

2007 Acura RL

2005-08 ENGINE Cylinder Head - RL

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Cylinder Head - RL

SPECIAL TOOLS

Ref. No.	Tool Number	Description	Qty
①	07AAB-RJAA100	Crankshaft Pulley Holder	1
②	07AAJ-PNAA101	Air Pressure Regulator	1
③	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
④	07JAA-001020A	Socket, 19 mm	1
⑤	07JAB-001020A	Holder Handle	1
⑥	07PAD-0010000	Stem Seal Driver	1
⑦	07VAJ-P8A010A	VTEC Air Adapter	1
⑧	070AJ-0030100	VTEC Air Stopper	1
⑨	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑩	07757-PJ1010A	Valve Spring Compressor Attachment	1

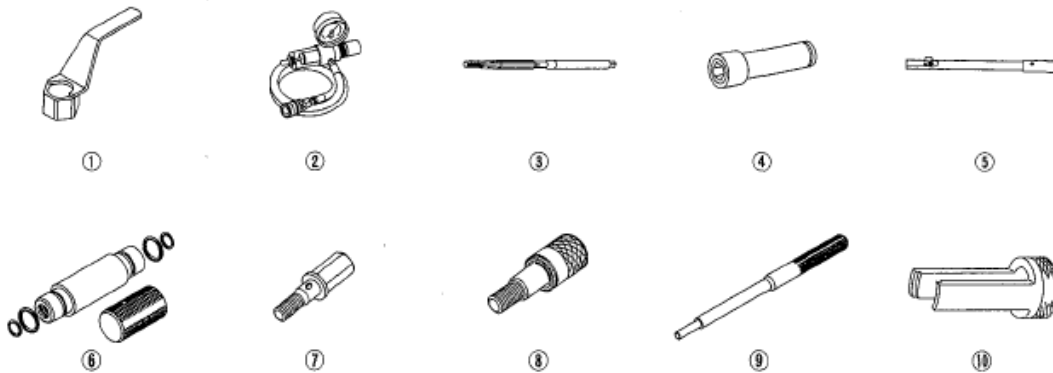


Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

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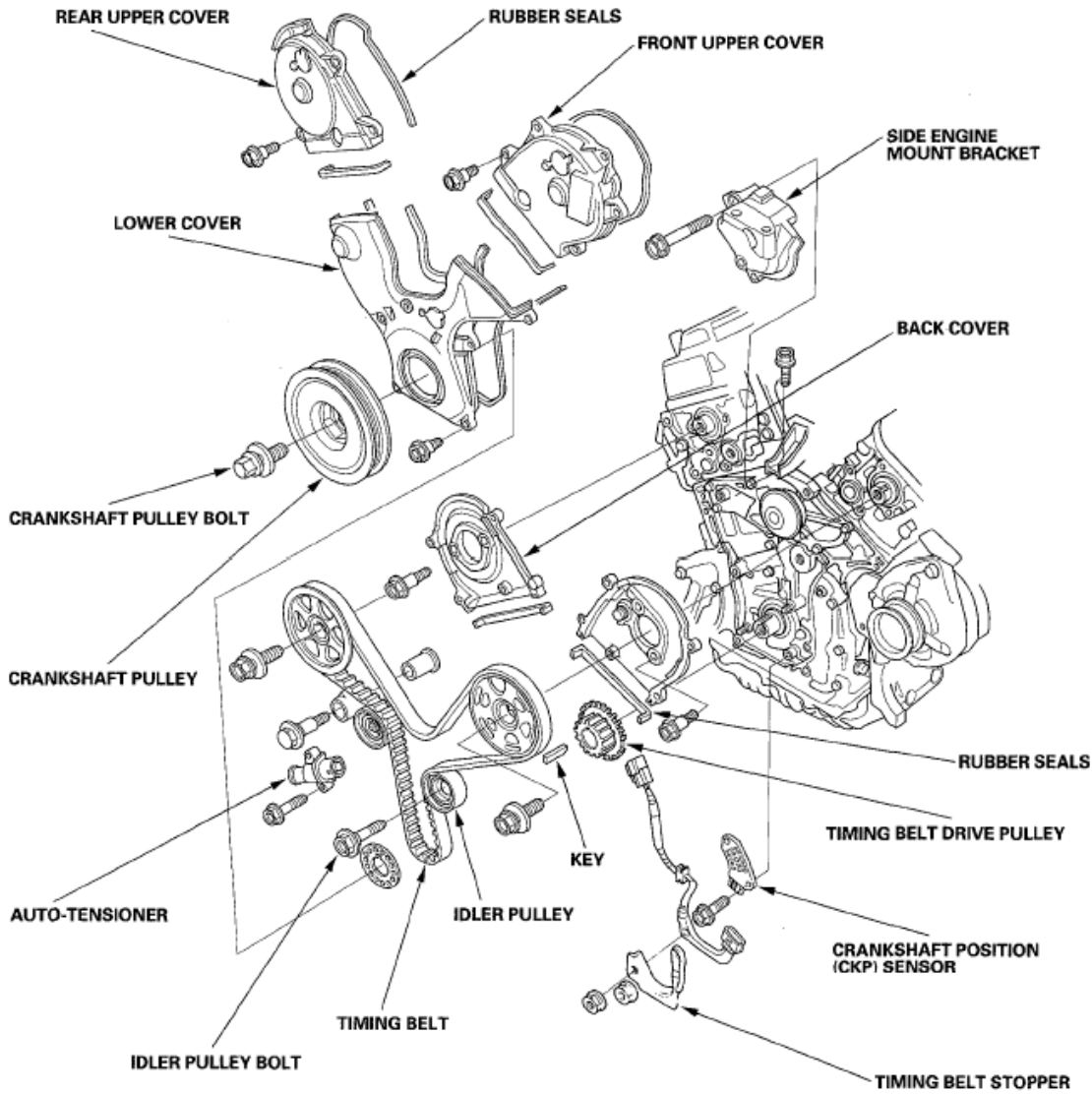


Fig. 2: Identifying Engine Assembly Components Location (1 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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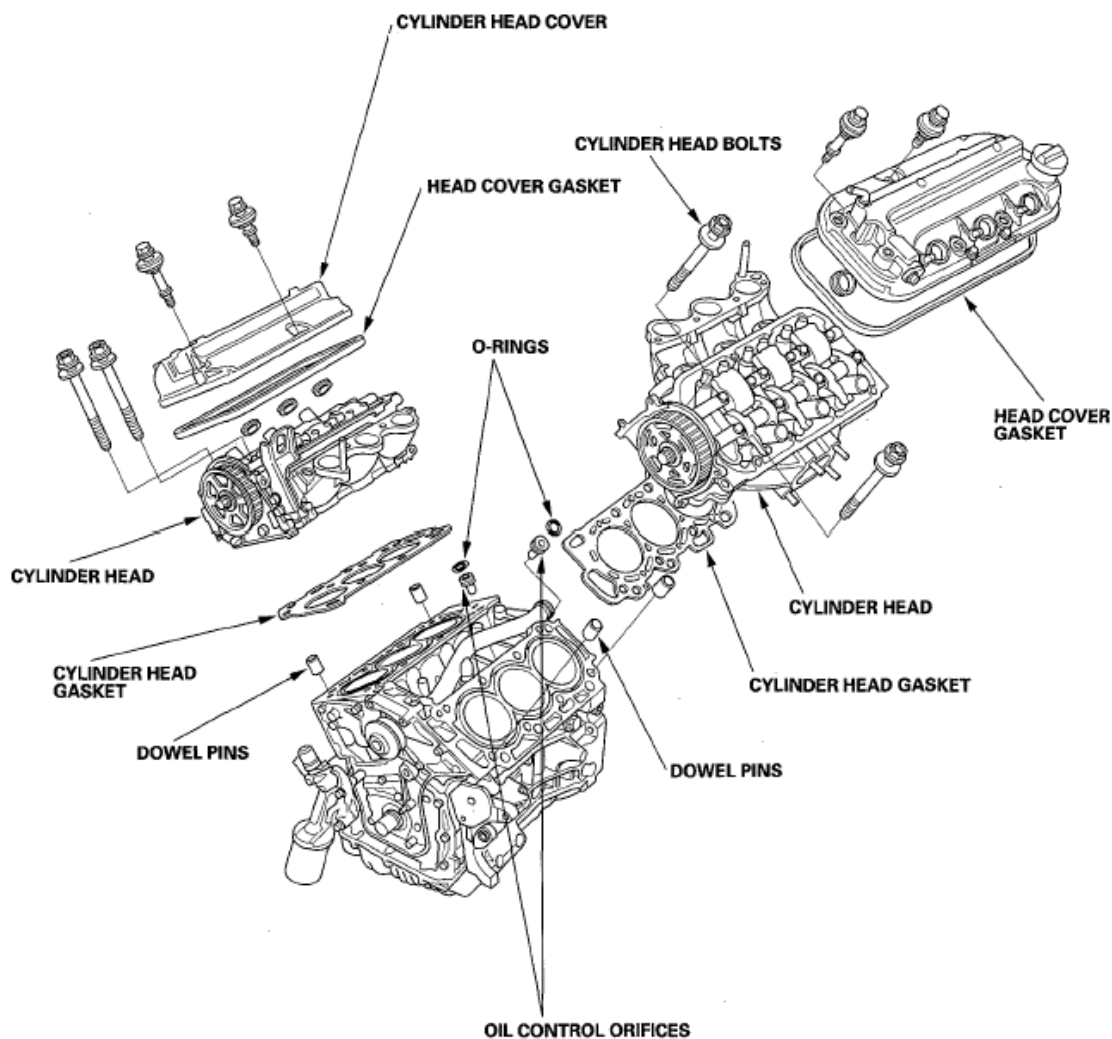


Fig. 3: Identifying Engine Assembly Components Location (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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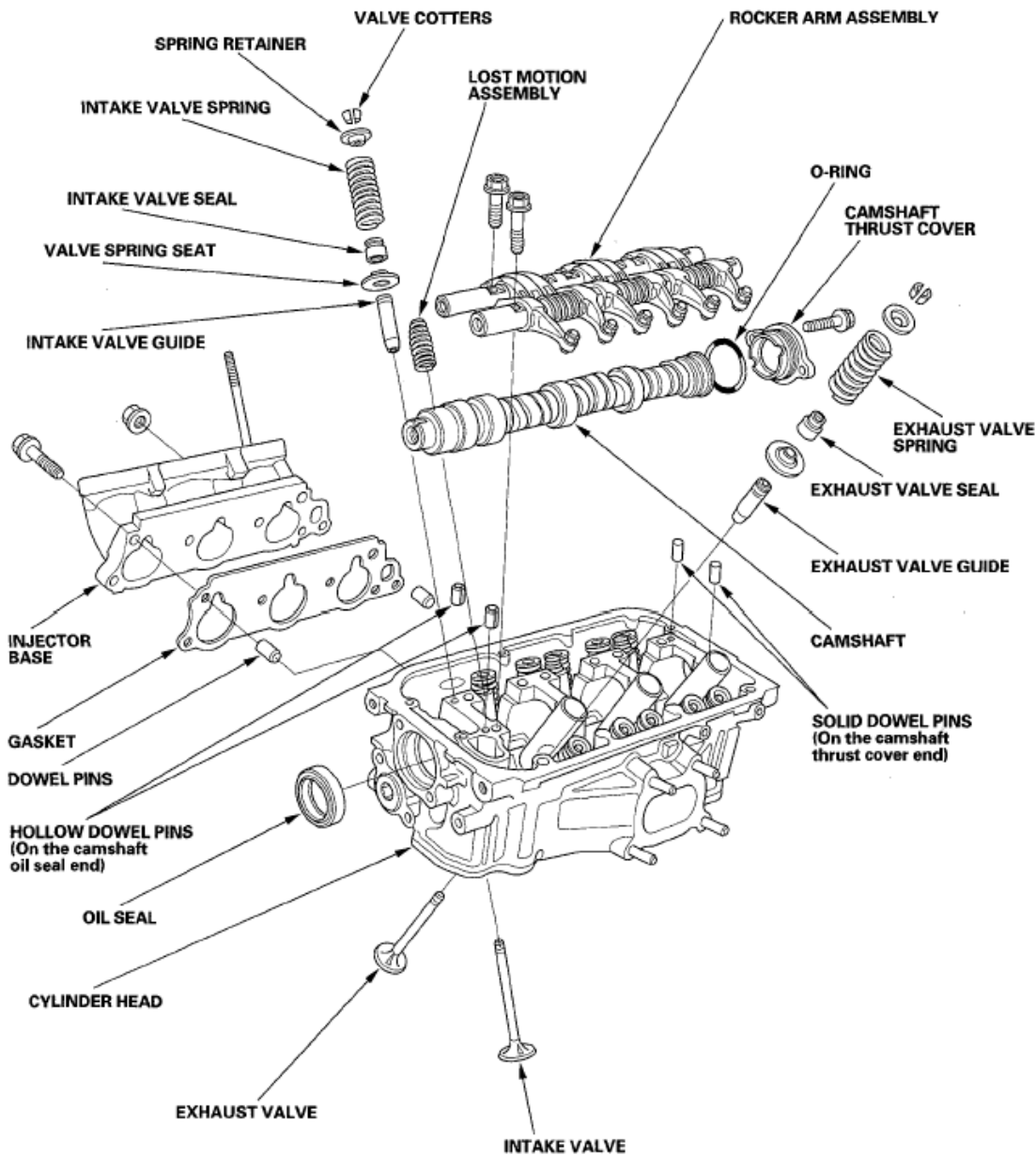


Fig. 4: Identifying Engine Assembly Components Location (3 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the powertrain control module (PCM). Otherwise, the PCM will continue to stop the fuel injectors from functioning. Select PCM reset using the Honda Diagnostic System (HDS).

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch OFF.
3. Connect the HDS to the data link connector (DLC) (see step 2 under **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)**).

4. Turn the ignition switch ON (II), and select PGM-FI, INSPECTION, then ALL INJECTORS OFF on the HDS.
5. Remove the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
6. Remove the six spark plugs.
7. Attach the compression gauge to the spark plug hole.

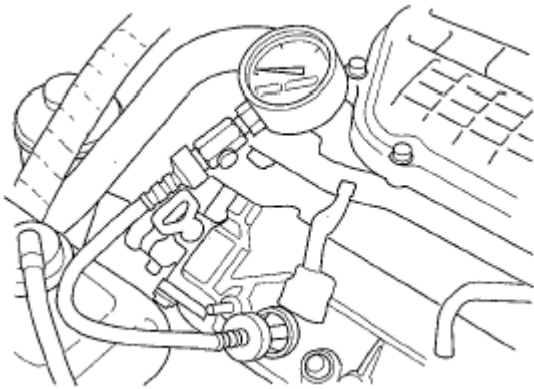


Fig. 5: Checking Engine Compression
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Compression Pressure:

Above 930 kPa (9.5 kgf/cm² , 135 psi)

9. Measure the compression on the remaining cylinders.

Maximum Variation:

Within 200 kPa (2.0 kgf/cm² , 28 psi)

10. If the compression is not within specifications, check the following items, then remeasure the compression.
 - Damaged or worn valves and seats
 - Damaged cylinder head gasket
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore
11. Select PCM reset (see **PCM RESET**) to cancel the ALL INJECTORS OFF function on the HDS.

VTEC ROCKER ARM TEST

Special Tools Required

- VTEC air adapter 07VAJ-P8A010A
- VTEC air stopper 070AJ-0030100

- Air pressure regulator 07AAJ-PNAA101

1. Start the engine and let it run for 5 minutes, then turn OFF the ignition switch.
2. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
3. Set the No. 1 piston at top dead center (TDC) (see step 3).
4. Push on the intake mid rocker arm (A) for the No. 1 cylinder. The mid rocker arm should move independently of the primary rocker arm (B) and secondary rocker arm (C).
 - If the mid rocker arm moves freely, go to step 5.
 - If the intake mid rocker arm does not move, remove the mid, primary, and secondary intake rocker arms as an assembly, then check that the pistons in the mid and primary rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, then retest.

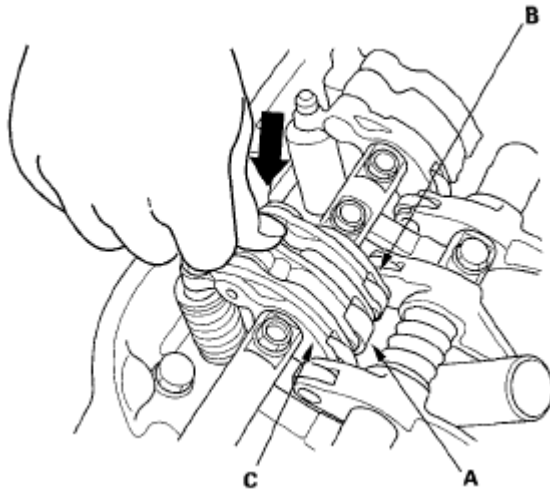


Fig. 6: Pushing On Intake Mid Rocker Arm
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat step 4 on the remaining intake mid rocker arms with each piston at TDC. When all the mid rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 690 kPa (7.0 kg/cm², 100 psi).
7. Inspect the valve clearance (see step 4).
8. Remove the No. 1 and No. 6 intake rocker shaft mounting bolts, then install and connect the air pressure regulator, VTEC air adapter, and VTEC air stopper as shown.

FRONT

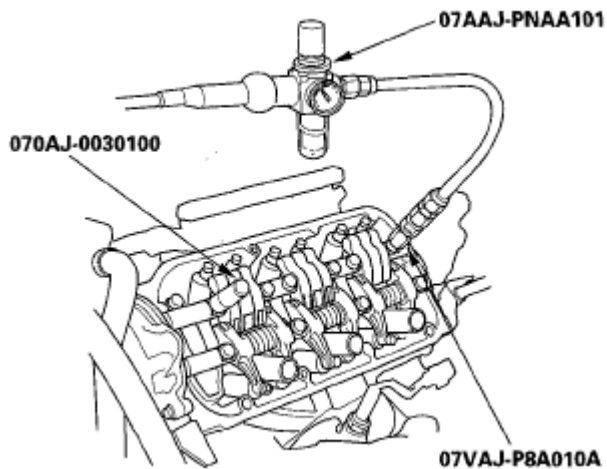


Fig. 7: Identifying Air Pressure Regulator, VTEC Air Adapter And VTEC Air Stopper (Front)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

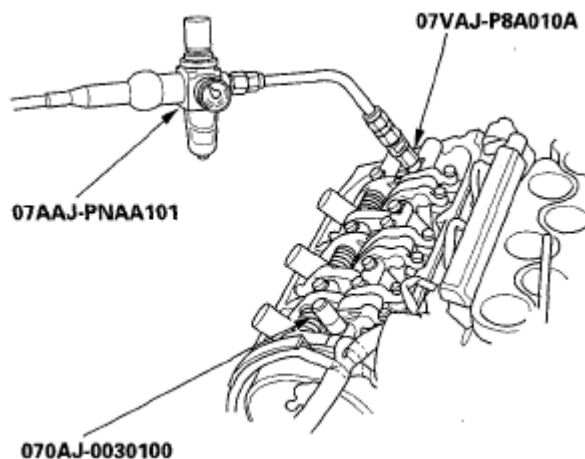


Fig. 8: Identifying Air Pressure Regulator, VTEC Air Adapter And VTEC Air Stopper (Rear)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Air Pressure:

440-540 kPa (4.5-5.5 kgf/cm² , 64-78 psi)

NOTE: If the synchronizing pistons do not move after applying air pressure, move the primary or secondary rocker arm up and down manually.

10. Make sure that the intake primary rocker arm (A) and intake secondary rocker arm (B) are mechanically connected by the piston and that the mid rocker arm (C) does not move when pushed manually. If any intake mid rocker arm moves independently of the primary and secondary rocker arms, replace the rocker arms as a set.

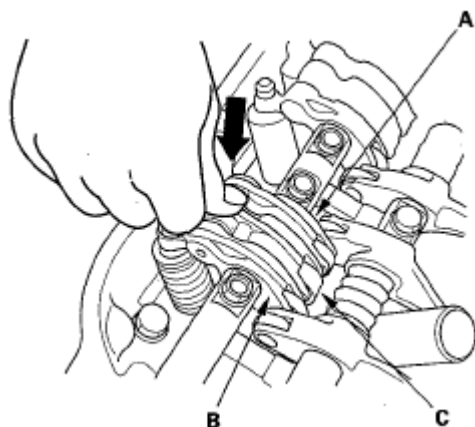


Fig. 9: Inspecting Rocker Arm Function

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the air pressure regulator, VTEC air adapter, and VTEC air stopper.
12. Tighten the rocker shaft bolts to 24 N.m (2.4 kgf.m, 17 lbf.ft)
13. Install the cylinder head covers (see **CYLINDER HEAD COVER INSTALLATION**).

