

2002-04 ENGINES

2.4L 4-Cylinder - CR-V

ENGINE ASSEMBLY

ENGINE REMOVAL

Special Tools Required

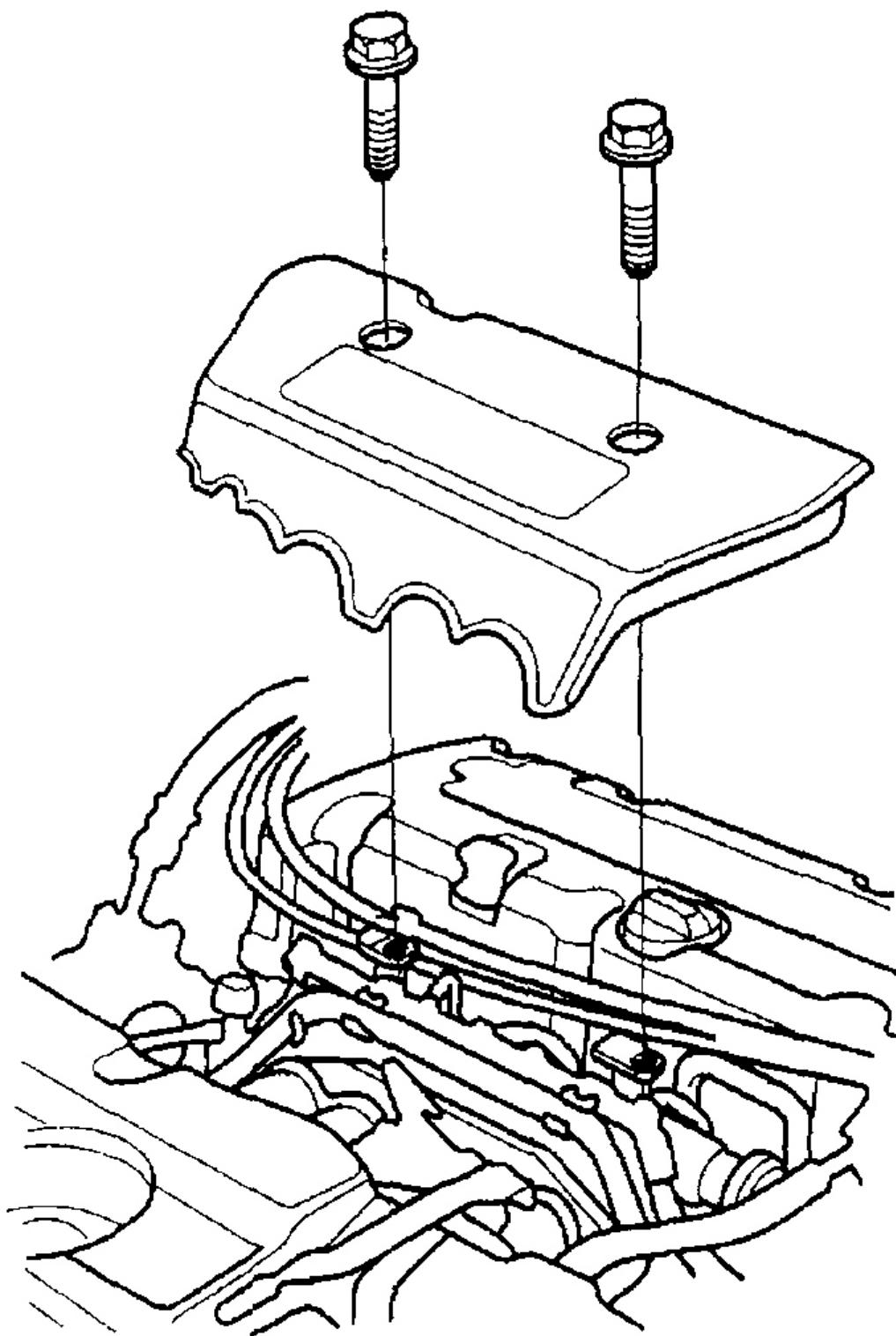
Front subframe adapter EQS02C000011

NOTE:

- **Use fender covers to avoid damaging painted surfaces.**
- **To avoid damage, unplug the wiring connectors carefully while holding the connector portion.**
- **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.

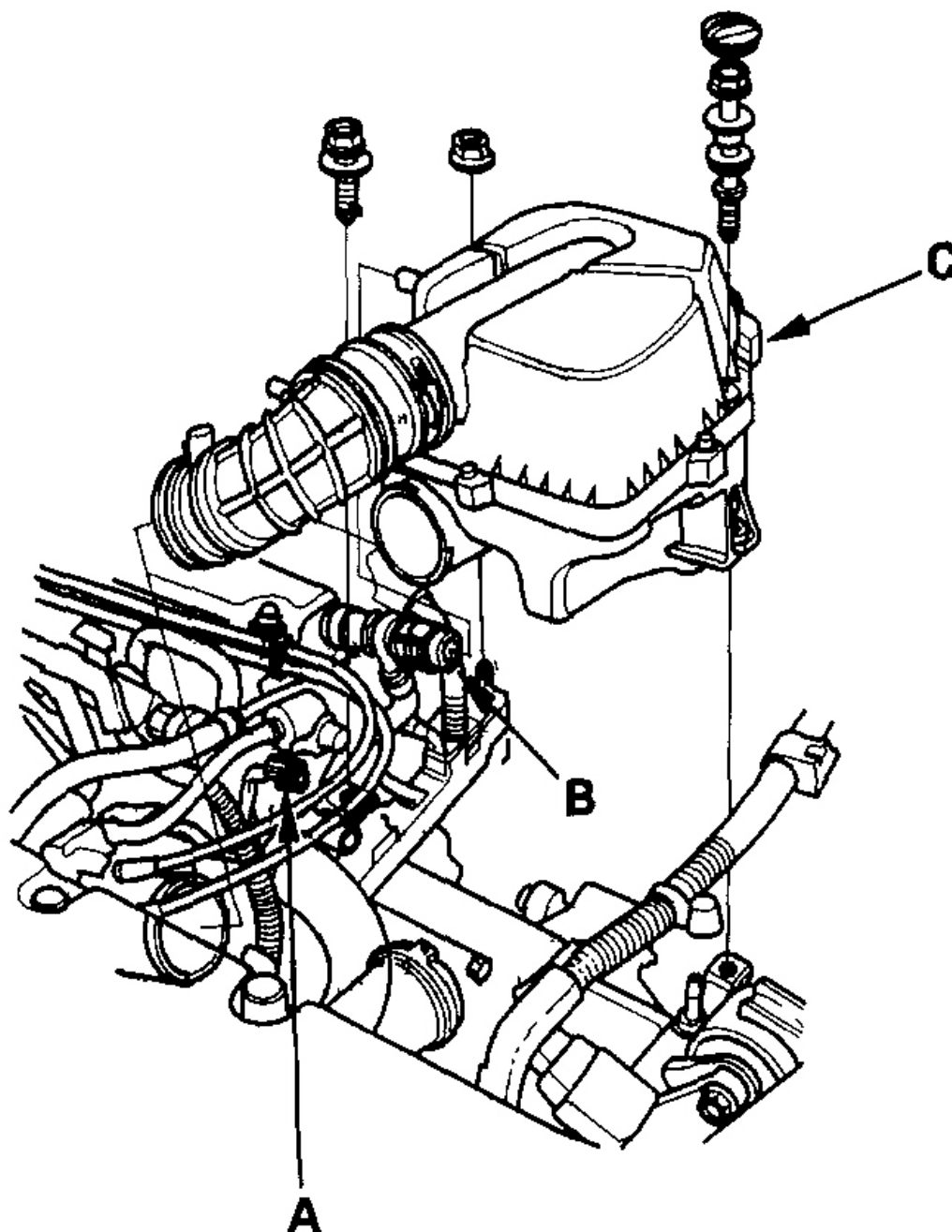
1. Secure the hood in the wide open position (support rod in the lower hole).
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for radio's preset buttons.
3. Disconnect the negative cable from the battery, then disconnect the positive cable.
4. Remove the battery.
5. Remove the intake manifold cover.



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Fig. 1: Removing Intake Manifold Cover**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

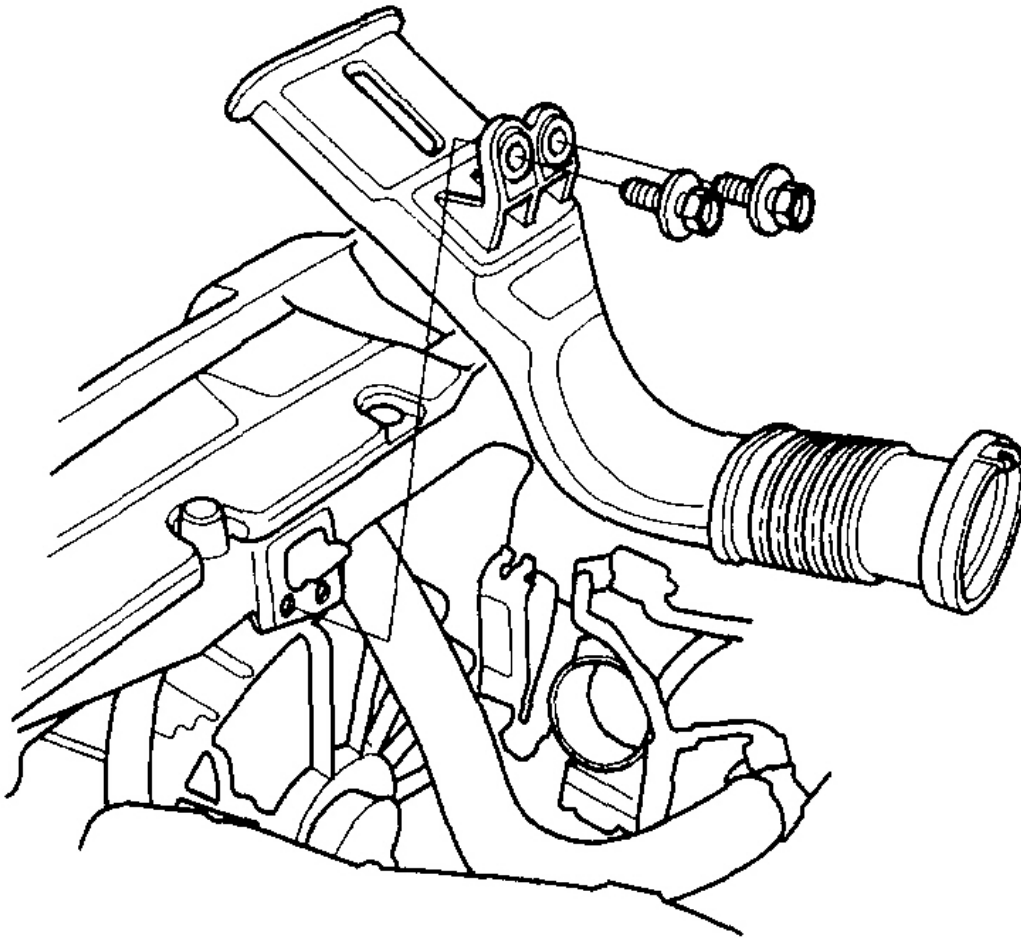
6. Disconnect the intake air temperature (IAT) sensor connector (A), remove the breather hose (B), then remove the air cleaner housing (C).



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Fig. 2: Removing Breather Hose & Air Cleaner Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the intake air duct.

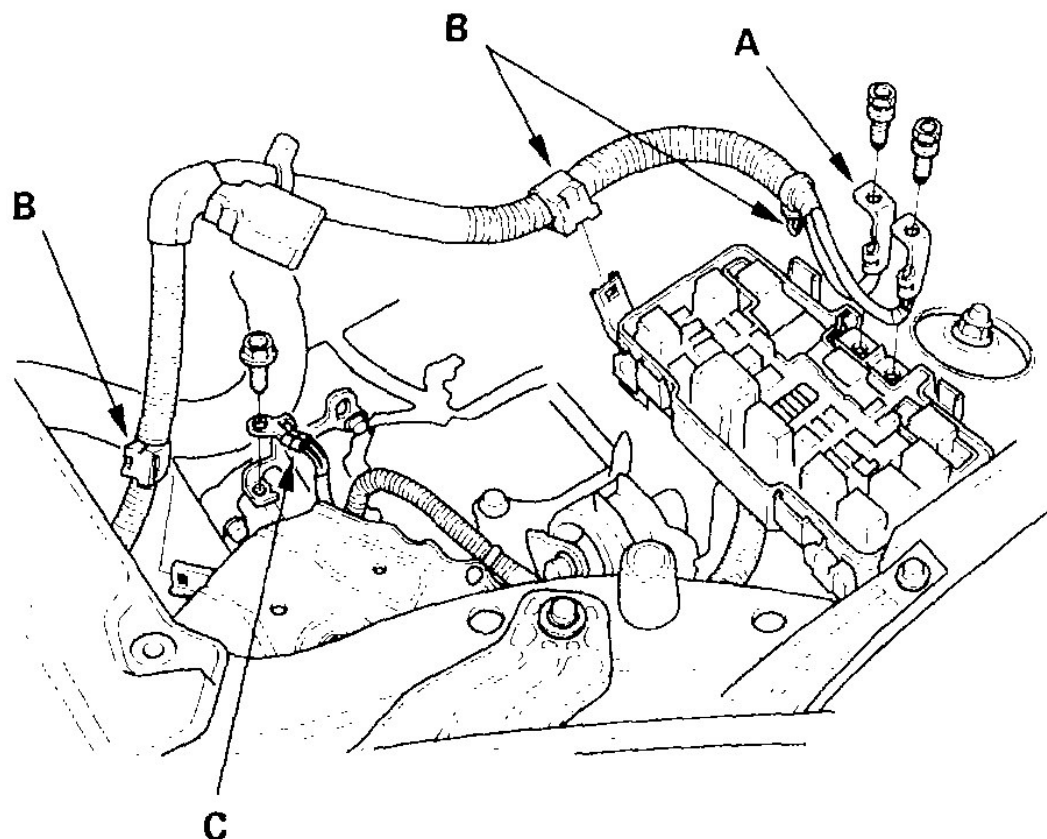


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Fig. 3: Removing Intake Air Duct

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the battery cables (A) from the under-hood fuse/relay box, then remove the harness clamps (B) and ground cable (C).



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Fig. 4: Removing Battery Cables, Harness Clamps & Ground Cable
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the throttle cover (A). Fully open the throttle link and cruise control link by hand, then remove the throttle cable (B) and cruise control actuator cable (C) from the links. Loosen the locknuts (D), and remove the cables from the bracket.

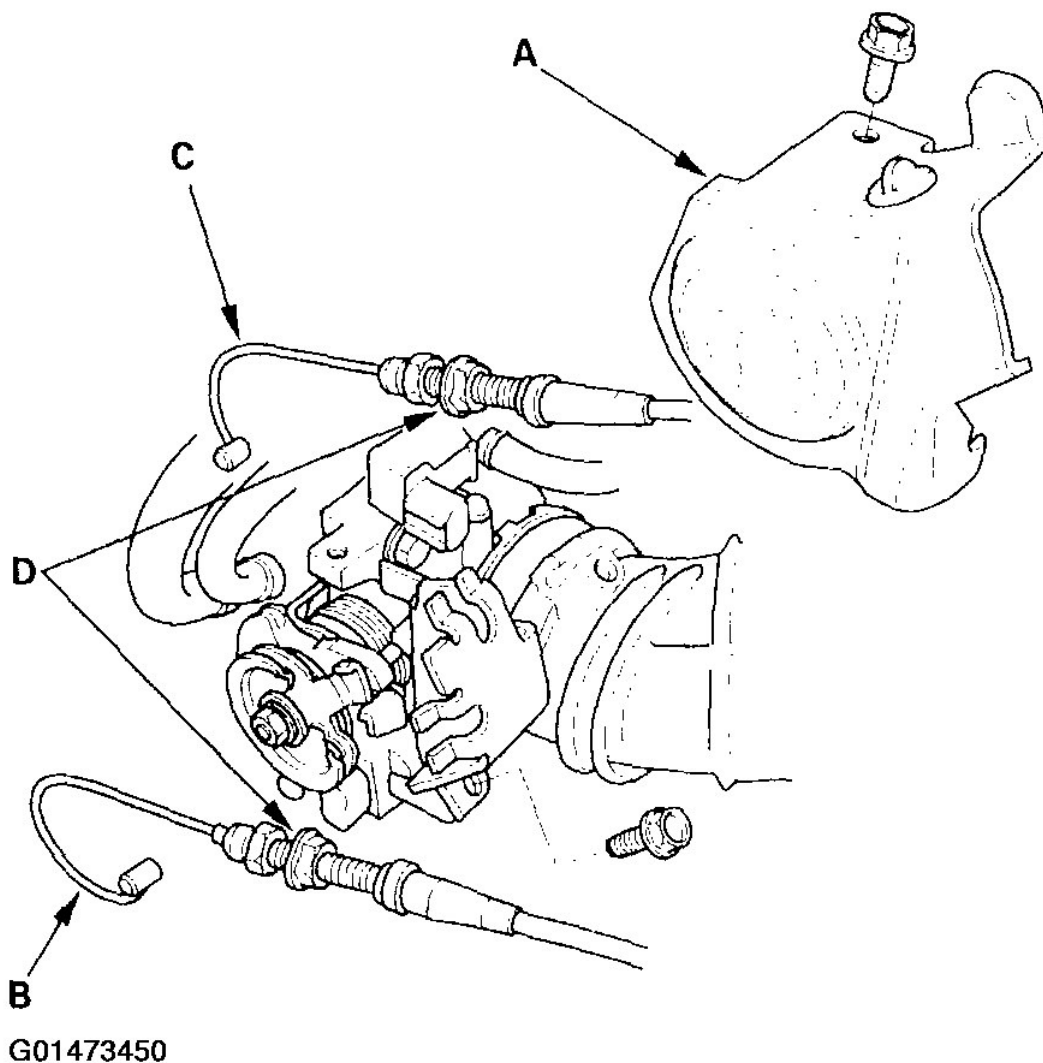
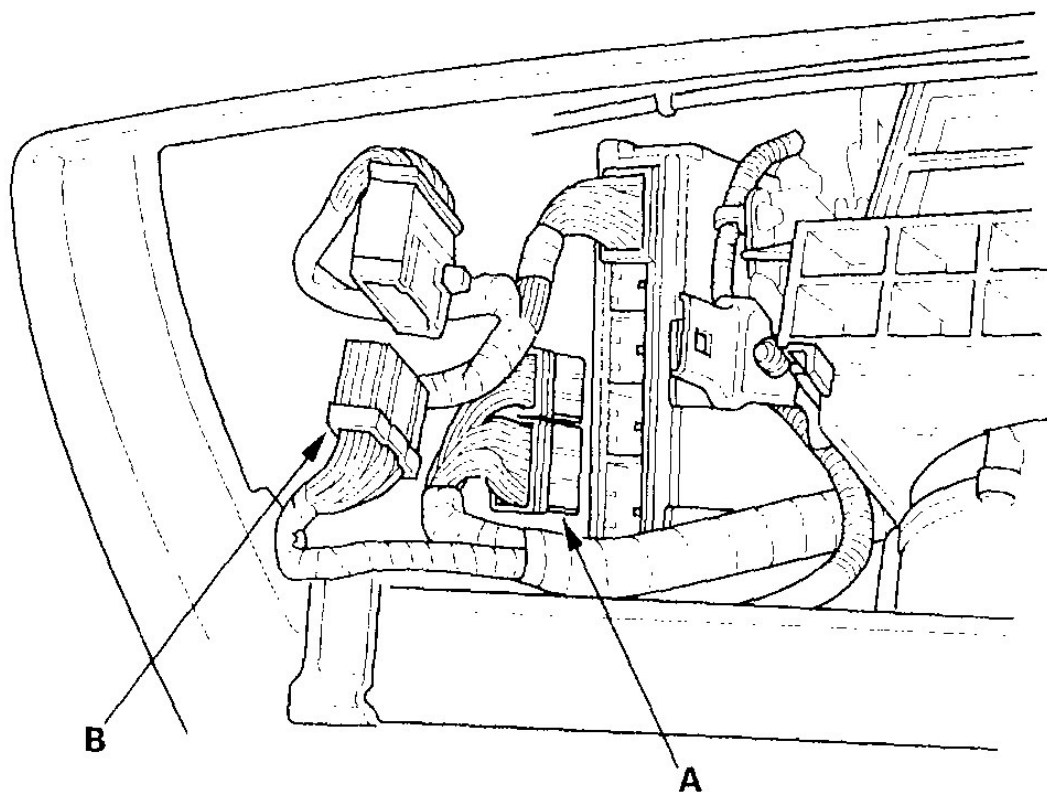


Fig. 5: Removing Throttle Cover, Throttle Cable, Cruise Control Actuator Cable & Cables From The Bracket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

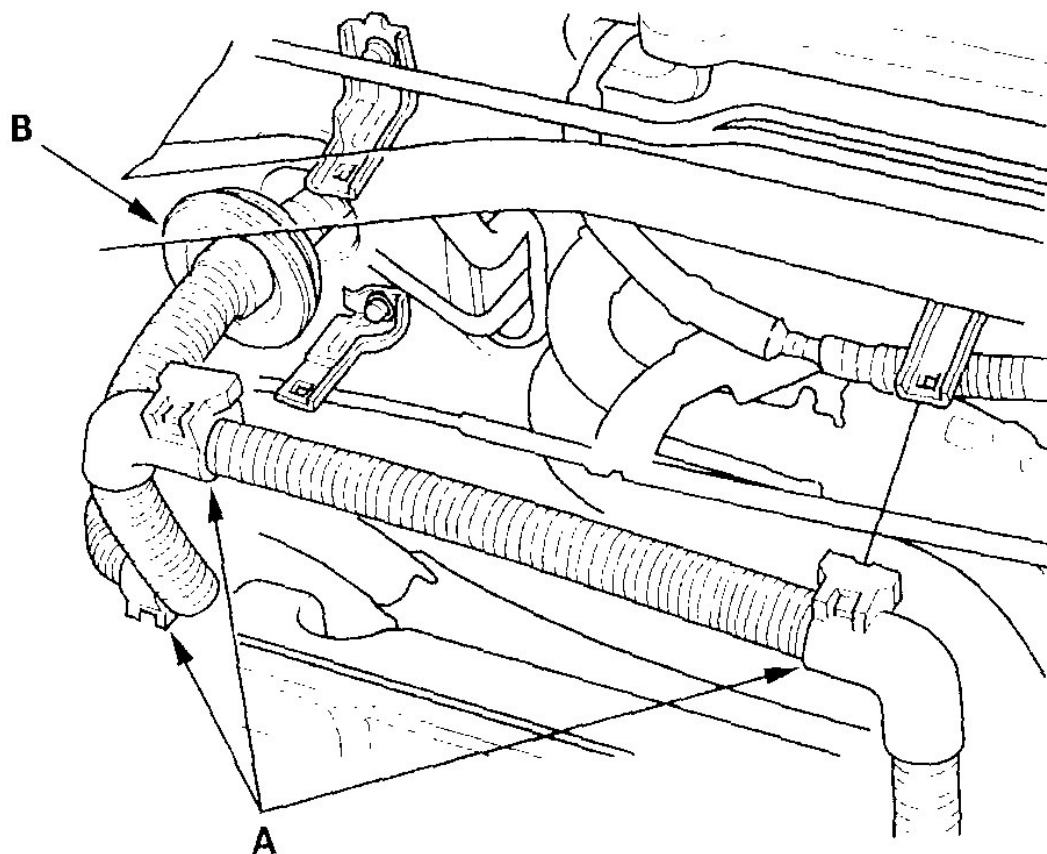
10. Disconnect the engine control module (ECM)/powertrain control module (PCM) connectors (A) and main wire harness connector (B).



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Fig. 6: Disconnecting ECM/PCM Connectors & Main Wire Harness Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

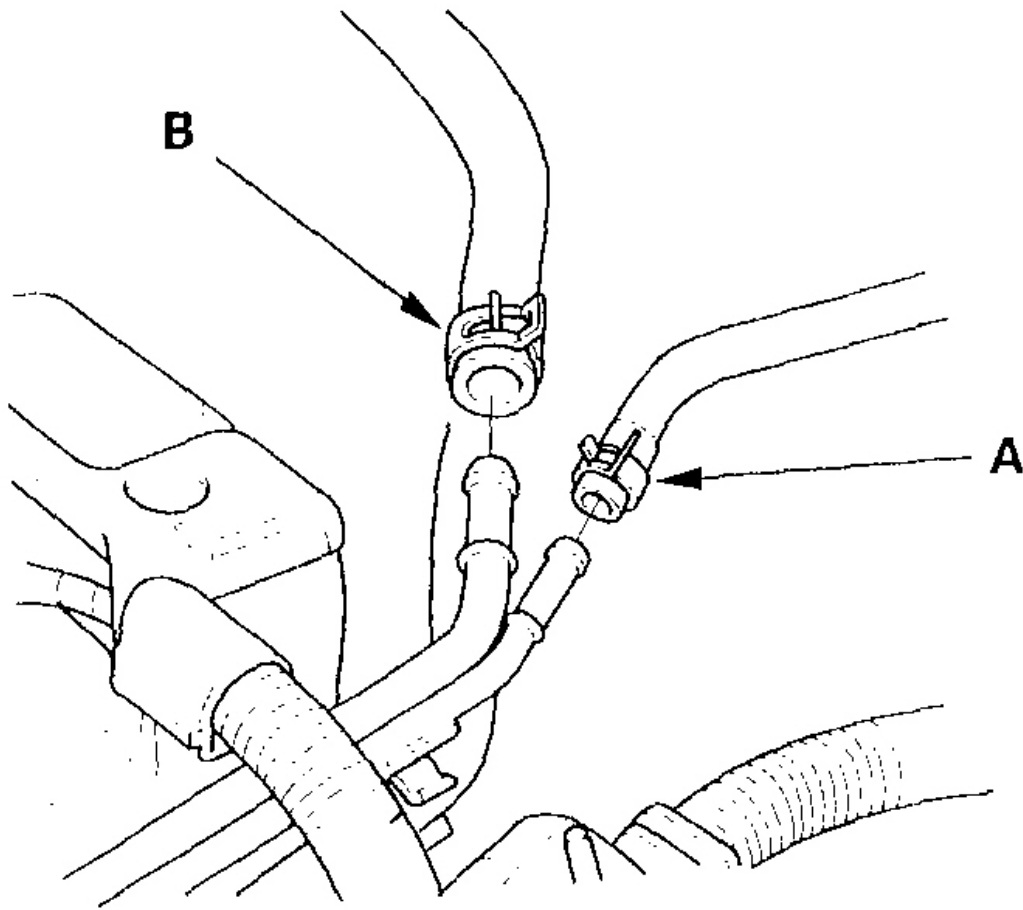
11. Remove the harness clamps (A) and grommet (B), then pull the engine wire harness through the bulkhead.



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Fig. 7: Removing Harness Clamps & Grommet
Courtesy of AMERICAN HONDA MOTOR CO., INC.

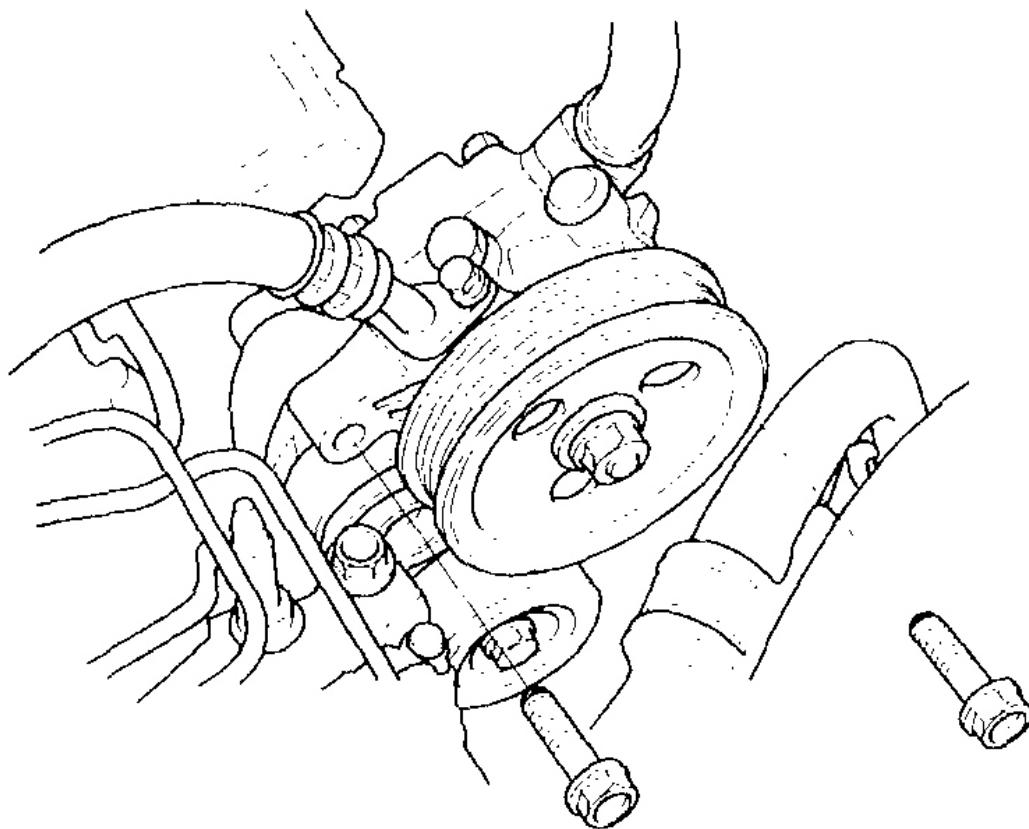
12. Relieve fuel pressure (see **FUEL PRESSURE TEST**).
13. Disconnect the fuel line (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).
14. Remove the evaporative emission (EVAP) canister hose (A) and brake booster vacuum hose (B).



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Fig. 8: Removing Evaporative Emission Canister Hose & Brake Booster Vacuum Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

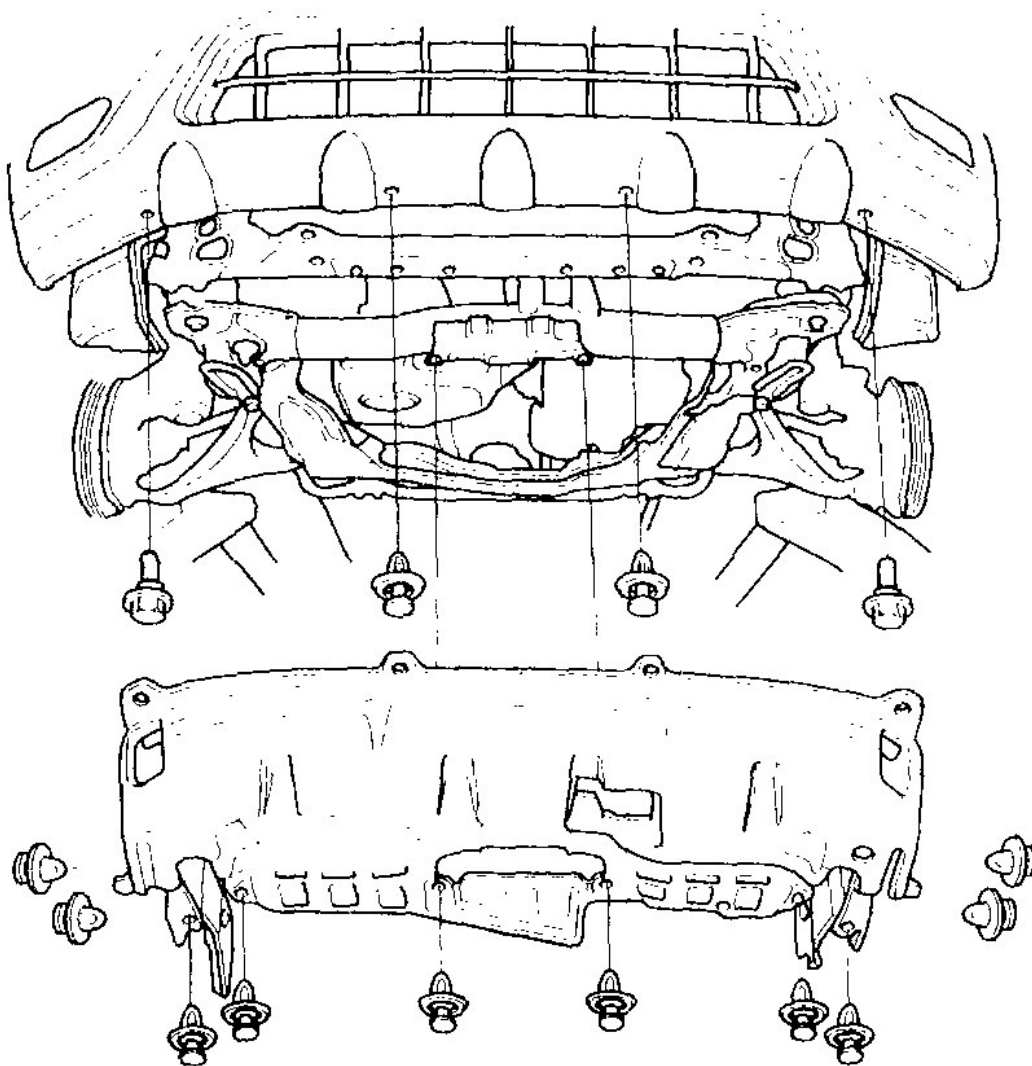
15. Remove the clutch slave cylinder and clutch line bracket (M/T) (see **SLAVE CYLINDER REPLACEMENT**).
16. Remove the shift cable and select cable (M/T) (see step 7 on **TRANSMISSION REMOVAL**).
17. Remove the drive belt (see **DRIVE BELT**).
18. Remove the power steering (P/S) pump without disconnecting the P/S hoses.



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Fig. 9: Removing Power Steering Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the radiator cap.
20. Raise the vehicle on the hoist to full height.
21. Remove the front tires/wheels.
22. Remove the splash shield.

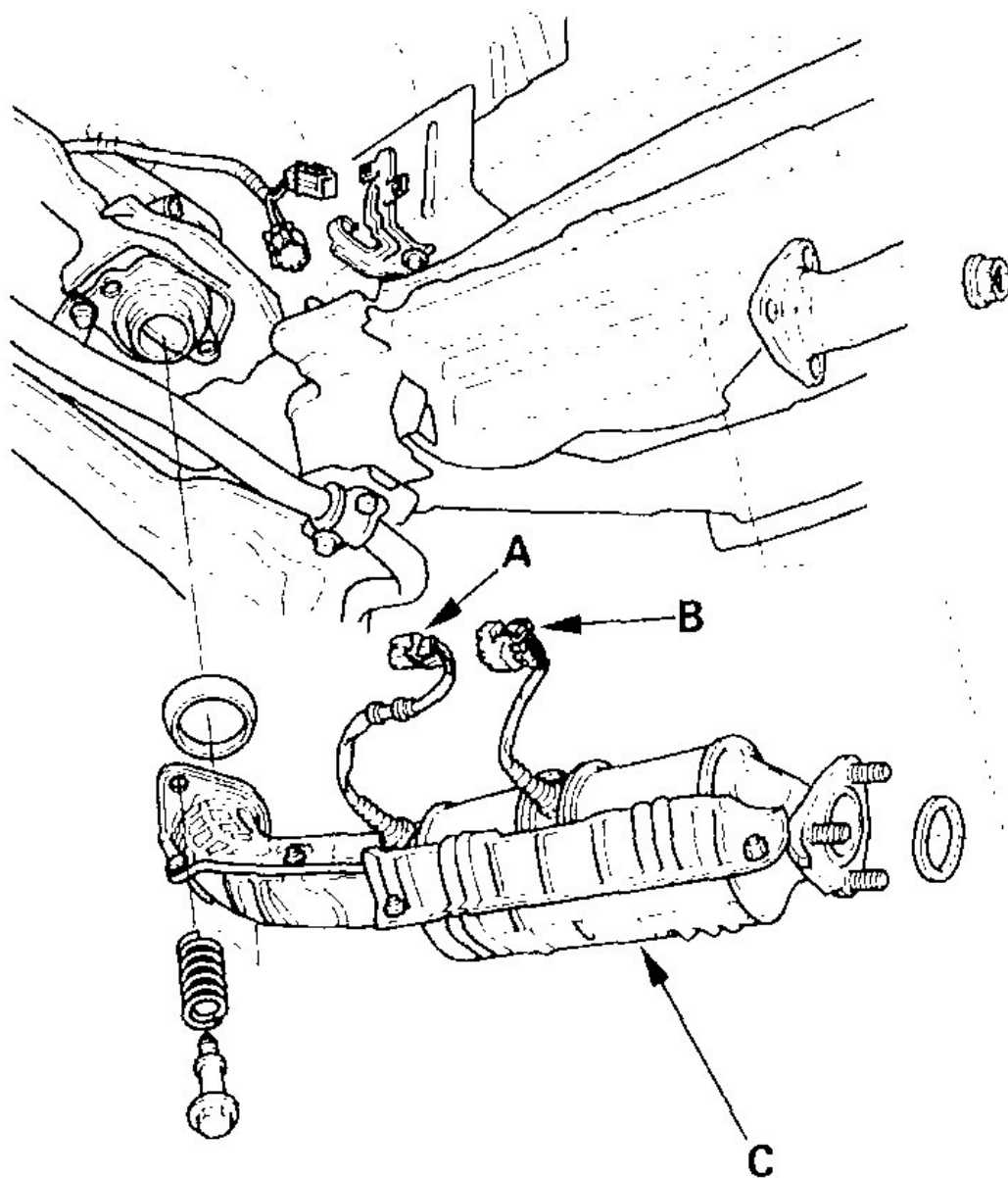


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Fig. 10: Removing Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Loosen the drain plug in the radiator, and drain the engine coolant (see **COOLANT REPLACEMENT**).
24. Drain the transmission fluid:
 - Manual transmission (see **TRANSMISSION FLUID INSPECTION AND REPLACEMENT**).
 - Automatic transmission (see **ATF REPLACEMENT**).
25. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
26. Disconnect air fuel ratio (A/F) sensor connector (A) and the secondary heated oxygen sensor (secondary HO2S) connector (B), then remove the three way catalytic converter (TWC) assembly (C).



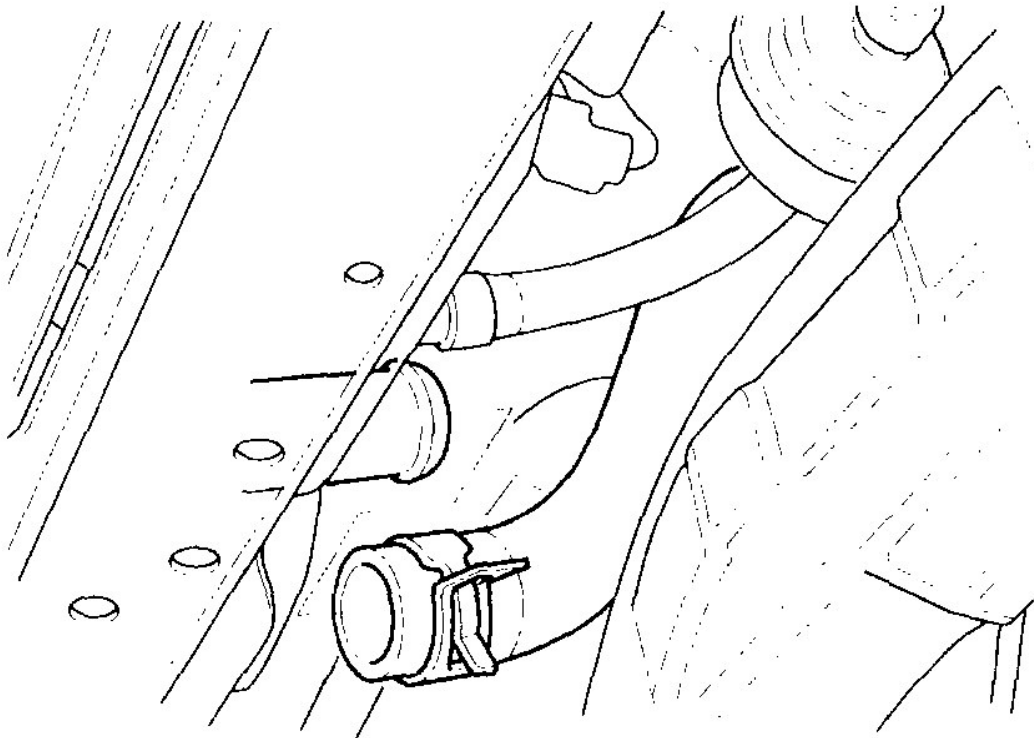
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Fig. 11: Disconnecting Air Fuel Ratio Sensor Connector & Secondary Heated Oxygen Sensor Connector

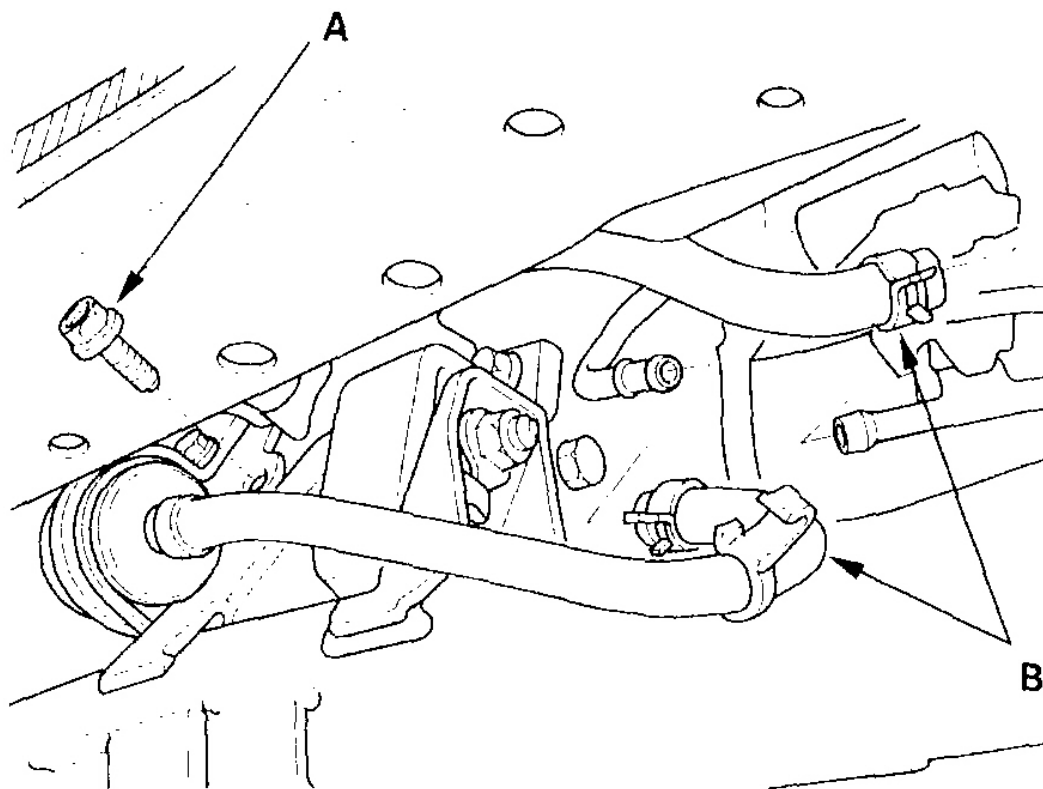
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Separate the propeller shaft from the transfer assembly (4WD models) (see **PROPELLER SHAFT INSPECTION**).

28. Disconnect the stabilizer links (see **STABILIZER LINK**).
29. Disconnect the suspension lower arm ball joints (see **LOWER ARM**).
30. Remove the driveshafts (see **AXLE SHAFTS**). Coat all precision finished surfaces with clean engine oil. Tie plastic bags over the driveshaft ends.
31. Remove the shift cable (A/T) (see **SHIFT CABLE REPLACEMENT**).
32. Remove the lower hose.

**G01473457****Fig. 12: Removing Lower Hose****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

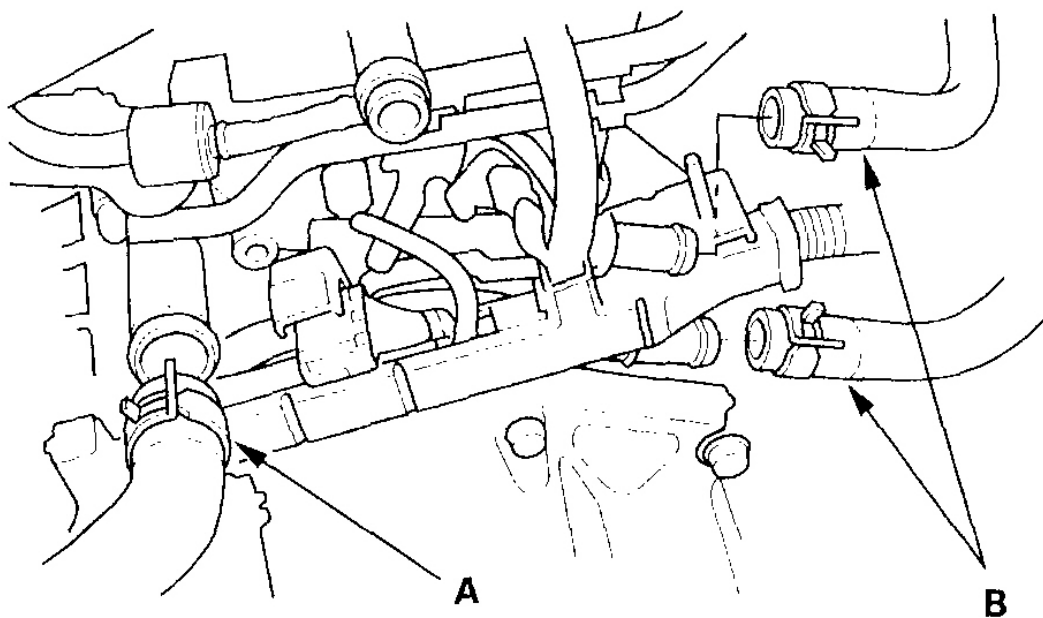
33. Remove the automatic transmission fluid (ATF) filter mounting bolt (A)(A/T).



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Fig. 13: Removing Automatic Transmission Fluid Filter Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

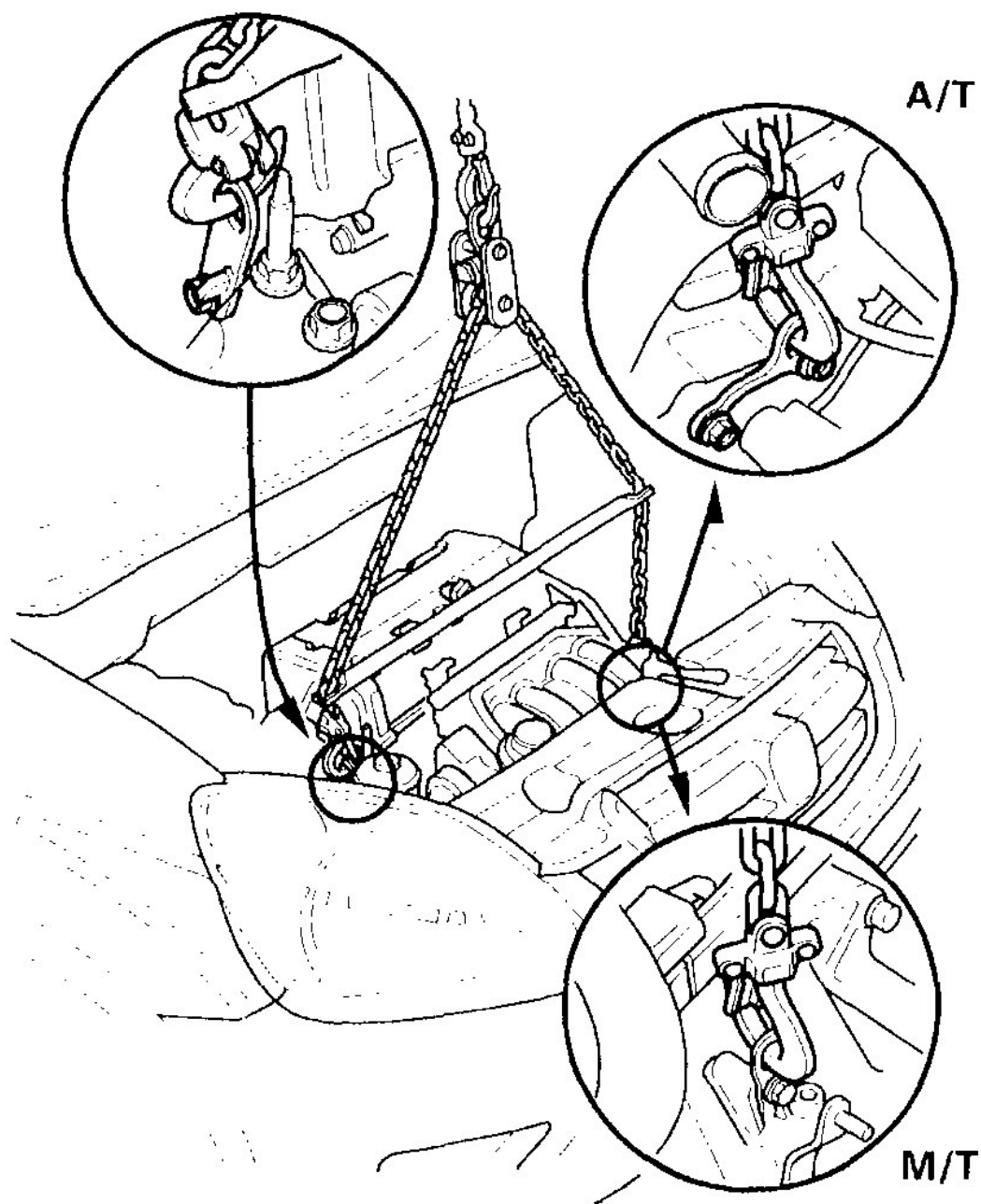
34. Remove the ATF cooler hoses (B), then plug the ATF cooler hoses and lines (A/T).
35. Lower the vehicle on the hoist.
36. Remove the upper radiator hose (A) and heater hoses (B).



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Fig. 14: Removing Upper Radiator Hose & Heater Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

37. Attach the chain hoist to the engine as shown.

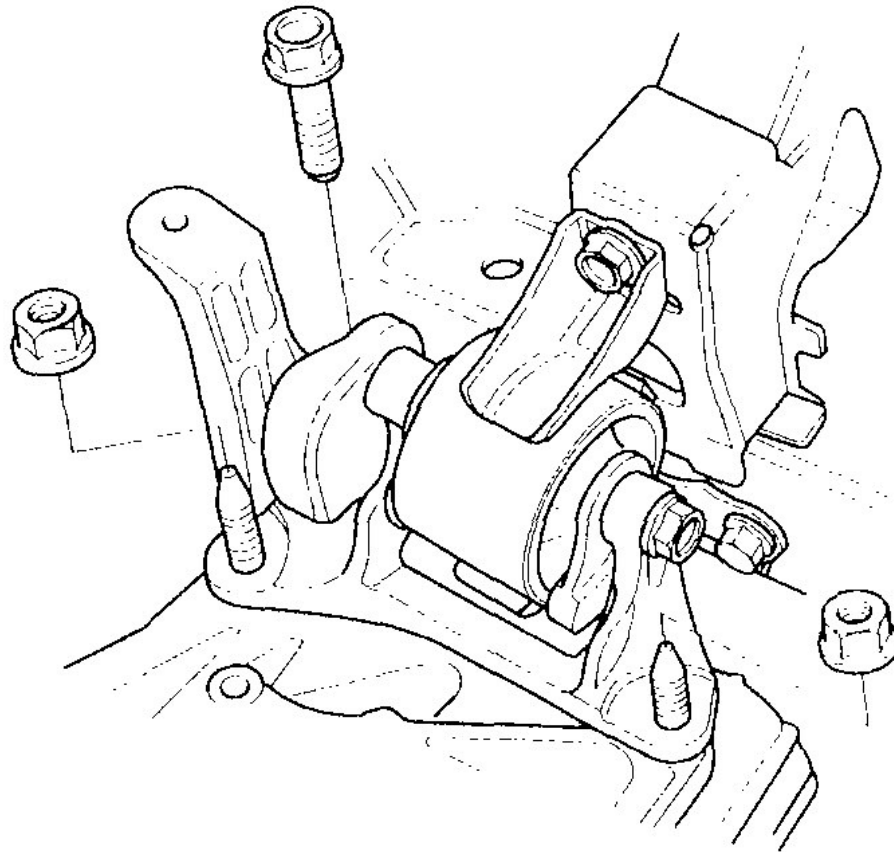


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Fig. 15: Attaching Chain Hoist To The Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

38. Remove the transmission mount bracket support bolt/nuts.

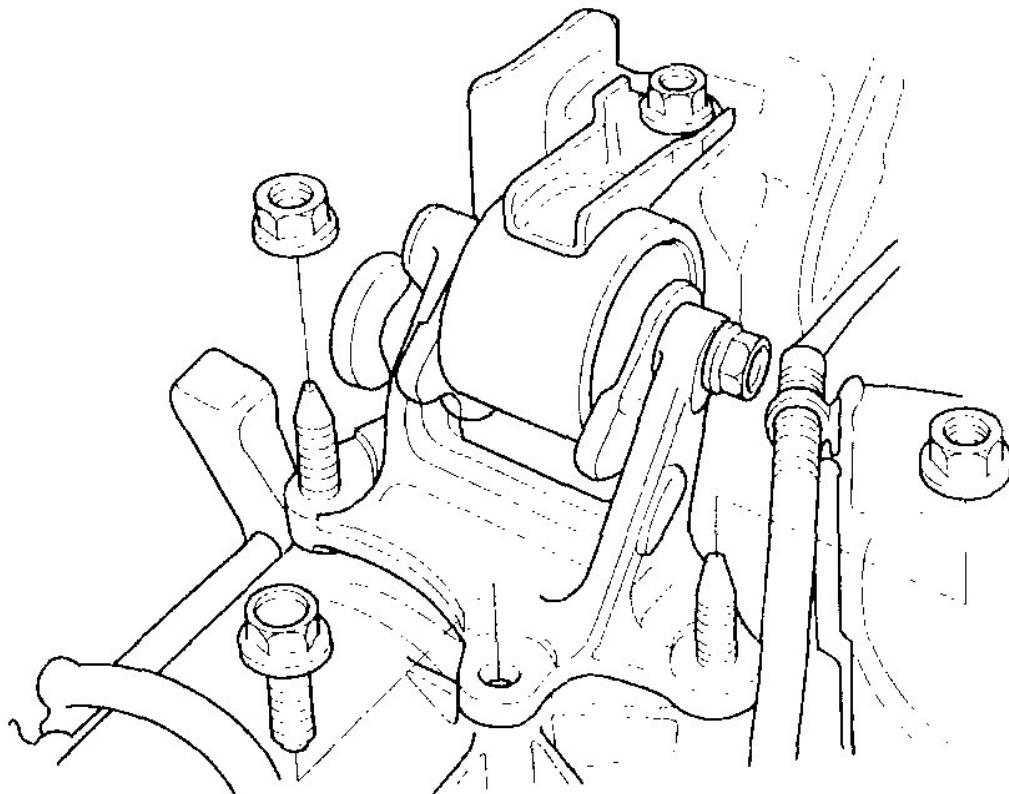
M/T:



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Fig. 16: Removing Transmission Mount Bracket Support Bolt/Nuts (M/T)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

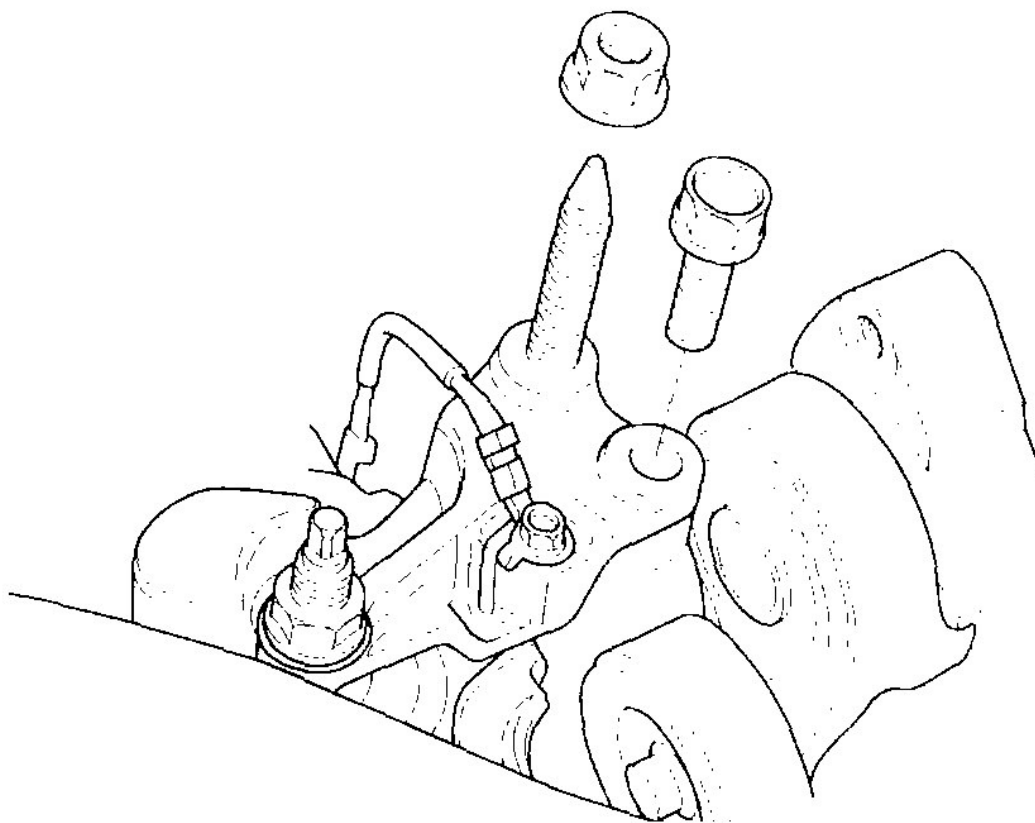
A/T:



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Fig. 17: Removing Transmission Mount Bracket Support Bolt/Nuts (A/T)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

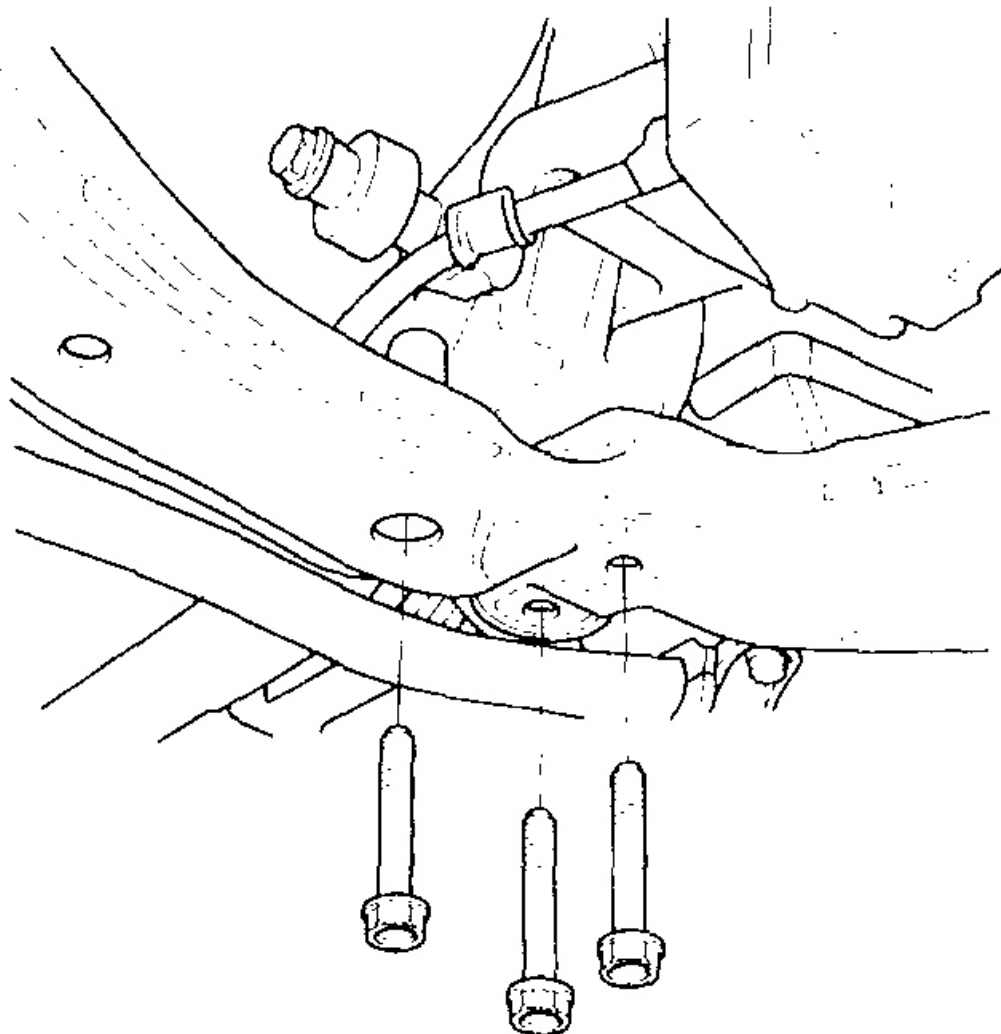
39. Remove the upper bracket mounting bolt and nut.



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Fig. 18: Removing Upper Bracket Mounting Bolt & Nut
Courtesy of AMERICAN HONDA MOTOR CO., INC.

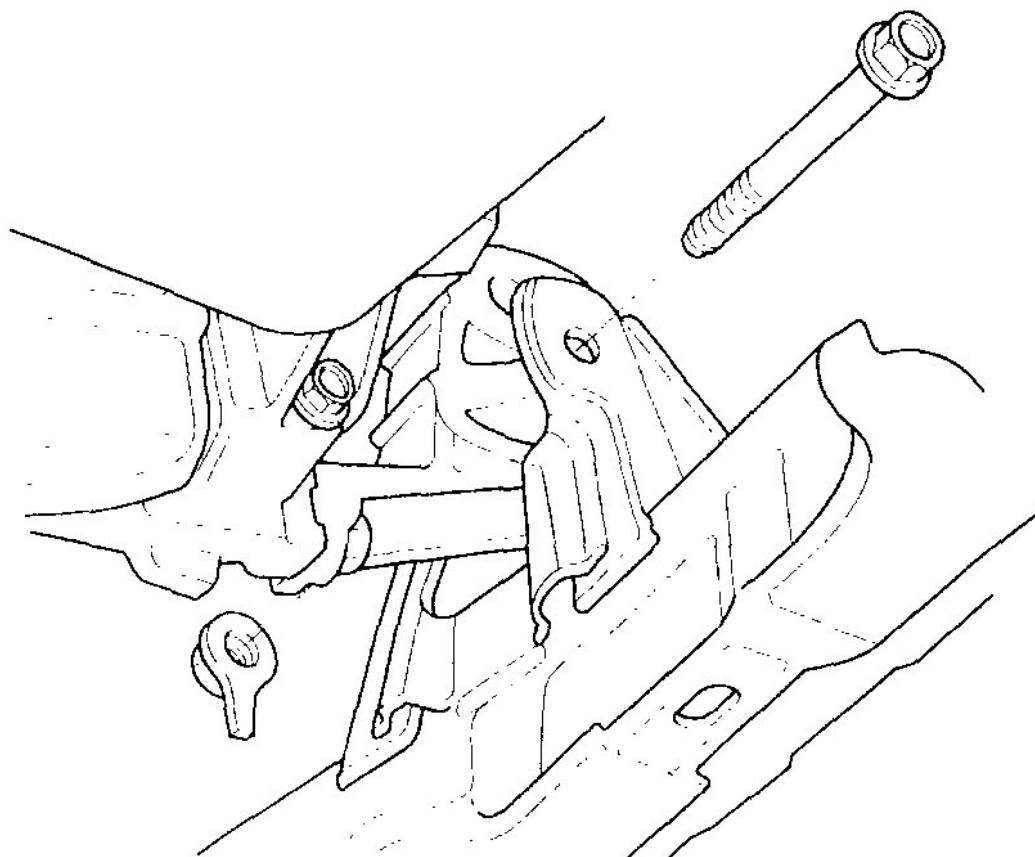
40. Make sure the hoist brackets are positioned properly. Raise the vehicle on the hoist to full height.
41. Remove the rear mount mounting bolts.



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Fig. 19: Removing Rear Mount Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

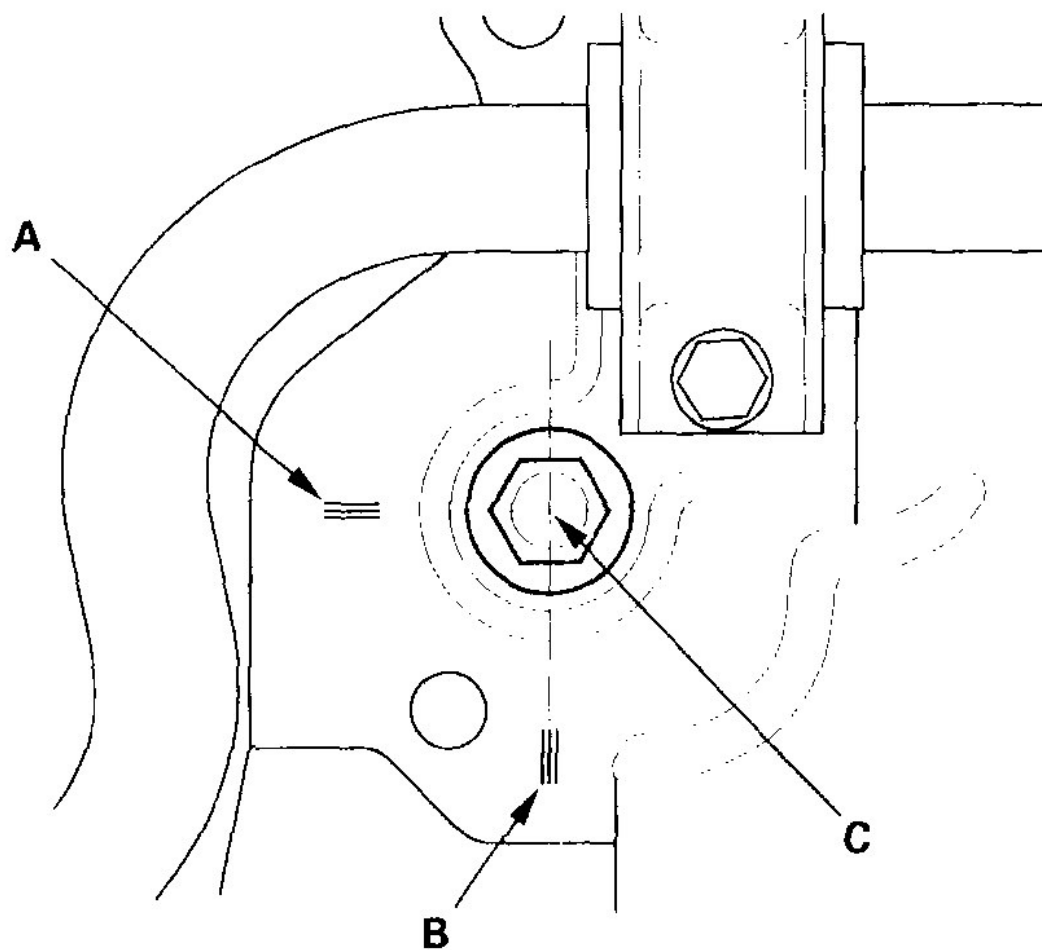
42. Remove the front mount bracket mounting bolt.



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Fig. 20: Removing Front Mount Bracket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

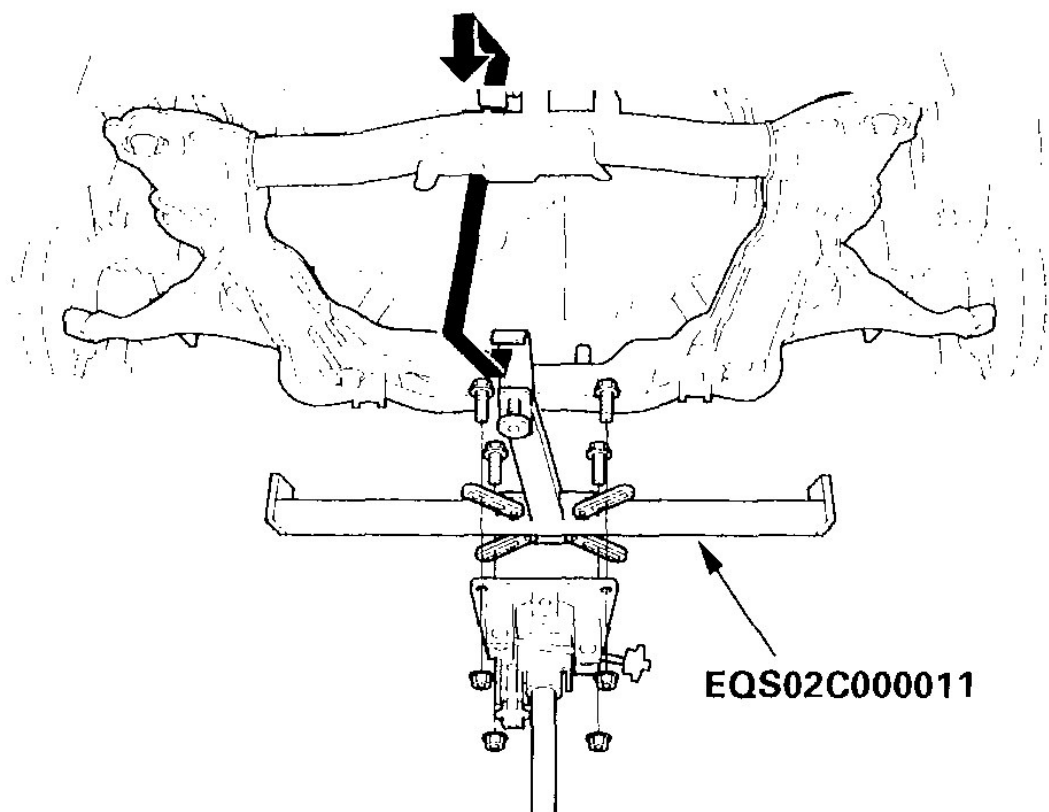
43. Make the appropriate reference lines at positions A and B that line up with the center of the subframe mounting bolts (C).



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Fig. 21: Identifying Subframe Mounting Bolts Reference Lines
Courtesy of AMERICAN HONDA MOTOR CO., INC.

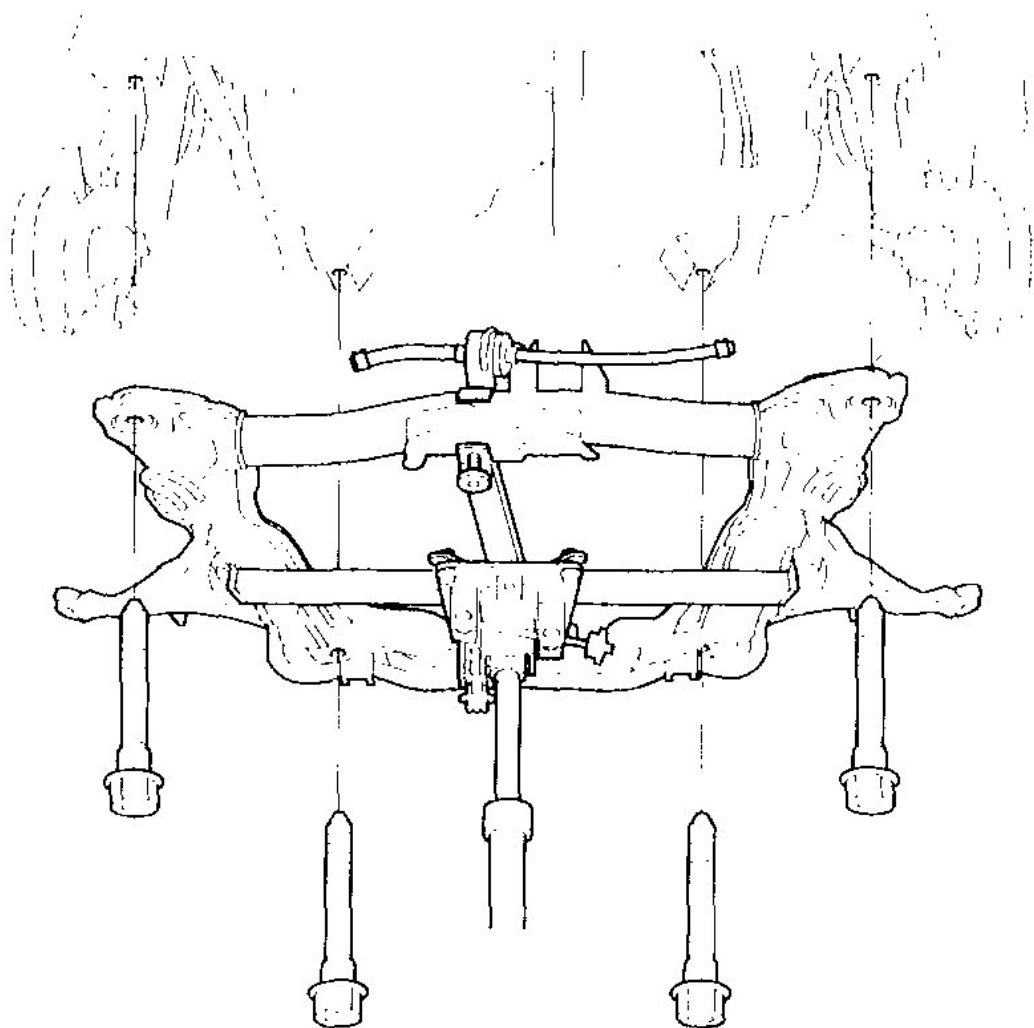
44. Attach the special tool to the subframe with hanging the hook of the special tool over the front of the subframe, then tighten the special tool screw.



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Fig. 22: Attaching Special Tool To The Subframe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

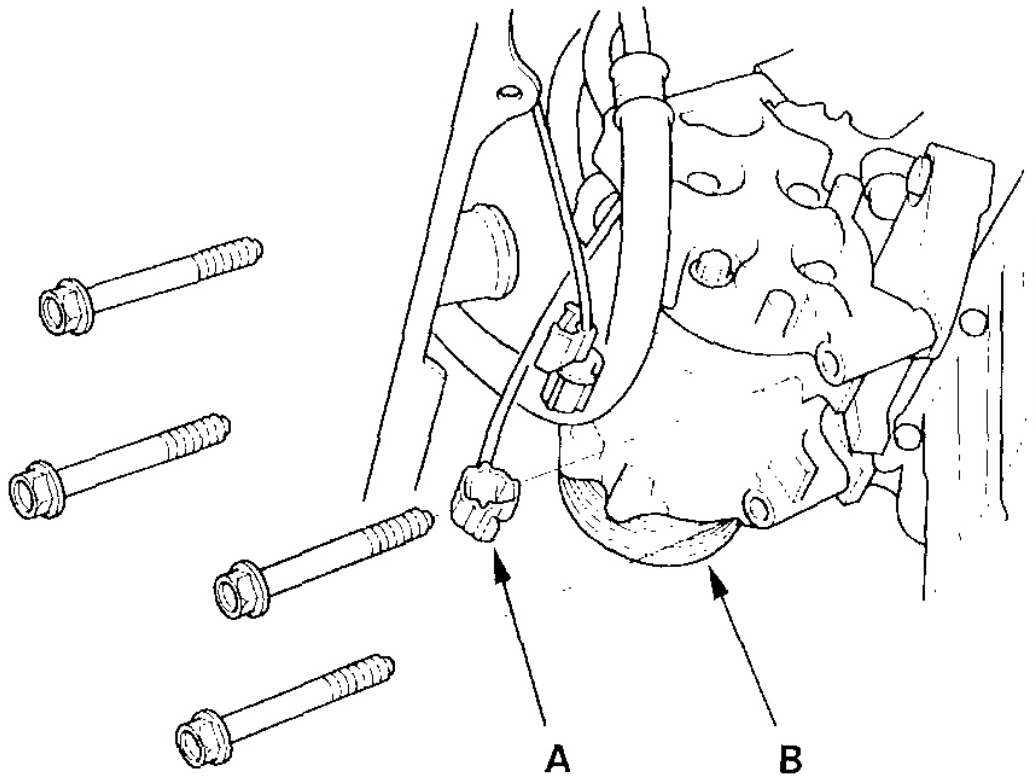
45. Raise the jack and line up the slots in the arms with the bolt holes on the corner of the jack base, then attach them with the bolts securely.
46. Remove the four subframe mounting bolts, then lower the subframe.



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Fig. 23: Removing Four Subframe Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

47. Disconnect the compressor clutch connector (A), then remove the A/C compressor (B) without disconnecting the A/C hoses.



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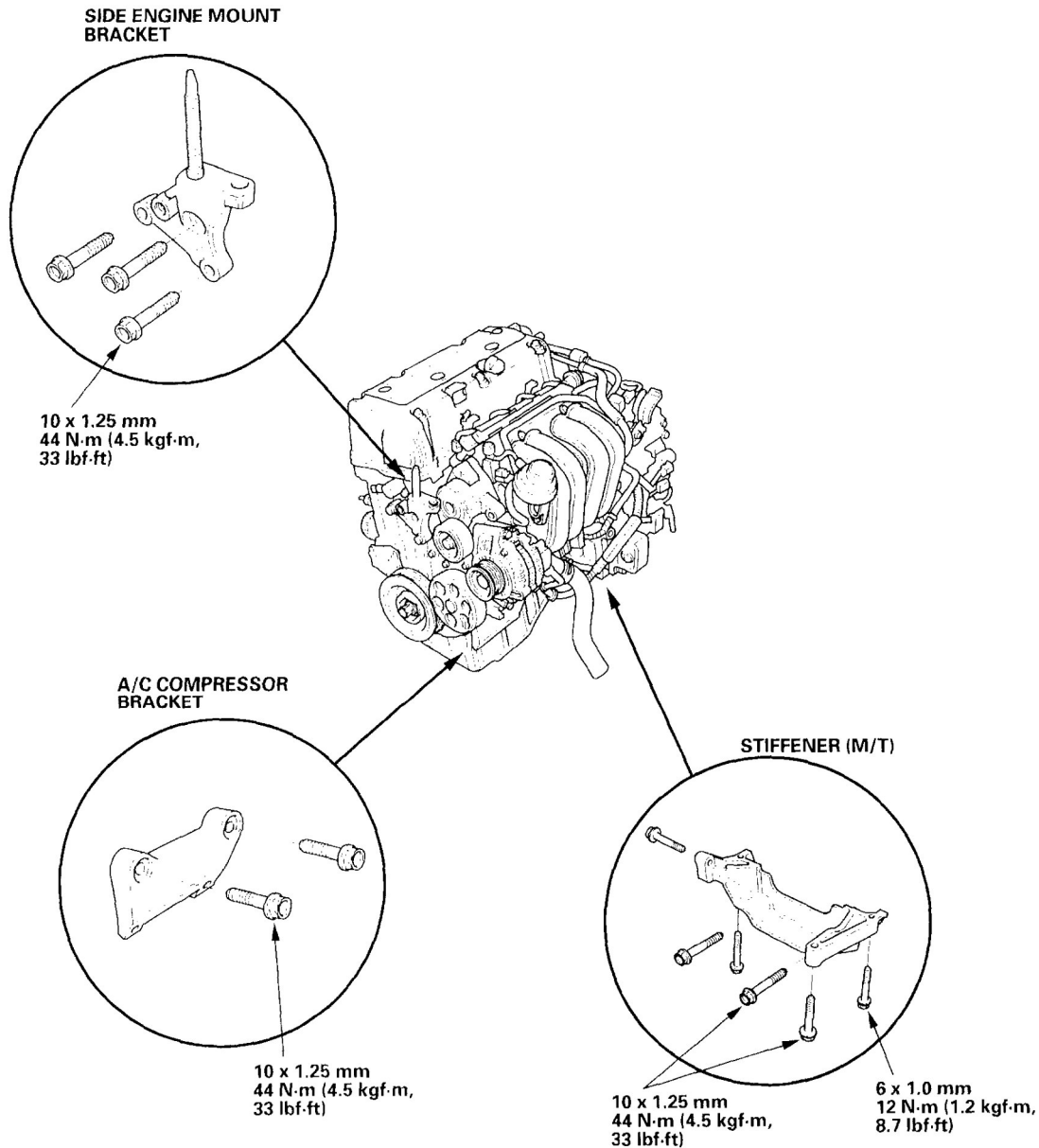
Fig. 24: Removing A/C Compressor

Courtesy of AMERICAN HONDA MOTOR CO., INC.

48. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.
49. Slowly lower the engine about 150 mm (6 in.). Check once again that all hoses and wires are disconnected from the engine/transmission.
50. Lower the engine/transmission assembly all the way. Remove the chain hoist from the engine.
51. Remove the engine/transmission assembly from under the vehicle.

ENGINE INSTALLATION

1. Install the accessory brackets, and tighten their bolts and nuts to the specified torques.



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Fig. 25: Installing Accessory Brackets

Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Position the engine under the vehicle. Attach the chain hoist to the engine, then lift the engine into position in the vehicle.

NOTE: Reinstall the mounting bolts/support nuts in the sequence given. Failure to follow this sequence may cause excessive noise and vibration, and reduce bushing life.

3. Install the A/C compressor (A), and connect the compressor clutch connector (B).

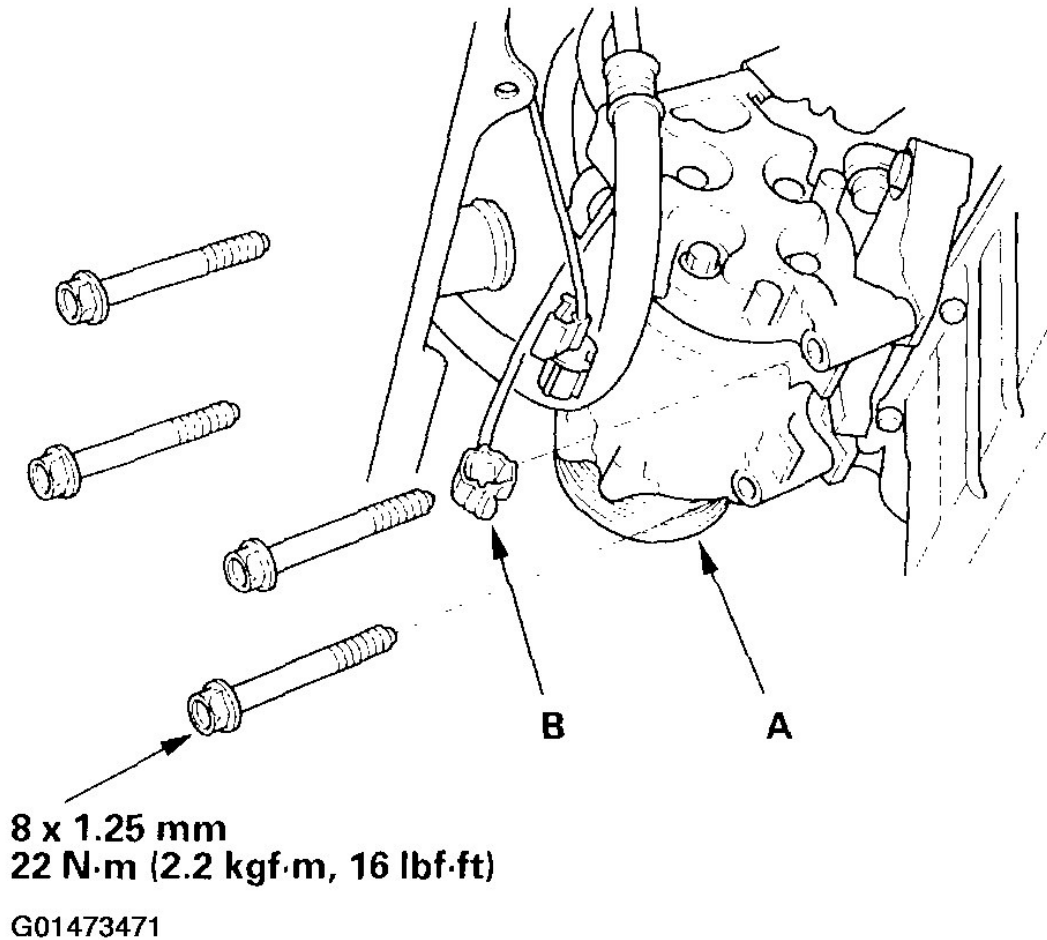
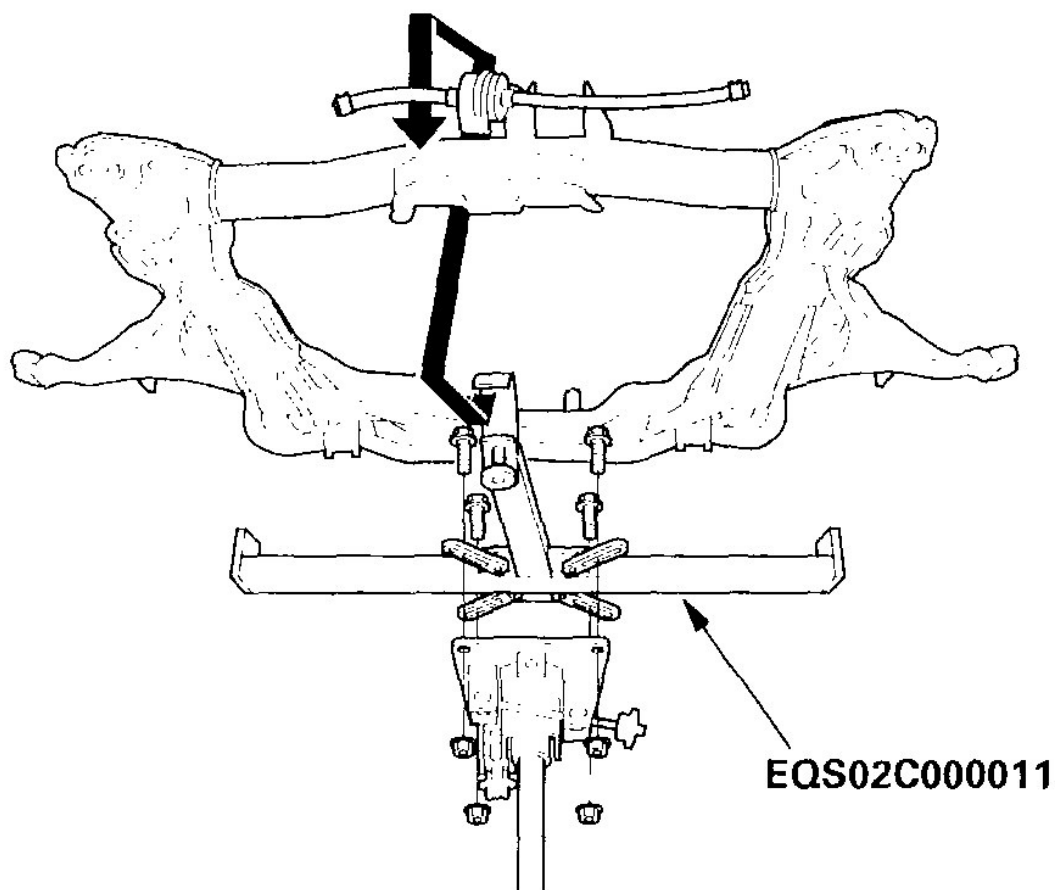


Fig. 26: Installing A/C Compressor

Courtesy of AMERICAN HONDA MOTOR CO., INC.

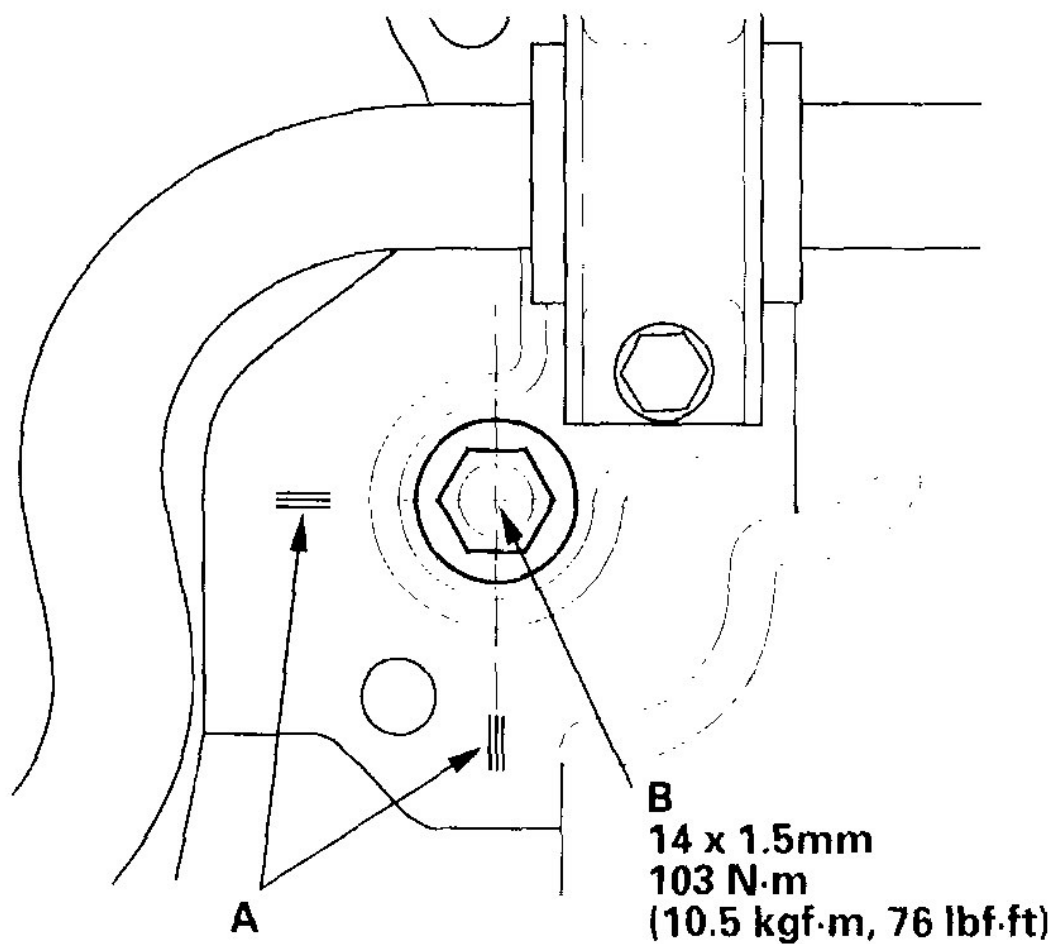
4. Support the subframe (A) with the special tool and a jack, and lift it up to the body.



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Fig. 27: Supporting Subframe With Special Tool
Courtesy of AMERICAN HONDA MOTOR CO., INC.

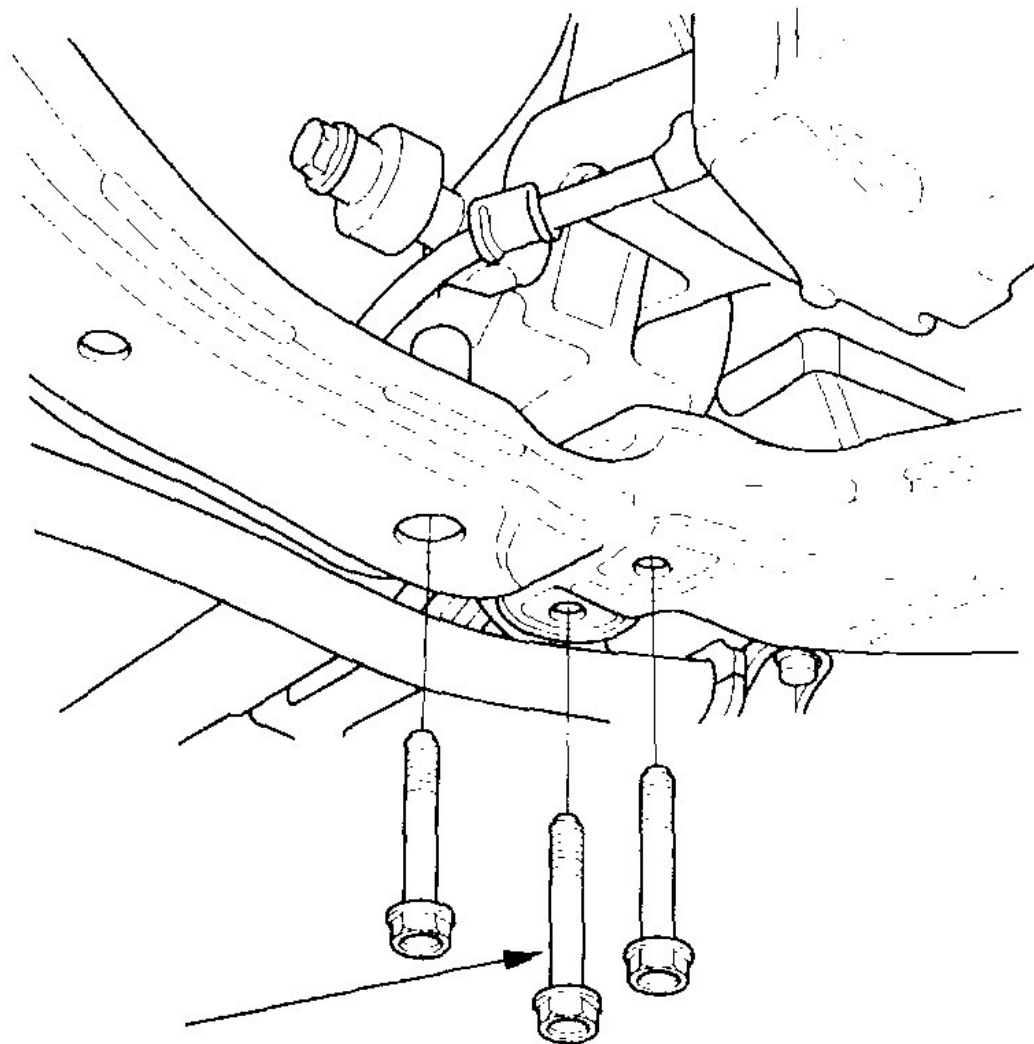
5. Loosely install the new subframe mounting bolts. Remove the special tool.
6. Align the reference marks (A) with the center of the subframe mounting bolts (B), then tighten the bolts to the specified torque.



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Fig. 28: Aligning Reference Marks With The Center Of The Subframe Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the rear mount mounting bolts.

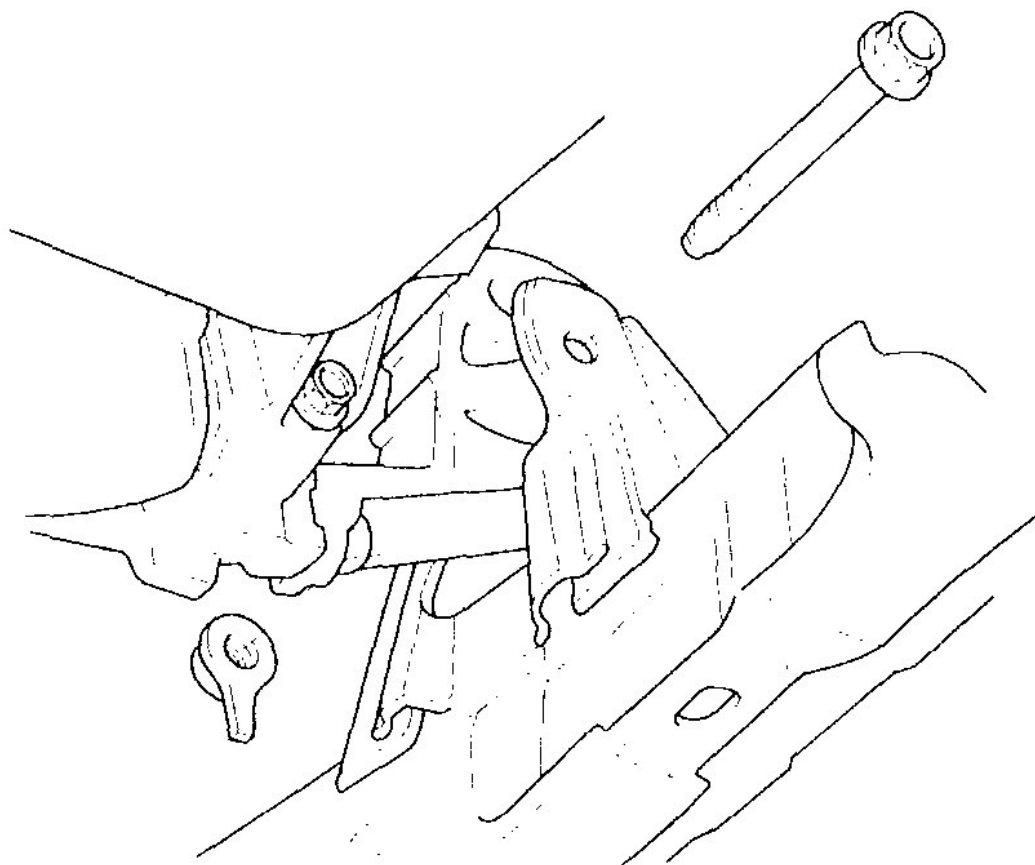


10 x 1.25 mm
59 N·m (6.0 kgf·m, 43 lbf·ft)

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Fig. 29: Tightening Rear Mount Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

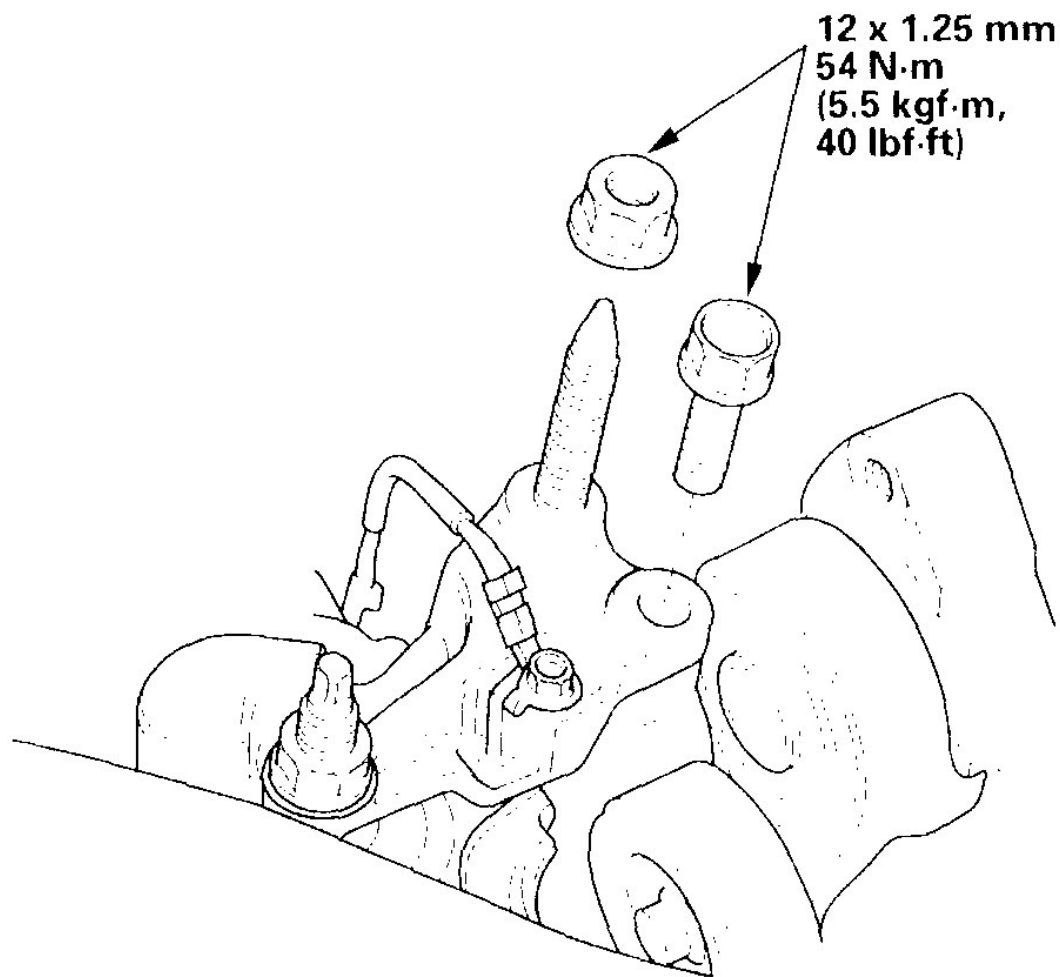
8. Loosely tighten the new front mount bracket mounting bolt.



