

2001 ENGINE

Overhaul - 1.7L 4-CYLINDER

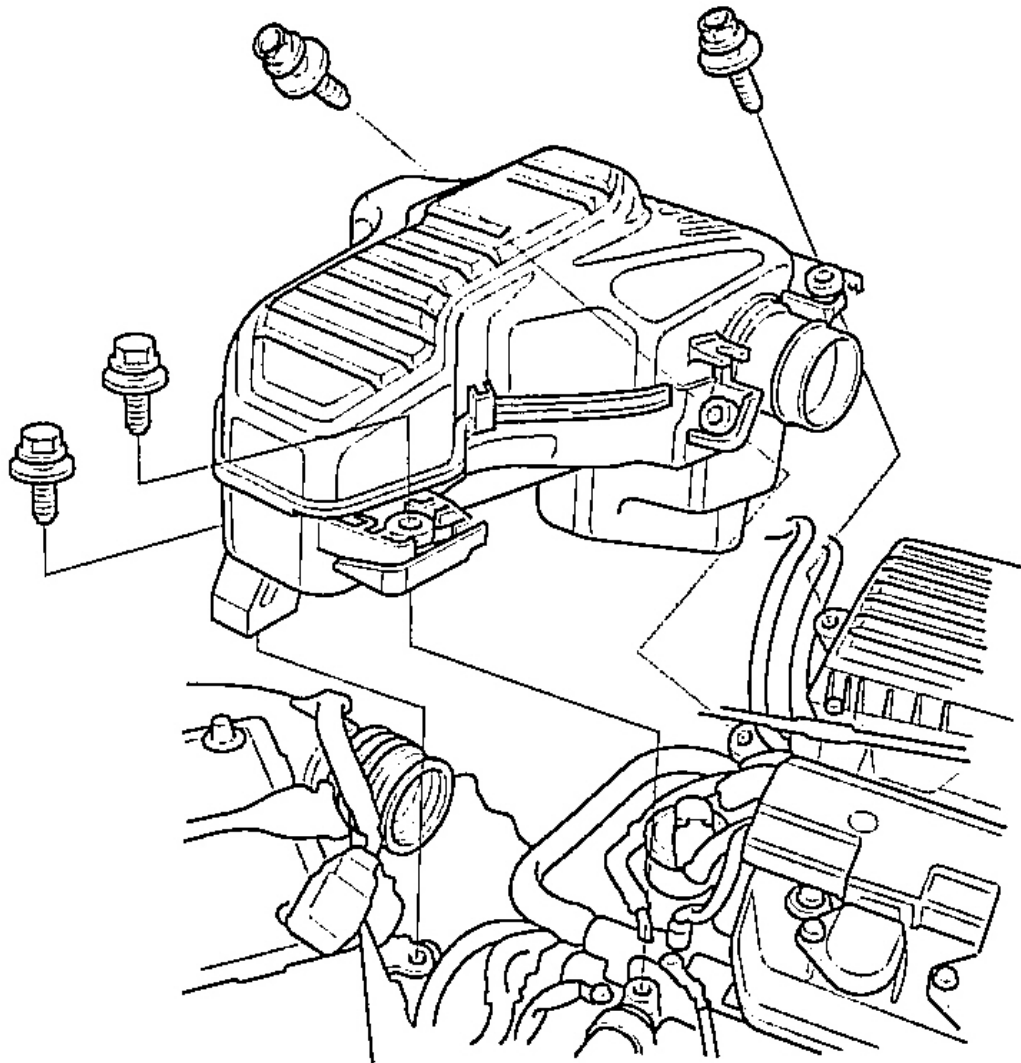
ENGINE ASSEMBLY

ENGINE REMOVAL

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.**

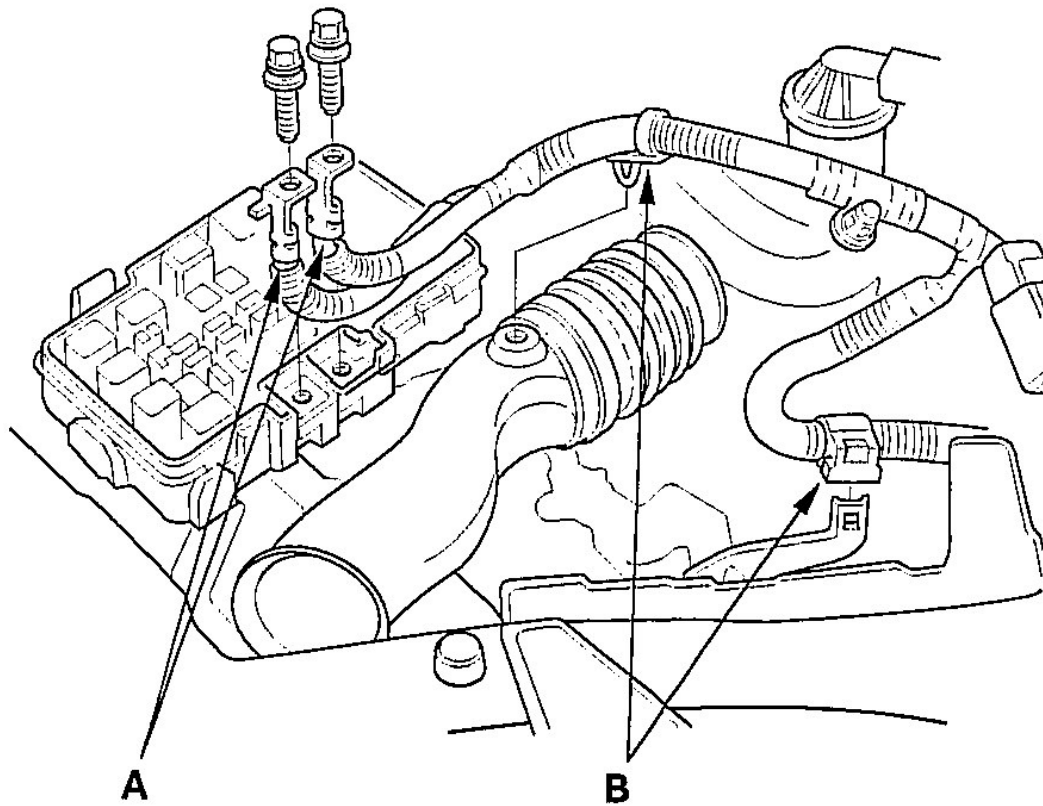
1. Secure the hood in the wide open position (support rod in the lower hole).
2. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
3. Disconnect the battery negative terminal first, then the positive terminal.
4. Remove the intake resonator.



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Fig. 1: Removing Intake Resonator

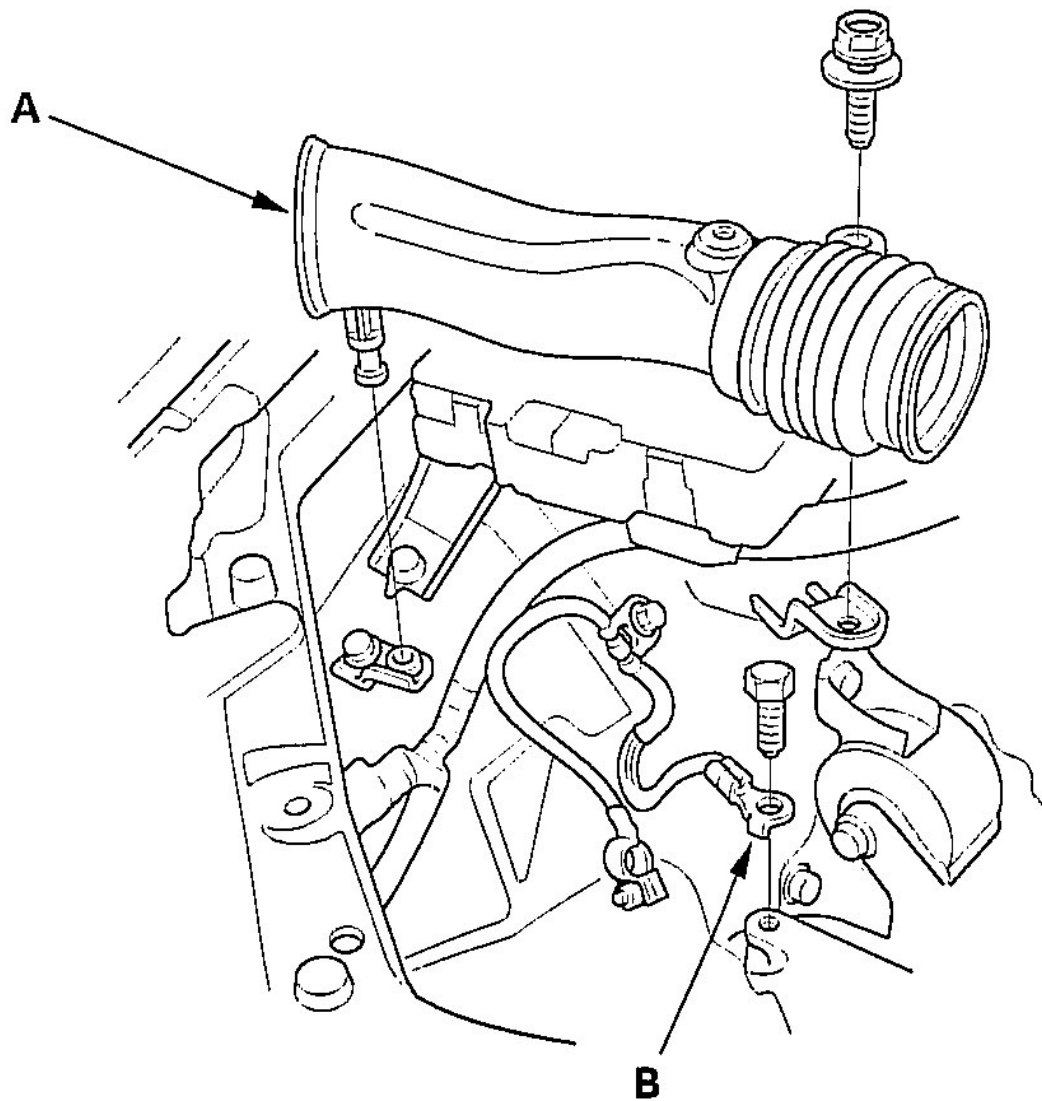
5. Remove the battery and battery base.
6. Remove the battery cables (A) from the fuse box, and remove the harness clamps (B).



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Fig. 2: Removing Battery Cables From Fuse Box & Harness Clamps

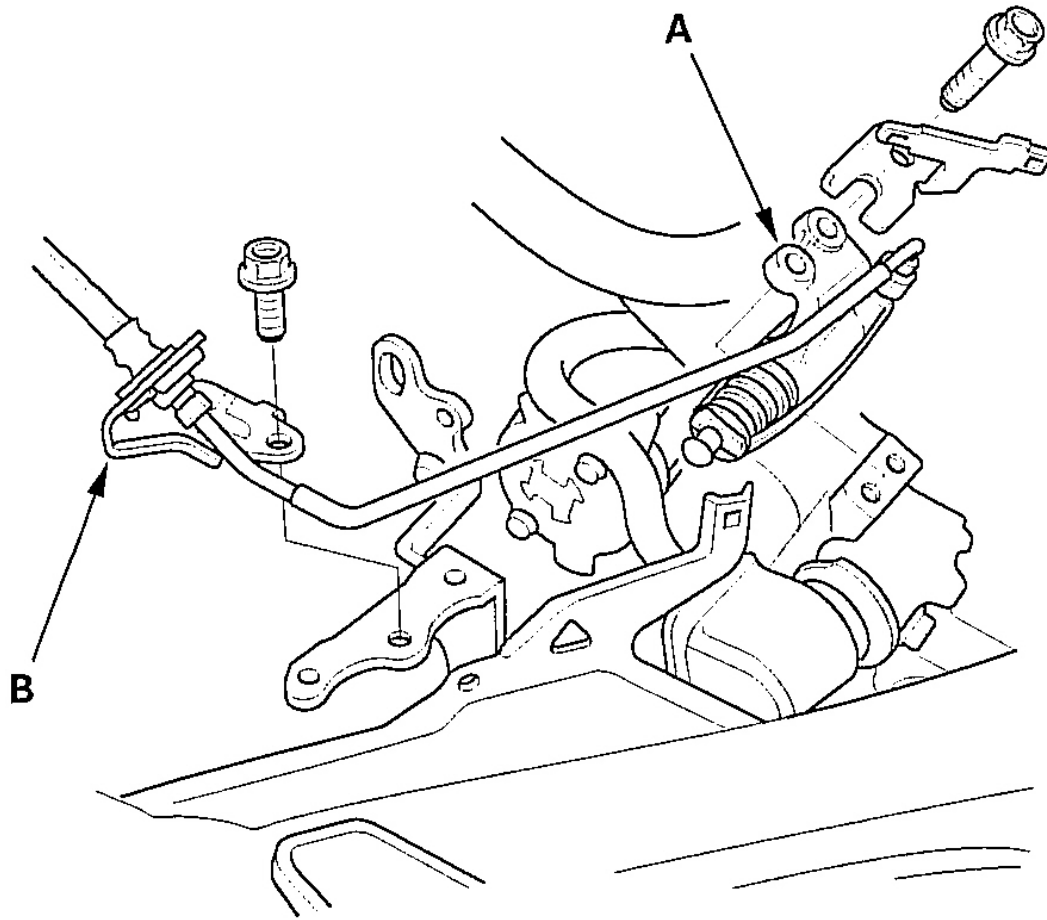
7. Remove the intake air duct (A) and ground cable (B).



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Fig. 3: Removing Intake Air Duct & Ground Cable

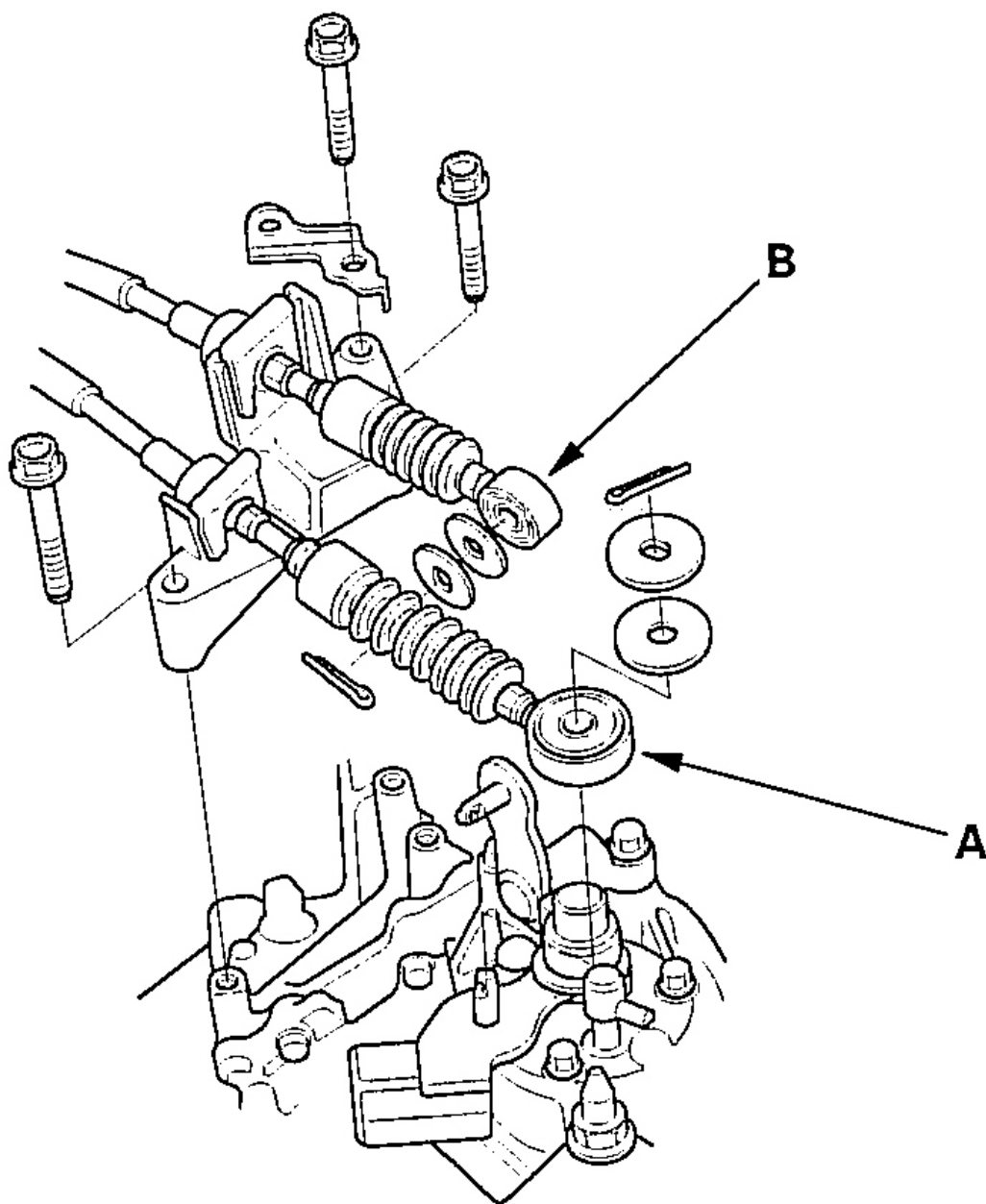
8. Remove the clutch slave cylinder (A) and clutch line bracket (B) (M/T).



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Fig. 4: Removing Clutch Slave Cylinder & Clutch Line Bracket - M/T

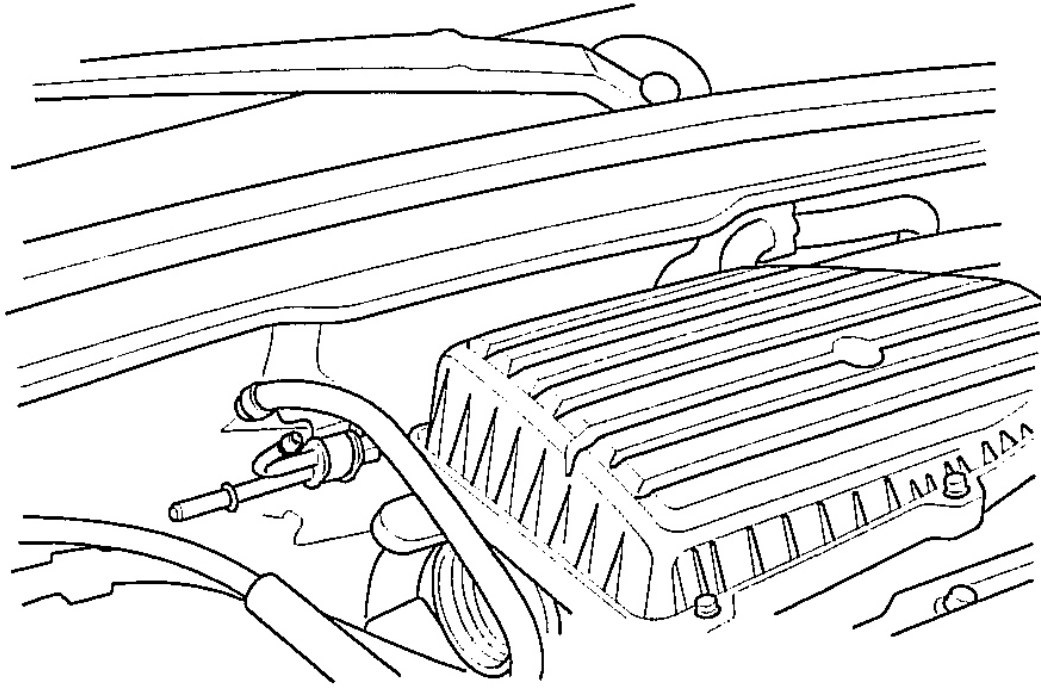
9. Remove the shift cable (A) and select cable (B) (M/T).



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Fig. 5: Removing Shift Cable & Select Cable - M/T

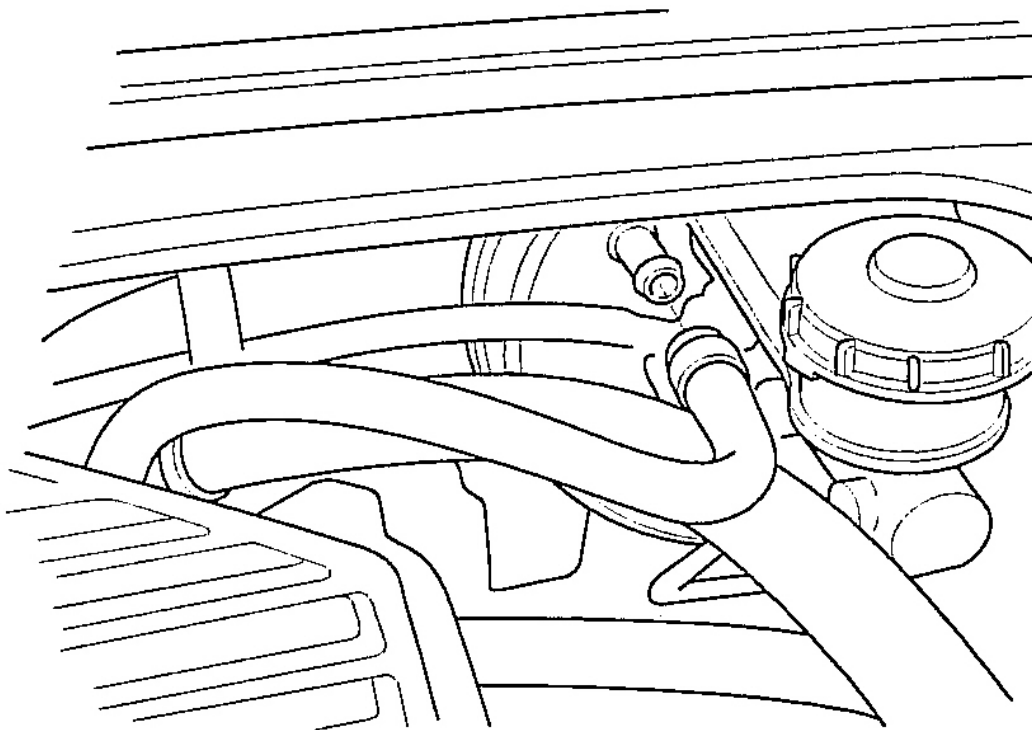
10. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
11. Remove the Evaporative Emission (EVAP) canister hose.



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Fig. 6: Removing EVAP Canister Hose

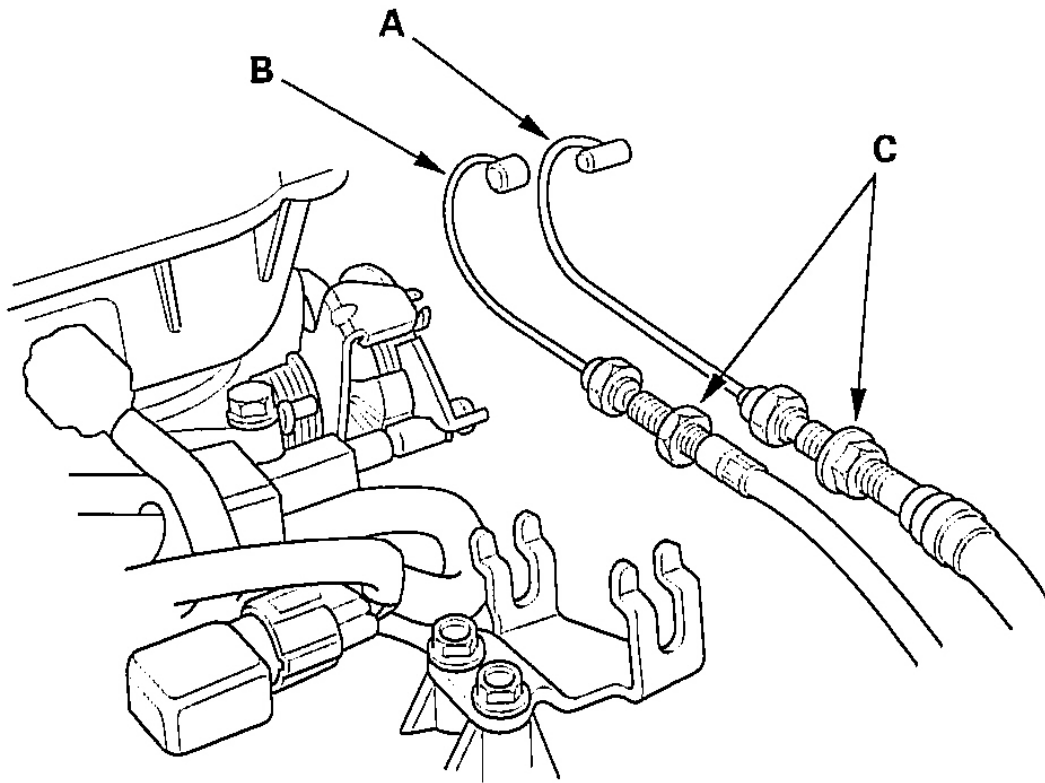
12. Remove the brake booster vacuum hose.



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Fig. 7: Removing Brake Booster Vacuum Hose

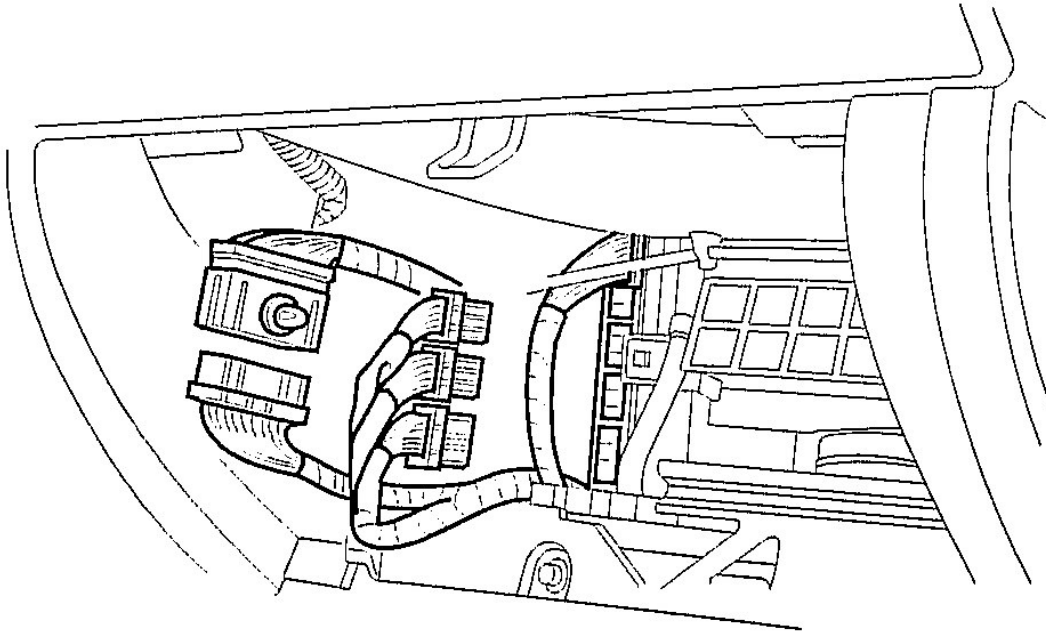
13. Remove the throttle cable (A) and cruise control cable (B) by loosening the locknuts (C), then slipping the cable ends out of the accelerator linkage. Take care not to bend the cables when removing them. Always replace any kinked cable with a new one.



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Fig. 8: Removing Throttle Cable & Cruise Control Cable

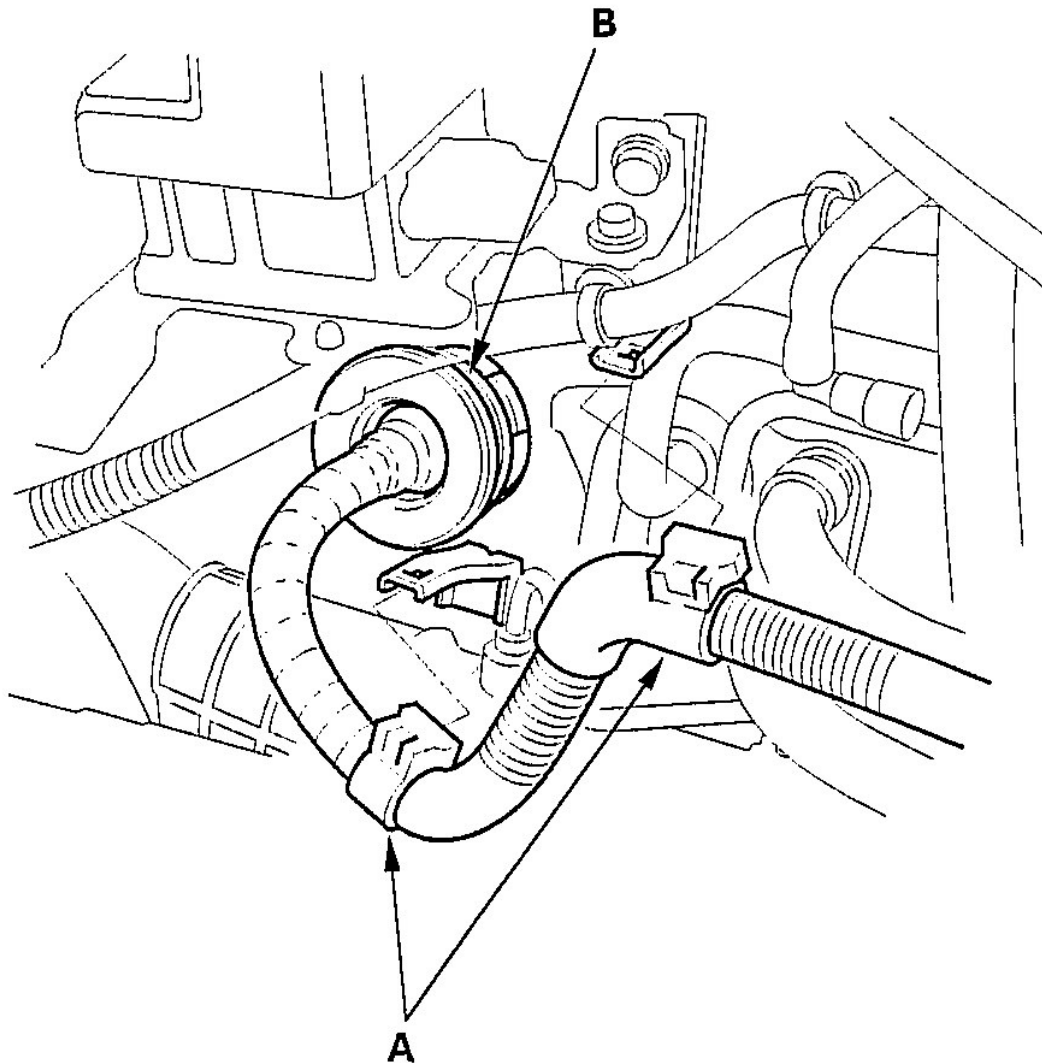
14. Remove the glove box stops, then open the glove box.
15. Disconnect the Engine Control Module (ECM)/Powertrain Control Module (PCM) connectors.



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Fig. 9: Disconnecting ECM/PCM Connectors

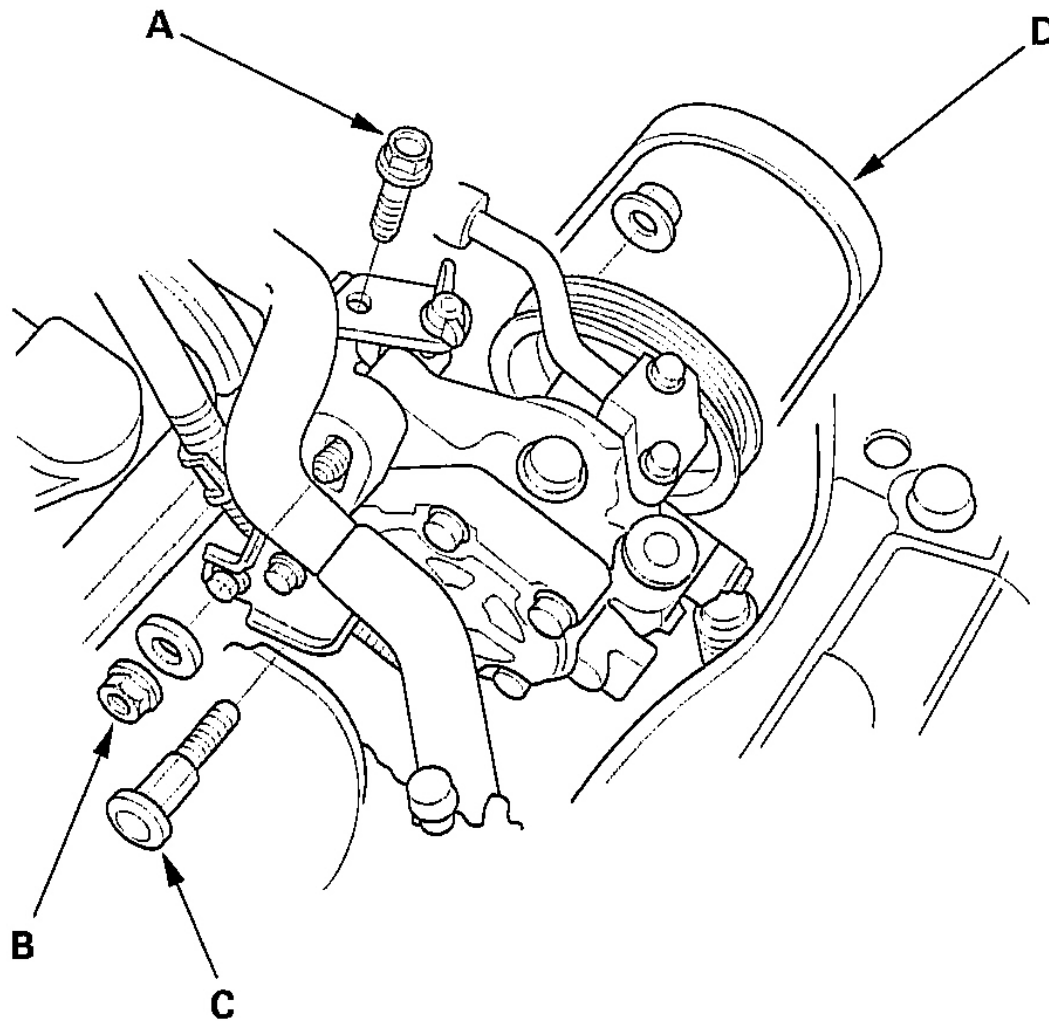
16. Remove the harness clamps (A) and grommet (B), then pull the engine wire harness through the bulkhead.



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Fig. 10: Removing Harness Clamps & Grommet

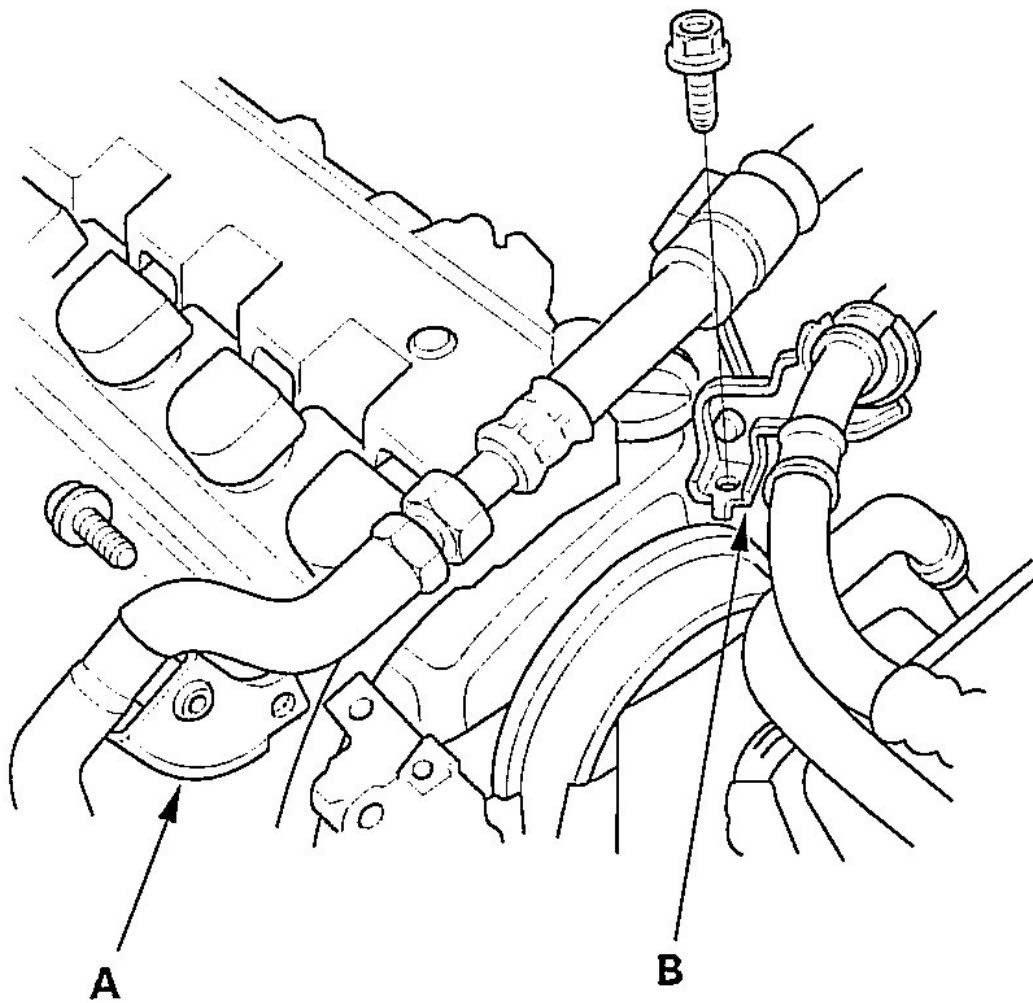
17. Remove the adjusting plate mounting bolt (A), locknut (B) and mounting bolt (C), then remove the power steering (P/S) pump belt (D) and pump without disconnecting the P/S hoses.



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Fig. 11: Removing Adjusting Plate Mounting Bolt

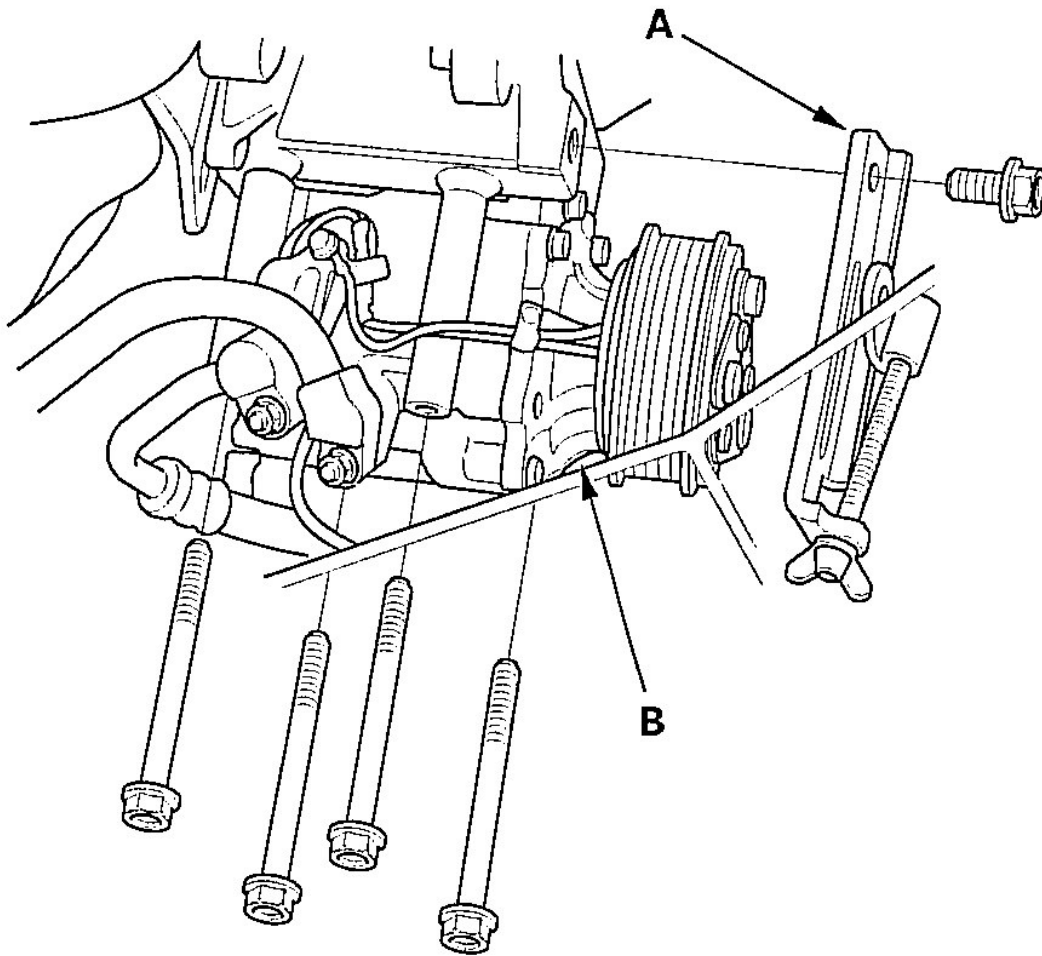
18. Remove the alternator (see **ALTERNATOR REPLACEMENT**).
19. Remove the air conditioning (A/C) hose bracket (A) and P/S hose bracket (B).



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Fig. 12: Removing A/C Hose Bracket & P/S Hose Bracket

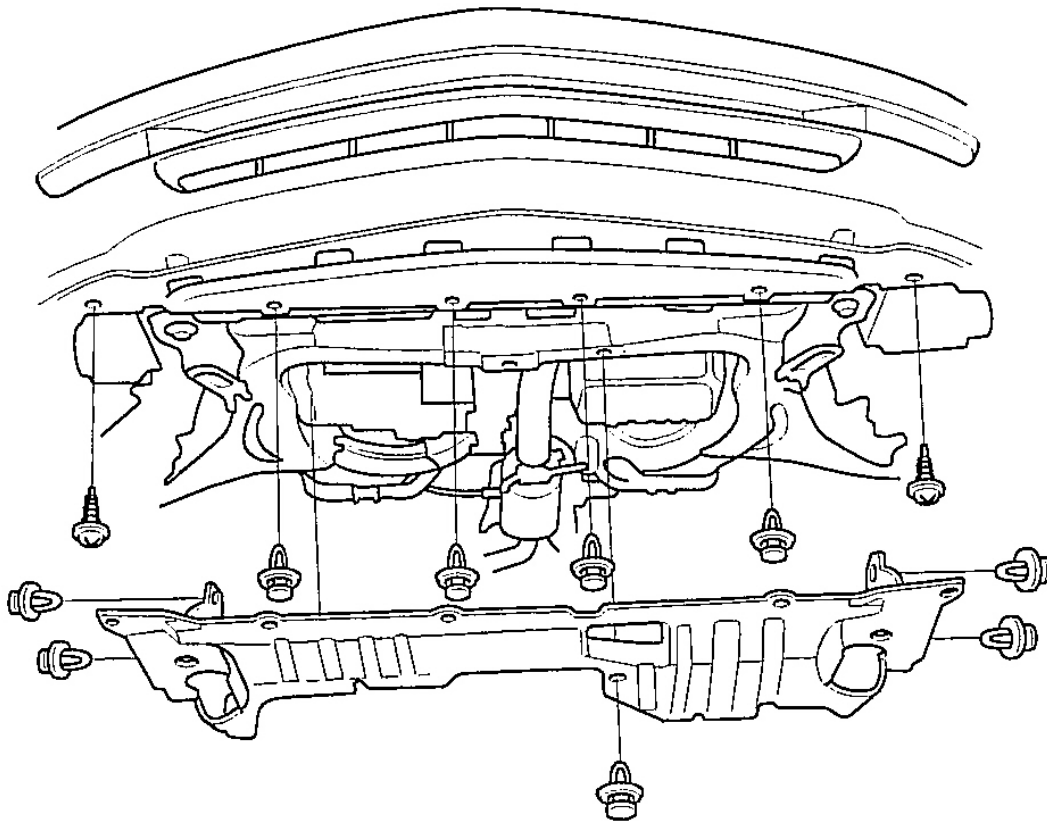
20. Remove the alternator lower bracket (A), then remove the A/C compressor (B) without disconnecting the A/C hoses.



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Fig. 13: Removing Alternator Lower Bracket & A/C Compressor

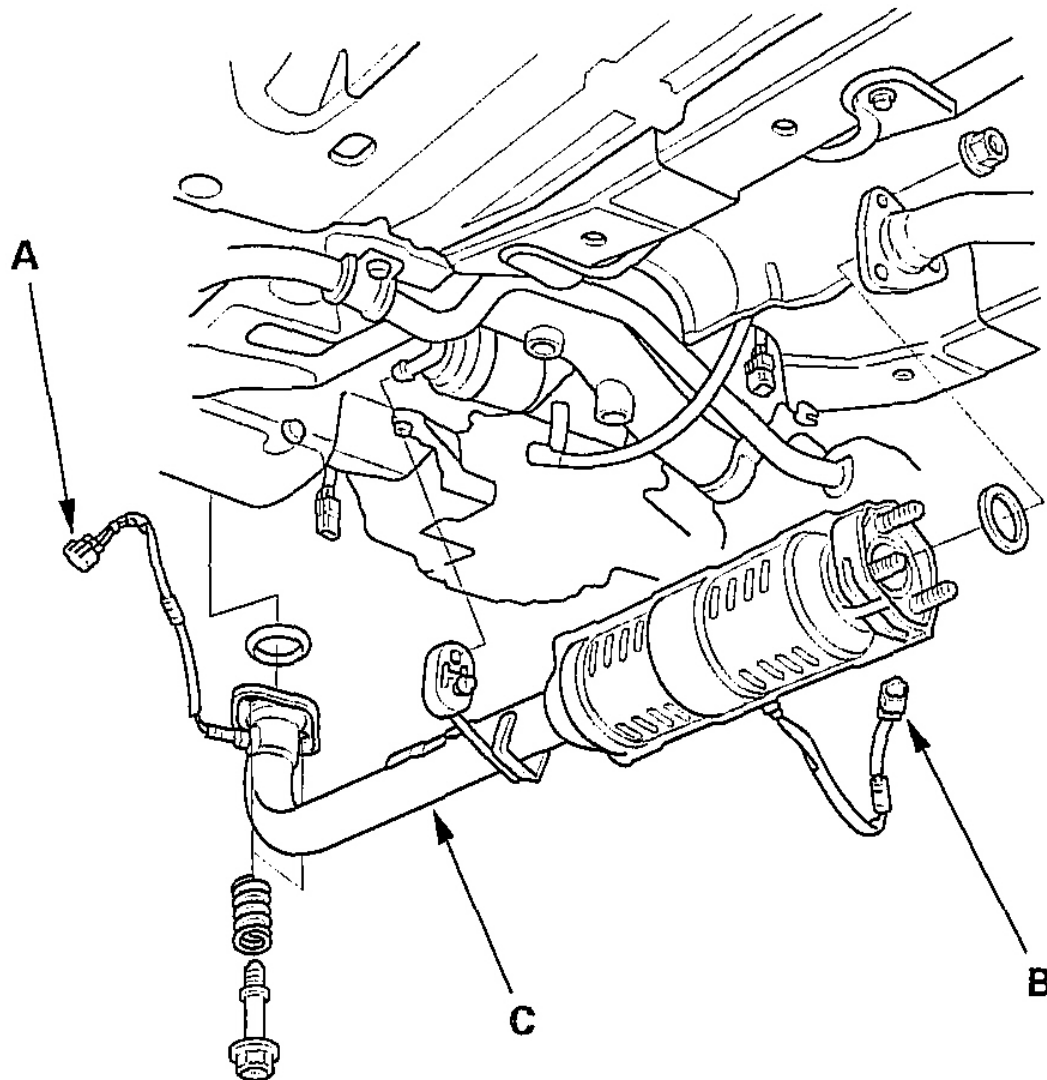
21. Remove the radiator cap.
22. Raise the hoist to full height.
23. Remove the front tires/wheels.
24. Remove the splash shield.



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Fig. 14: Removing Splash Shield

25. Loosen the drain plug in the radiator, drain the engine coolant (see **COOLANT REPLACEMENT**).
26. Drain the transmission fluid. Reinstall the drain plug using a new washer with MTF (see **TRANSMISSION FLUID INSPECTION AND REPLACEMENT**), or ATF (see **ATF REPLACEMENT**).
27. Drain the engine oil. Reinstall the drain bolt using a new washer (see **ENGINE OIL REPLACEMENT**).
28. Disconnect the primary Heated Oxygen Sensor (primary HO2S) connector (A) and secondary Heated Oxygen Sensor (secondary HO2S) connector (B), then remove the exhaust pipe A/Three Way Catalytic Converter (TWC) (C).



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Fig. 15: Removing Exhaust Pipe A/Three Way Catalytic Converter

29. Remove the shift cable covers (A), then remove the shift control cable (B) (A/T).

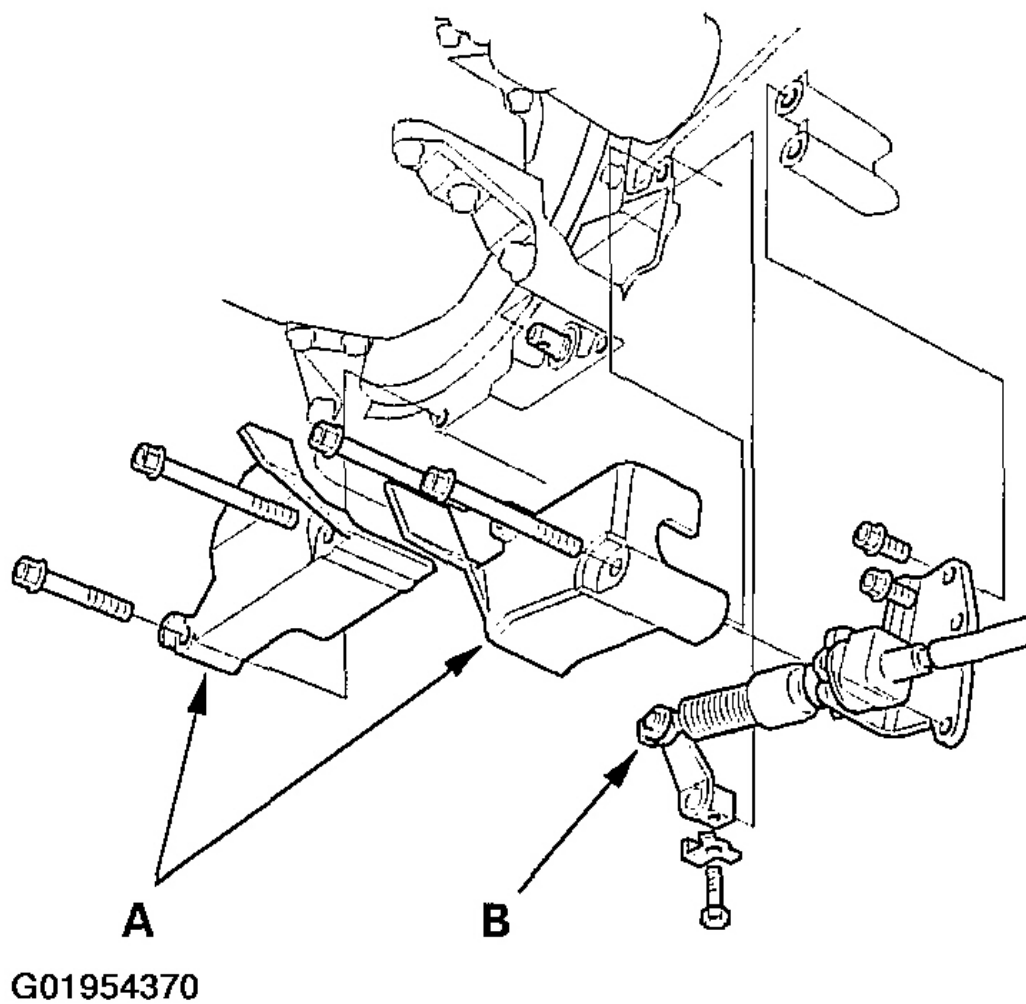
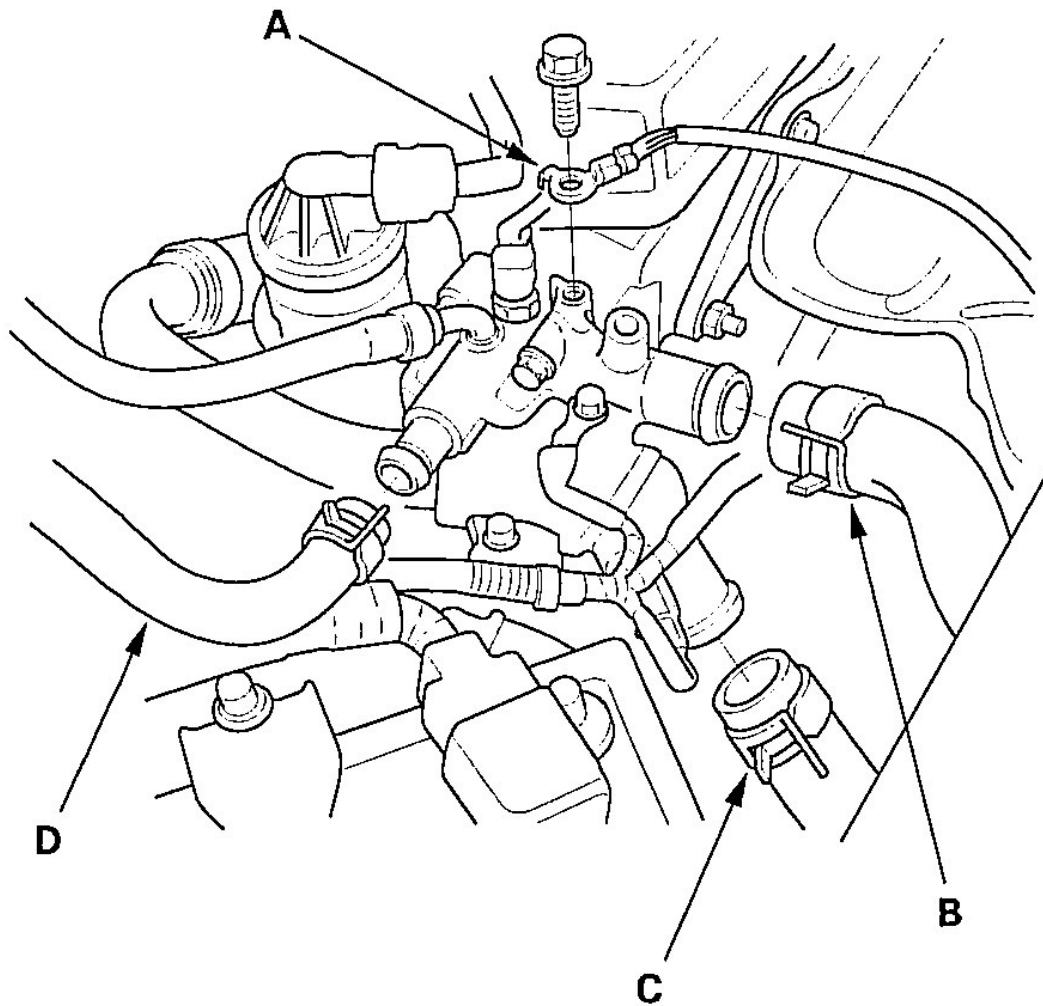


Fig. 16: Removing Shift Cable Covers & Shift Control Cable

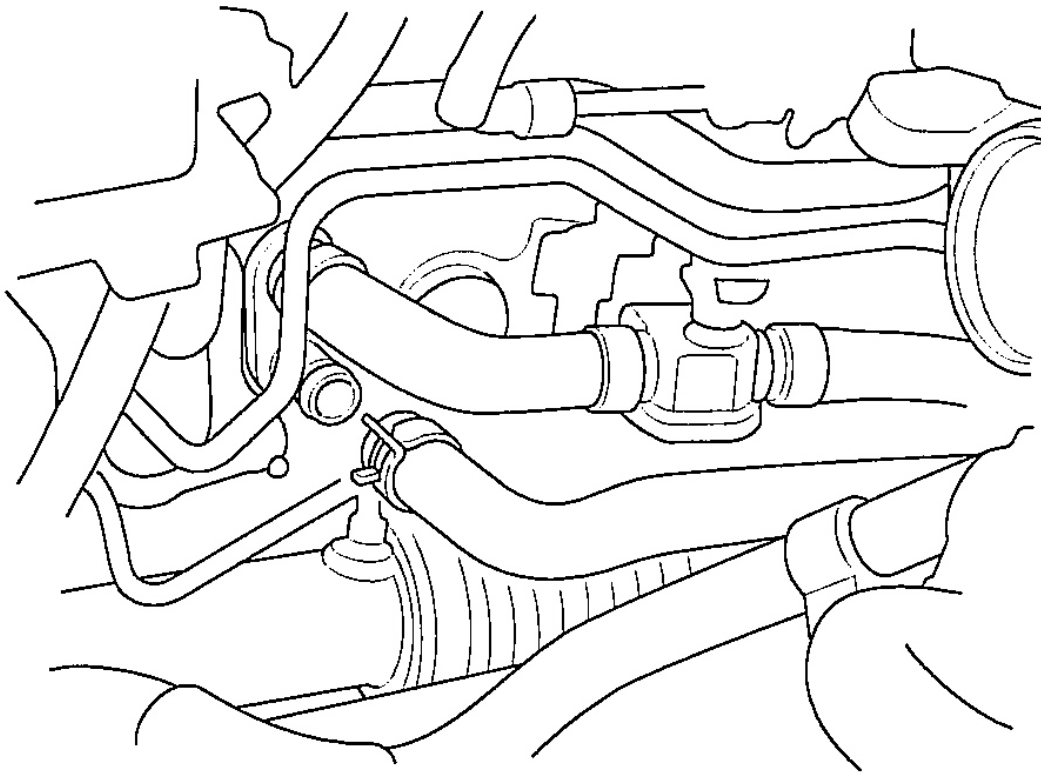
30. Disconnect the suspension lower arm ball joints (see **BALL JOINT REMOVAL**) and stabilizer links (see **STABILIZER LINK REPLACEMENT**).
31. Remove the driveshafts (see **DRIVESHAFTS REMOVAL**). Coat all precision finished surfaces with clean engine oil. Tie plastic bags over the driveshaft ends.
32. Lower the hoist.
33. Remove the ground cable (A), upper radiator hose (B), lower radiator hose (C) and heater hose (D).



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Fig. 17: Removing Ground Cable, Upper Radiator Hose, Lower Radiator Hose & Heater Hose

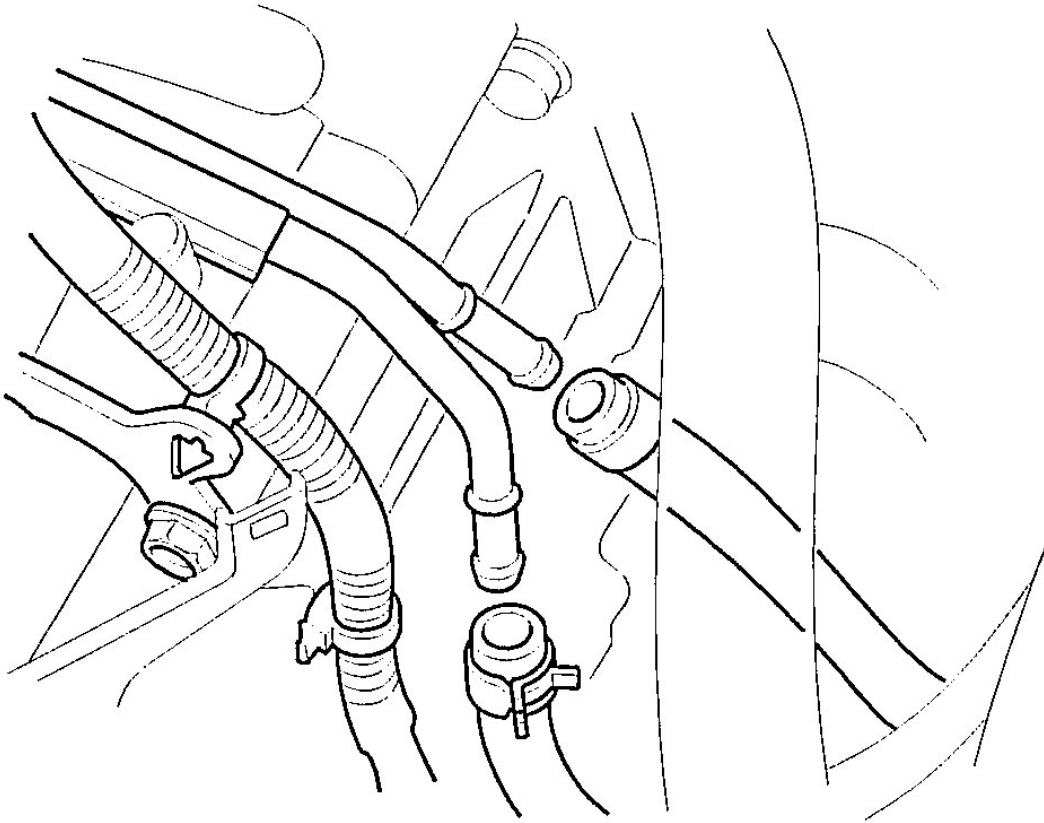
34. Remove the heater hose.



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Fig. 18: Removing Heater Hose

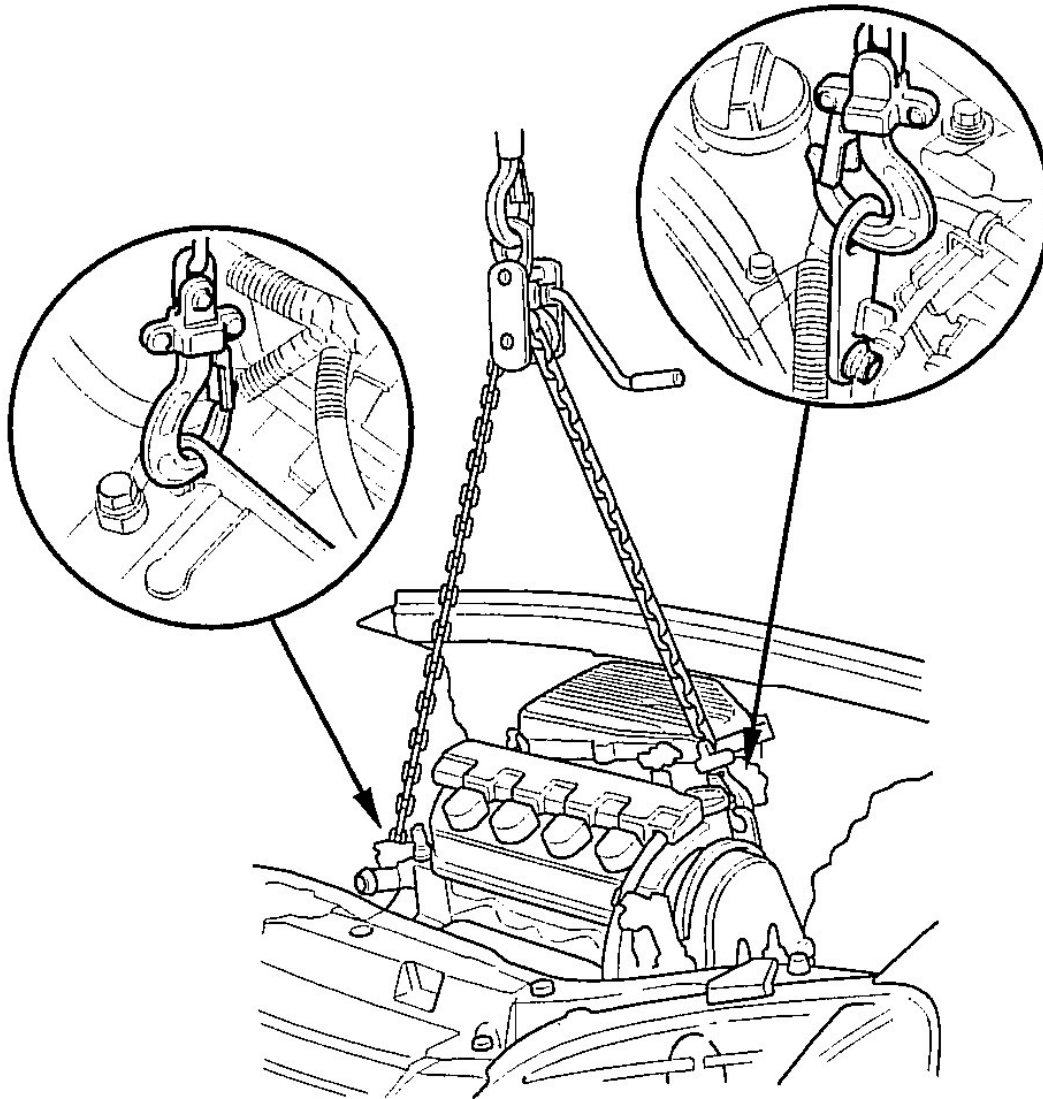
35. Remove the ATF cooler hoses, then plug the ATF cooler hoses and lines (A/T).



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Fig. 19: Removing ATF Cooler Hoses

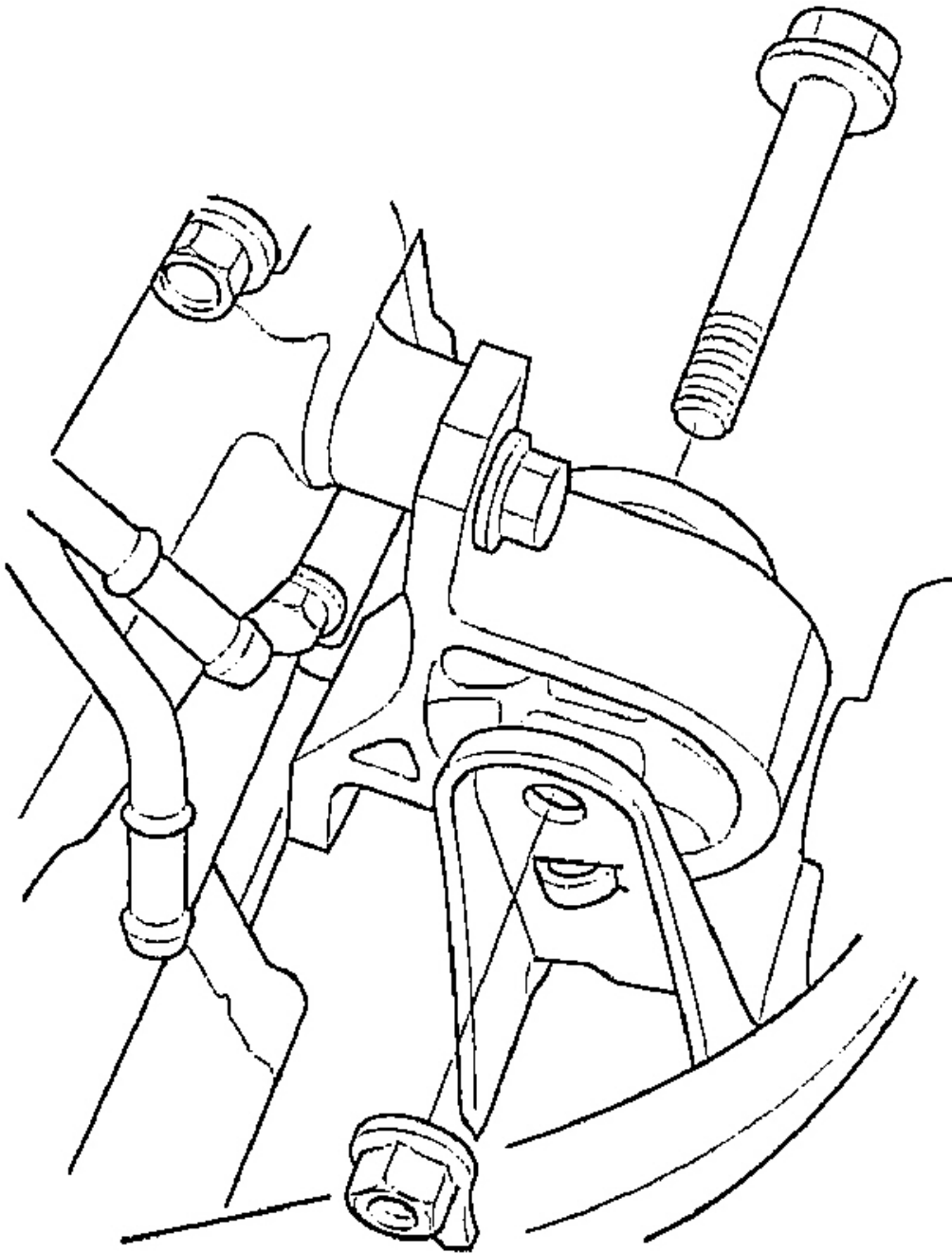
36. Attach the chain hoist to the engine as shown in **Fig. 20** .



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Fig. 20: Attaching Chain Hoist To Engine

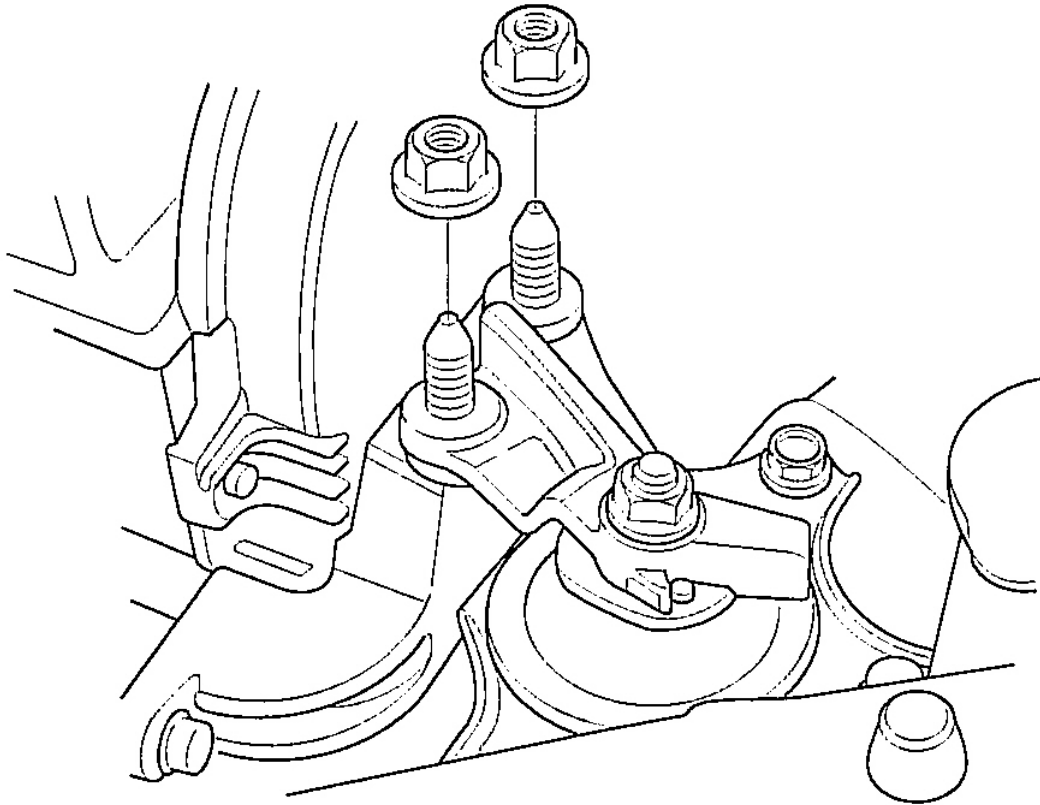
37. Remove the front mount mounting bolt.



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Fig. 21: Removing Front Mount Mounting Bolt

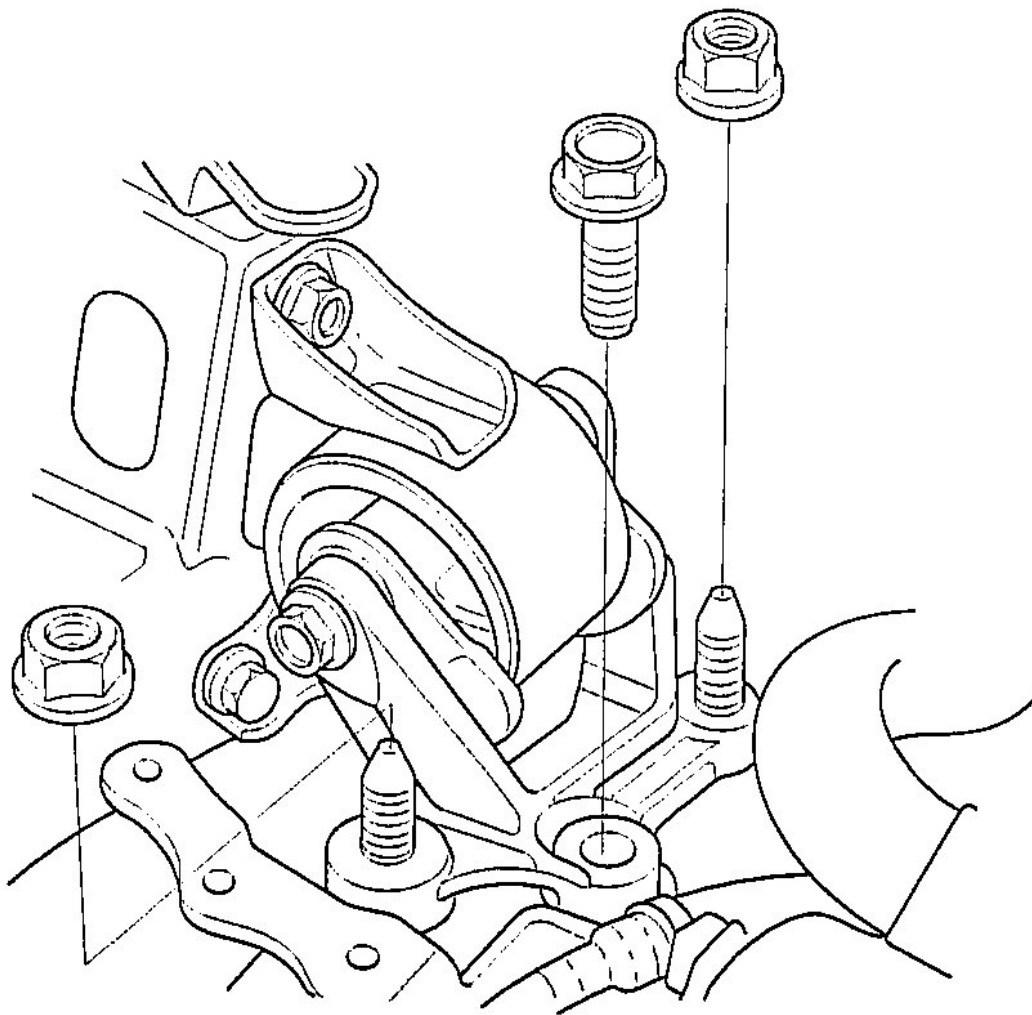
38. Remove the side engine mount bracket mounting nuts.



G01954376

Fig. 22: Removing Side Engine Mount Bracket Mounting Nuts

39. Remove the transmission mount bracket mounting bolt/nuts.



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Fig. 23: Removing Transmission Mount Bracket Mounting Bolt/Nuts - M/T

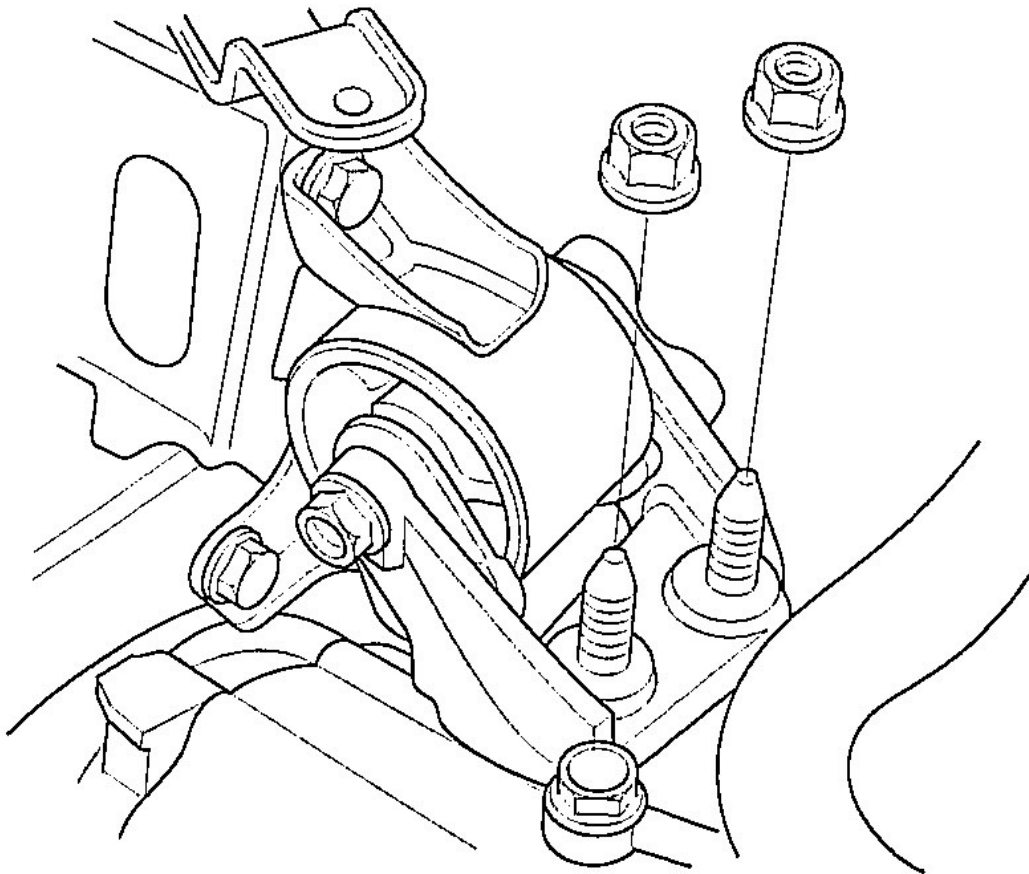
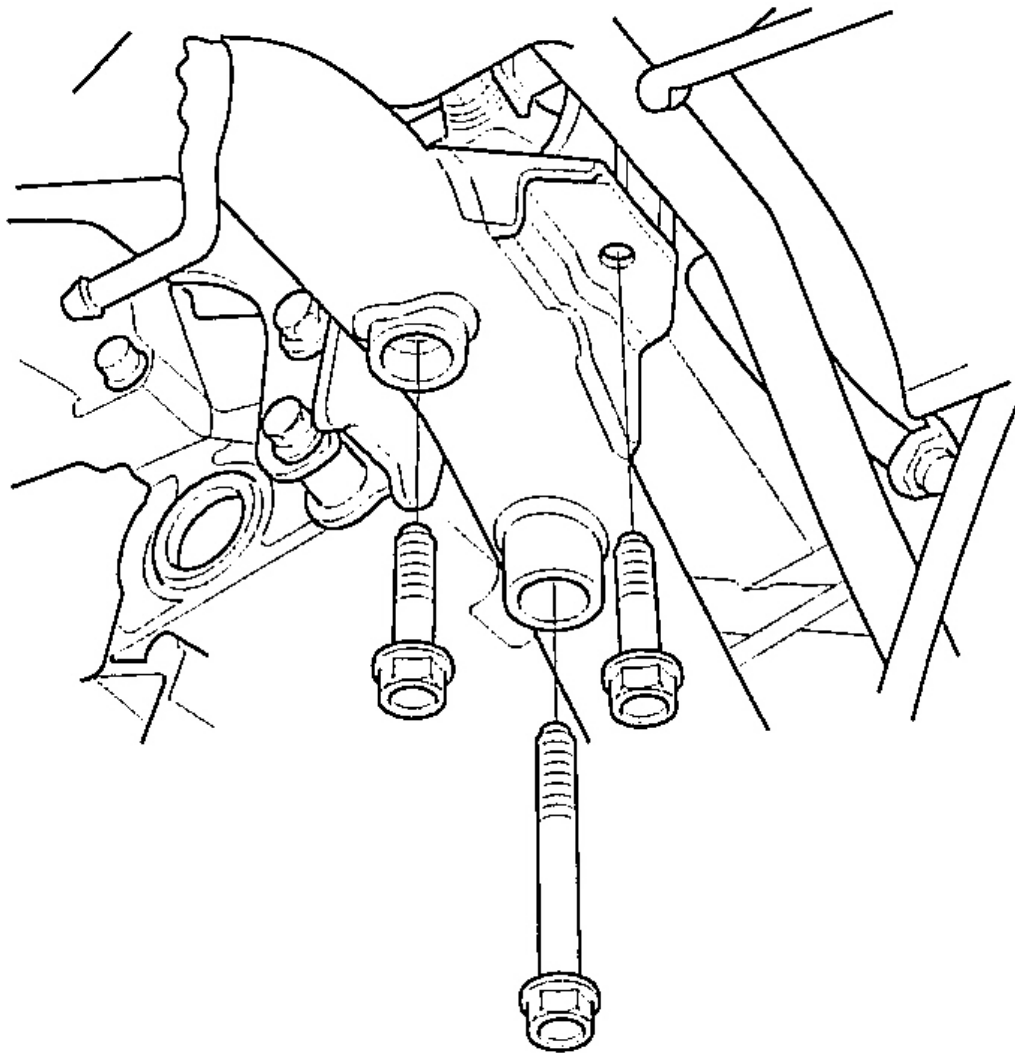
**G01954378**

Fig. 24: Removing Transmission Mount Bracket Mounting Bolt/Nuts - A/T

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



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Fig. 25: Removing Rear Mount Mounting Bolts

42. Use a marker to make alignment marks on the reference lines (A) that align with the centers of the rear sub-frame mounting bolts (B).

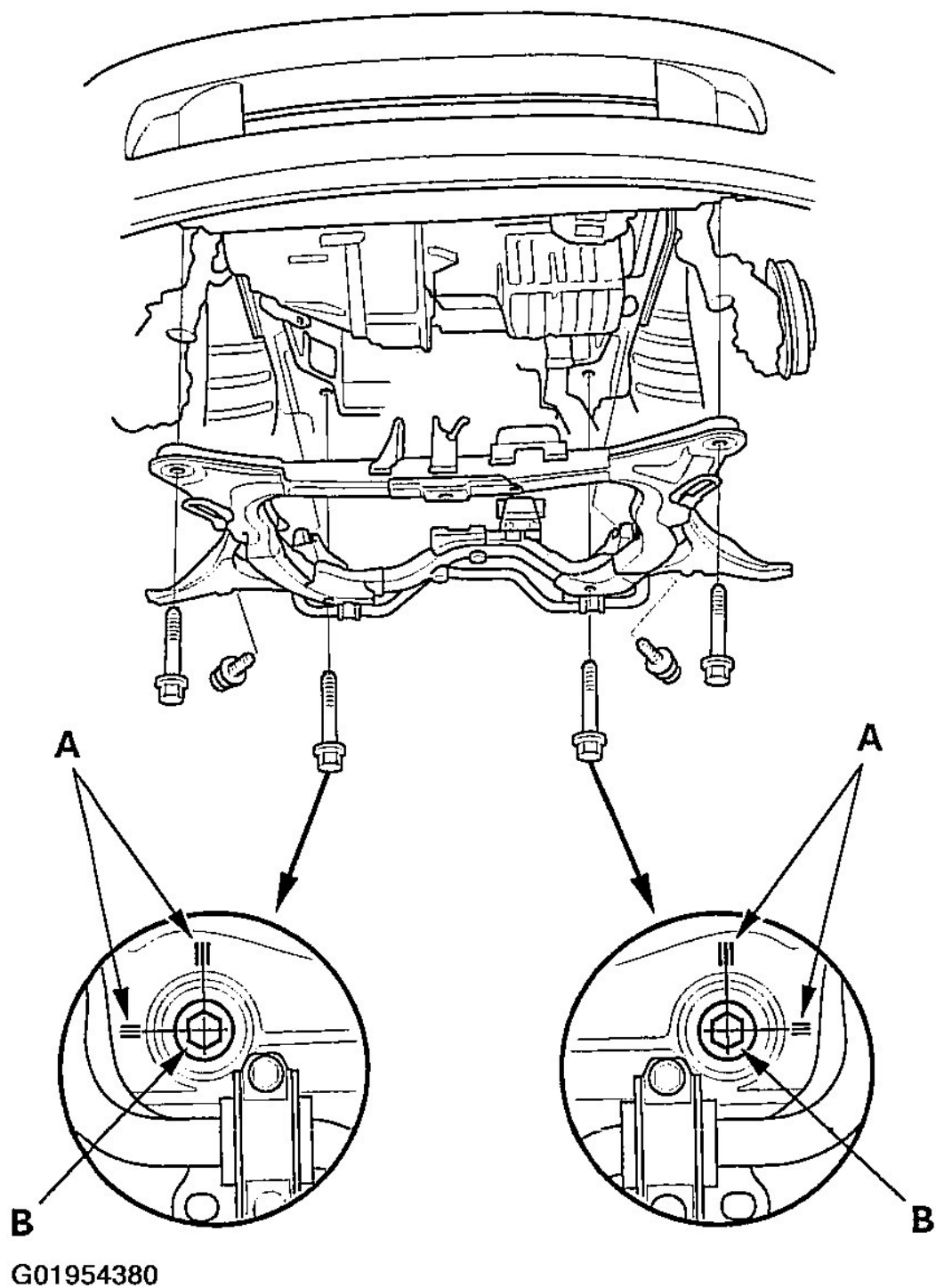
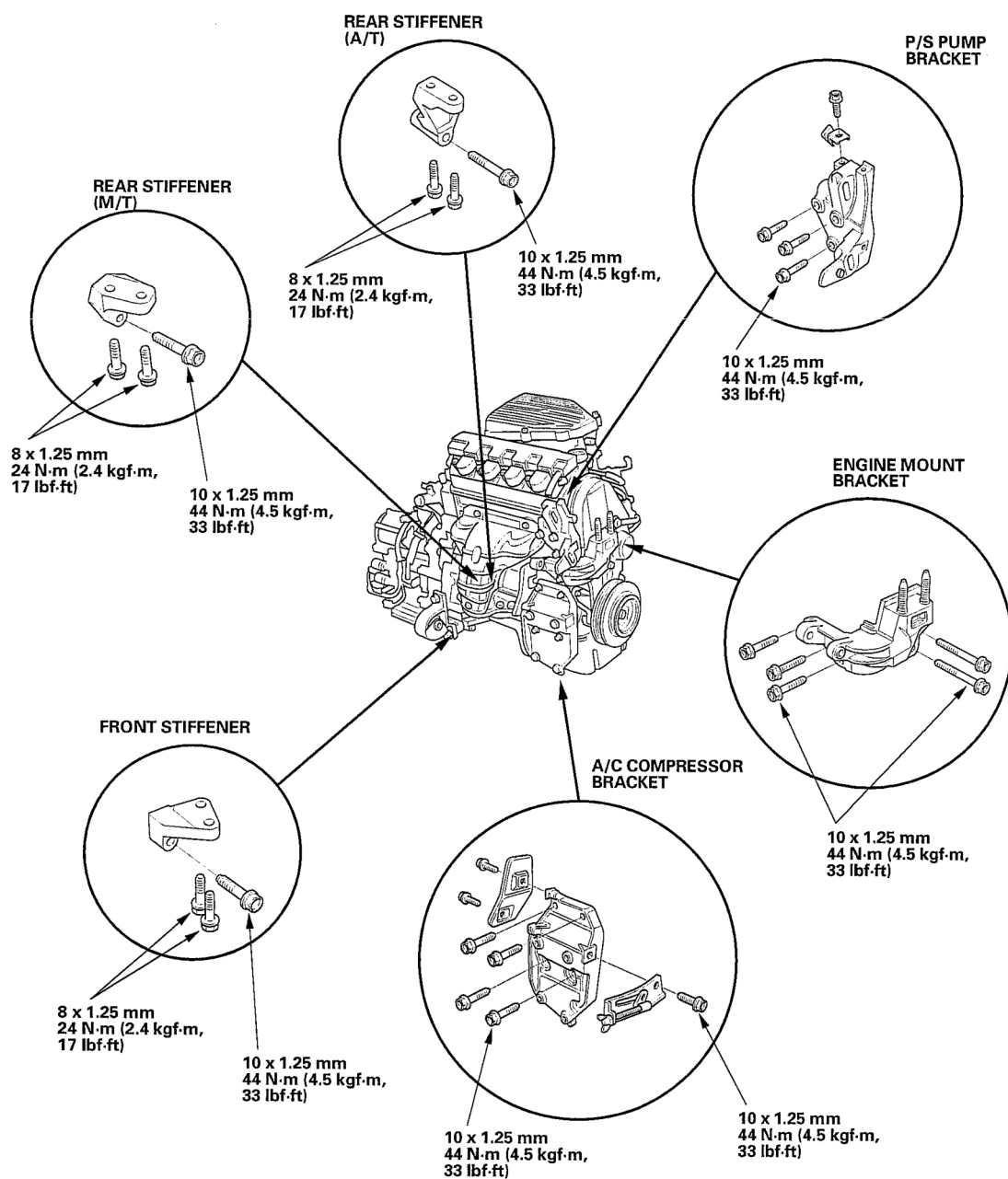


Fig. 26: Making Alignment Marks On Reference Lines Using A Marker

43. Remove the front sub-frame.
44. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.
45. Slowly lower the engine about 150 mm (6 in.). Check once again that all hoses and wires are disconnected from the engine/transmission.
46. Lower the engine all the way. Remove the chain hoist from the engine.
47. Remove the engine 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. 27: Installing Accessory Brackets

- 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 sub-frame (A). Align the reference lines (B) on the sub-frame with the bolt head center, then tighten the bolts.

