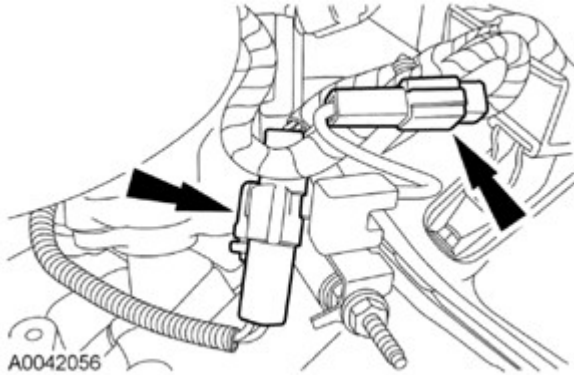


## 2007-11 ENGINE

### Cylinder Head (K24Z1) - CR-V

## CYLINDER HEAD

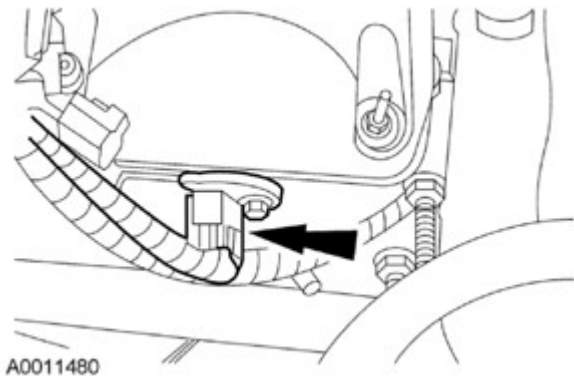
### SPECIAL TOOLS



**Fig. 1: Identifying Special Tools**

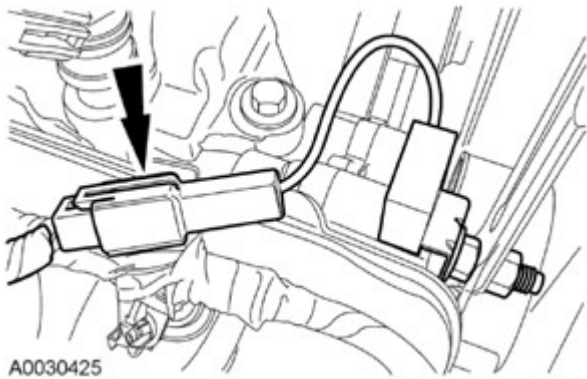
Courtesy of AMERICAN HONDA MOTOR CO., INC.

### COMPONENT LOCATION INDEX

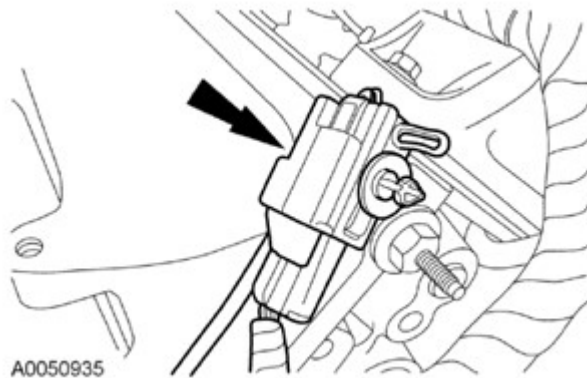


**Fig. 2: Identifying Cylinder Head Component Location (1 Of 3)**

Courtesy of AMERICAN HONDA MOTOR CO., INC.



**Fig. 3: Identifying Cylinder Head Component Location (2 Of 3)**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



**Fig. 4: Identifying Cylinder Head Component Location (3 Of 3)**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

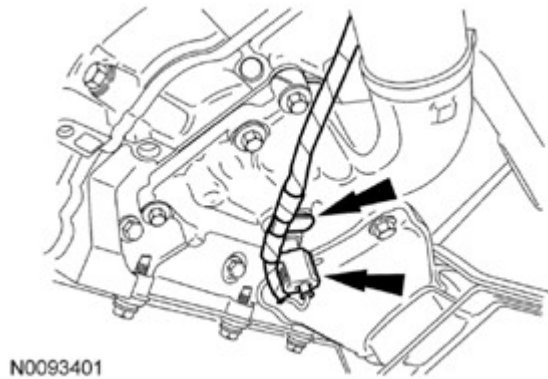
## ENGINE COMPRESSION INSPECTION

**NOTE:** After this inspection, you must reset the powertrain control module (PCM). Otherwise, the PCM will continue to stop the injectors from functioning.

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 under **HOW TO USE THE HDS (HONDA DIAGNOSTIC SYSTEM)** ).
4. Turn the ignition switch to ON (II).
5. Make sure the HDS communicate, with the vehicle and the PCM. If it doesn't communicate, troubleshoot the DLC circuit (see **DLC CIRCUIT TROUBLESHOOTING** ).
6. Select PGM-FI, INSPECTION, then ALL INJECTORS STOP function on the HDS.
7. Turn the ignition switch to LOCK (0).
8. Remove the four ignition coils and the four spark plugs (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION** ).

9. Attach the compression gauge to the spark plug hole.

**NOTE:** Use a compression gauge with a connecting length (between the edge and the flange) of less than 23 mm (0.9 in).



**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:**

**932 kPa (9.5 kgf/cm<sup>2</sup> , 135 psi)**

11. Measure the compression on the remaining cylinders.

**Maximum Variation:**

**196 kPa (2.0 kgf/cm<sup>2</sup> , 28 psi)**

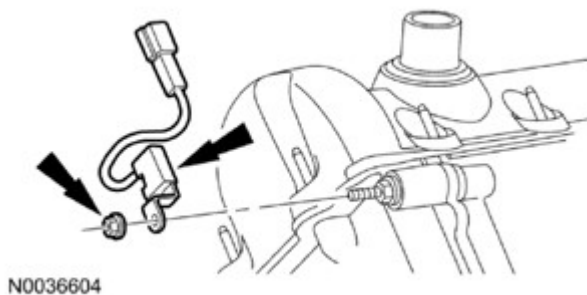
12. If the compression is not within specifications, check the following items, then remeasure the compression.
  - Incorrect valve clearance
  - Valve deposits
  - Confirmation of cam timing
  - Damaged or worn cam lobes
  - Damaged or worn valves and seats
  - Damaged cylinder head gasket
  - Damaged or worn piston rings
  - Damaged or worn piston and cylinder bore
13. Remove the compression gauge from the spark plug hole.

14. Install the four spark plugs and the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION** ).
15. Select the PCM reset (see **PCM RESET** ) to cancel the ALL INJECTORS STOP function on the HDS.

## VTEC ROCKER ARM TEST

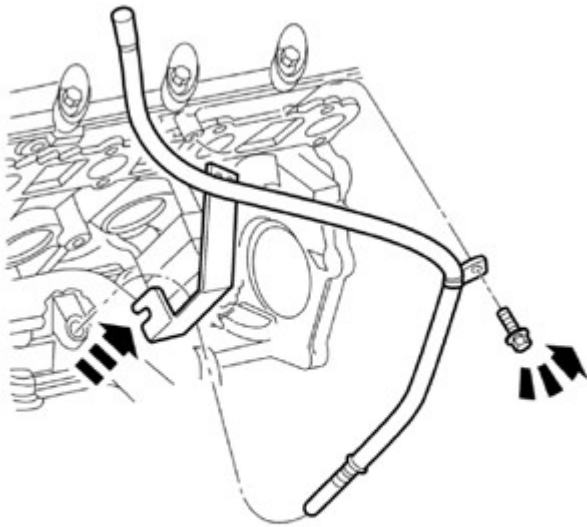
### Special Tools Required

- Air Pressure Regulator 07AAJ-PNAA101
  - VTEC Air Adapter 07ZAJ-PNAA101 (2)
  - VTEC Air Stopper 07ZAJ-PNAA200
  - Air Joint Adapter 07ZAJ-PNAA300
1. Start the engine, let it run for 5 minutes, then turn the ignition switch to LOCK (0).
  2. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
  3. Set the No. 1 piston at top dead center (TDC) (see step 5 ).
  4. Verify that the intake primary rocker arm (A) moves independently of the intake secondary rocker arm (B).
    - If the intake primary rocker arm does not move, remove the primary and secondary rocker arms as an assembly and check that the pistons in the secondary and primary rocker arms move smoothly (see **ROCKER ARM AND SHAFT INSPECTION**). If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
    - If the intake primary rocker arm moves freely, go to step 5.



**Fig. 6: Identifying Intake Primary Rocker Arm And Intake Secondary Rocker Arm**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat step 4 on the remaining intake primary rocker arms with each piston at TDC. When all the primary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.0 kgf/cm<sup>2</sup> , 57 psi).
7. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
8. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).



DA0108-B

**Fig. 7: Identifying Sealing Bolt And VTEC Air Stopper**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

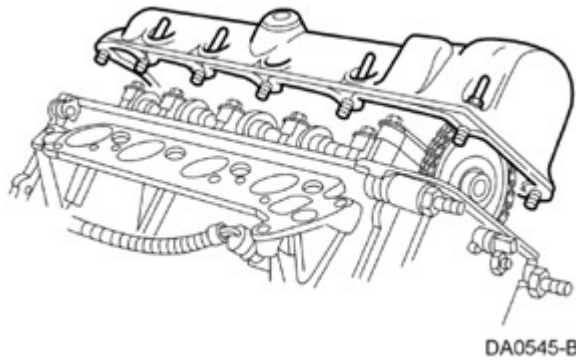
9. Remove the No. 2 and No. 3 camshaft holder bolts, and install the VTEC air adapters (C) finger-tight.
10. Connect the air joint adapter (D) and the air pressure regulator (E).
11. Loosen the valve on the regulator, and apply the specified air pressure.

**Specified Air Pressure:****290 kPa (3.0 kgf/cm<sup>2</sup> , 42 psi)**

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

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

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



**Fig. 8: Identifying Intake Primary Rocker Arm And Secondary Rocker Arm**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the special tools.
14. Tighten the camshaft holder mounting bolts to 22 N.m (2.2 kgf.m, 16 lbf.ft).
15. Tighten the sealing bolt to 20 N.m (2.0 kgf.m, lbf.ft).
16. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).

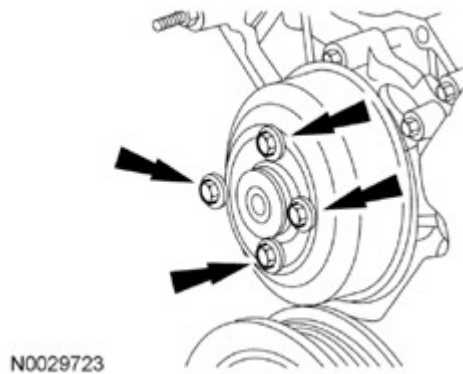
### VTC ACTUATOR INSPECTION

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Loosen the rocker arm adjusting screws (see step 2 ).
3. Remove the camshaft holder (see step 3 ).
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.
6. Seal the advance holes (A) in the No. 1 camshaft journal with tape and a wire tie.



**Fig. 9: Identifying No. 1 Camshaft Journal**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Seal one of the advance holes (A) with tape.



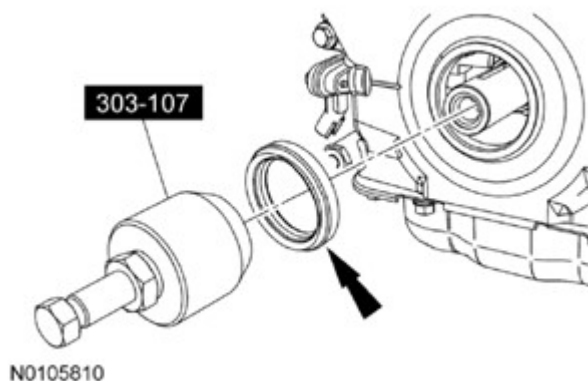
**Fig. 10: Sealing Advance Holes With Tape**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Apply air to the unsealed advance hole to release the lock.



**Fig. 11: Applying Air To Unsealed Advance Hole**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check that the VTC actuator moves smoothly. If the VTC actuator does not move smoothly, replace the VTC actuator.



**Fig. 12: Checking VTC Actuator**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the wire tie, the tape, and any adhesive residue from the camshaft journal.

11. Make sure the punch marks on the VTC actuator and exhaust camshaft sprocket are facing up, then set the camshafts in the head (see step 6 ).
12. Set the camshaft holders and chain guide B in place (see step 7 ).
13. Tighten the camshaft holder bolts to the specified torque (see step 8 ).
14. Hold the camshaft and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
15. Install the cam chain (see **CAM CHAIN INSTALLATION**).
16. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

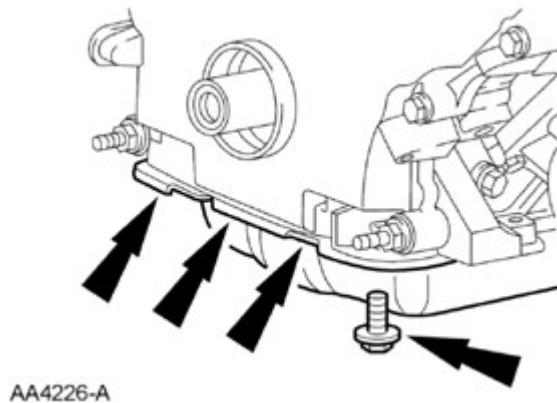
## **VALVE CLEARANCE ADJUSTMENT**

### **Special Tools Required**

- Adjuster 07MAA-PR70110
- Locknut Wrench 07MAA-PR70120

**NOTE:**        **Adjust the valves only when the cylinder head temperature is less than 100 °F (38 °C). Check the engine coolant temperature with the HDS if you are not sure.**

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.



**Fig. 13: Identifying Punch Mark On Variable Valve Timing Control Actuator**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

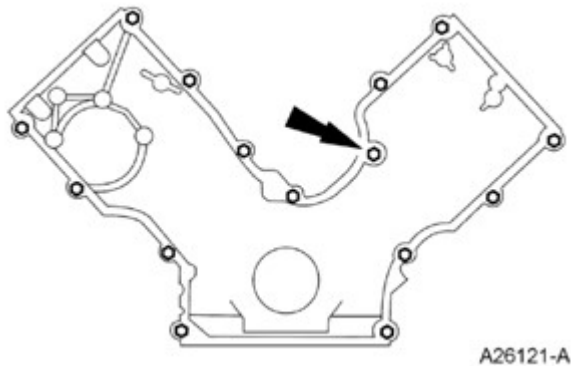
3. Select the correct feeler gauge for the valves you're going to check.

### **Valve Clearance**

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

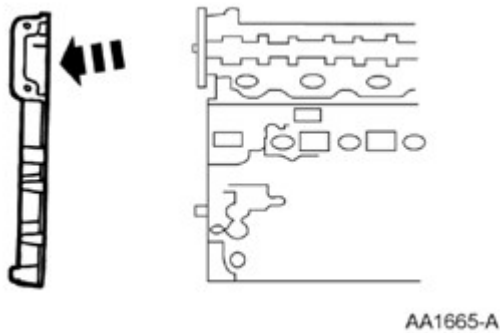


Exhaust: 0.28-0.32 mm (0.011-0.013 in)



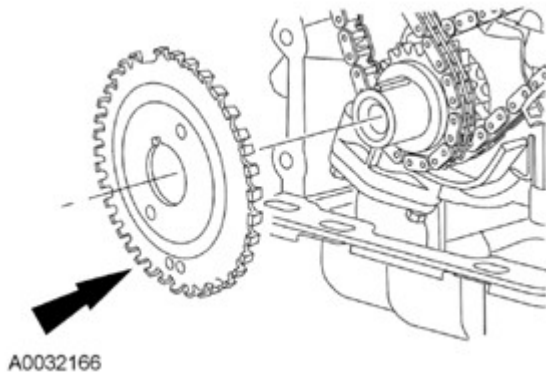
**Fig. 14: Identifying Intake And Exhaust Bolts**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 15: Inserting Feeler Gauge Between Adjusting Screw And Valve Stem**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 16: Loosening Locknut With Locknut Wrench And Adjuster**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Tighten the locknut to the specified torque and recheck the clearance. Repeat the adjustment if necessary.

#### **Specified Torque**

##### **Intake:**

**7 x 0.75 mm**

**20 N.m (2.0 kgf.m, 14 lbf.ft)**

**Apply engine oil to the nut threads.**

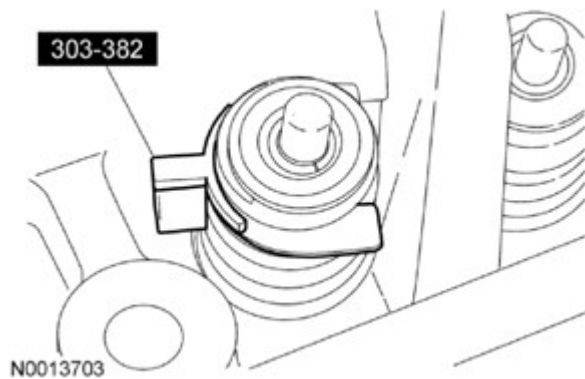
##### **Exhaust:**

**7 x 0.75 mm**

**14 N.m (1.4 kgf.m, 10 lbf.ft)**

**Apply engine oil to the nut threads.**

7. Rotate the crankshaft 180 ° clockwise (camshaft pulley turns 90 °).



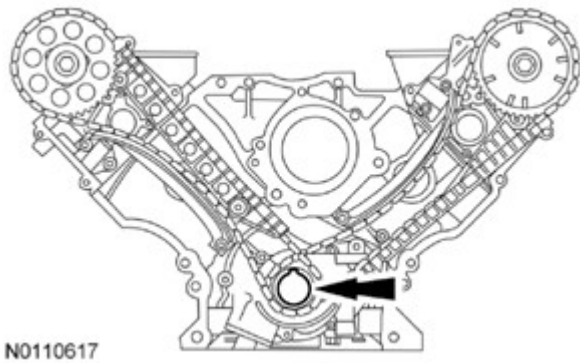
**Fig. 17: Identifying Crankshaft Rotation Direction**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 18: Identifying Crankshaft Rotation Direction**  
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 180 ° clockwise (camshaft pulley turns 90 °).



**Fig. 19: Identifying Crankshaft Rotation Direction**  
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**

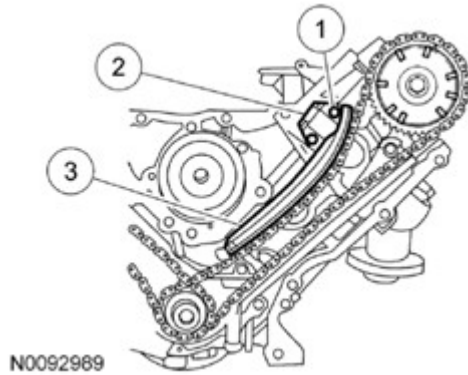
### **Special Tools Required**

- Handle, 6-25-660L 07JAB-001020B
- Crankshaft Pulley Holder 07AAB-RJAA100
- Socket, 19 mm 07JAA-001020A or equivalent

### **Removal**

1. Raise the vehicle on the lift, and remove the front wheels.

2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
4. Hold the pulley with the handle (A) and the holder attachment (B).

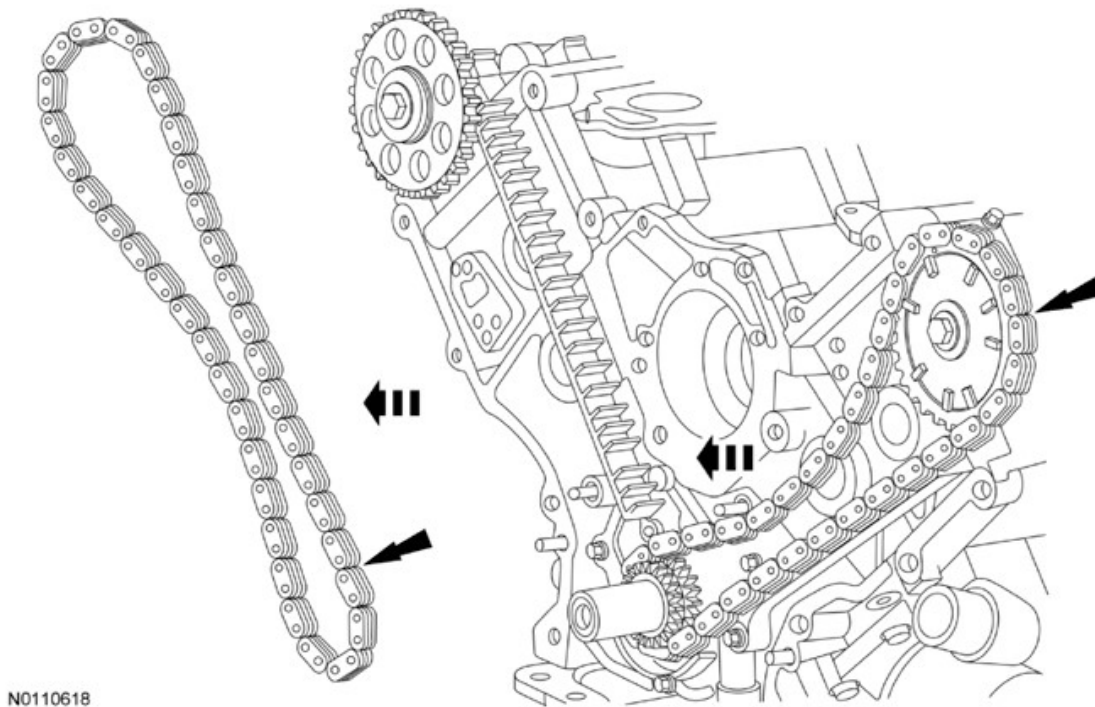


**Fig. 20: Identifying Handle, Holder Attachment And Socket**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

#### Installation

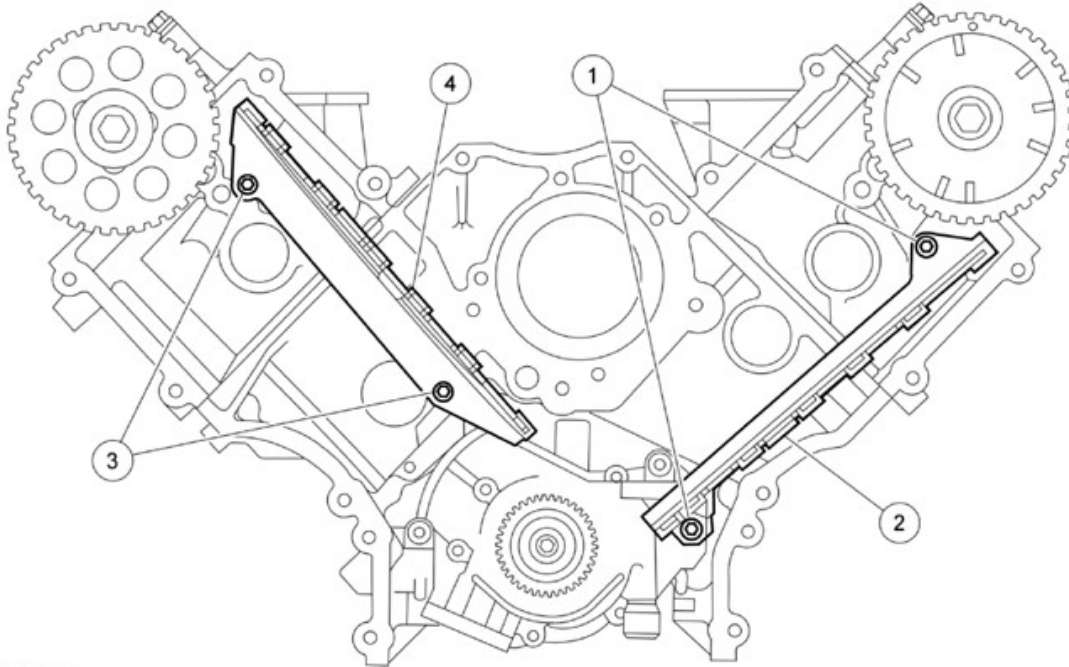
1. Clean the crankshaft pulley (A), crankshaft (B), bolt (C), and washer (D). Lubricate with new engine oil as shown.