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Fig. 30: Tightening New Front Mount Bracket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

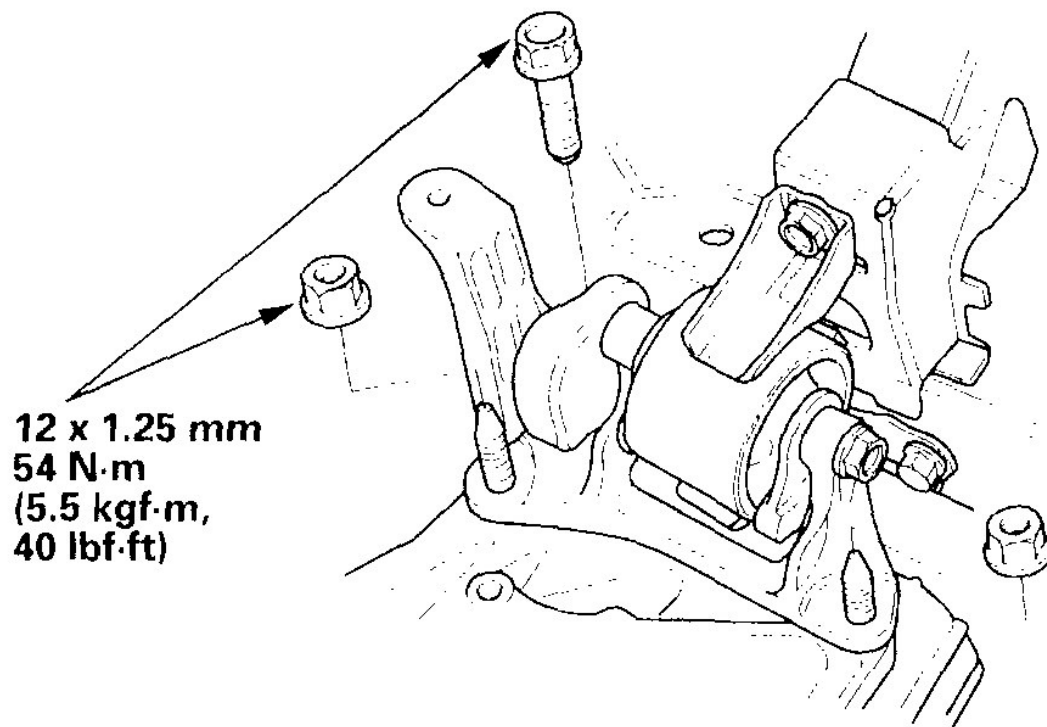
9. Lower the vehicle on the hoist.
10. Tighten the upper bracket mounting bolt and nut.



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Fig. 31: Tightening Upper Bracket Mounting Bolt & Nut
Courtesy of AMERICAN HONDA MOTOR CO., INC.

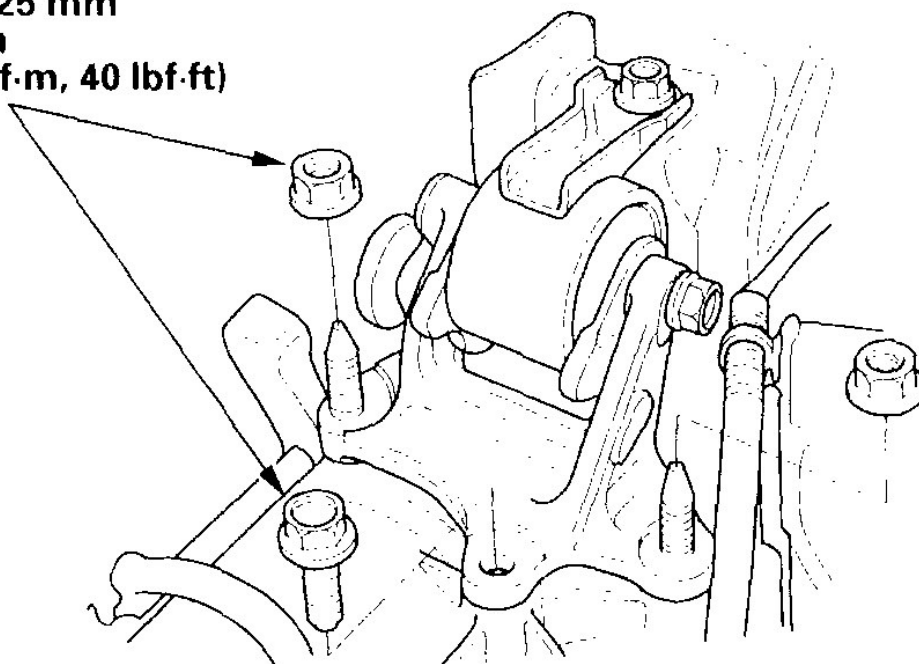
11. Tighten the transmission mount bracket support bolt/nuts.



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Fig. 32: Tightening Transmission Mount Bracket Support Bolt/Nuts (M/T)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

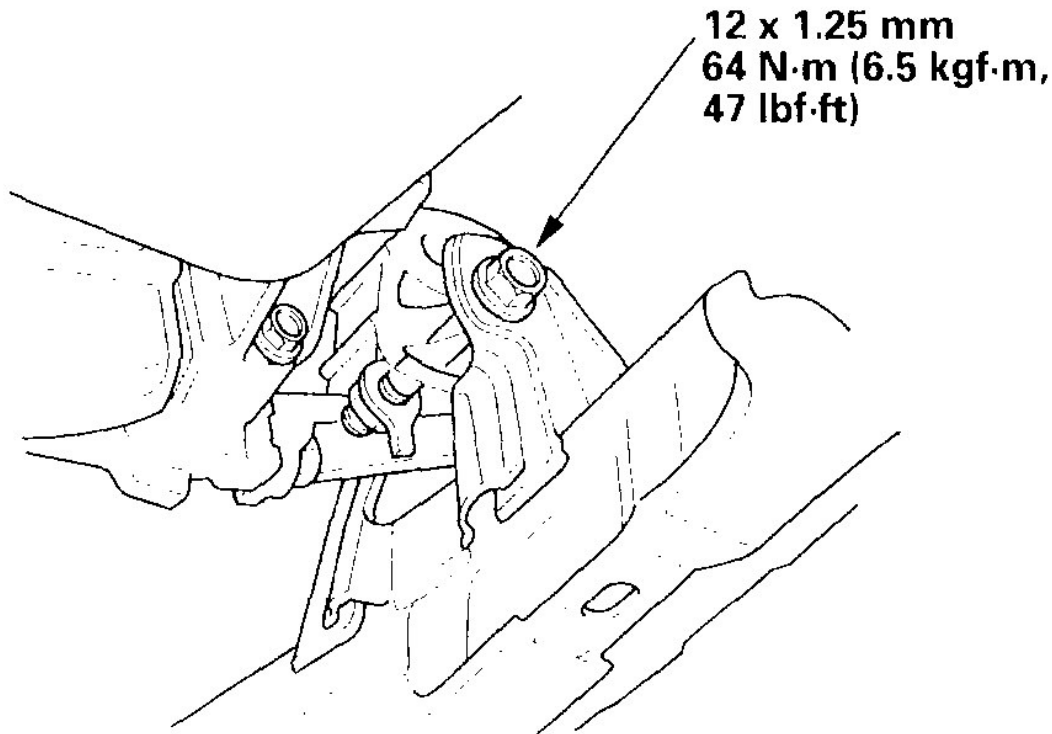
12 x 1.25 mm
54 N·m
(5.5 kgf·m, 40 lbf·ft)



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Fig. 33: Tightening Transmission Mount Bracket Support Bolt/Nuts (A/T)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

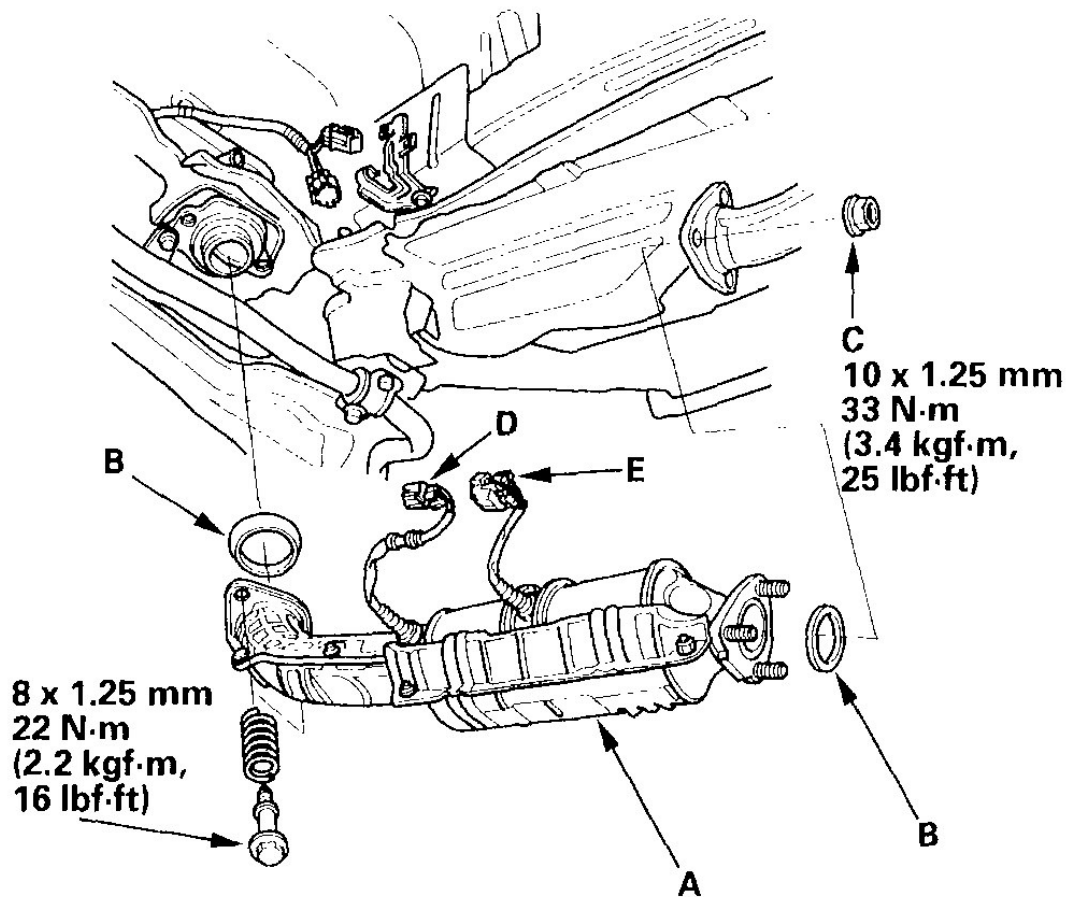
12. Raise the vehicle on the hoist to full height.
13. Loosen the front engine mount bracket mounting bolt, then tighten it to the specified torque.



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Fig. 34: Loosening Front Engine Mount Bracket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

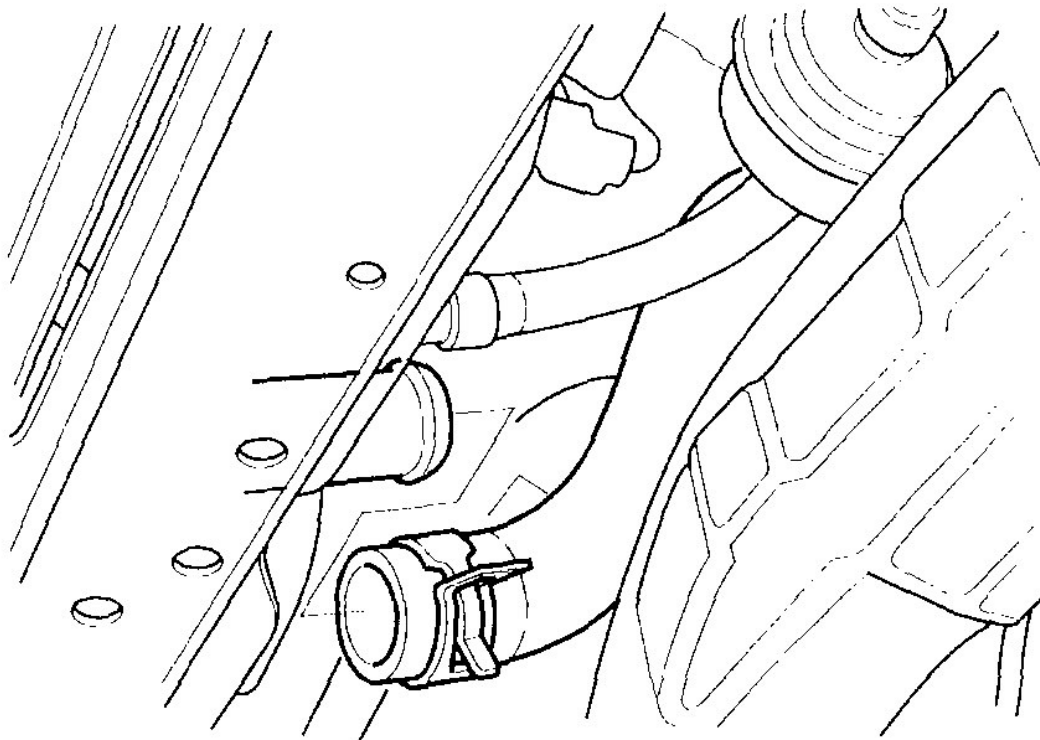
14. Lower the vehicle on the hoist.
15. Remove the chain hoist from the engine.
16. Raise the vehicle on the hoist to full height.
17. Install a new set ring on the end of each driveshaft, then install the driveshafts. Make sure each ring "clicks" into place in the differential and intermediate shaft.
18. Connect the suspension lower arm ball joints (see **LOWER ARM**).
19. Connect the stabilizer links (see **STABILIZER LINK**).
20. Install the propeller shaft on the transfer assembly (4WD) (see **PROPELLER SHAFT INSTALLATION**).
21. Install the shift cable (A/T) (see **SHIFT CABLE REPLACEMENT**).
22. Install the three way catalytic converter (TWC) assembly (A); use new gaskets (B) and new self locking nuts (C).



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Fig. 35: Installing Three Way Catalytic Converter Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Connect the air fuel ratio (A/F) sensor connector (D) and secondary heated oxygen sensor (secondary HO2S) connector (E).
24. Install the lower radiator hose.



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Fig. 36: Installing Lower Radiator Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Tighten the automatic transmission fluid (ATF) filter mounting bolt (A), and install the ATF cooler hoses (B) (A/T).

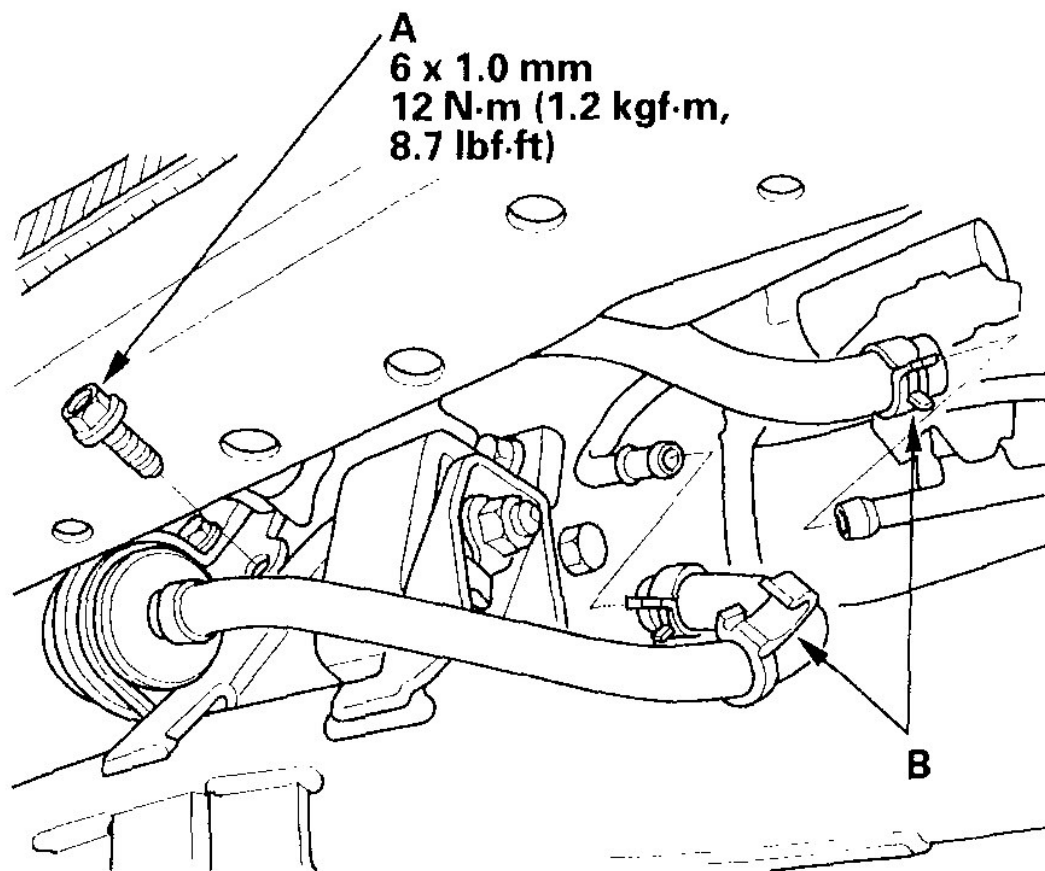
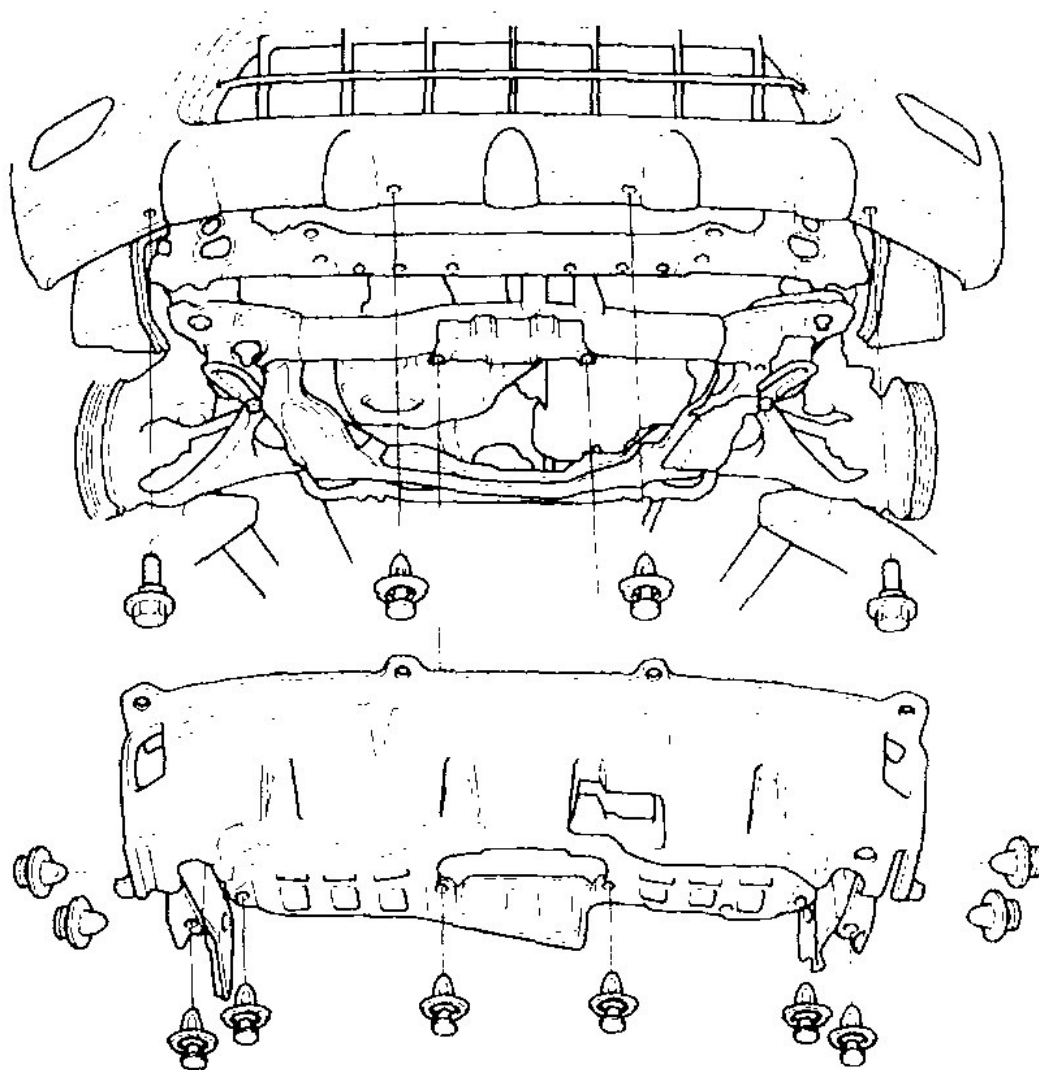


Fig. 37: Installing ATF Cooler Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Install the splash shield.

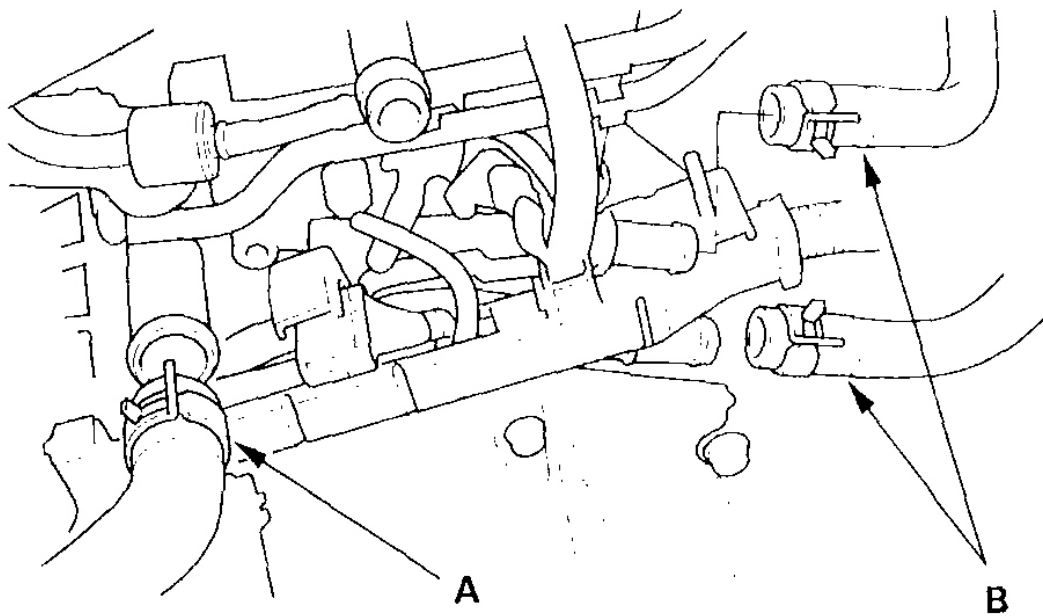


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Fig. 38: Installing Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

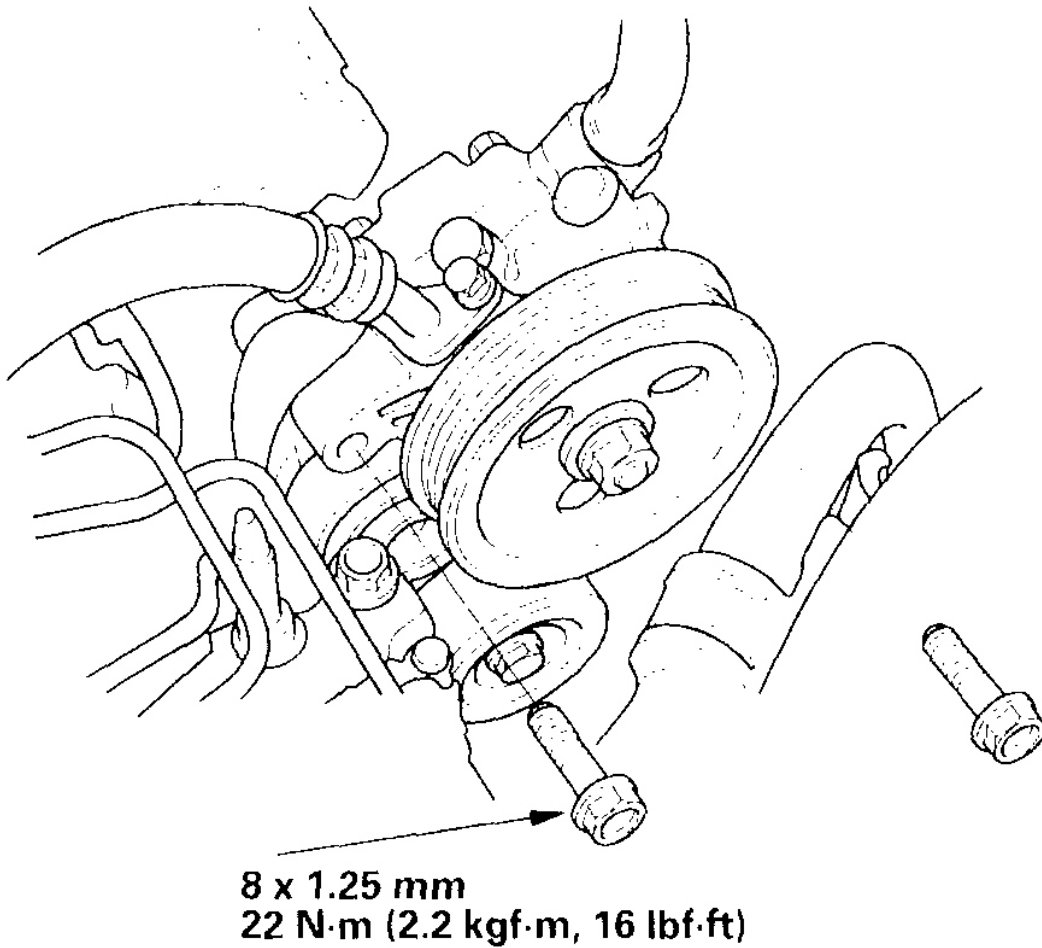
27. Lower the vehicle on the hoist.
28. Install the upper radiator hose (A) and heater hoses (B).



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Fig. 39: Installing Upper Radiator Hose & Heater Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Install the power steering (P/S) pump.



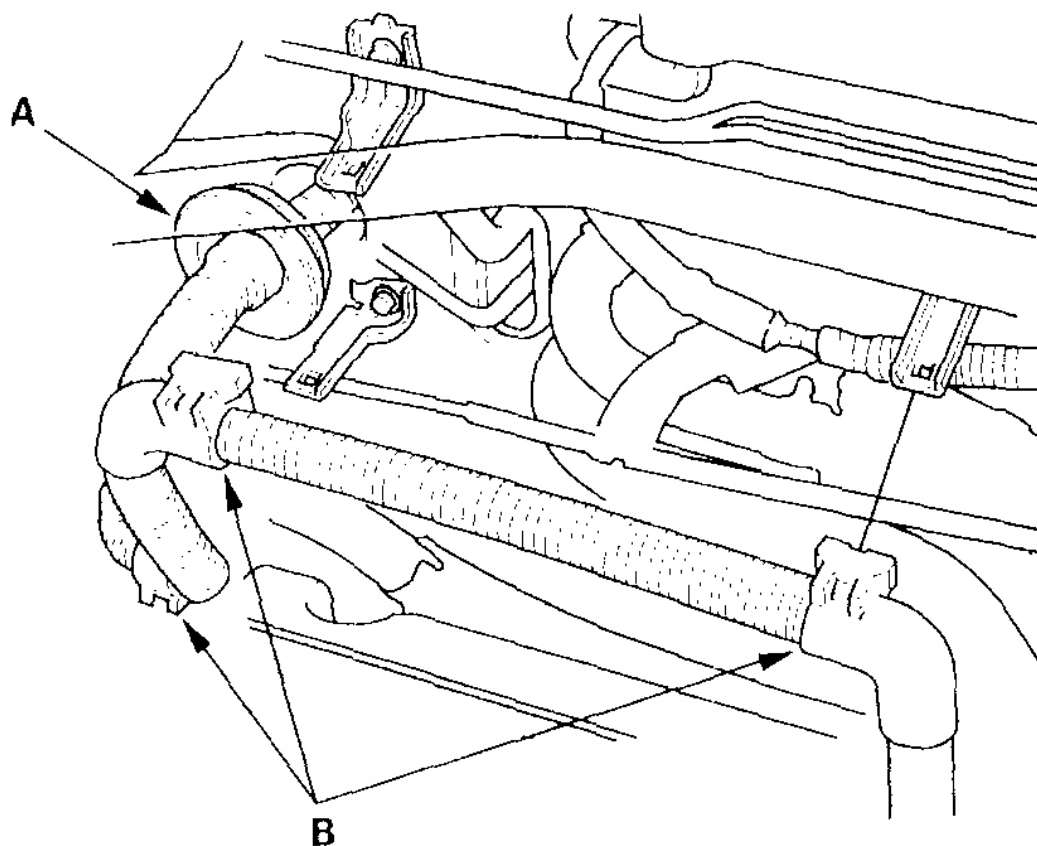
8 x 1.25 mm
22 N·m (2.2 kgf·m, 16 lbf·ft)

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Fig. 40: Installing Power Steering Pump

Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Install the drive belt (see **DRIVE BELT**).
31. Install the throttle cable (see **THROTTLE CABLE REMOVAL/INSTALLATION**), then adjust the cable (see **THROTTLE CABLE ADJUSTMENT**).
32. Install the cruise control actuator cable (see **CRUISE CONTROL ACTUATOR/CABLE REPLACEMENT**), then adjust the cable (see **CRUISE CONTROL ACTUATOR CABLE ADJUSTMENT**).
33. Push the engine control module (ECM)/powertrain control module (PCM) connectors through the bulkhead, then install the grommet (A).

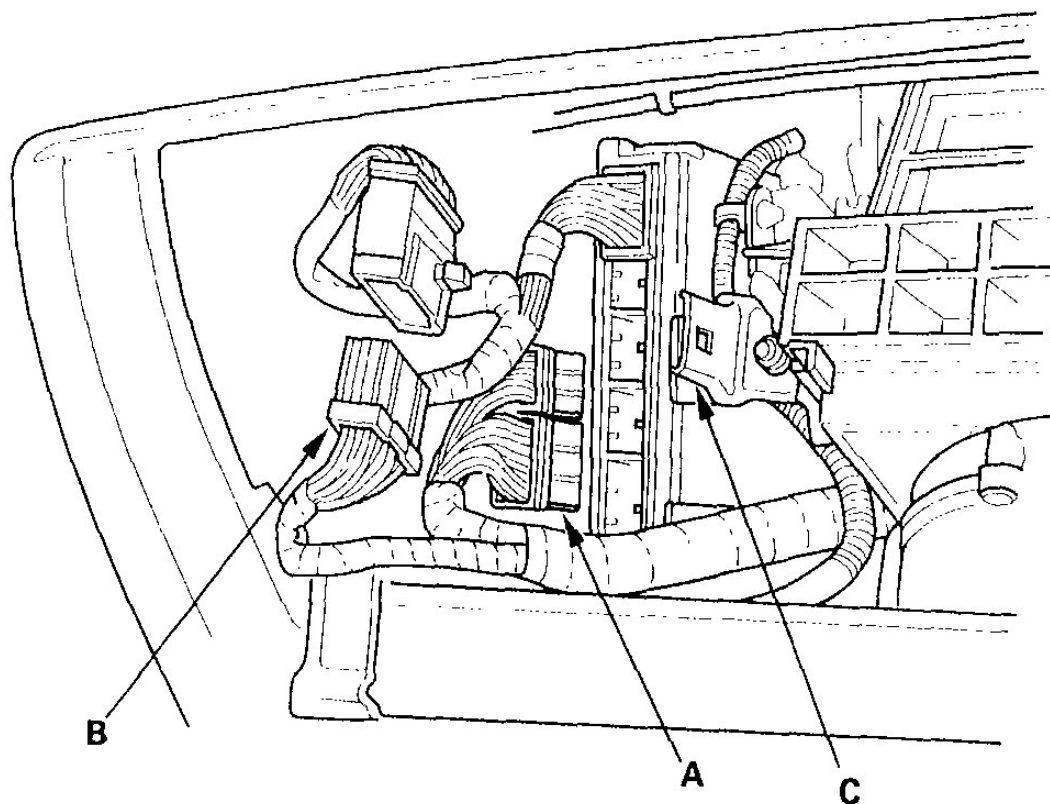


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Fig. 41: Installing Grommet

Courtesy of AMERICAN HONDA MOTOR CO., INC.

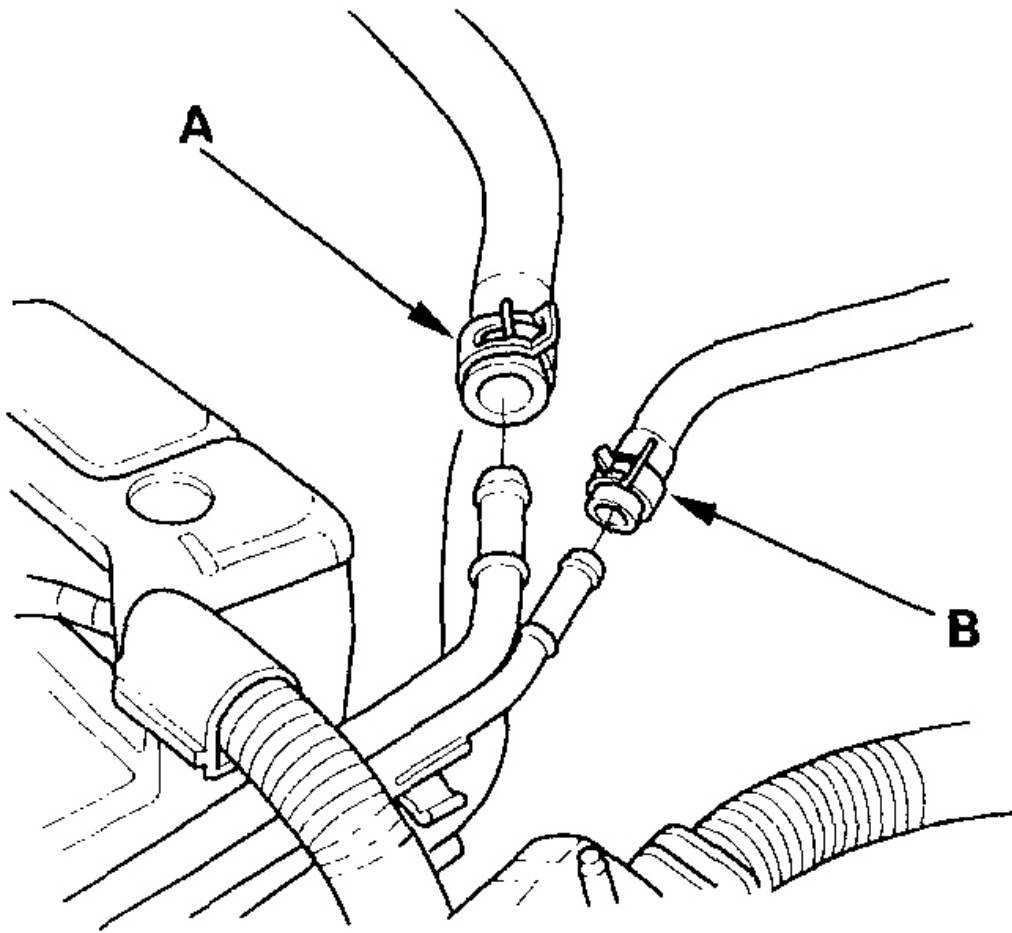
34. Install the harness clamps (B).
35. Connect the ECM/PCM connectors (A) and main wire harness connector (B). Attach the main wire harness connector to the connector holder (C).



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Fig. 42: Connecting ECM/PCM Connectors & Main Wire Harness Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

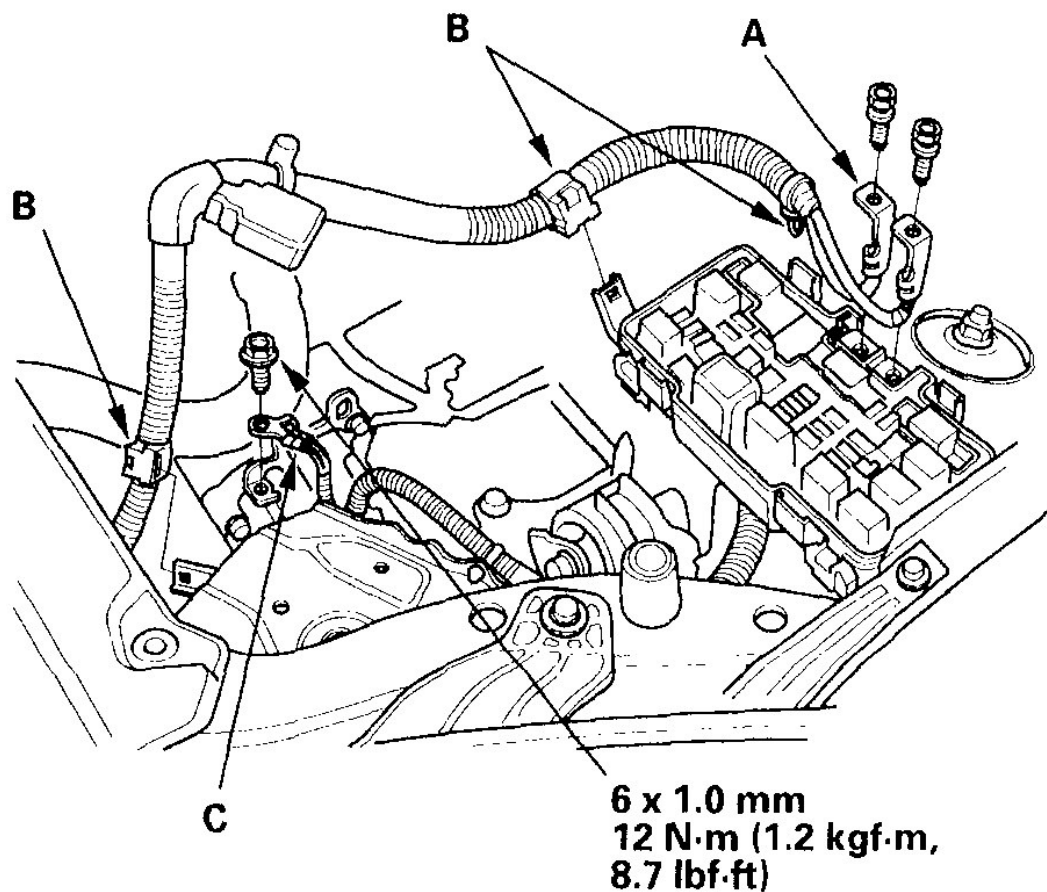
36. Install the brake booster vacuum hose (A) and the evaporative emission (EVAP) canister hose (B).



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Fig. 43: Installing Brake Booster Vacuum Hose & Evaporative Emission Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

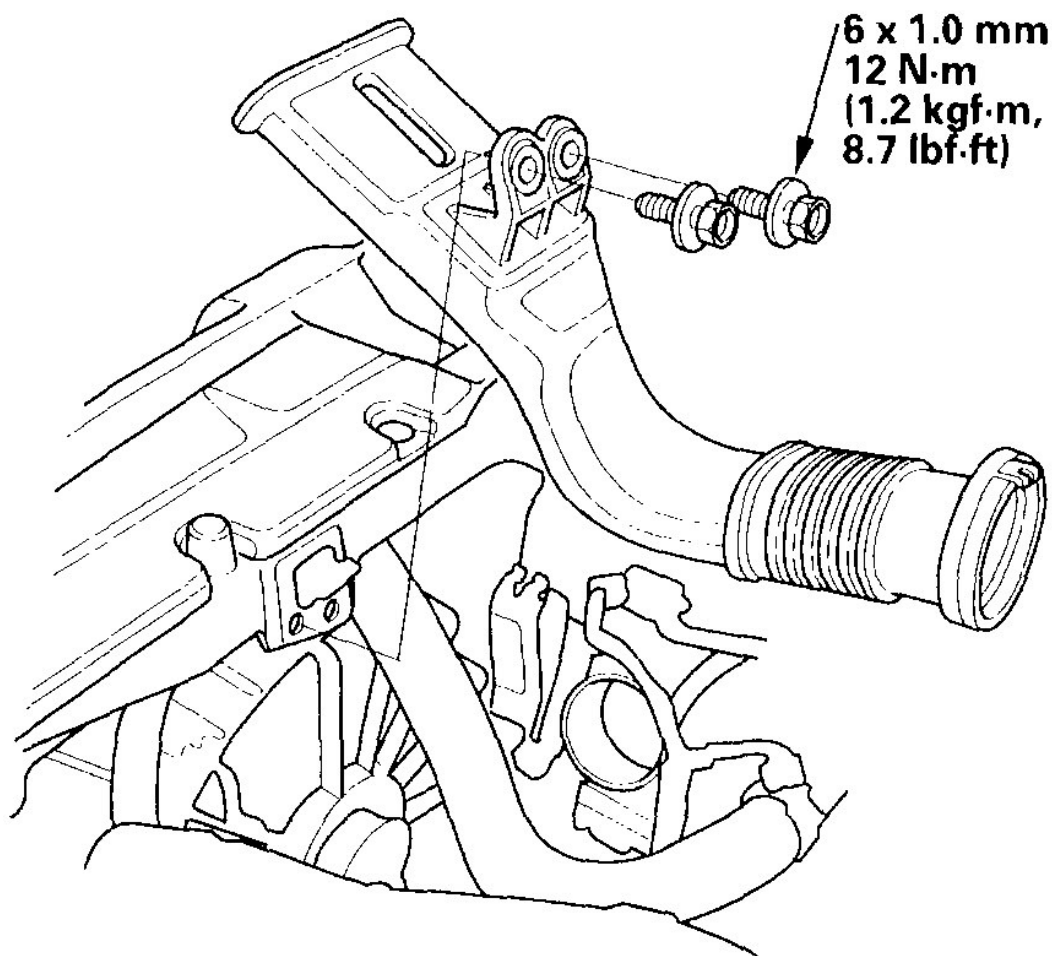
37. Connect the fuel line (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**).
38. Install the select cable and shift cable (M/T) (see **TRANSMISSION INSTALLATION**).
39. Install the clutch slave cylinder and clutch line bracket (M/T) (see **SLAVE CYLINDER REPLACEMENT**).
40. Install the battery cables (A) on the under-hood fuse/relay box, then install the harness clamps (B).



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Fig. 44: Installing Battery Cables & Harness Clamps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

41. Install the ground cable (C).
42. Install the intake air duct.

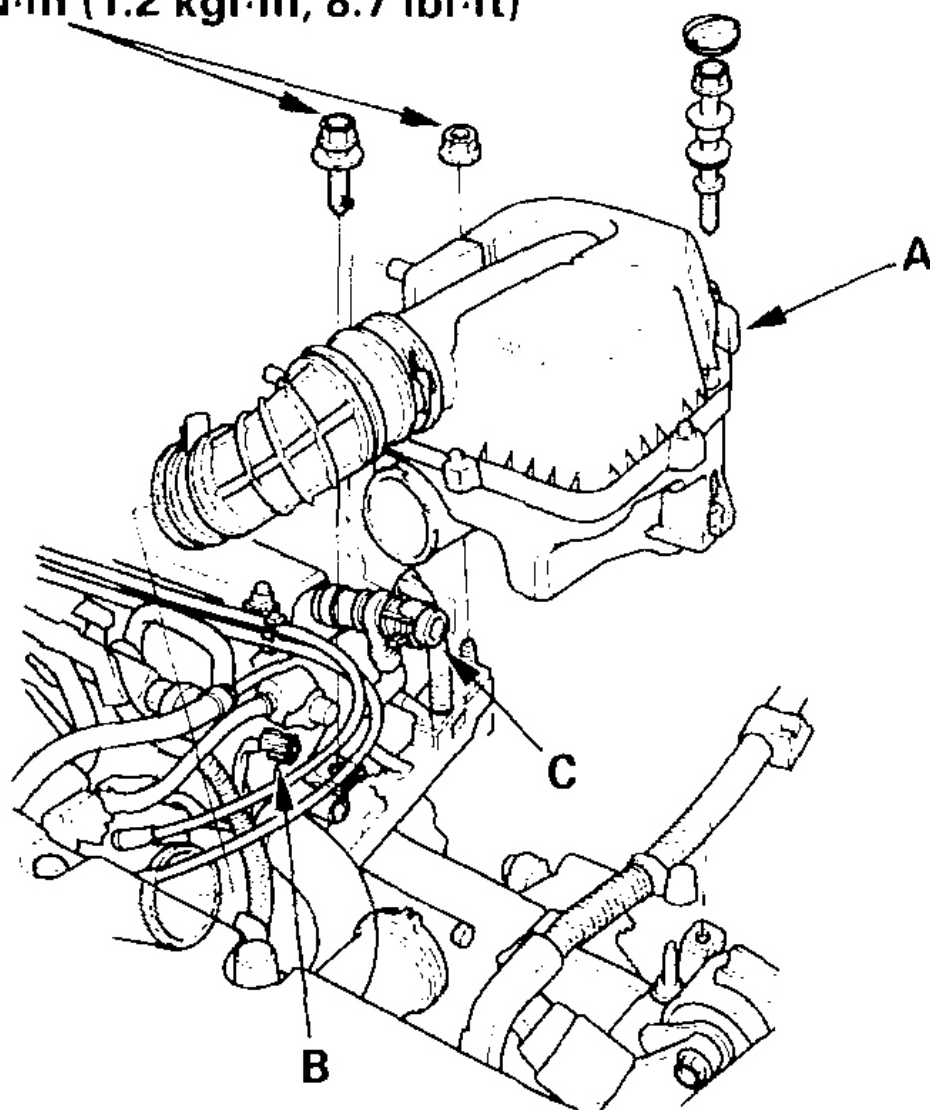


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Fig. 45: Installing Intake Air Duct
Courtesy of AMERICAN HONDA MOTOR CO., INC.

43. Install the air cleaner housing (A) and connect the intake air temperature (IAT) sensor connector (B).

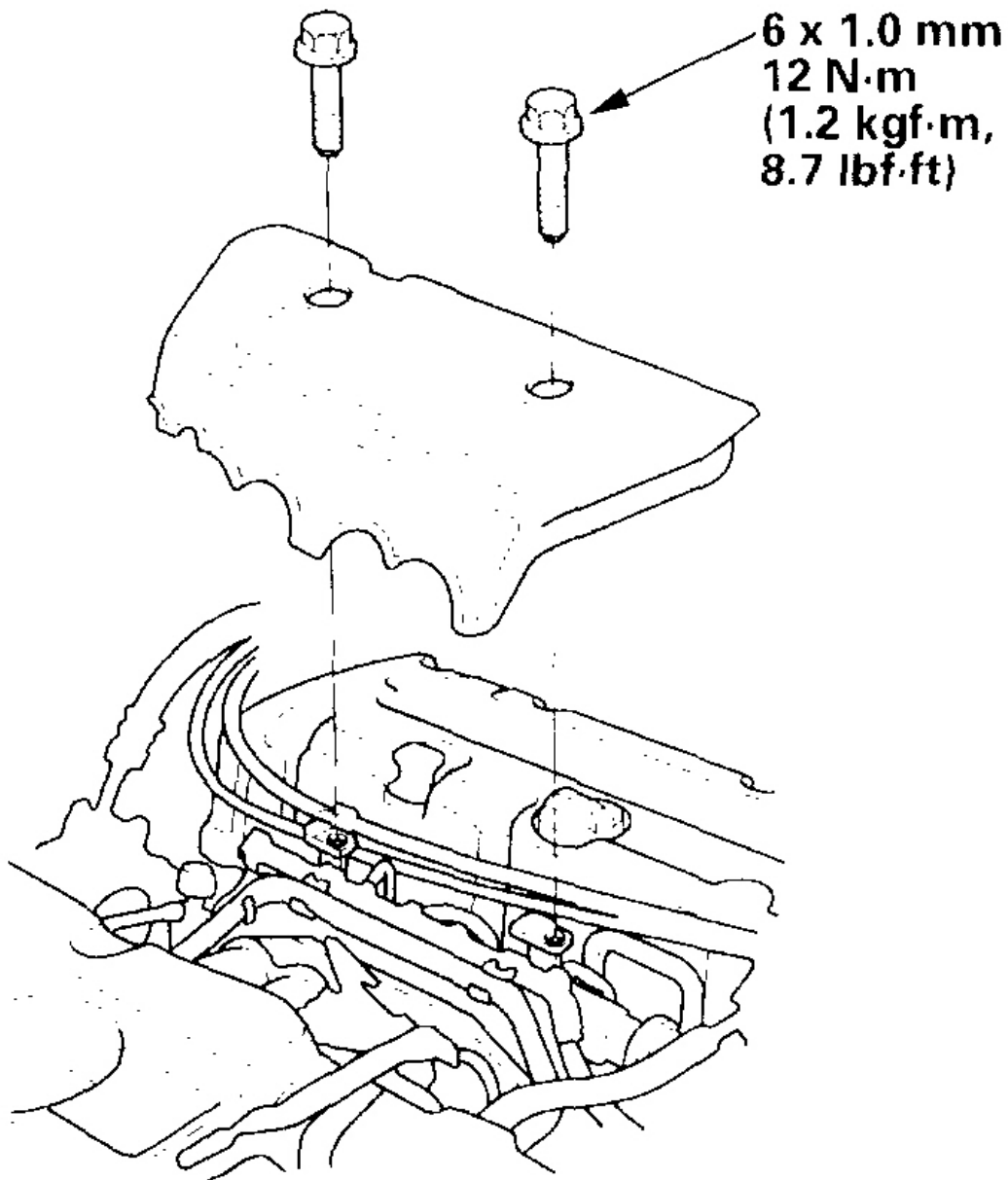
6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)



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Fig. 46: Installing Air Cleaner Housing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

44. Install the breather hose (C).
45. Install the intake manifold cover.



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Fig. 47: Installing Intake Manifold Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

46. Install the battery. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.
47. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission

range switch (A/T).

48. Check that the transmission shifts into gear smoothly (M/T).
49. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
50. Refill the engine with engine oil (see **ENGINE OIL REPLACEMENT**).
51. Refill the transmission with fluid:
 - Manual transmission (see **TRANSMISSION FLUID INSPECTION AND REPLACEMENT**).
 - Automatic transmission (see **ATF REPLACEMENT**).
52. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see **COOLANT REPLACEMENT**).
53. Perform the ECM/PCM idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**), and power window control unit reset procedure (see **RESETTING THE POWER WINDOW CONTROL UNIT**).
54. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
55. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
56. Check the wheel alignment (see **WHEEL ALIGNMENT PROCEDURES**).
57. Enter the anti-theft codes for the radio, then enter the customer's radio station presets.
58. Set the clock.

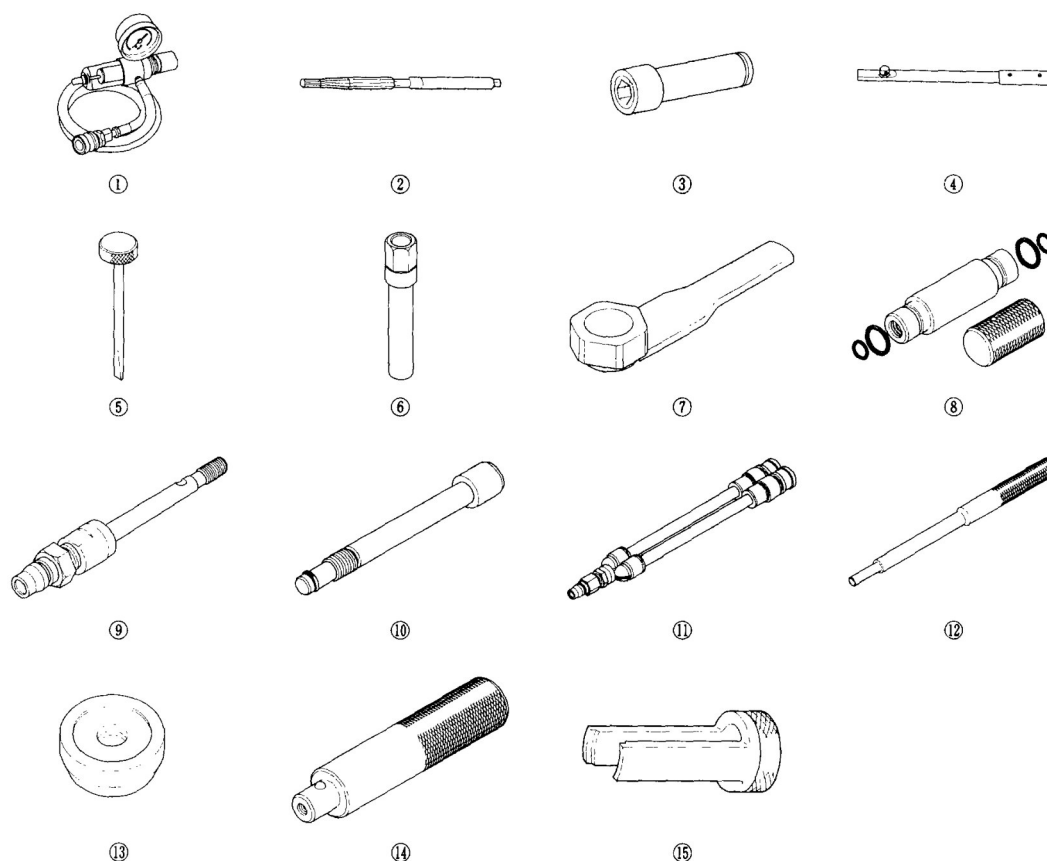
CYLINDER HEAD

SPECIAL TOOLS

2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V

Ref. No.	Tool Number	Description	Qty
①	07AAJ-PNAA100	Air Pressure Regulator	1
②	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
③	07JAA-001020A	Socket, 19 mm	1
④	07JAB-001020A	Holder Handle	1
⑤	07MAA-PR70110	Adjuster	1
⑥	07MAA-PR70120	Locknut Wrench	1
⑦	07NAB-001040A	Holder Attachment, 50 mm	1
⑧	07PAD-0010000	Stem Seal Driver	1
⑨	07ZAJ-PNAA100	VTEC Air Adapter	2
⑩	07ZAJ-PNAA200	VTEC Air Stopper	1
⑪	07ZAJ-PNAA300	Air Joint Adapter	1
⑫	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑬	07746-0010400	Attachment, 52 x 55 mm	1
⑭	07749-0010000	Driver	1
⑮	07757-PJ1010A	Valve Spring Compressor Attachment	1

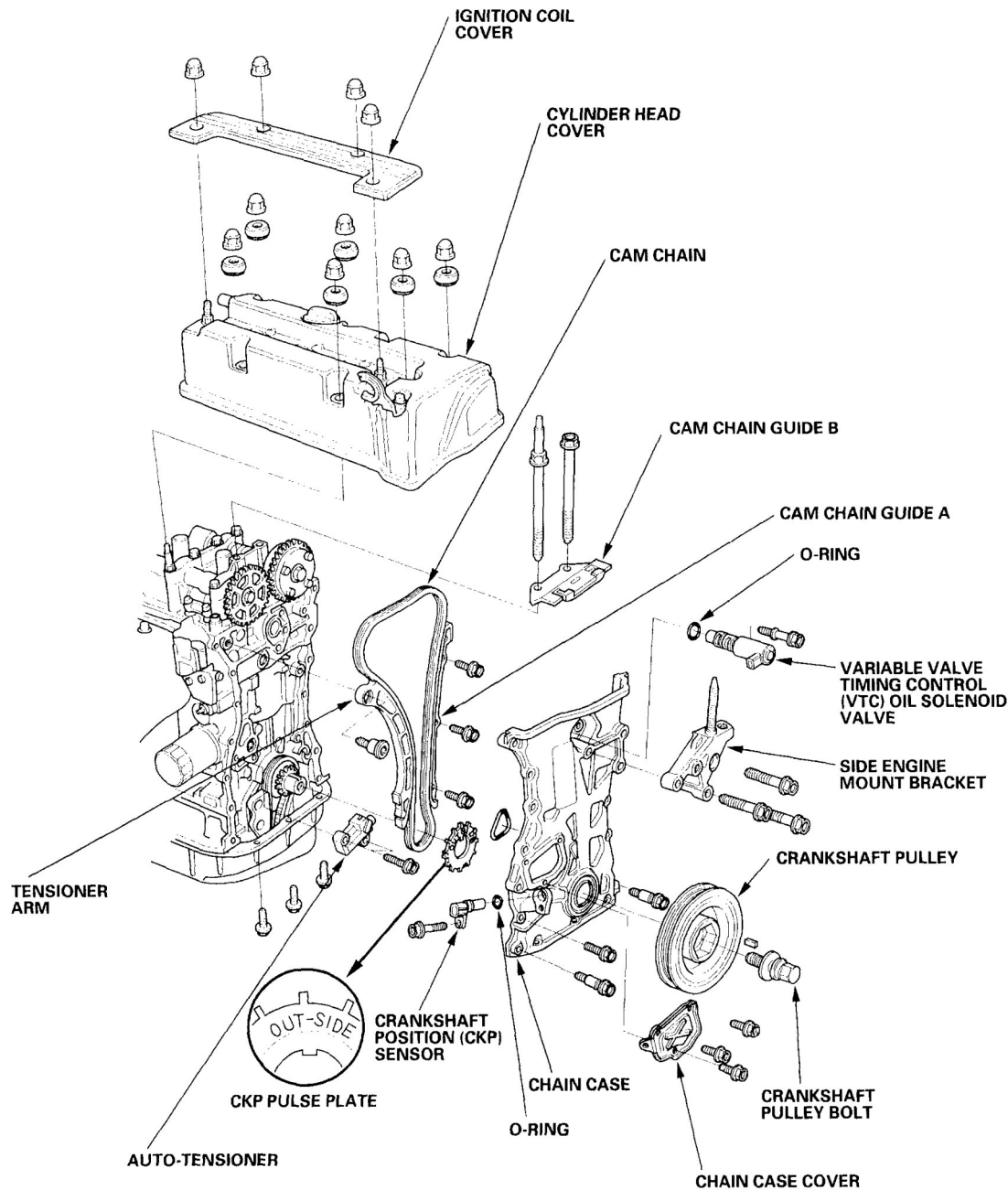


G01473493

Fig. 48: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

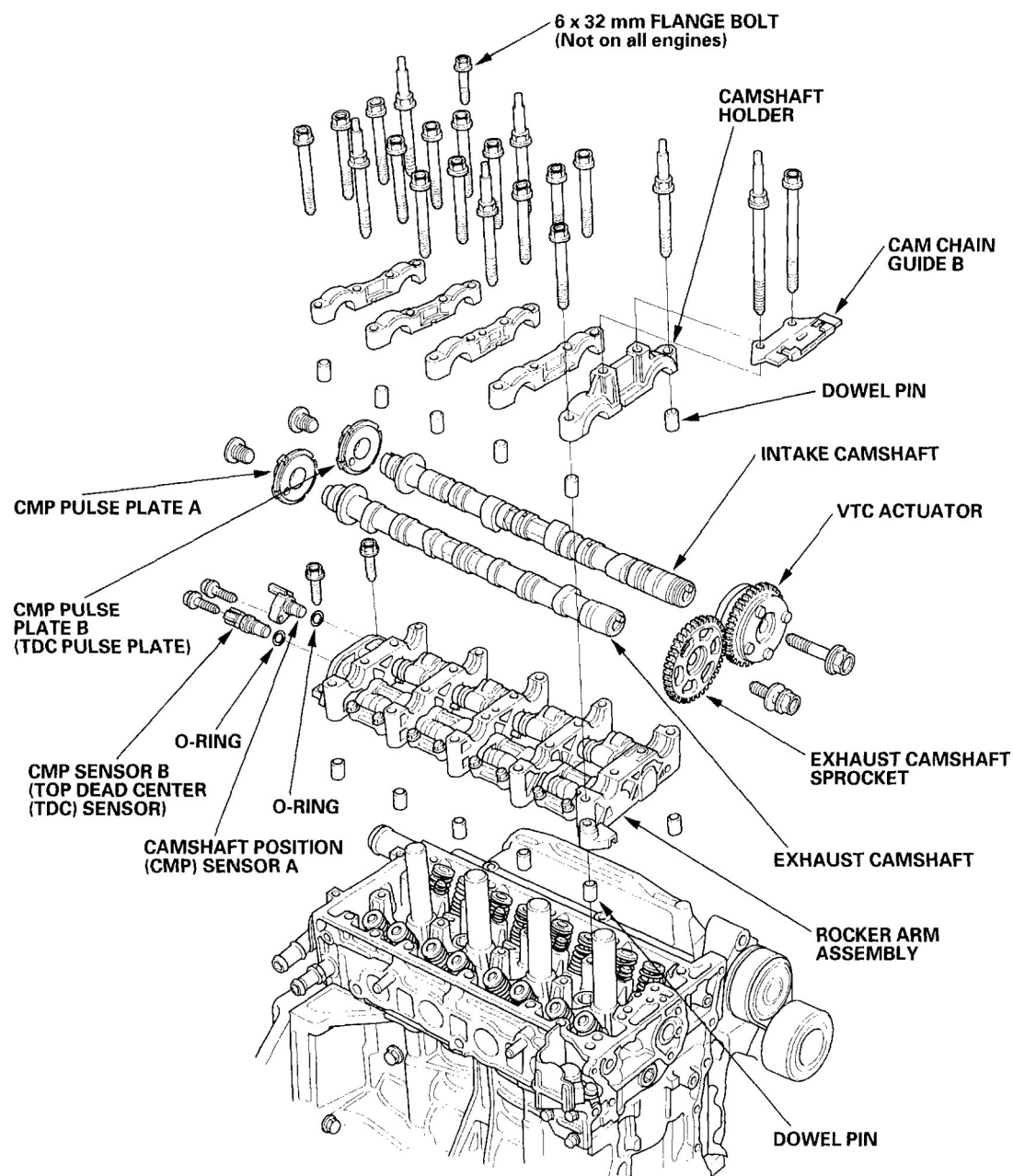


G01473494

Fig. 49: Identifying Cylinder Head Component Locations (1 of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

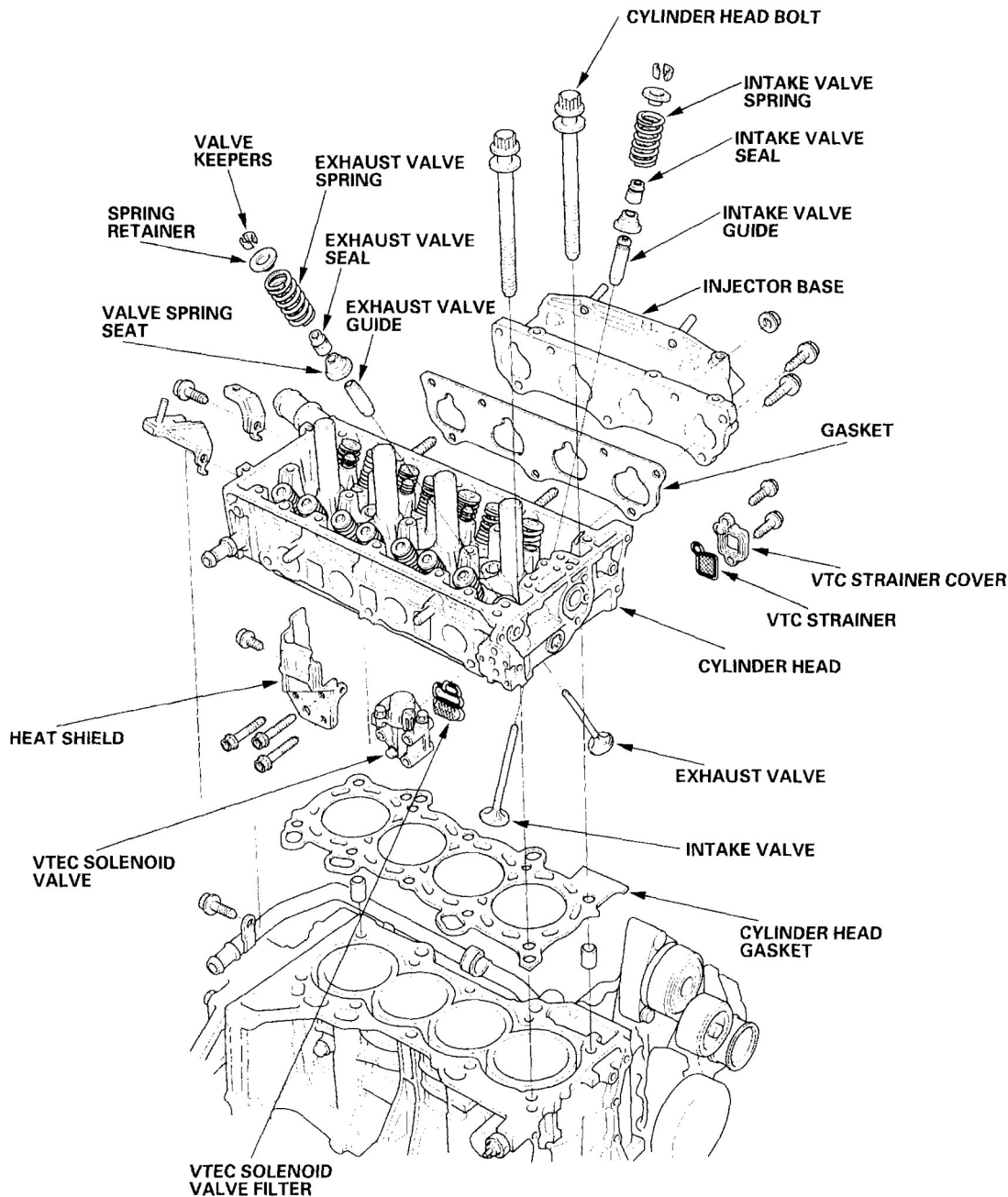
2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V



G01473495

Fig. 50: Identifying Cylinder Head Component Locations (2 of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



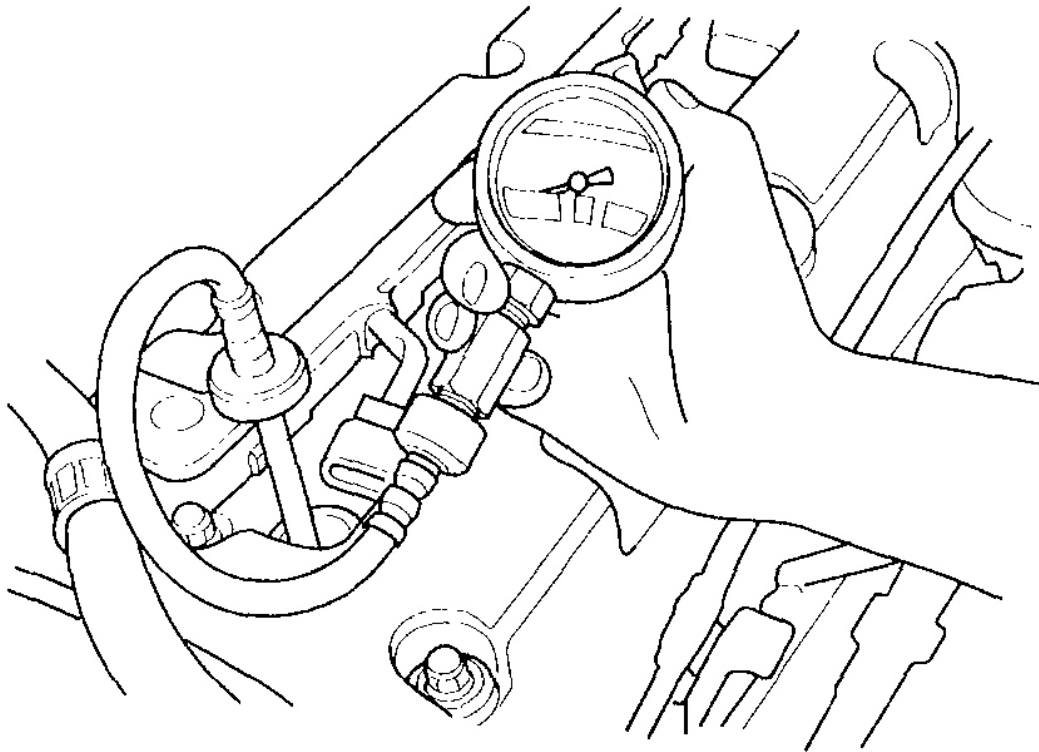
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Fig. 51: Identifying Cylinder Head Component Locations (3 of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch OFF.
3. Remove the intake manifold cover (see step 1 on).

4. Disconnect all four injector connectors.
5. Start the engine, and let it run until it stalls.
6. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
7. Remove the four spark plugs.
8. Attach the compression gauge to the spark plug hole.



G01473497

Fig. 52: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Open the throttle fully, then crank the engine with the starter motor and measure the compression.

Compression Pressure:

Above 930 kPa (9.5 kgf/cm² , 135 psi)

10. Measure the compression on the remaining cylinders.

Maximum variation:

Within 200 kPa (2.0 kgf/cm² , 28 psi)

11. If the compression is not within specifications, check the following items, then remeasure the compression.
 - Damaged or worn valves and seats
 - Damaged cylinder head gasket
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore

VTEC ROCKER ARM TEST

Special Tools Required

- Air pressure regulator 07AAJ-PNAA100
 - VTEC air adapter 07ZAJ-PNAA100
 - VTEC air stopper 07ZAJ-PNAA200
 - Air joint adapter 07ZAJ-PNAA300
1. Remove the cylinder head cover (see **Cylinder Head Cover Removal**).
 2. Set the No. 1 piston at top dead center (TDC) (see step 1 on).
 3. Verify that the intake primary rocker arm (A) moves independently of the intake secondary rocker arm (B).
 - If the intake primary rocker arm does not move, remove the primary and secondary rocker arms as an assembly and check that the pistons in the secondary and primary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, and test.
 - If the intake primary rocker arm moves freely, go to step 4.

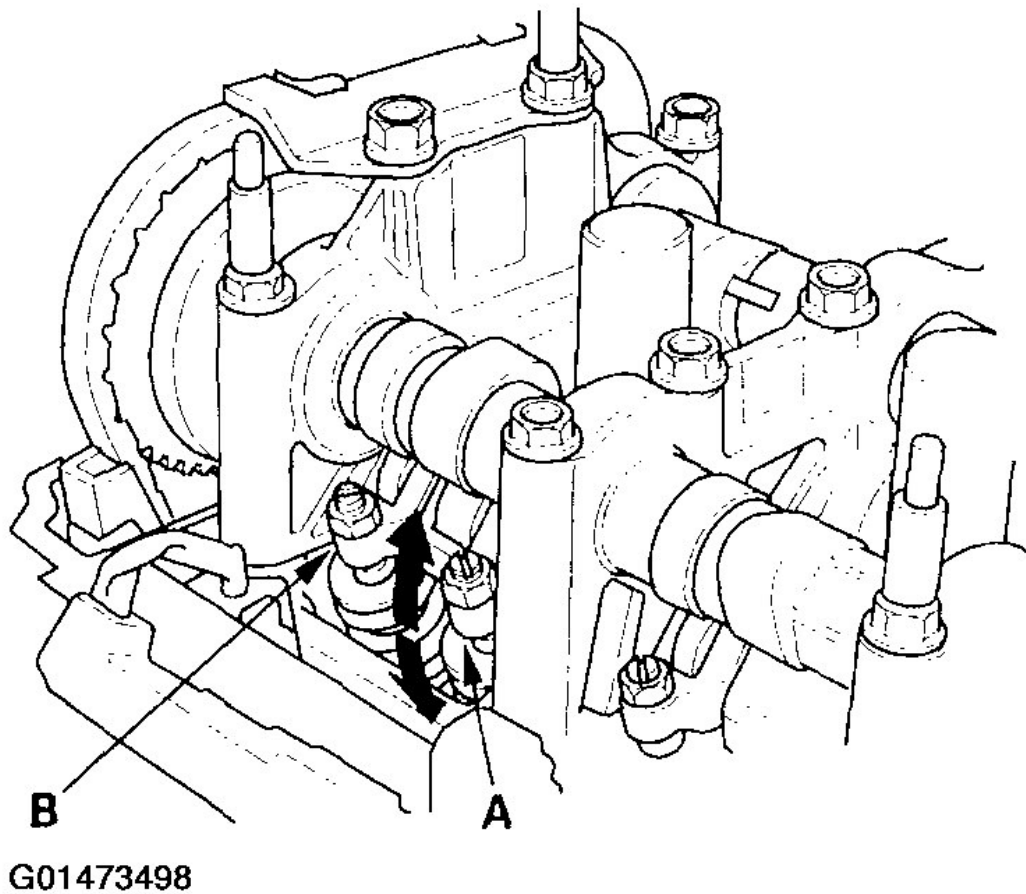


Fig. 53: Ensuring That Intake Primary Rocker Arm Moves Independently
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Repeat step 3 on the remaining intake primary rocker arms with each piston at TDC. When all the primary rocker arms pass the test, go to step 5.
5. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4 kgf/cm² , 57 psi).
6. Inspect the valve clearance (see **Valve Clearance Adjustment**).
7. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).



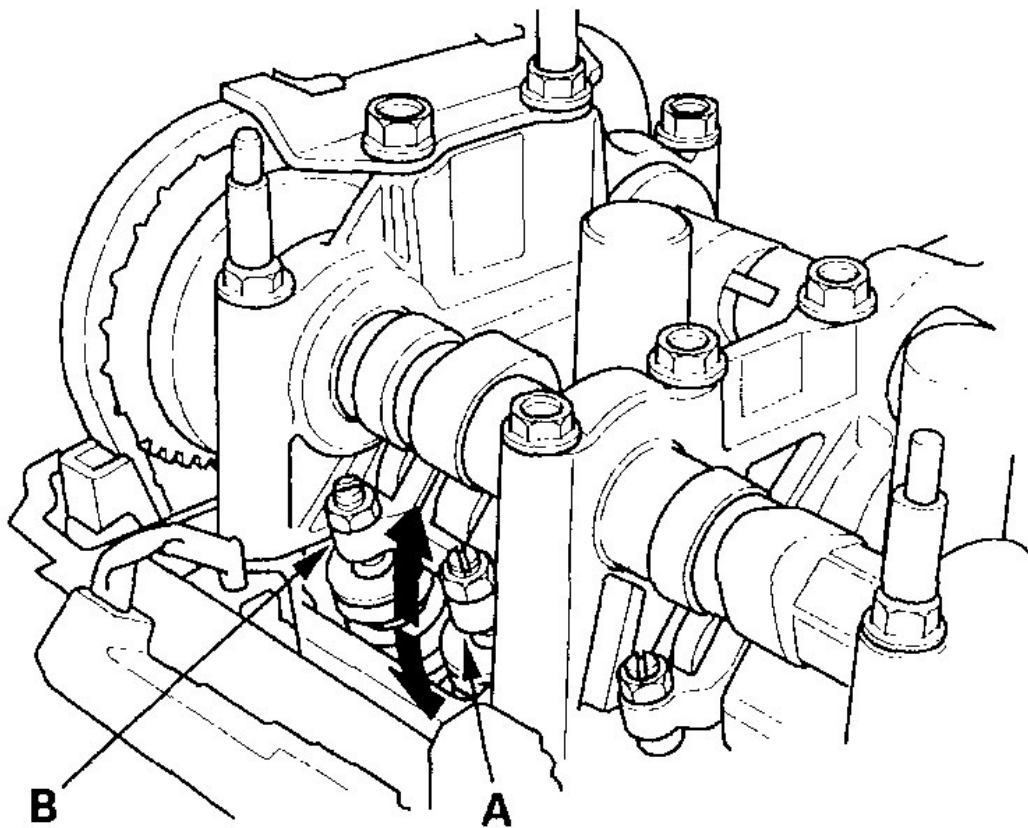
8. Remove the No. 2 and No. 3 camshaft holder bolts, and install the VTEC air adapters (C) finger-tight.
9. Connect the air joint adapter (D) and air pressure regulator (E).
10. Loosen the valve on the regulator, and apply the specified air pressure.

290 kPa (3.0 kgf/cm², 42 psi)

jueves, 4 de febrero de 2021 08:23:00 a. m.

11. With the specified air pressure applied, move the intake primary rocker arm (A) for the No. 1 cylinder. The primary rocker arm and secondary rocker arm (B) should move together.

If the intake secondary rocker arm does not move, remove the primary and secondary rocker arms as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, and test.



G01473500

Fig. 55: Ensuring That Primary Rocker Arm & Secondary Rocker Arm Moves Together
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the special tools.
13. Tighten the camshaft holder mounting bolts to 22 N.m (2.2 kgf.m, 16 Ft.Lbs).
14. Tighten the sealing bolt to 20 N.m (2.0 kgf.m, 14 Ft.Lbs).
15. 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 step 2 on).
3. Remove the camshaft holder (see step 3 on).
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator clockwise and counterclockwise. If the VTC actuator is not locked, replace the VTC actuator.
6. Seal the advance holes (A) and retard holes (B) in the No. 1 camshaft journal with tape.

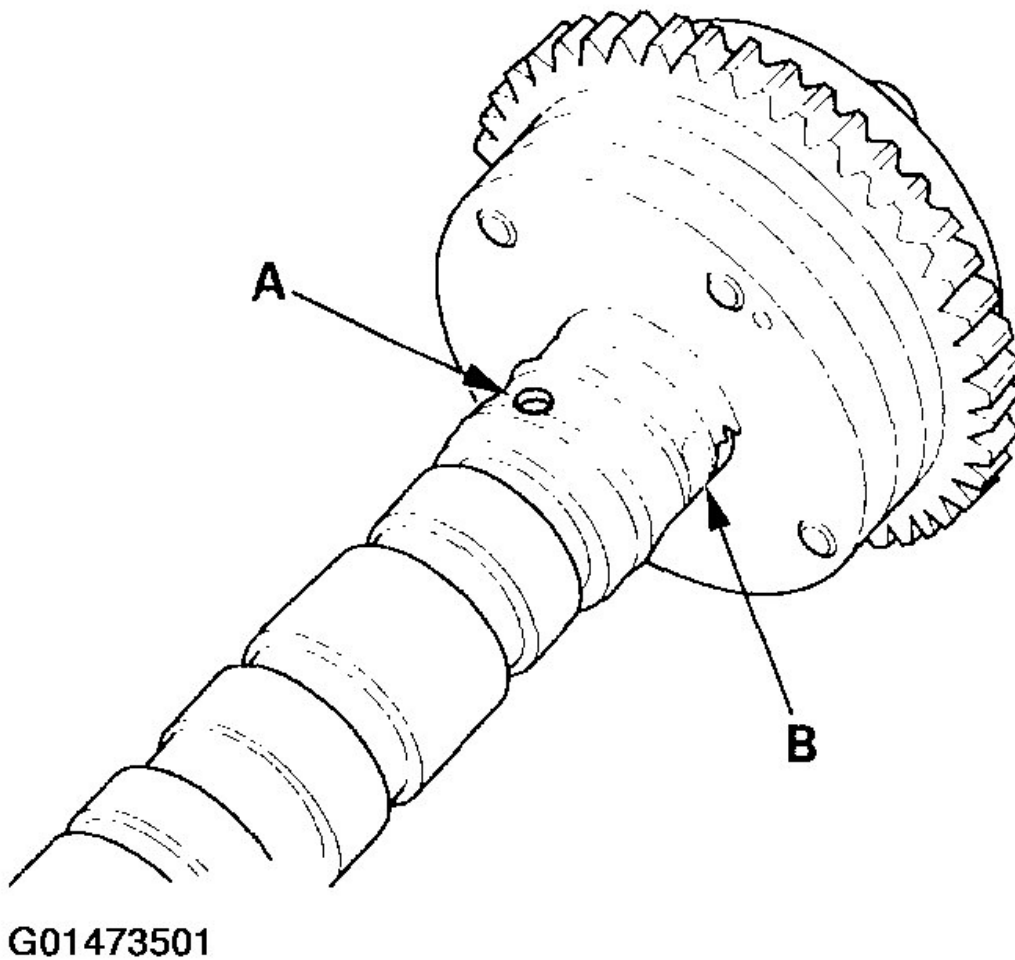
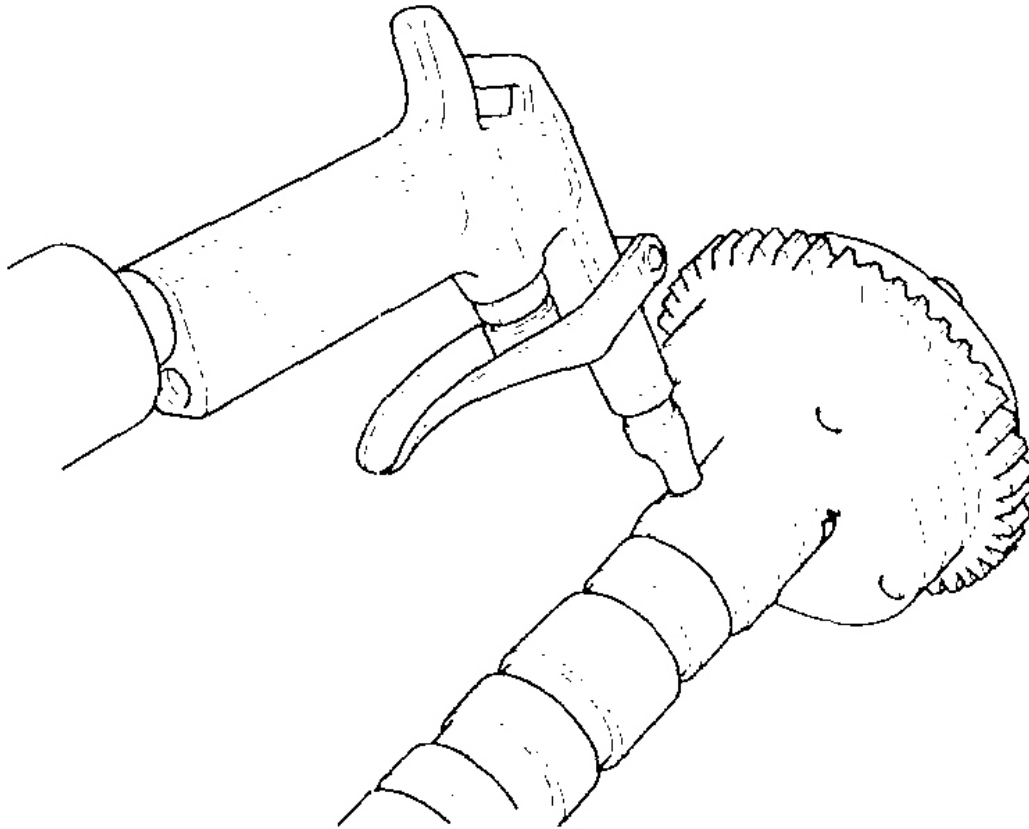


Fig. 56: Sealing Advance Holes & Retard Holes In No. 1 Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

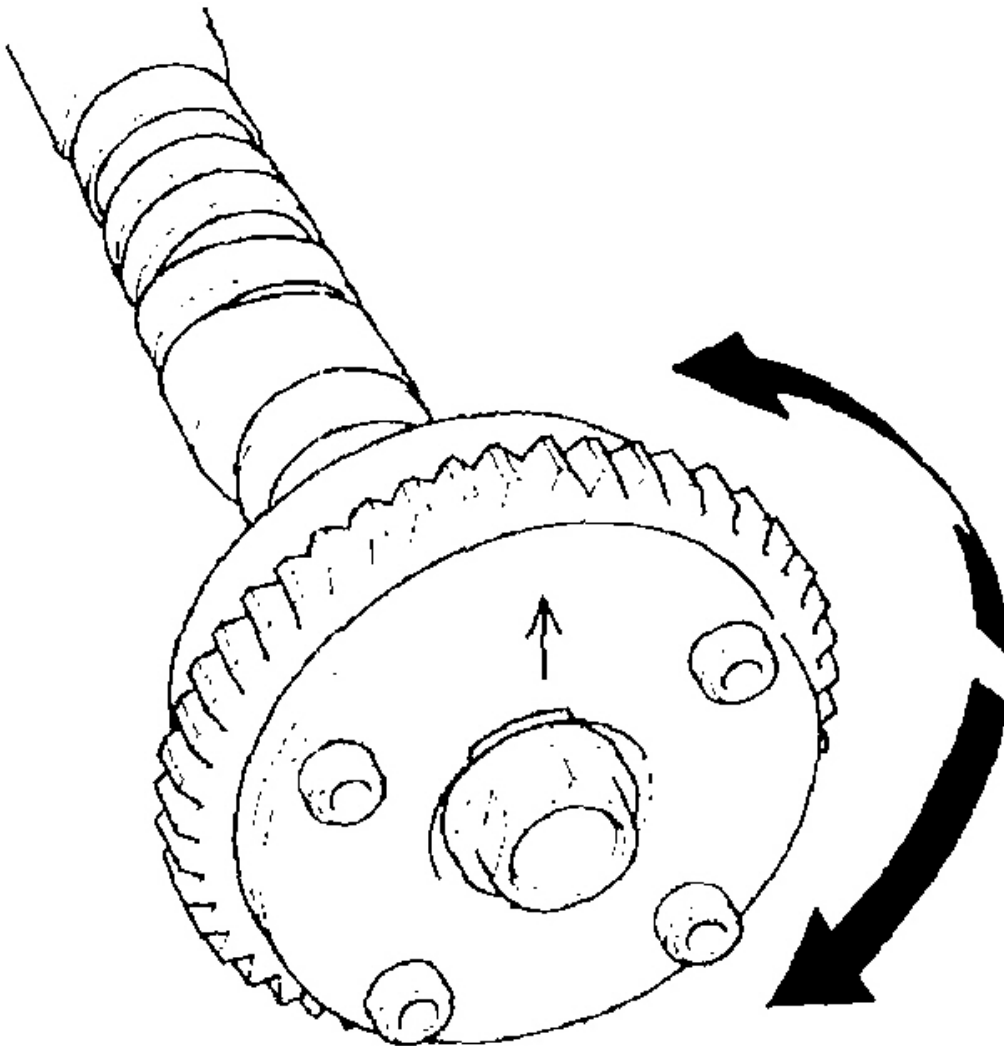
7. Punch a hole in the tape over one of the advance holes.
8. Apply air to the advance hole to release the lock.



G01473502

Fig. 57: Applying Air To The 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.



G01473503

Fig. 58: Checking That VTC Actuator

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Make sure the punch marks on the VTC actuator and exhaust camshaft sprocket are facing up, then set the camshafts in the rocker shaft holder (see step 6 on).
11. Set the camshaft holders and chain guide B in place (see step 7 on).
12. Tighten the camshaft holder bolts to the specified torque (see step 8 on).
13. Install the cam chain (see **Cam Chain Installation**).

14. Adjust the valve clearance (see Valve Clearance Adjustment).

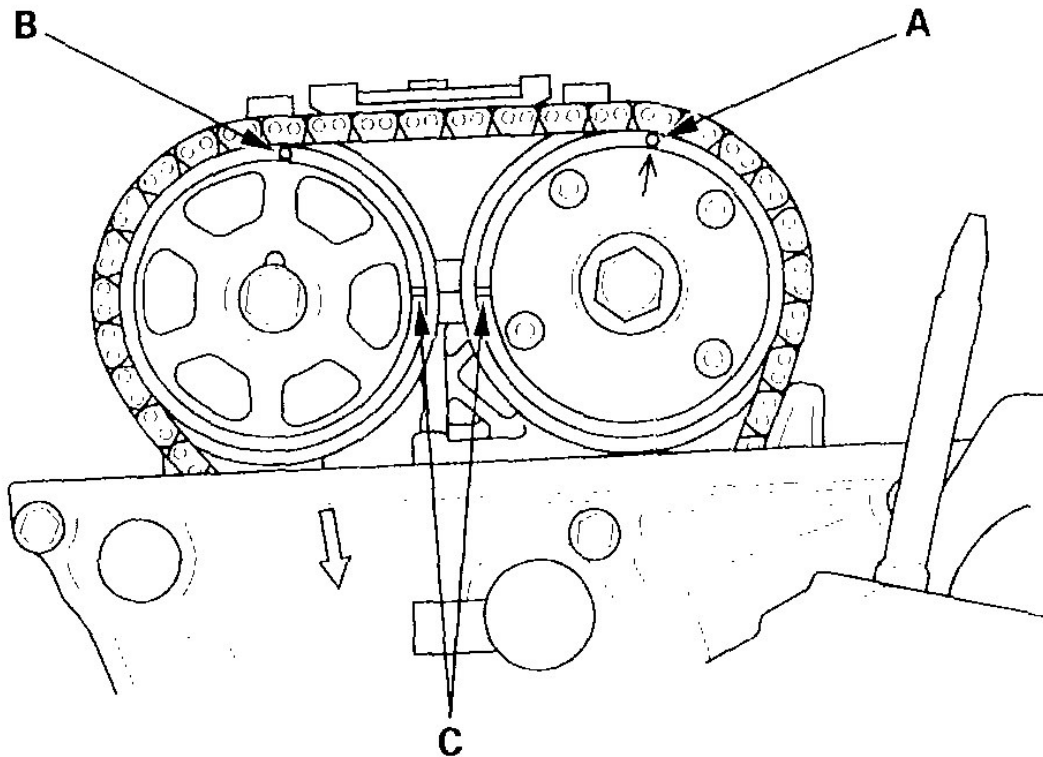
VALVE CLEARANCE ADJUSTMENT

Special Tools Required

- Adjuster 07MAA-PR70110
- Locknut wrench 07MAA-PR70120

NOTE: Adjust the valves only when the cylinder head 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 exhaust camshaft sprocket.



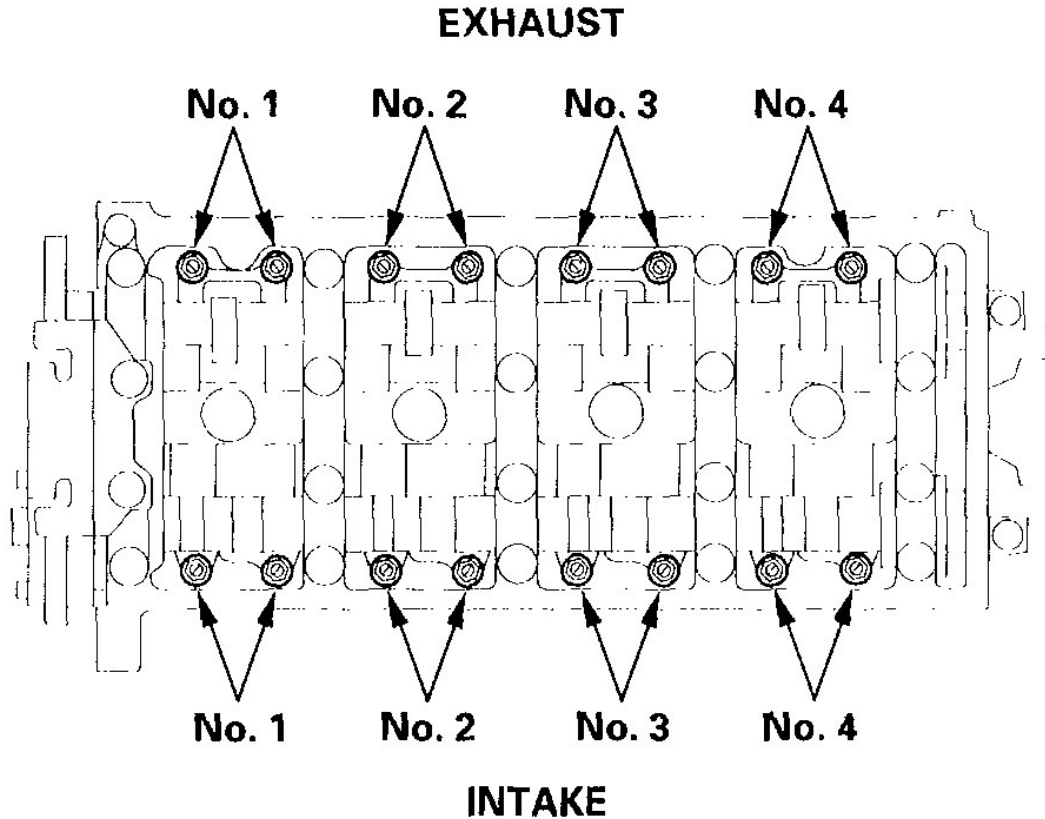
G01473504

Fig. 59: Identifying Timing Marks
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the correct thickness feeler gauge for the valves you're going to check.

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

Exhaust: 0.28 - 0.32 mm (0.011 - 0.013 in.)

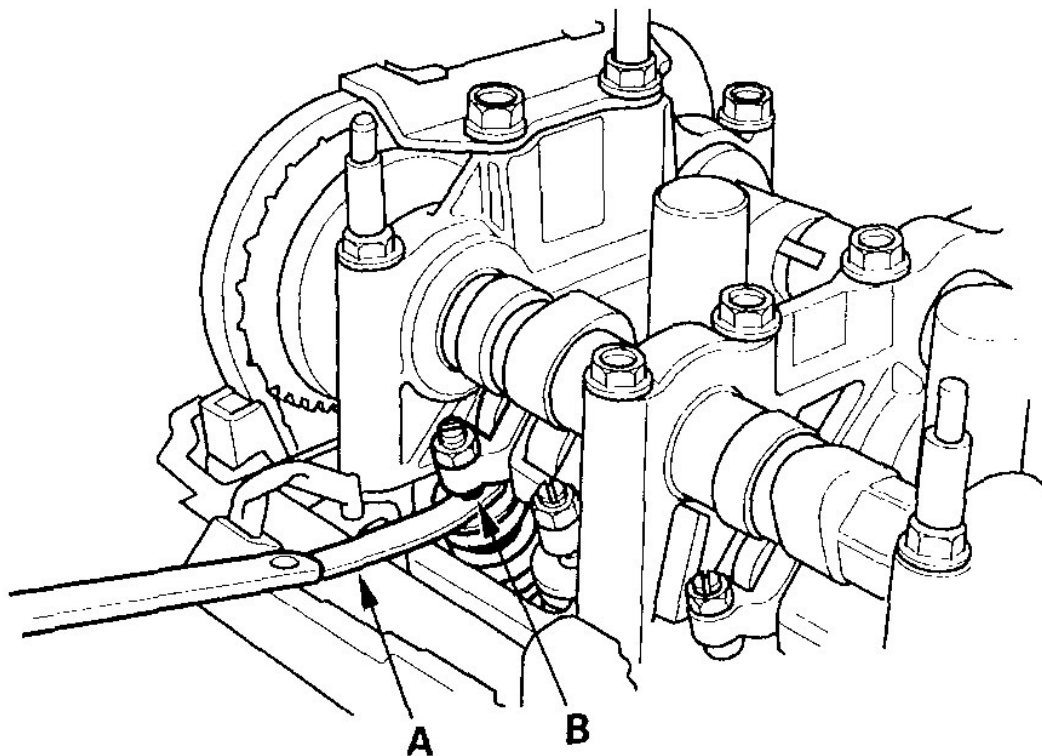


G01473505

Fig. 60: Adjusting Screw Locations

Courtesy of AMERICAN HONDA MOTOR CO., INC.

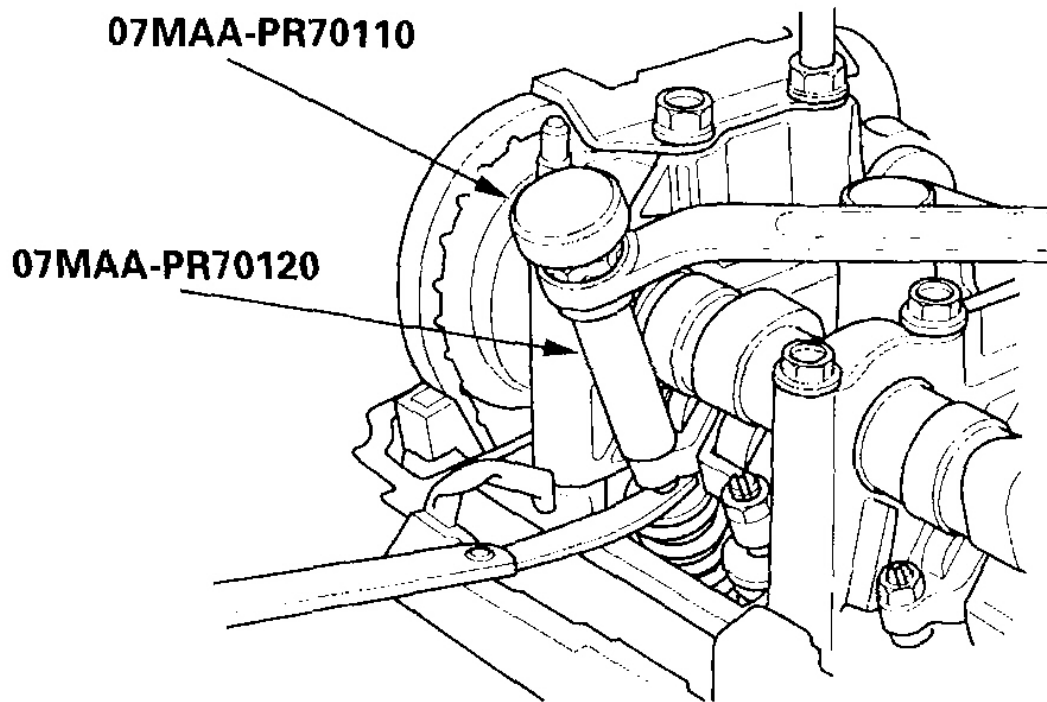
4. Insert the feeler gauge (A) between the adjusting screw (B) and the end of the valve stem, and slide it back and forth; you should feel a slight amount of drag.



G01473506

Fig. 61: Inserting Feeler Gauge Between Adjusting Screw & End Of The Valve Stem
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01473507

Fig. 62: Turning Adjusting Screw

Courtesy of AMERICAN HONDA MOTOR CO., INC.

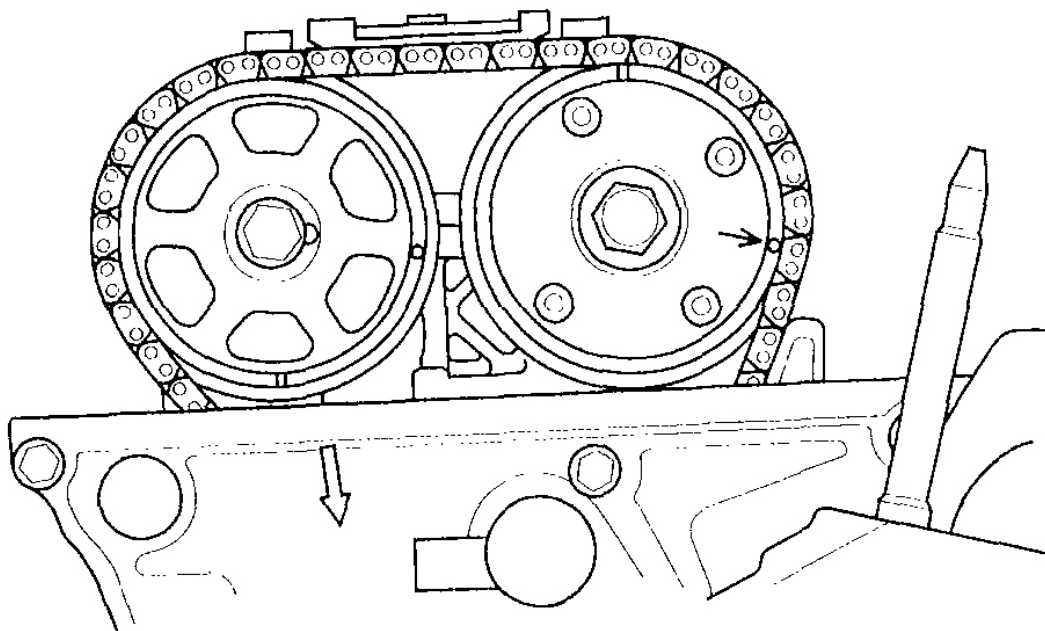
6. Tighten the locknut to the specified torque.

Specified torque

Intake: 20 N.m (2.0 kgf.m, 14 Ft.Lbs)

Exhaust: 14 N.m (1.4 kgf.m, 10 Ft.Lbs)

7. Recheck the valve clearance. Repeat the adjustment if necessary.
8. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).