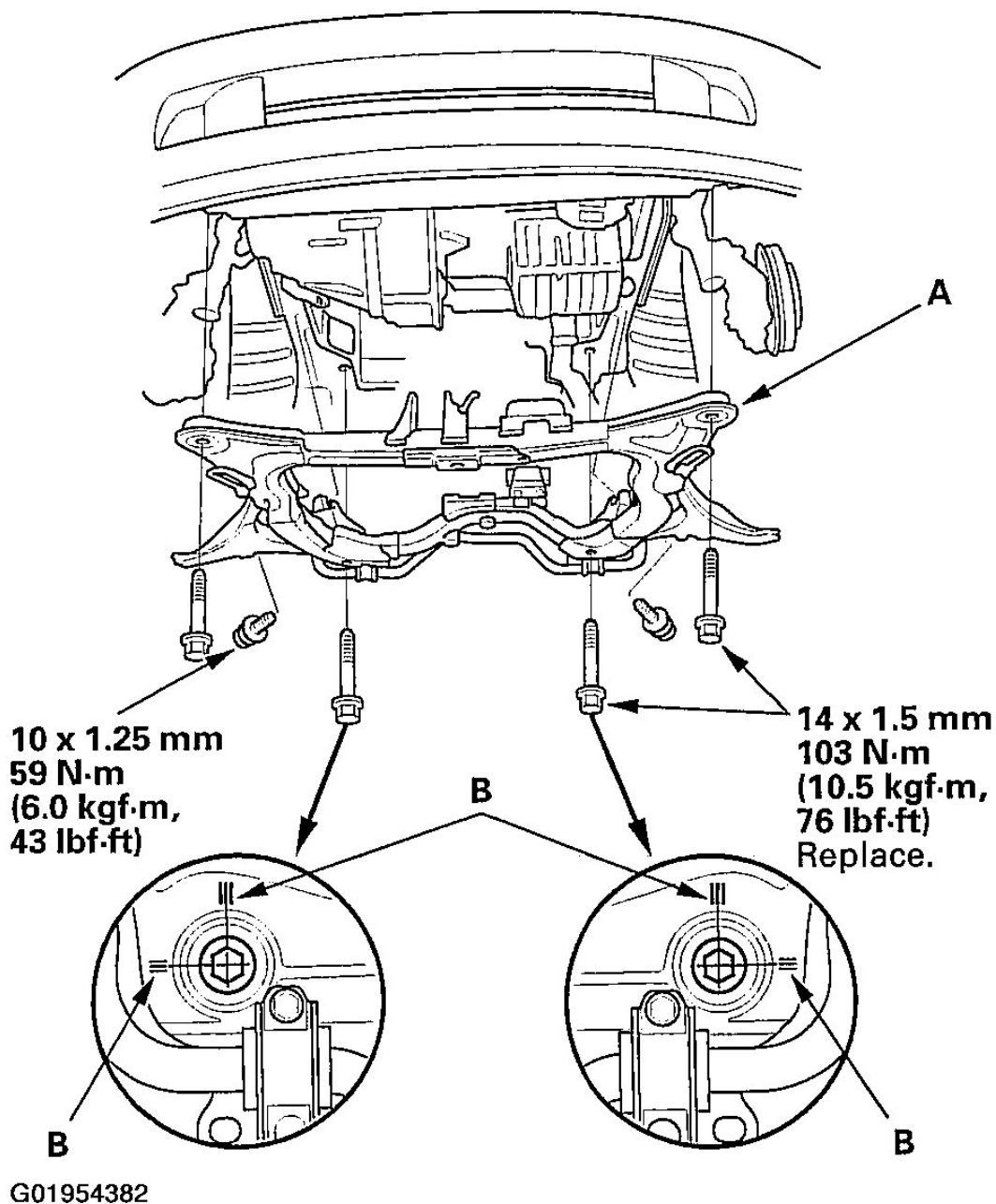
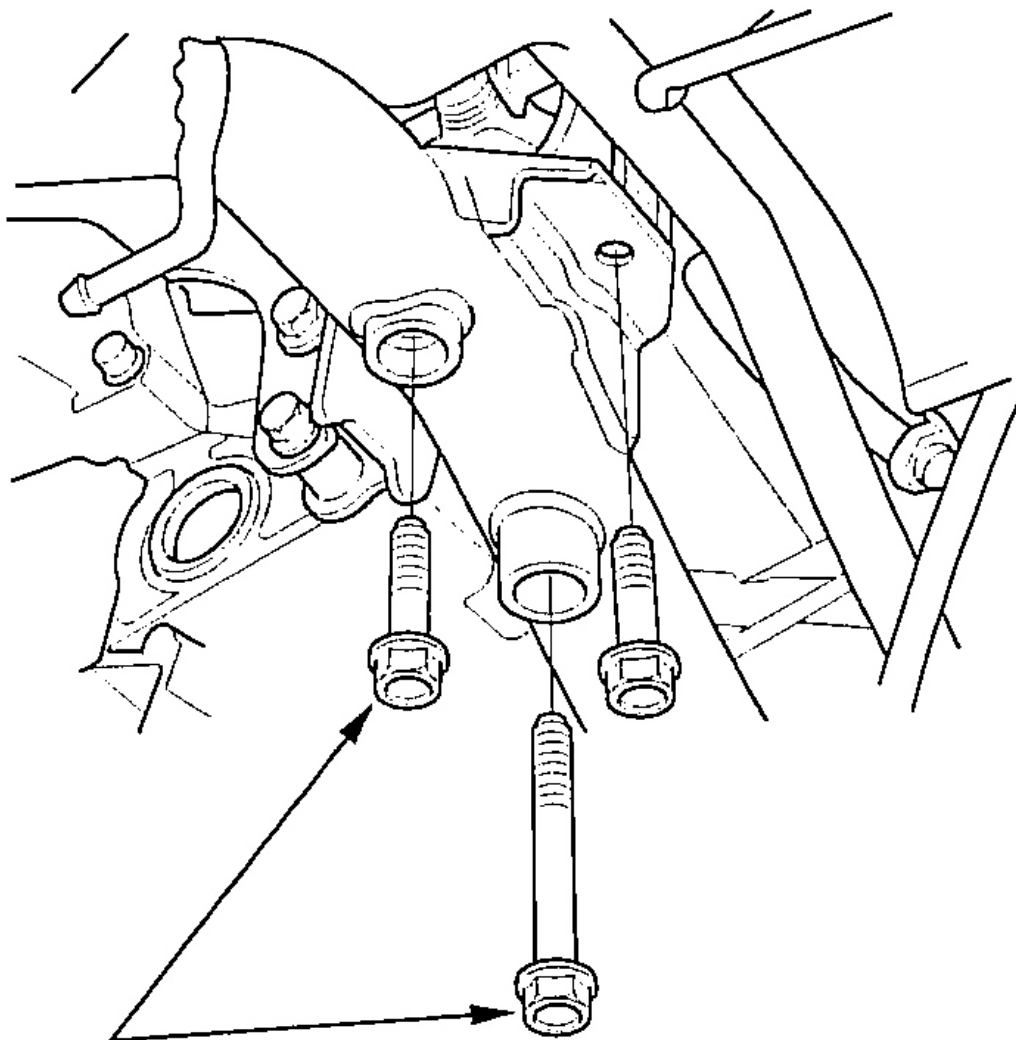


Fig. 28: Installing Sub-Frame

4. Tighten the rear mount mounting bolts.



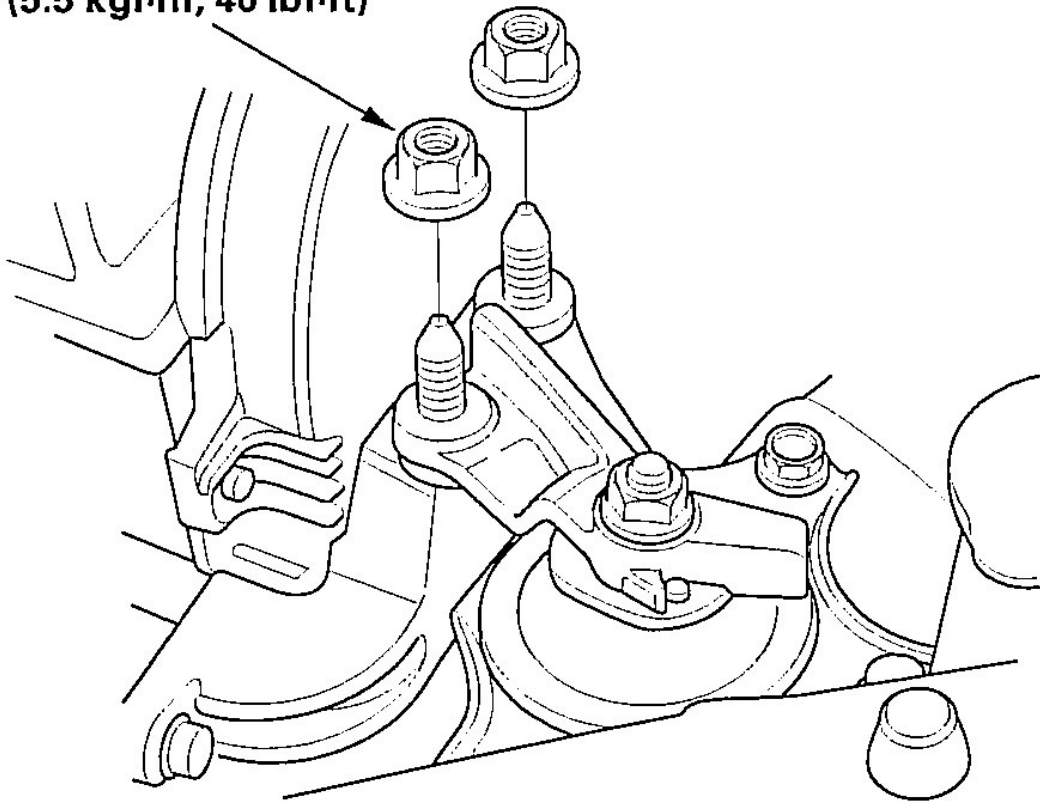
**10 x 1.25 mm
59 N·m
(6.0 kgf·m, 43 lbf·ft)**

G01954383

Fig. 29: Tightening Rear Mount Mounting Bolts

5. Lower the hoist.
6. Tighten the side engine mount bracket mounting nuts.

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

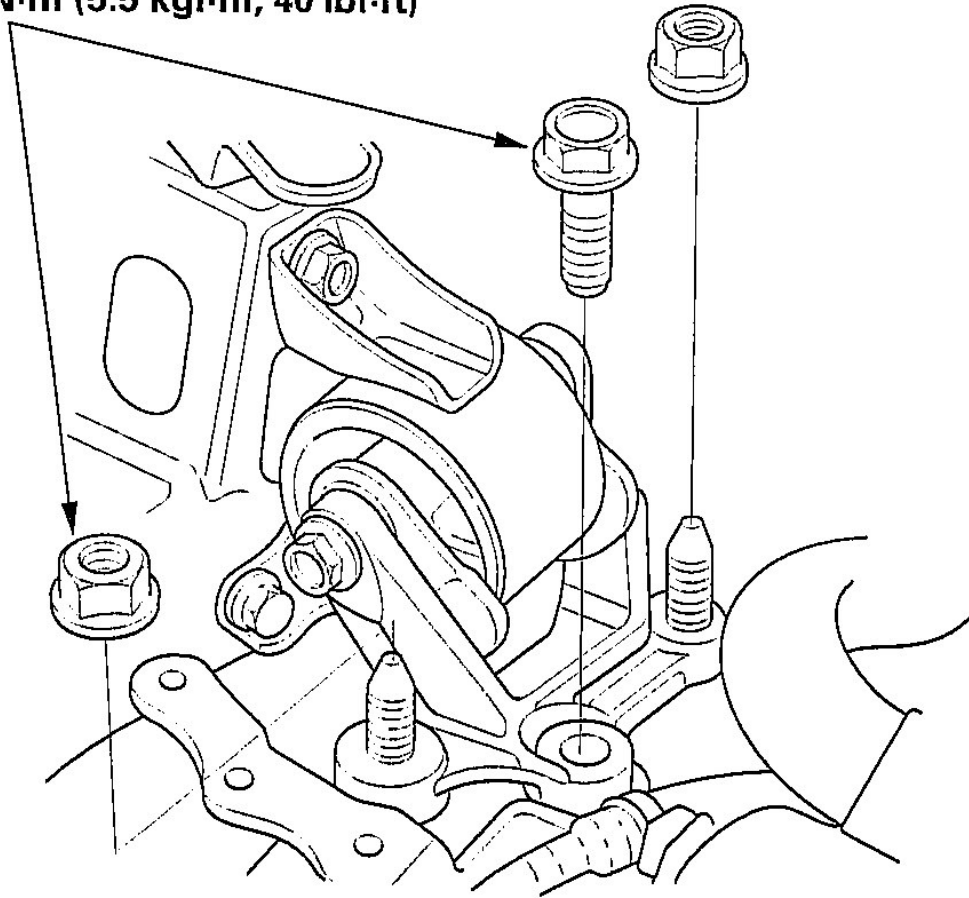


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Fig. 30: Tightening Side Engine Mount Bracket Mounting Nuts

7. Tighten the transmission mount bracket mounting bolt/nuts.

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



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Fig. 31: Tightening Transmission Mount Bracket Mounting Bolt/Nuts - M/T

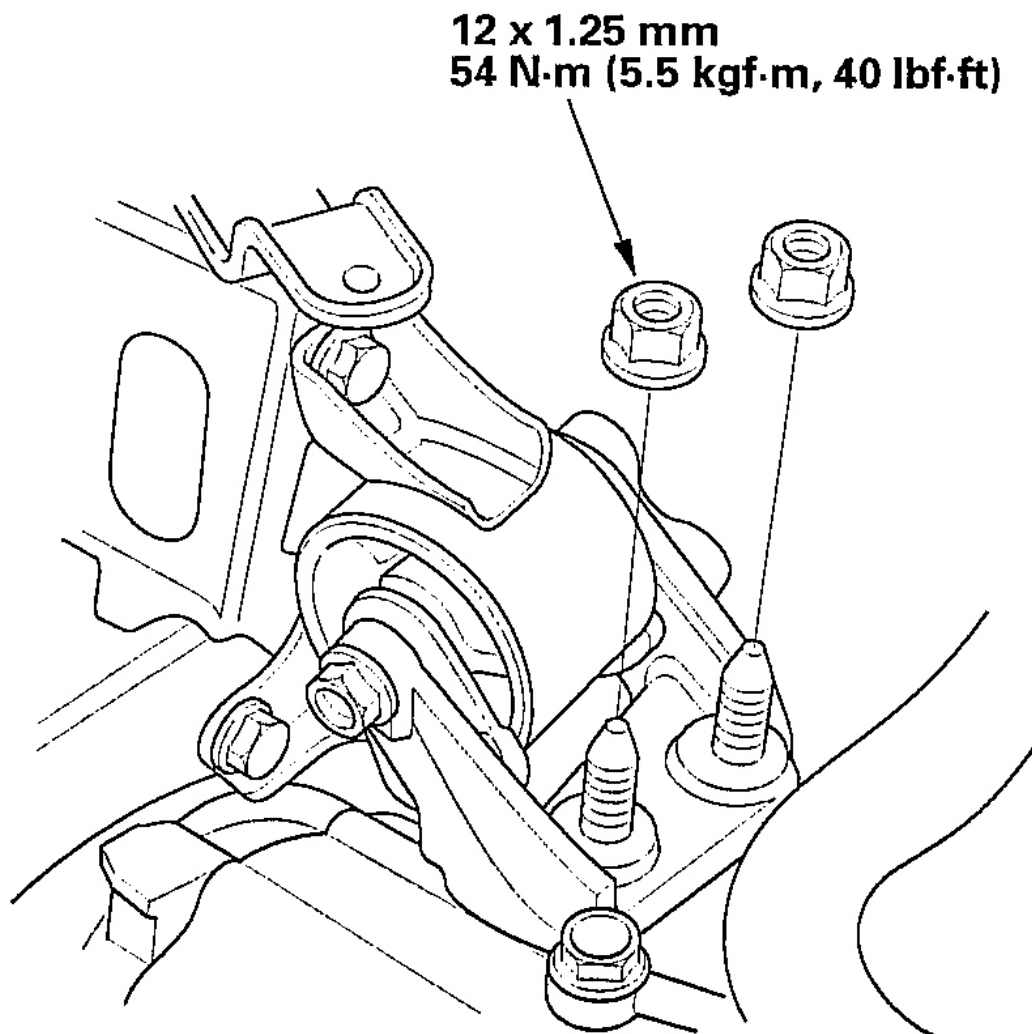
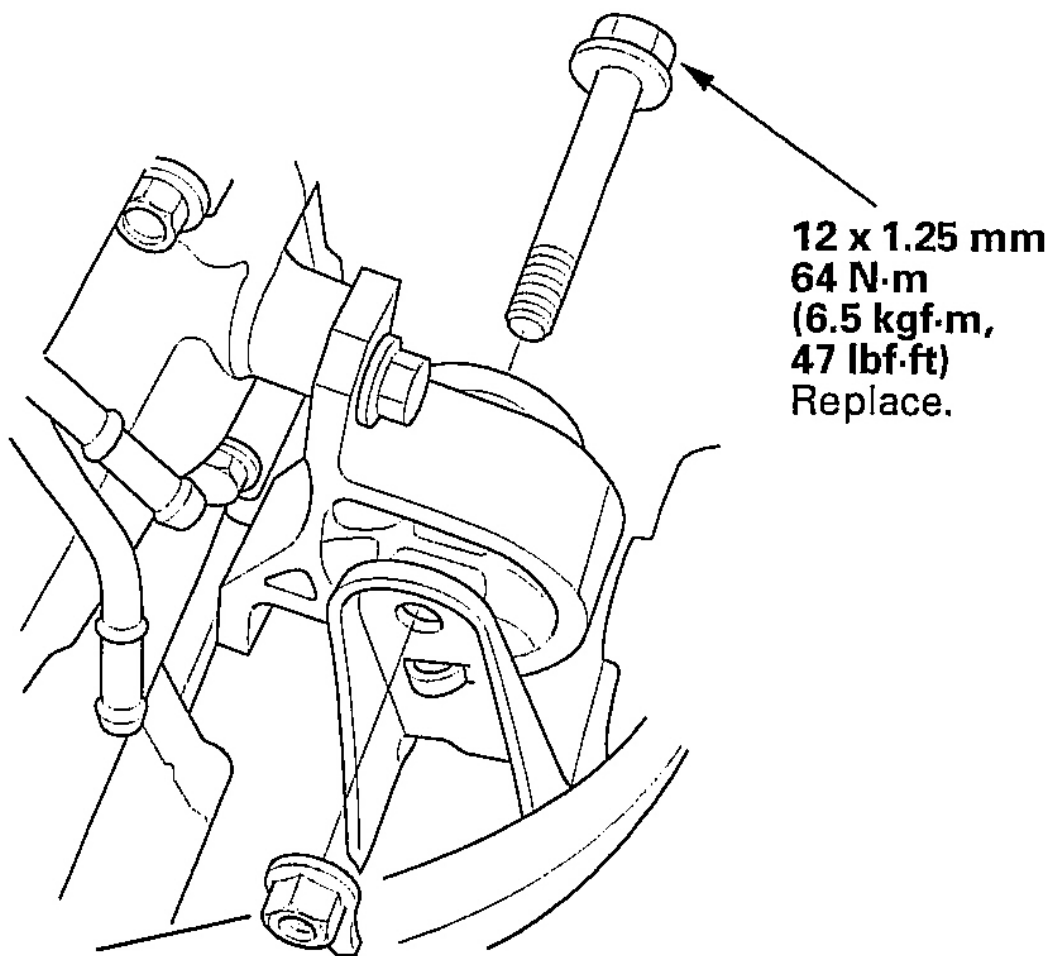


Fig. 32: Tightening Transmission Mount Bracket Mounting Bolt/Nuts - A/T

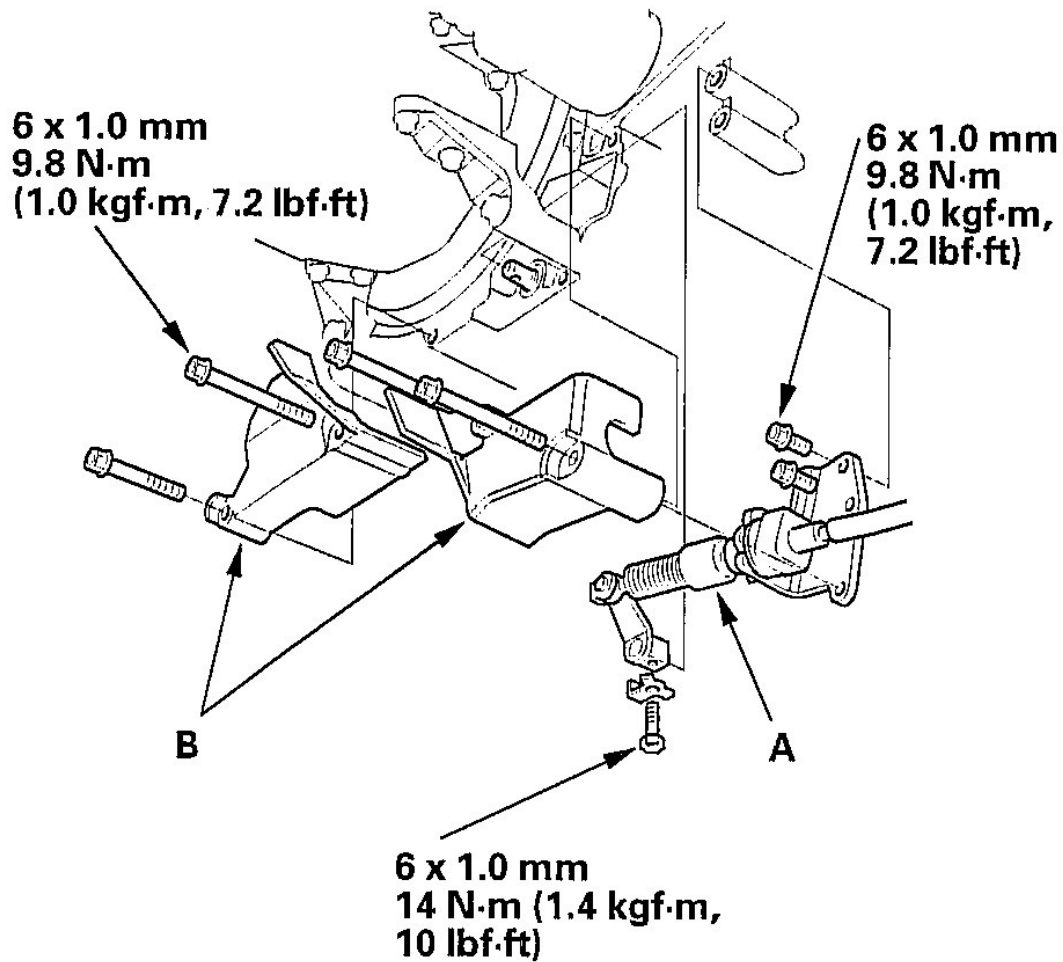
8. Tighten the front mount mounting bolt.



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Fig. 33: Tightening Front Mount Mounting Bolt

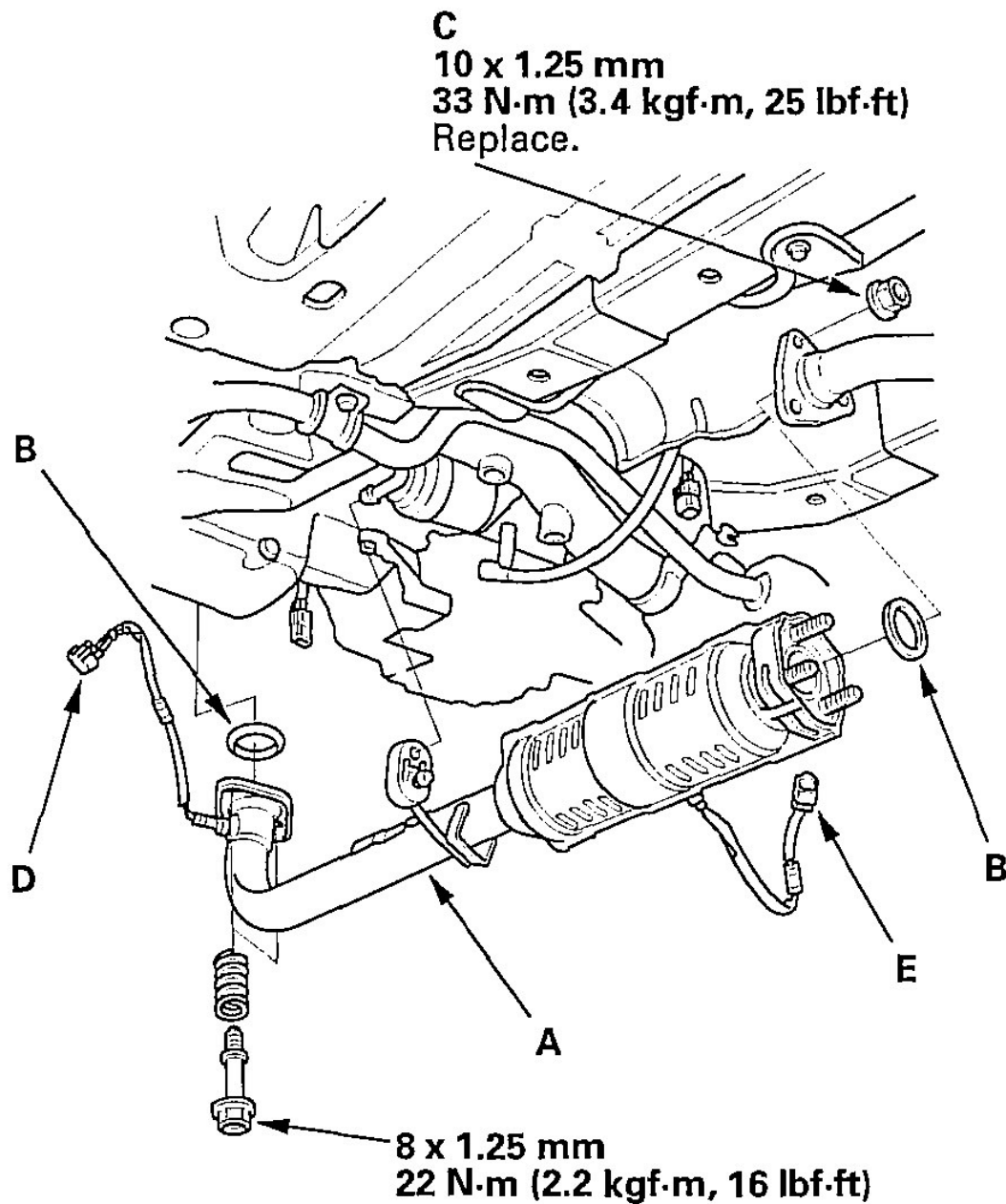
9. Remove the chain hoist from the engine.
10. Raise the hoist to full height.
11. Install a new spring clip on the end of each driveshaft, then install the driveshafts. Make sure each clip "clicks" into place in the differential and intermediate shaft.
12. Connect the suspension lower arm ball joints (see **BALL JOINT REMOVAL**), and stabilizer links (see **STABILIZER LINK REPLACEMENT**).
13. Install the shift control cable (A), then install the shift cable covers (B) (A/T).



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Fig. 34: Installing Shift Control Cable & Shift Cable Covers - A/T

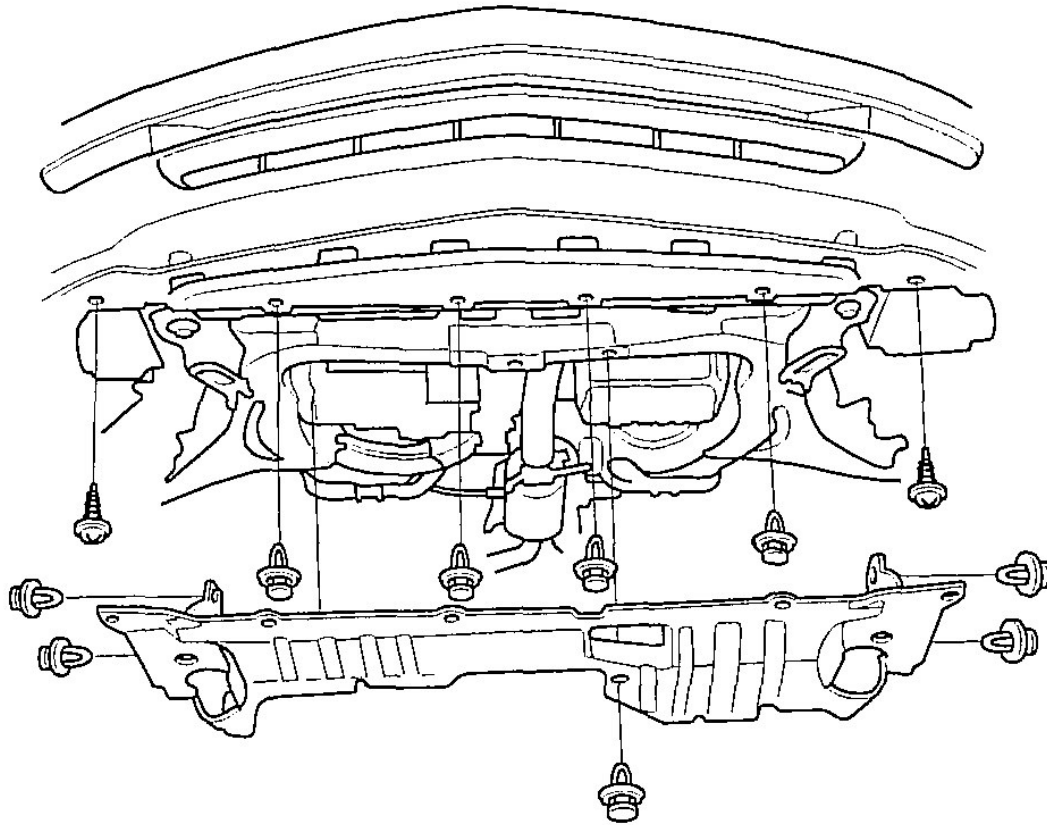
14. Install the exhaust pipe A/TWC (A): use new gaskets (B) and new self locking nuts (C). Connect the primary HO2S connector (D) and secondary HO2S connector (E).



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Fig. 35: Installing Exhaust Pipe A/TWC

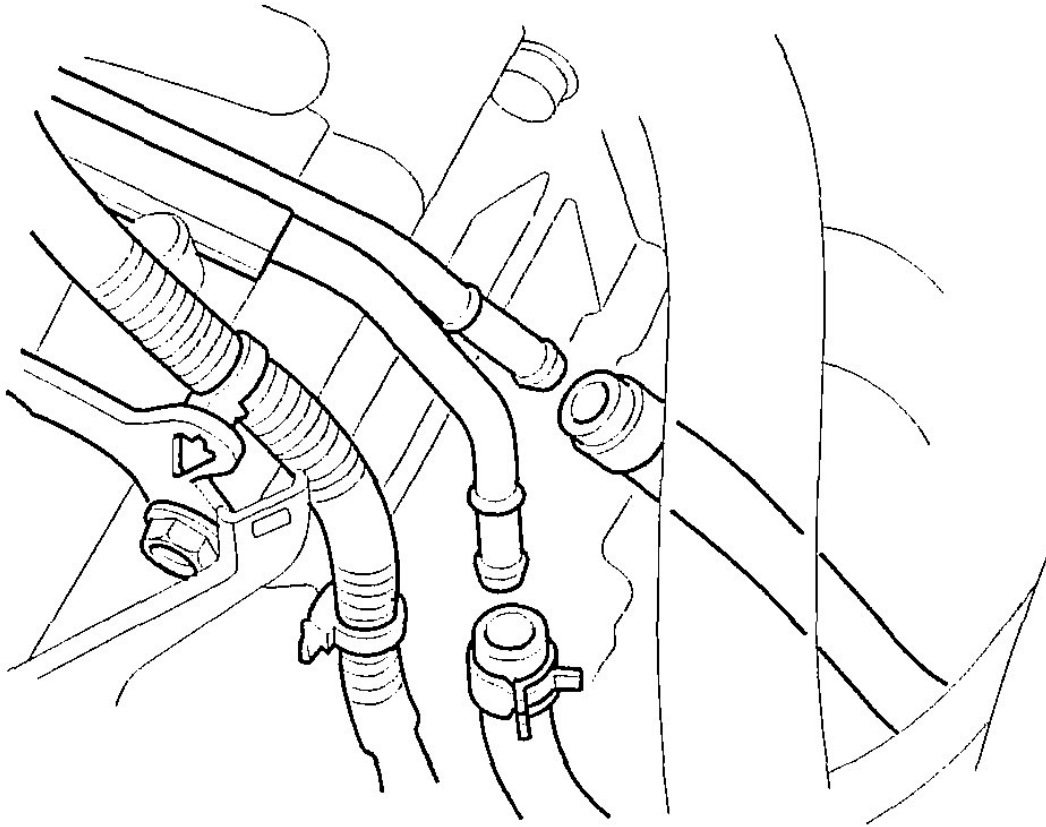
15. Install the splash shield.



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Fig. 36: Installing Splash Shield

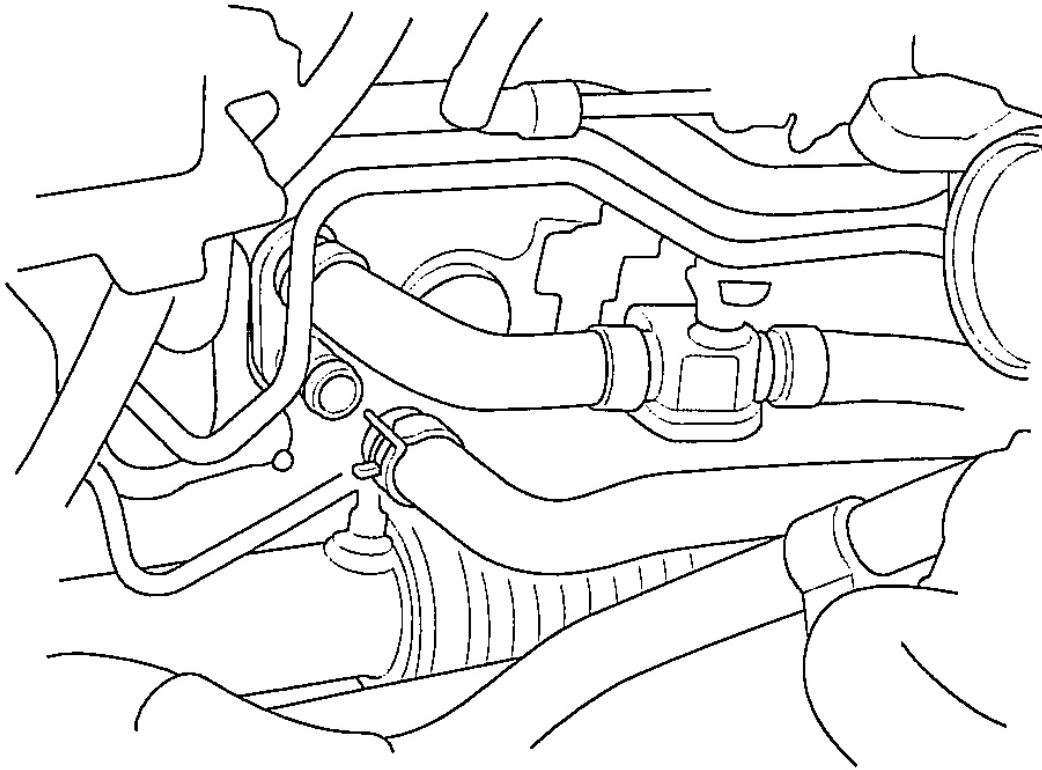
16. Install the front tires/wheels.
17. Lower the hoist.
18. Install the ATF cooler hoses (A/T).



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Fig. 37: Installing ATF Cooler Hoses - A/T

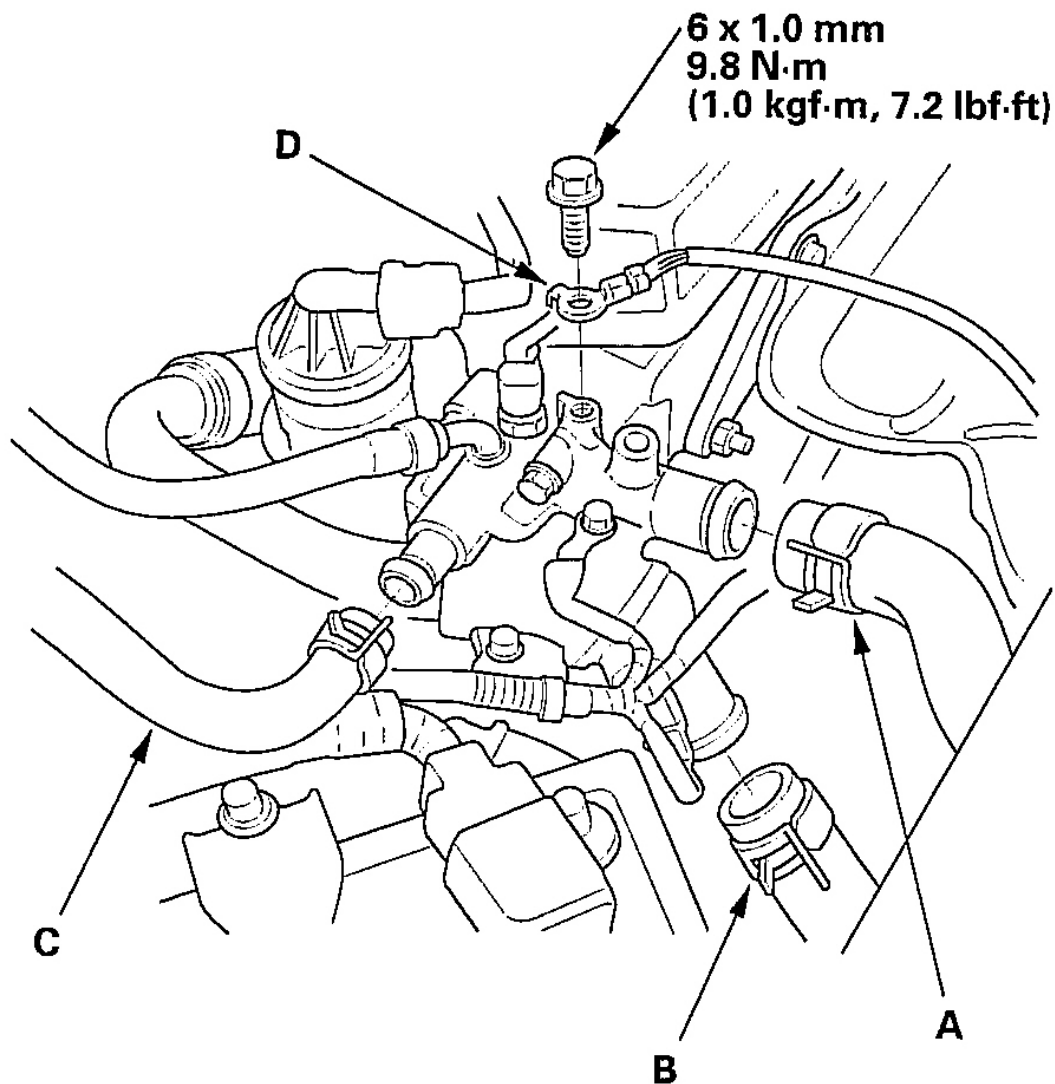
19. Install the heater hose.



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Fig. 38: Installing Heater Hose

20. Connect the upper radiator hose (A), lower radiator hose (B), heater hose (C) and ground cable (D).



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Fig. 39: Connecting Upper & Lower Radiator Hose

21. Install the A/C compressor (A), then install the alternator lower bracket (B).

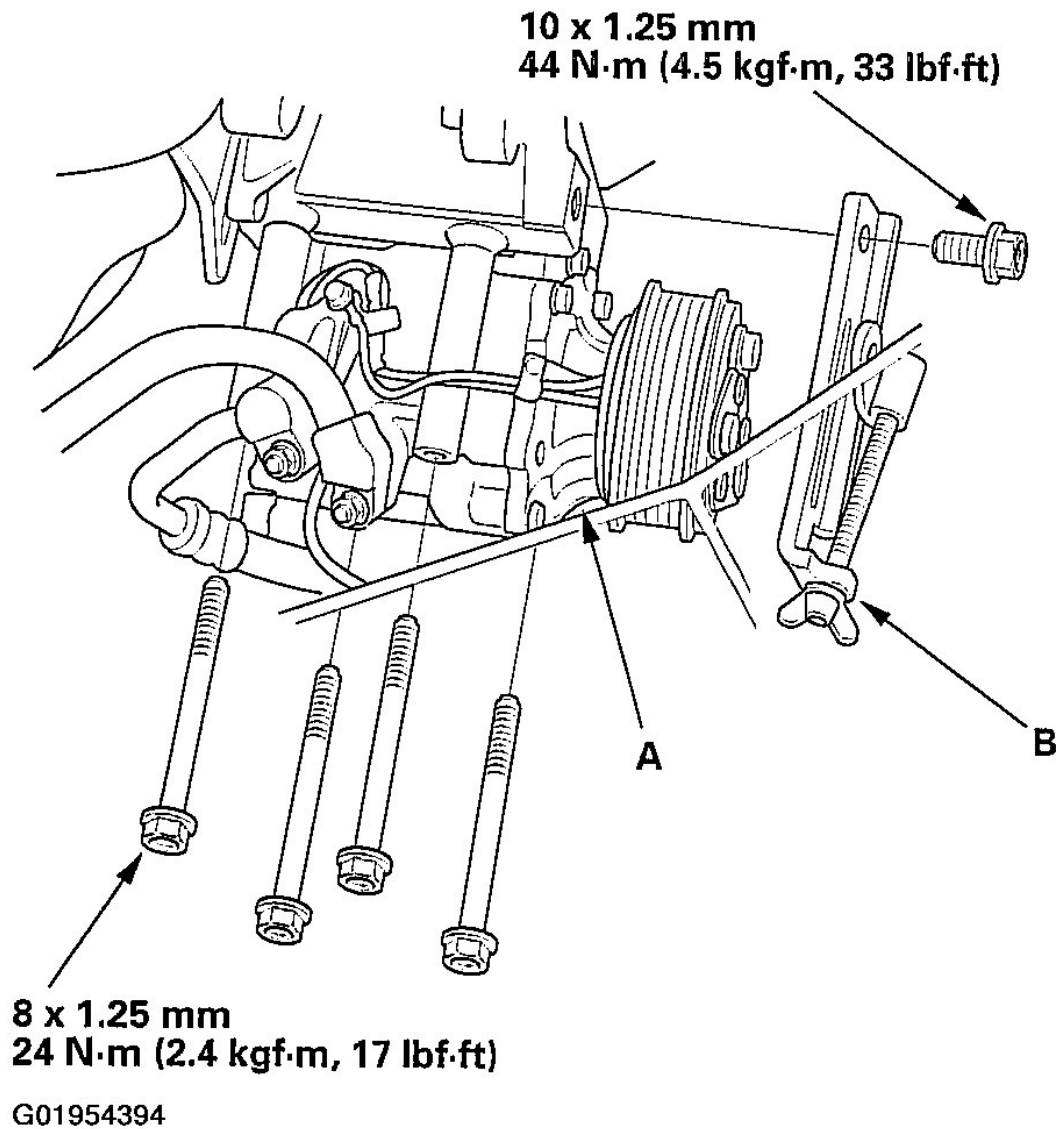
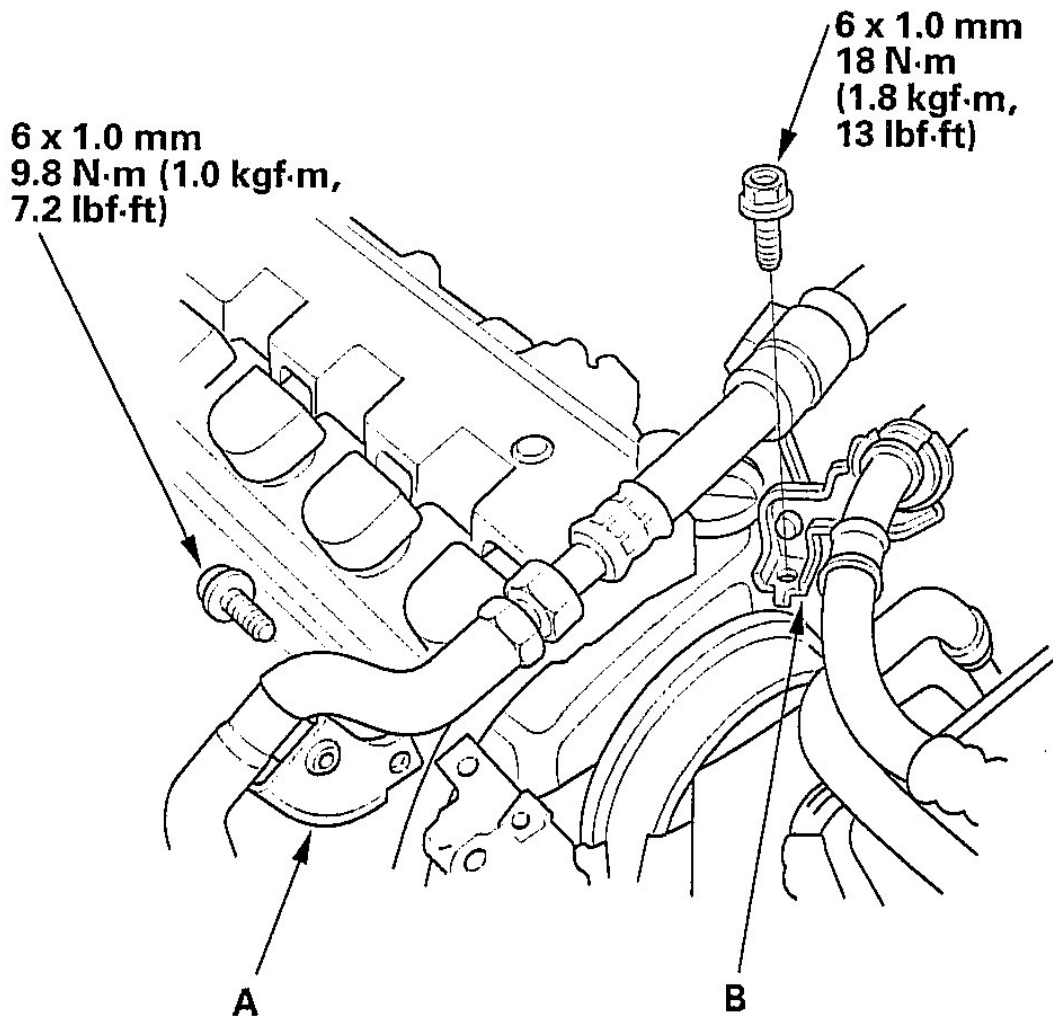


Fig. 40: Installing A/C Compressor & Alternator Lower Bracket

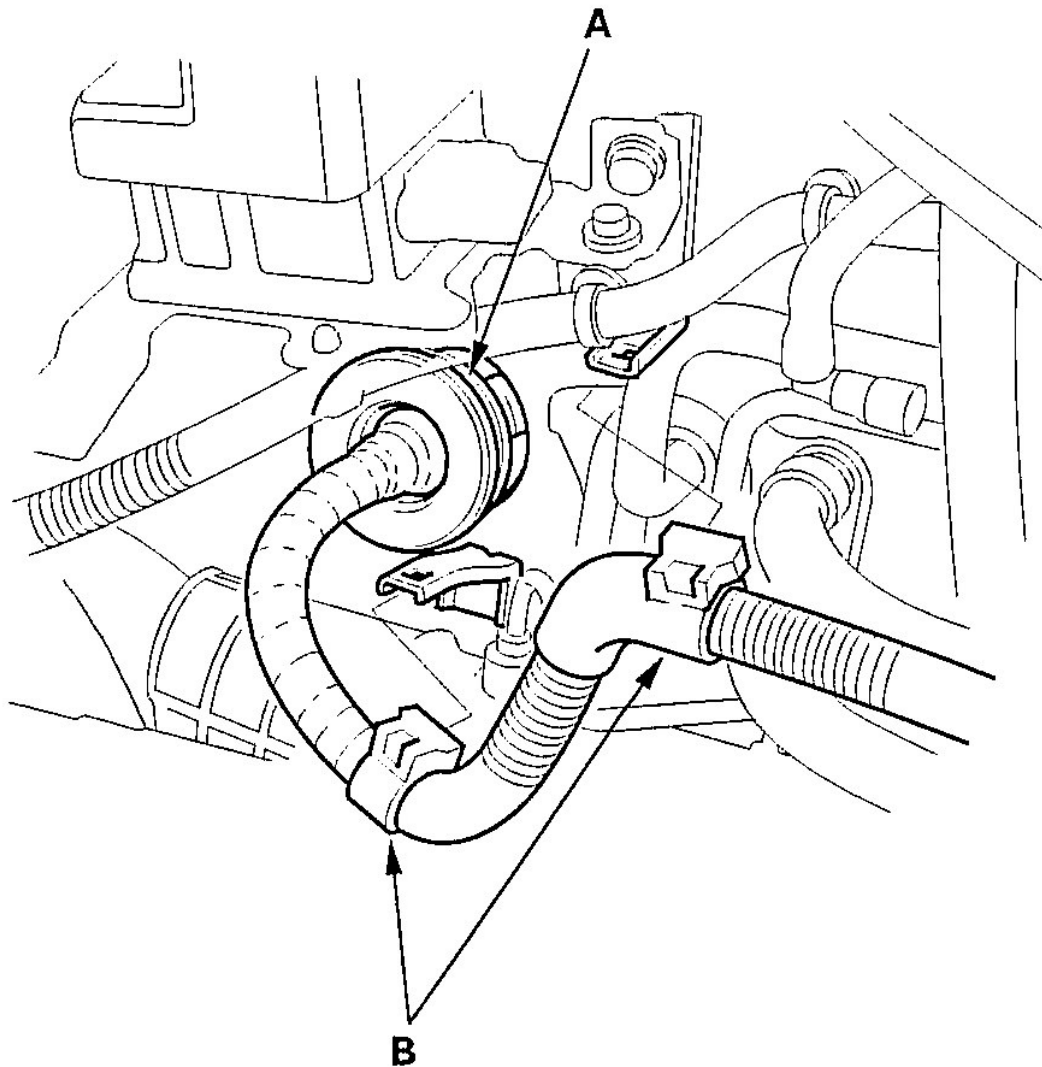
22. Install the A/C hose bracket (A) and P/S hose bracket (B).



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Fig. 41: Installing A/C Hose Bracket & P/S Hose Bracket

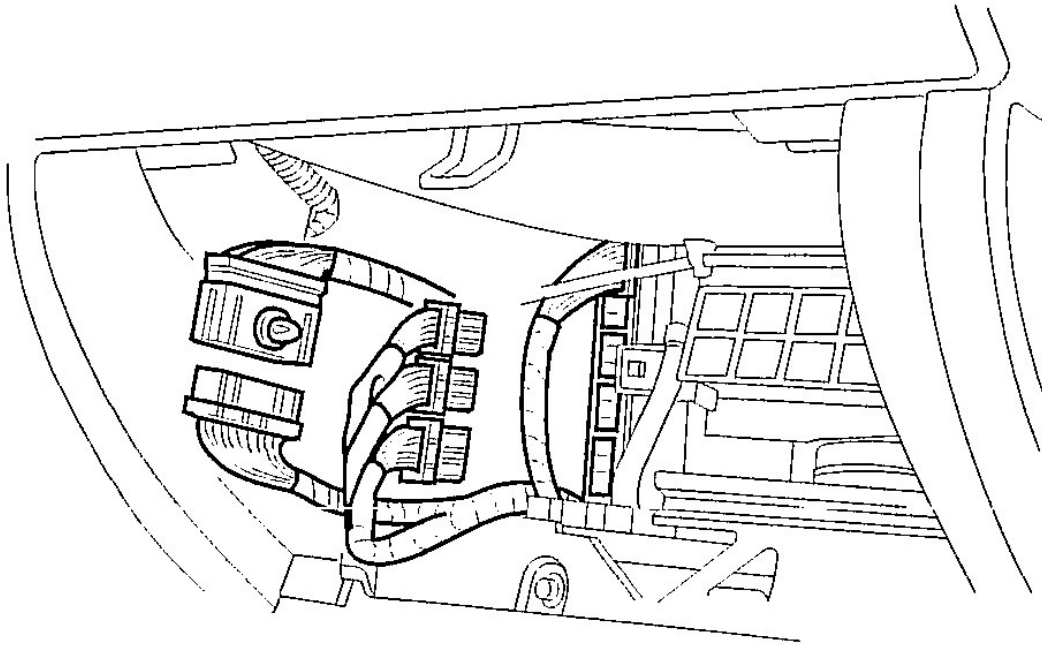
23. Loosely install the alternator.
24. Adjust the alternator belt tension (see **ALTERNATOR BELT INSPECTION AND ADJUSTMENT**) or the alternator-compressor belt tension (see **ALTERNATOR-A/C COMPRESSOR BELT INSPECTION AND ADJUSTMENT**).
25. Loosely install the P/S pump belt and pump.
26. Adjust the P/S pump belt (see **PUMP BELT INSPECTION AND ADJUSTMENT**).
27. Push the ECM/PCM connectors through the bulkhead, then install the grommet (A).



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Fig. 42: Installing Grommet

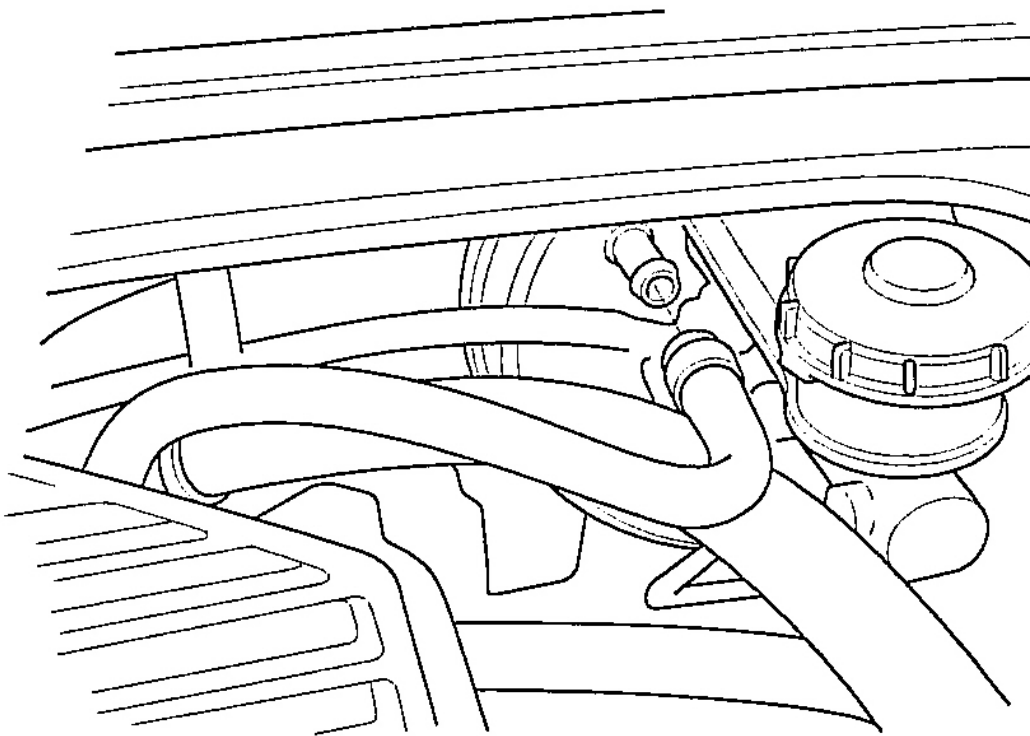
28. Install the harness clamps (B).
29. Connect the ECM/PCM connectors.



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Fig. 43: Connecting ECM/PCM Connectors

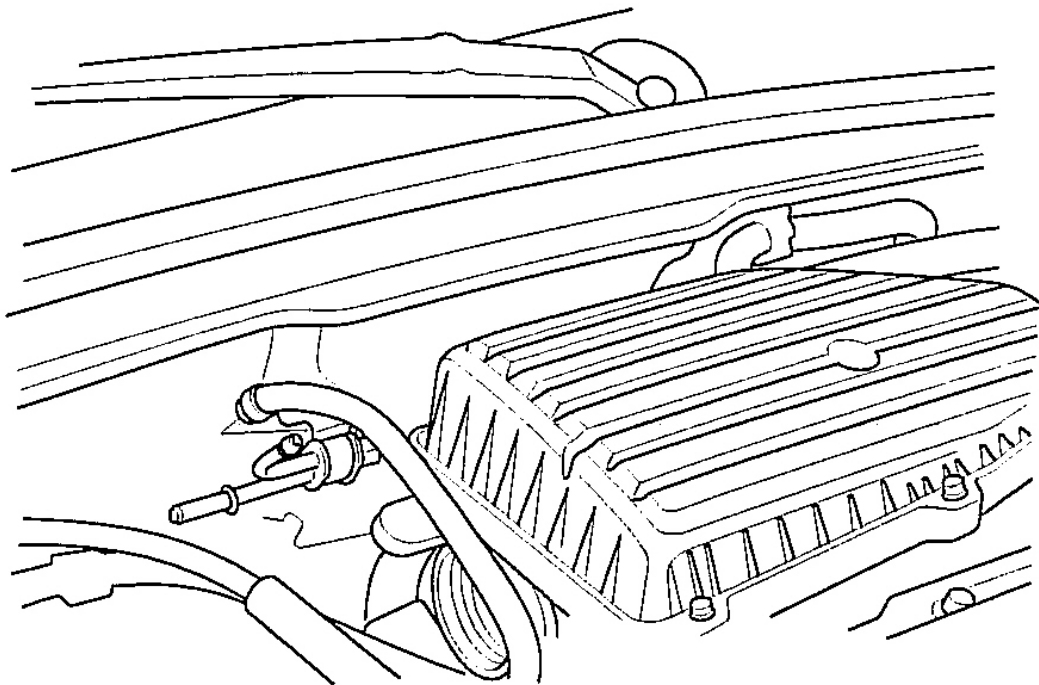
30. Install the glove box stops.
31. Install the cruise control cable, then adjust the cable (see **ACTUATOR CABLE ADJUSTMENT**).
32. Install the throttle cable, then adjust the cable (see **THROTTLE CABLE ADJUSTMENT**).
33. Install the brake booster vacuum hose.



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Fig. 44: Installing Brake Booster Vacuum Hose

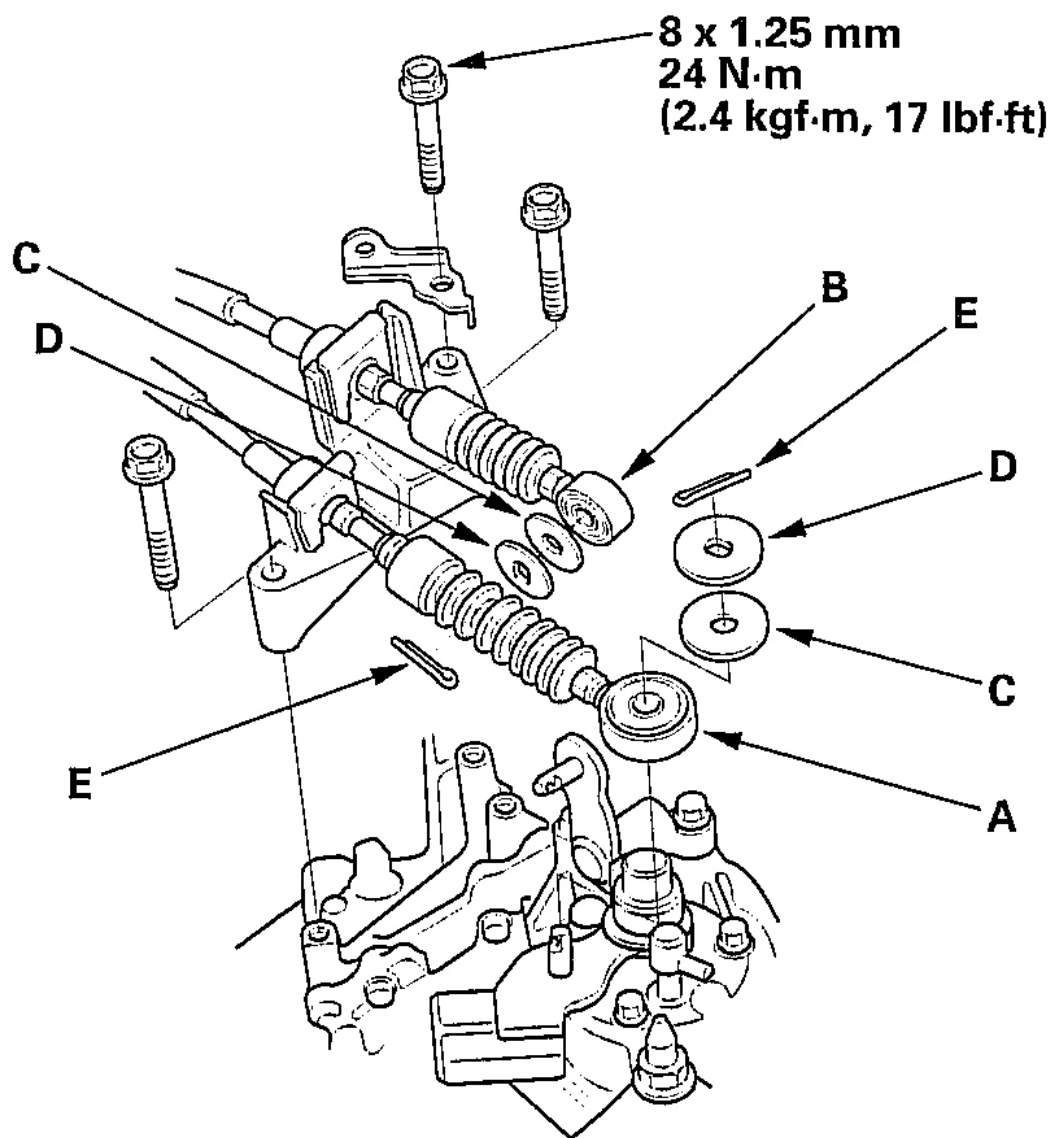
34. Install the EVAP canister hose.



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Fig. 45: Installing EVAP Canister Hose

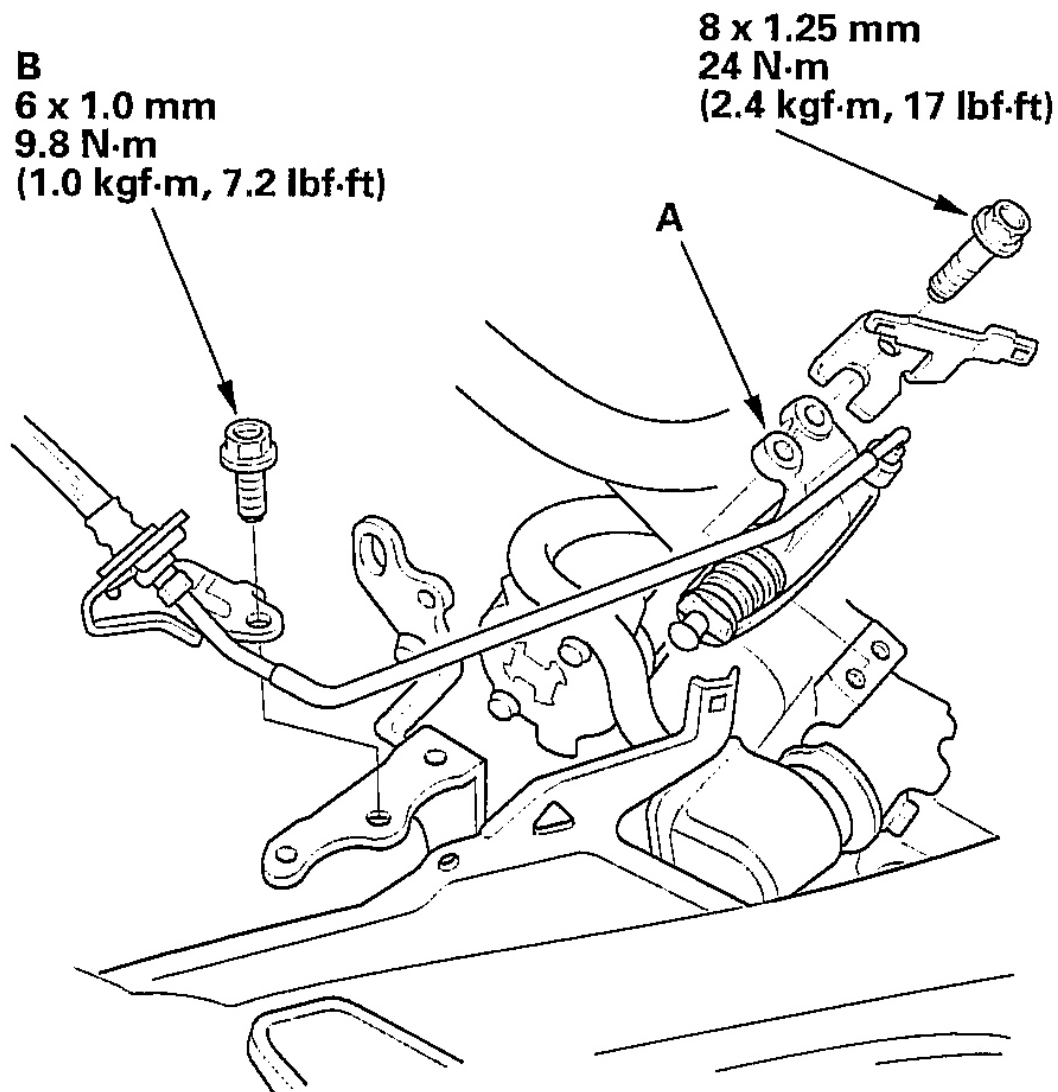
35. Install the select cable (A) and shift cable (B) using the plastic washers (C), washers (D) and new cotter pins (E) (M/T).



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Fig. 46: Installing Select Cable & Shift Cable

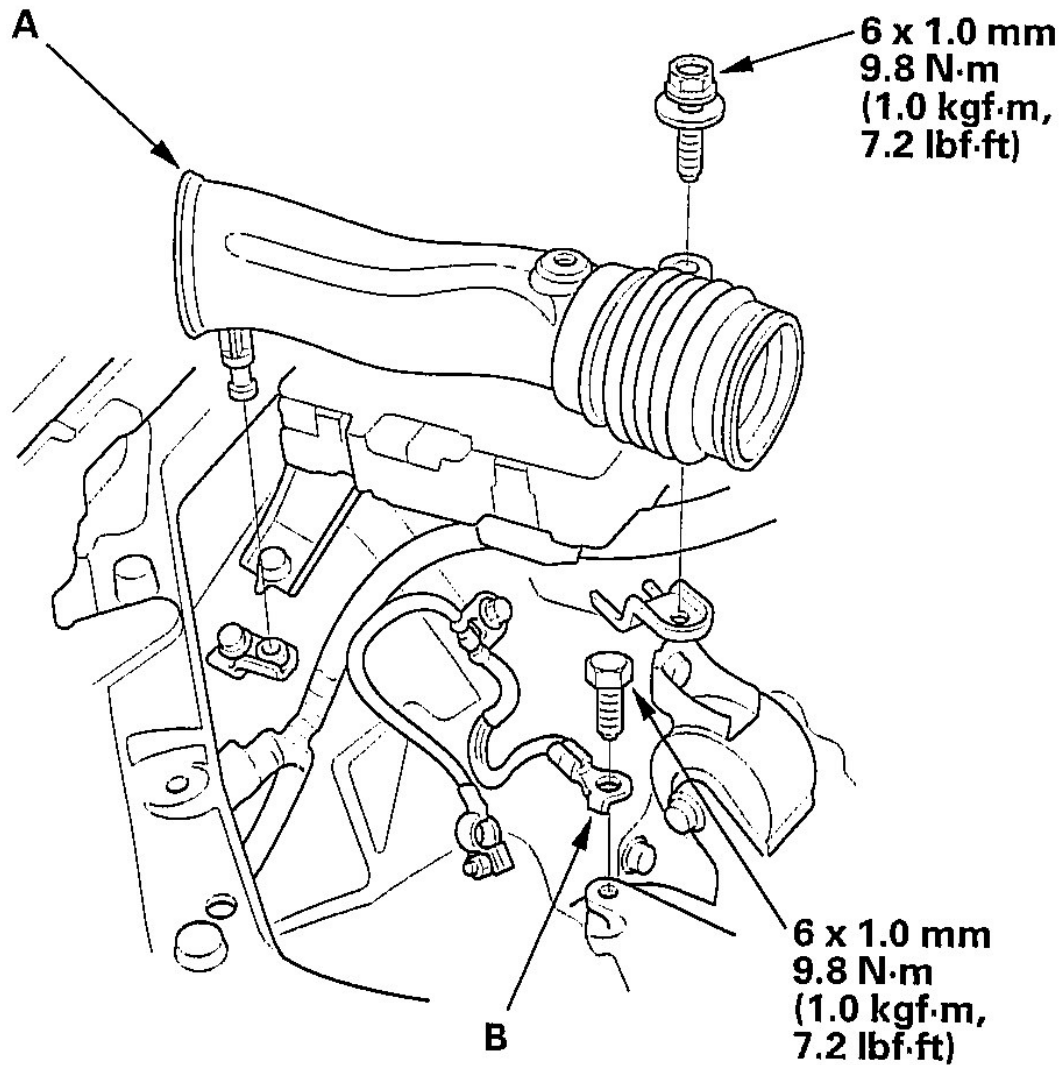
36. Install the clutch slave cylinder (A) and clutch line bracket mounting bolt (B) (M/T).



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Fig. 47: Installing Clutch Slave Cylinder & Clutch Line Bracket Mounting Bolt

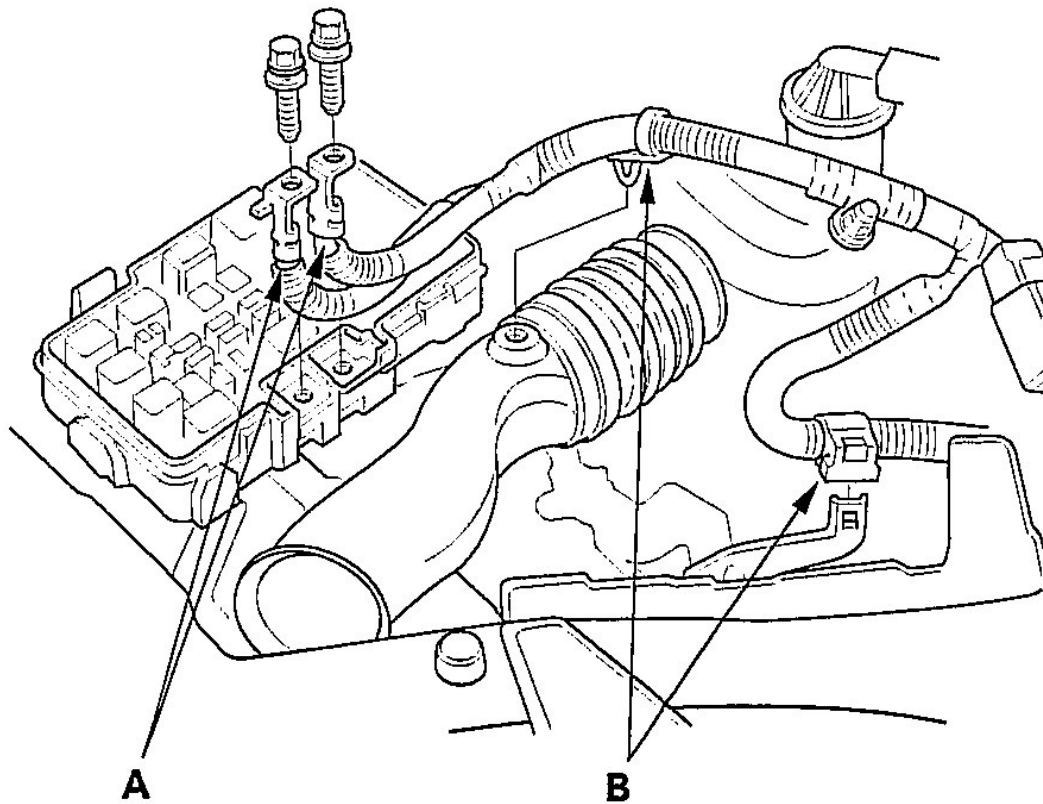
37. Install the battery base.
38. Install the intake air duct (A) and ground cable (B).



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Fig. 48: Installing Intake Air Duct & Ground Cable

39. Install the battery cables (A) on the under-hood fuse/relay box, then install the harness clamps (B).

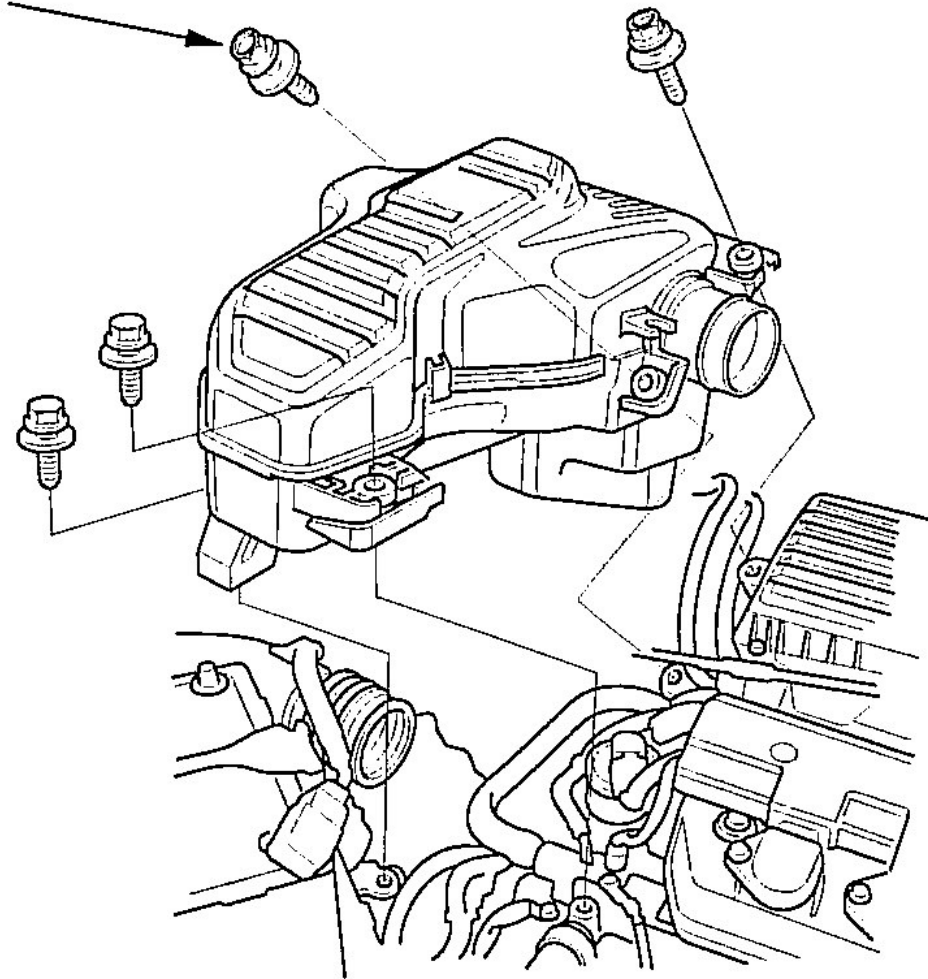


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Fig. 49: Installing Battery Cables On Under-Hood Fuse/Relay Box & Harness Clamps

40. Install the intake resonator.

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



G01954404

Fig. 50: Installing Intake Resonator

41. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.
42. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch (A/T).
43. Check that the transmission shifts into gear smoothly (M/T).
44. Inspect for fuel leaks. Turn ON (II) the ignition switch (do not operate the starter) so that the fuel pump runs for approximately 2 seconds and pressurizes the fuel line. Repeat this operation 2 or 3 times, then

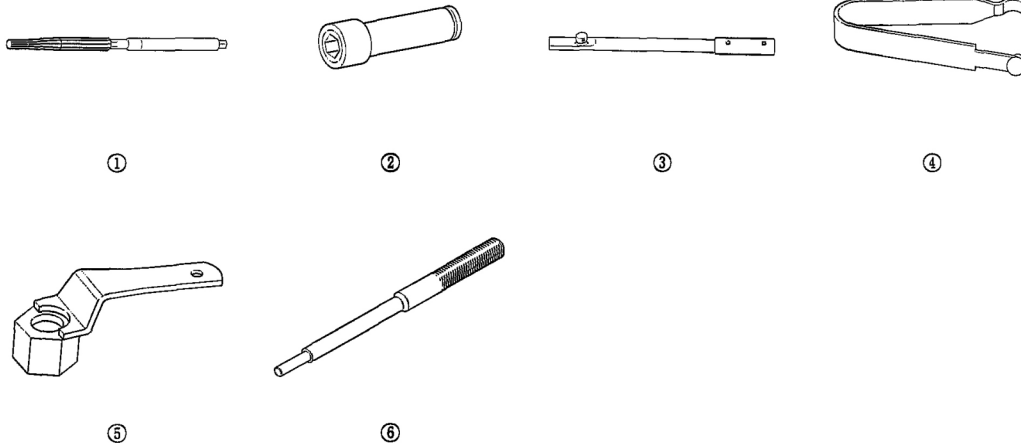
check for fuel leakage at any point in the fuel line.

45. Refill the engine with engine oil (see **ENGINE OIL REPLACEMENT**).
46. Refill the transmission with MTF (see **TRANSMISSION FLUID INSPECTION AND REPLACEMENT**), or ATF (see **ATF REPLACEMENT**).
47. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see **COOLANT REPLACEMENT**).
48. Check the wheel alignment (see **WHEEL ALIGNMENT**).
49. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

CYLINDER HEAD

SPECIAL TOOLS

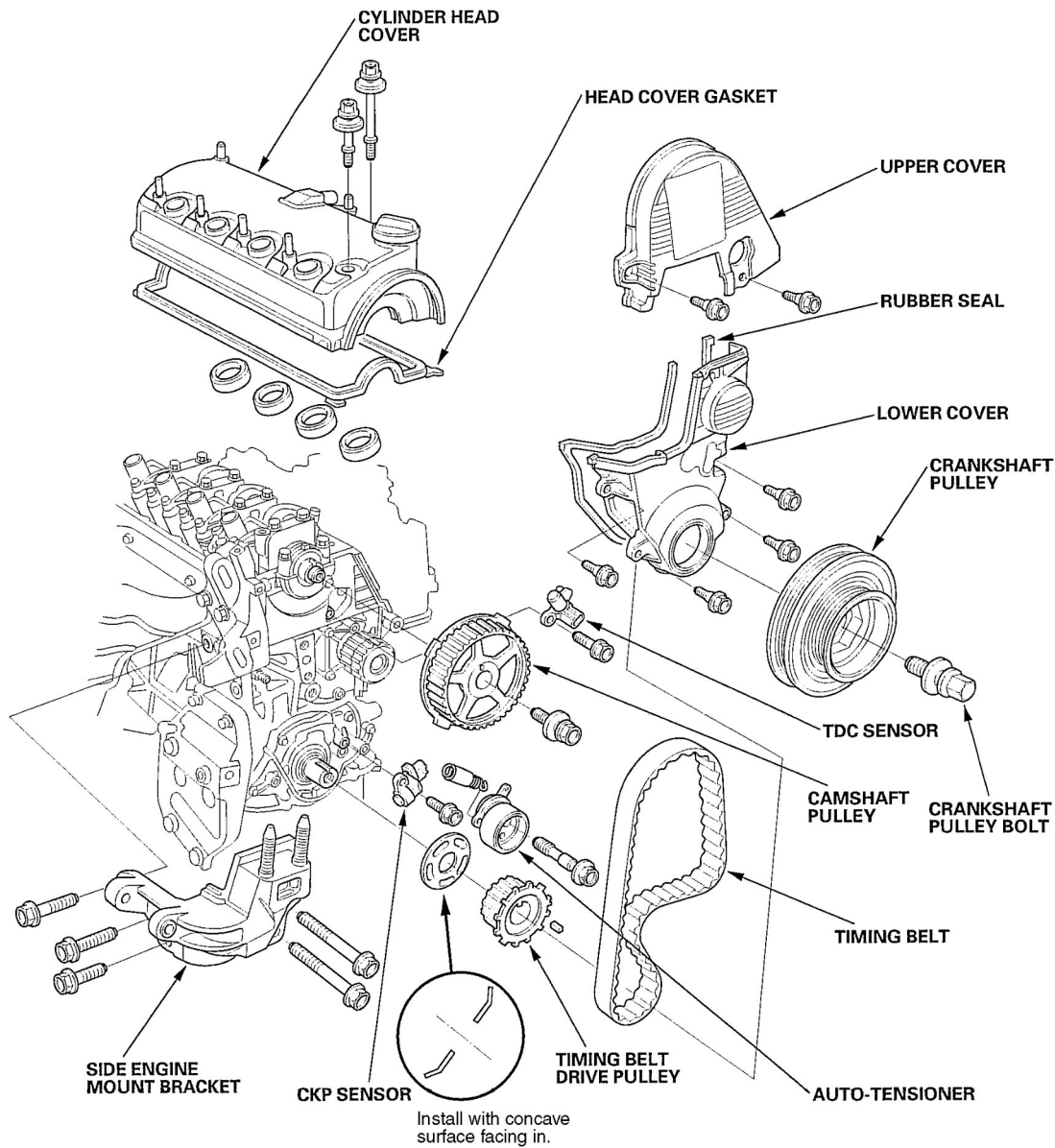
Ref.No.	Tool Number	Description	Qty
①	07HAH-PJ7010B	Valve Guide Reamer, 5.5 mm	1
②	07JAA-001020A	Socket, 19 mm	1
③	07JAB-001020A	Holder Handle	1
④	07LAJ-PR3020B	Air Stopper	1
⑤	07MAB-PY3010A	Holder Attachment, 50 mm, Offset	1
⑥	07742-0010100	Valve Guide Driver, 5.5 mm	1



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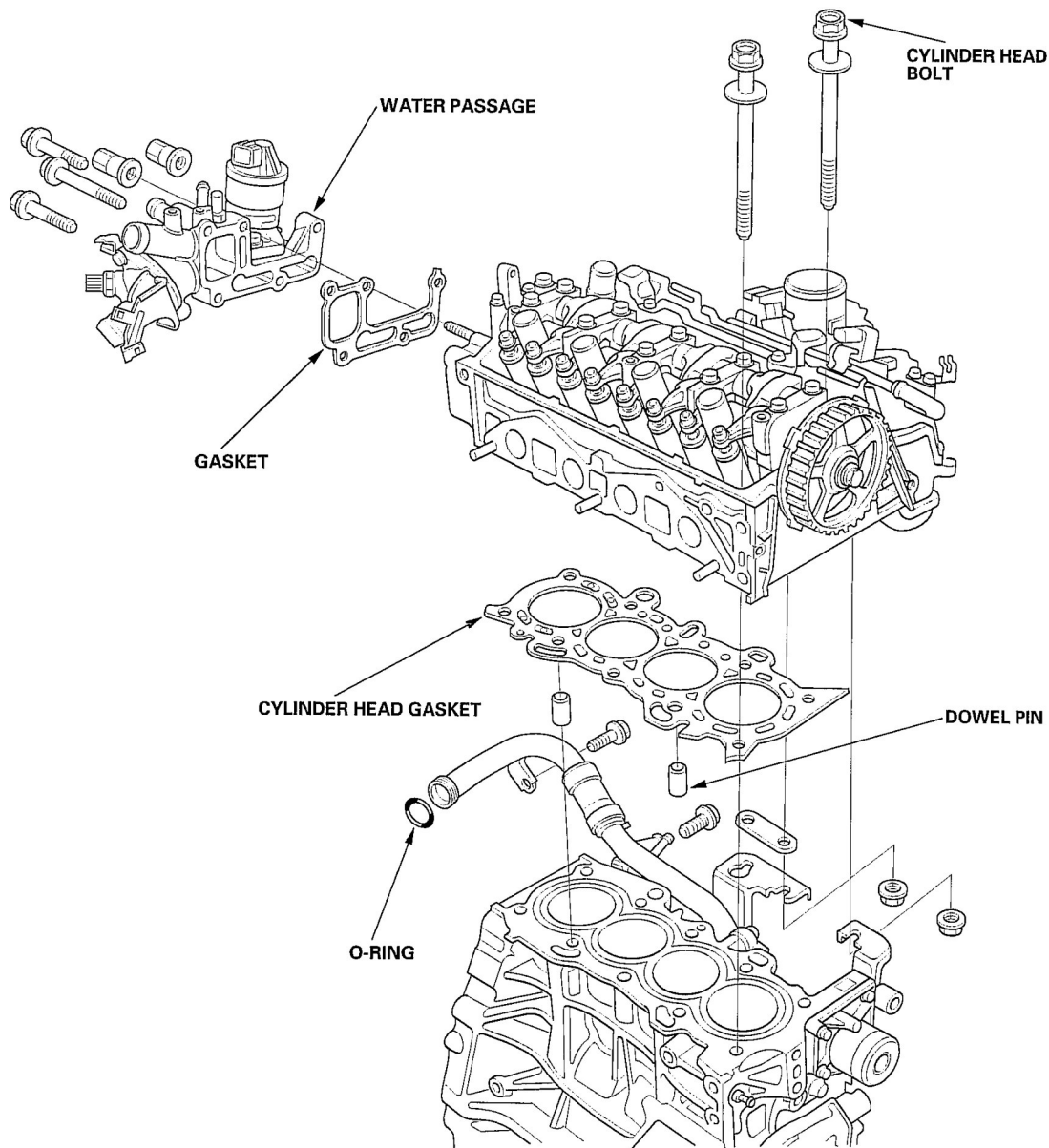
Fig. 51: Identifying Special Tools

COMPONENT LOCATION INDEX



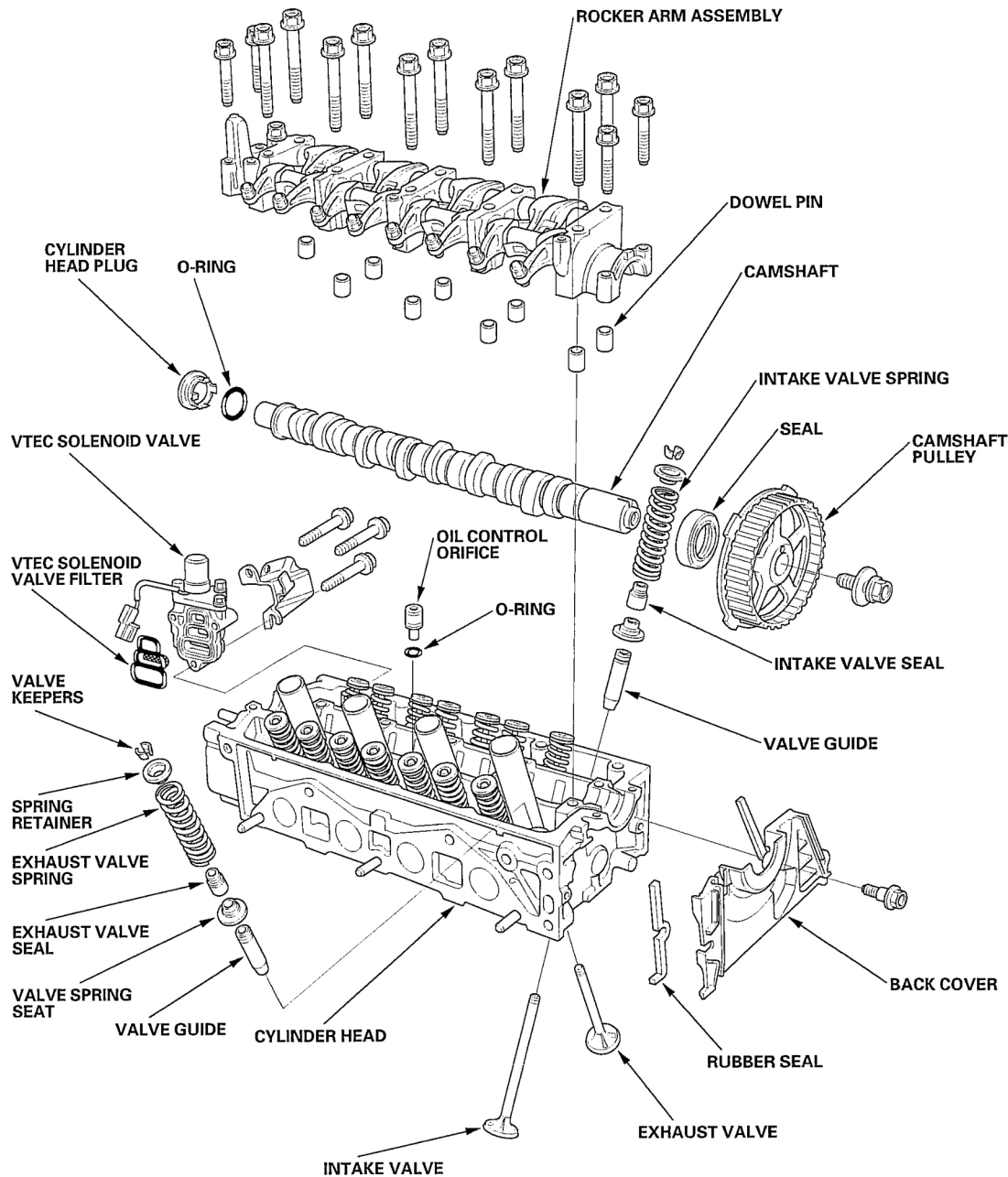
G01954406

Fig. 52: Locating Cylinder Head Components (1 Of 3)



G01954407

Fig. 53: Locating Cylinder Head Components (2 Of 3)



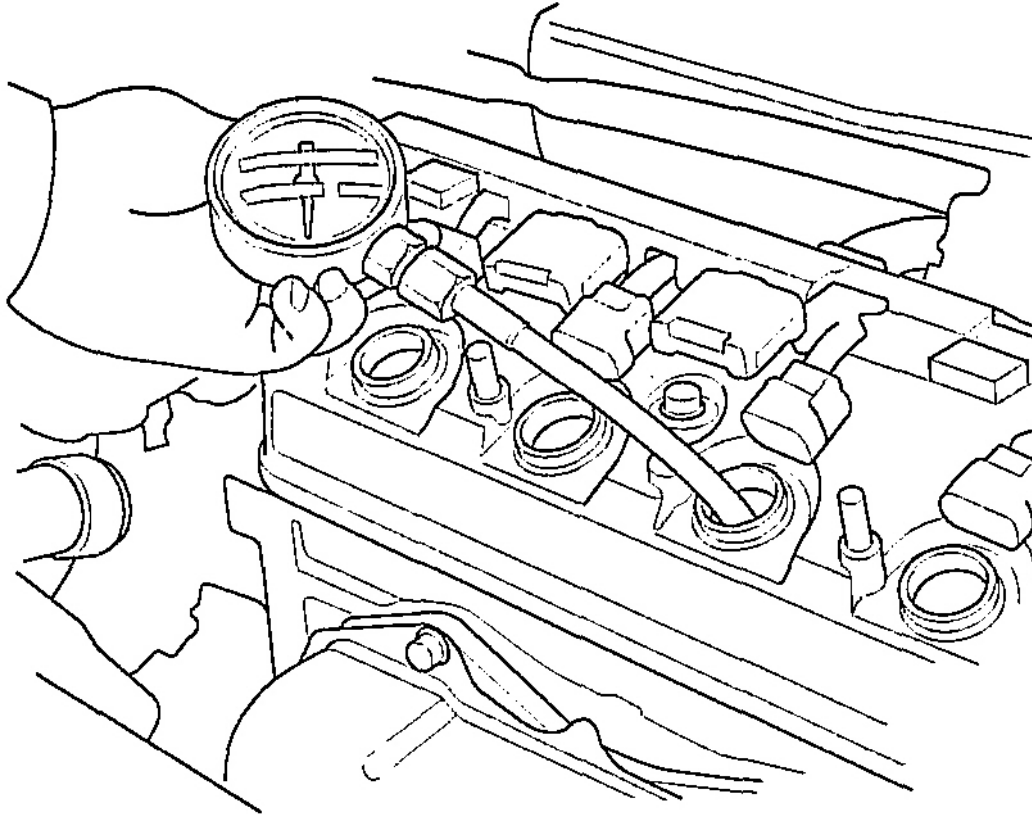
G01954408

Fig. 54: Locating Cylinder Head Components (3 Of 3)

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 air cleaner housing (see step 6 in Cylinder Head Removal).
4. Disconnect all four injector connectors.

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



G01954409

Fig. 55: Attaching Compression Gauge To Spark Plug Hole

9. Connect a tachometer.
10. 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)-250 RPM

11. Measure the compression on the remaining cylinders.

Maximum variation: Within 200 kPa (2.0 kgf/cm² , 28 psi)

12. 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 OIL PRESSURE SWITCH REPLACEMENT

1. Remove the resonator (see 5 in Cylinder Head Removal).
2. Remove the bolt (A) and loosen the bolt (B) securing the VTEC solenoid valve, then remove the harness bracket (C) from the VTEC solenoid valve.

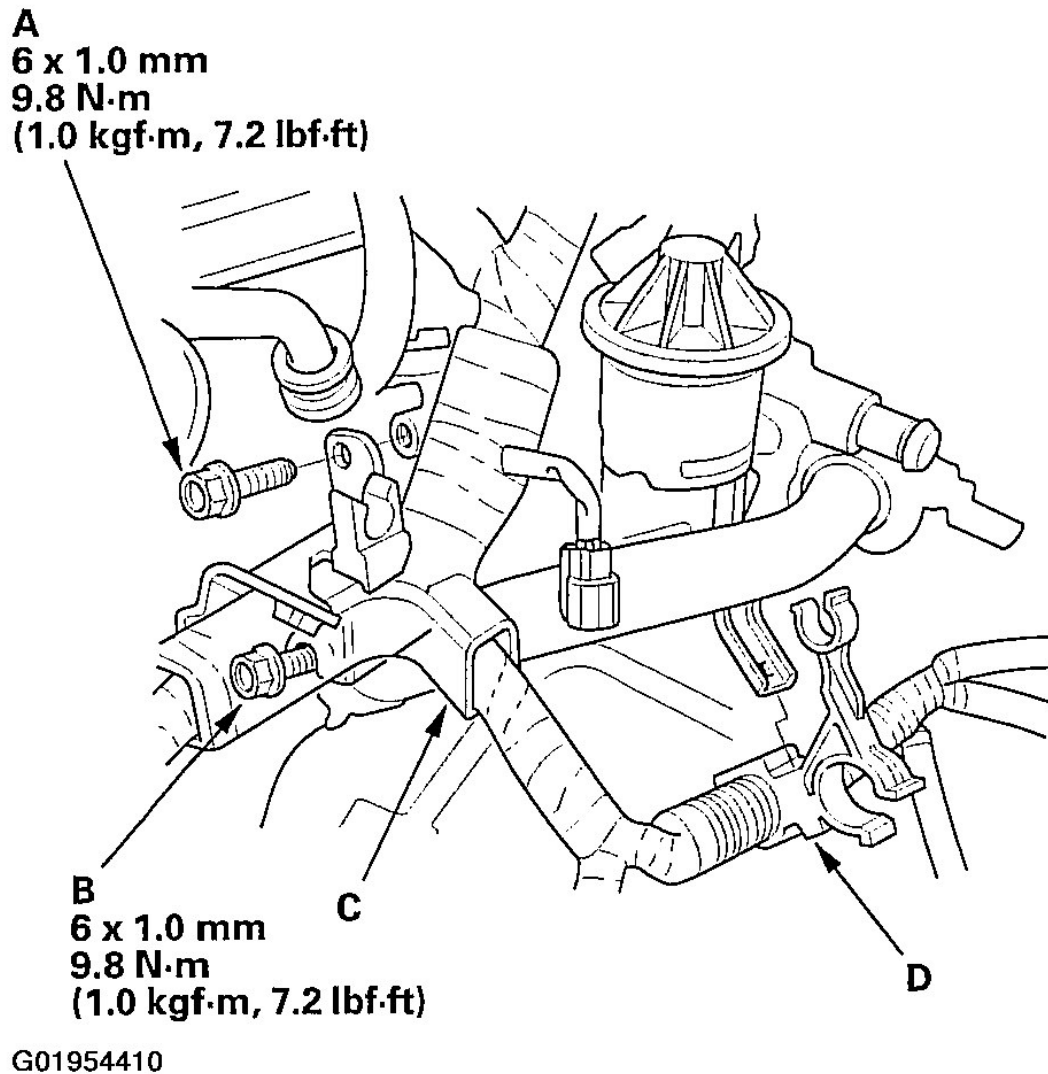


Fig. 56: Removing Bolt Securing VTEC Solenoid Valve

3. Remove the harness clamp (D) from the connecting pipe.
4. Disconnect the VTEC oil pressure switch connector, then remove the VTEC oil pressure switch (A).

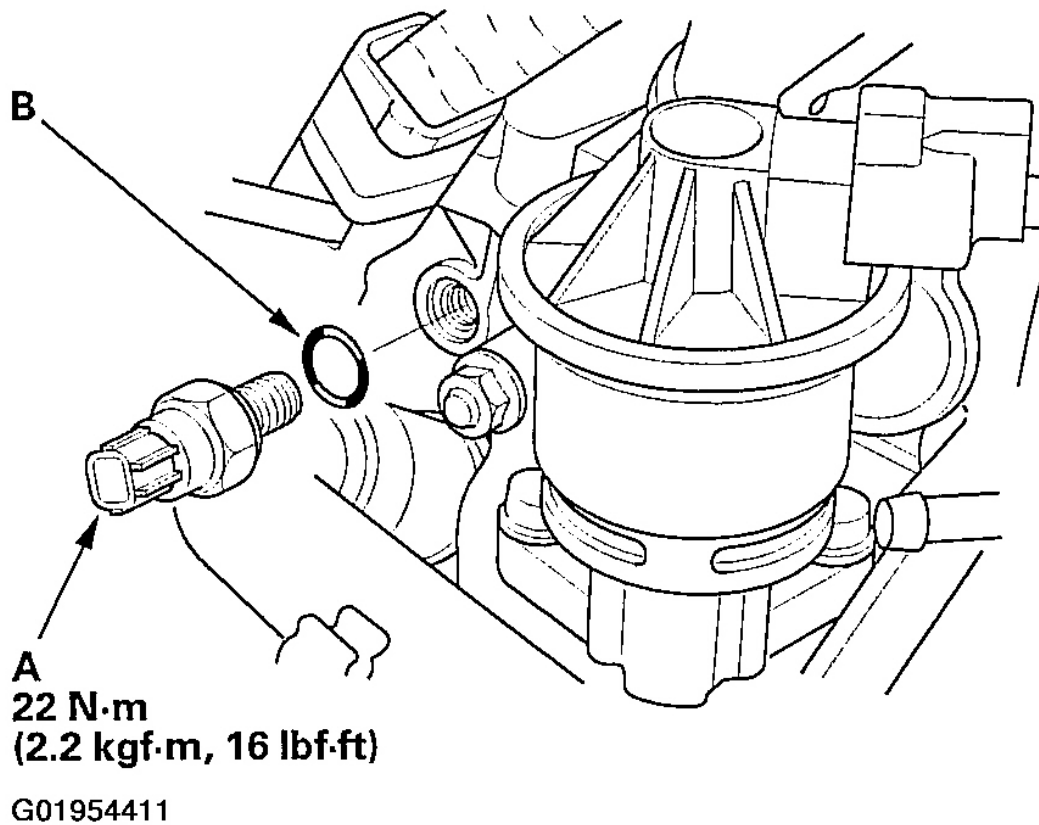


Fig. 57: Removing VTEC Oil Pressure Switch

5. Install the VTEC oil pressure switch using a new O-ring (B).

VTEC ROCKER ARM TEST

Special Tools Required

Air Stopper 07LAJ-PR3020B

1. Remove the resonator (see 5 in Cylinder Head Removal).
2. Remove the ignition coil cover, then remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
3. Remove the throttle cable clamps and harness holder from the cylinder head cover (see 9 in Timing Belt Removal).
4. Remove the cylinder head cover (see 10 in Timing Belt Removal).
5. Set the No. 1 piston at TDC (see 5 in Valve Clearance Adjustment).
6. Verify that the intake secondary rocker arm (A) moves independently of the intake primary rocker arm

(B).

- 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 secondary and primary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, and retest.
- If the intake secondary rocker arm moves freely, go to step 7.

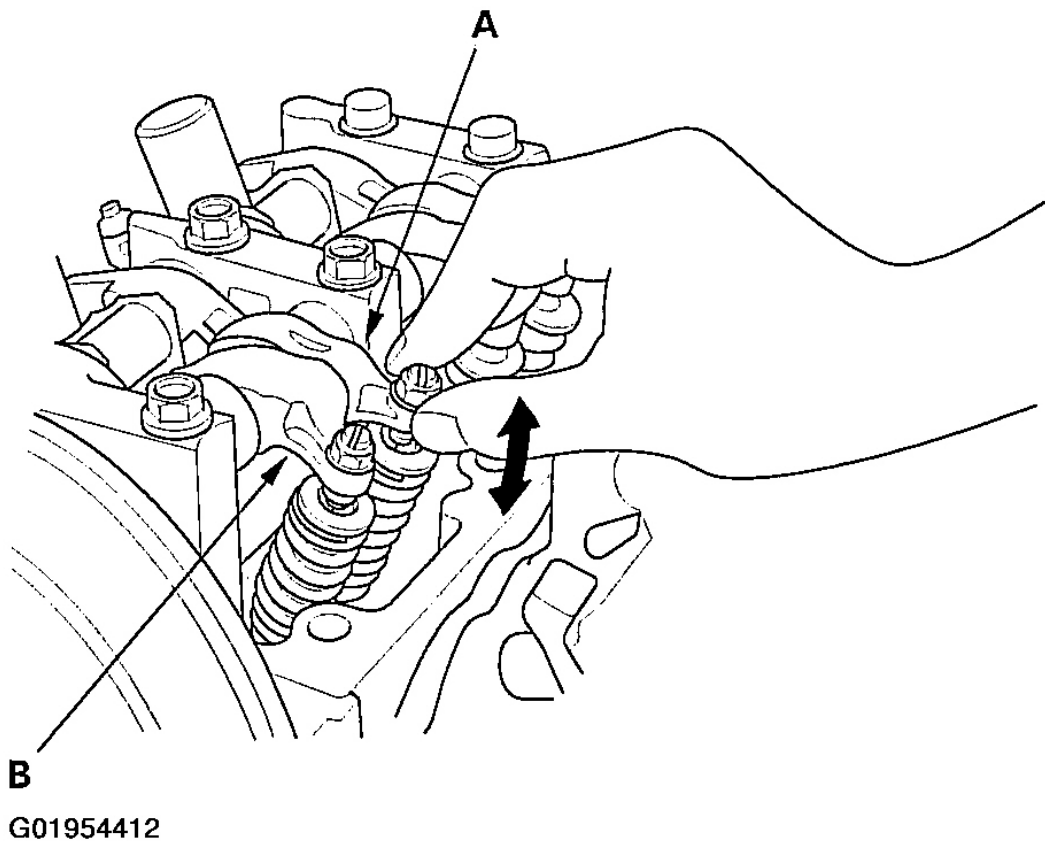


Fig. 58: Ensuring That Intake Secondary Rocker Arm Moves Independently

7. Repeat step 6 on the remaining intake secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 8.
8. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4 kgf/cm², 57 psi).
9. Inspect the valve clearance (see **Valve Clearance Adjustment**).
10. Cover the timing belt with a shop towel to protect the belt.
11. Plug the relief hole with the air stopper.

