

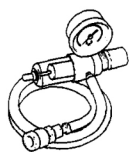
2002-05 ENGINES

2.0L 4-Cylinder - Civic (Hatchback)

CYLINDER HEAD

SPECIAL TOOLS

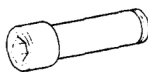
Ref. No.	Tool Number	Description	Qty
①	07AAJ-PNAA100	Air Pressure Regulator	1
②	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
③	07JAA-001020A	Socket, 19 mm	1
④	07JAB-001020B	Holder Handle	1
⑤	07MAA-PR70110	Adjuster	1
⑥	07MAA-PR70120	Locknut Wrench	1
⑦	07NAB-001040A	Holder Attachment, 50 mm	1
⑧	07PAD-0010000	Stem Seal Driver	1
⑨	07ZAJ-PNAA100	VTEC Air Adapter	2
⑩	07ZAJ-PNAA200	VTEC Air Stopper	1
⑪	07ZAJ-PNAA300	Air Joint Adapter	1
⑫	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑬	07746-0010400	Attachment, 52 x 55 mm	1
⑭	07749-0010000	Driver	1
⑮	07757-PJ1010A	Valve Spring Compressor Attachment	1



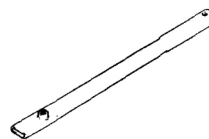
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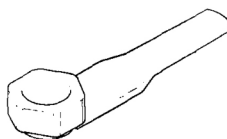
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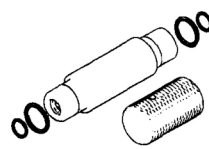
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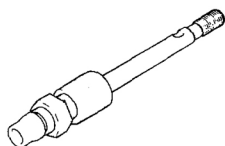
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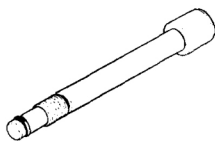
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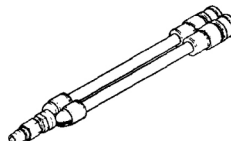
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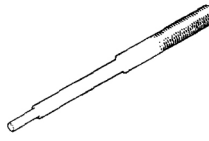
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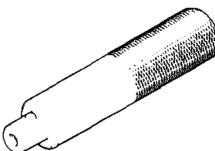
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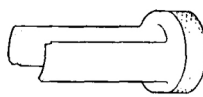
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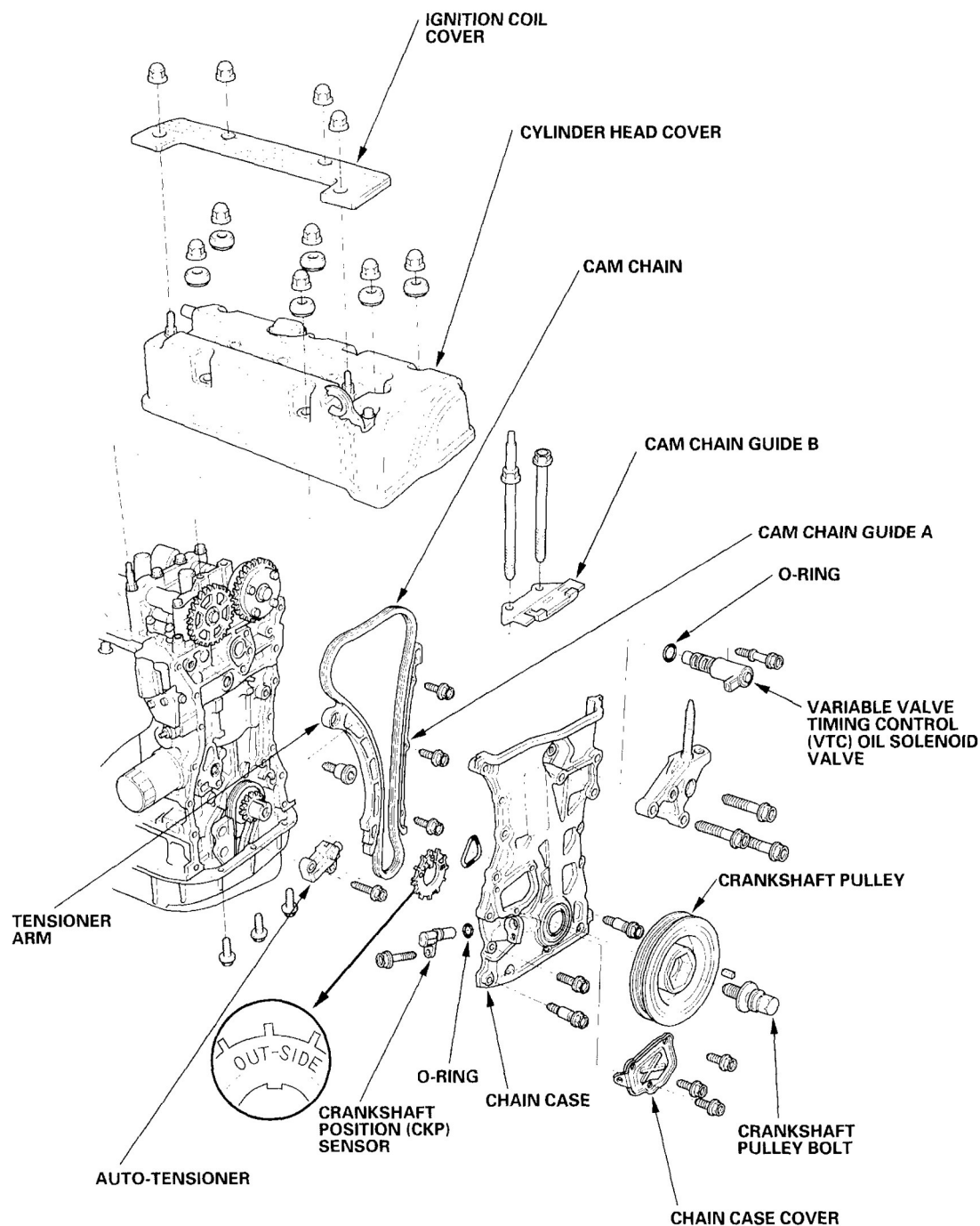
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Fig. 1: Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

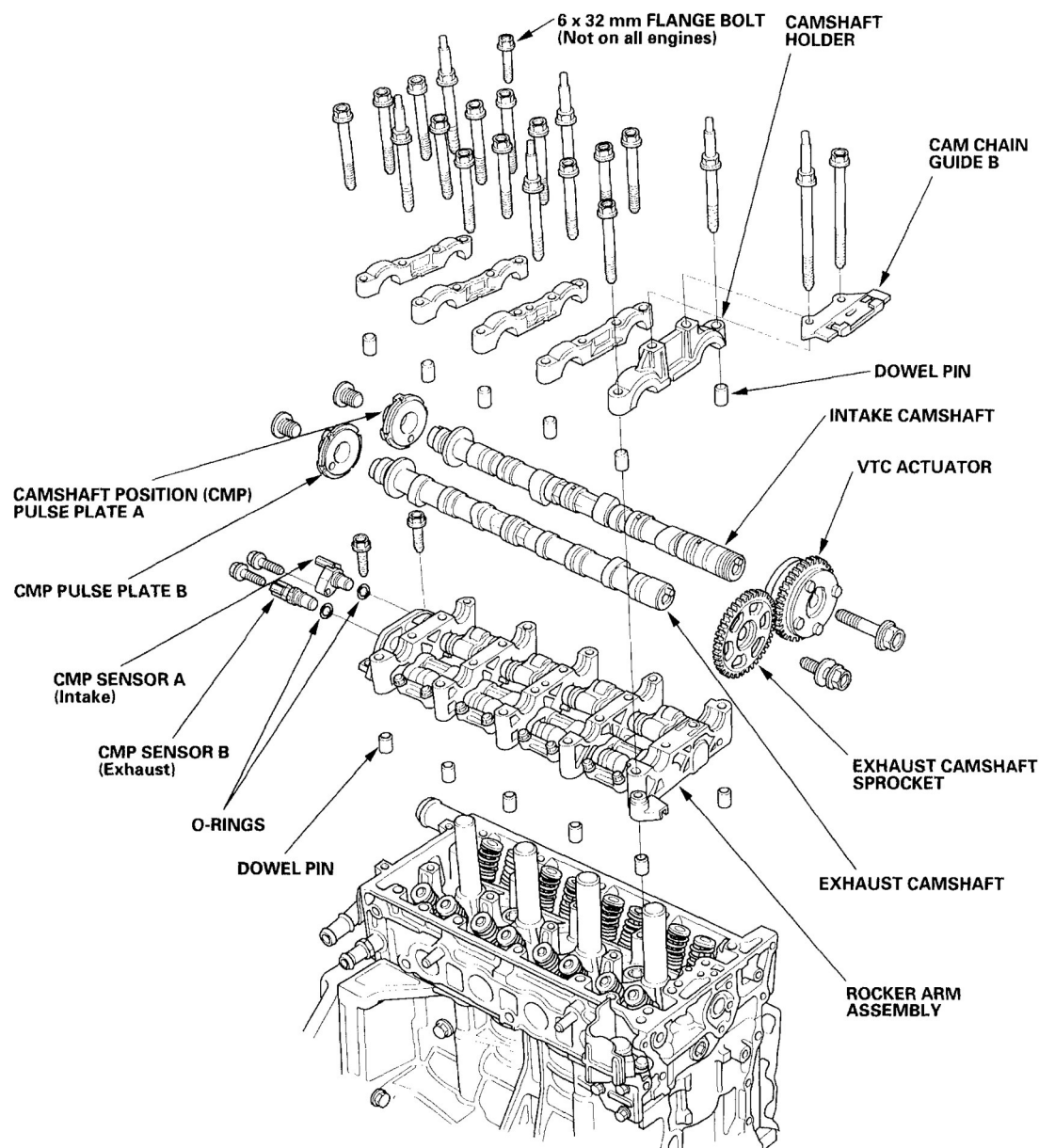
COMPONENT LOCATION INDEX



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Fig. 2: Exploded View Of Timing Components

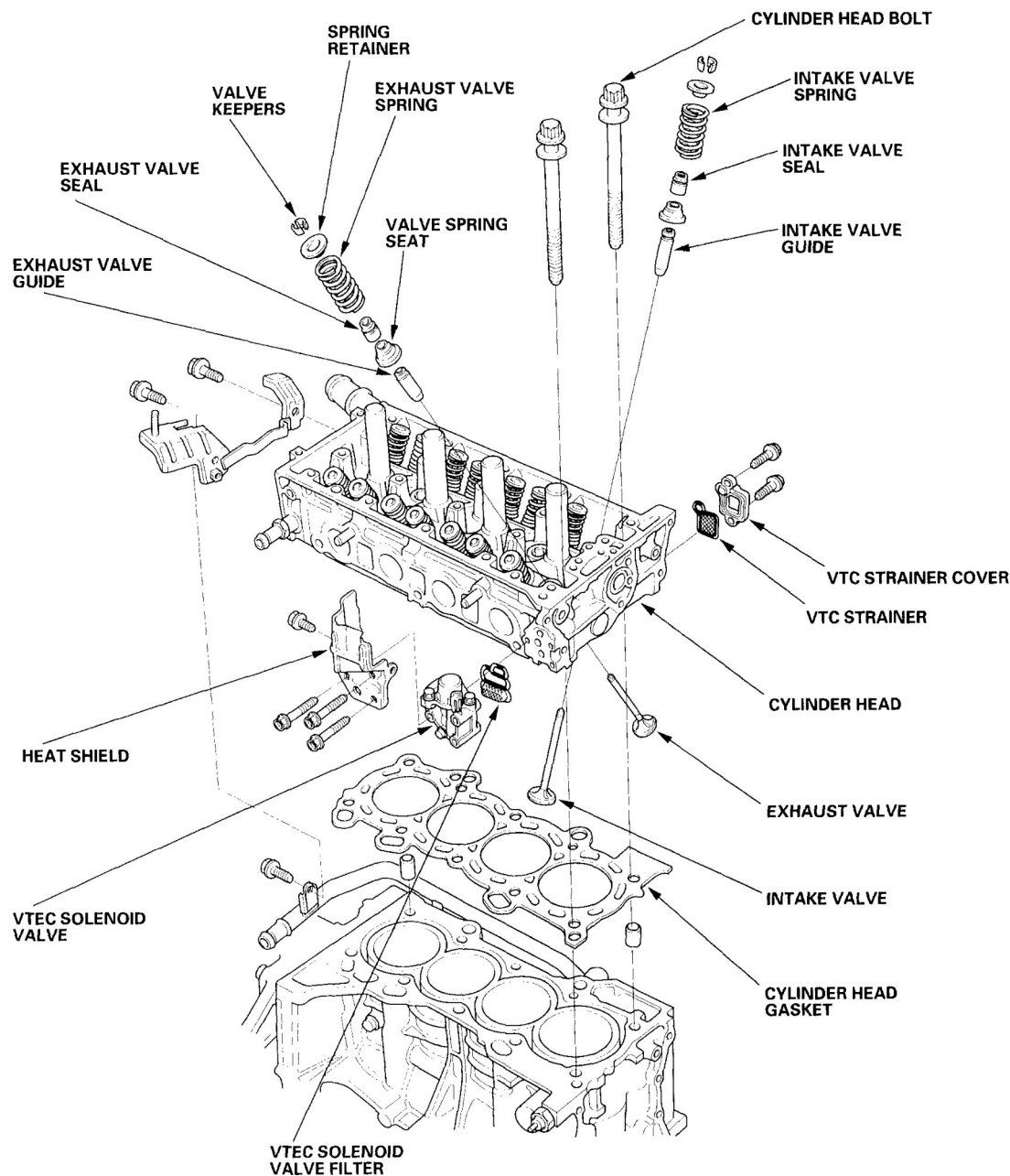
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 3: Exploded View Of Valvetrain

Courtesy of AMERICAN HONDA MOTOR CO., INC.



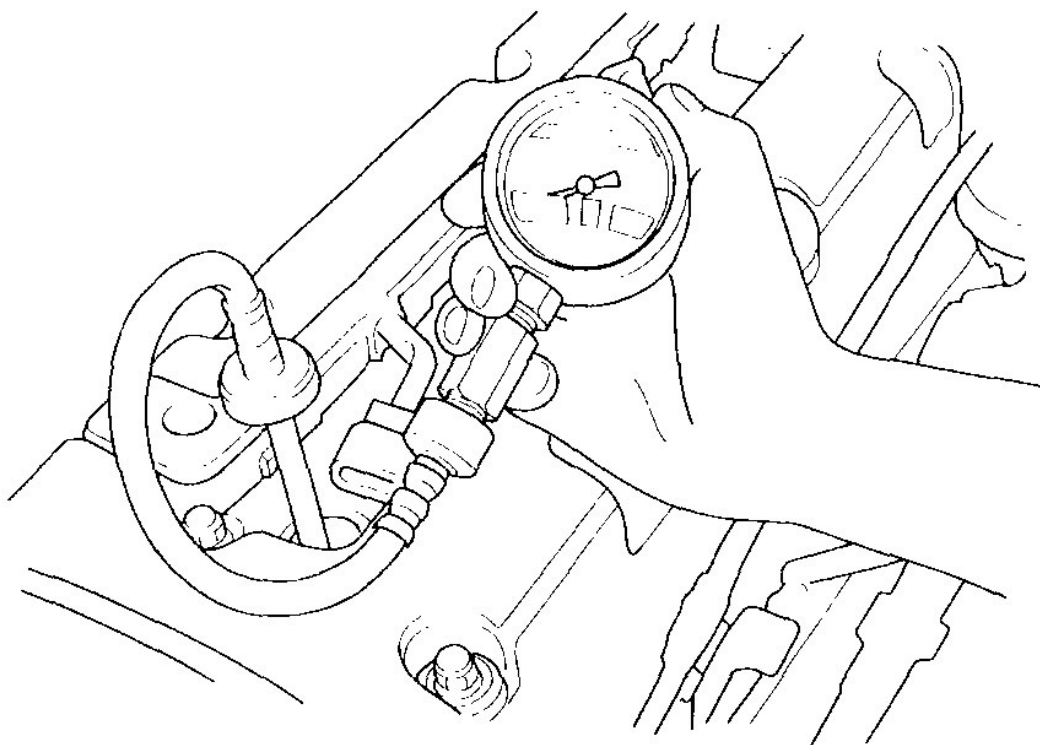
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Fig. 4: Exploded View Of Cylinder Head Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch OFF.
3. Remove the intake manifold cover (see step 1 of **CYLINDER HEAD COVER REMOVAL**).

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



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Fig. 5: Checking Compression

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Open the throttle fully, then crank the engine with the starter motor and measure the compression.
Compression Pressure: Above 930 kPa (9.5 kgf/cm² , 135 psi)
10. Measure the compression on the remaining cylinders.
Maximum Variation: Within 200 kPa (2.0 kgf/cm² , 28 psi)
11. If the compression is not within specifications, check these items, then remeasure the compression:
 - Damaged or worn valves and seats
 - Damaged cylinder head gasket
 - Damaged or worn piston rings

- Damaged or worn piston and cylinder bore

VTEC ROCKER ARM TEST

Special Tools Required:

- Air pressure regulator 07AAJ-PNAA100
- VTEC air adapter 07ZAJ-PNAA100
- VTEC air stopper 07ZAJ-PNAA200
- Air joint adapter 07ZAJ-PNAA300

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Set the No. 1 piston at top dead center (TDC) (see step 1 of **CAM CHAIN REMOVAL**).
3. 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. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, and test.
 - If the intake primary rocker arm moves freely, go to step 4.

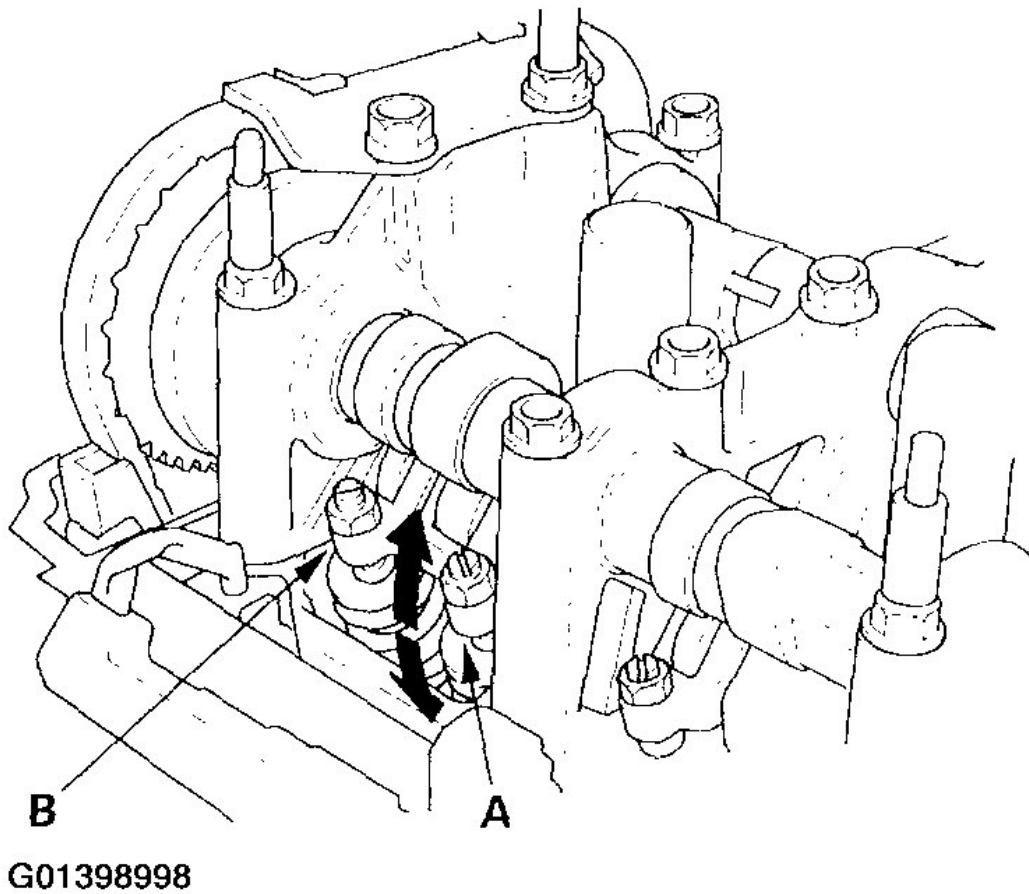
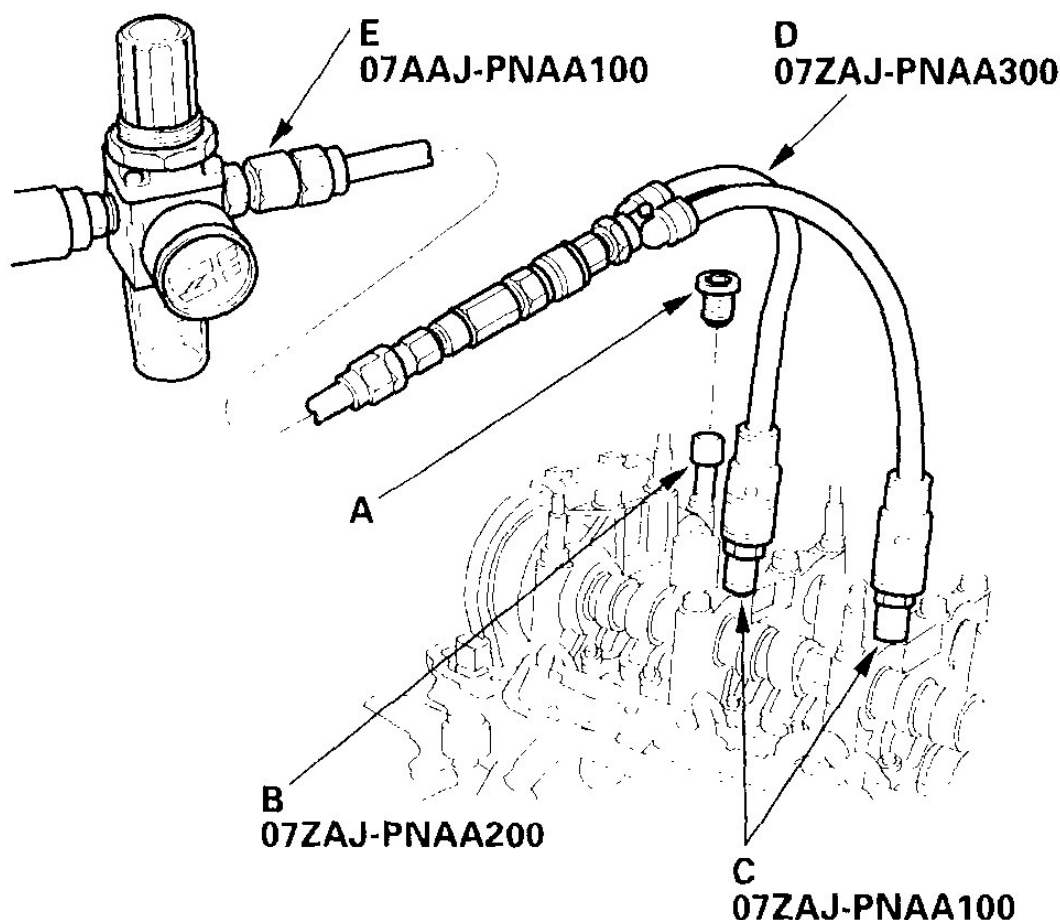


Fig. 6: Verifying That The Intake Primary Rocker Arm Moves Independently Of The Intake Secondary Rocker Arm

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Repeat step 3 on the remaining intake primary rocker arms with each piston at TDC. When all the primary rocker arms pass the test, go to step 5.
5. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4 kgf/cm² , 58 psi).
6. Inspect the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
7. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).



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Fig. 7: Removing The Sealing Bolt From The Relief Hole & Installing The VTEC Air Stopper
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Specified Air Pressure: 290 kPa (3.0 kgf/cm² , 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.

11. With the specified air pressure applied, move the intake primary rocker arm (A) for the No. 1 cylinder. The primary rocker arm and 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.

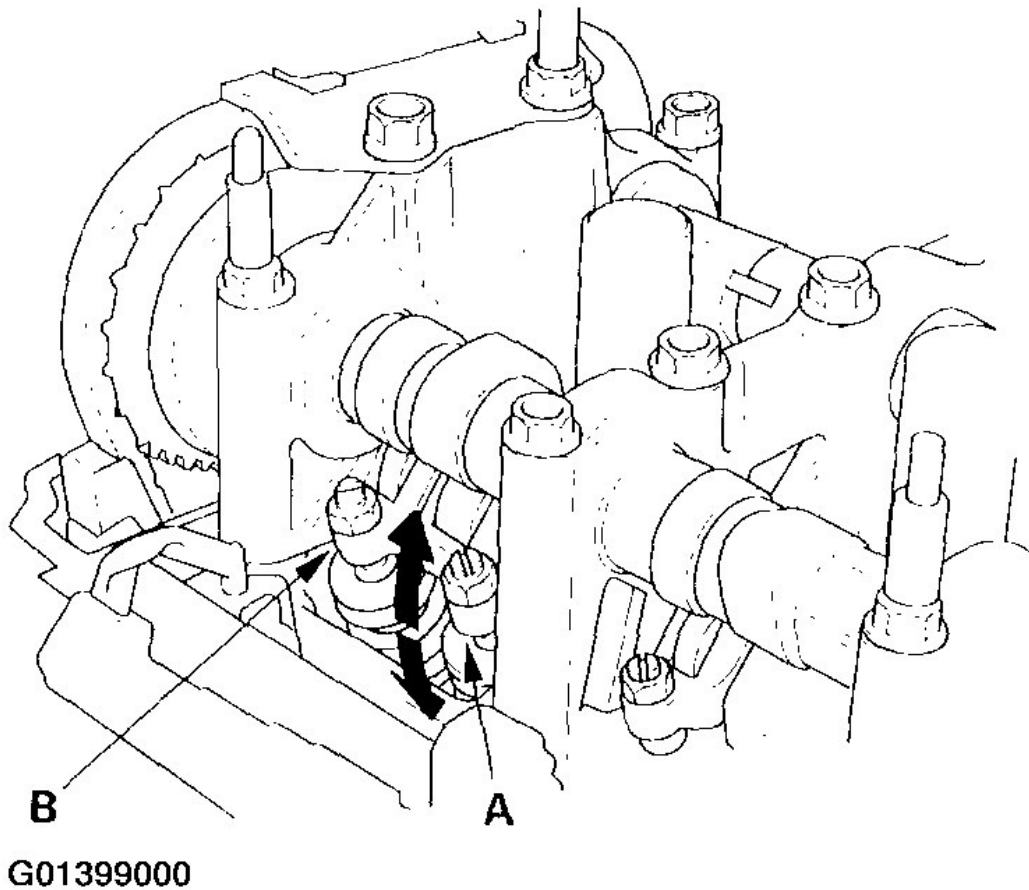


Fig. 8: Verifying That The Intake Primary Rocker Arm & The Intake Secondary Rocker Arm Move Together

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the special tools.
13. Tighten the camshaft holder mounting bolts to 22 N.m (2.2 kgf.m, 16 lbf.ft).
14. Tighten the sealing bolt to 20 N.m (2.0 kgf.m, 14 lbf.ft).
15. 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 **ROCKER ARM ASSEMBLY REMOVAL**).

3. Remove the camshaft holder (see **ROCKER ARM ASSEMBLY REMOVAL**).
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator clockwise and counterclockwise. If the VTC actuator is not locked, replace the VTC actuator.
6. Seal the advance holes (A) and retard holes (B) in the No. 1 camshaft journal with tape.

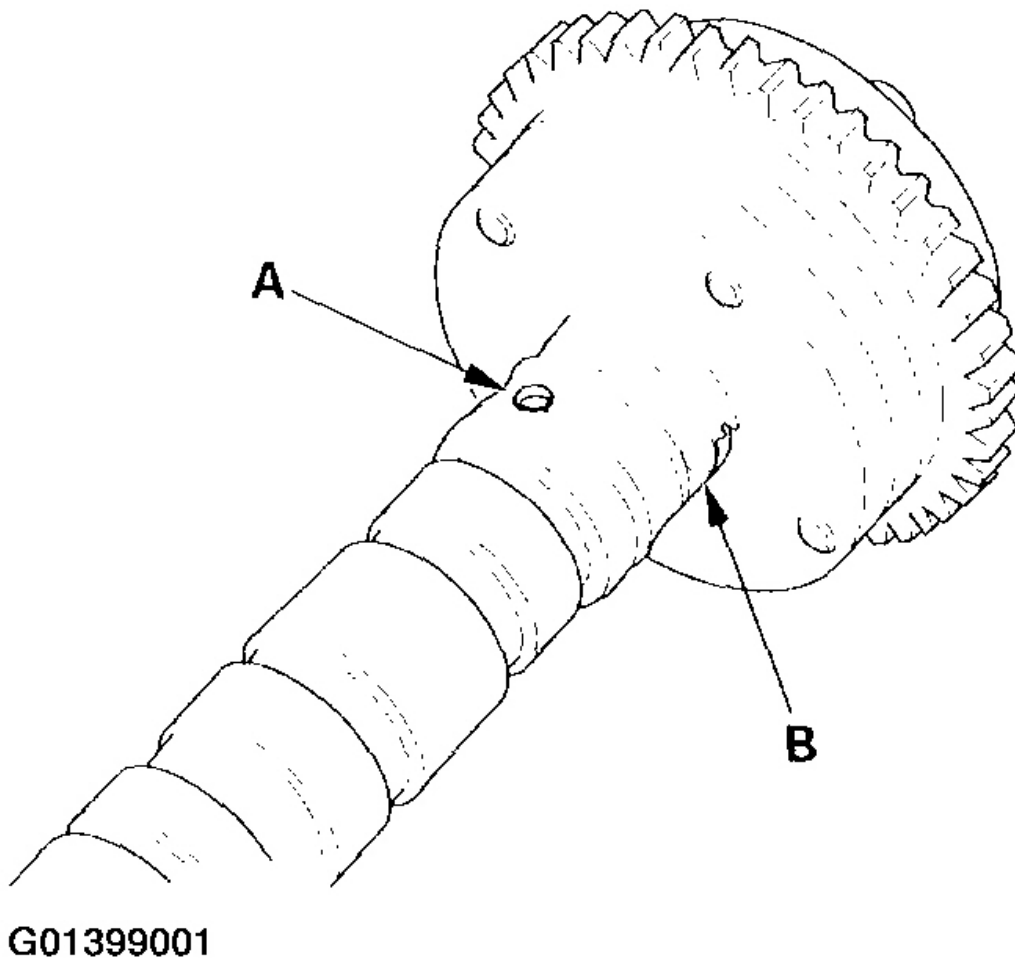
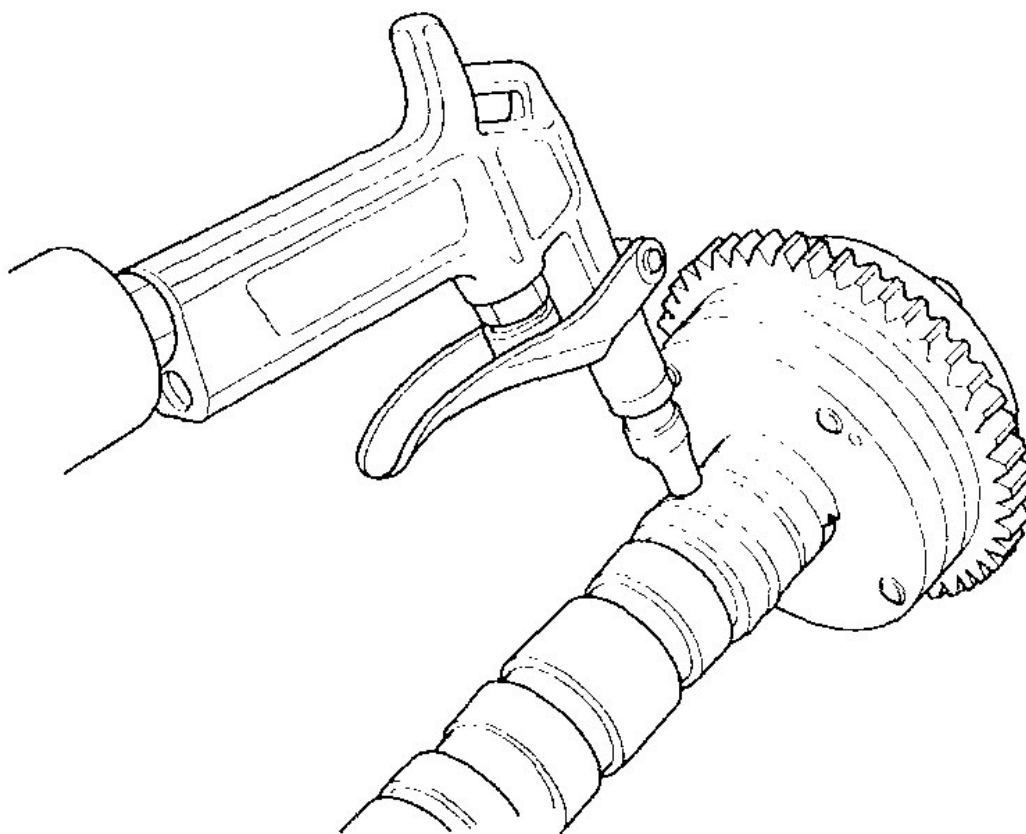


Fig. 9: Sealing The Advance Holes And Retard Holes In The No. 1 Camshaft Journal With Tape
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Punch a hole through the tape over one of the advance holes.
8. Apply air to the advance hole to release the lock.



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Fig. 10: Applying Air To The Advance Hole To Release The Lock
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.

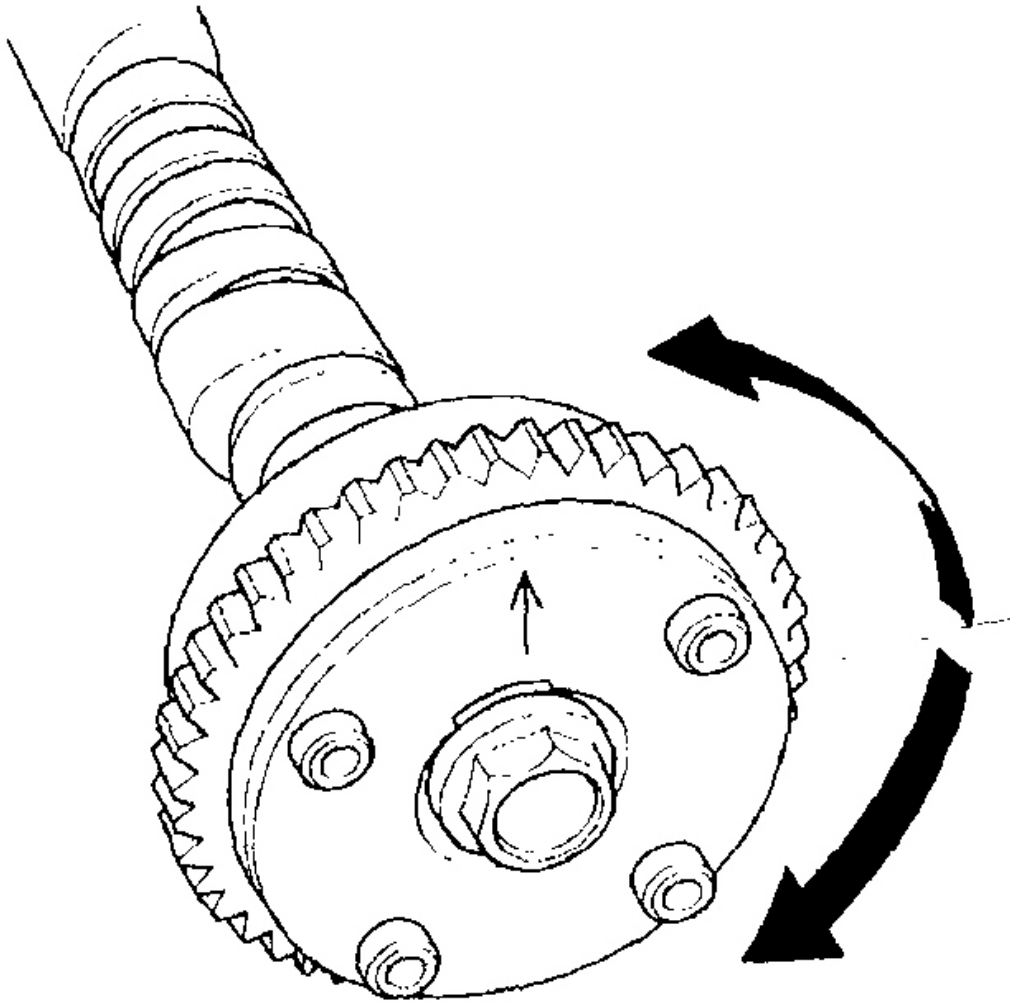
**G01399003**

Fig. 11: Checking VTC Actuator Movement

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. 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 of **ROCKER ARM ASSEMBLY INSTALLATION**).
11. Set the camshaft holders and chain guide B in place (see step 7 of **ROCKER ARM ASSEMBLY INSTALLATION**).
12. Tighten the camshaft holder bolts to the specified torque (see step 8 of **ROCKER ARM ASSEMBLY INSTALLATION**).
13. Install the cam chain (see **CAM CHAIN INSTALLATION**).

14. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).

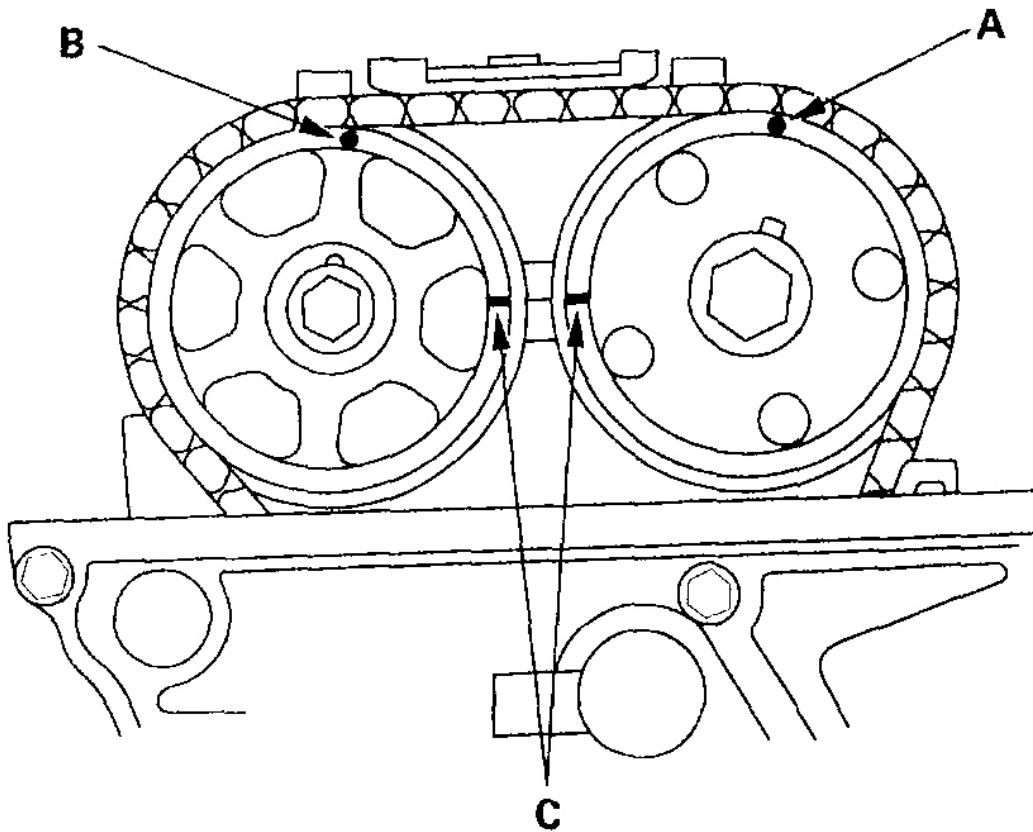
VALVE CLEARANCE ADJUSTMENT

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).**

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 exhaust camshaft sprocket.

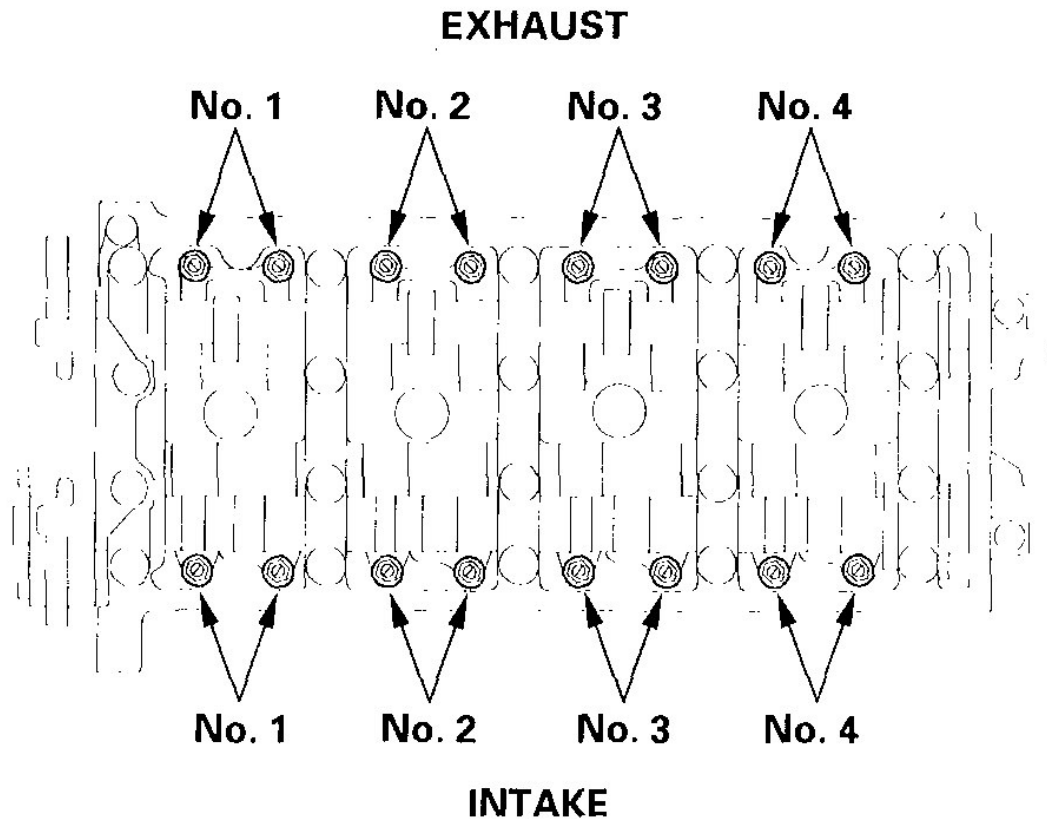


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Fig. 12: Aligning The TDC Marks

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

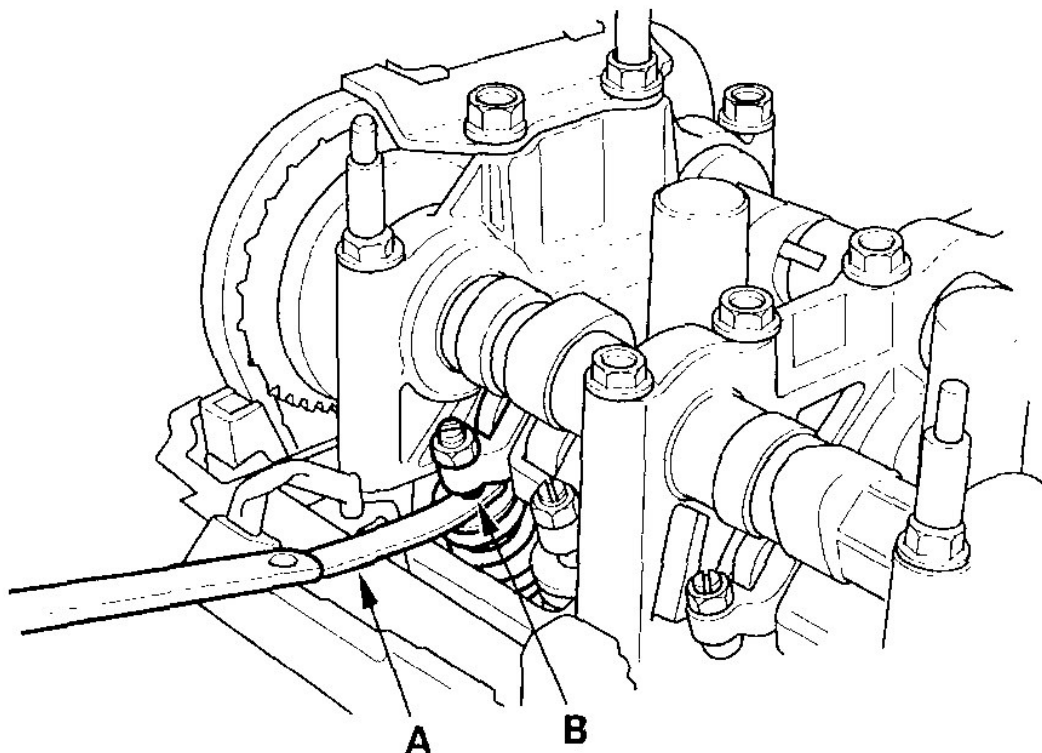
Valve Clearance:**Intake:** 0.21-0.25 mm (0.008-0.010 in.)**Exhaust:** 0.28-0.32 mm (0.011-0.013 in.)

G01399005

Fig. 13: Locating Adjusting Screws

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.



G01399006

Fig. 14: Inserting The Feeler Gauge Between The Adjusting Screw And The End Of The Valve Stem

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

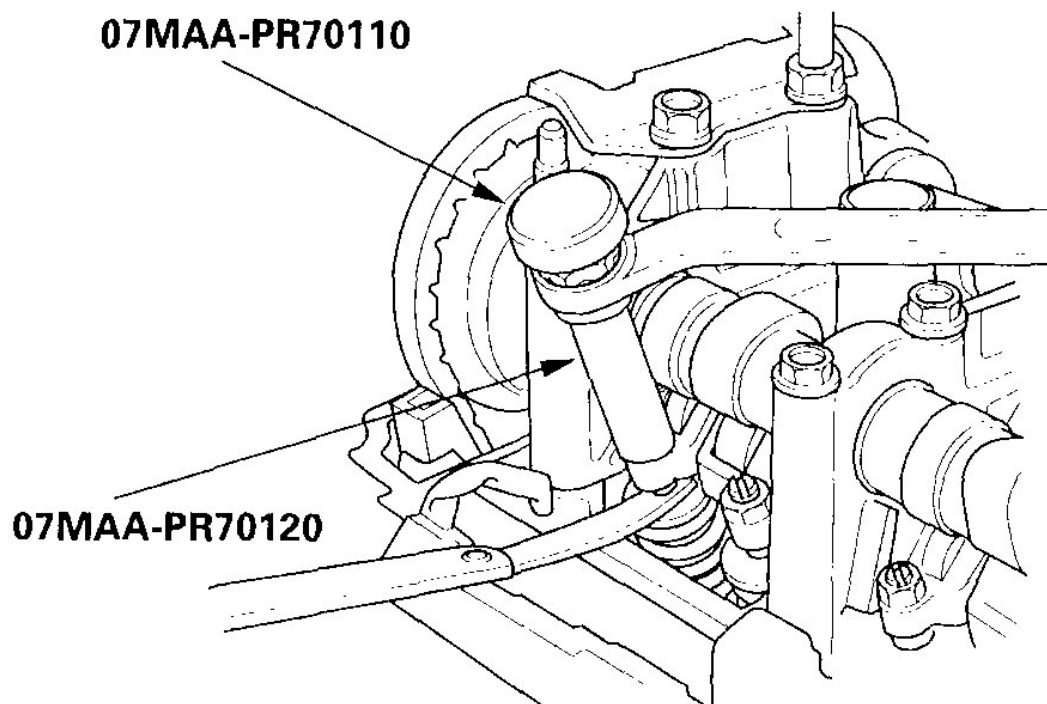


Fig. 15: Loosening The Locknut With The Special Tools & Turning The Adjusting Screw
Courtesy of AMERICAN HONDA MOTOR CO., INC.

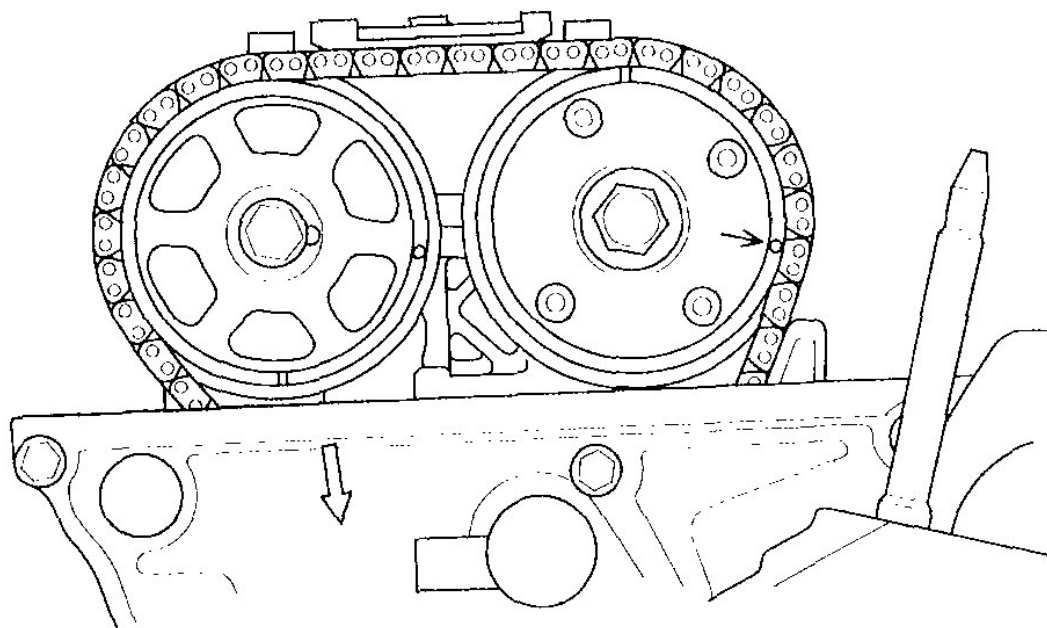
6. Tighten the locknut.

Specified Torque:

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

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

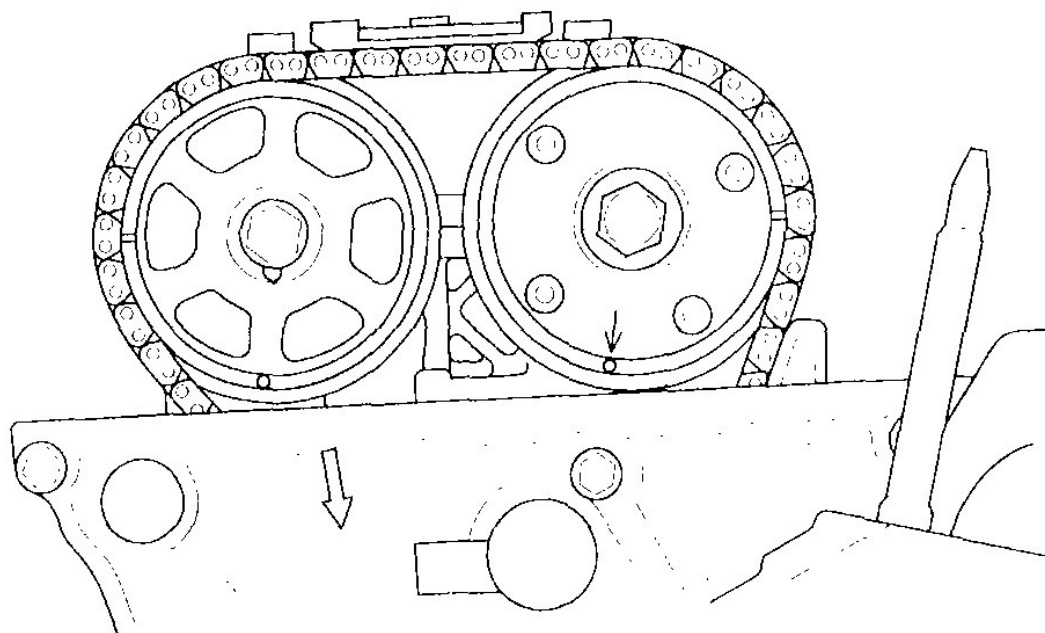
7. Recheck the valve clearance. Repeat the adjustment if necessary.
8. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).



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Fig. 16: Rotating The Crankshaft 180° Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

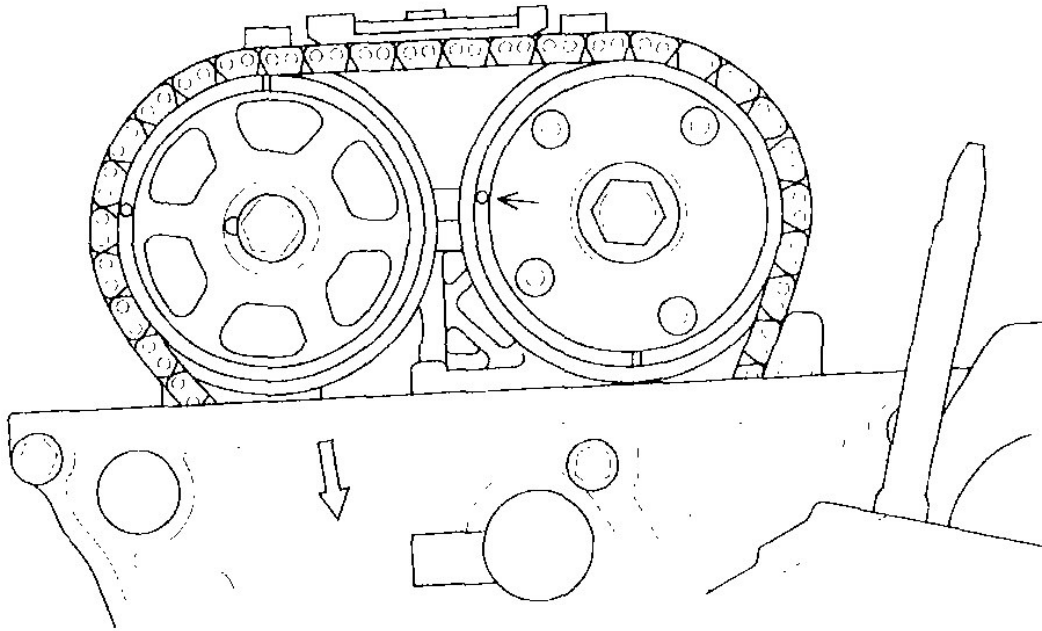
9. Check and, if necessary, adjust the valve clearance on No. 3 cylinder.
10. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).



G01399009

Fig. 17: Rotating The Crankshaft 180° Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Check and, if necessary, adjust the valve clearance on No. 4 cylinder.
12. Rotate the crankshaft 180° clockwise (camshaft pulley turns 90°).



G01399010

Fig. 18: Rotating The Crankshaft 180° Clockwise
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CRANKSHAFT PULLEY REMOVAL & INSTALLATION

Special Tools Required:

- Holder handle 07JAB-001020A
- Holder attachment, 50 mm 07NAB-001040A
- Socket, 19 mm 07 JAA-001020A or a commercially available 19 mm socket

Removal

1. Remove right front tire/wheel.
2. Remove the splash shield (see step 3 of **CAM CHAIN REMOVAL**).
3. Hold the pulley with holder handle (A) and holder attachment (B).

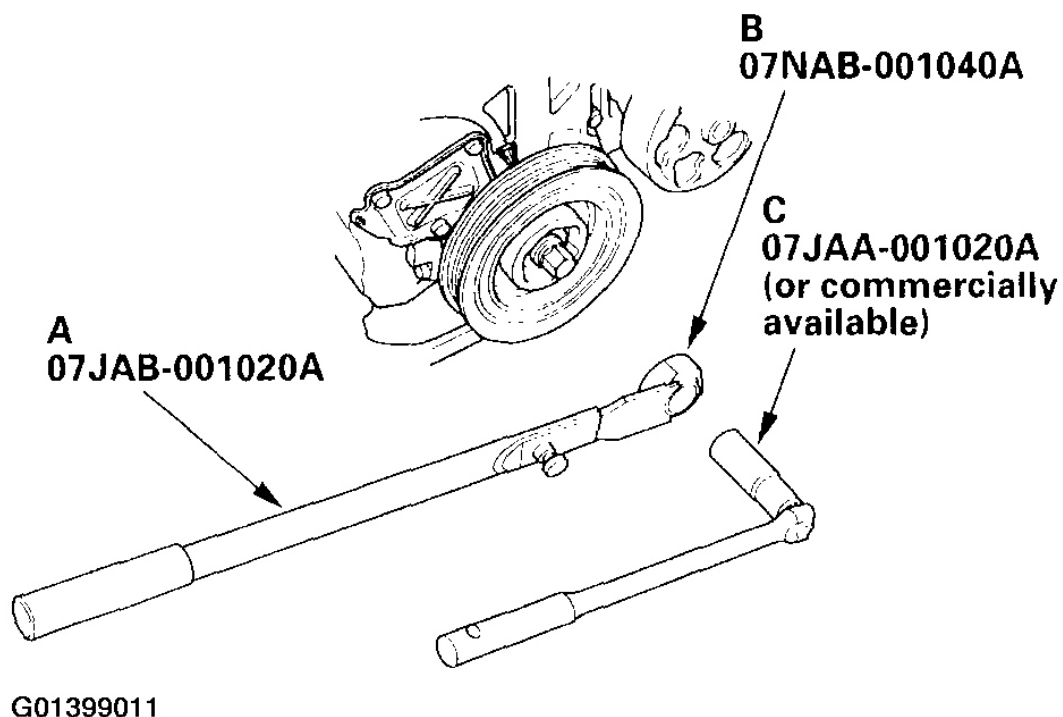


Fig. 19: Holding The Pulley With Holder Handle And Holder Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

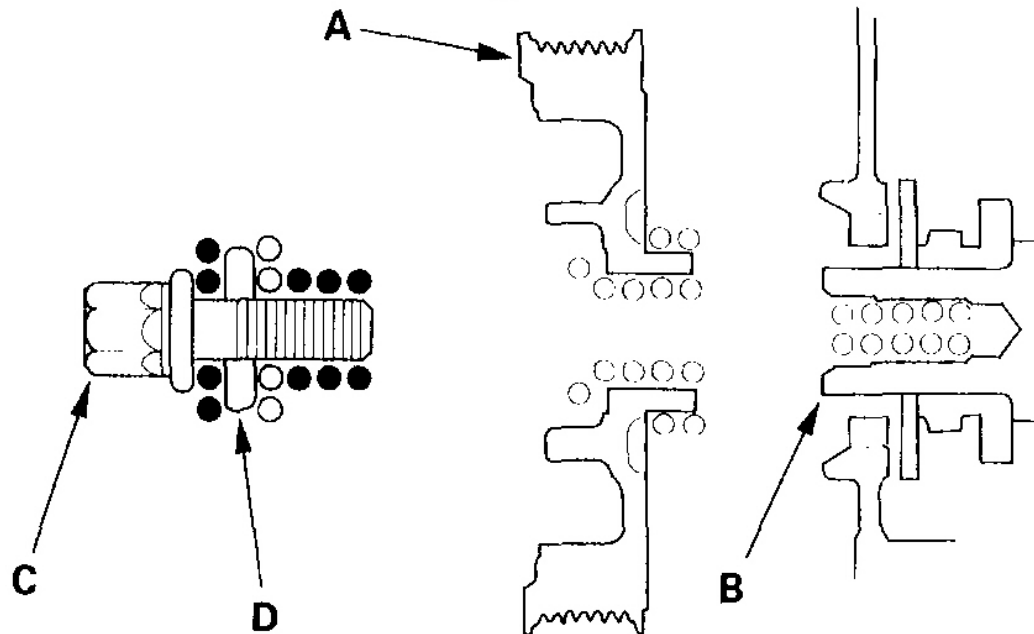
4. Remove the bolt with a 19 mm socket (C) and breaker bar.

Installation

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

○: Clean

●: Lubricate with new engine oil



G01399012

Fig. 20: Cleaning & Lubricating The Crankshaft Pulley, Crankshaft, Bolt, & Washer
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and tighten the bolt to 49 N.m (36 lbf.ft). Do not use an impact wrench.
 - a. Hold the pulley with the holder handle (A) and holder attachment (B).
 - b. Tighten the bolt with a torque wrench and 19 mm socket (C).

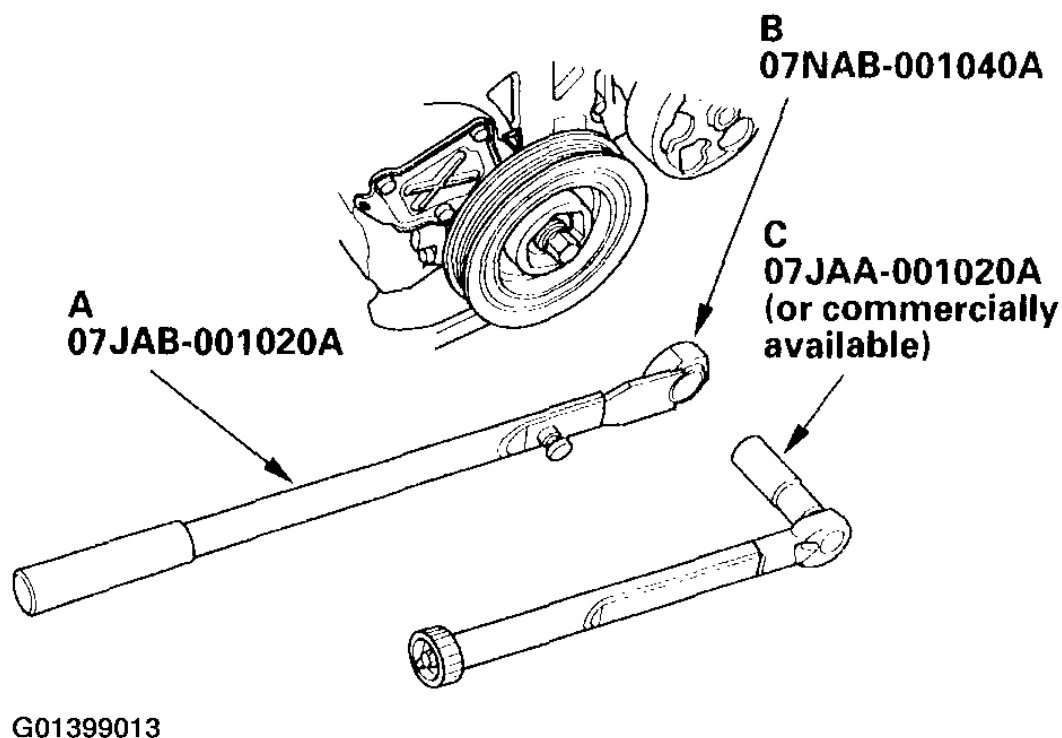


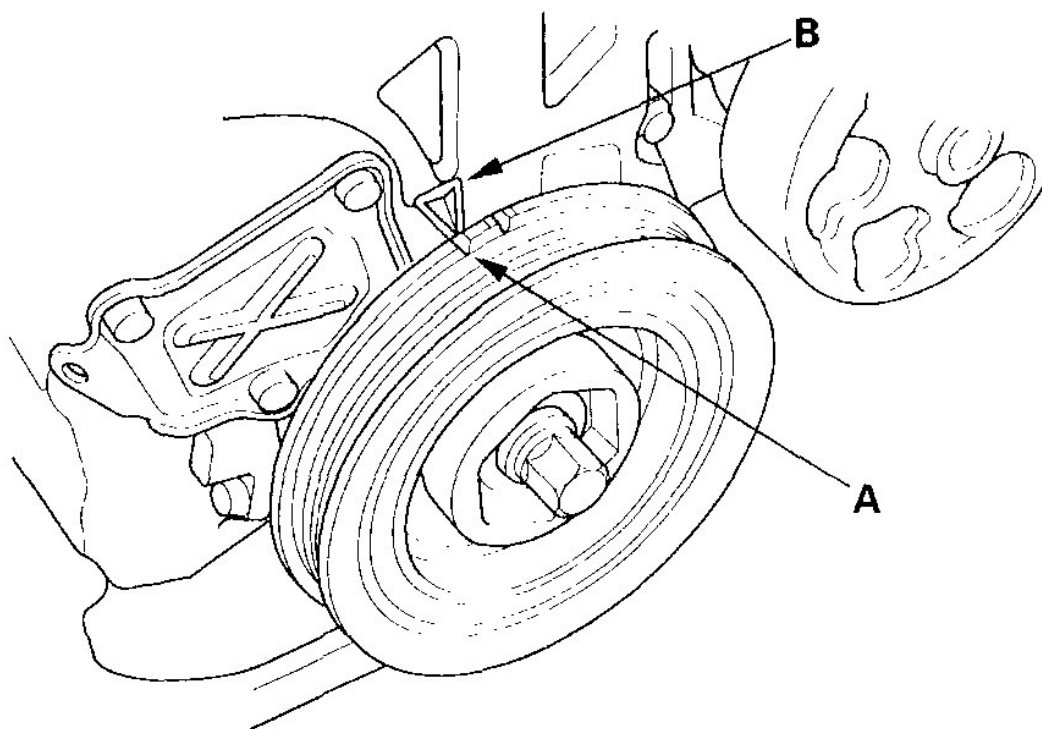
Fig. 21: Tightening The Bolt With A Torque Wrench And 19 mm Socket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Install the splash shield (see step 23 of ENGINE INSTALLATION).
4. Install right front tire/wheel.

CAM CHAIN REMOVAL

NOTE: Keep the cam chain away from magnetic fields.

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

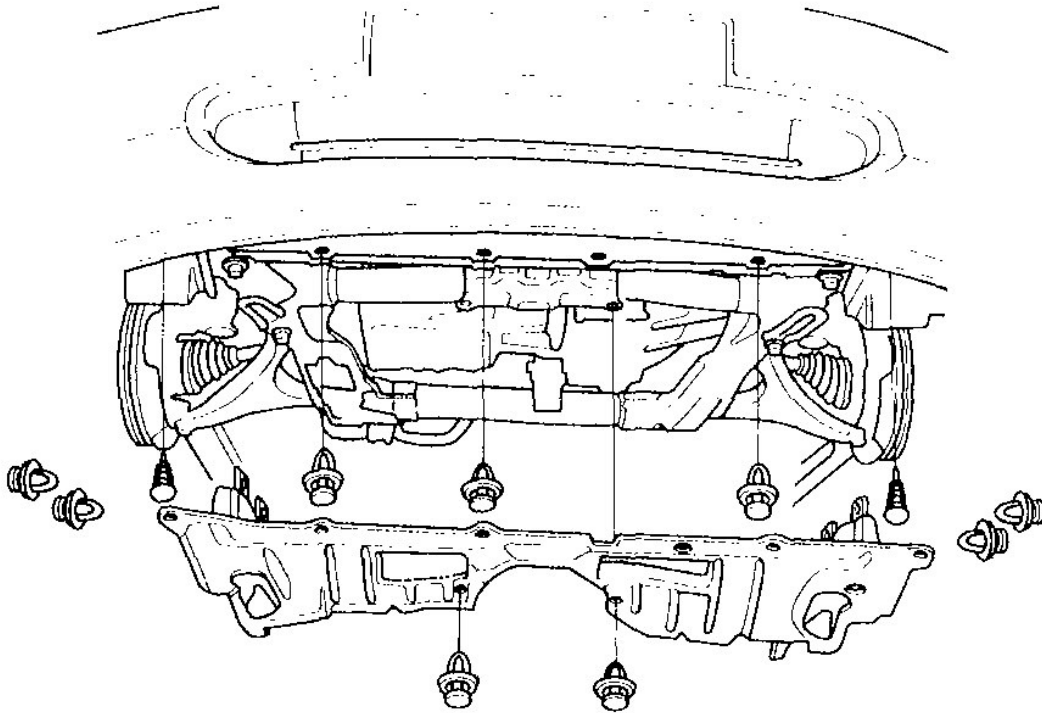


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Fig. 22: Turning The Crankshaft Pulley So Its Top Dead Center (TDC) Mark Lines Up With The Pointer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the right front tire/wheel.
3. Remove the splash shield.

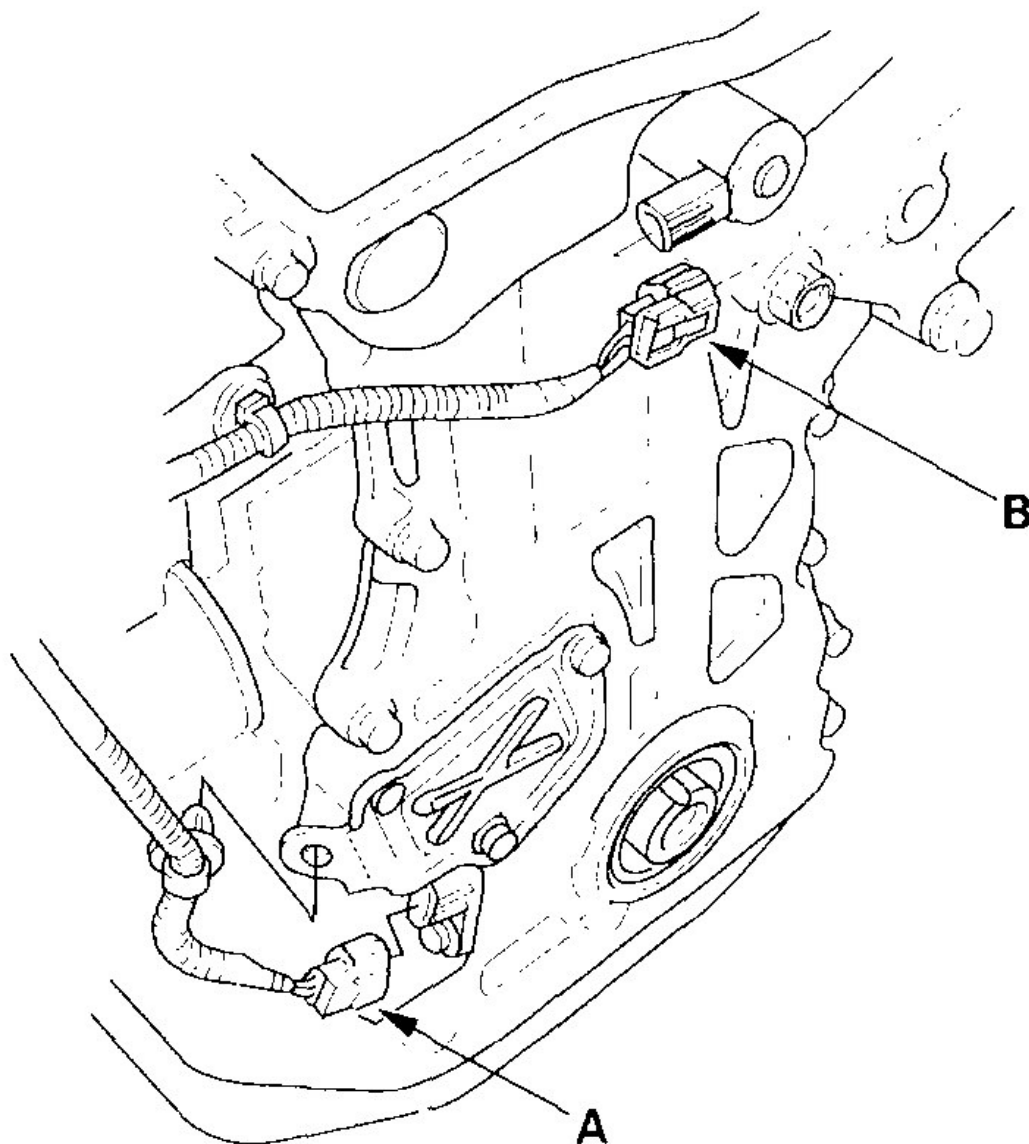


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Fig. 23: Removing The Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
5. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
6. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL & INSTALLATION**).
7. Disconnect the crankshaft position (CKP) sensor connector (A) and variable valve timing control (VTC) oil control solenoid valve connector (B).

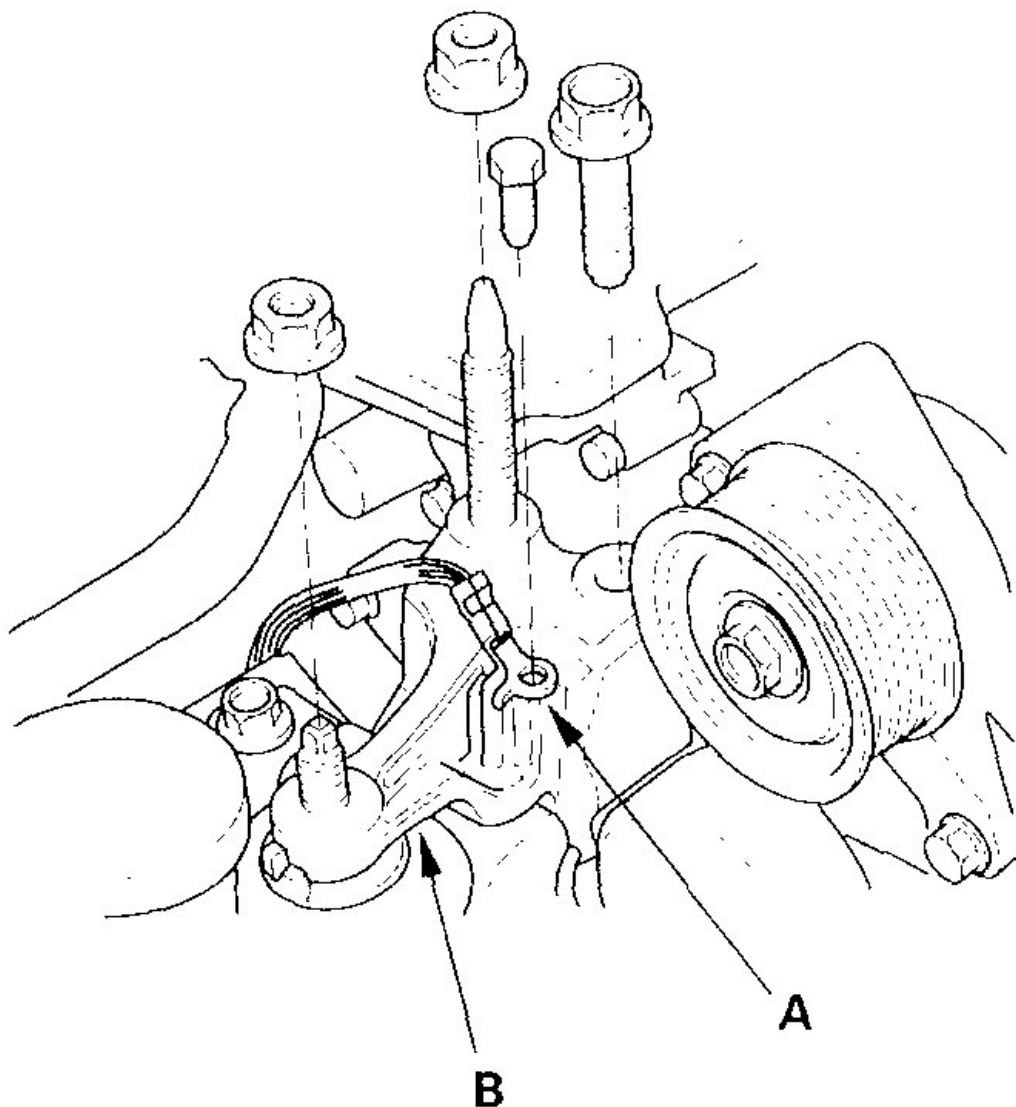


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Fig. 24: Disconnecting The Crankshaft Position (CKP) Sensor Connector And Variable Valve Timing Control (VTC) Oil Control Solenoid Valve Connector
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the VTC oil control solenoid valve (see step 1 of **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
9. Support the engine with a jack and wood block under the oil pan.

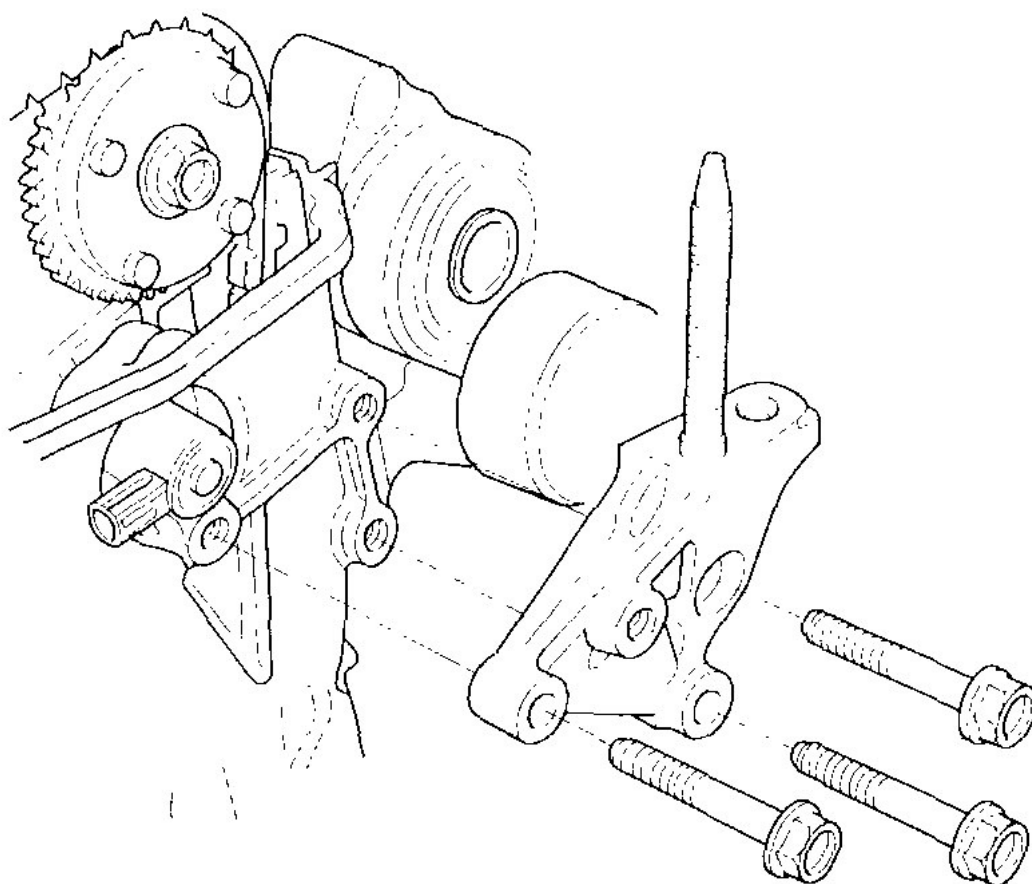
10. Remove the ground cable (A), and remove the upper bracket (B).



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Fig. 25: Removing The Ground Cable & The Upper Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

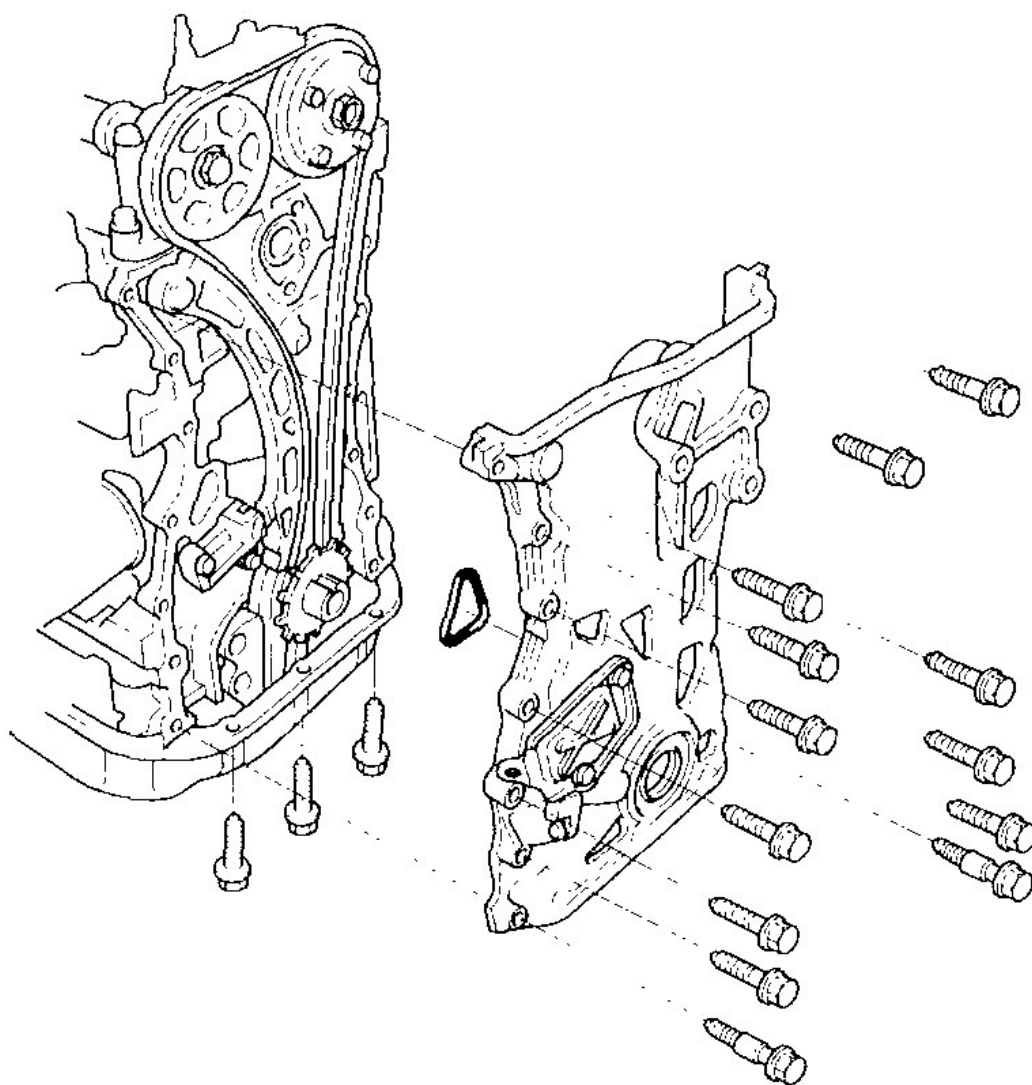
11. Remove the side engine mount bracket.