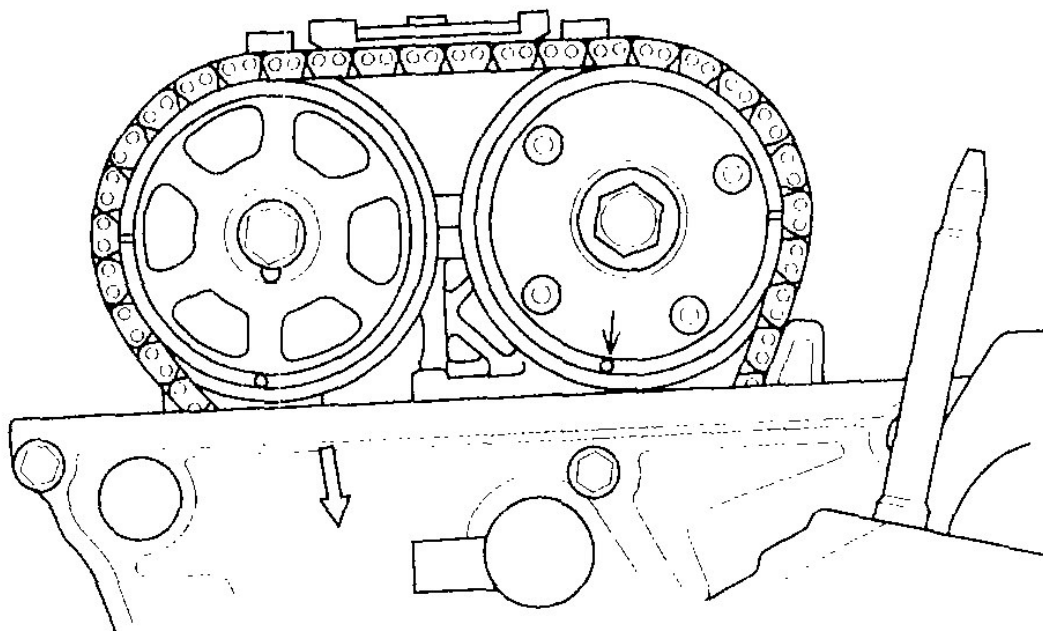


G01473508

Fig. 63: Rotating Crankshaft 180° Clockwise

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01473509

Fig. 64: Rotating Crankshaft 180° Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

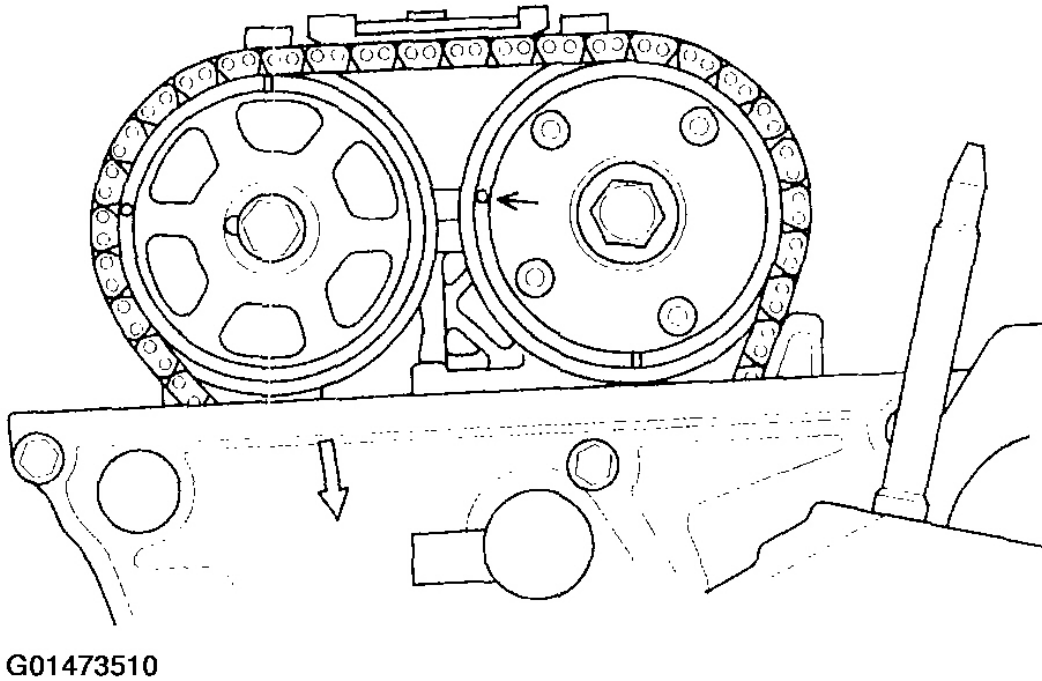


Fig. 65: Rotating Crankshaft 180° Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Check and, if necessary, adjust the valve clearance on No. 2 cylinder.
14. Install the cylinder head cover (see **Cylinder Head Cover Installation**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder handle 07JAB-001020A
- Holder attachment, 50 mm 07NAB-001040A
- Socket, 19 mm 07JAA-001020A or a commercially available 19 mm socket

Removal

1. Remove the front tires/wheels.
2. Remove the splash shield (see step 22 on).
3. Hold the pulley with holder handle (A) and holder attachment (B).

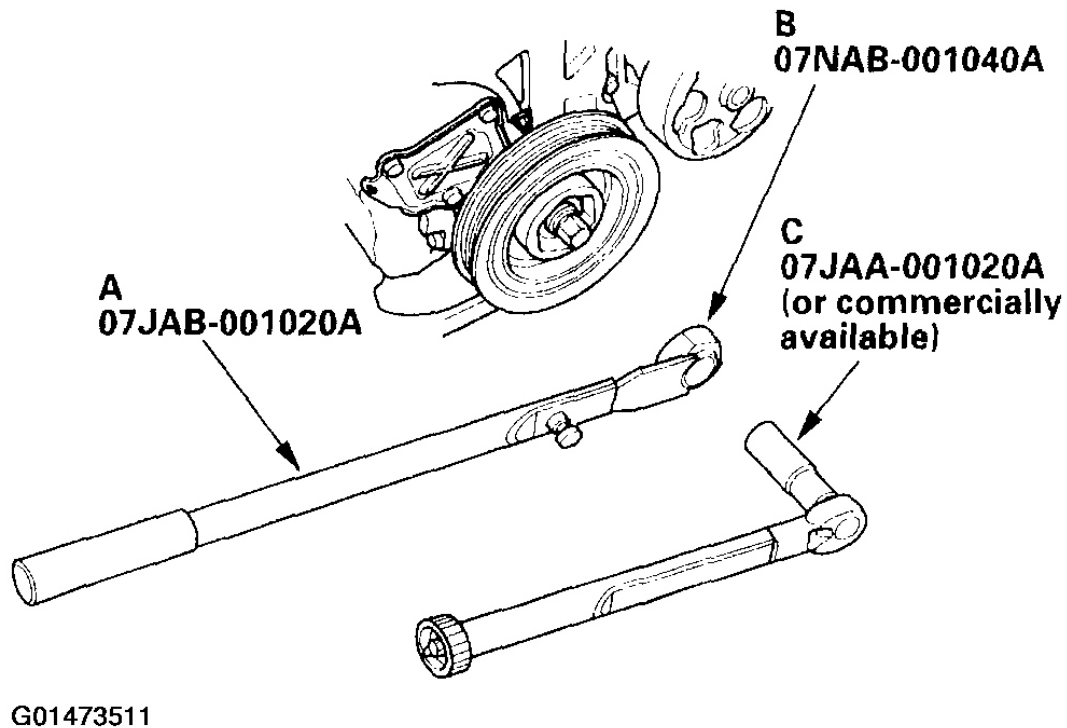


Fig. 66: Holding Pulley With Holder Handle & Holder Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

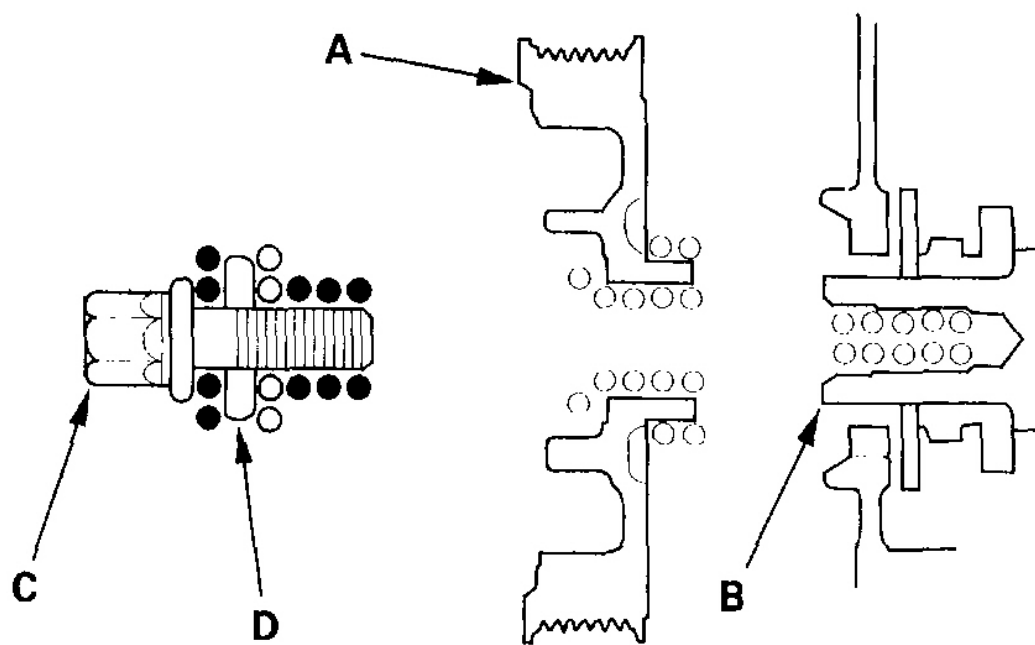
4. Remove the bolt with a 19 mm socket (C) and breaker bar.

Installation

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

○: Clean

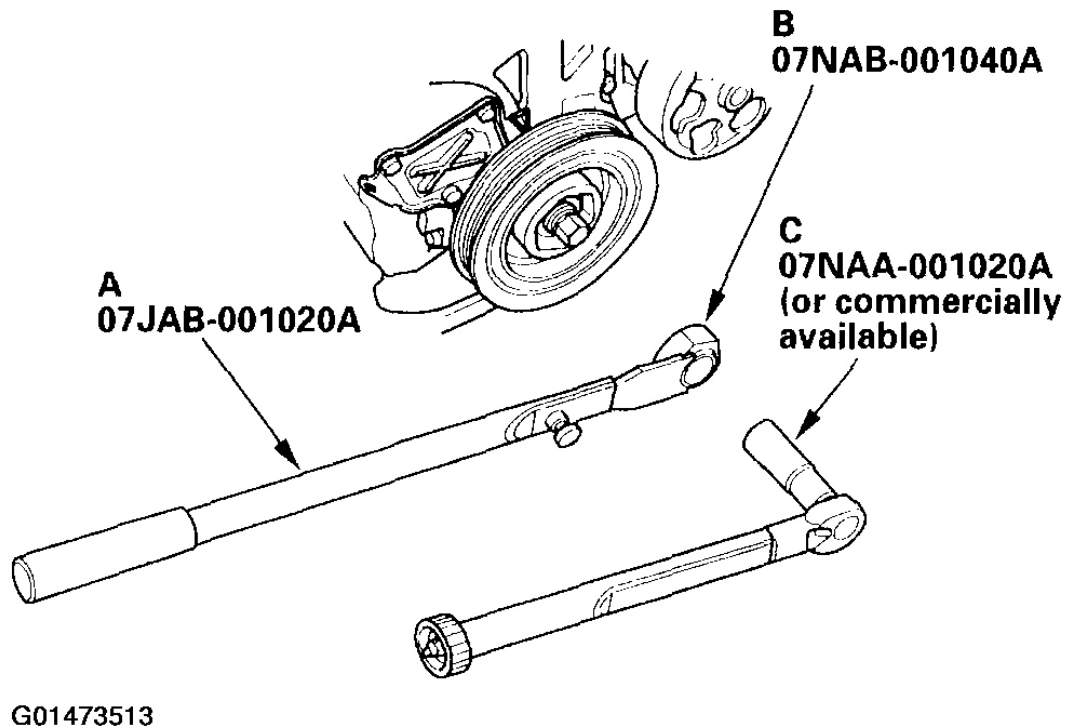
●: Lubricate with new engine oil



G01473512

Fig. 67: Cleaning & Drying Crankshaft Pulley, Crankshaft, Bolt & Washer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**Fig. 68: Installing Crankshaft Pulley**

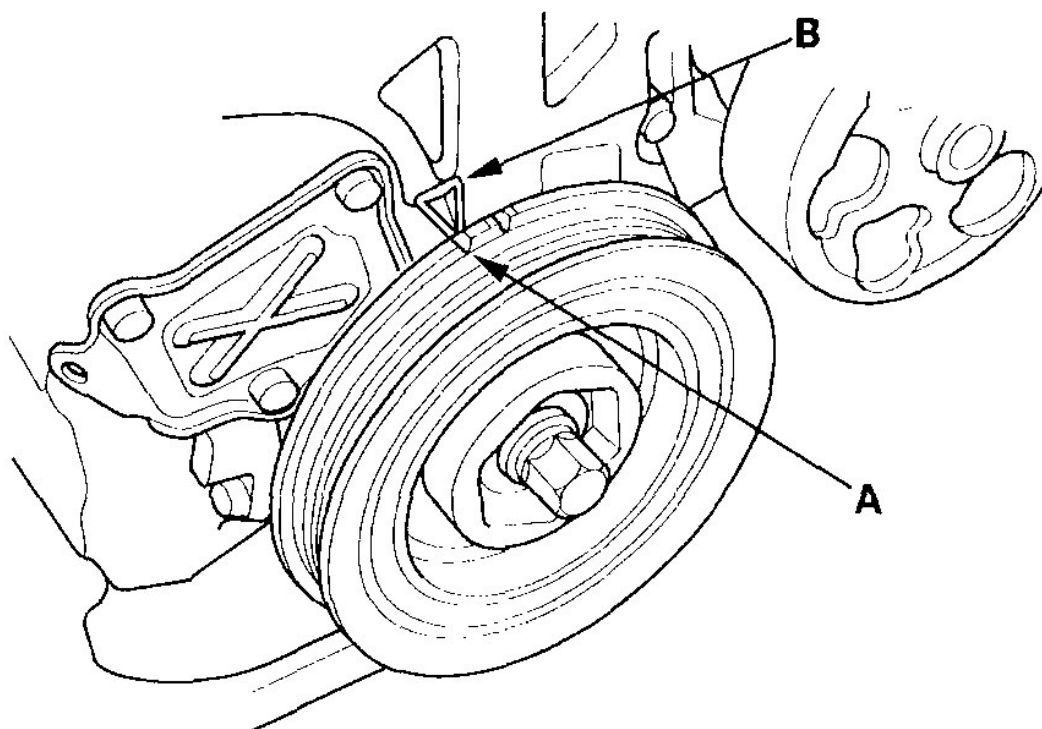
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Tighten the bolt to 49 N.m (5.0 kgf.m, 36 Ft.Lbs) with a torque wrench and 19 mm socket (C). Do not use an impact wrench.
4. Tighten the pulley bolt an additional 90°.
5. Install the splash shield (see step 26 on).
6. Install the front tires/wheels.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

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

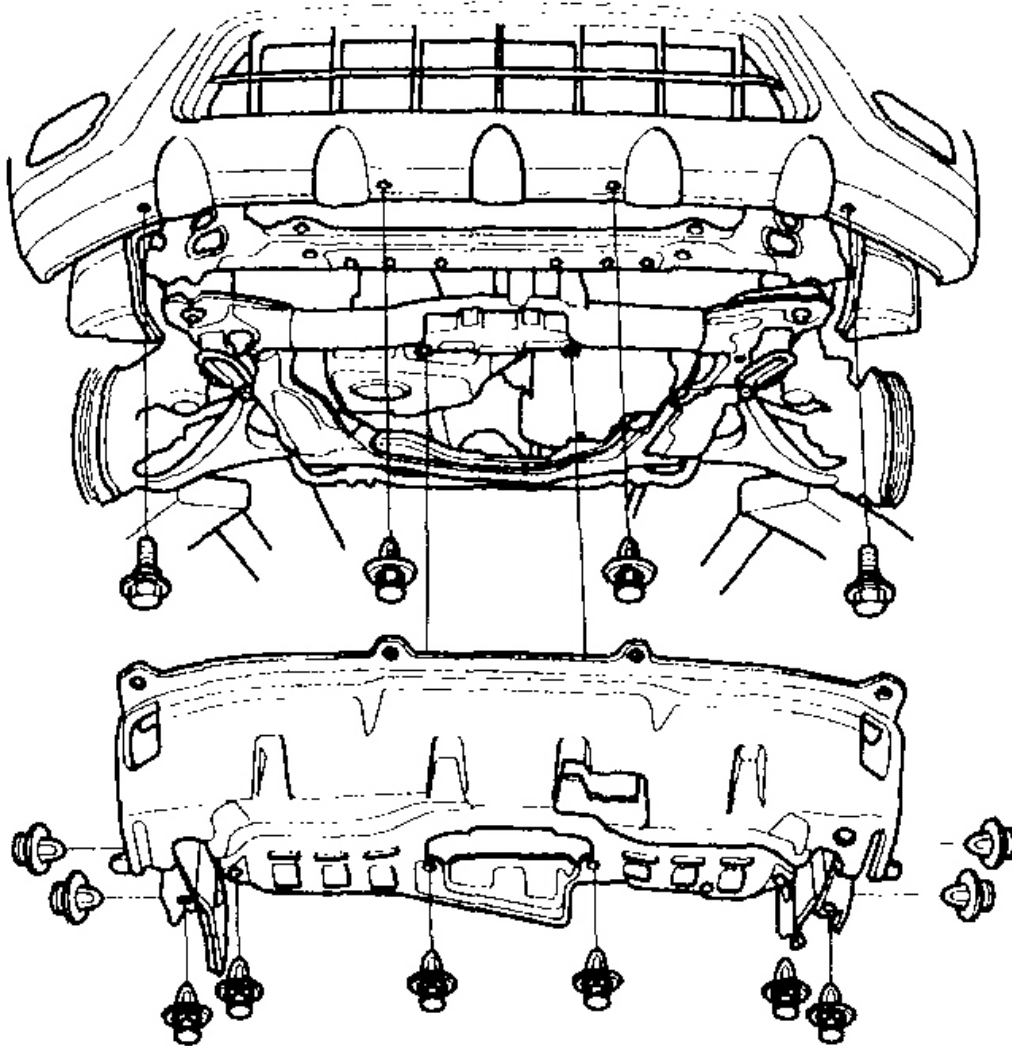


G01473514

Fig. 69: Turning Crankshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the right front tire/wheel.
3. Remove the splash shield.

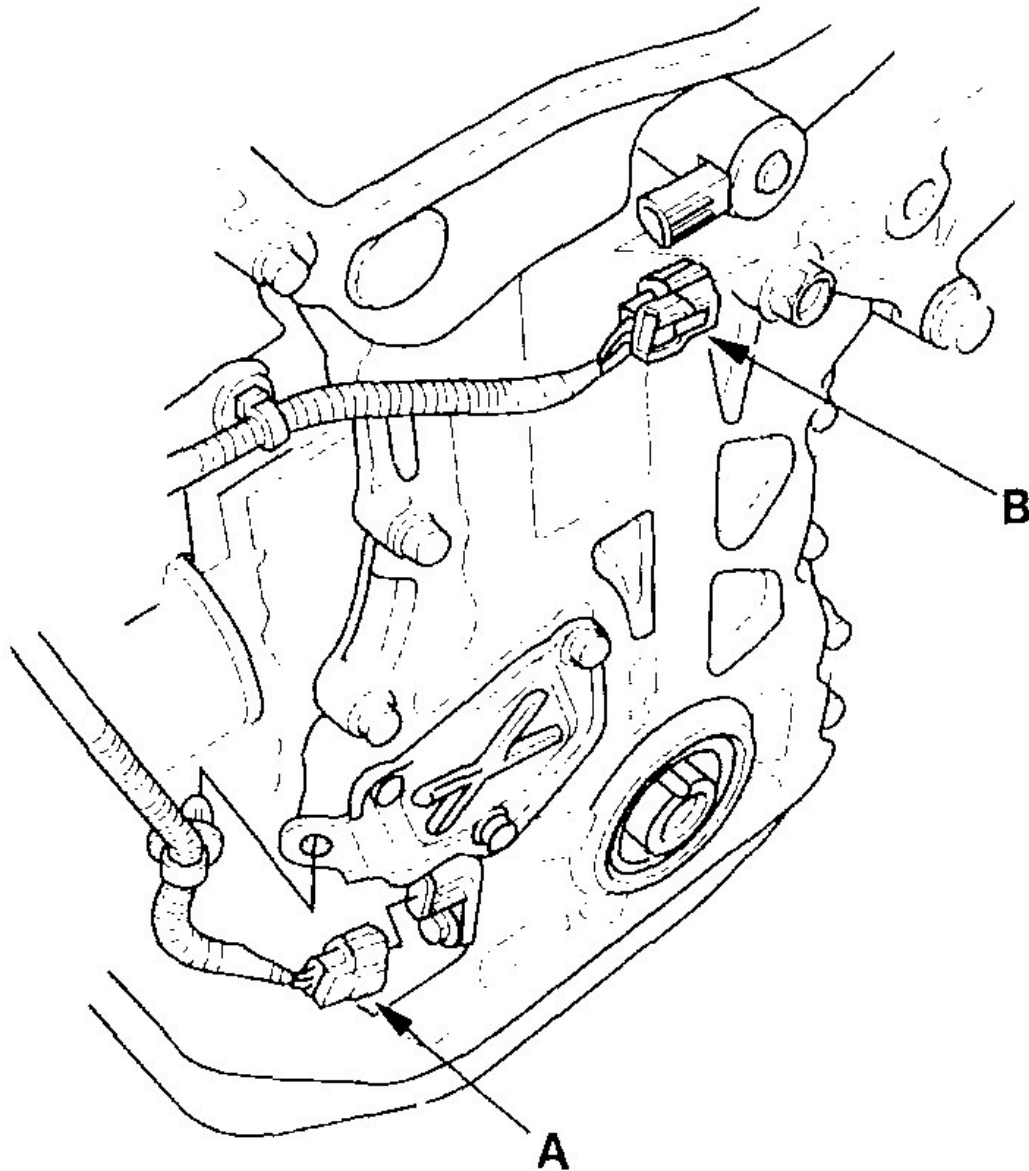


G01473515

Fig. 70: Removing Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the drive belt (see **DRIVE BELT**).
5. Remove the cylinder head cover (see **Cylinder Head Cover Removal**).
6. Remove the crankshaft pulley (see **Crankshaft Pulley Removal and Installation**).
7. Disconnect the crankshaft position (CKP) sensor connector (A) and variable valve timing control (VTC) oil control solenoid valve connector (B).



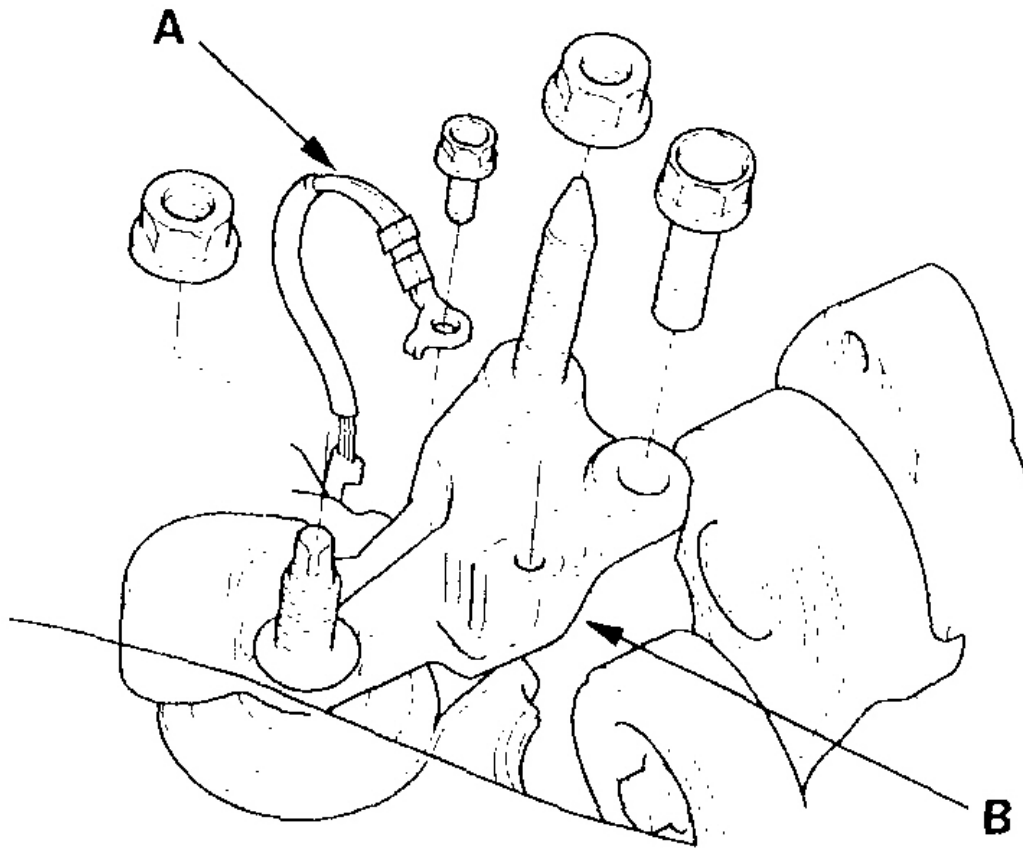
G01473516

Fig. 71: Disconnecting Crankshaft Position Sensor Connector & Variable Valve Timing Control Oil Control Solenoid Valve Connector

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
9. Support the engine with a jack and wood block under the oil pan.

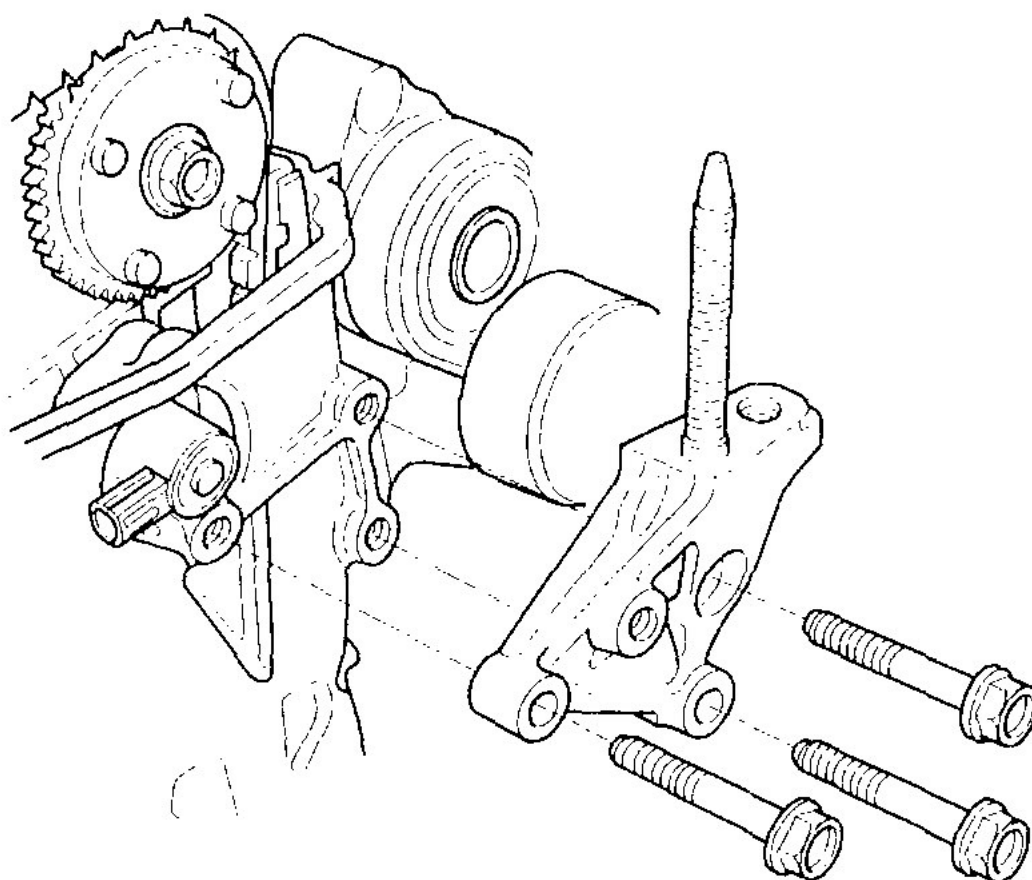
10. Remove the ground cable (A), and remove the upper bracket (B).



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Fig. 72: Removing Ground Cable & Upper Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

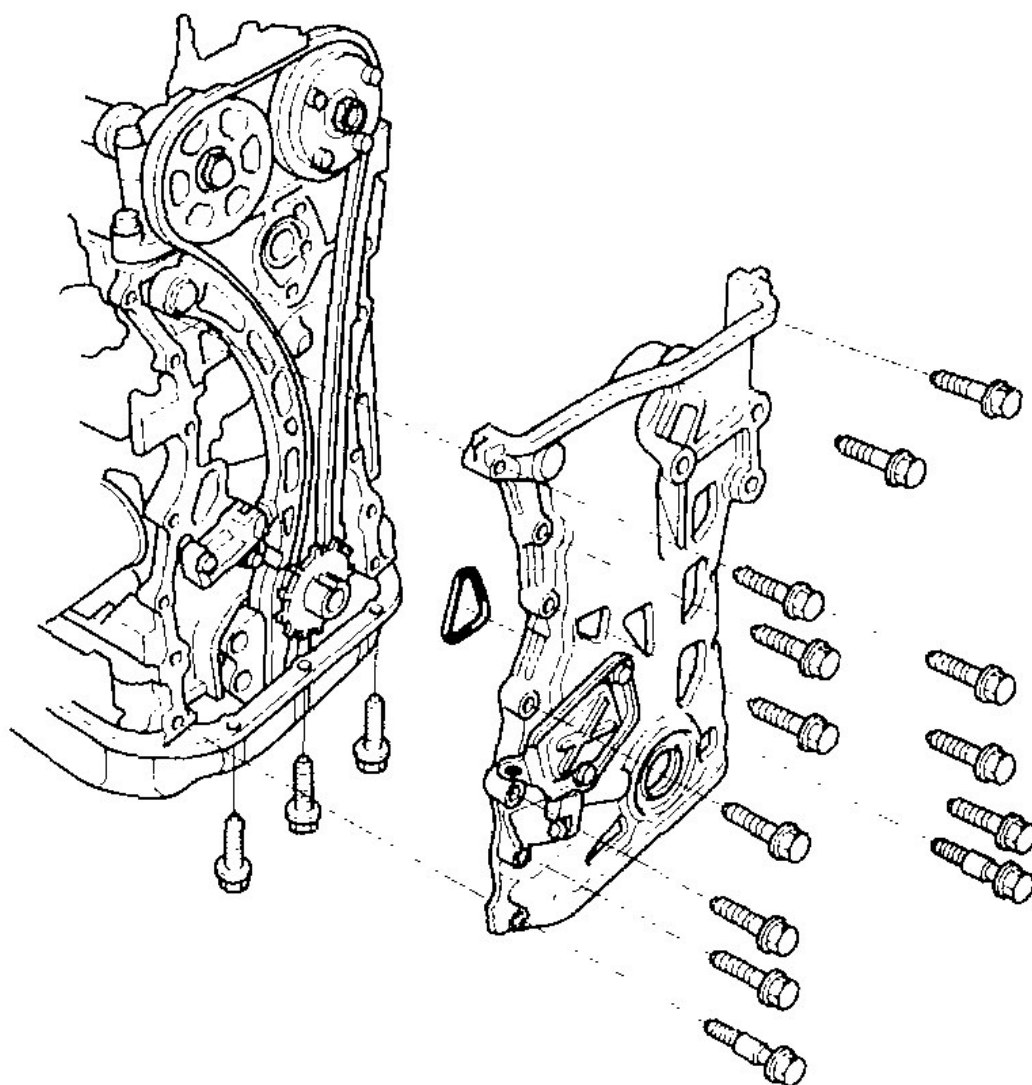
11. Remove the side engine mount bracket.



G01473518

Fig. 73: Removing Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the chain case.

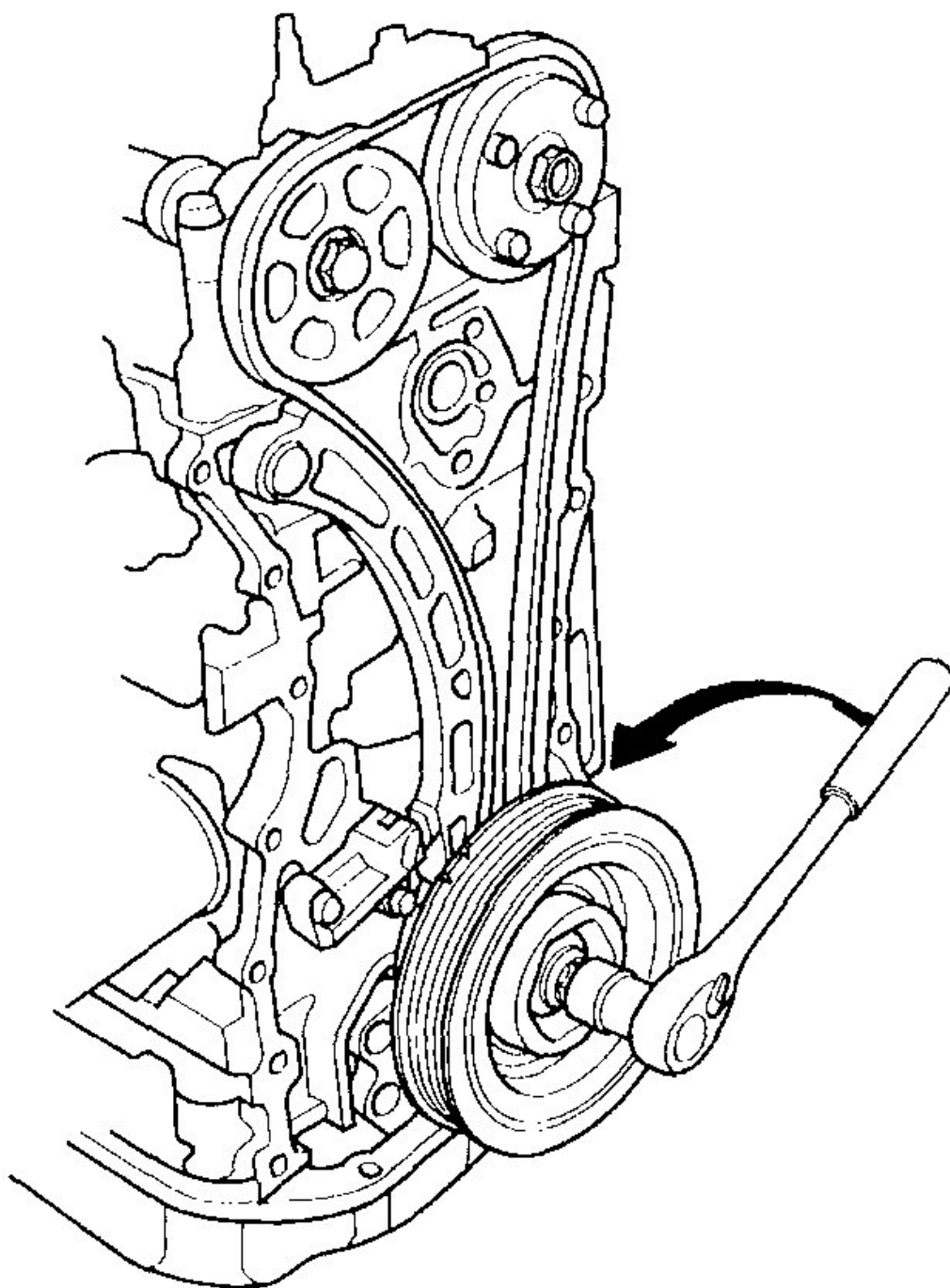


G01473519

Fig. 74: Removing Chain Case

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

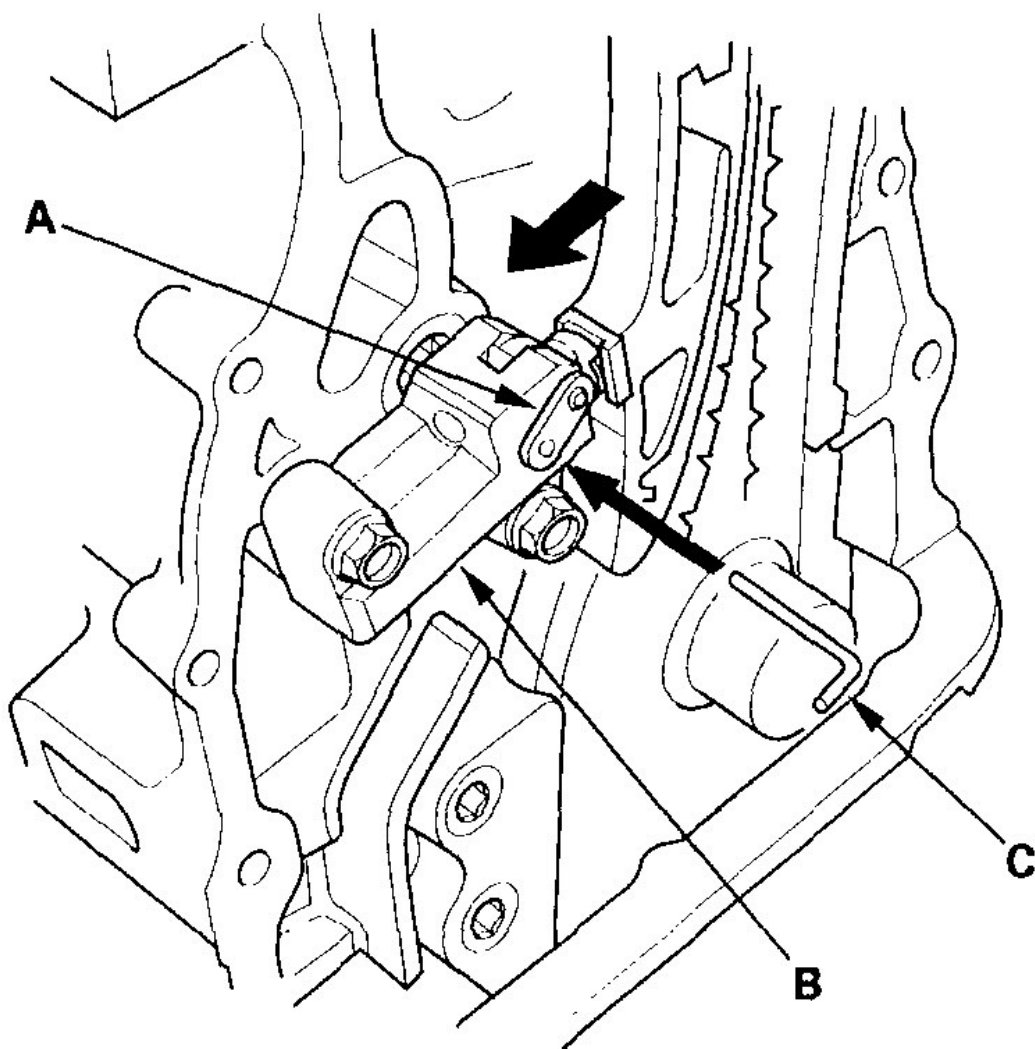


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Fig. 75: Turning Crankshaft Counterclockwise To Compress The Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

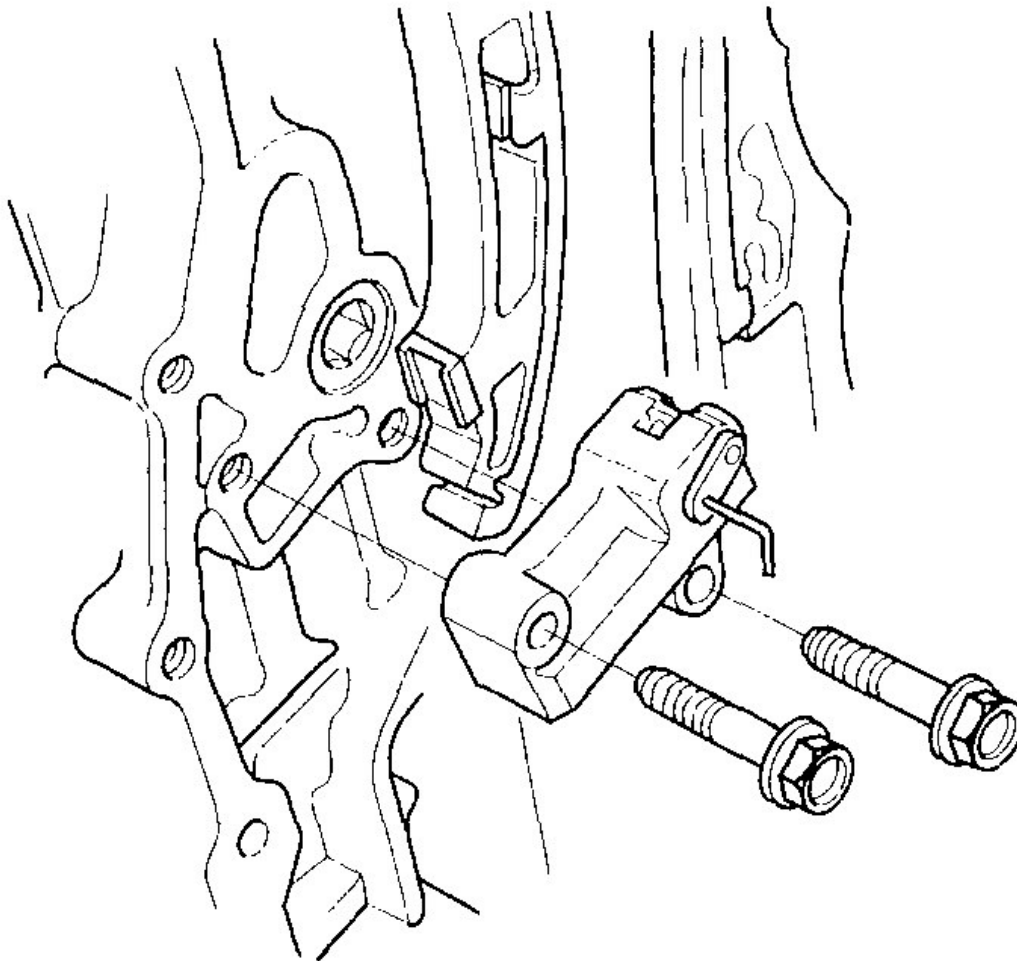
15. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.5 mm (0.06 in.) diameter pin (C) into the holes. Turn the crankshaft clockwise to secure the pin.



G01473521

Fig. 76: Aligning Holes On The Lock & Auto-tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

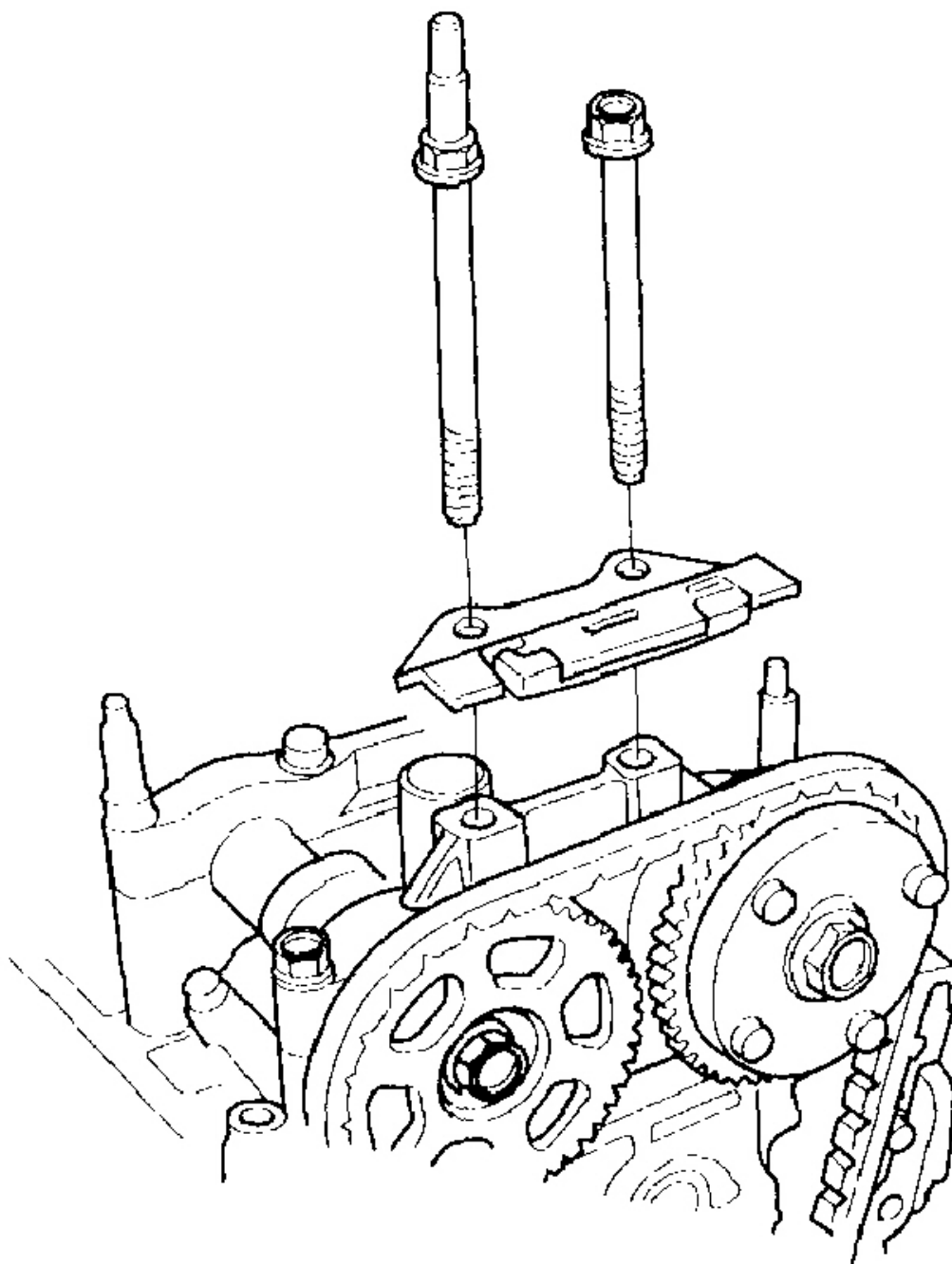
16. Remove the auto-tensioner.



G01473522

Fig. 77: Removing Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

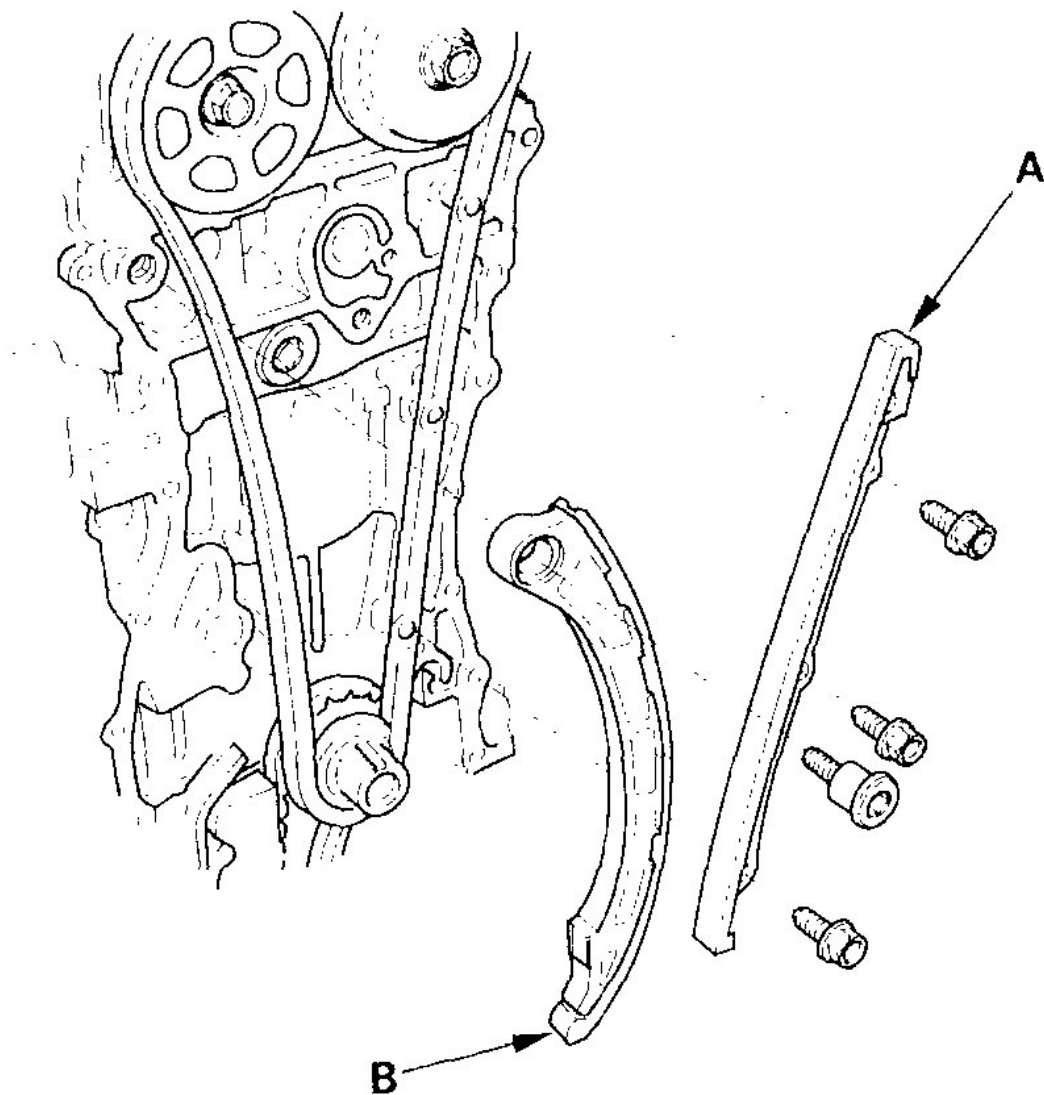
17. Remove the cam chain guide B.



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Fig. 78: Removing Cam Chain Guide B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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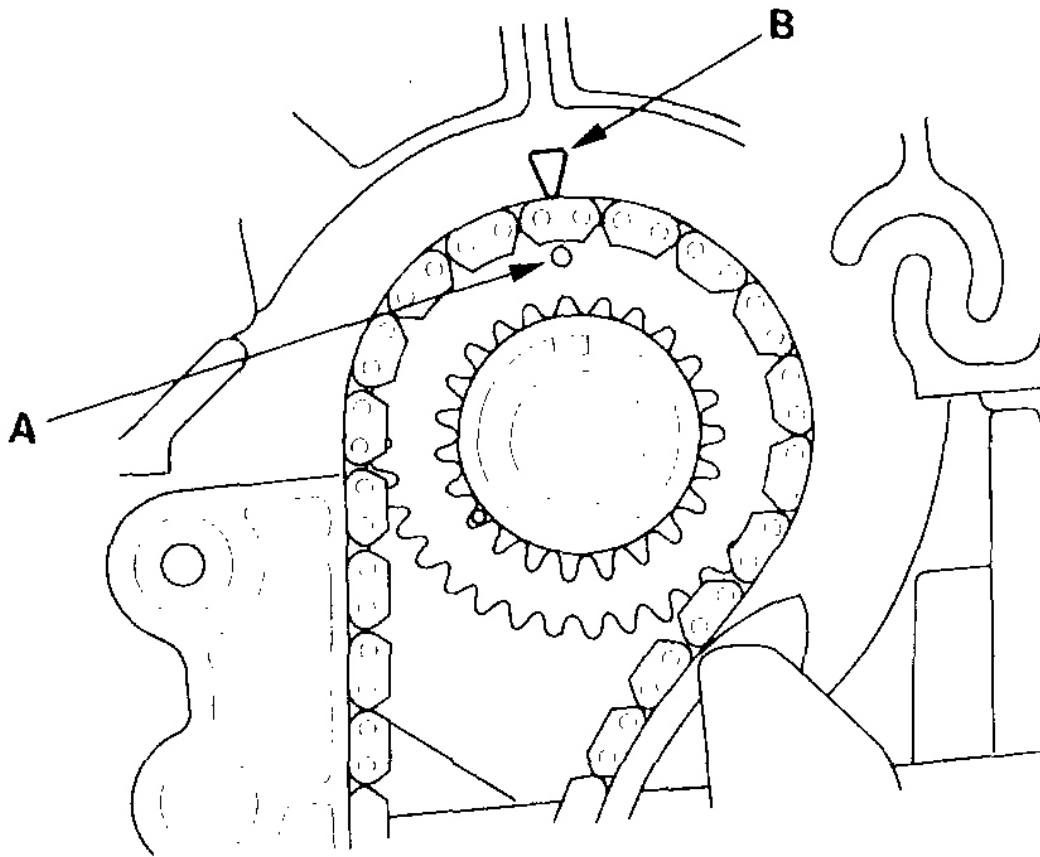
Fig. 79: Removing Cam Chain Guide & Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

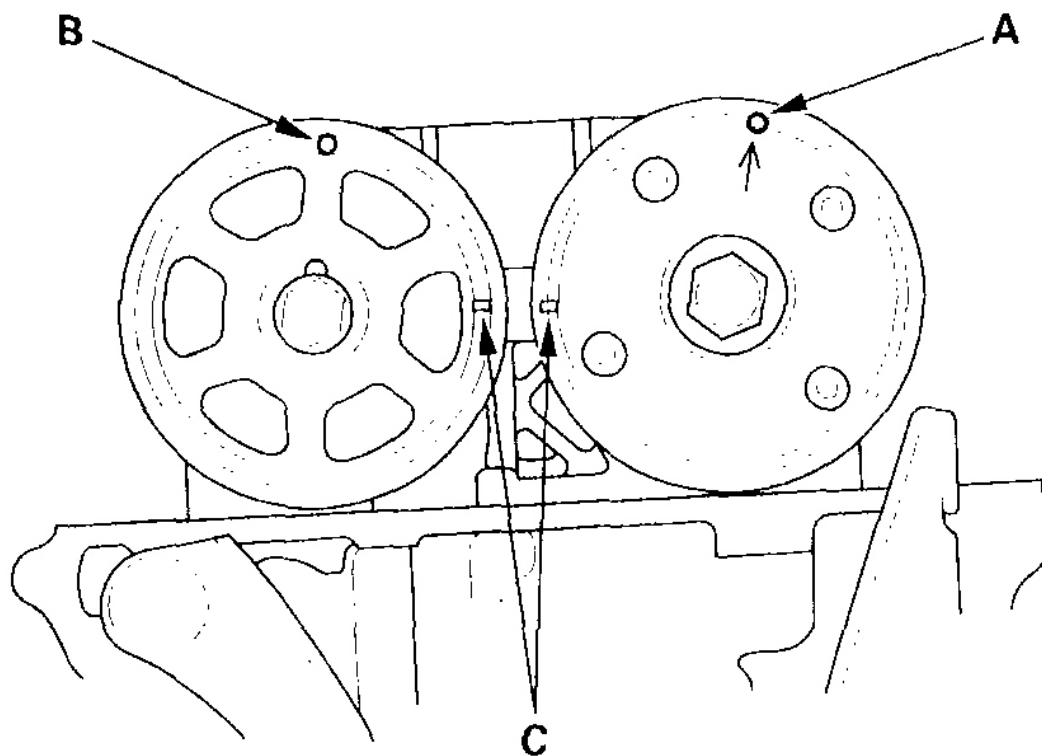
1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the cylinder block.



G01473525

Fig. 80: Aligning TDC Mark On Crankshaft Sprocket With The Pointer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Set the camshafts to 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 exhaust camshaft sprocket.

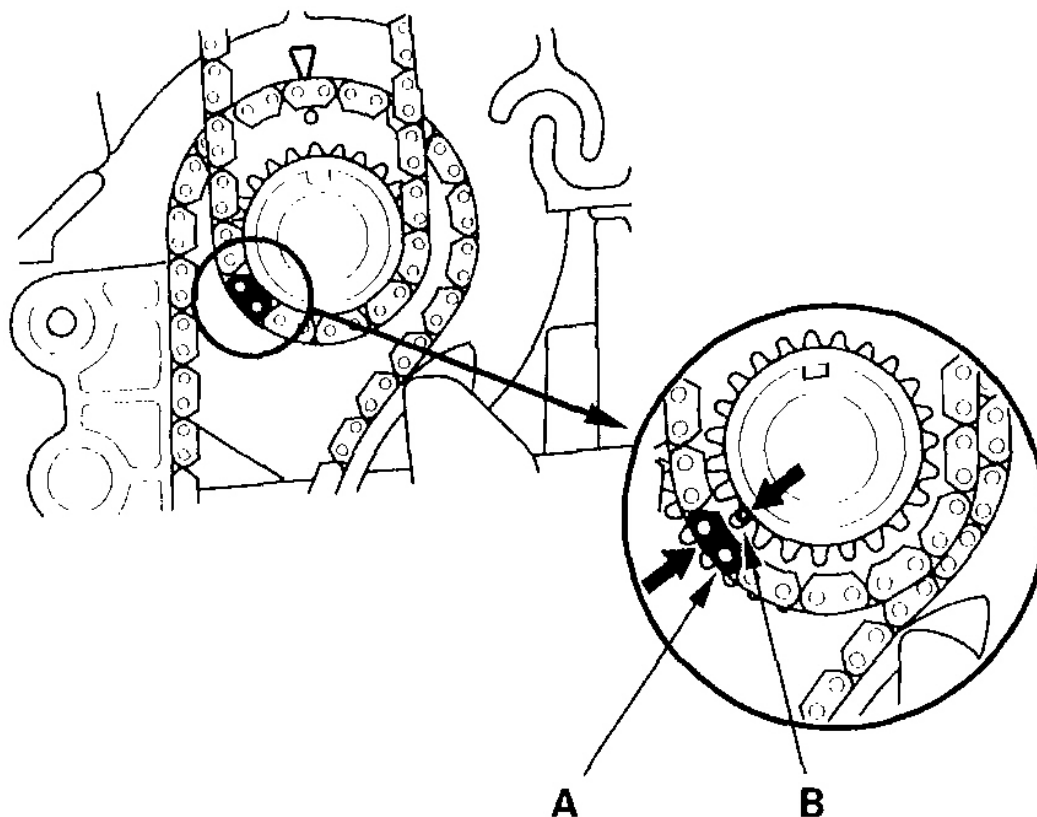


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Fig. 81: Setting The Camshafts To TDC

Courtesy of AMERICAN HONDA MOTOR CO., INC.

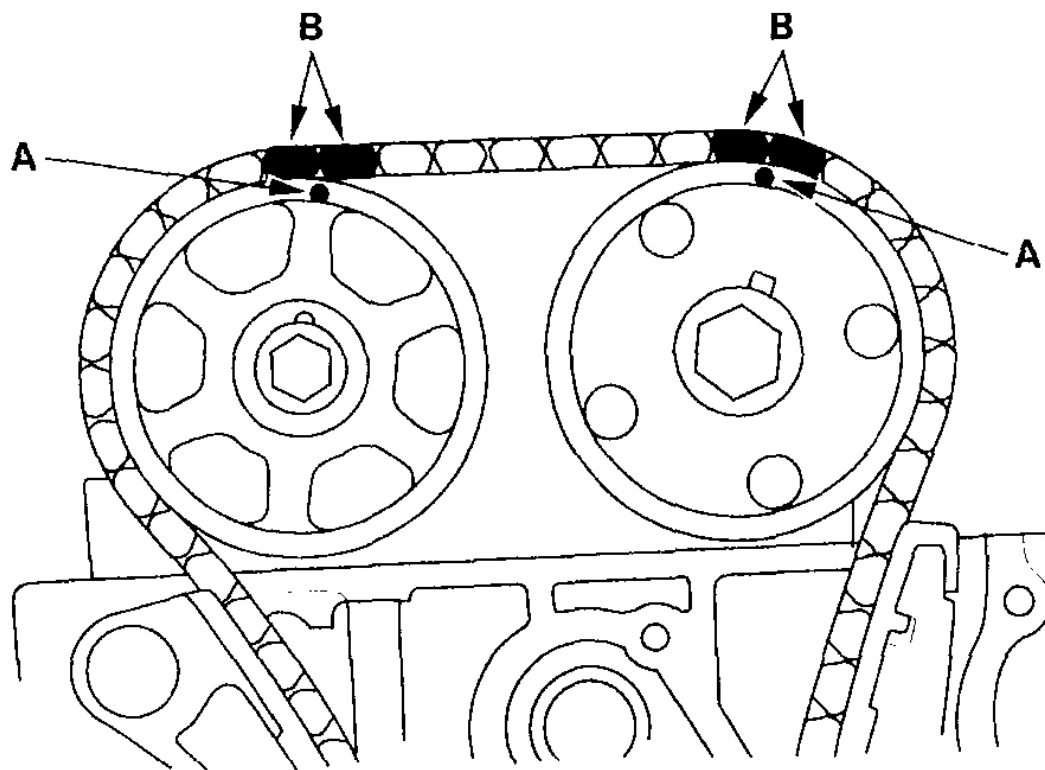
3. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the punch mark (B) on the crankshaft sprocket.



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Fig. 82: Installing Cam Chain On The Crankshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

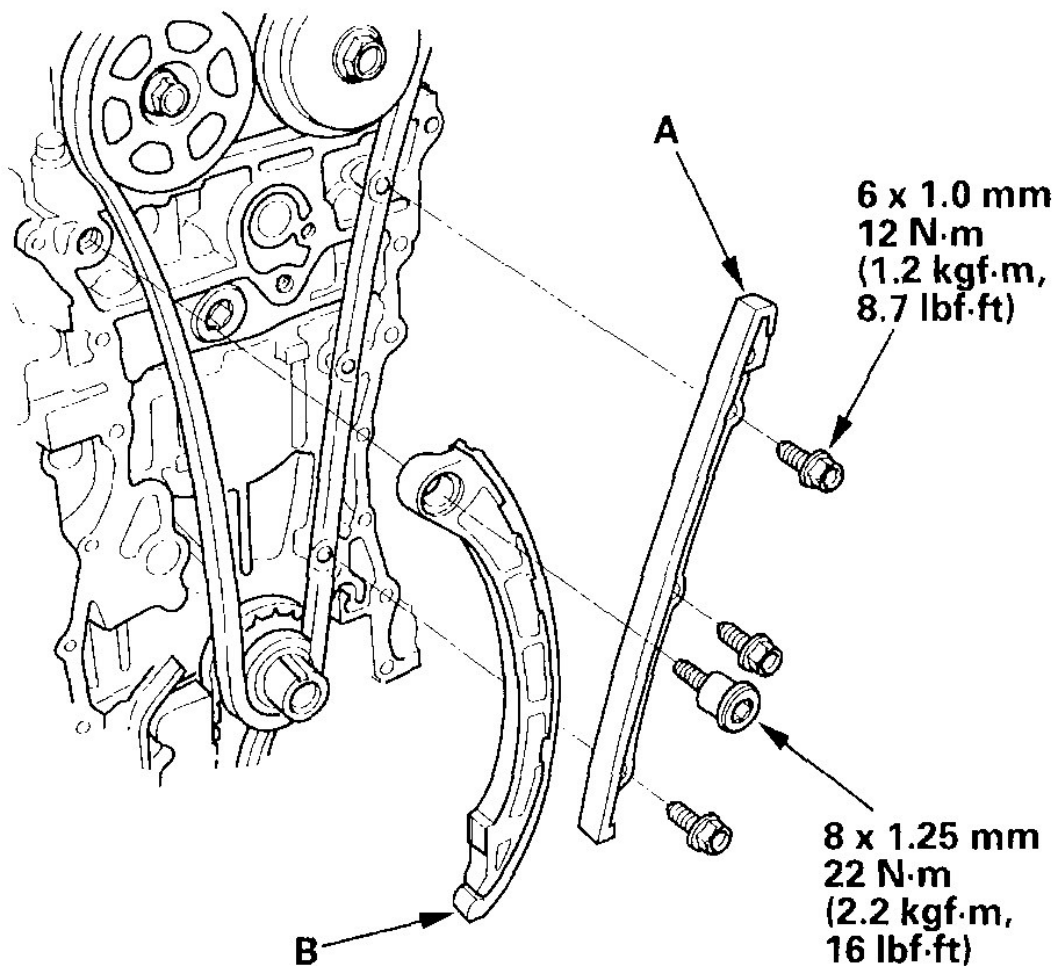
4. Install the cam chain on the VTC actuator and the exhaust camshaft sprocket with the punch marks (A) aligned with the center of the two colored pieces (B).



G01473528

Fig. 83: Installing Cam Chain & Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

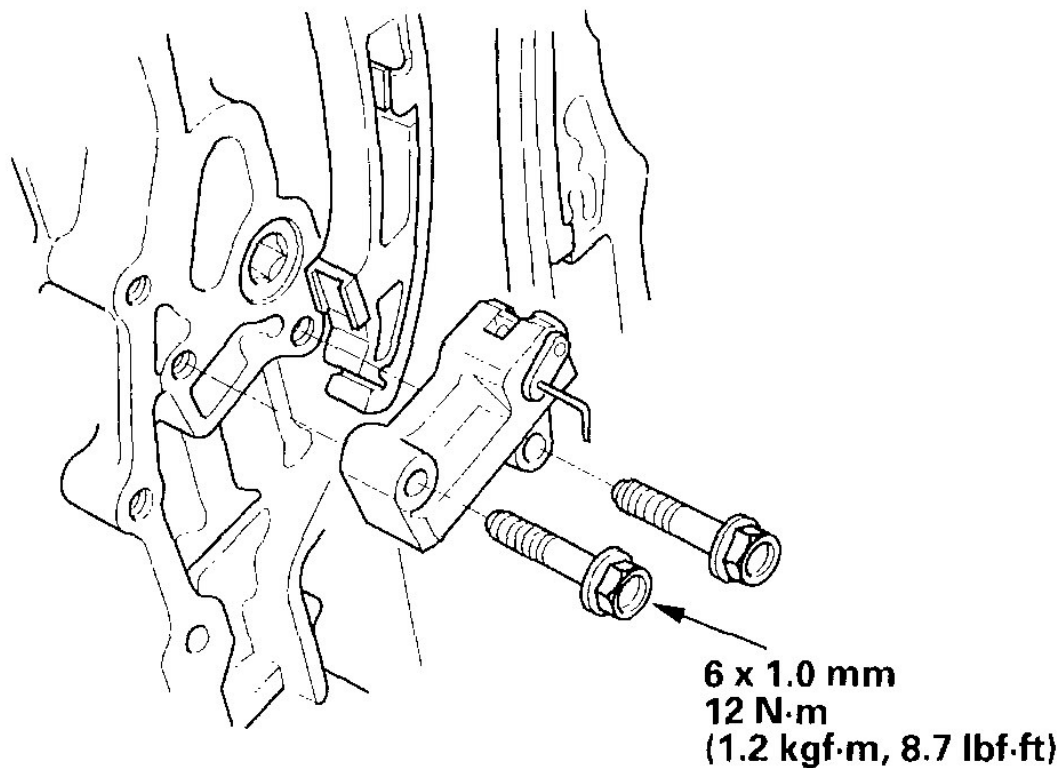
5. Install the cam chain guide A (A) and tensioner arm (B).



G01473529

Fig. 84: Installing Cam Chain Guide A & Tensioner Arm
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the auto-tensioner.

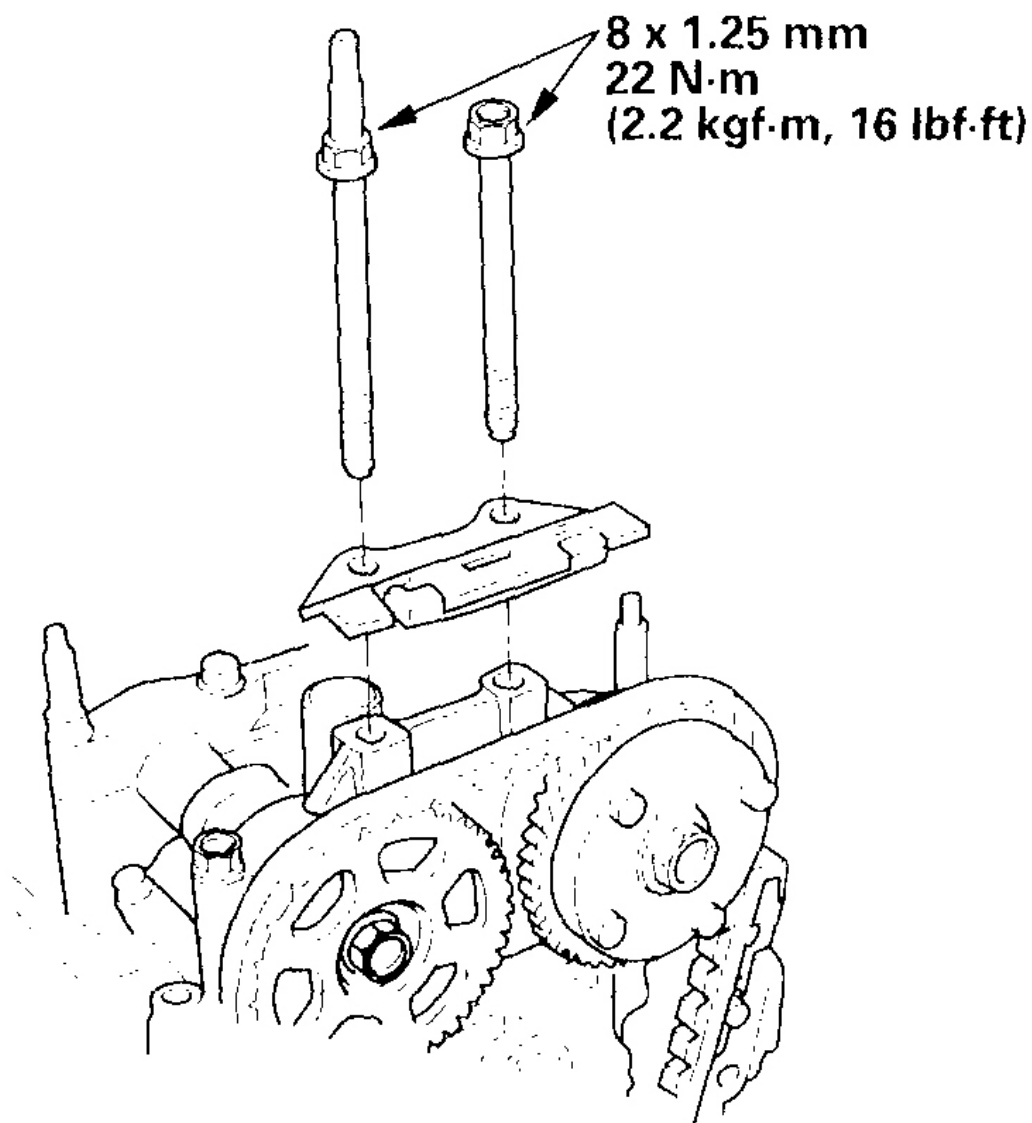


G01473530

Fig. 85: Installing Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cam chain guide B.

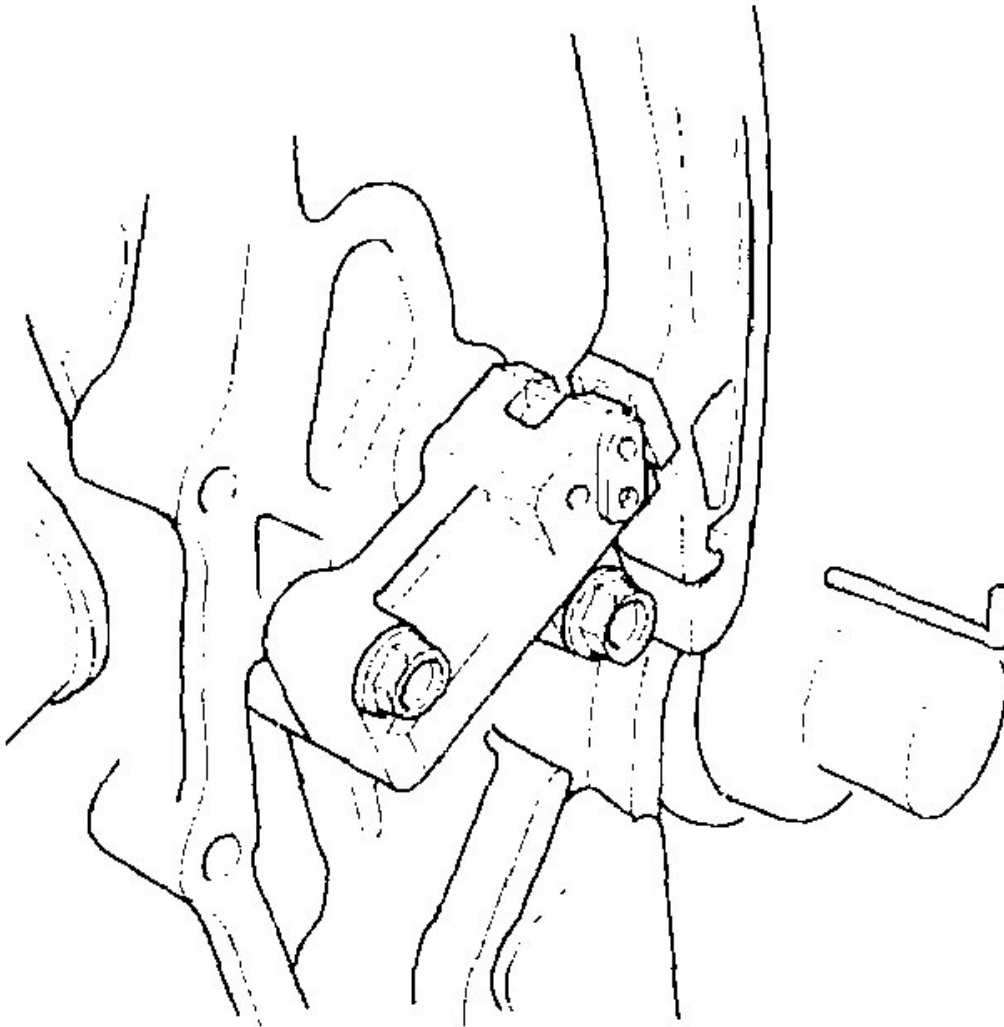


G01473531

Fig. 86: Installing Cam Chain Guide B

Courtesy of AMERICAN HONDA MOTOR CO., INC.

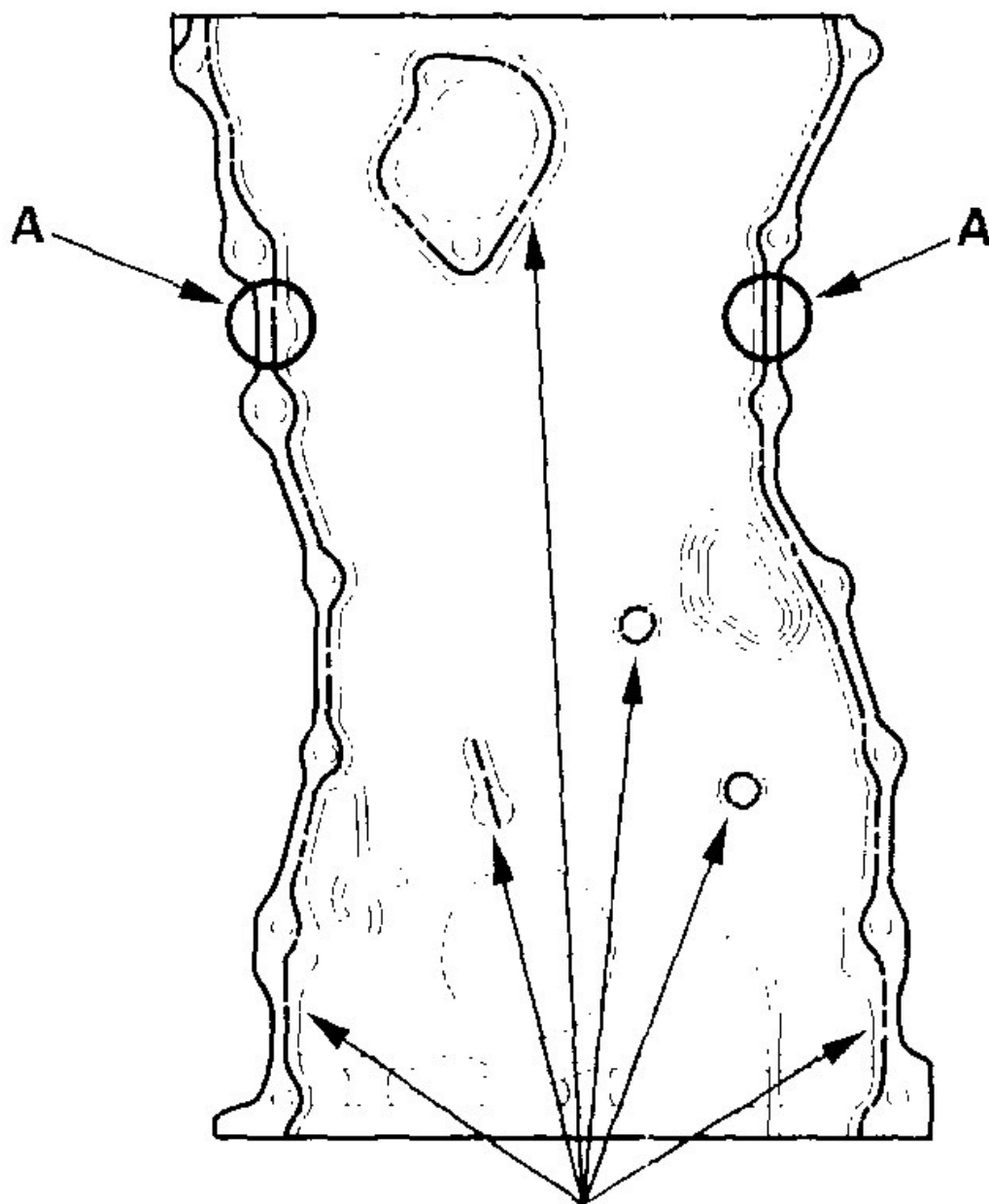
8. Remove the pin from the auto-tensioner.



G01473532

Fig. 87: Removing Pin From Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **Chain Case Oil Seal Installation**).
10. Remove any old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
11. Clean and dry the chain case mating surfaces.
12. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface on the chain case and to the inner threads on the holes.



Apply liquid gasket
along the broken line.

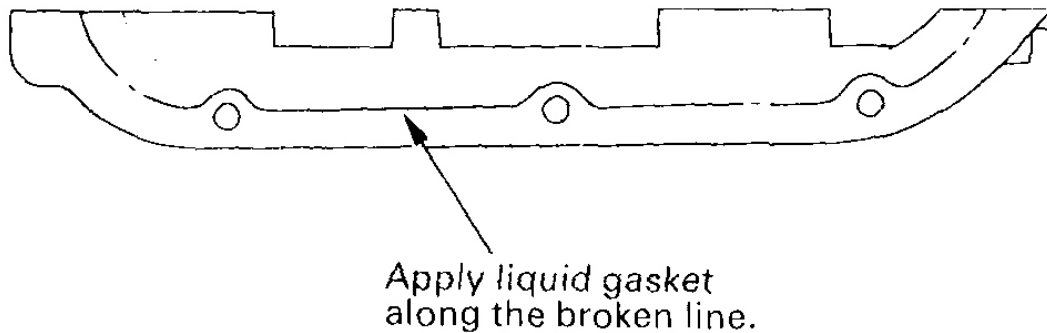
G01473533

Fig. 88: Applying Liquid Gasket To The Cylinder Block Mating Surface On Chain Case

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Apply liquid gasket to the cylinder block upper surface contact areas (A) on the chain case.
14. Apply liquid gasket, P/N 08718-0009, evenly to the oil pan mating surface of the chain case and to the inner threads of the holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

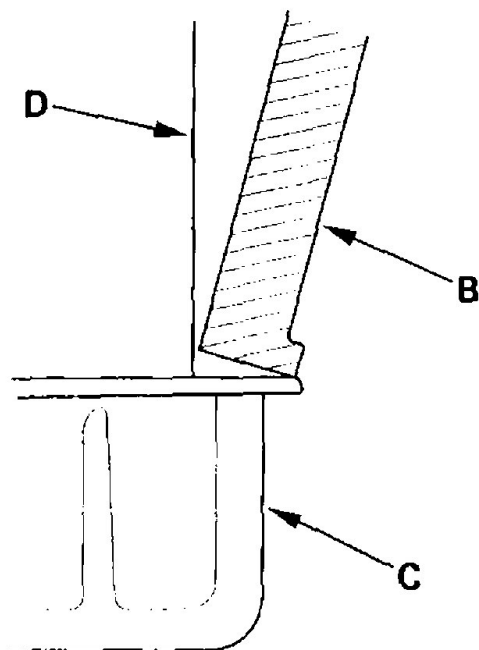
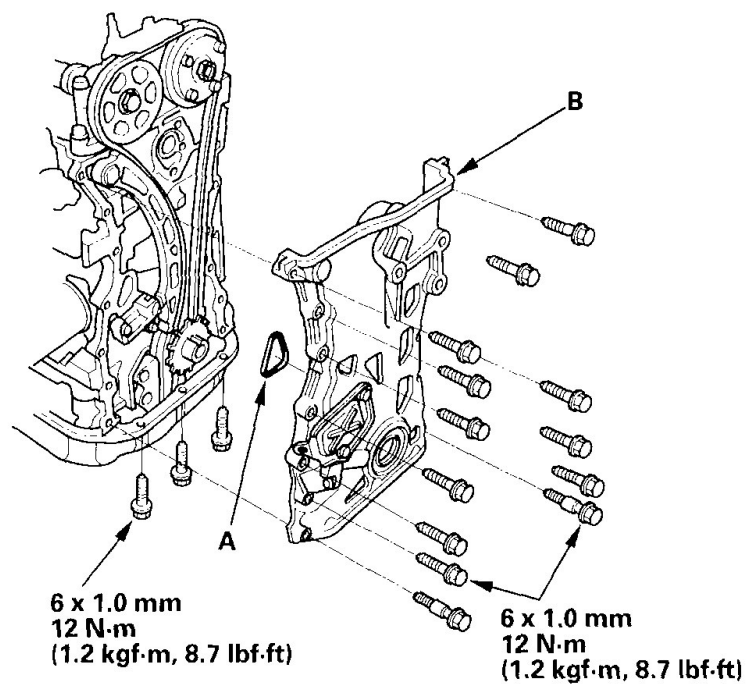


G01473534

Fig. 89: Applying Liquid Gasket To The Oil Pan Mating Surface Of The Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the new O-ring (A) on the chain case. Set the edge of the chain case (B) to the edge of the oil pan (C), then install the chain case on the cylinder block (D).

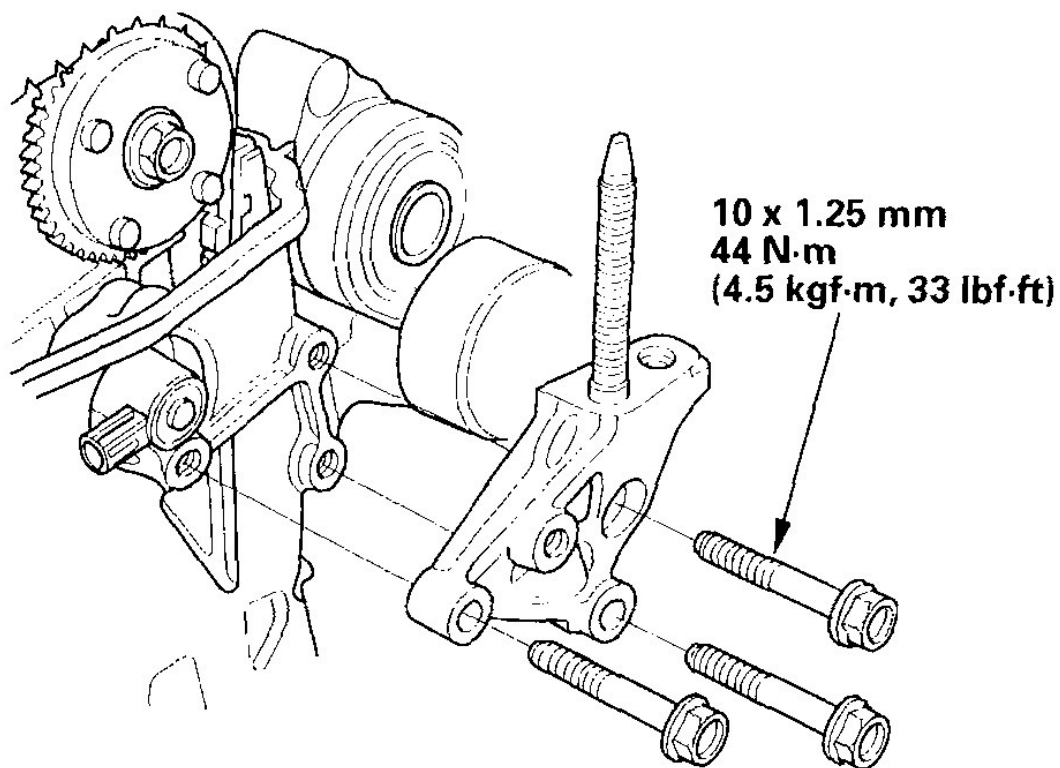
NOTE: When installing the chain case, do not slide the bottom surface on the oil pan mounting surface.



G01473535

Fig. 90: Installing New O-Ring On Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

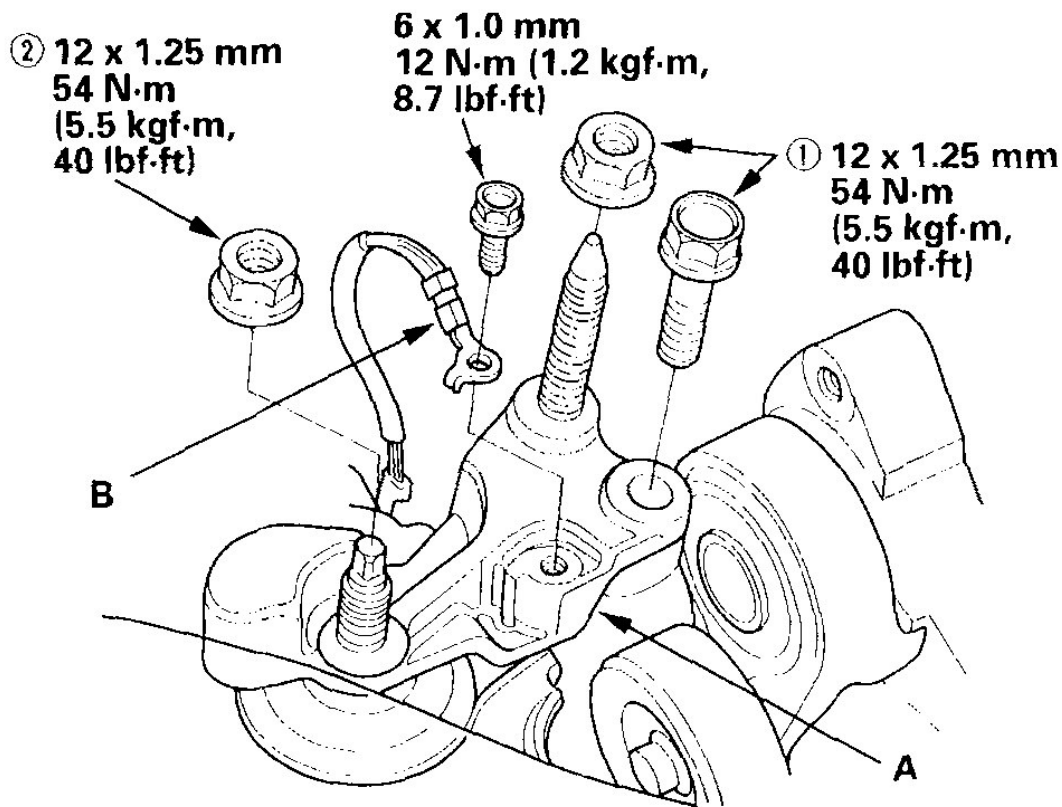
16. Install the side engine mount bracket.



G01473536

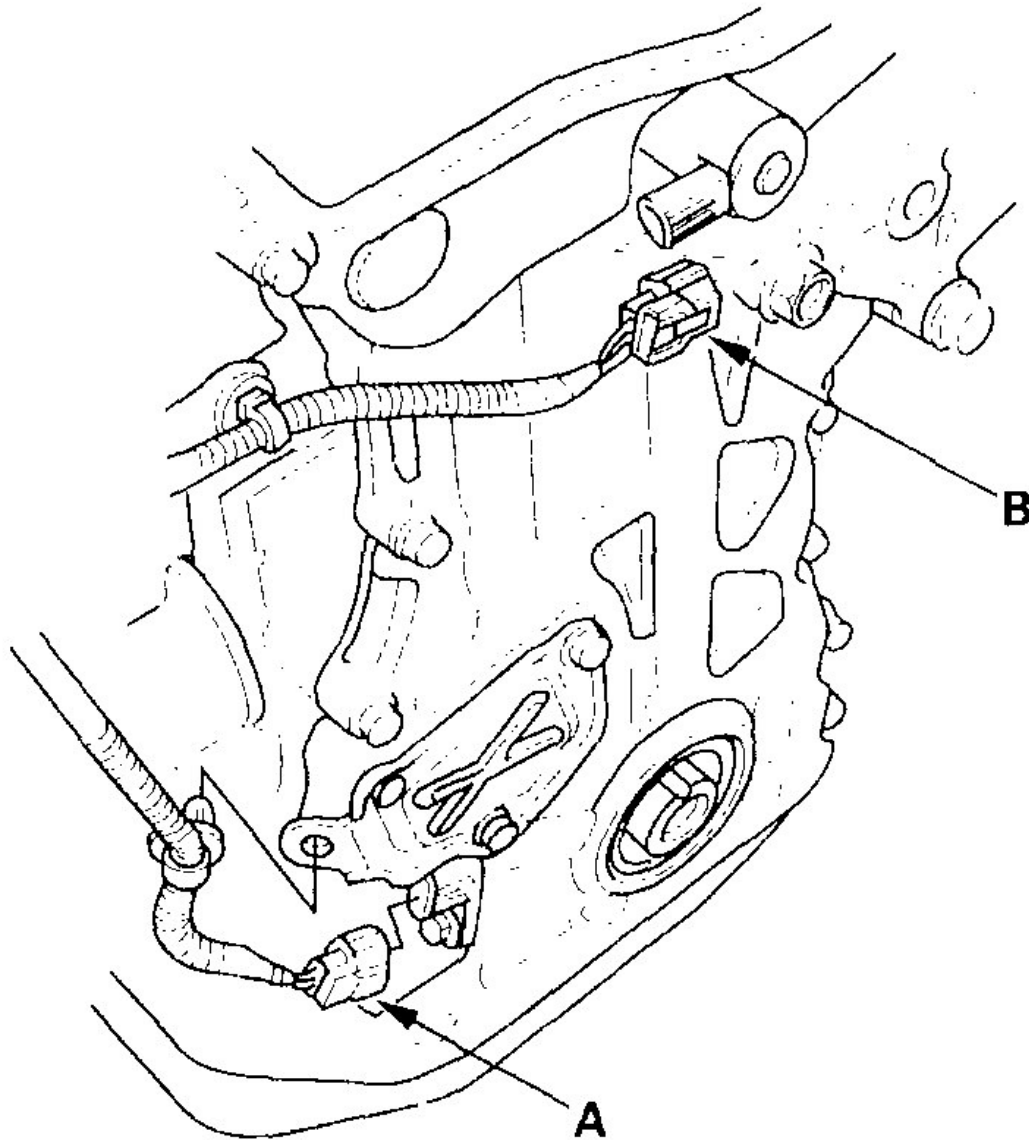
Fig. 91: Installing Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the upper bracket (A), then tighten the bolt/ nuts in the numbered sequence shown.

**Fig. 92: Installing Upper Bracket**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the ground cable (B).
19. Install the variable valve timing control (VTC) oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
20. Connect the crankshaft position (CKP) sensor connector (A) and VTC oil control solenoid valve connector (B).



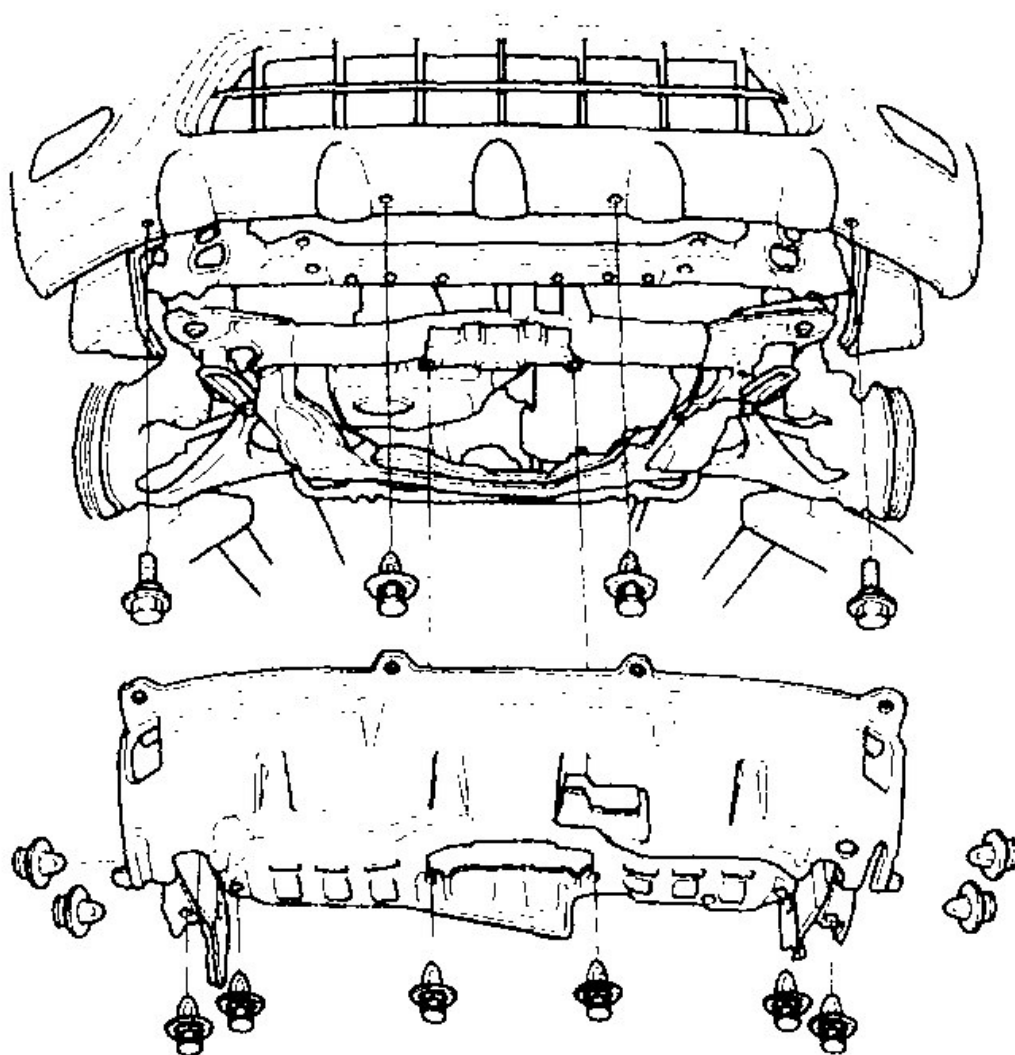
G01473538

Fig. 93: Connecting Crankshaft Position Sensor Connector & VTC Oil Control Solenoid Valve Connector

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the crankshaft pulley (see **Crankshaft Pulley Removal and Installation**).
22. Install the cylinder head cover (see **Cylinder Head Cover Installation**).
23. Install the drive belt (see **DRIVE BELT**).

24. Install the splash shield.



G01473539

Fig. 94: Installing Splash Shield

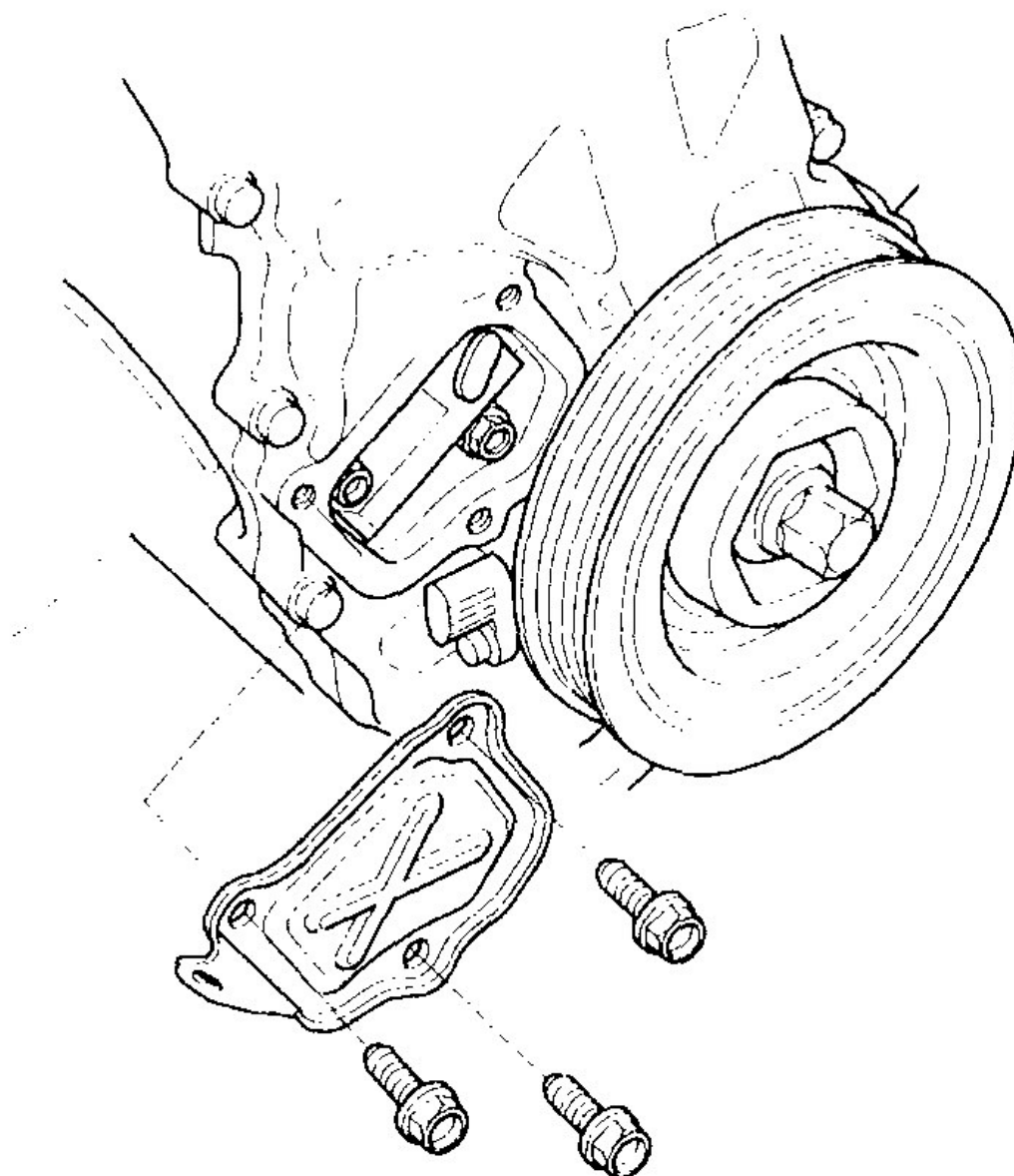
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Install the right front tire/wheel.

AUTO-TENSIONER REMOVAL AND INSTALLATION

Removal

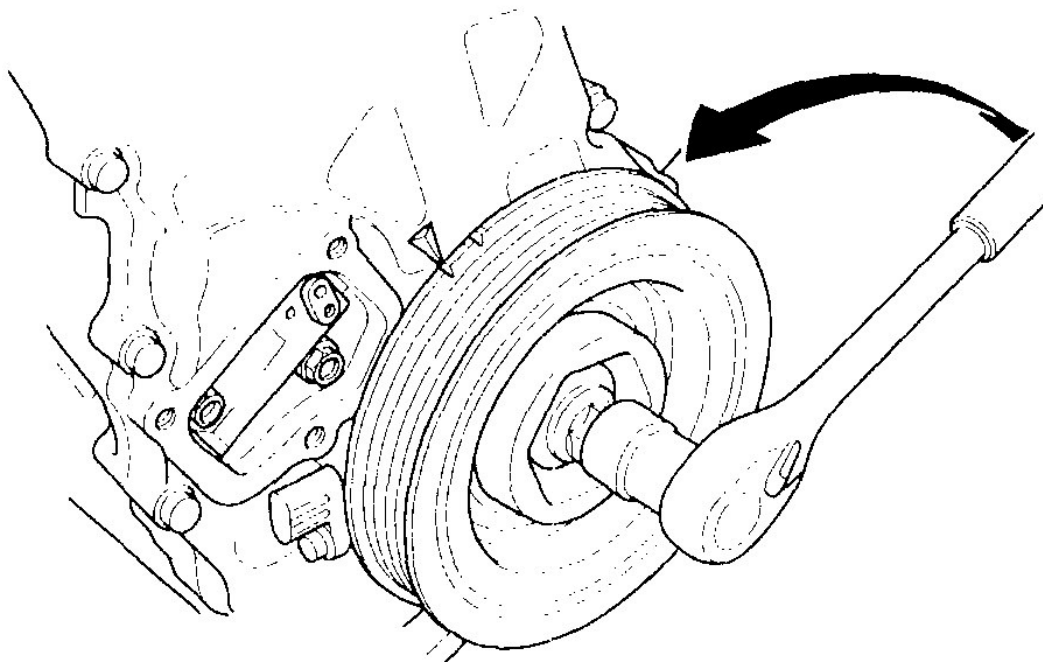
1. Remove the chain case cover.