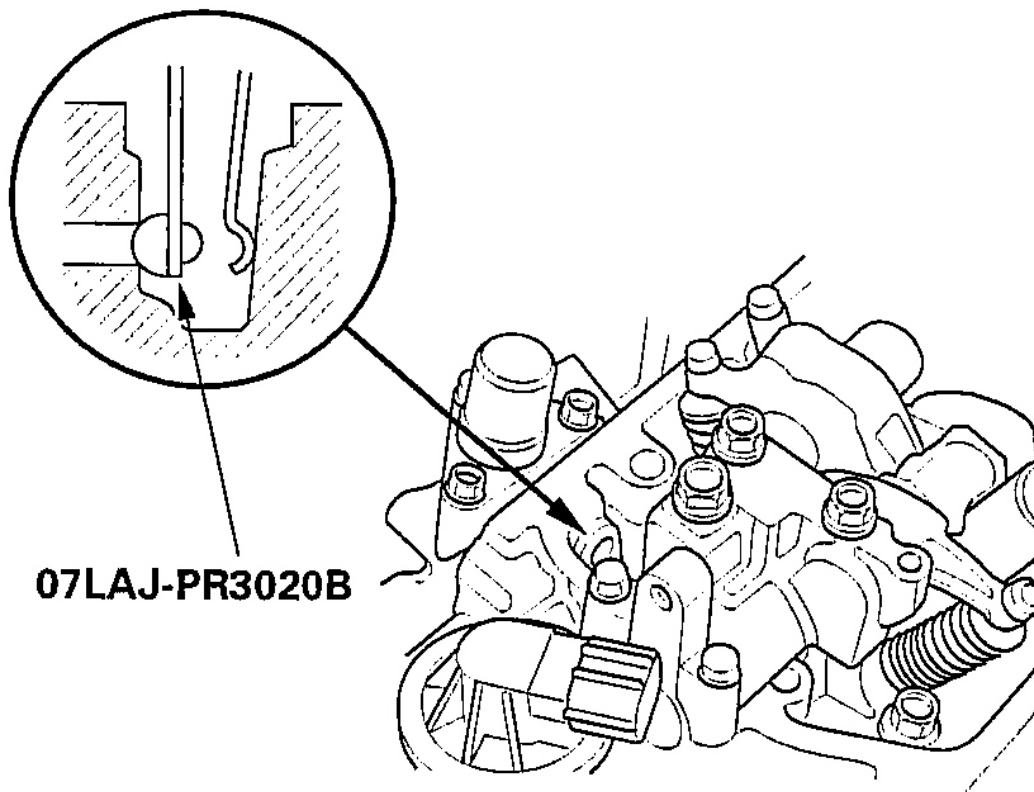
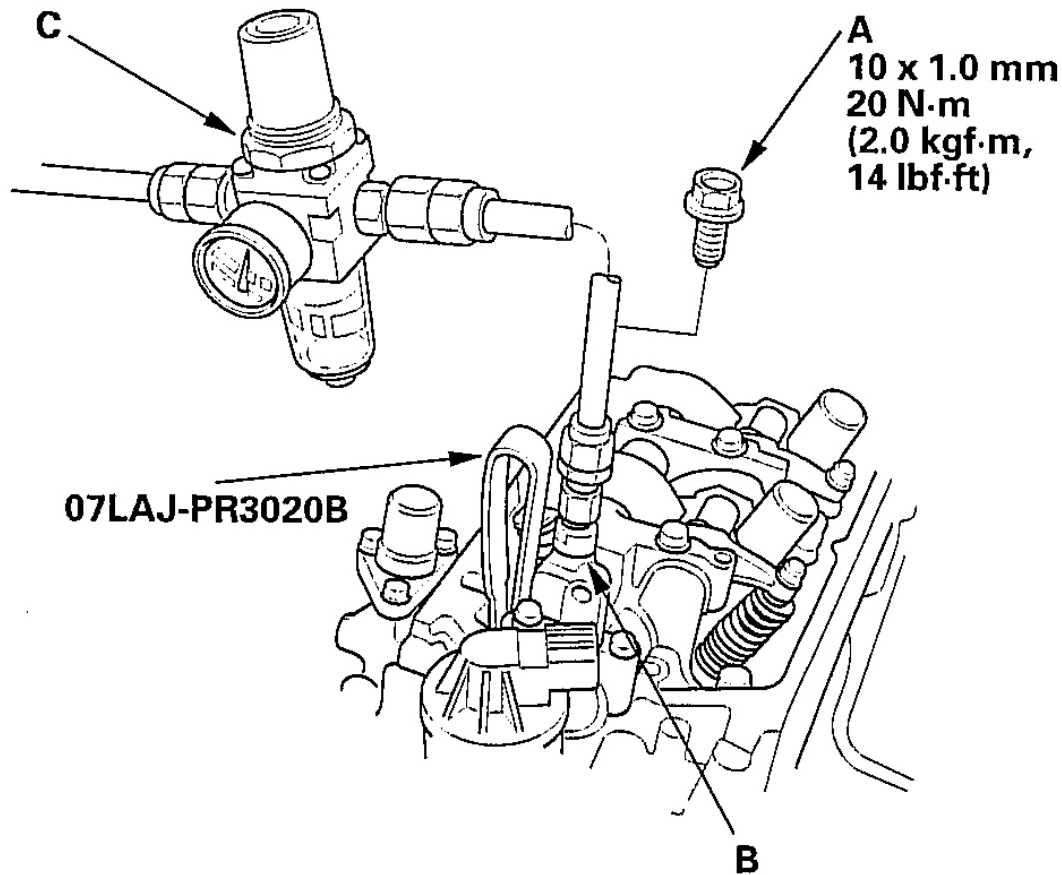
**07LAJ-PR3020B****G01954413**

Fig. 59: Plugging Relief Hole With Air Stopper

12. Remove the sealing bolt (A) from the inspection hole (B), and connect an air pressure regulator with a 0-100 psi gauge (C).



G01954414

Fig. 60: Removing Sealing Bolt From Inspection Hole

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

Specified Air Pressure: 250 kPa (2.5 kgf/cm² , 36 psi)

NOTE: If the synchronizing piston does not move after applying air pressure, move the primary or secondary rocker arm up and down manually by rotating the crankshaft counterclockwise.

14. Move the intake secondary rocker arm (A) for the No. 1 cylinder. The primary rocker arm (B) and secondary rocker arm should move together.
 - 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 retest.

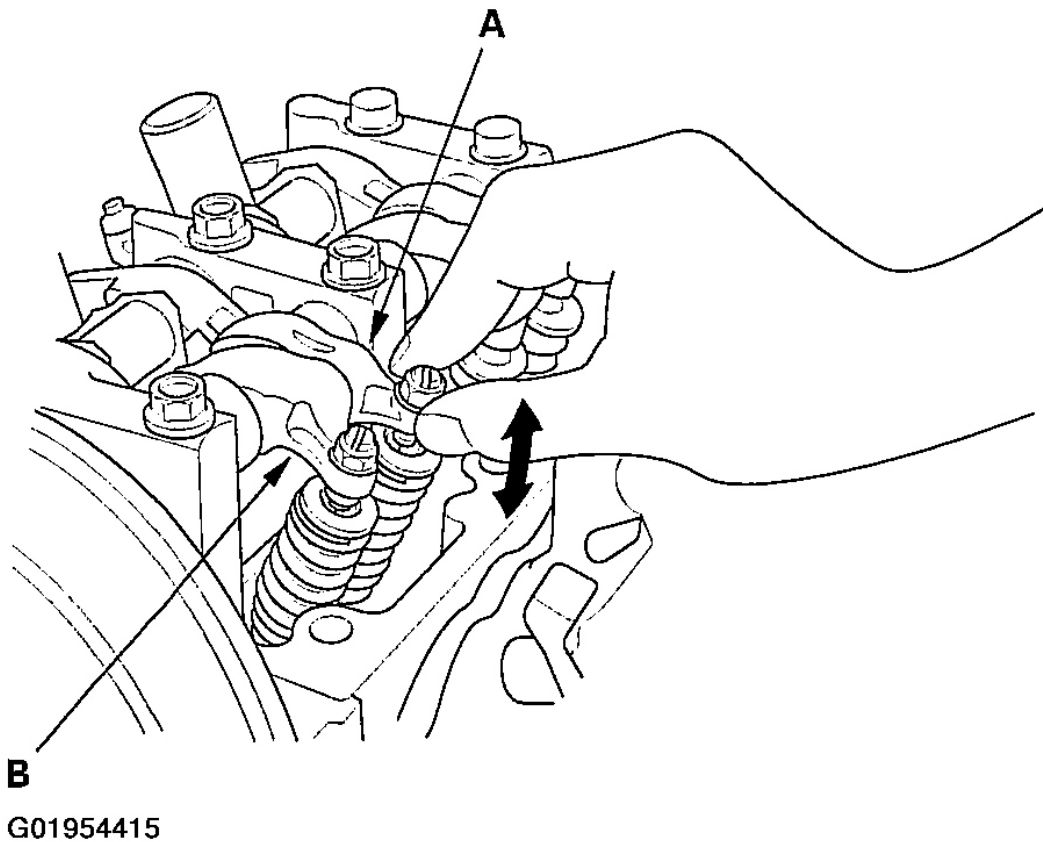


Fig. 61: Checking Primary Rocker Arm & Secondary Rocker Arm Movement

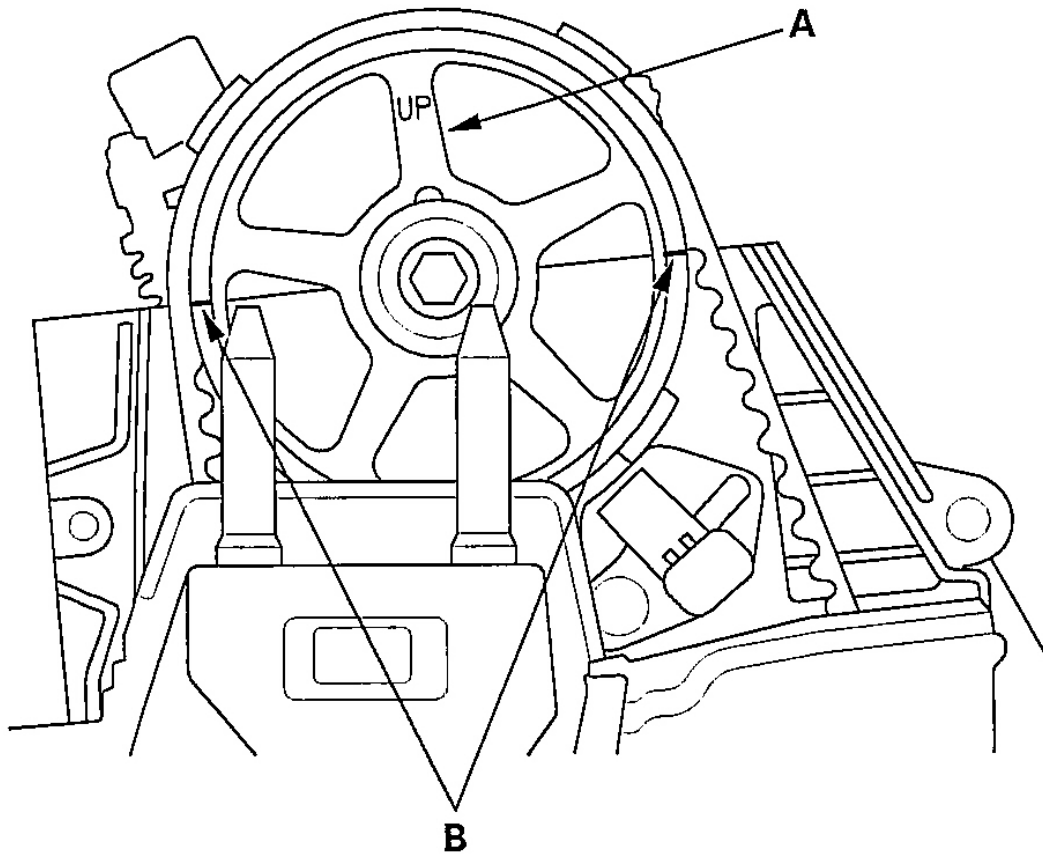
15. Remove the special tools.
16. After inspection, check that the MIL does not come on.

VALVE CLEARANCE ADJUSTMENT

NOTE: Adjust the valves only when the cylinder head temperature is less than 100°F (38°C).

1. Remove the ignition coil cover, then remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
2. Remove the throttle cable clamps and harness holder from the cylinder head cover (see step 9 in Timing Belt Removal).
3. Remove the cylinder head cover (see step 10 in Timing Belt Removal).
4. Remove the grommet from the upper cover, and disconnect the TDC sensor connector. Remove the upper cover (see step 1 in TDC Sensor Replacement).
5. Set the No. 1 piston at TDC. The "UP" mark (A) on the camshaft pulley should be at the top, and the

TDC marks (B) on the pulley should line up with the top edge of the head.



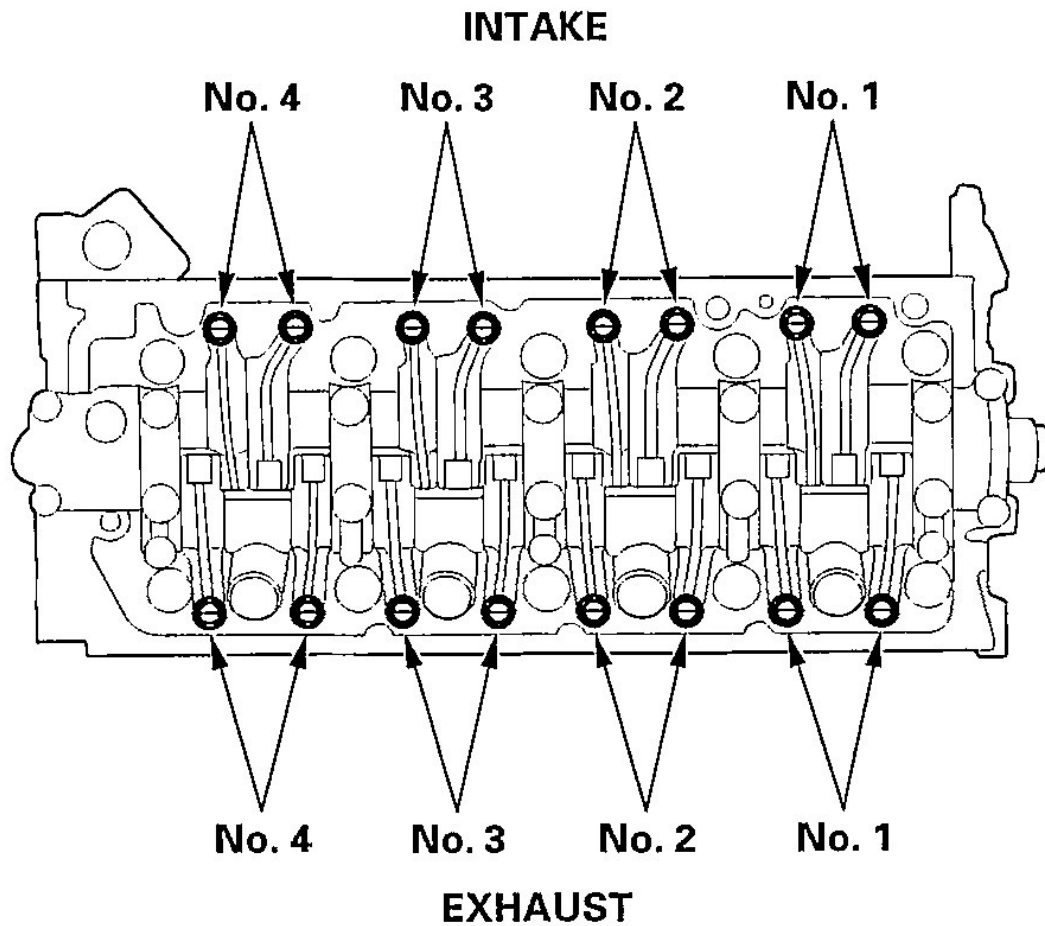
G01954416

Fig. 62: Setting No. 1 Piston At TDC

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

Intake: 0.18-0.22 mm (0.007-0.009 in.)

Exhaust: 0.23-0.27 mm (0.009-0.011 in.)



G01954417

Fig. 63: Locating Adjusting Screws

7. 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.

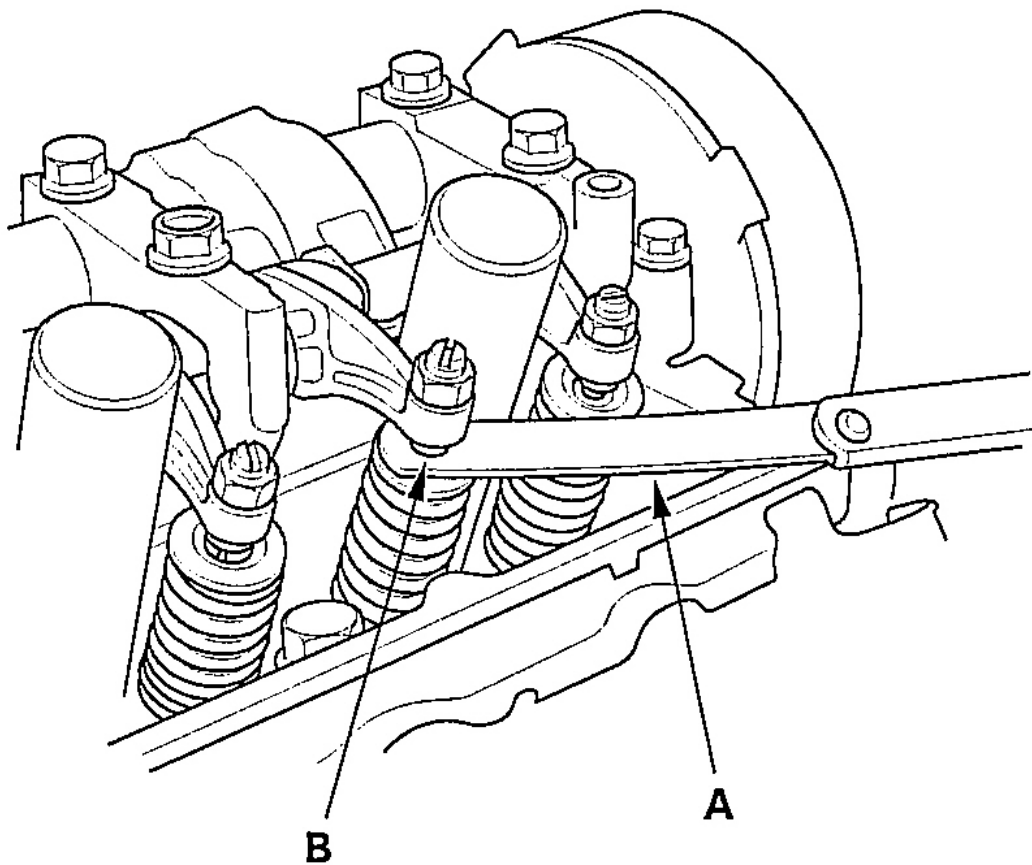
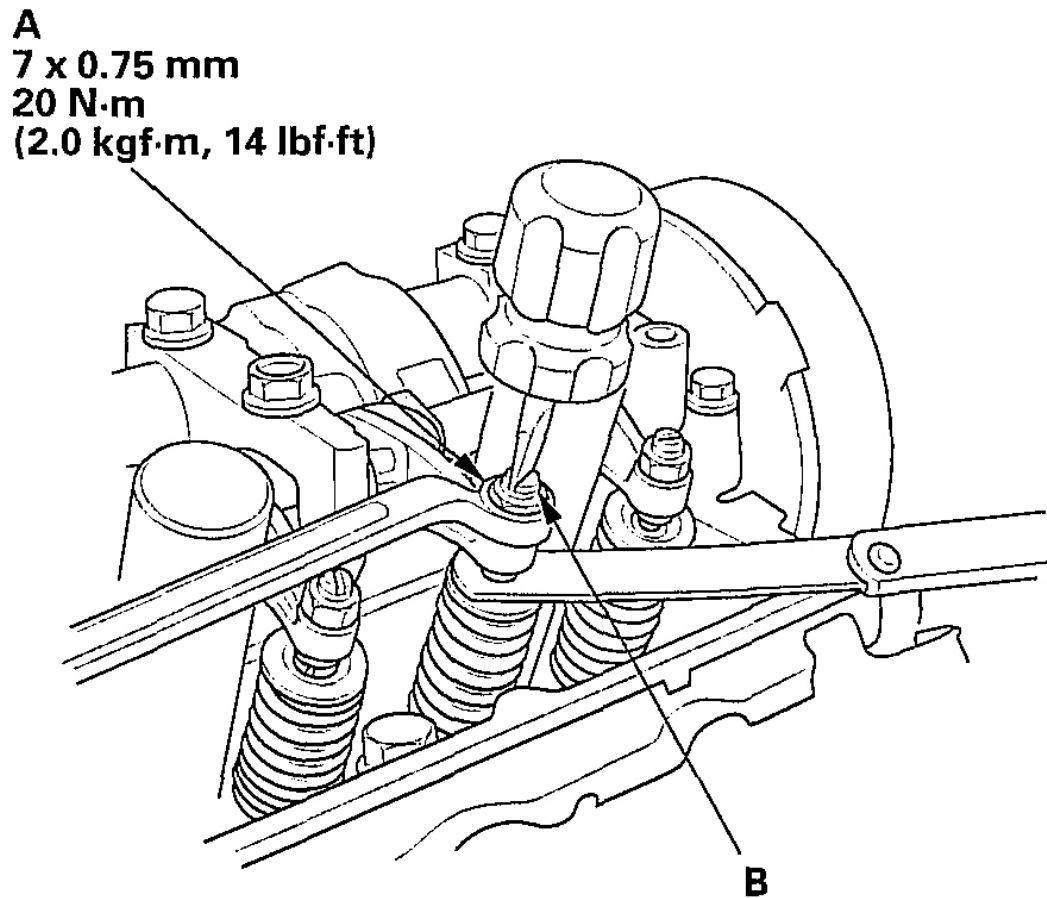
**G01954418**

Fig. 64: Inserting Feeler Gauge Between Adjusting Screw & End Of Valve Stem

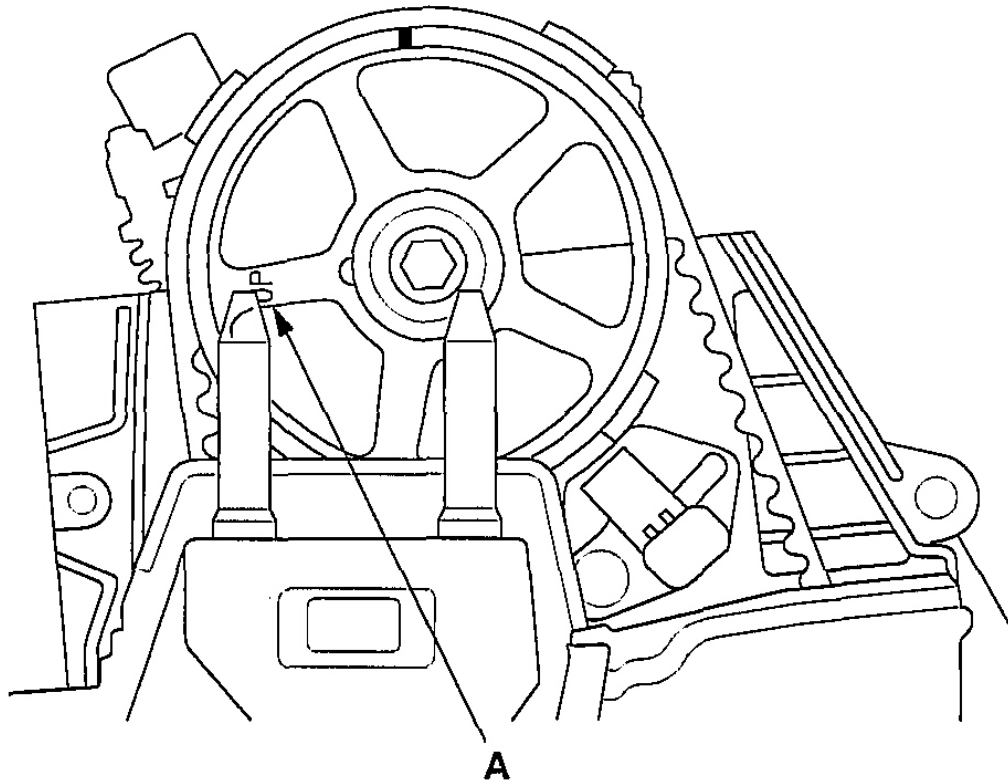
8. If you feel too much or too little drag, loosen the locknut (A), and turn the adjusting screw (B) until the drag on the feeler gauge is correct.



G01954419

Fig. 65: Turning Adjusting Screw

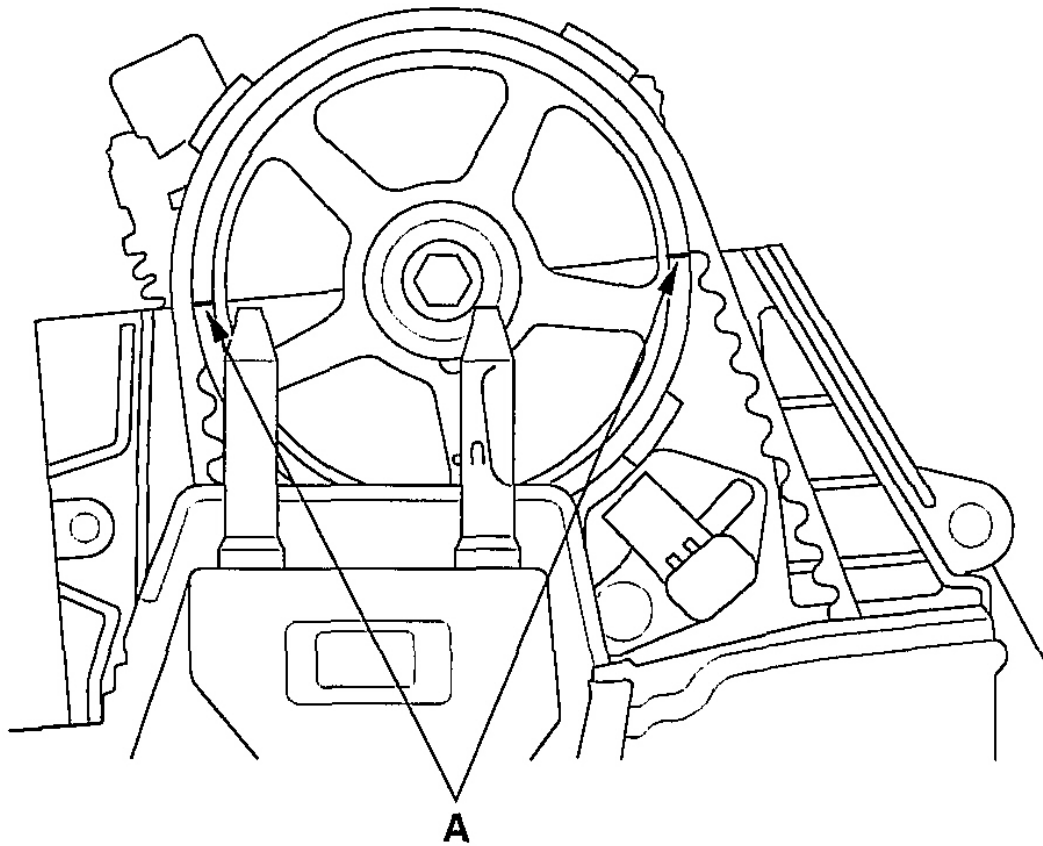
9. Tighten the locknut and recheck the clearance. Repeat the adjustment if necessary.
10. Rotate the crankshaft 180° counterclockwise (camshaft pulley turns 90°). The "UP" mark (A) on the camshaft pulley should be toward the exhaust side of the head.



G01954420

Fig. 66: Rotating Crankshaft 180° Counterclockwise

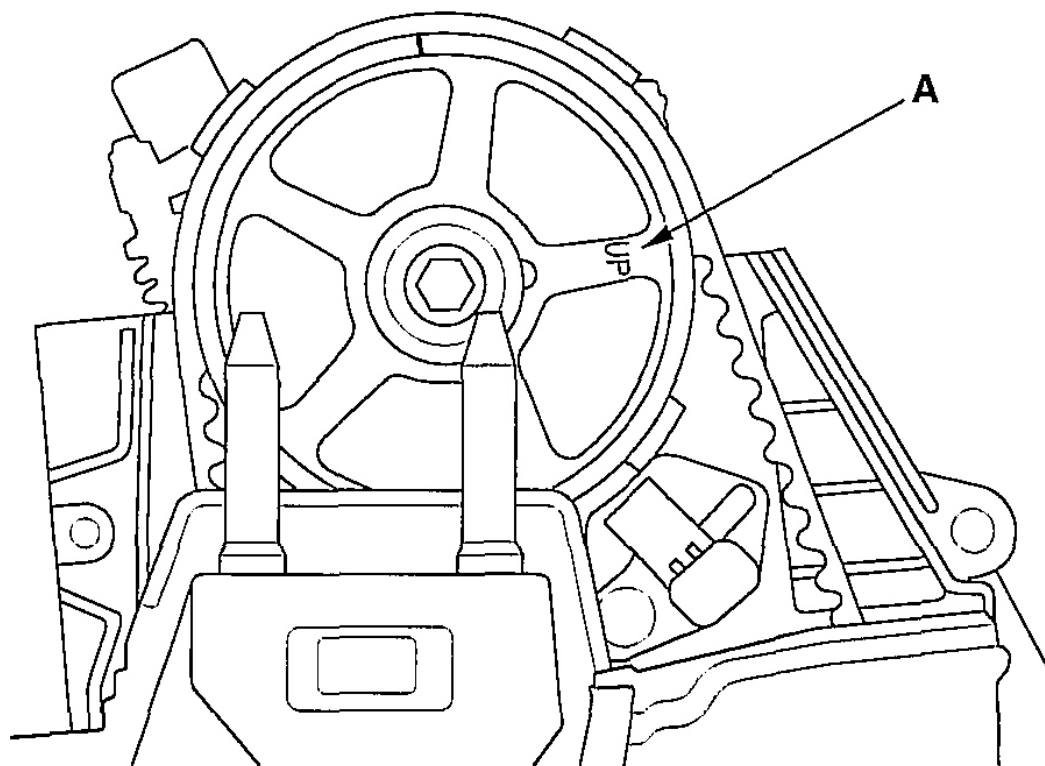
11. Check and, if necessary, adjust the valve clearance on No. 3 cylinder.
12. Rotate the crankshaft 180° counterclockwise to bring No. 4 piston to TDC. TDC marks (A) are visible again.



G01954421

Fig. 67: Rotating Crankshaft 180° Counterclockwise To Bring No. 4 Piston To TDC

13. Check and, if necessary, adjust the valve clearance on No. 4 cylinder.
14. Rotate the crankshaft 180° counterclockwise to bring No. 2 piston to TDC. The "UP" mark (A) should be on the intake side of the head.



G01954422

Fig. 68: Rotating Crankshaft 180° Counterclockwise To Bring No. 2 Piston To TDC

15. Check and, if necessary, adjust the valve clearance on No. 2 cylinder.
16. 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, offset 07MAB-PY3010A
- Socket, 19 mm 07JAA-001020A or a commercially available 19 mm socket

Removal

1. Hold the pulley with holder handle (A) and holder attachment (B).

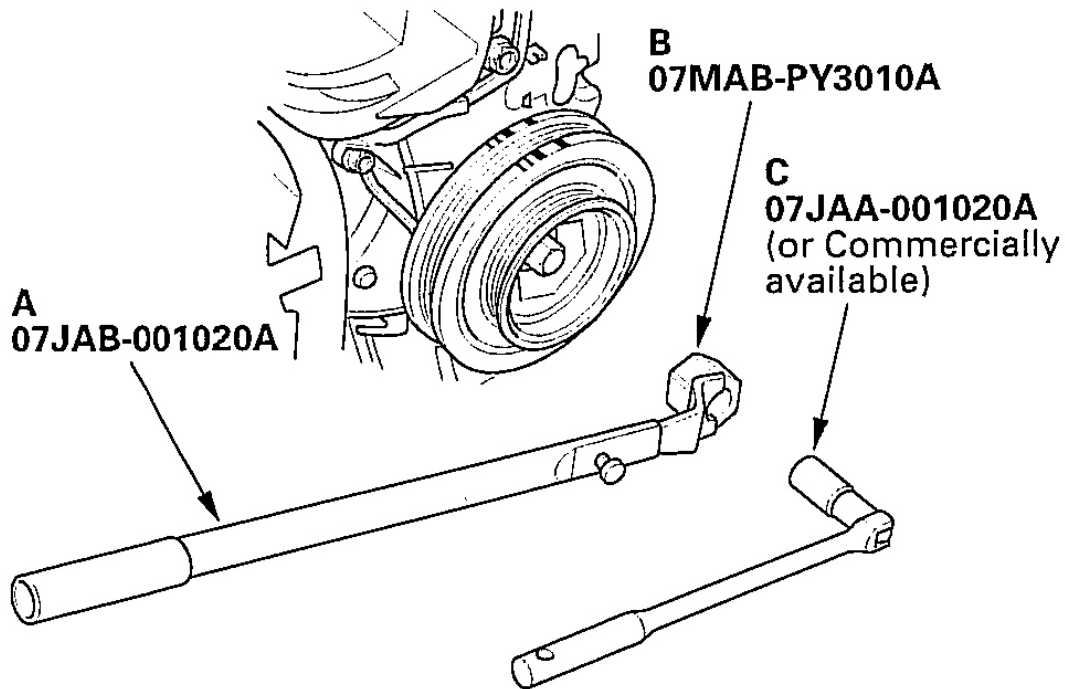
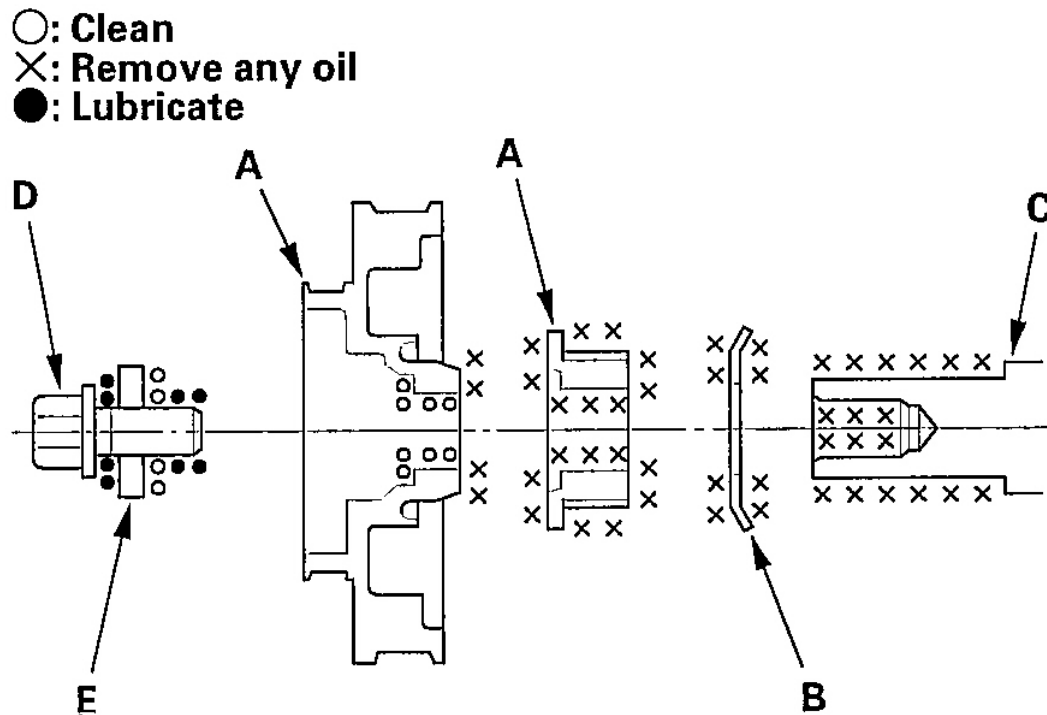


Fig. 69: Holding Pulley With Holder Handle & Holder Attachment

2. Remove the bolt with a heavy duty 19 mm socket (C) and breaker bar.

Installation

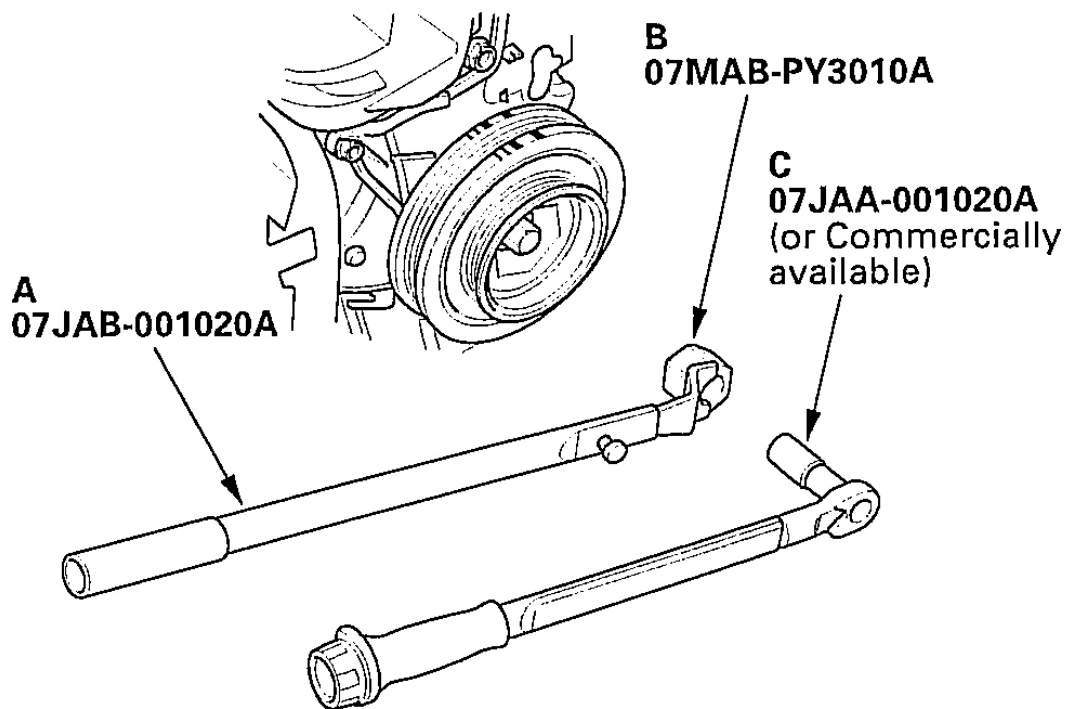
1. Remove any oil from the pulleys (A), guide plate (B), crankshaft (C), bolt (D), and washer (E). Clean and lubricate as shown below.



G01954424

Fig. 70: Removing Any Oil From Pulleys, Guide Plate, Crankshaft, Bolt & Washer

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



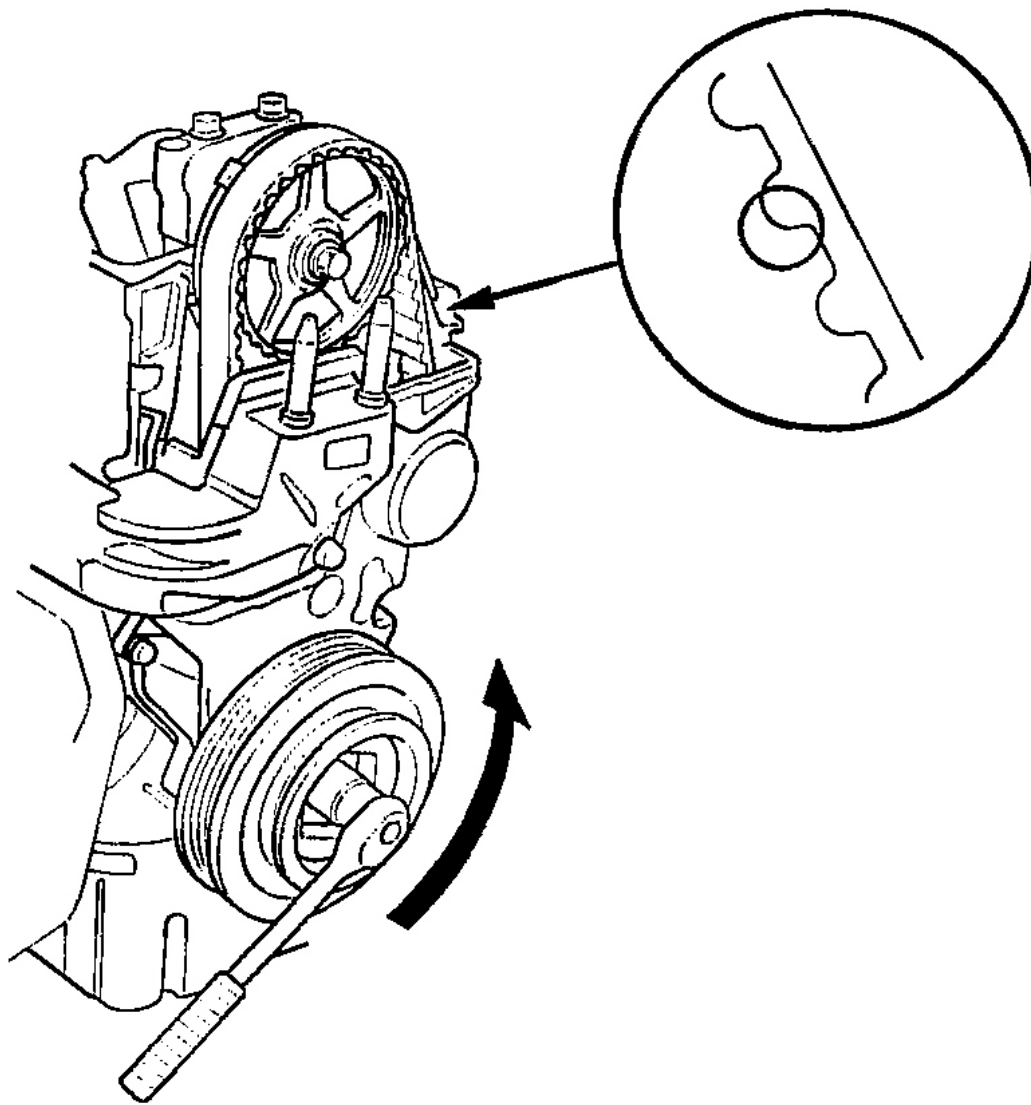
G01954425

Fig. 71: Installing Crankshaft Pulley

3. Tighten the bolt to 20 N.m (2.0 kgf.m, 14 lbf.Ft) with a torque wrench and 19 mm socket (C). Do not use an impact wrench.
4. Tighten the pulley bolt an additional 90°.

TIMING BELT INSPECTION

1. Remove the ignition coil cover, then remove the four ignition coils.
2. Remove the throttle cable clamps and harness holder mounting bolts.
3. Remove the cylinder head cover.
4. Inspect the timing belt for cracks and oil or coolant soaking. Replace the belt if it is oil or coolant soaked. Remove any oil or solvent that gets on the belt.



G01954426

Fig. 72: Inspecting Timing Belt

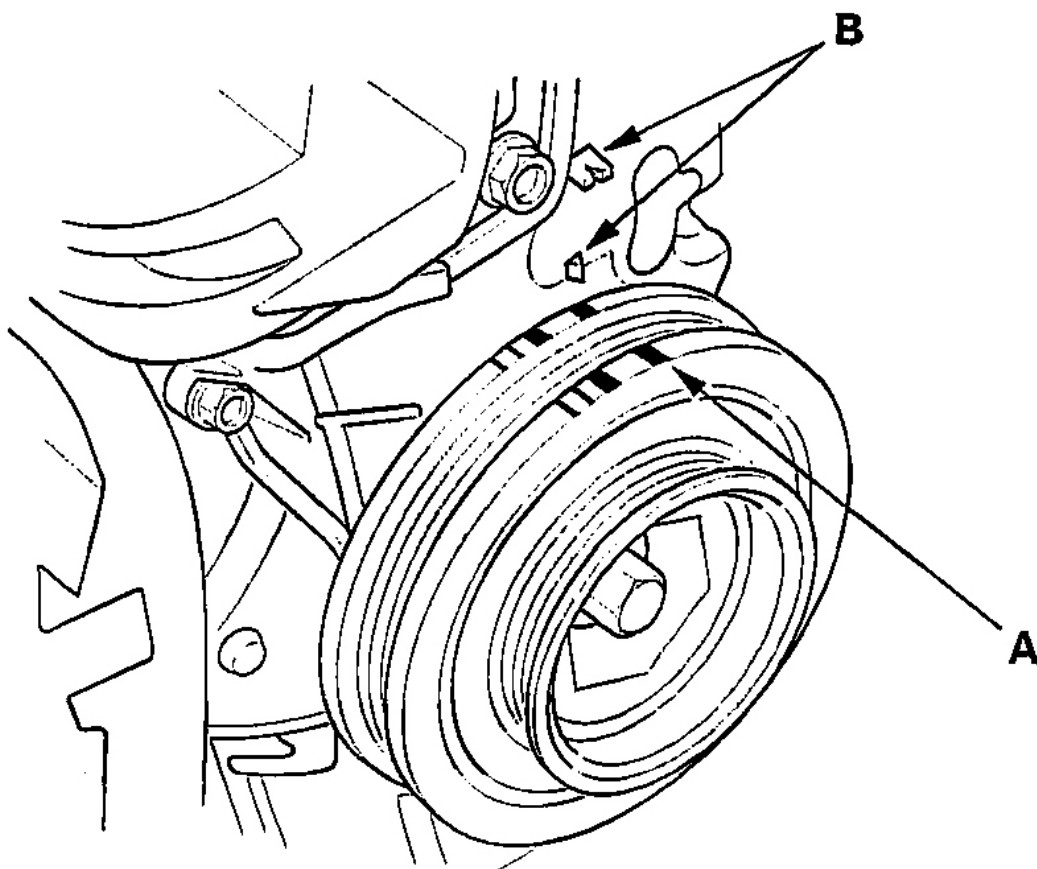
5. After inspecting, retorque the crankshaft pulley bolt (see **Crankshaft Pulley Removal and Installation**).

TIMING BELT REMOVAL

Special Tools Required

- Holder handle 07JAB-001020A

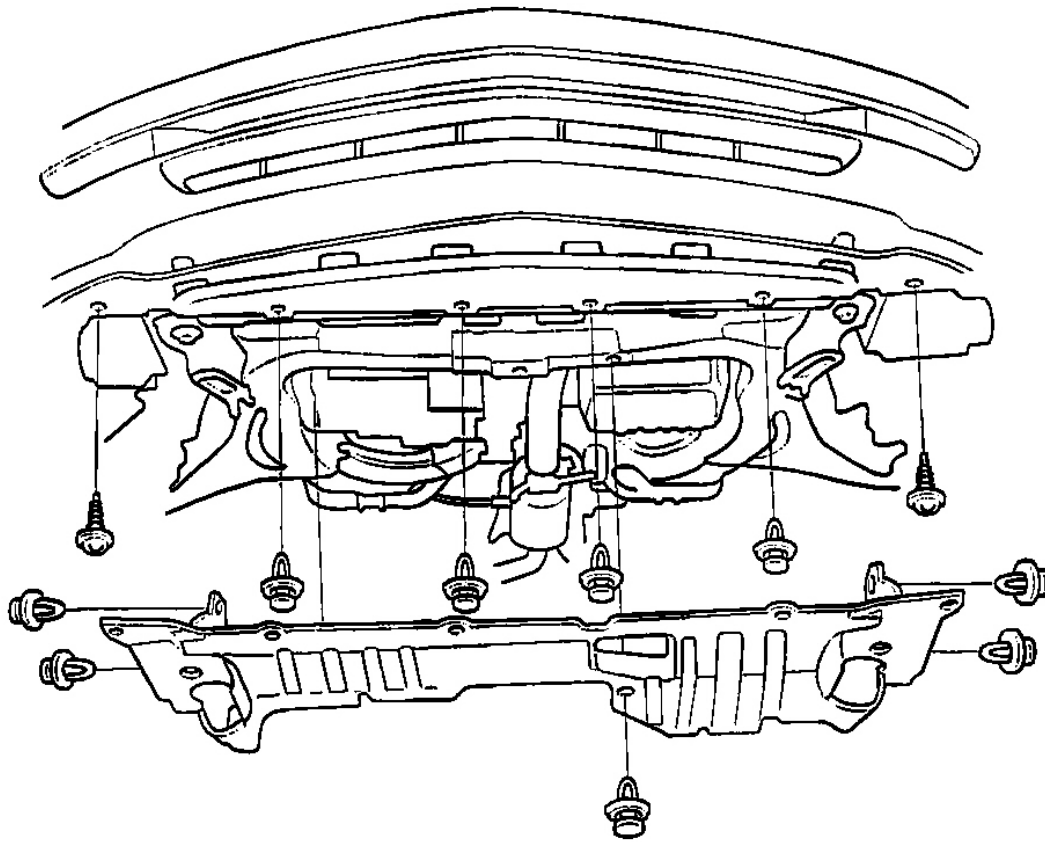
- Holder attachment, 50 mm, offset 07MAB-PY3010A
 - Socket, 19 mm 07JAA-001020A or a commercially available 19 mm socket
1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
 2. Disconnect the battery negative terminal.
 3. Turn the crankshaft pulley so its TDC mark (A) lines up with the pointers (B).



G01954427

Fig. 73: Turning Crankshaft Pulley Lining TDC Mark With Pointers

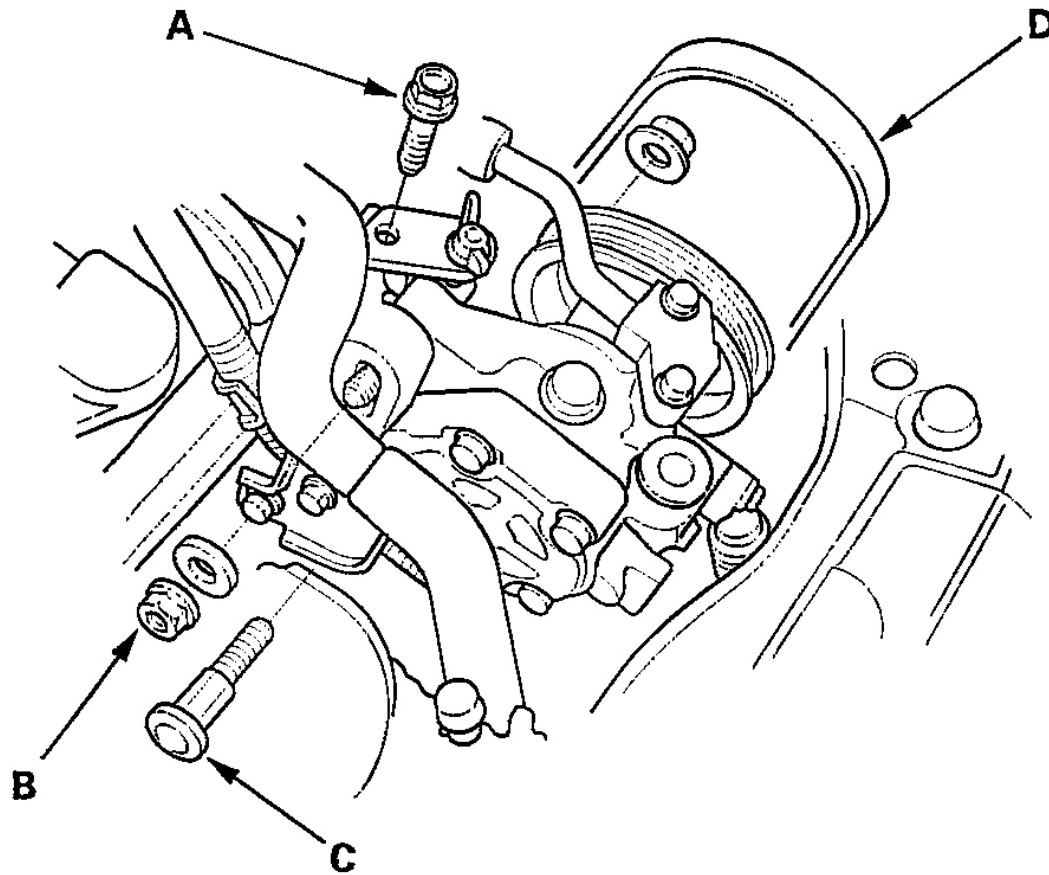
4. Remove the front tires/wheels.
5. Remove the splash shield.



G01954428

Fig. 74: Removing Splash Shield

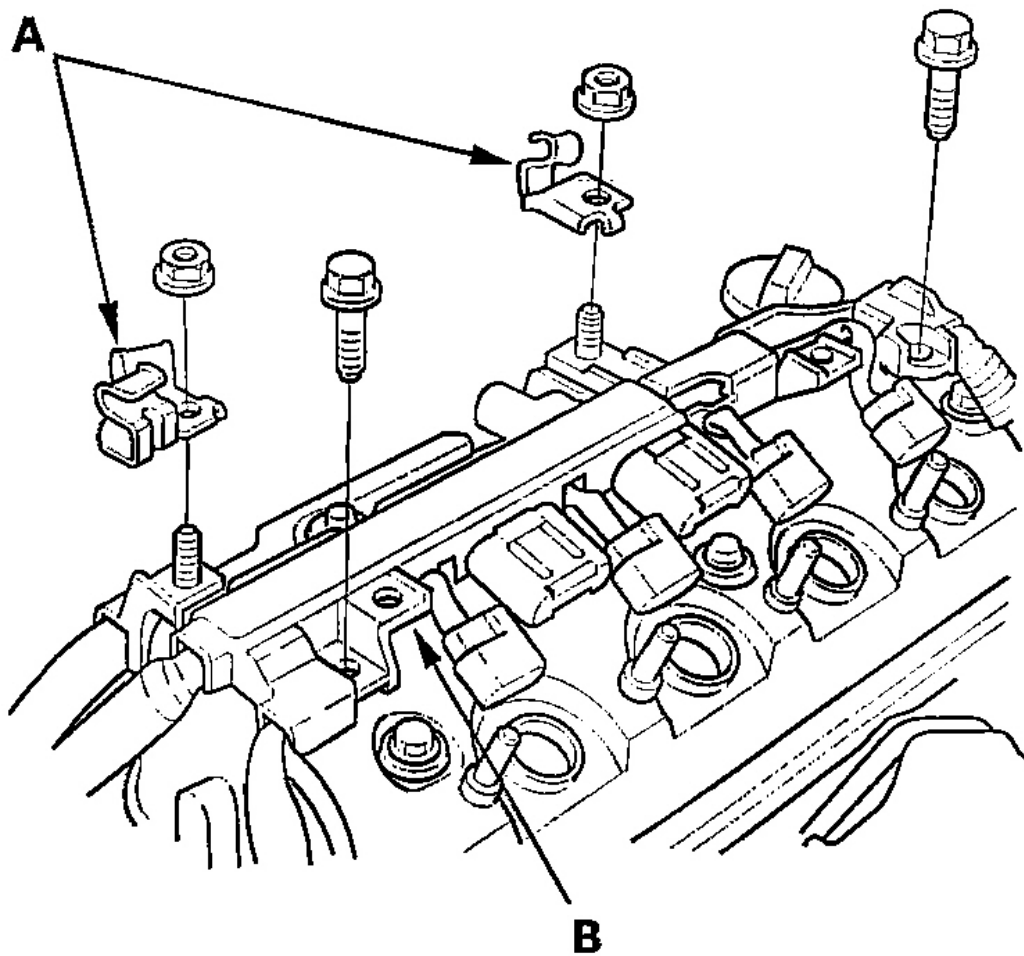
6. Remove the adjusting plate mounting bolt (A), locknut (B) and mounting bolt (C), then remove the power steering (P/S) pump belt (D) and pump without disconnecting the P/S hoses.



G01954429

Fig. 75: Removing Adjusting Plate Mounting Bolt

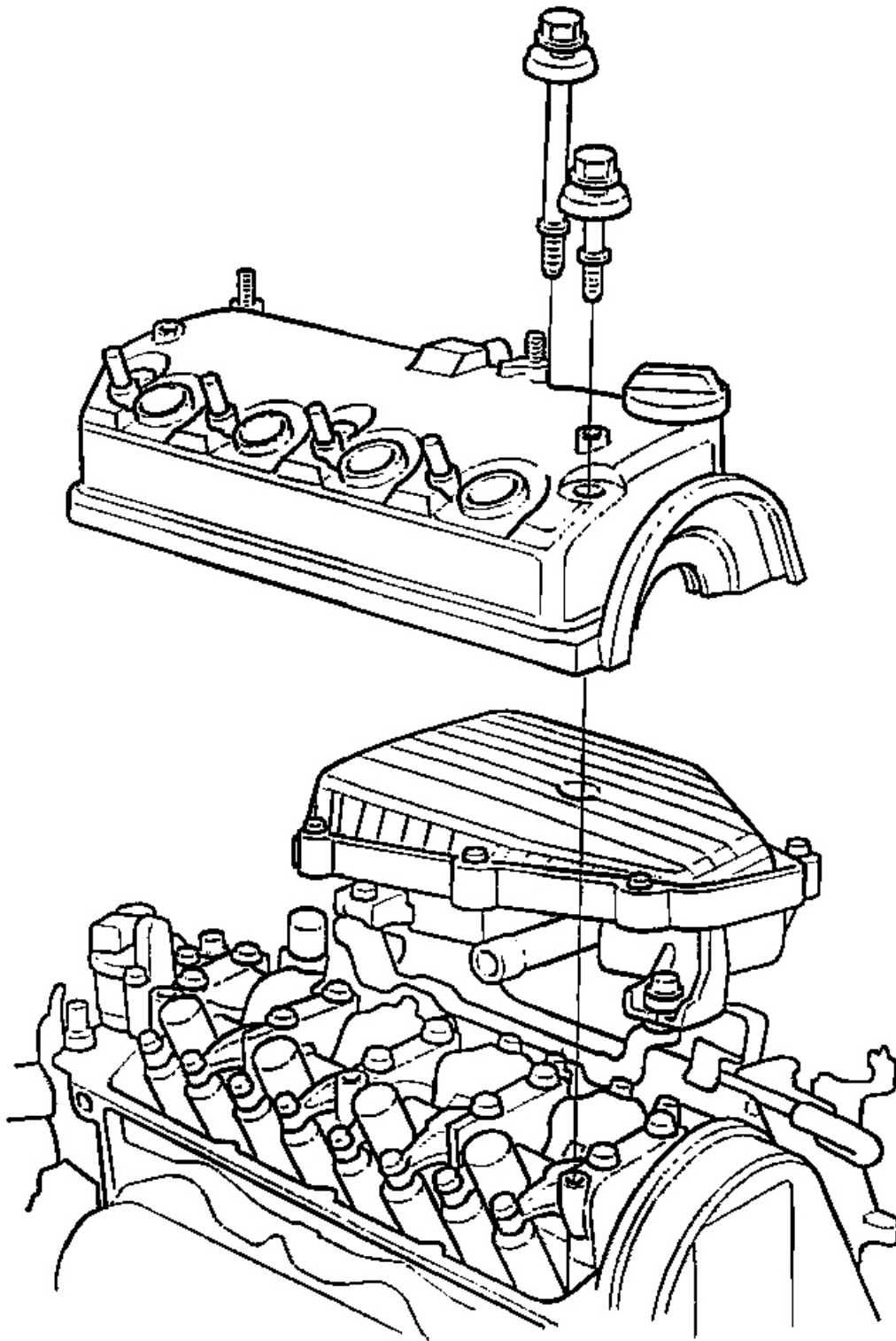
7. Remove the alternator (see **ALTERNATOR REPLACEMENT**).
8. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
9. Remove the throttle cable clamps (A) and harness holder (B) from the cylinder head cover.



G01954430

Fig. 76: Removing Throttle Cable Clamps & Harness Holder From Cylinder Head Cover

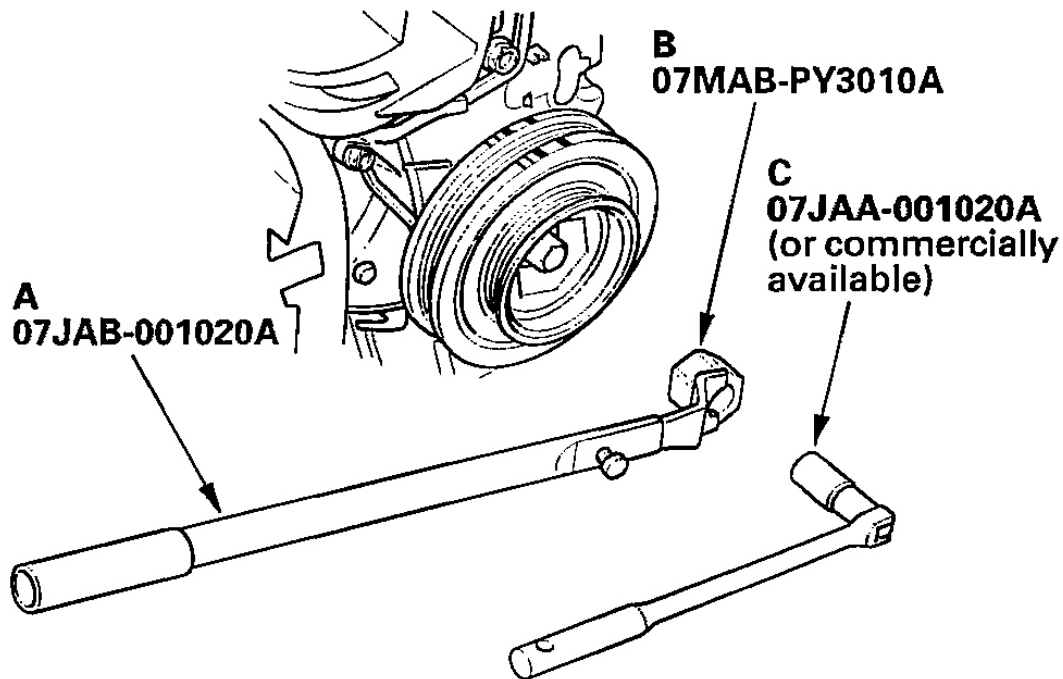
10. Remove the cylinder head cover.



G01954431

Fig. 77: Removing Cylinder Head Cover

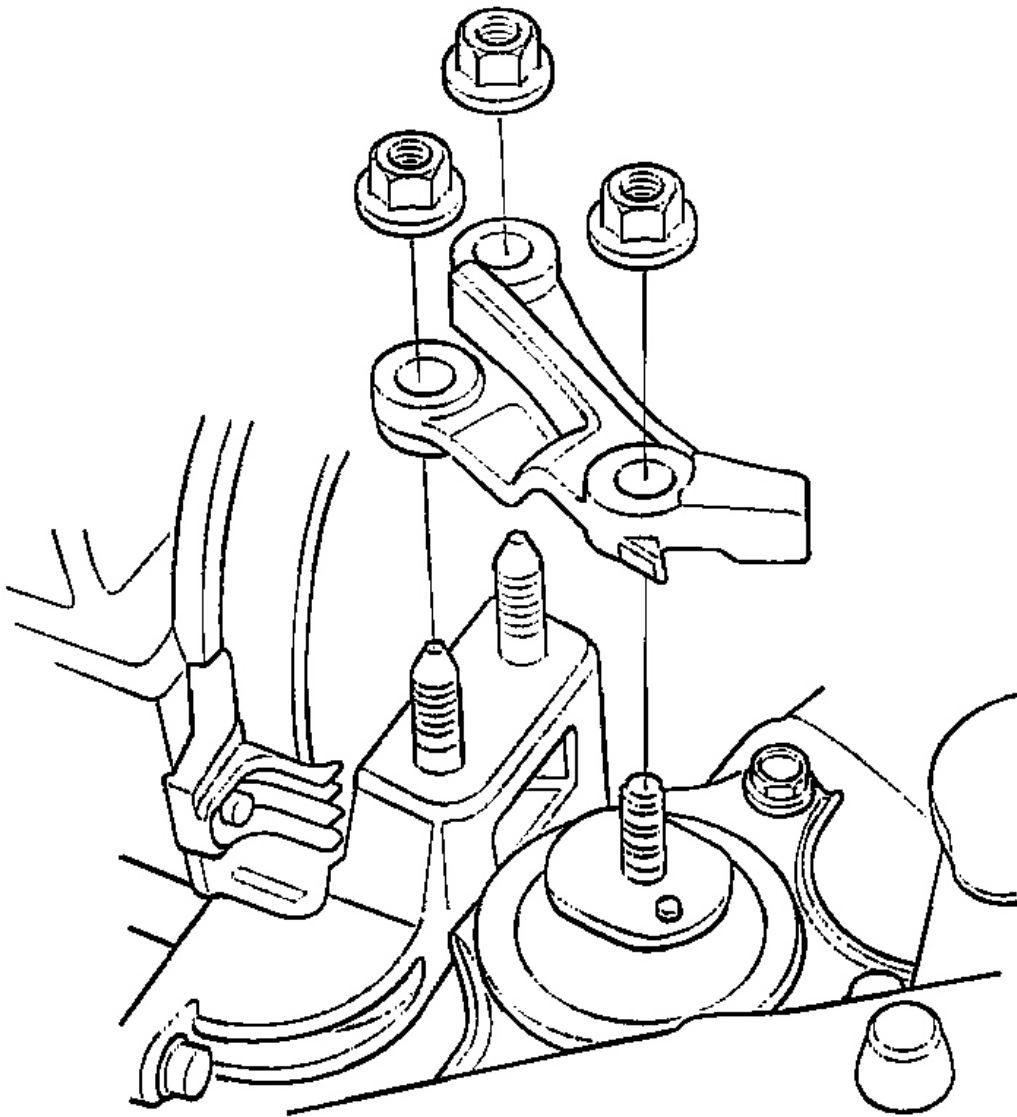
11. Hold the pulley with holder handle (A) and holder attachment (B).



G01954432

Fig. 78: Holding Pulley With Holder Handle & Holder Attachment

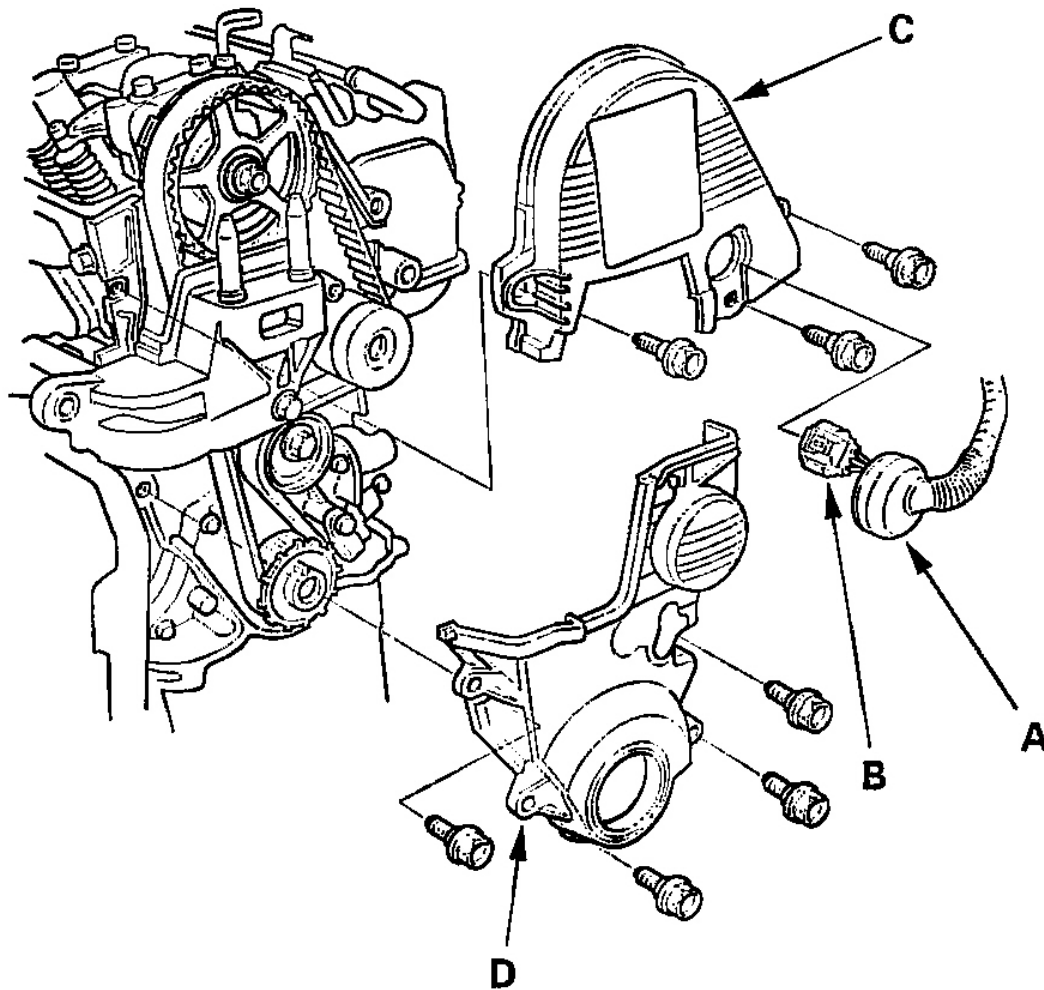
12. Remove the bolt with a heavy duty 19 mm socket (C) and breaker bar.
13. Support the engine with a jack and wood block under the oil pan.
14. Remove the upper bracket.



G01954433

Fig. 79: Removing Upper Bracket

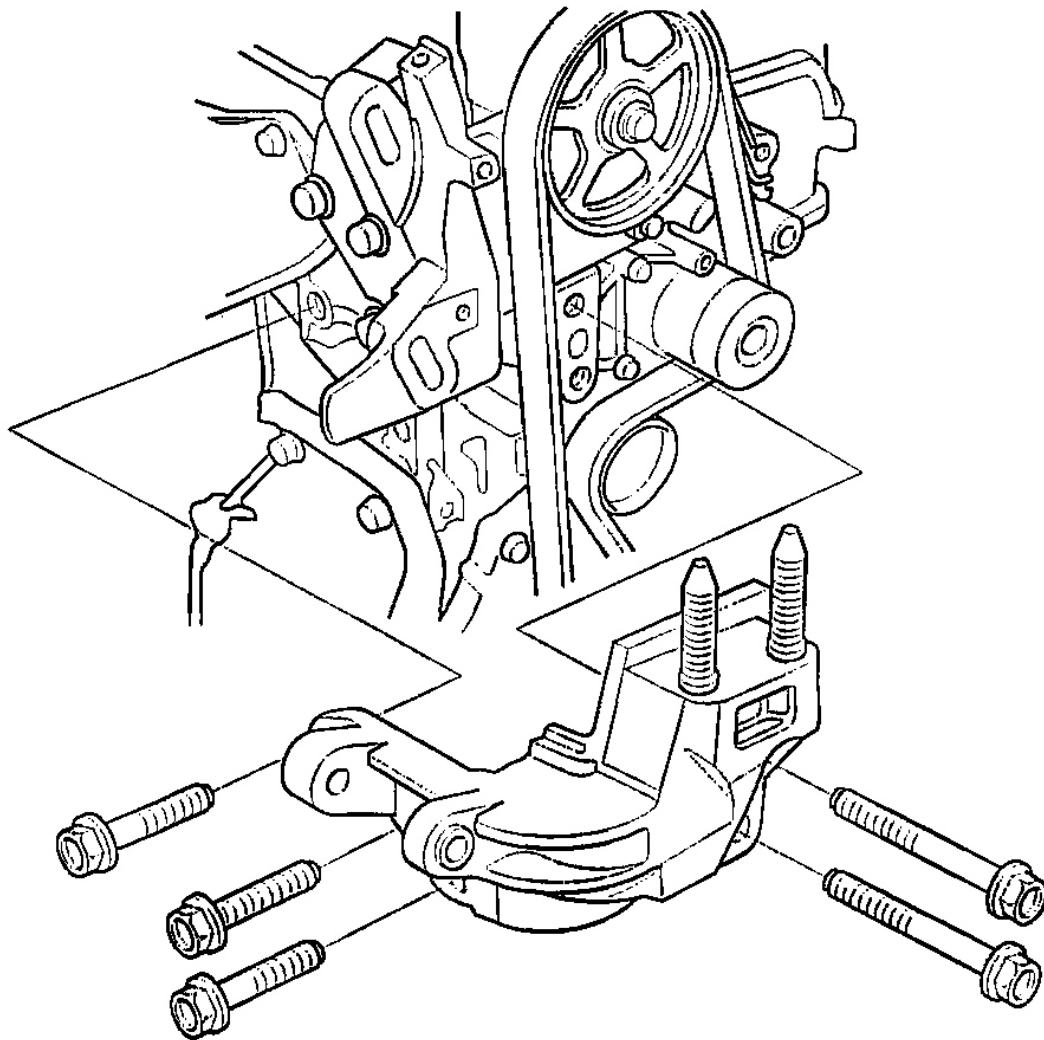
15. Remove the grommet (A) from the upper cover, and disconnect the TDC sensor connector (B).



G01954434

Fig. 80: Removing Grommet From Upper Cover

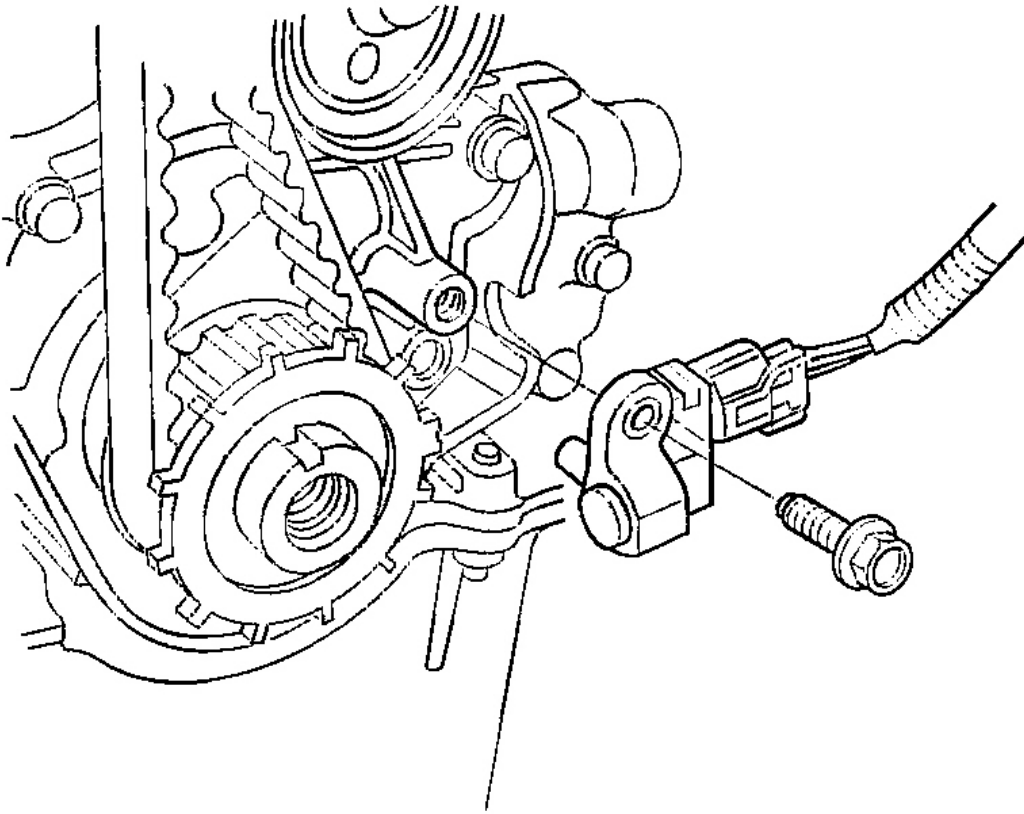
16. Remove the upper cover (C) and lower cover (D).
17. Remove the side engine mount bracket.



G01954435

Fig. 81: Removing Side Engine Mount Bracket

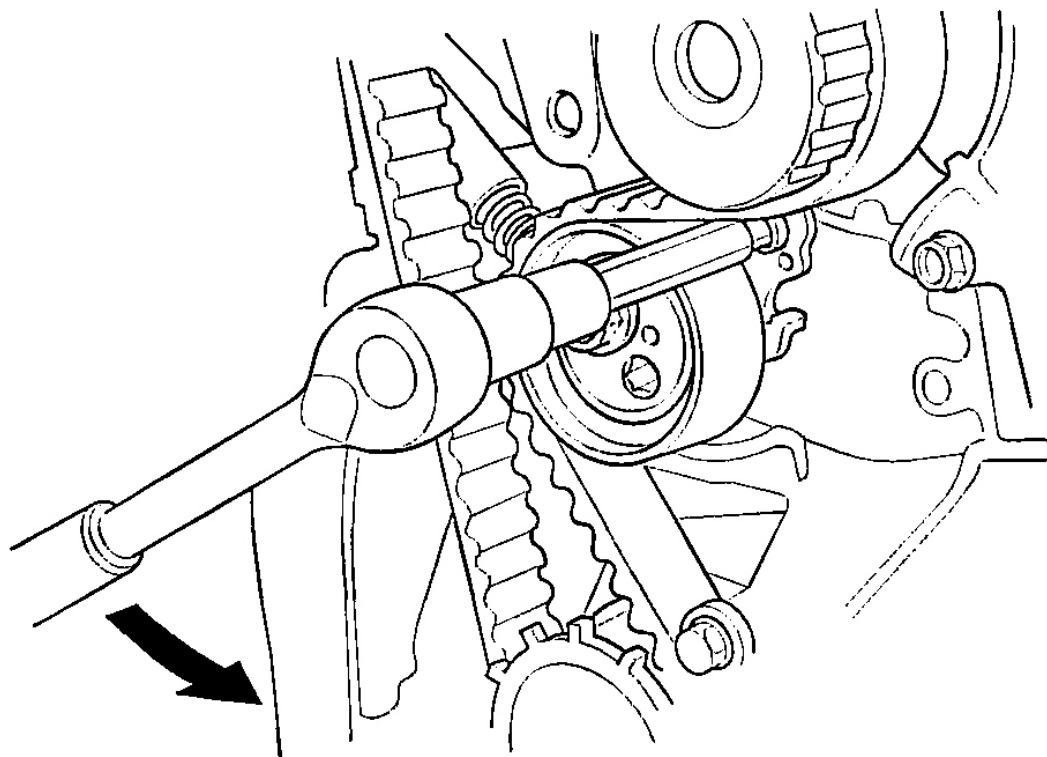
18. Remove the CKP sensor from the oil pump without disconnecting the connector.



G01954436

Fig. 82: Removing CKP Sensor From Oil Pump

19. Move the auto-tensioner to remove tension from the timing belt, then remove the timing belt.



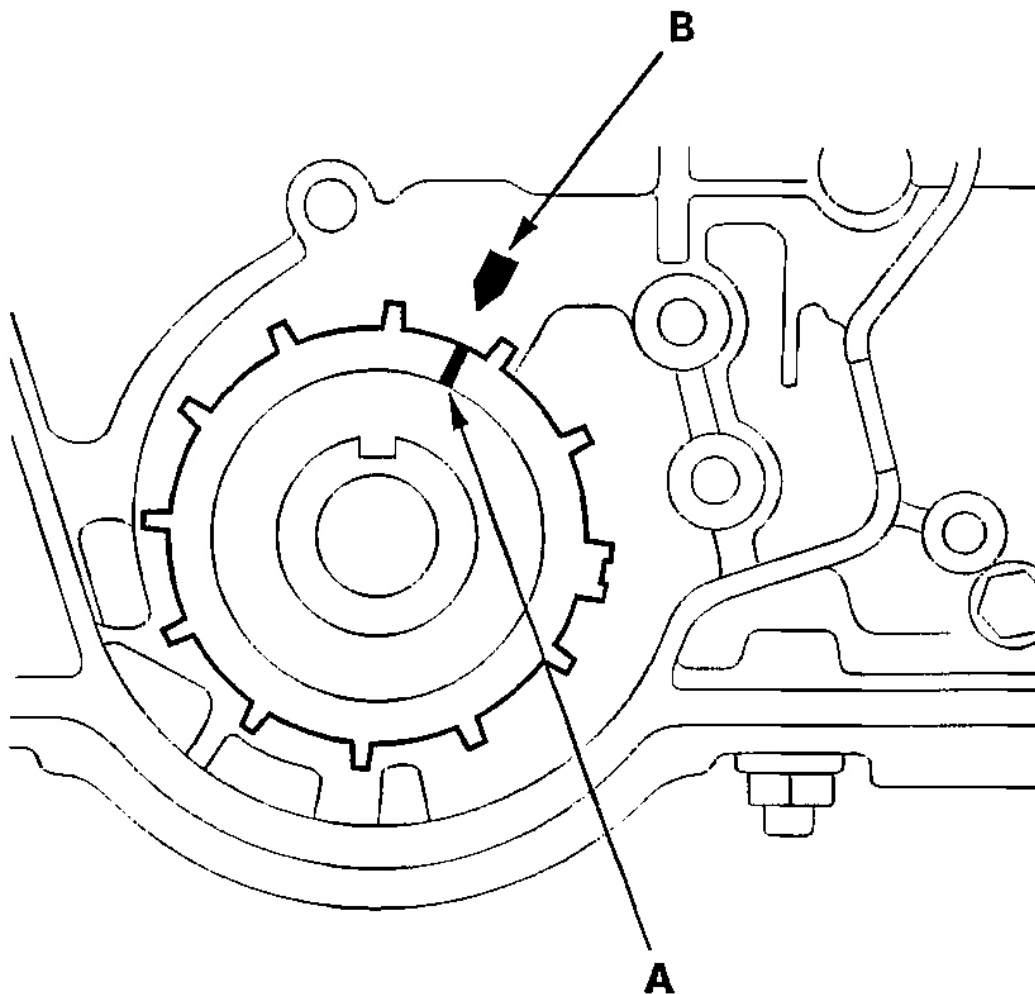
G01954437

Fig. 83: Removing Timing Belt**TIMING BELT INSTALLATION****Special Tools Required**

- Holder handle 07JAB-001020A
- Holder attachment, 50 mm, offset 07MAB-PY3010A
- Socket, 19 mm 07JAA-001020A or a commercially available 19 mm socket

NOTE: If you are removing the auto-tensioner, refer to the auto-tensioner installation procedure.

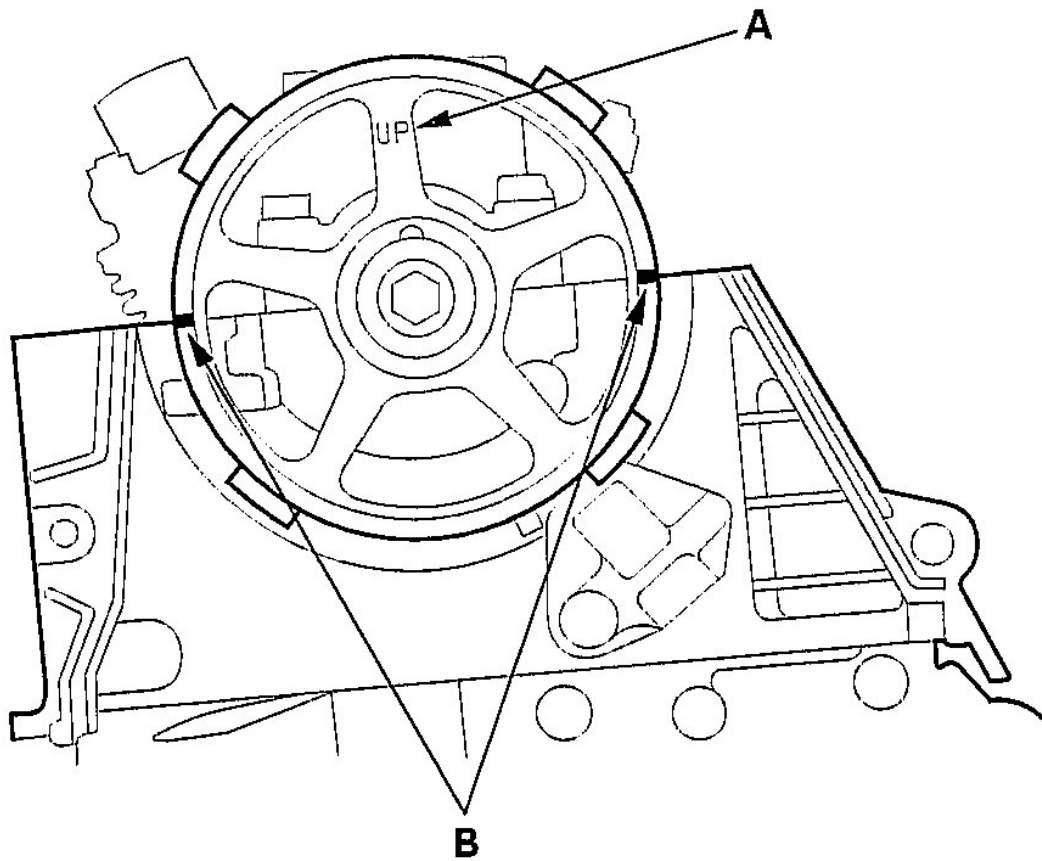
1. Clean the timing belt pulleys, and the upper and lower covers.
2. Set the crankshaft to TDC. Align the TDC mark (A) on the timing belt drive pulley with the pointer (B) on the oil pump.



G01954438

Fig. 84: Aligning TDC Mark On Timing Belt Drive Pulley With Pointer

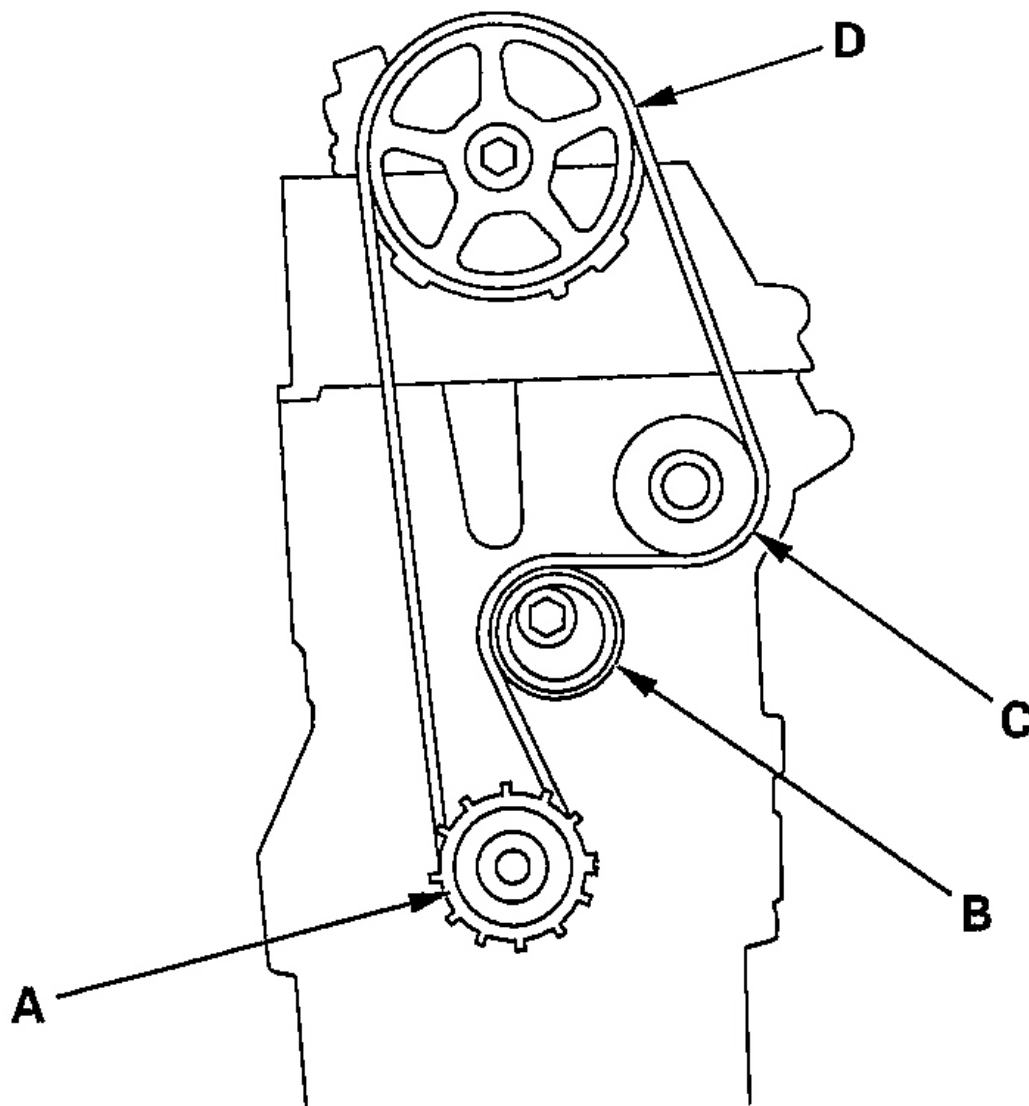
3. Clean the camshaft pulley and set it to TDC.
 1. The "UP" mark (A) on the camshaft pulley should be at the top.
 2. Align the TDC marks (B) on the camshaft pulley with the top edge of the head.



G01954439

Fig. 85: Facing "UP" Mark On Camshaft Pulley At Top

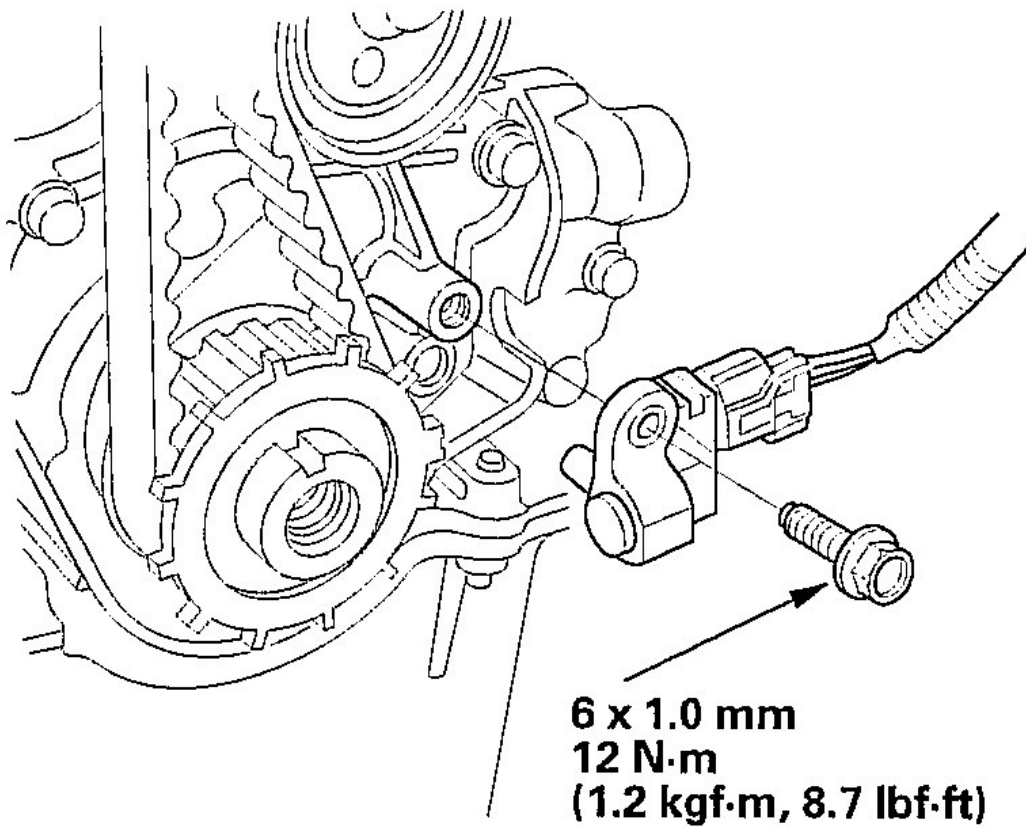
4. Install the timing belt in a counterclockwise sequence, starting with the drive pulley.
 1. Drive pulley (A).
 2. Tensioner pulley (B).
 3. Water pump pulley (C).
 4. Camshaft pulley (D).



G01954440

Fig. 86: Installing Timing Belt In Counterclockwise Sequence

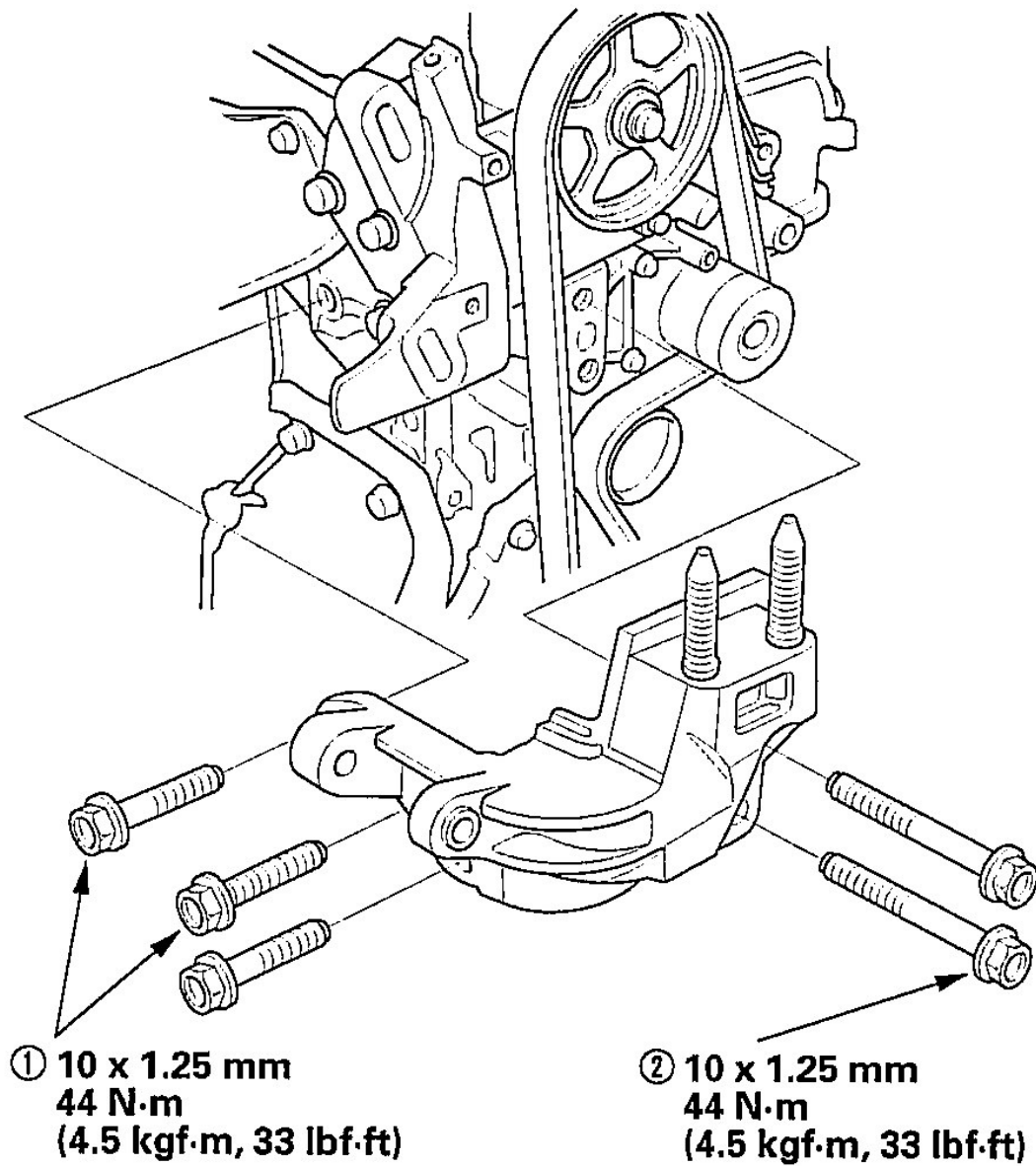
5. Install the CKP sensor.



