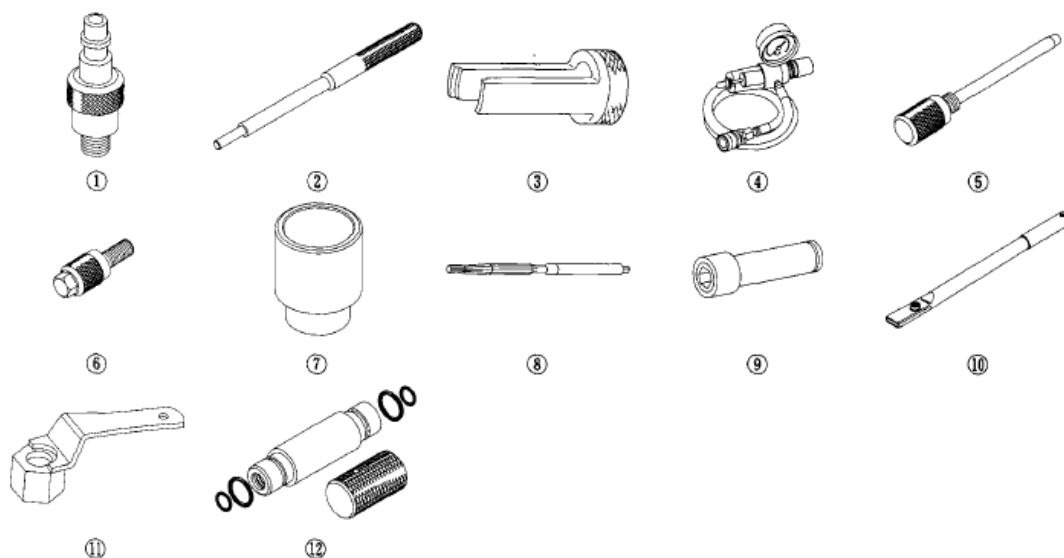


2011-12 ENGINE

Cylinder Head - RL

SPECIAL TOOLS

Ref.No.	Tool Number	Description	Qty
①	070AJ-001A101	VCM Air Adapter	1
②	07742-0010100	Valve Guide Driver, 5.35 x 9.7 mm	1
③	07757-PJ1010A	Valve Spring Compressor Attachment	1
④	07AAJ-PNAA101	Air Pressure Regulator	1
⑤	07AAJ-R70A100	VTEC Air Stop Tool A	1
⑥	07AAJ-R70A200	VTEC Air Stop Tool B	1
⑦	07GAF-SD40330	Ball Joint Remover/Installer	1
⑧	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
⑨	07JAA-001020A	Socket, 19 mm	1
⑩	07JAB-001020B	Holder Handle	1
⑪	07MAB-PY3010A	Holder Attachment, 50 mm, Offset	1
⑫	07PAD-0010000	Stem Seal Driver	1

**Fig. 1: Identifying Cylinder Head Components**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

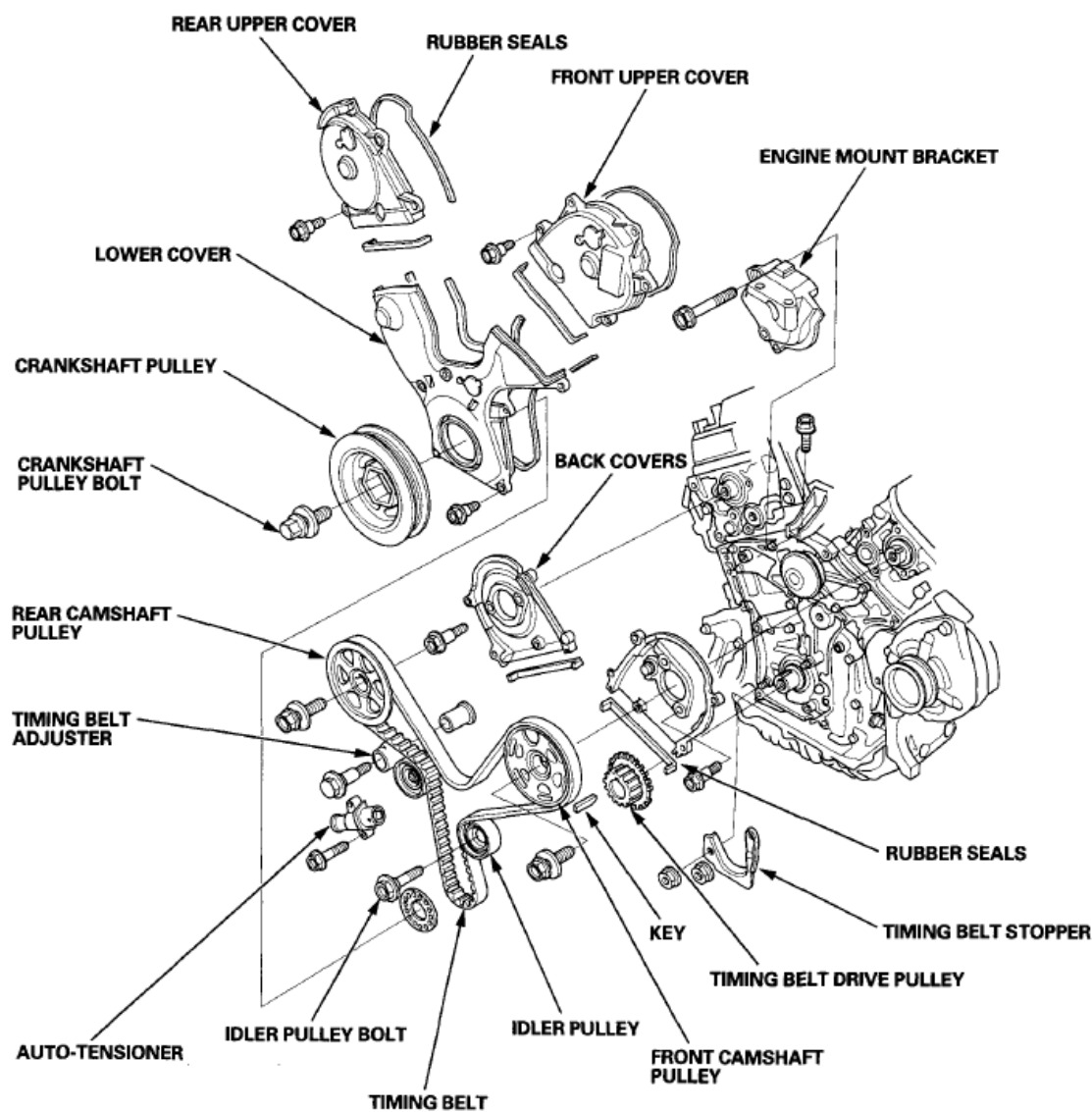


Fig. 2: Exploded View Of Timing Belt Components Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

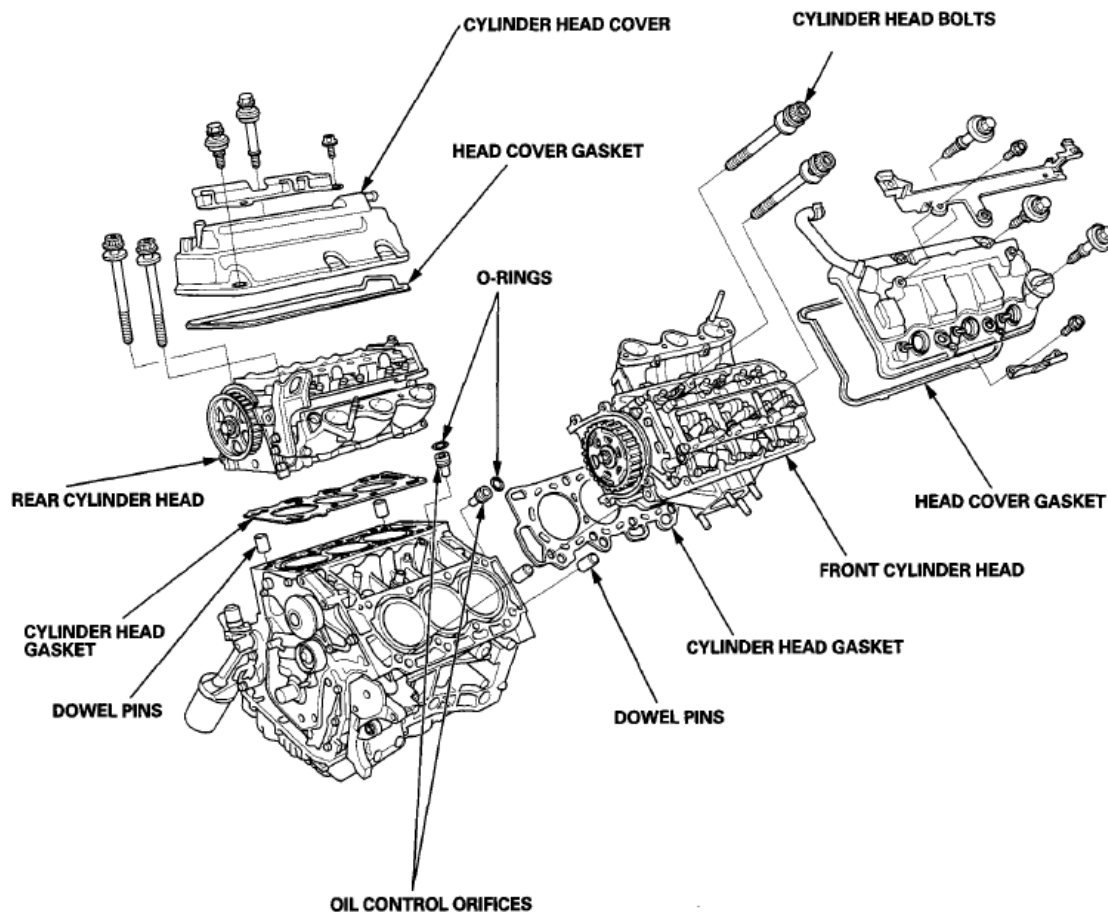


Fig. 3: Exploded View Of Cylinder Head Replacement Components Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

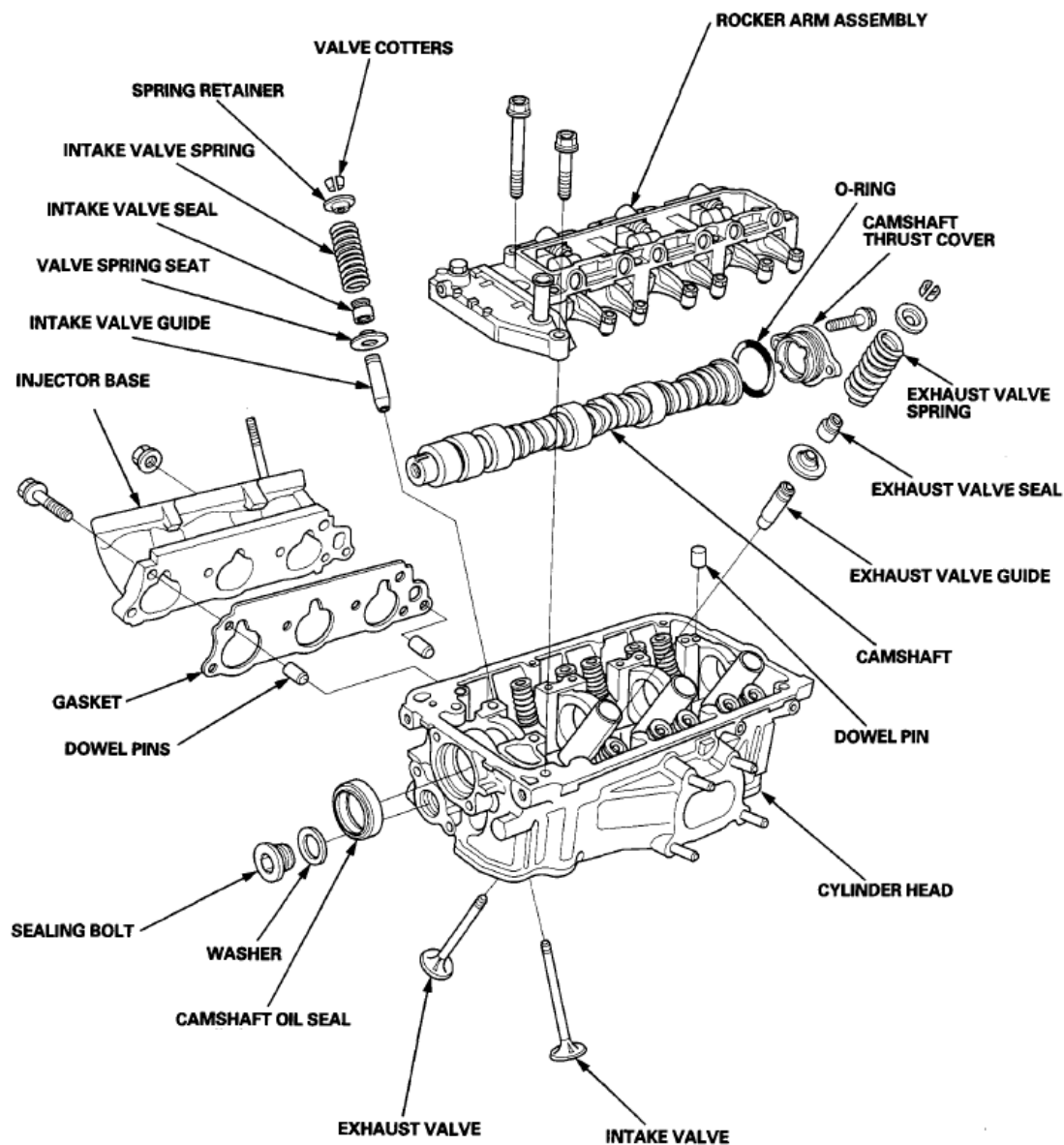


Fig. 4: Exploded View Of Cylinder Head - Front Components Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

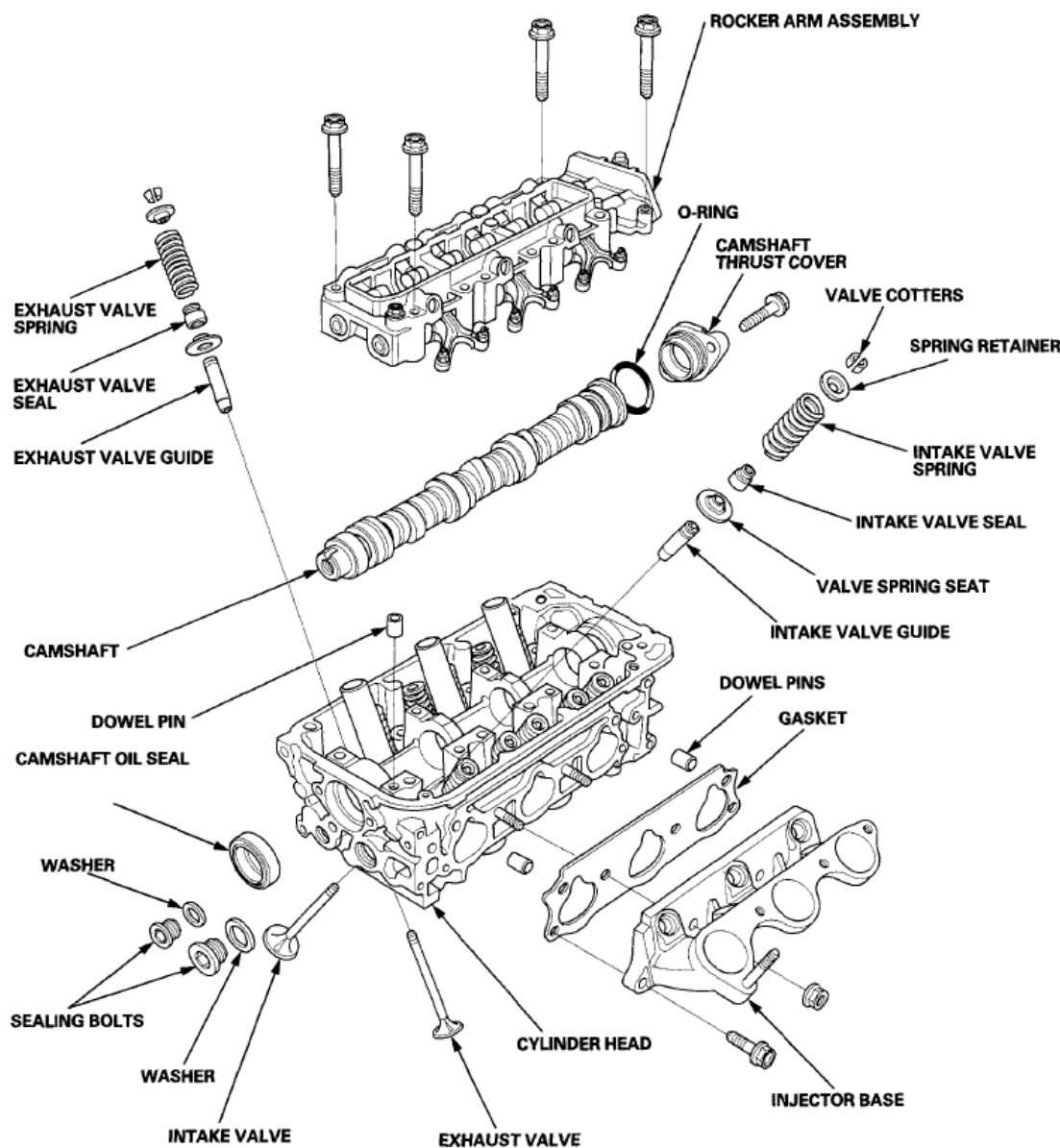


Fig. 5: Exploded View Of Cylinder Head - Rear Components Location
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After the inspection, you must reset the PCM. Otherwise, the PCM will continue to stop the fuel injectors from operating.

1. Turn the ignition switch to LOCK (0).
2. Connect the HDS to the DLC (see step 2 **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**).

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

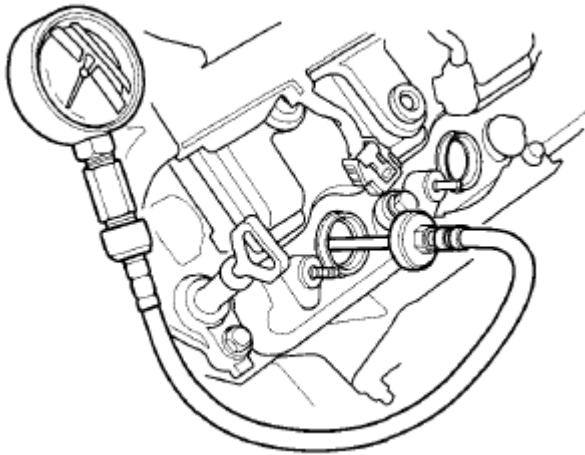


Fig. 6: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Compression Pressure

Above 930 kPa (9.48 kgf/cm² , 134.8 psi)

10. Measure the compression on the remaining cylinders.

Maximum Variation

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

11. If the compression is not within specifications, perform a cylinder leak down test to determine the problem area. Then check the following items, and remeasure the compression:
 - Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats

- Damaged cylinder head gasket
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore
12. Remove the compression gauge from the spark plug hole.
 13. Install the six spark plugs and the six ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
 14. Select PCM reset (see **IF THE MIL DID NOT STAY ON**) in the PGM-FI INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.

VTEC ROCKER ARM TEST

Special Tools Required

- Air Pressure Regulator 07AAJ-PNAA101
 - VTEC Air Stop Tool A 07AAJ-R70A100
 - VTEC Air Stop Tool B 07AAJ-R70A200
 - VCM Air Adapter 070AJ-001A101
1. Remove the six ignition coils and the six spark plugs (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
 2. Remove the cylinder head covers (see **TIMING BELT ADJUSTER REPLACEMENT**).
 3. Rotate the crankshaft pulley clockwise, and visually check all intake primary rocker arms (A) and intake secondary rocker arms (B) moves independently:
 - If the intake primary rocker arm and the intake secondary rocker arm move together, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the intake primary rocker arm and the intake secondary rocker arm move independently, go to step 4.

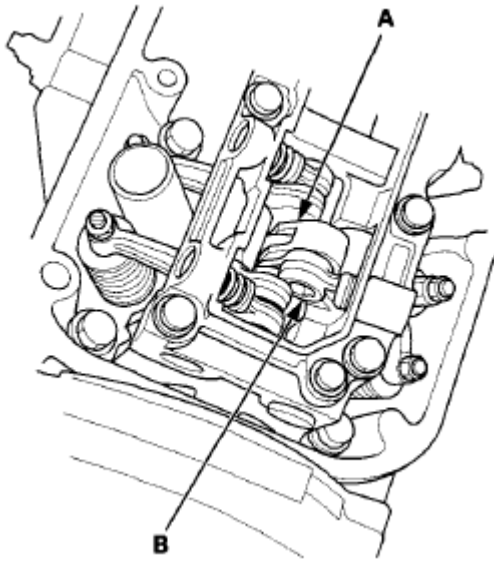


Fig. 7: Identifying Intake Primary Rocker Arms And Intake Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Rotate the crankshaft pulley clockwise, and visually check all exhaust primary rocker arms (A) and exhaust secondary rocker arms (B) move independently:
 - If the exhaust primary rocker arm and the exhaust primary rocker arm move together, remove the exhaust primary rocker arm and the exhaust secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any exhaust rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move independently, go to step 5.

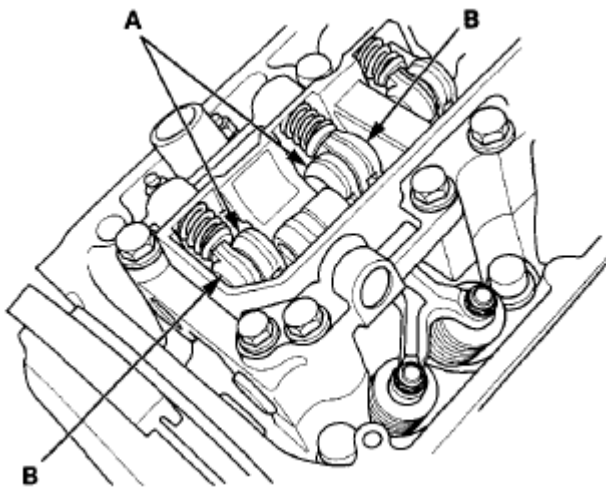


Fig. 8: Identifying Exhaust Primary Rocker Arms And Exhaust Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

6. Check that the air pressure on the shop air compressor gauge indicates over 981 kPa (10.0 kgf/cm² , 142 psi).
7. Remove the sealing bolts from the front cylinder head, then install the VTEC/VCM air adapter (A) to the inspection hole and install the VTEC air stop tool B, then connect the air pressure regulator (C).

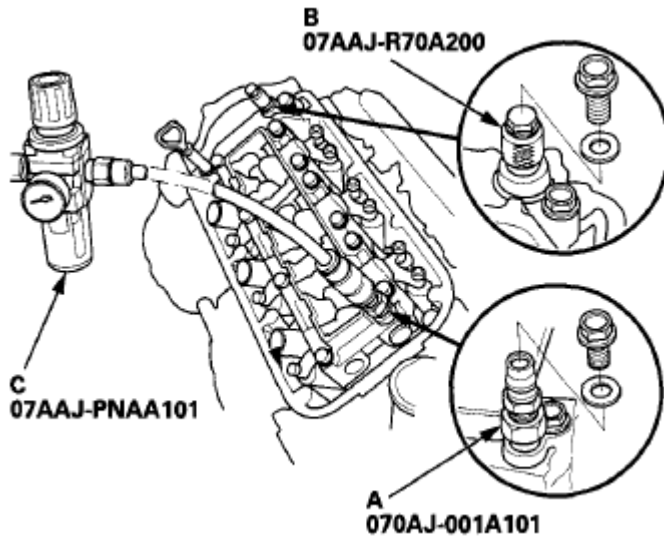


Fig. 9: Installing VTEC Air Stop Tool

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the sealing bolts from the rear cylinder head, then install the VTEC air stop tool A to the inspection hole and install the VTEC/VCM air adapter (B), then connect the air pressure regulator (C).

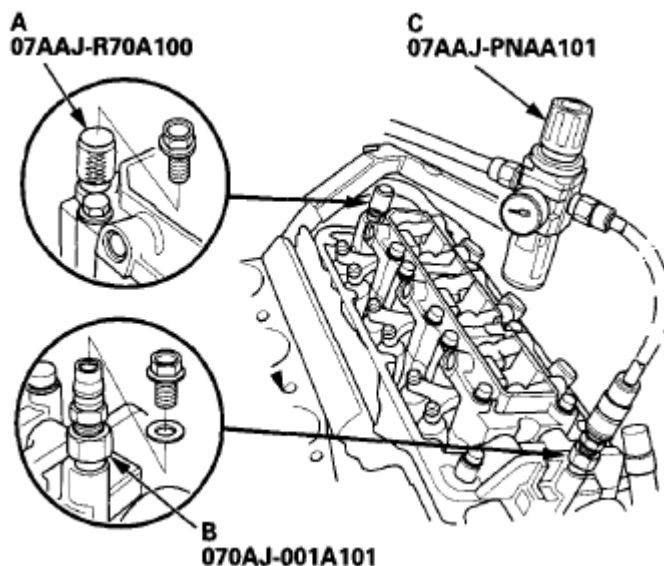


Fig. 10: Installing VTEC/VCM Air Adapter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Air Pressure

550-690 kPa (5.6-7.0 kgf/cm² , 80-100 psi)

10. With the specified air pressure applied, rotate the crankshaft pulley clockwise, and visually check all intake primary rocker arms (A) and intake secondary rocker arms (B) move together:
- If the intake primary rocker arm and the intake secondary rocker arm move independently, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the intake primary rocker arm and the intake secondary rocker arm move together, go to step 11.

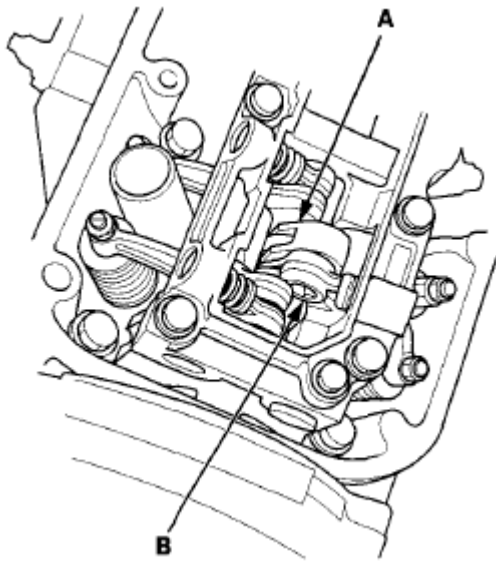


Fig. 11: Identifying Intake Primary Rocker Arms And Intake Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. With the specified air pressure applied, rotate the crankshaft pulley clockwise. The exhaust primary rocker arms (A) should move together with the exhaust secondary rocker arms (B):
- If the exhaust primary rocker arm and the exhaust secondary rocker arm move independently, remove the exhaust primary rocker arm and the exhaust secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any exhaust rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move together, go to step 12.

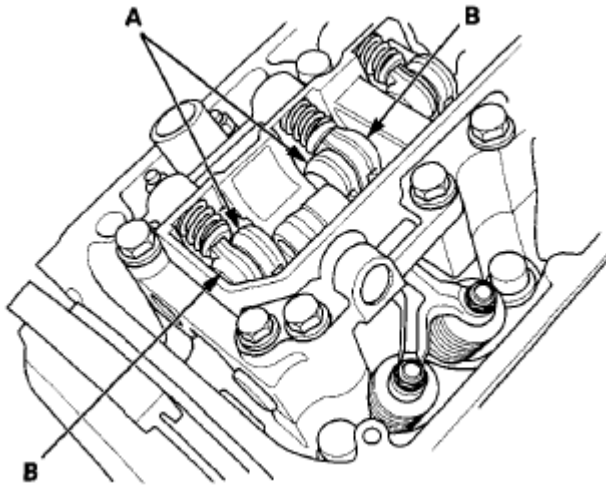


Fig. 12: Identifying Exhaust Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the air pressure regulator, the VTEC/VCM air adapter, the VTEC air stop tool A, and the VTEC air stop tool B.
13. Tighten the sealing bolts to 22 N.m (2.2 kg.m, 16 lb.ft).
14. Install the cylinder head covers (see **REAR**).
15. Install the six spark plugs and the six ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).

VALVE CLEARANCE ADJUSTMENT

NOTE: Connect the HDS to the DLC (see step 2 on **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**) and monitor the ECT sensor 1. Adjust the valve clearance only when the ECT sensor 1 temperature is less than 100°F (38°C).

1. Remove the right upper fender trim (see **UPPER FENDER TRIM REPLACEMENT**).
2. Remove the cylinder head covers (see **TIMING BELT ADJUSTER REPLACEMENT**).
3. Set the No. 1 piston at top dead center (TDC). Align the pointer (A) on the front upper cover with the No. 1 piston TDC mark (B) on the front camshaft pulley.

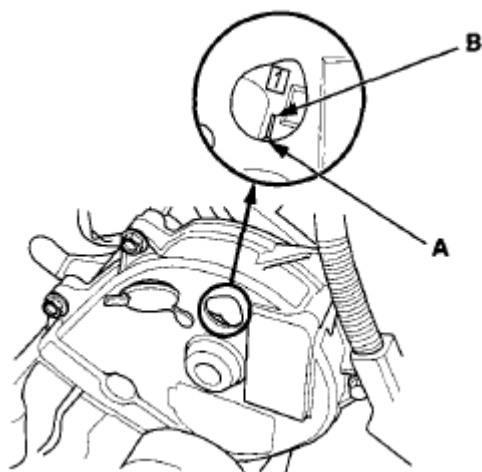


Fig. 13: Aligning Pointer On Front Upper Cover With No. 1 Piston TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Clearance

Intake: 0.20-0.24 mm (0.008-0.009)

Exhaust: 0.28-0.32 mm (0.011-0.013)

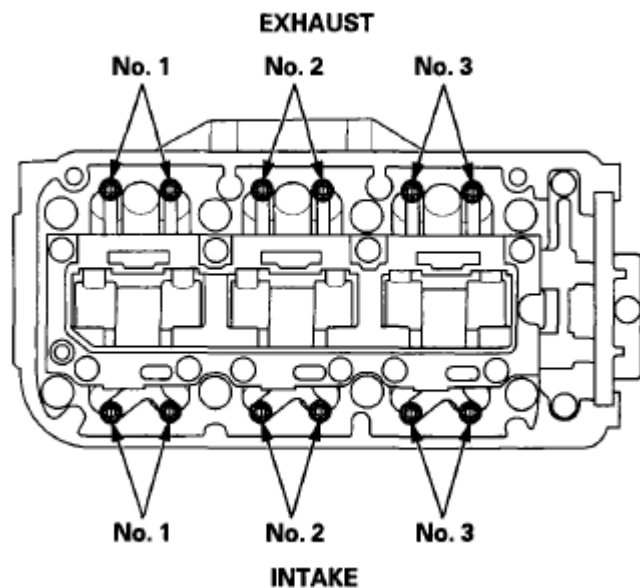


Fig. 14: Identifying Valve Clearance Points - Rear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

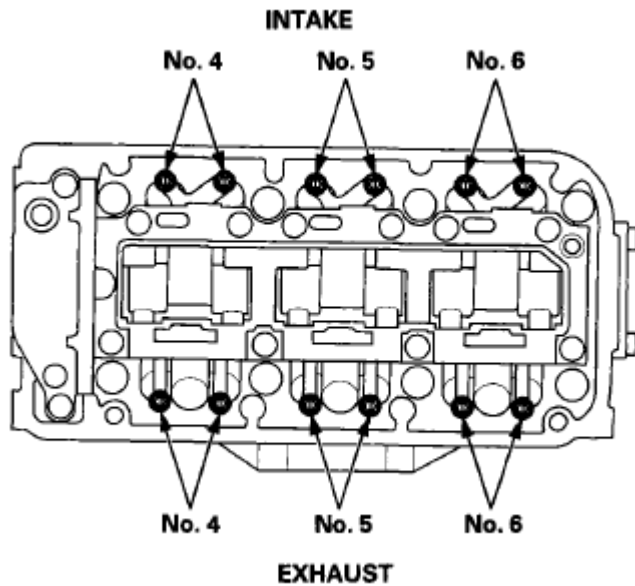


Fig. 15: Identifying Valve Clearance Points - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

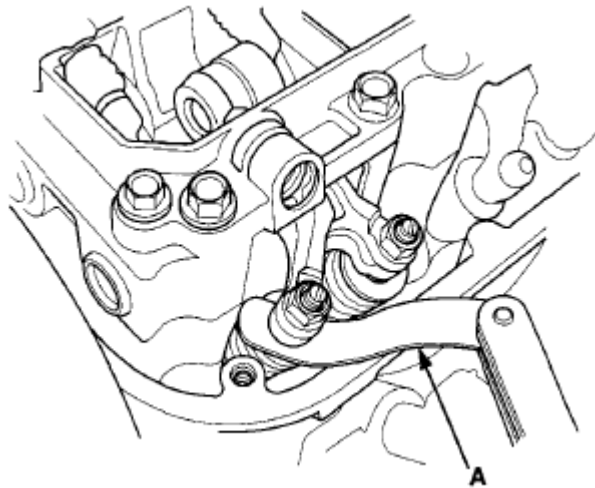


Fig. 16: Inserting Feeler Gauge Between Adjusting Screw - Intake
Courtesy of AMERICAN HONDA MOTOR CO., INC.

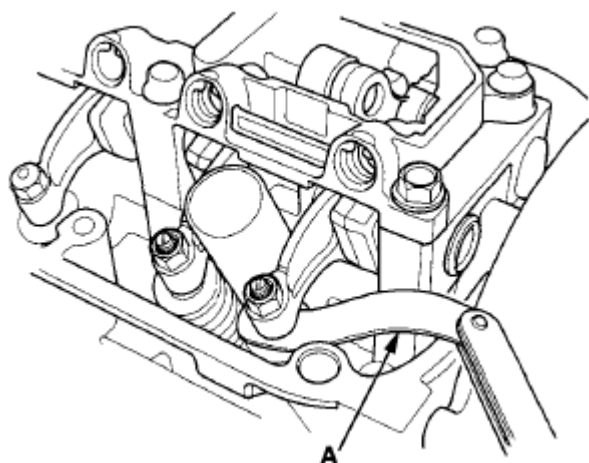


Fig. 17: Inserting Feeler Gauge Between Adjusting Screw - Exhaust
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

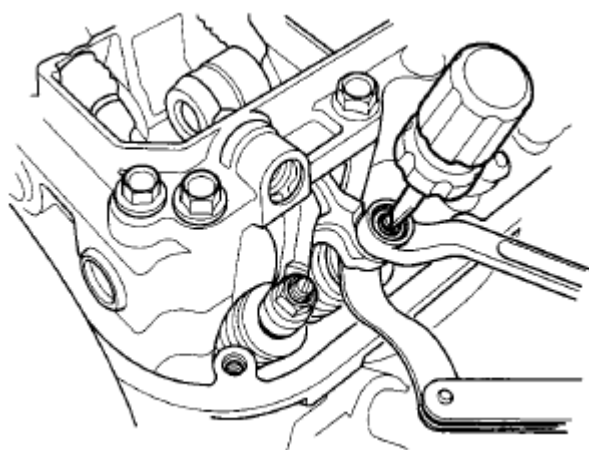


Fig. 18: Turning Adjusting Screw - Intake
Courtesy of AMERICAN HONDA MOTOR CO., INC.

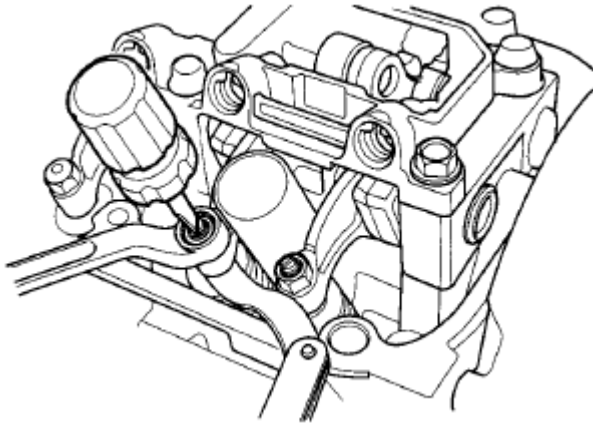


Fig. 19: Turning Adjusting Screw - Exhaust
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Torque

20 N.m (2.0 kg f.m, 14 lb. ft)

Apply new engine oil to the nut threads.

8. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 4 piston TDC mark (B) on the front camshaft pulley.

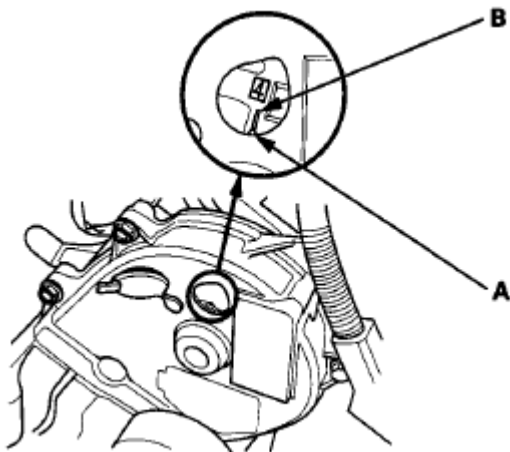


Fig. 20: Aligning Pointer On Front Upper Cover With No. 4 Piston TDC Mark On Front Camshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.
10. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 2 piston

TDC mark (B) on the front camshaft pulley.

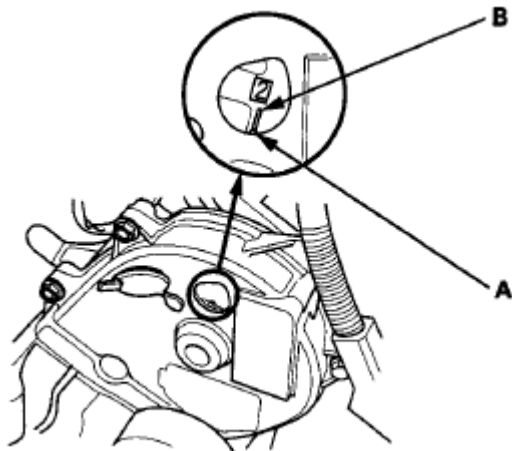


Fig. 21: Aligning Pointer On Front Upper Cover With No. 2 Piston TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.
12. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 5 piston TDC mark (B) on the front camshaft pulley.

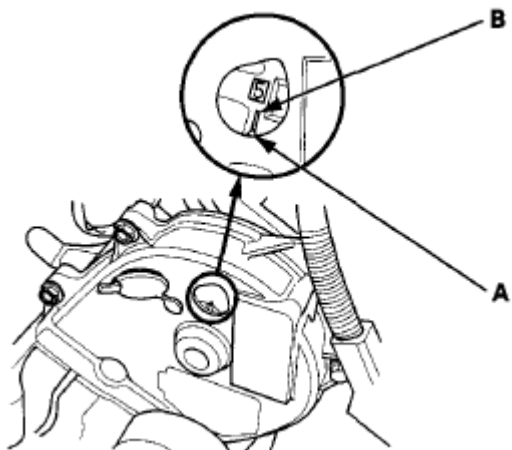


Fig. 22: Aligning Pointer On Front Upper Cover With No. 5 Piston TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Check and, if necessary, adjust the valve clearance on the No. 5 cylinder.
14. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 3 piston TDC mark (B) on the front camshaft pulley.

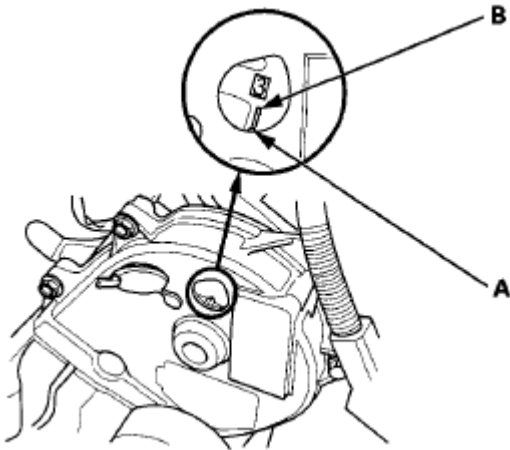


Fig. 23: Aligning Pointer On Front Upper Cover With No. 3 Piston TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.
16. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 6 piston TDC mark (B) on the front camshaft pulley.

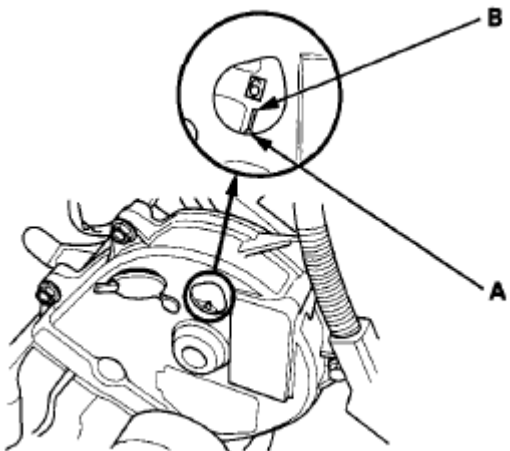


Fig. 24: Aligning Pointer On Front Upper Cover With No. 6 Piston TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Check and, if necessary, adjust the valve clearance on the No. 6 cylinder.
18. Install the cylinder head covers (see **REAR**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder Handle 07JAB-001020B
- Holder Attachment, 50 mm. Offset 07MAB-PY3010A
- Socket, 19 mm 07JAA-001020A or equivalent

REMOVAL

1. Raise the vehicle on the lift.
2. Remove the right front wheel.
3. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
4. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
5. Hold the pulley with the holder handle (A) and the holder attachment, 50 mm, offset (B).

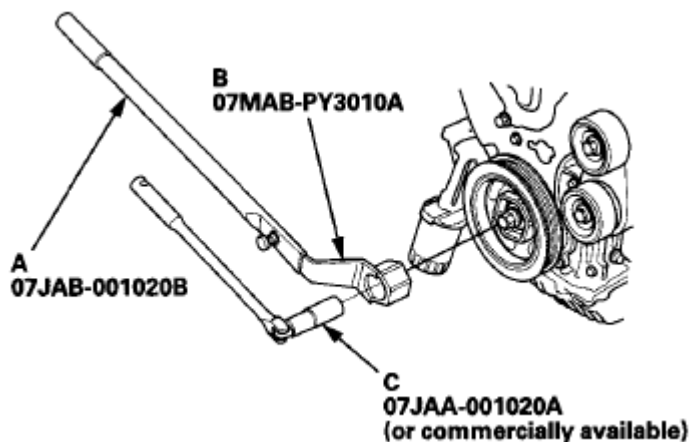


Fig. 25: Holding Pulley With Holder Handle And Holder Attachment

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

INSTALLATION

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

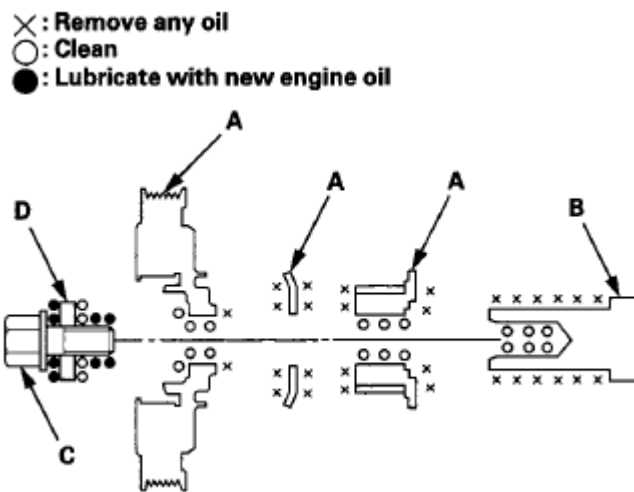


Fig. 26: Identifying Pulleys, Crankshaft, Bolt And Washer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and tighten the bolt. Do not use an impact wrench.
 - Hold the pulley with the holder handle (A) and the holder attachment, 50 mm, offset (B). Tighten the bolt to 64 N.m (6.5 kgf.m, 47 lbf.ft) with a torque wrench and a socket, 19 mm (C).
 - Tighten the bolt an additional 60°.

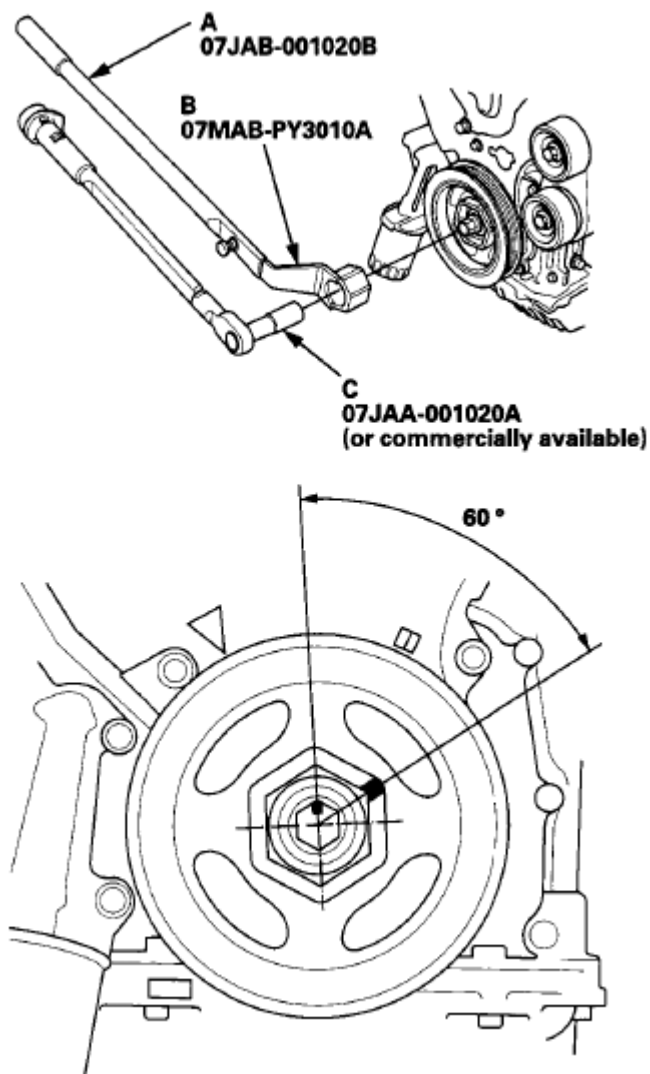


Fig. 27: Holding Pulley With Holder Handle And Holder Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

TIMING BELT INSPECTION

1. Remove the right upper fender trim (see **UPPER FENDER TRIM REPLACEMENT**).
2. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
3. Remove the front upper cover.

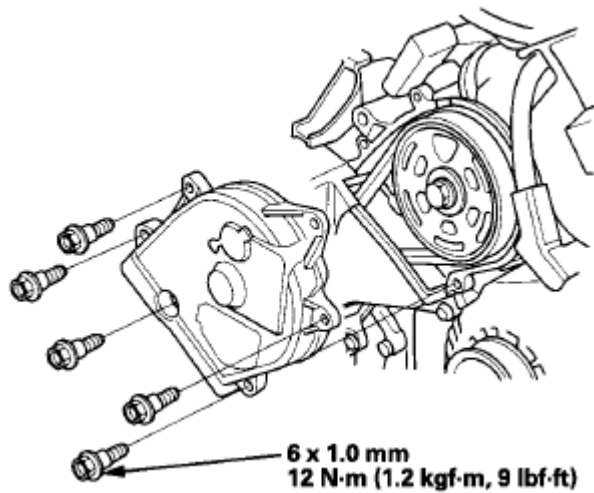


Fig. 28: Removing Front Upper Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Inspect the timing belt for cracks and oil or coolant contamination. Replace the belt if it is cracked, or contaminated with oil or coolant. Wipe off any oil or solvent that gets on the belt pulleys.

NOTE: If there is any leakage, repair them before replacing the timing belt.

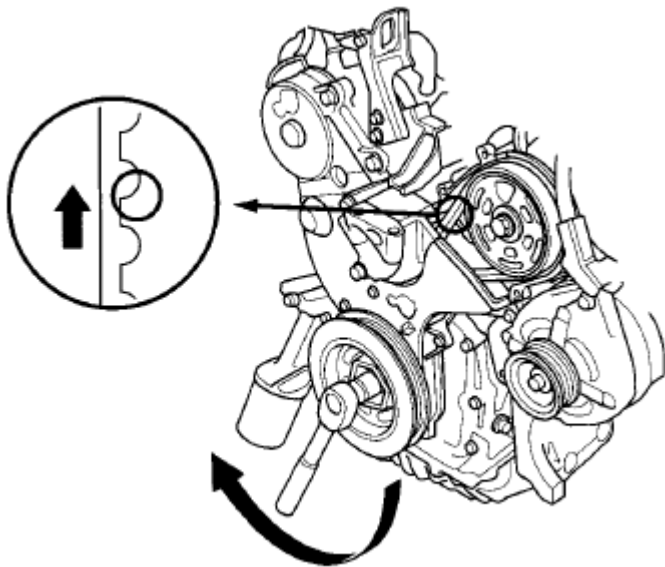


Fig. 29: Inspecting Timing Belt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT REMOVAL

1. Remove the right upper fender trim (see **UPPER FENDER TRIM REPLACEMENT**).
2. Turn the crankshaft pulley so its white mark (A) on the crankshaft pulley lines up with the pointer (B).

NOTE: The other pointer (C) is not used.

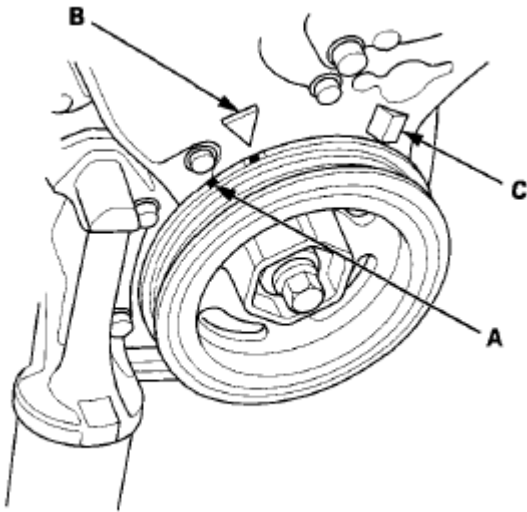


Fig. 30: Turning Crankshaft Pulley For Positioning
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the No. 1 piston top dead center (TDC) mark (A) on the front camshaft pulley and the pointer (B) on the front upper cover are aligned.

NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

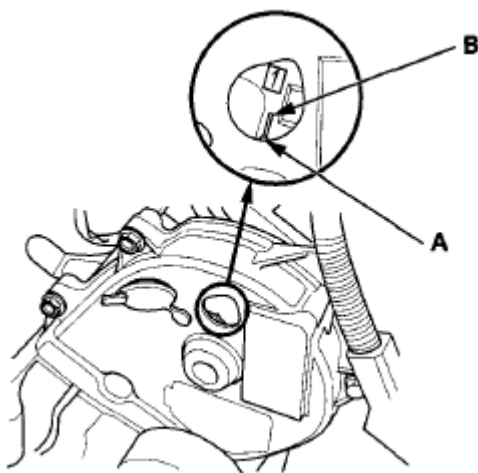


Fig. 31: Identifying Camshaft Pulley Mark
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Raise the vehicle on the lift, then remove the right front wheel.
5. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
6. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).

7. Remove the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
8. Lift and support the engine with a jack and wood block under the oil pan.
9. Remove the ground cable (A), then remove the upper engine mount bracket (B).

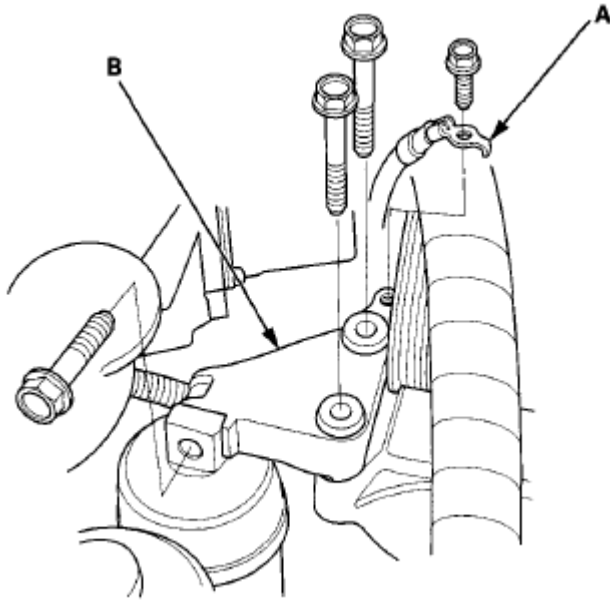


Fig. 32: Removing Upper Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the front upper cover (A) and rear upper cover (B).

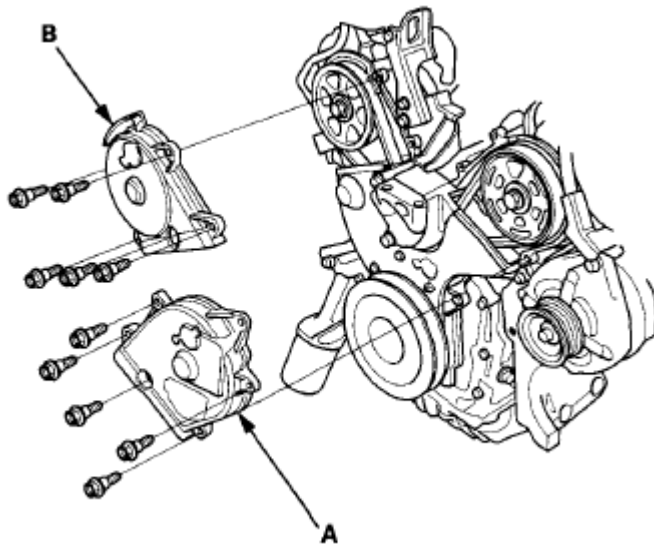


Fig. 33: Removing Front Upper Cover And Rear Upper Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the crankshaft pulley (see step 5 on **Crankshaft Pulley Removal and Installation**).

12. Remove the lower cover.

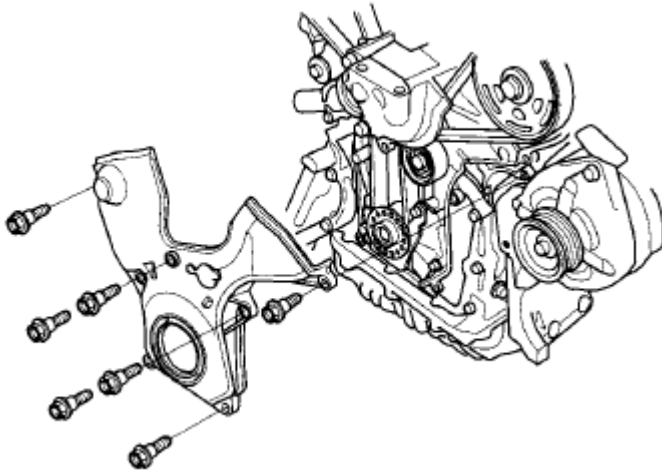


Fig. 34: Removing Lower Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove one of the battery clamp bolts from the battery tray, and grind the end of it as shown.