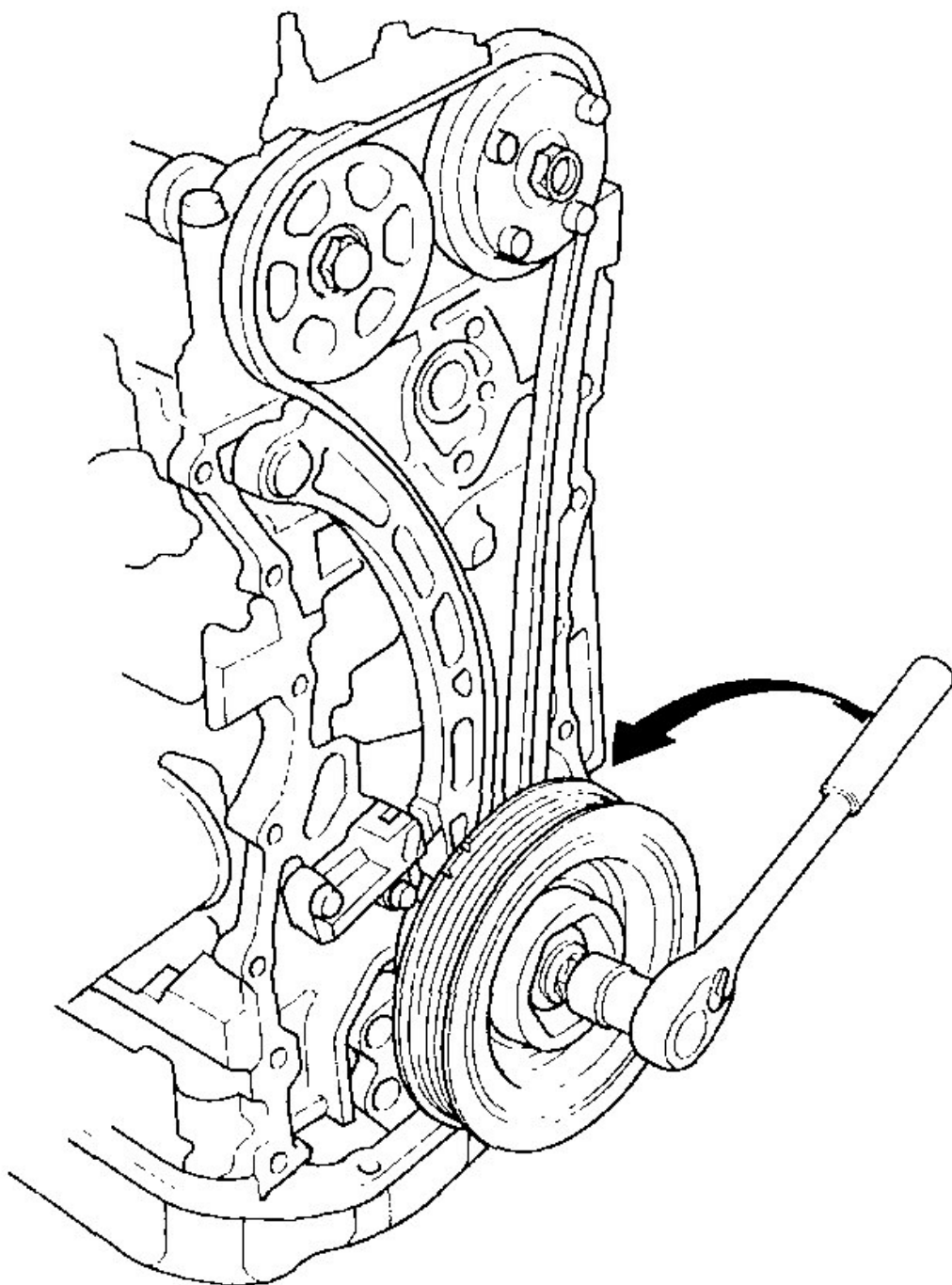
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Fig. 26: Removing The Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the chain case.

**G01399019****Fig. 27: Removing The Chain Case****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

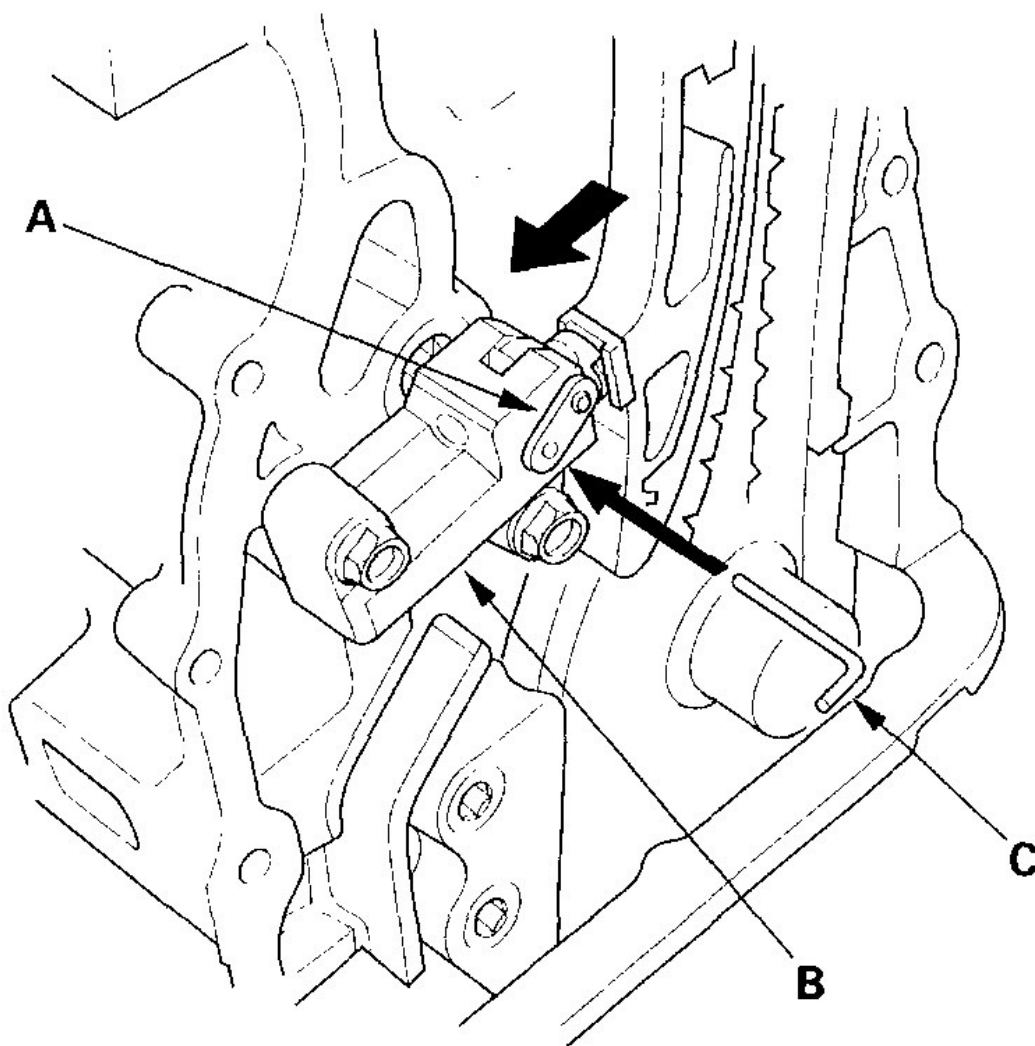


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Fig. 28: Turning The Crankshaft Counterclockwise To Compress The Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

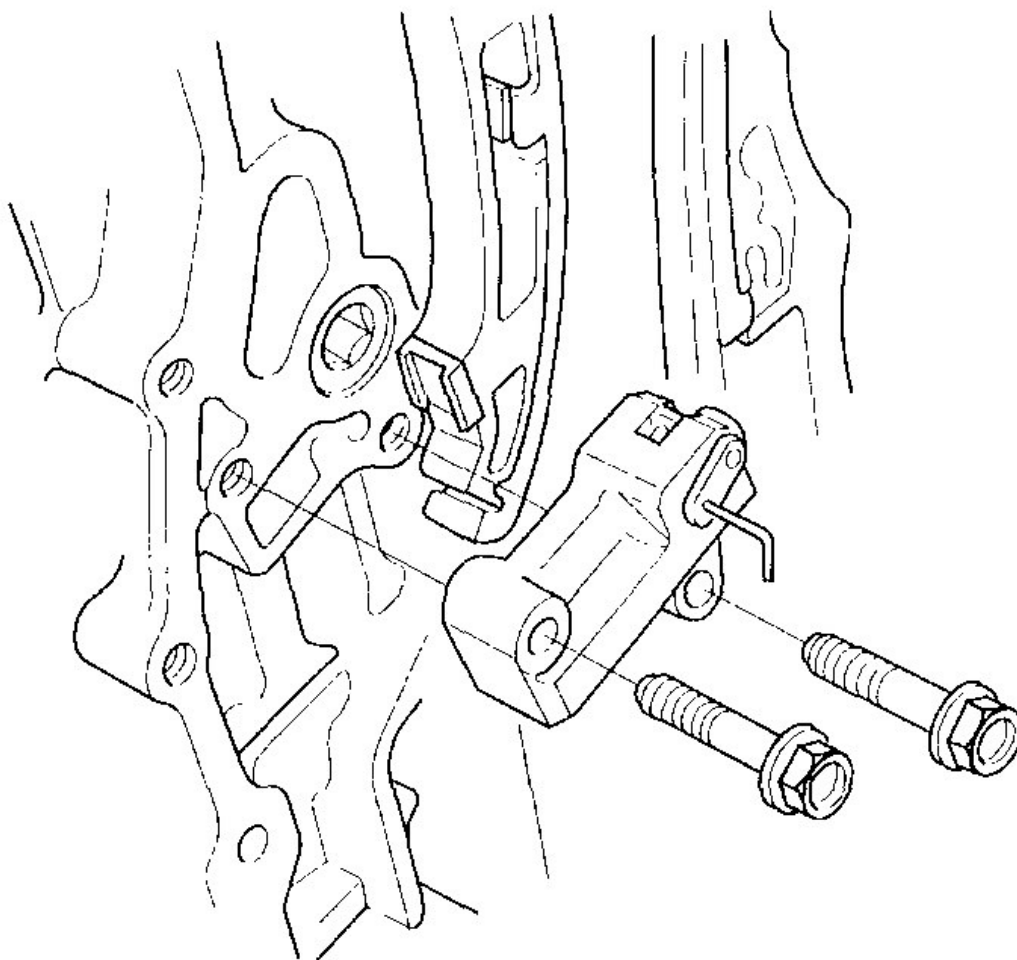
15. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in.) diameter pin (C) or stopper, P/N14511-PNA-003 into the holes. Turn the crankshaft clockwise to secure the pin.



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Fig. 29: Aligning The Holes On The Lock And The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

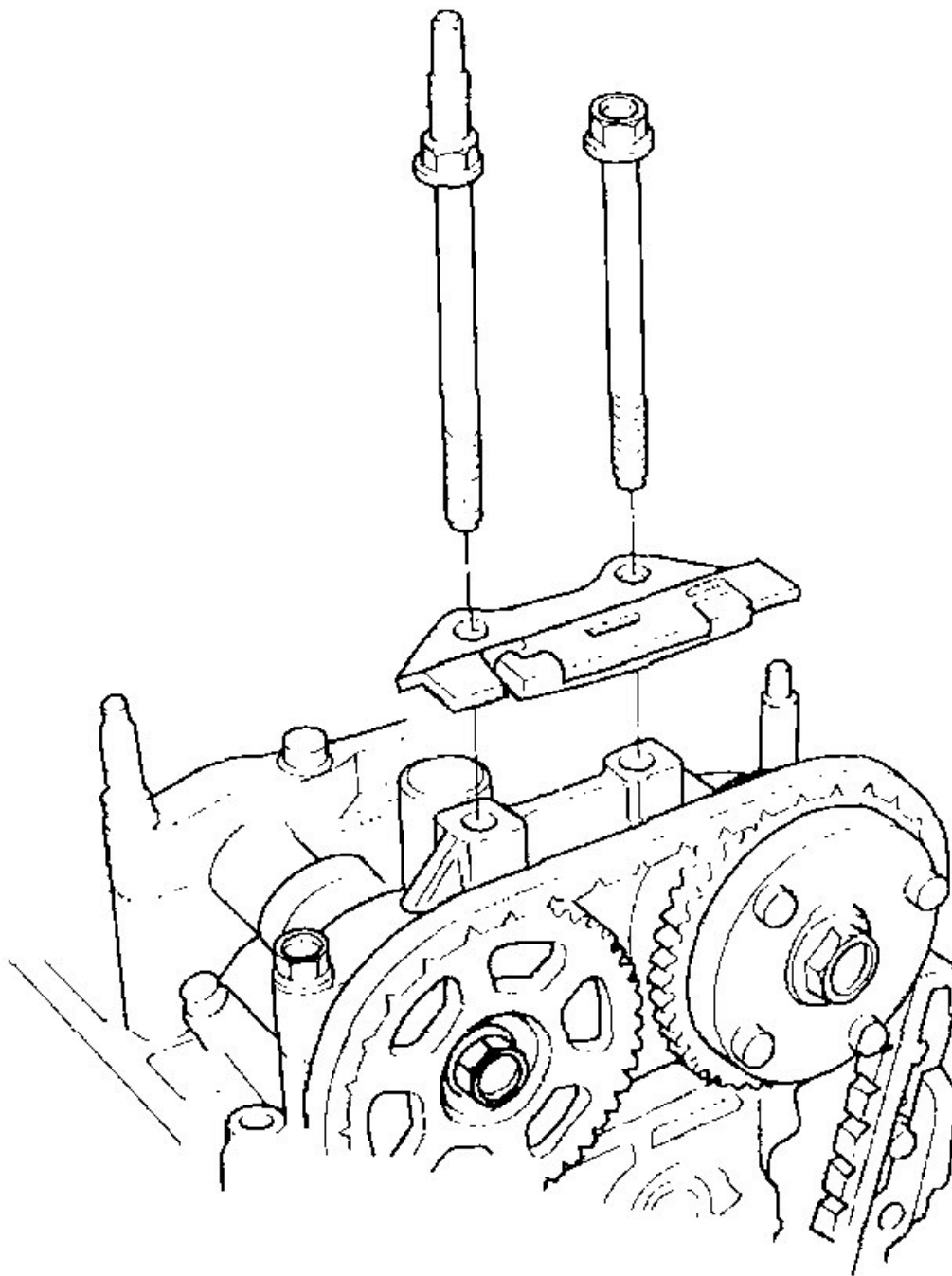
16. Remove the auto-tensioner.



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Fig. 30: Removing The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Remove the cam chain guide B.

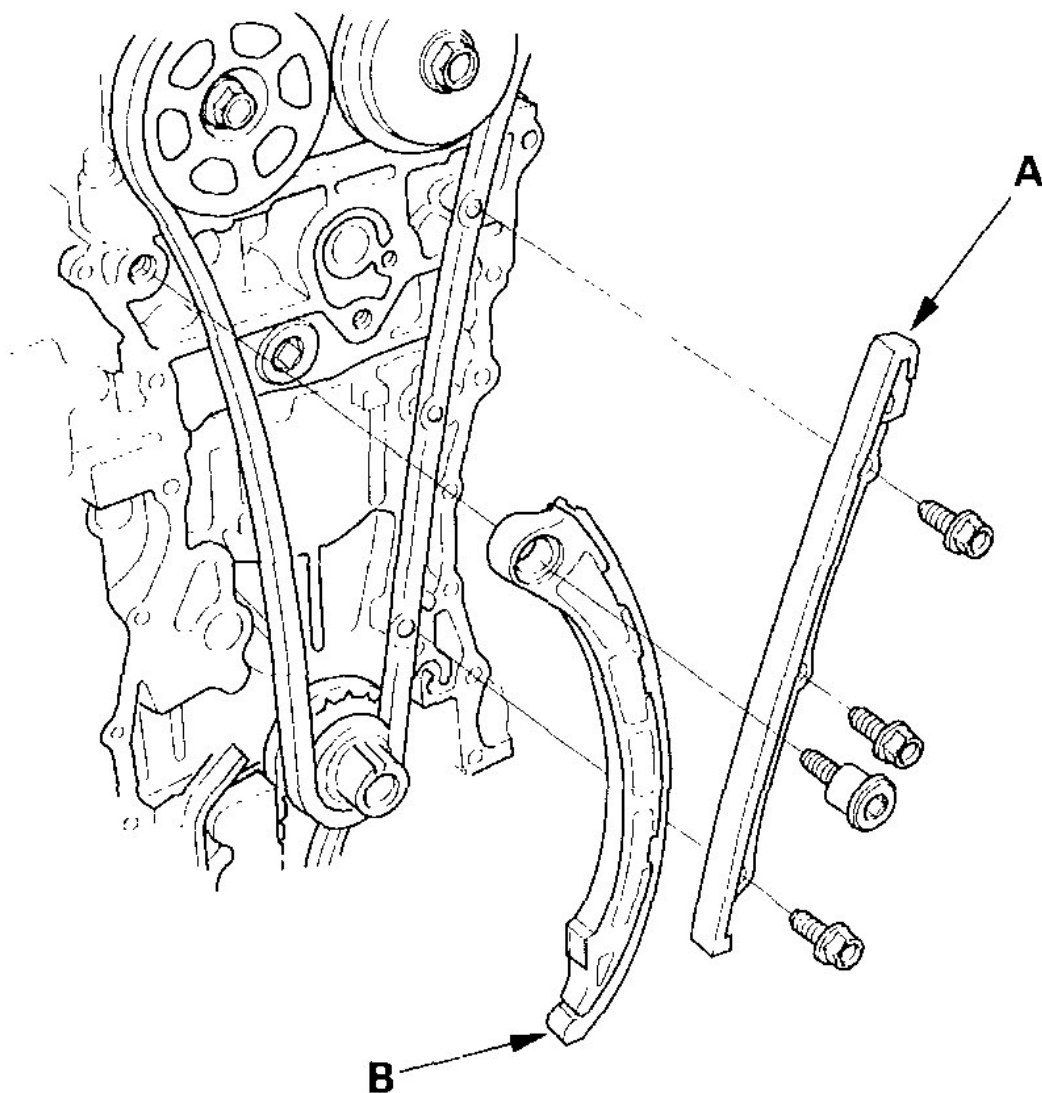


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Fig. 31: Removing The Cam Chain Guide B

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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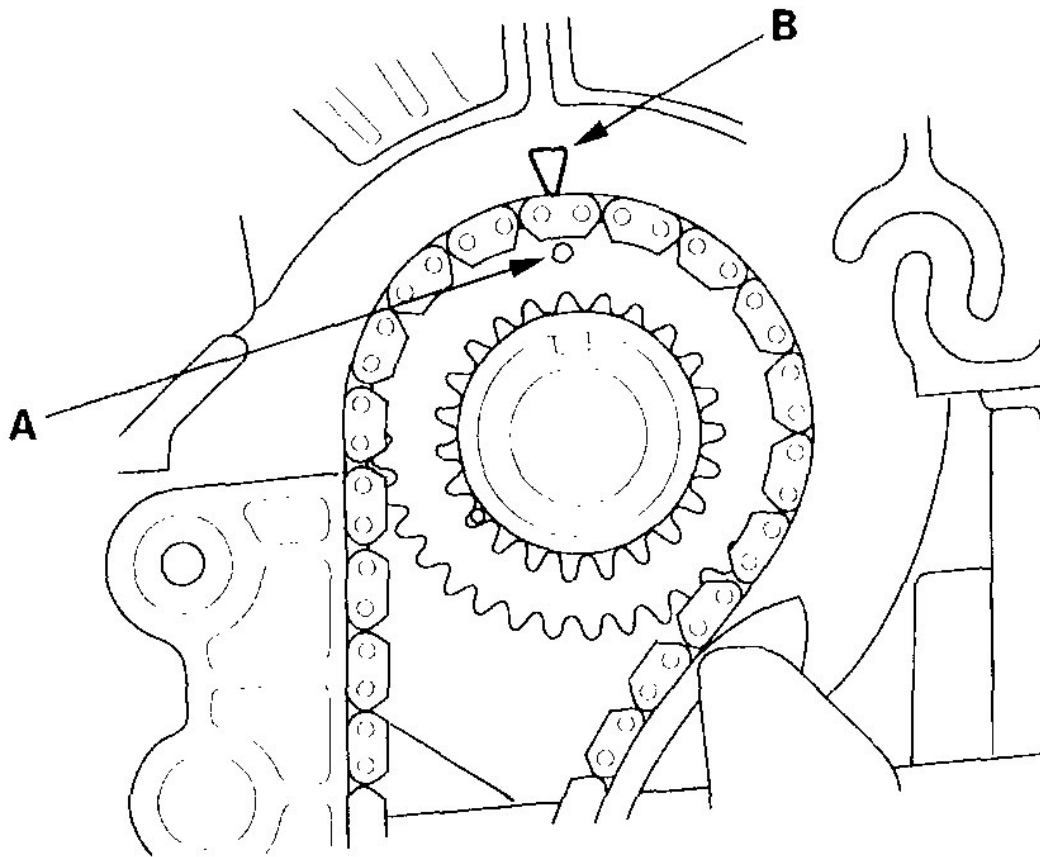
Fig. 32: Remove The Cam Chain Guide A And Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Remove the cam chain.

CAM CHAIN INSTALLATION

NOTE: Keep the cam chain away from magnetic fields.

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

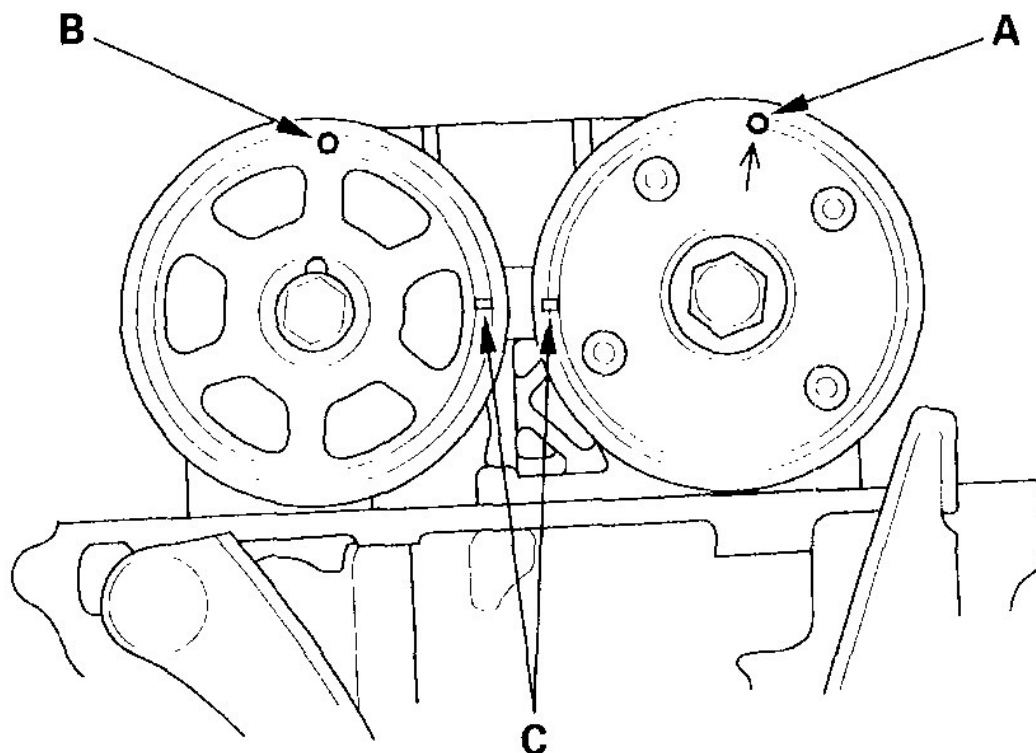


G01399025

Fig. 33: Aligning The TDC Mark On The Crankshaft Sprocket With The Pointer On The Cylinder Block

Courtesy of AMERICAN HONDA MOTOR CO., INC.

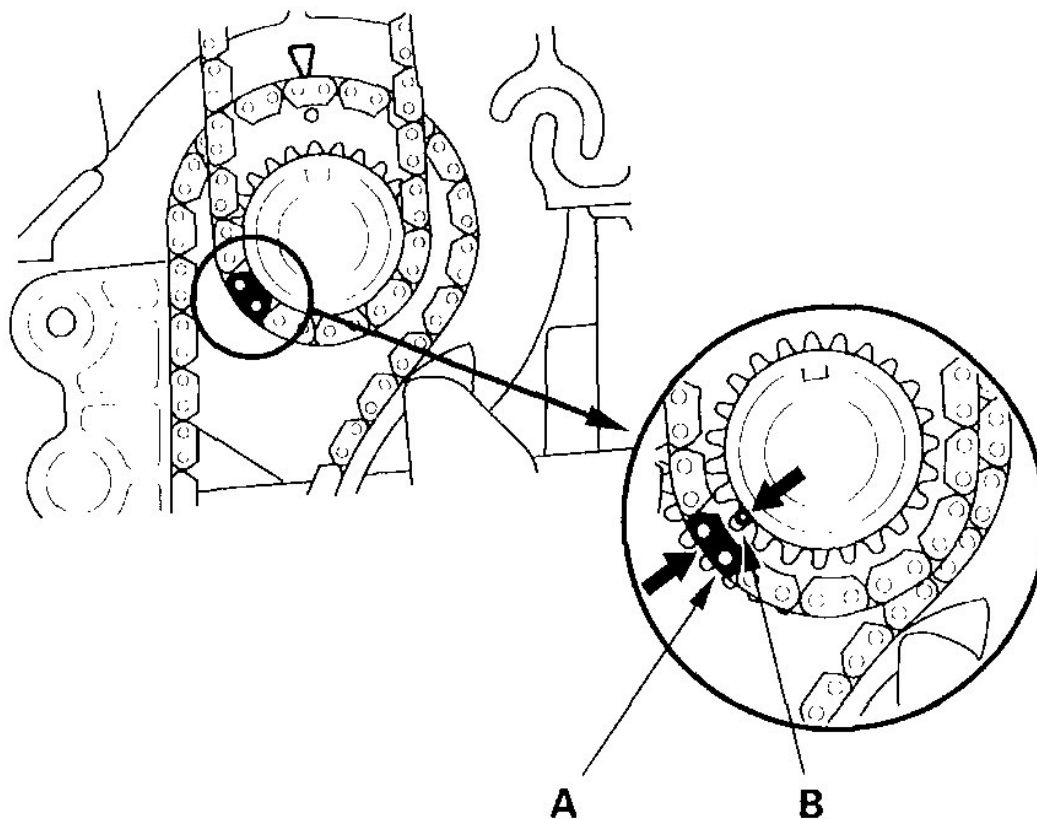
2. Set the camshafts to TDC. The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and exhaust camshaft sprocket.



G01399026

Fig. 34: Aligning The TDC Marks On The VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

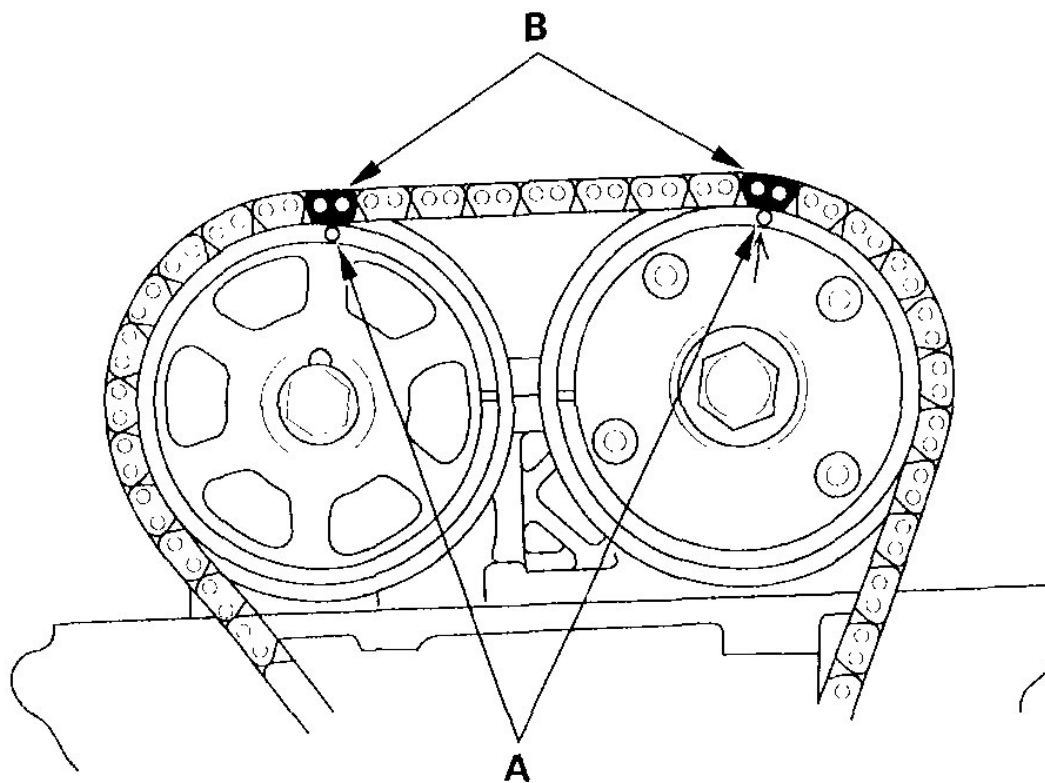
3. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the punch mark (B) on the crankshaft sprocket.



G01399027

Fig. 35: Installing The Cam Chain On The Crankshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

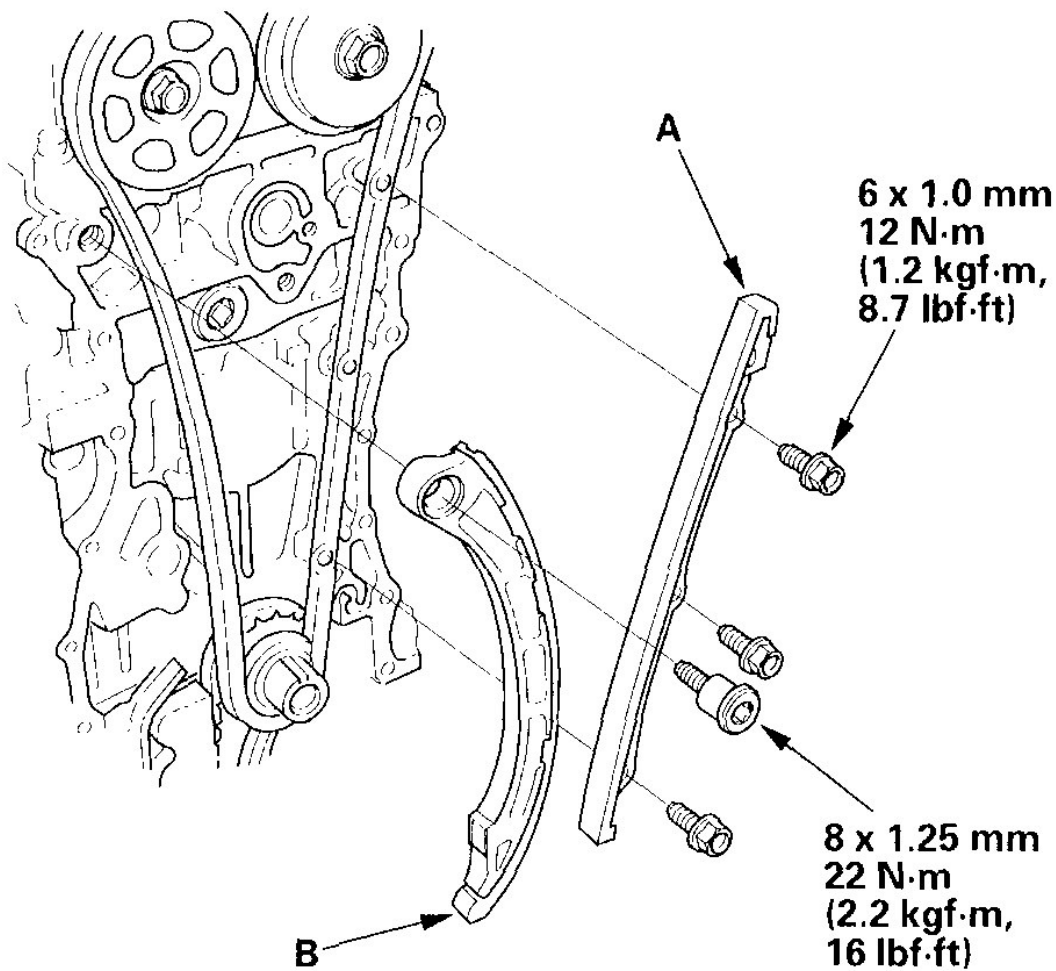
4. Install the cam chain on the VTC actuator and exhaust camshaft sprocket with the punch marks (A) aligned with the two colored pieces (B).



G01399028

Fig. 36: Installing The Cam Chain On The VTC Actuator And Exhaust Camshaft Sprocket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

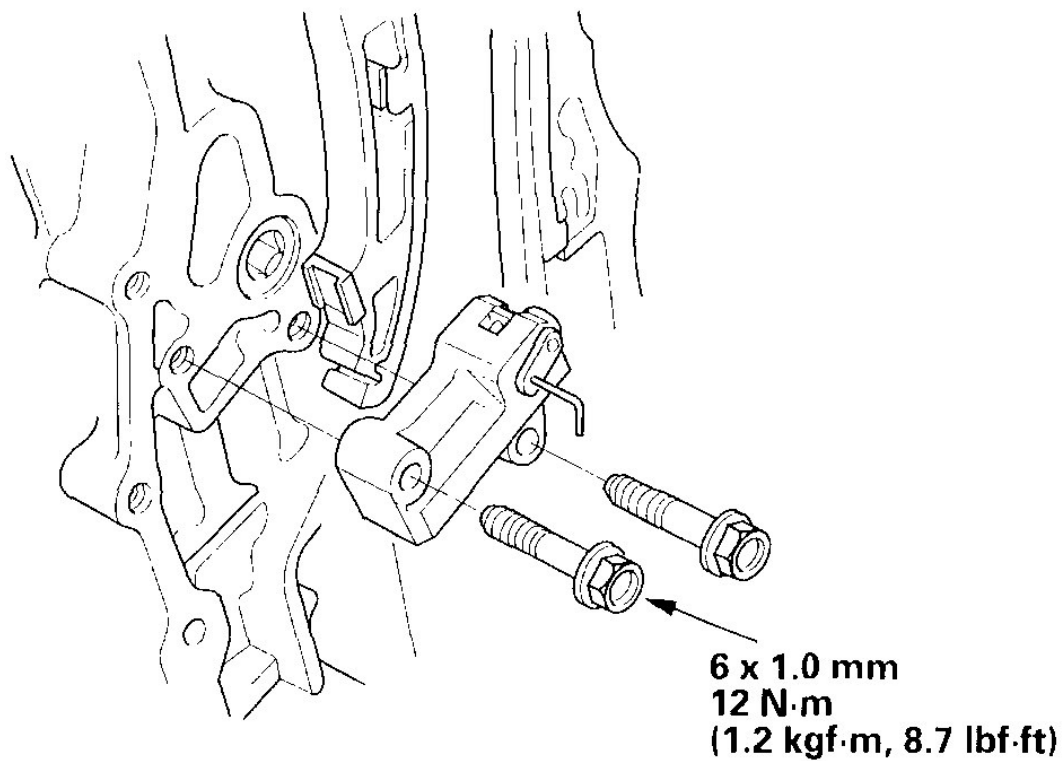
5. Install the cam chain guide A (A) and tensioner arm (B).



G01399029

Fig. 37: Installing The Cam Chain Guide A And Tensioner Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the auto-tensioner.

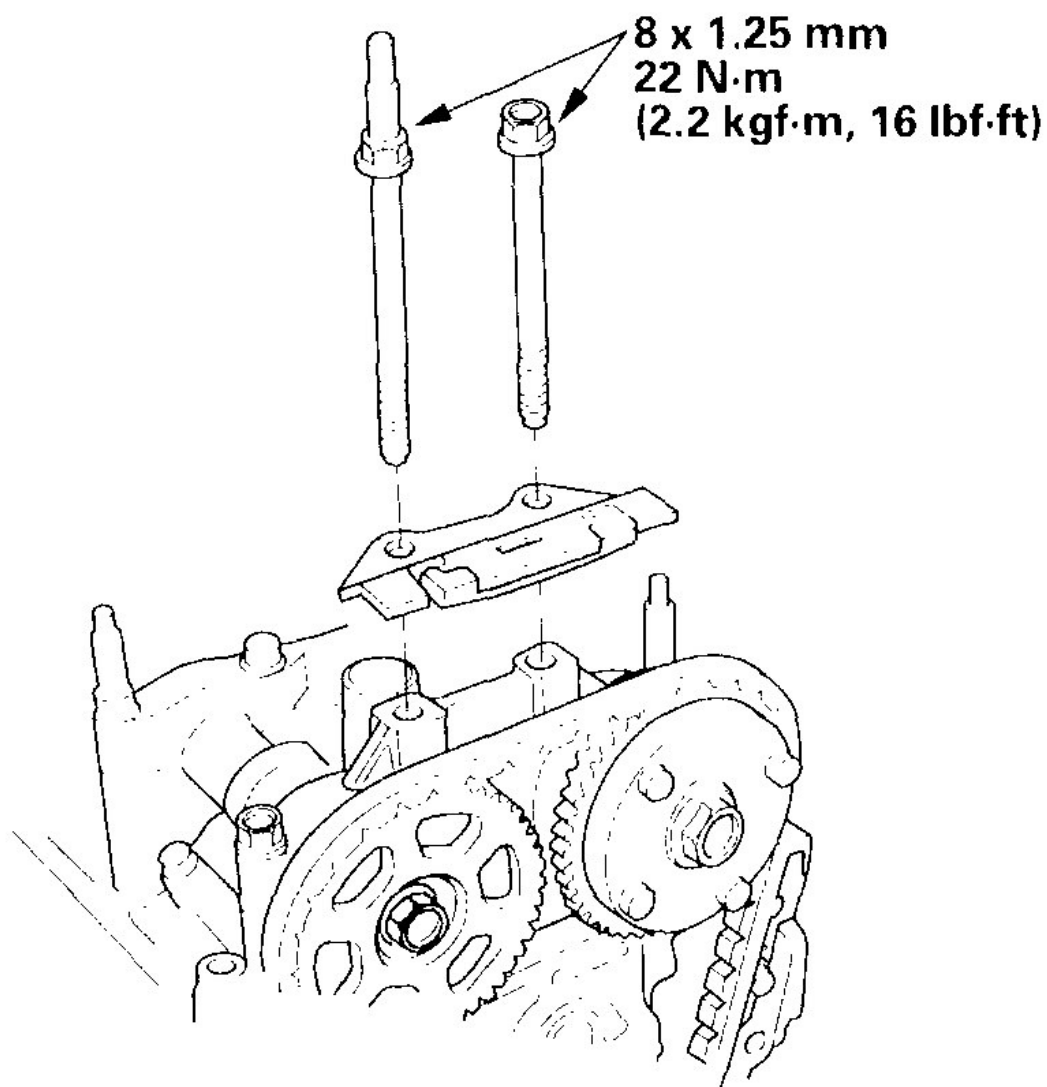


G01399030

Fig. 38: Installing The Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

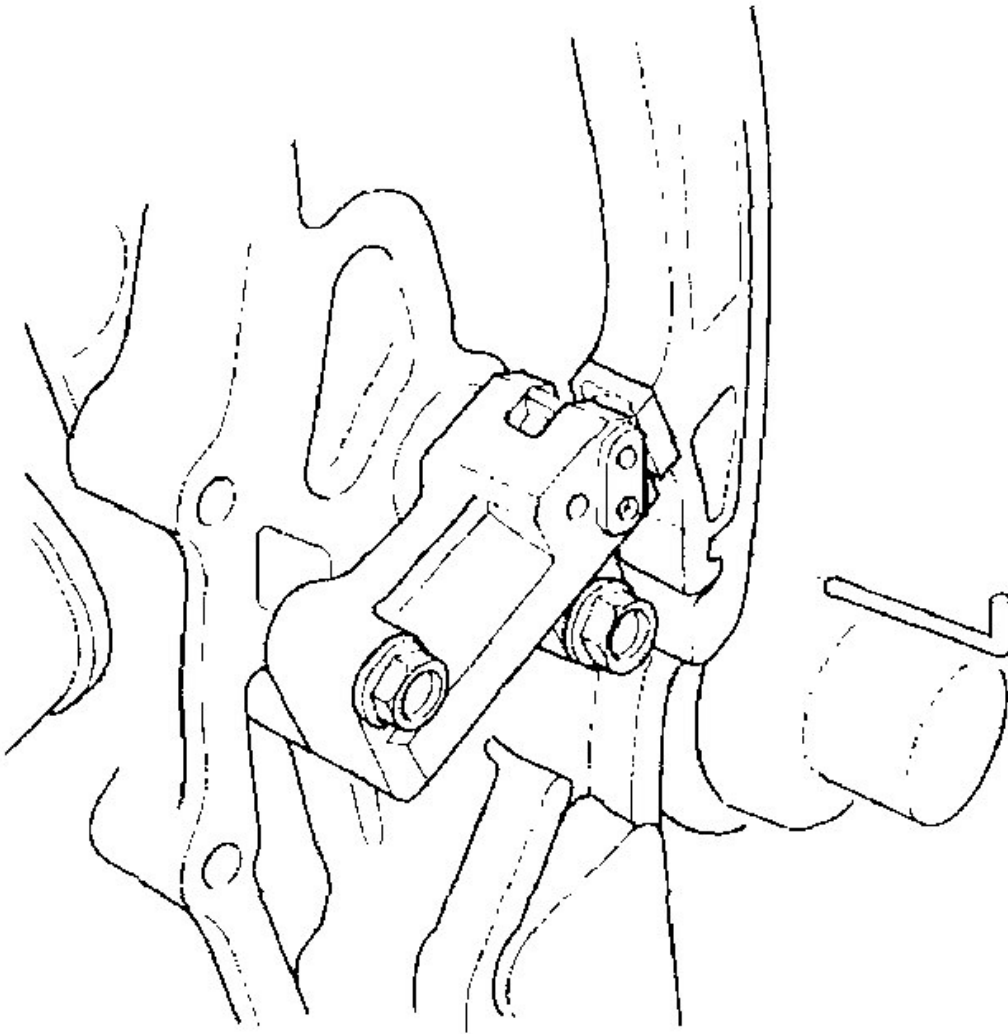
7. Install the cam chain guide B.



G01399031

Fig. 39: Installing The Cam Chain Guide B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

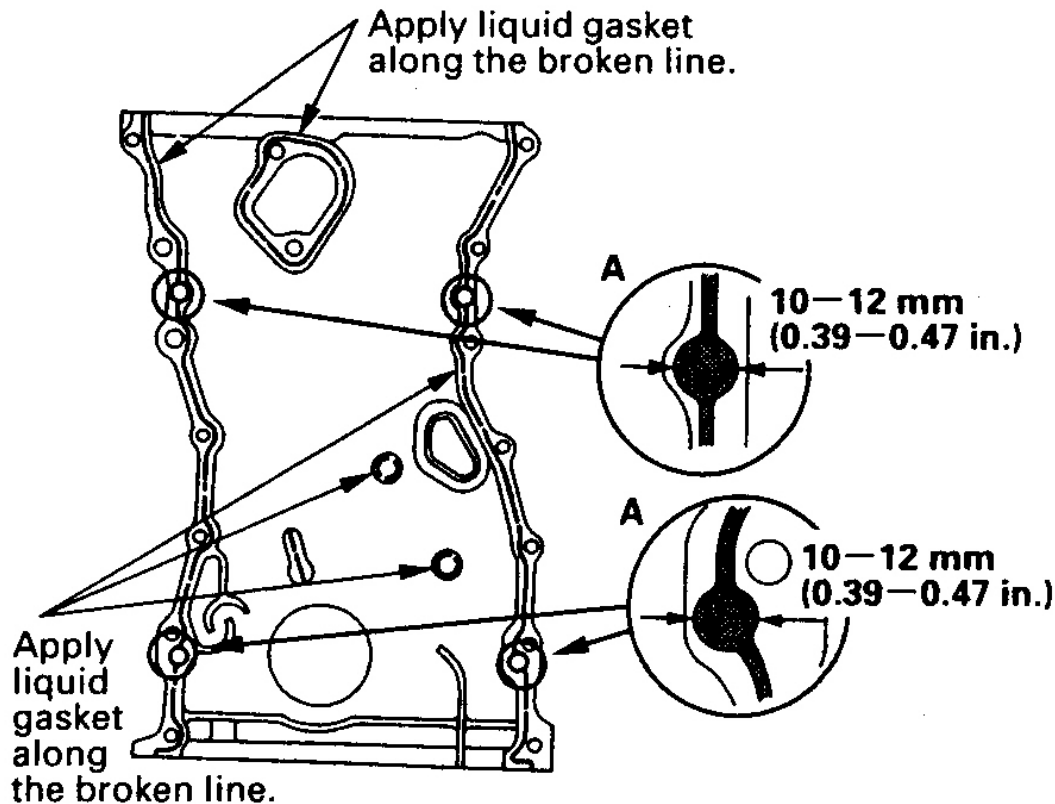
8. Remove the pin from the auto-tensioner.



G01399032

Fig. 40: Removing The Pin From The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see **CHAIN CASE OIL SEAL INSTALLATION**).
10. Remove any old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.
11. Clean and dry the chain case mating surfaces.
12. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the cylinder block mating surface of the chain case and to the inner threads of the holes.



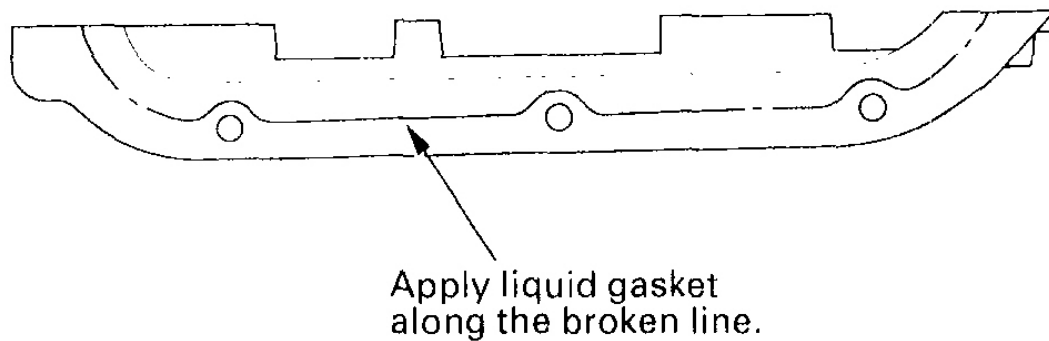
G01399033

Fig. 41: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Apply liquid gasket to the cylinder block upper surface contact areas (A) on the chain case.
14. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case and to the inner threads of the holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.



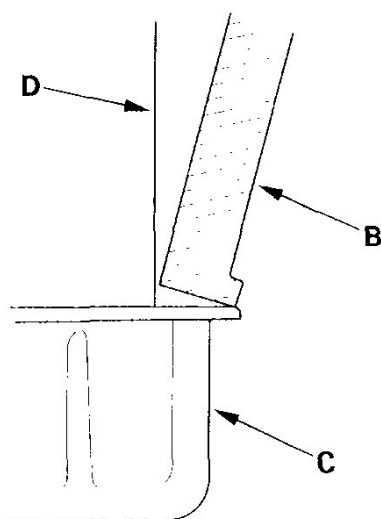
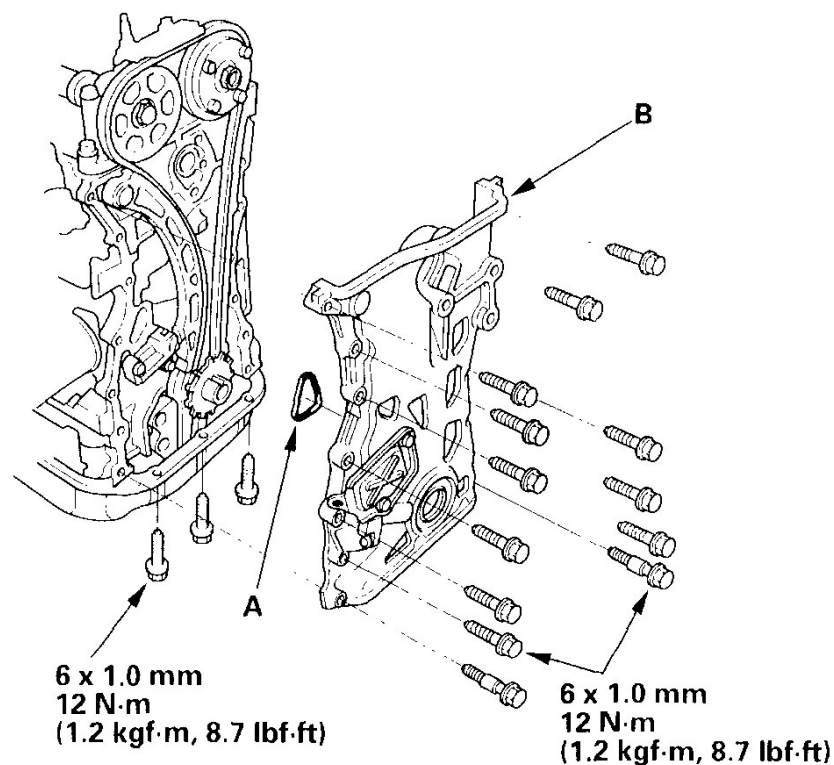
G01399034

Fig. 42: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the new O-ring (A) on the chain case. Set the edge of the chain case (B) to the edge of the oil pan (C), then install the chain case on the cylinder block (D).

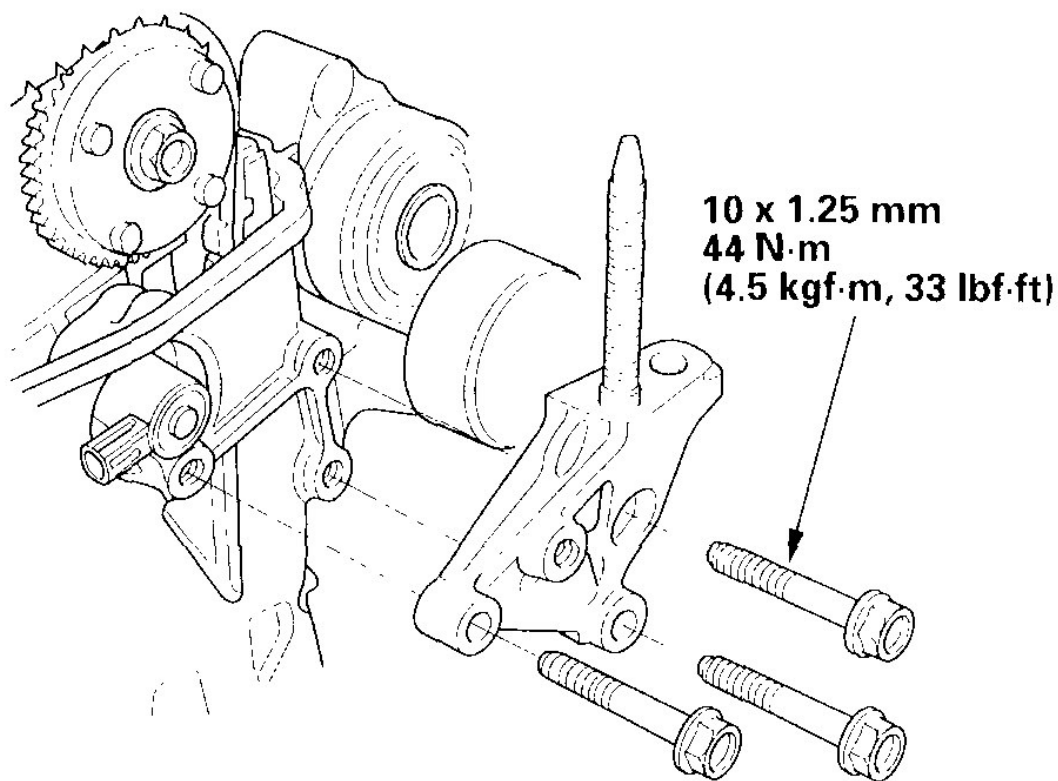
NOTE: **When installing the chain case, do not slide the bottom surface on the oil pan mounting surface.**



G01399035

Fig. 43: Installing The Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

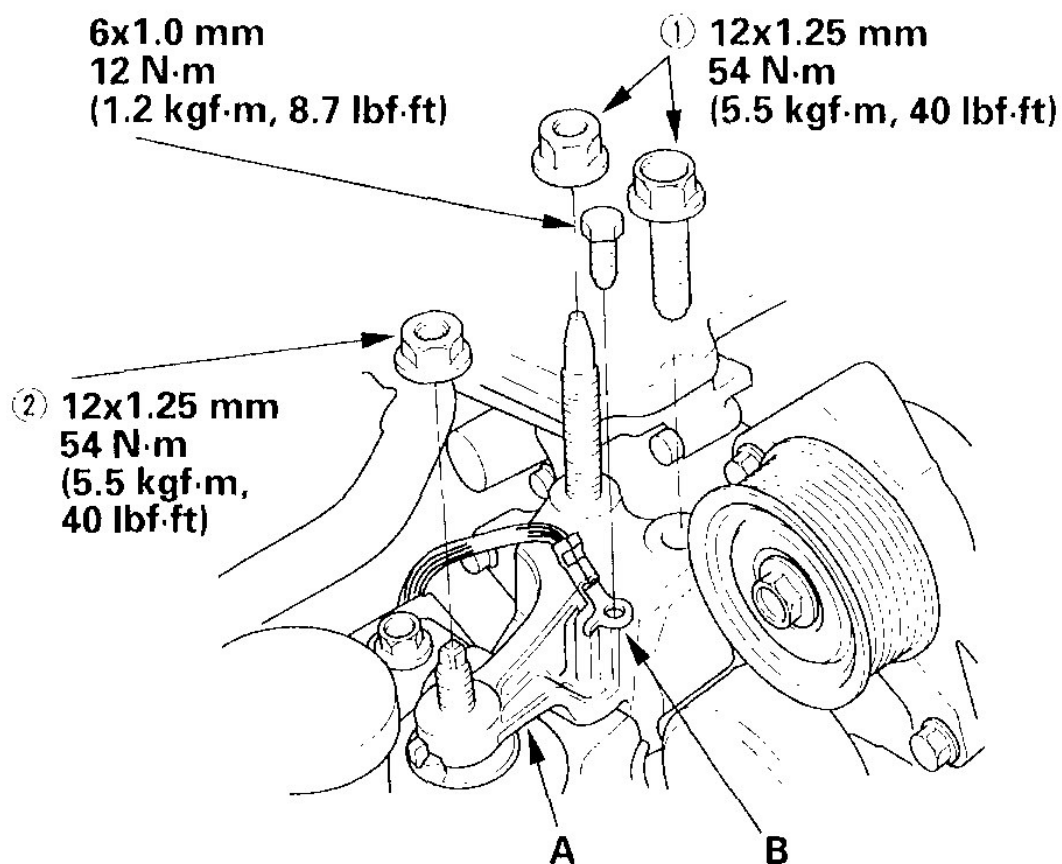
16. Install the side engine mount bracket.



G01399036

Fig. 44: Installing The Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01399037

Fig. 45: Installing The Upper Bracket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the ground cable (B).
19. Install the variable valve timing control (VTC) oil control solenoid valve (see step 1 of **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
20. Connect the crankshaft position (CKP) sensor connector (A) and VTC oil control solenoid valve connector (B).

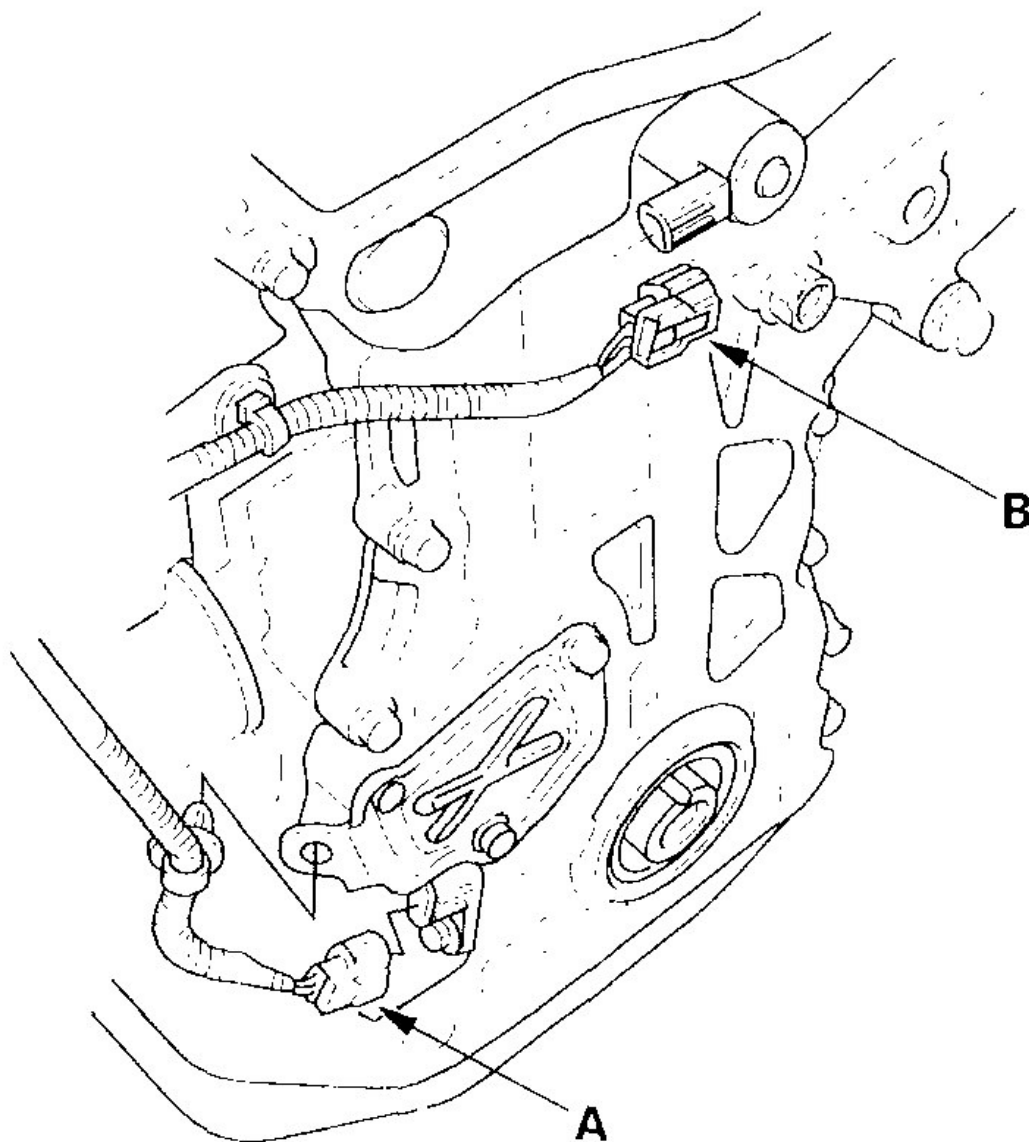
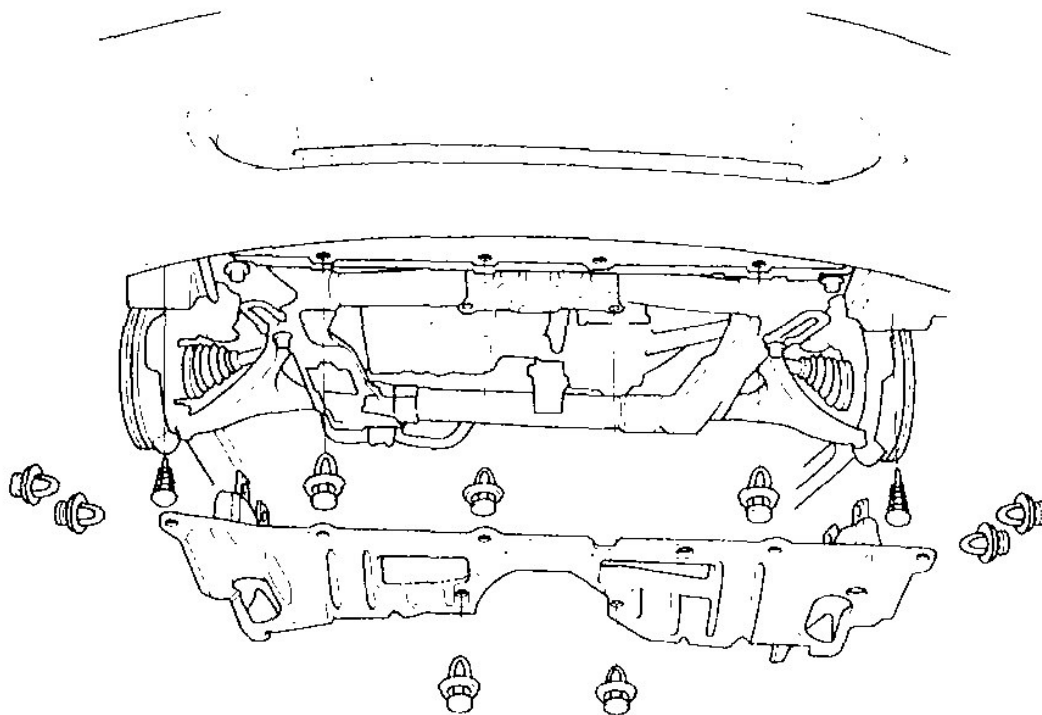
**G01399038**

Fig. 46: Connecting The Crankshaft Position (CKP) Sensor Connector & VTC Oil Control Solenoid Valve Connector

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Install the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL & INSTALLATION**).
22. Install the cylinder head cover (see **CYLINDER HEAD COVER INSTALLATION**).
23. Install the drive belt.

24. Install the splash shield.



G01399039

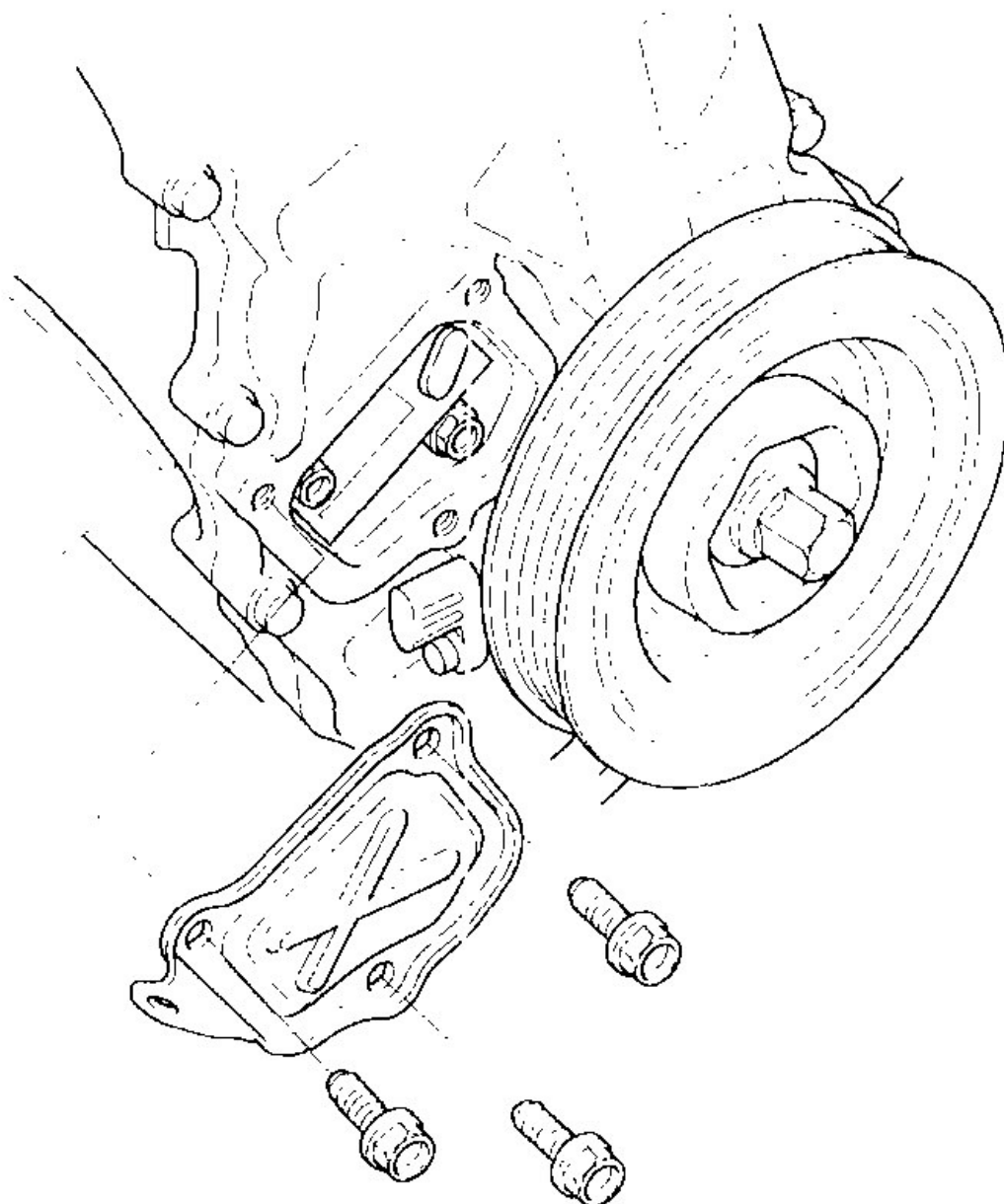
Fig. 47: Installing The Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

AUTO-TENSIONER REMOVAL & INSTALLATION

Removal

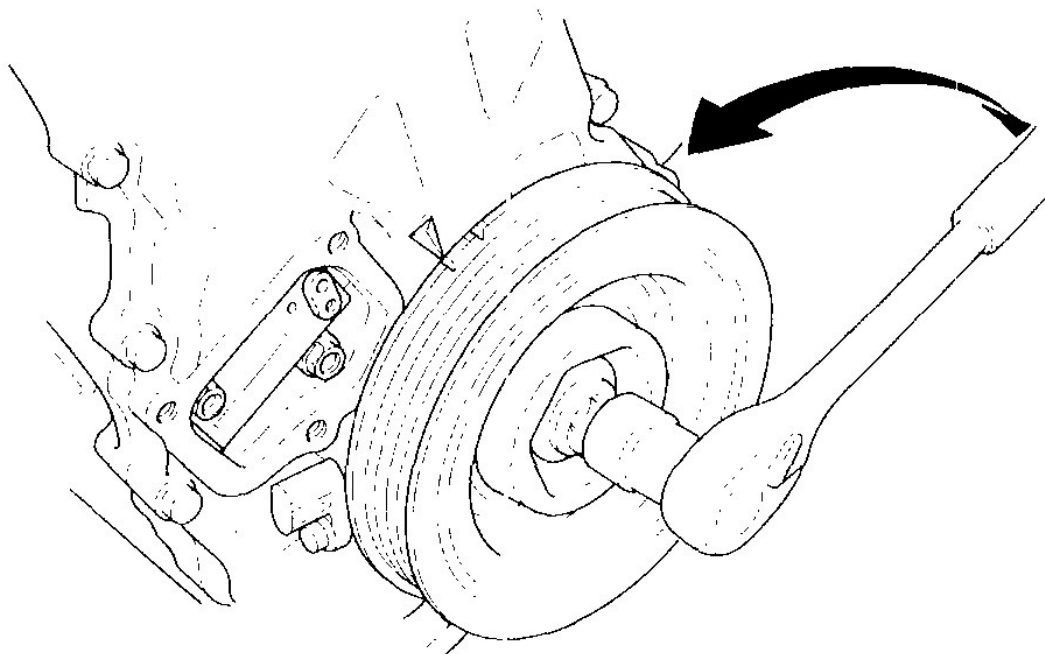
1. Remove the chain case cover.



G01399040

Fig. 48: Removing The Chain Case Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

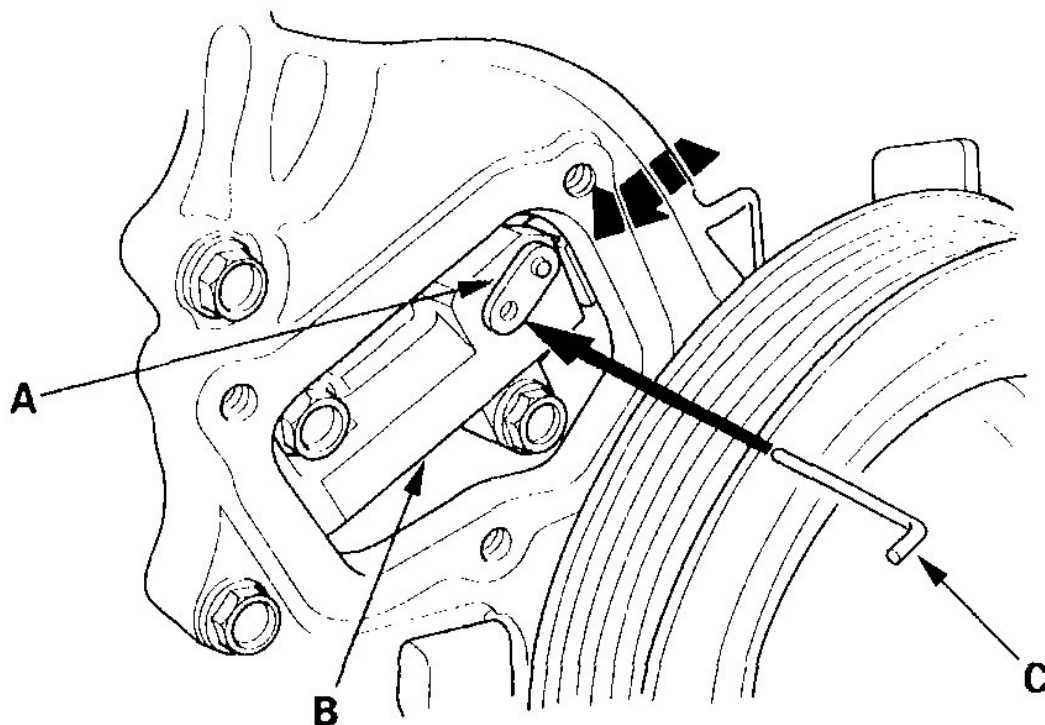
2. Turn the crankshaft counterclockwise to compress the auto-tensioner.



G01399041

Fig. 49: Turning The Crankshaft Counterclockwise To Compress The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

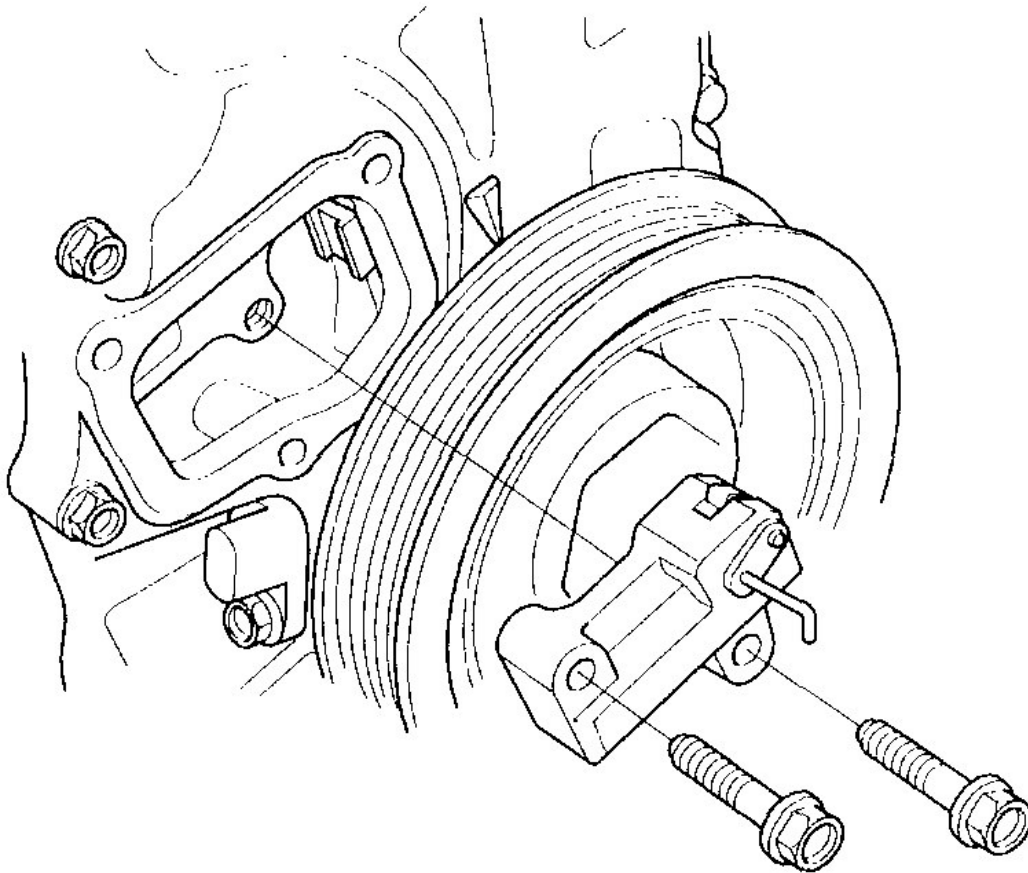
3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in.) diameter pin (C) or stopper, P/N 14511-PNA-003 into the holes. Turn the crankshaft clockwise to secure the pin.



G01399042

Fig. 50: Aligning The Holes On The Lock And The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the auto-tensioner.

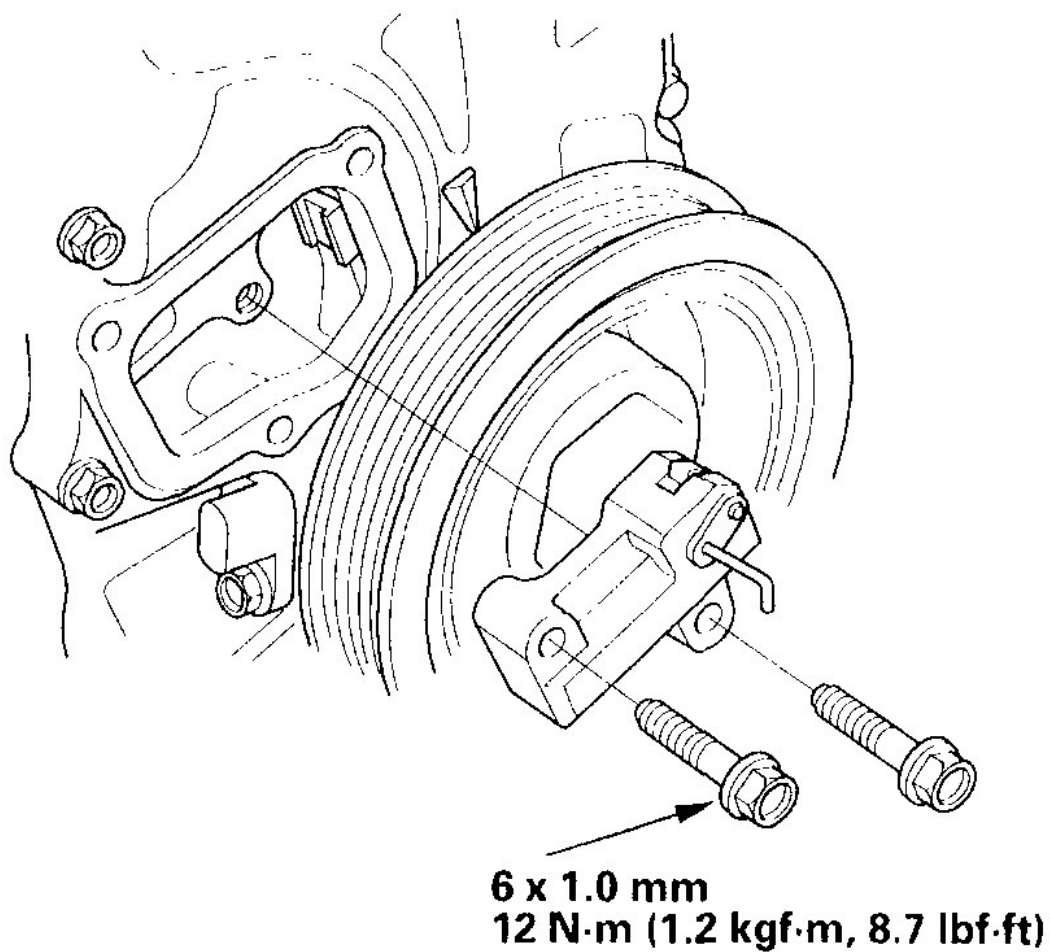


G01399043

Fig. 51: Removing The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation

1. Install the auto-tensioner.



G01399044

Fig. 52: Installing The Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the pin from the auto-tensioner.

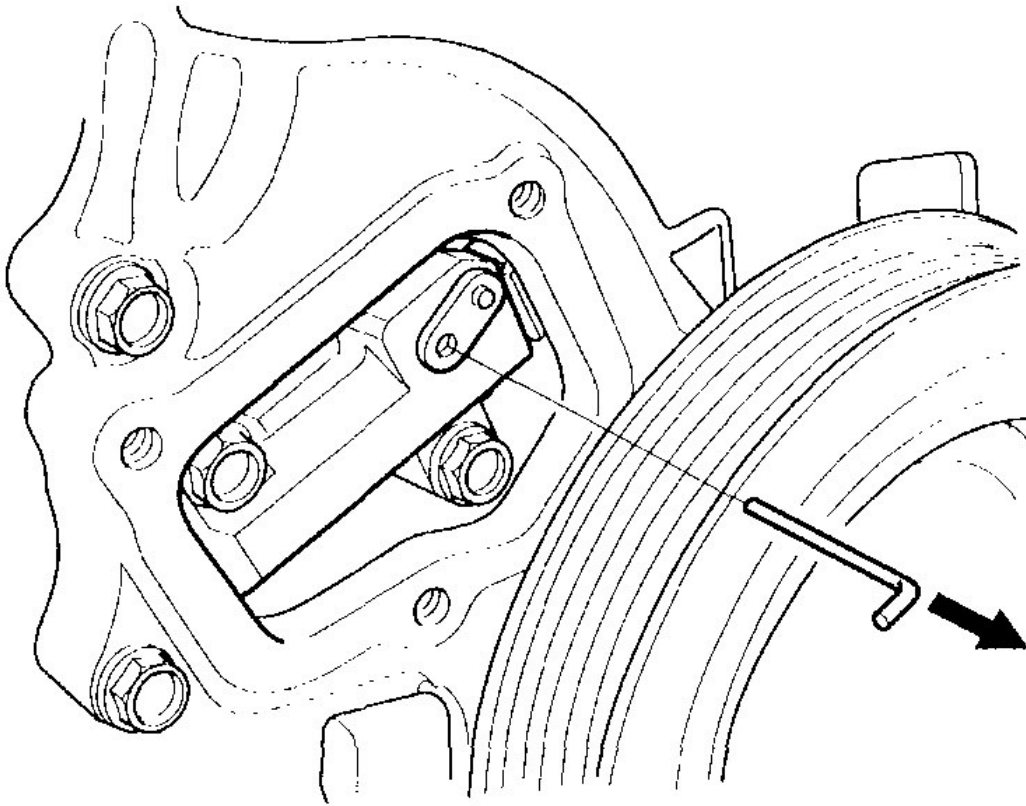
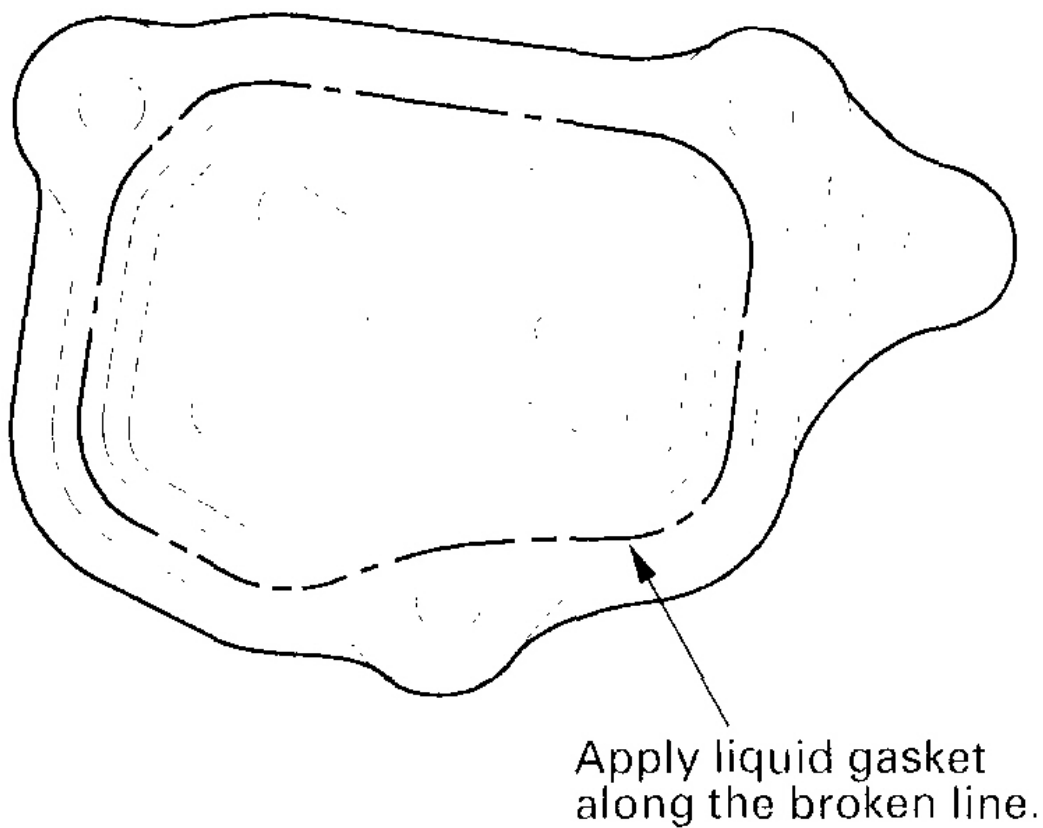
**G01399045**

Fig. 53: Removing The Pin From The Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove any 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 08718-0009, evenly to the chain case mating surface of the chain case cover and to the inner threads of the holes.