G01954441

Fig. 87: Installing CKP Sensor

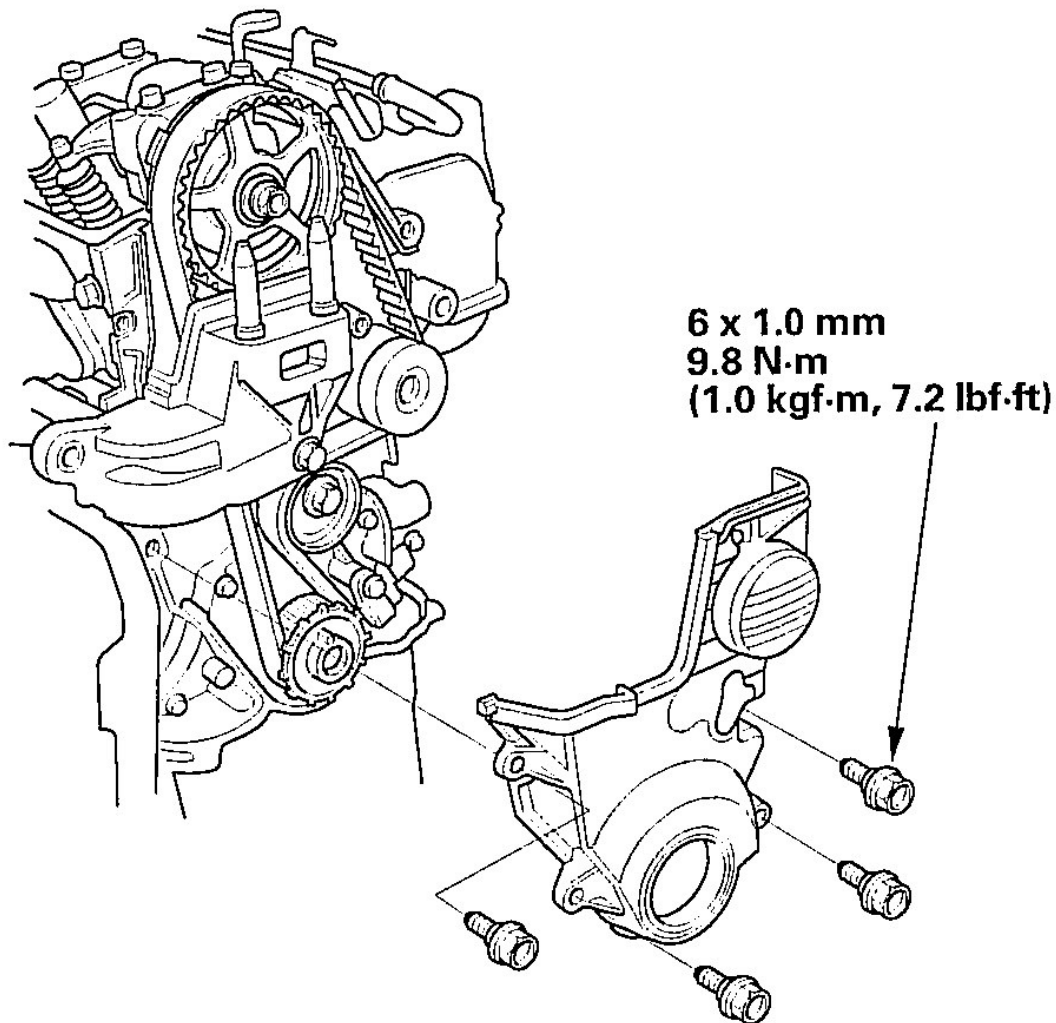
6. Install the all bolts loosely, then tighten the mounting bolts as the numbered sequence shown in **Fig. 88** .



G01954442

Fig. 88: Tightening Mounting Bolts In Sequence

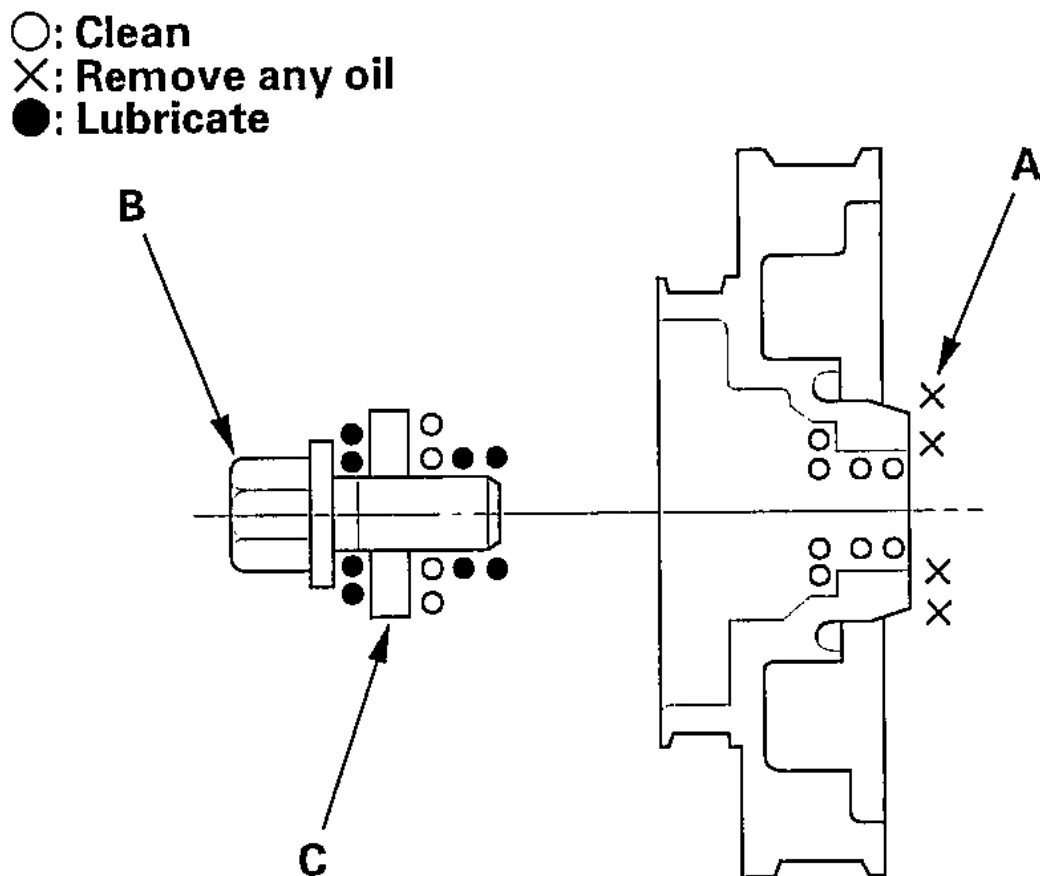
7. Install the lower cover.



G01954443

Fig. 89: Installing Lower Cover

8. Clean the pulley bolt and washer.
9. Clean all oil off the inside face (A) of the crankshaft pulley, and apply lubricant to the pulley bolt (B) and washer (C).



G01954444

Fig. 90: Applying Lubricant To Pulley Bolt & Washer

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

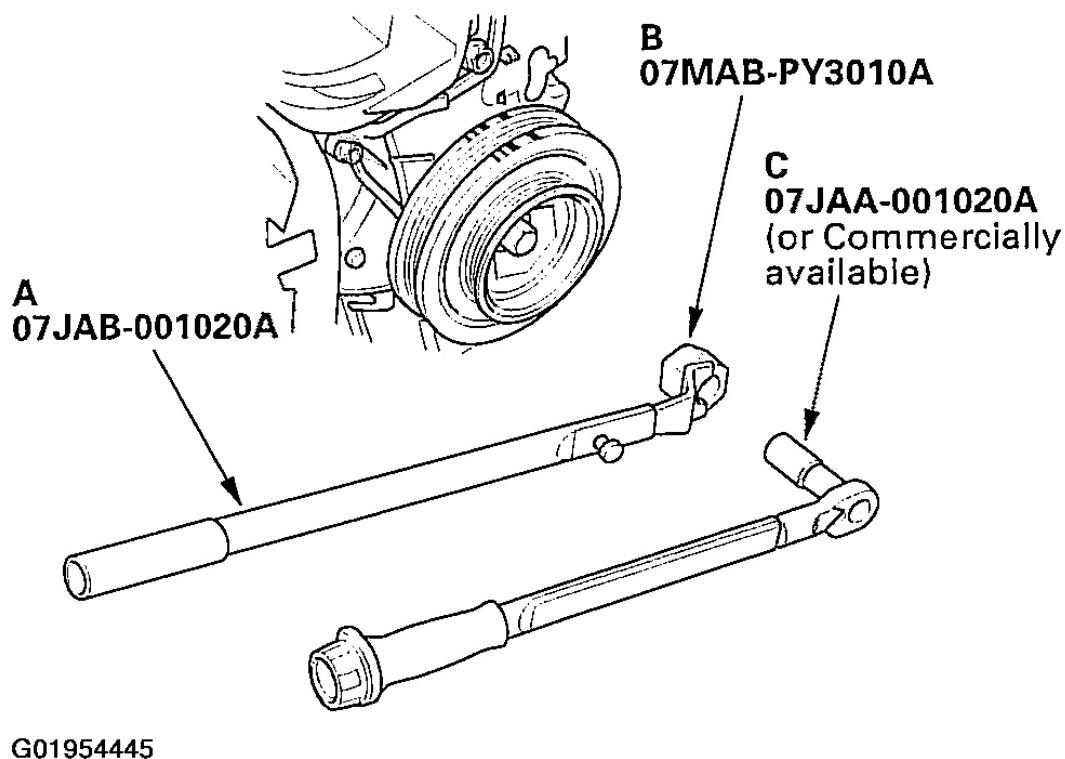
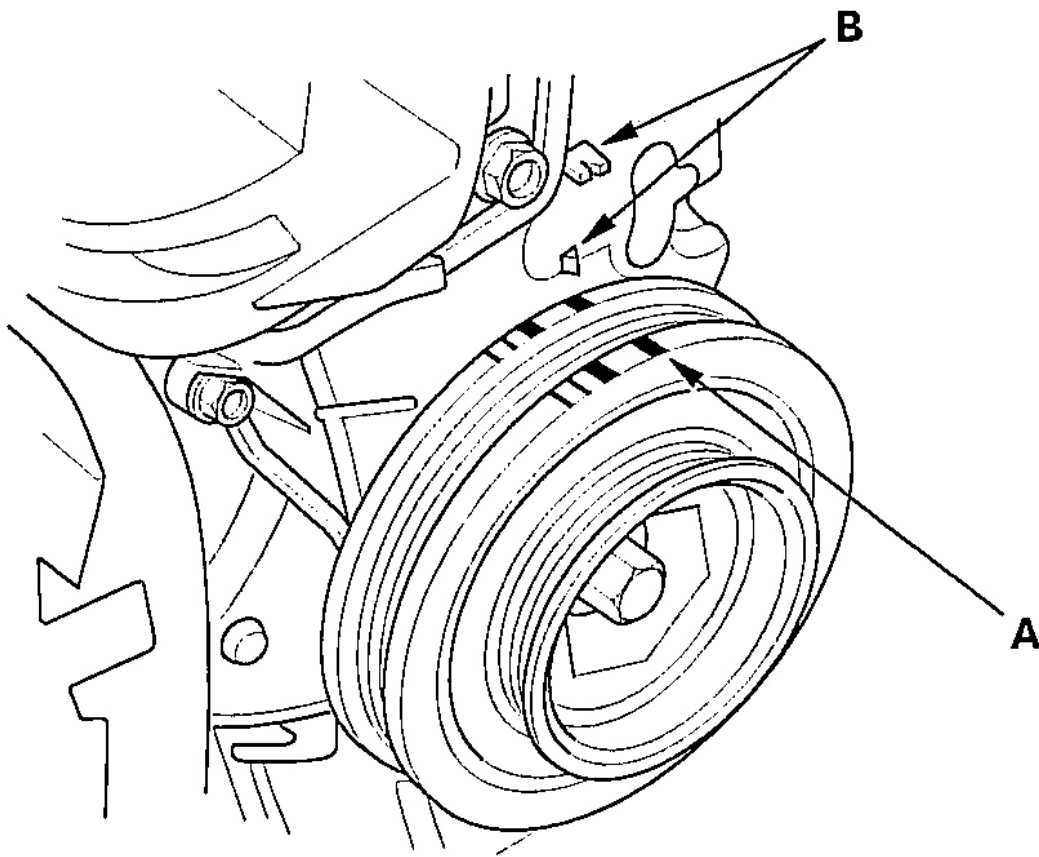


Fig. 91: Installing Crankshaft Pulley

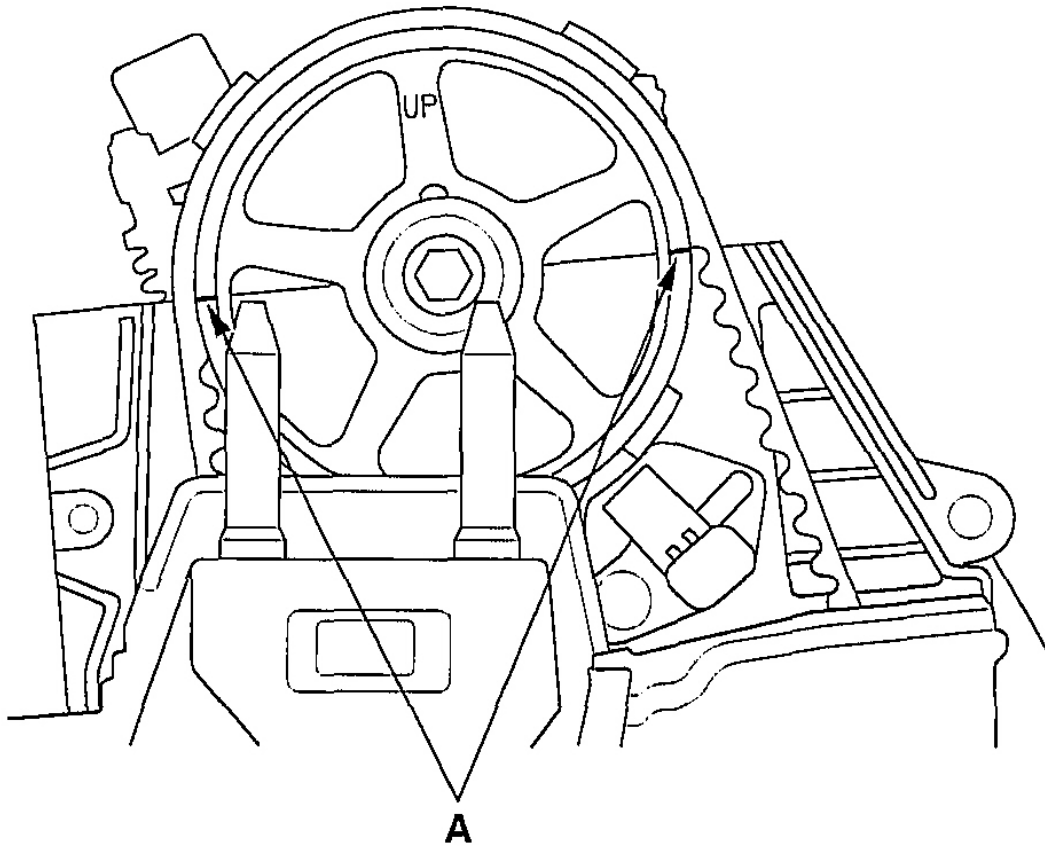
11. Tighten the bolt to 20 N.m (2.0 kgf.m, 14 lbf.Ft) with a torque wrench and 19 mm socket (C).
12. Tighten the pulley bolt an additional 90°.
13. Rotate the crankshaft pulley about 5 or 6 turns counterclockwise so that the timing belt positions on the pulleys.
14. Turn the crankshaft pulley so its TDC mark (A) lines up with the pointers (B).



G01954446

Fig. 92: Turning Crankshaft Pulley Lining TDC Mark With Pointers

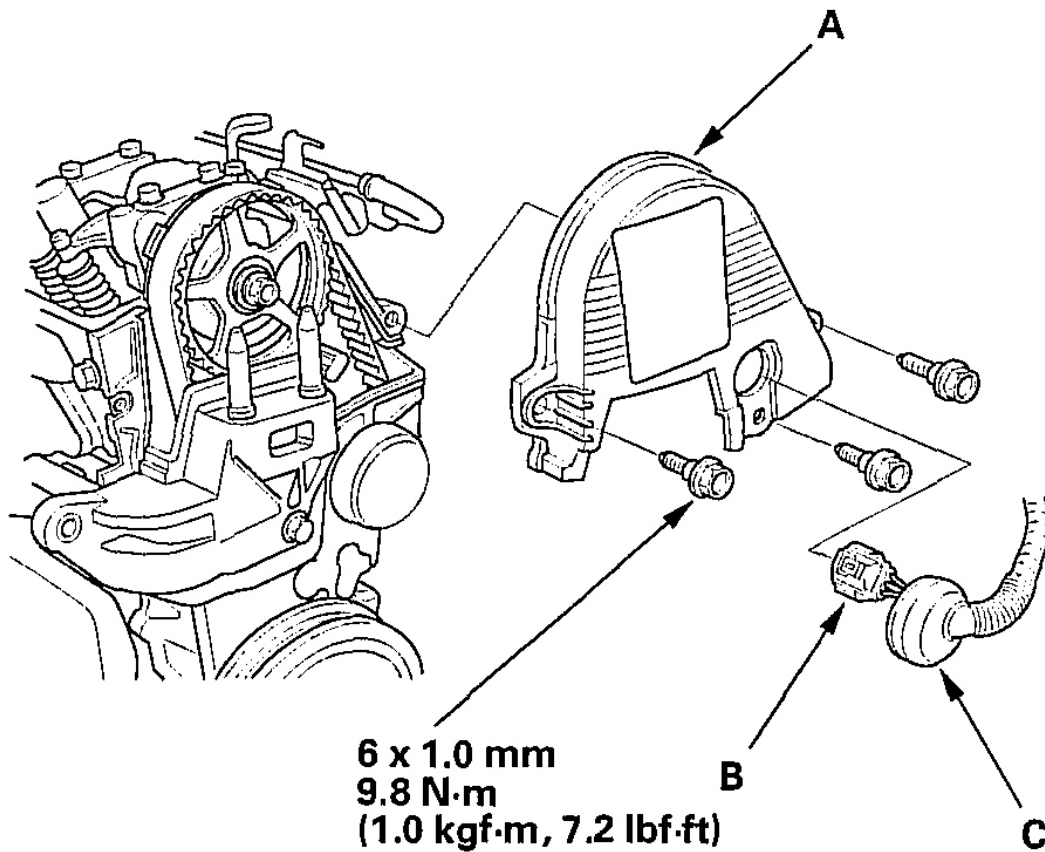
15. Check the camshaft pulley marks (A)
 - If the camshaft pulley marks are also at TDC, go to step 16.
 - If the camshaft pulley marks are not at TDC, remove the timing belt and repeat steps 2 through 12.



G01954447

Fig. 93: Checking Camshaft Pulley Marks

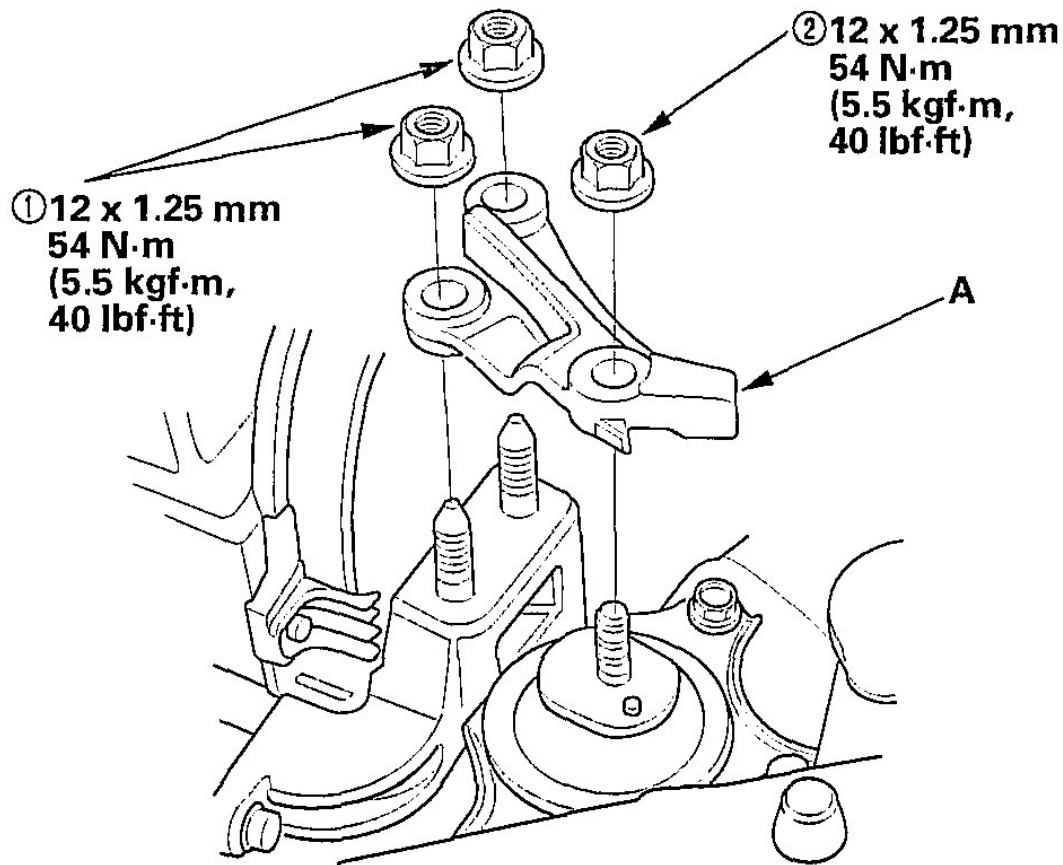
16. Install the upper cover (A), then connect the TDC sensor connector (B), and install the grommet (C).



G01954448

Fig. 94: Installing Upper Cover & Grommet

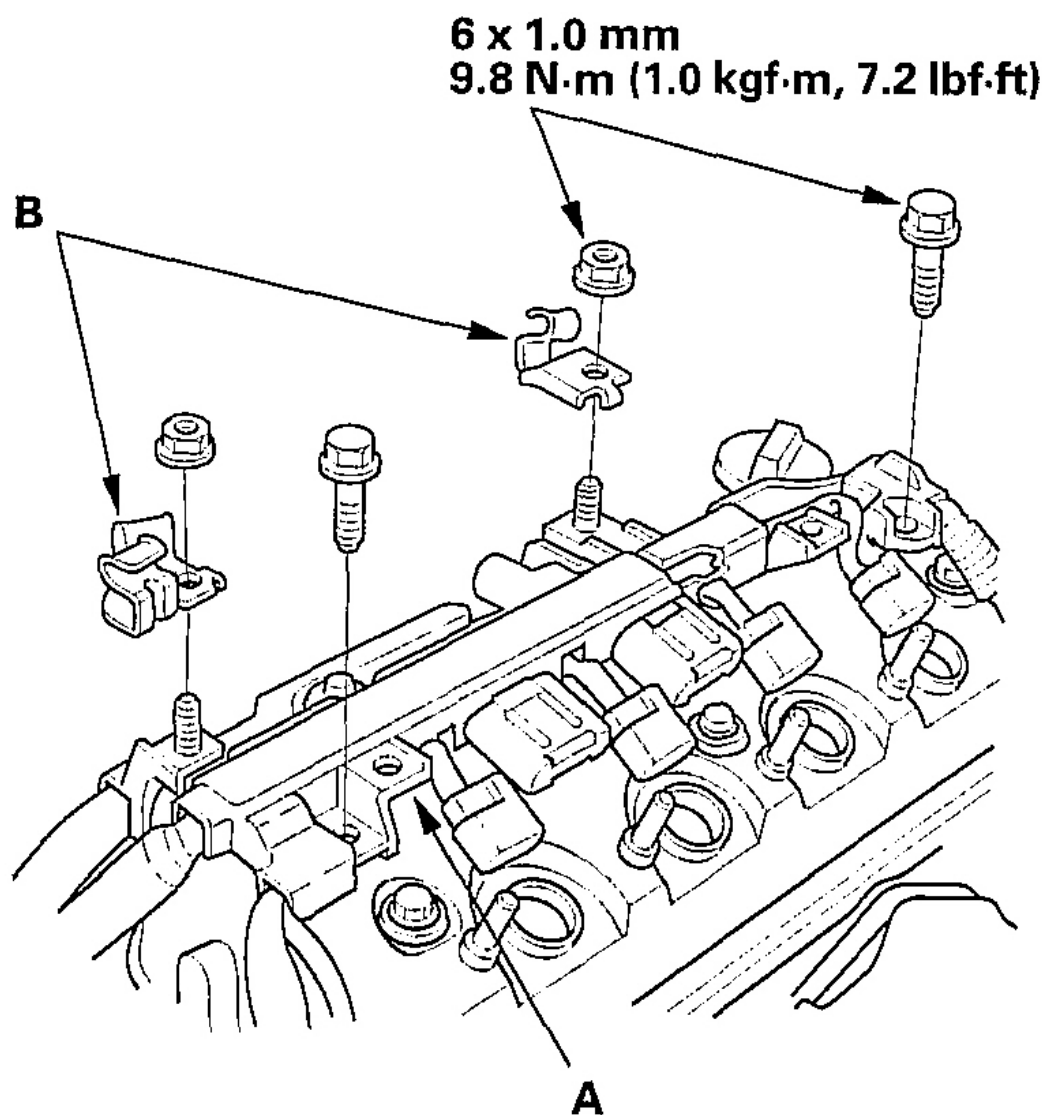
17. Install the upper bracket (A), then tighten the nuts in the numbered sequence shown.



G01954449

Fig. 95: Installing Upper Bracket

18. Install the cylinder head cover (see **Cylinder Head Cover Installation**).
19. Install the harness holder (A) and throttle cable clamps (B).



G01954450

Fig. 96: Installing Harness Holder & Throttle Cable Clamps

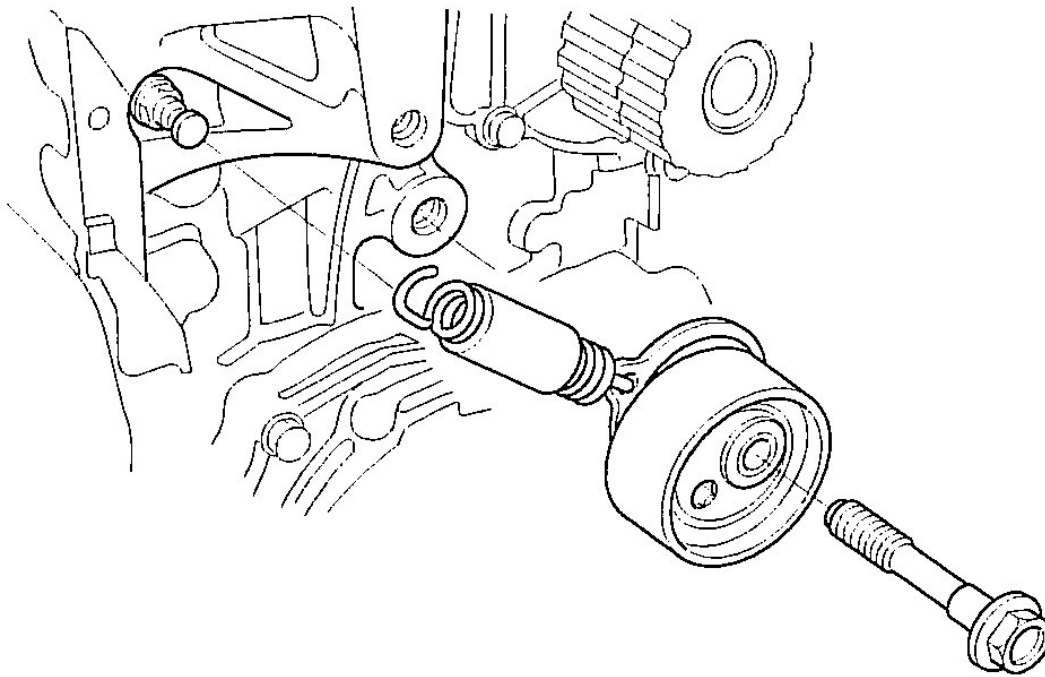
20. Install the ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
21. Loosely install the alternator.
22. Adjust the alternator belt tension (see **ALTERNATOR BELT INSPECTION AND ADJUSTMENT**) or the alternator-compressor belt tension (see **ALTERNATOR-A/C COMPRESSOR BELT INSPECTION AND ADJUSTMENT**).
23. Loosely install the P/S pump belt and pump.

24. Adjust the P/S pump belt (see **PUMP BELT INSPECTION AND ADJUSTMENT**).
25. Install the splash shield.
26. Install the front tires/wheels.
27. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.
28. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

AUTO-TENSIONER REMOVAL/INSTALLATION

Removal:

1. Remove the timing belt (see **Timing Belt Removal**).
2. Remove the auto-tensioner.

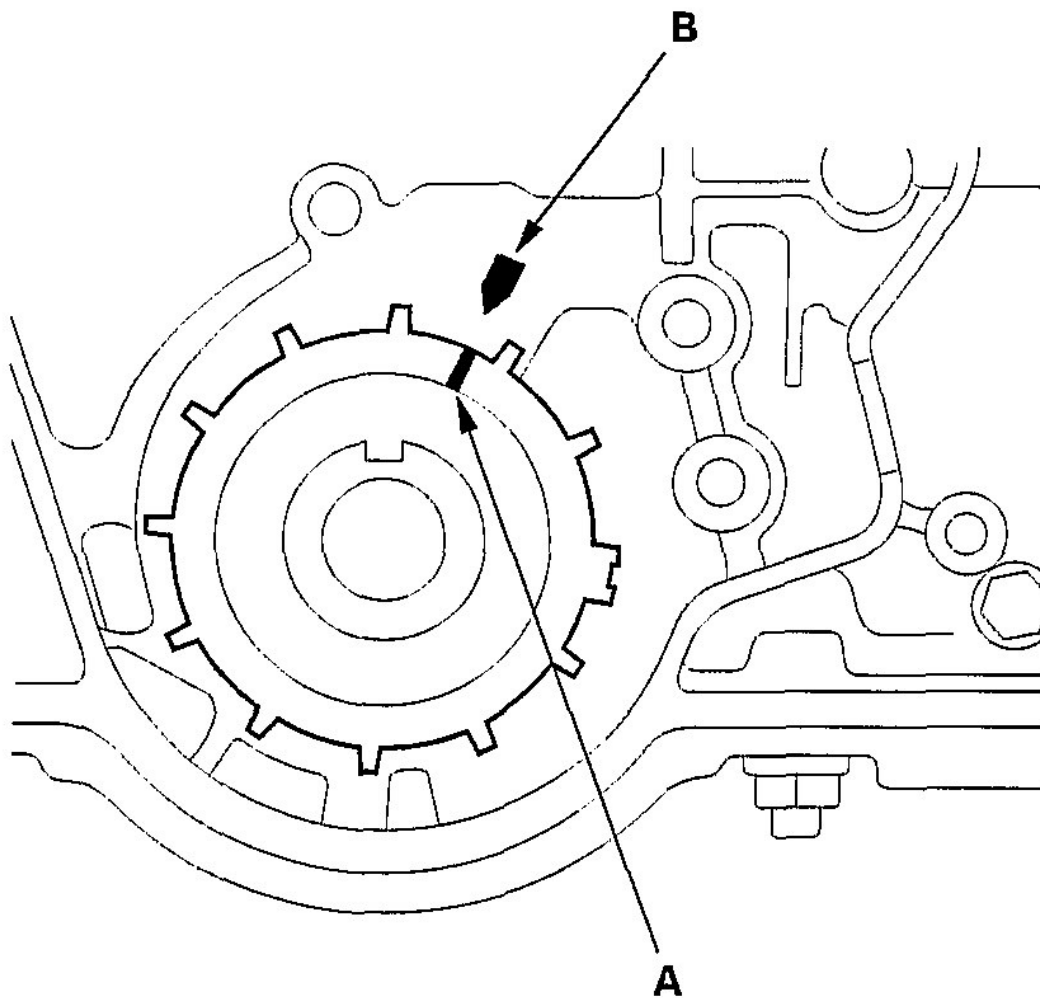


G01954451

Fig. 97: Removing Auto-Tensioner

Installation:

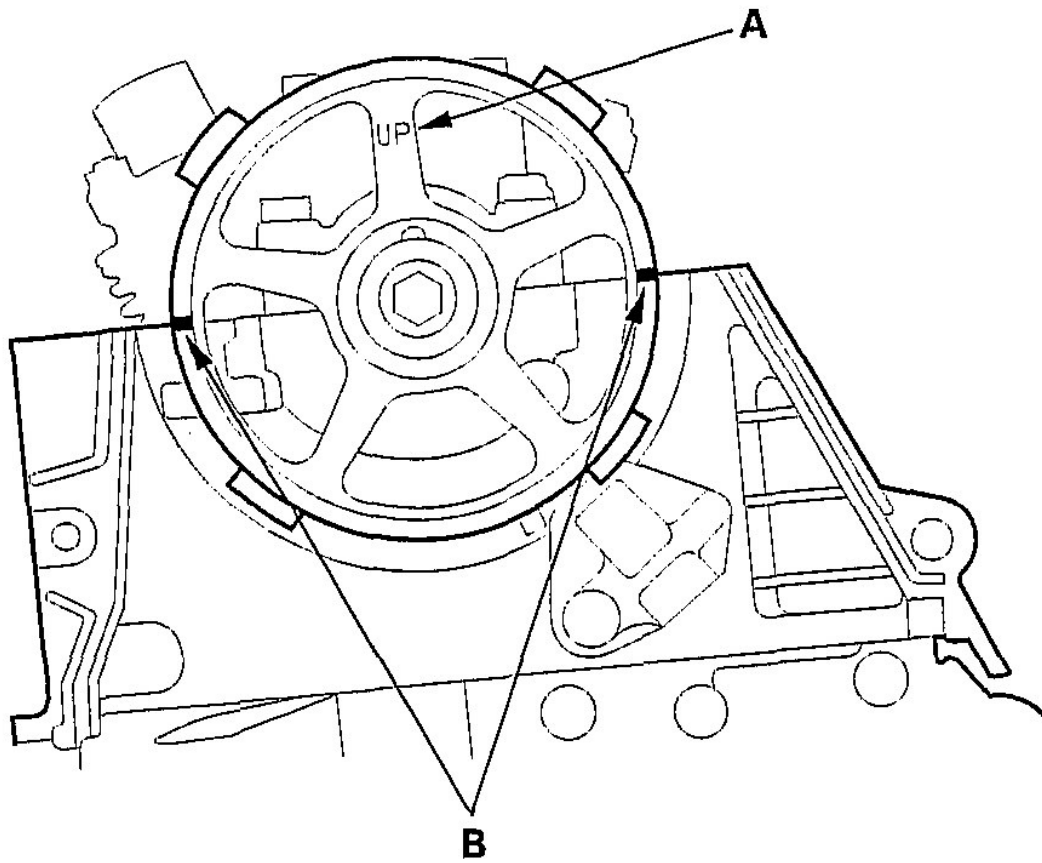
1. Clean the timing belt pulleys, and the upper and lower covers.
2. Set the crankshaft to TDC. Align the TDC mark (A) on the timing belt drive pulley with the pointer (B) on the oil pump.



G01954452

Fig. 98: Aligning TDC Mark On Timing Belt Drive Pulley With Pointer

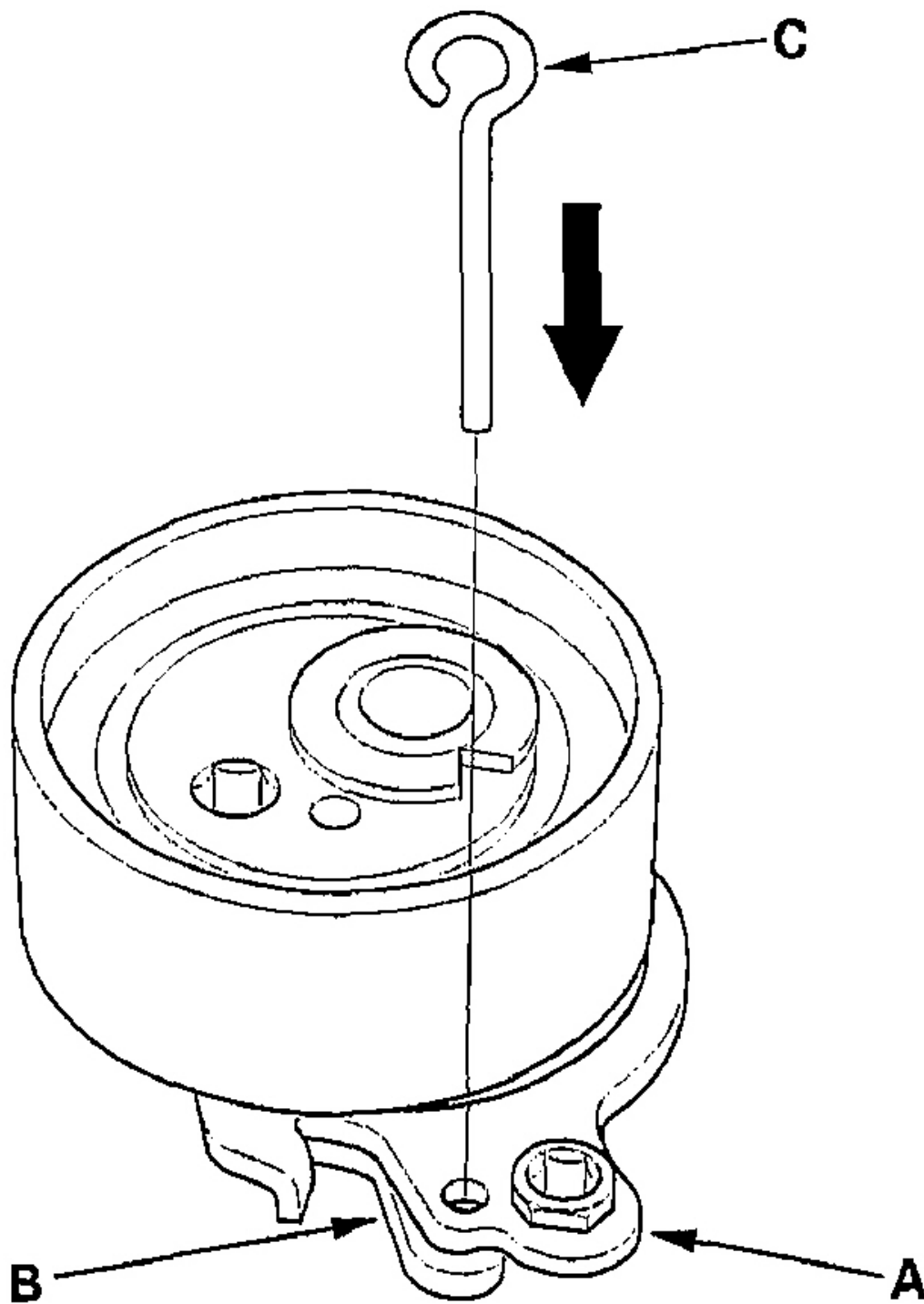
3. Clean the camshaft pulley and set it to TDC.
 1. The "UP" mark (A) on the camshaft pulley should be at the top.
 2. Align the TDC marks (B) on the camshaft pulley with the top edge of the head.



G01954453

Fig. 99: Setting Camshaft Pulley To DTC

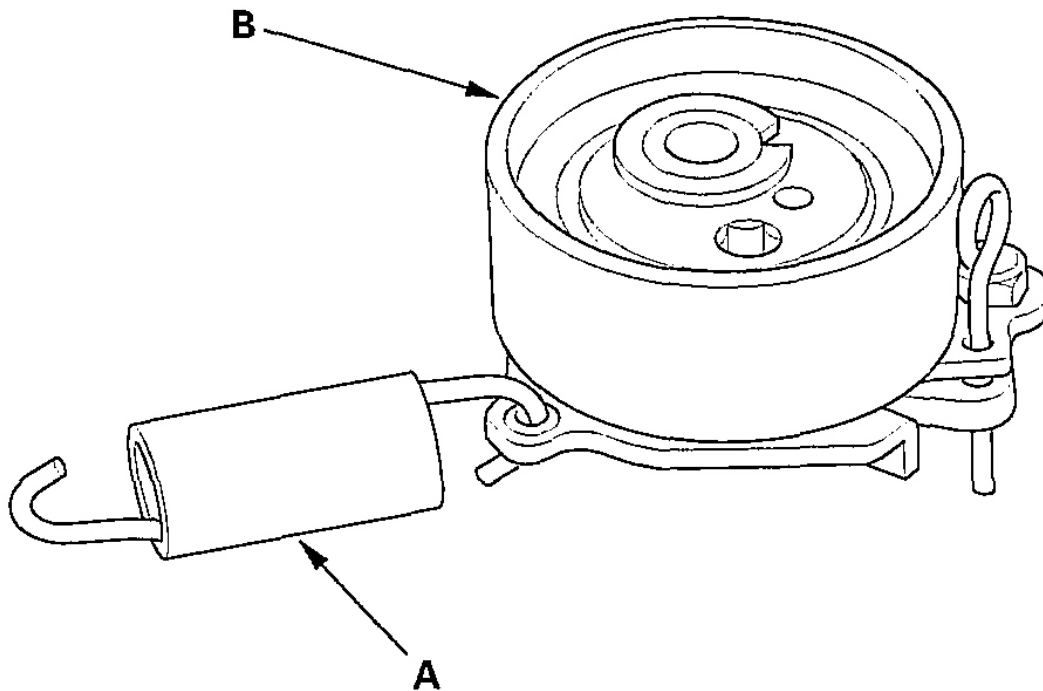
4. Align the holes on the tensioner pulley (A) and tensioner base (B), then insert 3.0 mm (0.12 in.) diameter pin (C) into the holes.



G01954454

Fig. 100: Aligning Holes On Tensioner Pulley & Tensioner Base

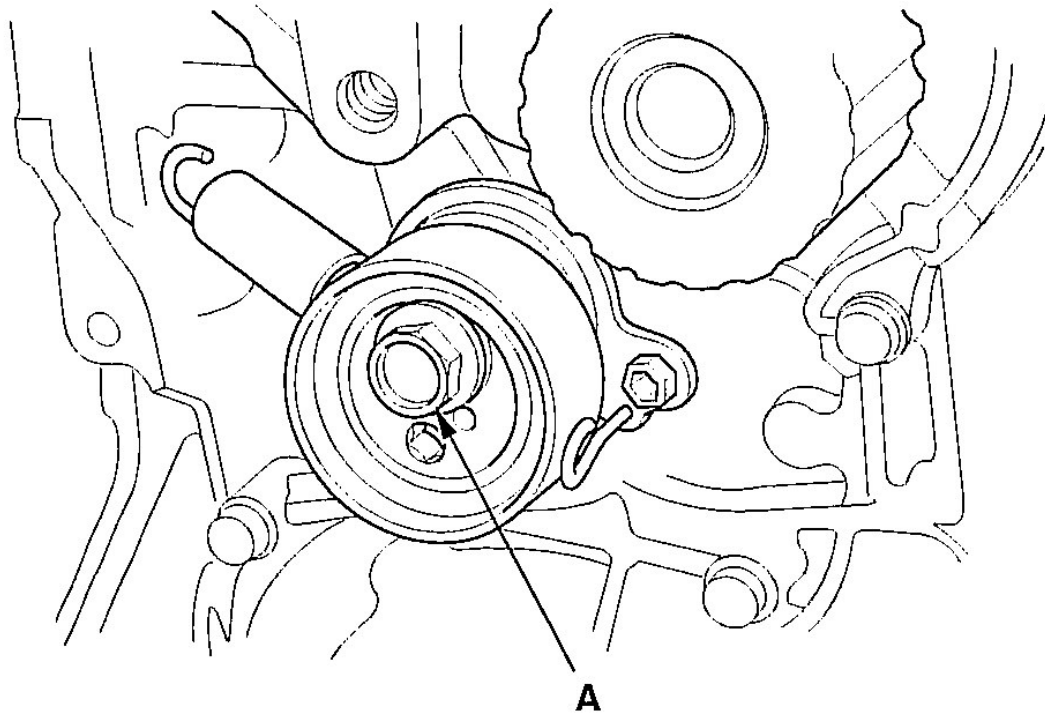
5. Install the tensioner spring (A) on the auto-tensioner (B).



G01954455

Fig. 101: Installing Tensioner Spring On Auto-Tensioner

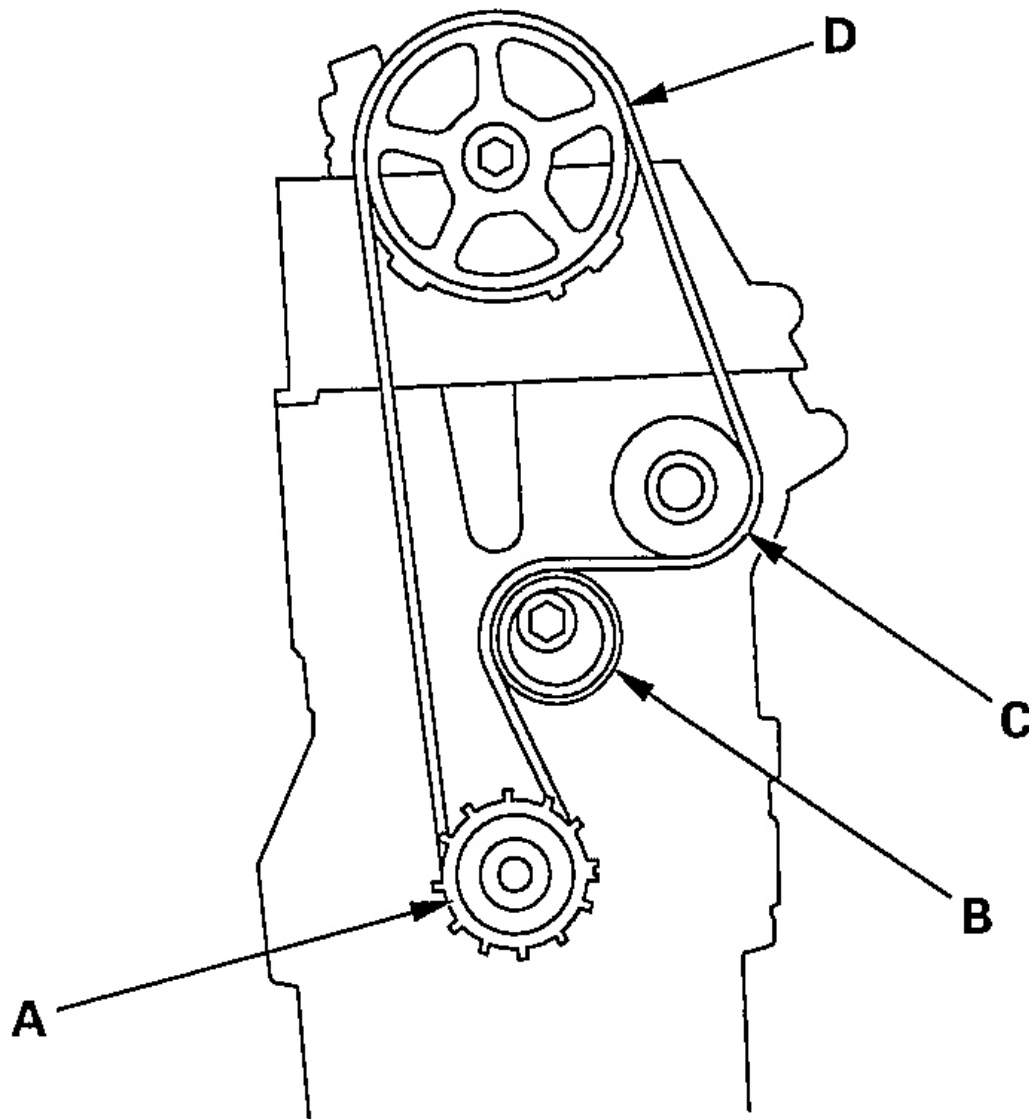
6. Install the auto-tensioner, then tighten the auto-tensioner mounting bolt (A) to 9.8 N.m (1.0 kgf.m, 7.2 lbf°Ft).



G01954456

Fig. 102: Installing Auto-Tensioner

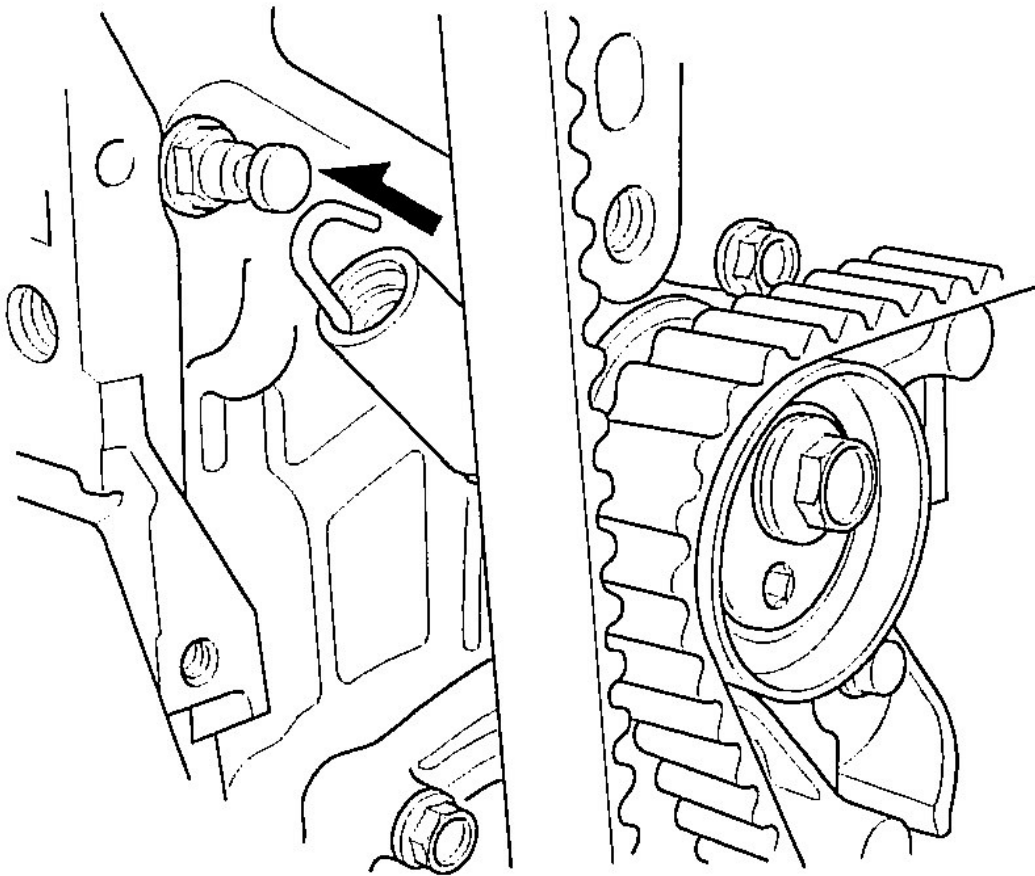
7. Loosen the auto-tensioner mounting bolt 180°.
8. Install the timing belt in a counterclockwise sequence, starting with the drive pulley.
 1. Drive pulley (A).
 2. Tensioner pulley (B).
 3. Water pump pulley (C).
 4. Camshaft pulley (D).



G01954457

Fig. 103: Installing Timing Belt In A Counterclockwise

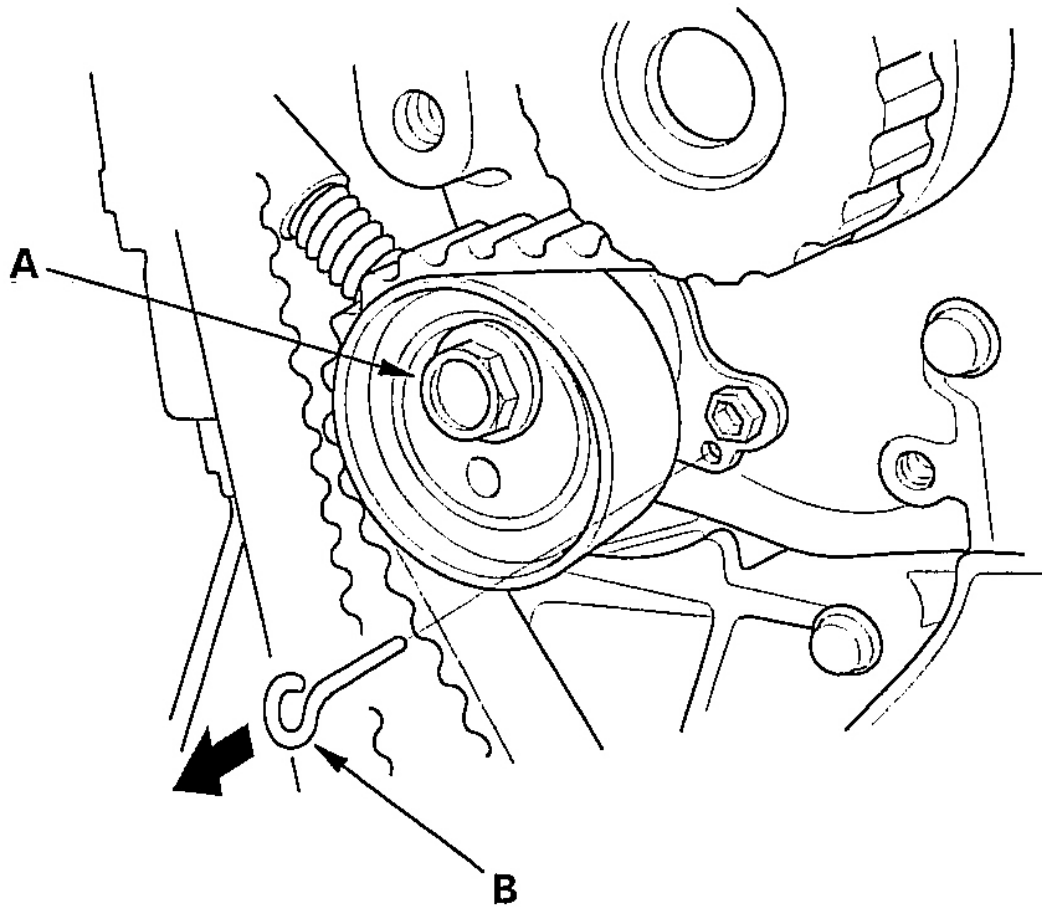
9. Install the tensioner spring on the tensioner bolt.



G01954458

Fig. 104: Installing Tensioner Spring On Tensioner Bolt

10. Rotate the crankshaft pulley 2 turns counterclockwise so that the timing belt positions on the pulleys.
11. Set the No. 1 piston at TDC.
12. Tighten the auto-tensioner mounting bolt (A) to 44 N.m (4.5 kgf.m, 33 lbf°Ft), then remove the pin (B) from the auto-tensioner.



G01954459

Fig. 105: Tightening Auto-Tensioner Mounting Bolt

13. Install the remaining parts.

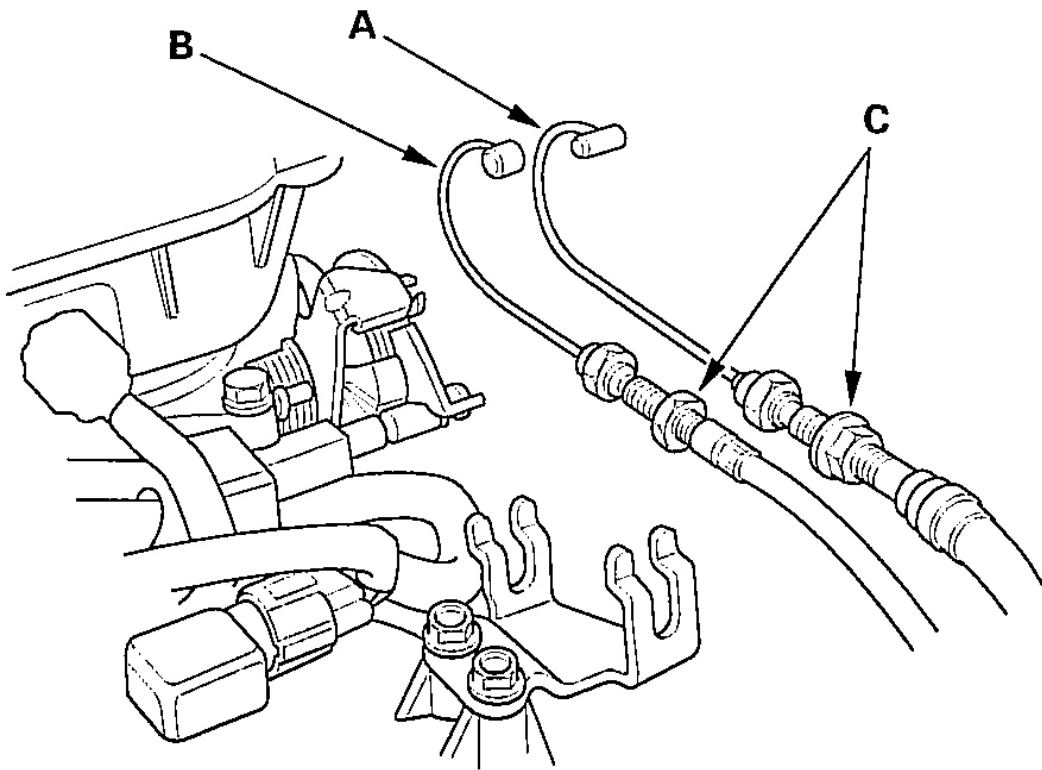
CYLINDER HEAD REMOVAL

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.

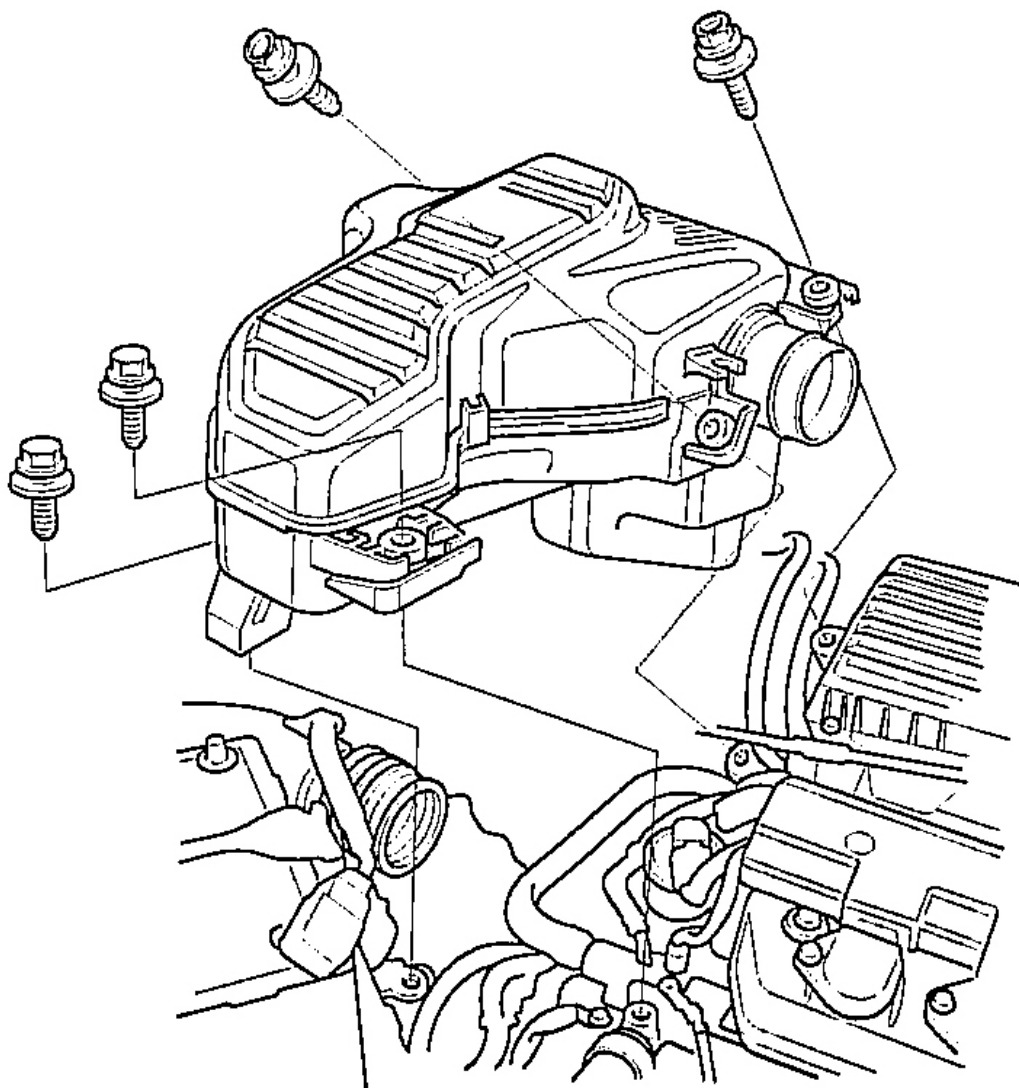
1. Make sure you have the anti-theft code for the radio, then write down the frequencies for the radio's preset buttons.
2. Disconnect the battery negative terminal.
3. Drain the engine coolant (see **COOLANT REPLACEMENT**).
4. Remove the throttle cable (A) and cruise control cable (B) by loosening the locknuts (C), then slipping the cable ends out of the accelerator linkage. Take care not to bend the cables when removing them. Always replace any kinked cable with a new one.



G01954460

Fig. 106: Removing Throttle Cable & Cruise Control Cable

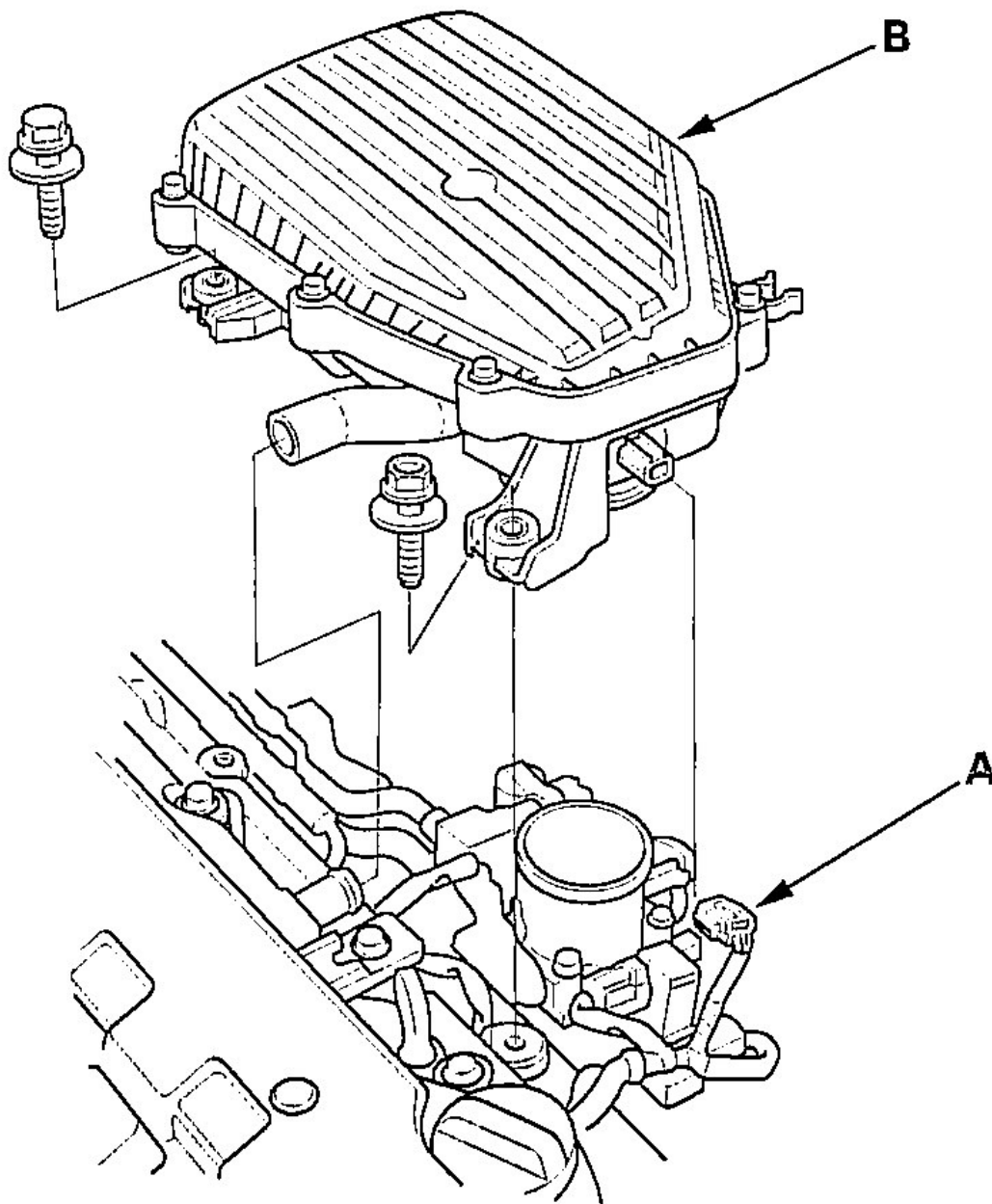
5. Remove the intake resonator.



G01954461

Fig. 107: Removing Intake Resonator

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



G01954462

Fig. 108: Disconnecting IAT Sensor Connector

7. Remove the brake booster vacuum hose (A) and positive crankcase ventilation (PCV) hose (B).

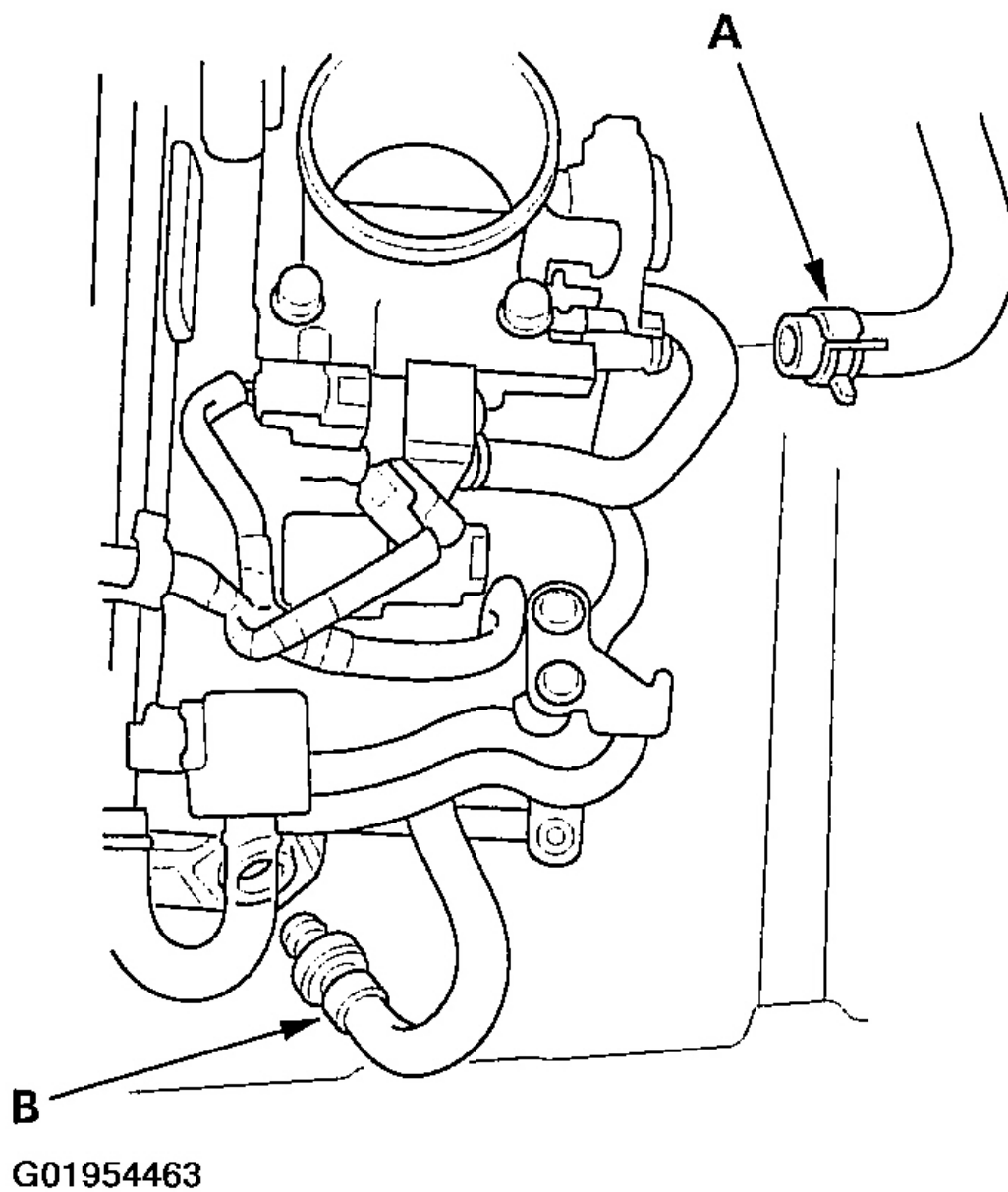
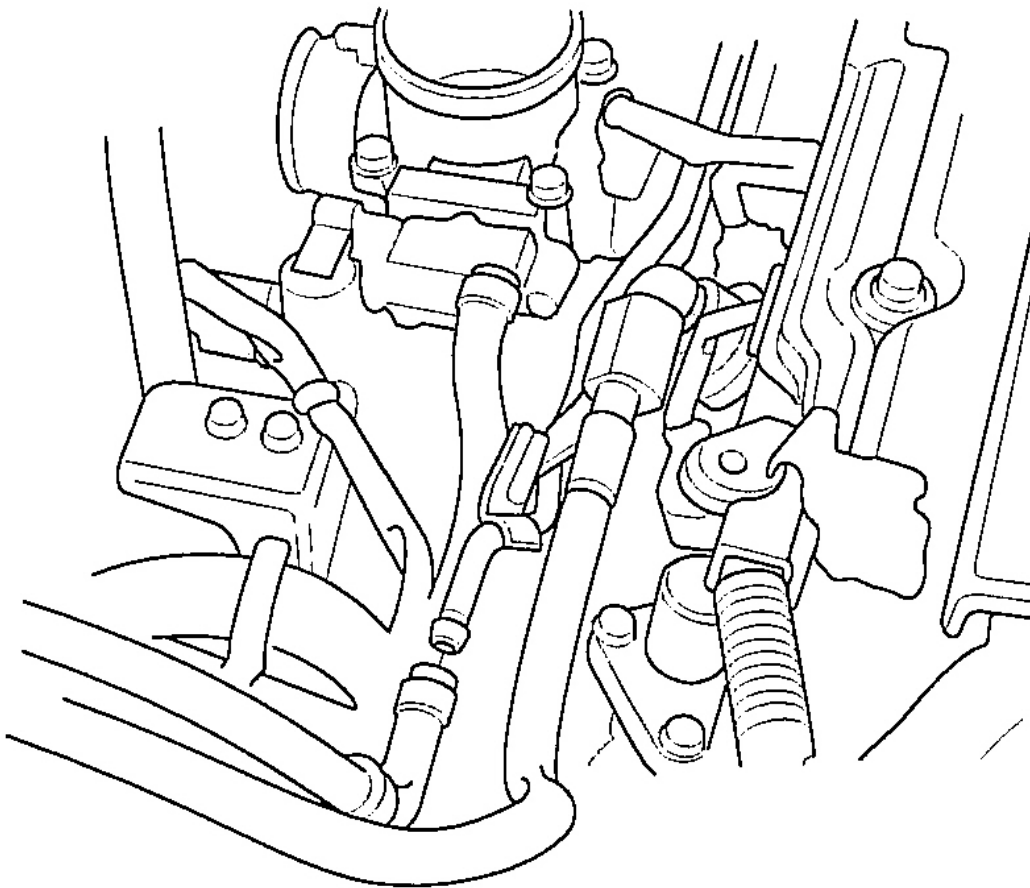


Fig. 109: Removing Brake Booster Vacuum Hose & PCV Hose

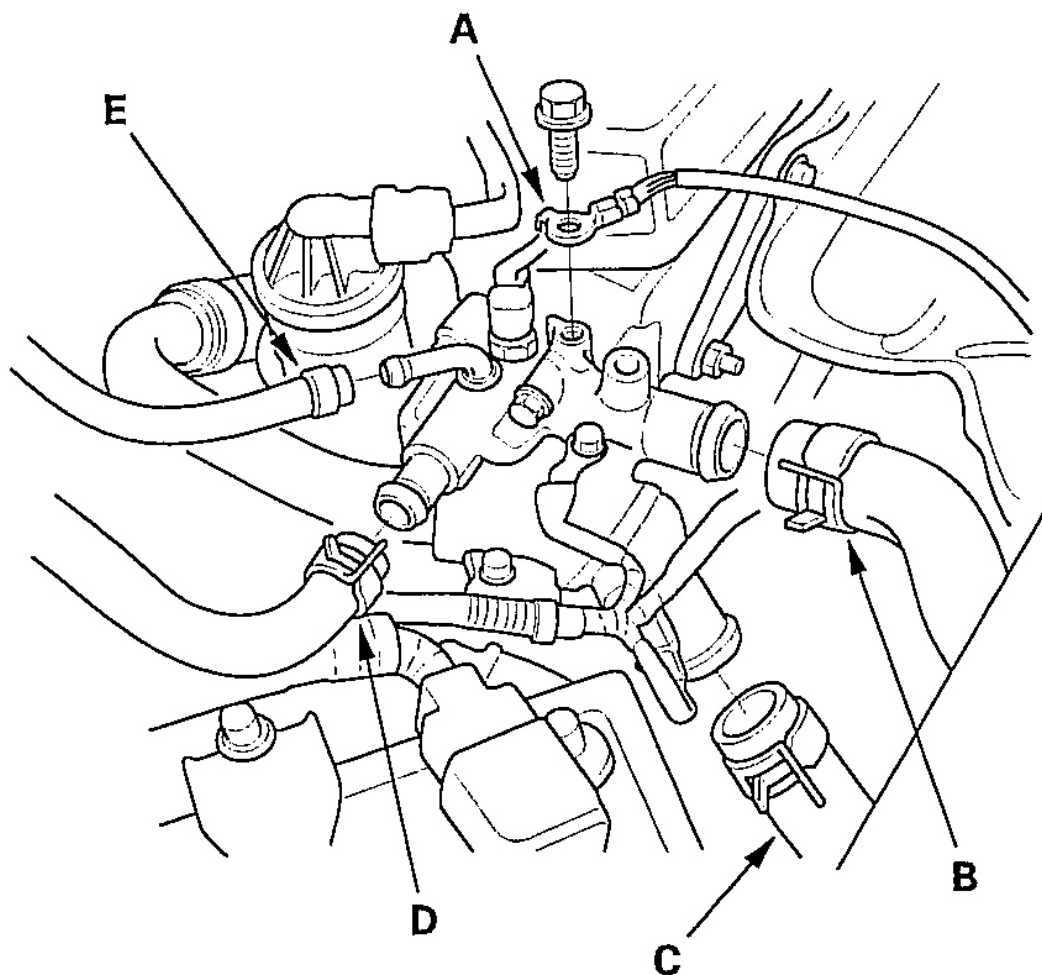
8. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
9. Remove the Evaporative Emission (EVAP) canister hose.



G01954464

Fig. 110: Removing EVAP Canister Hose

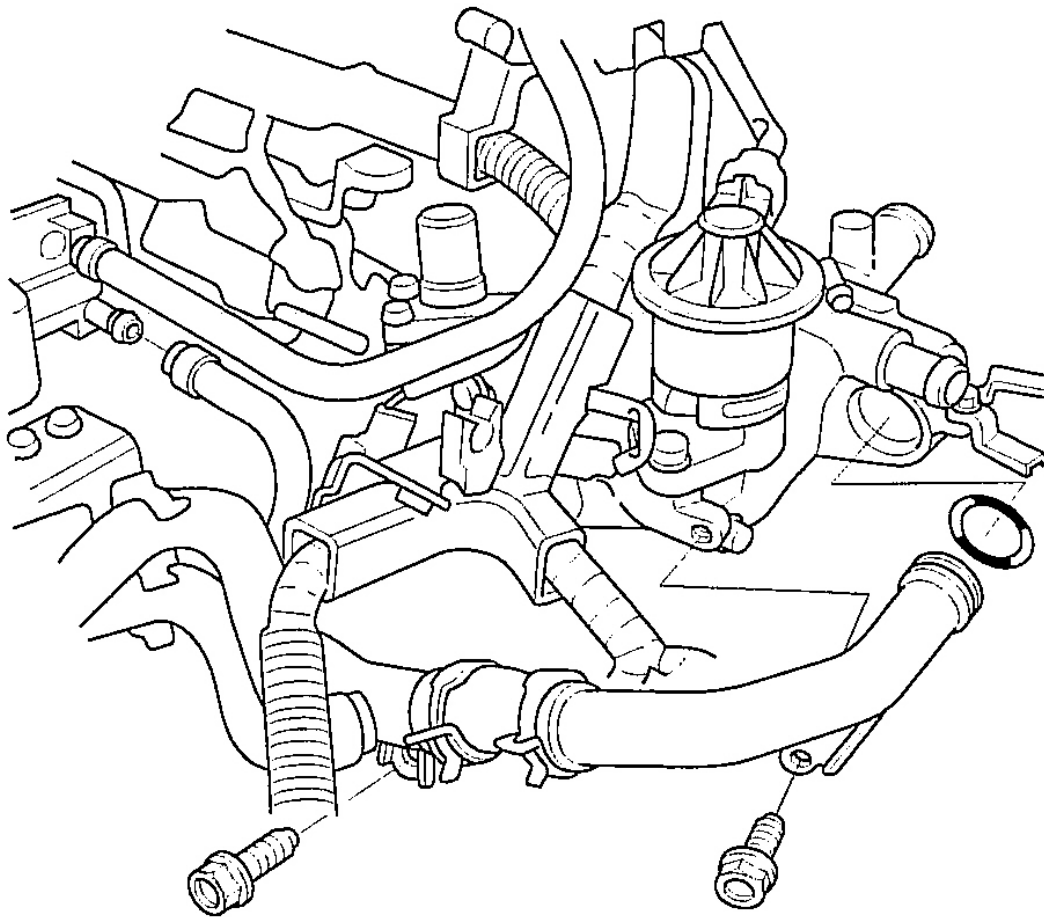
10. Remove the ground cable (A), upper radiator hose (B), lower radiator hose (C), heater hose (D) and water bypass hose (E).



G01954465

Fig. 111: Removing Ground Cable

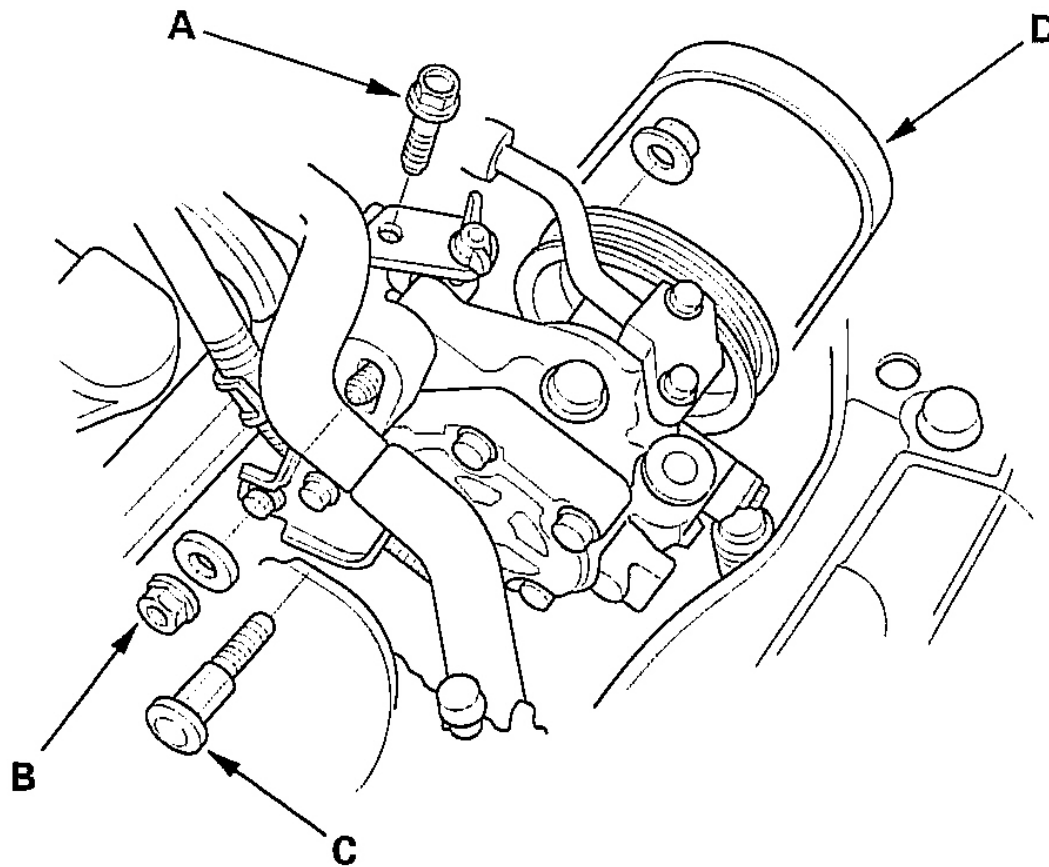
11. Remove the two bolts securing the connecting pipe, then remove the connecting pipe from the water passage.



G01954466

Fig. 112: Removing Bolts Securing Connecting Pipe

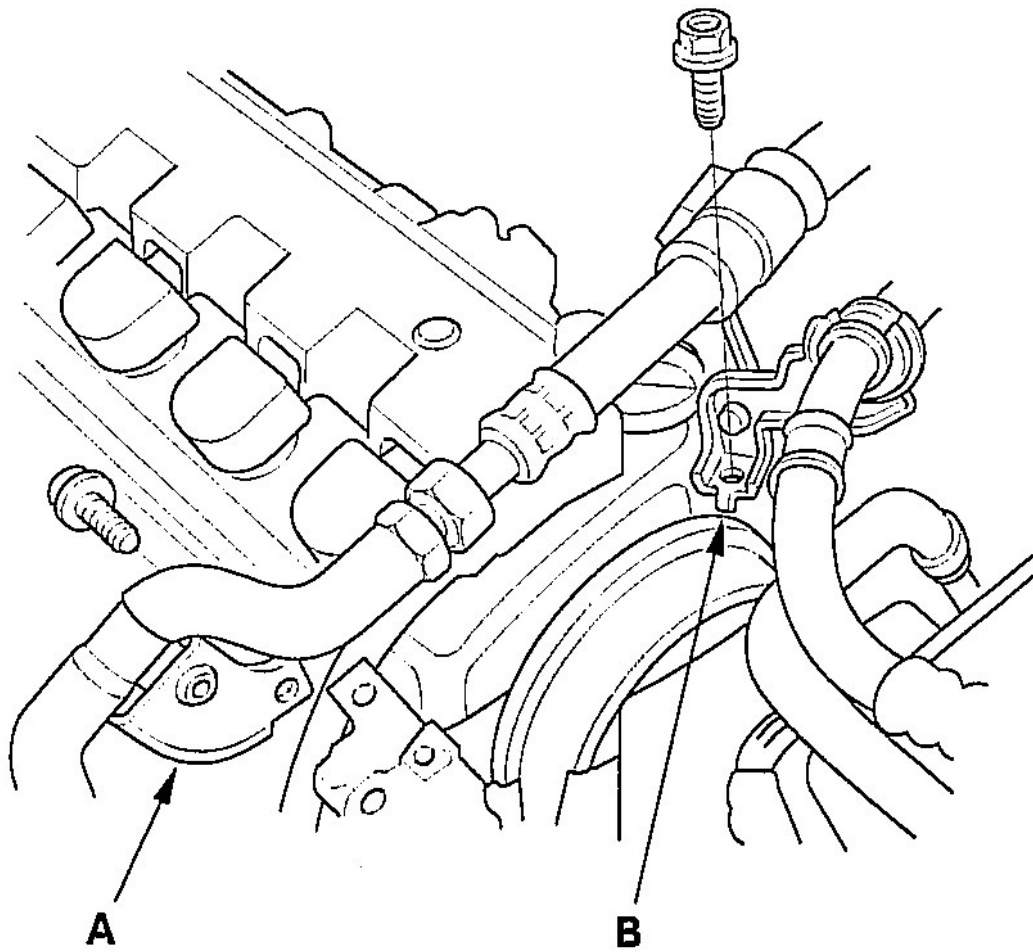
12. Remove the adjusting plate mounting bolt (A), locknut (B) and mounting bolt (C), then remove the power steering (P/S) pump belt (D) and pump without disconnecting the P/S hoses.



G01954467

Fig. 113: Removing Adjusting Plate Mounting Bolt, Locknut, Mounting Bolt & Power Steering (P/S) Pump Belt

13. Remove the alternator (see **ALTERNATOR REPLACEMENT**).
14. Remove the air conditioning (A/C) hose bracket (A) and P/S hose bracket (B).



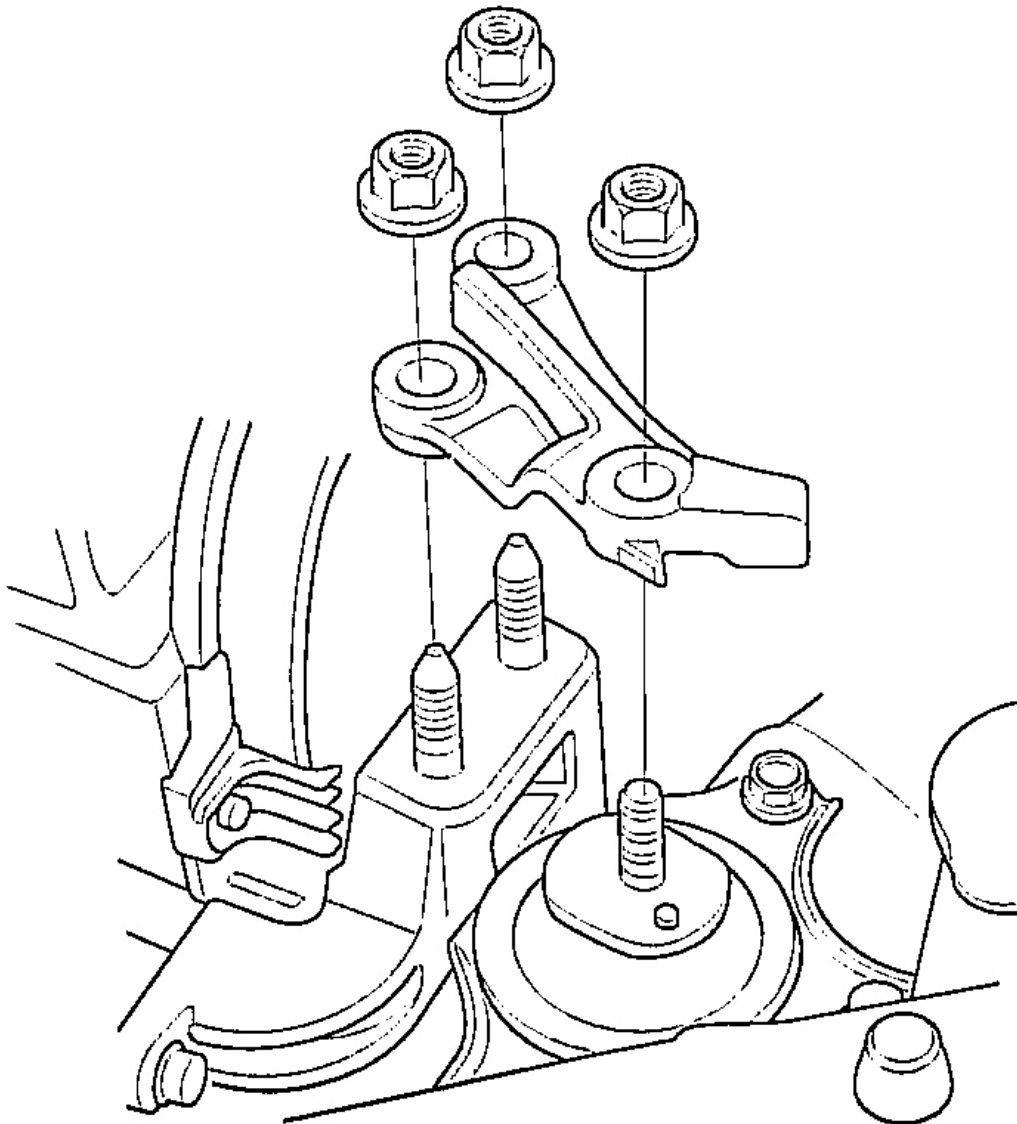
G01954468

Fig. 114: Removing A/C Hose Bracket & P/S Hose Bracket

15. 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
 - Engine Coolant Temperature (ECT) sensor connector
 - Radiator fan switch connector
 - CKP sensor connector
 - TDC sensor connector
 - Exhaust Gas Recirculation (EGR) connector

- VTEC solenoid valve connector
- VTEC oil pressure switch connector
- Oil pressure sensor connector

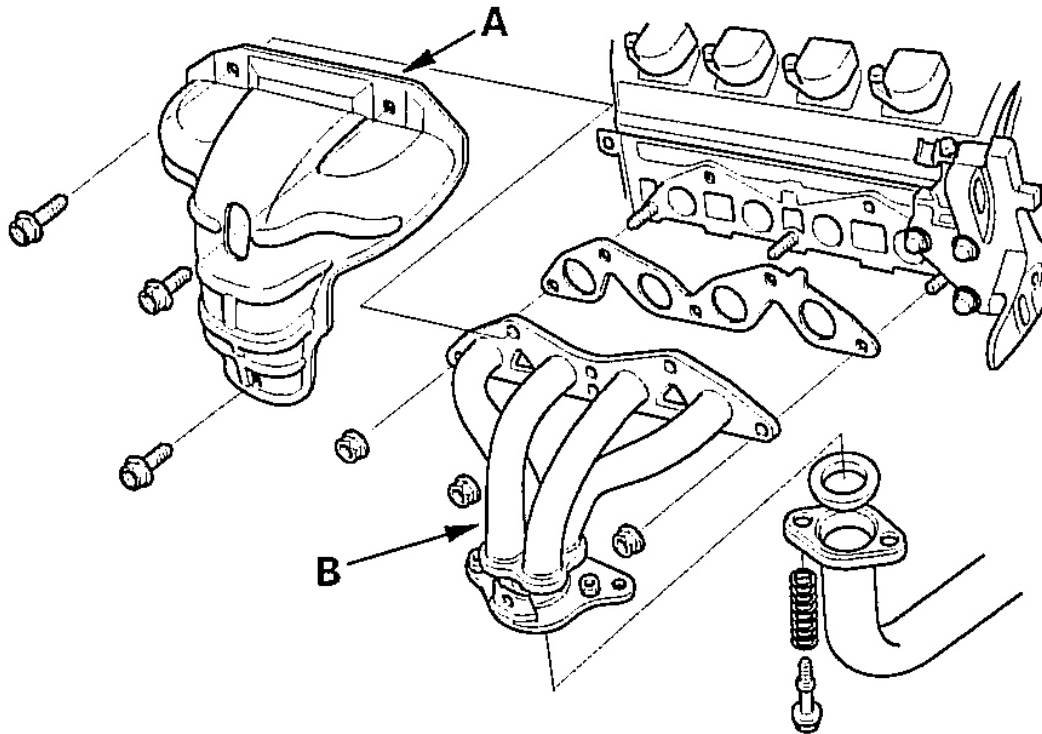
16. Support the engine with a jack and wood block under the oil pan.
17. Remove the upper bracket.



G01954469

Fig. 115: Removing Upper Bracket

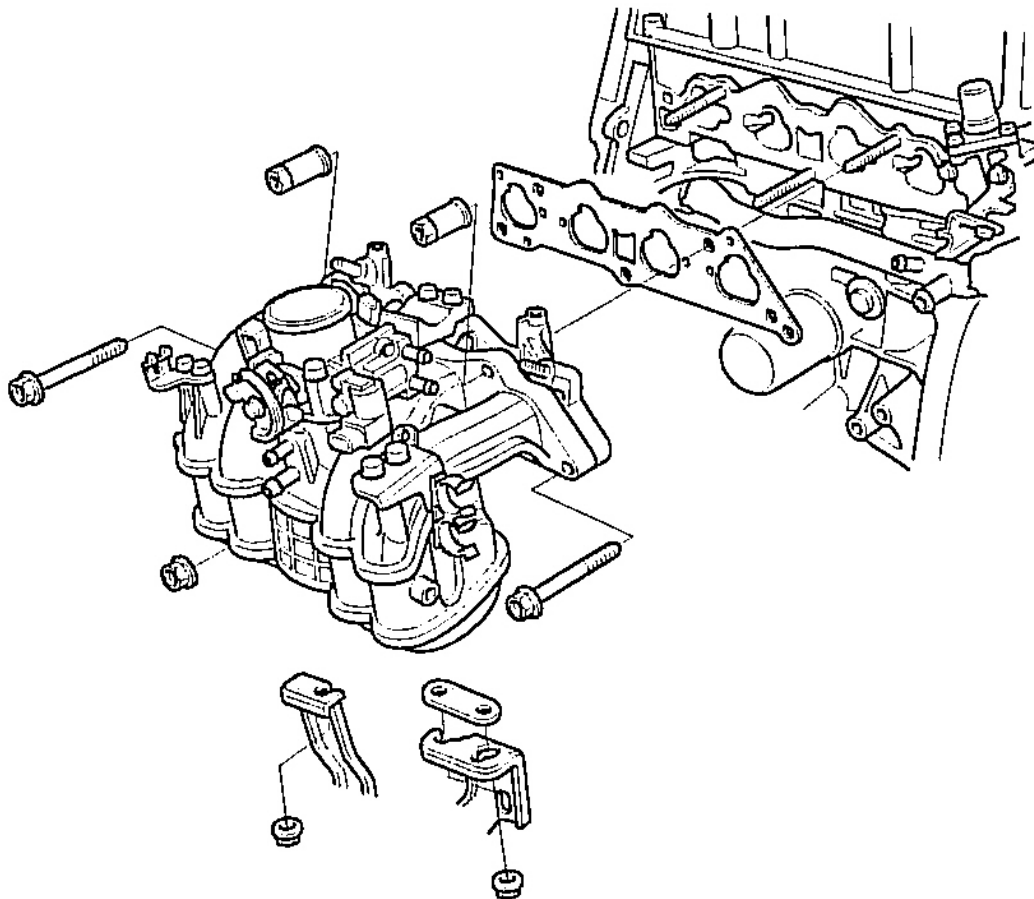
18. Remove the cover (A), then remove the exhaust manifold (B).