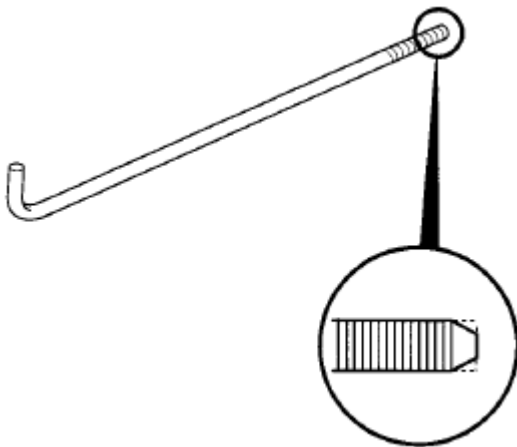


Fig. 35: Removing One Of Battery Clamp Bolts From Battery Tray

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Thread the battery clamp bolt in as shown to hold the timing belt adjuster in its current position. Tighten it by hand; do not use a wrench.

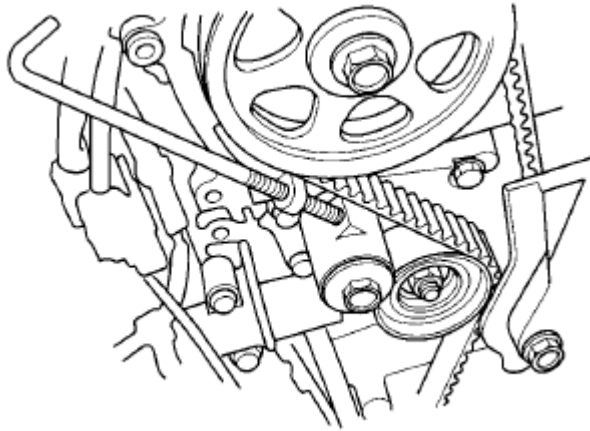


Fig. 36: Threading Battery Clamp Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the timing belt guide plate (A).

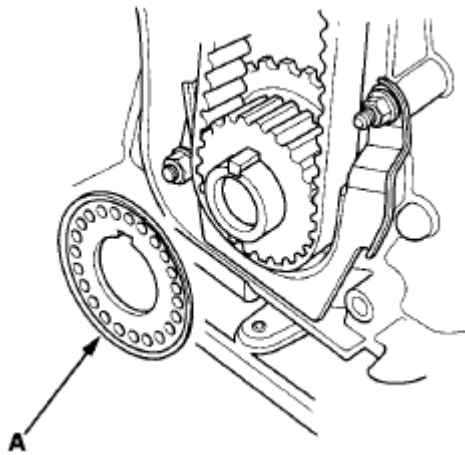


Fig. 37: Removing Timing Belt Guide Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Remove lower half of the side engine mount bracket.

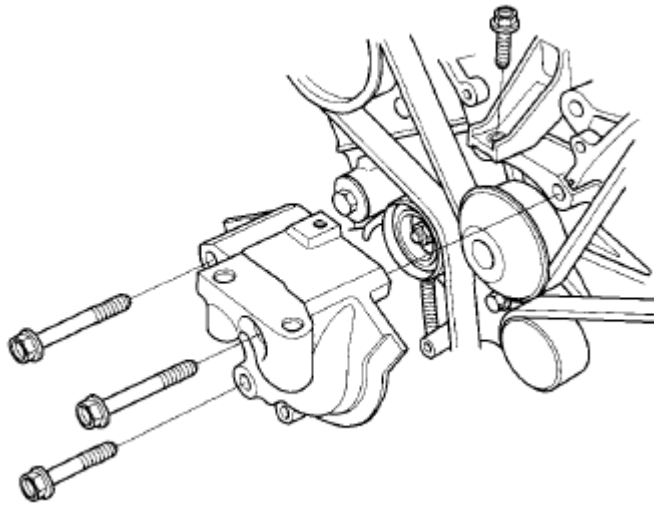


Fig. 38: Removing Lower Half Of Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the idler pulley bolt (A) and the idler pulley (B), then remove the timing belt. Discard the idler pulley bolt.

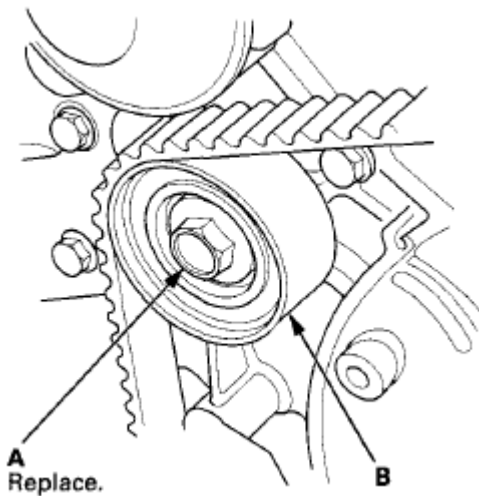


Fig. 39: Removing Idler Pulley Bolt And Idler Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT INSTALLATION

NOTE: The following procedure is for installation of a used timing belt. If you are installing a new belt, refer to the timing belt replacement procedure (see **TIMING BELT REPLACEMENT**).

1. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
2. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of

the timing belt drive pulley with the pointer (B) on the oil pump.

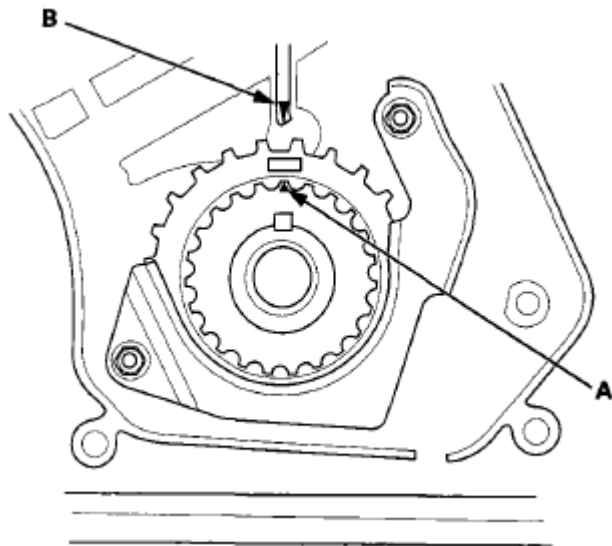


Fig. 40: Setting Timing Belt Drive Pulley To Top Dead Center

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

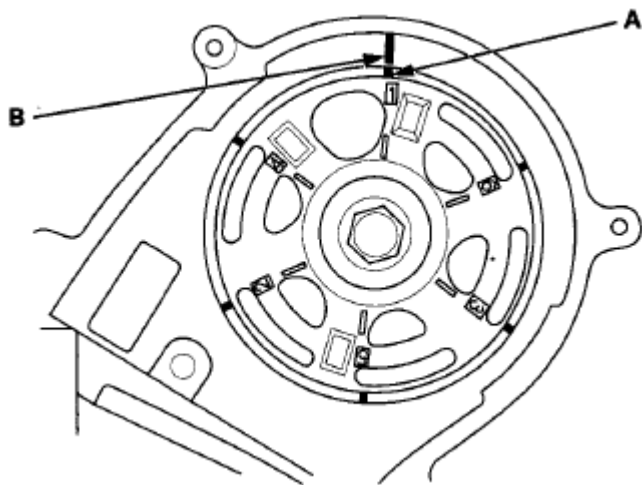


Fig. 41: Setting Camshaft Pulleys To TDC - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

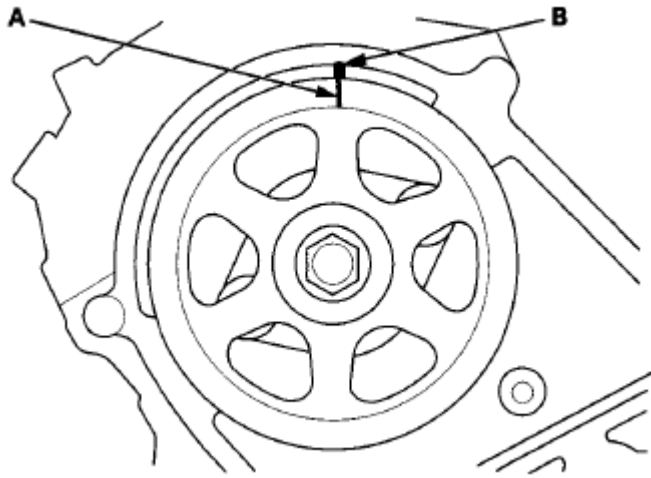


Fig. 42: Setting Camshaft Pulleys To TDC - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. loosely install the idler pulley with a new idler pulley bolt so the pulley can move, but does not come off.
5. If the auto-tensioner has extended and the timing belt cannot be installed, do the timing belt replacement procedure (see **TIMING BELT REPLACEMENT**).
6. 6. Install the timing belt in a counterclockwise sequence starting with the drive pulley. Take care not to damage the timing belt during installation:
 1. Drive pulley (A)
 2. Idler pulley (B)
 3. Front camshaft pulley (C)
 4. Water pump pulley (D)
 5. Rear camshaft pulley (E)
 6. Adjusting pulley (F)

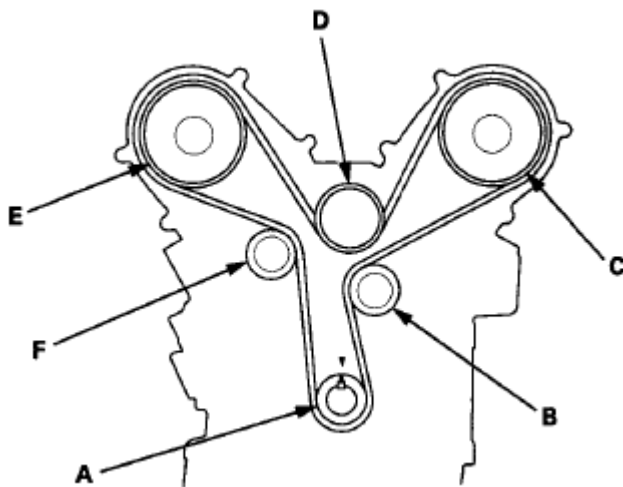


Fig. 43: Installing Timing Belt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the idler pulley bolt.

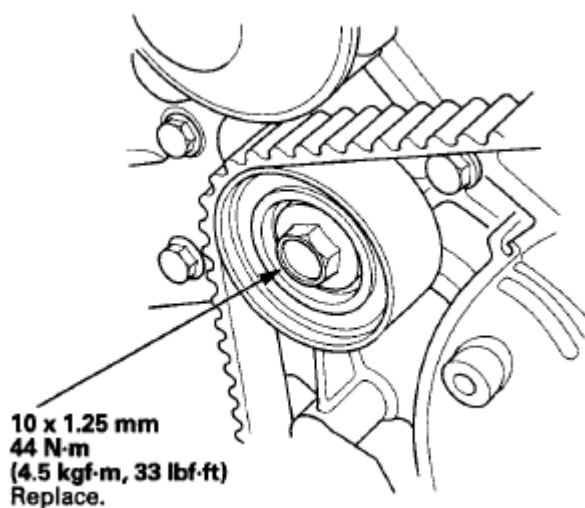


Fig. 44: Identifying Idler Pulley Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the battery clamp bolt from the back cover.

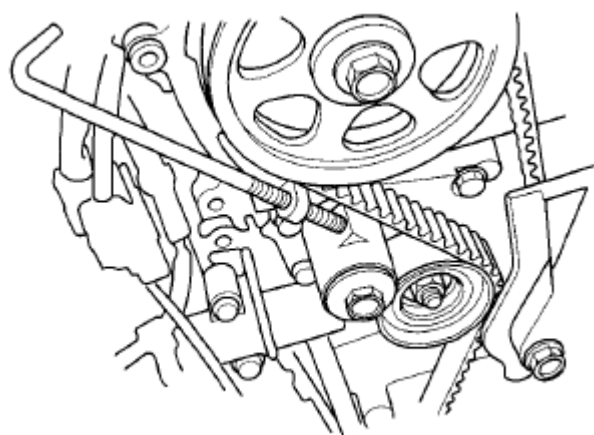


Fig. 45: Removing Battery Clamp Bolt From Back Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the lower half of the side engine mount bracket.

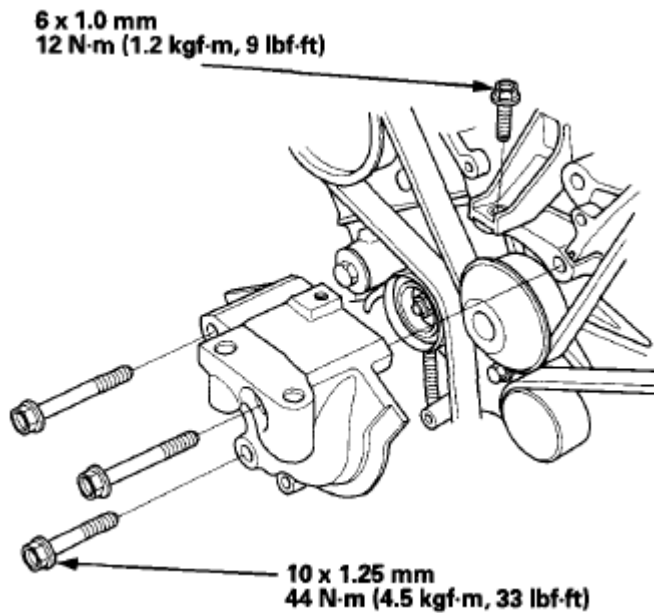


Fig. 46: Installing Lower Half Of Side Engine Mount Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the timing belt guide plate (A) as shown.

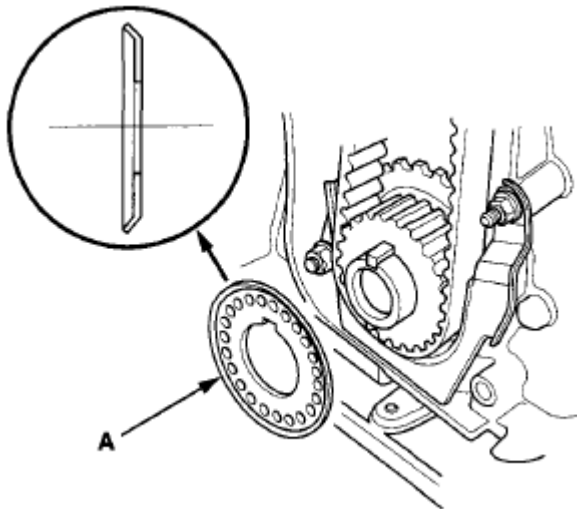


Fig. 47: Installing Timing Belt Guide Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the lower cover.

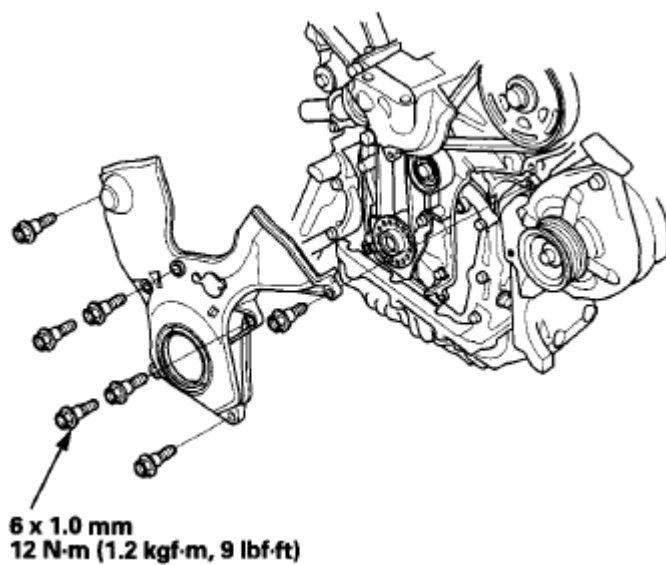


Fig. 48: Installing Lower Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
13. Install the front upper cover (A) and the rear upper cover (B).

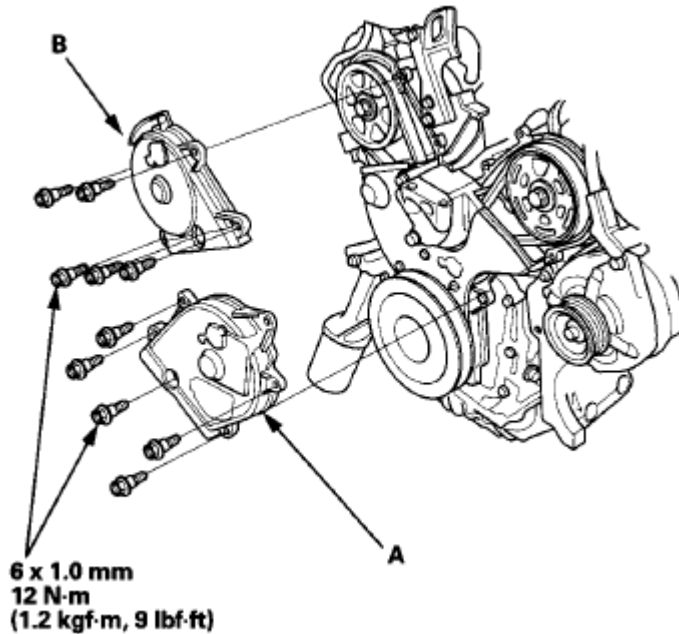


Fig. 49: Installing Front Upper Cover And Rear Upper Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Rotate the crankshaft pulley about six turns clockwise so the timing belt positions itself on the pulleys.
15. Turn the crankshaft pulley so its white mark (A) lines up with the pointer (B).

NOTE: The other pointer (C) is not used.

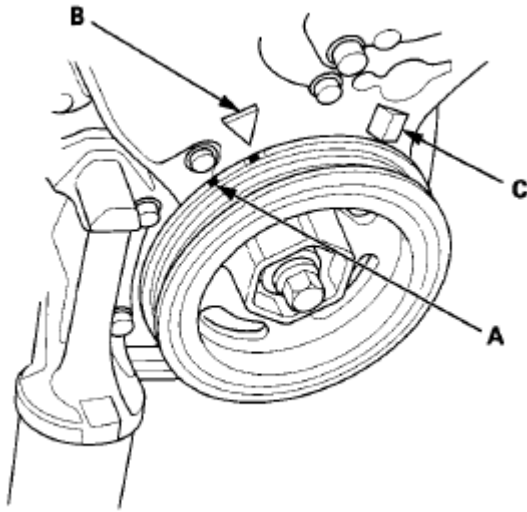


Fig. 50: Turning Crankshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Check the camshaft pulley marks.

NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- If the camshaft pulley marks are at TDC, go to step 17 17.
- If the camshaft pulley marks are not at TDC, remove the timing belt and repeat steps 2 through 16.

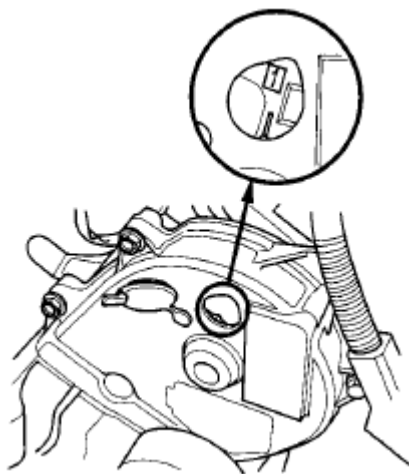


Fig. 51: Identifying Camshaft Pulley Marks - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

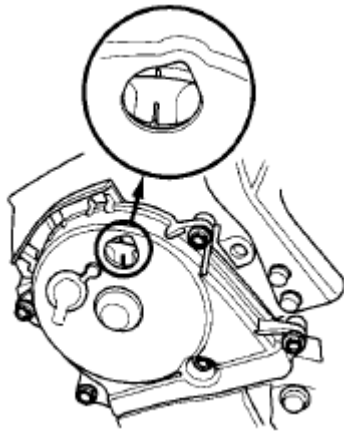


Fig. 52: Identifying Camshaft Pulley Marks - Rear
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. 17. Loosely install the upper engine mount bracket (A), then install the ground cable (B).

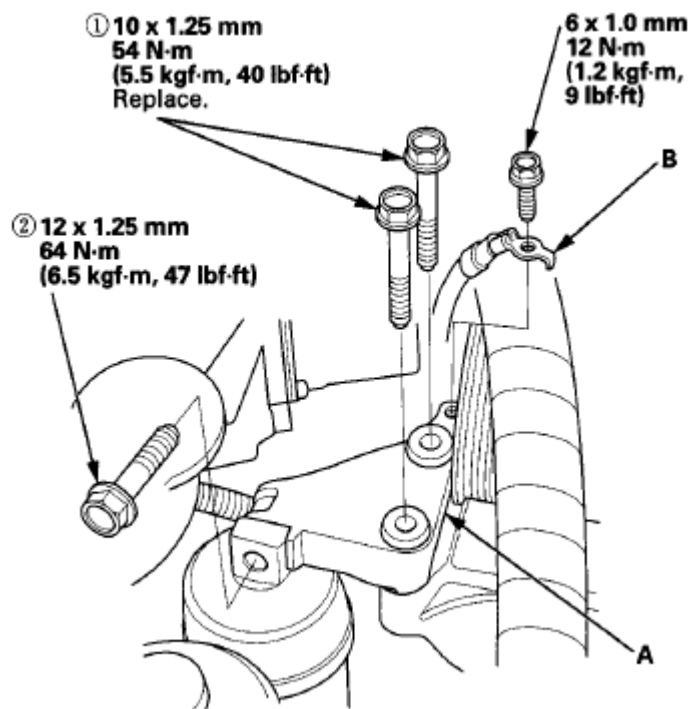


Fig. 53: Installing Ground Cable With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the jack and the wood block.
19. Tighten the mounting bolts in the numbered sequence shown.
20. 20. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
21. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
22. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).

23. Install the right front wheel.
24. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

TIMING BELT REPLACEMENT

NOTE: The following procedure is for the installation of a new timing belt. If you are installing a used belt, refer to the timing belt installation procedure (see **TIMING BELT INSTALLATION**).

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
3. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with the pointer (B) on the oil pump.

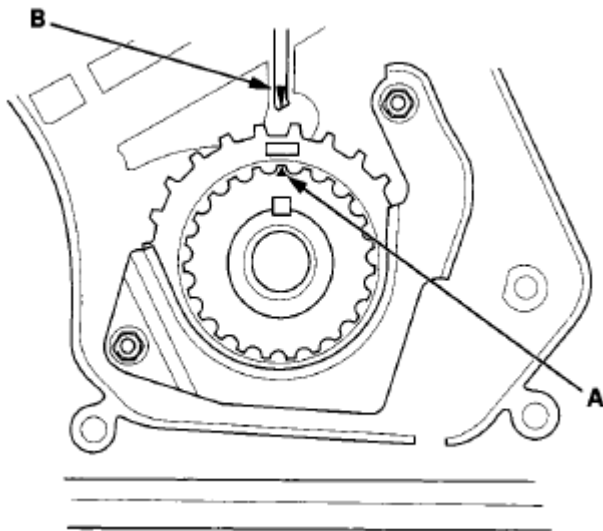


Fig. 54: Setting Timing Belt Drive Pulley To Top Dead Center
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

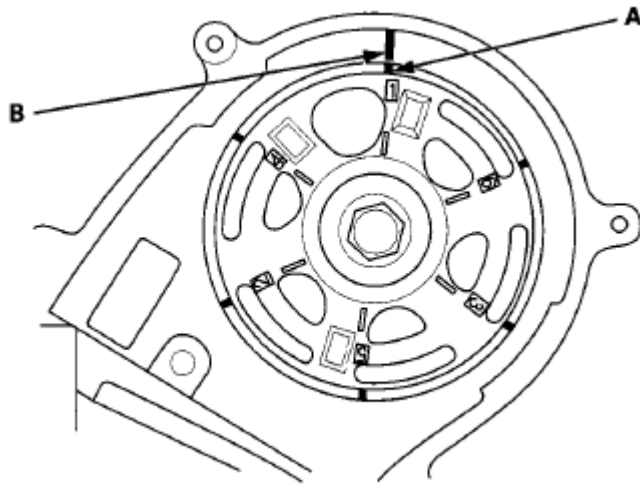


Fig. 55: Setting Camshaft Pulleys To TDC By Aligning TDC Marks On Camshaft Pulleys With Pointers

Courtesy of AMERICAN HONDA MOTOR CO., INC.

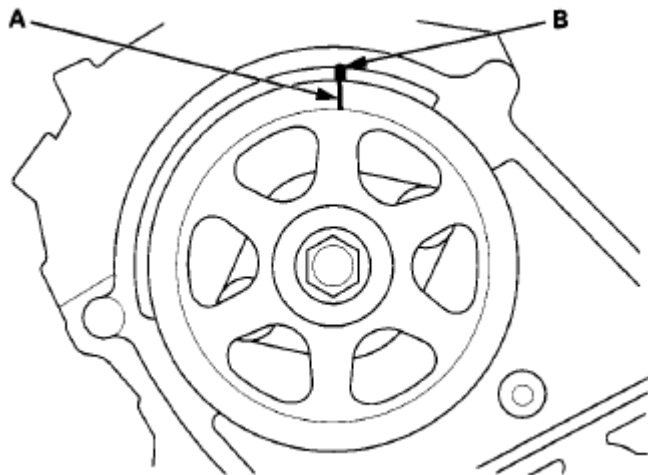


Fig. 56: Setting Camshaft Pulleys To TDC By Aligning TDC Marks On Camshaft Pulleys With Pointers - Rear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the battery clamp bolt from the back cover.
6. 6. Remove the auto-tensioner.

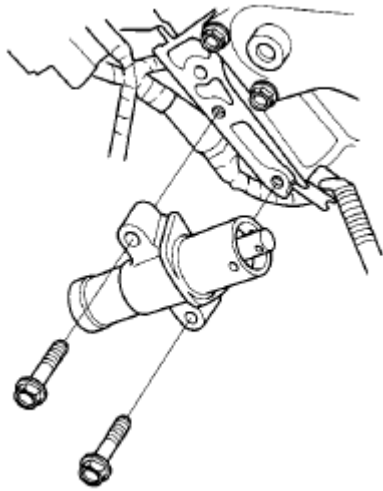


Fig. 57: Removing Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Align the holes on the rod and housing of the auto-tensioner.

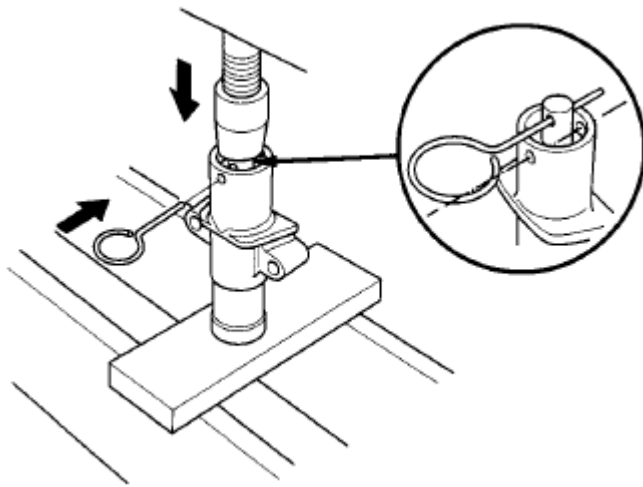


Fig. 58: Aligning Holes On Rod And Housing Of Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Use a hydraulic press to slowly compress the auto-tensioner. Insert a 2.0 mm (5/64 in) pin through the housing and the rod.

NOTE: The compression pressure should not exceed 9,800 N (999.3 kgf, 2,203.1 lbf).

9. Install the auto-tensioner.

NOTE: Make sure the pin stays in place.

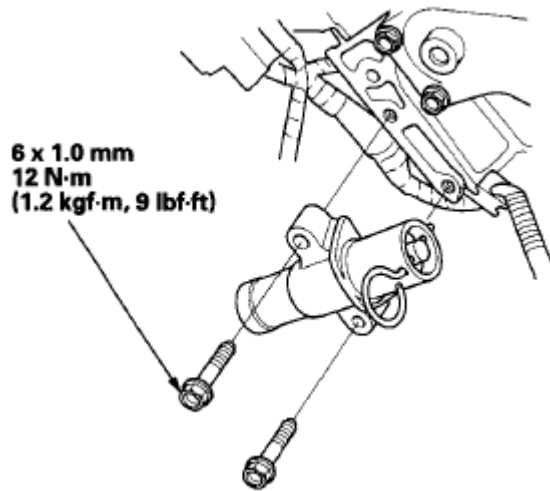


Fig. 59: Identifying Pin Stays With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Thread the battery clamp bolt in as shown to hold the timing belt adjuster. Tighten it by hand, do not use a wrench.

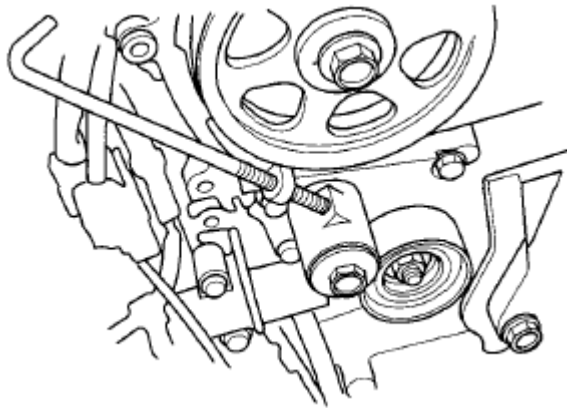


Fig. 60: Threading Battery Clamp Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.
12. Install the timing belt in a counterclockwise sequence starting with the drive pulley:
 1. Drive pulley (A)
 2. Idler pulley (B)
 3. Front camshaft pulley (C)
 4. Water pump pulley (D)
 5. Rear camshaft pulley (E)
 6. Adjusting pulley (F)

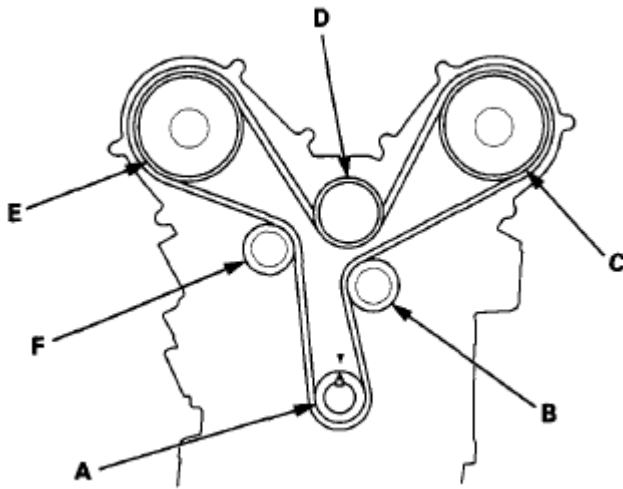


Fig. 61: Installing Timing Belt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Tighten the idler pulley bolt.

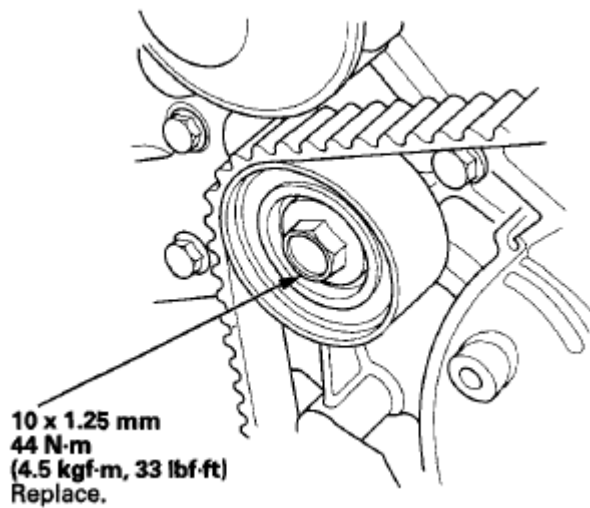


Fig. 62: Tightening Idler Pulley Bolt With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the pin from the auto-tensioner.

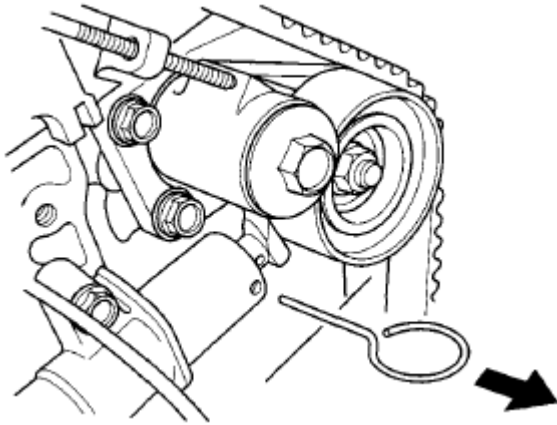


Fig. 63: Removing Pin From Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the battery clamp bolt from the back cover.
16. Install the lower half of the side engine mount bracket.

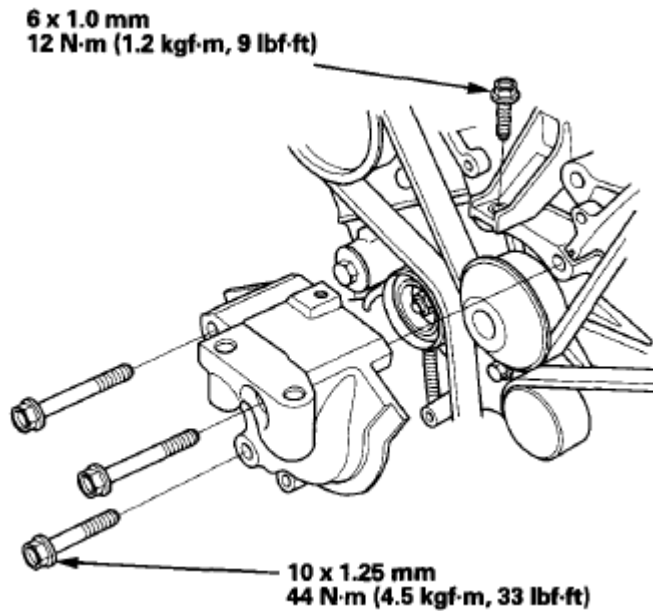


Fig. 64: Installing Lower Half Of Side Engine Mount Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the timing belt guide plate (A) as shown.

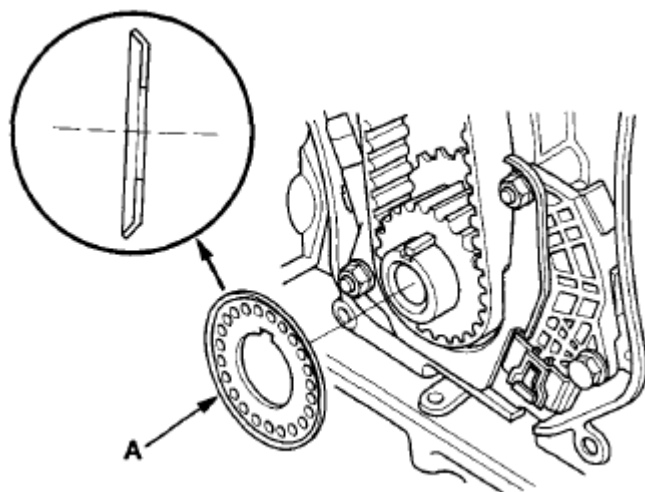


Fig. 65: Installing Timing Belt Guide Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the lower cover.

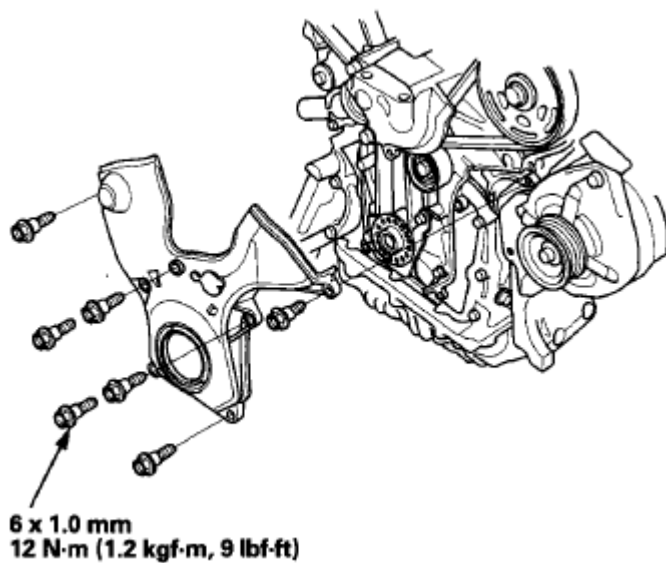


Fig. 66: Installing Lower Cover With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
20. Install the front upper cover (A) and the rear upper cover (B).

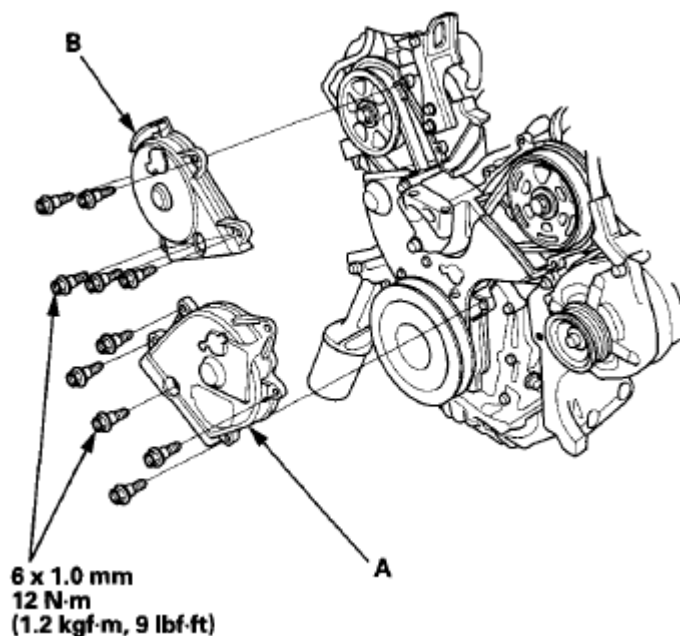


Fig. 67: Installing Front Upper Cover And Rear Upper Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Rotate the crankshaft pulley about six turns clockwise so the timing belt positions itself on the pulleys.
22. Turn the crankshaft pulley so the white mark (A) lines up with the pointer (B).

NOTE: The other pointer (C) is not used.

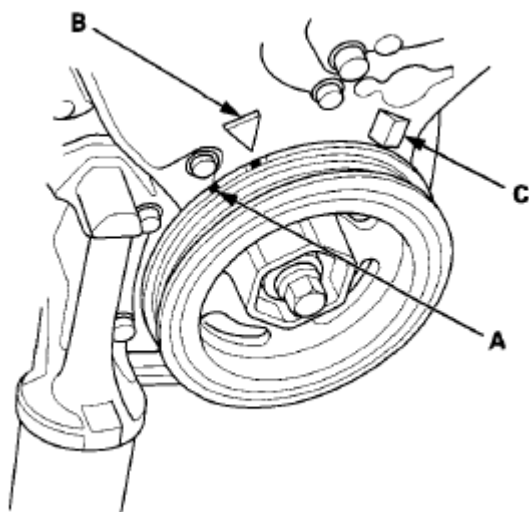


Fig. 68: Turning Crankshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Check the camshaft pulley marks.

NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- If the camshaft pulley marks are at TDC, go to step 24.
- If the camshaft pulley marks are not at TDC, remove the timing belt and repeat steps 3 through 23.

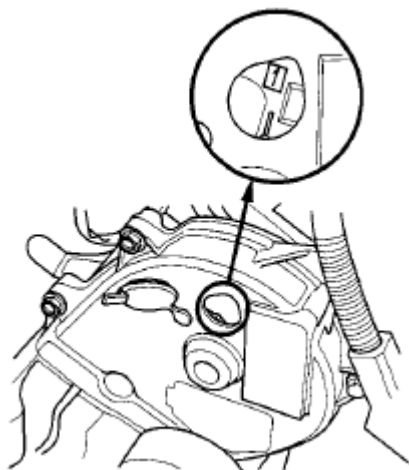


Fig. 69: Camshaft Pulley Marks - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

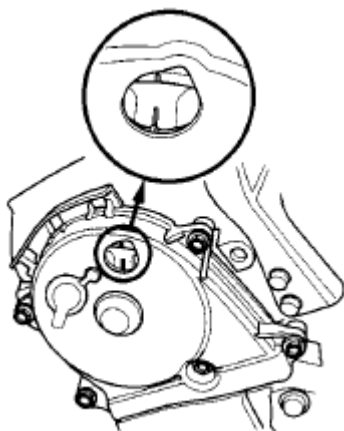


Fig. 70: Camshaft Pulley Marks - Rear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Loosely install the upper engine mount bracket (A), then install the ground cable (B).

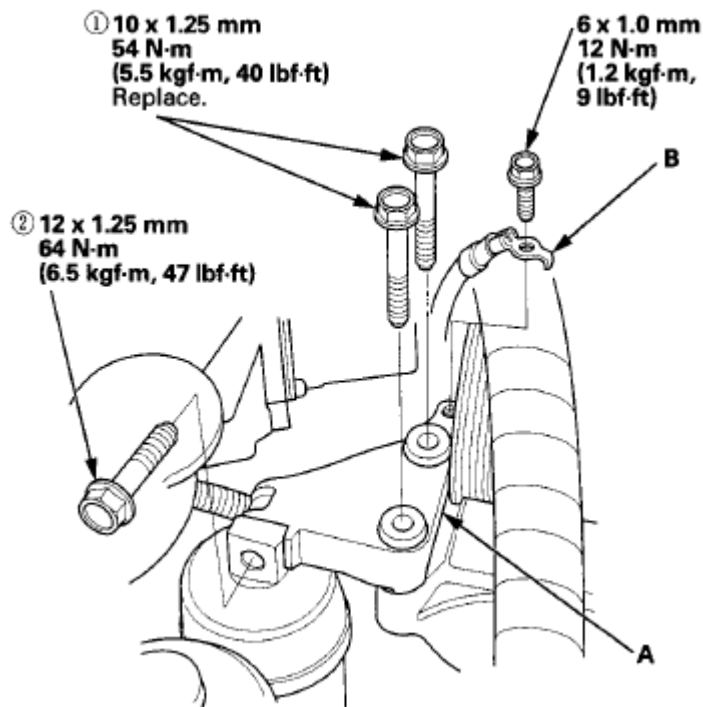


Fig. 71: Installing Upper Engine Mount Bracket With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Remove the jack and the wood block.
26. Tighten the bolts in the numbered sequence shown.
27. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
28. 28. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
29. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
30. Install the right front wheel.
31. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

TIMING BELT DRIVE PULLEY REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the timing belt drive pulley (A).

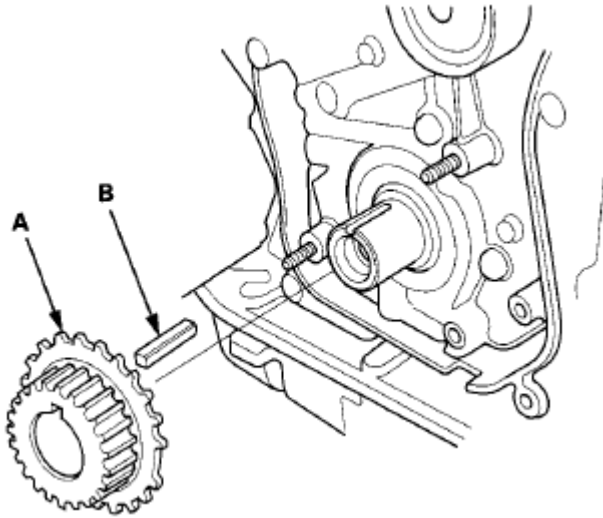


Fig. 72: Removing Timing Belt Drive Pulley
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Inspect the timing belt drive pulley and the key (B) for damage. If it is cracked or damaged, replace the timing belt drive pulley and the key.
4. Install the new timing belt drive pulley and the key, then install the timing belt stopper.
5. Install the timing belt (see **TIMING BELT INSTALLATION**).
6. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

TIMING BELT ADJUSTER REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the battery clamp bolt from the back cover.
3. Remove the auto-tensioner (see step 6 6).
4. Remove the bolt (A), then remove the timing belt adjuster (B) and the collar (C).

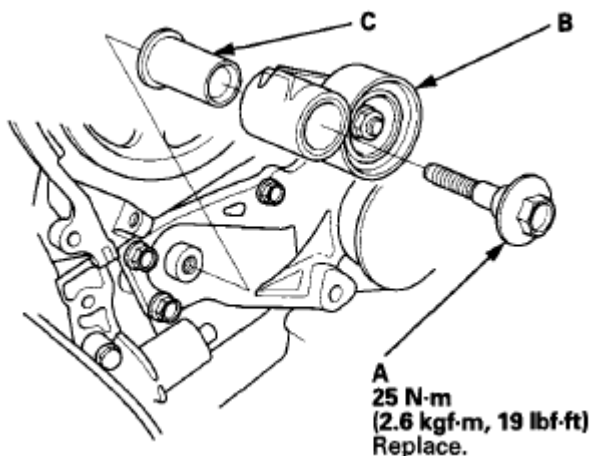


Fig. 73: Removing Timing Belt Adjuster And Collar With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the timing belt adjuster using new bolt in the reverse order of removal.
6. Install the timing belt (see **TIMING BELT INSTALLATION**).

CYLINDER HEAD COVER REMOVAL

FRONT

1. Remove the intake manifold (see **REMOVAL**).
2. Remove the three ignition coils from the front cylinder head (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
3. Remove the harness holder mounting bolt (A) and the harness clamp (B), then remove the harness holder (C) from the bracket.

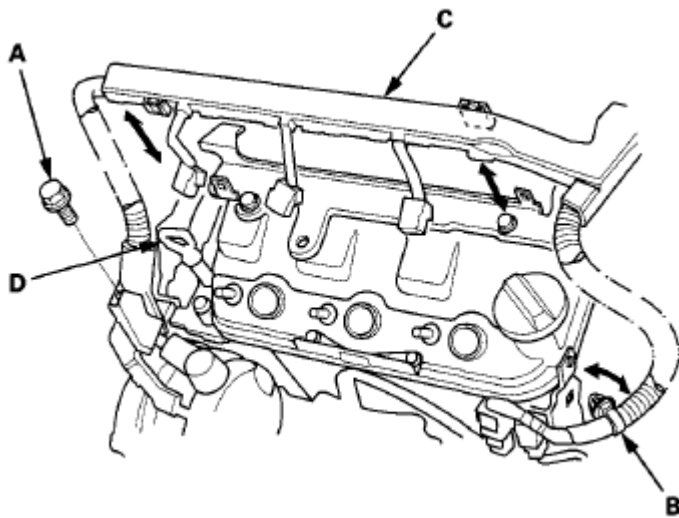


Fig. 74: Removing Harness Holder Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the dipstick (D).
5. Remove the front cylinder head cover.

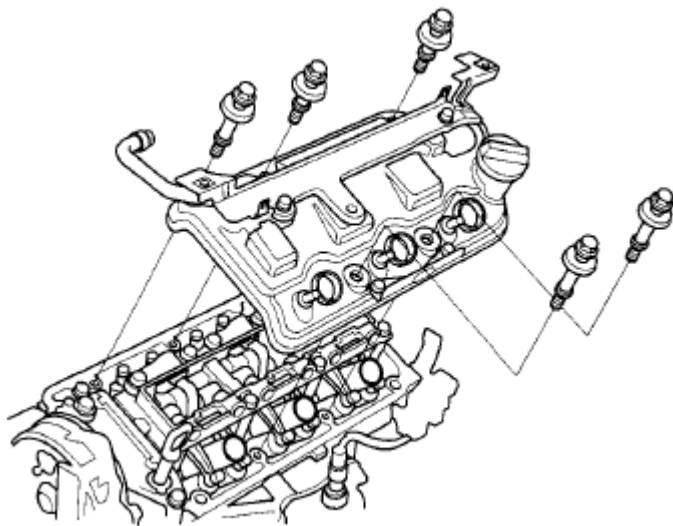


Fig. 75: Removing Front Cylinder Head Cover
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

1. Remove the intake manifold (see **REMOVAL**).
2. Remove the three ignition coils from the rear cylinder head (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
3. Remove the power steering hose clamp mounting bolt (A), the harness holder mounting bolts (B), the harness clamp (C), and the breather hose (D).

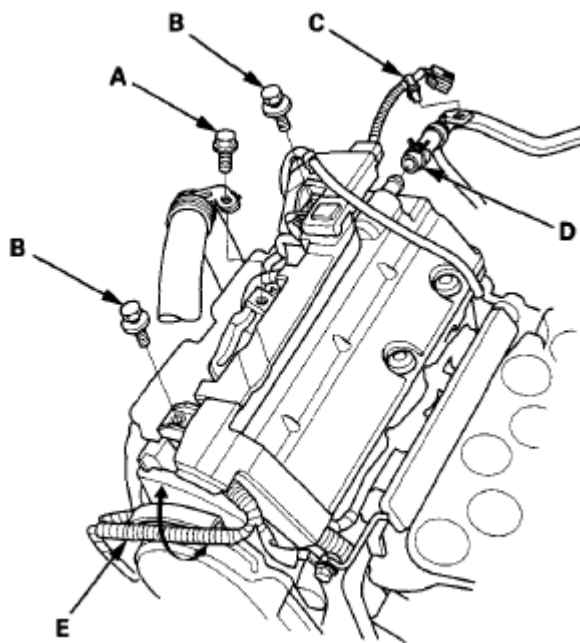


Fig. 76: Removing Power Steering Hose Clamp Mounting Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the wire harness (E) from the rear upper cover.
5. Remove the rear cylinder head cover.

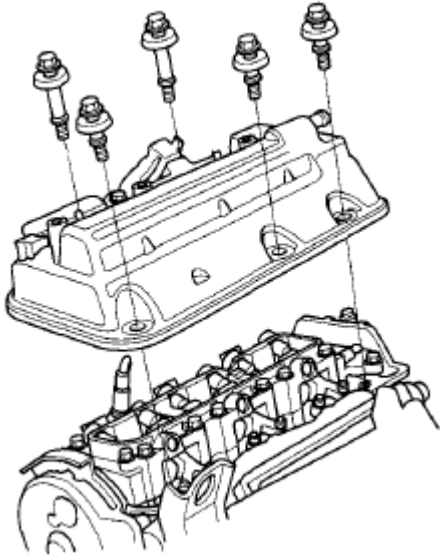


Fig. 77: Removing Rear Cylinder Head Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

FRONT

1. Check the spark plug seals for damage. If any seals are damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove of the cylinder head cover.

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

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

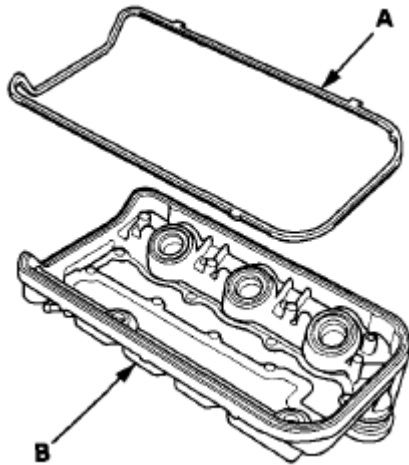


Fig. 78: Installing Head Cover Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove all of the old liquid gasket from the front rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.
6. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the rocker shaft holder mating area (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.

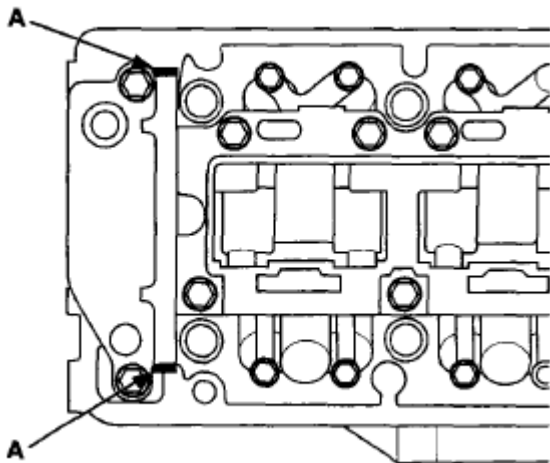


Fig. 79: Identifying Rocker Shaft Holder Mating Area

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the spark plug seals (A) on the spark plug tubes, and install the front cylinder head cover (B).

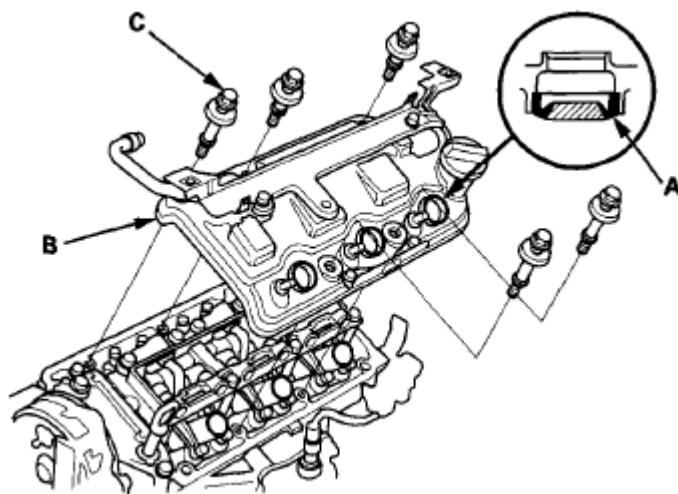


Fig. 80: Setting Spark Plug Seals On Spark Plug Tubes

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N.m (1.2 kgf.m, 9 lbf.ft).

NOTE:

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

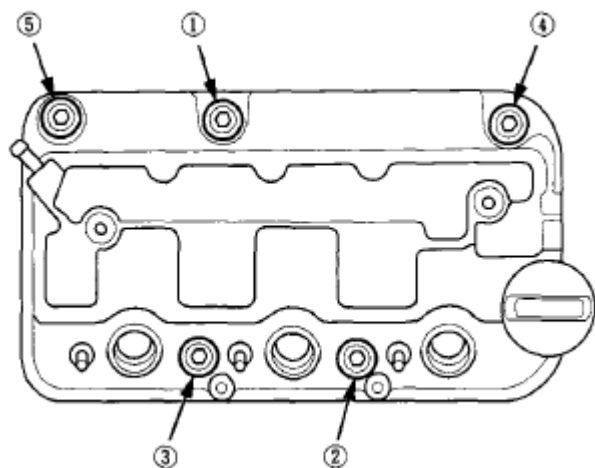


Fig. 81: Identifying Bolts Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the harness holder (A) to the bracket, then install the harness holder mounting bolt (B) and the harness clamp (C).