VALVE CLEARANCE ADJUSTMENT

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

1. Remove the right upper fender trim (see step 1).
2. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
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.

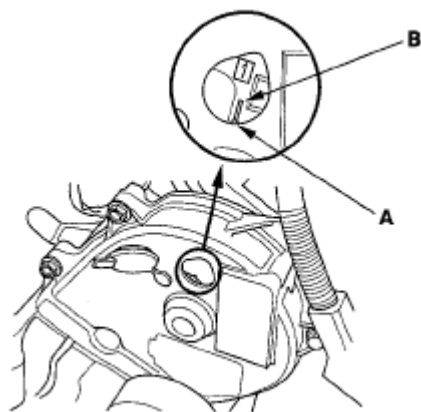


Fig. 10: Aligning Front Upper Cover Pointer With Piston 1 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Clearance

Intake: 0.20-0.24 mm (0.008-0.009 in.)

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

REAR

Intake: 0.20—0.24 mm (0.008—0.009 in.)

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

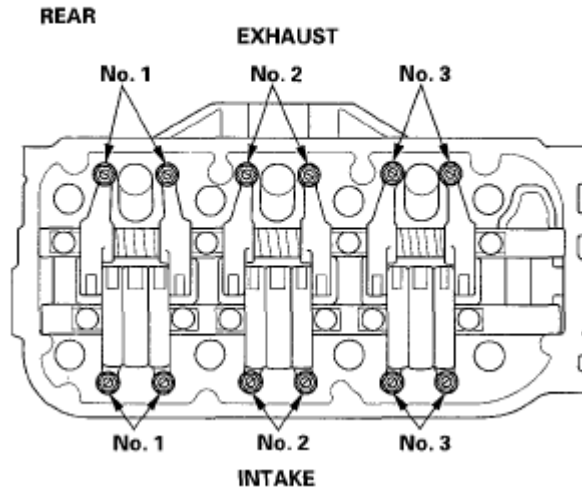


Fig. 11: Identifying Valves (Rear Head)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

FRONT

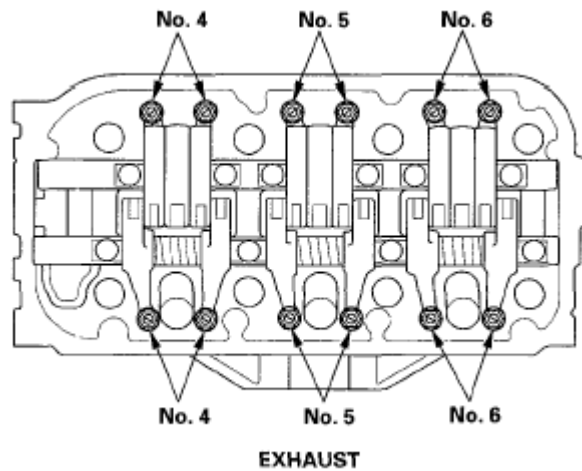


Fig. 12: Identifying Valves (Front Head)

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 No. 1 cylinder and slide it back and forth; you should feel a slight amount of drag.

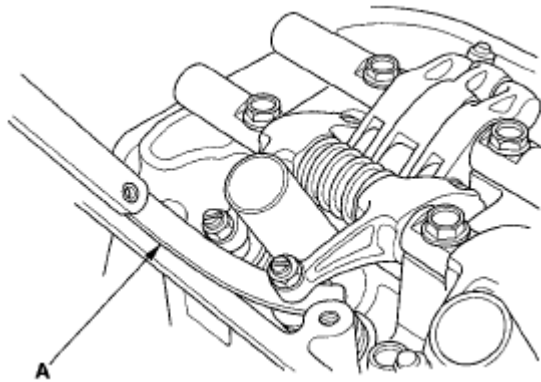


Fig. 13: Checking Valve Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

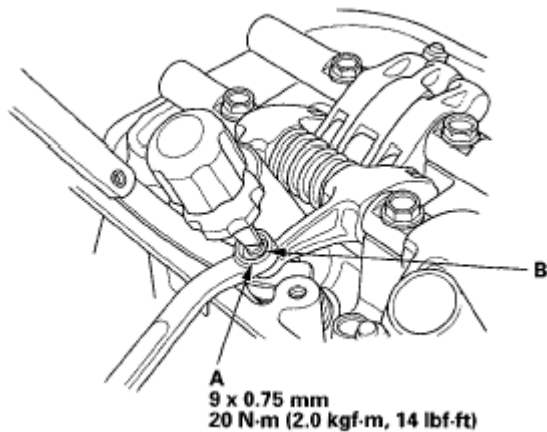


Fig. 14: Adjusting Valve Clearance

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the locknut and recheck the clearance. Repeat the adjustment, if necessary.
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.

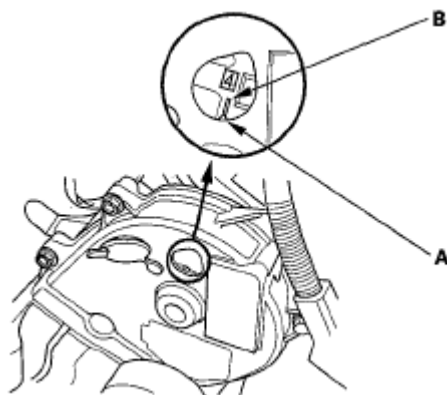


Fig. 15: Aligning Front Upper Cover Pointer With Piston 4 TDC Mark On Front Camshaft

Pulley**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

9. Check and, if necessary, adjust the valve clearance on 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.

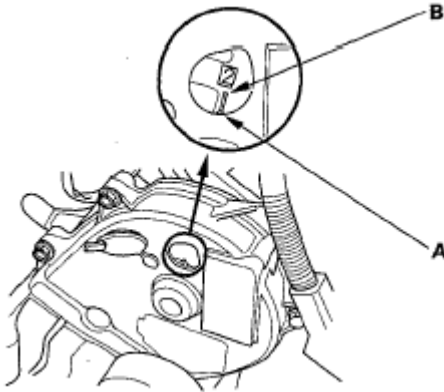


Fig. 16: Aligning Front Upper Cover Pointer With Piston 2 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Check and, if necessary, adjust the valve clearance on 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.

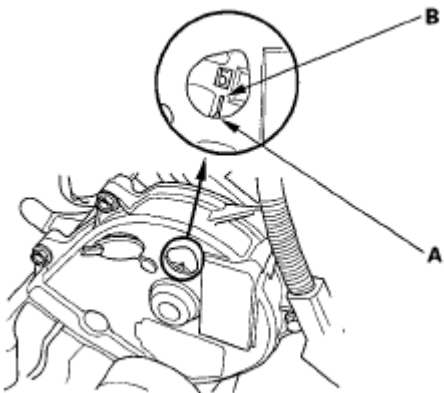


Fig. 17: Aligning Front Upper Cover Pointer With Piston 5 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Check and, if necessary, adjust the valve clearance on 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.

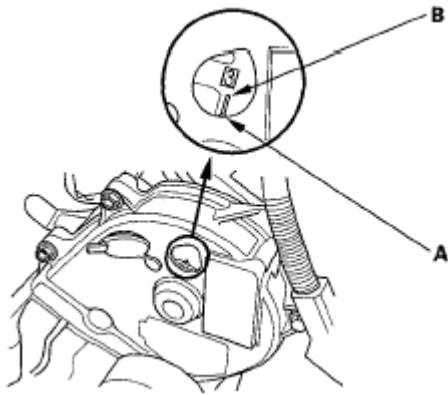


Fig. 18: Aligning Front Upper Cover Pointer With Piston 3 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Check and, if necessary, adjust the valve clearance on 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.

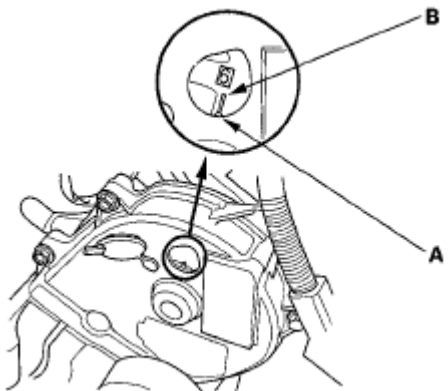


Fig. 19: Aligning Front Upper Cover Pointer With Piston 6 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Check and, if necessary, adjust the valve clearance on No. 6 cylinder.
18. Install the cylinder head covers (see **CYLINDER HEAD COVER INSTALLATION**).
19. Install the right upper fender trim.

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

Special Tools Required

- Holder handle 07JAB-001020A
- Crankshaft pulley holder 07AAB-RJAA100
- Socket, 19 mm 07JAA-001020A, or a commercially available 19 mm socket

REMOVAL

1. Remove the right front wheel.
2. Remove the splash shield.

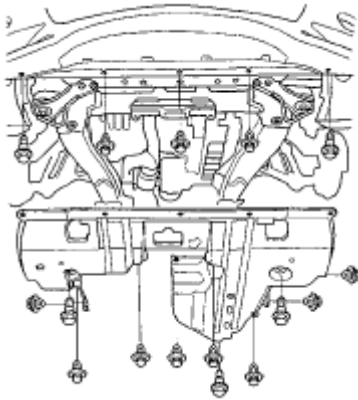


Fig. 20: Identifying Splash Shield
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
4. Hold the pulley with the holder handle (A) and holder attachment (B).

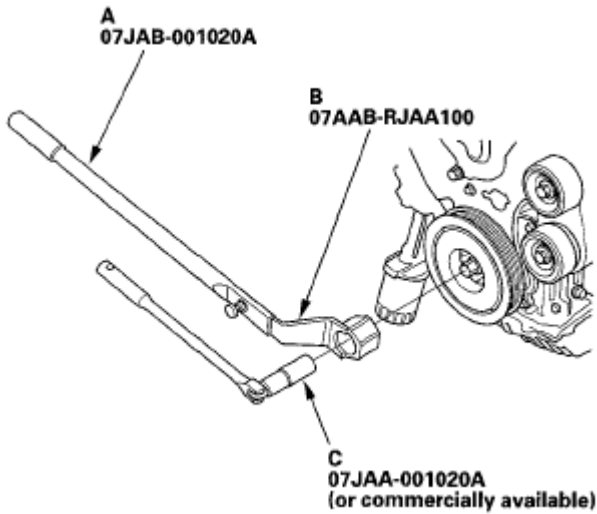


Fig. 21: Identifying Holder Handle And Holder Attachment
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

INSTALLATION

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

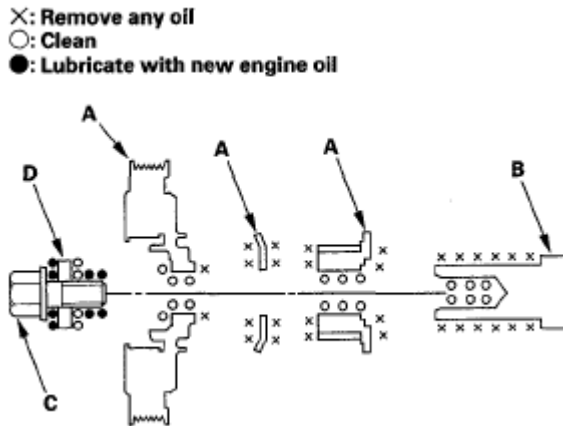


Fig. 22: Identifying Cleaning Areas Of Pulleys And Crankshaft
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and tighten the bolt. Do not use an impact wrench.
 1. Hold the pulley with the holder handle (A) and holder attachment (B), then torque the bolt to 64 N.m (6.5 kgf.m, 47 lbf.ft) with a torque wrench and 19 mm socket (C).
 2. Mark the bolt head (D) and crankshaft pulley (E) as shown, then tighten the bolt an additional 60° (The mark on the bolt head lines up with the mark on the crankshaft pulley).

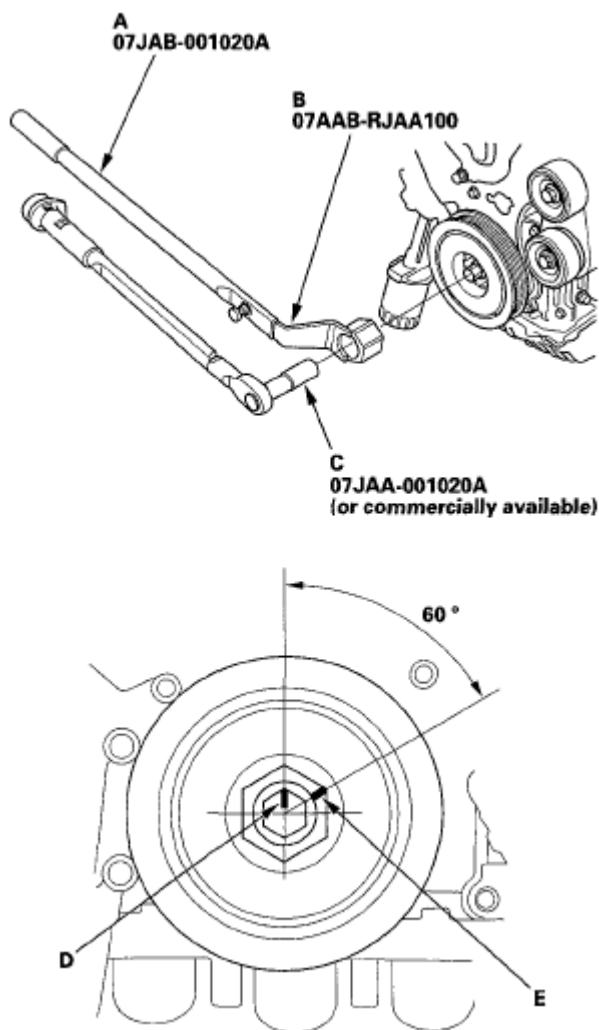


Fig. 23: Installing Crankshaft Pulley And Tightening Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

TIMING BELT INSPECTION

1. Remove the right upper fender trim.

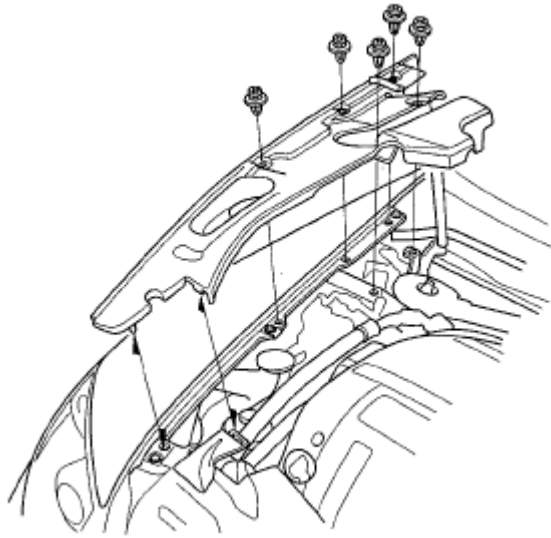


Fig. 24: Identifying Right Upper Fender Trim
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
3. Remove the front upper cover.

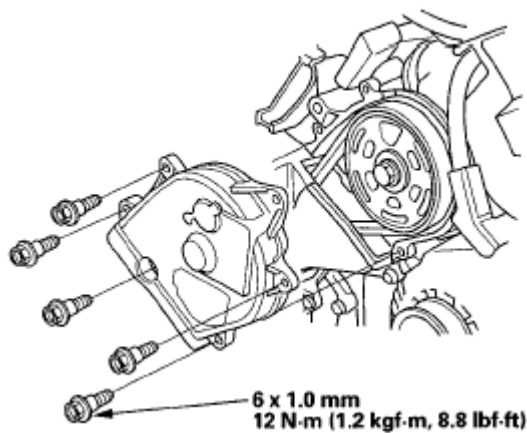


Fig. 25: Identifying Front Upper Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Inspect the timing belt for cracks and oil or coolant soaking. Replace the belt if it is cracked or soaked. Remove any oil or solvent that gets on the belt.

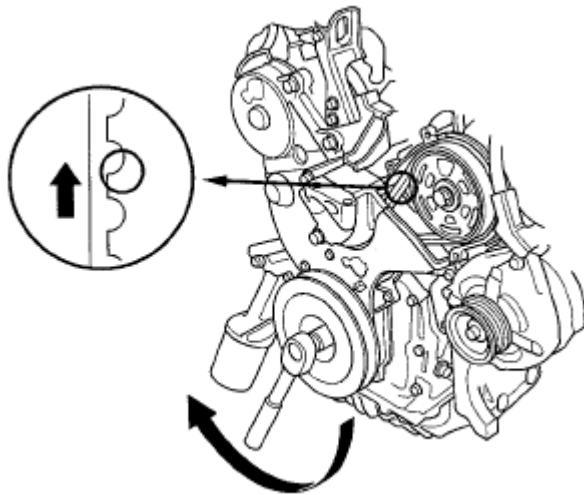


Fig. 26: Inspecting Timing Belt For Cracks And Oil Or Coolant Soaking
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT REMOVAL

1. Remove the right upper fender trim (see step 1).
2. Turn the crankshaft so its white mark (A) lines up with the pointer (B).

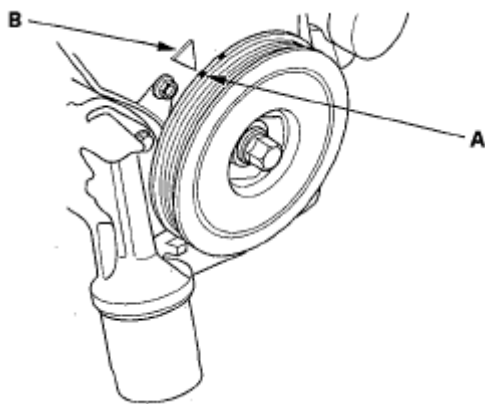


Fig. 27: Identifying White Mark On Crankshaft Pulley
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

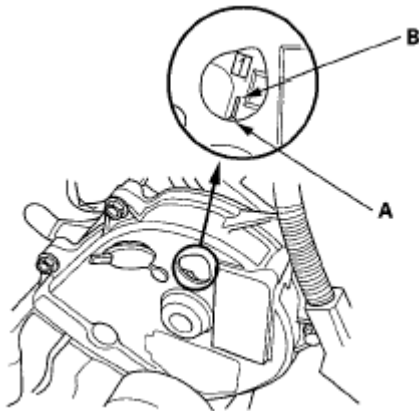


Fig. 28: Aligning Front Upper Cover Pointer With Piston 1 TDC Mark On Front Camshaft Pulley

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the right front wheel.
5. Remove the splash shield.