G01954470

Fig. 116: Removing Cover & Exhaust Manifold

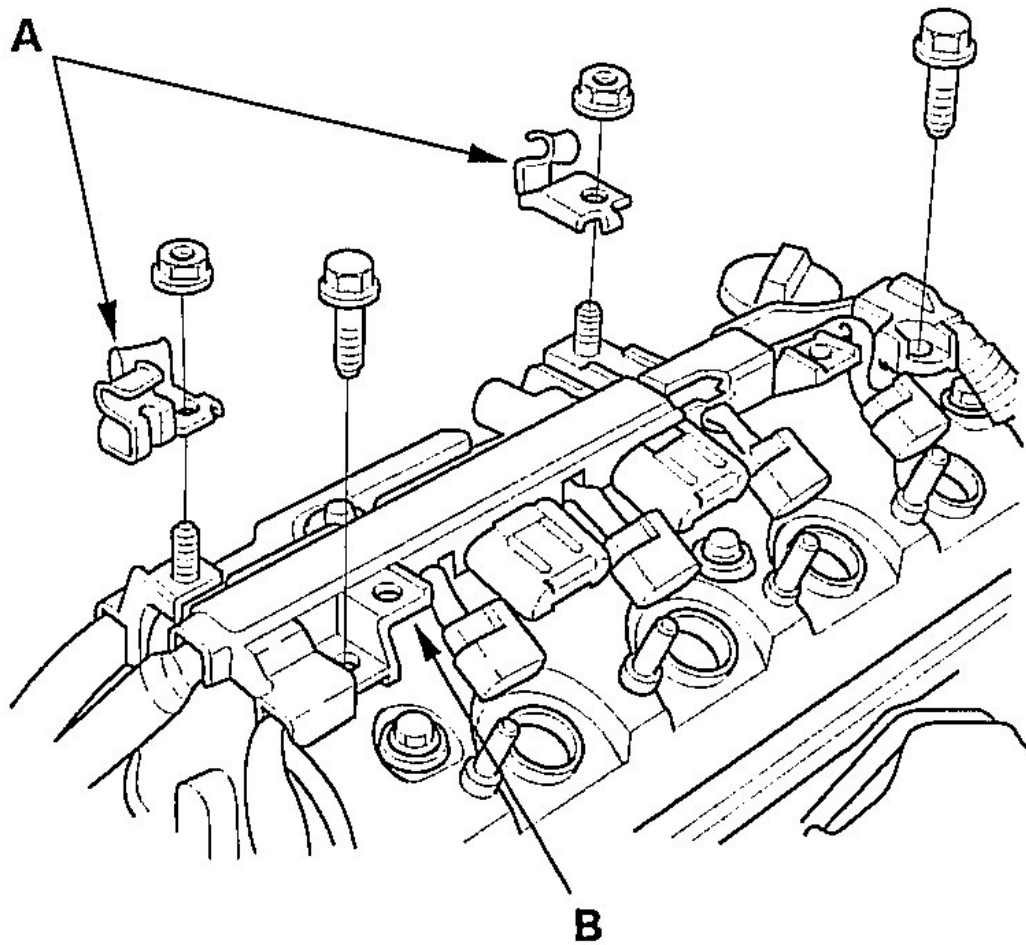
19. Remove the intake manifold.



G01954471

Fig. 117: Removing Intake Manifold

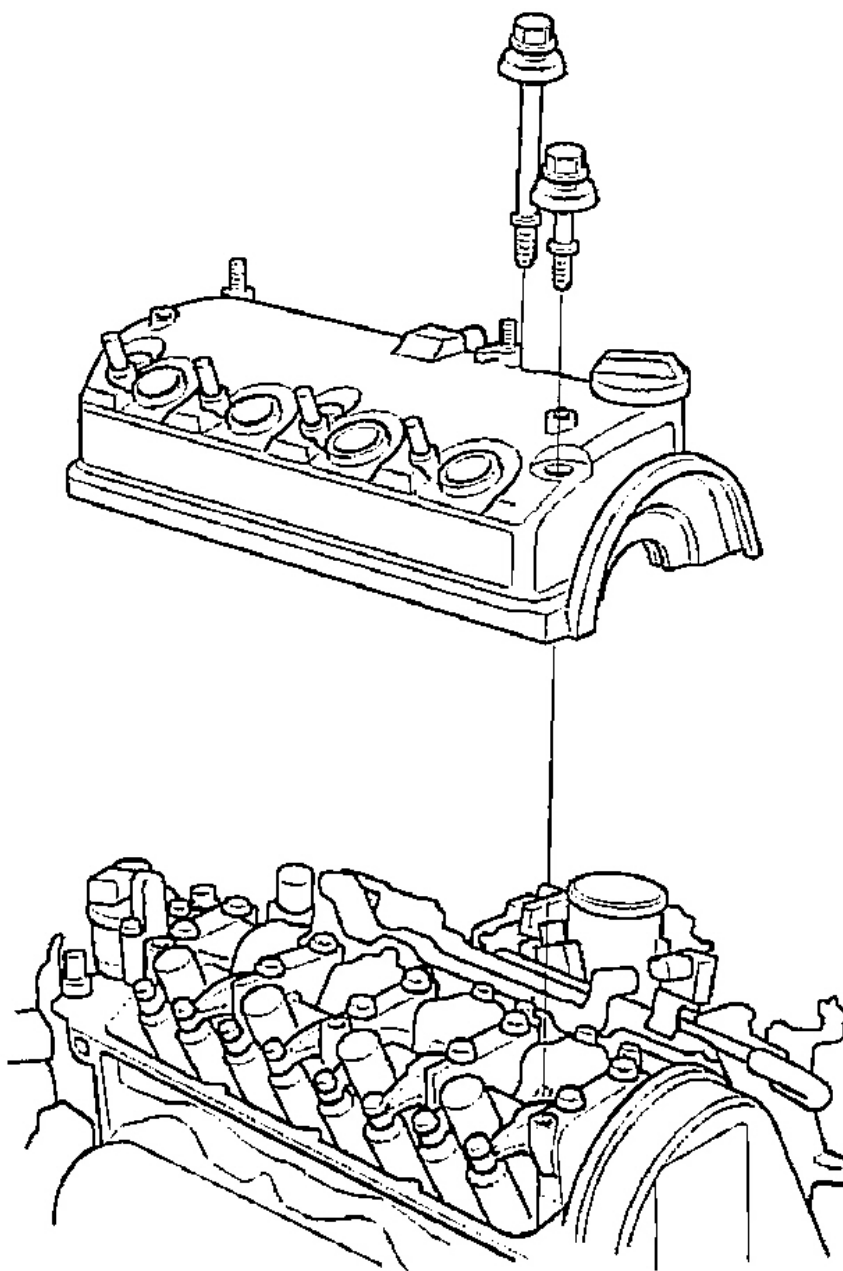
20. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
21. Remove the throttle cable clamps (A) and harness holder (B) from the cylinder head cover.



G01954472

Fig. 118: Removing Throttle Cable Clamps & Harness Holder

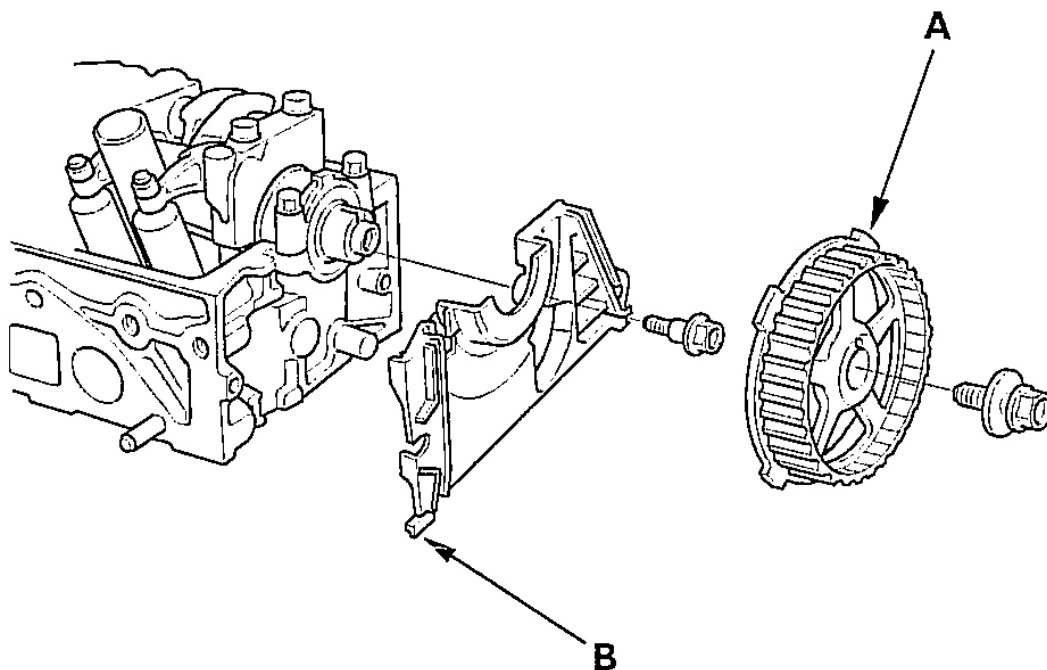
22. Remove the cylinder head cover.



G01954473

Fig. 119: Removing Cylinder Head Cover

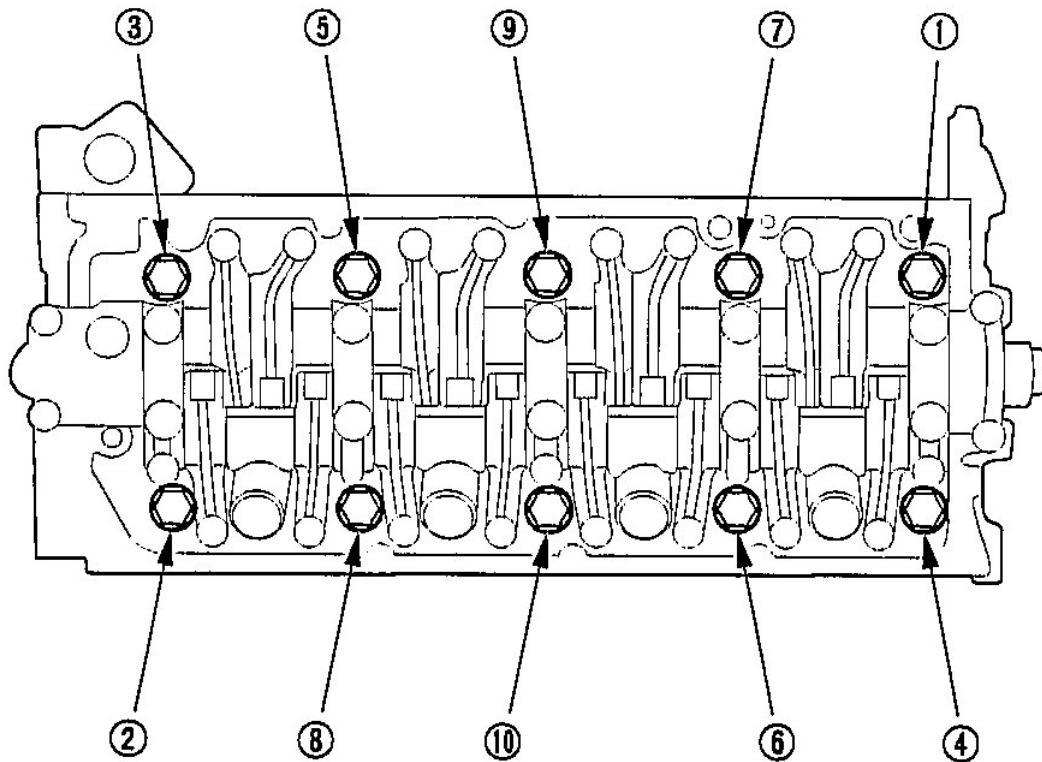
23. Remove the timing belt (see **Timing Belt Removal**).
24. Remove the camshaft pulley (A) and back cover (B).



G01954474

Fig. 120: Removing Camshaft Pulley & Back Cover

25. 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.



G01954475

Fig. 121: Cylinder Head Bolts Loosening Sequence

26. Remove the cylinder head.

CYLINDER HEAD INSPECTION FOR WARPAGE

NOTE: If camshaft-to-holder oil clearances (see Camshaft Inspection) are not within specifications, the cylinder head cannot be resurfaced.

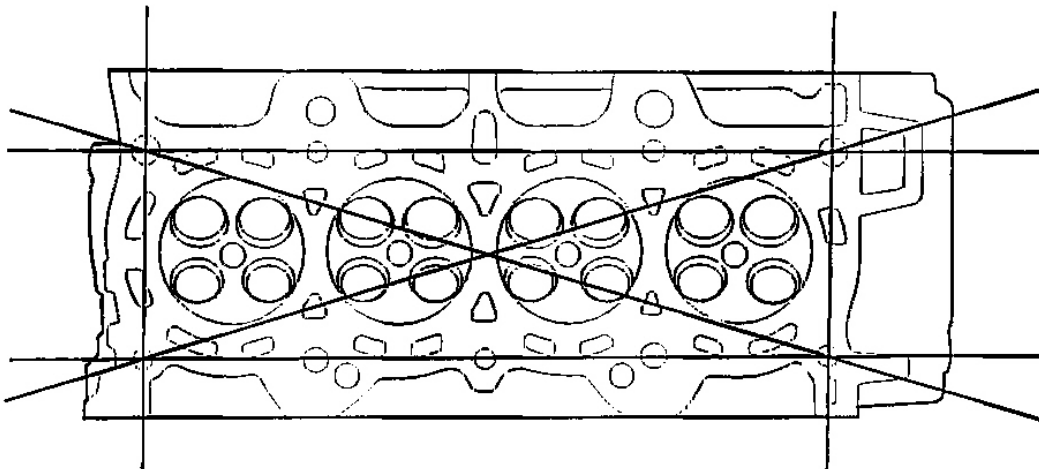
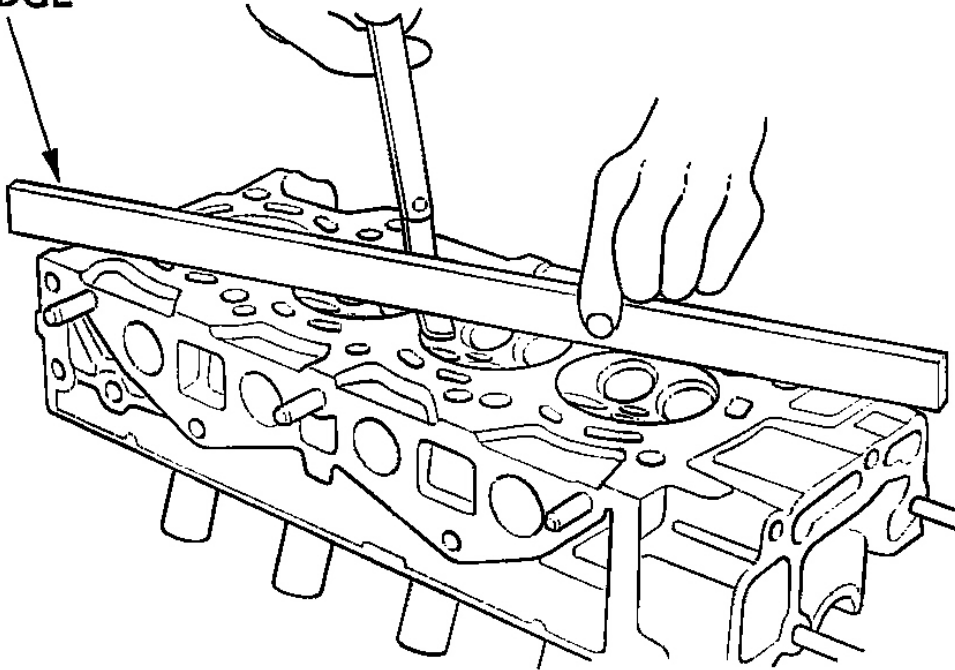
If camshaft-to-holder oil clearances are within specifications, check the cylinder head for warpage. Measure along the edges, and three ways across the center.

- 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 cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 93 mm (3.7 in.).

Cylinder Head Height:

Standard (New): 92.95-93.05 mm (3.659-3.663 in.)

**PRECISION STRAIGHT
EDGE**

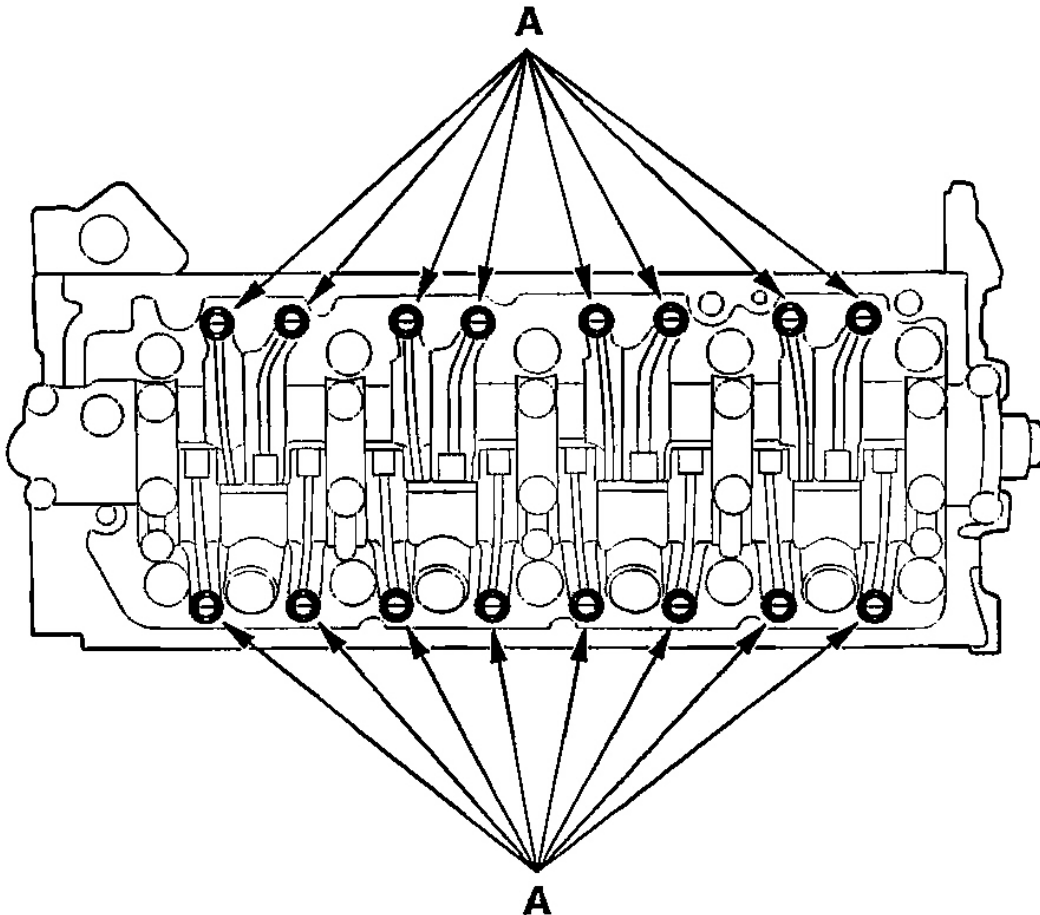


G01954476

Fig. 122: Inspecting Cylinder Head For Warpage

ROCKER ARM ASSEMBLY REMOVAL

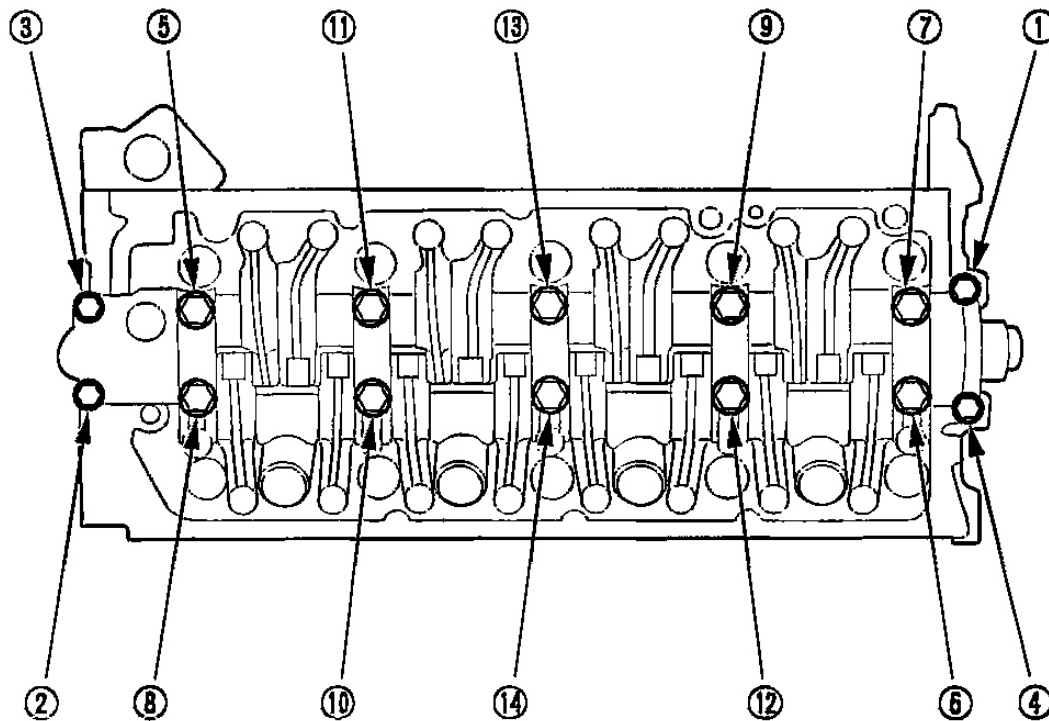
1. Loosen the adjusting screws (A).



G01954477

Fig. 123: Loosening Adjusting Screws

2. Remove the bolts and the rocker arm assembly.
 1. Unscrew the camshaft holder bolts 2 turns at a time, in a crisscross pattern, to prevent damaging the valves or rocker arm assembly.
 2. When removing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the camshaft holders, the springs and the rocker arms on the shafts.



G01954478

Fig. 124: Camshaft Holder Bolt Loosening Sequence

ROCKER ARMS AND SHAFTS DISASSEMBLY/REASSEMBLY

NOTE:

- Identify parts as they are removed to ensure reinstallation in original location.
- Inspect the rocker shafts and rocker arms (see [Rocker Arms and Shafts 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 to any contact points.
- Bundle the rocker arms with rubber bands to keep them together as a set.

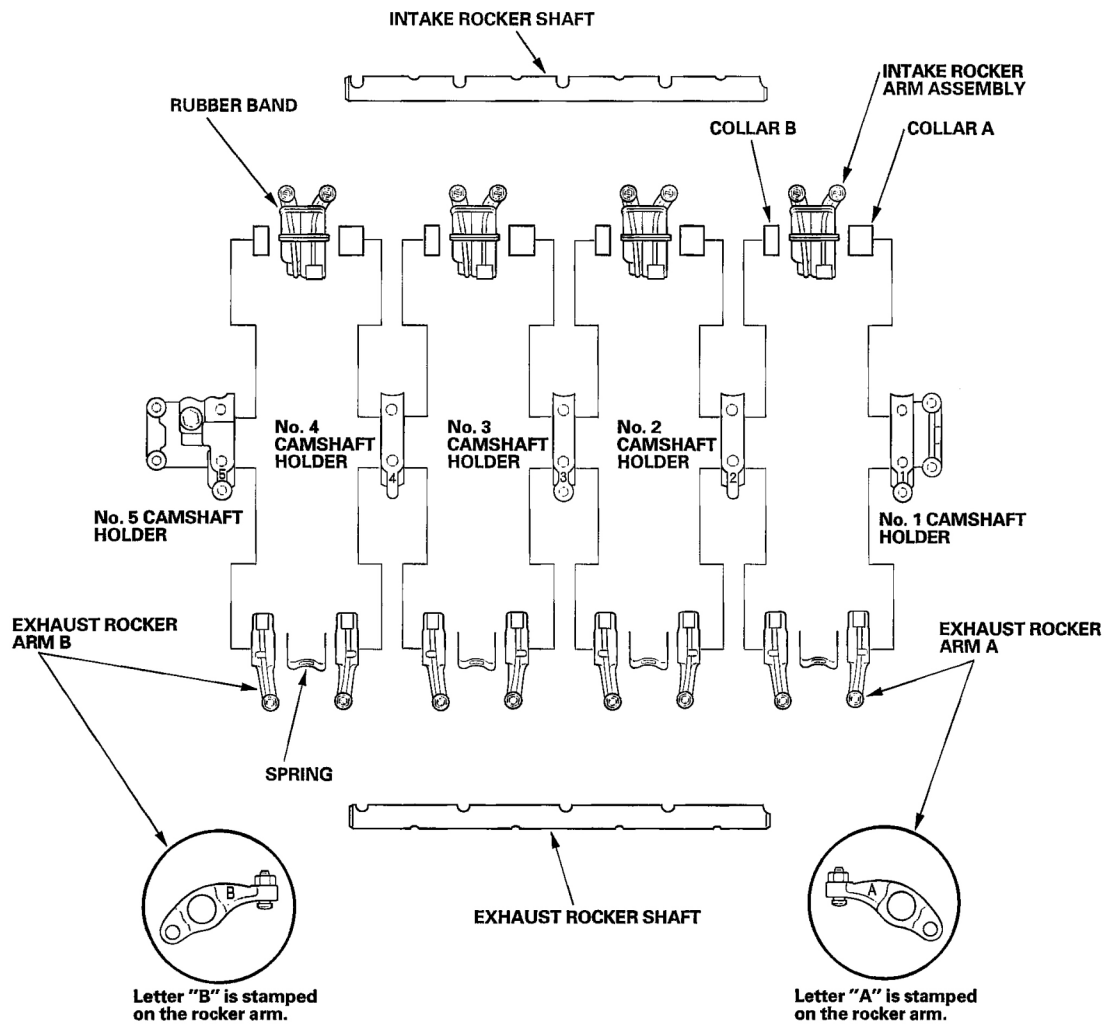
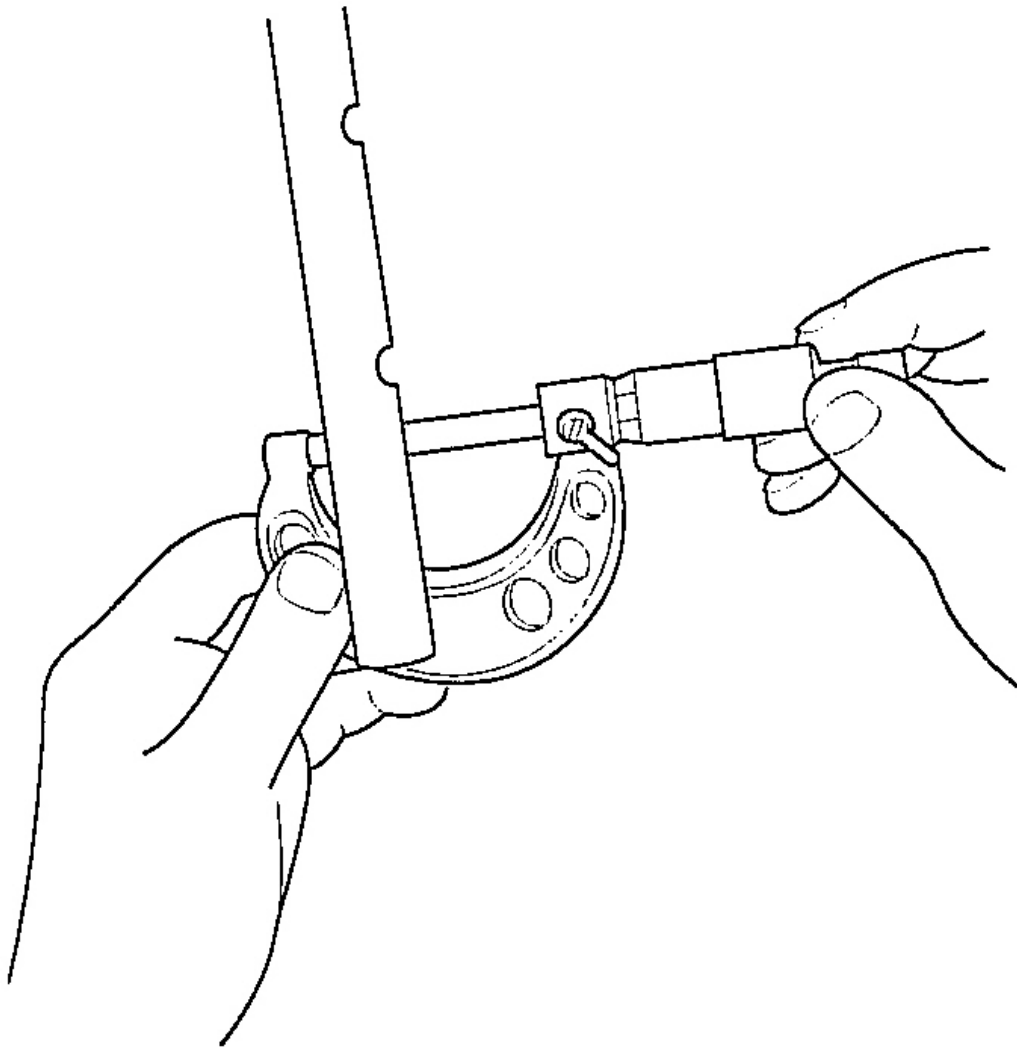


Fig. 125: Disassembly/Reassembly Of Rocker Arms & Shafts

ROCKER ARMS AND SHAFTS INSPECTION

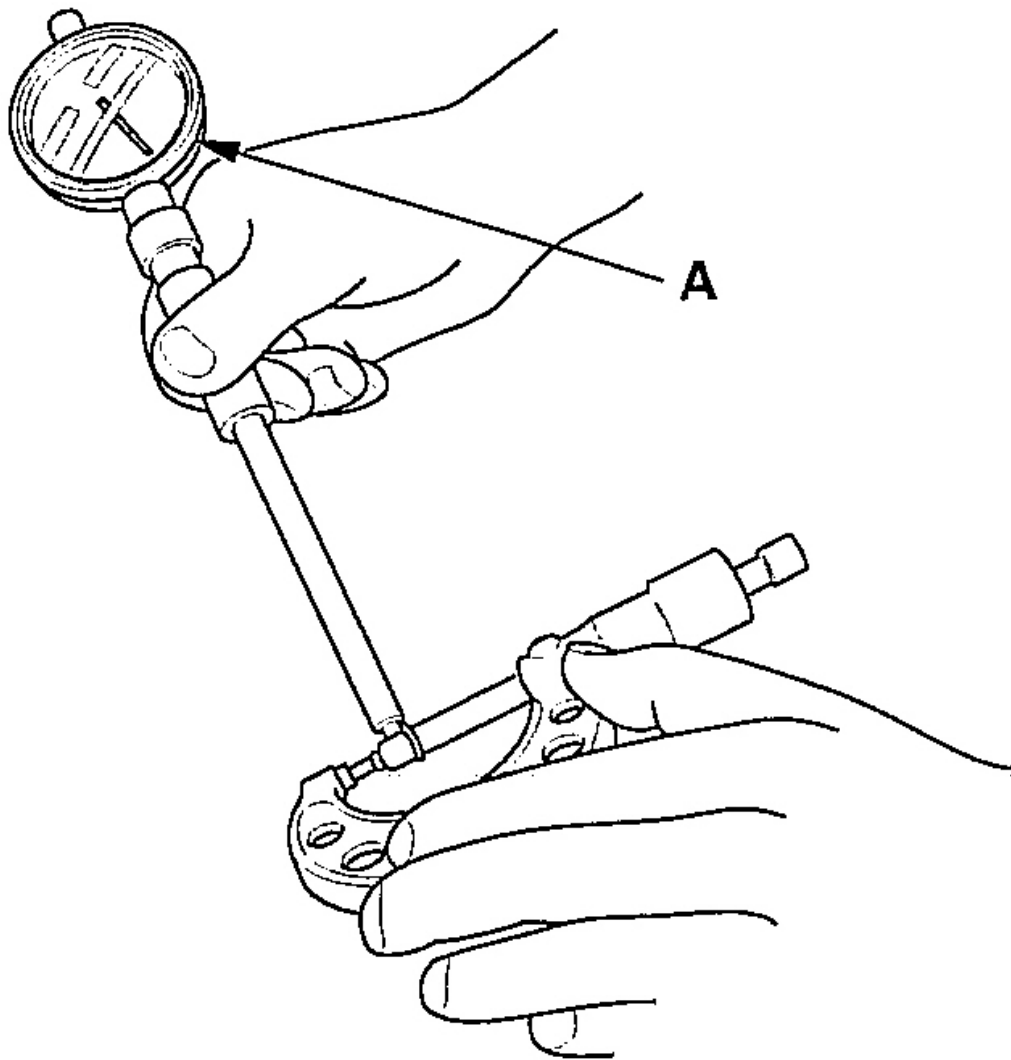
1. Measure the diameter of the shaft at the first rocker location.



G01954480

Fig. 126: Measuring Diameter Of Shaft

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



G01954481

Fig. 127: Zeroing Gauge To Shaft Diameter

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

Rocker Arm-to-Shaft Clearance:

Standard (New):

Intake: 0.017-0.050 mm (0.0007-0.0020 in.)

Exhaust: 0.018-0.054 mm (0.0007-0.0021 in.)

Service Limit: 0.08 mm (0.003 in.)

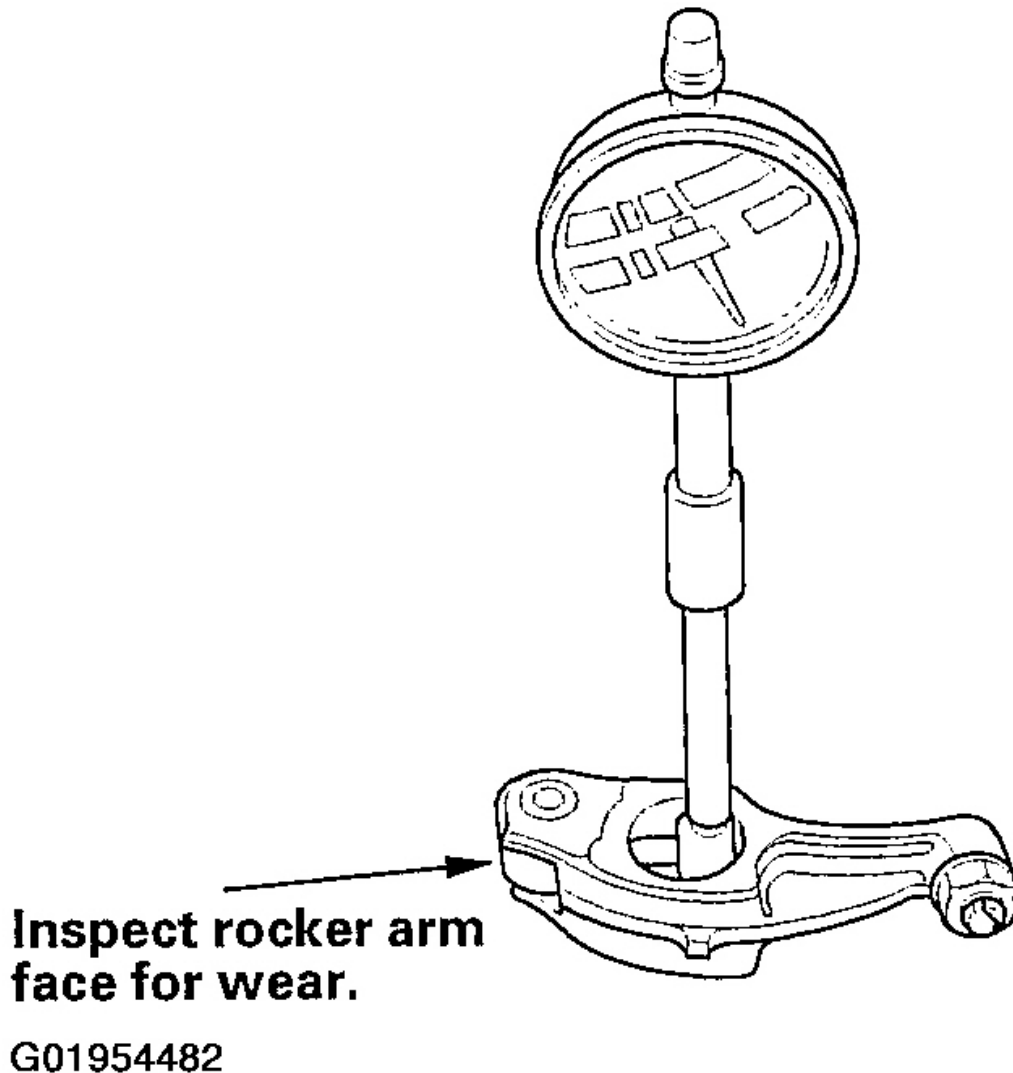
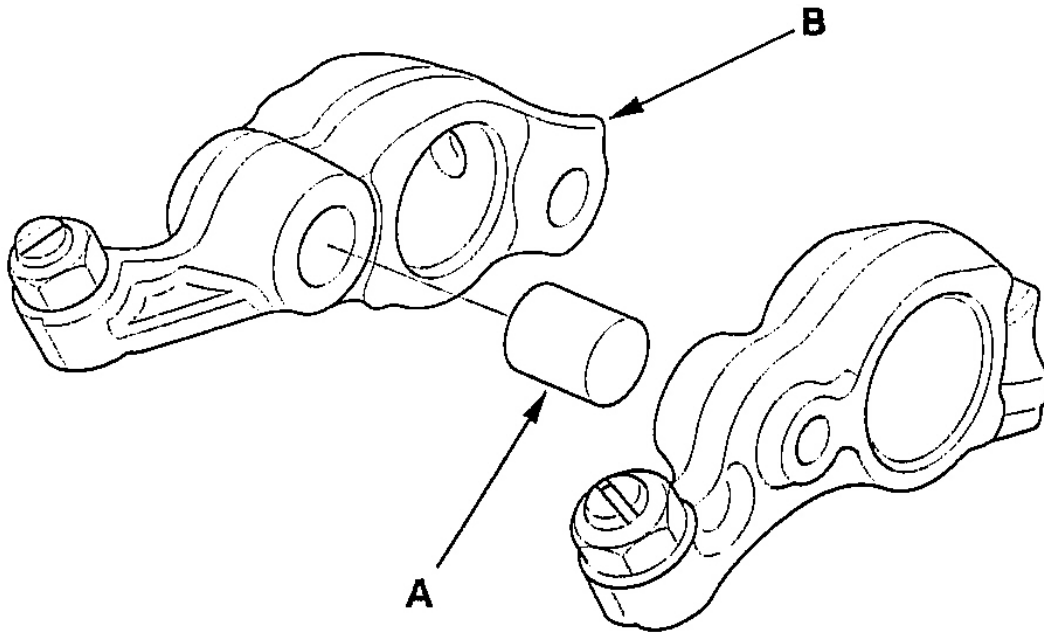


Fig. 128: Measuring Inside Diameter Of Rocker Arm

4. Repeat for all rockers and both shafts. If the clearance is over the limit, replace the rocker shaft and all overtolerance rocker arms. If any VTEC intake rocker arm needs replacement, replace both rocker arms in that set (primary and secondary).
5. Inspect the rocker arm piston (A). Push it manually. If it does not move smoothly, replace the rocker arm assembly.

NOTE:

- When reassembling the primary rocker arm (B), carefully apply air pressure to its oil passage.
- Apply oil to the pistons when reassembling.



G01954483

Fig. 129: Inspecting Rocker Arm Piston**CAMSHAFT INSPECTION****NOTE:**

- Do not rotate the camshaft during inspection.
- Remove the rocker arms and rocker shafts.

1. Put the camshaft and the camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

Specified torque:

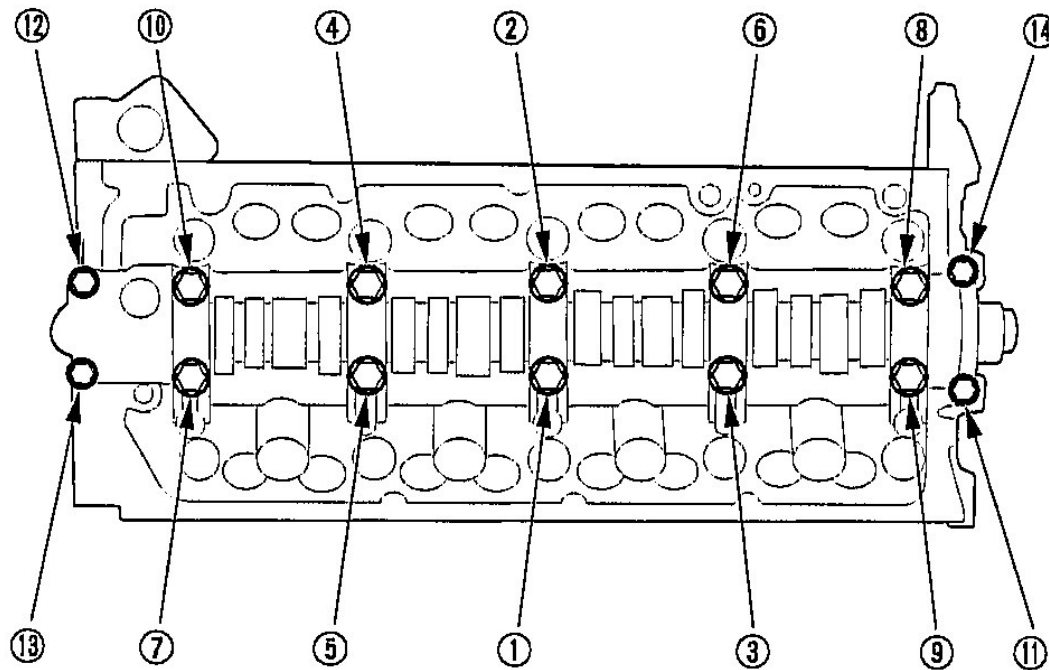
8 mm bolts: 20 N.m (2.0 kgf.m, 14 lbf.ft)

Apply engine oil to the bolt threads.

6 mm bolts: 12 N.m (1.2 kgf.m, 8.7 lbf.ft)

Apply engine oil to the bolt threads.

6 mm bolts: 11,12,13,14

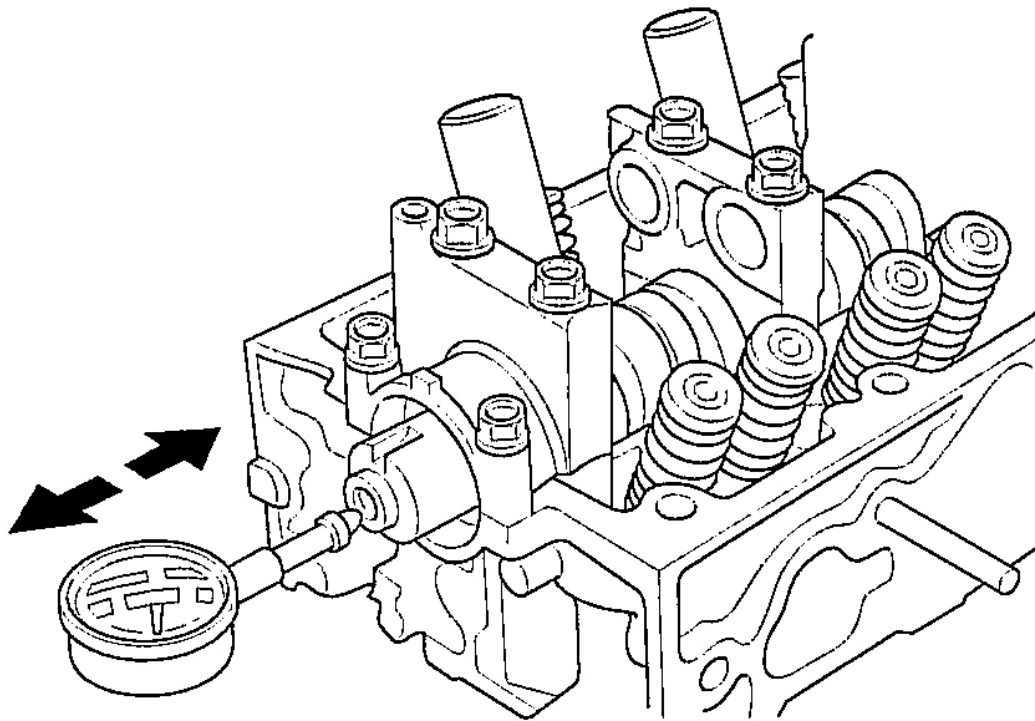


G01954484

Fig. 130: Tightening Camshaft Bolts

2. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
3. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth and read the end play.

Camshaft End Play:**Standard (New):** 0.05-0.15 mm (0.002-0.006 in.)**Service Limit:** 0.5 mm (0.02 in.)



G01954485

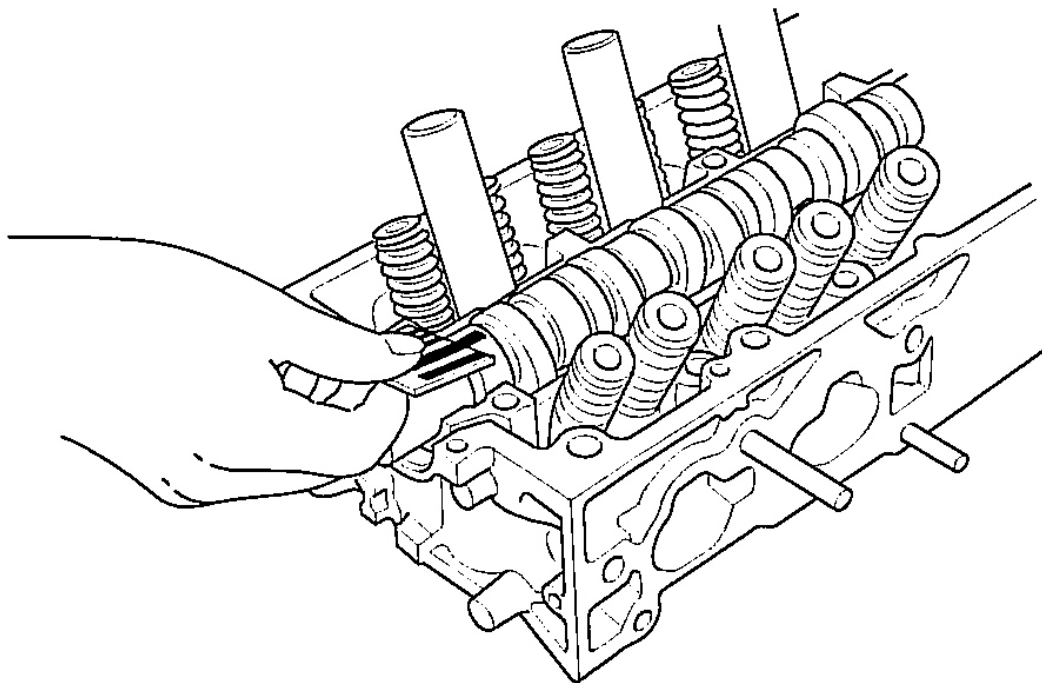
Fig. 131: Zeroing Dial Indicator Against End Of Camshaft

4. Unscrew the camshaft holder bolts 2 turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
5. Lift the camshaft out of the cylinder head, wipe it clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
6. Clean the camshaft journal surfaces in the cylinder head, then set the camshaft back in place. Place a plastigage strip across each journal.
7. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 1 .
8. 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 10
 - 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 9.

Camshaft-to-Holder Oil Clearance:

Standard (New): 0.050-0.089 mm (0.0020-0.0035 in.)

Service Limit: 0.15 mm (0.006 in.)



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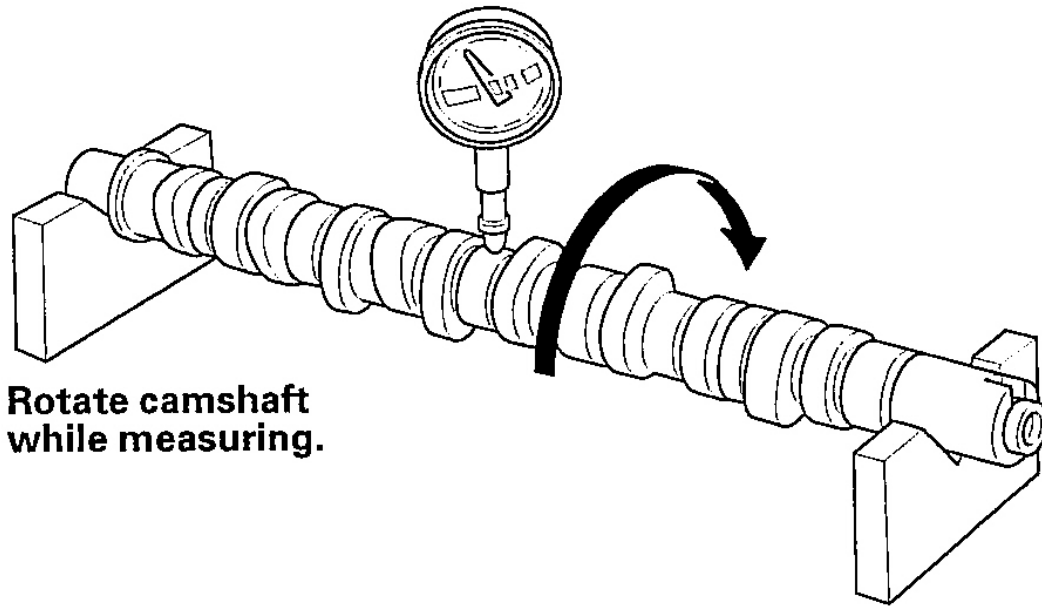
Fig. 132: Measuring Camshaft-To-Holder Clearance

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

Camshaft Total Runout:

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

Service Limit: 0.04 mm (0.002 in.)



G01954487

Fig. 133: Measuring Camshaft Total Runout

10. Measure cam lobe height.

	INTAKE	EXHAUST
PRI	38.604 mm (1.5198 in.)	38.784 mm (1.5269 in.)
SEC	32.848 mm (1.2932 in.)	

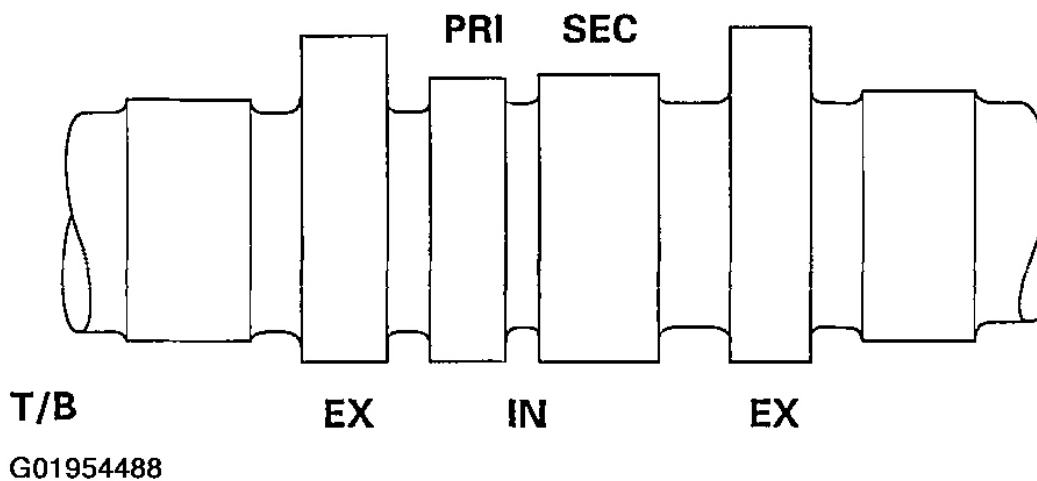
PRI: Primary

SEC: Secondary

IN: Intake

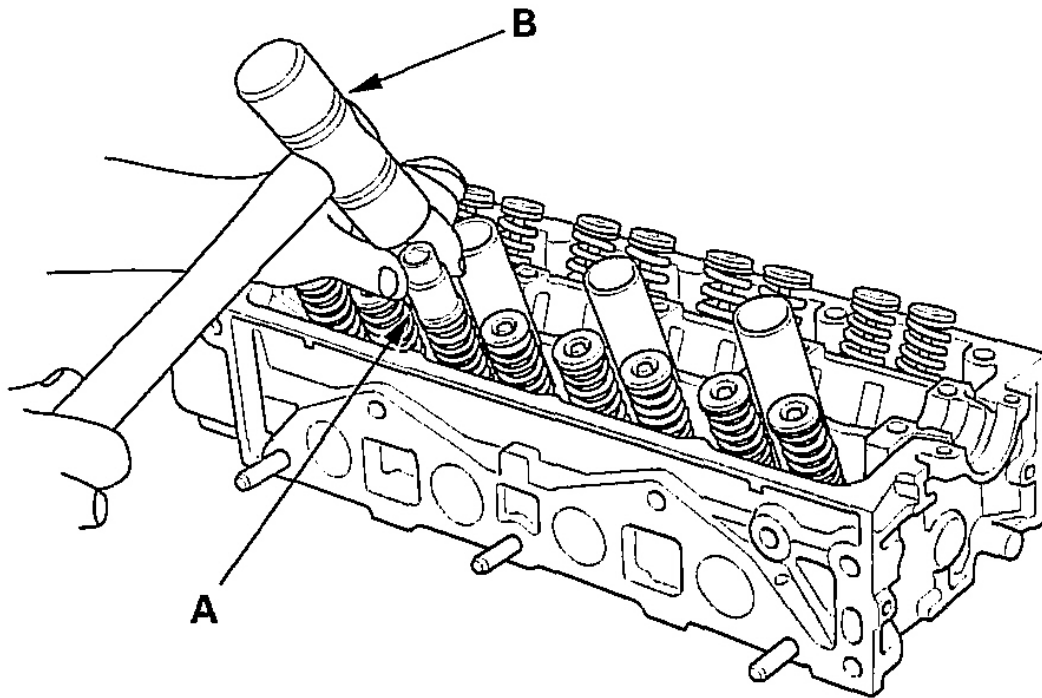
EX: Exhaust

T/B: Timing Belt

**Fig. 134: Measuring Cam Lobe Height****VALVES, SPRINGS AND VALVE SEALS REMOVAL**

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

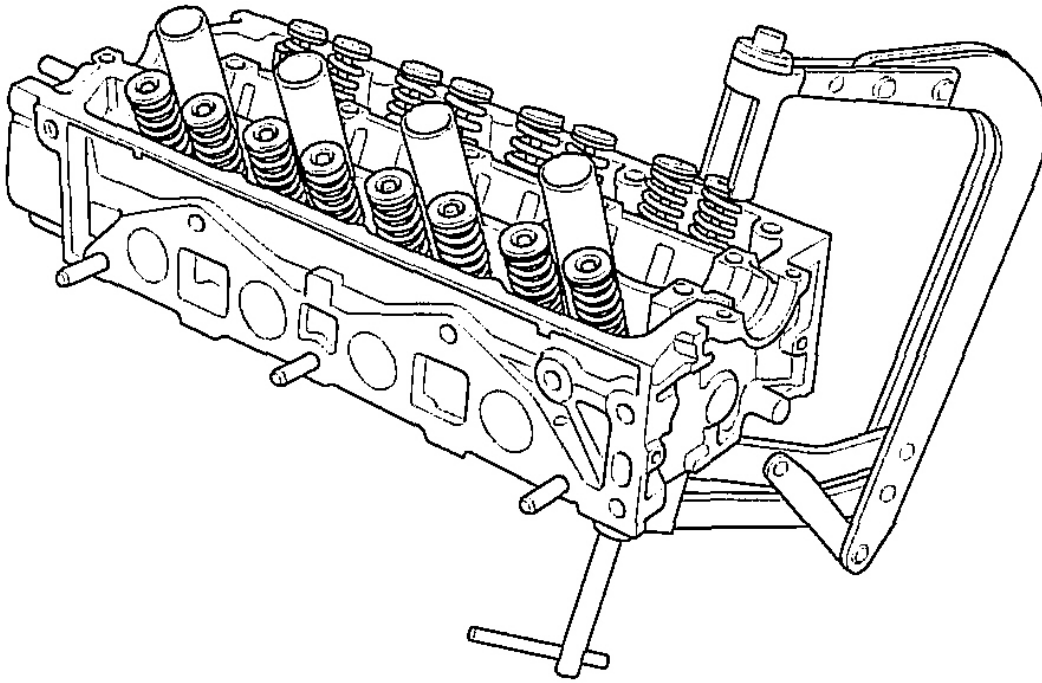
1. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the valve retainer to loosen the valve keepers.



G01954489

Fig. 135: Tapping Valve Retainer To Loosen Valve Keepers

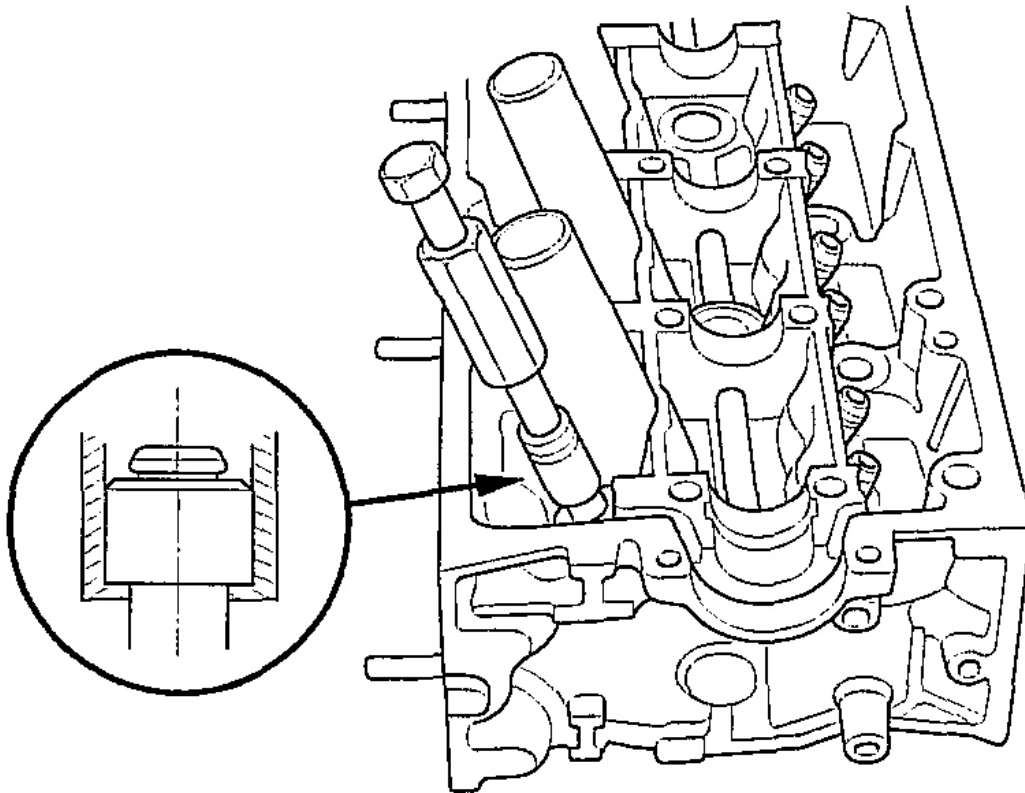
2. Install the spring compressor. Compress the spring and remove the valve keepers.



G01954490

Fig. 136: Installing Spring Compressor

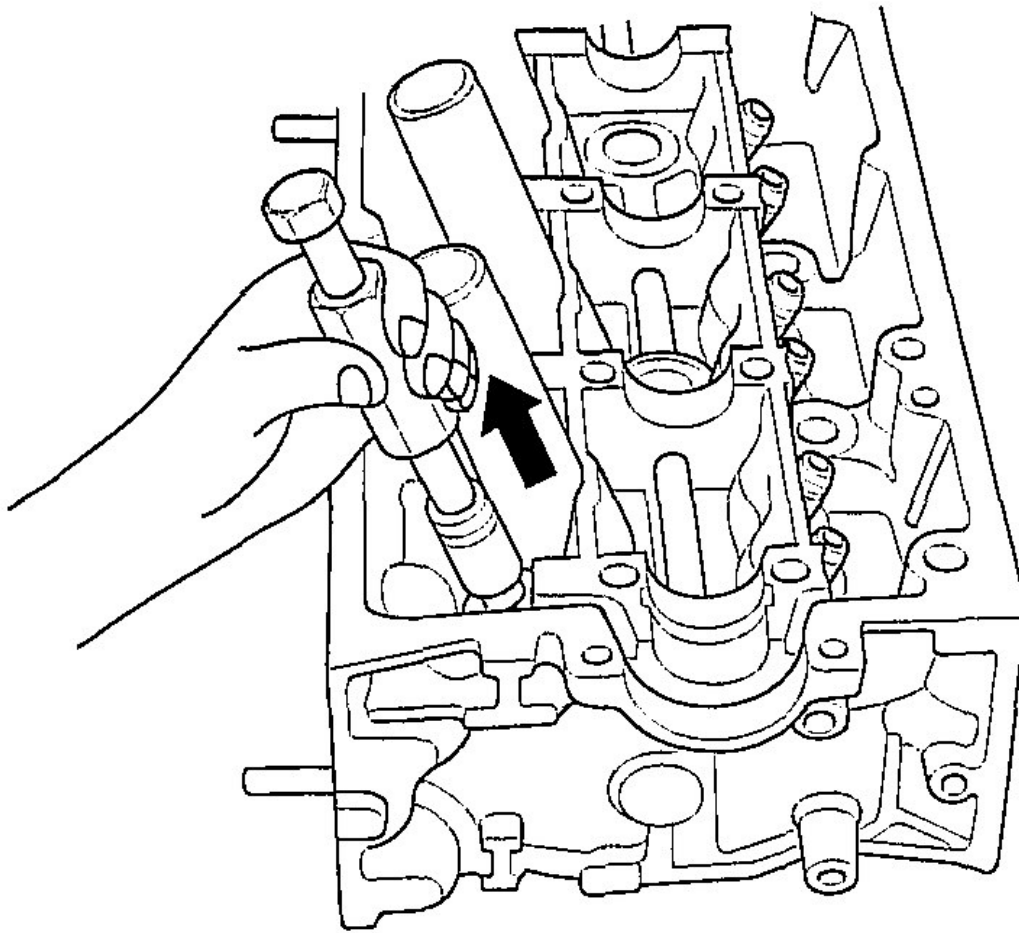
3. Install the valve guide seal remover.



G01954491

Fig. 137: Installing Valve Guide Seal Remover

4. Remove the valve seal.



G01954492

Fig. 138: Removing Valve Seal**VALVE INSPECTION**

Measure the valve in these areas.

Intake Valve Dimensions

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

B Standard (New): 118.27-118.87 mm (4.656-4.680 in.)

C Standard (New): 5.480-5.490 mm (0.2157-0.2161 in.)

C Service Limit: 5.45 mm (0.215 in.)

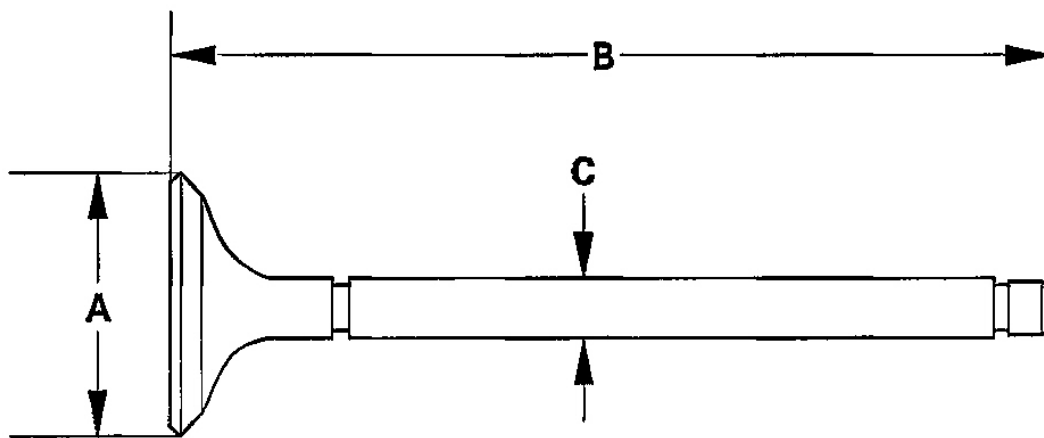
Exhaust Valve Dimensions

A Standard (New): 25.85-26.15 mm (1.018-1.030 in.)

B Standard (New): 115.65-116.25 mm (4.553-4.577 in.)

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

C Service Limit: 5.42 mm (0.213 in.)



G01954493

Fig. 139: Inspecting Valve

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Slide the valve out of its guide about 10 mm, 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 2.

Intake Valve Stem-to-Guide Clearance:

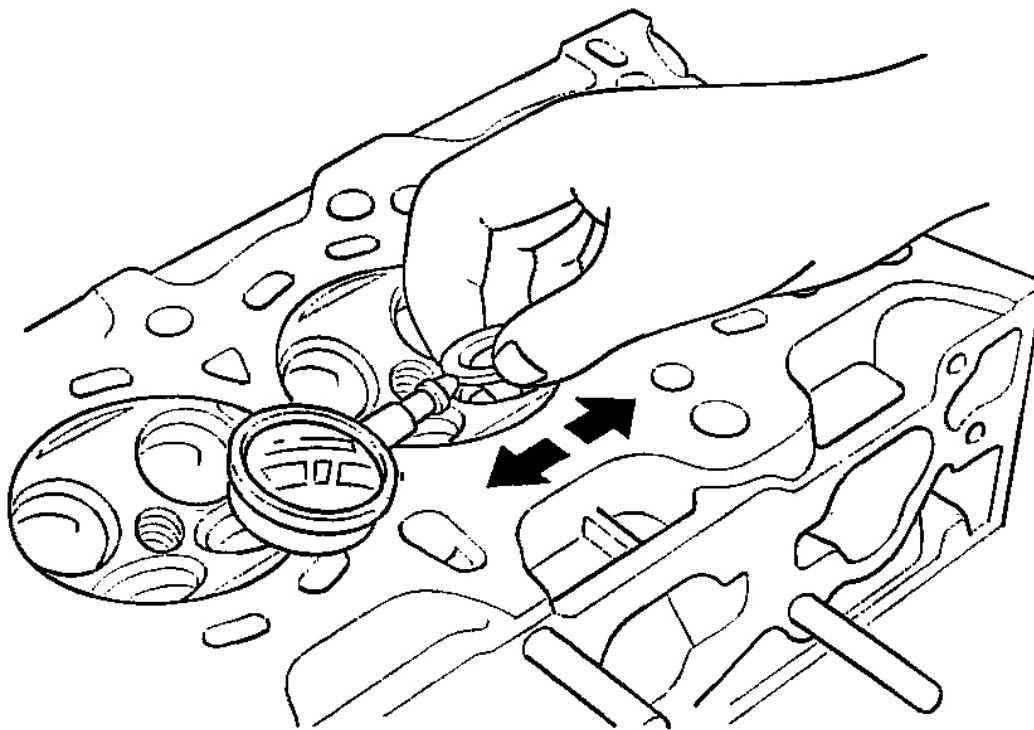
Standard (New): 0.04-0.10 mm (0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance:

Standard (New): 0.10-0.16 mm (0.004-0.006 in.)

Service Limit: 0.22 mm (0.009 in.)



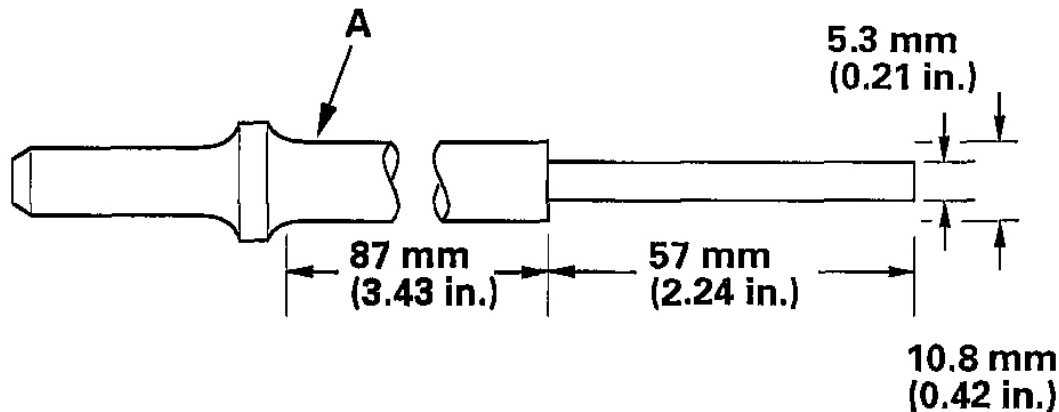
G01954494

Fig. 140: Inspecting Valve Stem-To-Guide Clearance

2. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge. Take the measurements in 3 places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance:**Standard (New):** 0.02-0.05 mm (0.0008-0.0020 in.)**Service Limit:** 0.08 mm (0.003 in.)**Exhaust Valve Stem-to-Guide Clearance:****Standard (New):** 0.05-0.08 mm (0.0020-0.0031 in.)**Service Limit:** 0.11 mm (0.004 in.)**VALVE GUIDE REPLACEMENT****Special Tools Required**

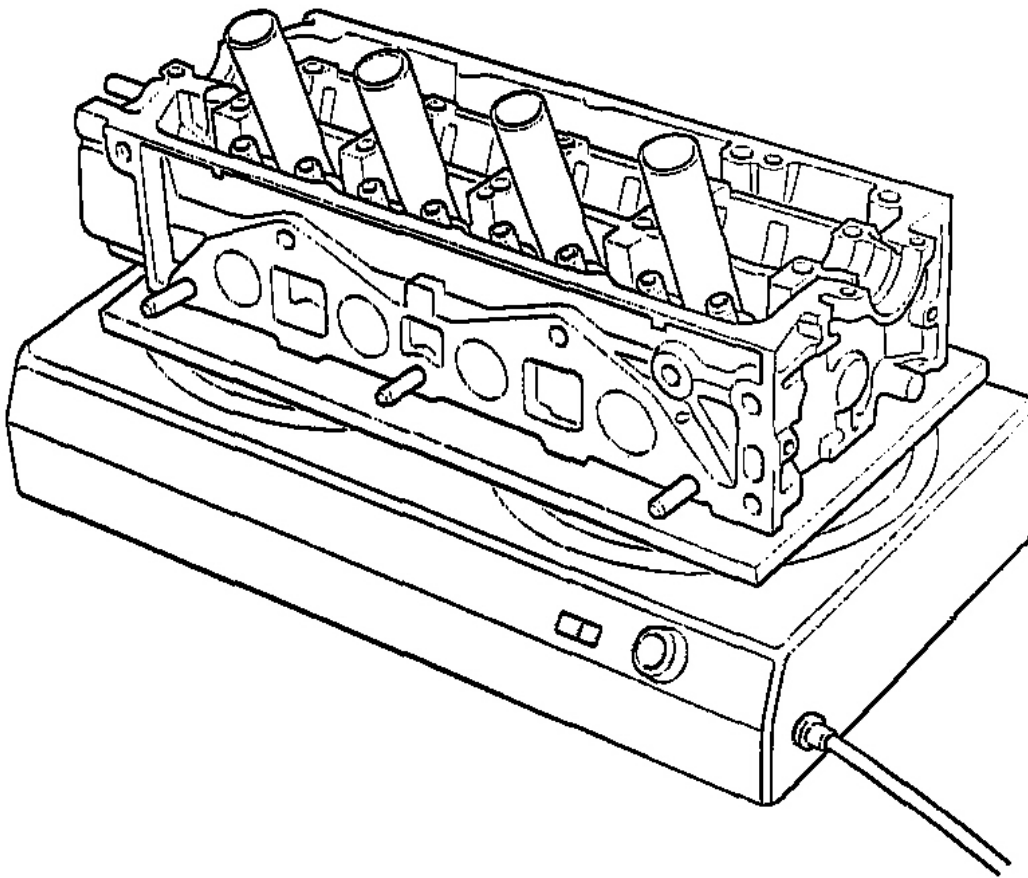
- Valve guide driver, 5.5 mm 07742-0010100
 - Valve guide reamer, 5.5 mm 07HAH-PJ7010B
1. As illustrated in **Fig. 141**, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.



G01954495

Fig. 141: Using Air-Impact Valve Guide Driver Modified To Fit Diameter Of Valve Guides

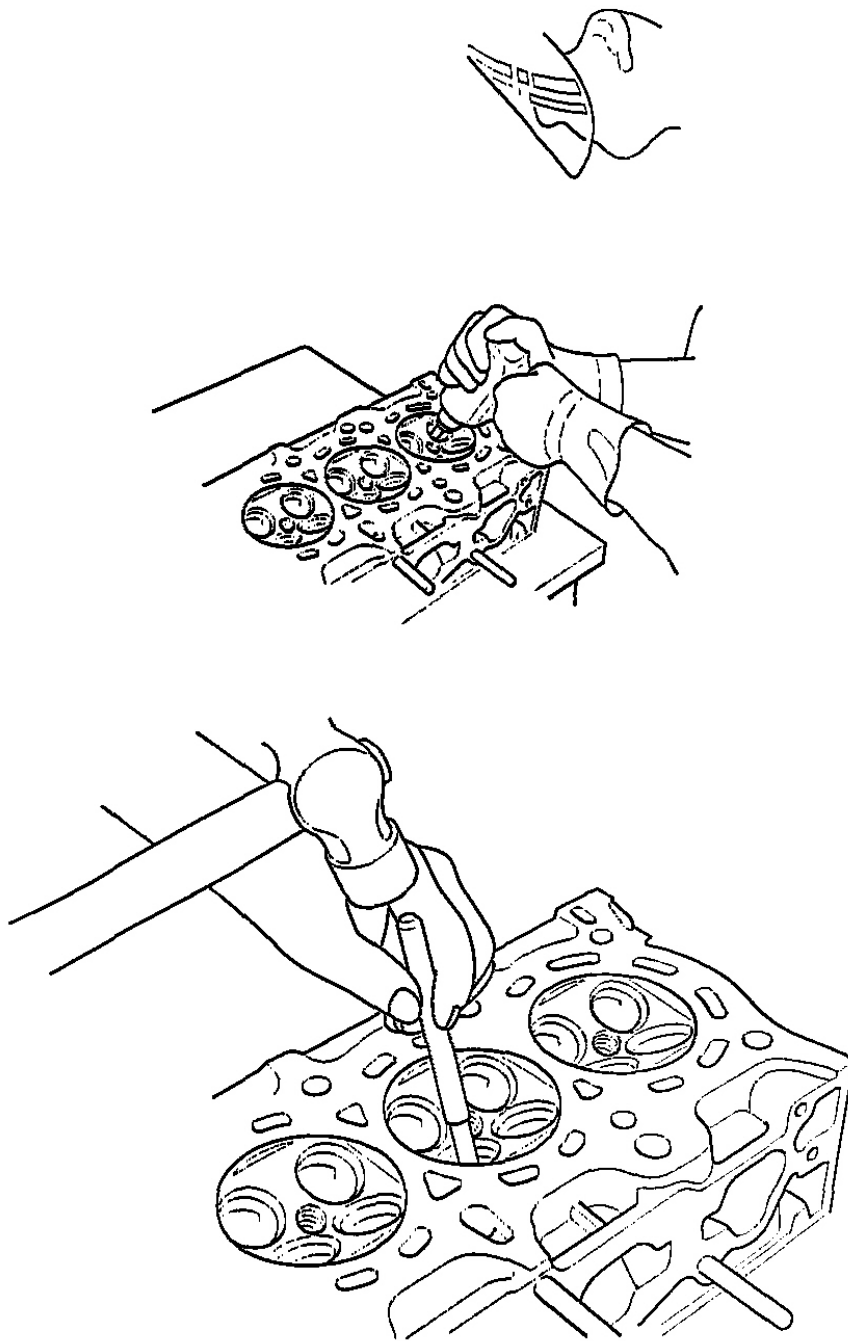
2. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for about an hour.
3. Use a hot plate or oven to evenly heat the cylinder head to 300°F (150°C). Monitor the temperature with a cooking thermometer. Do not get the head hotter than 300°F (150°C); excessive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



G01954496

Fig. 142: Using Hot Plate To Heat Cylinder Head

4. 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.
5. Turn the head over and drive the guide out toward the camshaft side of the head.



G01954497

Fig. 143: Driving Guide Out

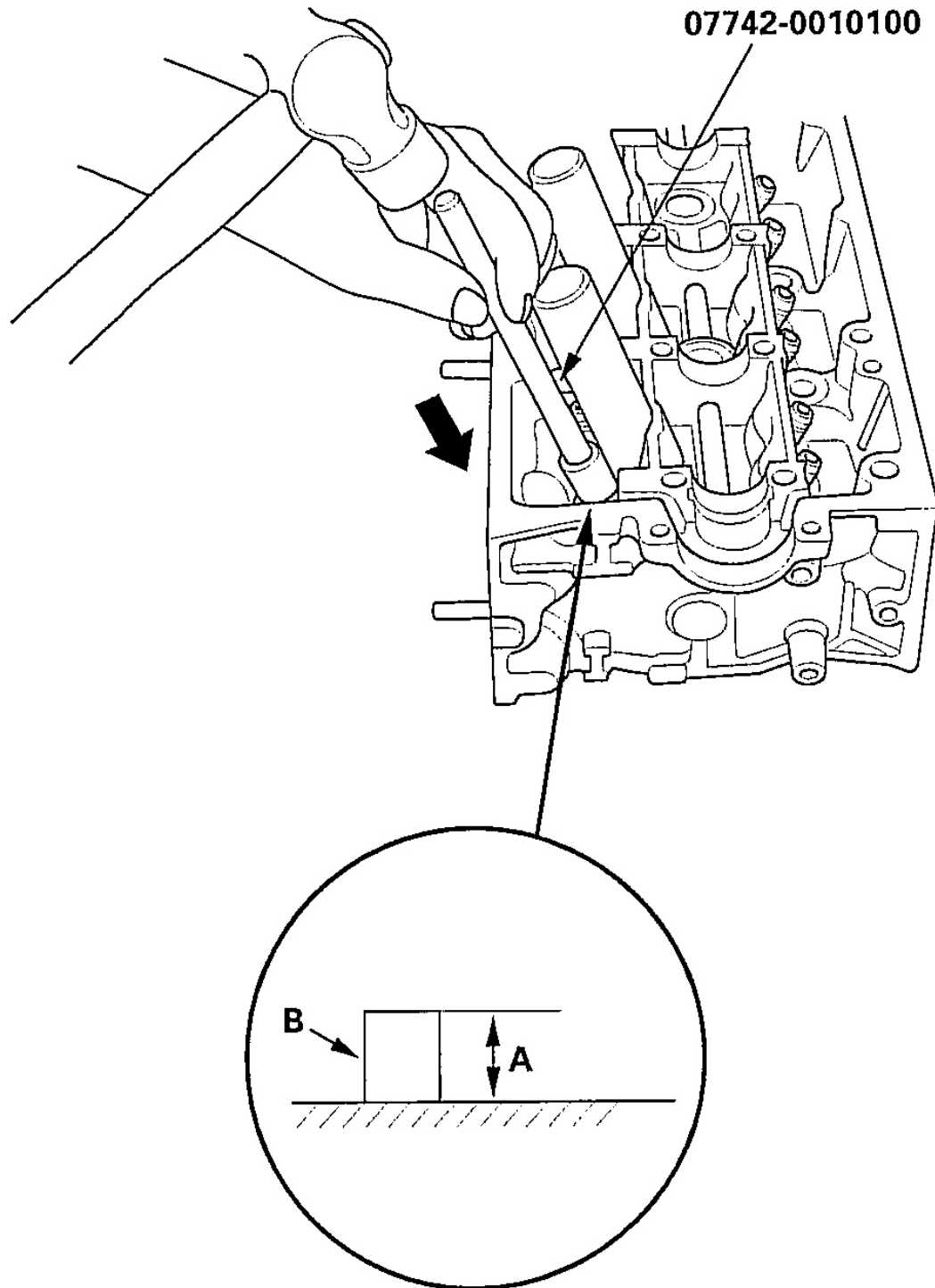
6. If a valve guide won't move, drill it out with a 8 mm (5/16 inch) bit, then try again. Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.
7. Remove the new guide(s) from the freezer, one at a time, as you need them.

8. 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: 17.85-18.35 mm (0.703-0.722 in.)

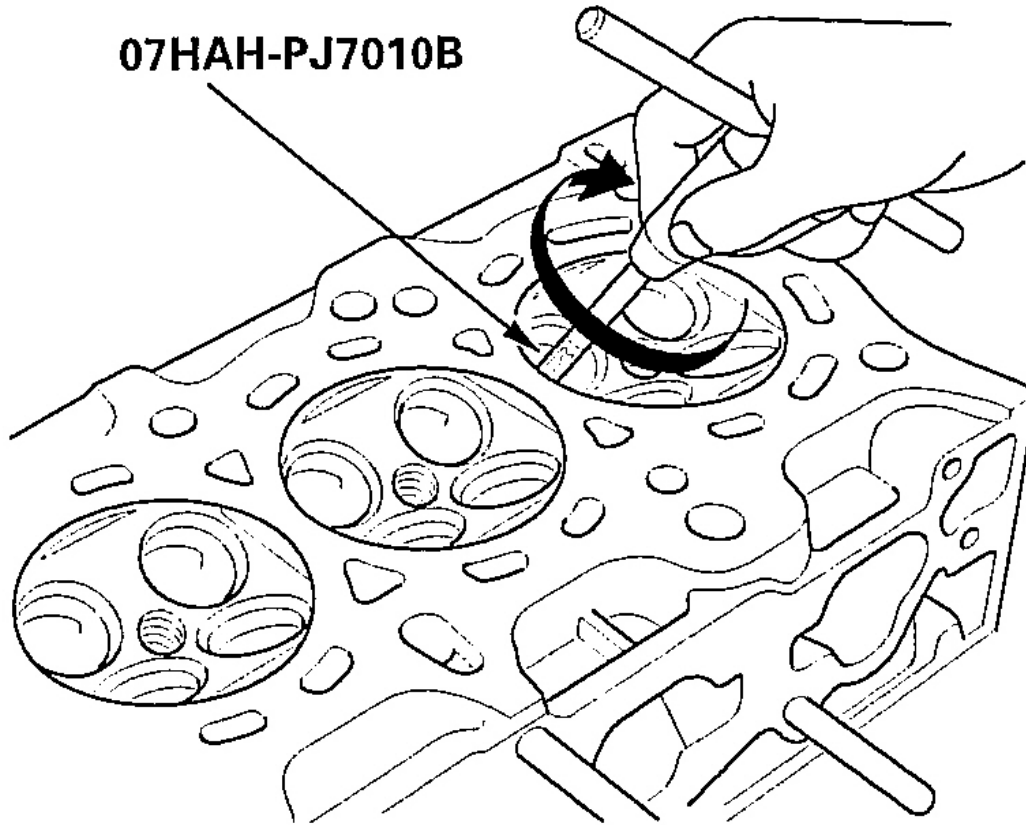
Exhaust: 18.65-19.15 mm (0.734-0.754 in.)



G01954498

Fig. 144: Installing Guide From Camshaft Side Of Head

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



G01954499

Fig. 145: Rotating Reamer Clockwise

11. Continue to rotate the reamer clockwise while removing it from the bore.
12. Thoroughly wash the guide in detergent and water to remove any cutting residue.
13. Check the clearance with a valve (see **Valve Inspection**). Verify that the valve slides in the intake and exhaust valve guides without exerting pressure.

VALVE SEAT RECONDITIONING

If the valve guides are worn (see **Valve Inspection**), replace them (see **Valve Guide Replacement**) before cutting the valve seats.

1. Renew the valve seats in the cylinder head using a valve seat cutter.

1. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
2. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 67.5° cutter (intake) or 60° cutter (exhaust). Check the width of the seat and adjust accordingly.
3. Make one more very light pass with the 45° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width:**Intake:**

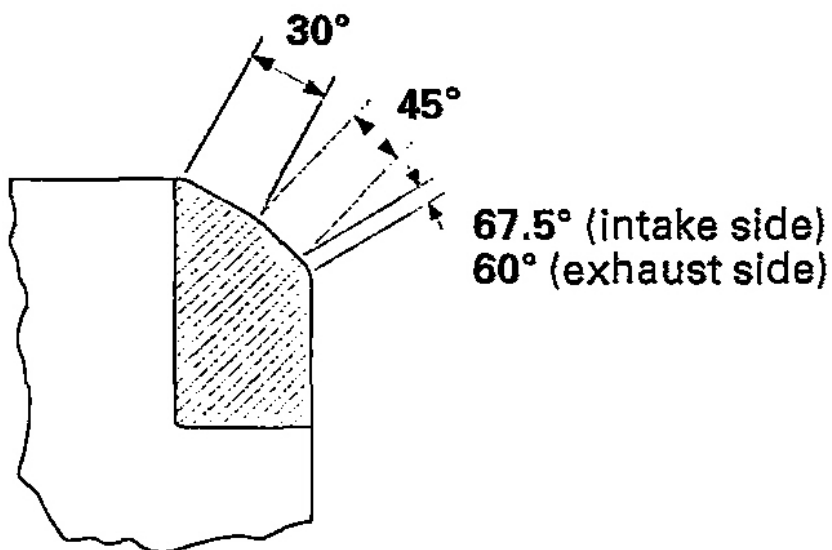
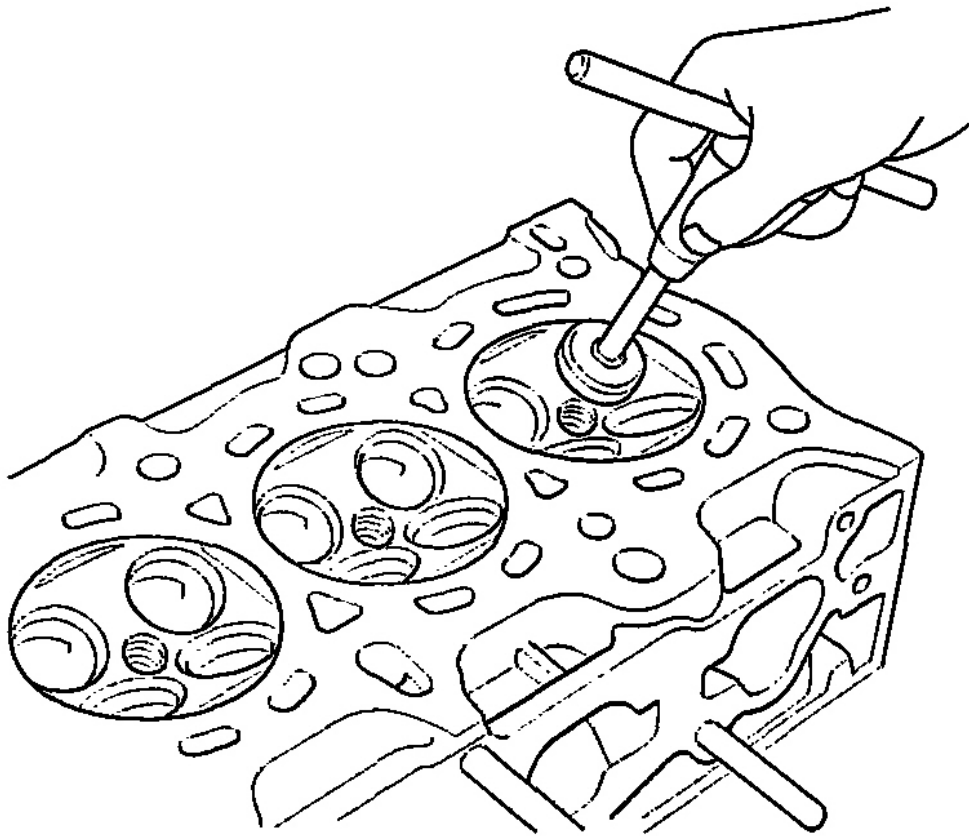
Standard (New): 0.85-1.15 mm (0.033-0.045 in.)

Service Limit: 1.60 mm (0.063 in.)

Exhaust:

Standard (New): 1.25-1.55 mm (0.049-0.061 in.)

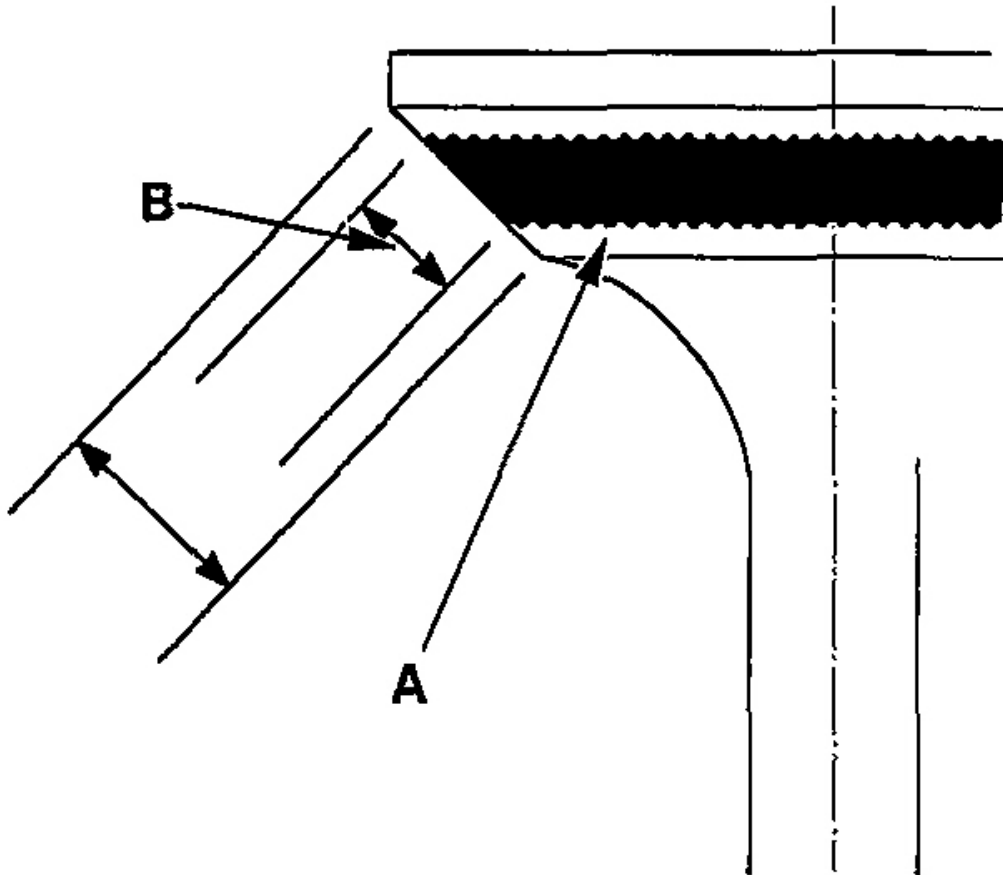
Service Limit: 2.00 mm (0.079 in.)



G01954500

Fig. 146: Renewing Valve Seats In Cylinder Head Using Valve Seat Cutter

2. After resurfacing the seat, inspect it 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.

**G01954501****Fig. 147: Applying Prussian Blue Compound To Valve Face**

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

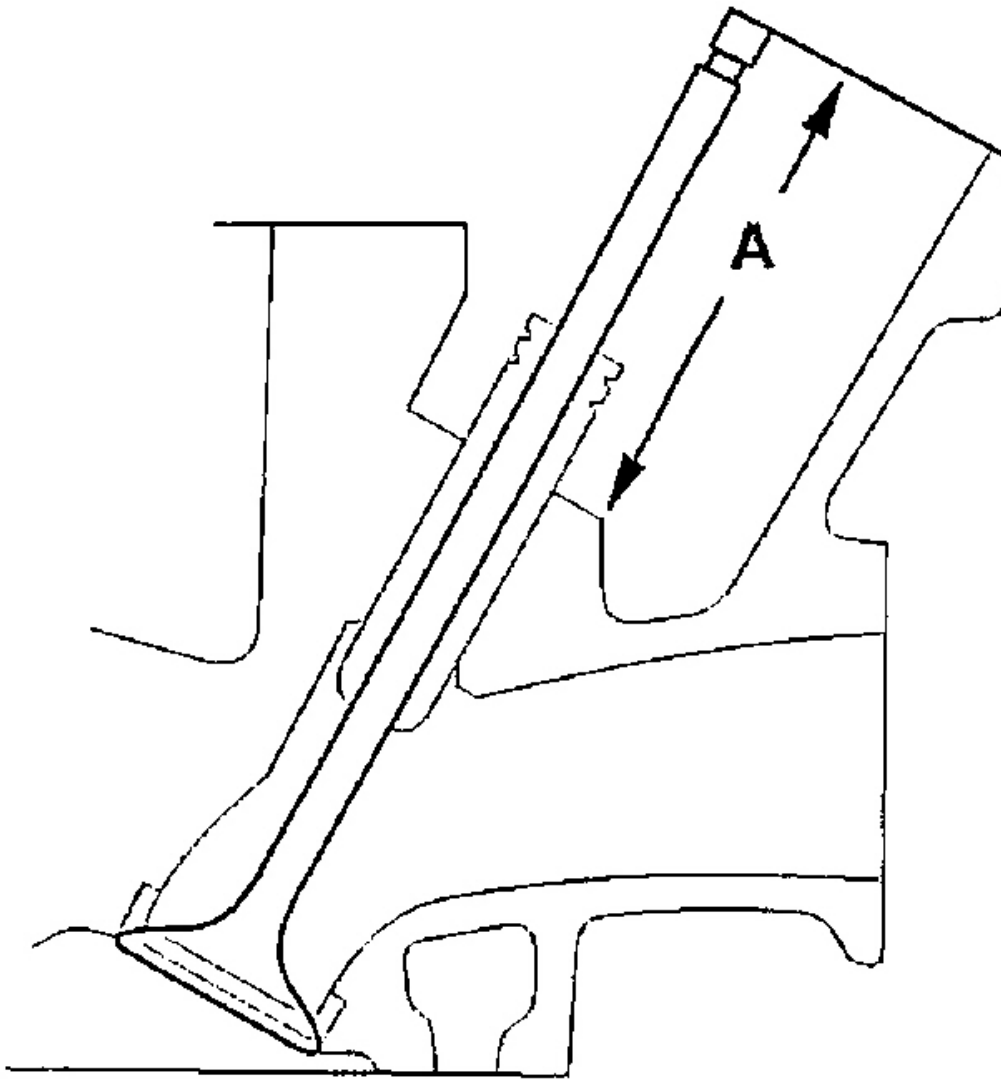
NOTE: **The final cut should always be made with the 45° cutter.**

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

Valve Stem Installed Height:

Standard (New): 53.17-53.64 mm (2.093-2.112 in.)

Service Limit: 53.89 mm (2.122 in.)



