

2004 Acura TL

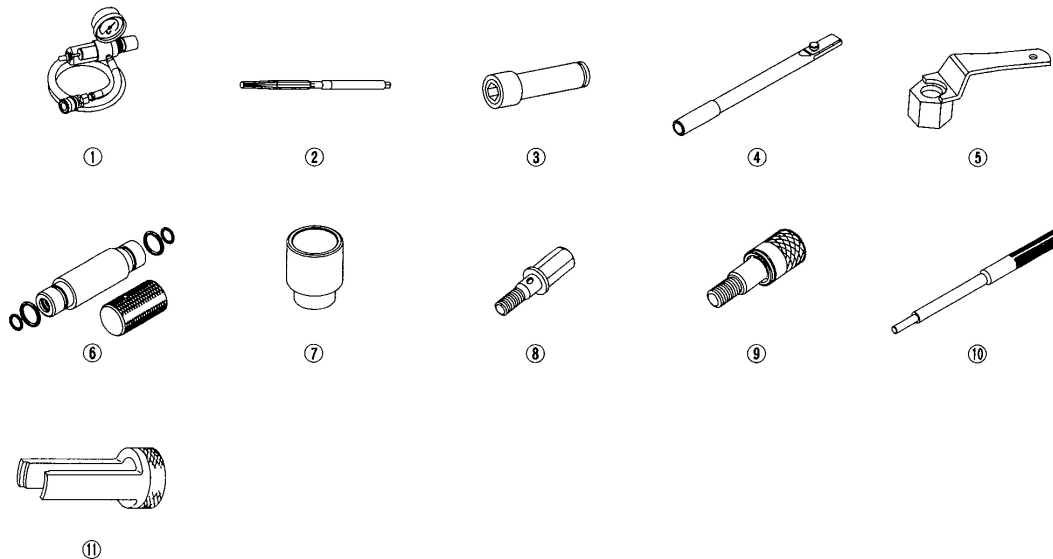
2004-06 ENGINE Cylinder Head - TL

2004-06 ENGINE

Cylinder Head - TL

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-001020A	Holder Handle	1
⑤	07MAB-PY3010A	Holder Attachment, 50 mm, Offset	1
⑥	07PAD-0010000	Stem Seal Driver	1
⑦	07PAF-0030100	Camshaft Oil Seal Driver	1
⑧	07VAJ-P8A010A	VTEC Air Adapter	1
⑨	070AJ-0030100	VTEC Air Stopper	1
⑩	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑪	07757-PJ1010A	Valve Spring Compressor Attachment	1

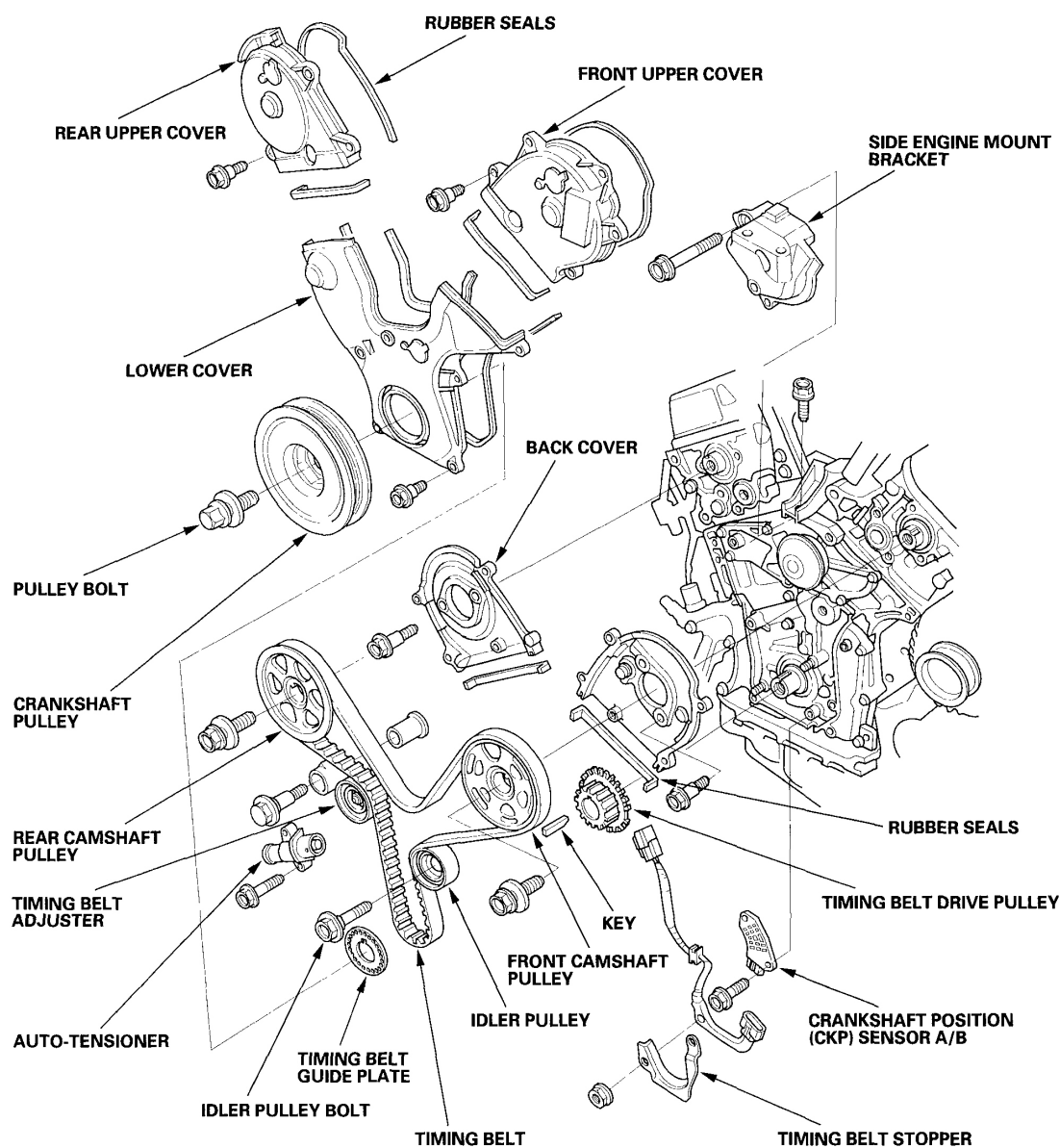


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Fig. 1: Identifying Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX



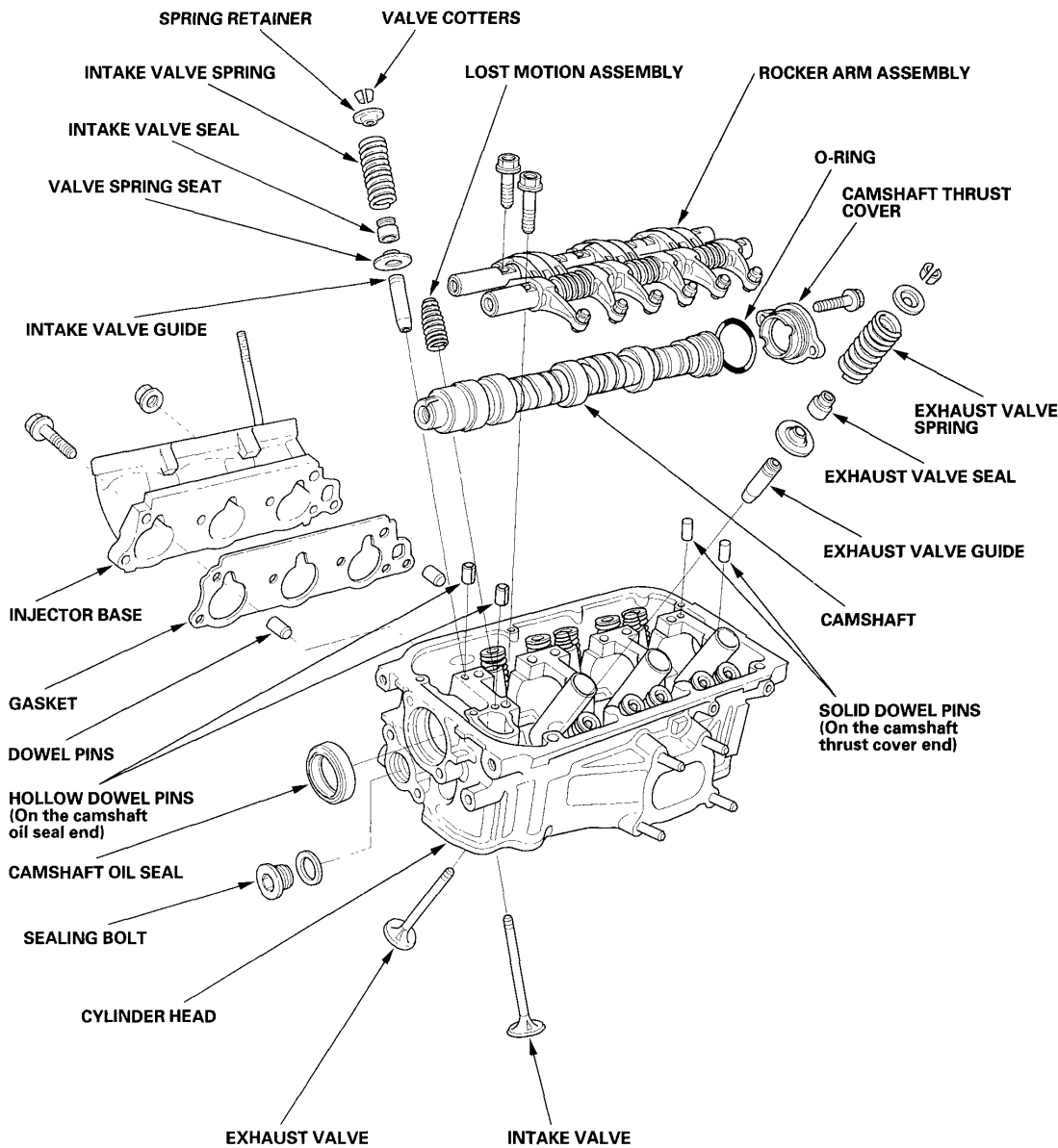
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Fig. 2: Cylinder Head - Component Location Index (1 Of 3)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2004-06 ENGINE Cylinder Head - TL



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Fig. 4: Cylinder Head - Component Location Index (3 Of 3)

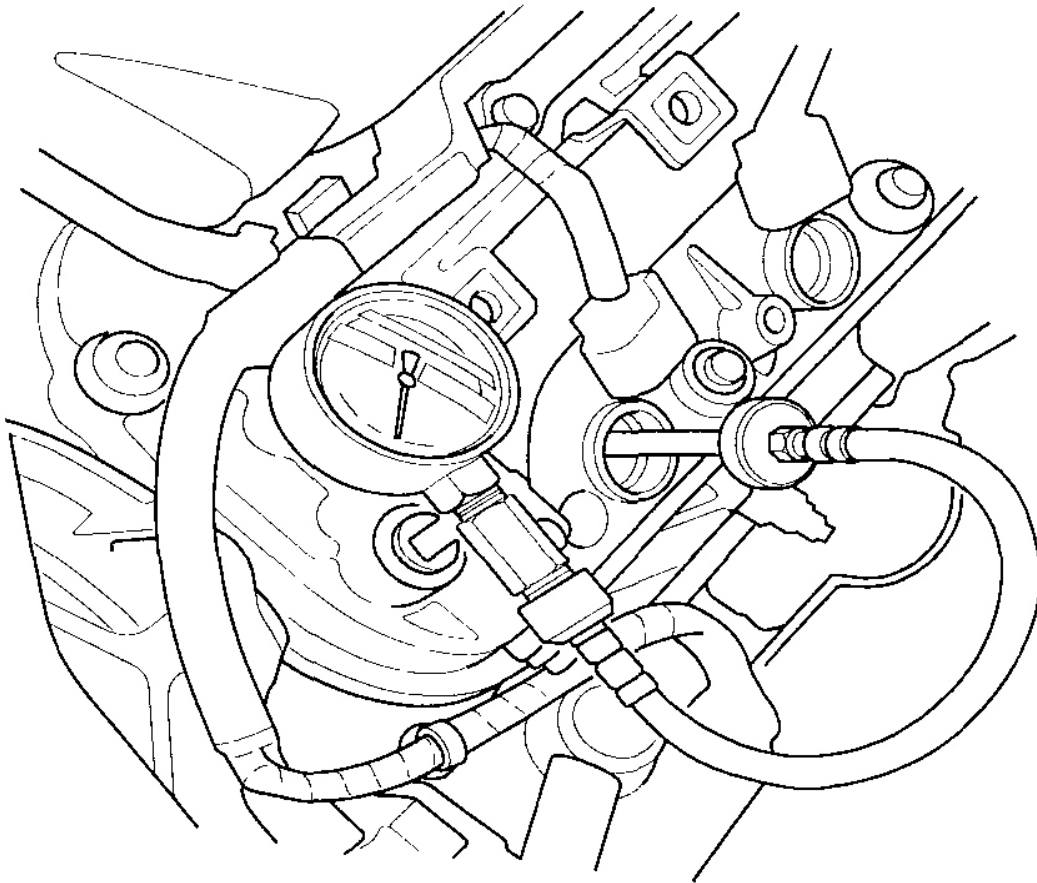
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ENGINE COMPRESSION INSPECTION

NOTE: After this inspection, you must reset the engine control module (ECM)/powertrain control module (PCM), otherwise the ECM/PCM will continue to stop the fuel injectors from functioning. Select ECM/PCM reset using the Honda Diagnostic System (HDS) (see HDS CLEAR COMMAND).

1. Warm up the engine to normal operating temperature (cooling fan comes on).

2. Turn the ignition switch OFF.
3. Connect the HDS to the data link connector (DLC) (see **GENERAL TROUBLESHOOTING INFORMATION**).
4. On the HDS, select PGM-FI, INSPECTION, then ALL INJECTORS OFF.
5. Remove the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
6. Remove the six spark plugs.
7. Attach the compression gauge to the spark plug hole.



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

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

Compression Pressure:

Above 930 kPa (9.5 kgf/cm² ,135 psi)

9. Measure the compression on the remaining cylinders.

Maximum Variation:

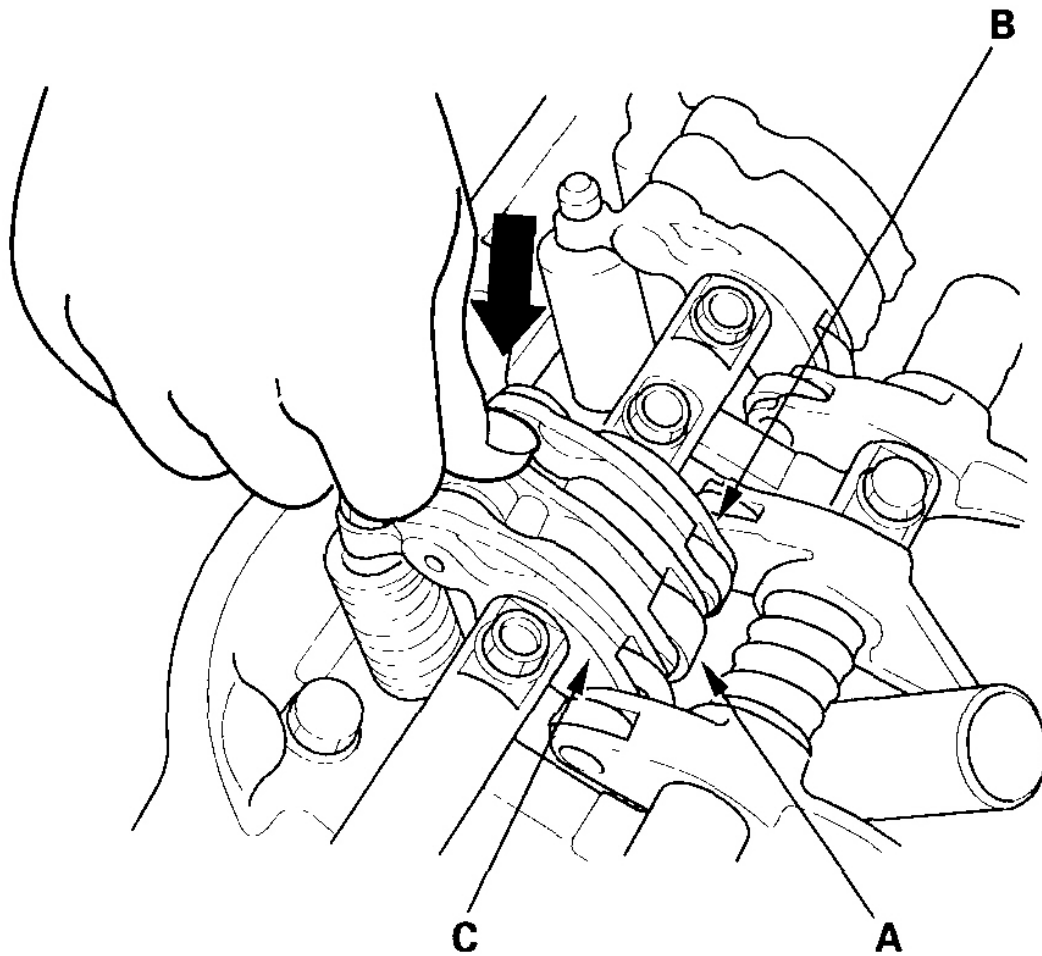
Within 200 kPa (2.0 kgf/cm² ,28 psi)

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

VTEC ROCKER ARM TEST

Special Tools Required

- VTEC air adapter 07VAJ-P8A010A
 - VTEC air stopper 070AJ-0030100
 - Air pressure regulator 07AAJ-PNAA100
1. Start the engine and let it run for 5 minutes, then turn the ignition switch OFF.
 2. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
 3. Set the No. 1 piston at top dead center (TDC) (see step 3).
 4. Push on the intake mid rocker arm (A) for the No. 1 cylinder. The mid rocker arm should move independently of the primary rocker arm (B) and secondary rocker arm (C).
 - If the mid rocker arm moves freely, go to step 5.
 - If the intake mid rocker arm does not move, remove the mid, primary, and secondary intake rocker arms as an assembly, then check that the pistons in the mid and primary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary, mid, and secondary rocker arms as an assembly, and retest.



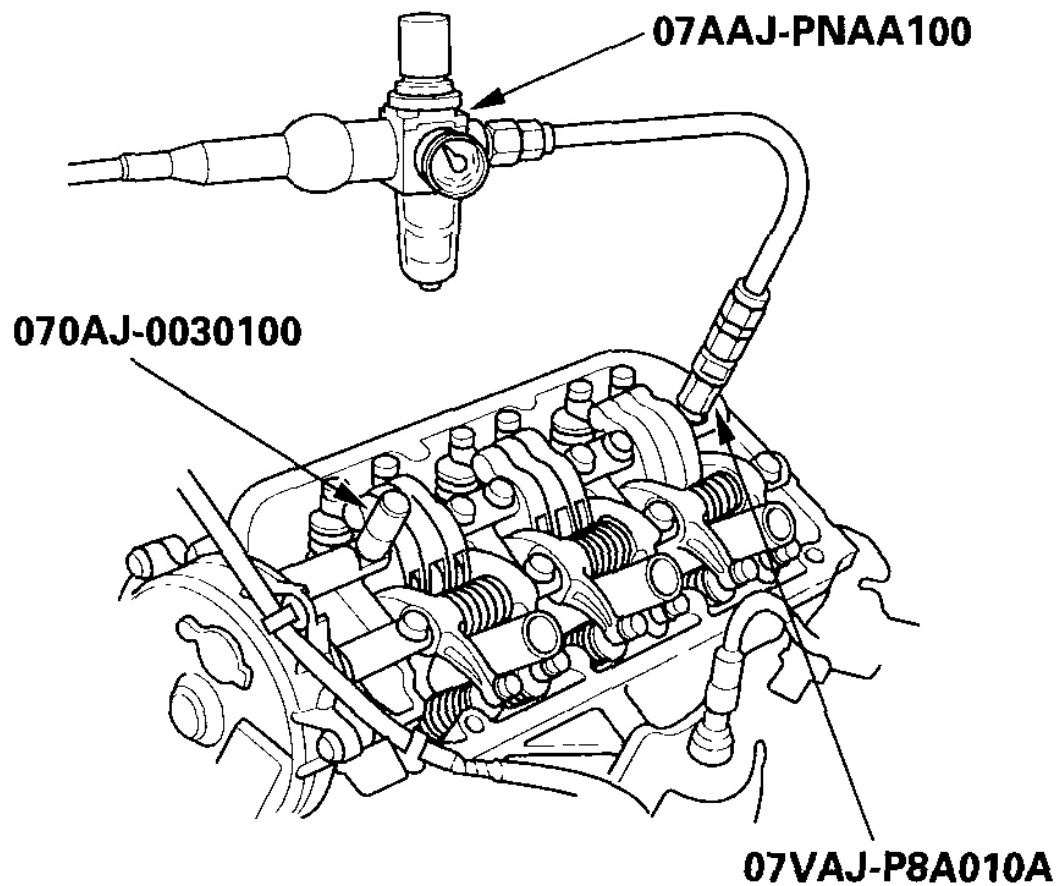
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Fig. 6: Identifying Intake Mid Rocker Arm (A), Primary Rocker Arm (B) And Secondary Rocker Arm (C)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

FRONT:



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Fig. 7: Identifying Special Tools - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:

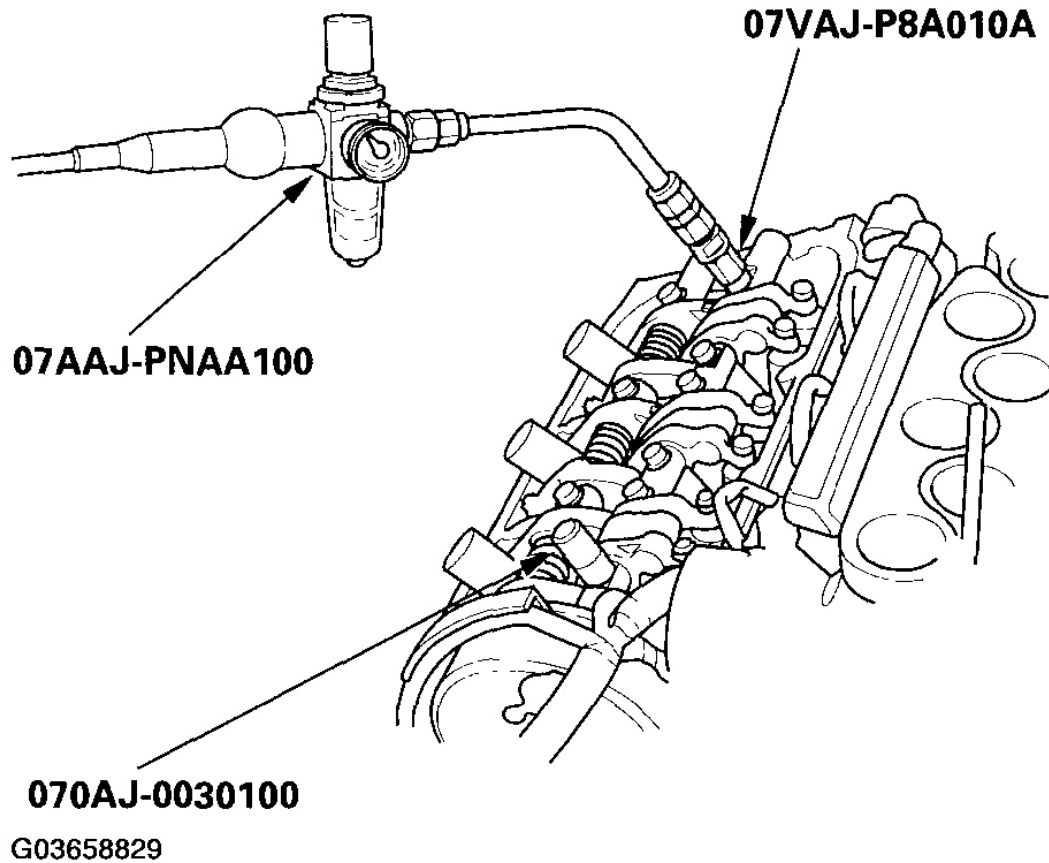


Fig. 8: Identifying Special Tools - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

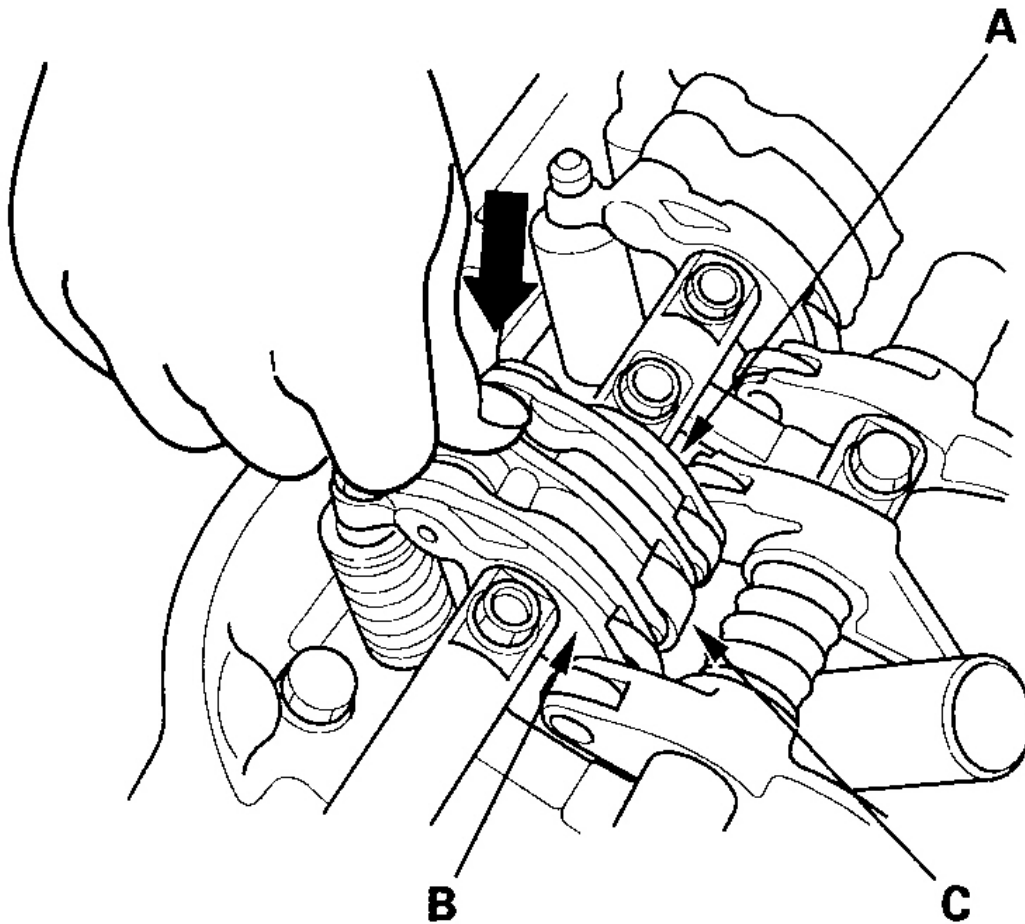
9. Loosen the valve on the regulator, and apply the specified air pressure.

Specified Air Pressure:

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

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

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



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Fig. 9: Identifying Intake Primary Rocker Arm (A), Secondary Rocker Arm (B) And Mid Rocker Arm (C)

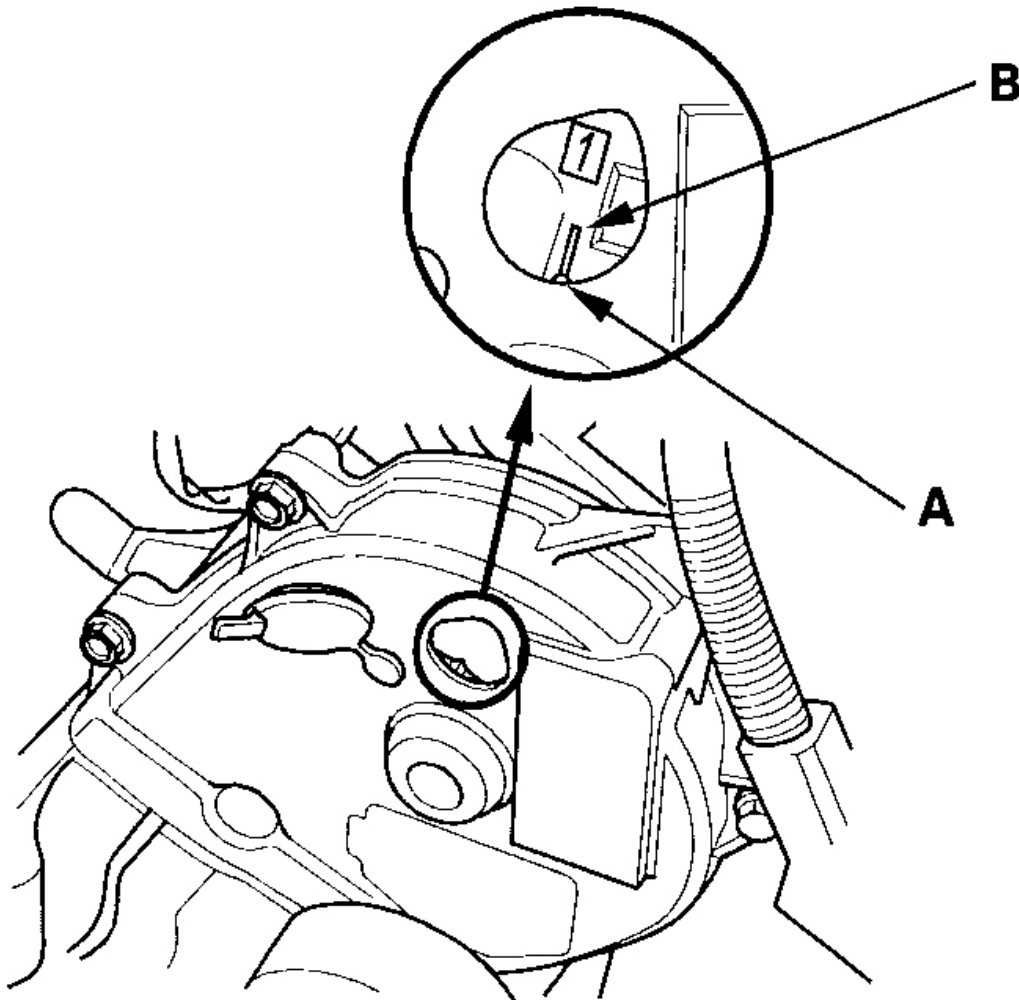
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the special tools.
12. Tighten the rocker shaft bolts to 24 N.m (2.4 kgf.m, 17 lbf.ft)
13. Install the cylinder head covers (see **CYLINDER HEAD COVER INSTALLATION**).

VALVE CLEARANCE ADJUSTMENT

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

1. Remove the right side engine compartment cover (see step 1).
2. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
3. Set the No. 1 piston at top dead center (TDC). Align the pointer (A) on the front upper cover with the No. 1 piston TDC mark (B) on the front camshaft pulley.



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Fig. 10: Aligning Pointer (A) With No. 1 Piston TDC Mark (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

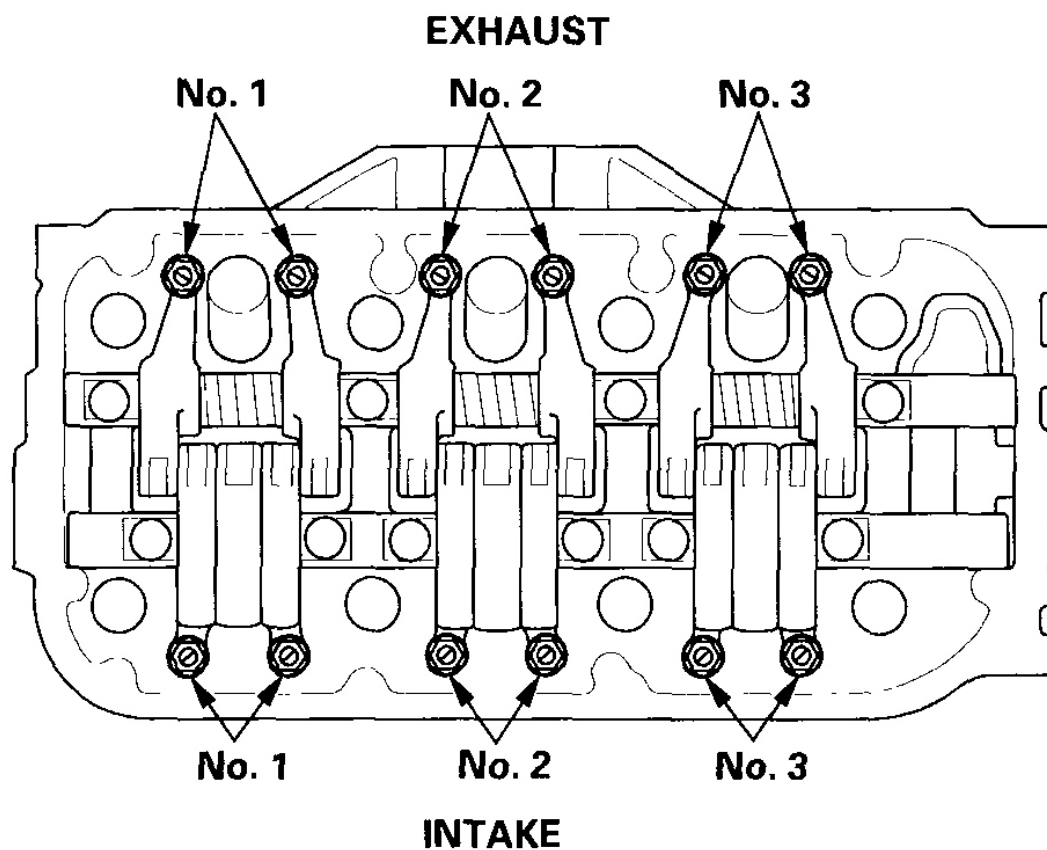
4. Select the correct thickness feeler gauge for the valves you're going to check.

Valve Clearance

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

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

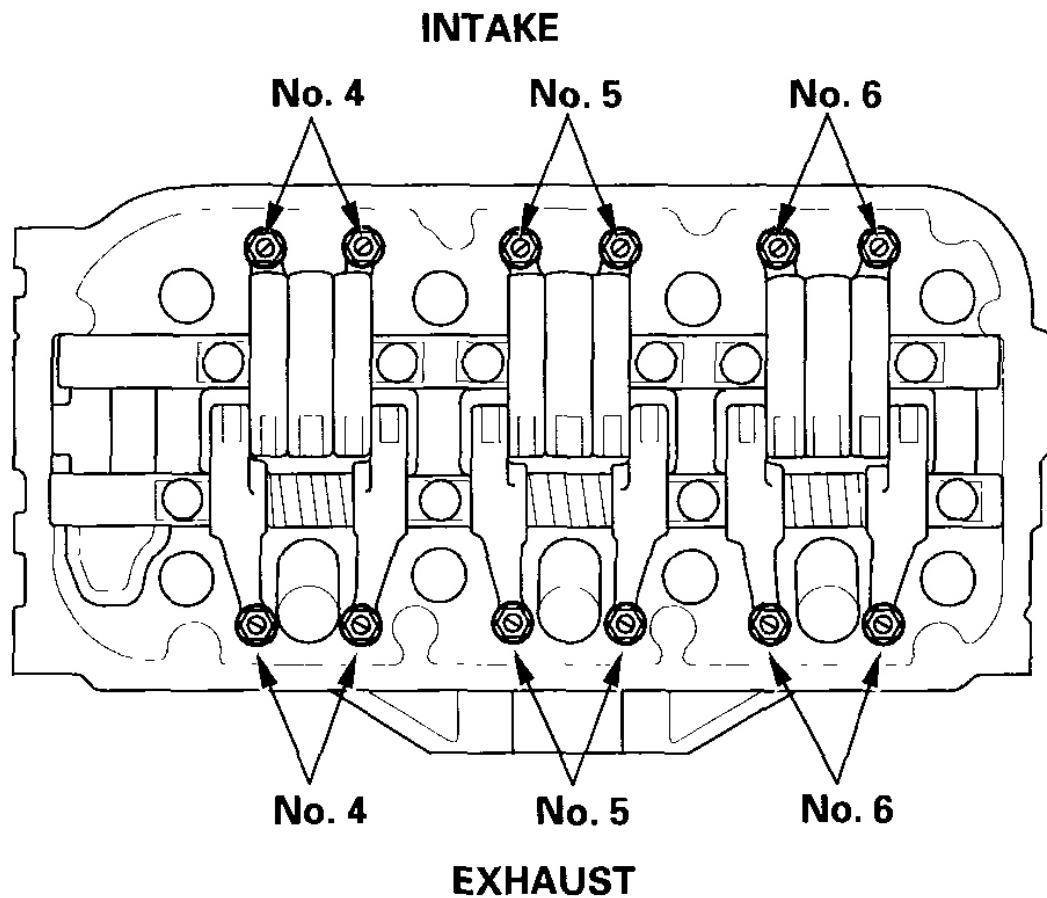
REAR:



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Fig. 11: Measuring Valve Clearance - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

FRONT:

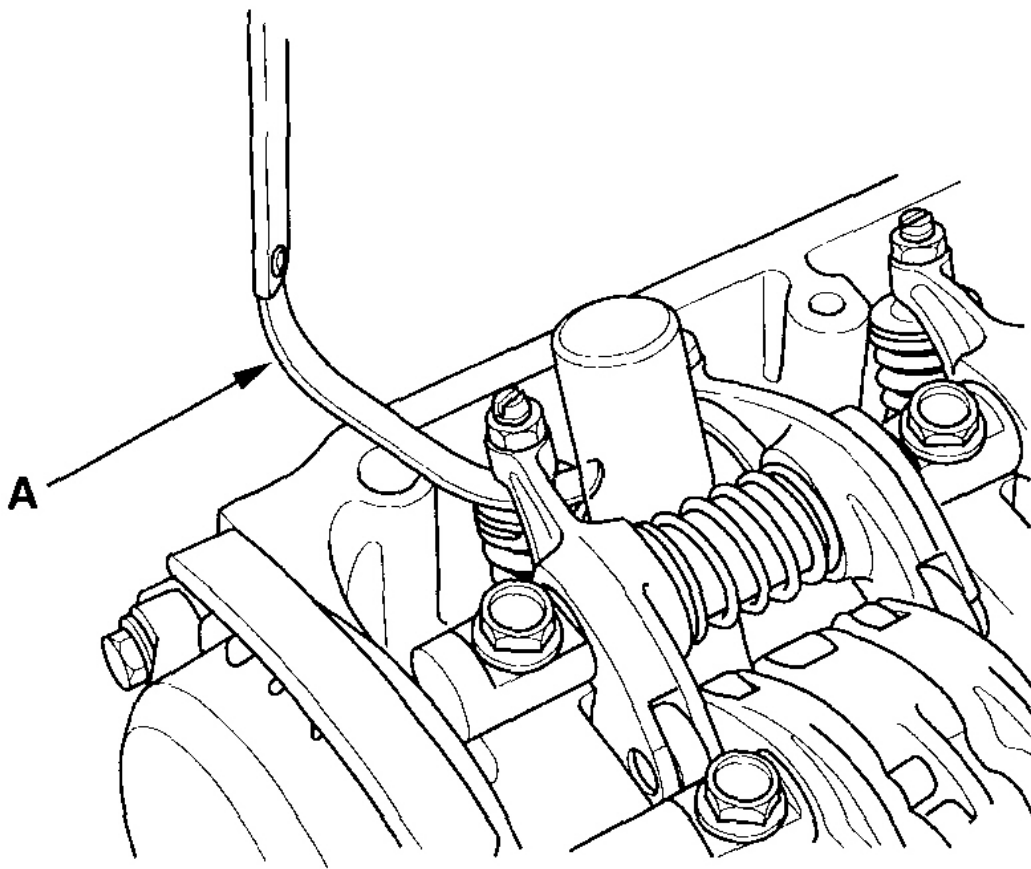


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Fig. 12: Measuring Valve Clearance - Front

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

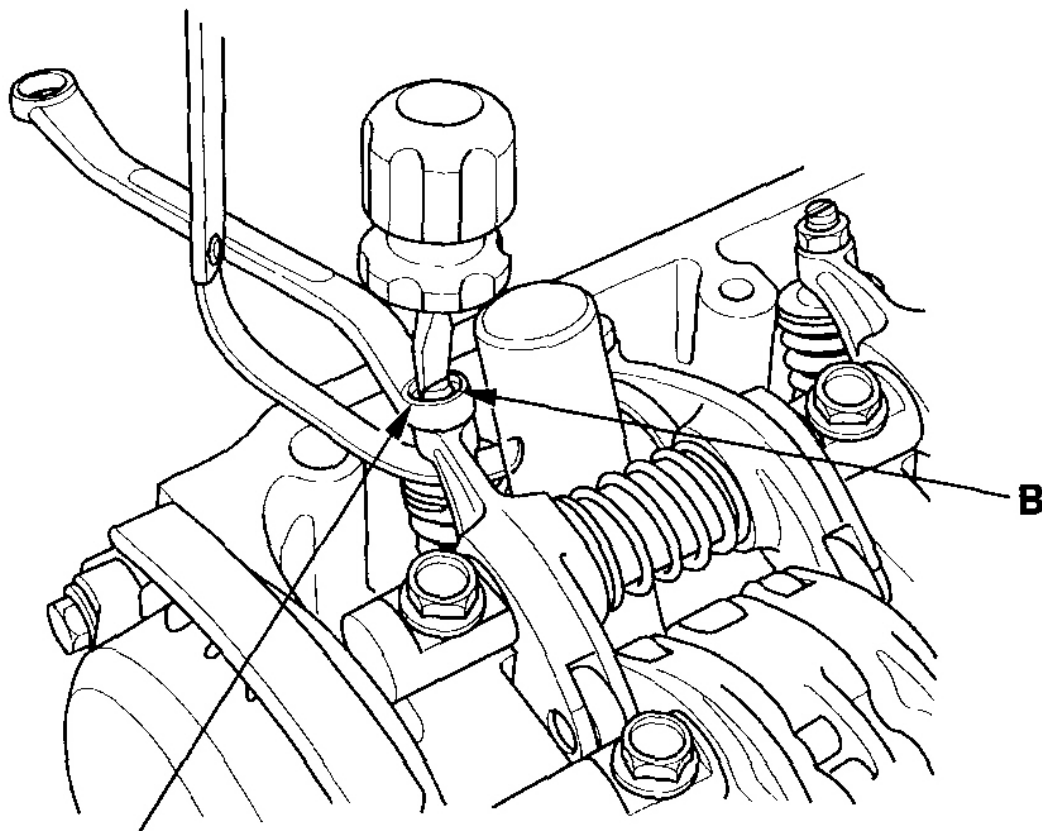


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Fig. 13: Identifying Feeler Gauge (A)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

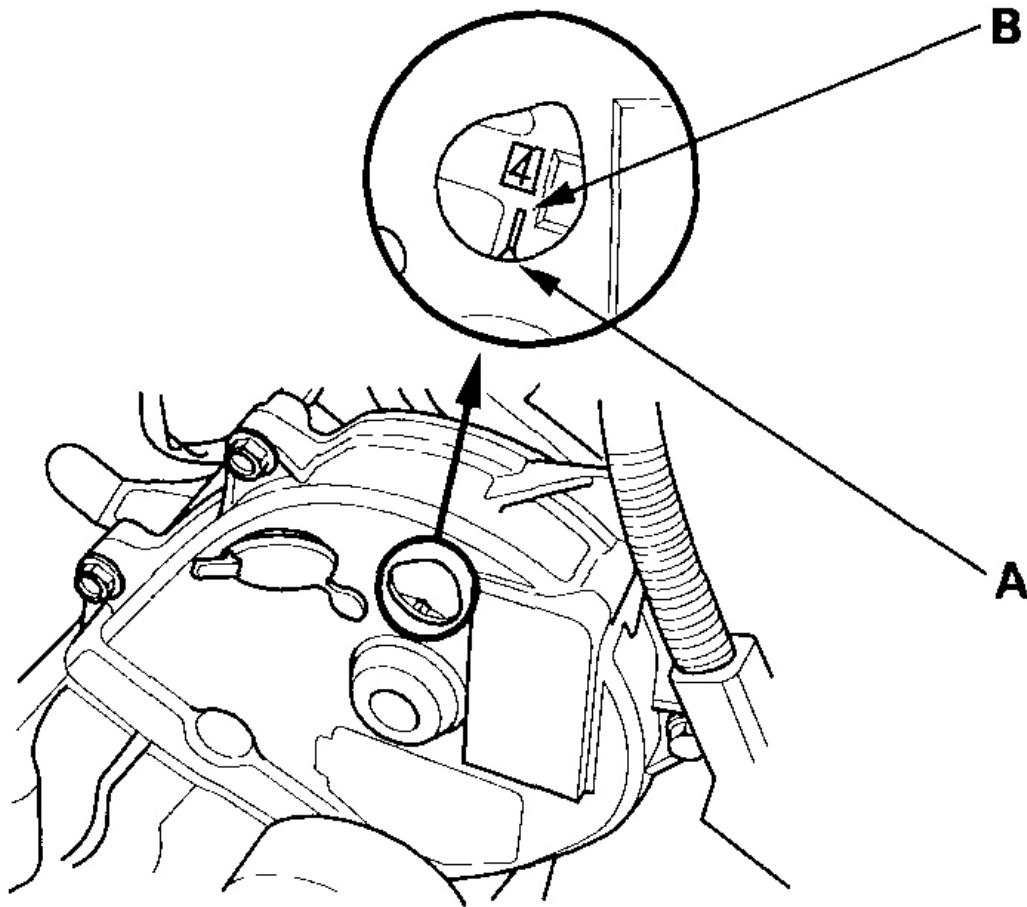


A
9 x 0.75 mm
20 N·m (2.0 kgf·m, 14 lbf·ft)

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Fig. 14: Identifying Locknut (A) And Adjusting Screw (B) With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the locknut and recheck the clearance. Repeat the adjustment, if necessary.
8. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 4 piston TDC mark (B) on the front camshaft pulley.