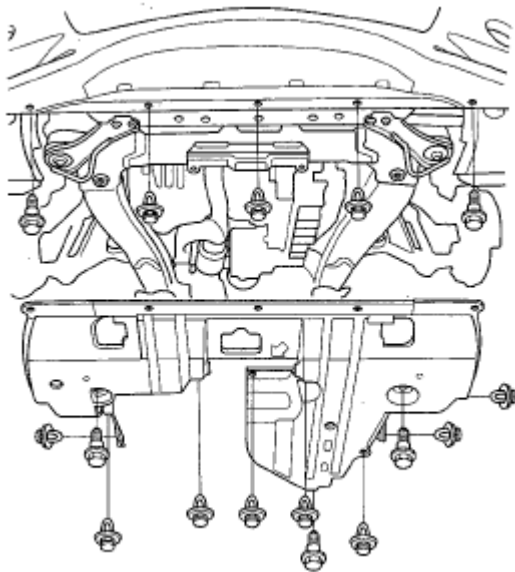


Fig. 29: Identifying Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

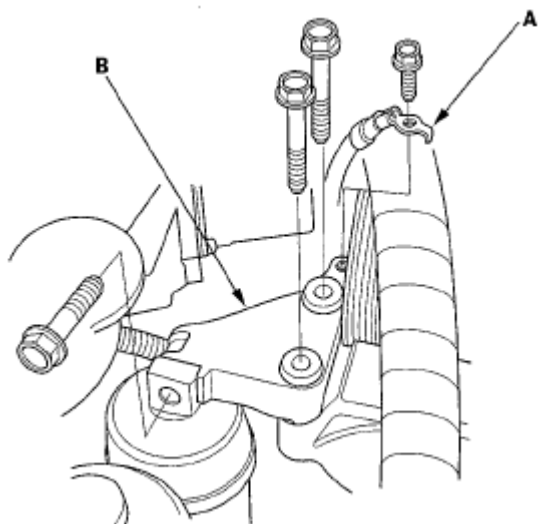


Fig. 30: Identifying Ground Cable And Upper Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

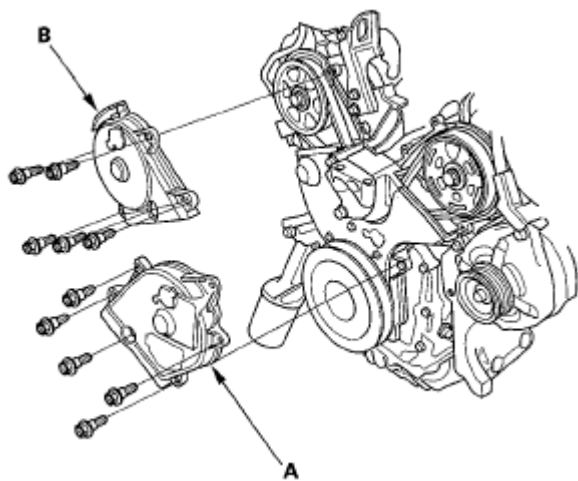


Fig. 31: Identifying Front Upper Cover And Rear Upper Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the crankshaft pulley (see step 4).
12. Remove the lower cover.

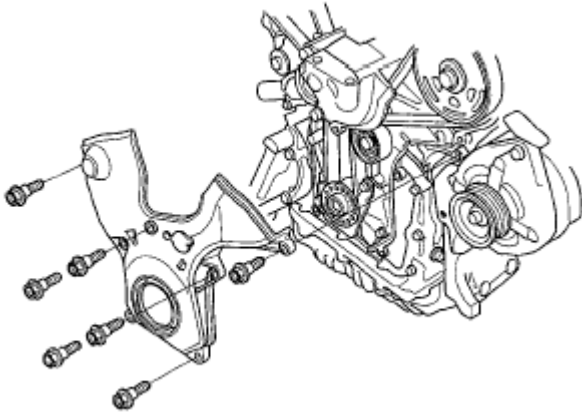


Fig. 32: Identifying Lower Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

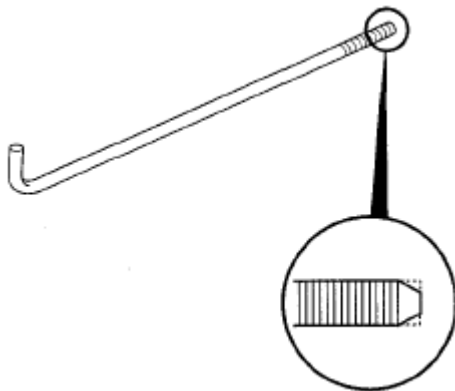


Fig. 33: Identifying Battery Clamp Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

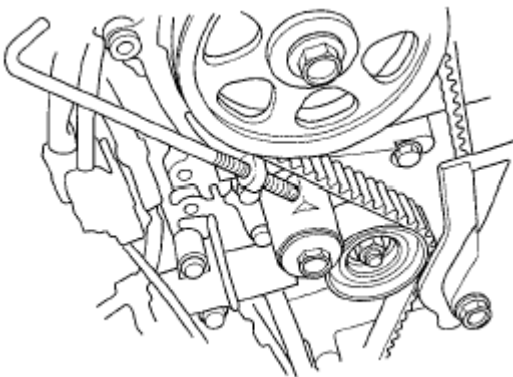


Fig. 34: Identifying Battery Clamp Bolt Used To Hold Timing Belt Adjuster In Position
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the side engine mount bracket.

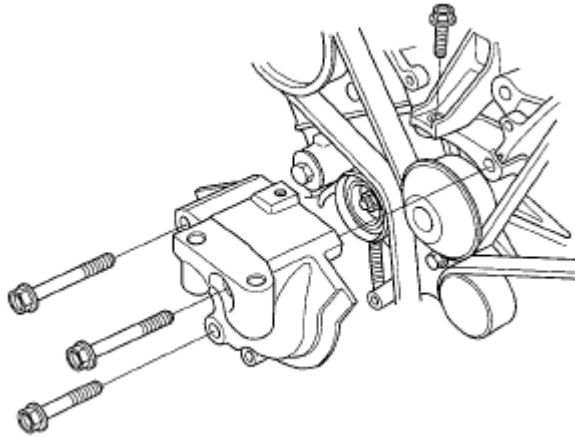


Fig. 35: Identifying Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

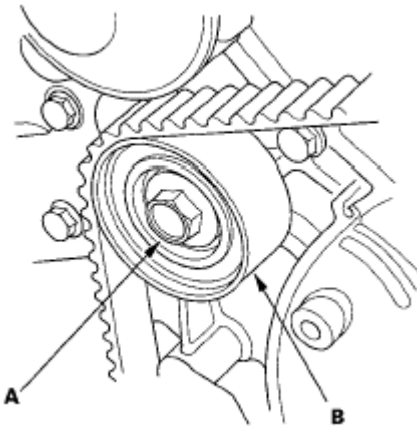


Fig. 36: Identifying Idler Pulley Bolt And Idler Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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**) -->.

1. Clean the timing belt pulleys, 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.

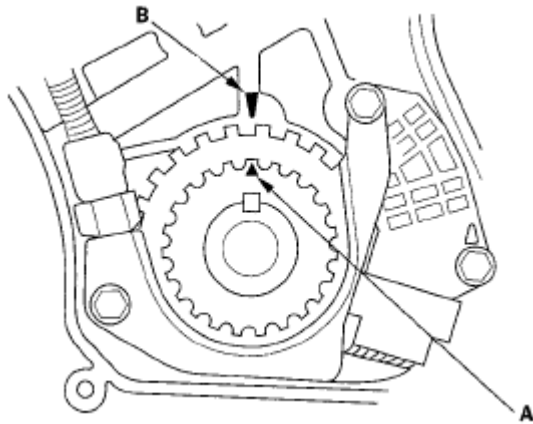


Fig. 37: Aligning TDC Mark On Tooth Of Timing Belt Drive Pulley With Oil Pump Pointer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

FRONT

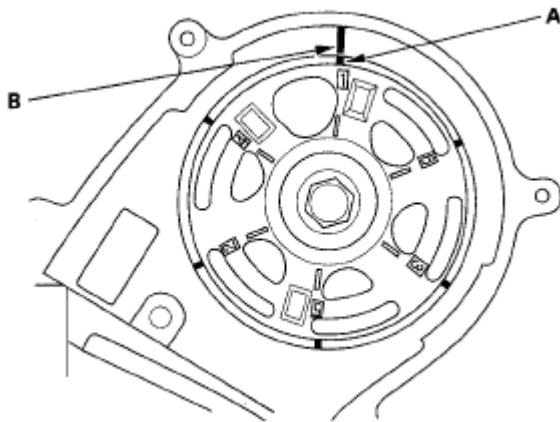


Fig. 38: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

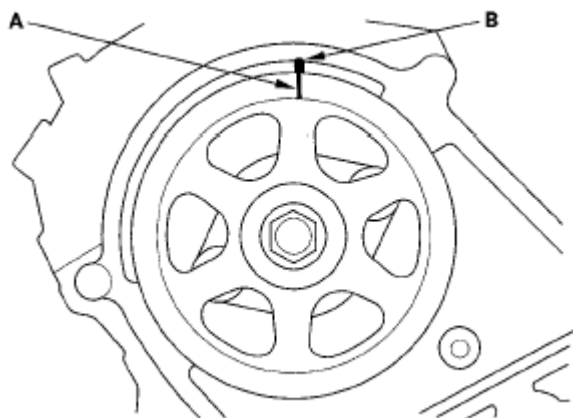


Fig. 39: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Rear)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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, perform the timing belt replacement procedure (see **TIMING BELT REPLACEMENT**).
6. Install the timing belt in a counterclockwise sequence starting with the drive pulley. Take care not to damage the timing belt when installing it.

- 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)

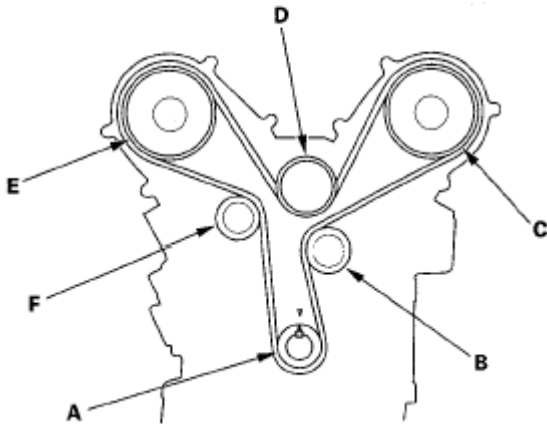


Fig. 40: Identifying Drive Pulley, Idler Pulley, Rear Camshaft Pulley And Water Pump Pulley
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the idler pulley bolt.

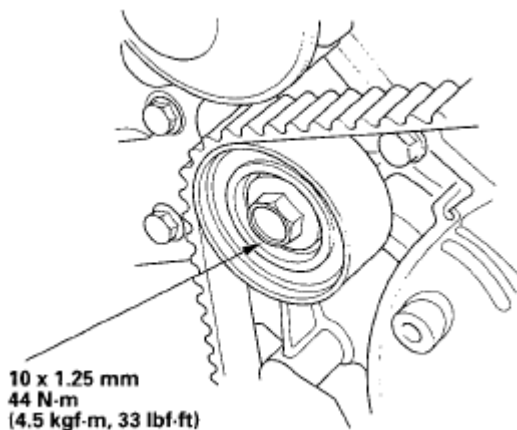


Fig. 41: Identifying Idler Pulley Bolt With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

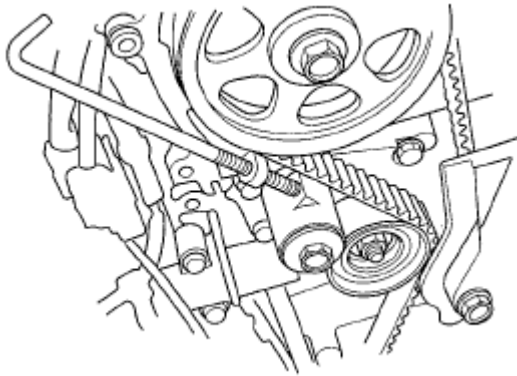


Fig. 42: Identifying Battery Clamp Bolt Used To Hold Timing Belt Adjuster In Position
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the side engine mount bracket.

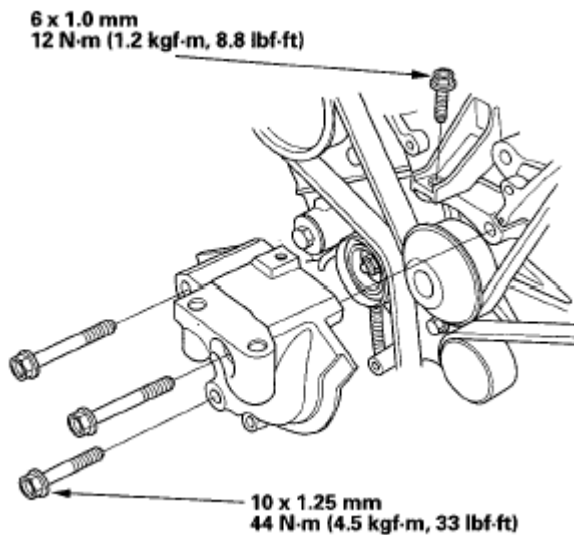


Fig. 43: Identifying Side Engine Mount Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the timing belt guide plate as shown.

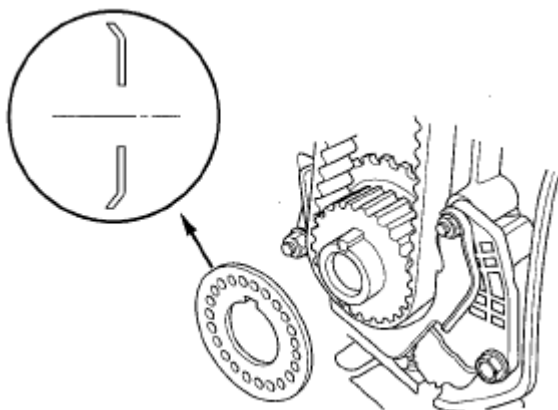


Fig. 44: Identifying Timing Belt Guide Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the lower cover.

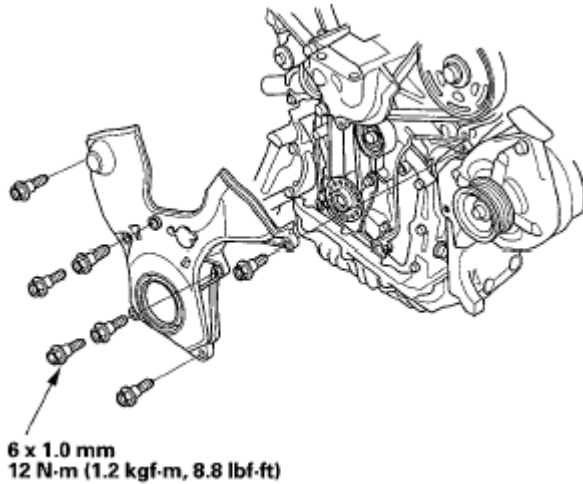


Fig. 45: Identifying Lower Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

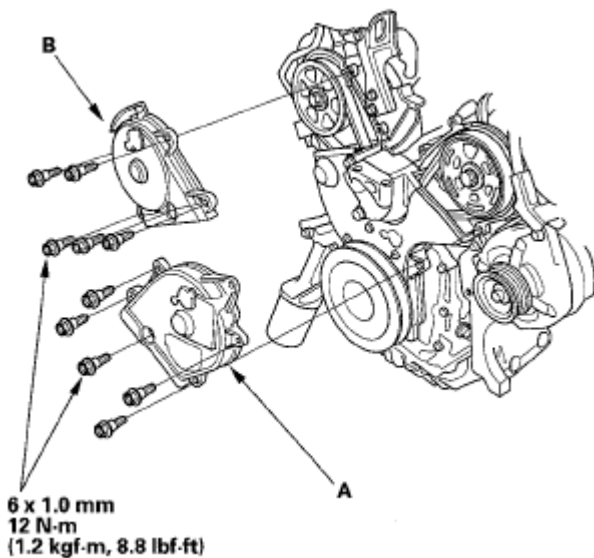


Fig. 46: Identifying Front Upper Cover And Rear Upper Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

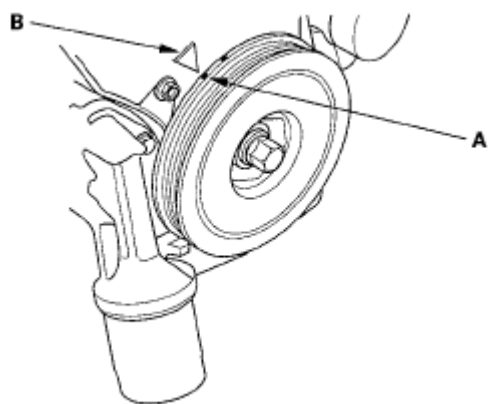


Fig. 47: Identifying White Mark On Crankshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

FRONT

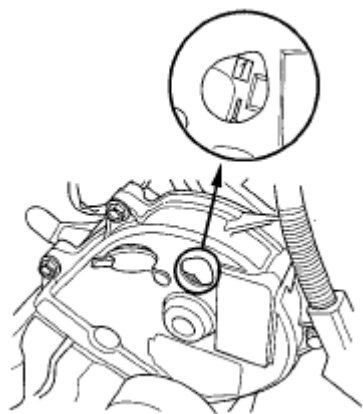


Fig. 48: Identifying Camshaft Pulley Marks (Front Head)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

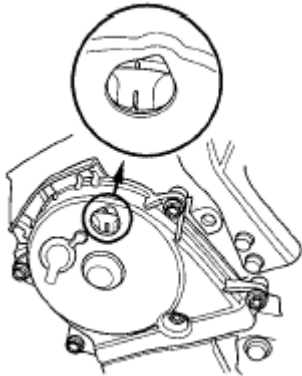


Fig. 49: Identifying Camshaft Pulley Marks (Rear Head)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

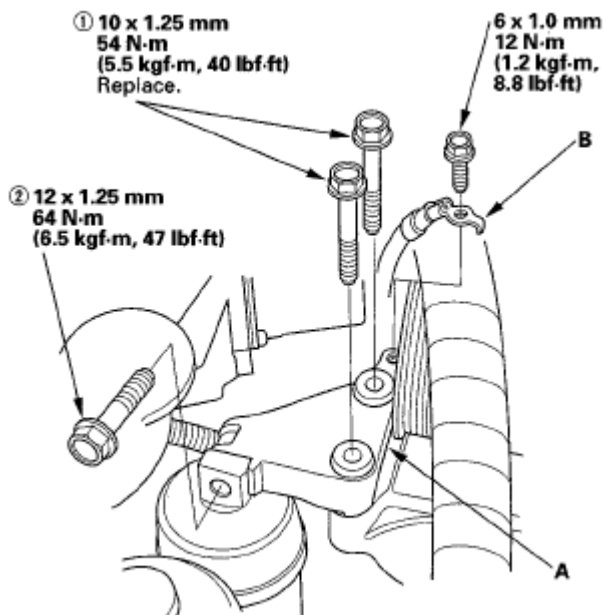


Fig. 50: Identifying Tightening Sequence Of Upper Bracket Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the ground cable (B).
19. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
20. Install the drive belt (see **DRIVE BELT INSPECTION**).
21. Install the splash shield.
22. Install the right front wheel.
23. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).

TIMING BELT REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).

2. Clean the timing belt pulleys, 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.

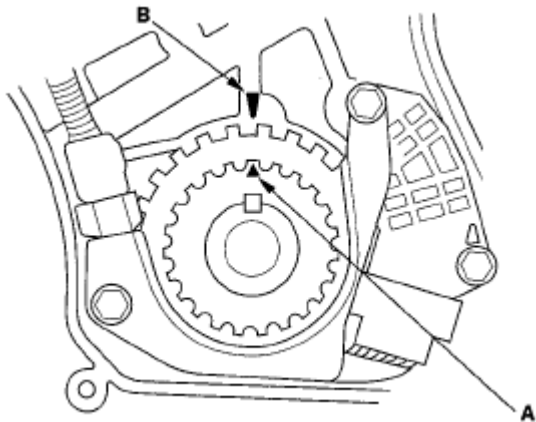


Fig. 51: Aligning TDC Mark On Tooth Of Timing Belt Drive Pulley With Oil Pump Pointer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.