G01473540

Fig. 95: Removing Chain Case Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

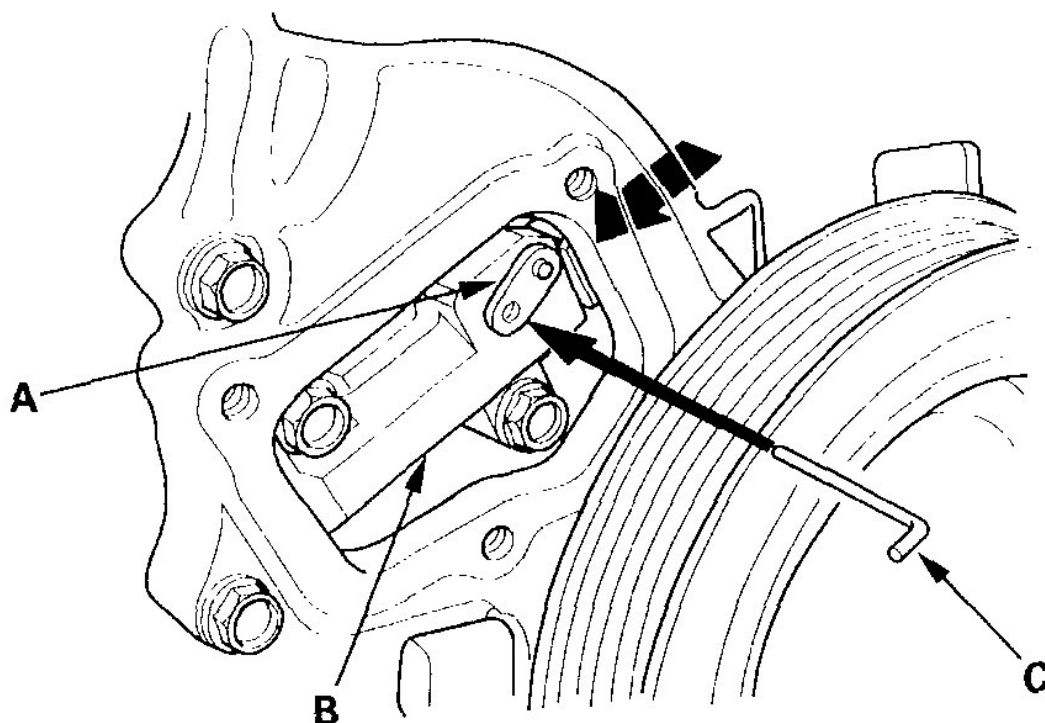
2. Turn the crankshaft counterclockwise to compress the auto-tensioner.



G01473541

Fig. 96: Turning Crankshaft Counterclockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

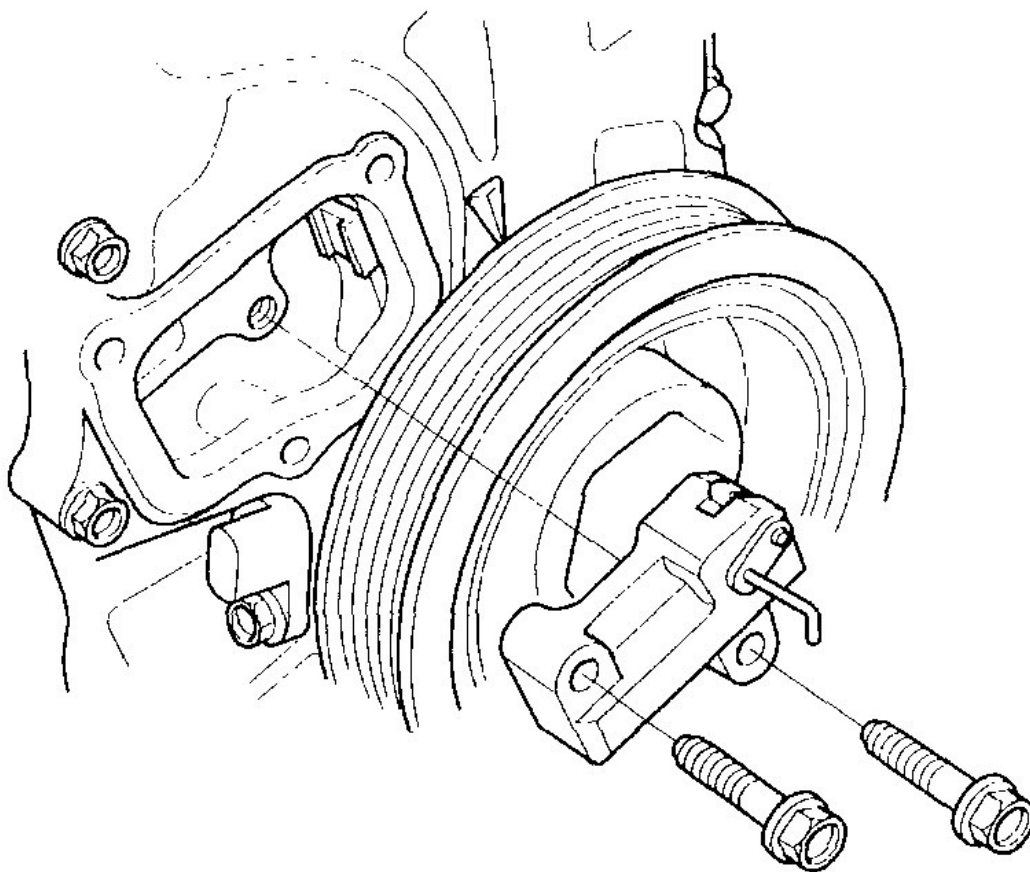
3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.5 mm (0.06 in.) diameter pin (C) into the holes. Turn the crankshaft clockwise to secure the pin.



G01473542

Fig. 97: Aligning Holes On Lock & Auto-tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the auto-tensioner.

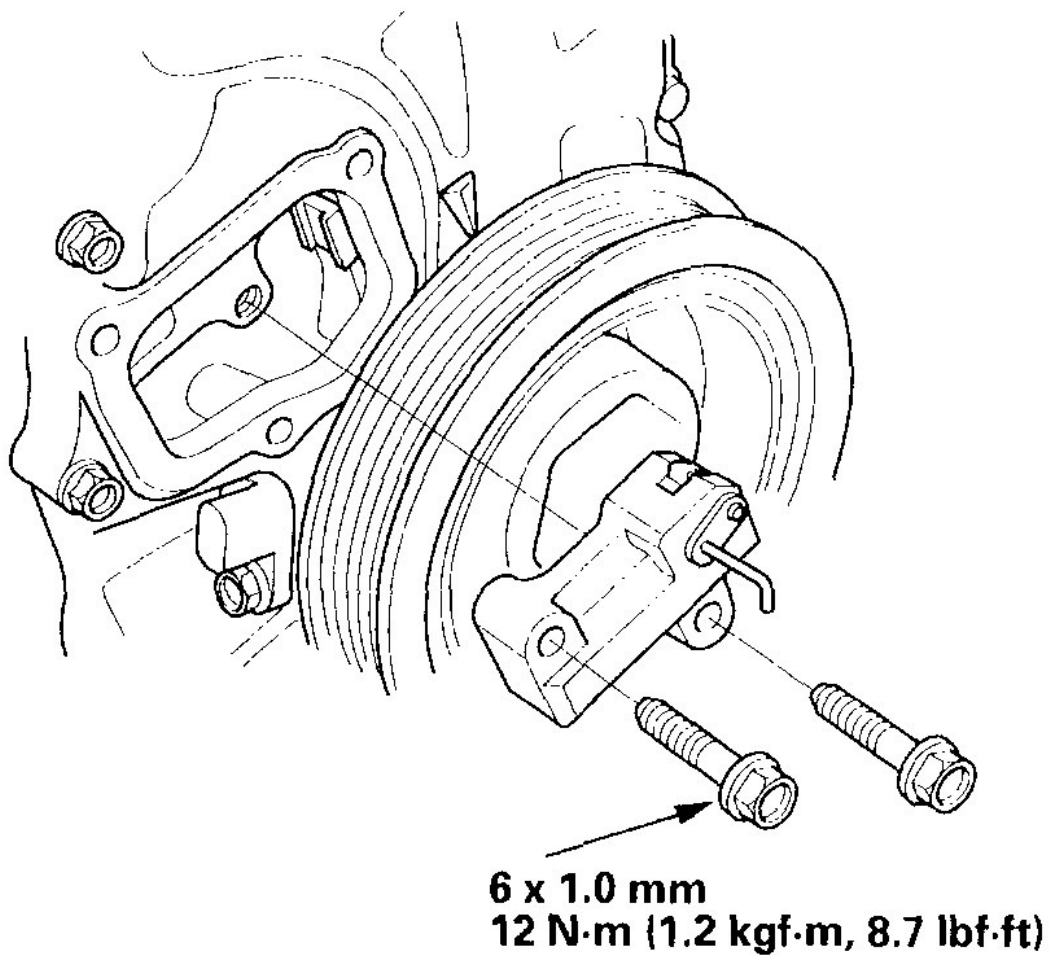


G01473543

Fig. 98: Removing Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install the auto-tensioner.

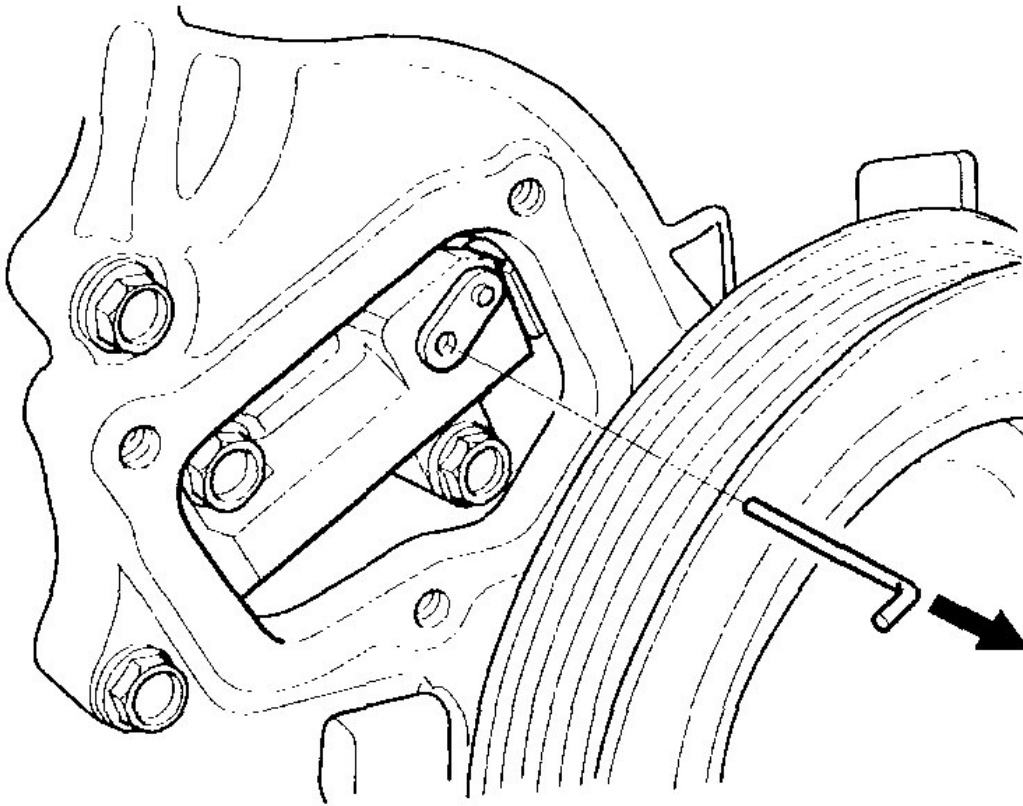


G01473544

Fig. 99: Installing Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the pin from the auto-tensioner.

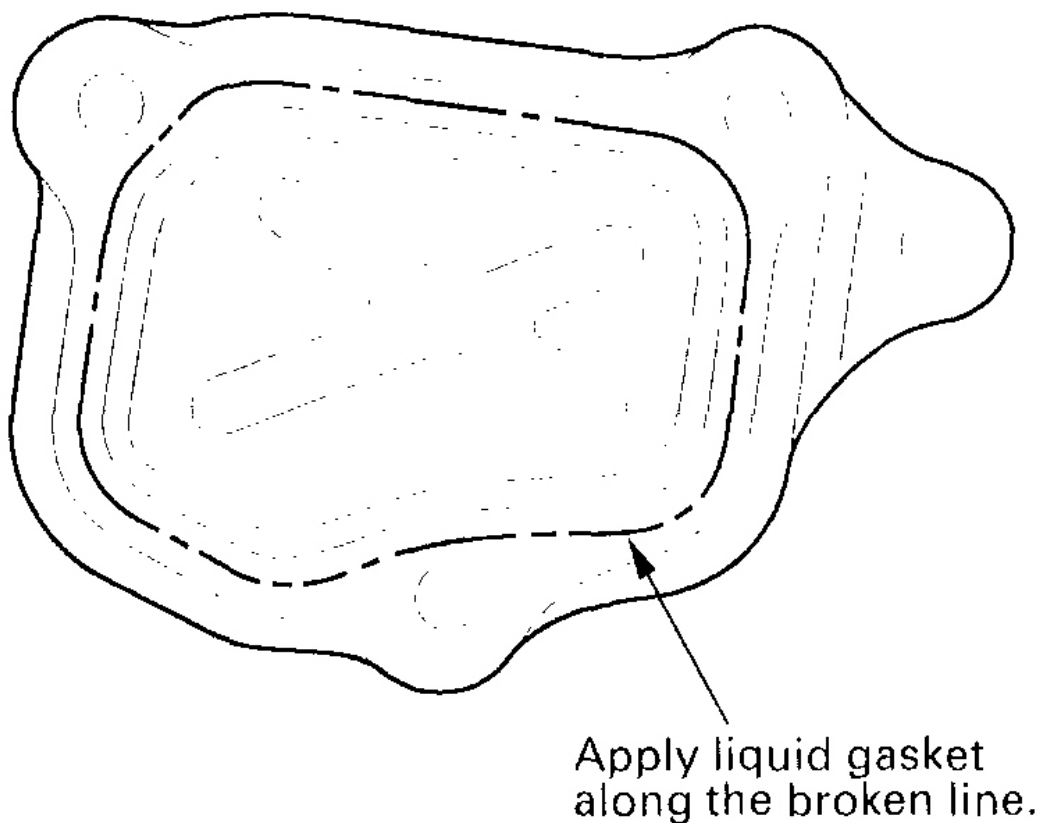


G01473545

Fig. 100: Removing Pin From Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove any old liquid gasket from the chain case cover mating surfaces, bolts, and bolt holes.
4. Clean and dry the chain case cover mating surfaces.
5. Apply liquid gasket, P/N 08718-0009, evenly to the chain case mating surface of the chain case cover and to the inner threads of the holes.

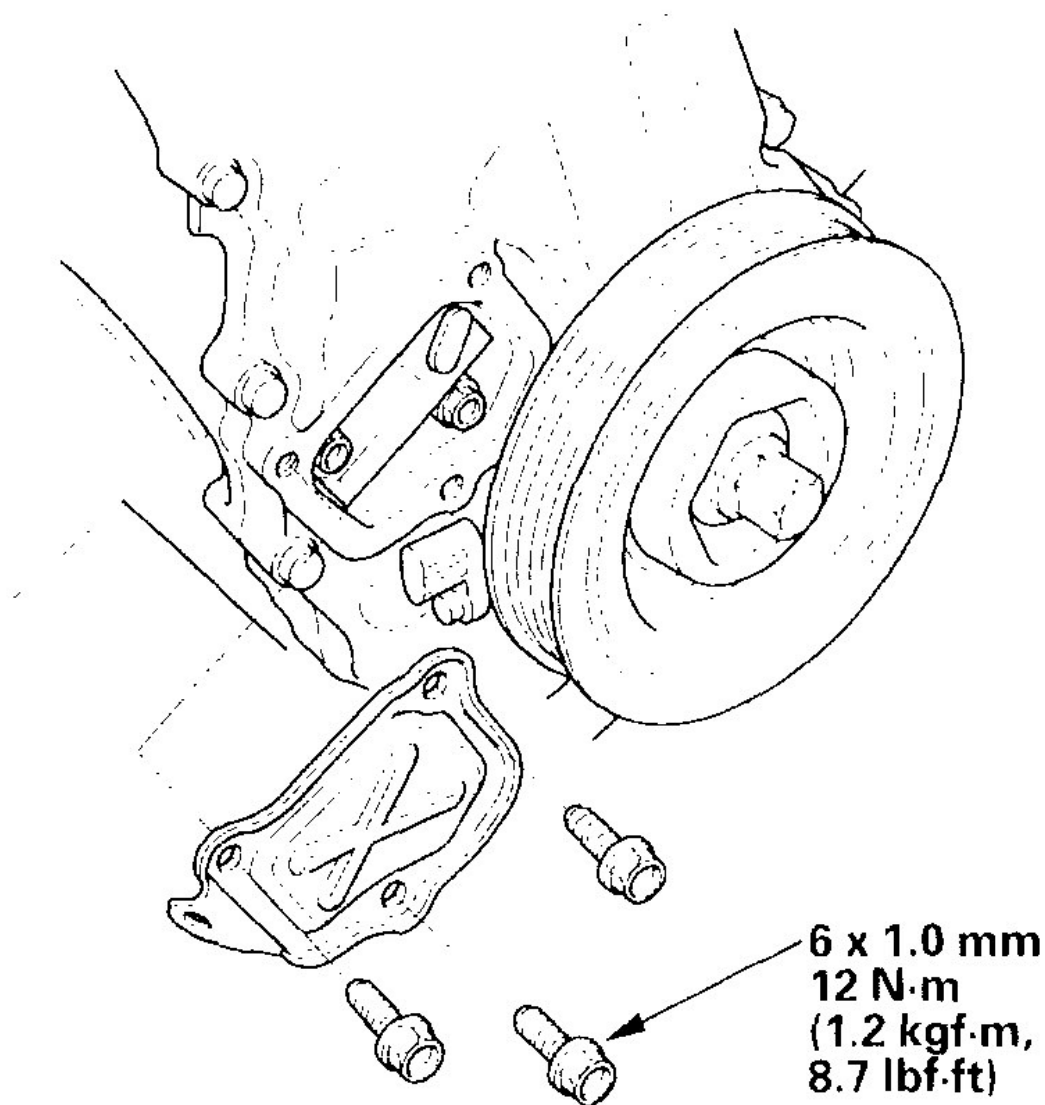
NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.



G01473546

Fig. 101: Applying Liquid Gasket To Chain Case Mating Surface Of The Chain Case Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.



G01473547

Fig. 102: Installing Chain Case Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CHAIN CASE OIL SEAL INSTALLATION

Special Tools Required

- Driver 07749-0010000
- Attachment, 52 x 55 mm 07746-0010400

1. Use the special tools to drive a new oil seal squarely into the chain case to the specified installed height.

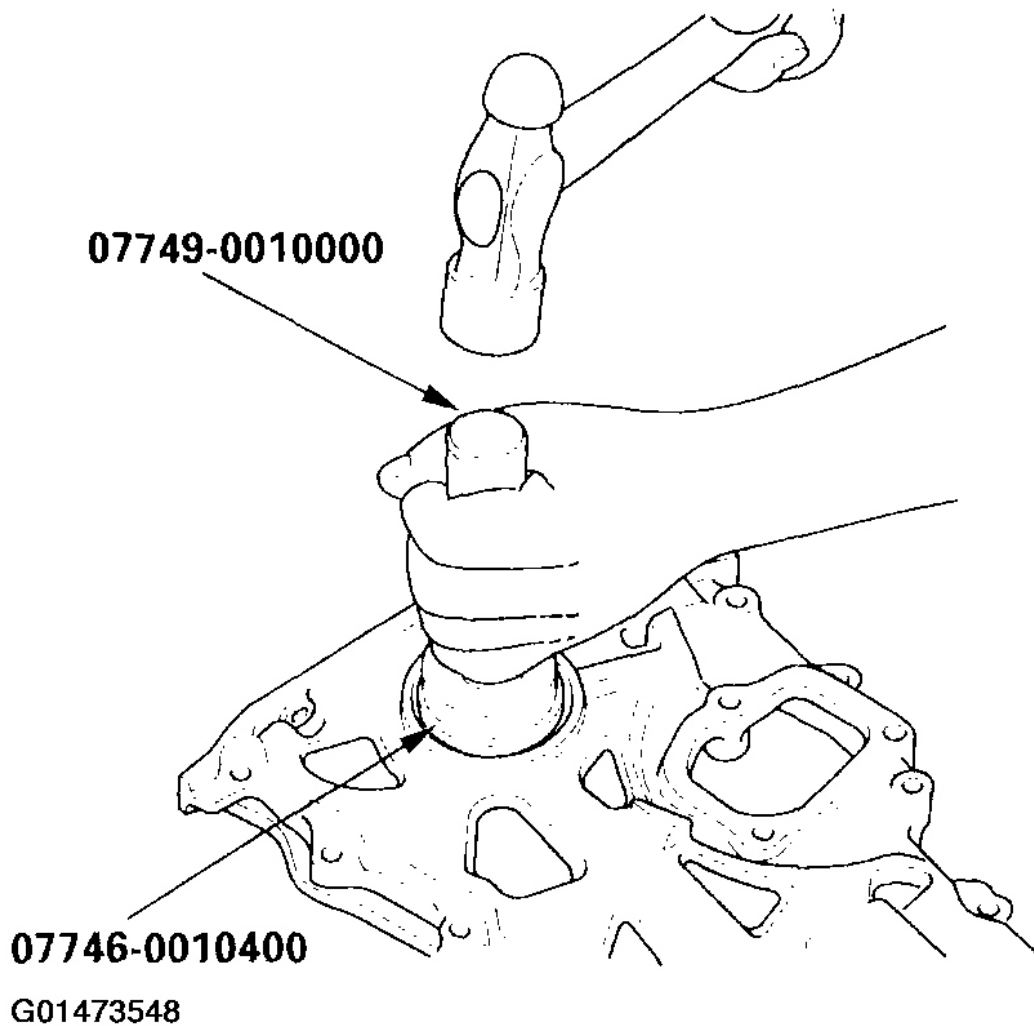
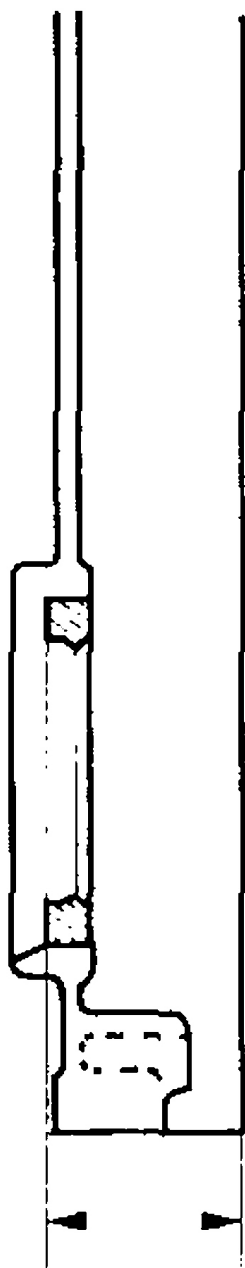


Fig. 103: Driving New Oil Seal Squarely Into The Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Oil Seal Installed Height:

33.0 33.7 mm (1.30 - 1.33 in.)



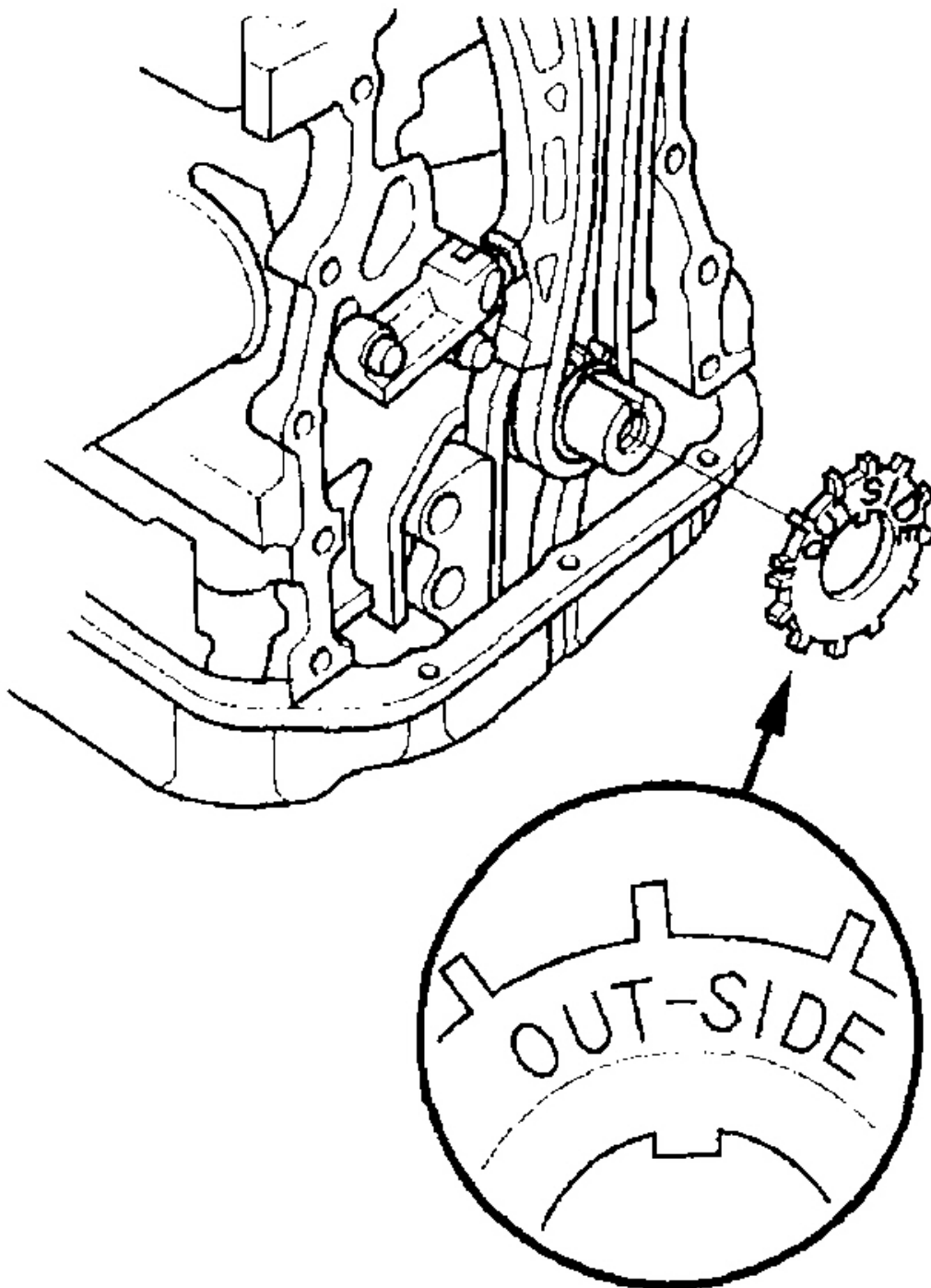
33.0—33.7 mm
(1.30—1.33 in.)

G01473549

Fig. 104: Measuring Distance Between Chain Case Surface & Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CKP PULSE PLATE REPLACEMENT

1. Remove the front tires/wheels.
2. Remove the splash shield (see step 3 on).
3. Remove the drive belt (see **DRIVE BELT**).
4. Remove the cylinder head cover (see **Cylinder Head Cover Removal**).
5. Remove the crankshaft pulley (see **Crankshaft Pulley Removal and Installation**).
6. Disconnect the crankshaft position (CKP) sensor connector and variable valve timing control (VTC) oil control solenoid valve connector (see step 7 on).
7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
8. Support the engine with a jack and wood block under the oil pan.
9. Remove the ground cable, and remove the upper bracket (see step 10 on).
10. Remove the side engine mount bracket (see step 11 on).
11. Remove the chain case (see step 12).
12. Remove the CKP pulse plate.



G01473550

Fig. 105: Removing CKP Pulse Plate**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

13. Install the CKP pulse plate.
14. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **Chain Case Oil Seal Installation**).
15. Remove any old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
16. Clean and dry the chain case mating surfaces.
17. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the chain case and to the inner threads of the holes (see step 12).
18. Apply liquid gasket to the cylinder block upper surface contact areas on the chain case (see step 13).
19. Apply liquid gasket, P/N 08718-0009, evenly to the oil pan mating surface of the chain case and to the inner threads of the holes (see step 14).

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

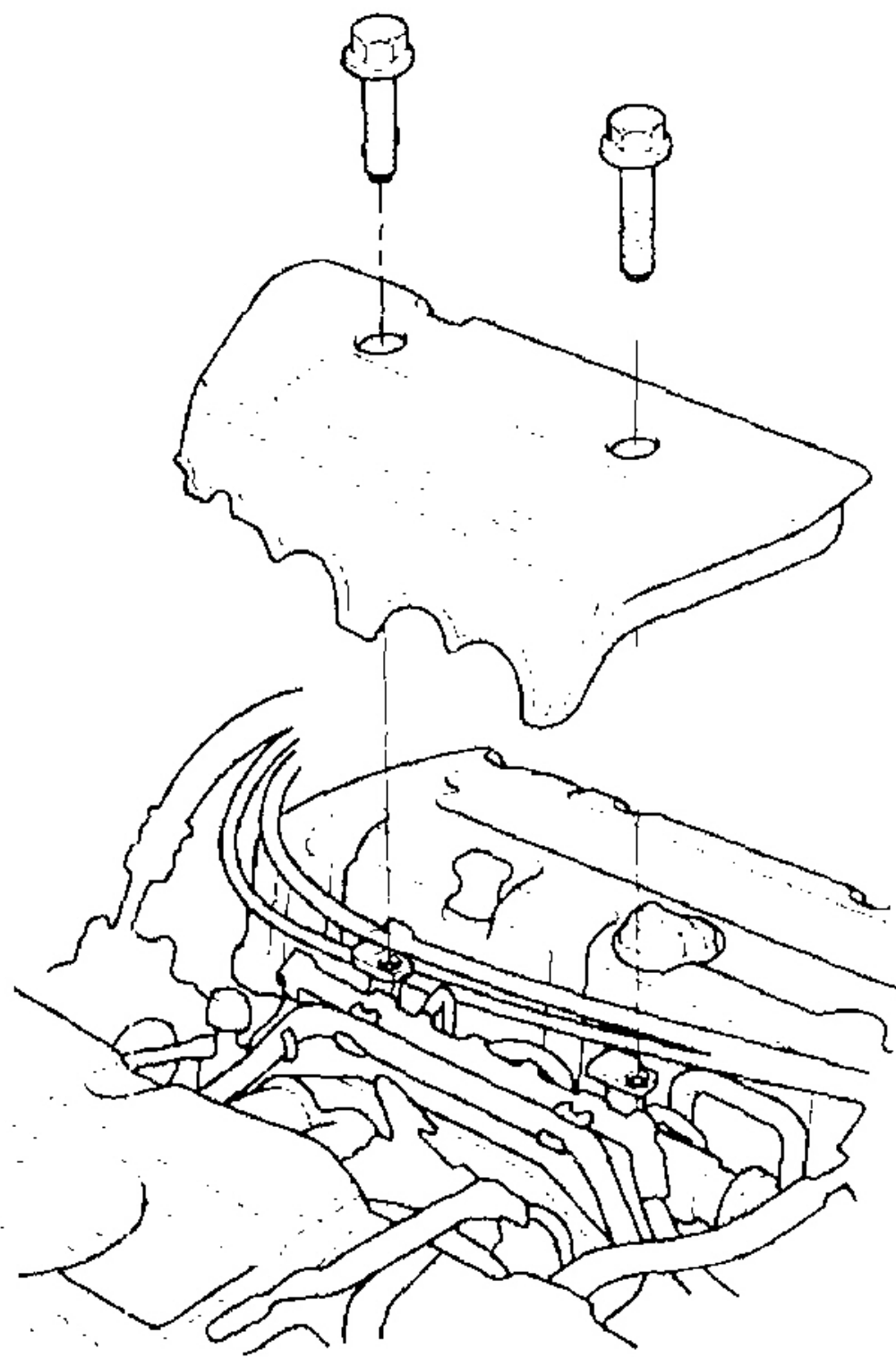
20. Install the new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the cylinder block (see step 15).

NOTE: When installing the chain case, do not slide the bottom surface on the oil pan mounting surface.

21. Install the side engine mount bracket (see step 16).
22. Install the upper bracket and the ground cable (see step 17).
23. Install the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
24. Connect the CKP sensor connector and VTC oil control solenoid valve connector (see step 20).
25. Install the crankshaft pulley (see **Crankshaft Pulley Removal and Installation**).
26. Install the cylinder head cover (see **Cylinder Head Cover Installation**).
27. Install the drive belt.
28. Install the splash shield (see **TRANSMISSION INSTALLATION**).
29. Install the front tires/wheels.

CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold cover.

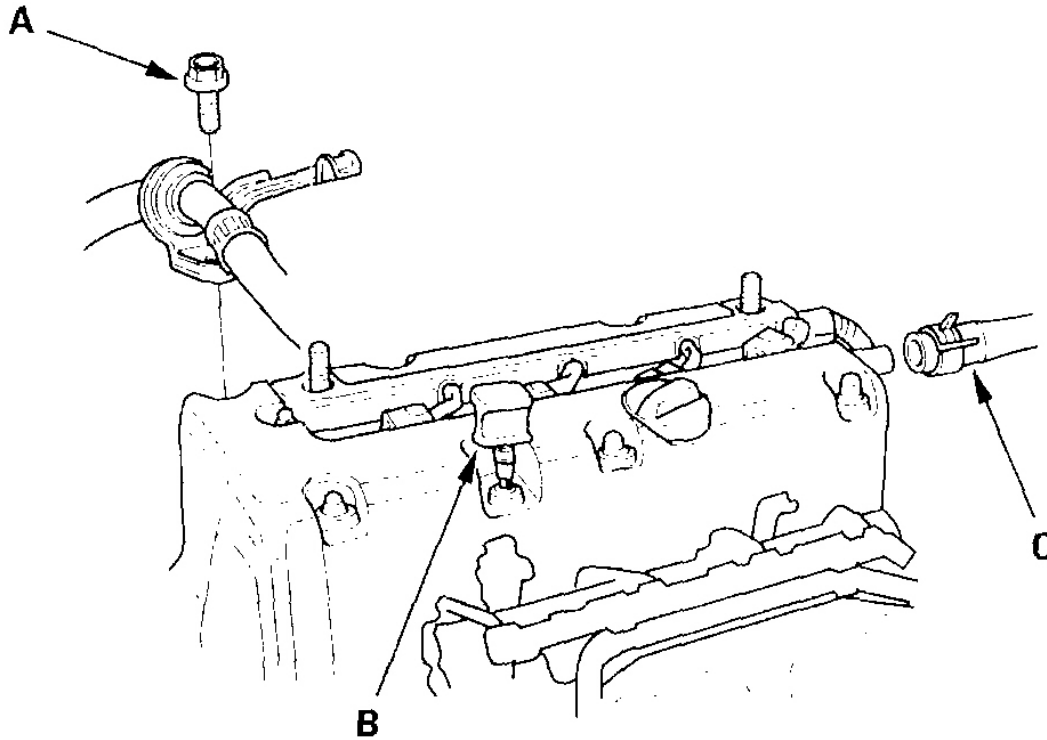


G01473551

Fig. 106: Removing Intake Manifold Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
3. Remove the bolt (A) securing the power steering hose bracket.

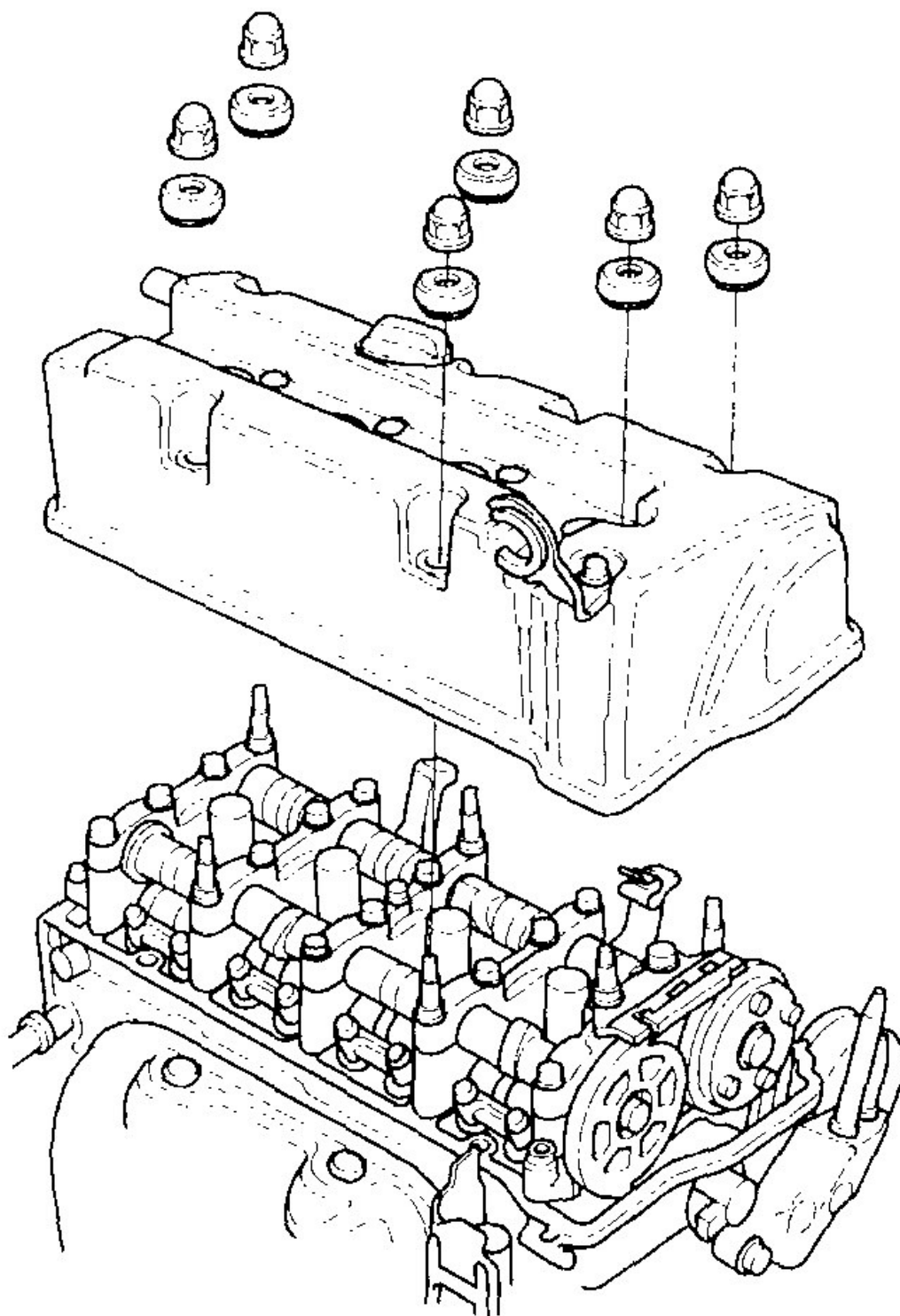


G01473552

Fig. 107: Removing Bolt Securing Power Steering Hose Bracket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the dipstick (B) and breather hose (C).
5. Remove the cylinder head cover.



G01473553

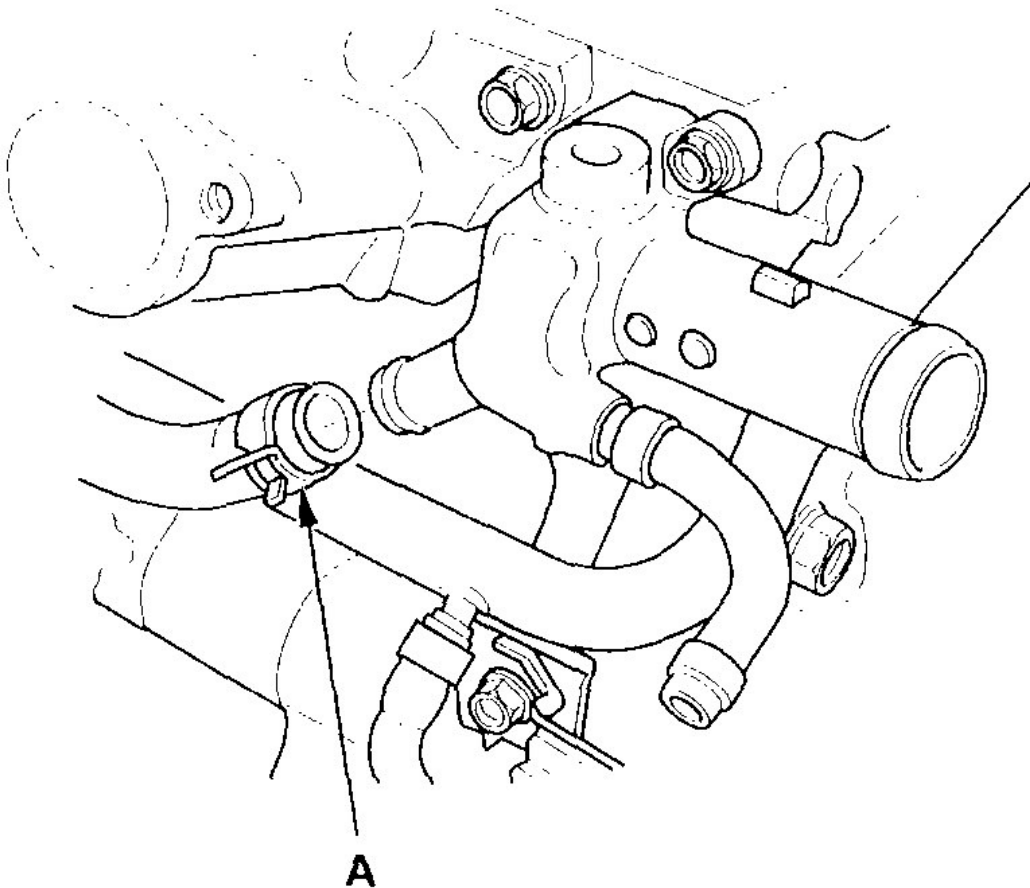
Fig. 108: Removing Cylinder Head Cover

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.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100° F (38° C) before loosening the cylinder head bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Drain the engine coolant (see COOLANT REPLACEMENT).
2. Relieve fuel pressure (see FUEL PRESSURE TEST).
3. Remove the fuel feed hose (see FUEL LINE/QUICK-CONNECT FITTING REMOVAL).
4. Remove the drive belt (see DRIVE BELT).
5. Remove the intake manifold (see Intake Manifold).
6. Remove the water bypass hose (A).

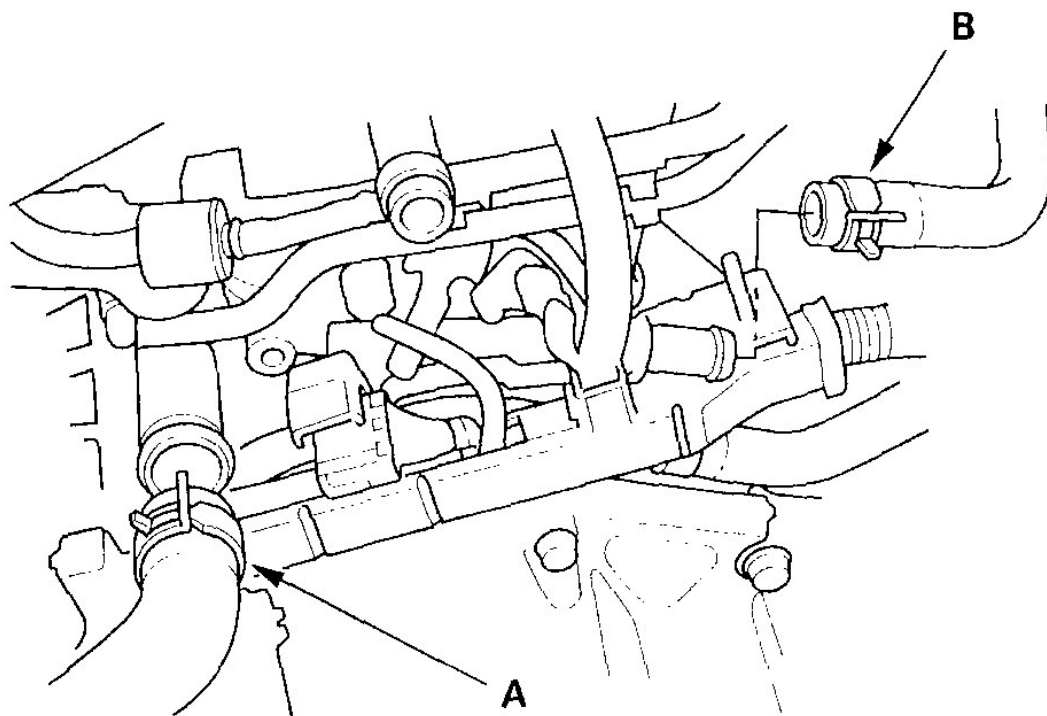


G01473554

Fig. 109: Removing Water Bypass Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

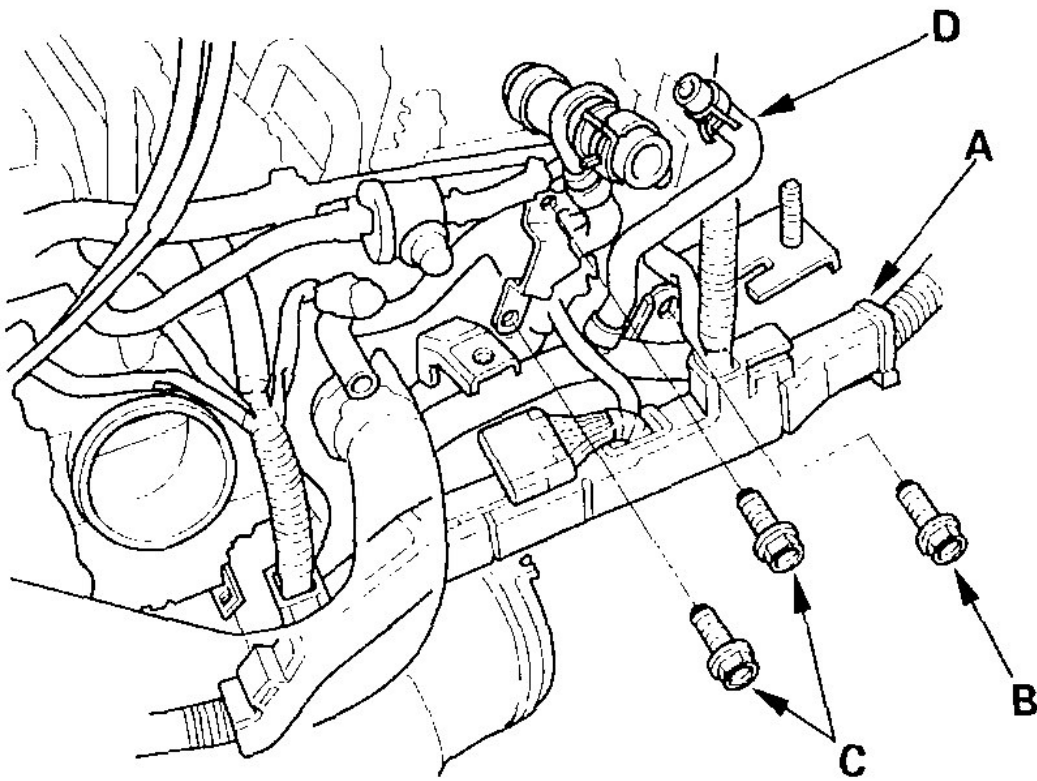
7. Remove the exhaust manifold (see **Exhaust Manifold**).
8. Remove the cam chain (see **Cam Chain Removal**).
9. Remove the engine wire harness connectors and wire harness clamps from the cylinder head.
 - Four injector connectors
 - Engine coolant temperature (ECT) sensor connector
 - Camshaft position (CMP) sensor A (Intake) connector
 - Camshaft position (CMP) sensor B (Exhaust) connector
10. Remove the upper radiator hose (A) and heater hose (B).



G01473555

Fig. 110: Removing Upper Radiator Hose & Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the harness holder (A) from the bracket, then remove the connecting pipe mounting bolt (B) and brake booster vacuum line mounting bolts (C).

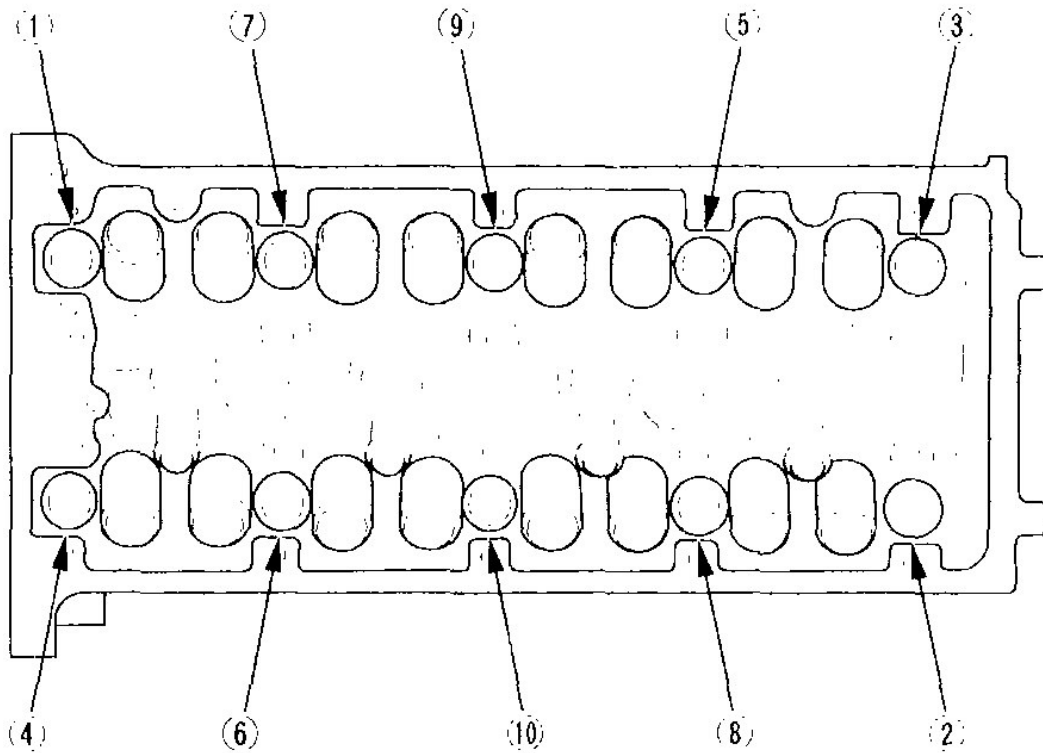


G01473556

Fig. 111: Removing Harness Holder, Connecting Pipe Mounting Bolt & Brake Booster Vacuum Line Mounting Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the water bypass hose (D).
13. Remove the rocker arm assembly (see **Rocker Arm Assembly Removal**).
14. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



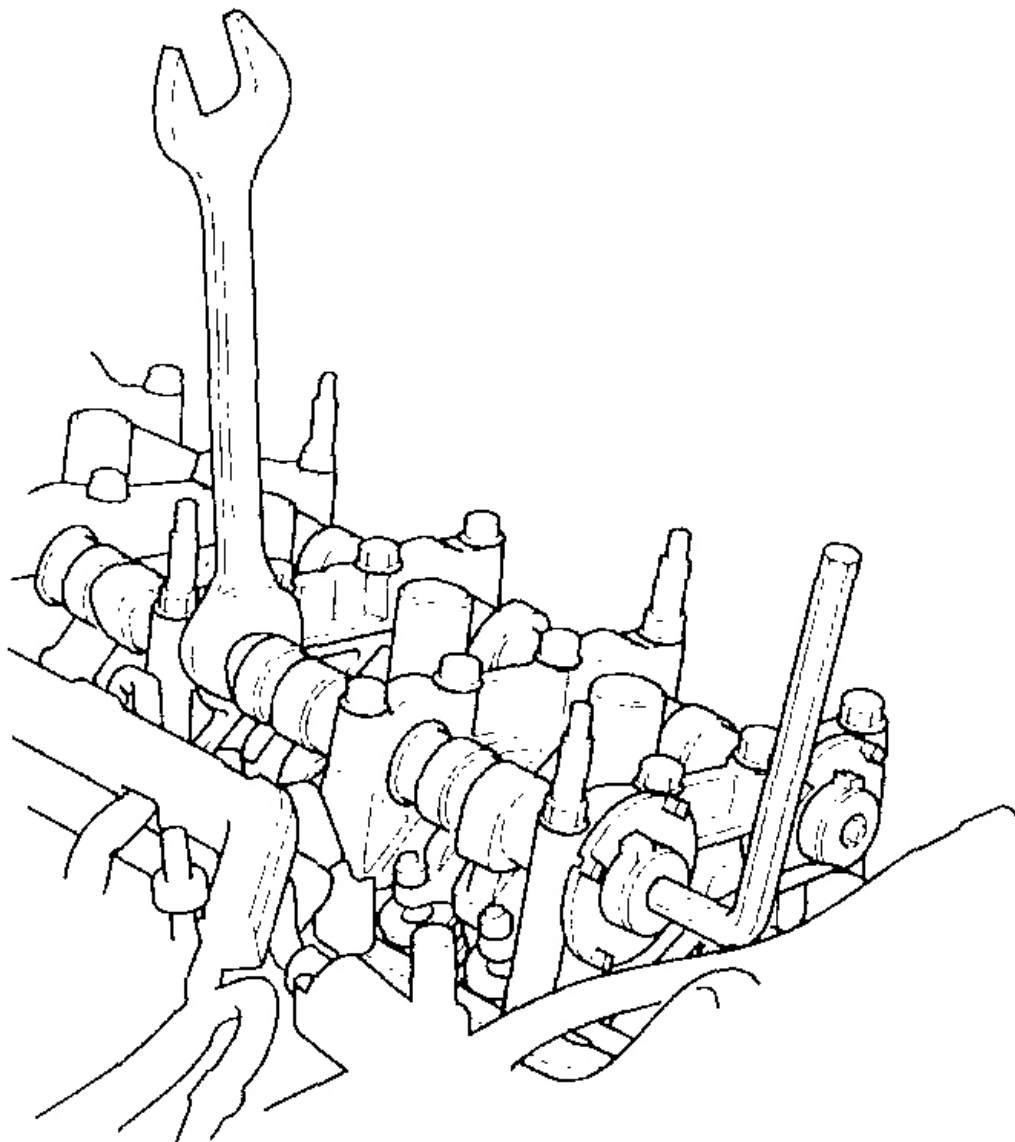
G01473557

Fig. 112: Cylinder Head Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the cylinder head.

CMP PULSE PLATE A REPLACEMENT

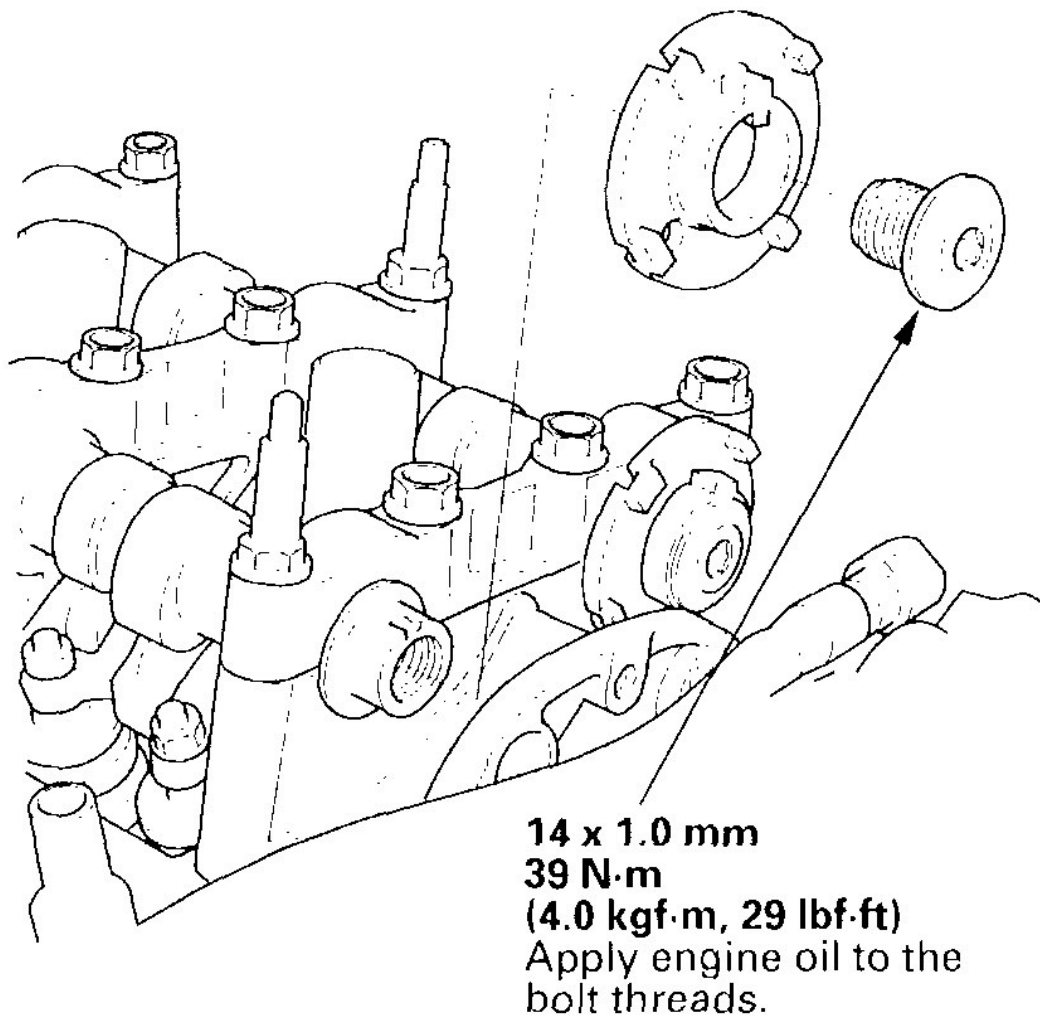
1. Remove the cylinder head cover (see **Cylinder Head Cover Removal**).
2. Hold the intake camshaft with an open-end wrench, then loosen the bolt.



G01473558

Fig. 113: Holding Intake Camshaft With An Open-End Wrench
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft position (CMP) pulse plate A.



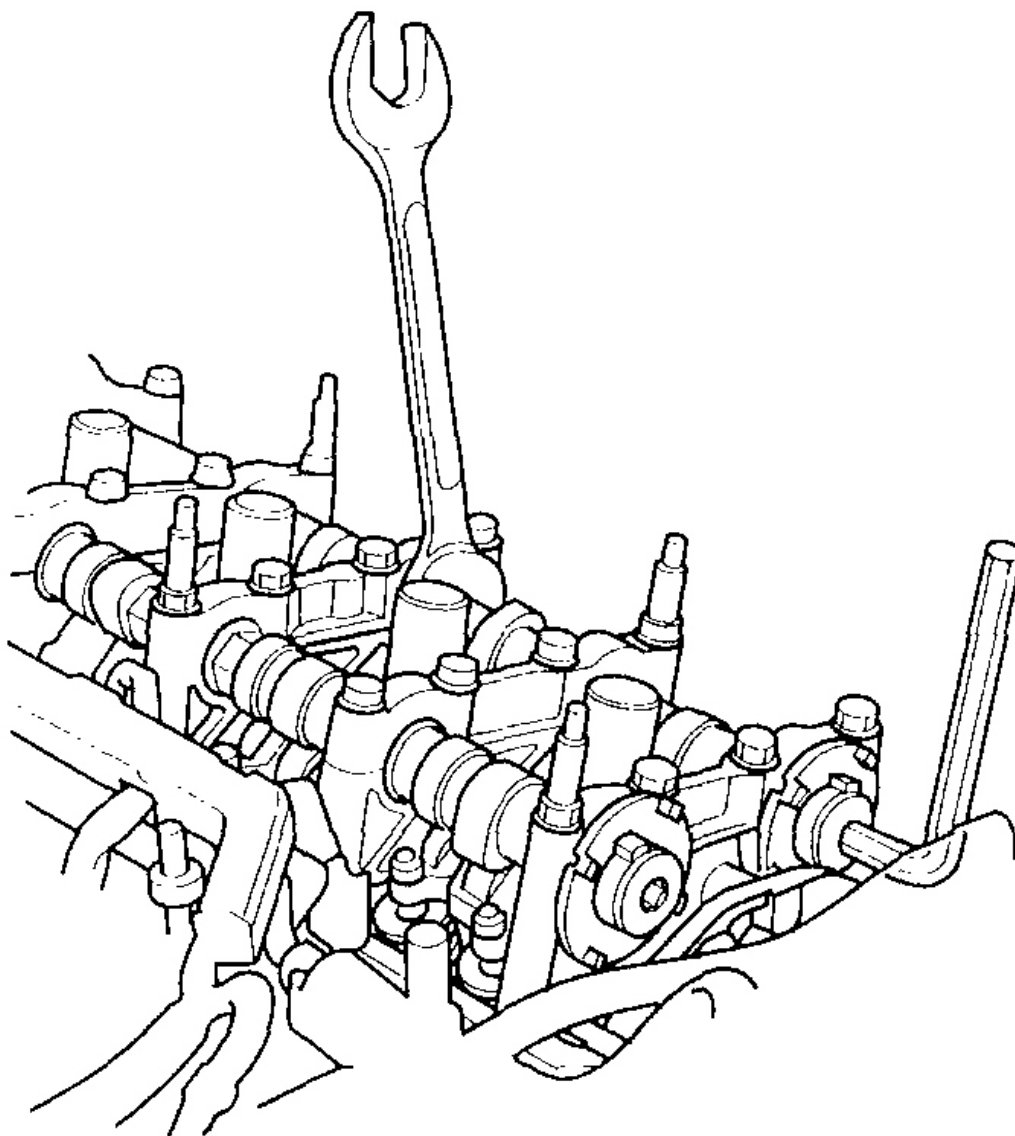
G01473559

Fig. 114: Removing Camshaft Position Pulse Plate A
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CMP PULSE PLATE B (TDC PULSE PLATE) REPLACEMENT

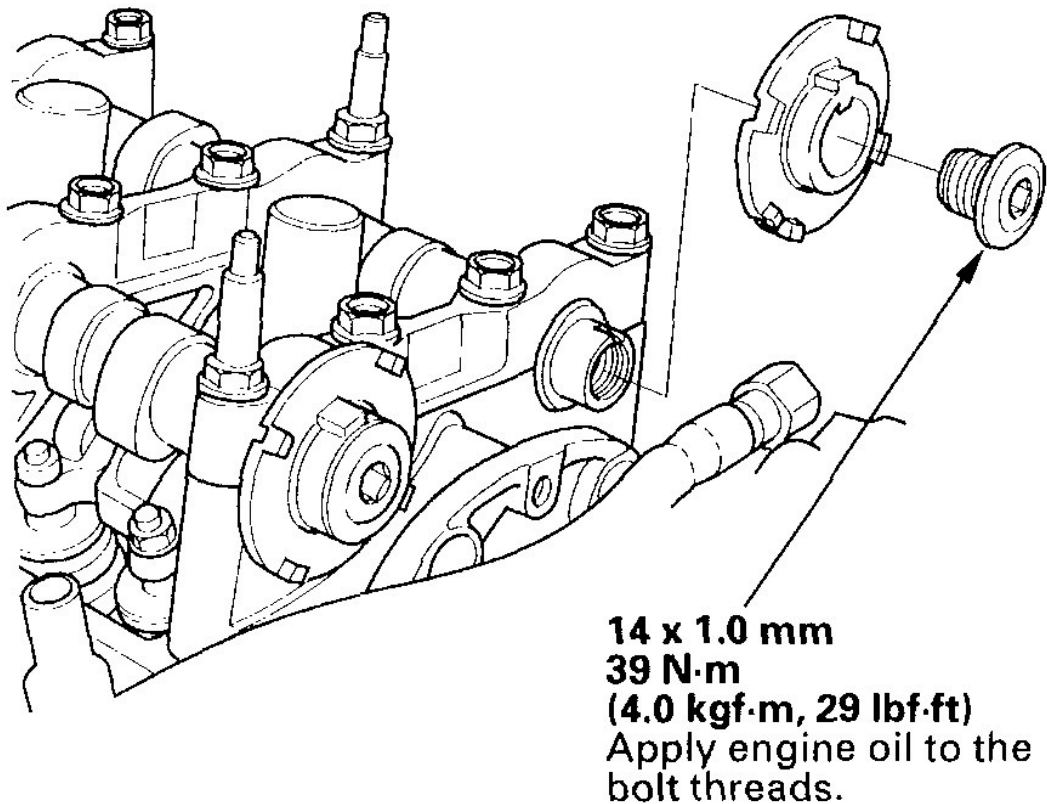
1. Remove the cylinder head cover (see **Cylinder Head Cover Removal**).
2. Hold the exhaust camshaft with an open-end wrench, then loosen the bolt.



G01473560

Fig. 115: Holding Exhaust Camshaft With An Open-End Wrench
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft position (CMP) pulse plate B (top dead center (TDC) pulse plate).



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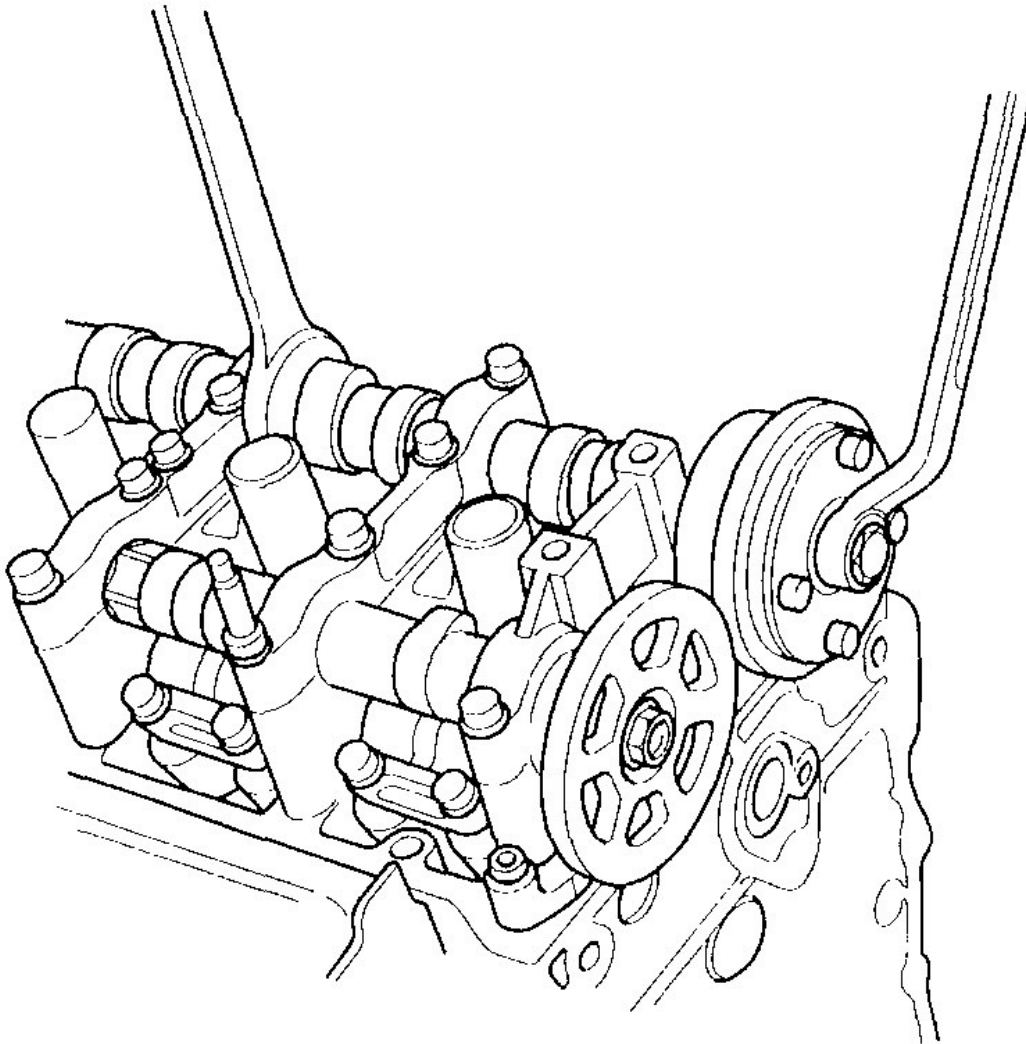
Fig. 116: Removing Camshaft Position Pulse Plate B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the CMP pulse plate B (TDC pulse plate) in the reverse order of removal.

VTC ACTUATOR, EXHAUST CAMSHAFT SPROCKET REMOVAL AND INSTALLATION

Removal

1. Remove the cam chain (see [Cam Chain Removal](#)).
2. Hold the camshaft with an open-end wrench, then loosen the variable valve timing control (VTC) actuator mounting bolt and exhaust camshaft sprocket mounting bolt.



G01473562

Fig. 117: Loosening Variable Valve Timing Control Actuator Mounting Bolt & Exhaust Camshaft Sprocket Mounting Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. To the VTC actuator is reused, do the following steps.
 - Remove the intake camshaft, and seal the advance holes and retard holes in the No.1 camshaft journal with tape (see step 6 on).
 - Punch a hole in the tape over one of the advance holes (see step 7 on).
 - Apply air to the advance hole to release the lock (see step 8 on).
4. Remove the VTC actuator and exhaust camshaft sprocket.

Installation

1. Install the VTC actuator and exhaust camshaft sprocket.

NOTE: **Install the VTC actuator in the unlock position.**

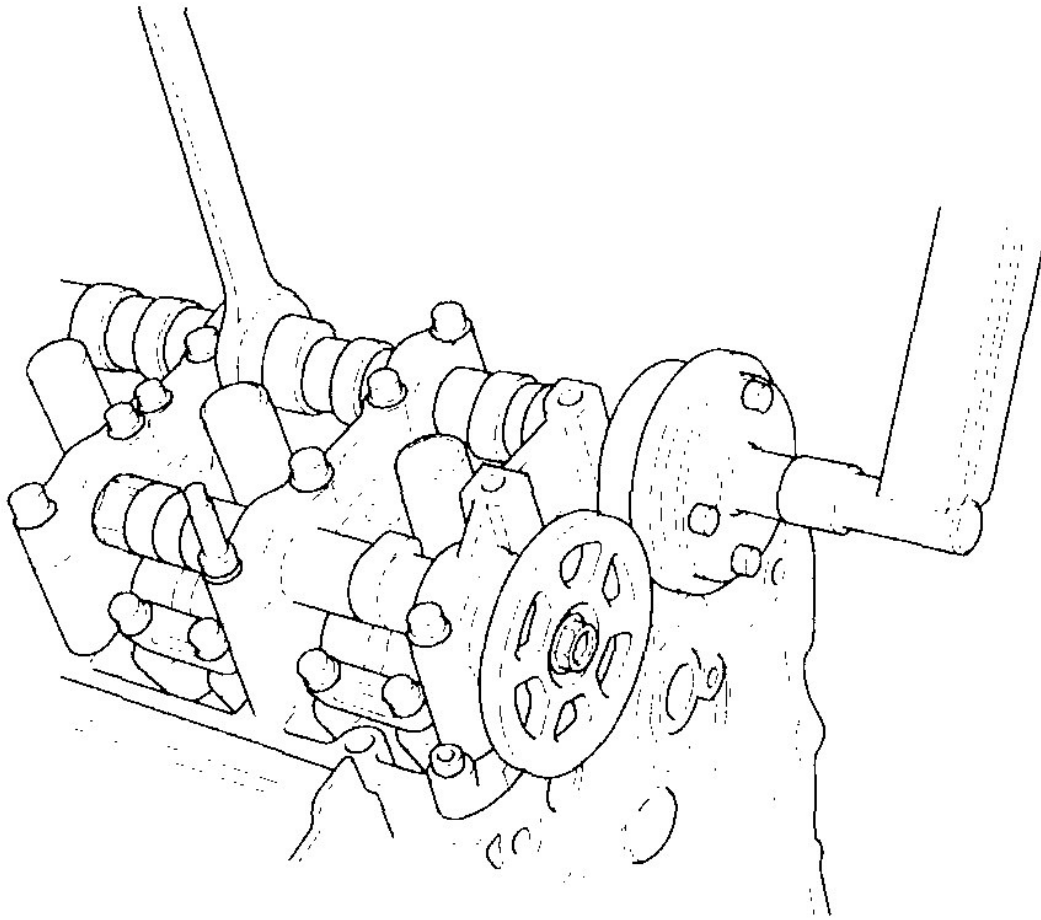
2. Apply engine oil to the threads of the VTC actuator mounting bolt and exhaust camshaft mounting bolt, then install them.
3. Hold the camshaft with an open-end wrench, then tighten the bolts.

Specified torque**VTC actuator mounting bolt:**

113 N.m (11.5 kgf.m, 83 Ft.Lbs)

Exhaust camshaft sprocket mounting bolt:

72 N.m (7.3 kgf.m, 53 Ft.Lbs)



G01473563

Fig. 118: Holding Camshaft With An Open-End Wrench
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Hold the camshaft, and turn the VTC actuator clockwise until you hear it click.
5. Install the cam chain (see **Cam Chain Installation**).

CYLINDER HEAD INSPECTION FOR WARPAGE

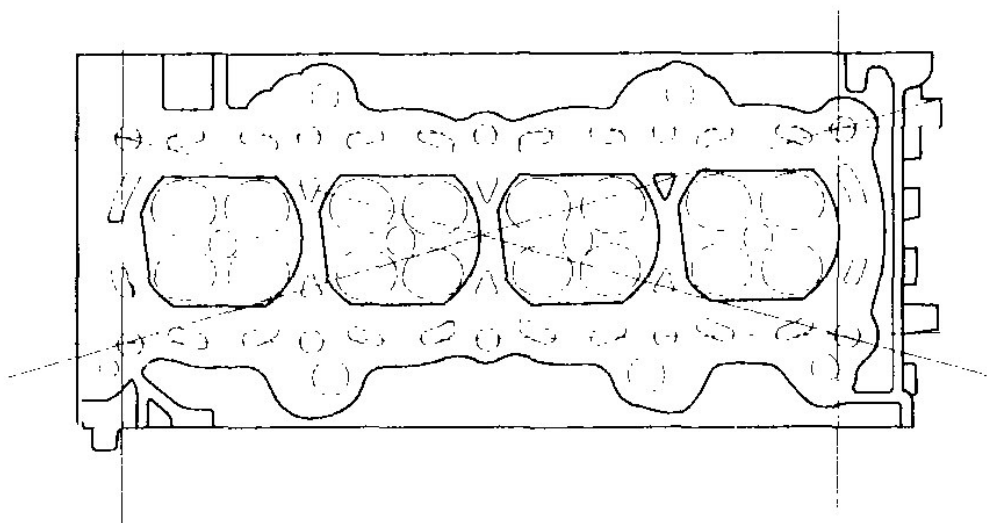
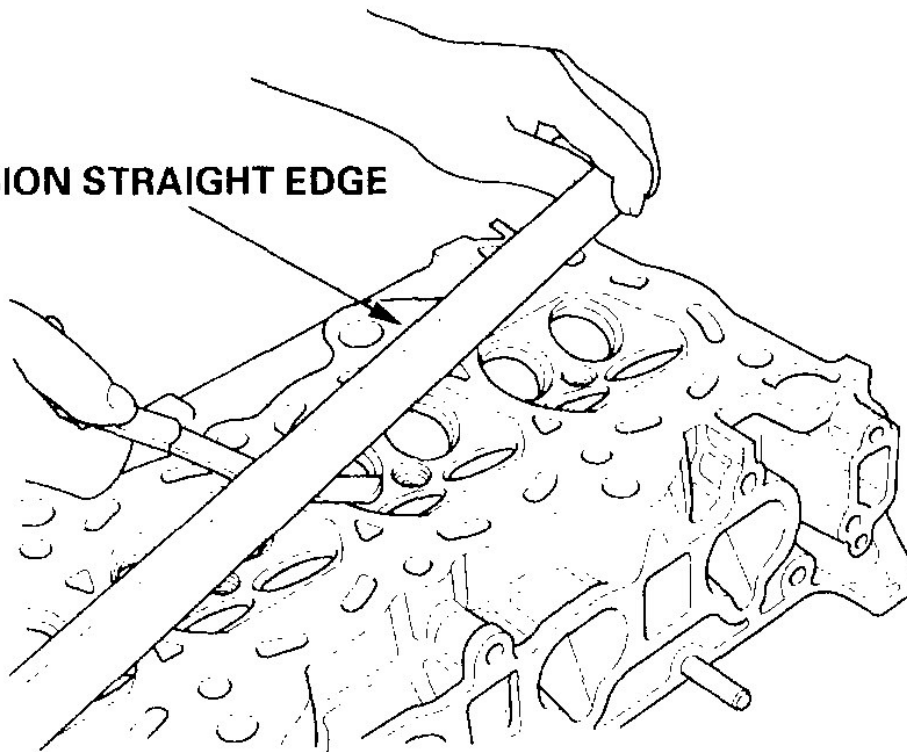
1. Remove the cylinder head (see **Cylinder Head Removal**).
2. Inspect the camshaft (see **Camshaft Inspection**).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
 - If warpage is less than 0.05 mm (0.002 in.) cylinder head resurfacing is not required.
 - If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface the cylinder head.
 - 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.)

PRECISION STRAIGHT EDGE

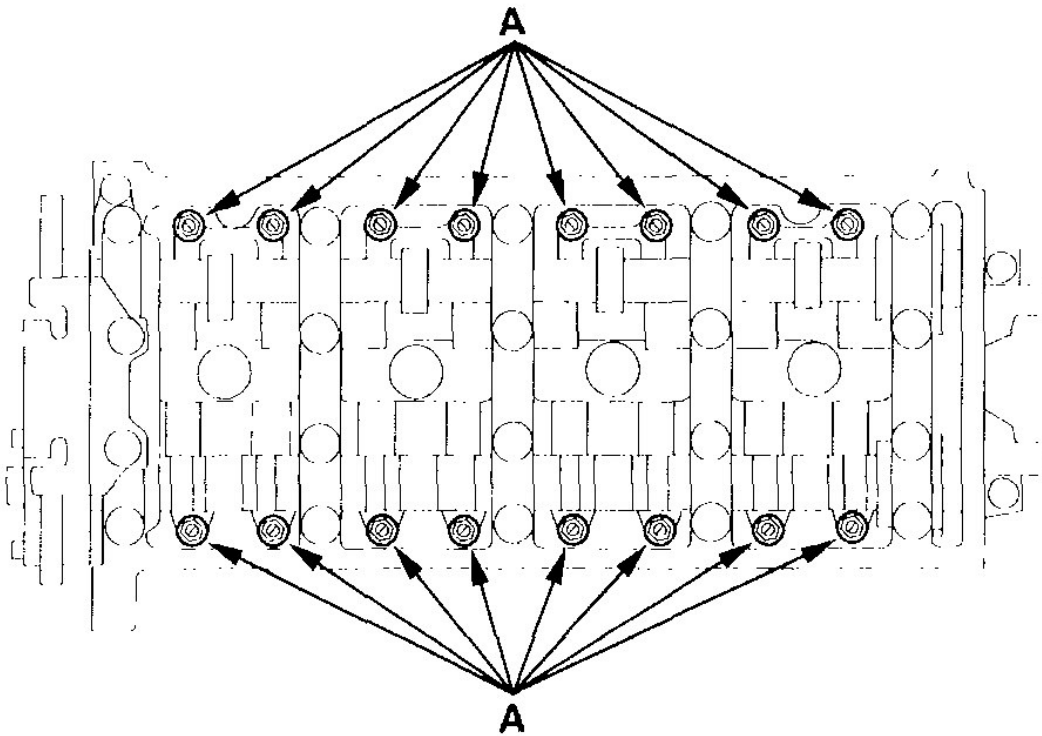


G01473564

Fig. 119: Checking Cylinder Head
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).

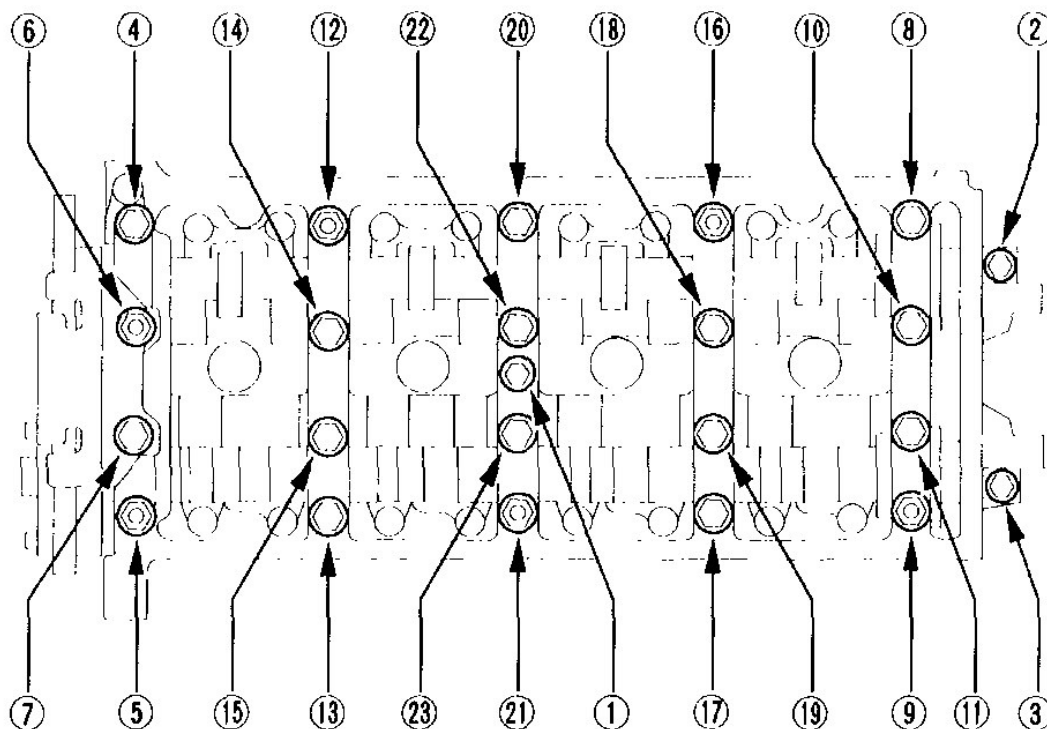


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Fig. 120: Loosening Rocker Arm Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft holder bolts. To prevent damaging the camshafts, unscrew the bolts two turns at a time, in a crisscross pattern.

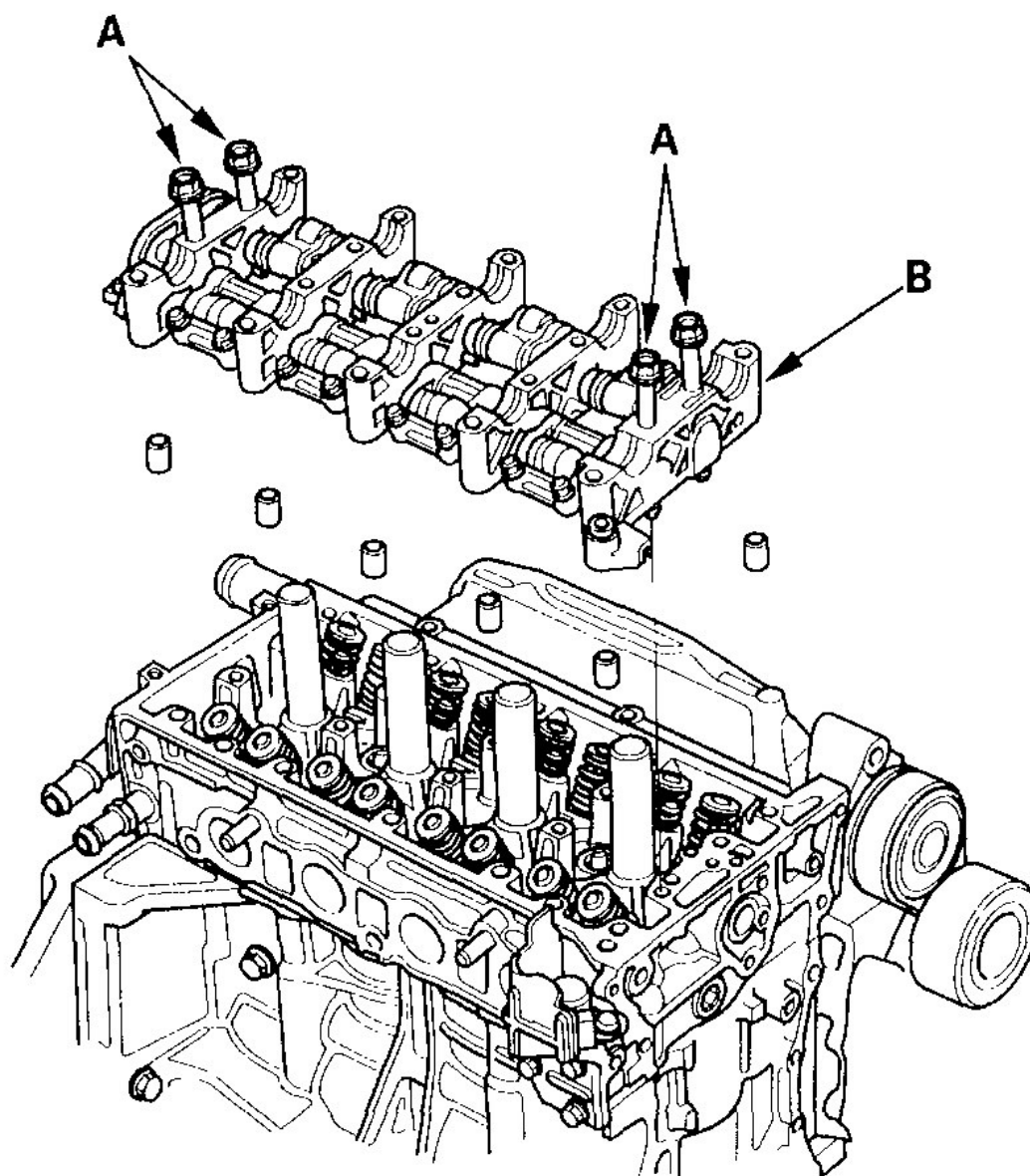
NOTE: **Bolt (1) is not on all engines.**

Camshaft Holder Bolts Loosening Sequence:

G01473566

Fig. 121: Camshaft Holder Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the cam chain guide B, camshaft holders, and camshafts.
5. Insert the bolts (A) into the rocker shaft holder, then remove the rocker arm assembly (B).



G01473567

Fig. 122: Removing Rocker Arm Assembly

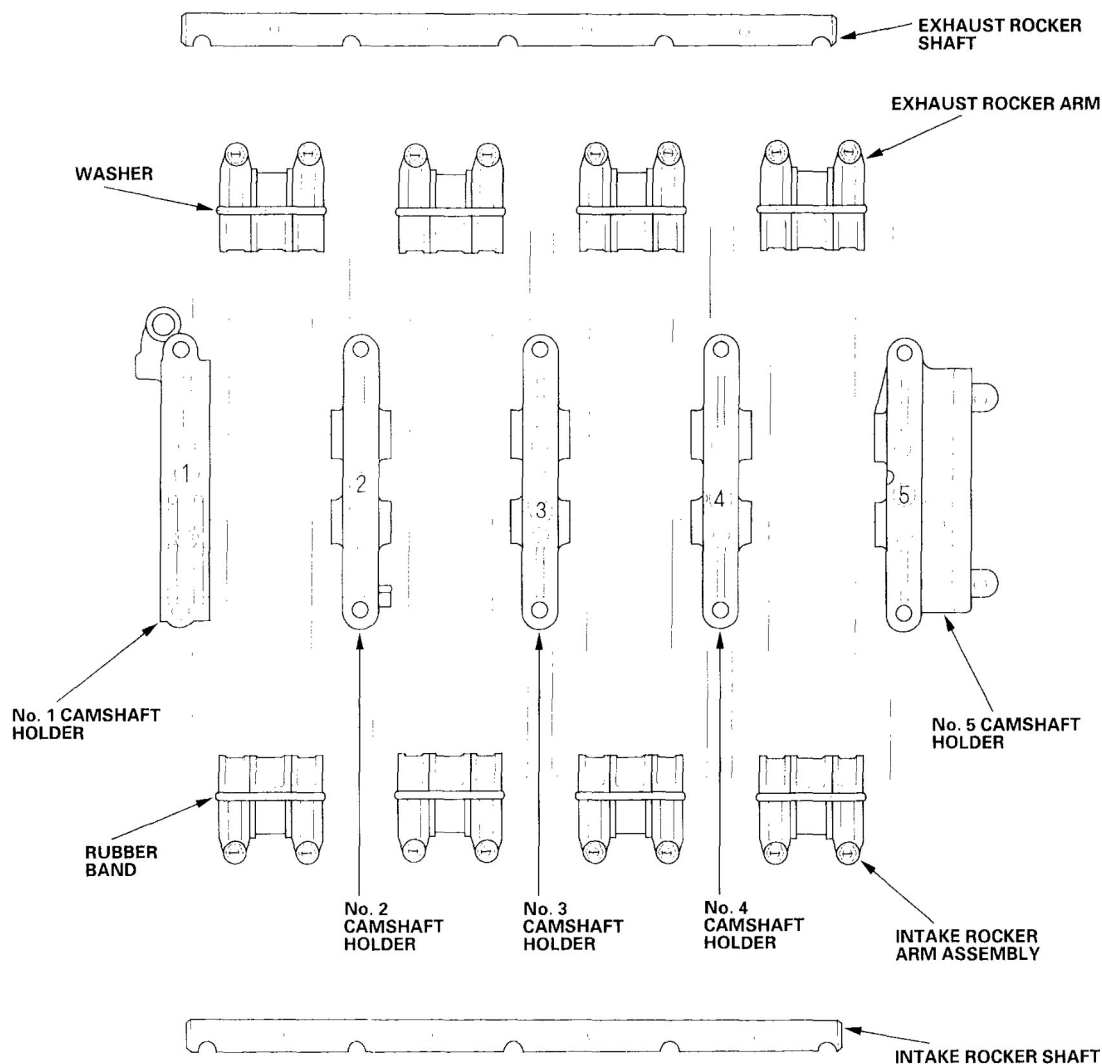
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- Identify parts as they are removed to ensure they are reinstalled in original location.

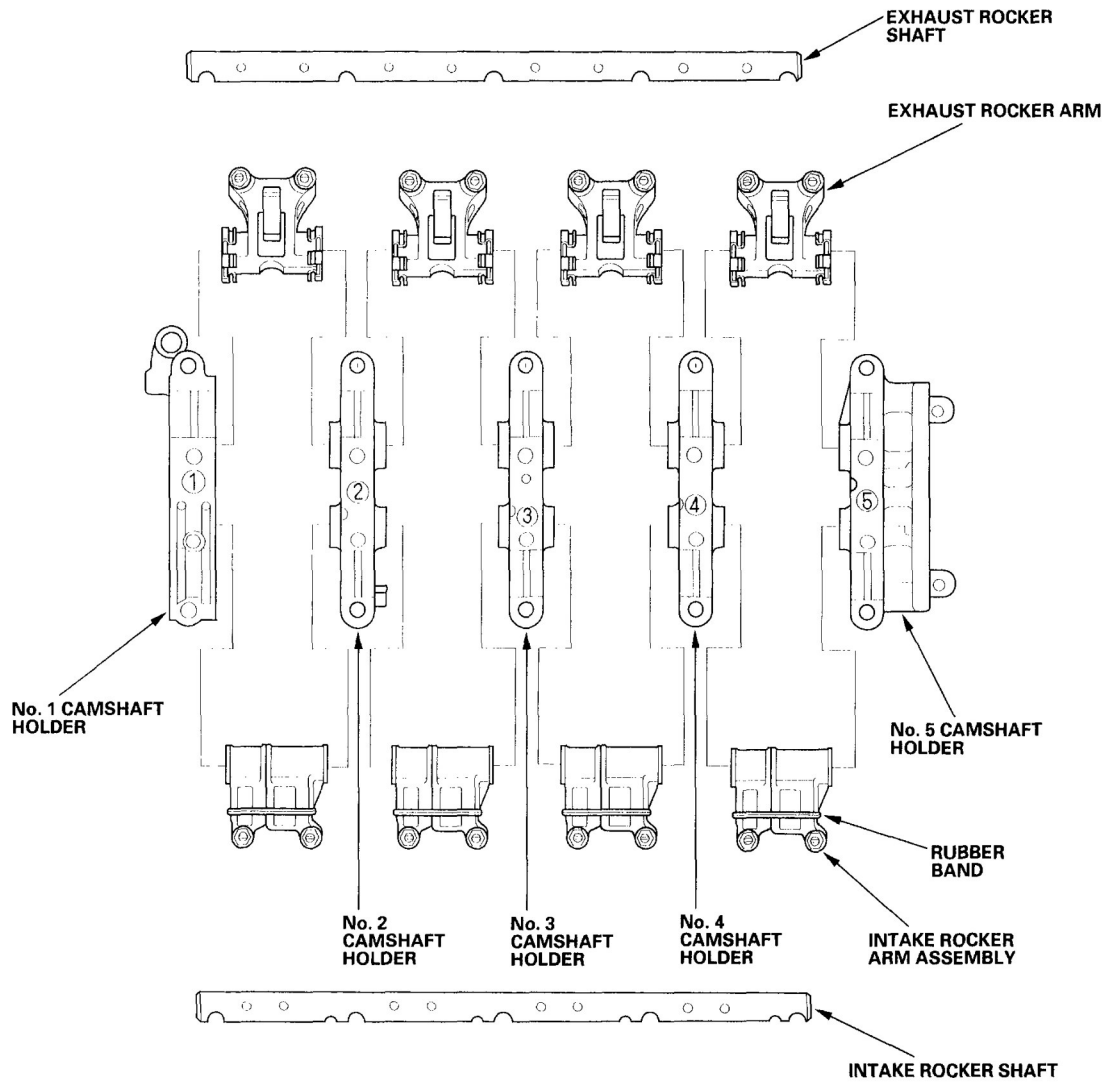
- Inspect the rocker shafts and rocker arms (see Rocker Arm and Shaft Inspection).
- The rocker arms must be installed in the same positions if reused.
- When removing or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs, and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant with engine oil to any contact points.
- Bundle the rocker arms with rubber bands to keep them together as a set.



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Fig. 123: Rocker Arm & Shaft Disassembly/Reassembly (2002 Models)

Courtesy of AMERICAN HONDA MOTOR CO., INC.



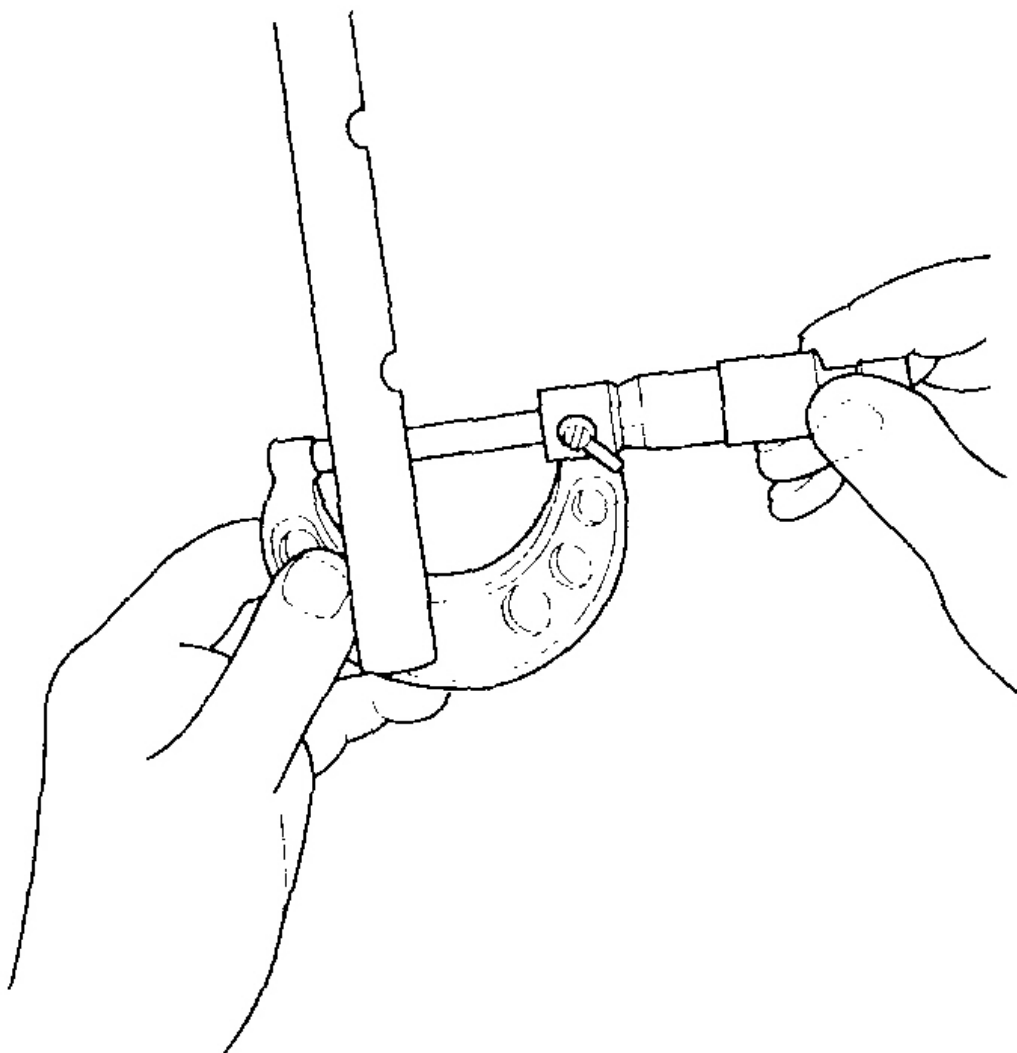
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Fig. 124: Rocker Arm & Shaft Disassembly/Reassembly (2003-2004 Models)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

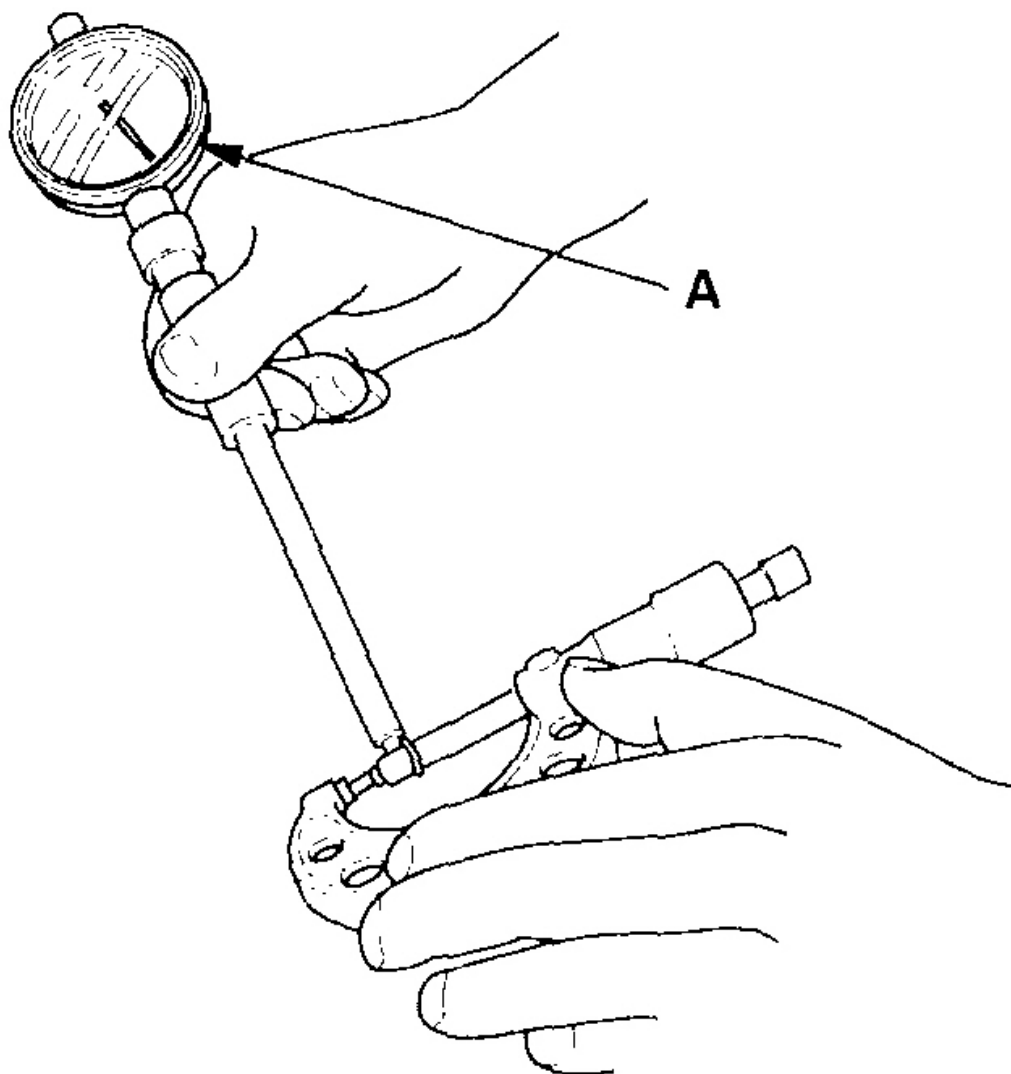
1. Remove the rocker arm assembly (see **Rocker Arm Assembly Removal**).
2. Measure the diameter of the shaft at the first rocker location.



