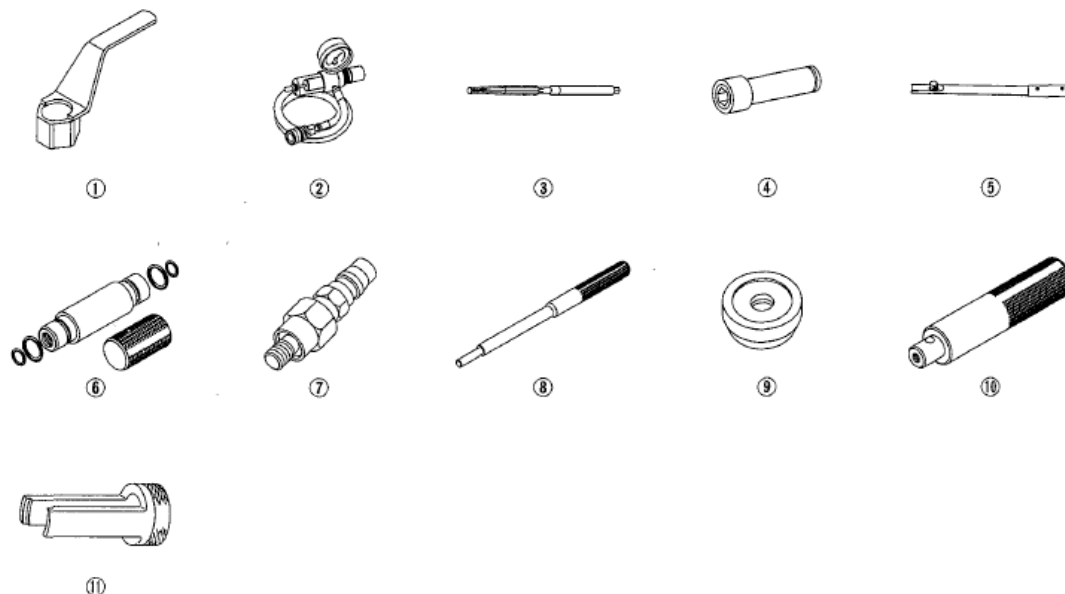


2009-12 ENGINE

Cylinder Head - Fit

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-001020B	Holder Handle	1
⑥	07PAD-0010000	Stem Seal Driver	1
⑦	070AJ-001A101	VTEC Air Adapter	1
⑧	07742-0010100	Valve Guide Driver, 5.35 mm	1
⑨	07746-0010400	Attachment, 52 x 55 mm	1
⑩	07749-0010000	Driver Handle	1
⑪	07757-PJ1010A	Valve Spring Compressor Attachment	1

**Fig. 1: Identifying Special Tools**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX

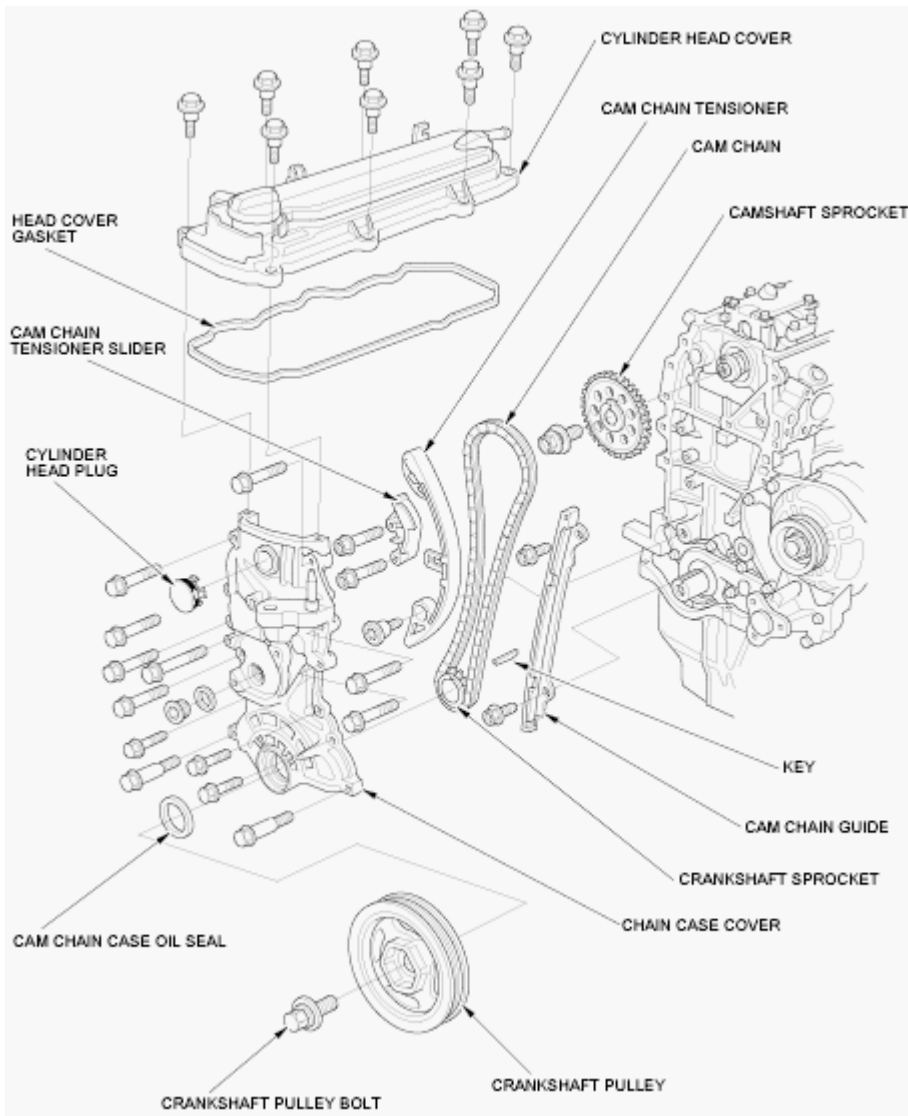


Fig. 2: Identifying Cylinder Head Replacement Components (1 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

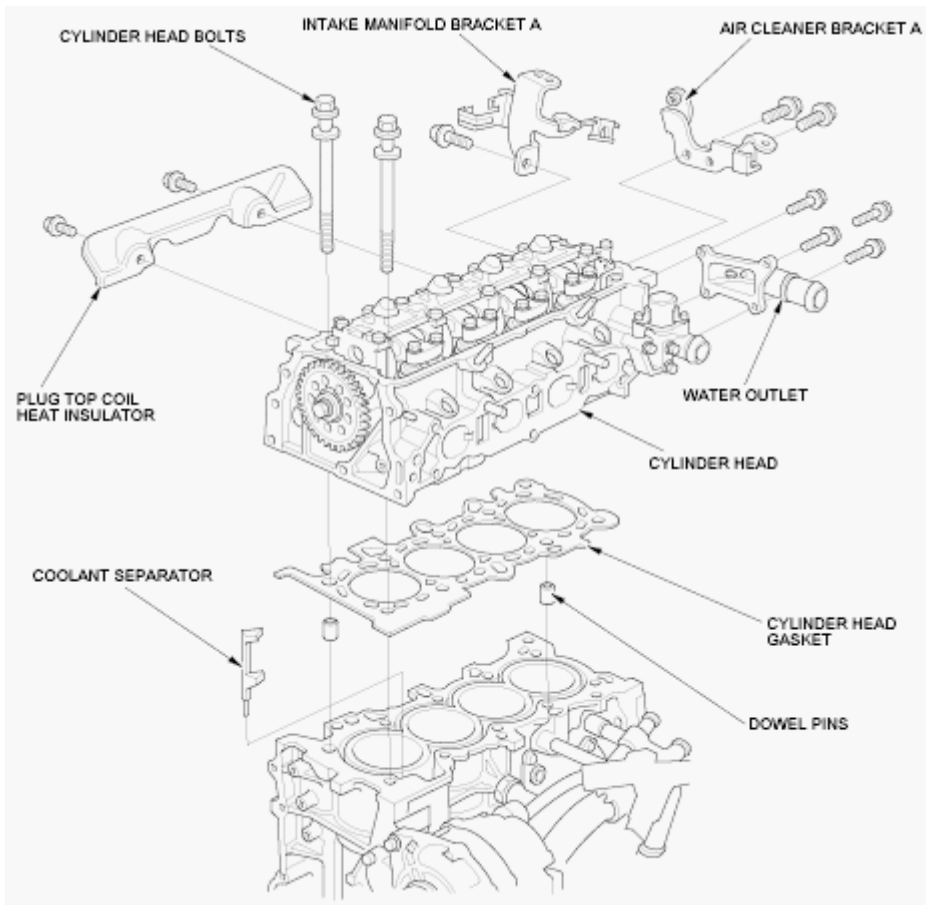


Fig. 3: Identifying Cylinder Head Replacement Components (2 Of 3)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

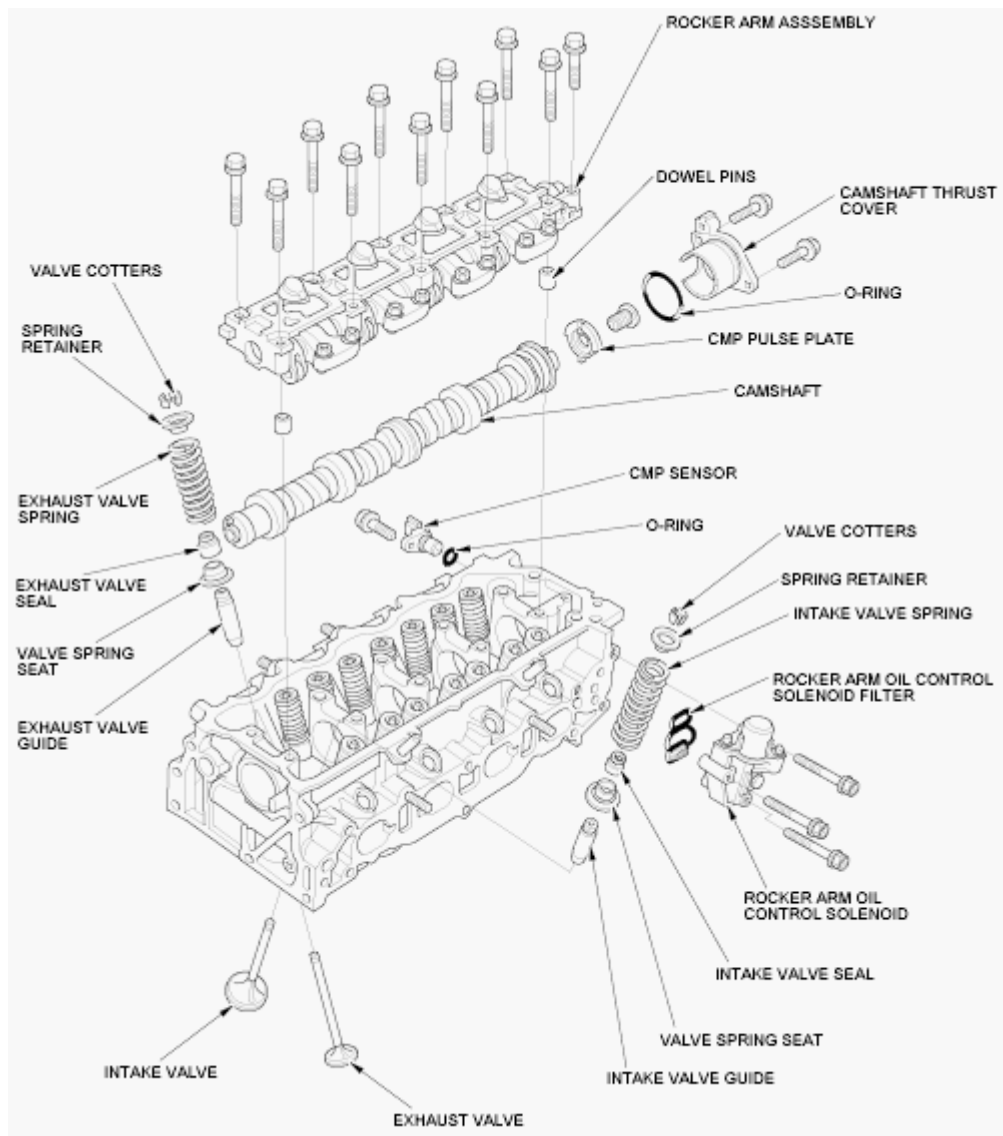


Fig. 4: Identifying Cylinder Head Replacement Components (3 Of 3)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After the inspection, you must reset the ECM/PCM. Otherwise, the ECM/PCM will continue to stop the injectors from operating. (See GENERAL TROUBLESHOOTING INFORMATION).

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0).
3. Connect the HDS to the data link connector (DLC) (see step 2 on GENERAL TROUBLESHOOTING INFORMATION).
4. Turn the ignition switch to ON (II).

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

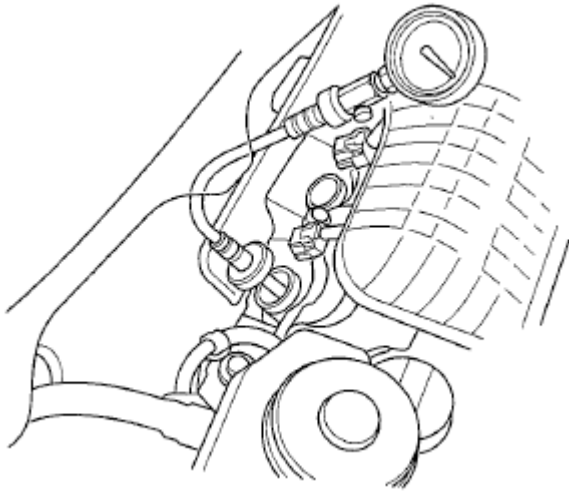


Fig. 5: Attaching Compression Gauge To Spark Plug Hole
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Compression Pressure:

Above 980 kPa (10.00 kgf/cm² , 142.2 psi)

11. Measure the compression on the remaining cylinders.

Maximum Variation:

Within 196 kPa (2.00 kgf/cm² , 28.4 psi)

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

- Damaged cylinder head gasket
 - Damaged or worn valves and seats
 - Damaged or worn piston and cylinder bore
13. Remove the compression gauge from the spark plug hole.
 14. Install the four spark plugs and the four ignition coils.
 - 15.
 16. Select ECM/PCM reset in the PGM-FI INSPECTION menu (see **HDS CLEAR COMMAND**) to cancel the ALL INJECTORS STOP function on the HDS.

VTEC ROCKER ARM TEST

SPECIAL TOOLS REQUIRED

- Air pressure regulator 07AAJ-PNAA101
 - VCM air adapter 070AJ-001A101
1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
 2. Rotate the crankshaft pulley clockwise. Make sure that the primary rocker arm (A) and the secondary rocker arm (B) are separated and that the primary rocker arm should move independently.
 - If the primary rocker arm and the secondary rocker arm move together, remove the primary rocker arm and the secondary rocker arm as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly (see **ROCKER ARM AND SHAFT INSPECTION**). If any rocker arm needs replacing, replace the rocker arm set, then retest.
 - If all the primary rocker arms and secondary rocker arms move freely, go to step 3.

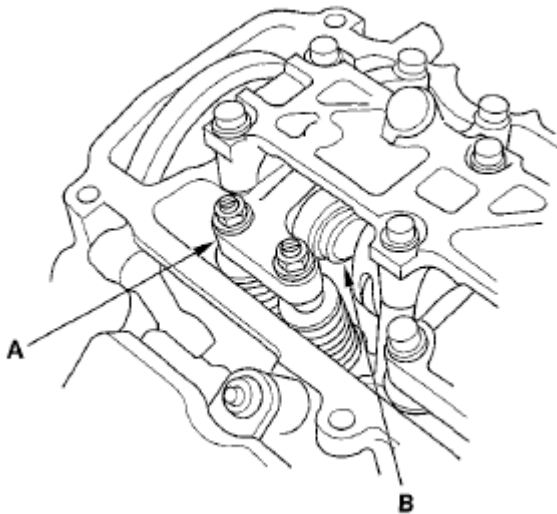


Fig. 6: Identifying Primary Rocker Arms & Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.08 kgf/cm², 58.0

psi).

4. Inspect the valve clearance (see step 7 **VALVE CLEARANCE ADJUSTMENT**).
5. Install the VCM air adapter (A) to the inspection hole, then connect the air pressure regulator (B) as shown below.

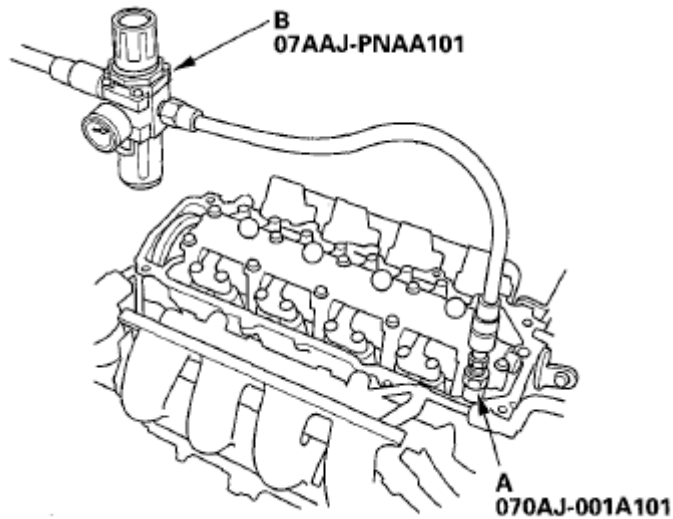


Fig. 7: Identifying VTEC Air Adapter & Air Pressure Regulator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Air Pressure:

340 kPa (3.47 kgf/cm² , 59.3 psi)

7. With the specified air pressure applied, rotate the crankshaft pulley clockwise. The primary rocker arm (A) should move together with the secondary rocker arm (B):
 - If the primary rocker arm and the secondary rocker arm move independently of each other, remove the primary rocker arm and the secondary rocker arm as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the rocker arm set, then retest. (see **ROCKER ARM AND SHAFT INSPECTION**). If any rocker arm needs replacing, replace the rocker arm set, then retest.
 - If all the primary rocker arms and the secondary rocker arms move together, go to step 8.

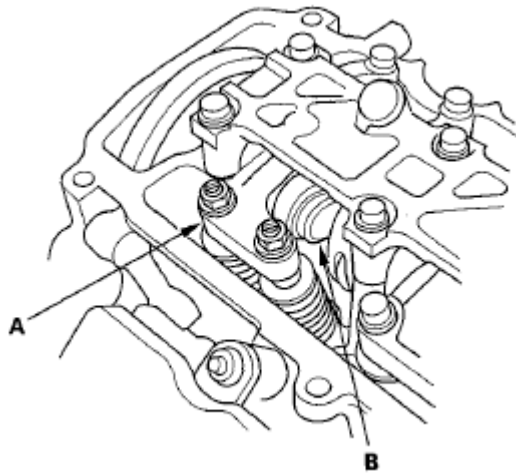


Fig. 8: Identifying Primary Rocker Arms & Secondary Rocker Arms
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the air pressure regulator and the VCM air adapter.
9. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).

VALVE CLEARANCE ADJUSTMENT

NOTE: Connect the HDS to the DLC, and monitor ECT SENSOR 1 (see GENERAL TROUBLESHOOTING INFORMATION). Adjust the valves only when the cylinder head temperature is less than 100°F (38°C).

1. Remove the cylinder head cover (see CYLINDER HEAD COVER REMOVAL).
2. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

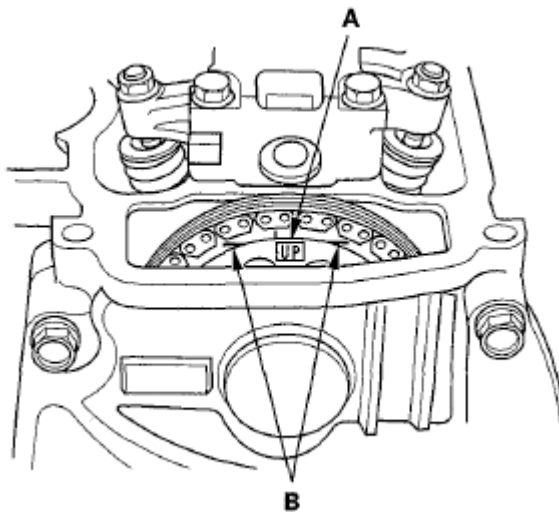


Fig. 9: Identifying Up Mark On Camshaft Sprocket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Clearance

Intake: 0.15-0.19 mm (0.006-0.007 in.)

Exhaust: 0.26-0.30 mm (0.010-0.012 in.)