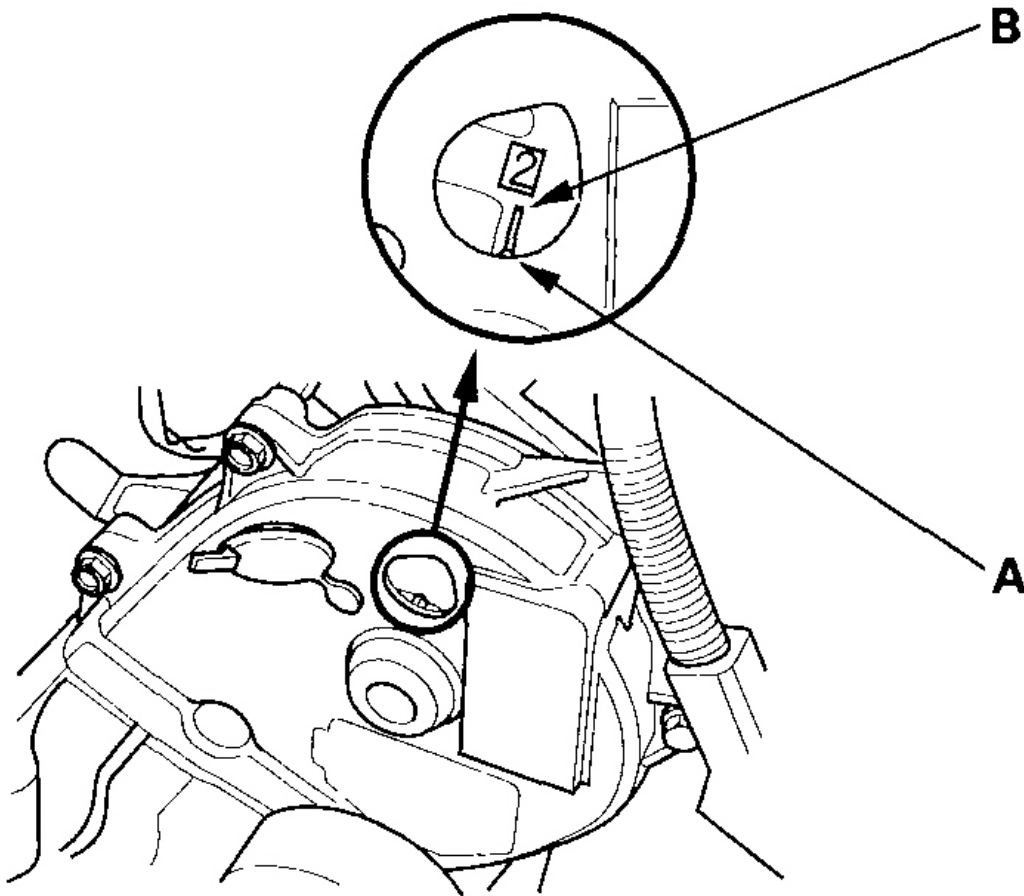


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Fig. 15: Aligning Pointer (A) With No. 4 Piston TDC Mark (B)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

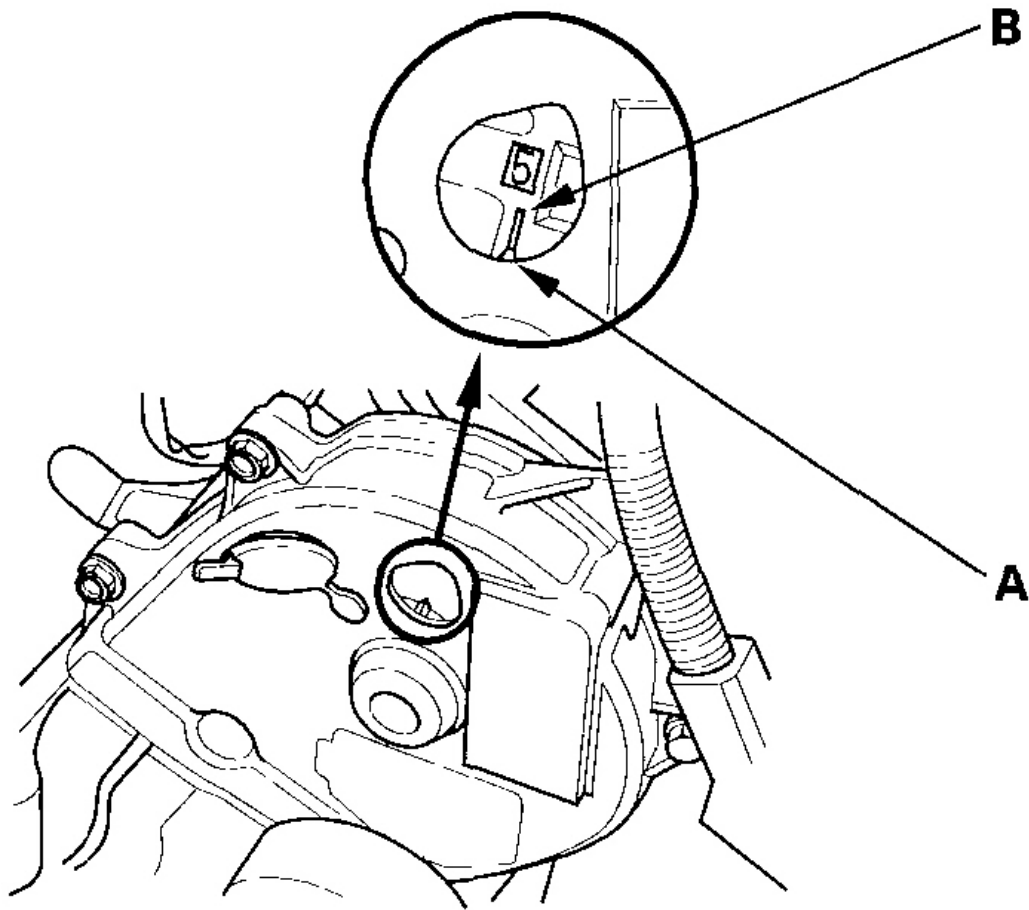


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Fig. 16: Aligning Pointer (A) With No. 2 Piston TDC Mark (B)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

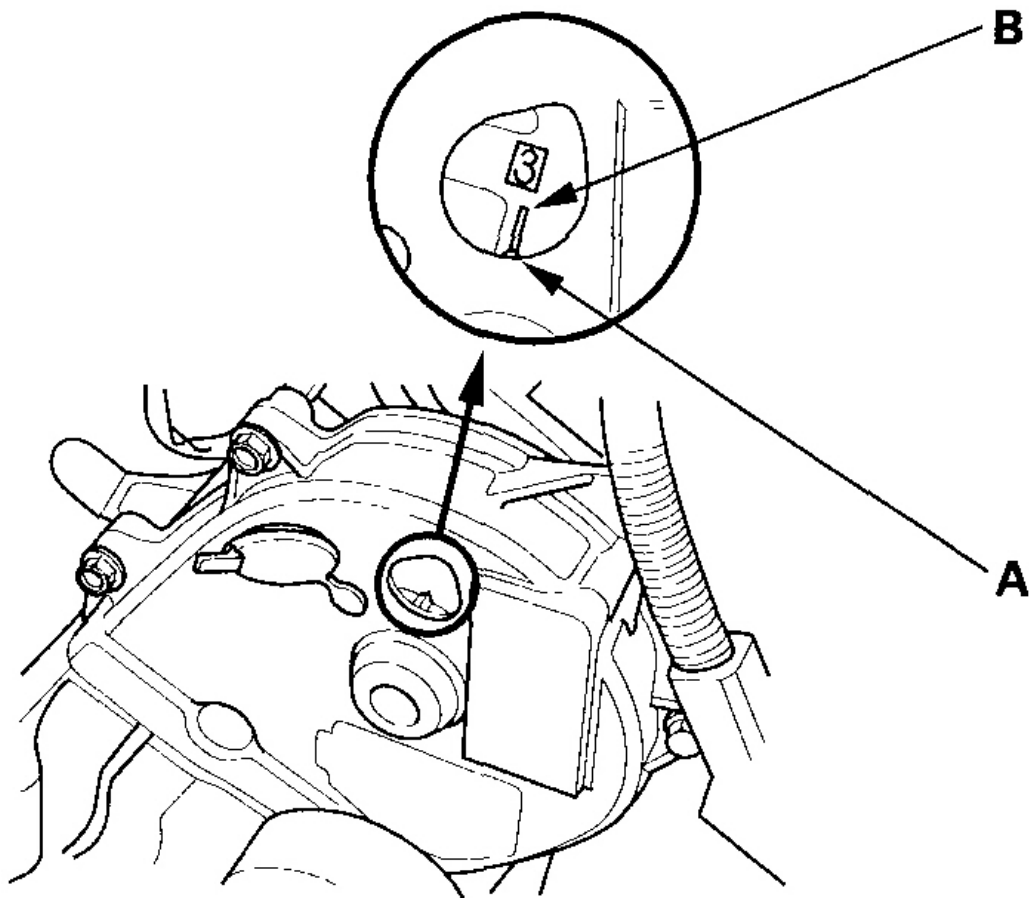
11. Check and, if necessary, adjust the valve clearance on No. 2 cylinder.
12. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 5 piston TDC mark (B) on the front camshaft pulley.



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Fig. 17: Aligning Pointer (A) With No. 5 Piston TDC Mark (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

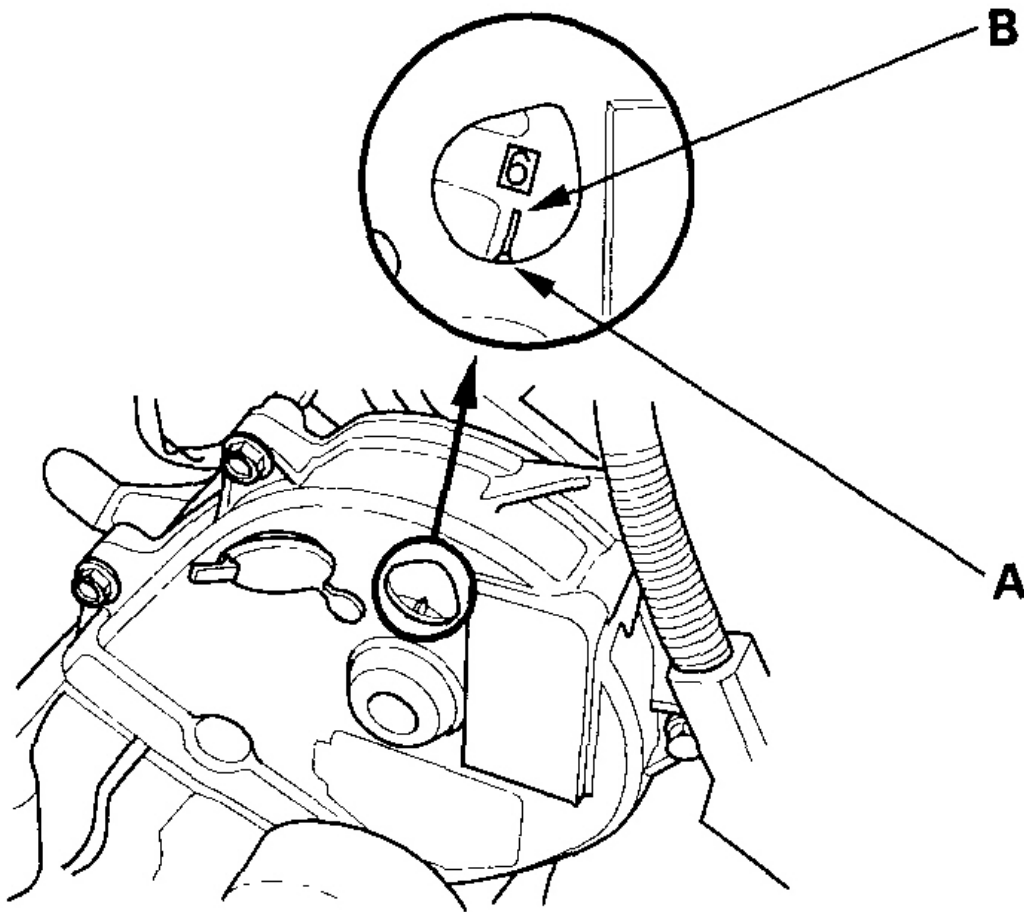
13. Check and, if necessary, adjust the valve clearance on No. 5 cylinder.
14. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 3 piston TDC mark (B) on the front camshaft pulley.



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Fig. 18: Aligning Pointer (A) With No. 3 Piston TDC Mark (B)**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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



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Fig. 19: Aligning Pointer (A) With No. 6 Piston TDC Mark (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CRANKSHAFT PULLEY REMOVAL AND INSTALLATION

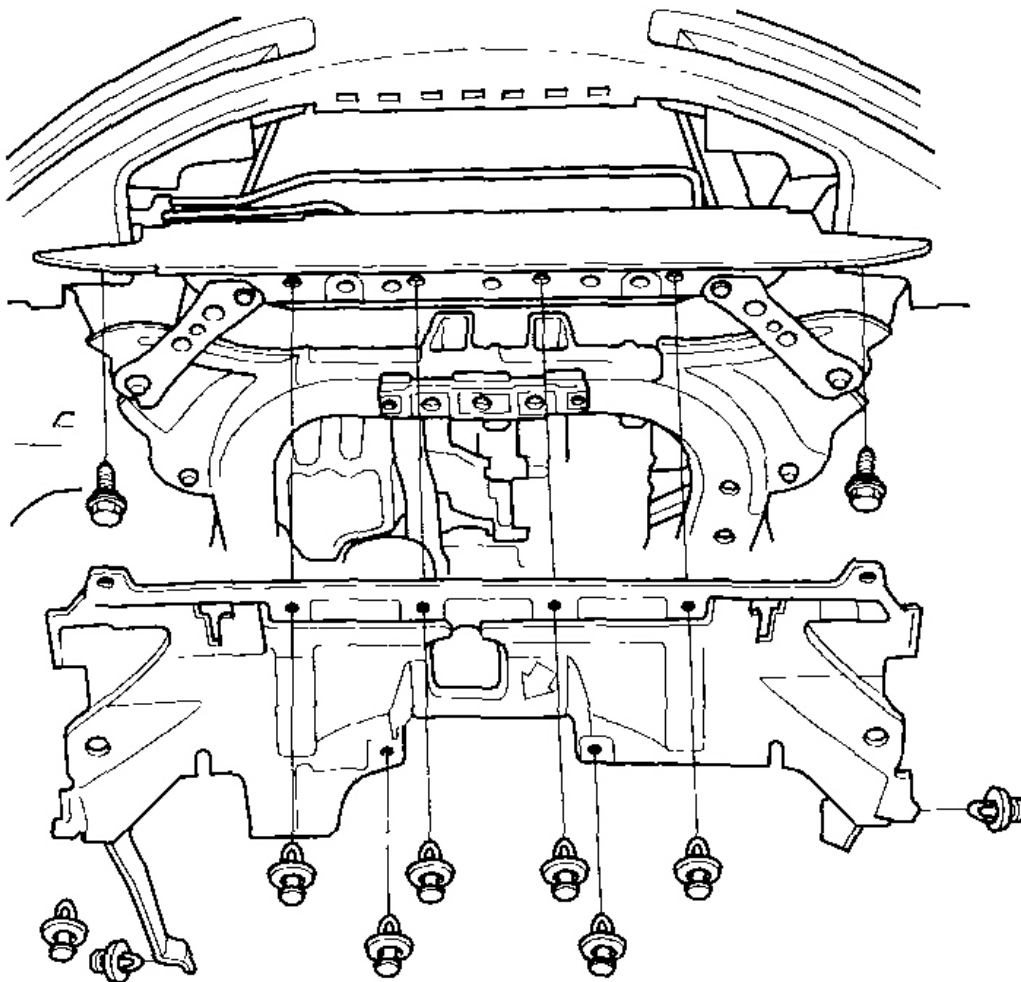
Special Tools Required

- Holder handle 07 JAB-001020A
- Holder attachment, 50 mm, offset 07MAB-PY3010A

- Socket, 19 mm 07JAA-001020A, or a commercially available 19 mm socket

REMOVAL

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



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Fig. 20: Removing Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Remove the drive belt (see **DRIVE BELT INSPECTION**).

4. Hold the pulley with the holder handle (A) and holder attachment (B).

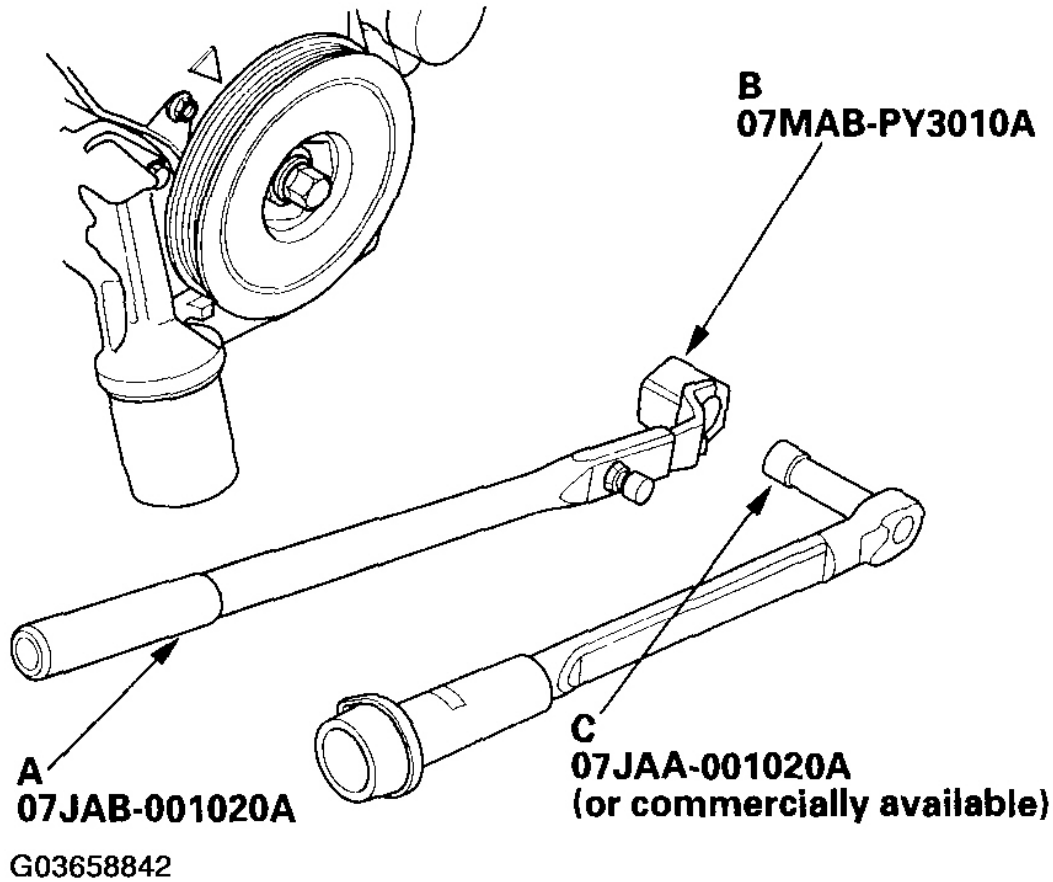


Fig. 21: Identifying Holder Handle (A), Holder Attachment (B) And 19 Mm Socket (C)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

INSTALLATION

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

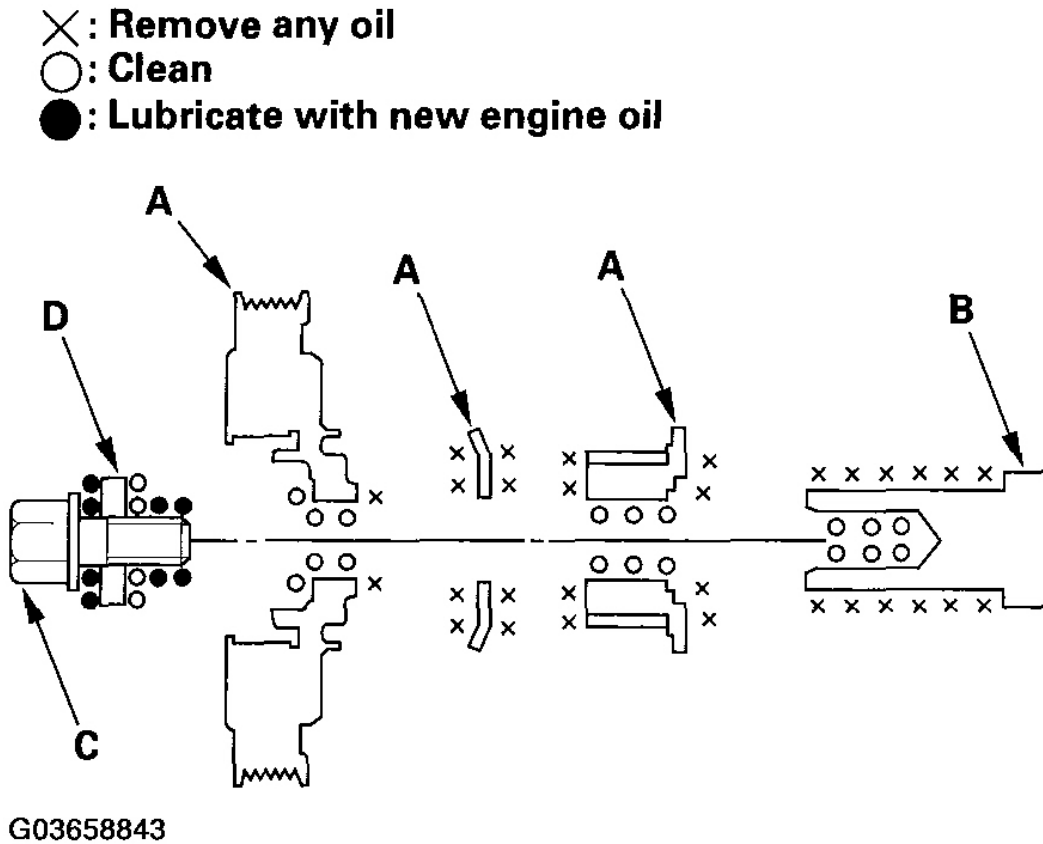
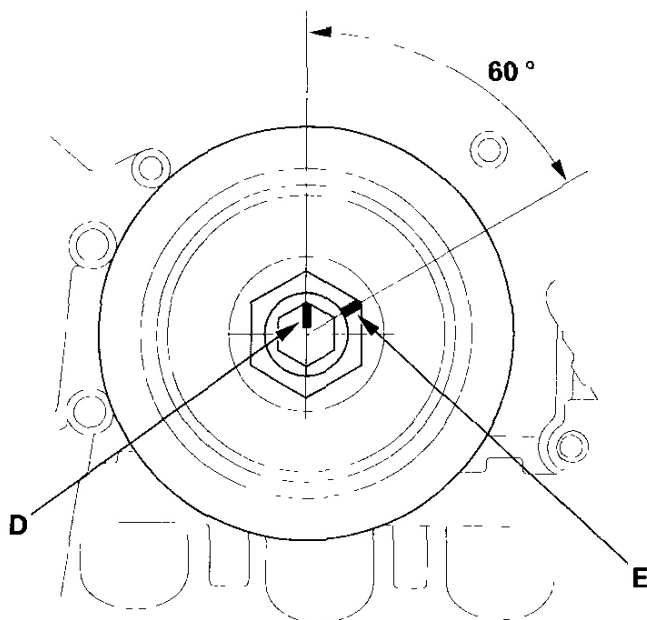
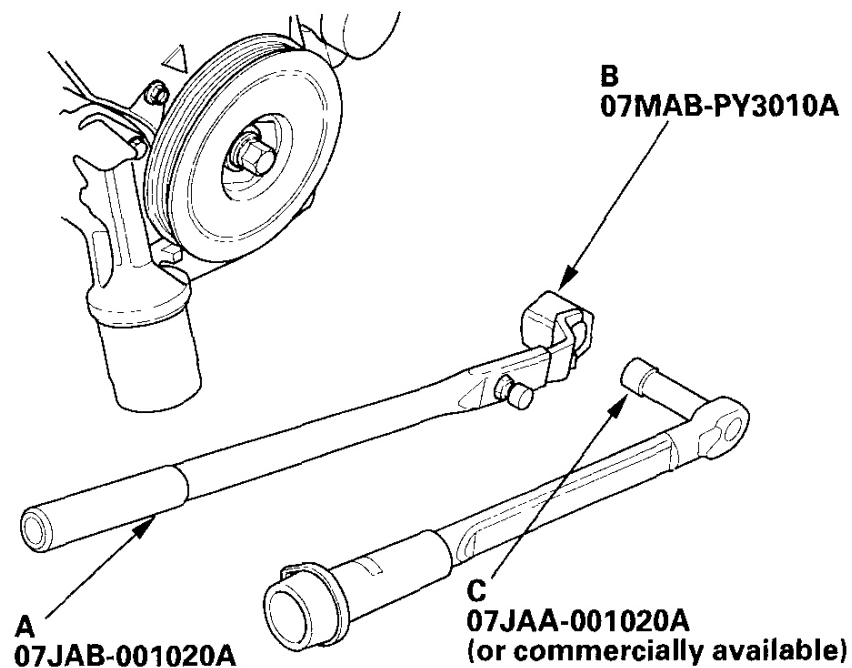


Fig. 22: Identifying Pulleys (A), Crankshaft (B), Bolt (C) And Washer (D)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Install the crankshaft pulley, and tighten the bolt. Do not use an impact wrench.

-1 Hold the pulley with the holder handle (A) and holder attachment (B), then tighten the bolt to 64 N.m (6.5 kgf.m, 47 lbf-ft) with a torque wrench and heavy duty 19 mm socket (C).

-2 Mark the bolt head (D) and crankshaft pulley (E) as shown, then tighten the bolt an additional 60 ° (The mark on the bolt head lines up with the mark on the crankshaft pulley).



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Fig. 23: Identifying Holder Handle (A), Holder Attachment (B), Socket (C), Bolt Head (D) And Crankshaft Pulley (E)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

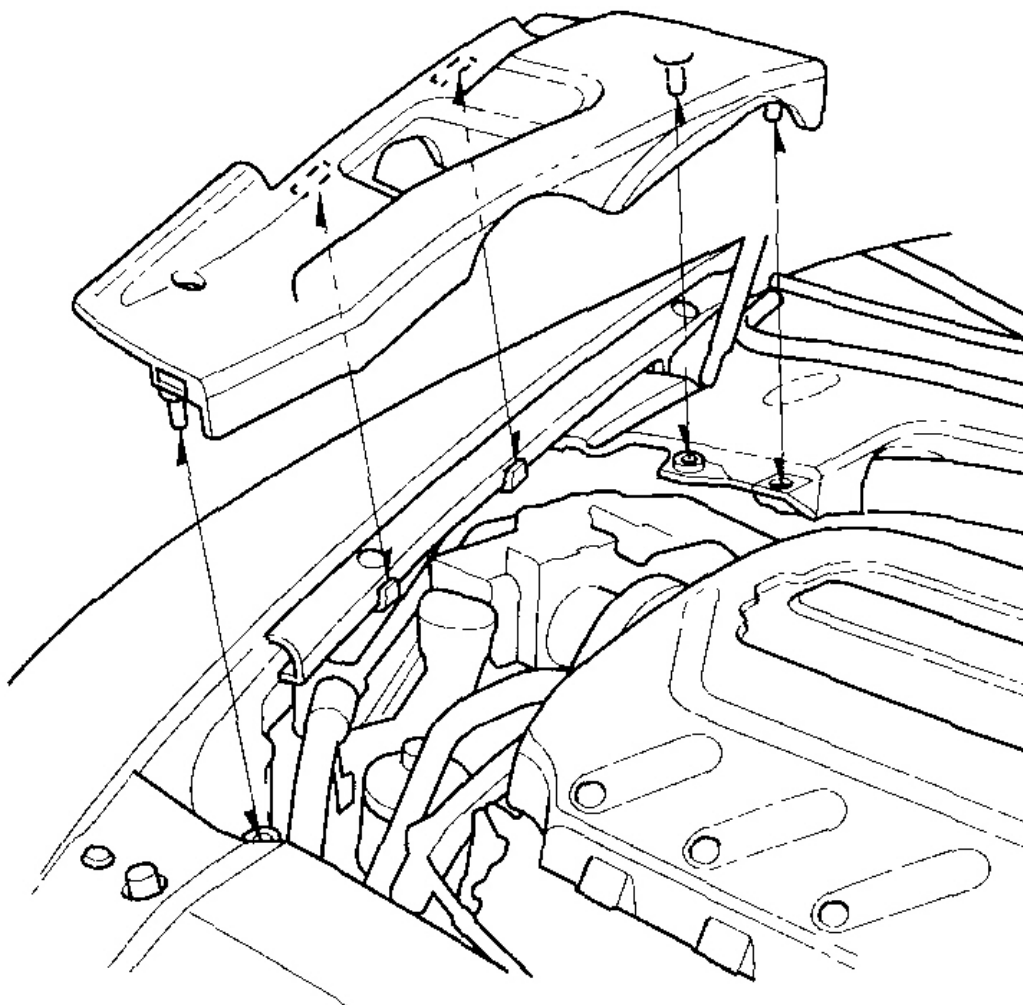
3. Install the drive belt (see **DRIVE BELT INSPECTION**).

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

NOTE: On M/T model, be careful not to damage or chip the paint of the brake calipers when installing the wheel.

TIMING BELT INSPECTION

1. Remove the right side engine compartment cover.

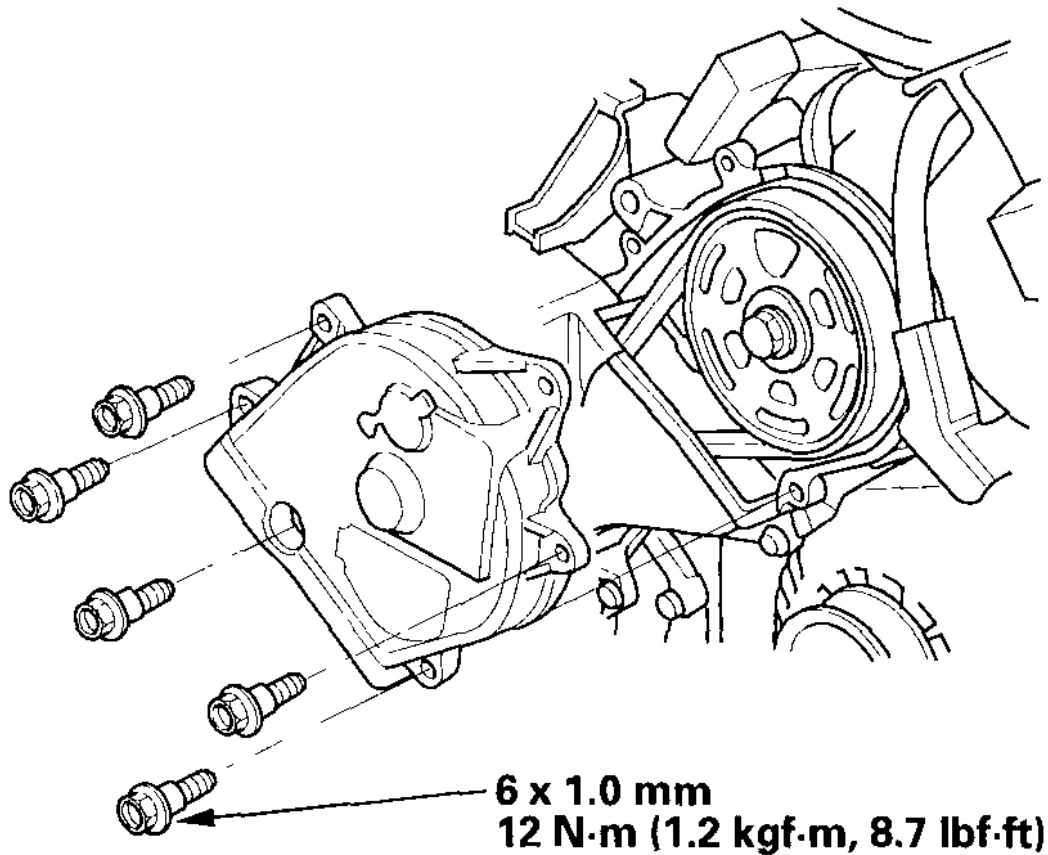


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Fig. 24: Removing Right Side Engine Compartment Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

2. Remove the drive belt (see **DRIVE BELT INSPECTION**).
3. Remove the front upper cover.

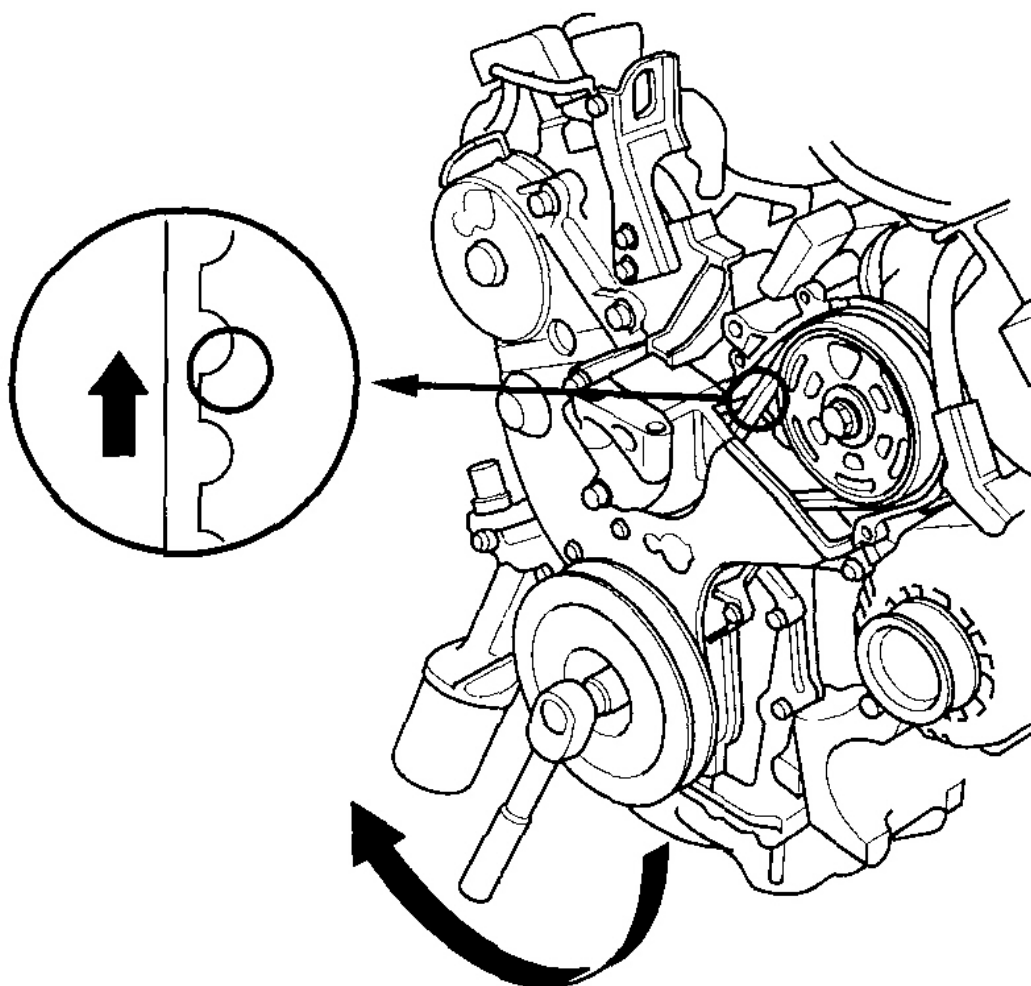


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Fig. 25: Removing Front Upper Cover With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

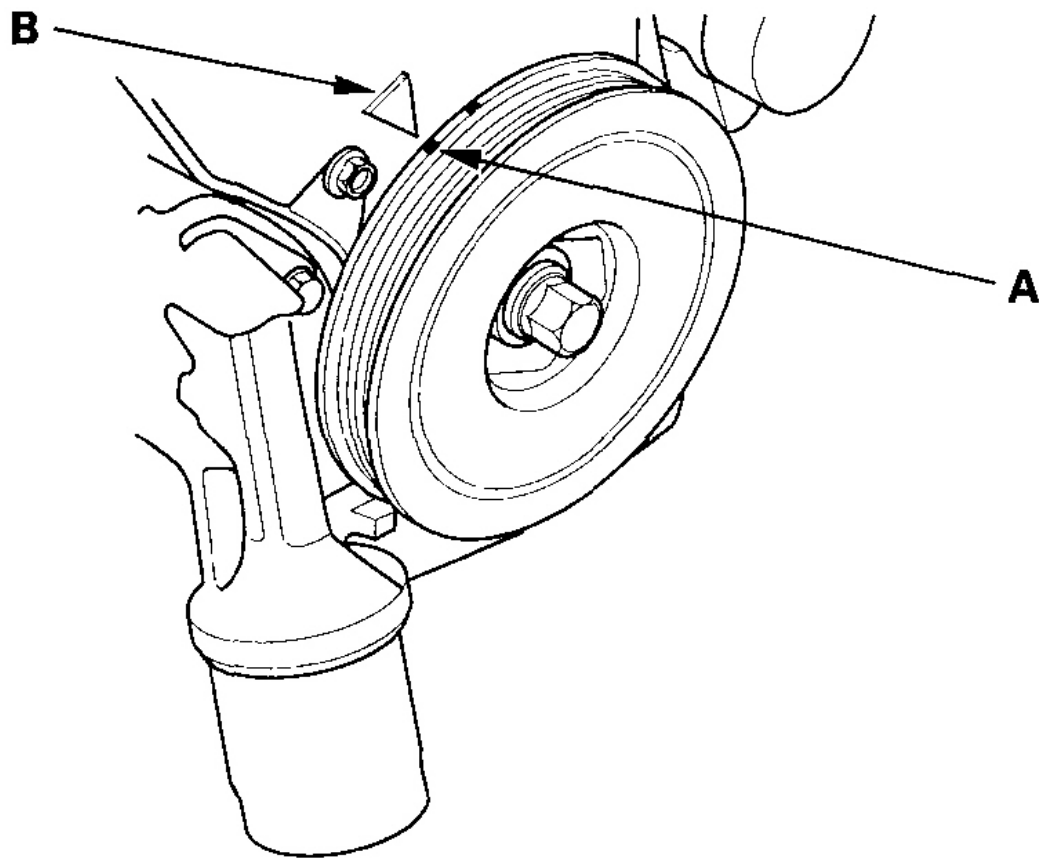


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Fig. 26: Inspecting Timing Belt For Cracks, Oil And Coolant Contamination
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT REMOVAL

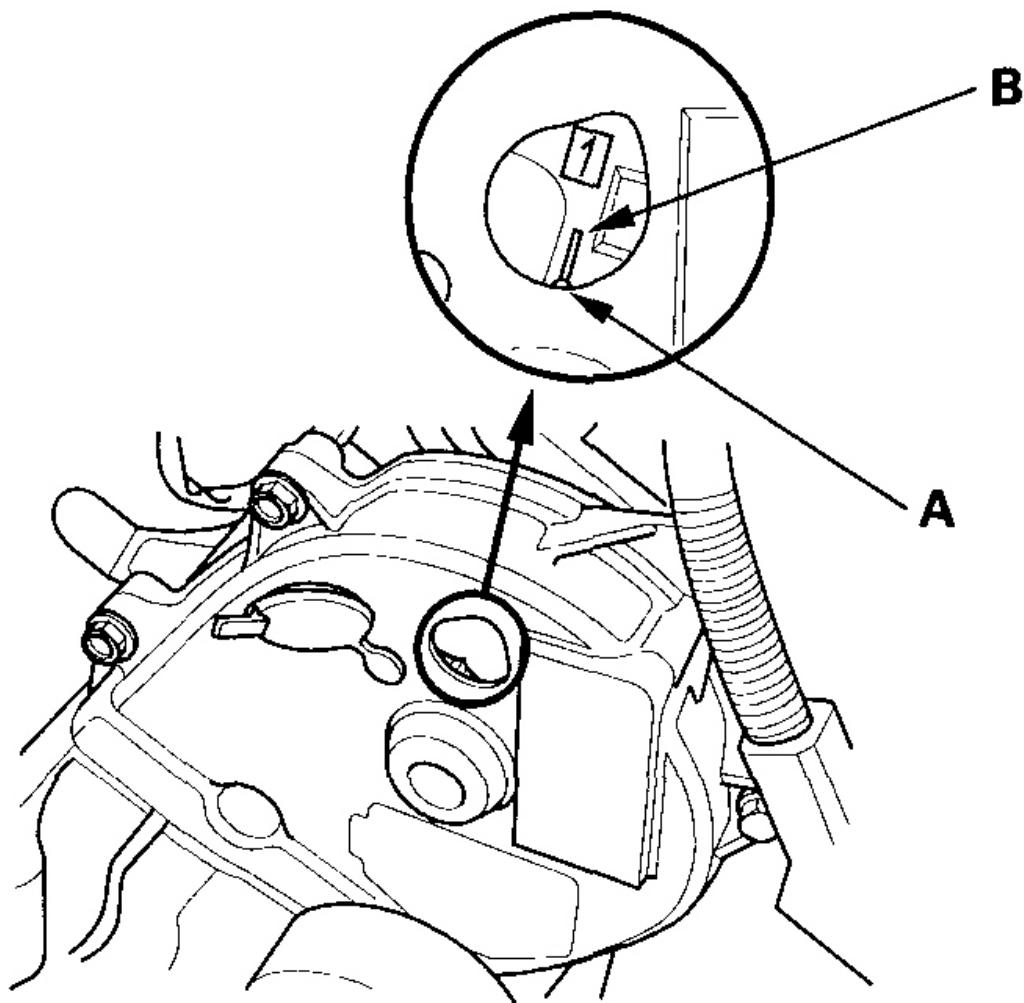
1. Remove the right side engine compartment cover (see step 1).
2. Turn the crankshaft so its white mark (A) on the crankshaft pulley lines up with the pointer (B).