G01473570

Fig. 125: Measuring Diameter Of The Shaft At The First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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Fig. 126: Identifying Zero Gauge To The Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Rocker Arm-to-Shaft Clearance

Standard (New):

2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V

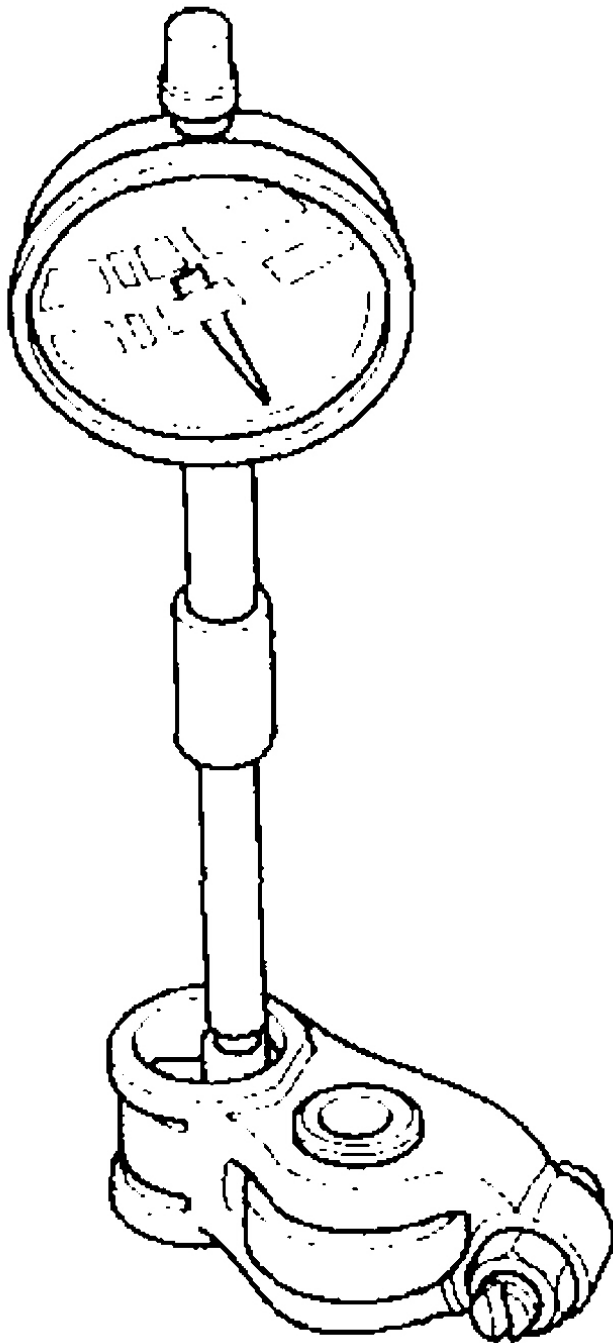
Intake: 0.025 - 0.052 mm

(0.0010 - 0.0020 in.)

Exhaust: 0.018 - 0.056 mm

(0.0007 - 0.0022 in.)

Service Limit: 0.08 mm (0.003 in.)



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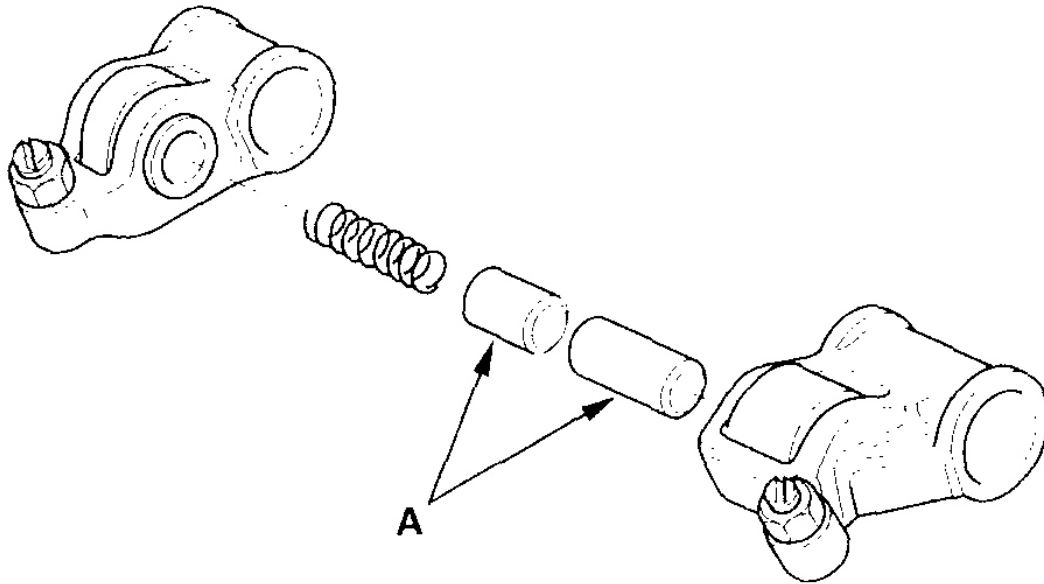
Fig. 127: Measuring Inside Diameter Of The Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat for all rocker arms and both shafts. If the clearance is over the limit, replace the rocker shaft and all overtolerance rocker arms. If any VTEC rocker arm needs replacement, replace the rocker arms

(primary and secondary), as a set.

6. Inspect the rocker arm pistons (A). Push each piston manually. If it does not move smoothly, replace the rocker arm set.

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



G01473573

Fig. 128: Inspecting Rocker Arm Pistons

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSPECTION

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see **Rocker Arm Assembly Removal**).
2. Put the rocker shaft holders, camshaft and camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

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

Specified torque

8 mm bolts: 22 N.m (2.2 kgf.m, 16 Ft.Lbs)

6 mm bolts: 12 N.m (1.2 kgf.m, 8.7 Ft.Lbs)

6 mm bolts: (21) (22) (23)

Specified torque

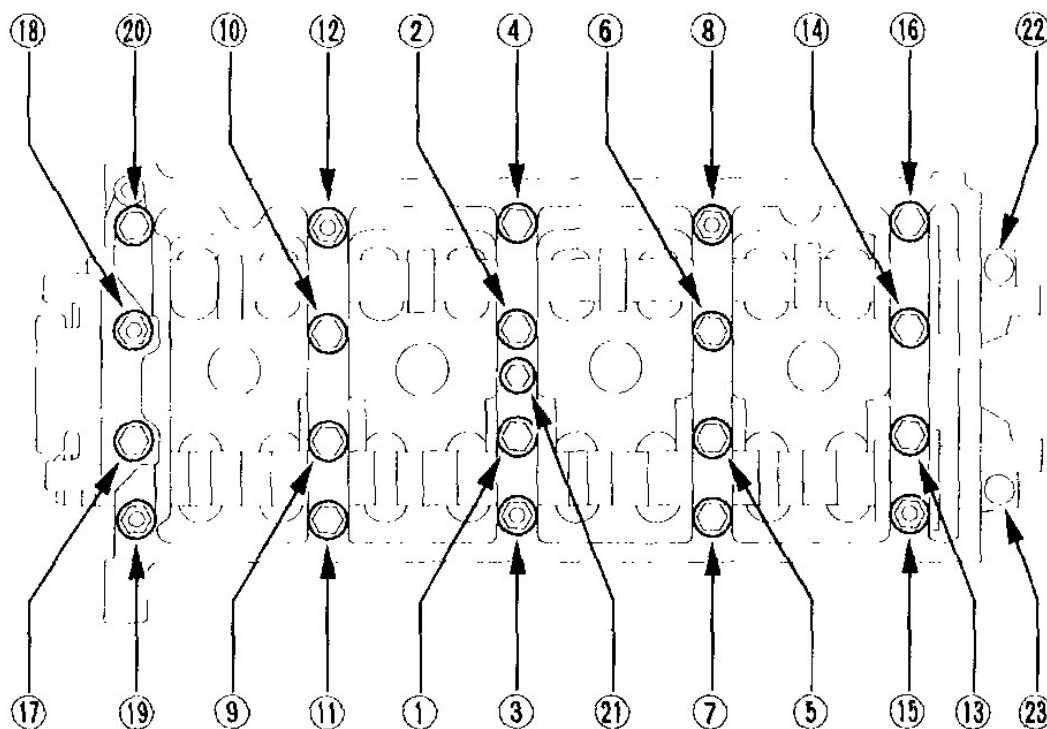
8 mm bolts:

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 mm bolts:

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 mm bolts: (21), (22), (23)



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Fig. 129: Putting Rocker Shaft Holders, Camshaft & Camshaft Holders On The Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

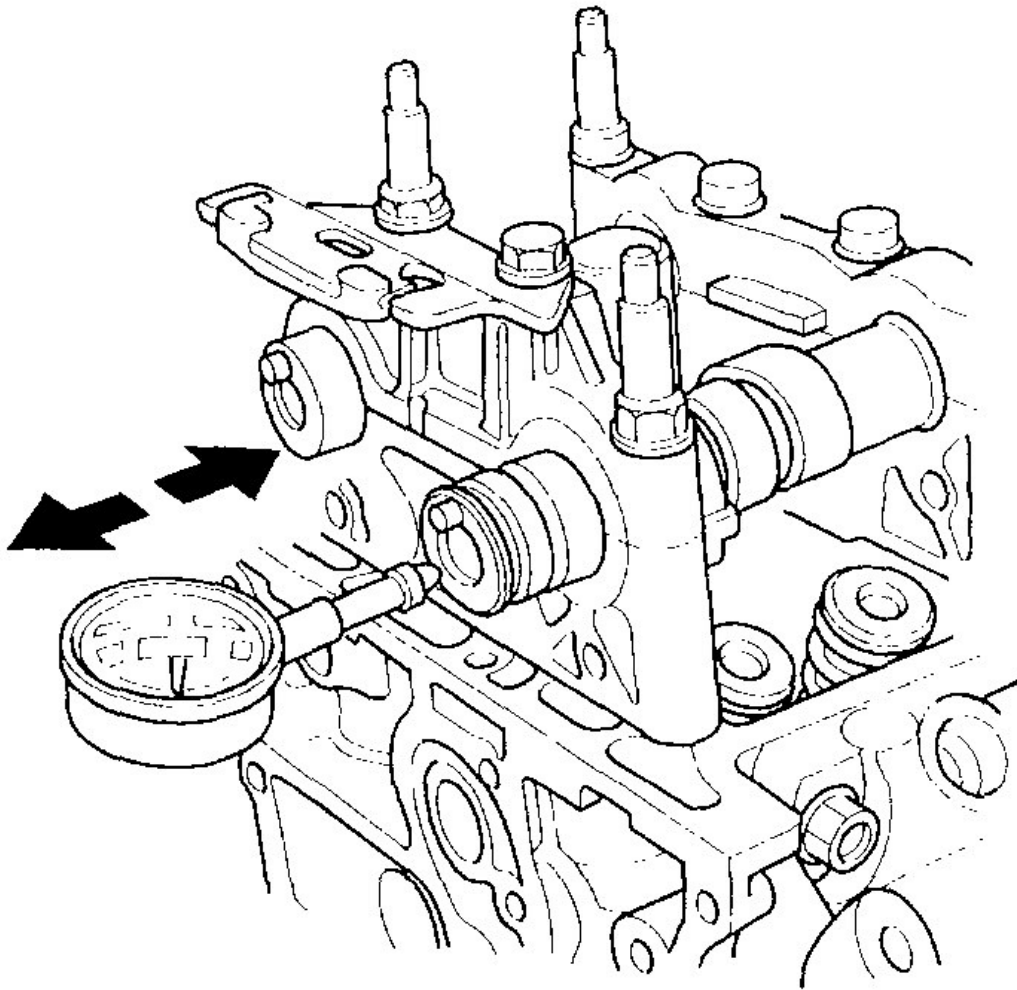
3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth and read the end play. If the end play is beyond the service limit, replace the cylinder head and recheck. If it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



G01473575

Fig. 130: Reading Camshaft End Play By Pushing Camshaft Back & Forth
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Unscrew 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, 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 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 (0.001 - 0.003 in.)

No. 2, 3, 4, 5 Journals: 0.060 - 0.099 mm (0.002 - 0.004 in.)

Service Limit: 0.15 mm (0.006 in.)

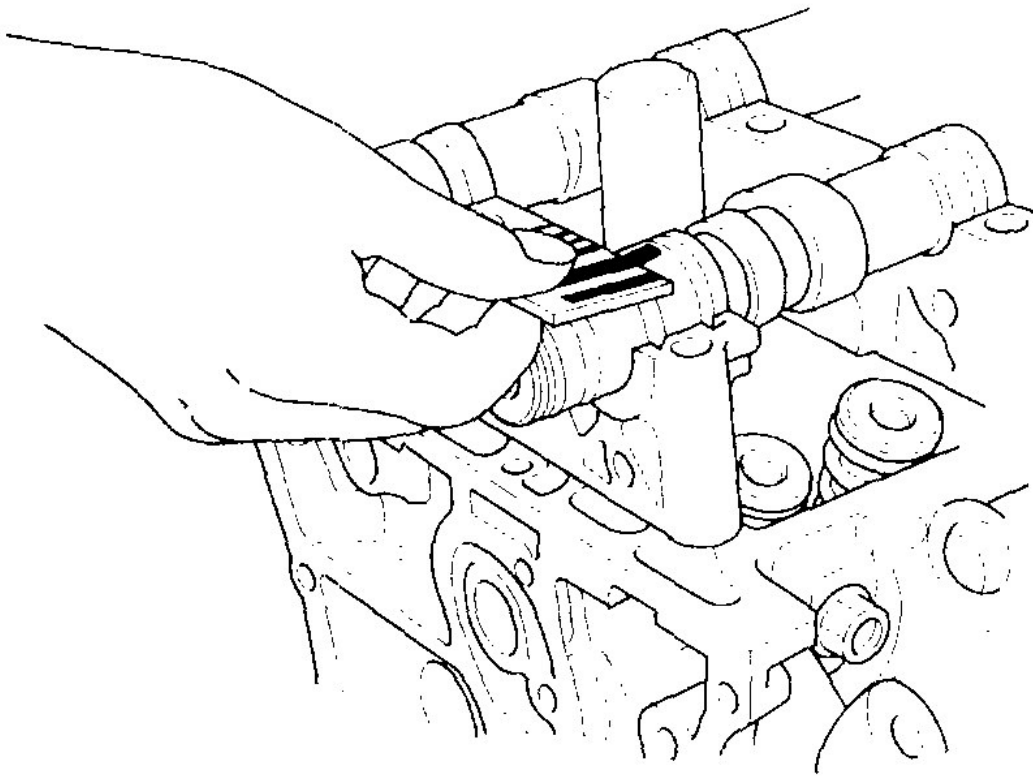
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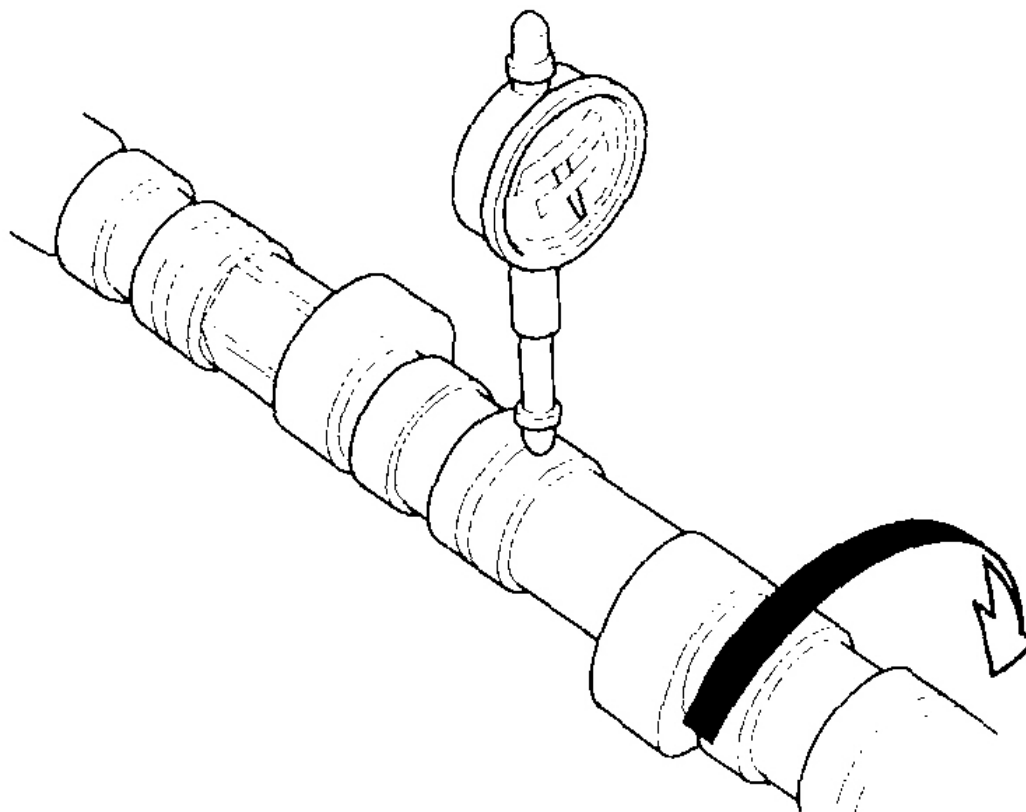
Fig. 131: Measuring Camshaft-To-Holder Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 beyond the service limit, replace the cylinder head.

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.002 in.)



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Fig. 132: Checking Total Runout

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Measure cam lobe height.

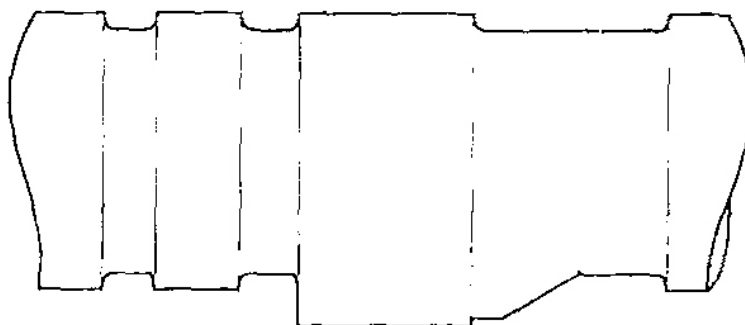
Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRI	33.925 mm (1.3356 in.)	34.092 mm (1.3422 in.)
SEC	29.638 mm (1.1668 in.)	

PRI: Primary

SEC: Secondary

C/C: Cam Chain

INTAKE**SEC****PRI**

← T/C

G01473578

Fig. 133: Measuring Cam Lobe Height

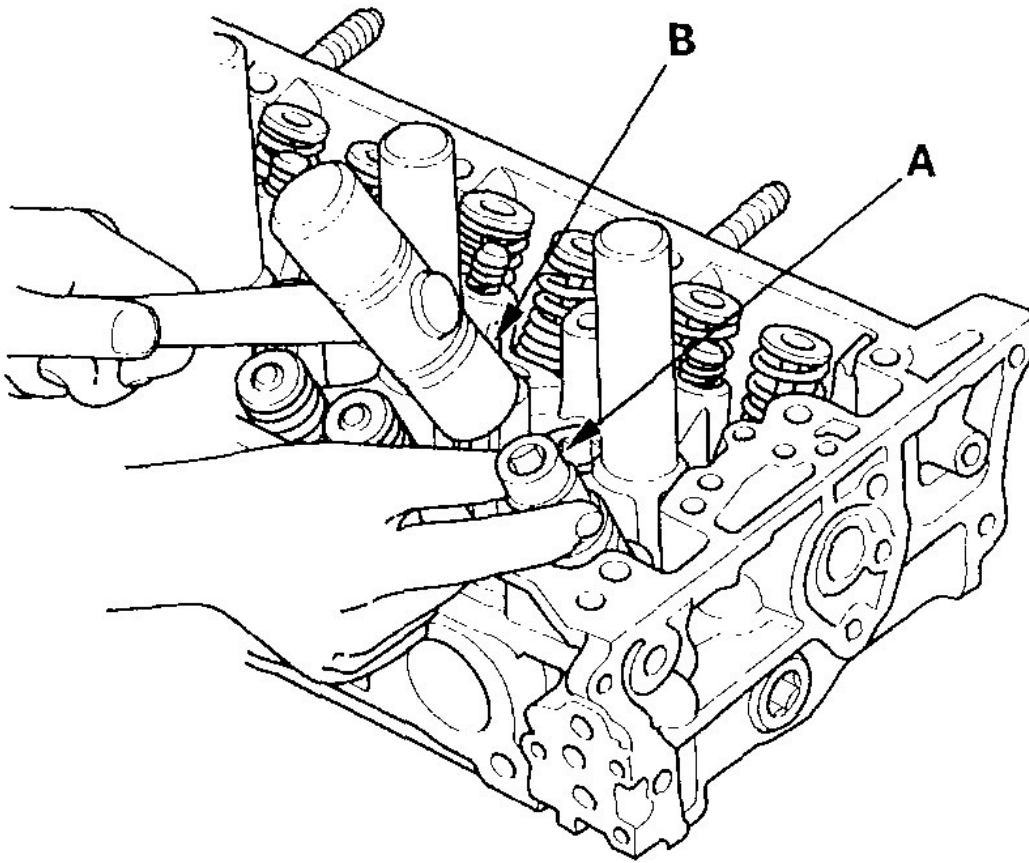
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve spring compressor attachment 07757-PJ1010A

Identify the valves and 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. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the valve retainer to loosen the valve keepers.



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Fig. 134: Tapping Valve Retainer To Loosen Valve Keepers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the special tool. Compress the spring, and remove the valve keepers.

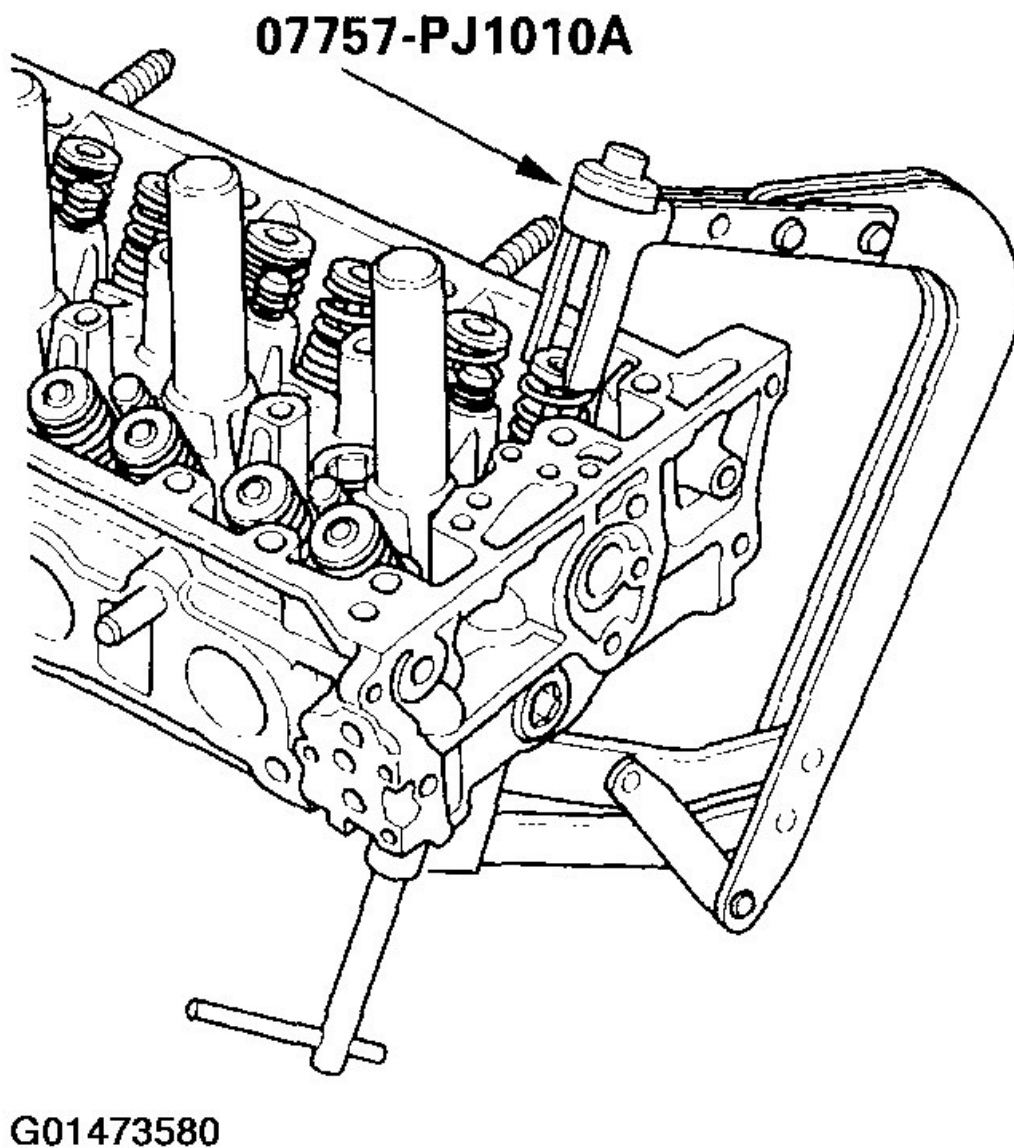
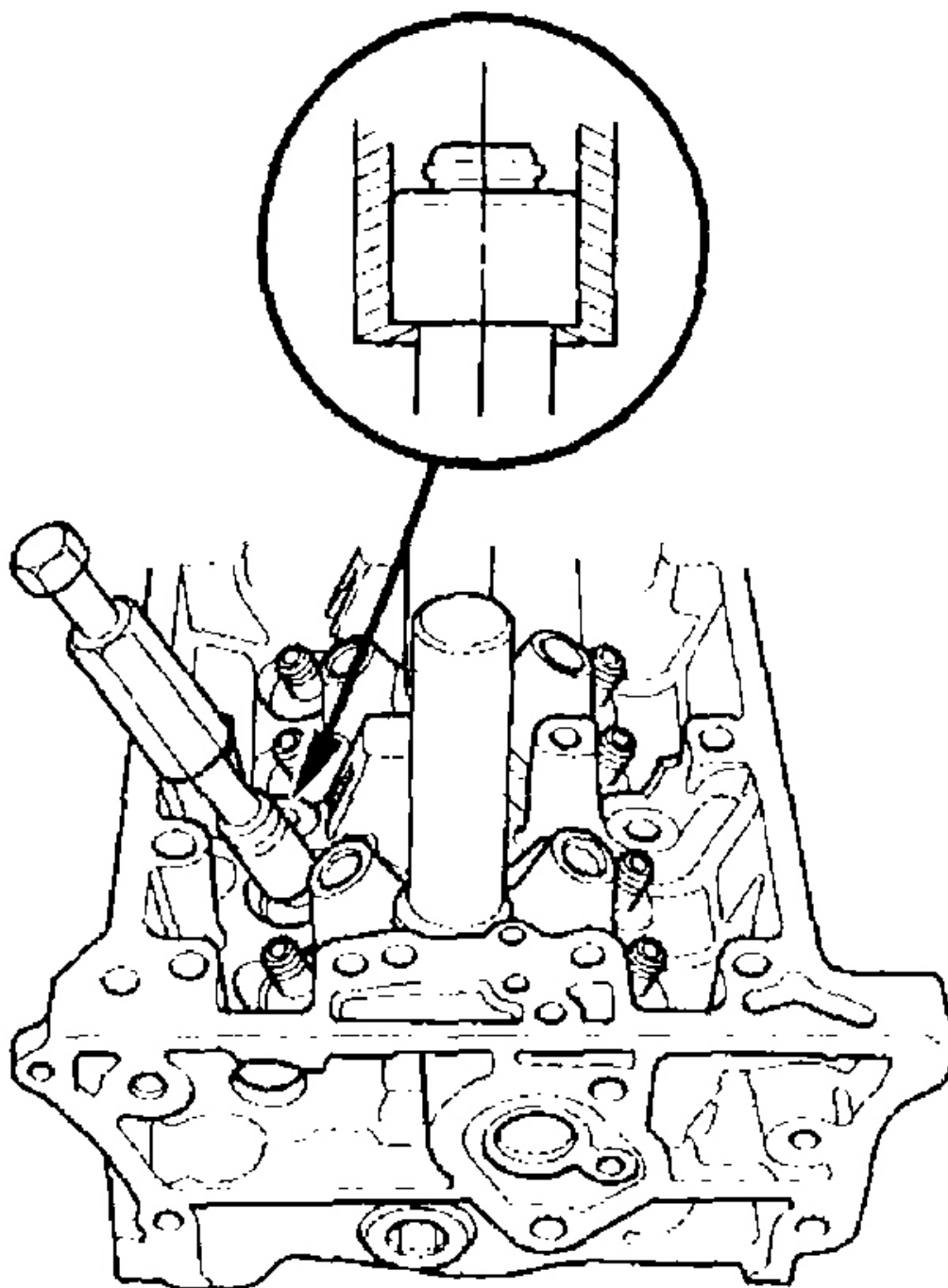


Fig. 135: Removing Valve Keepers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the special tool, then remove the valve retainer, valve spring, and valve.
5. Install the valve guide seal remover.

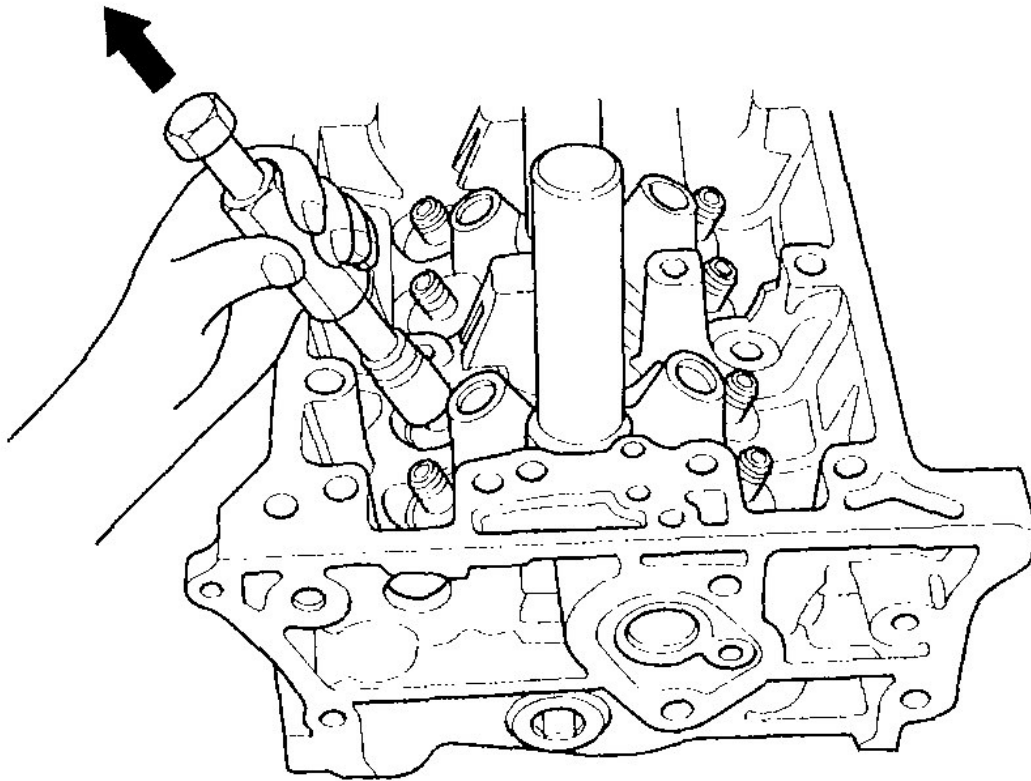


G01473581

Fig. 136: Installing Valve Guide Seal Remover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.



G01473582

Fig. 137: Removing Valve Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve 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): 34.85 - 35.15 mm (1.372 - 1.384 in.)

B Standard (New): 108.7 - 109.5 mm (4.280 - 4.311 in.)

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

Service Limit: 5.445 mm (0.214 in.)

Exhaust Valve Dimensions

Standard (New): 29.85 - 30.15 mm (1.175 - 1.187 in.)

Standard (New): 108.3 - 109.1 mm (4.264 - 4.295 in.)

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

C Service Limit: 5.42 mm (0.213 in.)

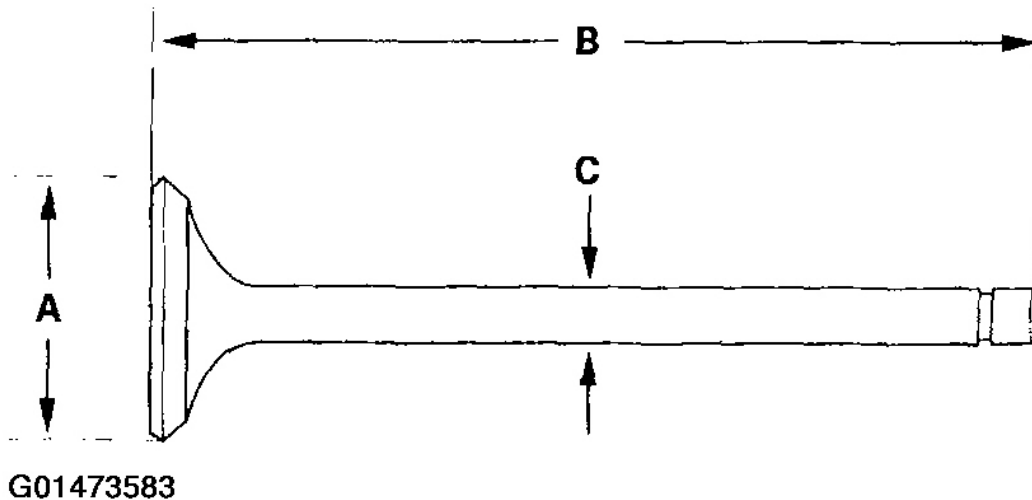


Fig. 138: Measuring Intake & Exhaust Valve Dimensions
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 guide-to-stem 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.)

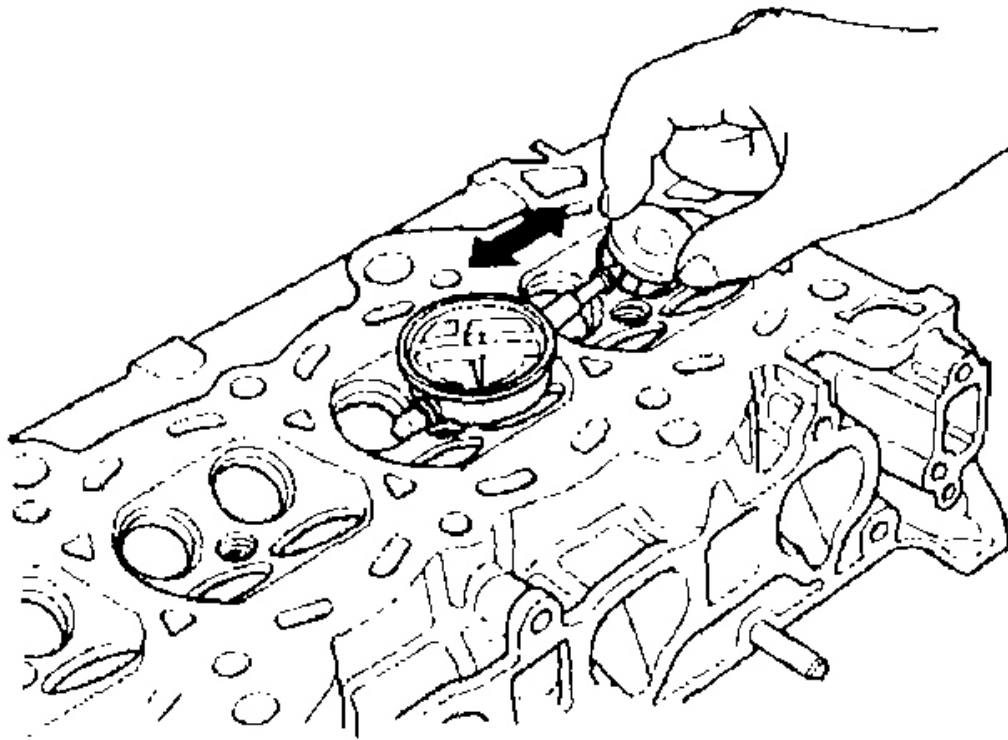
**G01473584**

Fig. 139: Measuring Guide-To-Stem Clearance With A Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Subtract the CD. 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

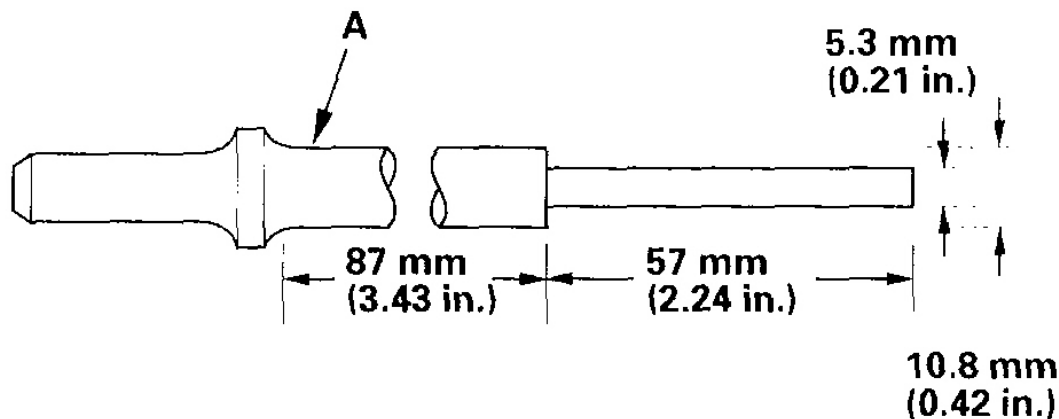
Standard (New): 0.055 - 0.080 mm (0.0022 - 0.0031 in.)

Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve guide driver, 5.5 mm 07742-0010100
 - Valve guide reamer, 5.5 mm 07HAH-PJ7010B
1. Inspect valve stem-to-guide clearance (see Valve Stem-to-Guide Clearance 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 special tool and a conventional hammer.



G01473585

Fig. 140: Using Air-Impact Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for about 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.

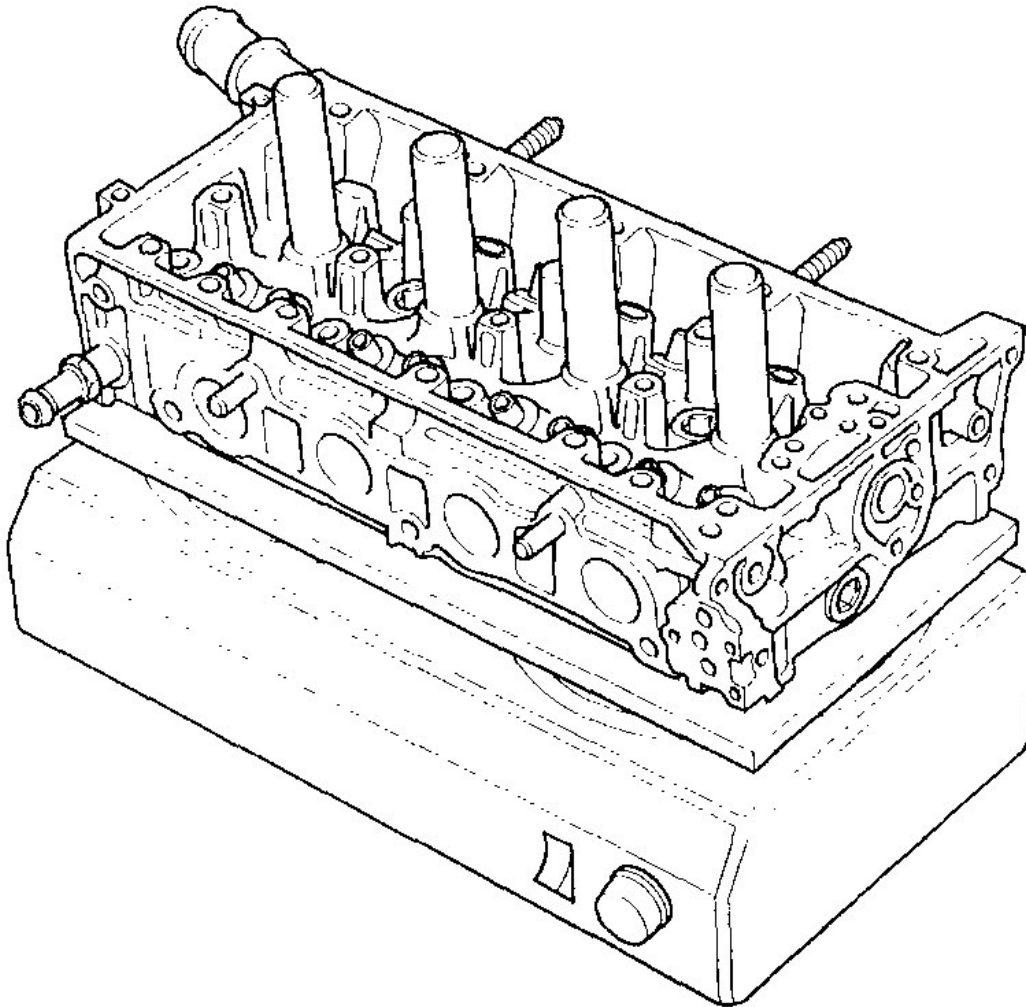
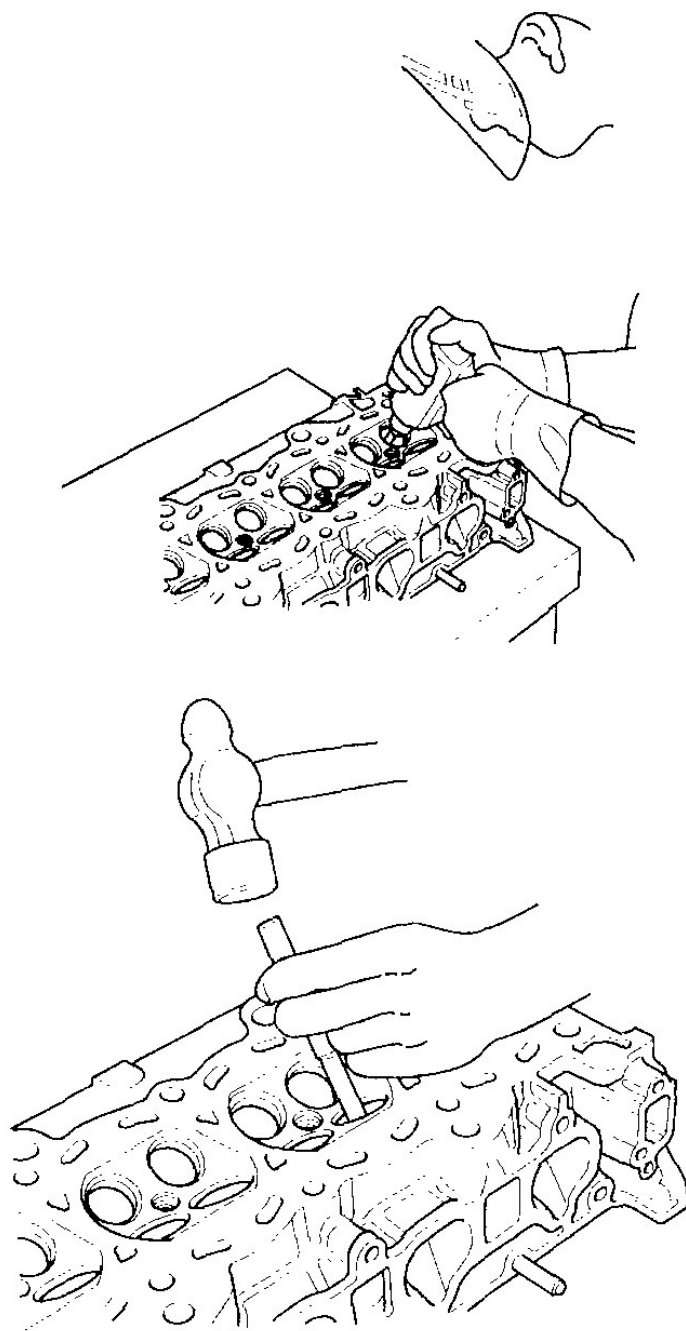
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Fig. 141: Monitoring Temperature With Cooking Thermometer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.



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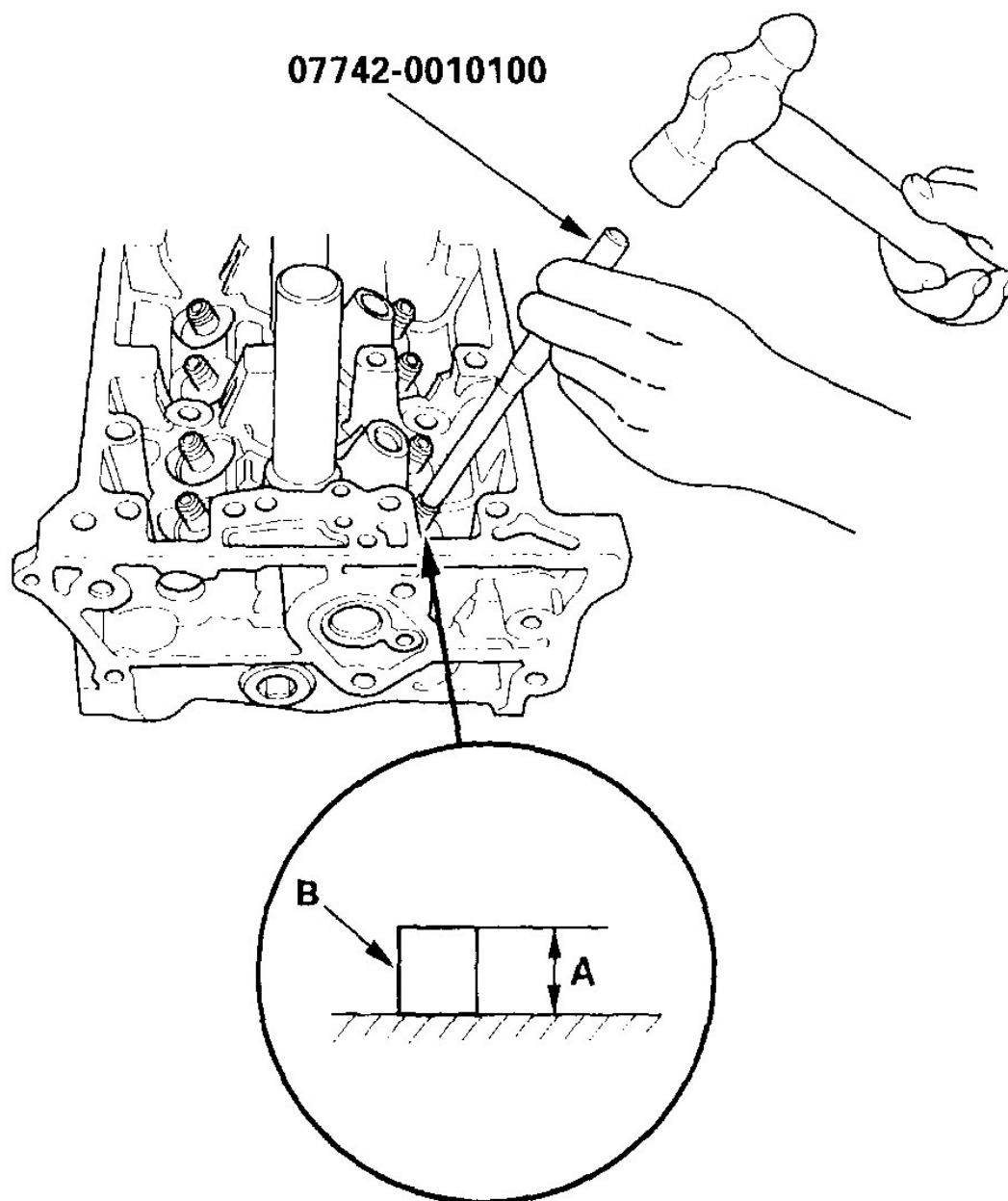
Fig. 142: Turning Head Over & Driving Guide Out Toward Camshaft Side Of Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If a valve guide won't move, drill it out with a 8 mm (5/16 inch) bit, then try again. Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.
8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool 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 (0.598 - 0.638 in.)

Exhaust: 15.5 - 16.5 mm (0.610 - 0.650 in.)



G01473588

Fig. 143: Driving Guide In To Specified Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

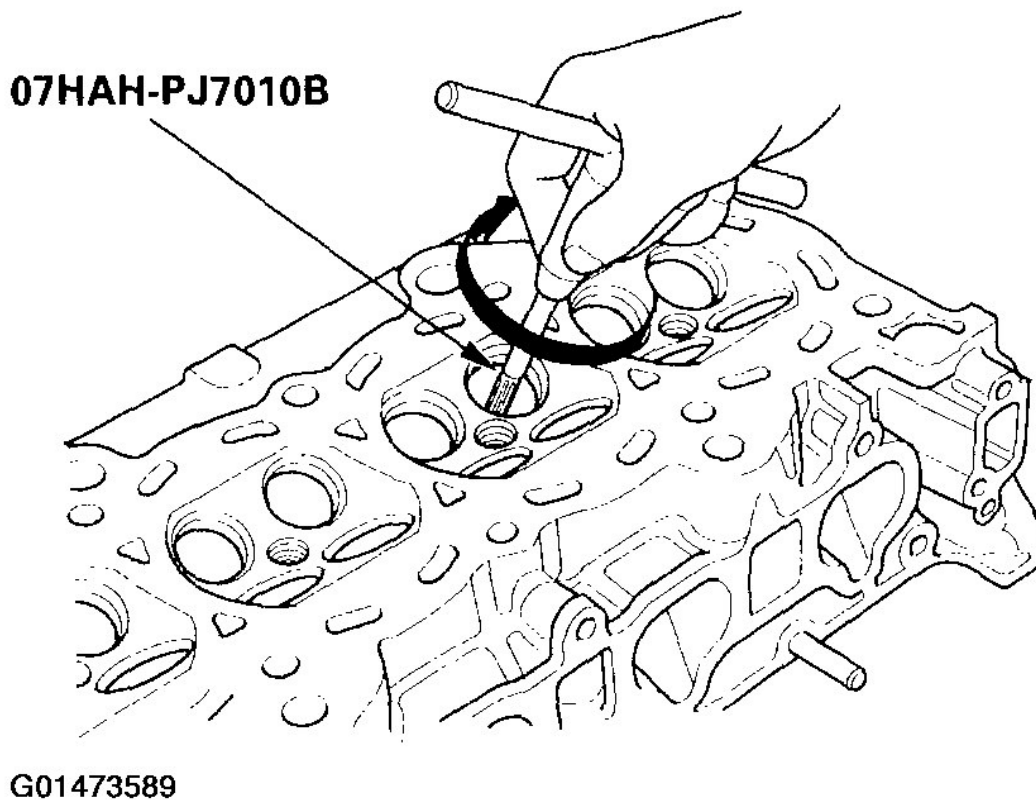
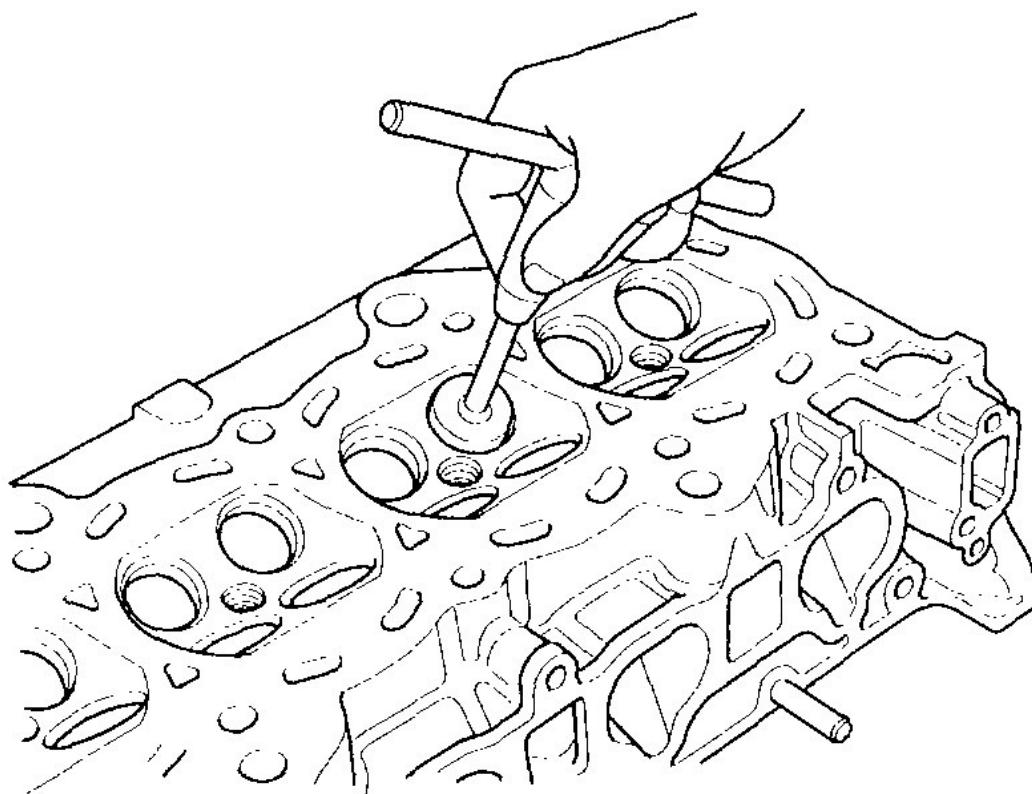


Fig. 144: Rotating Reamer Clockwise The Full Length Of Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 in the intake and exhaust valve guides without exerting pressure.

VALVE SEAT RECONDITIONING

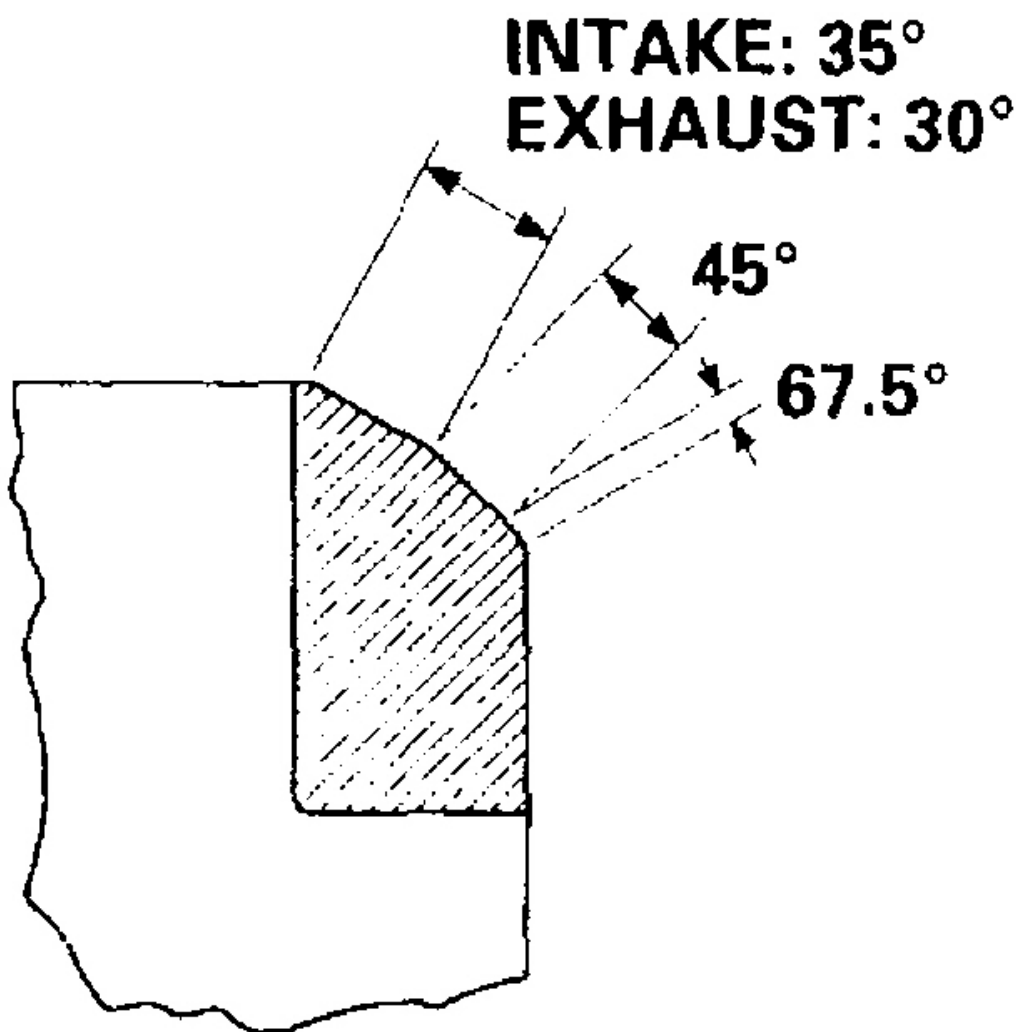
1. Inspect valve stem-to-guide clearance (see **Valve Stem-to-Guide Clearance Inspection**). If the valve guides are worn, replace them (see **Valve Guide Replacement**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



G01473590

Fig. 145: Renewing Valve Seats In Cylinder Head
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.



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Fig. 146: Checking Width Of Seat

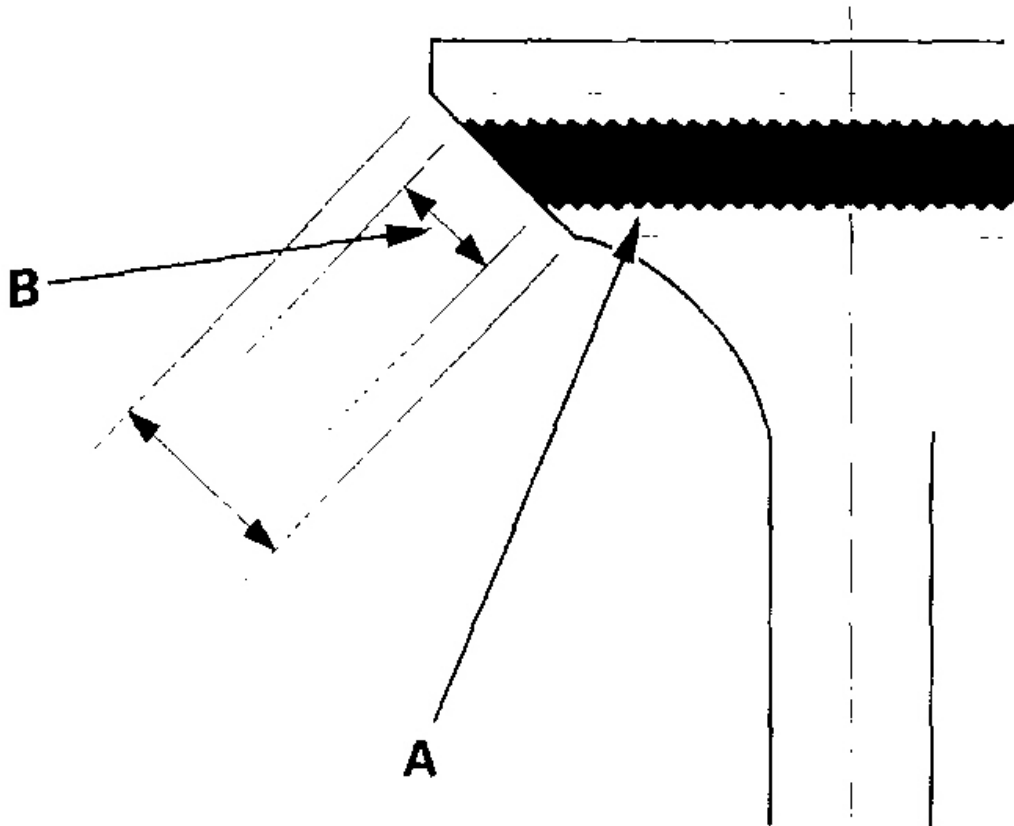
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Seat Width**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.



G01473592

Fig. 147: Applying Prussian Blue Compound To Valve Face
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. The actual valve seating surface (B), as shown by the blue compound, should be centered on the seat.
 - If it is too high (closer to the valve stem), you must make a second cut with the 67.5° cutter 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 valve stem installed height (A).

Intake Valve Stem Installed Height

Standard (New): 44.0 - 44.6 mm (1.73 - 1.76 in.)

Exhaust Valve Stem Installed Height

Standard (New): 44.0 - 44.6 mm (1.73 - 1.76 in.)

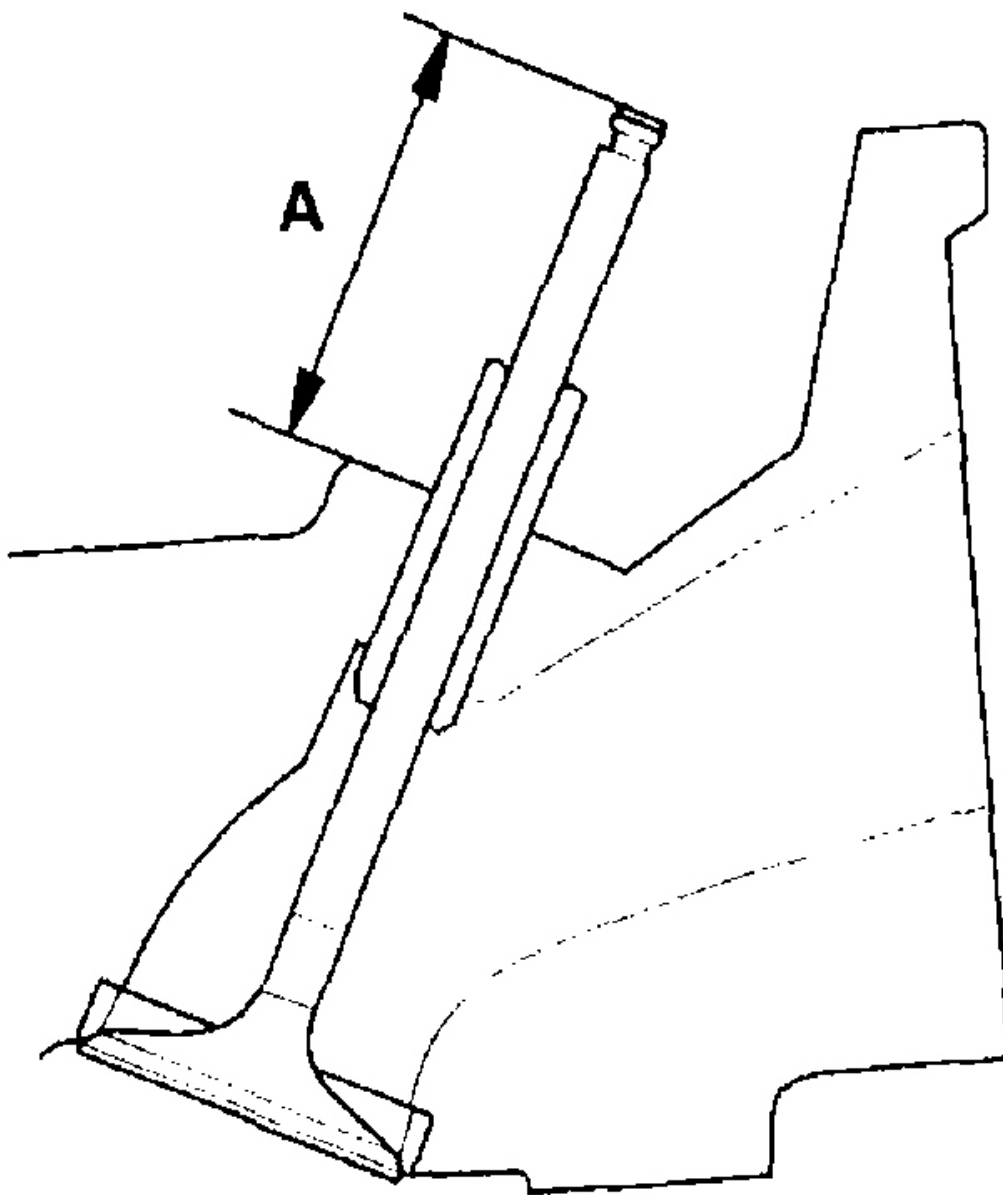
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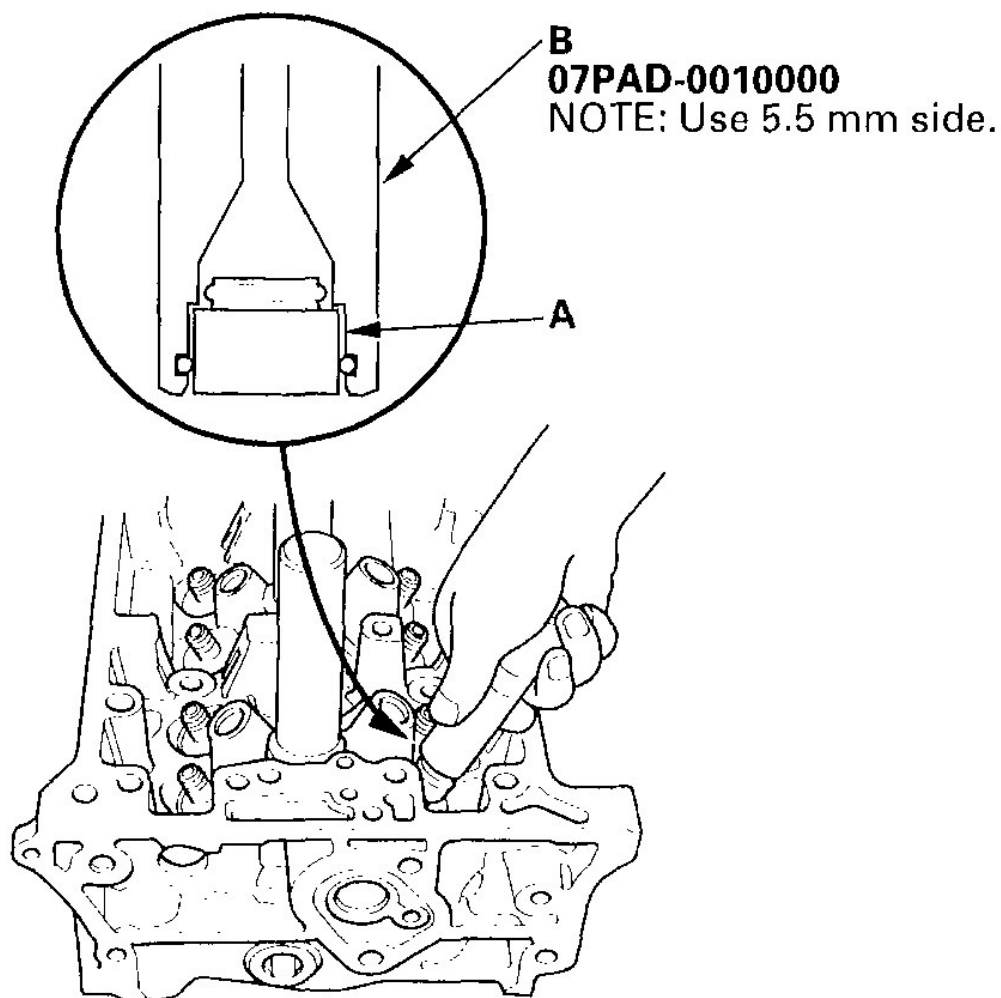
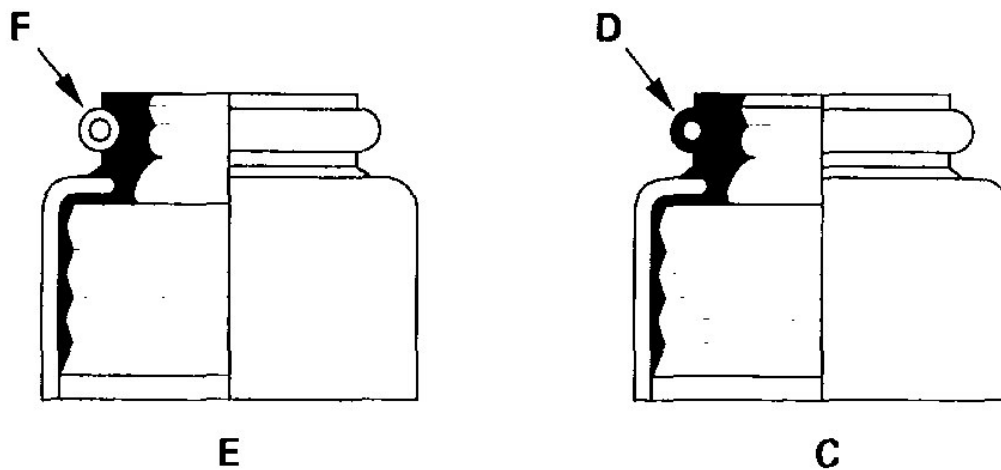
Fig. 148: Measuring Intake & Exhaust Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

- Stem seal driver 07PAD-0010000
 - Valve spring compressor attachment 07757-PJ1010A
1. Coat the valve stems with new engine oil. Install the valves in the valve guides.
 2. Check that the valves move up and down smoothly.
 3. Install the spring seats on the cylinder head.
 4. Install the new valve seals (A) using the 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.**



G01473594

Fig. 149: Installing New Valve Seals Using Stem Seal Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

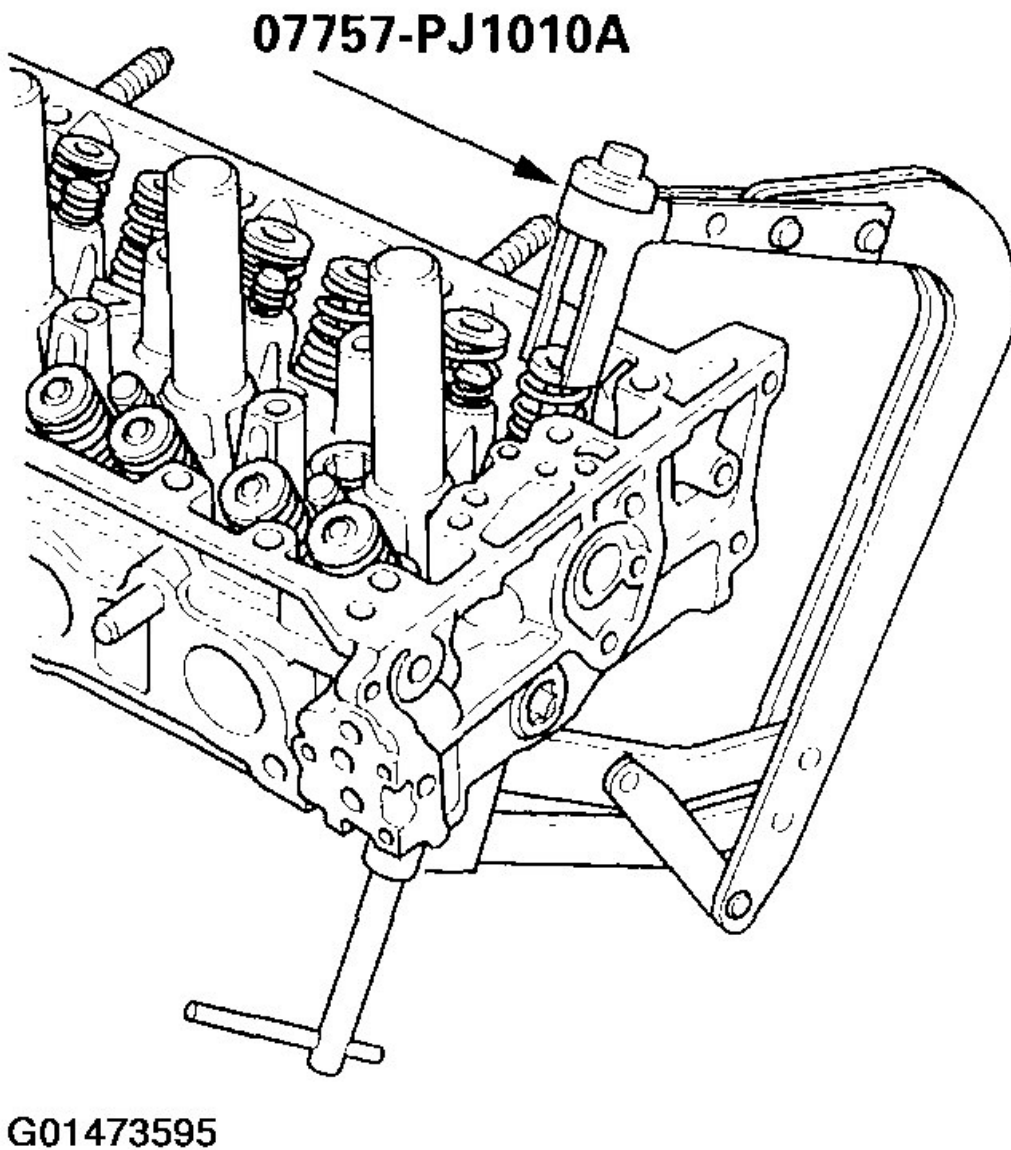
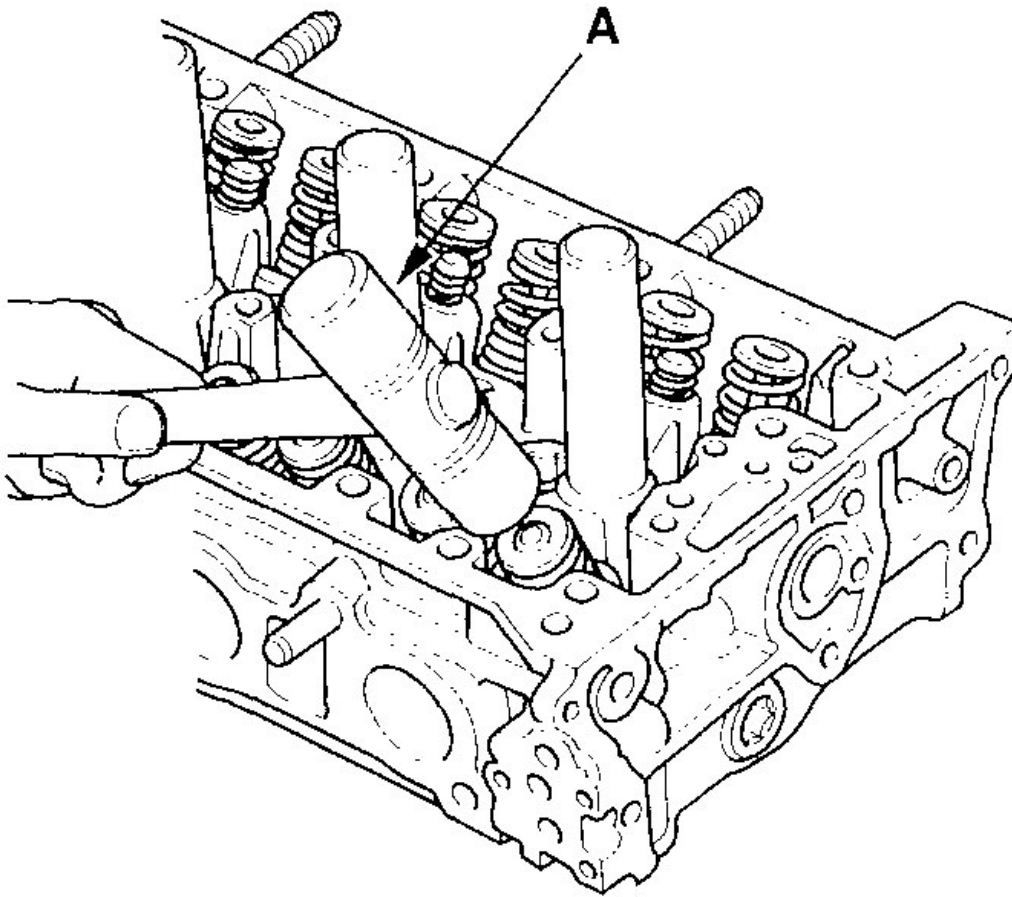


Fig. 150: Installing Valve Spring Compressor & Valve Keepers

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 valve keepers. Tap the valve stem only along its axis so you do not bend the stem.



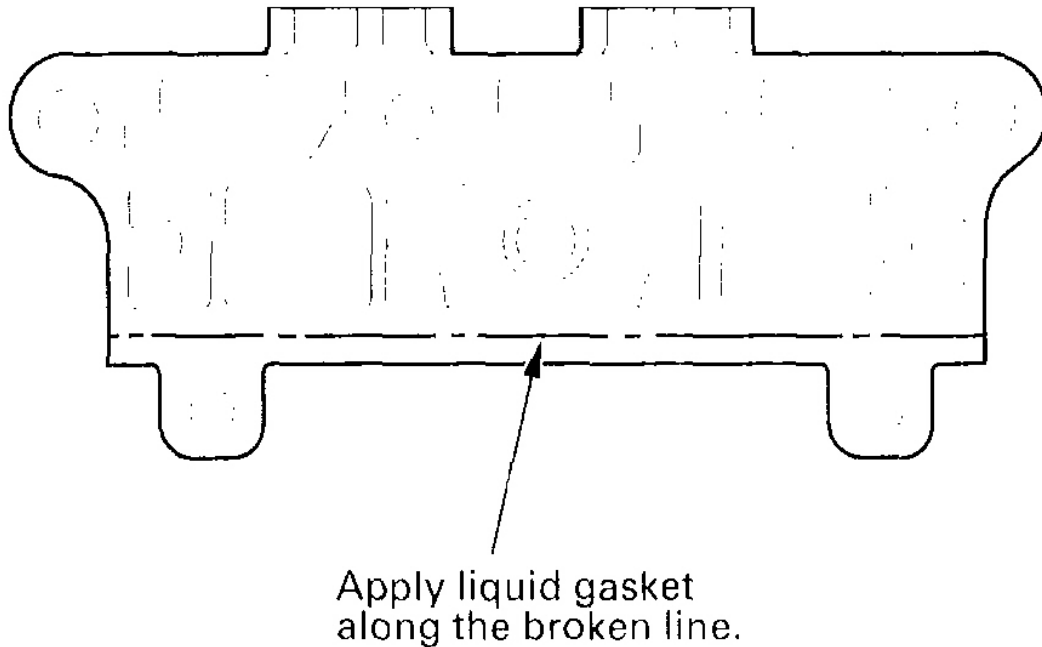
G01473596

Fig. 151: Lightly Tapping End Of Each Valve Stem
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY INSTALLATION

1. Clean and dry the No. 5 rocker shaft holder mating surface.
2. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

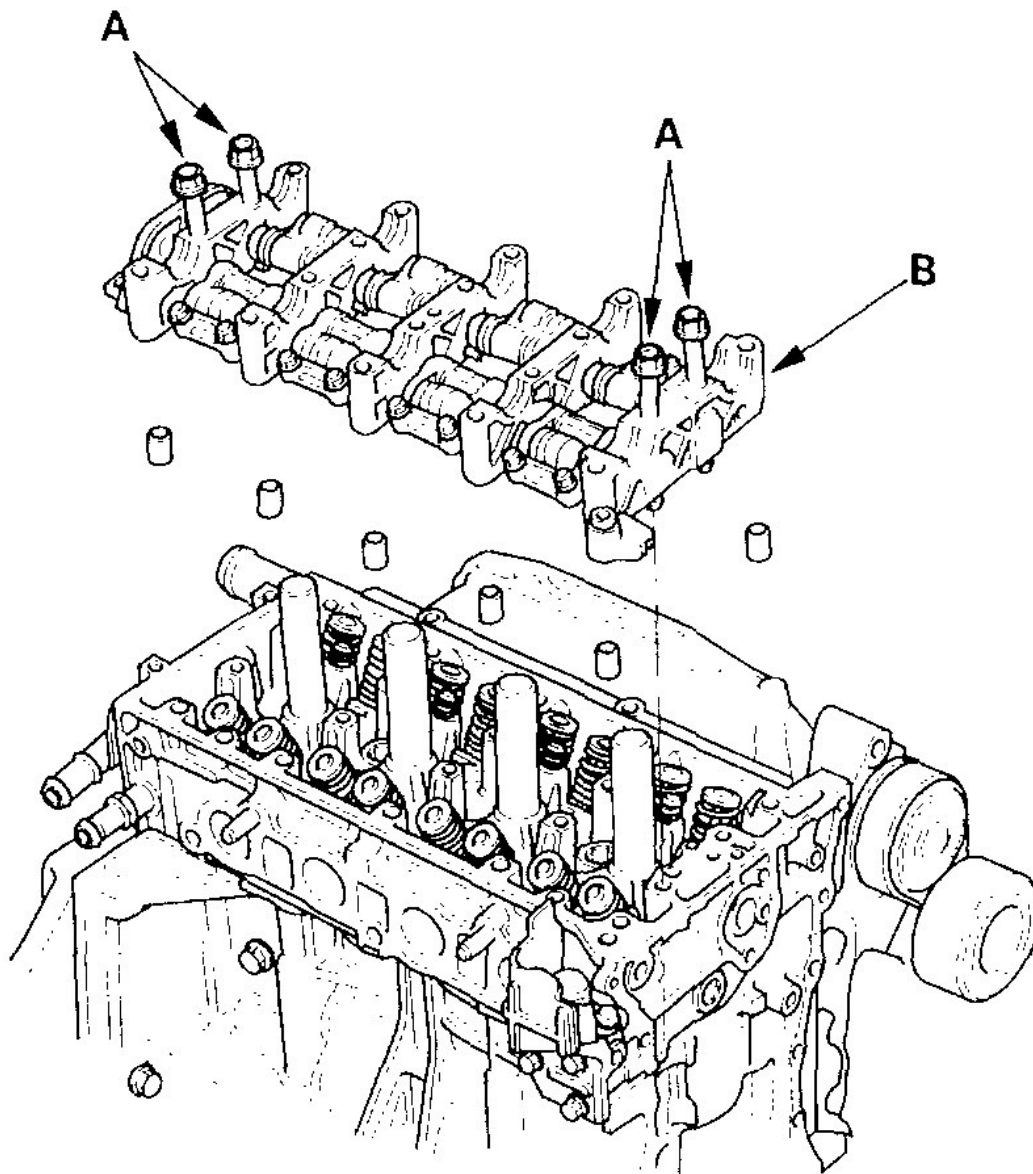


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Fig. 152: Applying Liquid Gasket To The Cylinder Head Mating Surface Of The No. 5 Rocker Shaft Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

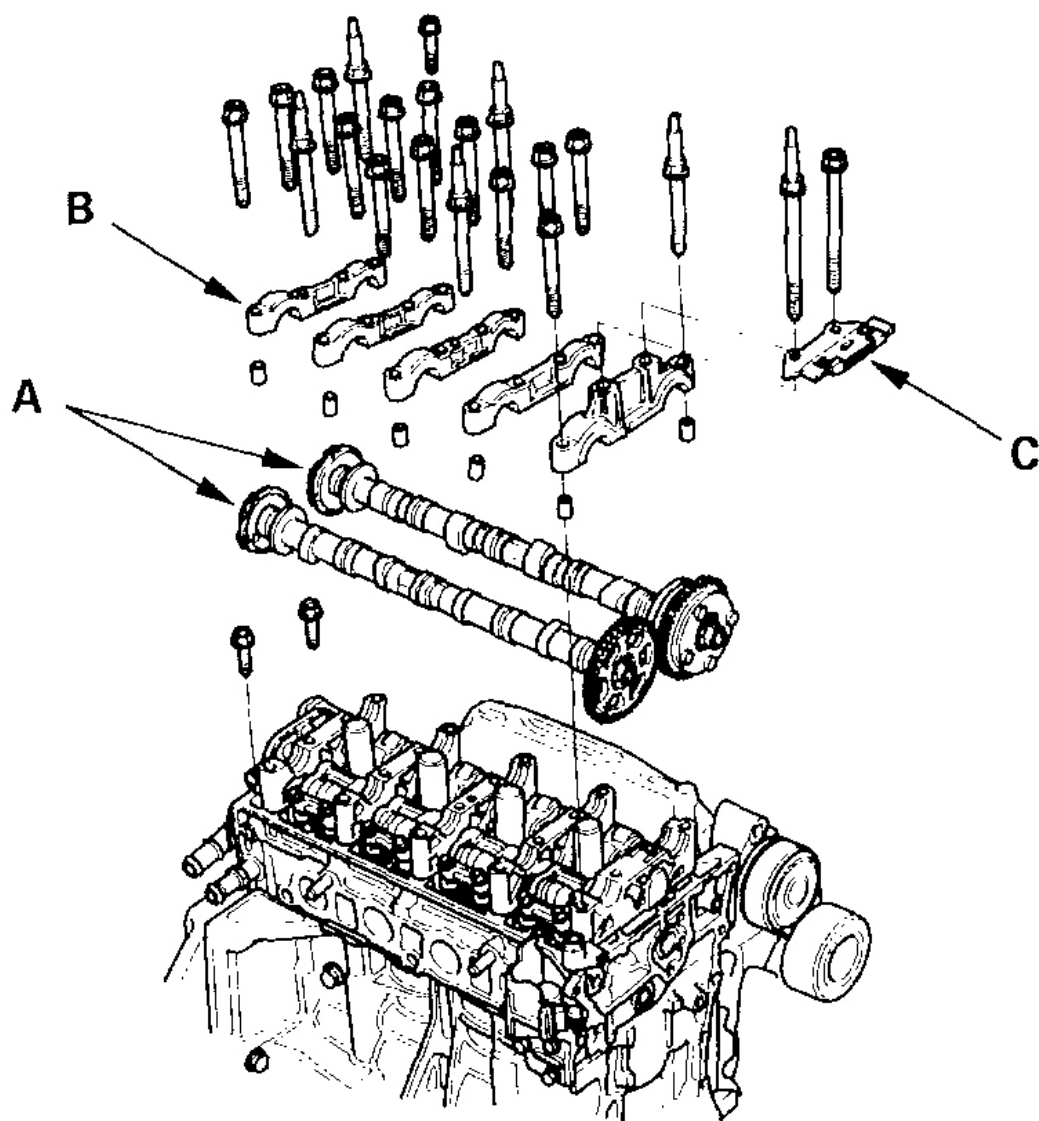
3. Reassemble the rocker arm assembly (see **Rocker Arm and Shaft Disassembly/Reassembly**).
4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.



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Fig. 153: Installing Rocker Arm Assembly On Cylinder Head.
 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 exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder. Apply new engine oil to the camshaft lobes and journals.



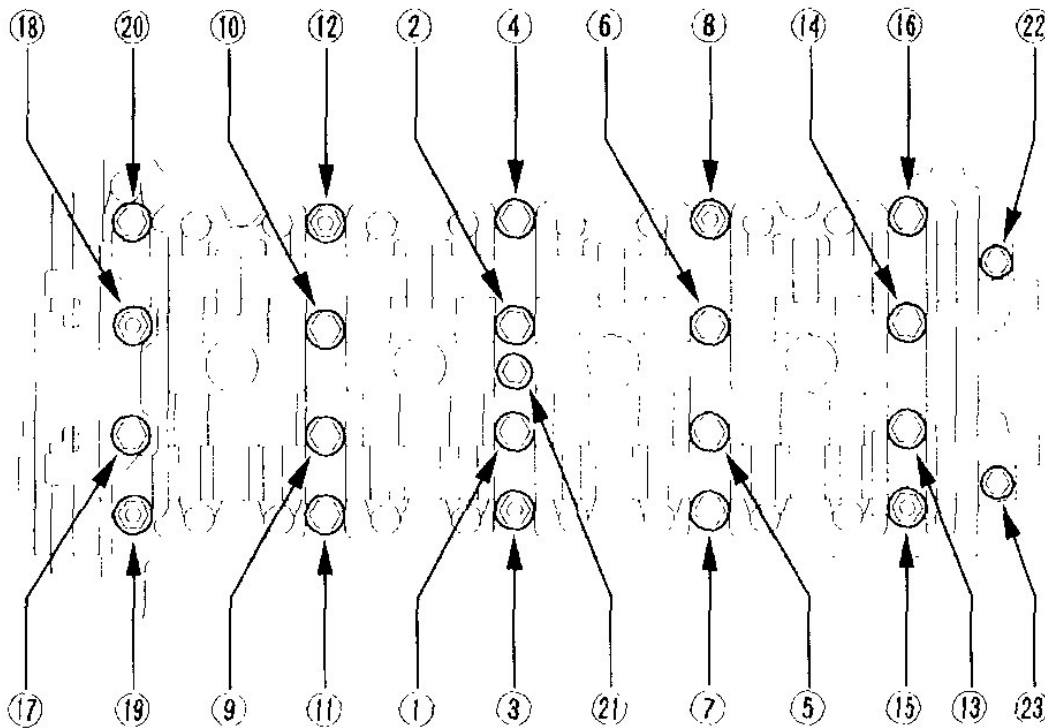
G01473599

Fig. 154: Setting Camshafts In Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

Specified torque**8 mm bolts: 22 N·m (2.2 kgf·m, 16 lbf·ft)****6 mm bolts: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)****6 mm bolts: (21), (22), (23)**

G01473600

Fig. 155: Tightening Rocker Arm Assembly Bolts

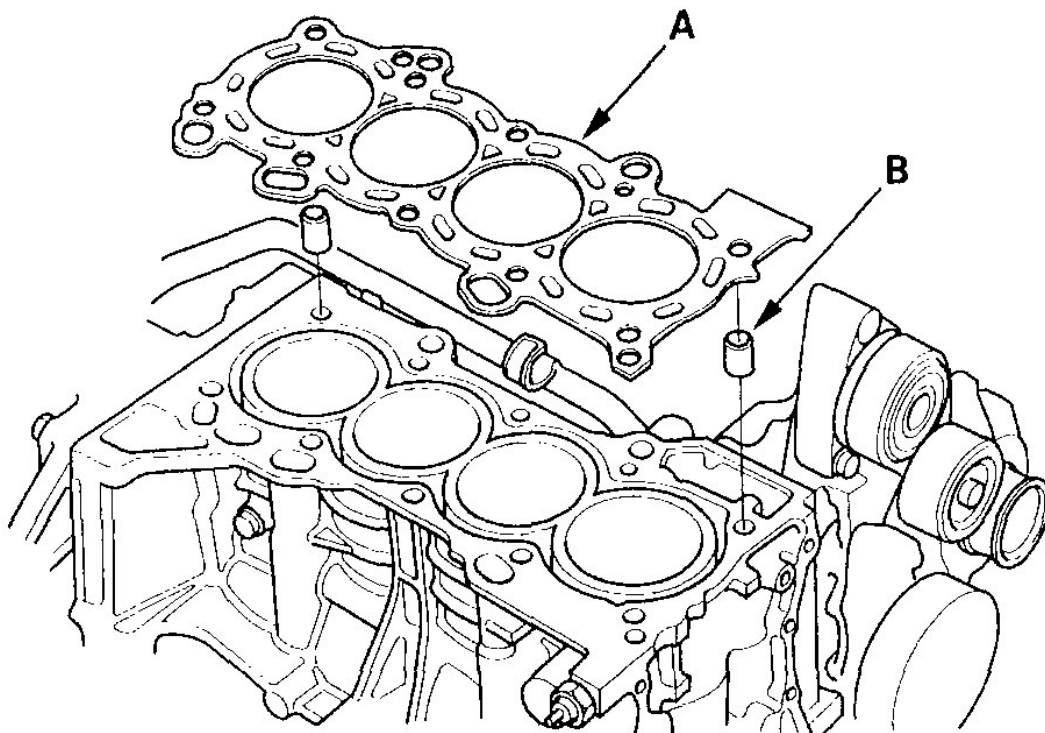
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the cam chain (see Cam Chain Installation), and adjust the valve clearance (see Valve Clearance Adjustment).

CYLINDER HEAD INSTALLATION

Install the cylinder head in the reverse order of removal:

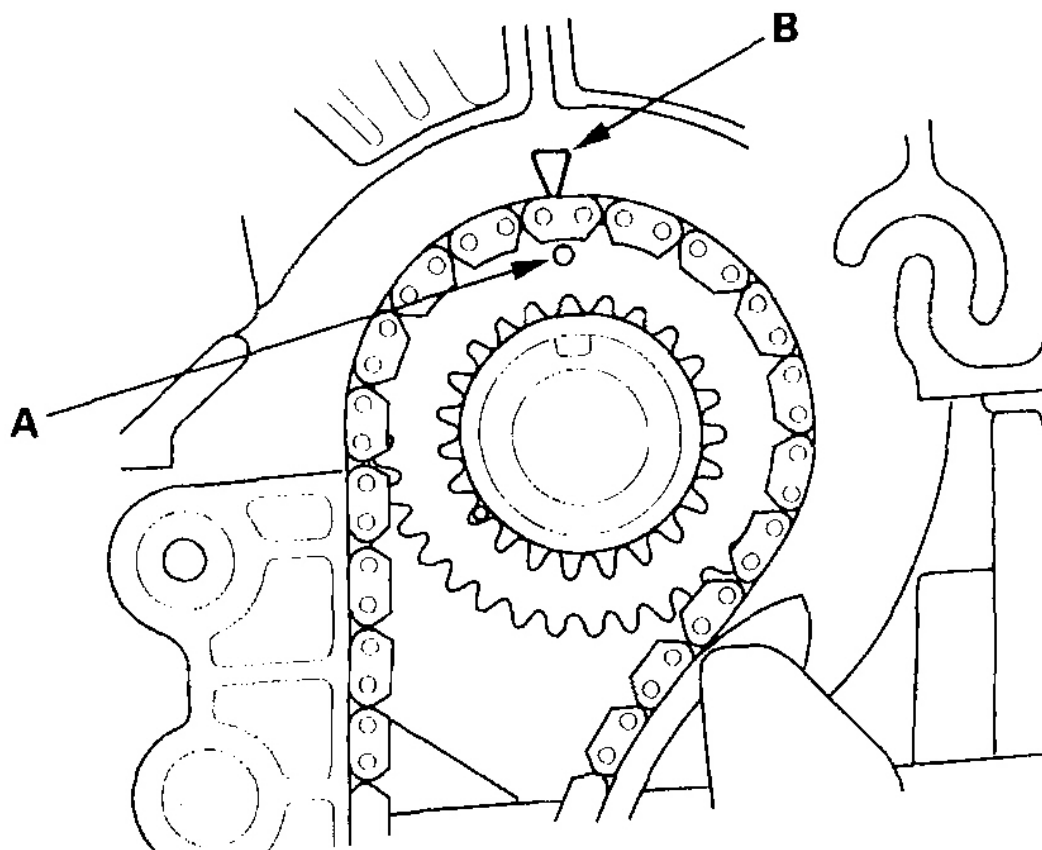
1. Clean the cylinder head and block surface.
2. Install the new cylinder head gasket (A) and dowel pins (B) on the cylinder block. Always use a new cylinder head gasket.



G01473601

Fig. 156: Installing New Cylinder Head Gasket & Dowel Pins On Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

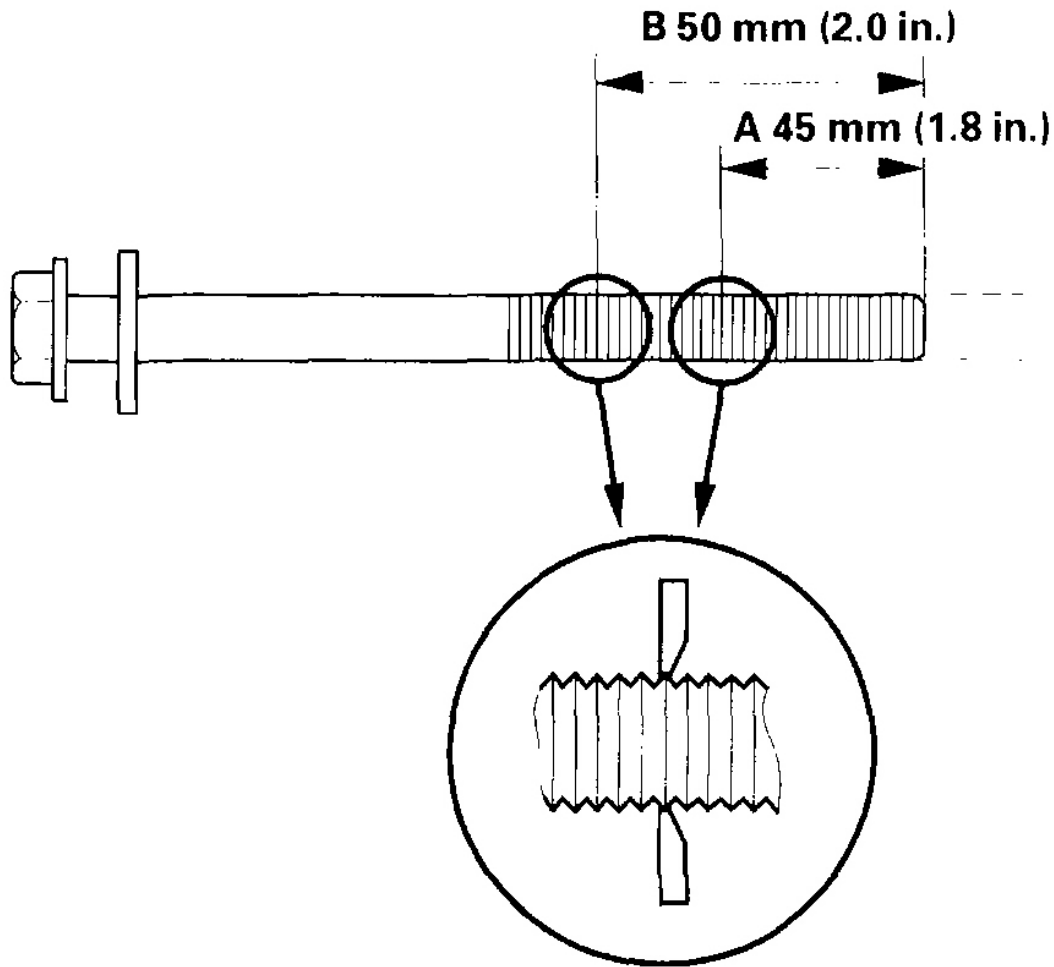
3. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the cylinder block.



G01473602

Fig. 157: Aligning TDC Mark On Crankshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

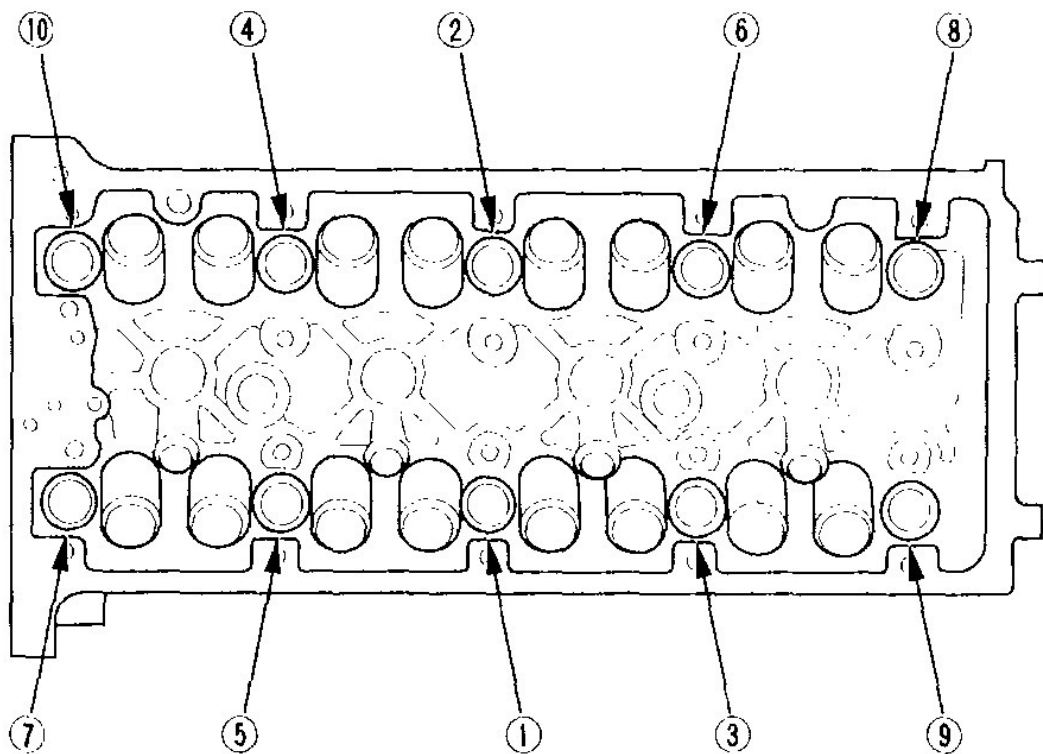
4. Install the cylinder head on the block.
5. Measure the diameter of each cylinder head bolt at point A and point B.



