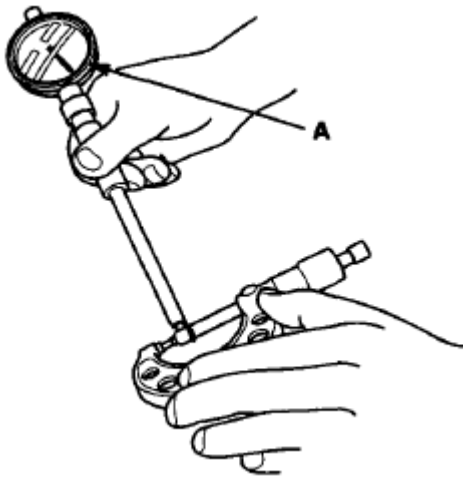


Fig. 106: Measuring Shaft Diameter Using Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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):

Intake: 0.018-0.059 mm

(0.0007-0.0023 in)

Exhaust: 0.018-0.056 mm

(0.0007-0.0022 in)

Service Limit: 0.08 mm (0.003 in)

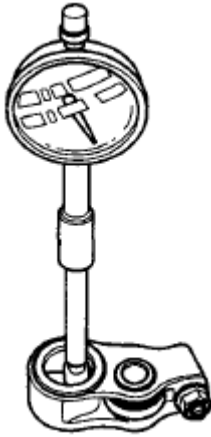


Fig. 107: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rocker arms and both shafts. 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 (primary, mid, and secondary), as a set.
7. Inspect the rocker arm pistons (A). Push on each piston manually. If it does not move smoothly, replace the rocker arm set.

NOTE: Apply new engine oil to the rocker arm pistons when reassembling.

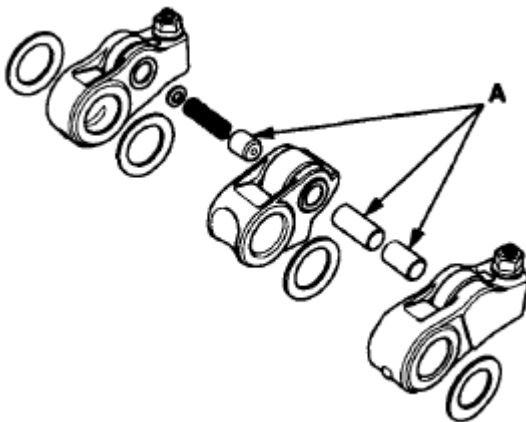


Fig. 108: Identifying Rocker Arm Pistons
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).

CAMSHAFT INSPECTION

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see CYLINDER HEAD INSPECTION FOR WARPAGE).
2. Put the rocker shaft holders, camshaft, and camshaft holders on the cylinder head, then tighten the bolts, in sequence, to the specified torque.

NOTE: If the engine does not have bolt (21), skip it and continue the torque sequence.

Specified Torque

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

6 x 1.0 mm 12 N.m (1.2 kgf.m, 8.7 lbf.ft)

6 x 1.0 mm Bolts: (21),(22),(23)

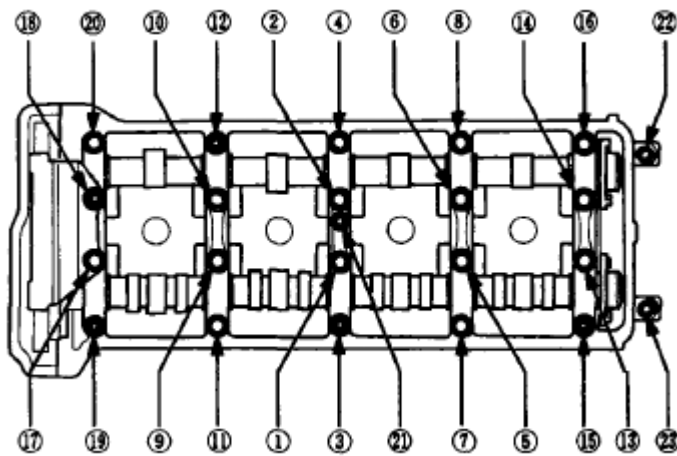


Fig. 109: Identifying Cylinder Head Bolts Tighten Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth, and read the end play. If the end play is beyond the service limit, replace the cylinder head and recheck. If it is still beyond the service limit, replace the camshaft.

Camshaft End Play

Standard (New): 0.05-0.20 mm (0.002-0.008 in)

Service Limit: 0.4 mm (0.02 in)

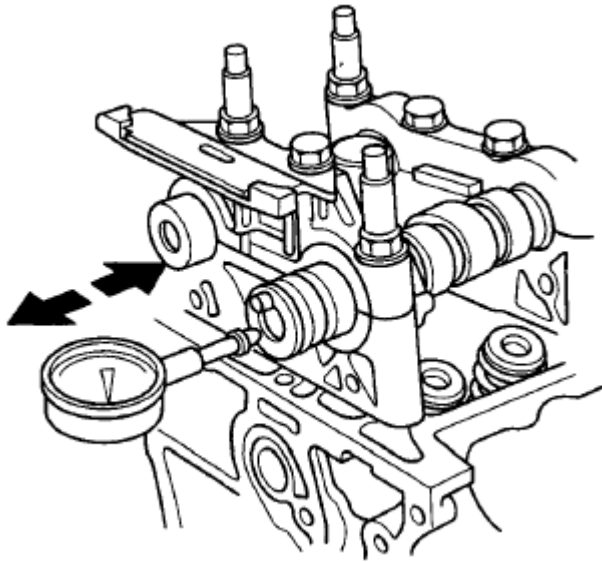


Fig. 110: Measuring Camshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Loosen the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
6. Lift the camshafts out of the cylinder head, and wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft journal surfaces in the cylinder head, then set the camshafts back in place. Place a plastigage strip across each journal.
8. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 2.
9. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.
 - If the camshaft-to-holder clearance is within the service limits, go to step 11.
 - 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 10.

Camshaft-to-Holder Oil Clearance

Standard (New):

No. 1 Journal: 0.030-0.069 mm (0.0012-0.0027 in)

No. 2, 3, 4, 5 Journals: 0.060-0.099 mm (0.0024-0.0039 in)

Service Limit: 0.15 mm (0.006 in)

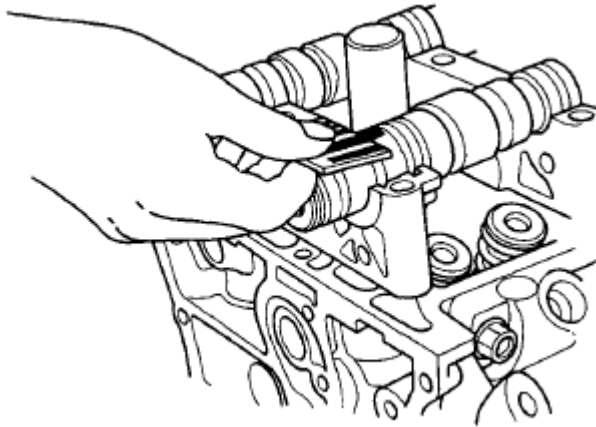


Fig. 111: Measuring Widest Portion Of Plastigage On Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. 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 camshaft-to-holder oil clearance. If the oil clearance is still out of tolerance, replace the cylinder head.

Camshaft Total Runout

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)

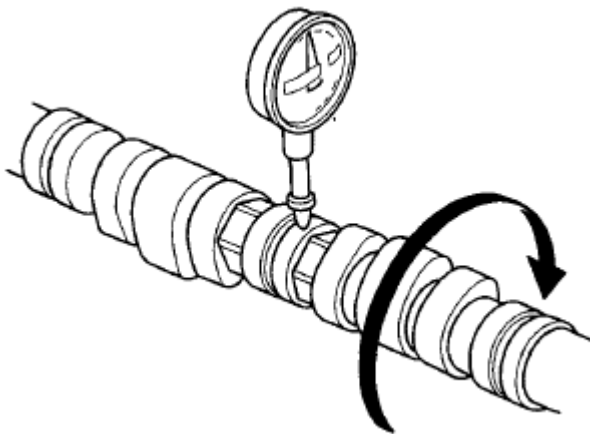


Fig. 112: Checking Total Runout With Camshaft Supported On V-blocks
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Measure the cam lobe height.

Cam Lobe Height Standard (New):

CAM LOBE HEIGHT SPECIFICATIONS

	INTAKE	EXHAUST
PRI	33.744 mm (1.3285 in)	34.291 mm (1.3500 in)
MID	35.456 mm (1.3959 in)	
SEC	33.744 mm (1.3285 in)	

PRI: Primary

MID: Mid

SEC: Secondary

C/C: Cam Chain

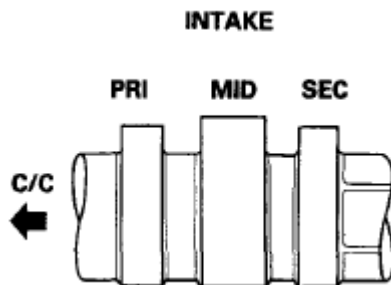


Fig. 113: [Identifying Cam Lobe]

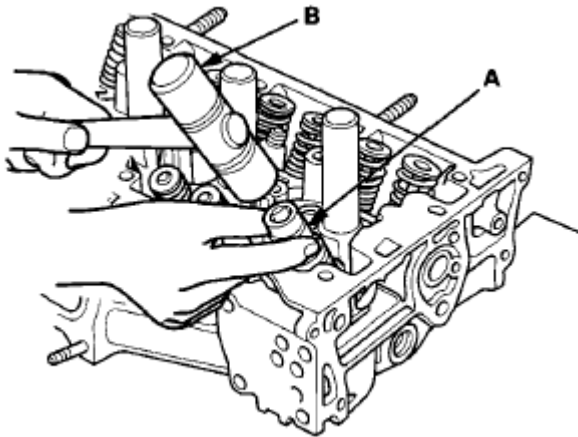
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL**Special Tools Required**

Valve Spring Compressor Attachment 07757-PJ1010A

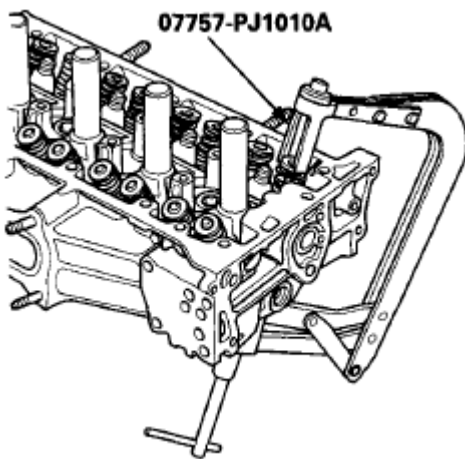
Identify the valves and the valve springs as they are removed so that each item can be reinstalled in its original position.

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arm assembly (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
3. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the spring retainer to loosen the valve cotters.

**Fig. 114: Loosening Valve Cotteners**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the valve spring compressor attachment and the valve spring compressor. Compress the spring, and remove the valve cotteners.

**Fig. 115: Installing Valve Spring Using Valve Spring Compressor**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

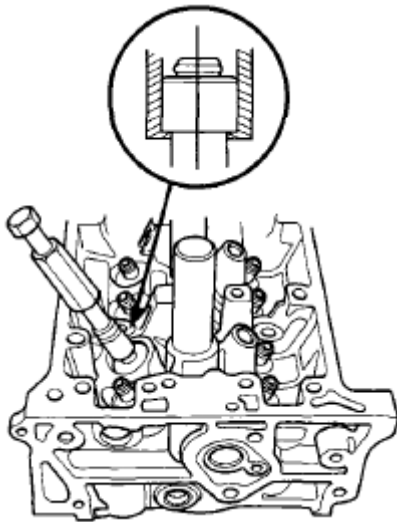


Fig. 116: Identifying Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve seal.

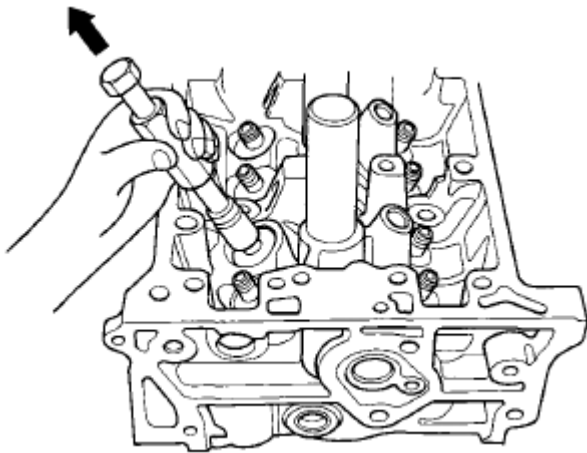


Fig. 117: Removing Valve Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. 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): 35.85-36.15 mm (1.411-1.423 in)

B Standard (New): 108.5-109.1 mm (4.272-4.295 in)

C Standard (New): 5.475-5.485 mm (0.2156-0.2159 in)

C Service Limit: 5.445 mm (0.2144 in)

Exhaust Valve Dimensions

A Standard (New): 30.85-31.15 mm (1.215-1.226 in)

B Standard (New): 108.4-109.0 mm (4.268-4.291 in)

C Standard (New): 5.450-5.460 mm (0.2146-0.2150 in)

C Service Limit: 5.42 mm (0.213 in)

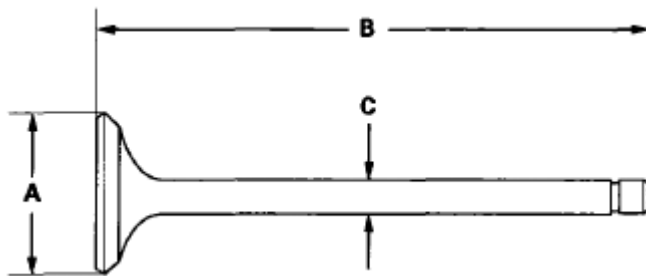


Fig. 118: Identifying Valve Dimension

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. Slide the valve out of its guide about 10 mm (0.39 in), then measure the stem-to-guide clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).
 - If the measurement exceeds the service limit, recheck it using a new valve.
 - If the measurement is now within the service limit, reassemble using a new valve.
 - If the measurement with a new valve still exceeds the service limit, go to step 3.

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.06-0.11 mm (0.002-0.004 in)

Service Limit: 0.16 mm (0.006 in)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.11-0.16 mm (0.004-0.006 in)

Service Limit: 0.22 mm (0.009 in)



Fig. 119: Measuring Stem-To-Guide Clearance With Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 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): 0.030-0.055 mm (0.0012-0.0022 in)

Service Limit: 0.08 mm (0.003 in)

Exhaust Valve Stem-to-Guide

Clearance

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

Service Limit: 0.11 mm (0.004 in)

VALVE GUIDE REPLACEMENT

Special Tools Required

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

1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver, 5.5 mm and a conventional hammer.

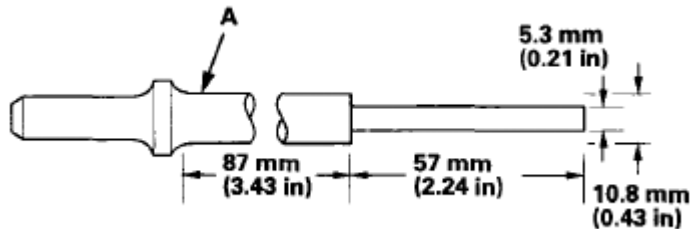


Fig. 120: Identifying Valve Guide Dimension

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.

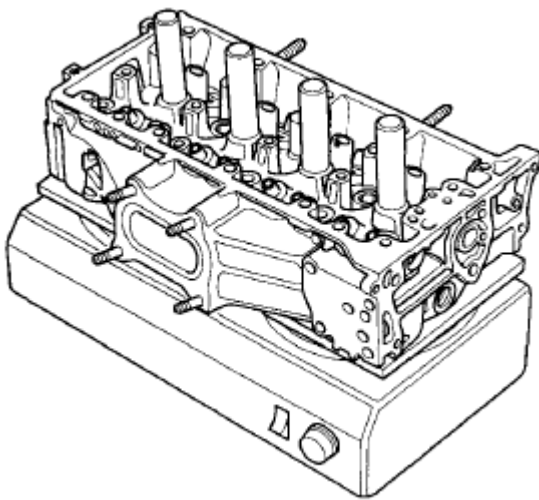


Fig. 121: Heating Cylinder Head

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm (0.1 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.
6. Turn the head over, and drive the guide out toward the camshaft side of the head.