NOTE: **Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.**

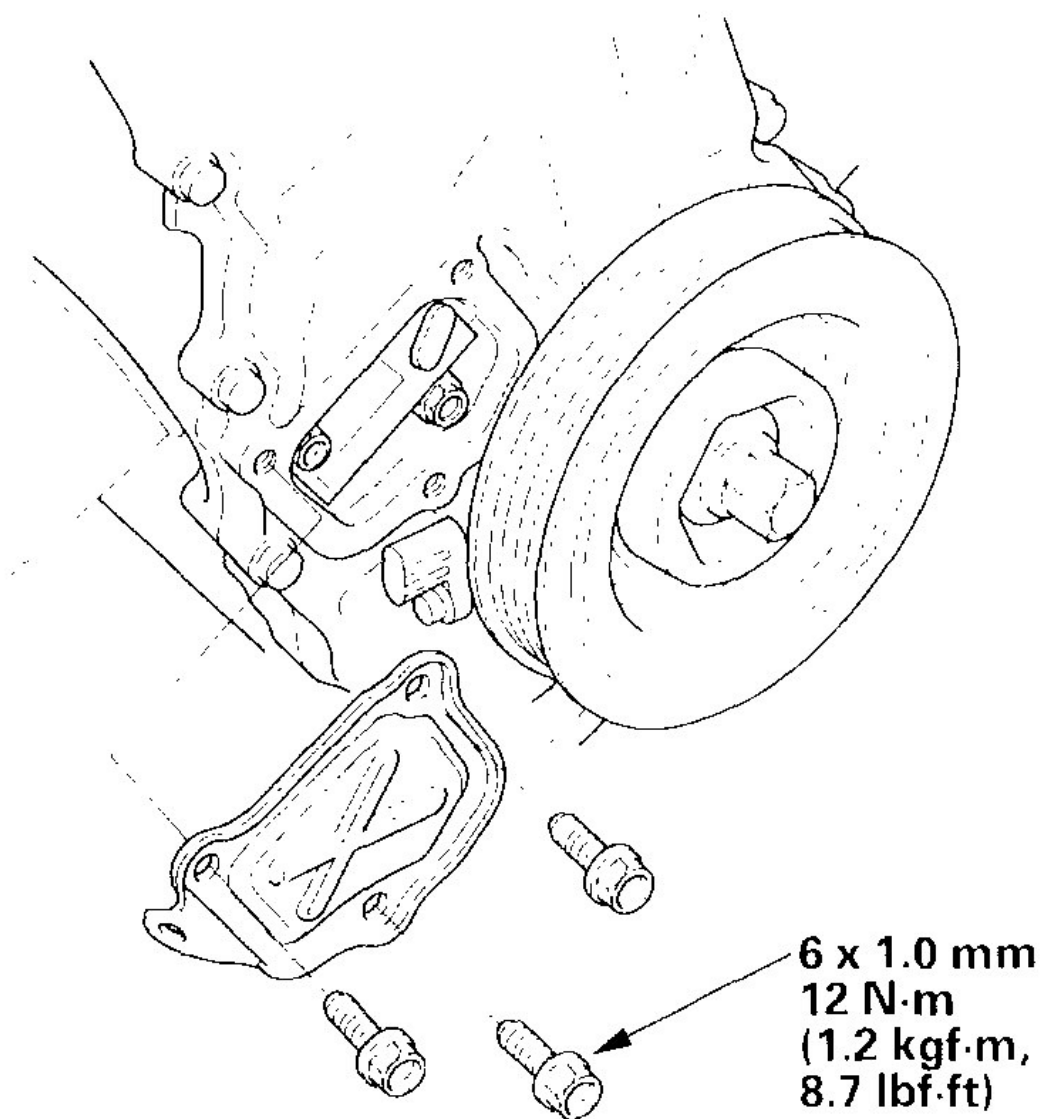


G01399046

Fig. 54: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the chain case cover.



G01399047

Fig. 55: Installing The Chain Case Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CHAIN CASE OIL SEAL INSTALLATION

Special Tools Required:

- Driver 07749-0010000
- Attachment, 52 x 55 mm 07746-0010400

1. Use the special tools to drive a new oil seal squarely into the chain case to the specified installed height.

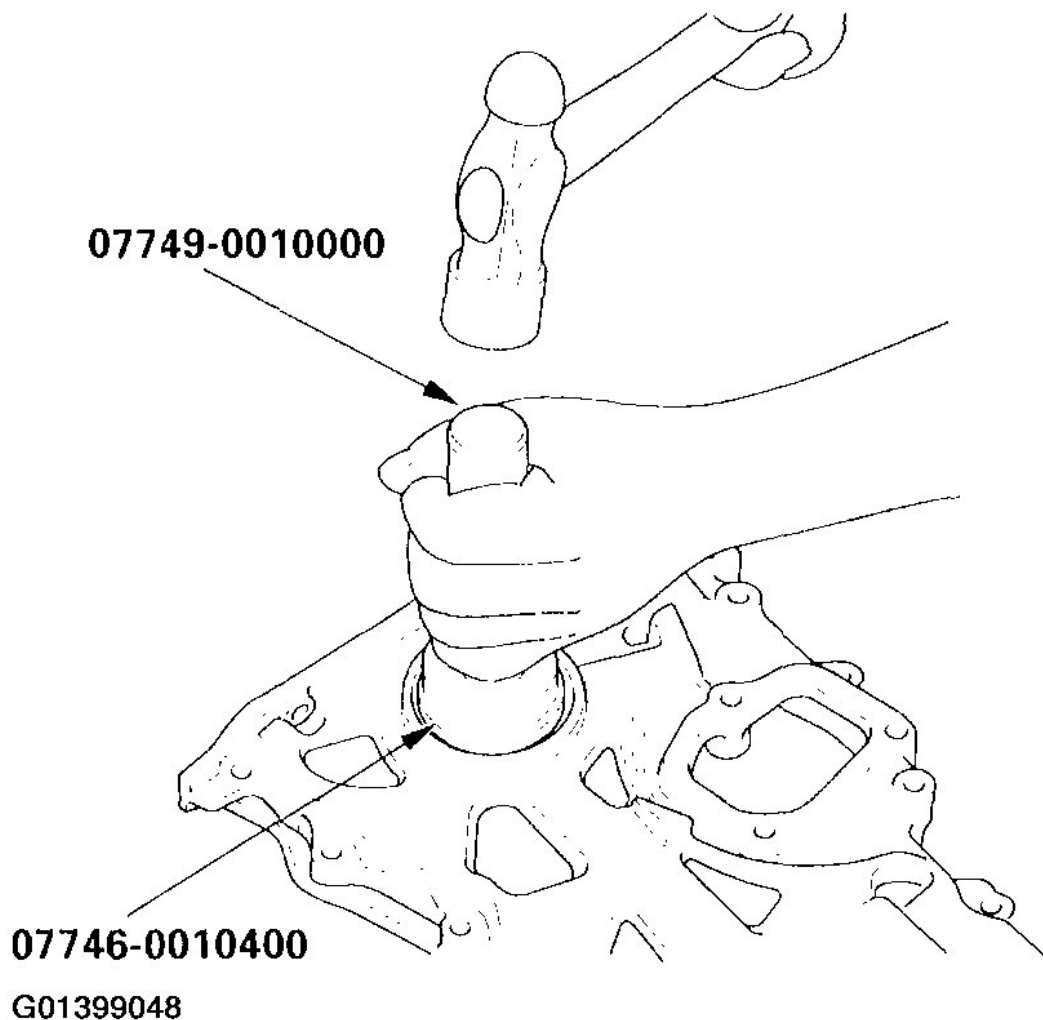
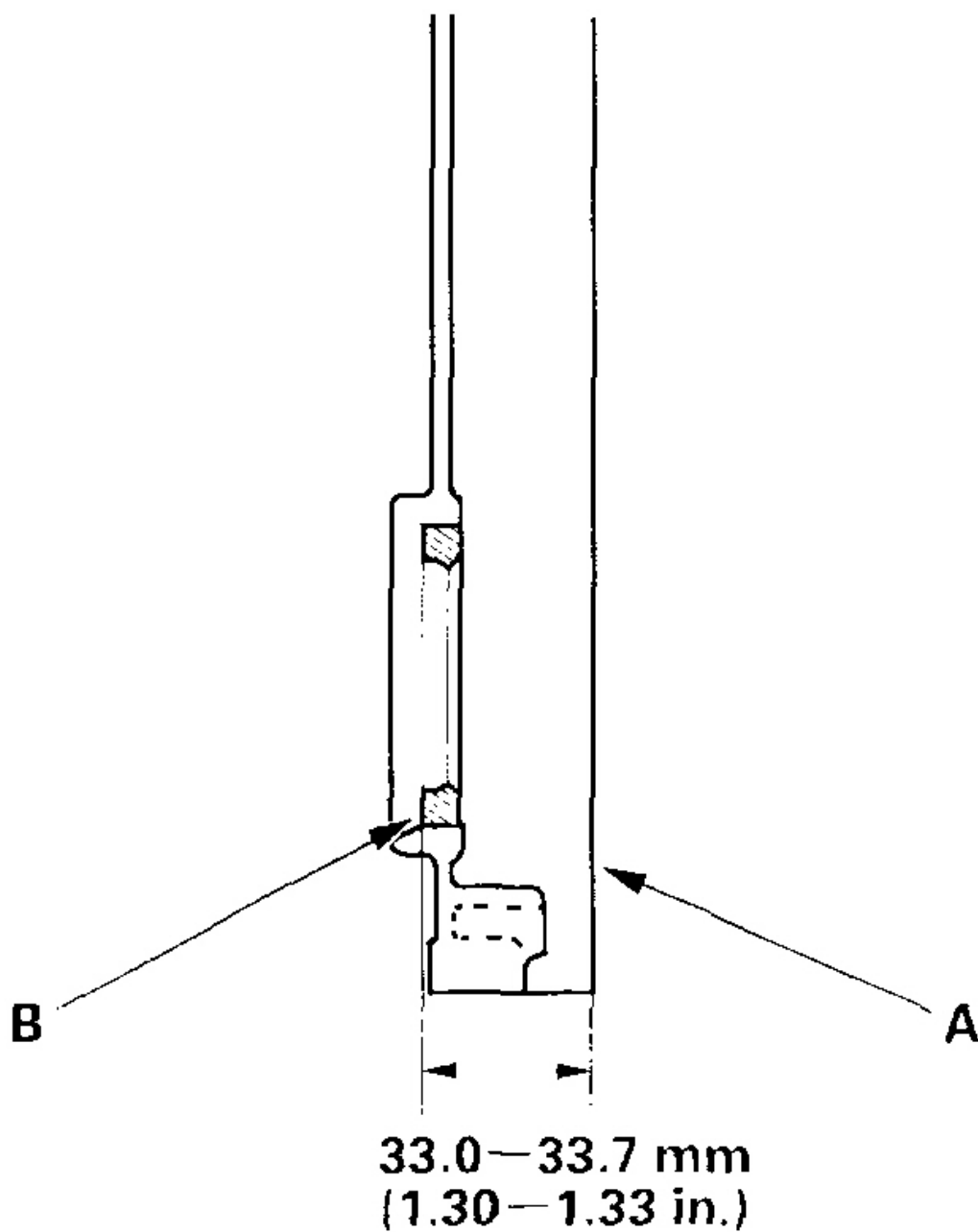


Fig. 56: Driving New Oil Seal Into The Chain Case
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.)

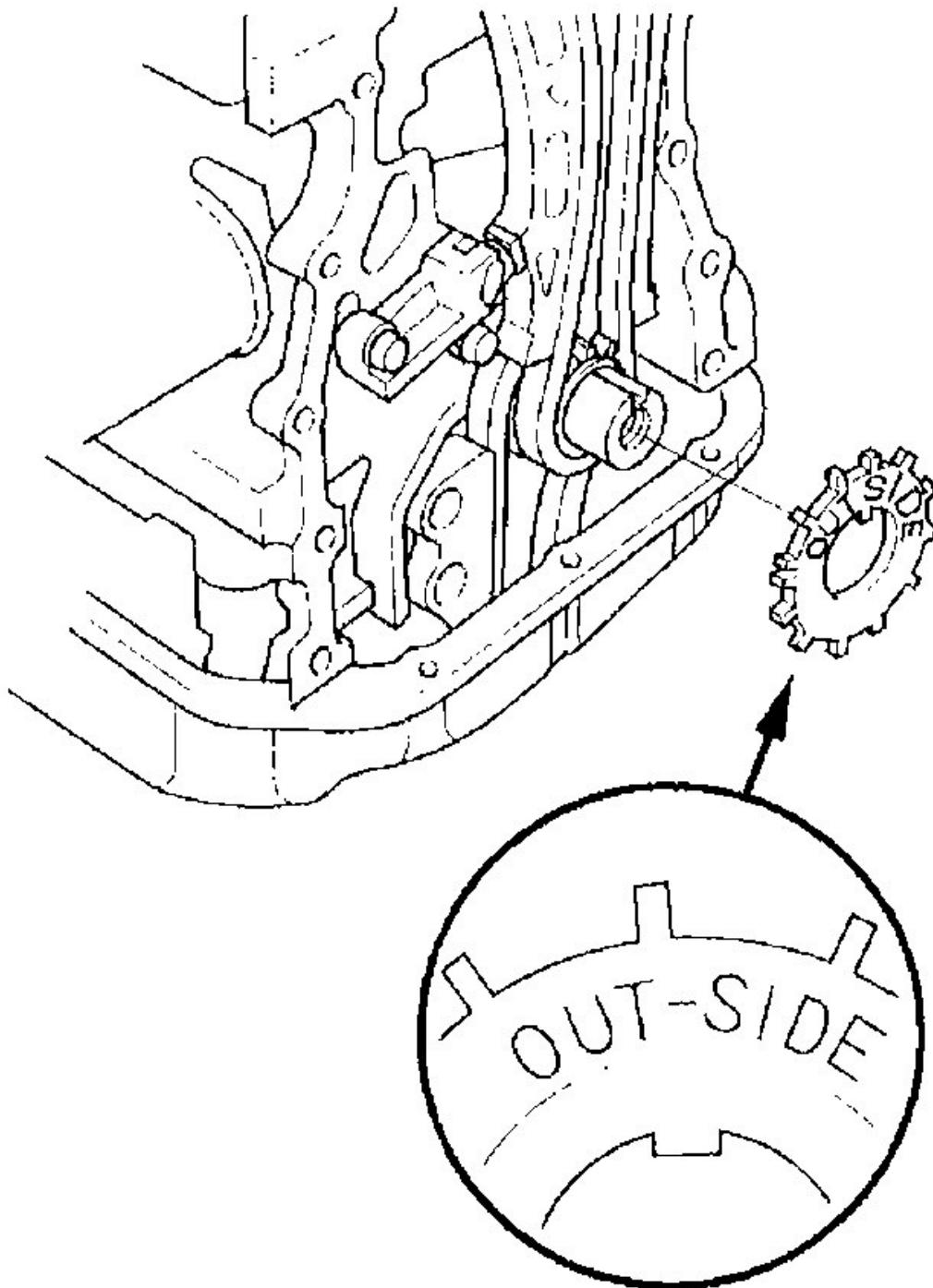


G01399049

Fig. 57: Measuring The Distance Between The Chain Case Surface And Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CKP PULSE PLATE REPLACEMENT

1. Remove the right front tire/wheel.
2. Remove the splash shield (see step 3 of **CAM CHAIN REMOVAL**).
3. Remove the drive belt (see **DRIVE BELT REPLACEMENT**).
4. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
5. Remove the crankshaft pulley (see **CRANKSHAFT PULLEY REMOVAL & INSTALLATION**).
6. Disconnect the crankshaft position (CKP) sensor connector and variable valve timing control (VTC) oil control solenoid valve connector (see step 7 of **CAM CHAIN REMOVAL**).
7. Remove the VTC oil control solenoid valve (see **VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION**).
8. Support the engine with a jack and wood block under the oil pan.
9. Remove the ground cable, and remove the upper bracket (see step 10 of **CAM CHAIN REMOVAL**).
10. Remove the side engine mount bracket (see step 11 of **CAM CHAIN REMOVAL**).
11. Remove the chain case (see step 12 of **CAM CHAIN REMOVAL**).
12. Remove the CKP pulse plate.



G01399050

Fig. 58: Removing The CKP Pulse Plate

Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Install the CKP pulse plate.
14. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see CHAIN CASE OIL SEAL INSTALLATION).
15. Remove any old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
16. Clean and dry the chain case mating surfaces.
17. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the chain case and to the inner threads of the holes (see step 12 of CAM CHAIN INSTALLATION).
18. Apply liquid gasket to the cylinder block upper surface contact areas on the chain case (see step 13 of CAM CHAIN INSTALLATION).
19. Apply liquid gasket, P/N 08718-0009, evenly to the oil pan mating surface of the chain case and to the inner threads of the holes (see step 14 of CAM CHAIN INSTALLATION).

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

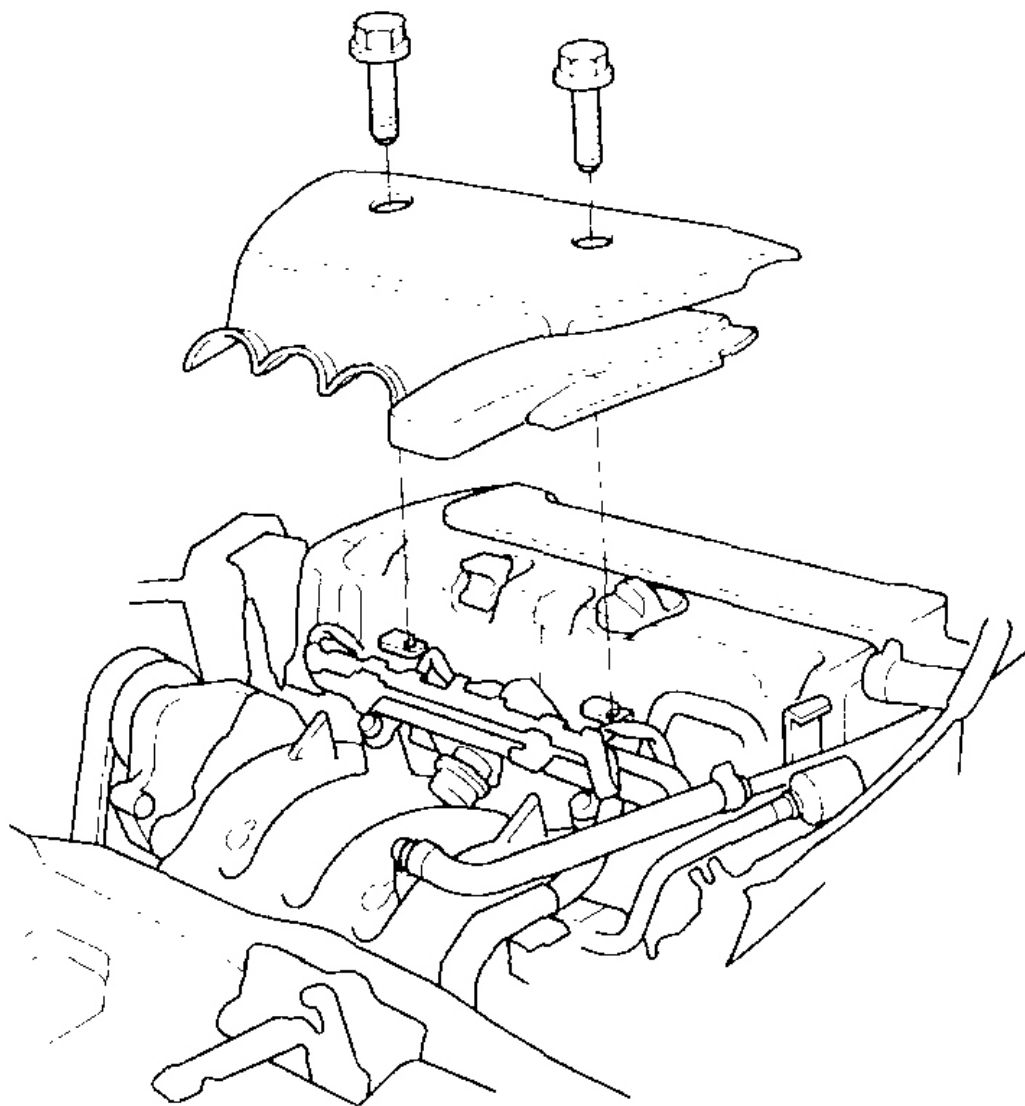
20. Install the new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the cylinder block (see step 15 of CAM CHAIN INSTALLATION).

NOTE: When installing the chain case, do not slide the bottom surface on the oil pan mounting surface.

21. Install the side engine mount bracket (see step 16 of CAM CHAIN INSTALLATION).
22. Install the upper bracket and the ground cable (see step 17 of CAM CHAIN INSTALLATION).
23. Install the VTC oil control solenoid valve (see VTC OIL CONTROL SOLENOID VALVE REMOVAL/TEST/INSTALLATION).
24. Connect the CKP sensor connector and VTC oil control solenoid valve connector (see step 20 of CAM CHAIN INSTALLATION).
25. Install the crankshaft pulley (see CRANKSHAFT PULLEY REMOVAL & INSTALLATION).
26. Install the cylinder head cover (see CYLINDER HEAD COVER INSTALLATION).
27. Install the drive belt.
28. Install the splash shield (see step 24 of CAM CHAIN INSTALLATION).
29. Install the right front tire/wheel.

CYLINDER HEAD COVER REMOVAL

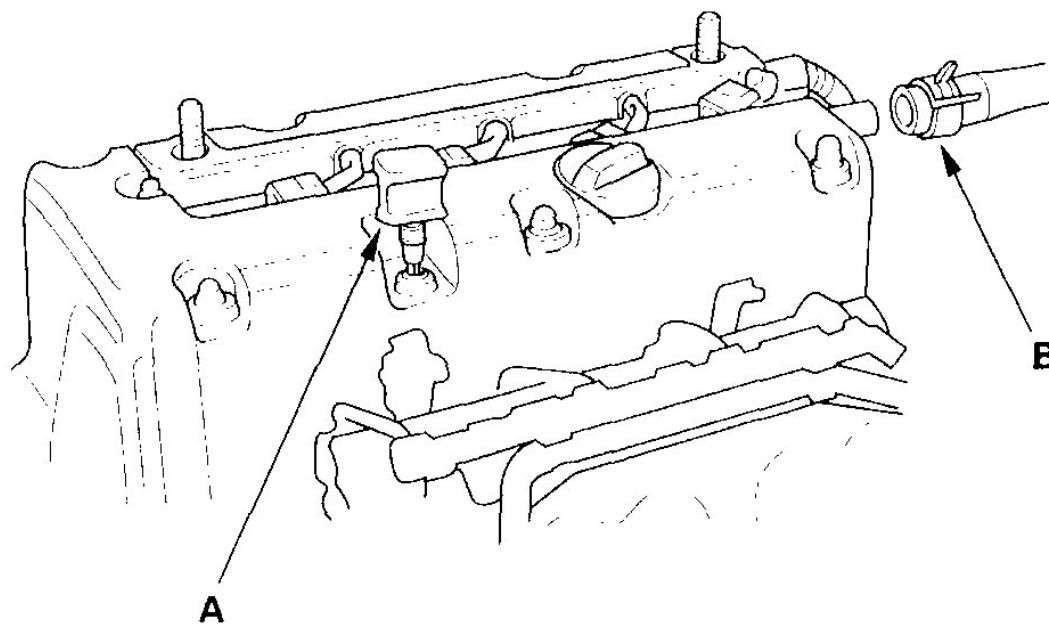
1. Remove the intake manifold cover.



G01399051

Fig. 59: Removing The Intake Manifold Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

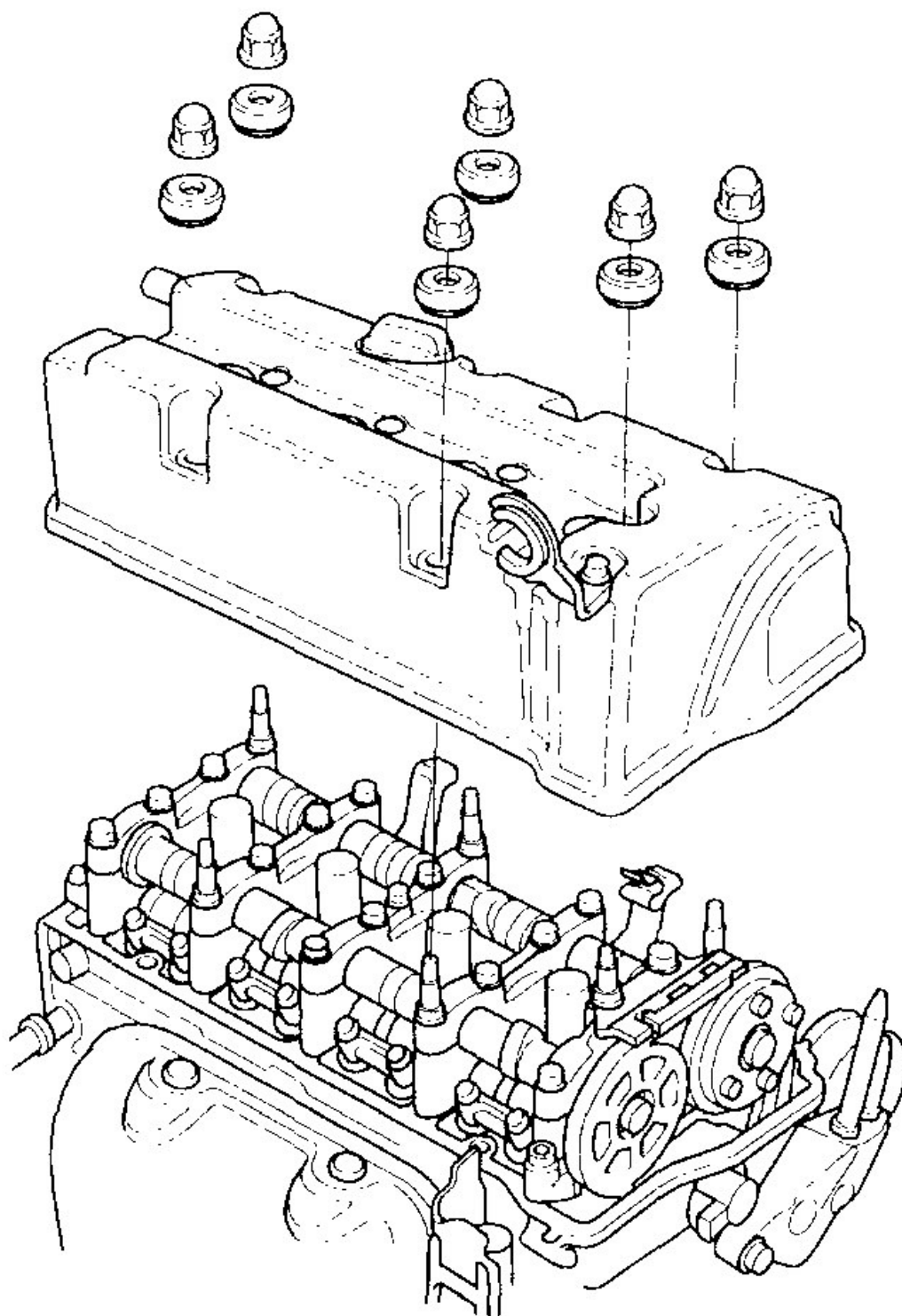
2. Remove the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
3. Remove the dipstick (A) and breather hose (B).



G01399052

Fig. 60: Removing The Dipstick And Breather Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Remove the cylinder head cover.



G01399053

Fig. 61: Removing The Cylinder Head Cover

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. Drain the engine coolant (see COOLANT REPLACEMENT).
2. Remove the drive belt (see DRIVE BELT REPLACEMENT).
3. Remove the intake manifold (see INTAKE MANIFOLD REMOVAL & INSTALLATION).
4. Remove the air cleaner housing (see step 7 of ENGINE REMOVAL).
5. Remove the water bypass hose (A).

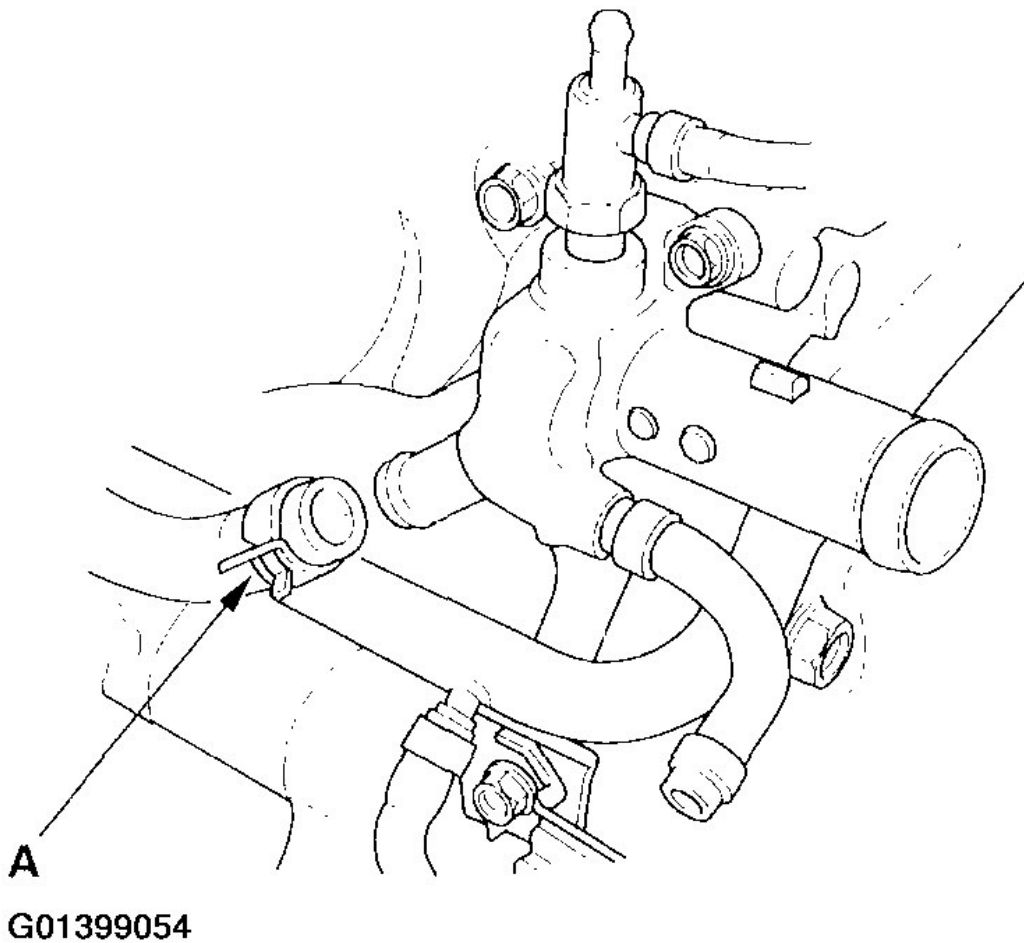
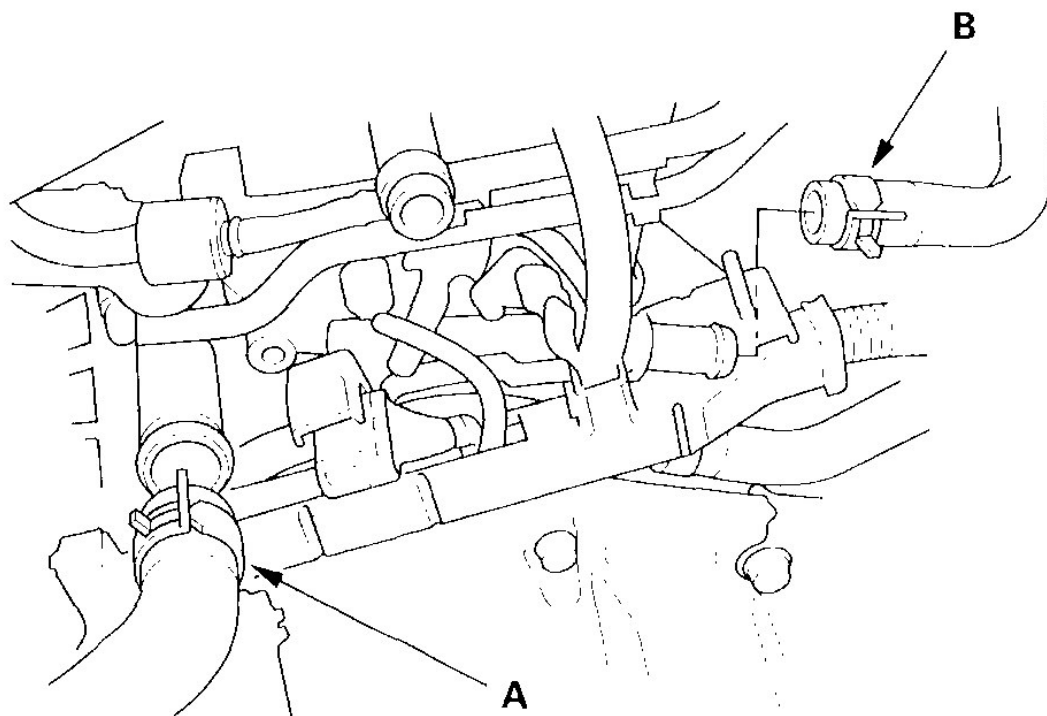


Fig. 62: Removing The Water Bypass Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

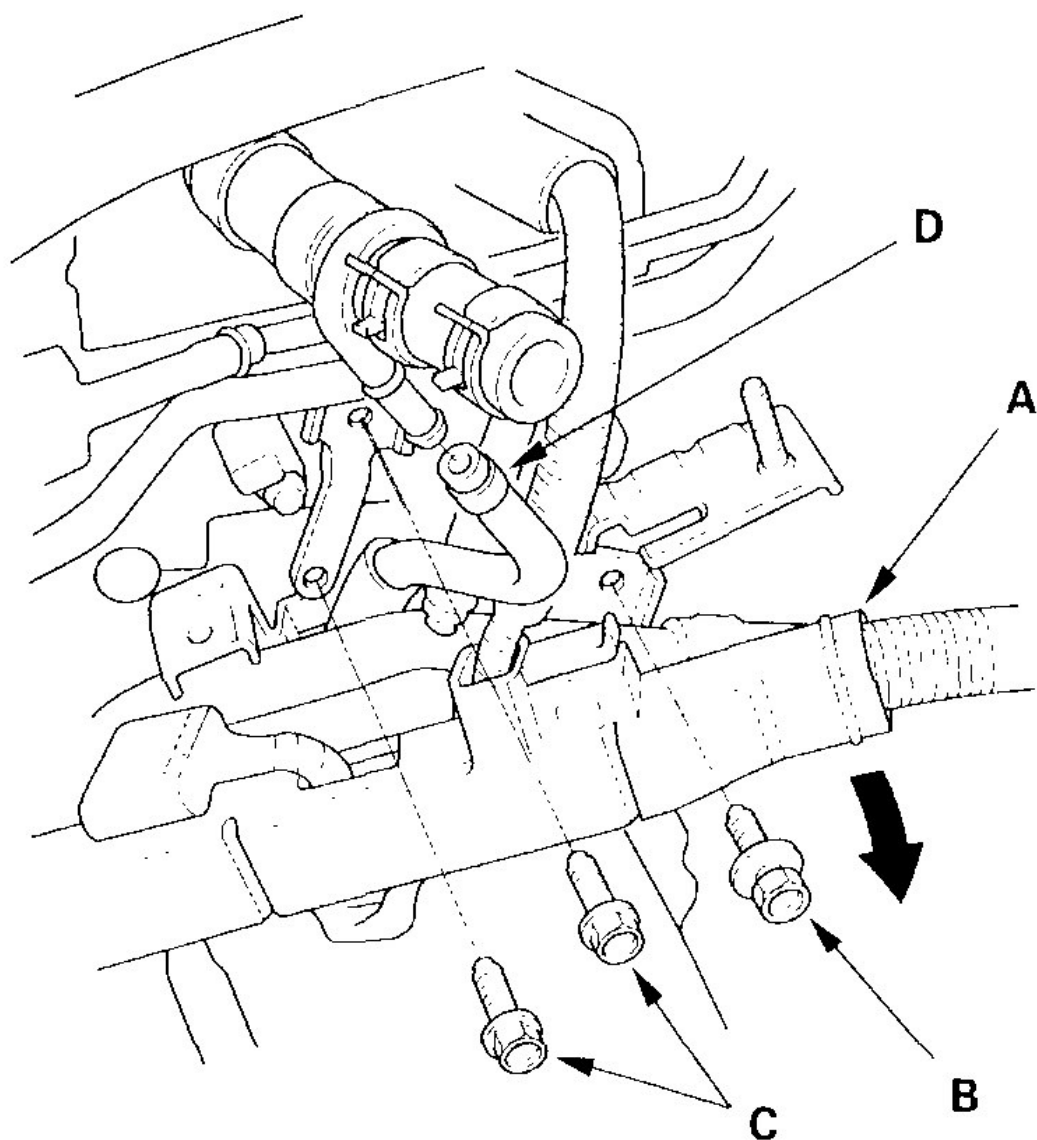
6. Remove the exhaust manifold (see **EXHAUST MANIFOLD REMOVAL & INSTALLATION**).
7. Remove the cam chain (see **CAM CHAIN REMOVAL**).
8. Remove the following engine wire harness connectors and wire harness clamps from the cylinder head:
 - Engine coolant temperature (ECT) sensor connector
 - Camshaft position (CMP) (top dead center (TDC)) sensor B connector
 - Camshaft position (CMP) sensor A connector
9. Remove the upper radiator hose (A) and heater hose (B).



G01399055

Fig. 63: Removing The Upper Radiator Hose And Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

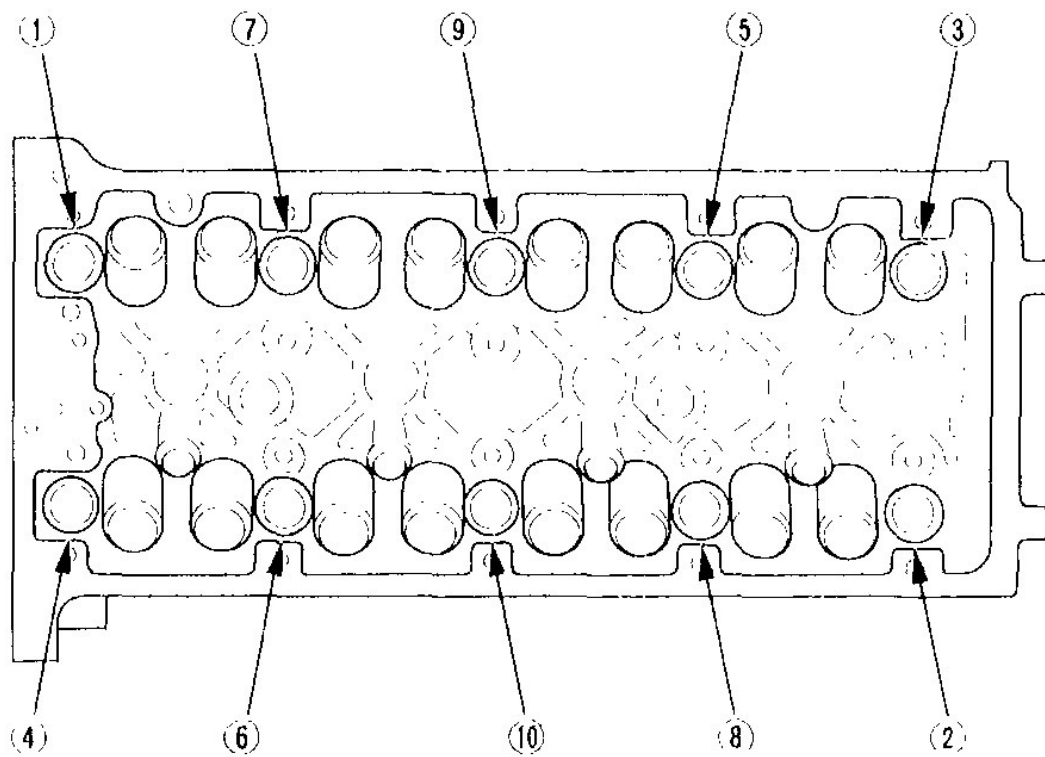
10. Remove the harness holder (A) from the bracket, then remove the connecting pipe mounting bolt (B) and brake booster vacuum line mounting bolts (C).



G01399056

Fig. 64: Removing The Harness Holder From The Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the water bypass hose (D).
12. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
13. Remove the cylinder head bolts. To prevent warpage, unscrew the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



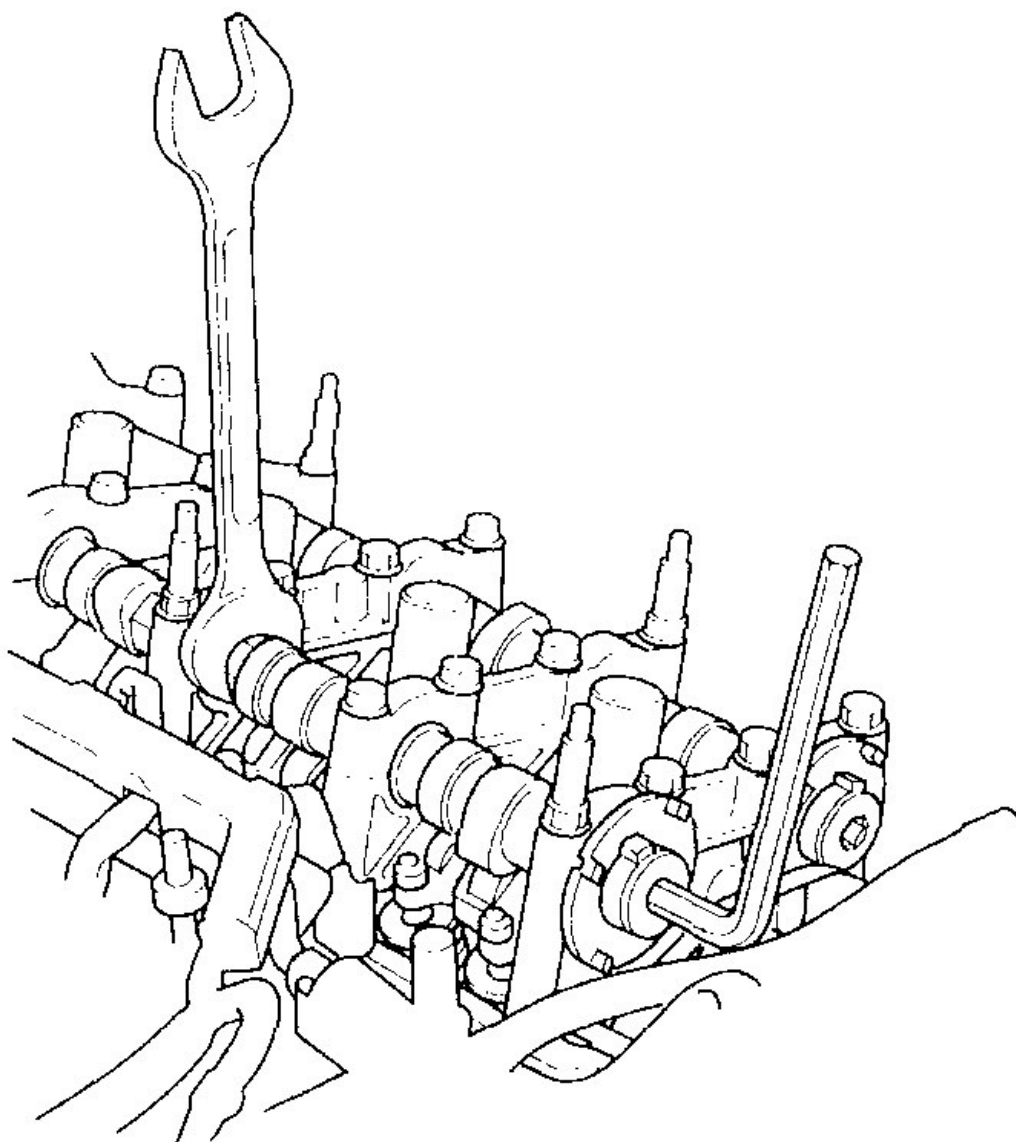
G01399057

Fig. 65: Cylinder Head Bolts Loosening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the cylinder head.

CMP PULSE PLATE A REPLACEMENT

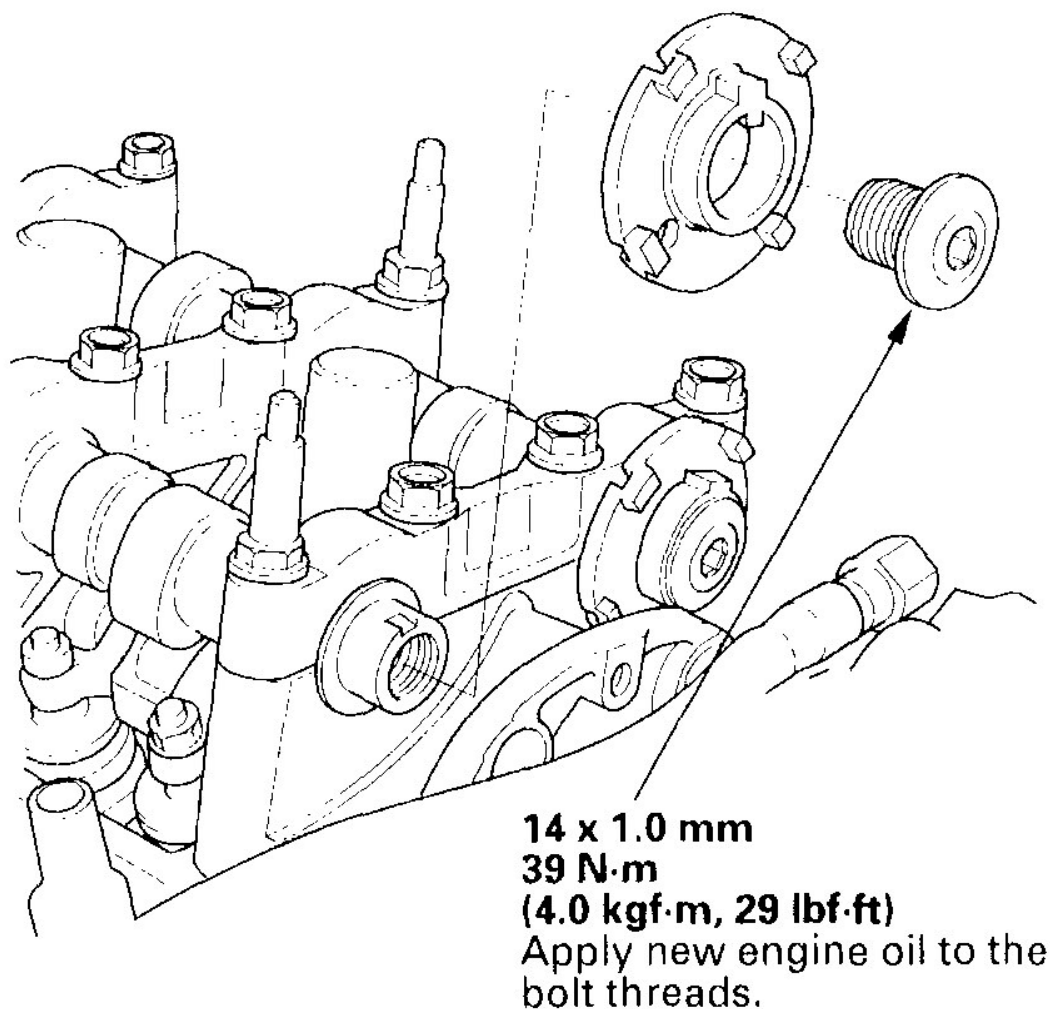
1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Hold the intake camshaft with an open-end wrench, then loosen the bolt.



G01399058

Fig. 66: Holding The Intake Camshaft
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



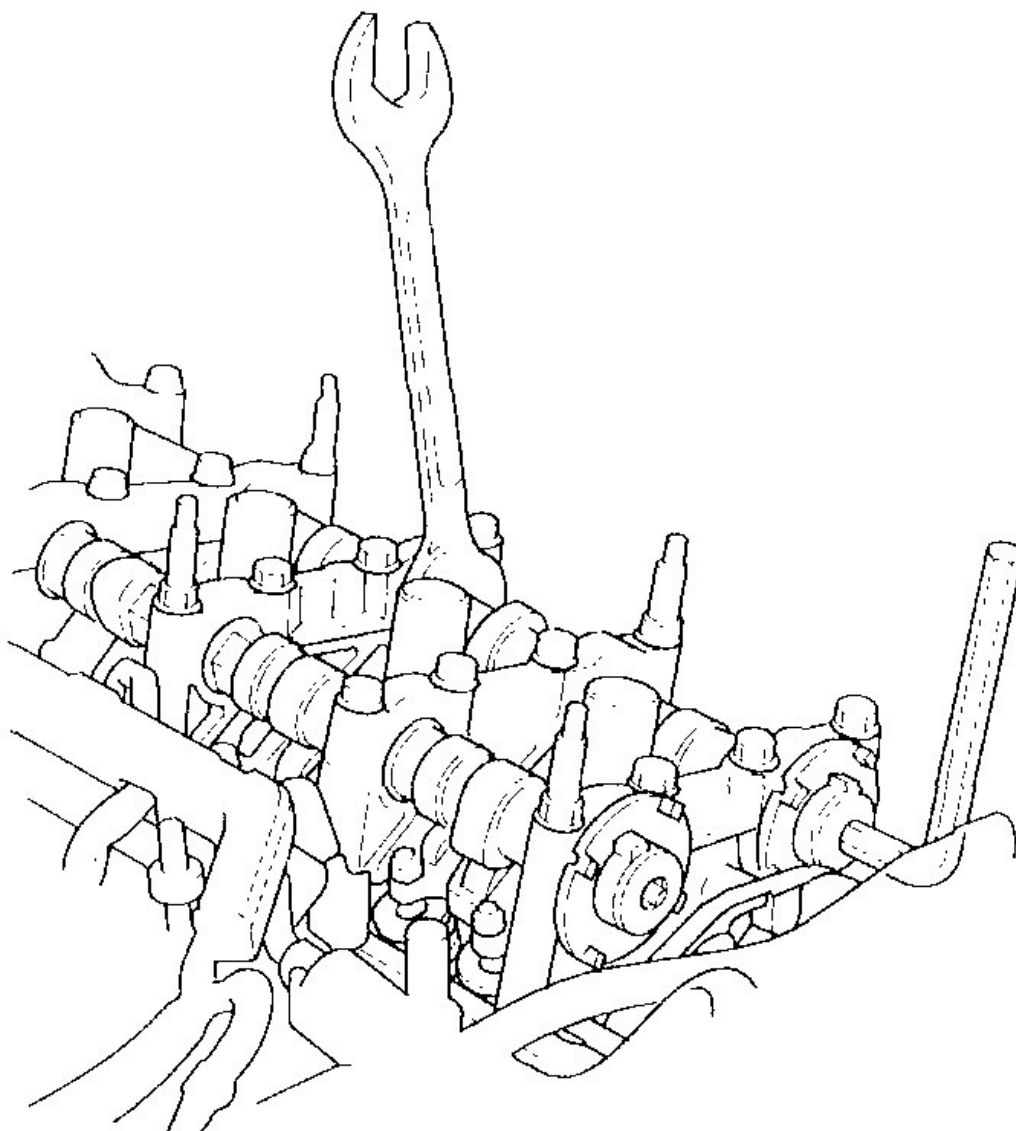
G01399059

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

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

CMP PULSE PLATE B (TDC PULSE PLATE) REPLACEMENT

1. Remove the cylinder head cover (see **CYLINDER HEAD COVER REMOVAL**).
2. Hold the exhaust camshaft with an open-end wrench, then loosen the bolt.

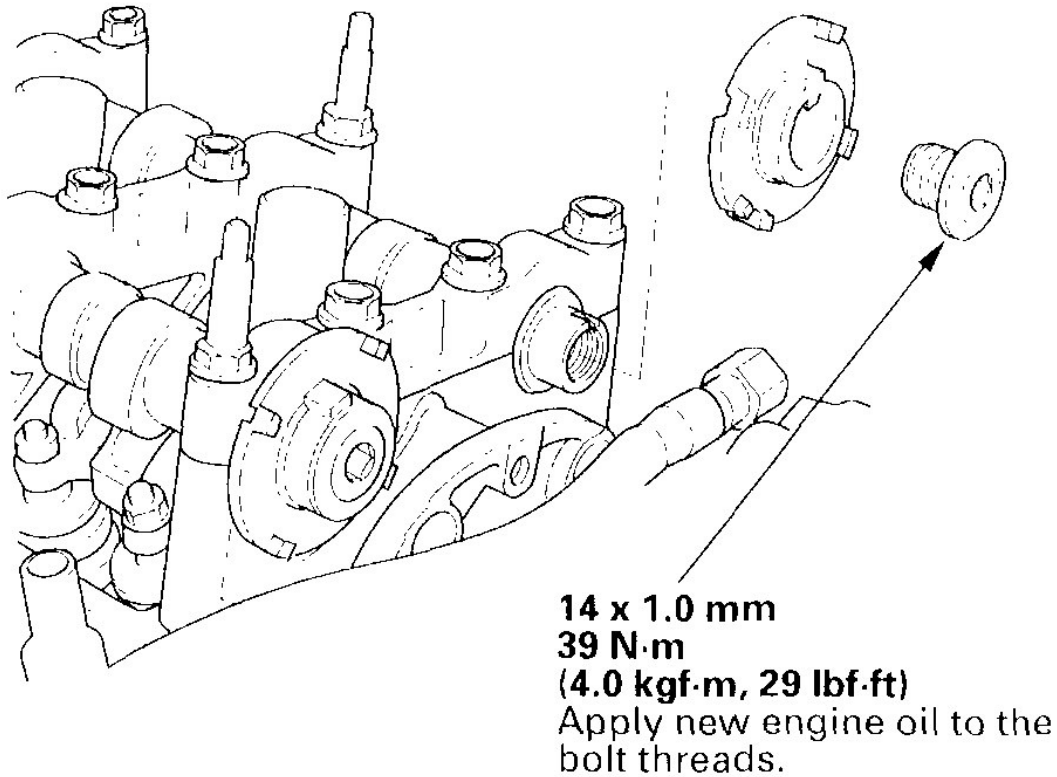


G01399060

Fig. 68: Holding The Exhaust Camshaft

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft position (CMP) pulse plate B (top dead center (TDC) pulse plate).



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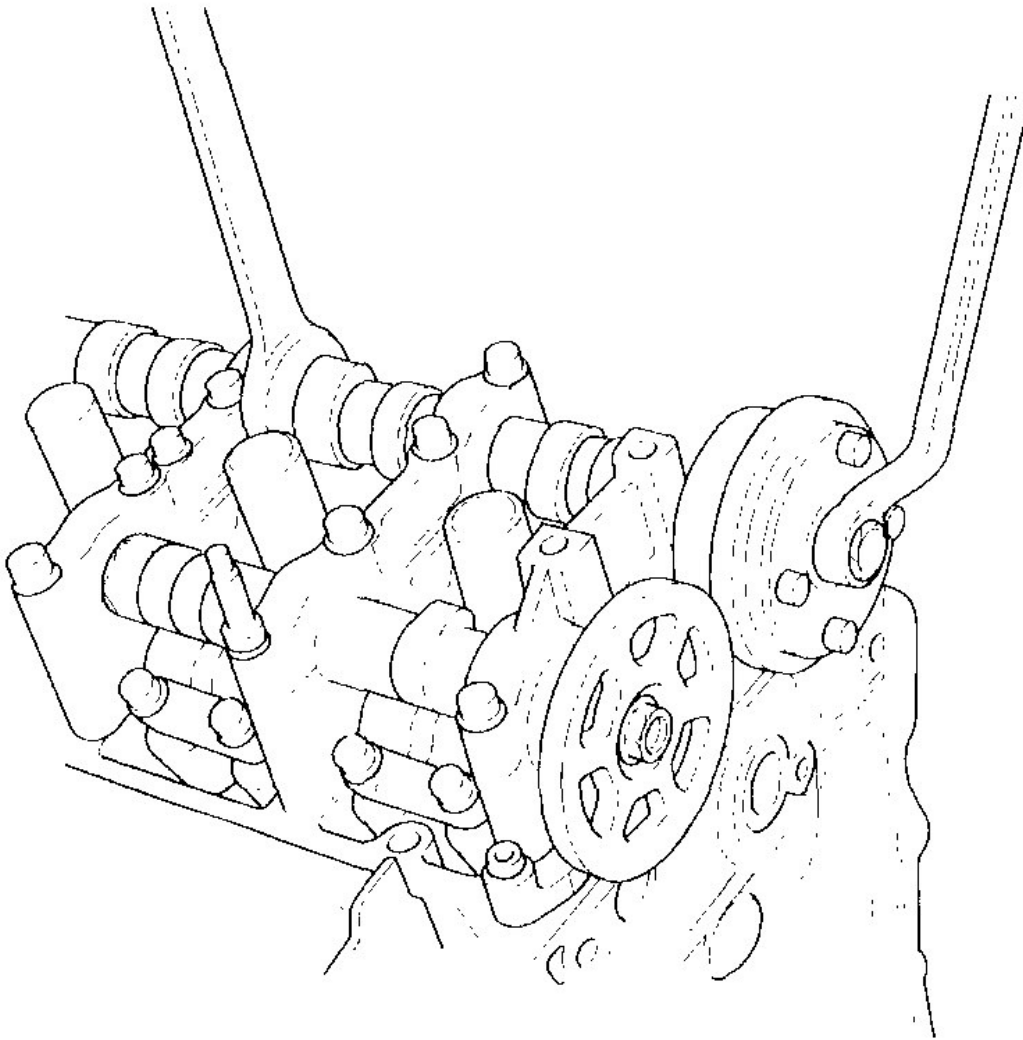
Fig. 69: Removing The Camshaft Position (CMP) Pulse Plate B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the CMP pulse plate B (TDC pulse plate) in the reverse order of removal.

VTC ACTUATOR & EXHAUST CAMSHAFT SPROCKET REPLACEMENT

Removal

1. Remove the cam chain (see **CAM CHAIN REMOVAL**).
2. Hold the camshaft with an open-end wrench, then loosen the variable valve timing control (VTC) actuator mounting bolt and exhaust camshaft sprocket mounting bolt.



G01399062

Fig. 70: Loosening The Variable Valve Timing Control (VTC) Actuator Mounting Bolt And Exhaust Camshaft Sprocket Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the VTC actuator and exhaust camshaft sprocket.

Installation

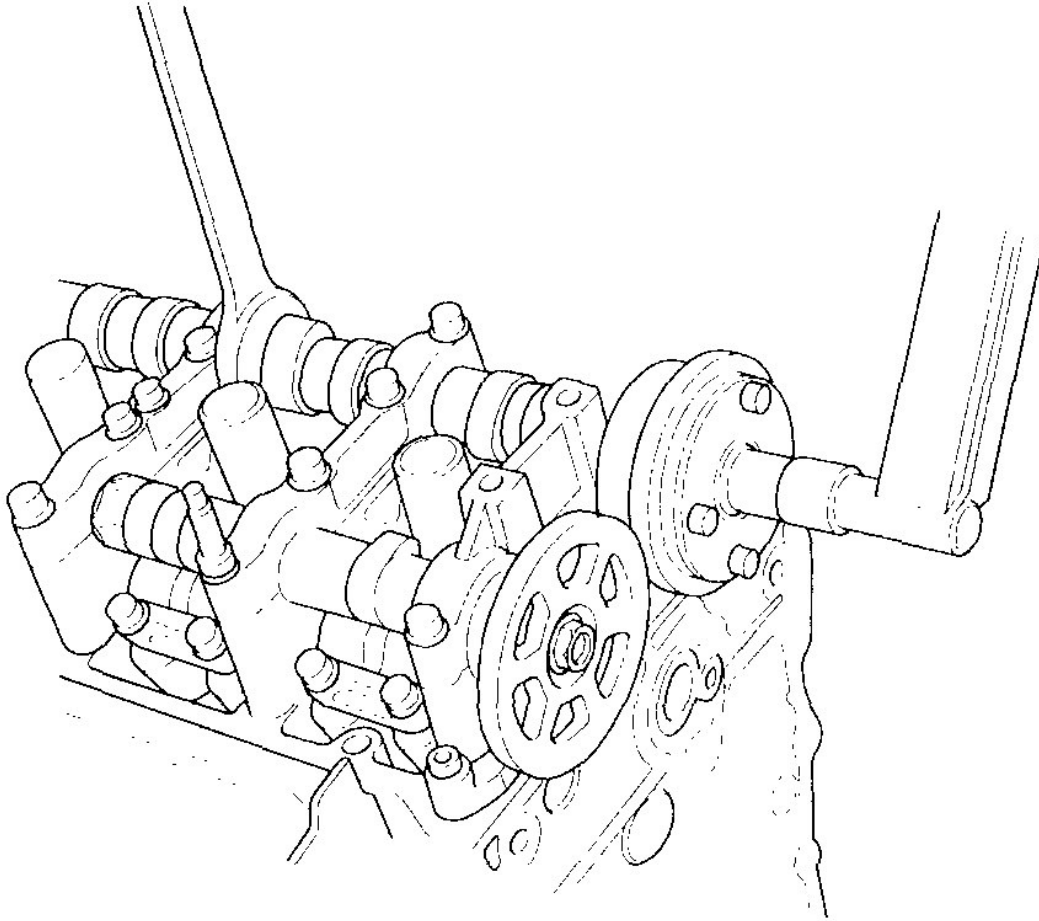
1. Install the VTC actuator and exhaust camshaft sprocket.
2. Apply engine oil to the threads of the VTC actuator mounting bolt and exhaust camshaft mounting bolt, then install them.

3. Hold the camshaft with an open-end wrench, then tighten the bolts.

Specified Torque:

VTC Actuator Mounting Bolt: 113 N.m (11.5 kgf.m, 83 lbf.ft)

Exhaust Camshaft Sprocket Mounting Bolt: 72 N.m (7.3 kgf.m, 53 lbf.ft)



G01399063

Fig. 71: Tightening VTC Actuator Mounting Bolt And Exhaust Camshaft Mounting Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the cam chain (see **CAM CHAIN INSTALLATION**).

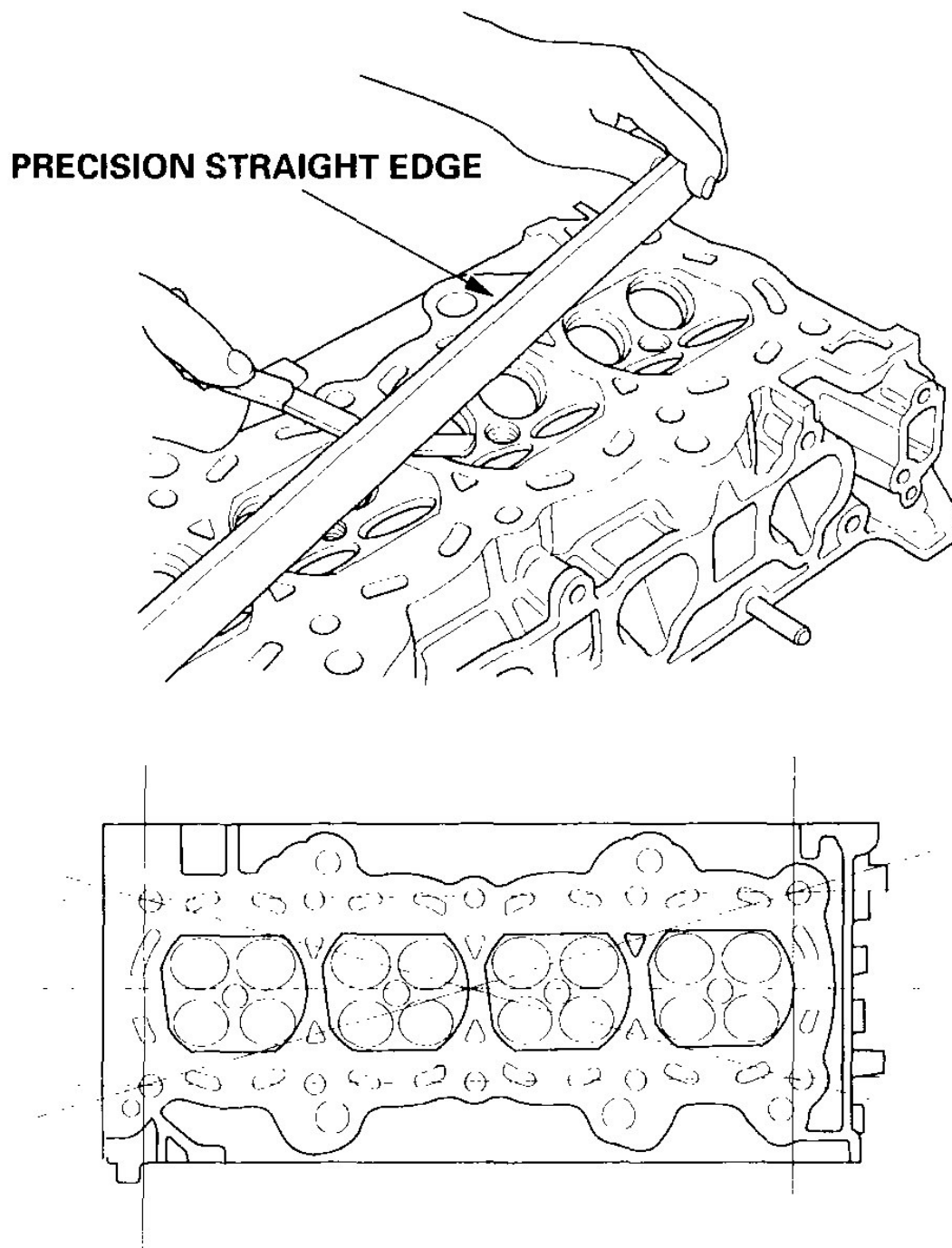
CYLINDER HEAD INSPECTION FOR WARPAGE

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.)

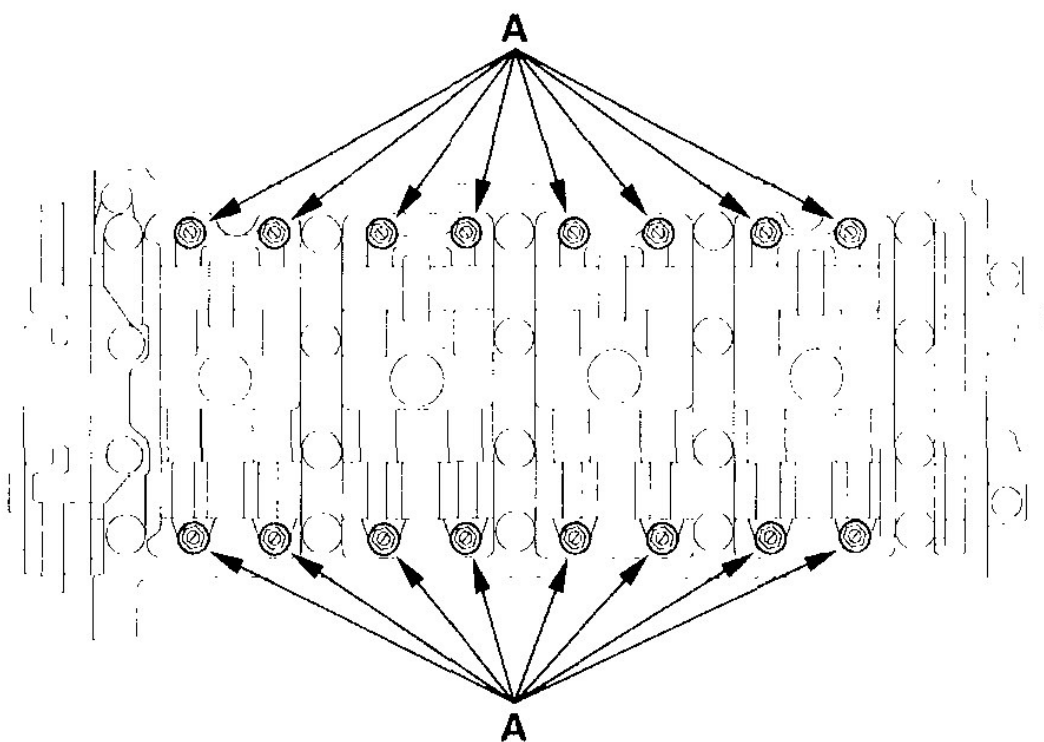


G01399064

Fig. 72: Checking The Cylinder Head For Warpage
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).

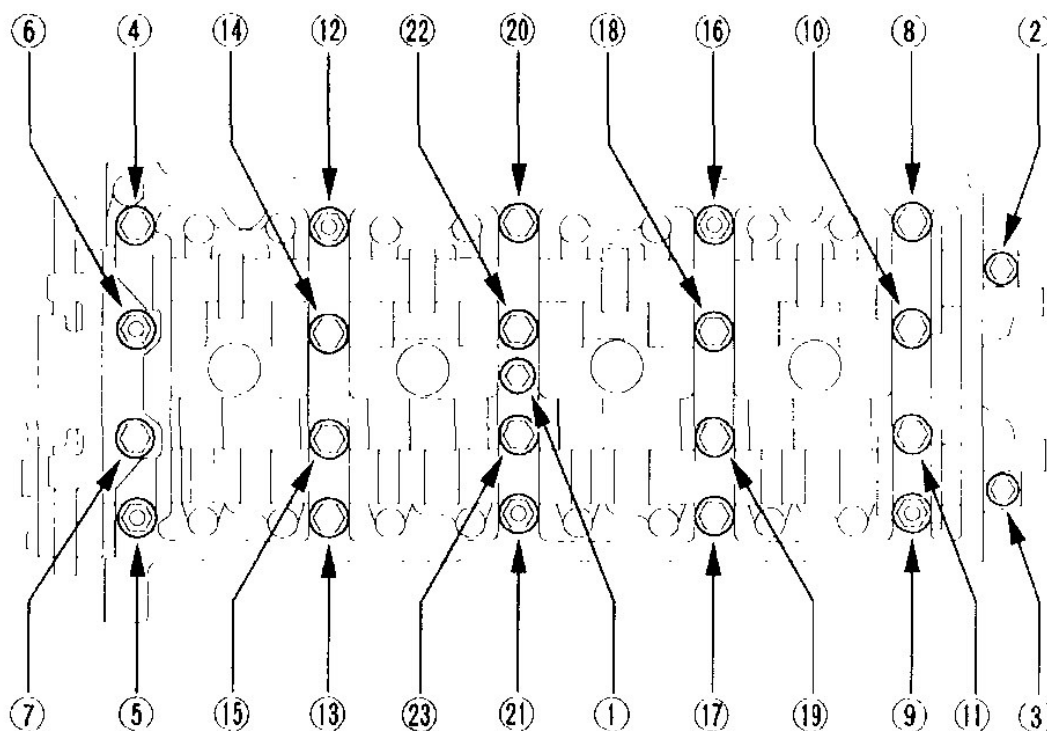


G01399065

Fig. 73: Loosening The Rocker Arm Adjusting Screws
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the camshaft holder bolts. To prevent damaging the camshafts, unscrew the bolts two turns at a time, in a crisscross pattern.

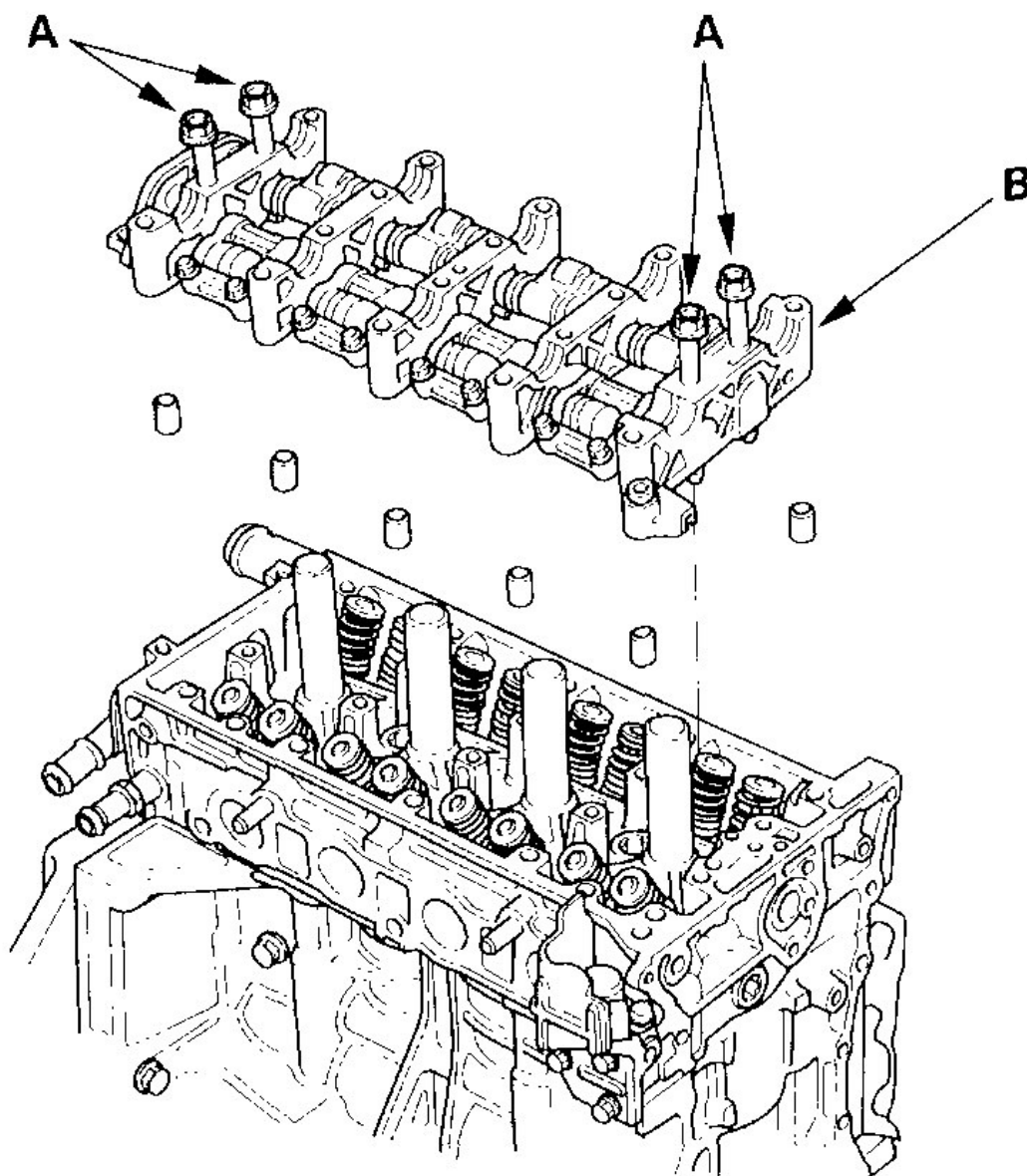
NOTE: **Bolt (1) not on all engines.**



G01399066

Fig. 74: Camshaft Holder Bolts Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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Fig. 75: Inserting The Bolts Into The Rocker Shaft Holder, Then Removing The Rocker Arm Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

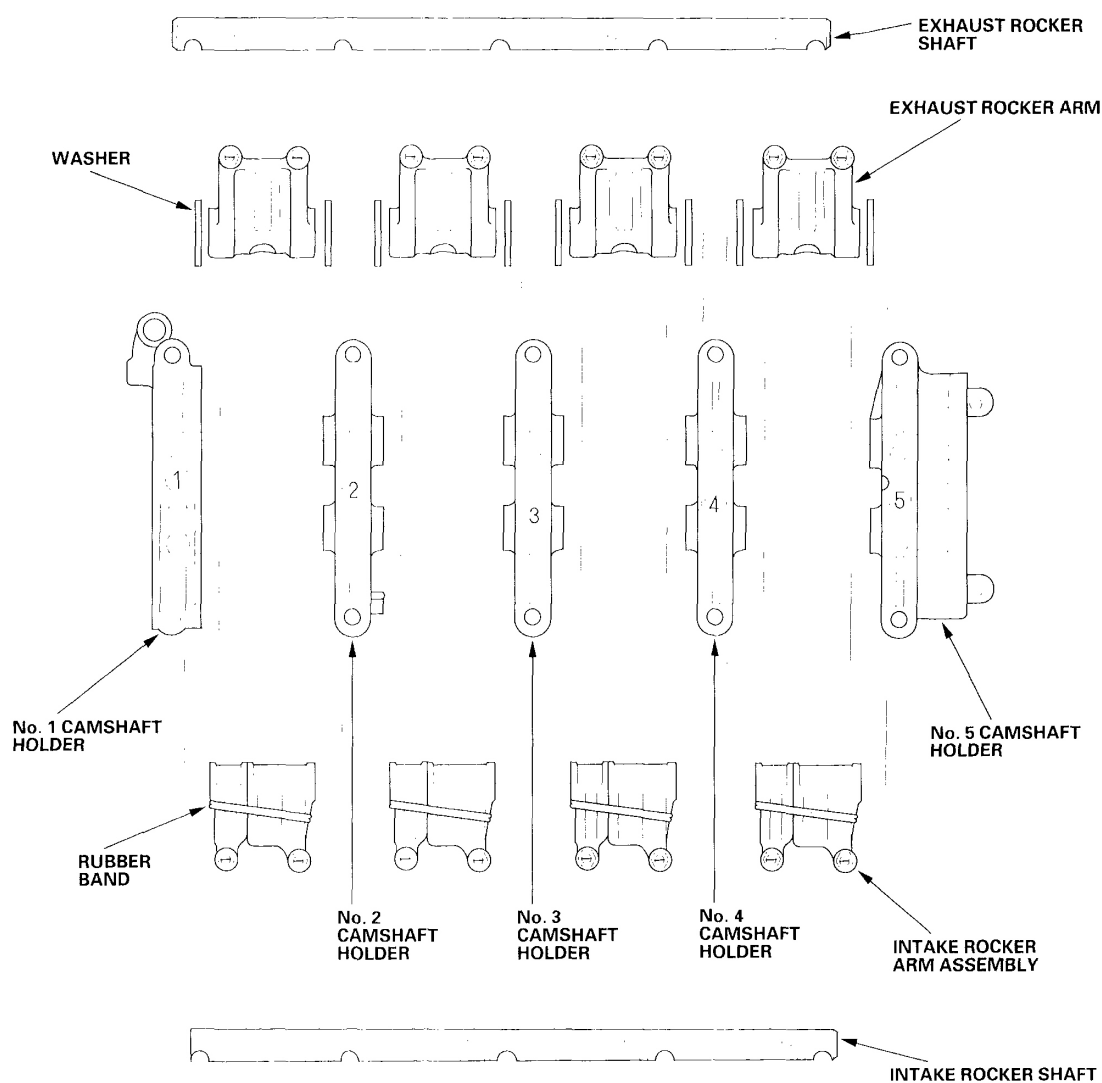
ROCKER ARM & SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

- Identify parts as they are removed to ensure reinstallation in original

location.