G01473603

Fig. 158: Measuring Diameter Of Each Cylinder Head Bolt At Point A & Point B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

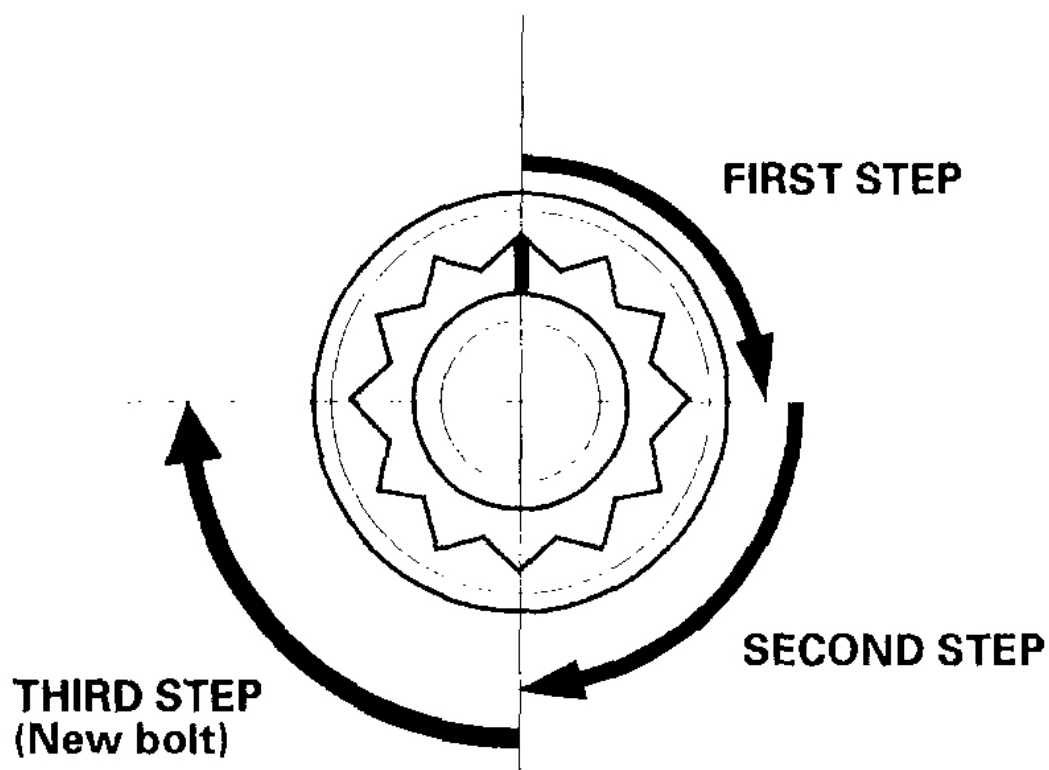
6. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.
7. Apply new engine oil to the bolt threads and under the bolt heads of all the cylinder head bolts.
8. Tighten the cylinder head bolts in sequence to 39 N.m (4.0 kgf.m, 29 Ft.Lbs). Use a beam-type torque wrench. When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



G01473604

Fig. 159: Cylinder Head Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

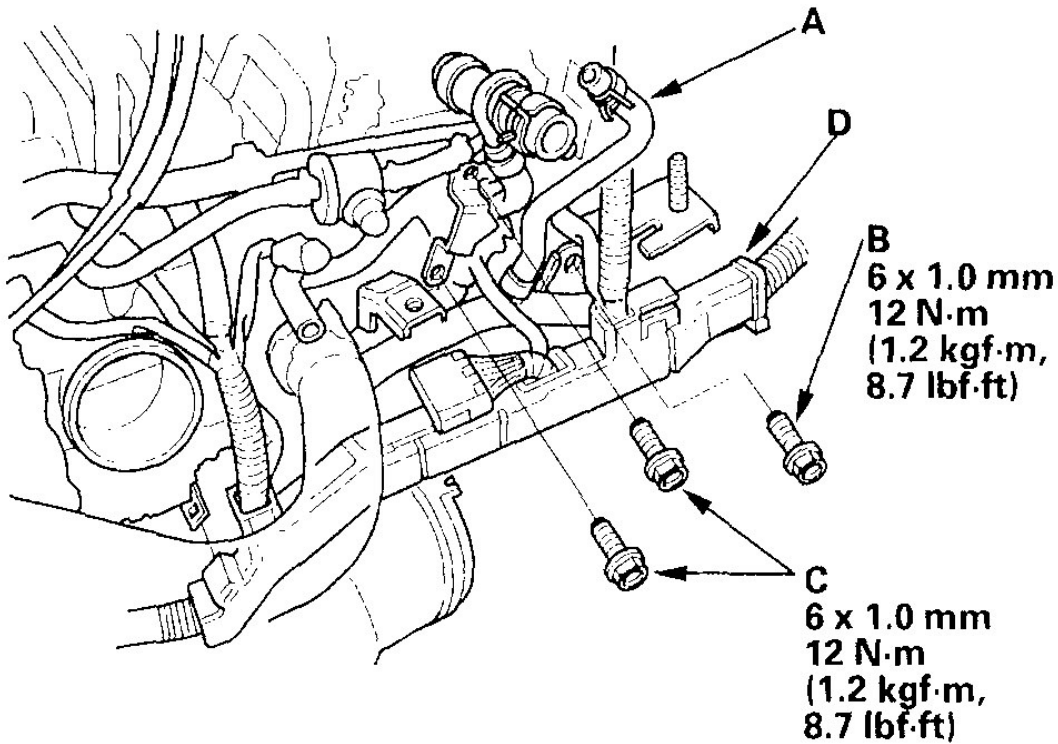
9. After torquing, tighten all cylinder head bolts in two steps (90° per step). If you are using a new cylinder head bolt, tighten the bolt an extra 90°.



G01473605

Fig. 160: Tightening All Cylinder Head Bolts In Two Steps (90° Per Step)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the rocker arm assembly (see **Rocker Arm Assembly Installation**).
11. Install the water bypass hose (A).

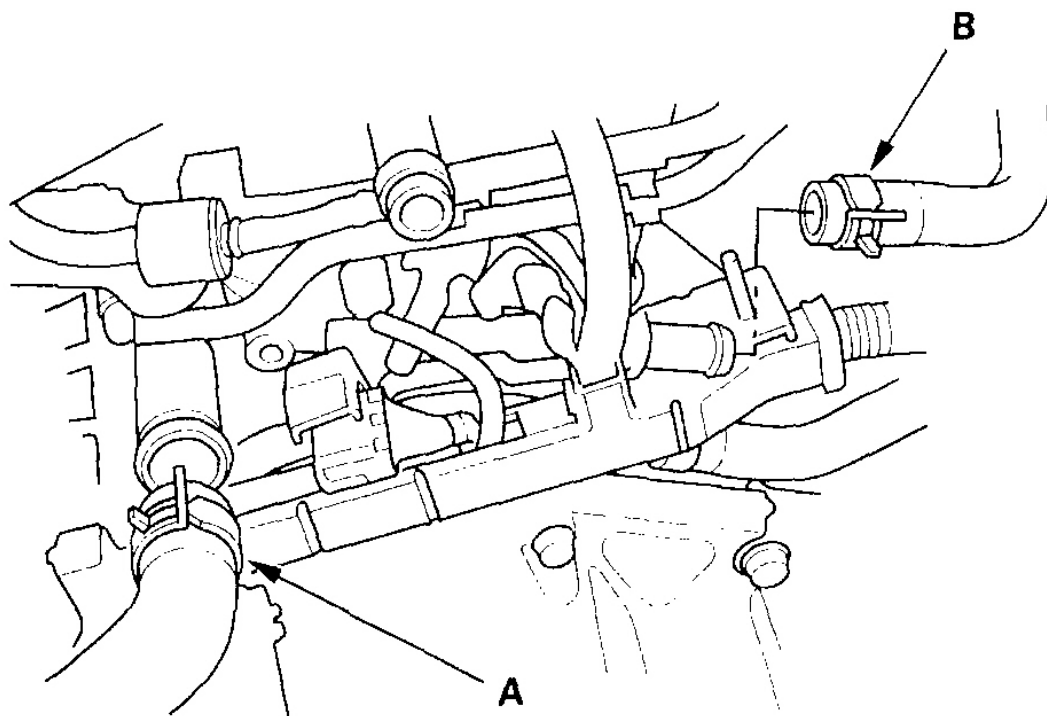


G01473606

Fig. 161: Installing Water Bypass Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

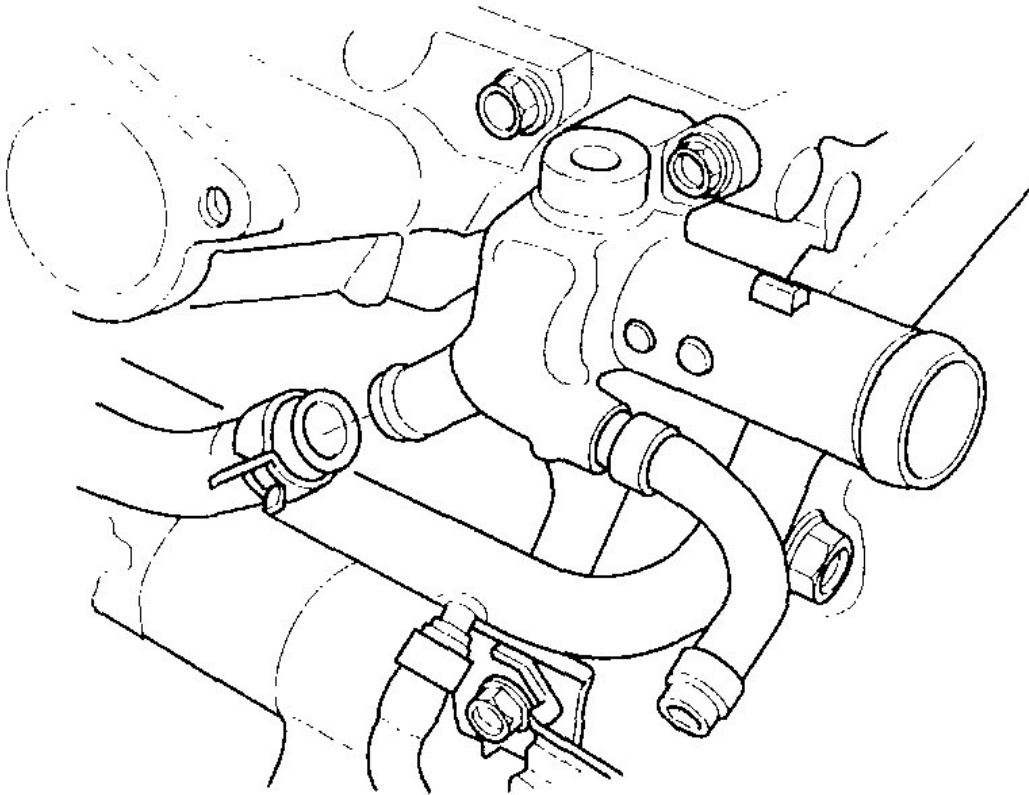
12. Tighten the connecting pipe mounting bolt (B) and brake booster vacuum line mounting bolts (C), then install the harness holder (D) on the bracket.
13. Install the upper radiator hose (A) and heater hose (B).



G01473607

Fig. 162: Installing Upper Radiator Hose & Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Install the water bypass hose.



G01473608

Fig. 163: Installing Water Bypass Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

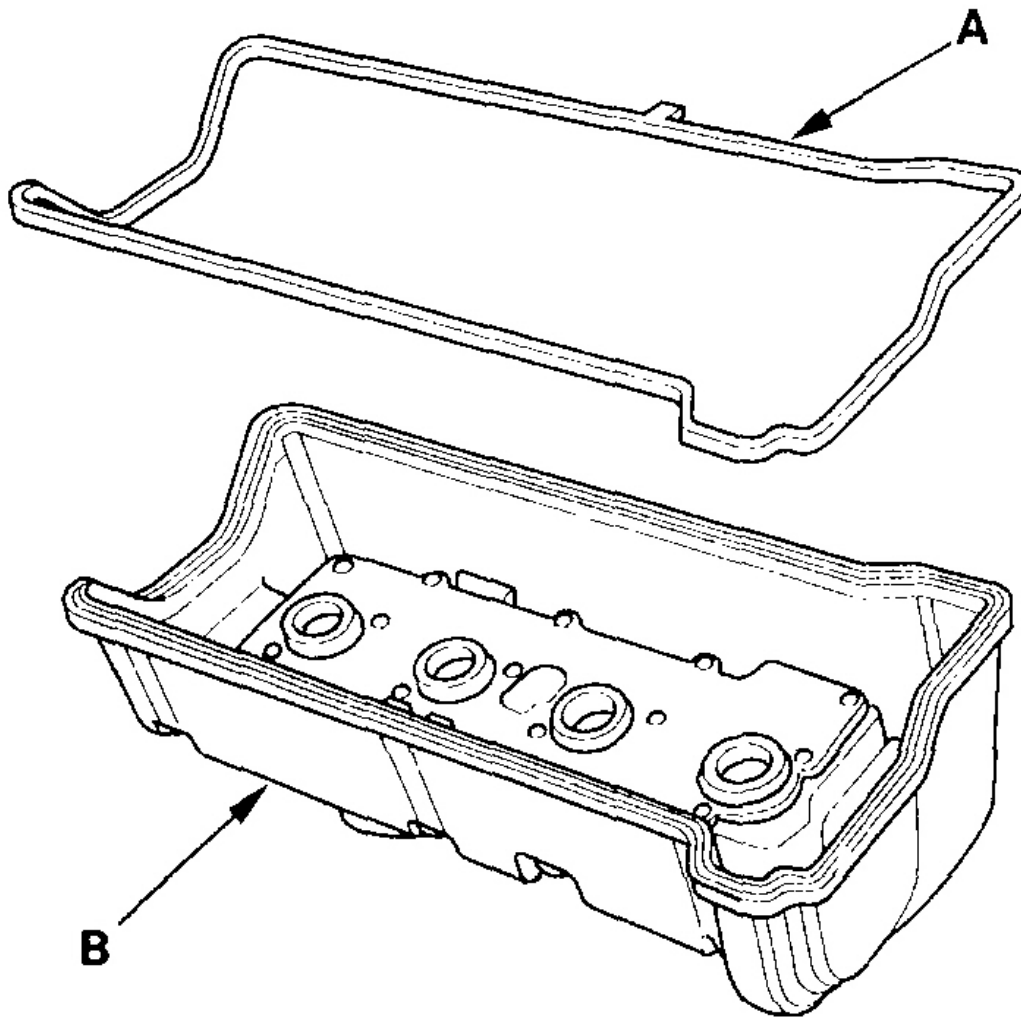
15. Install the intake manifold (see **Installation**).
16. Install the exhaust manifold (see **Removal & Installation**).
17. Install the cam chain (see **Cam Chain Installation**).
18. Connect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**).
19. Adjust the valve clearance (see **Valve Clearance Adjustment**).
20. Install the drive belt (see **DRIVE BELT**).
21. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.
22. After installation, check that all tubes, hoses and connectors are installed correctly.
23. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
24. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open

(see **COOLANT REPLACEMENT**).

25. Perform the engine control module (ECM)/powertrain control module (PCM) idle learn procedure (see **ECM/PCM IDLE LEARN PROCEDURE**), and power window control unit reset procedure (see **RESETTING THE POWER WINDOW CONTROL UNIT**).
26. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
27. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
28. Set the clock.

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).



G01473609

Fig. 164: Installing Head Cover Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08718-0009, on the chain case and the No. 5 rocker shaft holder mating areas.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

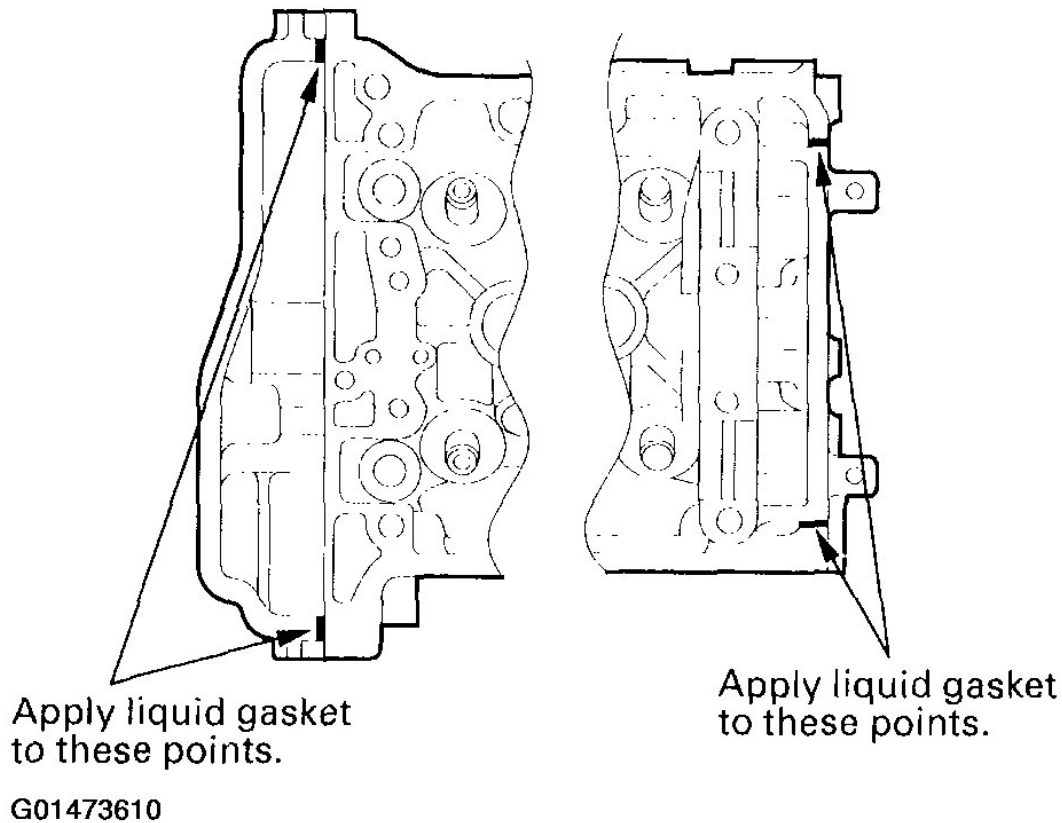
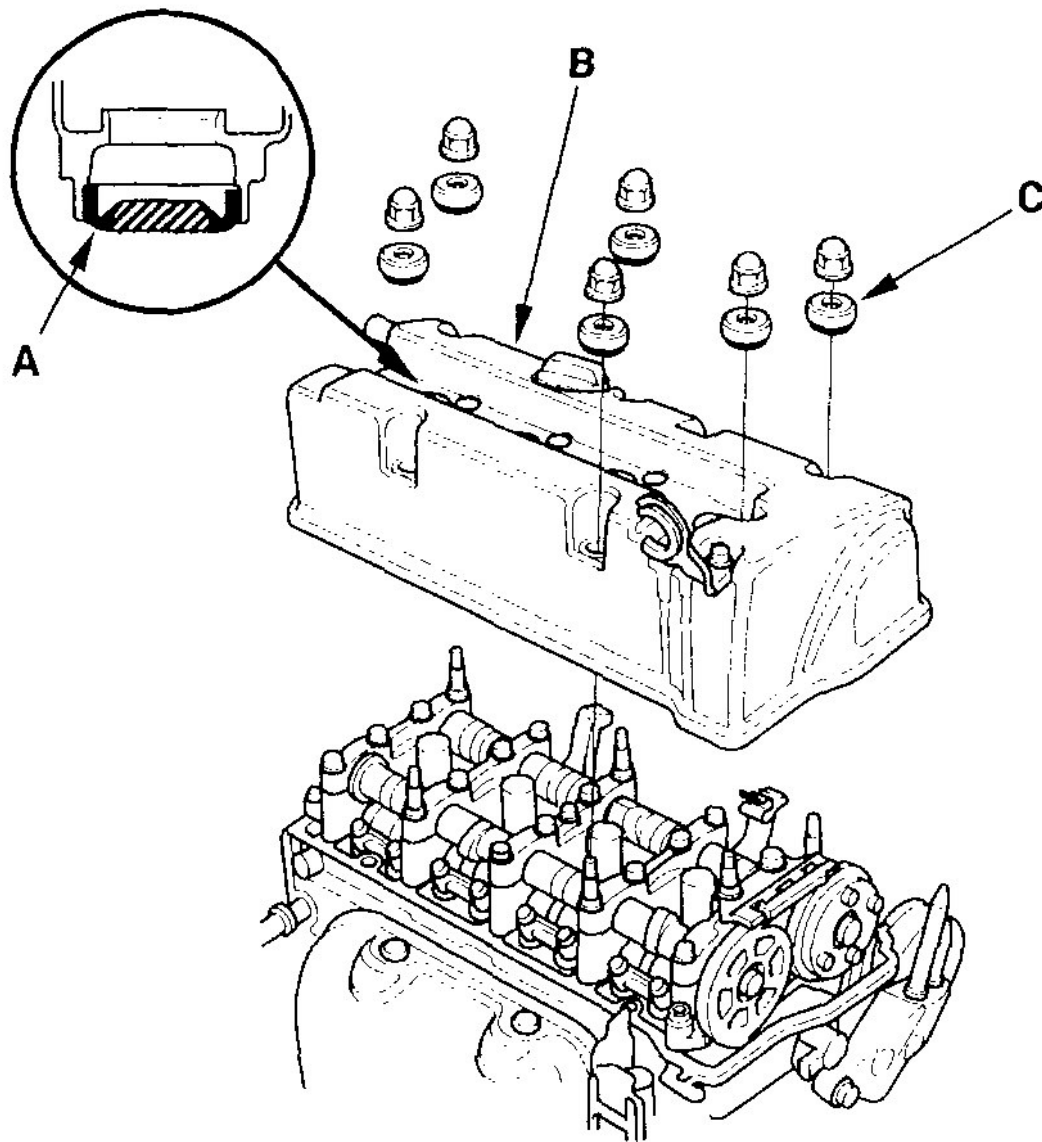


Fig. 165: Applying Liquid Gasket On Chain Case & No. 5 Rocker Shaft Holder Mating Areas
Courtesy of AMERICAN HONDA MOTOR CO., INC.

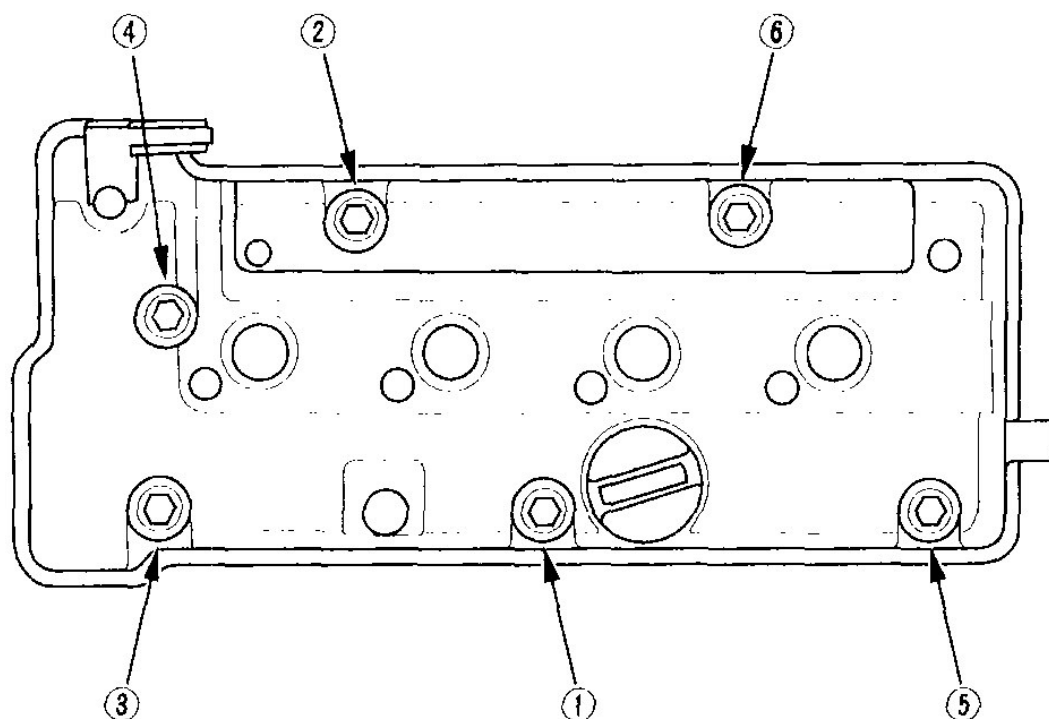
5. Set the spark plug seals (A) on the spark plug tubes. Once the cylinder head cover (B) is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.



G01473611

Fig. 166: Set Spark Plug Seals On Spark Plug Tubes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

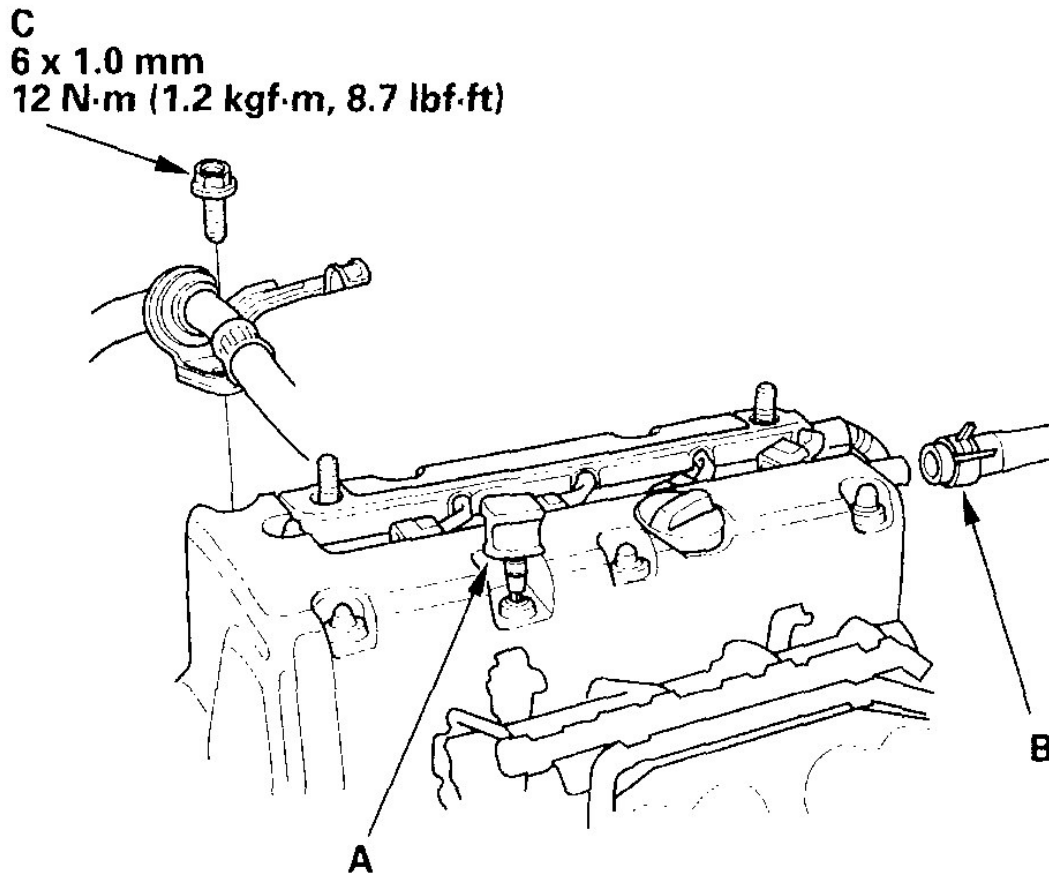
6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in two or three steps. In the final step, tighten all bolts, in sequence, to 9.8 N.m (1.0 kgf.m, 7.2 Ft.Lbs).



G01473612

Fig. 167: Cylinder Head Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

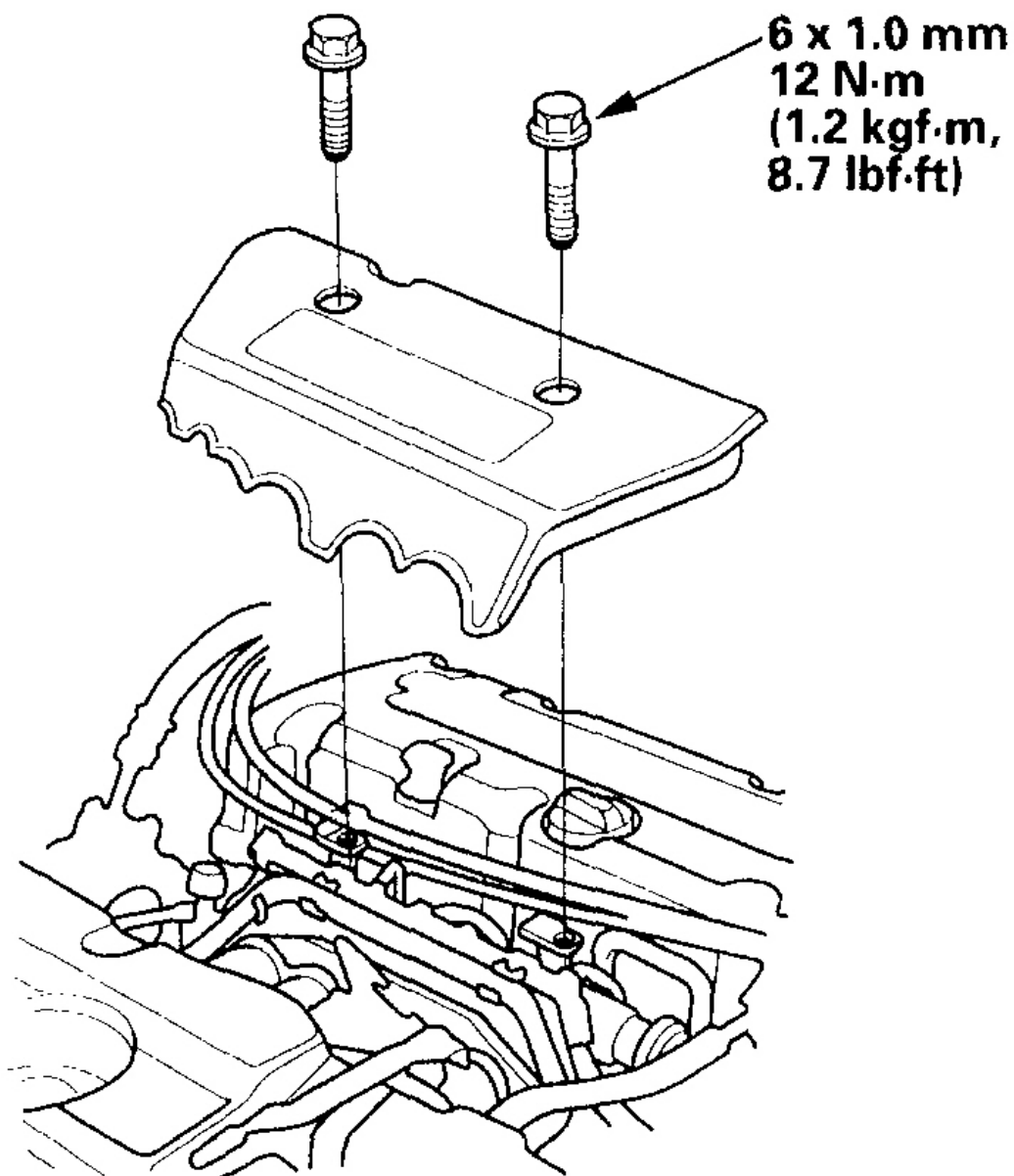
8. Install the dipstick (A) and breather hose (B).



G01473613

Fig. 168: Installing Dipstick & Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Tighten the bolt (C) securing the power steering hose bracket.
10. Install the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
11. Check that all tubes, hoses, and connectors are installed correctly.
12. Install the intake manifold cover.



G01473614

Fig. 169: Installing Intake Manifold Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. After assembly, wait at least 30 minutes before filling the engine with oil.

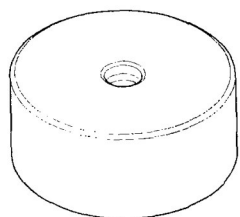
ENGINE BLOCK

2003 Honda CR-V EX

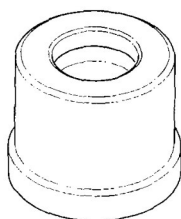
2002-04 ENGINES 2.4L 4-Cylinder - CR-V

SPECIAL TOOLS

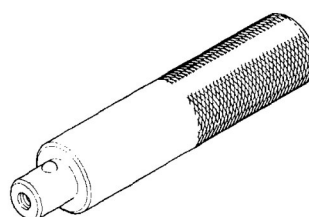
Ref.No.	Tool Number	Description	Qty
①	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1
②	07746-0010700	Attachment, 24 x 26 mm	1
③	07749-0010000	Driver	1



①



②



③

G01473615

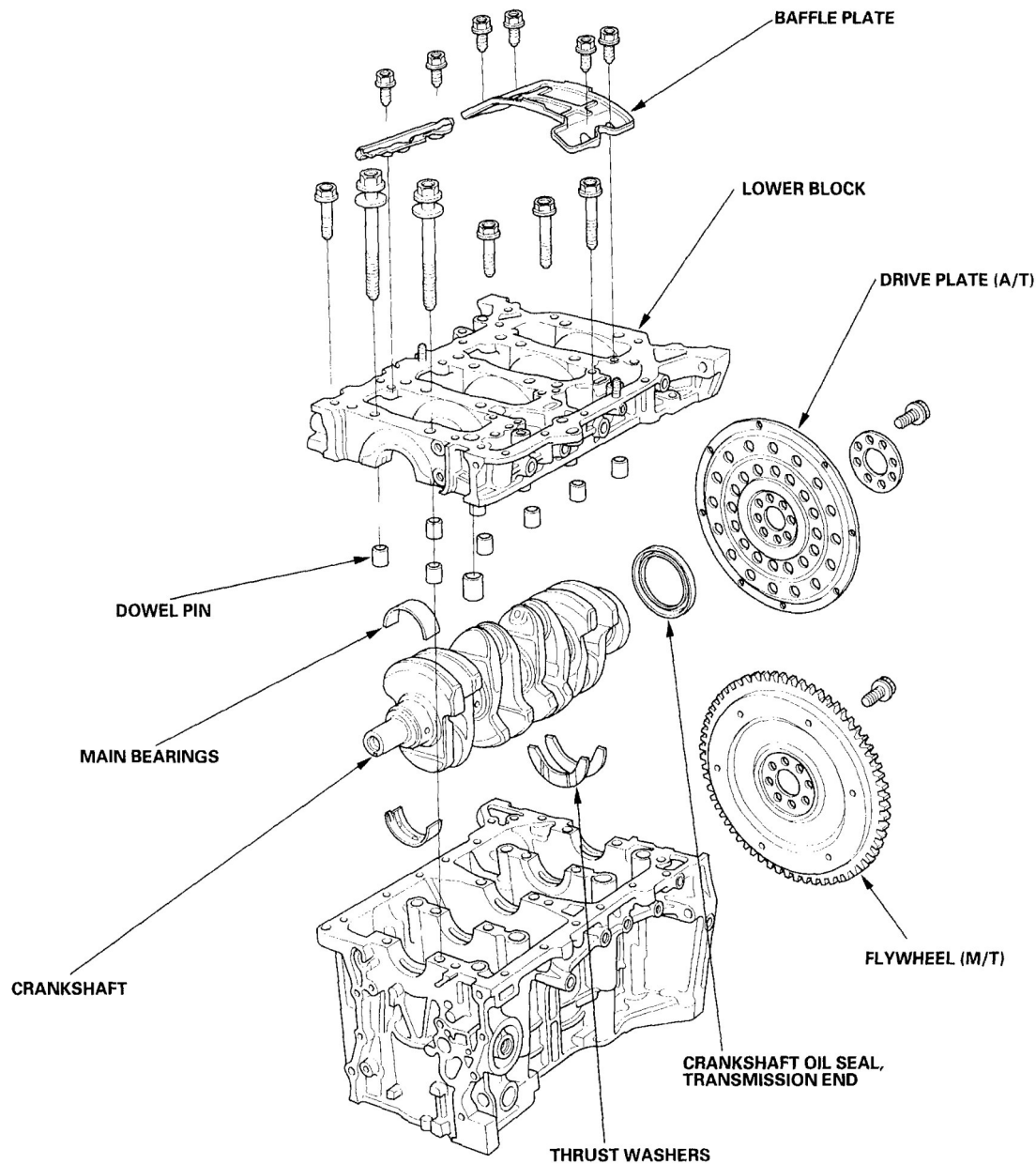
Fig. 170: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

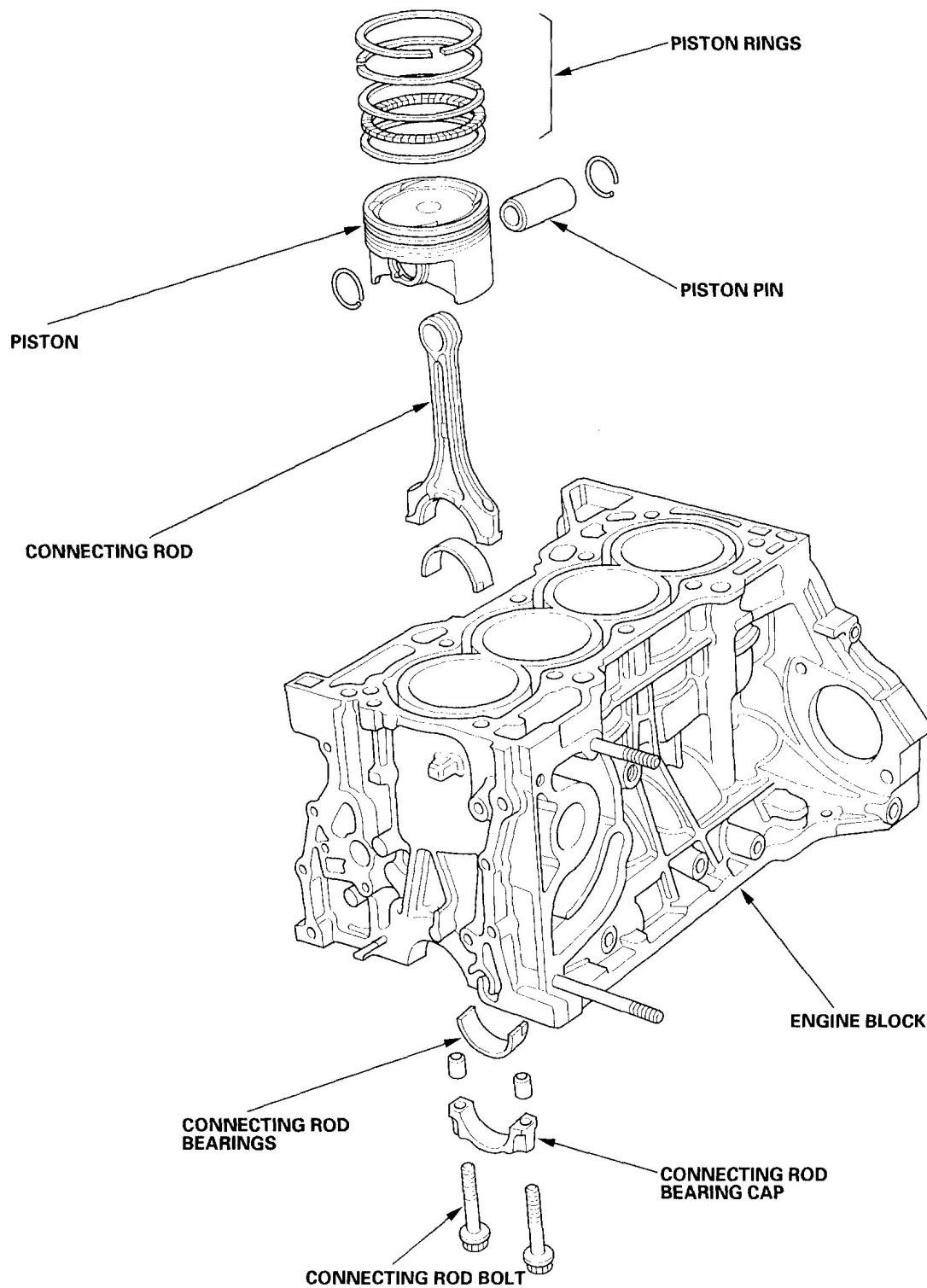
2003 Honda CR-V EX

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G01473616

Fig. 171: Identifying Engine Block Component Locations (1 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



G01473617

Fig. 172: Identifying Engine Block Component Locations (2 Of 2)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

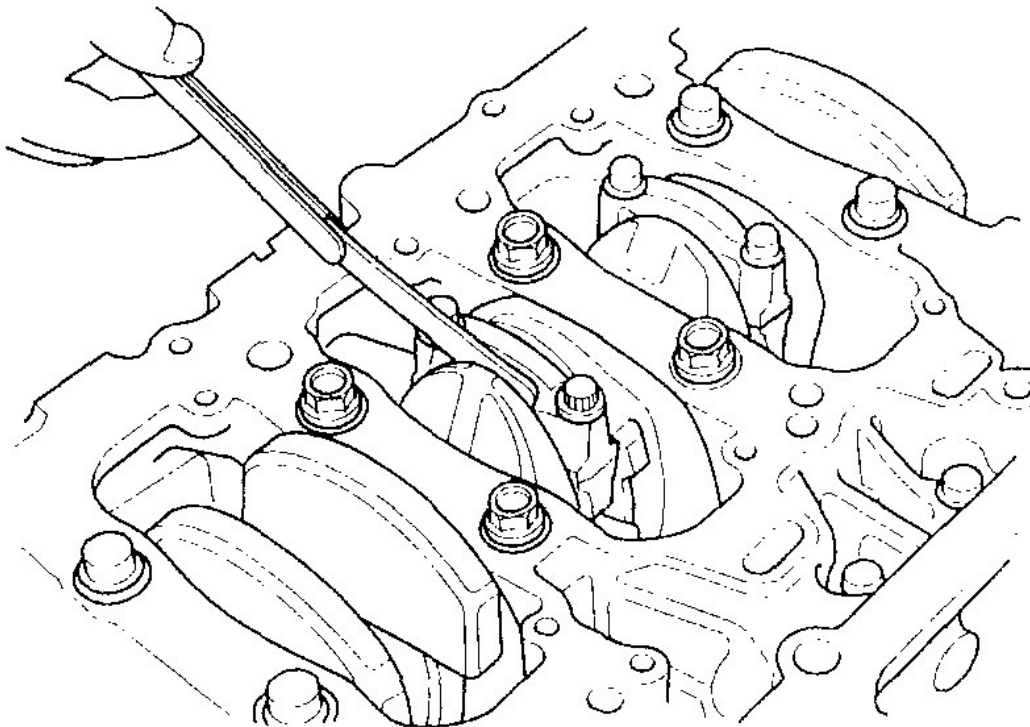
CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see **OIL PUMP OVERHAUL**).
2. Remove the baffle plates (see step 6 on).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and crankshaft.

Connecting Rod End Play

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

Service Limit: 0.40 mm (0.016 in.)



G01473618

Fig. 173: Measuring Connecting Rod End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

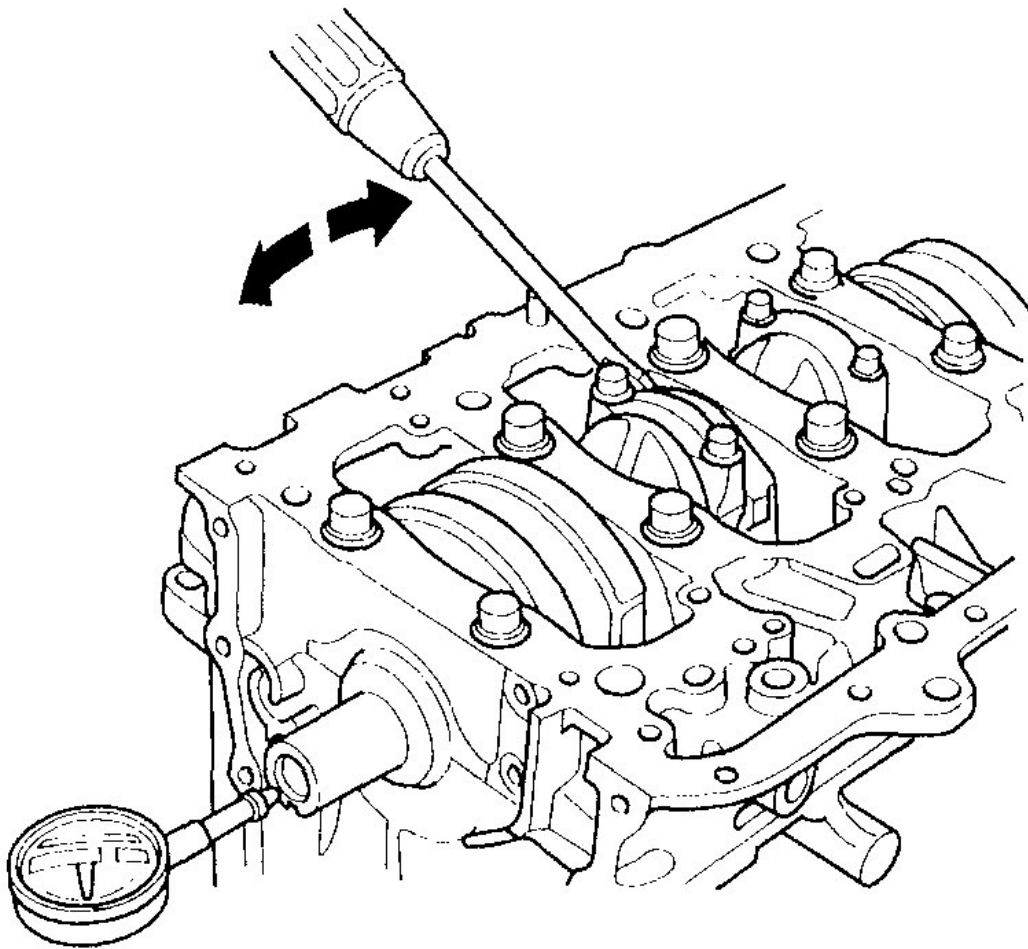
4. If the connecting rod end play is out-of-tolerance, install a new connecting rod, and recheck. If it is still out-of-tolerance, replace the crankshaft (see **Crankshaft and Piston Removal**).
5. Push the crankshaft firmly away from the dial indicator, and zero the dial against the end of the crankshaft. 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.)



G01473619

Fig. 174: Pushing Crankshaft Firmly Away From Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the end play is out-of-tolerance, replace the thrust washers and recheck. If it is still out-of-tolerance, replace the crankshaft (see **Crankshaft and Piston Removal**).

CRANKSHAFT MAIN BEARING REPLACEMENT**Main Bearing Clearance Inspection**

1. To check main bearing-to-journal oil clearance, remove the lower block and bearing halves (see **Crankshaft and Piston Removal**).
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and lower block, then torque the bolts to 29 N.m (3.0 kgf.m, 22 Ft.Lbs) + 56°.

NOTE: **Do not rotate the crankshaft during inspection.**

5. Remove the lower block and bearings again, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance**No. 1, 2, 4, 5 Journals:**

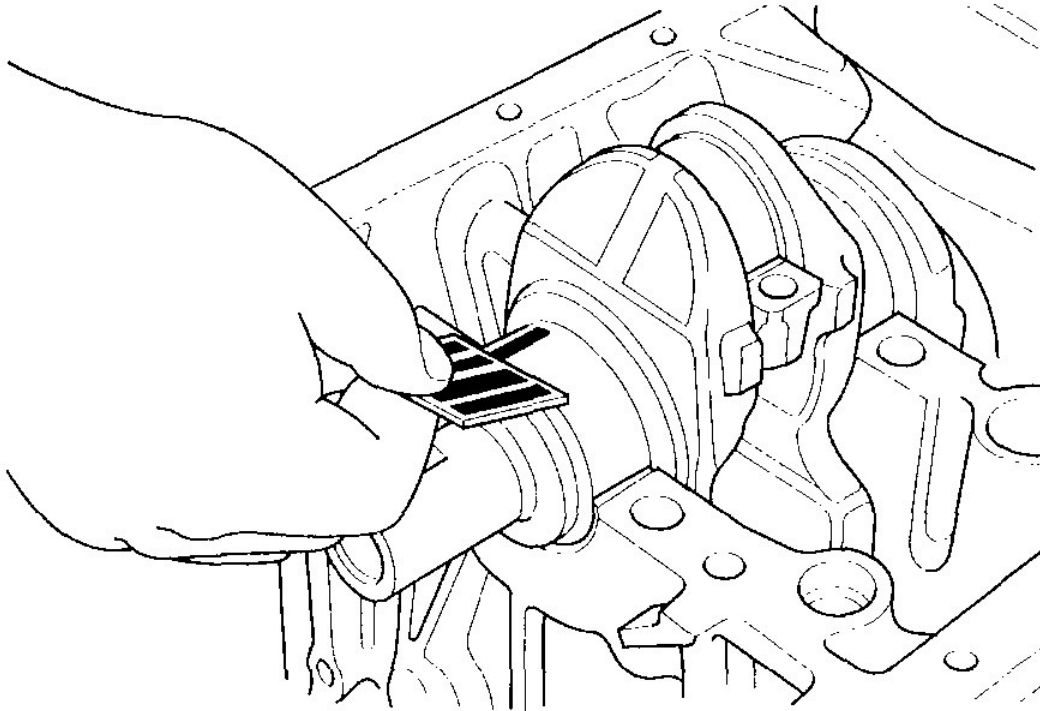
Standard (New): 0.017 - 0.041 mm (0.0007 - 0.0016 in.)

Service Limit: 0.050 mm (0.0020 in.)

No. 3 Journal:

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

Service Limit: 0.055 mm (0.0022 in.)



G01473620

Fig. 175: Removing Lower Block & Bearings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

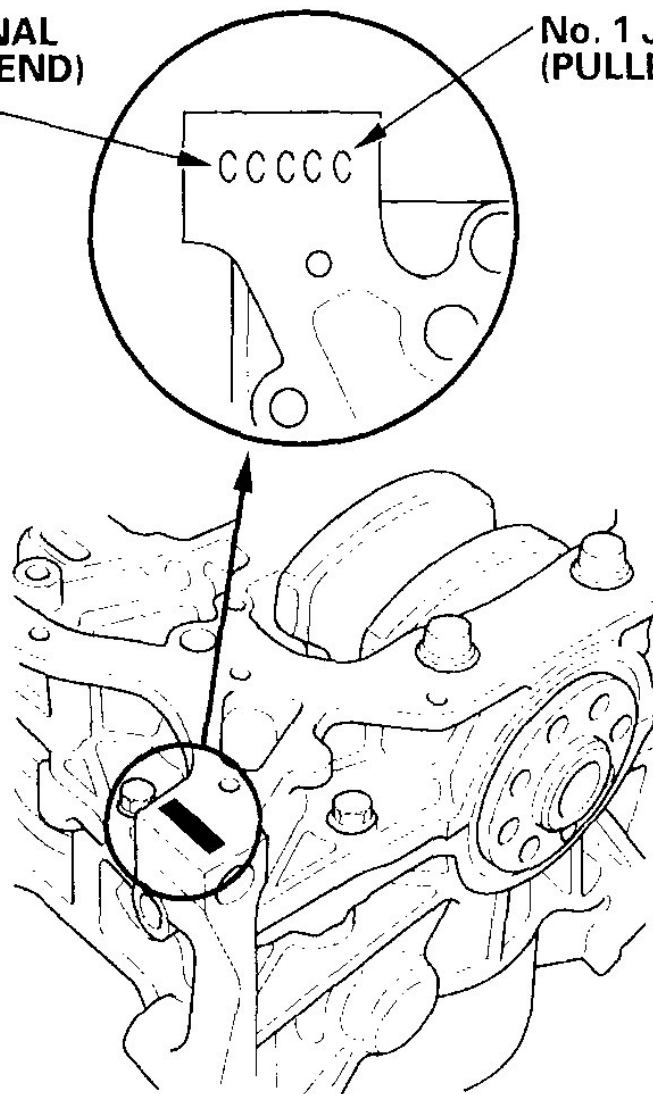
6. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that 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 or letters or bars have been stamped on the end of the block as a code for the size of each of the five main journal bores. Write down the crank bore codes.
2. If you can't read the codes because of accumulated dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

No. 5 JOURNAL
(FLYWHEEL END)

No. 1 JOURNAL
(PULLEY END)



G01473621

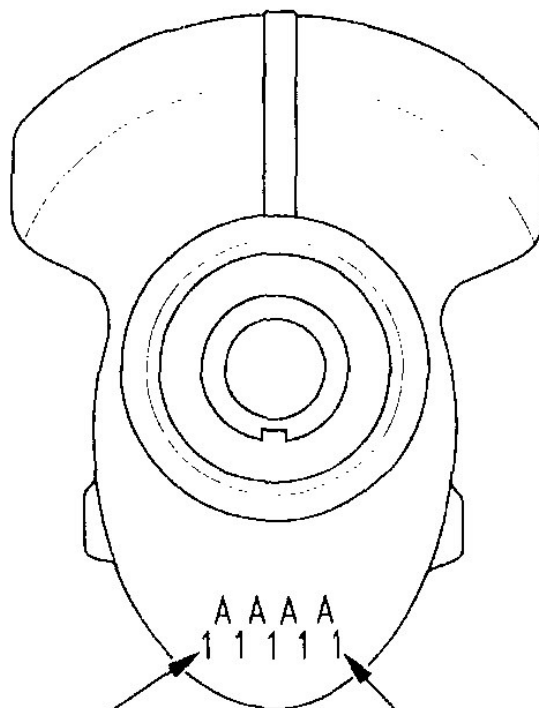
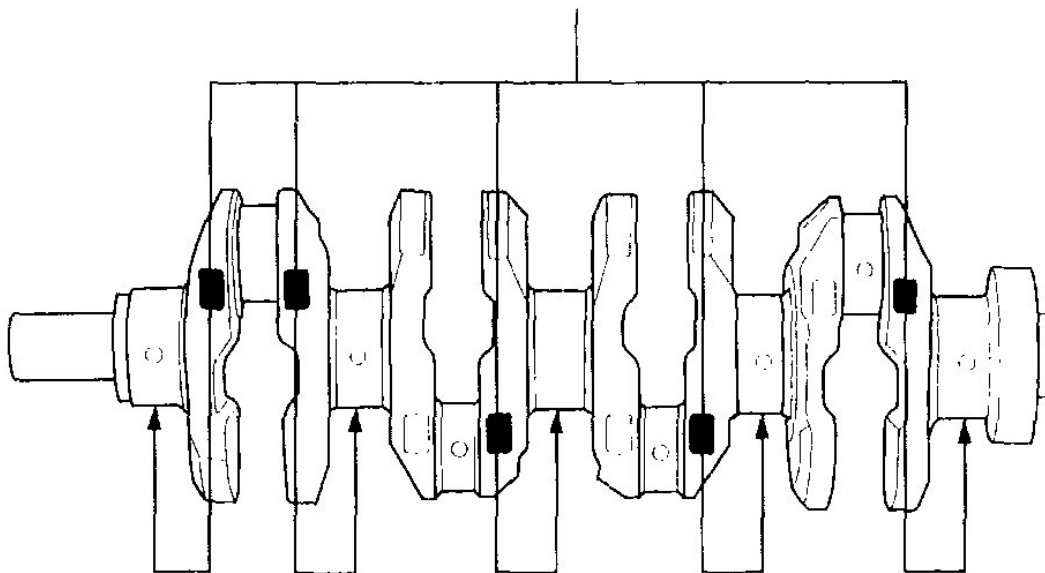
Fig. 176: Identifying Crankshaft Bore Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Location

3. The main journal codes are stamped on the crankshaft.

2003 Honda CR-V EX

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No. 1 JOURNAL

No. 5 JOURNAL

G01473622

Fig. 177: Identifying Main Journal Code Locations

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE:

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

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

G01473623

Fig. 178: Identifying Crank Bore Codes & Crank Journal Codes Replacement Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

Rod Bearing Clearance Inspection

1. Remove the oil pump (see **OIL PUMP OVERHAUL**).
2. Remove the baffle plates (see step 6 on).
3. Remove the connecting rod cap and bearing half.
4. Clean the crankshaft rod journal and bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and cap, and torque the bolts to 20 N.m (2.0 kgf.m, 14 Ft.Lbs) + 90°

NOTE: **Do not rotate the crankshaft during inspection.**

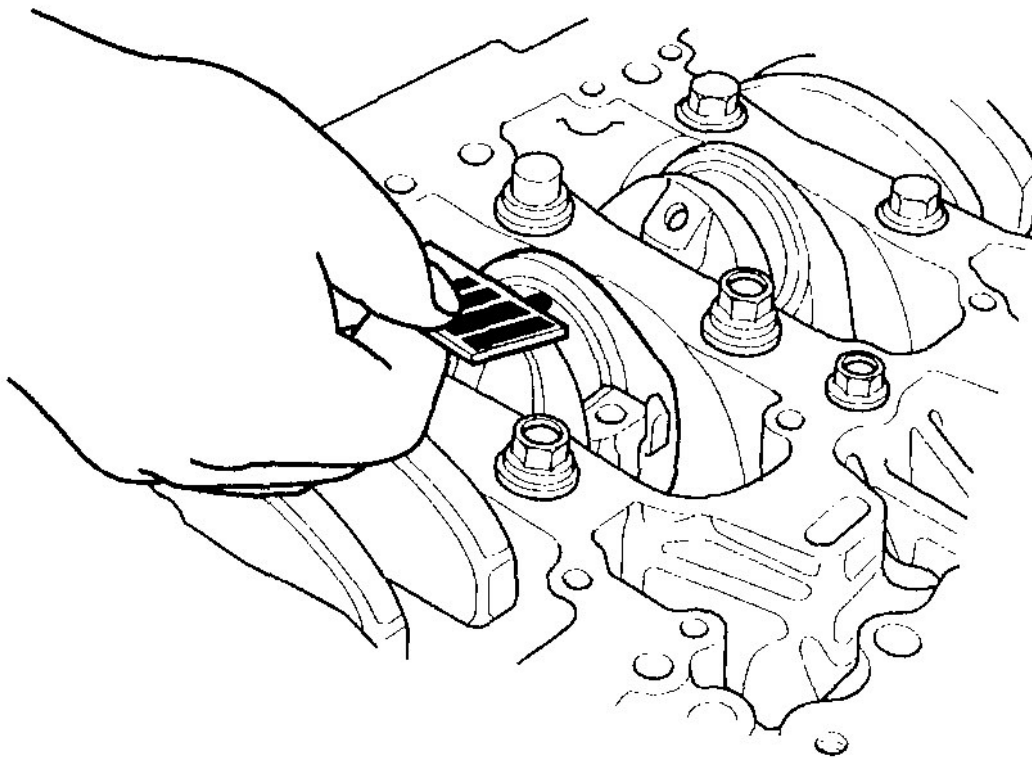
7. Remove the rod cap and bearing half, and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil

Clearance:

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

Service Limit: 0.060 mm (0.0024 in.)



G01473624

Fig. 179: Removing Rod Cap & Bearing Half & Measuring Widest Part Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Rod Bearing Selection

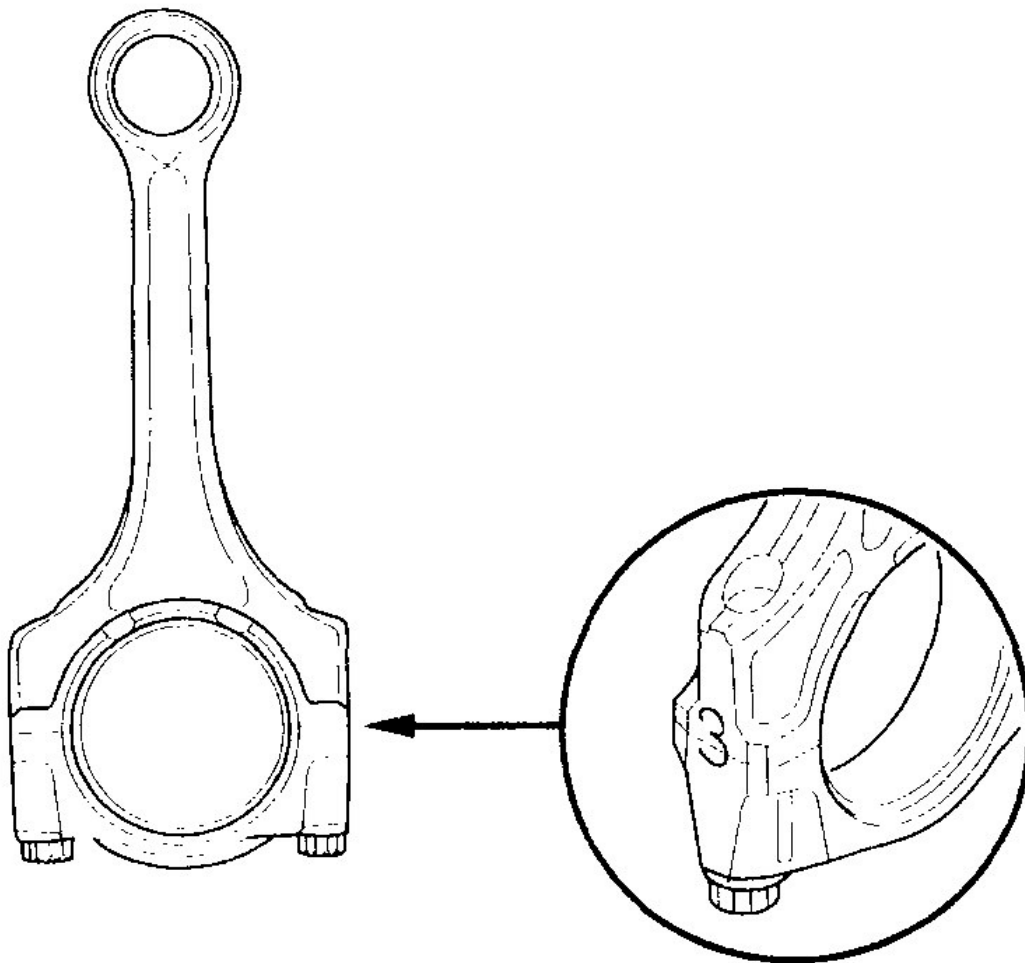
1. Inspect each connecting rod for cracks and heat damage.

Connecting Rod Big End Bore Code Locations

2. Each rod has a tolerance range from 0 to 0.024 mm (0.0009 in.), in 0.006 mm (0.0002 in.) increments, depending on the size of its big end bore. It's then stamped with a number or bar (1, 2, 3 or 4/1, 11, 111, or 1111) 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 on the rod.)

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

Normal Bore Size: 51.0 mm (2.01 in.)



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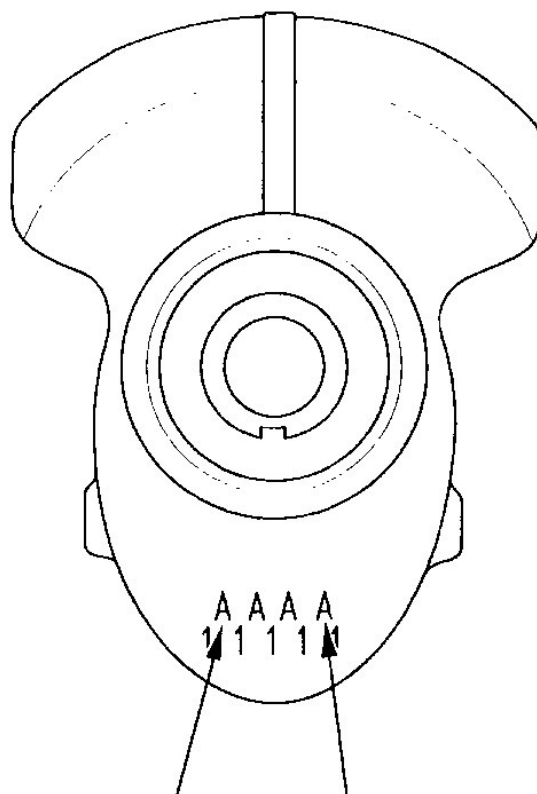
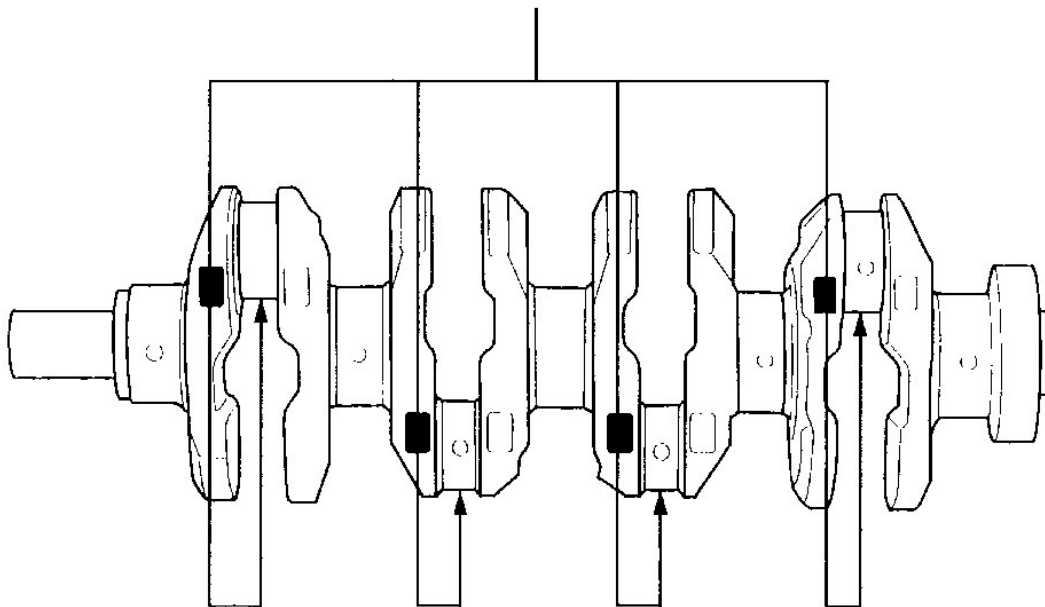
Fig. 180: Identifying Connecting Rod Big End Bore Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Location

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

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No. 1 JOURNAL No. 4 JOURNAL

G01473626

Fig. 181: Identifying Connecting Rod Journal Code Location (Letters or Bars)
 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.

NOTE:

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

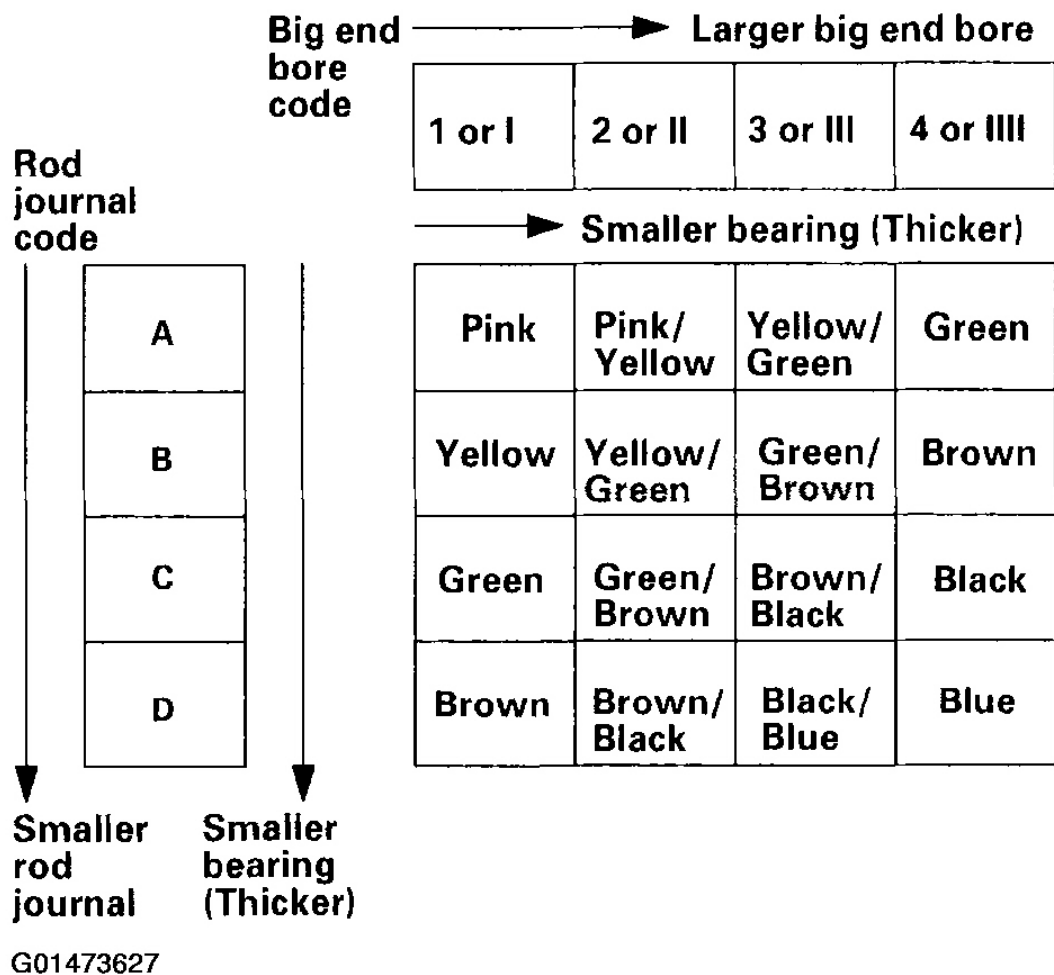
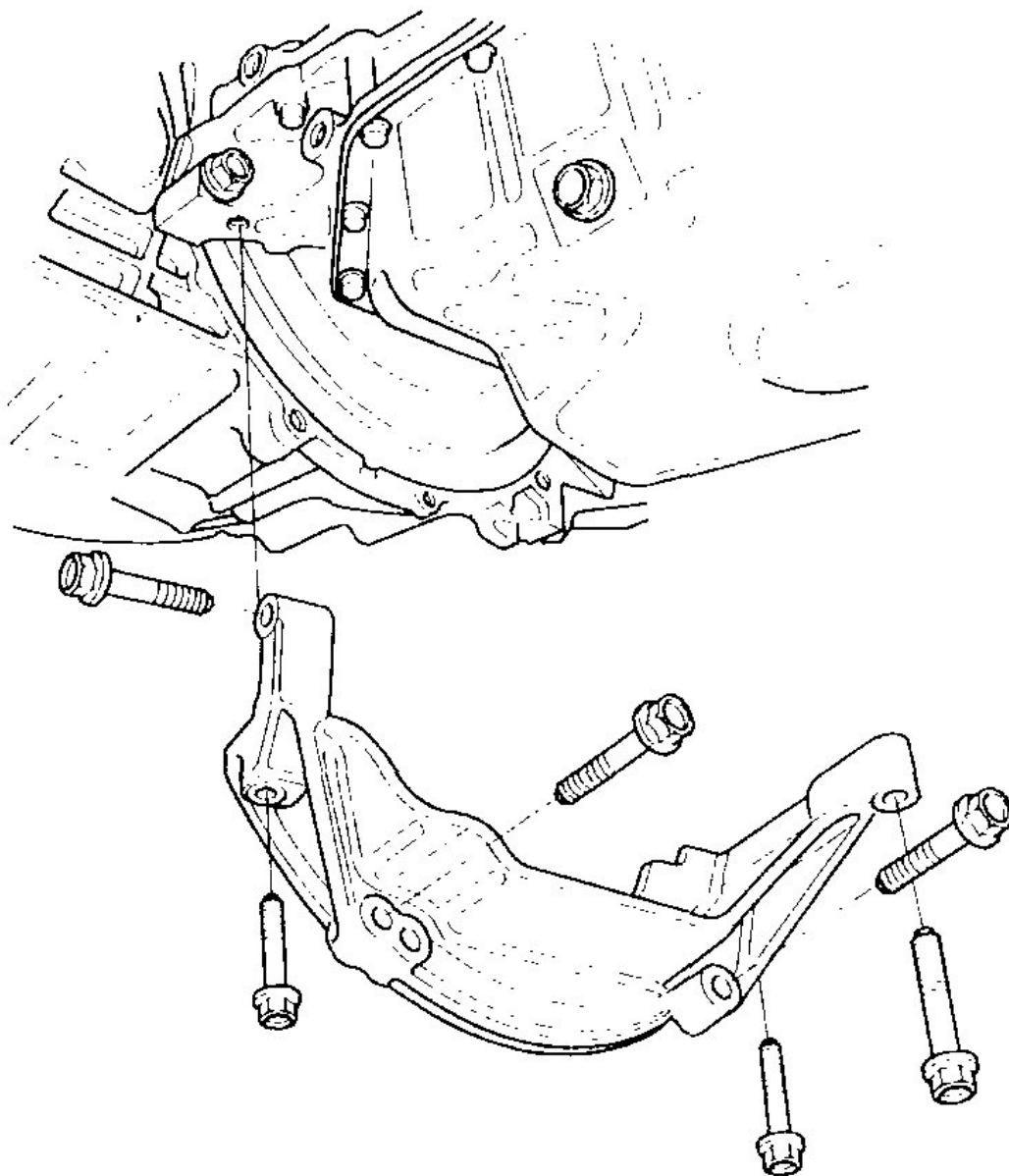


Fig. 182: Identifying Big End Bore Codes & Rod Journal Codes Replacement Chart
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

1. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
2. If the engine is still in the vehicle, remove the subframe.
 1. Attach the chain hoist to the engine (see step 37 on).
 2. Disconnect the suspension lower arm ball joints (see **KNUCKLE/HUB ASSEMBLY**).
 3. Remove the rear mount mounting bolts (see step 41 on).
 4. Remove the front mount mounting bolt (see step 42 on).
 5. Remove the ATF filter mounting bolt (A/T) (see step 33 on).
 6. Make the appropriate reference lines at positions A and B that line up with the center of the subframe mounting bolts (see step 43 on).
 7. Attach the special tool to the subframe, then attach the jack to the special tool (see step 44 on).
 8. Remove the front subframe mounting bolts, then remove the subframe (see step 46 on).
3. Remove the stiffener (M/T).

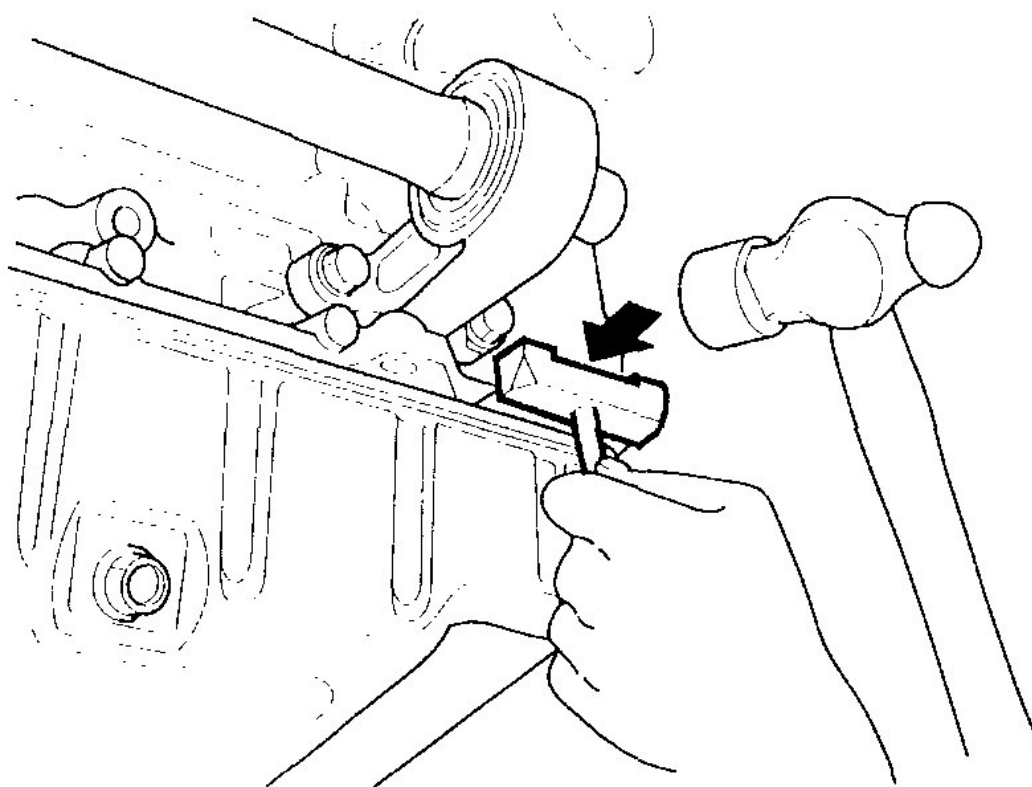


G01473628

Fig. 183: Removing Stiffener (M/T)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

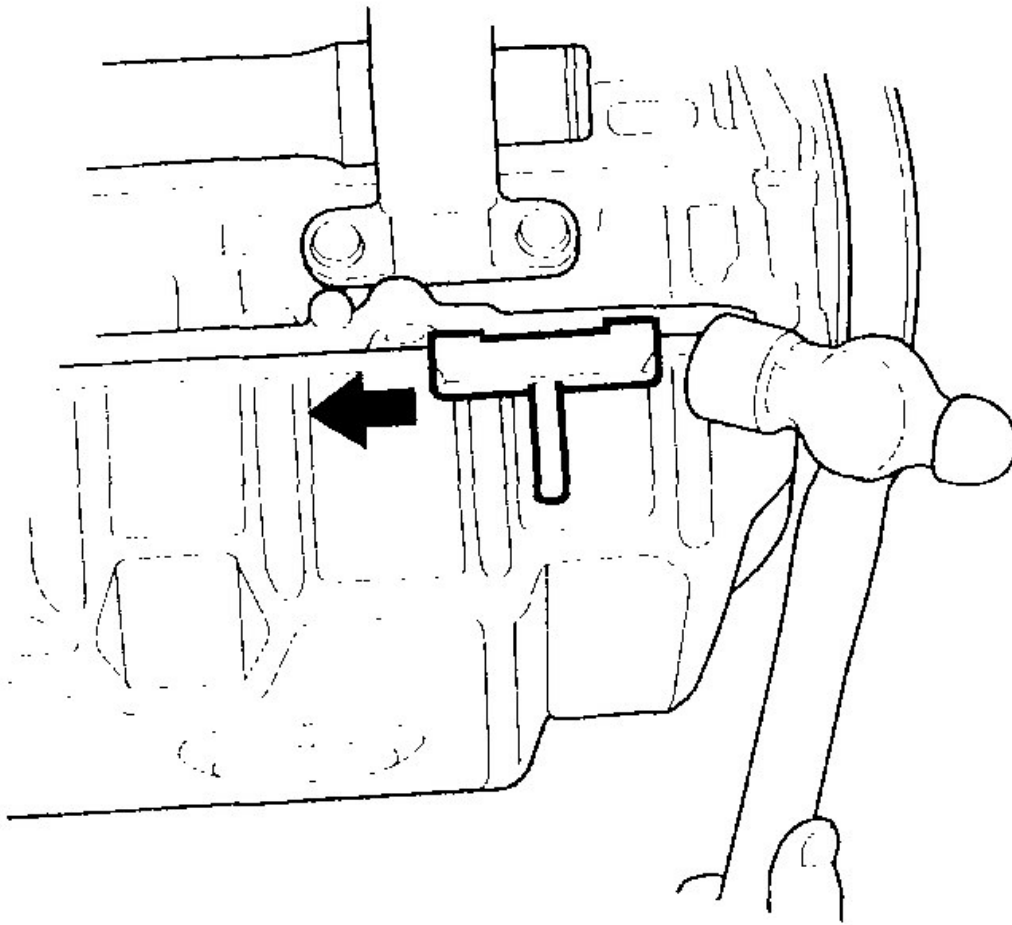
4. Remove the bolts/nuts securing the oil pan.
5. Drive an oil pan seal cutter between the oil pan and cylinder block.



G01473629

Fig. 184: Driving An Oil Pan Seal Cutter Between Oil Pan & Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Cut the oil pan seal by striking the side of the cutter to slide the cutter along the oil pan.



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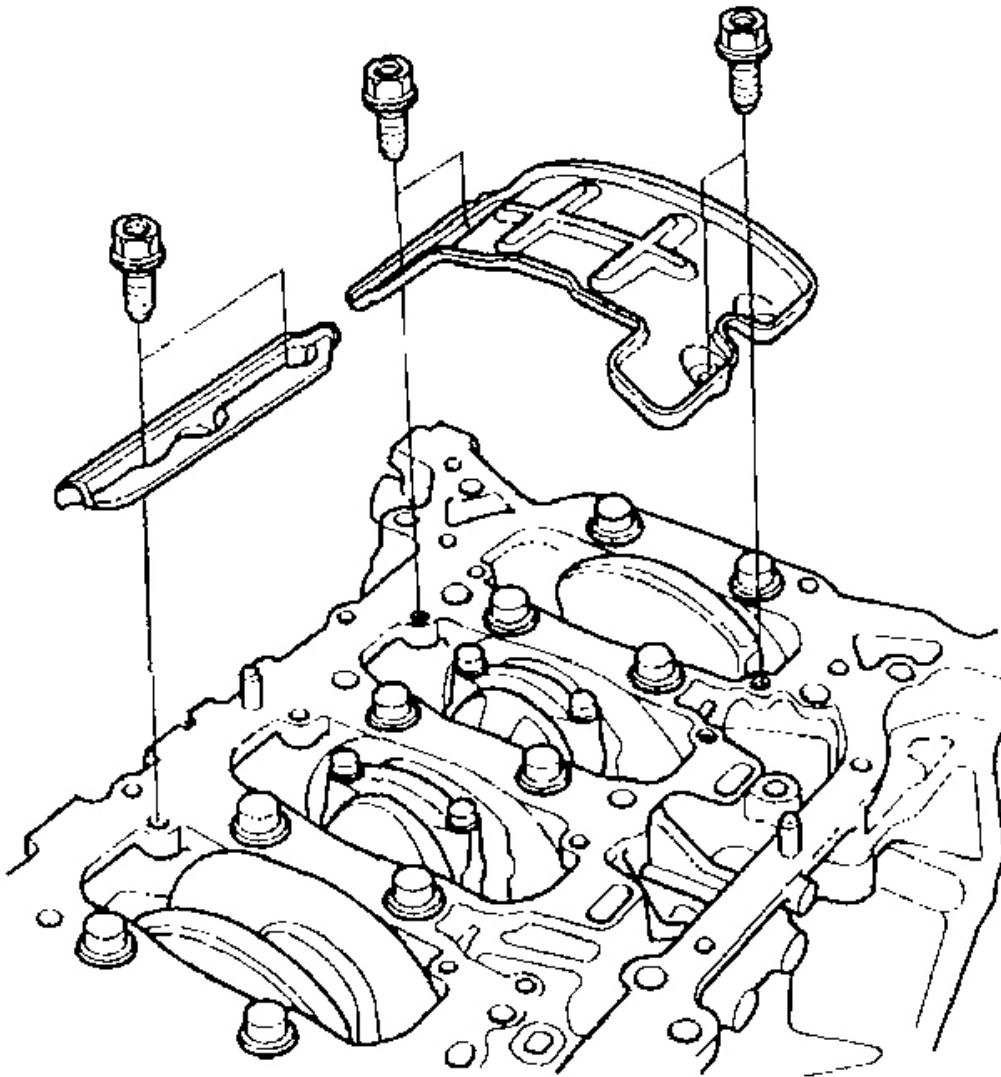
Fig. 185: Cutting Oil Pan Seal By Striking Side Of Cutter To Slide Cutter Along Oil Pan
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the oil pan.

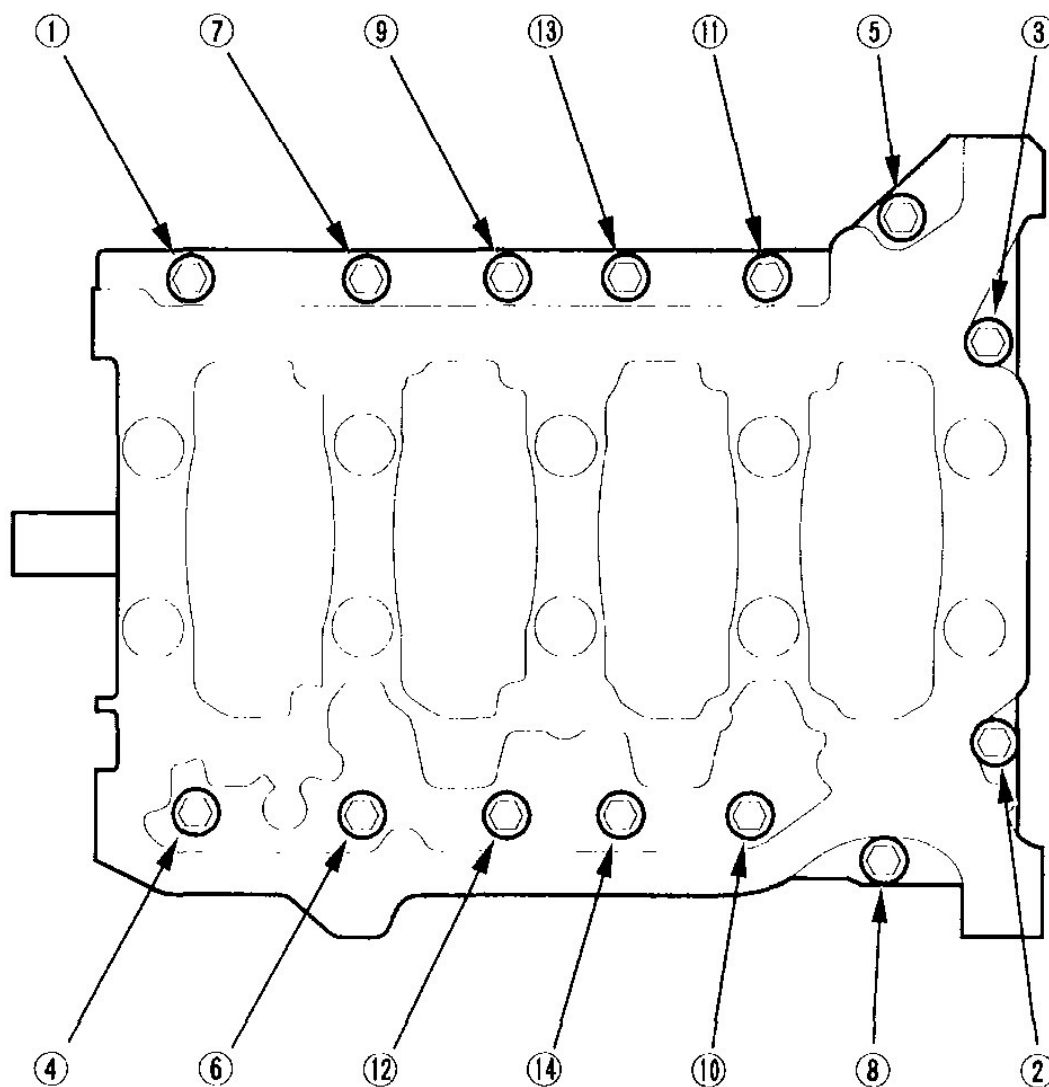
CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine assembly (see Engine Assembly).
2. Remove the transmission:
 - Manual transmission (see TRANSMISSION REMOVAL).
 - Automatic transmission (see TRANSMISSION REMOVAL)
3. Remove the oil pan (see Oil Pan Removal).

4. Remove the oil pump (see **OIL PUMP OVERHAUL**).
5. Remove the cylinder head (see **Cylinder Head Removal**).
6. Remove the baffle plates.

**G01473631****Fig. 186: Removing Baffle Plates****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

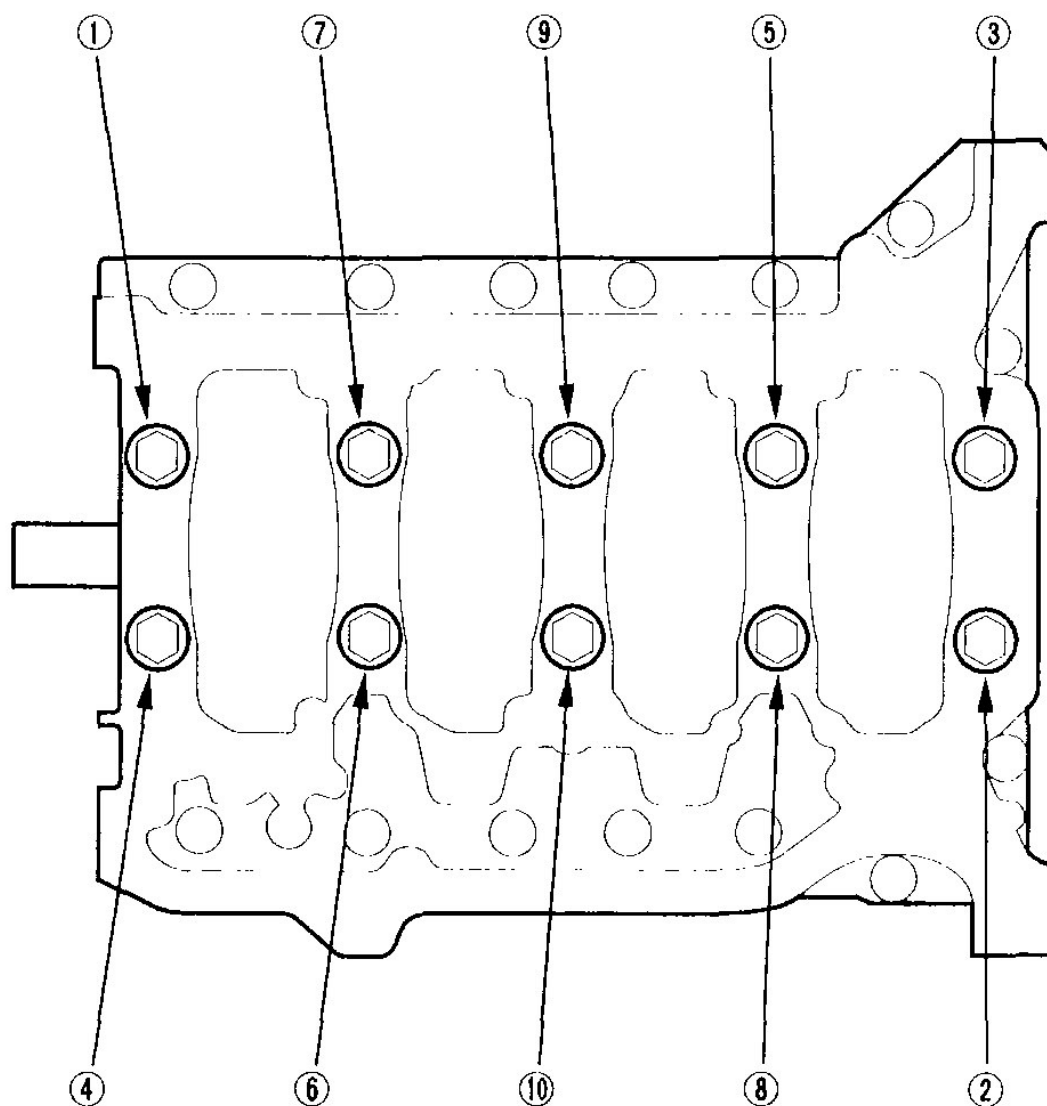
7. Remove the 8 mm bolts in the criss-cross pattern shown.



G01473632

Fig. 187: Removing 8 mm Bolts In Criss-cross Pattern
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

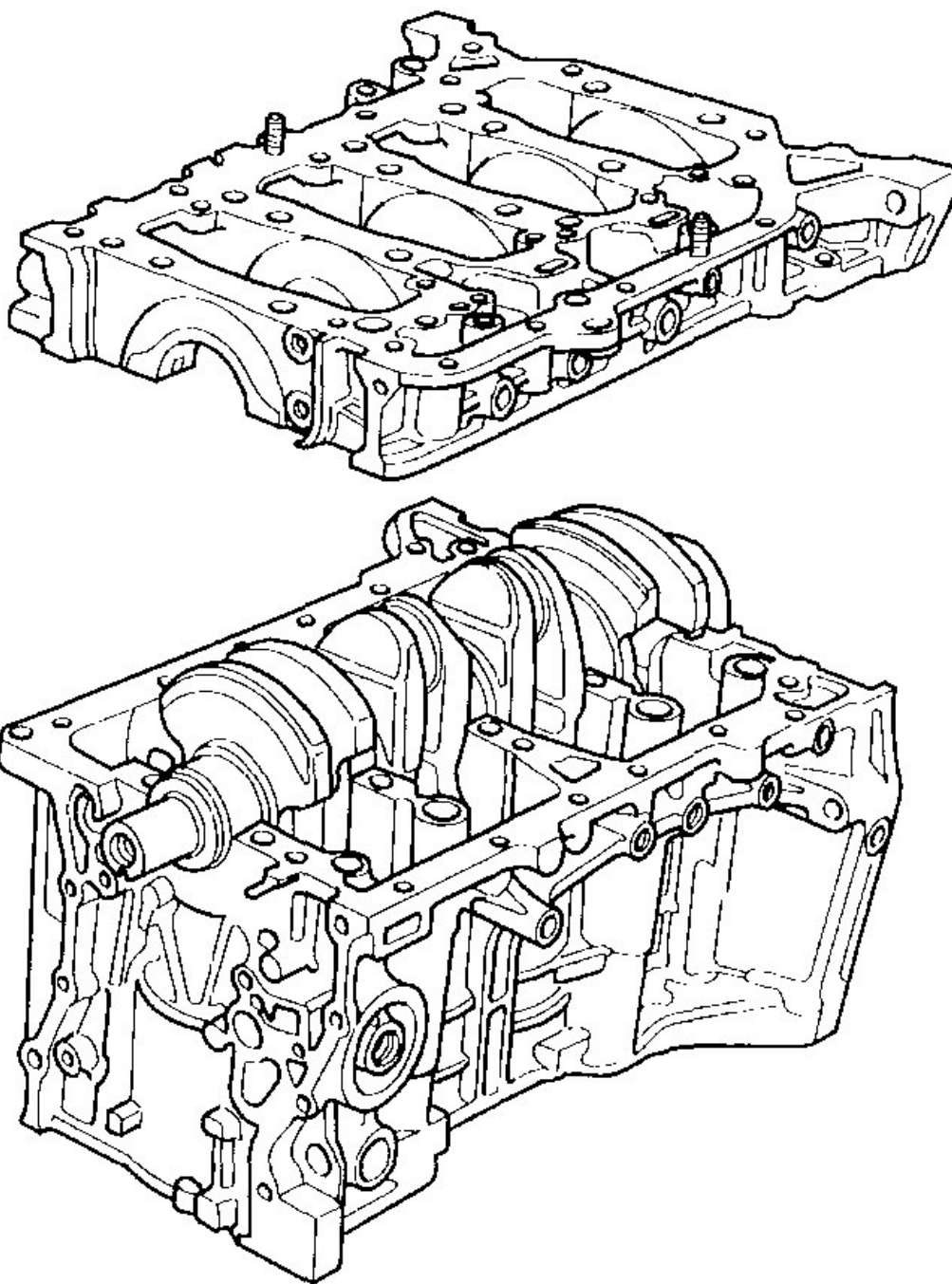


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Fig. 188: Removing Bearing Cap Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



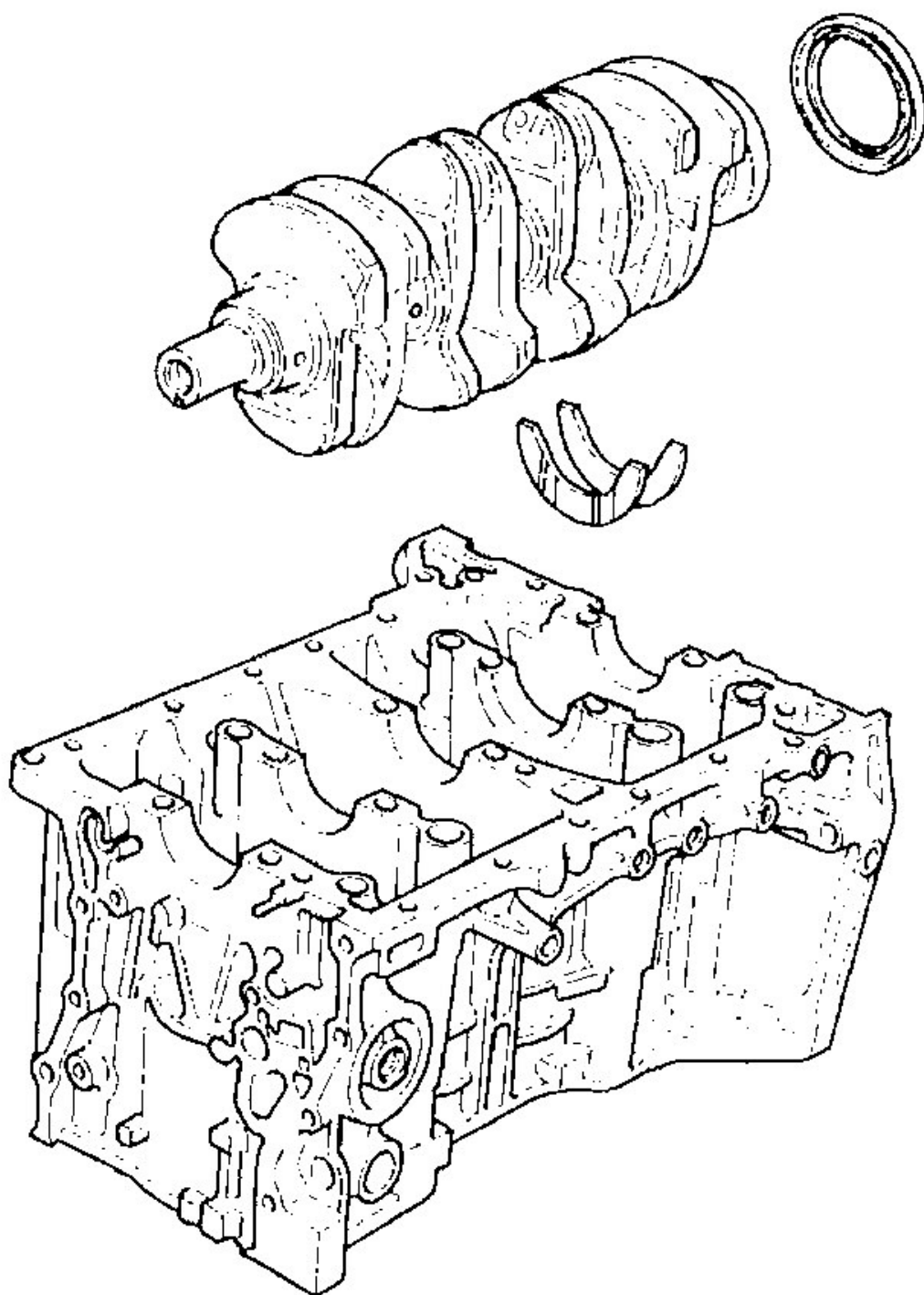
G01473634

Fig. 189: Removing Lower Block & Bearings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V

10. Remove the rod caps/bearings. Keep all caps/bearings in order.
11. Lift the crankshaft out of the engine, being careful not to damage the journals.

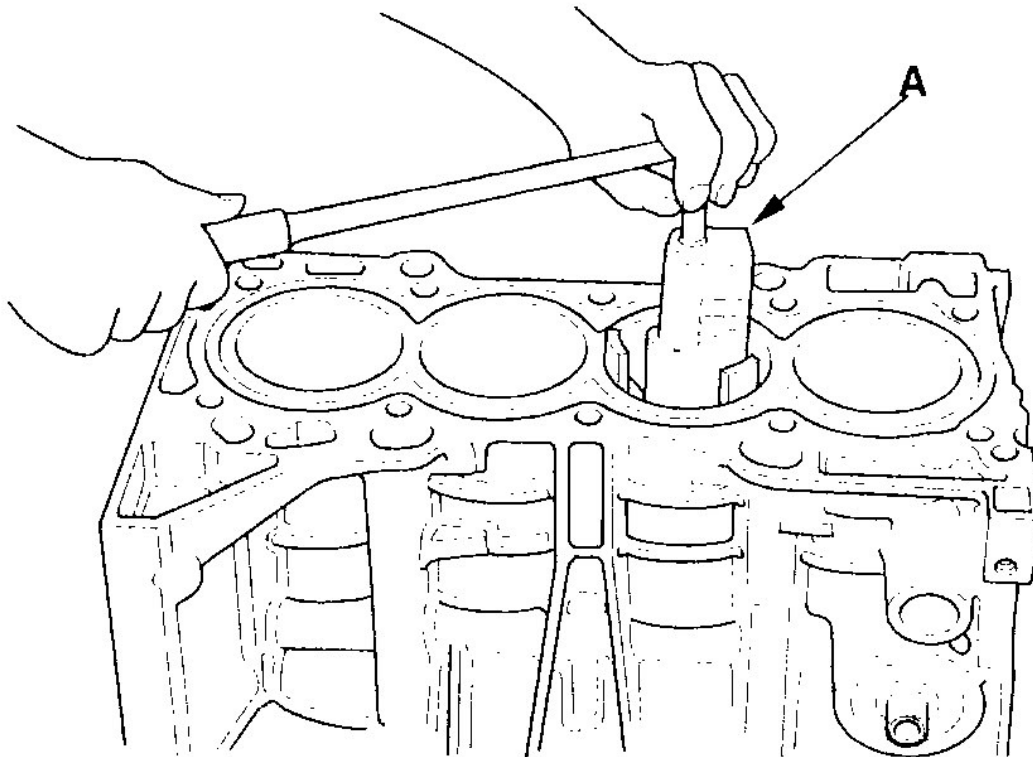


G01473635

Fig. 190: Lifting Crankshaft Out Of Engine

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

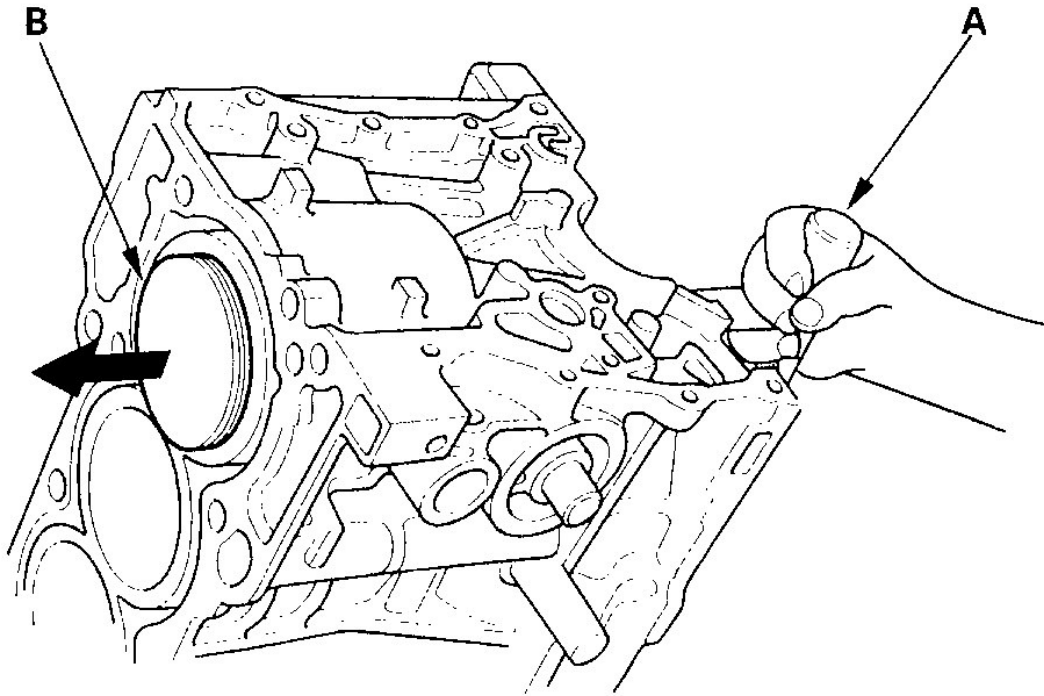


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Fig. 191: Remove Ridge With A Ridge Reamer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Use the wooden handle of a hammer (A) to drive out the pistons (B).