FRONT

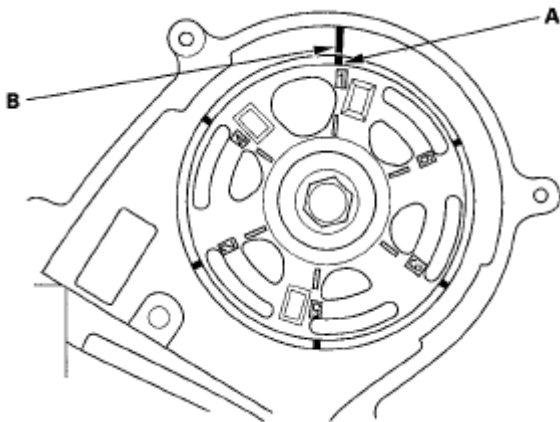


Fig. 52: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

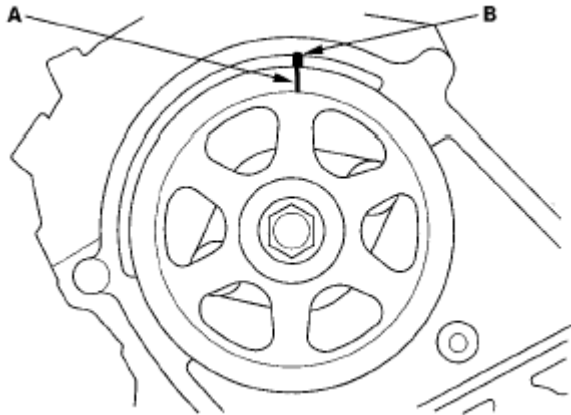


Fig. 53: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Rear)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

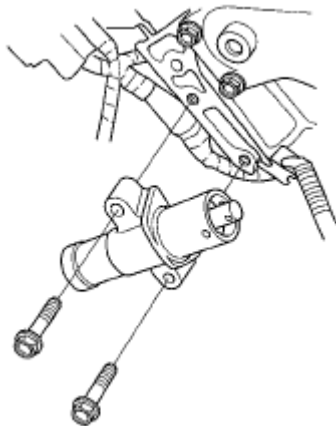


Fig. 54: Identifying Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

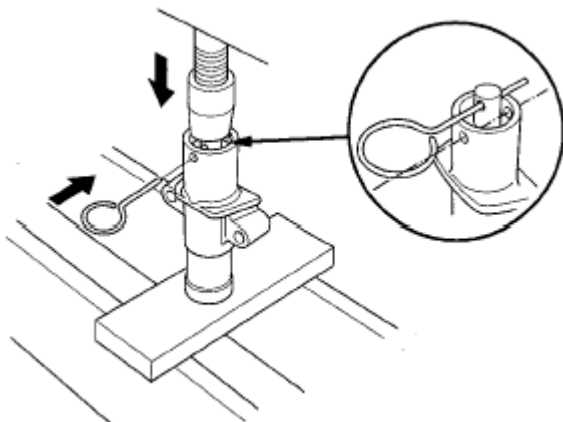


Fig. 55: Compressing Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Use a hydraulic press to slowly compress the auto-tensioner. Insert a 2.0 mm (0.08 in.) pin through the housing and the rod.

NOTE: The compression pressure should not exceed 9,800 N (1,000 kgf, 2,200 lbf).

- Install the auto-tensioner.

NOTE: Make sure the pin stays in place.

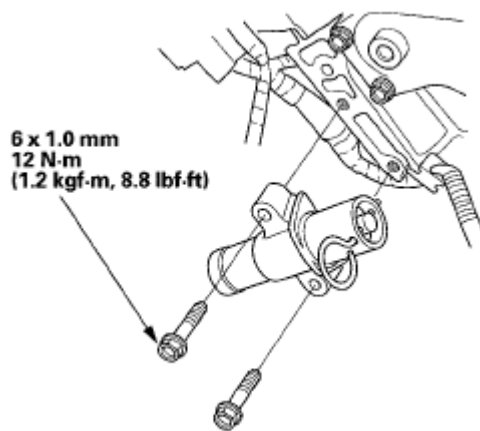


Fig. 56: Identifying Auto-Tensioner With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

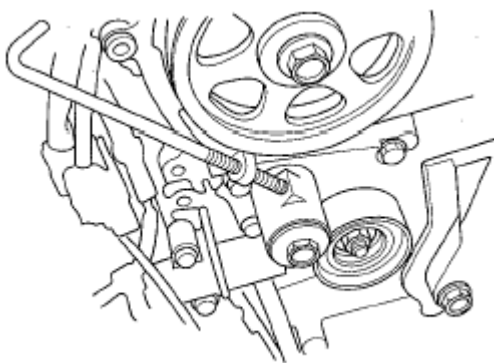


Fig. 57: Identifying Battery Clamp Bolt Used To Hold Timing Belt Adjuster In Position
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.
- 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)

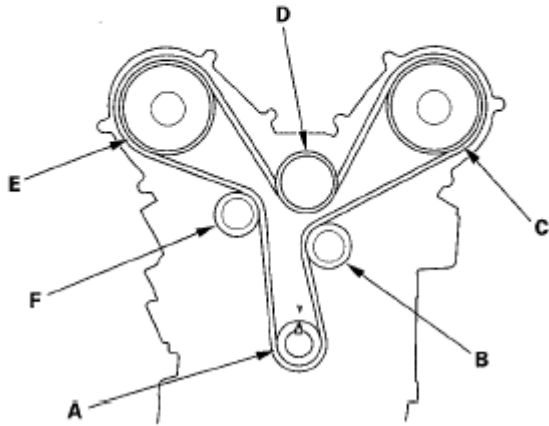


Fig. 58: Identifying Drive Pulley, Idler Pulley, Rear Camshaft Pulley And Water Pump Pulley
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Tighten the idler pulley bolt.

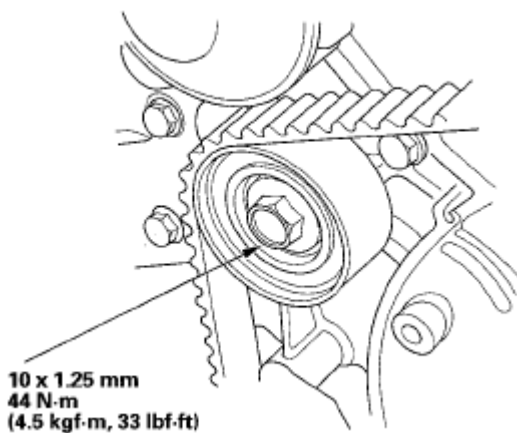


Fig. 59: Identifying Idler Pulley Bolt With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the pin from the auto-tensioner.

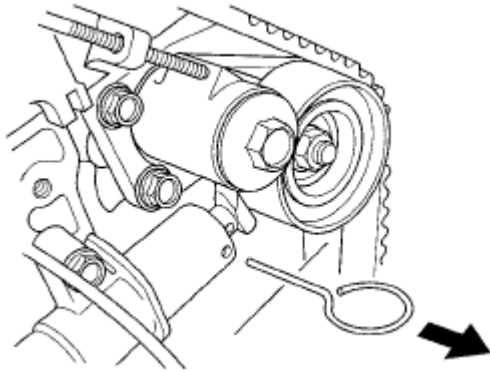


Fig. 60: Removing Pin From Auto-Tensioner
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

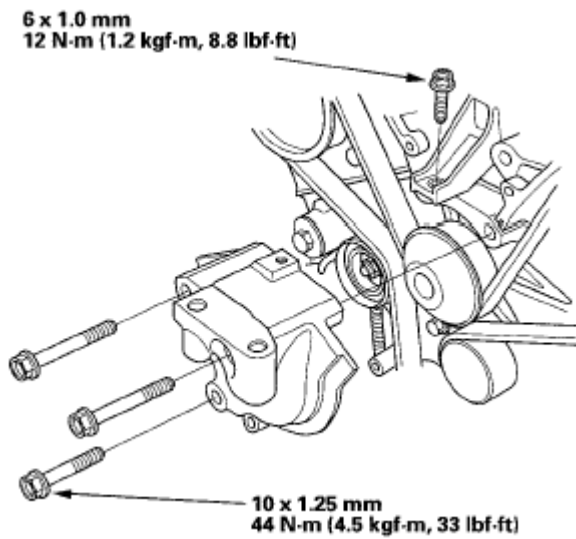


Fig. 61: Identifying Side Engine Mount Bracket With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the timing belt guide plate as shown.

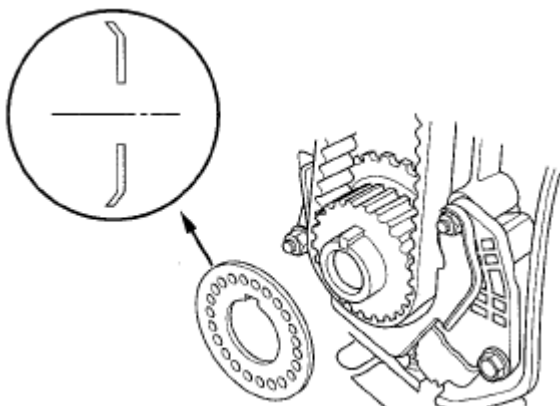


Fig. 62: Identifying Timing Belt Guide Plate
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the lower cover.

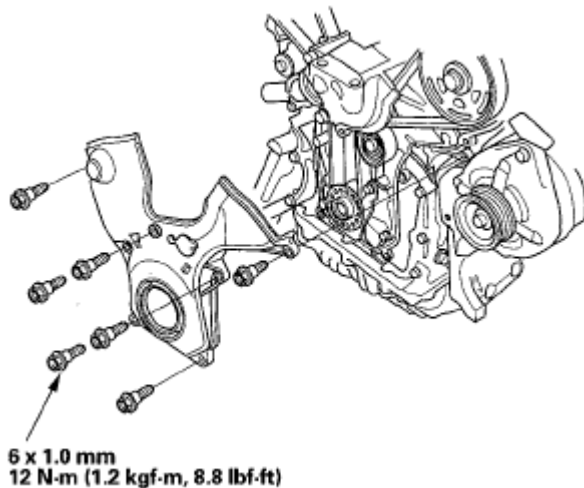


Fig. 63: Identifying Lower Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

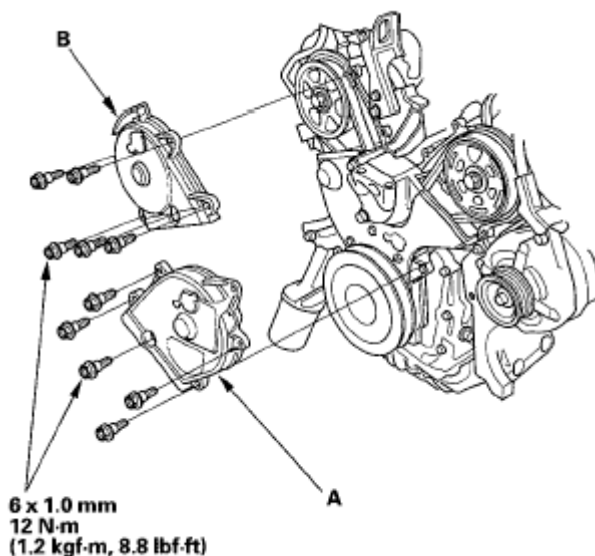


Fig. 64: Identifying Front Upper Cover And Rear Upper Cover With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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).

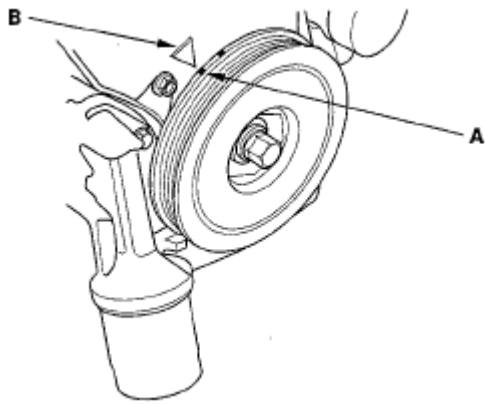


Fig. 65: Identifying White Mark On Crankshaft Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Check the camshaft pulley marks.
- 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.

FRONT

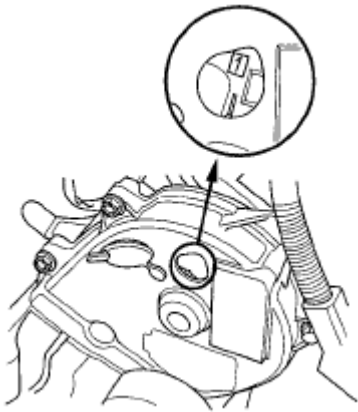


Fig. 66: Identifying Camshaft Pulley Marks (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

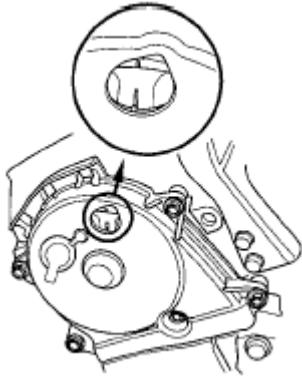


Fig. 67: Identifying Camshaft Pulley Marks (Rear)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the upper bracket (A), then tighten the bolts in the numbered sequence shown.

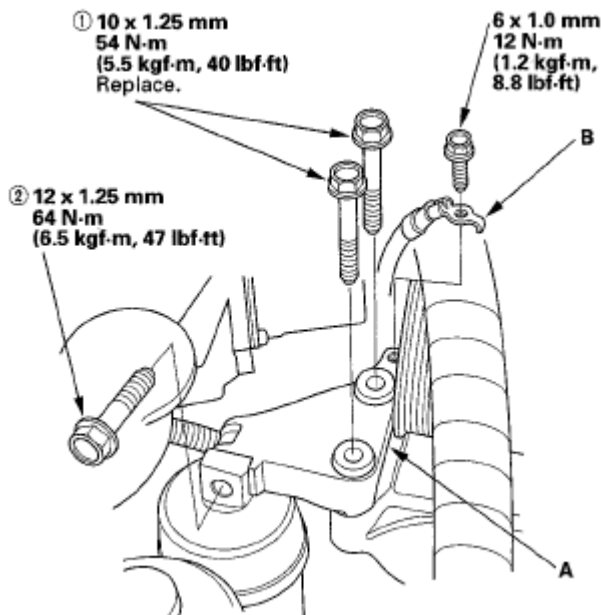


Fig. 68: Identifying Tightening Sequence Of Upper Bracket Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Install the ground cable (B).
26. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REPLACEMENT**).
27. Install the drive belt (see **DRIVE BELT INSPECTION**).
28. Install the splash shield.
29. Install the right front wheel.
30. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).

TIMING BELT DRIVE PULLEY REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).

2. Remove the crankshaft position (CKP) sensor (see **CKP SENSOR REPLACEMENT**).
3. Remove the timing belt drive pulley.

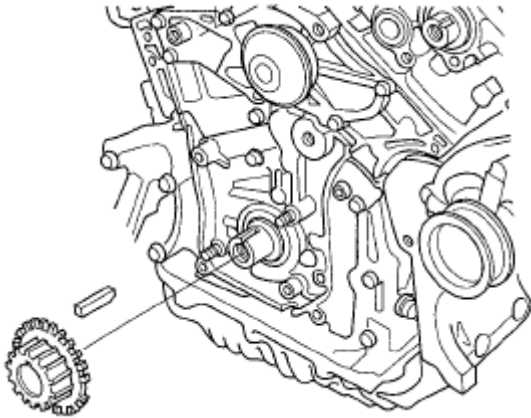


Fig. 69: Identifying Timing Belt Drive Pulley
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Inspect the timing belt drive pulley and key for damage. If it is cracked or damaged, replace the timing belt drive pulley.
5. Install the timing belt drive pulley.
6. Install the CKP sensor (see **CKP SENSOR REPLACEMENT**).
7. Install the timing belt (see **TIMING BELT INSTALLATION**).

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).
4. Remove the bolt (A), then remove the timing belt adjuster (B) and collar (C).

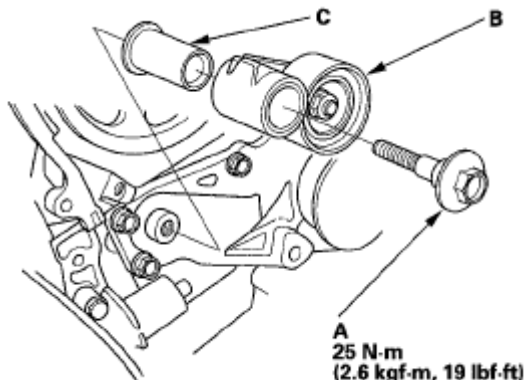


Fig. 70: Identifying Timing Belt Adjuster And Collar With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the timing belt adjuster.
6. Install the timing belt (see **TIMING BELT INSTALLATION**).

CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold (see **INTAKE MANIFOLD REMOVAL AND INSTALLATION**).
2. Remove the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
3. Remove the three bolts (A) securing the harness holder, and remove the dipstick (B).

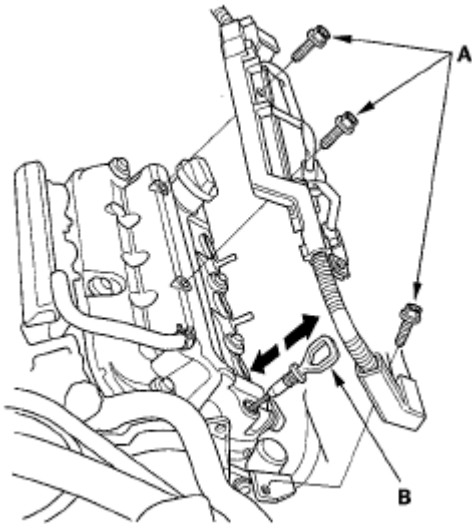


Fig. 71: Removing Harness Holder And Dipstick
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the bolt (A) securing the power steering hose clamp.

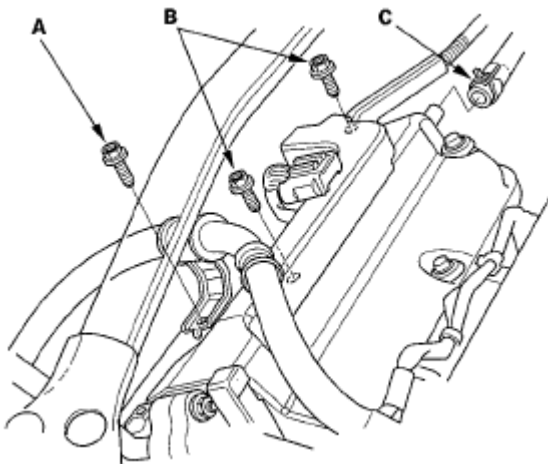


Fig. 72: Identifying Power Steering Hose Clamp And Harness Holder Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the two bolts (B) securing the harness holder.
6. Remove the breather hose (C).
7. Remove the cylinder head covers. FRONT

FRONT

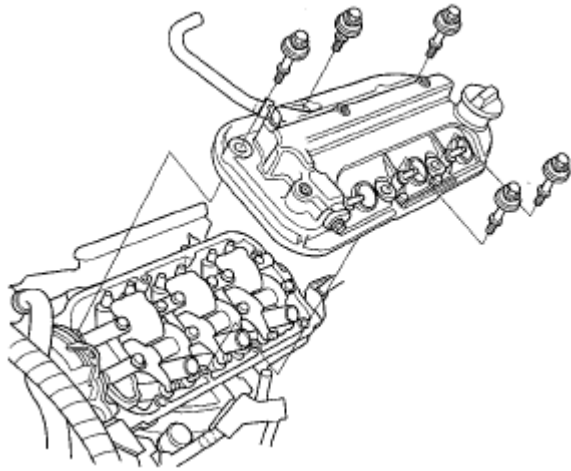


Fig. 73: Identifying Cylinder Head Cover (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

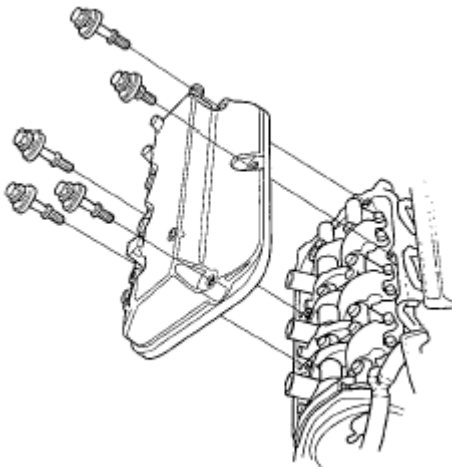


Fig. 74: Identifying Cylinder Head Cover (Rear)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Check the spark plug seals for damage. If the seal is damaged, replace it.
2. Clean the head cover contacting surfaces with a shop towel.
3. Set the spark plug seals (A) on the spark plug tubes, and install the cylinder head covers (B).