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Fig. 27: Aligning Crankshaft White Line Mark (A) With Crankshaft Pulley Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

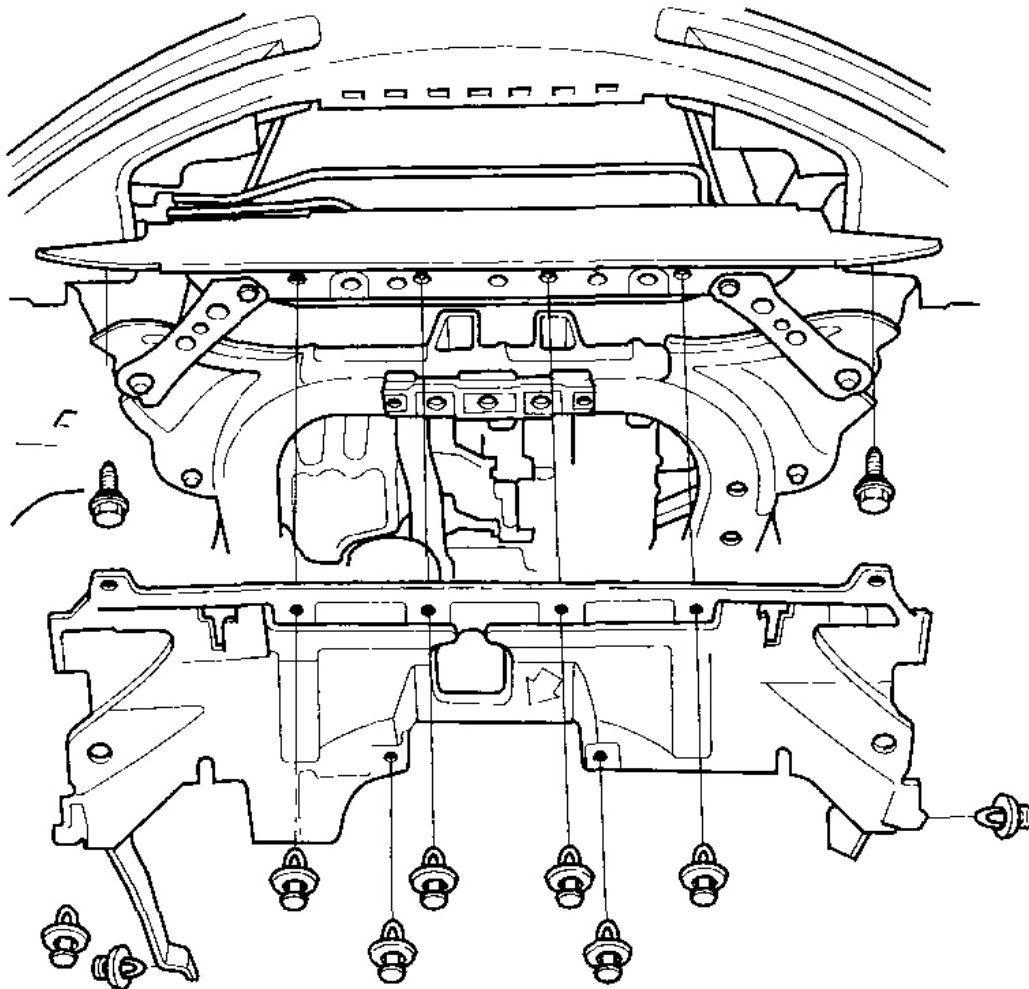
3. Check that the No. 1 piston top dead center (TDC) mark (A) on the front camshaft pulley and the pointer (B) on the front upper cover are aligned.



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Fig. 28: Aligning No. 1 Piston Mark (A) With Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

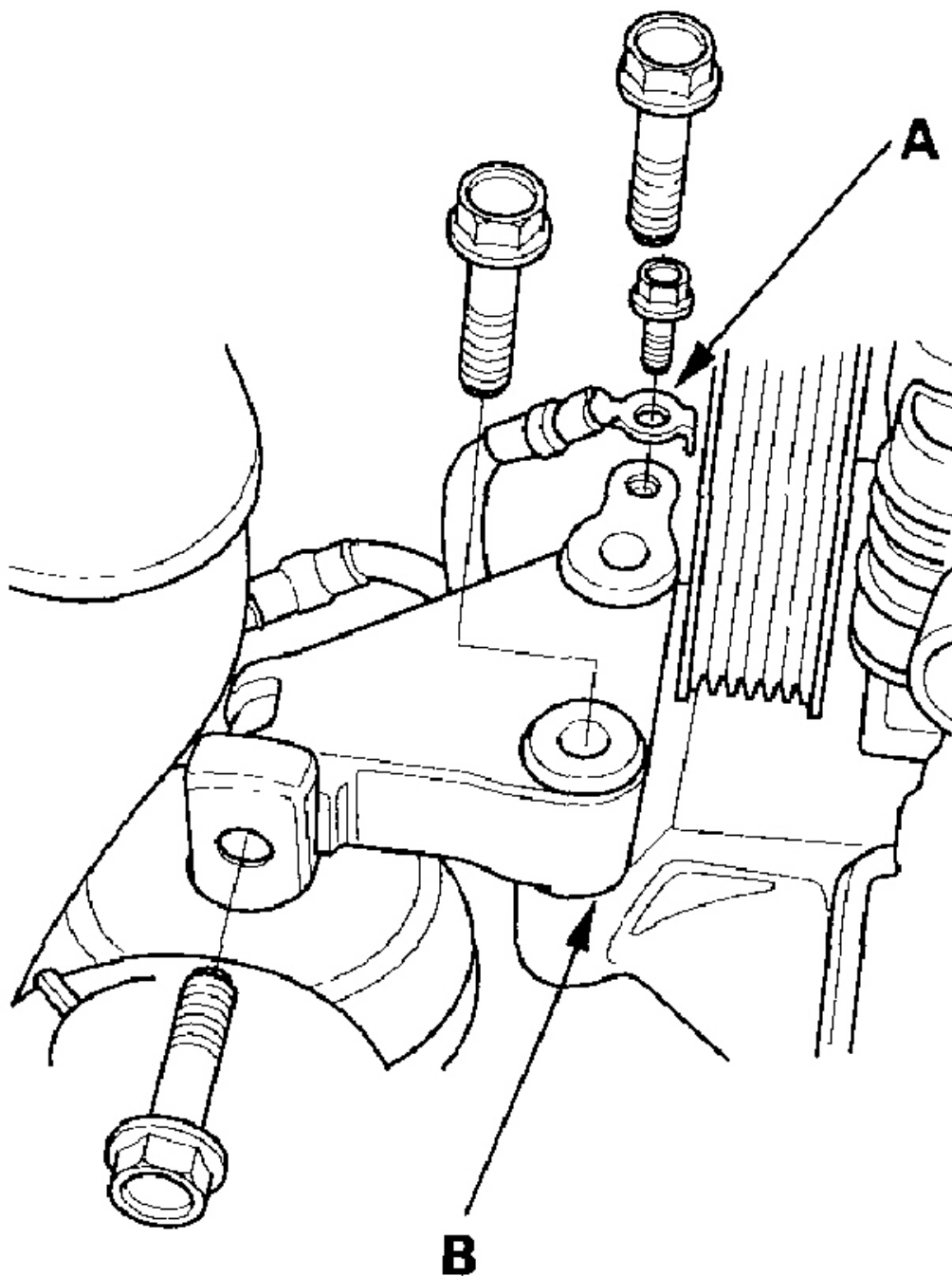


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Fig. 29: Removing Splash Shield

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the drive belt (see **DRIVE BELT INSPECTION**).
7. Support the engine with a jack and wood block under the oil pan.
8. Remove the ground cable (A), then remove the upper half of the side engine mount bracket (B).



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Fig. 30: Identifying Ground Cable (A) And Side Engine Mount Bracket (B)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the crankshaft pulley (see CRANKSHAFT PULLEY REMOVAL AND INSTALLATION).
10. Remove the front upper cover (A) and rear upper cover (B).

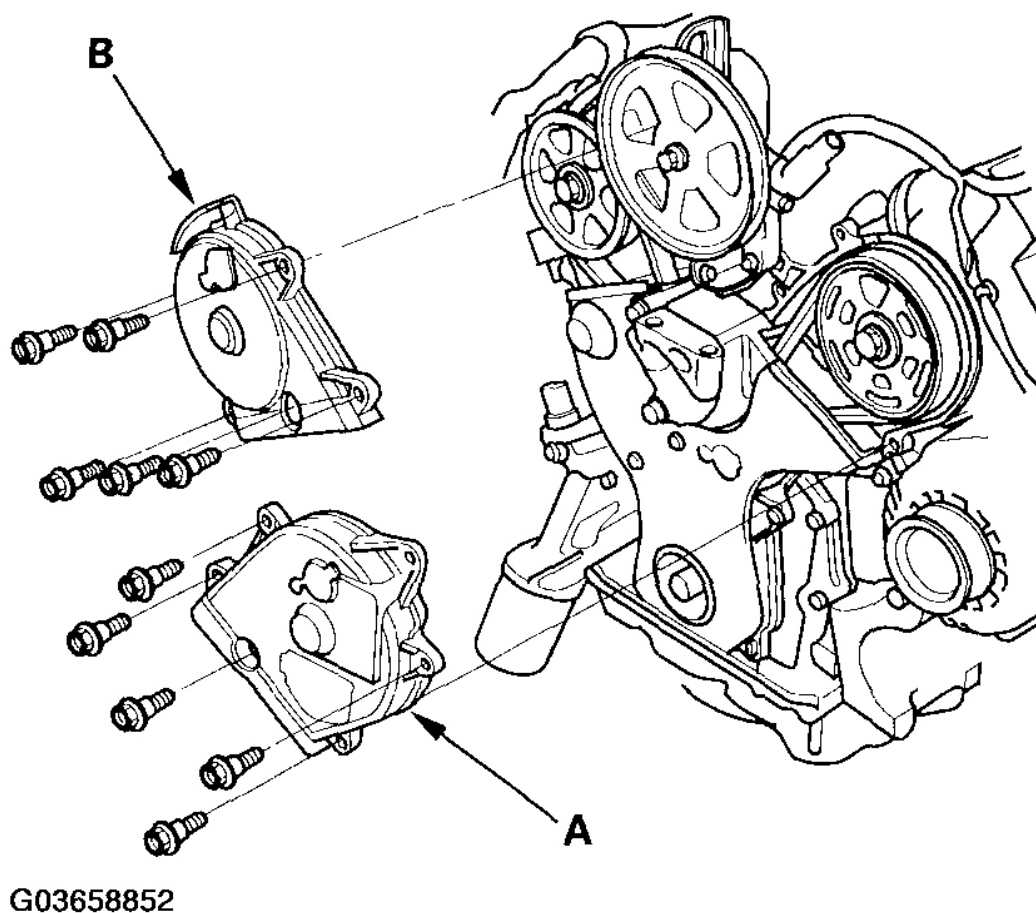
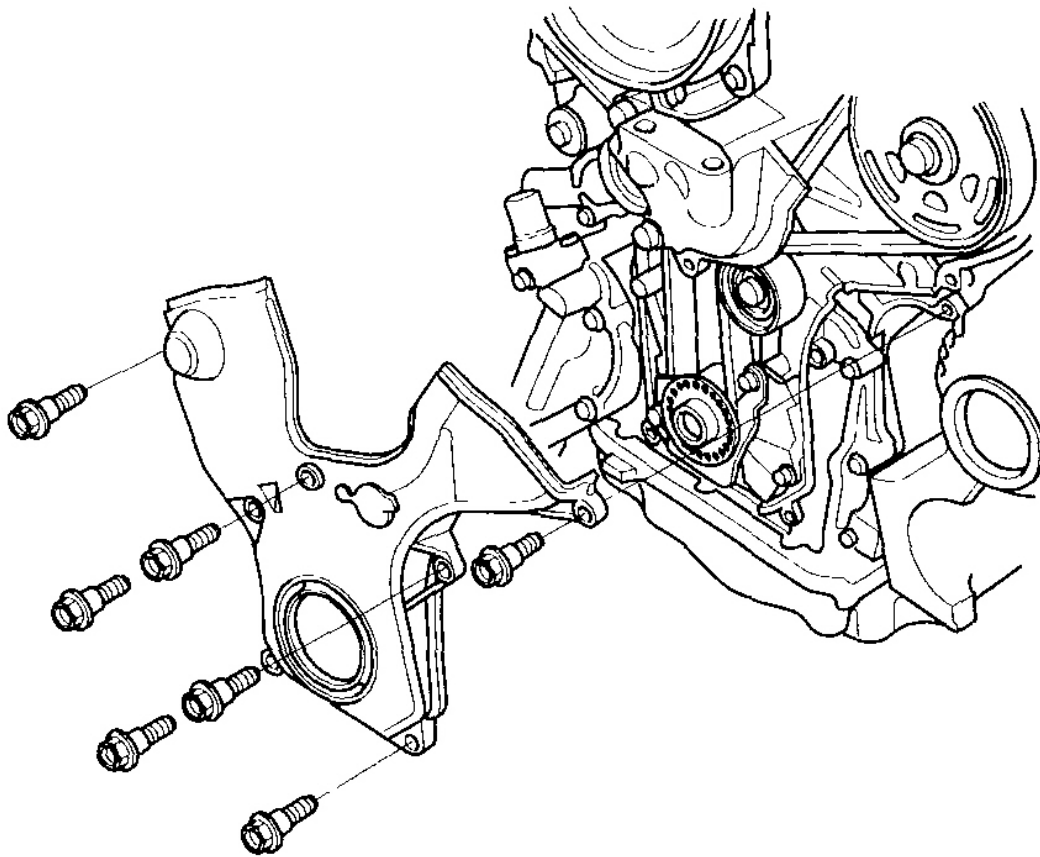
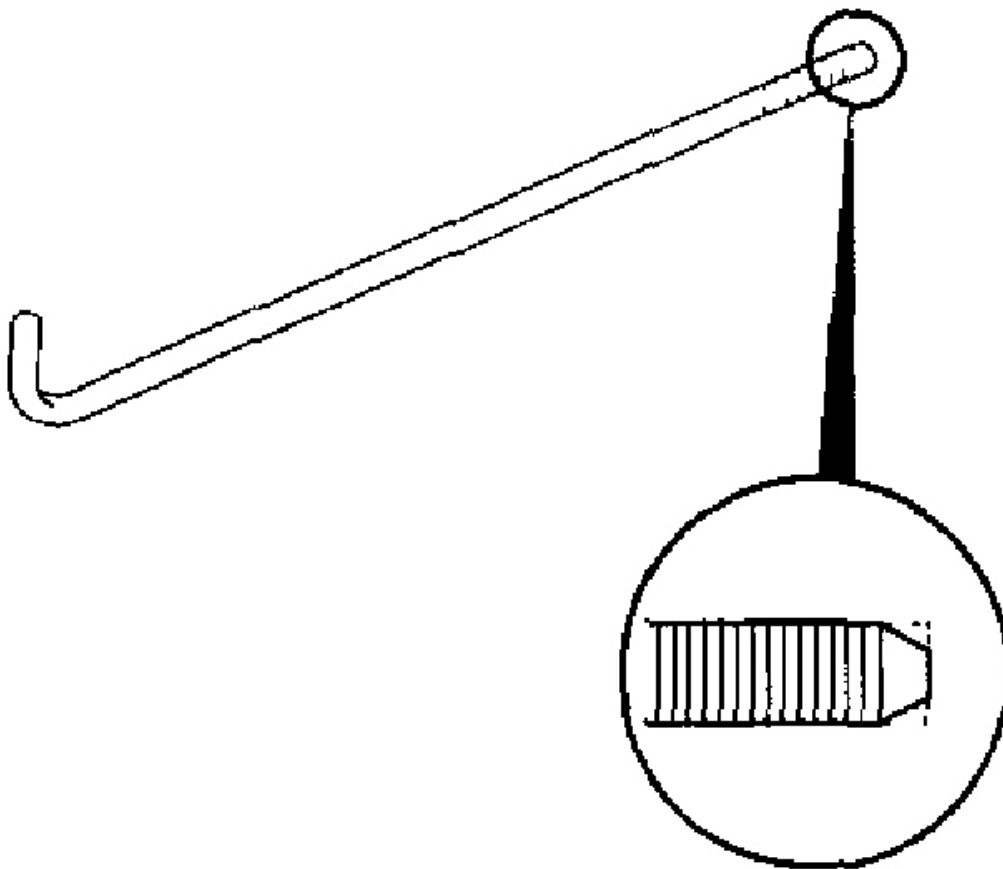


Fig. 31: Removing Front Upper Cover (A) And Rear Upper Cover (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Remove the lower cover.

**G03658853****Fig. 32: Removing Lower Cover****Courtesy of AMERICAN HONDA MOTOR CO., INC.**

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

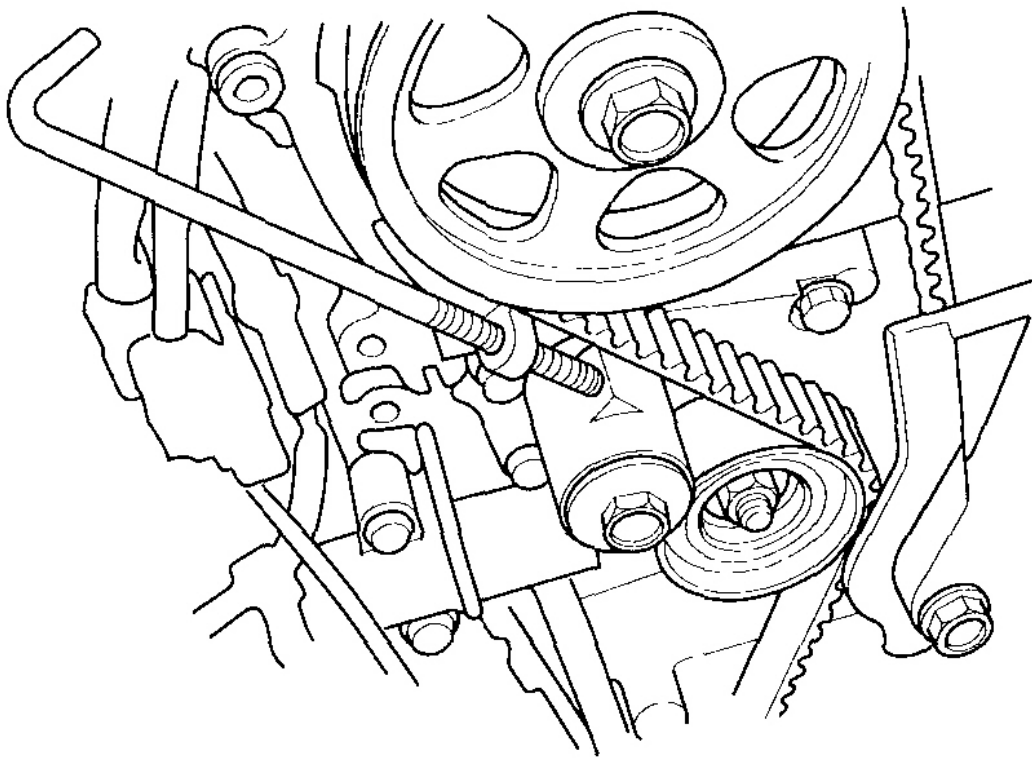


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Fig. 33: Grinding Battery Clamp Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

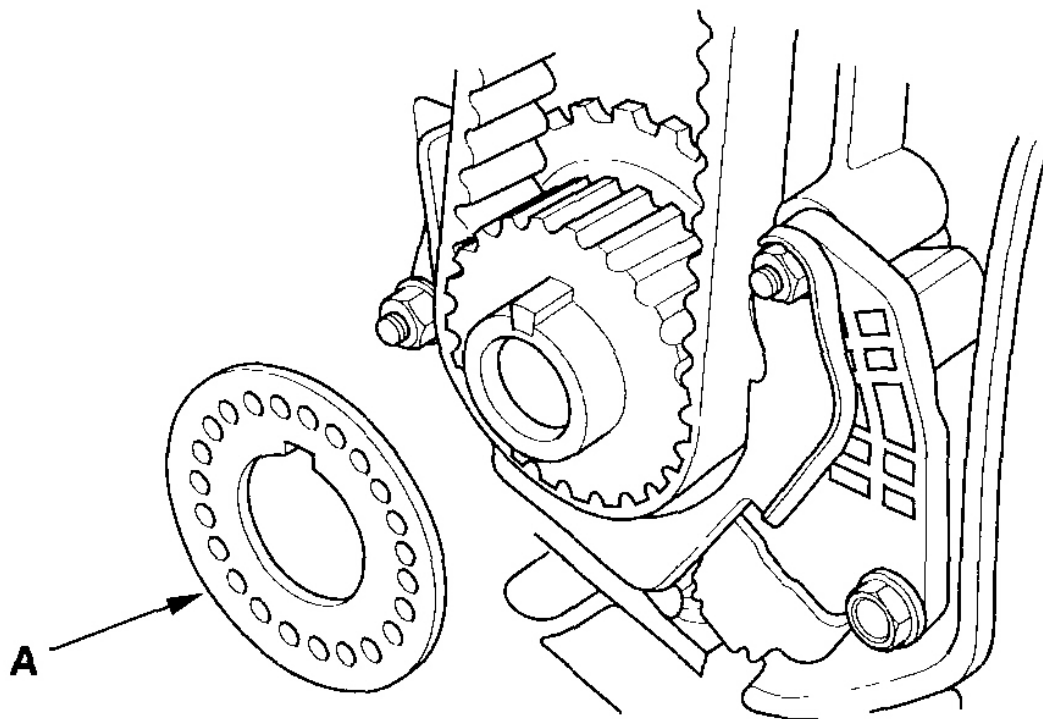


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Fig. 34: Installing Battery Clamp Bolt

Courtesy of AMERICAN HONDA MOTOR CO., INC.

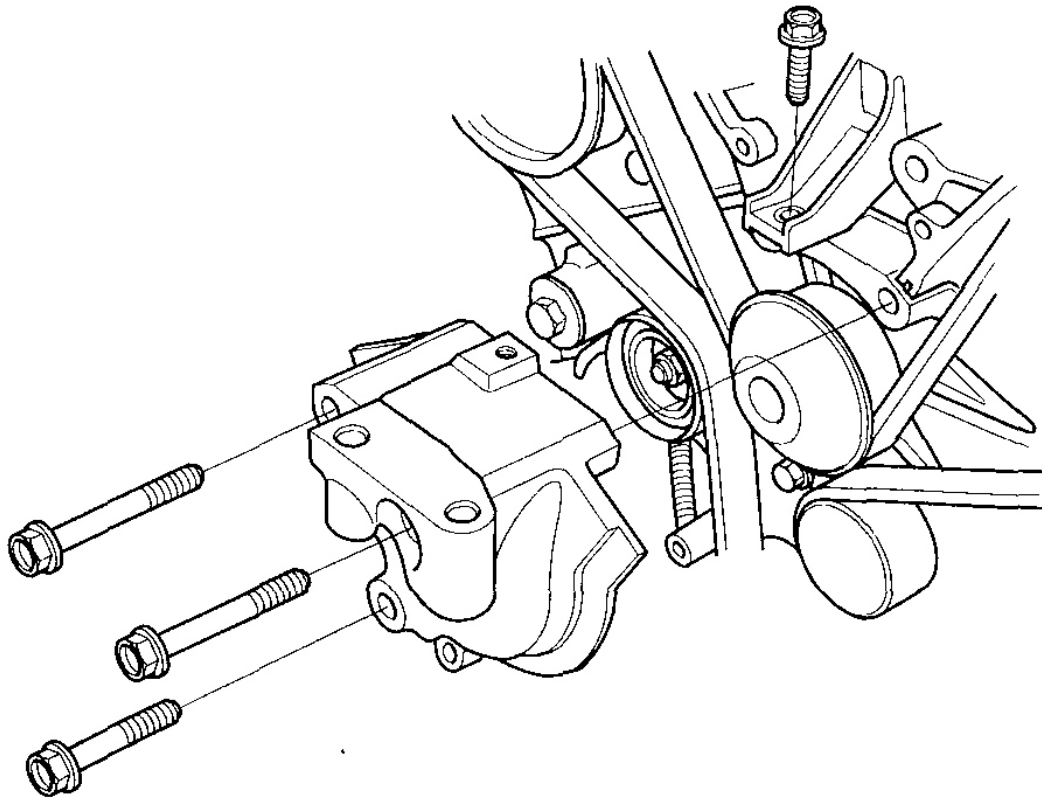
14. Remove the timing belt guide plate (A).



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Fig. 35: Removing Timing Belt Guide Plate (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

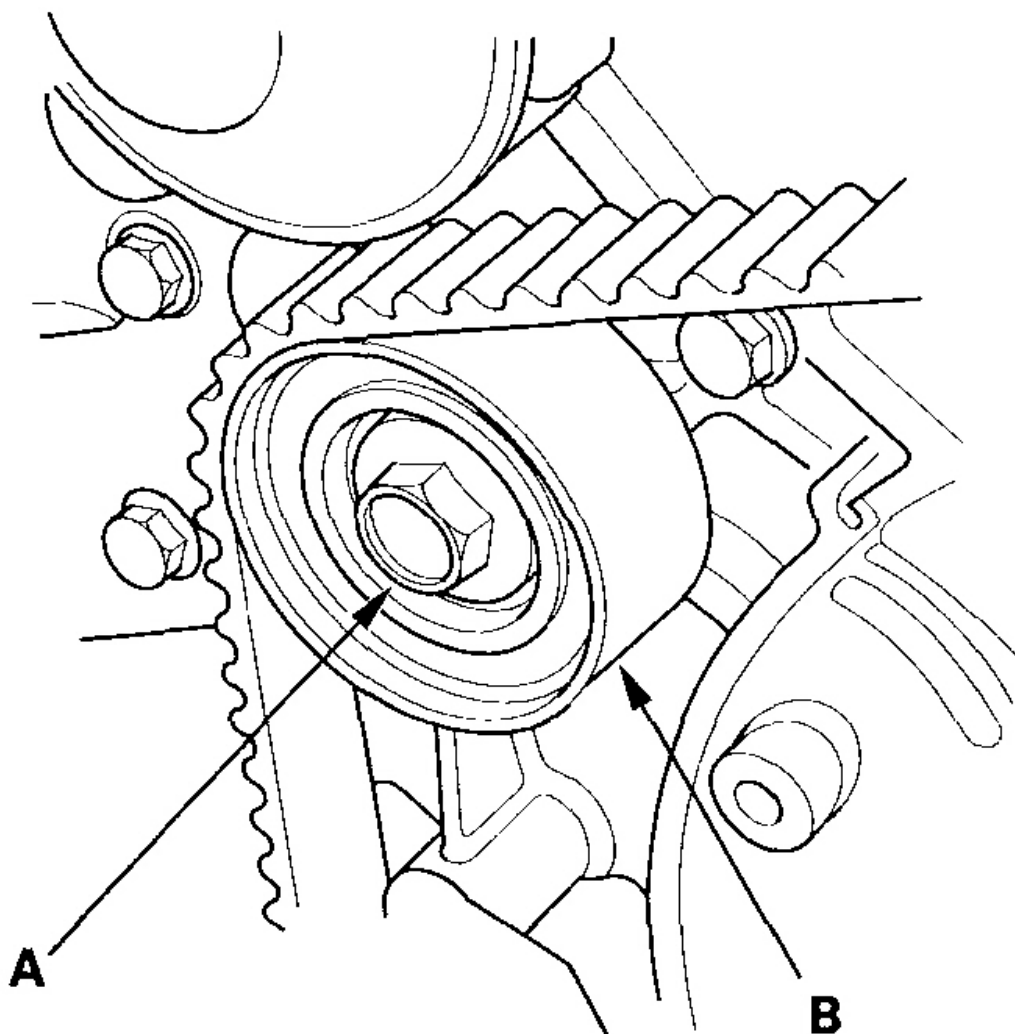
15. Remove the lower half of the side engine mount bracket.



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Fig. 36: Removing Lower Half Of Side Engine Mount Bracket
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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Fig. 37: Identifying Idler Pulley Bolt (A) And Idler Pulley (B)

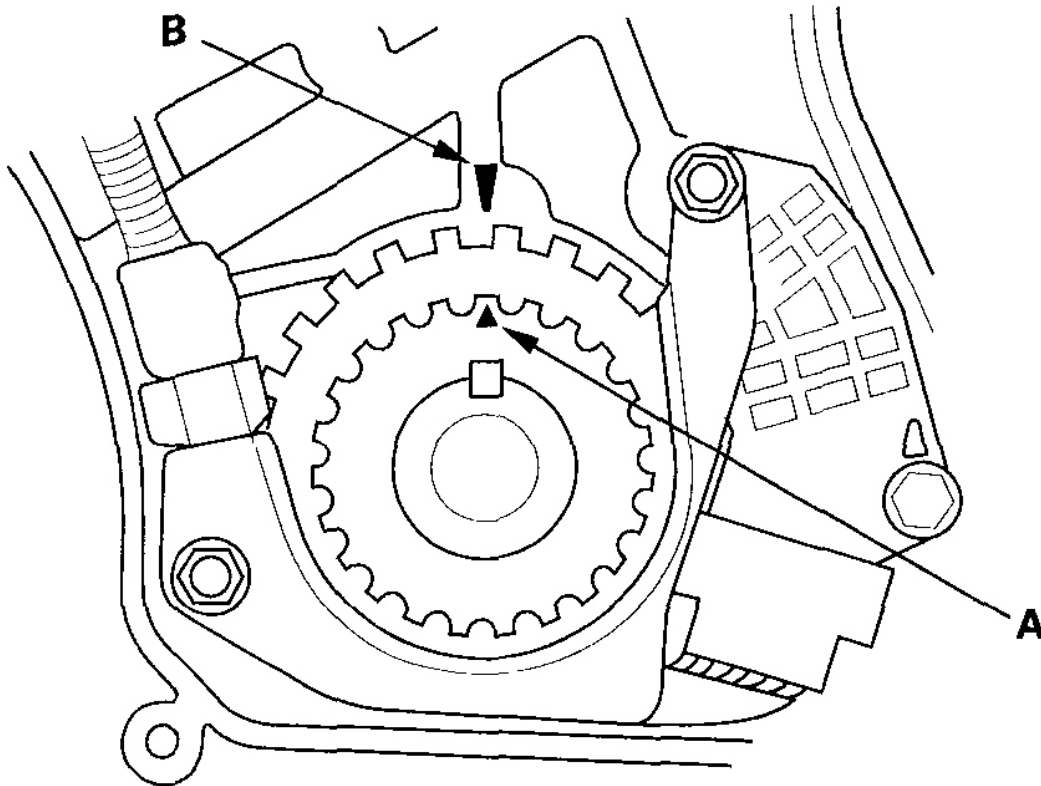
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT INSTALLATION

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

1. Clean the timing belt pulleys, timing belt guide plate, and the upper and lower covers.

2. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with the pointer (B) on the oil pump.

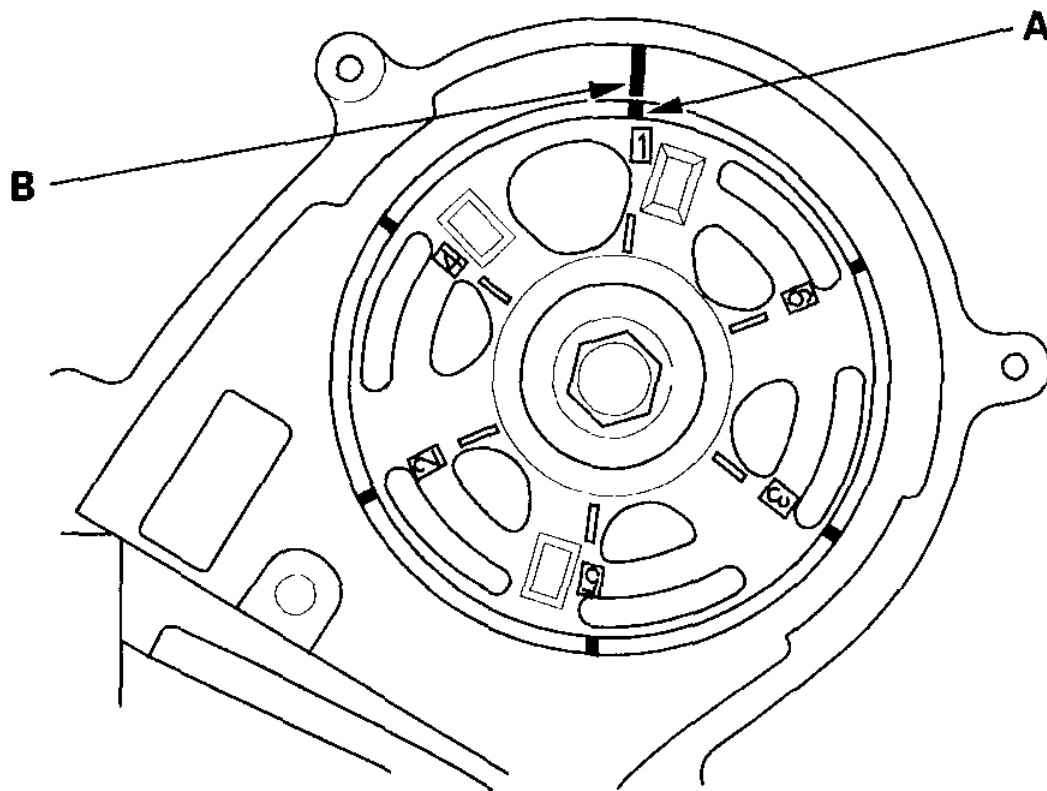


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Fig. 38: Aligning TDC Mark (A) With Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

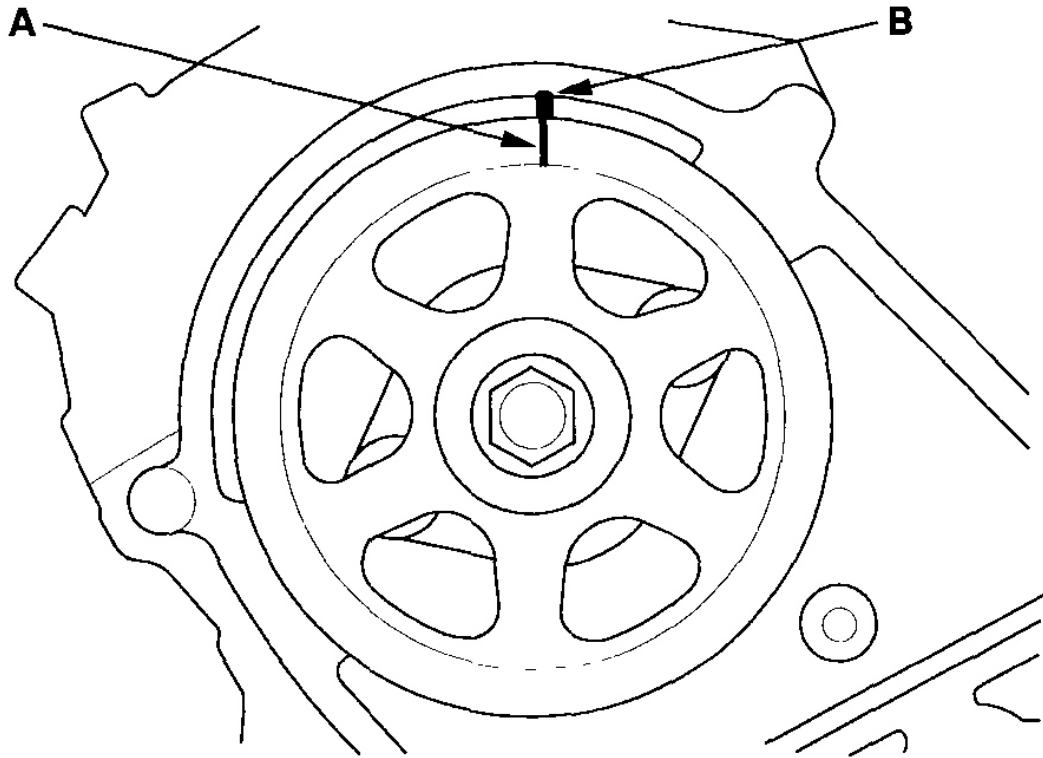
FRONT:



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Fig. 39: Alining TDC Mark (A) With Pointers (B) - Front
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

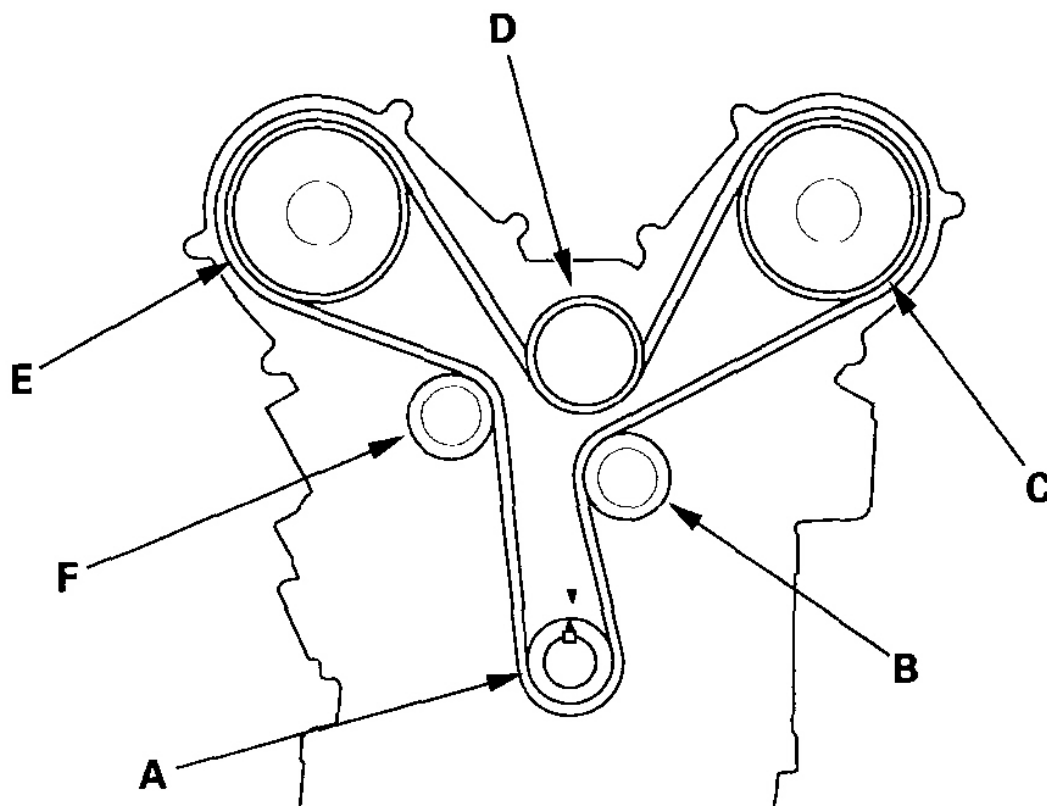
REAR:



G03658861

Fig. 40: Alining TDC Mark (A) With Pointers (B) - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658862

Fig. 41: Identifying Timing Belt Installation Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Tighten the idler pulley bolt.