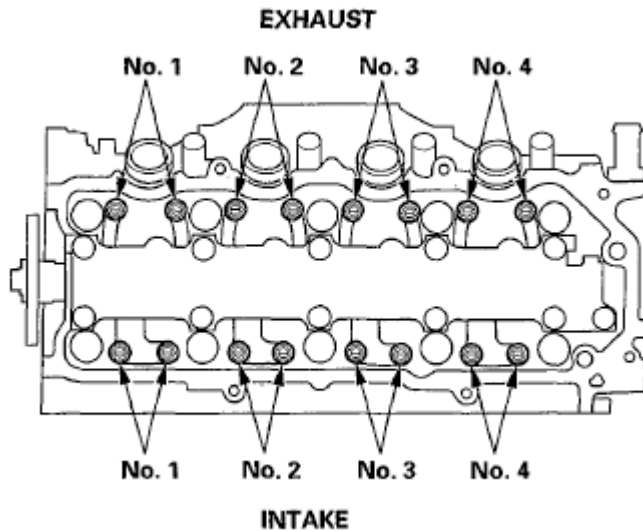


Fig. 10: Identifying Intake & Exhaust Valve

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. 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.

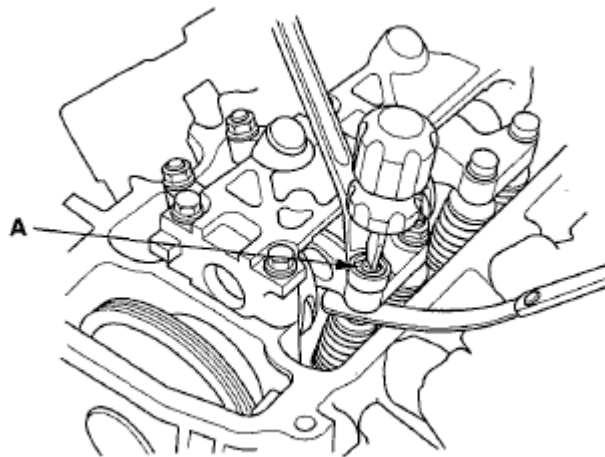


Fig. 11: Inserting Feeler Gauge Between Adjusting Screw & End Of Valve Stem On No. 1 Cylinder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

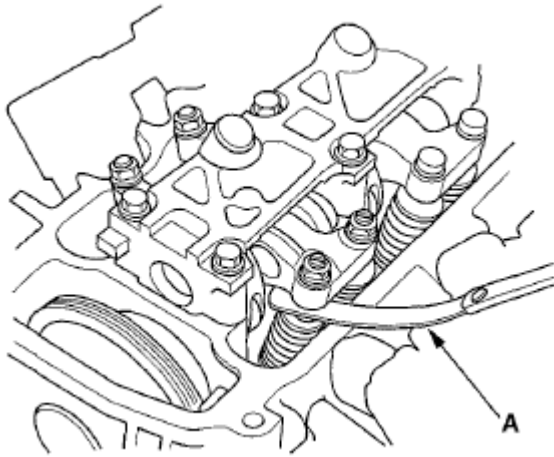


Fig. 12: Identifying Adjusting Screw

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Torque

7 x 0.75 mm, 14 N.m (1.4 kgf.m, 10 lbf.ft)

Apply new engine oil to the nut threads.

7. Rotate the crankshaft pulley clockwise. Align the No. 3 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

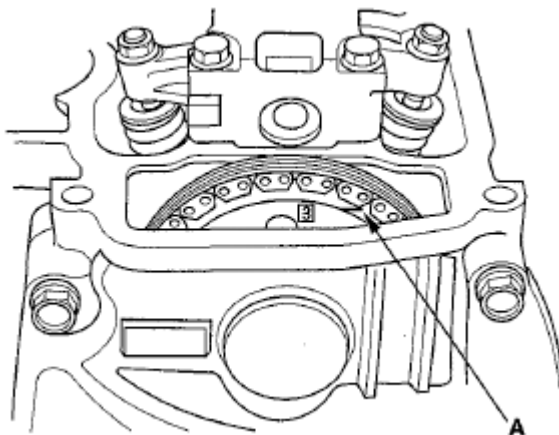


Fig. 13: Identifying TDC Groove On Camshaft Sprocket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.
9. Rotate the crankshaft clockwise. Align the No. 4 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

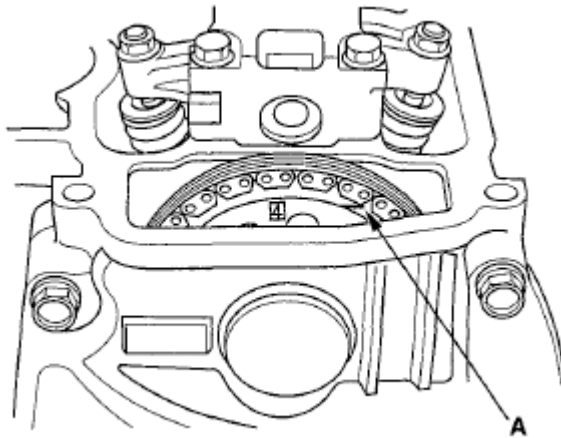


Fig. 14: Identifying No. 4 Piston TDC Groove On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.
11. Rotate the crankshaft clockwise. Align the No. 2 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.

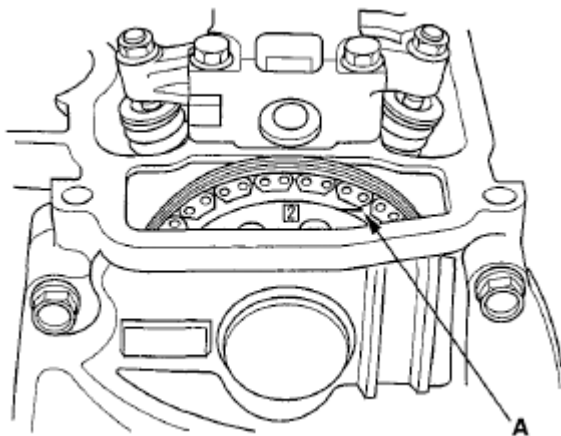


Fig. 15: Identifying No. 2 Piston TDC Groove On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.
13. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

SPECIAL TOOLS REQUIRED

- Crankshaft pulley holder 07AAB-RJAA100
- Socket, 19 mm 07JAA-001020A
- Holder handle 07JAB-001020B

REMOVAL

1. Raise the vehicle on the lift.
2. Remove the right front wheel.
3. Remove the splash shield.
4. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
5. Hold the pulley with the handle (A) and the crankshaft pulley holder (B).

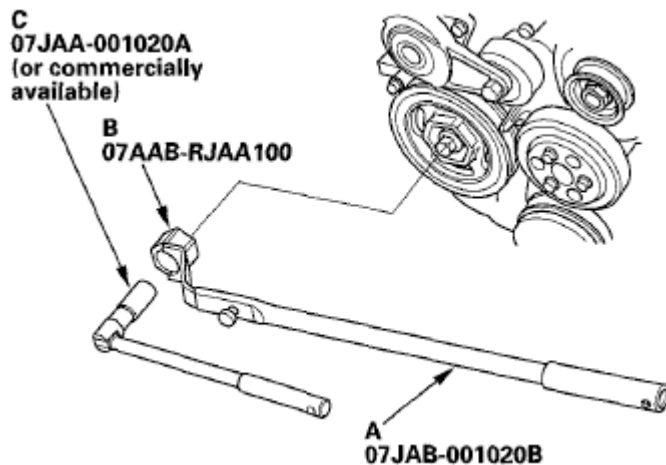


Fig. 16: Identifying Handle, Crankshaft Pulley Holder & Socket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

INSTALLATION

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

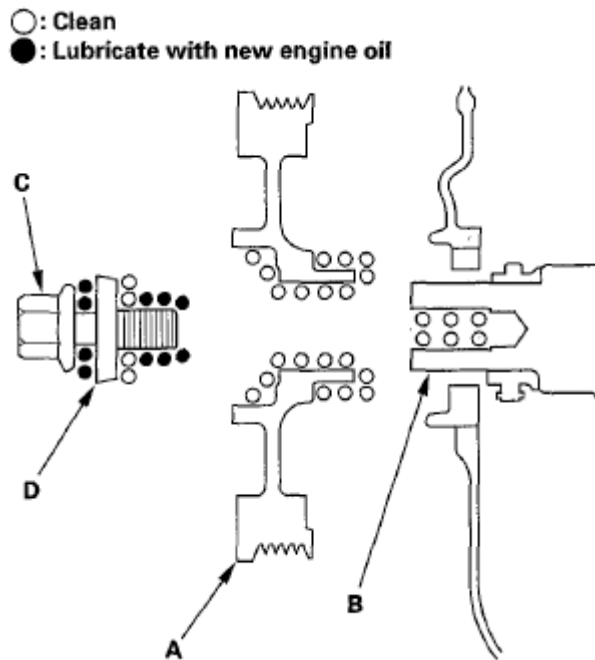


Fig. 17: Identifying Cleaning & Lubrication Area
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley.
3. When a new crankshaft or a new pulley bolt is installed: Tighten the crankshaft pulley bolt. Do not use an impact wrench.
 - Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), tighten the bolt to 177 N.m (18.0 kgf.m, 130 lbf.ft) with a torque wrench and a socket (C), then remove the bolt.
 - Tighten the bolt to 39 N.m (4.0 kgf.m, 29 lbf.ft) with a torque wrench and a socket.
 - Tighten the bolt an additional 94 °

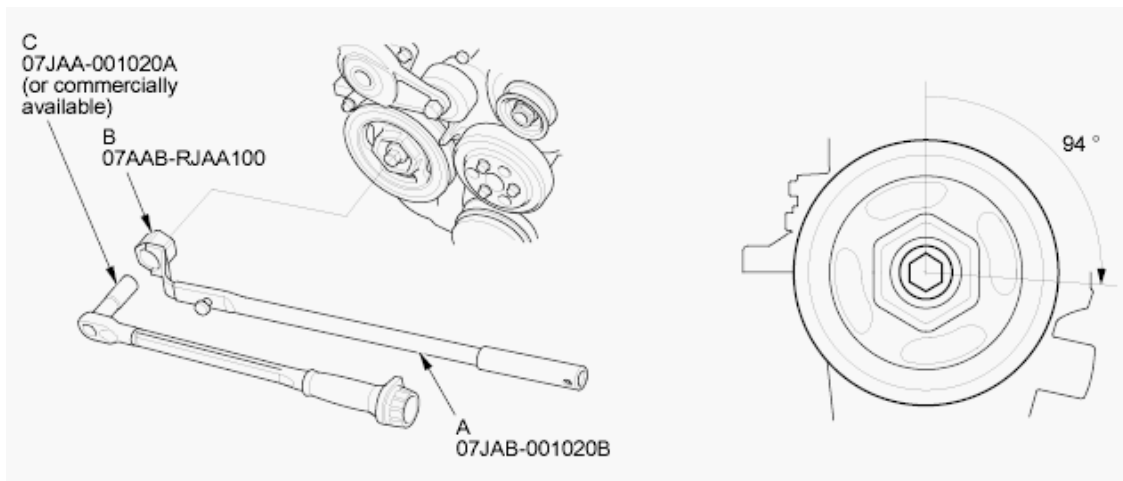


Fig. 18: Tightening Crankshaft Pulley Bolt An Additional 94 Degrees (New Crankshaft Or Pulley Bolt)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. When the crankshaft or the pulley bolt is reused: Tighten the crankshaft pulley bolt. Do not use an impact wrench.
 1. Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), then tighten the bolt to 37 N.m (3.8 kgf.m, 27 lbf.ft) with a torque wrench and a socket (C).
 2. Tighten the bolt an additional 90 °.

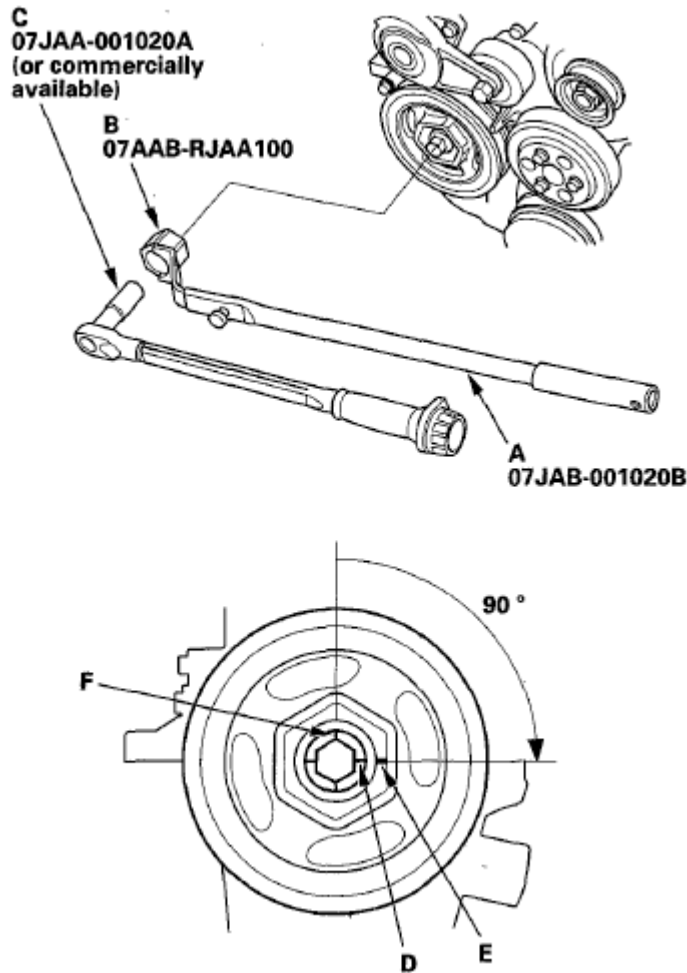


Fig. 19: Tightening Crankshaft Pulley Bolt An Additional 90 Degrees (Used Crankshaft Or Pulley Bolt)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
6. Install the splash shield.
7. Install the right front wheel.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

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

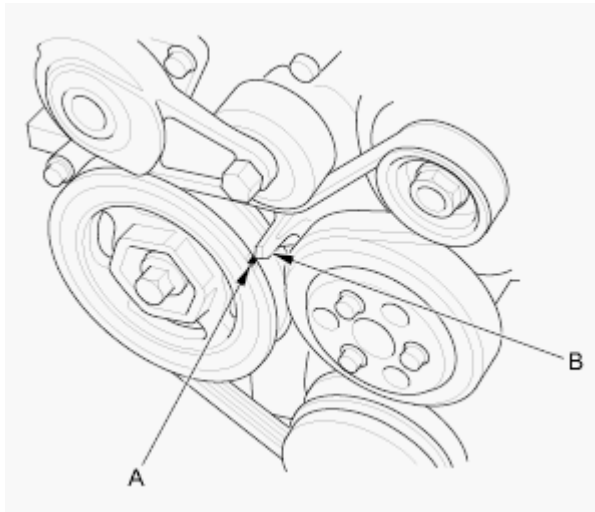


Fig. 20: Identifying Crankshaft Pulley At Top Dead Center (TDC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
3. Check the No. 1 piston at TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

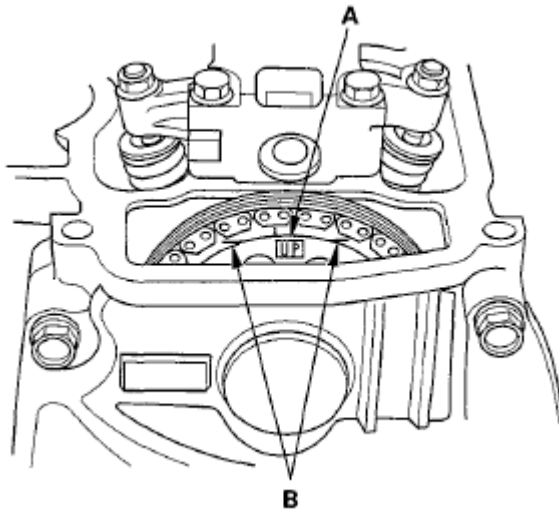


Fig. 21: Identifying UP Mark On Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the right front wheel.
5. Remove the splash shield.
6. Loosen the water pump pulley mounting bolts (A). (See **Fig. 22**)
7. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).

8. Remove the water pump pulley (B).

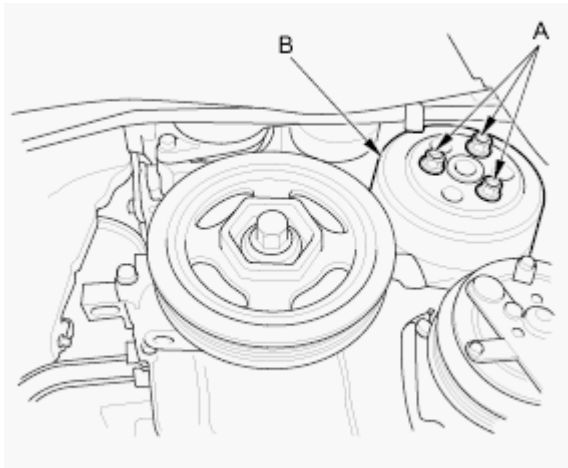


Fig. 22: Identifying Water Pump Pulley And Mounting Bolts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the crankshaft pulley (see CRANKSHAFT PULLEY REMOVAL AND INSTALLATION).
10. Remove the drive belt auto-tensioner (see DRIVE BELT AUTO-TENSIONER REMOVAL/INSTALLATION).
11. Support the engine with a jack and a wood block under the oil pan.
12. Remove the ground cable (A), then remove the side engine mount/bracket assembly (B).

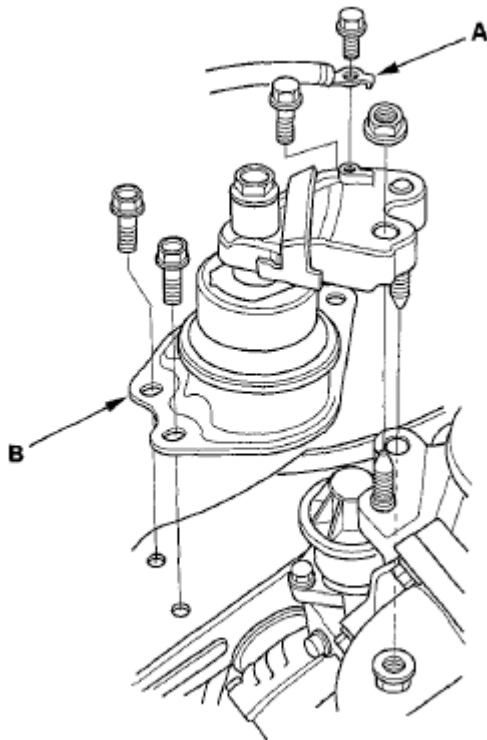


Fig. 23: Identifying Ground Cable & Side Engine Mount/Bracket Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the chain case.

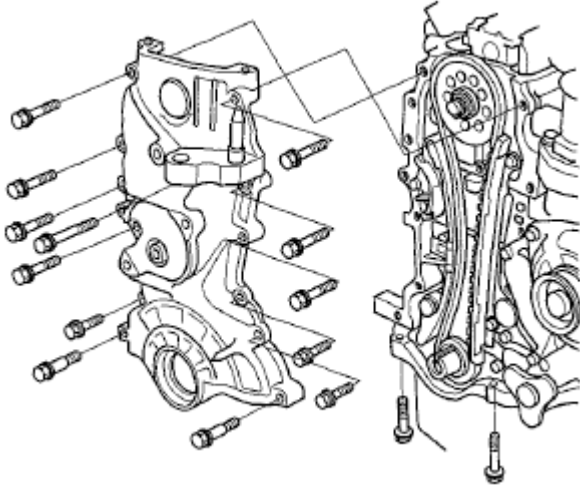


Fig. 24: Identifying Chain Case

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Measure the cam chain separation. If the distance is less than the service limit, replace the cam chain and cam chain tensioner.

Standard Distance: 19 mm (0.75 in.)

Service Limit: 15 mm (0.59 in.)

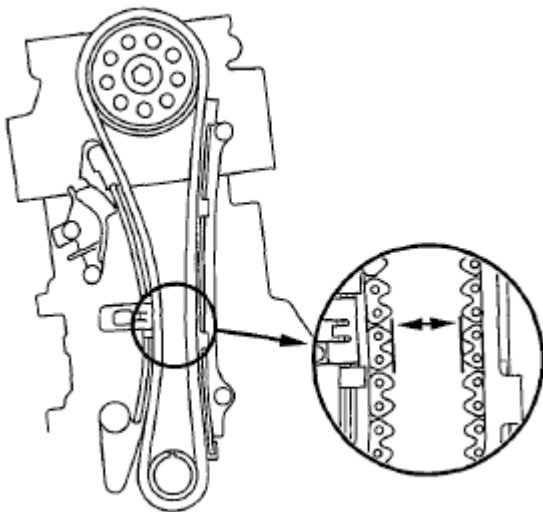


Fig. 25: Identifying Distance Between Cam Chain & Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Apply new engine oil to the sliding surface of the cam chain tensioner slider (A).