**Fig. 21: Identifying Crankshaft Pulley, Crankshaft, Bolt And Washer**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

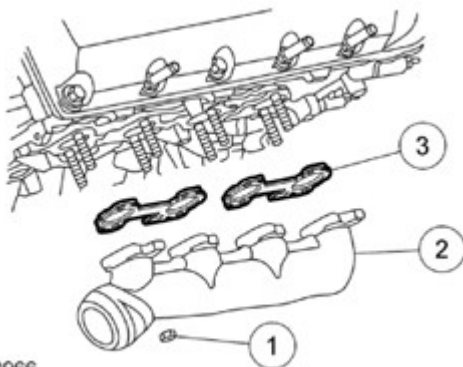
2. Install the crankshaft pulley, and hold the pulley with handle (A) and holder attachment (B).



N0110619

**Fig. 22: Identifying Crankshaft Pulley, Handle And Holder Attachment**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Tighten the bolt to 49 N.m (5.0 kgf.m, 36 lbf.ft) with a torque wrench and 19 mm socket (C). Do not use an impact wrench.
4. Tighten the pulley bolt an additional 90 °.



N0062966

**Fig. 23: Tightening Pulley Bolt**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

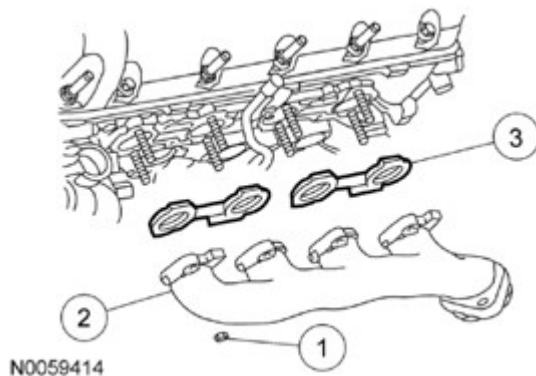
5. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).

6. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
7. Install the front wheels.

## CAM CHAIN REMOVAL

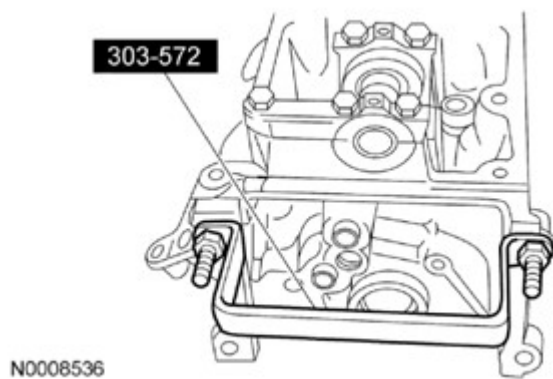
**NOTE:** Keep the cam chain away from magnetic fields.

1. Raise the vehicle on the lift, and remove the front wheels.
2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL** ).
5. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.



**Fig. 24: Identifying TDC Marks On VTC Actuator And Exhaust Camshaft Sprocket**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

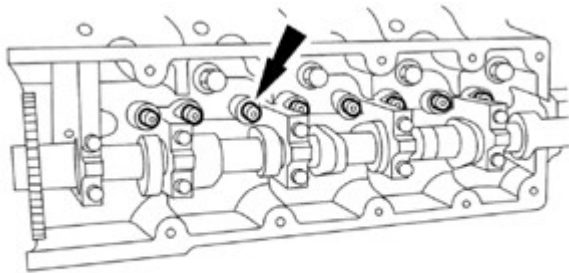
6. Disconnect the crankshaft position (CKP) sensor connector (A) and the VTC oil control solenoid valve connector (B).



**Fig. 25: Identifying Crankshaft Position Sensor Connector And VTC Oil Control Solenoid Valve**

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

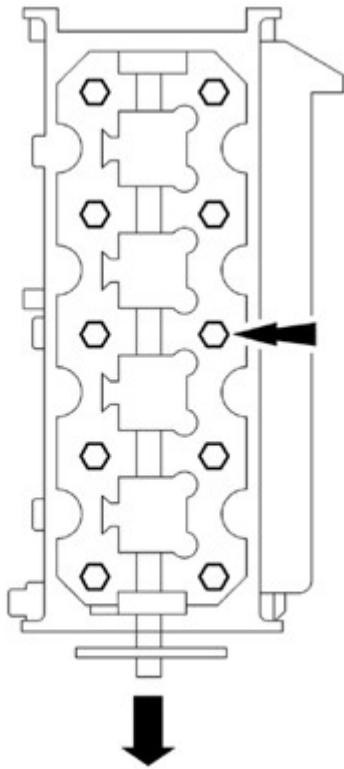
7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
8. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod.



A26324-A

**Fig. 26: Identifying Side Engine Mount Bracket****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

11. Remove the ground cable (A), then remove the side engine mount bracket (B).

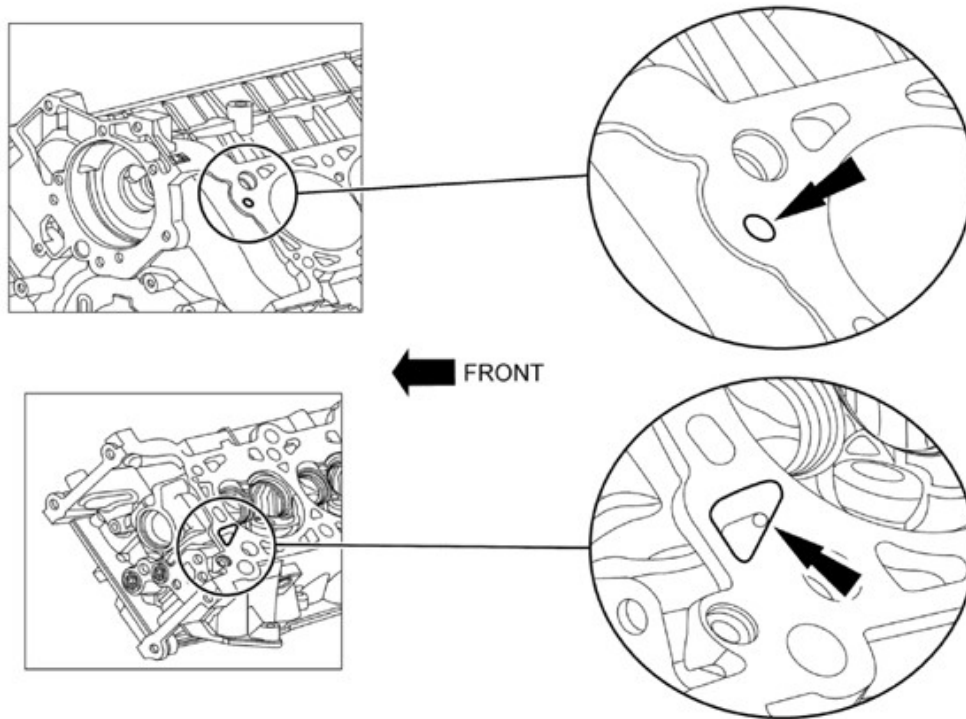


N0067889

**Fig. 27: Identifying Side Engine Mount Bracket And Ground Cable**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the side engine mount bracket mounting bolts.

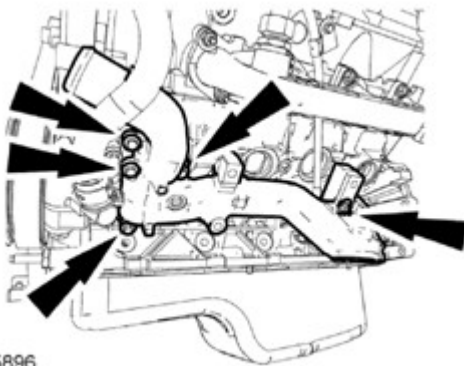




A0079634

**Fig. 28: Identifying Side Engine Mount Bracket Mounting Bolts**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

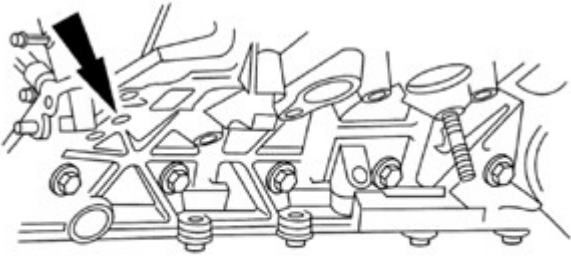
13. Remove the cam chain case (A) and the side engine mount bracket (B).



A0055896

**Fig. 29: Identifying Cam Chain Case And Side Engine Mount Bracket**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

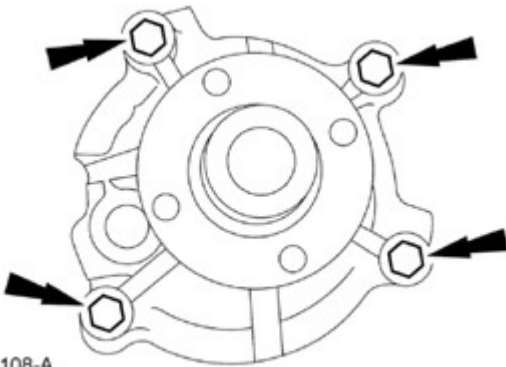
14. Loosely install the crankshaft pulley.
15. Turn the crankshaft counterclockwise to compress the auto-tensioner.



AA4458-A

**Fig. 30: Turning Crankshaft Counterclockwise**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

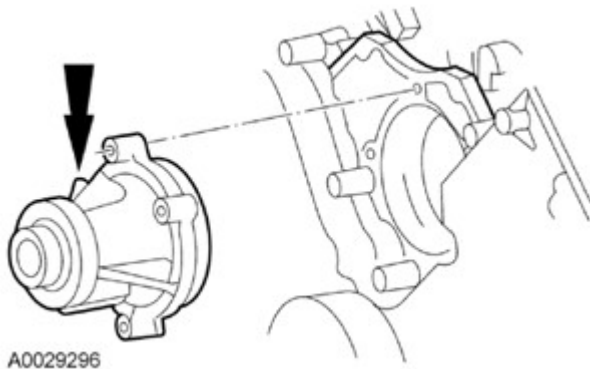
16. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.



A26108-A

**Fig. 31: Aligning Holes On Lock And Auto-Tensioner**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

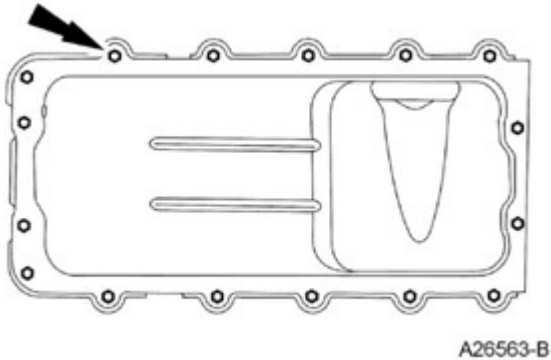
17. Remove the auto-tensioner.



A0029296

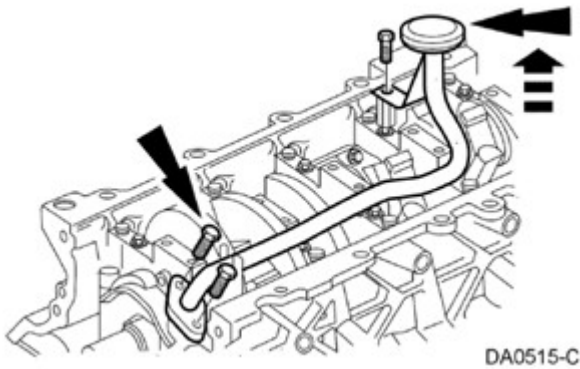
**Fig. 32: Identifying Auto-Tensioner**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove cam chain guide B.



**Fig. 33: Identifying Cam Chain Guide**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 34: Identifying Cam Chain Guide And Tensioner Arm**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the cam chain.

## CAM CHAIN INSTALLATION

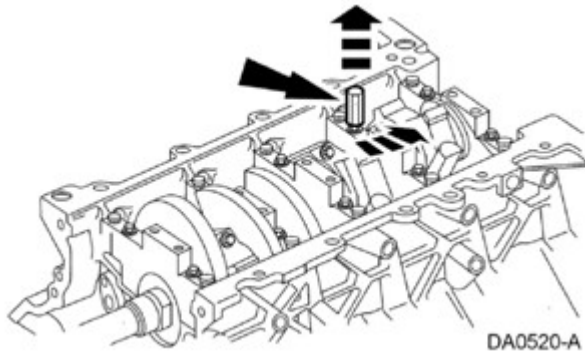
### Special Tools Required

Camshaft Lock Pin Set 07AAB-RWCA120

### NOTE:

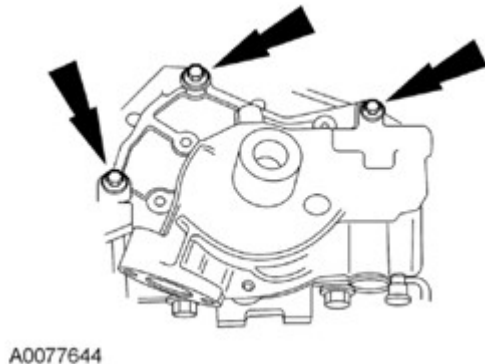
- Keep the cam chain away from magnetic fields.
- Before starting this procedure, check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.

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



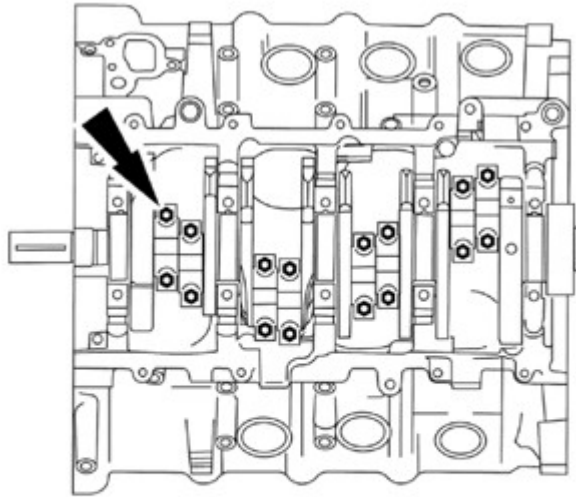
**Fig. 35: Identifying Cam Chain Guide And Tensioner Arm**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Set the camshafts to TDC. The punch mark (A) on the VTC actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.



**Fig. 36: Identifying Punch Mark On Exhaust Camshaft Sprocket**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

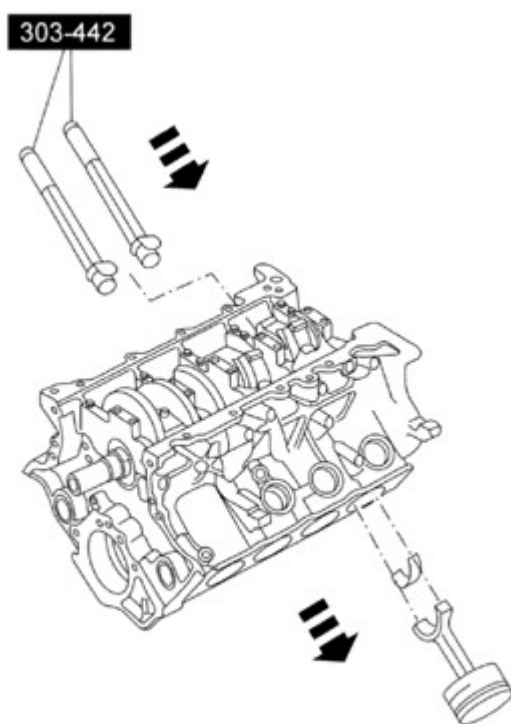
3. To hold the intake camshaft, insert the a camshaft lock pin (07AAB-RWCA120) (A) into the maintenance hole in the camshaft position (CMP) pulse plate A (B) and through the No. 5 rocker shaft holder (C).



DA0578-A

**Fig. 37: Identifying Camshaft Position Pulse Plate And Rocker Shaft Holder**  
**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

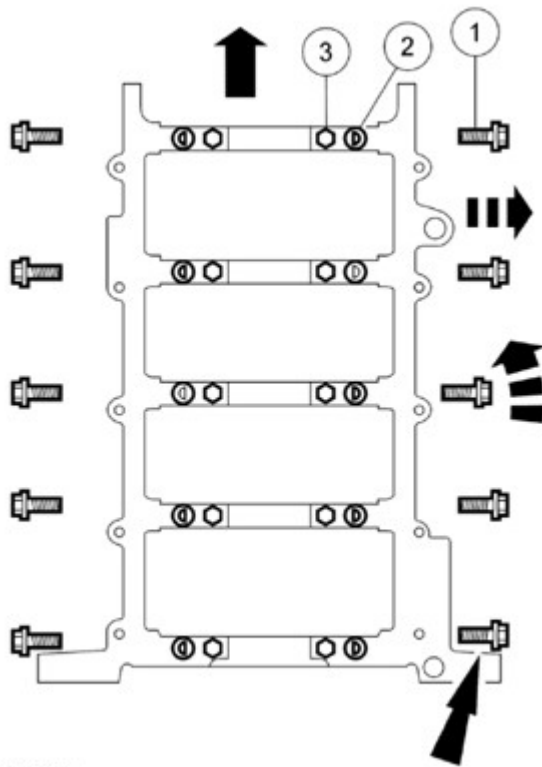
4. To hold the exhaust camshaft, insert the other camshaft lock pin (A) into the maintenance hole in the CMP pulse plate B (D) and through No. 5 rocker shaft holder (C).
5. Install the cam chain on the crankshaft sprocket with the colored link plate (A) aligned with the mark (B) on the crankshaft sprocket.



N0010189

**Fig. 38: Identifying Mark On Crankshaft Sprocket**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

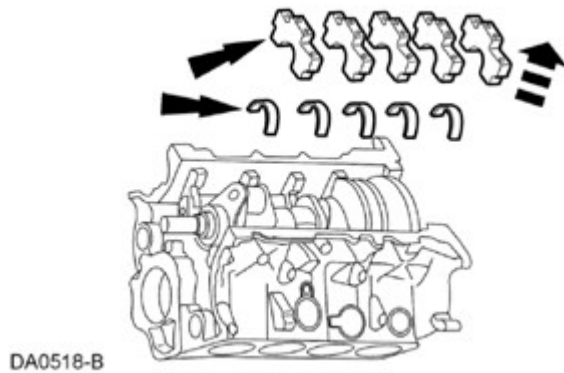
6. Install the cam chain on the VTC actuator and the exhaust camshaft sprocket with the punch marks (A) aligned with the center of the two colored link plates (B).



**Fig. 39: Installing Cam Chain On VTC Actuator**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Apply new engine oil to the threads of the cam chain tensioner mounting bolt.