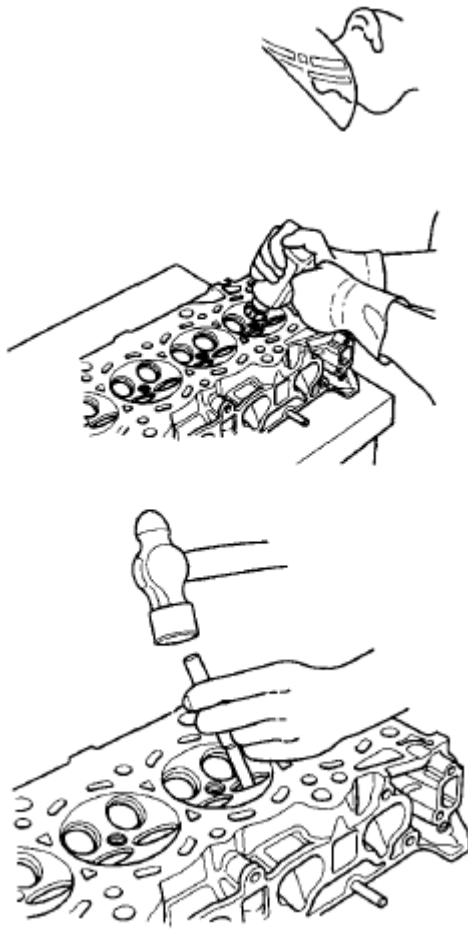


Fig. 122: Inspecting Valve Guide

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE: **Drill out the 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

Intake: 15.2-16.2 mm (0.60-0.64 in)

Exhaust: 15.5-16.5 mm (0.61 -0.65 in)

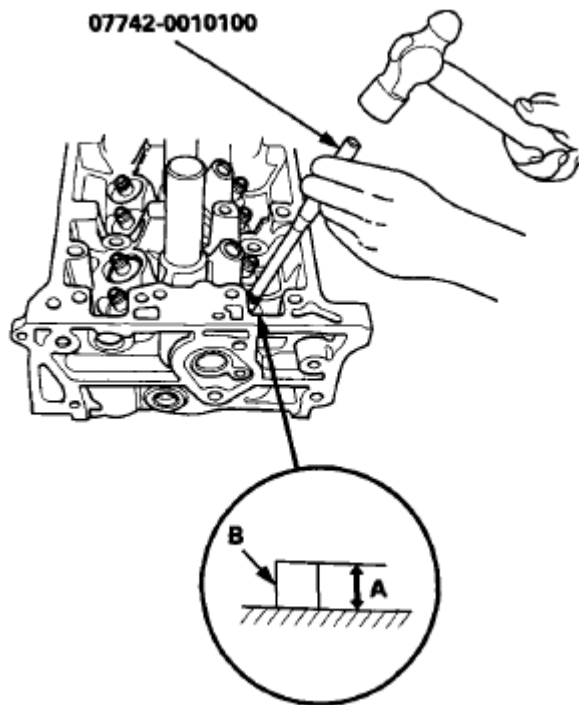


Fig. 123: Identifying Valve Guide Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Coat both the valve guide reamer, 5.5 mm and the valve guide with cutting oil.
11. Rotate the reamer clockwise to the full length of the valve guide bore.

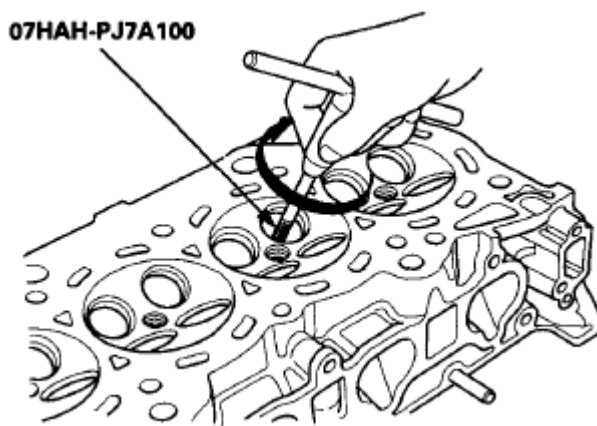


Fig. 124: Rotating Reamer Clockwise To Full Length Of Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer 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 into the intake and exhaust valve guides without sticking.

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

VALVE SEAT RECONDITIONING

1. Inspect the valve stem-to-guide clearance (see **VALVE 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.

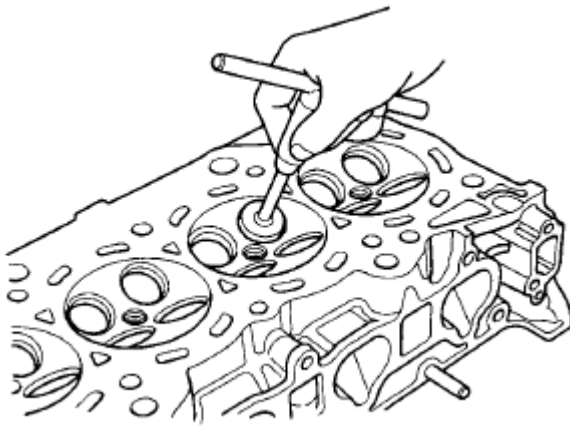


Fig. 125: Inspecting Valve Seat

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.

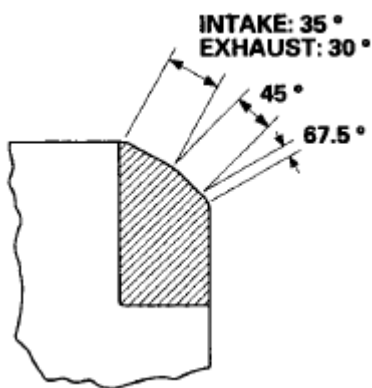


Fig. 126: Identifying Bevel Upper/Lower Edges Angles

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**Standard (New): 1.25-1.55 mm (0.049-0.061 in)****Service Limit: 2.00 mm (0.079 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.

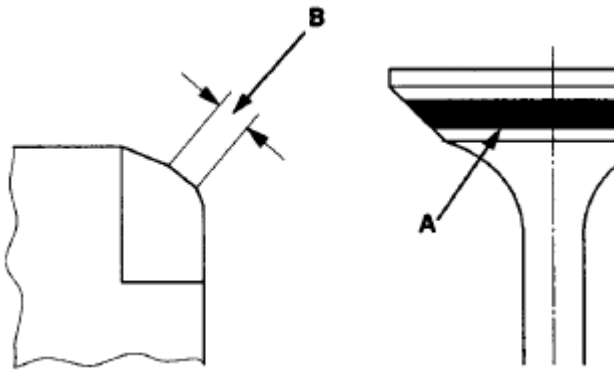


Fig. 127: Identifying Actual Valve Seating Surface
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 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 35 ° cutter (intake side) or the 30 ° cutter (exhaust side) 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 the valve stem installed height (A).

Intake Valve Stem Installed Height**Standard (New): 44.0-44.5 mm (1.73-1.75 in)****Service Limit: 44.7 mm (1.76 in)****Exhaust Valve Stem Installed Height****Standard (New): 44.0-44.5 mm (1.73-1.75 in)****Service Limit: 44.7 mm (1.76 in)**

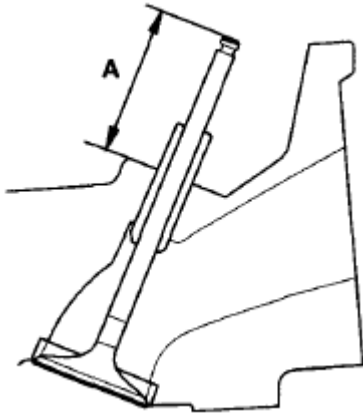


Fig. 128: Identifying Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If valve stem installed height is beyond the service limit, replace the valve and recheck. If it is still beyond 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, 30 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 spring (F). They are not interchangeable.

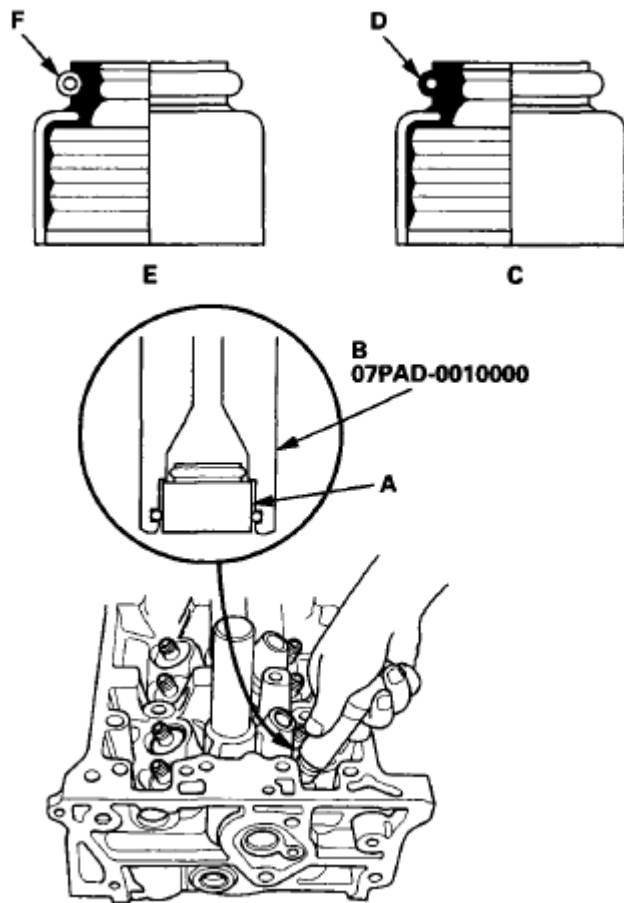


Fig. 129: Installing Spring Seats On Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

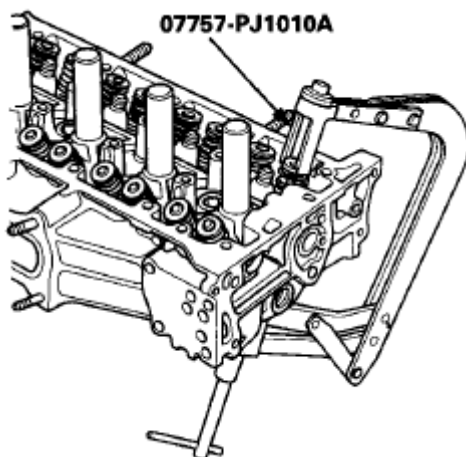


Fig. 130: Installing Valve Spring Using Valve Spring Compressor
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring compressor and the valve spring compressor attachment.
8. 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.

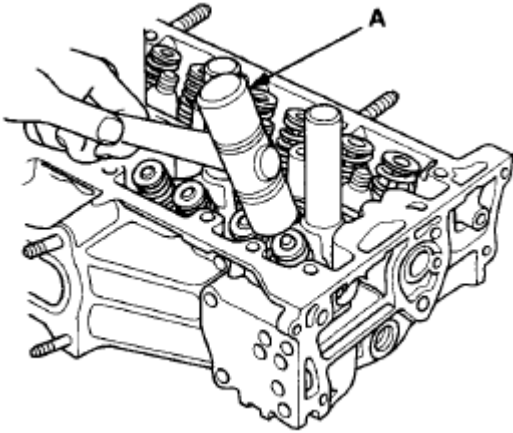


Fig. 131: Tapping Valve Stem
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY INSTALLATION

1. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 3 mm (0.12 in) 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.

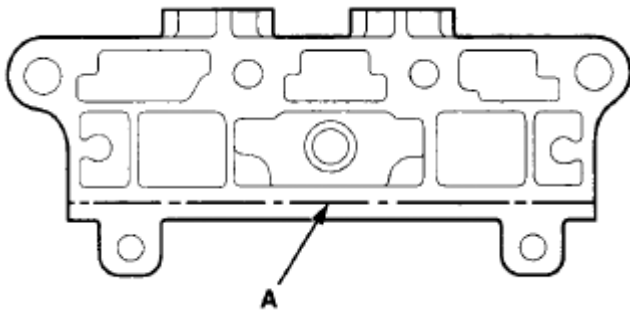


Fig. 132: Identifying Rocker Arm Broken Line Area
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.

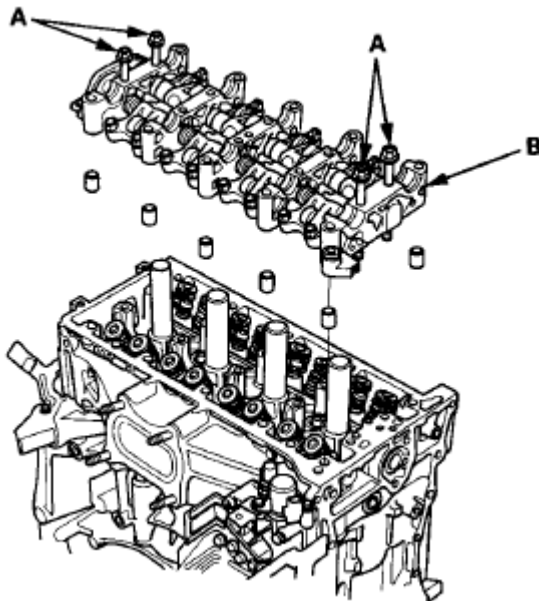


Fig. 133: Identifying Rocker Arm Assembly And Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the bolts from the rocker shaft holder.
6. Make sure the punch marks on the variable valve timing control (VTC) actuator and the exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder. Apply new engine oil to the camshaft journals and lobes.

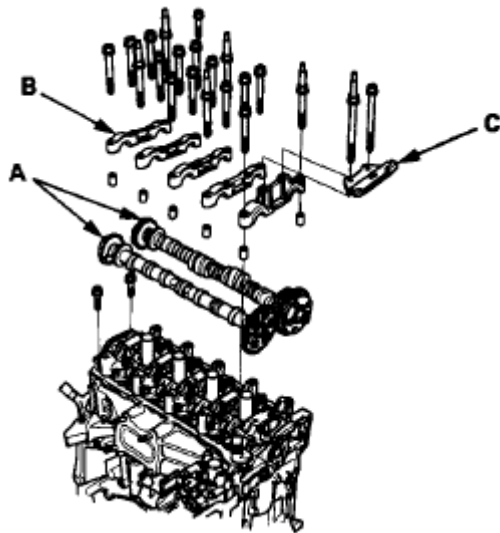


Fig. 134: Identifying Rocker Arm Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the camshaft holders (B) and the cam chain guide B (C) in place.
8. Tighten the bolts to the specified torque.

NOTE: If the engine does not have bolt ©, skip it and continue the torque sequence.

Specified Torque

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

6 x 1.0 mm 12 N.m (1.2 kgf.m, 8.7 lbf.ft)

6 x 1.0 mm Bolts: (21),(22) ,(23)

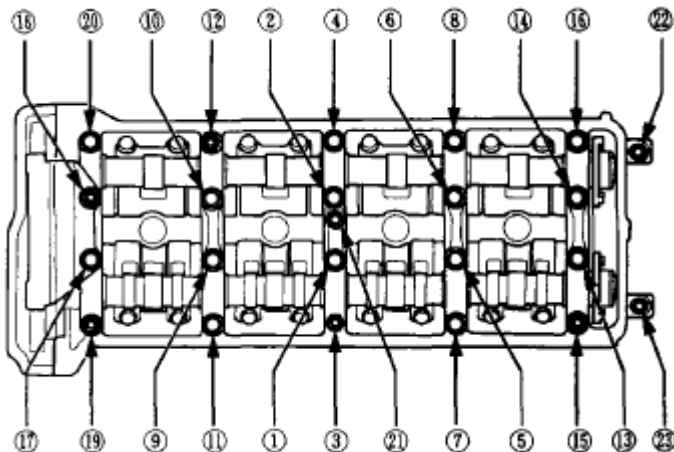


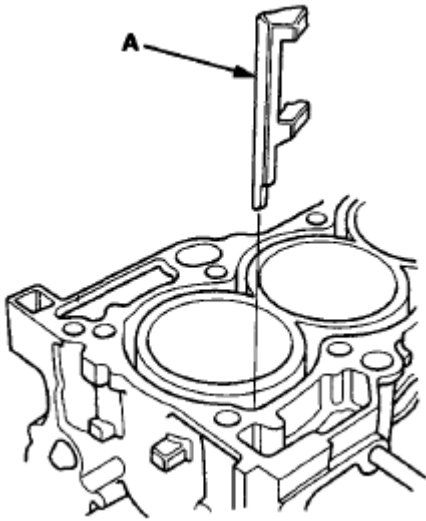
Fig. 135: Identifying Cylinder Head Bolts Tighten Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the cam chain (see **CAM CHAIN INSTALLATION**), then adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

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. 136: Identifying Coolant Separator**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the new cylinder head gasket (A) and the dowel pins (B) on the engine block. Always use a new cylinder head gasket.

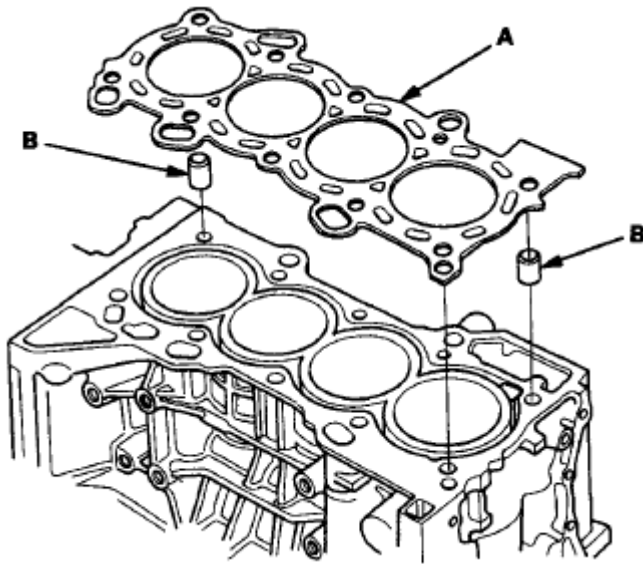


Fig. 137: Identifying Cylinder Head Gasket And Dowel Pins
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

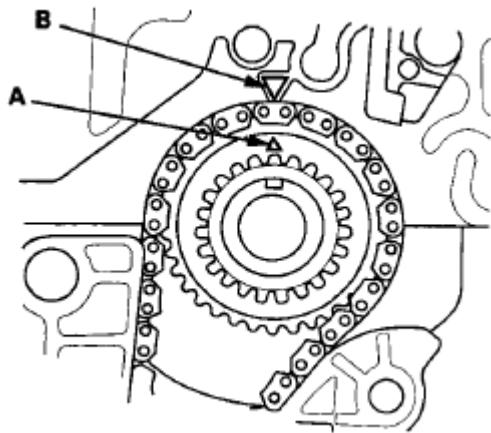


Fig. 138: Identifying TDC Mark On Crankshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cylinder head on the engine block.
6. Measure the diameter of each cylinder head bolt at point A and point B.