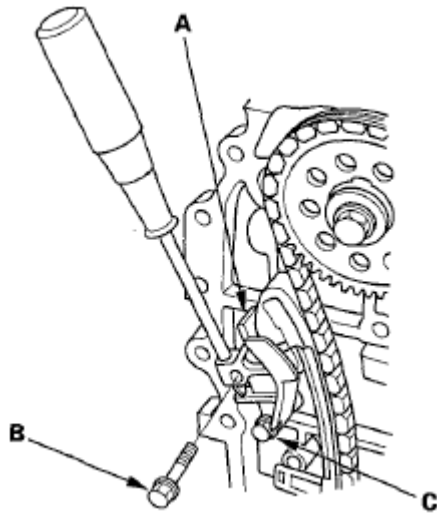


Fig. 26: Identifying Cam Chain Tensioner Slider & Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Hold the cam chain tensioner slider with the screwdriver, then remove the bolt (B), and loosen the bolt (C).
17. Remove the cam chain tensioner slider.

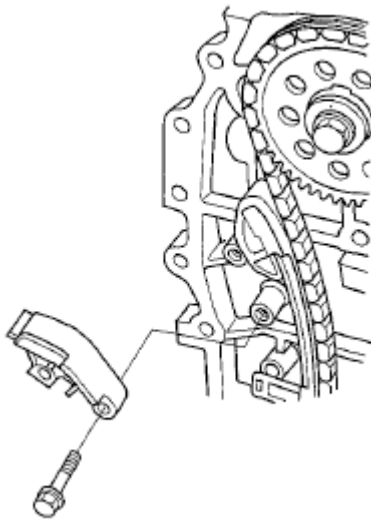


Fig. 27: Identifying Cam Chain Tensioner Slider

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

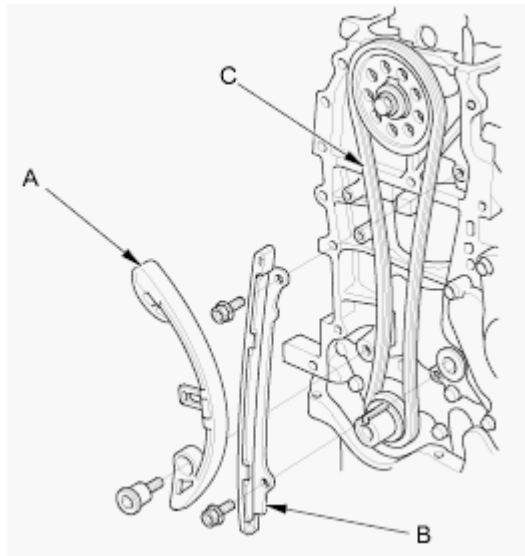


Fig. 28: Identifying Cam Chain Tensioner, Cam Chain Guide And Cam Chain
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

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

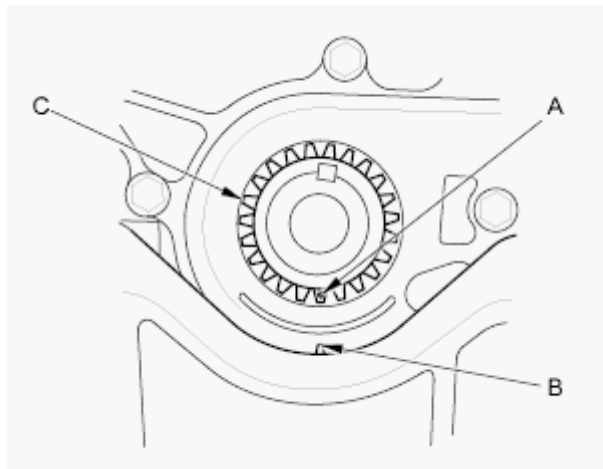


Fig. 29: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Oil Pump
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the crankshaft sprocket (C).
3. Set the camshaft to TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

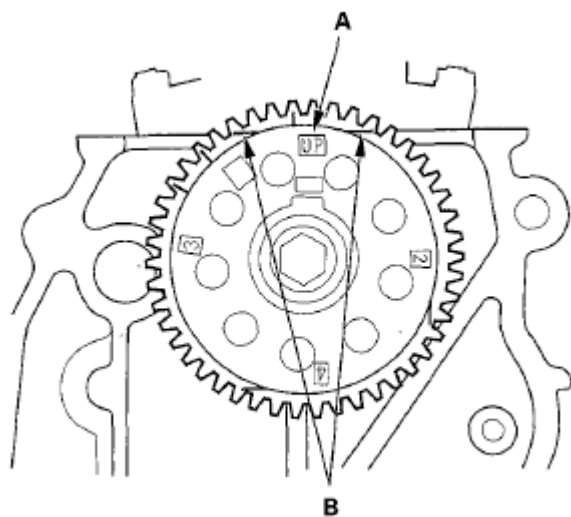


Fig. 30: Identifying UP Mark On Camshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the TDC mark (B) on the crankshaft sprocket, then install the crankshaft sprocket with the key (C) to the crankshaft.

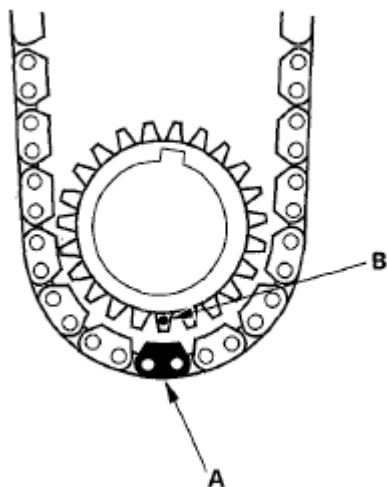


Fig. 31: Identifying TDC Mark On Crankshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the cam chain on the camshaft sprocket with the pointers (A) aligned with the three colored pieces (B) as shown below.

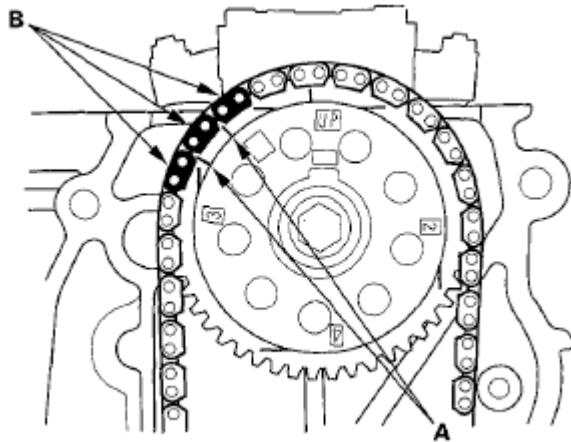


Fig. 32: Identifying Cam Chain On Camshaft Sprocket With Pointers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

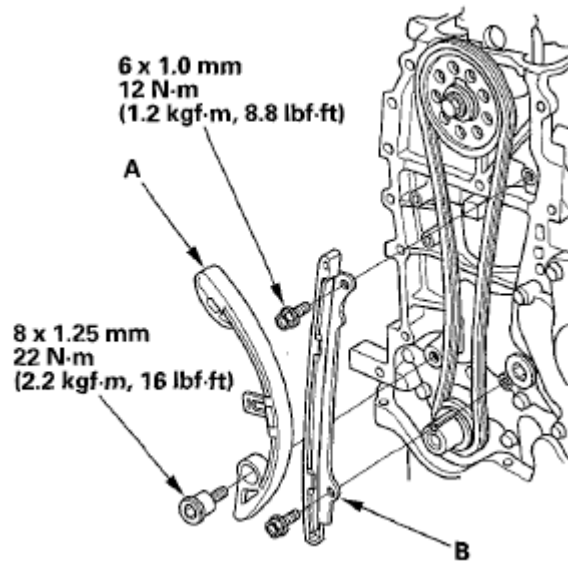


Fig. 33: Identifying Cam Chain Tensioner & Cam Chain Guide With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the cam chain tensioner slider, and loosely tighten the bolt.

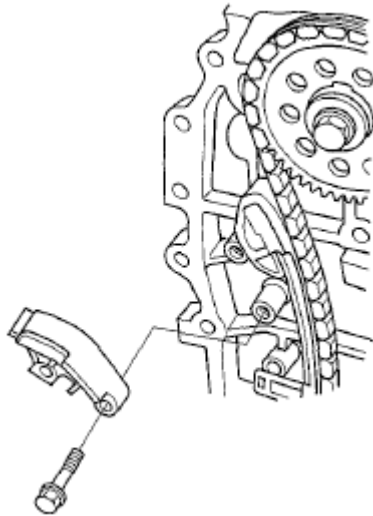


Fig. 34: Identifying Cam Chain Tensioner Slider Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Apply new engine oil to the sliding surface of the cam chain tensioner slider (A).

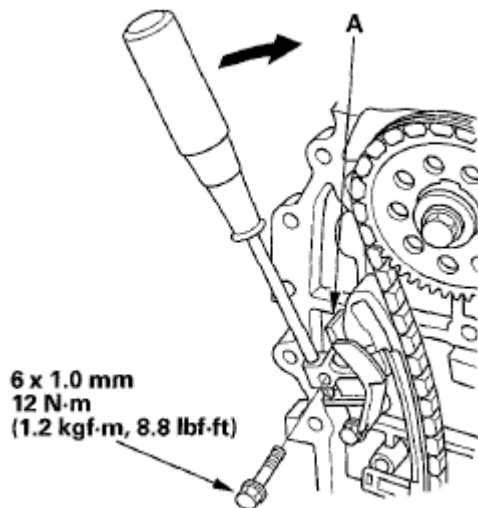


Fig. 35: Identifying Cam Chain Tensioner Slider With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Rotate the cam chain tensioner slider clockwise to compress the cam chain tensioner, and install the remaining bolt, then tighten the bolts.
10. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CHAIN CASE OIL SEAL INSTALLATION**).
11. Remove the all of the old liquid gasket from the chain case mating surfaces, the bolts, and the bolt holes.
12. Clean and dry the chain case mating surfaces.
13. Apply liquid gasket (P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009) to the engine block mating surface of the chain case and to the inside edge of the bolt holes. Install the component within 5

minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket along the broken line (B).
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

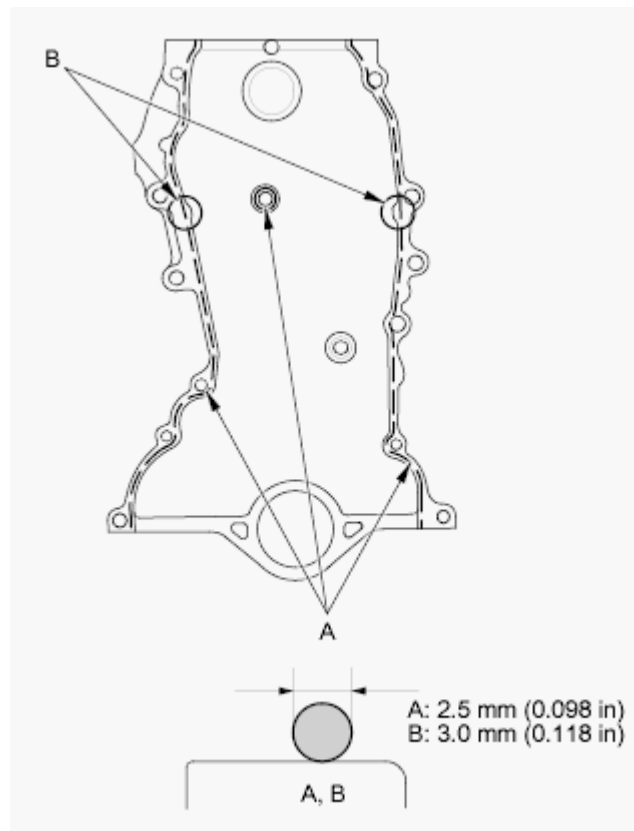


Fig. 36: Applying Liquid Gasket To Engine Block Mating Surface Of Chain Case

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the oil pan mating surface of the cam chain case and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply liquid gasket about 2.5 mm (0.098 in.) diameter bead along the broken line (A).
- Apply liquid gasket about 5.0 mm (0.20 in.) diameter bead to the

shaded area (B).

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

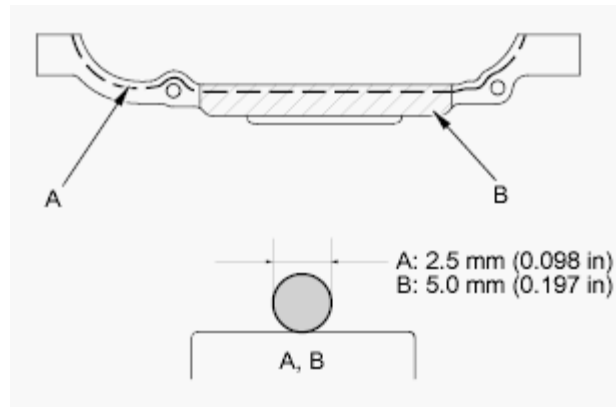


Fig. 37: Identifying Liquid Gasket Applying Area On Oil Pan Mating Surface Of Chain Case & Inside Edge Of Bolt Holes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Set the edge of the chain case (A) to the edge of the oil pan (B), then install the chain case on the engine block (C).

NOTE:

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

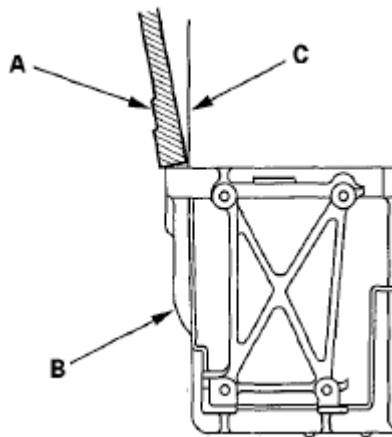


Fig. 38: Identifying Chain Case, Oil Pan & Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Tighten the chain case mounting bolts. Wipe off the excess liquid gasket on the oil pan and the chain case mating area.

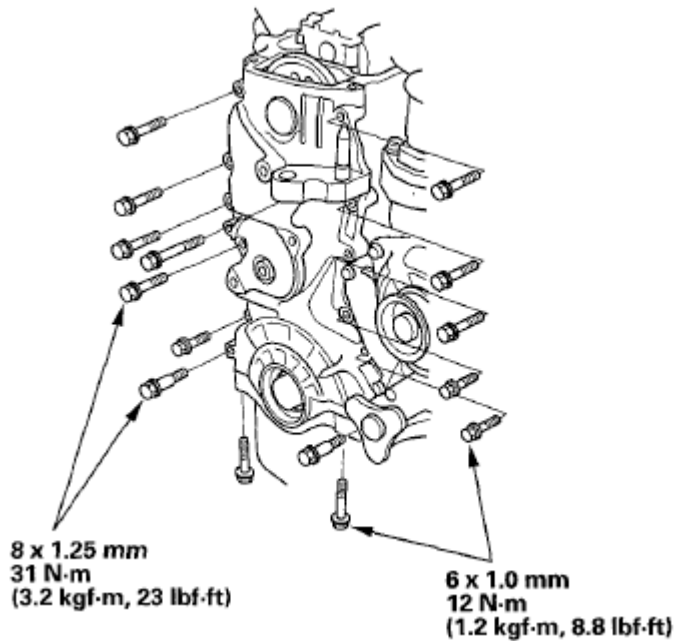


Fig. 39: Identifying Chain Case Mounting Bolts With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
18. Install the side engine mount/bracket assembly (A), then tighten the new side engine mount/bracket assembly mounting bolts (B).

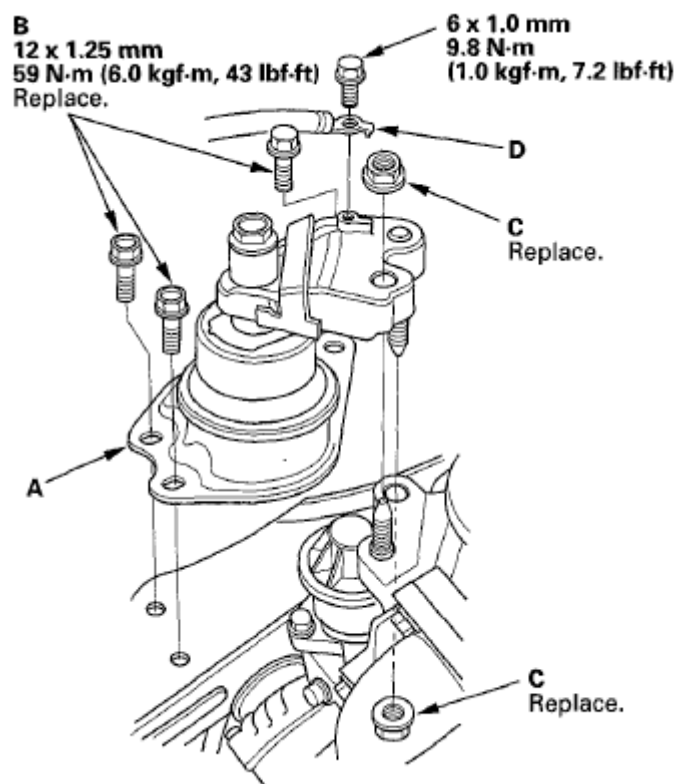


Fig. 40: Identifying Side Engine Mount/Bracket Assembly & Ground Cable With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Loosely tighten the new side engine mount/bracket assembly mounting nuts (C).
20. Install the ground cable (D).
21. Remove the jack and the wood block from under the oil pan.
22. Remove the air cleaner housing assembly (see AIR CLEANER REMOVAL/INSTALLATION).
23. Loosen the transmission mount bracket mounting bolts and nuts (A).

M/T model

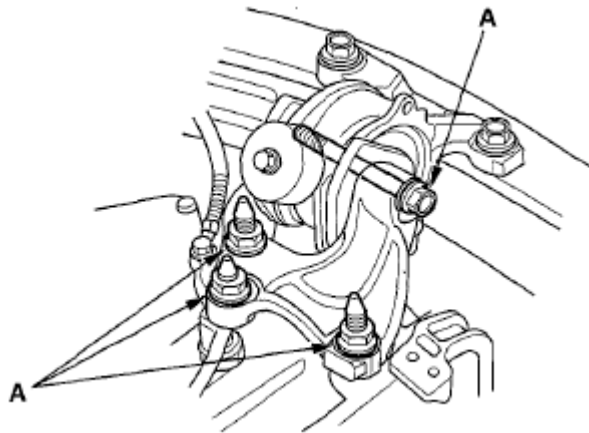


Fig. 41: Identifying Transmission Mount Bracket Mounting Bolts & Nuts - M/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T model

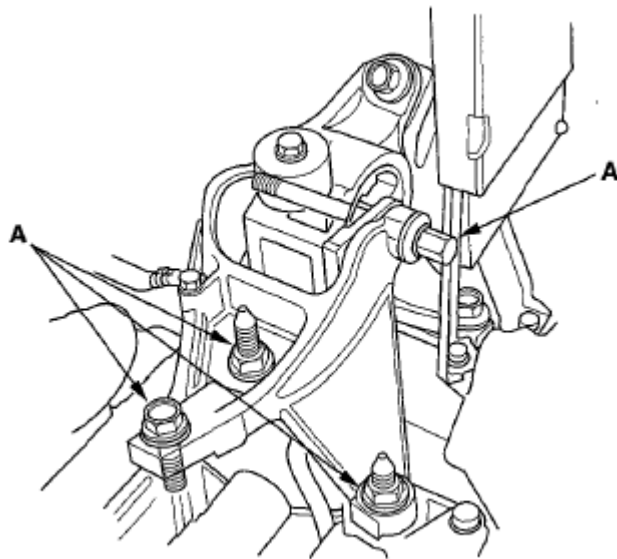


Fig. 42: Identifying Transmission Mount Bracket Mounting Bolts & Nuts - A/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Raise the vehicle on the lift.
25. Loosen the torque rod mounting bolt and nut (A).

M/T model

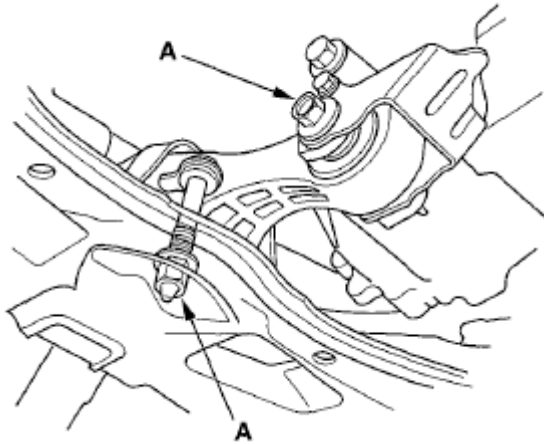


Fig. 43: Identifying Torque Rod Mounting Bolt & Nut - M/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T model

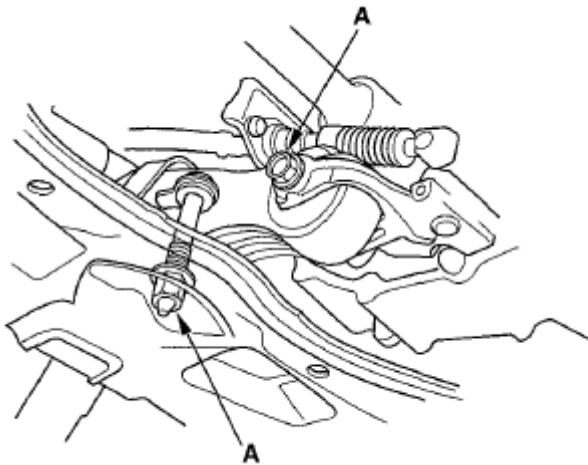


Fig. 44: Identifying Torque Rod Mounting Bolt & Nut - A/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Lower the vehicle on the lift.
27. Tighten the side engine mount/bracket assembly mounting nuts in the numbered sequence shown below.