G01473637

Fig. 192: Driving Out Pistons By Using Wooden Handle Of A Hammer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Reinstall the lower block and bearings on the engine in the proper order.
16. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
17. To avoid mixup on reassembly, mark each piston/ connecting rod assembly with its cylinder number.

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 cylinder block (see Crankshaft and Piston Removal).
2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Clean the keyway and threads.
4. Measure out-of round at the middle of each rod and main journal in two places. The difference between measurements on each journal must not be more than the service limit.

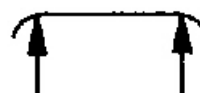
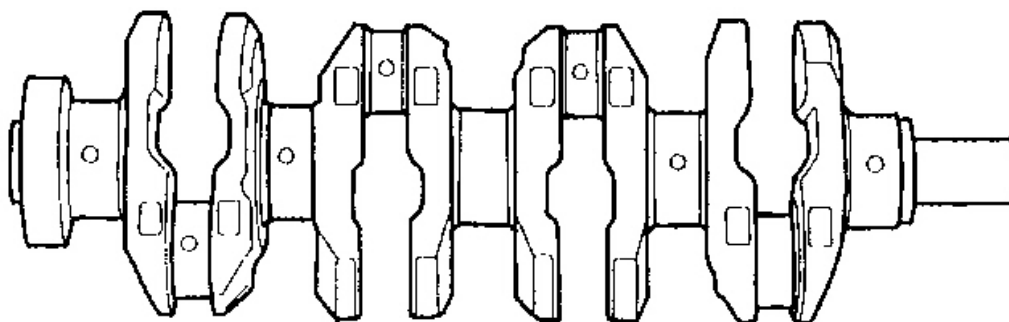
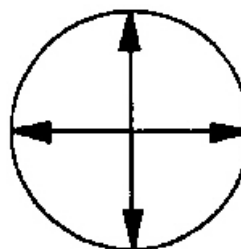
Journal Out-of-Round

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

Service Limit: 0.010 mm (0.0004 in.)

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G01473638

Fig. 193: Measuring Out-Of Round At Middle Of Each Rod & Main Journal In Two Places
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Journal Taper

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

Service Limit: 0.010 mm (0.0004 in.)

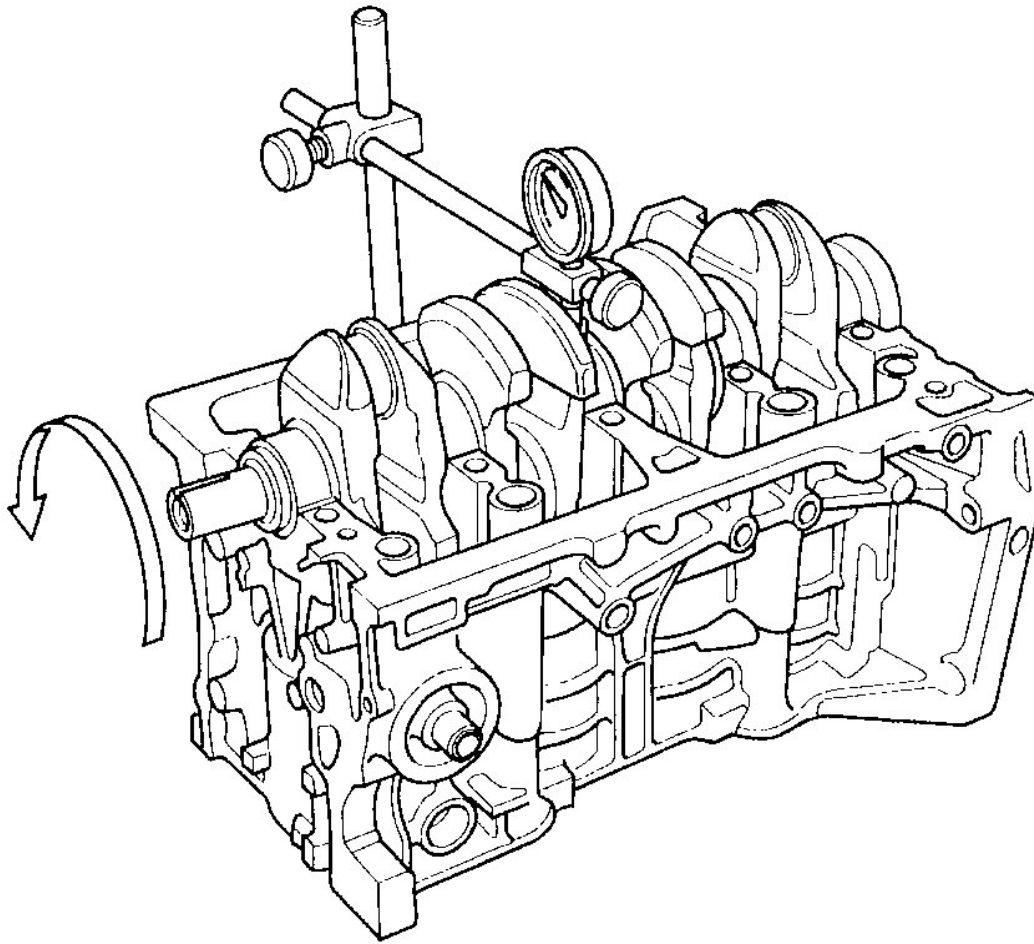
Straightness

6. Place the cylinder block on the surface plate.
7. Clean and install the bearings on the No. 1 and No. 5 journal of the cylinder block.
8. Lower the crankshaft into the block.
9. Measure runout on all main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in.)



G01473639

Fig. 194: Measuring Runout On All Main Journals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK AND PISTON INSPECTION

1. Remove the crankshaft and pistons (see **Crankshaft and Piston Removal**).
2. Check the piston for distortion or cracks.
3. Measure the piston diameter at a point 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 block as cylinder bore sizes.

Piston Diameter

Standard (New):

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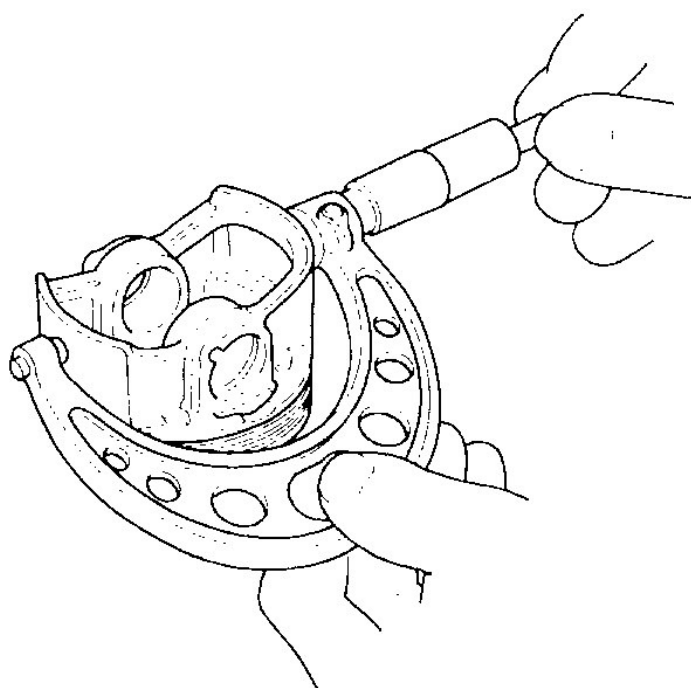
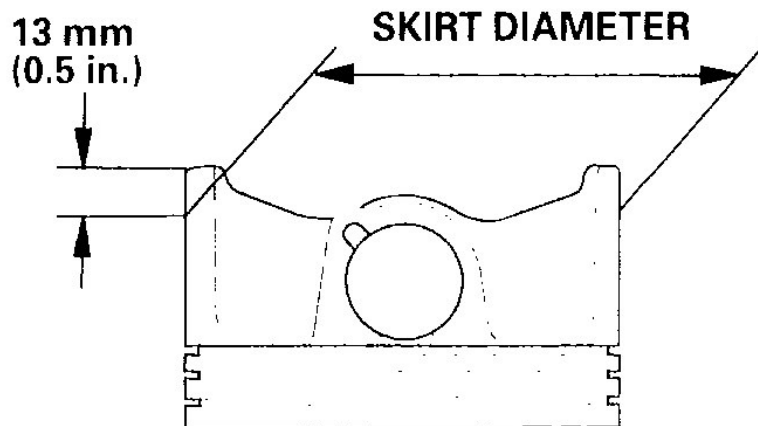
No Letter (or A): 86.980 - 86.990 mm (3.4244 3.4248 in.)

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

Service Limit:

No Letter (or A): 86.930 mm (3.4224 in.)

B: 86.920 mm (3.4220 in.)



G01473640

Fig. 195: Measuring Piston Diameter At A Point 13 mm From Bottom Of The Skirt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Oversize Piston Diameter

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

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

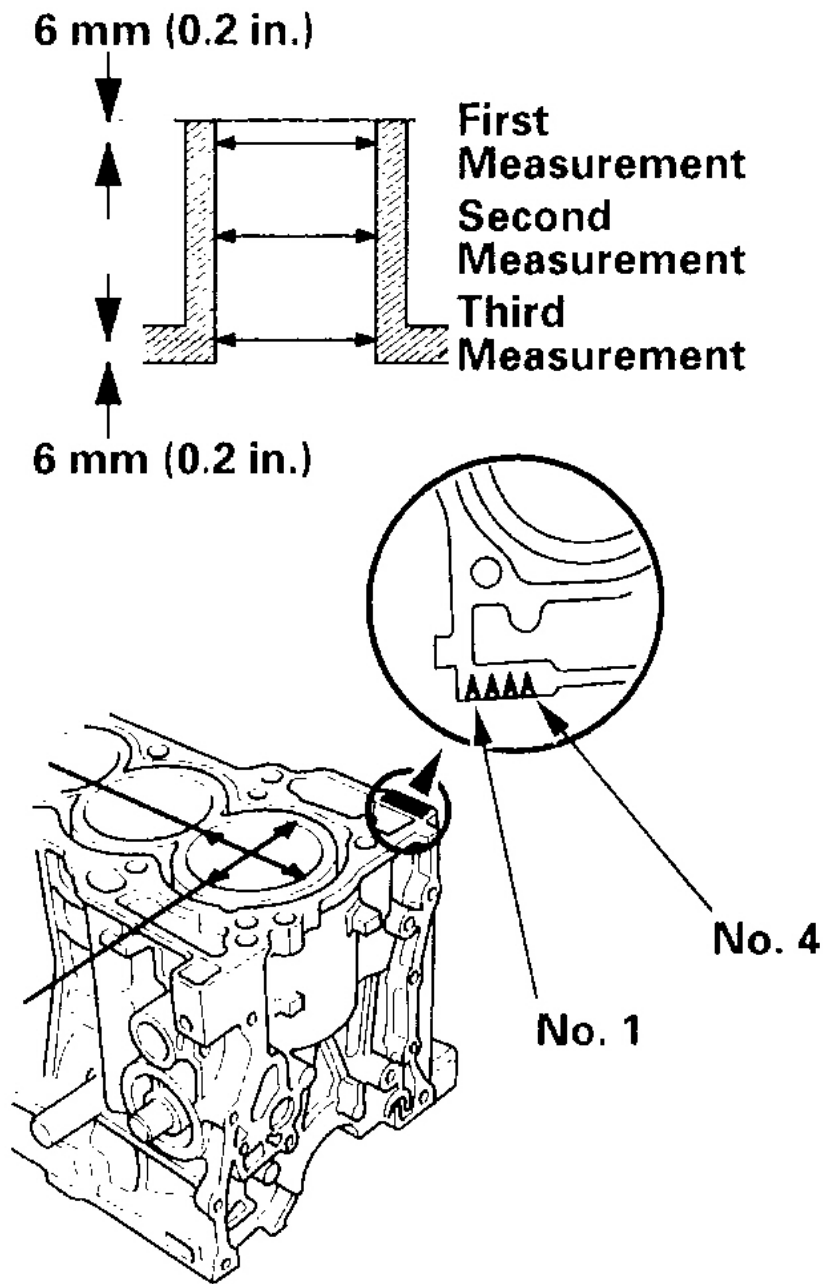
Oversize

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

Reboring limit: 0.25 mm (0.01 in.) max.

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in.)



G01473641

Fig. 196: Measuring Wear & Taper In Direction X & Y At Three Levels In Each Cylinder
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

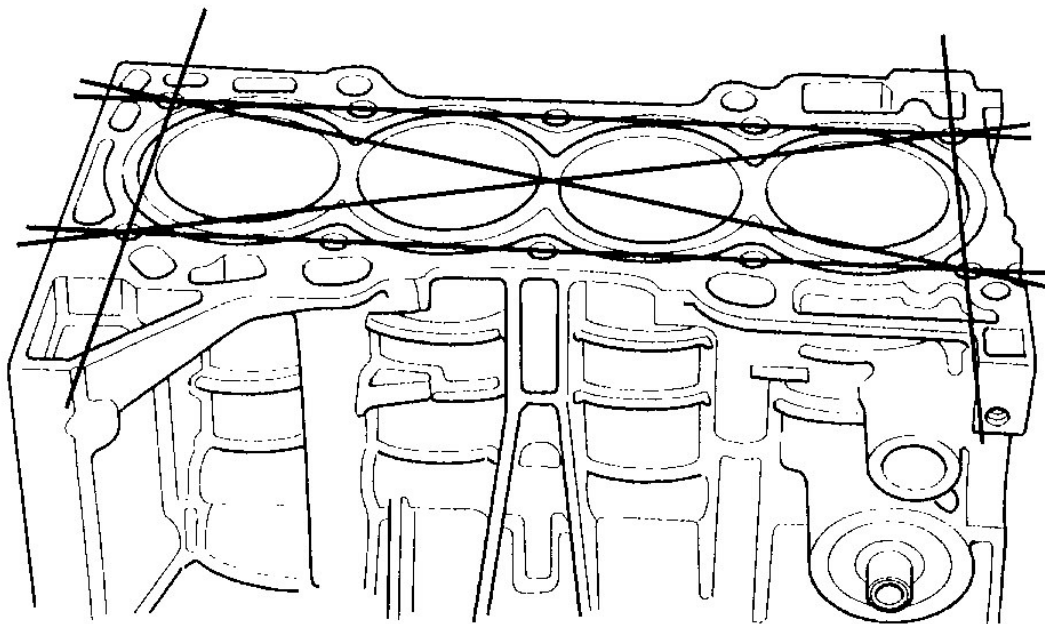
2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V

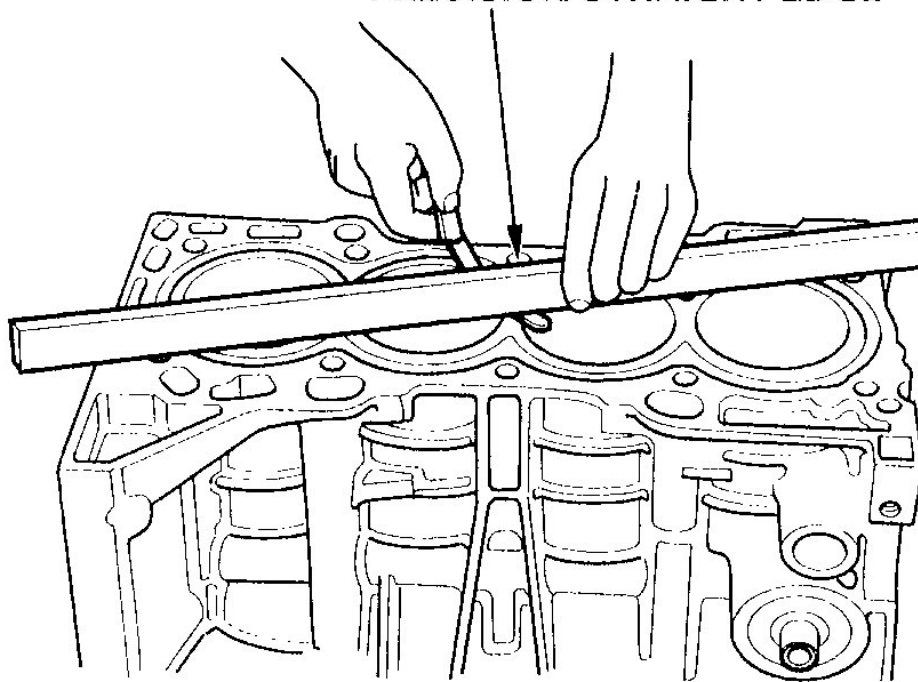
Engine Block Warpage

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

Service Limit: 0.10 mm (0.004 in.)



PRECISION STRAIGHT EDGE



G01473642

Fig. 197: Measuring Top Of Block Along Edges & Across Center
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 block for excessive wear.

Piston-to-Cylinder Clearance

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

Service Limit: 0.05 mm (0.002 in.)

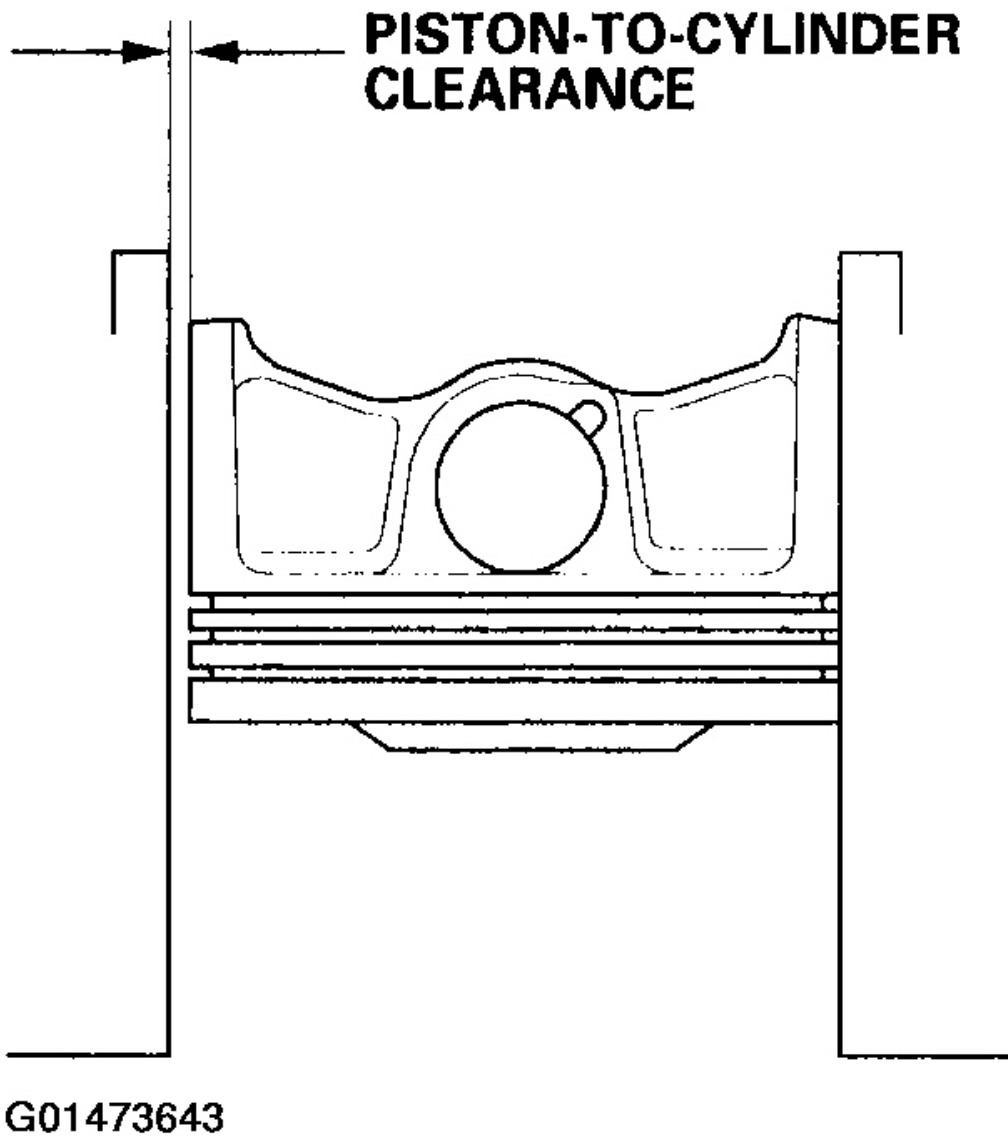


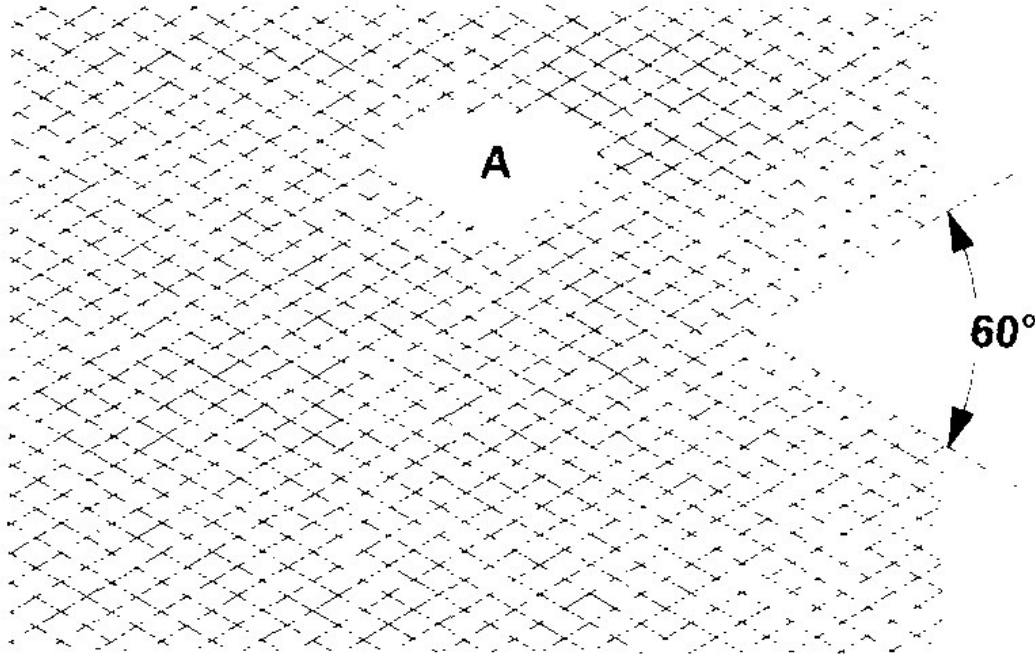
Fig. 198: Inspecting Piston & Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HONING

Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see **Block and Piston Inspection**). If the block is to be reused, hone the cylinders and remeasure the bores.

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



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Fig. 199: Identifying 60 Degree Cross-Hatch Pattern
Courtesy of AMERICAN HONDA MOTOR CO., INC.

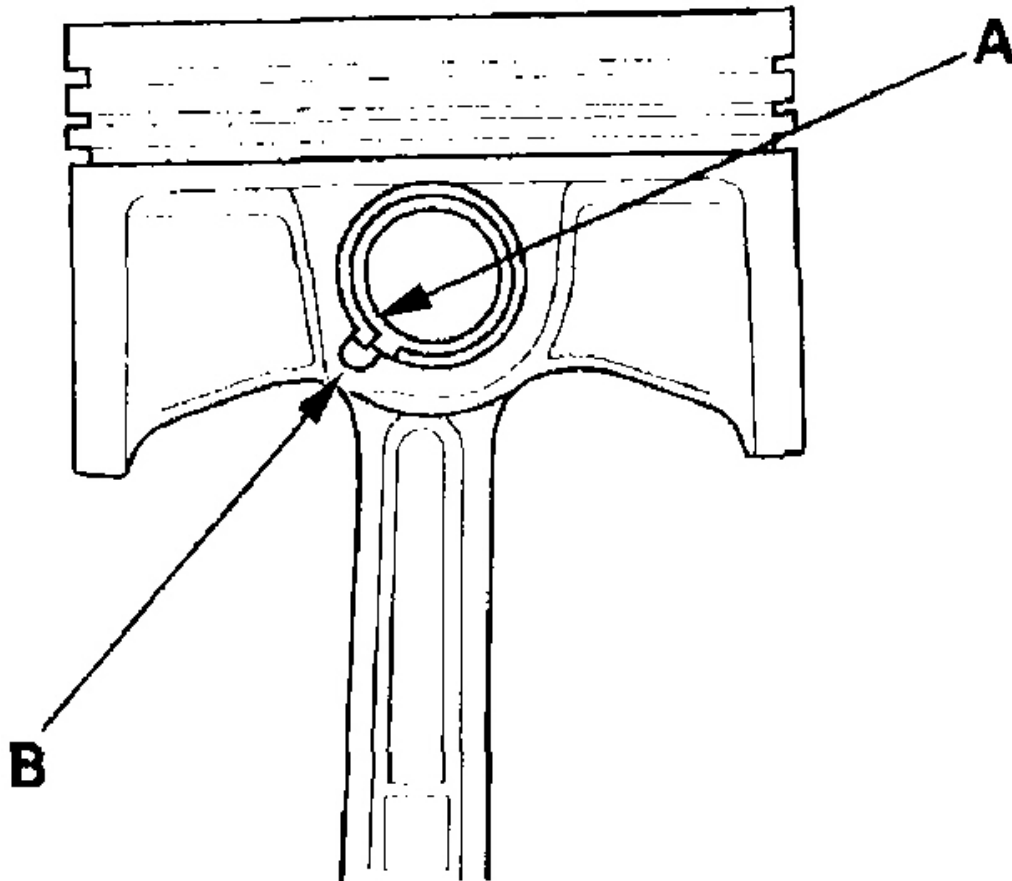
3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting. Never use solvent, it will only redistribute the grit on the cylinder walls.
4. If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the cylinder block. Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.

PISTON, PIN, AND CONNECTING ROD REPLACEMENT

Disassembly

1. Remove the piston from the cylinder 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).

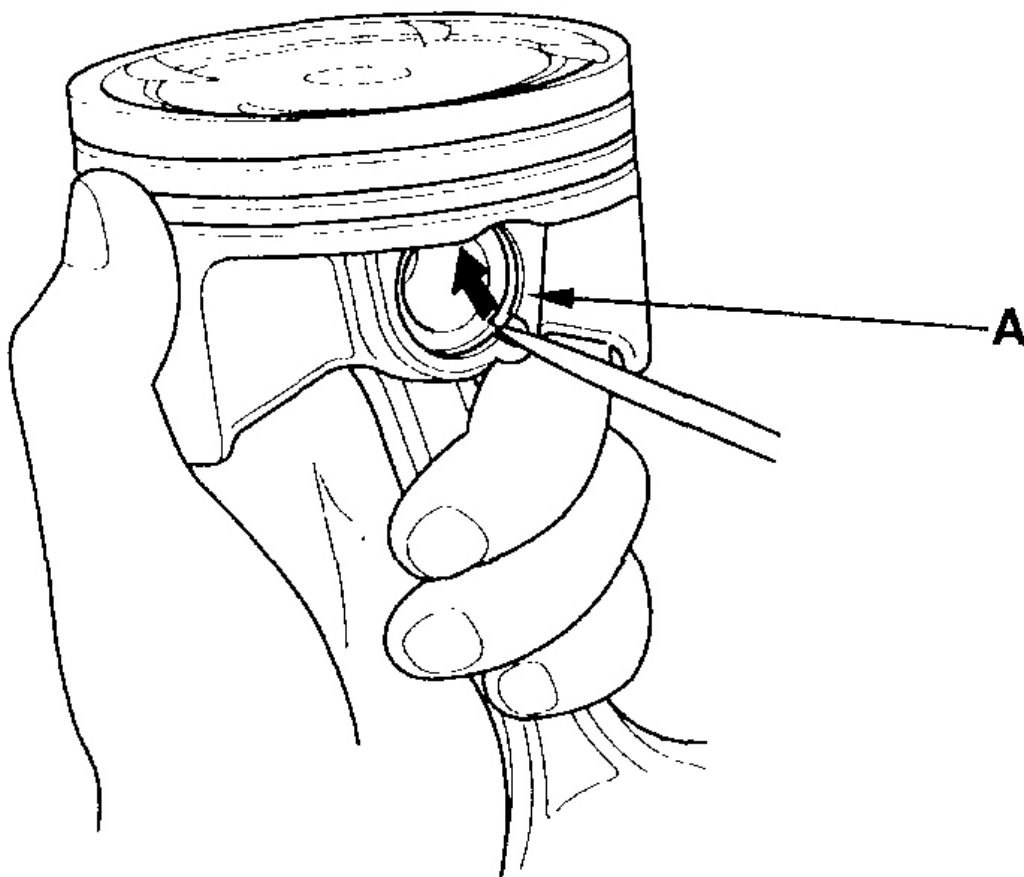
NOTE: Take care not to damage the ring grooves.



G01473645

Fig. 200: Applying New Engine Oil To Piston Pin Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

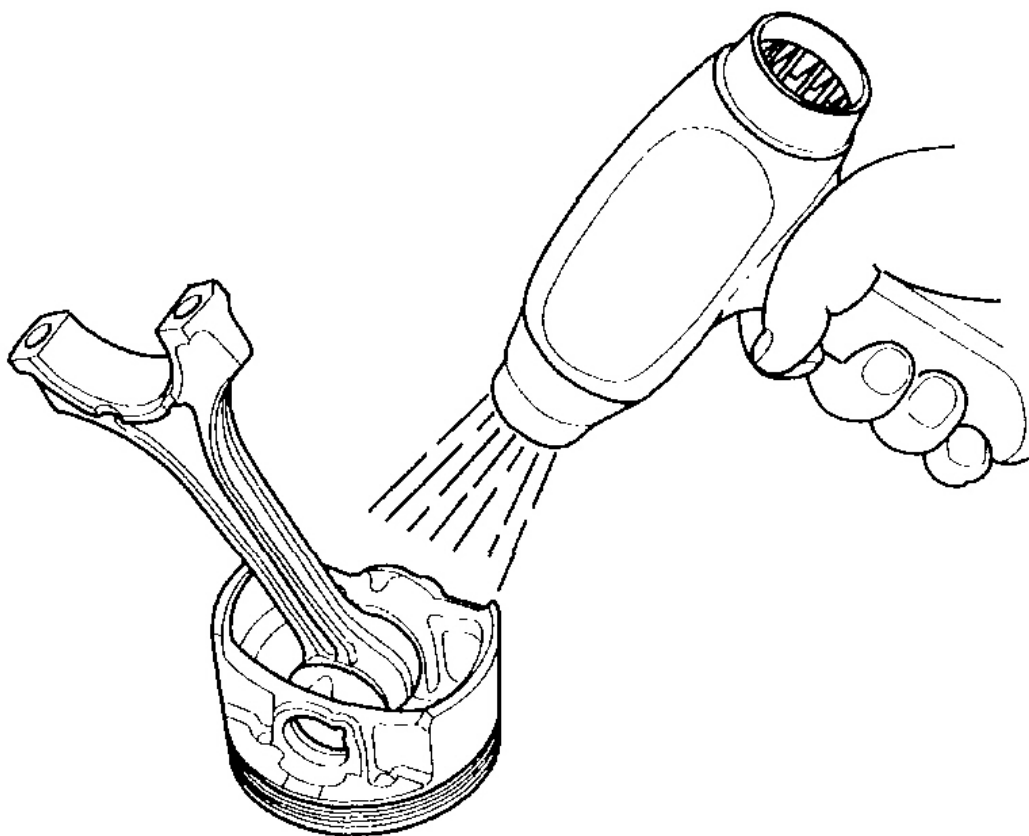


G01473646

Fig. 201: Removing Both Snap Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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Fig. 202: Removing Piston Pin

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection

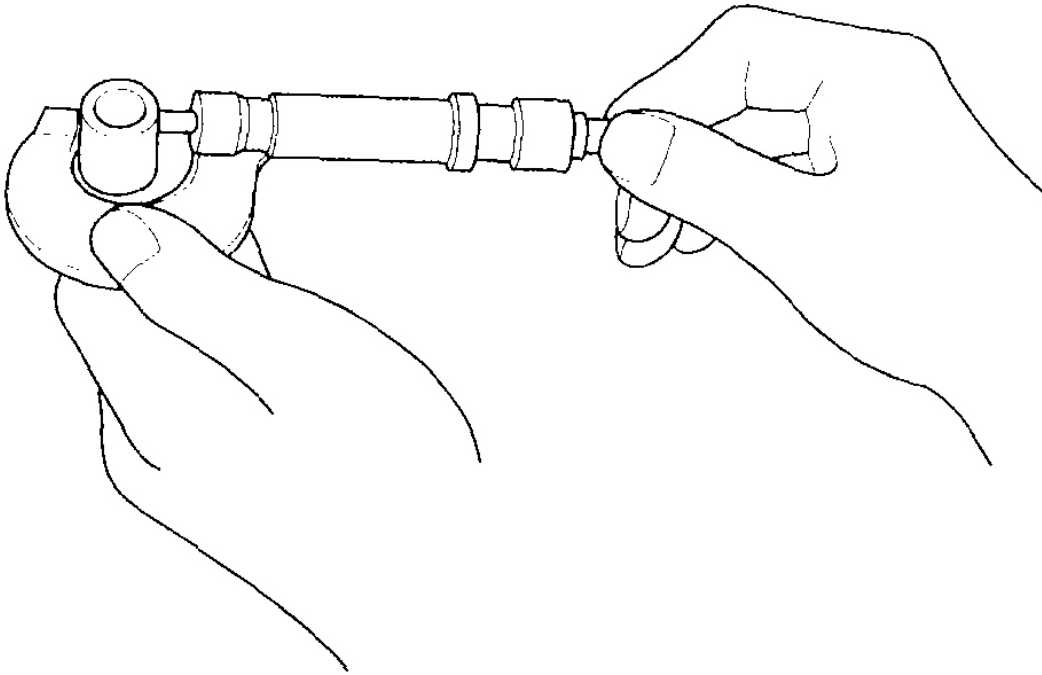
NOTE: Inspect the piston, piston pin, and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

Piston Pin Diameter

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

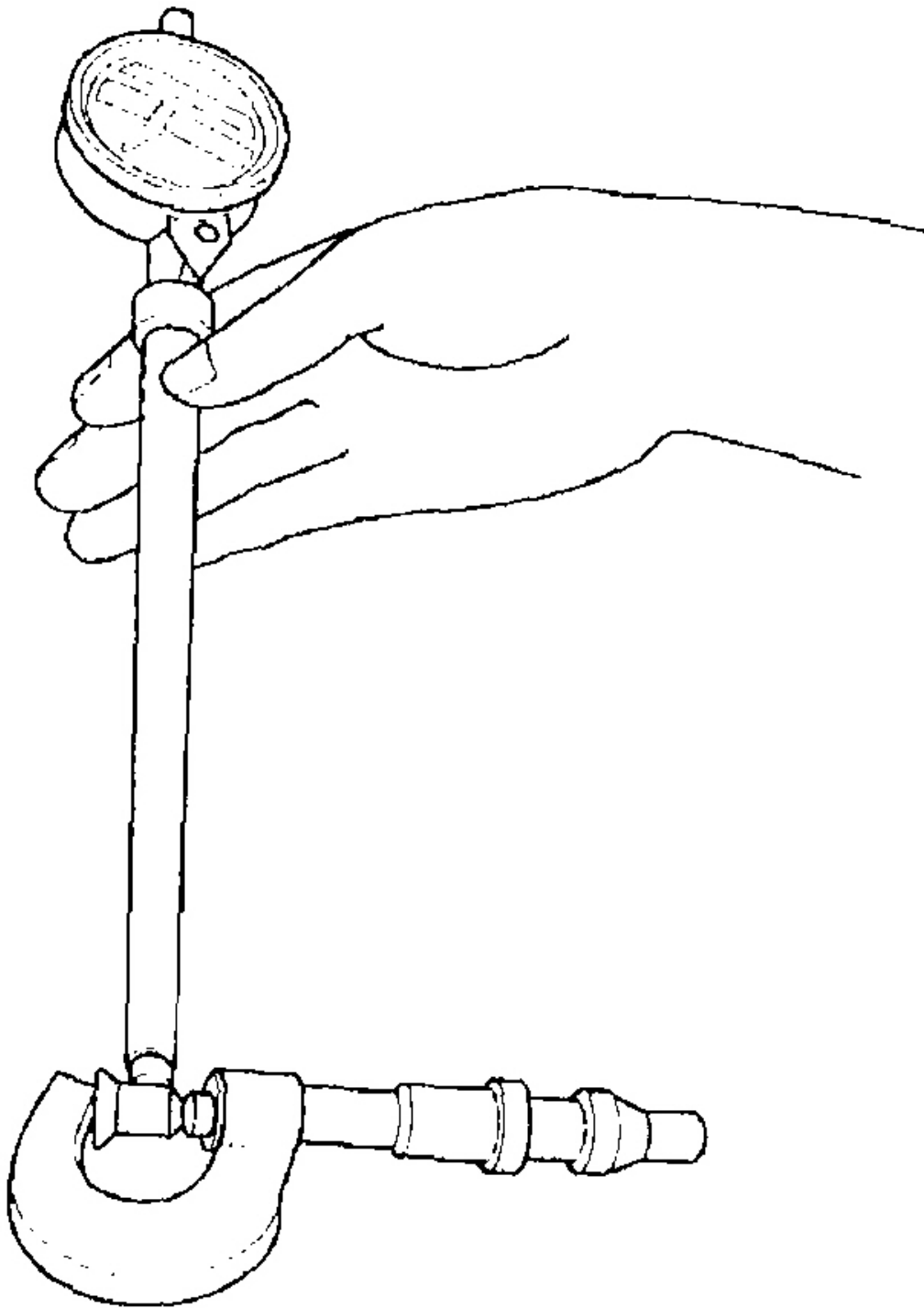
Service Limit: 21.953 mm (0.8643 in.)



G01473648

Fig. 203: Measuring Diameter Of Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

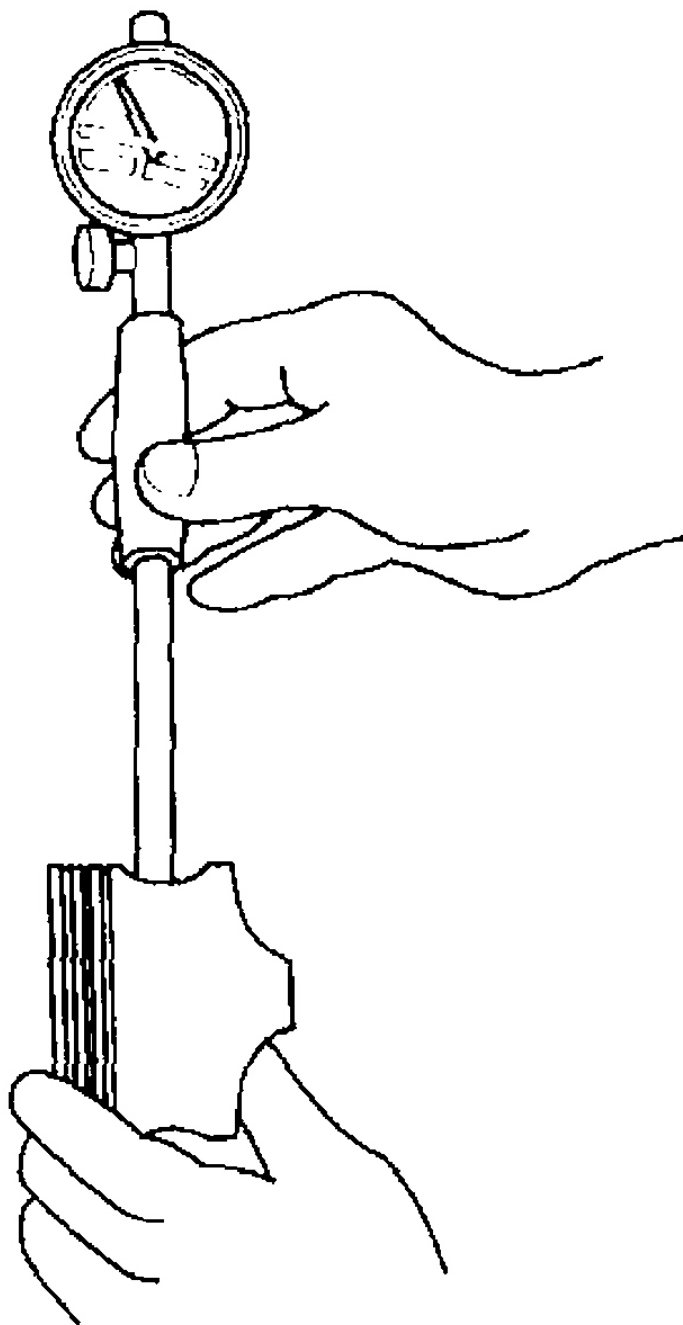


G01473649

Fig. 204: Identifying Zero Dial Indicator To Piston Pin Diameter**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

Piston-Pin-to-Piston Clearance**Standard (New):** - 0.005 to + 0.002 mm (0.00020 to + I 0.00008 in.)**Service Limit:** 0.005 mm (0.0002 in.)



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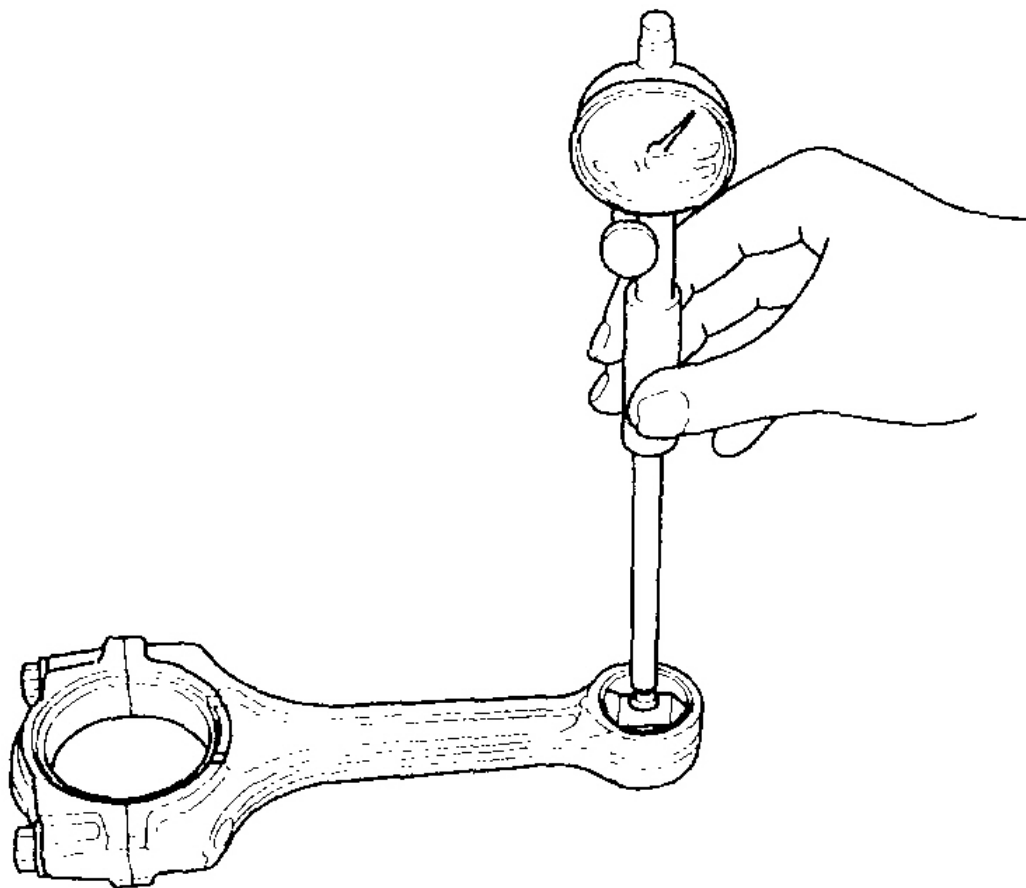
Fig. 205: Checking Difference Between Piston Pin Diameter & Piston Pin Hole Diameter In Piston
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-Pin-to-Connecting-Rod Clearance

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

Service Limit: 0.02 mm (0.0008 in.)

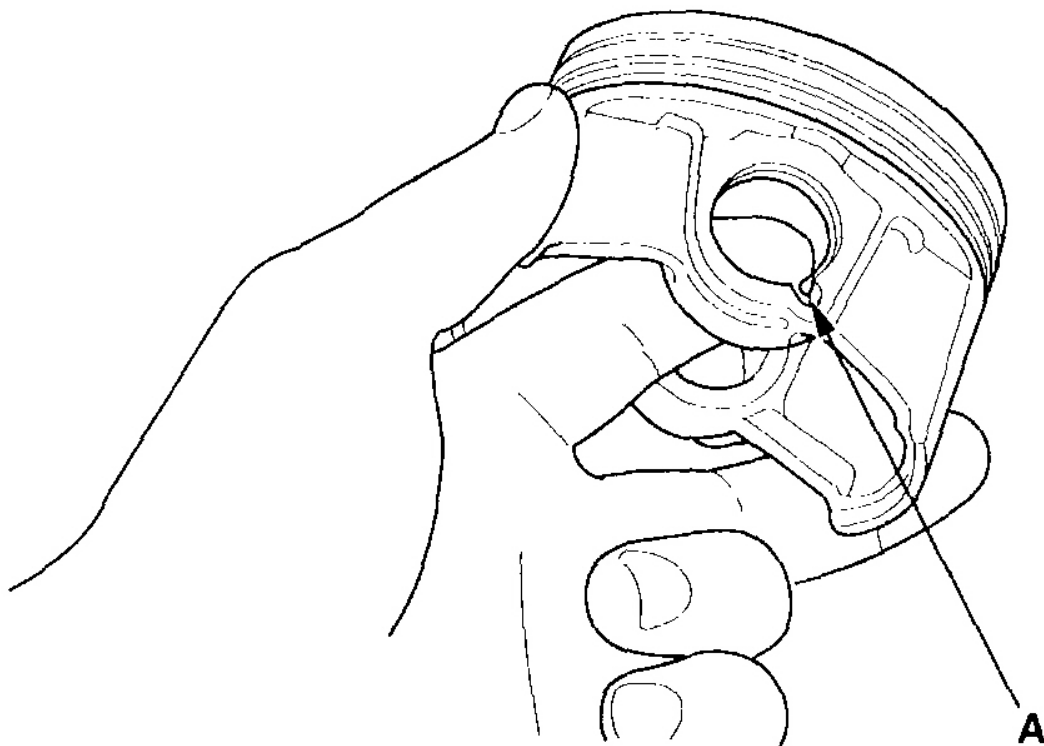


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Fig. 206: Measuring Piston-Pin-To-Connecting-Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Reassembly

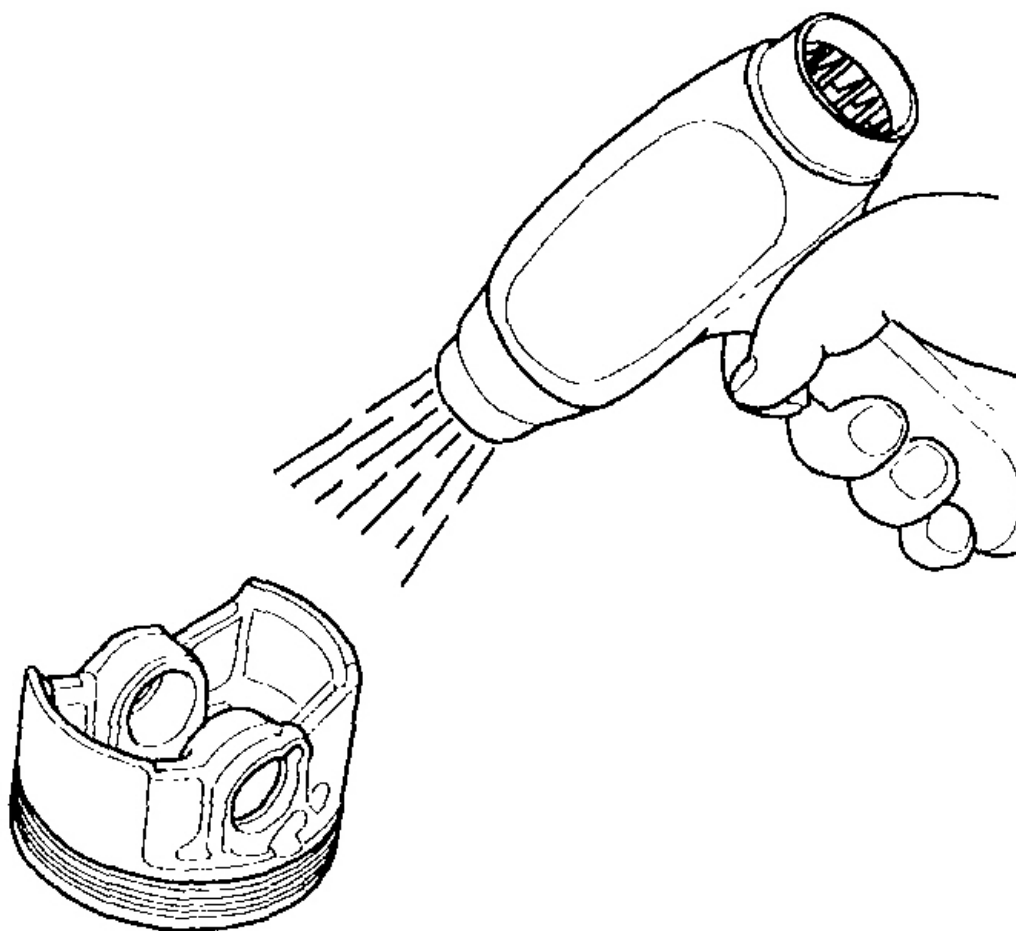
1. Install a piston pin snap ring (A).



G01473652

Fig. 207: Installing A 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 engine oil.
3. Heat the piston to about 158°F (70°C).

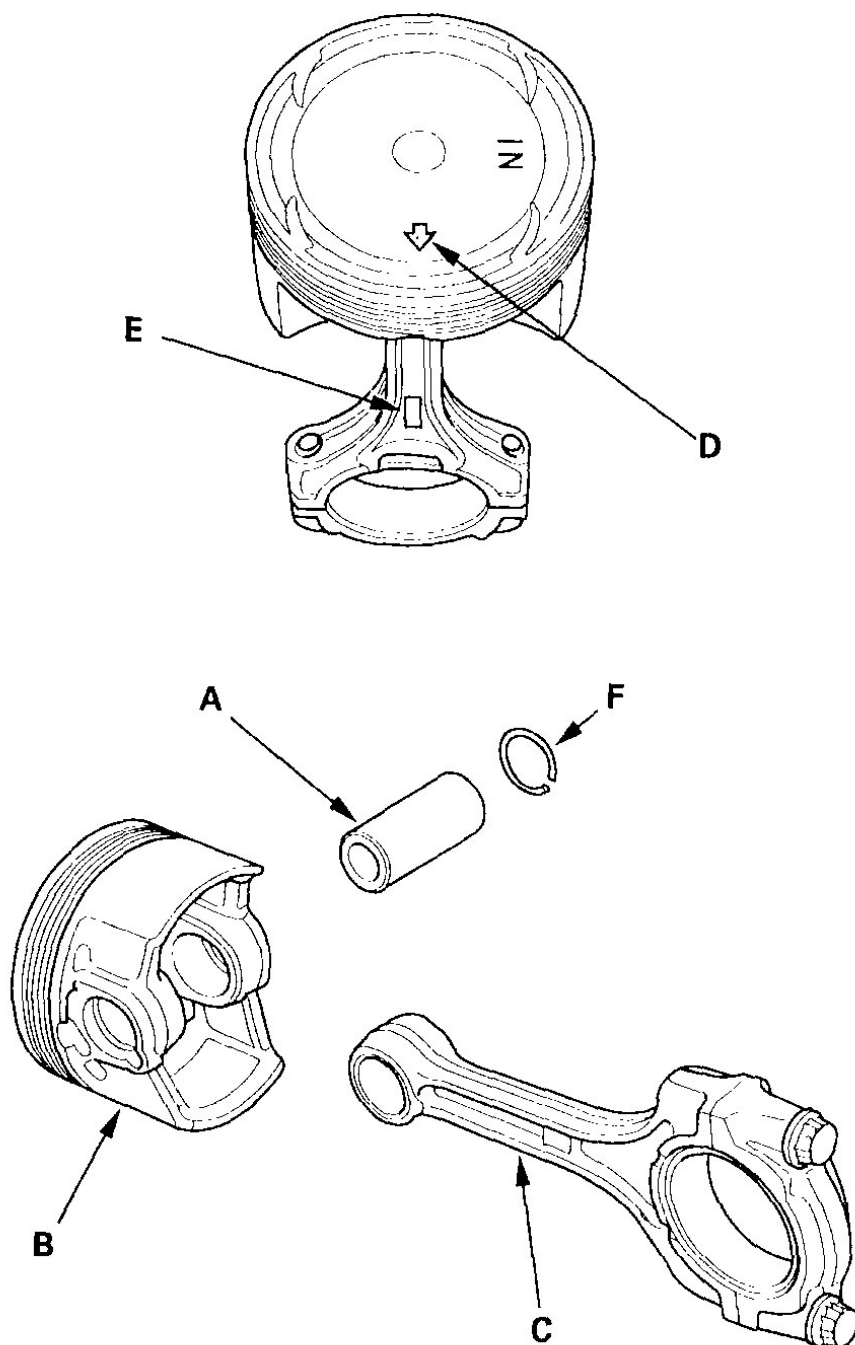


G01473653

Fig. 208: Heating Piston To About 158°F

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01473654

Fig. 209: Installing Piston Pin & Assembling Piston, Connecting Rod With Arrow & Embossed Mark

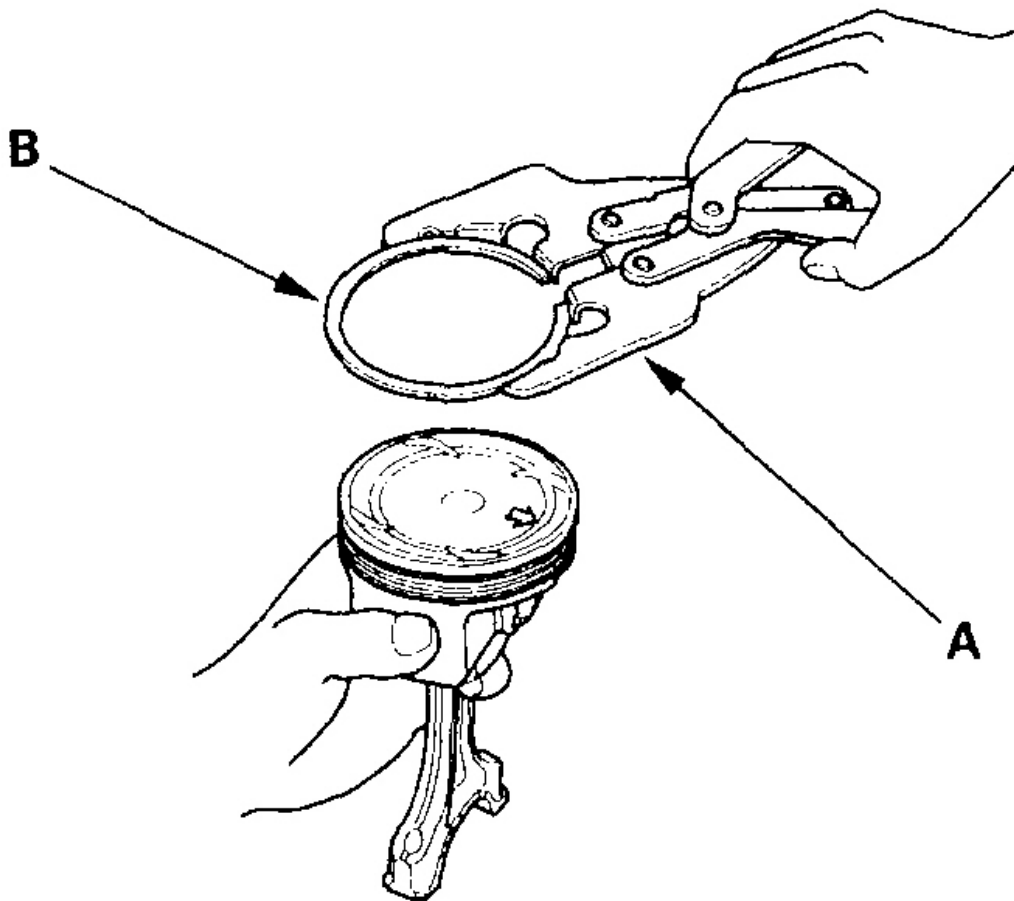
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 cylinder block (see **Crankshaft and Piston Removal**).
2. Using a ring expander (A), remove the old piston rings (8).



G01473655

Fig. 210: Removing Old Piston Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

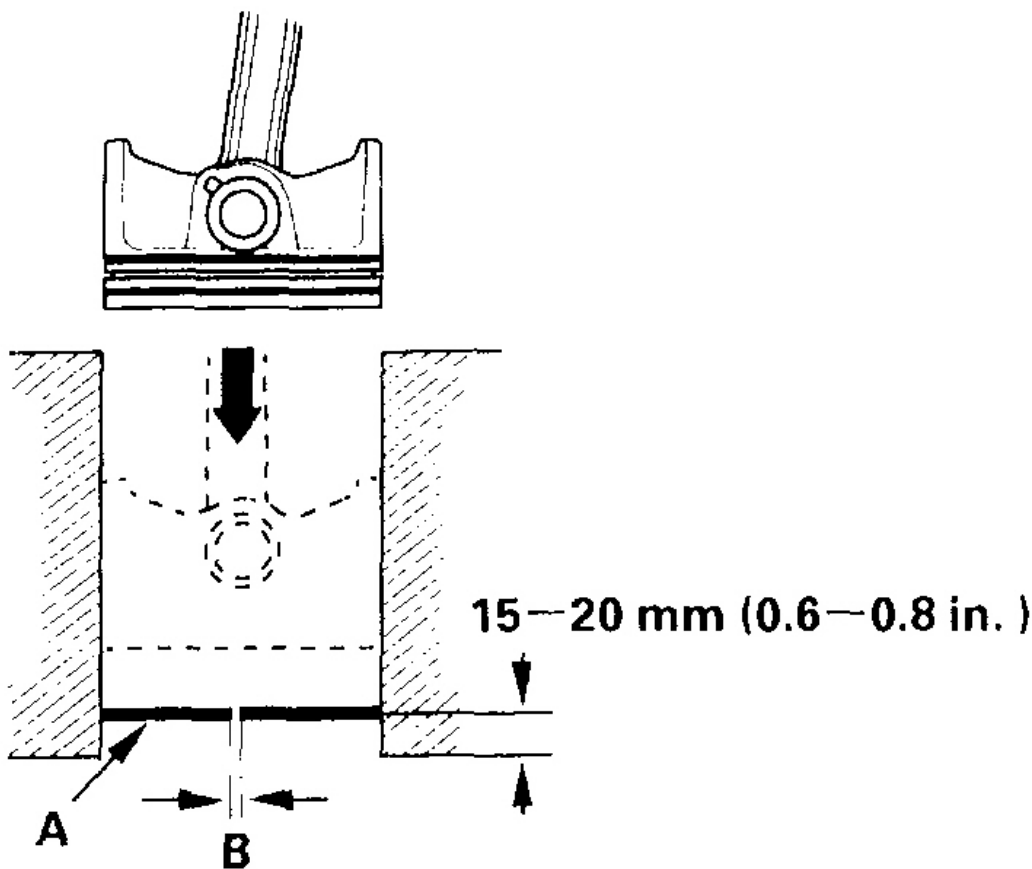
The top and 2nd ring grooves are 1.2 mm (0.05 in.) wide. The oil ring groove is 2.0 mm (0.08 in.) wide.

File down a blade if necessary.

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

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

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



G01473656

Fig. 211: Pushing A New Ring Into Cylinder Bore From The Bottom
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 page 7-15). If

the bore is over the service limit, the cylinder 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): 0.40 - 0.55 mm (0.016-0.022 in.)

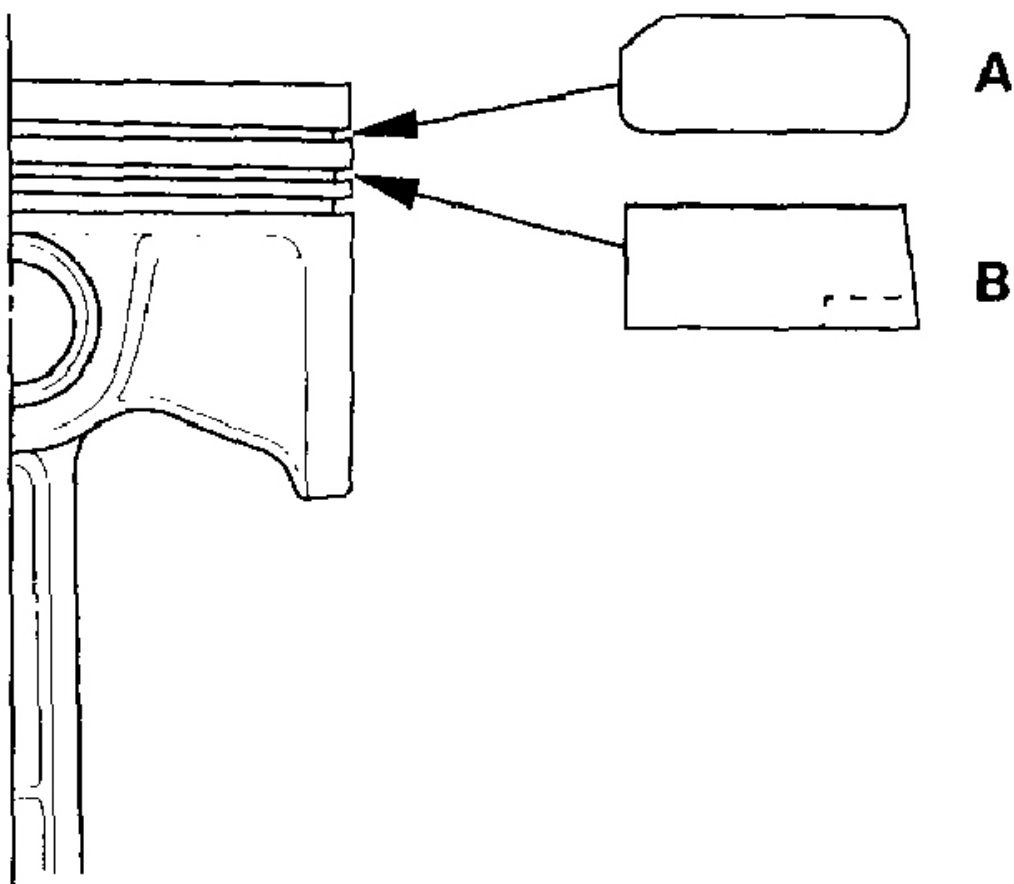
Service Limit: 0.70 mm (0.028 in.)

Oil Ring

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

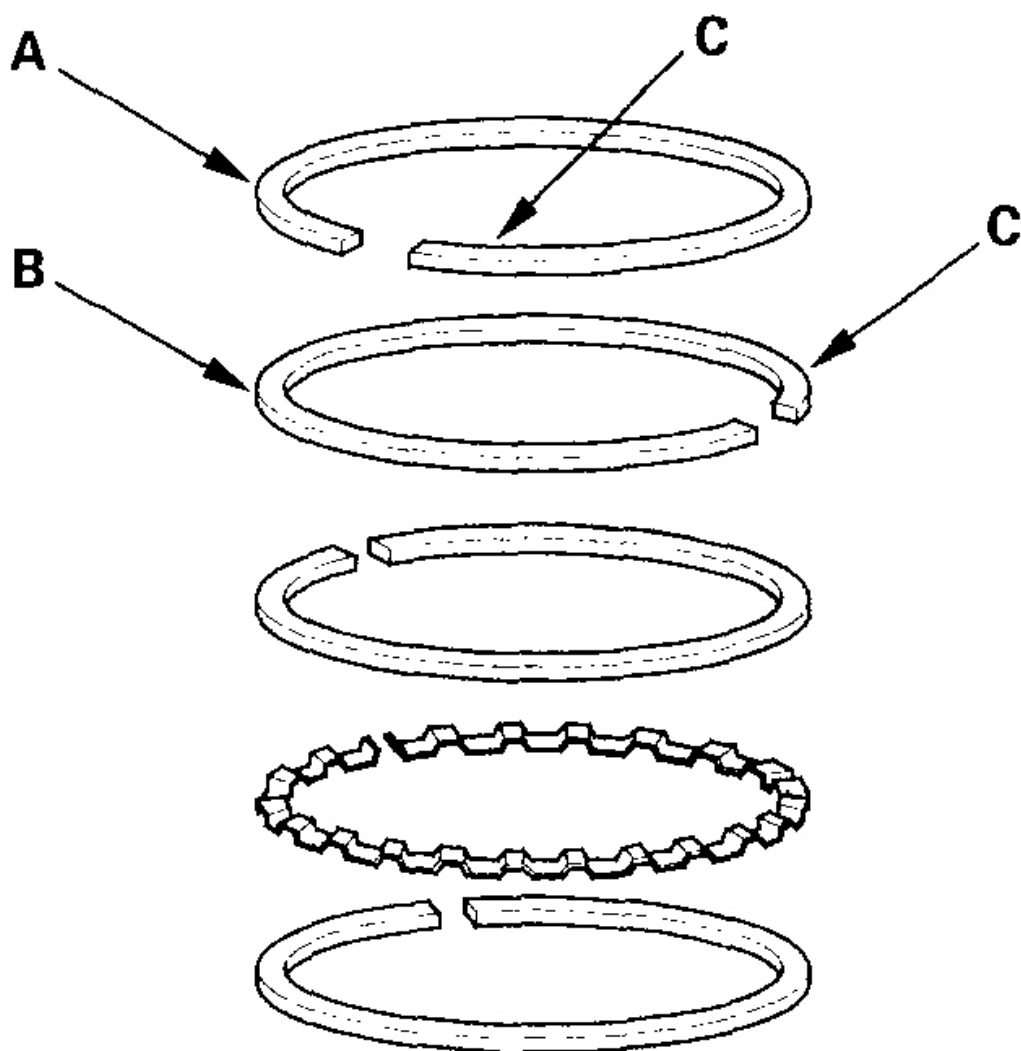
Service Limit: 0.80 mm (0.031 in.)

6. Install the top ring and second ring as shown. The top ring (A) has a T1 or R1 mark and the second ring (B) has a T2 or R2 mark. The manufacturing marks (C) must be facing upward.



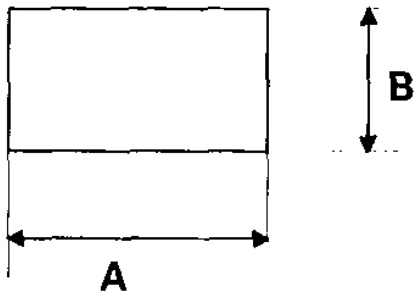
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Fig. 212: Installing Top Ring & Second Ring (1 of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 213: Installing Top Ring & Second Ring (2 of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

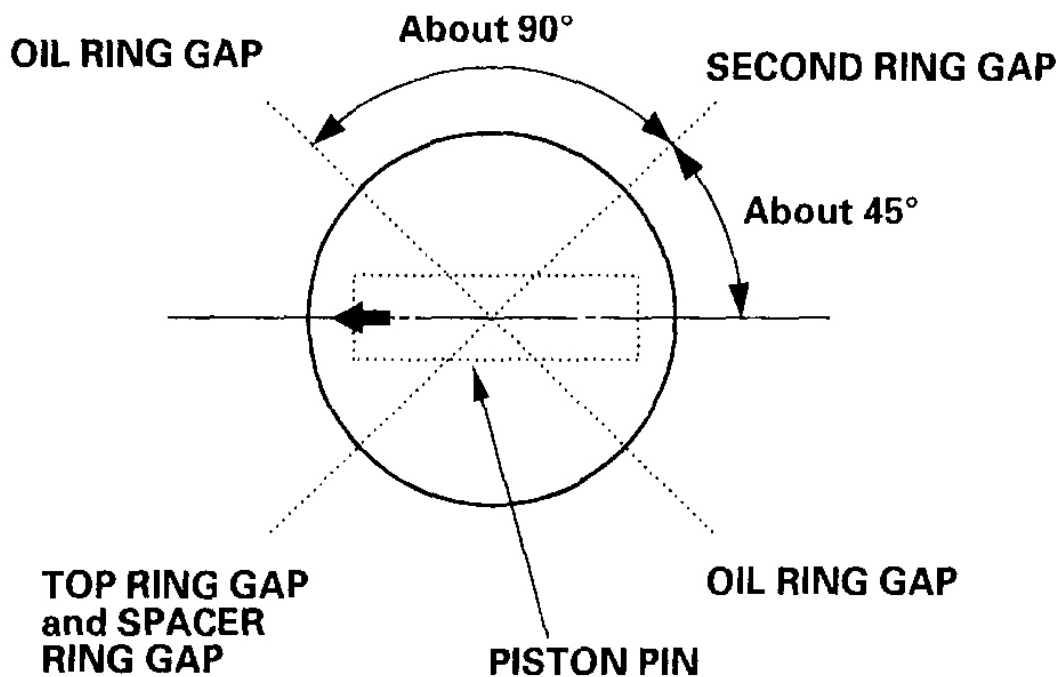
Piston Ring Dimensions:

G01473659

Top Ring (Standard):**A: 3.1 mm (0.12 in.)****B: 1.2 mm (0.05 in.)****Second Ring (Standard):****A: 3.4 mm (0.13 in.)****B: 1.2 mm (0.05 in.)**

Fig. 214: Installing Top Ring & Second Ring (3 of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

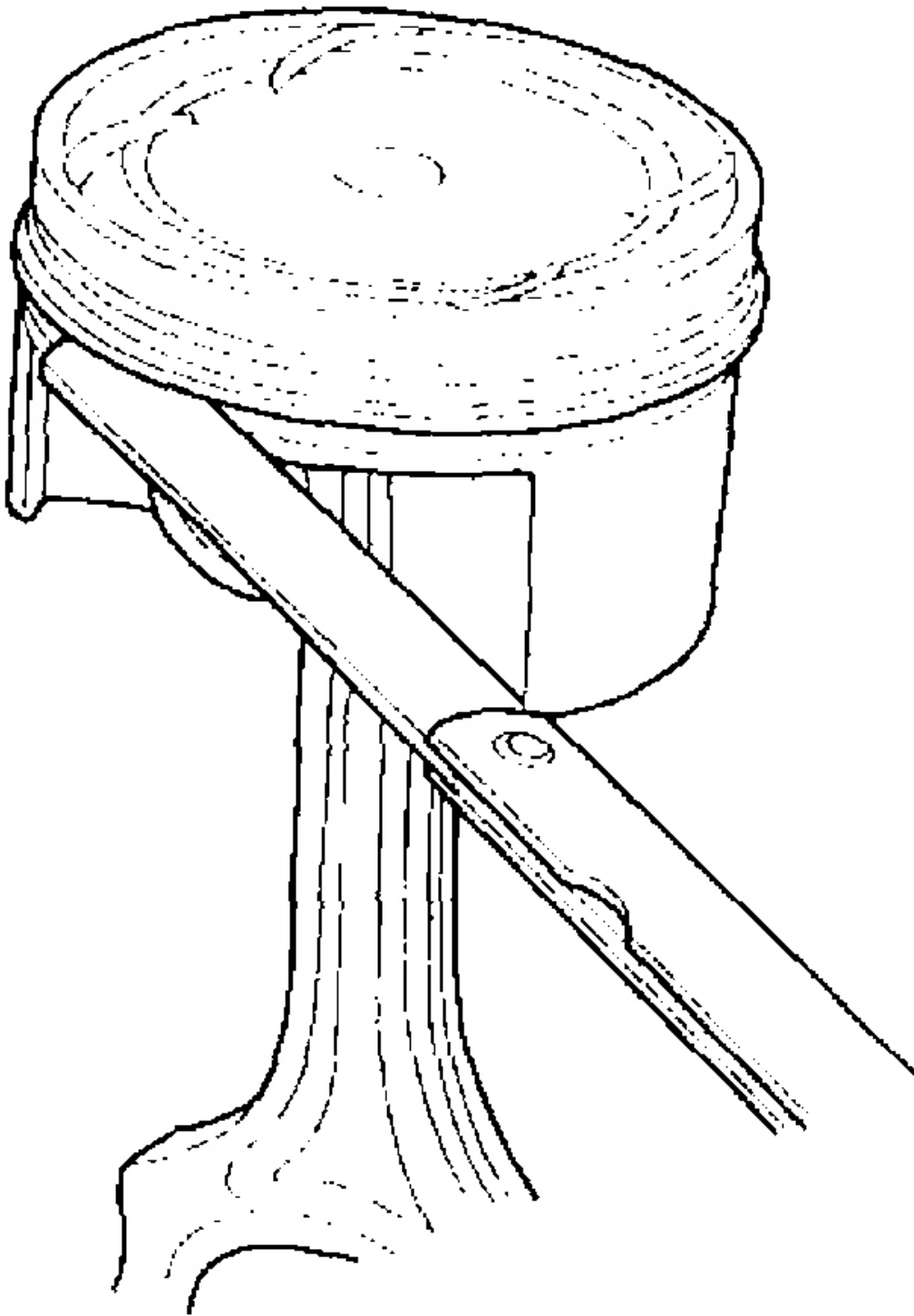


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Fig. 215: Identifying Position Ring End Gaps**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

Top Ring Clearance**Standard (New):** 0.045 - 0.070 mm (0.0018 - 0.0028 in.)**Service Limit:** 0.13 mm (0.005 in.)**Second Ring Clearance****Standard (New):** 0.050 - 0.075 mm (0.0020 - 0.0030 in.)**Service Limit:** 0.13 mm (0.005 in.)



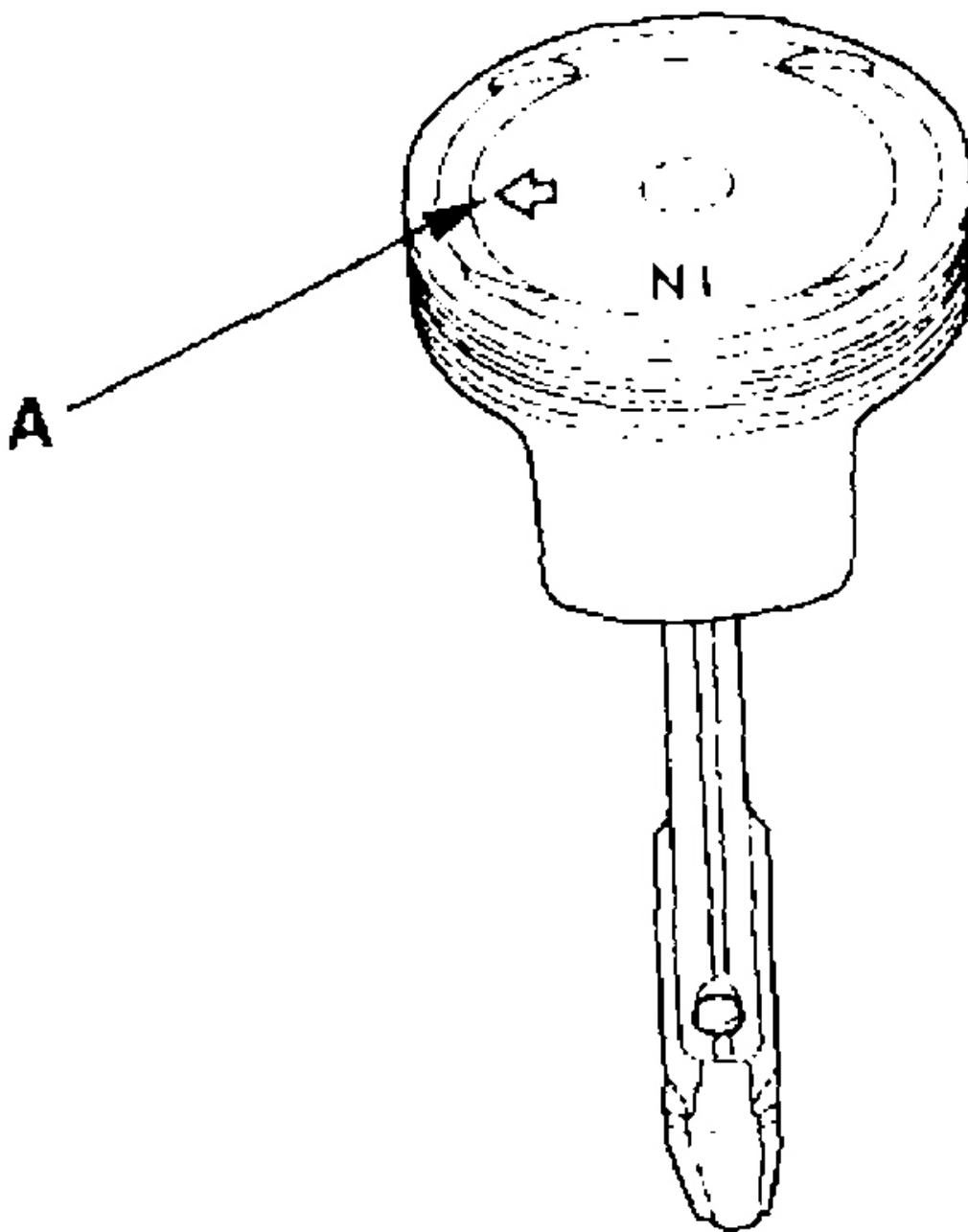
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Fig. 216: Measuring Ring-To-Groove Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION

If the crankshaft is already installed

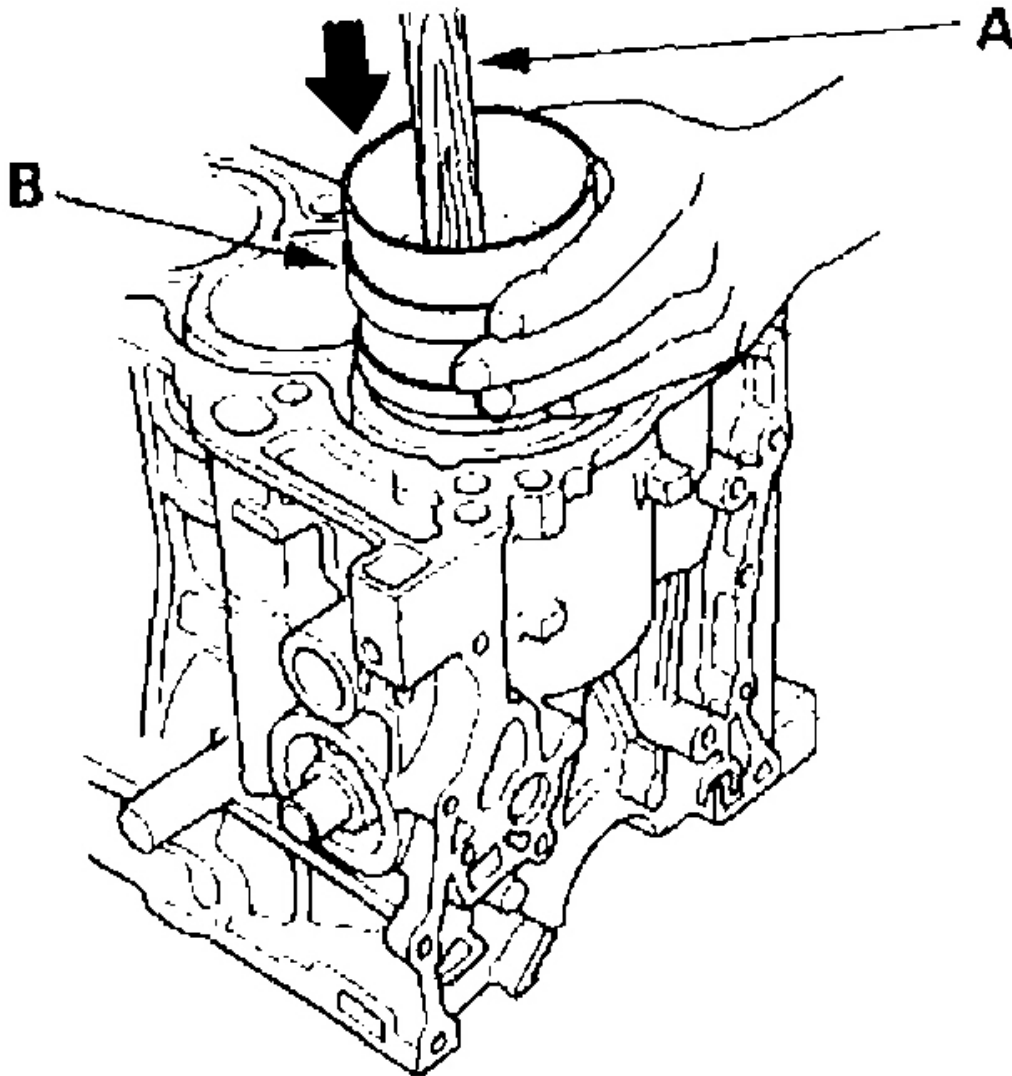
1. Set the crankshaft to bottom dead center (BDC) for each cylinder.
2. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
3. Position the arrow (A) facing the cam chain side of the engine.



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Fig. 217: Positioning Arrow Facing Cam Chain Side Of The Engine
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). Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



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Fig. 218: Positioning Piston In Cylinder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

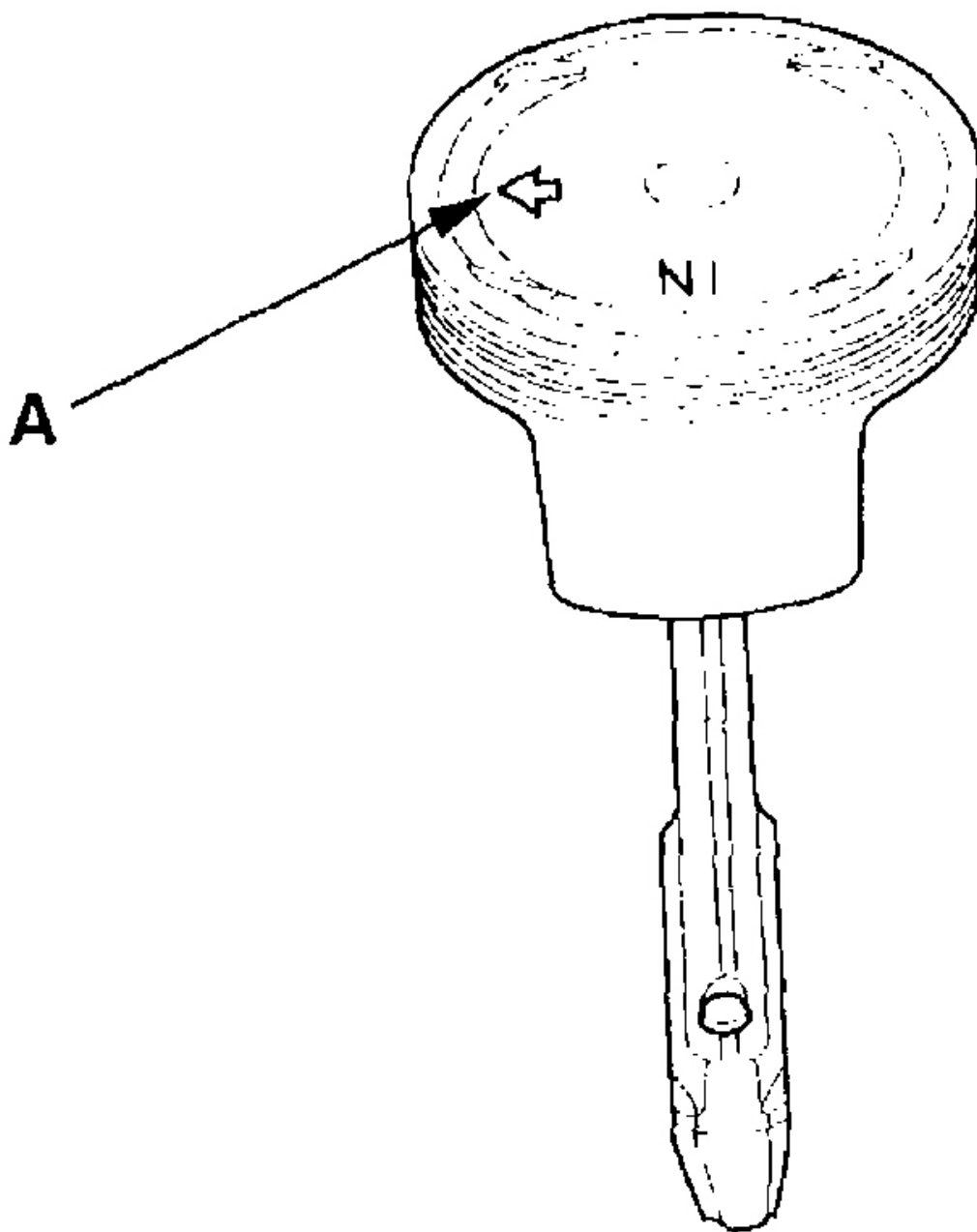
5. Stop after the ring compressor pops free, and check the connecting-rod-to-crank-journal alignment before

pushing the piston into place.

6. Check the connecting rod bearing clearance with plastigage (see **Connecting Rod Bearing Replacement**).
7. Inspect the connecting rod bolts (see **Connecting Rod Bolt Inspection**).
8. Apply new engine oil to the bolt threads, then install the rod caps with bearings. Torque the bolts to 20 N.m (2.0 kgf.m, 14 Ft.Lbs).
9. Tighten the connecting rod bolts an additional 90°.

If the crankshaft is not installed

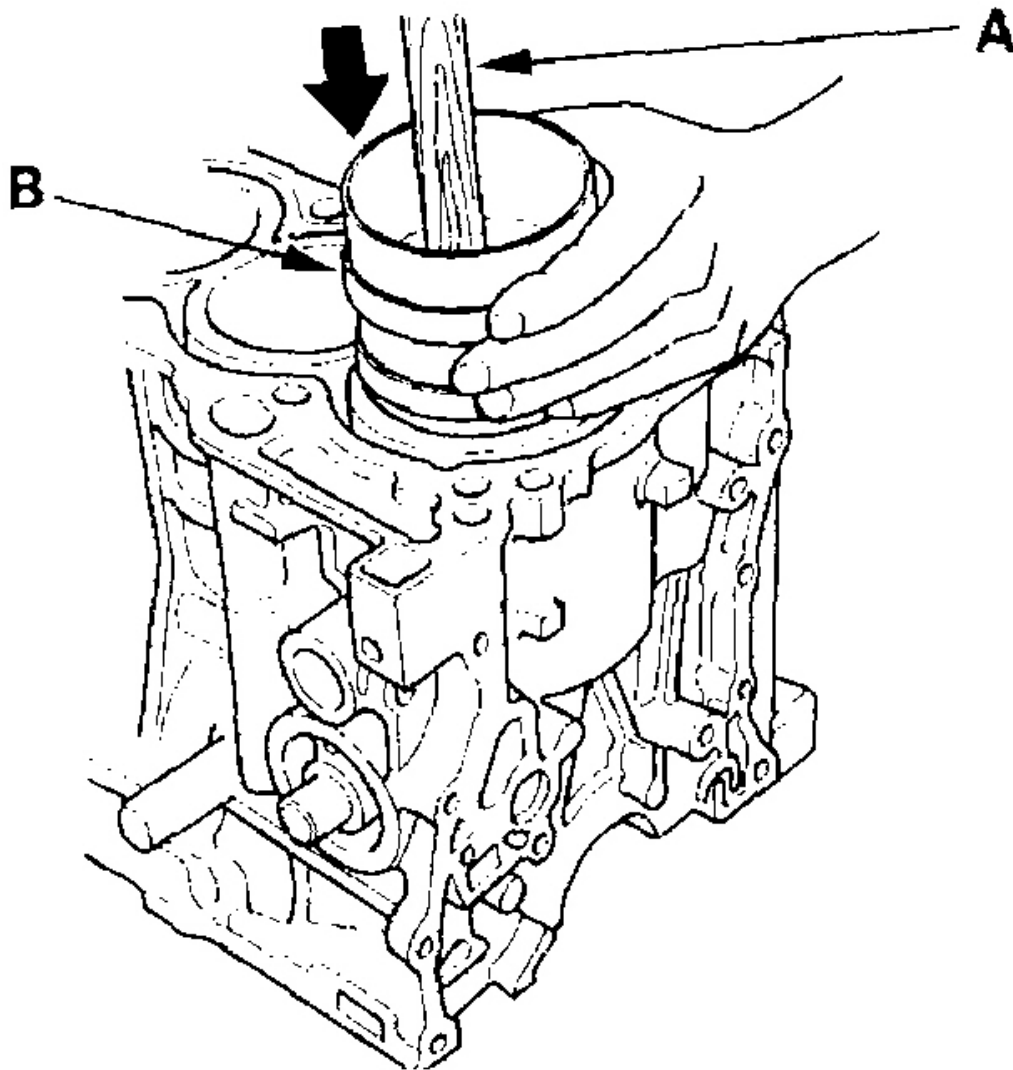
1. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
2. Position the arrow (A) facing the cam chain side of the engine.



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Fig. 219: Positioning Arrow Facing Cam Chain Side Of The Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 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.



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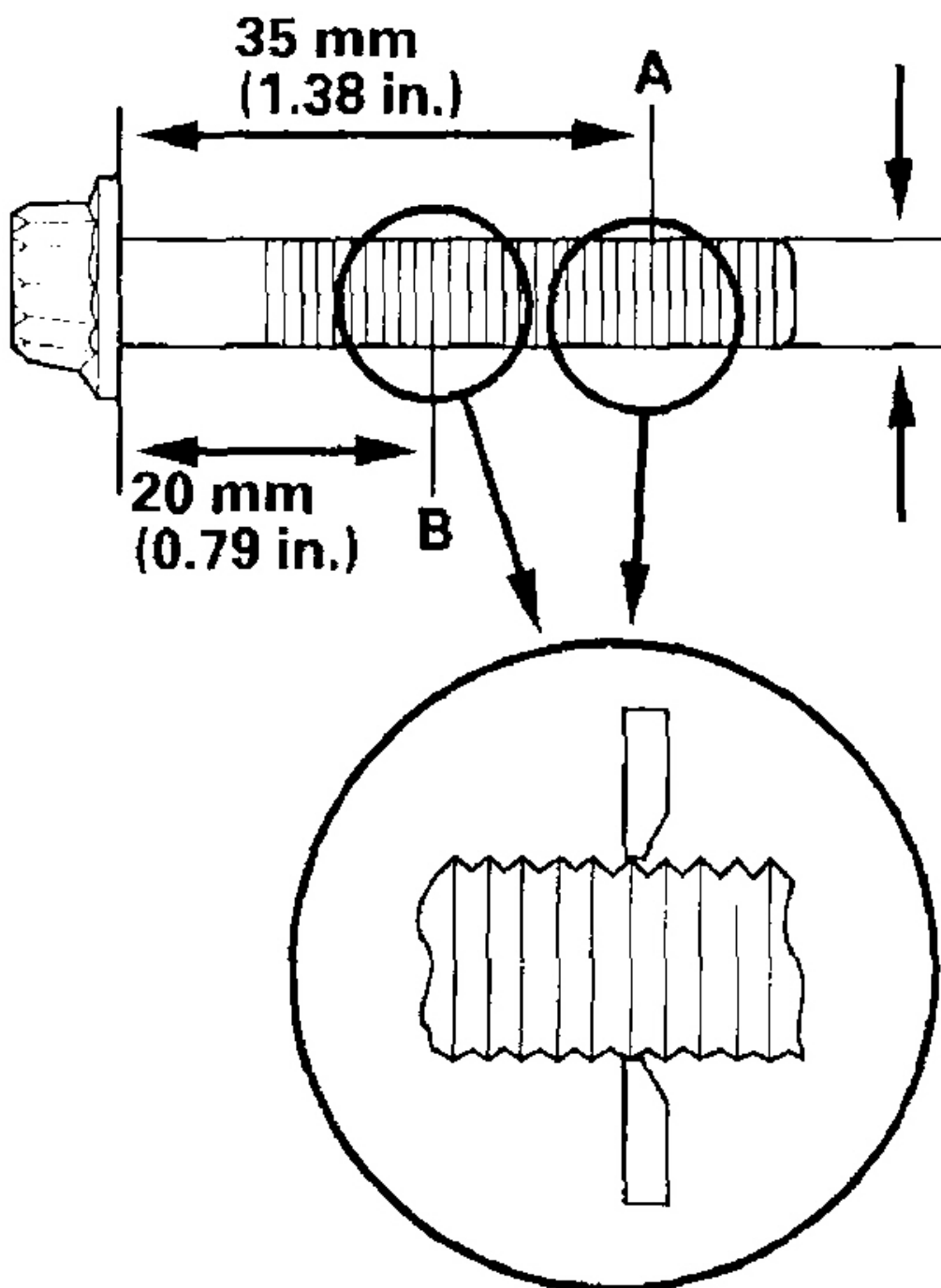
Fig. 220: Positioning Piston In Cylinder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. 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.



G01473666

Fig. 221: Measuring Diameter Of Each Connecting Rod Bolt At Point A & Point B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Point A-Point B = Difference in Diameter

Difference in Diameter:

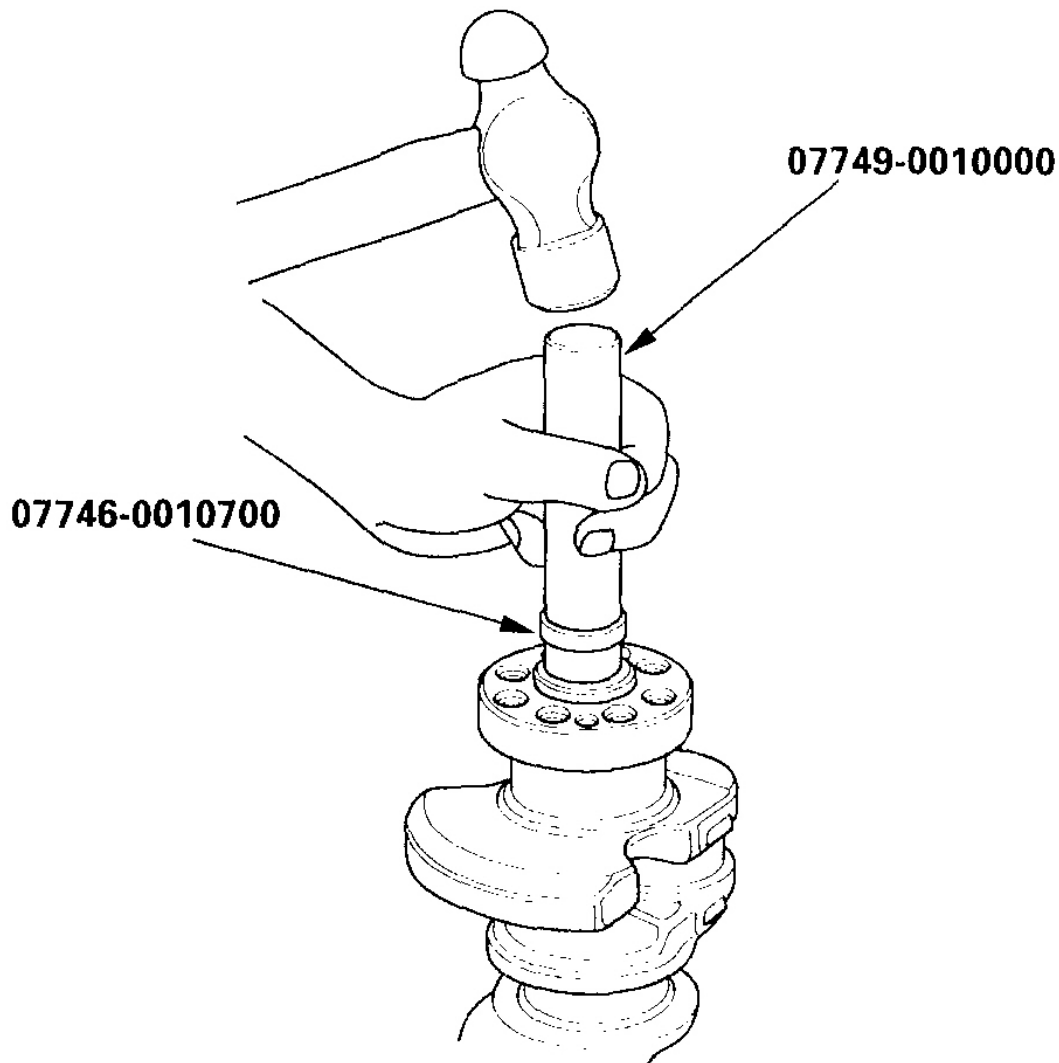
Specification: 0-0.1 mm (0-0.004 in.)

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

CRANKSHAFT INSTALLATION

Special Tools Required

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



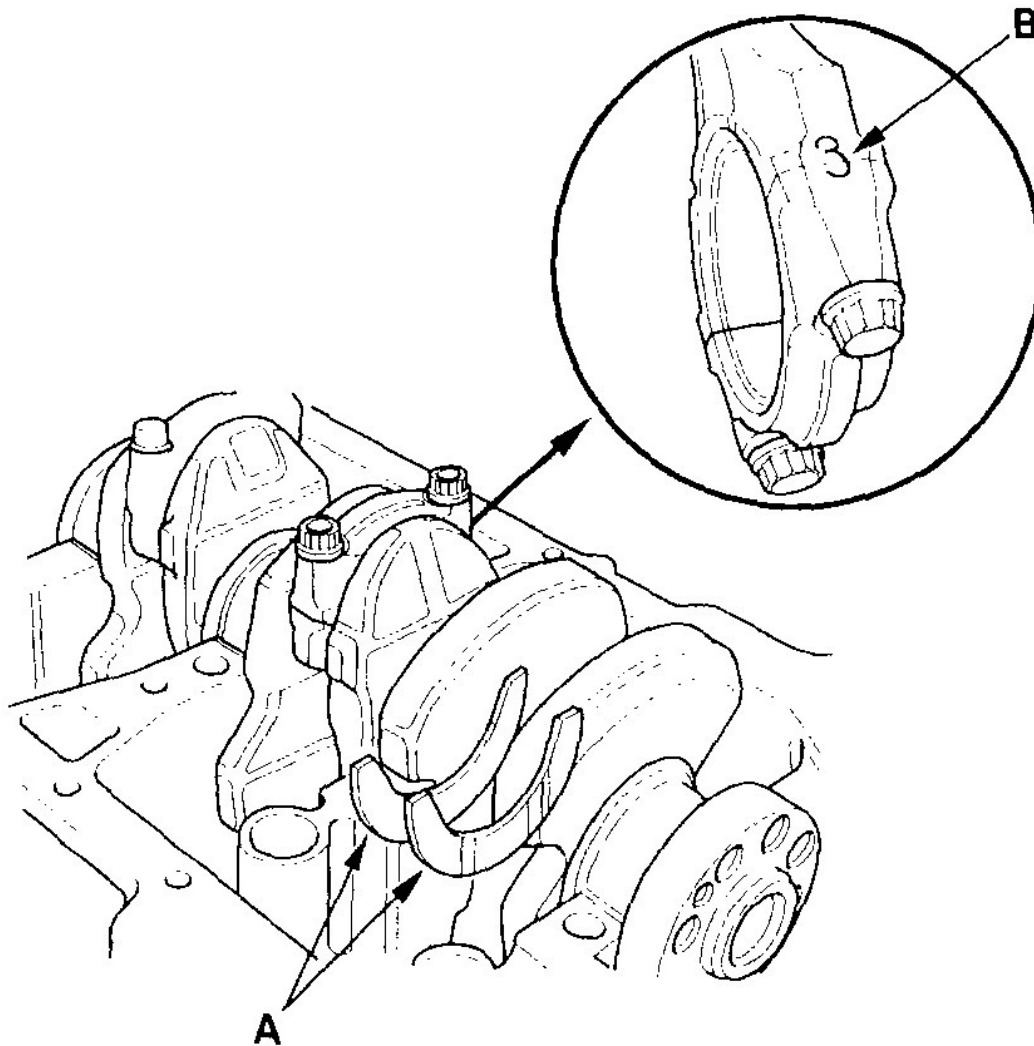
G01473667

Fig. 222: Installing Crankshaft End Bushing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check the connecting rod bearing clearance with plastigage (see **Connecting Rod Bearing Replacement**).
3. Check the main bearing clearance with plastigage (see **Crankshaft Main Bearing Replacement**).
4. Inspect the connecting rod bolts (see **Connecting Rod Bolt Inspection**).
5. Install the bearing halves in the cylinder block and connecting rods.
6. Apply a coat of new engine oil to the main bearings and rod bearings.
7. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, then lower the crankshaft

into the block.