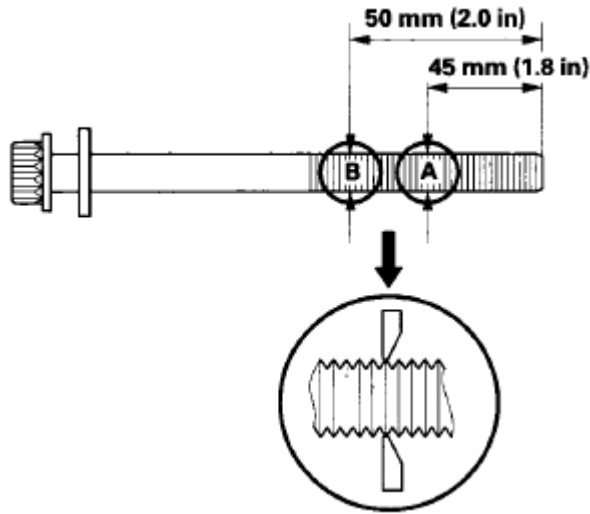


Fig. 139: Identifying Cylinder Head Bolt Dimension
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If either diameter is less than 10.6 mm (0.42 in), replace the cylinder head bolt.
8. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
9. Tighten the cylinder head bolts in sequence to 39 N.m (4.0 kgf.m, 29 lbf.ft). Use a beam-type torque wrench. 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.

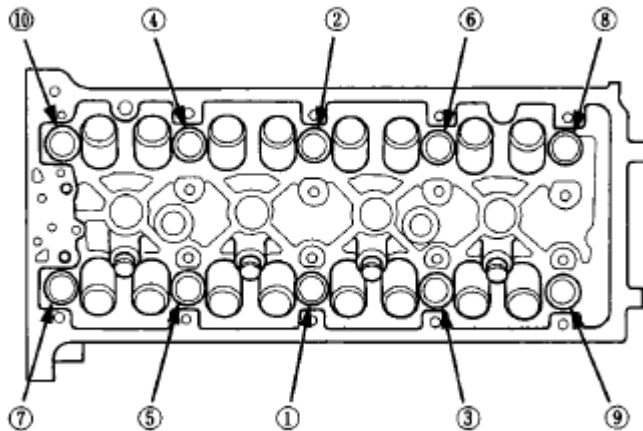


Fig. 140: Identifying Cylinder Head Bolts Tighten Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. After torquing, tighten all cylinder head bolts in two steps (90 ° per step) using the sequence shown in step 9. If you are using a new cylinder head bolt, tighten the bolt an extra 90 °.

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 6 of the procedure. Do not loosen it back to the specified angle.

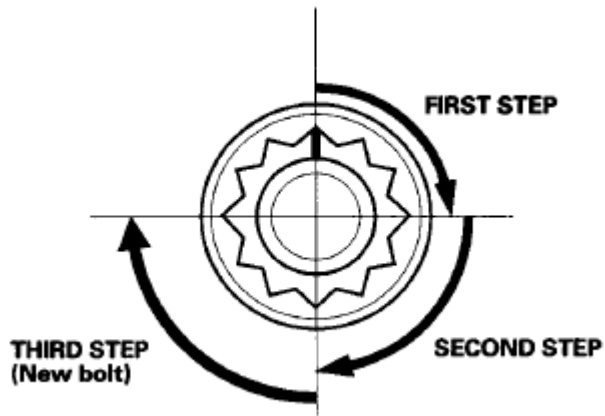


Fig. 141: Tightening Cylinder Head Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).
12. Install the cam chain (see **CAM CHAIN INSTALLATION**).
13. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor A (Intake) connector
 - Camshaft position (CMP) sensor B (Exhaust) connector
 - Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Evaporative emission (EVAP) canister purge valve connector
 - Variable valve timing control (VTC) oil control solenoid valve connector
 - Engine oil pressure switch connector
14. Install the two bolts (A) securing the connecting pipe.

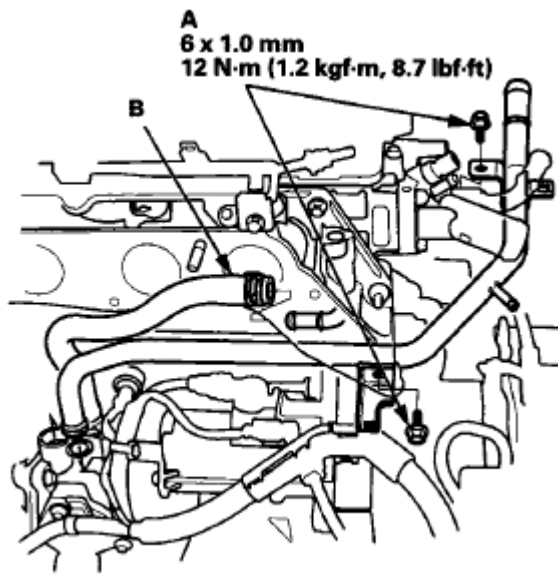


Fig. 142: Identifying Water Bypass Hose And Bolts With Torque Specification
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Connect the water bypass hose (B).
16. Connect the upper radiator hose (A), the heater hoses (B), and the water bypass hose (C).

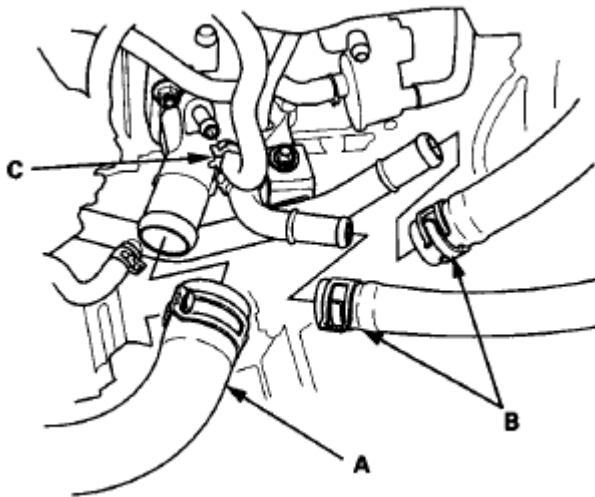


Fig. 143: Identifying Upper Radiator Hose, Heater Hoses And Water Bypass Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the four bolts securing the EVAP canister purge valve bracket.

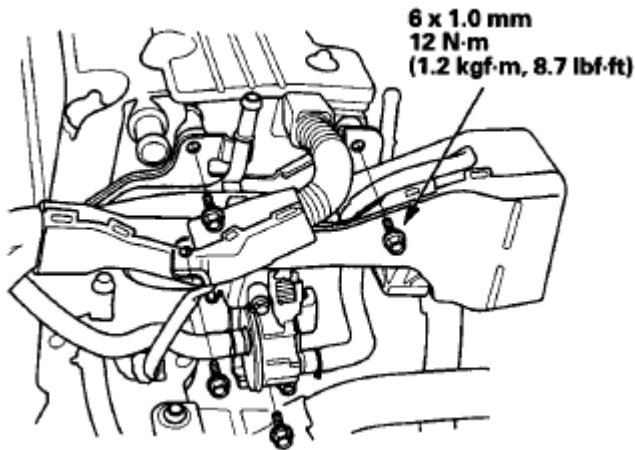


Fig. 144: Identifying EVAP Canister Purge Valve Bracket And Bolts With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Connect the four fuel injector connectors (A), install the ground cables (B).

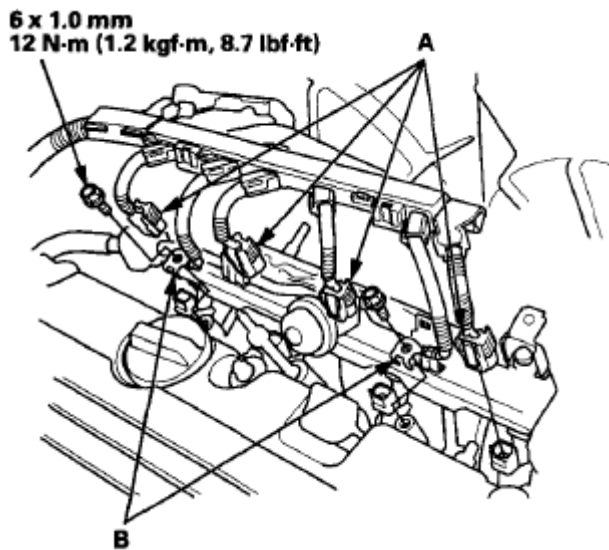


Fig. 145: Identifying Fuel Injector Connectors And Ground Cables With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Connect the fuel feed hose (A) (see FUEL LINE/QUICK-CONNECT FITTING INSTALLATION), then install the quick-connect fitting cover (B).

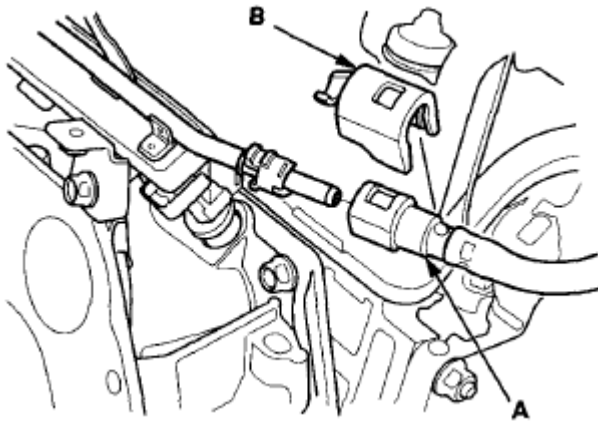


Fig. 146: Identifying Fuel Feed Hose And Quick-Connect Fitting Cover
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Connect the EVAP canister hose (A).

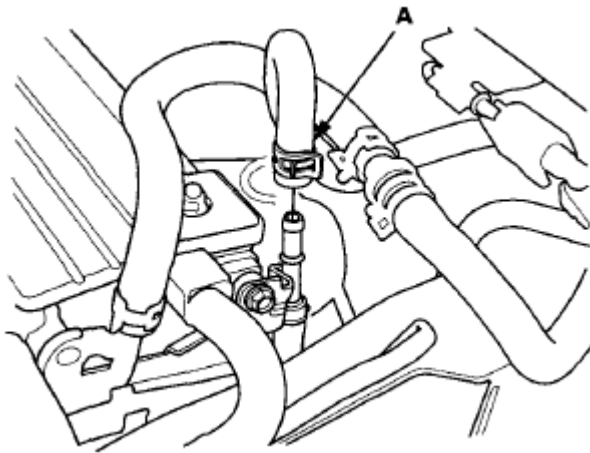


Fig. 147: Identifying EVAP Canister Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the warm up TWC (see **WARM UP TWC REMOVAL/INSTALLATION**).
22. Install the intake manifold (see **INTAKE MANIFOLD REMOVAL AND INSTALLATION**).
23. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
24. After installation, check that all tubes, hoses, and connectors are installed correctly.
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 CHECK**).
27. Do the powertrain control module (PCM) idle lean procedure (see **PCM IDLE LEARN PROCEDURE**).

28. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).
29. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
30. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).

SEALING BOLT INSTALLATION

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

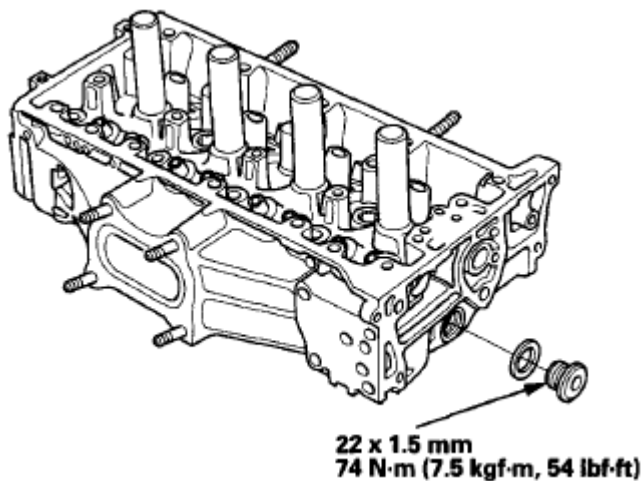


Fig. 148: Identifying Cylinder Head Sealing Bolt With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2011 Honda CR-V EX

2007-11 ENGINE Engine Block (K24Z6) - CR-V

2007-11 ENGINE

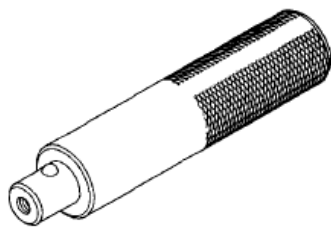
Engine Block (K24Z6) - CR-V

SPECIAL TOOLS

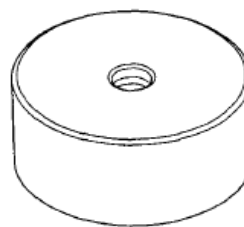
Ref.No.	Tool Number	Description	Qty
①	07746-0010700	Attachment, 24 x 26 mm	1
②	07749-0010000	Driver Handle, 15 x 135L	1
③	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1



①



②



③

Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

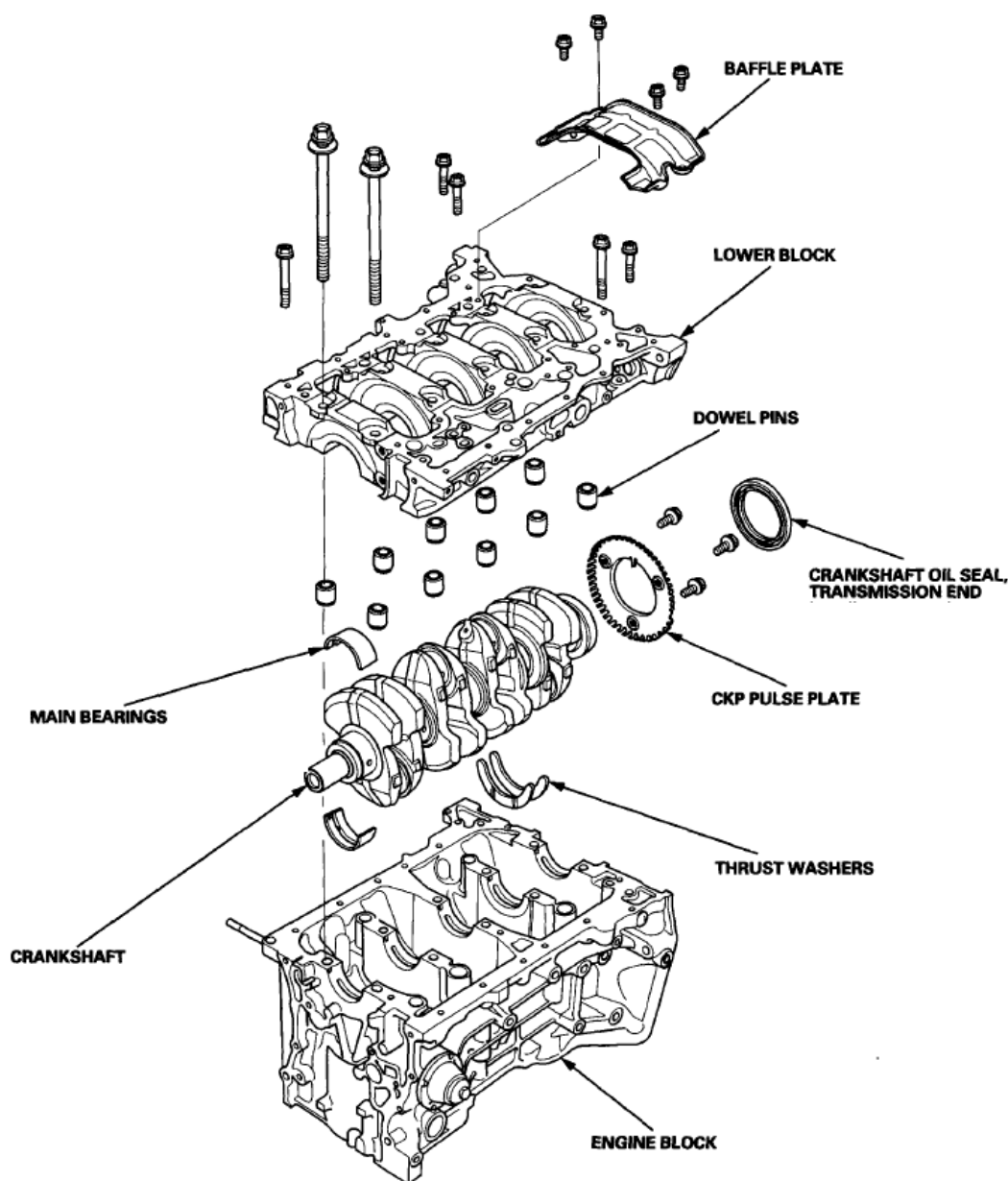


Fig. 2: Identifying Engine Block Component Location (1 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