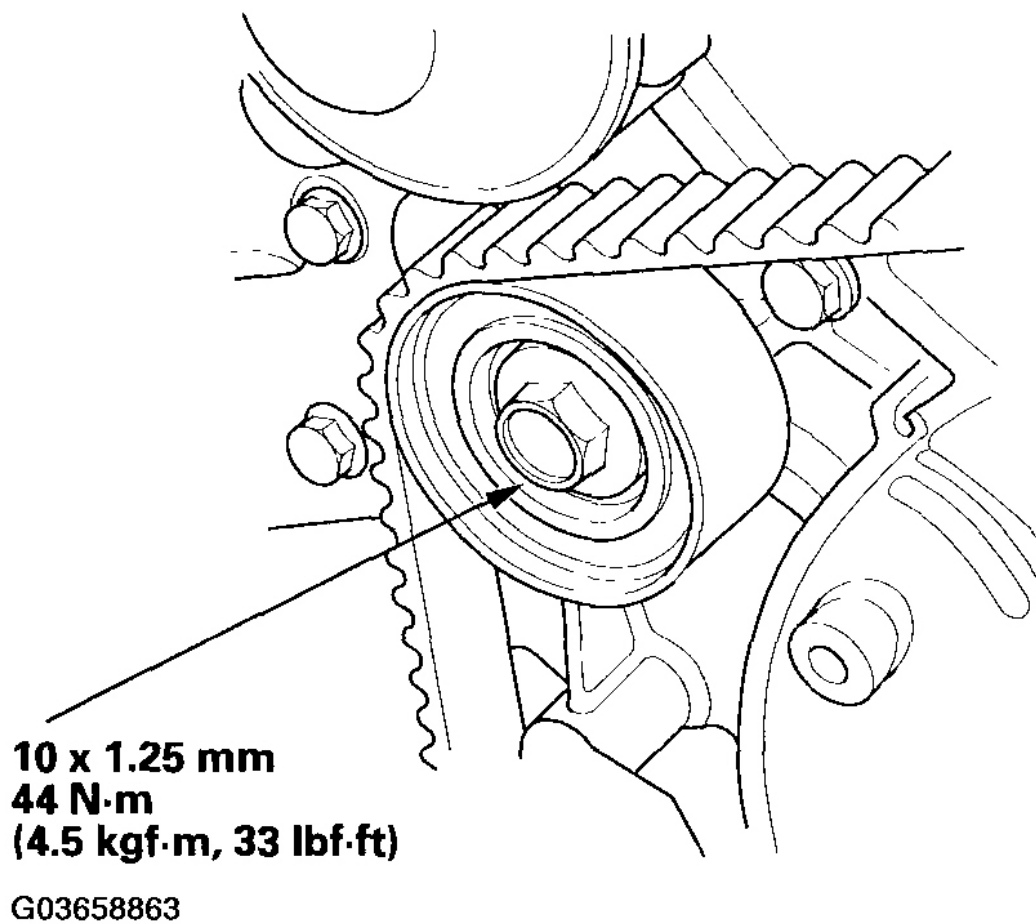
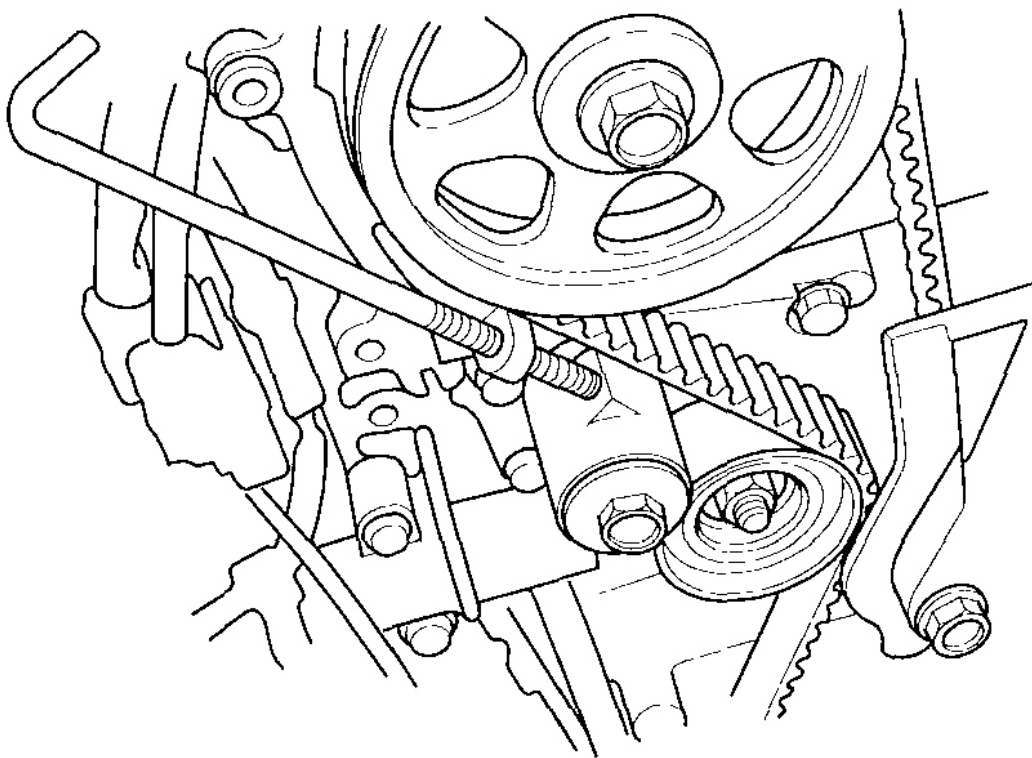


Fig. 42: Identifying Idler Pulley Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

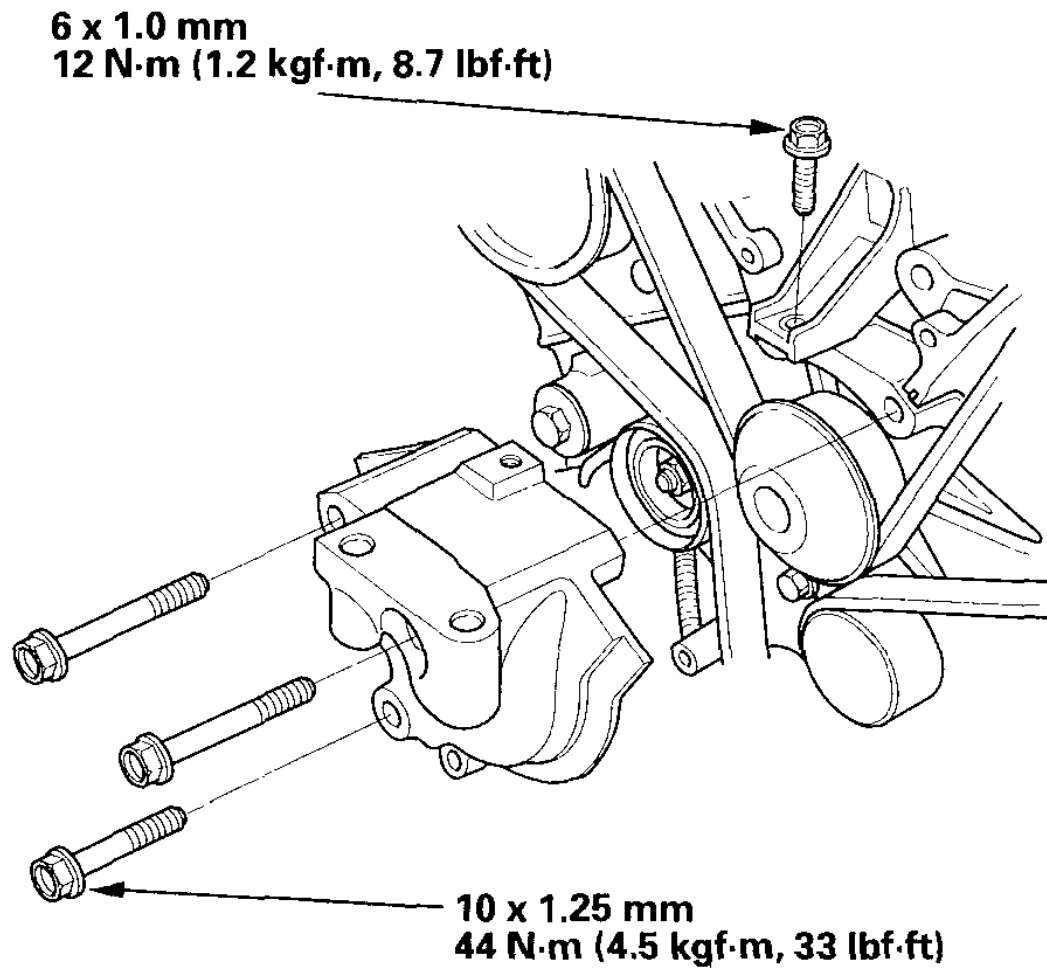
8. Remove the battery clamp bolt from the back cover.



G03658864

Fig. 43: Removing Battery Clamp Bolt From Back Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

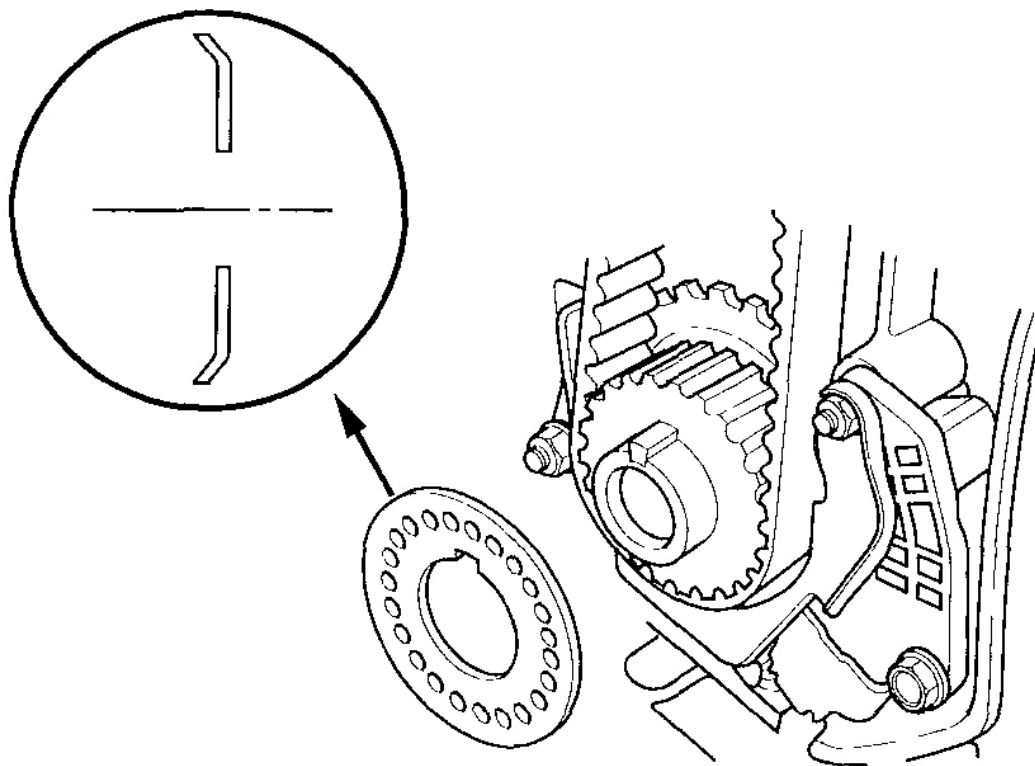
9. Install the lower half of the side engine mount bracket.



G03658865

Fig. 44: Installing Lower Half Of Side Engine Mount Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

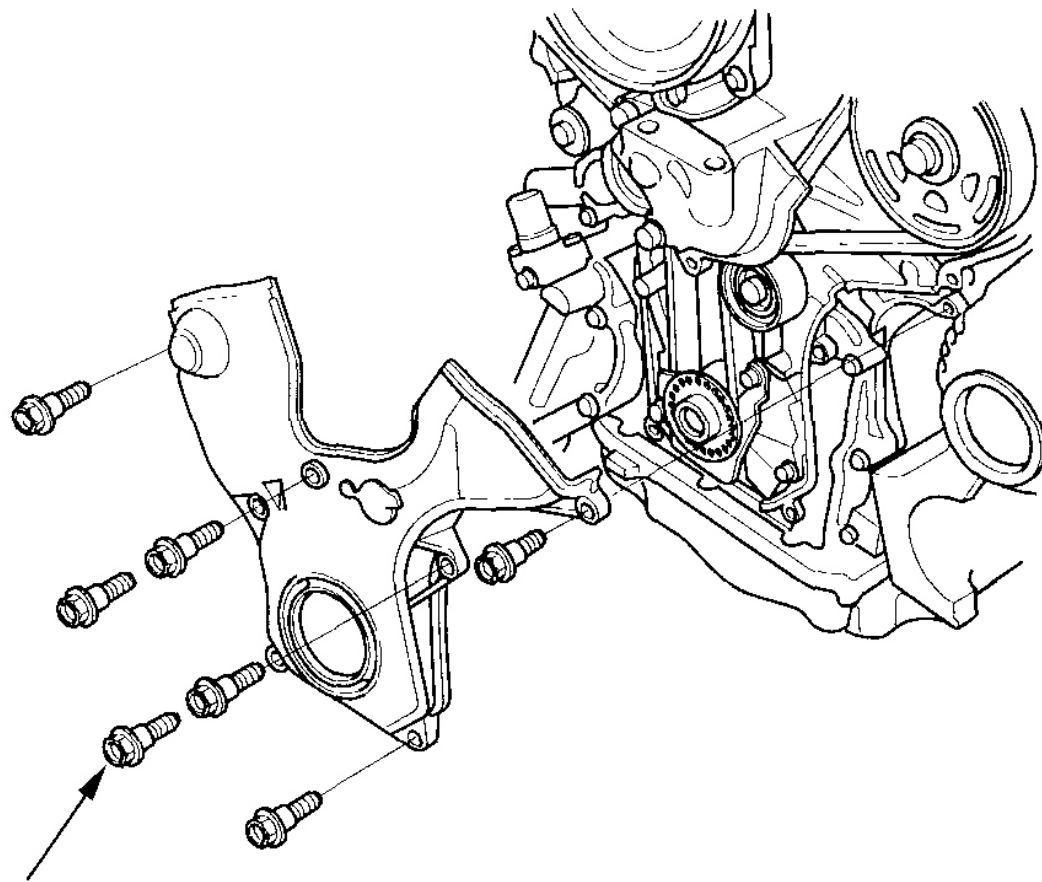
10. Install the timing belt guide plate as shown.



G03658866

Fig. 45: Installing Timing Belt Guide Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the lower cover.



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

G03658867

Fig. 46: Installing Lower Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the front upper cover (A) and rear upper cover (B).

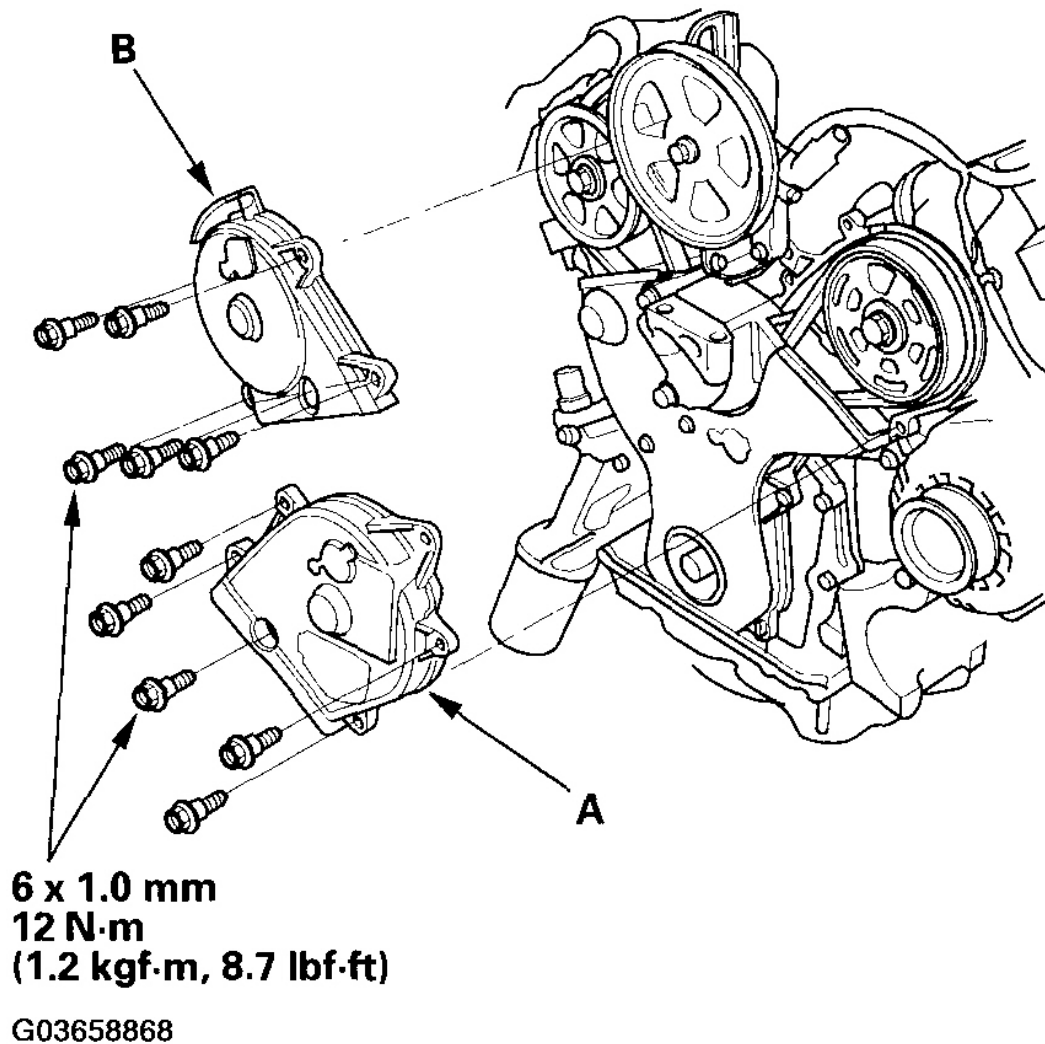
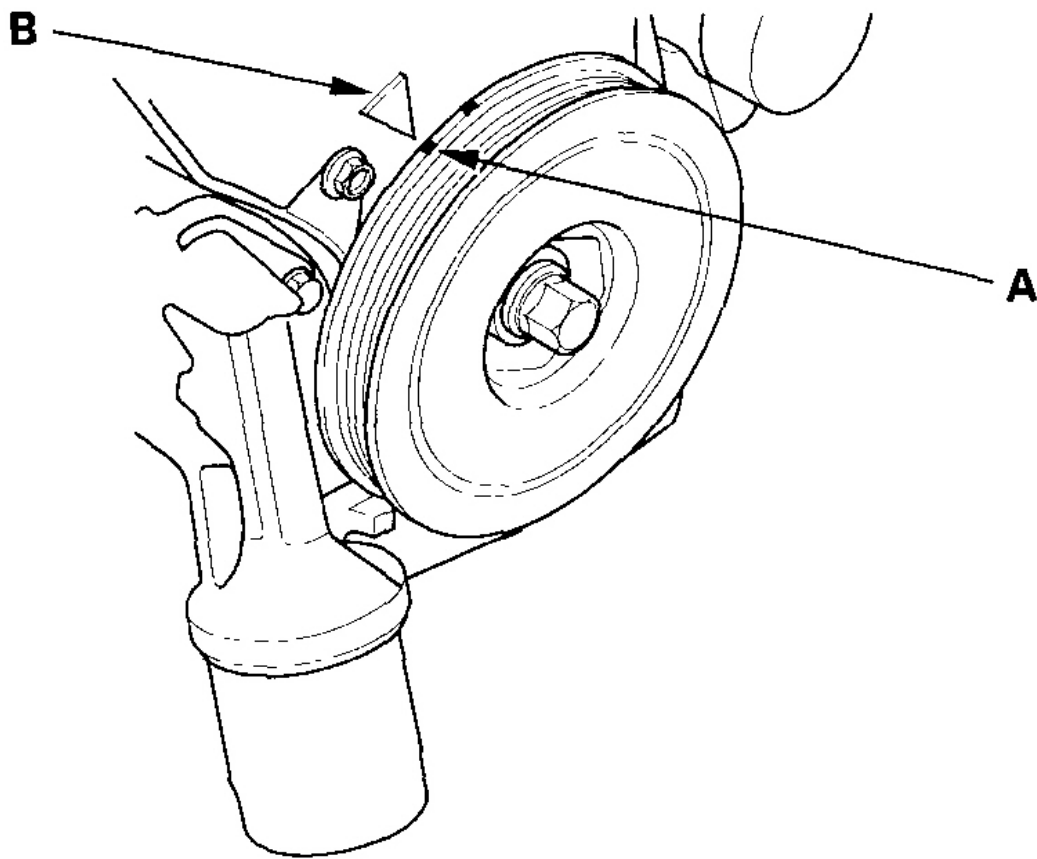


Fig. 47: Installing Front Upper Cover (A) And Rear Upper Cover (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



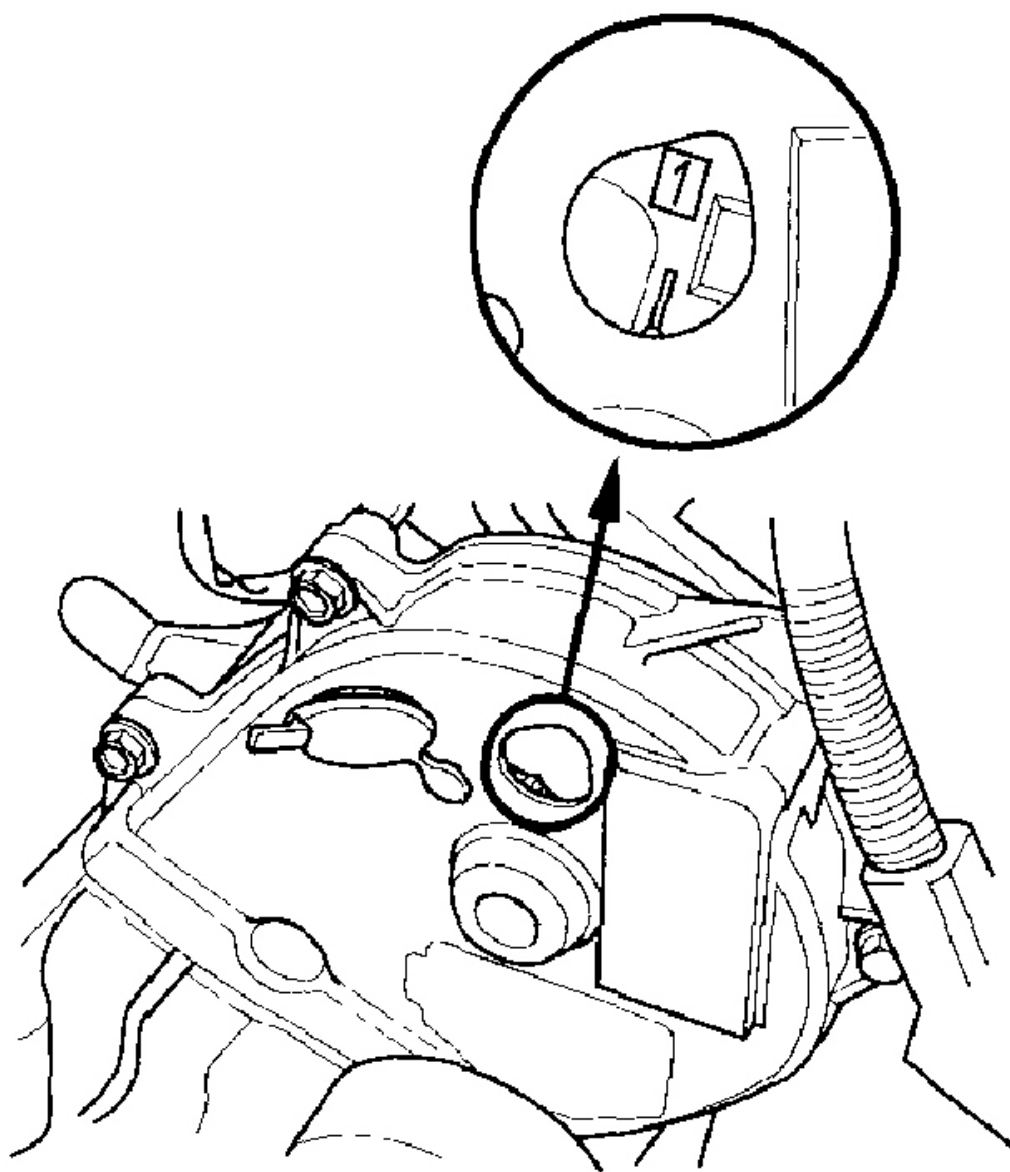
G03658869

Fig. 48: Aligning Crankshaft Pulley White Mark (A) With Pointer (B)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

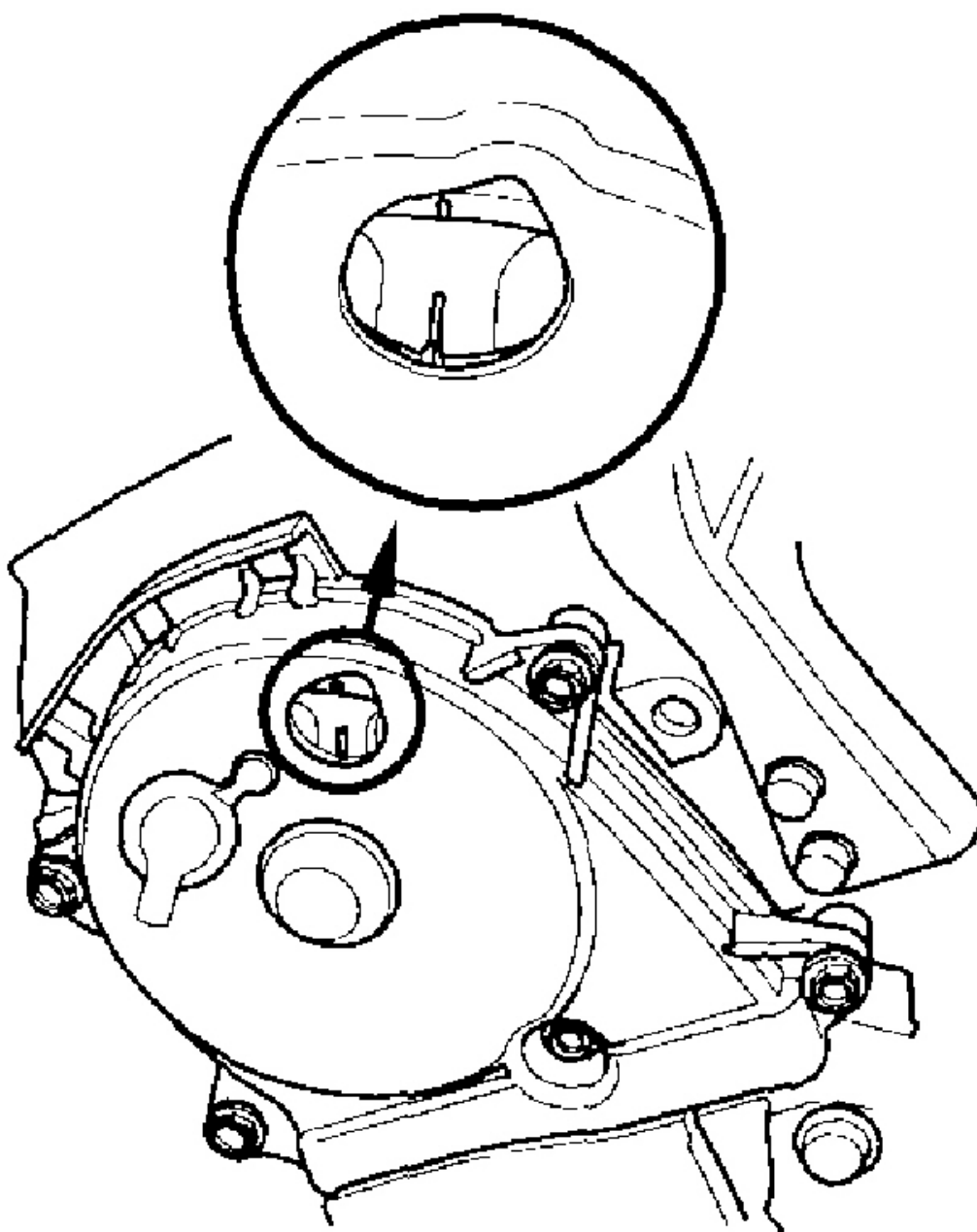
FRONT:



G03658870

Fig. 49: Identifying Camshaft Pulley Marks - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

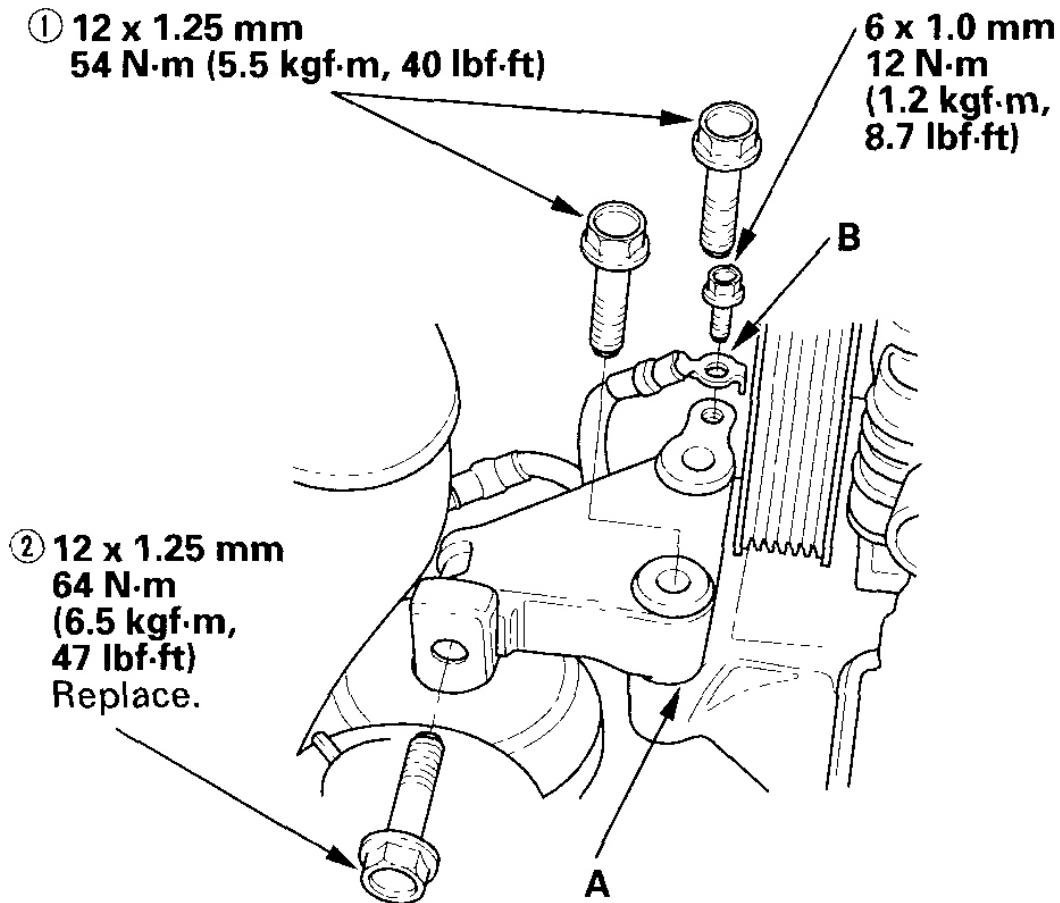
REAR:



G03658871

Fig. 50: Identifying Camshaft Pulley Marks - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the upper half of the side engine mount bracket (A), and tighten the bolts in the numbered sequence shown.



G03658872

Fig. 51: Identifying Side Engine Mount Bracket (A), Ground Cable (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the ground cable (B).
19. Install the drive belt (see **DRIVE BELT INSPECTION**).
20. Install the splash shield.
21. Install the right front wheel.

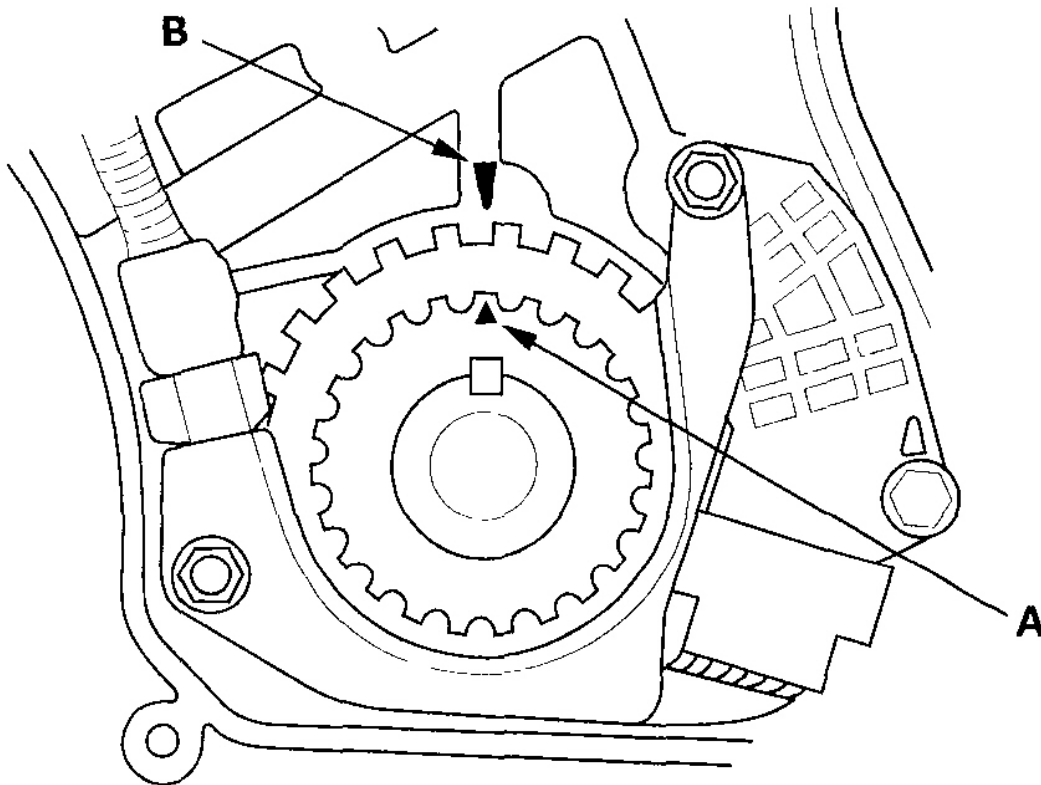
NOTE: On M/T model, be careful not to damage or chip the paint of the brake calipers when installing the wheel.

22. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP)**)

PATTERN CLEAR/CRANK (CKP) PATTERN LEARN).**TIMING BELT REPLACEMENT**

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

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

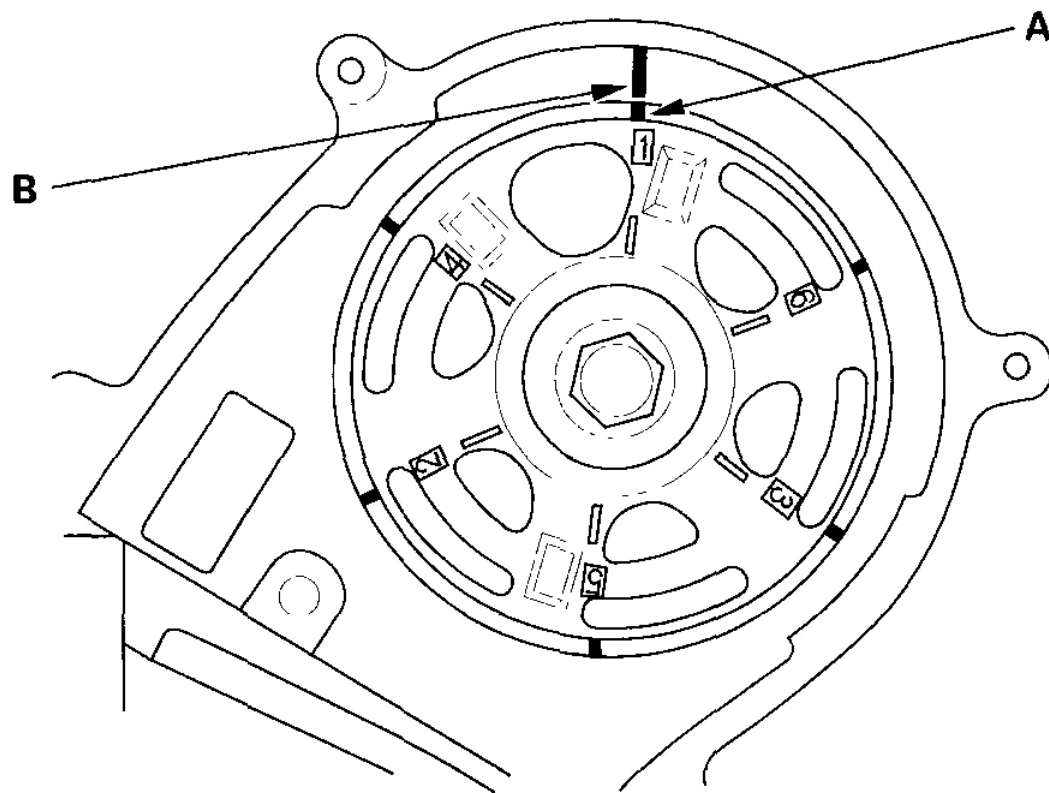


G03658873

Fig. 52: Aligning TDC Mark (A) With Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

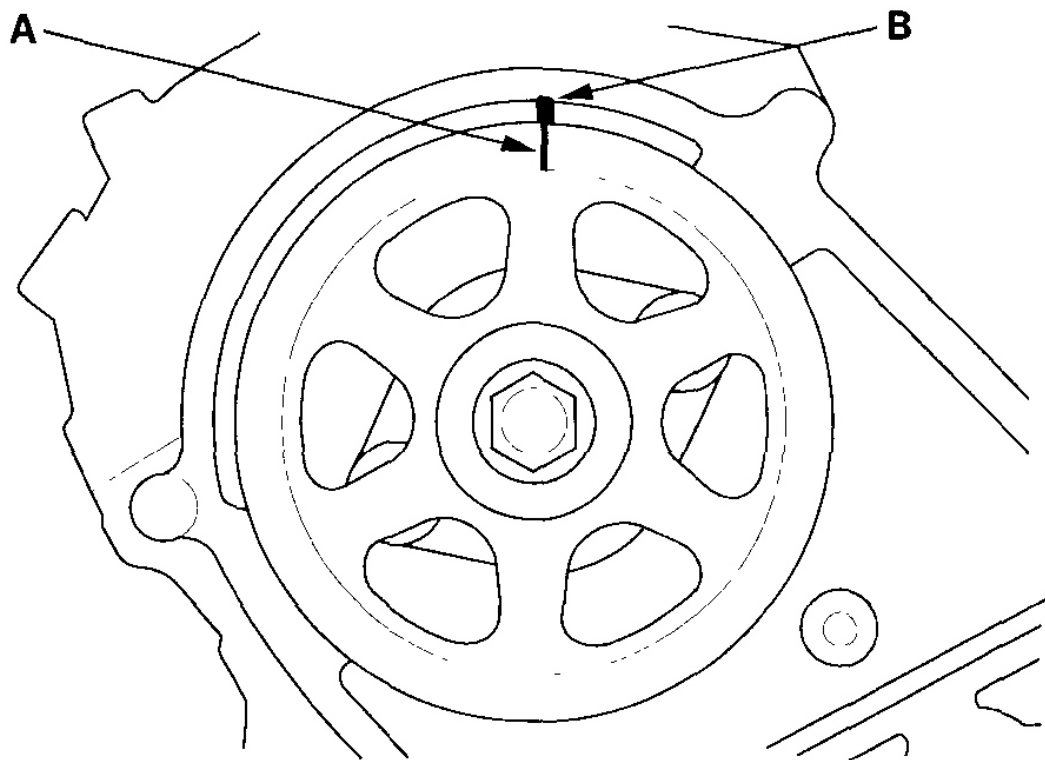
FRONT:



G03658874

Fig. 53: Aligning TDC Marks (A) With Pointers (B) - Front
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

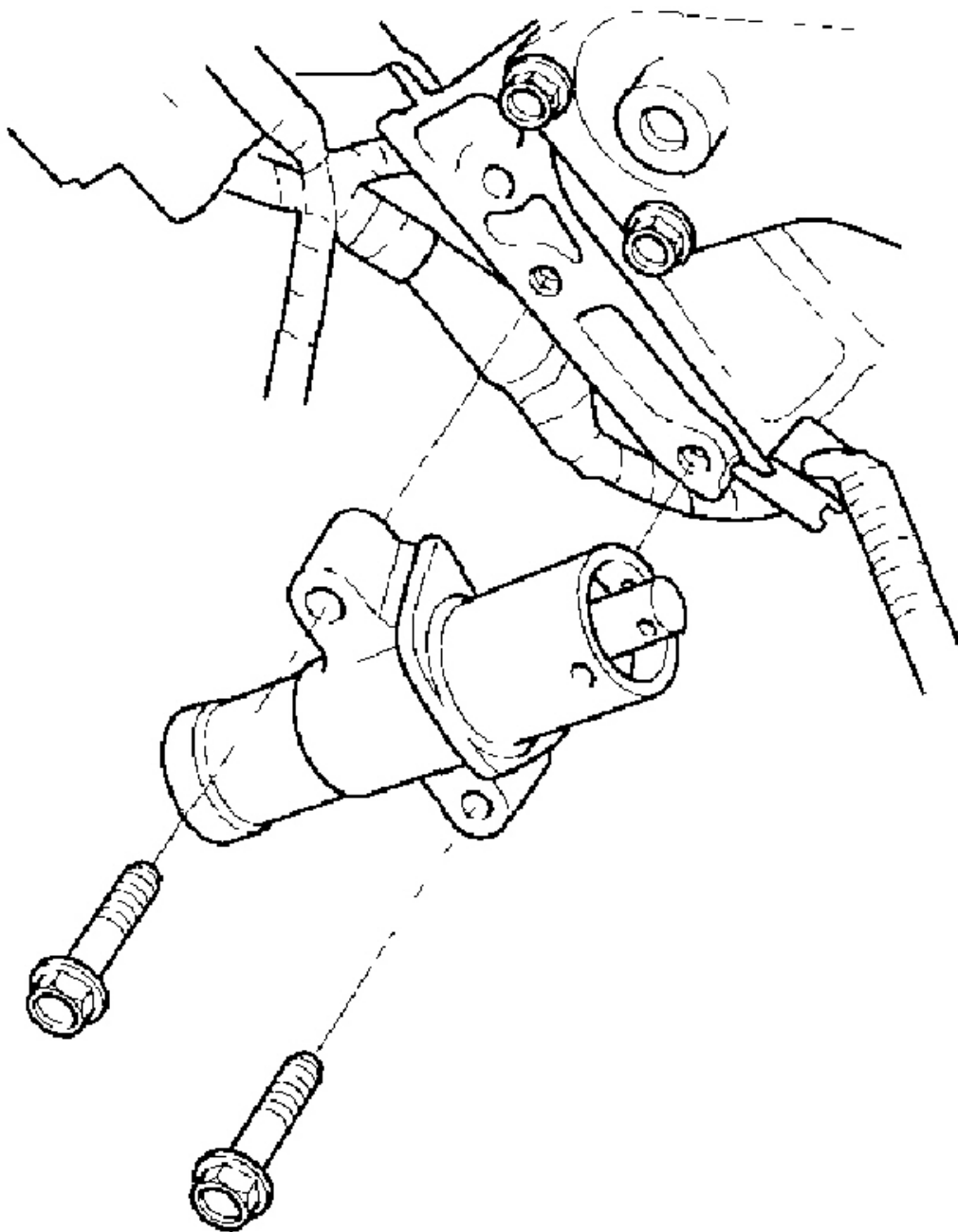
REAR:



G03658875

Fig. 54: Aligning TDC Marks (A) With Pointers (B) - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

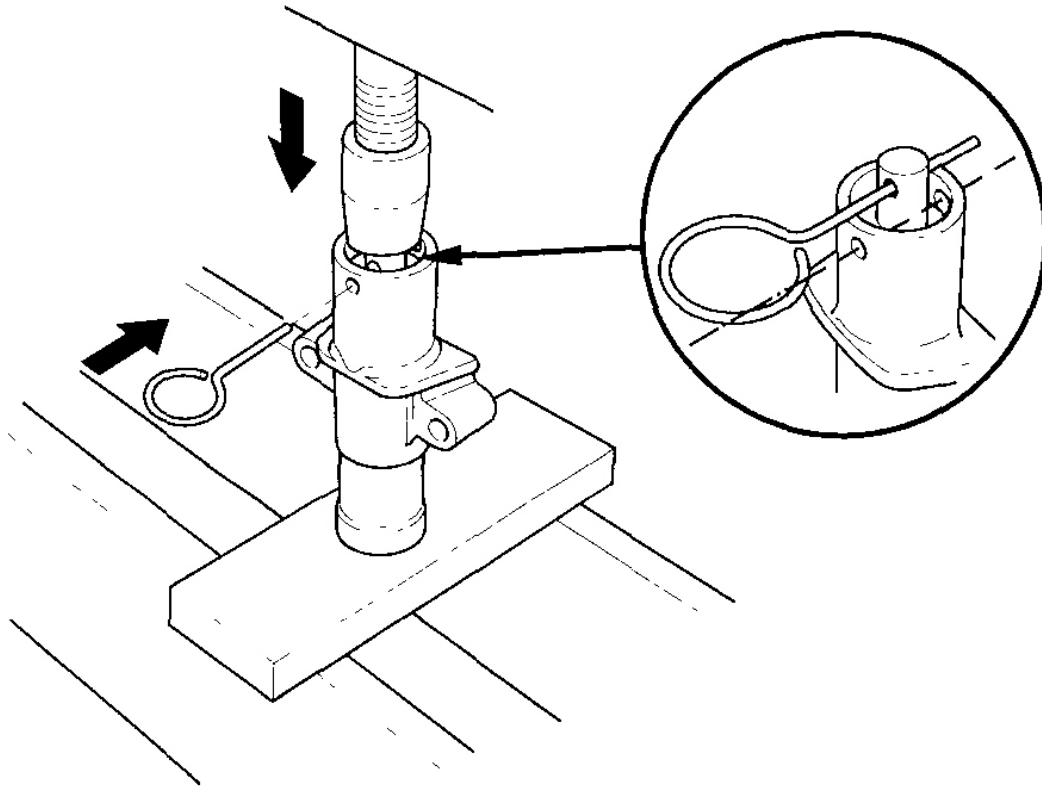


G03658876

Fig. 55: Removing Auto-Tensioner

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658877

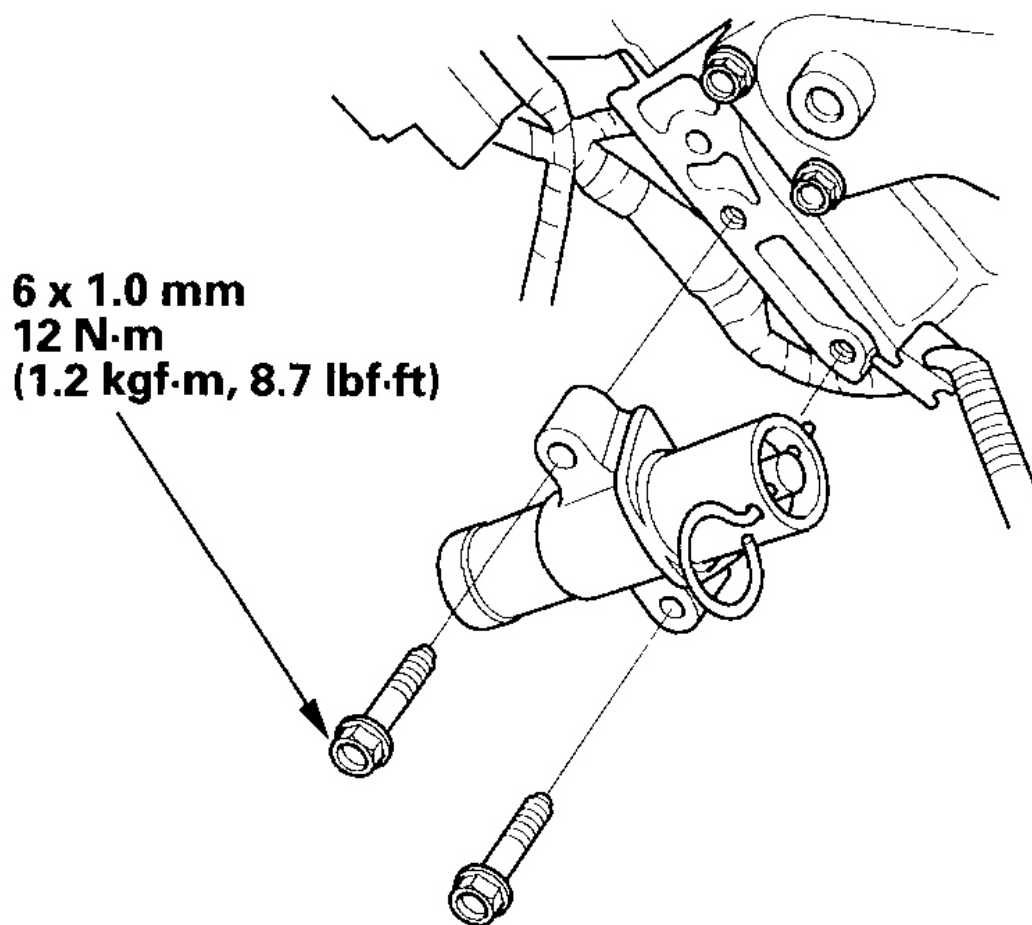
Fig. 56: Aligning Holes On Rod And Housing Of Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

9. Install the auto-tensioner.

NOTE: Make sure the pin stays in place.