G01954502

Fig. 148: Measuring Valve Stem Installed Height

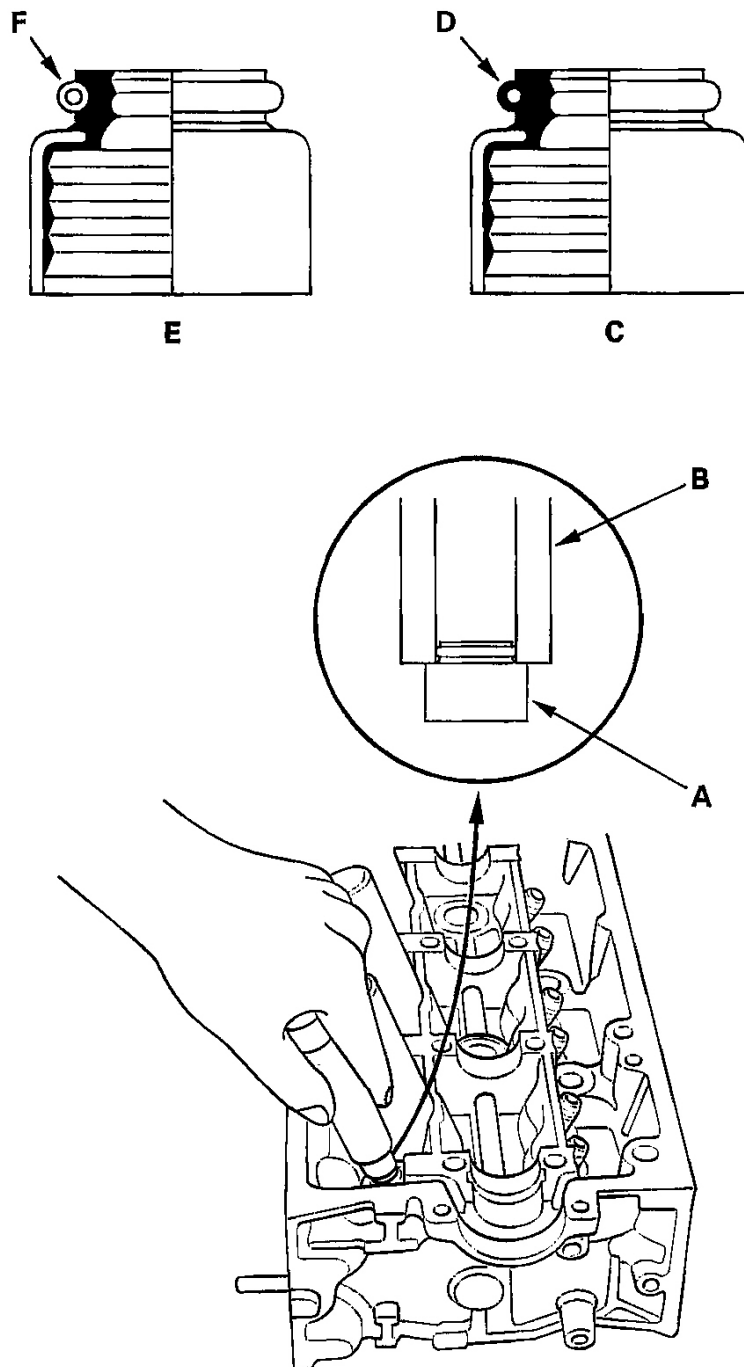
5. If the valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

VALVES, SPRINGS AND VALVE SEALS INSTALLATION

1. Coat the valve stems with 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 valve guide seal installer (B).

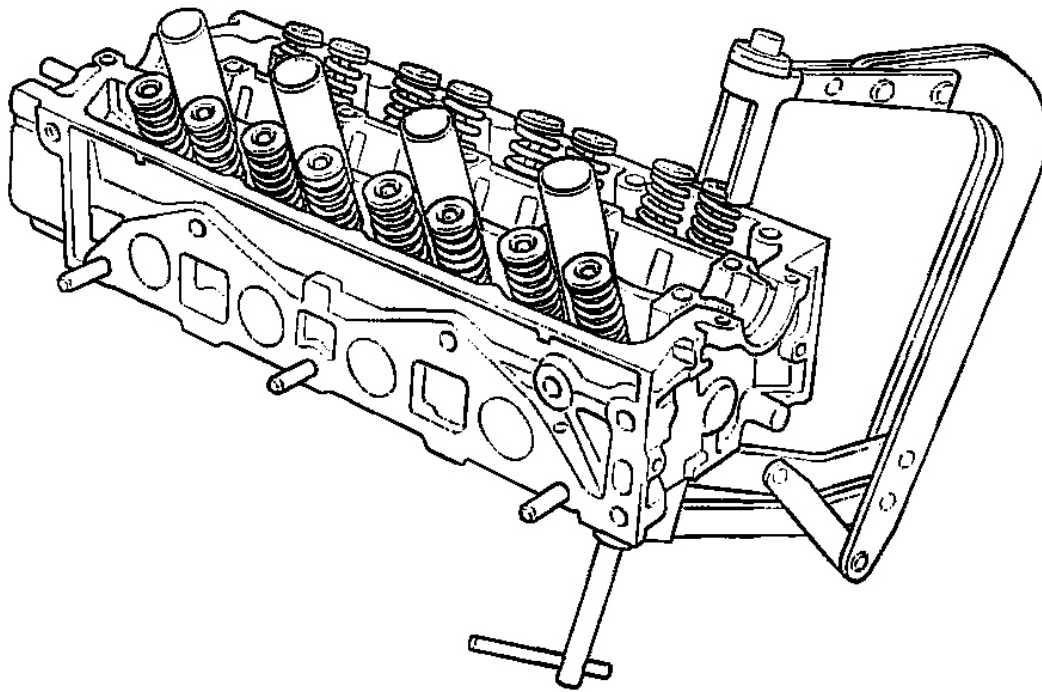
NOTE: Exhaust valve seal (C) has a black spring (D), and intake valve seal (E) has a white spring (F). They are not interchangeable.



G01954503

Fig. 149: Installing New Valve Seals

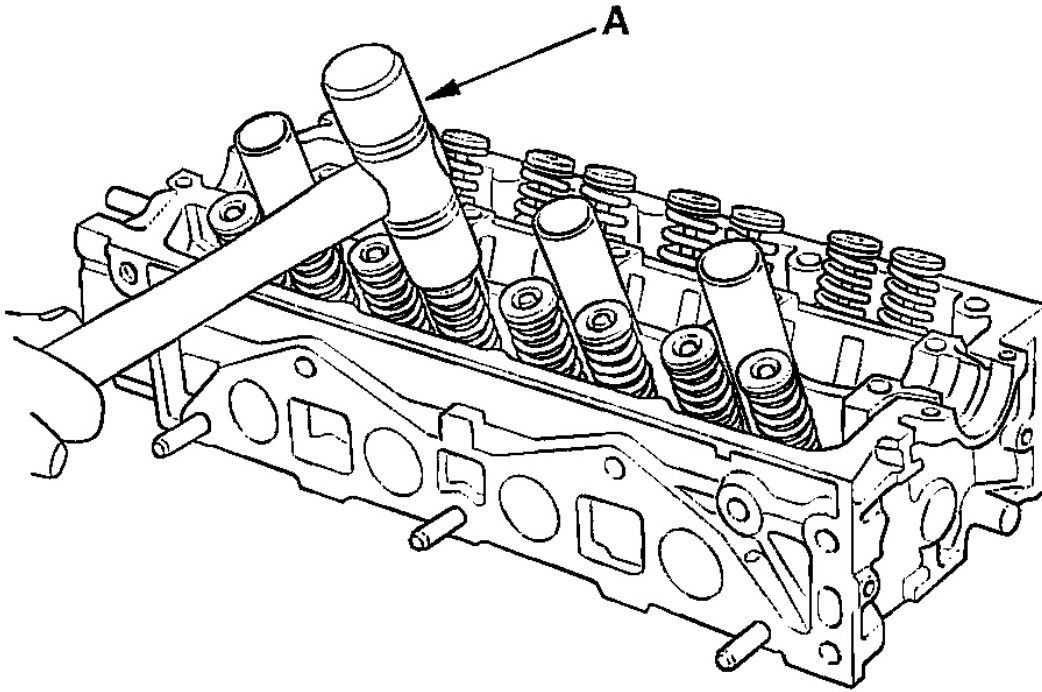
5. Install the valve spring and valve retainer. Place the end of the valve spring with closely wound coils toward the cylinder head.
6. Install the valve spring compressor. Compress the spring and install the valve keepers.



G01954504

Fig. 150: Installing Valve Spring Compressor

7. Lightly tap the end of each valve stem 2 or 3 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.



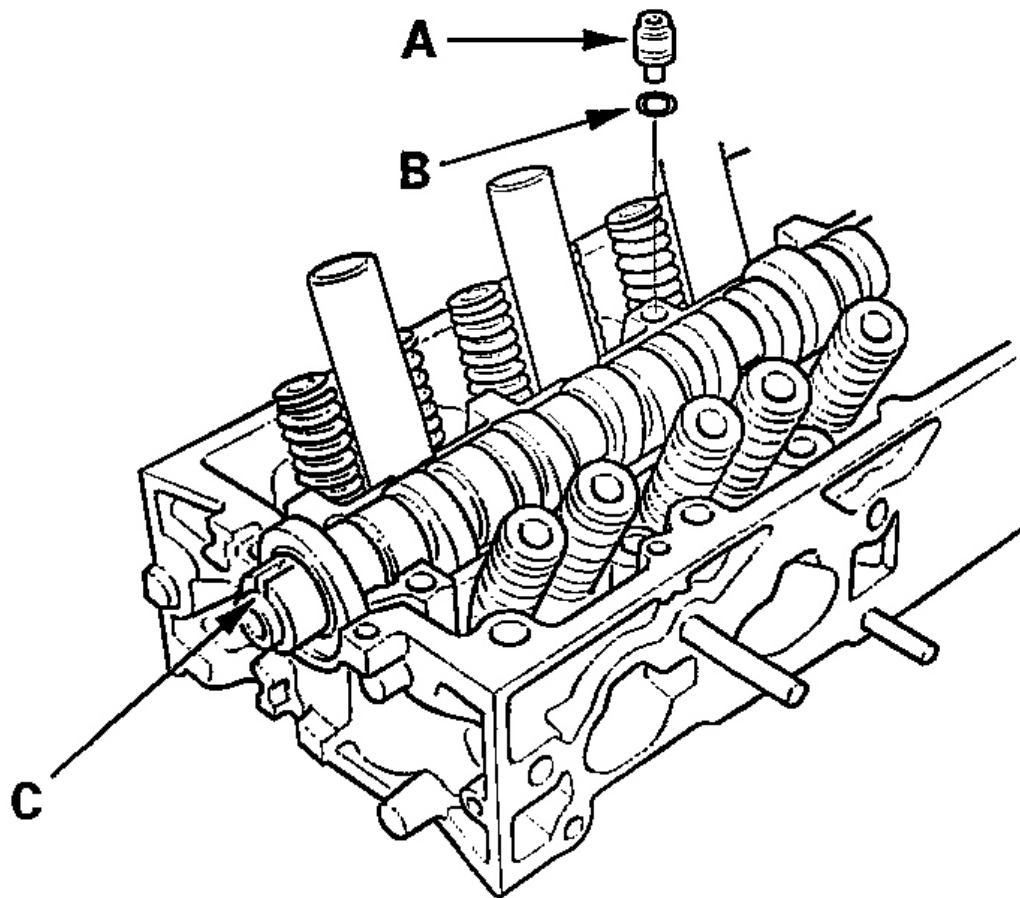
G01954505

Fig. 151: Tapping End Of Each Valve Stem With Plastic Mallet

CAMSHAFT/ROCKER ARMS, CAMSHAFT SEAL, AND PULLEY INSTALLATION

NOTE: To prevent the rocker arm assembly from coming apart, leave the camshaft holder bolts in the holes.

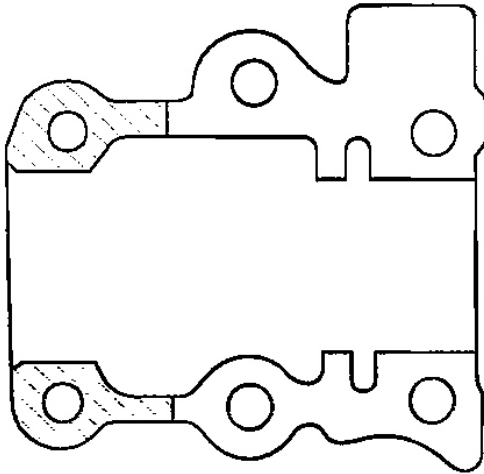
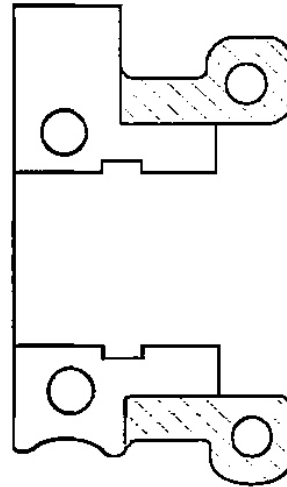
1. After wiping down the camshaft and the journals in the cylinder head, lubricate both surfaces and install the camshaft.
2. Clean and install the oil control orifice (A) with a new O-ring (B).



G01954506

Fig. 152: Installing Oil Control Orifice With New O-Ring

3. Turn the camshaft until its keyway (C) is facing up (No.1 piston TDC).
4. Loosen all the valve adjusting screws.
5. Apply liquid gasket to the head mating surface (shaded areas) of the No. 1 and No. 5 camshaft holders.

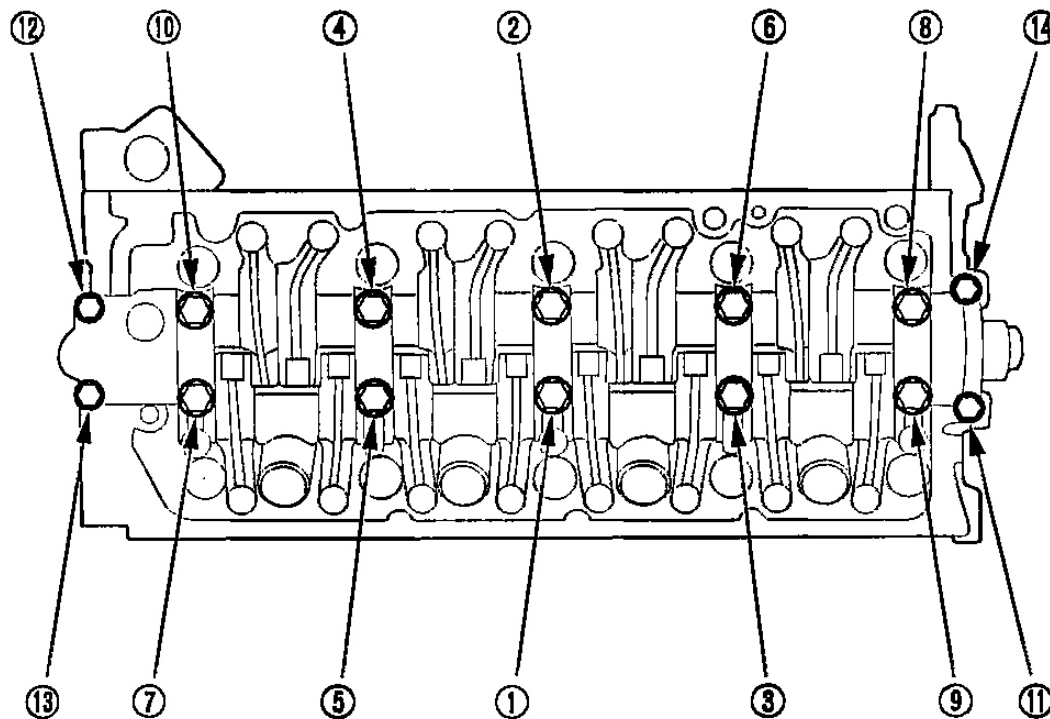
No. 5**No. 1**

G01954507

Fig. 153: Applying Liquid Gasket To Head Mating Surface Of No. 1 & No. 5 Camshaft Holders

6. Set the rocker arm assembly in place and loosely install the bolts. Make sure that the rocker arms are properly positioned on the valve stems.
7. Tighten each bolt 2 turns at a time, in the sequence shown **Fig. 154** to ensure that the rockers do not bind on the valves.

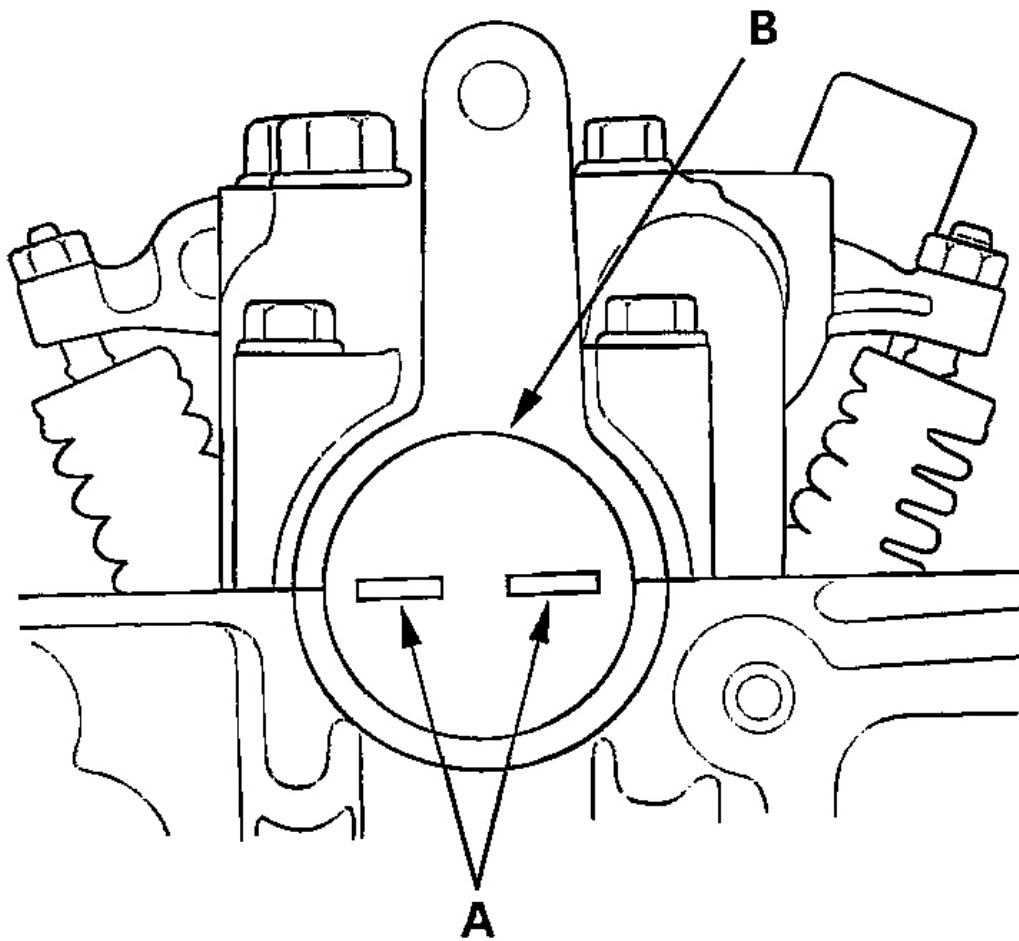
Specified torque:**8 mm bolts:** 20 N.m (2.0 kgf.m, 14 lbf.Ft)**Apply engine oil to the bolt threads.****6 mm bolts:** 12 N.m (1.2 kgf.m, 8.7 lbf.Ft)**Apply engine oil to the bolt threads.****6 mm bolts:** 11,12,13,14



G01954508

Fig. 154: Tightening Bolts In Sequence

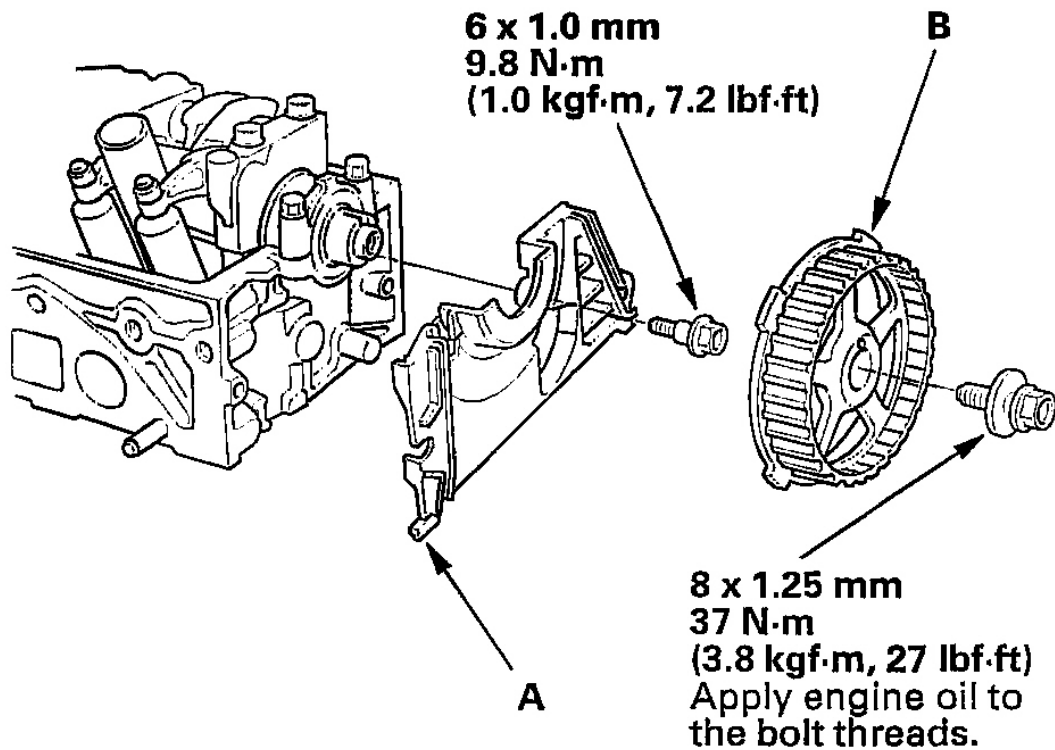
8. Align the marks (A) on the new cylinder head plug (B) with the top edge of the head, then install the cylinder head plug in the cylinder head.



G01954509

Fig. 155: Aligning Marks On Cylinder Head Plug To Top Edge Of Head

9. Install the back cover (A), then install the camshaft pulley (B).

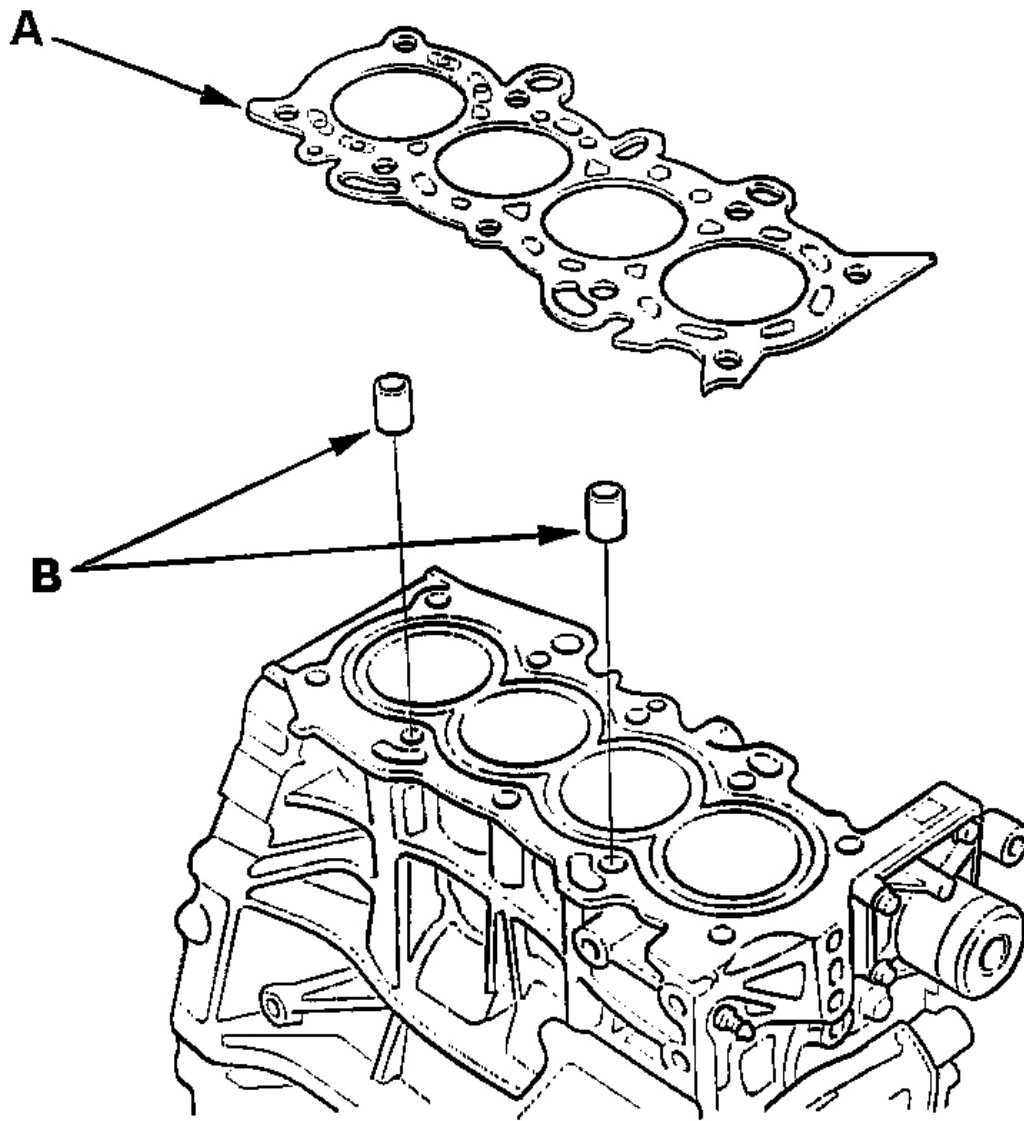


G01954510

Fig. 156: Installing Back Cover & Camshaft Pulley**CYLINDER HEAD INSTALLATION**

Install the cylinder head in the reverse order of removal:

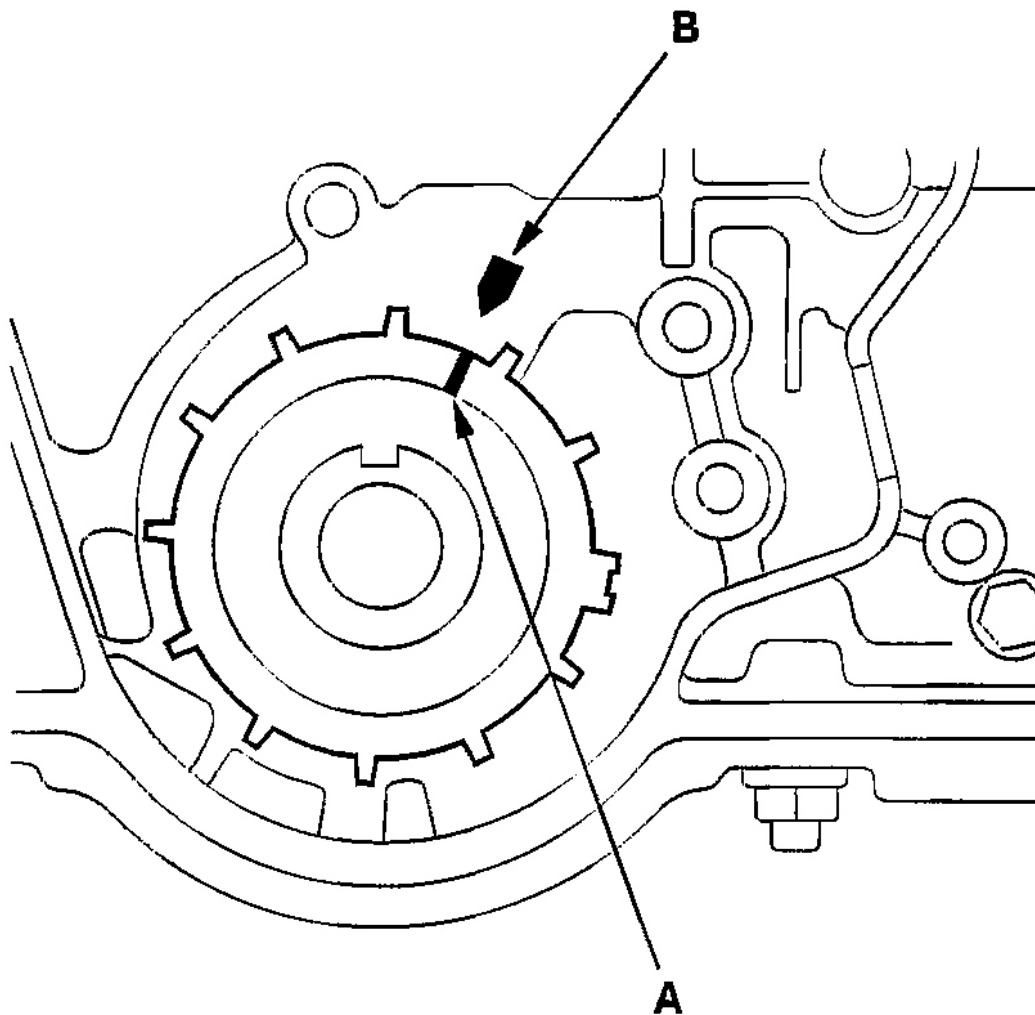
1. Clean the cylinder head and block surface.
2. Install the cylinder head gasket (A) and dowel pins (B) on the cylinder block. Always use a new cylinder head gasket.



G01954511

Fig. 157: Installing Cylinder Head Gasket & Dowel Pins On Cylinder Block

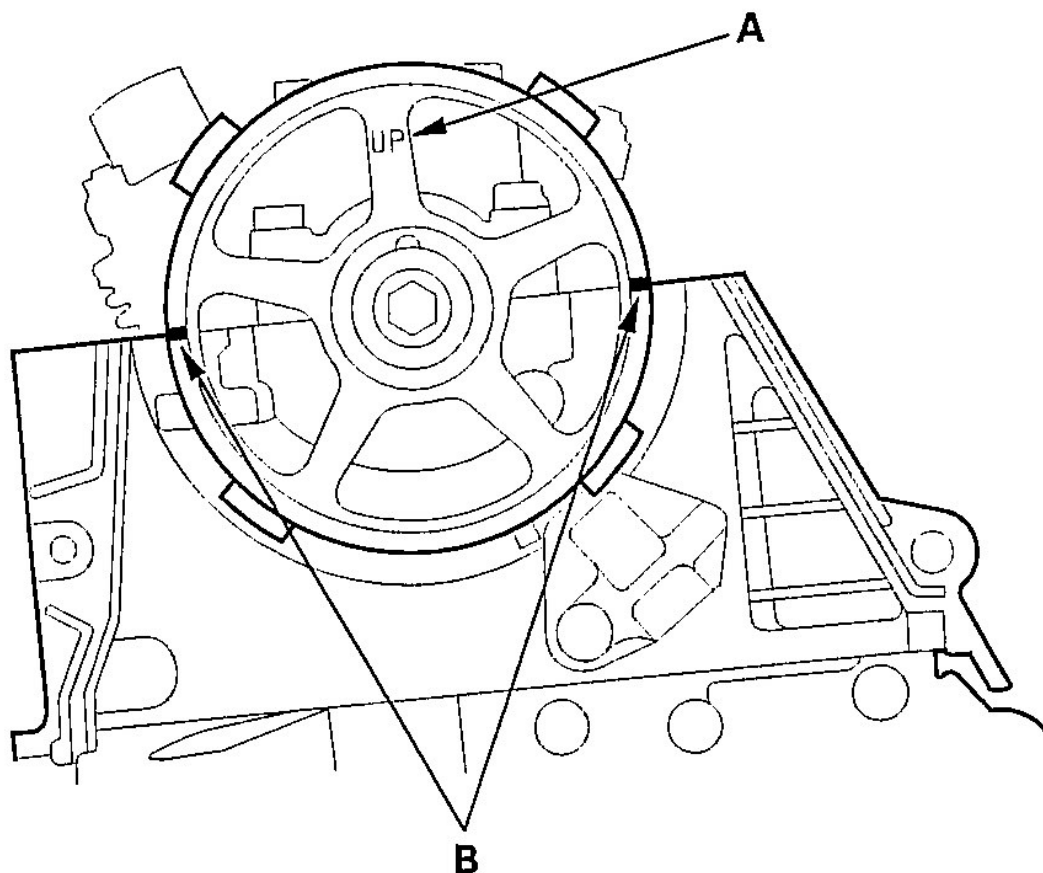
3. Set the crankshaft to TDC. Align the TDC mark (A) on the timing belt drive pulley with the pointer (B) on the oil pump.



G01954512

Fig. 158: Aligning TDC Mark On Timing Belt Drive Pulley With Pointer

4. Clean the camshaft pulley and set it to TDC.
 1. The "UP" mark (A) on the camshaft pulley should be at the top.
 2. Align the TDC marks (B) on the camshaft pulley with the top edge of the head.



G01954513

Fig. 159: Setting "UP" Mark On Camshaft Pulley At Top

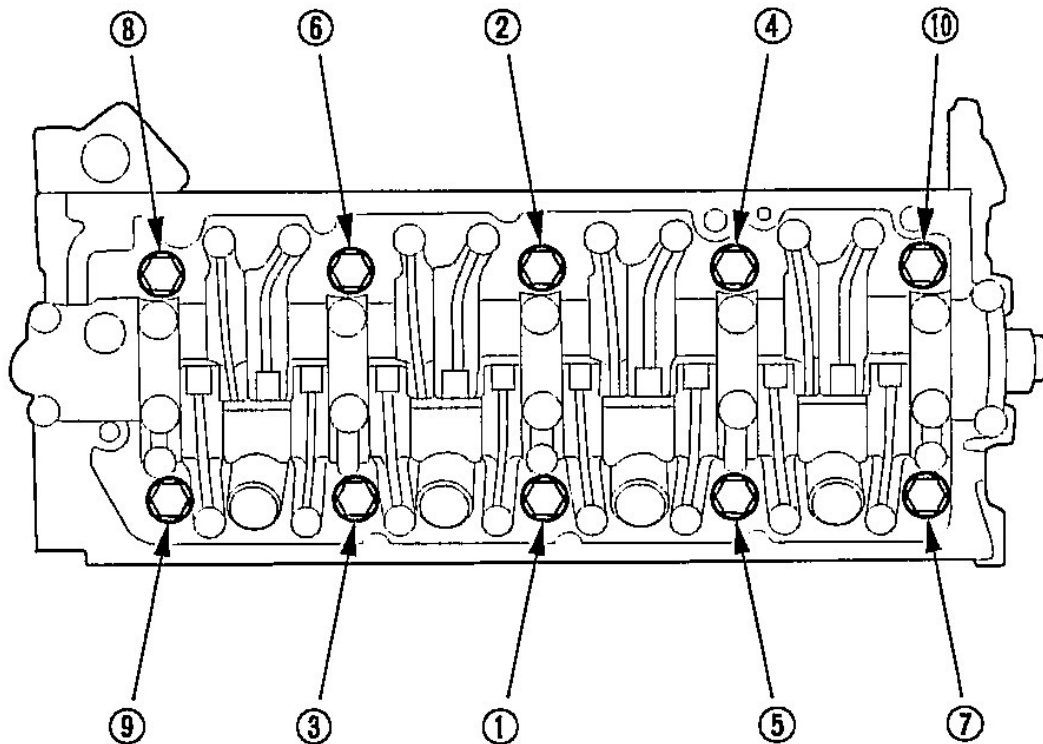
5. Install the cylinder head on the block.
6. Apply engine oil to the bolt threads and under the bolt heads of all the cylinder head bolts.
7. Tighten the cylinder head bolts sequentially in 3 steps.

1st step torque: 20 N.m (2.0 kgf.m, 14 lbf.Ft)

2nd step torque: 49 N.m (5.0 kgf.m, 36 lbf.Ft)

3rd step torque: 67 N.m (6.8 kgf.m, 49 lbf.Ft)

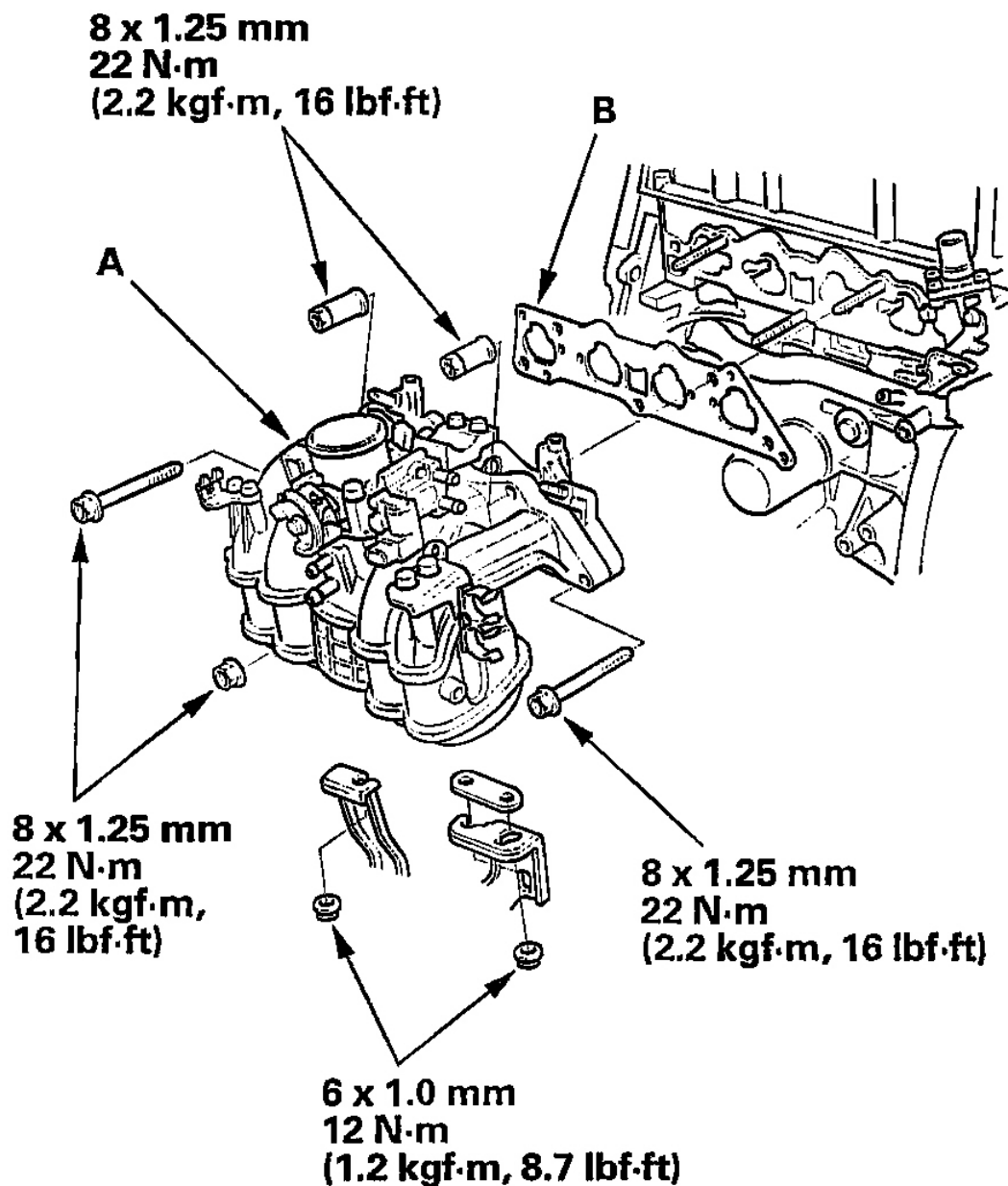
Use a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the 1st step.



G01954514

Fig. 160: Cylinder Head Bolts Tightening Sequence

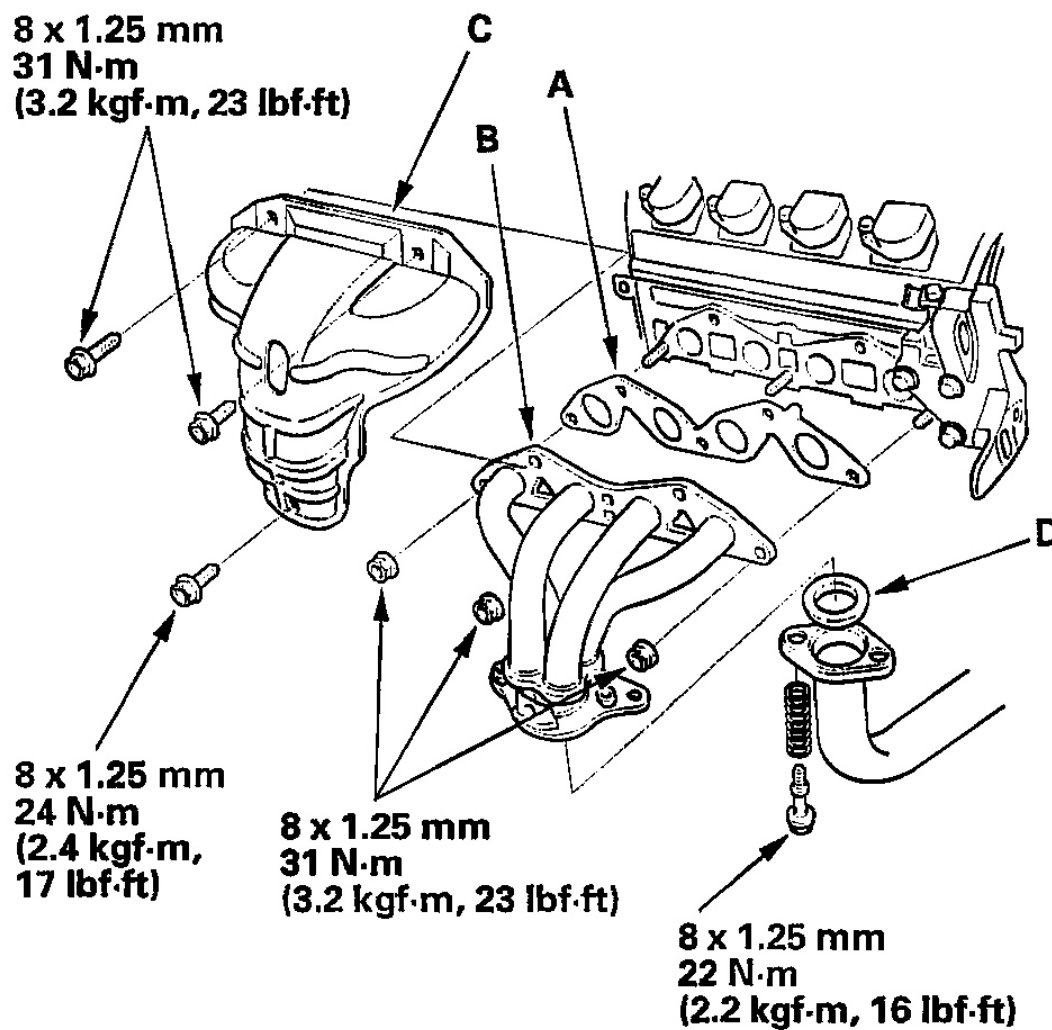
8. Install the timing belt (see **Timing Belt Installation**).
9. Adjust the valve clearance (see **Valve Clearance Adjustment**).
10. Install the cylinder head cover (see **Cylinder Head Cover Installation**).
11. Install the intake manifold (A) and tighten the bolts/nuts in a crisscross pattern in 2 or 3 steps, beginning with the inner nut. Always use a new intake manifold gasket (B).



G01954515

Fig. 161: Tightening Intake Manifold Bolts/Nuts In Crisscross Pattern

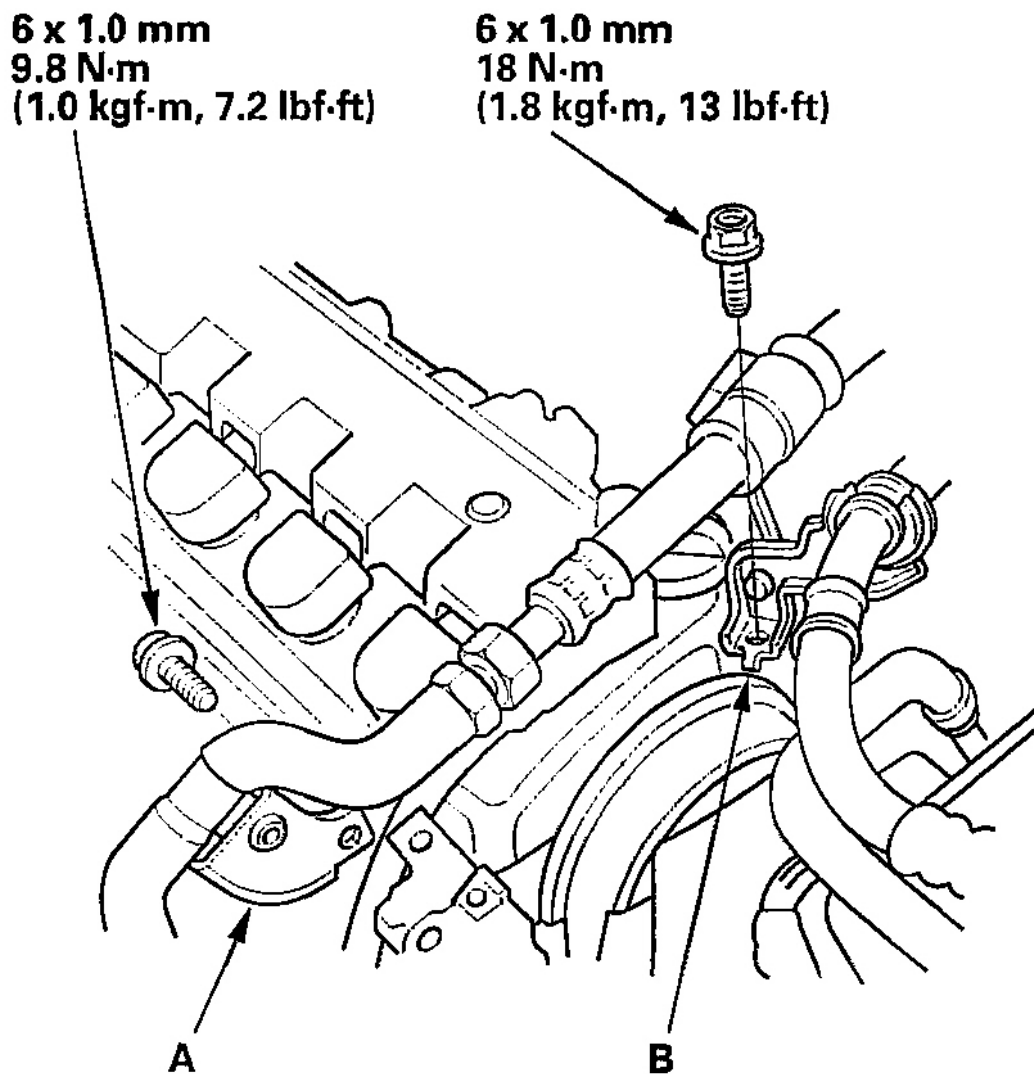
12. Tighten the three nuts securing the intake manifold and brackets.
13. Install the new exhaust manifold gasket (A) and exhaust manifold (B). Loosely install the new nuts, then install the cover (C) and loosely install the new bolts.



G01954516

Fig. 162: Installing Exhaust Manifold Gasket & Exhaust Manifold

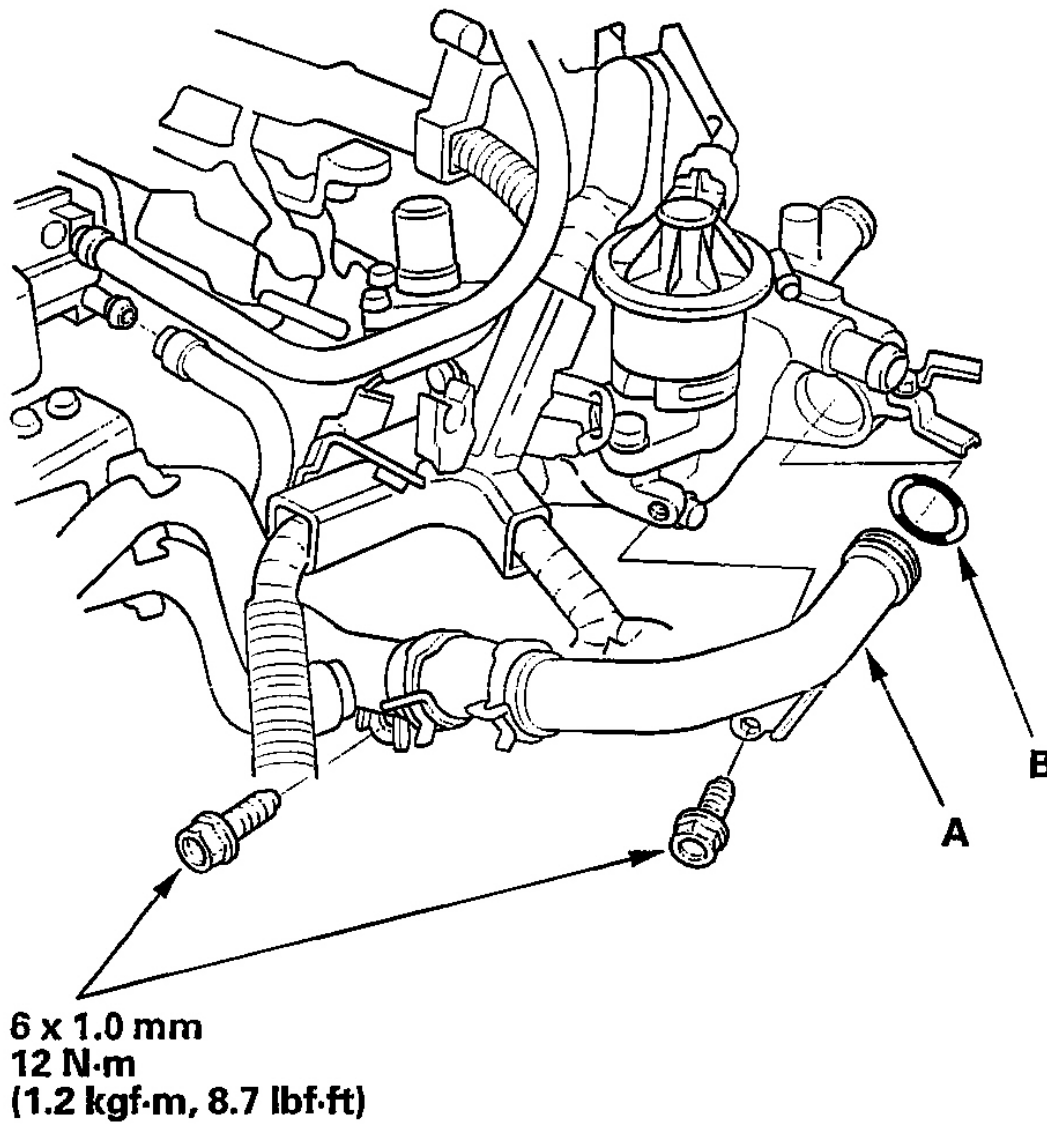
14. Tighten the bolts/nuts in a crisscross pattern in 2 or 3 steps.
15. Install the exhaust pipe with a new gasket (D).
16. Install the A/C hose bracket (A) and P/S hose bracket (B).



G01954517

Fig. 163: Installing A/C Hose Bracket & P/S Hose Bracket

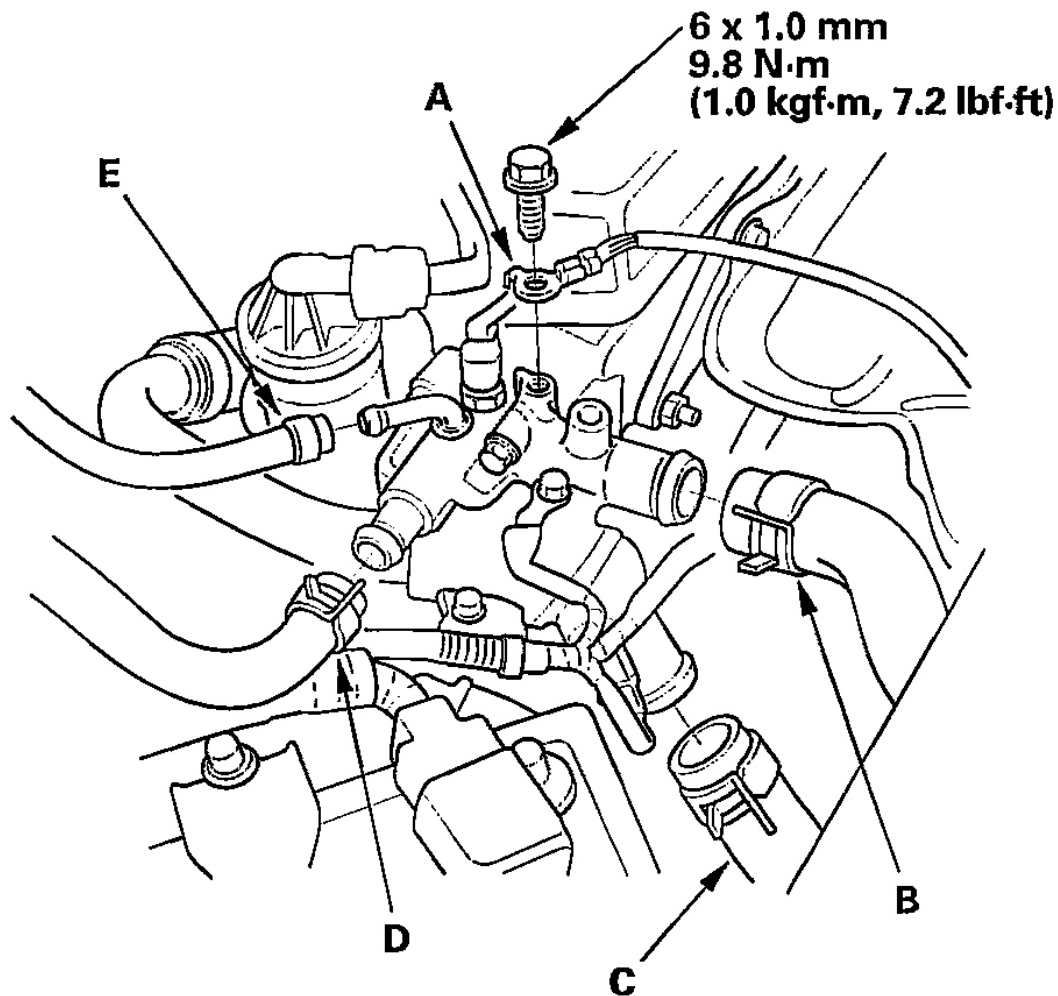
17. Loosely install the alternator.
18. Adjust the alternator belt tension (see **ALTERNATOR BELT INSPECTION AND ADJUSTMENT**) or the alternator-compressor belt tension (see **ALTERNATOR-A/C COMPRESSOR BELT INSPECTION AND ADJUSTMENT**).
19. Loosely install the P/S pump belt and pump.
20. Adjust the P/S pump belt (see **PUMP BELT INSPECTION AND ADJUSTMENT**).
21. Install the connecting pipe (A) with a new O-ring (B).



G01954518

Fig. 164: Installing Connecting Pipe With O-Ring

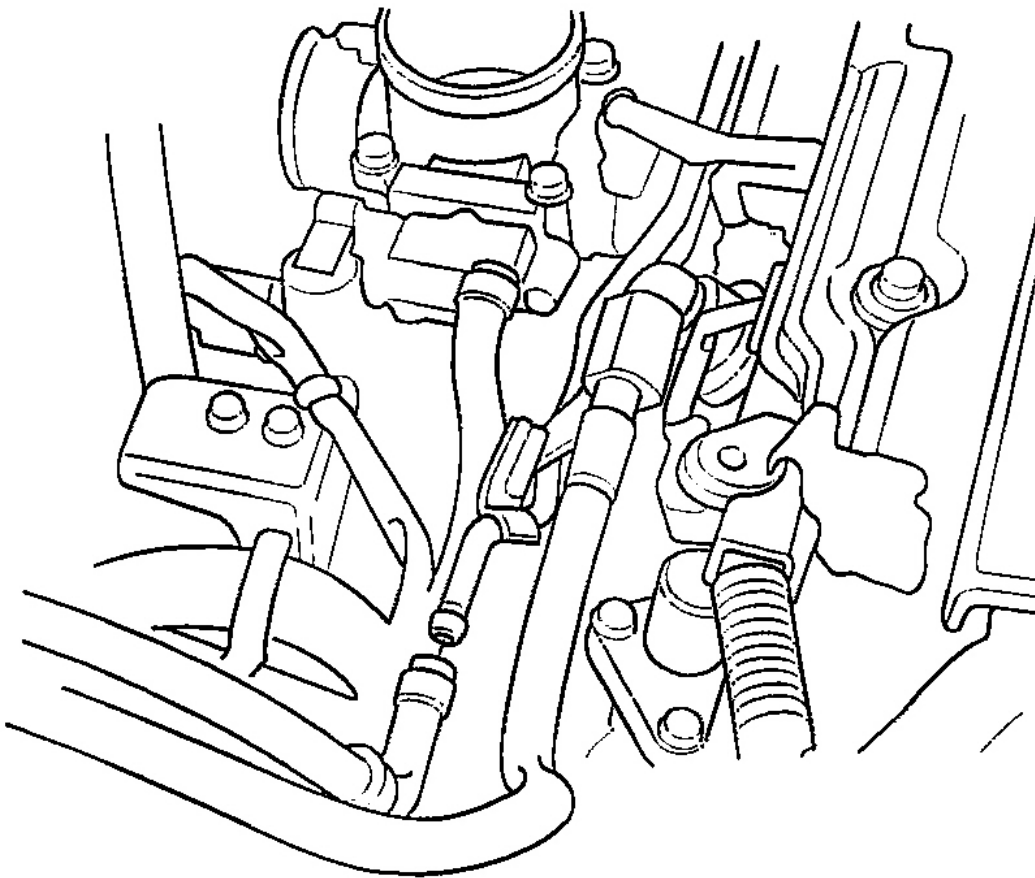
22. Install the ground cable (A), upper radiator hose (B), lower radiator hose (C), heater hose (D) and water bypass hose (E).



G01954519

Fig. 165: Installing Ground Cable

23. Install the EVAP canister hose.



G01954520

Fig. 166: Installing EVAP Canister Hose

24. Install the brake booster vacuum hose (A) and PCV hose (B).

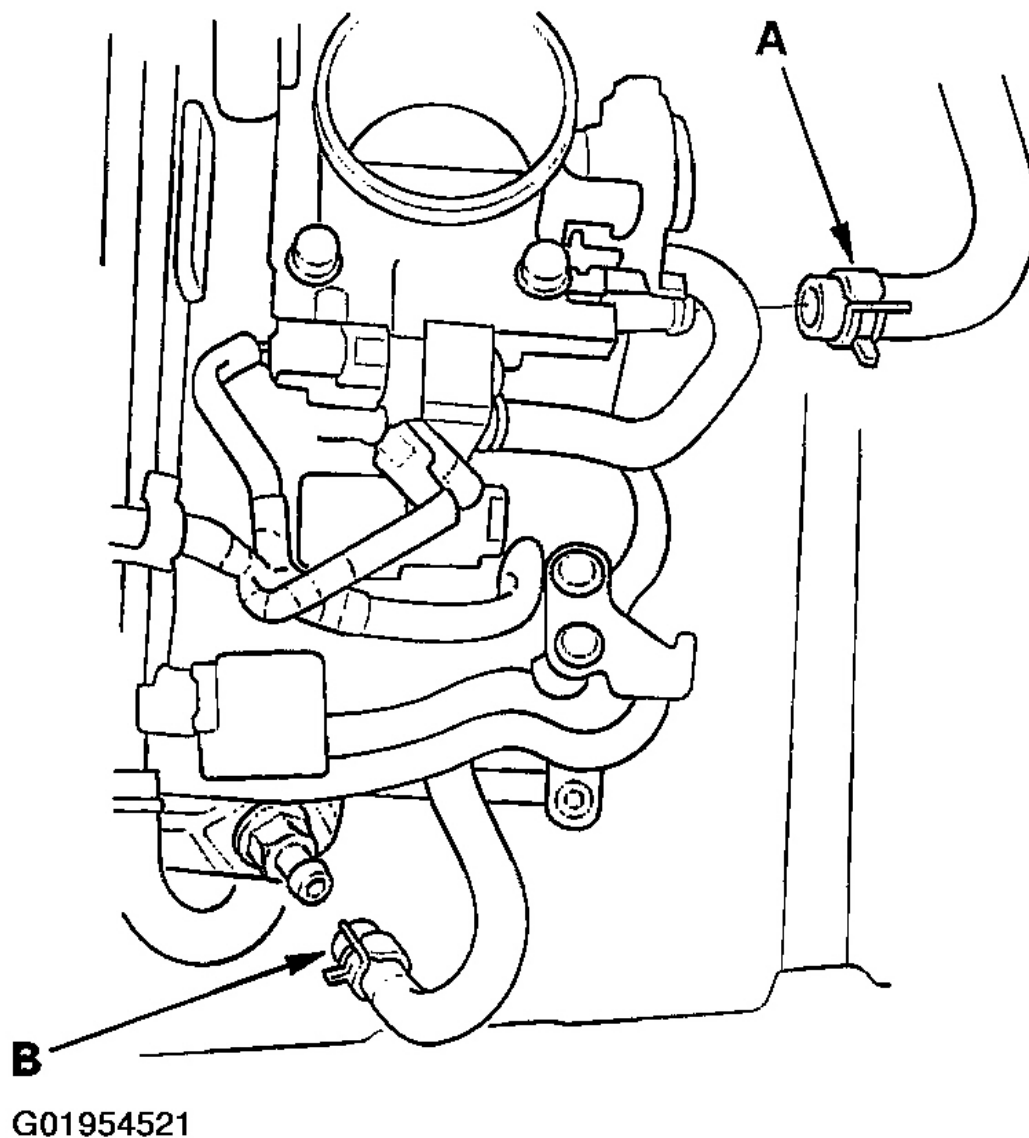
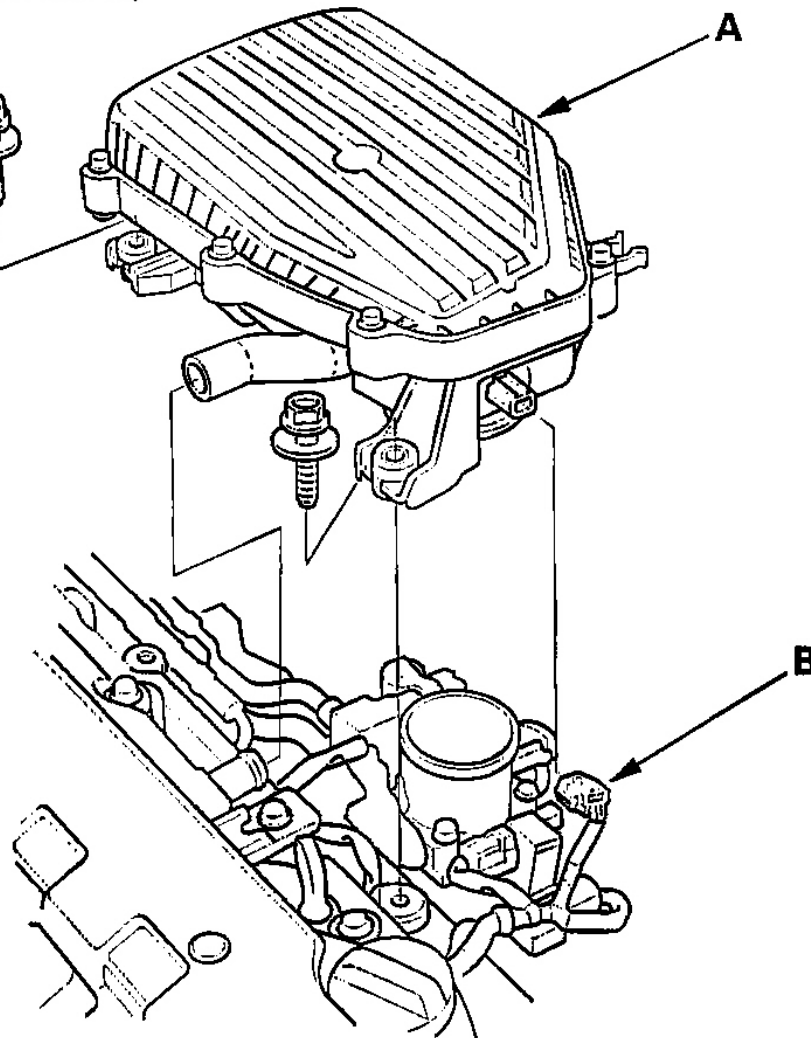


Fig. 167: Installing Brake Booster Vacuum Hose & PCV Hose

25. Install the air cleaner housing (A), then connect the IAT sensor connector (B) and breather hose.

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

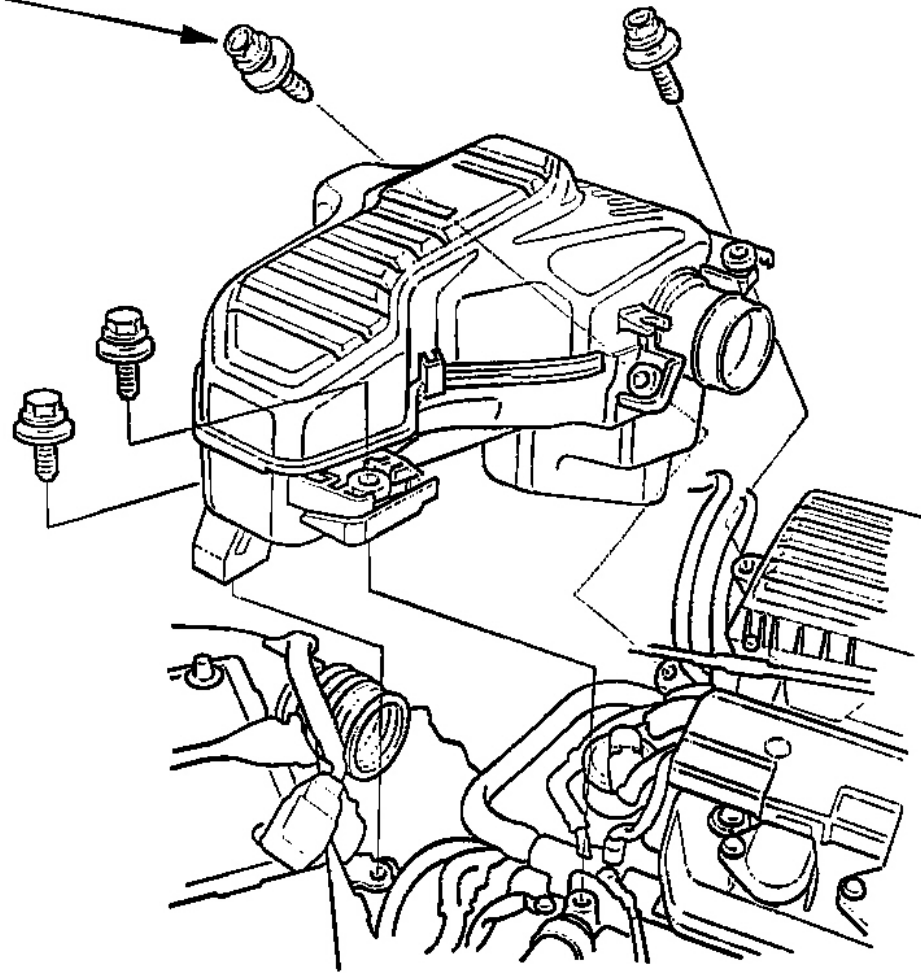


G01954522

Fig. 168: Installing Air Cleaner Housing

26. Install the intake resonator.

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



G01954523

Fig. 169: Installing Intake Resonator

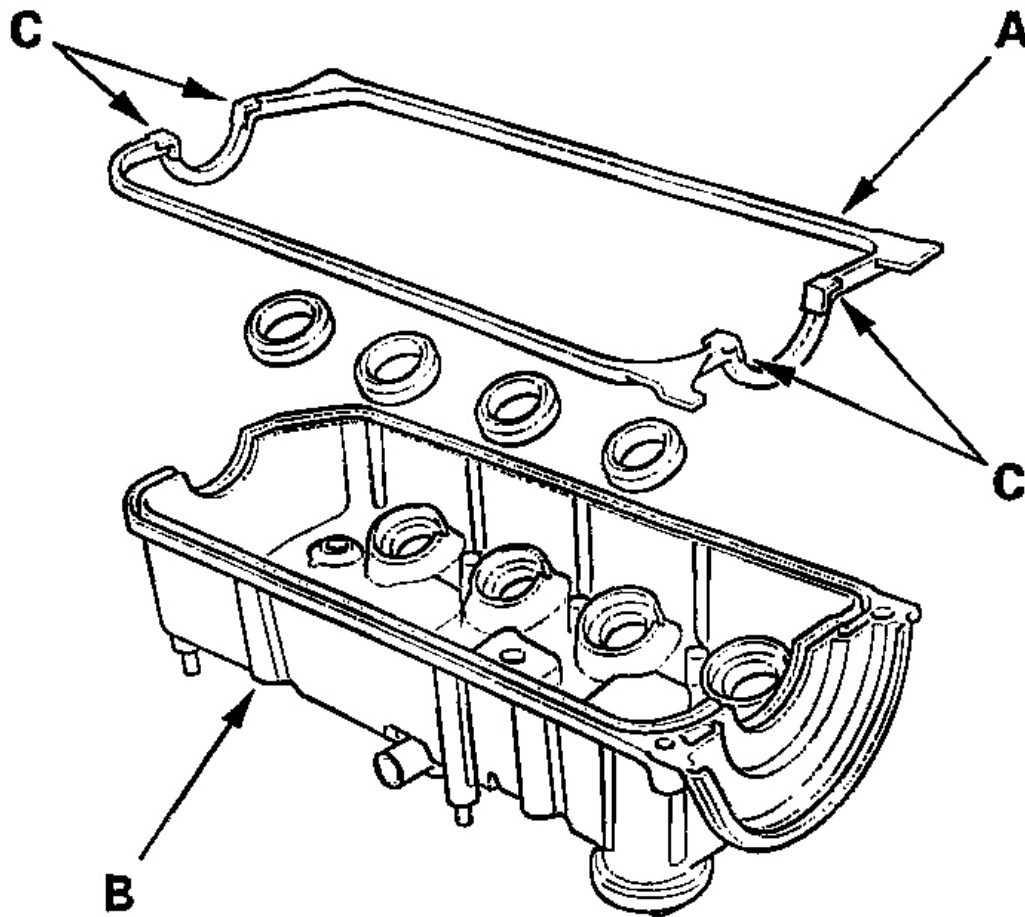
27. Install the cruise control cable, then adjust the cable (see **ACTUATOR CABLE ADJUSTMENT**).
28. Install the throttle cable, then adjust the cable (see **THROTTLE CABLE ADJUSTMENT**).
29. After installation, check that all tubes, hoses and connectors are installed correctly.
30. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.
31. Inspect for fuel leaks. Turn ON (II) the ignition switch (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation 2 or 3 times, then check for

fuel leakage at any point in the fuel line.

32. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see **COOLANT REPLACEMENT**).
33. Enter the anti-theft code for the radio, then enter the customer's radio station presets.

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). Seat the head cover gasket in the recesses for the camshaft first, then work it into the groove around the outside edges. Make sure the head cover gasket is seated securely in the corners of the recesses (C) with no gap.

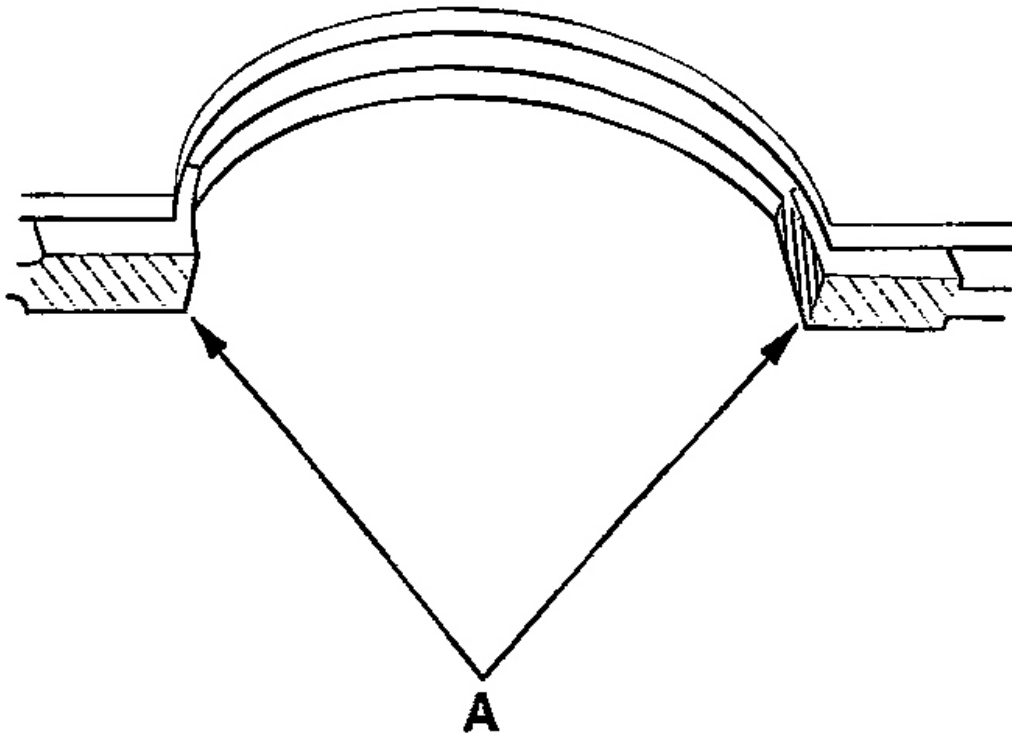


G01954524

Fig. 170: Installing Head Cover Gasket In Groove Of Cylinder Head Cover

3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, part No. 08718-0001 or 08718-0003, to the head cover gasket at the four corners of the recesses (A).

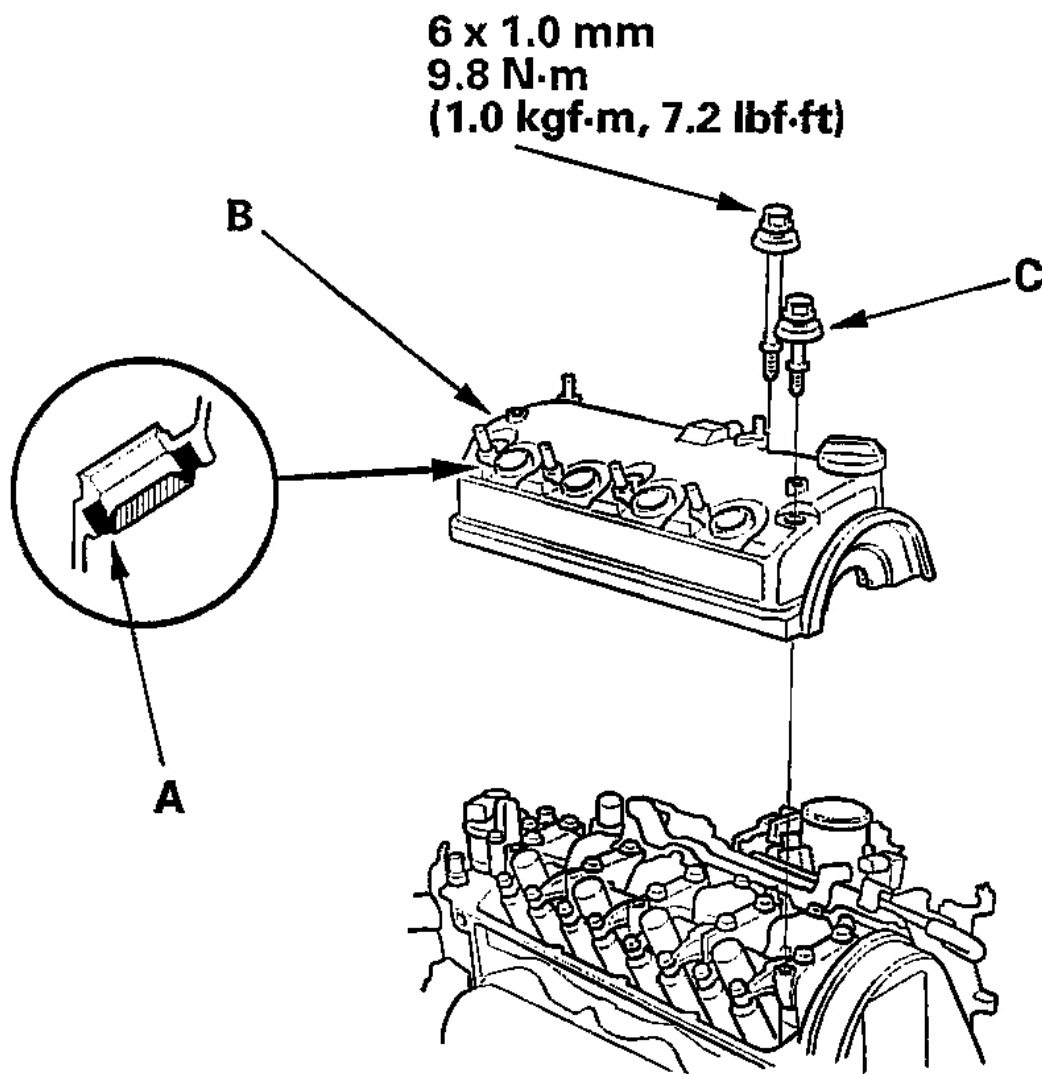
NOTE: Do not install the parts if 5 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing old residue.



G01954525

Fig. 171: Applying Liquid Gasket To Head Cover Gasket

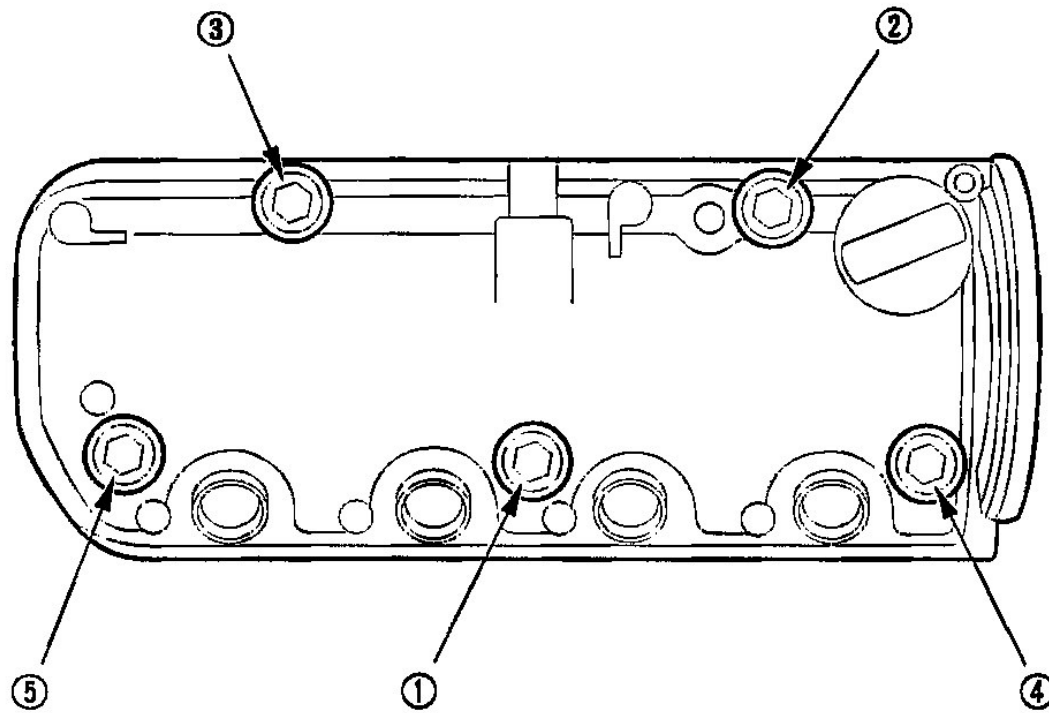
5. Hold the head cover gasket in the groove by placing your fingers on the camshaft holder contacting surfaces (top of the semicircles). Set the spark plug seal (A) on the spark plug tubes. Once the cylinder head cover (B) is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.



G01954526

Fig. 172: Setting Spark Plug Seal On Spark Plug Tubes

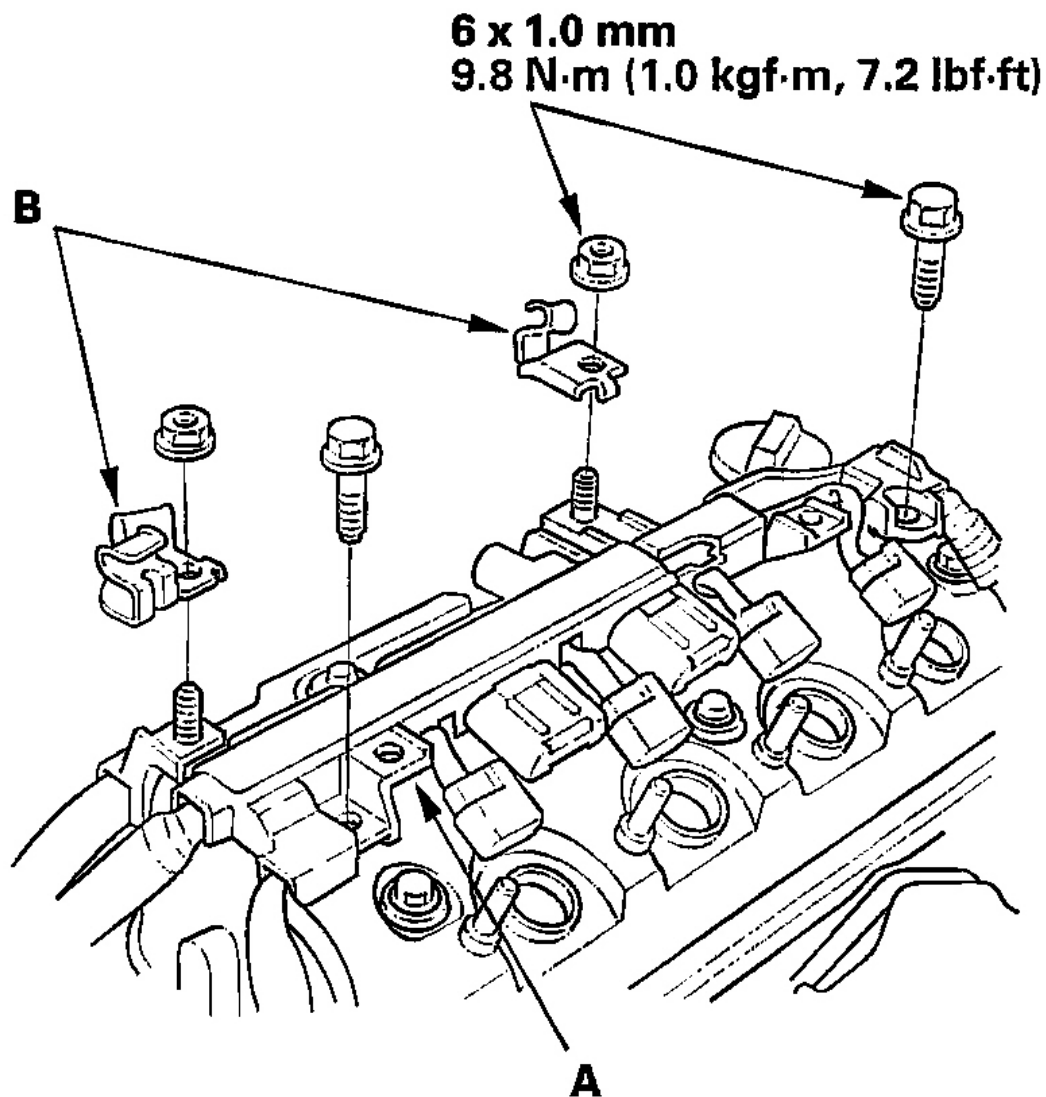
6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in 2 or 3 steps. In the final step, tighten all bolts, in sequence, to 9.8 N.m (1.0 kgf.m, 7.2 lbf.Ft).



G01954527

Fig. 173: Tightening Bolts In 2 Or 3 Steps

8. Install the harness holder (A) and throttle cable clamps (B).



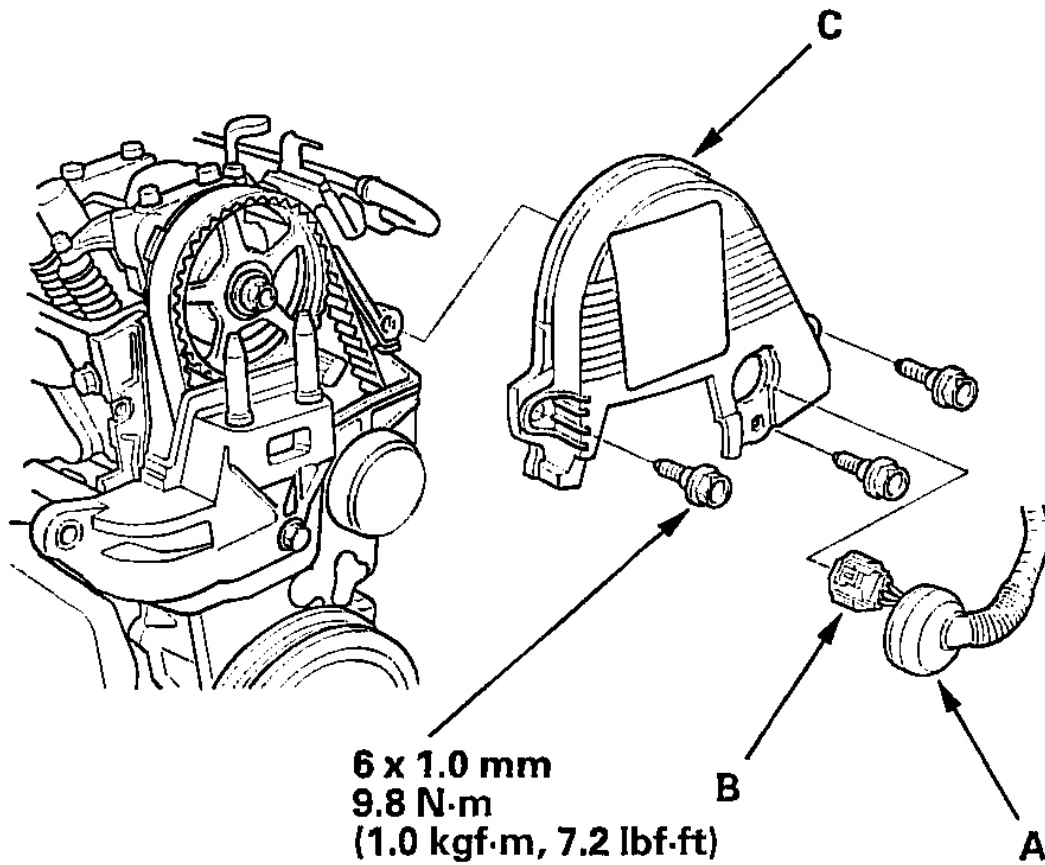
G01954528

Fig. 174: Installing Harness Holder & Throttle Cable Clamps

9. Install the ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
10. Check that all tubes, hoses and connectors are installed correctly.
11. After assembly, wait at least 30 minutes before filling the engine with oil.

TDC SENSOR REPLACEMENT

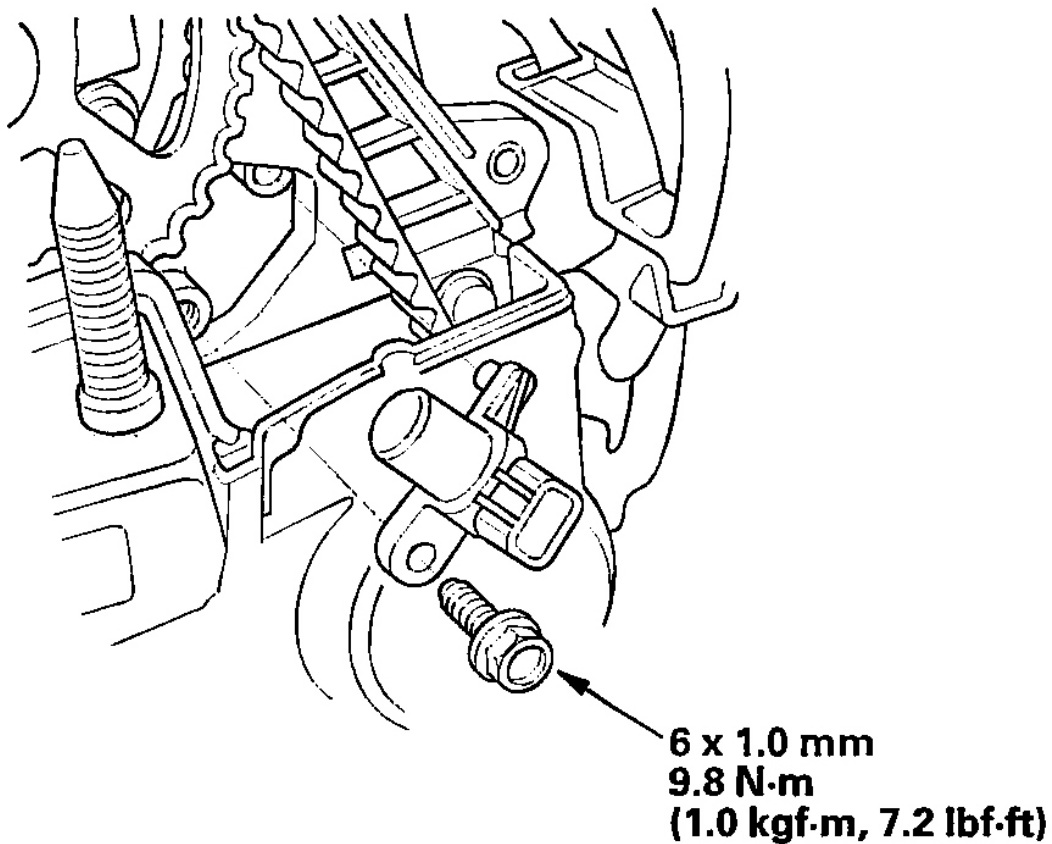
1. Remove the grommet (A) from the upper cover, and disconnect the TDC sensor connector (B).



G01954529

Fig. 175: Removing Grommet From Upper Cover

2. Remove the upper cover (C).
3. Remove the TDC sensor from the cylinder head.



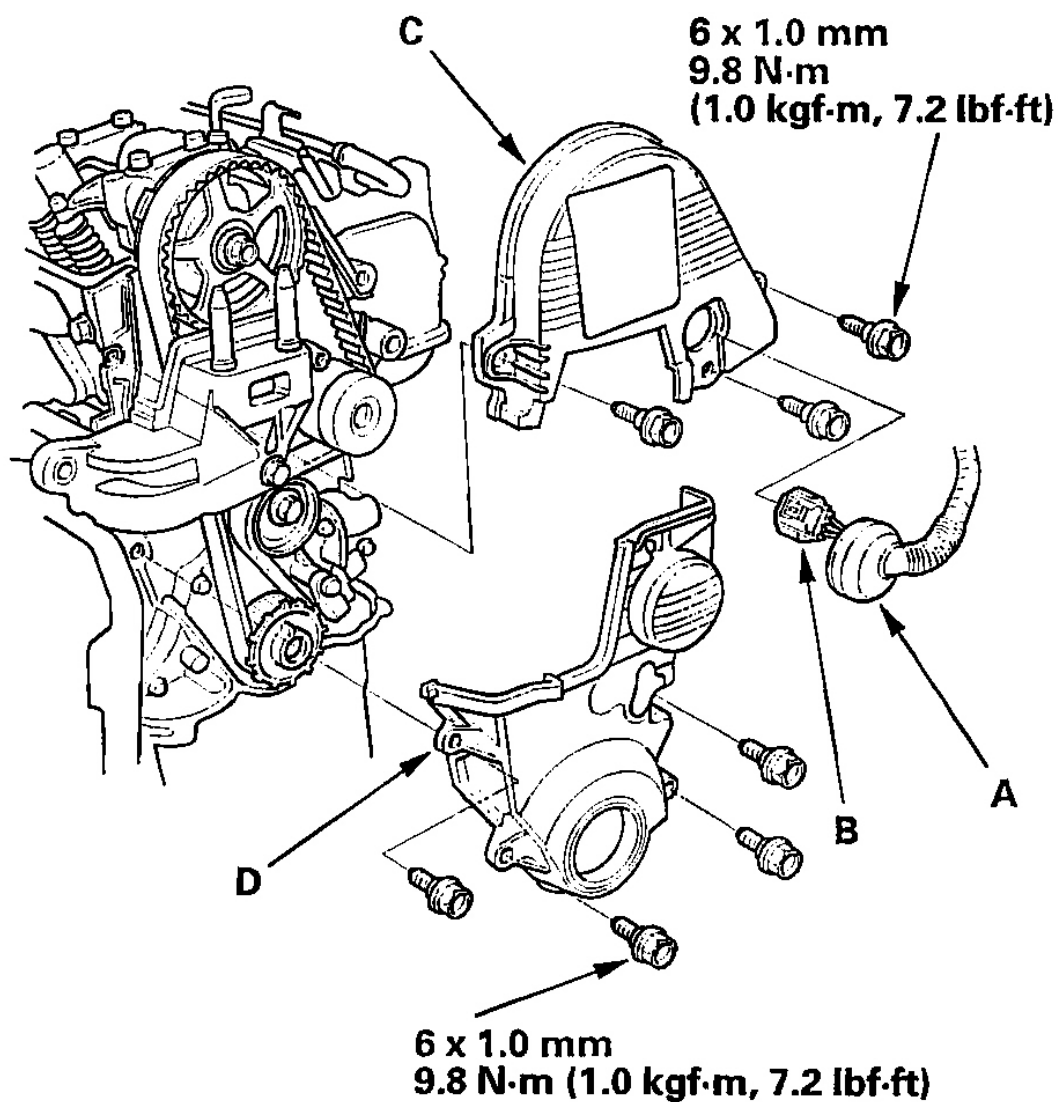
G01954530

Fig. 176: Removing TDC Sensor From Cylinder Head

4. Install the TDC sensor in reverse order of removal.

CKP SENSOR REPLACEMENT

1. Remove the grommet (A) from the upper cover, and disconnect the TDC sensor connector (B).



G01954531

Fig. 177: Removing Grommet From Upper Cover

2. Remove the upper cover (C) and lower cover (D).
3. Disconnect the CKP sensor connector, then remove the CKP sensor from the oil pump.