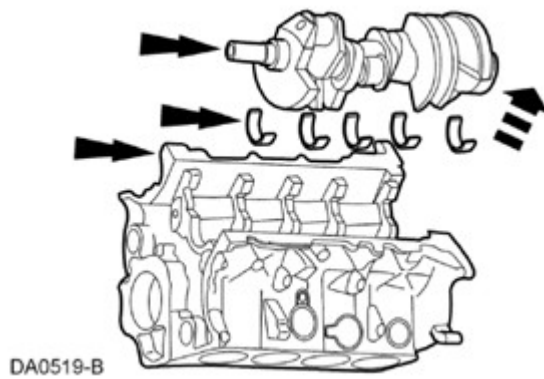


**Fig. 40: Identifying Cam Chain Tensioner Mounting Bolt With Torque Specifications**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

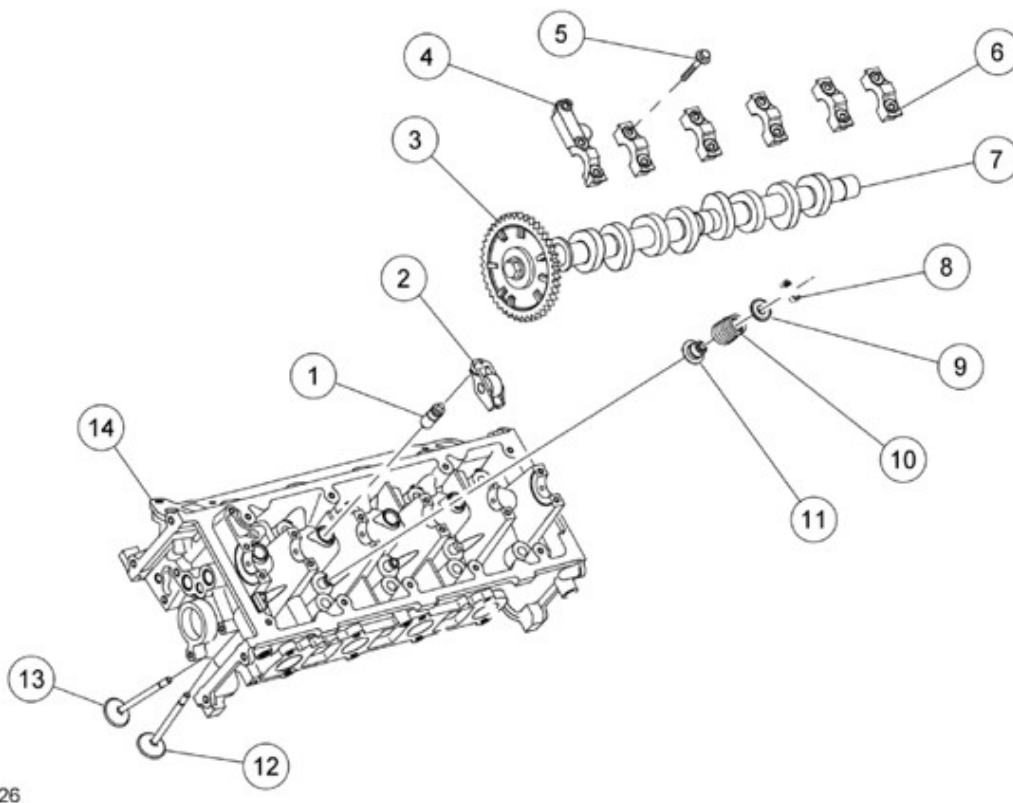
8. Install cam chain guide A and the tensioner arm (B).
9. Compress the auto-tensioner when replacing the cam chain. Remove the pin (P/N 14511-PNA-003) (A) from the auto-tensioner that was installed during removal. Turn the plate (B) counterclockwise, to release the lock, then press the rod (C), and set the first cam (D) to the edge of the rack (E). Insert the 1.2 mm (0.05 in) diameter pin or lock pin into the holes (F).

**NOTE:** If the chain tensioner is not set up as described, the tensioner will become damaged.



**Fig. 41: Identifying Tensioner Arm, Cam And Rod**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

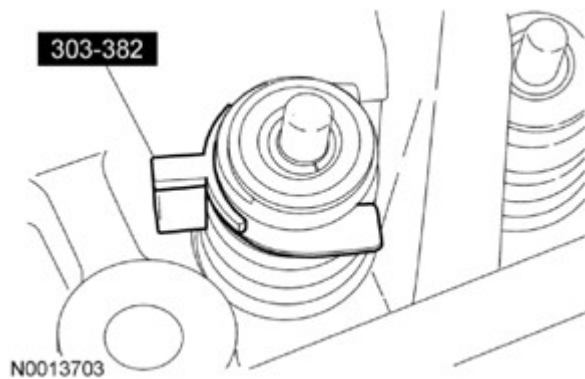
10. Install the auto-tensioner.



**Fig. 42: Identifying Auto-Tensioner With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

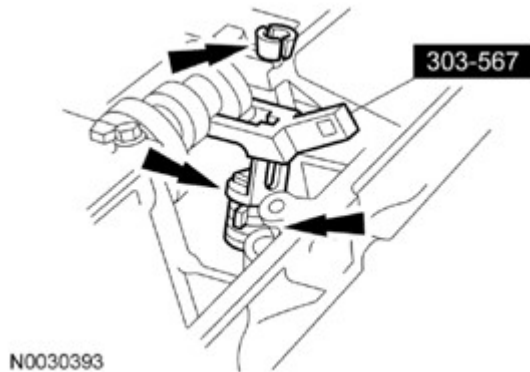
11. Install cam chain guide B.





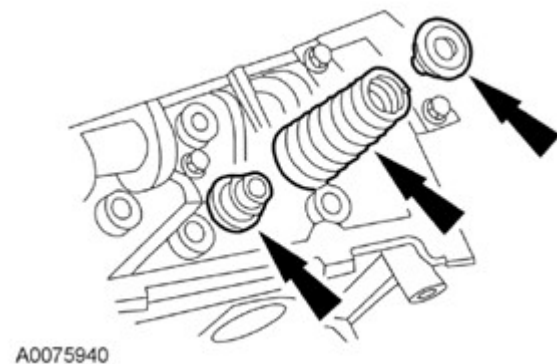
**Fig. 43: Identifying Cam Chain Guide With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.



**Fig. 44: Identifying Lock Pin And Auto-Tensioner**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the camshaft lock pin set.

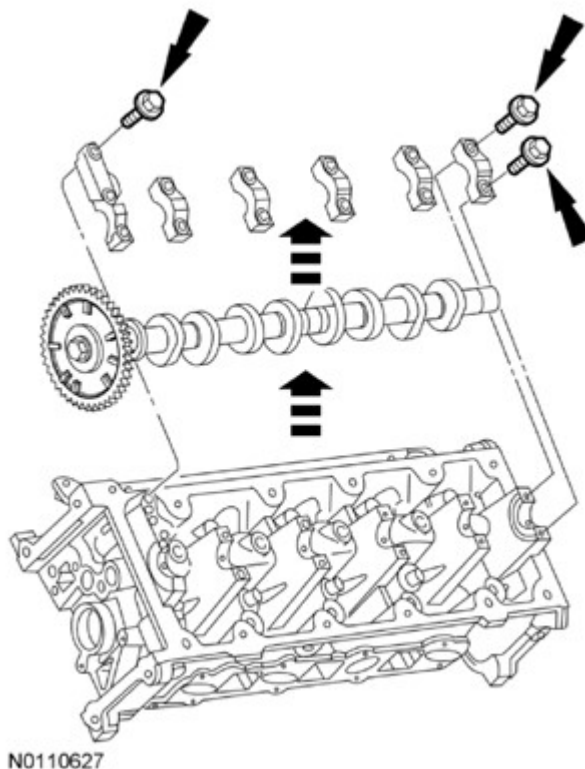


**Fig. 45: Removing Camshaft Lock Pin Set**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CAM CHAIN CASE OIL SEAL INSTALLATION**).
15. Remove old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
16. Clean and dry the chain case mating surfaces.
17. Apply liquid gasket (P/N 08717-0004, 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 3 mm (0.12 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



**Fig. 46: Identifying Engine Block Mating Surface Sealant Area**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Apply liquid gasket to the engine block upper surface contact areas (B) and the lower block upper surface contact areas (C) on the chain case.

**NOTE:**

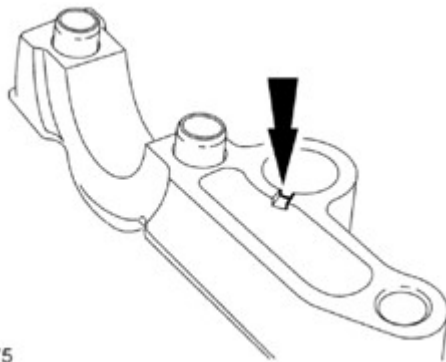
**Apply about 11 mm (0.43 in) diameter and about 3 mm (0.12 in) thickness of liquid gasket to the areas (B) and (C).**

19. Apply liquid gasket (P/N 08717-0004, 08718-0003, or 08718-0009) to the oil pan mating surface of the

oil pump. Install the component within 5 minutes of applying the liquid gasket.

**NOTE:**

- Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



A0049975

**Fig. 47: Identifying Cylinder Head Sealant Broken Line**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Install the new O-ring (A), the side engine mount bracket (B), and the mounting bolts (C) on the chain case. Set the edge of the chain case (D) to the edge of the oil pan (E), then install the chain case on the engine block (F). Wipe off the excess liquid gasket on the oil pan and chain case mating area.

**NOTE:**

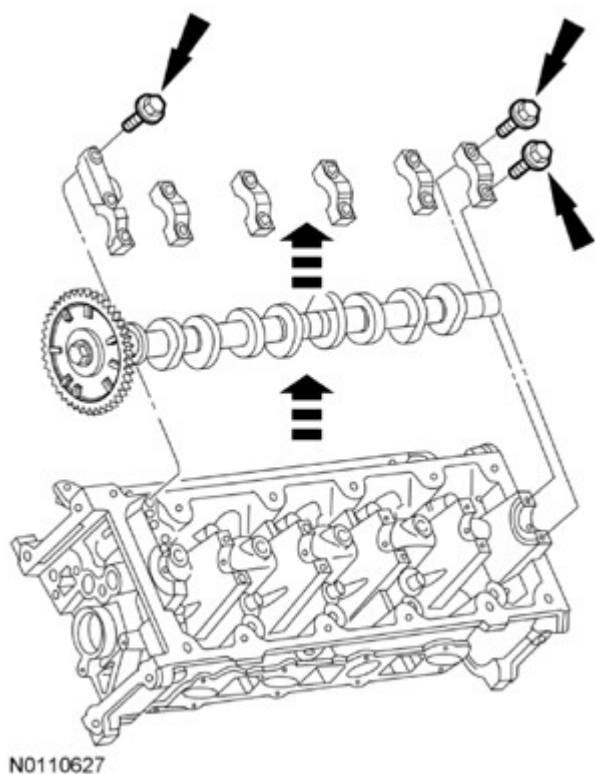
- When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.
- Wait at least 30 minutes to allow the liquid gasket to cure before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the chain case.



A26332-A

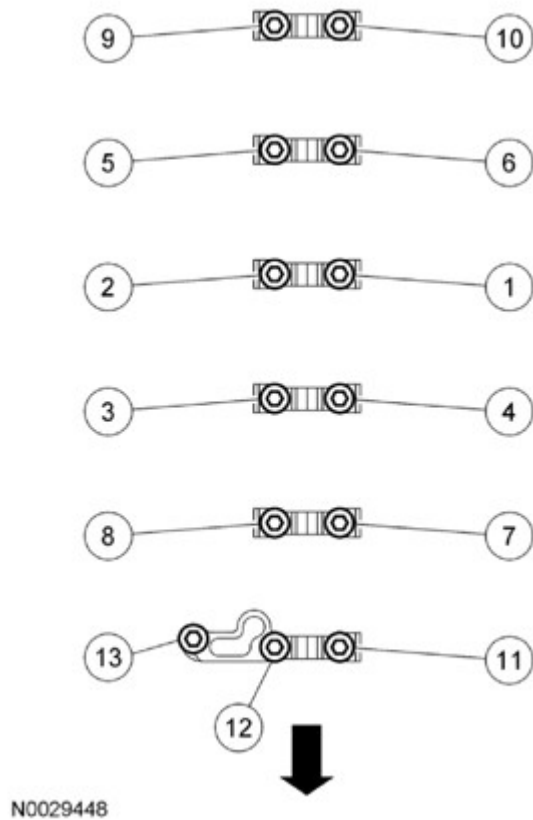
**Fig. 48: Identifying O-Ring, Side Engine Mount Bracket, Mounting Bolts And Chain Case With Torque Specifications**

Courtesy of AMERICAN HONDA MOTOR CO., INC.



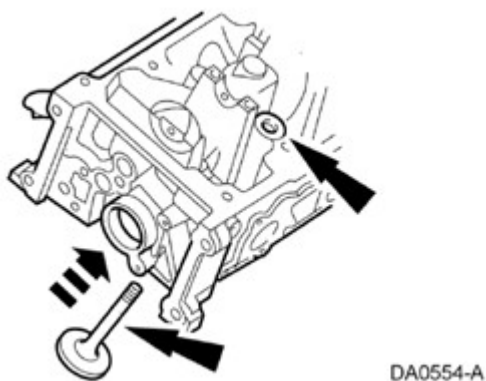
**Fig. 49: Identifying Chain Case, Engine Block And Oil Pan**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Tighten the side engine mount bracket mounting bolts.



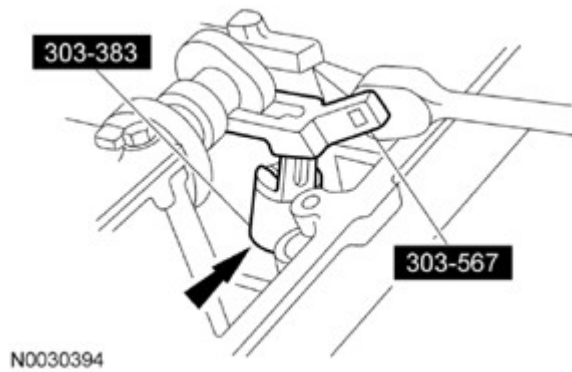
**Fig. 50: Identifying Side Engine Mount Bracket Mounting Bolts With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Install the side engine mount bracket (A), then loosely tighten the new bolt and nut (B), and loosely tighten the bolt (C).



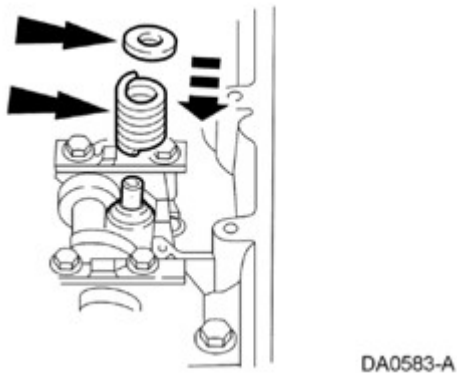
**Fig. 51: Identifying Side Engine Mount Bracket, Bolt And Nut With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the ground cable (D).
24. Remove the air cleaner housing assembly (see [AIR CLEANER REMOVAL/INSTALLATION](#) ).
25. Loosen the transmission mounting bolt and nuts (A).



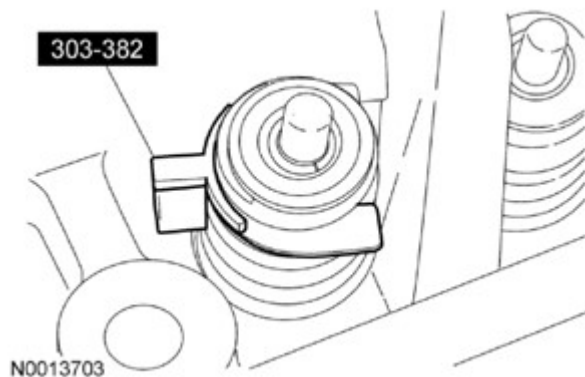
**Fig. 52: Identifying Transmission Mounting Bolt And Nuts**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Raise the vehicle on the lift.
27. Loosen the lower torque rod mounting bolt (A).



**Fig. 53: Identifying Lower Torque Rod Mounting Bolt**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

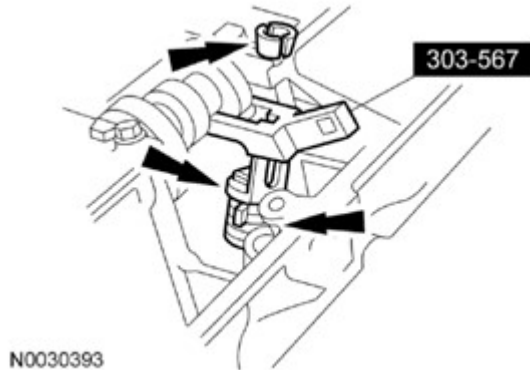
28. Lower the vehicle on the lift.
29. Tighten the side engine mount mounting bolts and nut.



**Fig. 54: Identifying Side Engine Mount Mounting Bolts And Nut With Torque Specifications**

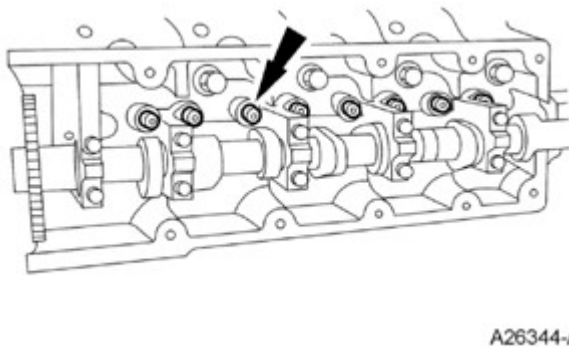
Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Tighten the transmission mounting bolt and nuts.



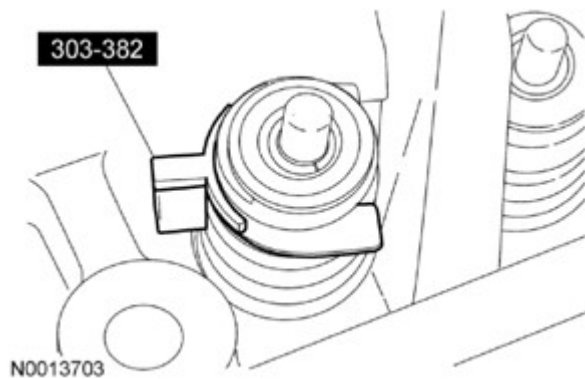
**Fig. 55: Identifying Transmission Mounting Bolt And Nuts With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

31. Raise the vehicle on the lift.
32. Tighten the lower torque rod mounting bolt.



**Fig. 56: Identifying Lower Torque Rod Mounting Bolt With Torque Specification**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

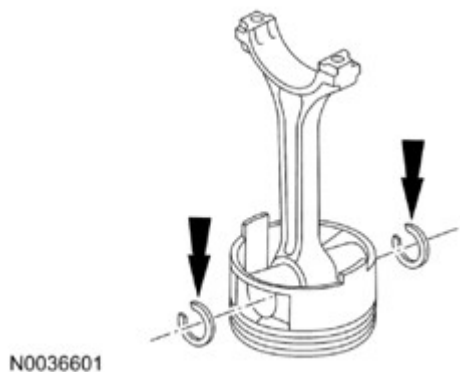
33. Lower the vehicle on the lift.
34. Install the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION** ).
35. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.



**Fig. 57: Identifying Upper Torque Rod And Upper Torque Rod Mounting Bolts With Torque Specifications**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

36. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
37. Install the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
38. Connect the crankshaft position (CKP) sensor connector (A) and VTC oil control solenoid valve connector (B).



**Fig. 58: Identifying Crankshaft Position Sensor Connector And VTC Oil Control Solenoid Valve Connector**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

39. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
40. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
41. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
42. Install the front wheels.
43. Do the CKP pattern clear/CKP learn procedure (see **HDS CLEAR COMMAND** ).

## CAM CHAIN AUTO-TENSIONER REMOVAL AND INSTALLATION

### Removal



1. Remove the chain case cover.

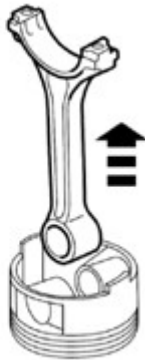


A26352-A

**Fig. 59: Identifying Chain Case Cover**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

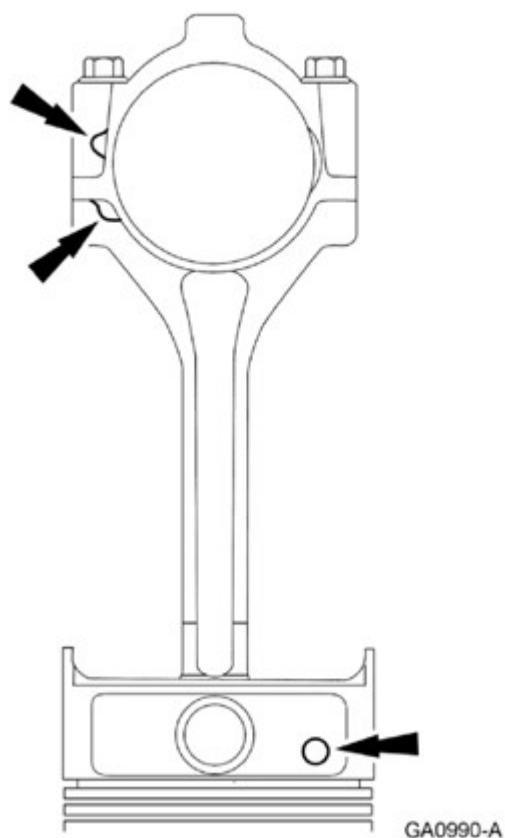


A26351-A

**Fig. 60: Turning Crankshaft Counterclockwise**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.



**Fig. 61: Aligning Holes On Lock And Auto-Tensioner**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

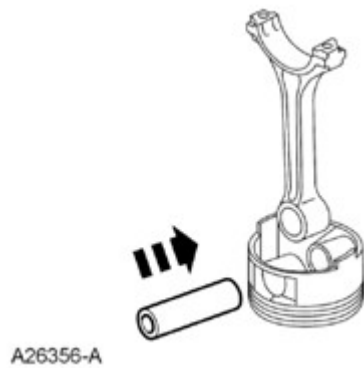
4. Remove the auto-tensioner.