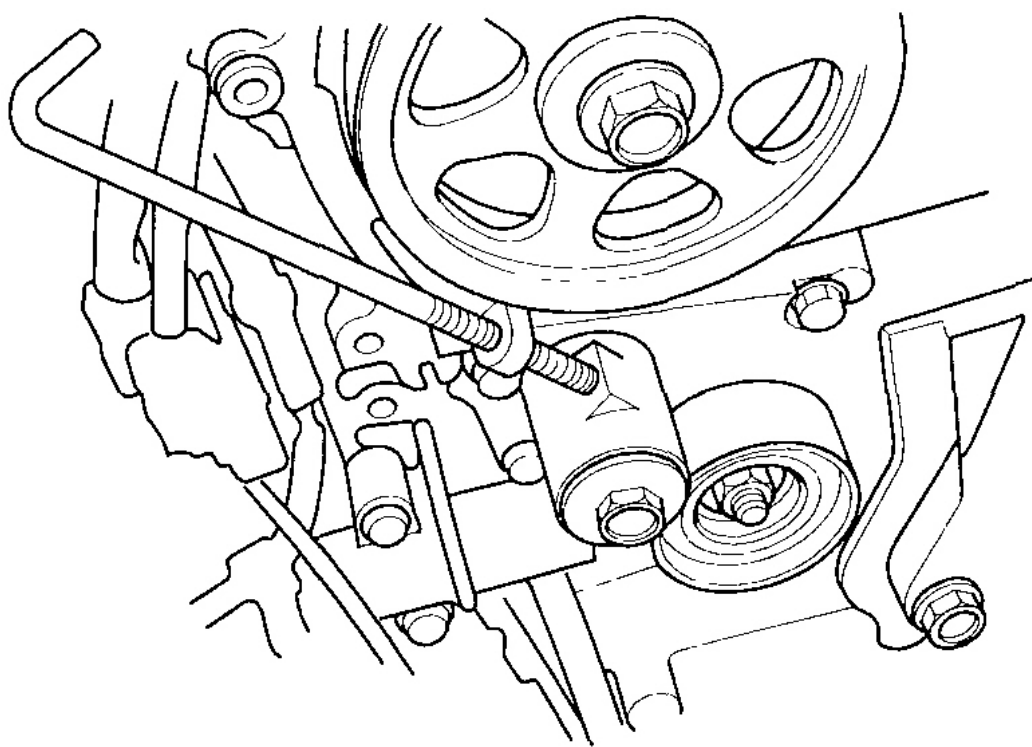


G03658878

Fig. 57: Installing Auto-Tensioner With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

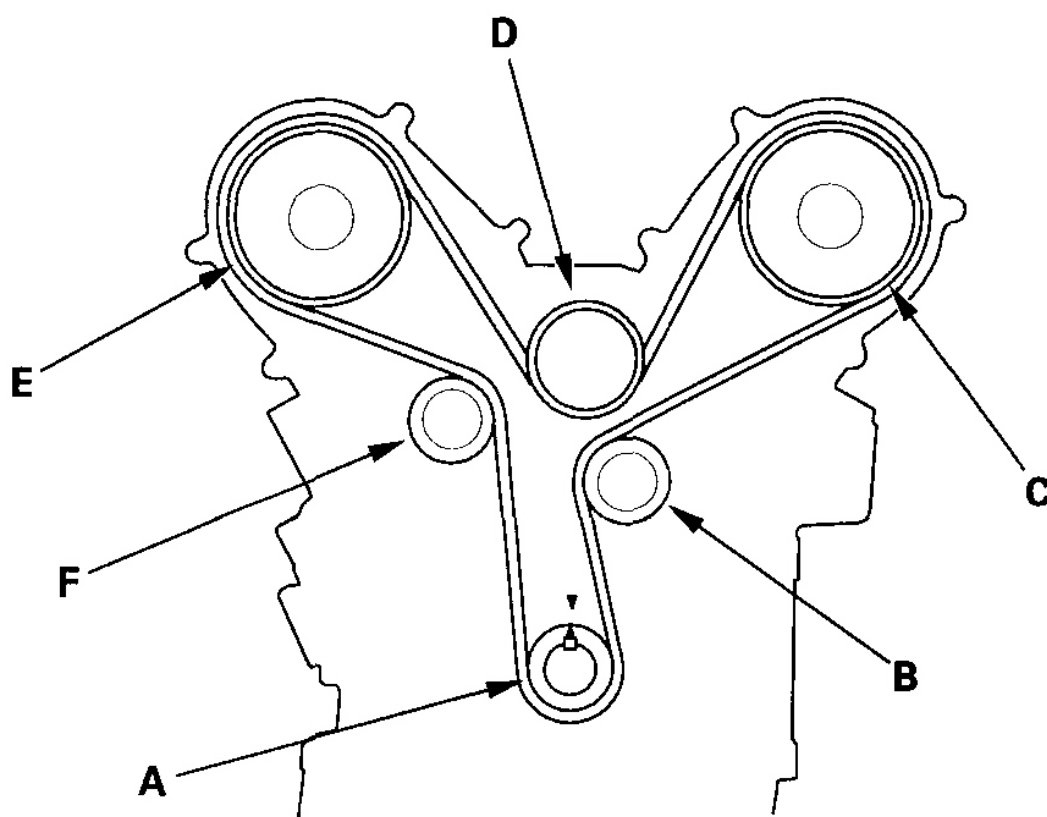


G03658879

Fig. 58: Installing Battery Clamp Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.
12. Install the timing belt in a counterclockwise sequence starting with the drive pulley. Take care not to damage the timing belt when installing it.

- 1 Drive pulley (A)
- 2 Idler pulley (B)
- 3 Front camshaft pulley (C)
- 4 Water pump pulley (D)
- 5 Rear camshaft pulley (E)
- 6 Adjusting pulley (F)



G03658880

Fig. 59: Identifying Timing Belt Installation Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Tighten the idler pulley bolt.

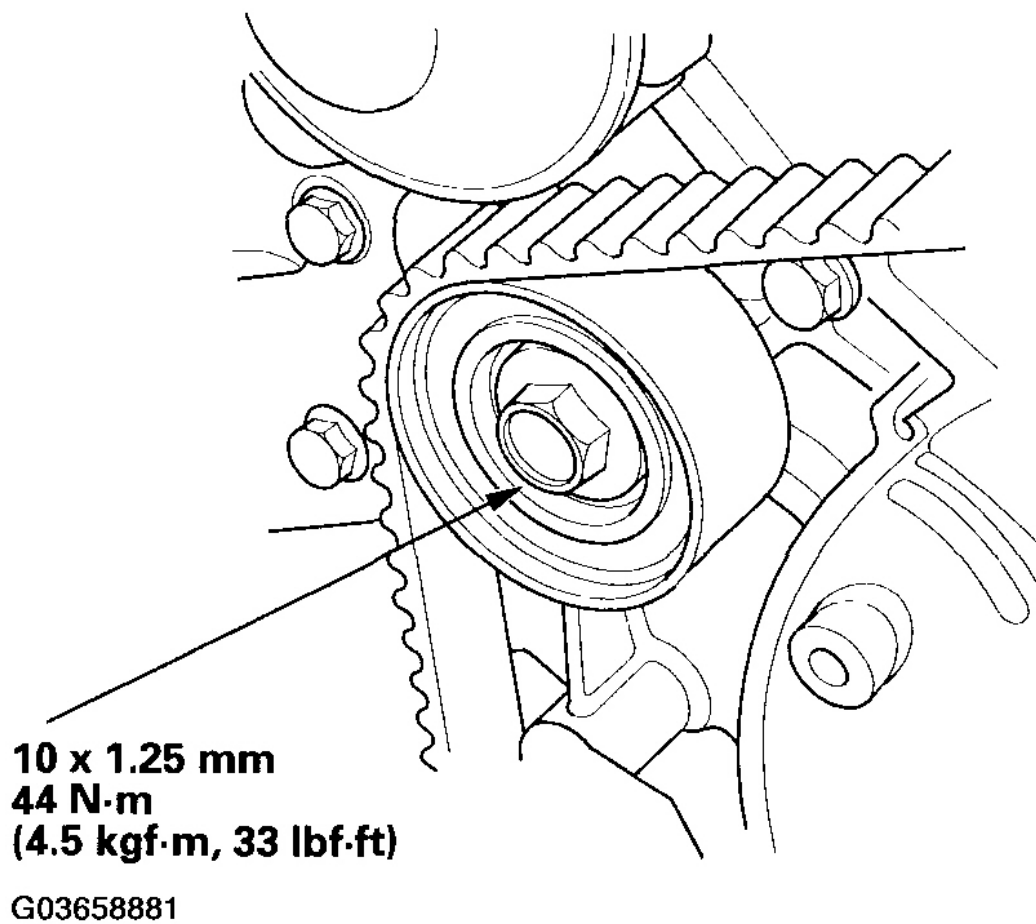
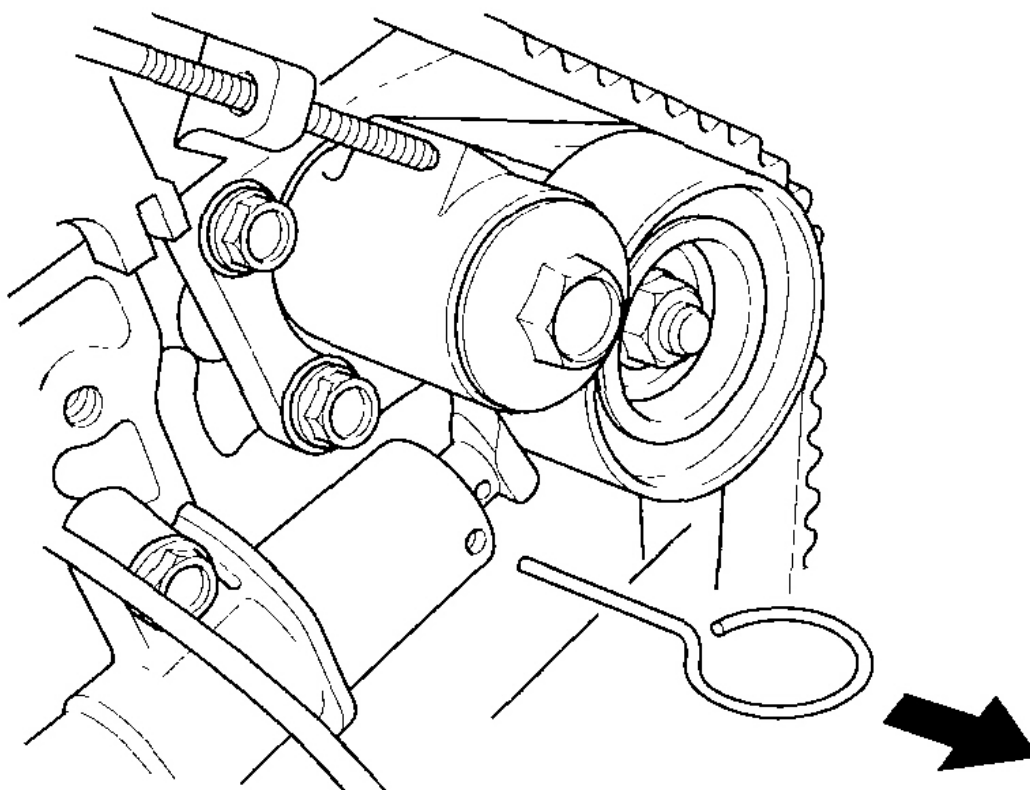


Fig. 60: Identifying Idler Pulley Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the pin from the auto-tensioner.

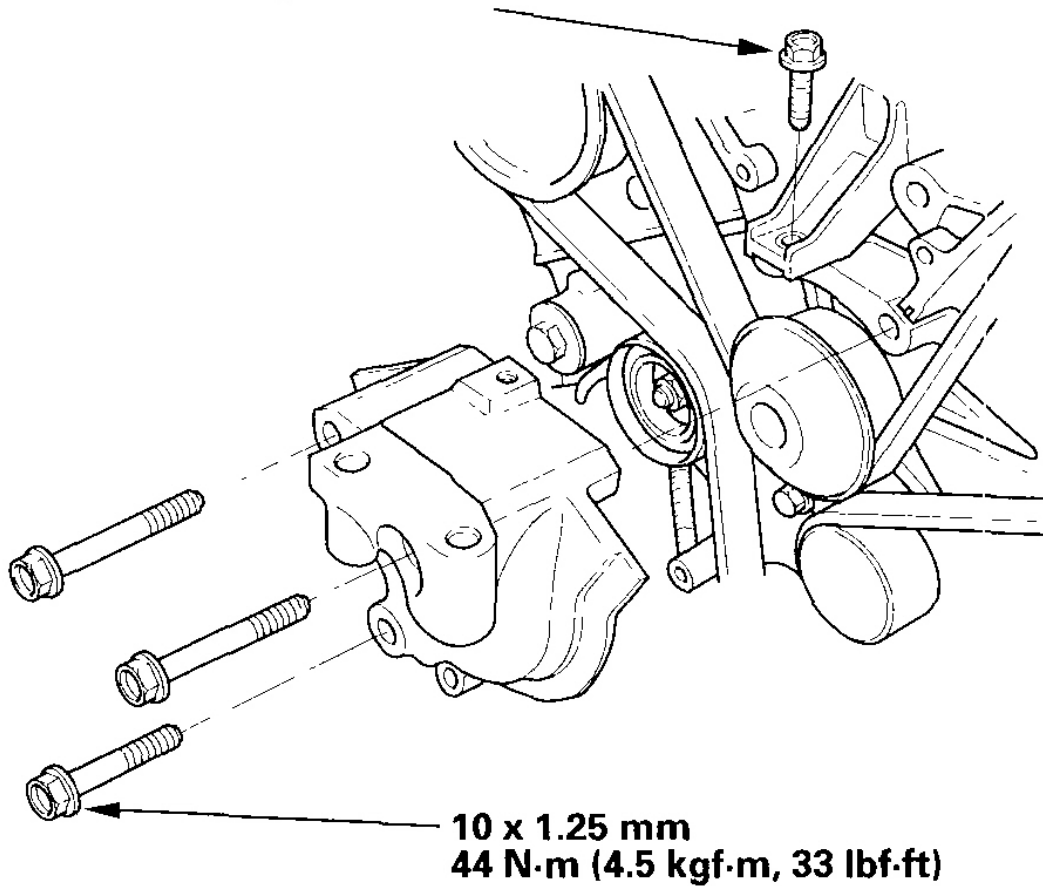


G03658882

Fig. 61: Removing Pin From Auto-Tensioner
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

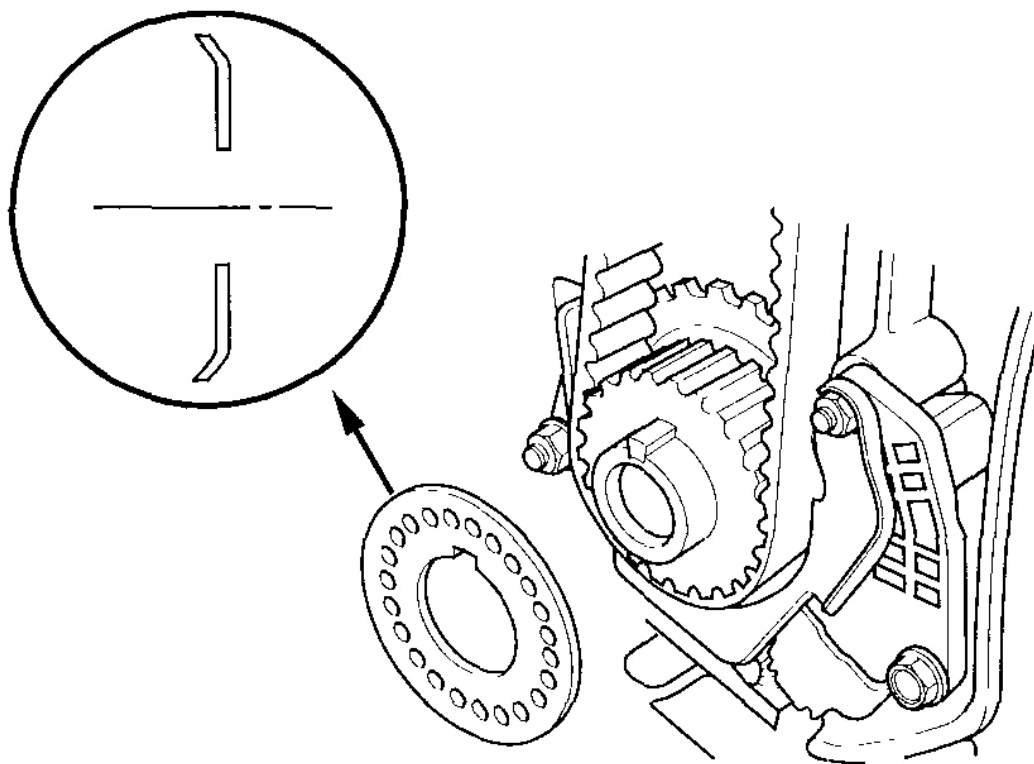
**6 x 1.0 mm
12 N·m (1.2 kgf·m, 8.7 lbf·ft)**



G03658883

Fig. 62: Installing Lower Half Of Side Engine Mount Bracket With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

17. Install the timing belt guide plate as shown.



G03658884

Fig. 63: Installing Timing Belt Guide Plate
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Install the lower cover.

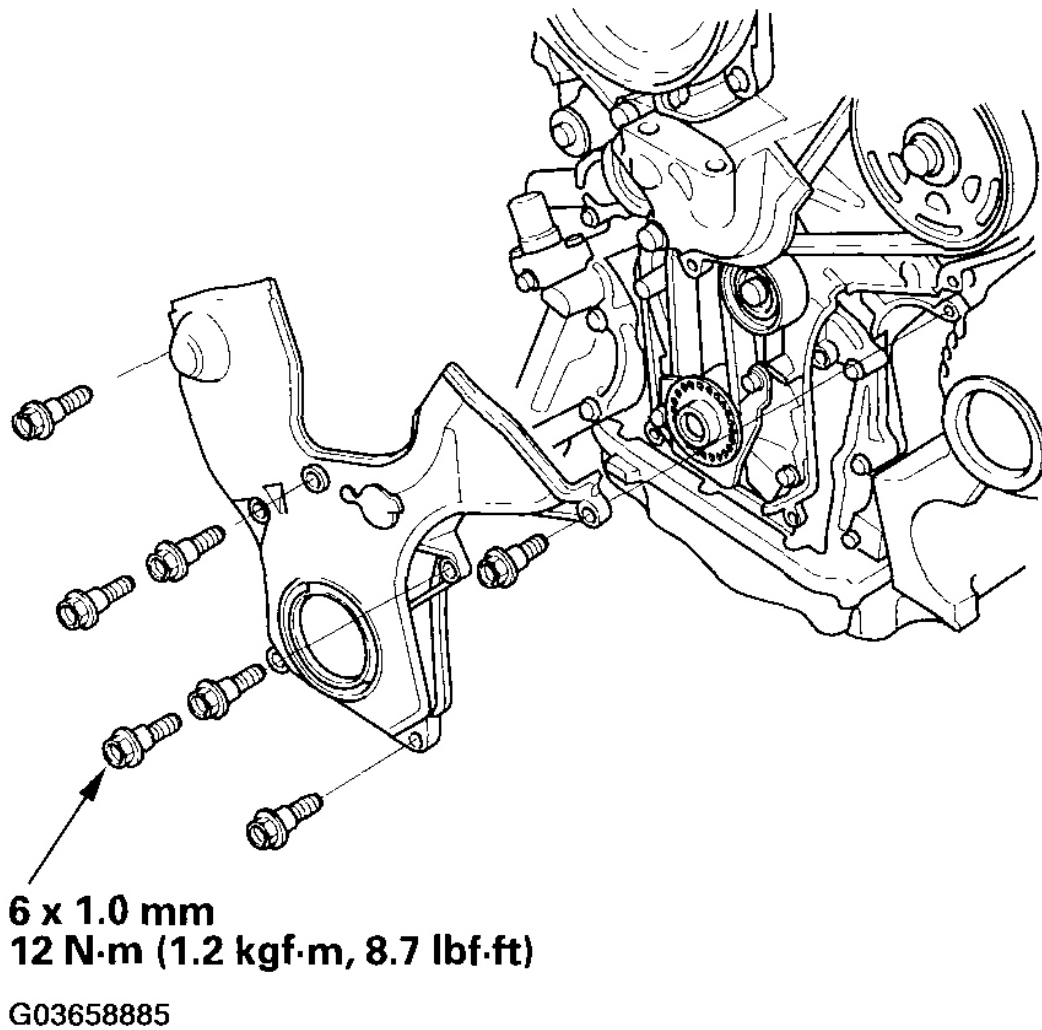


Fig. 64: Installing Lower Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Install the front upper cover (A) and rear upper cover (B).

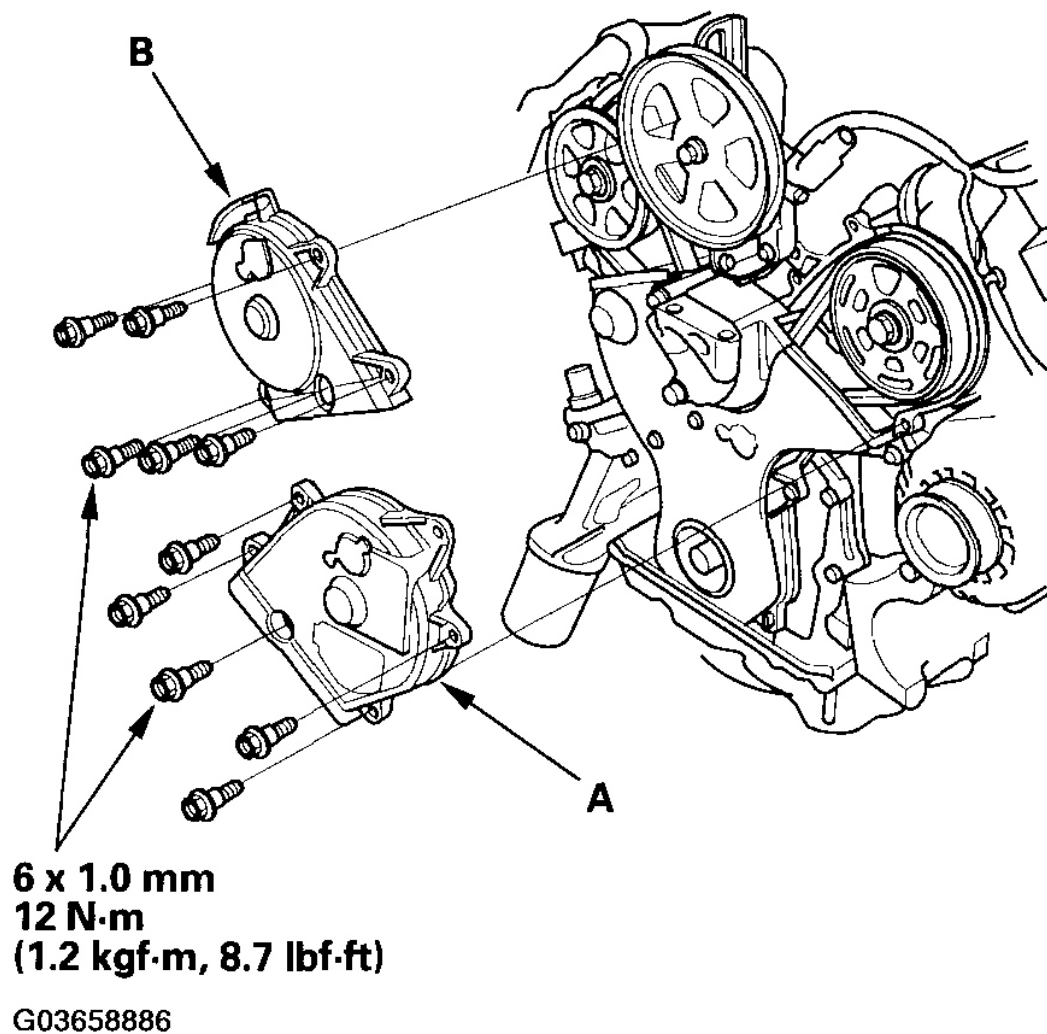
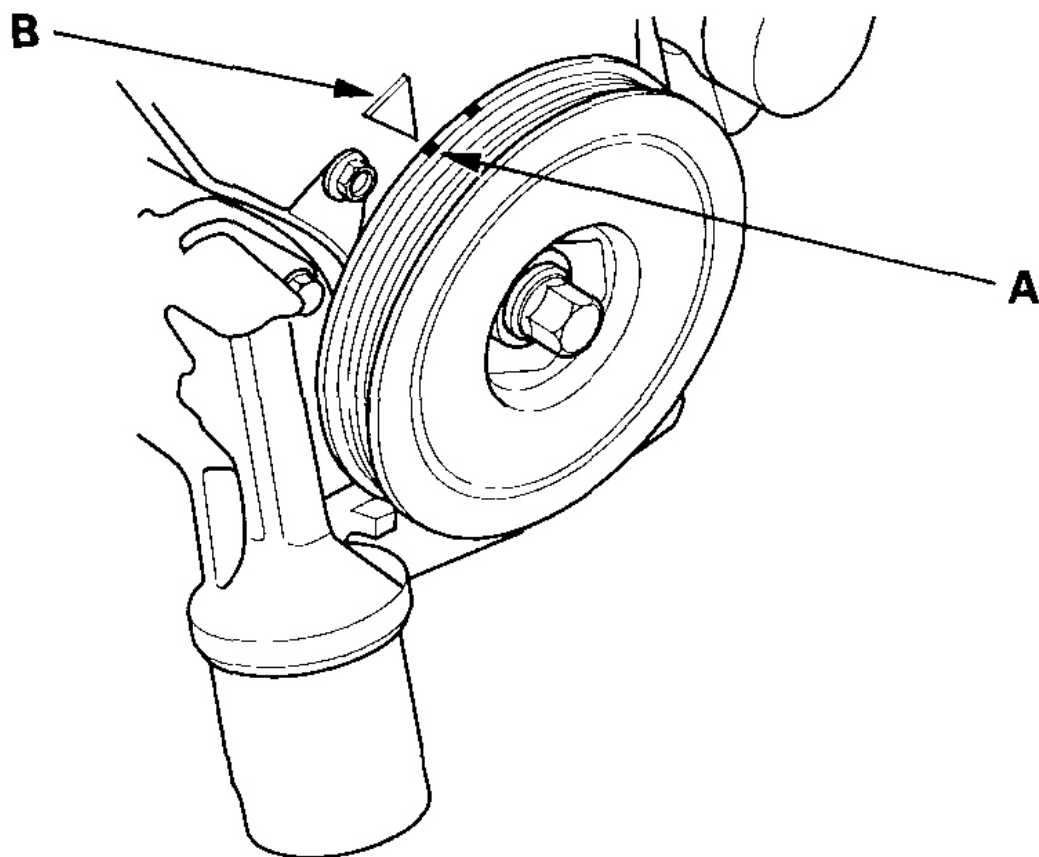


Fig. 65: Installing Front Upper Cover (A) And Rear Upper Cover (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

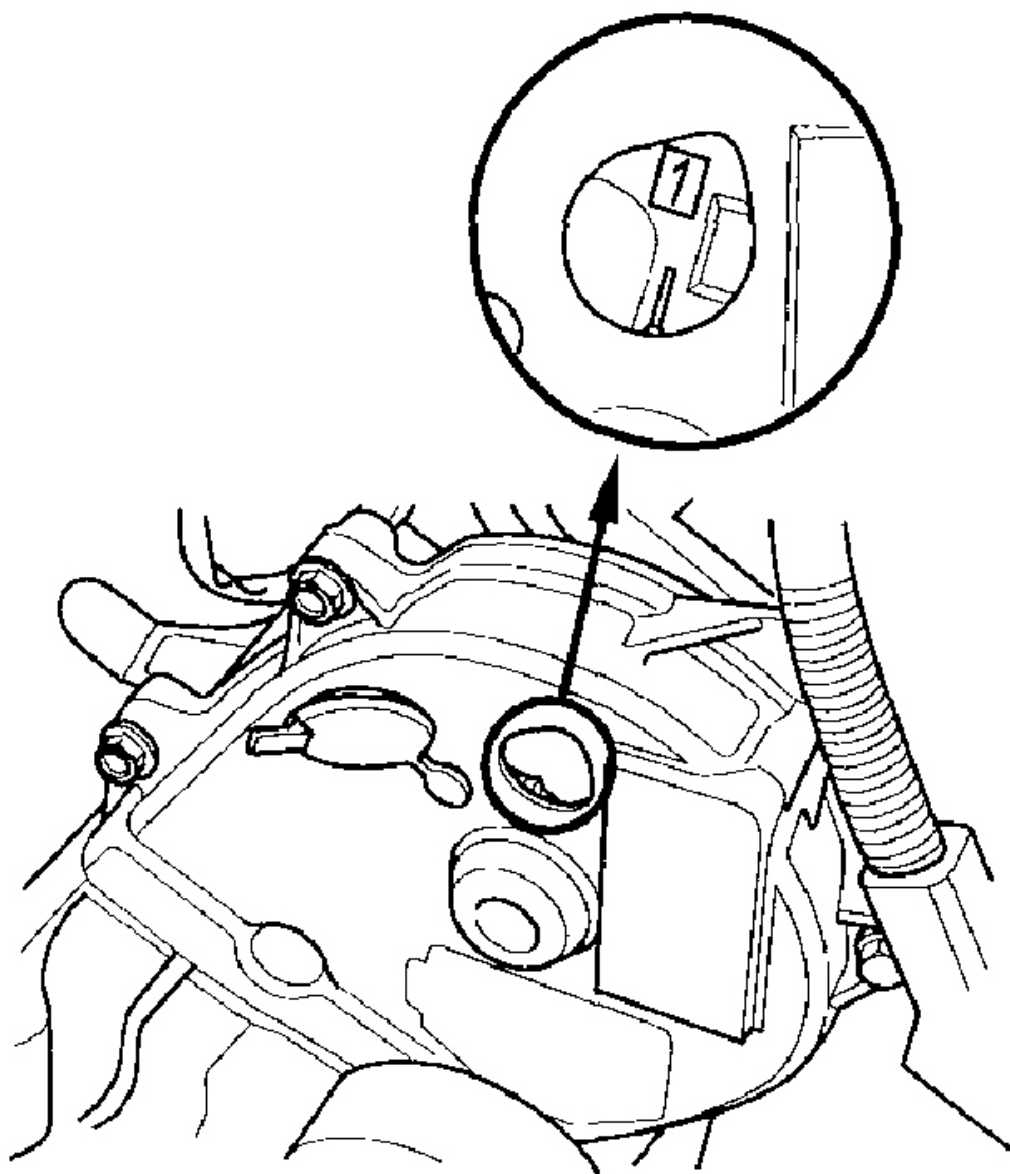


G03658887

Fig. 66: Aligning Crankshaft Pulley White Mark (A) With Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

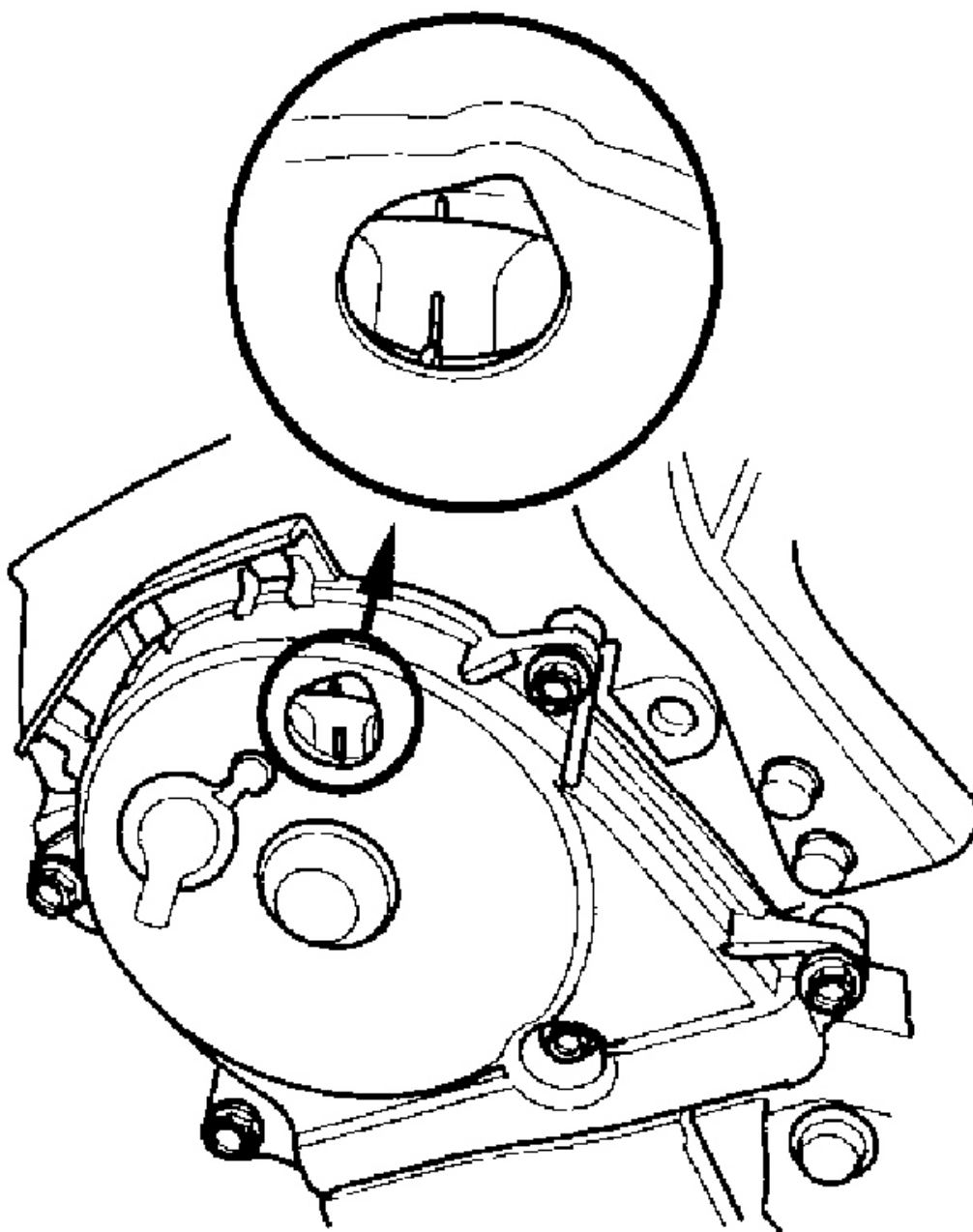
FRONT:



G03658888

Fig. 67: Identifying Camshaft Pulley Marks - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

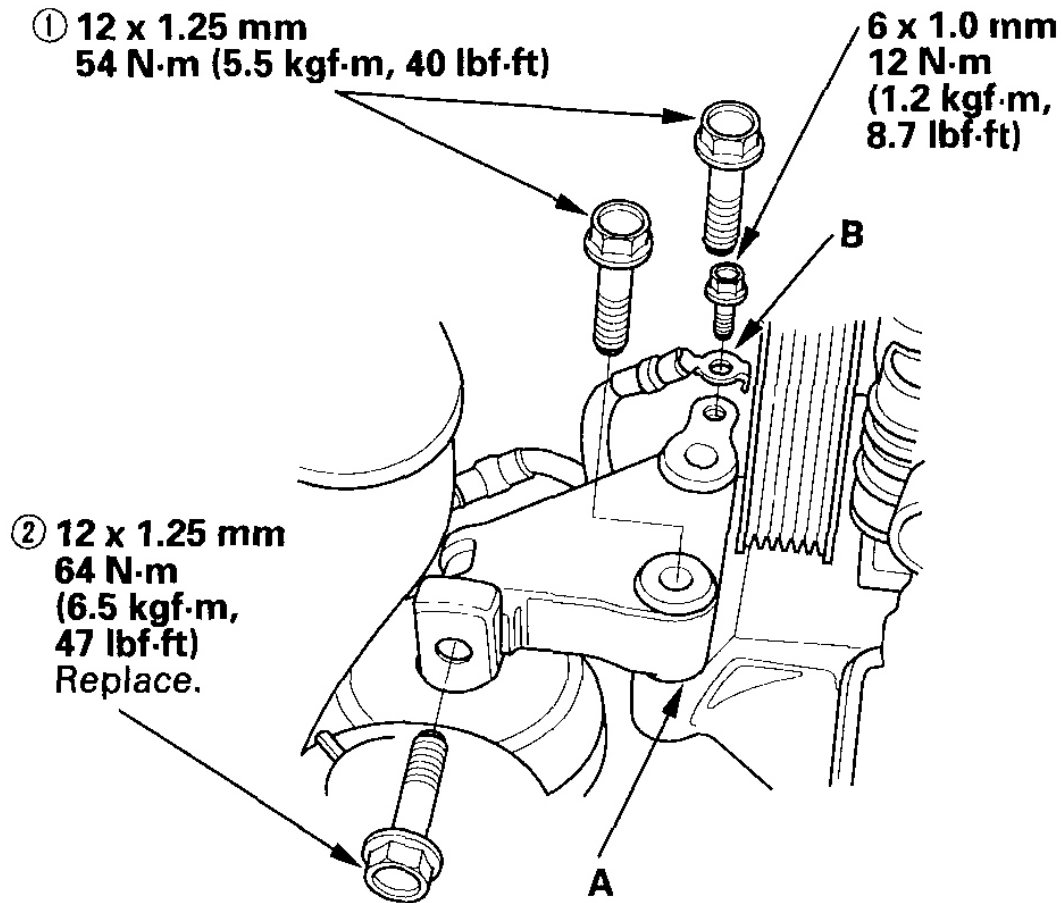
REAR:



G03658889

Fig. 68: Identifying Camshaft Pulley Marks - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Install the upper half of the side engine mount bracket (A), then tighten the bolts in the numbered sequence shown.



G03658890

Fig. 69: Identifying Side Engine Mount Bracket (A), Ground Cable (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

25. Install the ground cable (B).
 26. Install the drive belt (see **DRIVE BELT INSPECTION**).
 27. Install the splash shield.
 28. Install the right front wheel.

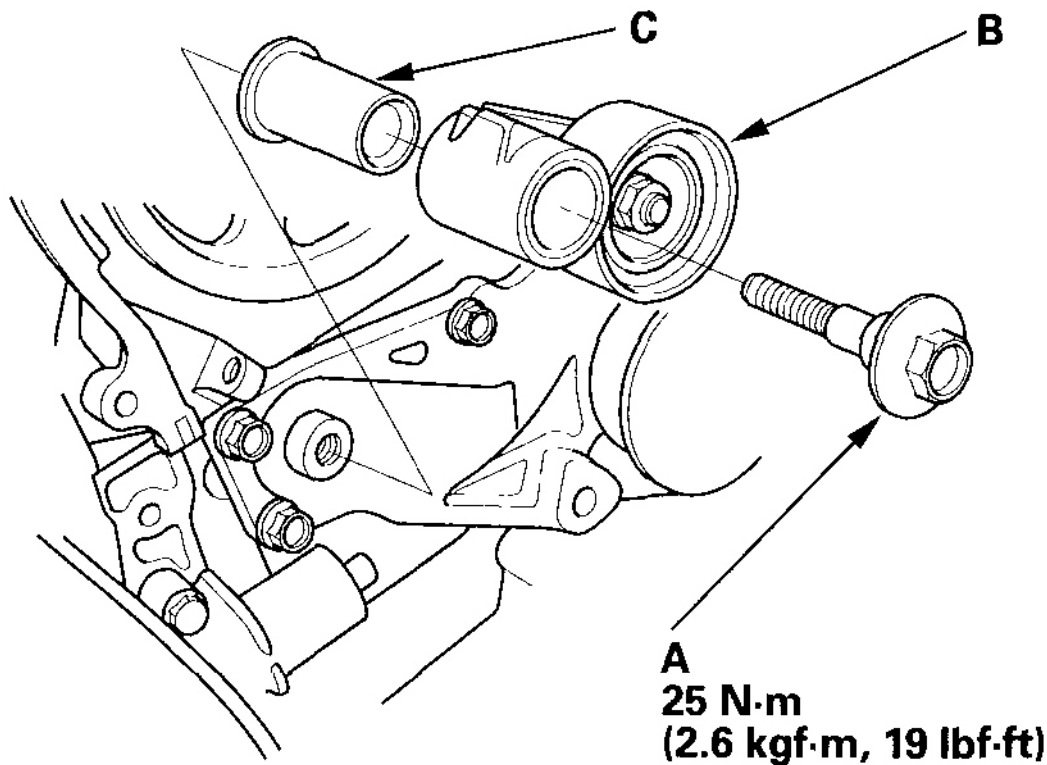
NOTE: On M/T model, be careful not to damage or chip the paint of the brake calipers when installing the wheel.

29. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP)**)

PATTERN CLEAR/CRANK (CKP) PATTERN LEARN).

TIMING BELT ADJUSTER REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the auto-tensioner.
3. Remove the bolt (A), then remove the timing belt adjuster (B) and collar (C).



G03658891

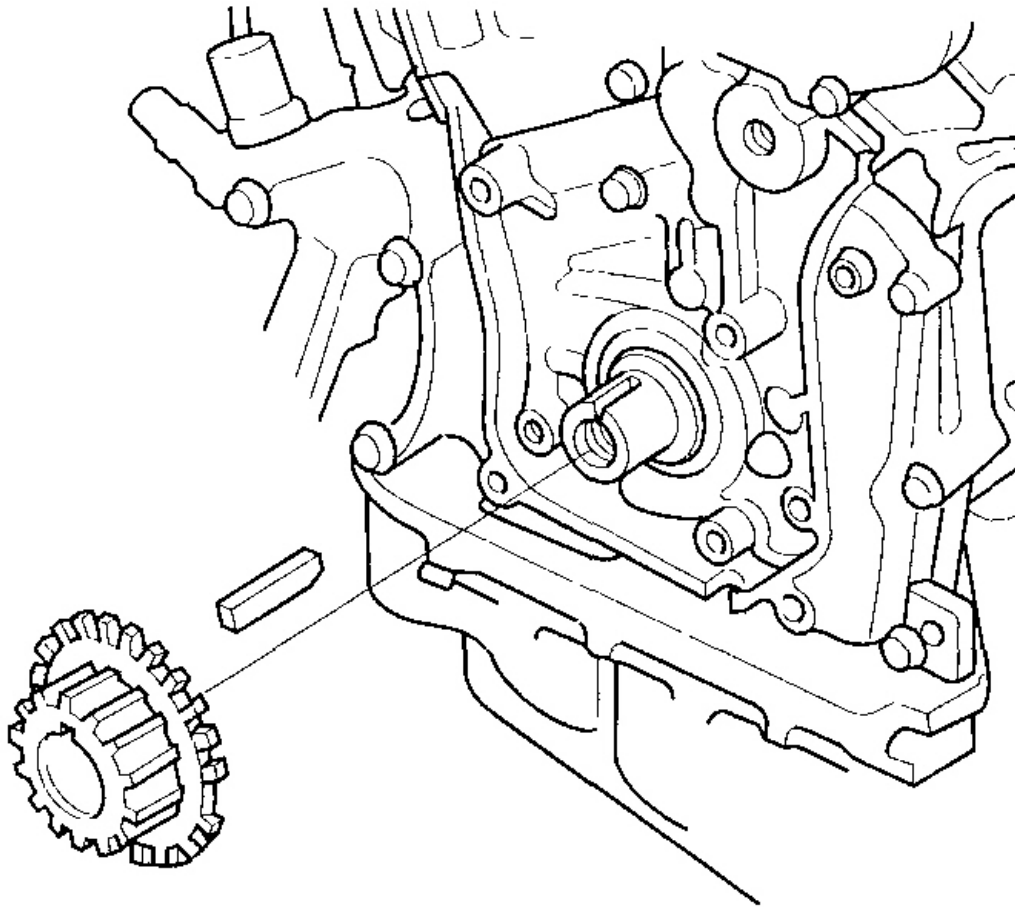
Fig. 70: Identifying Bolt (A), Timing Belt Adjuster (B) And Collar (C) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install in the reverse order of removal.
5. Install the timing belt (see **TIMING BELT REPLACEMENT**).

TIMING BELT DRIVE PULLEY REPLACEMENT

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the crankshaft position (CKP) sensor A/B (see **MAP SENSOR REPLACEMENT**).

3. Remove the timing belt drive pulley.



G03658892

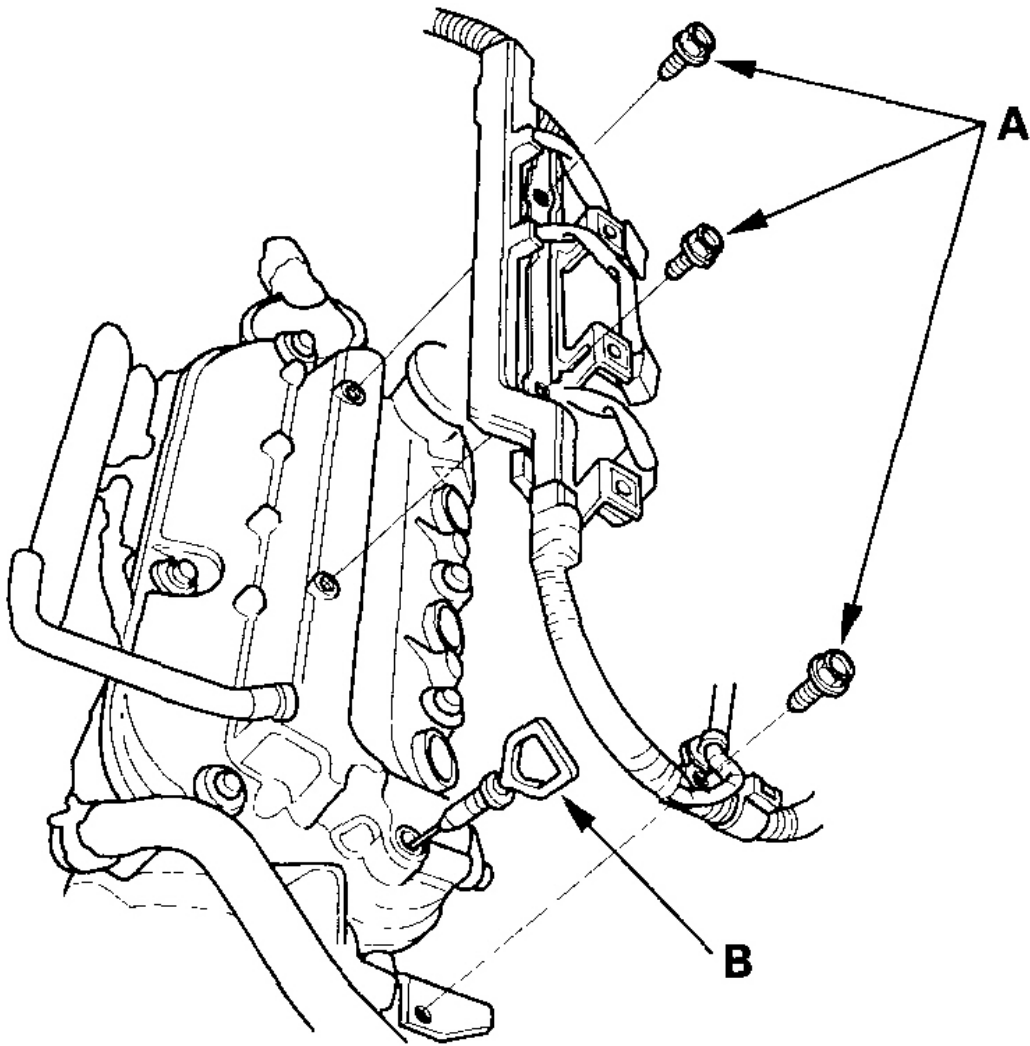
Fig. 71: Removing Timing Belt Drive Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the new timing belt drive pulley.
5. Install the CKP sensor A/B (see MAP SENSOR REPLACEMENT).
6. Install the timing belt (see TIMING BELT INSTALLATION).

CYLINDER HEAD COVER REMOVAL

1. Remove the intake manifold (see REMOVAL).
2. Remove the six ignition coils (see IGNITION COIL REMOVAL/INSTALLATION).

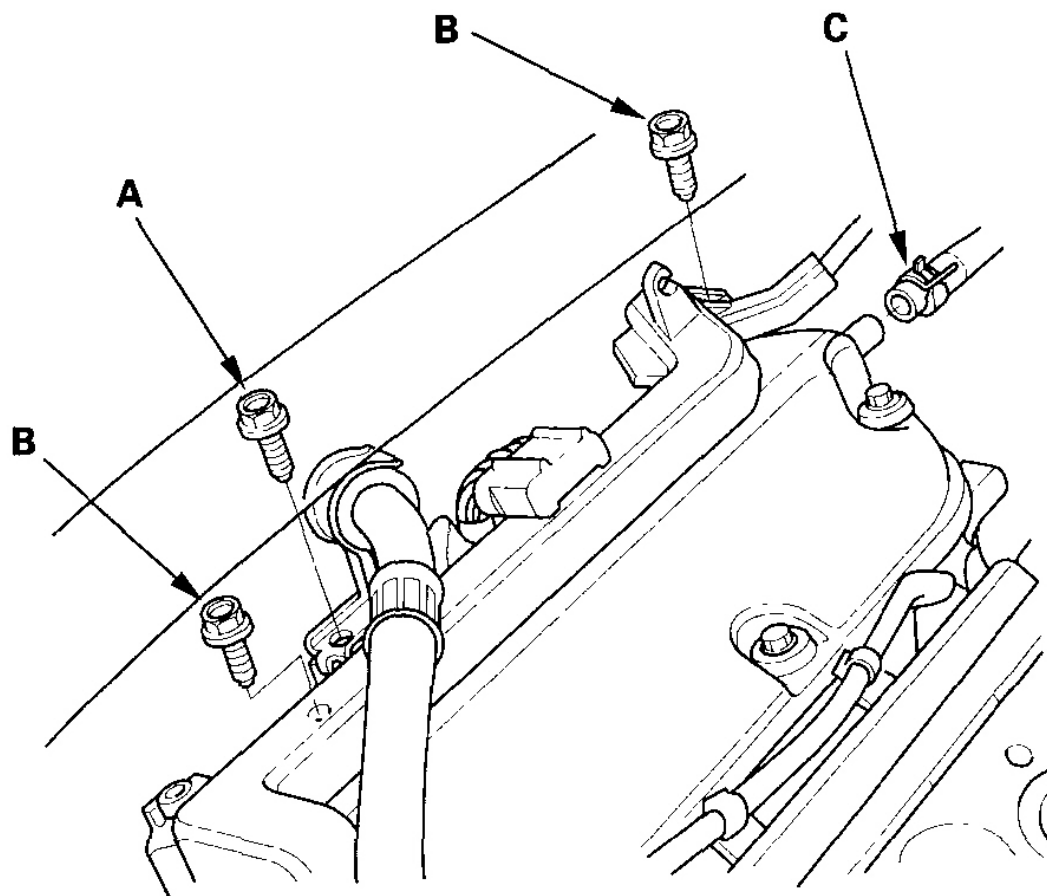
3. Remove the three bolts (A) securing the harness holder, and remove the dipstick (B).



G03658893

Fig. 72: Identifying Bolts (A) And Dipstick (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



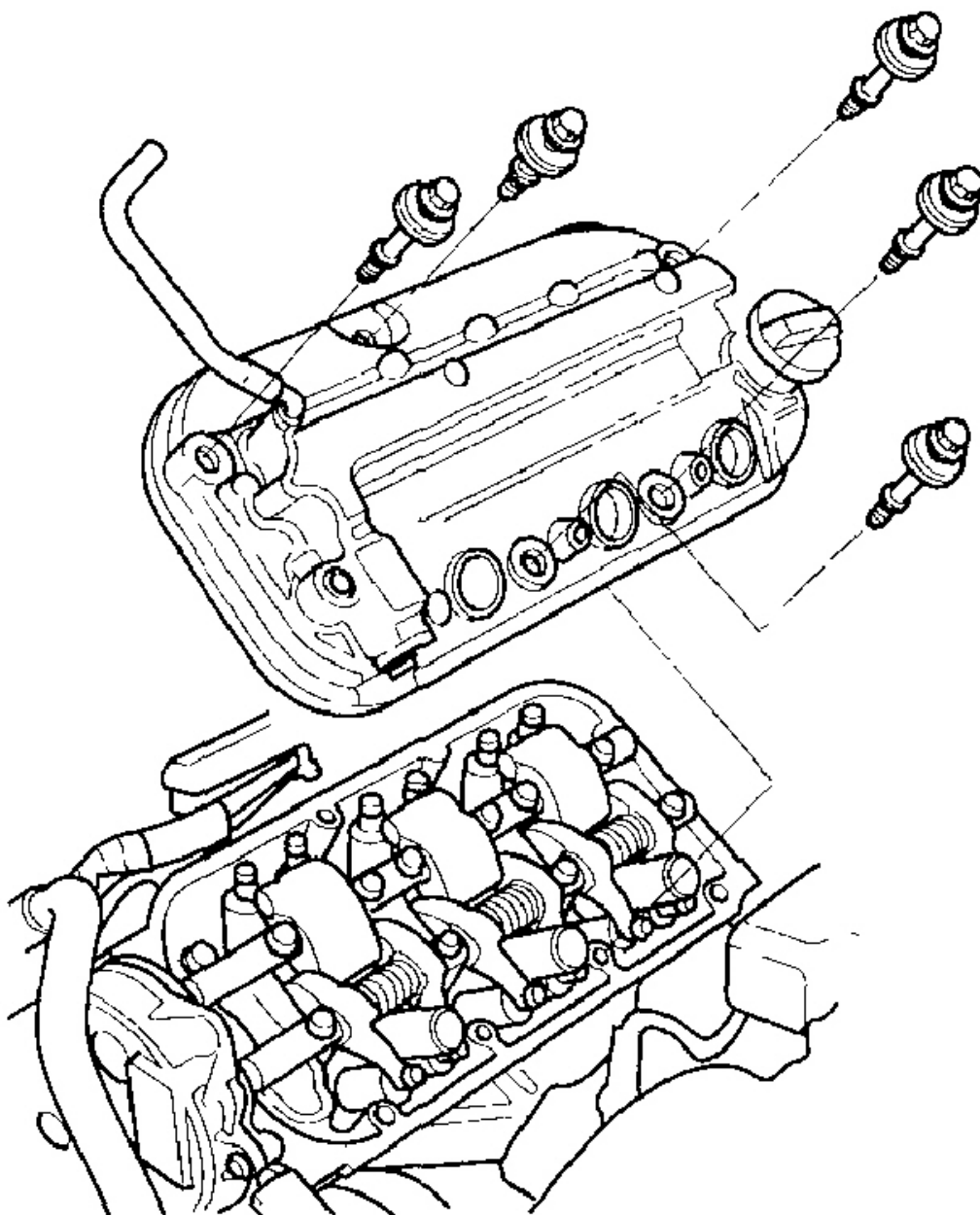
G03658894

Fig. 73: Identifying Power Steering Hose Bracket Bolt (A), Harness Holder Bolts (B) And Breather Hose (C)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

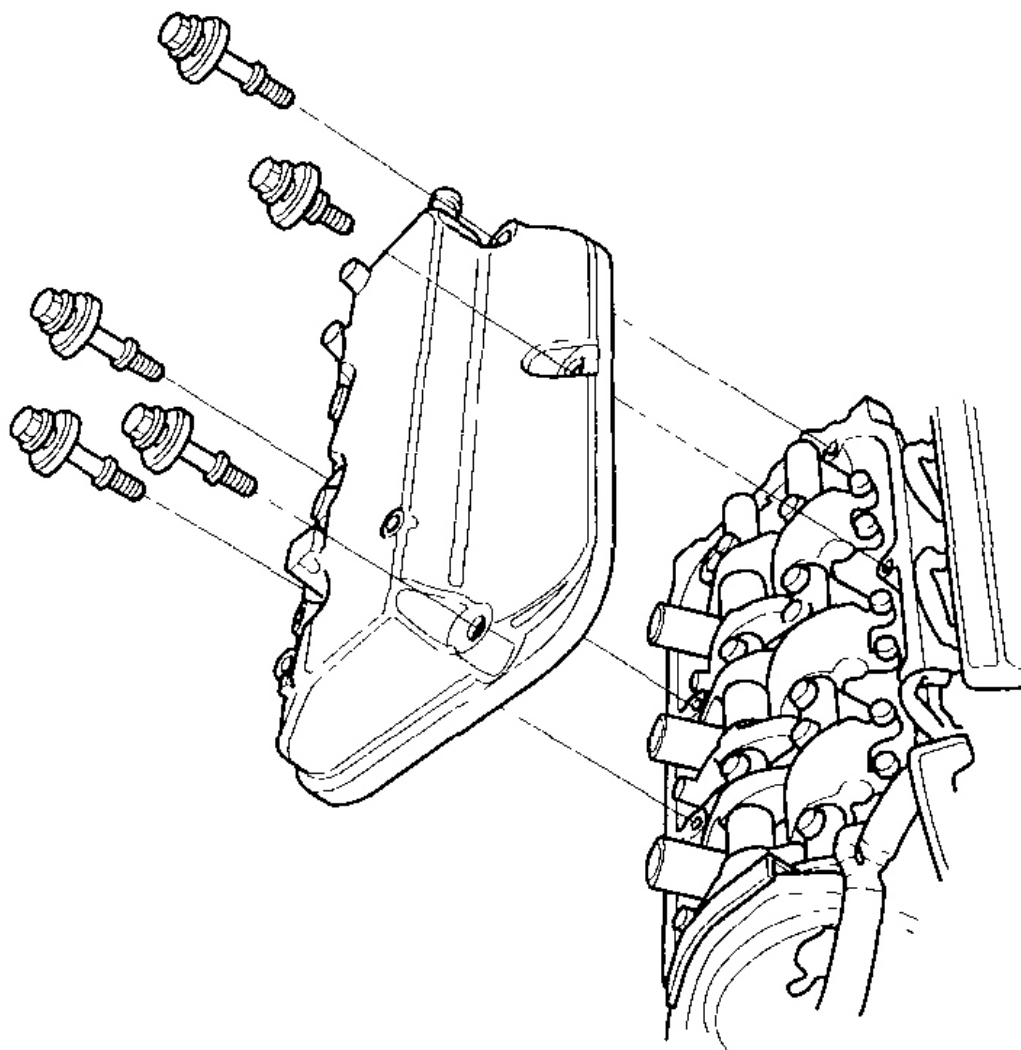
FRONT:



G03658895

Fig. 74: Removing Cylinder Head Cover - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:



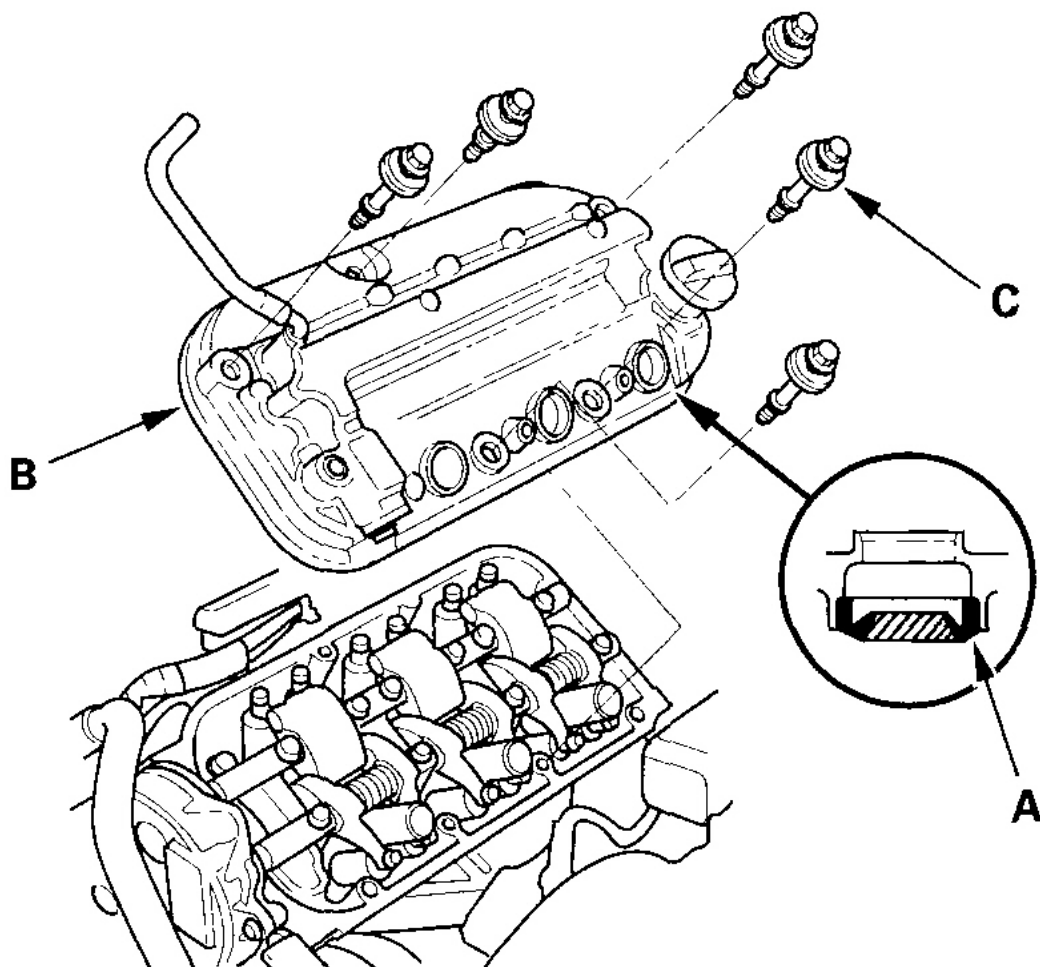
G03658896

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

CYLINDER HEAD COVER INSTALLATION

1. Clean the head cover contacting surfaces with a shop towel.
2. Set the spark plug seals (A) on the spark plug tubes, and install the cylinder head covers (B).

FRONT:



G03658897

Fig. 76: Identifying Spark Plug Seals (A) And Cylinder Head Covers (B) - Front
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:

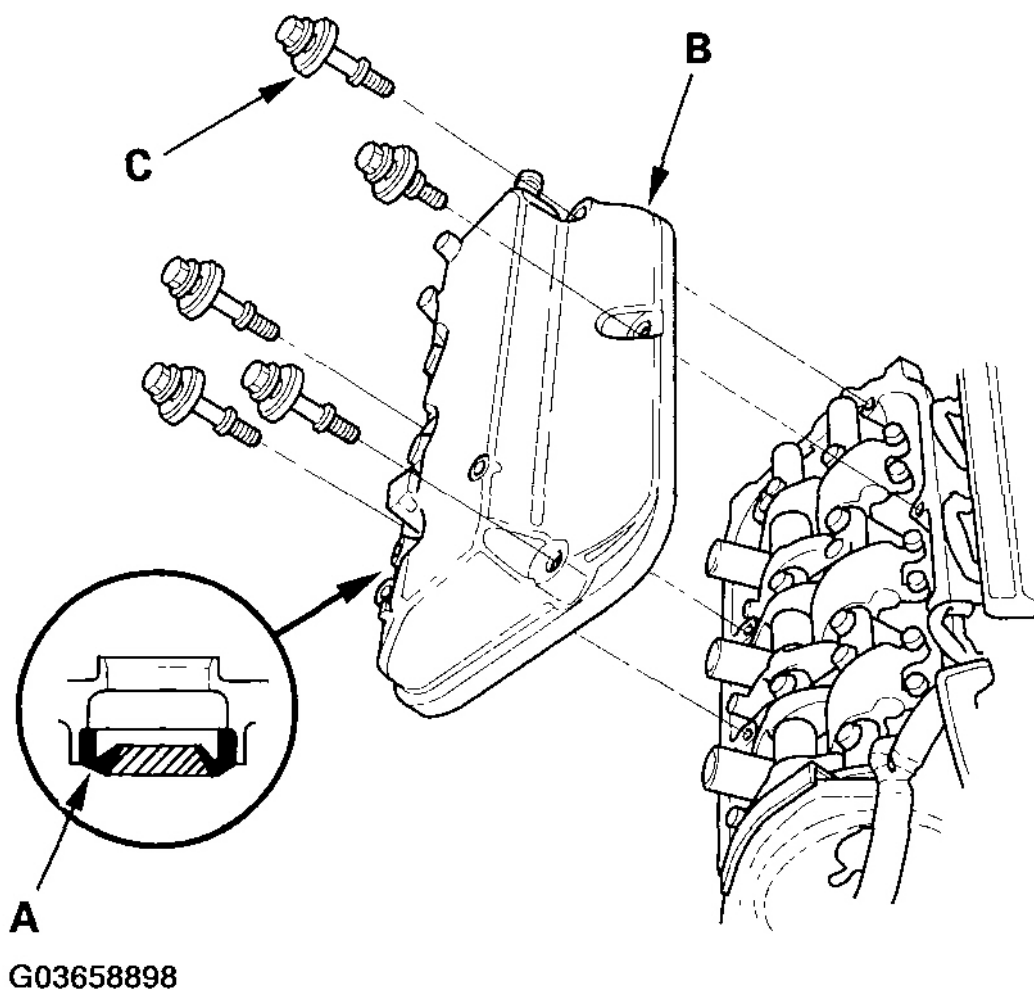
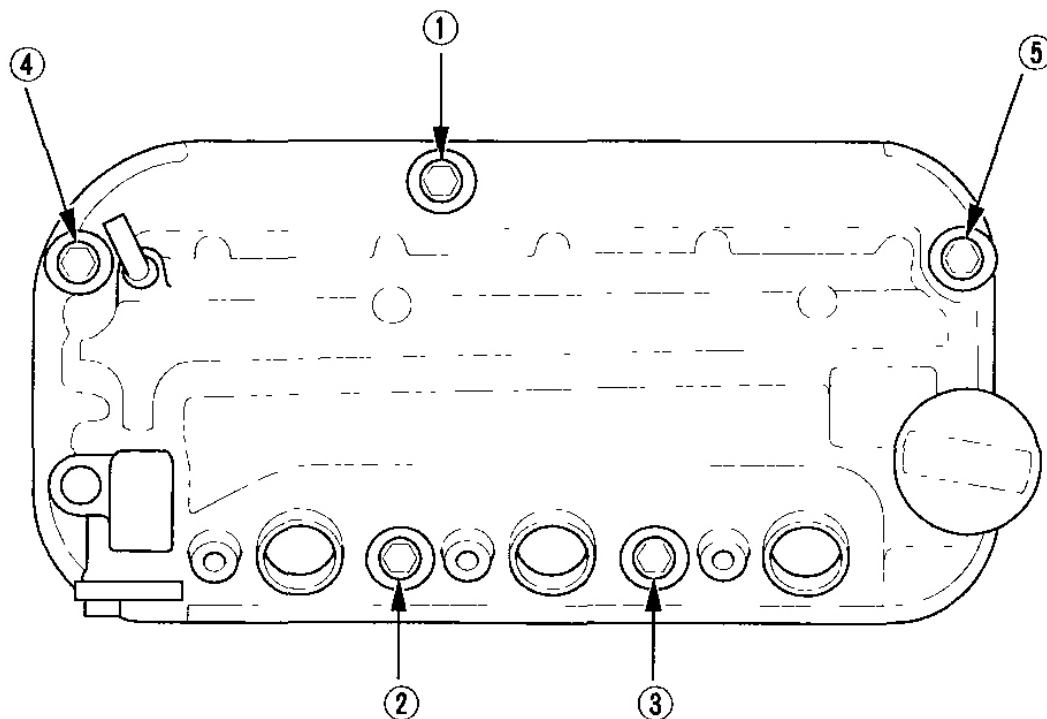


Fig. 77: Identifying Spark Plug Seals (A) And Cylinder Head Covers (B) - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

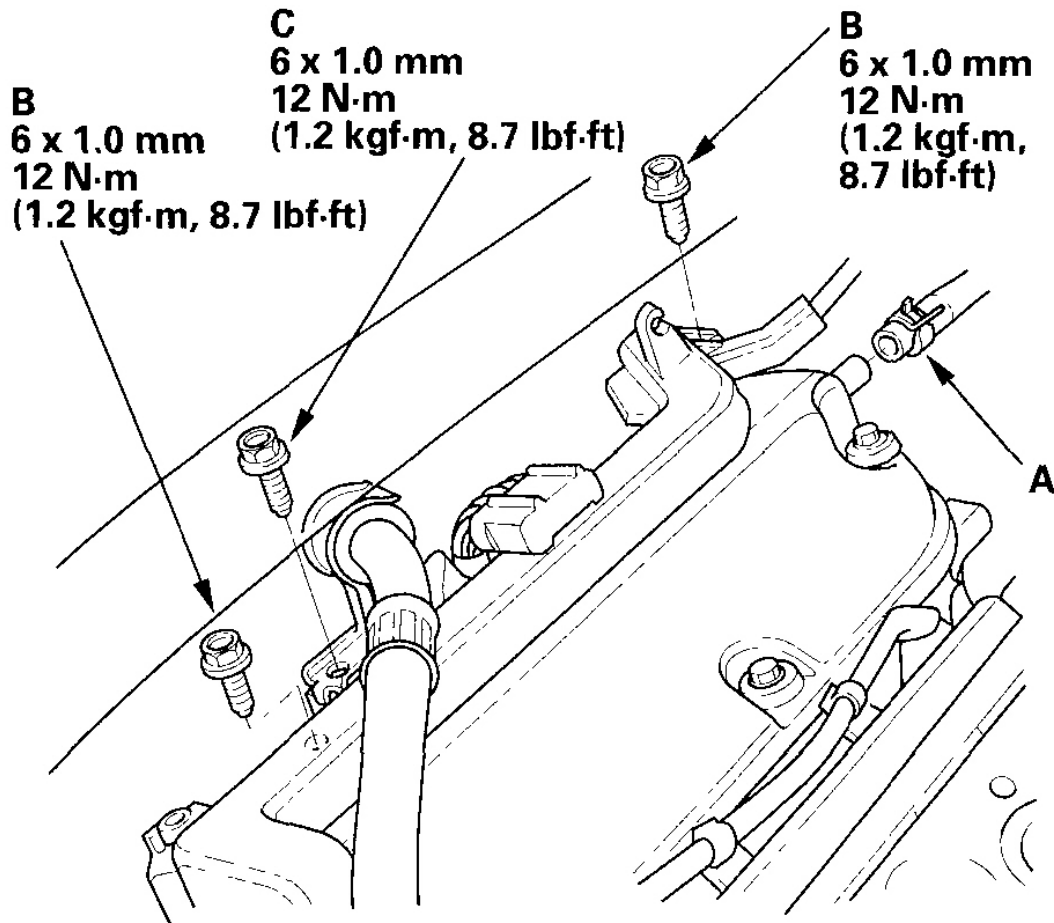
3. Visually check the spark plug seals for damage.
4. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
5. Tighten the bolts in two or three steps. In the final step tighten all of the bolts, in sequence, 12 N.m (1.2 kgf.m, 8.7 lbf.ft) (front cover shown).



G03658899

Fig. 78: Identifying Bolt Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

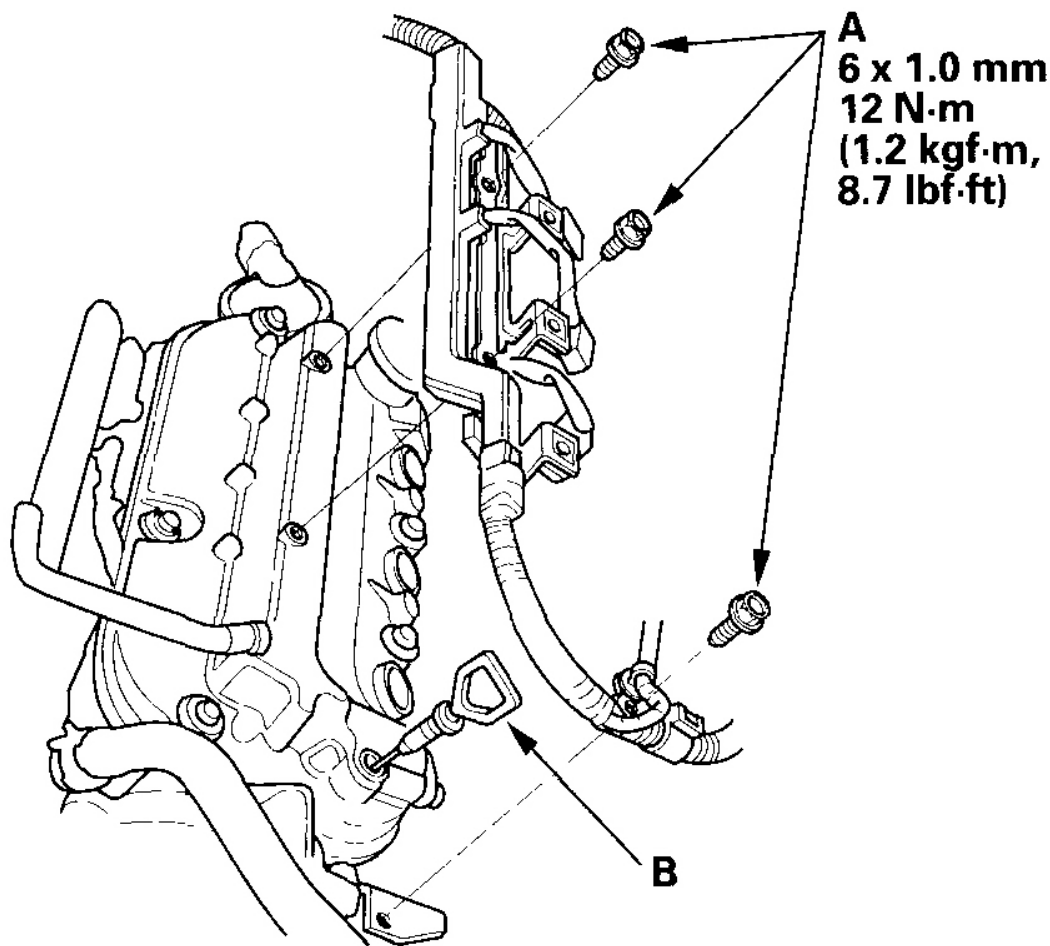
6. Install the breather hose (A).



G03658900

Fig. 79: Identifying Breather Hose (A) And Bolts (B, C) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658901

Fig. 80: Identifying Harness Holder Bolts (A) And Dipstick (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CYLINDER HEAD REMOVAL

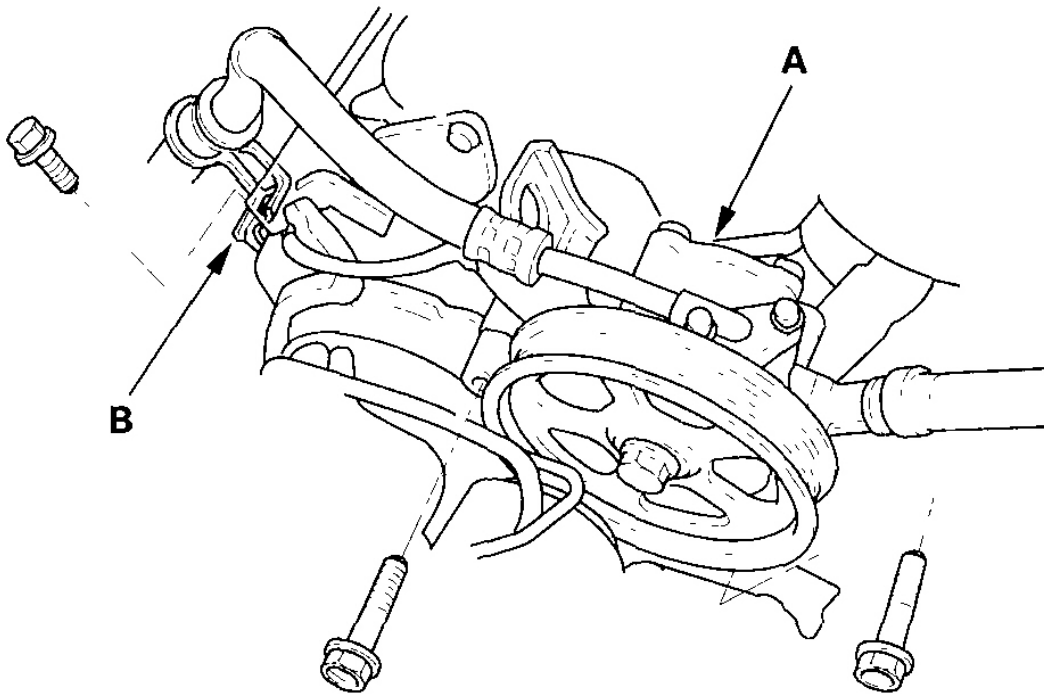
NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wires and terminals, 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. Make sure you have the anti-theft codes for the radio and the navigation system, then write down the audio presets. Make sure the ignition switch is OFF.
2. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
3. Disconnect the negative cable from the battery.
4. Drain the engine coolant (see **COOLANT CHECK**).
5. Remove the front warm up three way catalytic converter (front WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**) and rear warm up three way catalytic converter (rear WU-TWC) (see **REAR (BANK 1)**).
6. Remove the drive belt (see **DRIVE BELT INSPECTION**).
7. Remove the timing belt (see **TIMING BELT REMOVAL**).
8. Remove the power steering (P/S) pump (A), and P/S hose bracket (B).

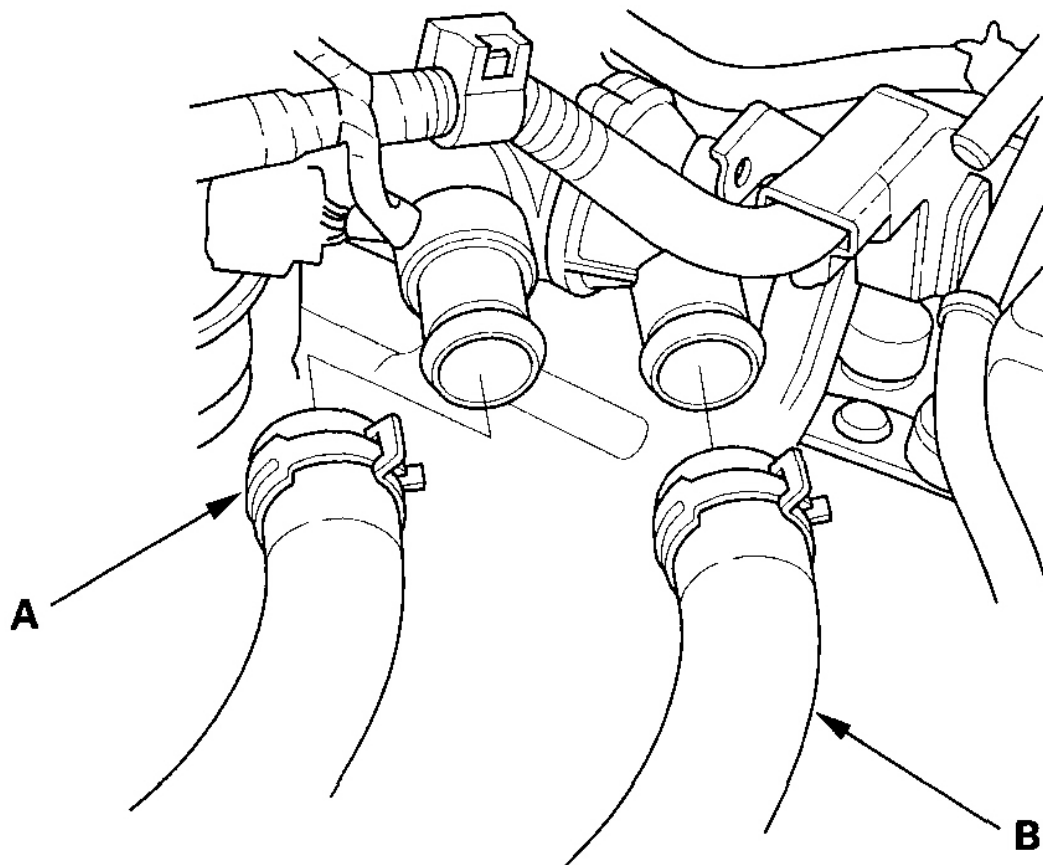


G03658902

Fig. 81: Identifying P/S Pump (A) And P/S Hose Bracket (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Remove the alternator (see **ALTERNATOR REMOVAL AND INSTALLATION**).

10. Remove the intake manifold (see **REMOVAL**).
11. Remove the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
12. Remove the engine wire harness connectors and wire harness clamps from the cylinder head.
 - Six injector connectors
 - Engine coolant temperature (ECT) sensor connector
 - Camshaft position (CMP) sensor connector
 - Crankshaft position (CKP) sensor A/B connector
 - Exhaust gas recirculation (EGR) valve connector
 - Rocker arm oil control solenoid (VTEC solenoid valve) connector
 - Rocker arm oil pressure switch (VTEC oil pressure switch) connector
 - Oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors
13. Remove the upper radiator hose (A) and lower radiator hose (B).

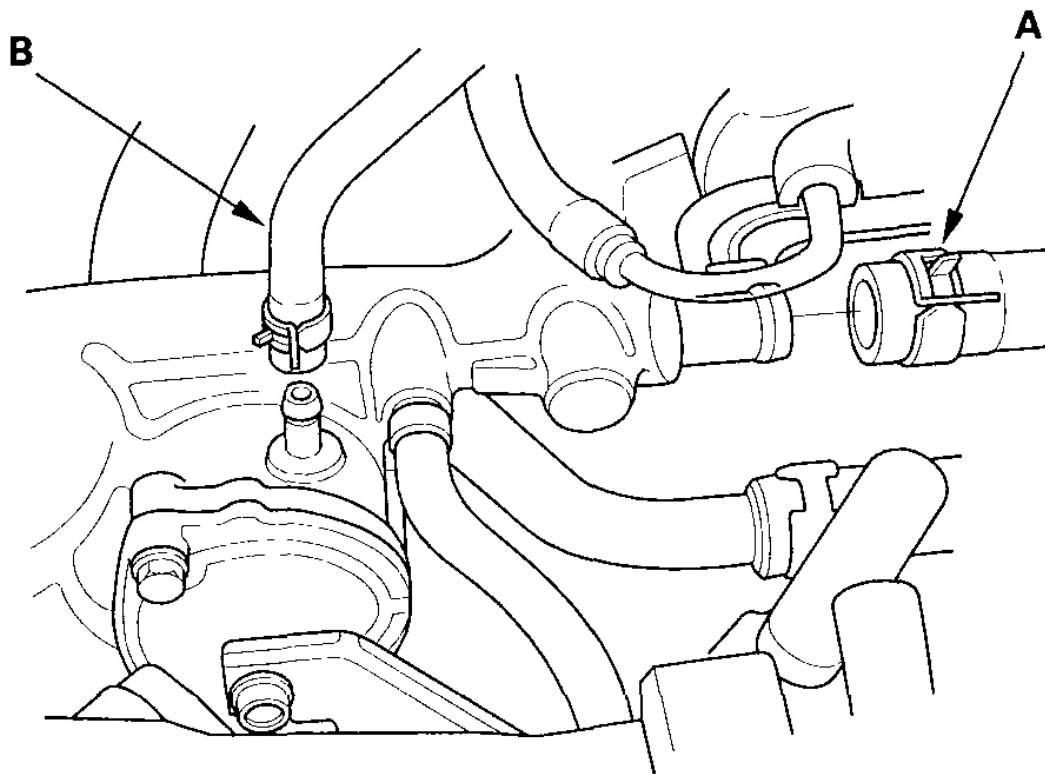


G03658903

Fig. 82: Removing Upper Radiator Hose (A) And Lower Radiator Hose (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the heater hose (A) and water bypass hose(s) (B).