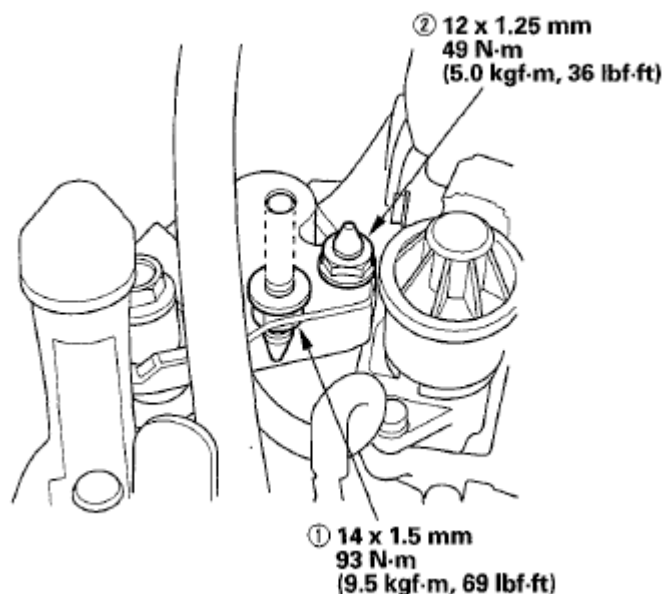


Fig. 45: Identifying Side Engine Mount/Bracket Assembly Mounting Nuts With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Tighten the transmission mount mounting bolts and nuts in the numbered sequence shown below.

M/T model

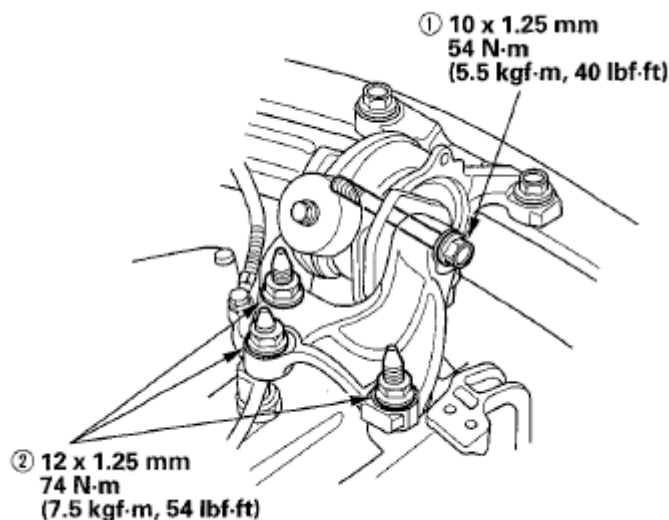


Fig. 46: Identifying Transmission Mount Mounting Bolts & Nuts Torque Sequence - M/T Model With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

A/T model

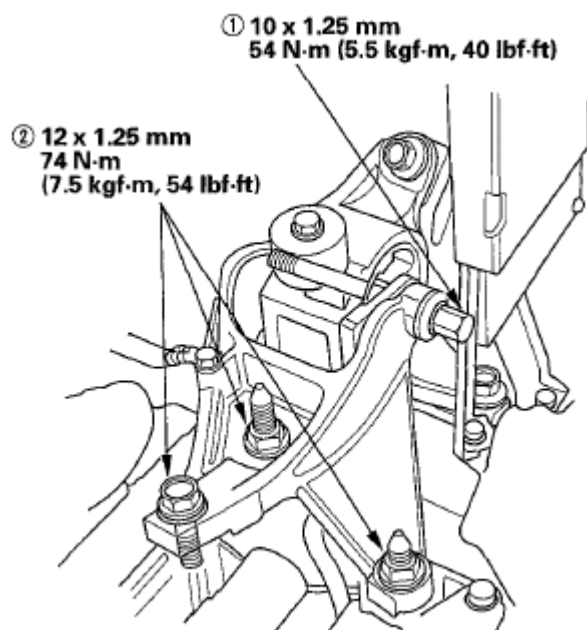


Fig. 47: Identifying Transmission Mount Mounting Bolts & Nuts Torque Sequence - A/T Model With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Raise the vehicle on the lift.
30. Tighten the torque rod mounting bolt and nut in the numbered sequence shown below.

M/T model

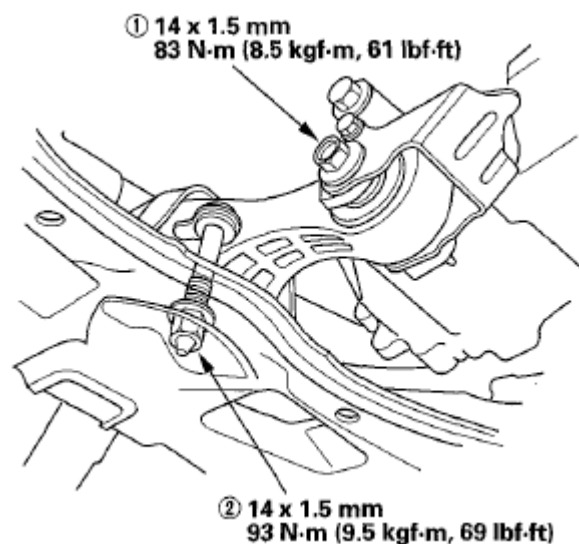


Fig. 48: Identifying Torque Rod Mounting Bolt & Nut Torque Sequence - M/T Model With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

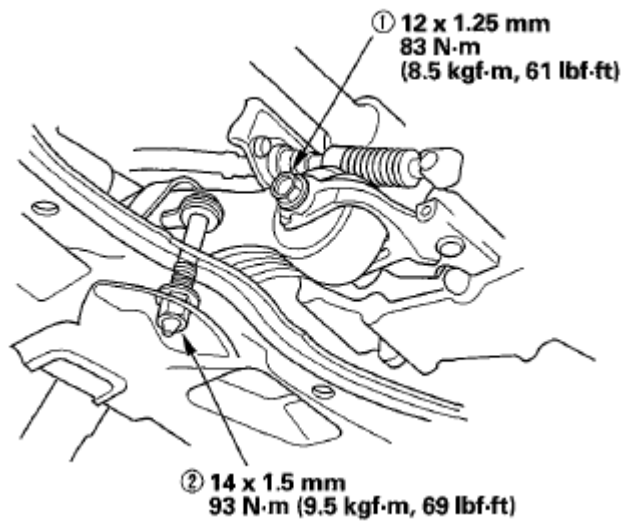
A/T model

Fig. 49: Identifying Torque Rod Mounting Bolt & Nut Torque Sequence - A/T Model With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Lower the vehicle on the lift.
32. Install the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
33. Install the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REMOVAL/INSTALLATION**).
34. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
35. Install the water pump pulley (A), and loosely install the water pump pulley mounting bolts (B).

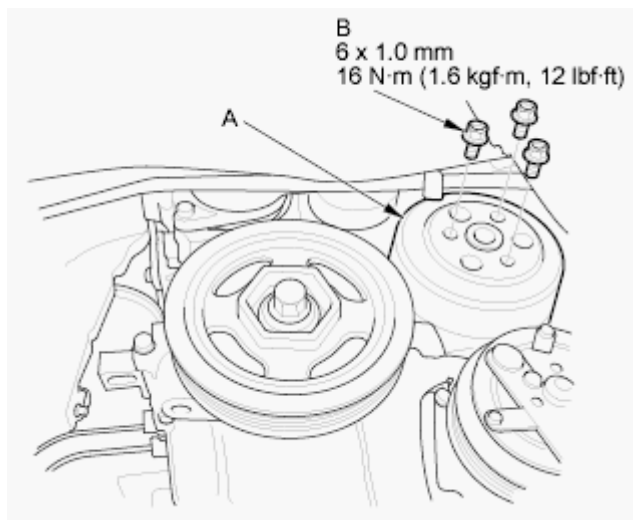


Fig. 50: Identifying Water Pump Pulley Bolts With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

36. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).

37. Tighten the water pump pulley mounting bolts (B), (see illustration above).
38. Install the splash shield.
39. Install the right front wheel.
40. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see CKP PATTERN CLEAR/CKP PATTERN LEARN).

CHAIN CASE OIL SEAL INSTALLATION

SPECIAL TOOLS REQUIRED

- Driver Handle, 15 x 135L 07749-0010000
 - Bearing Driver Attachment, 52 x 55 mm 07746-0010400
1. Clean and dry the cam chain case oil seal housing.
 2. Apply a light coat of new engine oil to the lip of the cam chain case oil seal.
 3. Use the driver handle, 15 x 135L and the bearing driver attachment, 52 x 55 mm to drive a new oil seal squarely into the cam chain case to the specified installed height.

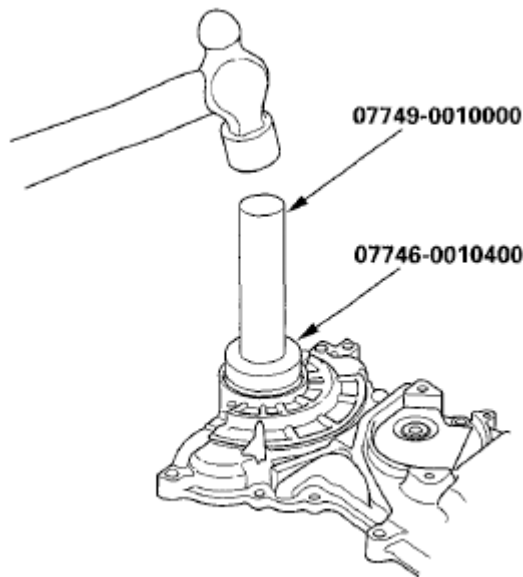


Fig. 51: Driving Oil Seal Squarely Into Chain Case Using Driver Handle & Bearing Driver Attachment

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the distance between the chain case surface and the oil seal.

Oil Seal Installed Height:

30.3-31.0 mm (1.19-1.22 in.)

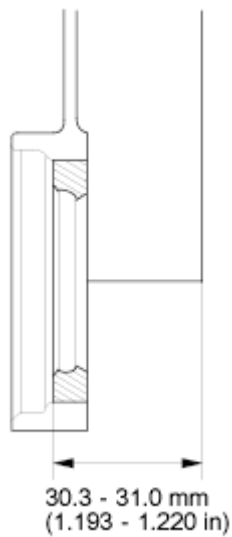


Fig. 52: Identifying Distance Between Chain Case Surface & Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold chamber (see **REMOVAL**).
2. Disconnect the four ignition coil connectors (A).
3. Remove the harness holder (B) and the breather hose (C).

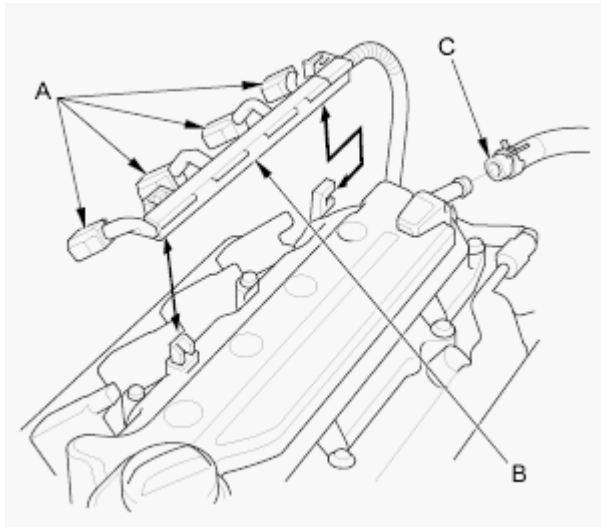


Fig. 53: Identifying Ignition Coil Connectors, Harness Holder & Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the cylinder head cover.

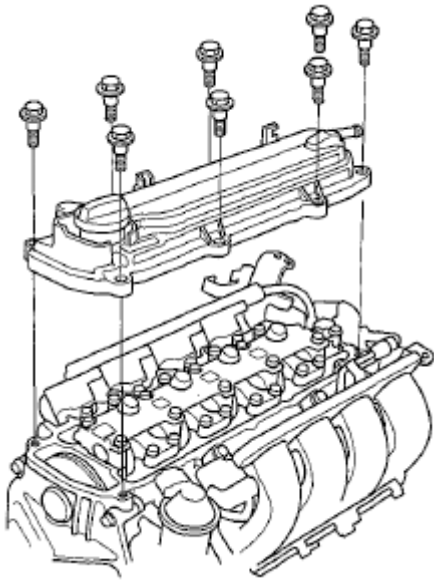


Fig. 54: Identifying Cylinder Head Cover And Fasteners
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD COVER INSTALLATION

1. Thoroughly clean the head cover gasket and the groove of the cylinder head cover.

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

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

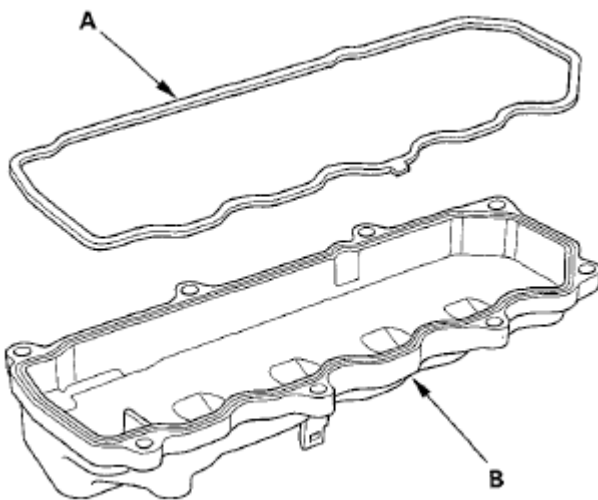


Fig. 55: Identifying Head Cover Gasket & Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove all of the old liquid gasket from the cylinder head/cam chain case mating surfaces.
4. Check the head cover contacting surfaces with a shop towel.
5. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) to the cam chain case contact areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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

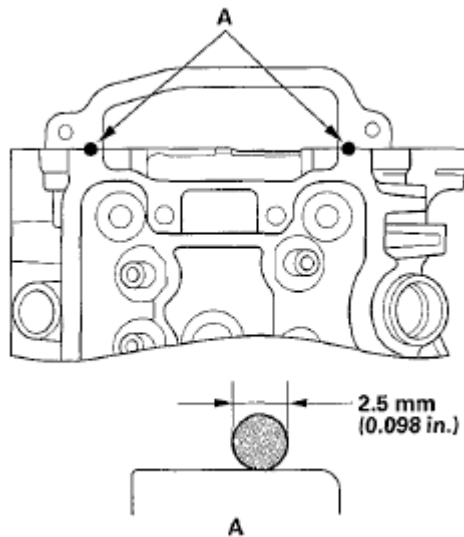


Fig. 56: Identifying Liquid Gasket Applying Area On Chain Case Contact Areas

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Place the cylinder head cover (A) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.

NOTE:

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

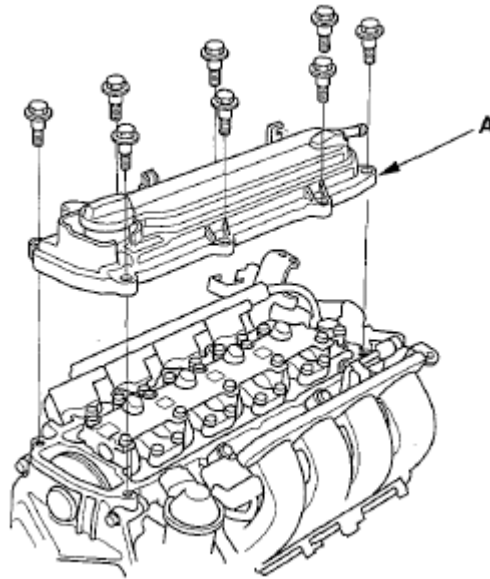


Fig. 57: Identifying Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the bolts in three steps. In the final step tighten all bolts, in sequence, to 9.8 N.m (1.0 kgf.m, 7.2 lbf.ft).

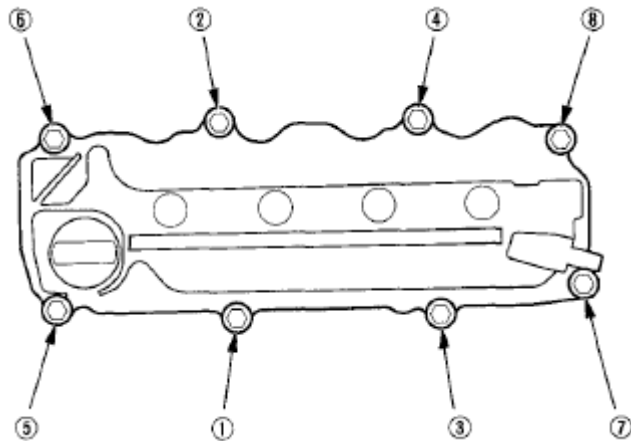


Fig. 58: Identifying Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Connect the breather hose (A), and install the harness holder (B).

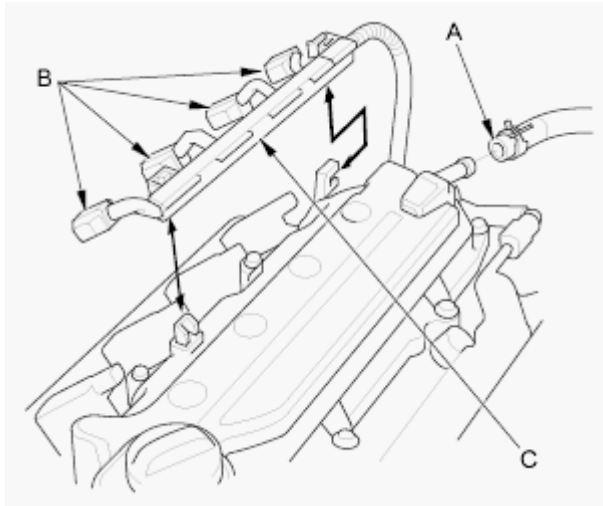


Fig. 59: Identifying Harness Holder & Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Connect the four ignition coil connectors (C).
10. Install the intake manifold chamber (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 °C) before loosening the cylinder head bolts. Connect the HDS to the DLC, and monitor ECT SENSOR 1 (see **GENERAL TROUBLESHOOTING INFORMATION**).
 - 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.
 - Keep the cam chain away from magnetic fields.
1. Relieve fuel pressure (see **FUEL PRESSURE REGULATOR REPLACEMENT**).
 2. Drain the engine coolant (see **COOLANT CHECK**).
 3. Do the battery removal procedure (see **BATTERY REMOVAL AND INSTALLATION**).
 4. Remove the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
 5. Remove the fuel feed hose clamp (A) and the quick-connect fitting cover (B), then disconnect the fuel feed hose (C) (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).