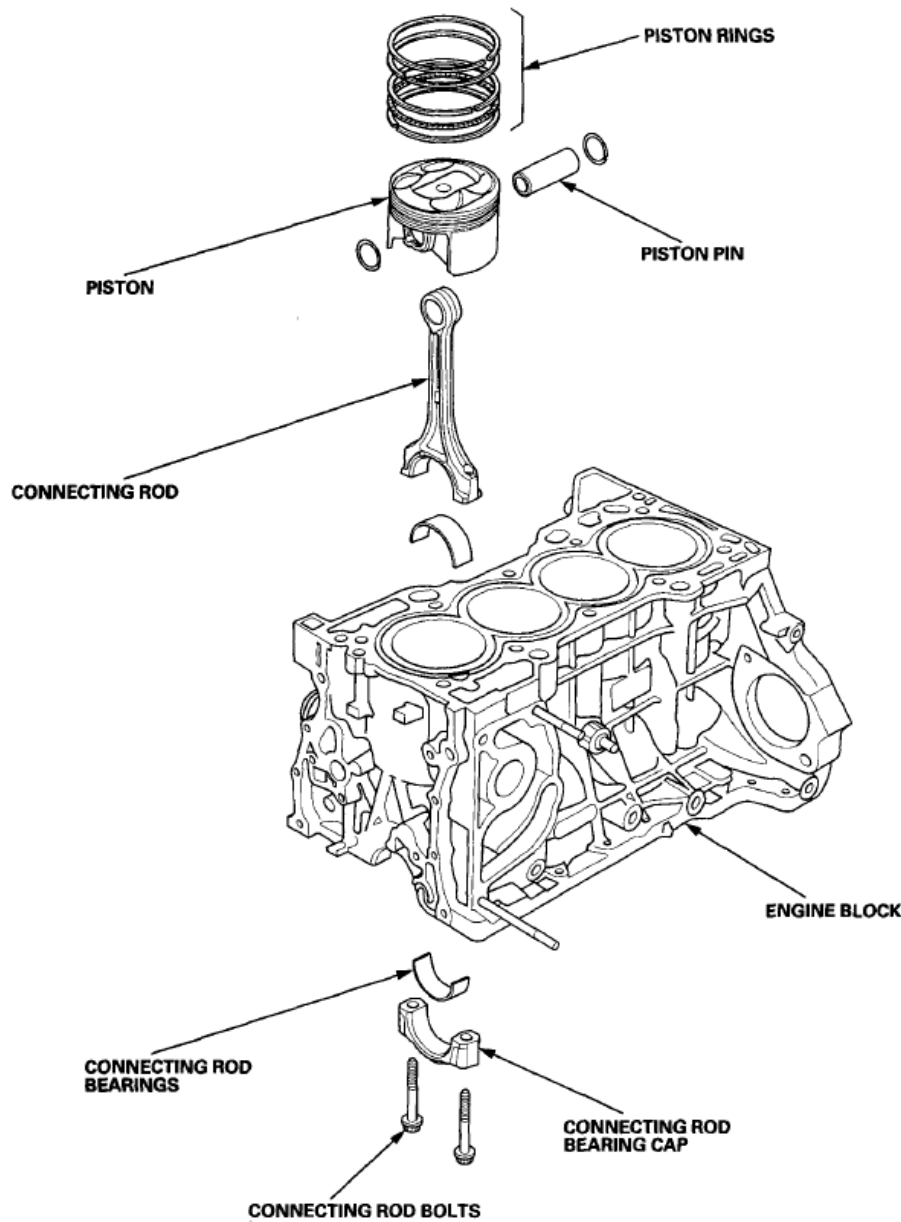


Fig. 3: Identifying Engine Block Component Location (2 Of 2)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see **OIL PUMP OVERHAUL**).
2. Remove the baffle plate (see step 7).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and the crankshaft.

Connecting Rod End Play

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

Service Limit: 0.40 mm (0.016 in)

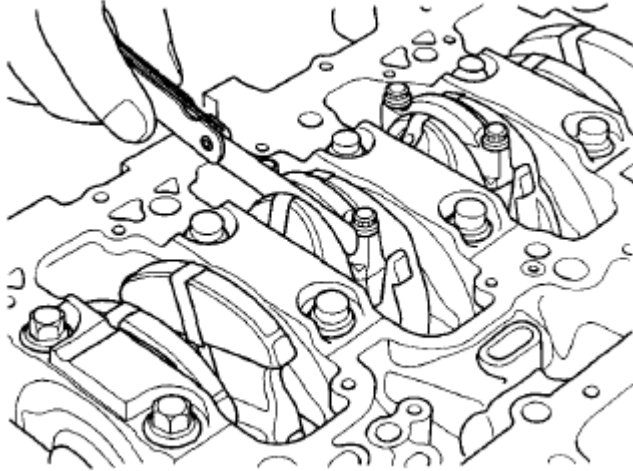


Fig. 4: Measuring Connecting Rod End Play With Feeler Gauge Between Connecting Rod And Crankshaft

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Crankshaft End Play

Standard (New): 0.10-0.35 mm (0.004-0.014 in)

Service Limit: 0.45 mm (0.018 in)

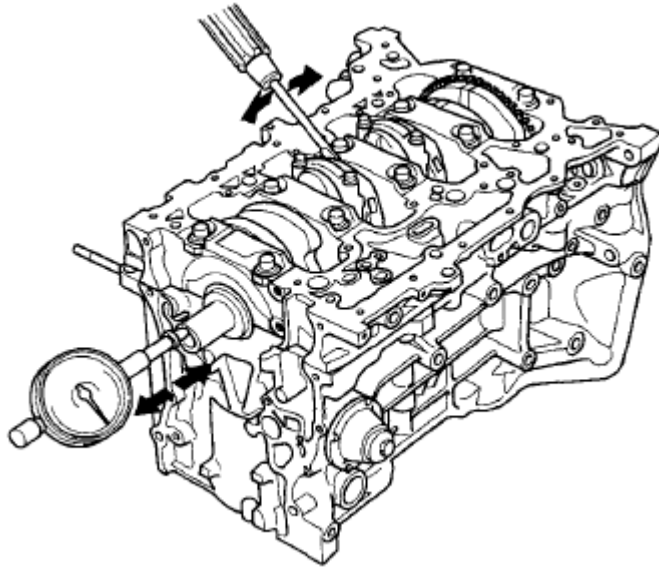


Fig. 5: Measuring Crankshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the end play is beyond 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. To check the main bearing-to-journal oil clearance, remove the lower block and the bearing halves (see CRANKSHAFT AND PISTON REMOVAL).
2. Clean each main journal and the bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and the lower block, then tighten the bolts to 29 N.m (3.0 kgf.m, 22 lbf.ft).

NOTE:

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

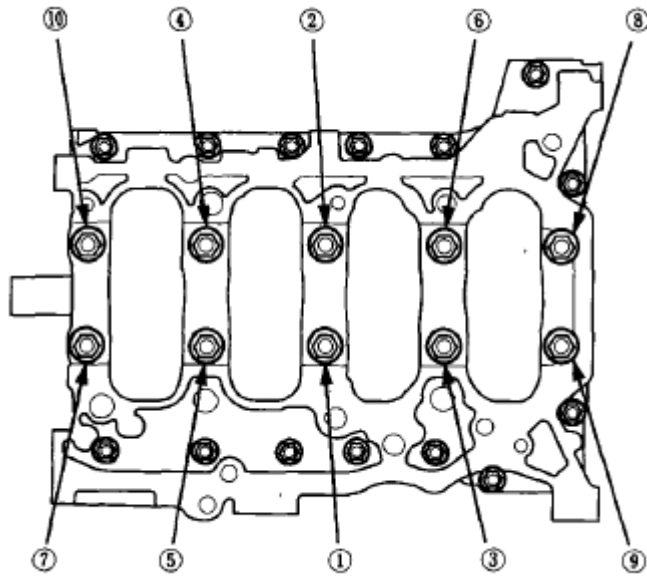


Fig. 6: Identifying Bearing Cap Bolts Tighten Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Tighten the bearing cap bolts an additional 48°.
6. Remove the lower block and the bearings again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

No. 1, 2, 4, 5 Journals:

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

Service Limit: 0.050 mm (0.0020 in)

No. 3 Journal:

Standard (New): 0.025-0.049 mm (0.0010-0.0019 in)

Service Limit: 0.055 mm (0.0022 in)

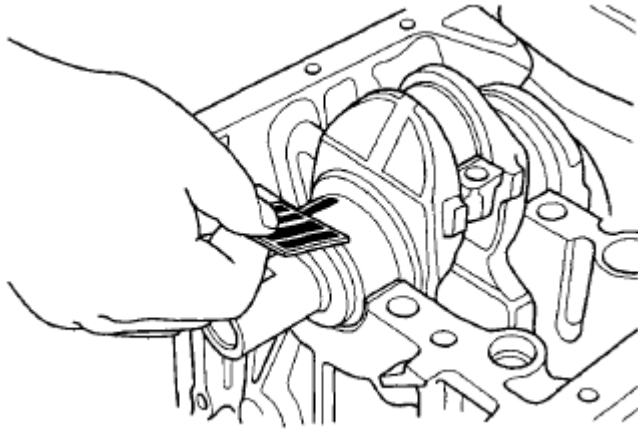


Fig. 7: Measuring Widest Part Of Plastigage

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

MAIN BEARING SELECTION

Crankshaft Bore Code Location

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

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

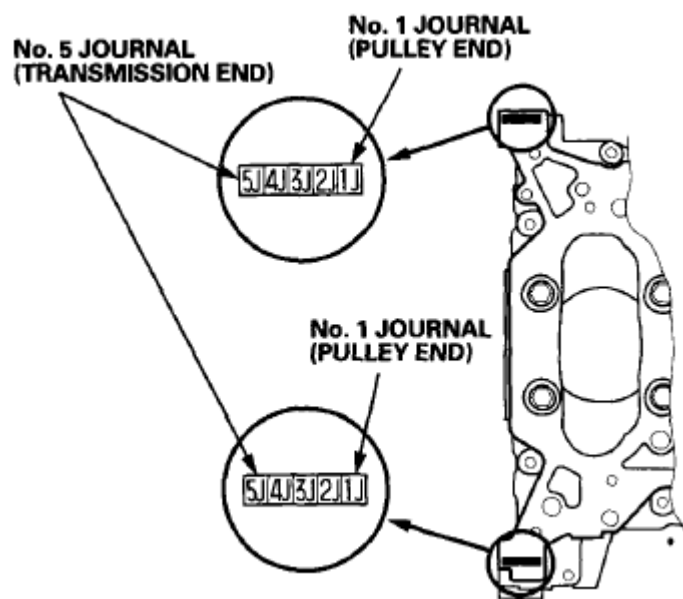


Fig. 8: Identifying Crankshaft Bore Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

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

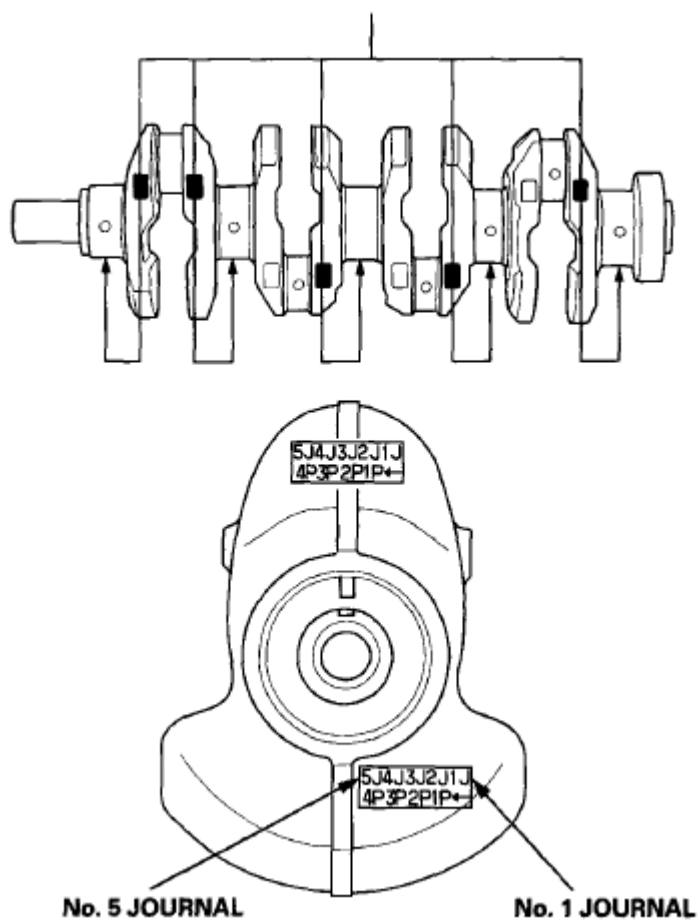


Fig. 9: Identifying Main Journal Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Use the crank bore codes and crank journal codes to select the appropriate replacement bearings from the following table.

Bearing Identification

Color code is on the edge of the bearing

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

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

Fig. 10: Bearing Color Code Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

CONNECTING ROD BEARING CLEARANCE INSPECTION

1. Remove the oil pump (see **OIL PUMP REMOVAL**).
2. Remove the baffle plate (see step 7).
3. Remove the connecting rod cap and the bearing half.
4. Clean the crankshaft rod journal and the bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and the cap, and tighten the bolts to 41 N.m (4.2 kgf.m, 30 lbf.ft) +120 °

NOTE:

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

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

Connecting Rod Bearing-to-Journal Oil Clearance

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

Service Limit: 0.077 mm (0.0030 in)

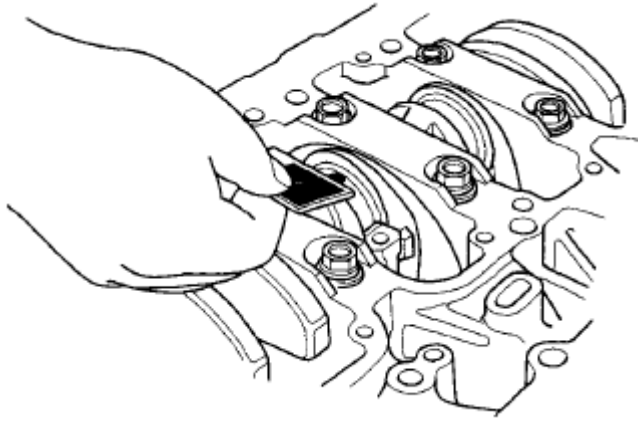


Fig. 11: Measuring Widest Part Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CONNECTING ROD BEARING SELECTION

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

Connecting Rod Big End Bore Code Locations

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

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

Normal Bore Size: 51.0 mm (2.01 in)

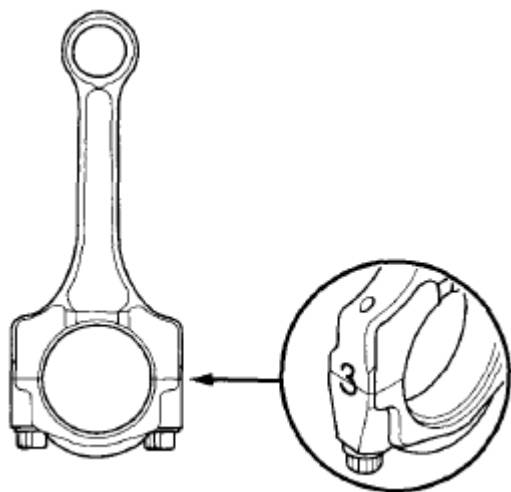


Fig. 12: Identifying Connecting Rod Big End Bore Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Location

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

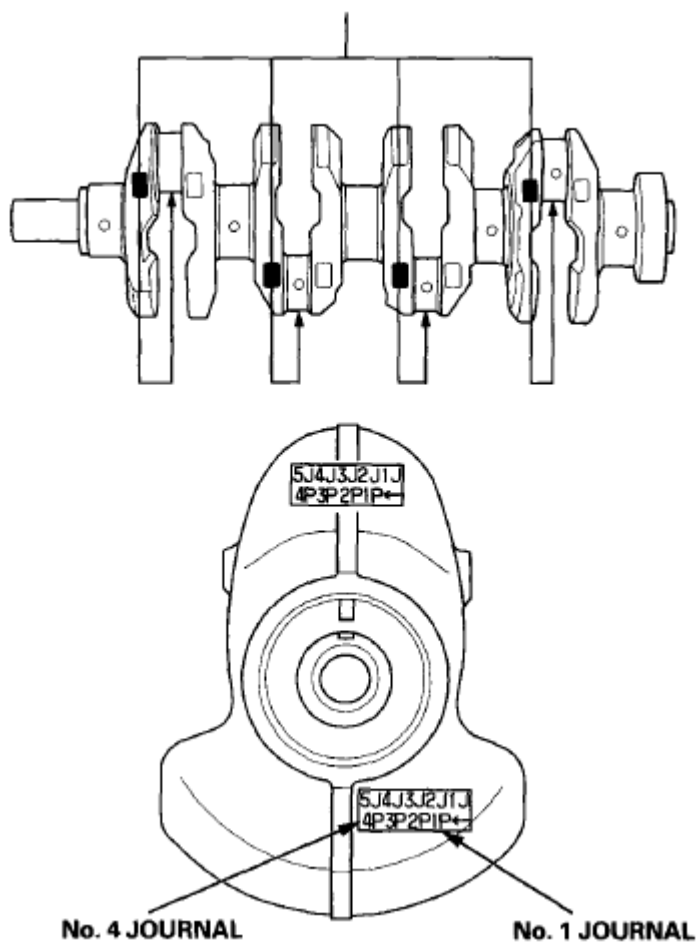


Fig. 13: Identifying Connecting Rod Journal Code Location

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Bearing Identification

Color code is on the edge of the bearing

		→ Larger big end bore			
		1 or I	2 or II	3 or III	4 or IIII
		→ Smaller bearing (Thicker)			
↓	A	Red	Pink	Pink/ Yellow	Yellow
	B	Pink	Yellow	Yellow/ Green	Green
	C	Yellow	Green	Green/ Brown	Brown
	D	Green	Brown	Brown/ Black	Black
↓	Smaller rod journal	↓	Smaller bearing (Thicker)	NOTE: When using bearing halves of different colors, it does not matter which color is used in the top or bottom.	