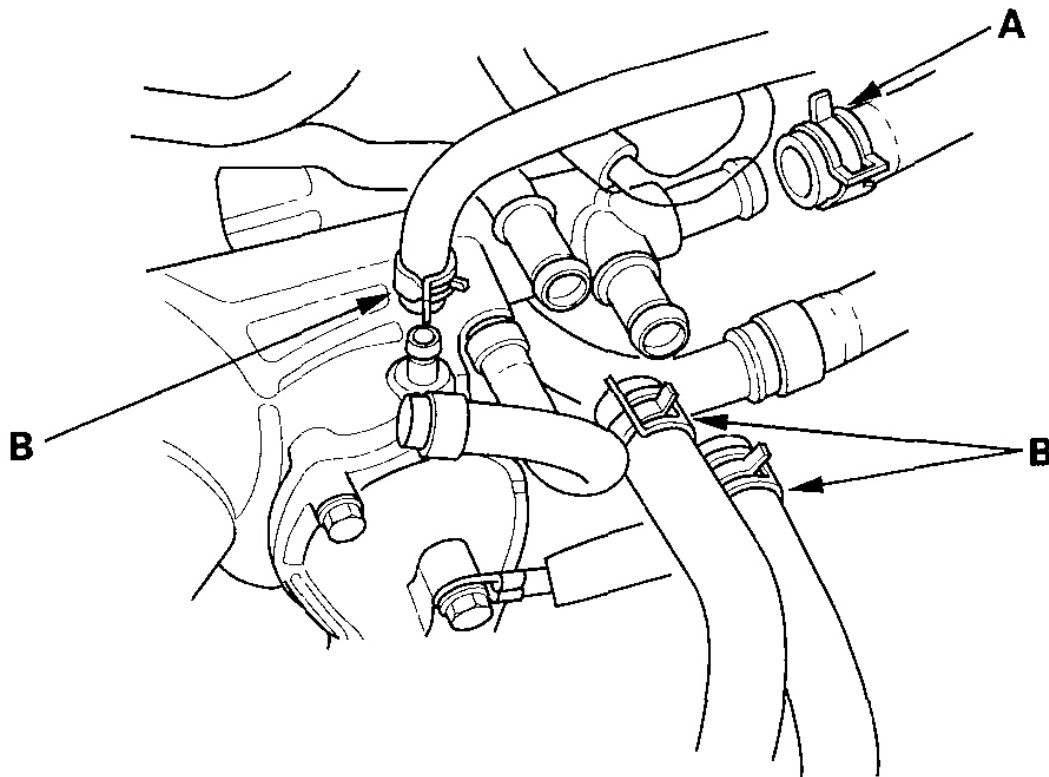
M/T model:



G03658904

Fig. 83: Removing Heater Hose (A) And Water Bypass Hose (B) - M/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

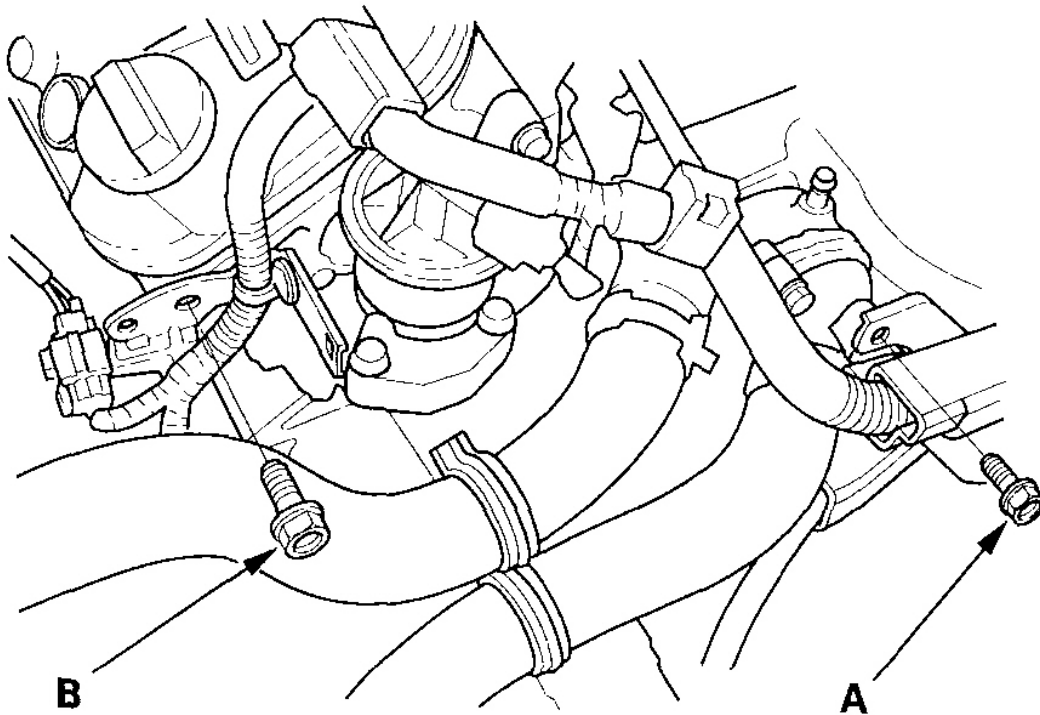
A/T model:



G03658905

Fig. 84: Removing Heater Hose (A) And Water Bypass Hoses (B) - A/T Model
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

15. Remove the bolt (A) securing the harness holder.

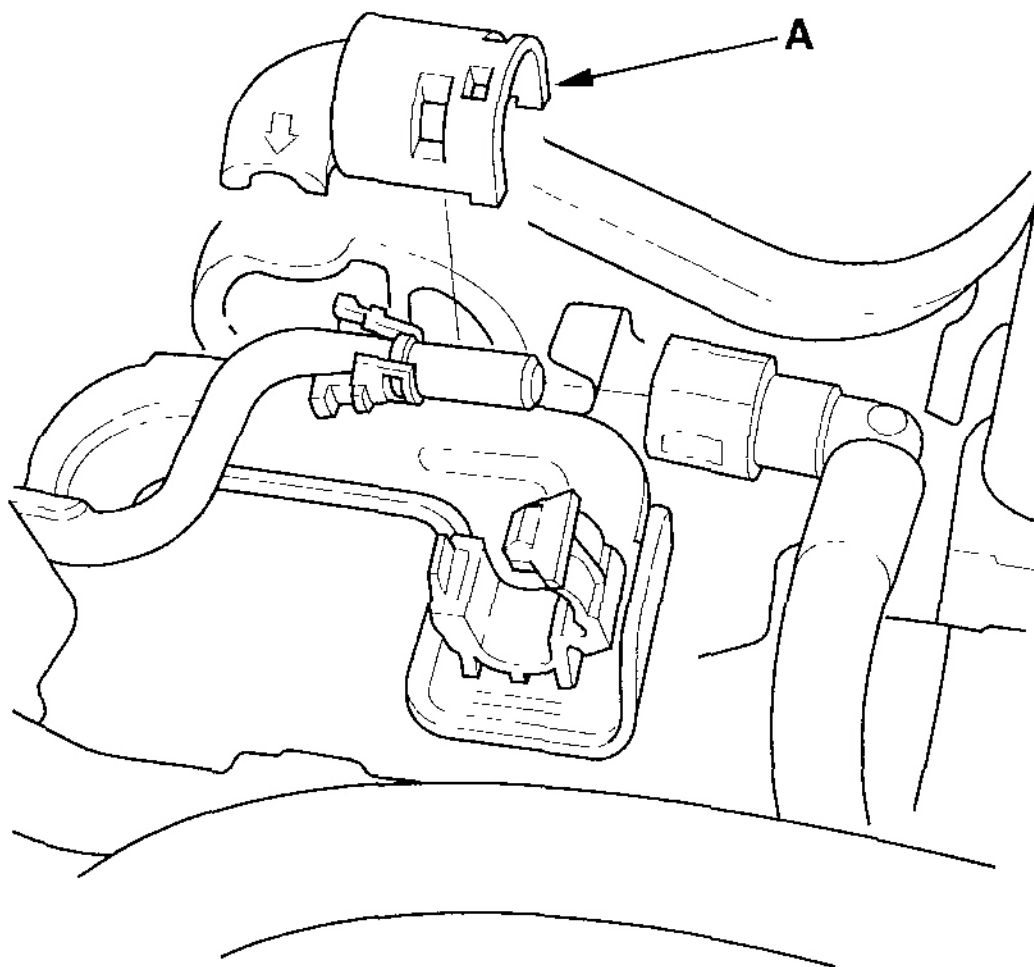


G03658906

Fig. 85: Identifying Harness Holder Bolt (A) And Harness Bracket Bolt (B)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

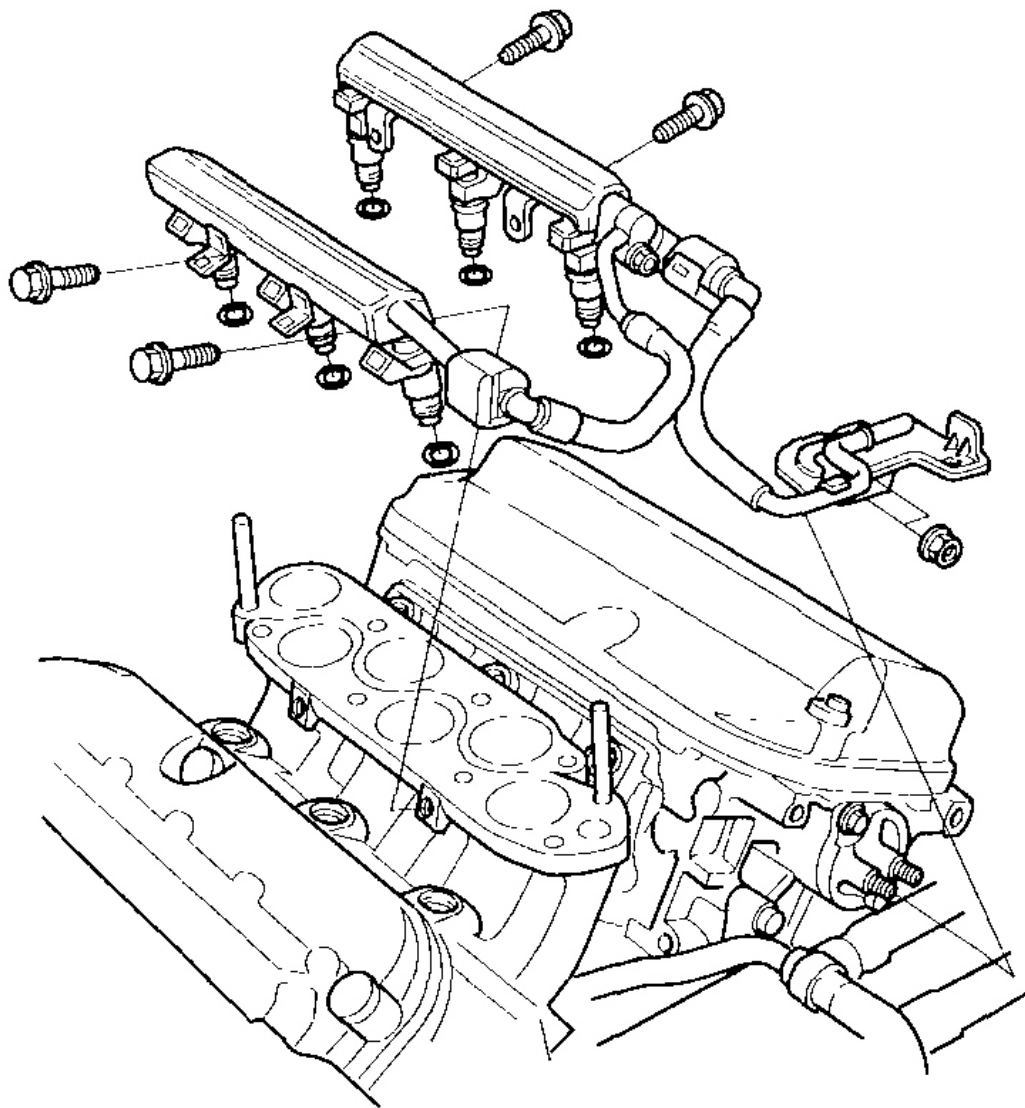
16. Remove the bolt (B) securing the harness bracket.
17. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING REMOVAL**).



G03658907

Fig. 86: Removing Quick-Connect Fitting Cover (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

18. Remove the fuel rails.

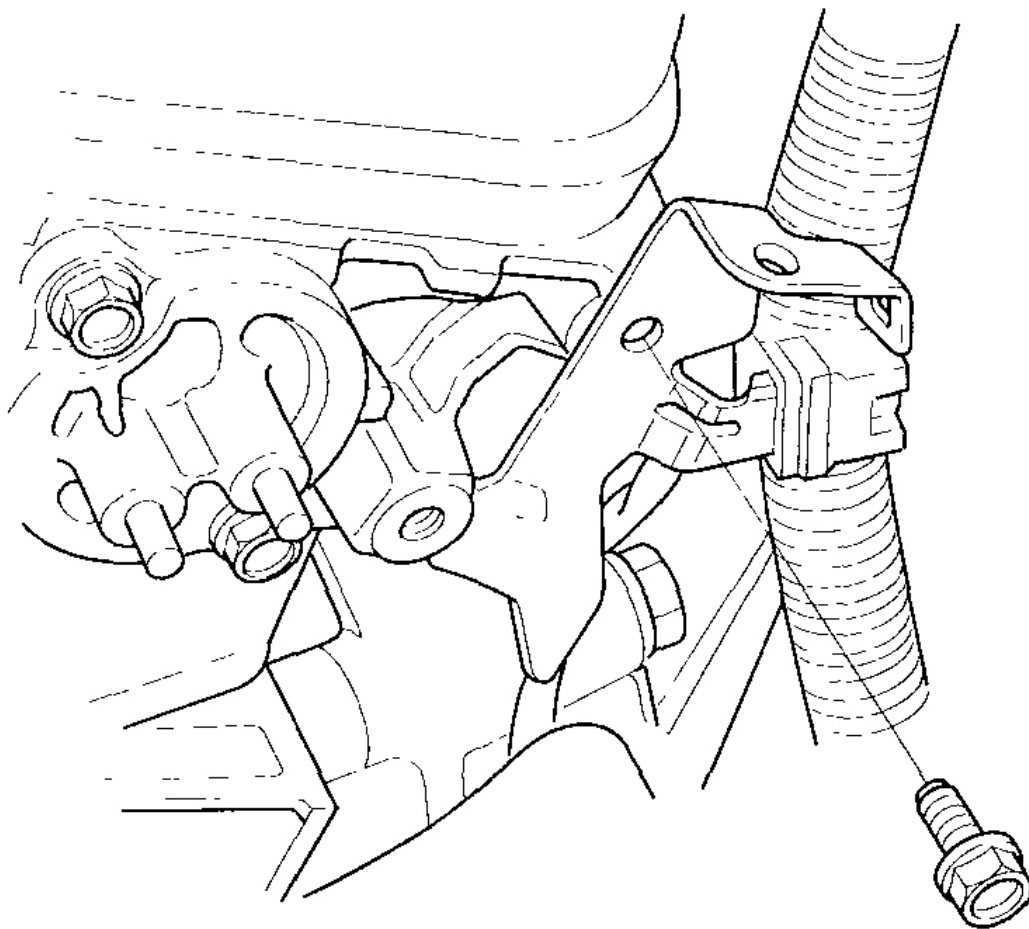


G03658908

Fig. 87: Removing Fuel Rails

Courtesy of AMERICAN HONDA MOTOR CO., INC.

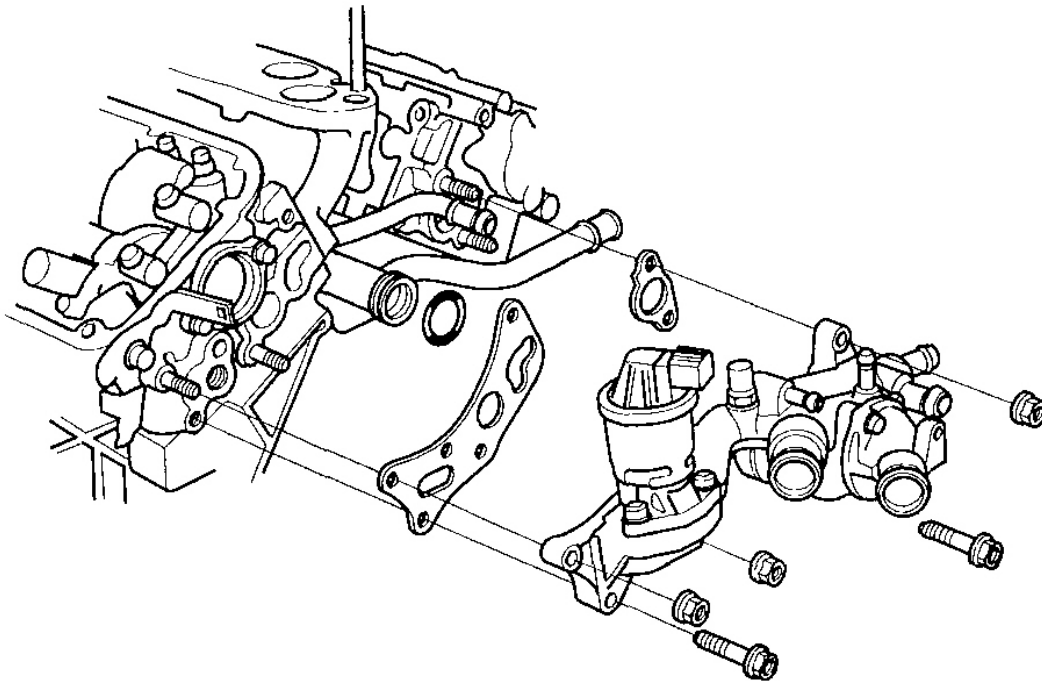
19. Remove the bolt securing the harness bracket.



G03658909

Fig. 88: Removing Harness Bracket Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

20. Remove the water passage.

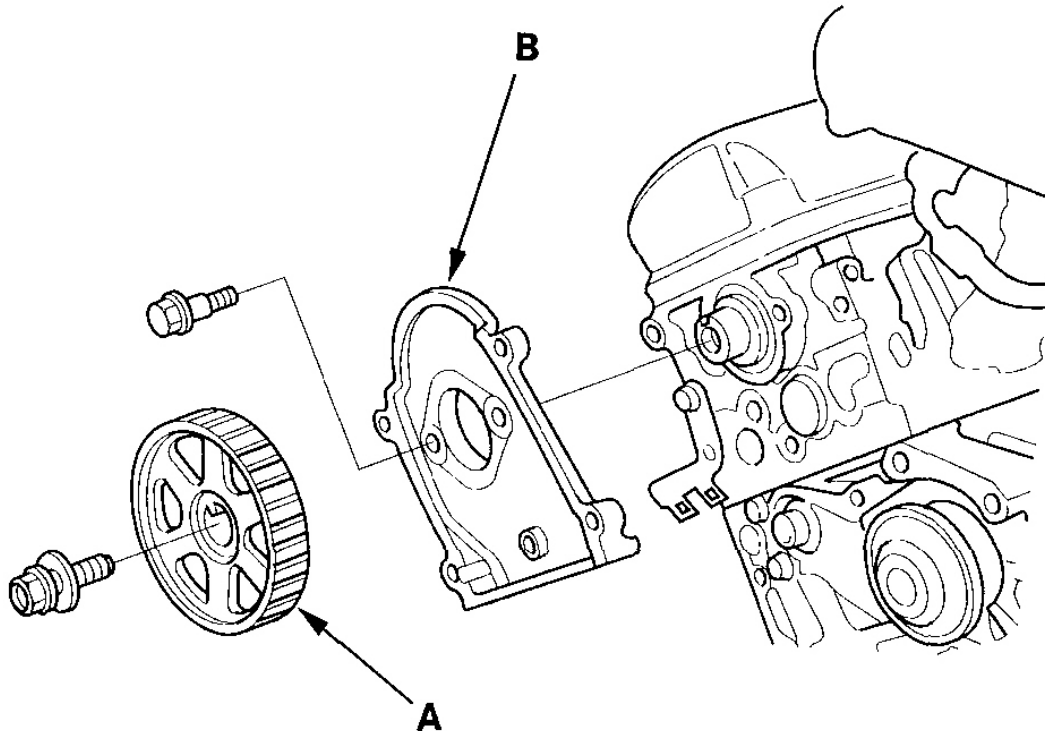


G03658910

Fig. 89: Removing Water Passage

Courtesy of AMERICAN HONDA MOTOR CO., INC.

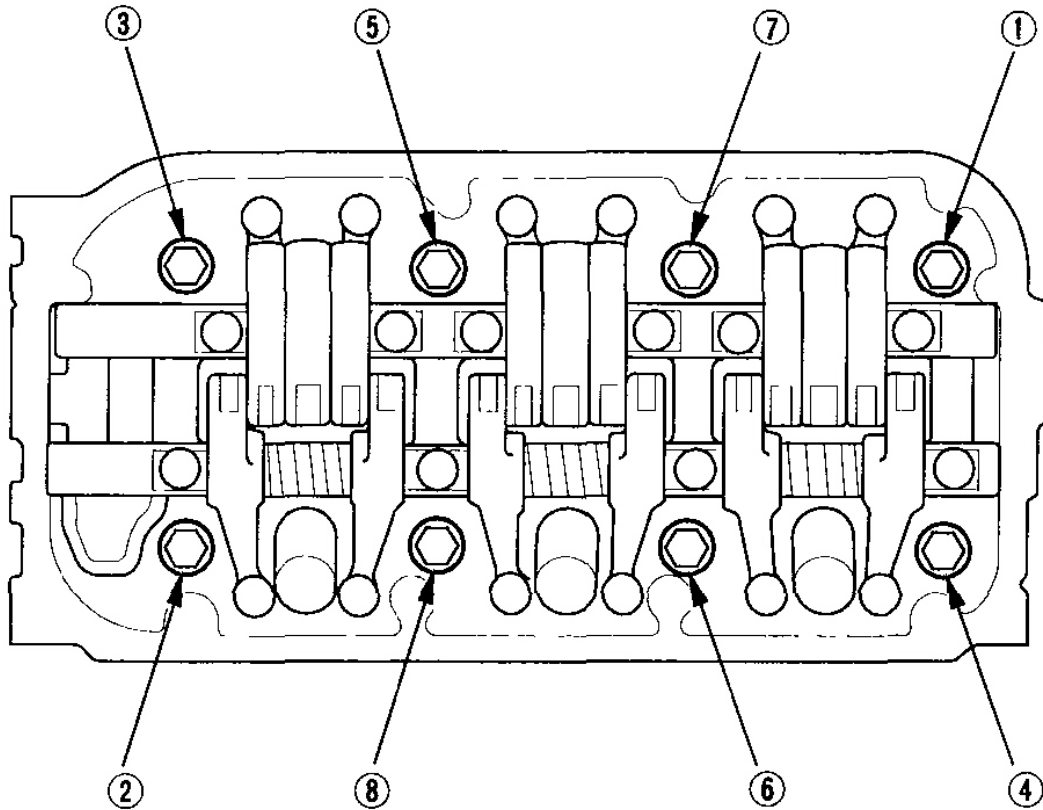
21. Remove the front and rear camshaft pulleys (A) and front and rear back covers (B).



G03658911

Fig. 90: Removing Camshaft Pulleys (A) And Back Covers (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

22. Remove the cylinder head covers (see **CYLINDER HEAD COVER REMOVAL**).
23. 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.



G03658912

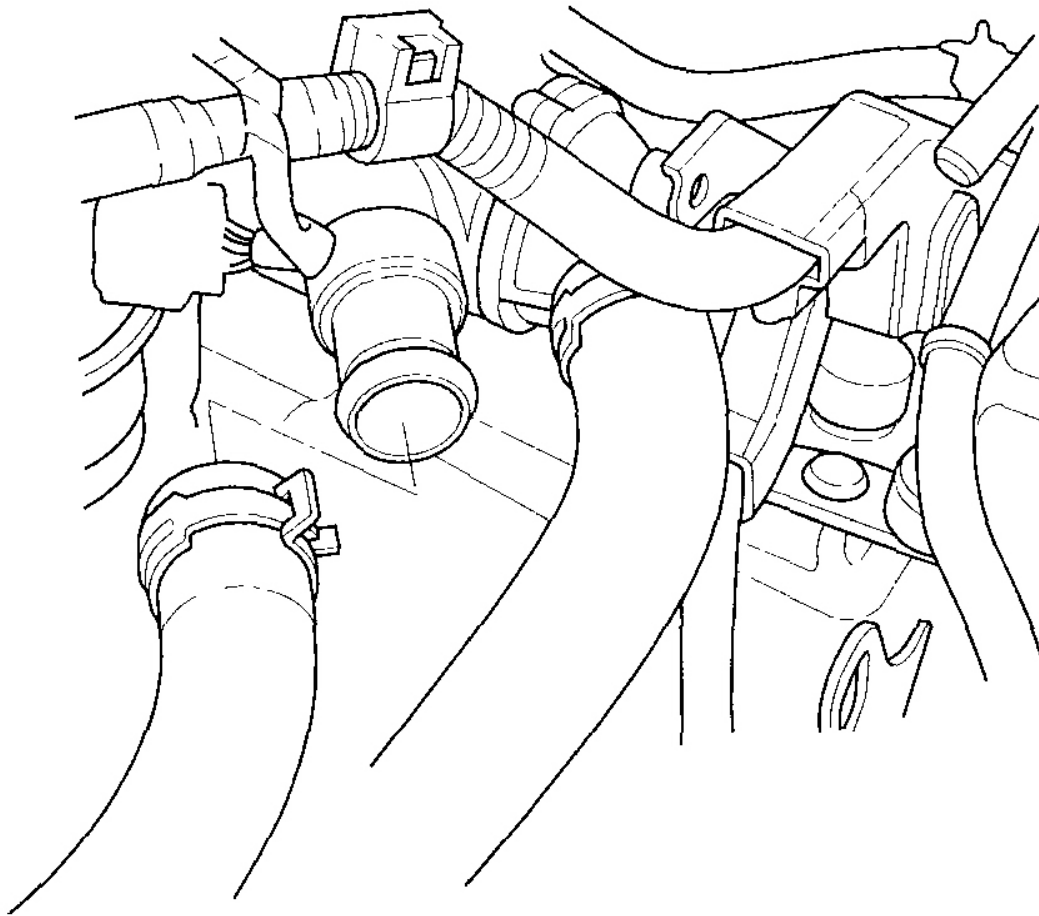
Fig. 91: Identifying Cylinder Head Bolts Removal Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Remove the cylinder heads.

CAMSHAFT REPLACEMENT

FRONT

1. Make sure you have the anti-theft codes for the radio and the navigation system, then write down the audio presets. Make sure the ignition switch is OFF.
2. Remove the left side engine compartment cover (see step 3 on **ENGINE REMOVAL**).
3. Disconnect the negative cable from the battery first, then disconnect the positive cable.
4. Remove the battery.
5. Drain the engine coolant (see **COOLANT CHECK**).
6. Remove the upper radiator hose.

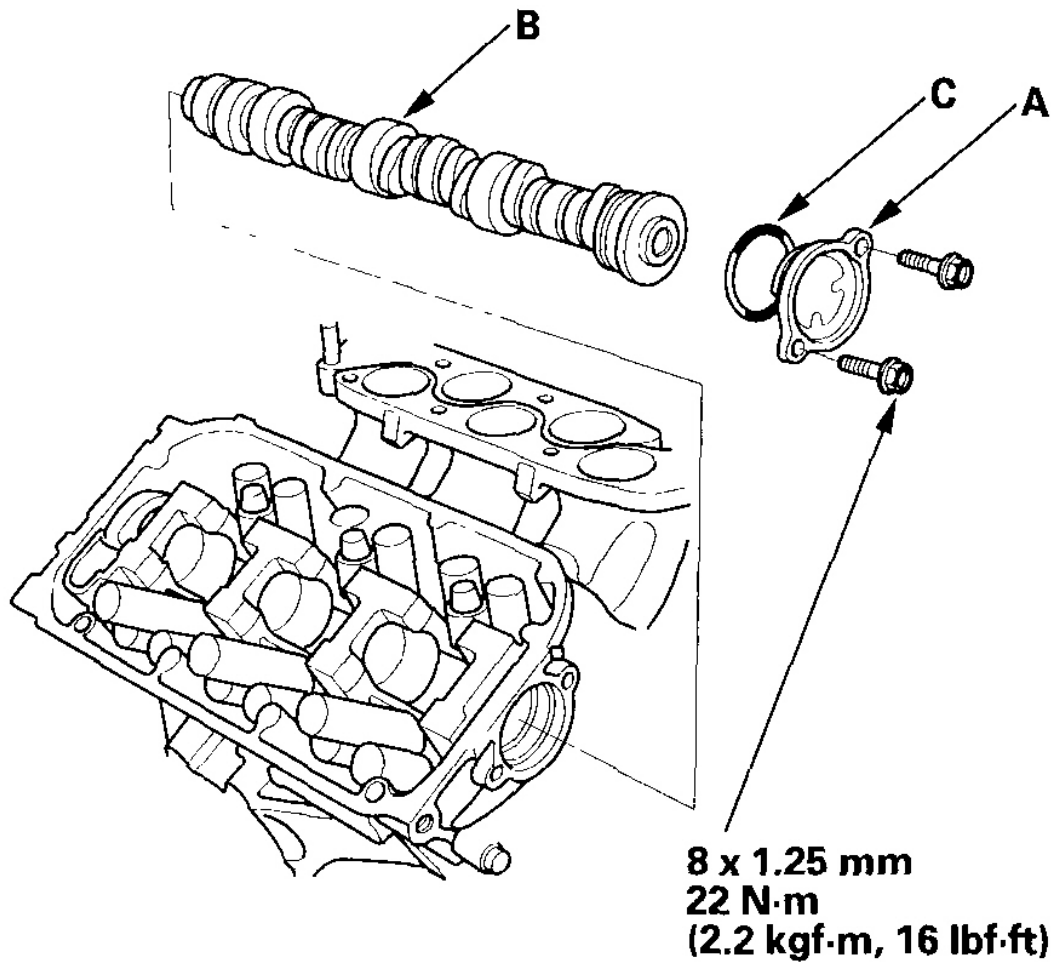


G03658913

Fig. 92: Removing Upper Radiator Hose

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658914

Fig. 93: Identifying Thrust Cover (A), Front Camshaft (B) And O-Ring (C) With Torque Specifications

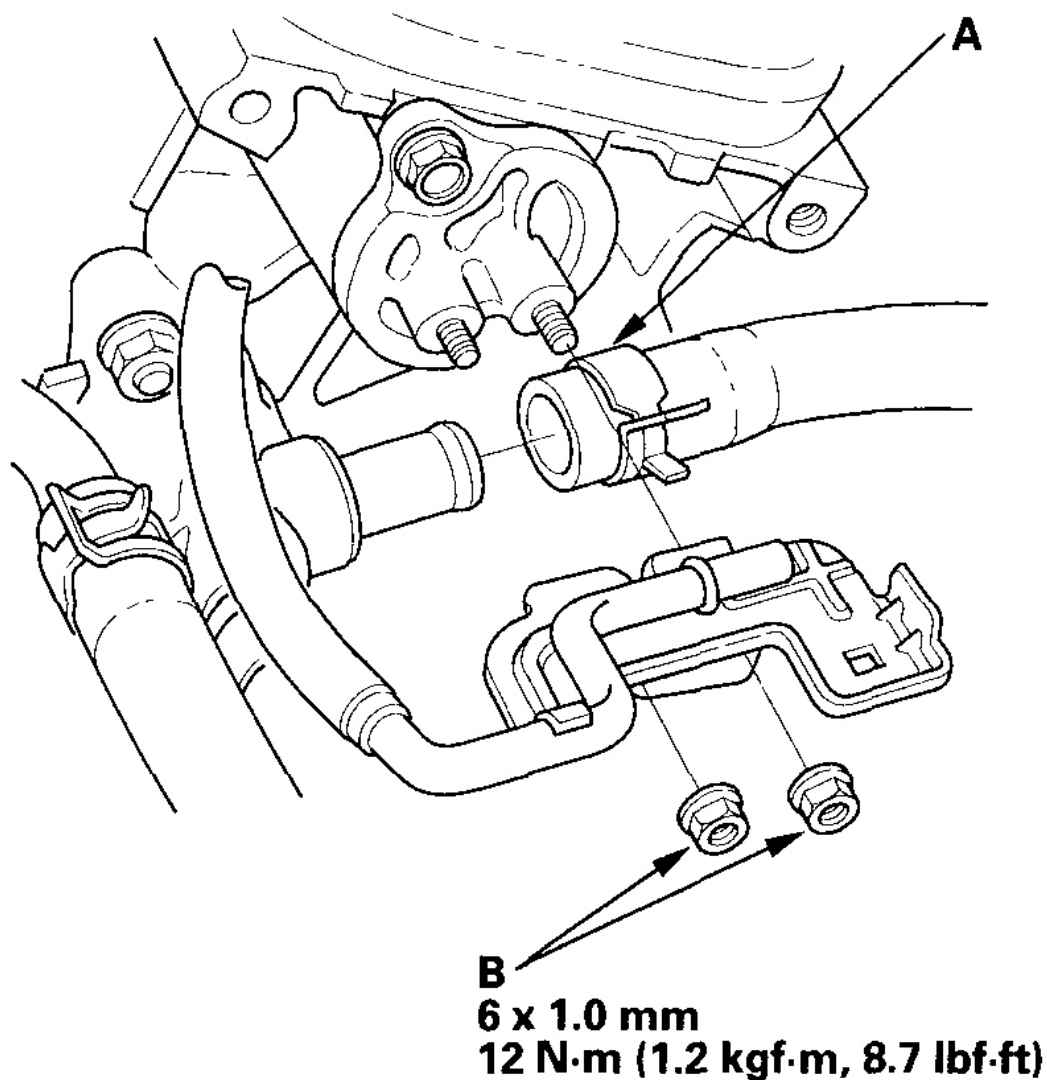
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Install the front camshaft in the reverse order of removal. Always use a new O-ring (C). Apply new engine oil to the journals and cam lobes.
13. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 11).
14. Install the rocker arm assembly, then tighten the mounting bolts (see step 8).
15. Install the timing belt (see **TIMING BELT INSTALLATION**).
16. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
17. Install the battery. Clean the battery posts and cable terminals with sandpaper, then assemble them and apply grease to prevent corrosion.

18. Fill the radiator with engine coolant and bleed the air out (see step 8 on **COOLANT CHECK**).
19. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).
20. Enter the anti-theft codes for the radio and the navigation system, then enter the audio presets.
21. Set the clock.

REAR

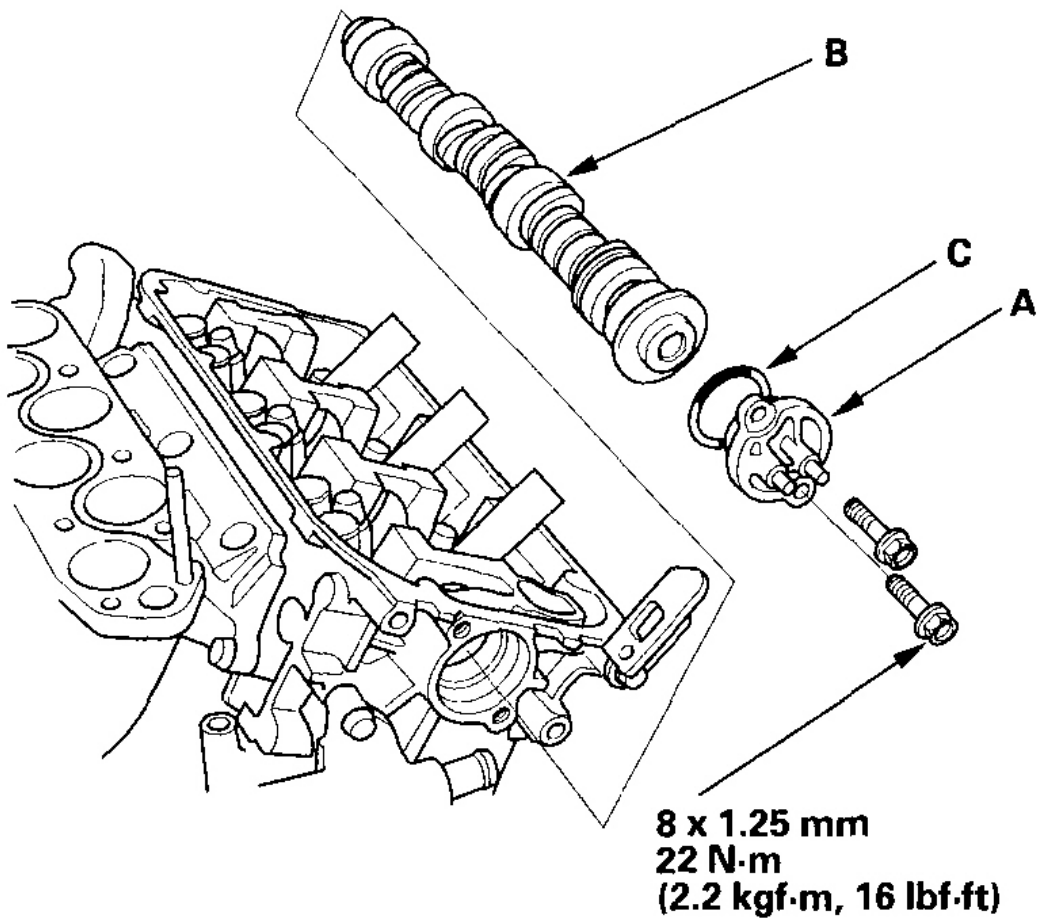
1. Make sure you have the anti-theft codes for the radio and the navigation system, then write down the audio presets. Make sure the ignition switch is OFF.
2. Relieve fuel pressure (see **FUEL PRESSURE RELIEVING**).
3. Disconnect the negative cable from the battery.
4. Remove the under-hood fuse/relay box.
5. Drain the engine coolant (see **COOLANT CHECK**).
6. Remove the heater hose (A), and two nuts (B) securing the fuel line.



G03658915

Fig. 94: Removing Heater Hose (A) And Nuts (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the timing belt (see **TIMING BELT REMOVAL**).
8. Remove the rocker arm assembly (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
9. Remove the rear camshaft pulley.
10. Remove the thrust cover (A), then remove the rear camshaft (B).



G03658916

Fig. 95: Identifying Thrust Cover (A), Rear Camshaft (B) And O-Ring (C)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

11. Install the rear camshaft in the reverse order of removal. Always use a new O-ring (C). Apply new engine oil to the journals and cam lobes.
12. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the rear camshaft pulley (see step 11).
13. Install the rocker arm assembly, then tighten the mounting bolts (see step 8).
14. Install the timing belt (see **TIMING BELT INSTALLATION**).
15. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
16. Install the under-hood fuse/relay box.
17. Connect the negative cable to the battery.
18. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so the fuel pump runs

for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.

19. Fill the radiator with engine coolant and bleed the air out (see step 8 on **COOLANT CHECK**).
20. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).
21. Enter the anti-theft codes for the radio and the navigation system, then enter the audio presets.
22. Set the clock.

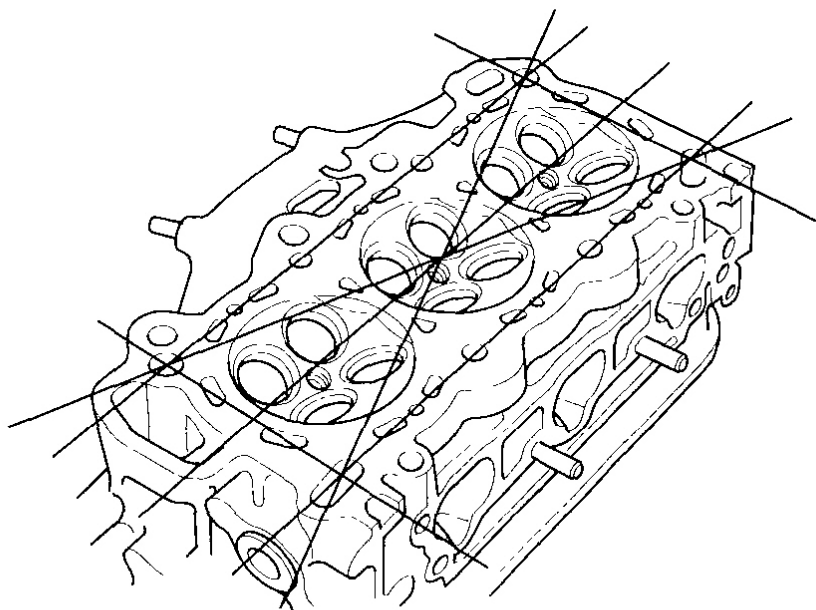
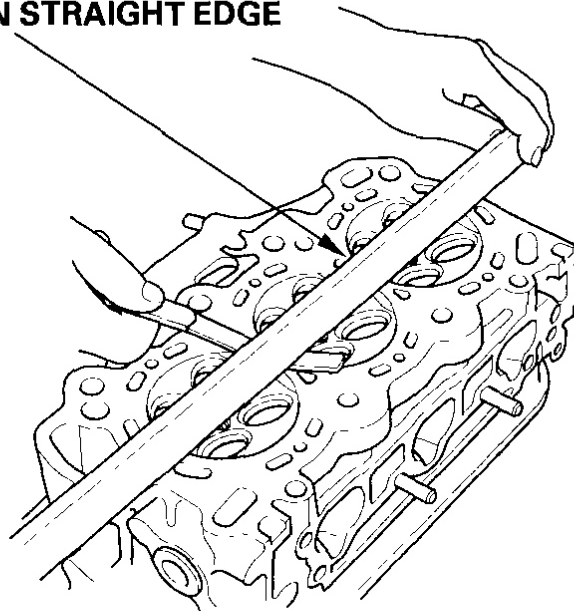
CYLINDER HEAD INSPECTION FOR WARPAGE

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

Cylinder Head Height Standard (New):

120.95-121.05 mm (4.762-4.766 in.)