- Inspect the rocker shafts and rocker arms (see ROCKER ARM & SHAFT INSPECTION).
- The rocker arms must be installed in the same positions if reused.
- When removing or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders, springs and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points.
- Bundle the rocker arms with rubber bands to keep them together as a set.



G01399068

Fig. 76: Bundling The Rocker Arms
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM & SHAFT INSPECTION

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**).
2. Measure the diameter of the shaft at the first rocker location.

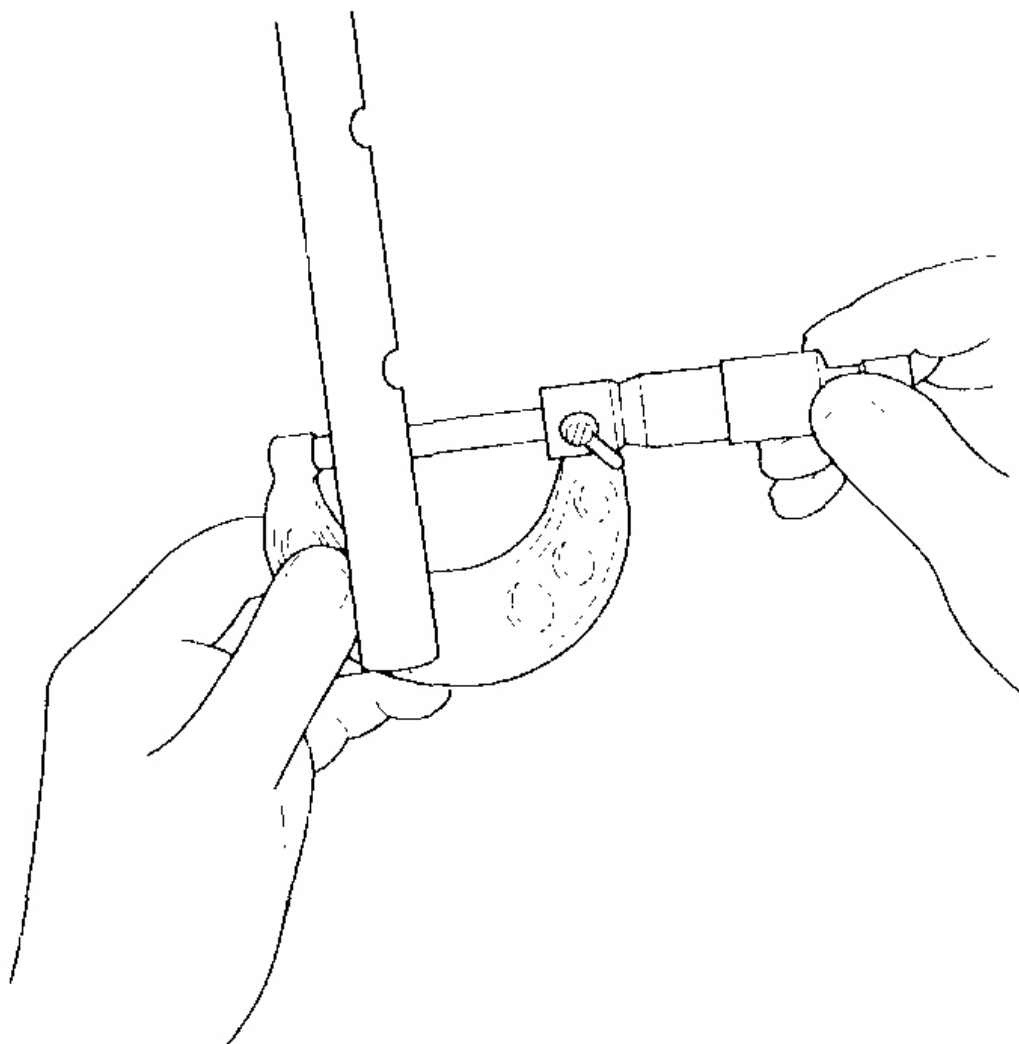
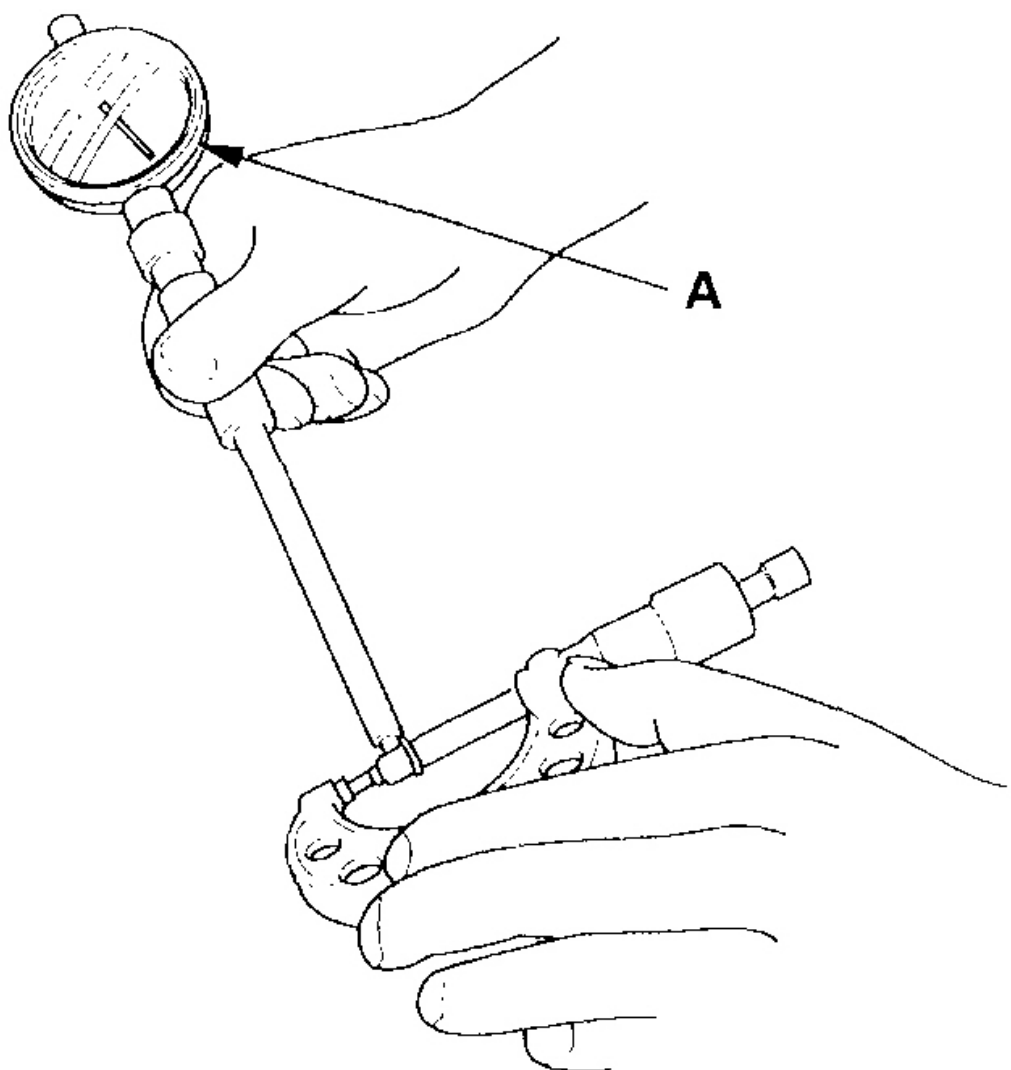
**G01399069**

Fig. 77: Measuring The Diameter Of The Shaft At The First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01399070

Fig. 78: Zeroing The Gauge To The Shaft Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

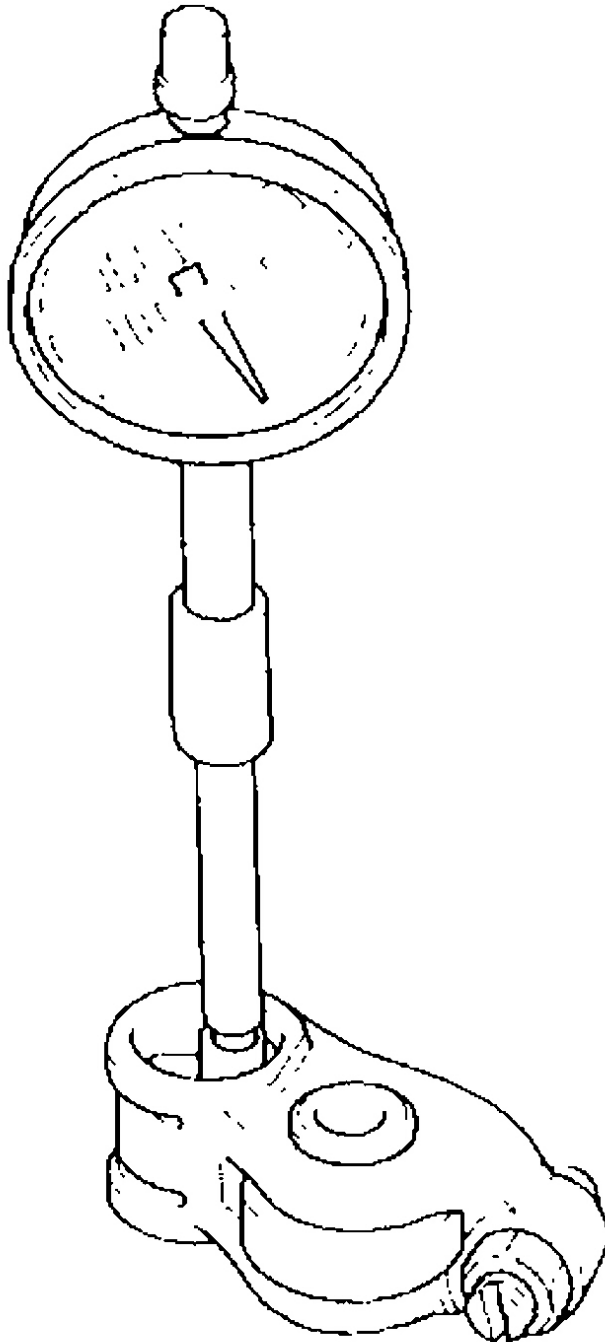
Rocker Arm-to-Shaft Clearance:

Standard (New):

Intake: 0.025-0.052 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.)

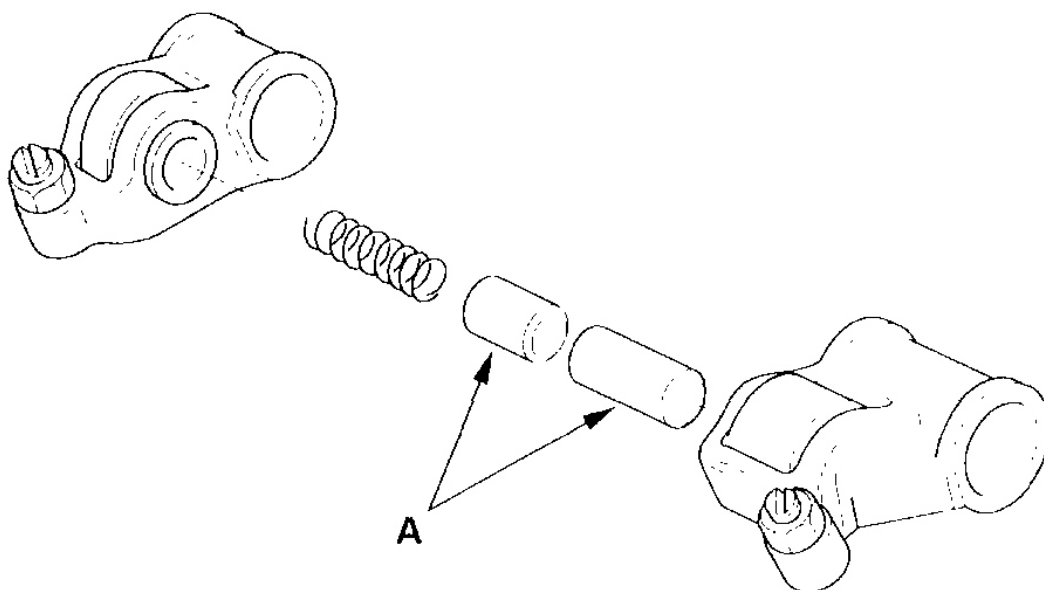


G01399071

Fig. 79: Measuring The Inside Diameter Of The Rocker Arm
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Repeat for all rocker arms and both shafts. If the clearance is over the limit, replace the rocker shaft and all overtolerance rocker arms. If any VTEC rocker arm needs replacement, replace the rocker arms (primary and secondary) as a set.
6. Inspect the rocker arm pistons (A). Push each piston manually. If it does not move smoothly, replace the rocker arm set.

NOTE: Apply new engine oil to the pistons when reassembling.



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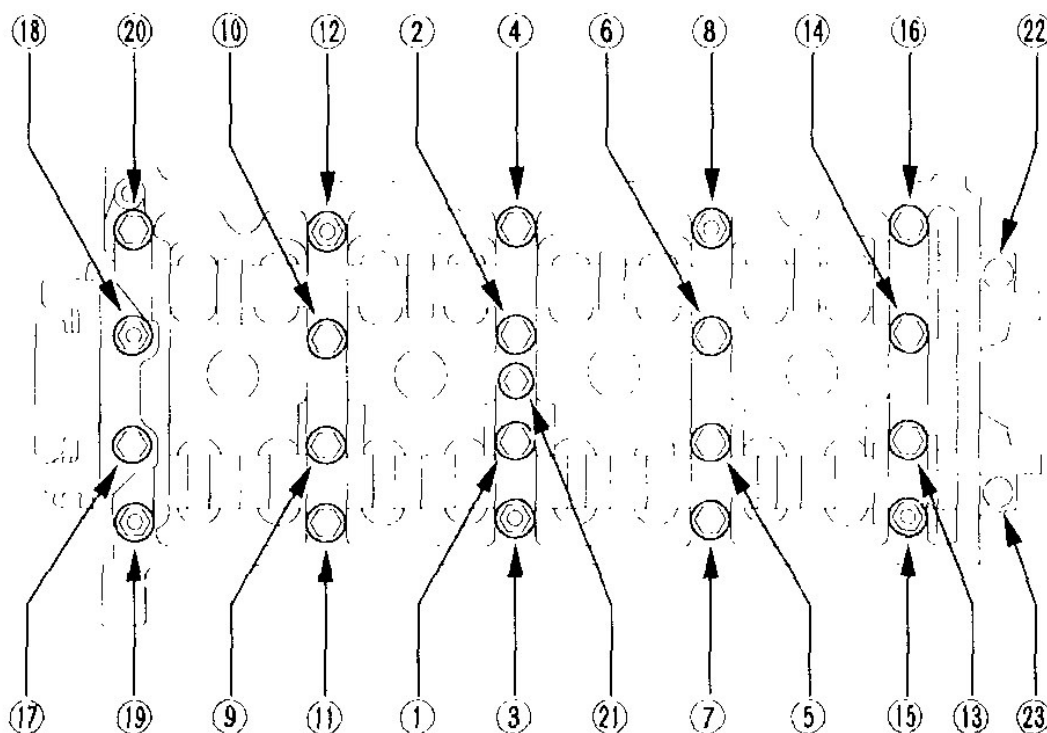
Fig. 80: Inspecting The Rocker Arm Pistons
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT INSPECTION

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see **ROCKER ARM ASSEMBLY REMOVAL**) and disassemble it (see **ROCKER ARM & SHAFT DISASSEMBLY/REASSEMBLY**).
2. Put the rocker shaft holders, camshaft, and camshaft holders on the cylinder head, then tighten the bolts to the specified torque.

NOTE: If the engine does not have bolt (21), skip it and continue the torque sequence. See **Fig. 81** .

Specified Torque:**8 mm bolts:** 22 N.m (2.2 kgf.m, 16 lbf.ft)**6 mm bolts:** 12 N.m (1.2 kgf.m, 8.7 lbf.ft)**6 mm bolts (21), (22), (23):** See Fig. 81 .

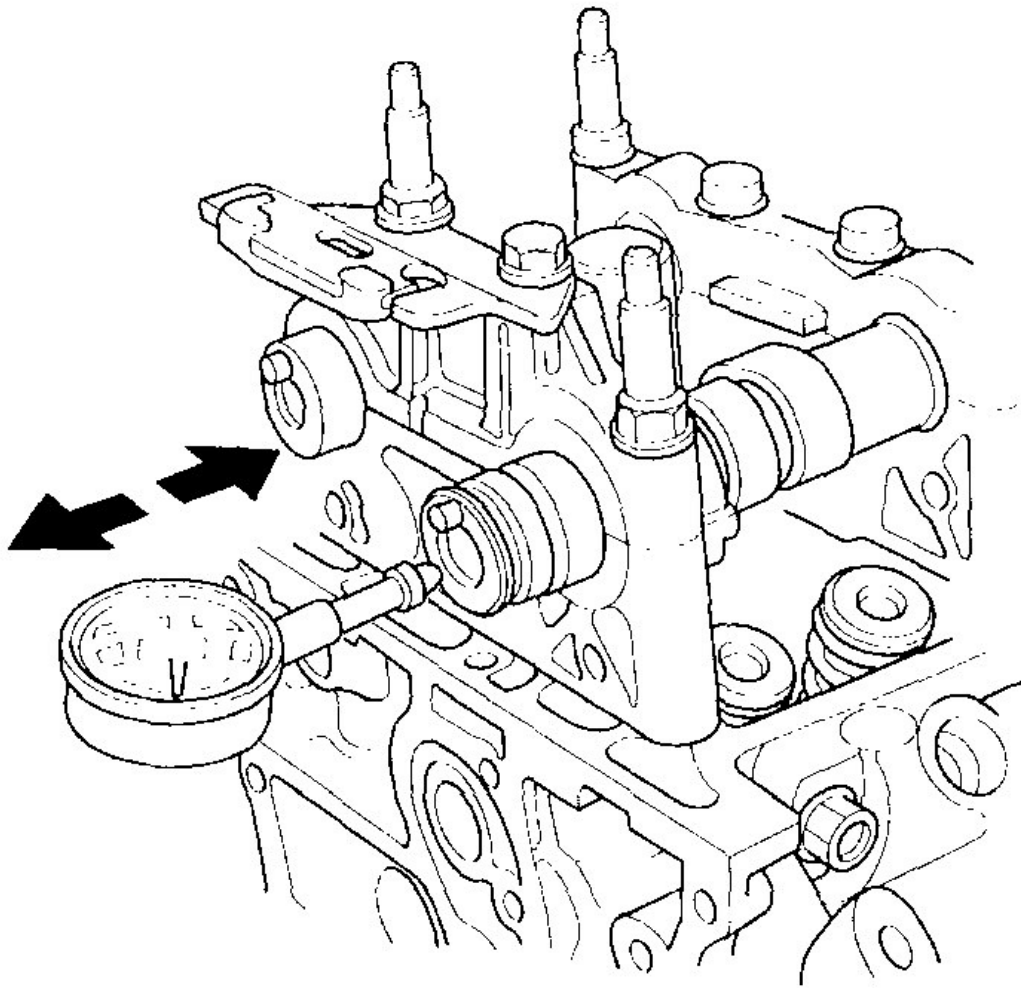
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Fig. 81: Camshaft Torque Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth and read the end play. If the end play is beyond the service limit, replace the camshaft head and recheck. If it is still beyond the service limit, replace the cylinder.

Camshaft End Play:**Standard (New):** 0.05-0.20 mm (0.002-0.008 in.)**Service Limit:** 0.4 mm (0.02 in.)

**G01399074****Fig. 82: Checking End Play****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

5. Unscrew the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
6. Lift the camshafts out of the cylinder head, wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft journal surfaces in the cylinder head, then set the camshafts back in place. Place a plastigage strip across each journal.
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.

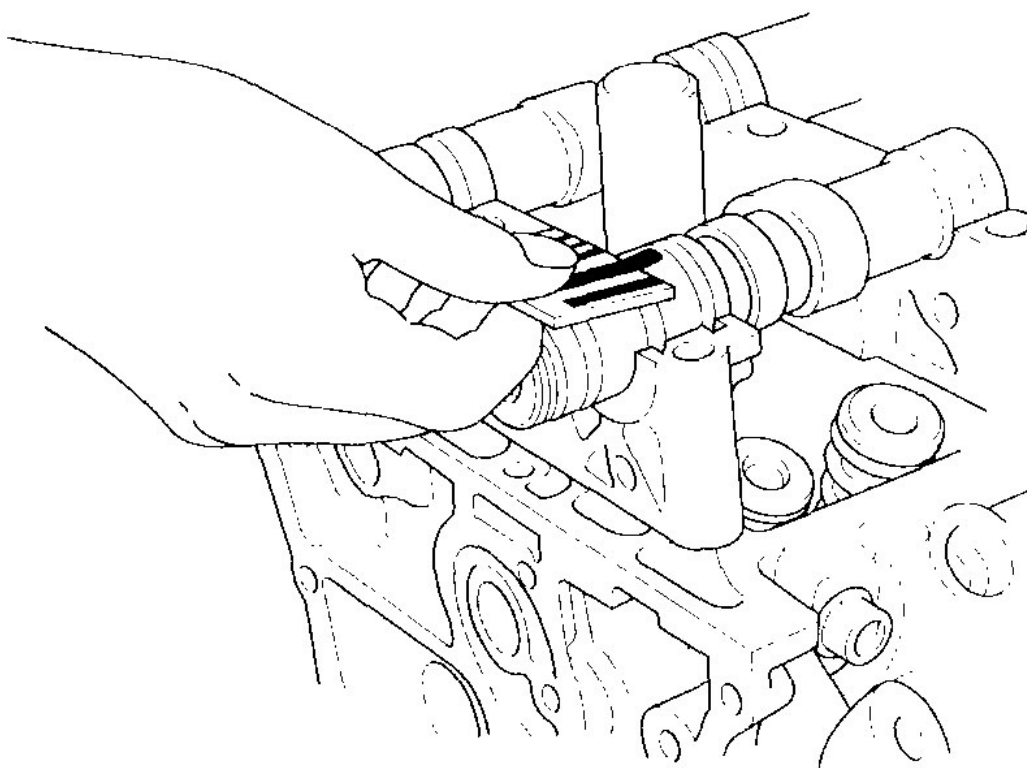
Camshaft-to-Holder Oil Clearance:**Standard (New):****No. 1 Journal:** 0.030-0.069 mm (0.001-0.003 in.)**No. 2, 3, 4, 5 Journals:** 0.060-0.099 mm (0.002-0.004 in.)**Service Limit:** 0.15 mm (0.006 in.)**G01399075**

Fig. 83: Measuring The Widest Portion Of Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

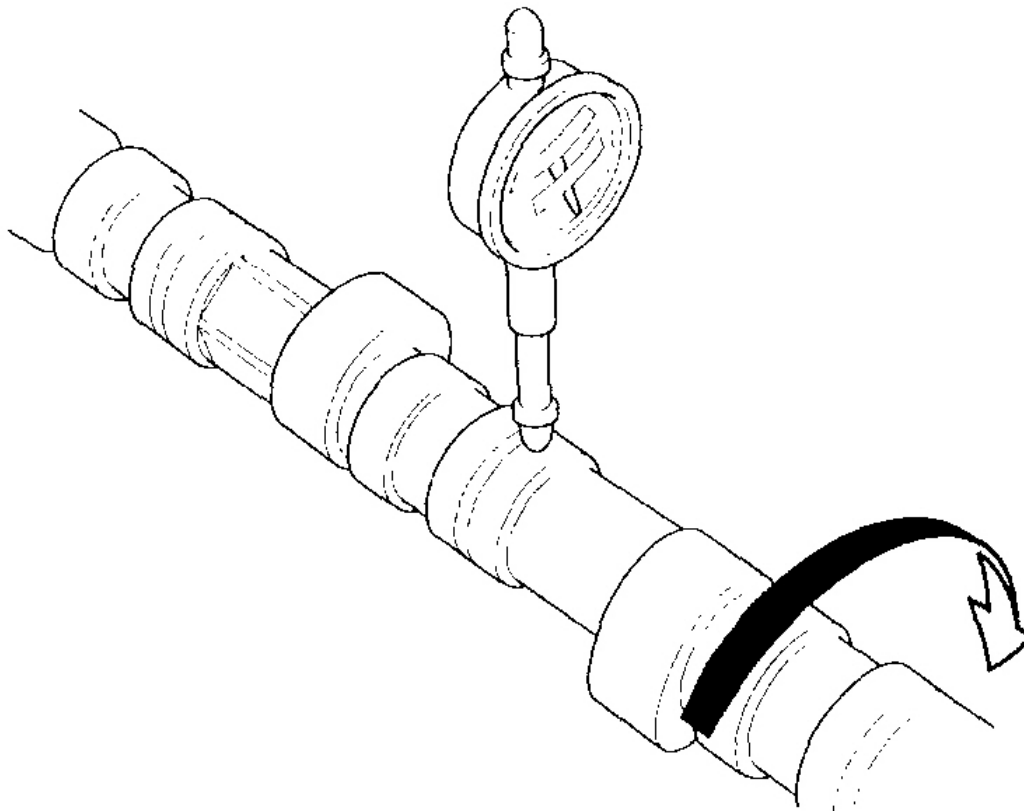
10. Check the total runout with the camshaft supported on V-blocks.
- If the total runout of the camshaft is within the service limit, replace the cylinder head.
 - If the total runout is beyond the service limit, replace the camshaft and recheck the camshaft-to-

holder oil clearance. If the oil clearance is still beyond the service limit, replace the cylinder head.

Camshaft Total Runout:

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

Service Limit: 0.04 mm (0.002 in.)



G01399076

Fig. 84: Checking The Total Runout With The Camshaft Supported On V-Blocks
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Measure cam lobe height.

2003 Honda Civic Si

2002-05 ENGINES 2.0L 4-Cylinder - Civic (Hatchback)

	INTAKE	EXHAUST
PRI	33.925 mm (1.3356 in.)	34.092 mm (1.3422 in.)
SEC	29.638 mm (1.1668 in.)	

PRI: Primary

SEC: Secondary

C/C: Cam Chain

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Fig. 85: Cam Lobe Height Standard (New)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

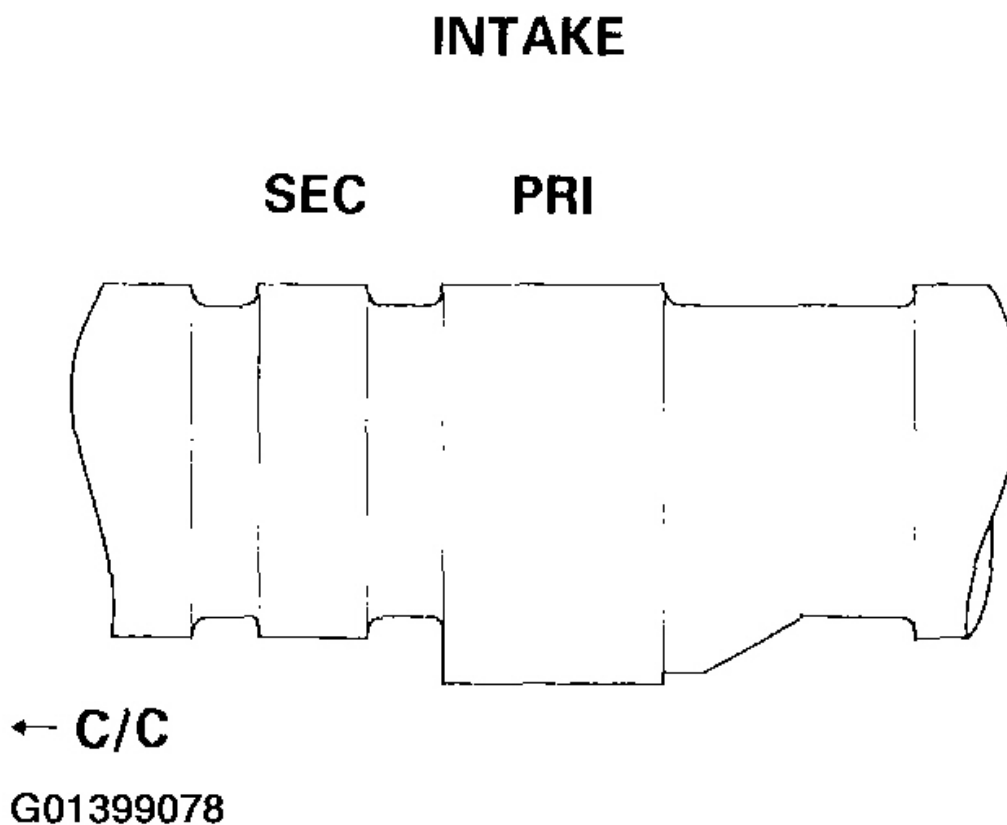


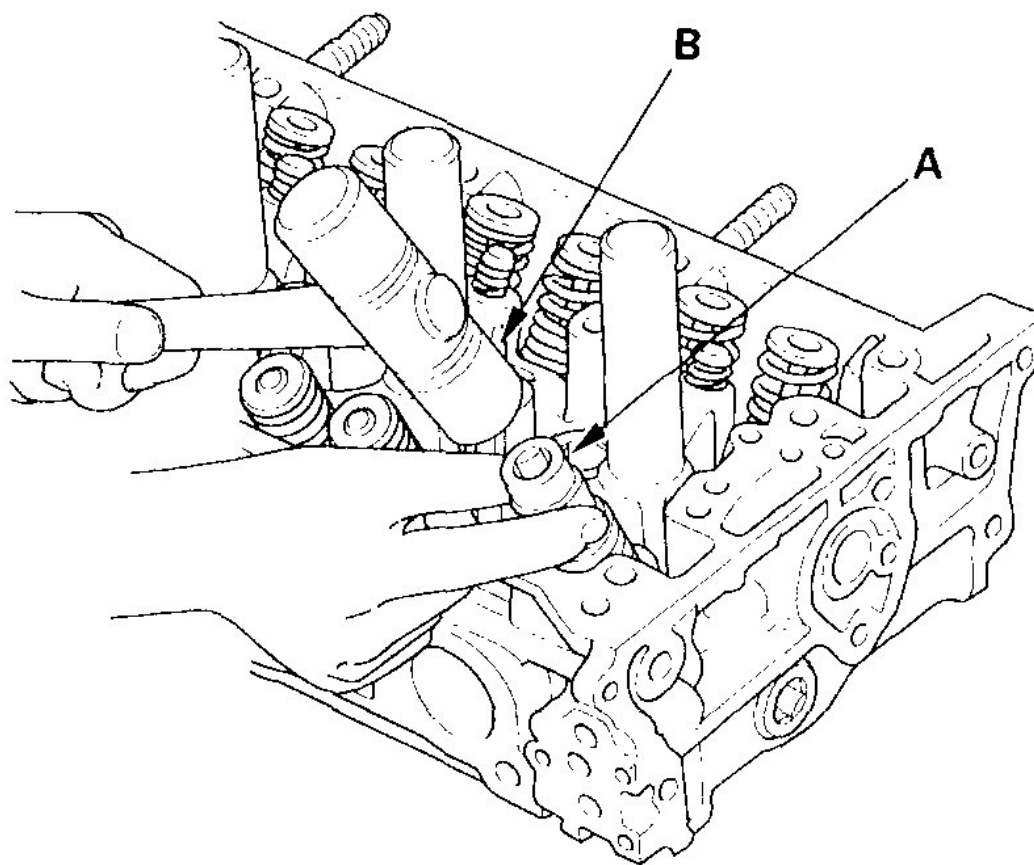
Fig. 86: Identifying Cam Lobes

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE, SPRING & VALVE SEAL REMOVAL

Special Tools Required:

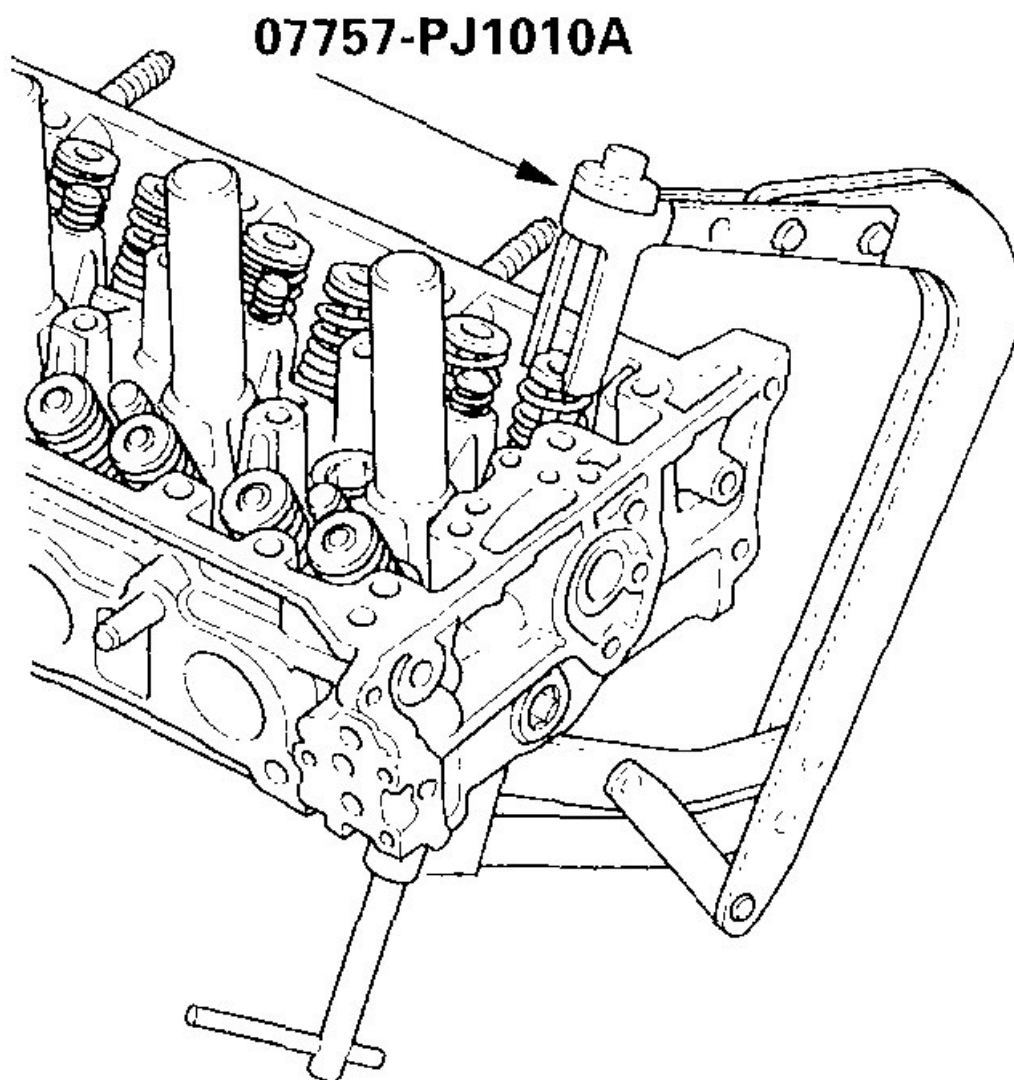
- Valve spring compressor attachment 07757-PJ1010A
 - Identify the valves and valve springs as they are removed so that each item can be reinstalled in its original position.
1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
 2. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the valve retainer to loosen the valve keepers.



G01399079

Fig. 87: Tapping The Valve Retainer To Loosen The Valve Keepers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

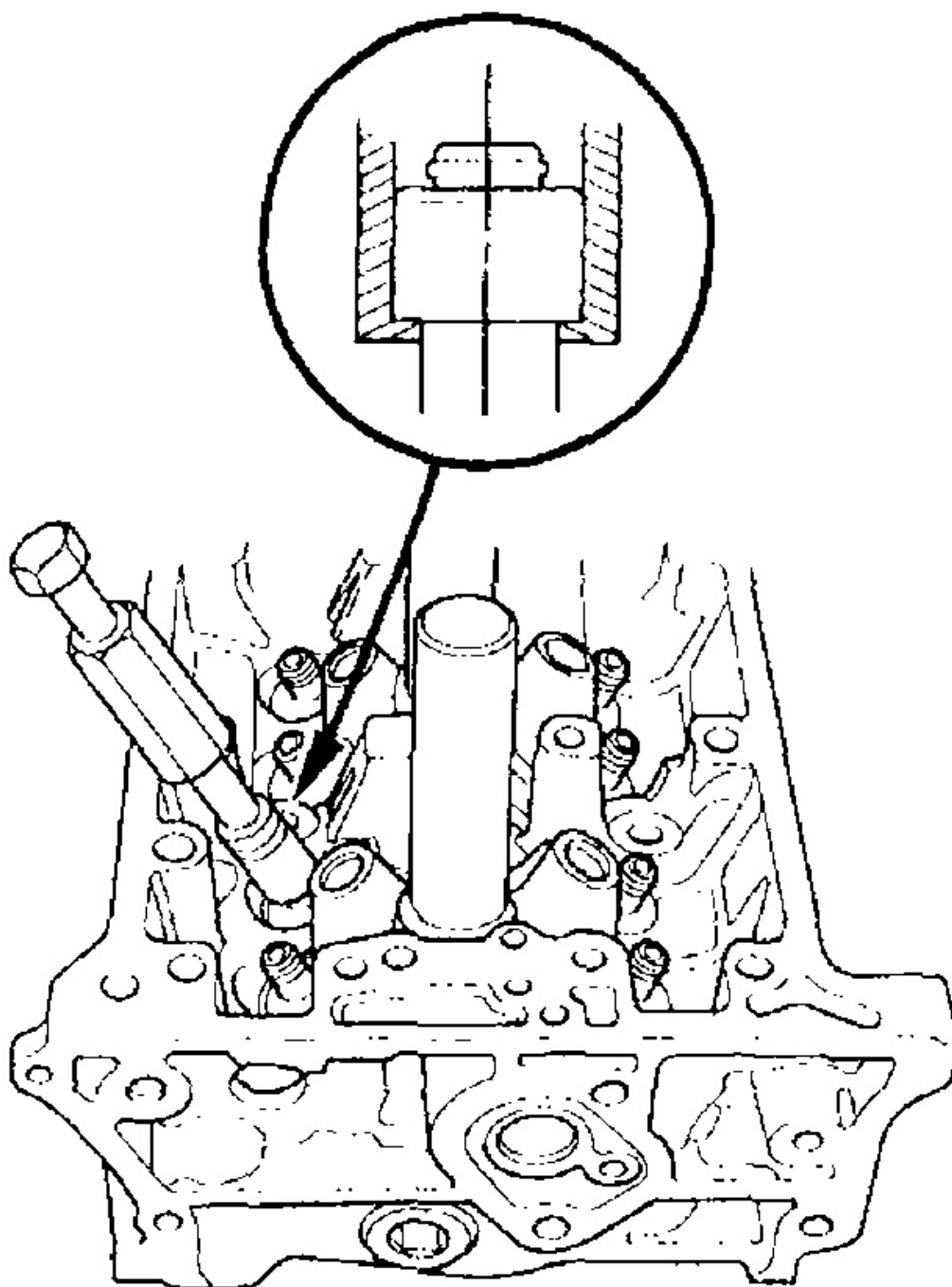
3. Install the special tool. Compress the spring, and remove the valve keepers.



G01399080

Fig. 88: Compressing The Spring & Removing The Valve Keepers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

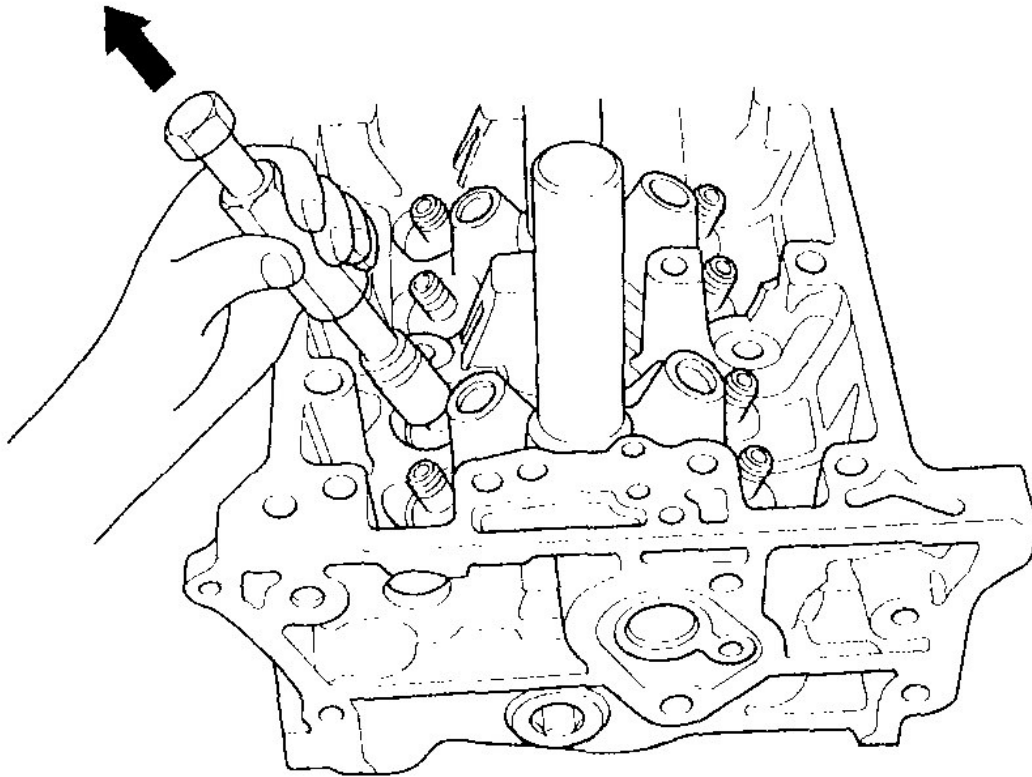


G01399081

Fig. 89: Installing The Valve Guide Seal Remover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.



G01399082

Fig. 90: Removing The Valve Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve.
8. Repeat this procedure for the remaining valves.

VALVE INSPECTION

1. Remove the valves (see **VALVE, SPRING & 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 (0.214 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.)

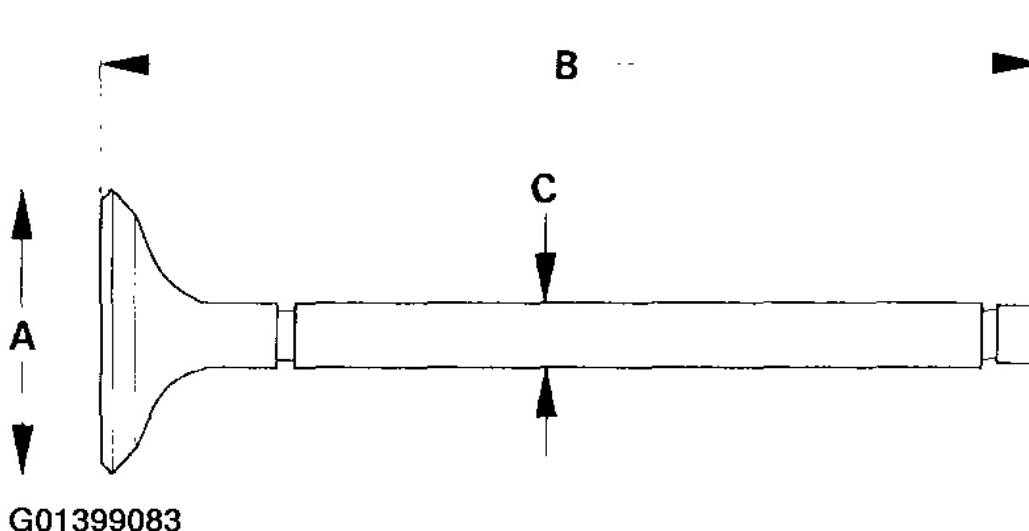


Fig. 91: Measuring Valve

Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

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

Intake Valve Stem-To-Guide Clearance:

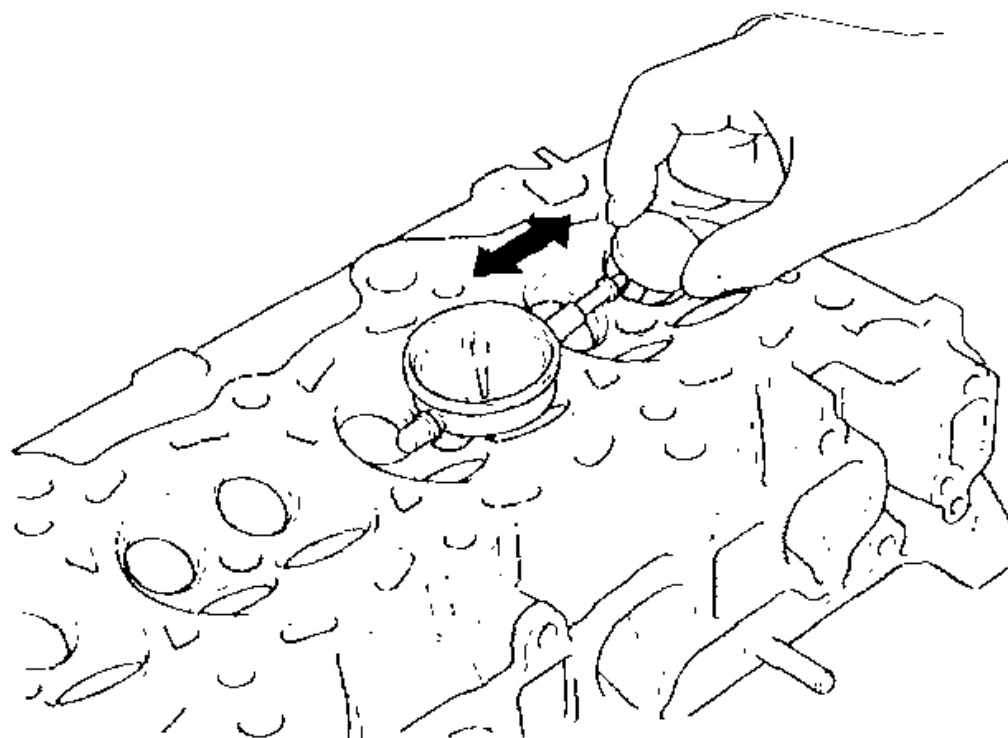
Standard (New): 0.06-0.11 mm (0.002-0.004 in.)

Service Limit: 0.16 mm (0.006 in.)

Exhaust Valve Stem-To-Guide Clearance:

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

Service Limit: 0.22 mm (0.009 in.)



G01399084

Fig. 92: Measuring The Guide-To-Stem Clearance With A Dial Indicator

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Intake Valve Stem-To-Guide Clearance:

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

Service Limit: 0.08 mm (0.003 in.)

Exhaust Valve Stem-To-Guide Clearance:

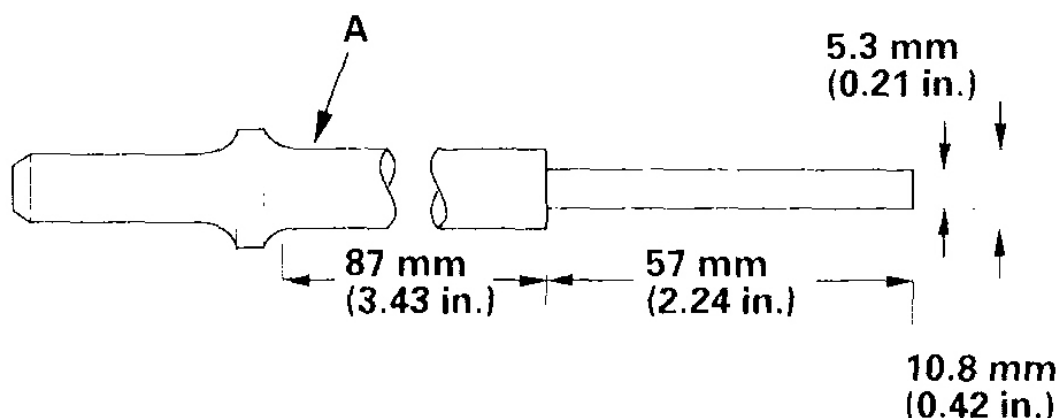
Standard (New): 0.055-0.080 mm (0.0022-0.0031 in.)

Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required:

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



G01399085

Fig. 93: Using A Commercially Available Air-Impact Valve Guide Driver Modified To Fit The Diameter Of The Valve Guides

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.

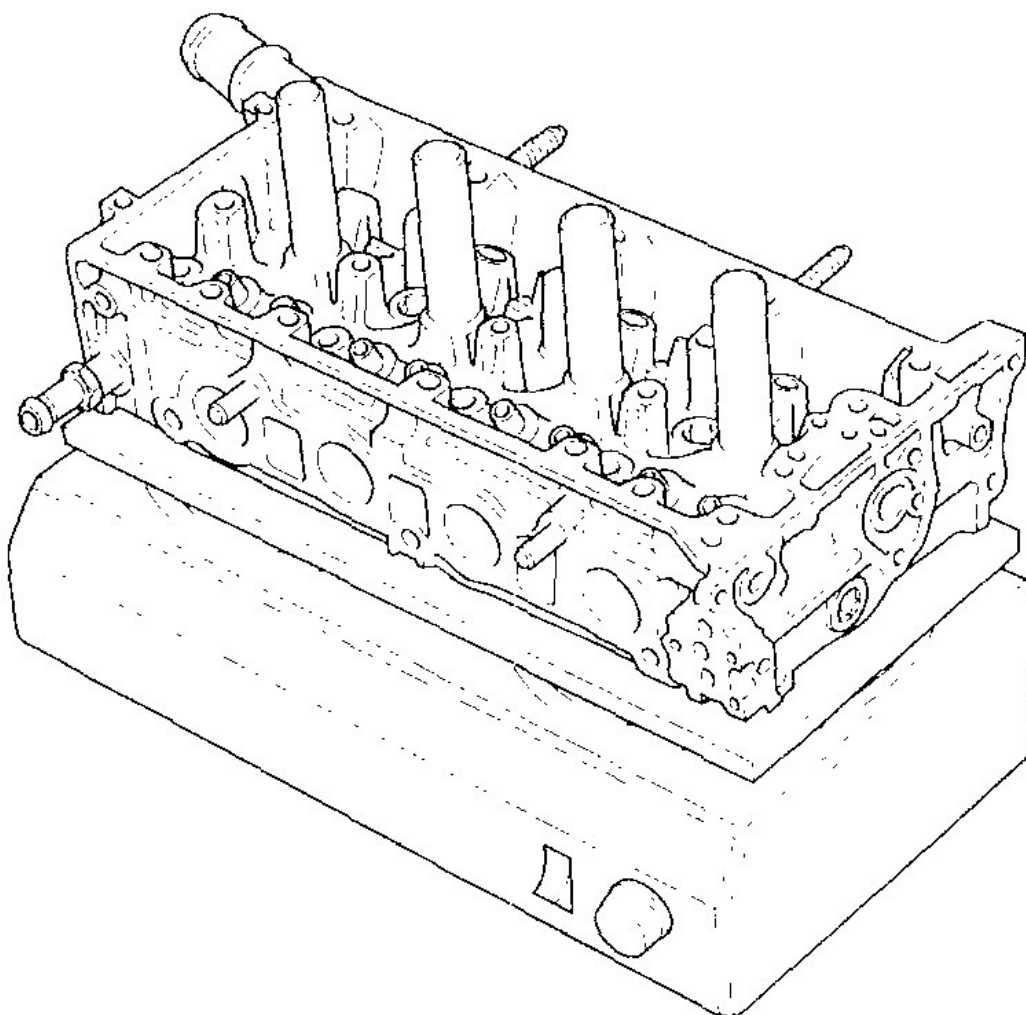
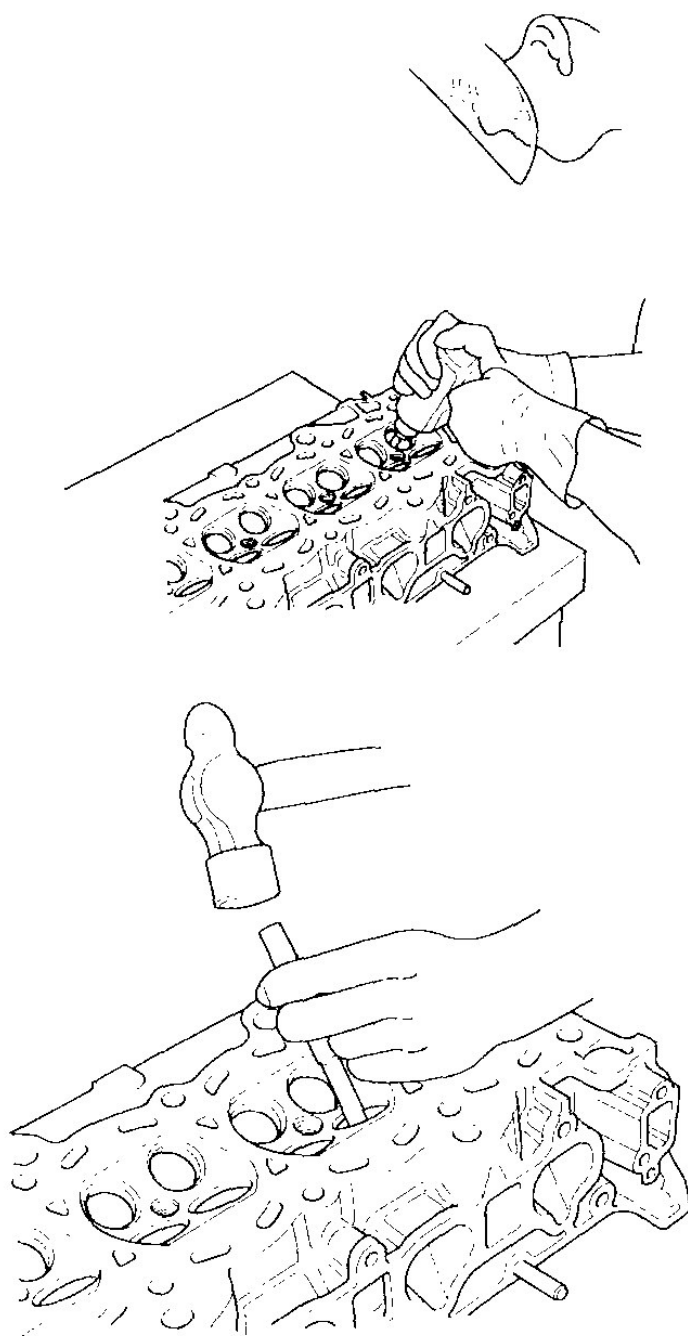
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Fig. 94: Using A Hot Plate To Evenly Heat The Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Working from the camshaft side, use the driver and an air hammer to drive the guide about 2 mm (0.1 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.



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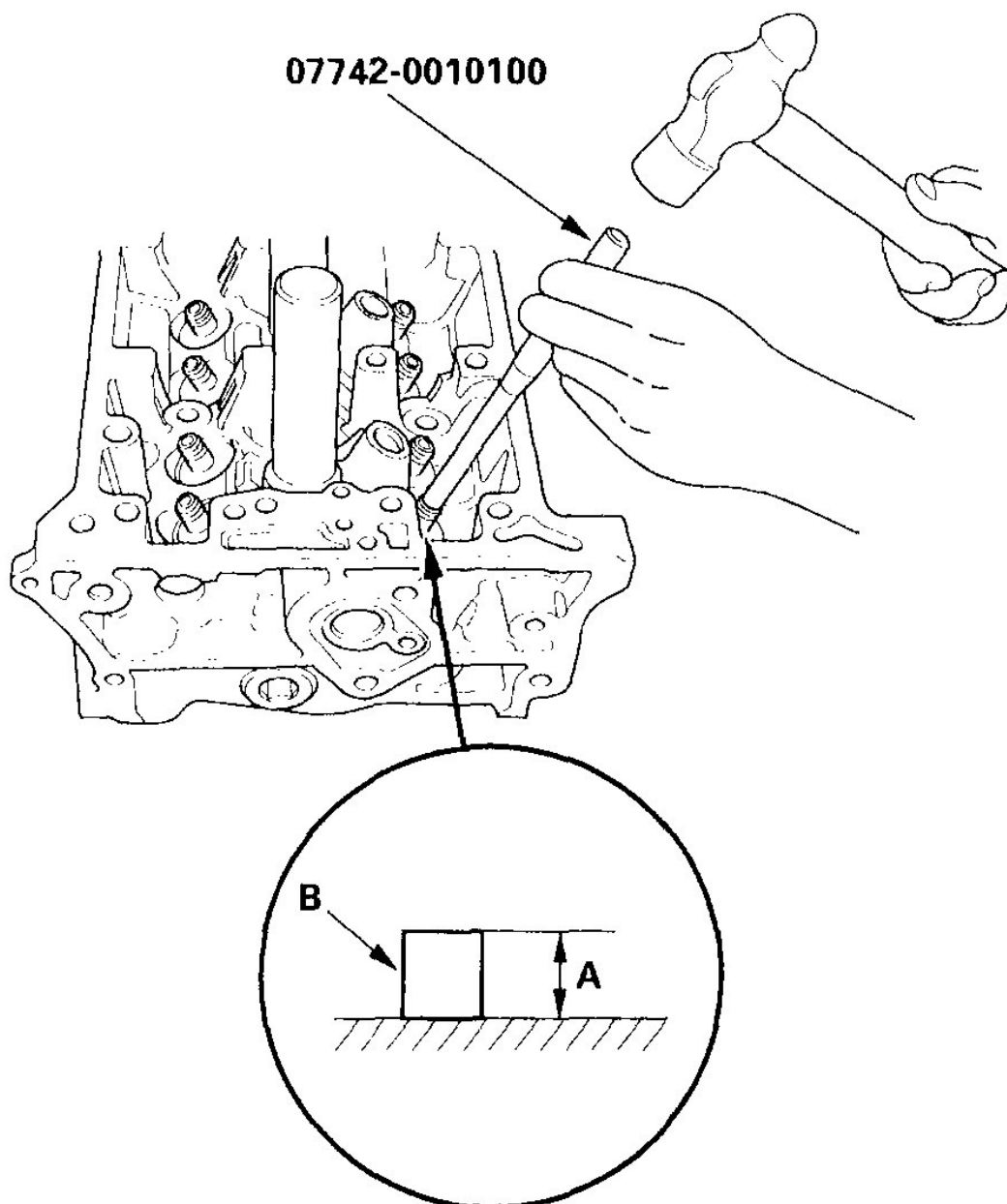
Fig. 95: Removing Guide

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If a valve guide won't move, drill it out with a 8 mm (5/16 in.) bit, then try again. Drill guides only in extreme cases; you could damage the cylinder head if the guide breaks.

8. Remove the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool to drive the guide into 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 (0.598-0.638 in.)**Exhaust:** 15.5-16.5 mm (0.610-0.650 in.)



G01399088

Fig. 96: Driving The Guide Into The Specified Installed Height Of The Guide
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

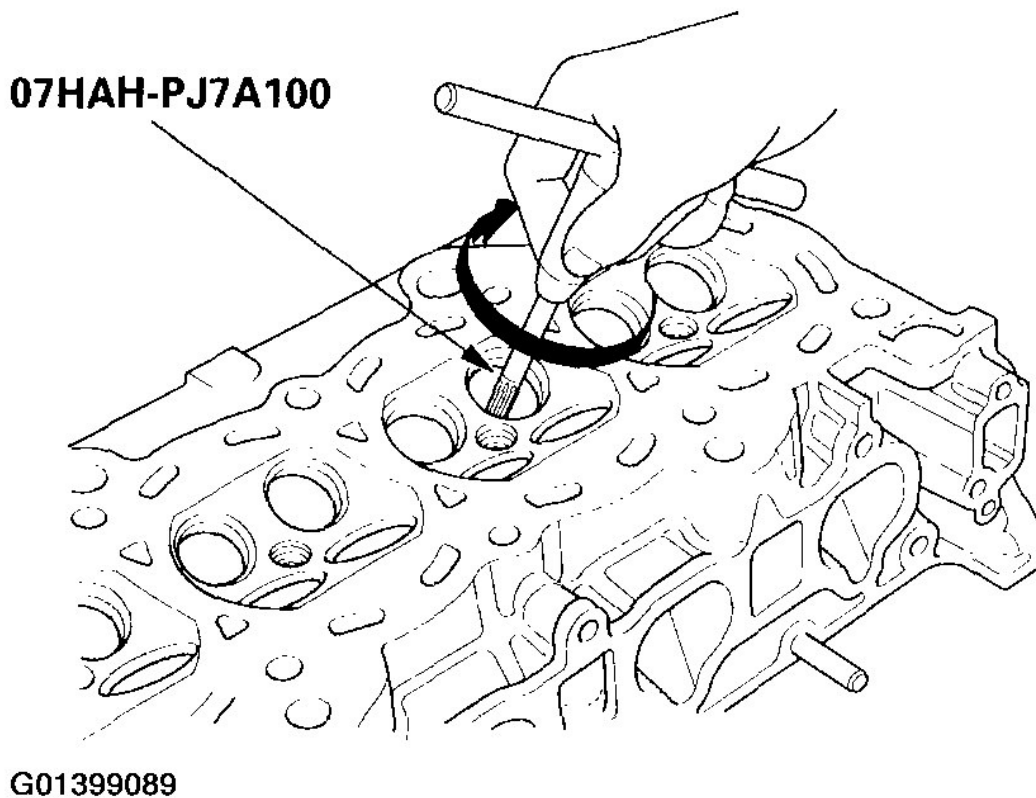


Fig. 97: Rotating The Reamer Clockwise The Full Length Of The Valve Guide Bore
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearances with a valve (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**). Verify that a valve slides in the intake and exhaust valve guides without exerting pressure.

VALVE SEAT RECONDITIONING

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

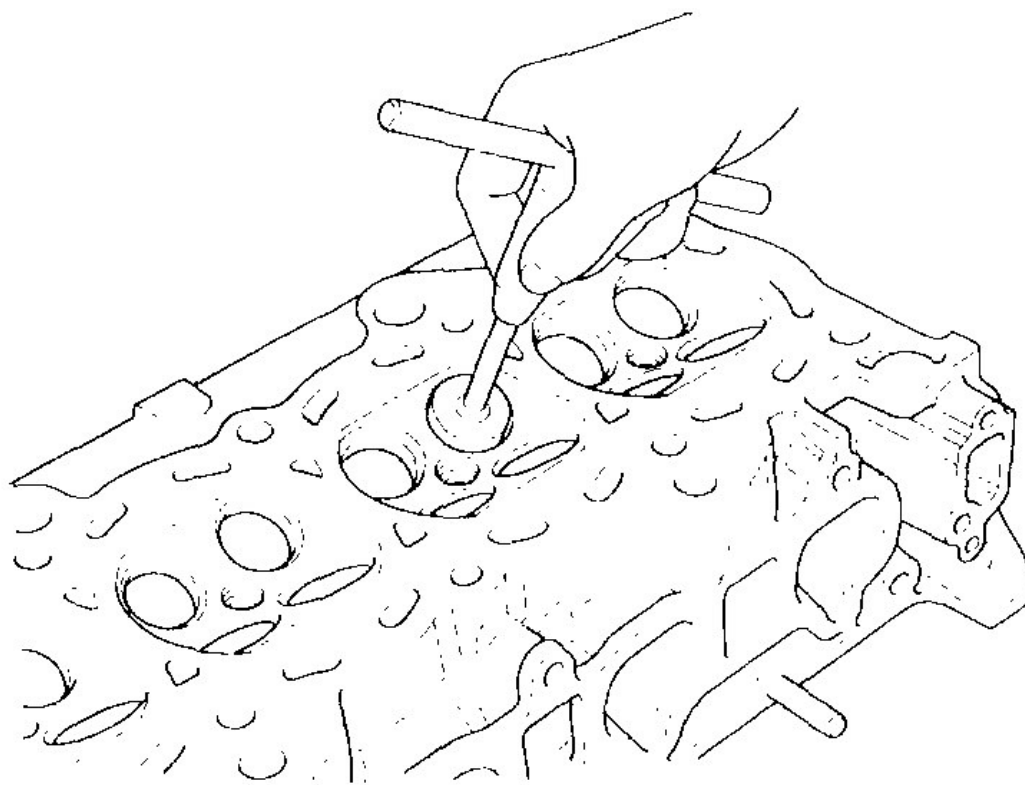
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Fig. 98: Renewing The Valve Seats In The Cylinder Head Using A Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Check the width of the seat and adjust accordingly.

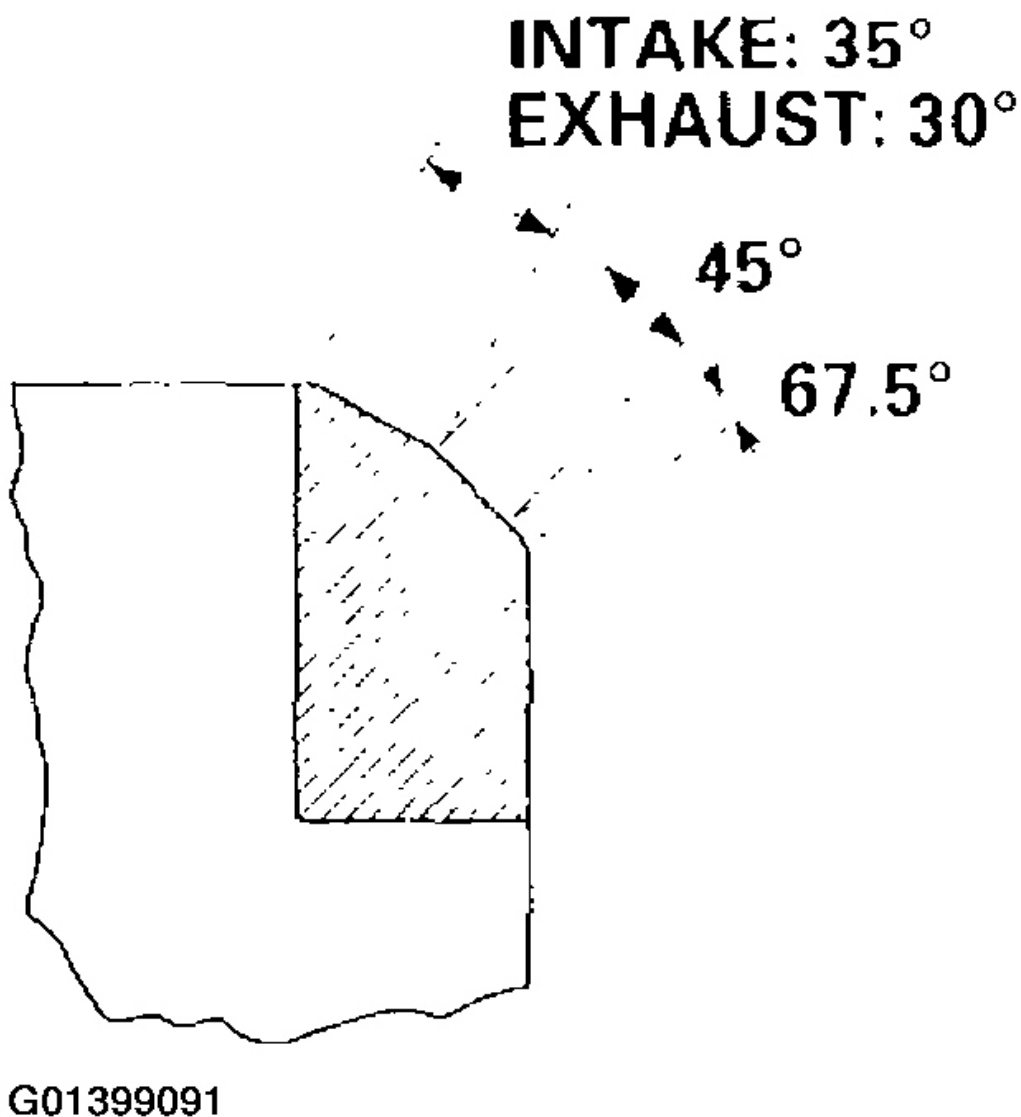


Fig. 99: Identifying Valve Seat Angles

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

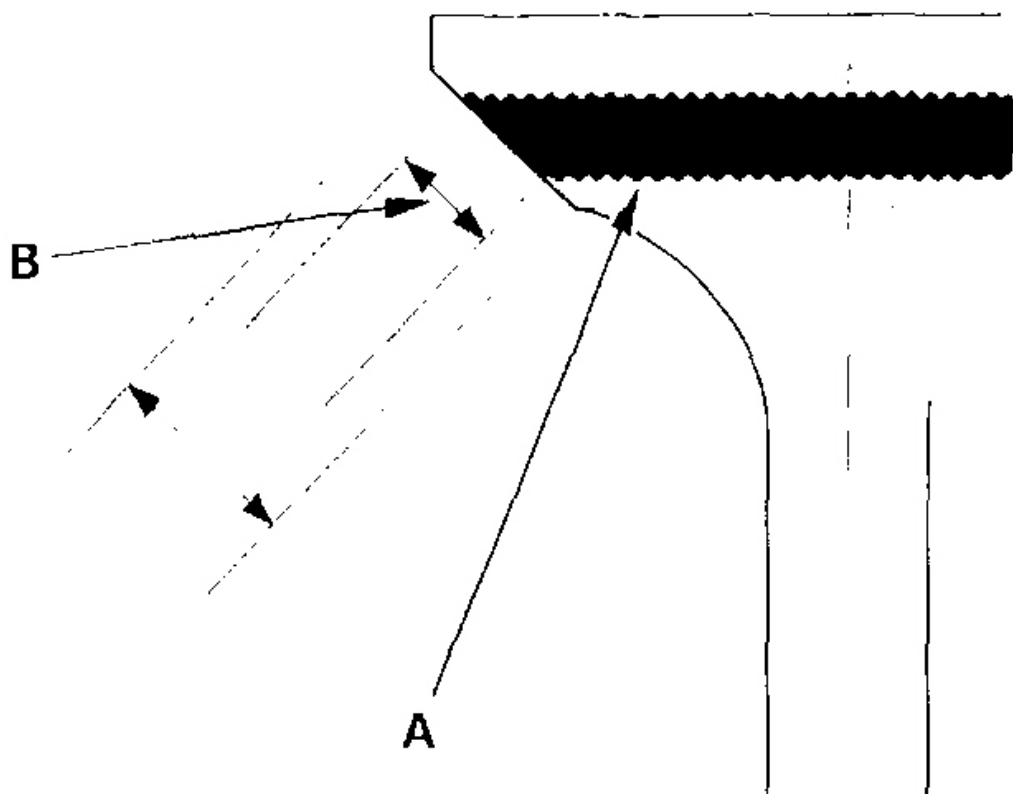
Valve Seat Width:

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



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Fig. 100: Inspecting For Even 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.

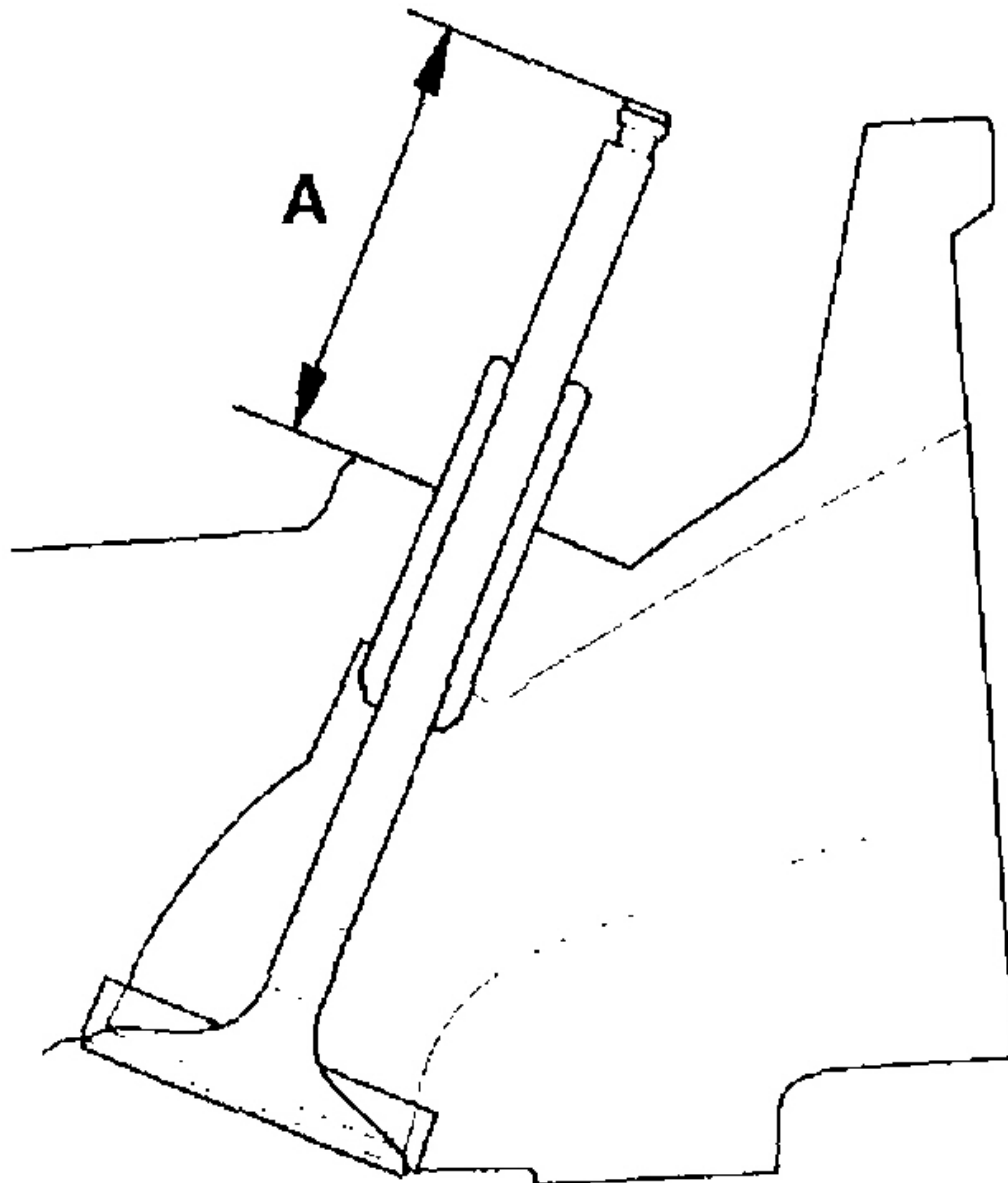
8. Insert the intake and exhaust valves in the head, and measure valve stem installed height (A).

Intake Valve Stem Installed Height:

Standard (New): 44.0-44.6 mm (1.73-1.76 in.)

Exhaust Valve Stem Installed Height:

Standard (New): 44.0-44.6 mm (1.73-1.76 in.)



G01399093

Fig. 101: Measuring Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

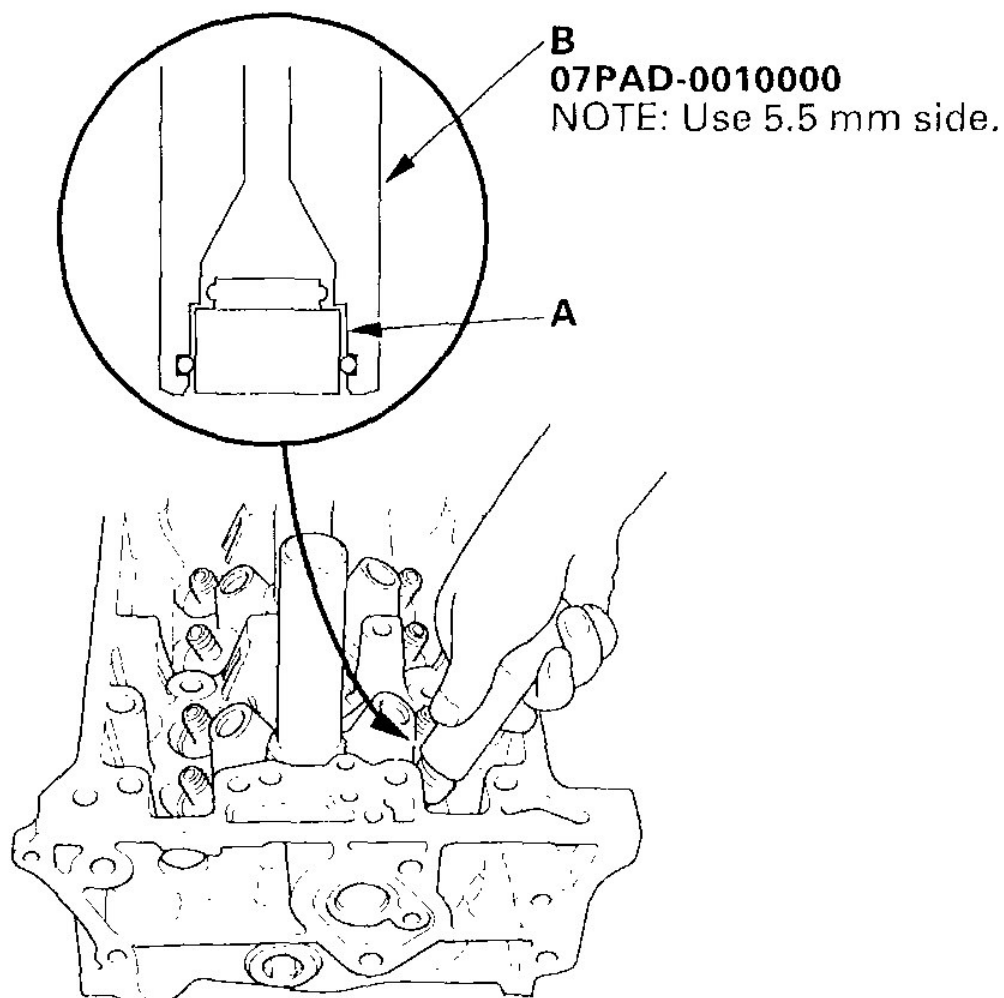
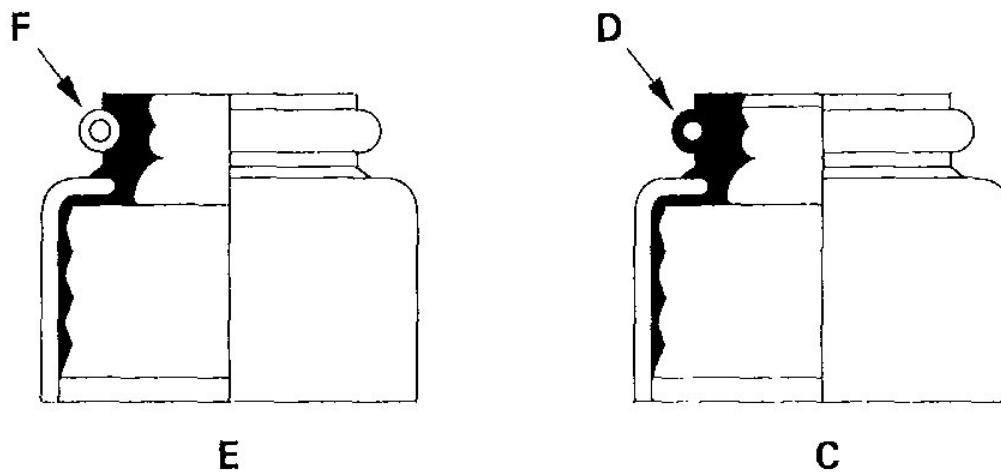
9. If valve stem installed height is over the standard, replace the valve and recheck. If it is still over the standard, replace the cylinder head; the valve seat in the head is too deep.