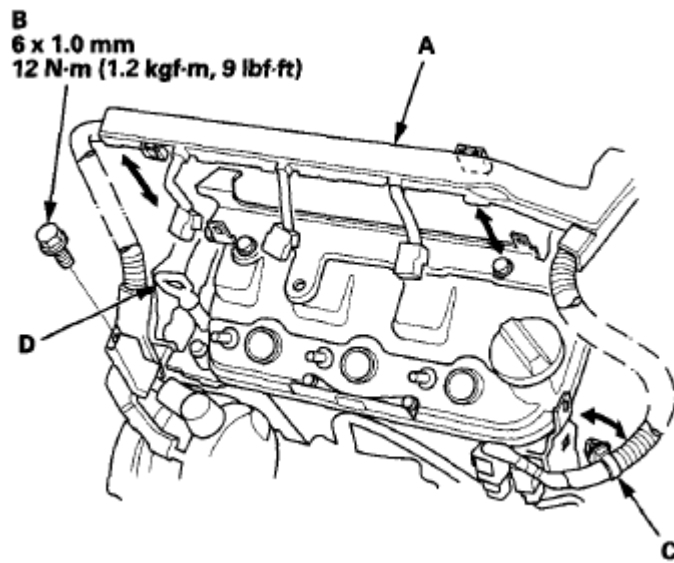


Fig. 82: Installing Harness Holder To Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the dipstick (D).
13. Install the three ignition coils to the front cylinder head (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
14. Install the intake manifold (see **INSTALLATION**).

REAR

1. Check the spark plug seals for damage. If any seals are damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove of the cylinder head cover.

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

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

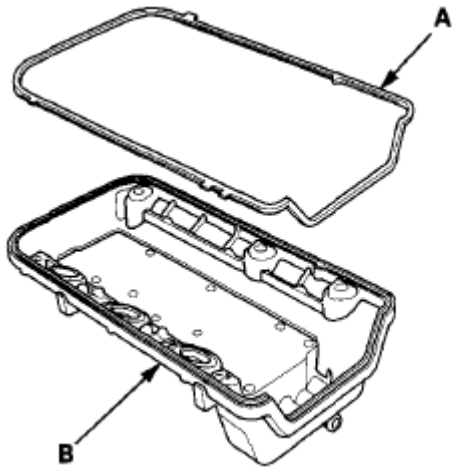


Fig. 83: Installing Head Cover Gasket In Groove Of Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove all of the old liquid gasket from the rear rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.
6. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the rocker shaft holder mating area (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.

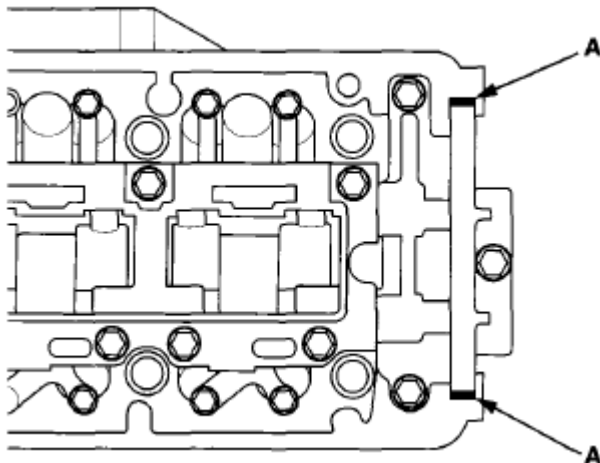


Fig. 84: Identifying Rocker Shaft Holder Mating Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the spark plug seals (A) on the spark plug tubes, and install the rear cylinder head cover (B).

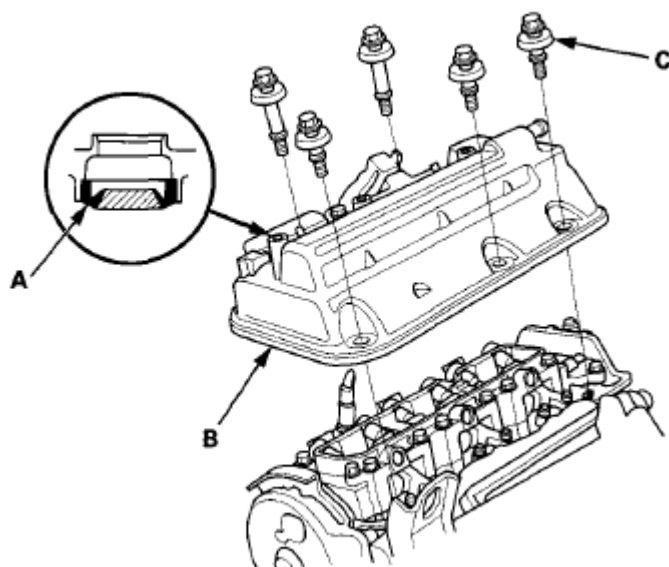


Fig. 85: Setting Spark Plug Seals On Spark Plug Tubes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N.m (1.2 kgf.m, 9 lbf.ft).

NOTE:

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

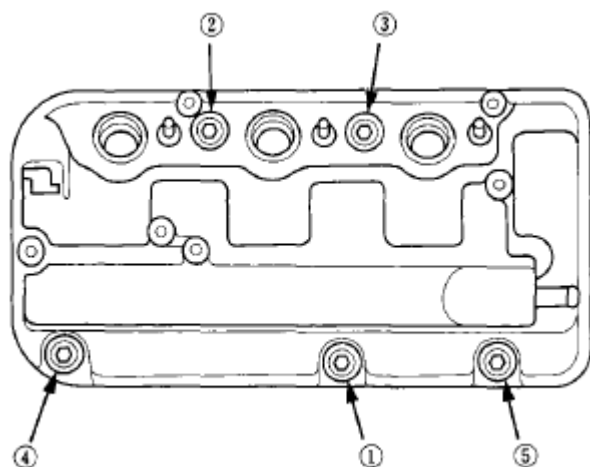


Fig. 86: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the wire harness (A) to the rear upper cover.

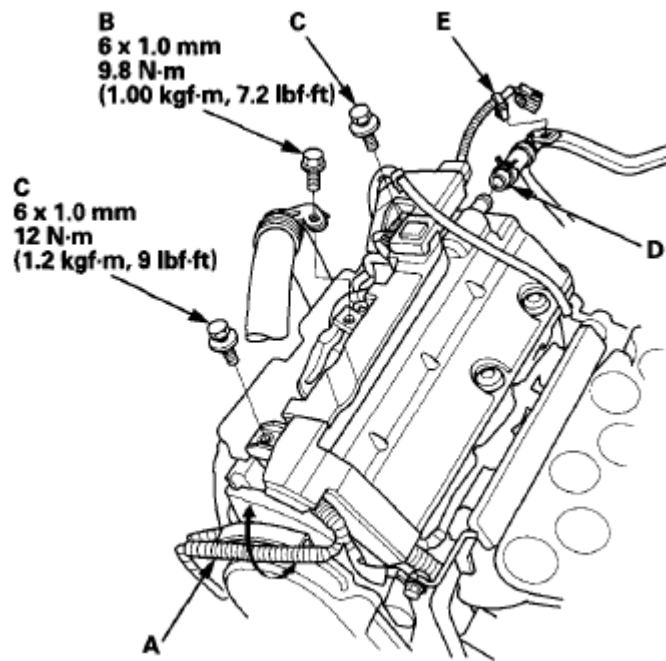


Fig. 87: Installing Wire Harness To Rear Upper Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the power steering hose clamp mounting bolt (B), the harness holder mounting bolts (C), the breather hose (D), and the harness clamp (E).
13. Install the three ignition coils to the rear cylinder head (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
14. Install the intake manifold (see **INSTALLATION**).

CYLINDER HEAD REMOVAL

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wiring and terminals, unplug the wiring connectors carefully while holding the connector portion.
- Connect the HDS to the DLC (see step 2 on **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**), and monitor the ECT sensor 1. To avoid damaging the cylinder head, wait until the ECT sensor 1 temperature drops below 100°F (38°C) before loosening the cylinder head bolts.
- Mark all wiring and hoses to avoid mis-connection. Also, be sure that they do not contact any other wirings or hoses, or interfere with any other parts.

1. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
2. Do the battery terminal disconnection procedure (see **BATTERY TERMINAL DISCONNECTION AND RECONNECTION**).
3. Drain the engine coolant (see **COOLANT CHECK**).

4. Remove the power steering pump (A) and the power steering hose clamp (B) with its hoses connected.

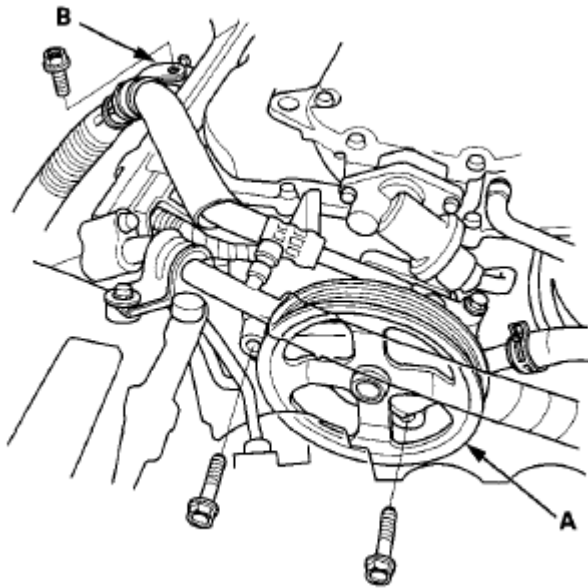


Fig. 88: Removing Power Steering Pump And Power Steering Hose Clamp
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the alternator (see **ALTERNATOR REMOVAL AND INSTALLATION**).
6. Remove the intake manifold (see **REMOVAL**).
7. Remove the six ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
8. Remove the timing belt (see **TIMING BELT REMOVAL**).
9. Disconnect the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Six injector connectors
 - ECT sensor 1 connector
 - Oil pressure switch connector
 - CMP sensor connector
 - Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Front and rear A/F sensor connectors
 - Front and rear secondary HO2S connectors
10. Remove the front WU-TWC (see **WARM UP TWC REMOVAL/INSTALLATION**) and the rear WU-TWC (see **REAR**).
11. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).

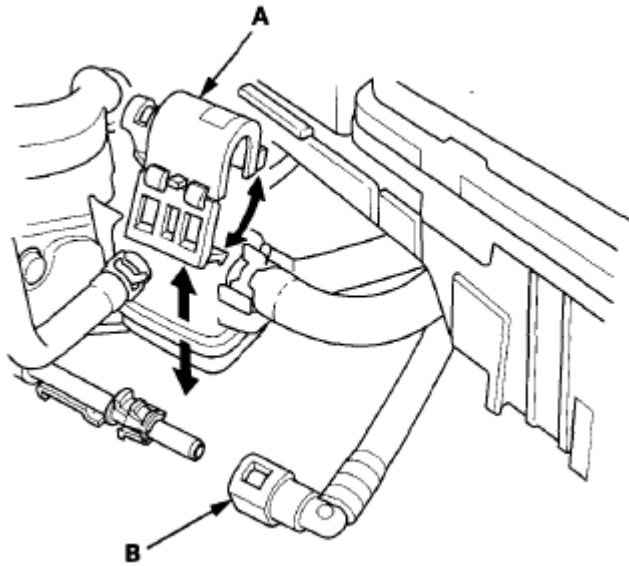


Fig. 89: Removing Quick-Connect Fitting Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the connector bracket (A) from the front cylinder head.

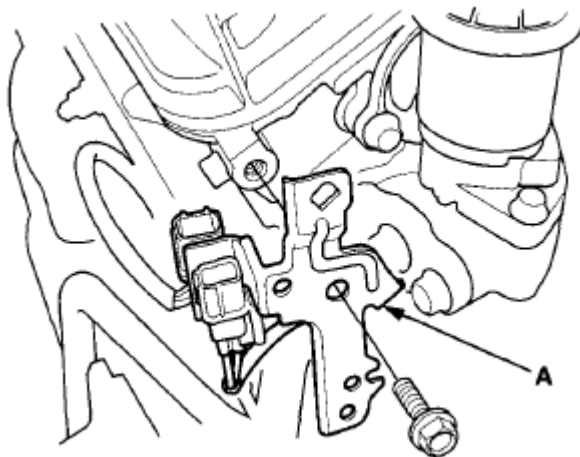


Fig. 90: Removing Connector Bracket From Front Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the engine mount control solenoid valve bracket (A) and the harness clamp bracket (B) from the rear cylinder head.

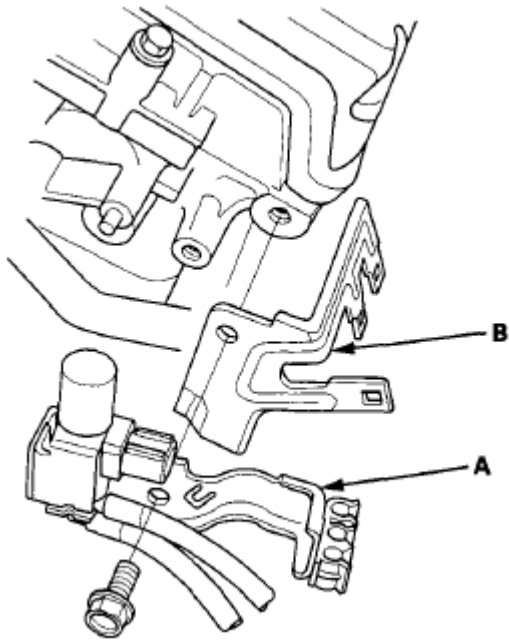


Fig. 91: Removing Engine Mount Control Solenoid Valve Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the fuel rails (see **INJECTOR REPLACEMENT**).
15. Remove the water passage (see **WATER PASSAGE REPLACEMENT**).
16. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
17. Remove the camshaft pulleys (A) and the back covers (B).

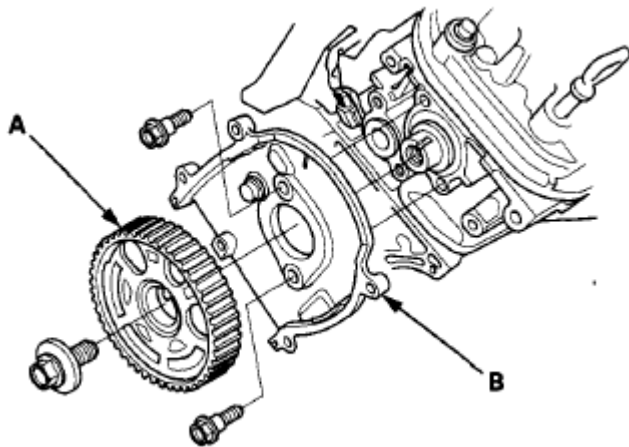


Fig. 92: Removing Camshaft Pulleys And Back Covers - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

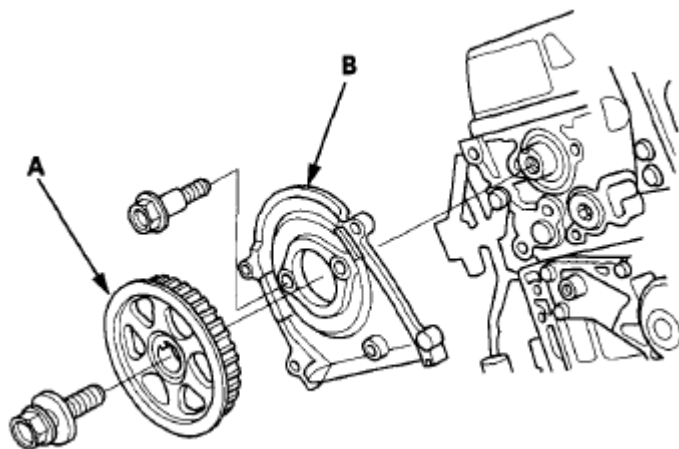


Fig. 93: Removing Camshaft Pulleys And Back Covers - Rear
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the cylinder head covers (see **TIMING BELT ADJUSTER REPLACEMENT**).
19. Remove the cylinder head bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

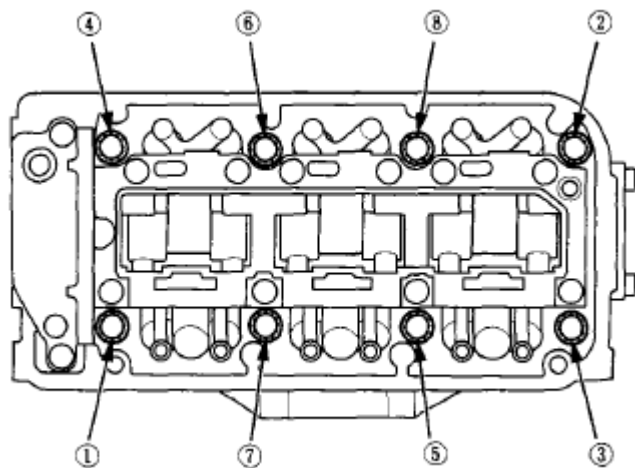


Fig. 94: Identifying Cylinder Head Bolts - Front
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

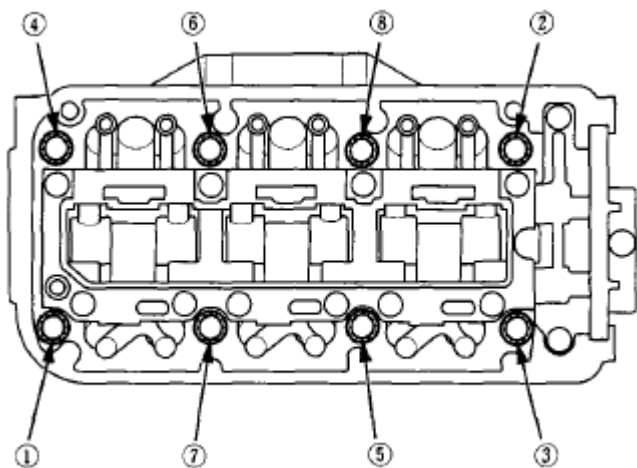


Fig. 95: Identifying Cylinder Head Bolts - Rear
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the cylinder heads.

CAMSHAFT REPLACEMENT

FRONT

1. Do the battery removal procedure (see **BATTERY REMOVAL AND INSTALLATION**).
2. Drain the engine coolant (see **COOLANT REPLACEMENT**).
3. Disconnect the radiator hoses (A).

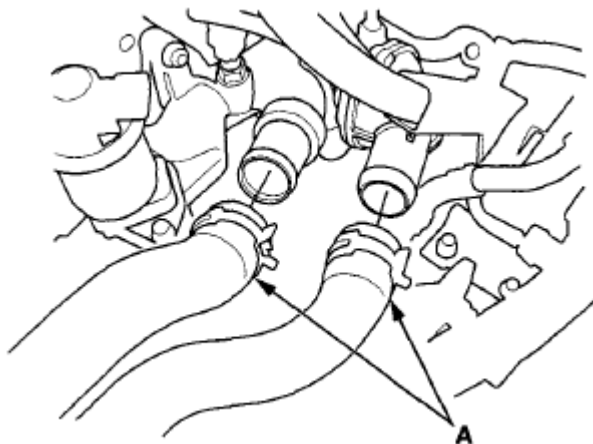


Fig. 96: Disconnecting Radiator Hoses
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the EGR valve (see **EGR VALVE REPLACEMENT**).
5. Remove the EGR valve stud bolts.

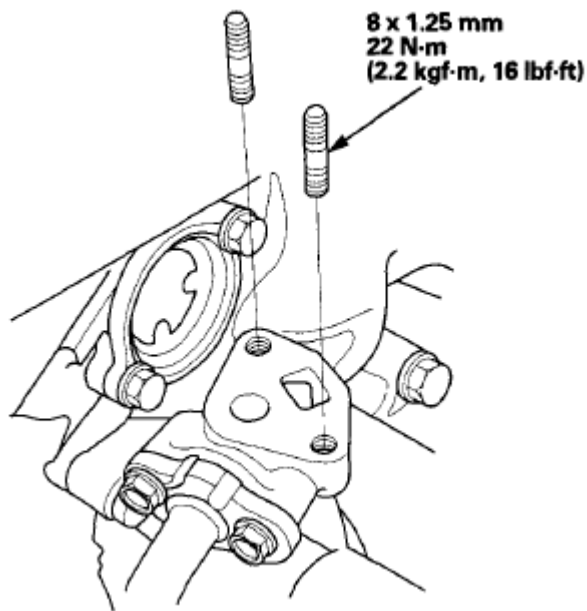


Fig. 97: Removing EGR Valve Stud Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the timing belt (see **TIMING BELT REMOVAL**).
7. Remove the front rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
8. Remove the front camshaft pulley (see step 17 on 17).
9. Remove the thrust cover (A), then remove the front camshaft (B).

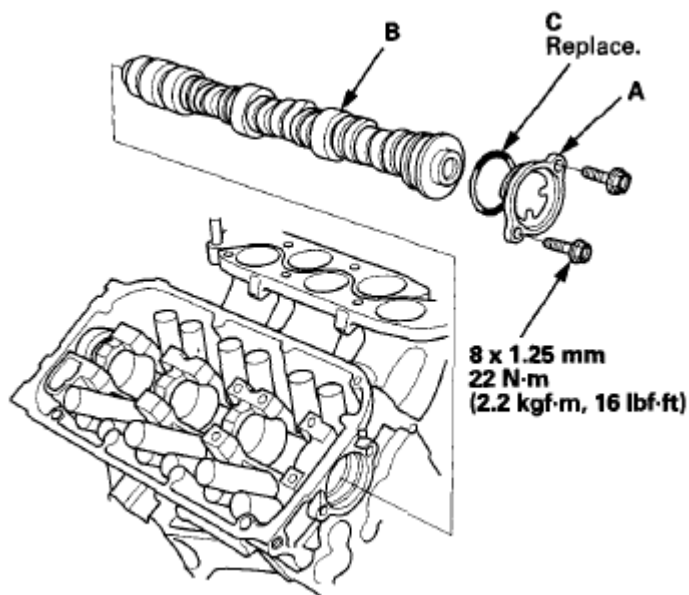


Fig. 98: Removing Thrust Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the front camshaft in the reverse order of removal. Always use a new O-ring (C). Apply new engine oil to the journals and the cam lobes.
11. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 14 14).
12. Install the rocker arm assembly (see **CAMSHAFT, ROCKER ARM ASSEMBLY, CAMSHAFT SEAL, AND PULLEY INSTALLATION**).
13. Install the timing belt (see **TIMING BELT INSTALLATION**).
14. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
15. Install the EGR valve stud bolts, then install the EGR valve (see **EGR VALVE REPLACEMENT**).
16. Connect the upper radiator hose and the lower radiator hose.
17. Do the battery installation procedure (see **RECONNECTION**).
18. Refill the radiator with engine coolant, and bleed the air from the cooling system (see **COOLANT CHECK**).
19. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

REAR

1. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
2. Remove the quick-connect fitting cover, then disconnect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).
3. Remove the intake manifold (see **REMOVAL**).
4. Remove the EVAP canister purge joint (A).

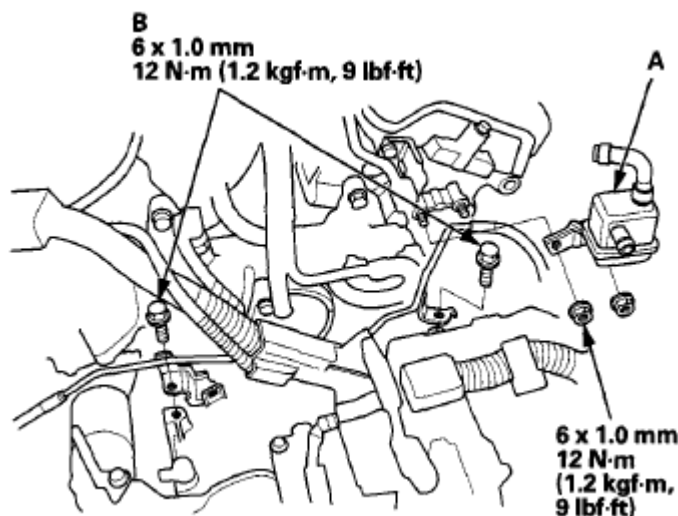


Fig. 99: Removing EVAP Canister Purge Joint With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the two bolts (B) securing the vacuum line.
6. Remove the timing belt (see **TIMING BELT REMOVAL**).

7. Remove the rear rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
8. Remove the rear camshaft pulley (see step 17 17).
9. Remove the thrust cover (A), then remove the rear camshaft (B).

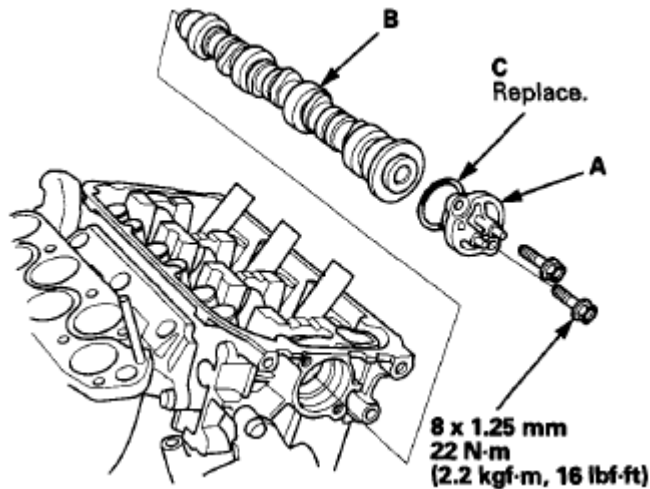


Fig. 100: Removing Thrust Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the rear camshaft in the reverse order of removal. Always use a new O-ring (C). Apply new engine oil to the journals and cam lobes.
11. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 1414).
12. Install the rocker arm assembly (see **REAR**).
13. Install the timing belt (see **TIMING BELT INSTALLATION**).
14. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
15. Install the vacuum line and the EVAP canister purge joint.
16. Install the intake manifold (see **INSTALLATION**).
17. Connect the fuel feed hose, then install the quick-connect fitting cover (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**).
18. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
19. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).

CYLINDER HEAD INSPECTION FOR WARPAGE

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

- If warpage is less than 0.05 mm (0.0020 in), cylinder head resurfacing is not required.
- If warpage is between 0.05 mm (0.0020 in) and 0.2 mm (0.008 in), resurface the cylinder head.
- Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 121 mm (4.76 in).

Cylinder Head Height

Standard (New): 120.95-121.05 mm (4.7618-4.7657 in)

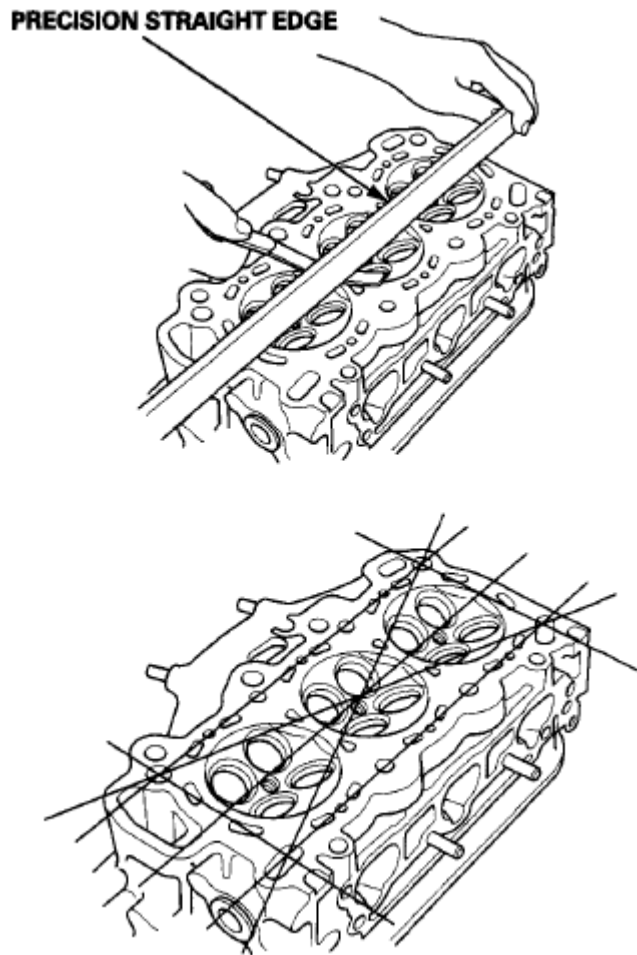


Fig. 101: Checking Cylinder Head For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

FRONT

1. Remove the cylinder head cover (see **TIMING BELT ADJUSTER REPLACEMENT**).
2. Loosen the locknuts and the adjusting screws (A).

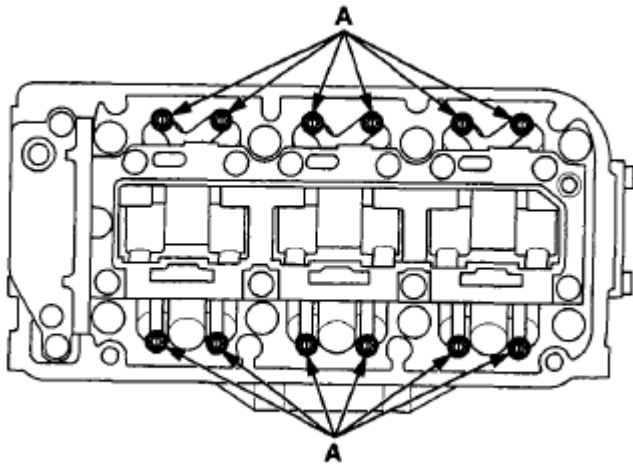


Fig. 102: Identifying Locknuts And Adjusting Screws
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.
1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the springs and the rocker arms on the shafts.

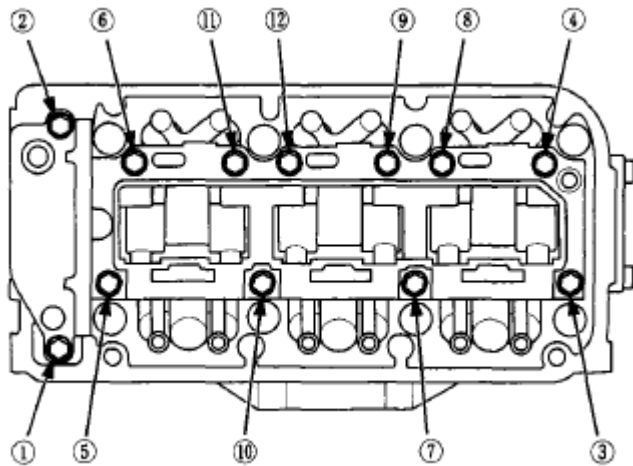


Fig. 103: Identifying Rocker Shaft Bridge Mounting Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

1. Remove the cylinder head cover (see **TIMING BELT ADJUSTER REPLACEMENT**).
2. Loosen the locknuts and the adjusting screws (A).

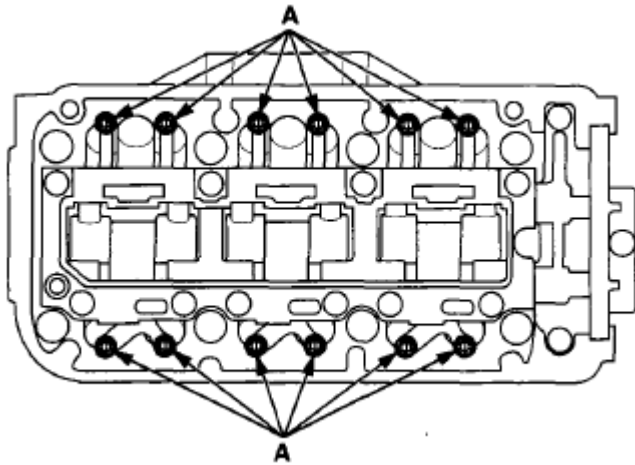


Fig. 104: Identifying Locknuts And Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 6. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.
 1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
 2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the rocker arms on the shafts.

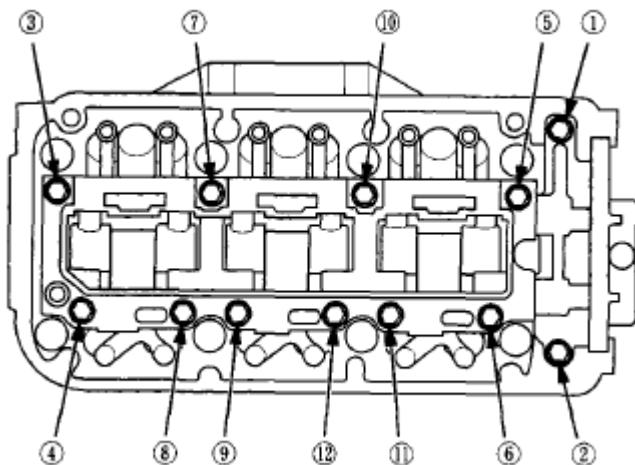


Fig. 105: Identifying Rocker Shaft Bridge Mounting Bolts And Rocker Shaft Holder Mounting Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

FRONT

NOTE:

- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see ROCKER ARM AND SHAFT INSPECTION).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft does not remove or does not install by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points the bearing surface, and the lost motion assembly.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.

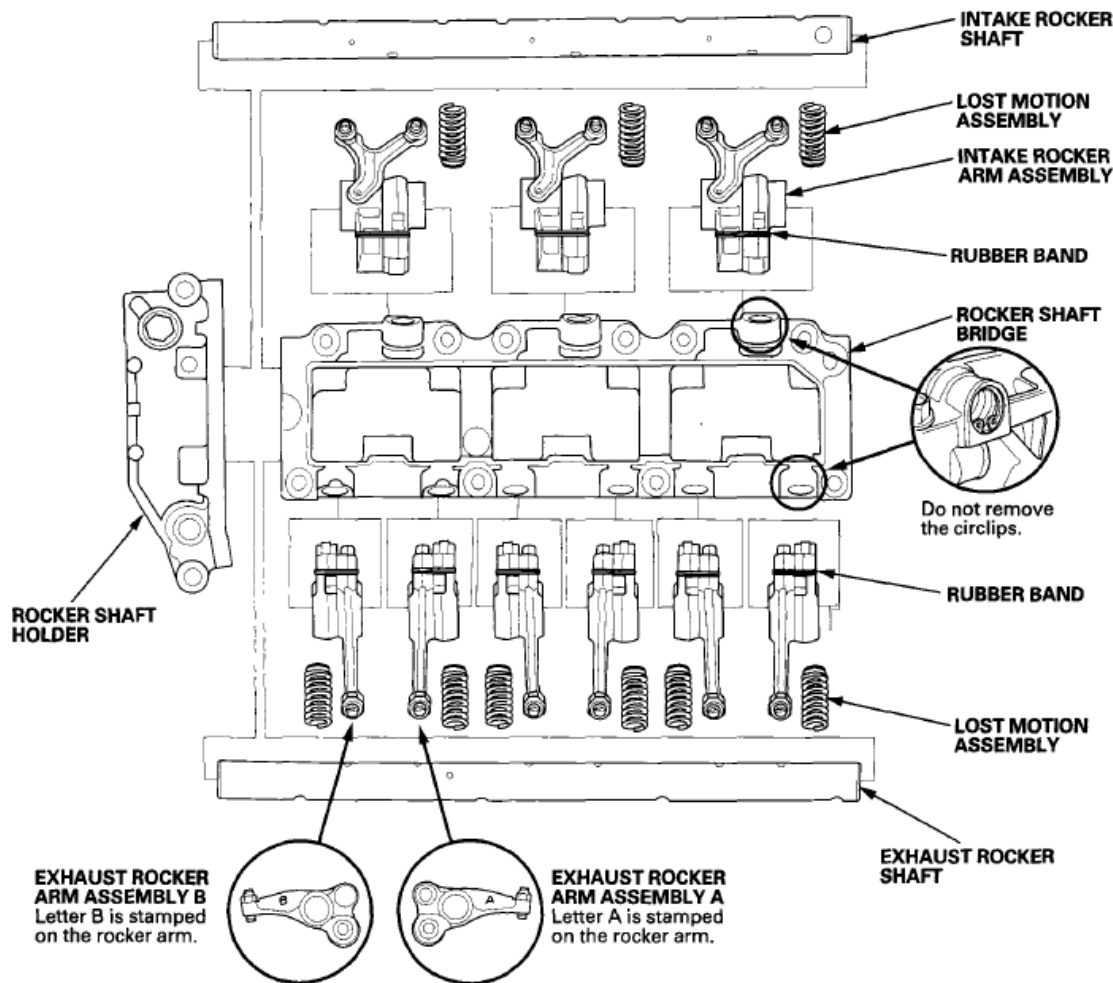


Fig. 106: Locating Rocker Arm And Shaft Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

NOTE:

- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see **ROCKER ARM AND SHAFT INSPECTION**).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft does not remove or does not install by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.

- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points the bearing surfaces, and the lost motion assembly.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.

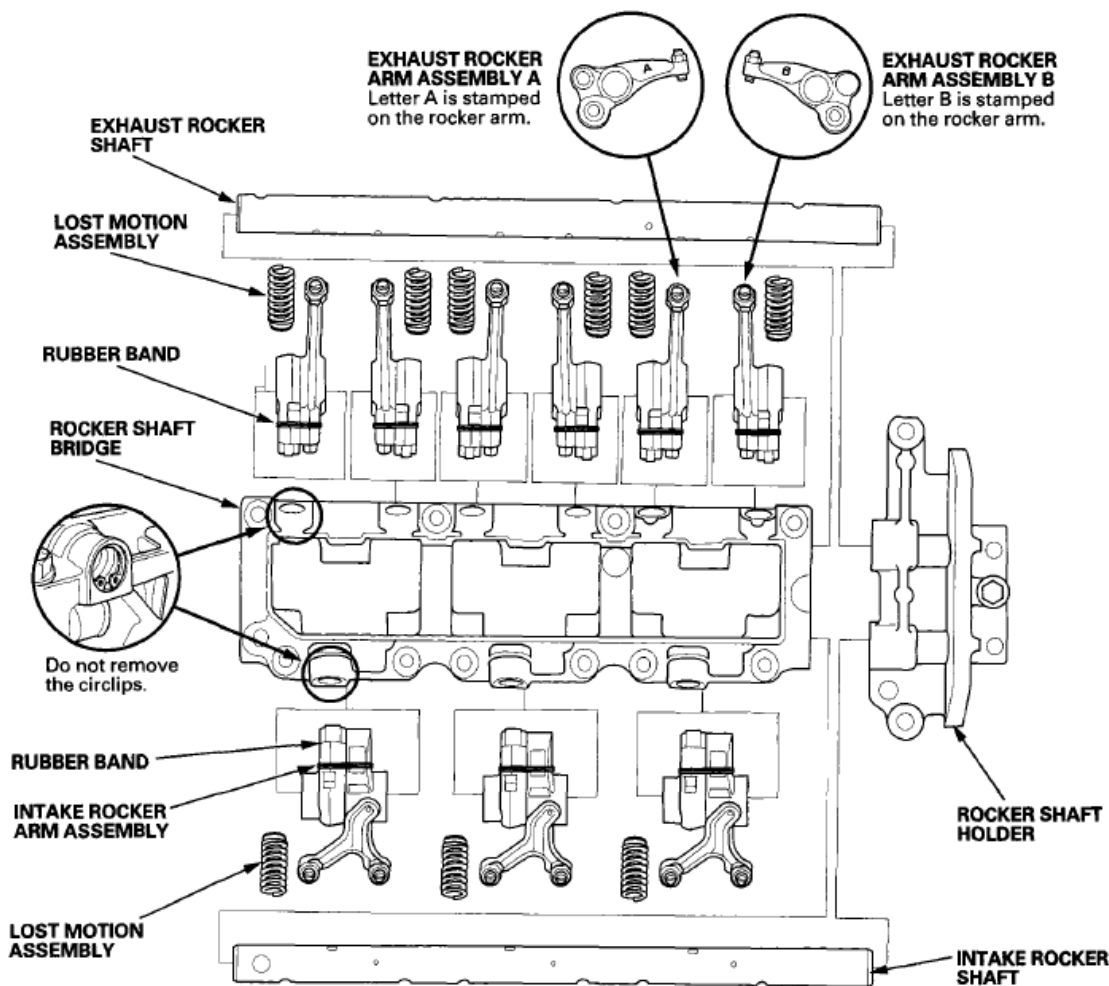


Fig. 107: Identifying Rocker Arm And Shaft Components Location - Rear
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Disassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).

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

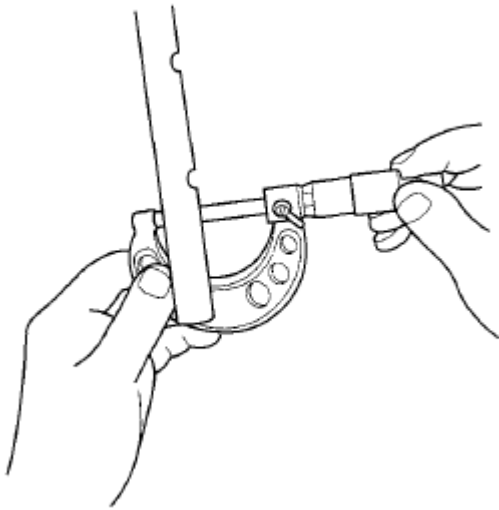


Fig. 108: Measuring Diameter Of Shaft At First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

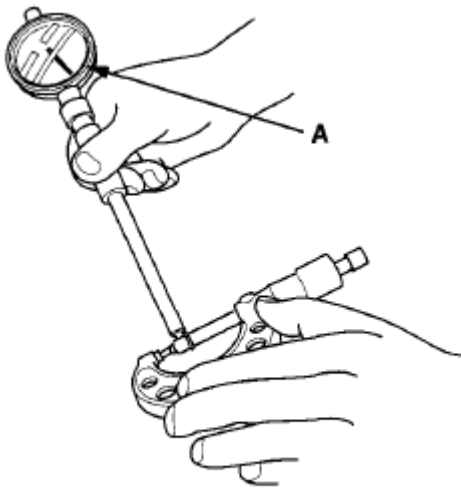


Fig. 109: Identifying Zero Gauge In Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Intake Rocker Arm-to-Shaft Clearance:

Standard (New): 0.015-0.046 mm (0.00059-0.00181 in)

Service Limit: 0.046 mm (0.00181 in)

Exhaust Rocker Arm-to-Shaft Clearance:

Standard (New): 0.015-0.046 mm (0.00059-0.00181 in)

Service Limit: 0.046 mm (0.00181 in)

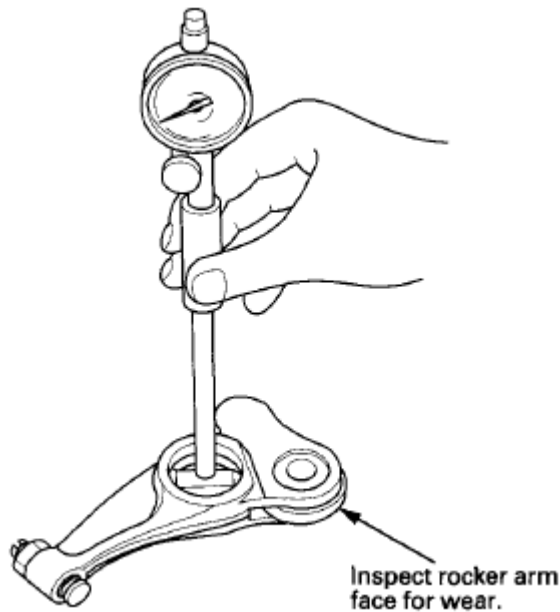


Fig. 110: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rockers and both shafts. If the clearance is over the limit, replace the rocker shaft and all over-tolerance rocker arms. If any intake rocker arm needs replacement, replace all rocker arms in that set (primary and secondary).

VTEC ROCKER ARMS

1. Inspect the rocker arm piston (A). Slide them into the rocker arms. If they do not move smoothly, replace the rocker arm set.

NOTE:

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

INTAKE

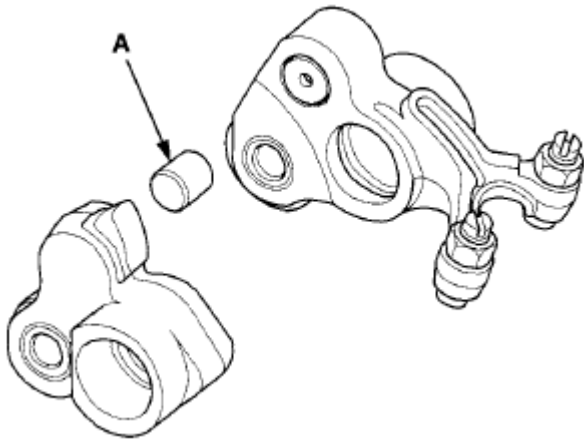


Fig. 111: Identifying Rocker Arm Piston - Intake
Courtesy of AMERICAN HONDA MOTOR CO., INC.

EXHAUST

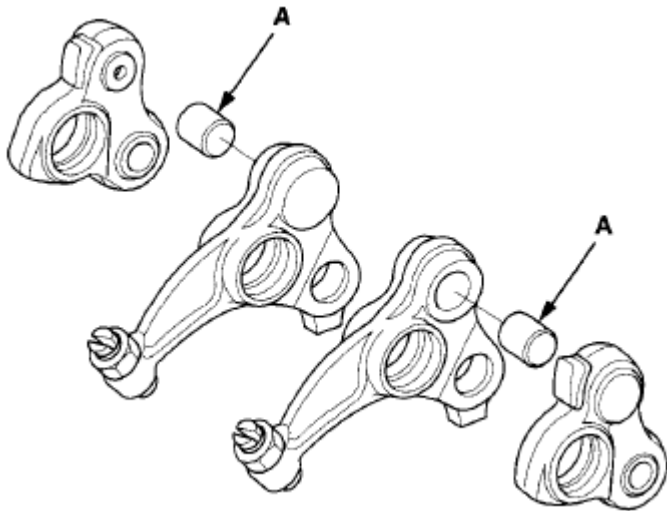


Fig. 112: Identifying Rocker Arm Piston - Exhaust
Courtesy of AMERICAN HONDA MOTOR CO., INC.

1. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
2. Install the rocker arm assembly (see **CAMSHAFT, ROCKER ARM ASSEMBLY, CAMSHAFT SEAL, AND PULLEY INSTALLATION**).

CAMSHAFT INSPECTION

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Front: Put the rocker shafts bridge and the rocker shaft holder on the front cylinder head, then tighten the

bolts to the specified torque.

Specified Torque

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

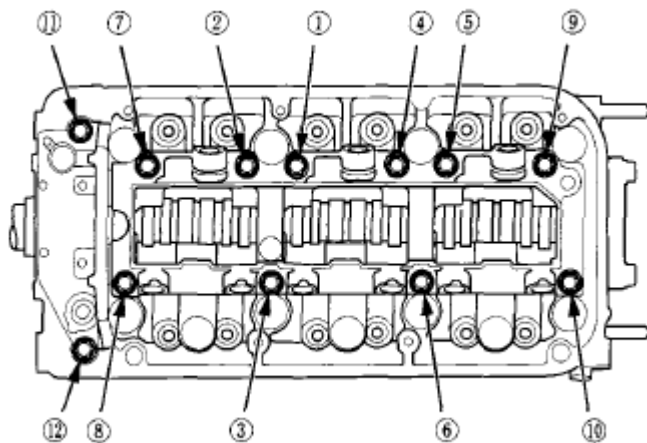


Fig. 113: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Rear: Put the rocker shaft bridge and the rocker shaft holder on the rear cylinder head, then tighten the bolts to the specified torque.

Specified Torque

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

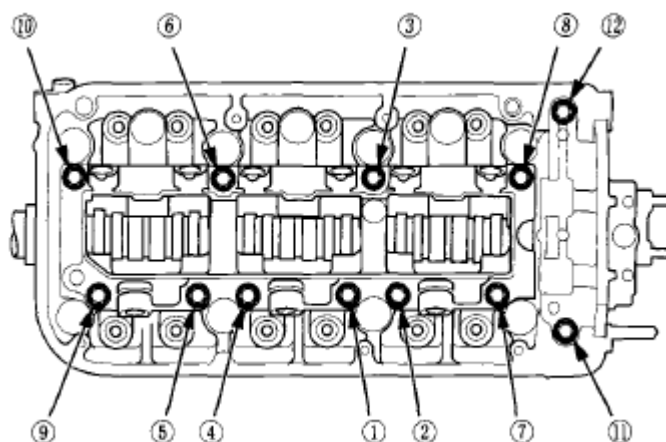


Fig. 114: Identifying Bolts Tightening Sequence - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Seat the camshaft by pushing it toward the rear of the cylinder head.
6. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth and read the end

play. If the end play is beyond the service limit, replace the thrust cover and recheck. If it is still beyond the service limit, replace the cylinder head. If it is still beyond the service limit, replace the camshaft.

Camshaft End Play

Standard (New): 0.05-0.20 mm (0.0020-0.0079 in)

Service Limit: 0.20 mm (0.0079 in)

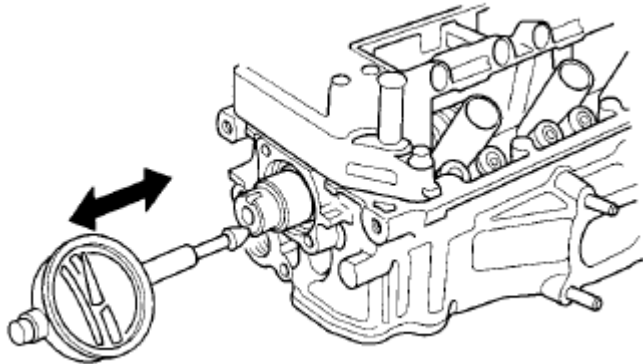


Fig. 115: Measuring Camshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the camshaft thrust cover (A), then pull out the camshaft (B).

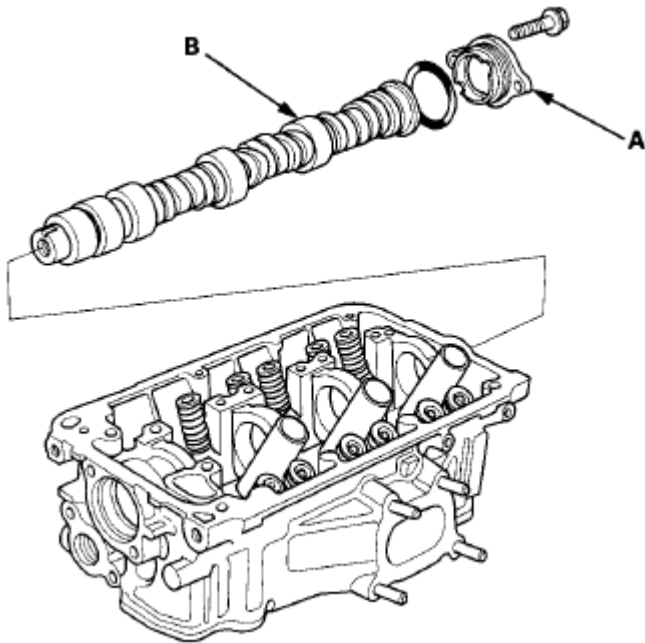


Fig. 116: Removing Camshaft Thrust Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
9. Measure the diameter of each camshaft journal.

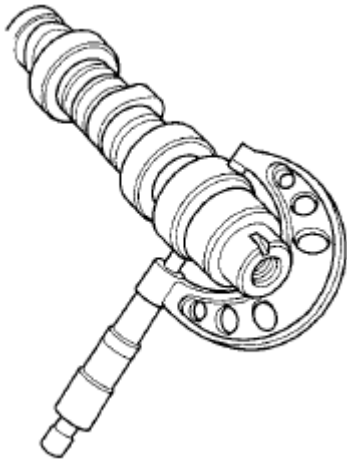


Fig. 117: Measuring Diameter Of Each Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Zero the gauge to the journal diameter.

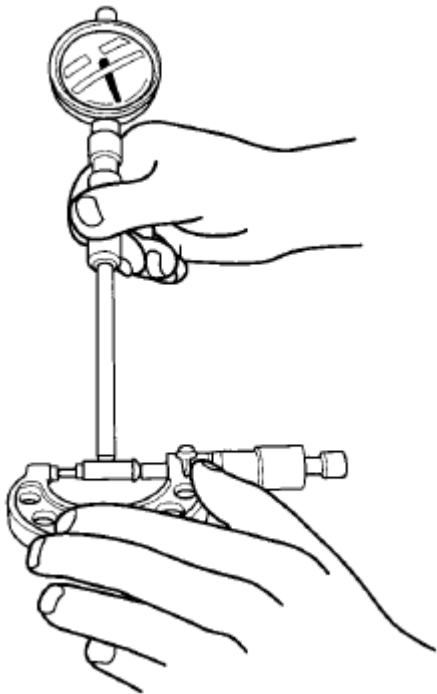


Fig. 118: Identifying Zero Reading In Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft

bearing surface, and check for an out-of-round condition.

- If the camshaft-to-holder clearance is within limits, go to step 1313.
- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has been replaced, replace the cylinder head.
- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has not been replaced, go to step 12.

Camshaft-to-Holder Oil Clearance

Standard (New): 0.050-0.089 mm (0.00197-0.00350 in)

Service Limit: 0.15 mm (0.0059 in)

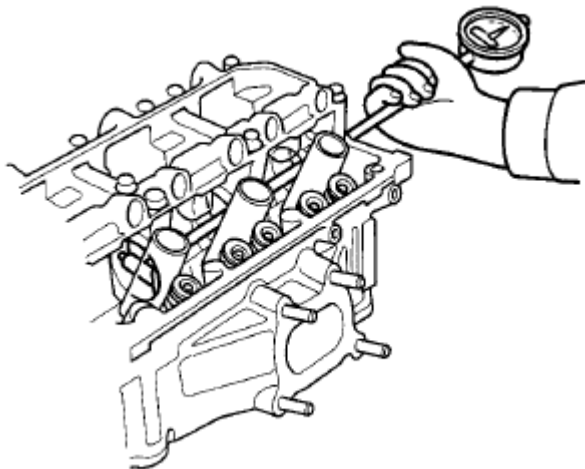


Fig. 119: Checking Camshaft-To-Holder Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in)

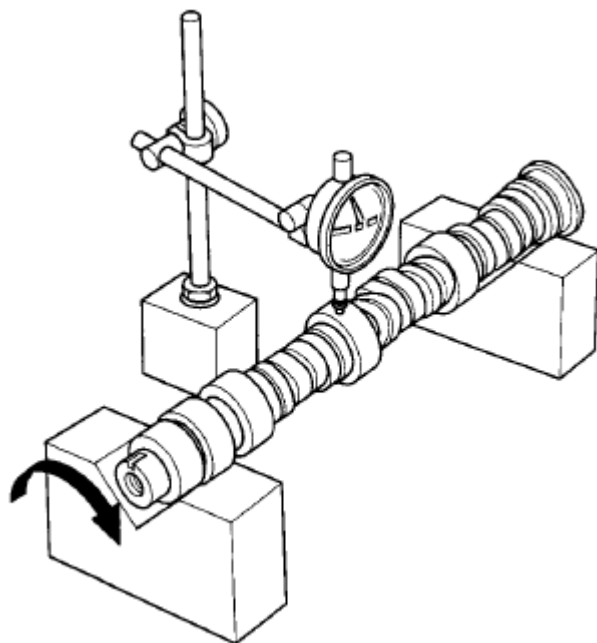


Fig. 120: Checking Camshaft Total Runout
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Measure the cam lobe height.