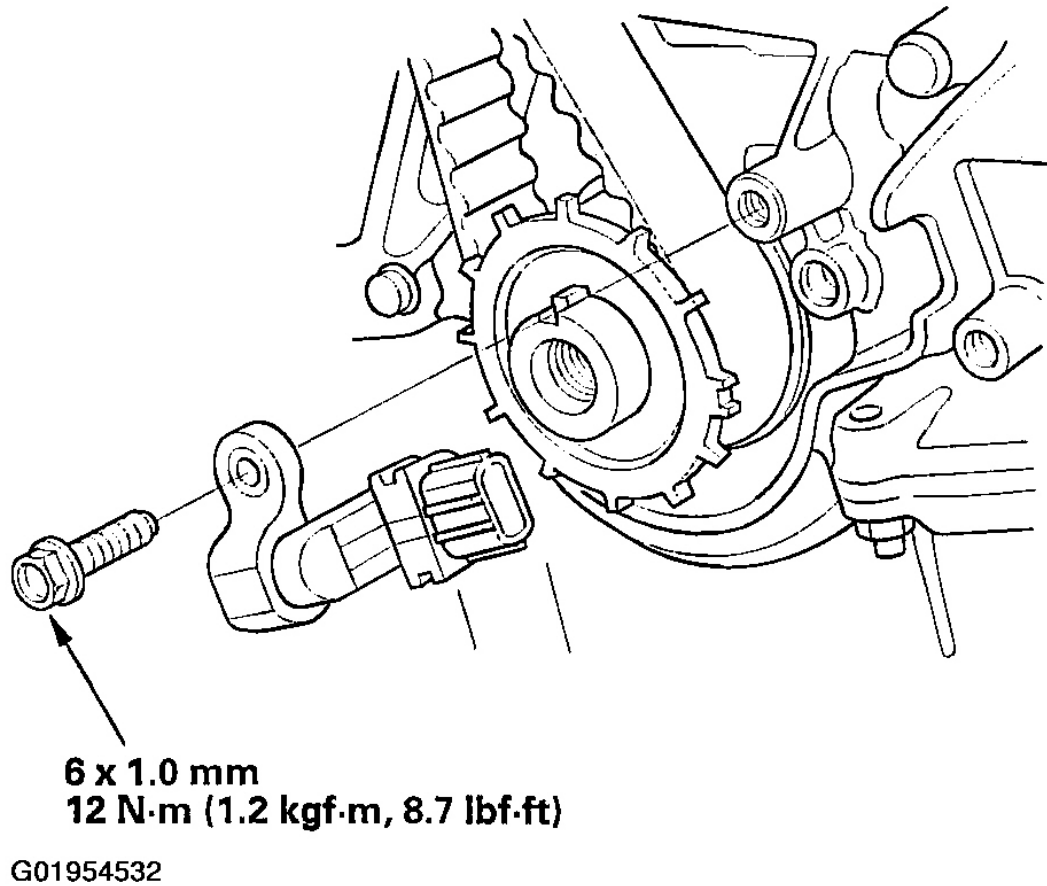


Fig. 178: Removing CKP Sensor From Oil Pump

4. Install the CKP sensor in reverse order of removal.

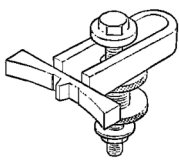
ENGINE BLOCK

SPECIAL TOOLS

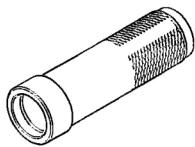
2005 Acura 1.7EL

2001 ENGINE Overhaul - 1.7L 4-CYLINDER

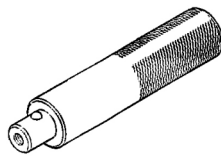
Ref.No.	Tool Number	Description	Qty
①	07LBA-PV00100	Ring Gear Holder	1
②	07746-0030100	Inner Driver Handle	1
③	07749-0010000	Driver	1
④	07948-SB00101	Driver Attachment, 96 mm	1
⑤	07973-PE00200	Pilot Collar	1
⑥	07973-PE00310	Piston Pin Driver Shaft	1
⑦	07973-PE00320	Piston Pin Driver Head	1
⑧	07973-PE00400	Piston Pin Base Insert	1
⑨	07973-SB00100	Piston Base Head	1
⑩	07973-6570500	Piston Base	1
⑪	07973-6570600	Piston Base Spring	1



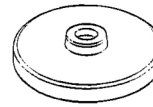
①



②



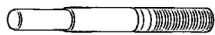
③



④



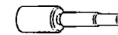
⑤



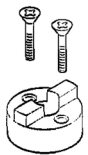
⑥



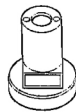
⑦



⑧



⑨



⑩

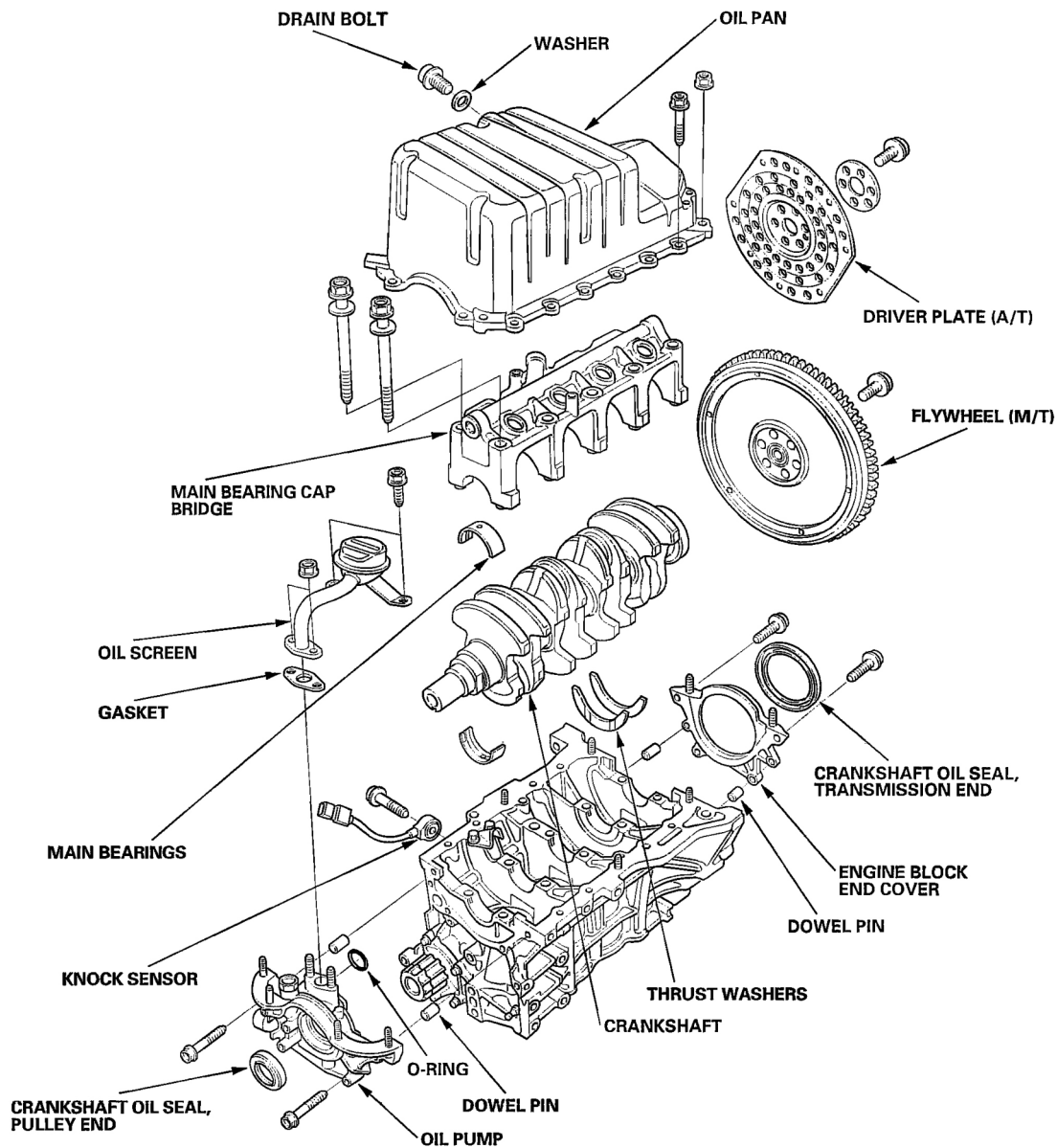


⑪

G01954533

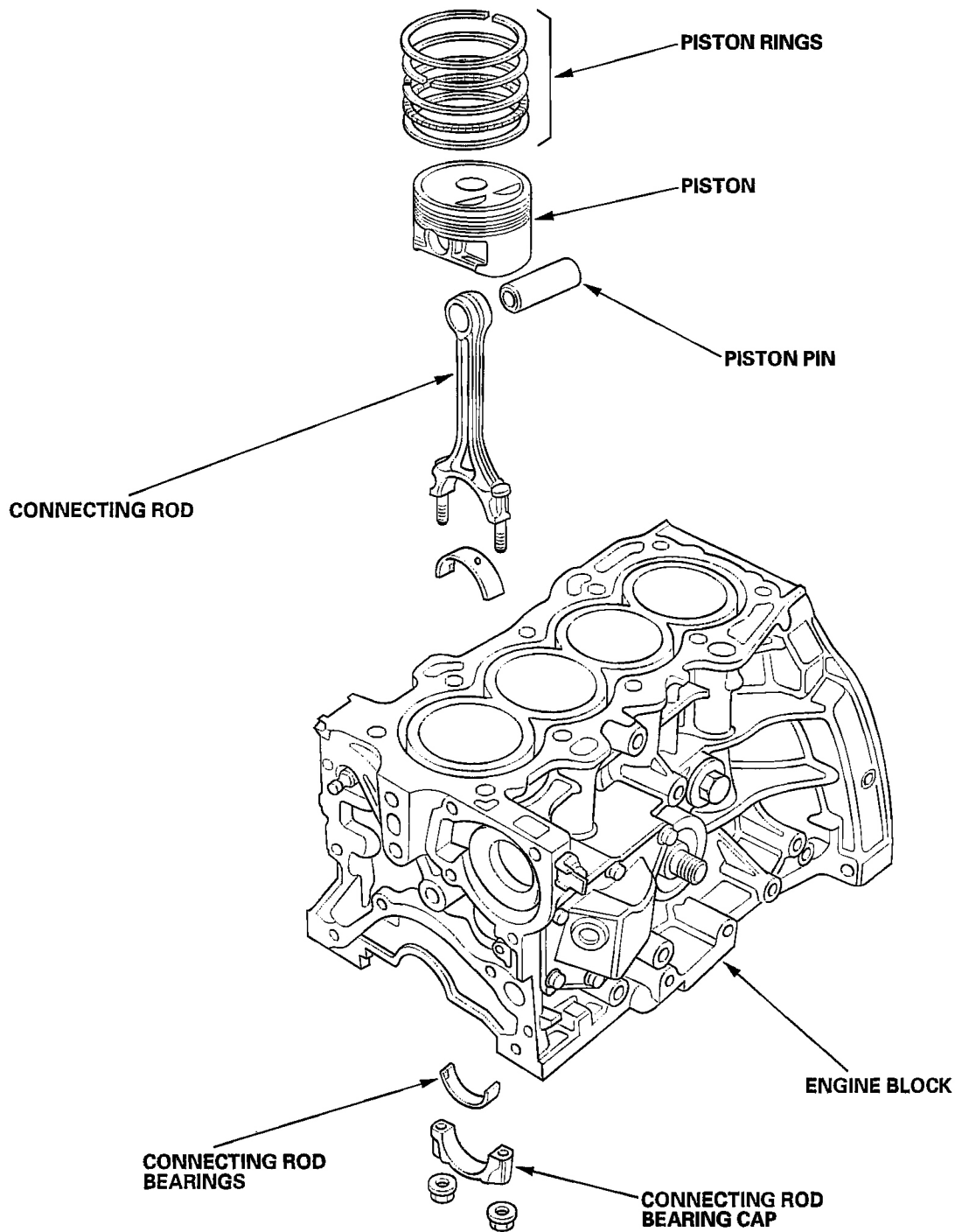
Fig. 179: Identifying Special Tools

COMPONENT LOCATION INDEX



G01954534

Fig. 180: Locating Engine Block Components (1 Of 2)



G01954535

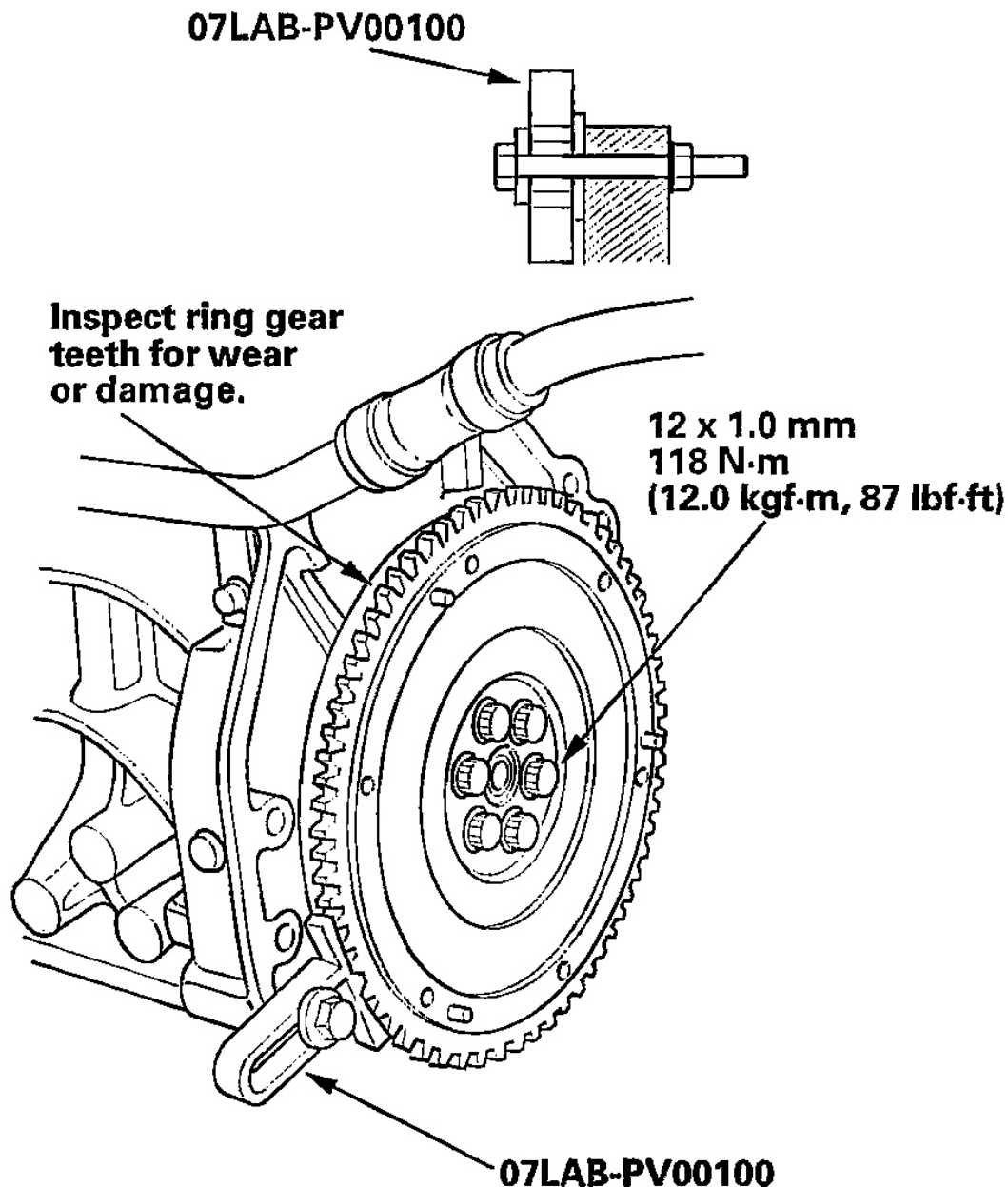
Fig. 181: Locating Engine Block Components (2 Of 2)

FLYWHEEL REMOVAL AND INSTALLATION

Special Tools Required

Ring Gear Holder 07LAB-PV00100

Remove the six flywheel bolts, then separate the flywheel from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.

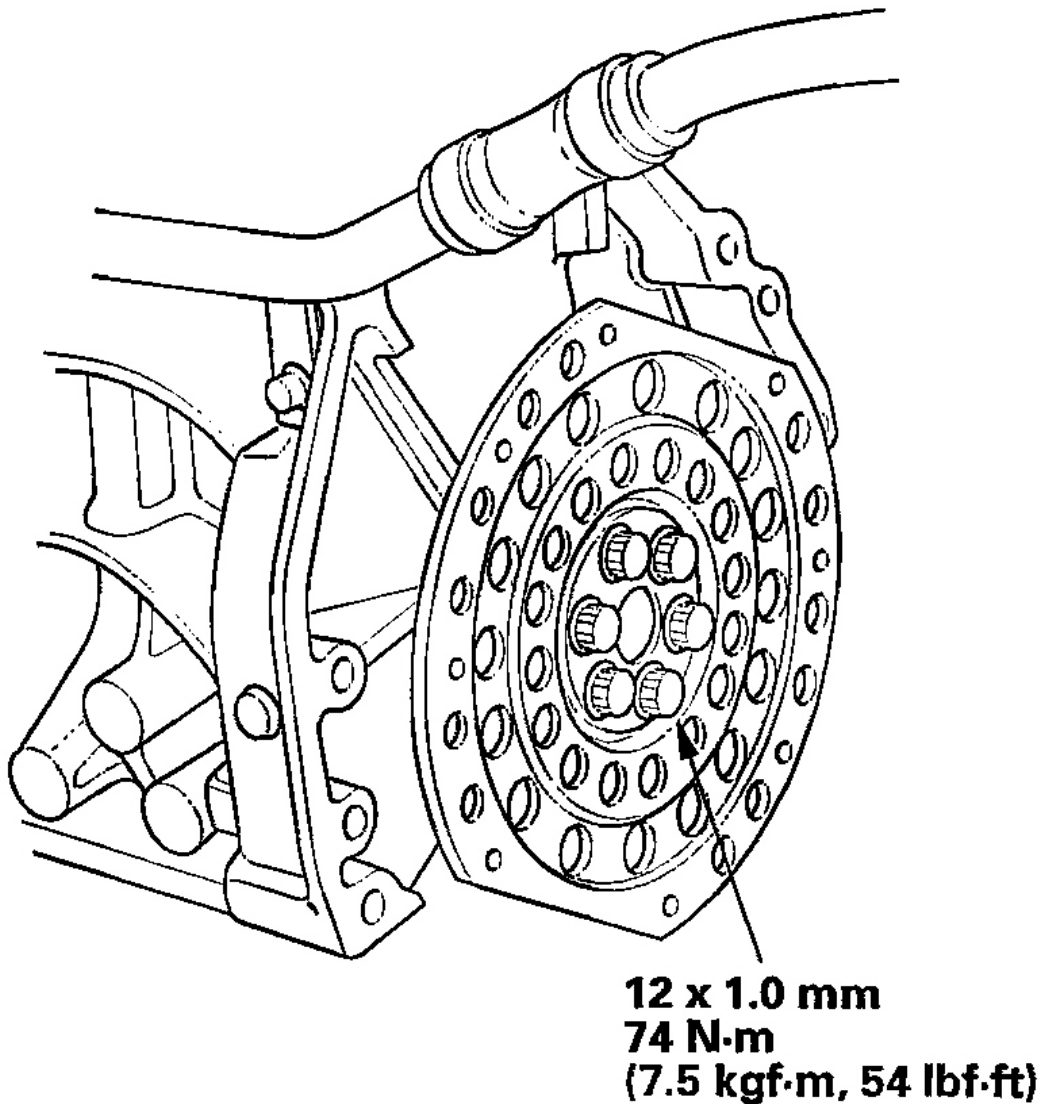


G01954536

Fig. 182: Removing/Installing Flywheel

DRIVE PLATE REMOVAL AND INSTALLATION

Remove the six drive plate bolts, then separate the drive plate from the crankshaft flange. After installation, tighten the bolts in a crisscross pattern.



G01954537

Fig. 183: Removing/Installing Drive Plate

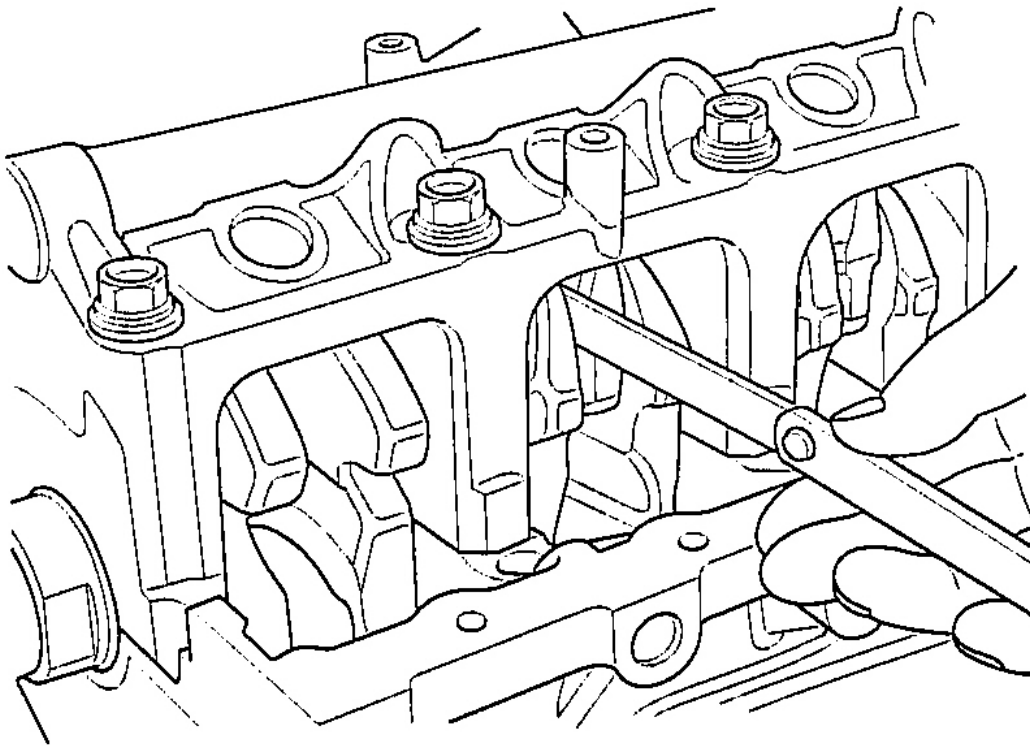
CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. 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.)



G01954538

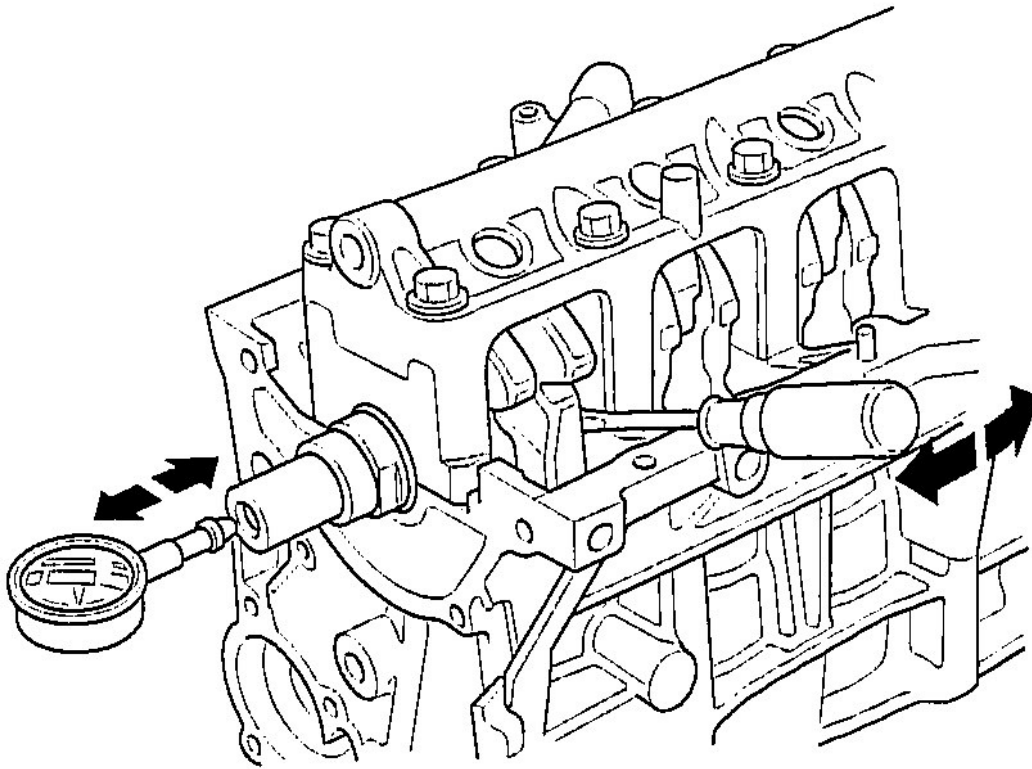
Fig. 184: Measuring Connecting Rod End Play

2. 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**).
3. Mount a dial indicator on the block so that its tip contacts the end of the crankshaft.
4. 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.)



G01954539

Fig. 185: Zeroing Dial Against End Of Crankshaft

5. If the end play is excessive, inspect the thrust washers and thrust surface on the crankshaft. Replace parts as necessary. Thrust washer thickness is fixed and must not be changed either by grinding or shimming.

CRANKSHAFT MAIN BEARING REPLACEMENT

Main Bearing Clearance Inspection

1. To check main bearing-to-journal oil clearance, remove the main caps and bearing halves.
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

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

4. Reinstall the bearings and caps, then torque the bolts to 51 N.m (5.2 kgf.m, 38 lbf.ft). Do not rotate the crankshaft.
5. Remove the cap and bearing half, and measure the widest part of the plastigage.

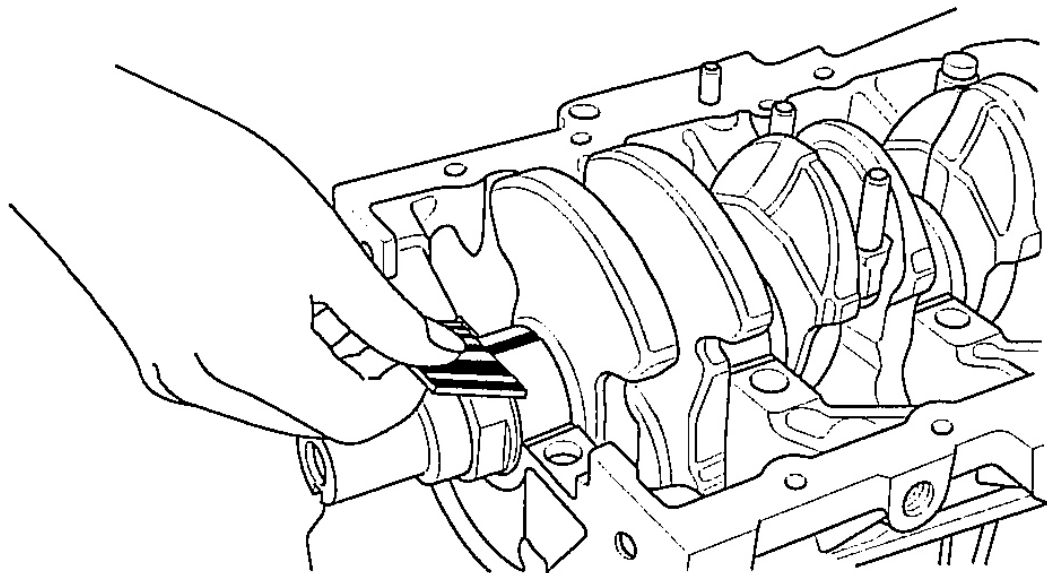
Main Bearing-to-Journal Oil Clearance:

Standard (New):

No.1,5: 0.018-0.036 mm (0.0007-0.0014 in.)

No.2, 3, 4: 0.024-0.042 mm (0.0009-0.0017 in.)

Service Limit: 0.05 mm (0.002 in.)



G01954540

Fig. 186: Measuring Widest Part Of Plastigage

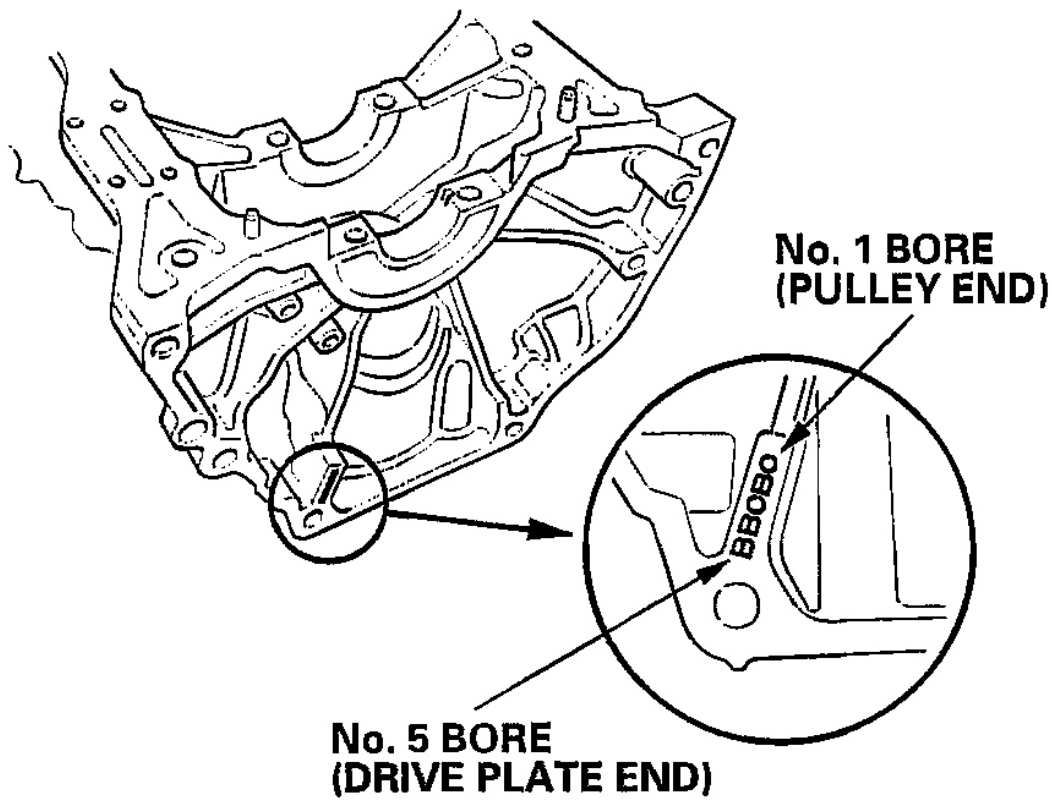
6. If the plastigage measures too wide or too narrow, (remove the engine if it's still in the car), remove the crankshaft, and remove the upper half of the bearing. Install a new, complete bearing with the same color code, and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.
7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check 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

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

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



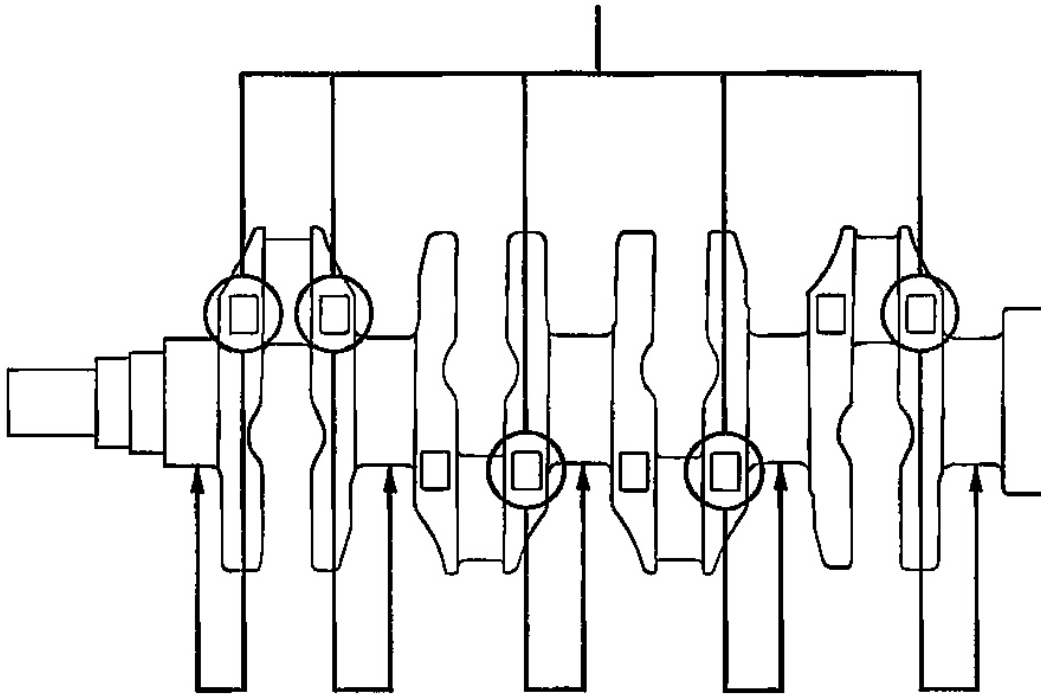
G01954541

Fig. 187: Locating Crankshaft Bore Code

		→ Larger crank bore				
		→ Smaller bearing (Thicker)				
Main Journal code	Crank bore code		A	B	C	D
	1	Red	Pink	Yellow	Green	
	2	Pink	Yellow	Green	Brown	
	3	Yellow	Green	Brown	Black	
	4	Green	Brown	Black	Blue	
Smaller main journal		Smaller bearing (Thicker)				

G01954542

Fig. 188: Crankshaft Bore Codes & Main Journal Codes Chart

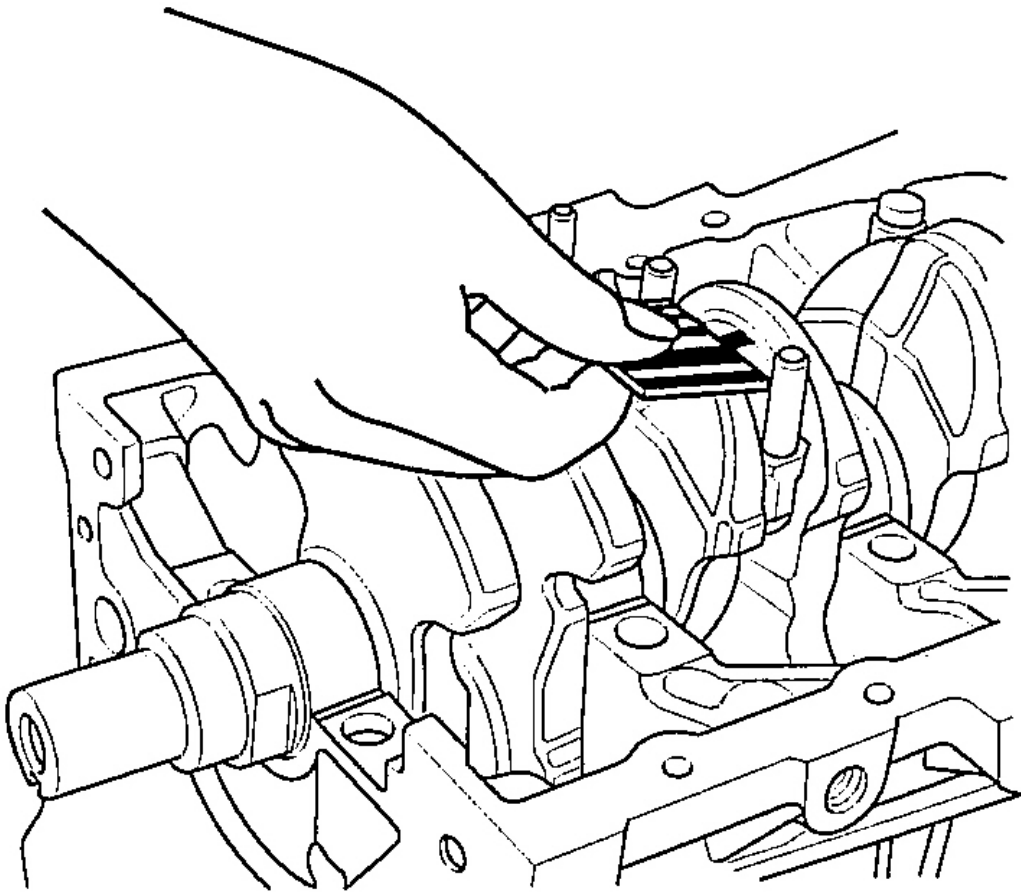


G01954543

Fig. 189: Locating Main Journal Code**CONNECTING ROD BEARING REPLACEMENT****Rod Bearing Clearance Inspection**

1. Remove the connecting rod cap and bearing half.
2. Clean the crankshaft rod journal and bearing half with a clean shop towel.
3. Place a strip of plastigage across the rod journal.
4. Reinstall the bearing half and cap, and torque the bolts to 32 N.m (3.3 kgf.m, 24 lbf.Ft). Do not rotate the crankshaft.
5. Remove the rod cap and bearing half and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance:**Standard (New):** 0.024-0.042 mm (0.0009-0.0017 in.)**Service Limit:** 0.05 mm (0.002 in.)



G01954544

Fig. 190: Measuring Widest Part Of Plastigage

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

Rod Bearing Selection

Each rod falls into one of four tolerance ranges from 0 to 0.024 mm (0.0009 in.), in 0.006 mm (0.0002 in.) increments) depending on the size of its big end bore. It's then stamped with a number (1, 2, 3 or 4), indicating the range.

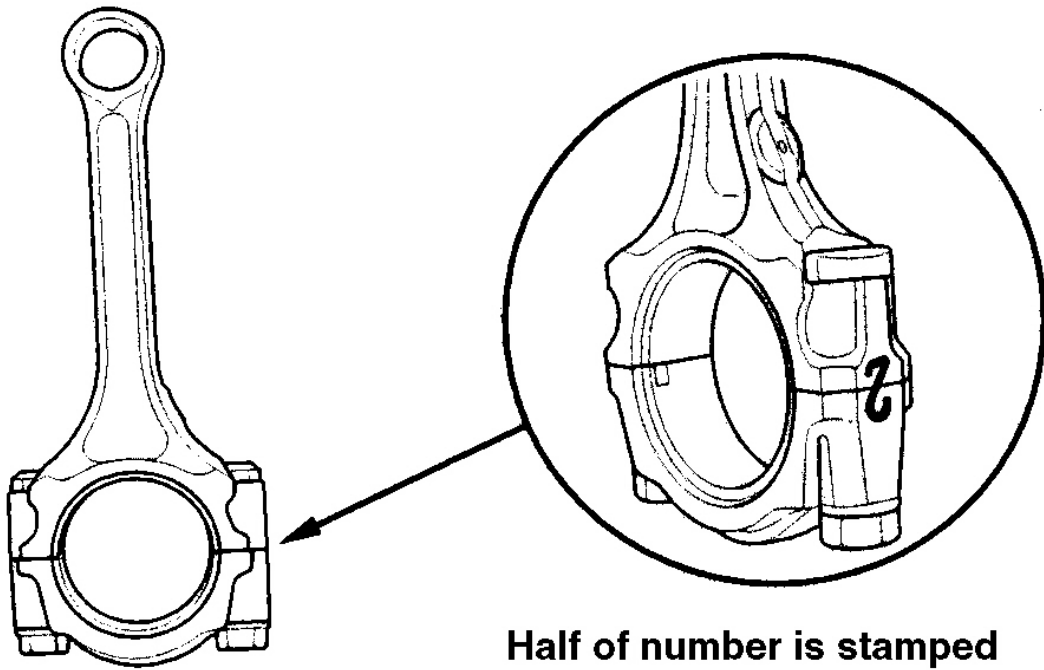
You may find any combination of 1, 2, 3, or 4 in any engine.

Normal Bore Size: 48.0 mm (1.89 in.)

Inspect the connecting rod for cracks and heat damage.

Connecting Rod Journal Code Locations

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

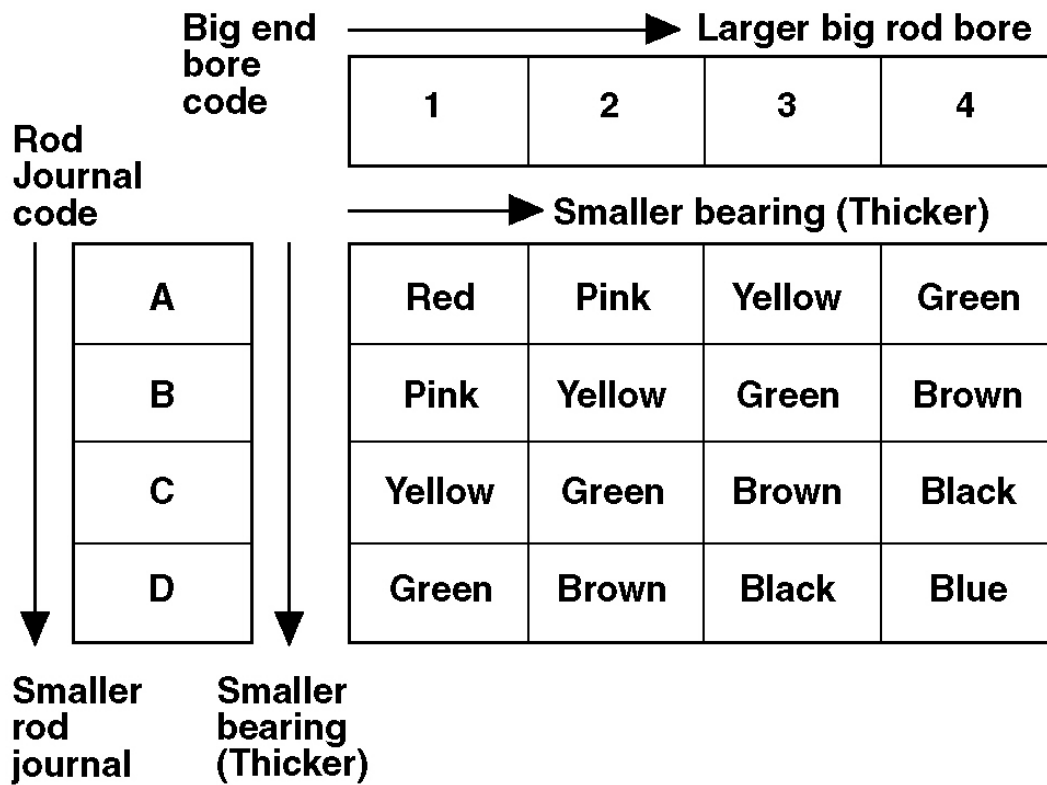


**Half of number is stamped
on bearing cap and the other
half is stamped on rod.**

G00387657

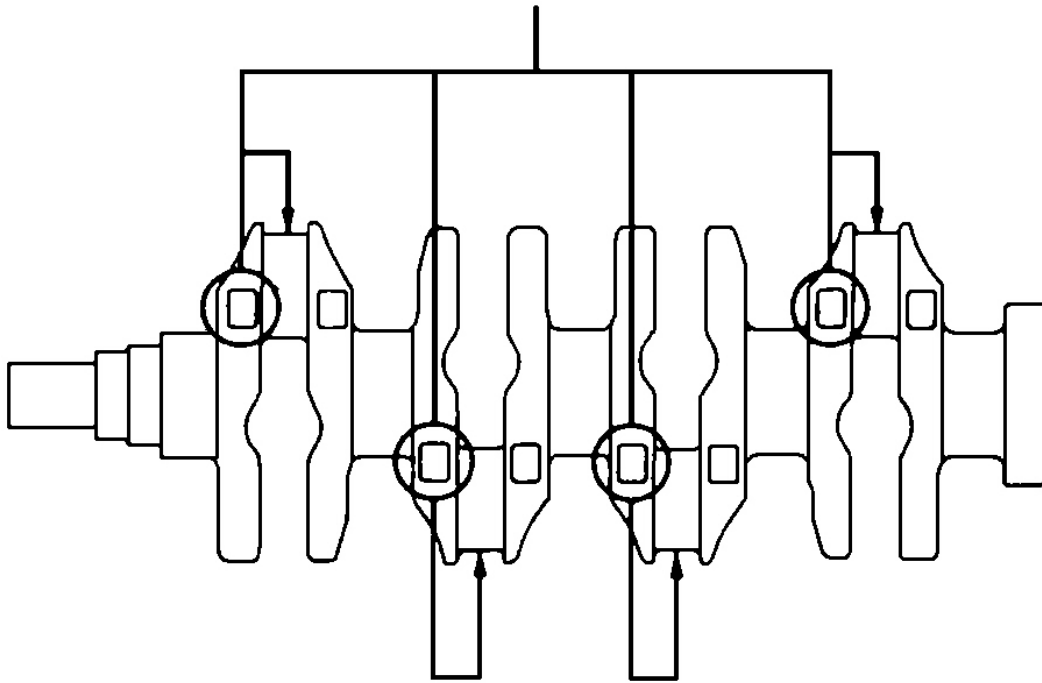
Fig. 191: Identifying Rod Journal Code

Courtesy of AMERICAN HONDA MOTOR CO., INC.



G00387665

Fig. 192: Connecting Rod Journal Codes Chart
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

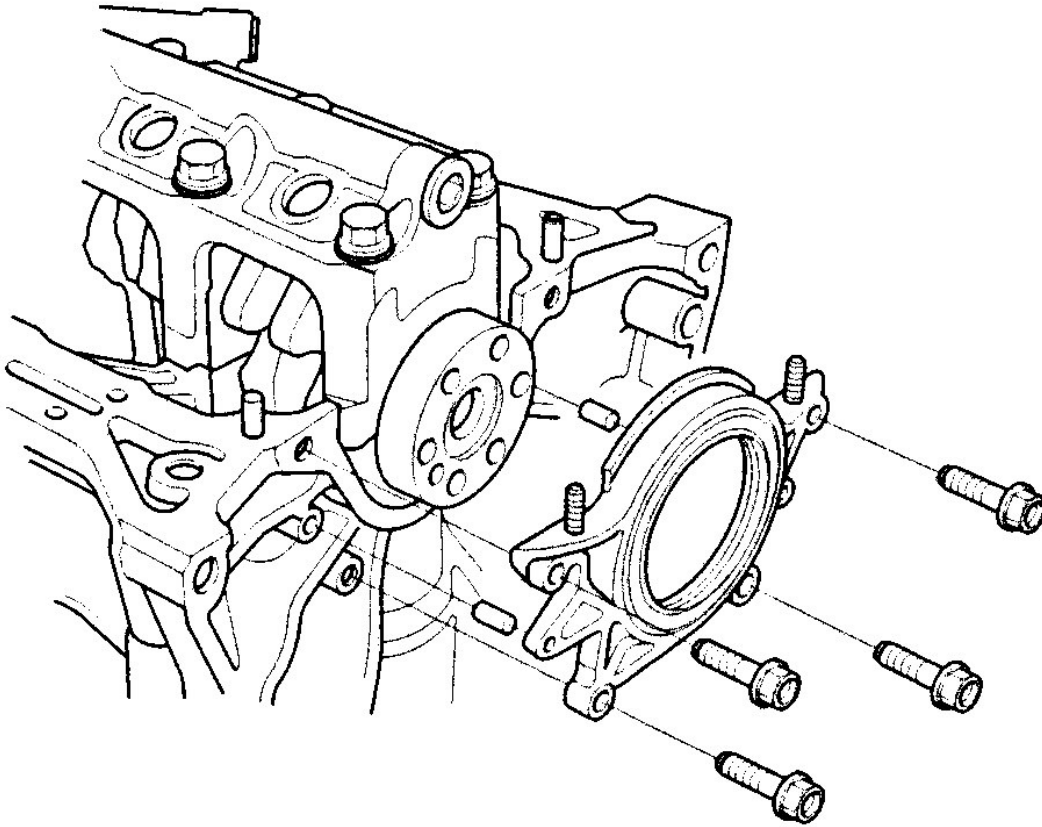


G00387661

Fig. 193: Locating Connecting Rod Journal Code
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CRANKSHAFT AND PISTON REMOVAL

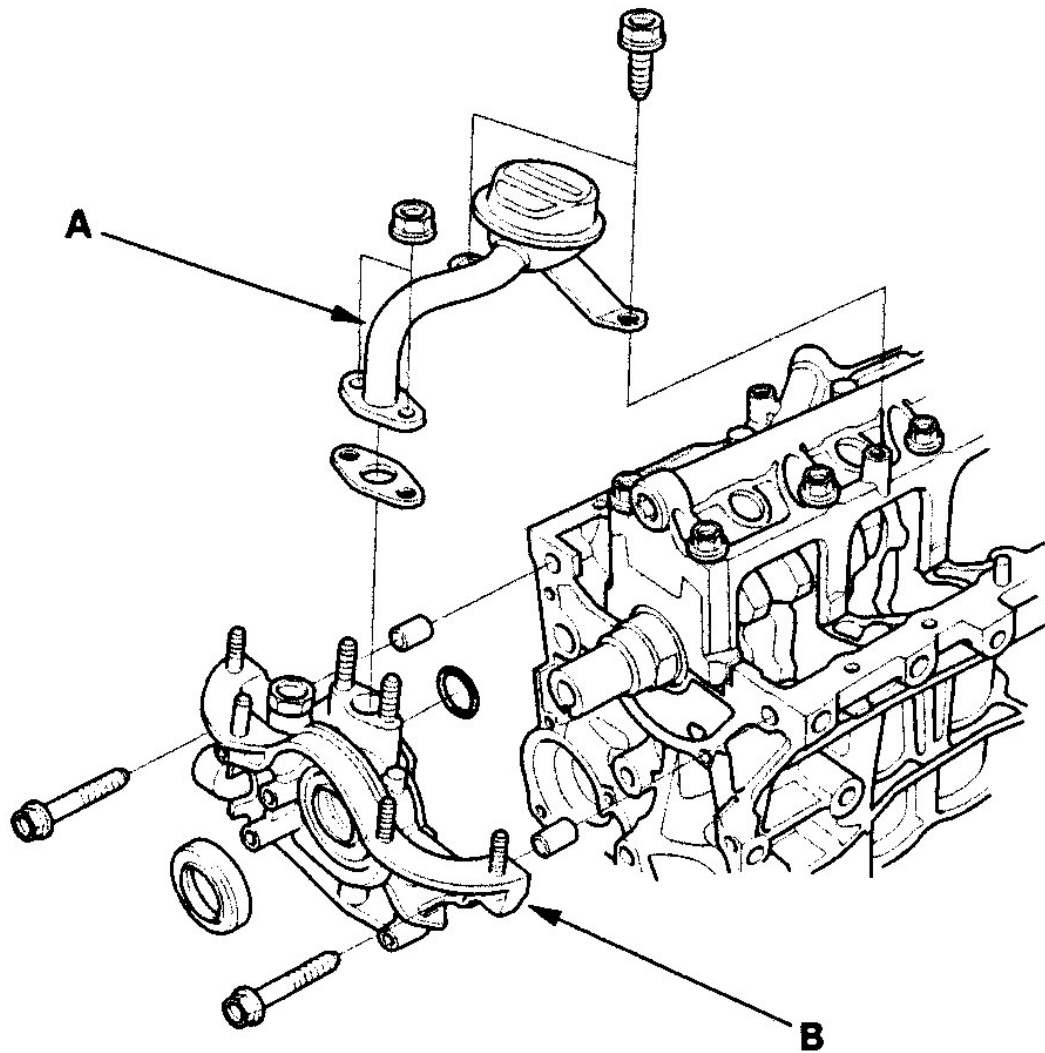
1. Remove the oil pan.
2. Remove the engine block end cover.



G00387669

Fig. 194: Removing Engine Block End Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the oil screen (A), then remove the oil pump (B).

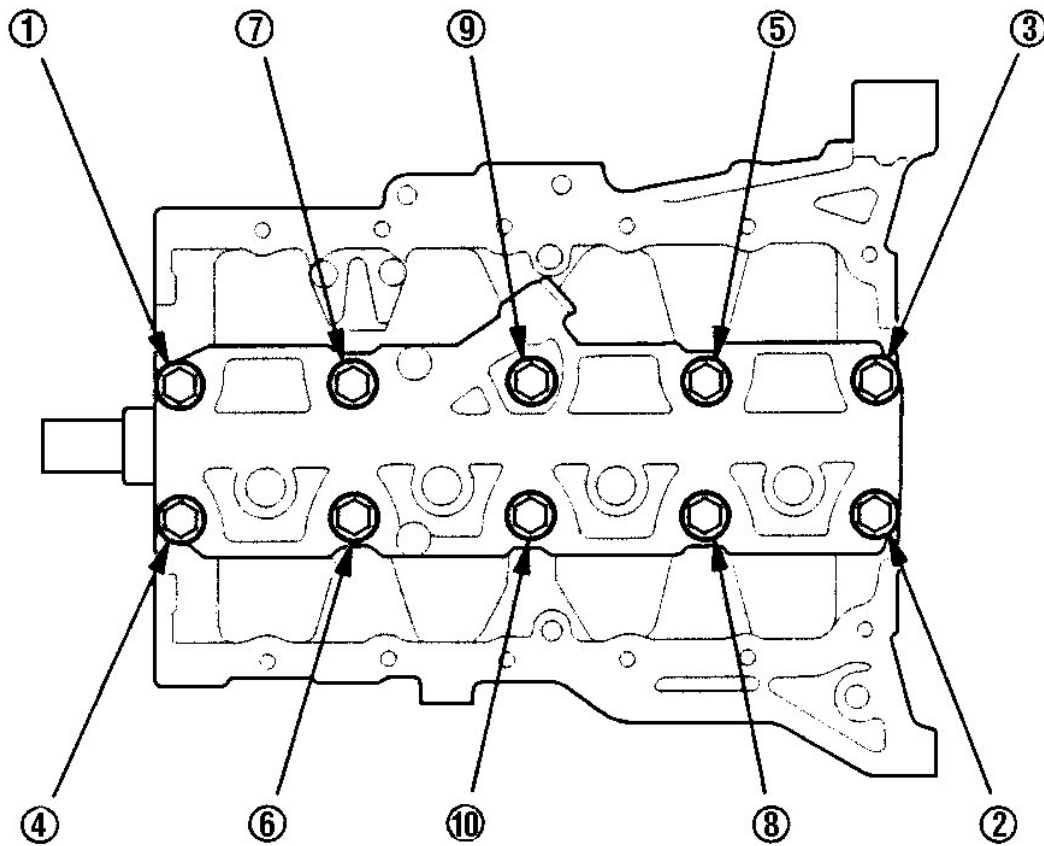


G00397605

Fig. 195: Removing Oil Screen & Oil Pump

Courtesy of AMERICAN HONDA MOTOR CO., INC.

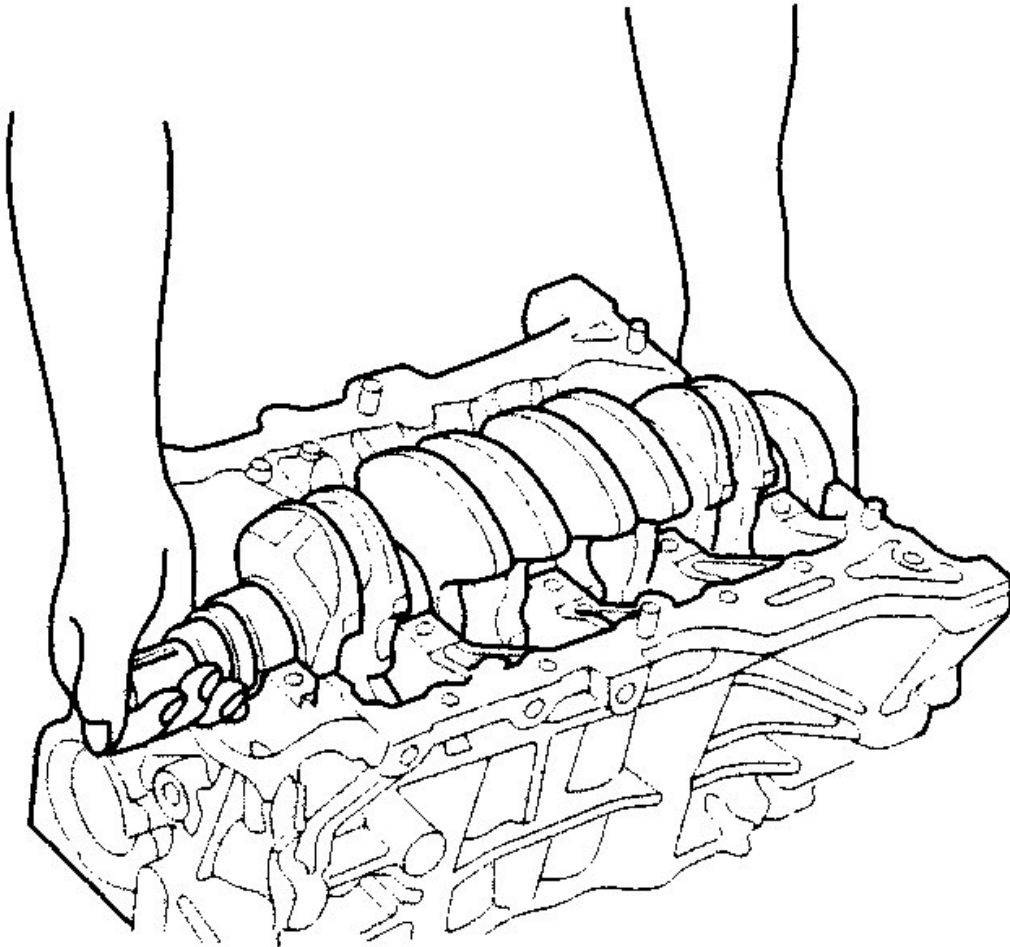
4. Removing bearing cap bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



G00397609

Fig. 196: Bearing Cap Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

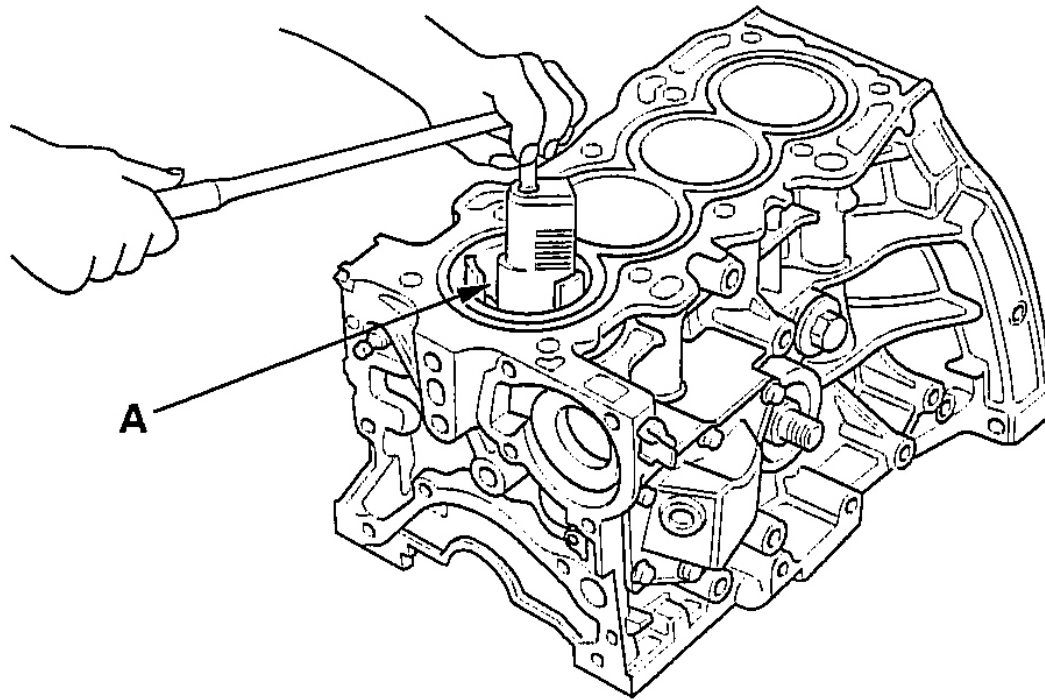
5. Remove the bearing cap bridge/bearings. Keep all bearings in order.
6. Turn the crankshaft so No.2 and No.3 crankpins are at the top.
7. Remove the rod caps/bearings. Keep all caps/bearings in order.
8. Lift the crankshaft out of the engine, being careful not to damage the journals.



G00397613

Fig. 197: Lifting Crankshaft Out Of Engine**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

9. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
10. Reinstall the bearing cap bridge and bearings on the engine in the proper order.
11. 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.



G01954545

Fig. 198: Removing Ridge Around Top Of Cylinder

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

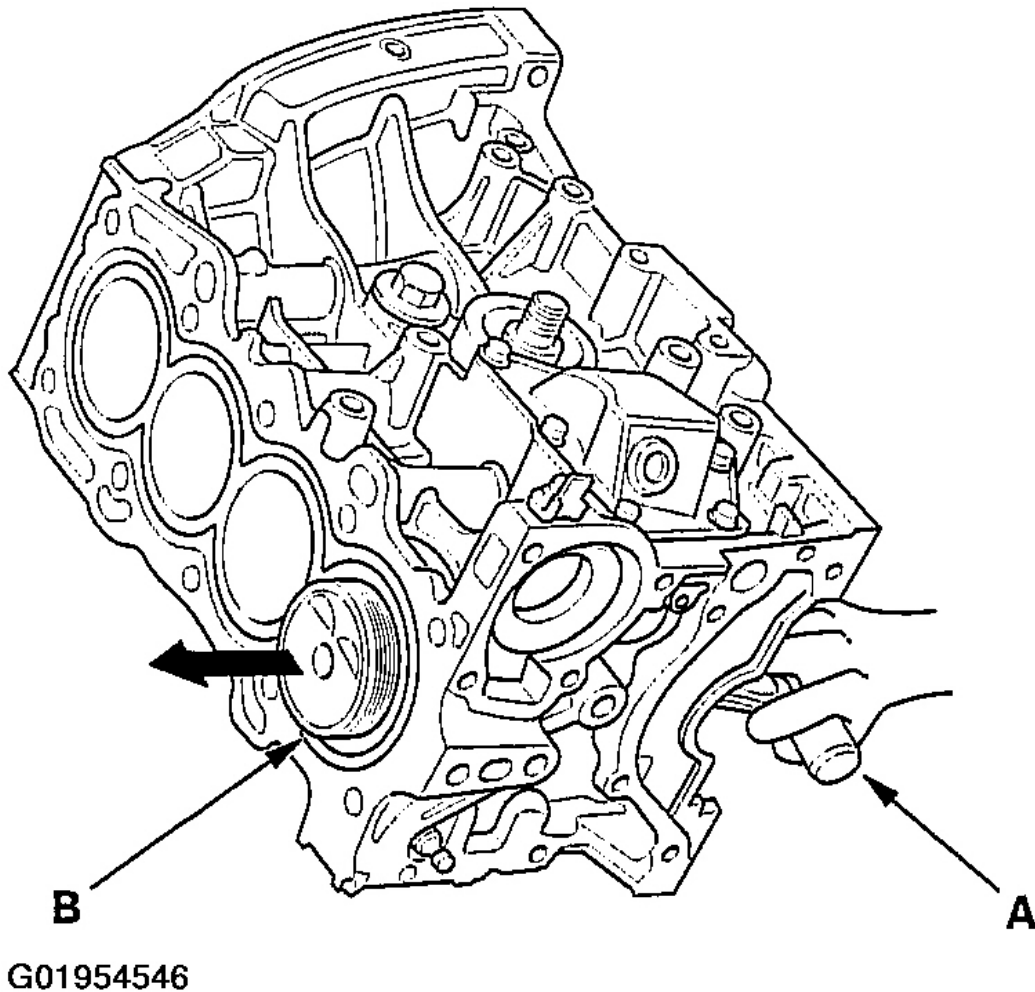


Fig. 199: Driving Out Pistons By Using Wooden Handle Of A Hammer

13. Reinstall the connecting rod bearing and caps after removing each piston/connecting rod assembly.
14. To avoid mix up 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 size.

CRANKSHAFT INSPECTION

Straightness

NOTE: • Clean the crankshaft oil passages with pipe cleaners or a suitable brush.

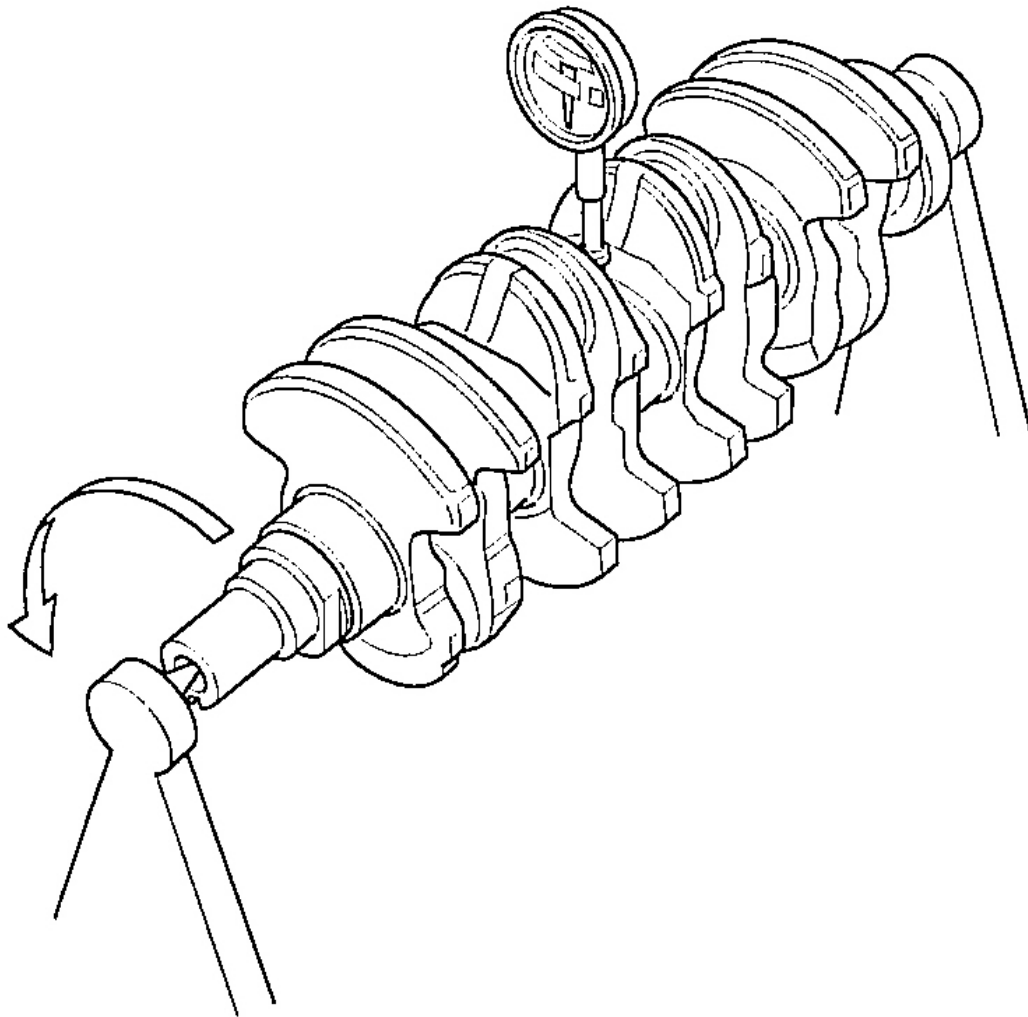
- **Check the keyway and threads.**

1. Support the crankshaft with a lathe-type tool or V-blocks.
2. Measure runout on all main journals to make sure the crank is not bent. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Indicator Runout:

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

Service Limit: 0.04 mm (0.002 in.)

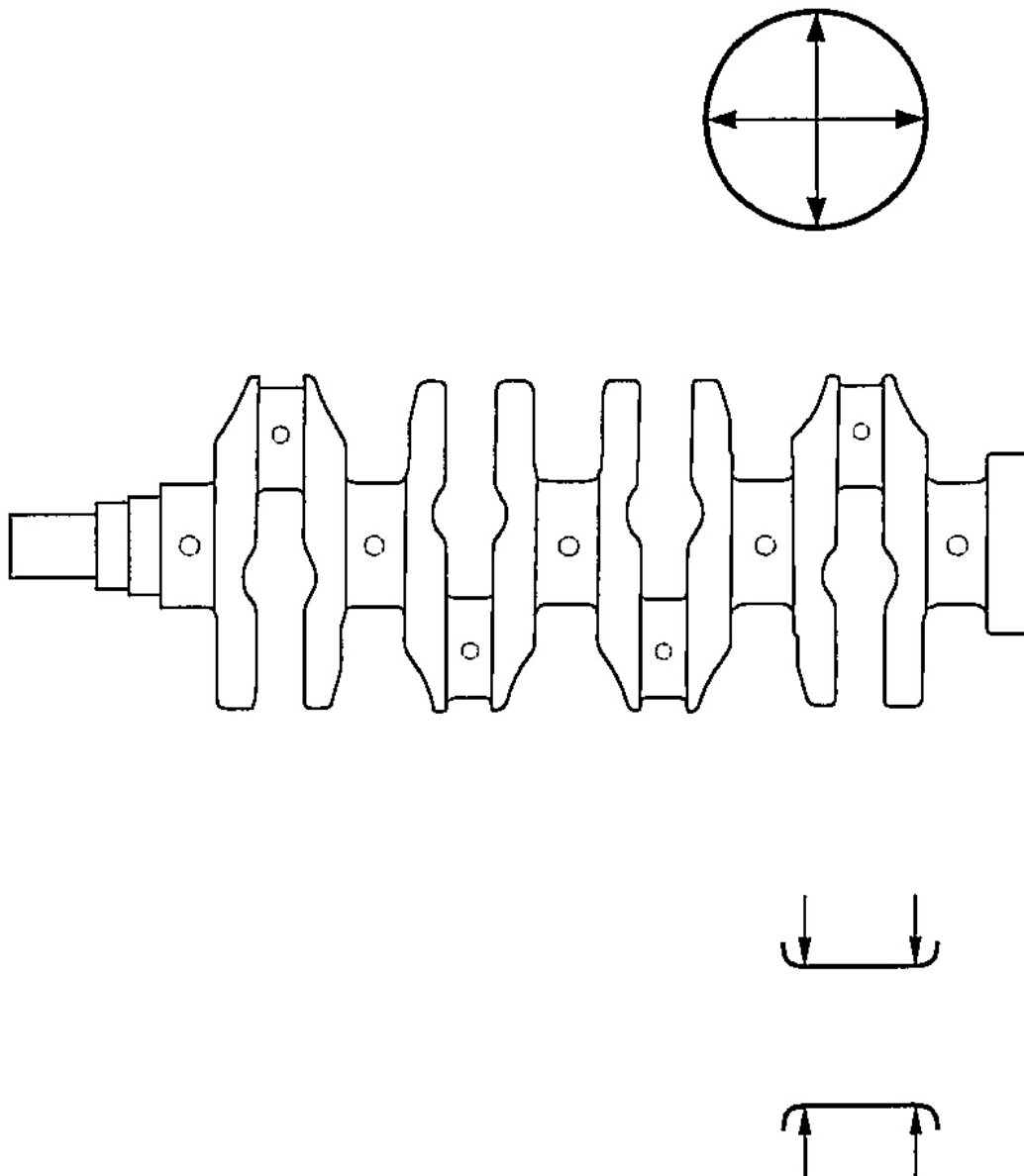


G01954547

Fig. 200: Measuring Runout On All Main Journals**Out-of-Round and Taper**

1. 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):** 0.0025 mm (0.0001 in.) max.**Service Limit:** 0.005 mm (0.0002 in.)



G01954548

Fig. 201: Measuring Out-Of-Round At Middle Of Each Rod & Main Journal

2. Measure taper at the edge 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): 0.0025 mm (0.0001 in.) max.

Service Limit: 0.005 mm (0.0002 in.)

BLOCK AND PISTON INSPECTION

1. Check the piston for distortion or cracks.
2. Measure the piston diameter at a point 13 mm (0.5 in.) from the bottom of the skirt.

Piston Diameter:

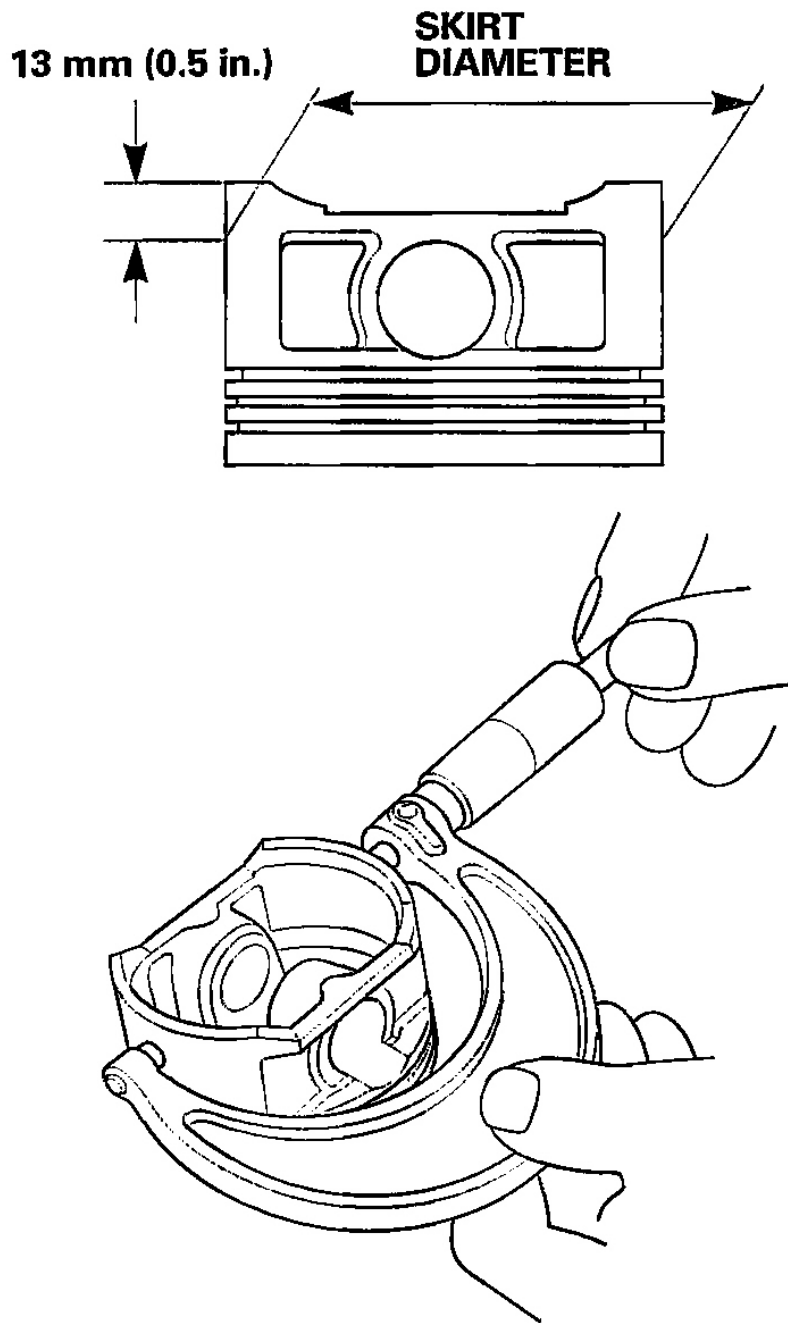
Standard (New): 74.98-74.99 mm (2.9520-2.9524 in.)

Service Limit: 74.97 mm (2.9516 in.)

Oversize:

0.25: 75.23-75.24 mm (2.9618-2.9622 in.)

0.50: 75.48-75.49 mm (2.9716-2.9720 in.)

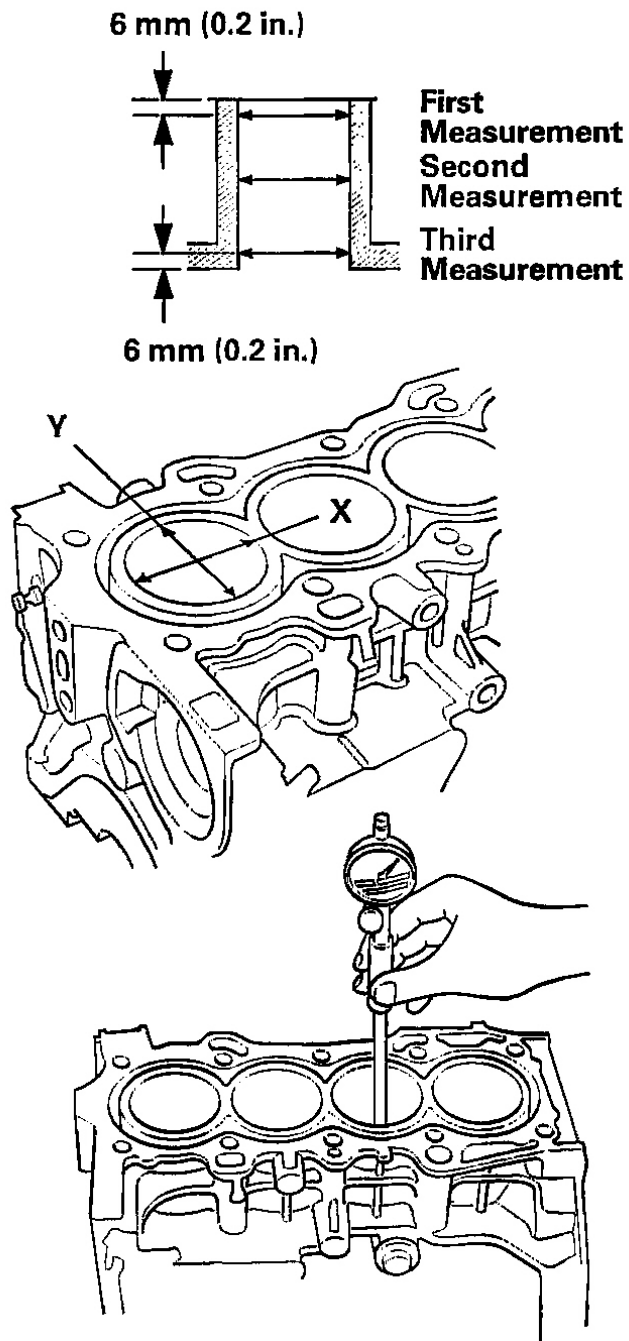


G01954549

Fig. 202: Measuring Piston Diameter From Bottom Of Skirt

3. Measure wear and taper in direction X and Y at 3 levels in each cylinder as shown in **Fig. 203** . 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 6 after reboring.

Cylinder Bore Size:**Standard (New):** 75.00-75.02 mm (2.9528-2.9535 in.)**Service Limit:** 75.07 mm (2.9555 in.)**Oversize:****0.25:** 75.25-75.27 mm (2.9626-2.9634 in.)**0.50:** 75.50-75.52 mm (2.9724-2.9732 in.)**Reboring limit:** 0.5 mm (0.02 in.) max.**Bore Taper:****Limit:** (Difference between first and third measurement) 0.05 mm (0.002 in.)



G01954550

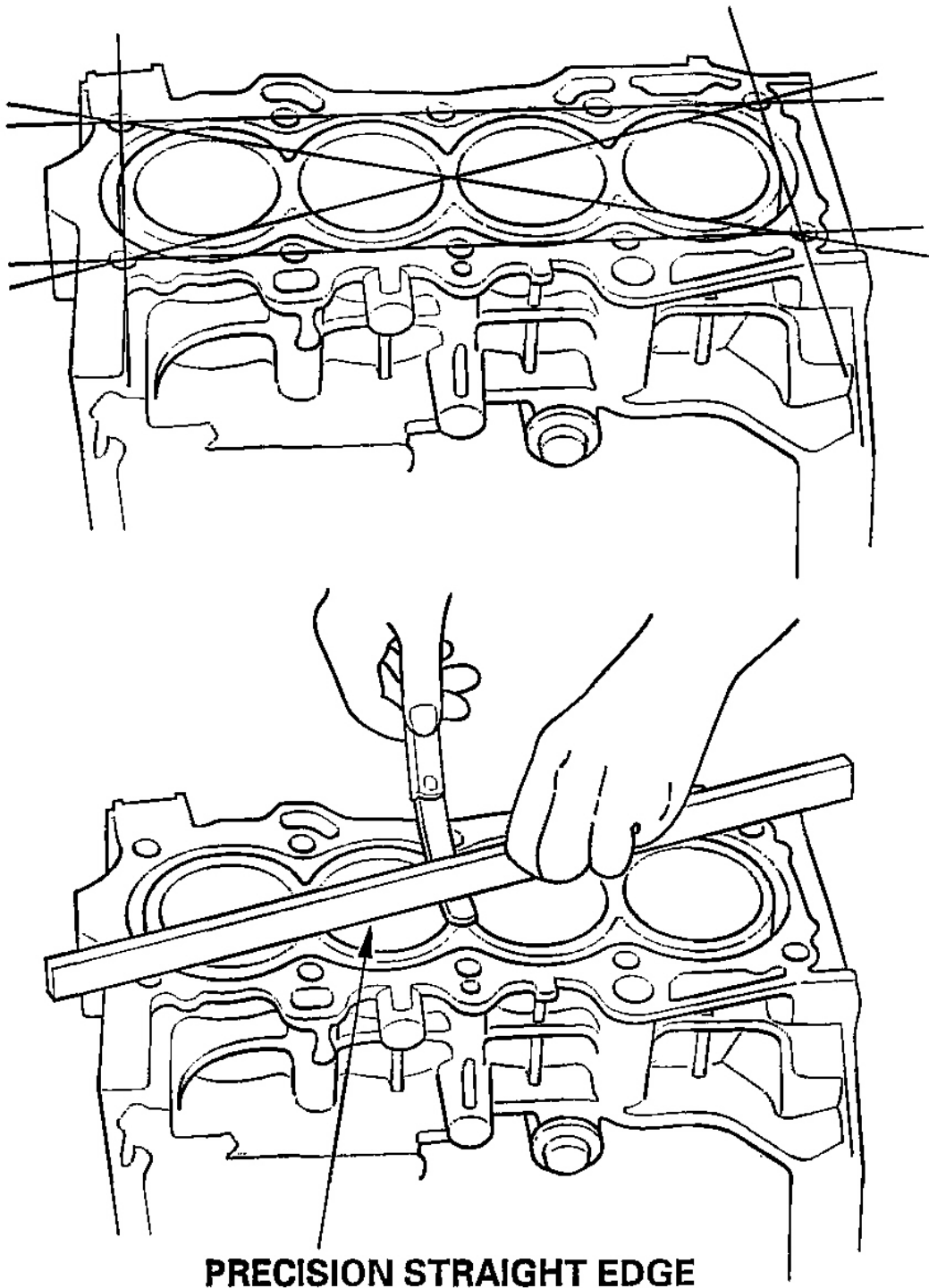
Fig. 203: Measuring Wear & Taper

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

Engine Block Warpage:

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

Service Limit: 0.10 mm (0.004 in.)



G01954551

Fig. 204: Checking Top Of Cylinder Block For Warpage

6. 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): 0.010-0.040 mm (0.0004-0.0016 in.)

Service Limit: 0.05 mm (0.002 in.)

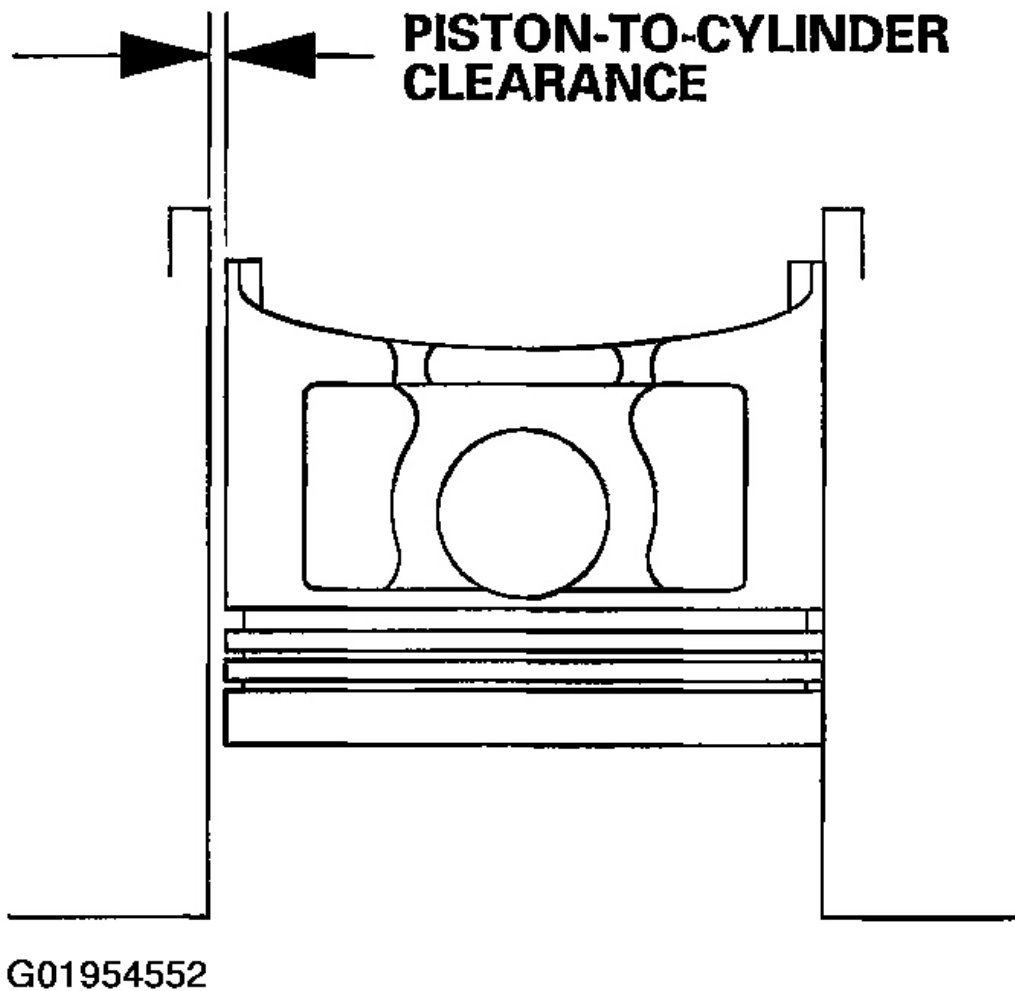
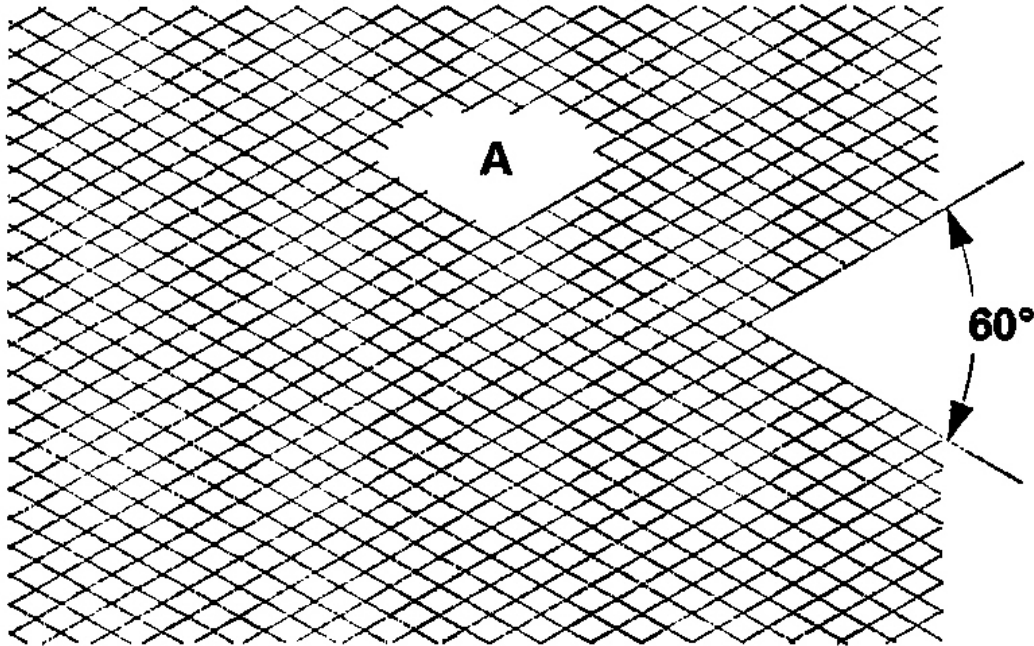


Fig. 205: Measuring Piston-To-Cylinder Clearance

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.



G01954553

Fig. 206: Honing Cylinder Bores

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

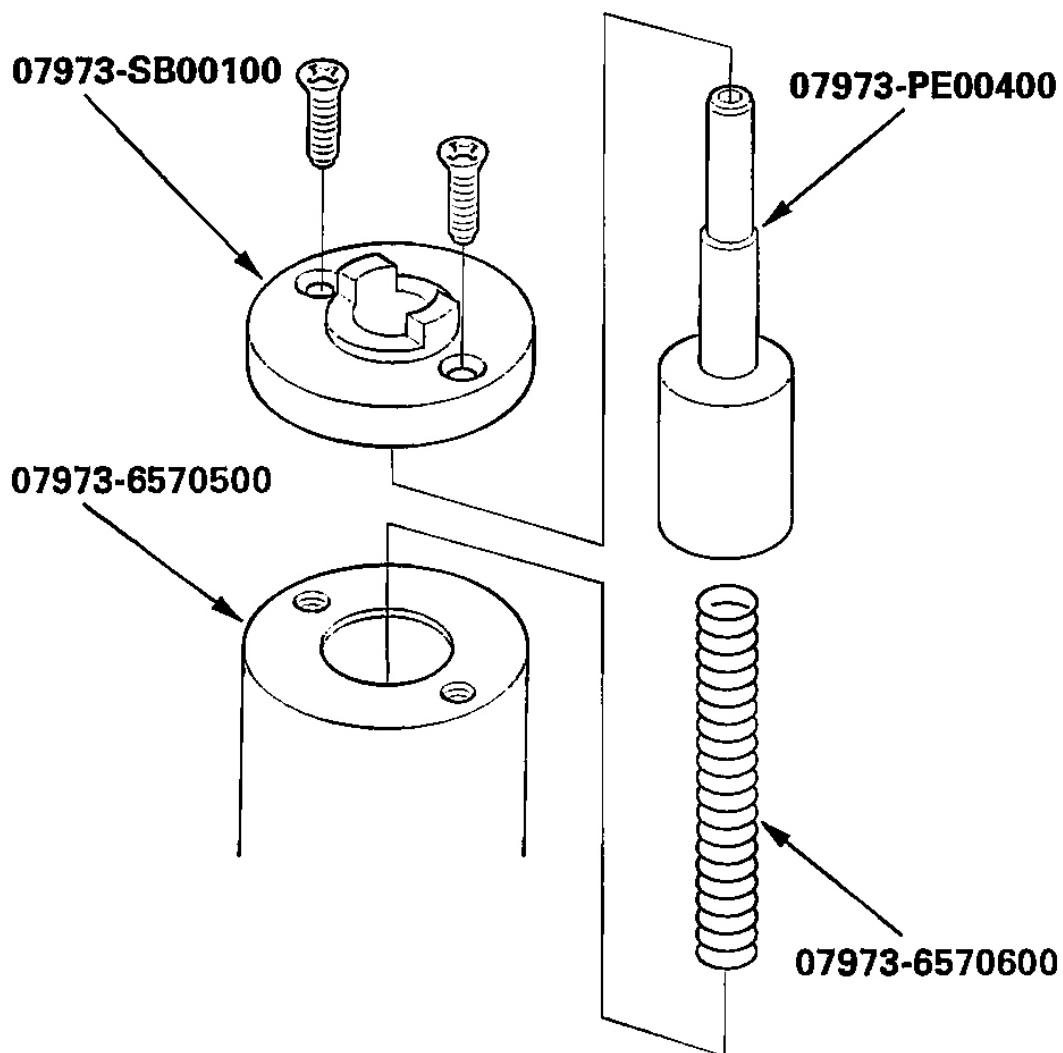
Special Tools Required

- Piston Base 07973-6570500
- Piston Base Spring 07973-6570600

- Piston Pin Base Insert 07973-PE00400
- Piston Base Head 07973-SB00100
- Pilot Collar 07973-PE00200
- Piston Pin Driver Shaft 07973-PE00310
- Piston Pin Driver Head 07973-PE00320

Disassembly

1. Assemble the special tool as shown in **Fig. 207**.



G01954554

Fig. 207: Assembling Special Tool

2. Assemble and adjust the length of the piston pin driver head and shaft to 53 mm (2.1 in.).

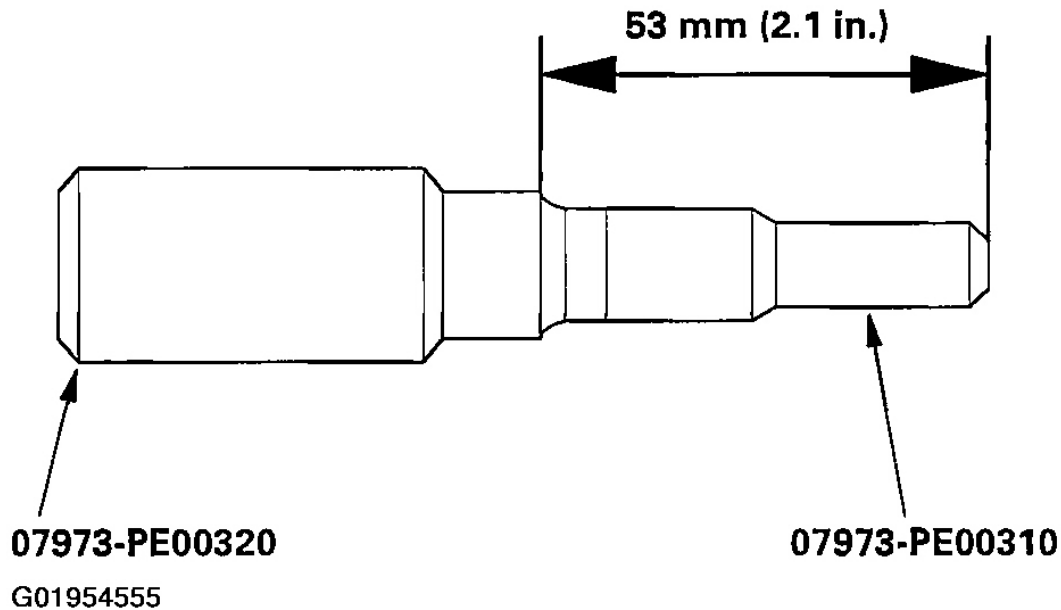
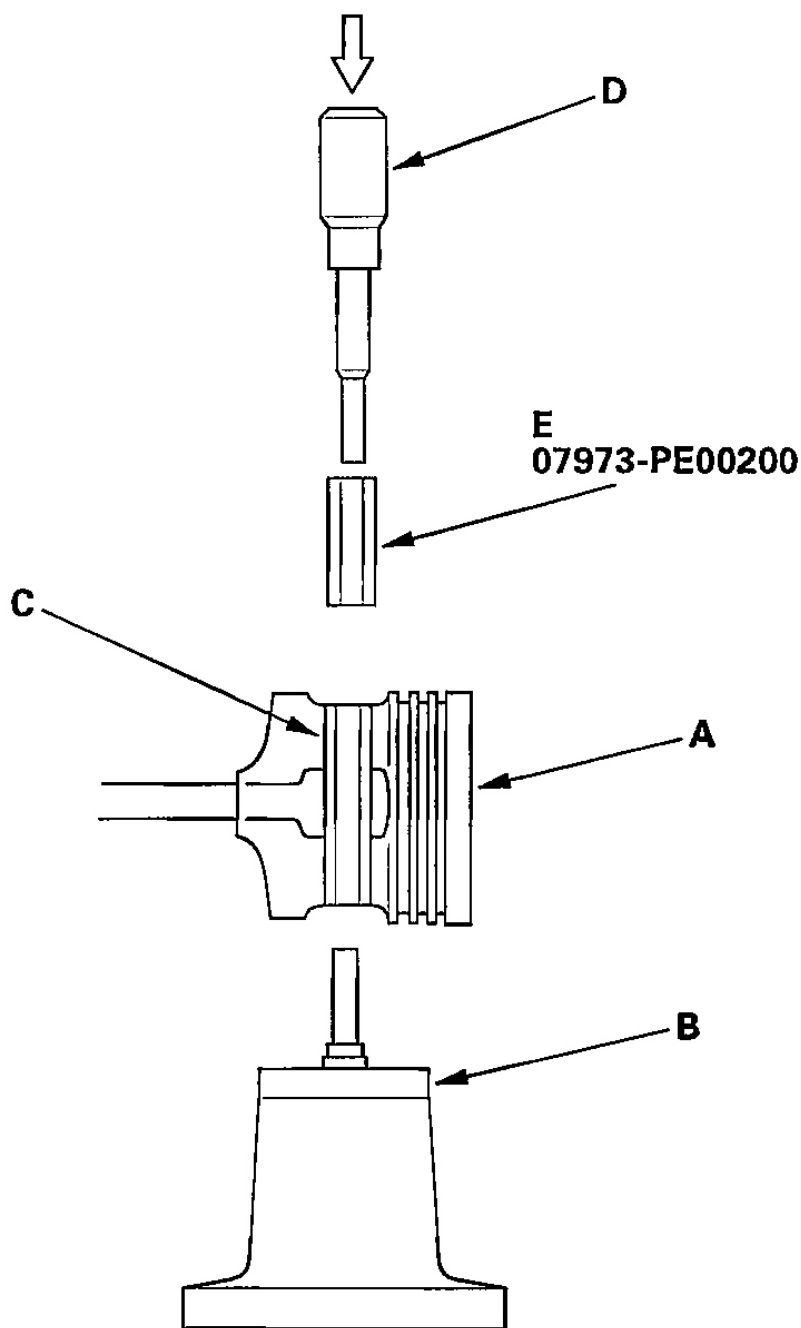


Fig. 208: Assembling & Adjusting Length Of Piston Pin Driver Head & Shaft

3. With the embossed mark facing up, place the piston assembly (A) on the special tool (B). Be sure you position the recessed flat on the piston against the lugs on the base attachment.



G01954556

Fig. 209: Placing Piston Assembly On Special Tool

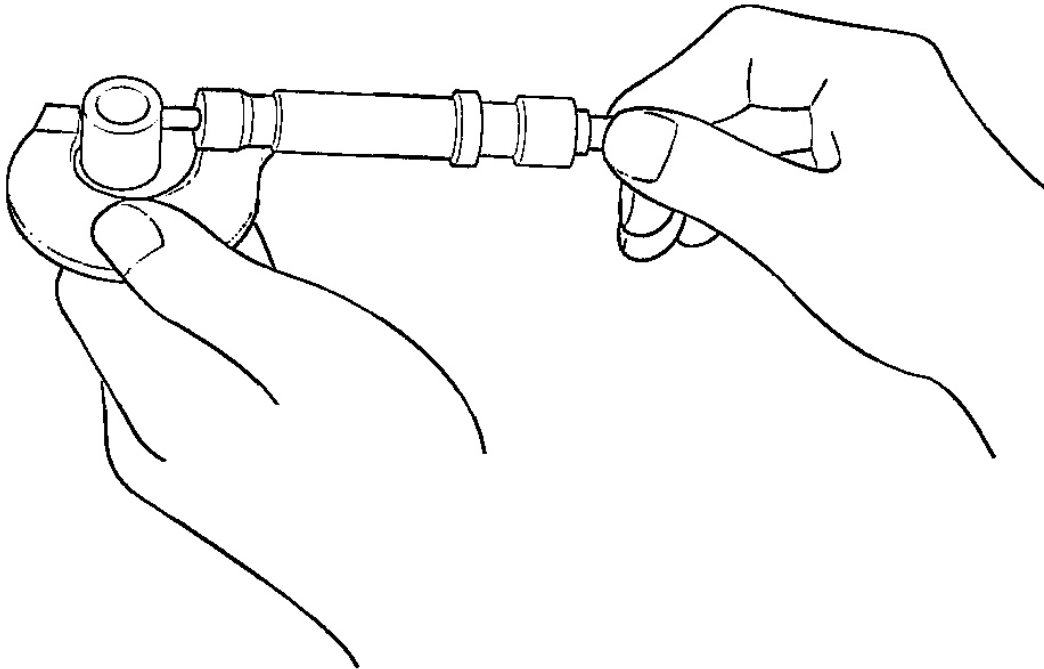
4. Press the pin (C) out with the pin driver (D), pilot collar (E) and a hydraulic press.