VALVE, SPRING & VALVE SEAL INSTALLATION

Special Tools Required:

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

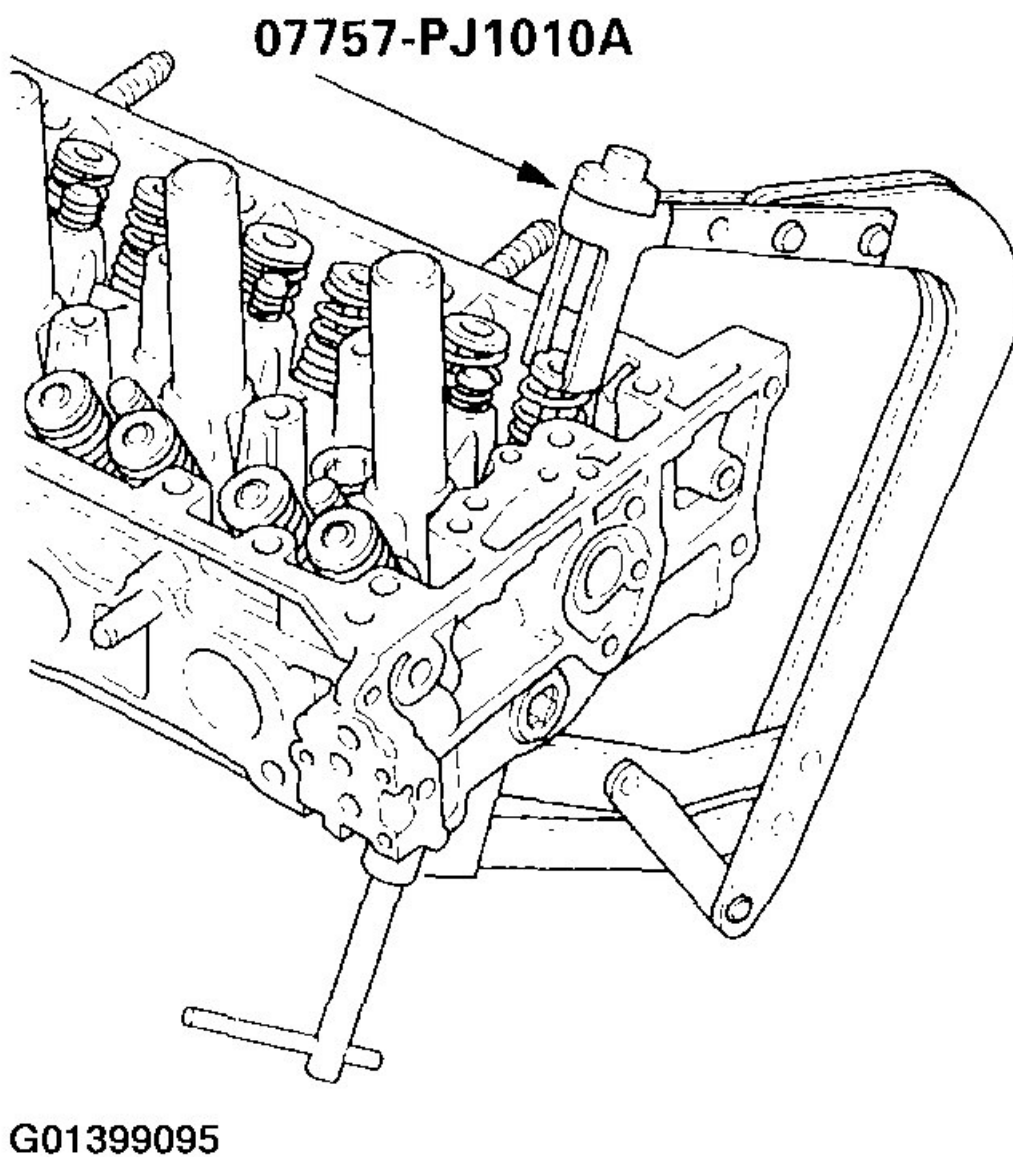
NOTE: **The exhaust valve seal (C) has a black spring (D), and the intake valve seal (E) has a white spring (F). They are not interchangeable.**



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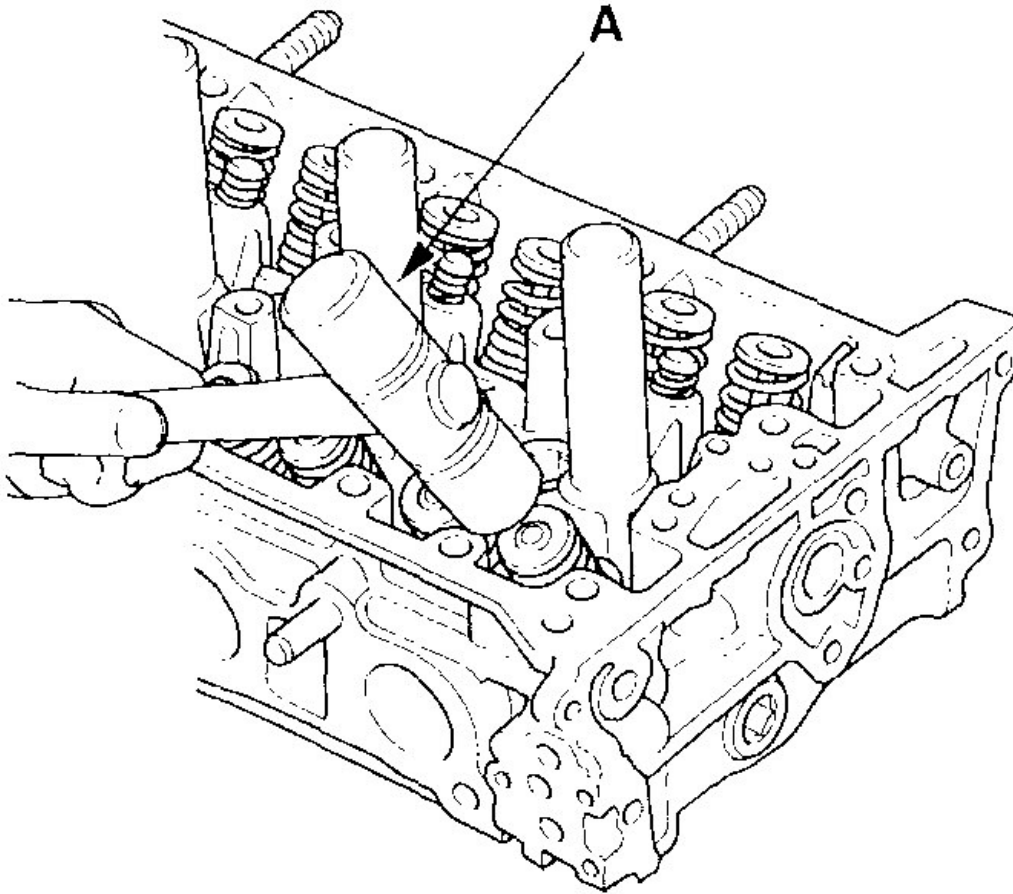
Fig. 102: Installing The New Valve Seals**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

**Fig. 103: Installing The Valve Keepers**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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.



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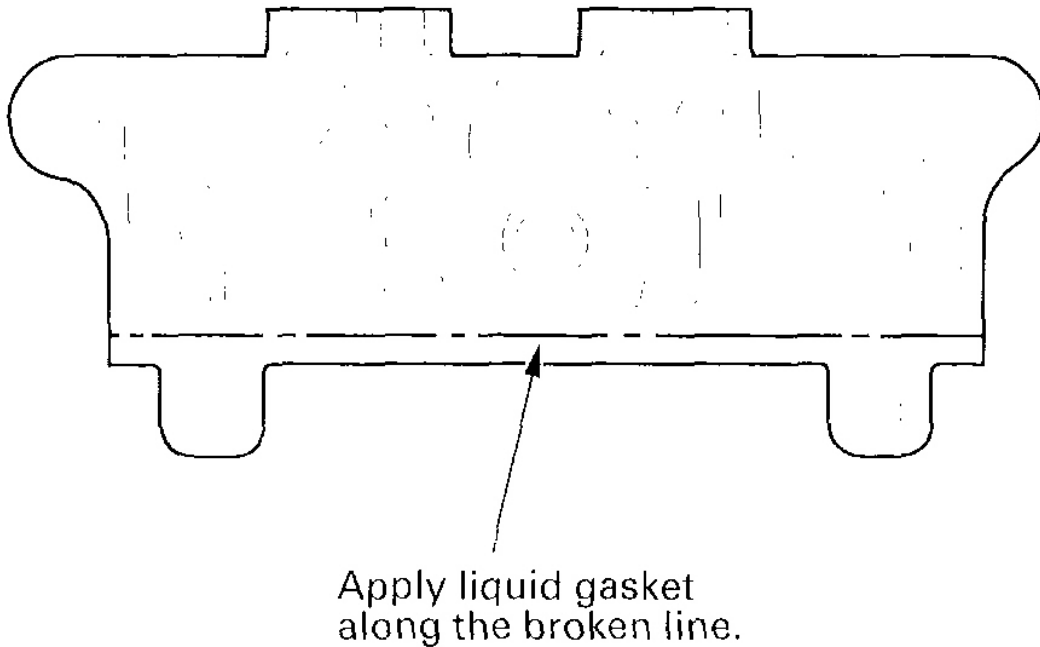
Fig. 104: Ensuring Proper Seating Of The Valve And Valve Keepers
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY INSTALLATION

1. Clean and dry the No. 5 rocker shaft holder mating surfaces.
2. Reassemble the rocker arm assembly (see **ROCKER ARM & SHAFT DISASSEMBLY/REASSEMBLY**).

3. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

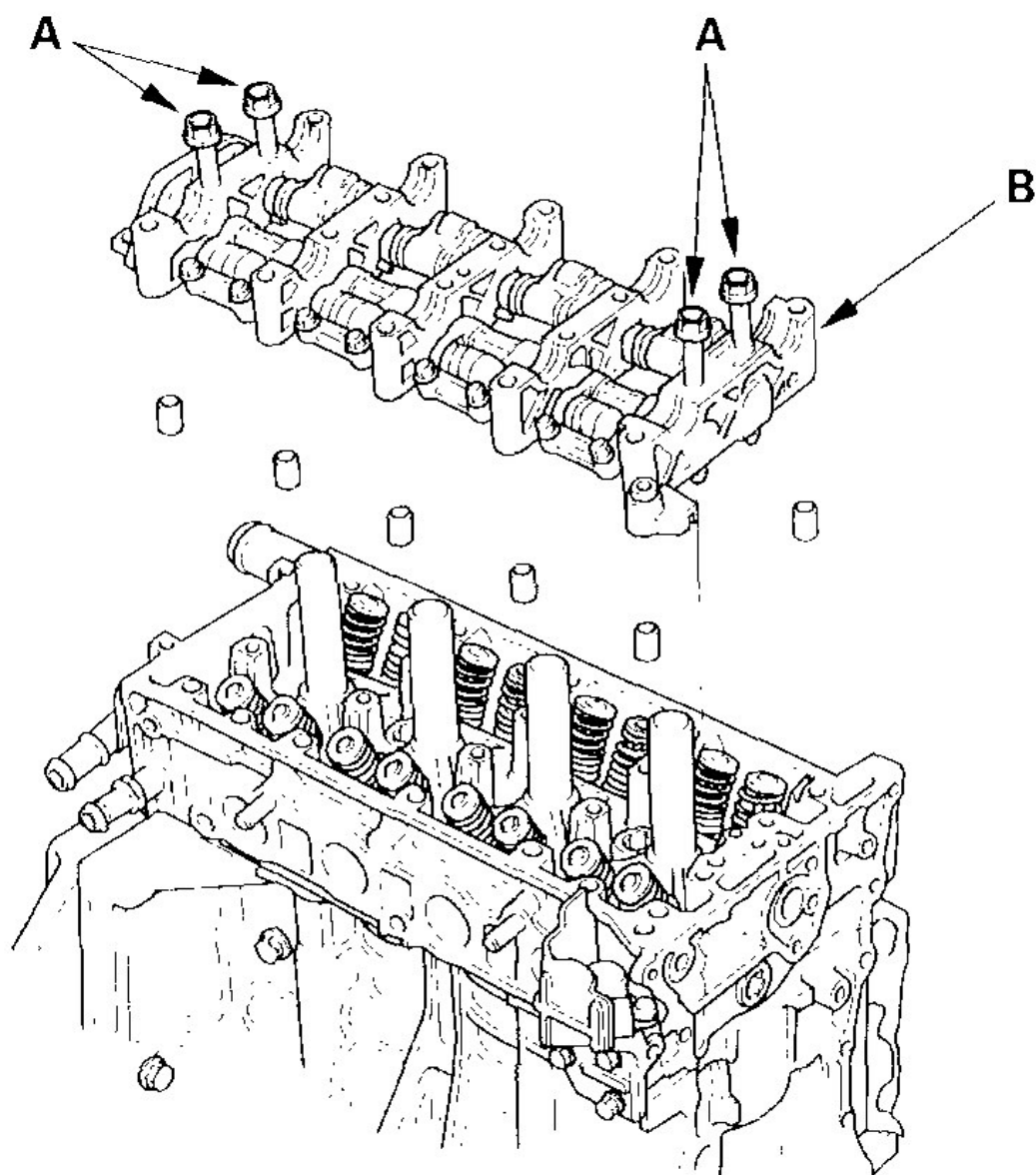


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Fig. 105: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

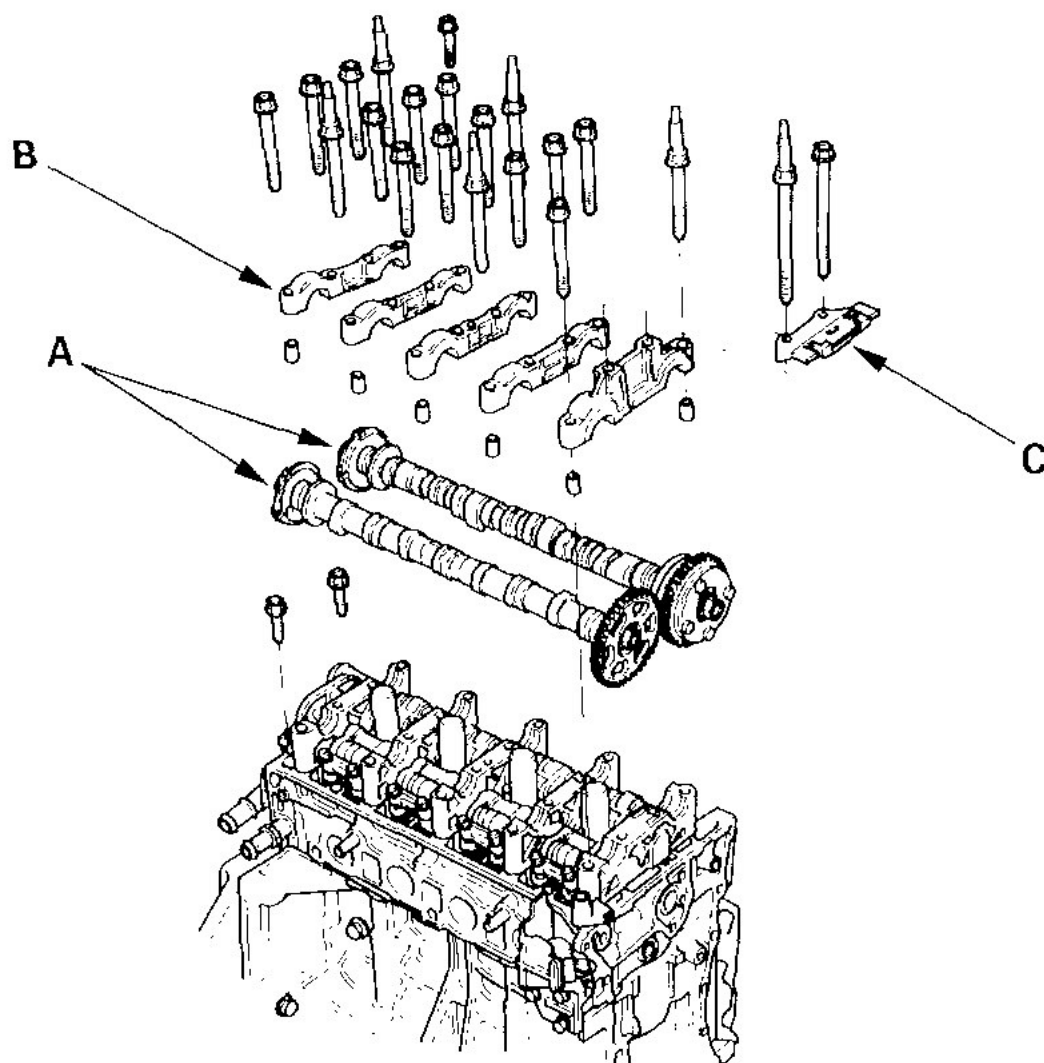
4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.



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Fig. 106: Installing The Rocker Arm Assembly
 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. Apply new engine oil to the camshaft lobes and journals.



G01399099

Fig. 107: Setting The Camshafts In The Holder
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Set the camshaft holders (B) and cam chain guide B (C) in place.
8. Tighten the bolts to the specified torque.

NOTE: If the engine does not have bolt (21), skip it and continue the torque sequence. See [Fig. 108](#) .

Specified Torque:

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

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

6 mm bolts (21), (22), (23): See **Fig. 108** .

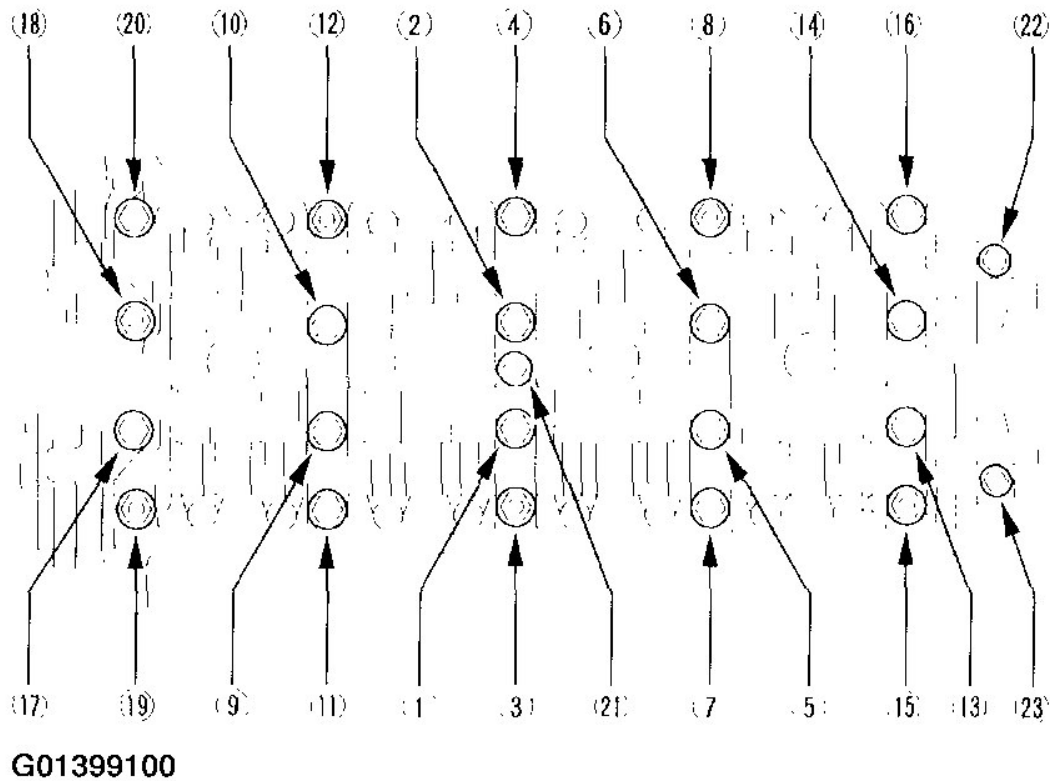


Fig. 108: Camshaft Torque Sequence

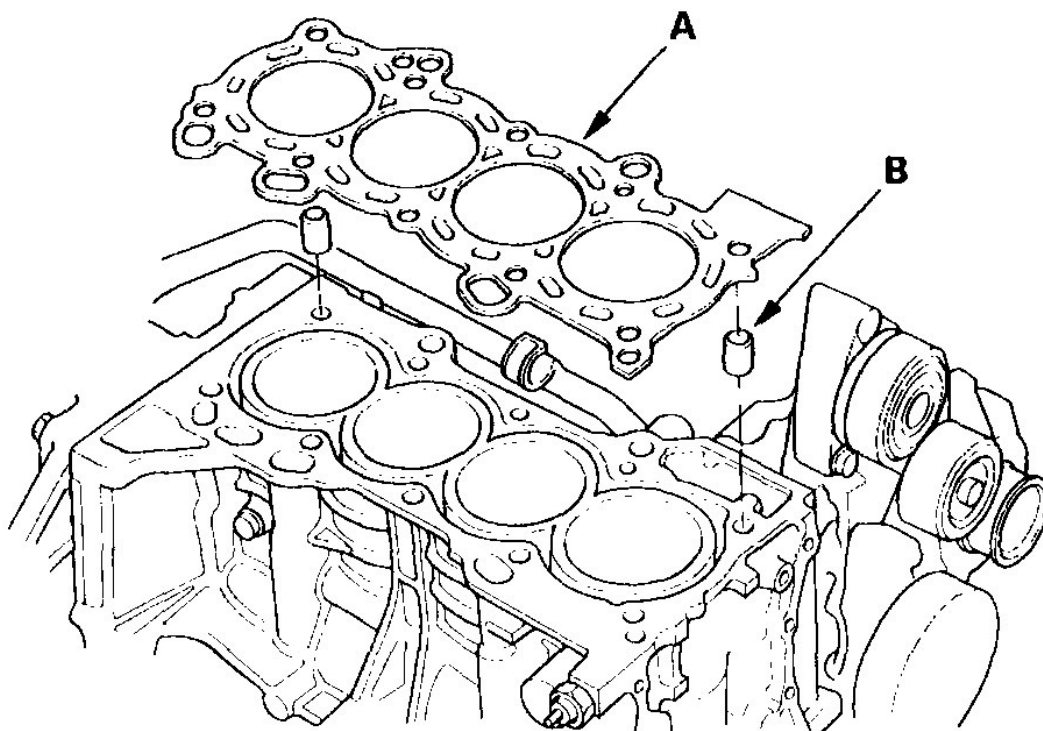
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CYLINDER HEAD INSTALLATION

Install the cylinder head in the reverse order of removal:

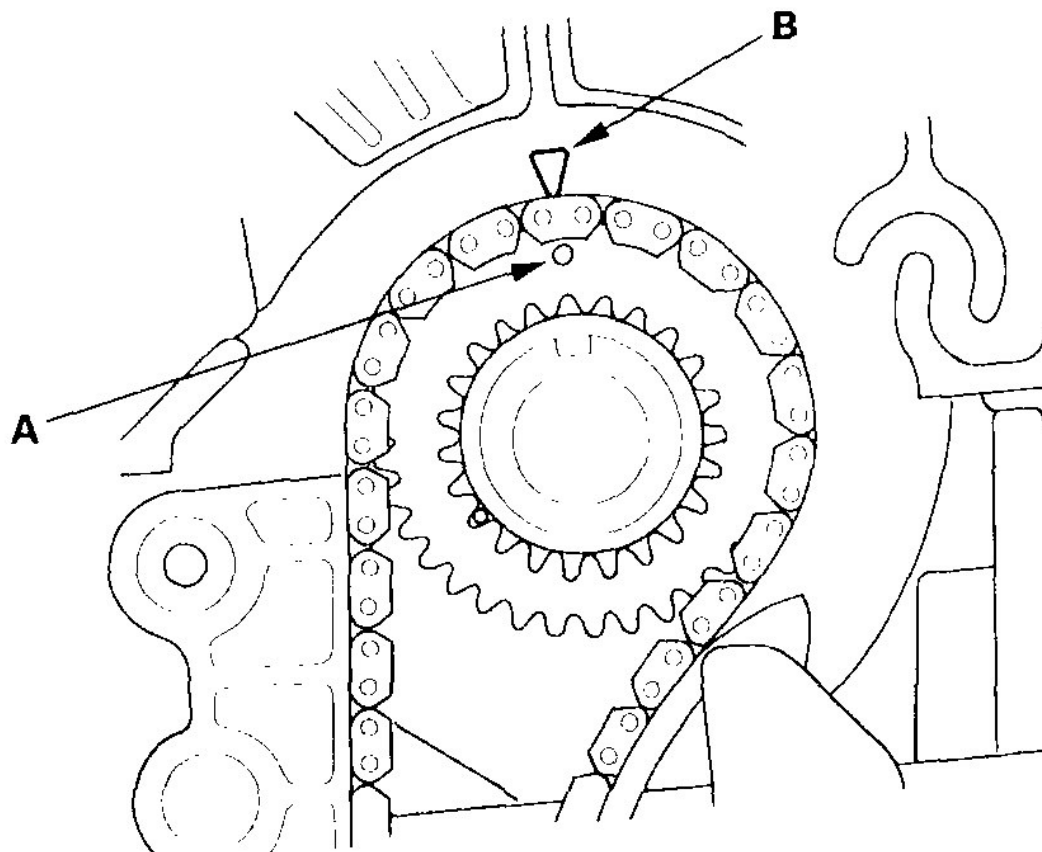
1. Clean the cylinder head and block surface.
2. Install the new cylinder head gasket (A) and dowel pins (B) on the cylinder block. Always use a new cylinder head gasket.



G01399101

Fig. 109: Installing The New Cylinder Head Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

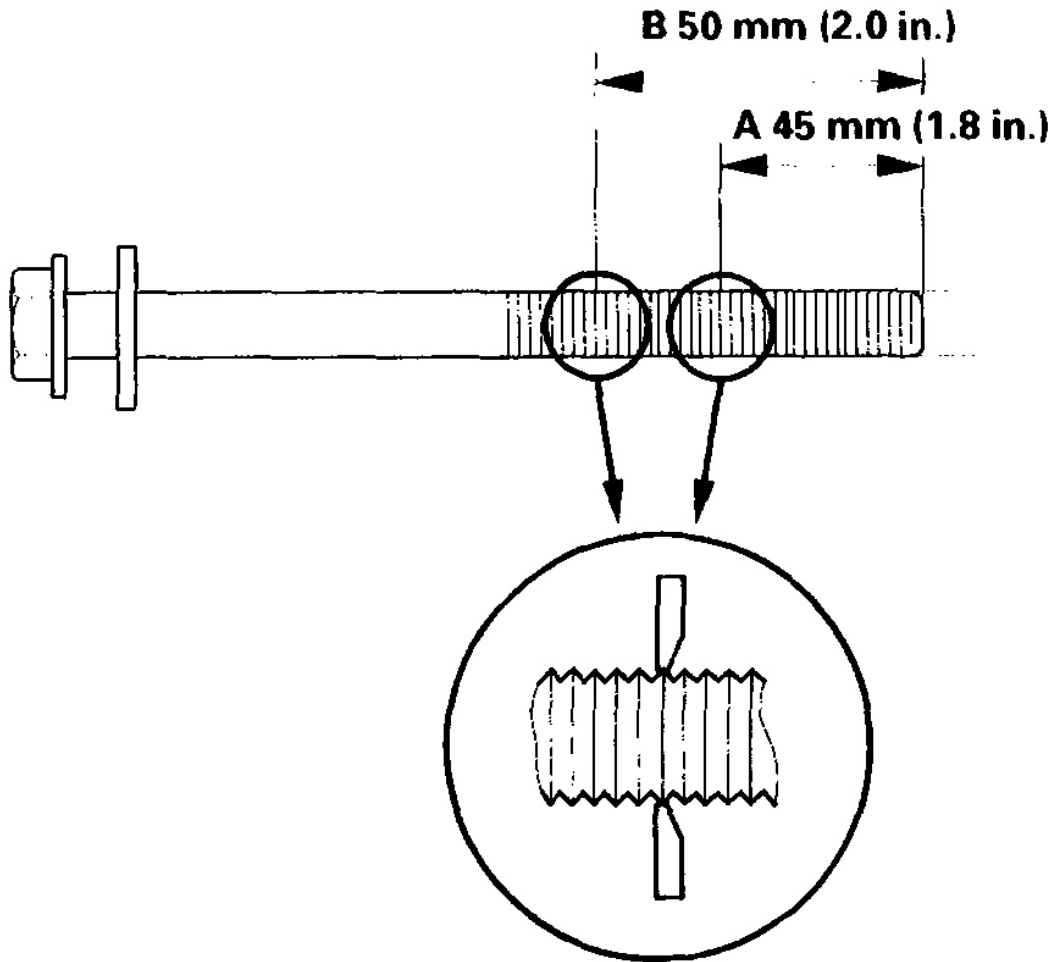
3. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the cylinder block.



G01399102

Fig. 110: Setting The Crankshaft To Top Dead Center (TDC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

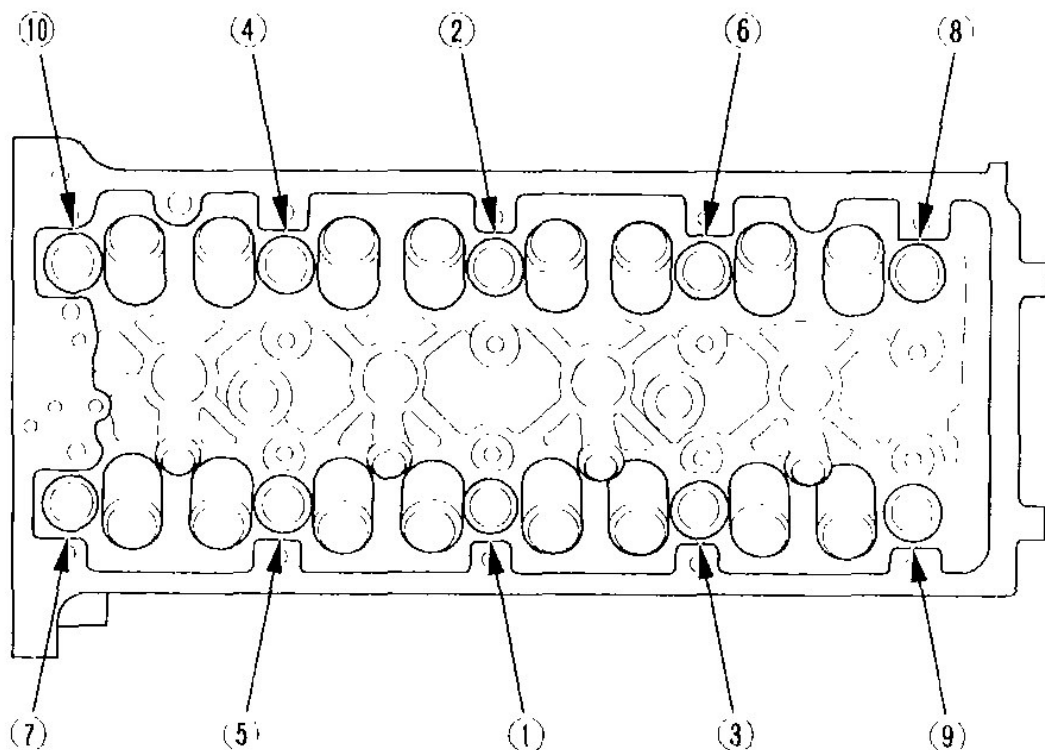
4. Install the cylinder head on the block.
5. Measure the diameter of each cylinder head bolt at point A and point B.



G01399103

Fig. 111: Measuring The Diameter Of Each Cylinder Head Bolt At Point A And Point B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.
7. Apply new engine oil to the bolt threads and under the bolt heads of all the cylinder head bolts.
8. 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-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.



G01399104

Fig. 112: Cylinder Head Bolt Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. 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°.

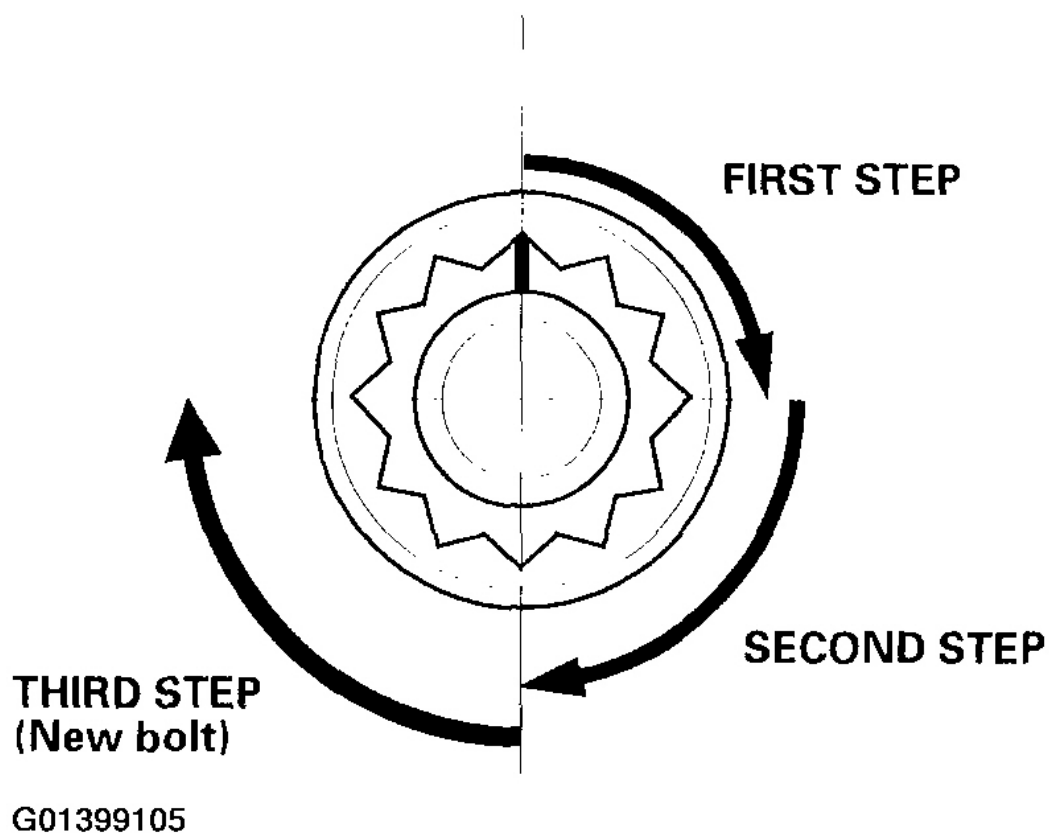
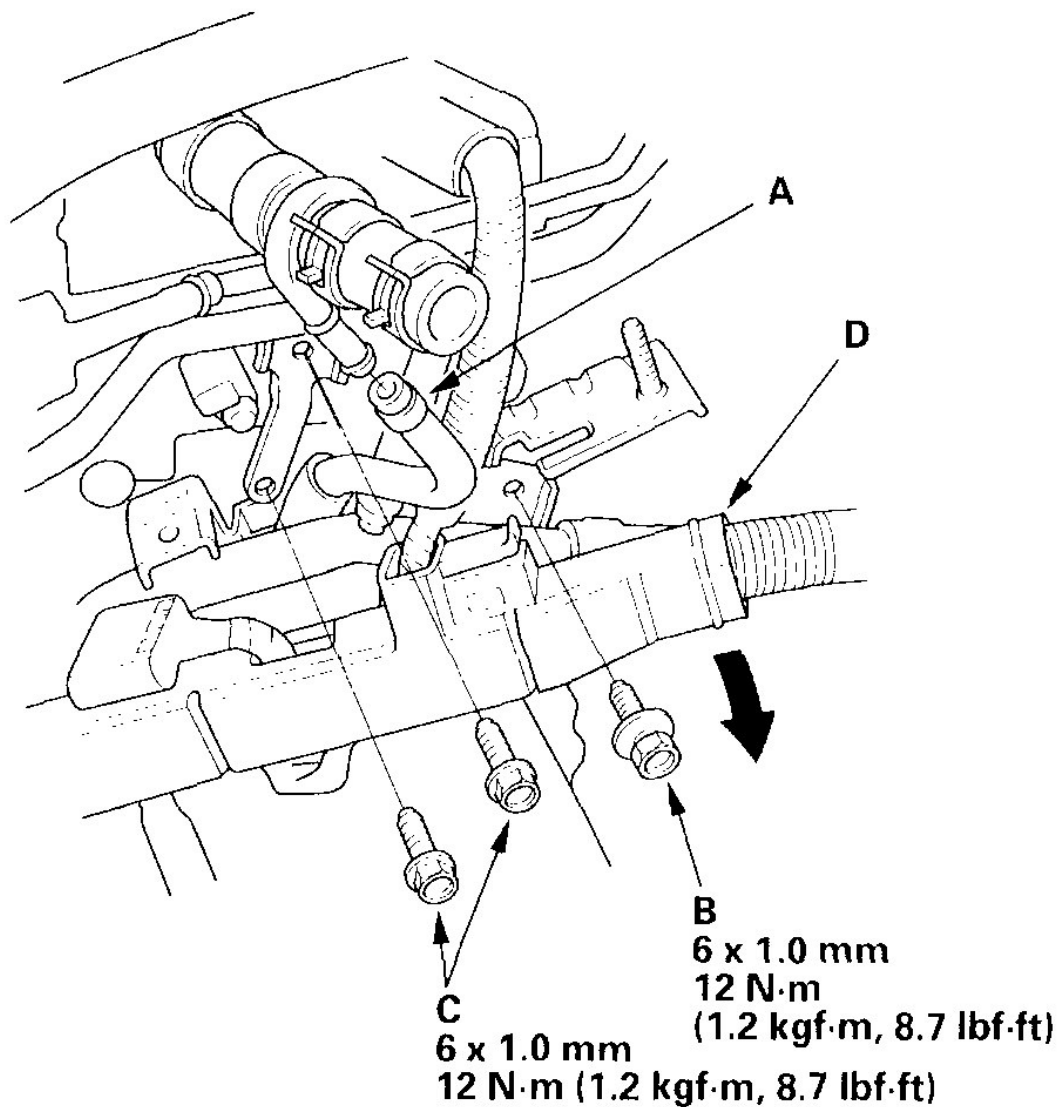


Fig. 113: Tightening Cylinder Head Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the rocker arm assembly (see **ROCKER ARM ASSEMBLY INSTALLATION**).
11. Install the water bypass hose (A).

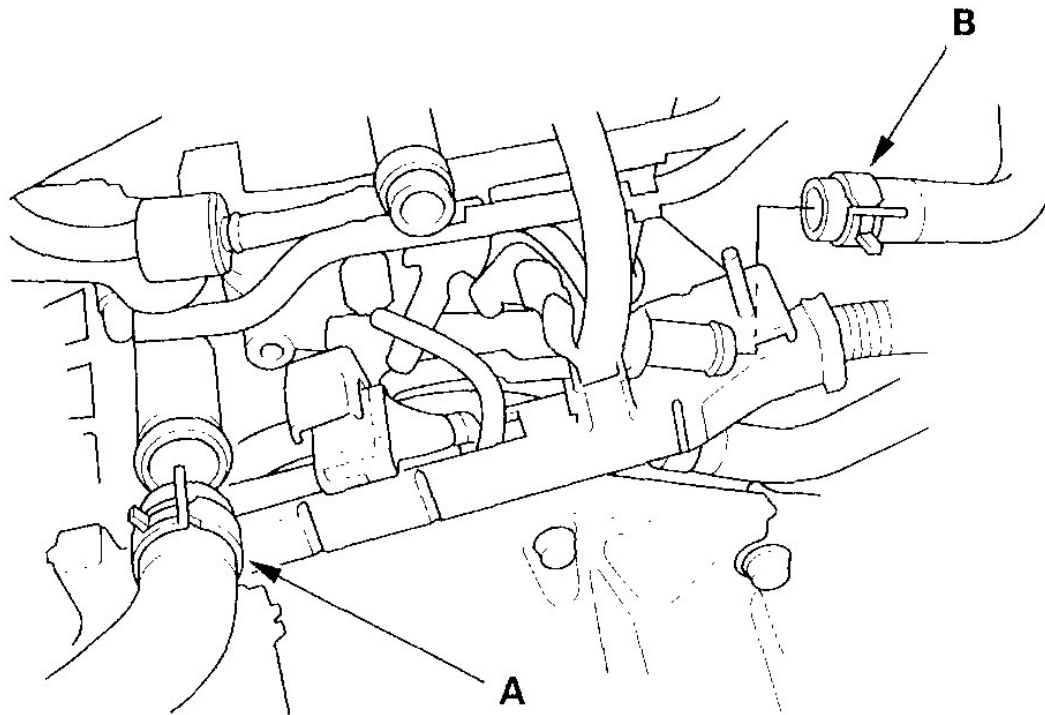


G01399106

Fig. 114: Installing The Water Bypass Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

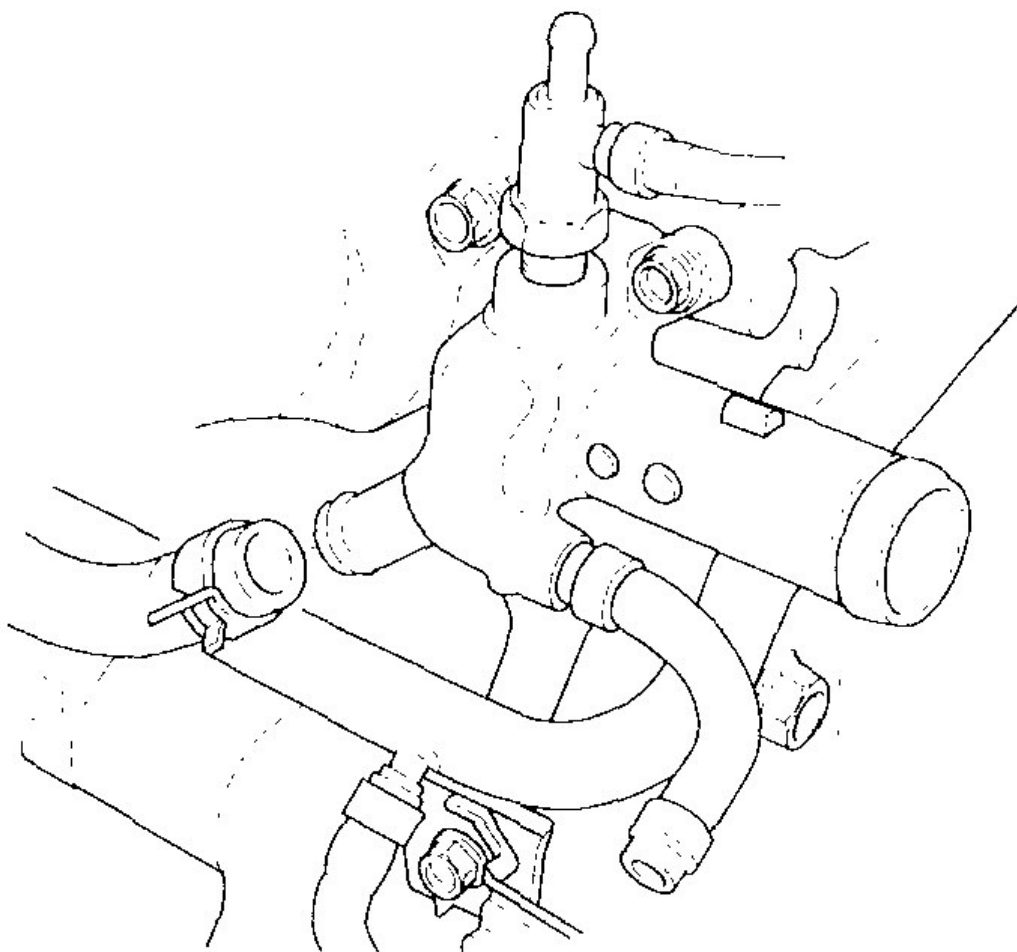
12. Tighten the connecting pipe mounting bolt (B) and brake booster vacuum line mounting bolts (C), then install the harness holder (D) on the bracket.
13. Install the upper radiator hose (A) and heater hose (B).



G01399107

Fig. 115: Installing The Upper Radiator Hose And Heater Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Install the water bypass hose.



G01399108

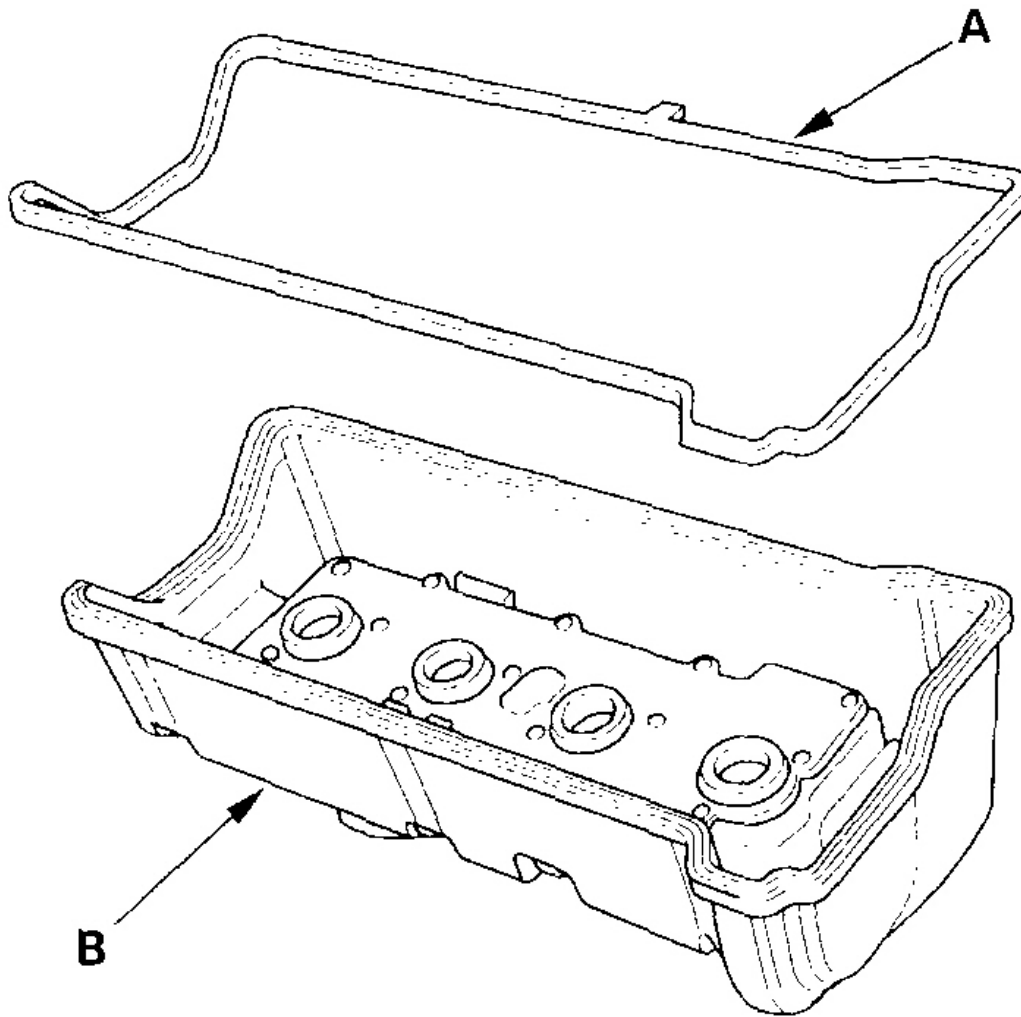
Fig. 116: Installing The Water Bypass Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Install the air cleaner housing (see step 40 of ENGINE INSTALLATION).
16. Install the intake manifold (see INTAKE MANIFOLD REMOVAL & INSTALLATION).
17. Install the exhaust manifold (see EXHAUST MANIFOLD REMOVAL & INSTALLATION).
18. Install the cam chain (see CAM CHAIN INSTALLATION).
19. Adjust the valve clearance (see VALVE CLEARANCE ADJUSTMENT).
20. Install the drive belt (see DRIVE BELT REPLACEMENT).
21. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.

22. After installation, check that all tubes, hoses, and connectors are installed correctly.
23. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
24. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 7 of **COOLANT REPLACEMENT**).
25. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
26. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).

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).

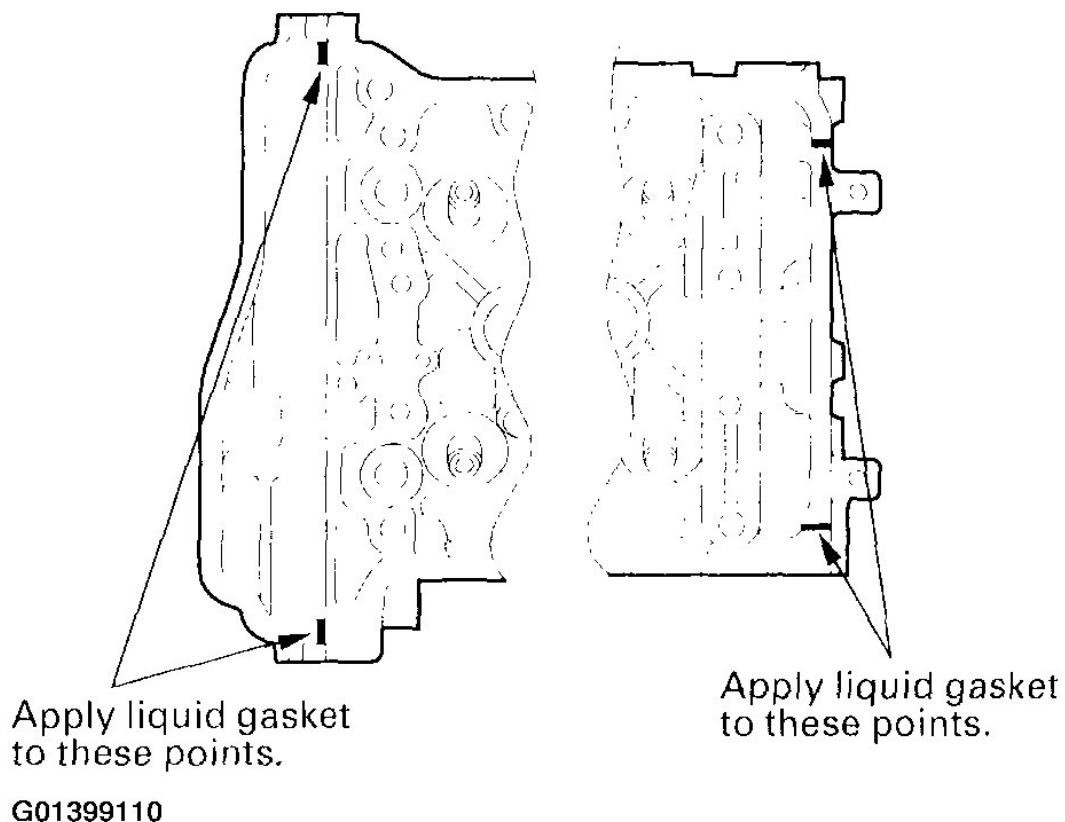


G01399109

Fig. 117: Installing The Head Cover Gasket In The Groove Of The Cylinder Head Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

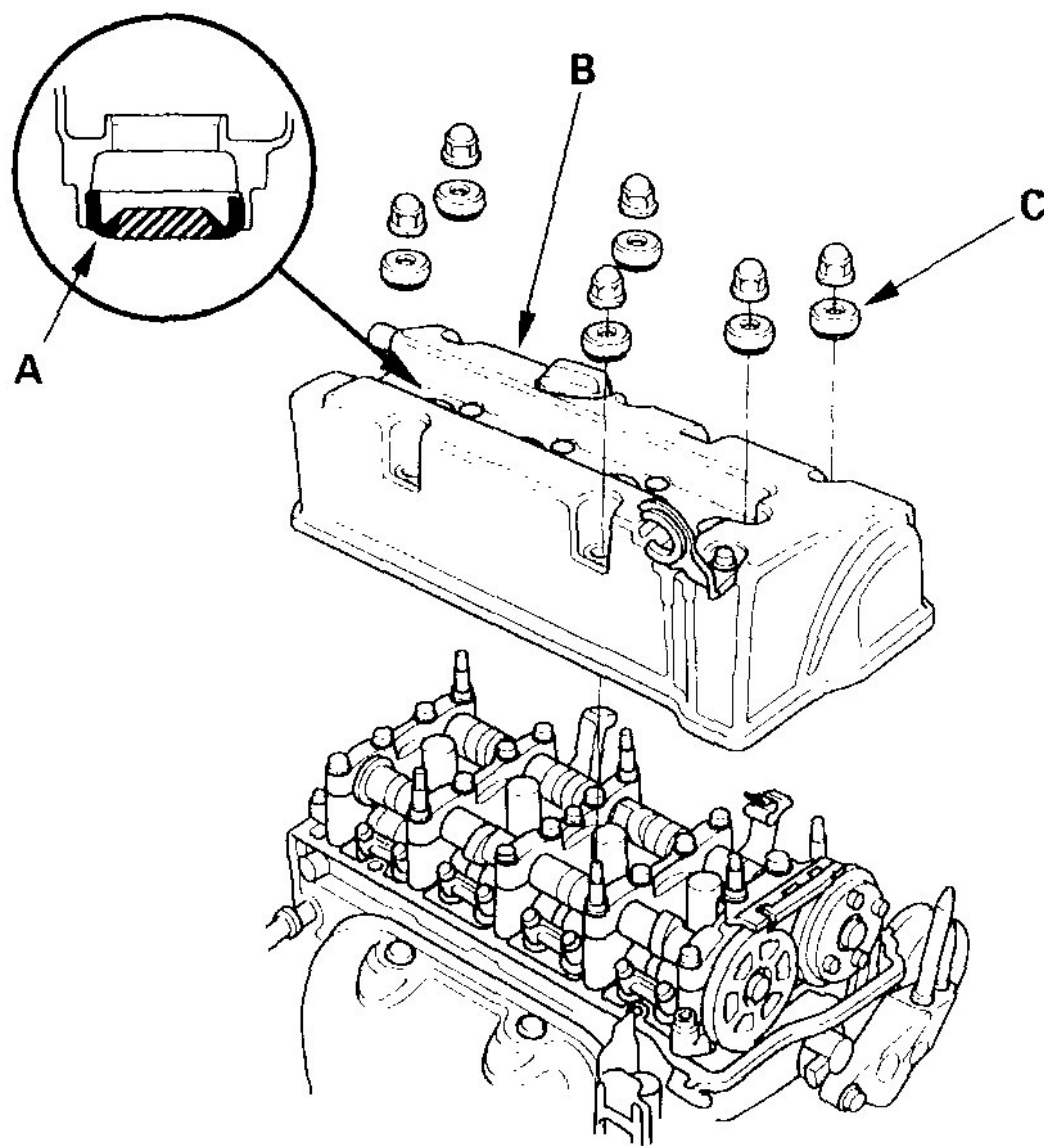
3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08718-0009, on the chain case and the No. 5 rocker shaft holder mating areas.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

**Fig. 118: Applying Liquid Gasket**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

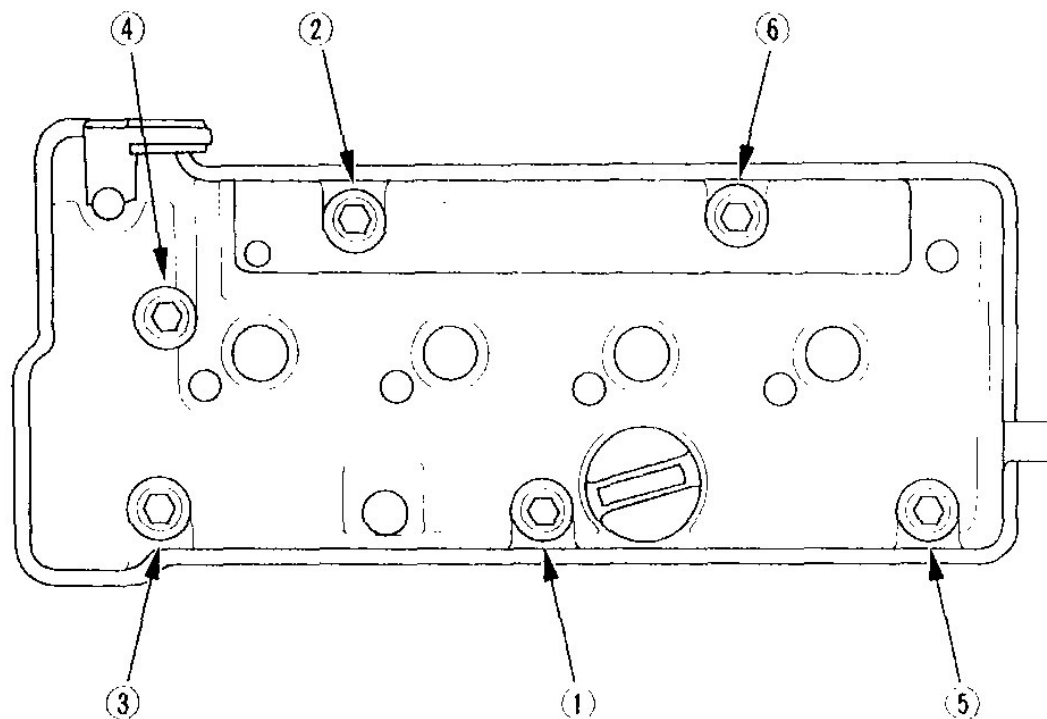
5. Set the spark plug seals (A) on the spark plug tubes. Once the cylinder head cover (B) is on the cylinder head, slide the cover slightly back and forth to seat the head cover gasket.



G01399111

Fig. 119: Setting The Spark Plug Seals On The Spark Plug Tubes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

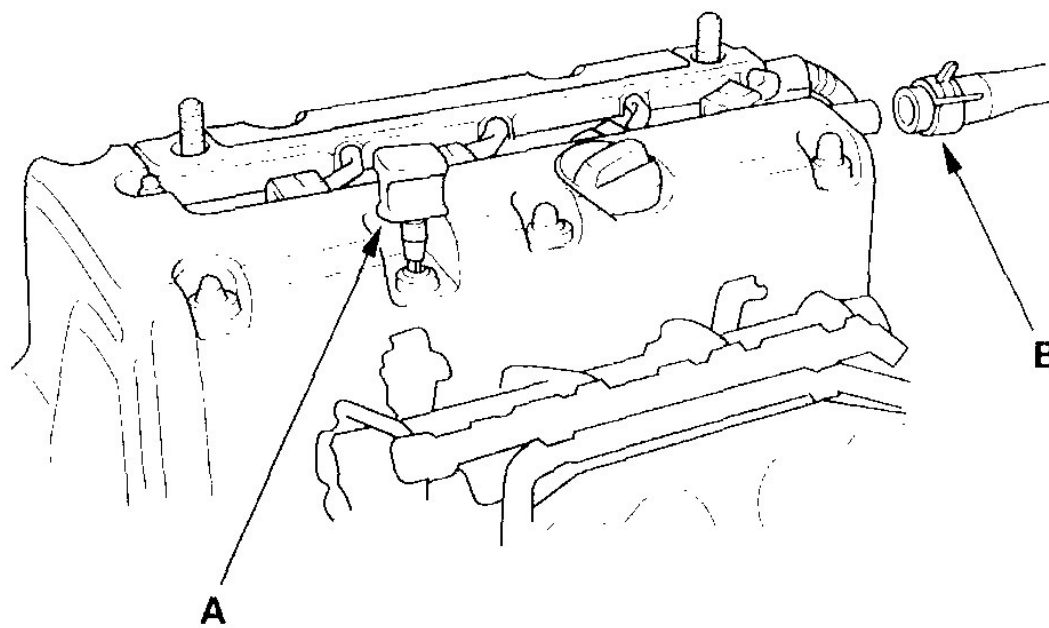
6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in two or three steps. In the final step, tighten all bolts, in sequence, to 9.8 N.m (1.0 kgf.m, 7.2 lbf.ft).



G01399112

Fig. 120: Cylinder Head Cover Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

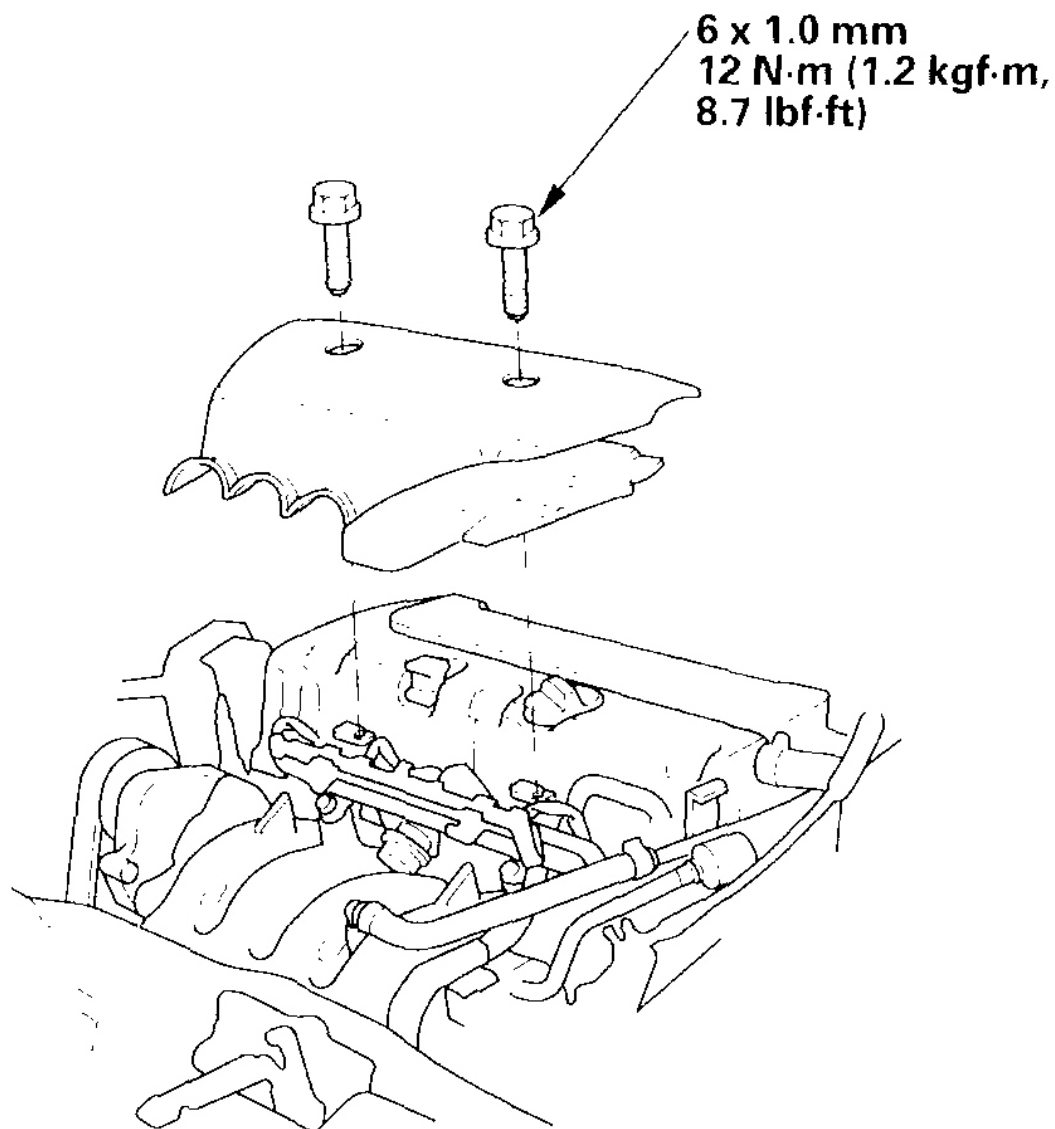
8. Install the dipstick (A) and breather hose (B).



G01399113

Fig. 121: Installing The Dipstick And Breather Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Install the four ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
10. Check that all tubes, hoses, and connectors are installed correctly.
11. Install the intake manifold cover.



G01399114

Fig. 122: Installing The Intake Manifold Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

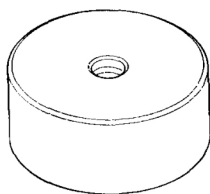
ENGINE BLOCK

SPECIAL TOOLS

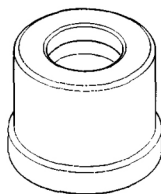
2003 Honda Civic Si

2002-05 ENGINES 2.0L 4-Cylinder - Civic (Hatchback)

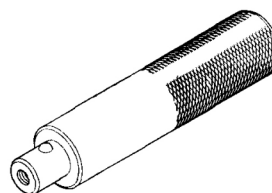
Ref. No.	Tool Number	Description	Qty
①	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1
②	07746-0010700	Attachment, 24 x 26 mm	1
③	07749-0010000	Driver	1



①



②



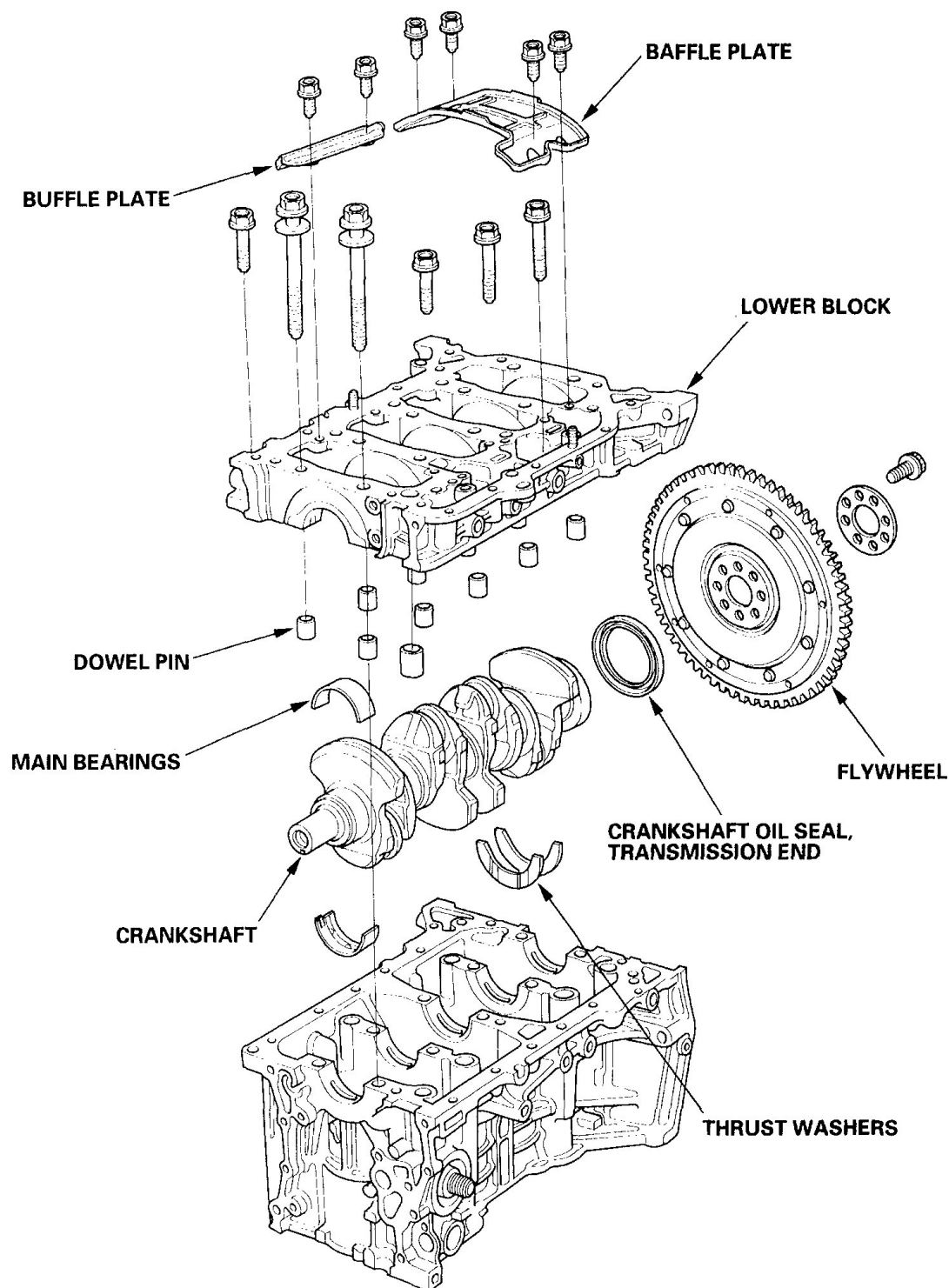
③

G01399115

Fig. 123: Special Tools

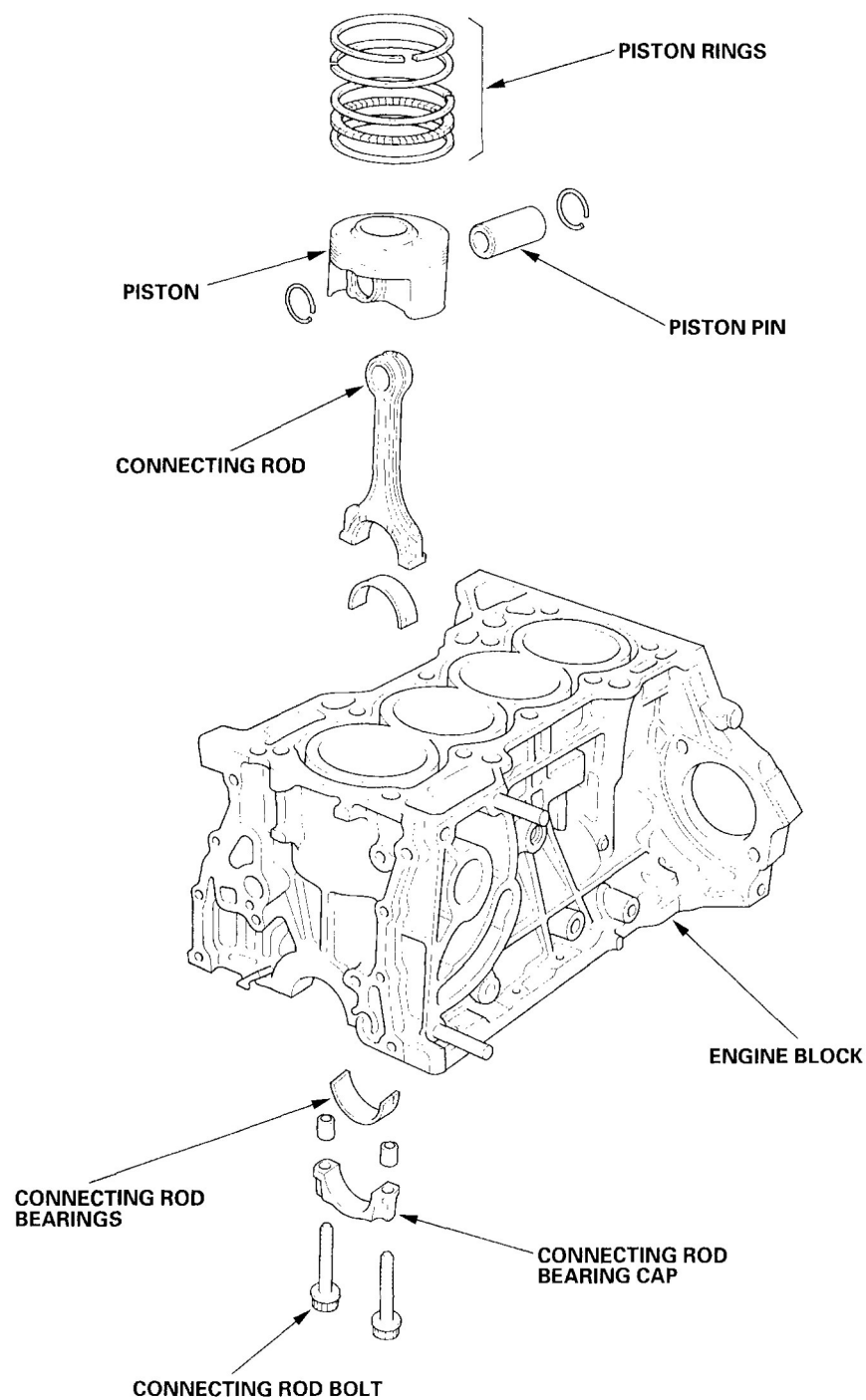
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX



G01399116

Fig. 124: Exploded View Of Engine Block Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



G01399117

Fig. 125: Exploded View Of Piston/Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

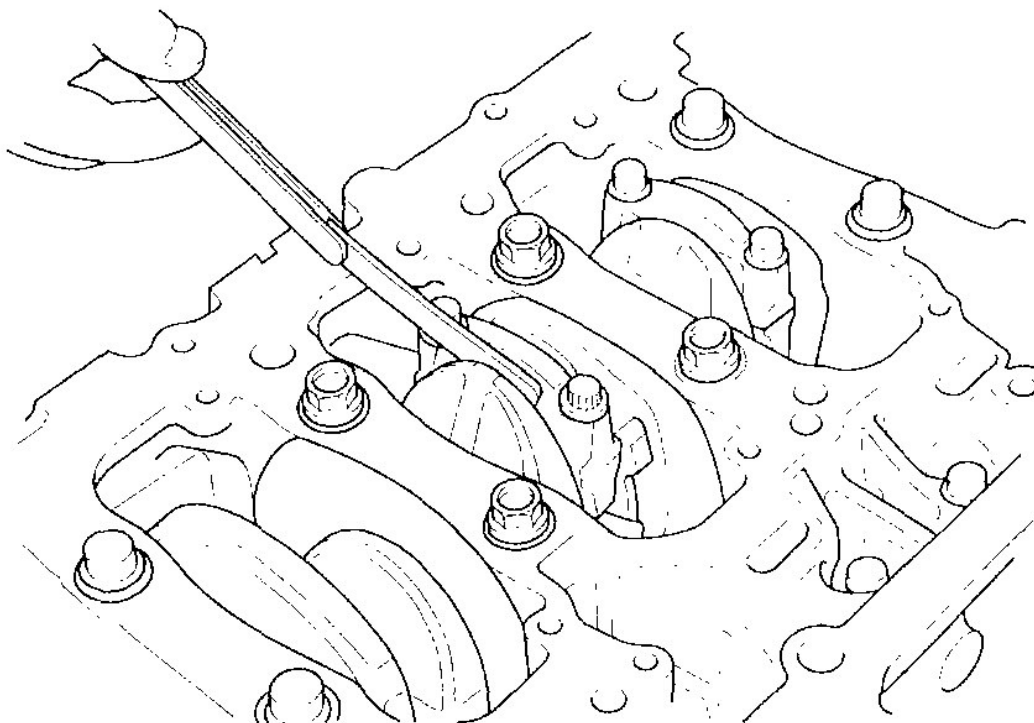
CONNECTING ROD & CRANKSHAFT END PLAY INSPECTION

1. Remove the oil pump (see **OIL PUMP OVERHAUL**).
2. Remove the baffle plates (see step 6 on **CRANKSHAFT & PISTON REMOVAL**).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and crankshaft.

Connecting Rod End Play:

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

Service Limit: 0.40 mm (0.016 in.)



G01399118

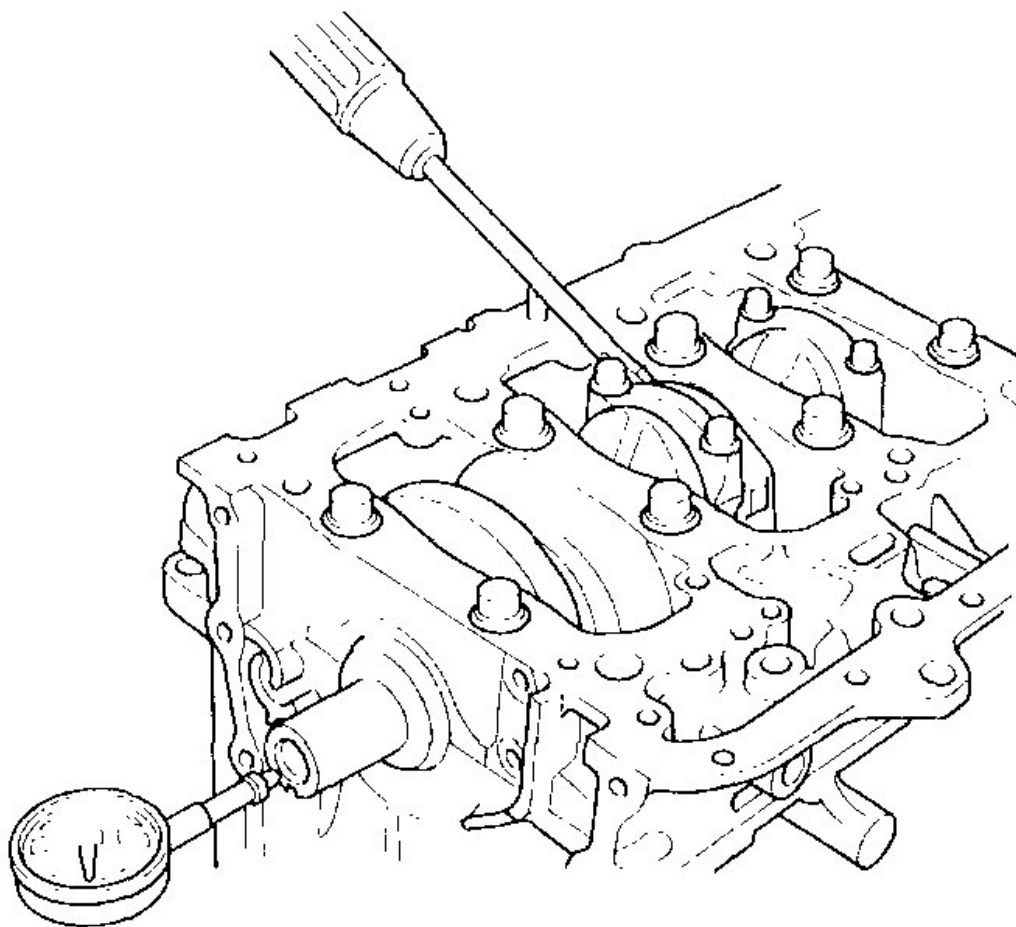
Fig. 126: Measuring The Connecting Rod End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Crankshaft End Play:

Standard (New): 0.10-0.35 mm (0.004-0.014 in.)

Service Limit: 0.45 mm (0.018 in.)



G01399119

Fig. 127: Measuring The Crankshaft End Play
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the end play is out-of-tolerance, replace the thrust washers and recheck. If it is still out-of-tolerance, replace the crankshaft (see **CRANKSHAFT & PISTON REMOVAL**).

CRANKSHAFT MAIN BEARING REPLACEMENT

Main Bearing Clearance Inspection

1. To check main bearing-to-journal oil clearance, remove the lower block and bearing halves (see **CRANKSHAFT & PISTON REMOVAL**).
2. Clean each main journal and bearing half with a clean shop towel.

3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and lower block, then torque the bolts to 29 N.m (3.0 kgf.m, 22 lbf.ft) + 56°.

NOTE: Do not rotate the crankshaft during inspection.

5. Remove the lower block and bearings again, and measure the widest part of the plastigage.

Main Bearing-To-Journal Oil Clearance:

No. 1, 2, 4, 5 Journals:

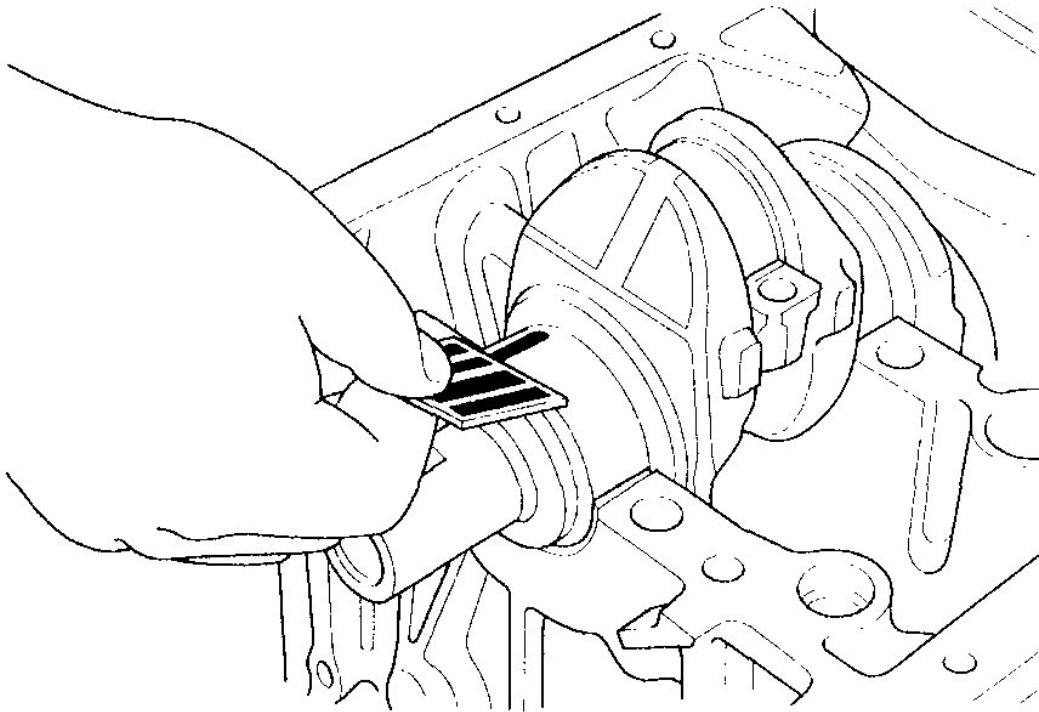
Standard (New): 0.017-0.041 mm (0.0007-0.0016 in.)

Service Limit: 0.050 mm (0.0020 in.)

No. 3 Journal:

Standard (New): 0.025-0.049 mm (0.0010-0.0019 in.)

Service Limit: 0.055 mm (0.0022 in.)