Cam Lobe Height Standard (New):

CAM LOBE HEIGHT SPECIFICATIONS

	INTAKE	EXHAUST
PRI	34.299 mm (1.35035 in)	36.734 mm (1.44622 in)
SEC	35.932 mm (1.41464 in)	37.370 mm (1.47126 in)

FRONT

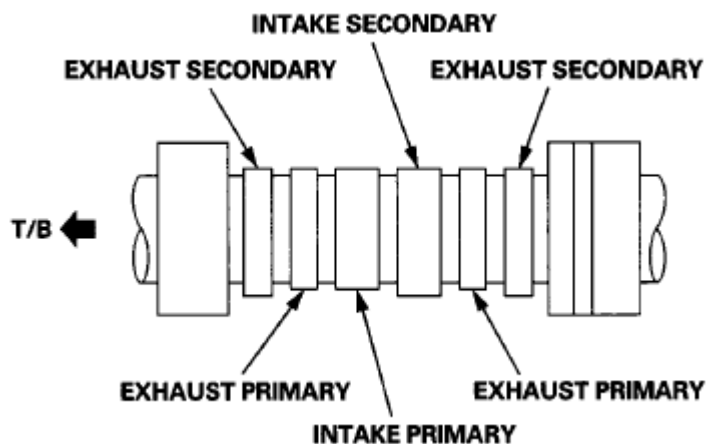


Fig. 121: Identifying Cam Lobes - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

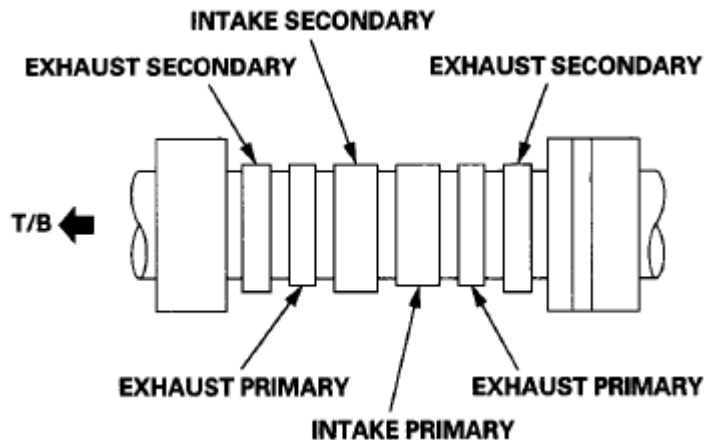


Fig. 122: Identifying Cam Lobes - Rear

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve Spring Compressor Attachment 07757-PJ1010A

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

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

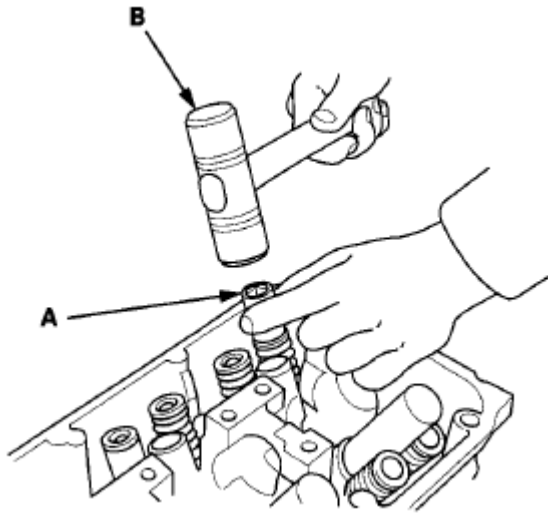


Fig. 123: Tapping Spring Retainer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the valve spring compressor attachment and the valve spring compressor. Compress the spring and remove the valve cotters.

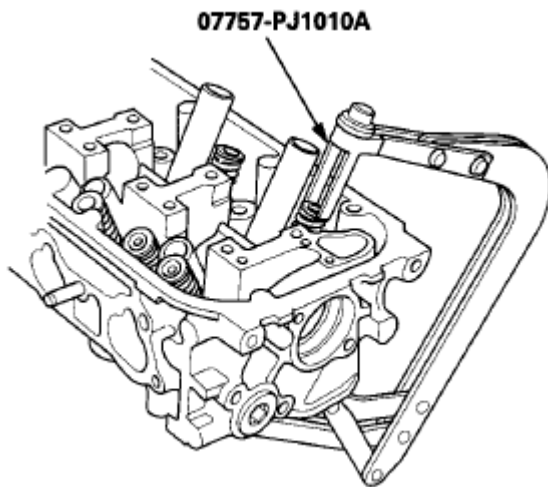


Fig. 124: Installing Valve Spring Compressor Attachment And Valve Spring Compressor

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the valve spring compressor and the valve spring compressor attachment, then remove the spring retainer, the valve spring, and the valve.
5. Install the valve guide seal remover (A).

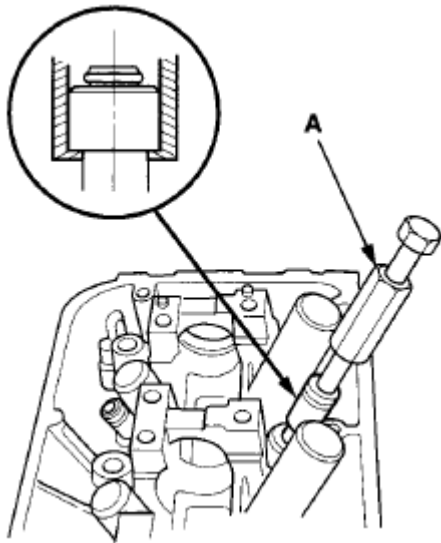


Fig. 125: Installing Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.

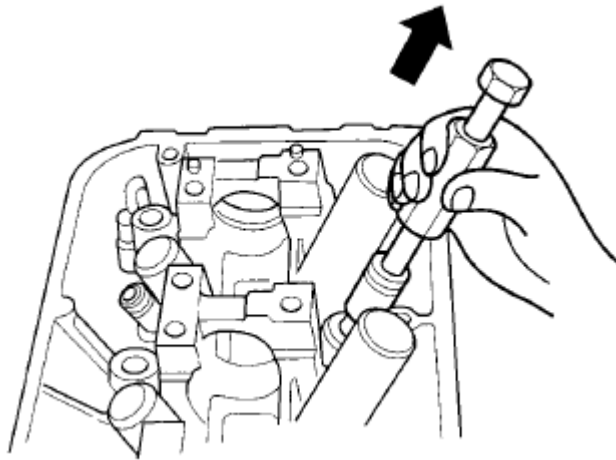


Fig. 126: Removing Valve Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring seat.

VALVE INSPECTION

1. Remove the valves (see **FRONT**).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 35.90-36.01 mm (1.4134-1.4177 in)

B Standard (New): 116.55-117.15 mm (4.5885-4.6122 in)

C Standard (New): 5.485-5.495 mm (0.21594-0.21634 in)

C Service Limit: 5.455 mm (0.21476 in)

Exhaust Valve Dimensions

A Standard (New): 29.85-30.15 mm (1.1752-1.1870 in)

B Standard (New): 113.90-114.50 mm (4.4843-4.5079 in)

C Standard (New): 5.450-5.460 mm (0.21457-0.21496 in)

C Service Limit: 5.420 mm (0.21339 in)

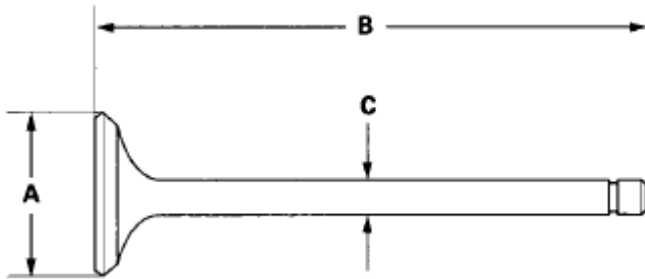


Fig. 127: Inspecting Valve

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Remove the valves (see **FRONT**).
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 a ball gauge. Take the measurements in three places along the valve stem and three places inside the valve guide. The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.020-0.045 mm (0.00079-0.00177 in)

Service Limit: 0.08 mm (0.0031 in)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.055-0.080 mm (0.00217-0.00315 in)

Service Limit: 0.11 mm (0.0043 in)

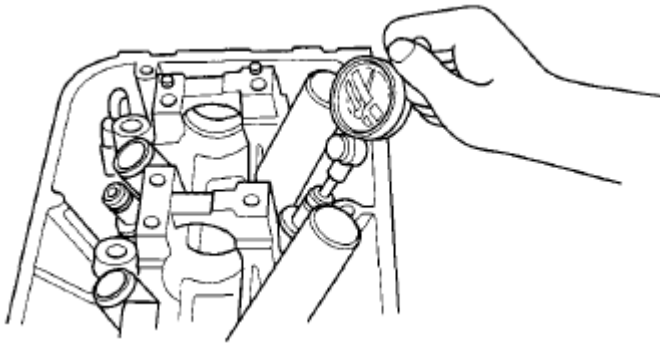


Fig. 128: Checking Intake Valve Stem-To-Guide Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve Guide Driver, 5.35x9.7 mm 07742-0010100
 - Valve Guide Reamer, 5.5 mm 07HAH-PJ7A100
1. Inspect the valve stem-to-guide clearance (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**).
 2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver,

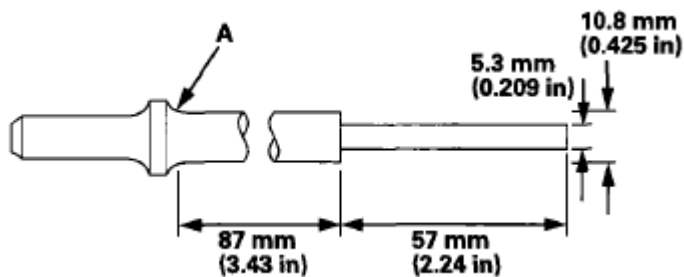


Fig. 129: Identifying Commercially Available Air-Impact Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

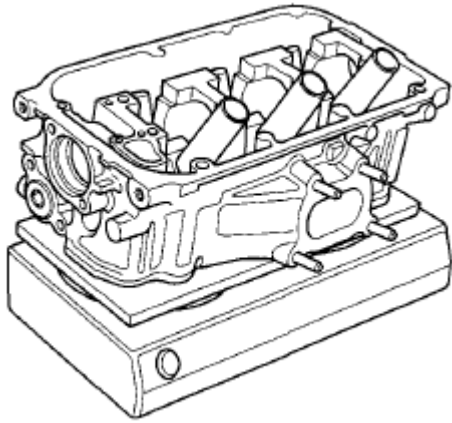


Fig. 130: Heating Cylinder Head

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

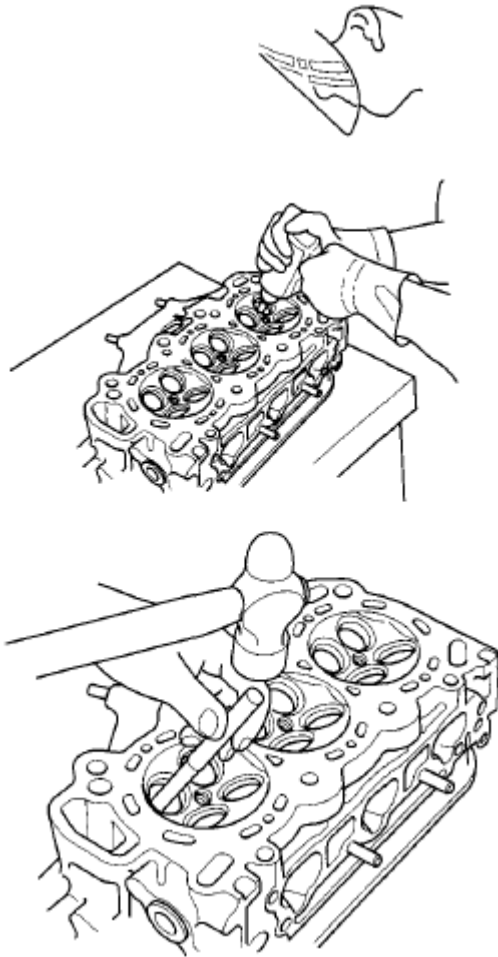


Fig. 131: Driving Guide Out Toward Camshaft Side Of Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the valve guide driver, 5.35 x 9.7 mm to drive the guide to the specified installed height (A) of the guide (B). If you have all 12 guides to do, you may have to reheat the head.

Valve Guide Installed Height

Intake: 21.2-22.2 mm (0.835-0.874 in)

Exhaust: 20.6-21.6 mm (0.811-0.850 in)

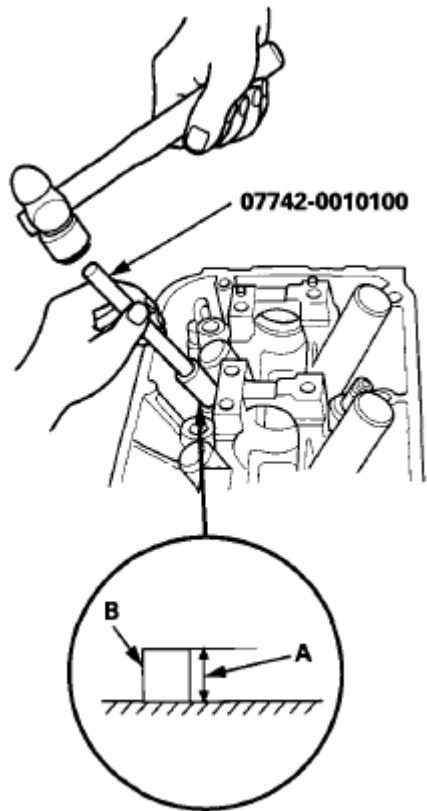


Fig. 132: Inspecting Valve Guide Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

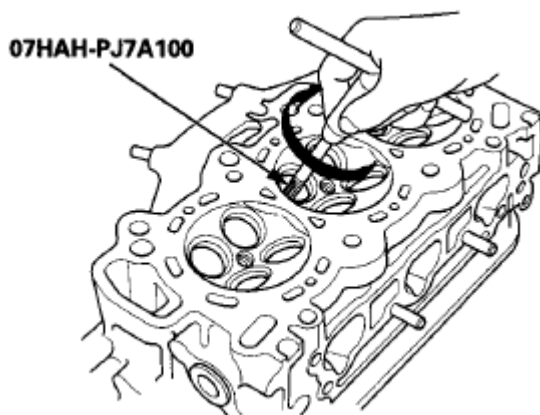


Fig. 133: Rotating Reamer Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.

14. Check the clearance with a valve (see VALVE STEM-TO-GUIDE CLEARANCE INSPECTION). Verify that a valve slides in the intake and exhaust valve guides without sticking.
15. Inspect the valve seating. If necessary renew the valve seat using a valve seat cutter (see VALVE SEAT RECONDITIONING).

VALVE SEAT RECONDITIONING

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

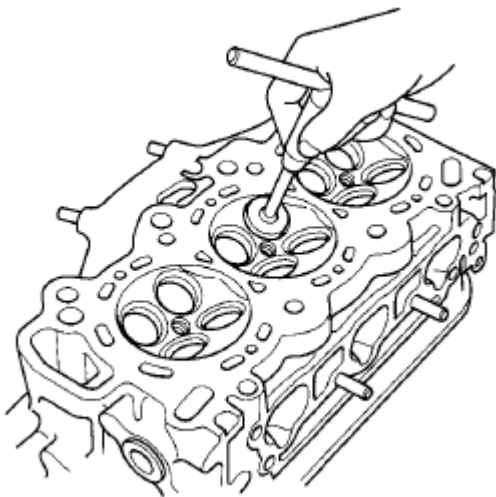


Fig. 134: Reaming Valve Seats In Cylinder Head Using Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

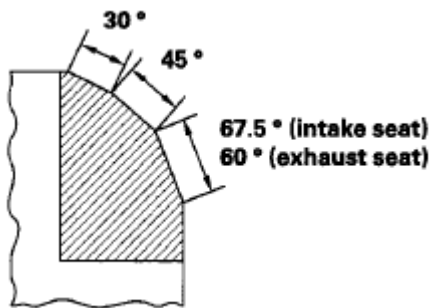


Fig. 135: Valve Seat Cutting Angles
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Seat Width

Standard (New): 1.25-1.55 mm (0.0492-0.0610 in)

Service Limit: 2.0 mm (0.079 in)

6. 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.

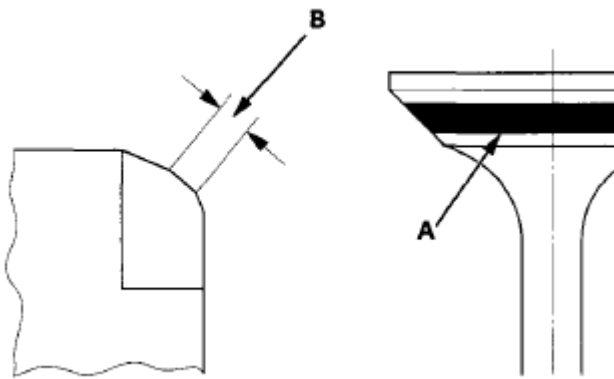


Fig. 136: Identifying Prussian Blue Compound In Valve Face
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

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

Intake Valve Stem Installed Height

Standard (New): 46.75-47.55 mm (1.8405-1.8720 in)

Service Limit: 47.80 mm (1.8819 in)

Exhaust Valve Stem Installed Height

Standard (New): 46.68-47.48 mm (1.8378-1.8693 in)

Service Limit: 47.73 mm (1.8791 in)

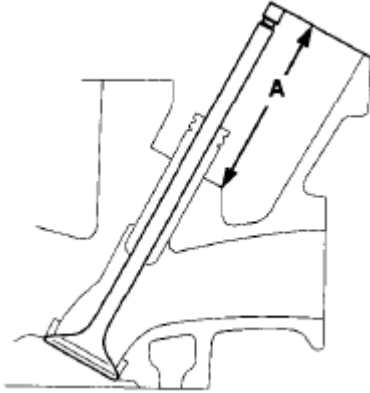


Fig. 137: Identifying Intake Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. 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.

VALVE, SPRING, AND VALVE SEAL INSTALLATION

Special Tools Required

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

NOTE: Exhaust valve seals (C) have a black spring (D) and intake valve seals (E) have a white or silver spring (F). They are not interchangeable.

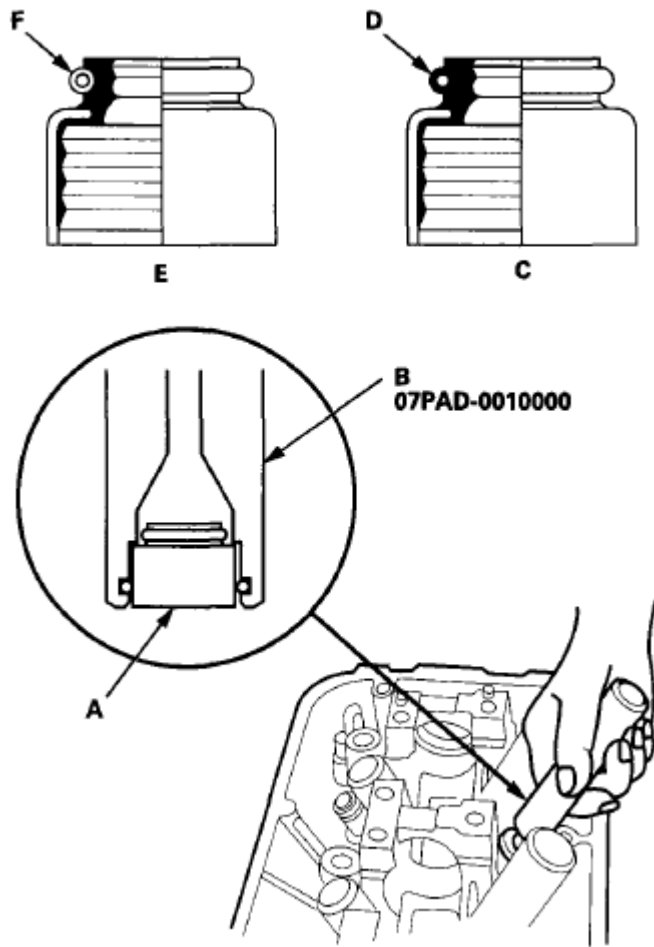


Fig. 138: Identifying Valve Seals

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

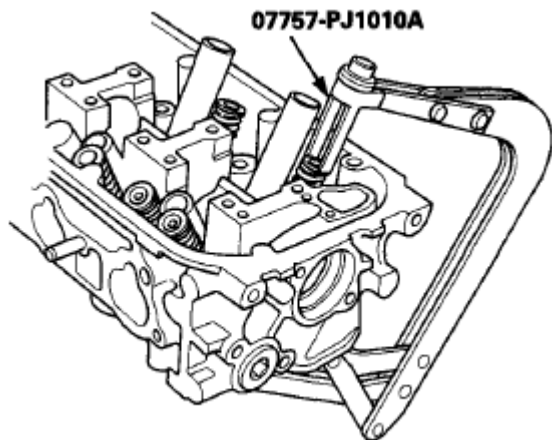


Fig. 139: Installing Valve Spring Compressor Attachment And Valve Spring Compressor
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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



Fig. 140: Tapping End Of Valve Stem
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT, ROCKER ARM ASSEMBLY, CAMSHAFT SEAL, AND PULLEY INSTALLATION

FRONT

1. Loosen the locknuts and the adjusting screws.
2. Clean and dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. Gently tap the new camshaft oil seal (A) into the cylinder head.
 1. Tap the camshaft oil seal in squarely.
 2. Install the oil seal about 0.5-1.5 mm (0.020-0.059 in) below the surface of the cylinder head.

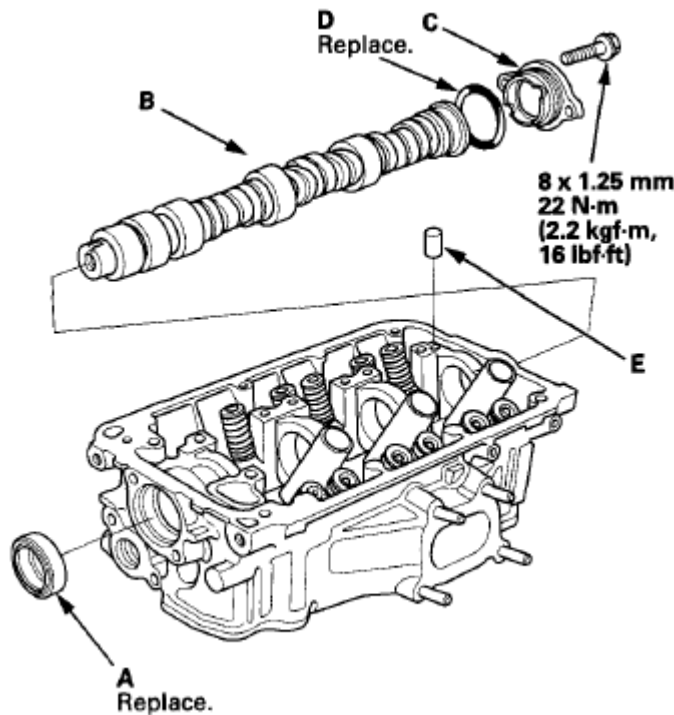


Fig. 141: Identifying Camshaft Oil Seal With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and lobes.
6. Clean the excess oil off the camshaft, and check that the oil seal lip is not distorted.
7. Install the dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).

- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.

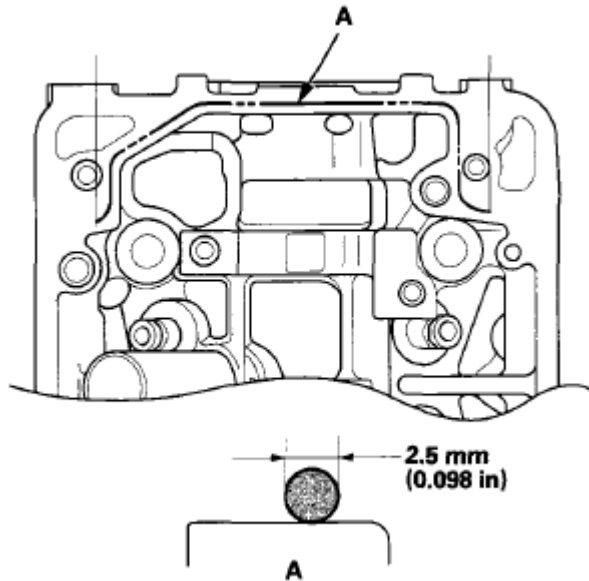


Fig. 142: Identifying Broken Line

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. 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.

NOTE:

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

12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

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

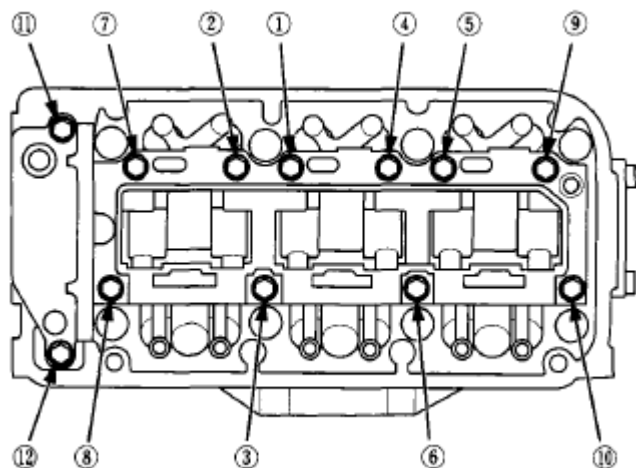


Fig. 143: Identifying Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the injector base (A). Always use a new gasket (B).

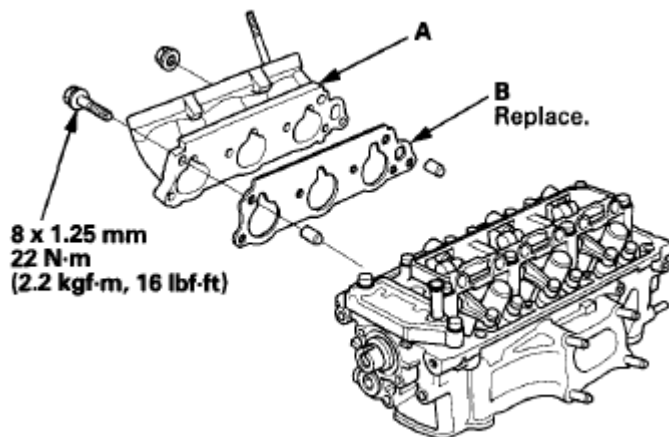


Fig. 144: Installing Injector Base With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Apply new engine oil to the threads of the camshaft pulley mounting bolt (A). Install the back cover (B), then install the camshaft pulley (C).

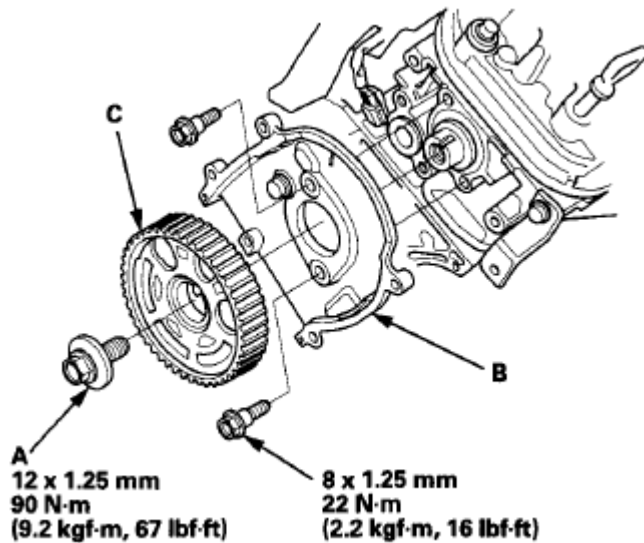


Fig. 145: Installing Back Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Set the camshaft pulleys to top dead center (TDC) before bolting them onto the engine block (see step 66).

REAR

1. Loosen the locknuts and the adjusting screws.
2. Clean and dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. Gently tap the new camshaft oil seal (A) into the cylinder head.
 1. Tap the camshaft oil seal in squarely.
 2. Install the oil seal about 0.5-1.5 mm (0.02-0.06 in) below the surface of the cylinder head.

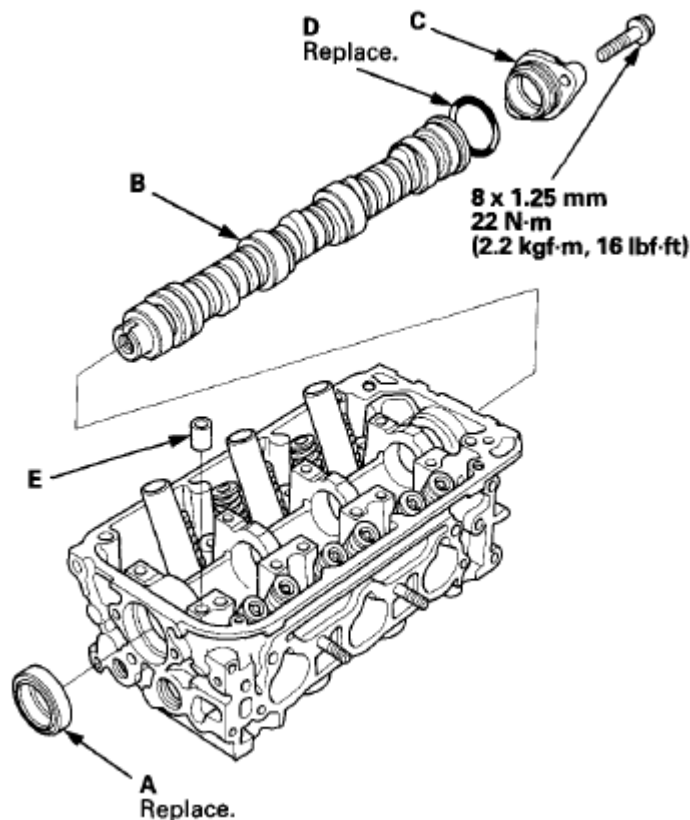


Fig. 146: Identifying Camshaft Oil Seal With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the camshaft journals and lobes.
6. Clean the excess oil off the camshaft, and check that the oil seal lip is not distorted.
7. Install the dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see **REAR**).
9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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

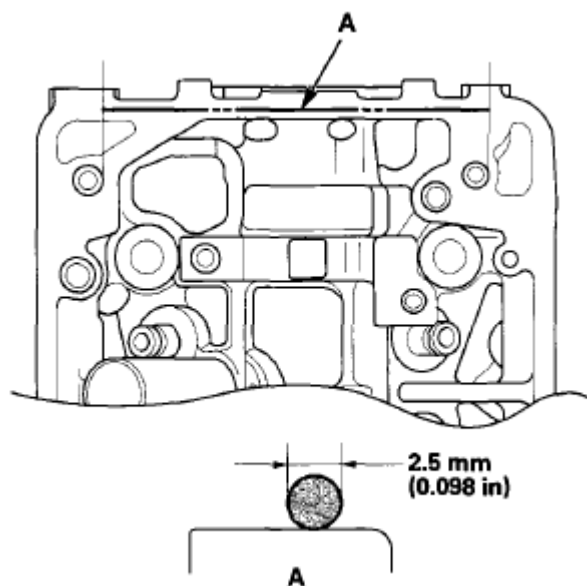


Fig. 147: Applying Bead Of Liquid Gasket To Broken Line
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. 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.

NOTE:

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

12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

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

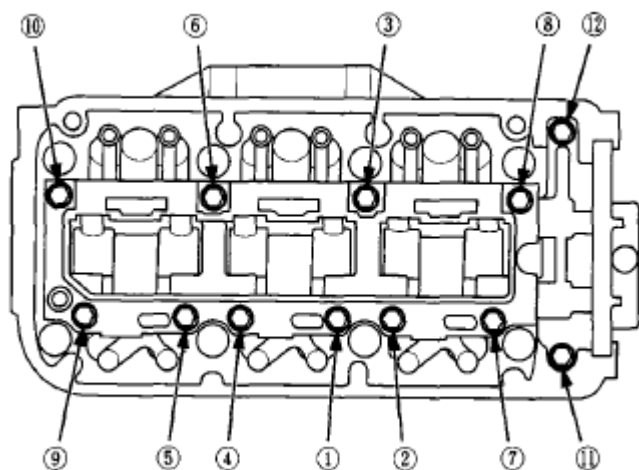


Fig. 148: Identifying Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the injector base (A). Always use a new gasket (B).

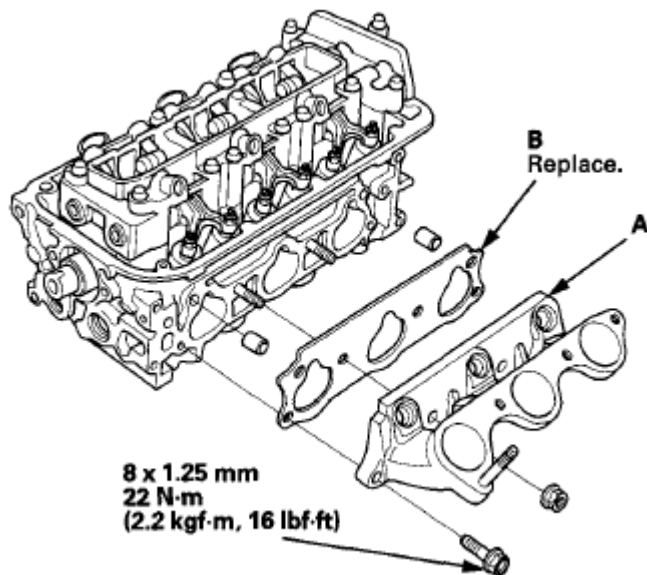


Fig. 149: Installing Injector Base With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Apply new engine oil to the threads of the camshaft pulley mounting bolt (A). Install the back cover (B), then install the camshaft pulley (C).

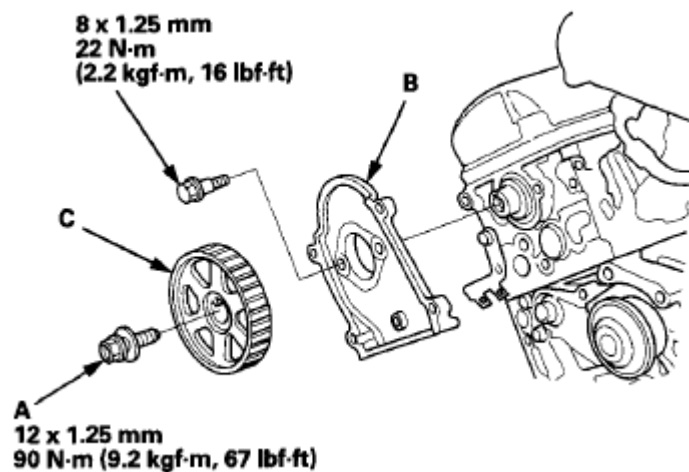


Fig. 150: Installing Back Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Set the camshaft pulleys to TDC before bolting them onto the engine block (see step 66).

CYLINDER HEAD INSTALLATION

1. Clean the cylinder head and the engine block surface.
2. Clean and install the oil control orifices (A) with new O-rings (B).

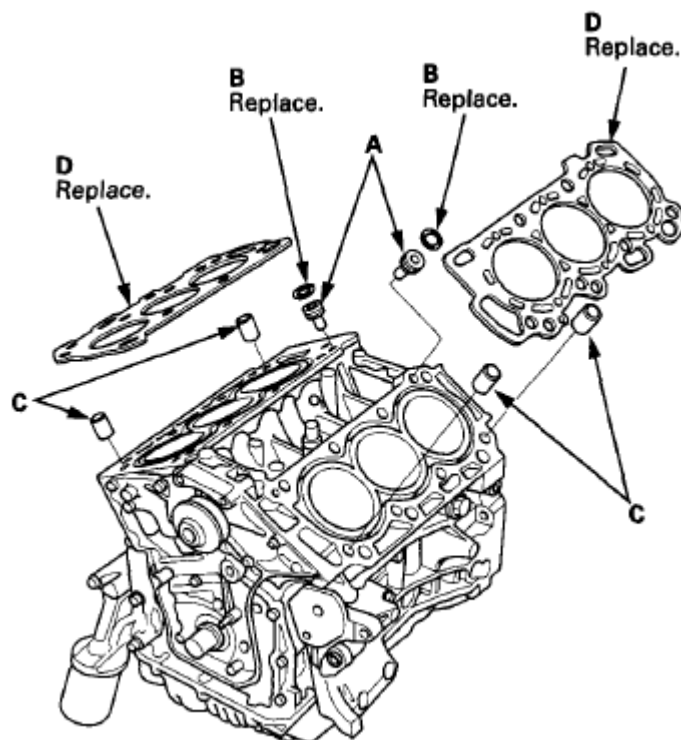


Fig. 151: Installing Oil Control Orifices With New O-Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the dowel pins (C) and the new cylinder head gaskets (D).
4. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
5. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with the pointer (B) on the oil pump.

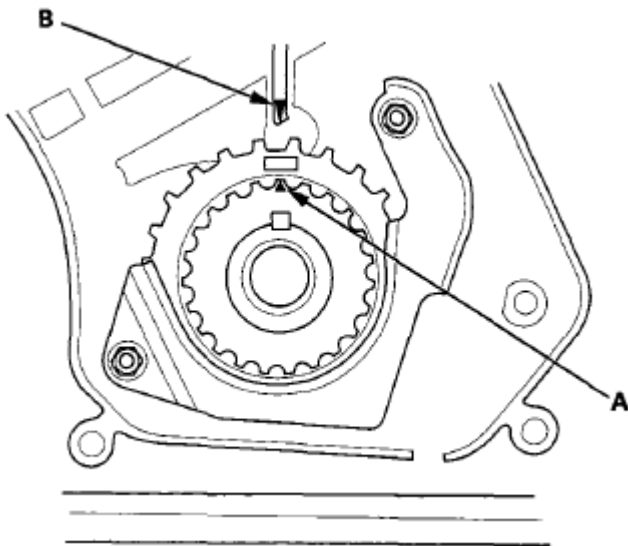


Fig. 152: Aligning TDC Mark On Tooth Of Timing Belt Drive Pulley With Pointer On Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

FRONT

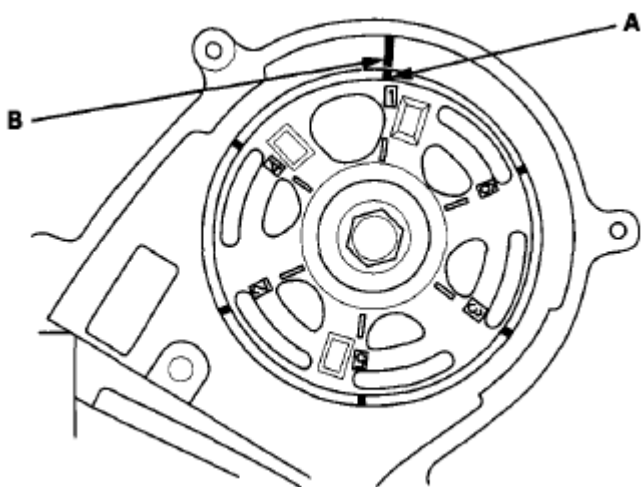


Fig. 153: Setting Camshaft Pulleys To TDC - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

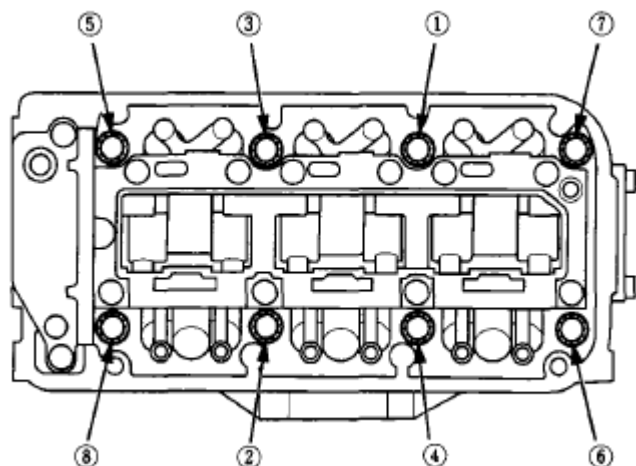


Fig. 154: Identifying Cylinder Head Bolts Tightening Sequence - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

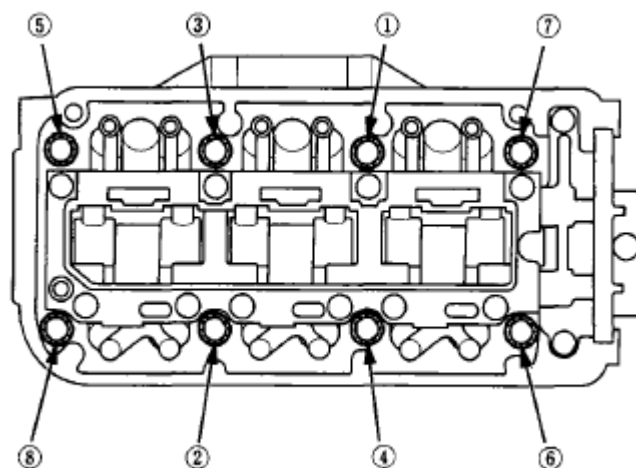


Fig. 155: Identifying Cylinder Head Bolts Tightening Sequence - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

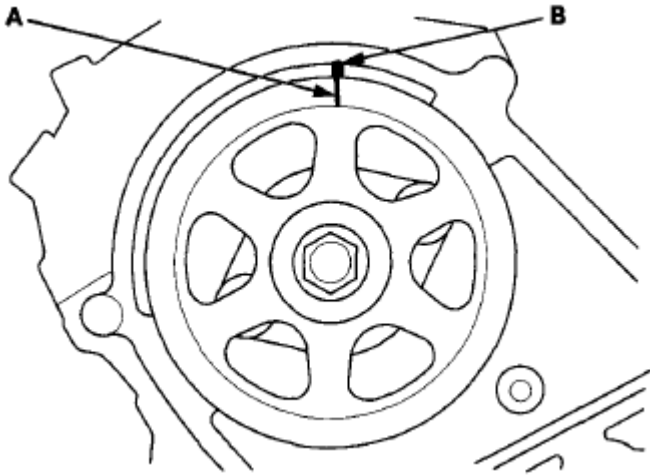


Fig. 156: Setting Camshaft Pulleys To TDC - Rear
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

1. Install the cylinder heads on the engine block.
2. Measure the diameter of each cylinder head bolt at point A and point B.

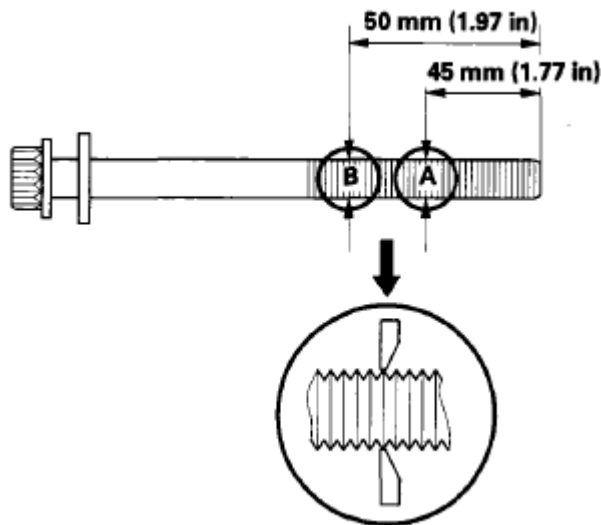


Fig. 157: Measuring Diameter Of Each Cylinder Head Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. If either diameter is less than 10.6 mm (0.417 in), replace the cylinder head bolt.
4. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
5. Torque the cylinder head bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft) using a beam-type torque wrench. When using a preset click-type torque wrench, be sure to torque slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.
6. After torquing, tighten all cylinder head bolts in two steps (90° per step) using the sequence shown in step 11. If you are using a new cylinder head bolt, tighten the bolt an extra 90°.

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

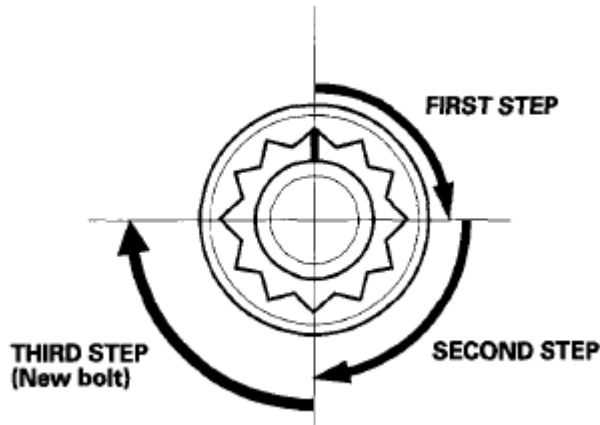


Fig. 158: Identifying Cylinder Head Bolts Tightening Steps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cylinder head covers (see **REAR**).
8. Install the timing belt (see **TIMING BELT INSTALLATION**).
9. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
10. 16. Install the water passage (see **WATER PASSAGE REPLACEMENT**).
11. Install the fuel rails (see **INJECTOR REPLACEMENT**).
12. Install the connector bracket (A) to the front cylinder head.

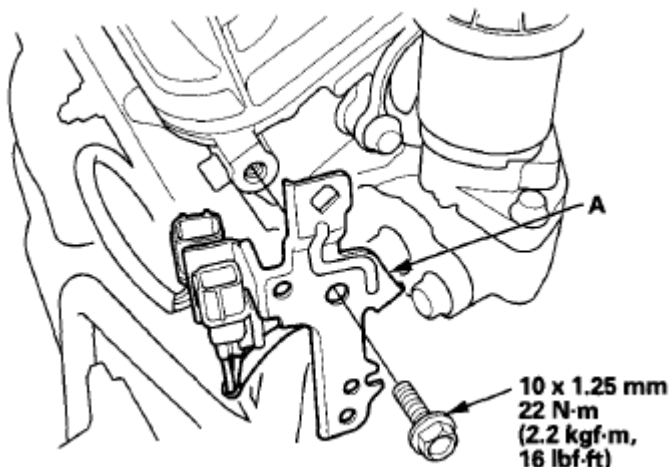


Fig. 159: Installing Connector Bracket To Front Cylinder Head With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the engine mount control solenoid valve bracket (A) and the harness clamp bracket (B) from the rear cylinder head.

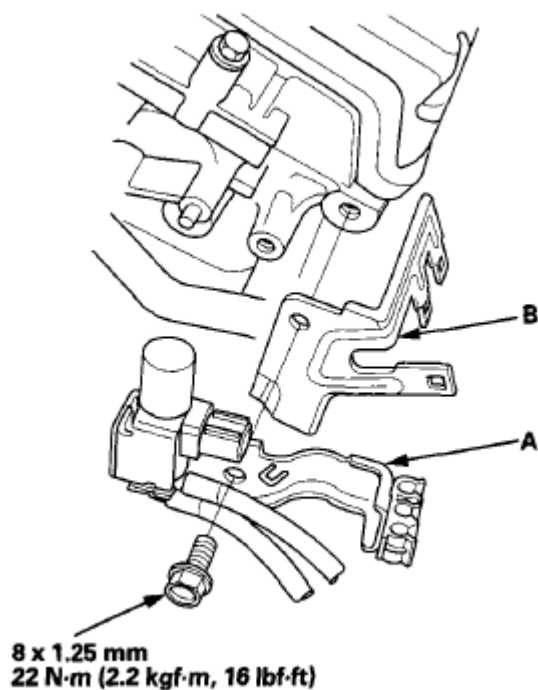


Fig. 160: Installing Engine Mount Control Solenoid Valve Bracket And Harness Clamp Bracket With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

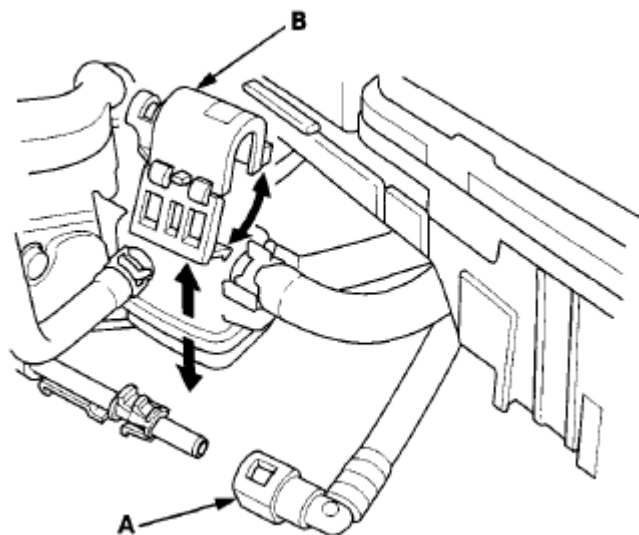


Fig. 161: Connecting Fuel Feed Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the front WU-TWC (see **WARM UP TWC REMOVAL/INSTALLATION**) and the rear WU-TWC (see **REAR**).

16. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:
 - Six injector connectors
 - ECT sensor 1 connector
 - Oil pressure switch connector
 - CMP sensor connector
 - Front and rear A/F sensor connectors
 - Front and rear secondary HO2S connectors
17. Install the six ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION**).
18. Install the intake manifold (see **INSTALLATION**).
19. Install the alternator (see **INSTALLATION**).
20. Install the power steering pump (A) and the power steering hose bracket (B).

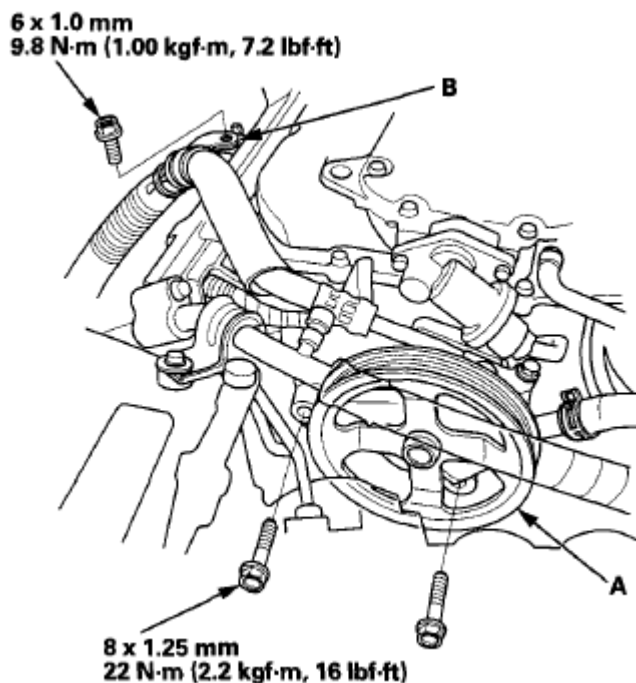


Fig. 162: Installing Power Steering Pump And Power Steering Hose Bracket With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
22. Do the battery terminal reconnection procedure (see **BATTERY TERMINAL DISCONNECTION AND RECONNECTION**).
23. After installation, check that all tubes, hoses, and connectors are installed correctly.
24. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for

fuel leakage at any point in the fuel line.

25. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see **COOLANT CHECK**).
26. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).
27. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
28. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
29. Check for fluid leaks.

CAMSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

Ball Joint Remover/Installer 07GAF-SD40330

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the camshaft pulley and the back cover (see step 1717).
3. Remove the camshaft oil seal.
4. Clean and dry the camshaft oil seal housing.
5. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
6. Using the ball joint remover/installer (A), a washer (B), and a 12 x 75 x 1.25 mm bolt (C), press in the new camshaft oil seal (D) about 0.5-1.5 mm (0.02-0.06 in) below the surface of the cylinder head.

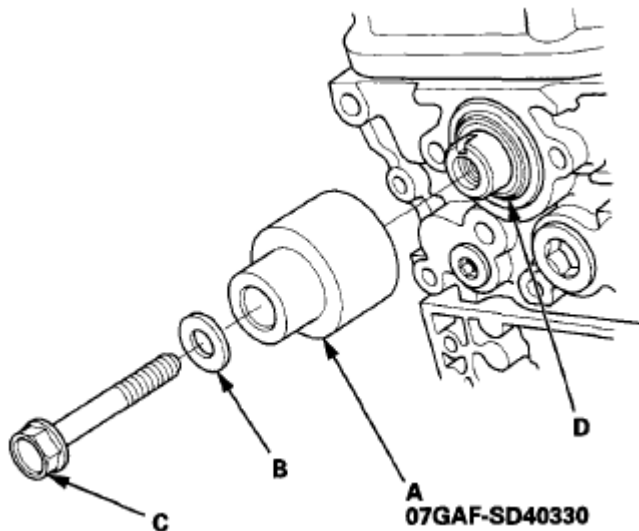


Fig. 163: Pressing In New Camshaft Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Clean the excess oil off the camshaft, and check that the oil seal lip is not distorted.
8. Apply new engine oil to the threads of the camshaft pulley mounting bolt. Install the back cover, then install the camshaft pulley:

- Front (see step 14 14)
 - Rear (see step 1414)
9. Install the timing belt (see **TIMING BELT INSTALLATION**).

SEALING BOLT INSTALLATION

NOTE: When installing the sealing bolts (A), always use the new washers (B).