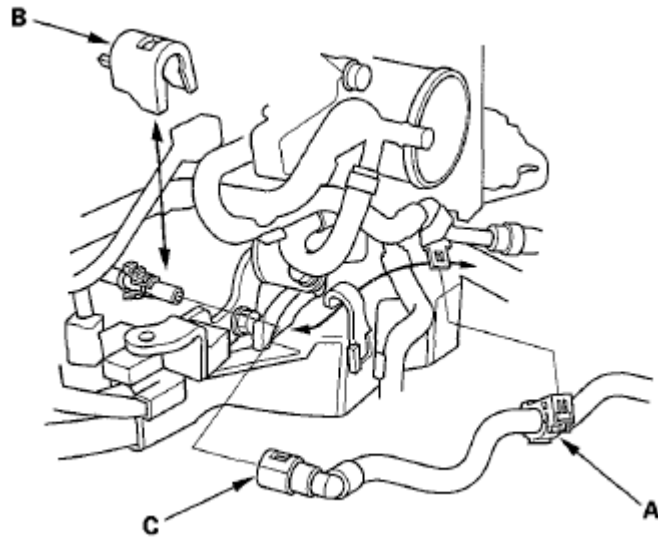


Fig. 60: Identifying Fuel Feed Hose Clamp, Quick-Connect Fitting Cover & Fuel Feed Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

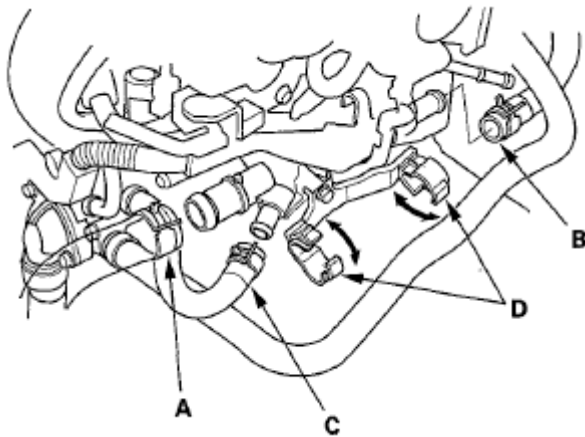


Fig. 61: Identifying Upper Radiator Hose, Heater Hose & Water Bypass Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the heater hose from the clamps (D).
8. Remove the intake manifold/chamber assembly (see **REMOVAL**).
9. Remove the warm up three way catalytic converter (WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**).
10. Remove the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor connector
 - Secondary heated oxygen sensor (secondary HO2S) connector

- Rocker arm oil control solenoid connector

11. Remove the harness holder (A) from the fuel rail.

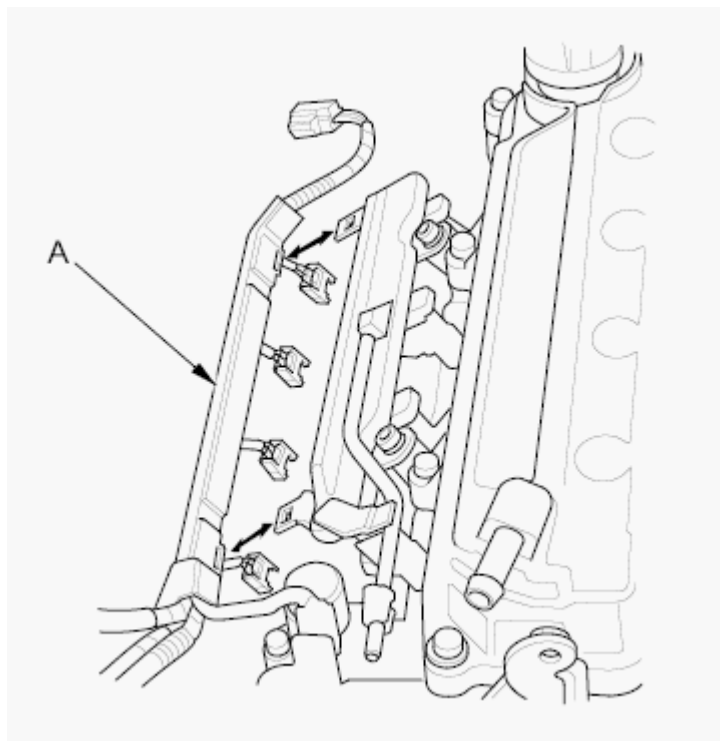


Fig. 62: Identifying Harness Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the harness holder mounting bolt (A) and the ground cable (B), then remove the harness holder (C) from the bracket.

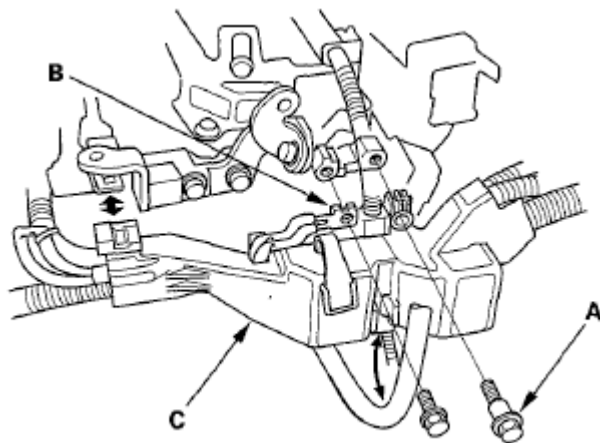


Fig. 63: Identifying Harness Holder Mounting Bolt, Ground Cable & Harness Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).

14. Remove the cam chain (see **CAM CHAIN REMOVAL**).
15. 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.

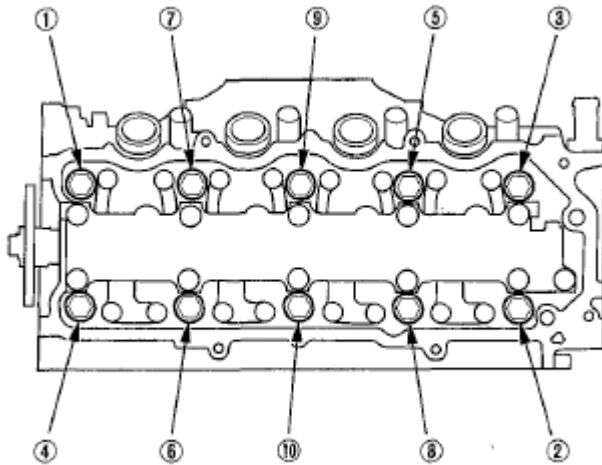


Fig. 64: Identifying Cylinder Head Bolt Loosening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Remove the cylinder head.

CMP PULSE PLATE REMOVAL AND INSTALLATION

REMOVAL

1. Remove the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
2. Remove the intake manifold chamber (see **REMOVAL**).
3. Disconnect the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor connector
 - Air fuel ratio (A/F) sensor connector
 - Secondary heated oxygen sensor (secondary HO2S) connector
4. Remove the harness holder mounting bolt and the ground cable, then remove the harness holder from the bracket (see step 12).
5. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
6. Remove the camshaft thrust cover (A).

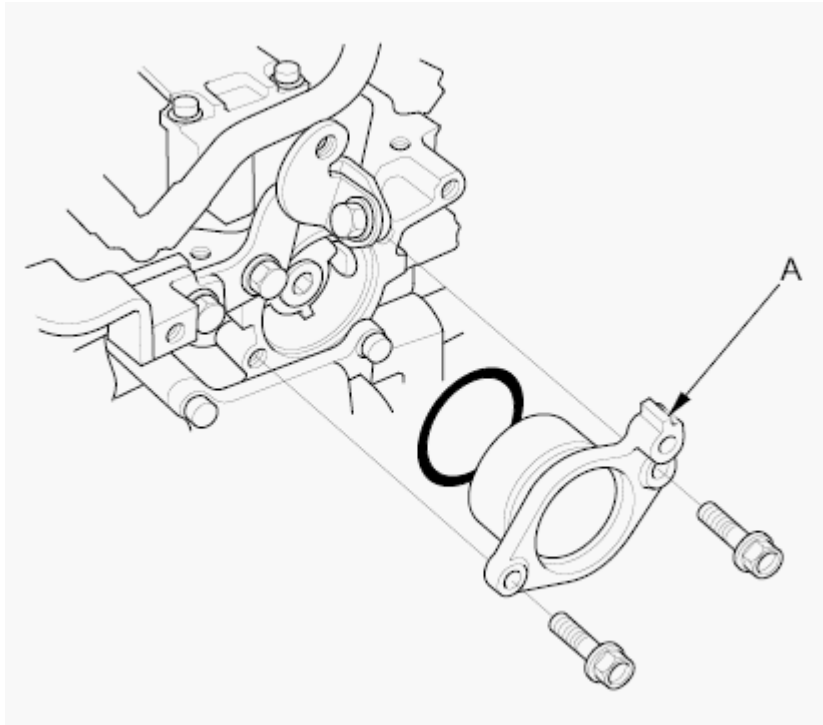


Fig. 65: Identifying Camshaft Thrust Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Hold the camshaft with an open-end wrench, then loosen the bolt.

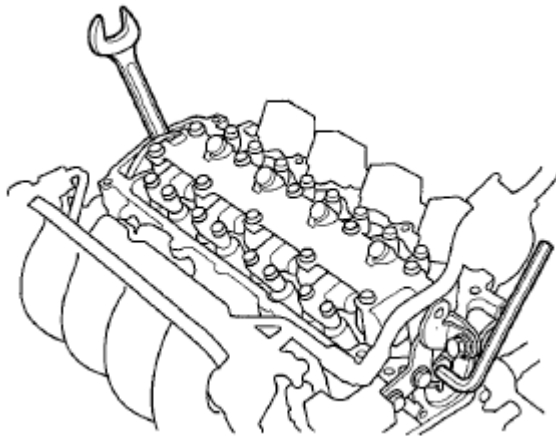


Fig. 66: Identifying Camshaft Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

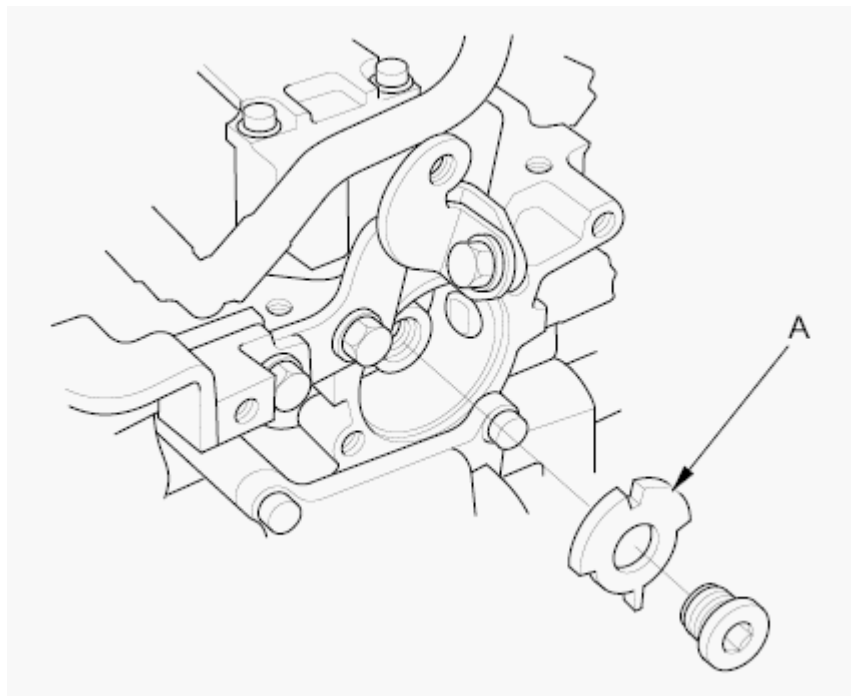


Fig. 67: Identifying Camshaft Position (CMP) Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSTALLATION

1. Install the CMP pulse plate (A).

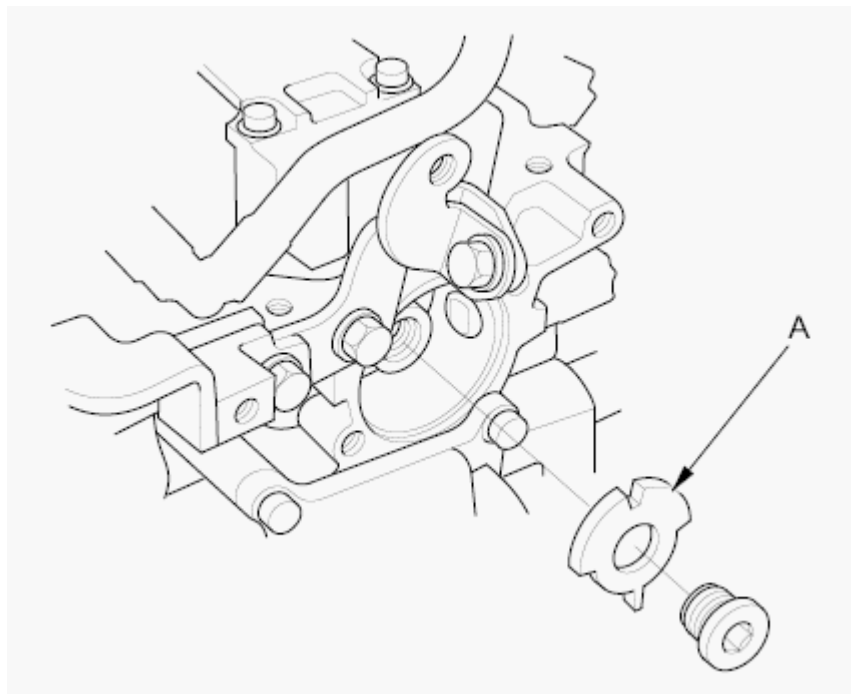
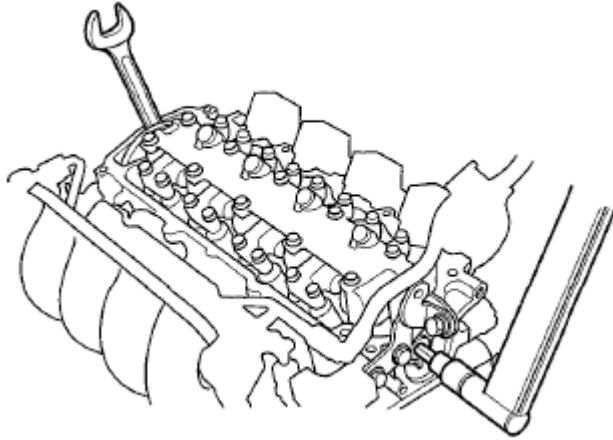


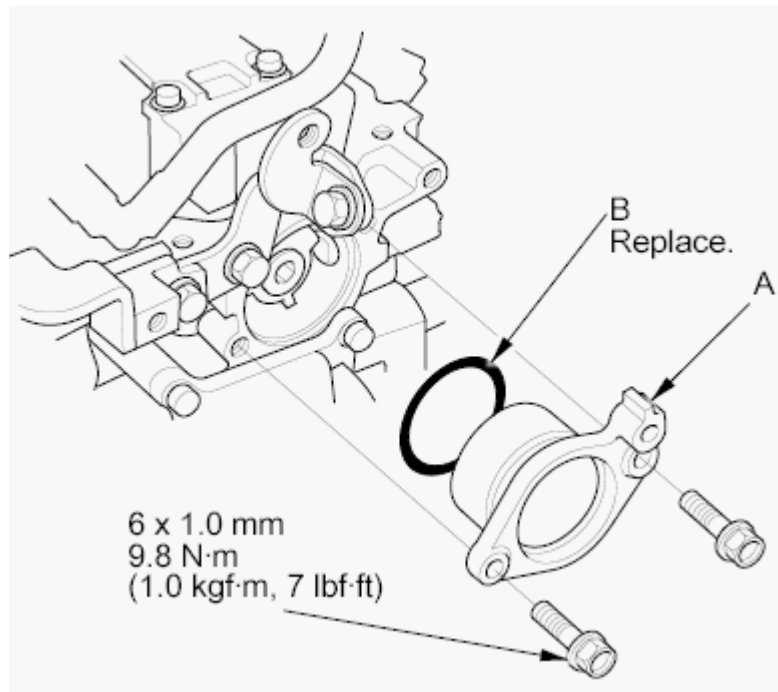
Fig. 68: Identifying Camshaft Position (CMP) Pulse Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Hold the camshaft with an open-end wrench, then tighten the bolt.

Specified Torque**14 x 1.5 mm****34 N.m (3.5 kgf.m, 25 lbf.ft)****Fig. 69: Identifying Camshaft Bolt**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the camshaft thrust cover (A) with new O-ring (B).

**Fig. 70: Identifying Camshaft Thrust Cover & O-Ring With Torque Specifications**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
5. Install the harness holder, then install the ground cable (see step 12).
6. Install the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor connector
 - Air fuel ratio (A/F) sensor connector
 - Secondary heated oxygen sensor (secondary HO2S) connector
7. Install the intake manifold chamber (see **INSTALLATION**).
8. Install the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).

CAMSHAFT SPROCKET REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

1. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION**).
2. Remove the drive belt auto-tensioner (see **DRIVE BELT AUTO-TENSIONER REMOVAL/INSTALLATION**).
3. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
4. Make a reference mark (A) across the camshaft sprocket and cam chain.

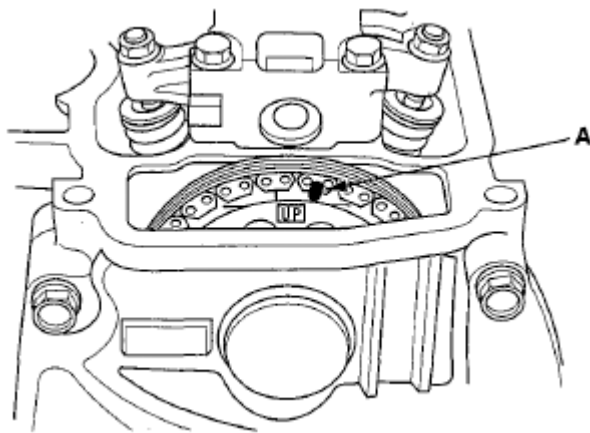


Fig. 71: Identifying Mark On Camshaft Sprocket & Cam Chain
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.

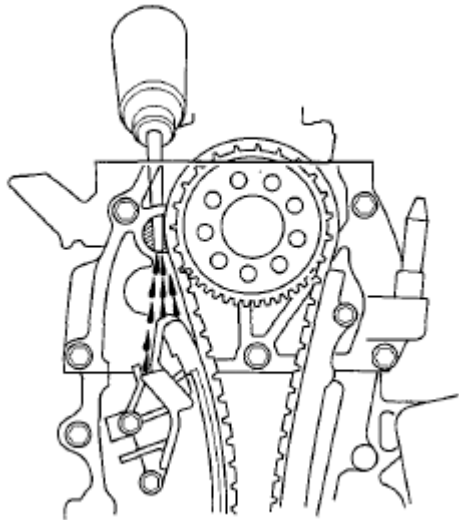


Fig. 72: Applying Engine Oil To Slider Surface Of Cam Chain Tensioner Slider
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the cylinder head plug.

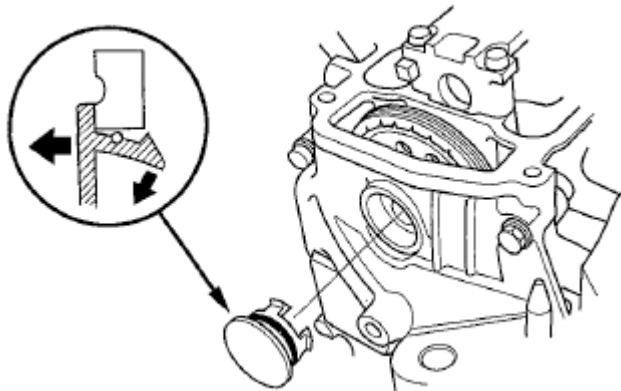


Fig. 73: Identifying Cylinder Head Plug
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Hold the crankshaft pulley and set the socket wrench (A) on the camshaft sprocket bolt.

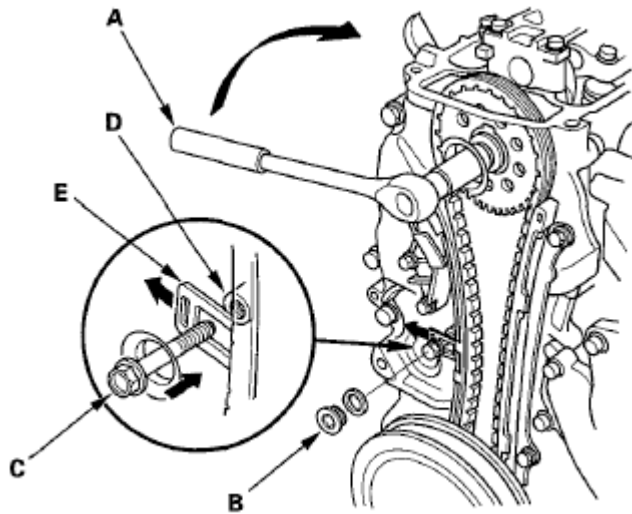


Fig. 74: Turning Camshaft Clockwise To Compressing Cam Chain Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the maintenance bolt (B), and turn the camshaft clockwise to compress the cam chain tensioner, then install the 6 x 1.0 mm bolt (C) in the bolt hole (D) on the engine block through the maintenance hole and cam chain tensioner (E).

NOTE:

- Turning torque should not exceed 56 N.m (5.7 kgf.m, 41 lbf.ft), when turning the camshaft.
- Do not turn the camshaft counterclockwise.

9. Hold the camshaft with an open-end wrench, then remove the camshaft sprocket.

NOTE:

Hang the cam chain with a wire.