**Fig. 62: Identifying Auto-Tensioner**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

#### Installation

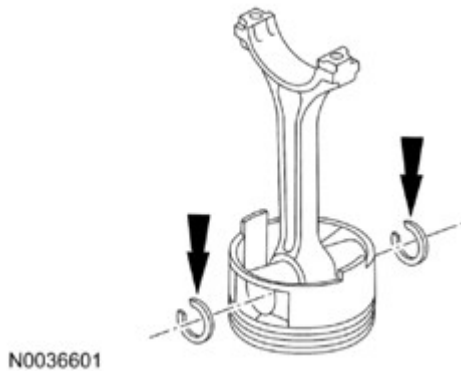
1. Install the auto-tensioner.



**Fig. 63: Identifying Auto-Tensioner**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.



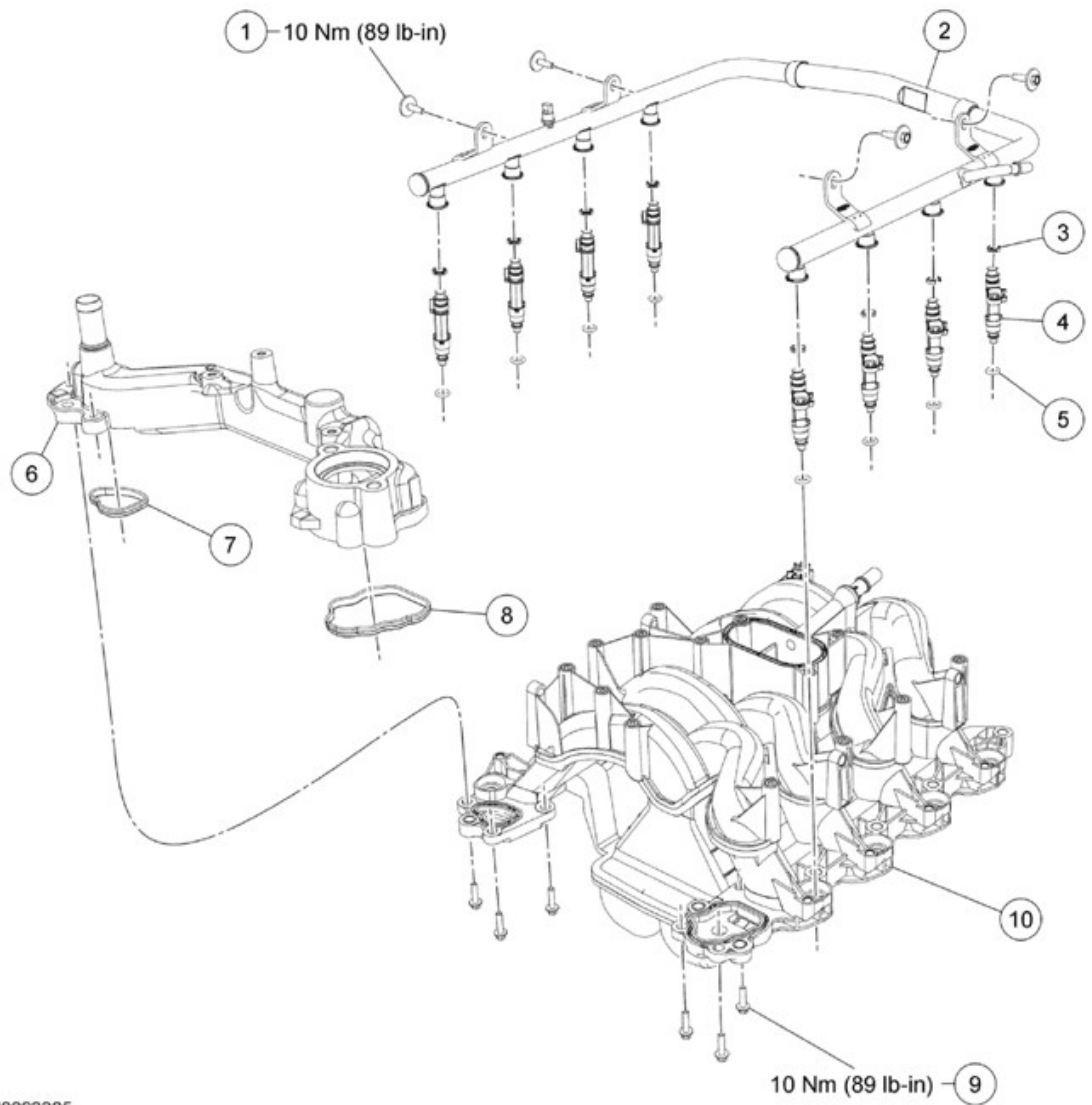
**Fig. 64: Identifying Lock Pin (P/N 14511-PNA-003) And Auto-Tensioner**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove old liquid gasket from the chain case cover mating surfaces, bolts, and bolt holes.
4. Clean and dry the chain case cover mating surfaces.
5. Apply liquid gasket (P/N 08717-0004, 08718-0003, or 08718-0009) to the chain case mating surface of the chain case cover and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

**NOTE:**

- Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

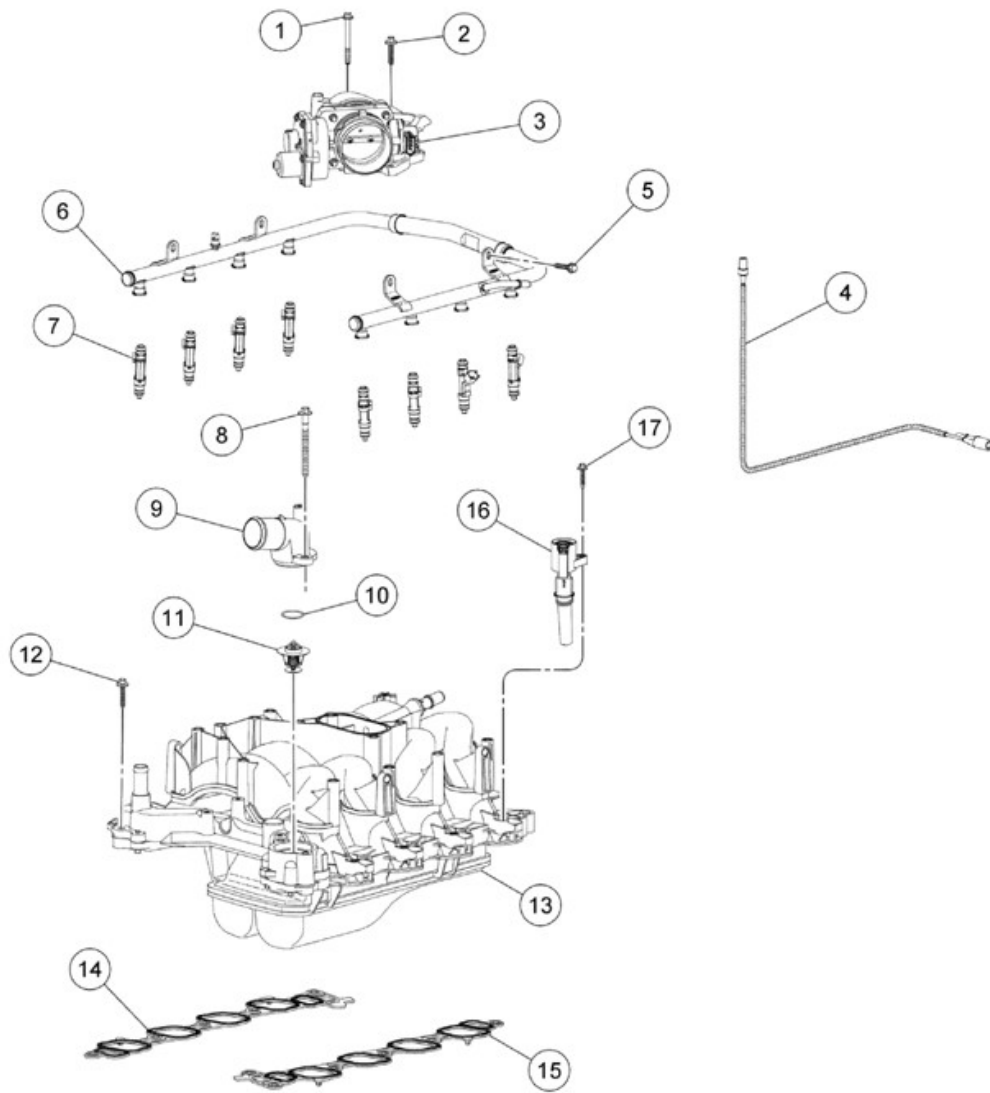


**Fig. 65: Identifying Chain Case Mating Surface Sealant Area**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.

**NOTE:**

- Wait at least 30 minutes to allow the liquid gasket to cure before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the chain case cover.



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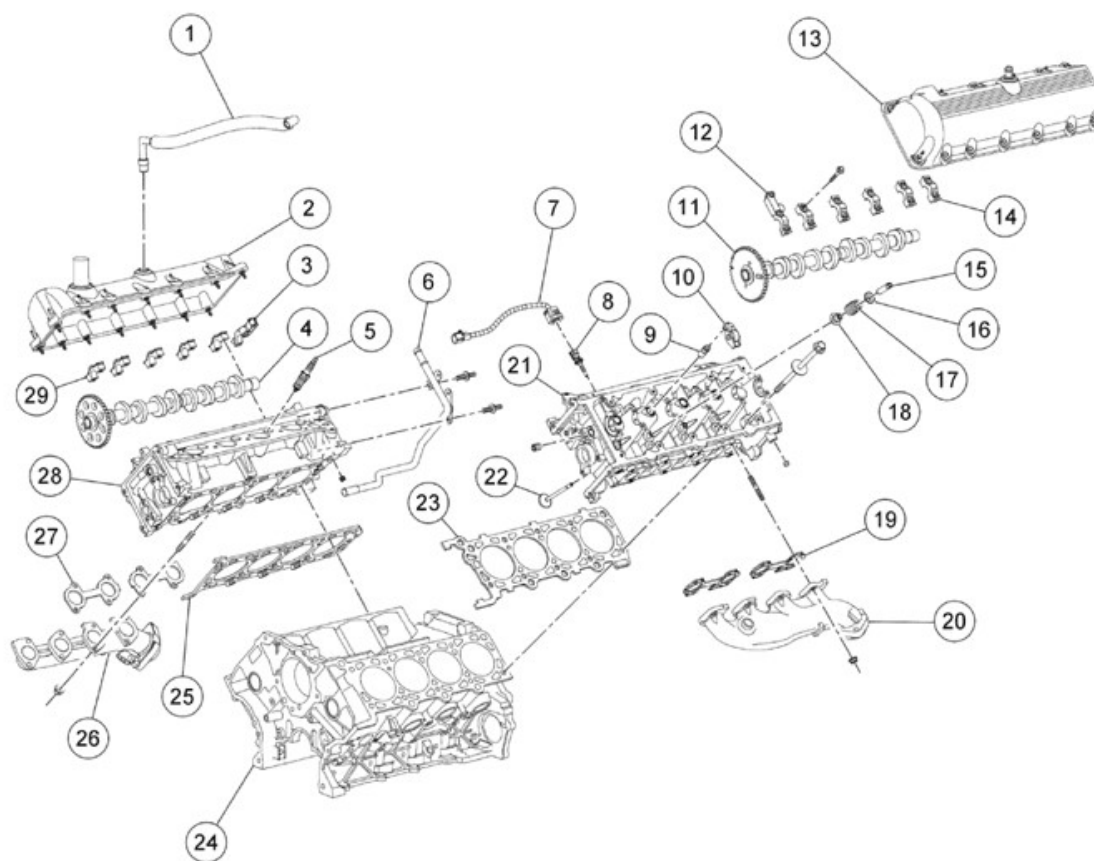
**Fig. 66: Identifying Chain Case Cover And Mounting Bolts With Torque Specification**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

## CAM CHAIN CASE OIL SEAL INSTALLATION

### Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Attachment, 52 x 55 mm 07746-0010400

1. Use the driver and attachment to drive a new oil seal squarely into the chain case to the specified installed height.



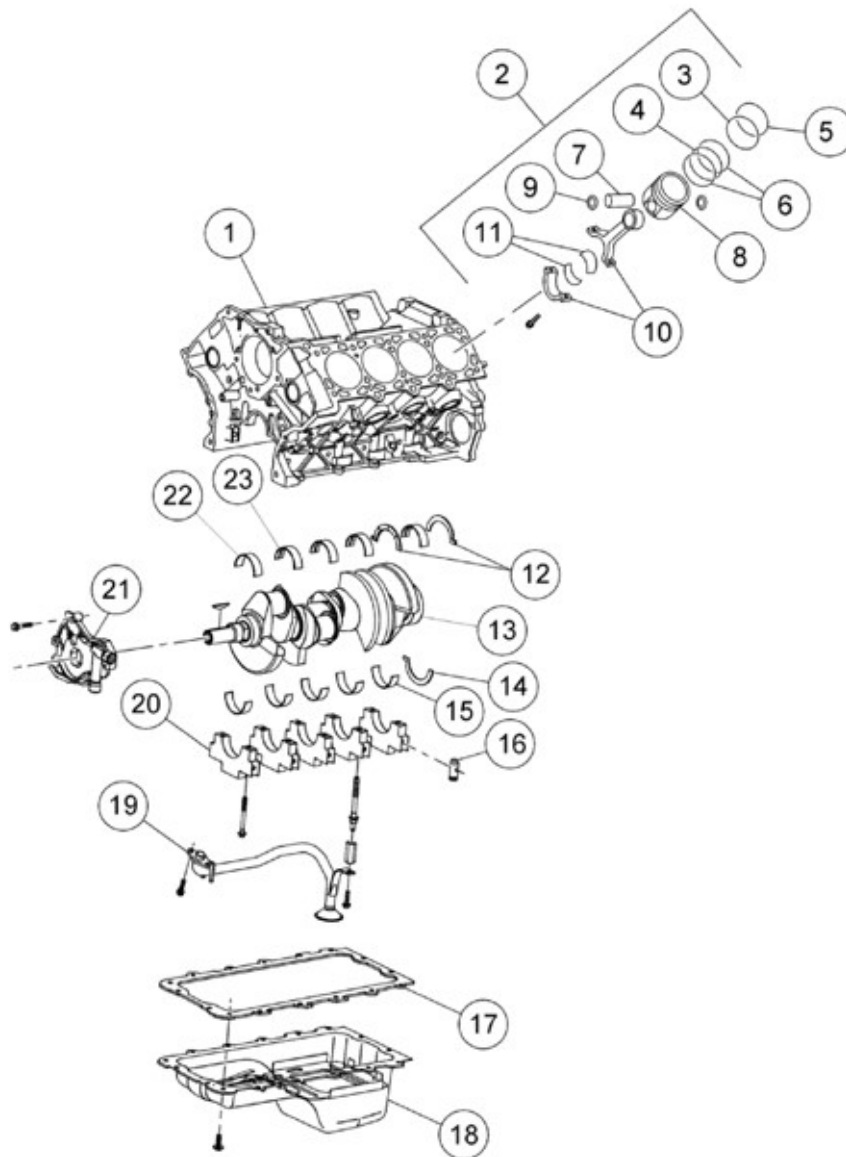
N0062975

**Fig. 67: Installing Cam Chain Case Oil Seal**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**Oil Seal Installed Height:**

**33.0-33.7 mm (1.30-1.33 in)**



A0043129

**Fig. 68: Measuring Distance Between Chain Case Surface And Oil Seal**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

## CAM CHAIN INSPECTION

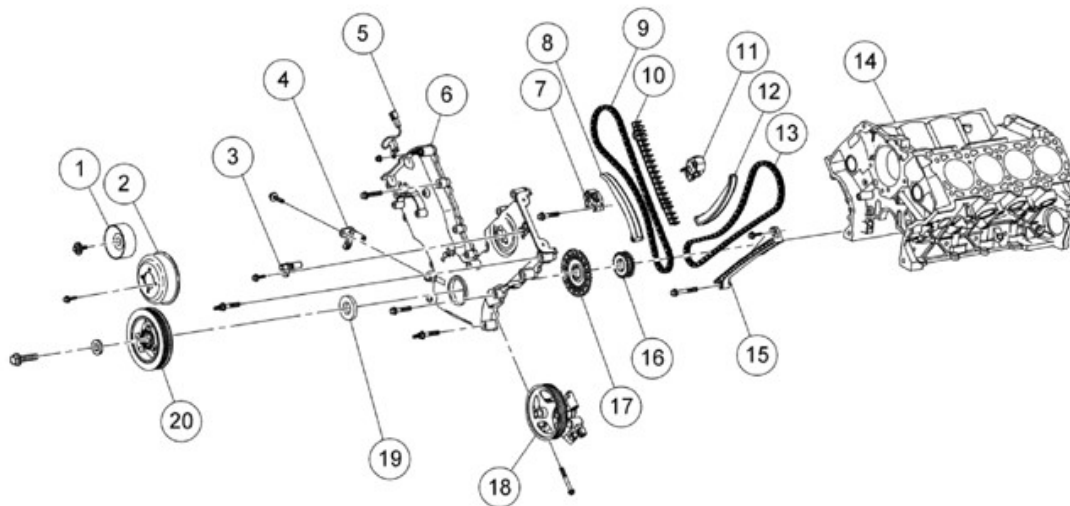
1. Raise the vehicle on the lift, and remove the front wheels.
2. Remove the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL** ).
5. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC

marks on the VTC actuator and the exhaust camshaft sprocket (see step 5 ).

6. Disconnect the crankshaft position (CKP) sensor connector and the VTC oil control solenoid valve connector (see step 6 ).
7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
8. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION**).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod (see step 10 ).
11. Remove the ground cable, then remove the side engine mount bracket (see step 11 ).
12. Remove the side engine mount bracket mounting bolts (see step 12 ).
13. Remove the cam chain case and side engine mount bracket (see step 13 ).
14. Measure the tensioner rod length between the tensioner body and bottom of the flat surface section on the tensioner rod. If the length is more than the service limit, replace the cam chain and the oil pump chain.

### Tensioner Rod Length

**Service Limit: 13.5 mm (0.53 in)**



A0043130

**Fig. 69: Identifying Tensioner Rod Length**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CAM CHAIN CASE OIL SEAL INSTALLATION**).
16. Remove all of the old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
17. Clean and dry the chain case mating surfaces.



18. Apply liquid gasket (P/N 08717-0004, 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 (see step [17](#) ).

**NOTE:**

- Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

19. Apply liquid gasket to the engine block upper surface contact areas and the lower block upper surface contact areas on the chain case (see step 18 ).

**NOTE:**

**Apply about 11 mm (0.43 in) diameter and about 3 mm (0.12 in) thickness of liquid gasket to these areas.**

20. Apply liquid gasket (P/N 08717-0004, 08718-0003, or 08718-0009) to the oil pan mating surface of the oil pump. Install the component within 5 minutes of applying the liquid gasket (see step 19 ).

**NOTE:**

- Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

21. Install the new O-ring, side engine mount bracket, and mounting bolts on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 20 ). Wipe off the excess liquid gasket on the oil pan and the chain case mating area.

**NOTE:**

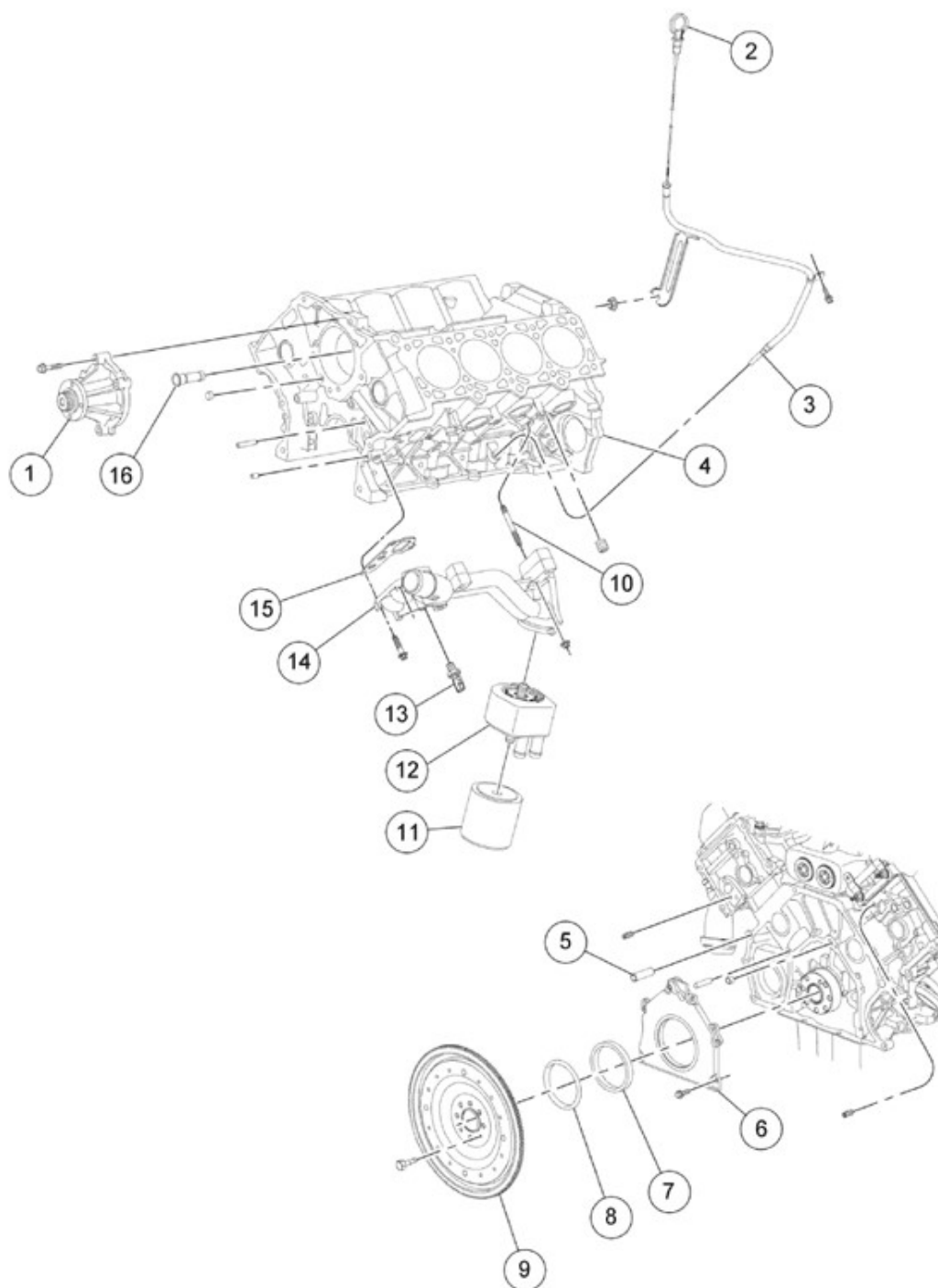
- When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.
- Wait at least 30 minutes to allow the liquid gasket to cure before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the chain case.