G01399120

Fig. 128: Measuring The Widest Part Of The Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of

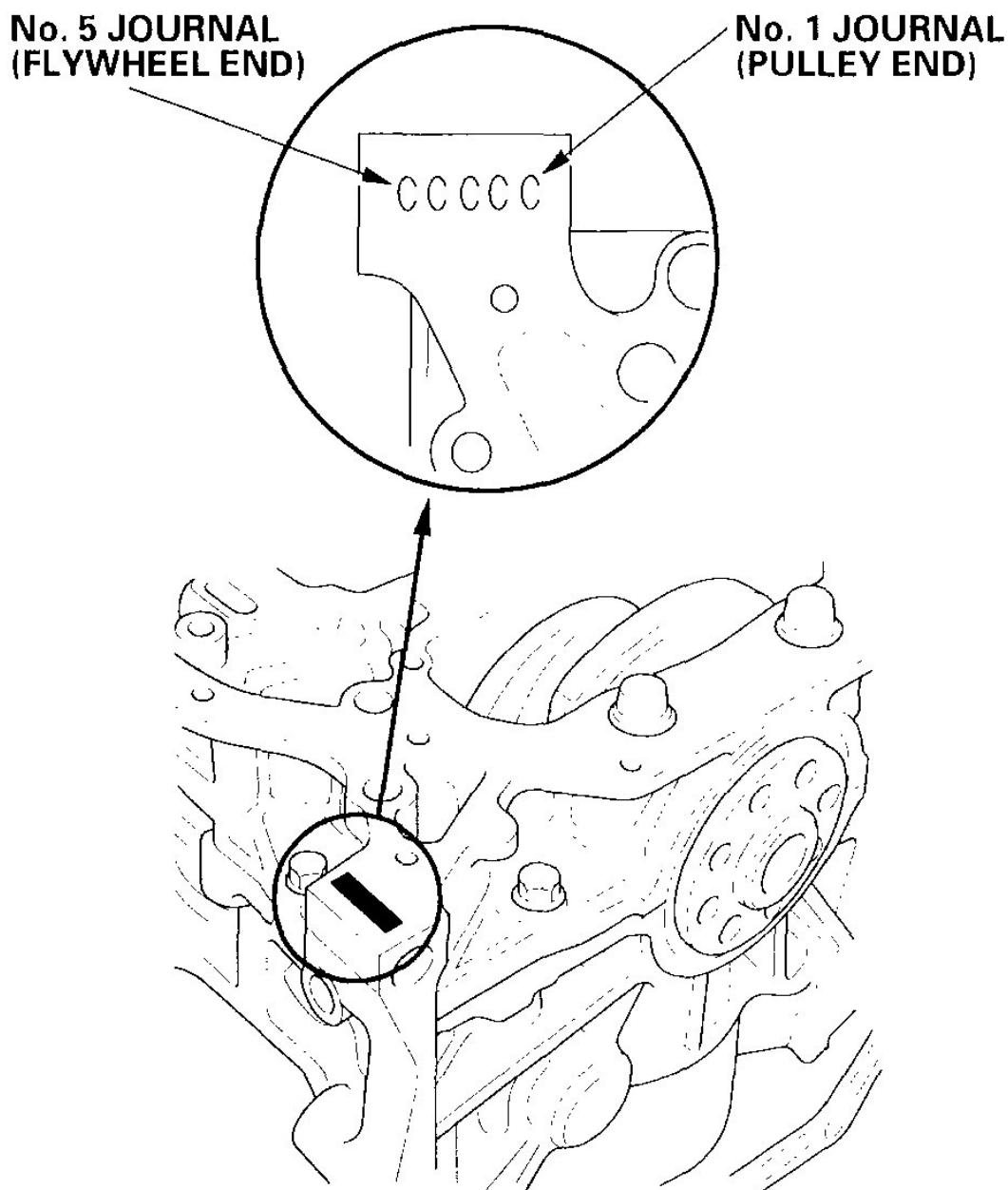
the bearing. Install a new, complete bearing with the same color code(s), and recheck the clearance. Do not file, shim, or scrape the bearings or the caps to adjust clearance.

7. If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check again. If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

Main Bearing Selection

Crankshaft Bore Code Location

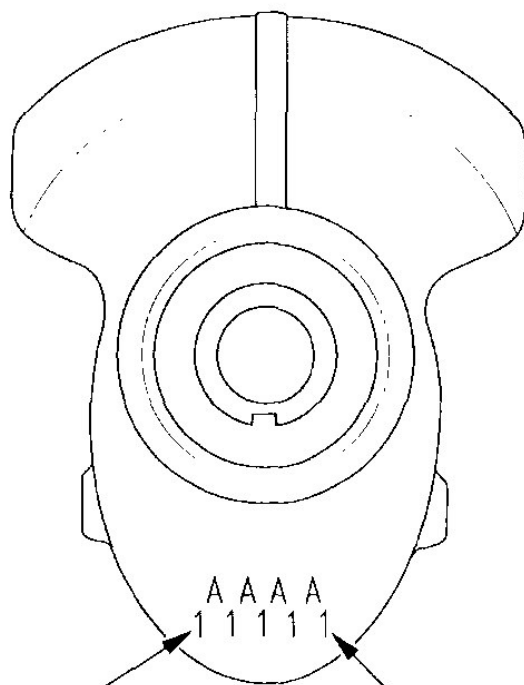
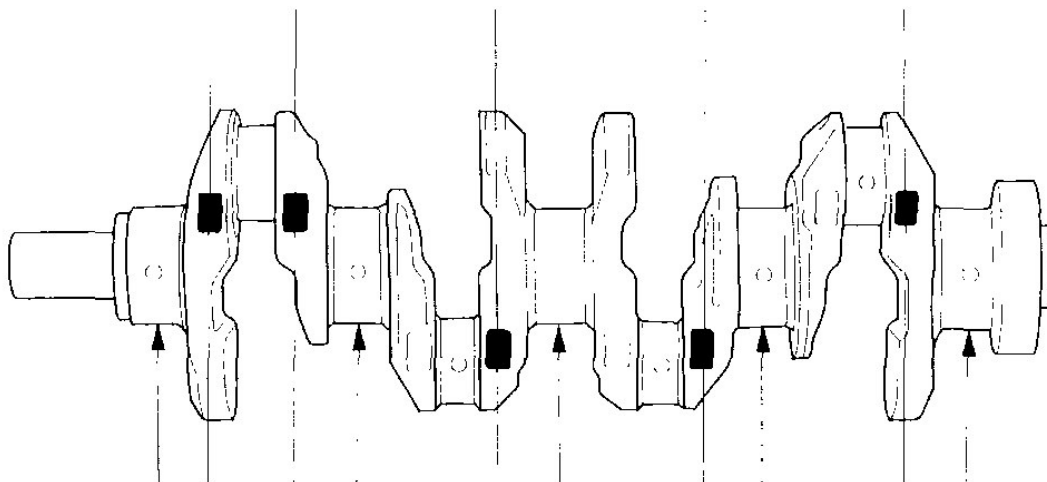
1. Numbers or letters or bars have been stamped on the end of the block as a code for the size of each of the five main journal bores. Write down the crank bore codes. If you can't read the codes because of accumulated dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



G01399121

Fig. 129: Locating Crankshaft Bore Codes
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. The main journal codes are stamped on the crankshaft.



No. 1 JOURNAL

No. 5 JOURNAL

G01399122

Fig. 130: Locating Main Journal Codes

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Use the crank bore codes and crank journal codes to select the appropriate replacement bearings from the following table. See **Fig. 131**.

NOTE:

- Color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

Main journal code	Crank bore code	Larger crank bore			
		1 or A or I	2 or B or II	3 or C or III	4 or D or IIII
		Smaller bearing (Thicker)			
1		Pink	Pink/Yellow	Yellow	Green
2		Pink/Yellow	Yellow	Green	Green/Brown
3		Yellow	Green	Green/Brown	Brown
4		Green	Green/Brown	Brown	Black
5		Green/Brown	Brown	Black	Black/Blue
6		Brown	Black	Black/Blue	Blue

Smaller main journal
 Smaller bearing (Thicker)

G01399123

Fig. 131: Replacement Bearings Table

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

Rod Bearing Clearance Inspection

1. Remove the oil pump (see **OIL PUMP OVERHAUL**).
2. Remove the baffle plates (see step 6 of **CRANKSHAFT & PISTON REMOVAL**).
3. Remove the connecting rod cap and bearing half.
4. Clean the crankshaft rod journal and bearing half with a clean shop towel.
5. Place plastigage across the rod journal.
6. Reinstall the bearing half and cap, and torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) + 90°.

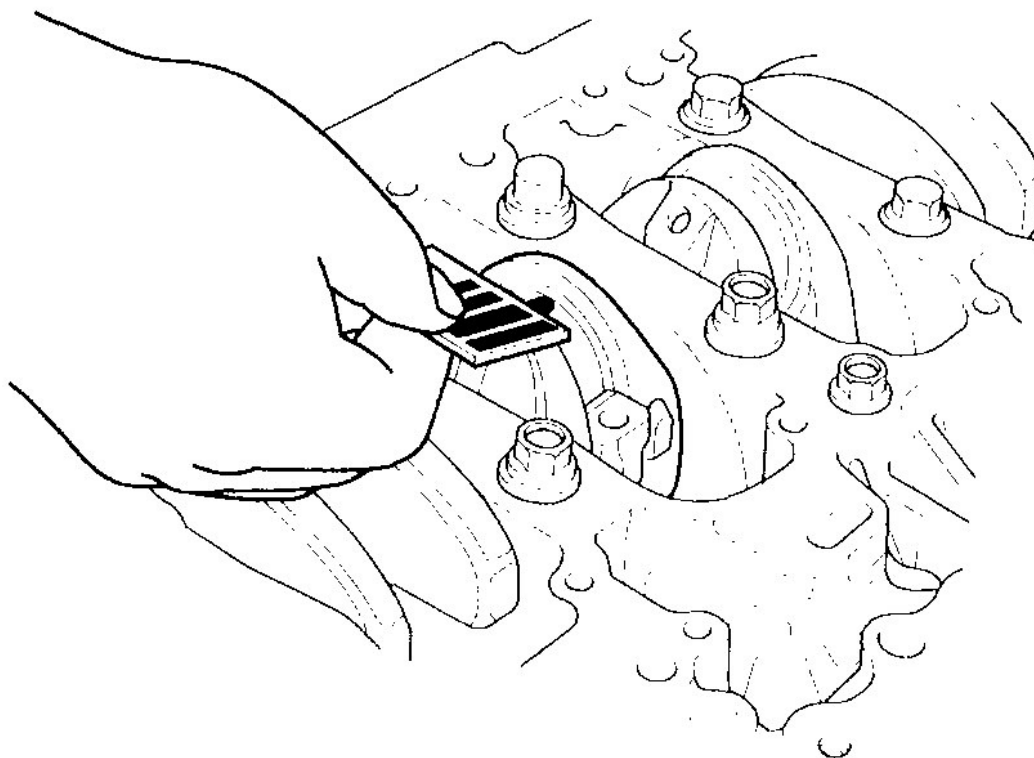
NOTE: **Do not rotate the crankshaft during inspection.**

7. Remove the rod cap and bearing half, and measure the widest part of the plastigage.

Connecting Rod Bearing-To-Journal Oil Clearance:

Standard (New): 0.020-0.050 mm (0.0008-0.0020 in.)

Service Limit: 0.060 mm (0.0024 in.)



G01399124

Fig. 132: Measuring The Widest Part Of The Plastigage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Rod Bearing Selection

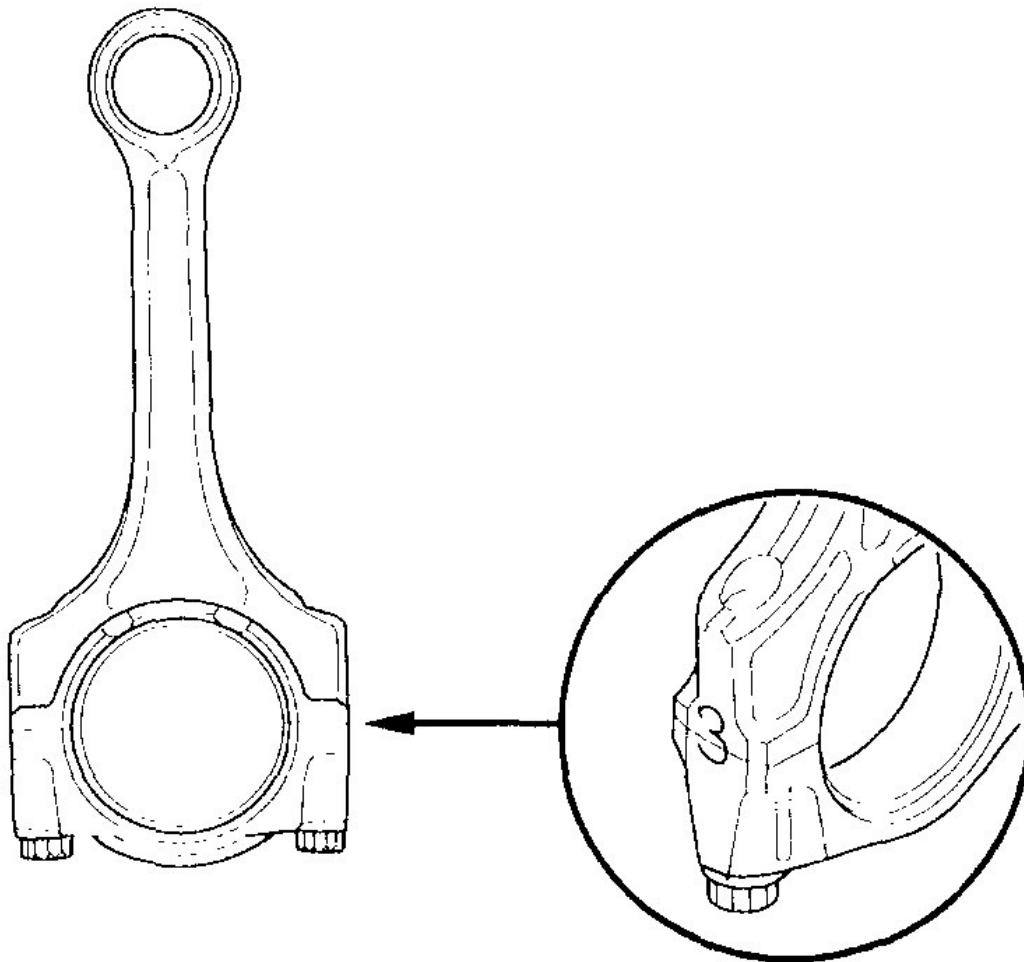
1. Inspect each connecting rod for cracks and heat damage.

Connecting Rod Big End Bore Code Locations

2. Each rod has a tolerance range from 0-0.024 mm (0.0009 in.), in 0.006 mm (0.0002 in.) increments, depending on the size of its big end bore. It's then stamped with a number or bar (1, 2, 3 or 4/I, II, III, or IIII) indicating the range. You may find any combination of numbers and bars in any engine. (Half the

number or bar is stamped on the bearing cap, the other half on the rod.) If you can't read the code because of an accumulation of oil and varnish, do not scrub it with a wire brush or scraper. Clean it only with solvent or detergent.

Normal Bore Size: 48.0 mm (1.89 in.)



G01399125

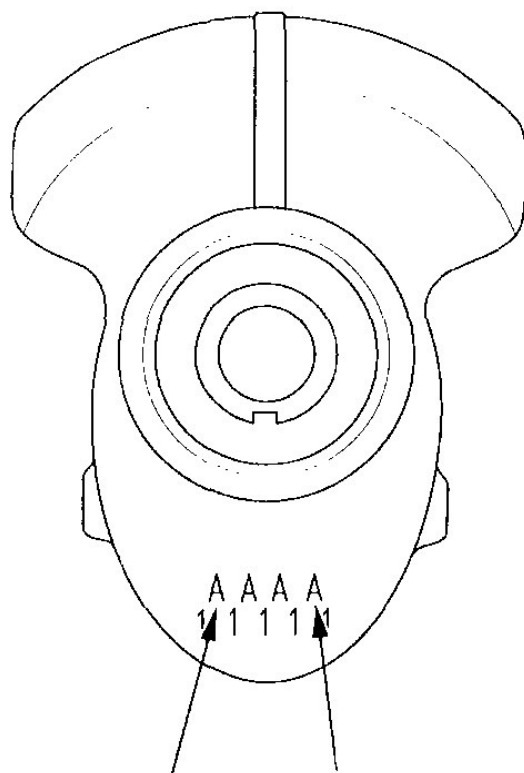
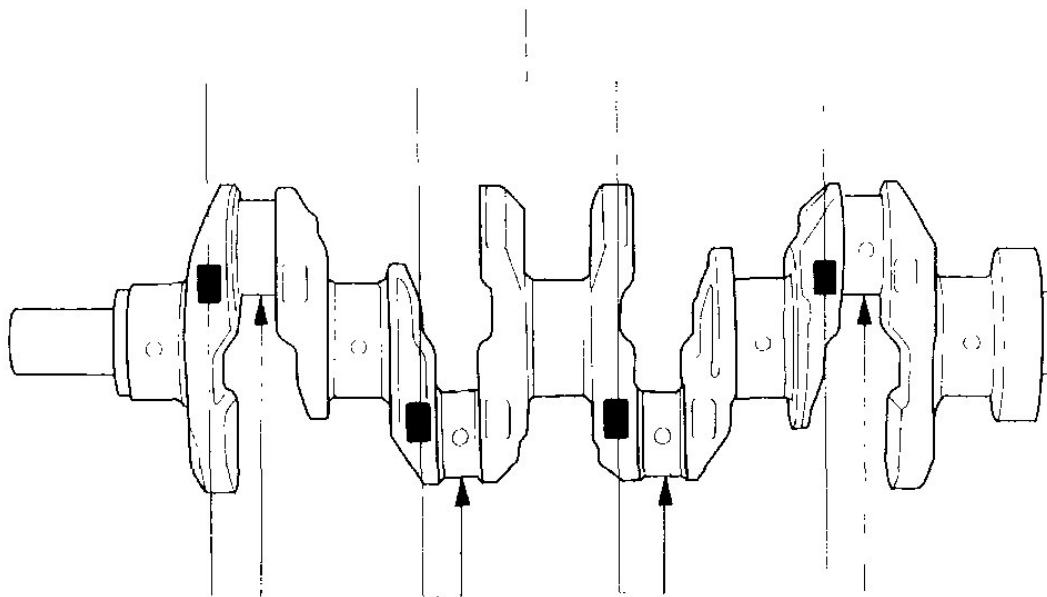
Fig. 133: Locating Connecting Rod Big End Bore Code
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Location

3. The connecting rod journal codes are stamped on the crankshaft.

2003 Honda Civic Si

2002-05 ENGINES 2.0L 4-Cylinder - Civic (Hatchback)



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G01399126

Fig. 134: Locating Connecting Rod Journal Code (Letters or Bars)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Use the big end bore codes and rod journal codes to select appropriate replacement bearings from the following table. See **Fig. 135**.

NOTE:

- Color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

		Big end bore code		→ Larger big end bore	
		1 or I	2 or II	3 or III	4 or IIII
		→ Smaller bearing (Thicker)			
Rod journal code	A	Pink	Pink/ Yellow	Yellow/ Green	Green
	B	Yellow	Yellow/ Green	Green/ Brown	Brown
	C	Green	Green/ Brown	Brown/ Black	Black
	D	Brown	Brown/ Black	Black/ Blue	Blue
↓ Smaller rod journal		↓ Smaller bearing (Thicker)			

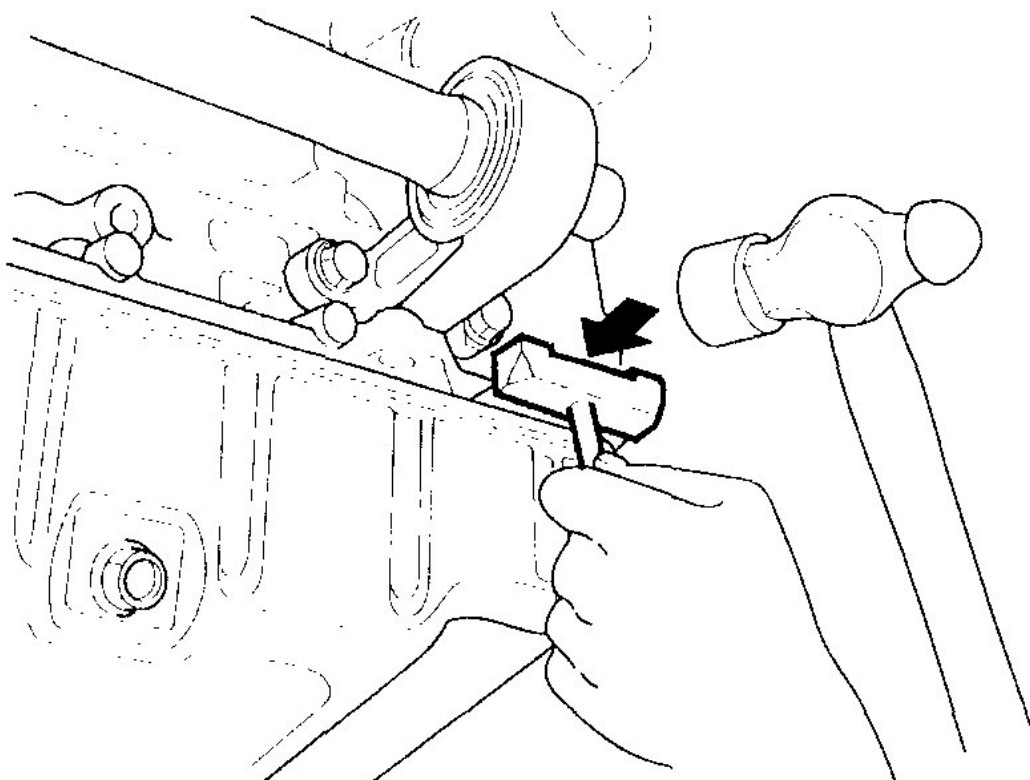
G01399127

Fig. 135: Replacement Bearings Table

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

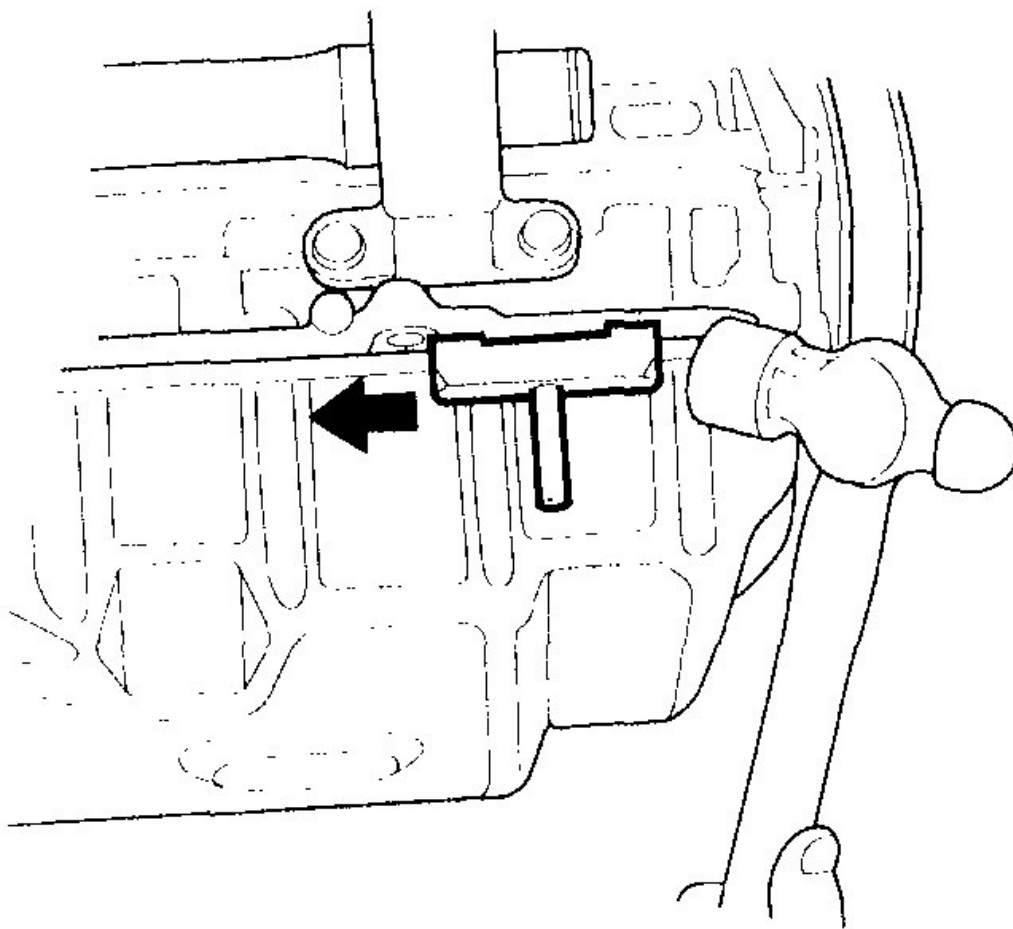
1. Drain the engine oil (see **ENGINE OIL REPLACEMENT**).
2. If the engine is still in the vehicle, remove the subframe:
 - a. Attach the engine hanger to the engine (see step 35 of **ENGINE REMOVAL**).
 - b. Disconnect the suspension lower arm ball joints (see step 3 of **BALL JOINT**).
 - c. Remove the rear mount mounting bolts (see step 40 of **ENGINE REMOVAL**).
 - d. Remove the front mount mounting bolt (see step 41 of **ENGINE REMOVAL**).
 - e. Use a marker to make alignment marks on the reference lines that align with the centers of the rear subframe mounting bolts. Remove the front subframe (see step 44 of **ENGINE REMOVAL**).
3. Remove the bolts/nuts securing the oil pan.
4. Drive an oil pan seal cutter between the oil pan and cylinder block.



G01399128

Fig. 136: Driving An Oil Pan Seal Cutter Between The Oil Pan And Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Cut the oil pan seal by striking the side of the cutter to slide the cutter along the oil pan.



G01399129

Fig. 137: Sliding The Cutter Along The Oil Pan
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the oil pan.

CRANKSHAFT & PISTON REMOVAL

1. Remove the engine assembly (see ENGINE REMOVAL).
2. Remove the transmission (see TRANSMISSION REMOVAL).
3. Remove the oil pan (see OIL PAN REMOVAL).
4. Remove the flywheel (see SHAFTS AND CLUTCHES).
5. Remove the oil pump (see OIL PUMP OVERHAUL).

6. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
7. Remove the baffle plates.

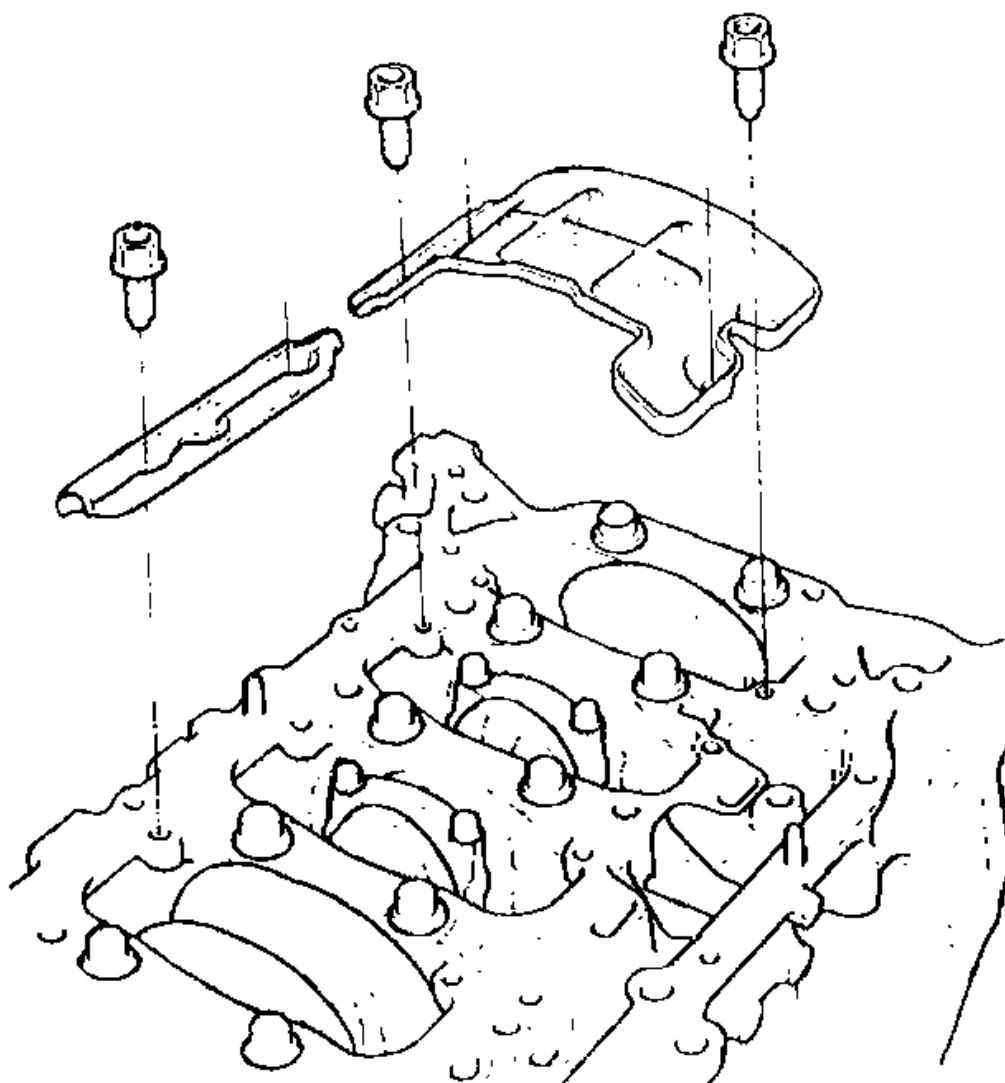
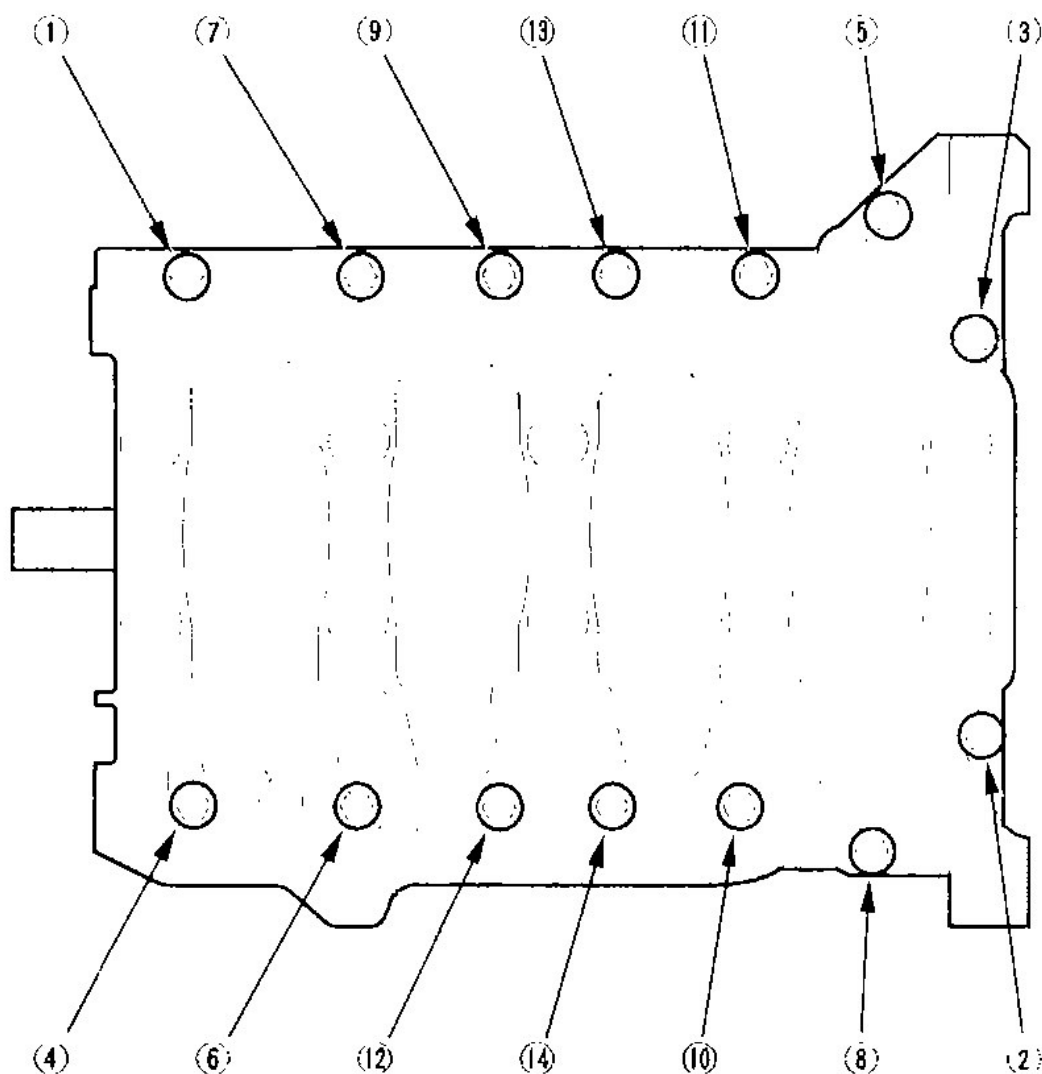
**G01399130**

Fig. 138: Removing The Baffle Plates
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Remove the 8 mm bolts.

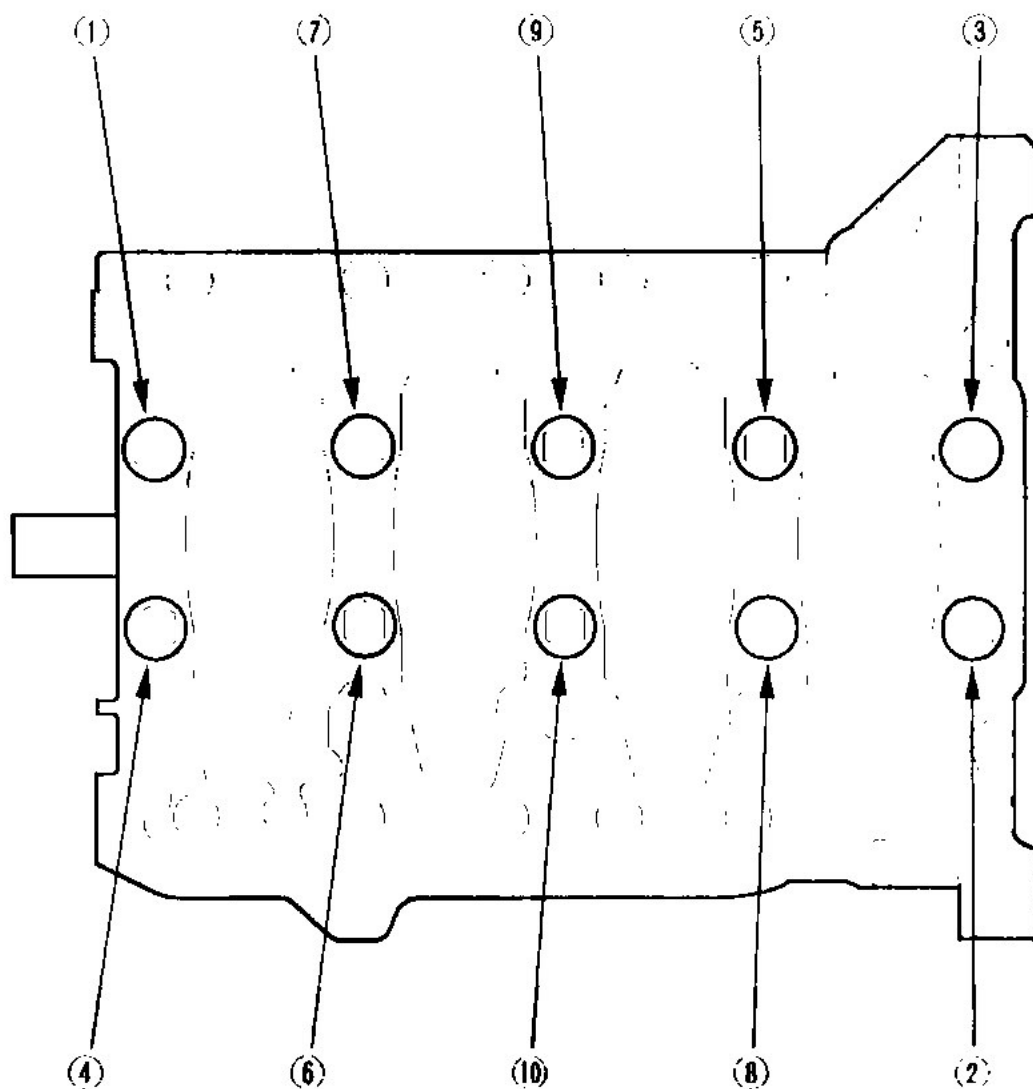


G01399131

Fig. 139: Removing The 8 mm Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

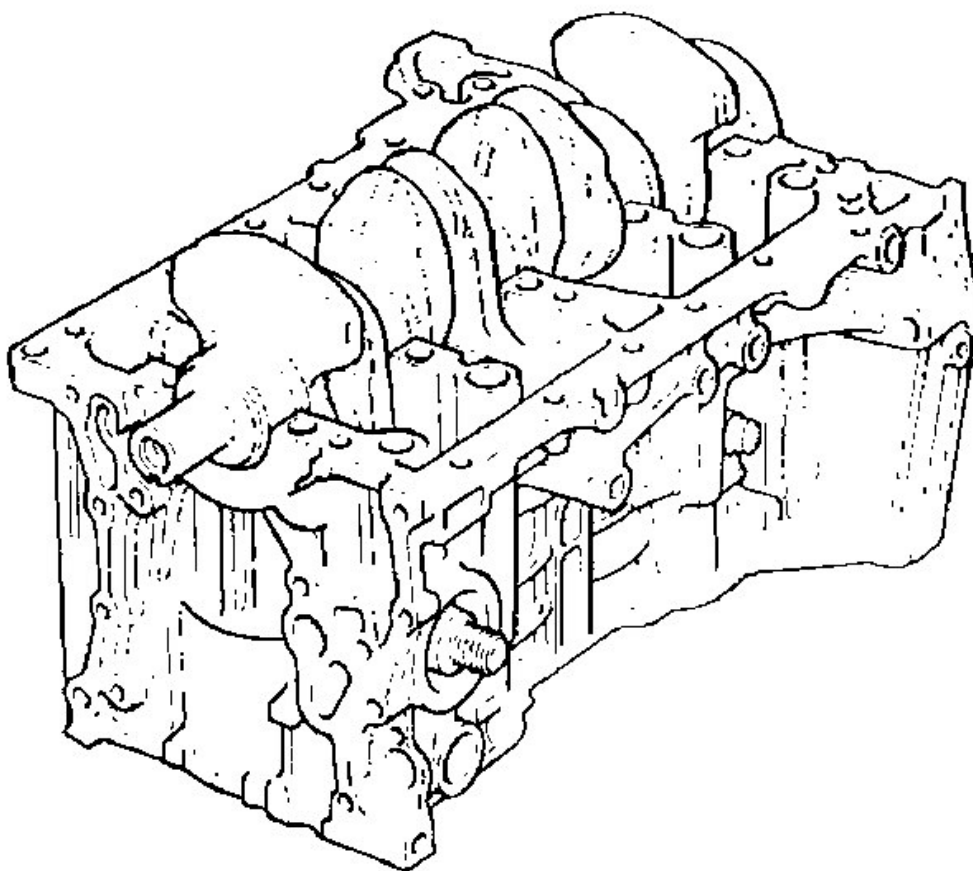
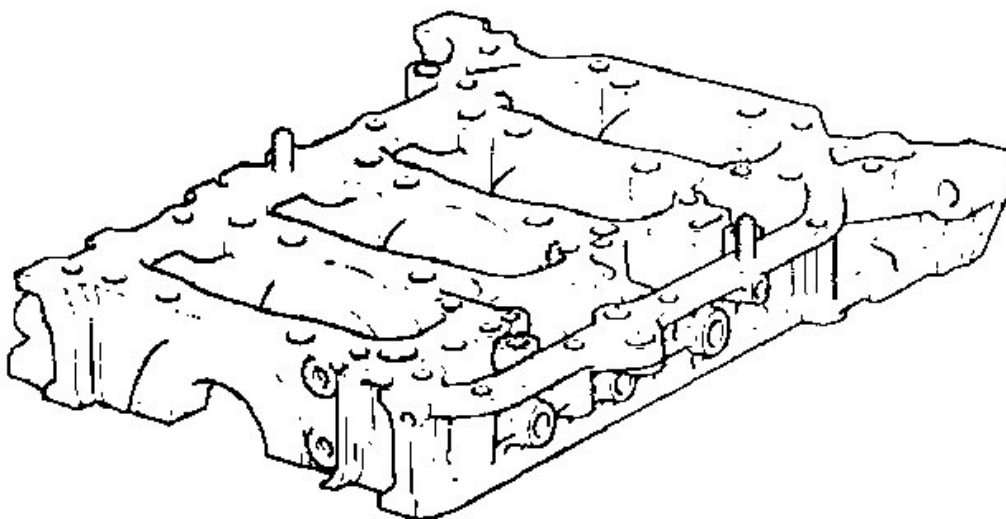


G01399132

Fig. 140: Removing The Bearing Cap Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the lower block and bearings. Keep all bearings in order.



G01399133

Fig. 141: Removing The Lower Block And Bearings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the rod caps/bearings. Keep all caps/bearings in order.
12. Lift the crankshaft out of the engine, being careful not to damage the journals.

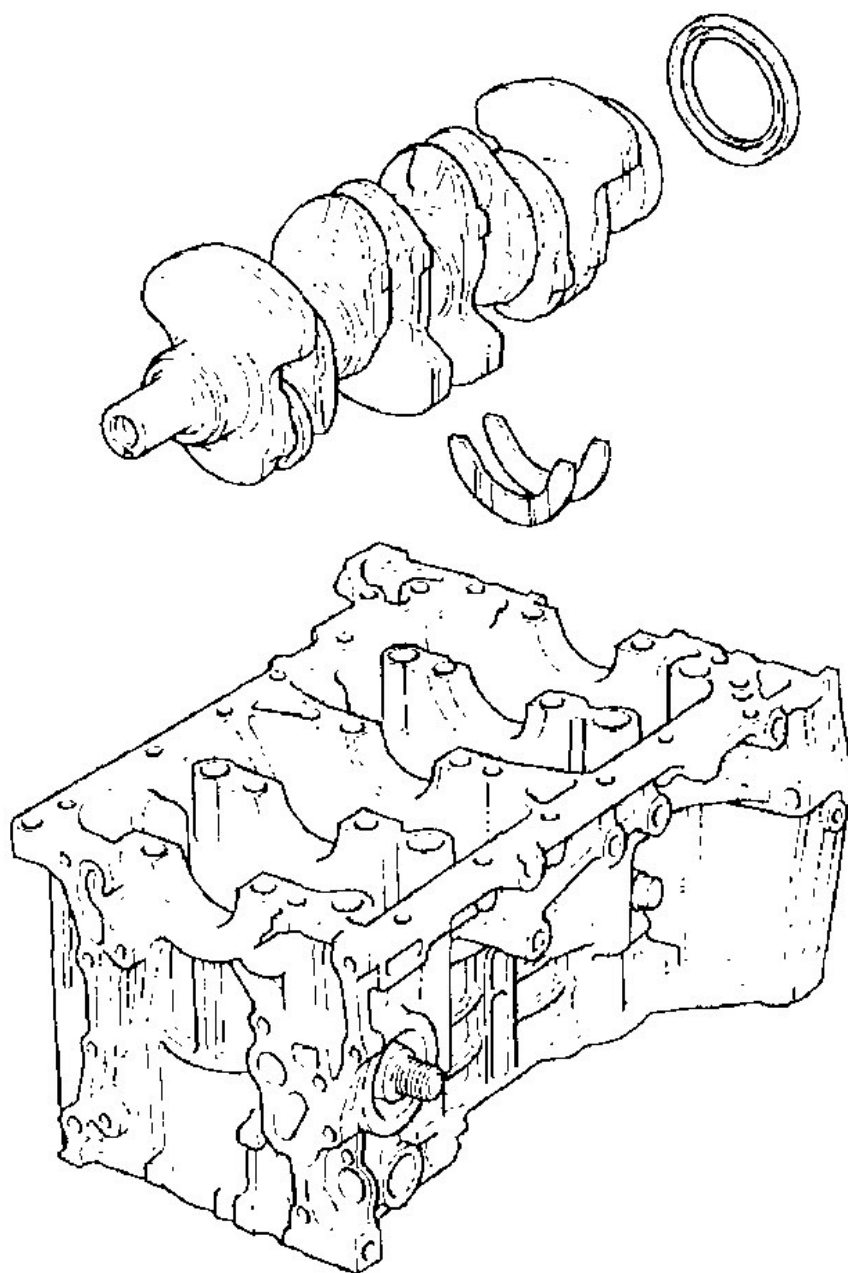
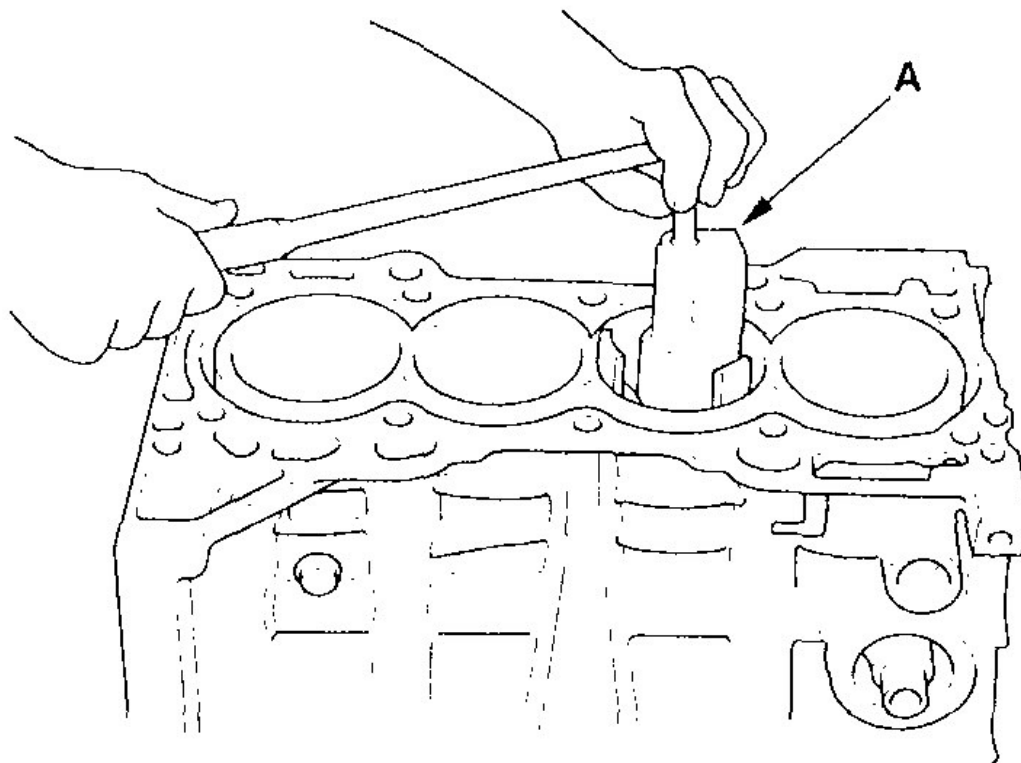
**G01399134**

Fig. 142: Lifting The Crankshaft Out Of The Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
14. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge

reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the pistons as they are pushed out.



G01399135

Fig. 143: Using Ridge Reamer

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

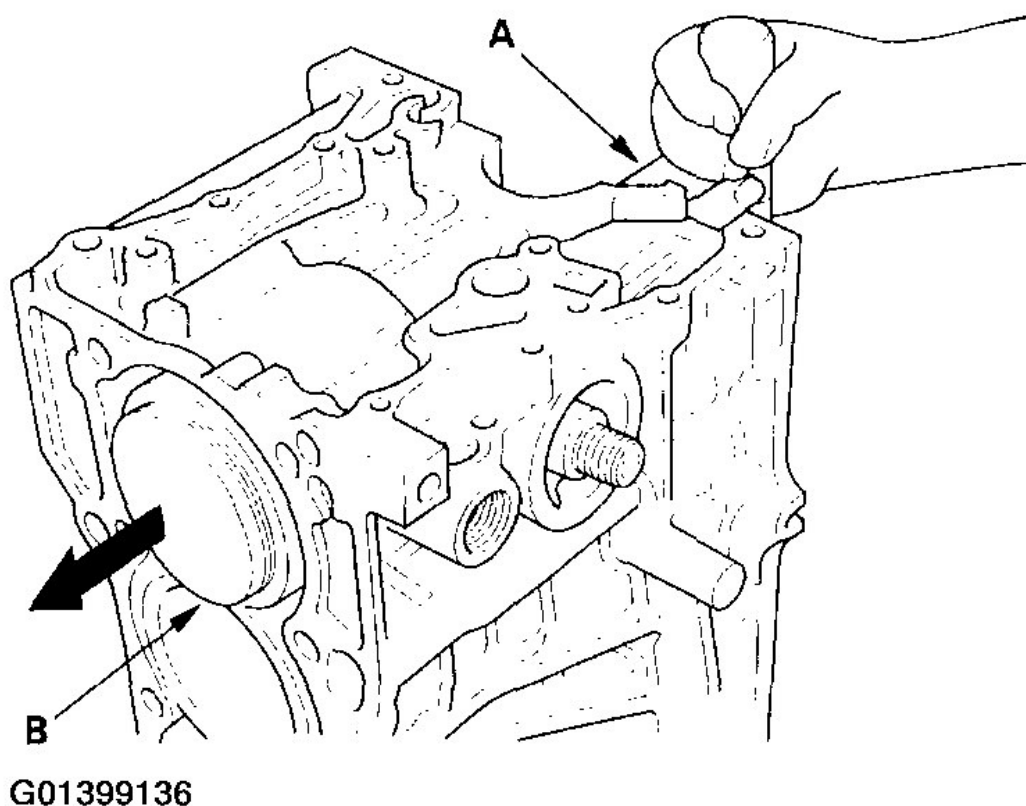


Fig. 144: Driving Out The Pistons

Courtesy of AMERICAN HONDA MOTOR CO., INC.

16. Reinstall the lower block and bearings on the engine in the proper order.
17. Reinstall the connecting rod bearings and caps after removing each piston/connecting rod assembly.
18. To avoid mix up on reassembly, mark each piston/connecting rod assembly with its cylinder number.

NOTE: The existing number on the connecting rod does not indicate its position in the engine, it indicates the rod bore size.

CRANKSHAFT INSPECTION

Out-Of-Round & Taper

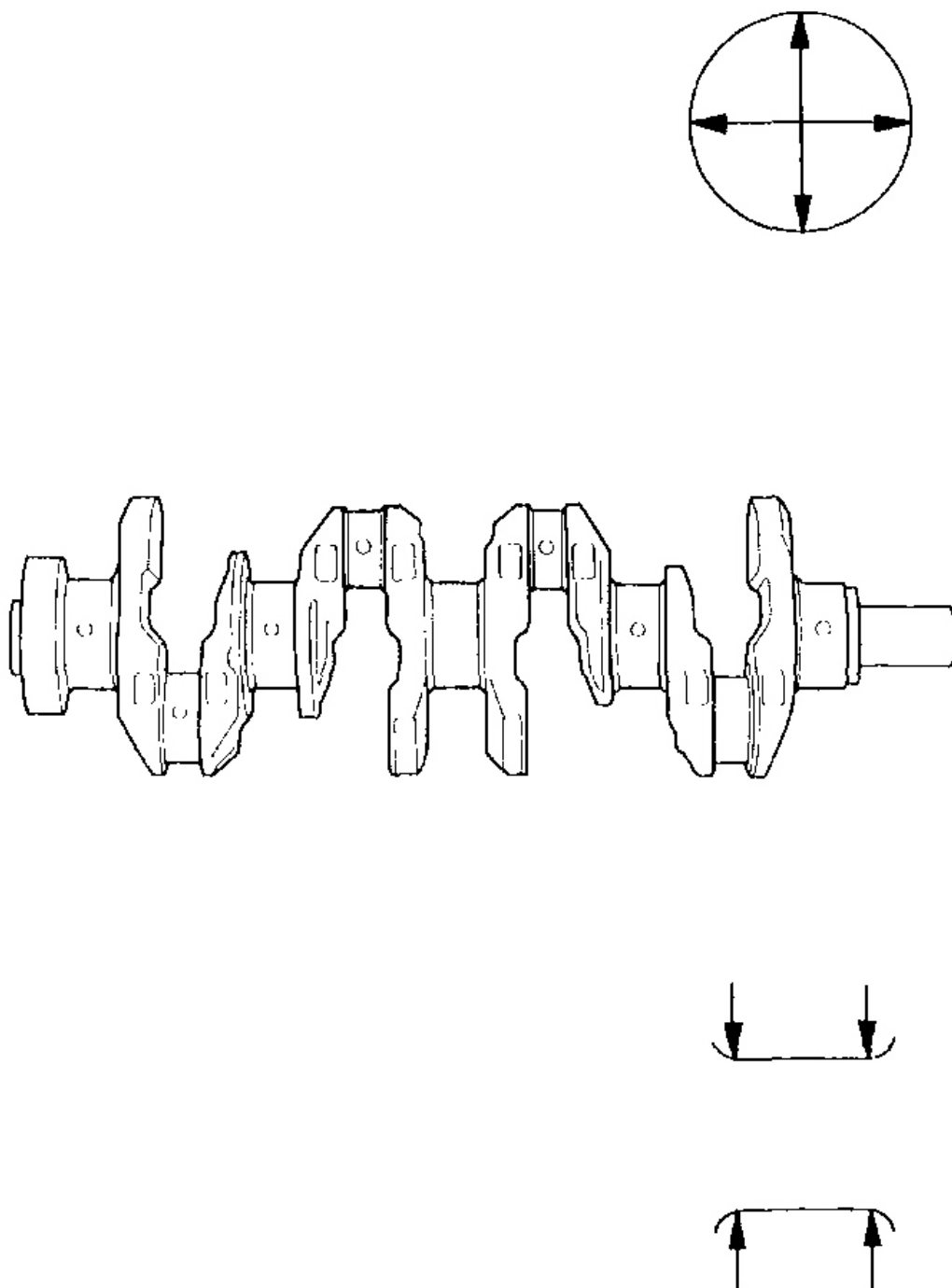
1. Remove the crankshaft from the cylinder block (see **CRANKSHAFT & PISTON REMOVAL**).
2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Clean the keyway and threads.
4. Measure the out-of round at the middle of each rod and main journal in two places. The difference

between measurements on each journal must not be more than the service limit.

Journal Out-Of-Round:

Standard (New): 0.005 mm (0.0002 in.) Max.

Service Limit: 0.010 mm (0.0004 in.)



G01399137

Fig. 145: Measuring The Out-Of Round Of Each Rod And Main Journal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Journal Taper:

Standard (New): 0.005 mm (0.0002 in.) Max.

Service Limit: 0.010 mm (0.0004 in.)

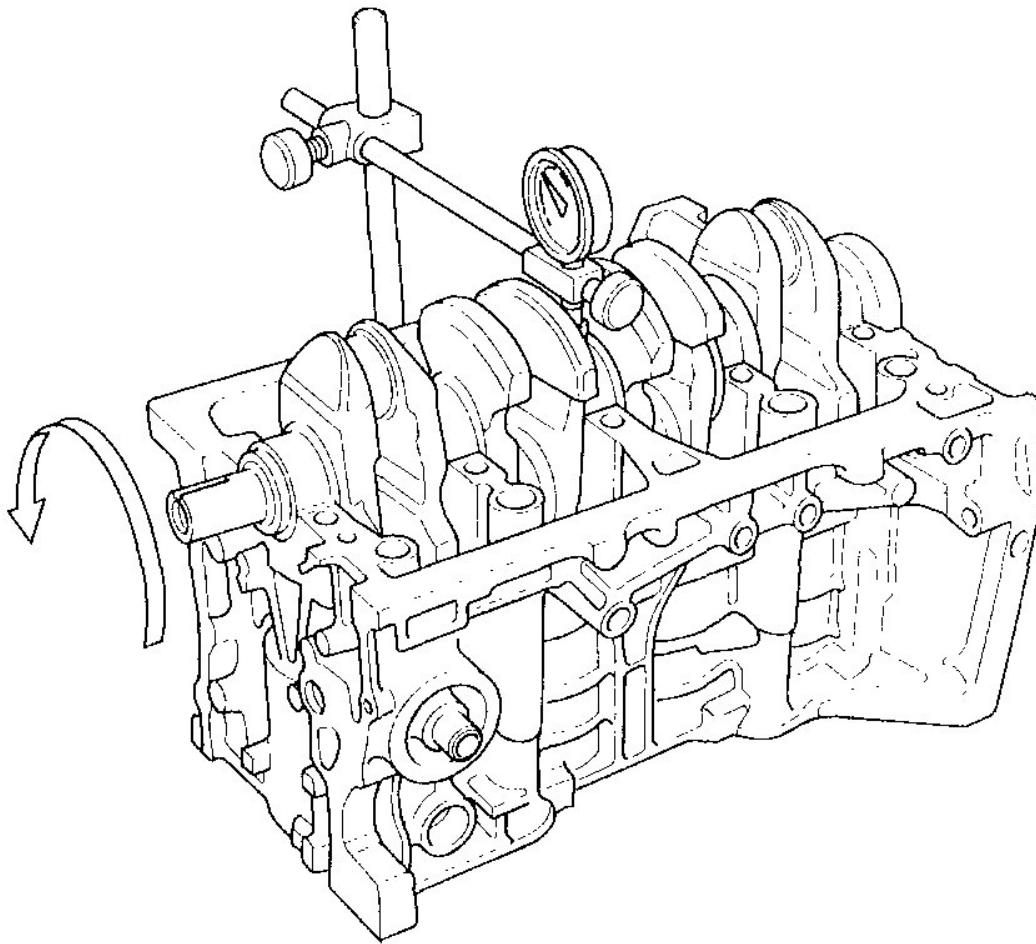
Straightness

1. Place the cylinder block on the surface plate.
2. Clean and install the bearings on the No. 1 and No. 5 journal of the cylinder block.
3. Lower the crankshaft into the block.
4. Measure the runout on all main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each journal must not be more than the service limit.

Crankshaft Total Runout:

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

Service Limit: 0.04 mm (0.0016 in.)



G01399138

Fig. 146: Measuring The Runout On Main Journals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK & PISTON INSPECTION

1. Remove the crankshaft and pistons (see **CRANKSHAFT & PISTON REMOVAL**).
2. Check the piston for distortions or cracks.
3. Measure the piston diameter at a point 11 mm (0.4 in.) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the block as cylinder bore sizes.

Piston Diameter:

Standard (New):

No Letter (or A): 85.980-85.990 mm (3.3850-3.3854 in.)

2003 Honda Civic Si

2002-05 ENGINES 2.0L 4-Cylinder - Civic (Hatchback)

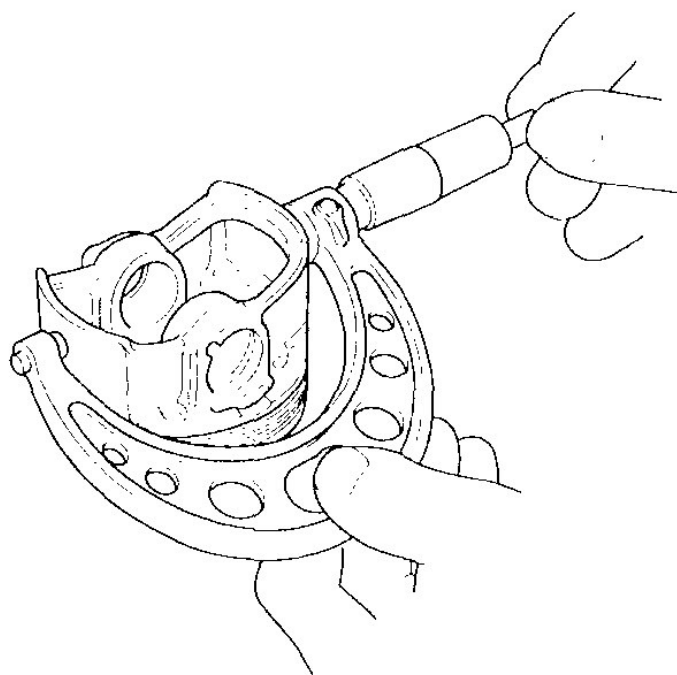
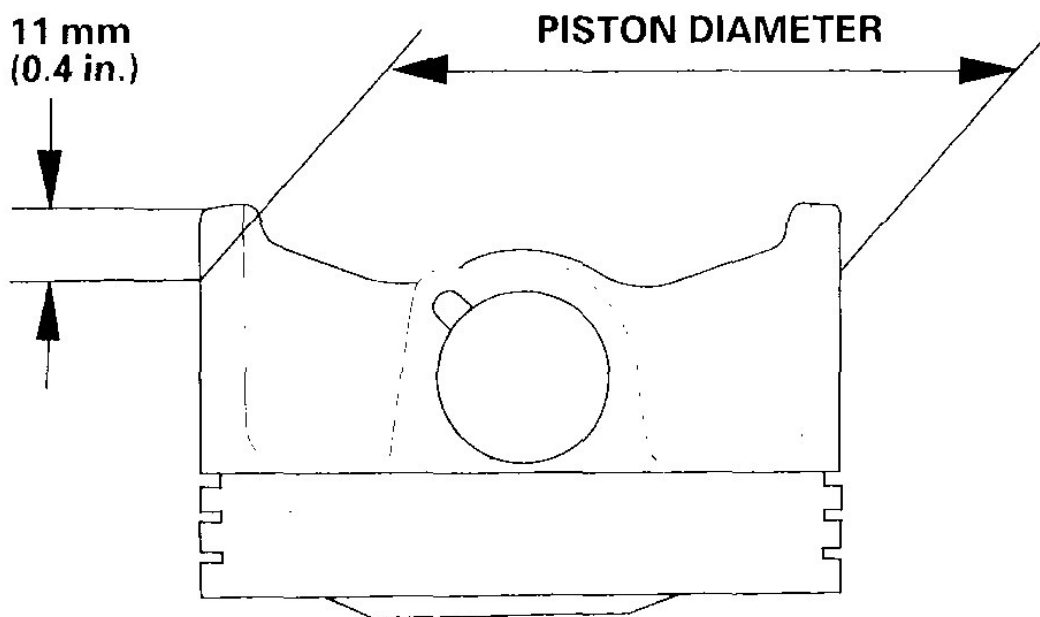
B: 85.970-85.980 mm (3.3846-3.3850 in.)

Service Limit:

No Letter (or A): 85.930 mm (3.3831 in.)

B: 85.920 mm (3.3827 in.)

Oversize Piston Diameter 0.25: 86.230-86.240 mm (3.3949-3.3953 in.)



G01399139

Fig. 147: Measuring The Piston Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure the wear and taper in direction X and Y at three levels in each cylinder as shown. If measurements in any cylinder are beyond the oversize bore service limit, replace the block. If the block is to be rebored, refer to step 7 after reboring.

Cylinder Bore Size:**Standard (New):**

A or I: 86.010-86.020 mm (3.3862-3.3866 in.)

B or II: 86.000-86.010 mm (3.3858-3.3862 in.)

Service Limit: 86.070 mm (3.3886 in.)

Oversize:

0.25: 86.250-86.260 mm (3.3957-3.3961 in.)

Reboring Limit: 0.25 mm (0.01 in.) Max.

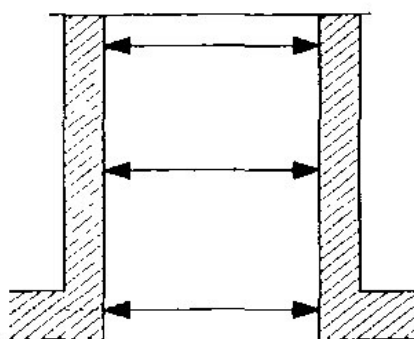
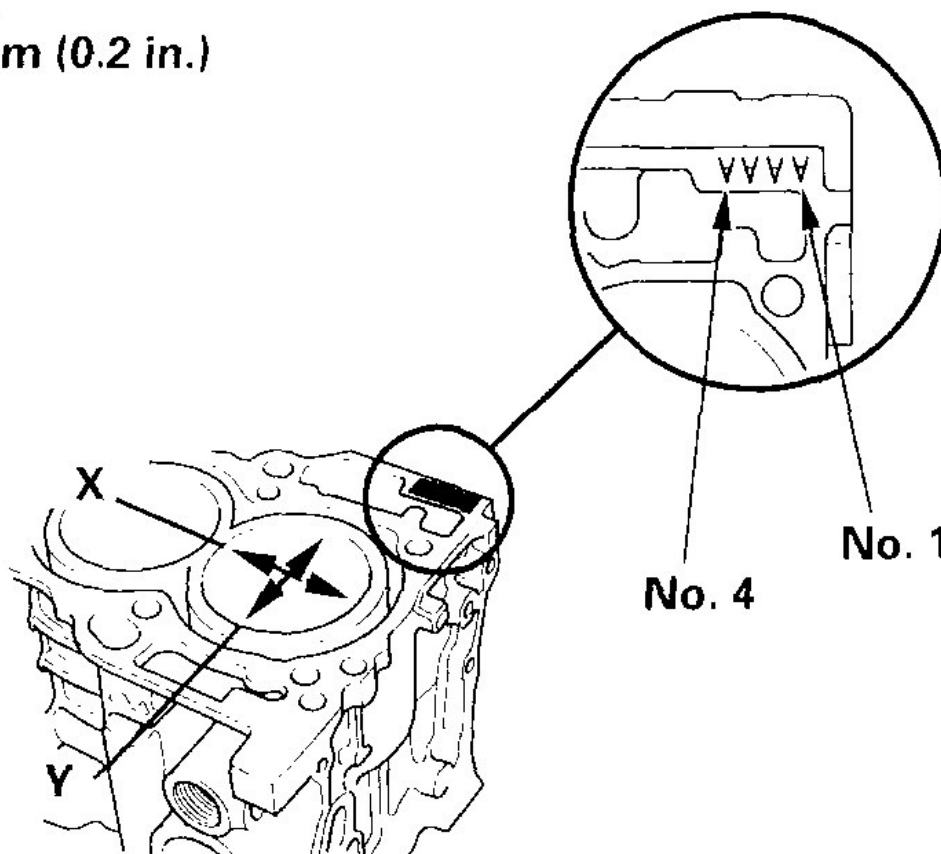
Bore Taper:

Limit: (Difference Between First & Third Measurement): 0.05 mm (0.002 in.)

6 mm (0.2 in.)



6 mm (0.2 in.)

**First
Measurement****Second
Measurement****Third
Measurement**

G01399140

Fig. 148: Measuring The Wear And Taper In Each Cylinder

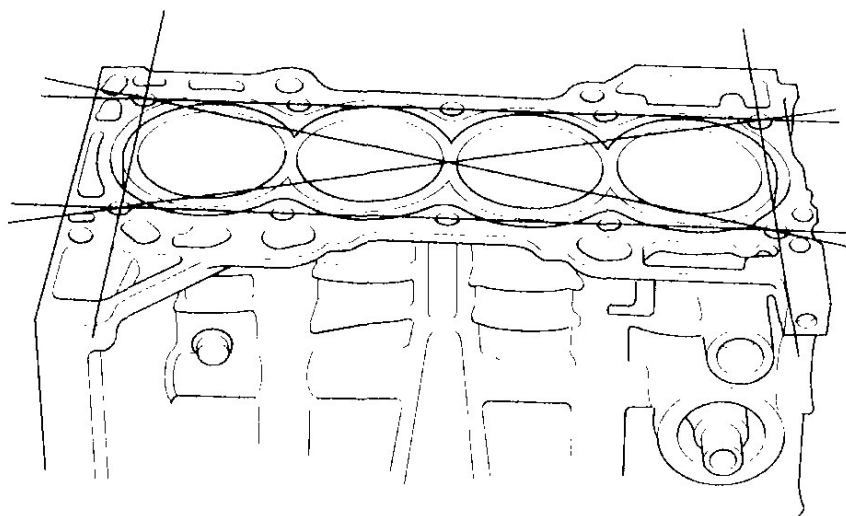
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

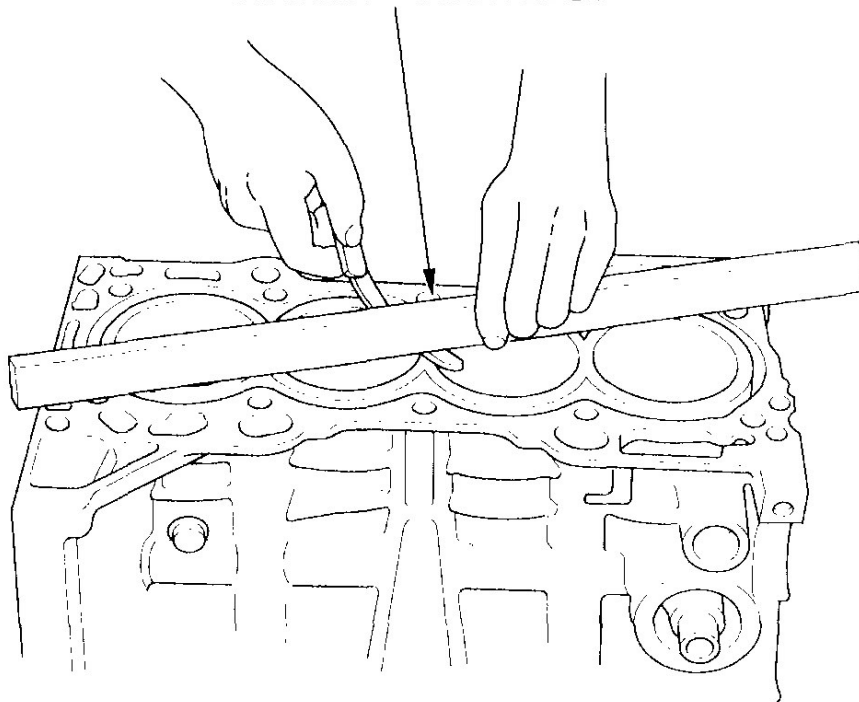
Engine Block Warpage:

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

Service Limit: 0.10 mm (0.004 in.)



PRECISION STRAIGHT EDGE



G01399141

Fig. 149: Checking The Top Of The Block For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-To-Cylinder Clearance:

Standard (New): 0.020-0.040 mm (0.0008-0.0016 in.)

Service Limit: 0.05 mm (0.002 in.)

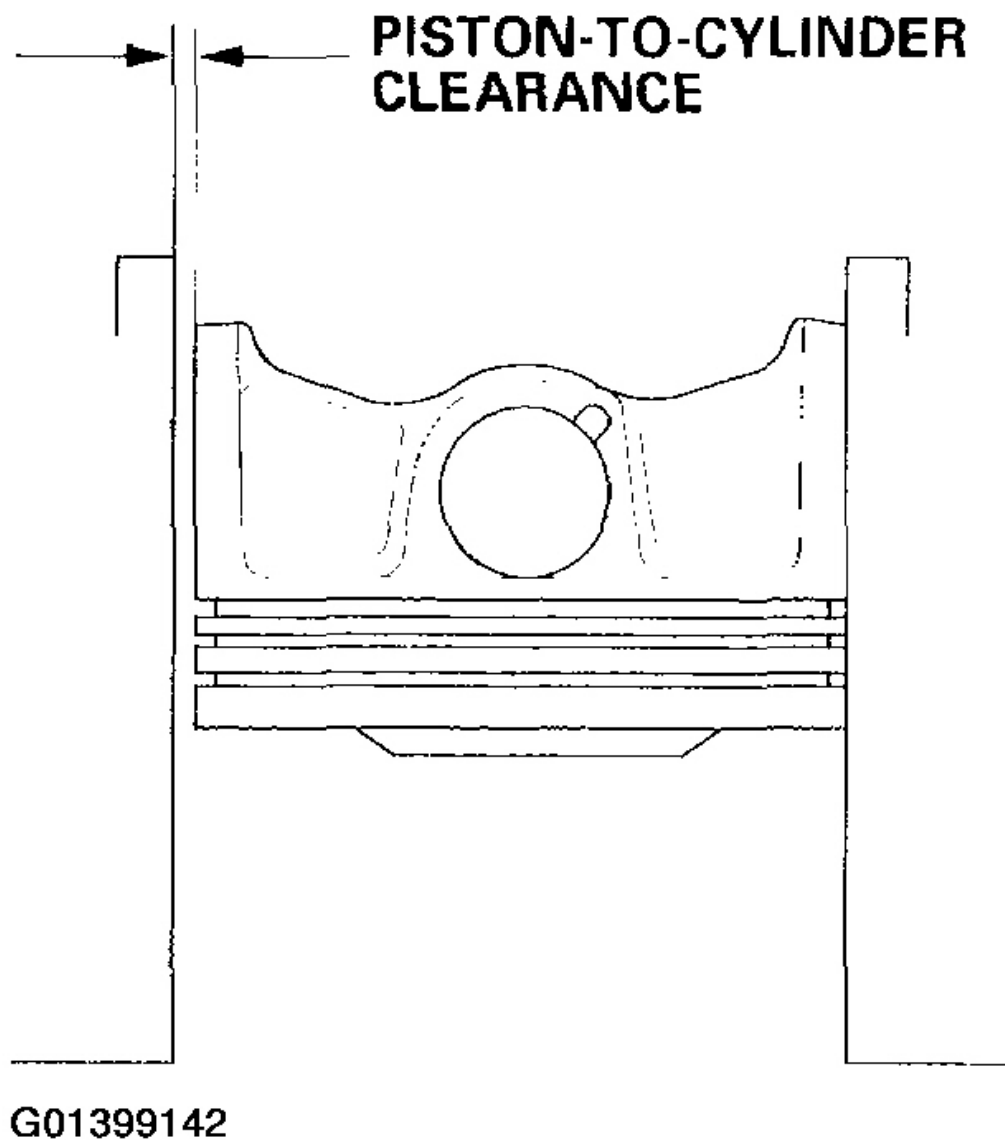


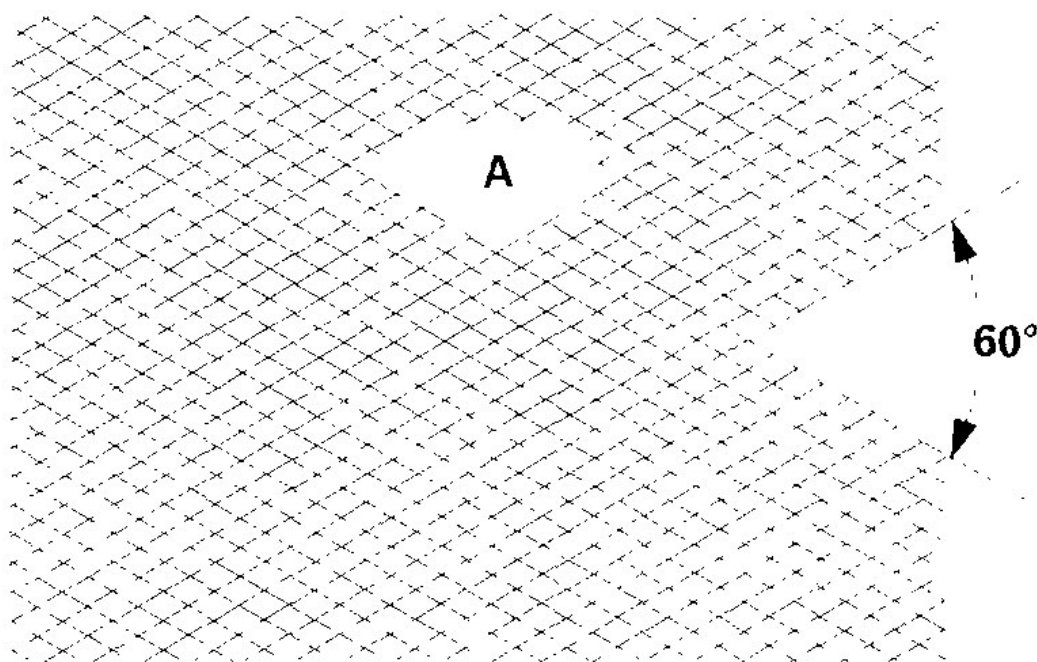
Fig. 150: Identifying Difference Between The Cylinder Bore Diameter And The Piston Diameter

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BORE HONING

Only a scored or scratched cylinder bore should be honed.

1. Measure the cylinder bores (see **BLOCK & PISTON INSPECTION**). If the block is to be reused, hone the cylinders and remeasure the bores.
2. Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern (A). Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent. Do not use stones that are worn or broken.



G01399143

Fig. 151: Honing The Cylinder Bores In A 60 Degree Cross-Hatch Pattern
Courtesy of AMERICAN HONDA MOTOR CO., INC.

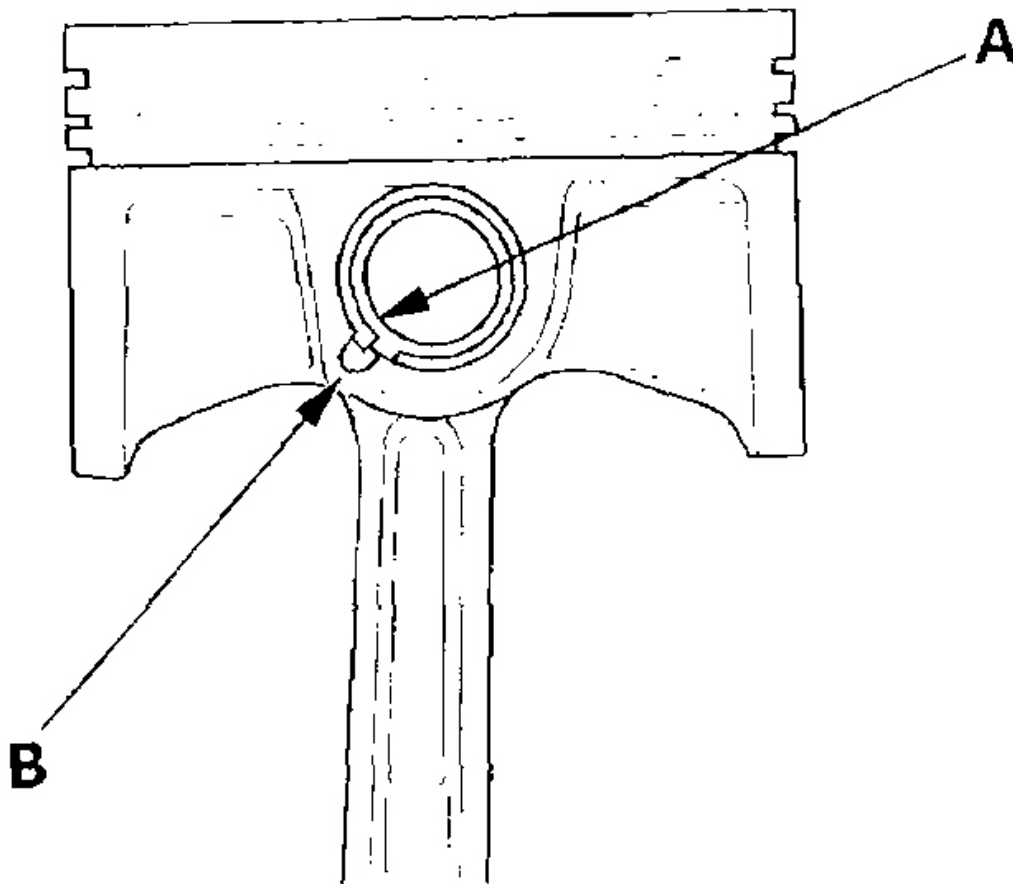
3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting. Never use solvent, it will only redistribute the grit on the cylinder walls.
4. If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the cylinder block. Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.

PISTON, PIN & CONNECTING ROD REPLACEMENT

Disassembly

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

NOTE: Take care not to damage the ring grooves.