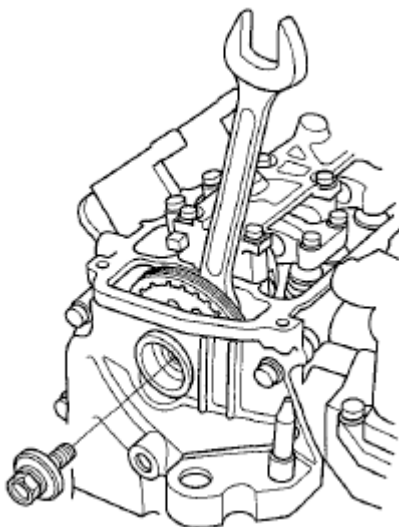


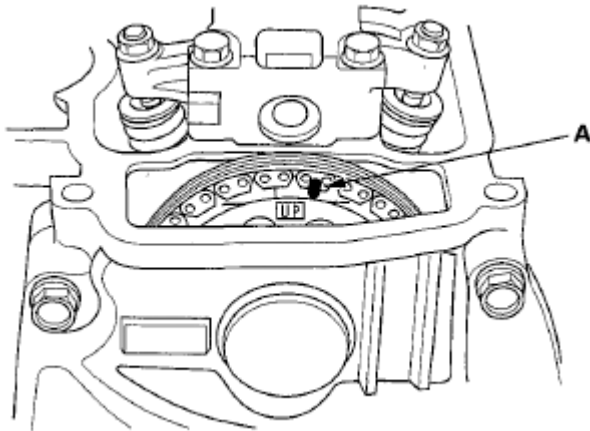
Fig. 75: Identifying Camshaft Sprocket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT SPROCKET INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

1. Install the cam chain to the camshaft sprocket by aligning the reference mark (A), then install the camshaft sprocket on the camshaft.

**Fig. 76: Aligning Mark On Camshaft Sprocket & Camshaft**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Apply new engine oil to the threads and flange of camshaft sprocket bolt.
3. Hold the camshaft with a 27 mm open-end wrench, then tighten the bolt.

Specified torque:

56 N.m (5.7 kgf.m, 41 lbf.ft)

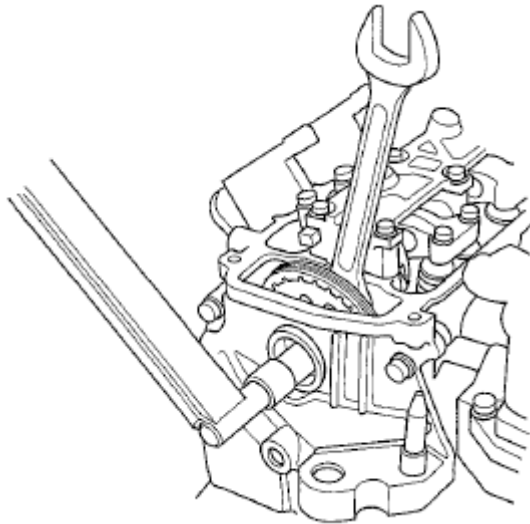


Fig. 77: Identifying Camshaft Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.

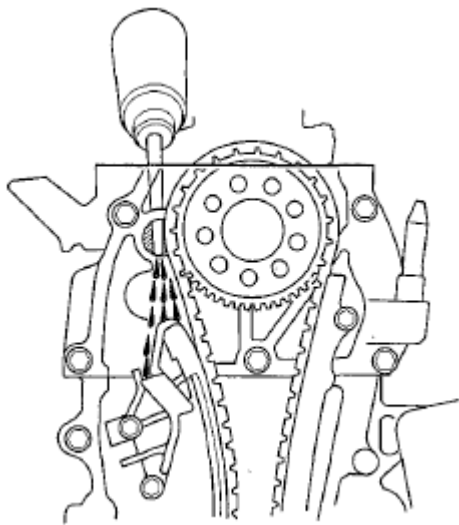


Fig. 78: Applying Engine Oil To Slider Surface Of Cam Chain Tensioner Slider

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Hold the crankshaft pulley and set the socket wrench (A) on the camshaft sprocket bolt.

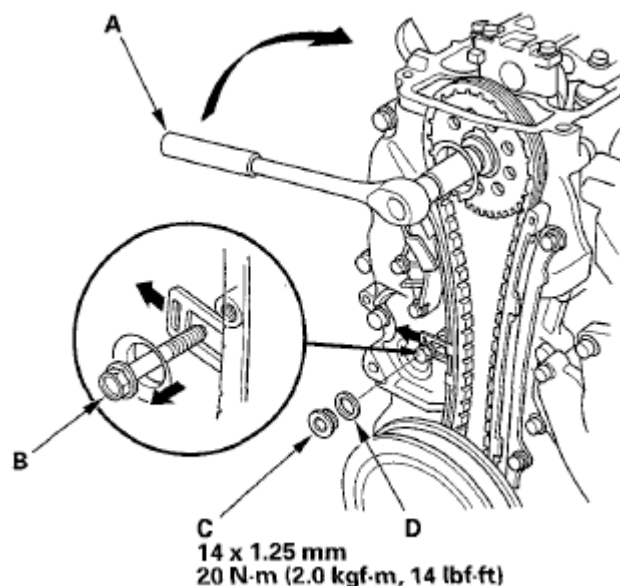


Fig. 79: Turning Camshaft Clockwise To Compressing Cam Chain Tensioner With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Turn the camshaft clockwise to compress the cam chain tensioner, then remove the 6 x 1.0 mm bolt (B).

NOTE:

- Turning torque should not exceed 56 N.m (5.7 kgf.m, 41 lbf.ft), when turning the camshaft.
- Do not turn the camshaft counterclockwise.

7. Install the maintenance bolt (C) with a new washer (D). (See **Fig. 79**)
8. Install the new cylinder head plug.

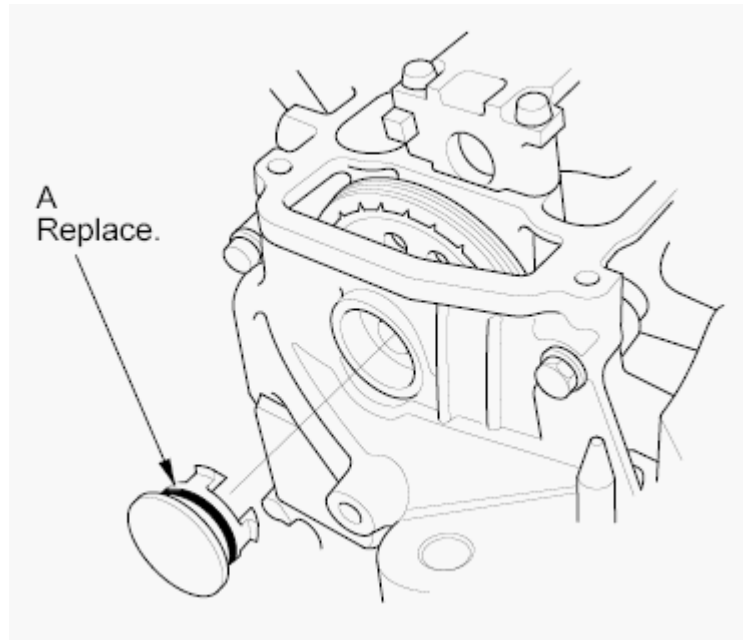


Fig. 80: Identifying Cylinder Head Plug
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CYLINDER HEAD INSPECTION FOR WARPAGE

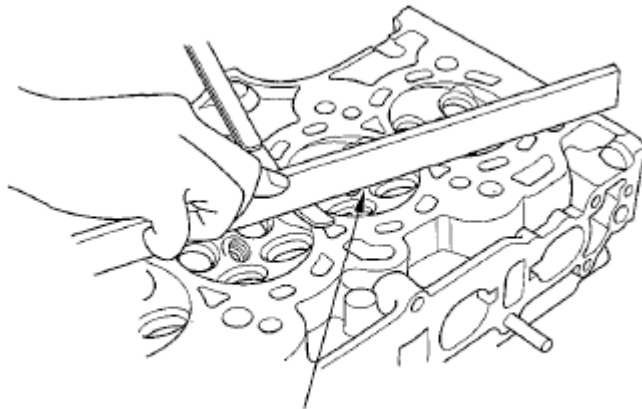
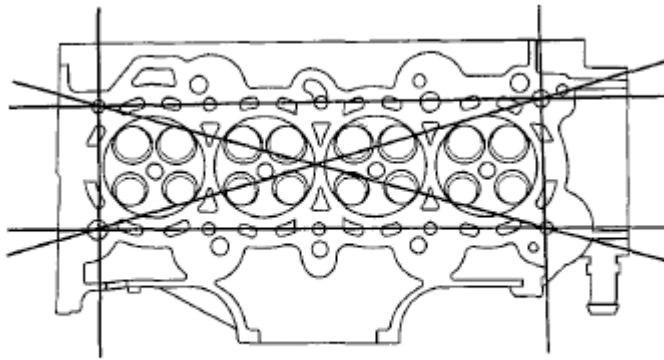
1. Remove the cylinder head (see CYLINDER HEAD REMOVAL).
2. Inspect the camshaft (see CAMSHAFT INSPECTION).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
 - If warpage is less than 0.08 mm (0.003 in.) cylinder head resurfacing is not required.
 - Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 120 mm (4.72 in.).

Cylinder Head Warpage

Standard (New): 0.08 mm (0.003 in.)

Cylinder Head Height

Standard (New): 119.9-120.1 mm (4.720-4.728 in.)



PRECISION STRAIGHT EDGE

Fig. 81: Inspecting 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 rocker arm adjusting screws (A).

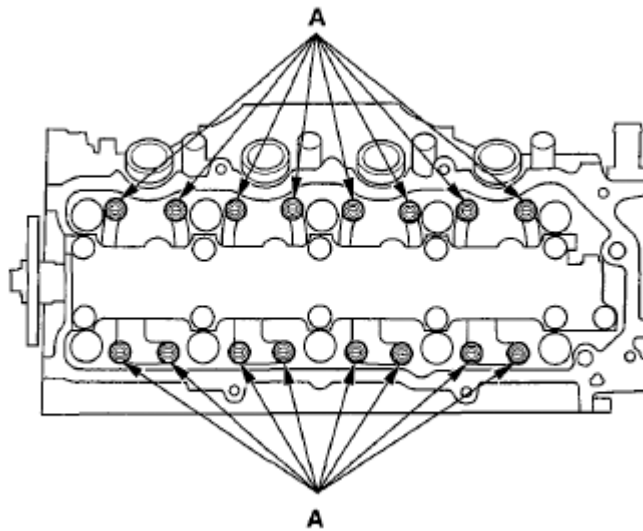


Fig. 82: Identifying Rocker Arm Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Unscrew the rocker shaft mounting bolts two turns at a time in sequence shown below.

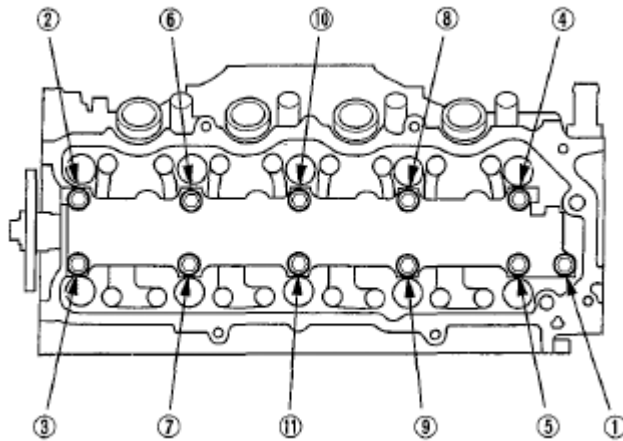


Fig. 83: Identifying Rocker Shaft Mounting Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the rocker shaft mounting bolts, then remove the rocker arm assembly.

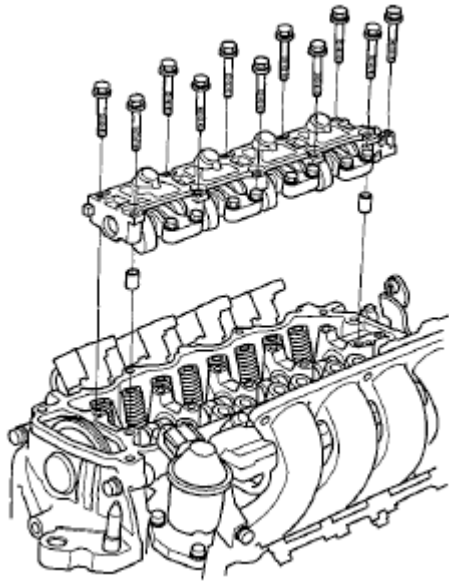


Fig. 84: Identifying Rocker Arm Assembly With Rocker Shaft Mounting Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original position.
- Inspect the rocker arm shaft and the rocker arms (see ROCKER ARM AND SHAFT INSPECTION).
- If reused, the rocker arms must be installed in the their original location.
- Remove the rocker shaft bolt before removing the rocker shaft from the rocker shaft holder bridge.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points, the bearing surfaces, and lost motions.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.

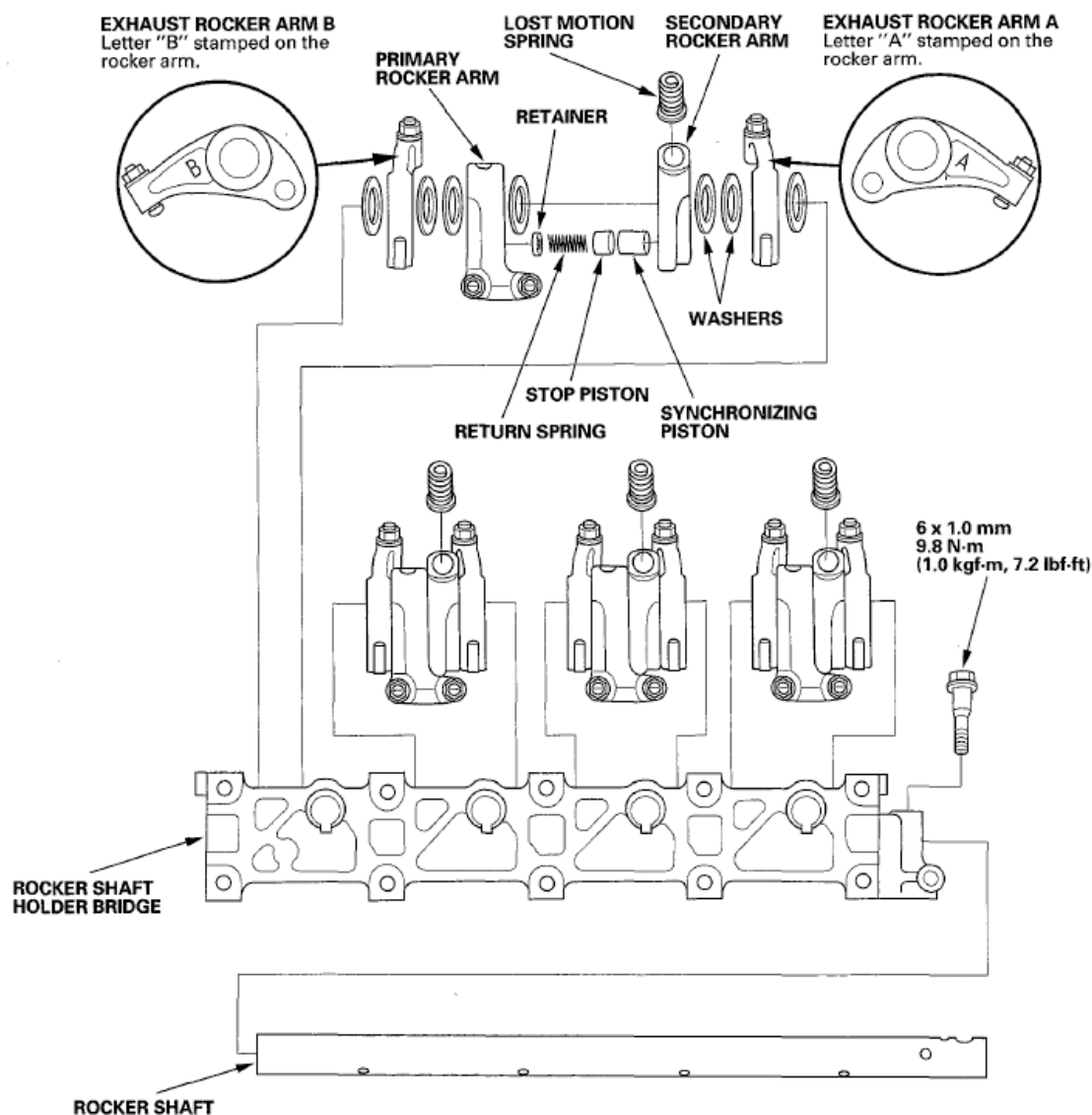


Fig. 85: Identifying Rocker Arm & Shaft Replacement Components With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

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

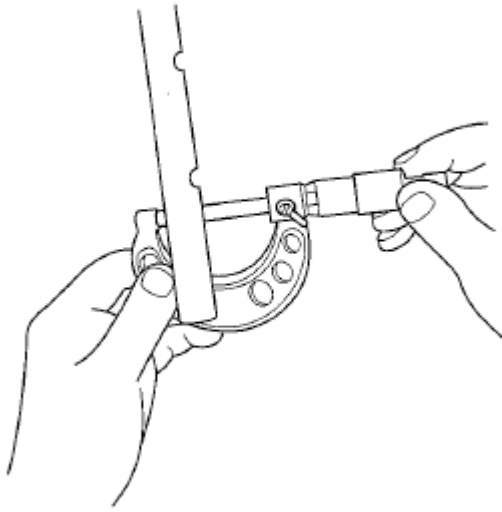


Fig. 86: Measuring Diameter Of Shaft At First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

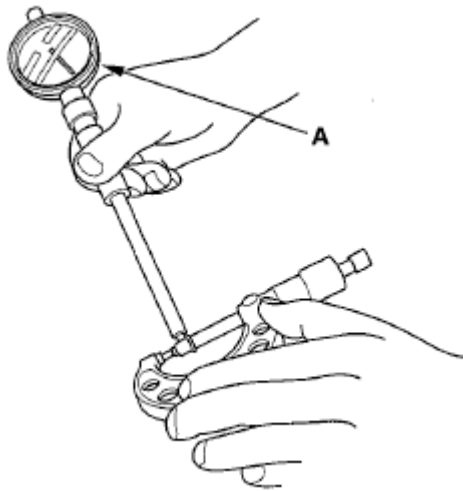


Fig. 87: Identifying Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Rocker Arm-to-Shaft Clearance

Intake:

Standard (New): 0.017-0.048 mm (0.0007-0.0019 in.)

Service Limit: 0.08 mm (0.0031 in.)

Exhaust:

Standard (New): 0.019-0.050 mm (0.0007-0.0020 in.)

Service Limit: 0.08 mm (0.0031 in.)

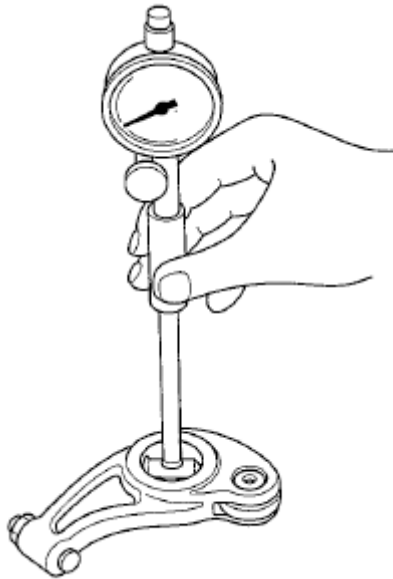


Fig. 88: Measuring Inside Diameter Of Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rockers and shaft. If the clearance is beyond the service limit, replace the rocker shaft and all out of service limit rocker arms. If any VTEC rocker arm needs replacement, replace the rocker arms as an assembly.

VTEC Rocker Arms

7. Inspect the rocker arm pistons (B). Push on them manually. If they do not move smoothly, replace the rocker arm set.

NOTE:

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

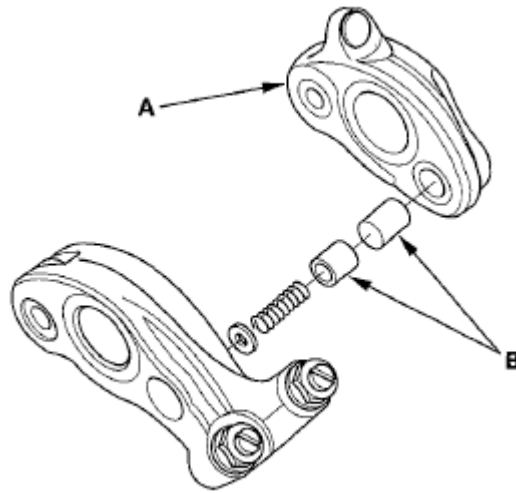


Fig. 89: Identifying Rocker Arm & Pistons
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
9. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).

CAMSHAFT REMOVAL

1. Remove the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION**).
2. Remove the intake manifold chamber (see **REMOVAL**).
3. Remove the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Four injector connectors
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor connector
 - Air fuel ratio (A/F) sensor connector
 - Secondary heated oxygen sensor (secondary HO2S) connector
4. Remove the harness holder mounting bolt and the ground cable, then remove the harness holder from the bracket (see step 12).
5. Remove the camshaft sprocket (see **CAMSHAFT SPROCKET REMOVAL**).
6. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
7. Remove the CMP sensor (see **CMP SENSOR REPLACEMENT**).
8. Remove the camshaft thrust cover (A), then remove the camshaft (B).