FRONT

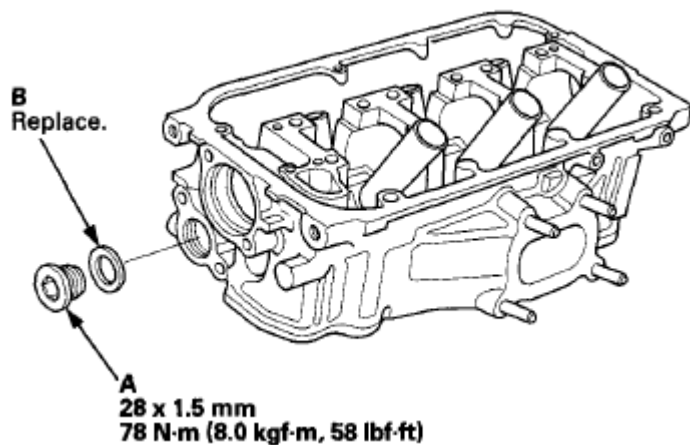


Fig. 164: Identifying Sealing Bolts - Front With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

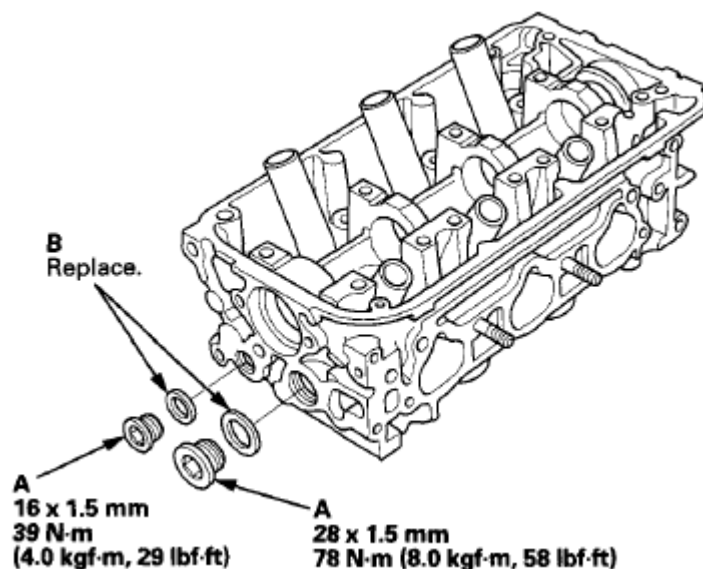


Fig. 165: Identifying Sealing Bolts - Rear With Torque Specifications

2011 Acura RL

2011-12 ENGINE Cylinder Head - RL

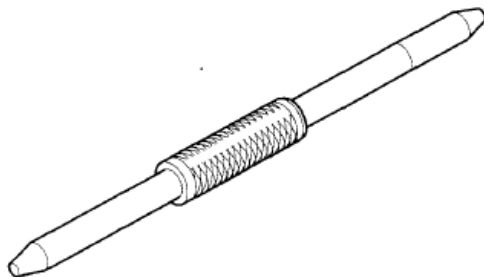
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2011-12 ENGINE

Engine Assembly - RL

SPECIAL TOOLS

Ref.No.	Tool Number	Description	Qty
①	070AG-SJAA10S	Subframe Alignment Pin	1



①

Fig. 1: Identifying Engine Assembly Special Tool
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE REMOVAL

Special Tools Required

- 2008 V6 Attachment Arm SIL02C000033*
- Subframe Adapter VSB02C000016*
- Engine Support Hanger, A and Reds AAR-T1256*
- Engine Hanger Balance Bar VSB02C000019*

*: Available through the Acura Tool and Equipment program, 888-424-6857.

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wiring and terminals, 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. Disconnect the support struts from both sides of the pivot ball (bolted to the hood) (A). Secure the hood in a vertical position. Remove the right side pivot ball and install it into the lower threaded hole, then reattach the support strut.

NOTE: Do not attempt to close the hood with the support strut in the vertical position, as it will damage the support strut and hood.

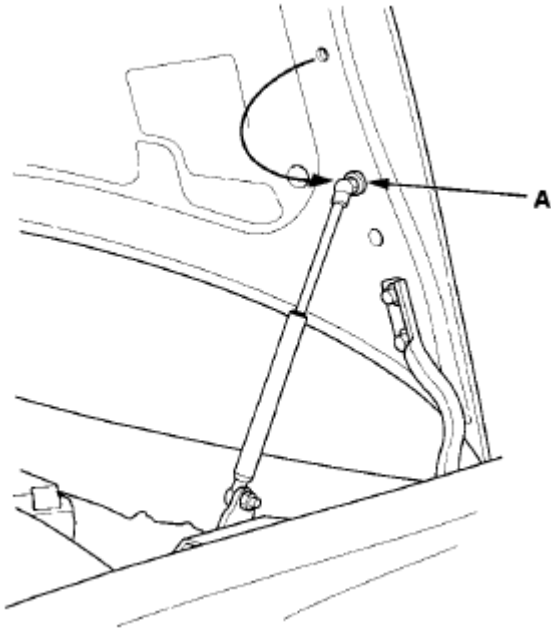


Fig. 2: Disconnecting Support Struts From Both Sides Of Pivot Ball
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Drain the power steering fluid (see **FLUID CHECK/REPLACEMENT**).
3. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
4. Do the battery removal procedure (see **BATTERY REMOVAL AND INSTALLATION**).
5. Remove the engine cover.

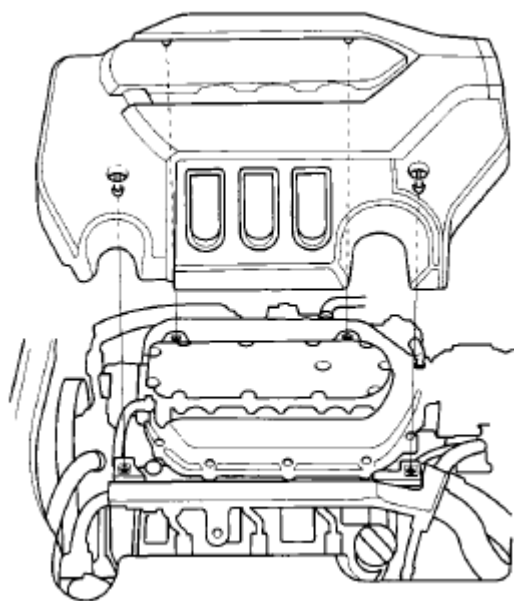


Fig. 3: Removing Engine Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove these items:
 - Upper fender trim (see **UPPER FENDER TRIM REPLACEMENT**)
 - Upper grille cover (see **UPPER GRILLE COVER REPLACEMENT**)
 - Cowl cover (see **COWL COVER REPLACEMENT**)
 - Air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**)
7. Remove the air intake duct cover.

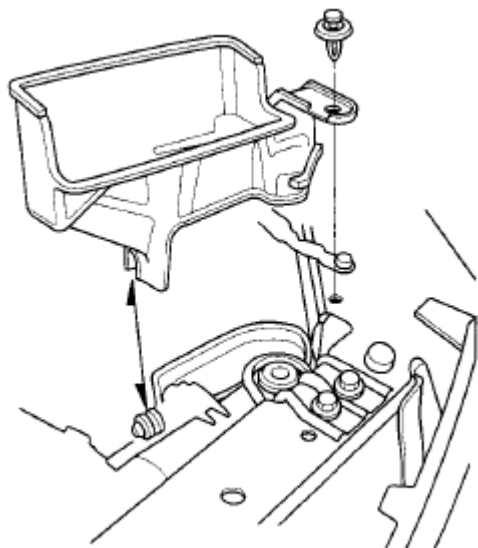


Fig. 4: Removing Air Intake Duct Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the two upper bolts (A), and loosen the two lower bolts (B), then remove the battery base (C).

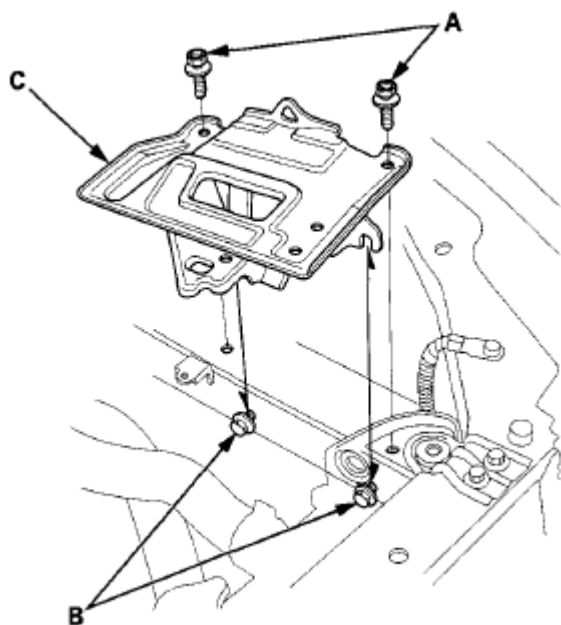


Fig. 5: Removing Two Upper Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Disconnect the positive starter cable (A), and remove the harness clamps (B).

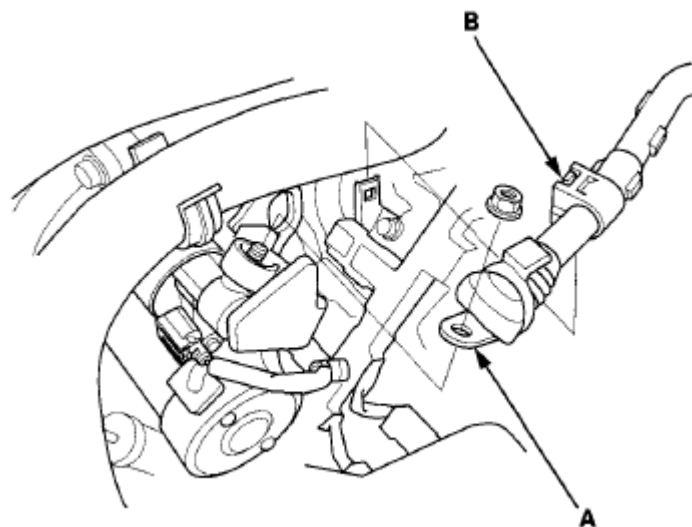


Fig. 6: Disconnecting Positive Starter Cable
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the battery cable terminal (A) from the under-hood fuse/relay box.

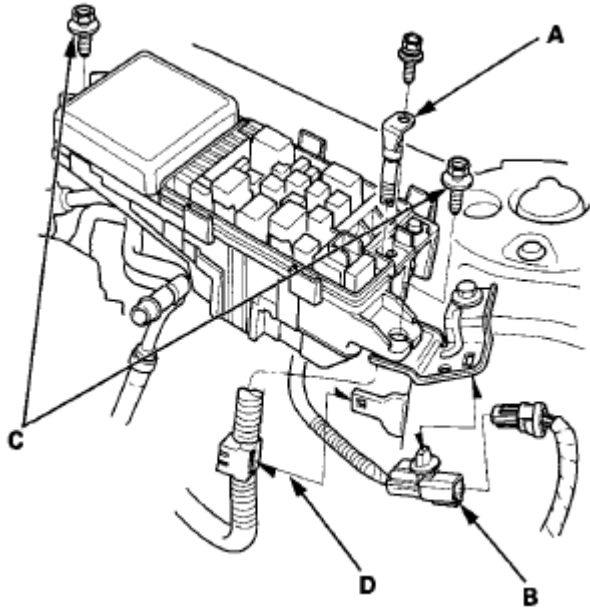


Fig. 7: Removing Battery Cable Terminal From Under-Hood Fuse/Relay Box
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Disconnect the starter connector (B).
12. Remove the under-hood fuse/relay box mounting bolts (C), and the harness clamp (D).
13. Remove the harness clamp (A), and disconnect the engine wire harness connectors (B) on the left side of the engine compartment.

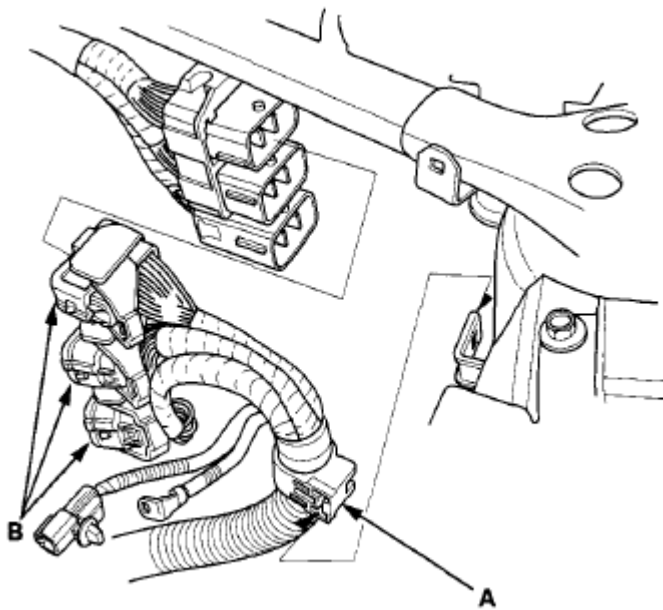


Fig. 8: Disconnecting Engine Wire Harness Connectors On Left Side Of Engine Compartment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the connector clamp (A) and the transfer breather hose (B), then remove the strut brace (C).

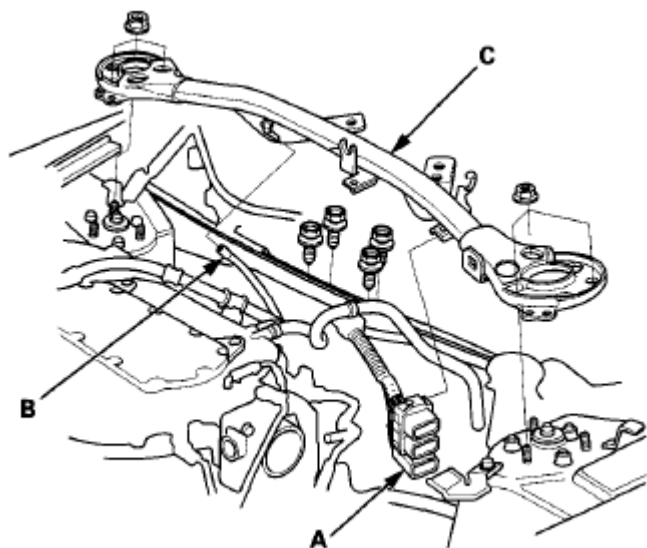


Fig. 9: Removing Connector Clamp And Transfer Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

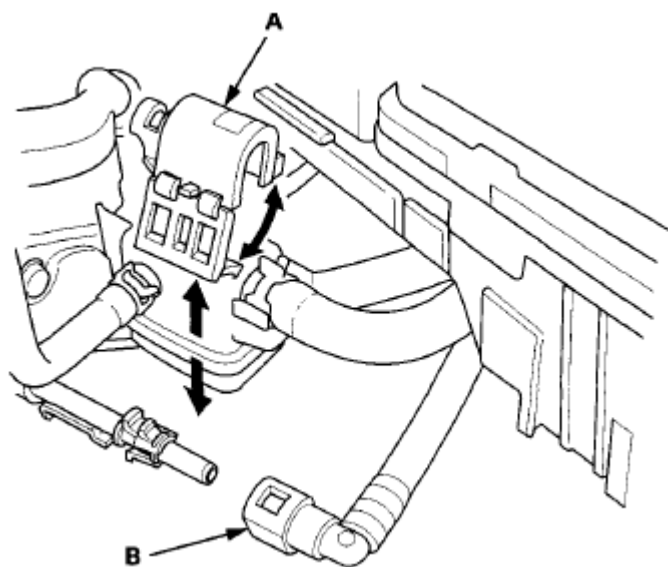


Fig. 10: Removing Quick-Connect Fitting Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Disconnect the brake booster vacuum hose (A) and the EVAP canister hose (B).

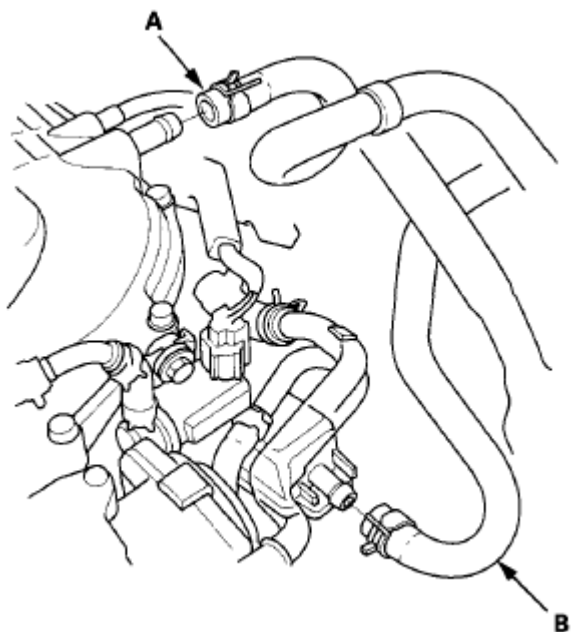


Fig. 11: Disconnecting Brake Booster Vacuum Hose And EVAP Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the shift cable (see **SHIFT CABLE REPLACEMENT**).
18. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
19. Disconnect the pump outlet hose (A) and the pump inlet hose (B) from the power steering pump, then plug the hoses and the power steering pump.

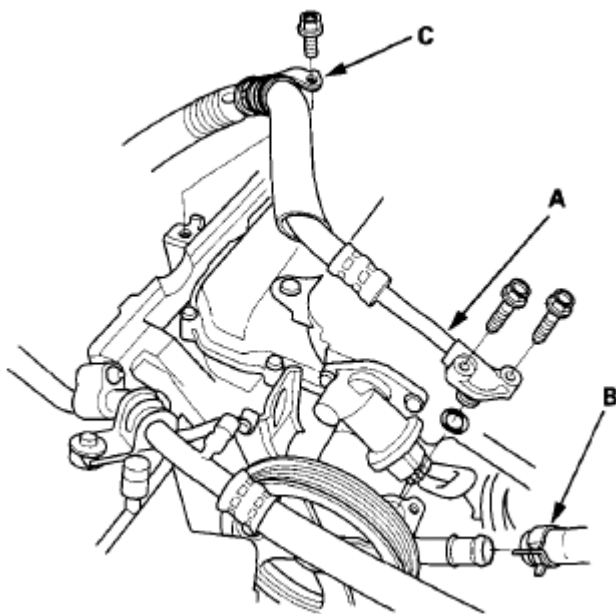


Fig. 12: Disconnecting Pump Outlet Hose And Pump Inlet Hose From Power Steering Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the power steering hose bracket (C).
21. Remove the power steering heat shield from the front subframe.

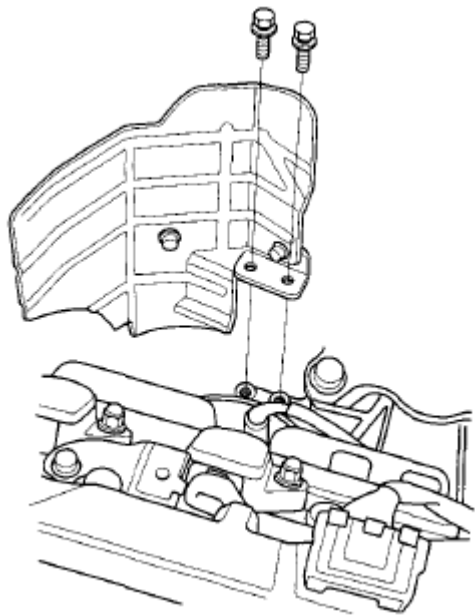


Fig. 13: Removing Power Steering Heat Shield From Front Subframe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Center the steering wheel spokes, and install a commercially available steering wheel holder tool (see step 3 on **STEERING SHAFT REMOVAL AND INSTALLATION**).
23. Remove the steering joint cover (A).

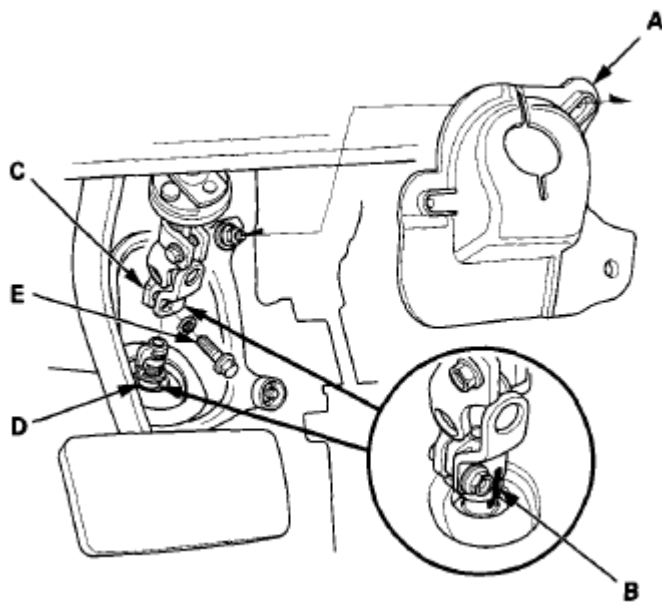
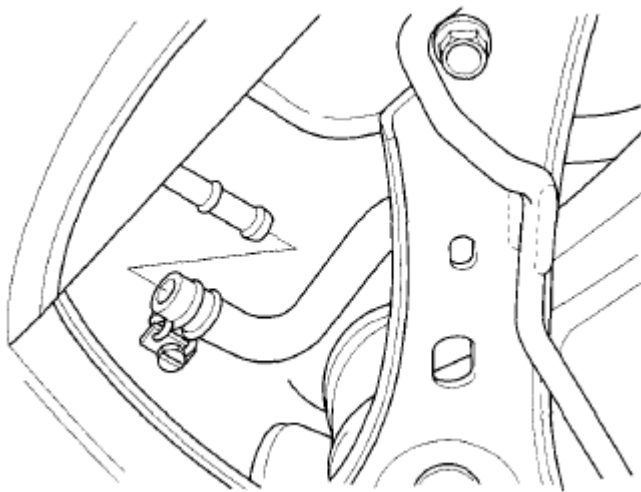


Fig. 14: Removing Steering Joint Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Make a reference mark (B) across the steering joint (C) and the steering gearbox pinion shaft (D). Remove the steering joint bolt (E), and disconnect the steering joint from the steering gearbox pinion shaft.
25. Wait until the engine is cool, then carefully remove the radiator cap.
26. Raise the vehicle on the lift.
27. Remove the front wheels.
28. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
29. Loosen the drain plug in the radiator, and drain the engine coolant (see **COOLANT REPLACEMENT**).
30. Drain the ATF (see **ATF REPLACEMENT**).
31. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
32. Disconnect the stabilizer links from the stabilizer bar (see **STABILIZER LINK REMOVAL/INSTALLATION**).
33. Remove the damper fork (see **DAMPER/SPRING REMOVAL/INSTALLATION**).
34. Separate the tie-rod end ball joints from the knuckles (see step 15 on **STEERING GEARBOX REMOVAL**).
35. Separate the knuckles from the lower arms (see **LOWER ARM REMOVAL/INSTALLATION**).
36. Remove the front driveshafts (see **DRIVESHAFT INSPECTION**). Coat all precision-finished surfaces with new engine oil. Tie plastic bags over the driveshaft ends.
37. Remove the exhaust pipe assembly (see **EXHAUST PIPE AND MUFFLER REPLACEMENT**).
38. Remove the propeller shaft (see **PROPELLER SHAFT REMOVAL**).
39. Remove the transfer assembly (see **TRANSFER ASSEMBLY REMOVAL**).
40. Disconnect the power steering hose, then plug the line and the hose.

**Fig. 15: Disconnecting Power Steering Hose****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

41. Disconnect the PSP switch connector.

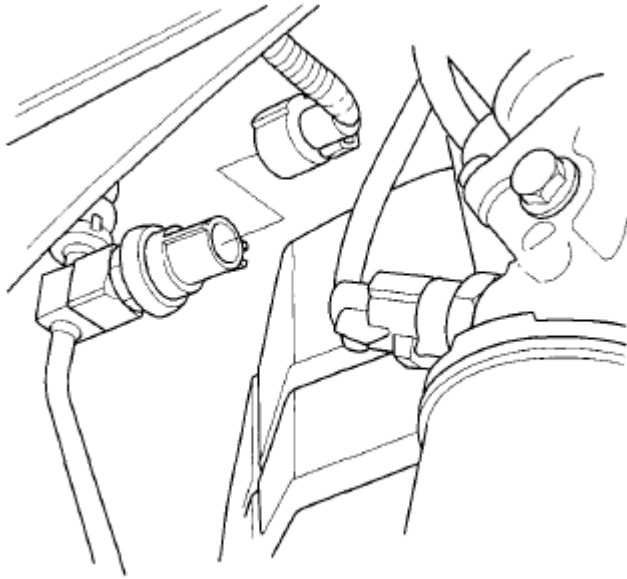


Fig. 16: Disconnecting PSP Switch Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

42. Disconnect the ECPS valve motor connector from the steering gearbox.

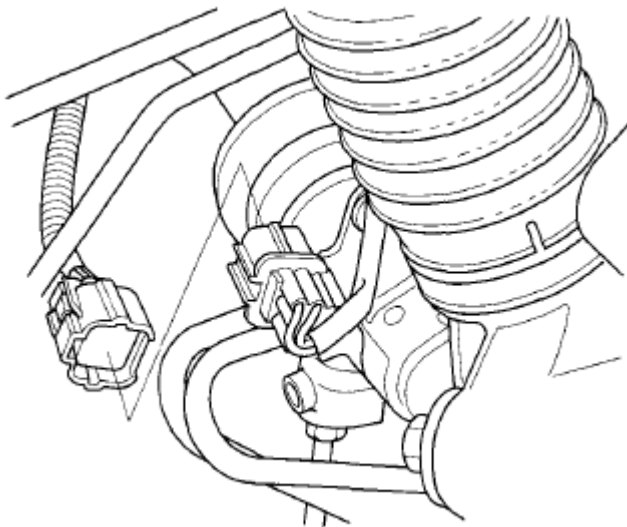


Fig. 17: Disconnecting ECPS Valve Motor Connector From Steering Gearbox
Courtesy of AMERICAN HONDA MOTOR CO., INC.

43. Remove the ground cable.

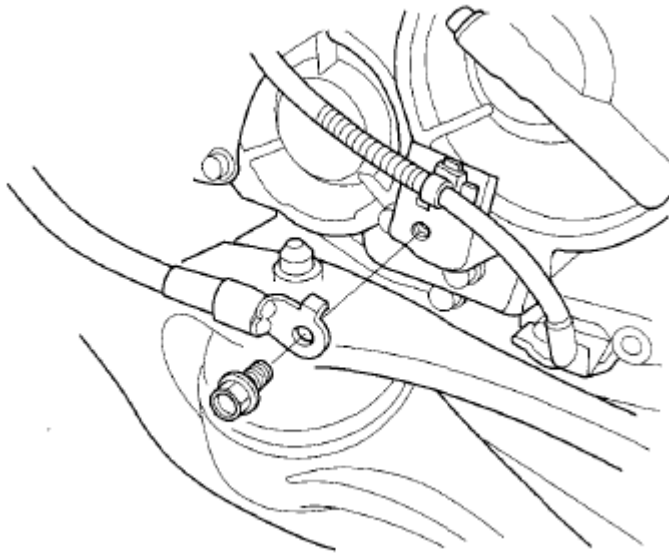


Fig. 18: Removing Ground Cable

Courtesy of AMERICAN HONDA MOTOR CO., INC.

44. Remove the transmission lower mounting bolts (A).

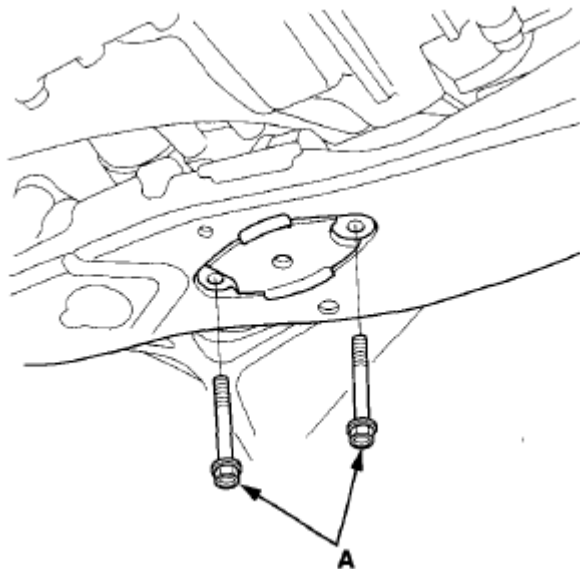


Fig. 19: Removing Transmission Lower Mounting Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

45. Lower the vehicle on the lift.
46. Disconnect the radiator hoses (A).

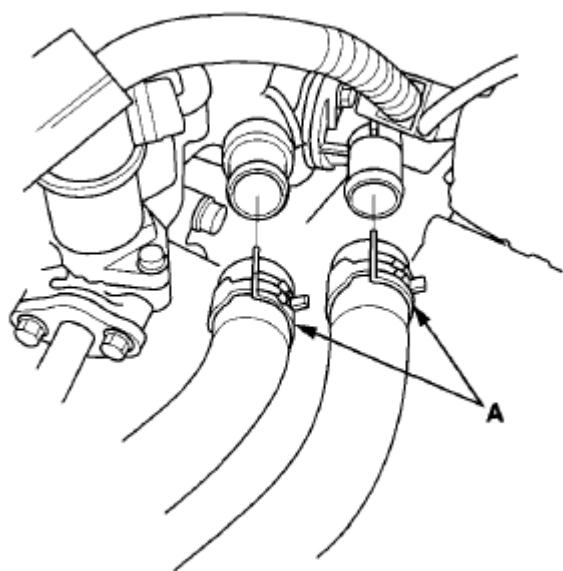


Fig. 20: Disconnecting Radiator Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

47. Disconnect the heater hoses (A).

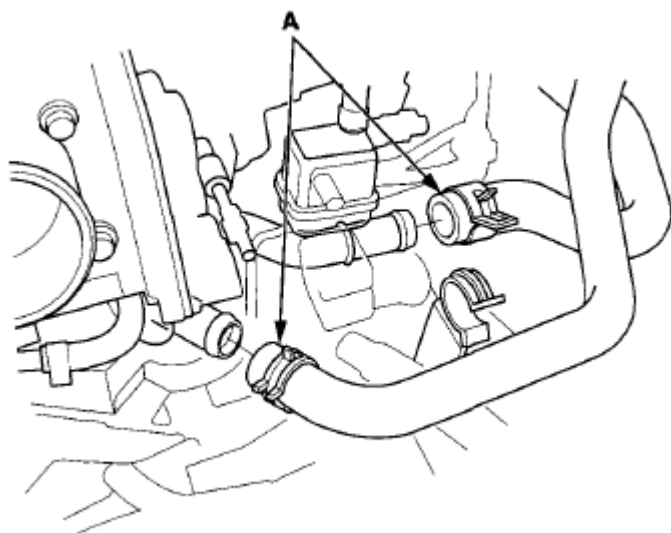


Fig. 21: Disconnecting Heater Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

48. Remove the radiator (see **RADIATOR REPLACEMENT**).
49. Disconnect the ATF cooler hoses (A) from the transmission, then plug the ATF cooler hoses and the lines.

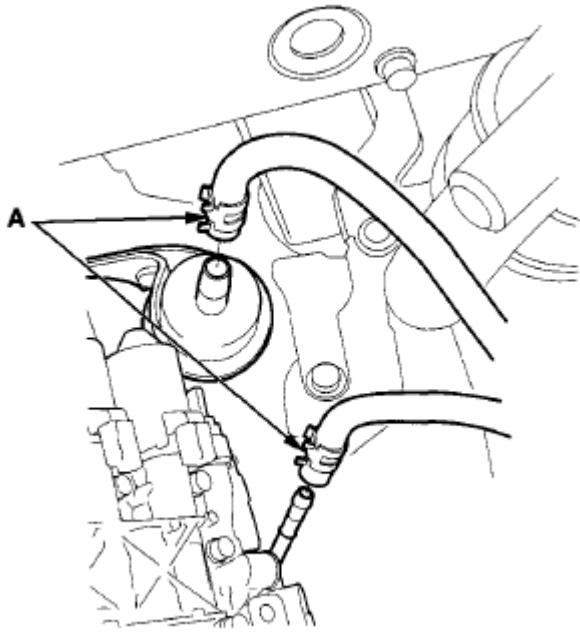


Fig. 22: Disconnecting ATF Cooler Hoses From Transmission
Courtesy of AMERICAN HONDA MOTOR CO., INC.

50. Remove the A/C compressor without disconnecting the A/C hoses. Do not bend the A/C hoses excessively.

NOTE: Hang the A/C compressor with a wire tie.

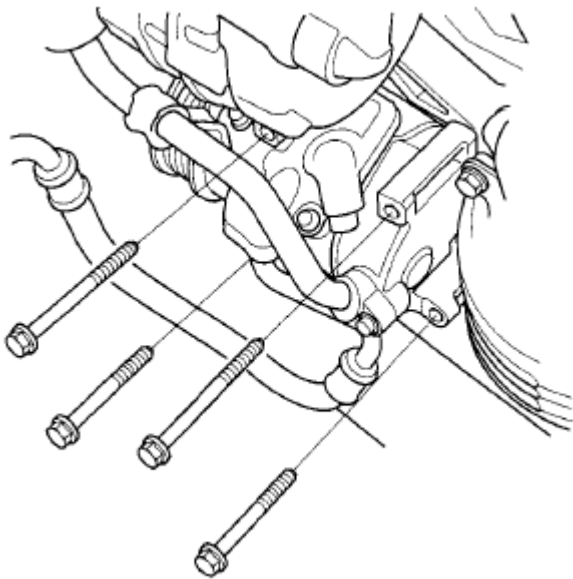


Fig. 23: Hanging A/C Compressor With Wire Tie
Courtesy of AMERICAN HONDA MOTOR CO., INC.

51. Remove the connector bracket (A) from the front cylinder head.

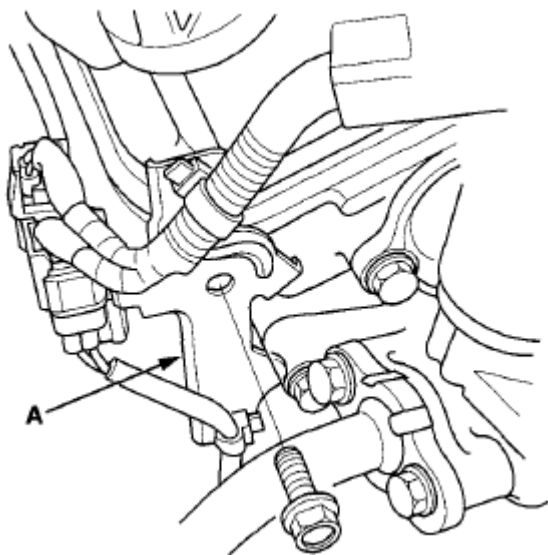


Fig. 24: Removing Connector Bracket From Front Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

52. Remove the engine mount control solenoid valve bracket (A) and the harness bracket (B) from the rear cylinder head.

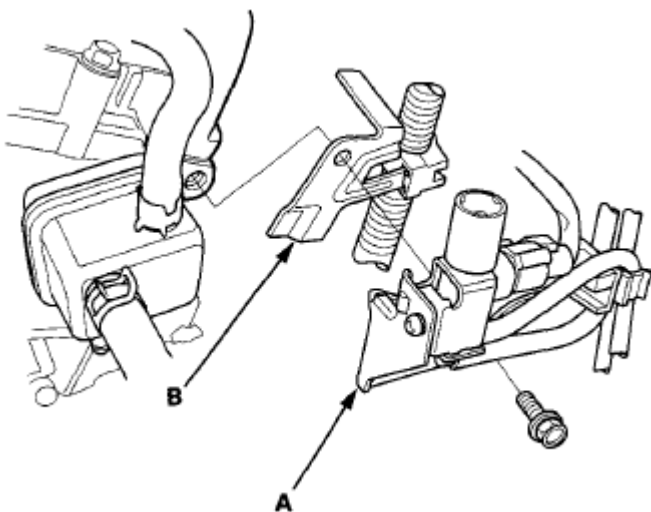


Fig. 25: Removing Engine Mount Control Solenoid Valve Bracket And Harness Bracket From Rear Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

53. Install the engine hanger balance bar (VSB02C000019). Attach the front arm (A) to the front cylinder head with a 10 mm (0.39 in) spacer (B) and a 10 x 1.25 mm bolt (C). Remove the rear arm from the engine hanger balance bar, then install the 2008 V6 attachment arm (SIL02C000033). Attach the 2008 V6 attachment arm to the rear cylinder head with a 10 mm (0.39 in) spacer (D) and an 8 x 1.25 mm bolt (E).

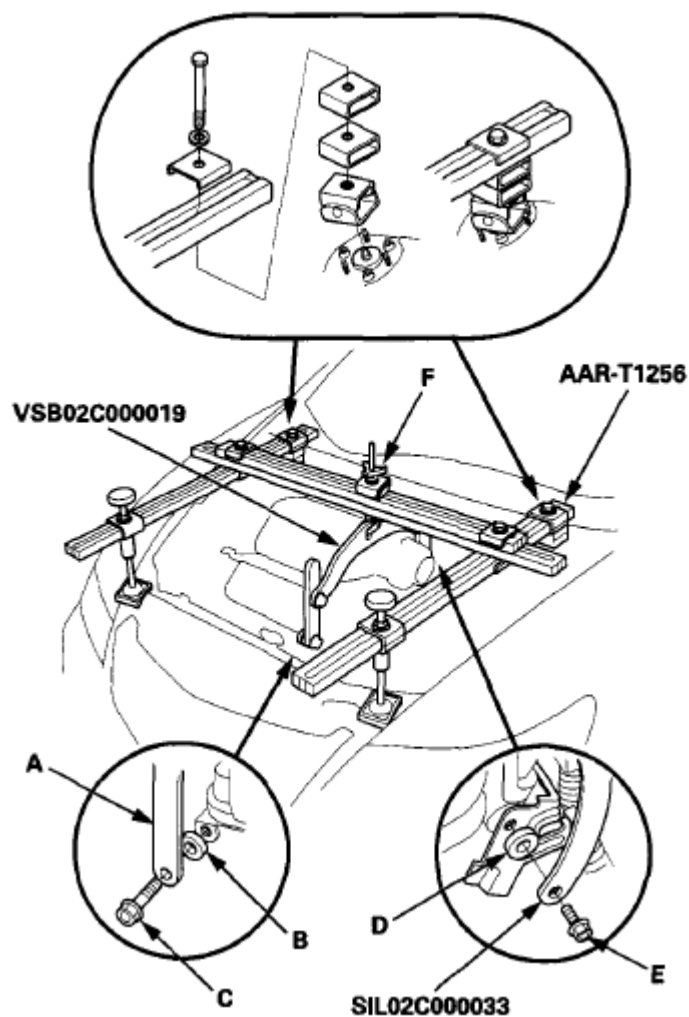


Fig. 26: Installing Engine Hanger Balance Bar
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

54. Install the engine support hanger (AAR-T1256) onto the vehicle as shown, and attach the hook to the slotted hole in the engine hanger balance bar. Tighten the wing nut (F) by hand, and lift and support the engine/transmission.

NOTE:

- Be careful when working around the windshield.
- Be careful not to damage the hood opener cable when installing the engine support hanger at the front bulkhead.
- AAR-T1256 two sets required for stacking additional cross section bar.

55. Disconnect the vacuum hose (A), then remove the front engine mounting mount stop (B) and the front engine mount bolt (C).

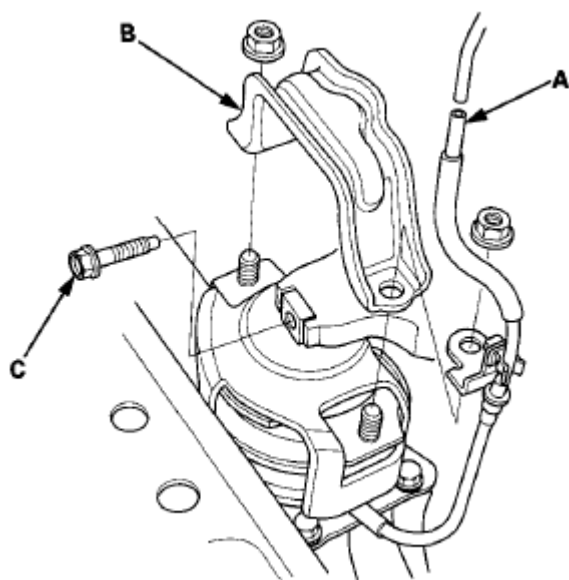


Fig. 27: Removing Front Engine Mounting Mount Stop And Front Engine Mount Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

56. Disconnect the vacuum hose (A), then remove the rear engine mounting mount stop (B) and the rear engine mount bolt (C).

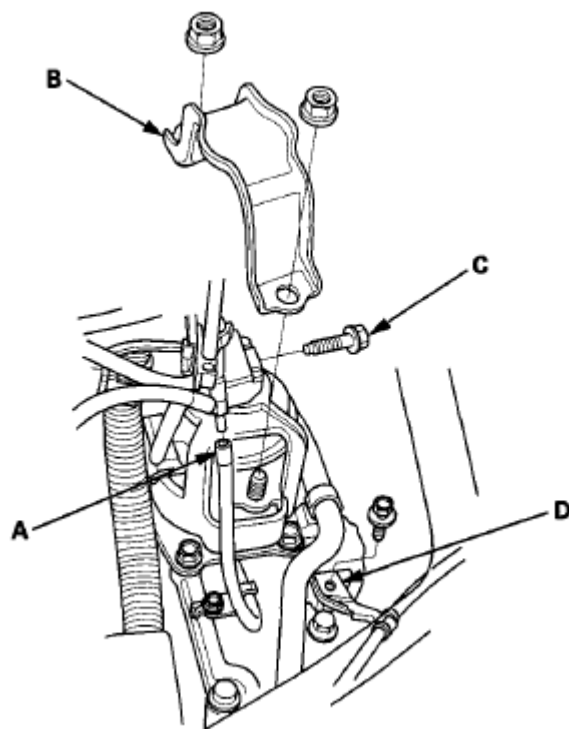


Fig. 28: Removing Rear Engine Mounting Mount Stop And Rear Engine Mount Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

57. Remove the shift cable bracket (D).
58. Raise the vehicle on the lift.
59. Attach the subframe adapter (VSB02C000016) to the front subframe by looping the belt (A) over the front of the front subframe (B), then secure the belt with its stop (C).

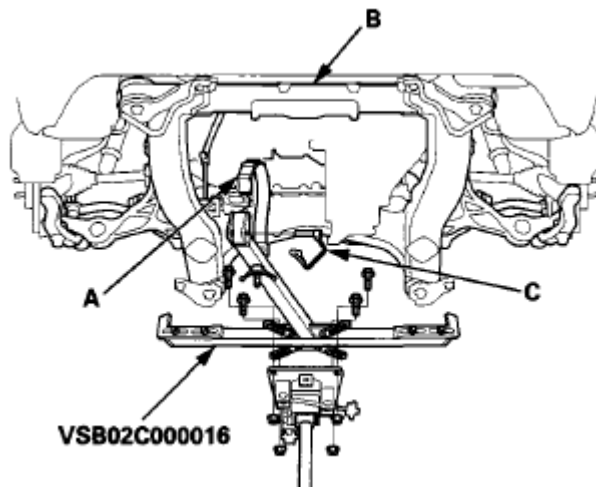


Fig. 29: Attaching Subframe Adapter (VSB02C000016) To Front Subframe By Looping Belt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

60. Raise the transmission jack and line up the slots in the subframe adapter arms with the bolt holes on the jack base, then securely attach them with four bolts.
61. Remove the six mounting bolts (A) securing the subframe stiffeners (B), the four subframe mounting bolts (C), and the stiffeners, then lower the front subframe (D).

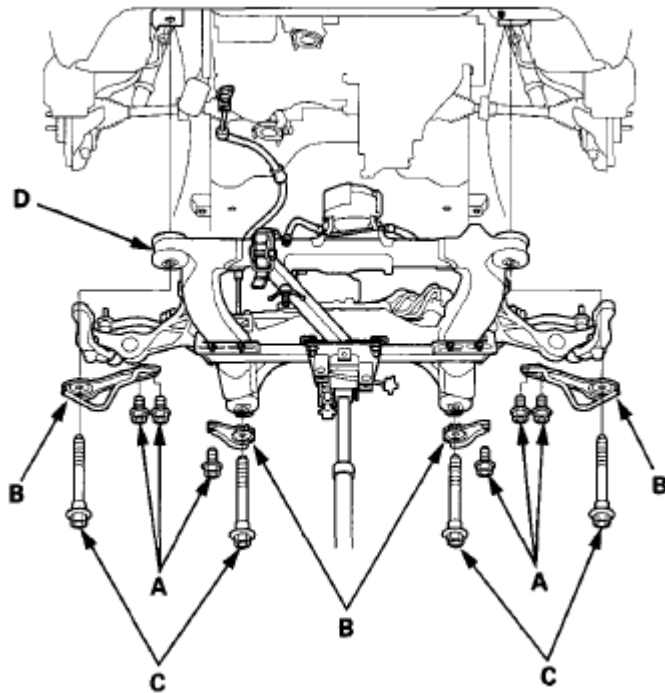


Fig. 30: Removing Mounting Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

62. Lower the vehicle and attach a chain hoist (A) to the engine hanger (B) and transmission hanger (C). Lift up the engine/transmission until it is securely supported by the chain hoist, and remove the engine support hanger and the engine balance bar, and the engine hanger adapter set.

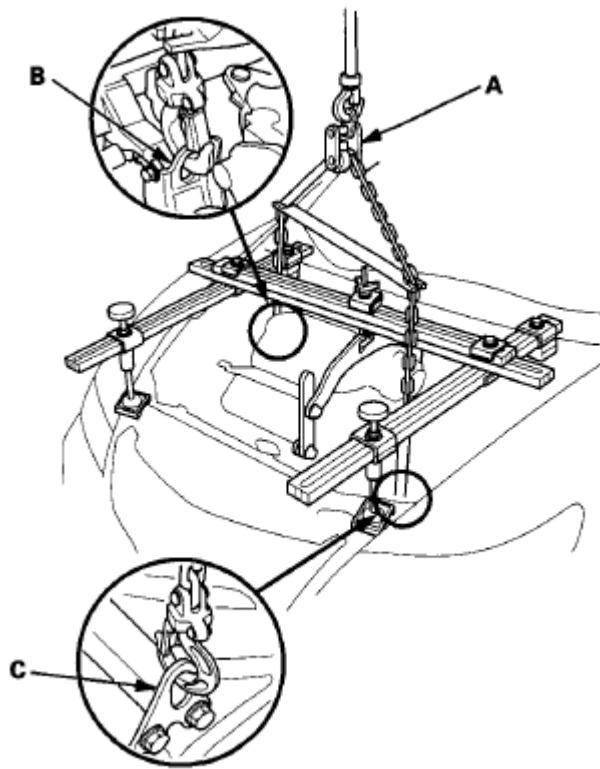


Fig. 31: Lifting Up Engine/Transmission
Courtesy of AMERICAN HONDA MOTOR CO., INC.

63. Remove the upper engine mount bracket bolts (A).

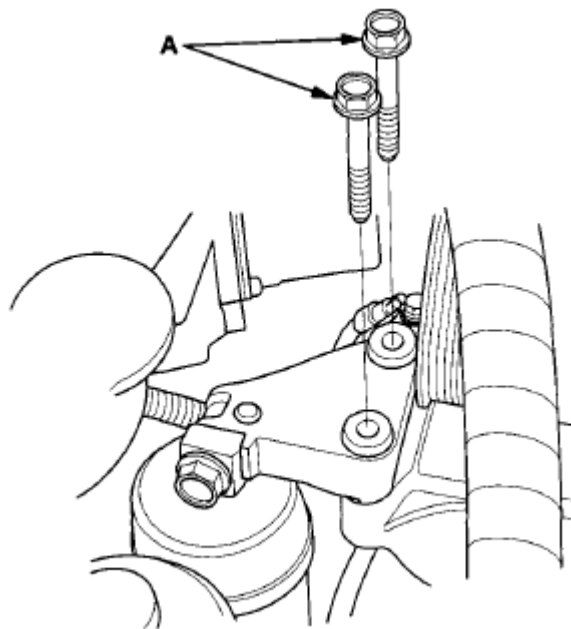


Fig. 32: Removing Upper Engine Mount Bracket Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

64. Check that the engine/transmission is completely free of the vacuum hoses, the fuel hoses, the coolant hoses, and the electrical wiring.
65. Slowly lower the engine/transmission about 150 mm (5.91 in). Check once again that all the hoses and the electrical wiring are disconnected and free from the engine/transmission, then lower it all the way and support it.
66. Disconnect the chain hoist from the engine/transmission.
67. Raise the vehicle, and remove the engine/transmission from under the vehicle.

ENGINE INSTALLATION

SPECIAL TOOLS REQUIRED

- Subframe Alignment Pin 070AG-SJAA1 OS
- 2008 V6 Attachment Arm SIL02C000033*
- Subframe Adapter VSB02C000016*
- Engine Support Hanger, A and Reds AAR-T1256*
- Engine Hanger Balance Bar VSB02C000019*

*: Available through the Acura Tool and Equipment program, 888-424-6857.

1. Install the accessory brackets and tighten their bolts to the specified torque.

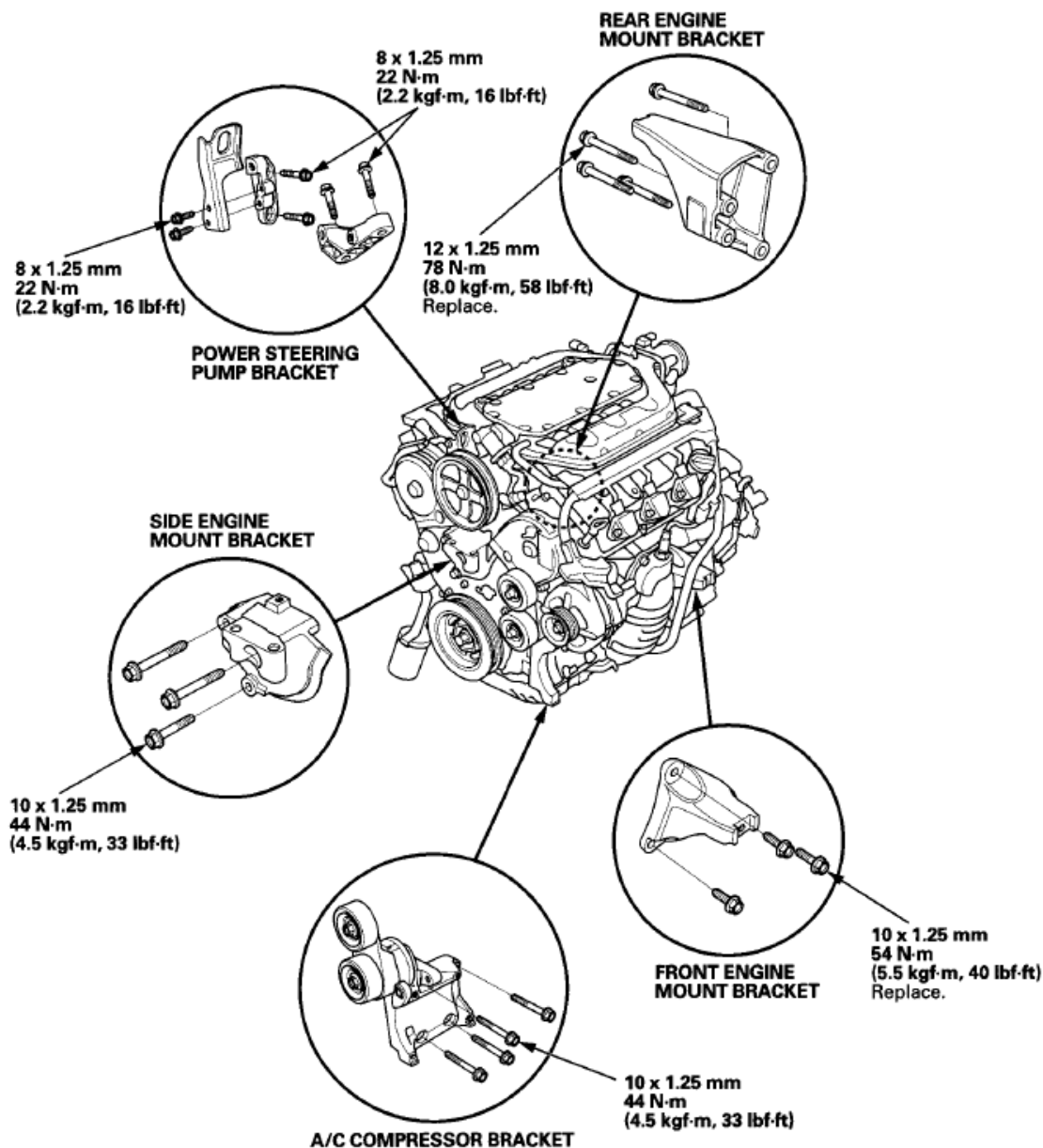


Fig. 33: Identifying Accessory Brackets With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Position the engine/transmission under the vehicle. Be sure that they are properly aligned. Carefully lower the vehicle until the engine/transmission are properly positioned in the engine compartment. Make sure the vehicle is not resting on any part of the engine/transmission. Support the engine/transmission with a chain hoist (A) and carefully raise the engine/transmission into place.

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

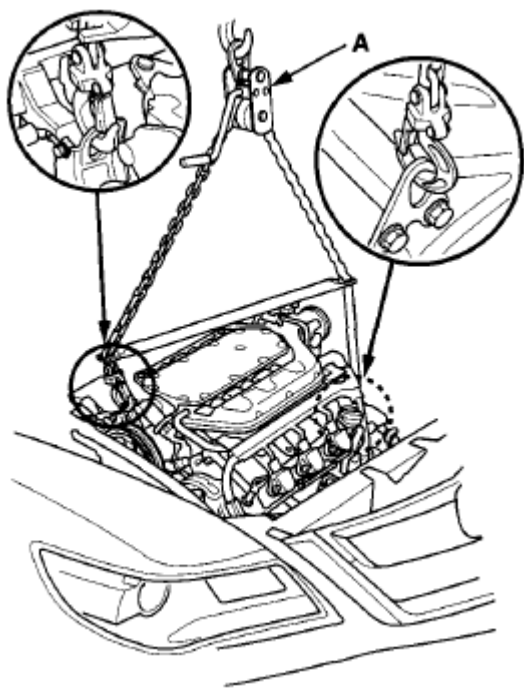


Fig. 34: Supporting Engine/Transmission With Chain Hoist
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install two new bolts securing the upper engine mount bracket. Tighten the bolts to the specified torque.

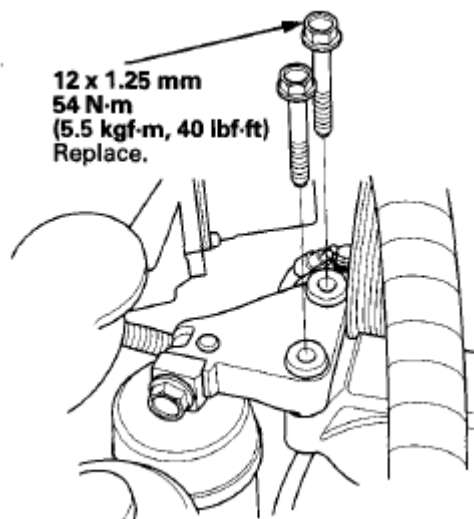


Fig. 35: Installing Two New Bolts Securing Upper Engine Mount Bracket With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the engine hanger balance bar (VSB02C000019). Attach the front arm (A) to the front cylinder head with a 10 mm (0.39 in) spacer (B) and a 10 x 1.25 mm bolt (C). Remove the rear arm from the engine hanger balance bar, then install the 2008 V6 attachment arm (SIL02C000033) to the rear cylinder

head with a 10 mm (0.39 in) spacer (D) and an 8 x 1.25 mm bolt (E).