Fig. 14: Bearing Color Code Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

1. If the engine is already out of the vehicle, go to step 21.
2. Raise the vehicle on the lift.
3. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
4. Remove the front wheels.
5. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
6. Remove the under-floor three way catalytic converter (TWC) (see **UNDER-FLOOR TWC REMOVAL/INSTALLATION**).
7. Remove the shift cable (see **SHIFT CABLE REPLACEMENT**).
8. Separate the stabilizer links from the stabilizer bar (see **STABILIZER LINK REMOVAL/INSTALLATION**).
9. Separate the knuckles from the lower arms (see **LOWER ARM REMOVAL/INSTALLATION**).
10. 4WD model: Remove the propeller shaft (see **PROPELLER SHAFT RUNOUT**).
11. Remove a bolt securing the P/S fluid line bracket, and unclamp the P/S fluid line clamps on the front subframe.
12. Remove the bolts securing the left steering gearbox mounting bracket.
13. Remove the bolts securing the right steering gearbox mounting brackets.
14. Remove the bolt securing the automatic transmission fluid (ATF) filter.

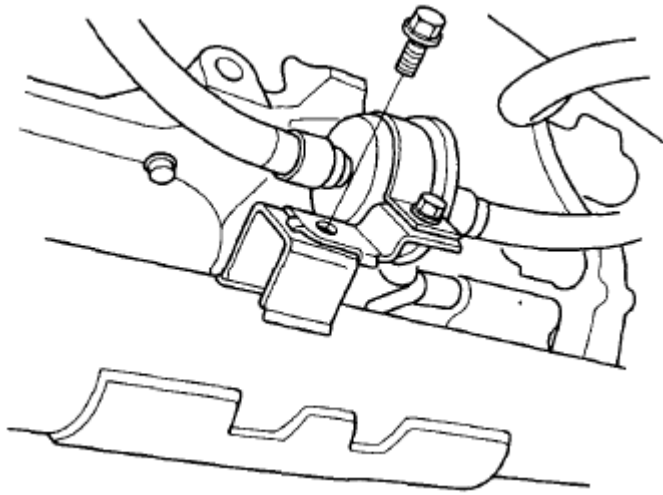


Fig. 15: Identifying Automatic Transmission Fluid Filter And Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the lower torque rod (see **SUBFRAME REPLACEMENT**).
16. Make the appropriate reference lines at both ends of the subframe that line up with the body.
17. Remove the subframe mounting bolts on both side.
18. Attach the subframe adapter to the subframe and hang the belt of the subframe adapter over the front of the subframe, then secure the belt with its stop.
19. Raise the jack and line up the slots in the arms with the bolt holes on the corner of the jack base, then attach them with bolts securely.
20. Remove the subframe (see **SUBFRAME REPLACEMENT**).
21. Remove the lower torque rod bracket.

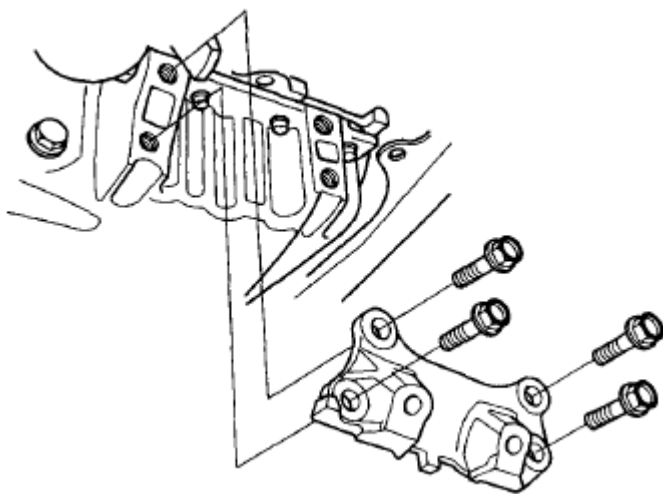


Fig. 16: Identifying Lower Torque Rod Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

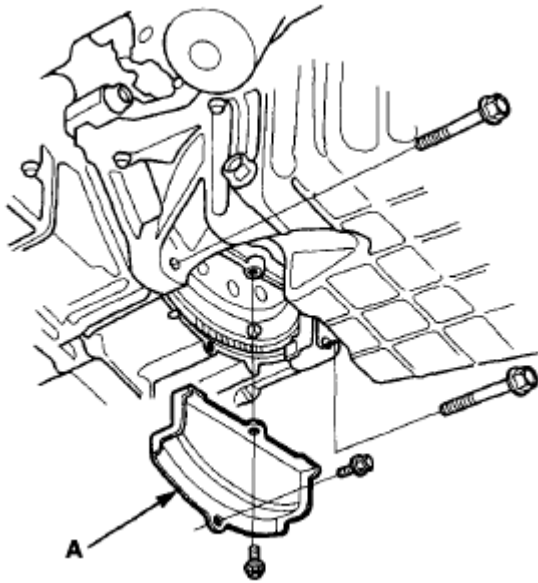


Fig. 17: Identifying Torque Converter Cover
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

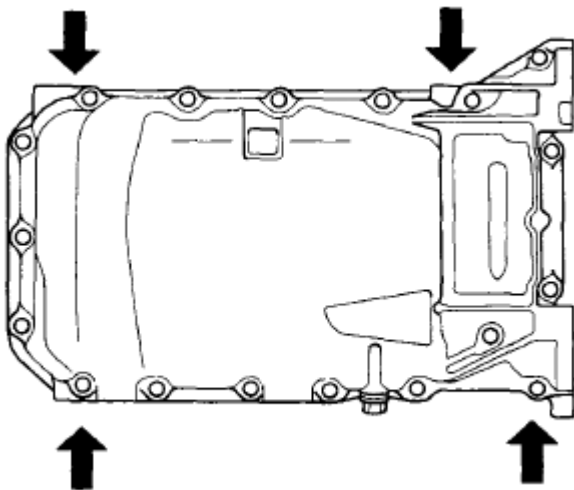


Fig. 18: Identifying Oil Pan Bolts Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Remove the oil pan.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine/transmission (see **ENGINE REMOVAL**).
2. Remove the transmission (see **TRANSMISSION REMOVAL**).

3. Remove the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
4. Remove the oil pan (see **OIL PAN REMOVAL**).
5. Remove the oil pump (see **OIL PUMP OVERHAUL**).
6. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
7. Remove the baffle plate.

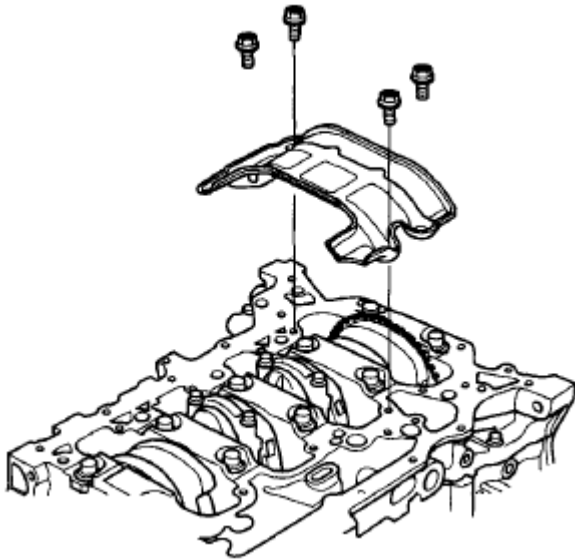


Fig. 19: Identifying Baffle Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the 8 mm bolts

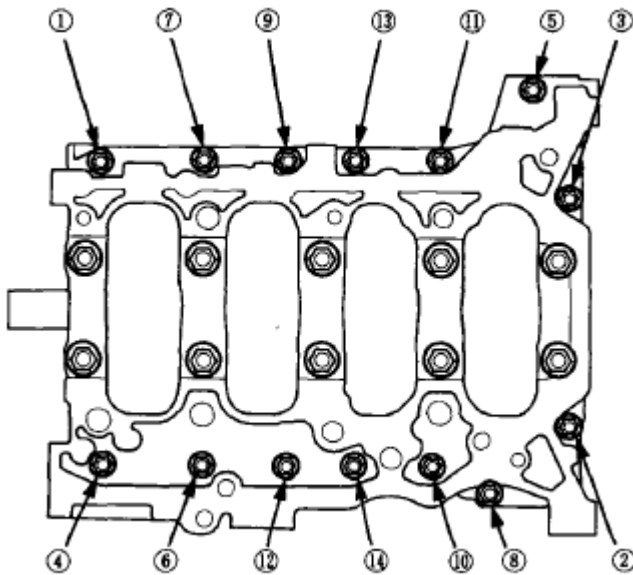


Fig. 20: Identifying Baffle Plate Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. 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.

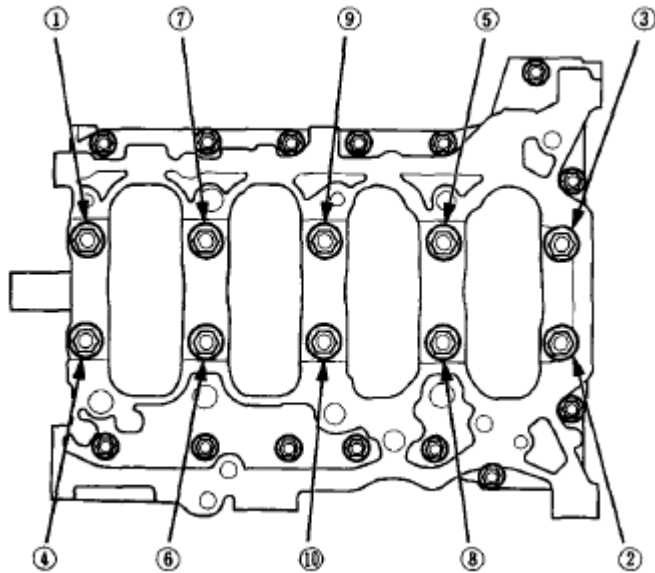


Fig. 21: Identifying Bearing Cap Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

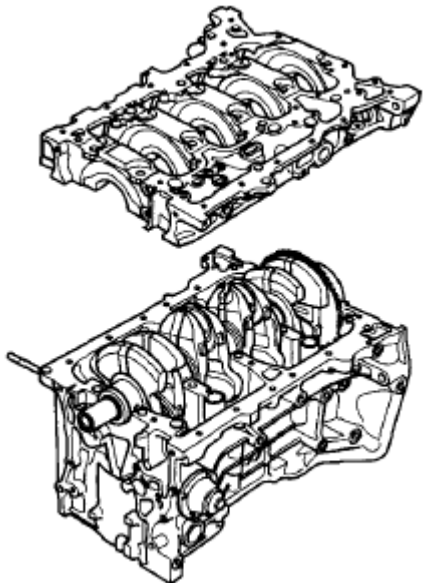


Fig. 22: Identifying Lower Block And Bearings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

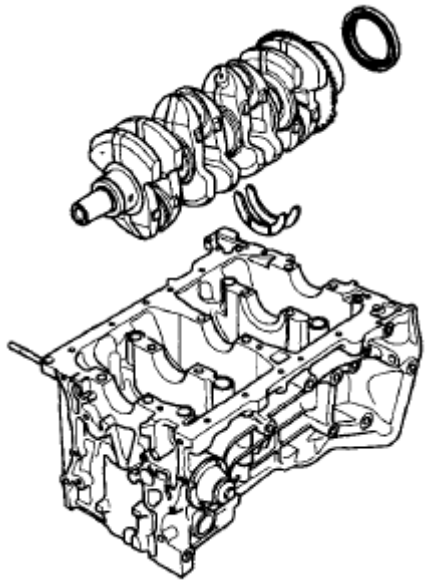


Fig. 23: Identifying Journals And CKP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

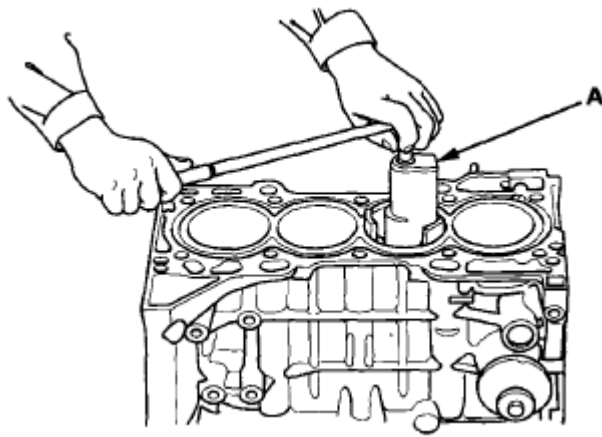


Fig. 24: Removing Cylinder With Ridge Reamer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

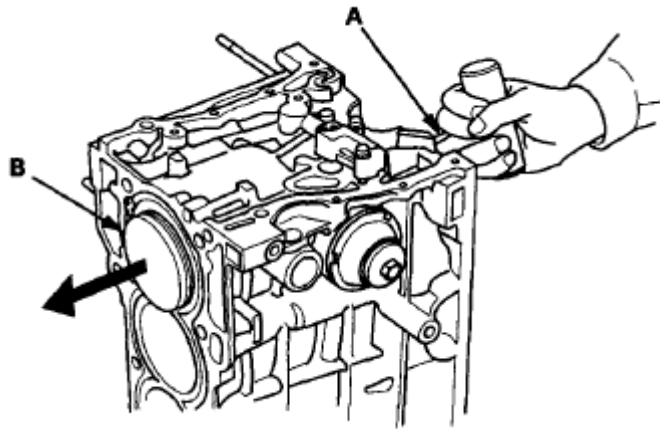


Fig. 25: Identifying Piston And Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

CRANKSHAFT INSPECTION

OUT-OF-ROUND AND TAPER

1. Remove the crankshaft from the engine block (see CRANKSHAFT AND PISTON REMOVAL).
2. Remove the CKP pulse plate from the crankshaft (see CKP PULSE PLATE REPLACEMENT).
3. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
4. Clean the keyway and threads, and check for damage.
5. Measure the out-of-round at the middle of each rod and the main journal in two places. The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round

Standard (New): 0.004 mm (0.0002 in) max.

Service Limit: 0.010 mm (0.0004 in)

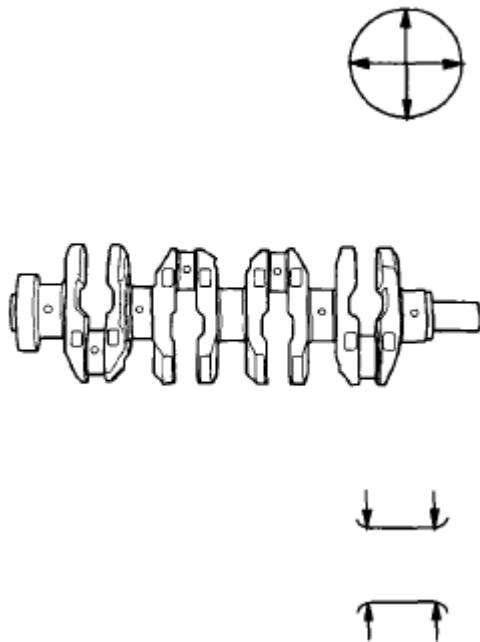


Fig. 26: Identifying Crankshaft

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Journal Taper

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

Service Limit: 0.010 mm (0.0004 in)

Straightness

7. Place the V-blocks on a flat surface.
8. Check the total runout with the crankshaft supported on V-blocks.
9. Measure the runout on all main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Runout

Standard (New): 0.03 mm (0.001 in) max.

Service Limit: 0.04 mm (0.002 in)

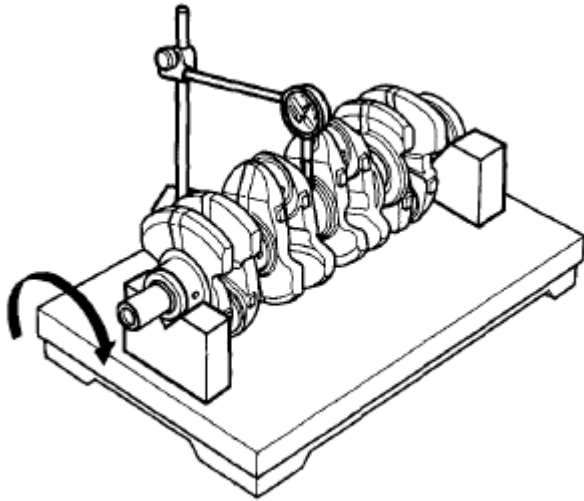


Fig. 27: Measuring Runout On Main Journals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 diameter at a point 13 mm (0.5 in) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the engine block as the cylinder bore sizes.