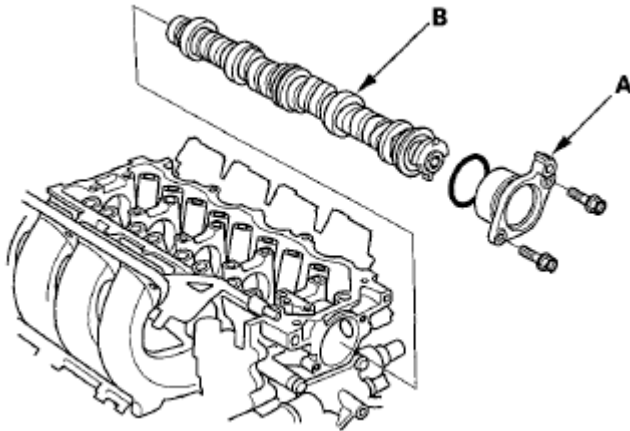


Fig. 90: Identifying Camshaft Thrust Cover & Camshaft
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSPECTION

1. Remove the camshaft sprocket (see CAMSHAFT SPROCKET REMOVAL).
2. Remove the rocker arm assembly (see ROCKER ARM ASSEMBLY REMOVAL), then disassemble the rocker arm (see ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY).
3. Put the rocker shaft holder bridge/rocker shaft holders on the cylinder head, then tighten the bolts to the specified torque.

Specified Torque

6 x 1.0 mm

(1)-(10): 15 N.m (1.5 kgf.m, 11 lbf.ft)

(11): 9.8 N.m (1.0 kgf.m, 7.2 lbf.ft)

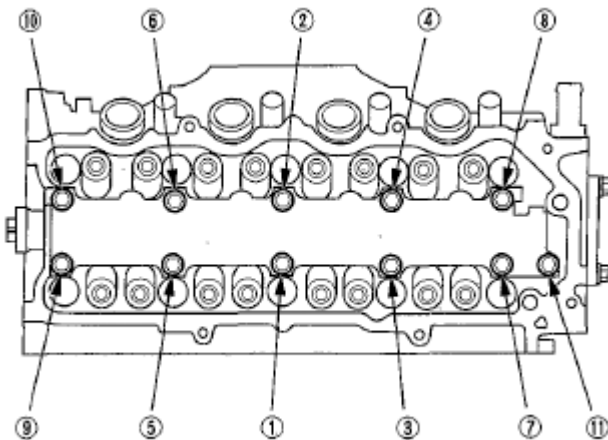


Fig. 91: Identifying Cylinder Head Bolt Torque Sequence

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): 0.05-0.25 mm (0.002-0.010 in.)

Service Limit: 0.5 mm (0.02 in.)

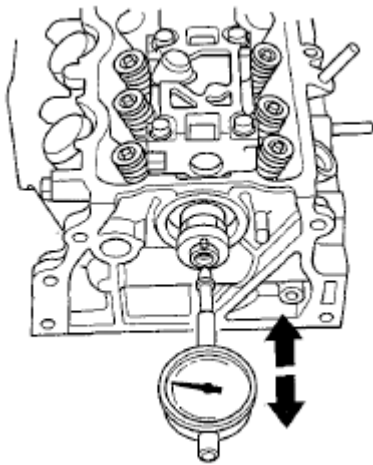


Fig. 92: Identifying Camshaft End Play

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the camshaft (see **CAMSHAFT REMOVAL**).
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.

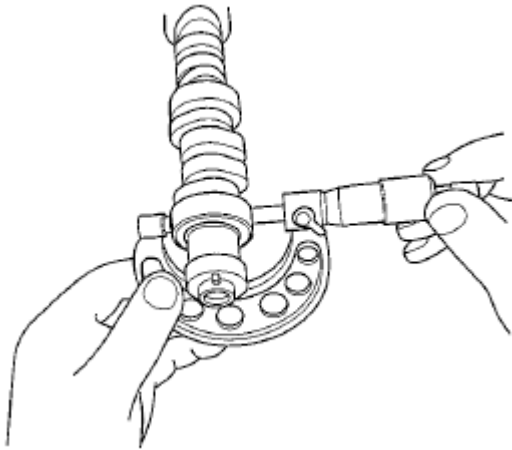


Fig. 93: Measuring Diameter Of Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Zero the gauge (A) to the journal diameter.

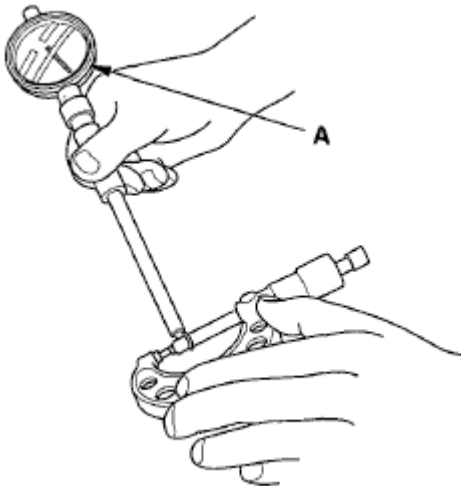


Fig. 94: Identifying Gauge
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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): 0.045-0.084 mm

(0.0018-0.0033 in.)

Service Limit: 0.100 mm (0.004 in.)

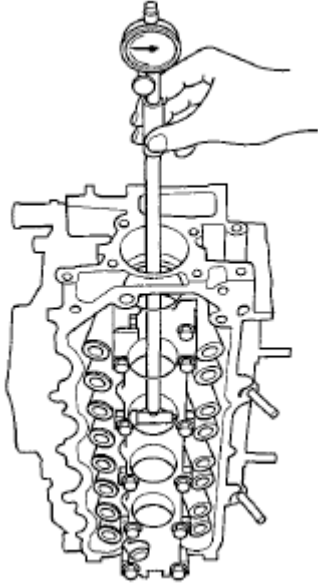


Fig. 95: Measuring Inside Diameter Of Camshaft-To-Holder Oil Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.002 in.)

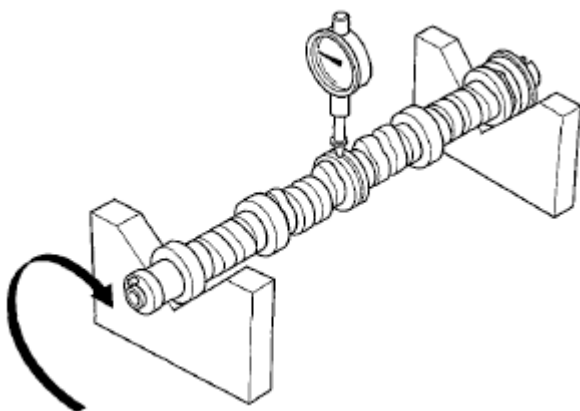


Fig. 96: Identifying Camshaft Total Runout
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Measure the cam lobe height.

Cam Lobe Height Standard (New):

CAM LOBE HEIGHT SPECIFICATION TABLE

-	INTAKE	EXHAUST
PRI	35.241 mm (1.3874 in.)	35.471 mm (1.3965 in.)
SEC	36.173 mm (1.4241 in.)	

PRI: Primary, SEC: Secondary

C/C: Cam Chain, IN: Intake, EX: Exhaust

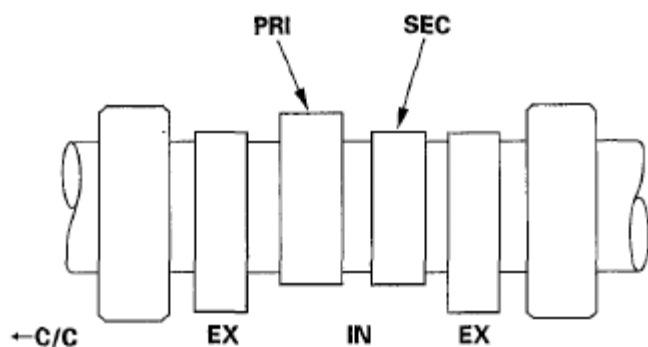


Fig. 97: Identifying Cam Lobe Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING, AND VALVE SEAL REMOVAL

SPECIAL TOOLS REQUIRED

Valve spring compressor attachment 07757-PJ1010A

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

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

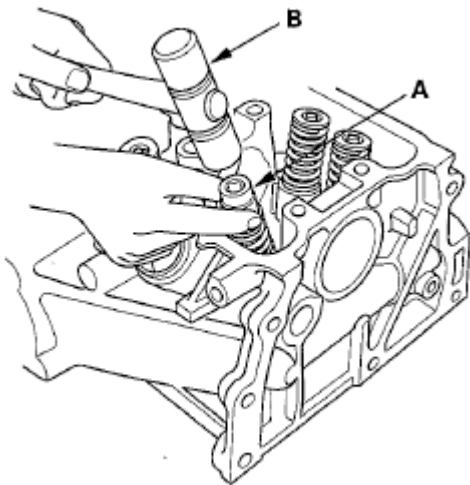


Fig. 98: Tapping Spring Retainer To Loosening Valve Cotters Using Socket & Plastic Mallet
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

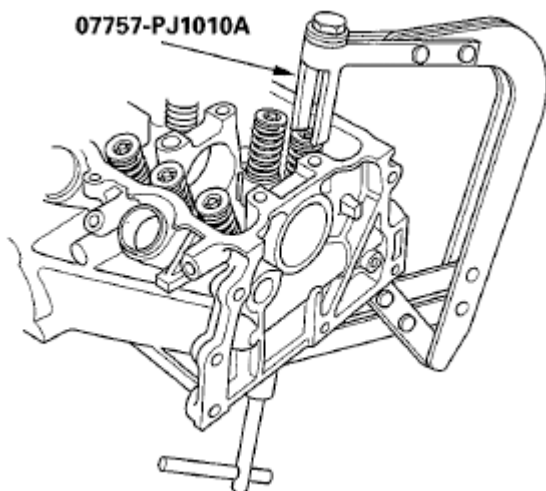


Fig. 99: Identifying Valve Spring Compressor & Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

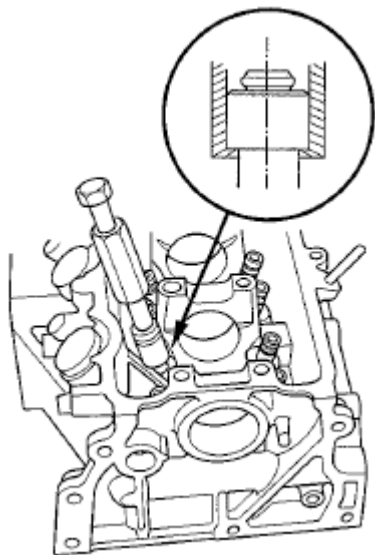


Fig. 100: Identifying Valve Guide Seal Remover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the valve seal.

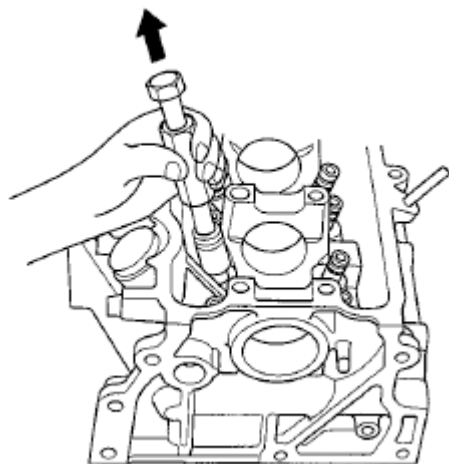


Fig. 101: Identifying Valve Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the valve spring seat.

VALVE INSPECTION

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

Intake Valve Dimensions

A Standard (New): 27.85-28.15 mm (1.096-1.108 in.)

B Standard (New): 118.55-119.15 mm (4.667-4.691 in.)

C Standard (New): 5.48-5.49 mm (0.2157-0.2161 in.)

C Service Limit: 5.45 mm (0.215 in.)

Exhaust Valve Dimensions

A Standard (New): 22.85-23.15 mm (0.900-0.911 in.)

B Standard (New): 117.25-117.85 mm (4.616-4.640 in.)

C Standard (New): 5.45-5.46 mm (0.2146-0.2150 in.)

C Service Limit: 5.42 mm (0.213 in.)

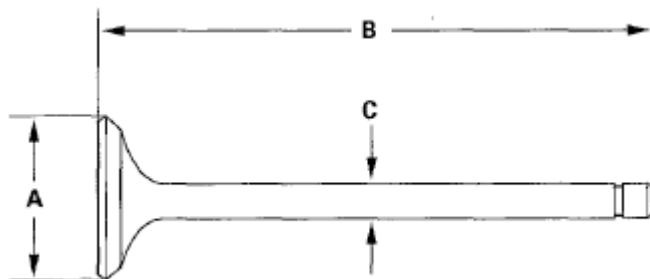


Fig. 102: Identifying Intake Valve Dimensions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

1. Remove the valves (see VALVE, SPRING, AND VALVE SEAL REMOVAL).
2. 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): 0.020-0.050 mm (0.0008-0.0020 in.)

Service Limit: 0.08 mm (0.003 in.)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.050-0.080 mm (0.0020-0.0031 in.)

Service Limit: 0.11 mm (0.004 in.)

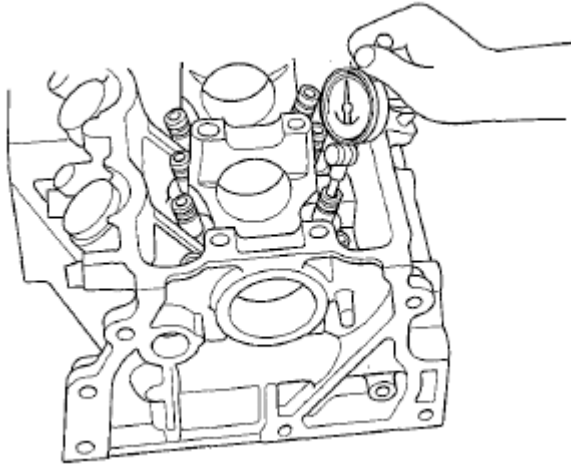


Fig. 103: Measuring Intake Valve Stem-To-Guide Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE GUIDE REPLACEMENT

SPECIAL TOOLS REQUIRED

- Valve Guide Driver, 5.35 x 9.7 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**).
2. As shown below, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver and a conventional hammer.

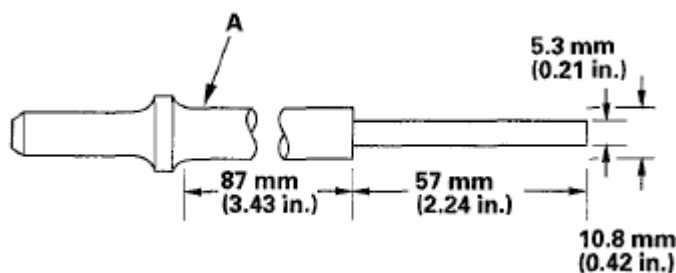


Fig. 104: Identifying Air-Impact Valve Guide Driver Dimensions
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

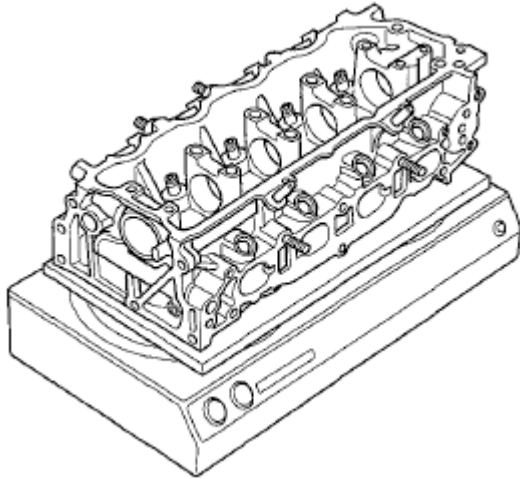


Fig. 105: Heating Cylinder Head Using Hot Plate Or Oven
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

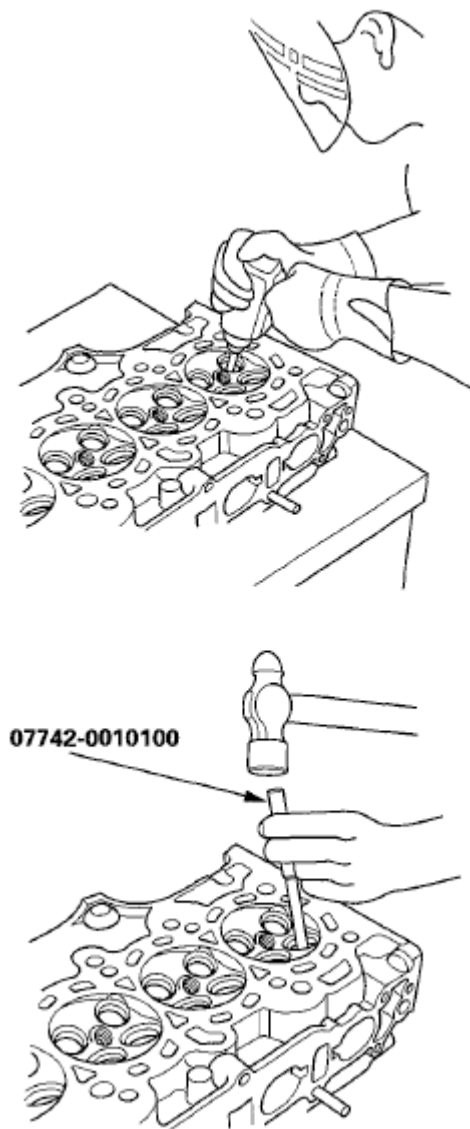


Fig. 106: Driving Guide Using Valve Guide Driver & Air Hammer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of new engine oil to the outside of a new valve guide. Install the valve guide from the camshaft side of the head; use the valve guide driver to drive the valve guide to the specified installed height (A) of the valve guide (B). If you have all 16 valve guides to do, you may have to reheat the head.

Valve Guide Installed Height:

15.85-16.35 mm (0.6240-0.6437 in.)

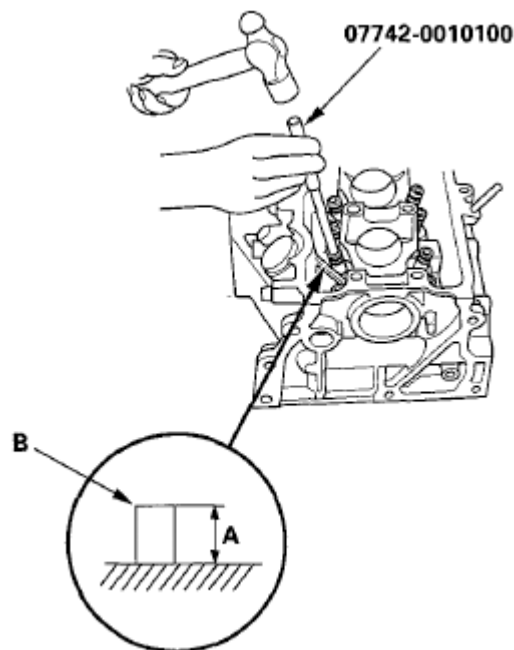


Fig. 107: View Of Guide From Camshaft Side Of Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



Fig. 108: Rotating Reamer Of Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

14. Check the clearances with a valve (see VALVE 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.

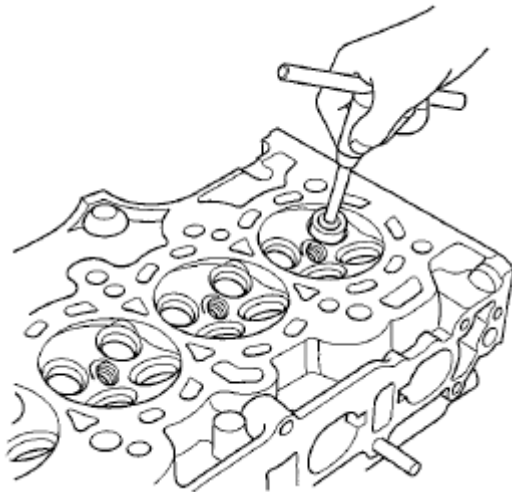


Fig. 109: Reconditioning Valve Seats In Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Carefully cut a 45° seat, removing only enough material to ensure a smooth and concentric seat.
4. Bevel the upper and lower edges at the angles shown below.

Check the width of the seat and adjust accordingly.

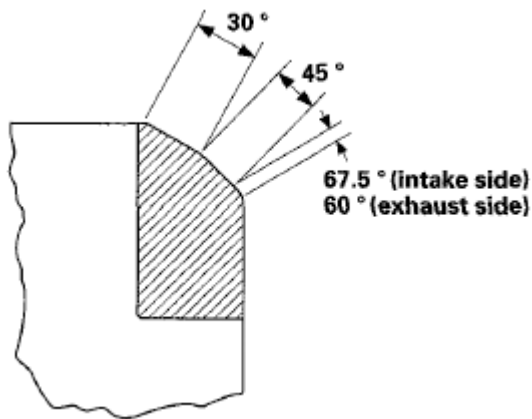


Fig. 110: Identifying Bevel Upper & Lower Angles
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Valve Seat Width

Intake:

Standard (New): 0.850-1.150 mm (0.0335-0.0453 in.)