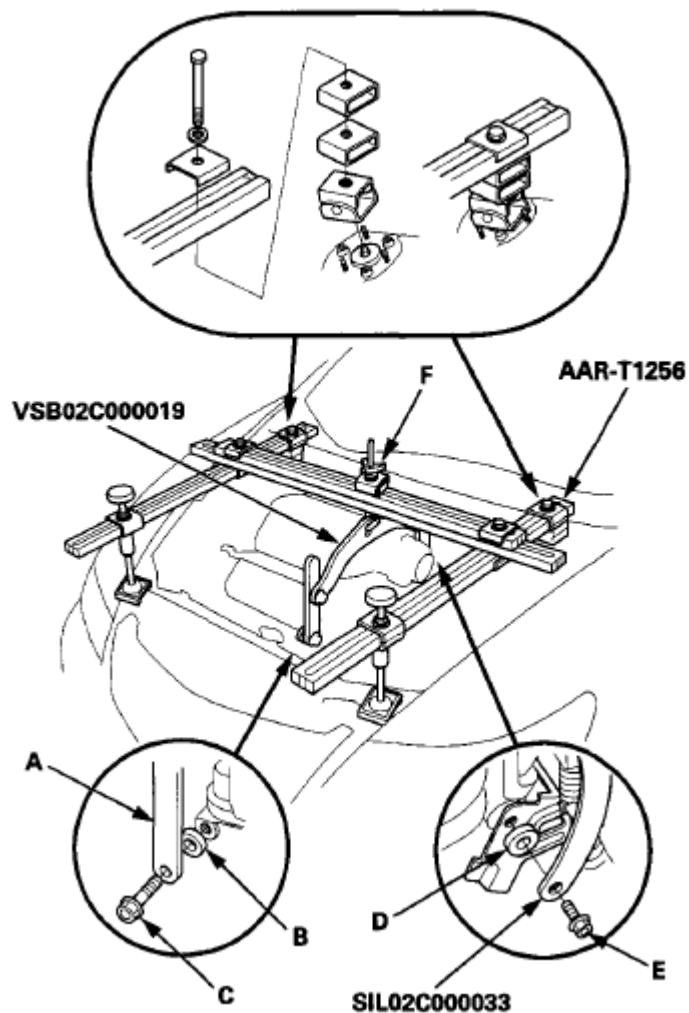


Fig. 36: Attaching Front Arm To Front Cylinder Head With Spacer
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the engine support hanger (AAR-T1256) onto the vehicle as shown, and attach the hook to the slotted hole in the engine hanger balance bar. Tighten the wing nut (F) by hand, and lift and support the engine/transmission.

NOTE:

- Be careful when working around the windshield.
- Be careful not to damage the hood opener cable when installing the engine support hanger at the front bulkhead.
- AAR-T1256 two sets required for stacking additional cross section bar.

6. Remove the chain hoist, then raise the vehicle on the lift.
7. Using the subframe adapter (VSB02C000016) and a transmission jack, raise the front subframe up to the

body.

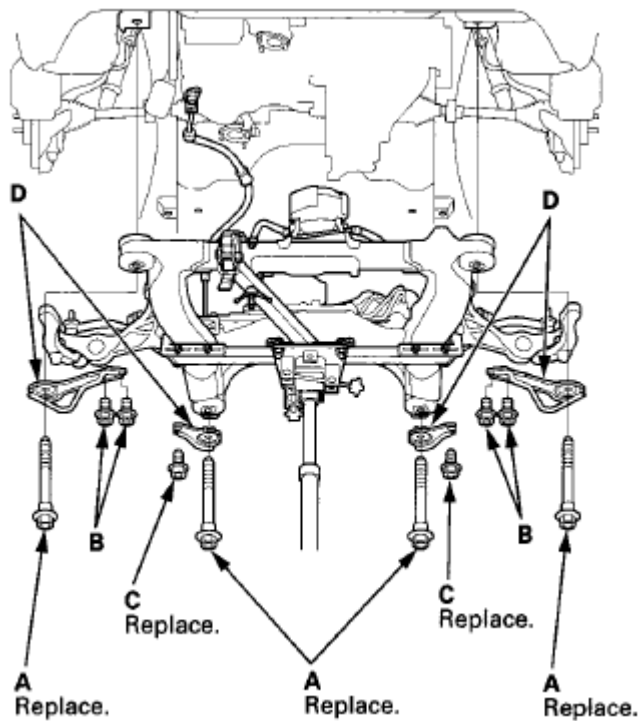


Fig. 37: Raising Front Subframe Up To Body
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Loosely install the new front subframe mounting bolts (four) (A), the mounting bolts (four) (B), the new mounting bolts (two) (C) and the stiffeners (D).
9. Align the front subframe with the subframe alignment pin (see **SUBFRAME REPLACEMENT**).
10. Remove the transmission jack and front subframe adapter.
11. Tighten the transmission lower mount mounting bolts.

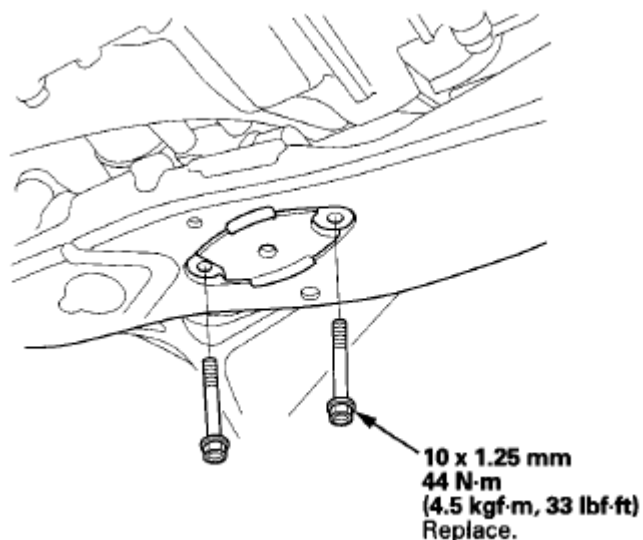


Fig. 38: Identifying Transmission Lower Mount Mounting Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Lower the vehicle on the lift.
13. Remove the engine support hanger, engine hanger balance bar, and the 2008 V6 attachment arm.
14. Install the connector bracket (A) to the front cylinder head.

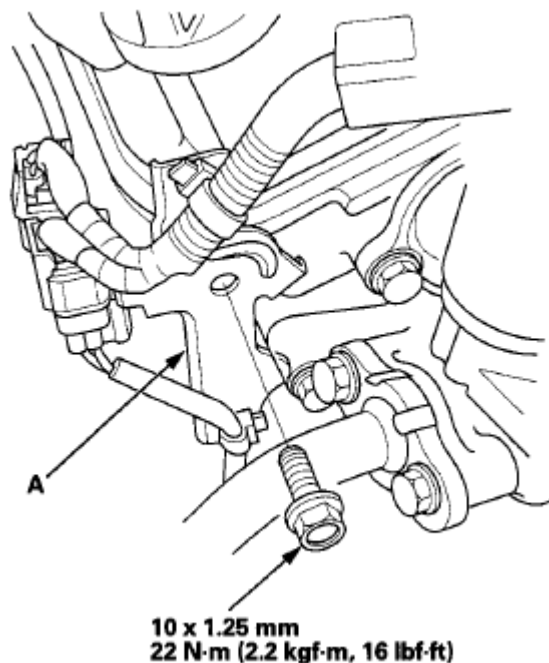


Fig. 39: Installing Connector Bracket To Front Cylinder Head With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the harness clamp (A) and the engine mount control solenoid valve bracket (B) to the rear cylinder head.

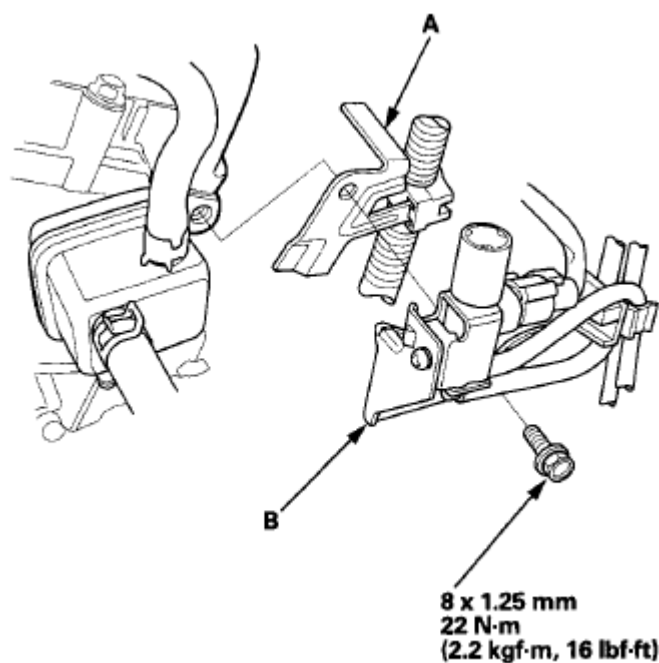


Fig. 40: Installing Harness Clamp And Engine Mount Control Solenoid Valve Bracket To Rear Cylinder Head With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Install the shift cable and tighten the bolt (A) securing the shift cable bracket.

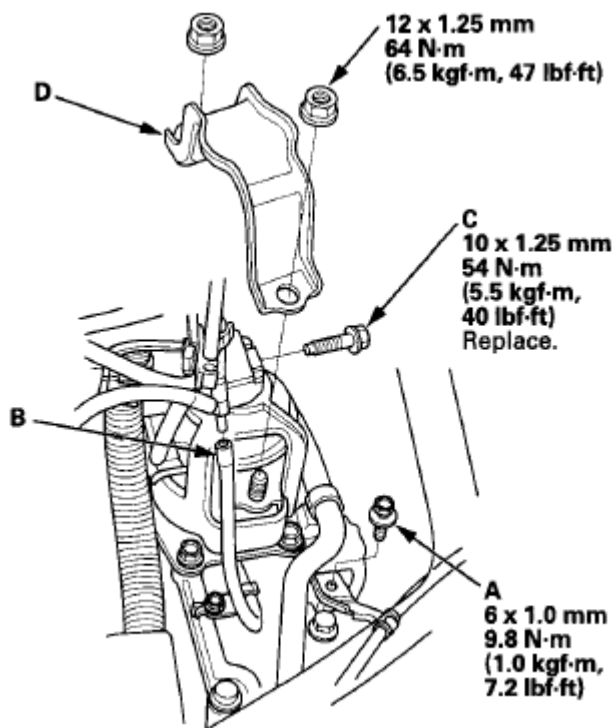


Fig. 41: Installing Shift Cable With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the vacuum hose (B).
18. Tighten the rear engine mount bolt (C), then install the rear engine mount stop (D).
19. Install the vacuum hose (A).

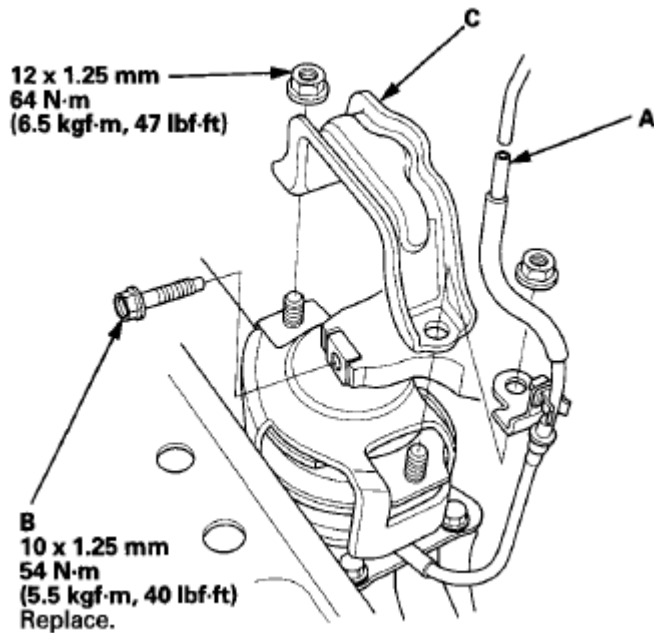


Fig. 42: Installing Vacuum Hose With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Tighten the front engine mount bolt (B), then install the front engine mount stop (C).
21. Loosen the side engine mount bracket mounting bolts (A) for the upper engine mount bracket, then retighten them to the specified torque.

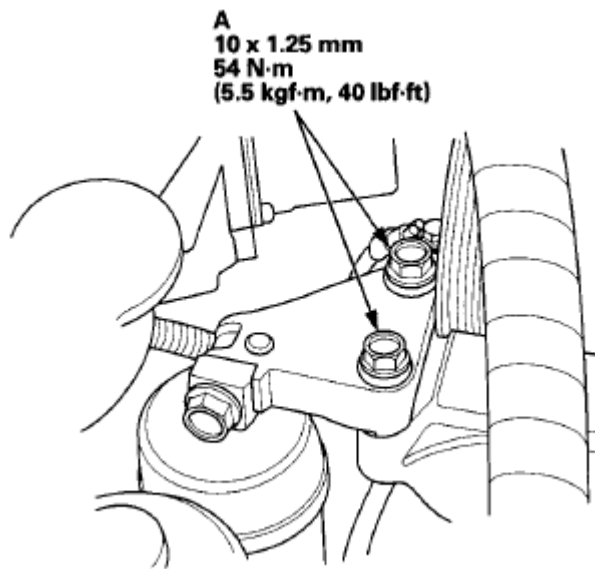


Fig. 43: Installing Front Engine Mount Stop With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the A/C compressor.

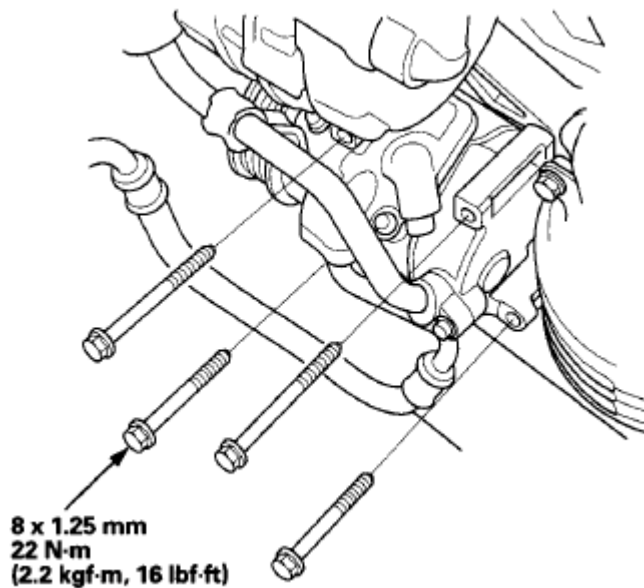


Fig. 44: Installing A/C Compressor With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Connect the heater hoses.

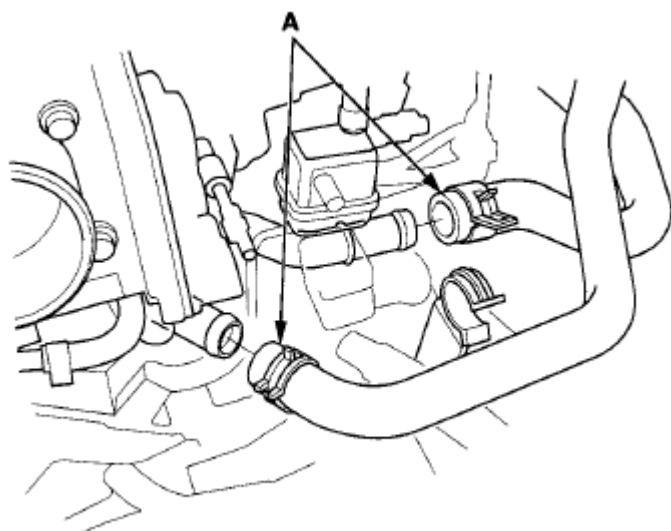


Fig. 45: Connecting Heater Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the radiator (see **RADIATOR REPLACEMENT**).
25. Connect the ATF cooler hoses (A) to the transmission.

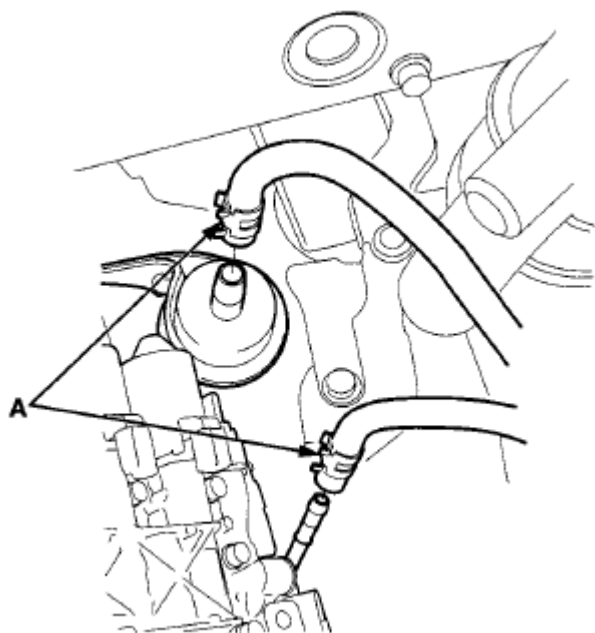


Fig. 46: Connecting ATF Cooler Hoses To Transmission

Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Connect the radiator hoses (A).

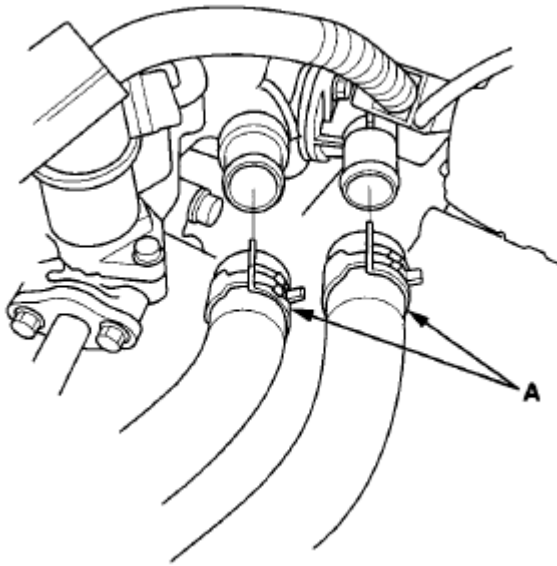


Fig. 47: Connecting Radiator Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Raise the vehicle on the lift.
28. Install the ground cable.

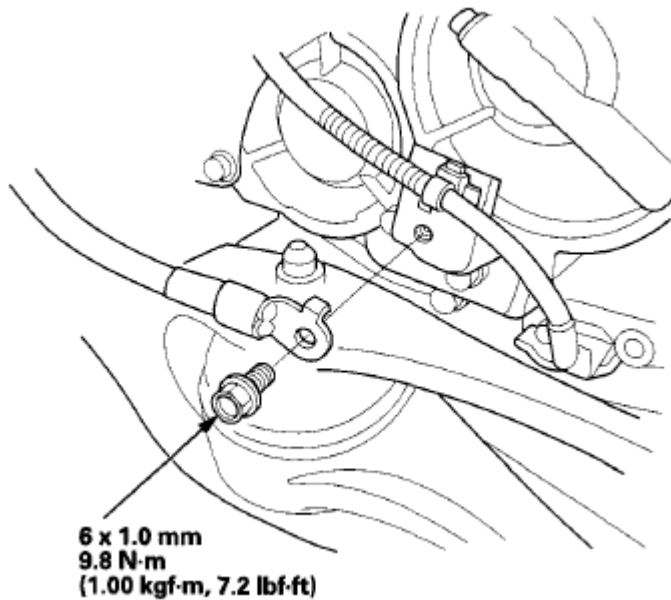


Fig. 48: Installing Ground Cable With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Connect the PSP switch connector.

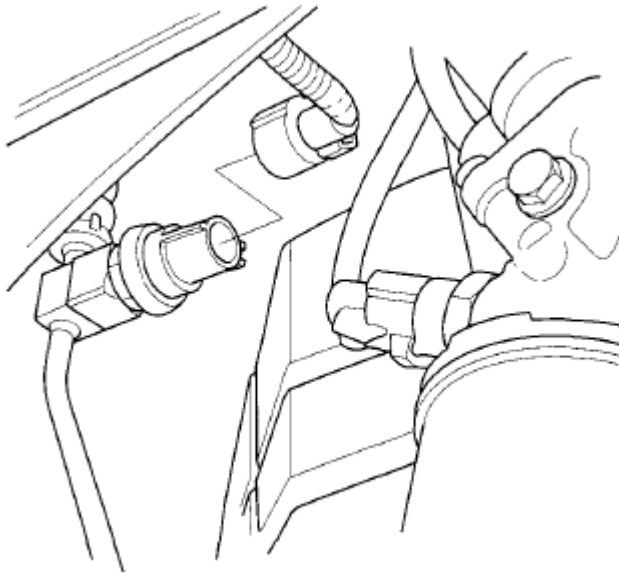


Fig. 49: Connecting PSP Switch Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Connect the ECPS valve motor connector to the steering gearbox.

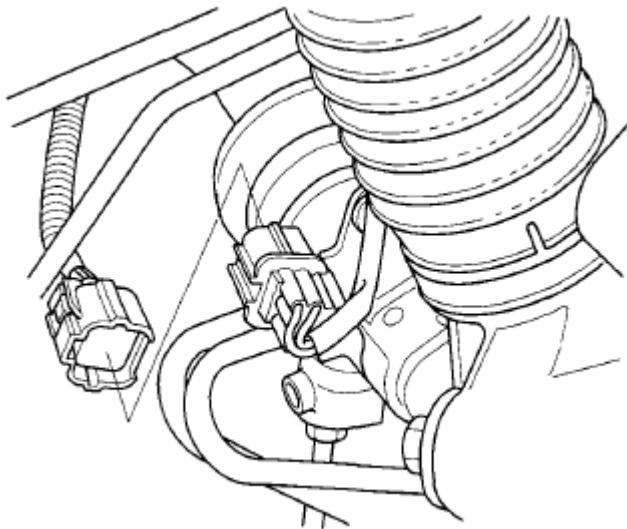


Fig. 50: Connecting ECPS Valve Motor Connector To Steering Gearbox
Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Connect the power steering hose.

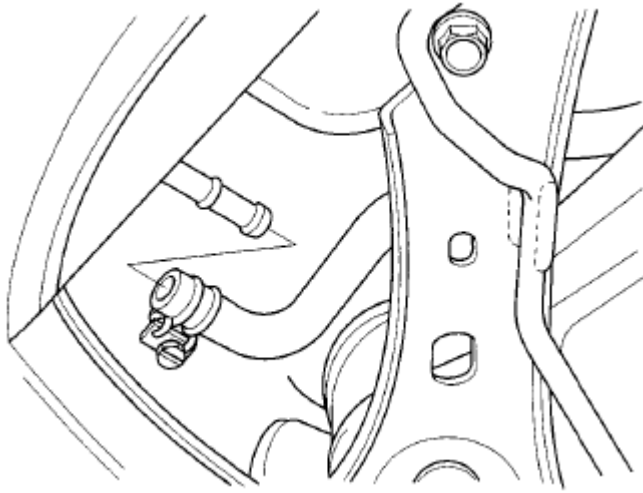


Fig. 51: Connecting Power Steering Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

32. Install the transfer assembly (see **TRANSFER ASSEMBLY INSTALLATION**).
33. Install the propeller shaft (see **PROPELLER SHAFT INSTALLATION**).
34. Install the exhaust pipe assembly using new gaskets and new self-locking nuts (see **EXHAUST PIPE AND MUFFLER REPLACEMENT**).
35. Install a new set ring on the end of each driveshaft, then install the front driveshafts (see **FRONT DRIVESHAFT INSTALLATION**). Make sure each ring "clicks" into place in the differential and intermediate shaft.
36. Connect the suspension lower arm to the knuckles (see **LOWER ARM REMOVAL/INSTALLATION**).
37. Connect the tie-rod end ball joints to the knuckles (see step 23 on **STEERING GEARBOX INSTALLATION**).
38. Install the damper fork (see **INSTALLATION**).
39. Connect the stabilizer links to the stabilizer bar (see **STABILIZER LINK REMOVAL/INSTALLATION**).
40. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
41. Install the front wheels.
42. Lower the vehicle on the lift.
43. Align the reference mark (A) on the steering joint (B) and the steering gearbox pinion shaft (C). Connect the steering joint to the steering gearbox pinion shaft. Tighten the steering joint bolt (D).

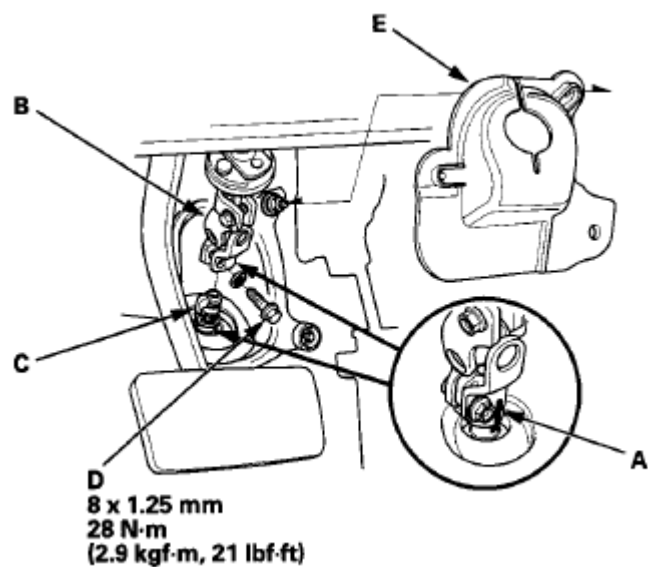


Fig. 52: Aligning Reference Mark On Steering Joint And Steering Gearbox Pinion Shaft With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

44. Install the steering joint cover (E).
45. Remove the steering wheel holder from the steering wheel.
46. Install the power steering heat shield.

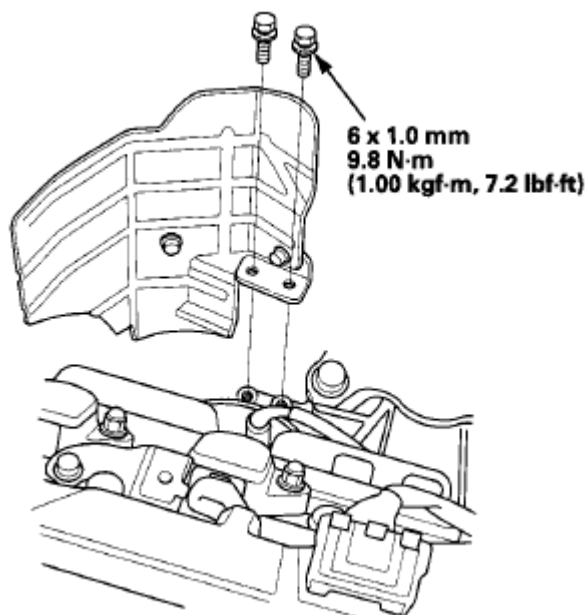


Fig. 53: Installing Power Steering Heat Shield With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

47. Connect the pump outlet hose (A) with a new O-ring (B) and the pump inlet hose (C) to the power

steering pump.

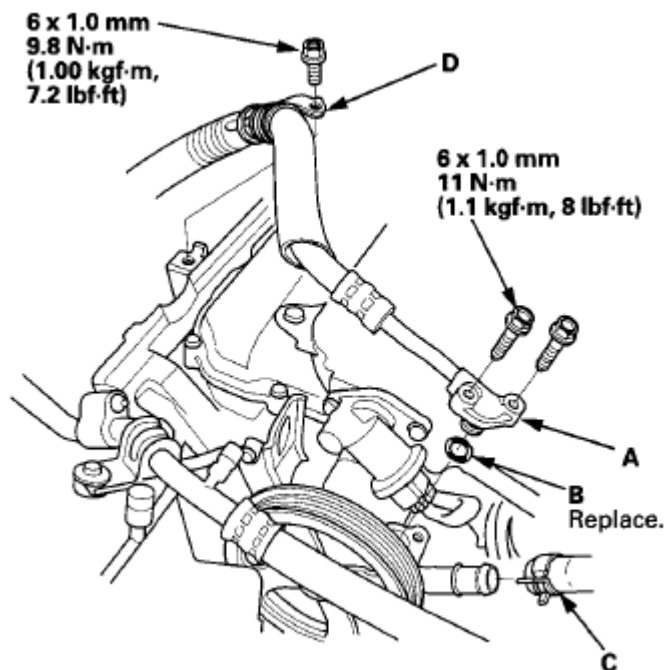


Fig. 54: Connecting Pump Outlet Hose With New O-Ring And Pump Inlet Hose To Power Steering Pump With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

48. Install the power steering hose clamp (D).
49. Install the power steering system fluid reservoir to the clamp.
50. Install the drive belt (see **DRIVE BELT REPLACEMENT**).
51. Install the shift cable (see **SHIFT CABLE REPLACEMENT**).
52. Install the brake booster vacuum hose (A) and the EVAP canister hose (B).

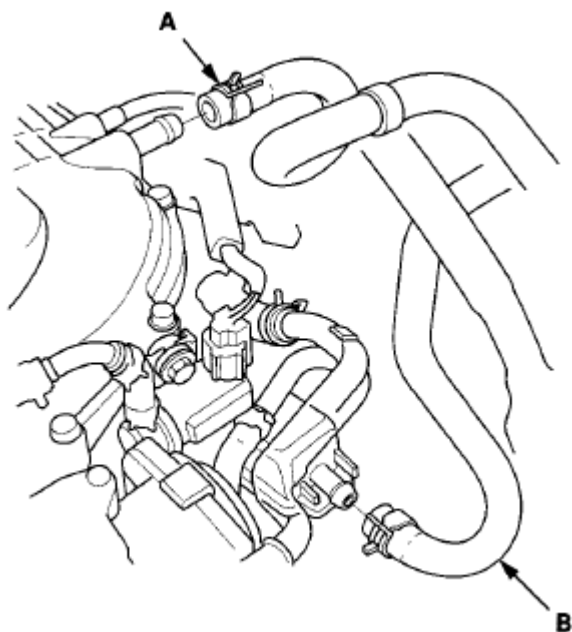


Fig. 55: Installing Brake Booster Vacuum Hose And EVAP Canister Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

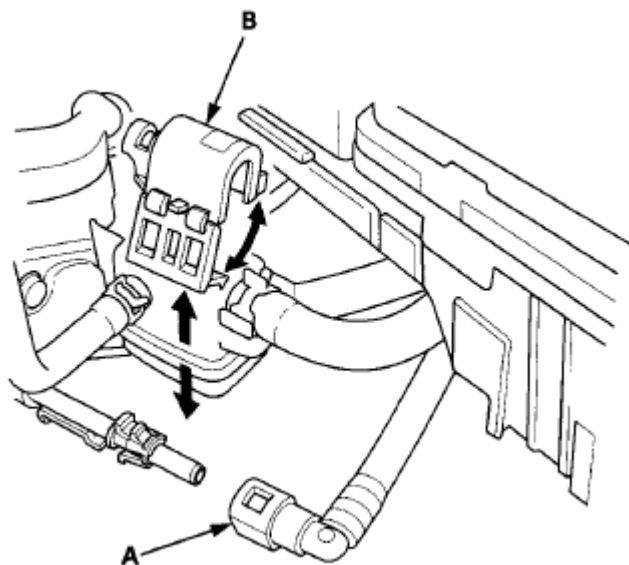


Fig. 56: Installing Quick-Connect Fitting Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

54. Install the strut brace (A), then install the connector (B) and the transfer breather hose (C).

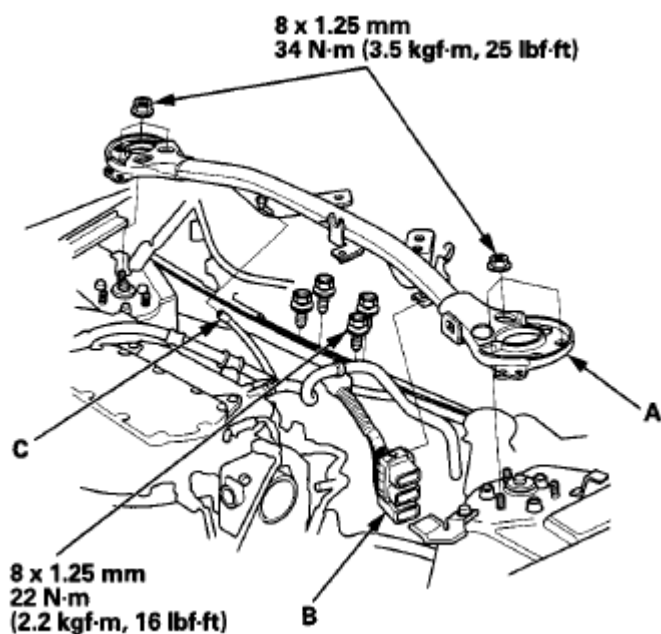


Fig. 57: Installing Connector And Transfer Breather Hose With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

55. Connect the engine wire harness connectors (A), then install the harness clamp (B).

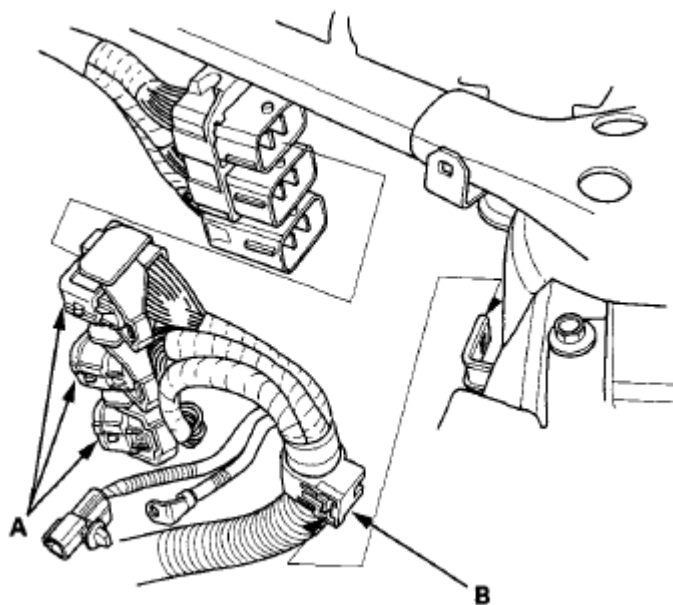


Fig. 58: Connecting Engine Wire Harness Connectors
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

56. Install the battery cable terminal(A), and connect the starter connector (B).

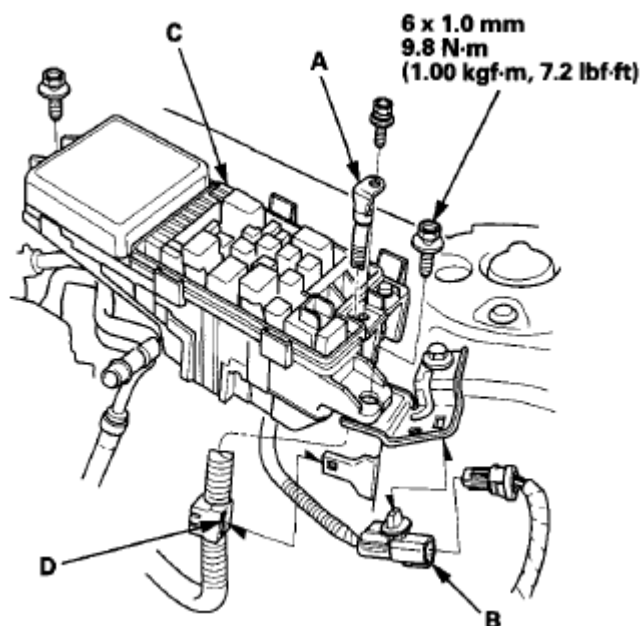


Fig. 59: Installing Battery Cable Terminal With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

57. Install the under-hood fuse/relay box (C) and the harness clamp (D).
58. Connect the positive starter cable (A), and install the harness clamp (B).

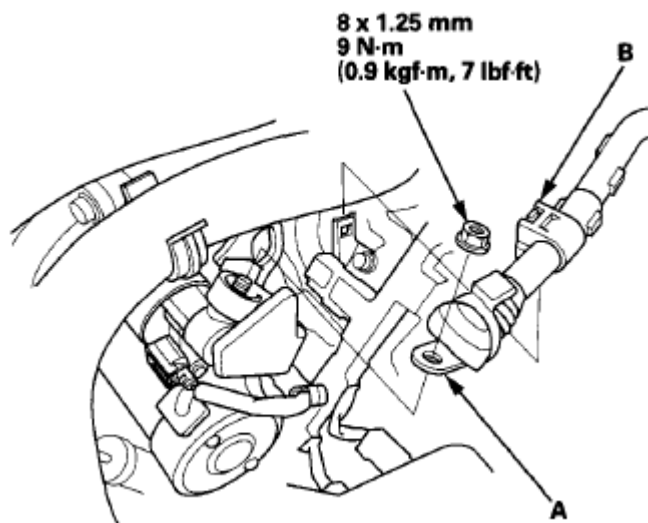


Fig. 60: Installing Harness Clamp With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

59. Install the battery base (A).

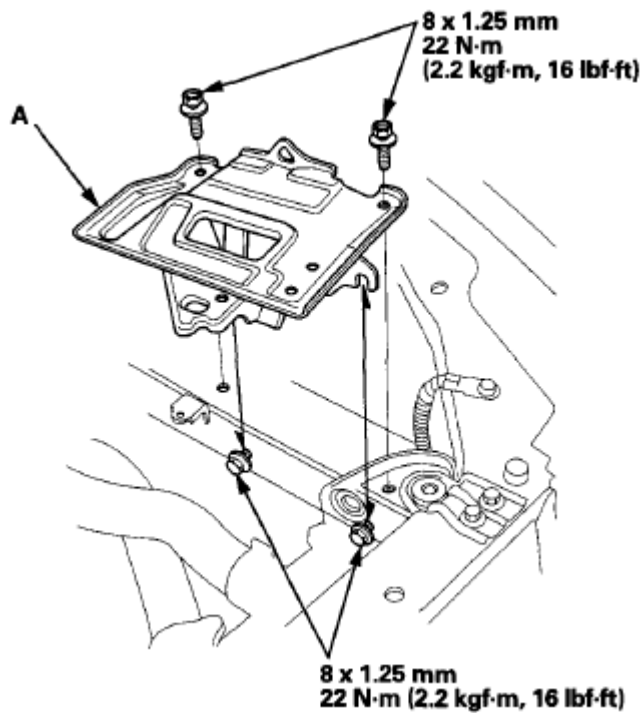


Fig. 61: Installing Battery Base With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

60. Install the air intake duct cover.

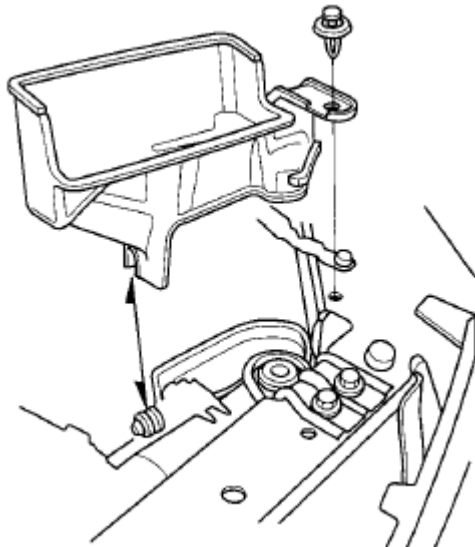


Fig. 62: Installing Air Intake Duct Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

61. Install the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
62. Do the battery installation procedure (see **BATTERY REMOVAL AND INSTALLATION**).

63. Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.
64. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leaks at any point in the fuel line.
65. Refill the engine with engine oil (see **ENGINE OIL REPLACEMENT**).
66. Refill the transmission with ATF (see **ATF REPLACEMENT**).
67. Refill the reservoir with power steering fluid (see **FLUID CHECK/REPLACEMENT**).
68. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see **COOLANT CHECK**).
69. Do the power steering system bleeding procedure (see **FLUID CHECK/REPLACEMENT**).
70. Check for fluid leaks.
71. Do the PCM reset procedure.
72. Do the CKP pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).
73. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
74. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
75. Install these items:
 - Cowl cover (see **UPPER GRILLE COVER REPLACEMENT**)
 - Upper grille cover (see **UPPER GRILLE COVER REPLACEMENT**)
 - Upper fender trim (see **UPPER FENDER TRIM REPLACEMENT**)
76. Install the engine cover.

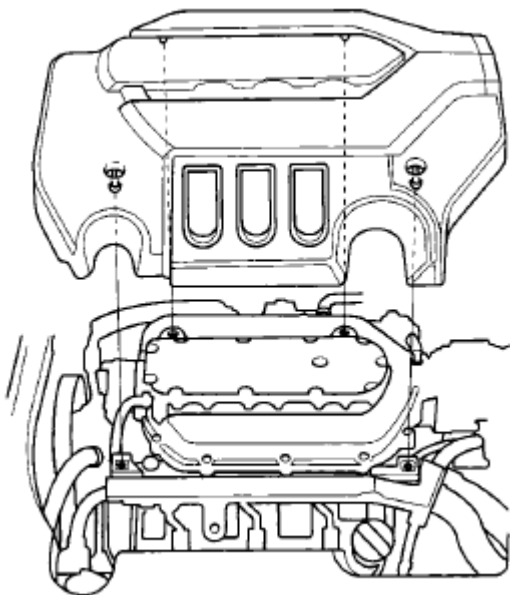


Fig. 63: Installing Engine Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

77. Check the wheel alignment (see **WHEEL ALIGNMENT**).

SIDE ENGINE MOUNT REMOVAL AND INSTALLATION

REMOVAL

1. Lift and support the engine with a jack and a wood block under the oil pan.
2. Remove the ground cable (A), then remove the upper half of the side engine mount bracket (B).

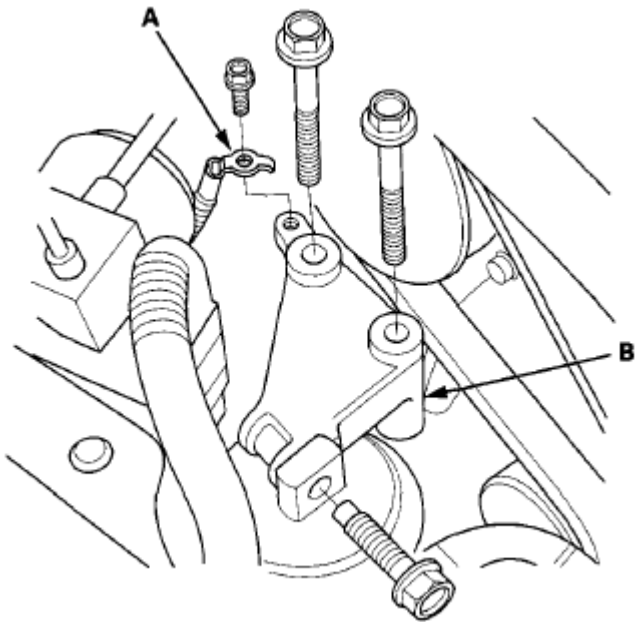


Fig. 64: Removing Upper Half Of Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the side engine mount (A).

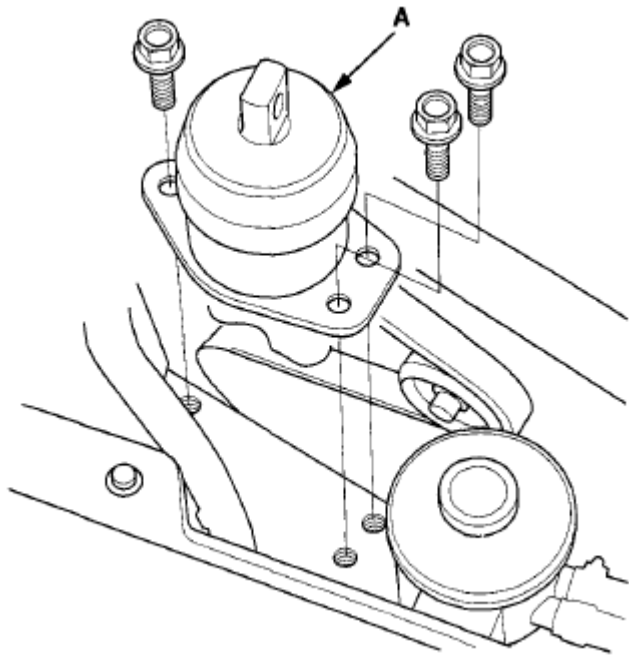


Fig. 65: Removing Side Engine Mount

Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Install the side engine mount (A), 12x1.25 mm

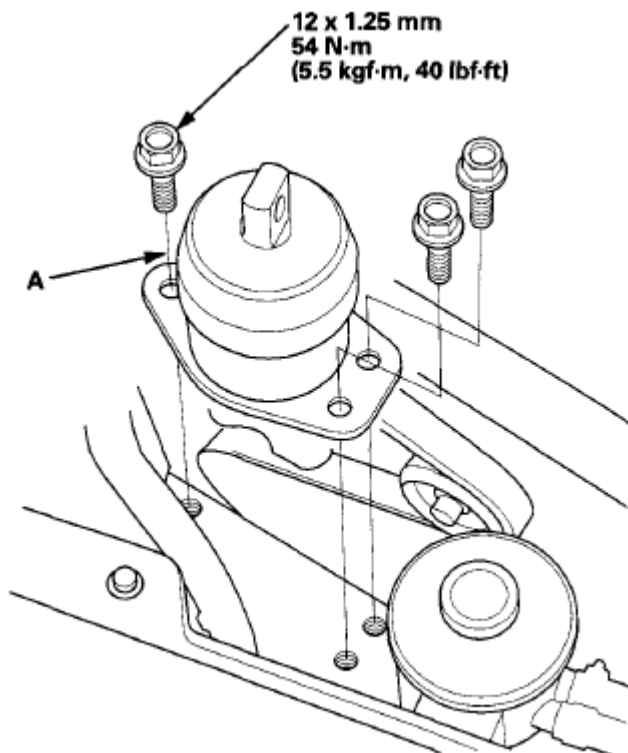


Fig. 66: Installing Side Engine Mount With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the upper half of the side engine mount bracket (A), and tighten the mounting bolts (B).

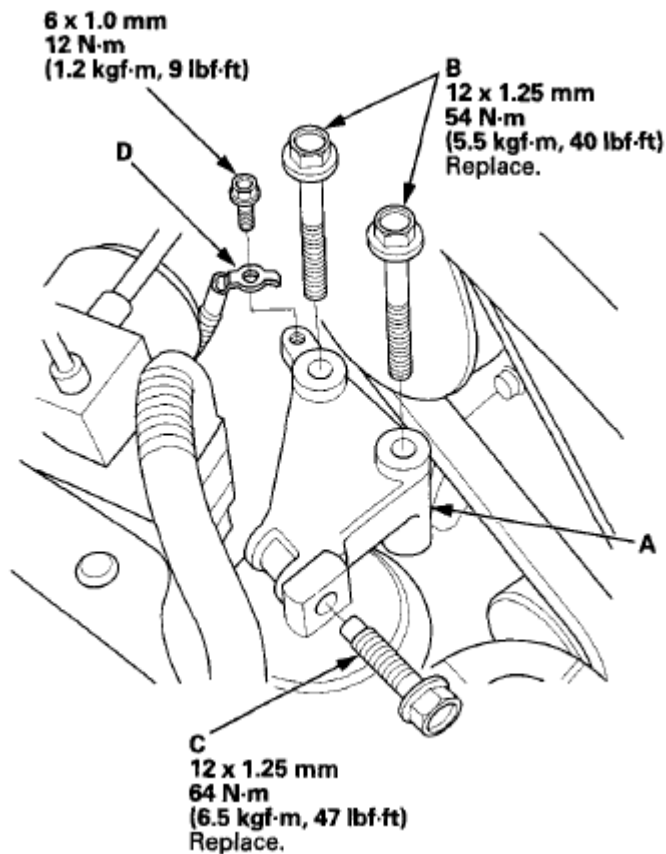


Fig. 67: Installing Upper Half Of Side Engine Mount Bracket With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the jack and the wood block.
4. Tighten the side engine mount mounting bolt (C).
5. Install the ground cable (D).
6. Tighten the mounting bolts in the numbered sequence shown.

FRONT ENGINE MOUNT REMOVAL AND INSTALLATION

REMOVAL

1. Remove the radiator fan shroud assembly (see **FAN, FAN MOTOR, AND SHROUD REMOVAL AND INSTALLATION**).
2. Remove the front engine mount stop (A), and disconnect the vacuum hose (B).

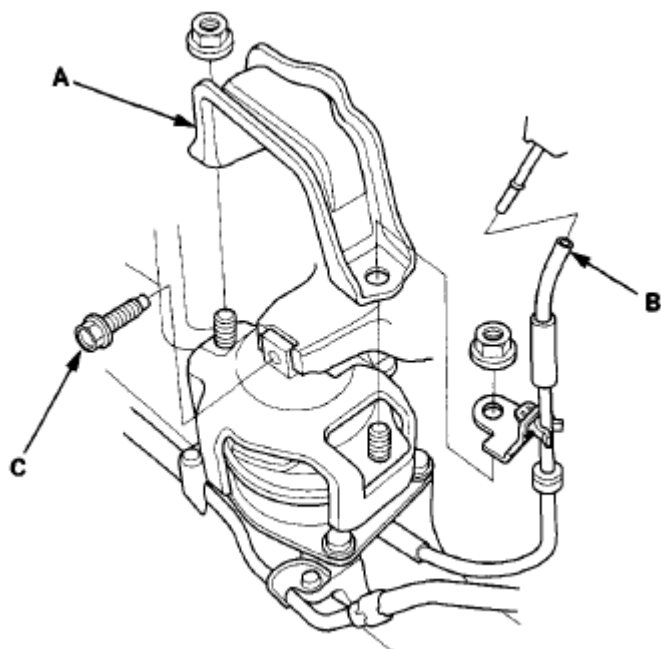


Fig. 68: Removing Front Engine Mount Stop
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the front engine mount bolt (C).
4. Lift and support the engine with a jack and a wood block under the engine/transmission.
5. Remove the front engine mount (A) from the front subframe.

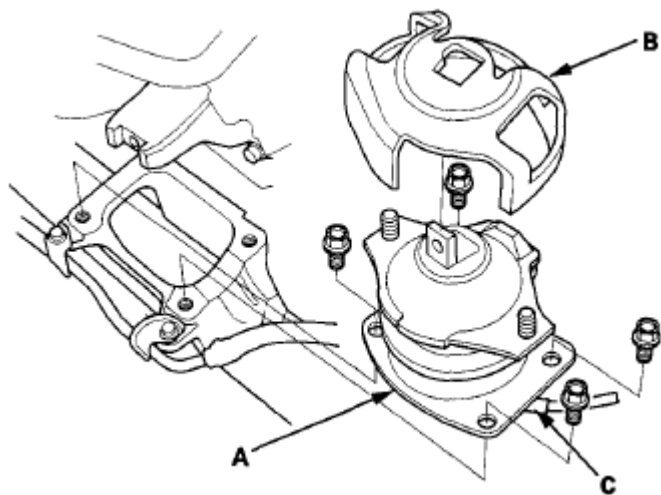


Fig. 69: Removing Front Engine Mount From Front Subframe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the front engine mount insulator (B), then disconnect the vacuum hose (C).

INSTALLATION

1. Connect the vacuum hose (A), and install the engine mount insulator (B) to the front engine mount (C).

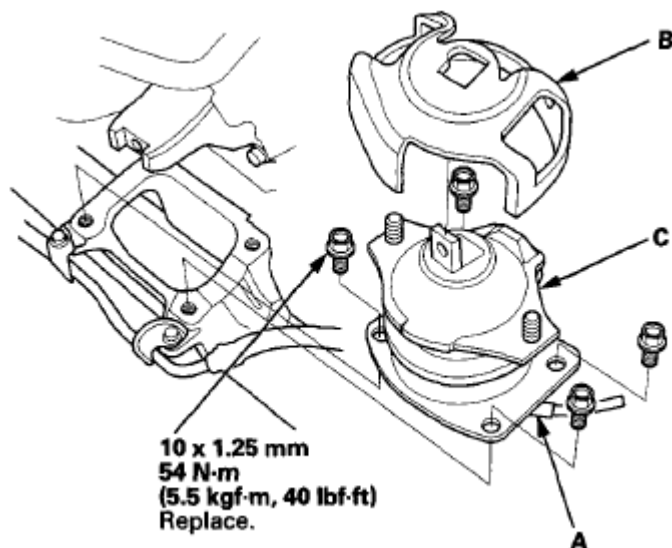


Fig. 70: Installing Engine Mount Insulator To Front Engine Mount With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the front engine mount to the front subframe.
3. Remove the jack and the wood block.
4. Tighten the front engine mount bolt (A), then install the front engine mount stop (B).

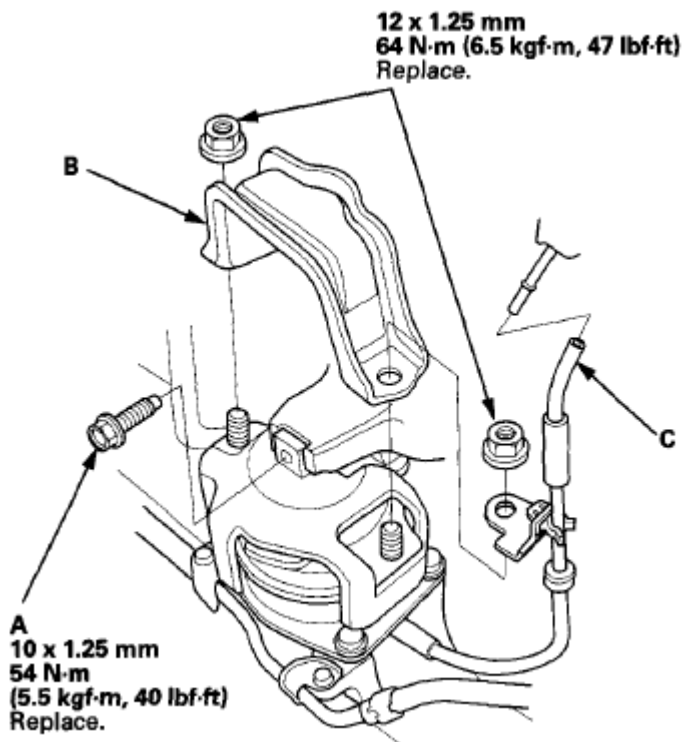


Fig. 71: Installing Front Engine Mount Stop With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Connect the vacuum hose (C).
6. Install the radiator fan shroud assembly (see **FAN, FAN MOTOR, AND SHROUD REMOVAL AND INSTALLATION**).