22. Tighten the side engine mount bracket mounting bolts (see step 21 ).
23. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 22 ).
24. Remove the air cleaner housing assembly (see [AIR CLEANER REMOVAL/INSTALLATION](#) ).
25. Loosen the transmission mounting bolt and nuts (see step 25 ).
26. Raise the vehicle on the lift.
27. Loosen the lower torque rod mounting bolt (see step 27 ).
28. Lower the vehicle on the lift.

29. Tighten the side engine mount mounting bolts and nut (see step 29 ).
30. Tighten the transmission mounting bolt and nuts (see step 30 ).
31. Raise the vehicle on the lift.
32. Tighten the lower torque rod mounting bolt (see step 32 ).
33. Lower the vehicle on the lift.
34. Install the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION** ).
35. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 35 ).
36. Install the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
37. Connect the CKP sensor connector and VTC oil control solenoid valve connector (see step 38 ).
38. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION** ).
39. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION** ).
40. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
41. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
42. Install the front wheels.
43. Do the CKP pattern clear/CKP learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN** ).

## **CKP PULSE PLATE REPLACEMENT**

1. Raise the vehicle on the lift, and remove the front wheels.
2. Remove the front splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
3. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL** ).
5. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC marks on the VTC actuator and exhaust camshaft sprocket (see step 5 ).
6. Disconnect the crankshaft position (CKP) sensor connector and VTC oil control solenoid valve connector (see step 6 ).
7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
8. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION** ).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod (see step 10 ).
11. Remove the ground cable, then remove the side engine mount bracket (see step 11 ).
12. Remove the side engine mount bracket mounting bolts (see step 12 ).
13. Remove the cam chain case and side engine mount bracket (see step 13 ).
14. Remove the CKP pulse plate.



A0056141

**Fig. 70: Identifying CKP Pulse Plate**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the CKP pulse plate.

16. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CAM CHAIN CASE OIL SEAL INSTALLATION**).
17. Remove all of the old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
18. Clean and dry the chain case mating surfaces.
19. Apply liquid gasket (P/N 08717-0004, 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 (see step 17 ).

**NOTE:**

- **Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

20. Apply liquid gasket to the engine block upper surface contact areas and the lower block upper surface contact areas on the chain case (see step 18 ).

**NOTE:**

**Apply about 11 mm (0.43 in) diameter and about 3 mm (0.12 in) thickness of liquid gasket to these areas.**

21. Apply liquid gasket (P/N 08717-0004, 08718-0003, or 08718-0009) to the oil pan mating surface of the oil pump. Install the component within 5 minutes of applying the liquid gasket (see step 19 ).

**NOTE:**

- **Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line.**
- **If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.**

22. Install the new O-ring, side engine mount bracket, and mounting bolts on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 20 ). Wipe off the excess liquid gasket on the oil pan and the chain case mating area.

**NOTE:**

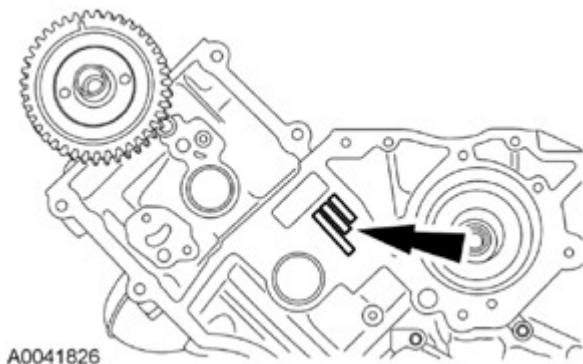
- **When installing the chain case, do not slide the bottom surface onto the oil pan mounting surface.**
- **Wait at least 30 minutes to allow the liquid gasket to cure before filling the engine with oil.**
- **Do not run the engine for at least 3 hours after installing the chain case.**

23. Tighten the side engine mount bracket mounting bolts (see step 21 ).
24. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 22 ).
25. Remove the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION** ).

26. Loosen the transmission mounting bolt and nuts (see step 25 ).
27. Raise the vehicle on the lift.
28. Loosen the lower torque rod mounting bolt (see step 27 ).
29. Lower the vehicle on the lift.
30. Tighten the side engine mount mounting bolts and nut (see step 29 ).
31. Tighten the transmission mounting bolt and nuts (see step 30 ).
32. Raise the vehicle on the lift.
33. Tighten the lower torque rod mounting bolt (see step 32 ).
34. Lower the vehicle on the lift.
35. Install the air cleaner housing assembly (see **AIR CLEANER REMOVAL/INSTALLATION** ).
36. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 35 ).
37. Install the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION** ).
38. Connect the CKP sensor connector and VTC oil control solenoid valve connector (see step 38 ).
39. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL AND INSTALLATION** ).
40. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION** ).
41. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
42. Install the splash shield (see **FRONT SPLASH SHIELD REPLACEMENT** ).
43. Install the front wheels.
44. Do the CKP pattern clear/CKP learn procedure (see **CKP PATTERN CLEAR/CKP PATTERN LEARN** ).

## CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold cover.

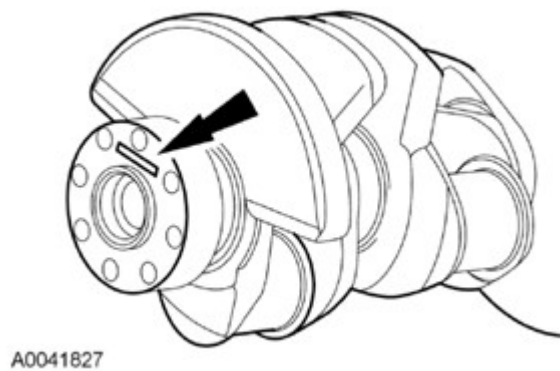


**Fig. 71: Identifying Intake Manifold Cover**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the four ignition coils (see **IGNITION COIL AND SPARK PLUG**

**REMOVAL/INSTALLATION ).**

3. Disconnect the evaporative emission (EVAP) canister purge valve connector.
4. Remove the dipstick (A), the breather hose (B), and the power steering (P/S) hose clamp (C).



**Fig. 72: Identifying Dipstick, Breather Hose And Power Steering (P/S) Hose Clamp**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Remove the two bolts (D) securing the EVAP canister purge valve bracket.
6. Remove the cylinder head cover.

MAXIMUM CRANKSHAFT DIA

## MINIMUM BLOCK DIA

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
	72.400	.401	.402	.403	.404	.405	.406	.407	.408	.409	.410	.411	.412	.413	.414	.415	.416	.417	.418	.419	.420	.421	.422	.423	.424
X	67.504	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
W	67.503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
V	67.502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
U	67.501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
T	67.500	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
S	67.499	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
R	67.498	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
Q	67.497	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
P	67.496	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
O	67.495	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
N	67.494	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
M	67.493	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
L	67.492	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
K	67.491	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
J	67.490	1	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
I	67.489	1	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
H	67.488	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
G	67.487	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
F	67.486	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
E	67.485	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
D	67.484	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C	67.483	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
B	67.482	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A	67.481	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

A0031544

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

**CYLINDER HEAD COVER INSTALLATION**

1. Thoroughly clean the head cover gasket and the groove.
2. Install the head cover gasket (A) in the groove of the cylinder head cover (B).

MAXIMUM CRANKSHAFT DIA

## MINIMUM BLOCK DIA

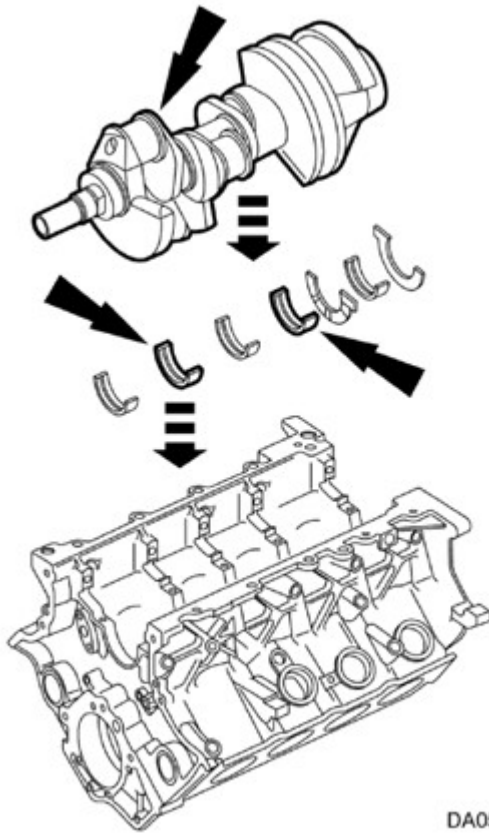
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
72.400	.401	.402	.403	.404	.405	.406	.407	.408	.409	.410	.411	.412	.413	.414	.415	.416	.417	.418	.419	.420	.421	.422	.423	.424
X 67.254	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
W 67.253	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
V 67.252	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
U 67.251	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
T 67.250	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
S 67.249	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
R 67.248	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Q 67.247	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
P 67.246	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
O 67.245	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
N 67.244	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
M 67.243	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
L 67.242	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
K 67.241	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
J 67.240	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
I 67.239	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
H 67.238	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
G 67.237	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
F 67.236	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
E 67.235	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
D 67.234	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C 67.233	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
B 67.232	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A 67.231	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

A0041840

**Fig. 74: Identifying Head Cover Gasket And Cylinder Head Cover**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

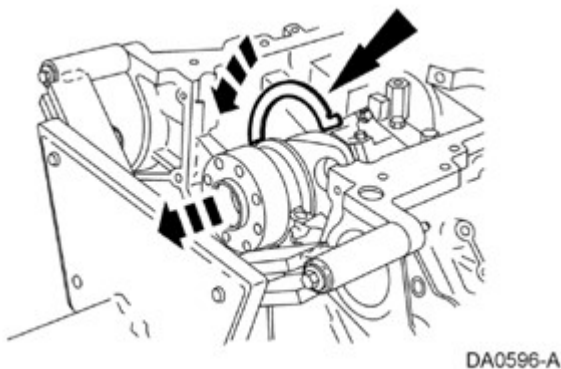
3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009, on the chain case and the No. 5 rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

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



**Fig. 75: Identifying Chain Case And No. 5 Rocker Shaft Holder Mating**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



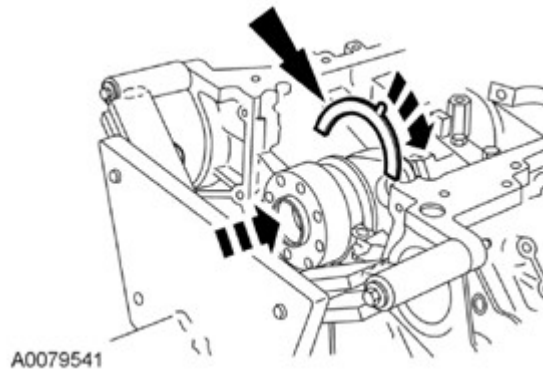
**Fig. 76: Identifying Spark Plug Seals And Cylinder Head Cover**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in three steps. In the final step tighten all bolts, in sequence, to 12 N.m (1.2 kgf.m, 8.8 lbf.ft).



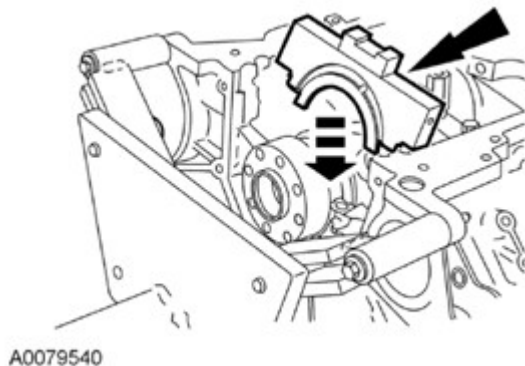
**NOTE:**

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



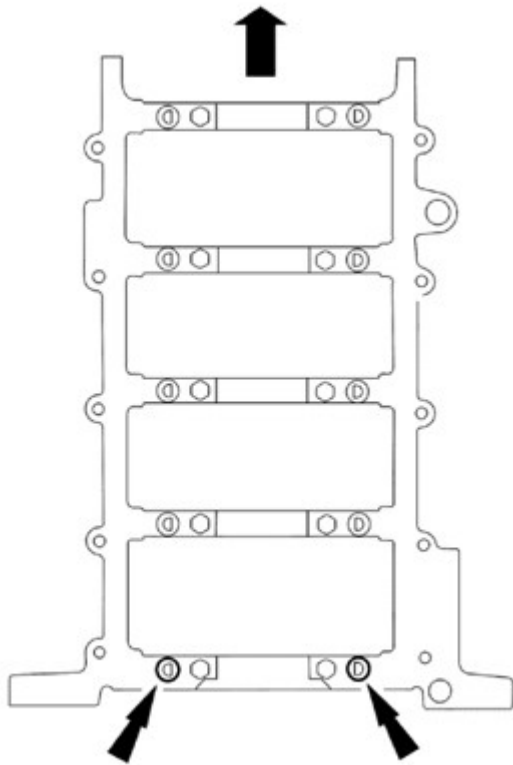
**Fig. 77: Identifying Cylinder Head Cover Bolts Tighten Sequence**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install two bolts (A) securing the evaporative emission (EVAP) canister purge valve bracket.



**Fig. 78: Identifying Evaporative Emission Canister Purge Valve Bracket With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the power steering (P/S) hose clamp (B), breather hose (C), and the dipstick (D).
10. Connect the EVAP canister purge valve connector.
11. Install the four ignition coils (see **IGNITION COIL AND SPARK PLUG REMOVAL/INSTALLATION** ).
12. Install the intake manifold cover.



N0067893

**Fig. 79: Identifying Intake Manifold Cover And EVAP Canister Purge Valve Connector With Torque Specification**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

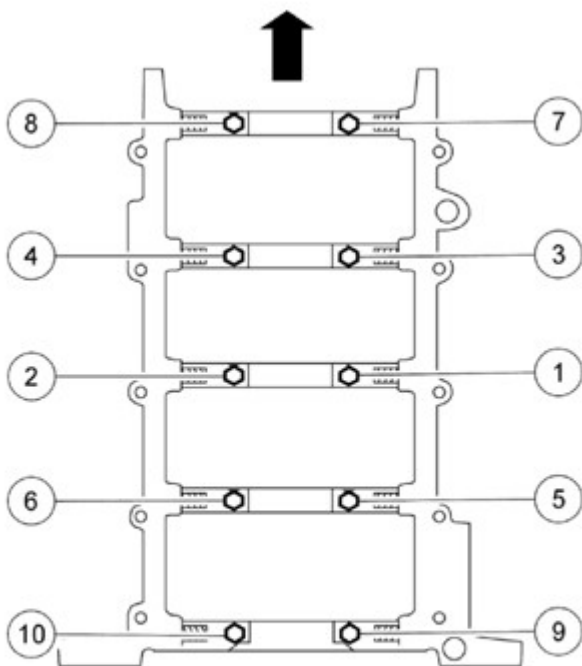
## CYLINDER HEAD REMOVAL

### NOTE:

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

1. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING** ).
2. Drain the engine coolant (see **COOLANT CHECK** ).
3. Remove the air cleaner housing (see **AIR CLEANER REMOVAL/INSTALLATION** ).
4. Remove the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
5. Remove the intake manifold (see **REMOVAL** ).
6. Remove the exhaust manifold (see **EXHAUST MANIFOLD REMOVAL AND INSTALLATION** ).

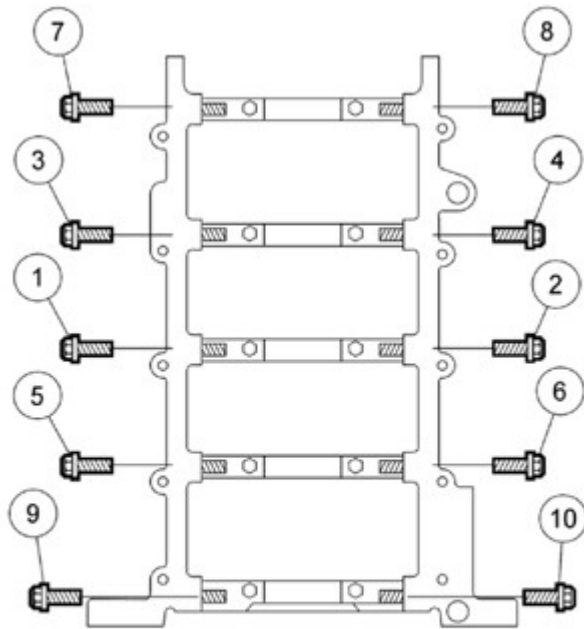
7. Disconnect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).



N0013765

**Fig. 80: Identifying Evaporative Emission Canister Hose And Brake Booster Vacuum Hose**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

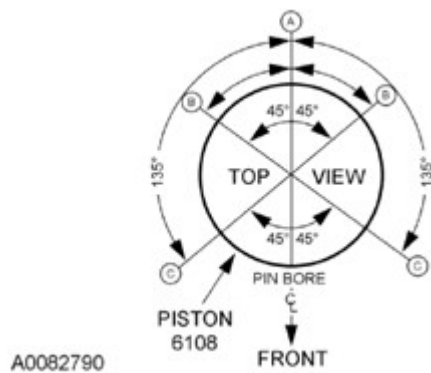
8. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL** ).



N0062977

**Fig. 81: Identifying Quick-Connect Fitting Cover And Fuel Feed Hose**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

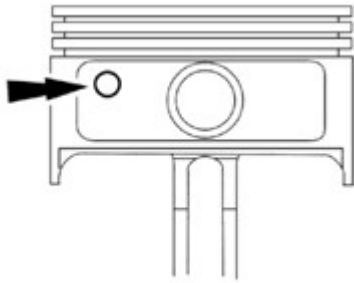
9. Disconnect the positive crankcase ventilation (PCV) hose (A) and remove the ground cable (B).



A0082790

**Fig. 82: Identifying Positive Crankcase Ventilation Hose And Ground Cable**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

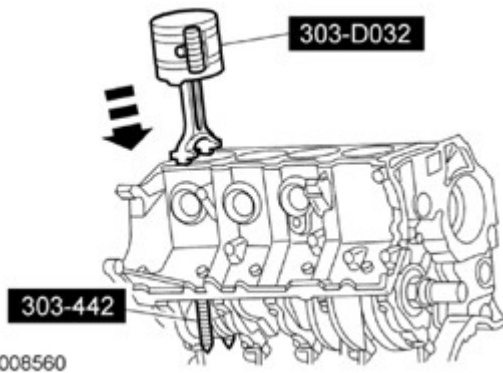
10. Remove the harness holder (A) from the bracket, then remove the harness holder bracket (B).



N0088510

**Fig. 83: Identifying Harness Holder, Bracket And Harness Holder Bracket**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

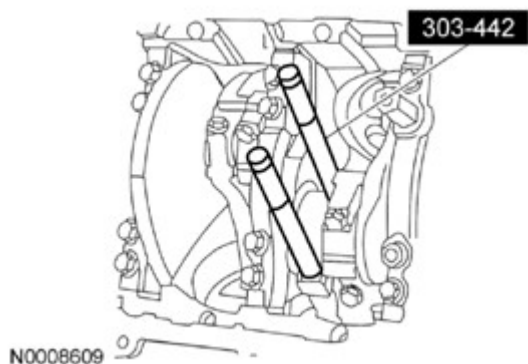
11. Disconnect the upper radiator hose (A) and the heater hoses (B).



N0008560

**Fig. 84: Identifying Upper Radiator Hose And Heater Hoses**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the bolt (A) securing the connecting pipe.

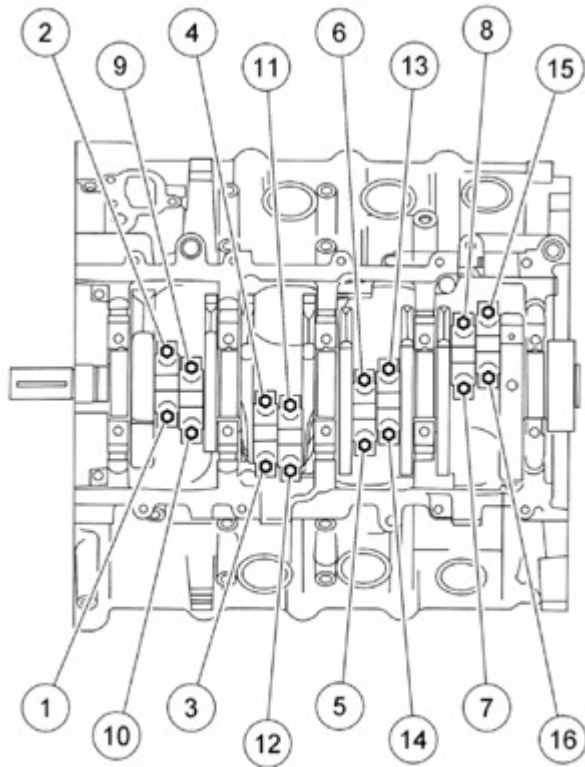


N0008609

**Fig. 85: Identifying Connecting Pipe And Bolt**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Disconnect the water bypass hose (B).
14. Remove the following engine wire harness connectors and wire harness clamps from the cylinder head:

- Four fuel injector connectors
  - Engine coolant temperature (ECT) sensor 1 connector
  - Camshaft position (CMP) sensor A (Intake) connector
  - Camshaft position (CMP) sensor B (Exhaust) connector
  - Rocker arm oil control solenoid connector
  - Rocker arm oil pressure switch connector
  - EVAP canister purge valve connector
  - Exhaust gas recirculation (EGR) valve connector
15. Remove the cam chain (see **CAM CHAIN REMOVAL**).
  16. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
  17. 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.