Piston Skirt Diameter

Standard (New): No Letter (or A): 86.980-86.990 mm (3.4244-3.4248 in)

B: 86.970-86.980 mm (3.4240-3.4244 in)

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

Oversize Piston Skirt Diameter

0.25: 87.230-87.240 mm (3.4342-3.4346 in)

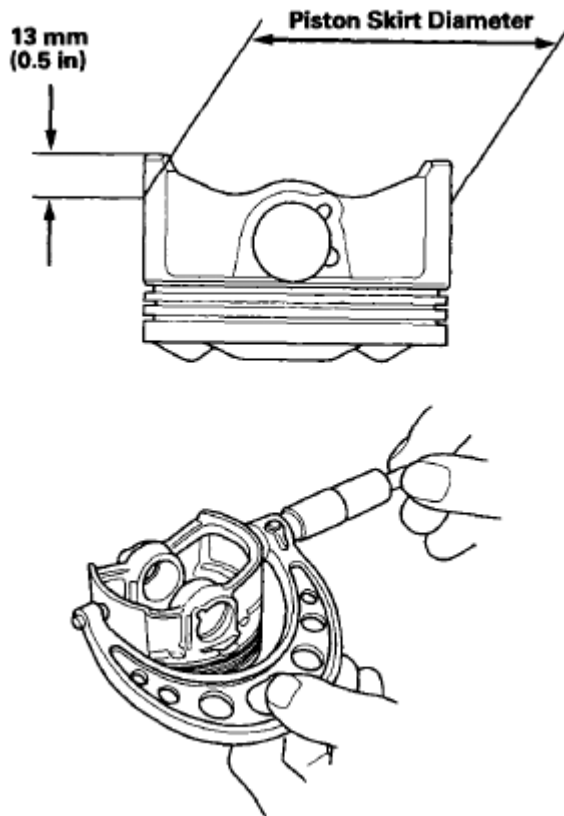


Fig. 28: Measuring Piston Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the wear and taper in direction X and Y at three levels inside each cylinder as shown. If the measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the engine block. If the engine block is being rebored, refer to step 7 after reboring.

Cylinder Bore Size

Standard (New):

A or I: 87.010-87.020 mm (3.4256-3.4260 in)

B or II: 87.000-87.010 mm (3.4252-3.4256 in)

Service Limit: 87.070 mm (3.4279 in)

Oversize Bore

0.25: 87.250-87.260 mm (3.4350-3.4354 in)

Reboring Limit: 0.025 mm (0.01 in) max.

Bore Taper

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

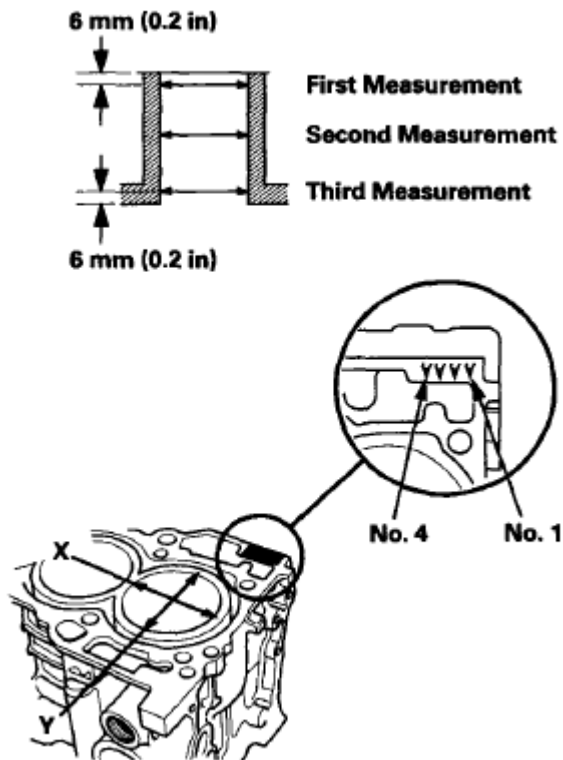


Fig. 29: Identifying Cylinder Bore Size Dimension
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bores must be honed.
6. Check the top of the engine block for warpage. Measure along the edges and across the center as shown.

Engine Block Warpage

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

Service Limit: 0.10 mm (0.004 in)

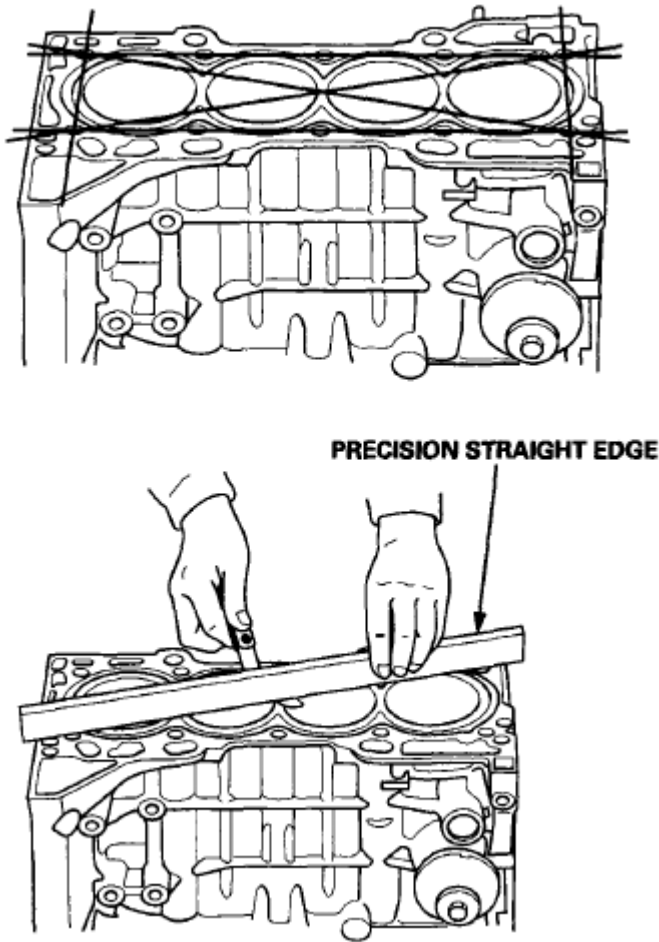


Fig. 30: Precaution For Engine Block Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-to-Cylinder Bore Clearance

Standard (New): 0.020-0.040 mm (0.0008-0.0016 in)

Service Limit: 0.05 mm (0.002 in)

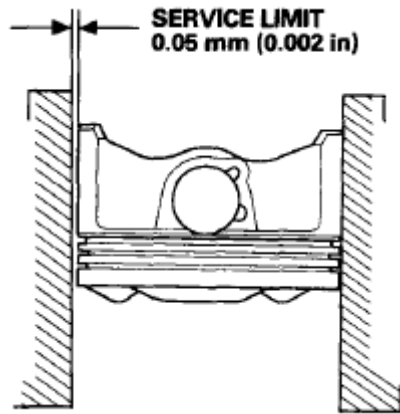


Fig. 31: Identifying Difference Between Cylinder Bore Diameter And Piston Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BORE HONING

Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see **BLOCK AND PISTON INSPECTION**).

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

2. Remove the oil jets (see **OIL JET REPLACEMENT**).
3. Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern (A). Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent. Do not use stones that are worn or broken.

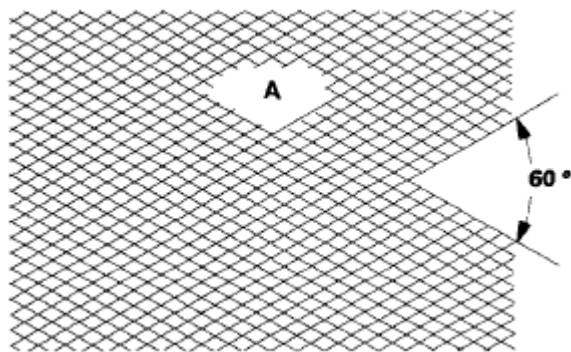


Fig. 32: Identifying Cylinder Bore Honing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

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

PISTON, PIN, AND CONNECTING ROD REPLACEMENT

DISASSEMBLY

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

NOTE: Take care not to damage the ring grooves.

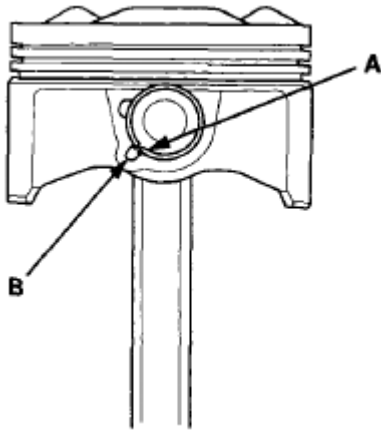


Fig. 33: Identifying Piston Pin Bores And Piston Pin Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

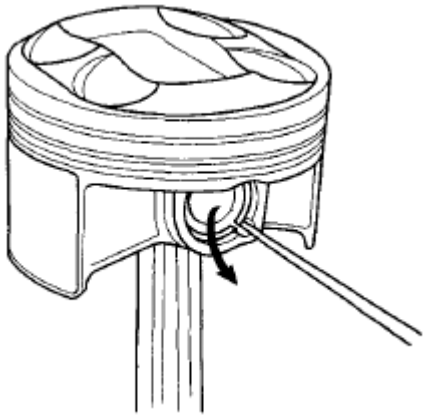


Fig. 34: Removing Snap Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

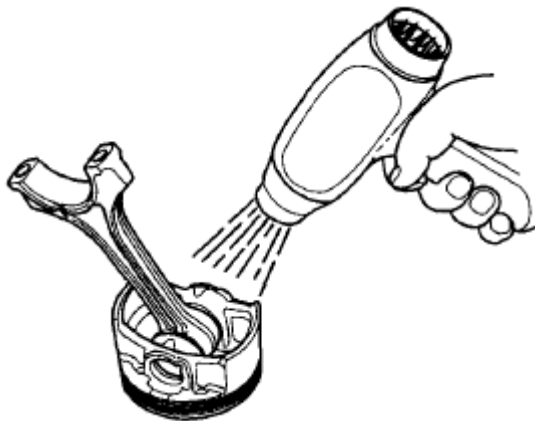


Fig. 35: Heating Piston And Connecting Rod Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSPECTION

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

1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New): 21.961-21.965 mm (0.6646-0.8648 In)

Service Limit: 21.953 mm (0.8643 In)

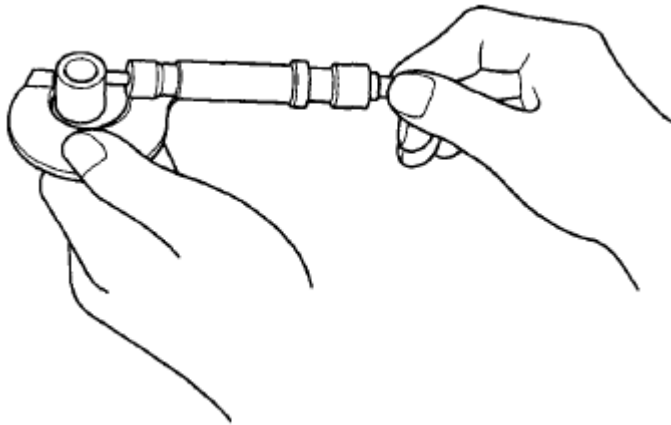


Fig. 36: Measuring Diameter Of Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

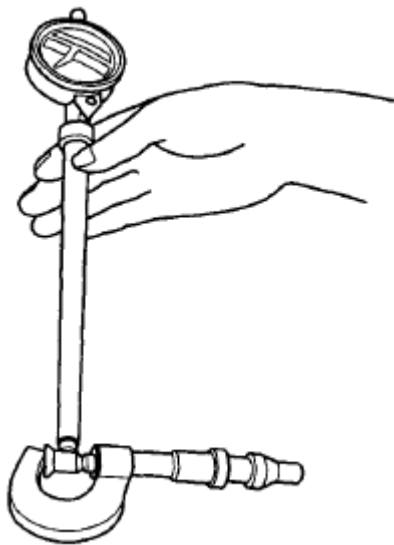


Fig. 37: Measuring Piston Pin Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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): -0.005-0.002 mm (-0.0002-0.0001 in)

Service Limit: 0.005 mm (0.0002 in)

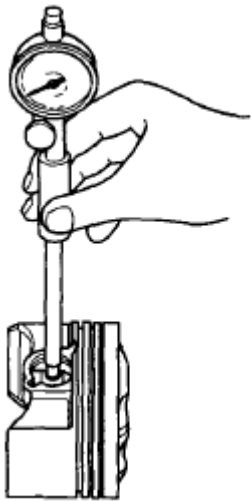


Fig. 38: Checking Difference Between Piston Pin Diameter And Piston Pin Hole Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Connecting Rod Clearance

Standard (New): 0.005-0.015 mm (0.0002-0.0006 in)

Service Limit: 0.02 mm (0.001 in)

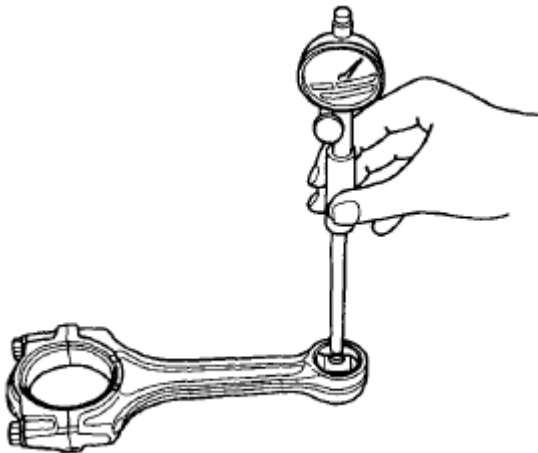
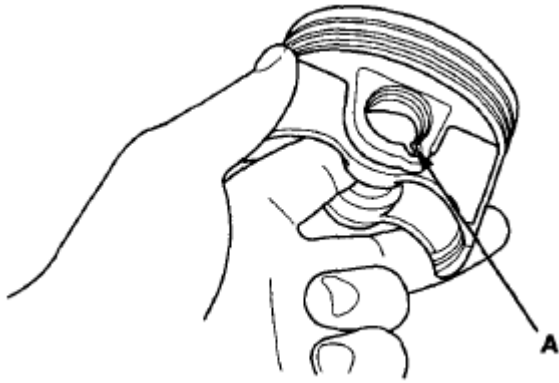


Fig. 39: Measuring Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

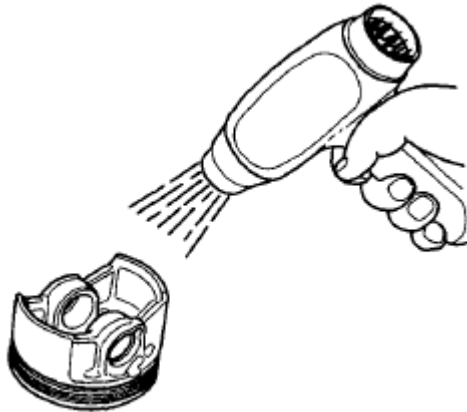
REASSEMBLY

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

**Fig. 40: Installing Piston Pin Snap Ring**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**Fig. 41: Heating Piston**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

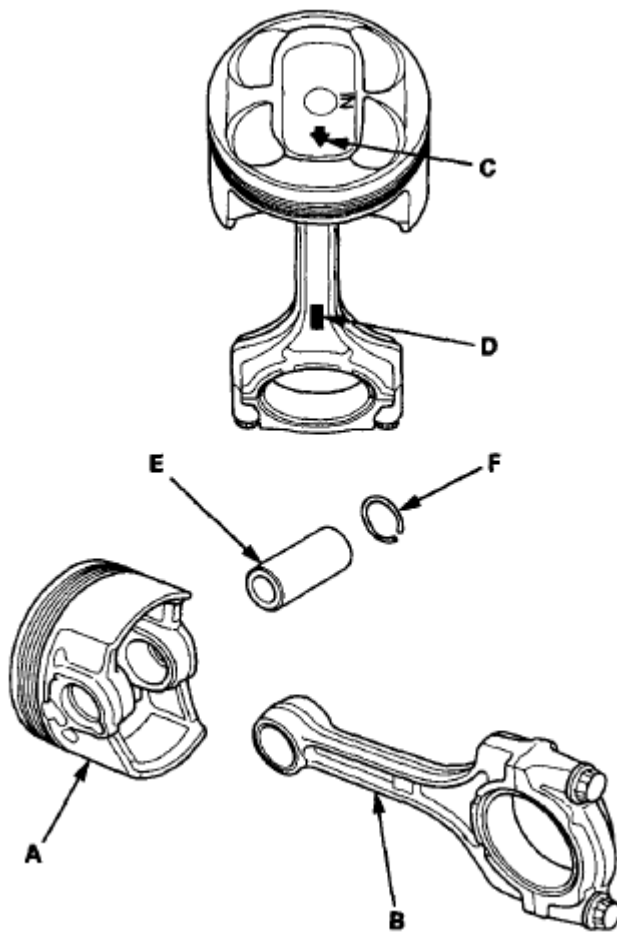


Fig. 42: Identifying Piston, Connecting Rod And Remaining Snap Ring
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the remaining snap ring (F).
6. Turn the snap rings in the ring grooves until the end gaps are positioned at the bottom of the piston.