REAR ENGINE MOUNT REMOVAL AND INSTALLATION

REMOVAL

1. Remove the front strut brace (see **FRAME BRACE REPLACEMENT**).
2. Lift and support the engine with a jack and a wood block under the engine/transmission.
3. Remove the rear engine mount stop (A), then remove the rear engine mount bolt (B).

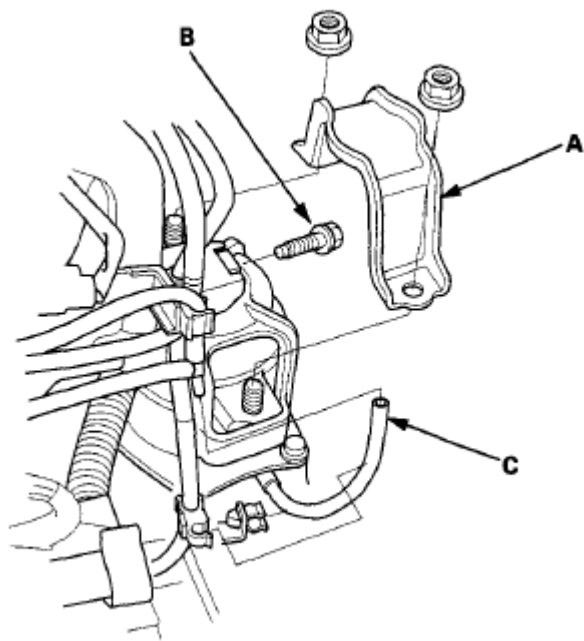


Fig. 72: Removing Rear Engine Mount Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Disconnect the vacuum hose (C).
5. Remove the rear engine mount assembly (A).

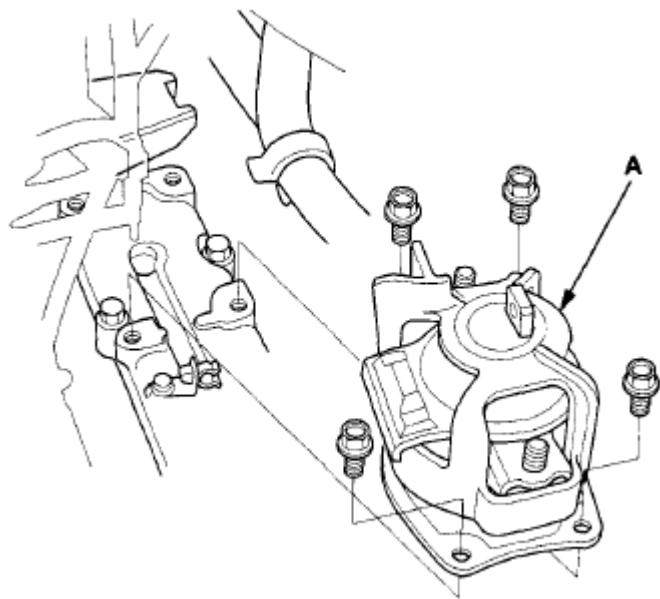


Fig. 73: Removing Rear Engine Mount Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Disconnect the vacuum hose (A), and remove the engine mount insulator (B) from the engine mount.

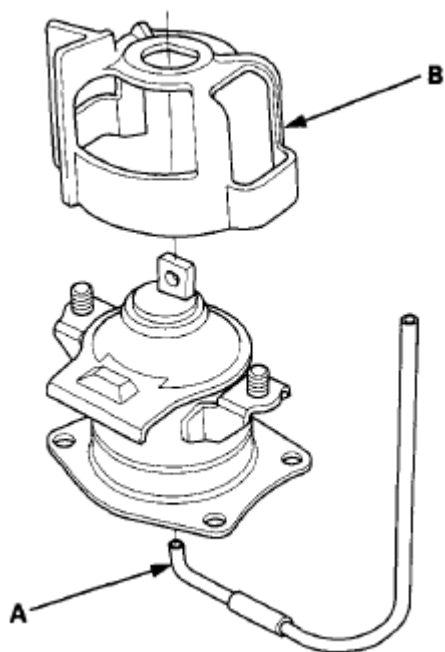


Fig. 74: Removing Engine Mount Insulator From Engine Mount
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Connect the vacuum hose (A), and install the engine mount insulator (B) to the engine mount.

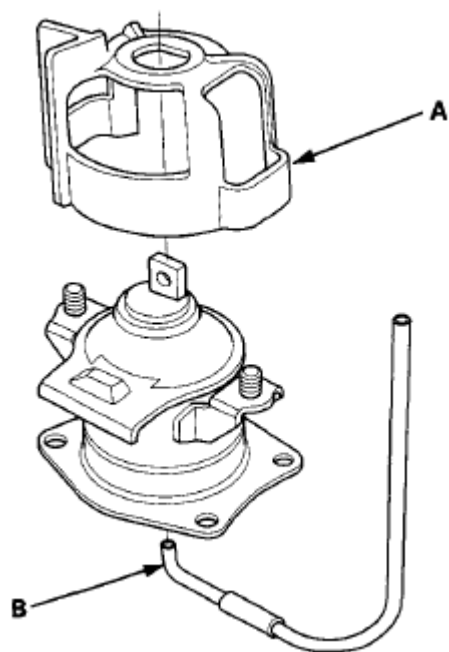


Fig. 75: Installing Engine Mount Insulator To Engine Mount
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the rear engine mount assembly (A) to the front subframe.

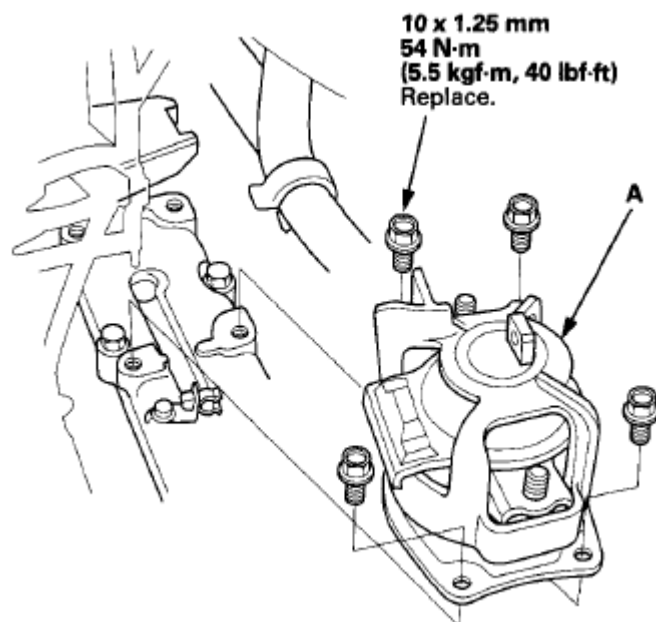


Fig. 76: Installing Rear Engine Mount Assembly To Front Subframe With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the jack and the wood block.
4. Install the rear engine mount bolt (A)

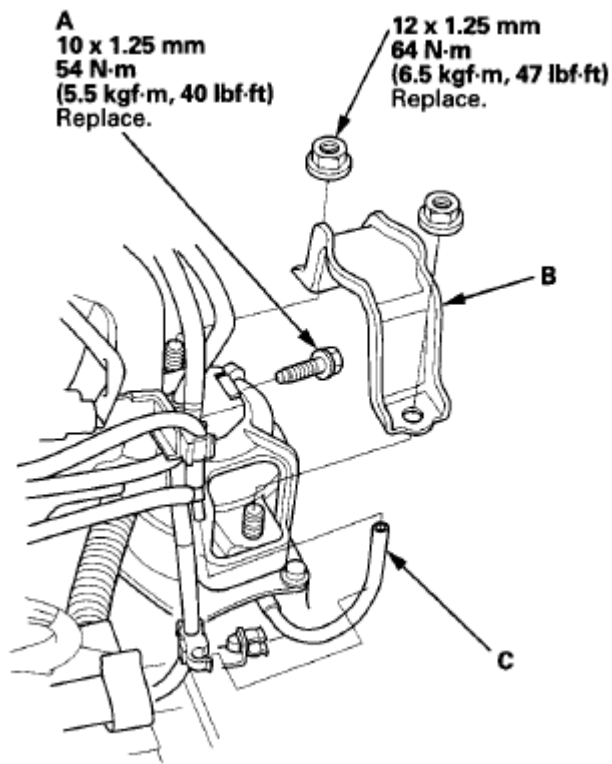


Fig. 77: Installing Rear Engine Mount Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the rear engine mount stop (B), and connect the vacuum hose (C).
6. Install the front strut brace (see **FRAME BRACE REPLACEMENT**).

LOWER TRANSMISSION MOUNT REMOVAL AND INSTALLATION

REMOVAL

1. Remove the lower transmission mount mounting bolts (A) from the subframe side.

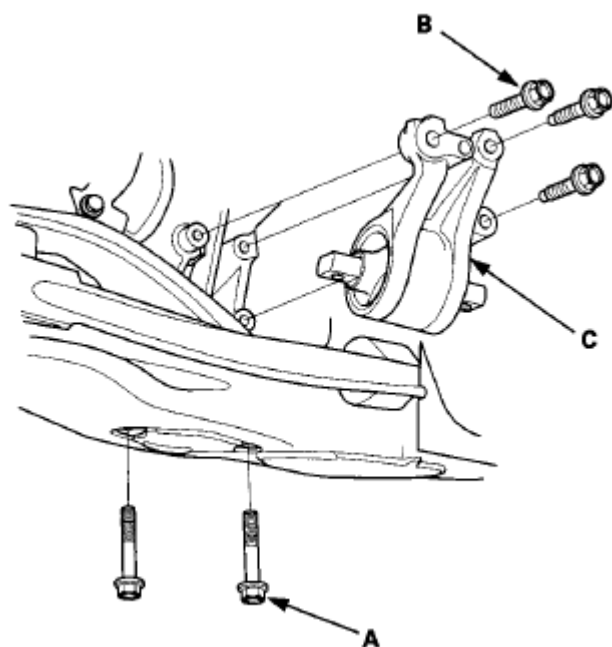


Fig. 78: Removing Lower Transmission Mount Mounting Bolts From Subframe Side
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Lift and support the engine/transmission with a transmission jack and a wood block.
3. Remove the lower transmission mount mounting bolts (B), then remove the lower transmission mount (B).

INSTALLATION

1. Install the lower transmission mount (A), tighten the lower transmission mount mounting bolts (B).

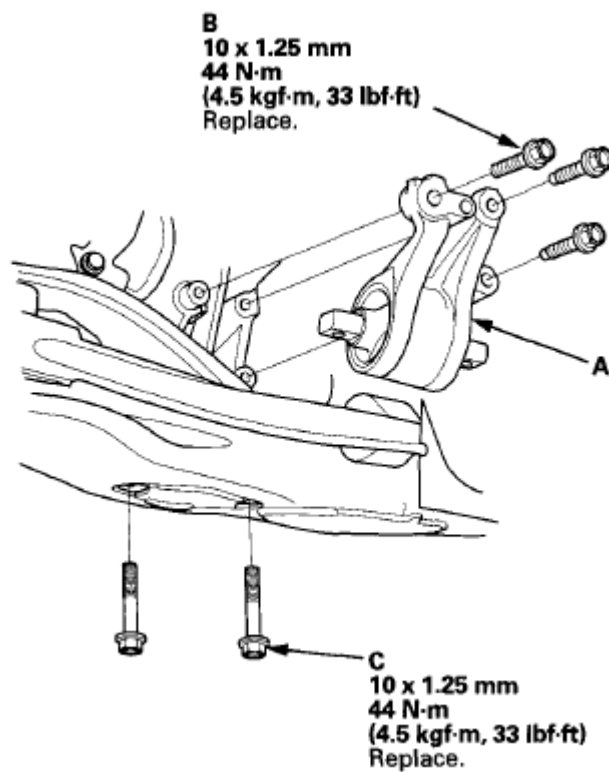


Fig. 79: Installing Lower Transmission Mount With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the transmission jack and the wood block.
3. Install the lower transmission mount mounting bolts (C) to subframe side.

2011 Acura RL

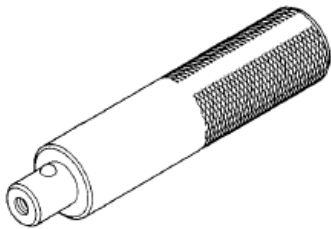
2011-12 ENGINE Engine Block - RL

2011-12 ENGINE

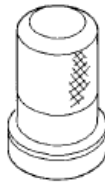
Engine Block - RL

SPECIAL TOOLS

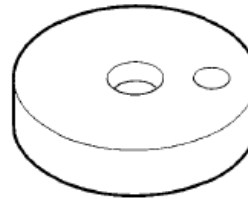
Ref.No.	Tool Number	Description	Qty
①	07749-0010000	Driver Handle, 15 x 135L	1
②	07OAD-RCAA100	Oil Seal Driver, 64 mm	1
③	07OAD-RCAA200	Driver Attachment, 106 mm	1



①



②



③

Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

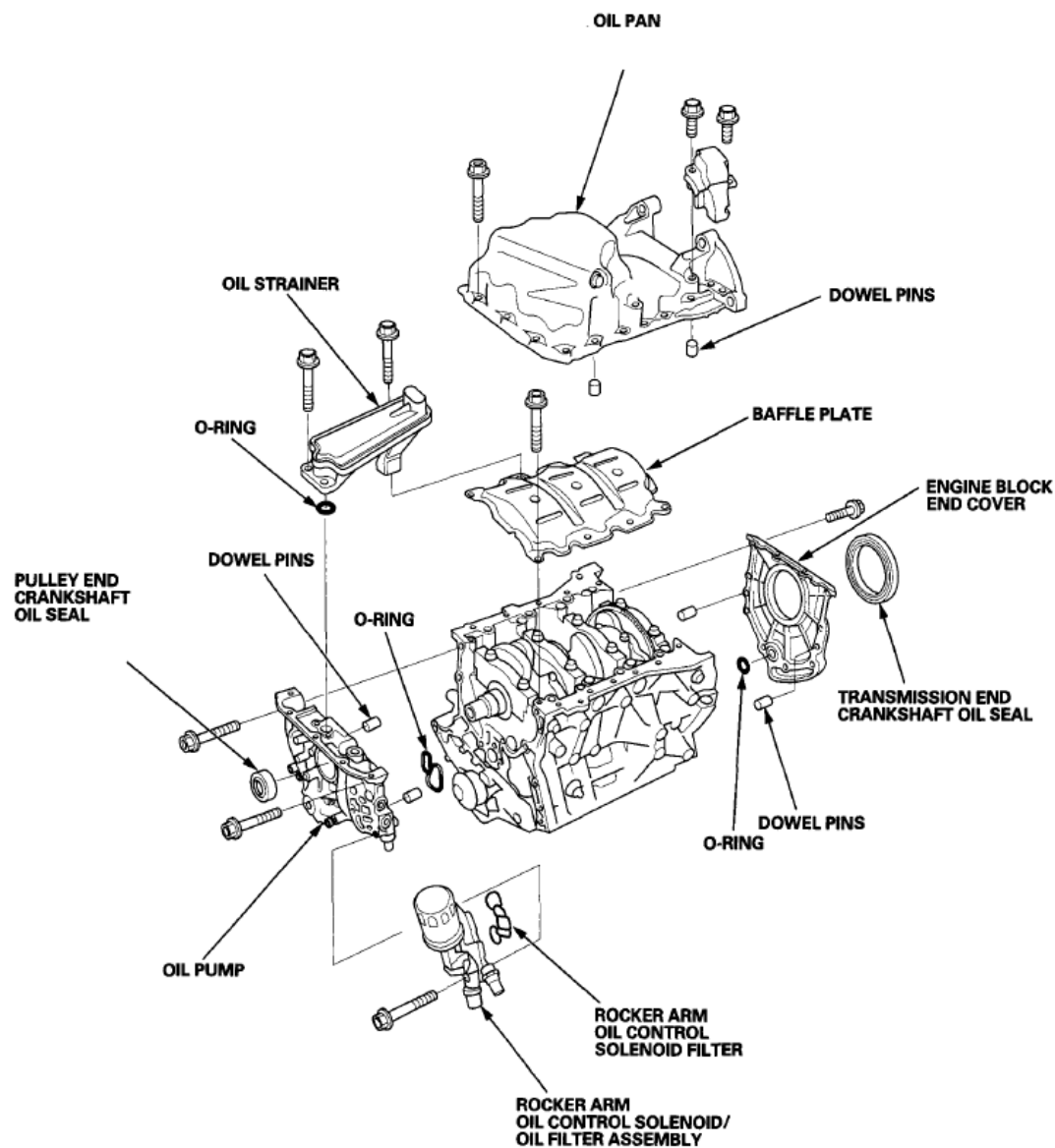


Fig. 2: Exploded View Of Engine Block Components (1 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

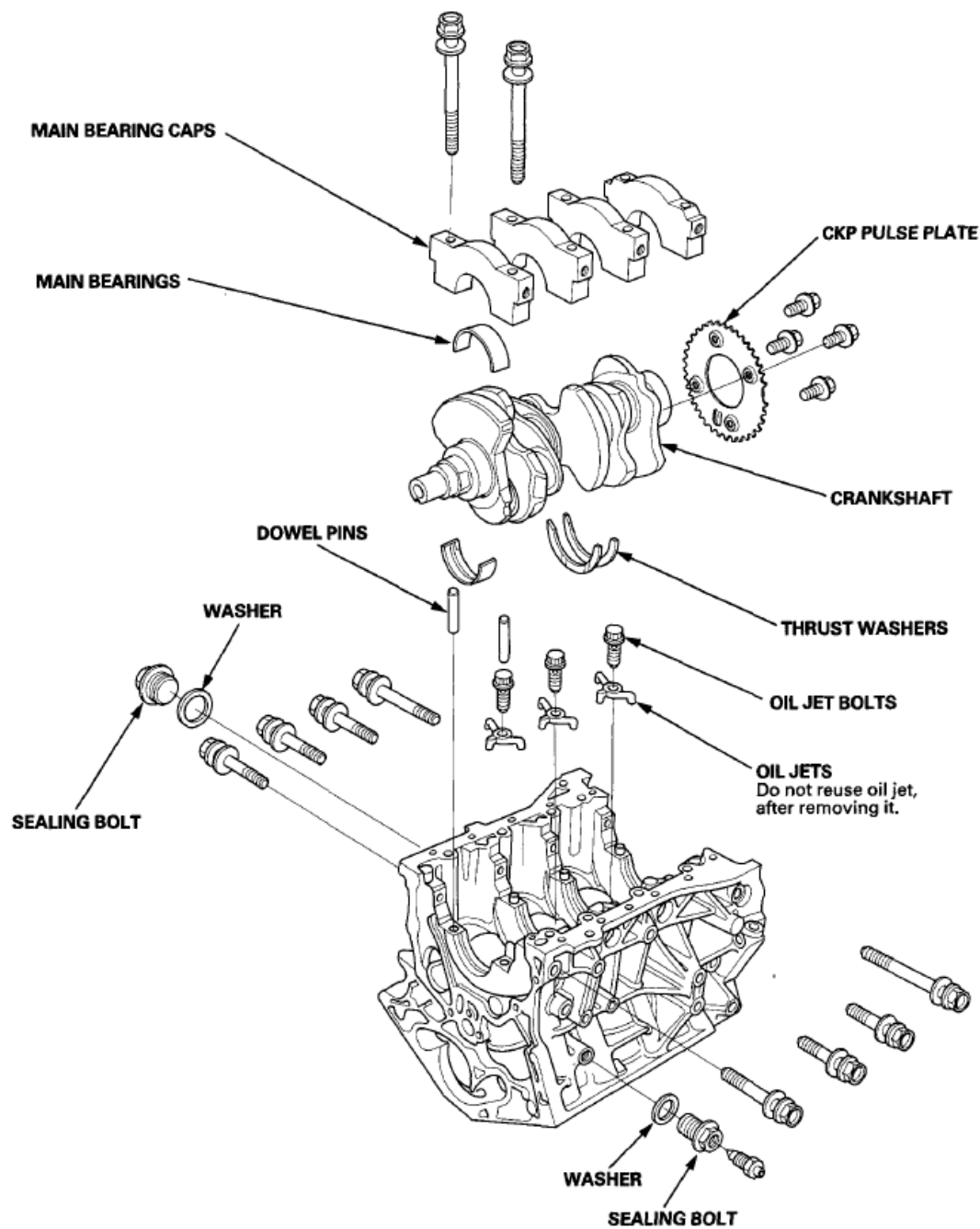


Fig. 3: Exploded View Of Engine Block Components (2 Of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

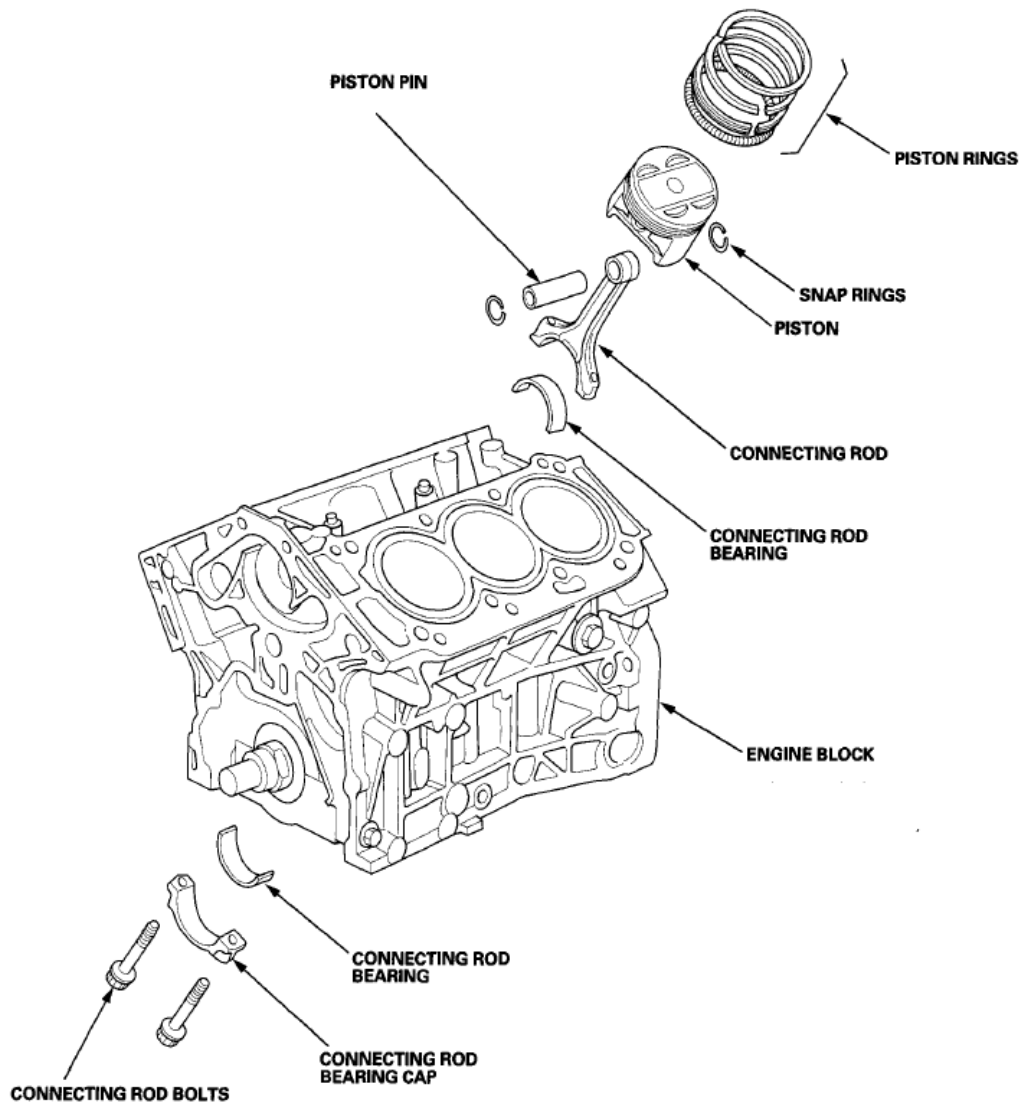


Fig. 4: Exploded View Of Engine Block Components (3 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see **REMOVAL**).
2. Remove the baffle plate (see step 9).
3. Measure the connecting rod end play with a feeler gauge (A) between the connecting rod (B) and the crankshaft (C).

Connecting Rod End Play

Standard (New): 0.15-0.35 mm (0.0059-0.0138 in)

Service Limit: 0.45 mm (0.0177 in)

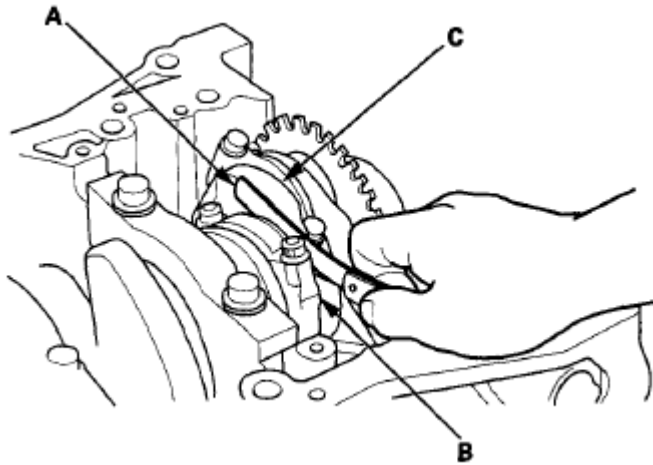


Fig. 5: Checking Connecting Rod End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Crankshaft End Play

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

Service Limit: 0.45 mm (0.0177 in)

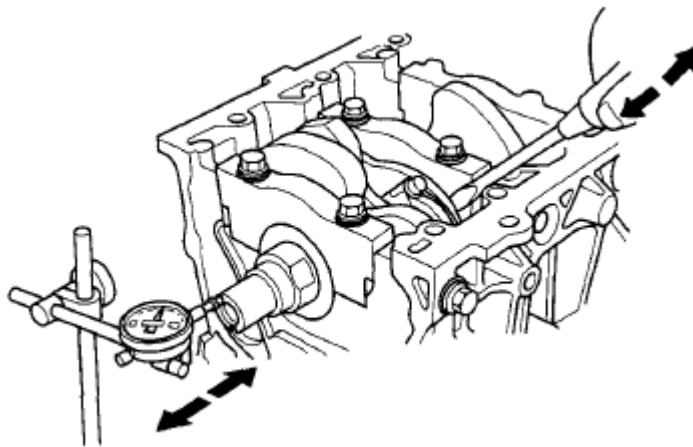


Fig. 6: Checking Crankshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the crankshaft end play is beyond the service limit, replace the thrust washers and recheck. If it is still

beyond the service limit, replace the crankshaft (see CRANKSHAFT AND PISTON REMOVAL).

CRANKSHAFT MAIN BEARING REPLACEMENT

MAIN BEARING CLEARANCE INSPECTION

1. Remove the main bearing caps and the bearing halves (see CRANKSHAFT AND PISTON REMOVAL).
2. Clean each main journal and the bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.

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

4. Reinstall the bearings and the main bearing caps, then torque the bearing cap bolts to 74 N.m (7.5 kgf.m, 54 lbf.ft), and the bearing cap side bolts to 49 N.m (5.0 kgf.m, 36 lbf.ft) in the proper sequence (see step 22).

NOTE:

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

5. Remove the main bearing caps and the bearing halves, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

Standard (New): 0.019-0.045 mm (0.00075-0.00177 in)

Service Limit: 0.050 mm (0.00197 in)

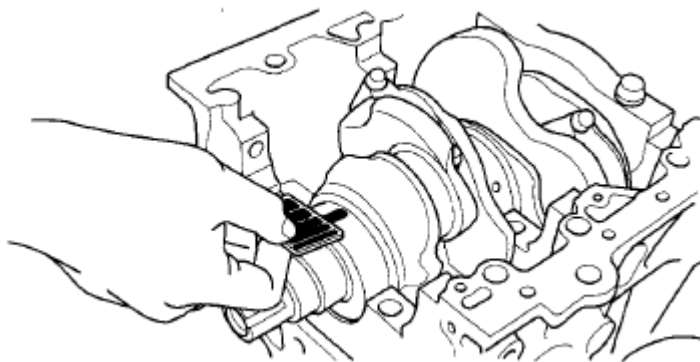


Fig. 7: Measuring Widest Part Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

MAIN BEARING SELECTION

Block Bore Code Location

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

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

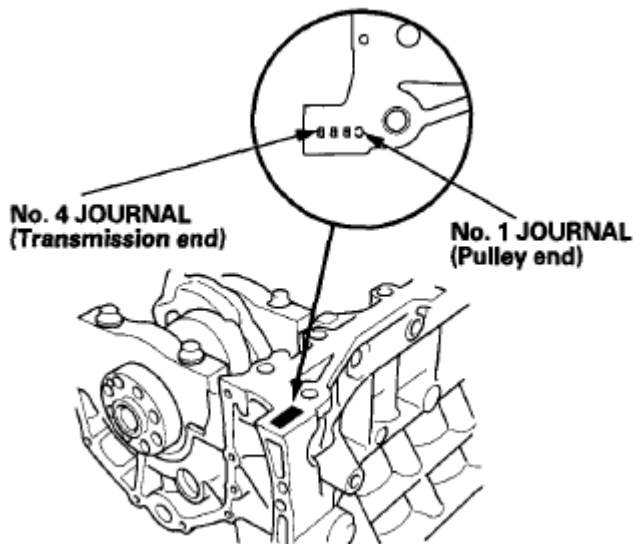


Fig. 8: Main Bearing Selection Identifying Block Bore Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

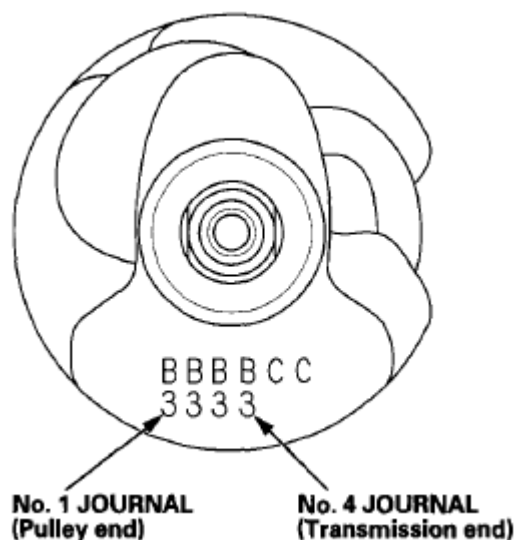
Bearing Identification
Color code is on the edge of the bearing

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

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

Fig. 9: Main Bearing Selection Reference Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Locations (Numbers or Bars)**Fig. 10: Identifying Main Journal Code Locations**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

CONNECTING ROD BEARING CLEARANCE INSPECTION

1. Remove the connecting rod cap and the bearing half (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Clean the connecting rod journal and the bearing half with a clean shop towel.
3. Place one strip of plastigage across the connecting rod journal.
4. Reinstall the bearing half and the connecting rod cap, then torque the connecting rod bolts.

NOTE:

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

Tightening Torque:

20 N.m (2.0 kgf.m, 14 lbf.ft) + 90 °

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.020-0.044 mm (0.00079-0.00173 in)

Service Limit: 0.050 mm (0.00197 in)

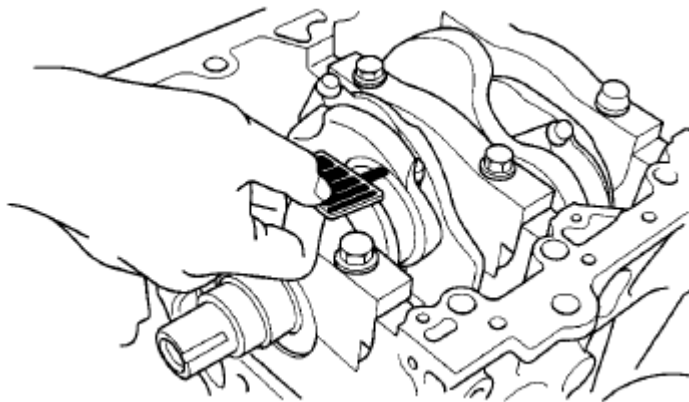


Fig. 11: Checking Connecting Rod Bearing-To-Journal Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 the clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over (see **CRANKSHAFT AND PISTON REMOVAL**).

CONNECTING ROD BEARING SELECTION

Each connecting rod falls into one of four tolerance ranges (from 0 to 0.024 mm (0.00094 in), in 0.006 mm (0.00024 in) increments) depending on the size of its big end bore.

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

Big End Bore Size: 60.0 mm (2.362 in)

Inspect the connecting rod for cracks and heat damage.

Big End Bore Code Locations

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

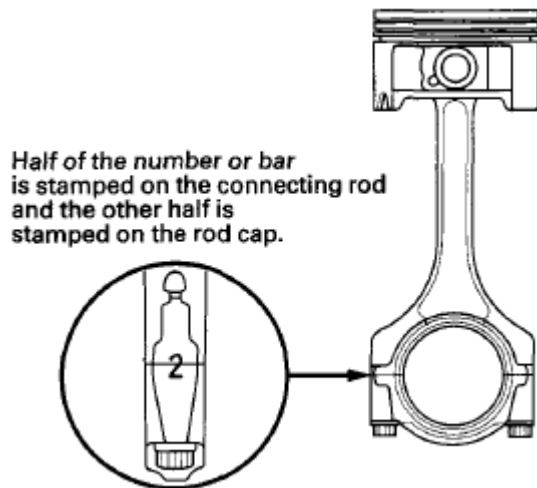


Fig. 12: Identifying Big End Bore Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Bearing Identification
Color code is on the edge of the bearing

A or I	B or II	C or III	D or IIII	E or IIIII	F or IIIII
--------	---------	----------	-----------	------------	------------

Smaller rod journal Smaller bearing (Thicker)

Larger big end bore			
1 or I	2 or II	3 or III	4 or IIII
Smaller bearing (Thicker)			
Pink	Pink/Yellow	Yellow	Yellow/Green
Pink/Yellow	Yellow	Yellow/Green	Green
Yellow	Yellow/Green	Green	Green/Brown
Yellow/Green	Green	Green/Brown	Brown
Green	Green/Brown	Brown	Brown/Black
Green/Brown	Brown	Brown/Black	Black

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

Fig. 13: Big End Bore Code Locations Reference Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Locations

(Letters or Bars)

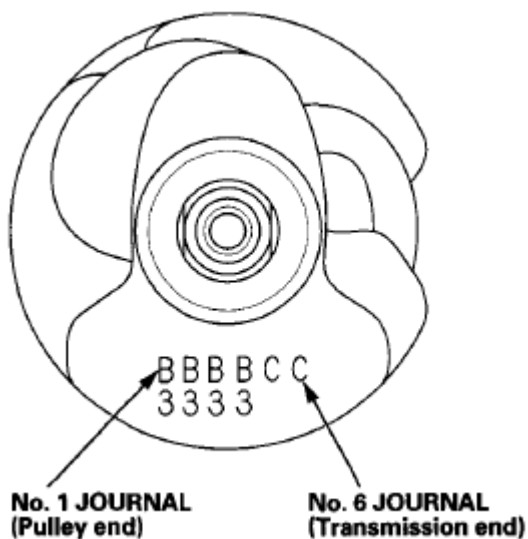


Fig. 14: Identifying Connecting Rod Journal Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

1. If the engine is out of the vehicle, go to step 6.
2. Raise the vehicle on the lift.
3. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
4. Remove the splash shield (see **SPLASH SHIELD REPLACEMENT**).
5. Remove exhaust pipe A (see **EXHAUST PIPE AND MUFFLER REPLACEMENT**).
6. Remove the rear WU-TWC bracket.

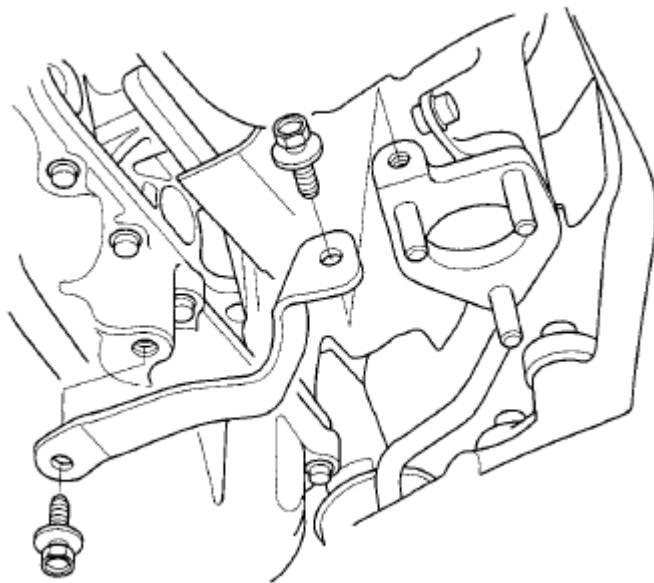


Fig. 15: Removing Rear WU-TWC Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

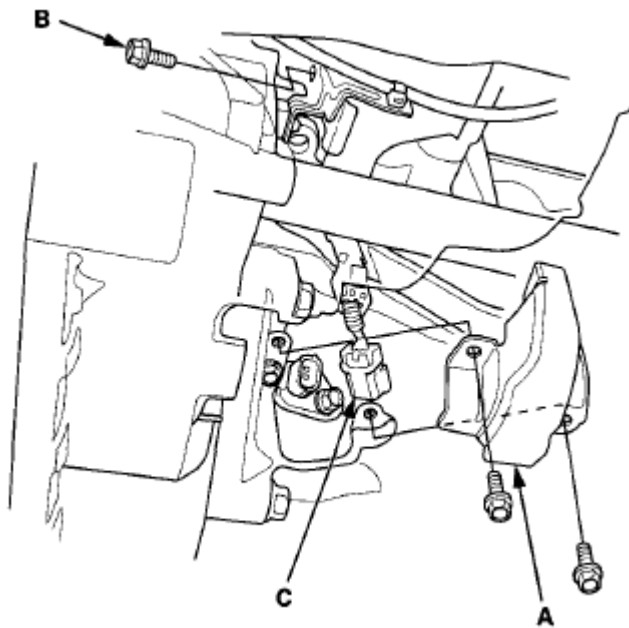


Fig. 16: Removing CKP Sensor Cover And Bolt
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

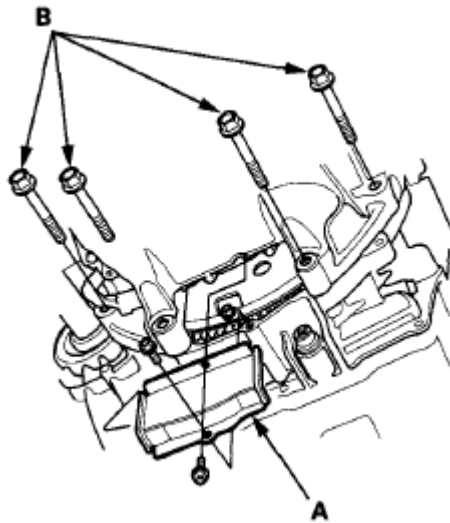


Fig. 17: Removing Torque Converter Case Cover And Four Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

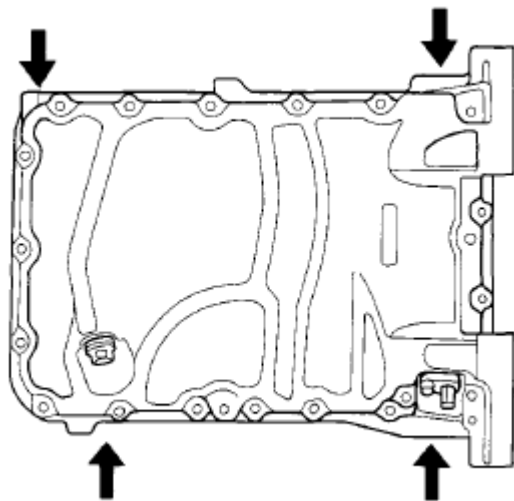


Fig. 18: Separating Oil Pan From Block

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the oil pan.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine/transmission (see **ENGINE REMOVAL**).
2. Remove the transmission (see **TRANSMISSION REMOVAL**).
3. Remove the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
4. Remove the cylinder heads (see **CYLINDER HEAD REMOVAL**).
5. Remove the timing belt drive pulley from the crankshaft (see **TIMING BELT DRIVE PULLEY REPLACEMENT**).
6. Remove the oil pan (see **OIL PAN REMOVAL**).
7. Remove the engine block end cover.

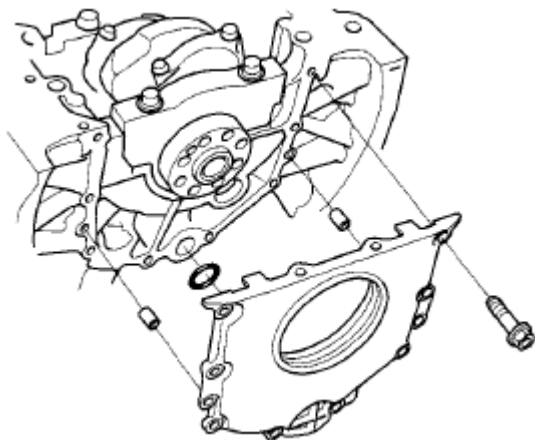


Fig. 19: Removing Engine Block End Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

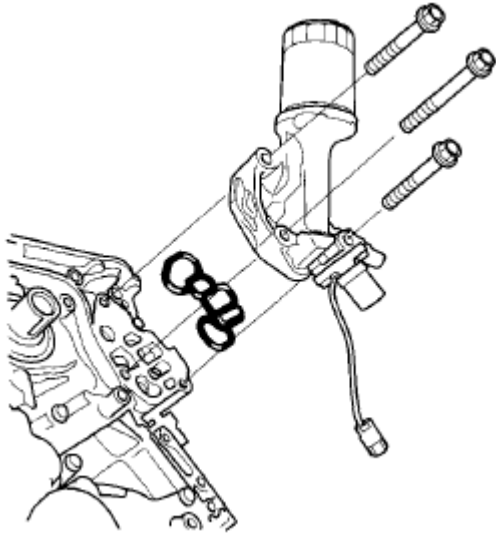


Fig. 20: Removing Rocker Arm Oil Control Solenoid/Oil Filter Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

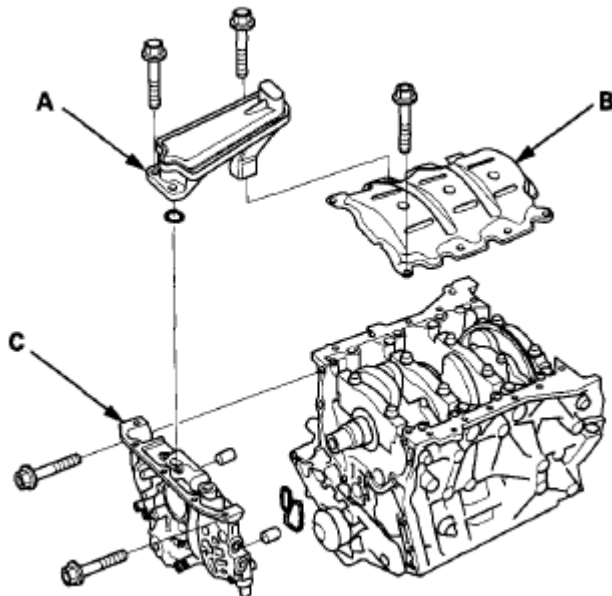


Fig. 21: Removing Oil Strainer, Baffle Plate And Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the connecting rod caps after setting the connecting rod journal at bottom dead center (BDC) for each cylinder. Remove the piston/connecting rod assembly by pushing on the connecting rod. Take care

not to damage the oil jets, the connecting rod journal, or the cylinder with the connecting rod.

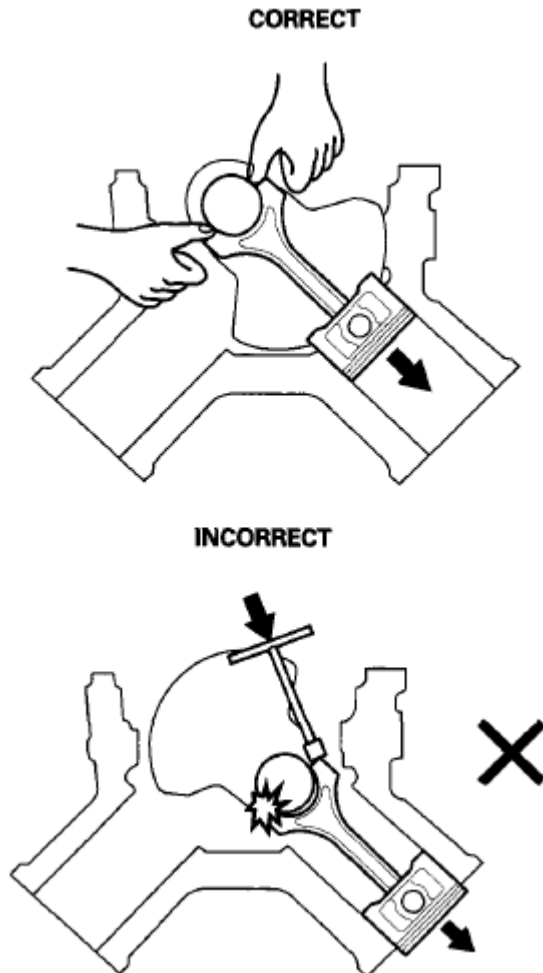


Fig. 22: Removing Piston/Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

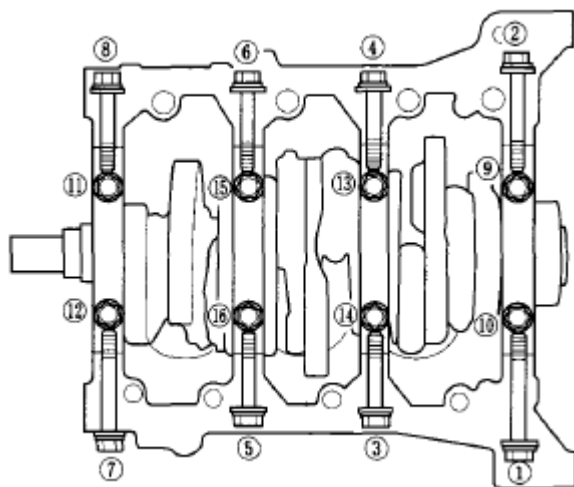


Fig. 23: Identifying Bearing Cap Bolts And Bearing Cap Side Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

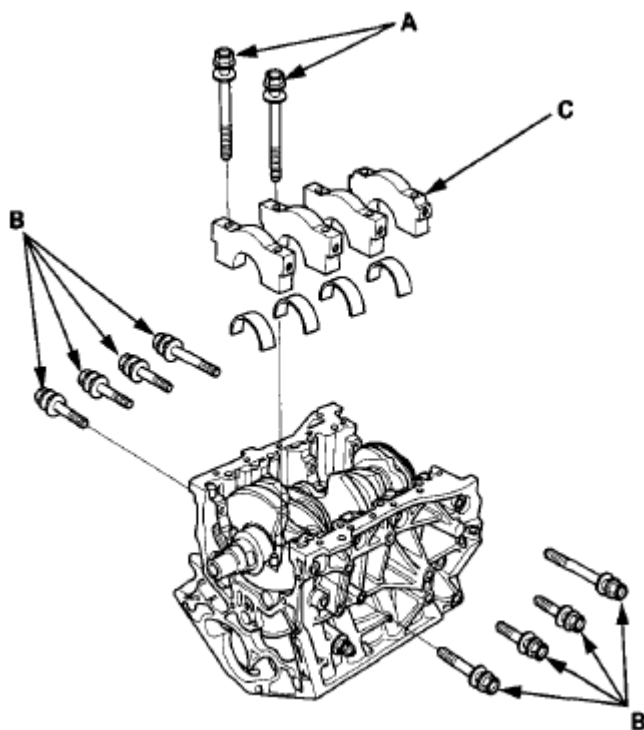


Fig. 24: Removing Bearing Cap Bolts And Bearing Cap Side Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

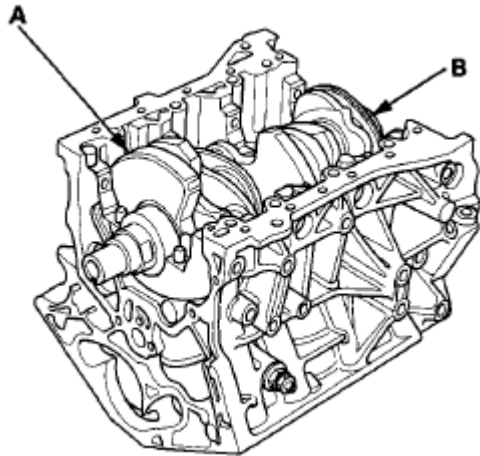


Fig. 25: Lifting Crankshaft Out Of Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the CKP pulse plate from the crankshaft (see **CKP PULSE PLATE REPLACEMENT**).
19. Reinstall the main bearing caps and the bearings on the engine block in the proper order.

CRANKSHAFT INSPECTION

Out-of-Round and Taper

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

Journal Out-of-Round

Standard (New): 0.005 mm (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)

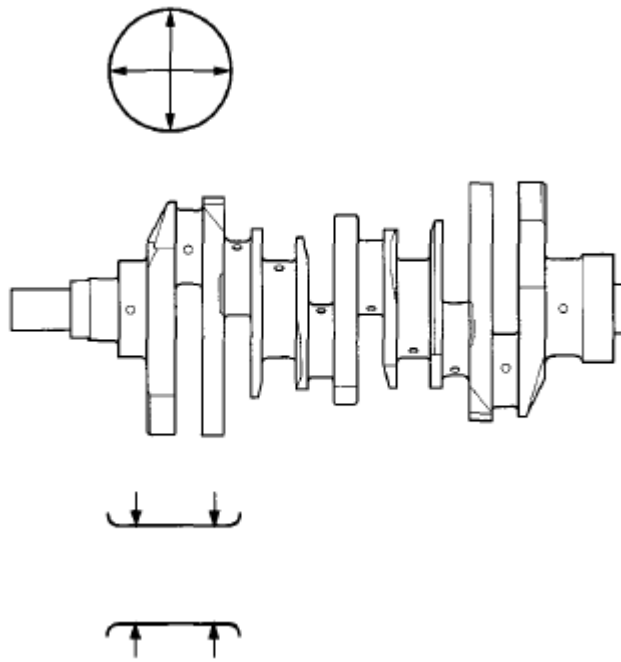


Fig. 26: Checking Journal Out-Of-Round

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Journal Taper

Standard (New): 0.005 mm (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)

Straightness

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

Crankshaft Total Runout

Standard (New): 0.025 mm (0.00098 in) max.

Service Limit: 0.030 mm (0.00118 in)

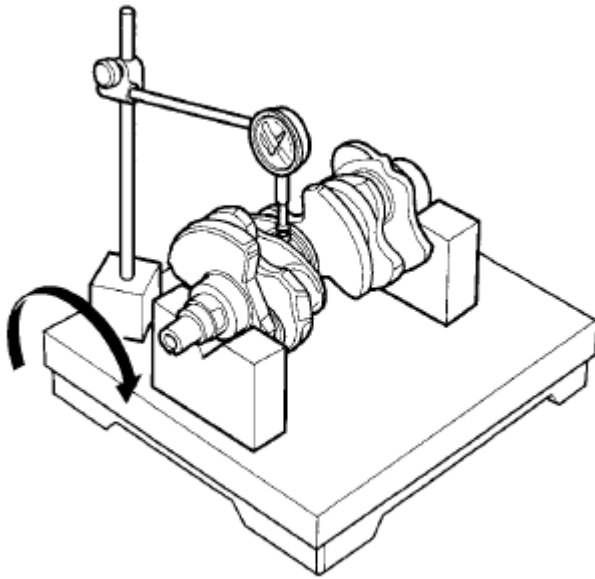


Fig. 27: Checking Crankshaft Total Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK AND PISTON INSPECTION

1. Remove the pistons from the engine block (see CRANKSHAFT AND PISTON REMOVAL).
2. Check the pistons for distortion or cracks.
3. Measure the piston diameter at a point 16 mm (0.63 in) from the bottom of the skirt.

Piston Diameter

Standard (New): 89.983-89.996 mm (3.54263-3.54314 in)

Service Limit: 89.975 mm (3.54232 in)

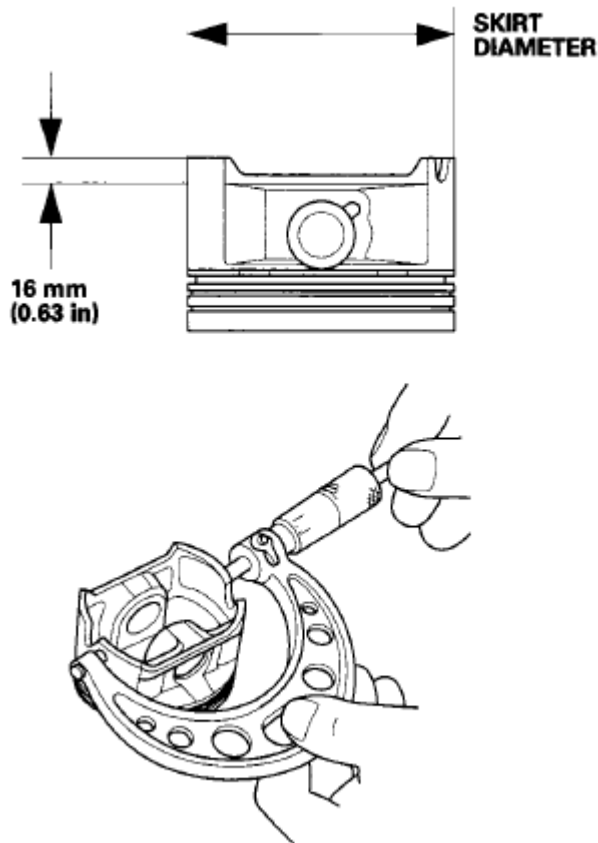


Fig. 28: Checking Piston Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the wear and taper in direction X and Y at three levels in each cylinder as shown. If measurements in any cylinder are beyond the standard limit, replace the engine block.