N0062970

**Fig. 86: Identifying Cylinder Head Bolts Remove Sequence**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the cylinder head.

### **CMP PULSE PLATE A REPLACEMENT**

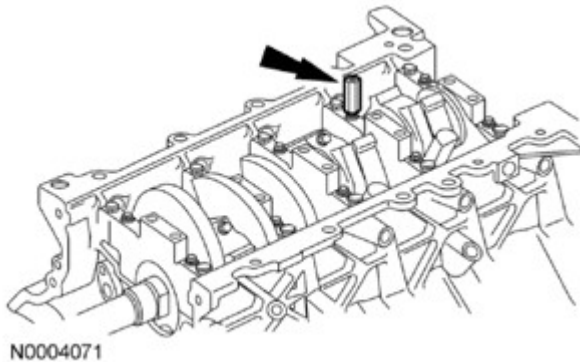
1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).

2. Remove camshaft position (CMP) sensor A (see **CMP SENSOR A REPLACEMENT** ).
3. Hold the camshaft with an open-end wrench, then loosen the bolt.



**Fig. 87: Identifying Camshaft Position Sensor**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove CMP pulse plate A

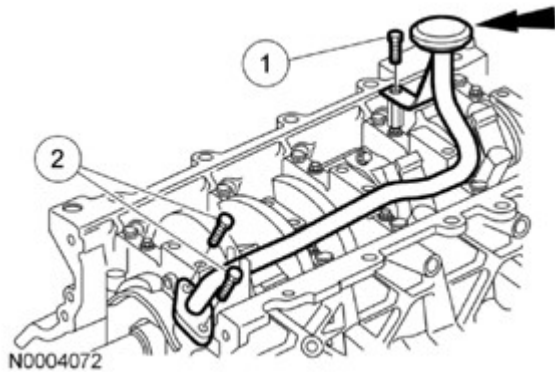


**Fig. 88: Identifying CMP Pulse Plate With Torque Specifications**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

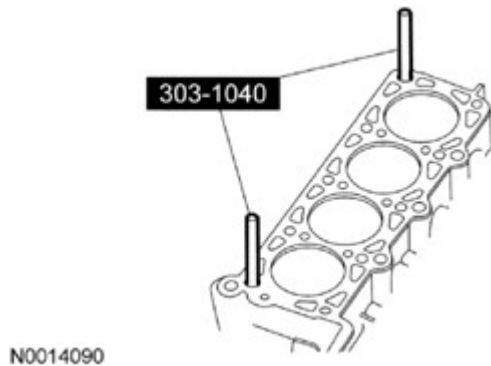
### **CMP PULSE PLATE B REPLACEMENT**

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Remove camshaft position (CMP) sensor B (see **CMP SENSOR B REPLACEMENT** ).
3. Hold the camshaft with an open-end wrench, then loosen the bolt.



**Fig. 89: Identifying Camshaft Position Sensor B**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove CMP pulse plate B.



**Fig. 90: Identifying CMP Pulse Plate With Torque Specification**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

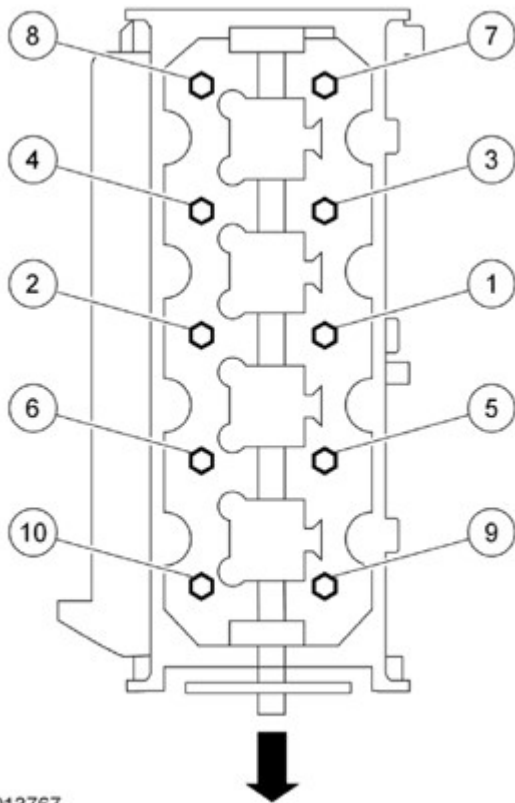
5. Install CMP pulse plate B in the reverse order of removal.

## VTC ACTUATOR, EXHAUST CAMSHAFT SPROCKET REPLACEMENT

1. Remove the cylinder head cover Cylinder Head Cover Removal.
2. Hold the camshaft with an open-end wrench, then loosen the VTC actuator mounting bolt and the exhaust camshaft sprocket mounting bolt.

**NOTE:** Do not remove the VTC actuator and the exhaust camshaft sprocket mounting bolts.

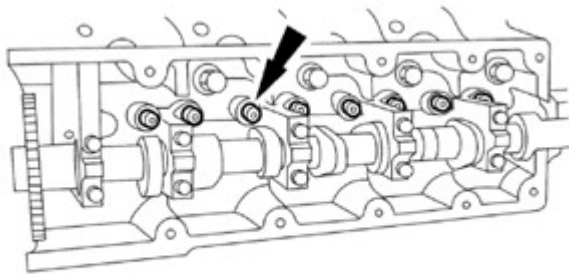




**Fig. 91: Holding Camshaft**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

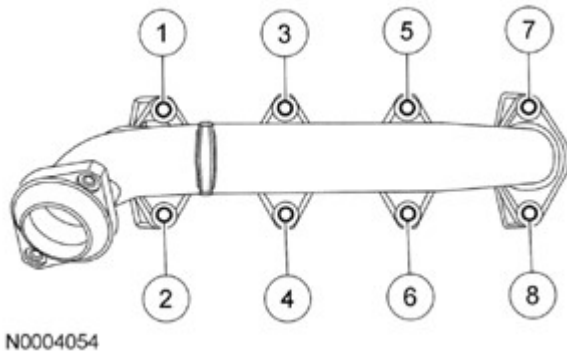
3. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the VTC actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.



**Fig. 92: Aligning the TDC Marks On The VTC Actuator And The Exhaust Camshaft Sprocket.**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the chain case cover.

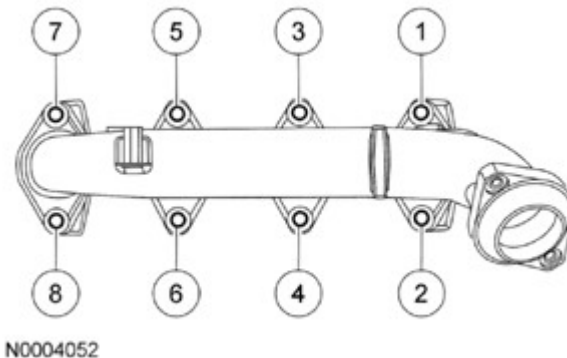


**Fig. 93: Chain Case Cover And Bolts**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Rotate the crankshaft counterclockwise and align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (3/64 in) diameter pin (C) into the holes.

**NOTE:** If the holes in the lock and the auto-tensioner do not align, continue to rotating the crankshaft counterclockwise until the holes align, then install the pin.



**Fig. 94: Aligning The Holes On The Lock And The Auto-Tensioner**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Turn the crankshaft clockwise to secure the pin and the TDC on the No. 1 cylinder.
7. Loosen the rocker arm adjusting screws 2.
8. Remove the camshaft holder bolts 3.
9. Remove the five camshaft holders and cam chain guide B.
10. Carefully tip up the intake camshaft on the transmission side of the engine until there is enough slack in the chain to lift the chain off of the VTC actuator's teeth.
11. Remove the intake and exhaust camshafts while keeping some tension on the cam chain.
12. Secure the cam chain to the A/C compressor suction hose or the power steering hose with a wire tie to prevent the chain from falling down into the chain case.
13. Remove the VTC actuator and the exhaust camshaft sprocket.

14. Install the VTC actuator and the exhaust camshaft sprocket.

**NOTE:**        **Install the VTC actuator while in the unlocked position.**

15. Apply new engine oil to the threads of the VTC actuator and the exhaust camshaft sprocket mounting bolts, then loosely install them.
16. Turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
17. Remove the wire tie while keeping light tension on the cam chain.
18. Slide the intake and exhaust camshafts in at an angle to allow the cam chain to slip over the VTC actuator's teeth and the exhaust sprocket's teeth.
19. Line up the marks made in step 3 for each cam.
20. Apply new engine oil to the camshaft journals and lobes on both cams, and reinstall the five camshaft holders and cam chain guide B in place.
21. Tighten the camshaft holder bolts to the specified torque 8.
22. Hold the camshaft with an open-end wrench, then tighten the bolts.

### **Specified Torque**

#### **VTC Actuator Mounting Bolt:**

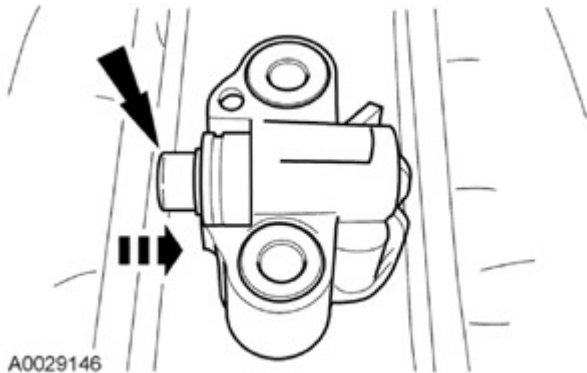
12 x 1.25 mm

113 N.m (11.5 kgf.m, 83 lbf.ft)

#### **Exhaust Camshaft Sprocket Mounting Bolt:**

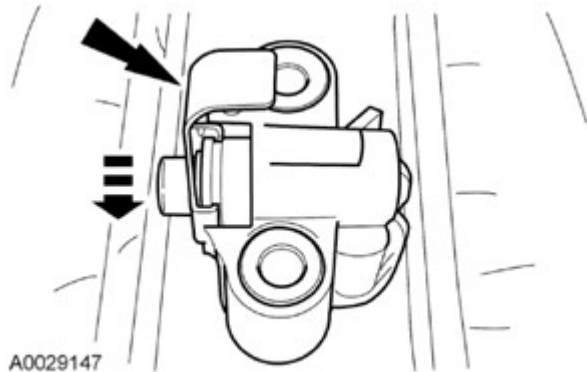
10 x 1.25 mm

72 N.m (7.3 kgf.m, 53 lbf.ft)



**Fig. 95: Holding Camshaft With An Open-End Wrench**  
**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

23. Remove the 1.2 mm (3/64 in) diameter pin from the auto-tensioner.

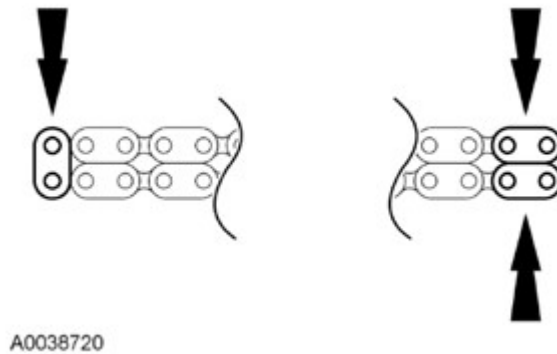


**Fig. 96: Removeing Pin From The Auto-Tensioner.**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Remove all of the old liquid gasket from the chain case cover mating surfaces, the bolts, and the bolt holes.
25. Clean and dry the chain case cover mating surfaces.
26. Apply liquid gasket (P/N 08717-0004, 08718-0003, 08718-0004, or 08718-0009) evenly to the chain case mating surface of the chain case cover, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

**NOTE:**

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



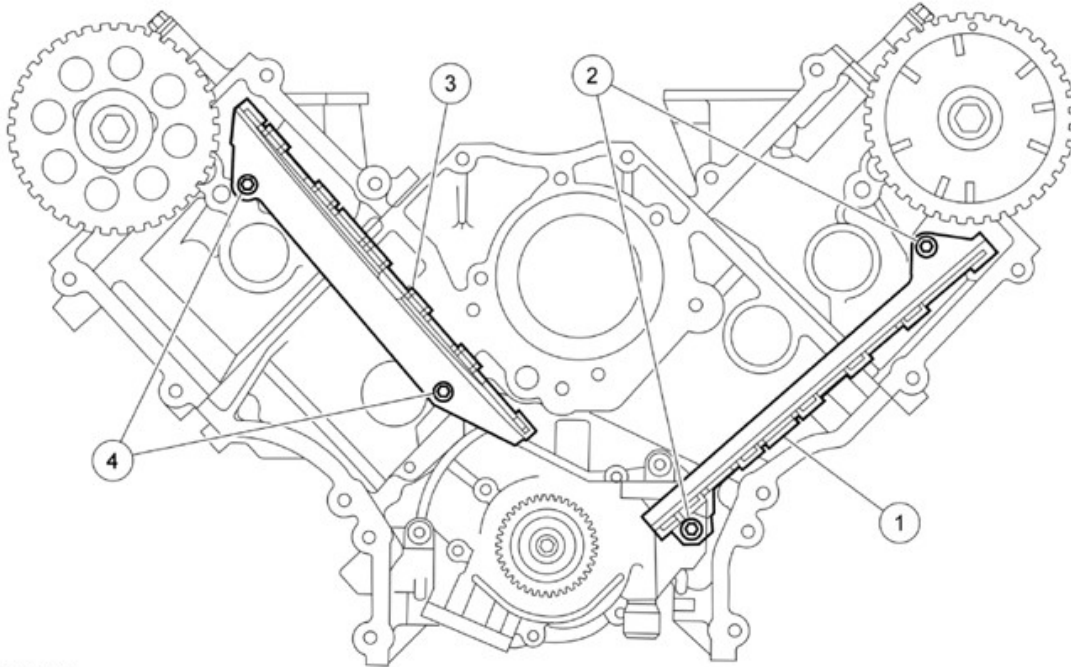
**Fig. 97: Identifying Bead Of Liquid Gasket**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Install the chain case cover.

**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 chain case cover.**



**Fig. 98: Chain Case Cover**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Adjust the valve clearance **Valve Clearance Adjustment**.
29. Install the cylinder head cover **Cylinder Head Cover Installation**.

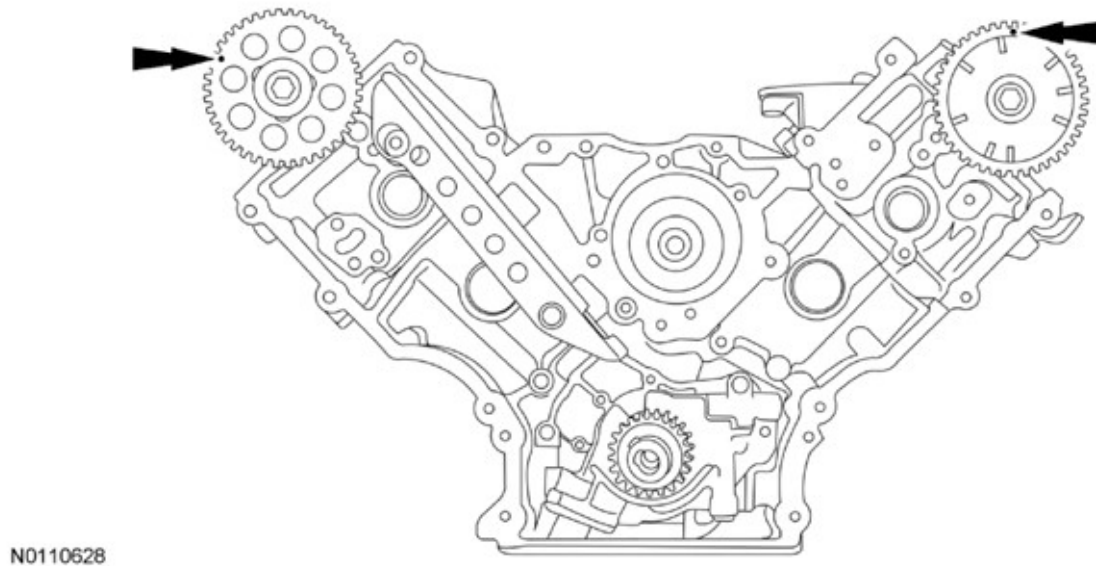
### **CYLINDER HEAD INSPECTION FOR WARPAGE**

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 0.05 mm (0.002 in) cylinder head resurfacing is not required.
  - If warpage is between 0.05 mm (0.002 in) and 0.2 mm (0.008 in), resurface the cylinder head.
  - Maximum resurface limit is 0.2 mm (0.008 in) based on a height of 104 mm (4.09 in).

### **Cylinder Head Height**

**Standard (New): 103.95-104.05 mm (4.093-4.096 in)**

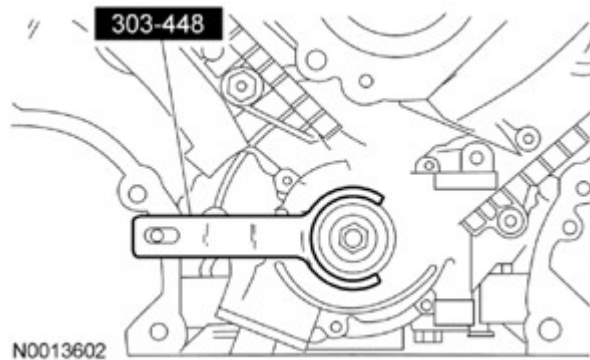
**Service Limit: 103.8 mm (4.09 in)**



**Fig. 99: Checking Cylinder Head For Warp**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

#### ROCKER ARM ASSEMBLY REMOVAL

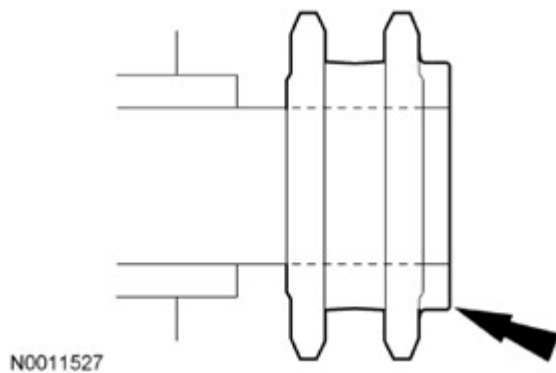
1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Loosen the rocker arm adjusting screws (A).



**Fig. 100: Identifying Rocker Arm Adjusting Screws**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft holder bolts. To prevent damaging the camshafts, loosen the bolts, in sequence, two turns at a time.

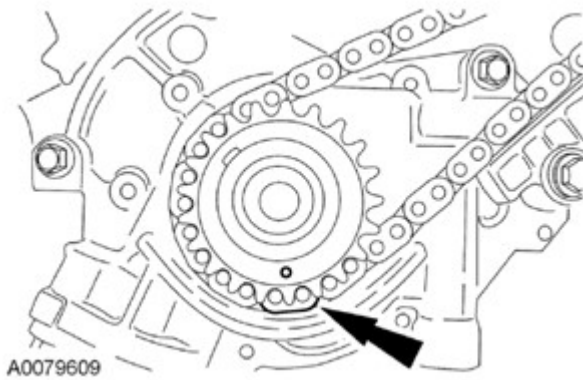
**NOTE:** Bolt (1) is not on all engines.



**Fig. 101: Identifying Camshaft Holder Bolts**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 102: Identifying Rocker Arm Assembly And Bolts**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

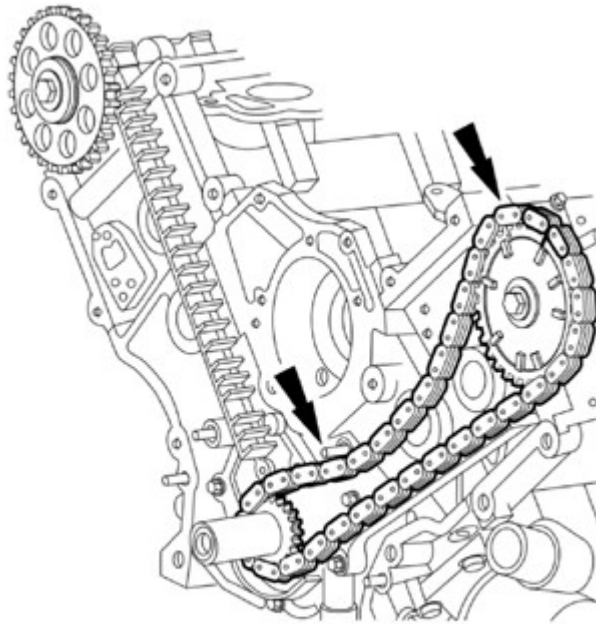
## ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

### NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original locations.
- Inspect the rocker arm shaft and rocker arms (see ROCKER ARM AND SHAFT INSPECTION).
- If reused, the rocker arms must be installed in the original locations.
- When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply lubricant to any contact points.
- Bundle the intake rocker arms with rubber bands to keep them together as

a set.