8. Install the thrust washers (A) in the No. 4 journal of the cylinder block.



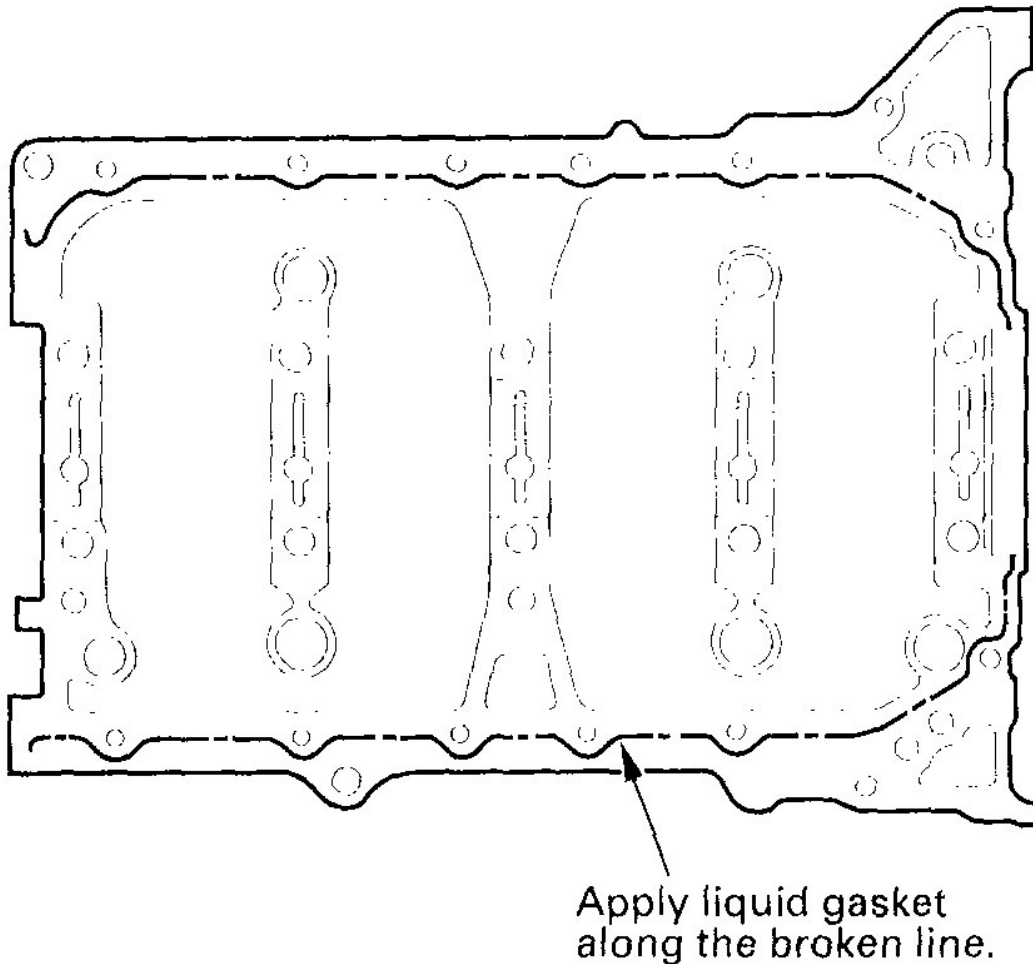
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Fig. 223: Installing Thrust Washers In No. 4 Journal Of Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Apply engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and cap, then install the caps and bolts finger-tight.
11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and cap, then install the caps and bolts finger-tight.

12. Tighten the connecting rod bolts to 20 N.m (2.0 kgf.m, 14 Ft.Lbs).
13. Tighten the connecting rod bolts an additional 90°.
14. Remove any old liquid gasket from the lower block mating surfaces, bolts, and bolt holes.
15. Clean and dry the lower block mating surfaces.
16. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the lower block and to the inner threads of the bolt holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

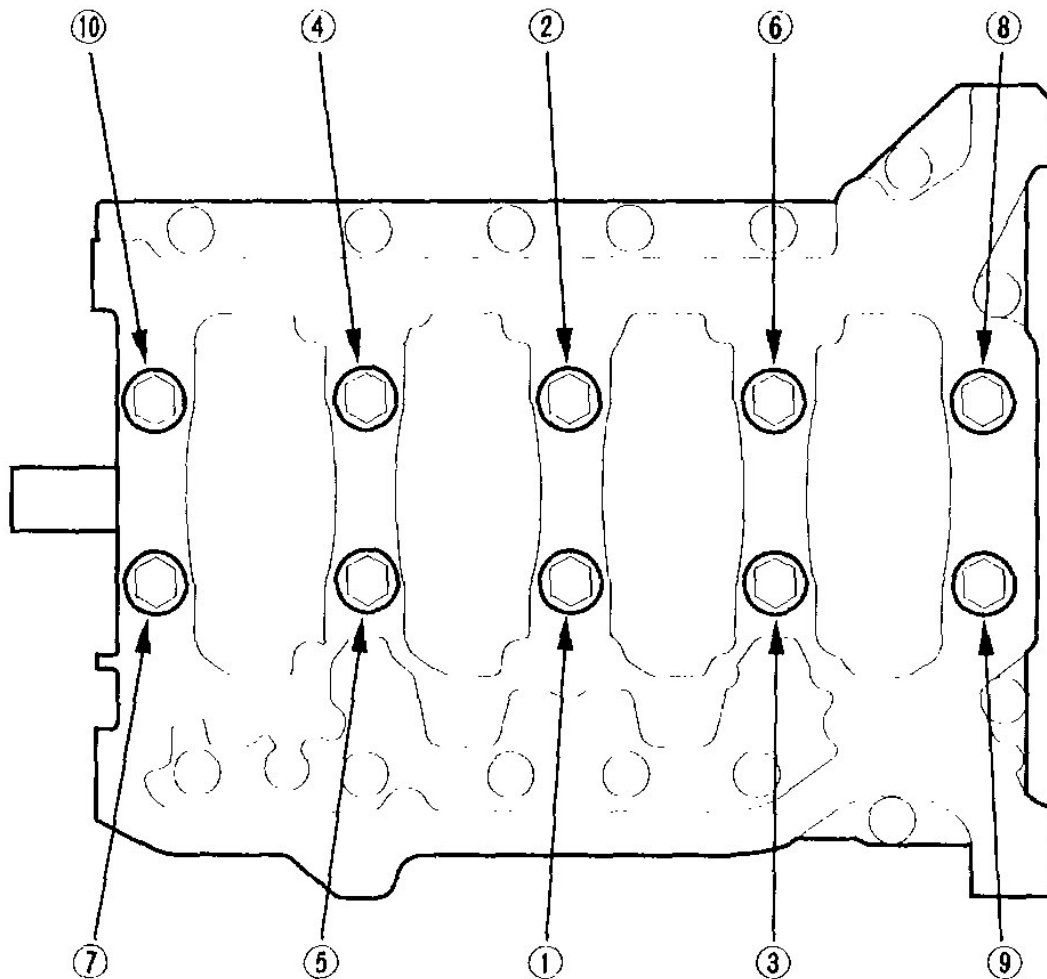


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Fig. 224: Applying Liquid Gasket To Cylinder Block Mating Surface Of Lower Block & To Inner Threads Of Bolt Holes

Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Put the lower block on the cylinder block.
18. Tighten the bearing cap bolts in sequence to 29 N.m (3.0 kgf.m, 22 Ft.Lbs).

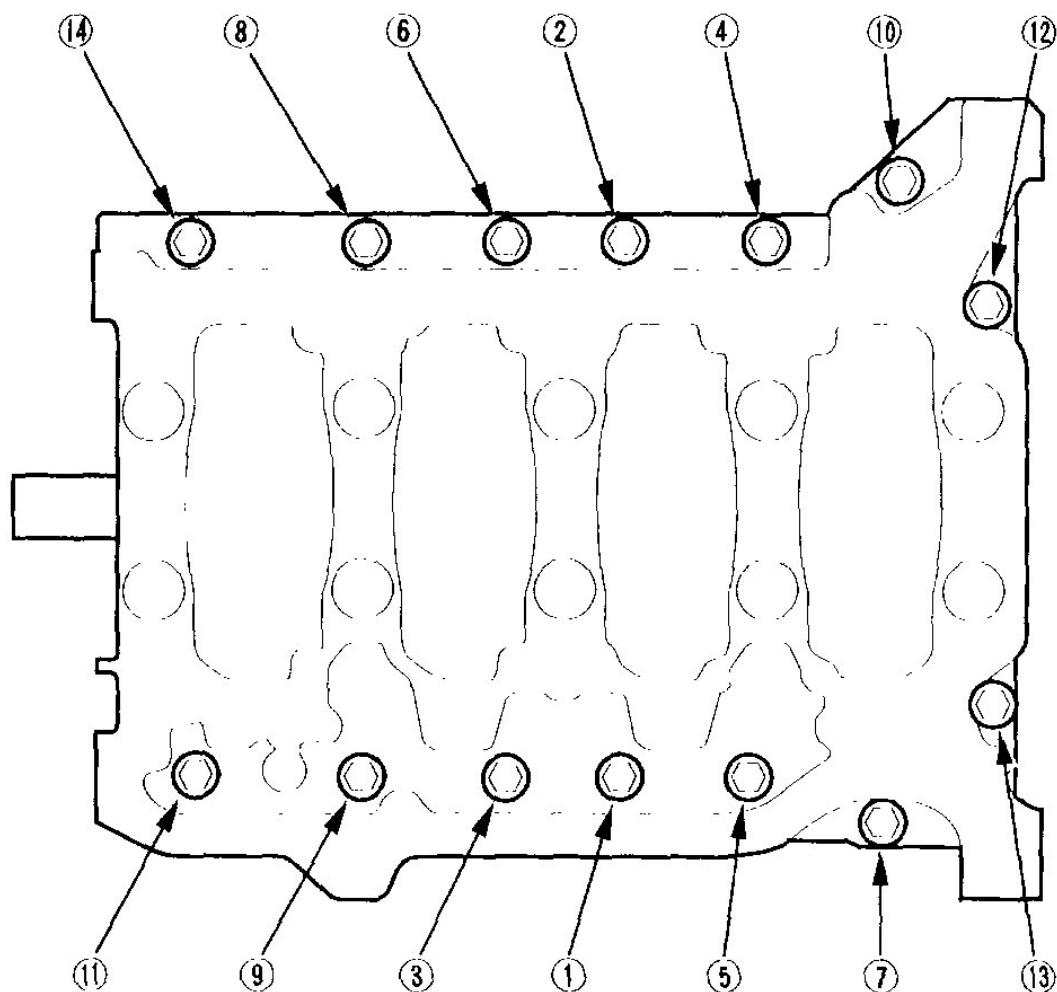


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Fig. 225: Bearing Cap Bolt Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Tighten the bearing cap bolts an additional 56°.
20. Tighten the 8 mm bolts in sequence to 22 N.m (2.2 kgf.m, 16 Ft.Lbs).



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Fig. 226: Tightening 8 mm Bolts In Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

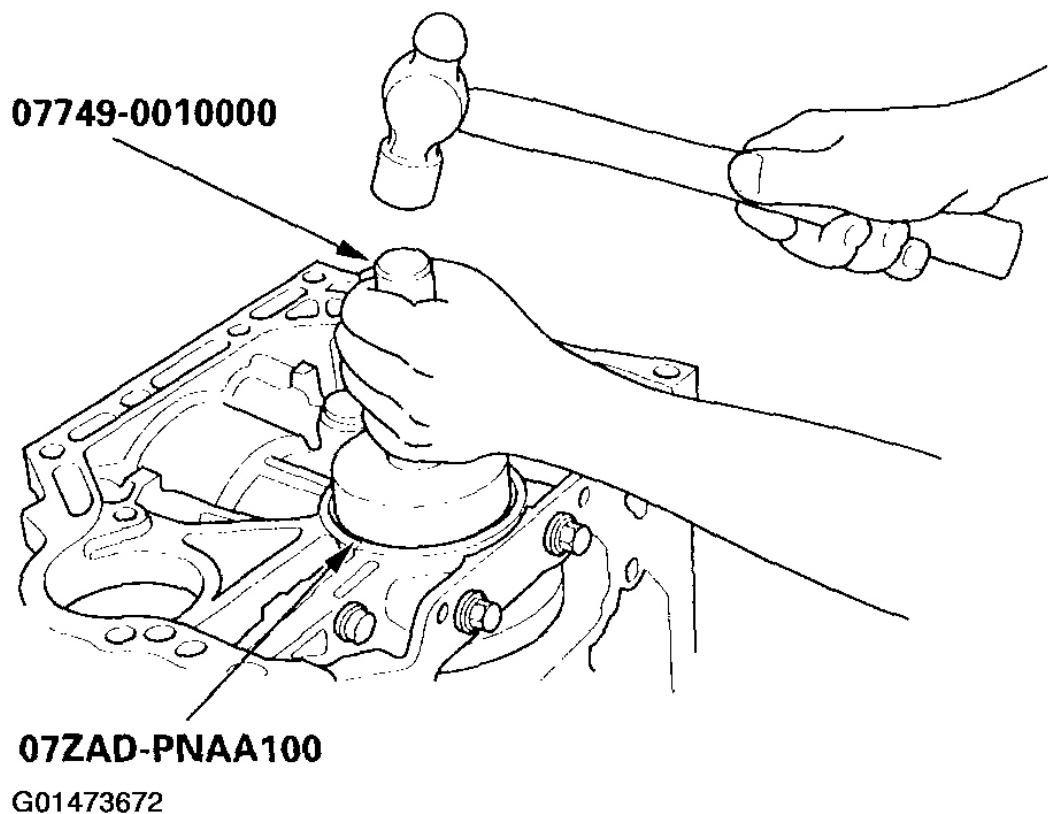
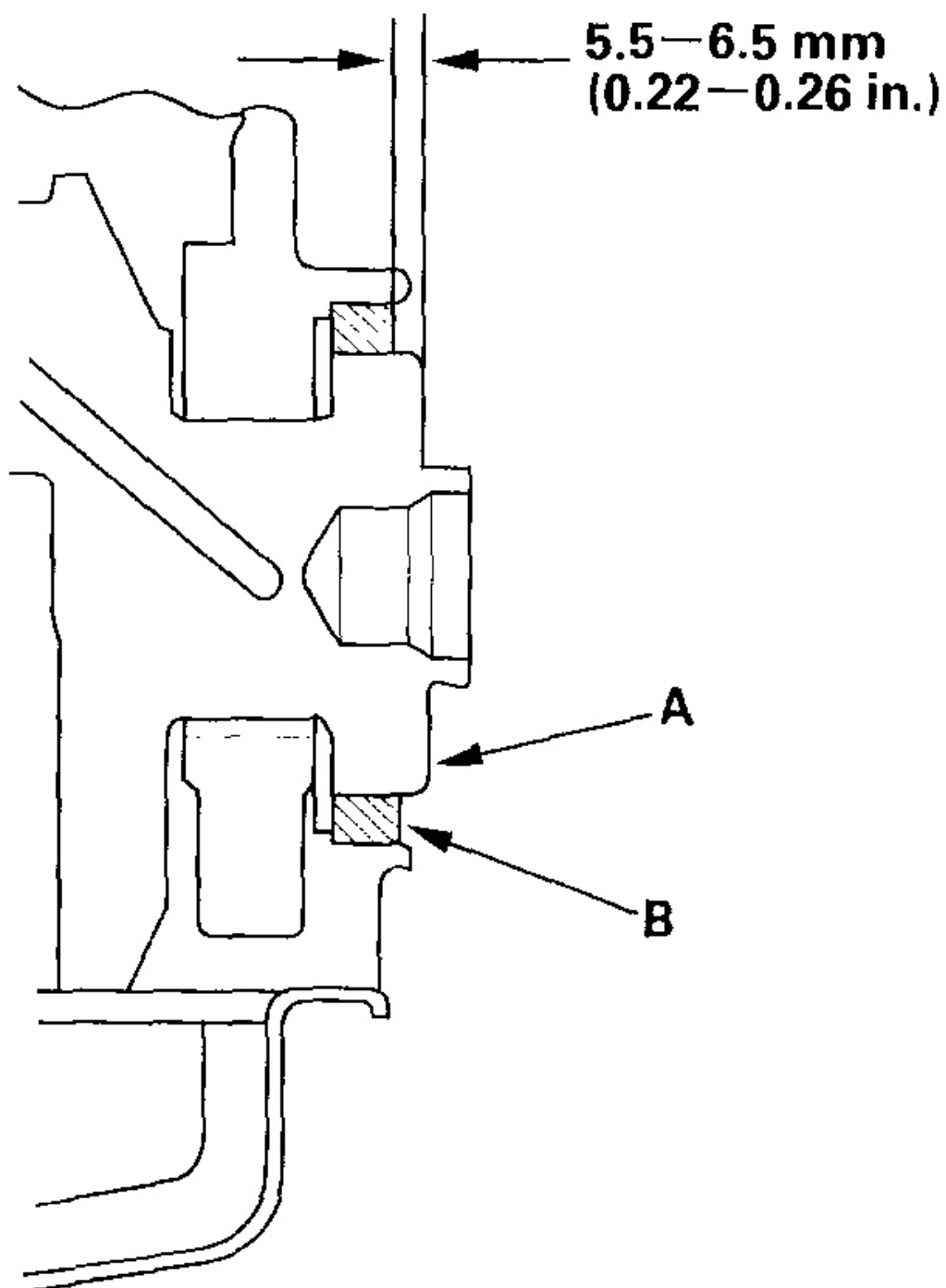


Fig. 227: Driving A New Oil Seal Squarely Into Block By Using Special Tools
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Measure the distance between the crankshaft (A) and oil seal (B).

Oil Seal Installed Height: 5.5 - 6.5 mm (0.22 - 0.26 in.)

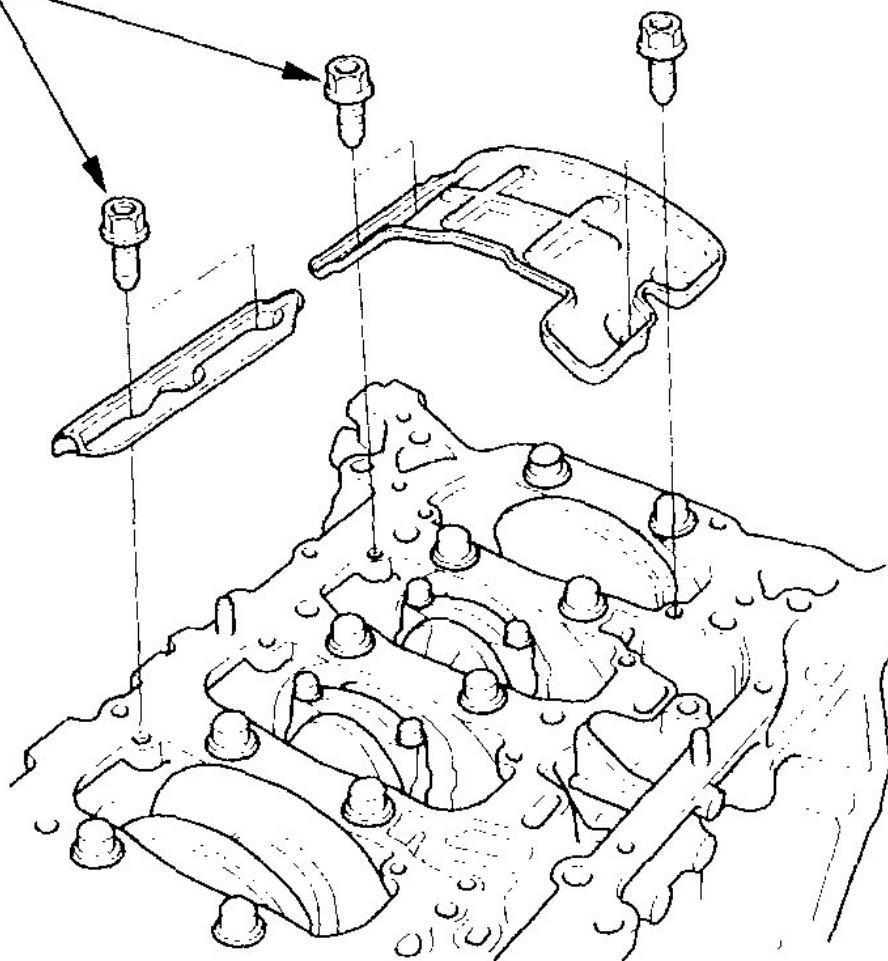


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Fig. 228: Measuring Distance Between Crankshaft & Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the baffle plates.

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



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Fig. 229: Installing Baffle Plates
Courtesy of AMERICAN HONDA MOTOR CO., INC.

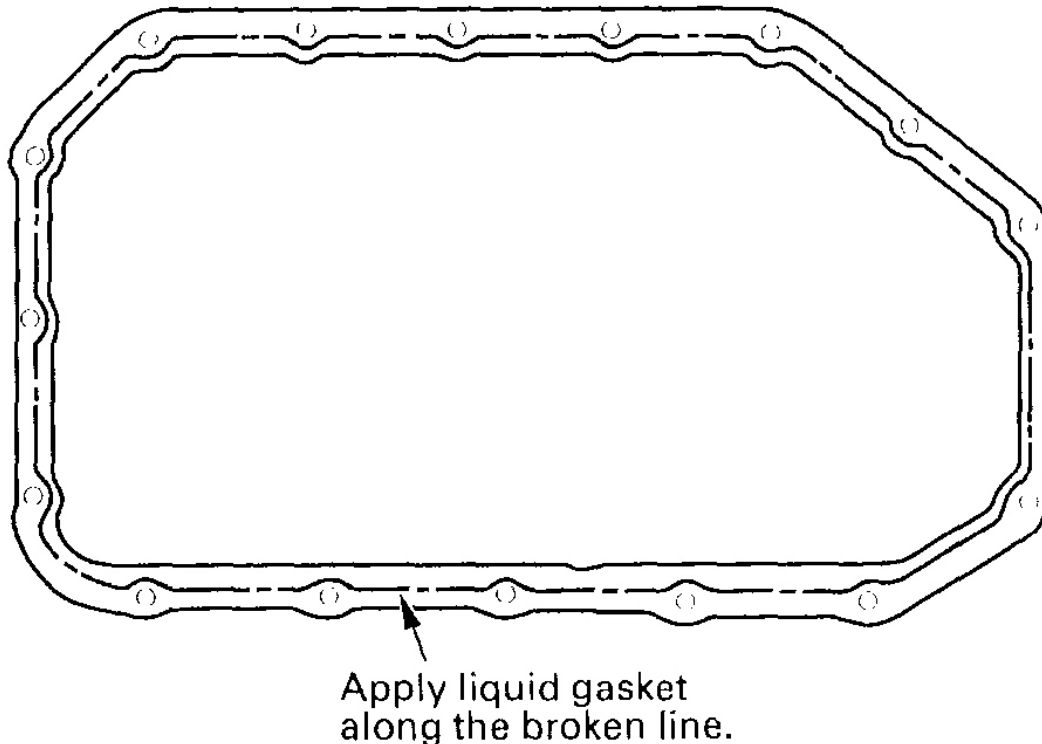
24. Install the oil pump (see **OIL PUMP INSTALLATION**).

25. Install the oil pan (see **Oil Pan Installation**).
26. Install the cylinder head (see **Cylinder Head Installation**).
27. Install the transmission:
 - Manual transmission (see **TRANSMISSION INSTALLATION**).
 - Automatic transmission (see **TRANSMISSION INSTALLATION**).
28. Install the engine assembly (see **Engine Installation**).

OIL PAN INSTALLATION

1. Remove any old liquid gasket from the oil pan mating surfaces, bolts, and bolt holes.
2. Clean and dry the oil pan mating surfaces.
3. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the oil pan and to the inner threads of the bolt holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

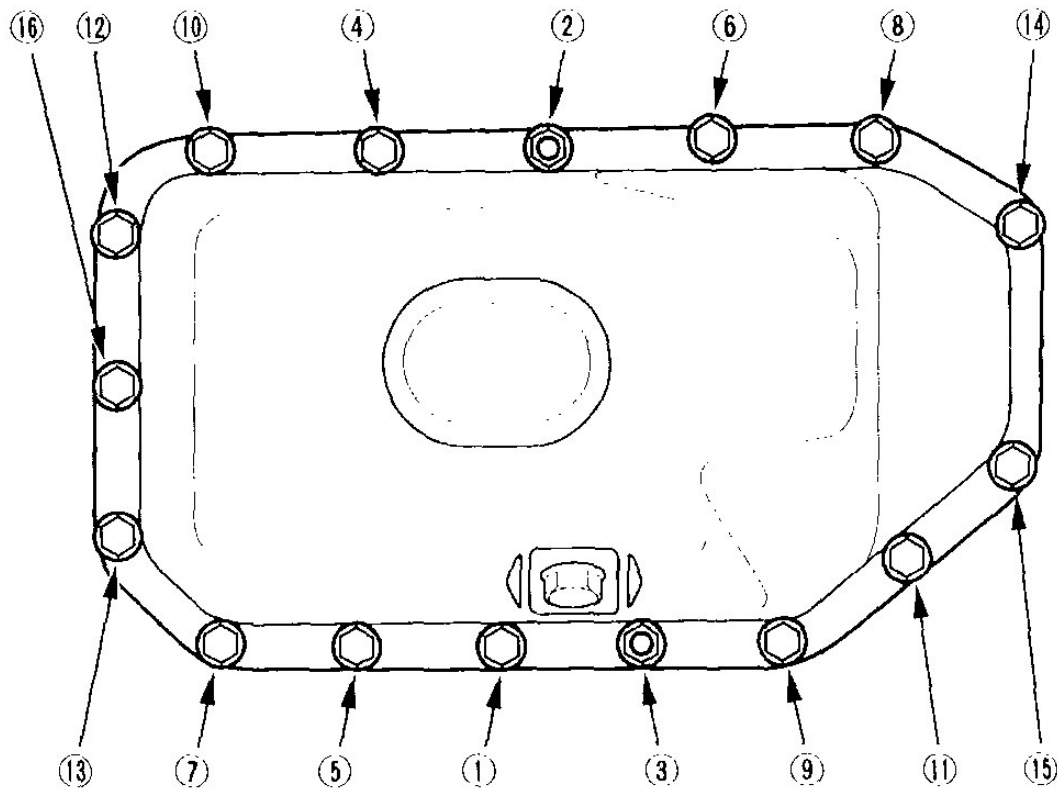


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Fig. 230: Applying Liquid Gasket To Cylinder Block Mating Surface Of The Oil Pan

Courtesy of AMERICAN HONDA MOTOR CO., INC.

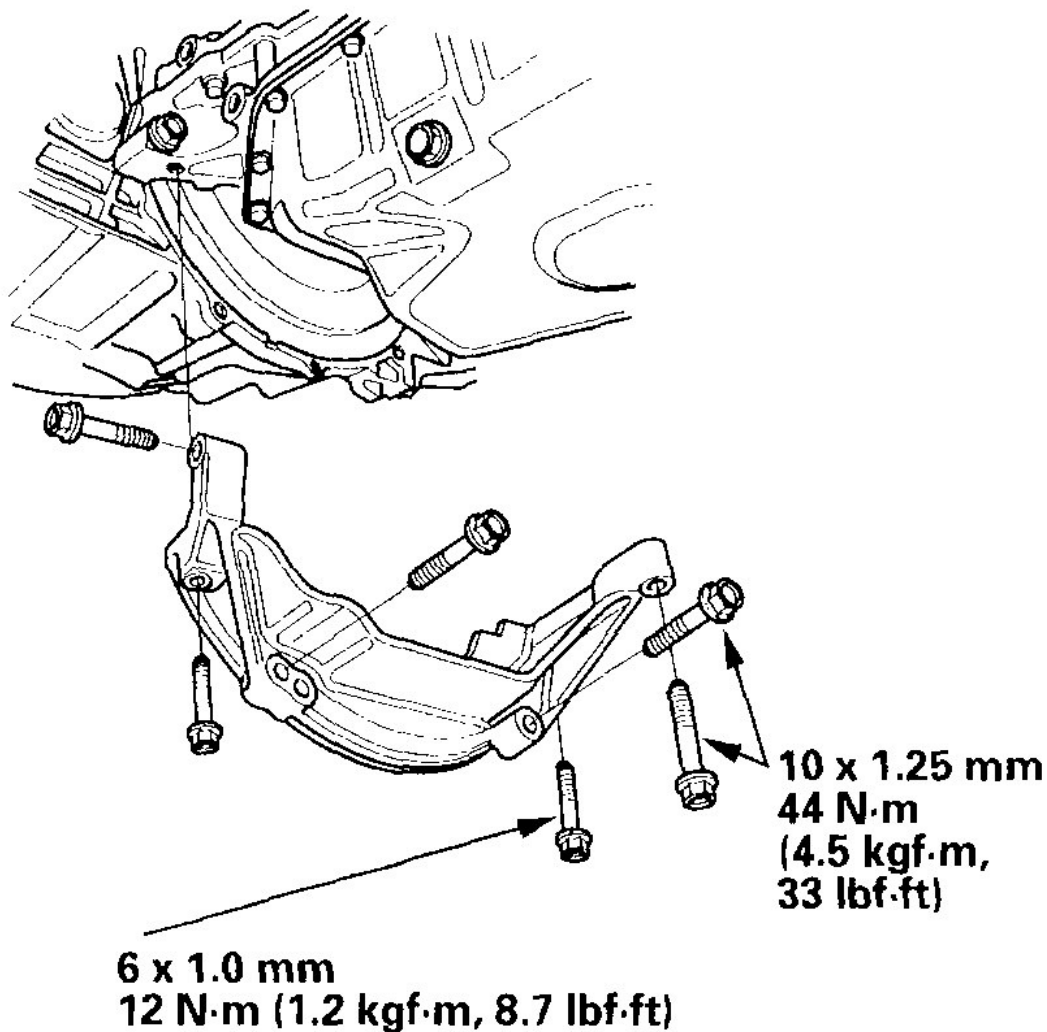
4. Install the oil pan.
5. Tighten the bolts in two or three steps. In the final step, tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 Ft.Lbs).



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Fig. 231: Tightening Oil Pan Bolts In Two Or Three Steps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the stiffener (M/T).



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Fig. 232: Installing Stiffener (M/T)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

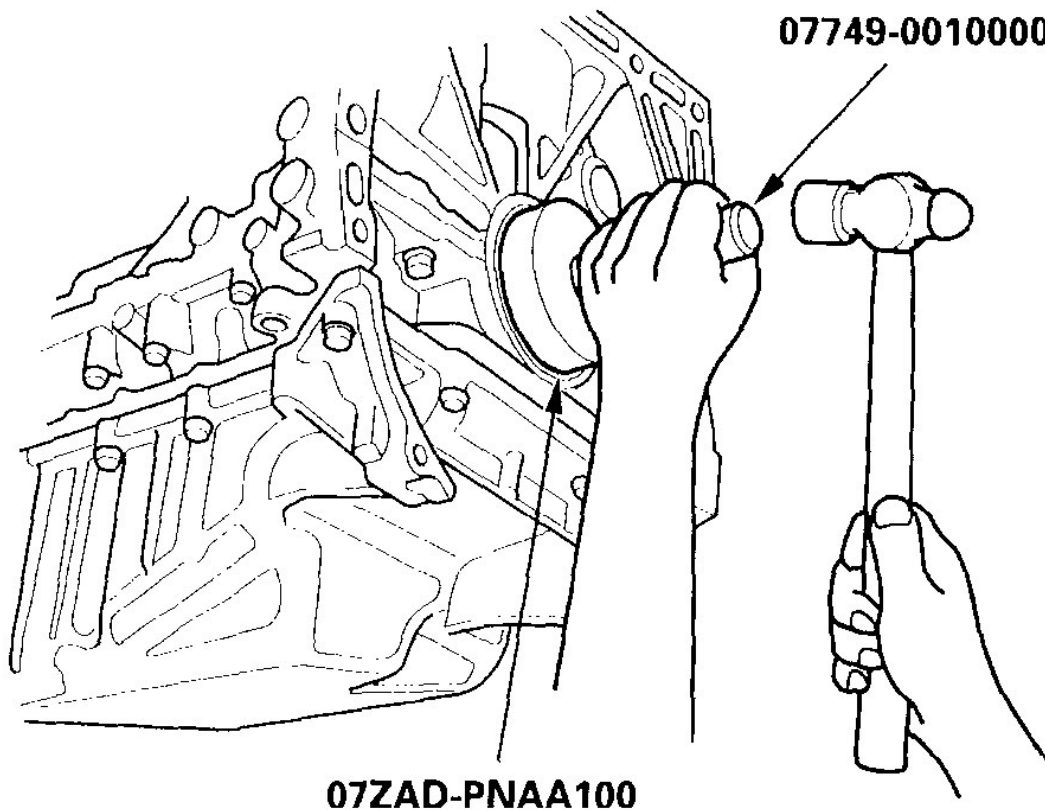
7. If the engine is still in the vehicle, install the subframe.
 1. Support the subframe with the special tool and a jack, and lift it up to body, then loosely install the new subframe mounting bolts (see step 4 on)
 2. Align the reference marks with the center of the subframe mounting bolts, then tighten the bolts to the specified torque (see step 6 on).
 3. Install the ATF filter mounting bolt (see step 25 on).
 4. Tighten the rear mount mounting bolts (see step 7 on).
 5. Tighten the new front mount mounting bolt (see step 13 on).

6. Connect the suspension lower arm ball joints (see **KNUCKLE/HUB ASSEMBLY**).
8. After assembly, wait at least 30 minutes before filling the engine with oil.

TRANSMISSION END CRANKSHAFT SEAL INSTALLATION - IN CAR

Special Tools Required

- Driver 07749-0010000
 - Oil seal driver attachment 96 07ZAD-PNAA100
1. Clean and dry the crankshaft oil seal housing.
 2. Use the special tools to drive a new oil seal squarely into the block to the specified installed height.



07ZAD-PNAA100

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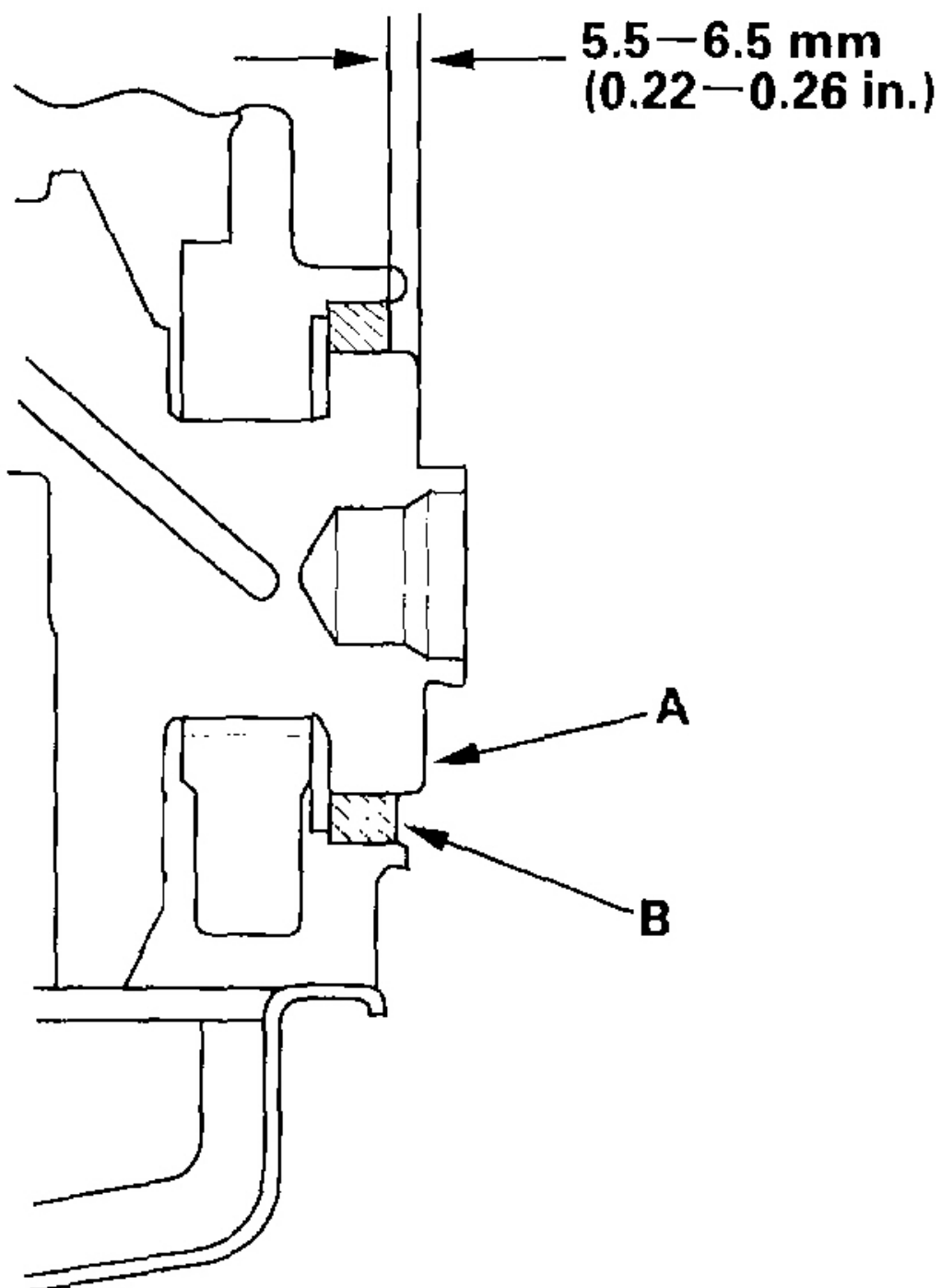
Fig. 233: Driving A New Oil Seal Squarely Into Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Measure the distance between the crankshaft (A) and oil seal (B).

2003 Honda CR-V EX

2002-04 ENGINES 2.4L 4-Cylinder - CR-V

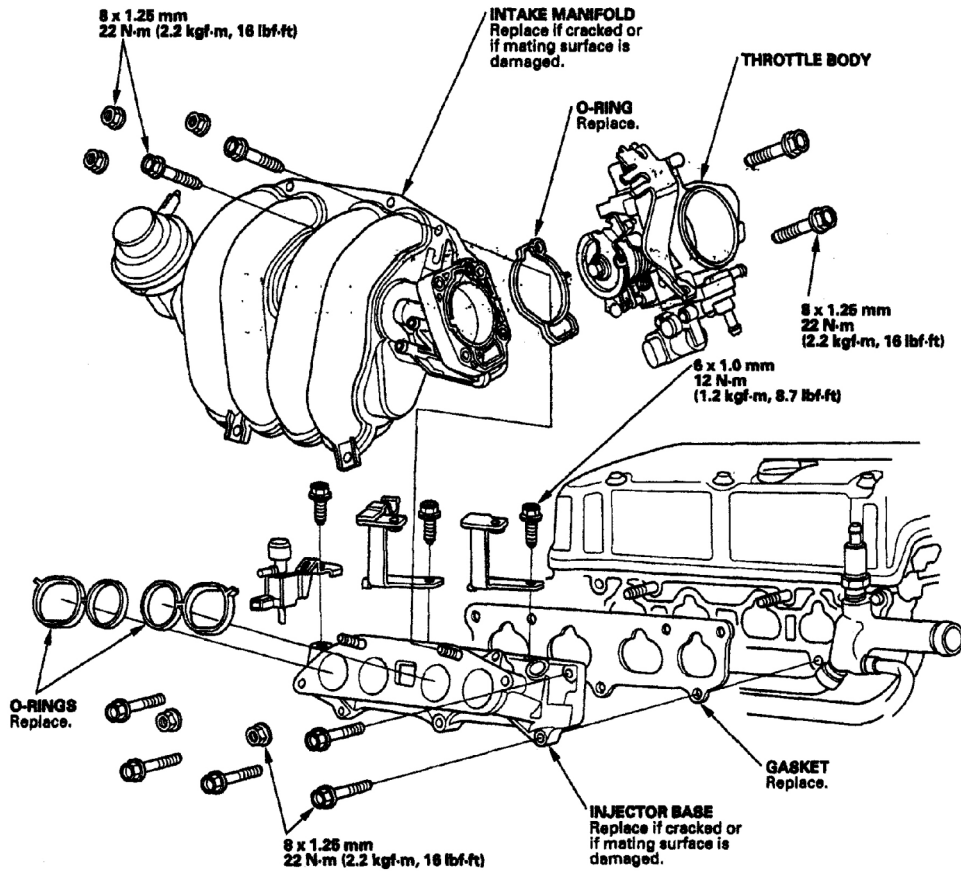
Oil Seal Installed Height: 5.5-6.5 mm (0.22-0.26 in.)



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Fig. 234: Measuring Distance Between Crankshaft & Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

INTAKE MANIFOLD

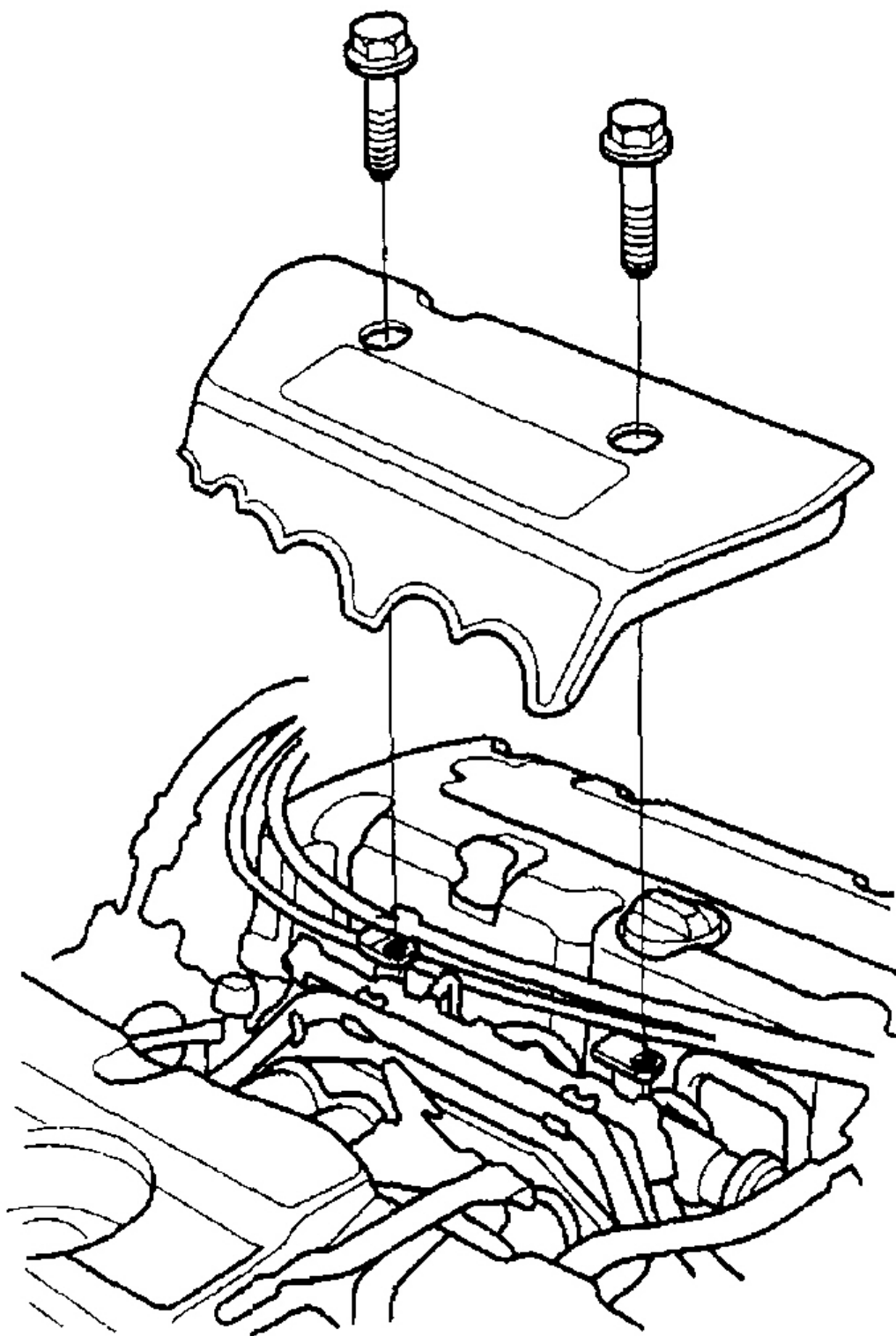


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Fig. 235: Exploded View Of Intake Manifold Assembly
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL

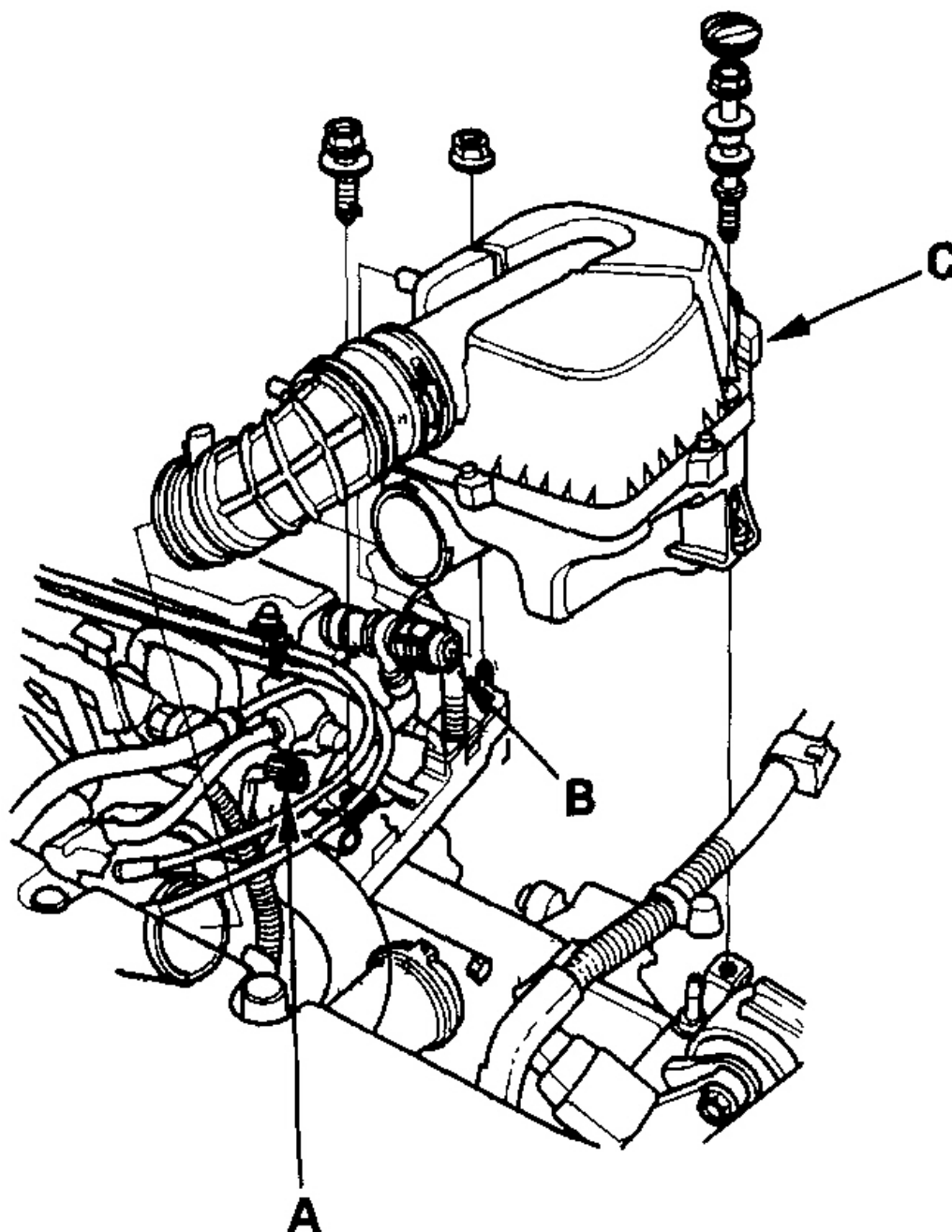
1. Remove the intake manifold cover.



G01473446

Fig. 236: Removing Intake Manifold Cover**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

2. Disconnect the intake air temperature (IAT) sensor connector (A), remove the breather hose (B), then remove the air cleaner Housing (C).



G01473447

Fig. 237: Disconnecting Intake Air Temperature Sensor Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the throttle cover (A). Fully open the throttle link and cruise control link by hand, then remove the throttle cable (B) and cruise control actuator cable (C) from the links. Loosen the locknuts (D), and remove the cables from the bracket.

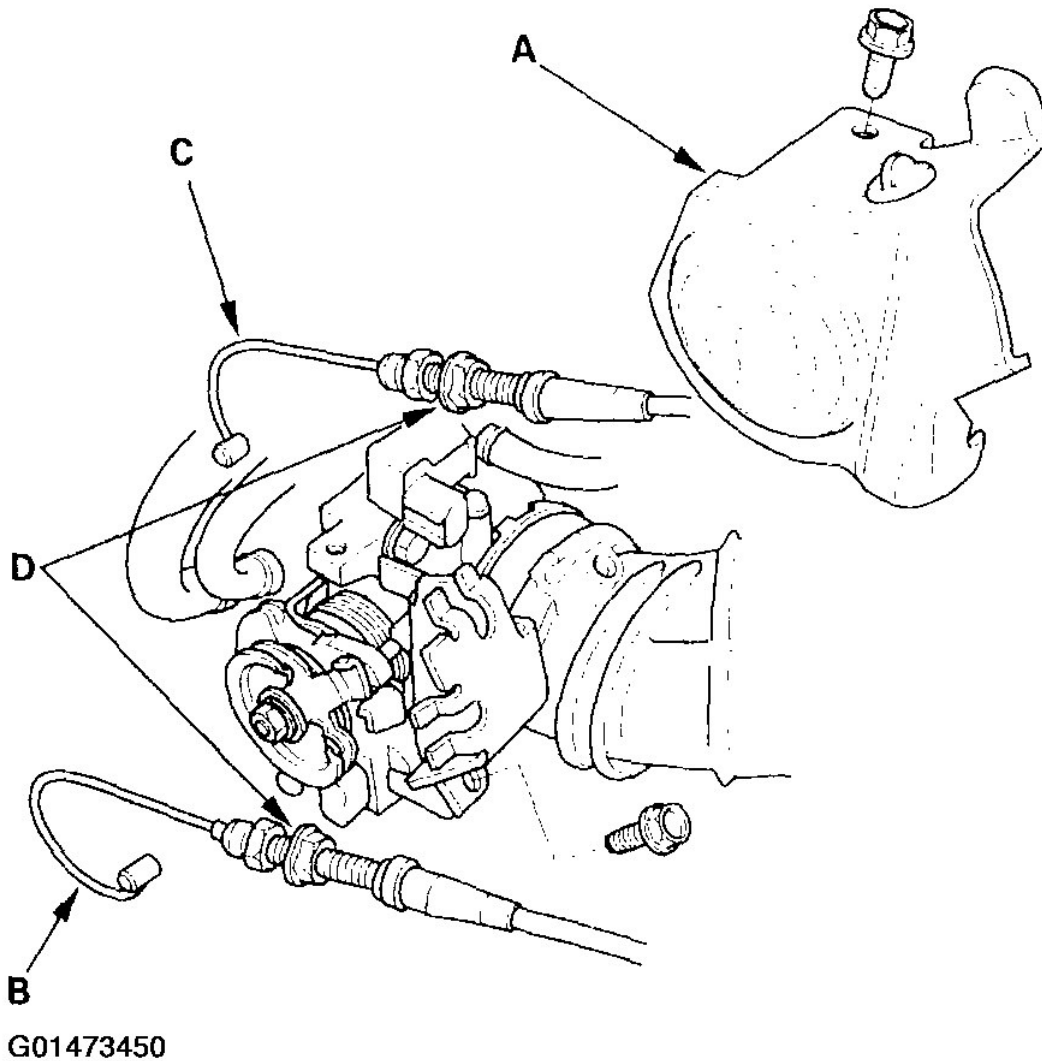
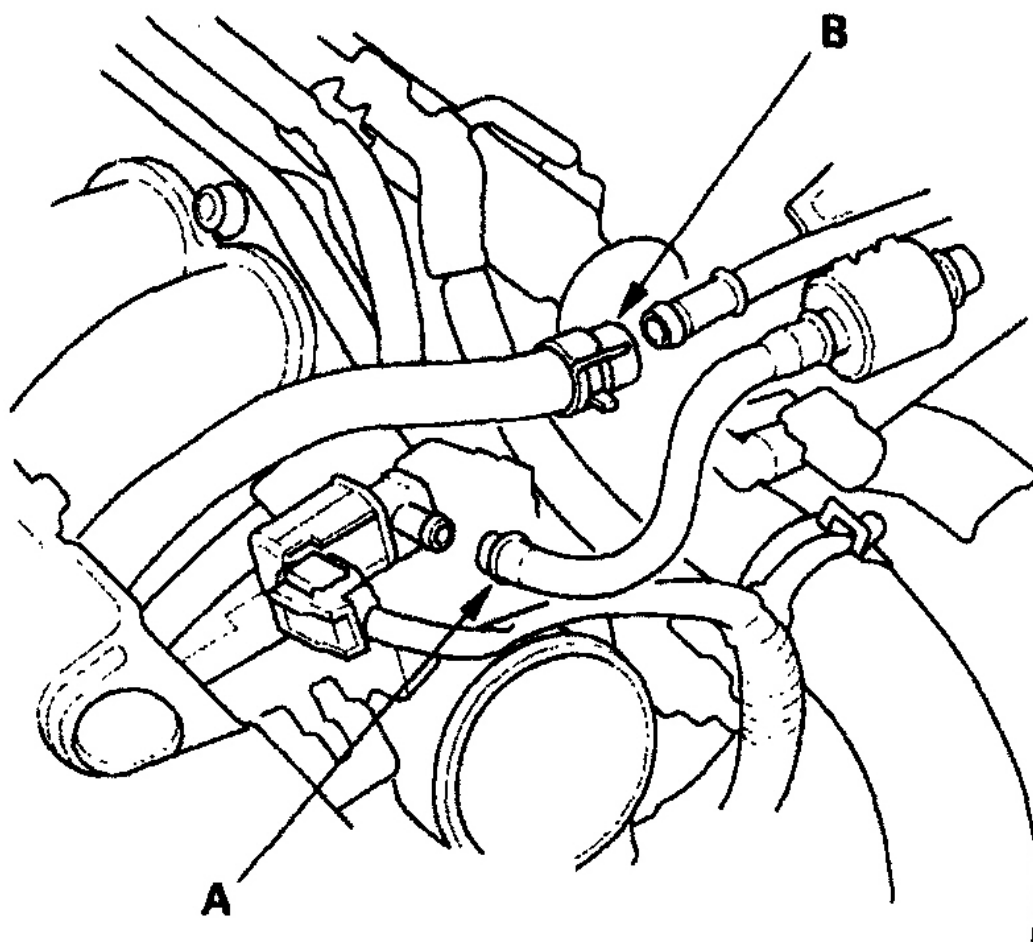


Fig. 238: Removing Throttle Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

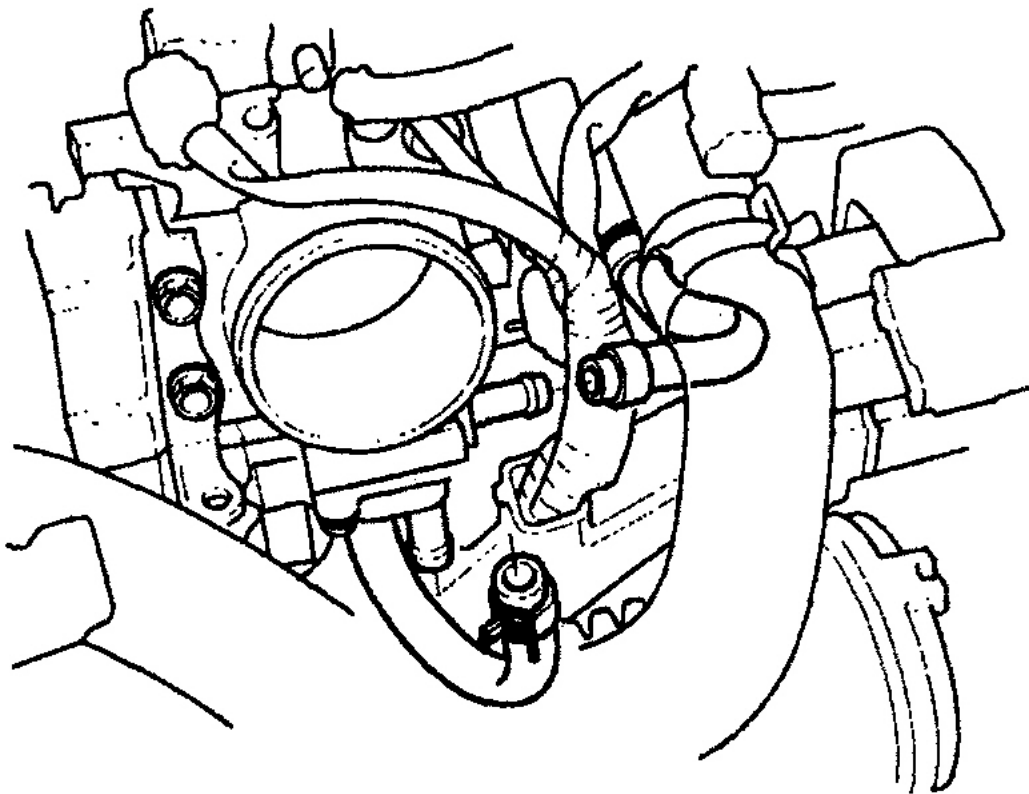
4. Remove the evaporative emission (EVAP) canister hose (A) and brake booster vacuum hose (B).



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Fig. 239: Removing EVAP Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the water bypass hoses, then plug the water bypass hoses.

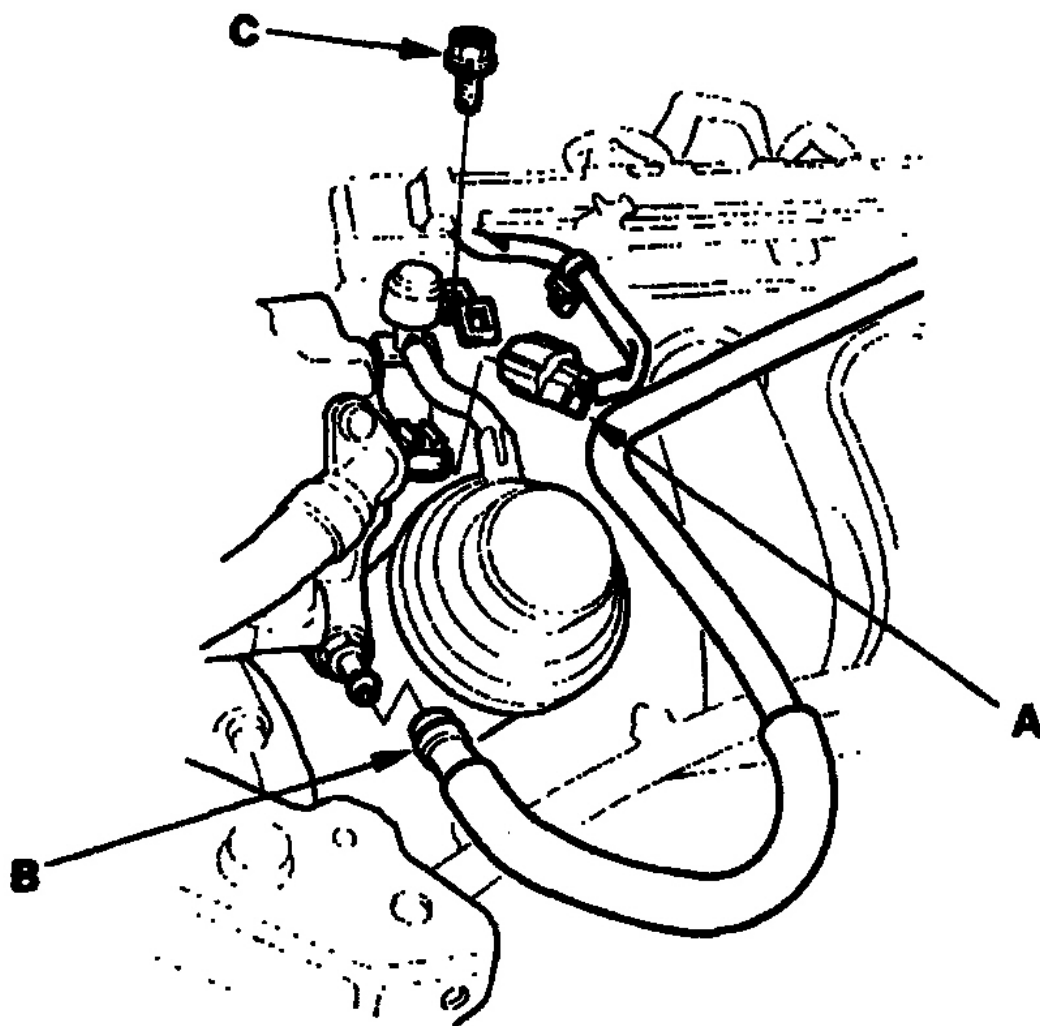


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Fig. 240: Removing Water Bypass Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

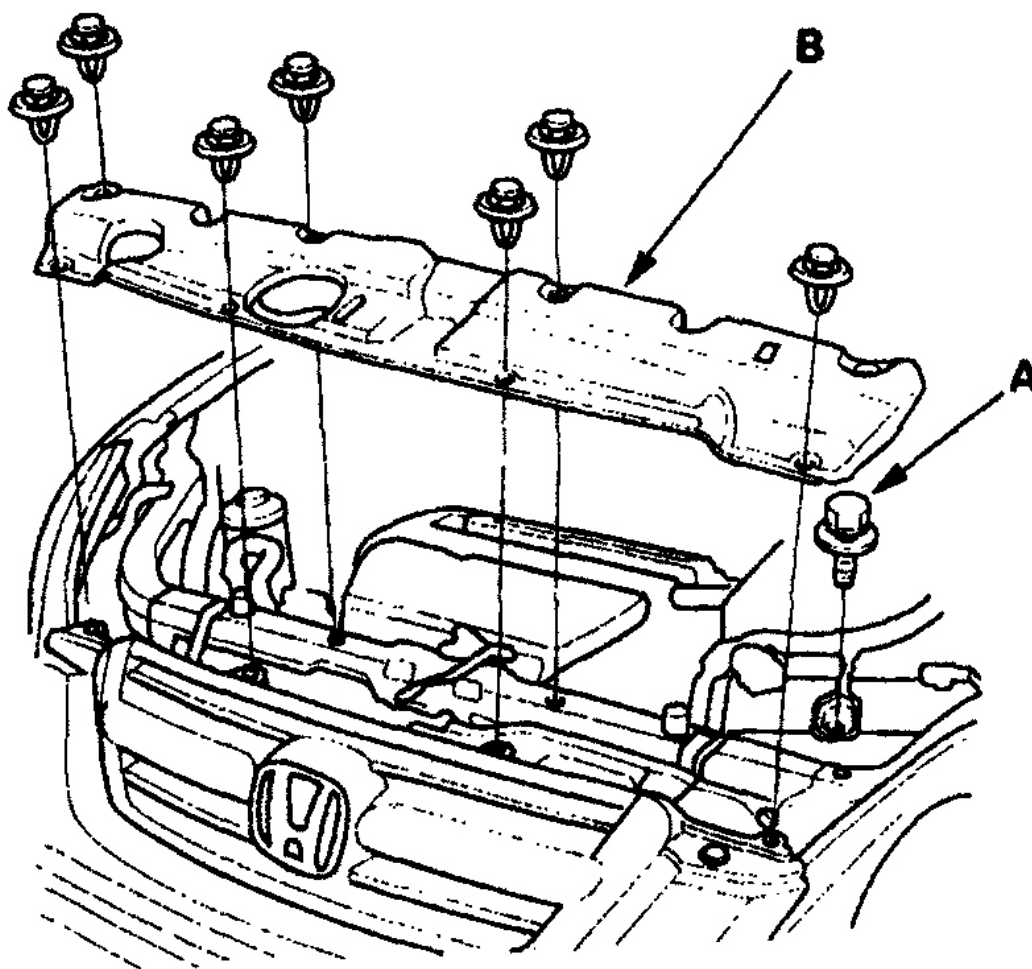
6. Disconnect the intake manifold runner control (IMRC) valve actuator control solenoid valve connector (A), then remove the positive crankcase ventilation (PCV) hose (B) and IMRC valve control solenoid valve mounting bolt (C).



G00256881

Fig. 241: Disconnecting IMRC Valve Actuator Control Solenoid Valve Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the bolt (A) securing the battery clamp, then remove the bulkhead cover (B).

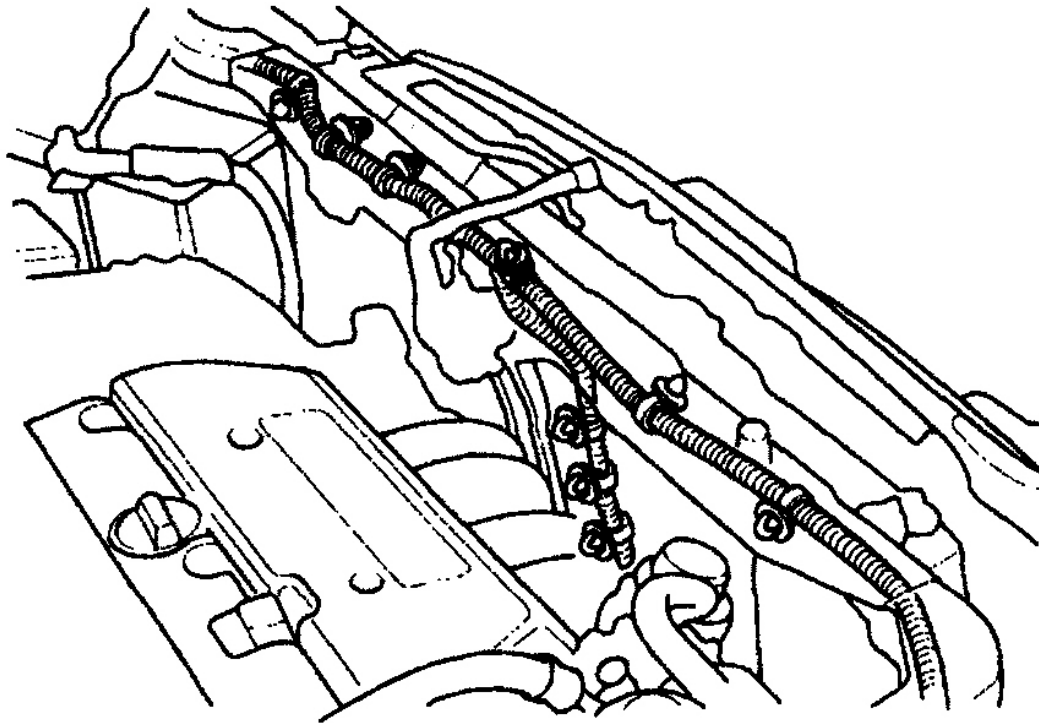


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Fig. 242: Removing Bulkhead Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the harness clamps.

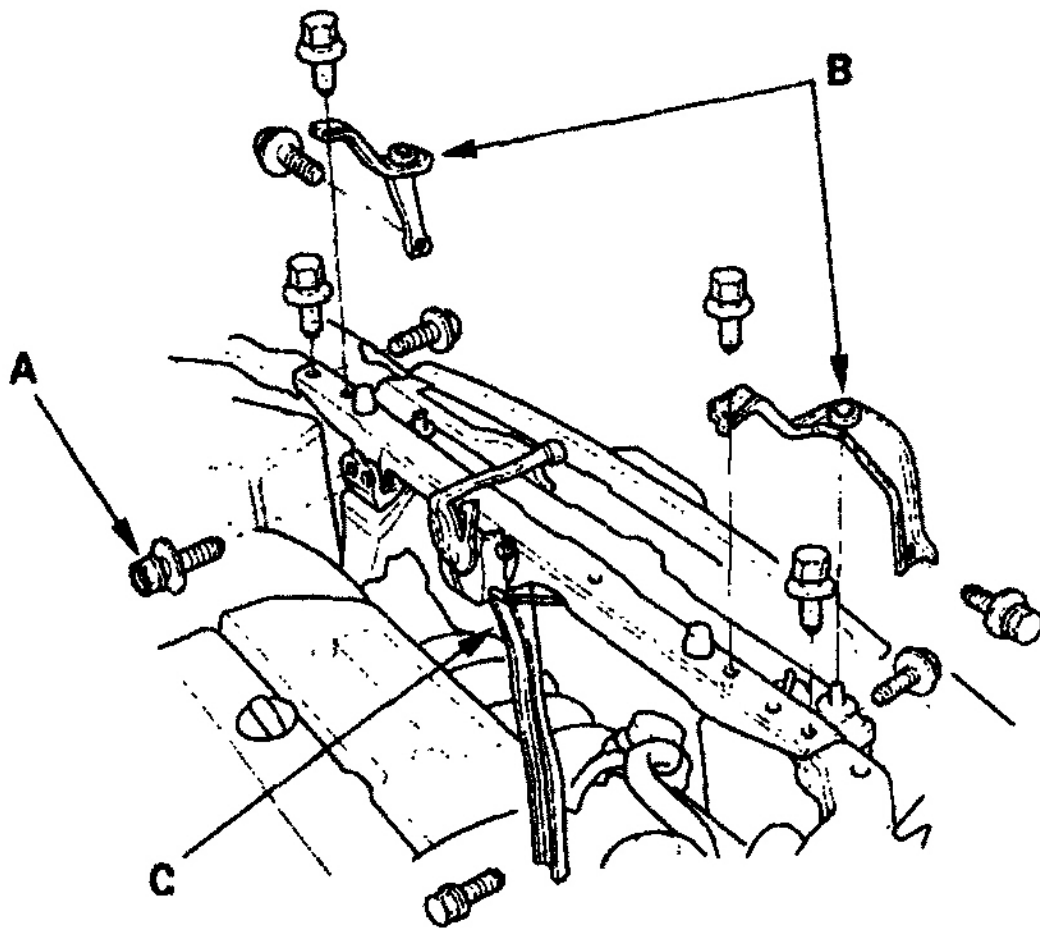


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Fig. 243: Removing Harness Clamps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

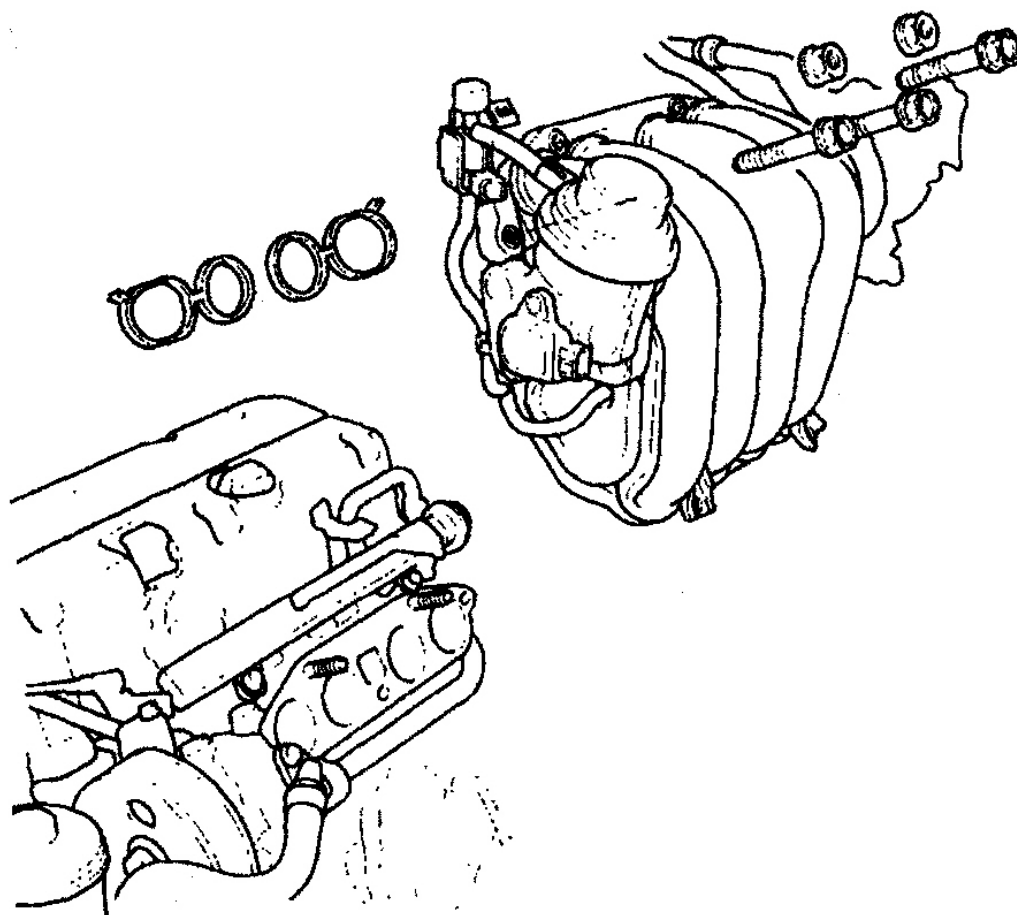
9. Remove the intake air duct mounting bolts (A) and upper bracket and cushion (B), then remove the bulkhead (C).



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Fig. 244: Remove Intake Air Duct Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the engine wire harness connectors and wire harness clamps from the intake manifold.
 - Idle air control (IAC) valve connector
 - Throttle position sensor connector
 - Manifold absolute pressure (MAP) sensor connector
 - Evaporative emission (EVAP) canister purge valve connector
 - IMRC valve position sensor connector
11. Remove the intake manifold.



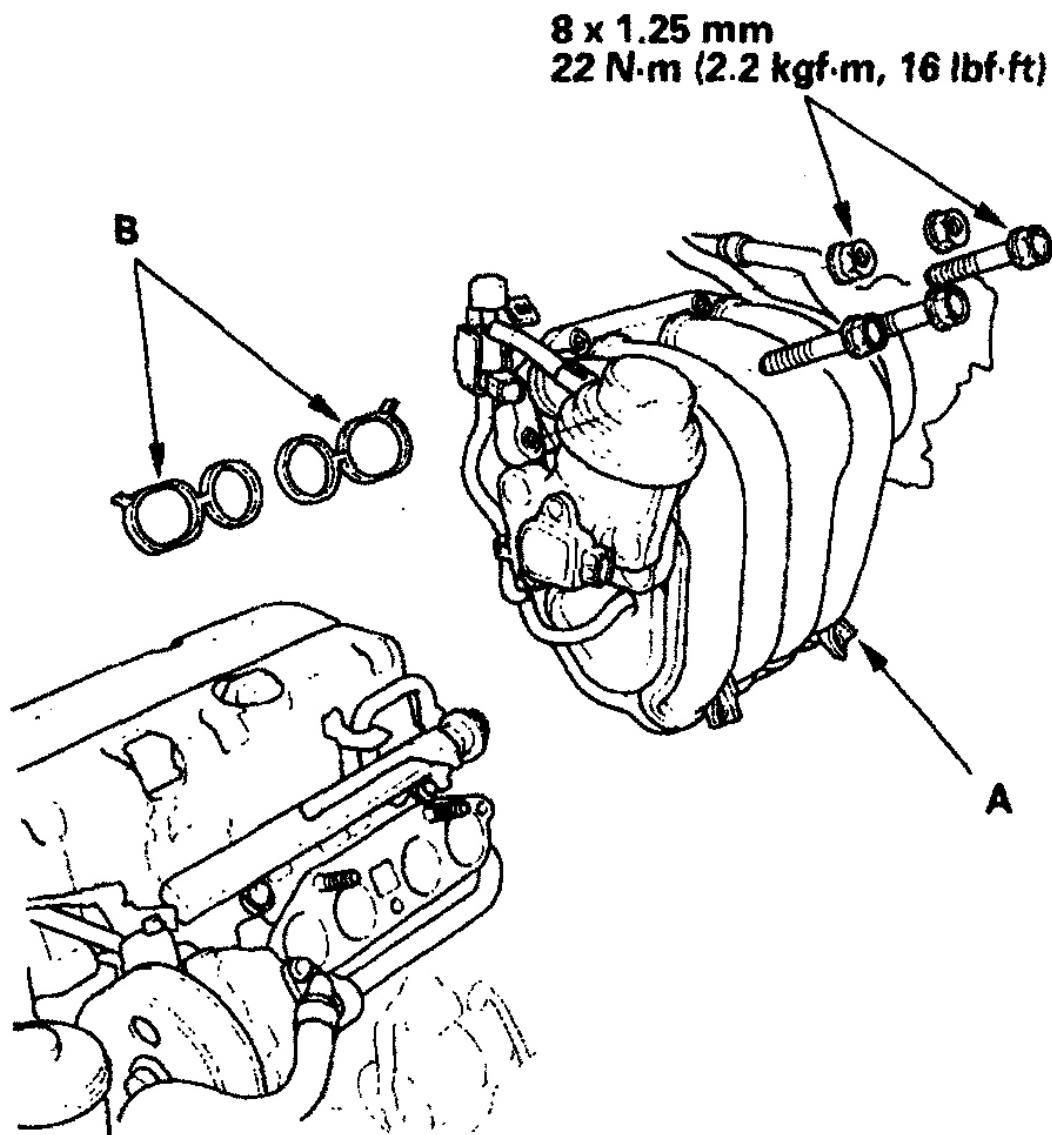
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Fig. 245: Removing Intake Manifold

Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Install the intake manifold (A), and tighten the bolts/nuts in a crisscross pattern in two or three steps, beginning with the inner bolt. Use the new O-rings (B).

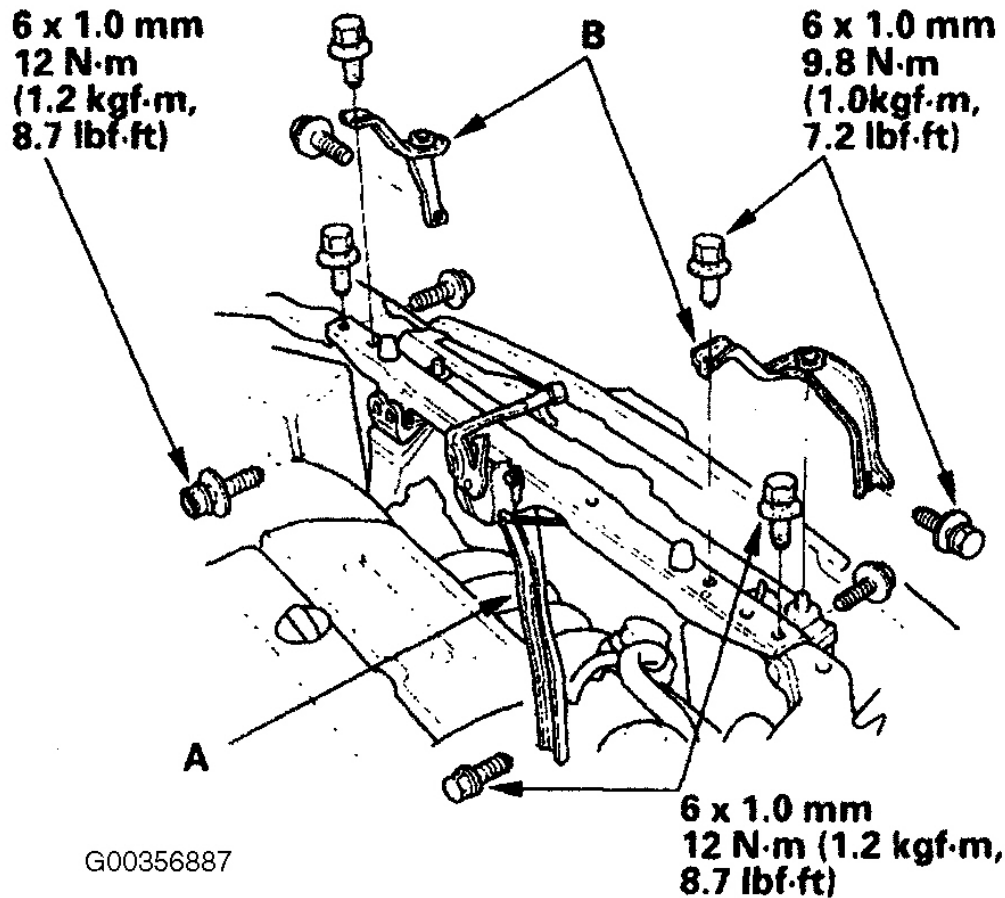


G00356886

Fig. 246: Installing Intake Manifold

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the bulkhead (A), then install the upper bracket and cushion (B) and intake air duct mounting bolts (C). Apply body paint to the bulkhead mounting bolts.

**Fig. 247: Installing Upper Brackets**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Connect the harness clamps. See **Fig. 243**.
4. Install the bulkhead cover (A), then install the battery clamp bolt (B). See **Fig. 242**.
5. Connect intake manifold runner control (IMRC) valve actuator control solenoid valve connector (A), then install the positive crankcase ventilation (PCV) hose (B) and IMRC valve control solenoid valve mounting bolt (C). See **Fig. 241**.
6. Install the water bypass hoses. See **Fig. 240**.
7. Install the evaporative emission (EVAP) canister hose (A) and brake booster vacuum hose (B). See **Fig. 239**.
8. Install the throttle cable, then adjust. See Throttle Cable Adjustment.
9. Install cruise control cable, then adjust. See Cruise Control Actuator Cable Adjustment.
10. Install the intake air temperature (IAT) sensor connector (A), remove the breather hose (B), then remove the air cleaner Housing (C). See **Fig. 237**.
11. Install the breather hose (C).

12. Install the intake manifold cover. See **Fig. 236** .
13. After installation, check that all tubes, hoses, and connectors are installed correctly.
14. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open. See **COOLANT REPLACEMENT** .
15. Clean up any spilled engine coolant.

EXHAUST MANIFOLD

REMOVAL & INSTALLATION

1. Remove the VTEC solenoid valve. See VTEC Solenoid Valve Removal & Installation .
2. Remove the intermediate shaft heat shield. See **INTERMEDIATE SHAFT** .
3. Remove the cover and exhaust manifold bracket, then remove the exhaust manifold.
4. Install the exhaust manifold and tighten the bolts/nuts in a crisscross pattern in two or three steps, beginning with the inner bolt.
5. Install the other parts in the reverse order of removal.

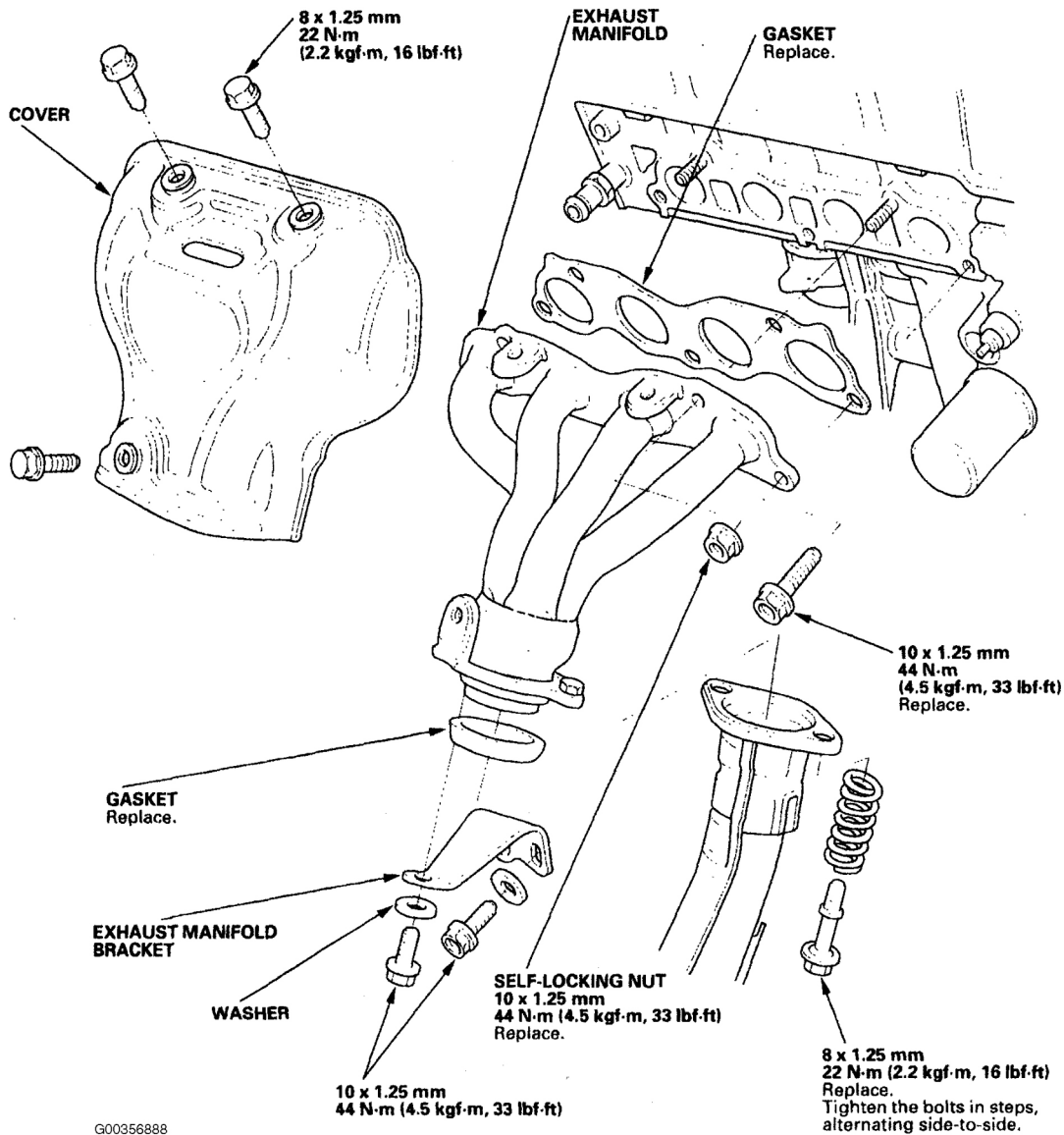


Fig. 248: Exploded View Of Exhaust Manifold
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Compressor Bracket-To-Engine Nut/Bolt	33 (44)
A/C Compressor-To-Bracket 8-mm Bolt	16 (22)
Ball Joint Castle Nut	44-51 (59-69)
Camshaft Holder Bolt ⁽¹⁾	
6-mm Bolt	

2003 Honda CR-V EX

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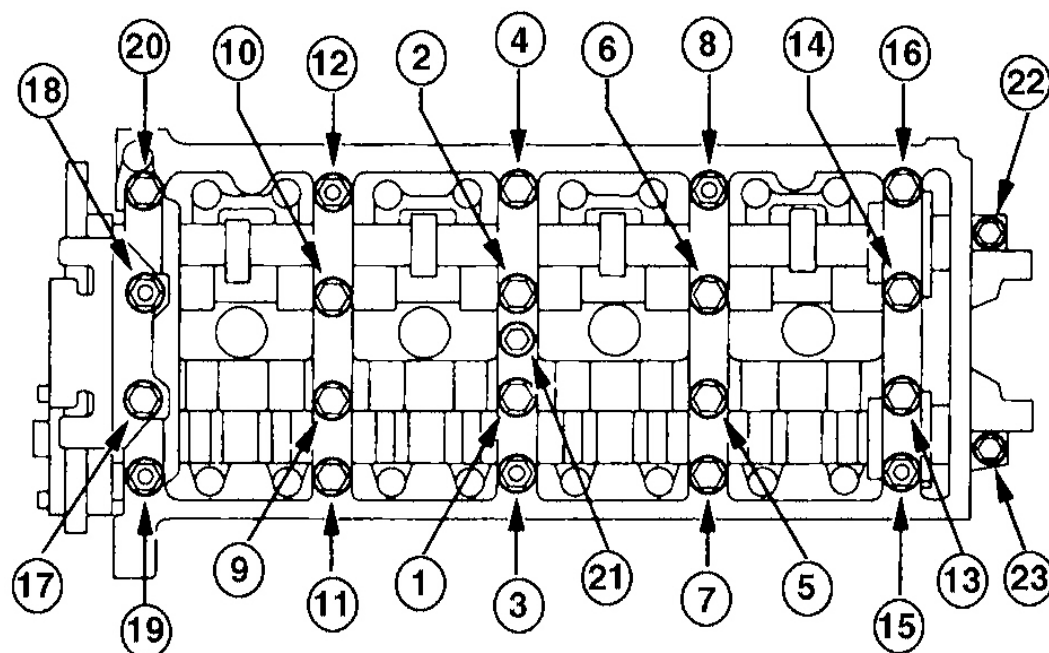
	(2)
8-mm Bolt	16 (22)
Camshaft Pulley Bolt	43 (58)
Clutch Slave Cylinder Bolt	16 (22)
Connecting Rod Bolt	
Step 1	14 (20)
Step 2	Tighten An Additional 90 Degrees
Crankshaft Main Bearing Cap/Bridge Bolt ⁽³⁾	
Inner Bolt	
Step 1	22 (29)
Step 2	Tighten An Additional 56 Degrees
Outer Bolt	16 (22)
Crankshaft Pulley Bolt	
Step 1	36 (49)
Step 2	Tighten An Additional 90 Degrees
Cylinder Head Bolt ⁽⁴⁾	
Step 1	29 (39)
Step 2	Tighten An Additional 90 Degrees
Step 3	Tighten An Additional 90 Degrees
Drive Belt Auto Tensioner Bolt	16 (22)
Drive Plate	55 (74)
Engine Mounts	
Front Engine Mount & Bracket	
Bracket-To-Engine 10-mm Bolt	33 (44)
Bracket-To-Mount 12-mm Through Bolt	47 (64)
Side Engine Mount-To-Side Bracket 10-mm Bolt	33 (44)
Side Upper Bracket-To-Mount Nut/Bolt	40 (54)
Rear Mount & Bracket	
Bracket-To-Engine Bolt	43 (59)
Bracket-To-Mount 12-mm Through Bolt	47 (64)
Transmission Mount	
Bracket-To-Transmission Bolt	40 (54)
Stiffener	
6-mm Bolt	(2)
10-mm Bolt	33 (44)
Engine Oil Pressure Switch	13 (18)

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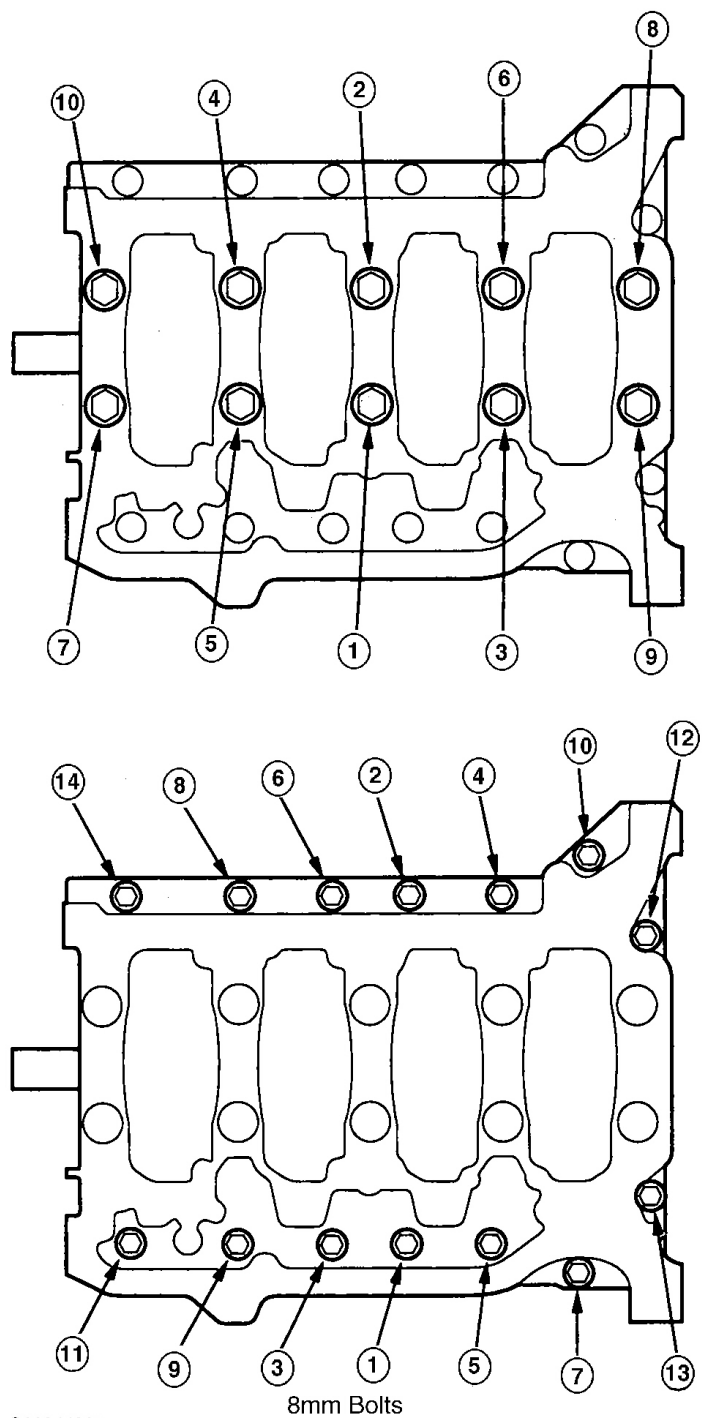
Exhaust Camshaft Sprocket Bolt	53 (72)
Exhaust Manifold Cover Bolt	16 (22)
Exhaust Manifold Nut	33 (44)
Exhaust Manifold Support Bracket Bolt	33 (44)
Exhaust Pipe Bracket Bolt	25 (34)
Exhaust Pipe 8-mm Flange Nut	16 (22)
Exhaust Pipe 10-mm Flange Nut	25 (34)
Generator	
Adjustment Brace-To-Bracket Bolt	16 (22)
Adjustment Lock Nut	16 (22)
Intake Manifold Chambers Bolt	16 (22)
Intake Manifold Nut	16 (22)
Intake Manifold Support Bracket Bolt	16 (22)
Knock Sensor	24 (32)
Oil Filter Feed Pipe	36 (49)
Oil Pan Drain Plug	33 (44)
Oil Pressure Switch	13 (18)
Power Steering Bracket-To-Engine 10-mm Bolt	36 (49)
VSS/Power Steering Speed Sensor Bolt	13 (18)
VTC Actuator Bolt	83 (113)
INCH Lbs. (N.m)	
A/C Compressor Bracket-To-Engine Nuts/Bolt	89 (10)
Baffle Plate Bolt	106 (12)
Battery Tray & Bracket	
6-mm Bolt	106 (12)
Ignition Coil	
6-mm Bolt	106 (12)
6-mm Nut	89 (10)
Intake Manifold	106 (12)
Oil Pan Nuts/Bolt ⁽⁵⁾	106 (12)
Oil Pump Cover Screw	106 (12)
Oil Pump Housing Bolt	106 (12)
Shift Cable Cover 6-mm Bolt	88 (10)
Water Pump Bolt	106 (12)

- (1) Tighten camshaft holder bolts in sequence. See **Fig. 249** .
- (2) Tighten bolts to 106 INCH (12).
- (3) Tighten crankshaft main bearing cap/bridge bolts in sequence. See **Fig. 250** .
- (4) Tighten cylinder head bolts in sequence. See **Fig. 251** .
- (5) Tighten oil pan bolts in sequence. See **Fig. 252** .



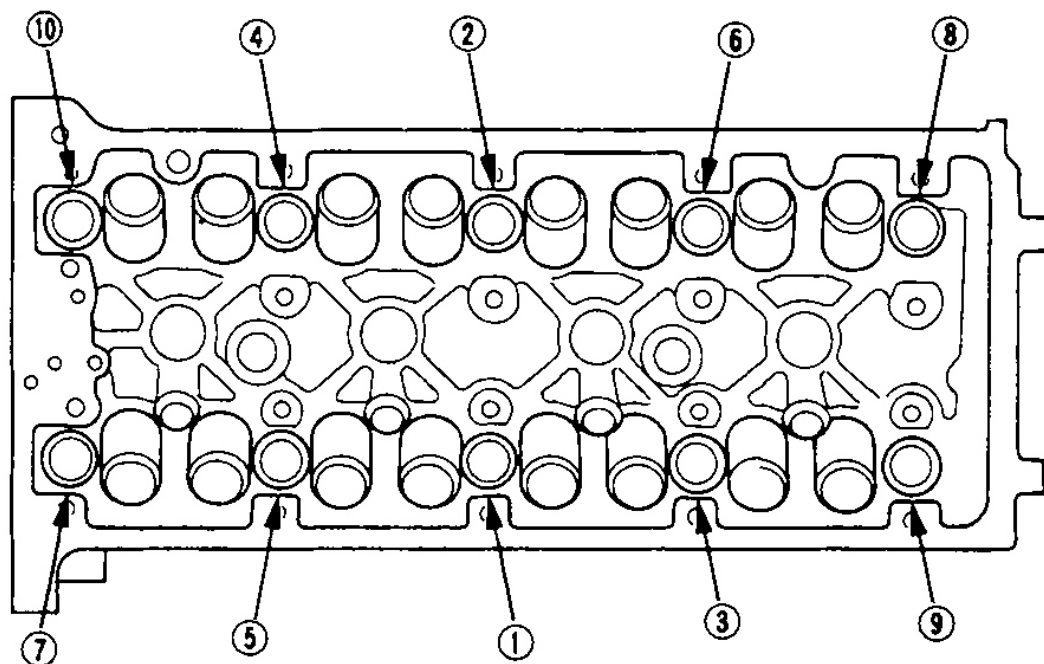
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Fig. 249: Camshaft Holder Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 250: Crankshaft Main Bearing Cap Bolt Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 251: Cylinder Head Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

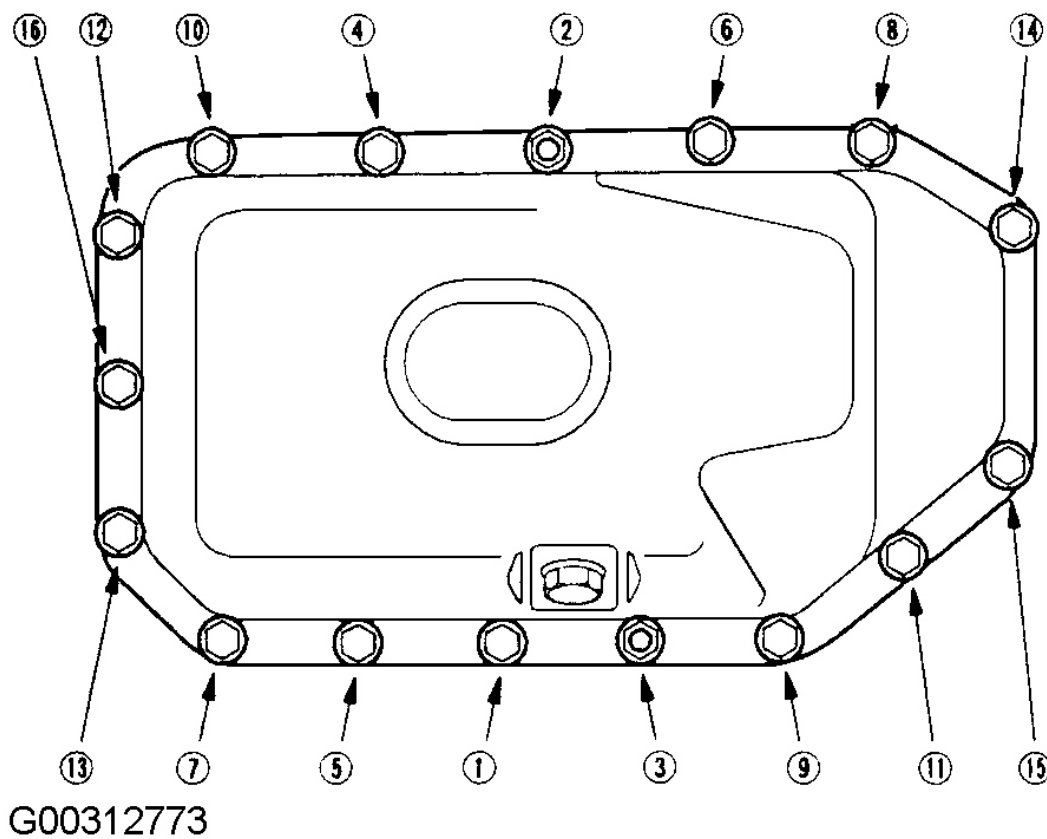


Fig. 252: Oil Pan Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.