Inspection

1. Measure the diameter of the piston pin.

Piston Pin Diameter:

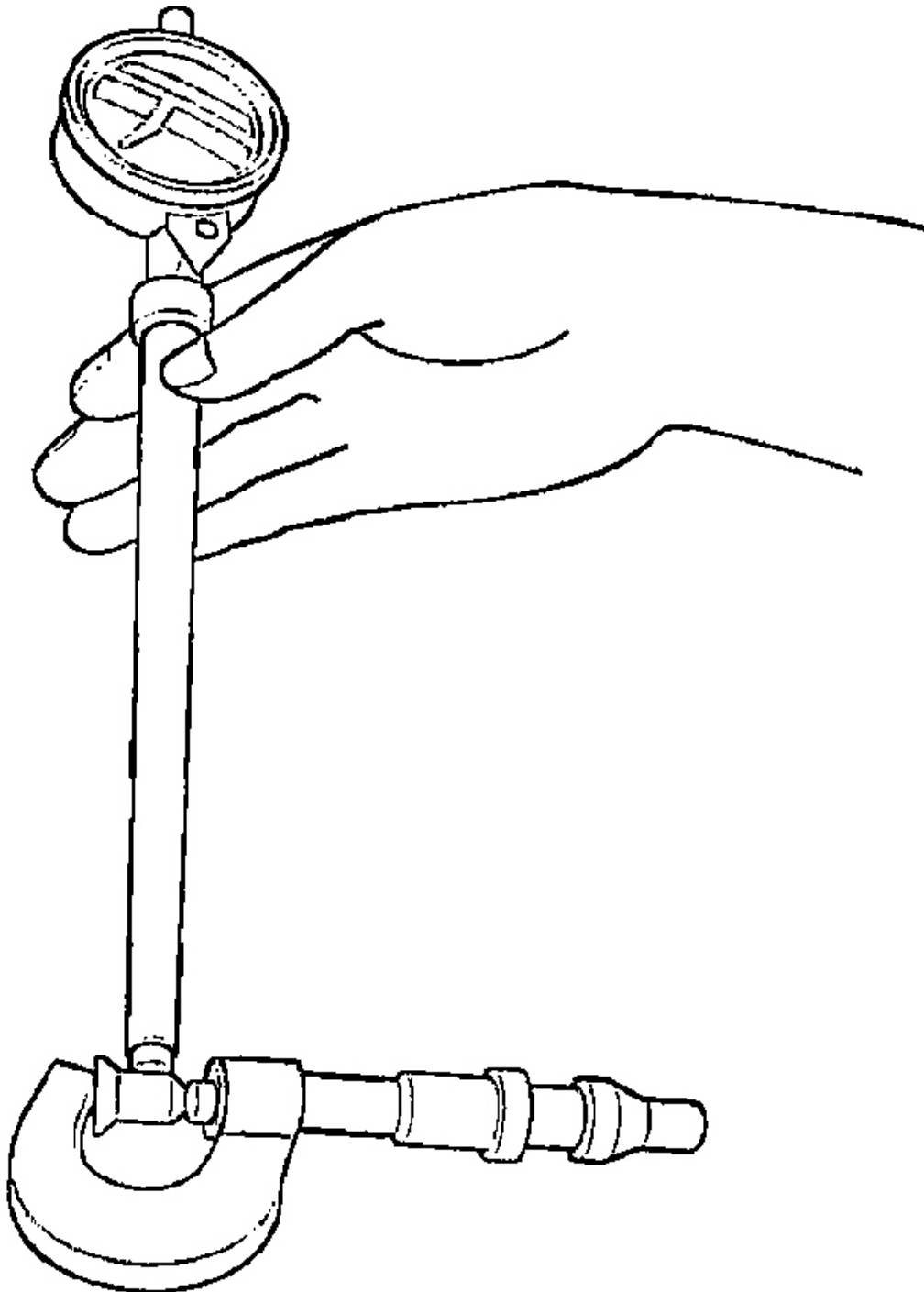
Standard (New): 18.996-19.000 mm (0.7479-0.7480 in.)



G01954557

Fig. 210: Measuring Diameter Of Piston Pin

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



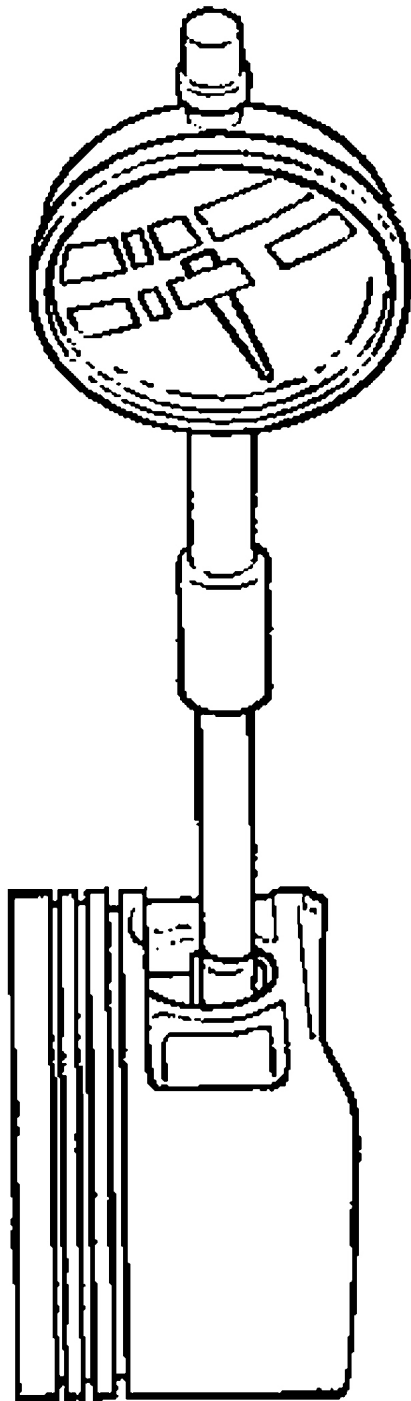
G01954558

Fig. 211: Zeroing Dial Indicator To Piston Pin Diameter

3. Measure the piston pin-to-piston clearance.

Piston Pin-to-Piston Clearance:

Standard (New): 0.010-0.020 mm (0.0004-0.0008 in.)



G01954559

Fig. 212: Measuring Piston Pin-To-Piston Clearance

4. Check the difference between the piston pin diameter and connecting rod small end diameter.

Piston Pin-to-Connecting Rod Interference:

Standard (New): 0.016-0.036 mm (0.0006-0.0014 in.)

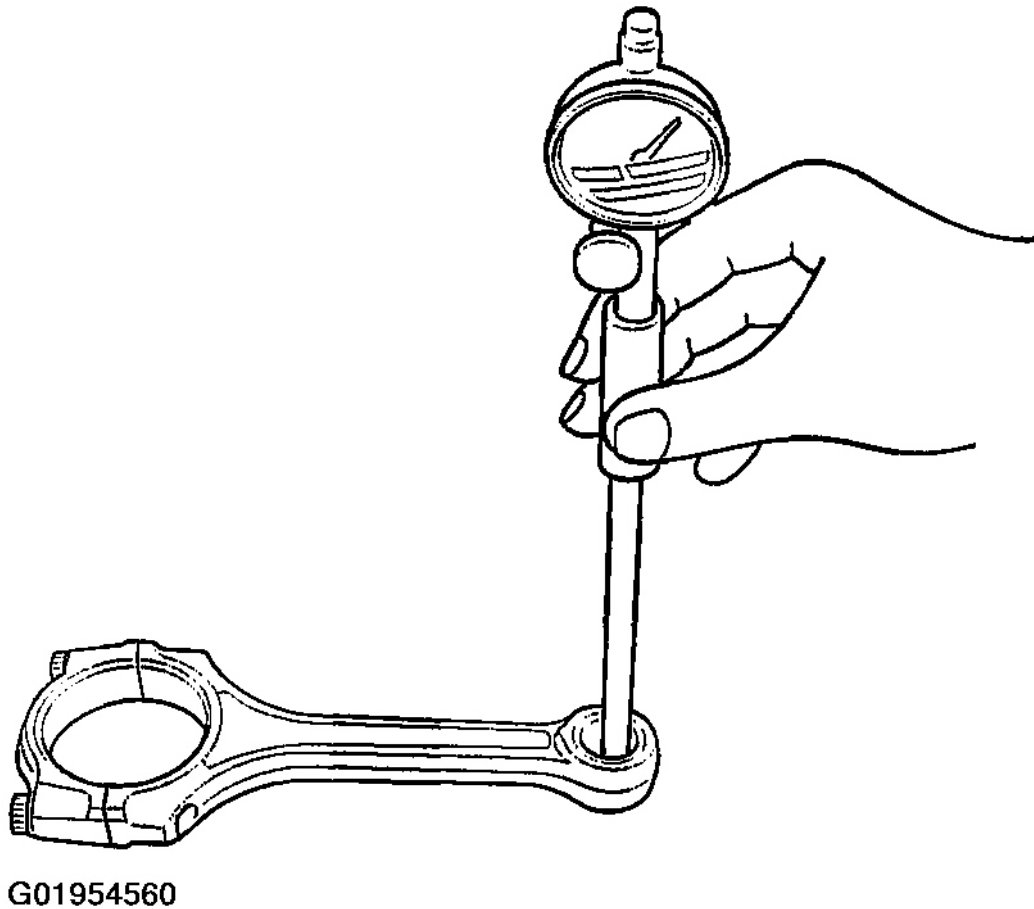
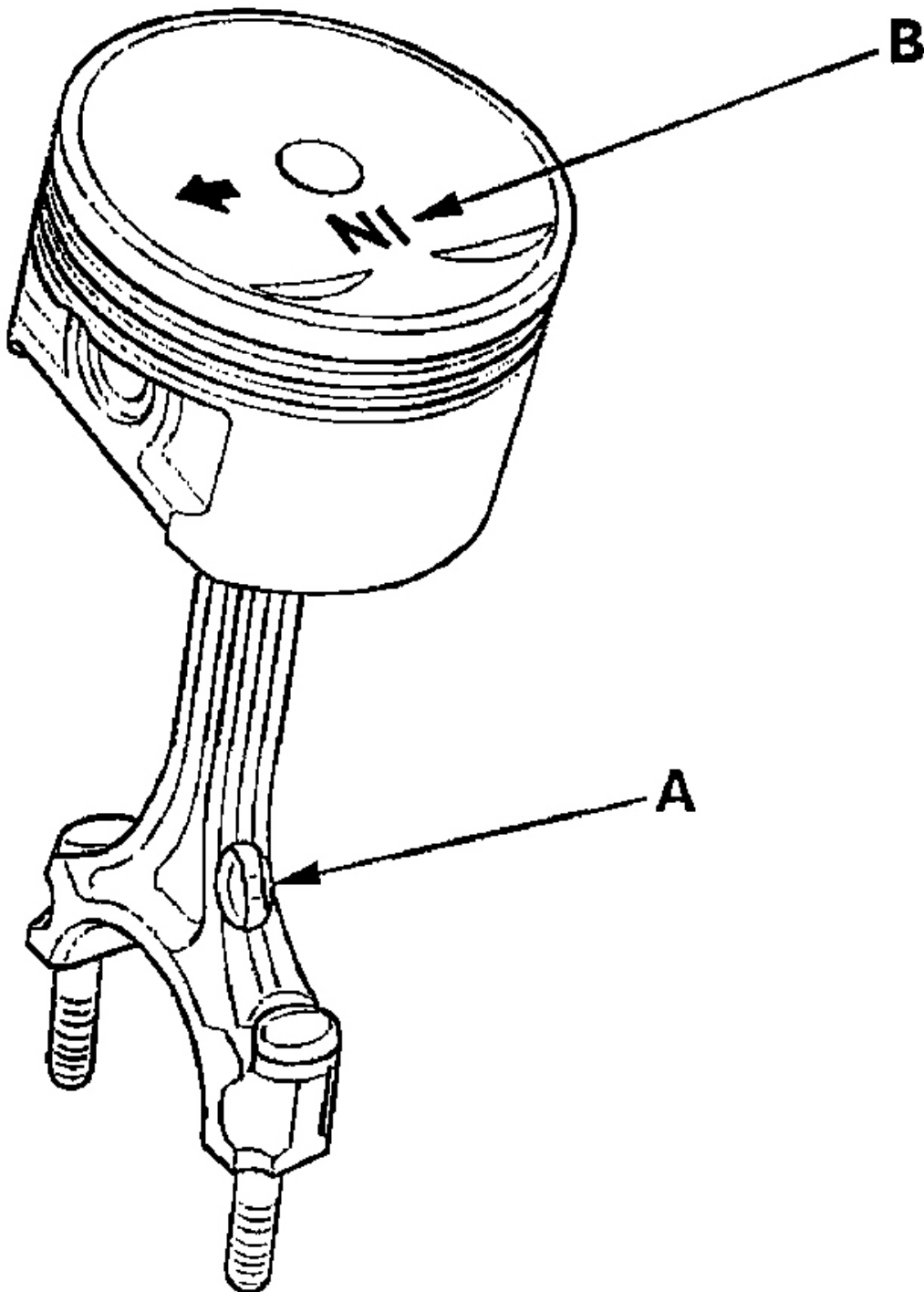


Fig. 213: Checking Difference Between Piston Pin Diameter & Connecting Rod Small End Diameter

Reassembly

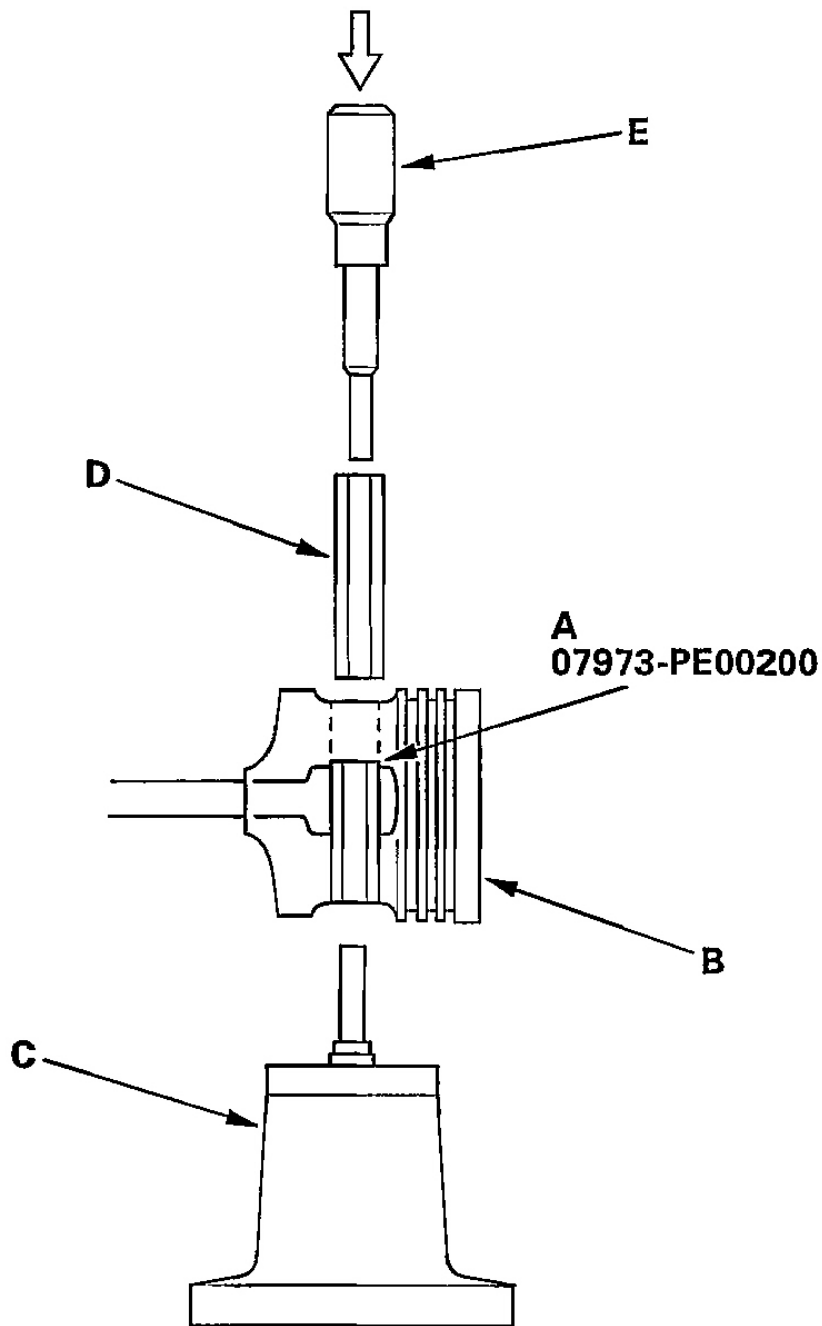
1. Assemble the piston and connecting rod with the connecting rod oil hole (A) facing the "IN" mark (B).



G01954561

Fig. 214: Assembling Piston & Connecting Rod With Connecting Rod Oil Hole Facing "IN" Mark

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



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Fig. 215: Inserting Pilot Collar Into Piston & Connecting Rod

3. With the embossed mark facing up, place the piston assembly (B) on the special tool (C). Be sure you position the recessed flat on the piston against the lugs on the base attachment.
4. Press the pin (D) in with the pin driver (E) and a hydraulic press.

PISTON RING REPLACEMENT

1. Using a ring expander (A), remove the old piston rings (B).

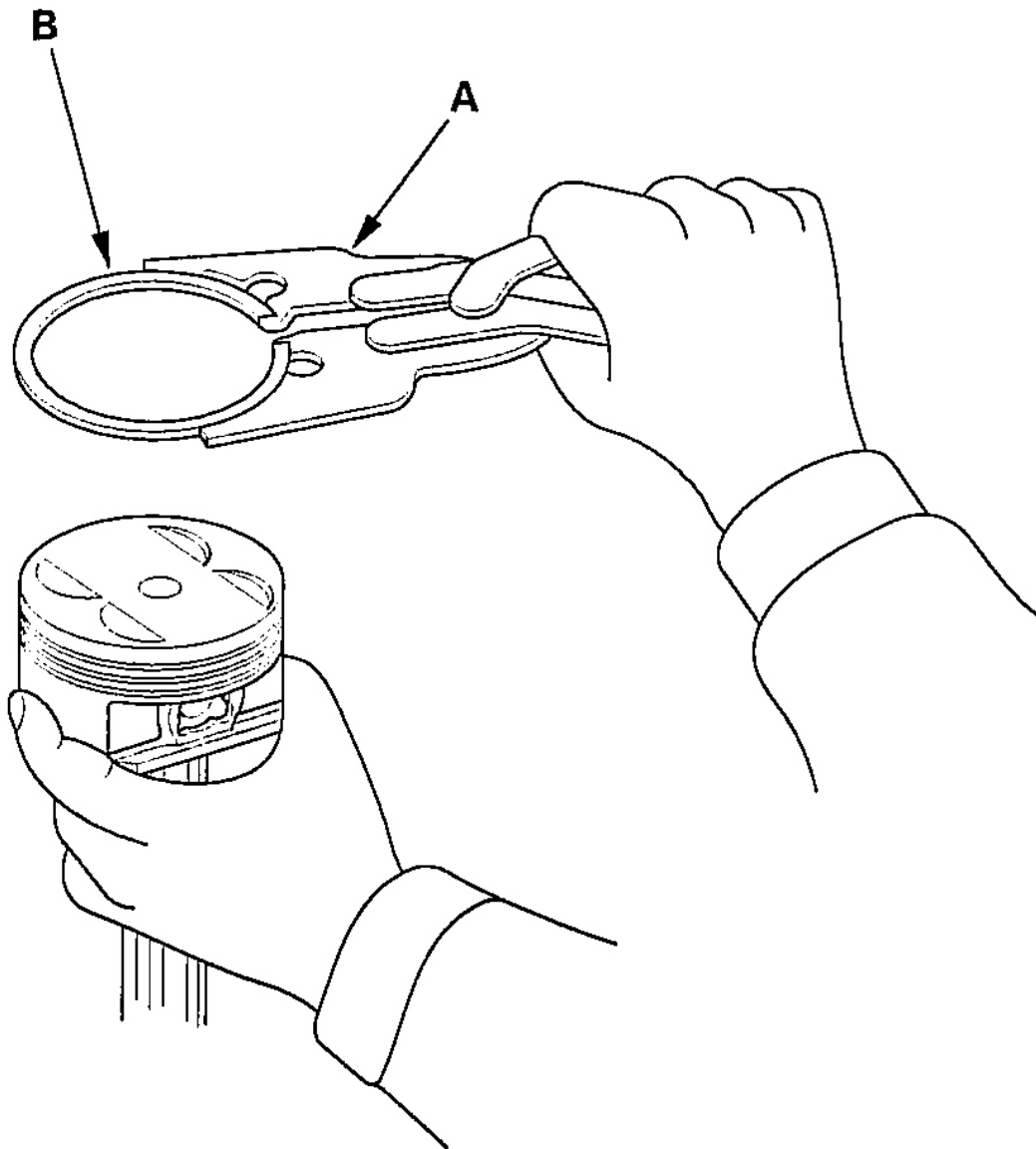
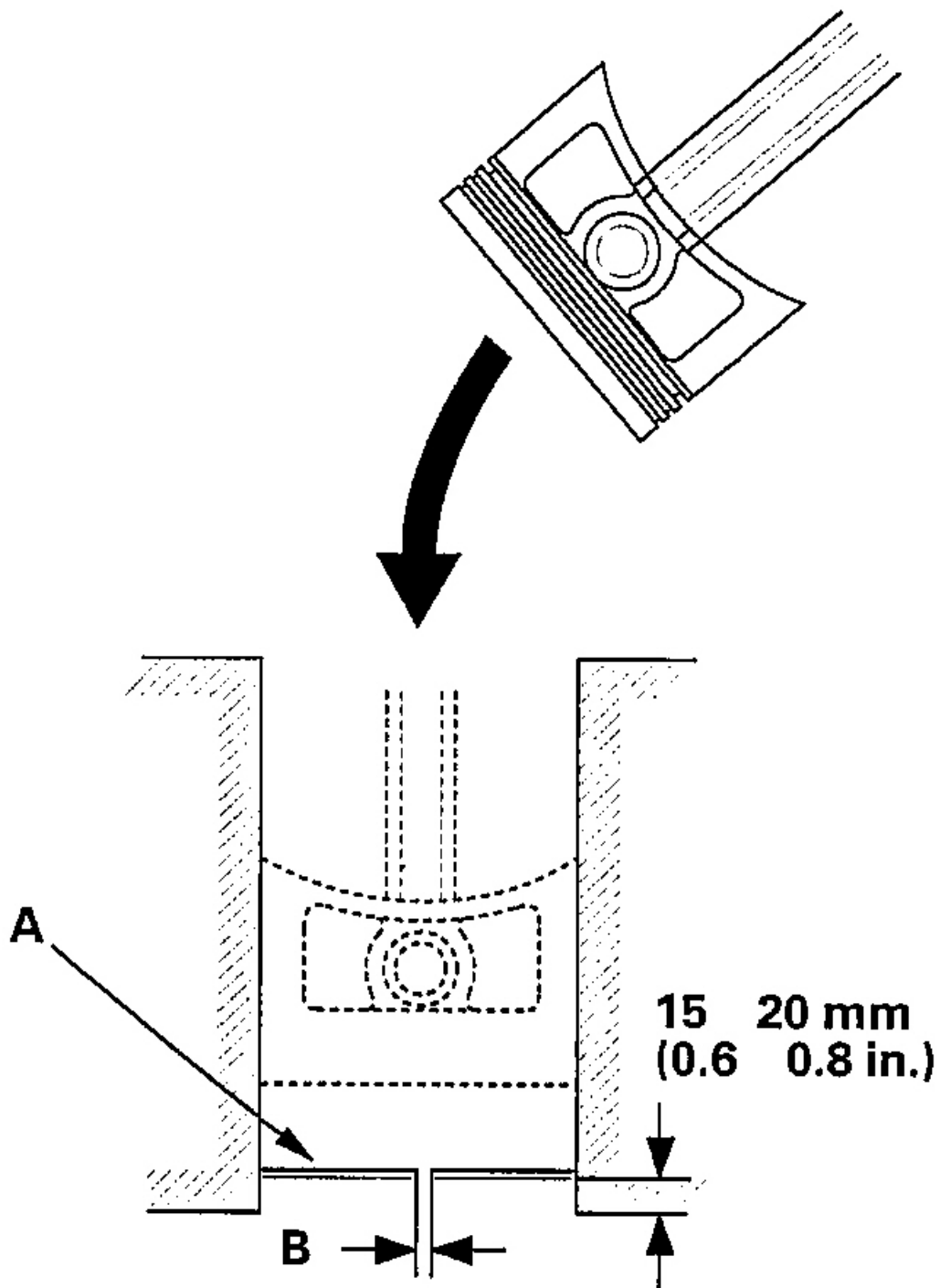
**G01954563**

Fig. 216: Removing Old Piston Rings

2. 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 ring groove is 1.0 mm (0.04 in.) wide. The second ring groove is 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 cleaning tools.

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

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



G01954564

Fig. 217: Pushing New Ring Into Cylinder Bore

4. Measure the piston ring end-gap (B) with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits (see **Block and Piston Inspection**). If the bore is over the service limit, the cylinder block must be rebored.

Piston Ring End-Gap:**Top Ring**

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

Service Limit: 0.60 mm (0.024 in.)

Second Ring

Standard (New): 0.30-0.45 mm (0.012-0.018 in.)

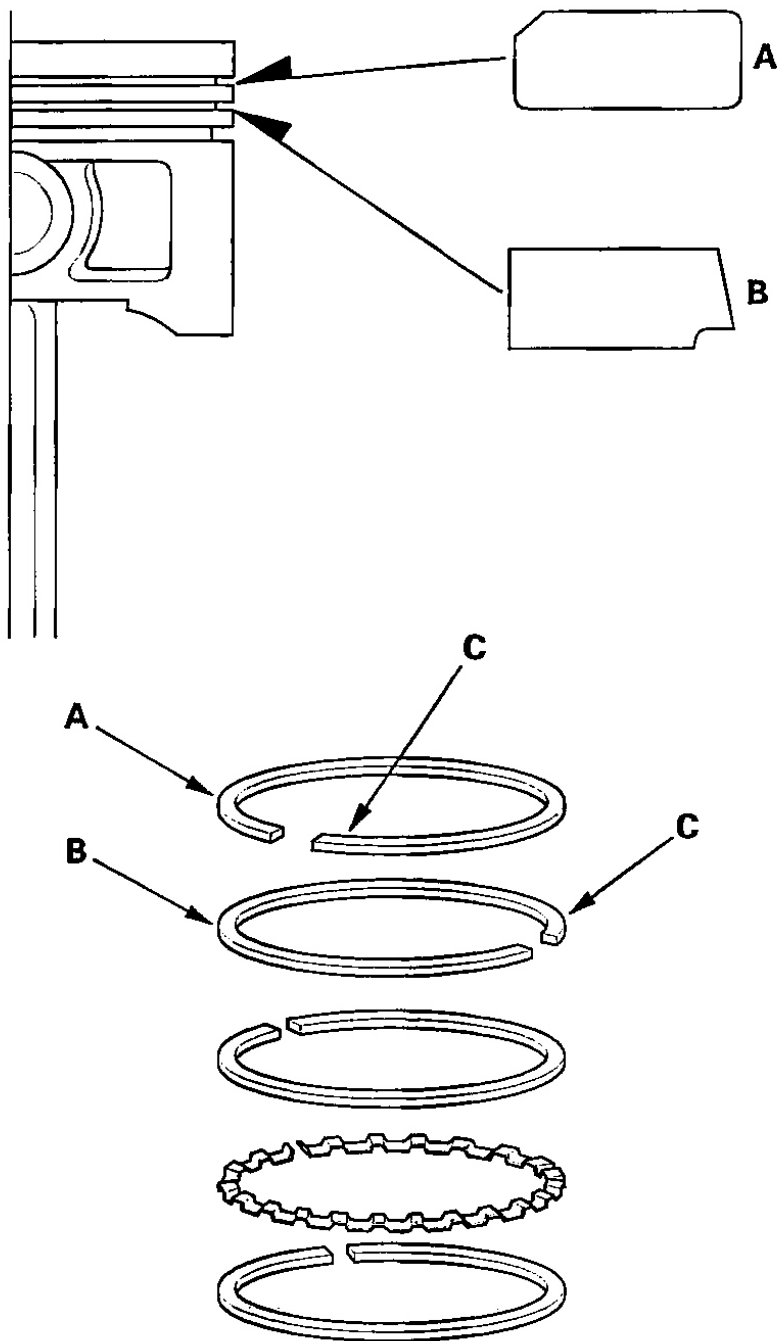
Service Limit: 0.60 mm (0.024 in.)

Oil Ring

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

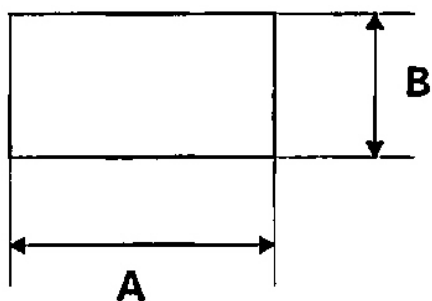
Service Limit: 0.80 mm (0.031 in.)

5. Install the top ring (A) has a IA mark and second ring (B) has a R mark. The manufacturing marks (C) must be facing upward.



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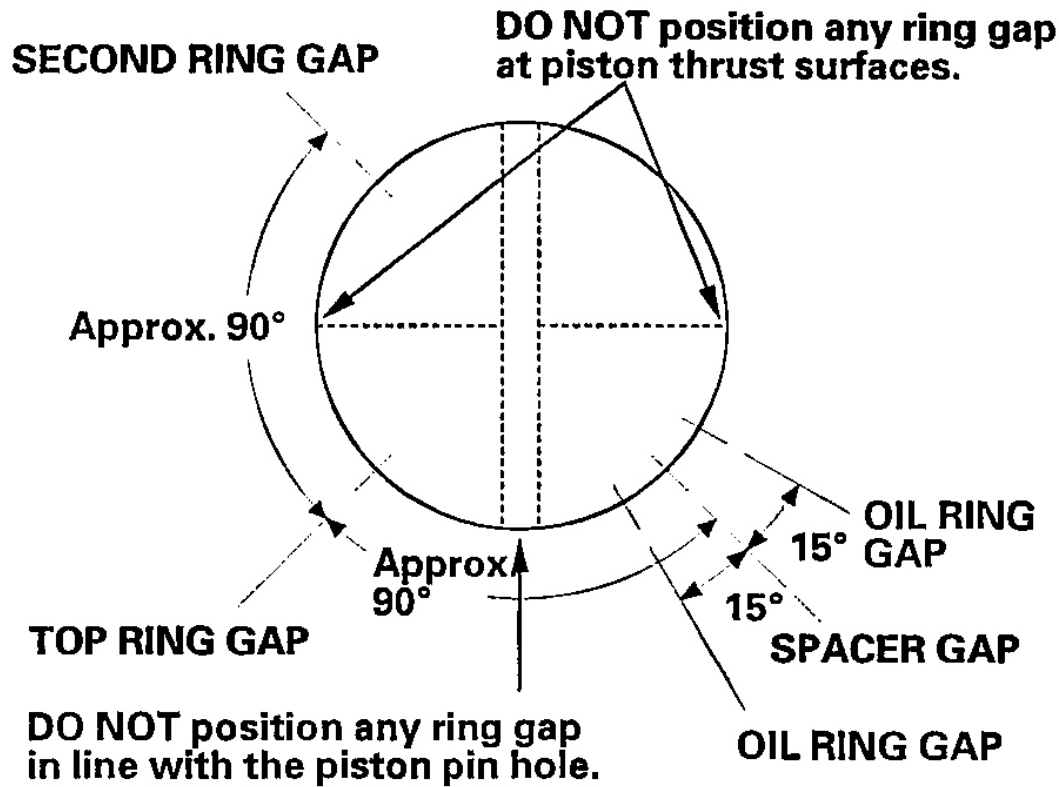
Fig. 218: Installing Top & Second Ring



G01954566

Top Ring (Standard):**A: 2.6 mm (0.10 in.)****B: 1.0 mm (0.04 in.)****Second Ring (Standard):****A: 3.0 mm (0.12 in.)****B: 1.2 mm (0.05 in.)****Fig. 219: Identifying Piston Ring Dimensions**

6. Rotate the rings in their grooves to make sure they do not bind.
7. Position the ring end gaps as shown in **Fig. 220** .



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Fig. 220: Positioning Ring End Gaps

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

Top Ring Clearance

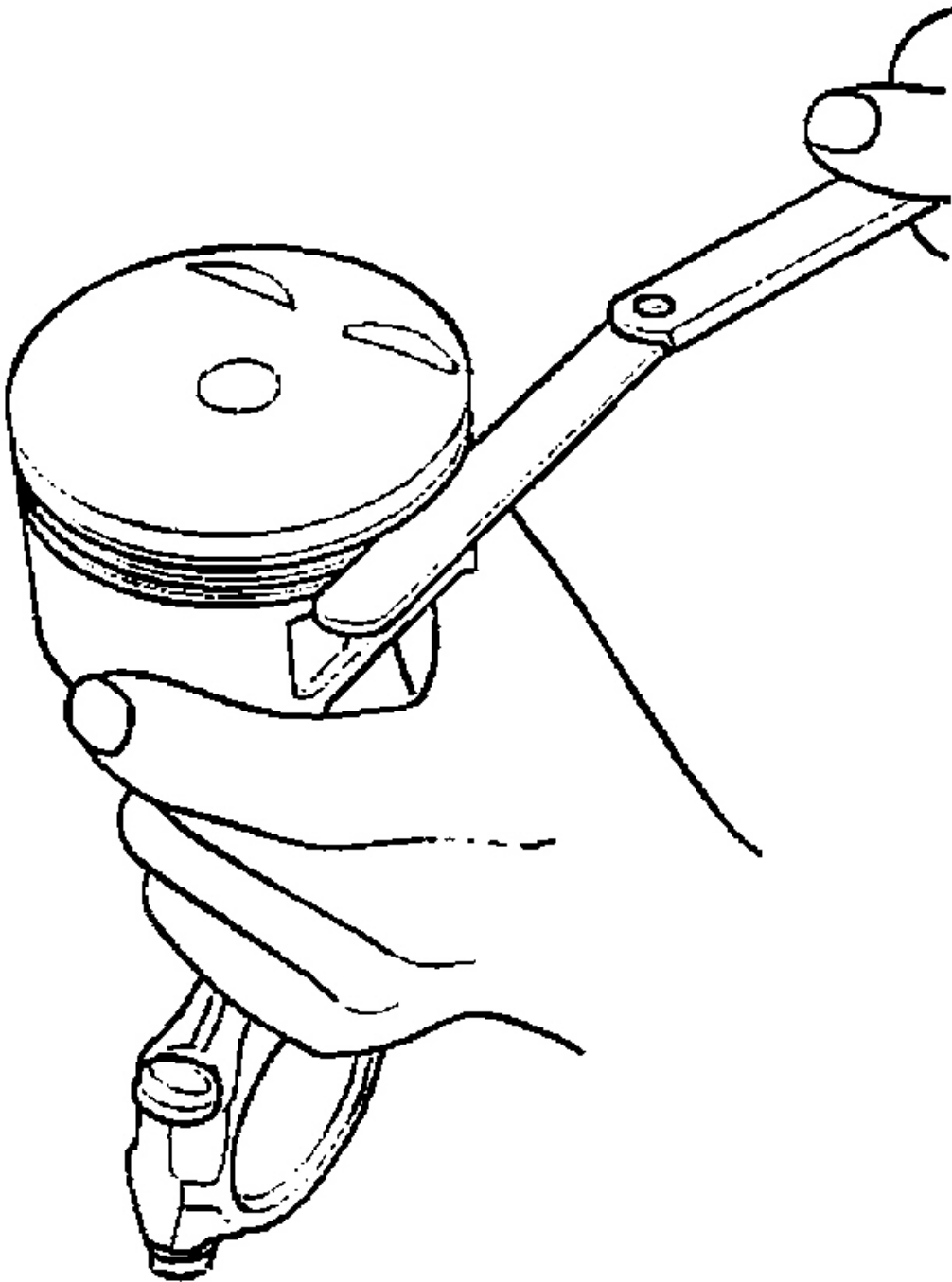
Standard (New): 0.035-0.060 mm (0.0014-0.0024 in.)

Service Limit: 0.13 mm (0.005 in.)

Second Ring Clearance

Standard (New): 0.030-0.055 mm (0.0012-0.0022 in.)

Service Limit: 0.13 mm (0.005 in.)

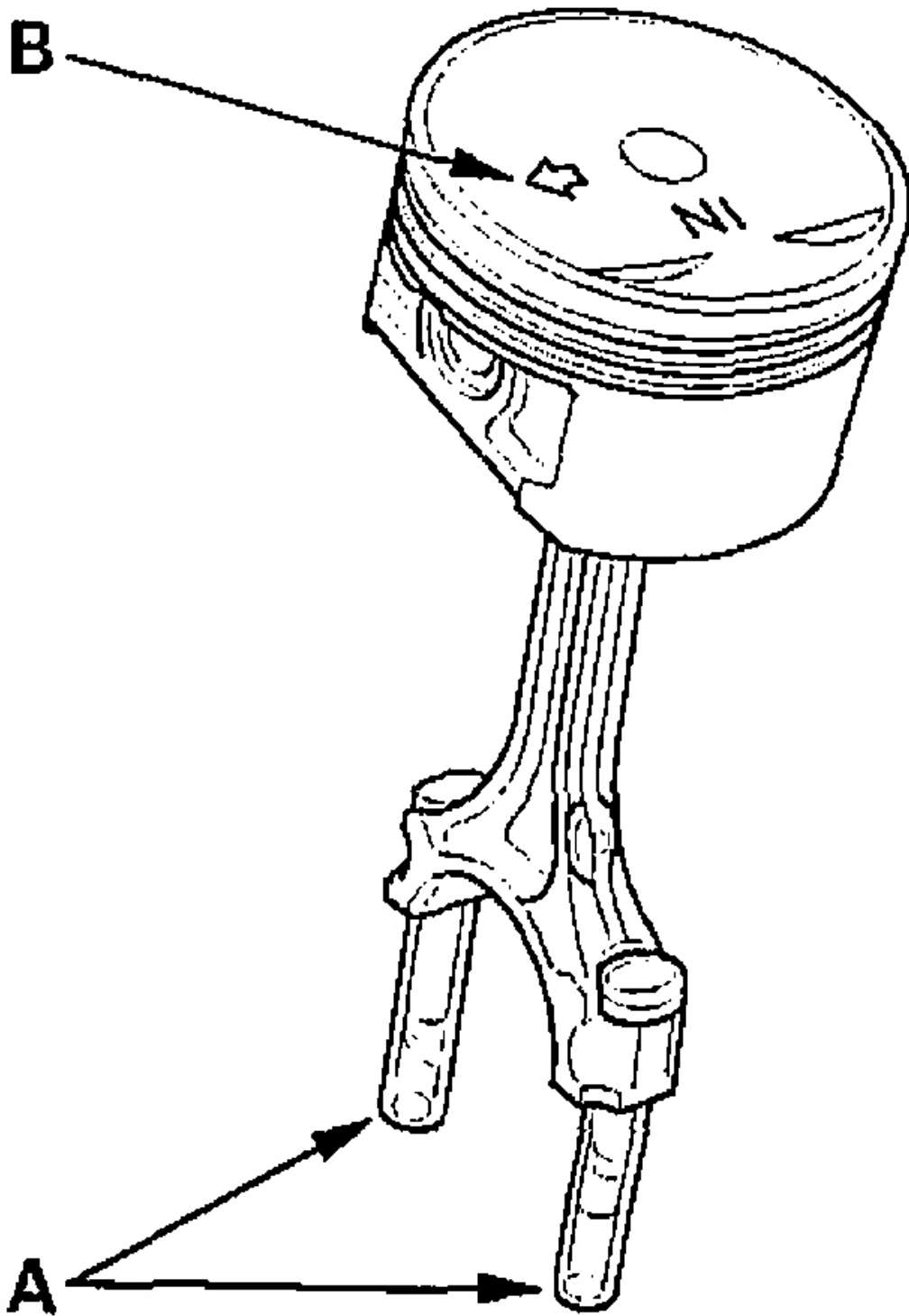


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Fig. 221: Measuring Ring-To-Groove Clearances

PISTON INSTALLATION**If the crankshaft is already installed**

1. Set the crankshaft to BDC for each cylinder.
2. Remove the connecting rod caps, and slip short sections of rubber hose (A) over the connecting rod bolts. Then install the ring compressor, and check that the bearing is securely in place.



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Fig. 222: Removing Connecting Rod Caps

3. Position the arrow (B) facing the timing belt side of the engine.
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.

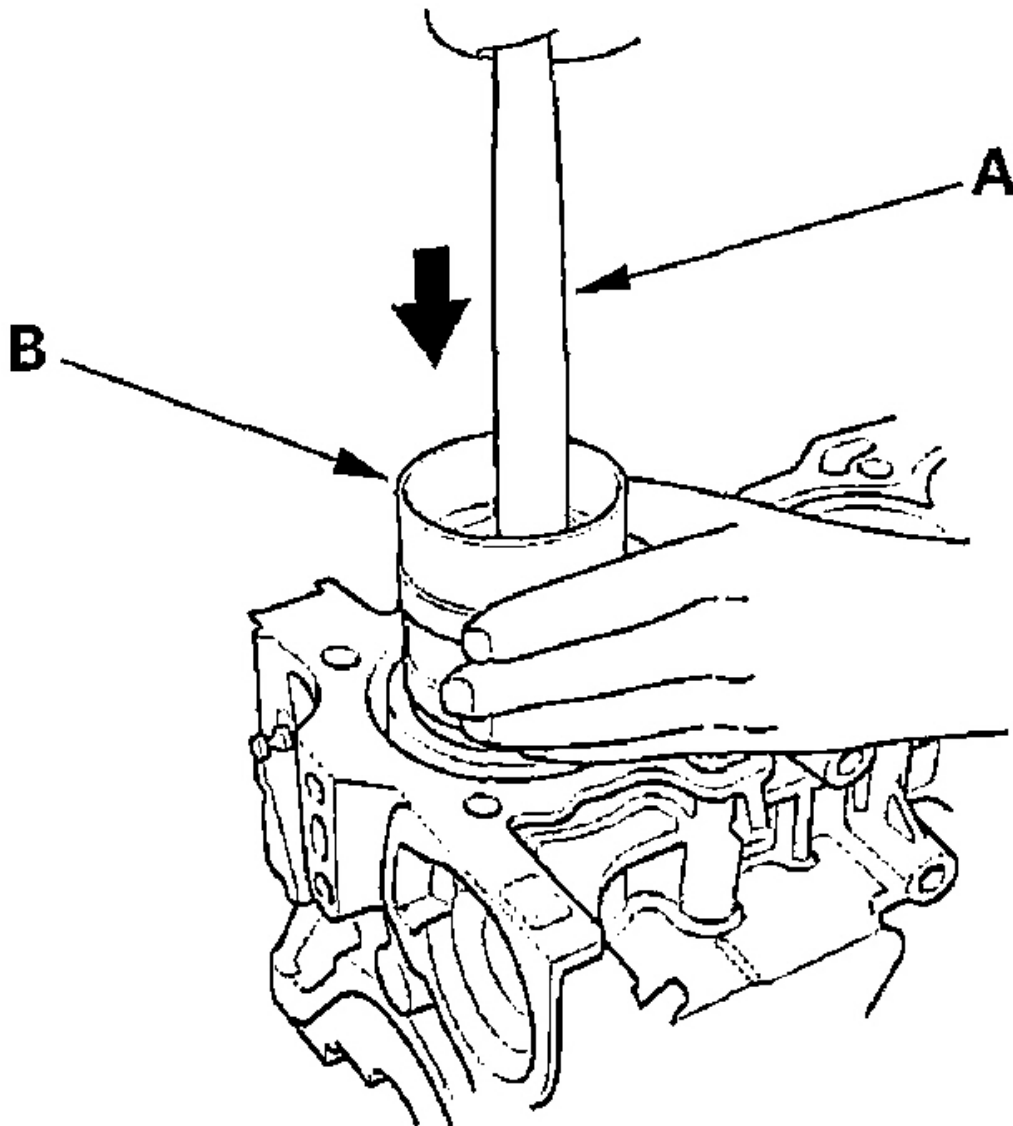
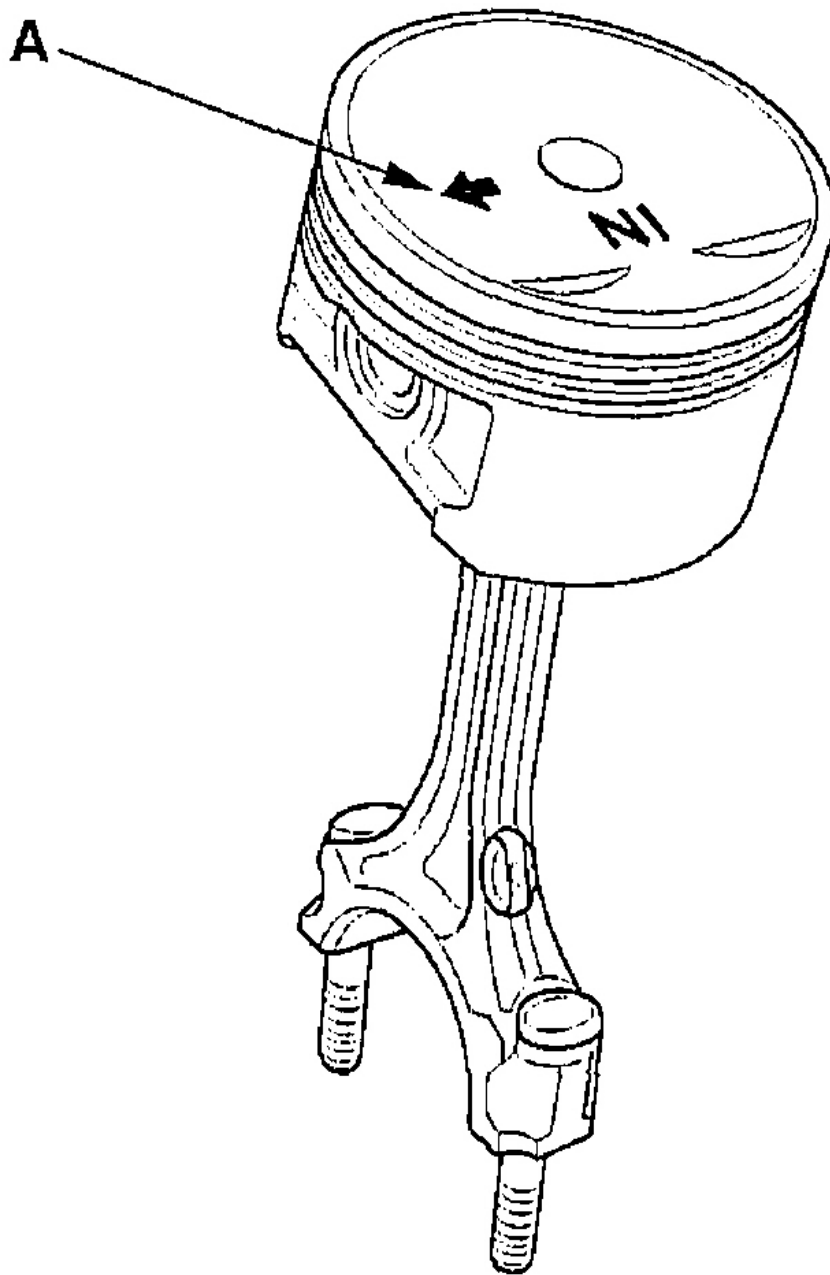
**G01954570**

Fig. 223: Positioning Piston In Cylinder

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. Apply engine oil to the bolt threads, then install the rod caps with bearings. Torque the nuts to 32 N.m (3.3 kgf.m, 24 lbf.Ft).

If the crankshaft is not installed

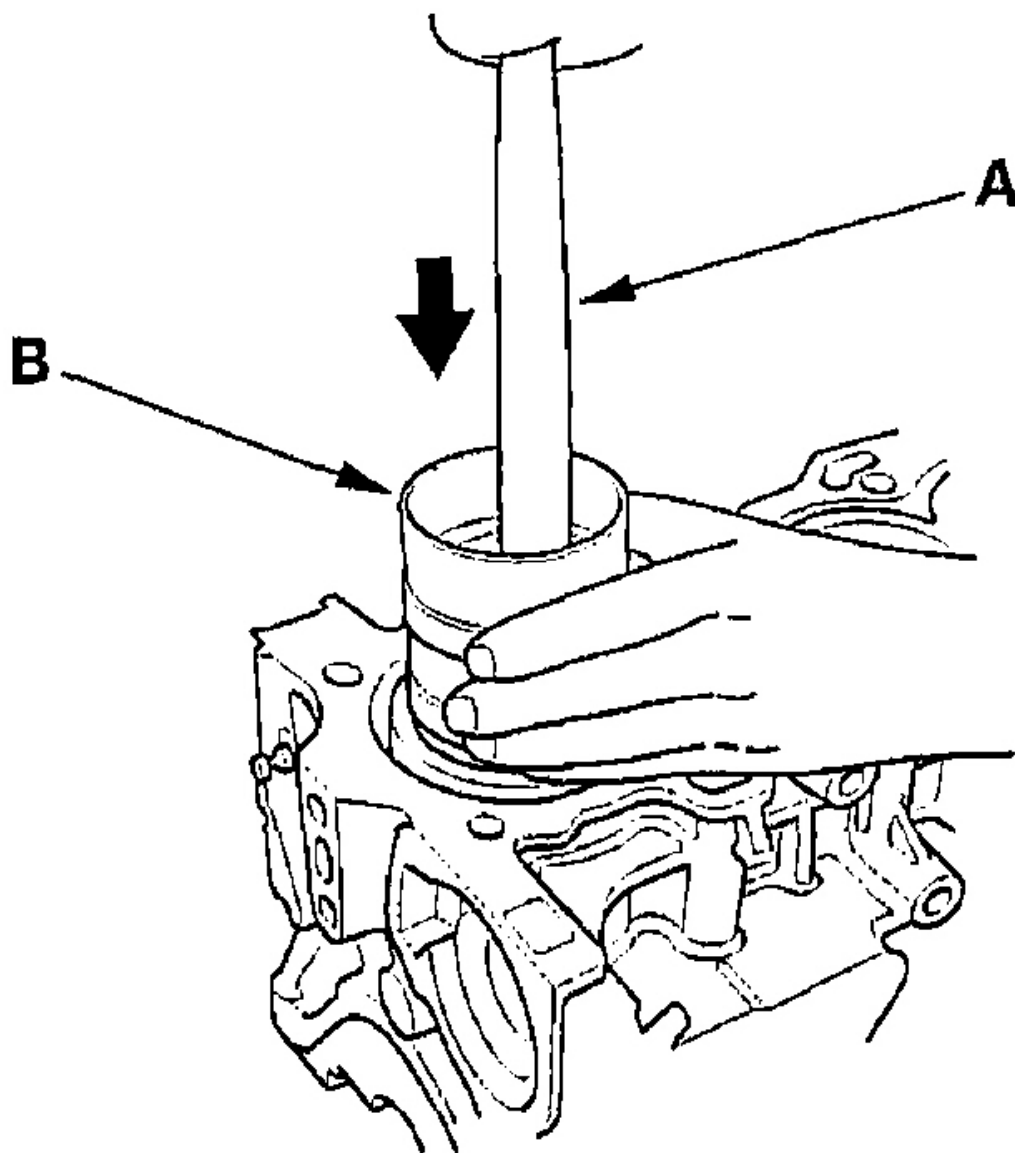
1. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
2. Position the arrow (A) facing the timing belt side of the engine.



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Fig. 224: Positioning Arrow Facing Timing Belt Side Of Engine

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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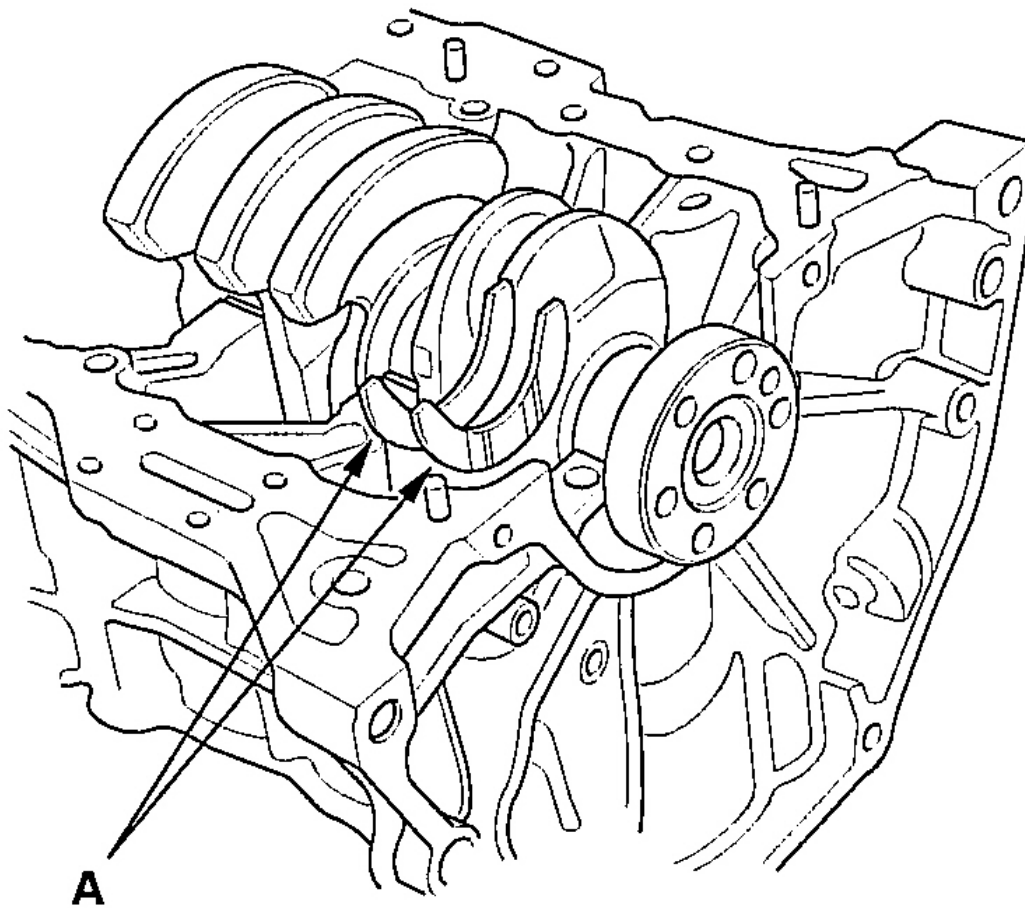
Fig. 225: Positioning Piston In Cylinder

4. Position all pistons at top dead center.

CRANKSHAFT INSTALLATION

Special Tools Required

- Driver 07749-0010000
 - Driver Attachment, 96 mm 07948-SB00101
1. Apply engine oil to the main bearings and rod bearings.
 2. Install the bearing halves in the cylinder block and connecting rods.
 3. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the block.
 4. Install the thrust washers (A) on both edges of the No. 4 main bearing recess.



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Fig. 226: Installing Thrust Washers

5. Apply engine oil to the threads of the connecting rod bolts.
6. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Install the caps and nuts finger

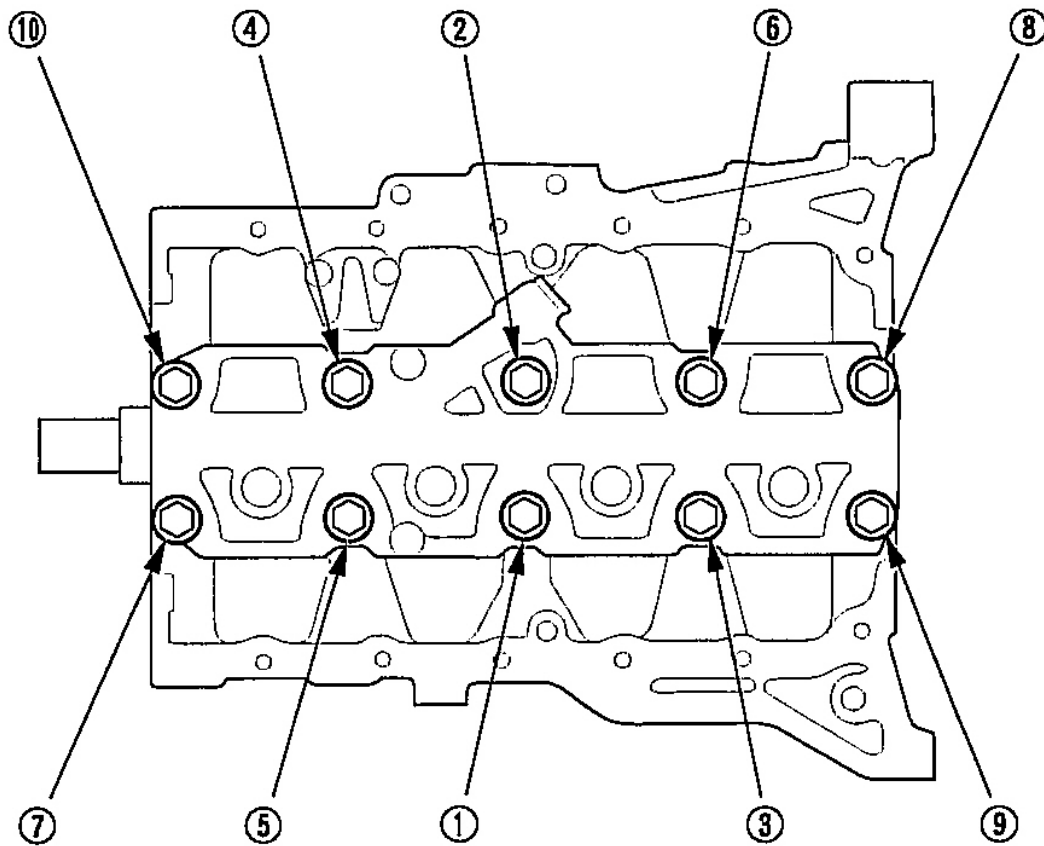
tight. Install the cap so the bearing recess is on the same side as the recess in the rod.

7. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Install the connecting rod cap and bolts finger tight.
8. Check the connecting rod bearing clearance with plastigage (see **Connecting Rod Bearing Replacement**).
9. Tighten the connecting rod bolts to 32 N.m (3.3 kgf.m, 24 lbf.Ft).
10. Check the main bearing clearance with plastigage (see **Crankshaft Main Bearing Replacement**).
11. Install the bearing cap bridge. Coat the bolt threads with engine oil.
12. Torque the cylinder head bolts sequentially in 2 steps.

1st step torque: 25 N.m (2.5 kgf.m, 18 lbf.Ft)

2nd step torque: 51 N.m (5.2 kgf.m, 38 lbf.Ft)

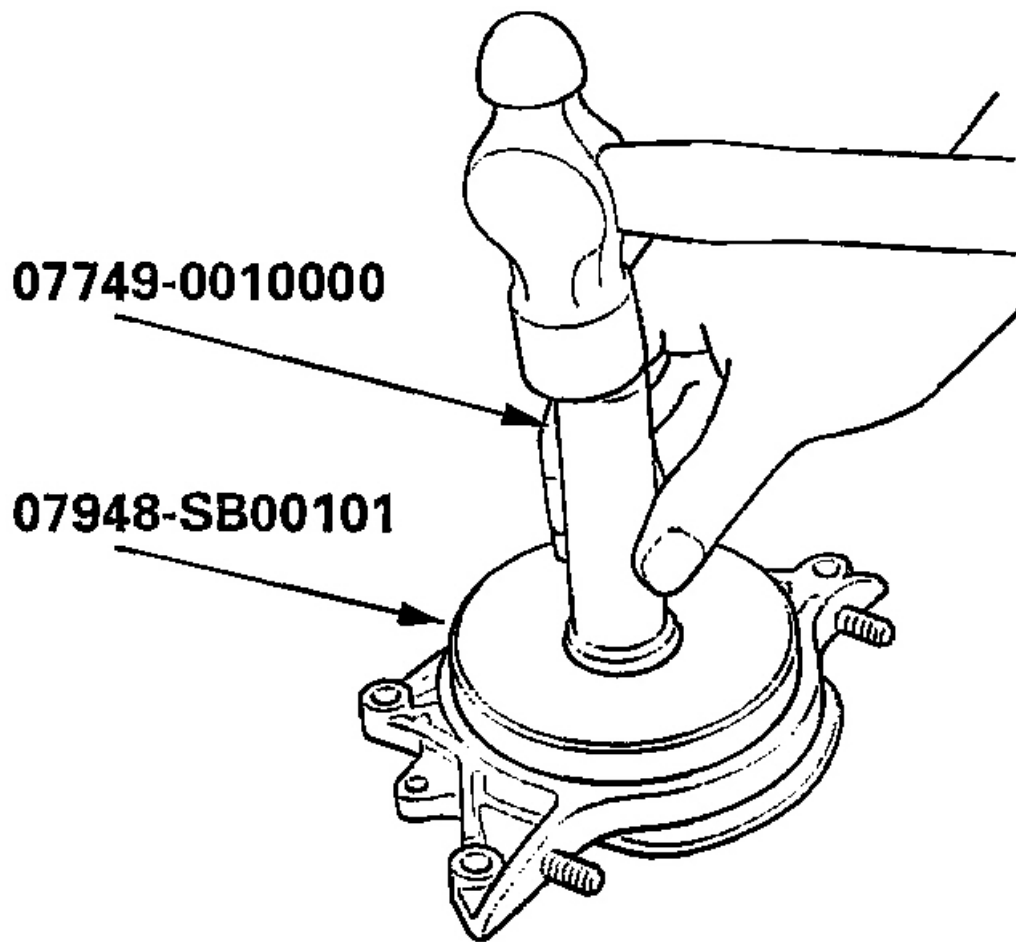
NOTE: **Whenever any crankshaft or connecting rod bearing is replaced, it is necessary after reassembly to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for approximately 15 minutes.**



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Fig. 227: Bearing Cap Bolts Tightening Sequence

13. The seal mating surface on the engine block end cover should be dry. Apply a light coat of grease to the crankshaft and to the lip of the seal.
14. Drive the crankshaft oil seal squarely into the engine block end cover.

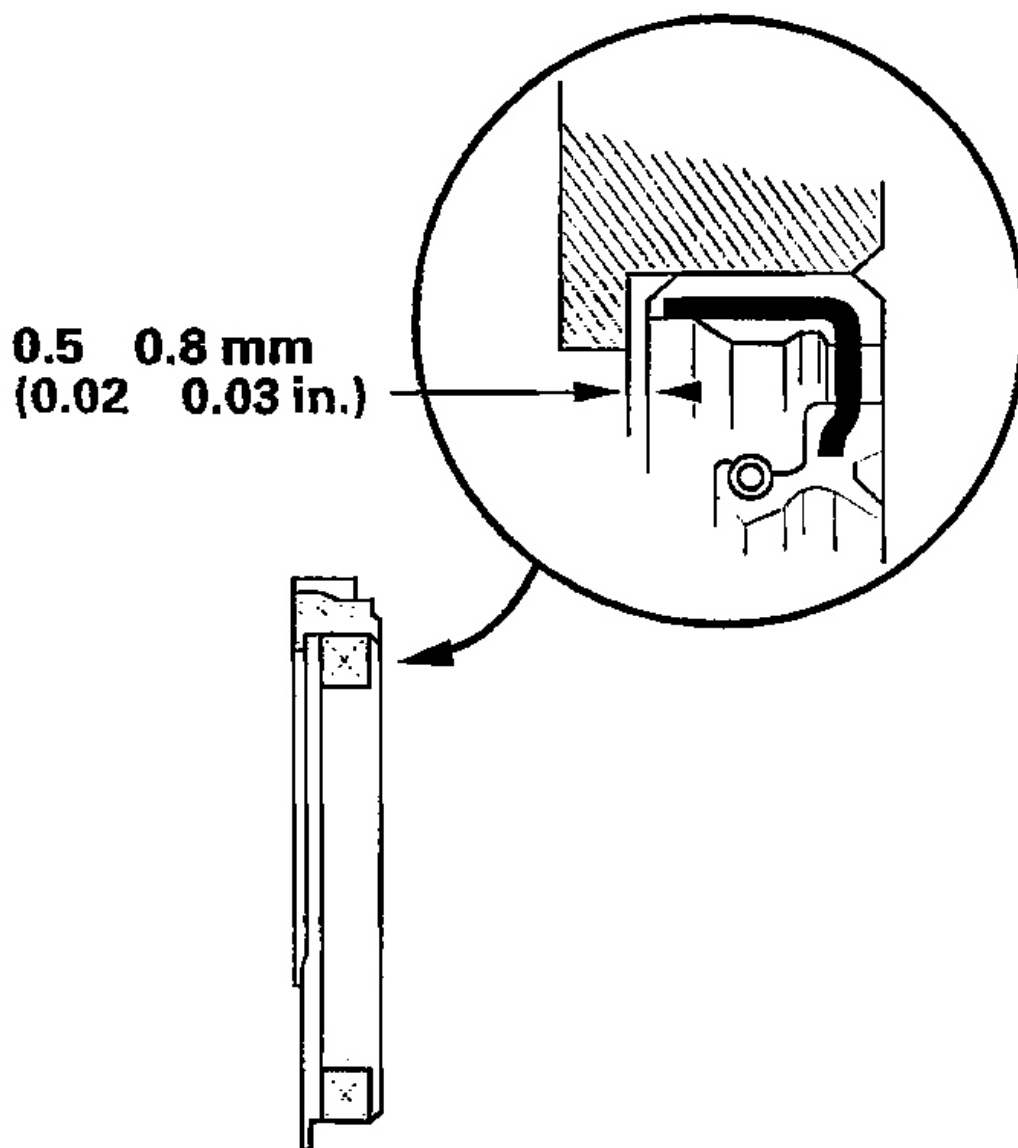


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Fig. 228: Driving Crankshaft Oil Seal Squarely Into Engine Block End Cover

15. Confirm that the clearance is equal all the way around with a feeler gauge.

Clearance: 0.5-0.8 mm (0.02-0.03 in.)

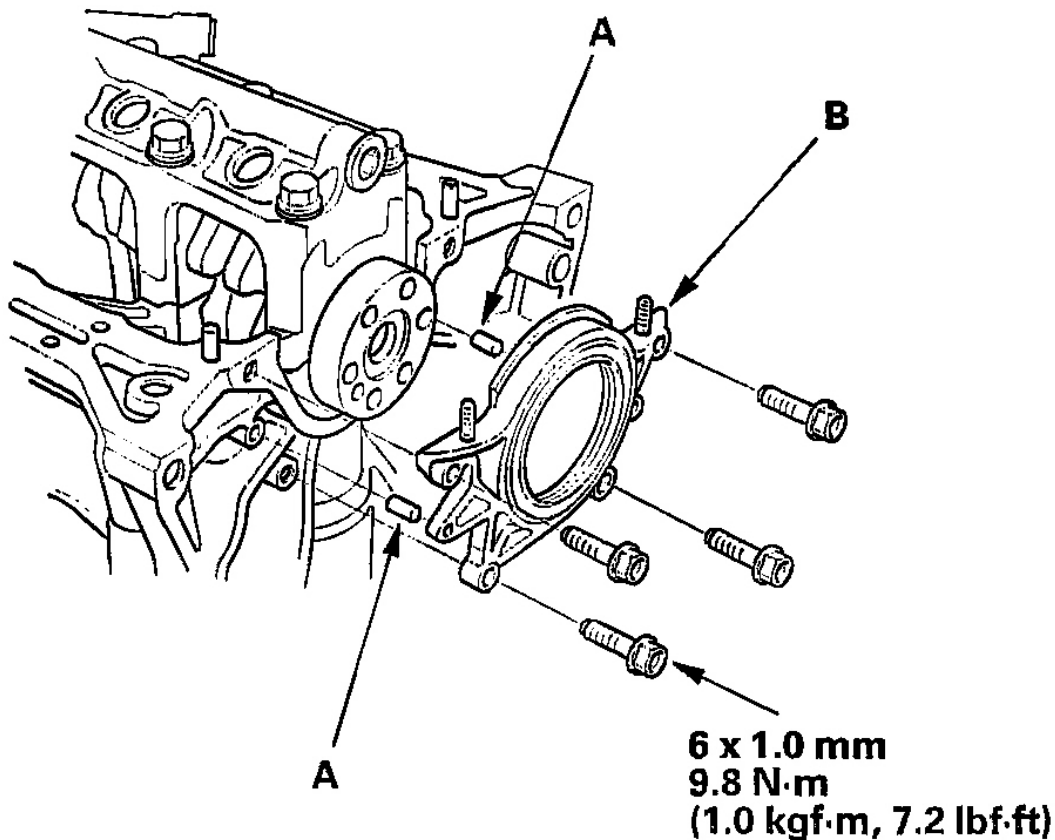


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Fig. 229: Confirming Clearance Is Equal

16. Clean and dry the engine block end cover mating surfaces.
17. Apply liquid gasket, part No. 08718-0001 or 08718-0003, evenly to the block mating surface of the engine block end cover and to the inner threads of the bolt holes. Install the dowel pins (A), and the engine block end cover (B) on the cylinder block.

NOTE: Do not install the parts if 5 minutes or more have elapsed since applying the liquid gasket. Instead, reapply liquid gasket after removing the old residue.



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Fig. 230: Applying Liquid Gasket To Engine Block Mating Surface

18. After assembly, wait at least 30 minutes before filling the engine with oil.
19. Clean and dry the oil pump mating surfaces.
20. Install the oil pump (A).
 - Install a new crankshaft oil seal in the oil pump (see **OIL PUMP OVERHAUL**).
 - Apply liquid gasket, part No. 08718-0001 or 08718-0003, evenly to the block mating surface of the oil pump and to the inner threads of the bolt holes.
 - Grease the lip of the oil seal and apply oil to the new O-ring (B).
 - Install the dowel pins (C), then align the inner rotor with the crankshaft and install the oil pump.
 - Clean the excess grease off the crankshaft and check the seal for distortion.

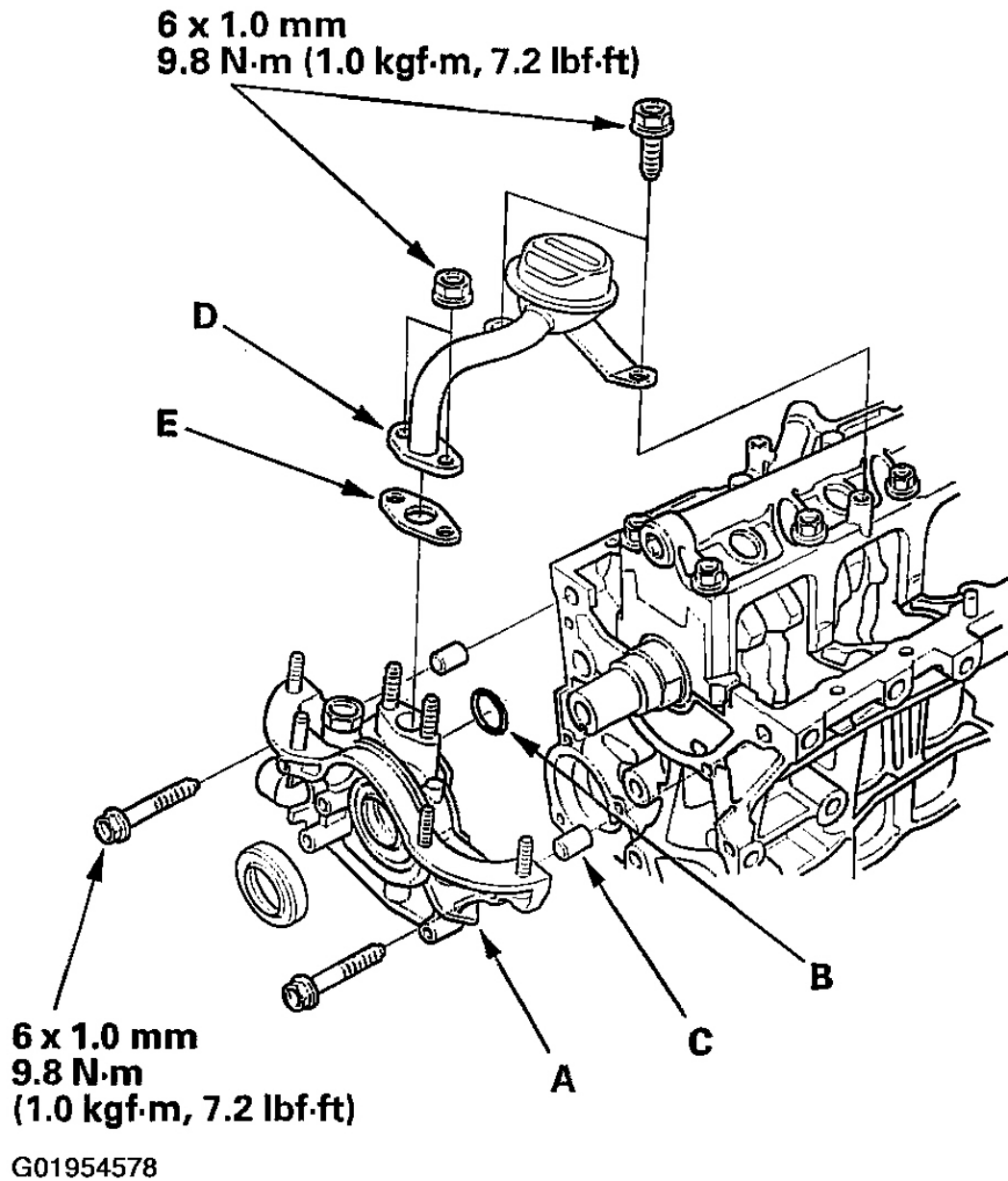


Fig. 231: Installing Oil Pump

21. Install the oil screen (D) with a new gasket (E).
22. Install the oil pan (see **Oil Pan Installation**).

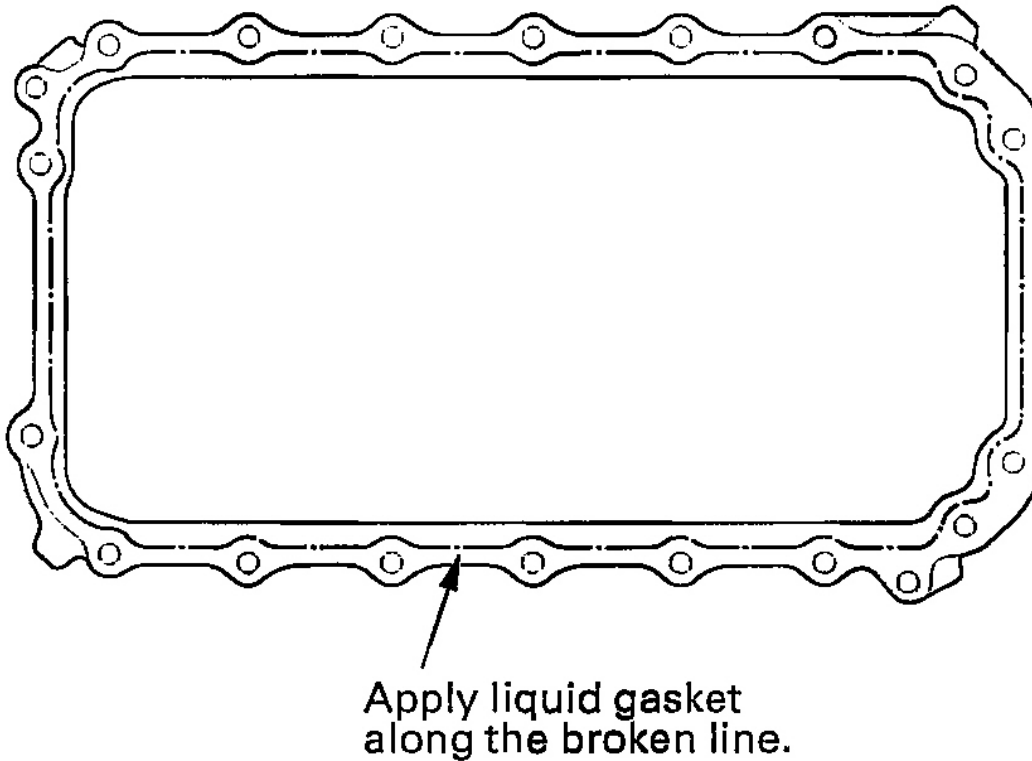
OIL PAN INSTALLATION

1. Clean and dry the oil pan mating surfaces and bolt holes.

2. Apply liquid gasket, part No. 08718-0001 or 08718-0003, evenly to the oil pan mating surface of the block and to the inner threads of the bolt holes.

NOTE:

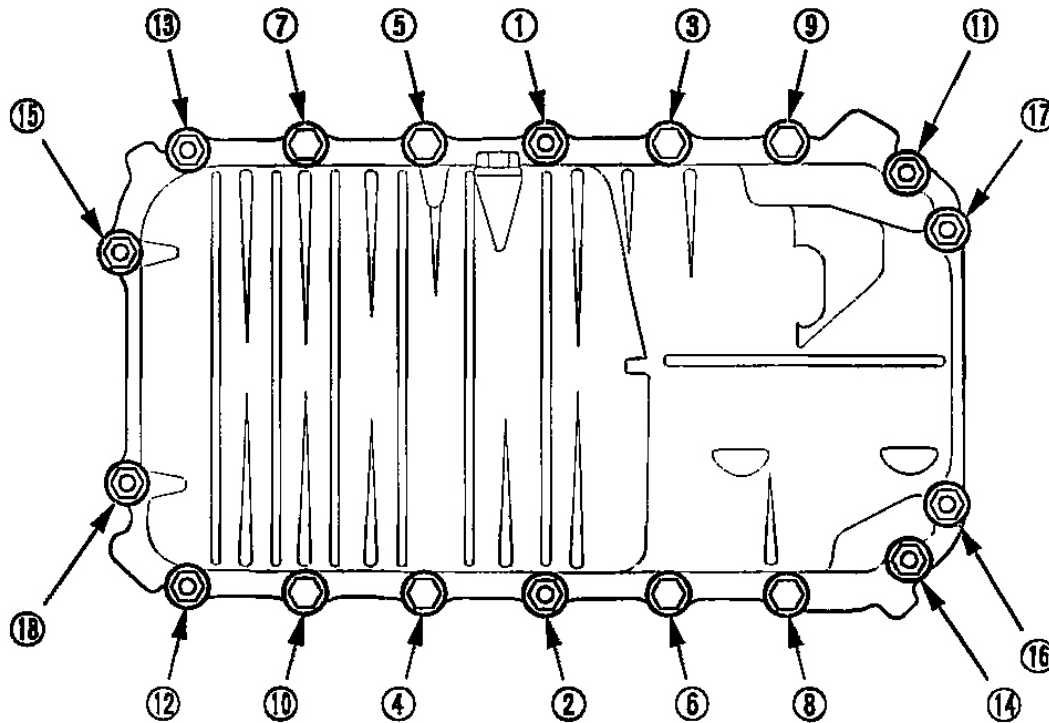
- Apply liquid gasket 4 mm wide.
- Apply liquid gasket doubly to the jointing point of the liquid gasket.



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Fig. 232: Applying Liquid Gasket

3. Install the oil pan.
4. Tighten the bolts in 2 or 3 steps. In the final step, tighten all bolts, in sequence to 12 N.m (1.2 kgf.m, 8.7 lbf.Ft).



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Fig. 233: Oil Pan Tightening Sequence

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

PULLEY END CRANKSHAFT SEAL INSTALLATION-IN-CAR**Special Tools Required**

Inner driver handle 07746-0030100

1. Dry the crankshaft oil seal housing.
2. Apply a light coat of grease to the crankshaft and to the lip of the seal.
3. Using the seal driver, drive in the crankshaft oil seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.

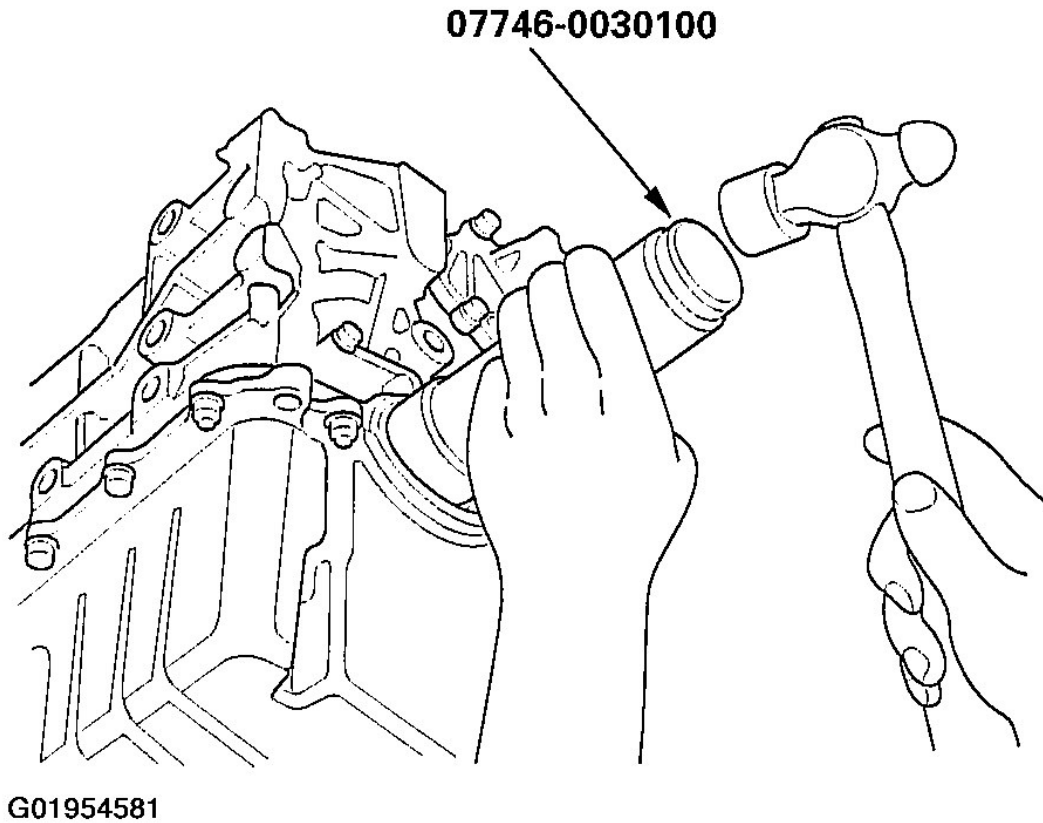


Fig. 234: Driving In Crankshaft Oil Seal

TRANSMISSION END CRANKSHAFT SEAL INSTALLATION-IN-CAR

Special Tools Required

- Driver 07749-0010000
- Driver attachment, 96 mm 07948-SB00101

1. Dry the crankshaft oil seal housing.
2. Apply a light coat of grease to the crankshaft and to the lip of the seal.
3. Using the special tools, drive in the crankshaft oil seal until the driver bottoms against the engine block end cover. When the seal is in place, clean any excess grease off the crankshaft and check that the oil seal lip is not distorted.

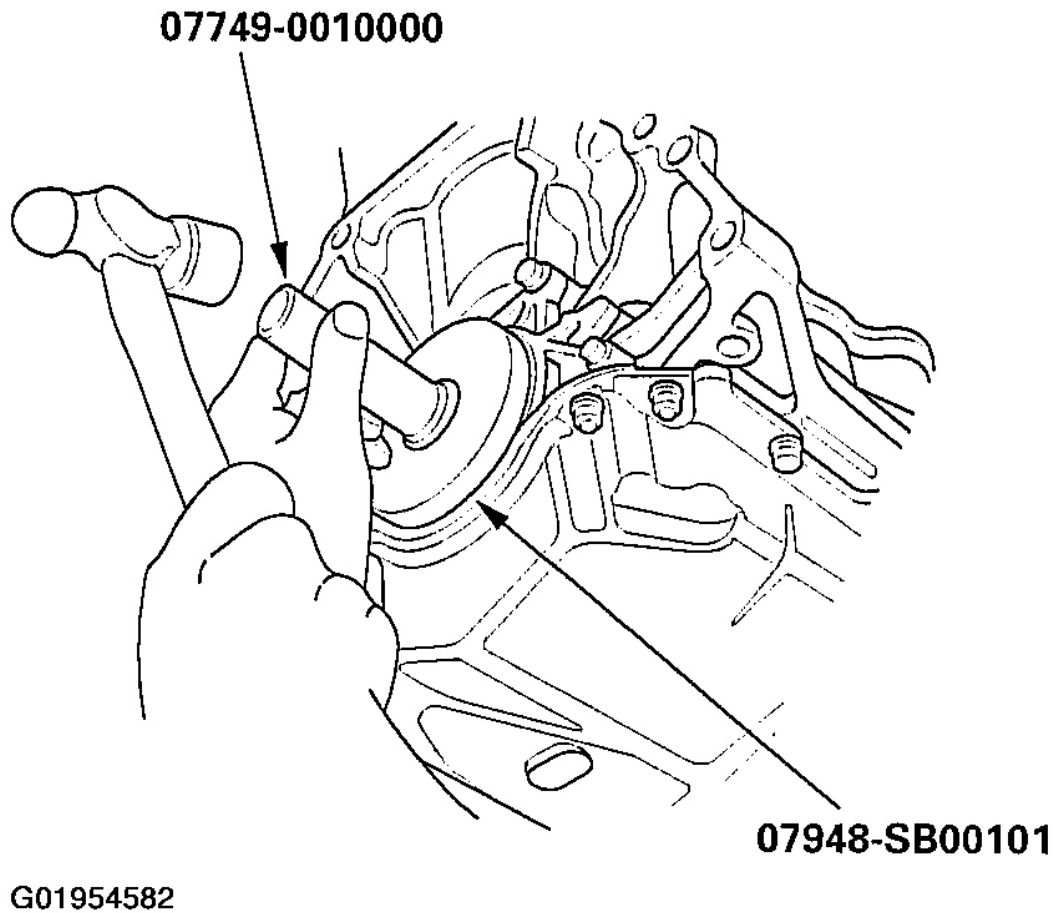
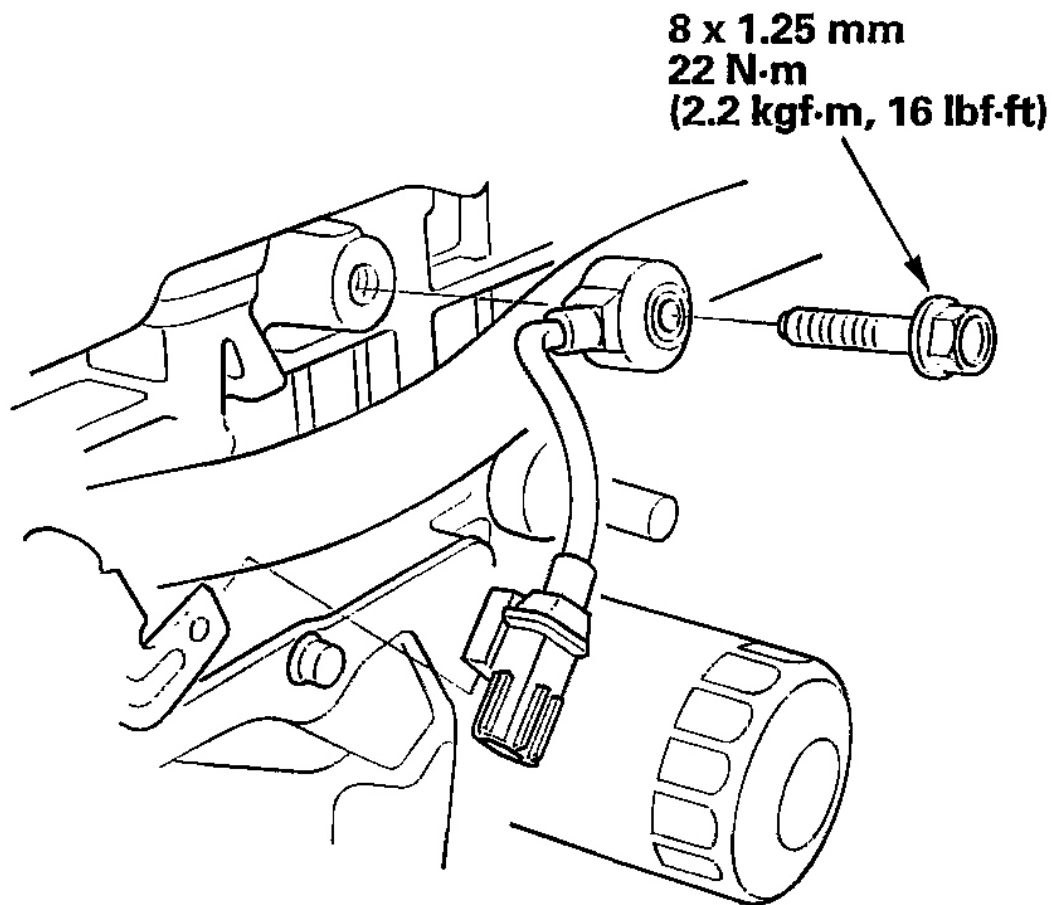


Fig. 235: Driving In Crankshaft Oil Seal

KNOCK SENSOR REPLACEMENT

1. Disconnect the knock sensor connector, then remove the knock sensor.



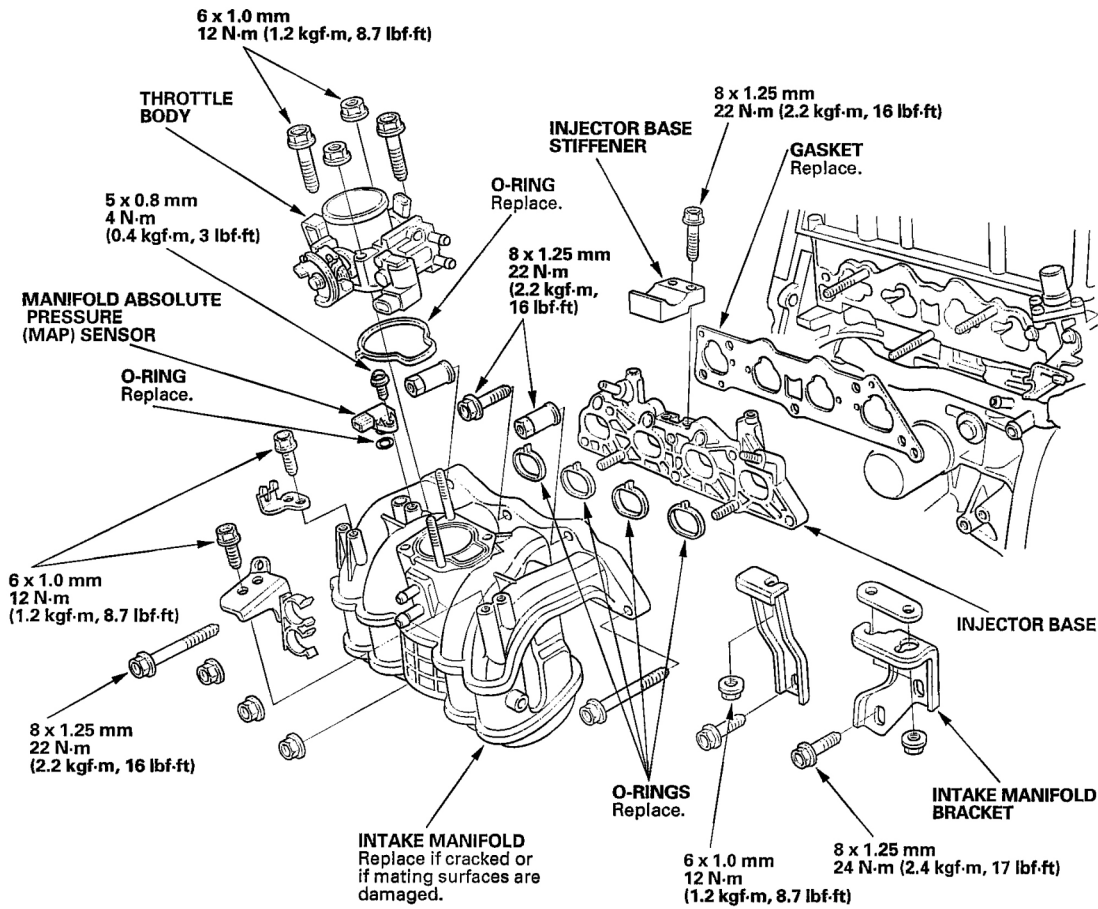
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Fig. 236: Removing Knock Sensor

2. Install the knock sensor.

INTAKE MANIFOLD REMOVAL AND INSTALLATION

NOTE: Use new O-rings and gasket when reassembling.

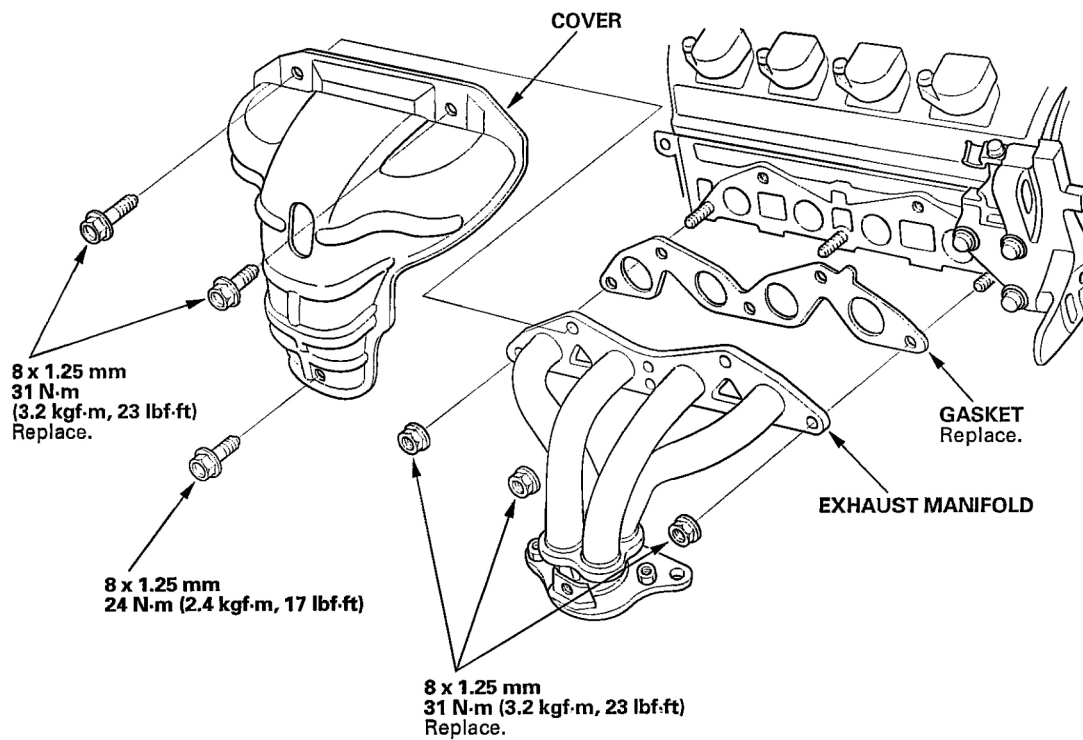


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Fig. 237: Exploded View Of Intake Manifold

EXHAUST MANIFOLD REMOVAL AND INSTALLATION

NOTE: Use a new gasket when reassembling.



G01954606

Fig. 238: Exploded View Of Exhaust Manifold