- When replacing the intake rocker arm assembly, remove the fastening hardware from the new intake rocker arm assembly.

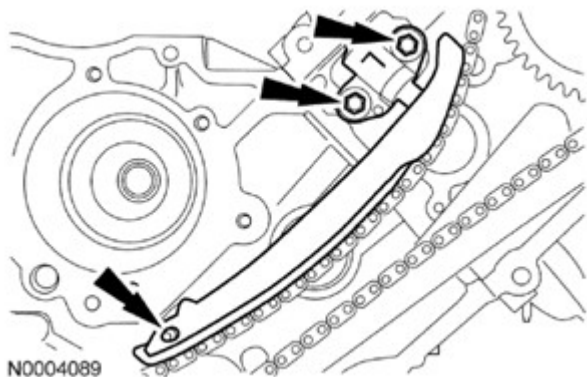


N0110622

**Fig. 103: Identifying Rocker Arm And Shaft Components**  
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.

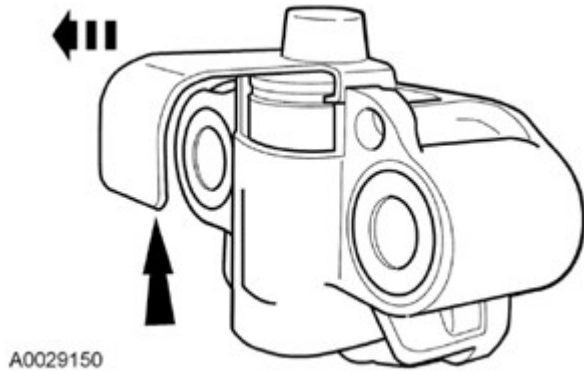


N0004089



**Fig. 104: Measuring Diameter Of Shaft At First Rocker**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 105: Measuring Shaft Diameter Using 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.

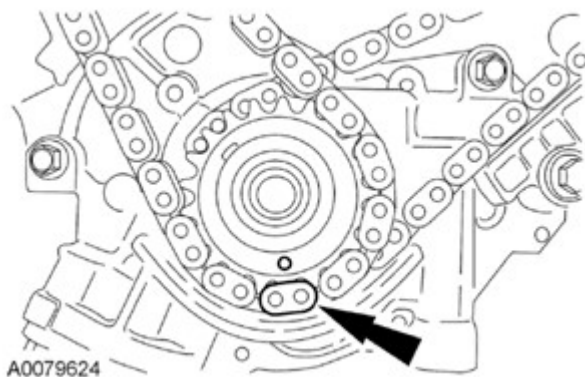
#### **Rocker Arm-to-Shaft Clearance**

##### **Standard (New):**

**Intake: 0.025-0.052 mm (0.0010-0.0020 in)**

**Exhaust: 0.018-0.056 mm (0.0007-0.0022 in)**

**Service Limit: 0.08 mm (0.003 in)**



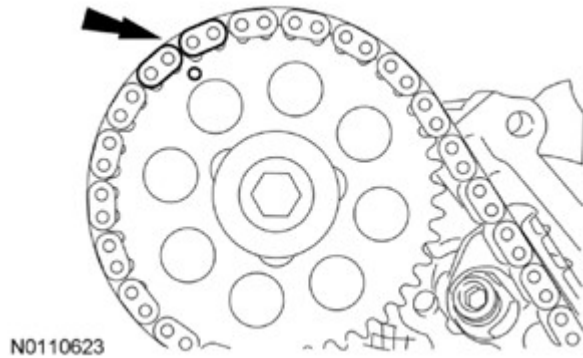
**Fig. 106: Measuring Inside Diameter Of Rocker Arm**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Repeat for all rocker arms and both shafts. 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 (primary and secondary), as a set.

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

**NOTE:** Apply oil to the pistons when reassembling.



**Fig. 107: Identifying Rocker Arm Pistons**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the rocker arm assembly (see ROCKER ARM ASSEMBLY INSTALLATION).

## CAMSHAFT INSPECTION

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

1. Remove the rocker arm assembly (see ROCKER ARM ASSEMBLY REMOVAL).
2. Put the rocker shaft holders, camshaft, and camshaft holders on the cylinder head, then tighten the bolts, in sequence, to the specified torque.

**NOTE:** If the engine does not have bolt @, skip it and continue the torque sequence.

### Specified Torque

8x1.25 mm

22 N.m (2.2 kgf.m, 16 lbf.ft)

6 x 1.0 mm

12 N.m (1.2 kgf.m, 8.8 lbf.ft)

6 x 1.0 mm Bolts: (21), (22), (23)



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

- ## Camshaft End Play

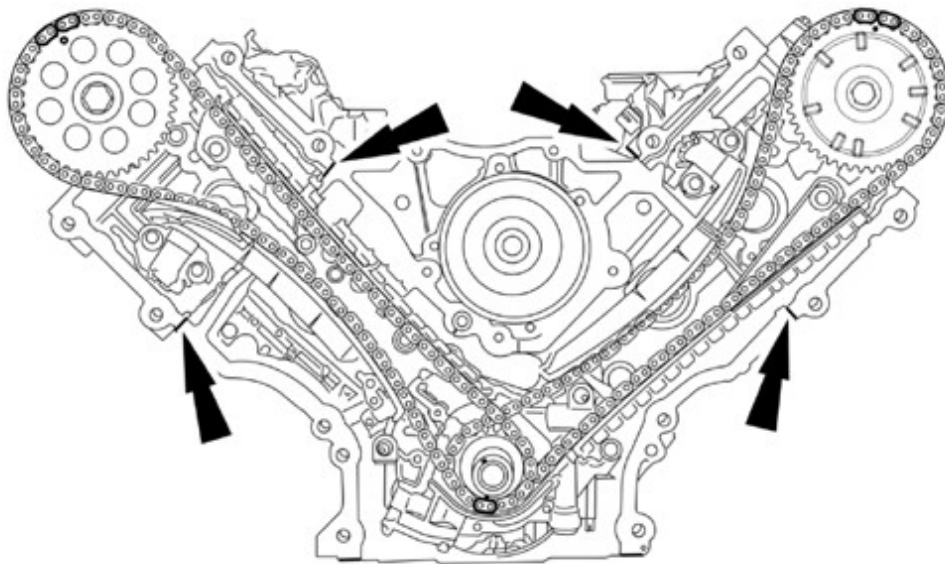
**Service Limit: 0.4 mm (0.02 in)**



Courtesy of AMERICAN HONDA MOTOR CO., INC.

- jueves, 28 de noviembre de 2019 09:39:43 p. m.

8. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 2.
9. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.
  - If the camshaft-to-holder clearance is within limits, go to step 11.
  - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has been replaced, replace the cylinder head.
  - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has not been replaced, go to step 10.

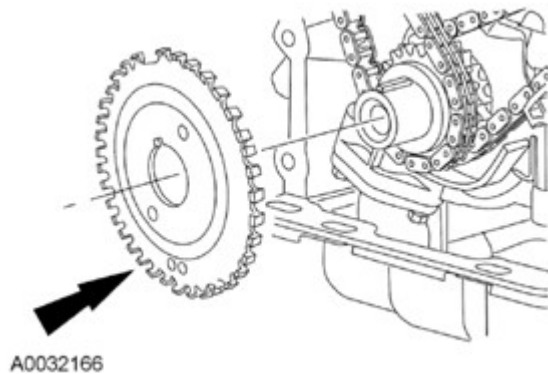
**Camshaft-to-Holder Oil Clearance Standard (New):****No. 1 Journal: 0.030-0.069 mm (0.0012-0.0027 in)****No. 2, 3, 4, 5 Journals: 0.060-0.099 mm (0.0024-0.0039 in)****Service Limit: 0.15 mm (0.006 in)**

N0110629

**Fig. 110: Measuring Widest Portion Of Plastigage On Journal**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Check the total runout with the camshaft supported on V-blocks.
  - If the total runout of the camshaft is within the service limit, replace the cylinder head.
  - If the total runout is beyond the service limit, replace the camshaft, and recheck the camshaft-to-holder oil clearance. If the oil clearance is still 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. 111: Checking Camshaft Total Runout**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

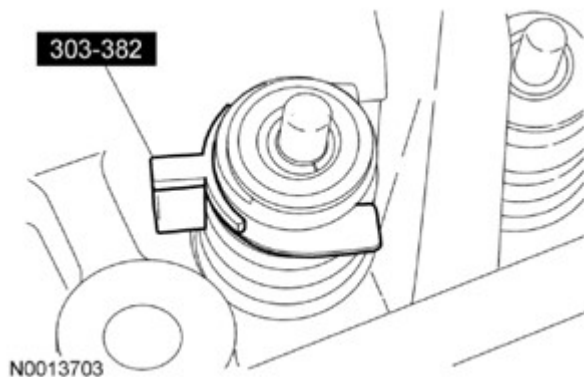
11. Measure cam lobe height.

**Cam Lobe Height Standard (New):**

**CAM LOBE HEIGHT STANDARD CHART**

	INTAKE	EXHAUST
PRI	34.263 mm (1.3489 in)	34.092 mm (1.3422 in)
SEC	29.638 mm (1.1668 in)	

PRI: Primary SEC: Secondary C/C: Cam Chain



**Fig. 112: Measuring Cam Lobe Height**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

**VALVE, SPRING, AND VALVE SEAL REMOVAL**

**Special Tools Required**

Valve Spring Compressor Attachment 07757-PJ1010A

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

position.

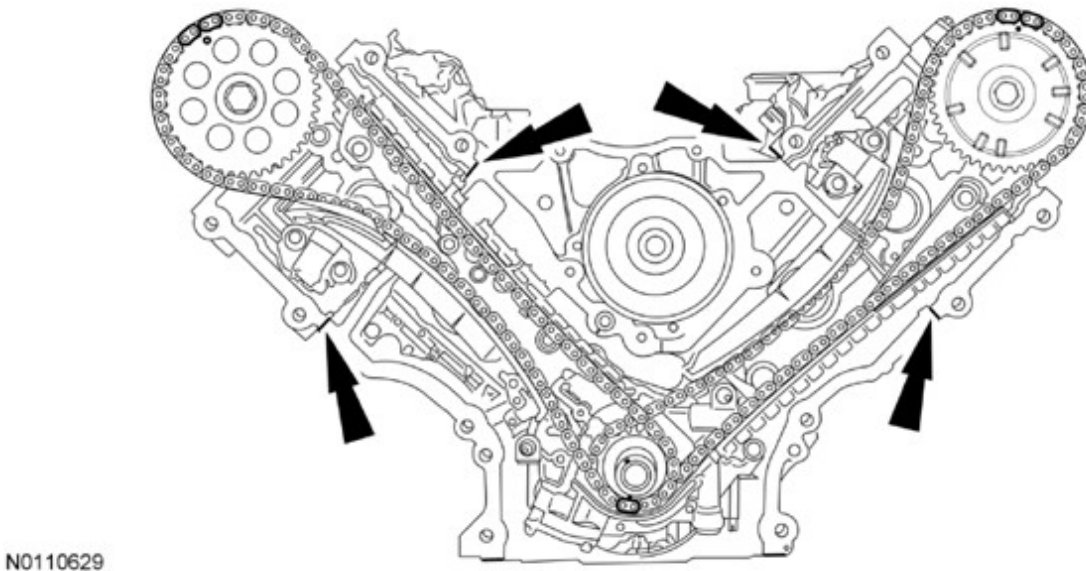
1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
3. Using an appropriate-sized socket (A) and a plastic mallet (B), lightly tap the valve retainer to loosen the valve cotters.



**Fig. 113: Tapping Valve Retainer**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

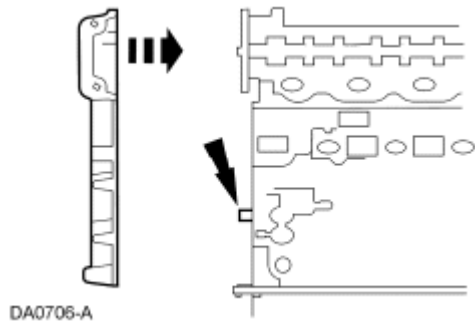
4. Install the valve spring compressor attachment and the valve spring compressor. Compress the spring and remove the valve cotters.



**Fig. 114: Removing Valve Cotters**

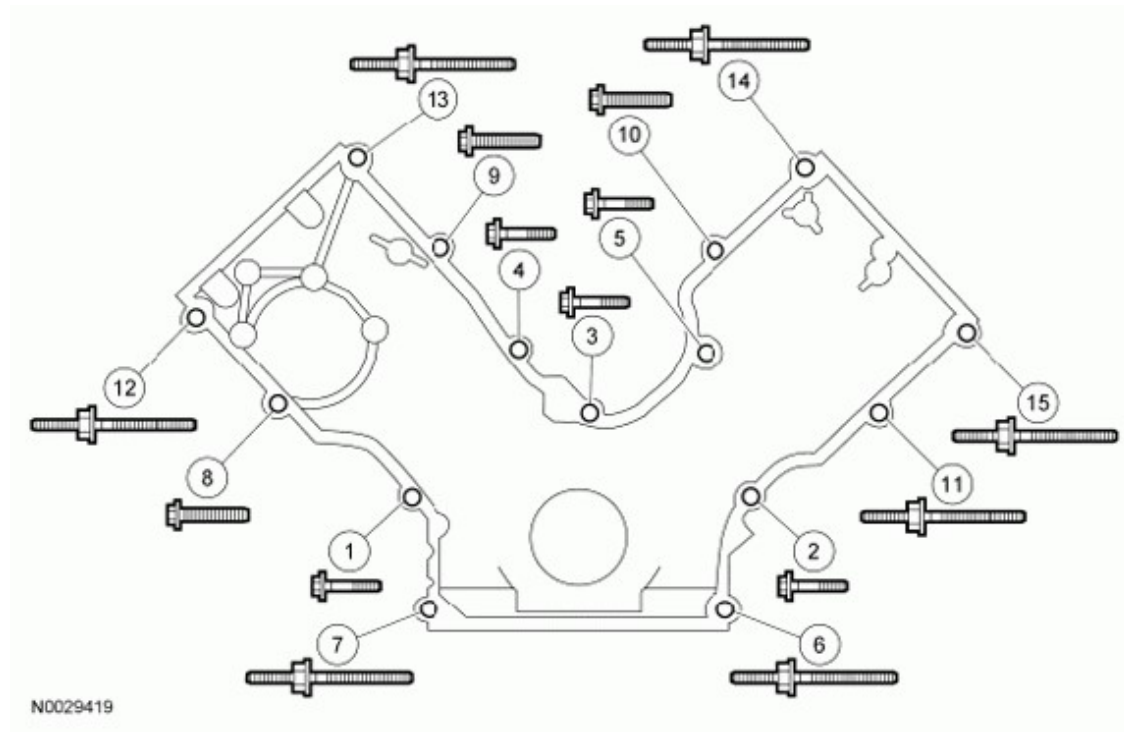
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 115: Installing Valve Guide Seal Remover**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve seal.



**Fig. 116: Removing Valve Seal**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. 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): 34.85-35.15 mm (1.372-1.384 in)**

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

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

**C Service Limit: 5.445 mm (0.2144 in)**

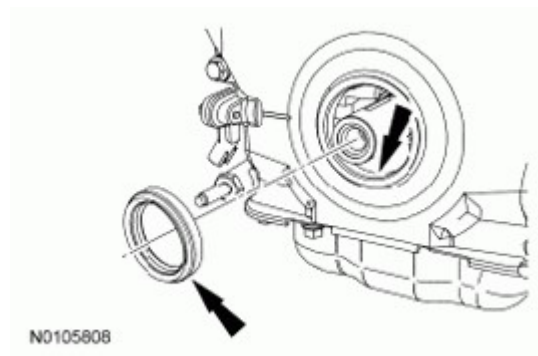
#### **Exhaust Valve Dimensions**

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

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

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

**C Service Limit: 5.42 mm (0.213 in)**



**Fig. 117: Identifying Valve Dimension**

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): 0.030-0.055 mm (0.0012-0.0022 in)**

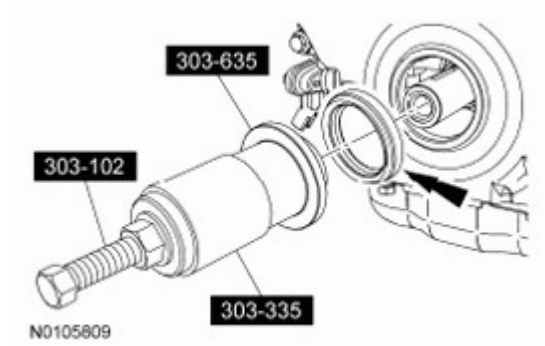
**Service Limit: 0.08 mm (0.003 in)**



**Exhaust Valve Stem-to-Guide Clearance**

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

**Service Limit: 0.11 mm (0.004 in)**

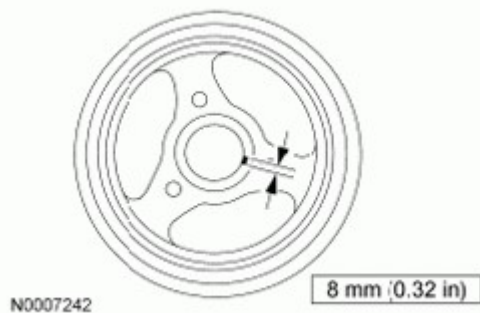


**Fig. 118: Inspecting Valve Stem-To-Guide Clearance**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

**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

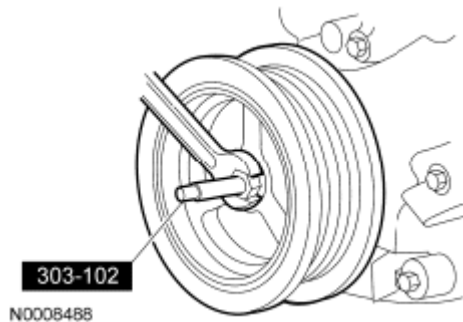
1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.



**Fig. 119: Identifying Air-Impact Valve Guide Driver Dimension**  
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

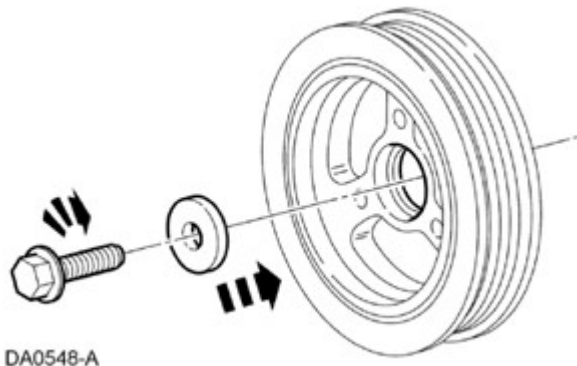
a cooking thermometer. Do not get the head hotter than 300 °F (150 °C); excessive heat may loosen the valve seats.



**Fig. 120: Identifying Valve Seats**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 121: Removing Valve Guide**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

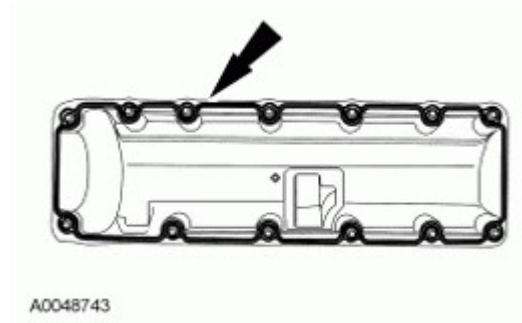
**NOTE:** Drill out of guides only in extreme cases; you could damage the cylinder head if the guide breaks.

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 5.5 mm valve guide driver to drive the guide in to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

#### Valve Guide Installed Height

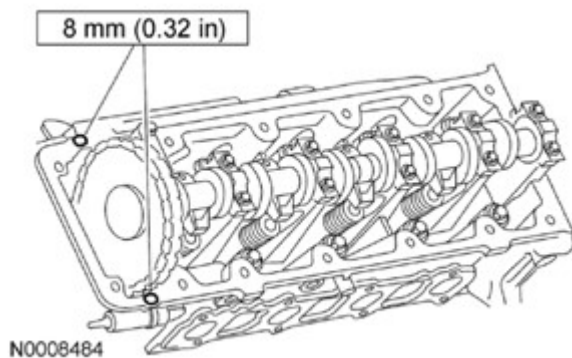
**Intake: 15.2-16.2 mm (0.60-0.64 in)**

**Exhaust: 15.5-16.5 mm (0.61 -0.65 in)**



**Fig. 122: Identifying Valve Guide Height**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

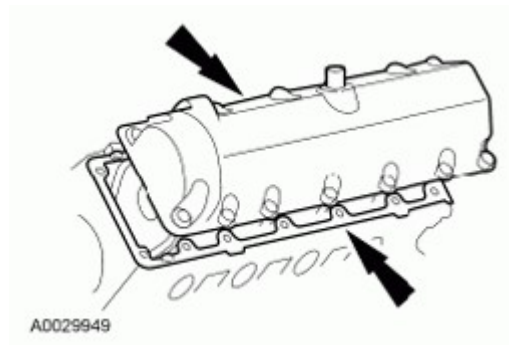


**Fig. 123: Rotating Valve Guide**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide with detergent and water to remove any cutting residue.
14. Check the clearances with a valve (see **VALVE INSPECTION**). Verify that a valve slides into the intake and exhaust valve guides without sticking.
15. Inspect the valve seat. If necessary renew the valve seat using a valve seat cutter (see **VALVE SEAT RECONDITIONING**).