Service Limit: 1.60 mm (0.063 in.)

Exhaust:

Standard (New): 1.250-1.550 mm (0.0492-0.0610 in.)

Service Limit: 2.00 mm (0.079 in.)

6. After resurfacing the seat, inspect for even valve seating: Apply Prussian Blue compound (A) to the valve face. Insert the valve in its original location in the head, then lift it and snap it closed against the seat several times.

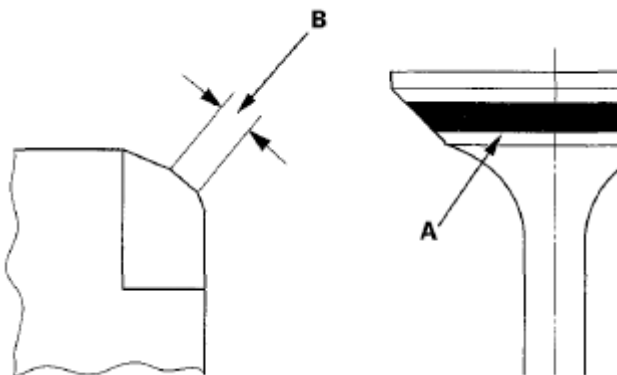


Fig. 111: Applying Prussian Blue Compound To Valve Face
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

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

Intake Valve Stem Installed Height

Standard (New): 46.1-46.5 mm (1.815-1.831 in.)

Service Limit: 46.8 mm (1.843 in.)

Exhaust Valve Stem Installed Height

Standard (New): 46.2-46.6 mm (1.819-1.835 in.)

Service Limit: 46.9 mm (1.846 in.)

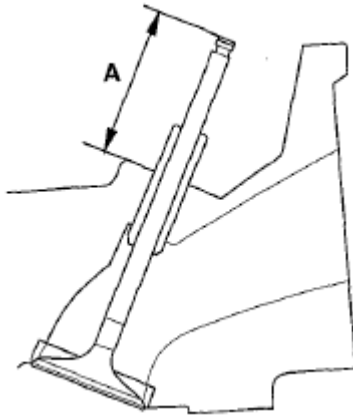


Fig. 112: Identifying Intake Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. If 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: The exhaust valve seal (C) has a black spring (D), and the intake valve seal (E) has a white spring (F). They are not interchangeable.

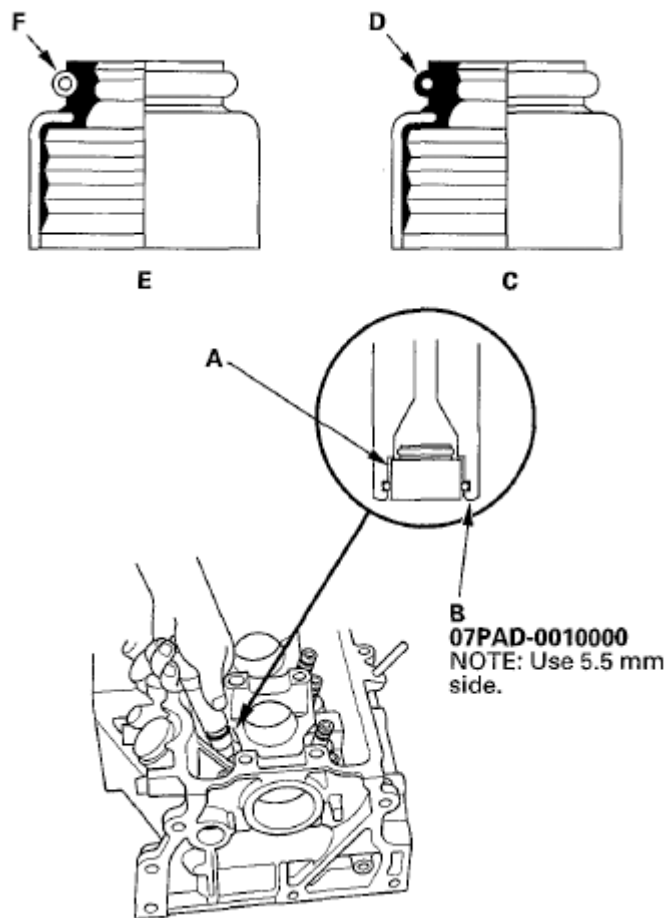


Fig. 113: View Of Valve Guide Seal Installer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

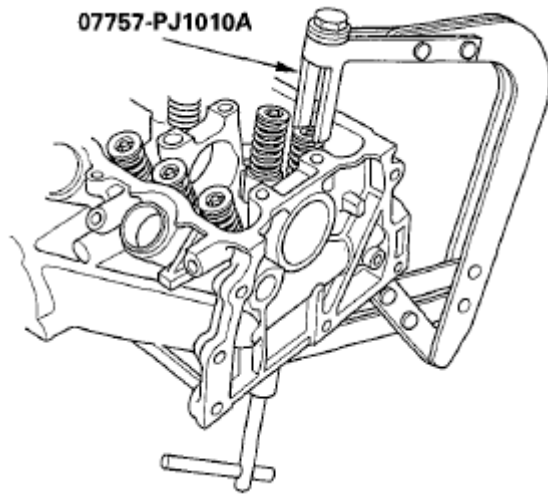


Fig. 114: Identifying Valve Cotters

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

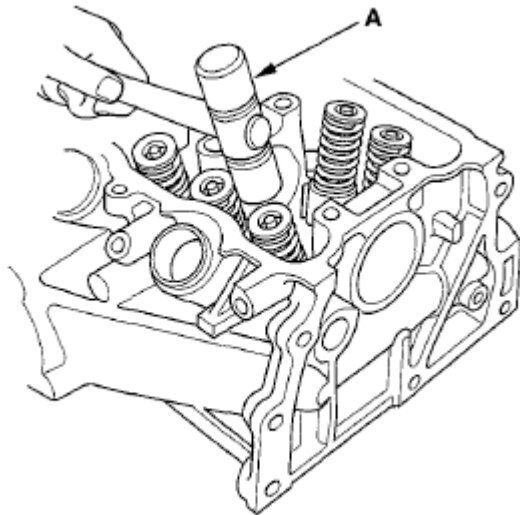


Fig. 115: Tapping End Of Each Valve Stem With Plastic Mallet

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSTALLATION

1. Install the camshaft (A).

NOTE: Apply new engine oil to the journals and the cam lobes.

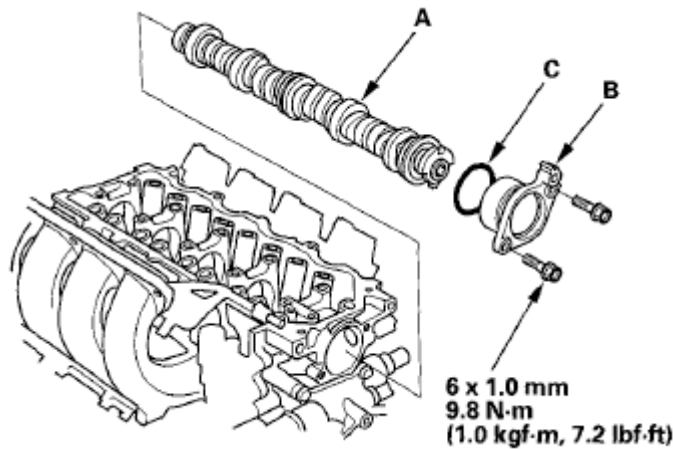


Fig. 116: Identifying Camshaft, Camshaft Thrust Cover & O-Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the CMP pulse plate (see INSTALLATION).
3. Install the camshaft position (CMP) sensor (see CMP SENSOR REPLACEMENT).
4. Install the rocker arm assembly (see ROCKER ARM ASSEMBLY INSTALLATION).
5. Install the camshaft sprocket (see CAMSHAFT SPROCKET INSTALLATION).

ROCKER ARM ASSEMBLY INSTALLATION

1. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly. (See ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY). Refer to Fig. 85.
2. Apply engine oil to the end of the valve stem.
3. Install the rocker arm assembly.

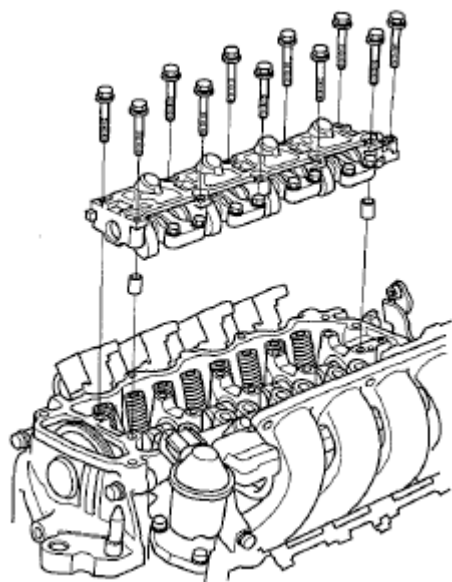


Fig. 117: Identifying Rocker Arm Assembly And Fasteners
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Tighten each bolts two turns at a time in the sequence shown below.

Specified Torque

6 x 1.0 mm

(1)-(10): 15 N.m (1.5 kgf.m, 11 lbf.ft)

(11): 9.8 N.m (1.0 kgf.m, 7.2 lbf.ft)

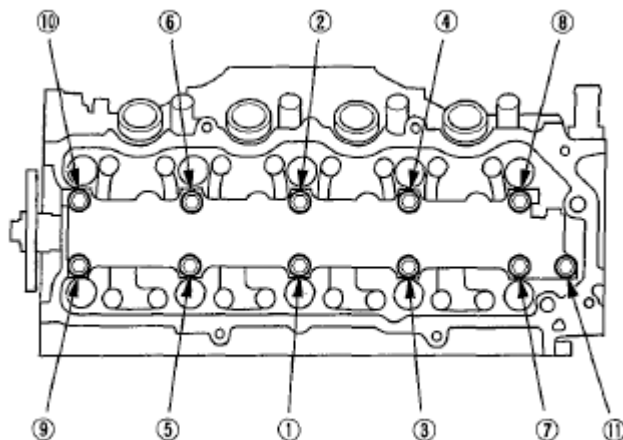


Fig. 118: Identifying Rocker Arm Assembly Bolts Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Adjust the valve clearance (see VALVE CLEARANCE ADJUSTMENT).

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

CYLINDER HEAD INSTALLATION

1. Clean the cylinder head and the block surface.
2. Install a new coolant separator (A) in the engine block whenever the engine block is replaced.

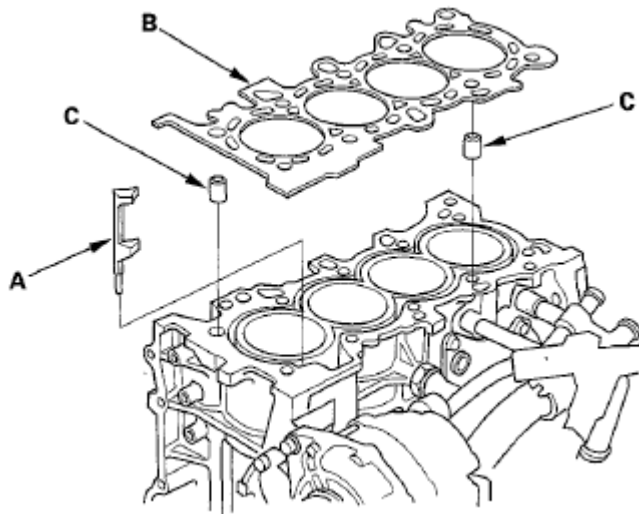


Fig. 119: Identifying Coolant Separator, Cylinder Head Gasket & Dowel Pins
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the new cylinder head gasket (B) and the dowel pins (C) on the engine block. Always use a new cylinder head gasket.
4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the oil pump.

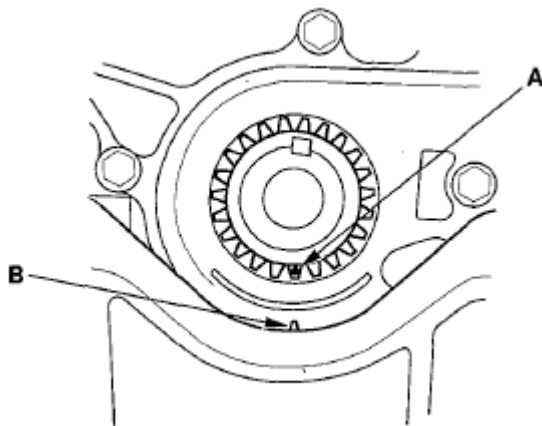


Fig. 120: Aligning TDC Mark On Crankshaft Sprocket With Pointer On Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Set the camshaft TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

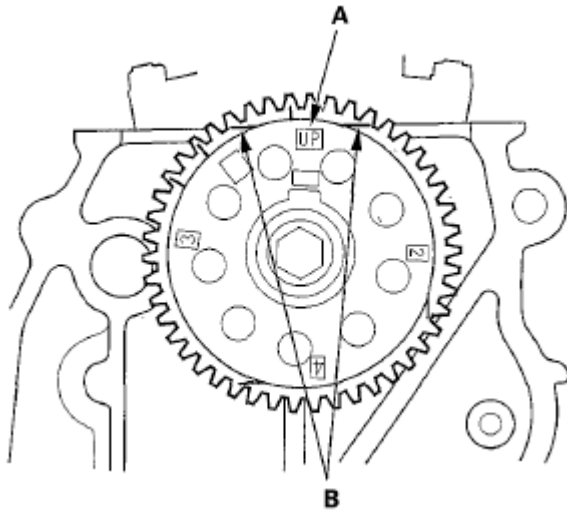


Fig. 121: Identifying UP Mark On Camshaft Sprocket
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the cylinder head on the engine block.
7. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
8. Tighten the cylinder head bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft). Using a beam-type torque wrench. When using a preset-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.

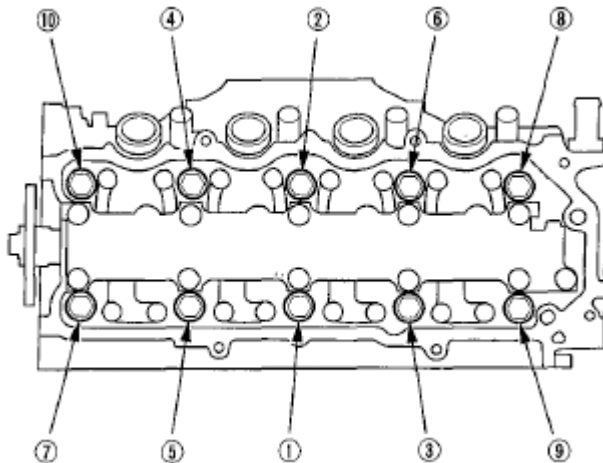


Fig. 122: Identifying Cylinder Head Bolt Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Tighten all cylinder head bolts an additional 130°.

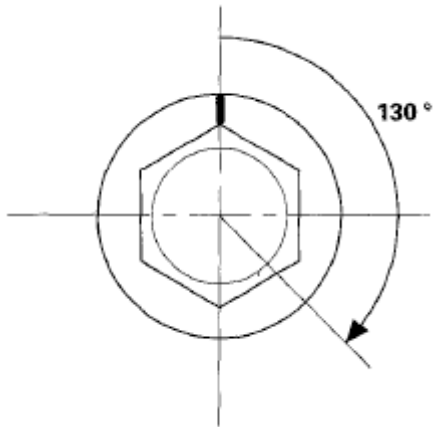


Fig. 123: Tightening Cylinder Head Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the cam chain (see CAM CHAIN INSTALLATION).
11. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).
12. Install the harness holder (A), then install the ground cable (B).

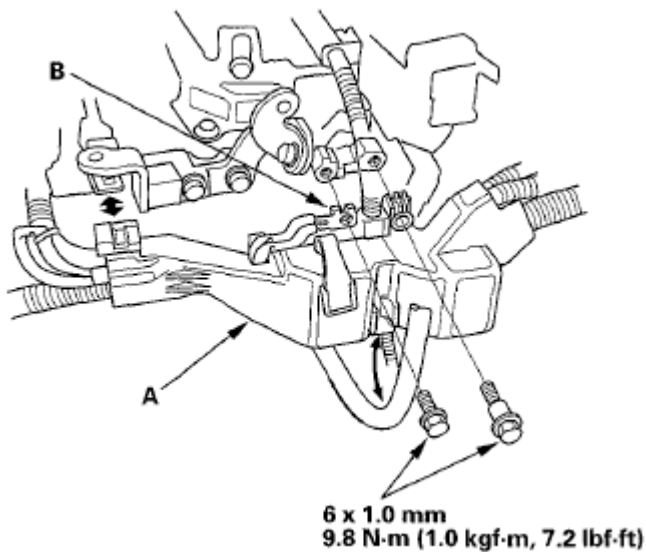


Fig. 124: Identifying Harness Holder & Ground Cable With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the harness holder to the fuel rail.

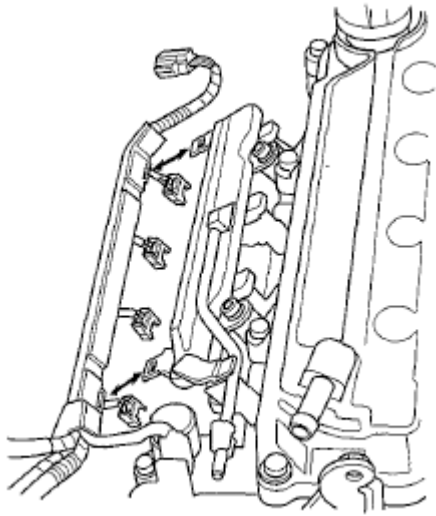


Fig. 125: Identifying Harness Holder

Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Connect the engine wire harness connectors, and install the wire harness clamps to the cylinder head.
 - Four injector connectors
 - Engine coolant temperature (ECT) sensor 1 connector
 - Camshaft position (CMP) sensor connector
 - Secondary heated oxygen sensor (secondary HO2S) connector
 - Rocker arm oil control solenoid connector
15. Install the warm up three way catalytic converter (WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**).
16. Install the intake manifold/chamber assembly (see **INSTALLATION**).
17. Install the upper radiator hose (A), the heater hose (B), and the water bypass hose (C).

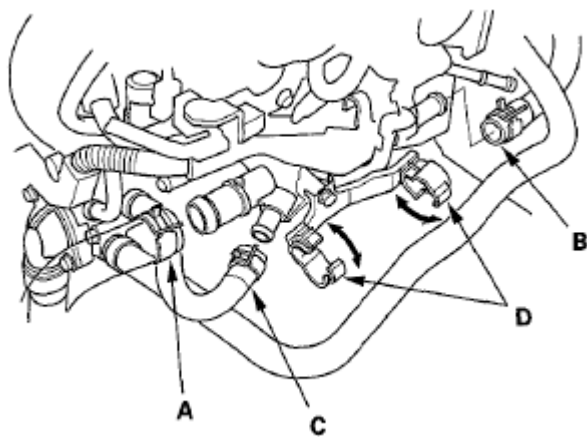


Fig. 126: Identifying Heater Hose To Clamps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the heater hose to the clamps (D).
19. Connect the fuel feed hose (A) (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**), then install the quick-connect fitting cover (B) and the fuel feed hose clamp (C).

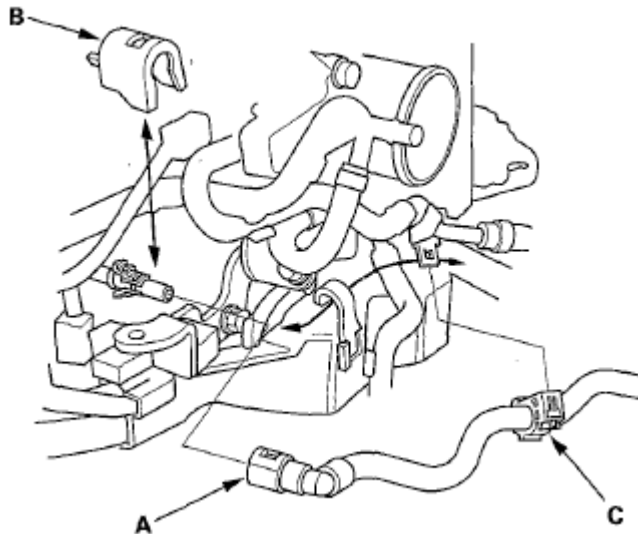


Fig. 127: Identifying Fuel Feed Hose, Quick-Connect Fitting Cover & Fuel Feed Hose Clamp
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Install the air cleaner (see **AIR CLEANER REMOVAL/INSTALLATION**).
21. After installation, check that all tubes, hoses, and connectors are installed correctly.
22. Do the battery installation procedure (see **BATTERY REMOVAL AND INSTALLATION**).
23. Inspect for fuel leaks. Turn the ignition switch to ON (II) (DO NOT operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
24. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 9 on **COOLANT REPLACEMENT**).
25. Clean up any spilled engine coolant.
26. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN**).
27. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
28. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).

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