PISTON RING REPLACEMENT

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

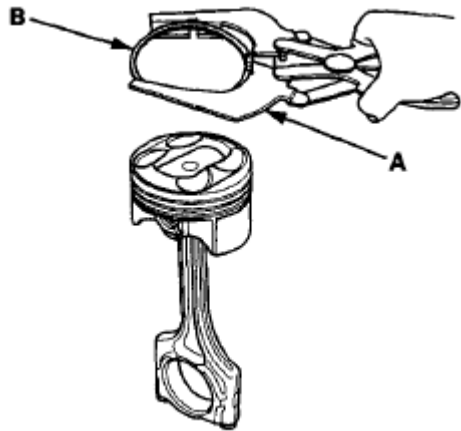


Fig. 43: Removing Piston Rings Using Piston Ring Expander

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

File down a blade if necessary.

Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tools.

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

4. Using a piston that has its rings removed, push a new ring (A) into the cylinder bore 15-20 mm (0.6-0.8 in) from the bottom.

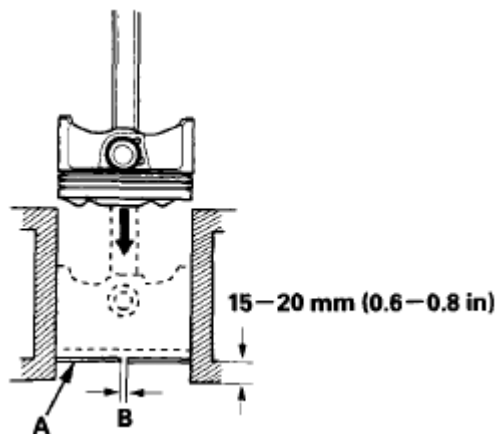


Fig. 44: Identifying Piston Ring End-Gap

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the piston ring end-gap (B) with a feeler gauge:

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits (see **BLOCK AND PISTON INSPECTION**).

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

Piston Ring End-Gap

Top Ring:

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

Service Limit: 0.60 mm (0.024 in)

Second Ring:

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

Service Limit: 0.70 mm (0.028 in)

Oil Ring:

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

Service Limit: 0.75 mm (0.030 in)

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

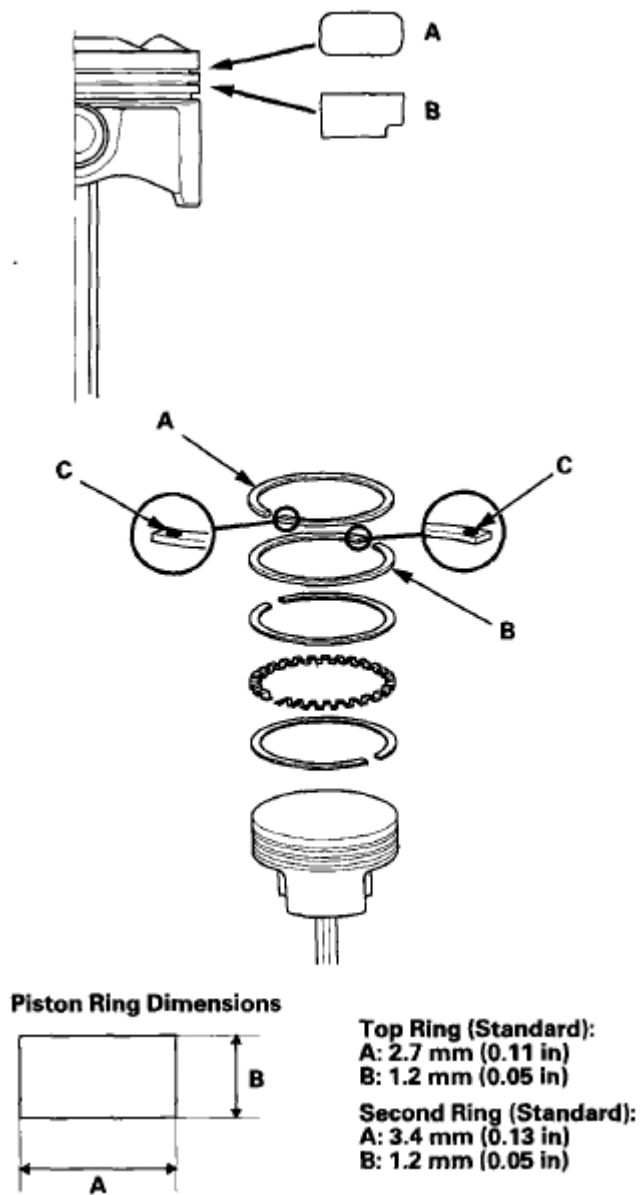


Fig. 45: Identifying Piston Ring Dimensions

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Top Ring Clearance

Standard (New): 0.060-0.085 mm (0.0024-0.0033 in)

Service Limit: 0.13 mm (0.005 in)

Second Ring Clearance

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

Service Limit: 0.13 mm (0.005 in)

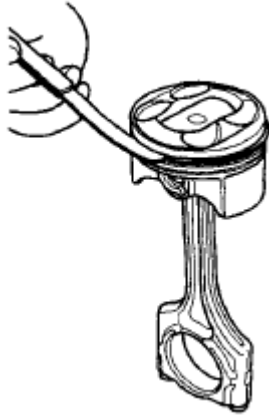


Fig. 46: Measuring Ring-To-Groove Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

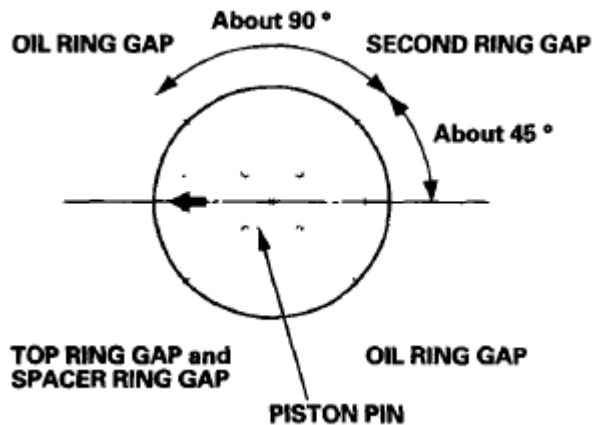


Fig. 47: Positioning Ring End Gaps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION

IF THE CRANKSHAFT IS ALREADY INSTALLED

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Remove the connecting rod caps, then install the ring compressor. Check that the bearing is securely in place.
3. Apply new engine oil to the piston, the inside of the ring compressor, and the cylinder bore, then attach

the ring compressor to the piston/connecting rod assembly.

4. Position the mark (A) to face the cam chain side of the engine block.

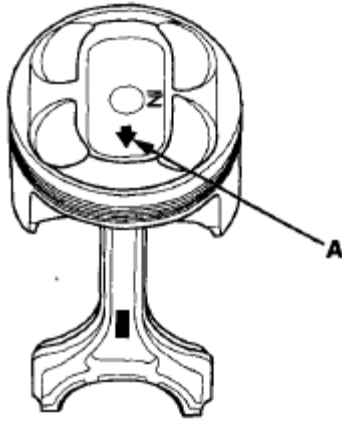


Fig. 48: Identifying Piston Mark Location

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

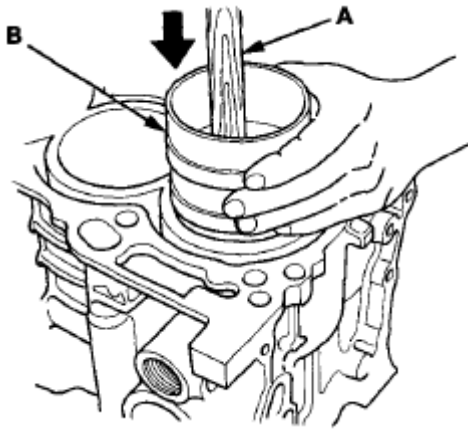


Fig. 49: Installing Piston Ring Using Piston Ring Compressor

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.
7. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
9. Apply new engine oil to the bolt threads, then install the connecting rod caps with bearings. Tighten the bolts to 41 N.m (4.2 kgf.m, 30 lbf.ft).

10. Tighten the connecting rod bolts an additional 120 °.

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

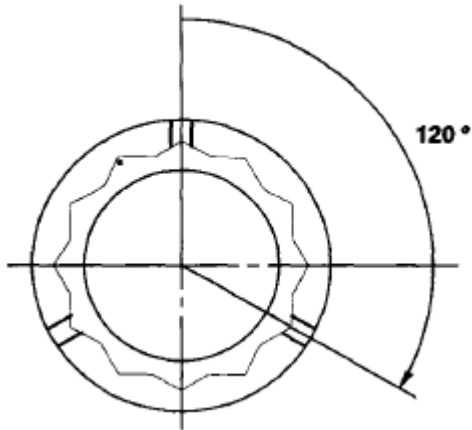


Fig. 50: Tightening Connecting Rod Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

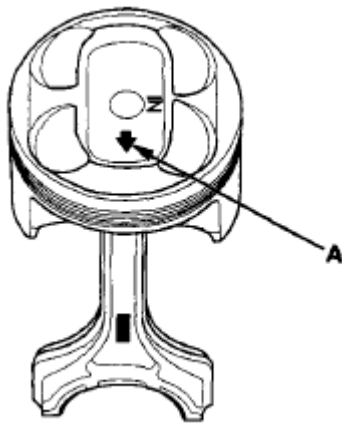


Fig. 51: Identifying Piston Mark Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

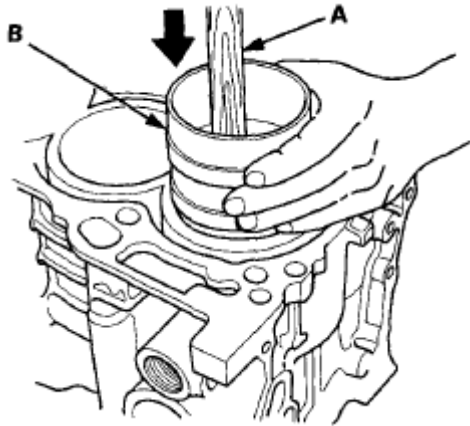


Fig. 52: Installing Piston Ring Using Piston Ring Compressor
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CONNECTING ROD BOLT INSPECTION

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

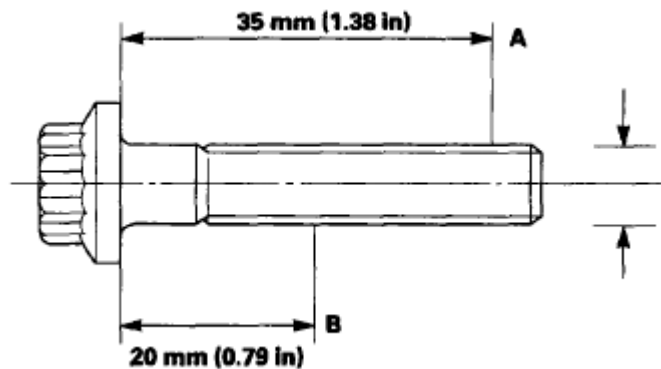


Fig. 53: Identifying Connecting Rod Bolt Dimension
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Point A-Point B = Difference in Diameter

Difference in Diameter

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

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

CRANKSHAFT INSTALLATION

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
 - Attachment, 24 x 26 mm 07746-0010700
 - Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100
1. Check the main bearing clearance with plastigage (see **CRANKSHAFT MAIN BEARING REPLACEMENT**).
 2. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
 3. Install the bearing halves in the engine block and the connecting rods.
 4. Apply a coat of new engine oil to the main bearings and the rod bearings.
 5. Install the CKP pulse plate to the crankshaft (see **CKP PULSE PLATE REPLACEMENT**).
 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. Be careful not to damage the journals and the CKP pulse plate.
 7. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the No. 4 journal of the engine block.

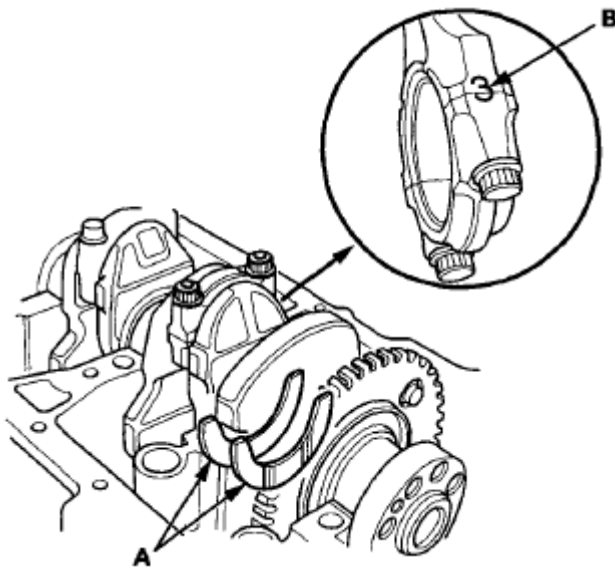


Fig. 54: Identifying Thrust Washers In No. 4 Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
9. Apply new engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the

connecting rod and the cap, then install the caps and bolts finger-tight.

11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and the cap, then install the caps and bolts finger-tight.
12. Tighten the connecting rod bolts to 41 N.m (4.2 kgf.m, 30 lbf.ft).
13. Tighten the connecting rod bolts an additional 120 °.

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

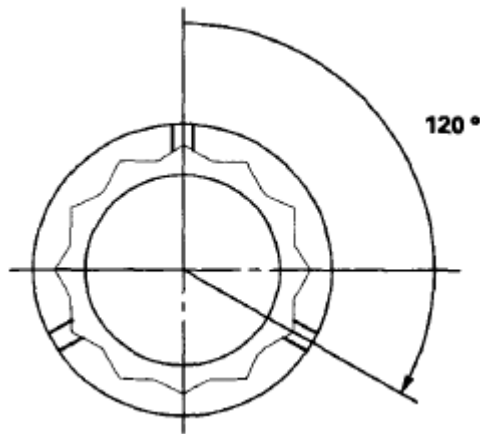


Fig. 55: Tightening Connecting Rod Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE:

- Apply a 3 mm (0.12 in) 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.

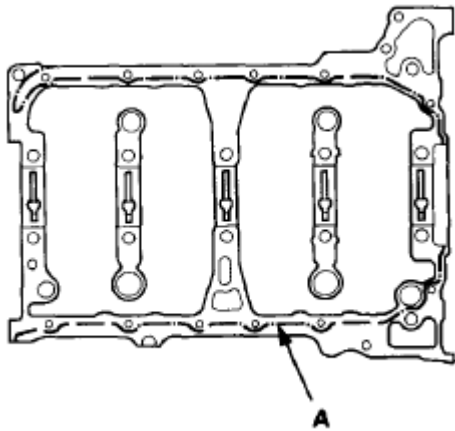


Fig. 56: Identifying Engine Block Mating Surface Sealant Area
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

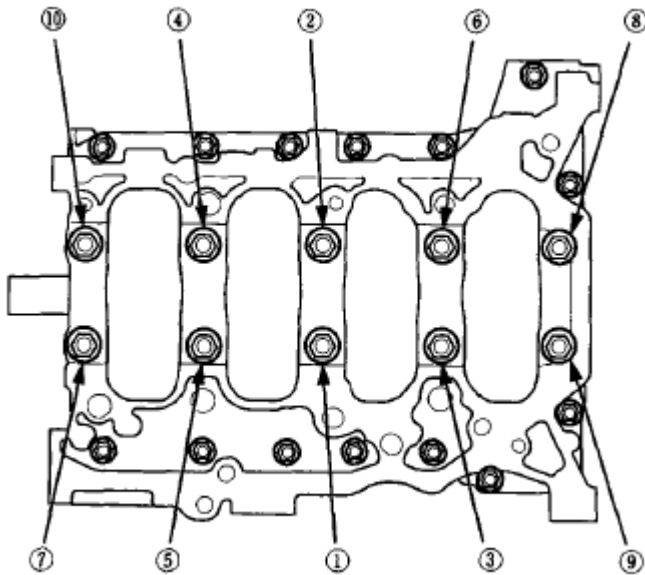


Fig. 57: Identifying Bearing Cap Bolts Tighten Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

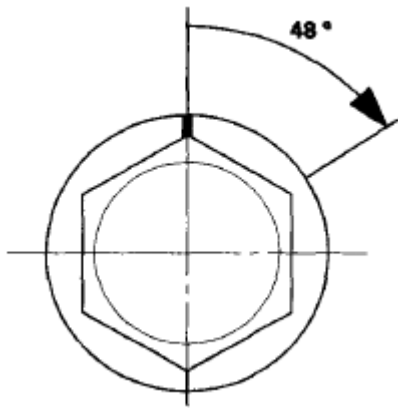


Fig. 58: Tightening Bearing Cap Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