## VALVE SEAT RECONDITIONING

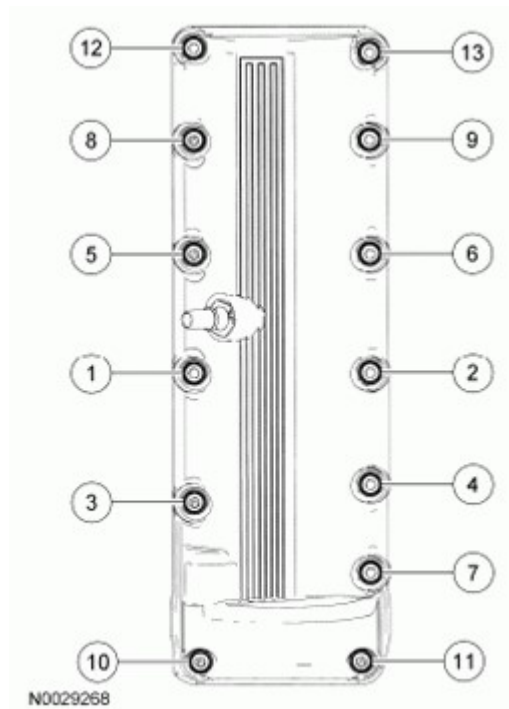
1. Inspect the valve stem-to-guide clearance (see **VALVE INSPECTION**). If the valve guides are worn, replace them (see **VALVE GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



**Fig. 124: Adjusting Valve Seats**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 125: Checking Width Of Seat**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

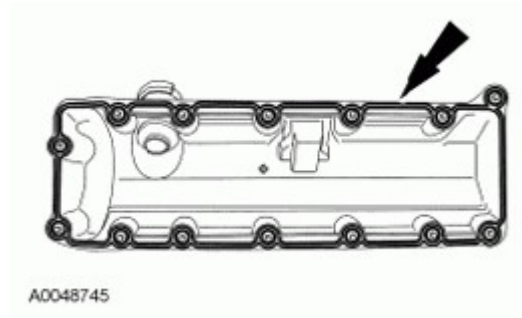
5. Make one more very light pass with the 45 ° cutter to remove any possible burrs caused by the other cutters.

### Valve Seat Width

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

**Service Limit: 2.00 mm (0.079 in)**

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



**Fig. 126: Inspecting Valve Seating**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. The actual valve seating surface (B), as shown by the blue compound, should be centered on the seat.
  - If it is too high (closer to the valve stem), you must make a second cut with the 67.5 ° cutter to move it down, then one more cut with the 45 ° cutter to restore seat width.
  - If it is too low (close to the valve edge), you must make a second cut with the 35 ° cutter (intake side) or the 30 ° cutter (exhaust side) to move it up, then make one more cut with the 45 ° cutter to restore seat width.

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

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

#### **Intake Valve Stem Installed Height**

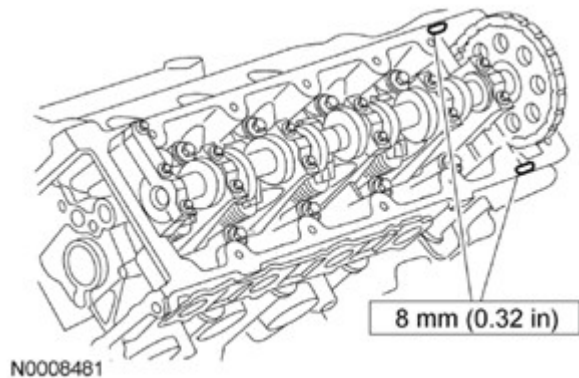
**Standard (New): 44.0-44.5 mm (1.73-1.75 in)**

**Service Limit: 44.7 mm (1.76 in)**

#### **Exhaust Valve Stem Installed Height**

**Standard (New): 44.1-44.6 mm (1.74-1.76 in)**

**Service Limit: 44.8 mm (1.76 in)**



**Fig. 127: Measuring Valve Stem Installed Height**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

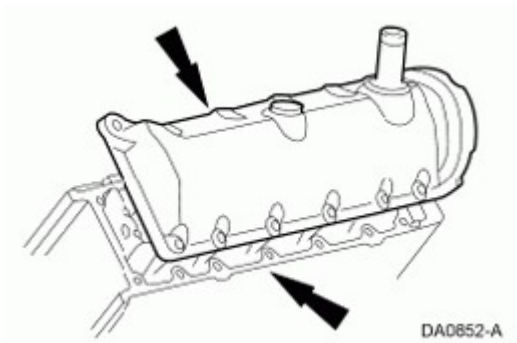
9. If valve stem installed height is beyond the service limit, replace the valve and recheck. If it is still beyond the service limit, replace the cylinder head; the valve seat in the head is too deep.

## VALVE, SPRING, AND VALVE SEAL INSTALLATION

### Special Tools Required

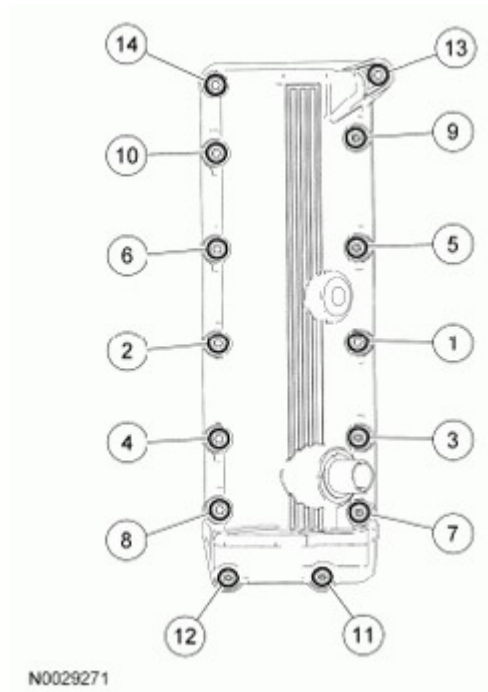
- Stem Seal Driver, 30 mm 07PAD-0010000
  - Valve Spring Compressor Attachment 07757-PJ1010A
1. Coat the valve stems with engine oil. Install the valves in the valve guides.
  2. Check that the valves move up and down smoothly.
  3. Install the spring seats on the cylinder head.
  4. Install the new valve seals (A) using the valve guide seal installer (B).

**NOTE:** 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.



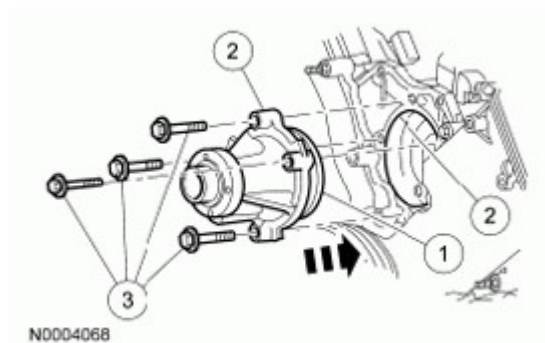
**Fig. 128: Installing Valve Seals**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 129: Installing Valve Spring Compressor Attachment And Valve Spring Compressor**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



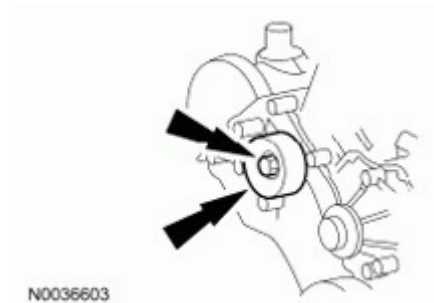
**Fig. 130: Tapping Valve Stem**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

## ROCKER ARM ASSEMBLY INSTALLATION

1. Reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket (P/N 08717-0004, 08718-0003, or 08718-0009) to the cylinder head mating surface of the No. 5 rocker shaft holder and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

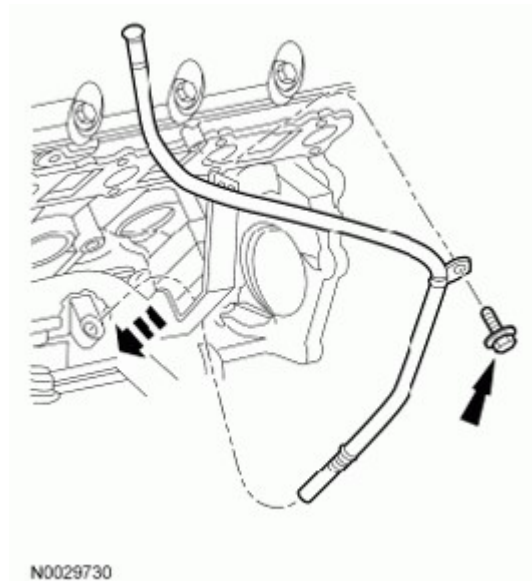
**NOTE:**

- Apply a 3 mm (0.12 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



**Fig. 131: Identifying Rocker Arm Broken Line**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

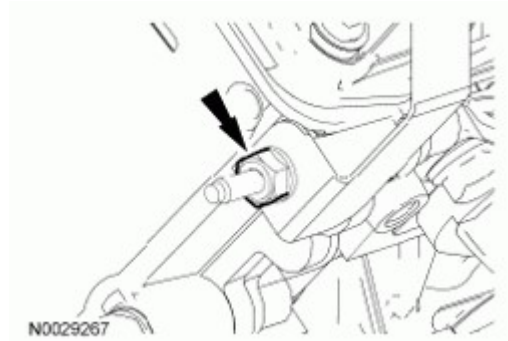
4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.



**Fig. 132: Identifying Rocker Arm Assembly And Cylinder Head**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.



5. Remove the bolts from the rocker shaft holder.
6. Make sure the punch marks on the variable valve timing control (VTC) actuator and exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder.



**Fig. 133: Identifying Variable Valve Timing Control Actuator And Camshaft**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the camshaft holders (B) and cam chain guide B (C) in place.
8. Apply new engine oil to the bolt threads and flange. Tighten the bolts to the specified torque.

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

#### Specified Torque

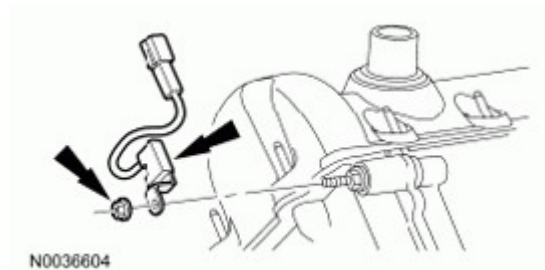
8 x 1.25 mm

22 N.m (2.2 kgf.m, 16 lbf.ft)

6 x 1.0 mm

12 N.m (1.2 kgf.m, 8.8 lbf.ft)

6 x 1.0 mm Bolts: (21), (22), (23)

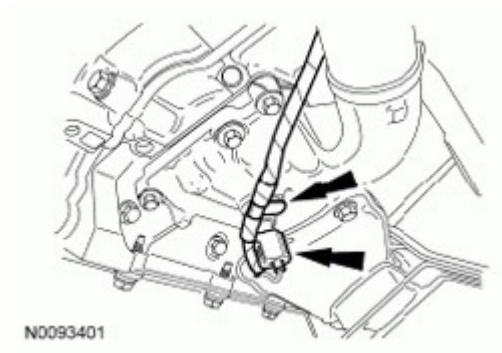


**Fig. 134: Identifying Camshaft Bolts Tighten Sequence**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the cam chain (see **CAM CHAIN INSTALLATION**), and adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

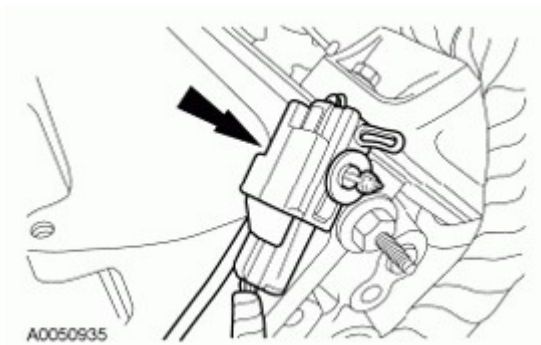
## CYLINDER HEAD INSTALLATION

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



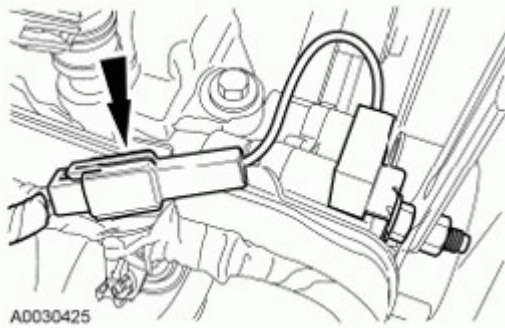
**Fig. 135: Identifying Coolant Separator**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the new cylinder head gasket (A) and dowel pins (B) on the engine block. Always use a new cylinder head gasket.



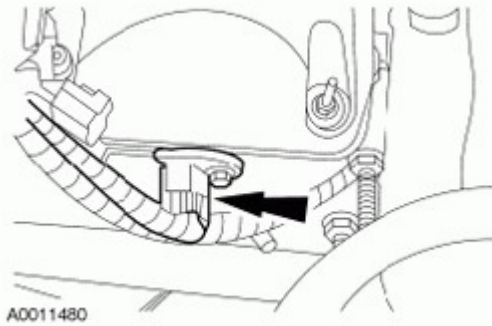
**Fig. 136: Identifying Cylinder Head Gasket And Dowel Pins**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



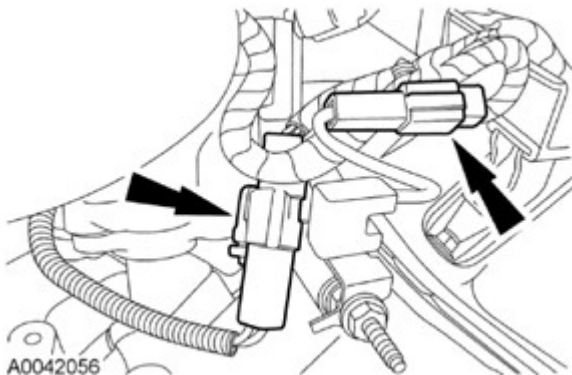
**Fig. 137: Identifying Pointer On Engine Block**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 138: Measuring Diameter Of Cylinder Head Bolt**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If either diameter is less than 10.6 mm (0.42 in), replace the cylinder head bolt.
8. Apply engine oil to the threads and under the bolt heads of all cylinder head bolts.
9. Tighten the cylinder head bolts in sequence to 39 N.m (4.0 kgf.m, 29 lbf.ft). Use a beam-type torque wrench. When using a preset click-type torque wrench, be sure to tighten slowly and do not over tighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

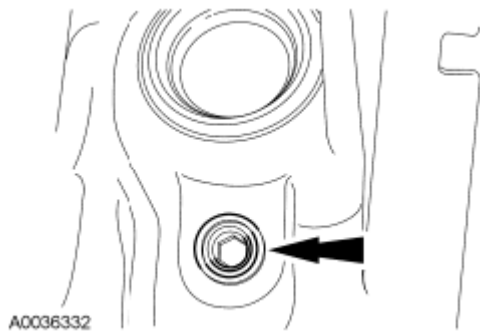


**Fig. 139: Identifying Cylinder Head Bolts Tighten Sequence**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

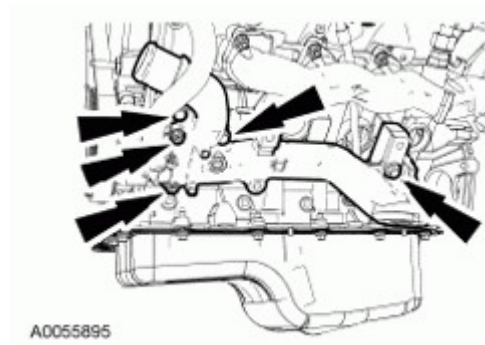
10. After torquing, tighten all cylinder head bolts in two steps (90 ° per step). If you are using a new cylinder head bolt, tighten the bolt an extra 90 °.

**NOTE:** Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 6 of the procedure. Do not loosen it back to the specified angle.

**Fig. 140: Identifying Cylinder Head Bolt Tightening Torque**

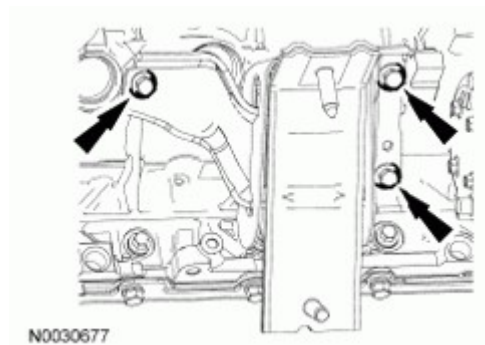
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).
12. Install the cam chain (see **CAM CHAIN INSTALLATION**).
13. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:
  - Four fuel injector connectors
  - Engine coolant temperature (ECT) sensor 1 connector
  - Camshaft position (CMP) sensor A (Intake) connector
  - Camshaft position (CMP) sensor B (Exhaust) connector
  - Rocker arm oil control solenoid connector
  - Rocker arm oil pressure switch connector
  - EVAP canister purge valve connector
  - Exhaust gas recirculation (EGR) valve connector
14. Install the bolt (A) securing the connecting pipe.



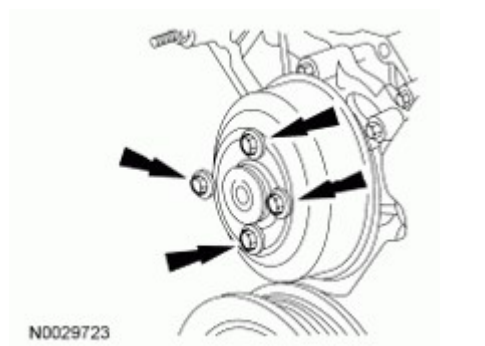
**Fig. 141: Identifying Water Bypass Hose And Bolt With Torque Specifications**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the water bypass hose (B).
16. Install the upper radiator hose (A) and the heater hoses (B).



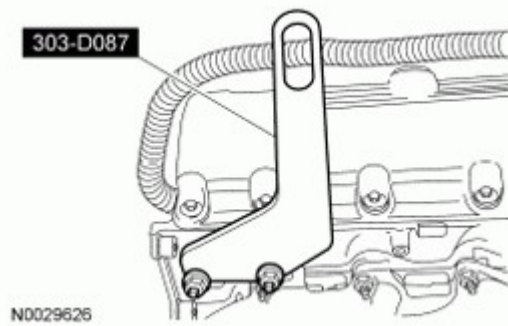
**Fig. 142: Identifying Upper Radiator Hose And Heater Hoses**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the harness holder bracket (A), then install the harness holder (B).



**Fig. 143: Identifying Harness Holder Bracket And Harness Holder With Torque Specification**  
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

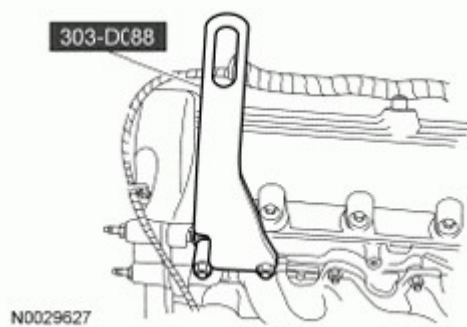
18. Install the positive crankcase ventilation (PCV) hose (A) and the ground cable (B).



**Fig. 144: Identifying Positive Crankcase Ventilation Hose And Ground Cable With Torque Specification**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

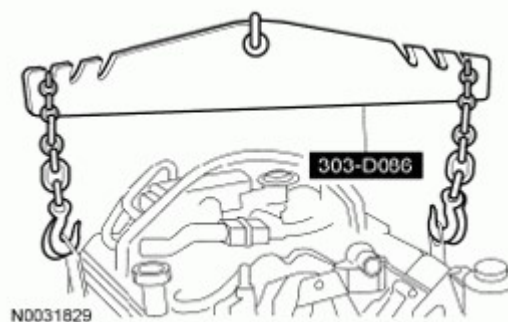
19. Connect the fuel feed hose (A) (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION** ), then install the quick-connect fitting cover (B).



**Fig. 145: Identifying Fuel Feed Hose And Quick-Connect Fitting Cover**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



**Fig. 146: Identifying Evaporative Emission Canister Hose And Brake Booster Vacuum Hose**

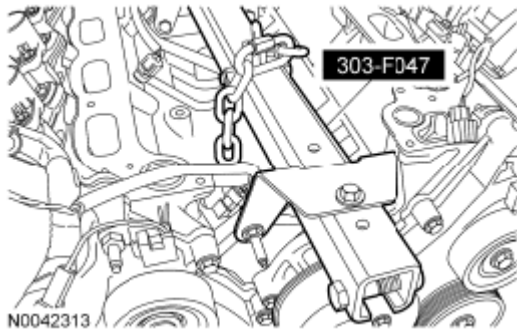
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the exhaust manifold (see **EXHAUST MANIFOLD REMOVAL AND INSTALLATION** ).
22. Install the intake manifold (see **INSTALLATION** ).

23. Install the drive belt (see **DRIVE BELT REMOVAL/INSTALLATION** ).
24. Install the air cleaner housing (see **AIR CLEANER REMOVAL/INSTALLATION** ).
25. After installation, check that all tubes, hoses and connectors are installed correctly.
26. 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 three times, then check for fuel leakage at any point in the fuel line.
27. Refill the radiator with engine coolant, and bleed the air from the cooling system (see **COOLANT CHECK** ).
28. Do The PCM Idle Learn Procedure **ECM/PCM IDLE LEARN PROCEDURE**
29. Inspect the idle speed (see **IDLE SPEED INSPECTION** ).
30. Inspect the ignition timing (see **IGNITION TIMING INSPECTION** ).

## SEALING BOLT INSTALLATION

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



**Fig. 147: Identifying Sealing Bolt With Torque Specification**  
Courtesy of AMERICAN HONDA MOTOR CO., INC.