FRONT

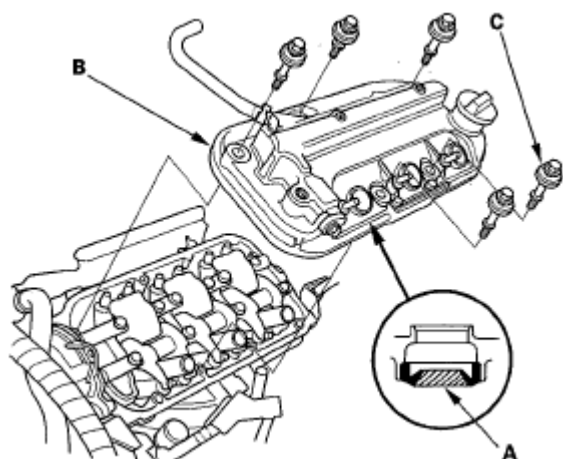


Fig. 75: Identifying Spark Plug Seal And Cylinder Head Cover (Front)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

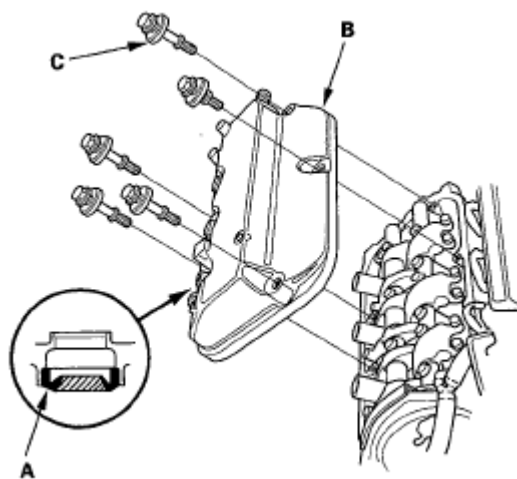


Fig. 76: Identifying Spark Plug Seal And Cylinder Head Cover (Rear)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Visually check the spark plug seals for damage.
5. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
6. Tighten the bolts in three steps. In the final step tighten all bolts, in sequence, 12 N.m (1.2 kgf.m, 8.8 lbf.ft).

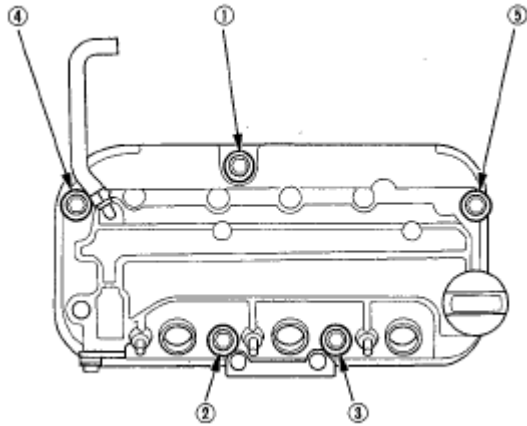


Fig. 77: Identifying Tightening Sequence Of Cylinder Head Cover Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the breather hose (A).

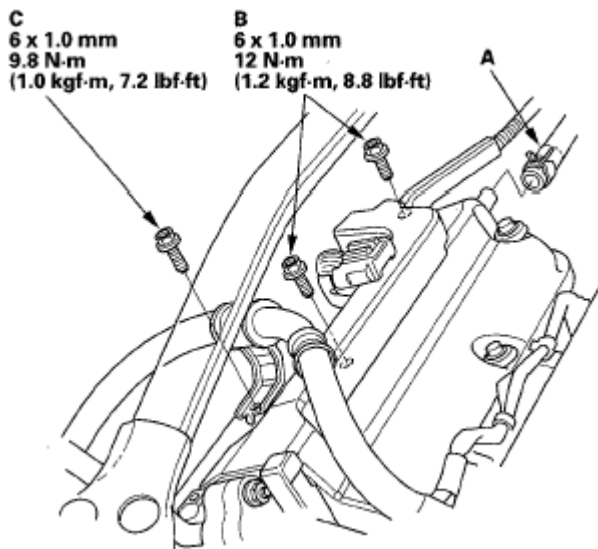


Fig. 78: Identifying Breather Hose And Harness Holder Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Tighten the two bolts (B) securing the harness holder.
9. Tighten the bolt (C) securing the power steering hose bracket.
10. Tighten the three bolts (A) securing the harness holder, and install the dipstick (B).

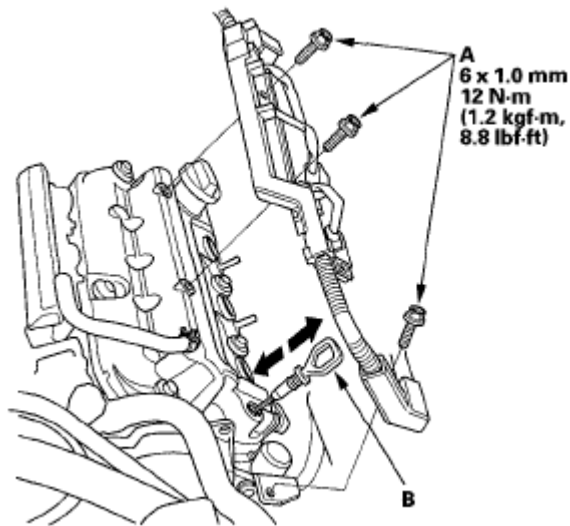


Fig. 79: Installing Harness Holder And Dipstick With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
12. Install the intake manifold (see **INSTALLATION**).

CYLINDER HEAD REMOVAL

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100°F (38 CC) before loosening the cylinder head bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Make sure you have the anti-theft codes for the audio system and the navigation system (if equipped). Make sure the ignition switch is OFF.
2. Relieve the fuel pressure (see **FUEL PRESSURE RELIEVING**).
3. Disconnect the negative cable from the battery.
4. Drain the engine coolant (see **COOLANT CHECK**).
5. Remove the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
6. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
7. Remove the timing belt (see **TIMING BELT REMOVAL**).
8. Remove the power steering (P/S) pump (A), and P/S hose clamp (B).

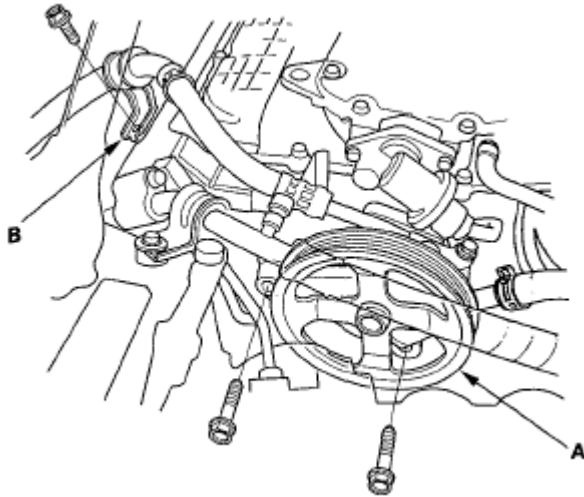


Fig. 80: Identifying Power Steering Pump And P/S Hose Clamp
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the alternator (see **ALTERNATOR REMOVAL AND INSTALLATION**).
10. Remove the intake manifold (see **INTAKE MANIFOLD REMOVAL AND INSTALLATION**).
11. Remove the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
12. Remove the engine wire harness connectors and wire harness clamps from the cylinder head.
 - Six injector connectors
 - Engine coolant temperature (ECT) sensor 1 connector
 - Engine coolant temperature (ECT) sensor 2 connector
 - Crankshaft position (CKP) sensor connector
 - Exhaust gas recirculation (EGR) valve connector
 - Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors
13. Remove the front warm up three way catalytic converter (front WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**) and rear warm up three way catalytic converter (rear WU-TWC) (see **REAR**).
14. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).

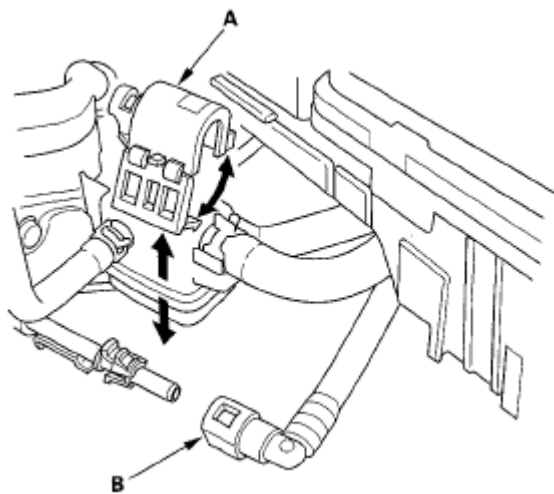


Fig. 81: Identifying Cover And Quick-Connect Fitting (Fuel Line)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the purge joint.

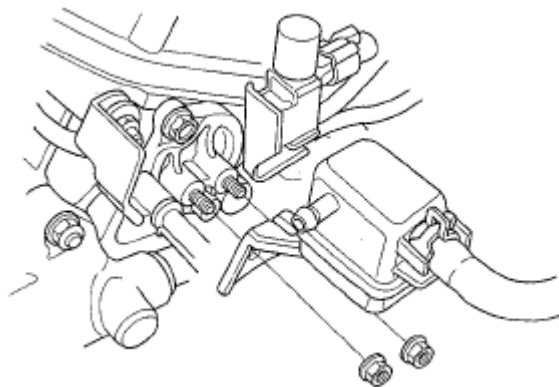


Fig. 82: Identifying Purge Joint
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Disconnect the upper radiator hose (A) and lower radiator hose (B).

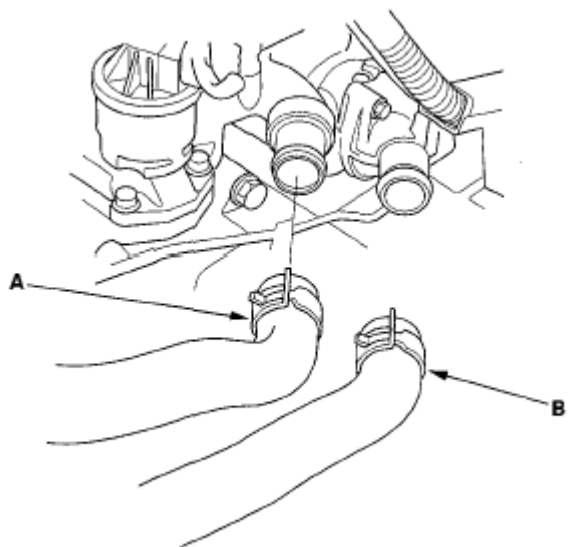


Fig. 83: Identifying Upper Radiator Hose And Lower Radiator Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Disconnect the heater hoses (A) and water bypass hose (B).

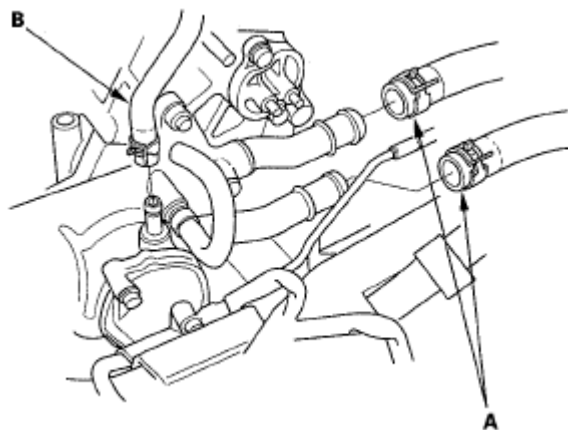


Fig. 84: Identifying Heater Hoses And Water Bypass Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the two bolts (A) securing the harness holder.

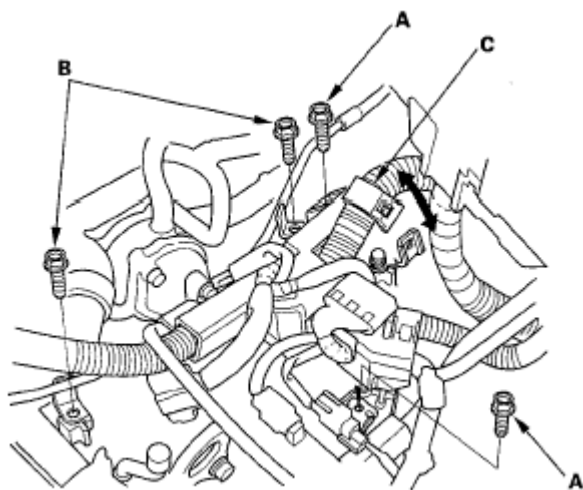


Fig. 85: Removing Harness Clamps And Fasteners
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the two bolts (B) securing the vacuum line.
20. Remove the harness clamp (C).
21. Remove the connector bracket from the front cylinder head.

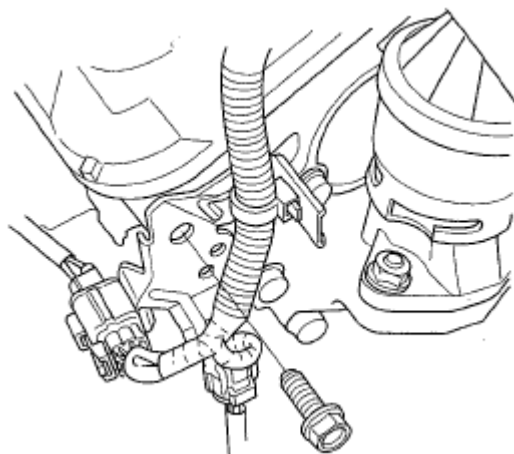


Fig. 86: Identifying Connector Bracket Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Remove the engine mount control solenoid valve bracket from the rear cylinder head.

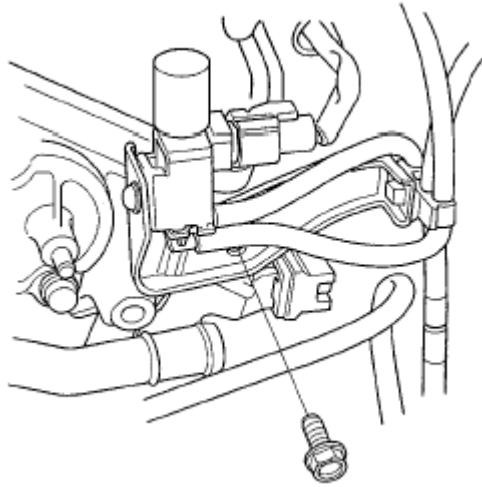


Fig. 87: Identifying Engine Mount Control Solenoid Valve Bracket Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Remove the fuel rails (see **INJECTOR REPLACEMENT**).
24. Remove the ground cable (A), then remove the water passage (B) and connecting pipe (C).

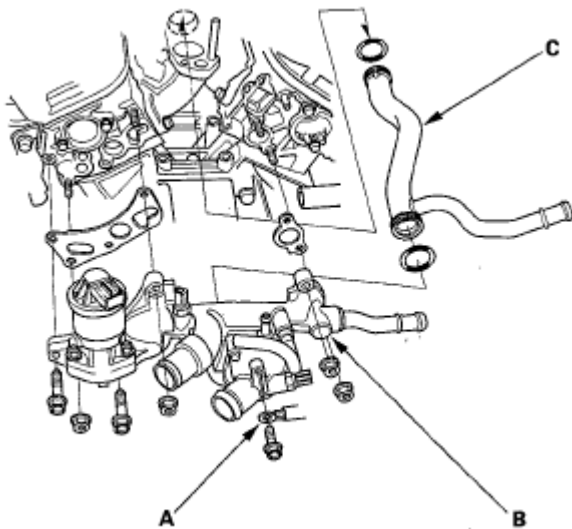


Fig. 88: Identifying Ground Cable, Water Passage And Connecting Pipe
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Remove the front and rear camshaft pulleys (A) and front and rear back covers (B).

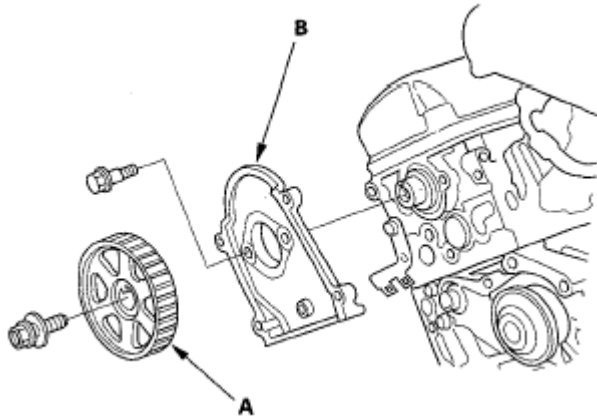


Fig. 89: Identifying Camshaft Pulleys And Back Covers
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
27. 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.

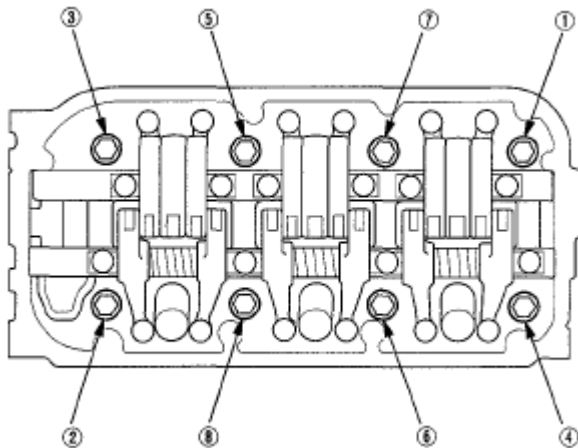


Fig. 90: Identifying Tightening Sequence Of Cylinder Head Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Remove the cylinder heads.

CAMSHAFT REPLACEMENT

FRONT

1. Make sure you have the anti-theft codes for the audio system and the navigation system (if equipped). Make sure the ignition switch is OFF.
2. Remove the battery trim and the left upper fender trim (see step 3 **ENGINE REMOVAL**).
3. Disconnect the negative cable from the battery first, then disconnect the positive cable.
4. Remove the battery.
5. Drain the engine coolant (see **COOLANT CHECK**).
6. Remove the upper radiator hose (A), lower radiator hose (B), and hose clamp (C).

2007 Acura RL

2005-08 ENGINE Cylinder Head - RL

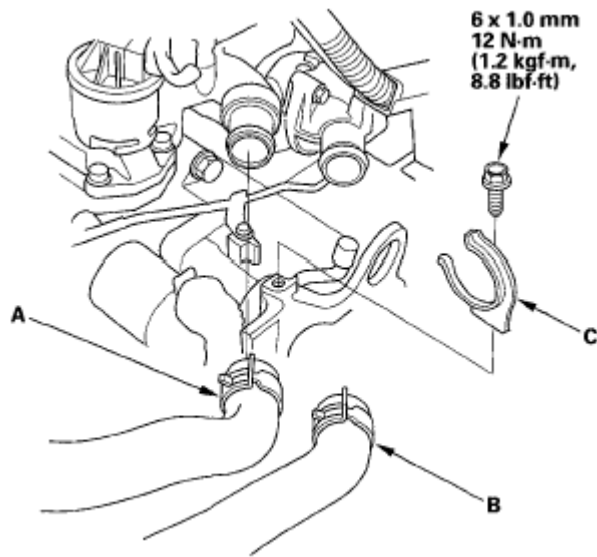


Fig. 91: Identifying Upper & Lower Radiator Hoses And Fasteners With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the exhaust gas recirculation (EGR) valve (see **EGR VALVE REPLACEMENT**).
8. Remove the timing belt (see **TIMING BELT REMOVAL**).
9. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
10. Remove the front camshaft pulley.
11. Remove the thrust cover (A), then remove the front camshaft (B).

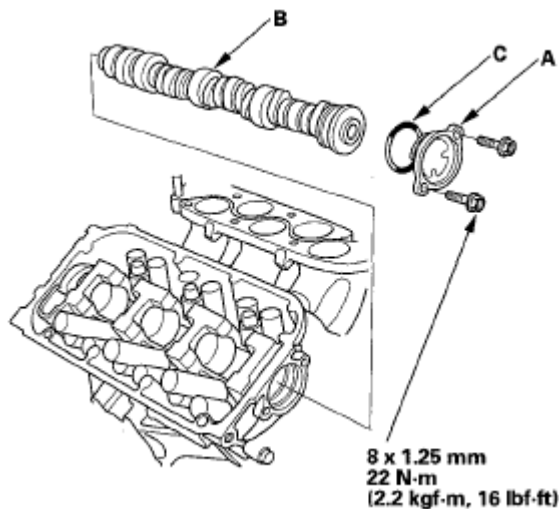


Fig. 92: Identifying Thrust Cover And Front Camshaft With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. 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 camshaft lobes.
13. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 11).
14. Install the rocker arm assembly, then tighten the mounting bolts (see step 8).

15. Install the timing belt (see **TIMING BELT INSTALLATION**).
16. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
17. Fill the radiator with engine coolant and bleed the air out (see step 8 under **COOLANT CHECK**).
18. Install the battery. Clean the battery posts and cable terminals, then assemble them and apply grease to prevent corrosion.
19. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).
20. Enter the anti-theft codes for the audio system and the navigation system.
21. Do the steering column position memorization procedure (see **STEERING COLUMN POSITION MEMORIZATION**).