G01399144

Fig. 152: Aligning Piston Pin Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

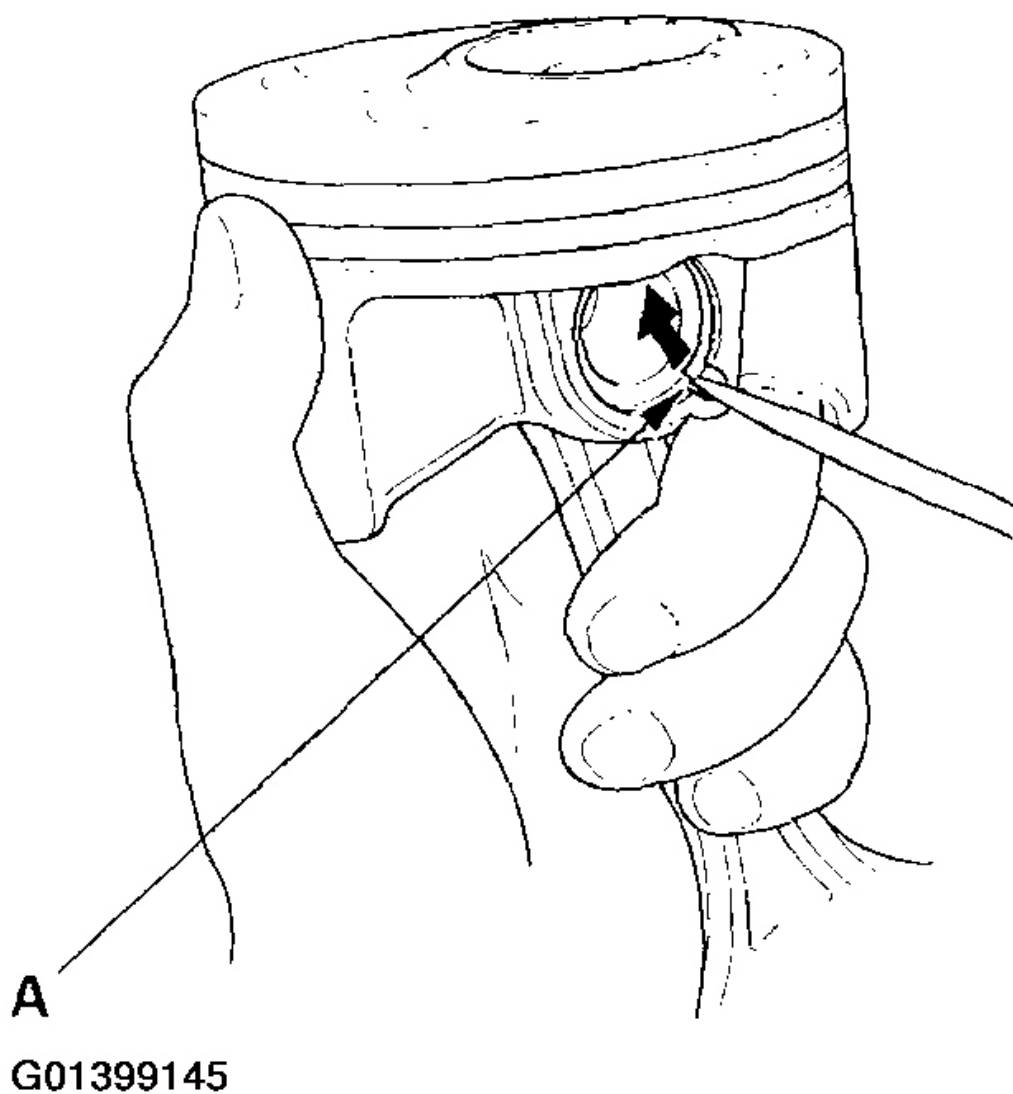
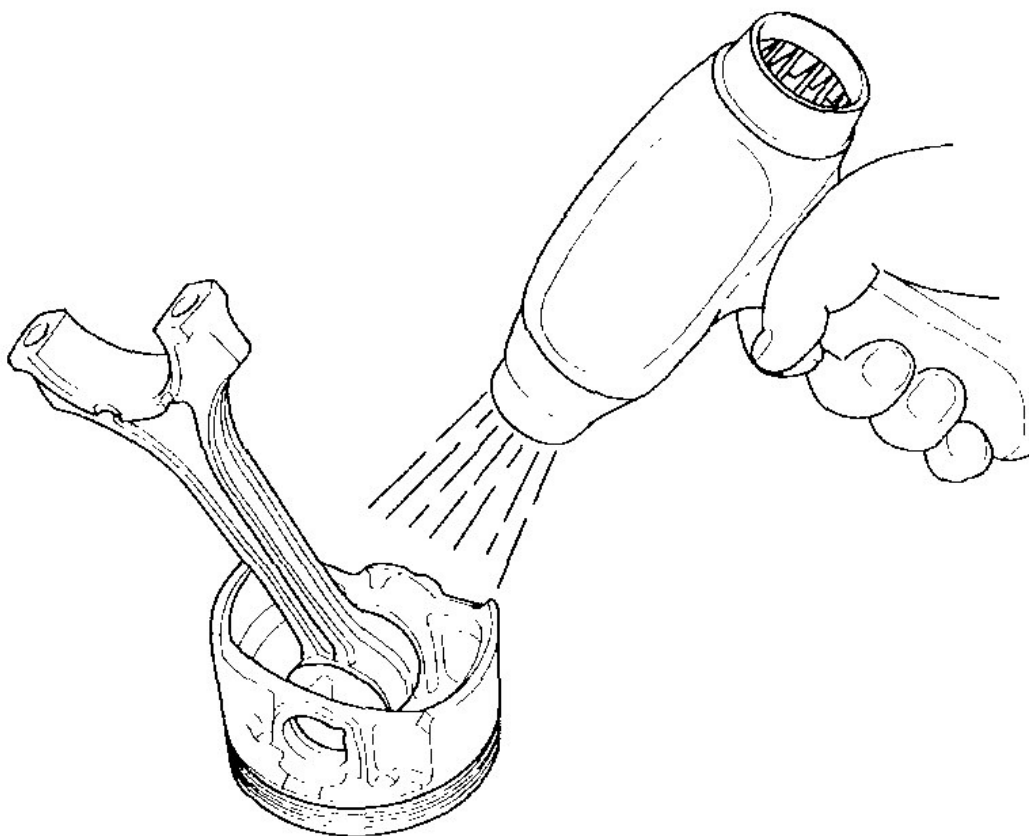


Fig. 153: Removing Both Snap Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01399146

Fig. 154: Heating The Piston And Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection

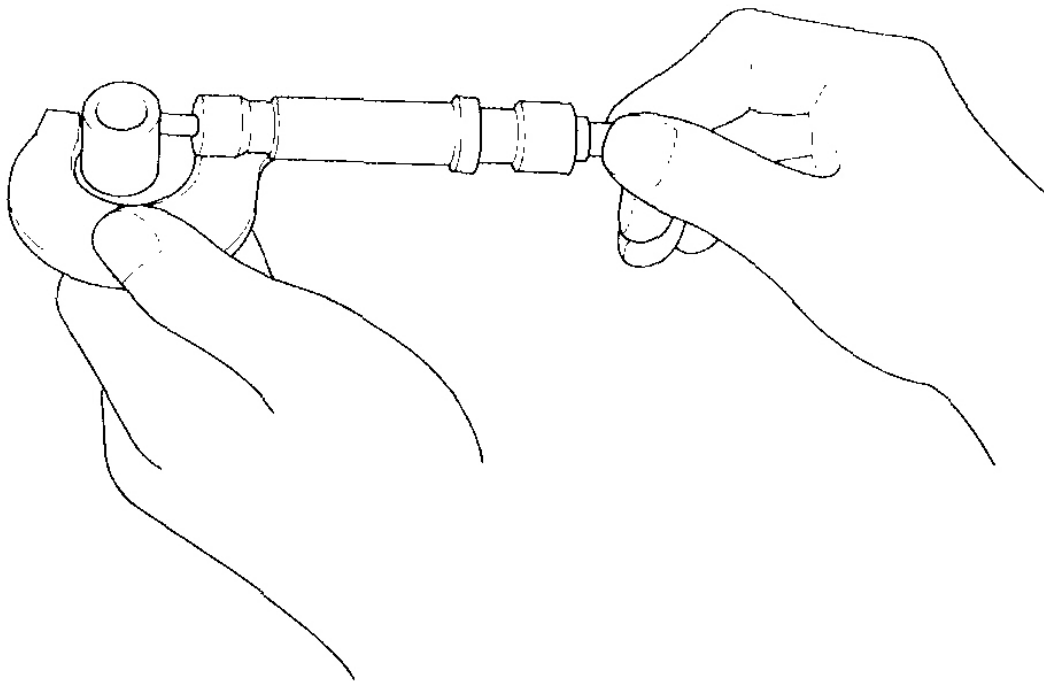
NOTE: Inspect the piston, piston pin, and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

Piston Pin Diameter:

Standard (New): 21.961-21.965 mm (0.8646-0.8648 in.)

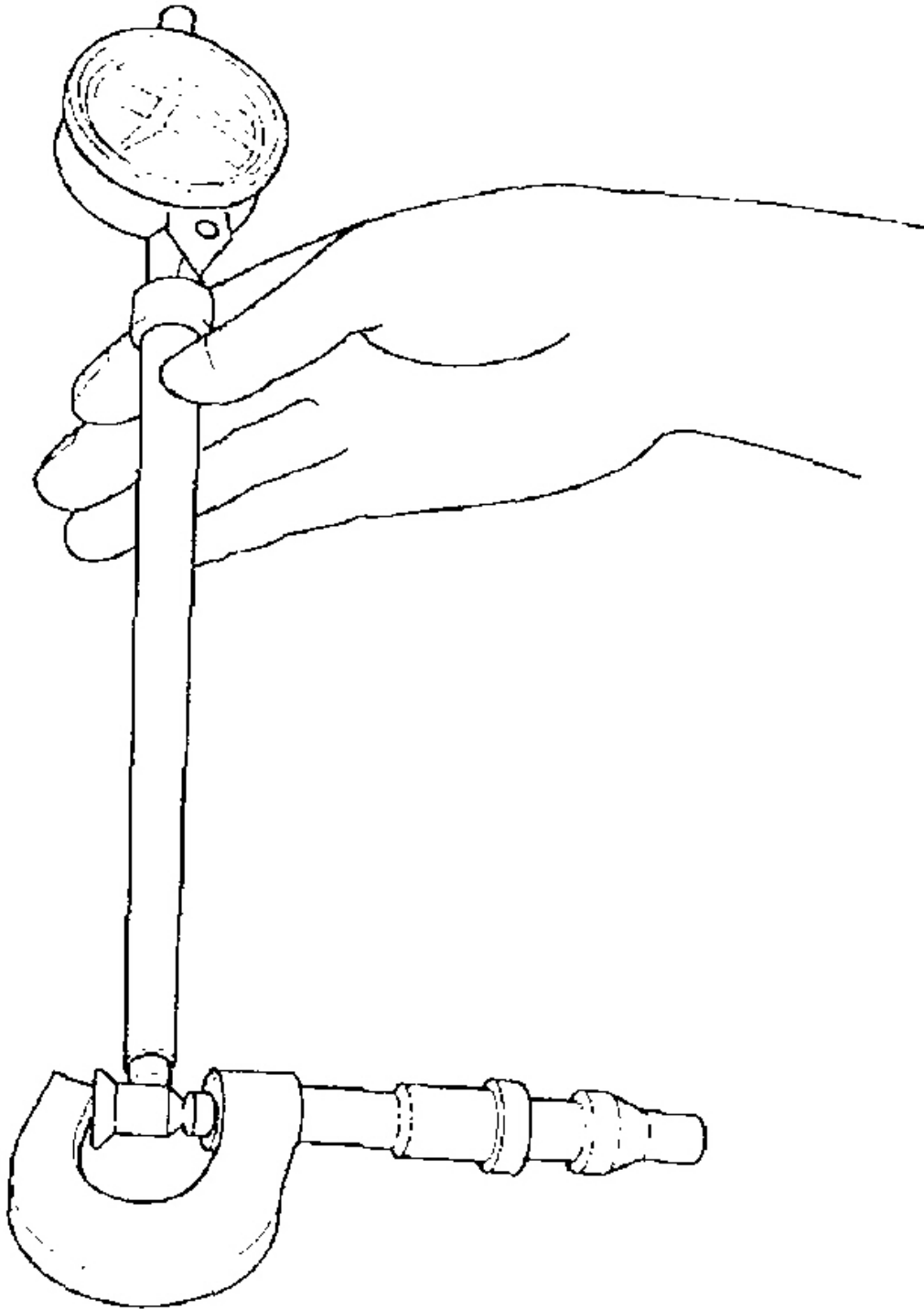
Service Limit: 21.953 mm (0.8643 in.)



G01399147

Fig. 155: Measuring The Diameter Of The Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

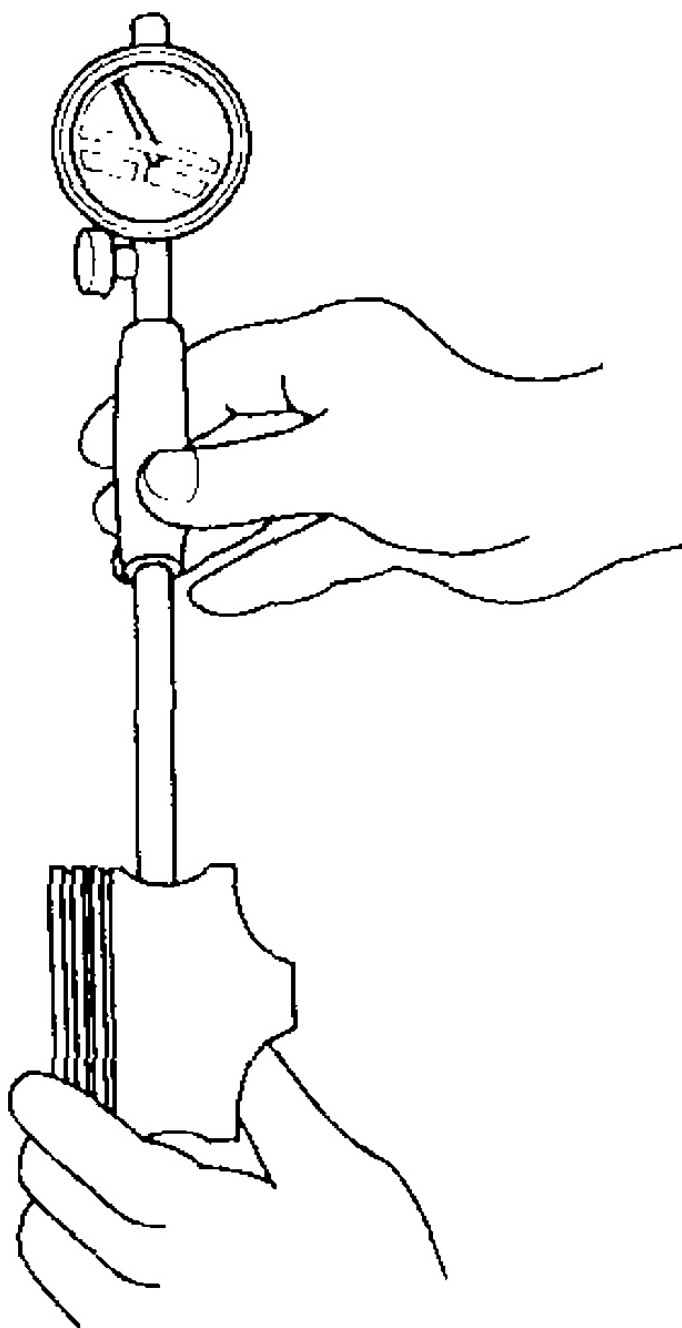


G01399148

Fig. 156: Zeroing The Dial Indicator To The Piston Pin Diameter**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

Piston Pin-To-Piston Clearance:**Standard (New):** -0.005 to +0.002 mm (-0.00020 to +0.00008 in.)**Service Limit:** 0.005 mm (0.0002 in.)



G01399149

Fig. 157: Checking The Difference Between The Piston Pin Diameter And Piston Pin Hole Diameter In The Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

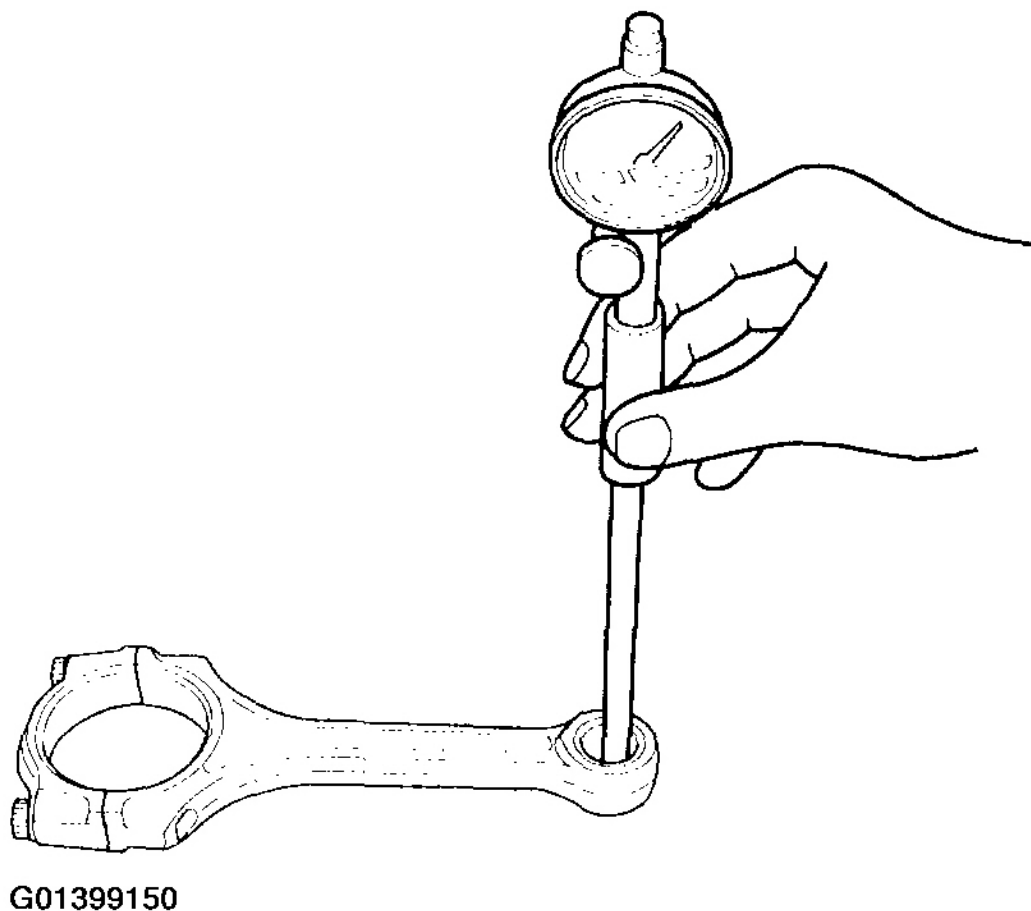
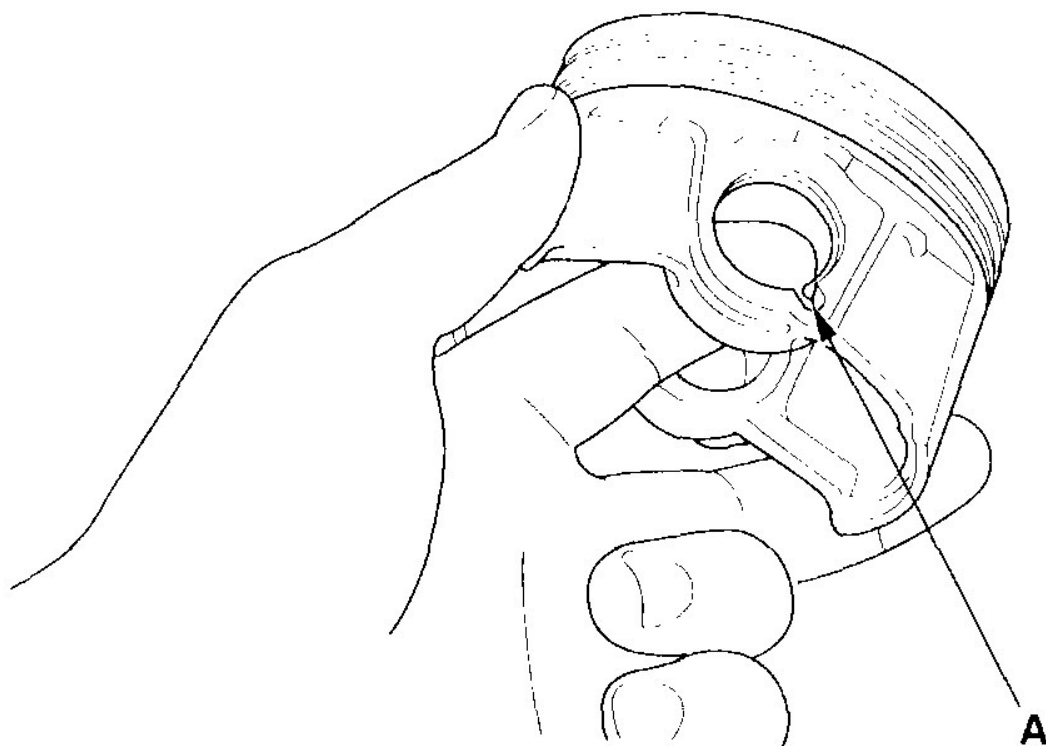
Piston Pin-To-Connecting Rod Clearance:**Standard (New):** 0.005-0.015 mm (0.0002-0.0006 in.)**Service Limit:** 0.02 mm (0.0008 in.)

Fig. 158: Measuring The Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Reassembly

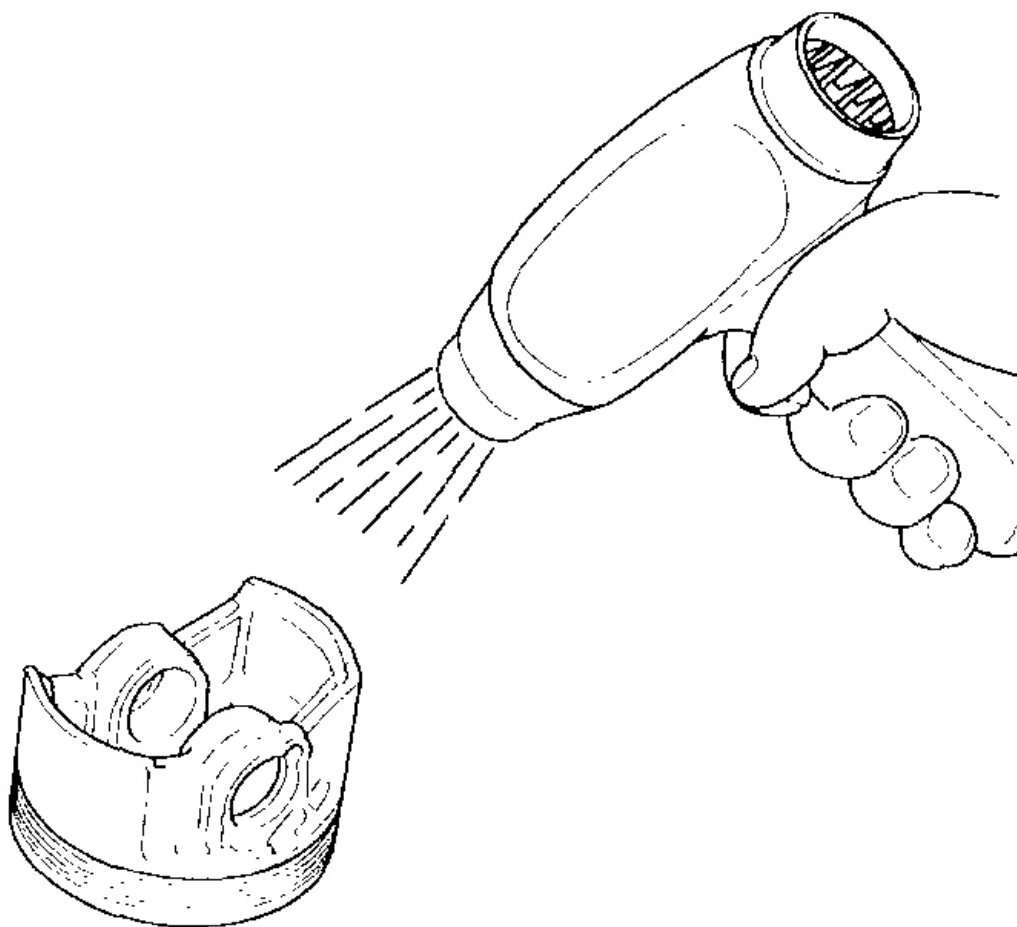
1. Install a piston pin snap ring (A).



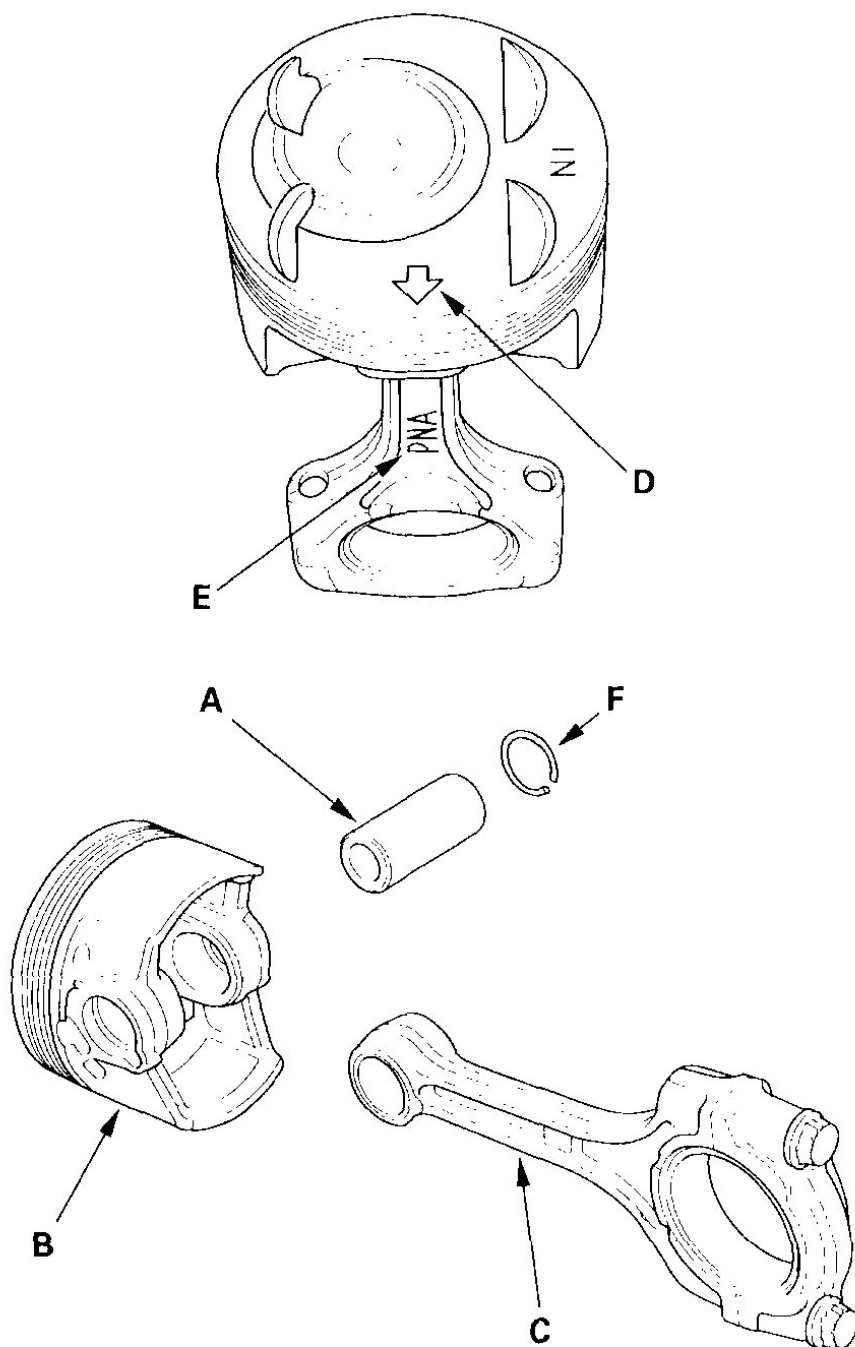
G01399151

Fig. 159: Installing A Piston Pin Snap Ring
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

**G01399152****Fig. 160: Heating The Piston****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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



G01399153

Fig. 161: Installing The Piston Pin

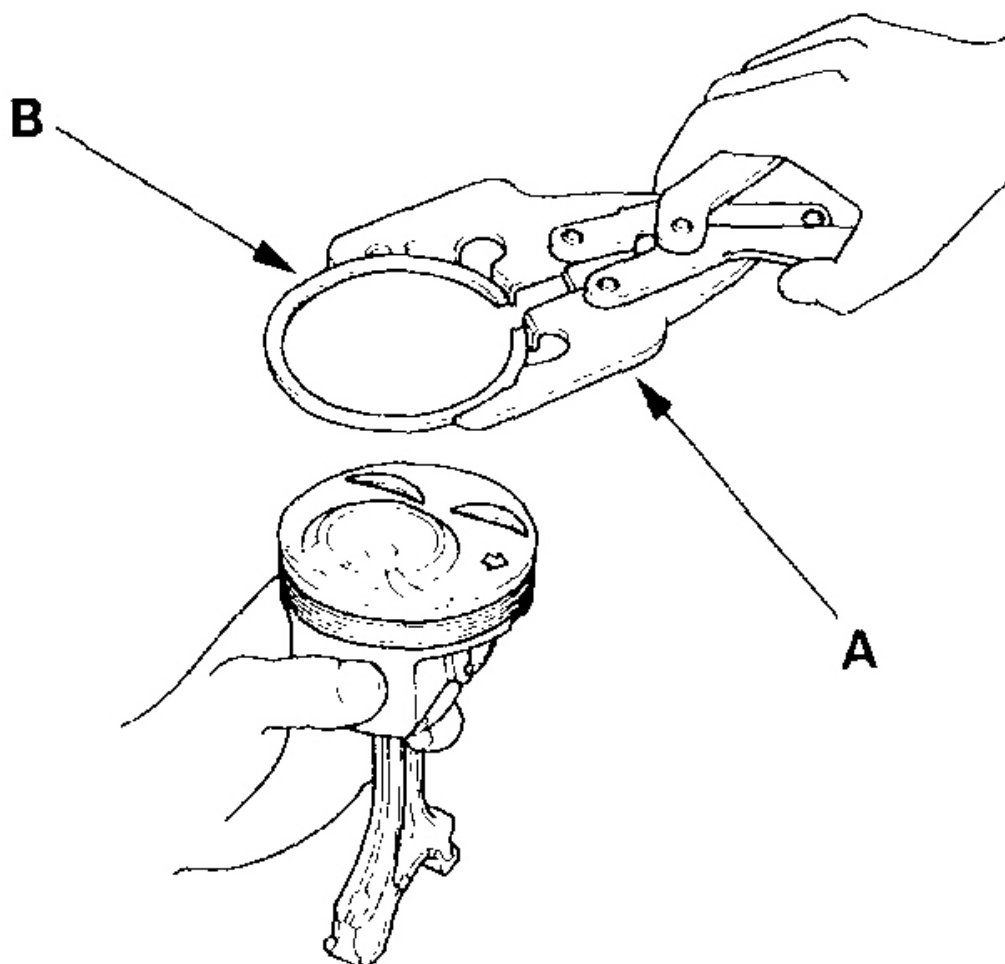
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the remaining snap ring (F).

6. Turn the snap rings in the ring grooves until the end gaps are positioned at the bottom of the piston.

PISTON RING REPLACEMENT

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



G01399154

Fig. 162: Removing The Old Piston Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

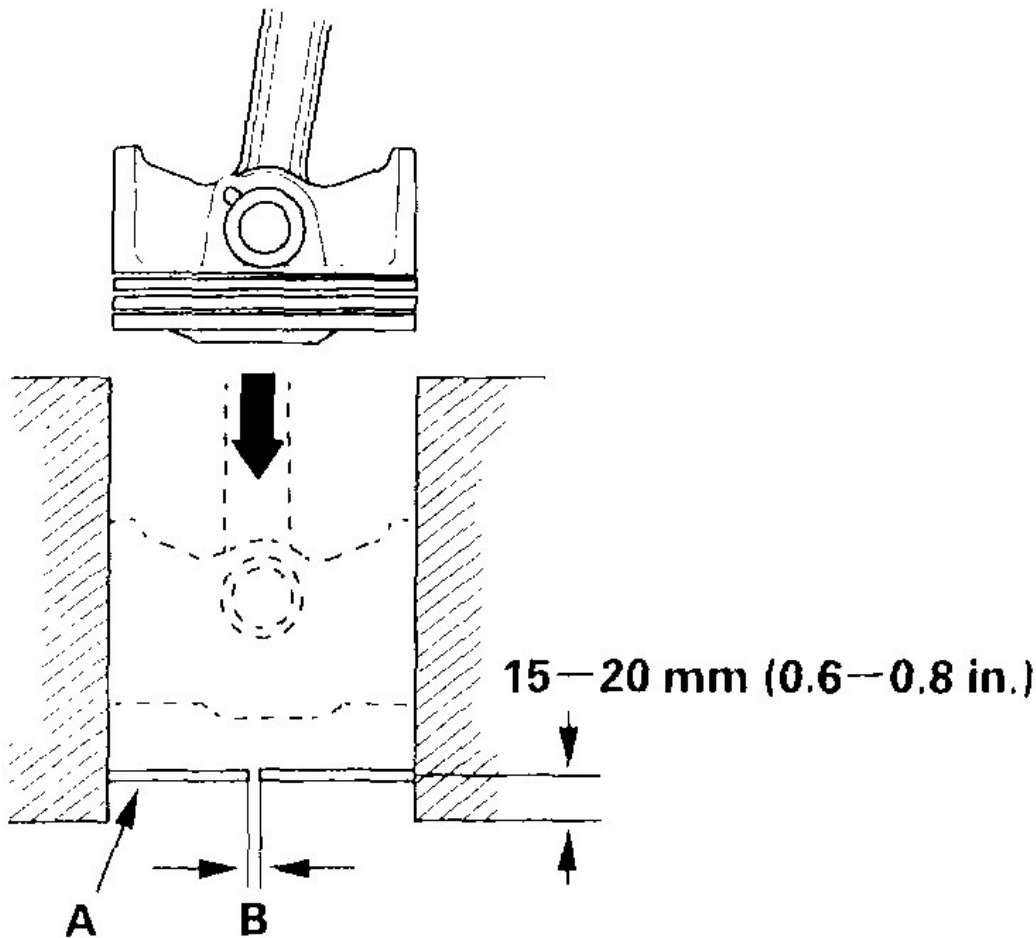
3. Clean all ring grooves thoroughly with a squared-off broken ring or ring groove cleaner with a blade to fit

the piston grooves.

- The top and 2nd ring grooves are 1.2 mm (0.05 in.) wide.
- The oil ring groove is 2.0 mm (0.08 in.) wide.
- File down a blade if necessary.
- Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tools.

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

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



G01399155

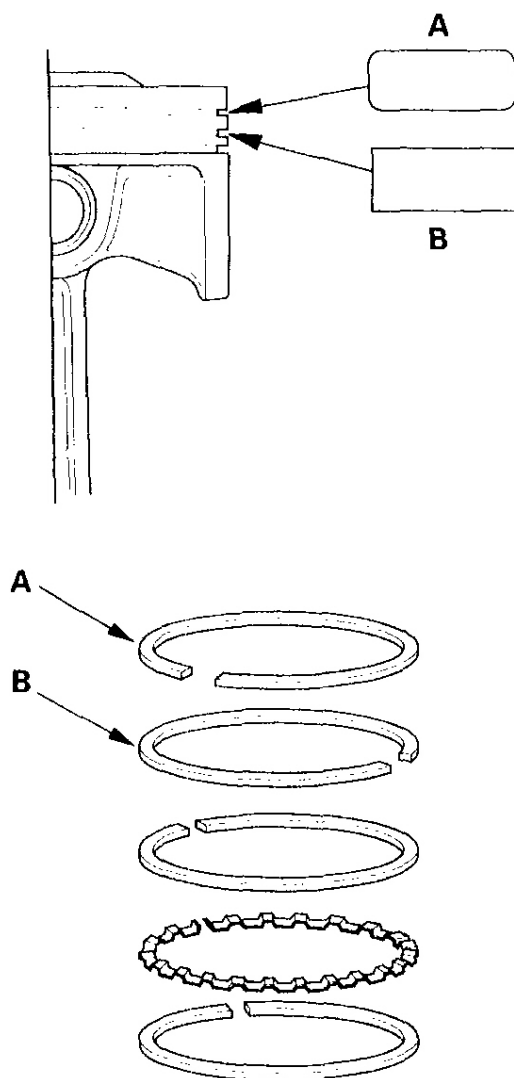
Fig. 163: Measuring The Piston Ring End-Gap**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

5. Measure the piston ring end-gap (B) with a feeler gauge:

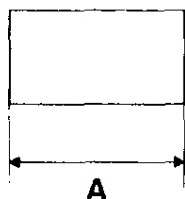
- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits (see step 4 of **BLOCK & PISTON INSPECTION**).
- If the bore is over the service limit, the cylinder block must be rebored.

Piston Ring End-Gap:**Top Ring:****Standard (New):** 0.20-0.35 mm (0.008-0.014 in.)**Service Limit:** 0.60 mm (0.024 in.)**Second Ring:****Standard (New):** 0.40-0.55 mm (0.016-0.022 in.)**Service Limit:** 0.70 mm (0.028 in.)**Oil Ring:****REKEN Manufactured Ring:****Standard (New):** 0.25-0.65 mm (0.010-0.026 in.)**Service Limit:** 0.75 mm (0.030 in.)**FEDERAL MOGUL Manufactured Ring:****Standard (New):** 0.20-0.70 mm (0.008-0.028 in.)**Service Limit:** 0.80 mm (0.031 in.)

6. Install the top ring and second ring as shown. The top ring (A) has a 1R mark or no mark and the second ring (B) has a 2R mark or 2ND mark. The marks must be facing upward.



Piston Ring Dimensions:



Top Ring (Standard):

A: 3.1 mm (0.12 in.)

B: 1.2 mm (0.05 in.)

Second Ring (Standard):

A: 3.4 mm (0.13 in.)

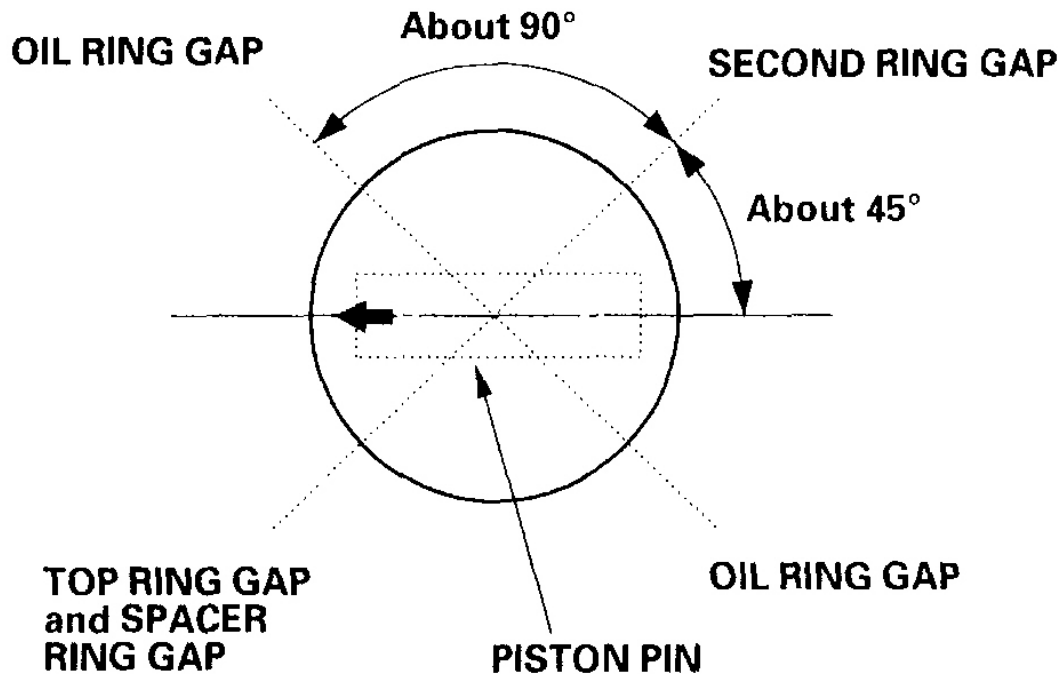
B: 1.2 mm (0.05 in.)

G01399156

Fig. 164: Installing Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



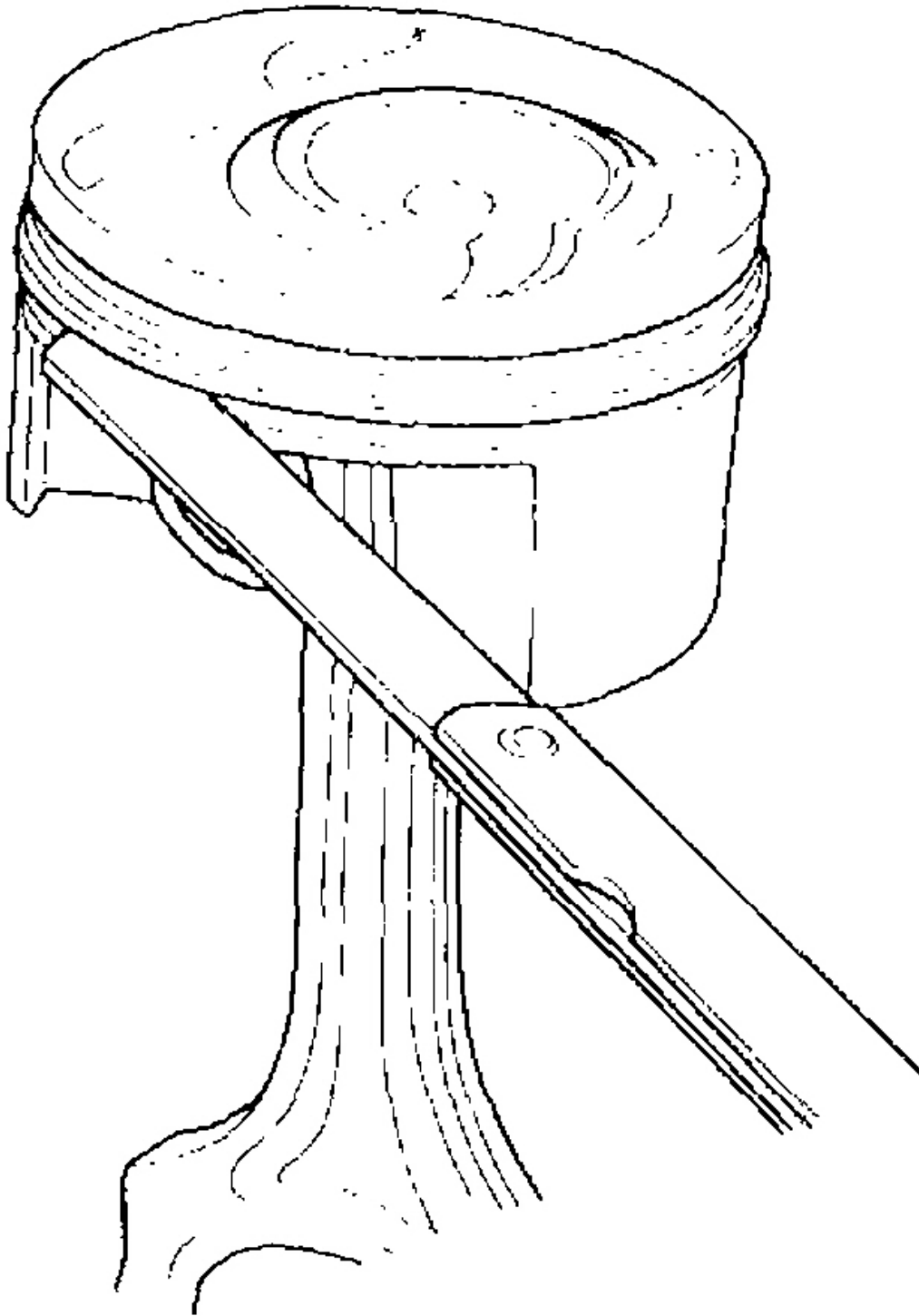
G01399157

Fig. 165: Positioning The Ring End Gaps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Top Ring Clearance:**Standard (New):** 0.035-0.060 mm (0.0014-0.0024 in.)**Service Limit:** 0.13 mm (0.005 in.)**Second Ring Clearance:****Standard (New):****REKEN Manufactured Ring:** 0.030-0.055 mm (0.0012-0.0022 in.)**FEDERAL MOGUL Manufactured Ring:** 0.025-0.060 mm (0.0010-0.0024 in.)**Service Limit:** 0.13 mm (0.005 in.)

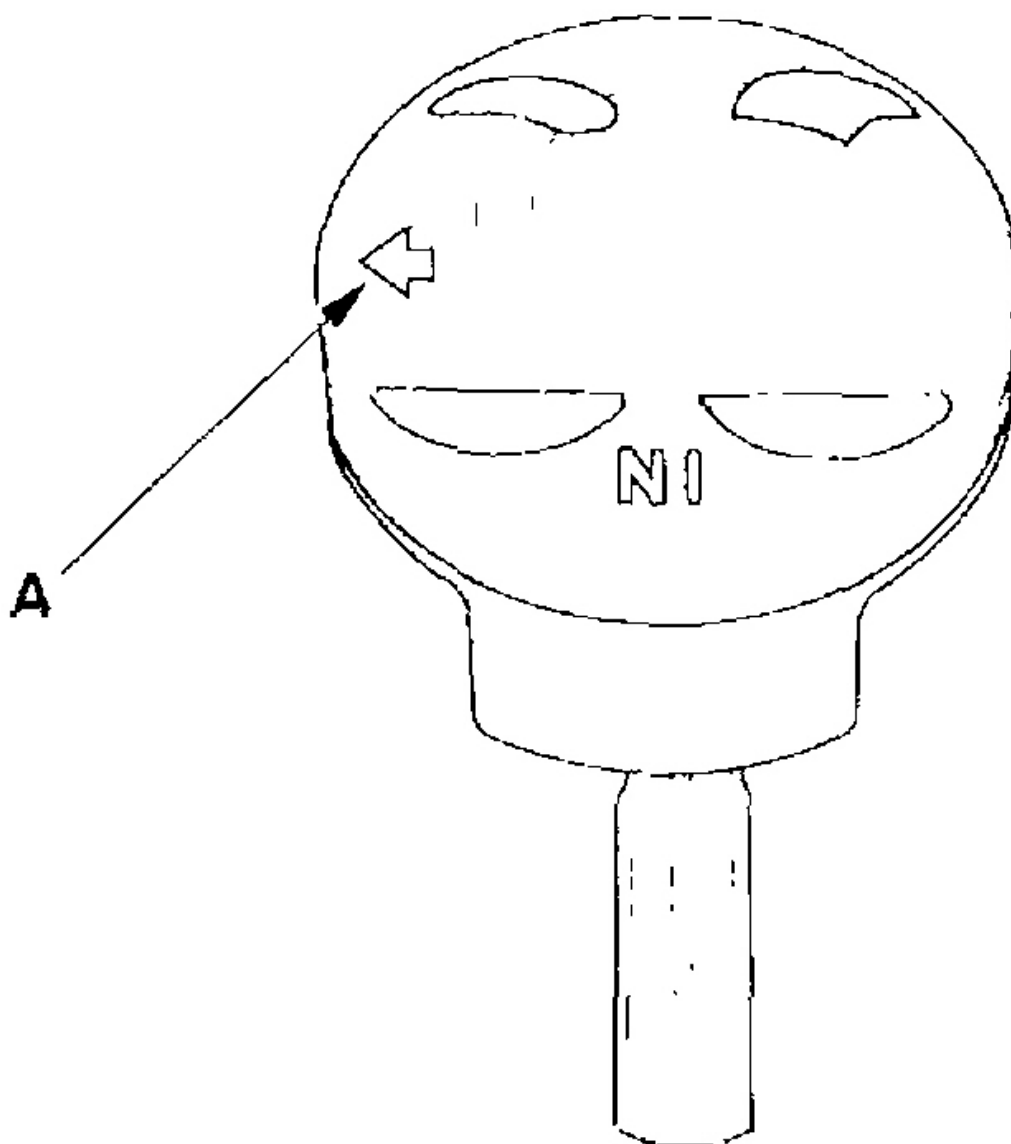


G01399158

Fig. 166: Measuring The Ring-To-Groove Clearances
Courtesy of AMERICAN HONDA MOTOR CO., INC.

PISTON INSTALLATION**If Crankshaft Is Already Installed**

1. Set the crankshaft to bottom dead center (BDC) for each cylinder.
2. Remove the connecting rod caps, then install the ring compressor, and check that the bearing is securely in place.
3. Position the arrow (A) facing the cam chain side of the engine.

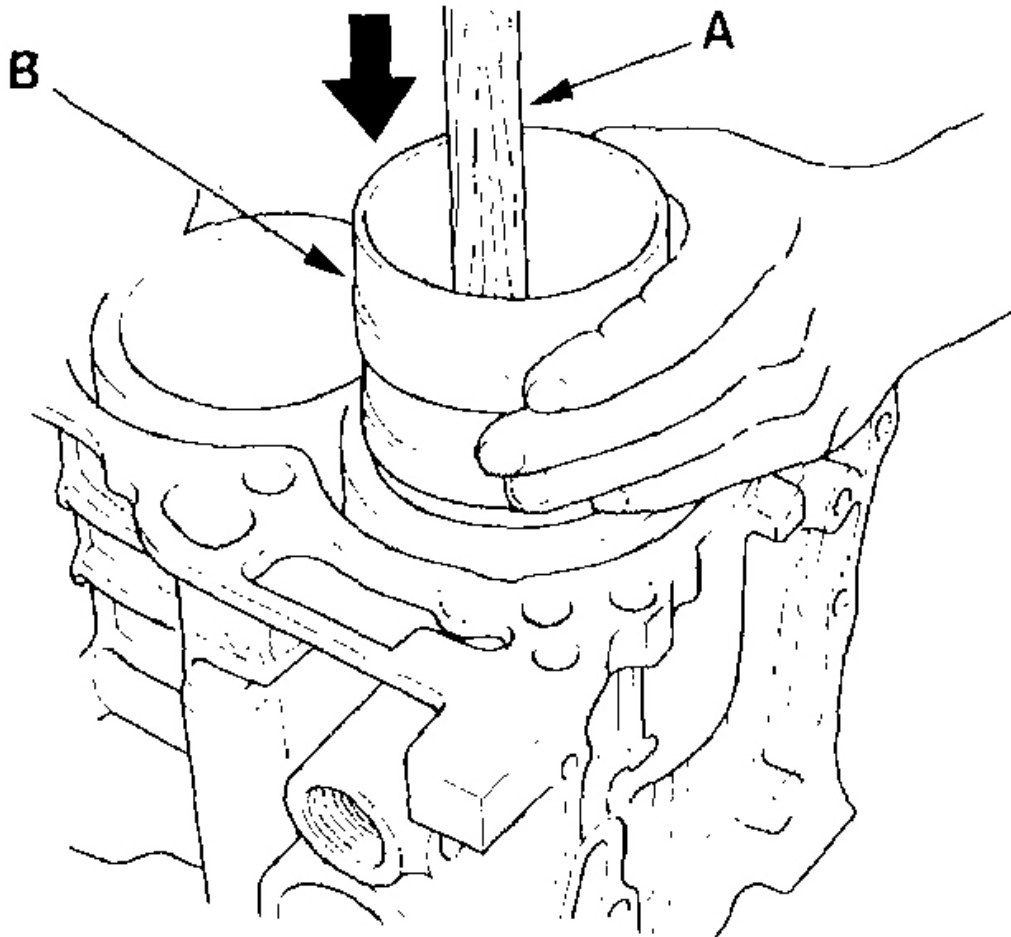


G01399159

Fig. 167: Positioning The Arrow Facing The Cam Chain Side Of The Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Position the piston in the cylinder, and tap it in using the wooden handle of a hammer (A).

Maintain downward force on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.

**G01399160****Fig. 168: Installing Piston****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

5. Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing the piston into place.
6. Check the connecting rod bearing clearance with plastigage (see **ROD BEARING CLEARANCE INSPECTION**).
7. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
8. Apply new engine oil to the bolt threads, then install the rod caps with bearings. Torque the bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft) + 90°.

If Crankshaft Is Not Installed

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

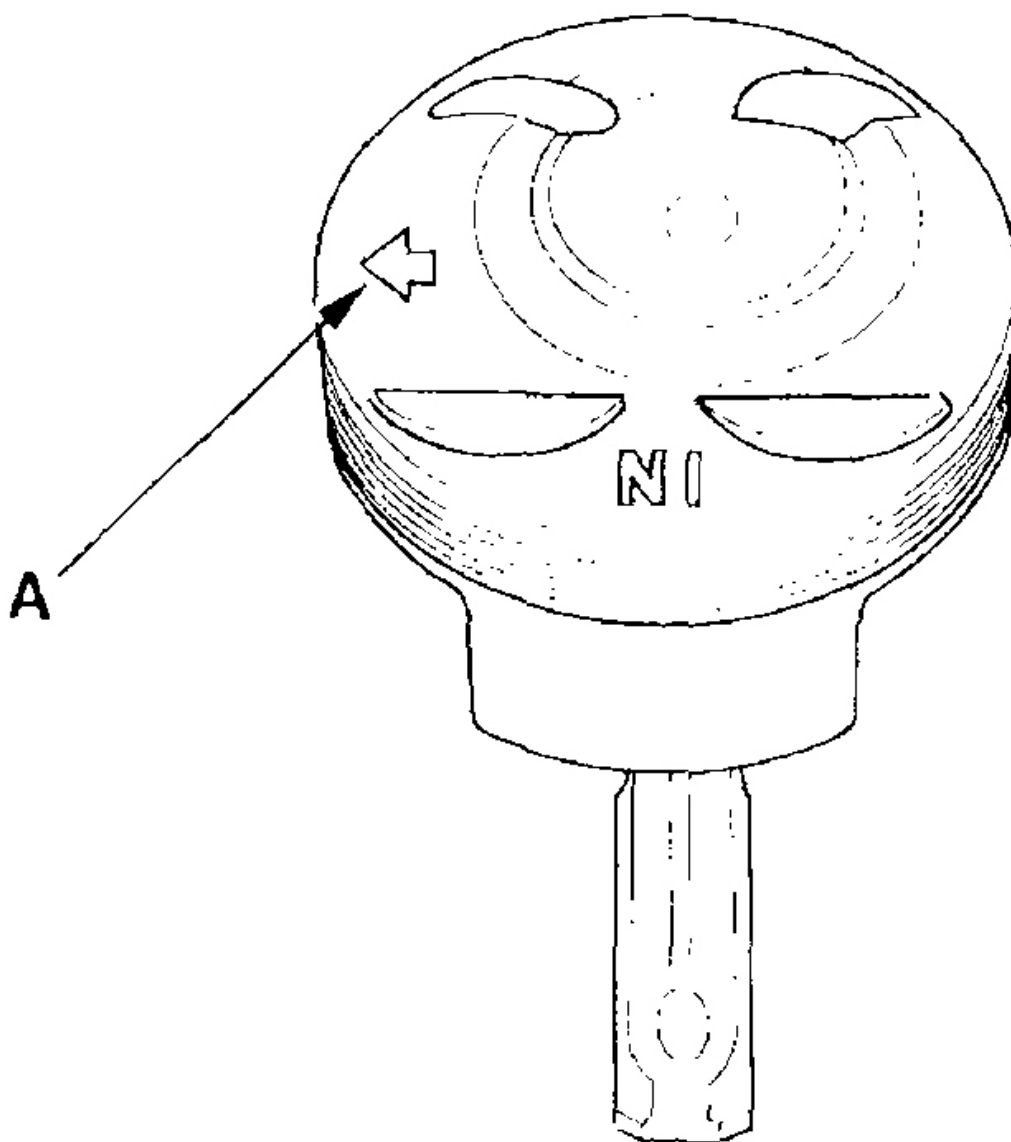
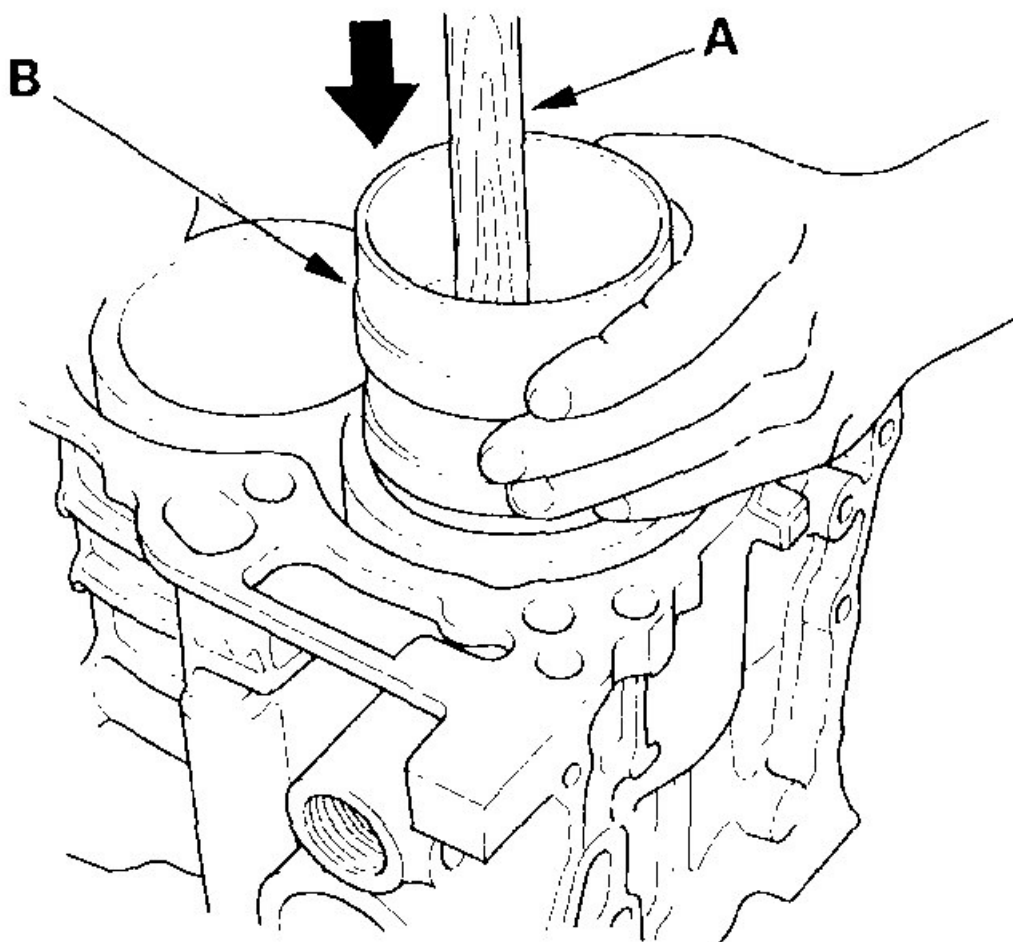
**G01399161**

Fig. 169: Positioning The Arrow Facing The Cam Chain Side Of The Engine
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G01399162

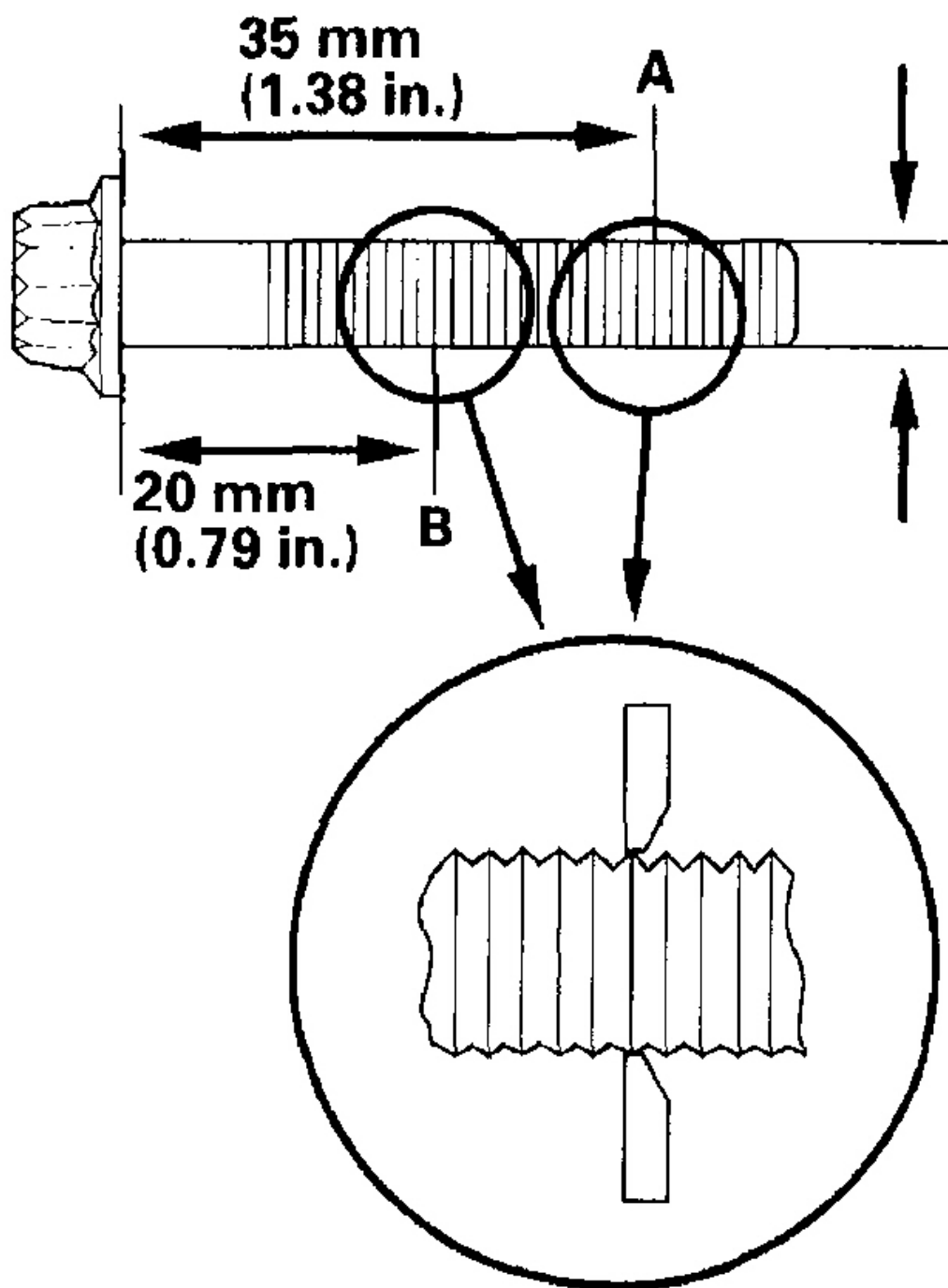
Fig. 170: Installing Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Position all pistons at top dead center.

CONNECTING ROD BOLT INSPECTION

1. Measure the diameter of each connecting rod bolt at point A and point B.



G01399163

Fig. 171: Measuring The Diameter Of Each Connecting Rod Bolt At Point A And Point B

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Point A-Point B = Difference In Diameter

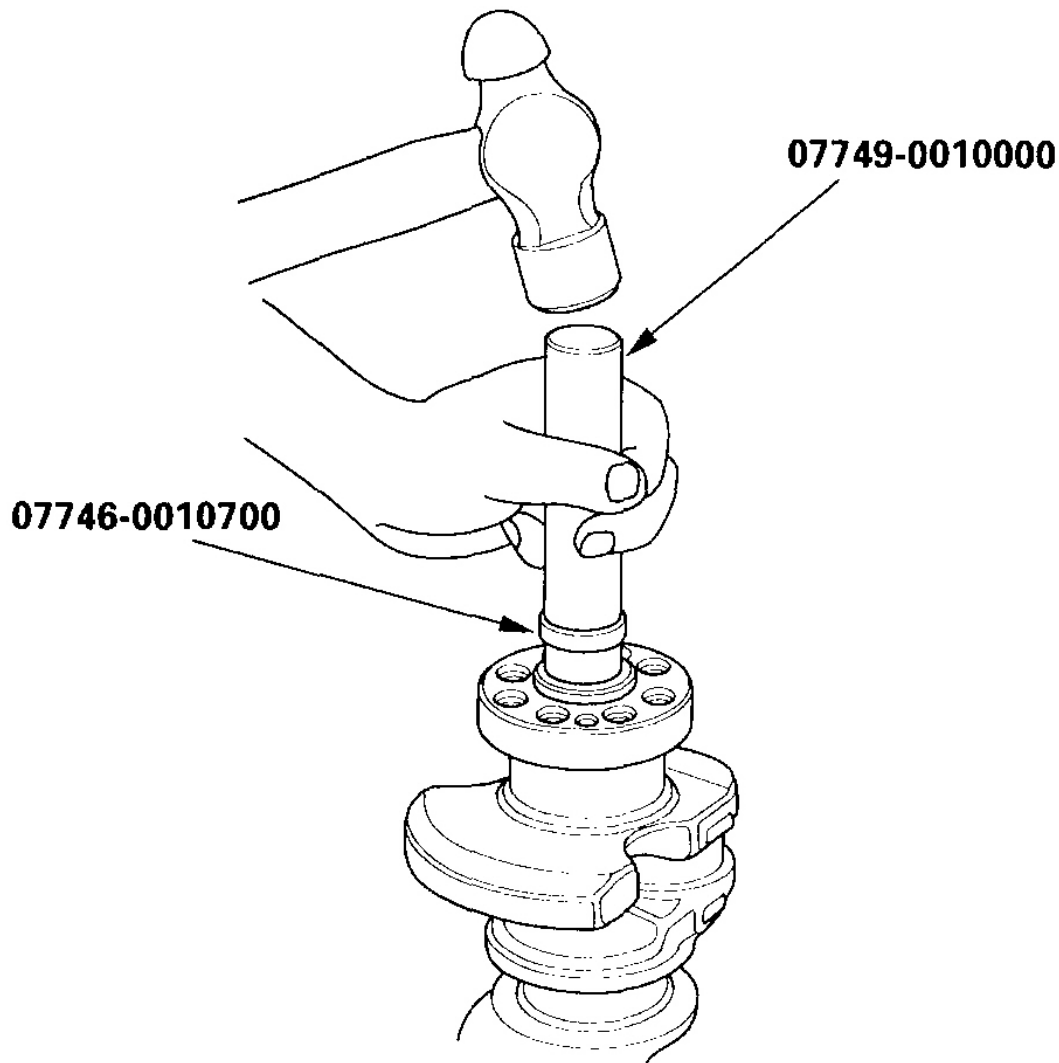
Difference In Diameter Specification: 0-0.1 mm (0-0.004 in.)

3. If the difference in diameter is out of tolerance, replace the connecting rod bolt.

CRANKSHAFT INSTALLATION

Special Tools Required:

- Drive 07749-0010000
 - Attachment, 24 x 26 mm 07746-0010700
 - Oil seal driver attachment, 96 mm 07ZAD-PNAA100
1. Install the crankshaft end bushing with the special tools when replacing the crankshaft. Drive in the crankshaft end bushing until the special tools bottom against the crankshaft.

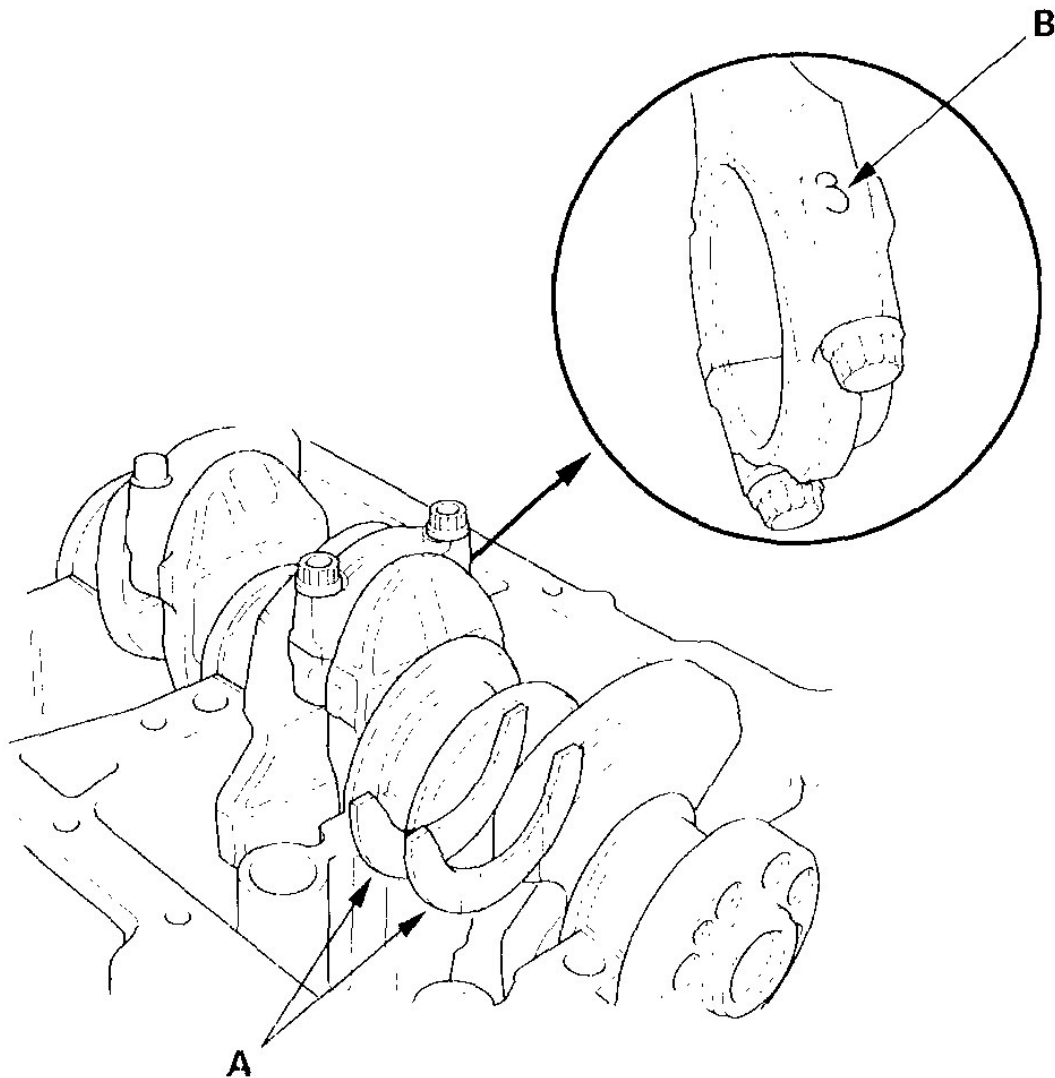


G01399164

Fig. 172: Installing The Crankshaft End Bushing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Check the connecting rod bearing clearance with plastigage (see **ROD BEARING CLEARANCE INSPECTION**).
3. Check the main bearing clearance with plastigage (see **MAIN BEARING CLEARANCE INSPECTION**).
4. Inspect the connecting rod bolts (see **CONNECTING ROD BOLT INSPECTION**).
5. Install the bearing halves in the cylinder block and connecting rods.
6. Apply a coat of engine oil to the main bearings and rod bearings.

7. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, and lower the crankshaft into the block.
8. Install the thrust washers (A) in the No. 4 journal of the cylinder block.



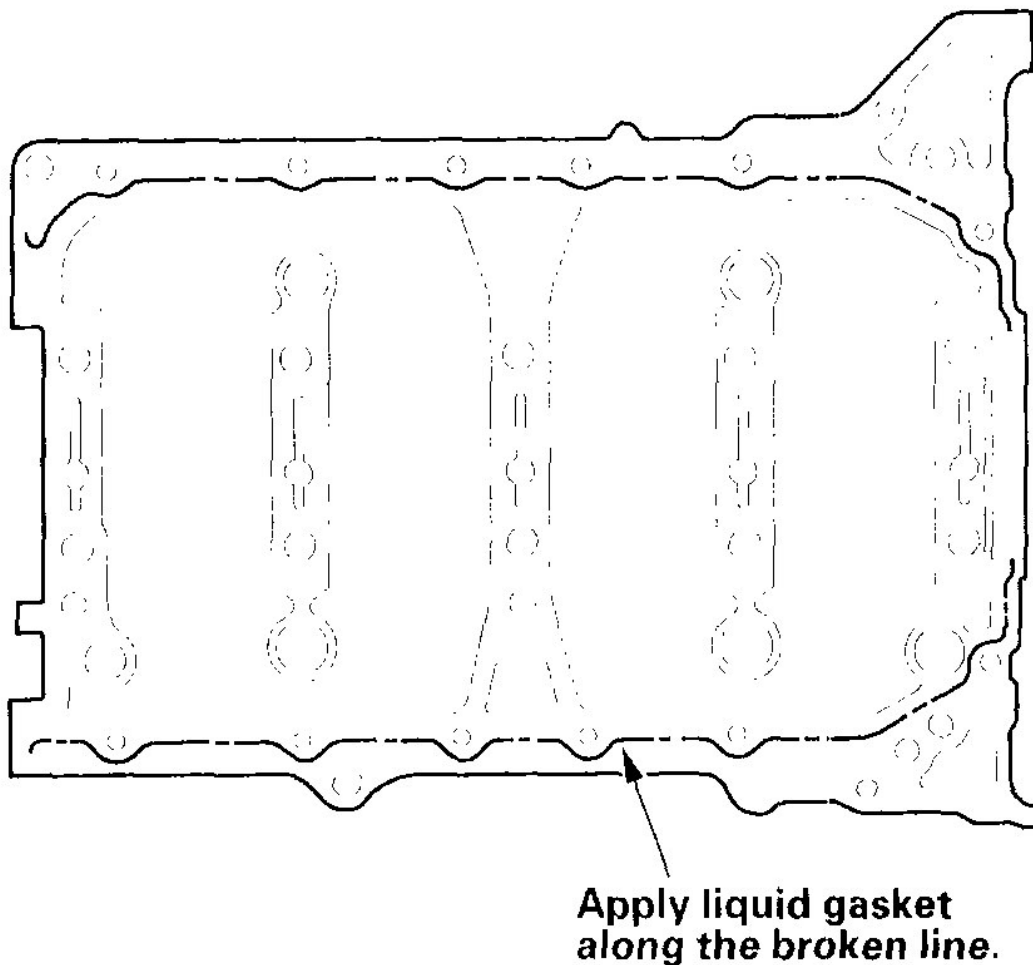
G01399165

Fig. 173: Installing The Thrust Washers In The No. 4 Journal Of The Cylinder Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Apply new engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and cap, then install the caps and bolts finger-tight.
11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No.

3. Line up the mark on the connecting rod and cap, then install the caps and bolts finger-tight.
12. Tighten the connecting rod bolts to 20 N.m (2.0 kgf.m, 14 lbf.ft).
13. Tighten the connecting rod bolts an additional 90°.
14. Remove any old liquid gasket from the lower block mating surfaces, bolts and bolt holes.
15. Clean and dry the lower block mating surfaces.
16. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the lower block and to the inner threads of the bolt holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket. Instead, reapply liquid gasket after removing the old residue.

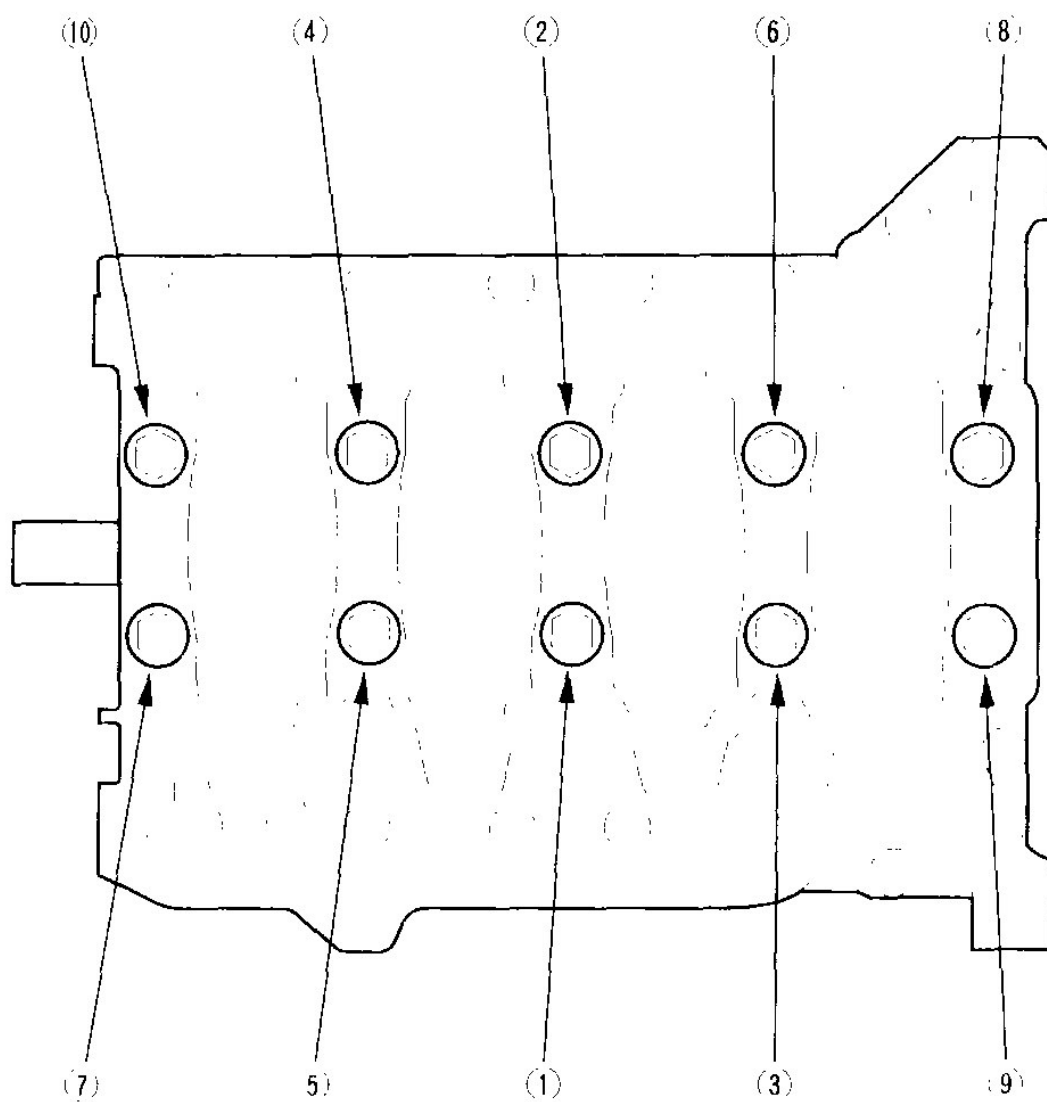


G01399166

Fig. 174: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Put the lower block on the cylinder block.
18. Tighten the bearing cap bolts in sequence to 29 N.m (3.0 kgf.m, 22 lbf.ft).



G01399167

Fig. 175: Bearing Cap Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Tighten the bearing cap bolts an additional 56°.
20. Tighten the 8 mm bolts in sequence to 22 N.m (2.2 kgf.m, 16 lbf.ft).

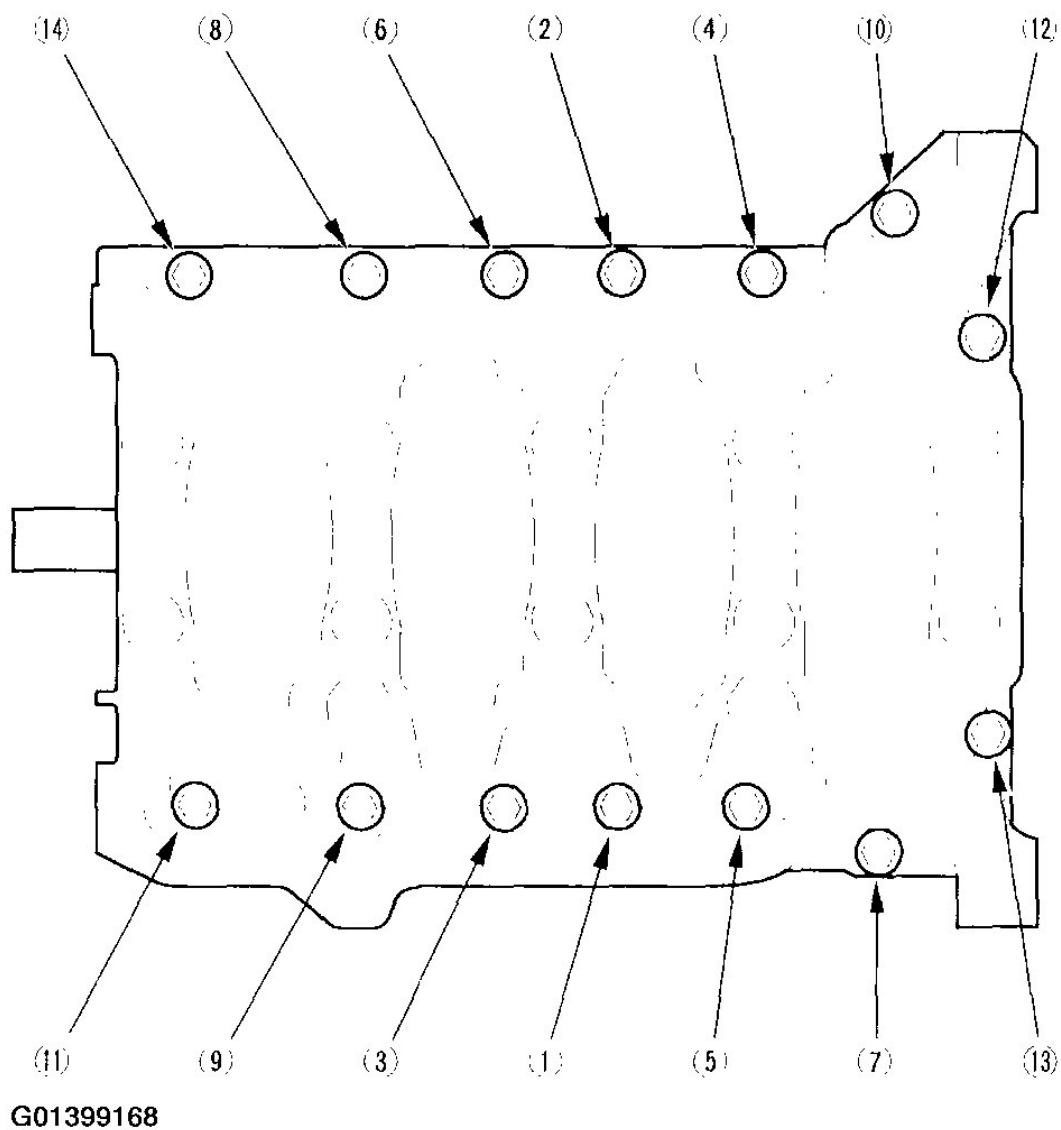


Fig. 176: 8 mm Bolt Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Use the special tools to drive a new oil seal squarely into the block to the specified installed height.