Cylinder Bore Size

Standard (New): 90.000-90.015 mm (3.54330-3.54389 in)

Service Limit: 90.065 mm (3.54586 in)

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.0020 in)

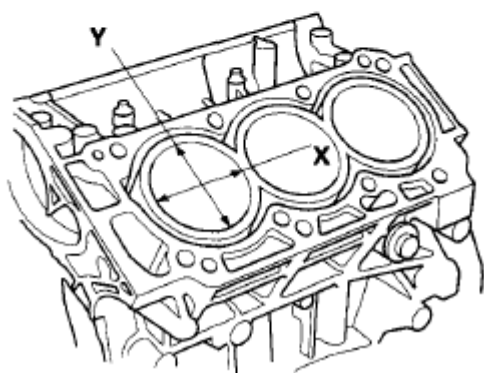
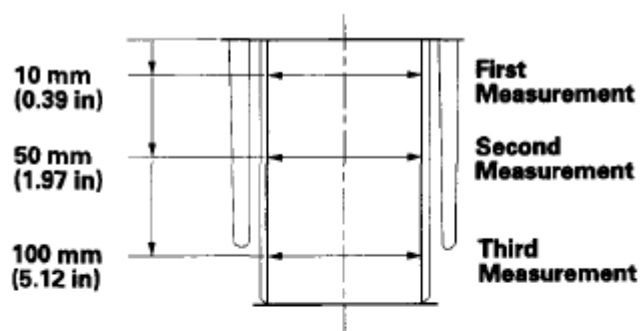


Fig. 29: Checking Cylinder Bore Size

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Engine Block Warpage

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

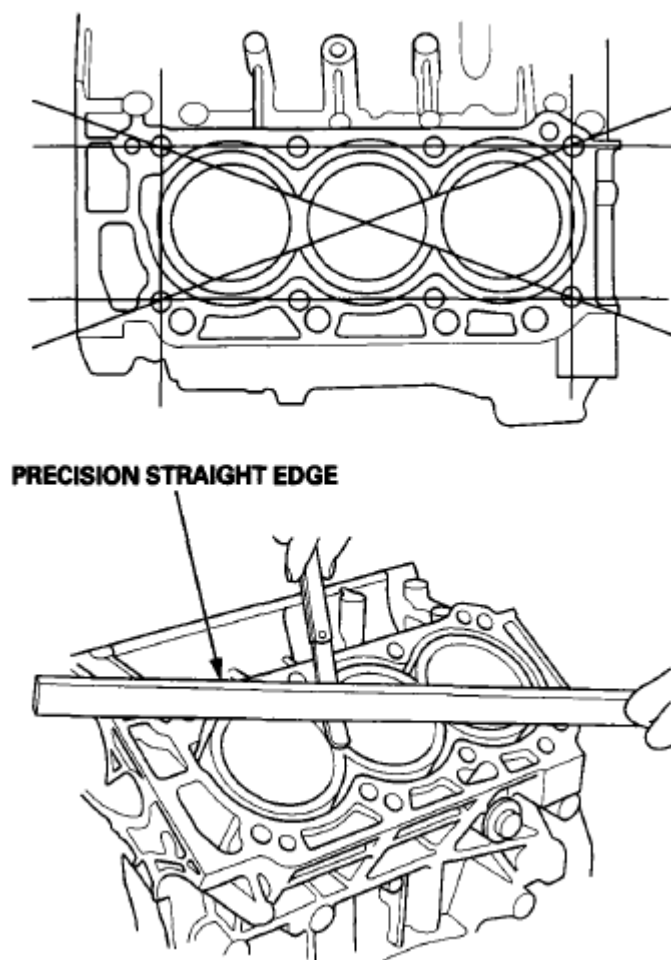


Fig. 30: Checking Engine Block Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-to-Cylinder Bore Clearance

Standard (New): 0.004-0.032 mm (0.00016-0.00126 in)

Service Limit: 0.07 mm (0.0028 in)

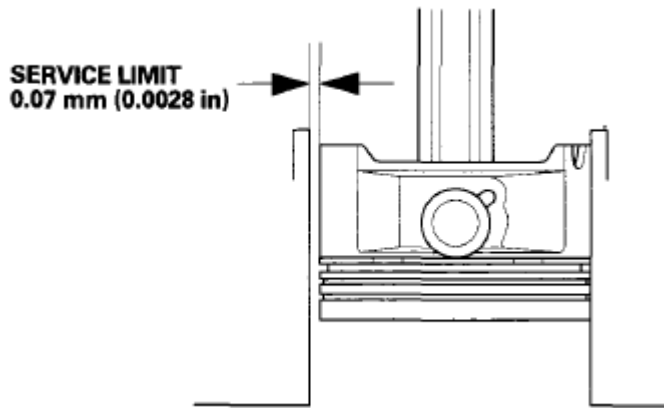


Fig. 31: Checking Piston-To-Cylinder Bore Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON, PIN, AND CONNECTING ROD REPLACEMENT

DISASSEMBLY

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

NOTE: Take care not to damage the ring grooves.

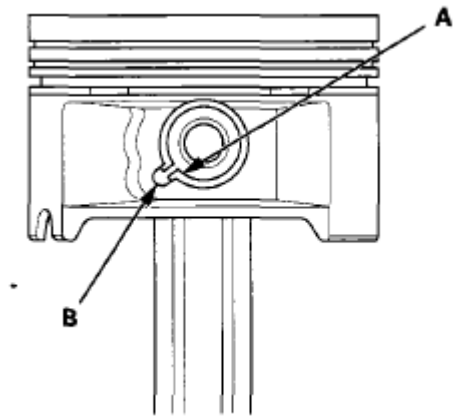


Fig. 32: Identifying Piston Pin Snap Rings And Piston Pin Bores
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

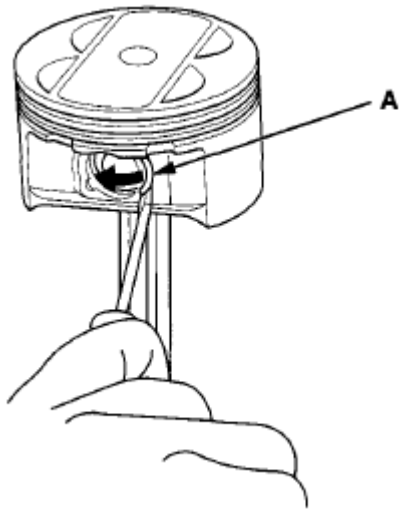


Fig. 33: Identifying Snap Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

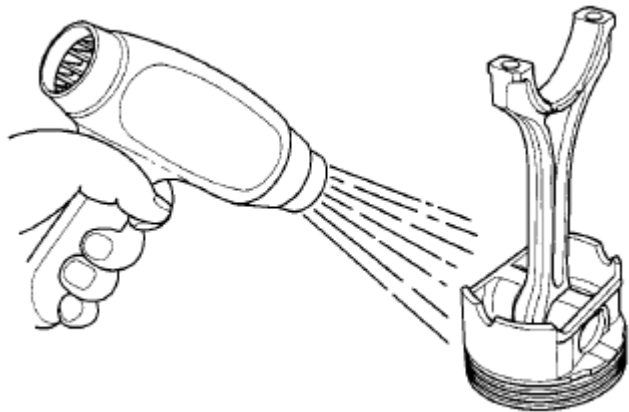


Fig. 34: Heating Piston And Connecting Rod Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSPECTION

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

1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New): 21.961-21.965 mm (0.86460-0.86476 in)

Service Limit: 21.954 mm (0.86433 in)

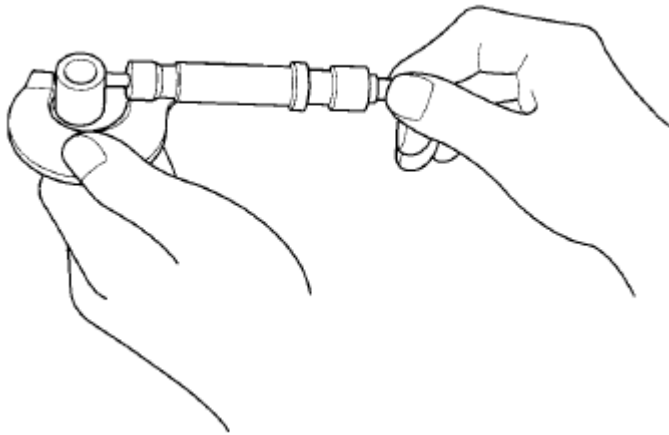


Fig. 35: Checking Piston Pin Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

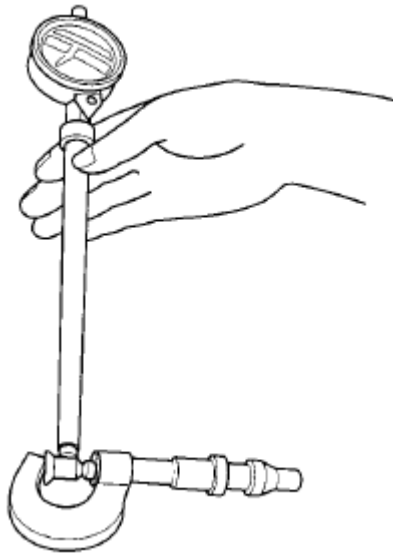


Fig. 36: Identifying Zero Reading In Gauge

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Piston Clearance

Standard (New): -0.005 to +0.002 mm (-0.00020 to +0.00008 in)

Service Limit: 0.004 mm (0.00016 in)

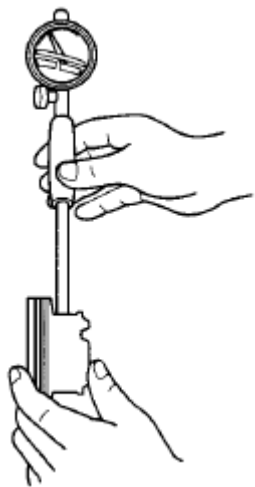


Fig. 37: Checking Piston Pin-To-Piston Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Connecting Rod Clearance

Standard (New): 0.005-0.015 mm (0.00020-0.00059 in)

Service Limit: 0.019 mm (0.00075 in)

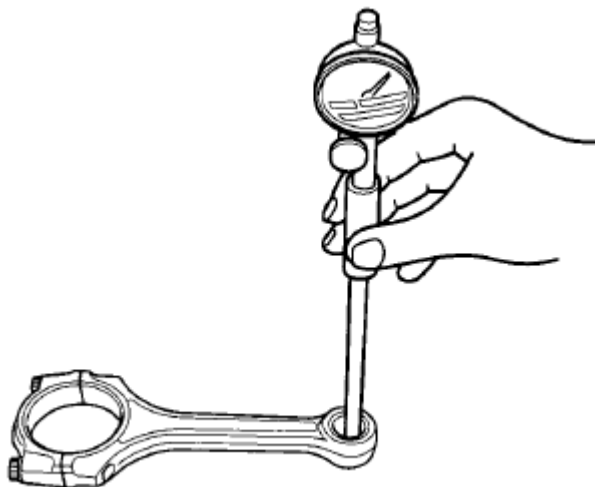


Fig. 38: Checking Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REASSEMBLY

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

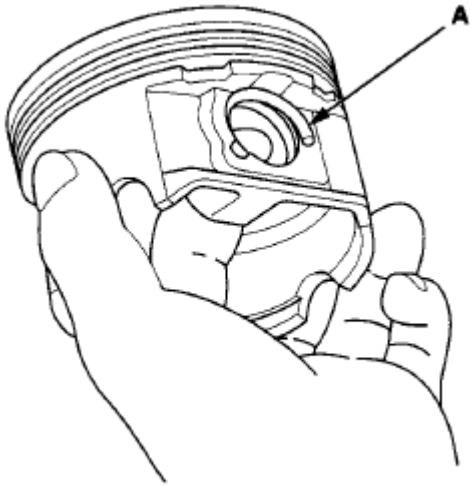


Fig. 39: Installing A Piston Pin Snap Ring

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



Fig. 40: Heating Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE: Apply new engine oil to the piston pin.

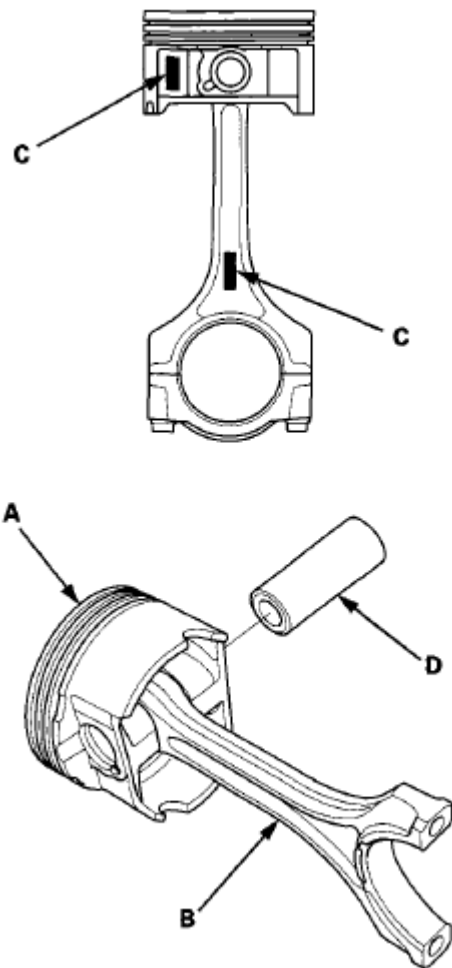


Fig. 41: Identifying Piston And Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

PISTON RING REPLACEMENT

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

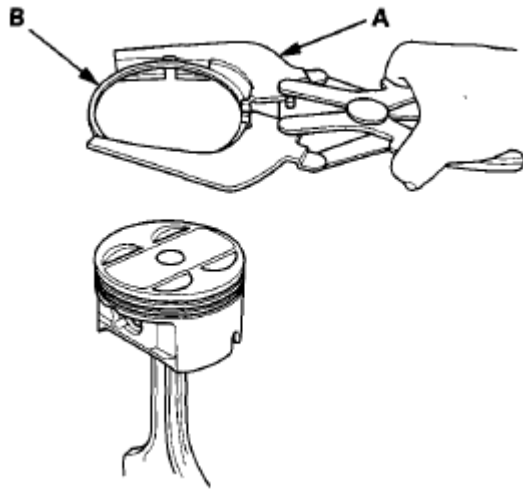


Fig. 42: Removing Old Piston Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Clean all the ring grooves thoroughly with a squared-off broken ring, or a ring groove cleaner with a blade to fit the piston grooves. File down the blade, if necessary. The top ring and second ring grooves are 1.2 mm (0.047 in) wide, and the oil ring groove is 2.8 mm (0.110 in) wide. Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tool.

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

4. Using a piston, push a new ring (A) into the cylinder bore 15-20 mm (0.59-0.79 in) from the bottom.

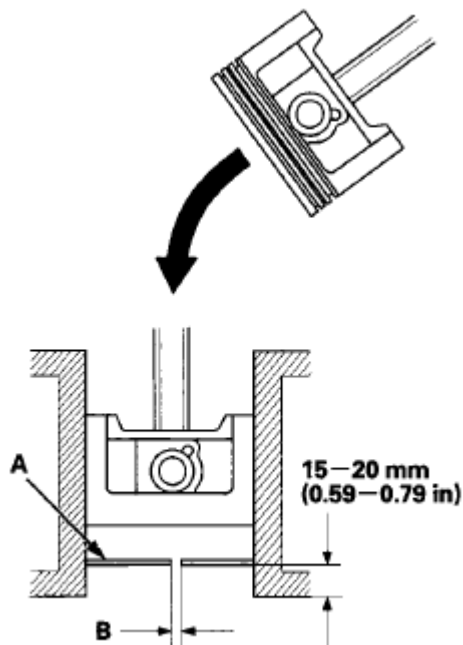


Fig. 43: Pushing Ring Into Cylinder Bore

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure the piston ring end-gap (B) with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits (see step 4).

Piston Ring End-Gap

Top Ring:

Standard (New): 0.30-0.40 mm (0.0118-0.0157 in)

Service Limit: 0.60 mm (0.0236 in)

Second Ring:

Standard (New): 0.40-0.55 mm (0.0157-0.0217 in)

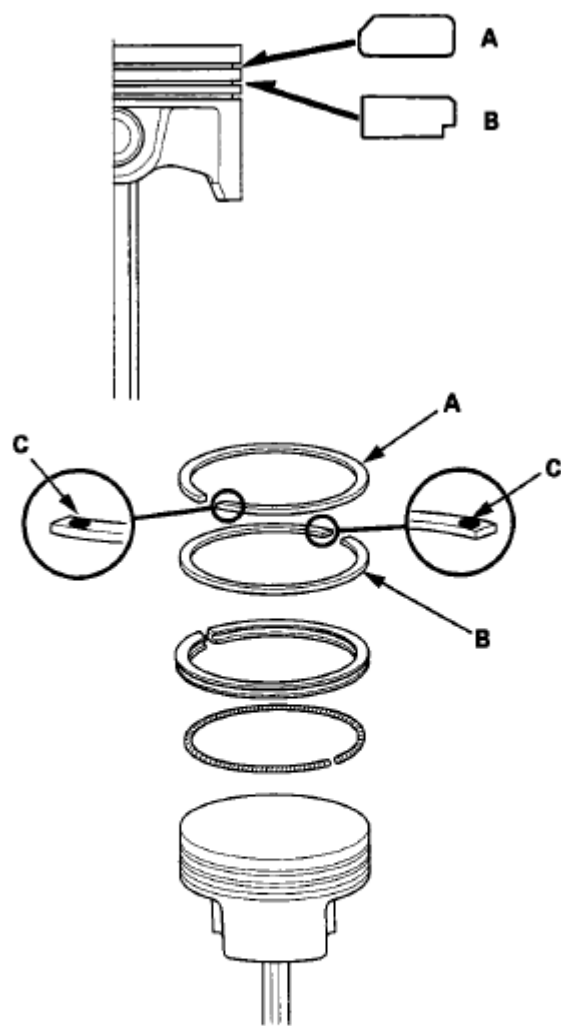
Service Limit: 0.70 mm (0.0276 in)

Oil Ring:

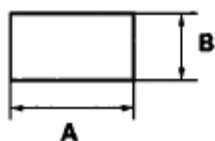
Standard (New): 0.20-0.70 mm (0.0079-0.0276 in)

Service Limit: 0.80 mm (0.0315 in)

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



Piston Ring Dimensions:



Top Ring (Standard)

A: 3.1 mm (0.122 in)

B: 1.2 mm (0.047 in)

Second Ring (Standard)

A: 3.4 mm (0.134 in)

B: 1.2 mm (0.047 in)

Fig. 44: Installing Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Top Ring Clearance

Standard (New): 0.055-0.085 mm (0.00217-0.00335 in)

Service Limit: 0.15 mm (0.0059 in)

Second Ring Clearance

Standard (New): 0.030-0.060 mm (0.00118-0.00236 in)

Service Limit: 0.13 mm (0.0051 in)

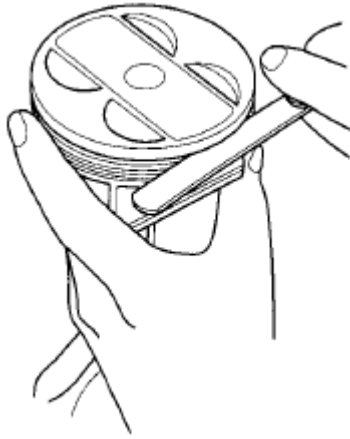


Fig. 45: Inspecting Top Ring Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

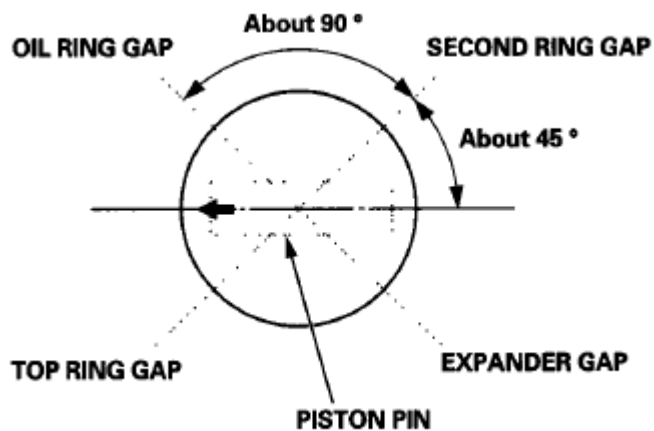


Fig. 46: Positioning Ring End Gaps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CRANKSHAFT AND PISTON INSTALLATION

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Driver Attachment, 106 mm 07OAD-RCAA200

1. Check the main bearing clearance with plastigage (see **CRANKSHAFT MAIN BEARING REPLACEMENT**).
2. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
3. Install the bearing halves in the engine block and the connecting rods.
4. Apply new engine oil to the inside of the main bearings and the connecting rod bearings.
5. Install the CKP pulse plate to the crankshaft (see **CKP PULSE PLATE REPLACEMENT**).
6. Lower the crankshaft (A) into the engine block, being careful not to damage the journals and the CKP pulse plate (B).

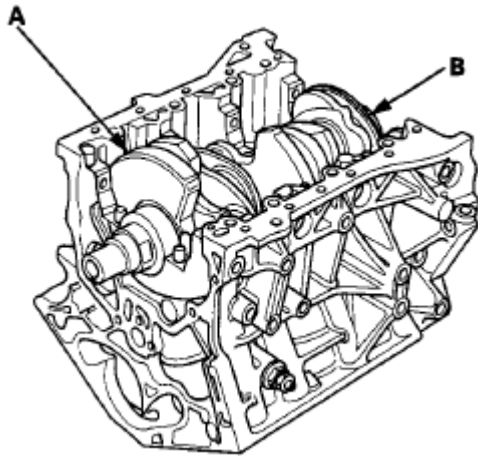


Fig. 47: Identifying Crankshaft And CKP Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

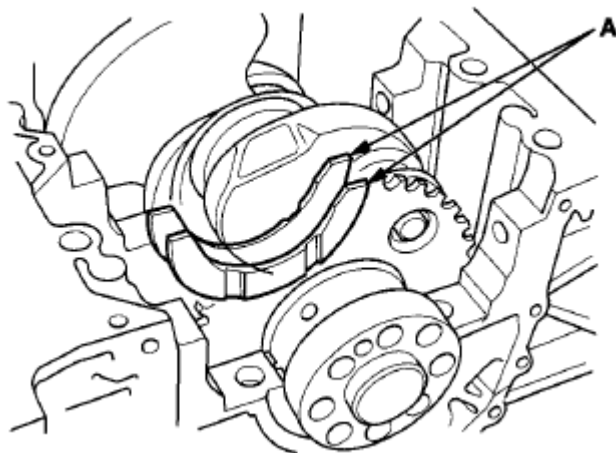


Fig. 48: Identifying Thrust Washers

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

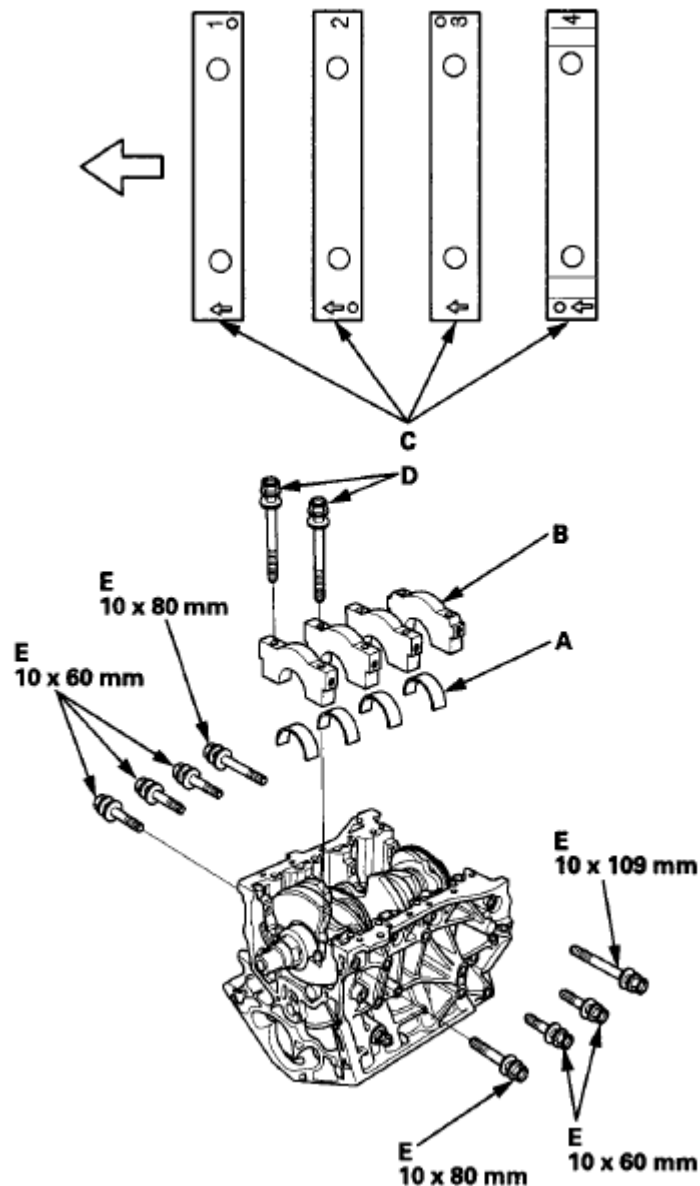


Fig. 49: Installing Main Bearings And Main Bearing Caps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Apply new engine oil to the bolt threads and flanges, then loosely install the bearing cap bolts (D) and the bearing cap side bolts (E).
10. Set the crankshaft to bottom dead center (BDC) for the cylinder you are installing the piston in.
11. Apply new engine oil to the piston, the inside of the ring compressor, and the cylinder bore.
12. Attach the ring compressor to the piston/connecting rod assembly, and check that the bearing is securely

in place.

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

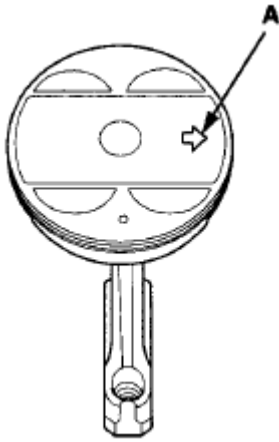


Fig. 50: Positioning Piston/Connecting Rod Assembly With Arrow Facing Timing Belt Side Of Engine Block

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

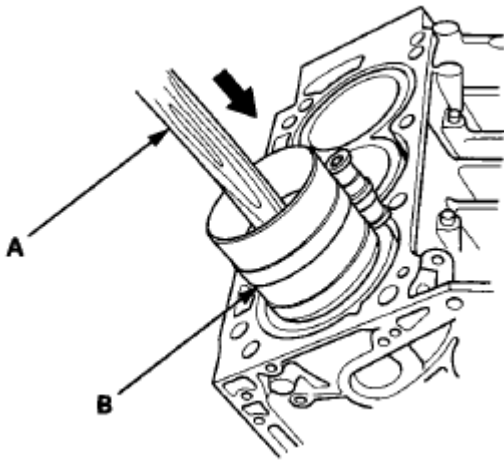


Fig. 51: Positioning Piston/Connecting Rod Assembly In Cylinder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.
16. Measure the diameter of each connecting rod bolt at point A and point B.

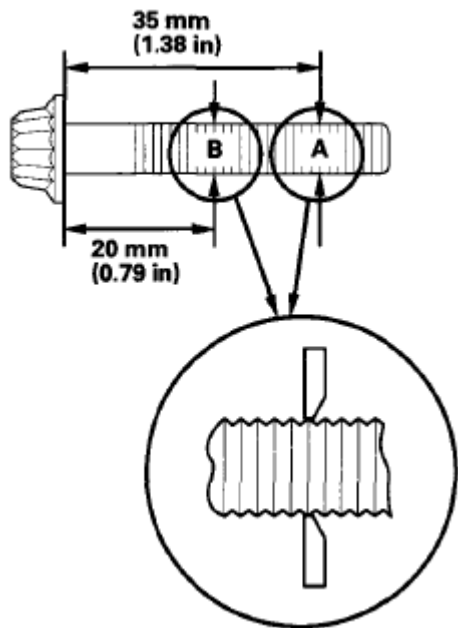


Fig. 52: Measuring Diameter Of Each Connecting Rod Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Point A-Point B = Difference in Diameter

Difference in Diameter

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

18. If the difference in diameter is out of tolerance, replace the connecting rod bolt.
19. Install the connecting rod bearing (A), then line up the mark (B) on the connecting rod (C) and the cap (D).

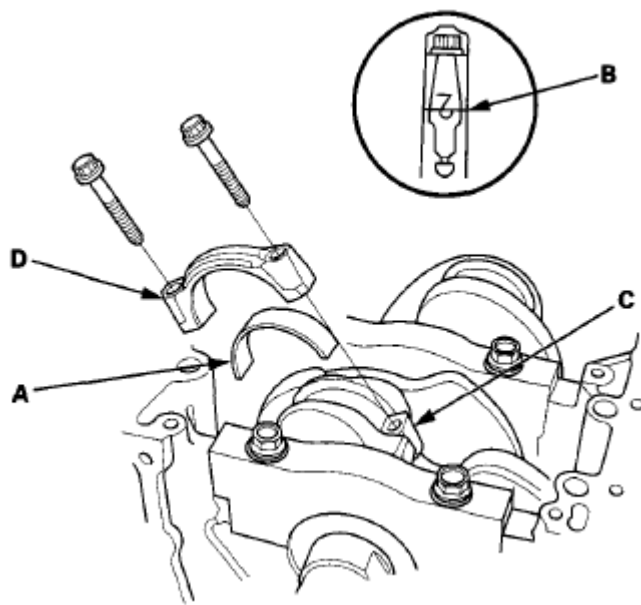


Fig. 53: Installing Connecting Rod Bearing

Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Apply new engine oil to the bolt threads and flanges. Torque the bolts (B) to 20 N.m (2.0 kgf.m, 14 lbf.ft).
21. Tighten the connecting rod bolt an additional 90 °.

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

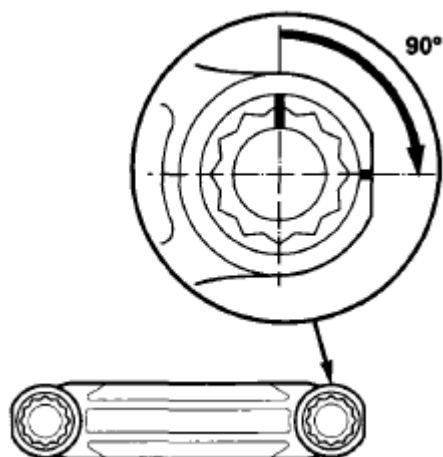


Fig. 54: Identifying Connecting Rod Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Tighten the main bearing cap bolts, then tighten the main bearing cap side bolts to the specified torque in

the sequence as shown. Repeat the torque sequence again to ensure the bolts are properly torqued.

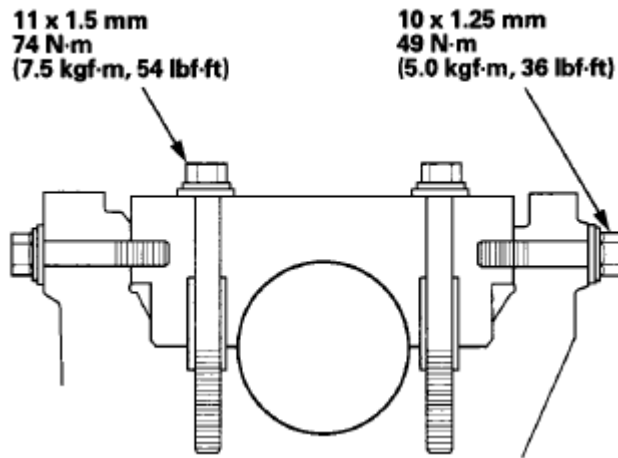


Fig. 55: Identifying Main Bearing Cap Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

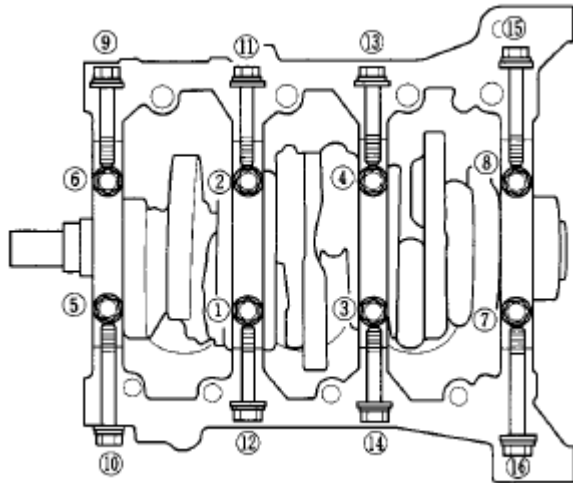


Fig. 56: Identifying Main Bearing Cap Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Remove all of the old liquid gasket from the engine block end cover mating surfaces, the bolts, and the bolt holes.
24. Clean and dry the engine block end cover mating surfaces and the crankshaft oil seal housing.
25. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
26. Using the driver handle, 15 x 135L and the oil seal driver attachment, 106 mm, drive in the new crankshaft oil seal (A) until the oil seal driver attachment bottoms on the engine block end cover.

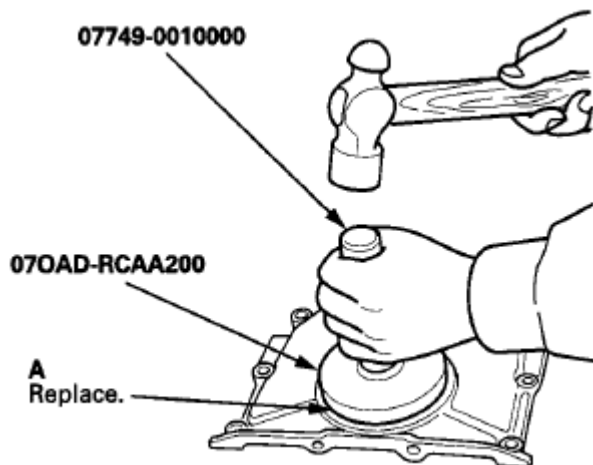


Fig. 57: Driving In New Crankshaft Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE:

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

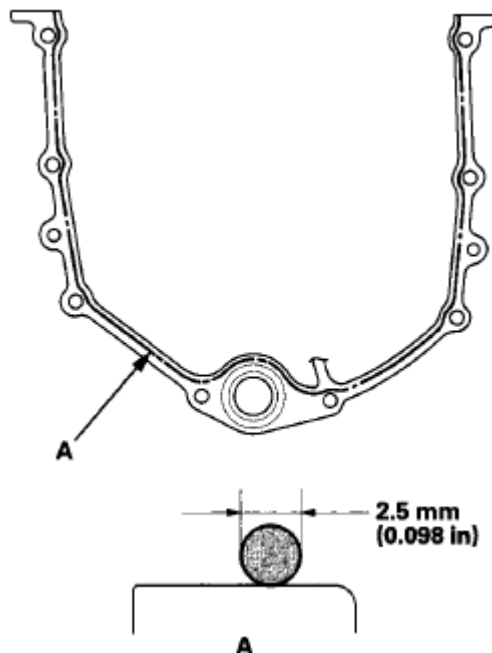


Fig. 58: Applying Bead Of Liquid Gasket Along Broken Line
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE:

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

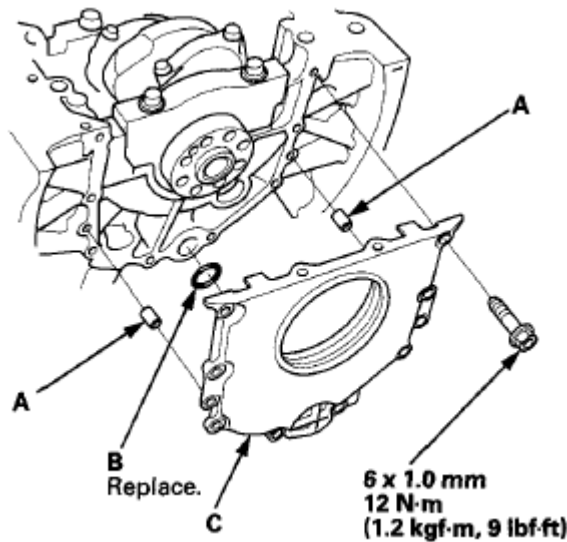


Fig. 59: Installing Dowel Pins, New O-Ring And Engine Block End Cover On Engine Block With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Clean the excess oil off the crankshaft, and check that the oil seal lip is not distorted.
30. Install a new crankshaft oil seal in the oil pump (see step 3 on **INSTALLATION**).
31. Remove all of the old liquid gasket from the oil pump mating surfaces, bolts, and bolt holes.
32. Clean and dry the oil pump mating surfaces.
33. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the engine block mating surface of the oil pump and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If you apply liquid gasket P/N 087178-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

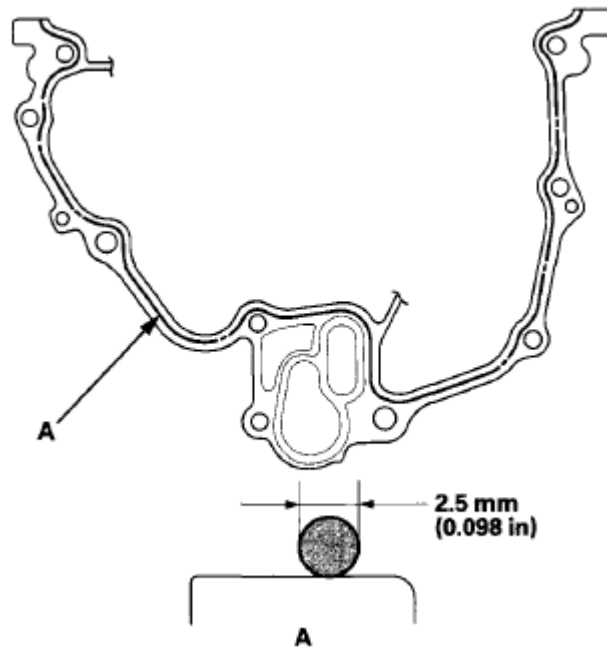


Fig. 60: Applying Bead Of Liquid Gasket Along Broken Line
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

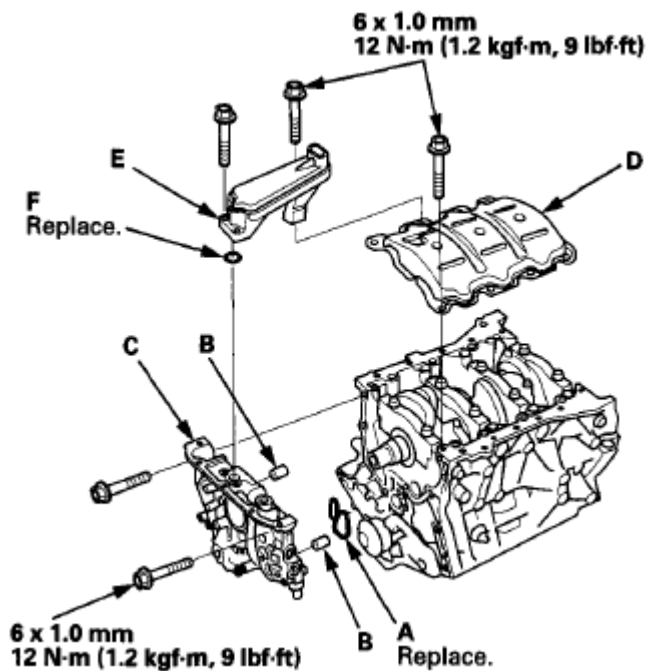


Fig. 61: Identifying Crankshaft Oil Seal And New O-Ring With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

35. Install the dowel pins (B), then align the inner rotor with the crankshaft, and install the oil pump (C).

NOTE:

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

36. Clean the excess oil off the crankshaft, and check that the oil seal lip is not distorted.
37. Install the baffle plate (D), then install the oil strainer (E) with the new O-ring (F).
38. Install the rocker arm oil control solenoid/oil filter assembly (A), with a new rocker arm oil control solenoid filter (B).

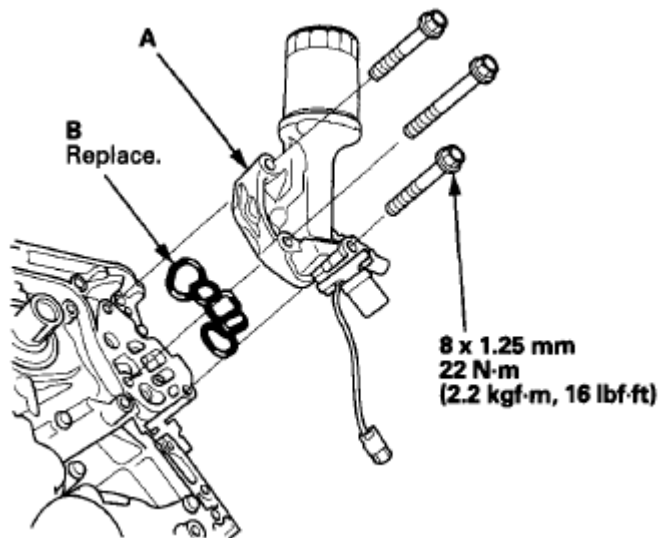


Fig. 62: Installing Rocker Arm Oil Control Solenoid/Oil Filter Assembly, Solenoid Filter With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

39. Install the oil pan (see CKP PULSE PLATE REPLACEMENT).
40. Install the timing belt drive pulley to the crankshaft (see TIMING BELT DRIVE PULLEY REPLACEMENT).
41. Install the cylinder heads (see CYLINDER HEAD INSTALLATION).
42. Install the drive plate (see DRIVE PLATE REMOVAL AND INSTALLATION).
43. Install the transmission (see TRANSMISSION INSTALLATION).
44. Install the engine/transmission (see ENGINE INSTALLATION).

NOTE:

When any crankshaft or connecting rod bearing is replaced, after assembly it is necessary to run the engine at idling speed until it reaches normal operating temperature, then continue to run it for about 15 minutes.

CKP PULSE PLATE REPLACEMENT

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

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

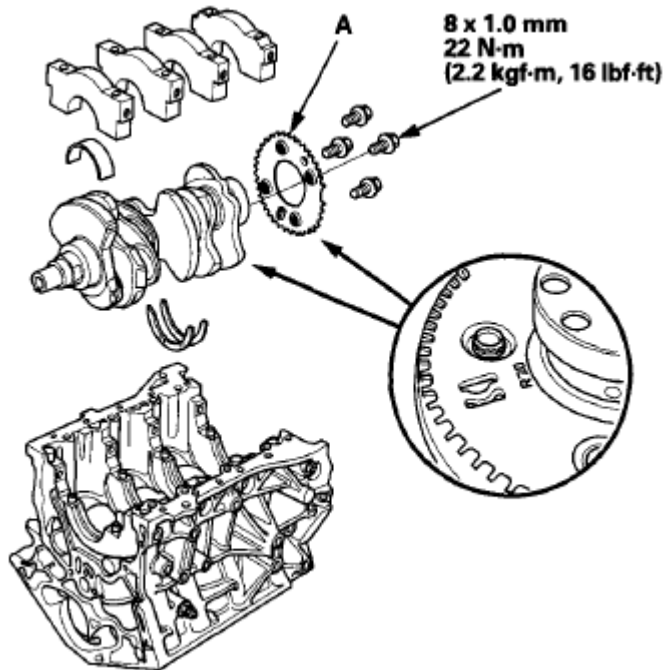


Fig. 63: Removing CKP Pulse Plate From Crankshaft With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE: When installing the crankshaft, refer to the CRANKSHAFT AND PISTON INSTALLATION PROCEDURE .

OIL PAN INSTALLATION

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

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.

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

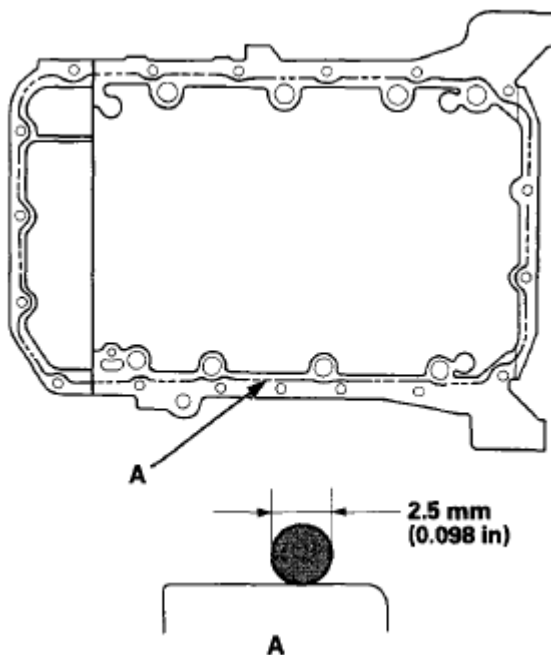


Fig. 64: Applying Bead Of Liquid Gasket Along Broken Line
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan on the engine block.
5. Tighten the bolts in three steps. In the final step, tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 9 lbf.ft).

NOTE:

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

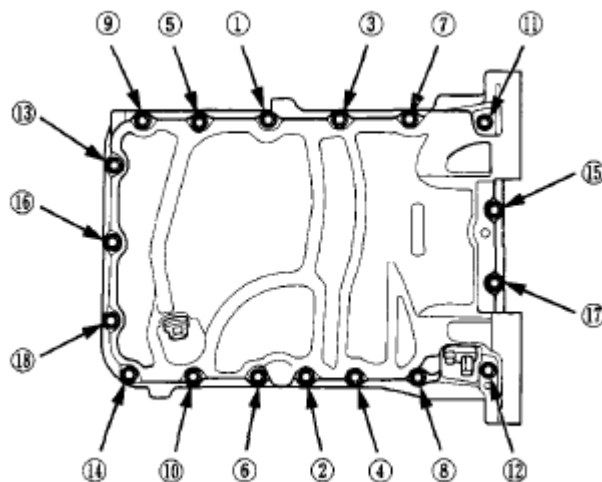


Fig. 65: Identifying Bolts Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

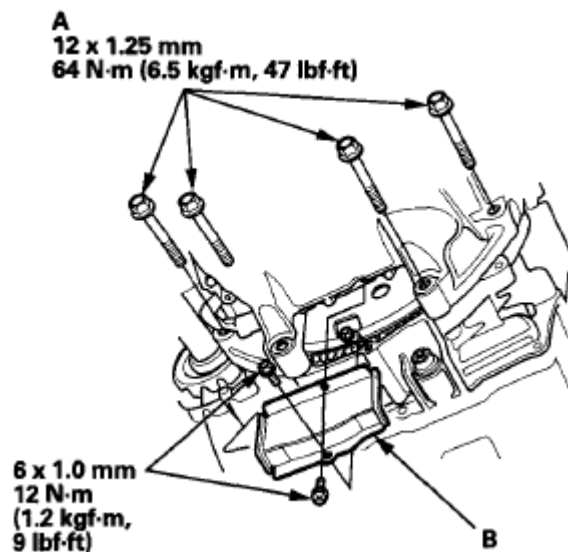


Fig. 66: Installing Torque Converter Case Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

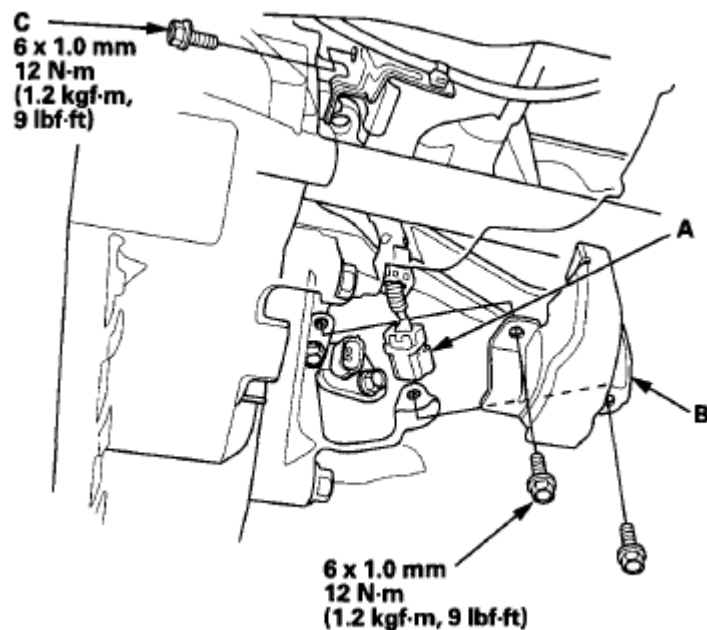


Fig. 67: Connecting CKP Sensor Connector With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the rear WU-TWC bracket.

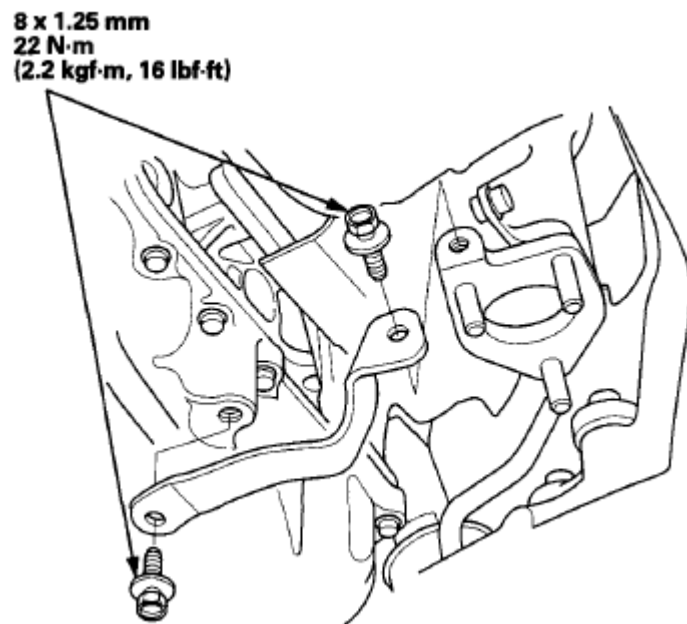


Fig. 68: Installing Rear WU-TWC Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If the engine is still in the vehicle, do the following steps.
10. Install exhaust pipe A, using new gaskets and new self-locking nuts (see **EXHAUST PIPE AND MUFFLER REPLACEMENT**).

11. Install the splash shield (see **SPLASH SHIELD REPLACEMENT**).
12. Lower the vehicle on the lift.
13. Refill the engine with oil (see **ENGINE OIL REPLACEMENT**).

PULLEY END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

Oil Seal Driver, 64 mm 07OAD-RCAA100

1. Remove the timing belt drive pulley (see **TIMING BELT DRIVE PULLEY REPLACEMENT**).
2. Remove the pulley end crankshaft oil seal.
3. Clean and dry the crankshaft oil seal housing.
4. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
5. Using the oil seal driver, 64 mm drive in the new crankshaft oil seal (A) until the driver bottoms against the oil pump.

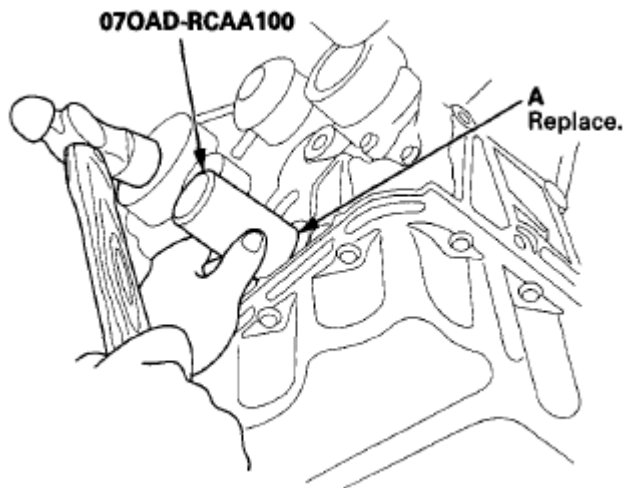


Fig. 69: Driving In New Crankshaft Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Clean the excess oil off the crankshaft, and check that the oil seal lip is not distorted.
7. Install the timing belt drive pulley and the timing belt (see **TIMING BELT DRIVE PULLEY REPLACEMENT**).

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Driver Attachment, 106 mm 07OAD-RCAA200

1. Remove the transmission (see **TRANSMISSION REMOVAL**) and the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
2. Remove the transmission end crankshaft oil seal.
3. Clean and dry the crankshaft oil seal housing.
4. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
5. Using the driver handle, 15 x 135L and the driver attachment, 106 mm, drive in the new crankshaft oil seal (A) until the driver attachment bottoms on the engine block end cover. Align the hole in the driver attachment with the pin on the crankshaft.

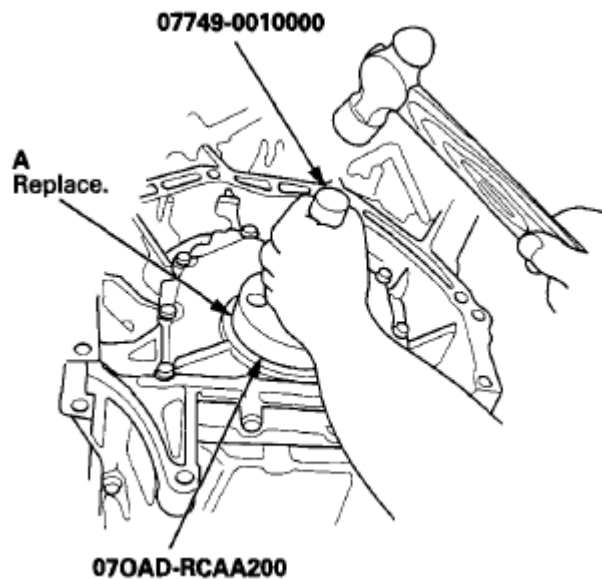


Fig. 70: Aligning Hole In Driver Attachment With Pin On Crankshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Clean the excess oil off the crankshaft, and check that the oil seal lip is not distorted.
7. Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**), and the transmission (see **TRANSMISSION INSTALLATION**).

SEALING BOLT INSTALLATION

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

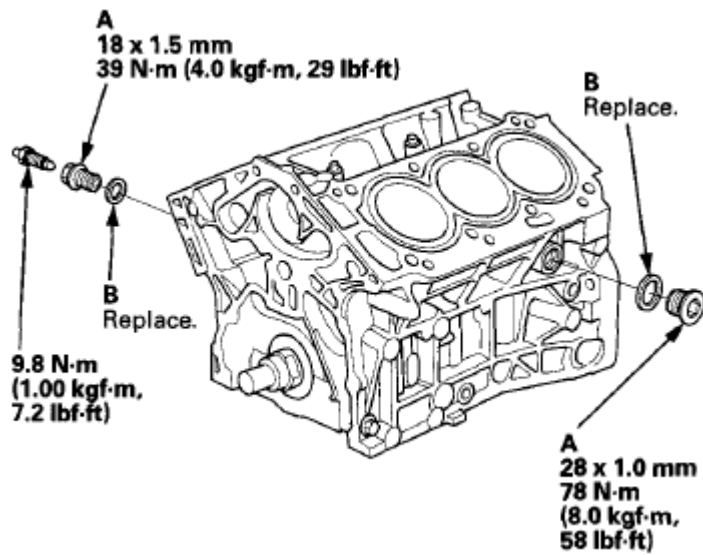


Fig. 71: Identifying Sealing Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.