REAR

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Remove the rear camshaft pulley.
4. Remove the two nuts securing the purge joint.

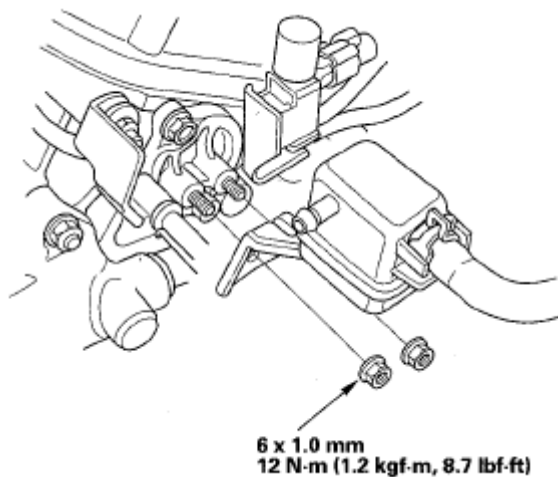


Fig. 93: Identifying Purge Joint Nuts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the thrust cover (A), then remove the rear camshaft (B).

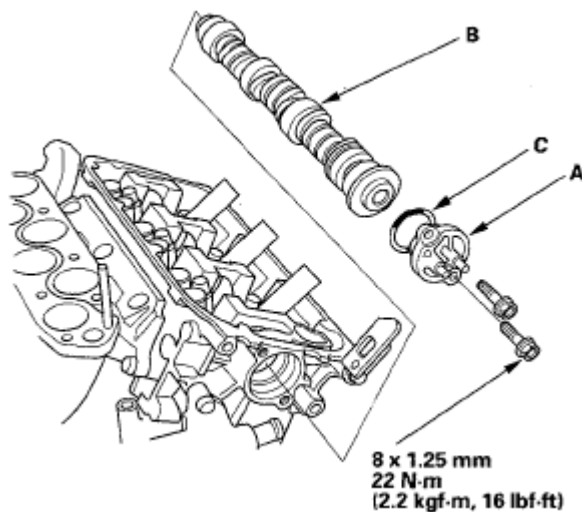


Fig. 94: Identifying Thrust Cover And Rear Camshaft With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. 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 camshaft lobes.
7. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the rear camshaft pulley (see step 11).
8. Install the rocker arm assembly, then tighten the mounting bolts (see step 8).
9. Install the timing belt (see **TIMING BELT INSTALLATION**).
10. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
11. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).

CYLINDER HEAD INSPECTION FOR WARPAGE

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Inspect the camshaft (see **CAMSHAFT INSPECTION**).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
 - If warpage is less than 0.05 mm (0.002 in.), cylinder head resurfacing is not required.
 - If warpage is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface the cylinder head.
 - Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 121 mm (4.76 in.).

Cylinder Head Height

Standard (New): 120.95-121.05 mm (4.762-4.766 in.)

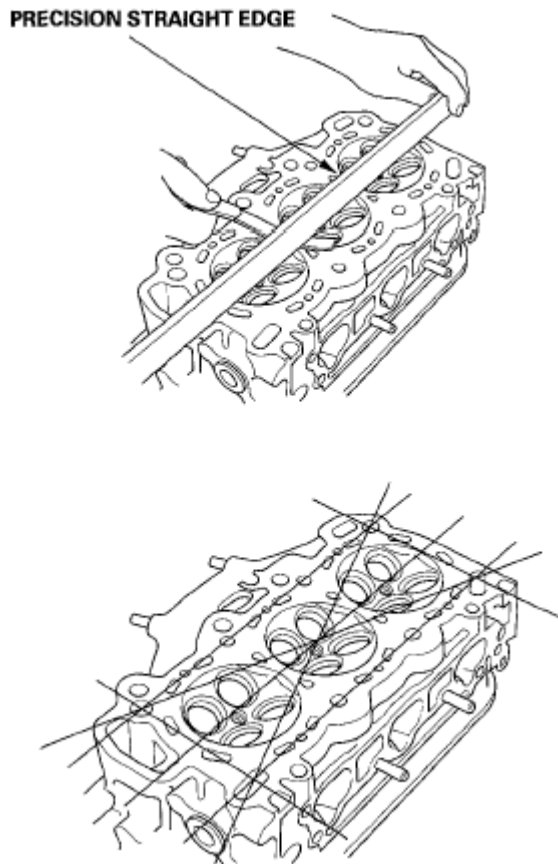


Fig. 95: Checking Cylinder Head For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

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

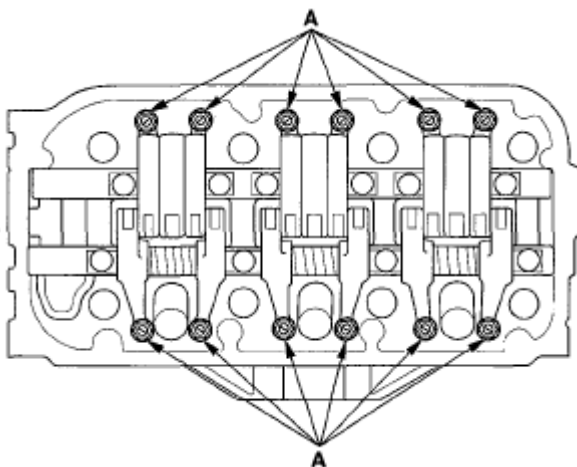


Fig. 96: Identifying Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

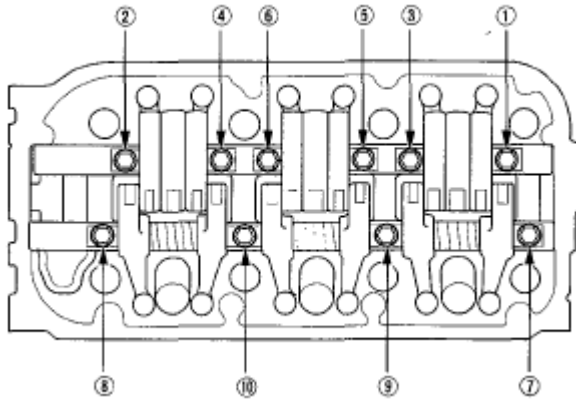


Fig. 97: Identifying Loosening Sequence Of Rocker Shaft Mounting Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

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

2007 Acura RL

2005-08 ENGINE Cylinder Head - RL

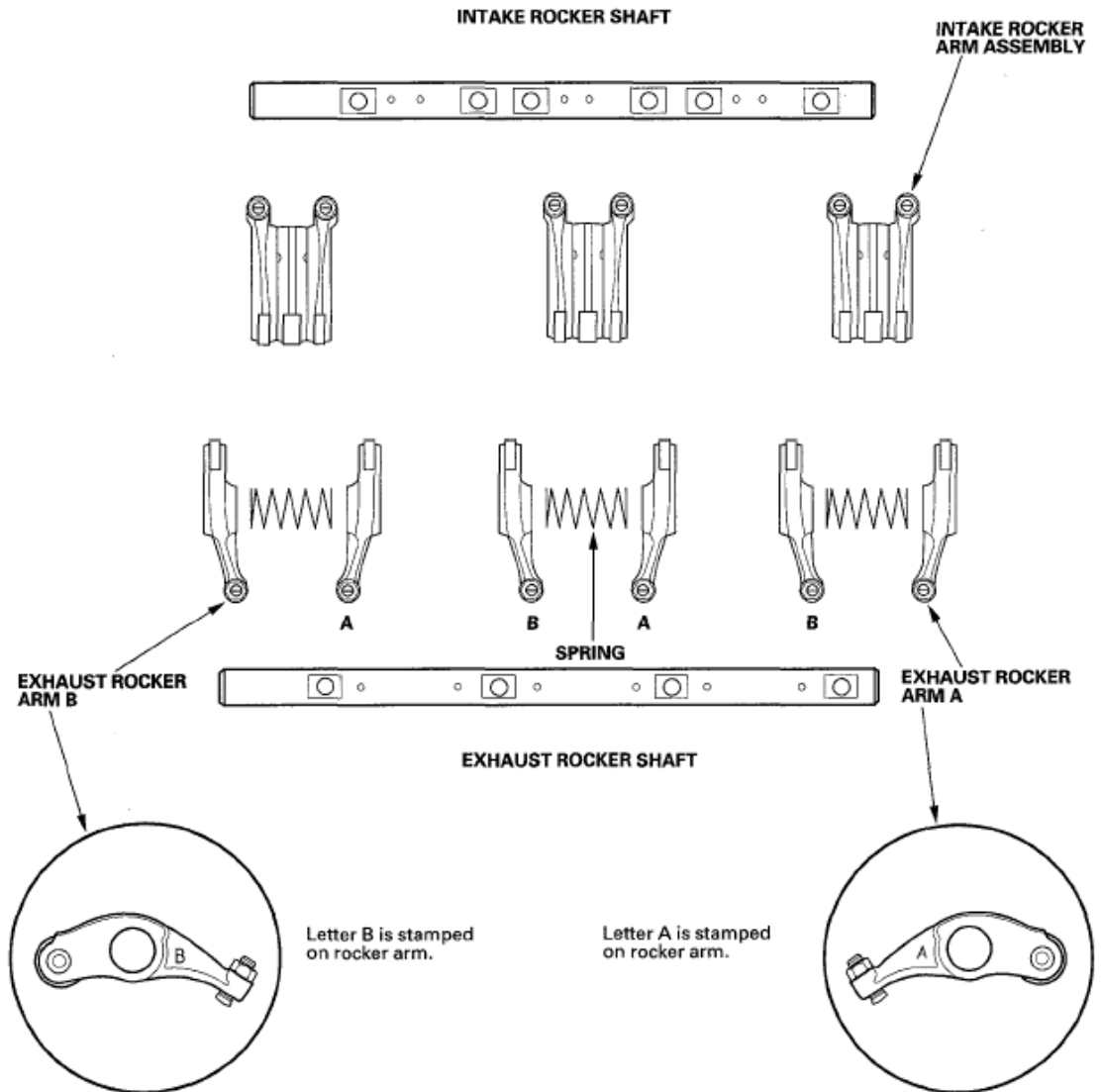


Fig. 98: Identifying Intake And Exhaust Rocker Shaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

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

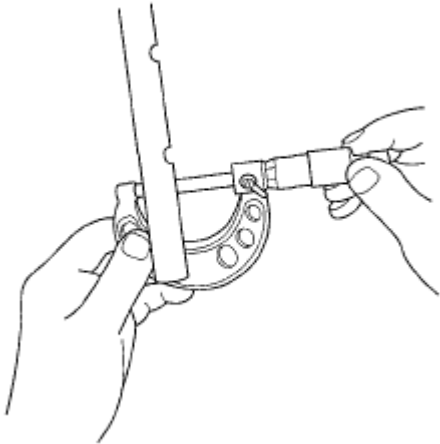


Fig. 99: Measuring Rocker Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

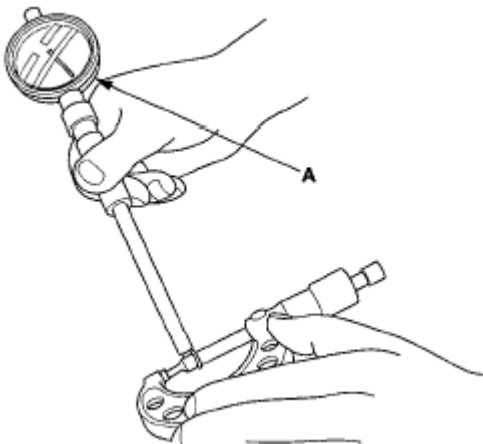


Fig. 100: Zeroing Gauge To The Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Rocker Arm-to-Shaft Clearance

Standard (New):

Intake: 0.026-0.067 mm (0.0010-0.0026 in.)

Service Limit: 0.067 mm (0.0026 in.)

Exhaust: 0.026-0.077 mm (0.0010-0.0030 in.)

Service Limit: 0.077 mm (0.0030 in.)

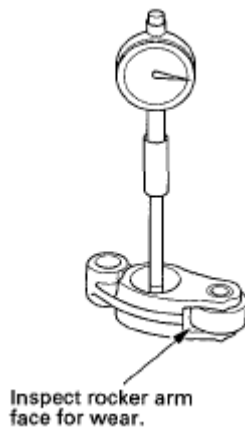


Fig. 101: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- 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 three rocker arms in that set (primary, mid, and secondary).

VTEC Rocker Arms

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

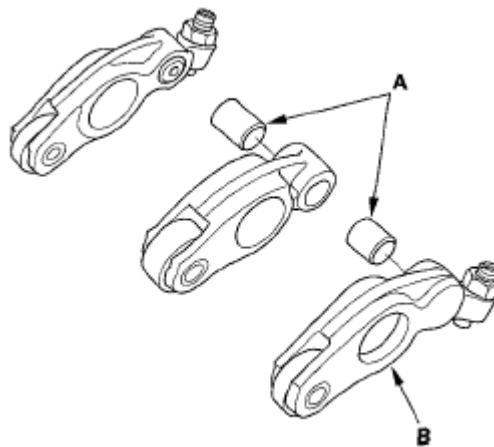


Fig. 102: Identifying Rocker Arm Pistons And Primary Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- 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 arms (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Put the rocker shafts on the cylinder head, then tighten the bolts to the specified torque.

Specified Torque

8 x 1.25 mm

24 N.m (2.4 kgf.m, 17 lbf.ft)

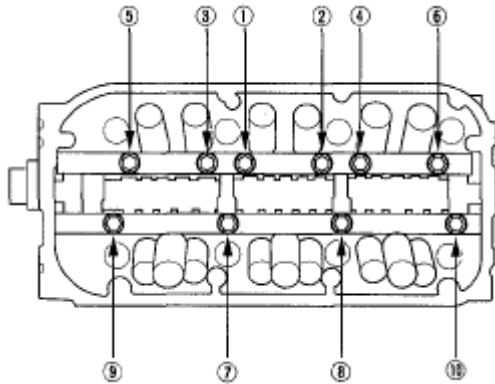


Fig. 103: Identifying Tightening Sequence Of Rocker Shafts Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Seat the camshaft by pushing it toward the rear of the cylinder head.
5. 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 camshaft.

Camshaft End Play

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

Service Limit: 0.20 mm (0.008 in.)

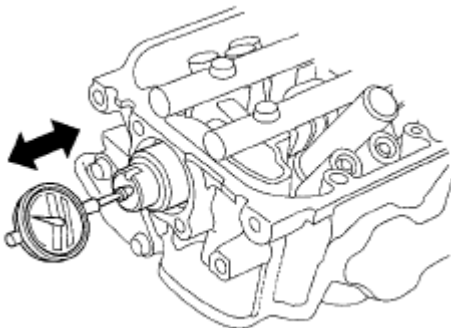


Fig. 104: Measuring Camshaft End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

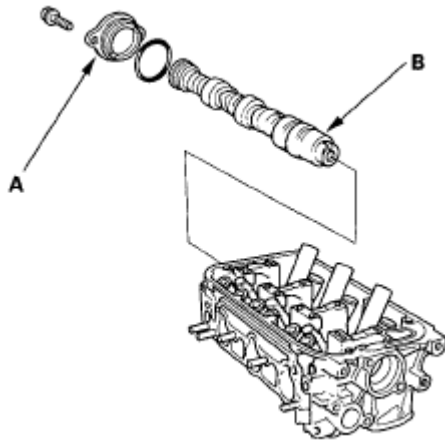


Fig. 105: Identifying Camshaft Thrust Cover And Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

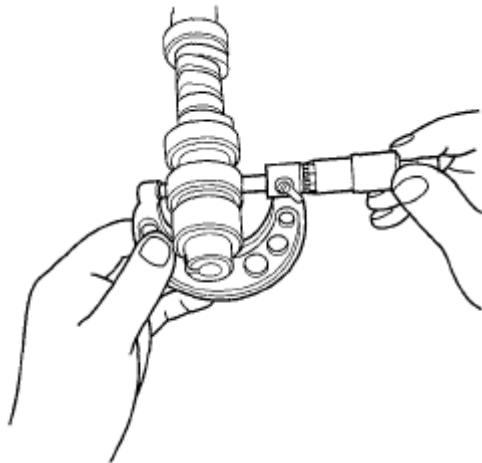


Fig. 106: Measuring Diameter Of Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Zero the gauge to the journal diameter.

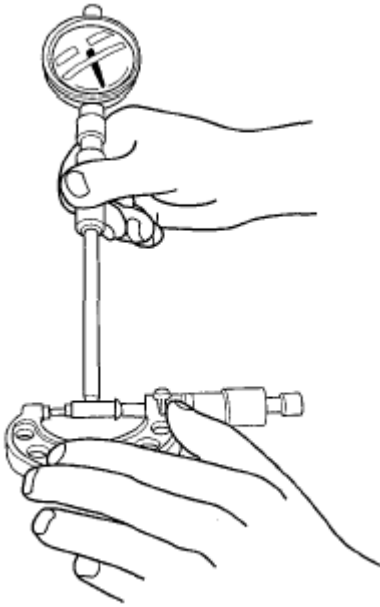


Fig. 107: Zeroing Gauge To The Journal Diameter
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. 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 12.
 - 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 11.

Camshaft-to-Holder Oil Clearance

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

Service Limit: 0.15 mm (0.006 in.)

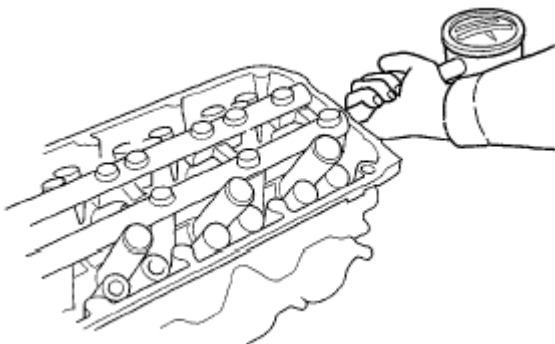


Fig. 108: Measuring Inside Diameter Of Camshaft Bearing Surface
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. 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 (0.001 in.) max.

Service Limit: 0.04 mm (0.002 in.)

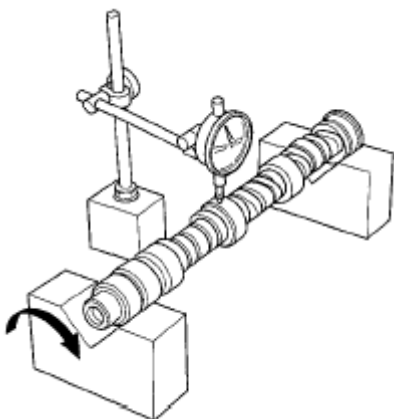


Fig. 109: Measuring Camshaft Total Runout
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Measure cam lobe height.

Cam Lobe Height Standard (New):

CAM LOBE HEIGHT SPECIFICATION

	INTAKE	EXHAUST
PRI	35.112 mm (1.3824 in.)	36.389 mm (1.4326 in.)
MID	36.394 mm (1.4328 in.)	
SEC	35.112 mm (1.3824 in.)	
PRI: Primary IN: Intake	MID: Mid EX: Exhaust	SEC: Secondary T/B: Timing Belt

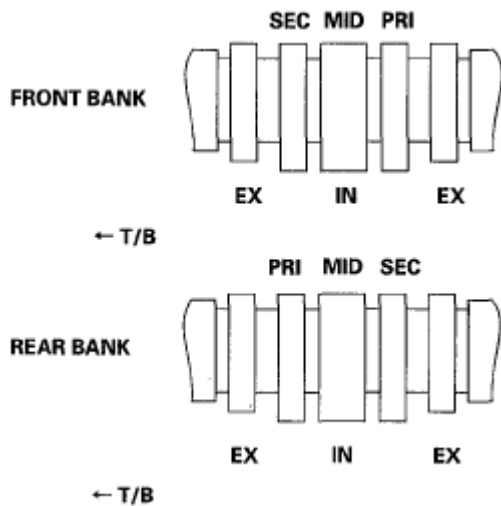


Fig. 110: Identifying Cam Lobe Height
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve spring compressor attachment 07757-PJ1010A

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

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

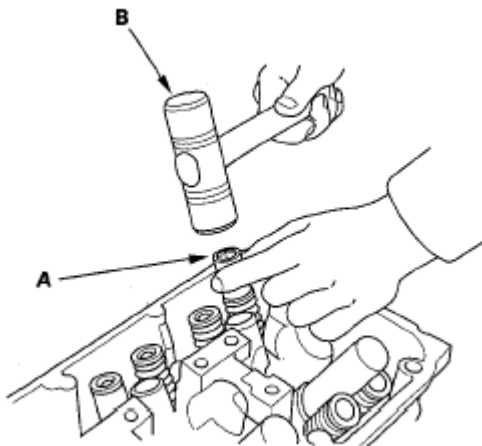


Fig. 111: Tapping Valve Retainer
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the special tool. Compress the spring and remove the valve cotters.