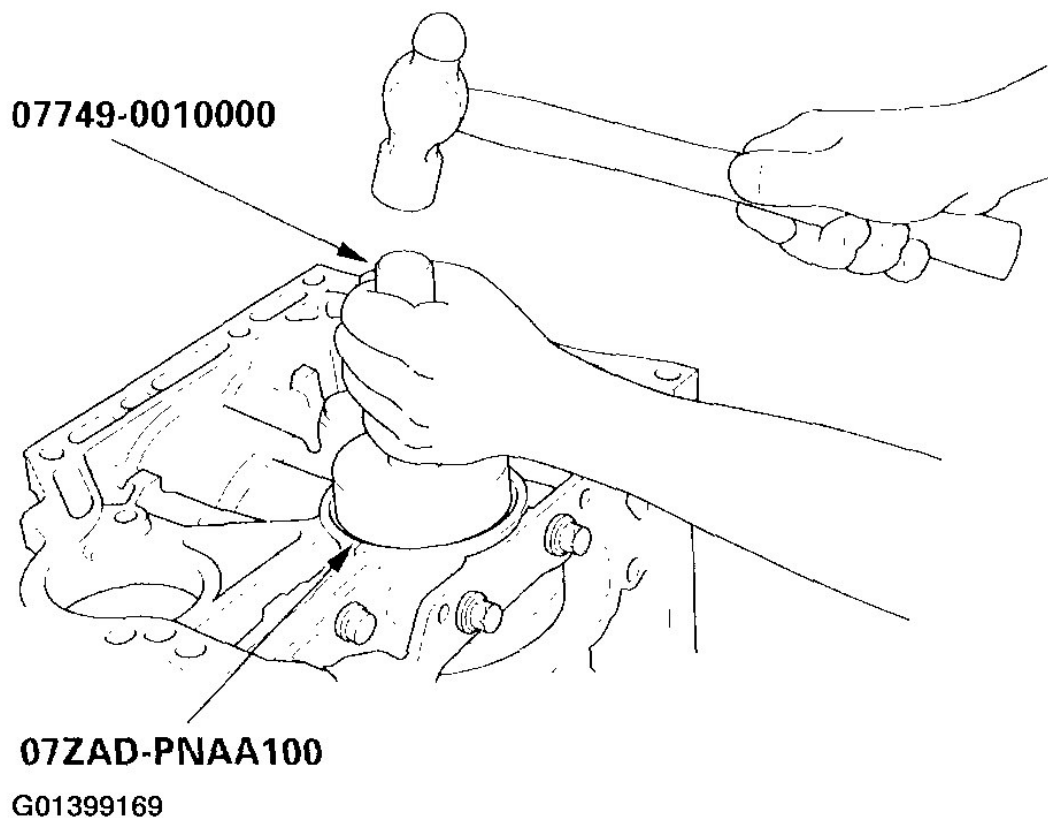
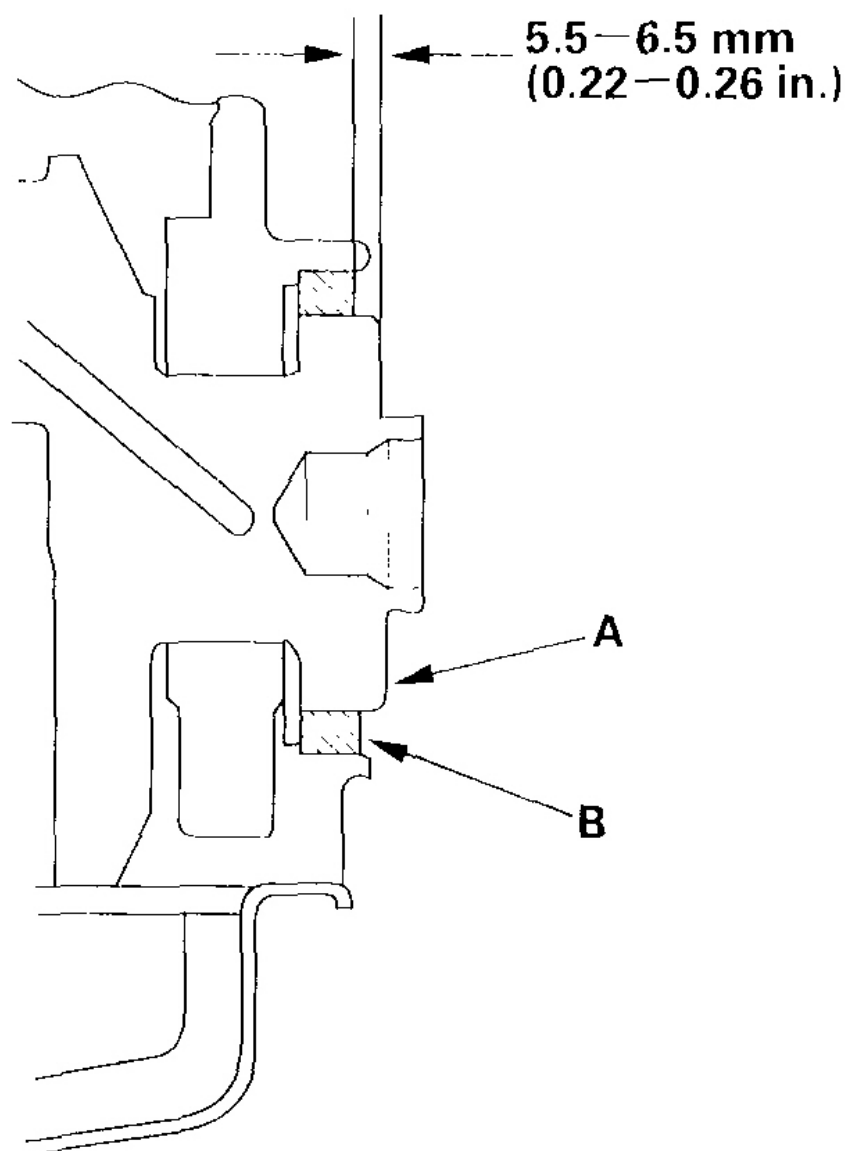


Fig. 177: Driving A New Oil Seal Squarely Into The Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Measure the distance between the crankshaft (A) and oil seal (B).

Oil Seal Installed Height: 5.5-6.5 mm (0.22-0.26 in.)

**Oil Seal Installed Height: 5.5 - 6.5 mm
(0.22 - 0.26 in.)**

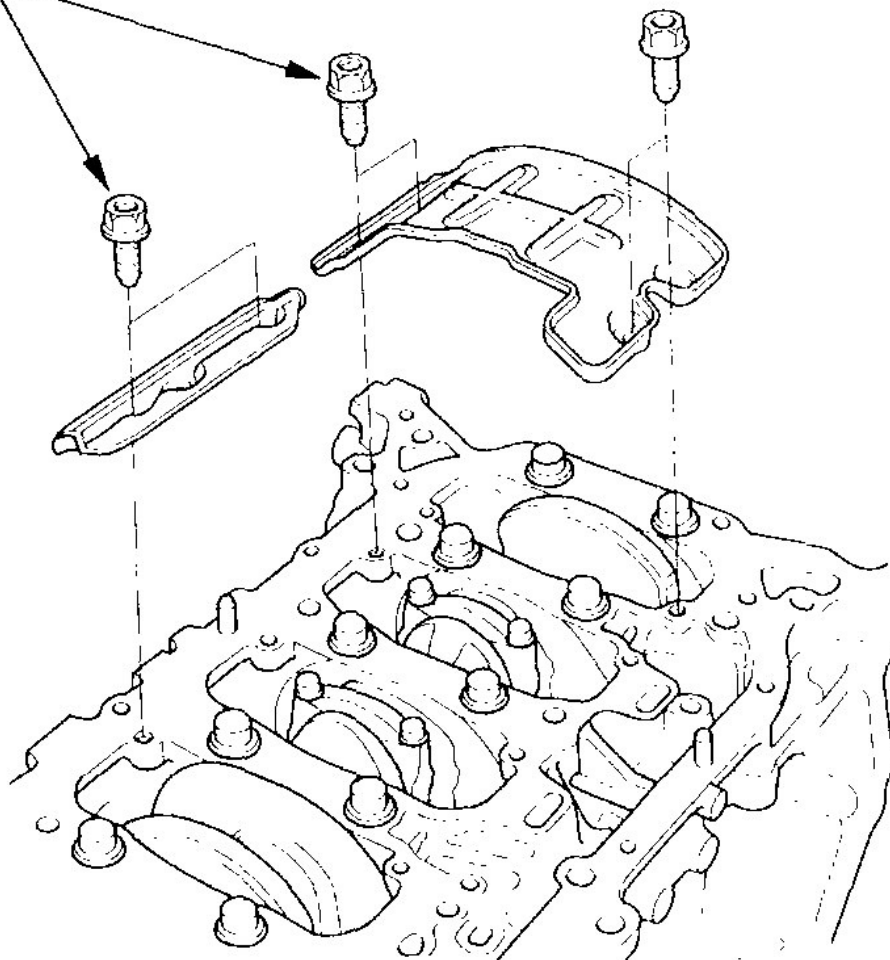


G01399170

Fig. 178: Measuring The Distance Between The Crankshaft And Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Install the baffle plates.

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



G01399171

Fig. 179: Installing The Baffle Plates

Courtesy of AMERICAN HONDA MOTOR CO., INC.

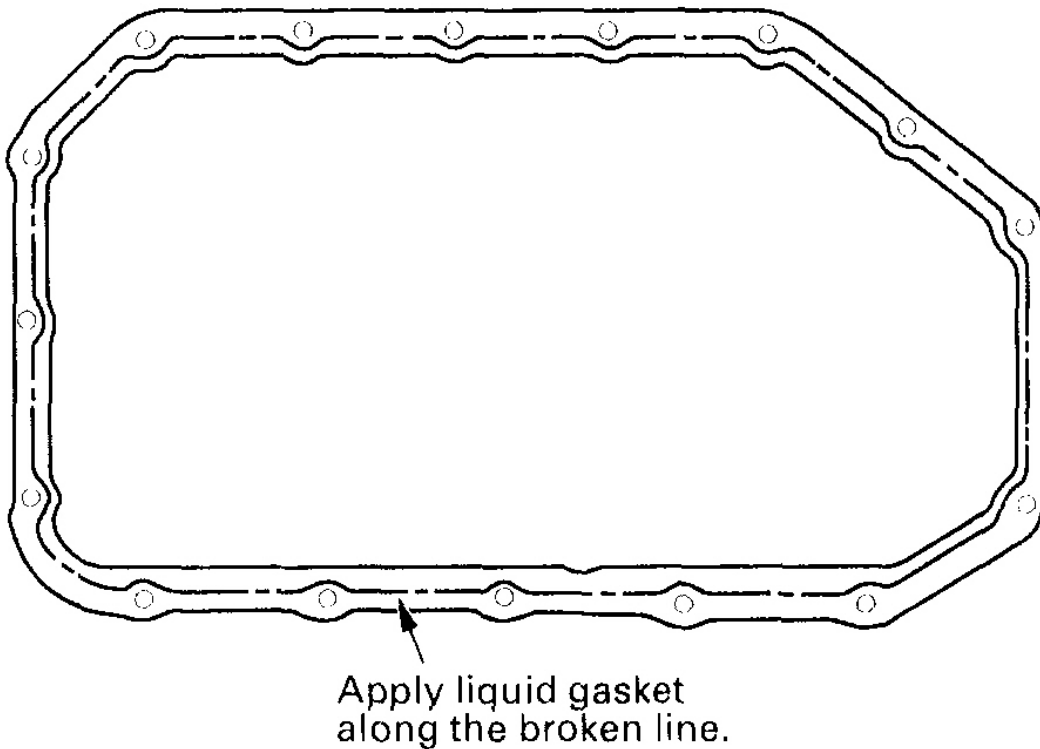
24. Install the oil pump (see **OIL PUMP OVERHAUL**).
25. Install the oil pan (see **OIL PAN INSTALLATION**).
26. Install the cylinder head (see **CYLINDER HEAD INSTALLATION**).
27. Install the flywheel (see **SHAFTS AND CLUTCHES**).
28. Install the transmission (see **TRANSMISSION INSTALLATION**).

29. Install the engine assembly (see **ENGINE INSTALLATION**).

OIL PAN INSTALLATION

1. Remove any old liquid gasket from the oil pan mating surfaces, bolts, and bolt holes.
2. Clean and dry the oil pan mating surfaces.
3. Apply liquid gasket, P/N 08718-0009, evenly to the cylinder block mating surface of the oil pan and to the inner threads of the bolt holes.

NOTE: Do not install the parts if 4 minutes or more have elapsed since applying liquid gasket instead, reapply liquid gasket after removing the old residue.



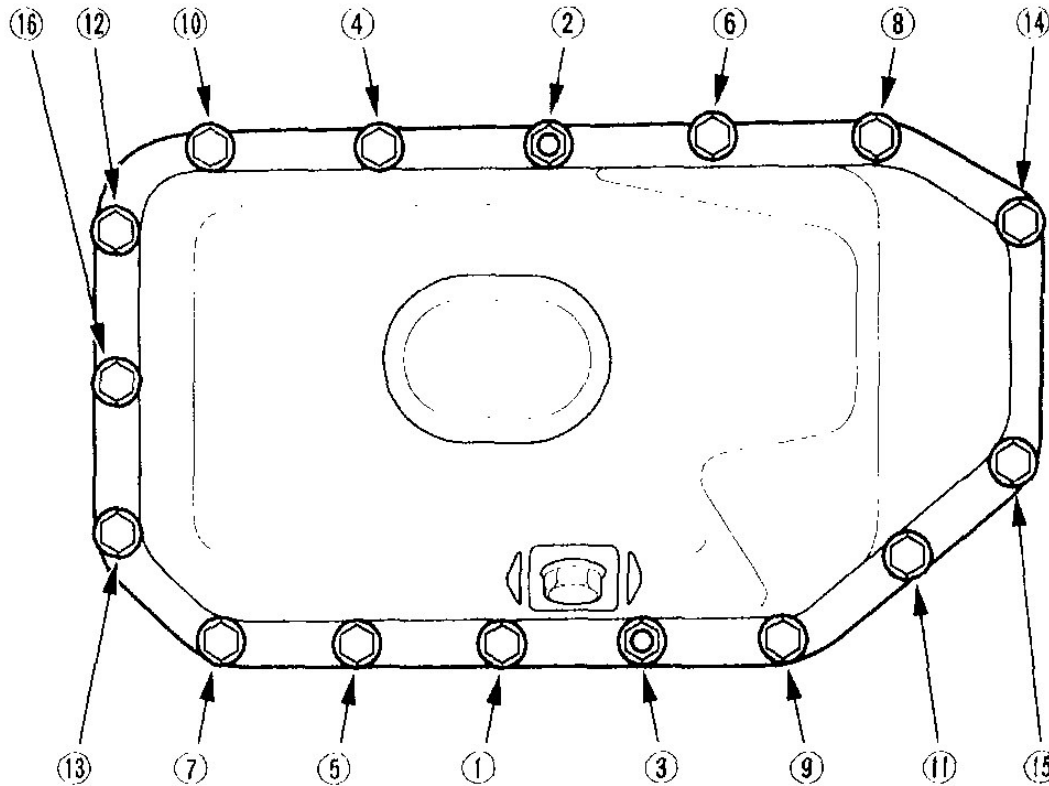
G01399172

Fig. 180: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan on the cylinder block.
5. Tighten the bolts and nuts in two or three steps. In the final step, tighten all bolts and nuts, in sequence, to 12 N.m (1.2 kgf.m, 8.7 lbf.ft).

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



G01399173

Fig. 181: Tightening The Oil Pan Bolts And Nuts In Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

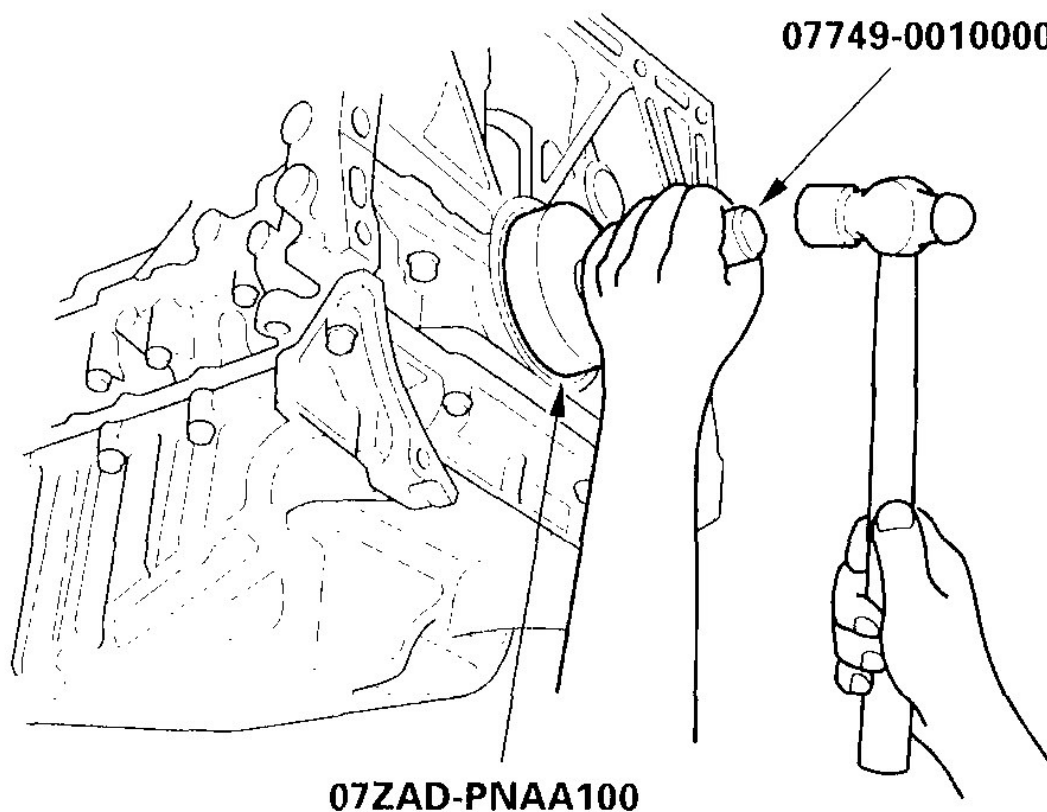
6. If the engine is still in the vehicle, install the subframe.
 - a. Install the subframe. Align the reference lines on the subframe with the bolt head center, then tighten the bolts (see step 8 of ENGINE INSTALLATION).
 - b. Tighten the rear mounting bolt (see step 9 of ENGINE INSTALLATION).
 - c. Tighten the front mount mounting bolts (see step 10 of ENGINE INSTALLATION).
 - d. Connect the suspension lower arm ball joints (see step 6 of BALL JOINT).

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required:

- Driver 07749-0010000
- Oil seal driver attachment, 96 mm 07ZAD-PNAA 100

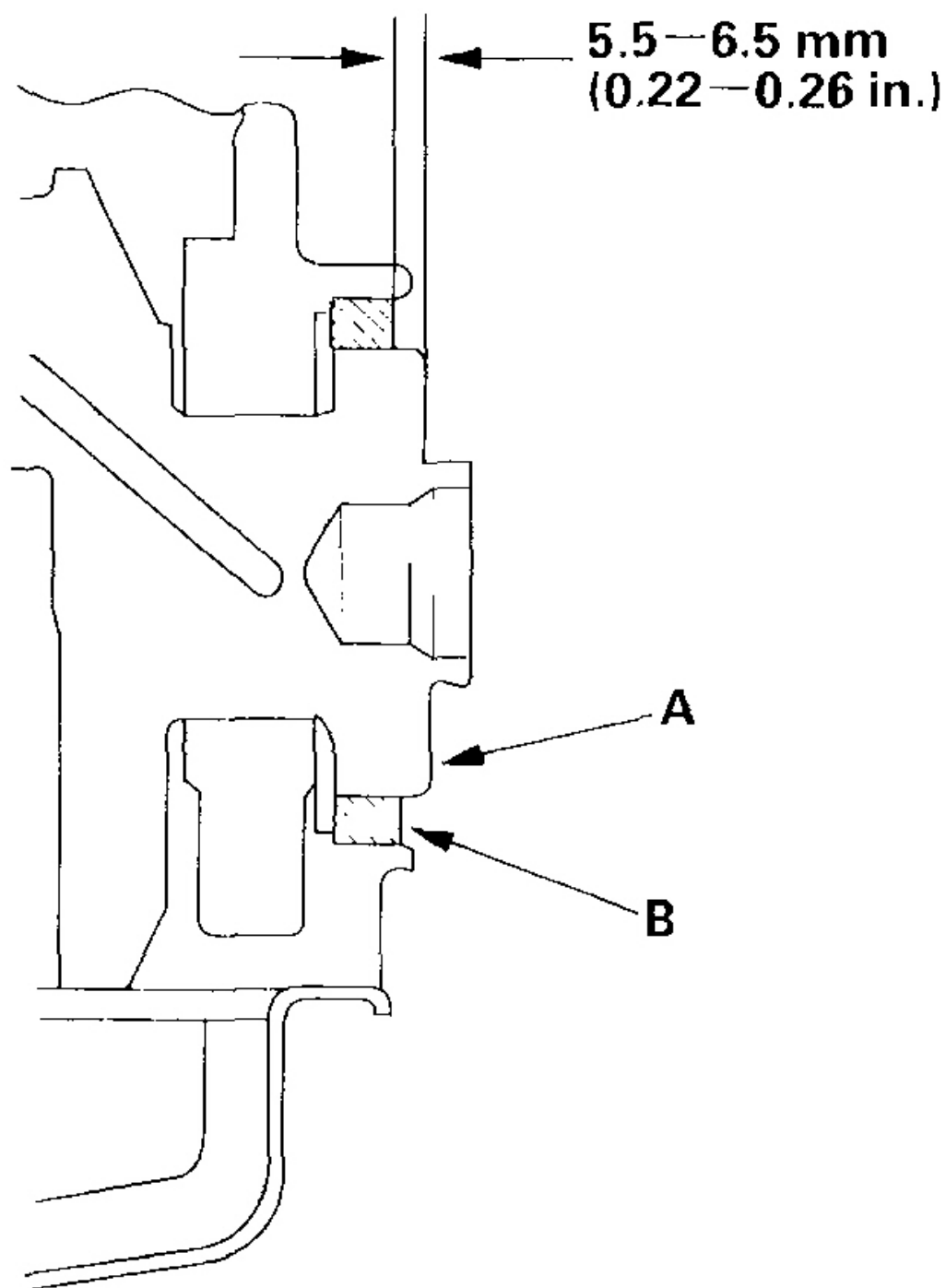
1. Dry the crankshaft oil seal housing.
2. Use the special tools to drive a new oil seal squarely into the block to the specified installed height.



G01399174

Fig. 182: Driving A New Oil Seal Squarely Into The Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Measure the distance between the crankshaft (A) and oil seal (B).
Oil Seal Installed Height: 5.5-6.5 mm (0.22-0.26 in.)

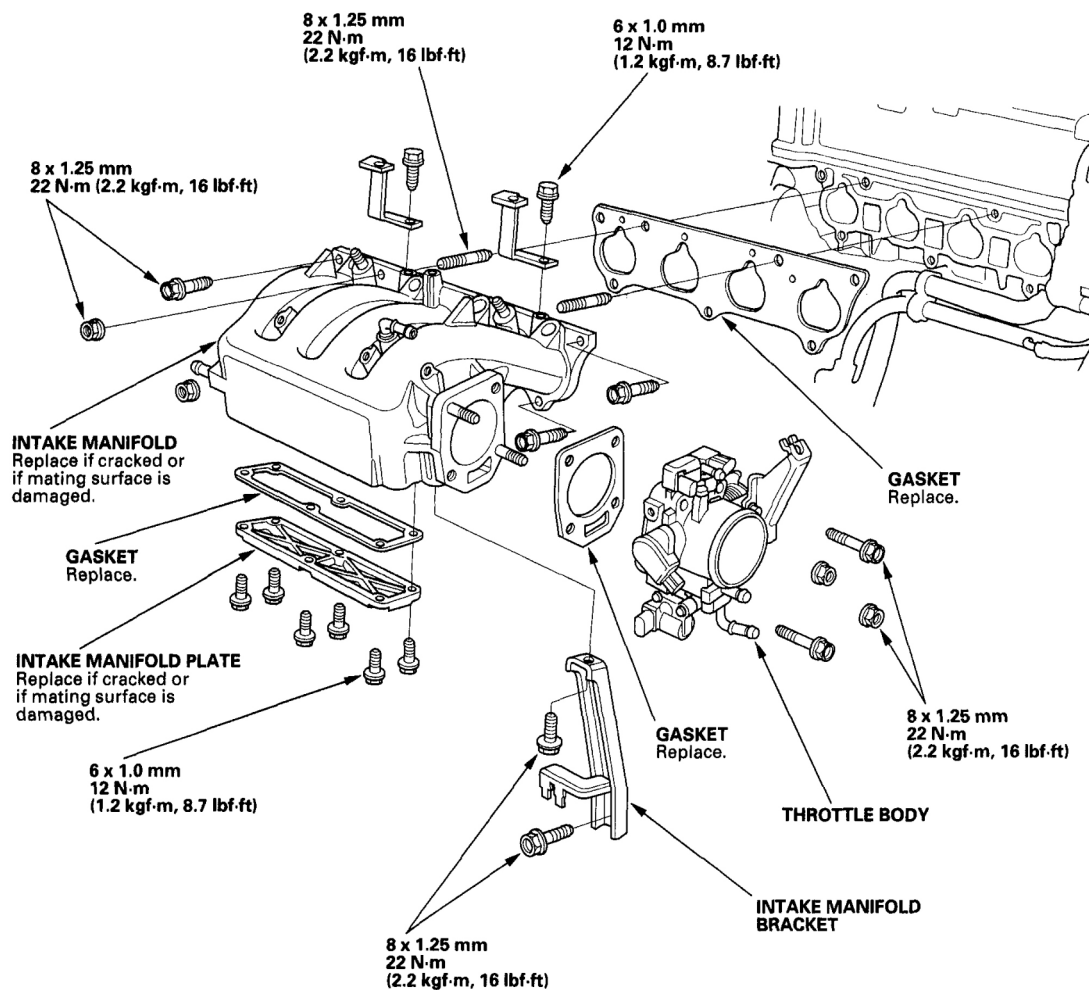


G01399175

Fig. 183: Measuring The Distance Between The Crankshaft And Oil Seal
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

INTAKE MANIFOLD & EXHAUST SYSTEM

INTAKE MANIFOLD REMOVAL & INSTALLATION

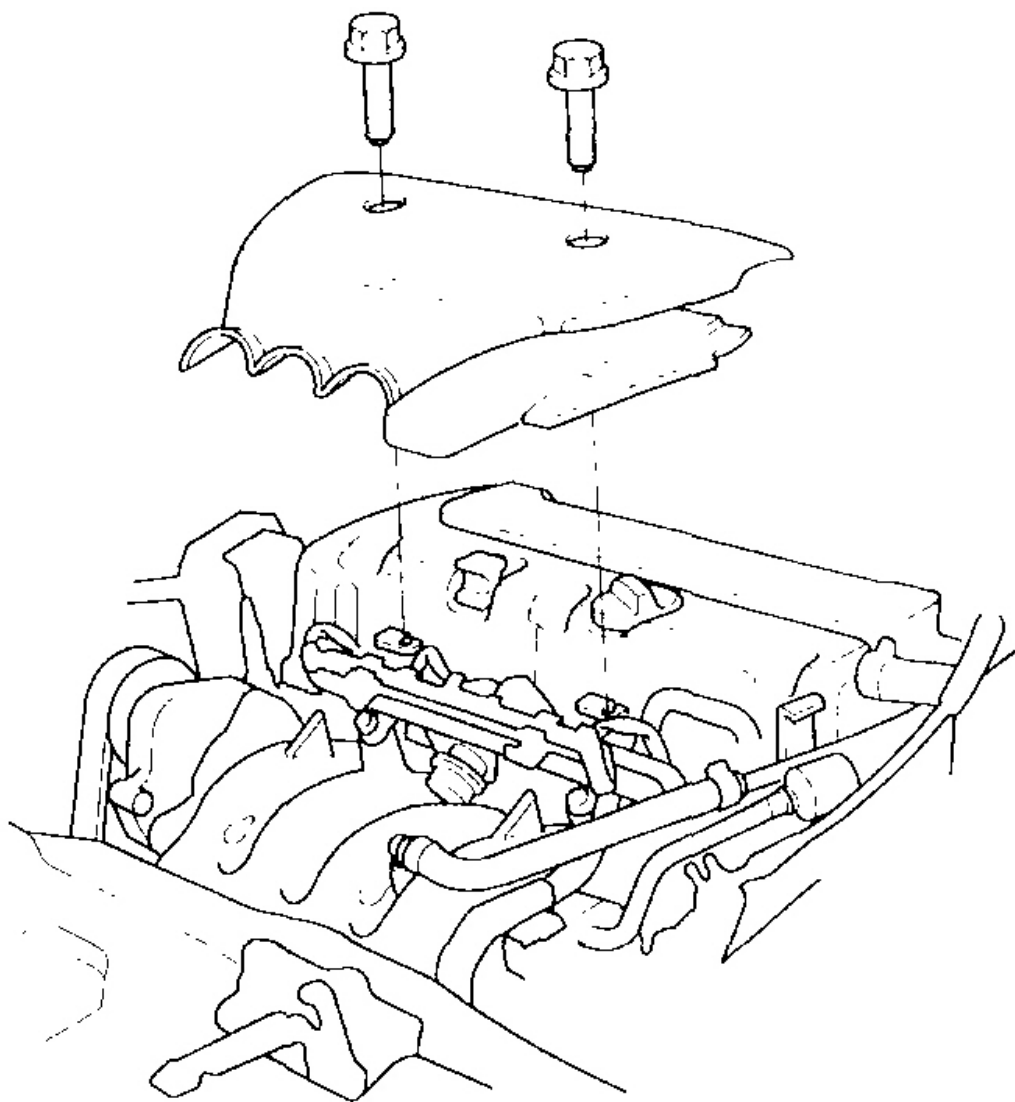


G01399212

Fig. 184: Exploded View Of Intake Manifold Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Removal

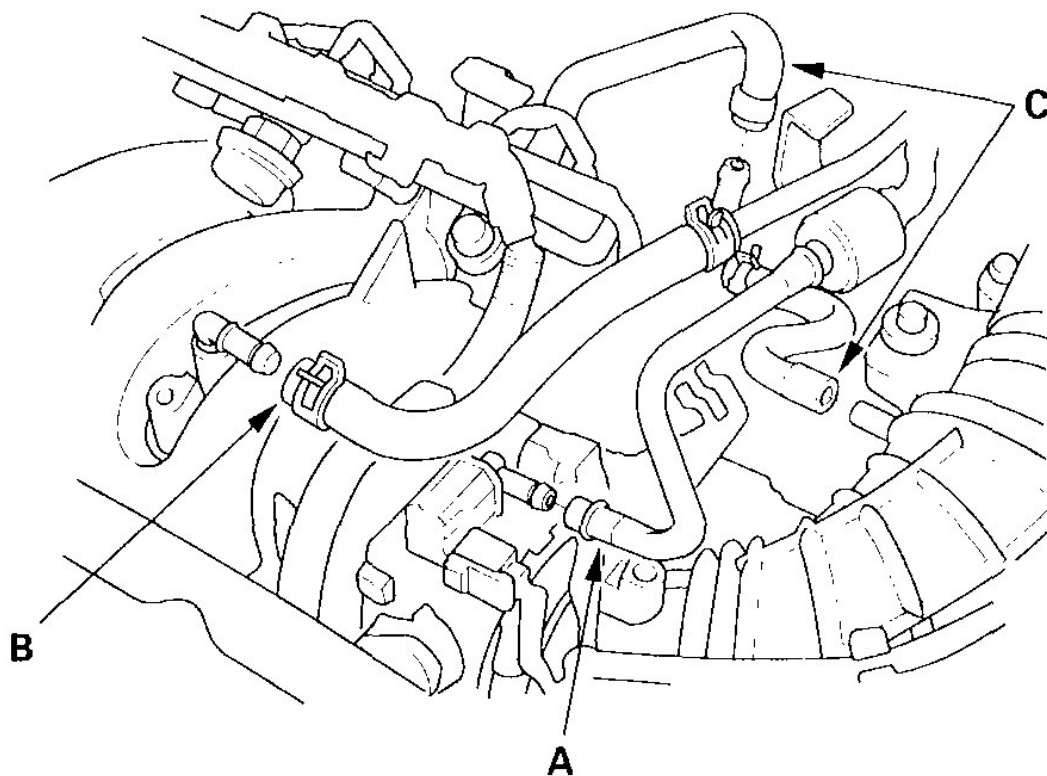
1. Remove the intake manifold cover.



G01399213

Fig. 185: Removing The Intake Manifold Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the evaporative emission (EVAP) canister hose (A), brake booster vacuum hose (B), and vacuum hoses (C).

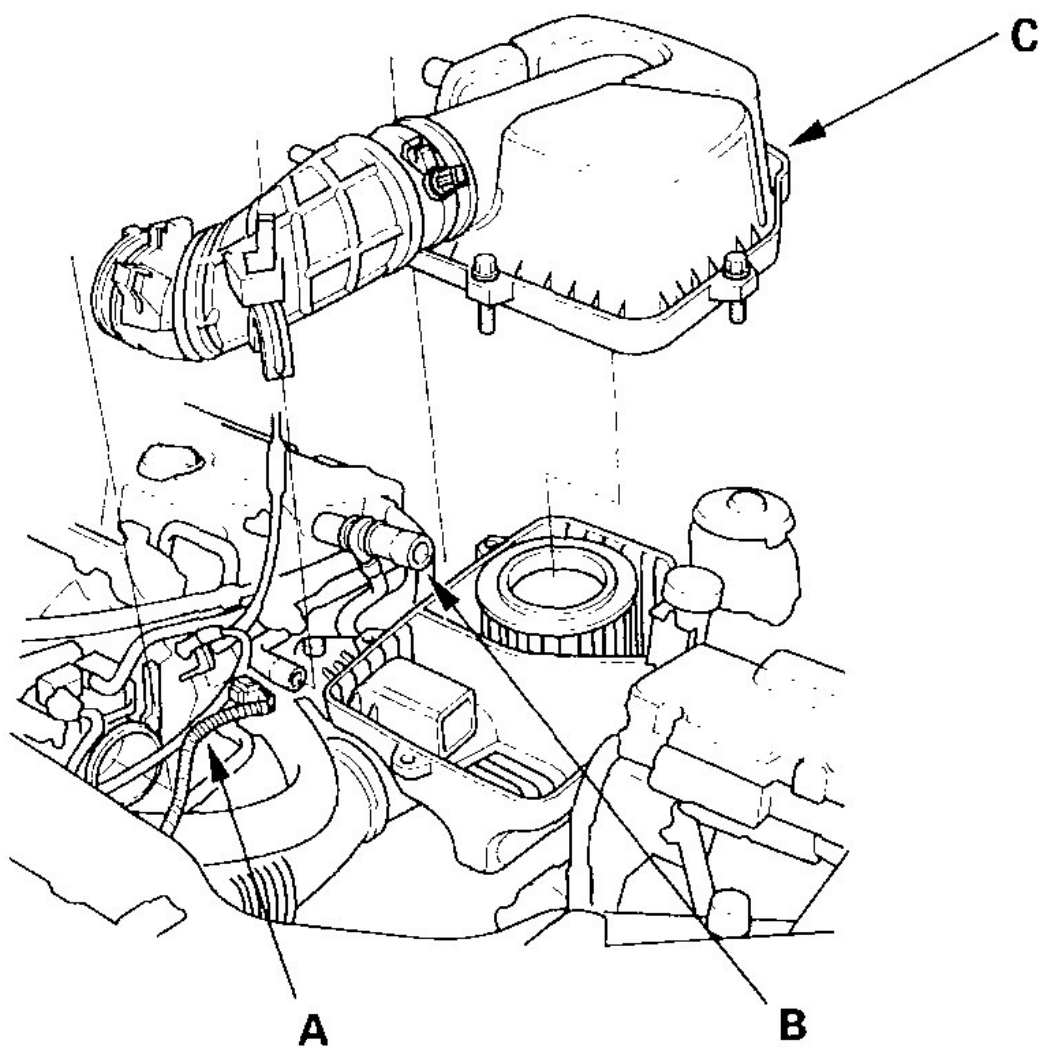


G01399214

Fig. 186: Removing The Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

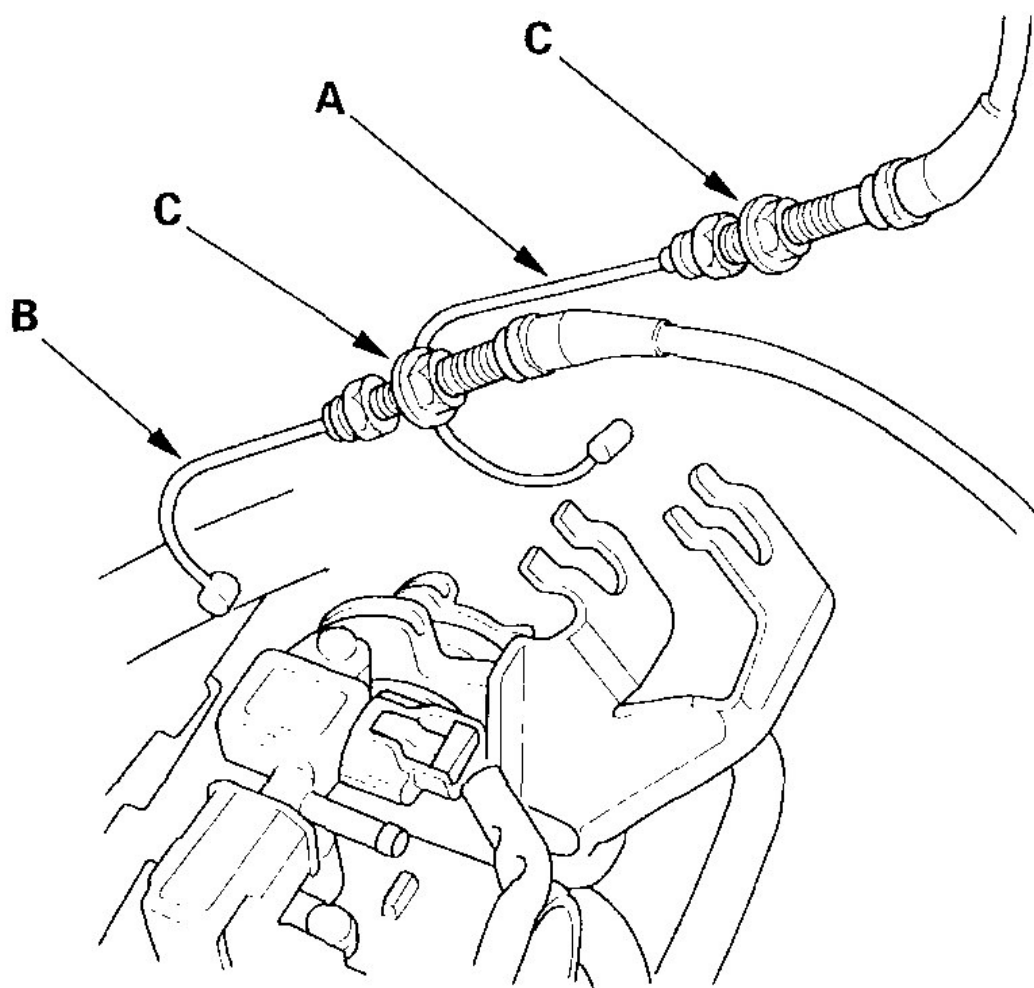
3. Disconnect the intake air temperature (IAT) sensor connector (A), and remove the breather hose (B), then remove the air cleaner housing cover/intake air duct assembly (C).



G01399215

Fig. 187: Removing The Air Cleaner Housing Cover/Intake Air Duct Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

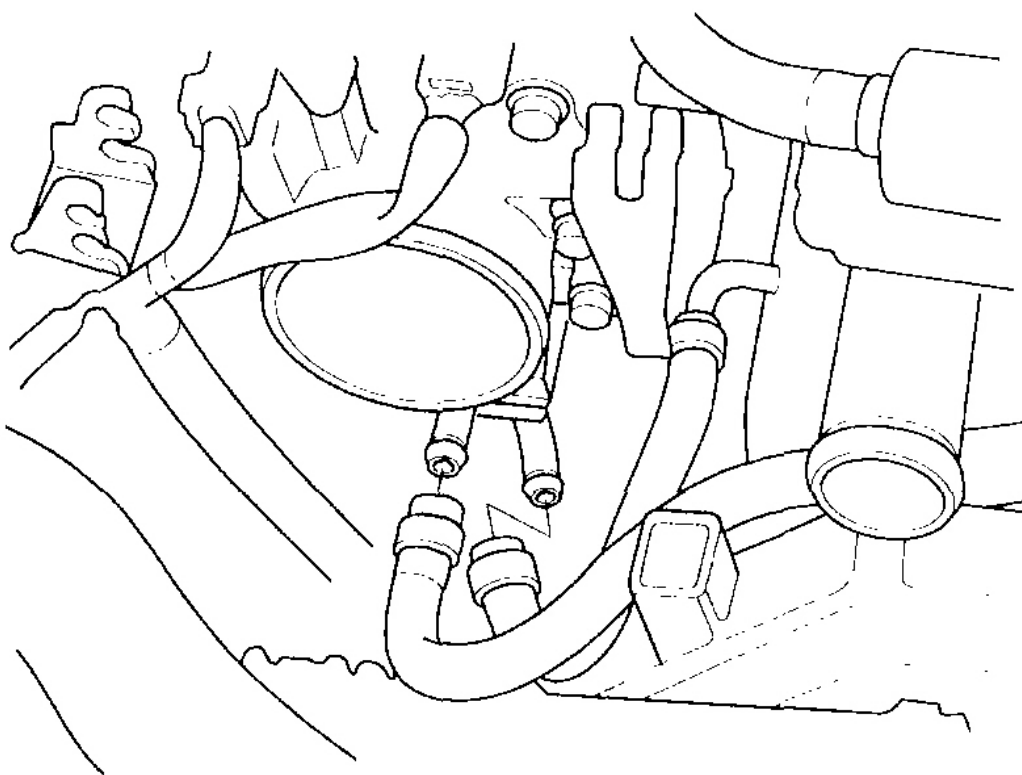
4. Fully open the throttle link and cruise control link by hand, then remove the throttle cable (A) and cruise control actuator cable (B) from the links. Loosen the locknuts (C), and remove the cables from the bracket.



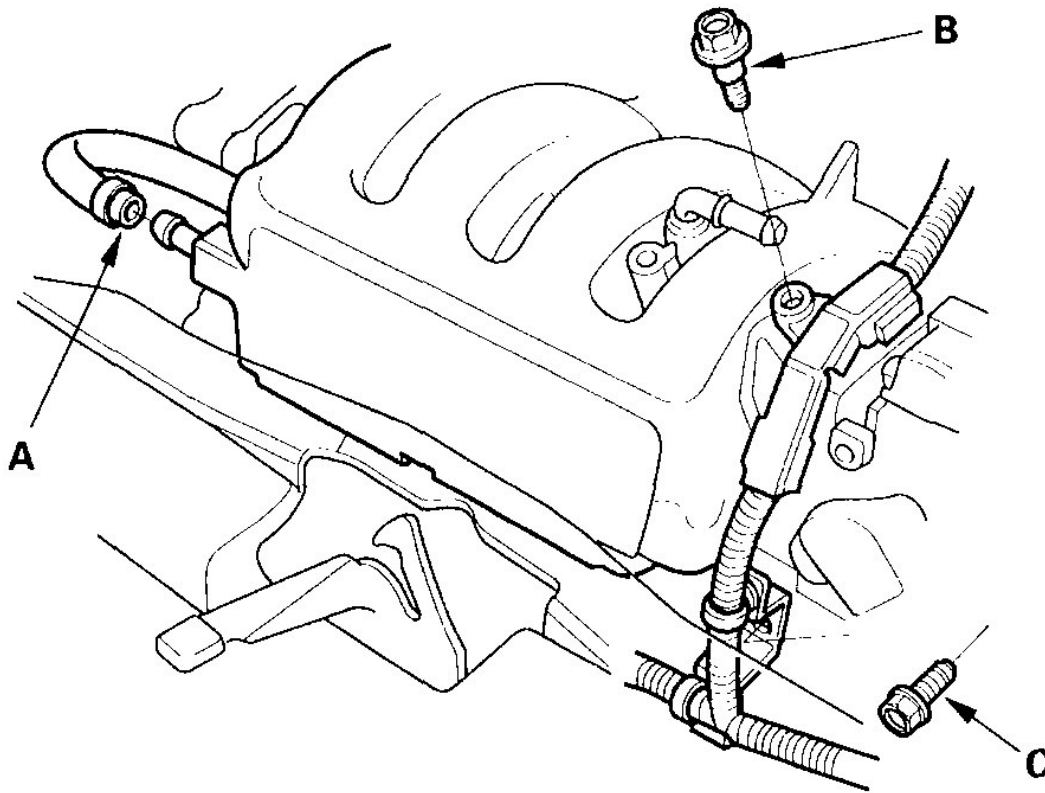
G01399216

Fig. 188: Removing The Throttle Cable And Cruise Control Actuator Cable
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Be prepared to catch and clean up spilled coolant. Remove the water bypass hoses, then plug the water bypass hoses, then plug the water bypass hoses.

**G01399217****Fig. 189: Removing The Coolant Hoses****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

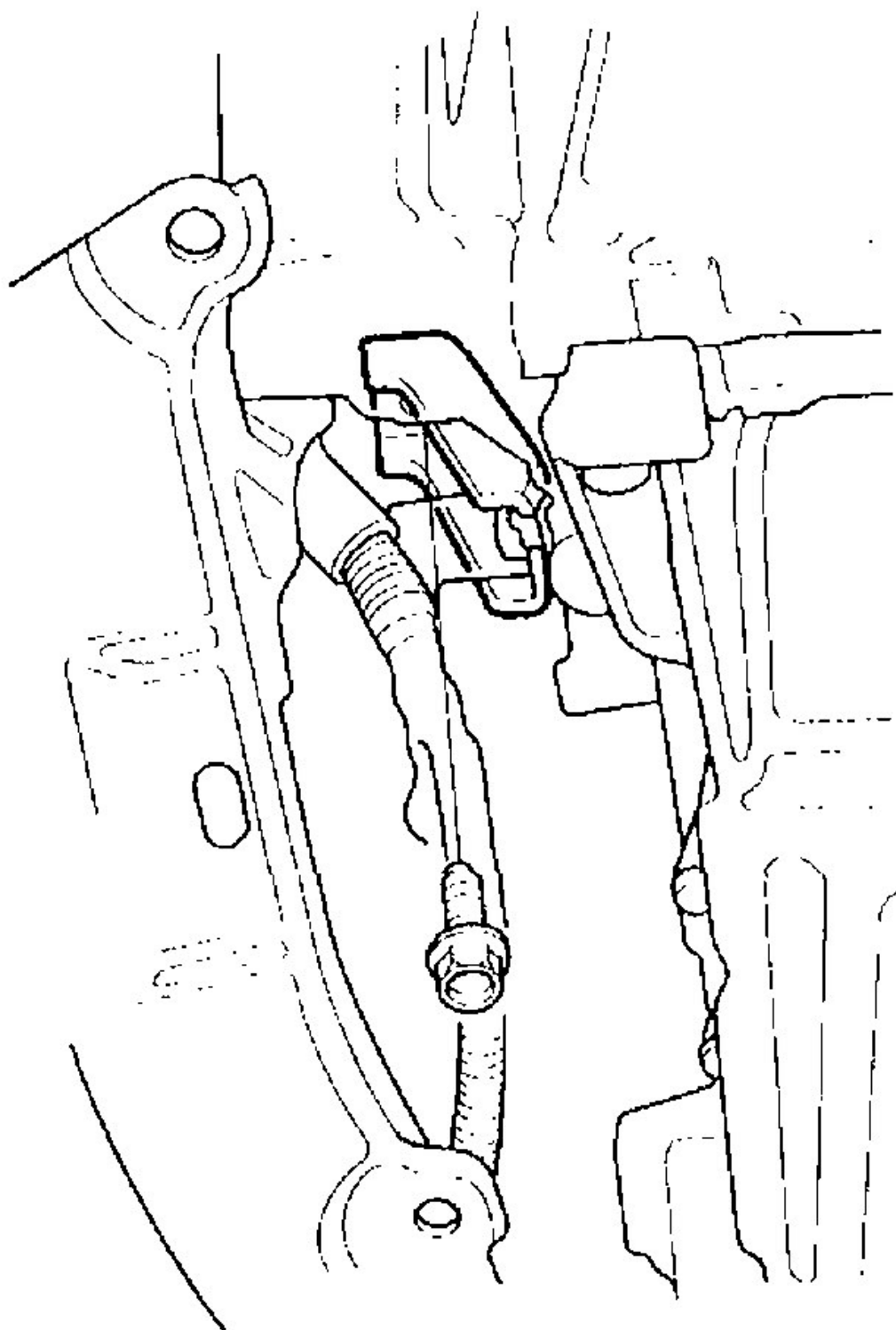
6. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
7. Remove the fuel line (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).
8. Remove the positive crankcase ventilation (PCV) hose (A), harness holder mounting bolt (B) and harness clamp mounting bolt (C).



G01399218

Fig. 190: Removing The Positive Crankcase Ventilation (PCV) Hose
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

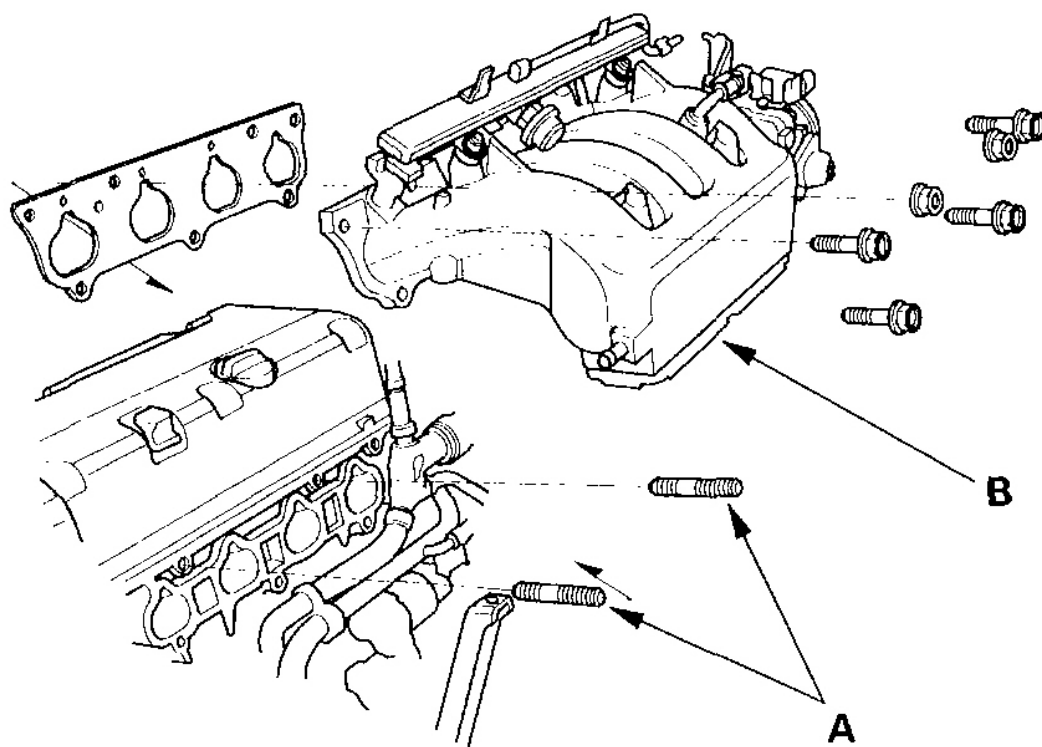
9. Remove the following engine wire harness connectors and wire harness clamps from the intake manifold:
 - Four injector connectors
 - Idle air control (IAC) valve connector
 - Throttle position (TP) sensor connector
 - Manifold absolute pressure (MAP) sensor connector
 - Evaporative emission (EVAP) canister purge valve connector
10. Remove the bolt securing the intake manifold and bracket.



G01399219

Fig. 191: Removing The Bolt Securing The Intake Manifold And Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove all the intake manifold mounting bolts/nuts.



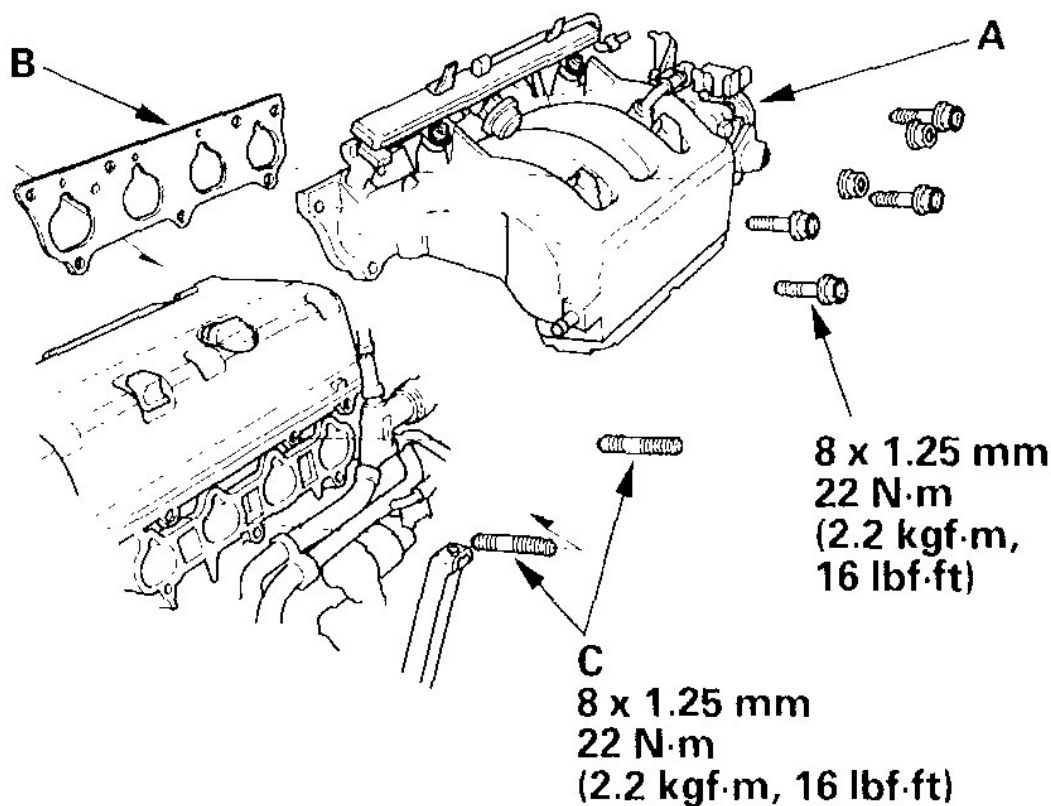
G01399220

Fig. 192: Removing The Intake Manifold
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Remove the two stud bolts (A), then remove the intake manifold (B).

Installation

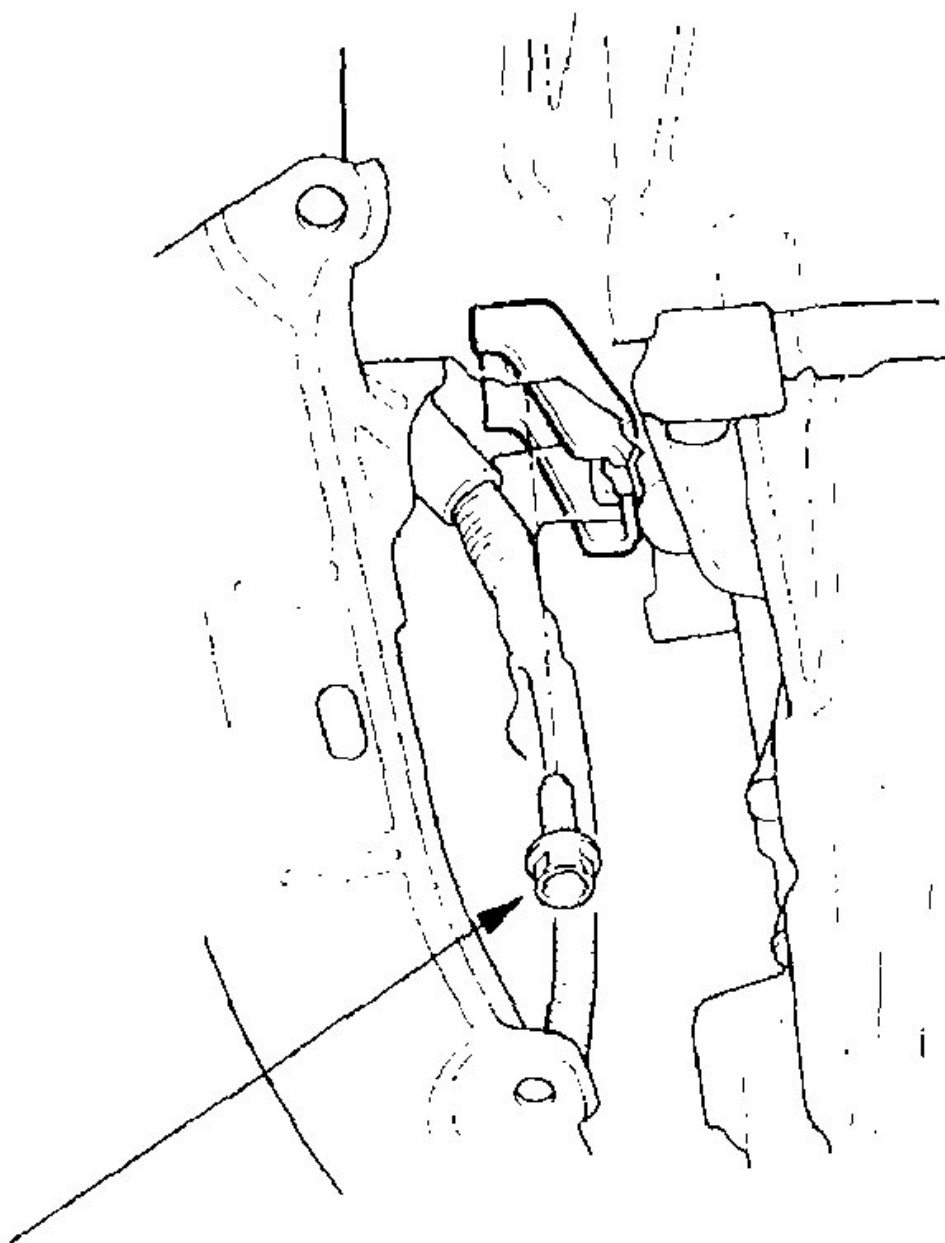
1. Install the intake manifold (A) with a NEW gasket (B), then install and tighten the two stud bolts (C).



G01399221

Fig. 193: Installing The Intake Manifold With A NEW Gasket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Tighten all intake manifold mounting bolts/nuts in a crisscross pattern in two or three steps, beginning with the inner bolt.
3. Tighten the bolt securing the intake manifold and bracket.

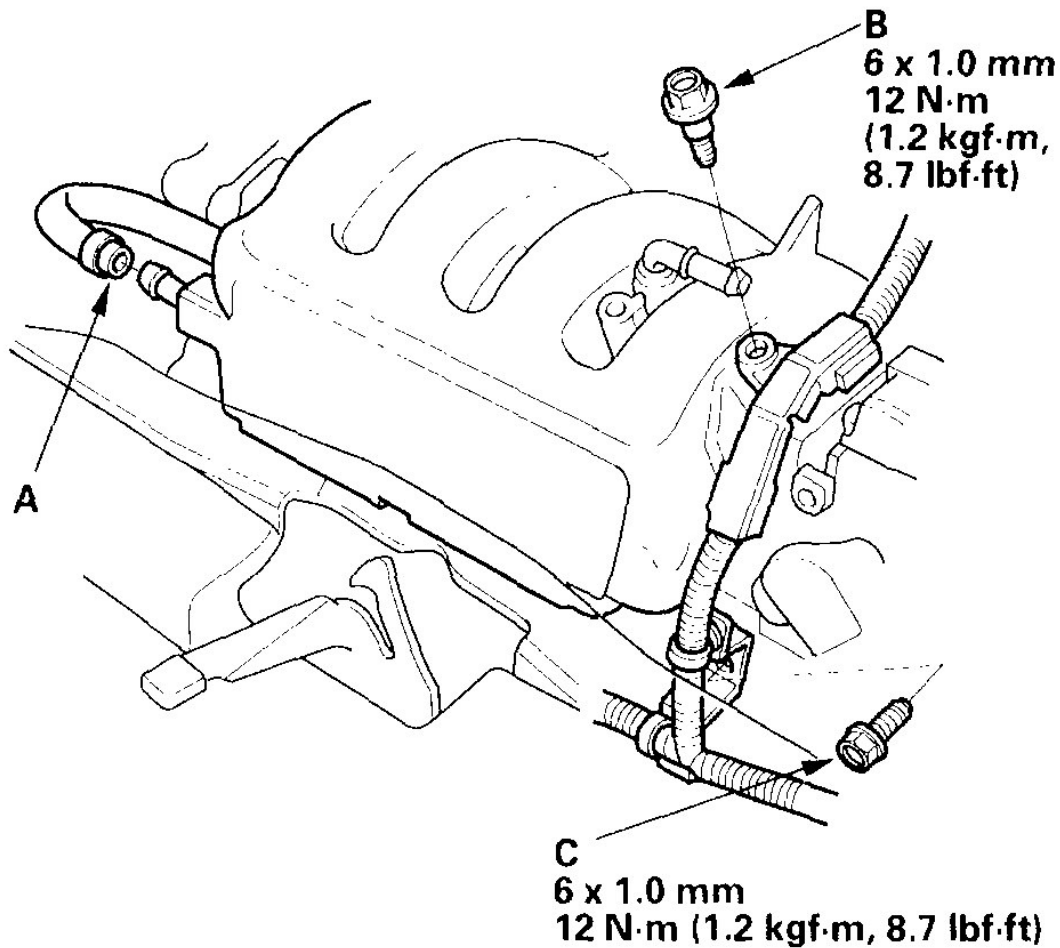


8 x 1.25 mm
22 N·m (2.2 kgf·m, 16 lbf·ft)

G01399222

Fig. 194: Tightening The Bolt Securing The Intake Manifold And Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the PCV hose (A), harness holder mounting bolt (B), and harness clamp mounting bolt (C).



G01399223

Fig. 195: Installing The PCV Hose
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the fuel line (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**).
6. Install the water bypass hoses.

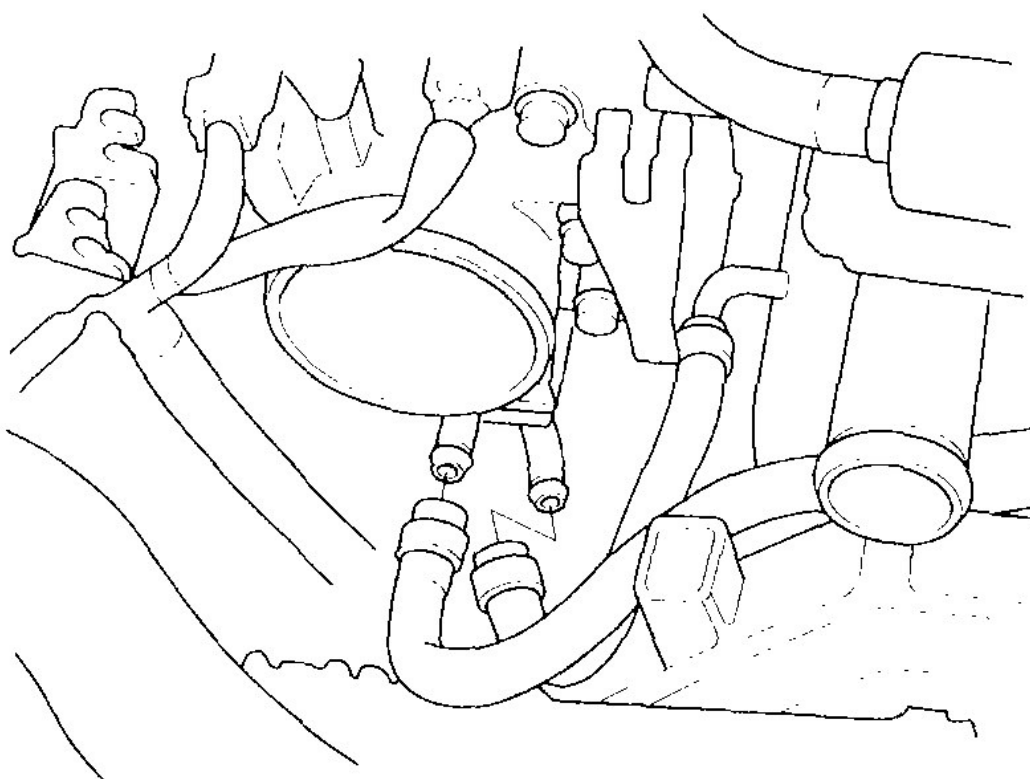
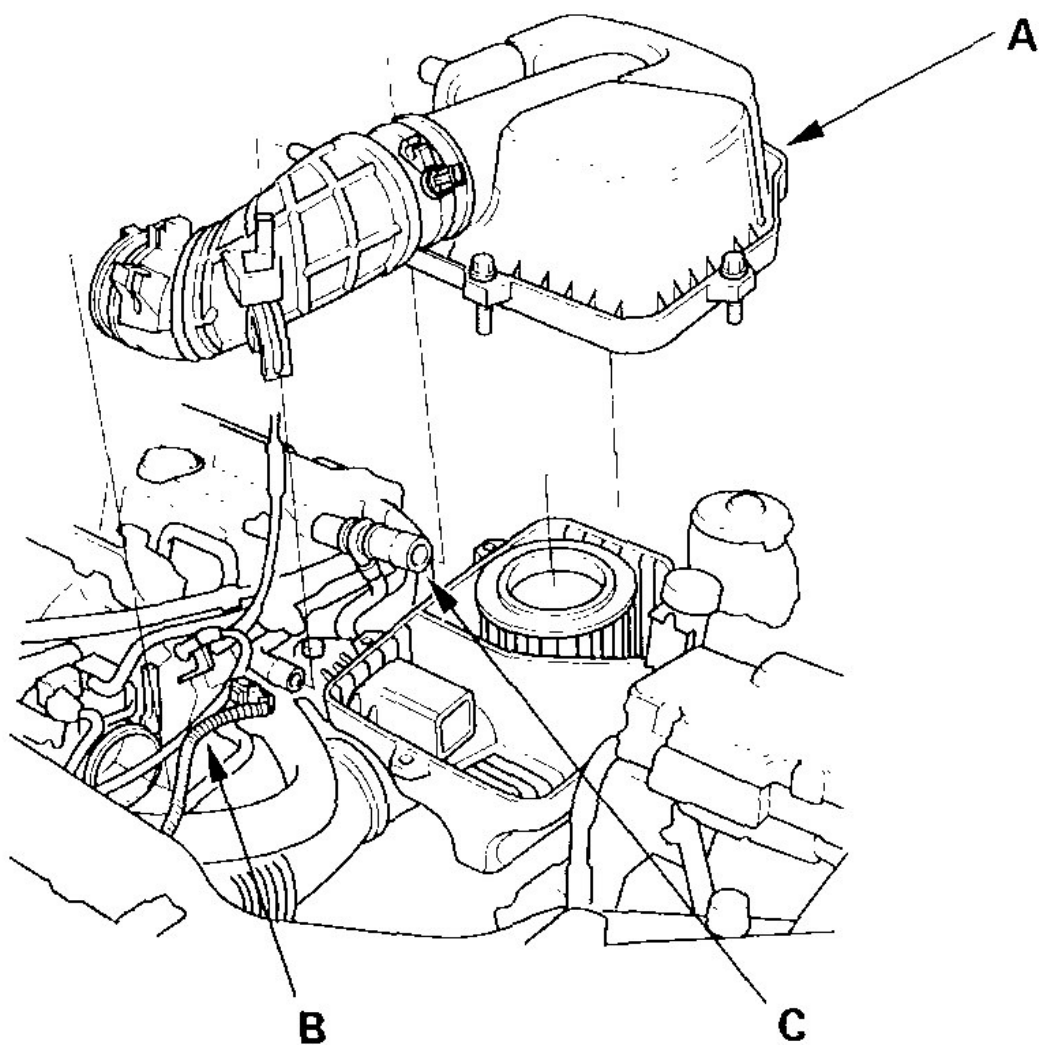
**G01399224**

Fig. 196: Installing The Water Bypass Hoses
Courtesy of AMERICAN HONDA MOTOR CO., INC.

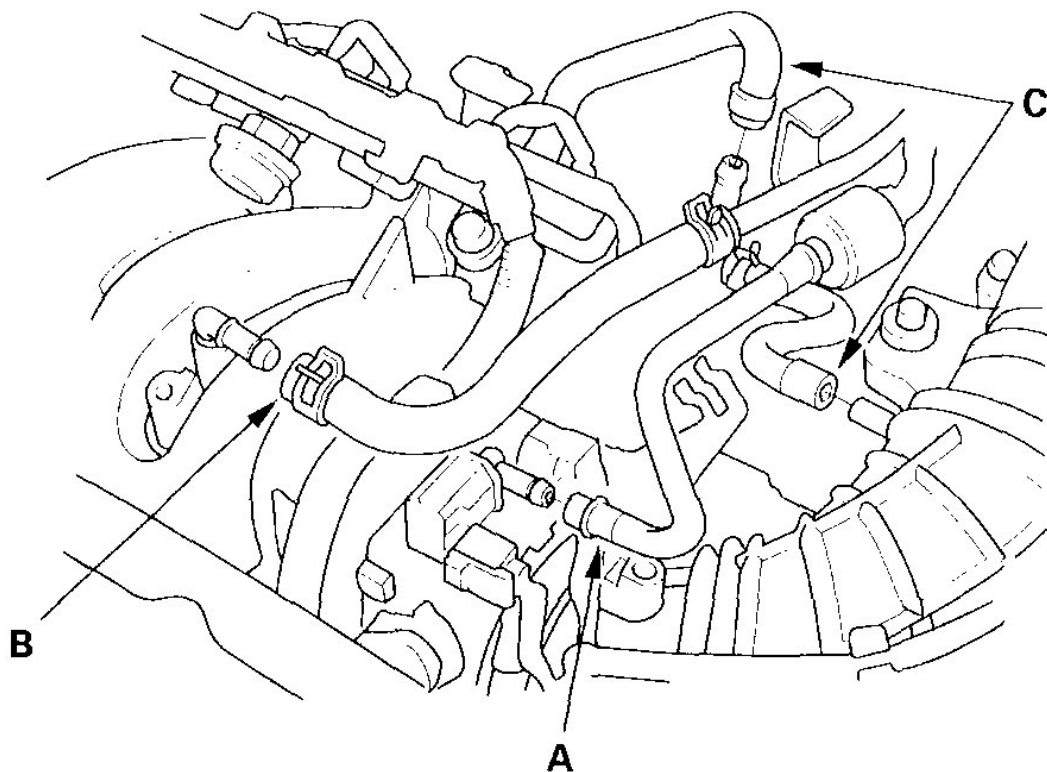
7. Install the throttle cable (see **THROTTLE CABLE REMOVAL/INSTALLATION**), then adjust it (see **THROTTLE CABLE ADJUSTMENT**).
8. Install the cruise control actuator cable (see **CRUISE CONTROL ACTUATOR/CABLE REPLACEMENT**), then adjust it (see **CRUISE CONTROL ACTUATOR CABLE ADJUSTMENT**).
9. Install the air cleaner housing cover (A), and connect the IAT sensor connector (B).



G01399225

Fig. 197: Installing The Air Cleaner Housing Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Install the breather hose (C).
11. Install the EVAP canister hose (A), brake booster vacuum hose (B), and vacuum hoses (C).



G01399226

Fig. 198: Installing The Hoses

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the intake manifold cover.

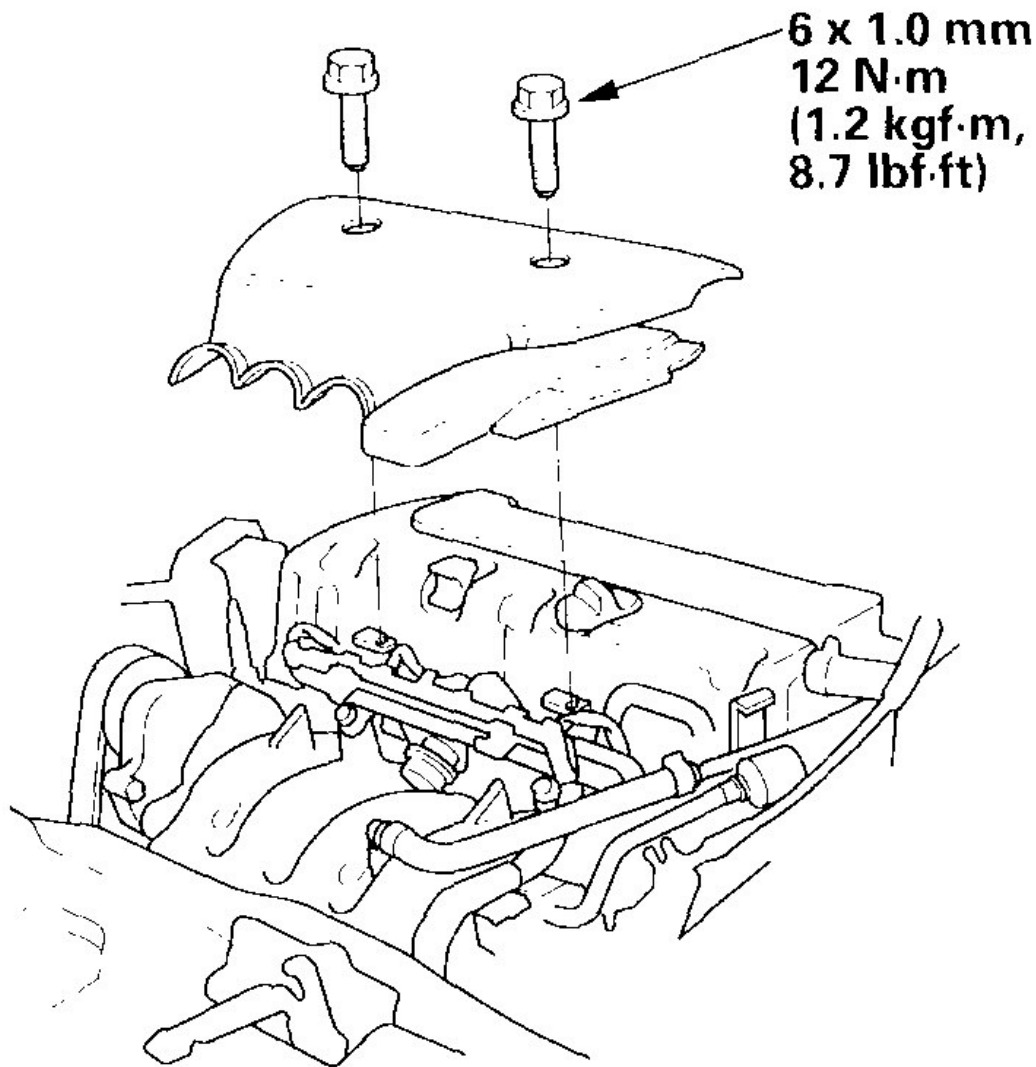
**G01399227**

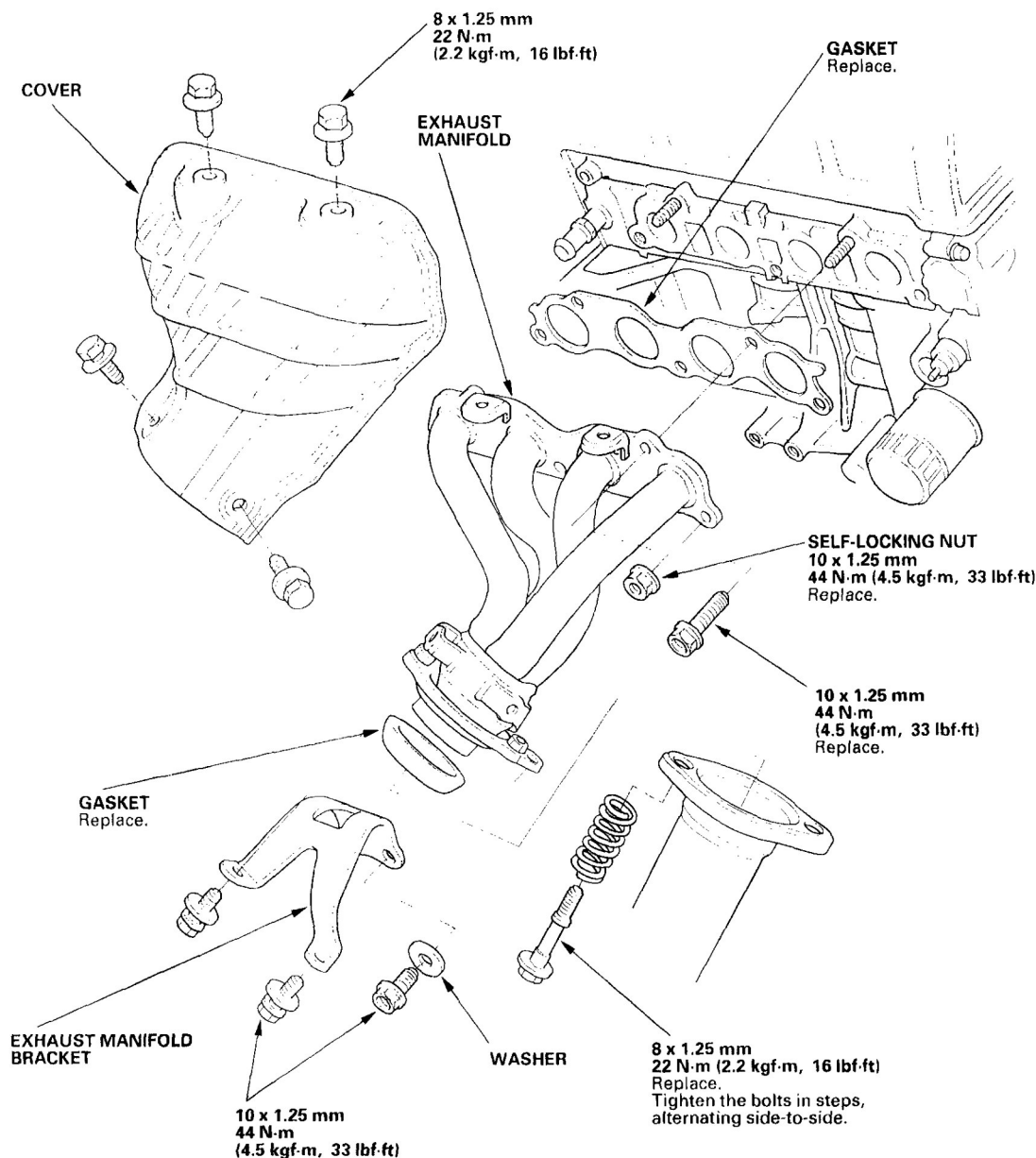
Fig. 199: Installing The Intake Manifold Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Clean up any spilled engine coolant.
14. After installation, check that all tubes, hoses, and connectors are installed correctly.
15. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so that the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
16. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open

(see step 7 of **COOLANT REPLACEMENT**).

EXHAUST MANIFOLD REMOVAL & INSTALLATION

1. Remove the VTEC solenoid valve (see **VTEC SOLENOID VALVE REMOVAL/INSPECTION**).
2. Remove the driveshaft heat shield (see **INTERMEDIATE SHAFT**).
3. Remove the cover and exhaust manifold bracket, then remove the exhaust manifold.



G01399228

Fig. 200: Removing The Exhaust Manifold

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2003 Honda Civic Si

2002-05 ENGINES 2.0L 4-Cylinder - Civic (Hatchback)

4. Install the exhaust manifold and tighten the bolts/nuts in a crisscross pattern in two or three steps, beginning with the inner bolt.
5. Install the other parts in the reverse order of removal.