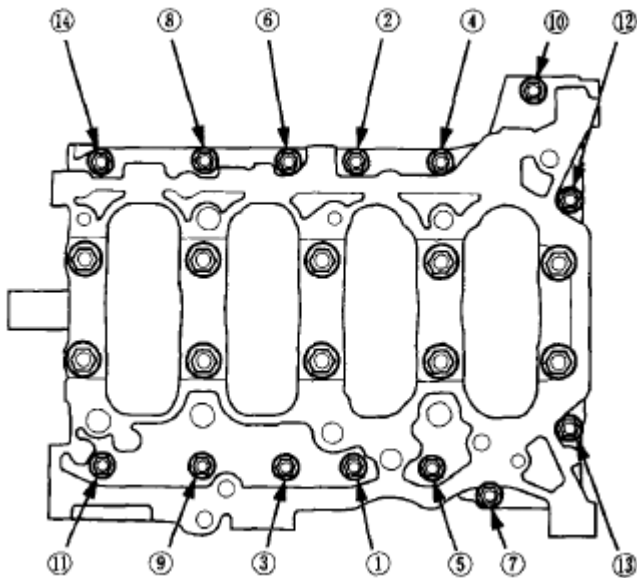


Fig. 59: Identifying Bearing Cap Bolts Tighten Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

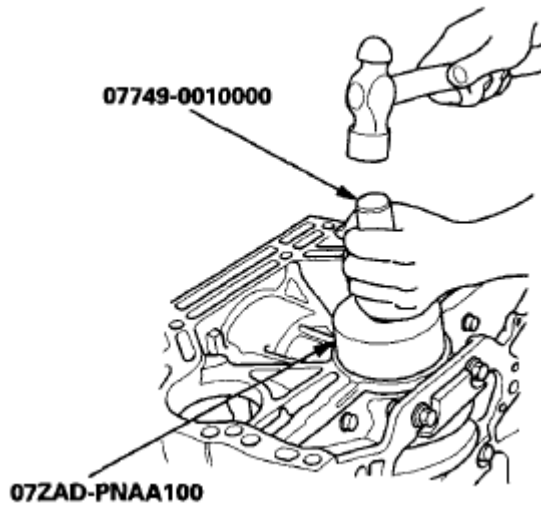


Fig. 60: Installing Crankshaft Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

0.2-1.2 mm (0.008-0.047 in)

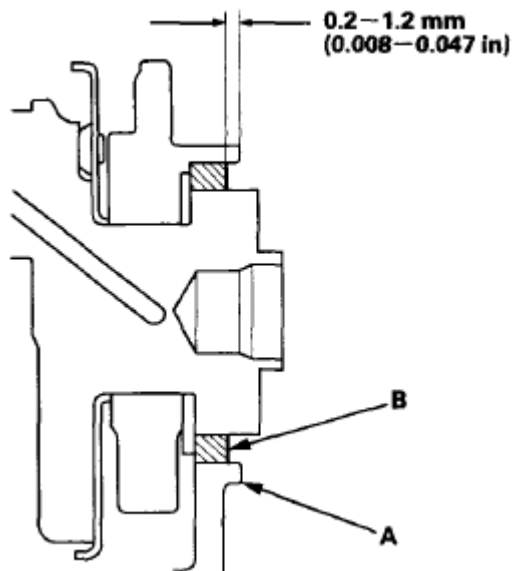


Fig. 61: Measuring Distance Between Engine Block And Crankshaft Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the baffle plate.

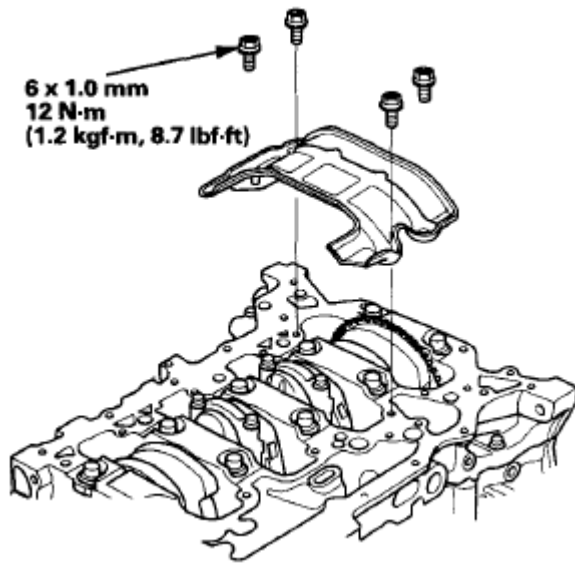


Fig. 62: Identifying Baffle Plate And Bolts With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Install the oil pump (see [OIL PUMP INSTALLATION](#)).
26. Install the oil pan (see [CKP PULSE PLATE REPLACEMENT](#)).
27. Install the cylinder head (see [CYLINDER HEAD INSTALLATION](#)).
28. Install the drive plate (see [DRIVE PLATE REMOVAL AND INSTALLATION](#)).
29. Install the transmission (see [TRANSMISSION INSTALLATION](#)).
30. Install the engine/transmission (see [ENGINE INSTALLATION](#)).

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

CKP PULSE PLATE REPLACEMENT

1. Remove the crankshaft from the engine block (see [CRANKSHAFT AND PISTON REMOVAL](#)).
2. Remove the CKP pulse plate (A) from the crankshaft. A,

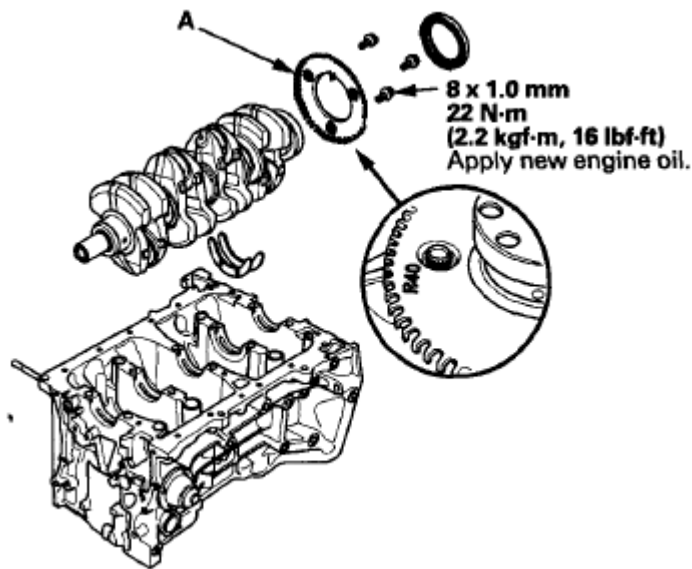


Fig. 63: Identifying CKP Pulse Plate With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

OIL PAN INSTALLATION

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

NOTE:

- Apply a 3 mm (0.12 in) 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.

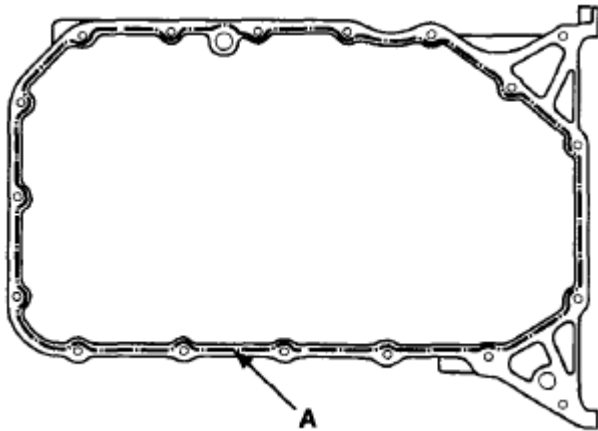


Fig. 64: Identifying Oil Pan Sealant Area

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE:

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

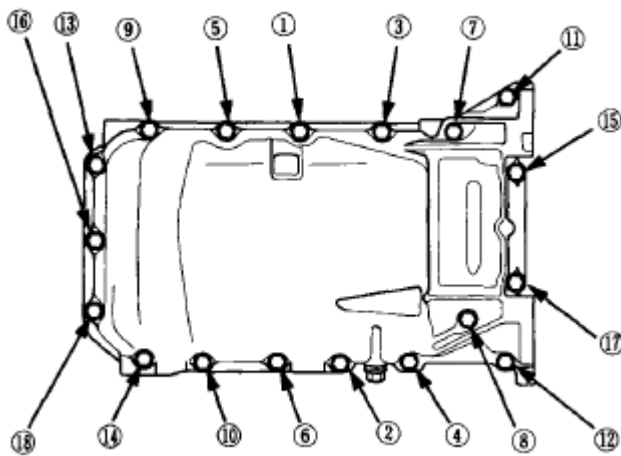


Fig. 65: Identifying Oil Pan Bolts Tighten Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the torque converter cover (A), and install the two bolts securing the transmission.

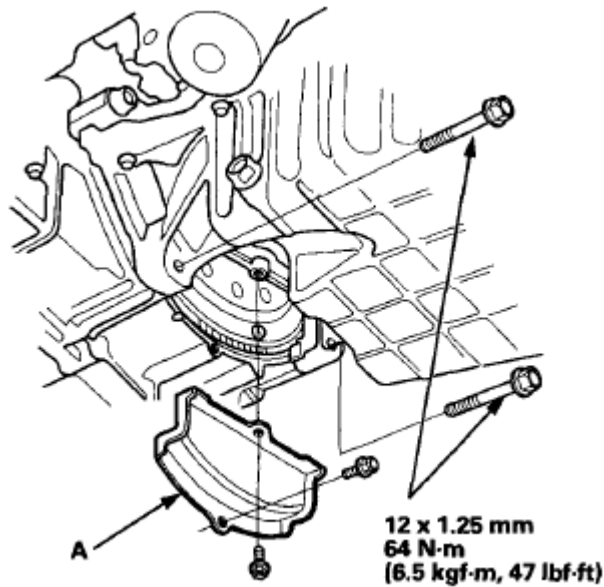


Fig. 66: Identifying Torque Converter Cover And Bolts With Torque Specification
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the bolts securing the oil pan.
8. Install the lower torque rod bracket.

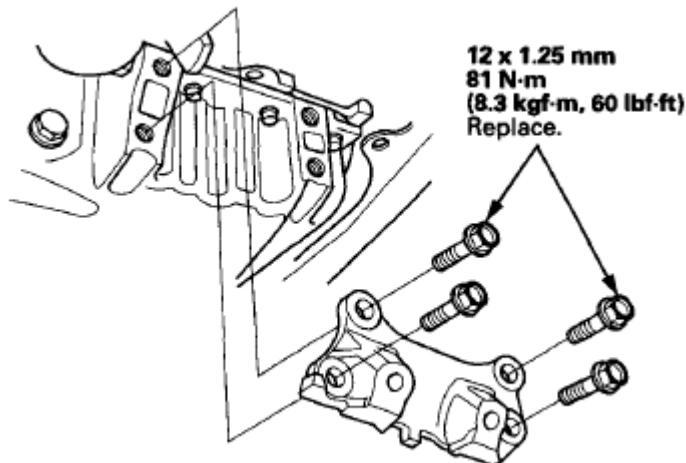


Fig. 67: Identifying Lower Torque Rod Bracket With Torque Specification
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If the engine is still in the vehicle, do steps 9 through 31.
10. Using the subframe adapter and a jack, raise the subframe up to body.
11. Loosely install the new 14 x 1.5 mm bolts.
12. Align all reference marks on the front subframe with the body, then tighten the bolts on the front subframe to the specified torque.
13. Tighten the new subframe mounting bolts on both side.

14. Lower the vehicle on the lift.
15. Loosen the upper torque rod mounting bolt.
16. Raise the vehicle on the lift.
17. Install the lower torque rod, then tighten the new lower torque rod mounting bolts in the numbered sequence shown.
18. Lower the vehicle on the lift.
19. Tighten the upper torque rod mounting bolt.
20. Install the automatic transmission fluid (ATF) filter.

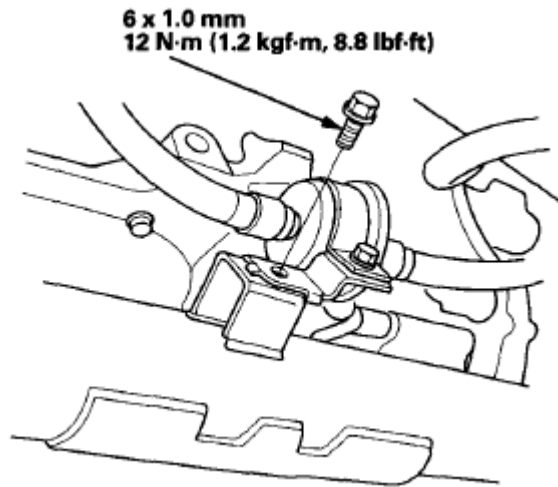


Fig. 68: Identifying Automatic Transmission Fluid Filter With Torque Specification
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the bolts securing the left steering gearbox mounting bracket.
22. Install the bolts securing the right steering gearbox mounting bracket.
23. Install the power steering (P/S) fluid line bracket and secure the hose with the hose clamps.
24. 4WD model: Install the propeller shaft (see **PROPELLER SHAFT INSTALLATION**).
25. Install a new set ring on the end of each driveshaft, then install the driveshafts (see **FRONT DRIVESHAFT INSTALLATION**). Make sure each ring "clicks" into place in the differential and intermediate shaft.
26. Connect the lower arms to the knuckles (see **LOWER ARM REMOVAL/INSTALLATION**).
27. Connect the stabilizer links to the stabilizer bar (see **STABILIZER LINK REMOVAL/INSTALLATION**).
28. Install the shift cable (see **SHIFT CABLE REPLACEMENT**).
29. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT**).
30. Install the front wheels.
31. Refill the engine with the recommended engine oil (see **ENGINE OIL REPLACEMENT**).
32. Check the wheel alignment.

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 (see TRANSMISSION REMOVAL).
2. Remove the drive plate (see DRIVE PLATE REMOVAL AND 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 and the oil seal driver attachment 96 to drive a new crankshaft oil seal squarely into the engine block to the specified installed height.

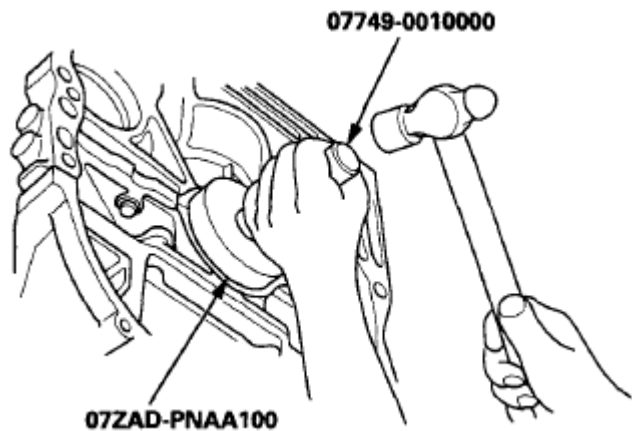


Fig. 69: Installing Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

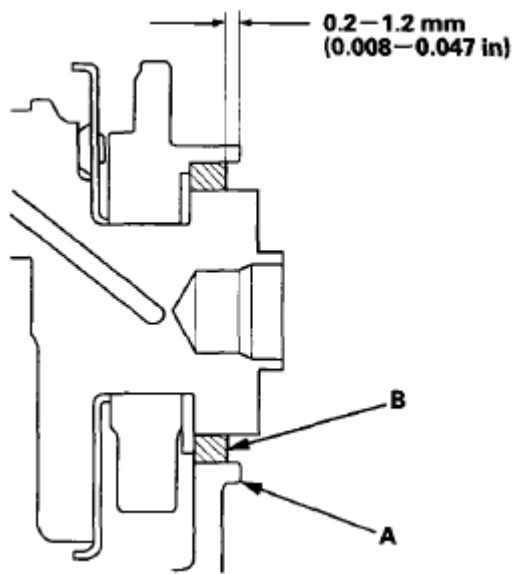


Fig. 70: Identifying Distance Between Engine Block And Crankshaft Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

SEALING BOLT INSTALLATION

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

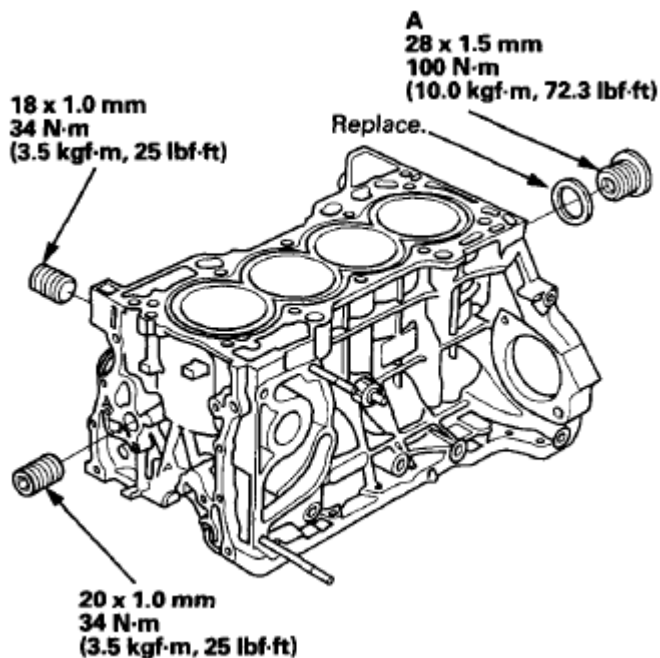


Fig. 71: Identifying Sealing Bolt With Torque Specifications

2011 Honda CR-V EX

2007-11 ENGINE Engine Block (K24Z6) - CR-V

Courtesy of AMERICAN HONDA MOTOR CO., INC.