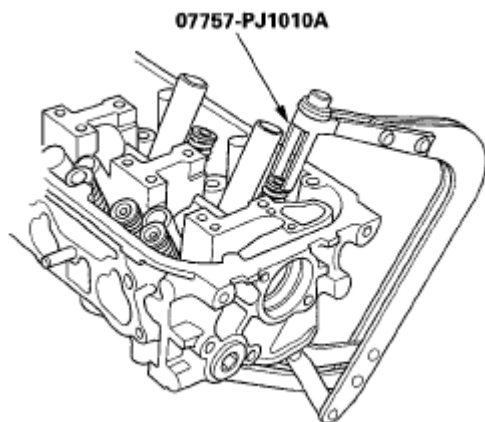


Fig. 112: Compressing Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

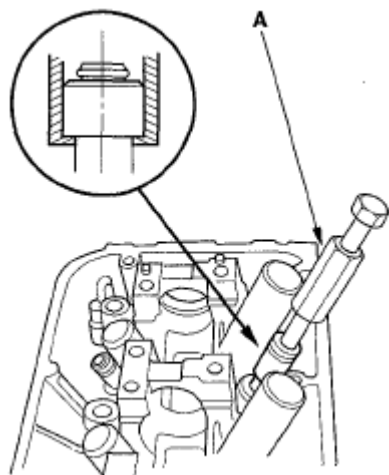


Fig. 113: Identifying Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.

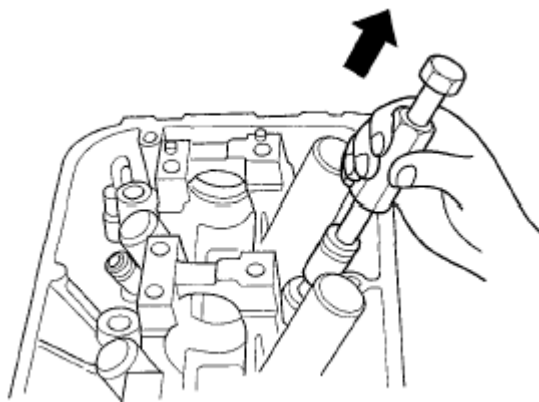
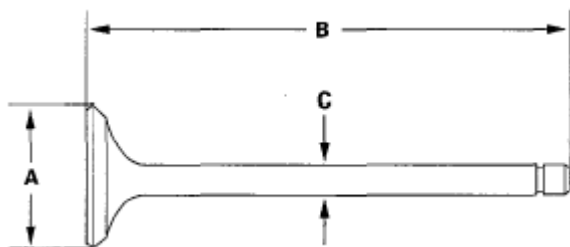


Fig. 114: Removing Valve Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE INSPECTION

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

Intake Valve Dimensions**A Standard (New): 35.90-36.10 mm (1.413-1.421 in.)****B Standard (New): 116.55-117.15 mm (4.589-4.612 in.)****C Standard (New): 5.485-5.495 mm (0.2159-0.2163 in.)****C Service Limit: 5.455 mm (0.2148 in.)****Exhaust Valve Dimensions****A Standard (New): 29.90-30.10 mm (1.177-1.185 in.)****B Standard (New): 113.90-114.50 mm (4.484-4.508 in.)****C Standard (New): 5.450-5.460 mm (0.2146-0.2150 in.)****C Service Limit: 5.420 mm (0.2134 in.)****Fig. 115: Identifying Valve Dimensions**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

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

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.04-0.09 mm (0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance

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

Service Limit: 0.22 mm (0.009 in.)

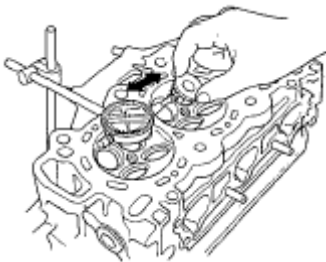


Fig. 116: Measuring Valve Stem-To-Guide Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Intake Valve Stem-to-Guide Clearance

Standard (New): 0.020-0.045 mm (0.0008-0.0018 in.)

Service Limit: 0.08 mm (0.003 in.)

Exhaust Valve Stem-to-Guide Clearance

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

Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve guide driver, 5.5 mm 07742-0010100
 - Valve guide reamer, 5.5 mm 07HAH-PJ7A100
1. Inspect valve stem-to-guide clearance (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**).

- As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.

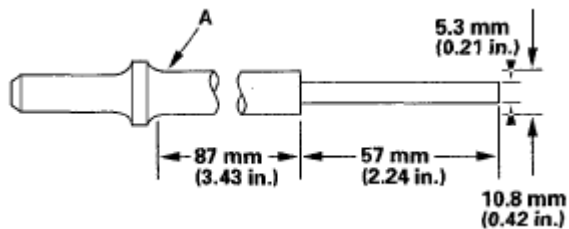


Fig. 117: Identifying Valve Guide Dimension
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

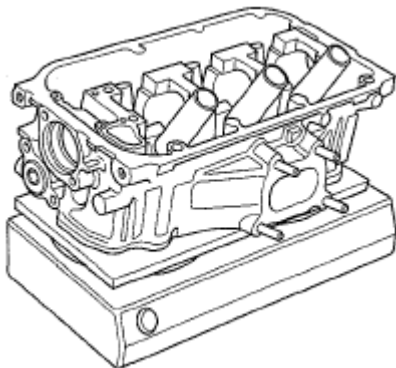


Fig. 118: Heating Cylinder Head
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

- Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm (0.1 in.) towards the combustion chamber. This will knock off some of the carbon and make removal easier. Hold the air hammer directly in line with the valve guide to prevent damaging the driver. Wear safety goggles or a face shield.
- Turn the head over, and drive the guide out toward the camshaft side of the head.

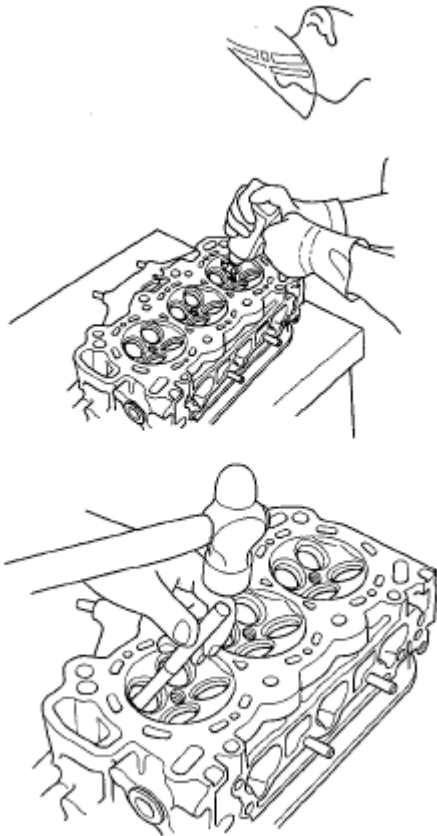


Fig. 119: Removing Valve Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool to drive the guide 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: 21.20-22.20 mm (0.835-0.874 in.)

Exhaust: 20.60-21.60 mm (0.811-0.850 in.)

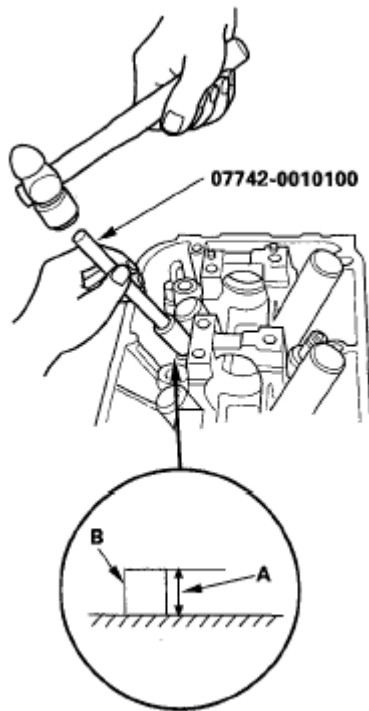


Fig. 120: Installing Valve Guide
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

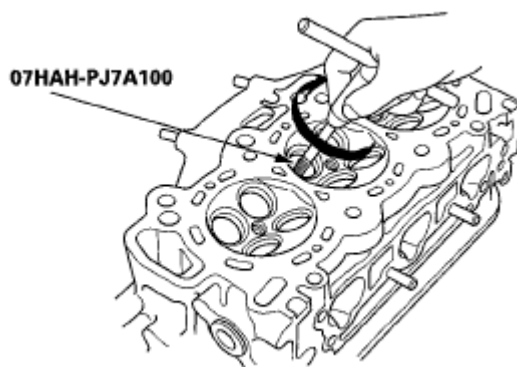


Fig. 121: Rotating Reamer Clockwise
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.

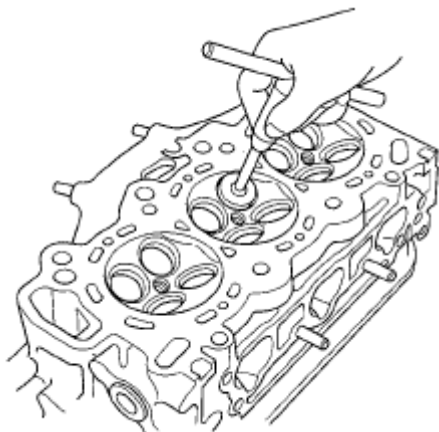


Fig. 122: Removing Valve Seats In Cylinder Head Using Valve Seat Cutter
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
4. Bevel the upper edge of the seat with the 30° cutter and the lower edge of the seat with the 67.5° cutter (intake seat) or the 60° cutter (exhaust seat). Check the width of the seat and adjust accordingly.

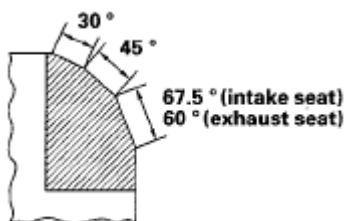


Fig. 123: Identifying Valve Seats Cutter Angle
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Seat Width

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

Service Limit: 2.00 mm (0.079 in.)

6. After resurfacing the seat, inspect 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.

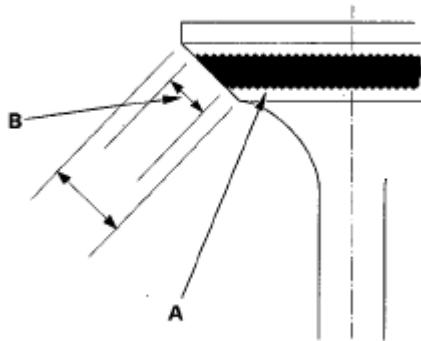


Fig. 124: Identifying Prussian Blue Compound On Valve Face
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 45° cutter to restore seat width.

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

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

Intake Valve Stem Installed Height

Standard (New): 46.75-47.55 mm (1.841-1.872 in.)

Service Limit: 47.80 mm (1.882 in.)

Exhaust Valve Stem Installed Height

Standard (New): 46.68-47.48 mm (1.838-1.869 in.)

Service Limit: 47.73 mm (1.879 in.)

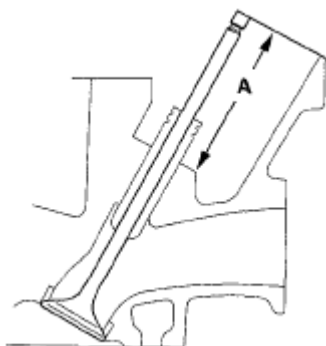


Fig. 125: Identifying Valve Stem Installed Height
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 valve guide seal installer (B).

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

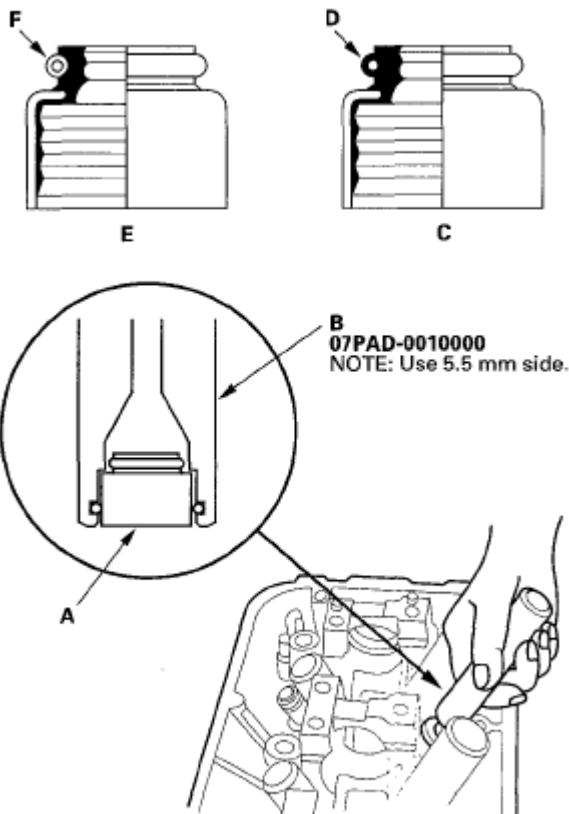


Fig. 126: Installing Valve Seals Using Valve Guide Seal Installer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

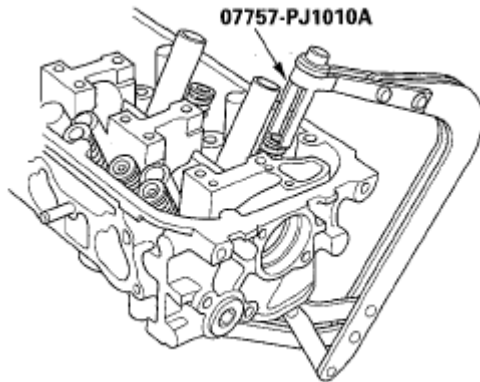


Fig. 127: Compressing Valve Spring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring compressor.
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.



Fig. 128: Tapping End Of Valve Stem With Plastic Mallet
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

1. Apply a light coat of new engine oil around the camshaft oil seal.
2. 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.

FRONT

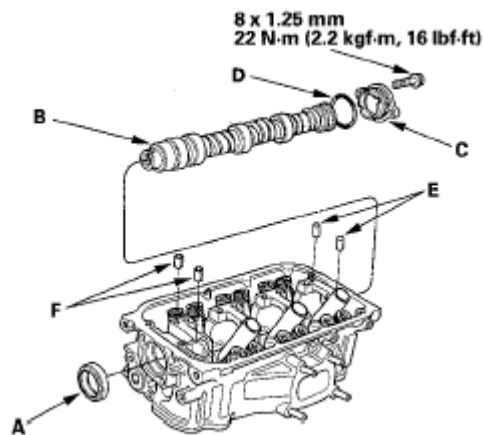


Fig. 129: Identifying Camshaft Oil Seal, Camshaft And Camshaft Thrust Cover (Front) With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

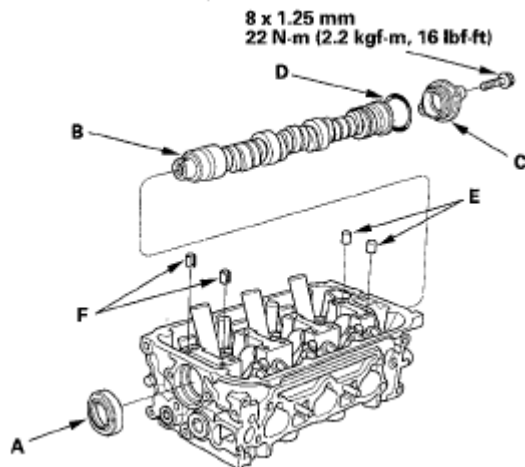


Fig. 130: Identifying Camshaft Oil Seal, Camshaft And Camshaft Thrust Cover (Rear) With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. 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.
4. Check that the oil seal lips are not distorted.
5. Install the solid dowel pins (E) and the hollow dowel pins (F).
6. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
7. Loosen the valve adjusting screws.
8. 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.
9. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

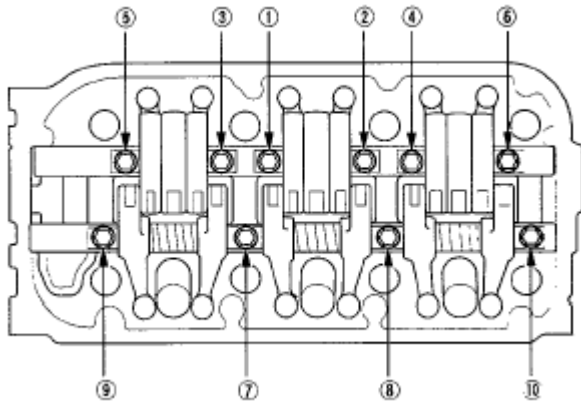
Specified Torque**8 x 1.25 mm****24 N.m (2.4 kgf.m, 17 lbf.ft)**

Fig. 131: Identifying Tightening Sequence Of Rocker Arm Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

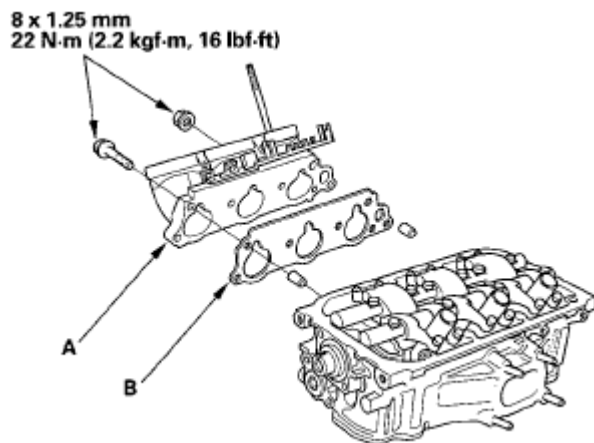


Fig. 132: Identifying Injector Base With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. 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).

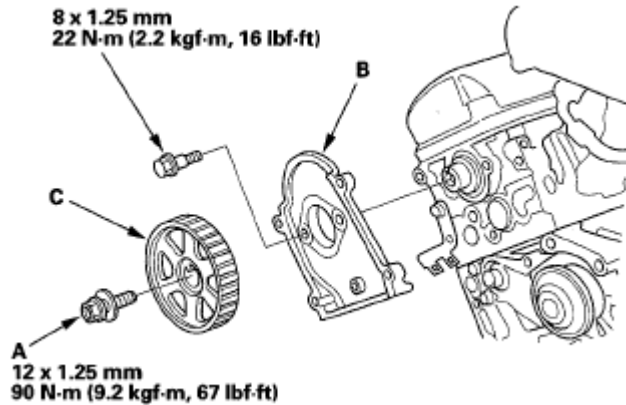


Fig. 133: Identifying Back Cover And Camshaft Pulley With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD INSTALLATION

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

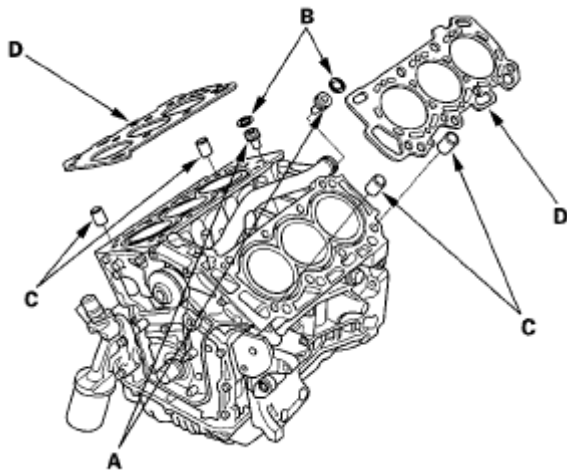


Fig. 134: Identifying Oil Control Orifices, Dowel Pins And O-Rings
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the dowel pins (C) and new cylinder head gaskets (D).
4. Clean the timing belt pulleys.
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.

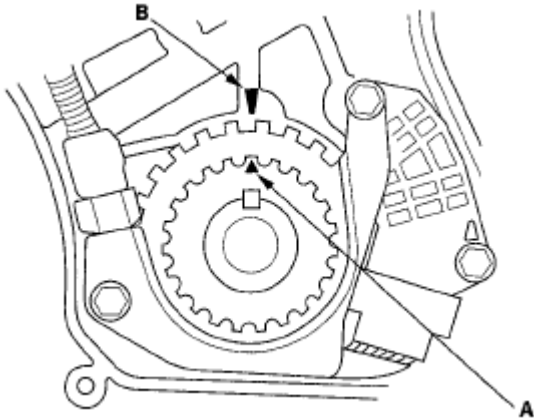


Fig. 135: Aligning TDC Mark On Tooth Of Timing Belt Drive Pulley With Oil Pump Pointer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

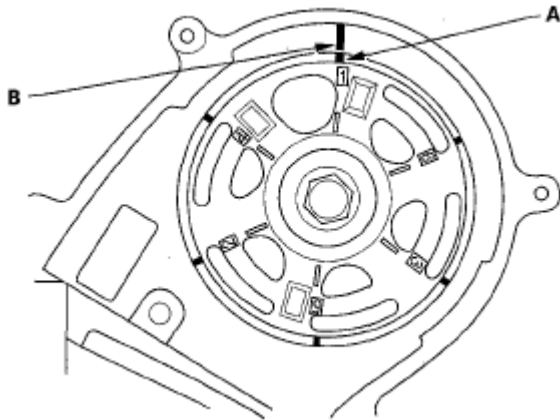


Fig. 136: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Front)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

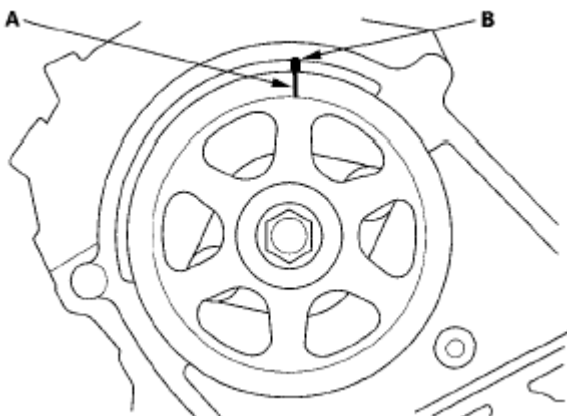


Fig. 137: Aligning TDC Marks On Camshaft Pulleys With Back Covers Pointers (Rear)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cylinder heads on the engine block.
8. Install the cylinder head bolts:
 - 6 point cylinder head bolt: Go to step 9
 - 12 point cylinder head bolt: Go to step 11

NOTE: Head bolt types must be all the same type on the cylinder head. Do not mix head bolt types.

Tightening sequence for 6 point cylinder head bolts

9. Apply new engine oil to the threads and flanges of the cylinder head bolts.
10. Tighten the cylinder head bolts sequentially in three steps.

NOTE: Perform each step twice.

1st Step Torque: 39 N.m (4.0 kgf.m, 29 lbf.ft)

2nd Step Torque: 69 N.m (7.0 kgf.m, 51 lbf.ft)

3rd Step Torque: 98.1 N.m (10.0 kgf.m, 72.3 lbf.ft)

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

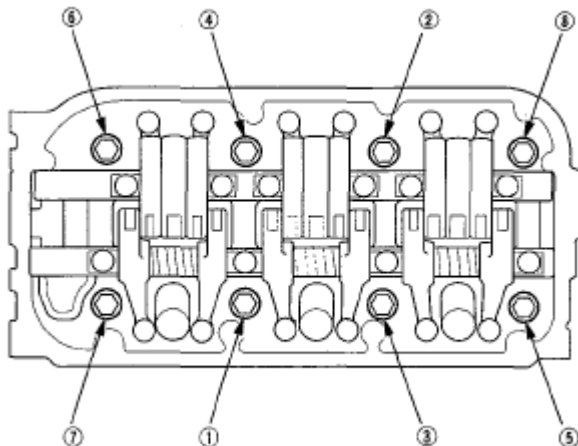


Fig. 138: Identifying Tightening Sequence Of Cylinder Head Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Tightening sequence for 12 point cylinder head bolts

11. Measure the diameter of each cylinder head bolt at point A and point B.

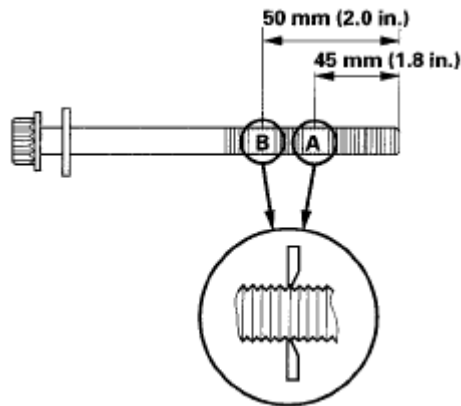


Fig. 139: Identifying Diameter Of Cylinder Head Bolt (Checking Bolt Stretch)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. If either diameter is less than 11.3 mm (0.44 in.), replace the cylinder head bolt.
13. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
14. Tighten the cylinder head bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft). Use a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

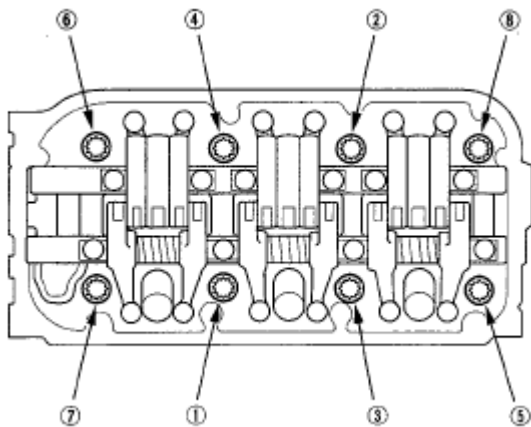


Fig. 140: Identifying Tightening Sequence Of Cylinder Head Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 11 of the procedure. Do not loosen it back to the specified angle.

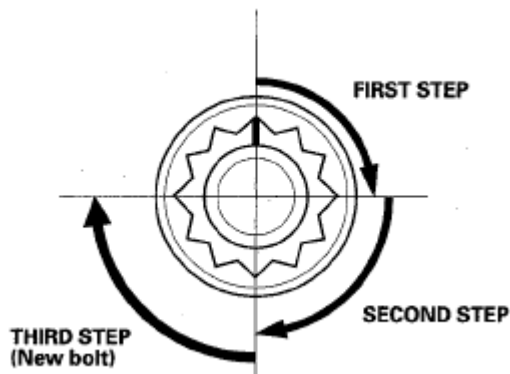


Fig. 141: Identifying Tightening Steps Of Cylinder Head Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Install the connecting pipe (A) and water passage (B), using the O-rings (C) and new gaskets (D).

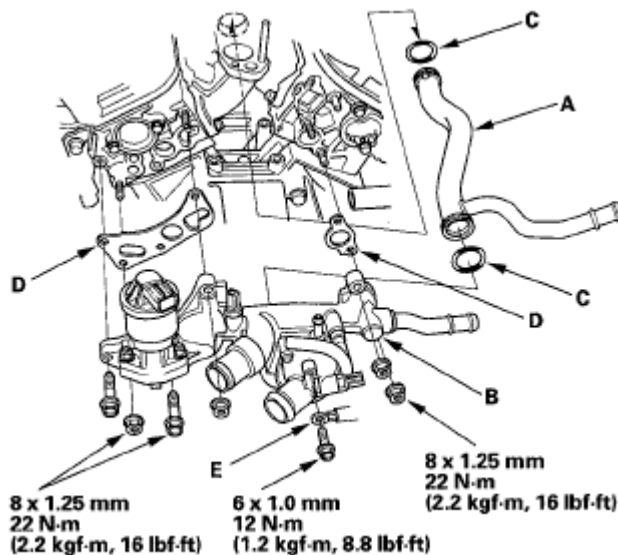
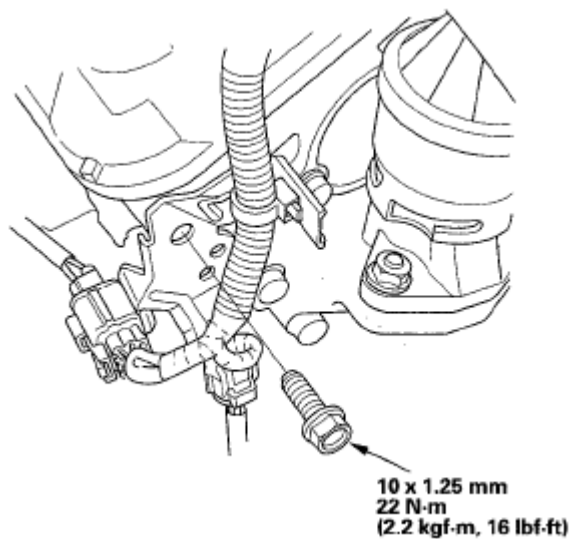


Fig. 142: Identifying Connecting Pipe, Water Passage, O-Rings, Gaskets And Ground Cable With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

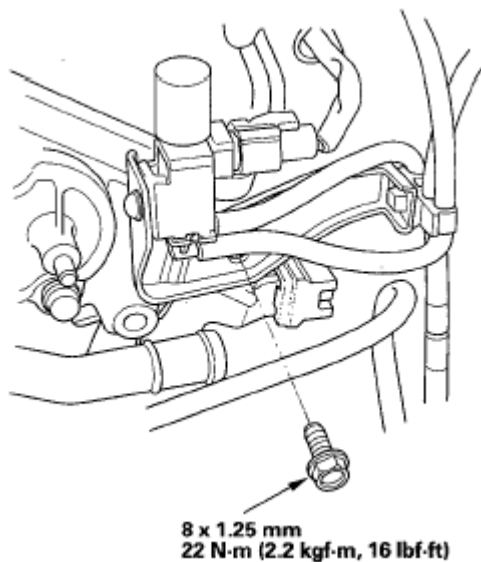
17. Install the ground cable (E).
18. Install the front warm up three way catalytic converter (front WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**) and rear warm up three way catalytic converter (WU-TWC) (see **REAR**).
19. Install the fuel rails (see **INJECTOR REPLACEMENT**).
20. Install the connector bracket to the front cylinder head.



10 x 1.25 mm
22 N-m
(2.2 kgf-m, 16 lbf-ft)

Fig. 143: Identifying Connector Bracket Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the harness clamp bracket to the rear cylinder head.



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

Fig. 144: Identifying Harness Clamp Bracket Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the harness clamp (A).

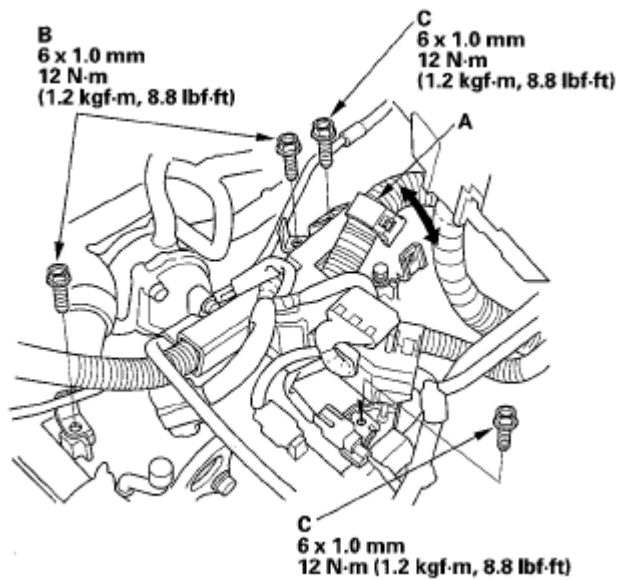


Fig. 145: Identifying Harness Clamp With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the two bolts (B) securing the vacuum line.
24. Install the two bolts (C) securing harness holder.
25. Install the heater hoses (A) and water bypass hose (B).

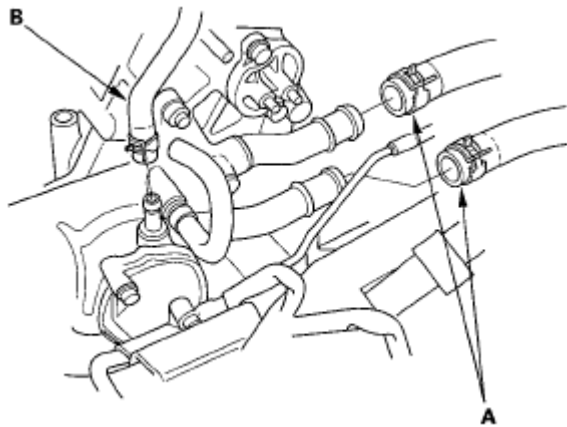


Fig. 146: Identifying Heater Hoses And Water Bypass Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Install the upper radiator hose (A) and lower radiator hose (B).

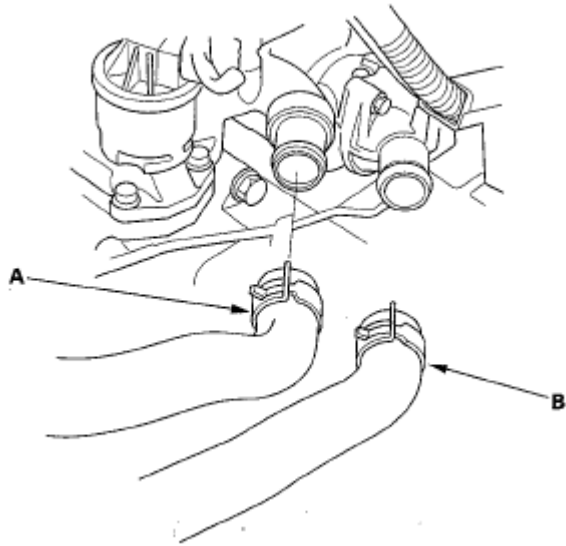


Fig. 147: Identifying Upper Radiator Hose And Lower Radiator Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Install the purge joint.

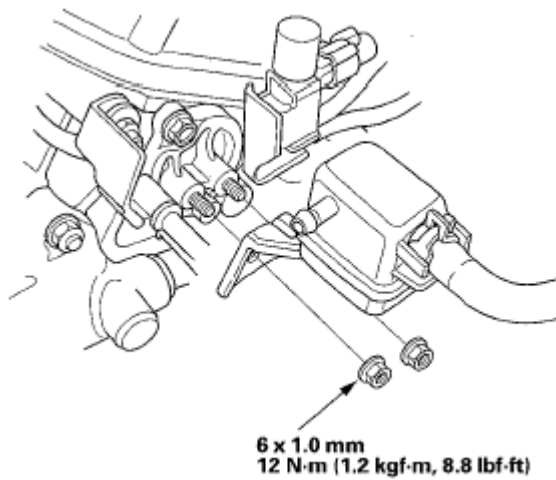


Fig. 148: Identifying Purge Joint With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

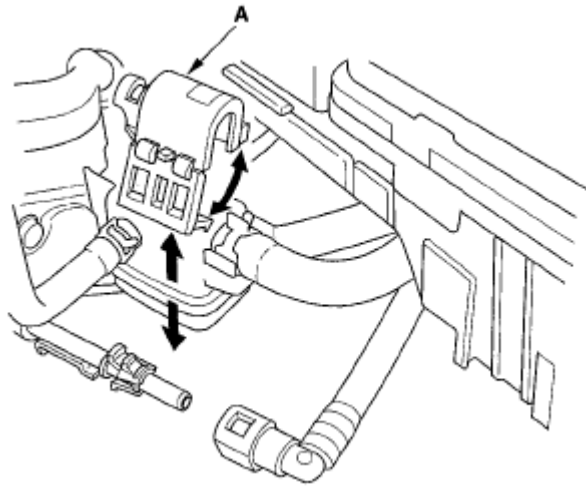


Fig. 149: Identifying Cover And Quick-Connect Fitting (Fuel Line)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Install the power steering (P/S) pump (A) and P/S hose bracket (B).

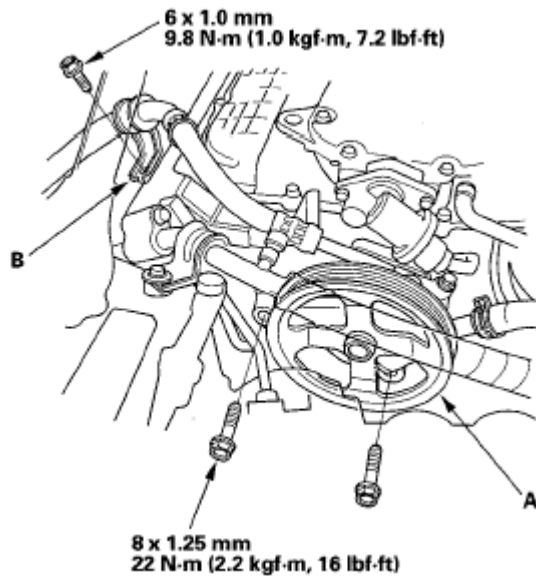


Fig. 150: Identifying Power Steering Pump And P/S Hose Bracket With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Install the timing belt (see **TIMING BELT INSTALLATION**).
31. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
32. Install the cylinder head covers (see **CYLINDER HEAD COVER INSTALLATION**).
33. Connect the engine wire harness connectors, and install the wire harness clamps to the cylinder head.
- Six injector connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Engine coolant temperature (ECT) sensor 2 connector
 - Crankshaft position (CKP) sensor connector
 - Exhaust gas recirculation (EGR) valve connector

- Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors
34. Install the intake manifold (see **INSTALLATION**).
 35. Install the alternator (see **INSTALLATION**).
 36. Install the drive belt (see **DRIVE BELT INSPECTION**).
 37. Install the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
 38. Clean the battery posts and cable terminals. Assemble them and apply grease to prevent corrosion.
 39. After installation, check that all tubes, hoses, and connectors are installed correctly.
 40. Inspect for fuel leaks. Turn the ignition switch 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.
 41. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 8 under **COOLANT CHECK**).
 42. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
 43. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
 44. Do the steering column position memorization procedure (see **STEERING COLUMN POSITION MEMORIZATION**).
 45. Enter the anti-theft codes for the audio system and the navigation system.

SEALING BOLT INSTALLATION

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

FRONT

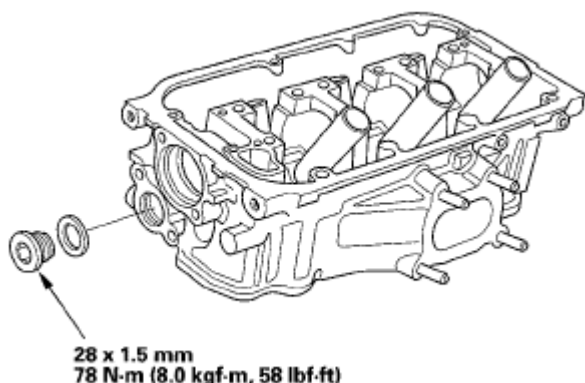


Fig. 151: Identifying Sealing Bolt (Front) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR

2007 Acura RL

2005-08 ENGINE Cylinder Head - RL

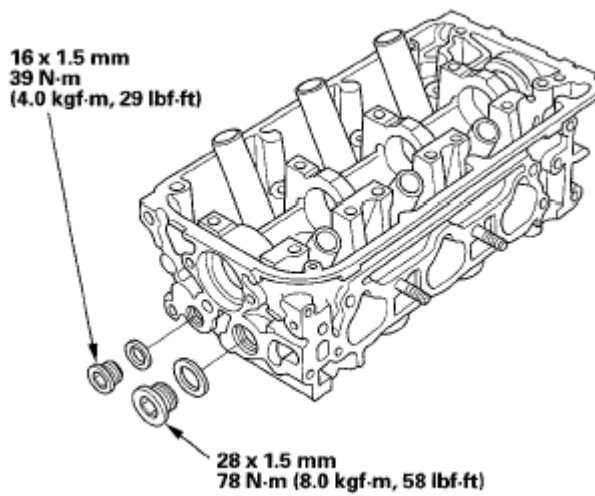


Fig. 152: Identifying Sealing Bolt (Rear) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.