PRECISION STRAIGHT EDGE

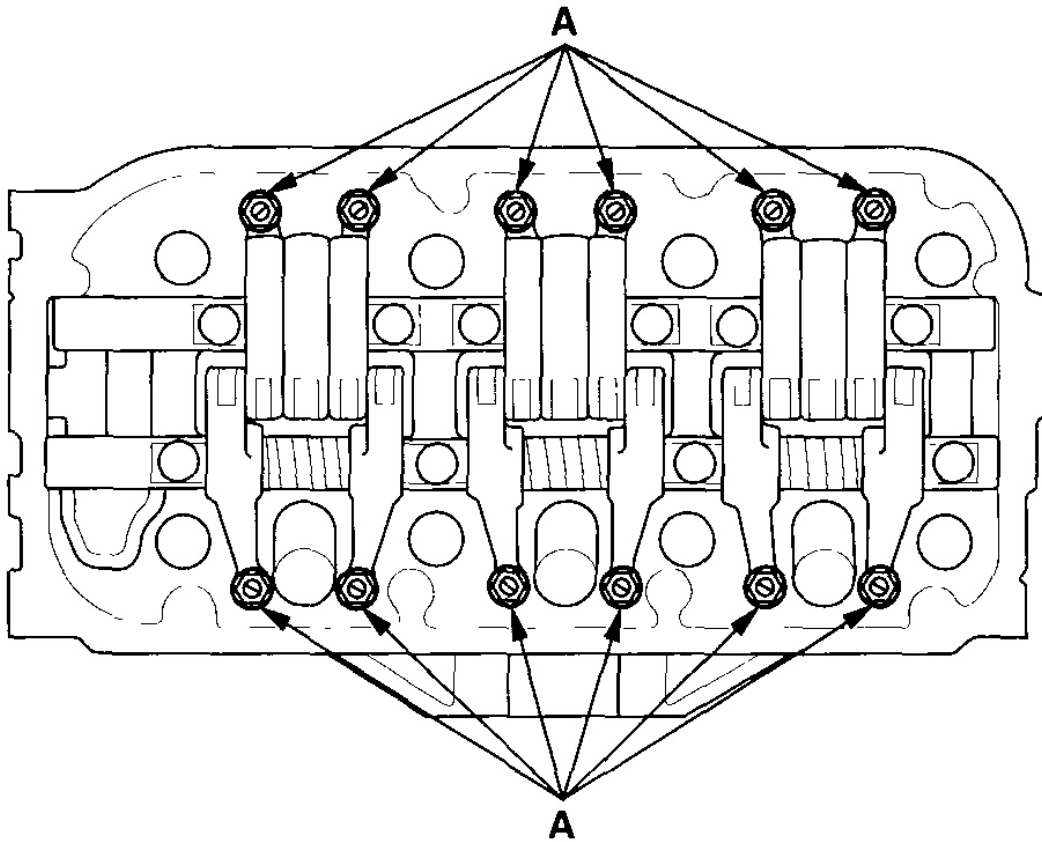


G03658917

Fig. 96: Measuring Cylinder Head For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM ASSEMBLY REMOVAL

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

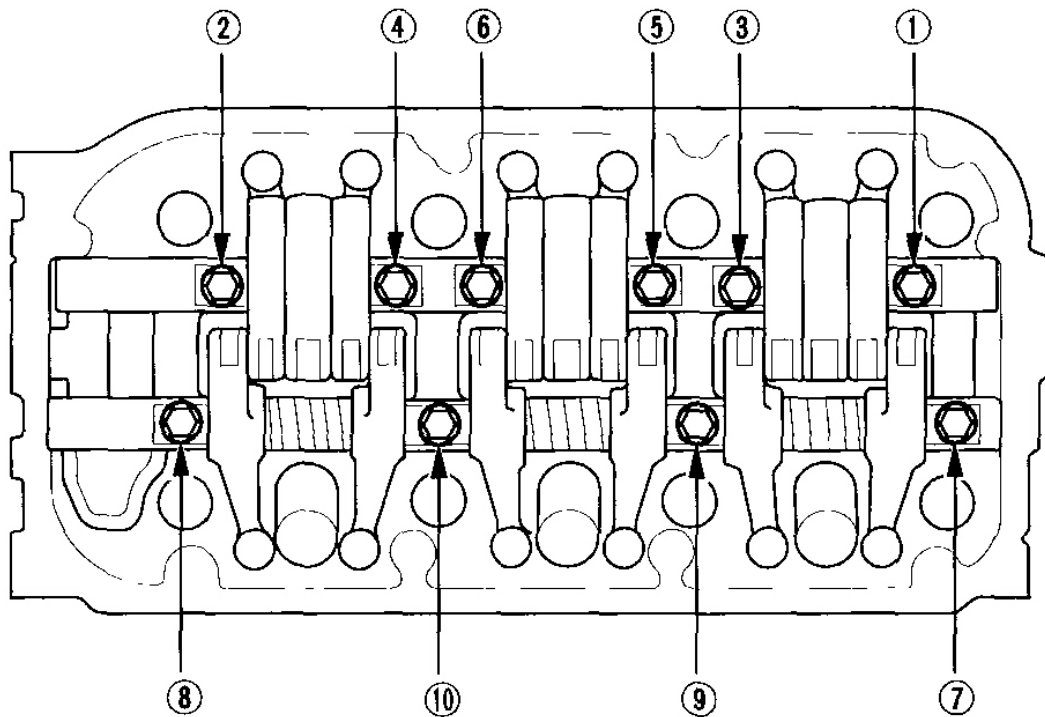


G03658918

Fig. 97: Identifying Adjusting Screws (A)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658919

Fig. 98: Identifying Rocker Shaft Mounting Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY

NOTE:

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

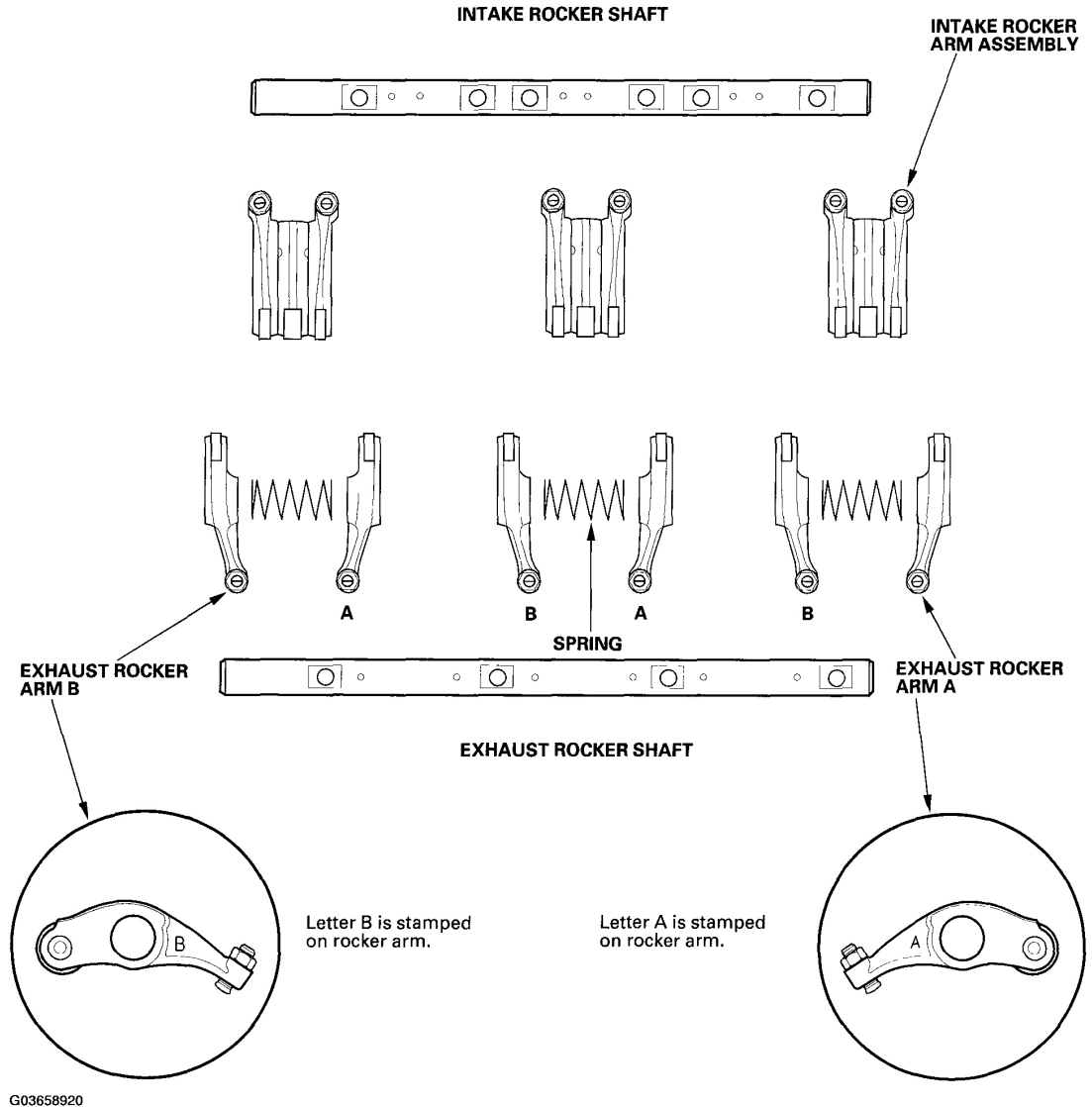
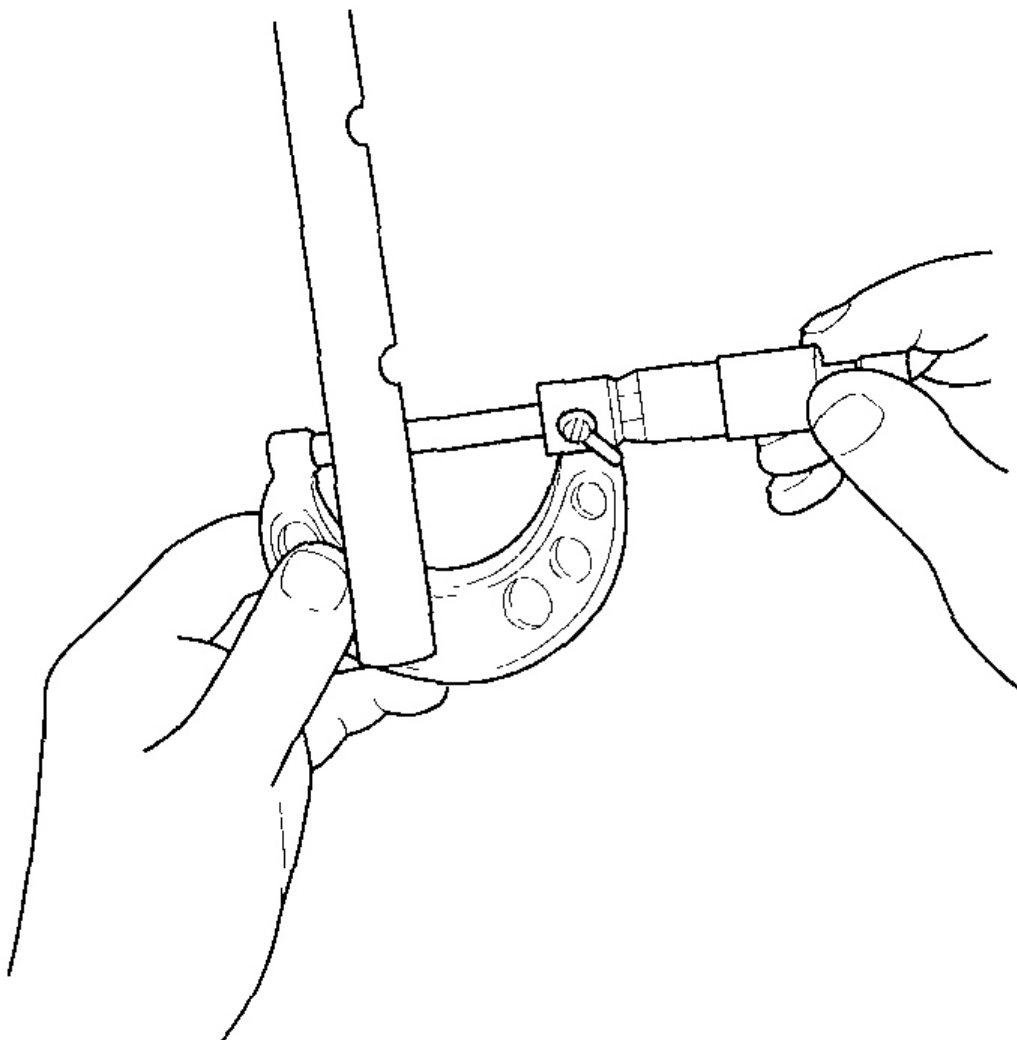


Fig. 99: Rocker Arm And Shaft Disassembly/Reassembly
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

ROCKER ARM AND SHAFT INSPECTION

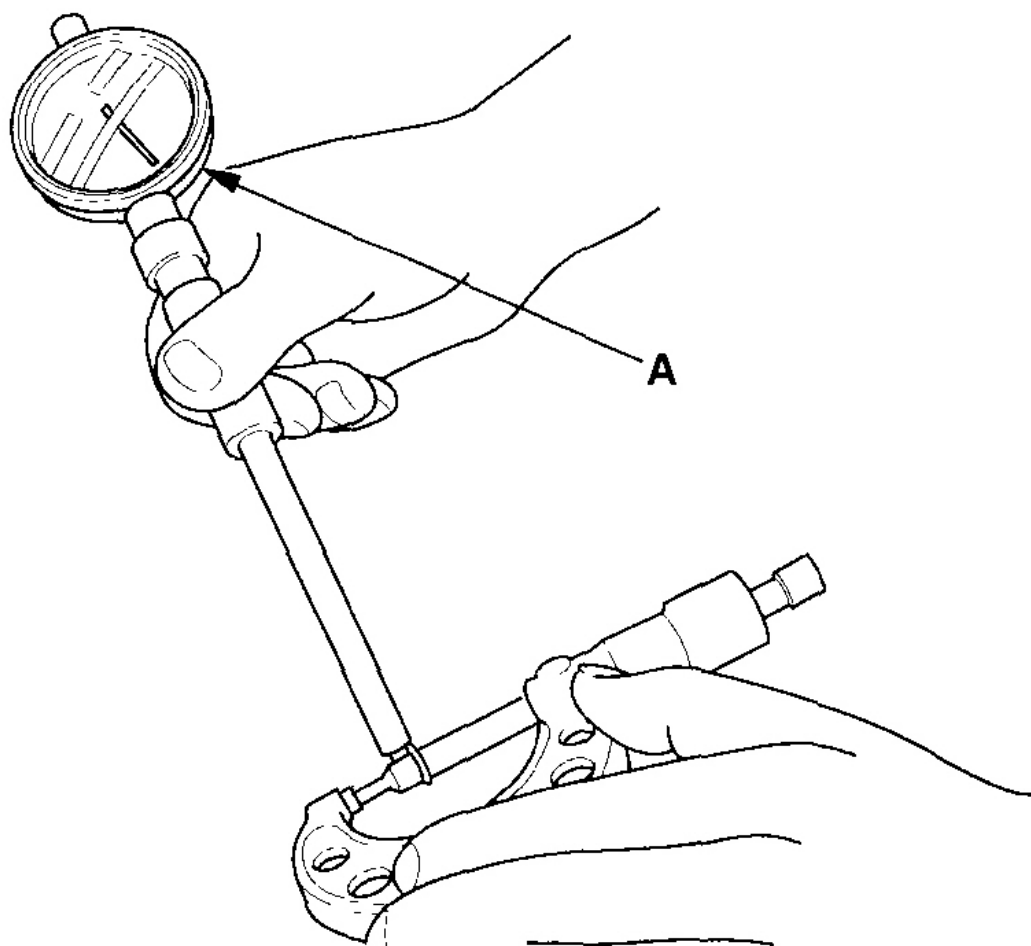
1. Remove the rocker arm assembly (see CYLINDER HEAD INSPECTION FOR WARPAGE).
2. Disassemble the rocker arm assembly (see ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY).
3. Measure the diameter of the shaft at the first rocker location.



G03658921

Fig. 100: Measuring Diameter Of Shaft At First Rocker Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658922

Fig. 101: Identifying Gauge (A)

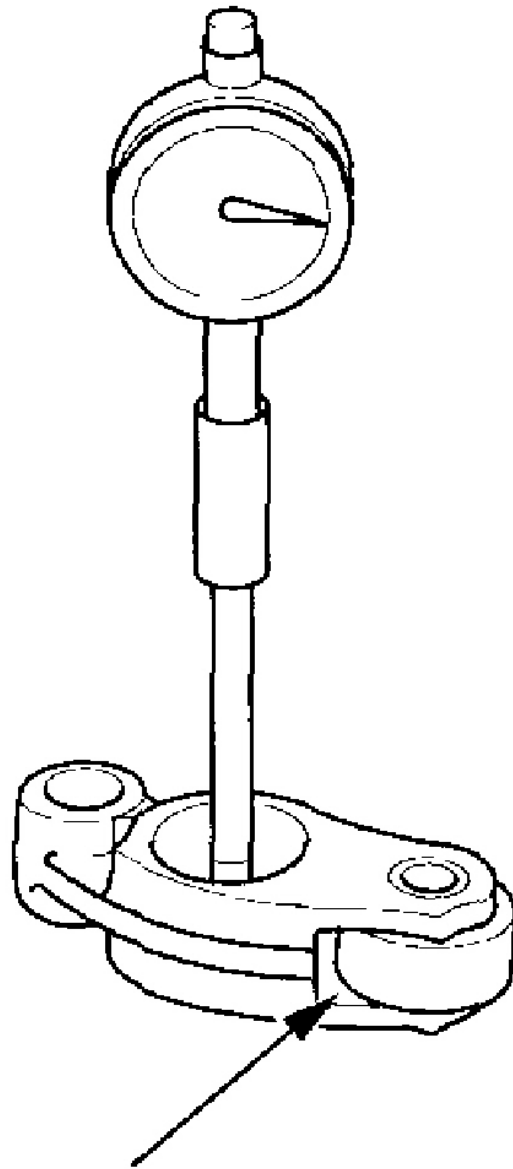
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Intake Rocker Arm-to-Shaft Clearance Standard (New):**0.026-0.067 mm (0.0010-0.0026 in.)****Service Limit:****0.067 mm (0.0026 in.)****Exhaust Rocker Arm-to-Shaft Clearance Standard (New):**

0.026-0.077 mm (0.0010-0.0030 in.)

Service Limit: 0.077 mm (0.0030 in.)



Inspect rocker arm
face for wear.

G03658923

Fig. 102: Measuring Inside Diameter Of Rocker Arm

Courtesy of AMERICAN HONDA MOTOR CO., INC.

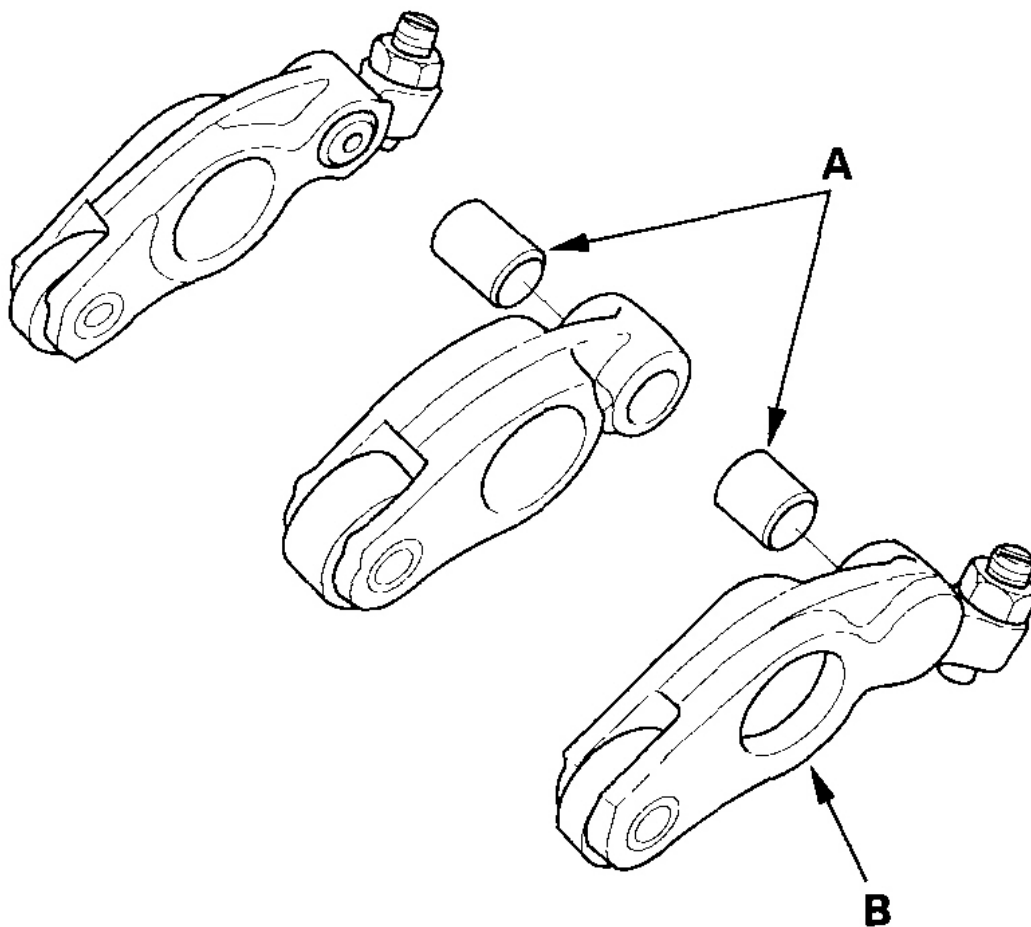
6. Repeat for all rockers and both shafts. If the clearance is over the limit, replace the rocker shaft and all over-tolerance rocker arms. If any intake rocker arm needs replacement, replace all three rocker arms in that set (primary, mid, and secondary).

VTEC ROCKER ARMS

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

NOTE:

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



G03658924

Fig. 103: Identifying Rocker Arm Pistons (A) And Primary Rocker Arm (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

9. Install the rocker arm assembly (see **CAMSHAFT, ROCKER ARM, CAMSHAFT SEAL, AND PULLEY INSTALLATION**).

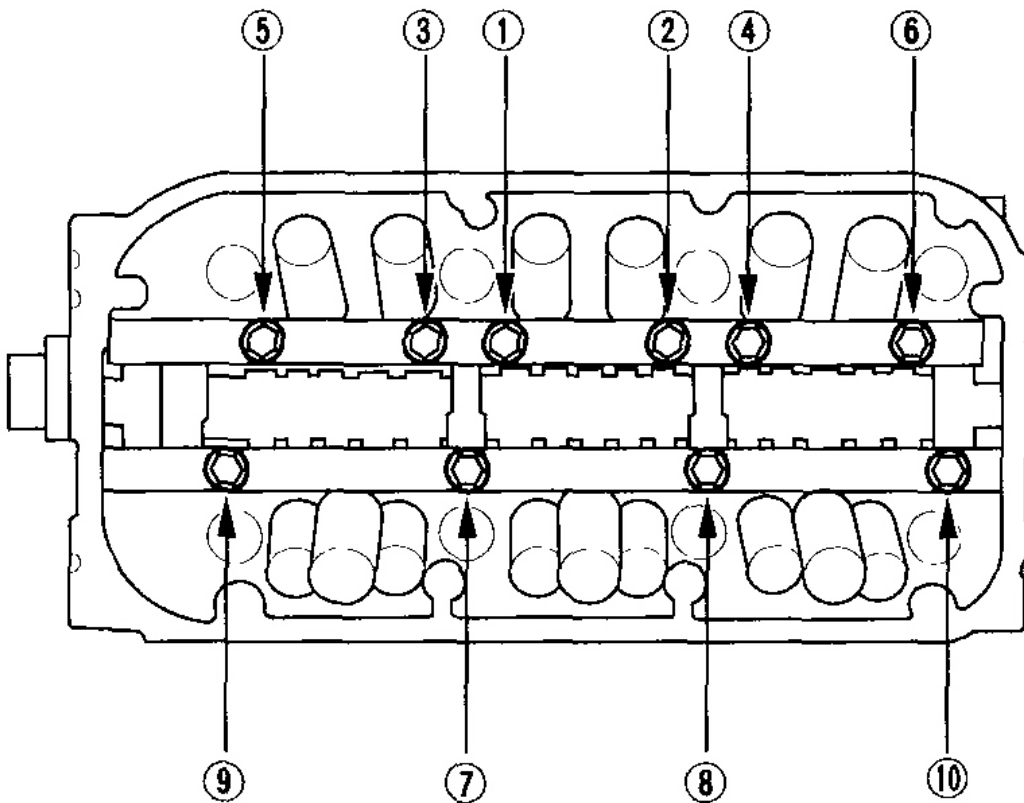
CAMSHAFT INSPECTION

1. Remove the cylinder head (see **CYLINDER HEAD REMOVAL**).
2. Remove the rocker arms (see **CYLINDER HEAD INSPECTION FOR WARPAGE**).
3. Put the rocker shafts on the cylinder head, then tighten the bolts to the specified torque.

NOTE: Apply new engine oil to the threads and flange of the exhaust rocker shaft mounting bolts.

Specified Torque

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



G03658925

Fig. 104: Identifying Rocker Shaft Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Seat the camshaft by pushing it toward the rear of the cylinder head.
5. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth and read the end play. If the end play is beyond the service limit, replace the thrust cover and recheck. If it is still beyond the service limit, replace the camshaft.

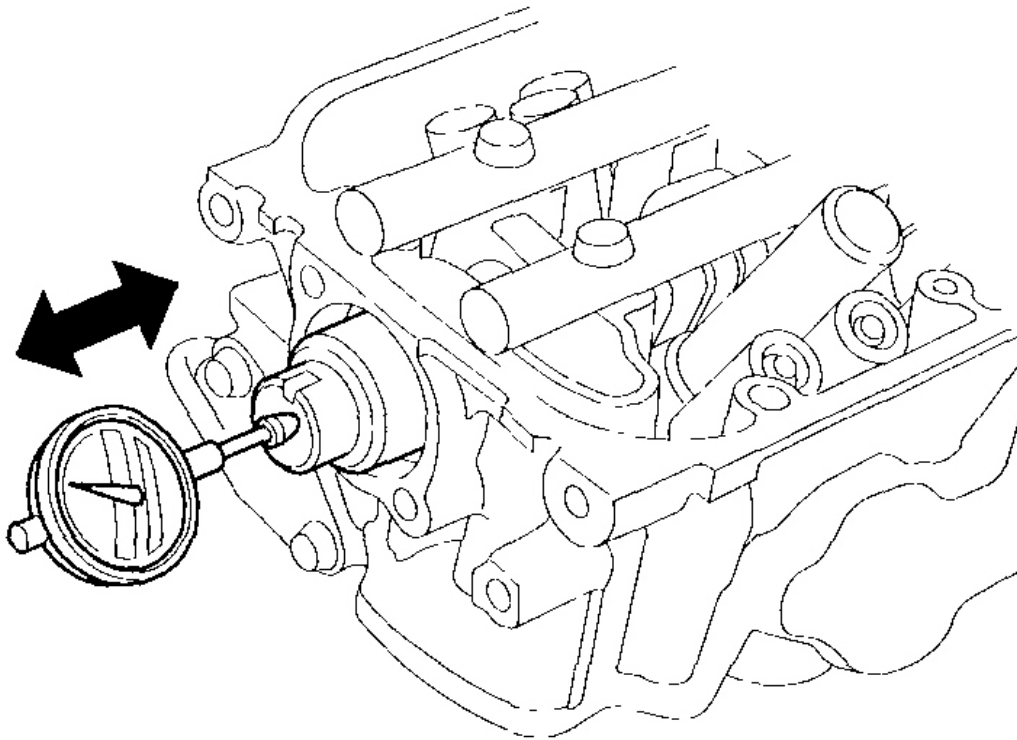
Camshaft End Play

Standard (New):

0.05-0.20 mm (0.002-0.008 in.)

Service Limit:

0.20 mm (0.008 in.)

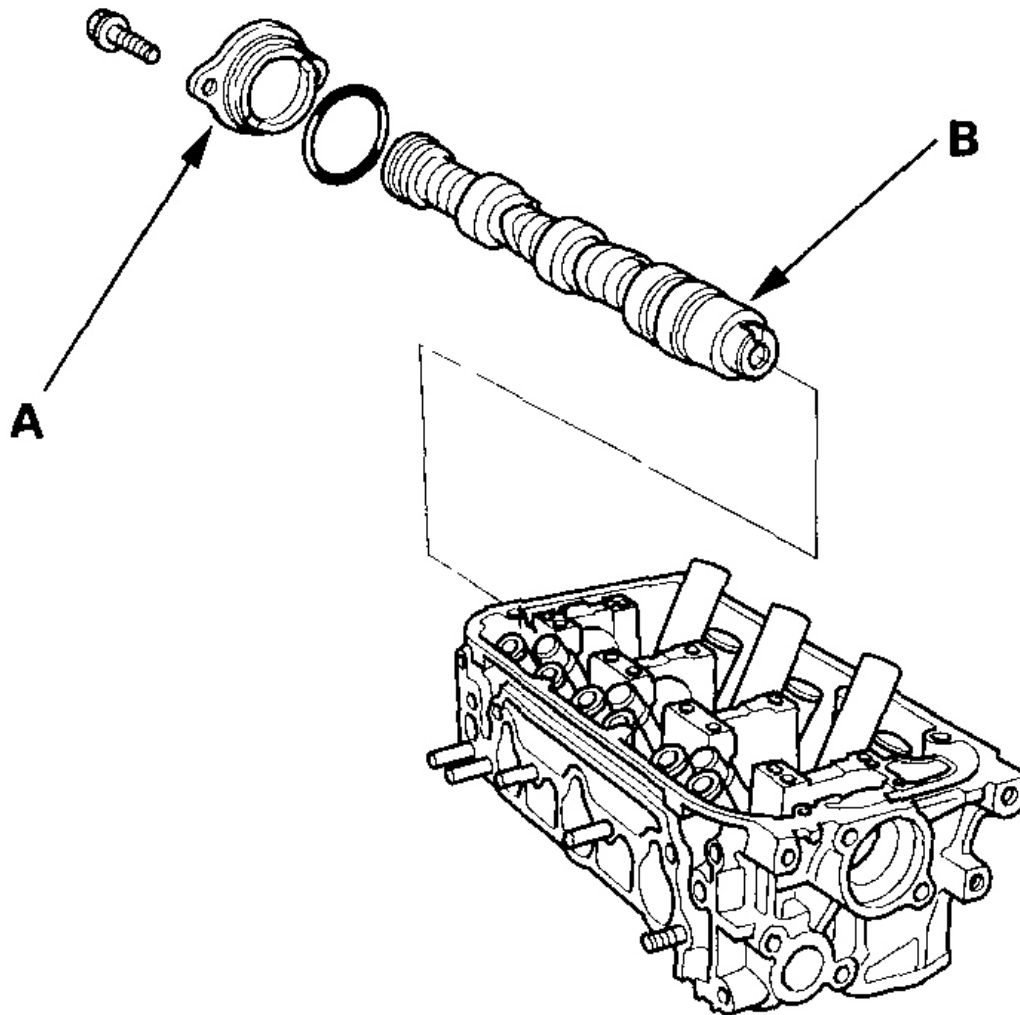


G03658926

Fig. 105: Identifying Dial Indicator

Courtesy of AMERICAN HONDA MOTOR CO., INC.

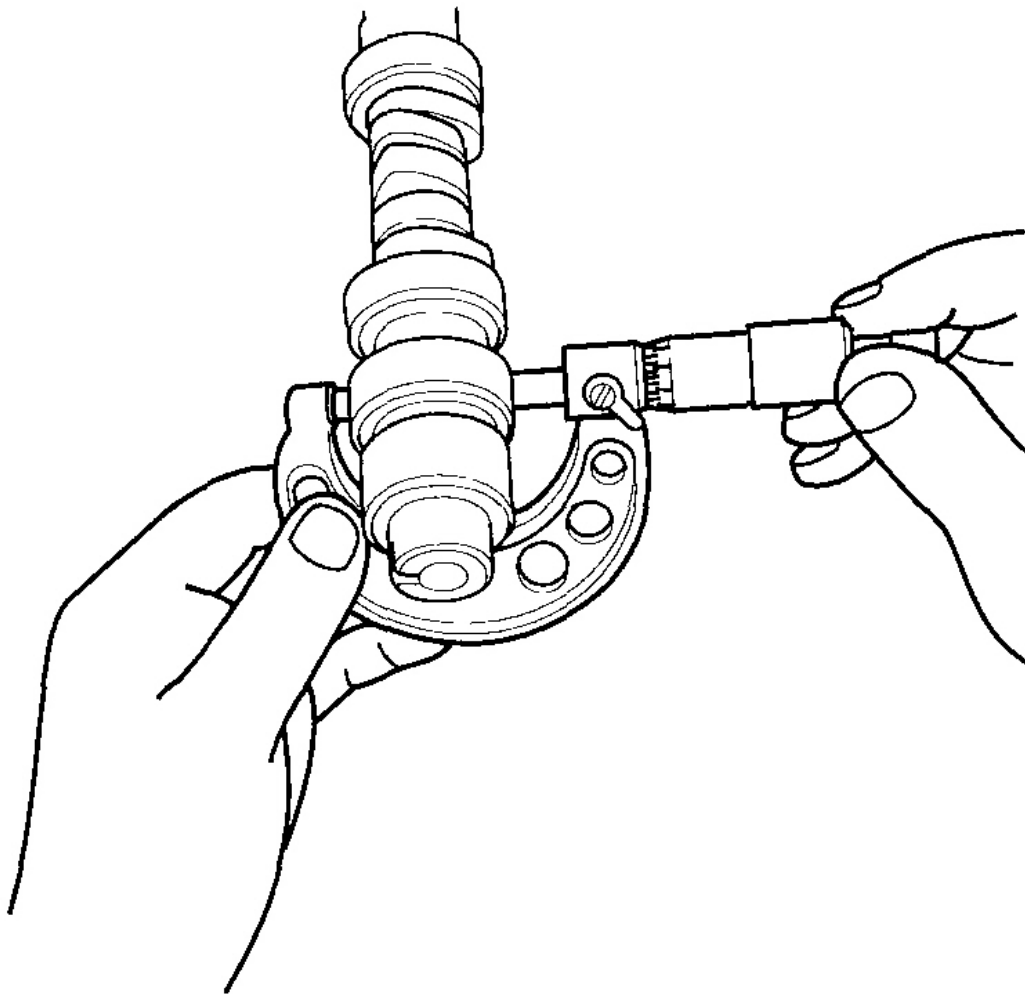
6. Remove the camshaft thrust cover (A), then pull out the camshaft (B).



G03658927

Fig. 106: Identifying Camshaft Thrust Cover (A) And camshaft (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

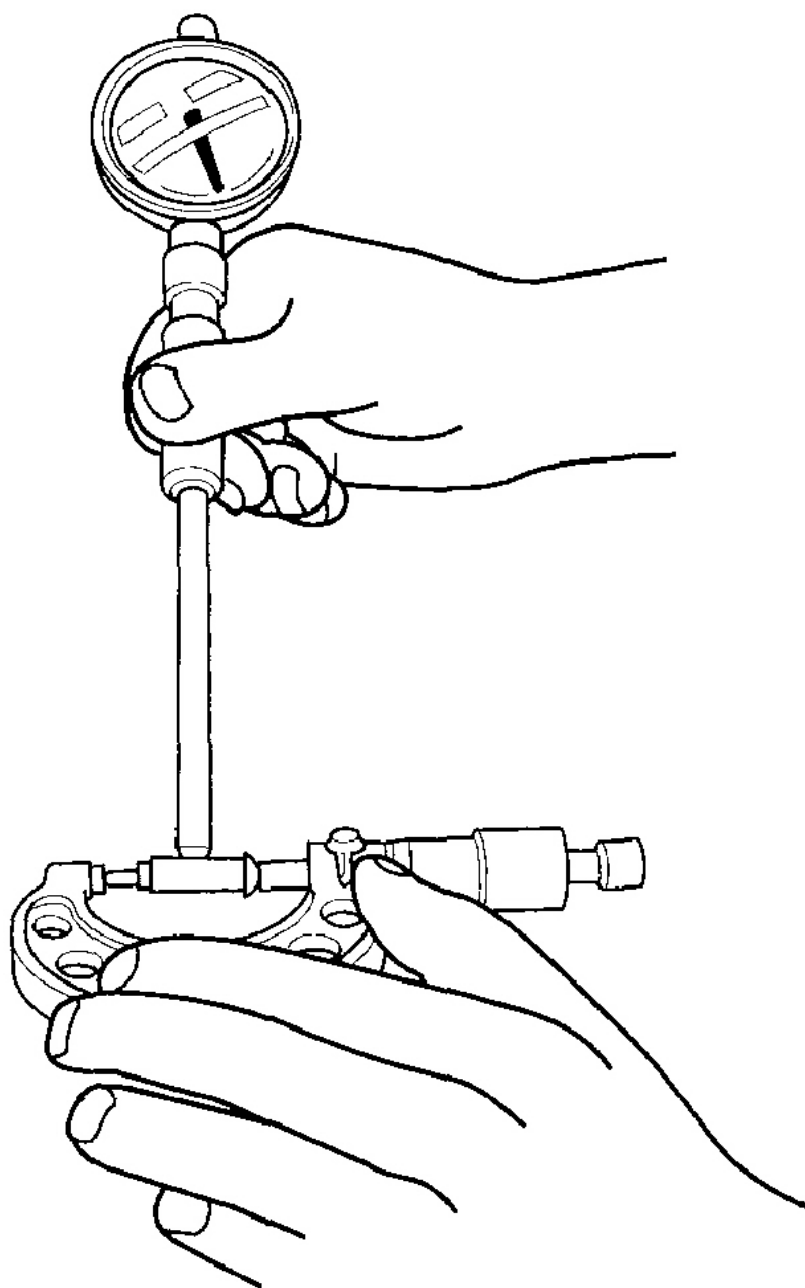
7. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
8. Measure the diameter of each camshaft journal.



G03658928

Fig. 107: Measuring Diameter Of Each Camshaft Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

9. Zero the gauge to the journal diameter.



G03658929

Fig. 108: Setting Zero Gauge To Journal Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round condition.

- If the camshaft-to-holder clearance is within limits, go to step 12.
- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has been replaced, replace the cylinder head.
- If the camshaft-to-holder clearance is beyond the service limit and the camshaft has not been replaced, go to step 11.

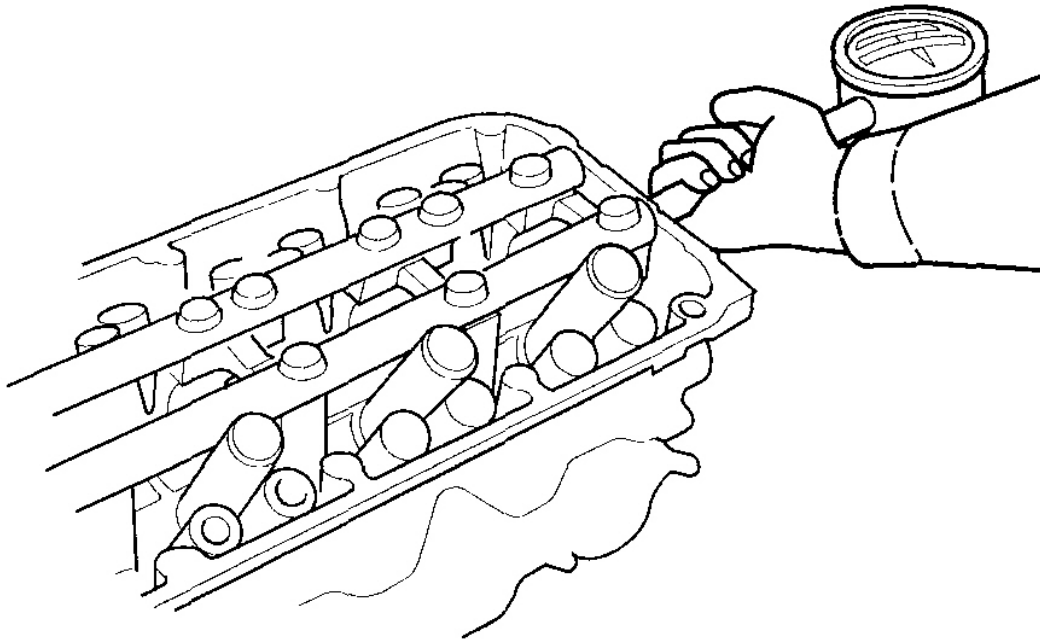
Camshaft-to-Holder Oil Clearance**Standard (New):****0.050-0.089 mm (0.0020-0.0035 in.)****Service Limit:****0.15 mm (0.006 in.)****G03658930**

Fig. 109: Measuring Inside Diameter Of Camshaft Bearing Surface
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

the oil clearance is still out of tolerance, replace the cylinder head.

Camshaft Total Runout**Standard (New):**

0.03 mm (0.001 in.) max.

Service Limit:

0.04 mm (0.002 in.)

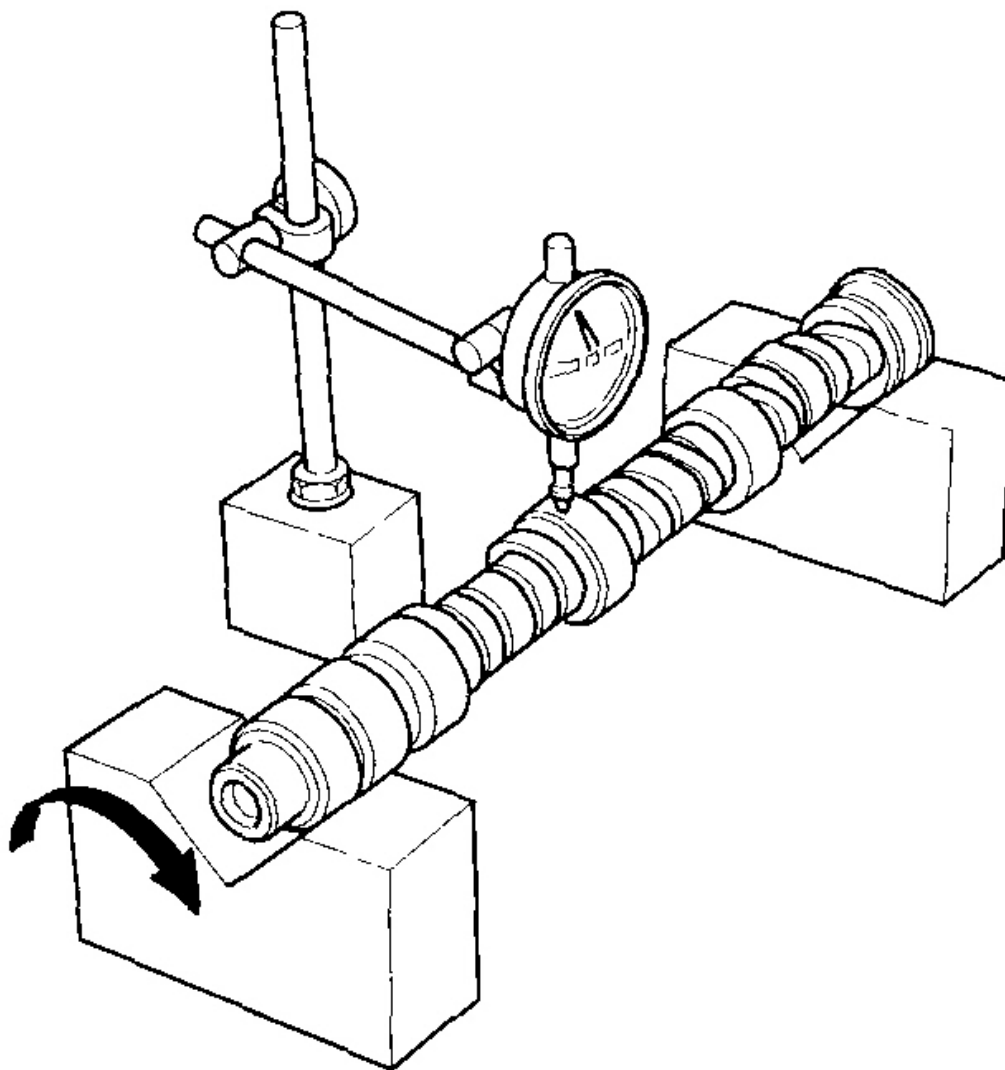
**G03658931**

Fig. 110: Checking Total Runout With Camshaft Supported On V-Blocks
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Measure cam lobe height.

CAM LOBE HEIGHT SPECIFICATION TABLE

	INTAKE	EXHAUST
PRI	35.041 mm (1.3796 in.)	36.326 mm (1.4302 in.)

2004 Acura TL

2004-06 ENGINE Cylinder Head - TL

MID	36.445 mm (1.4348 in.)	
SEC	35.284 mm (1.3891 in.)	

PRI: Primary

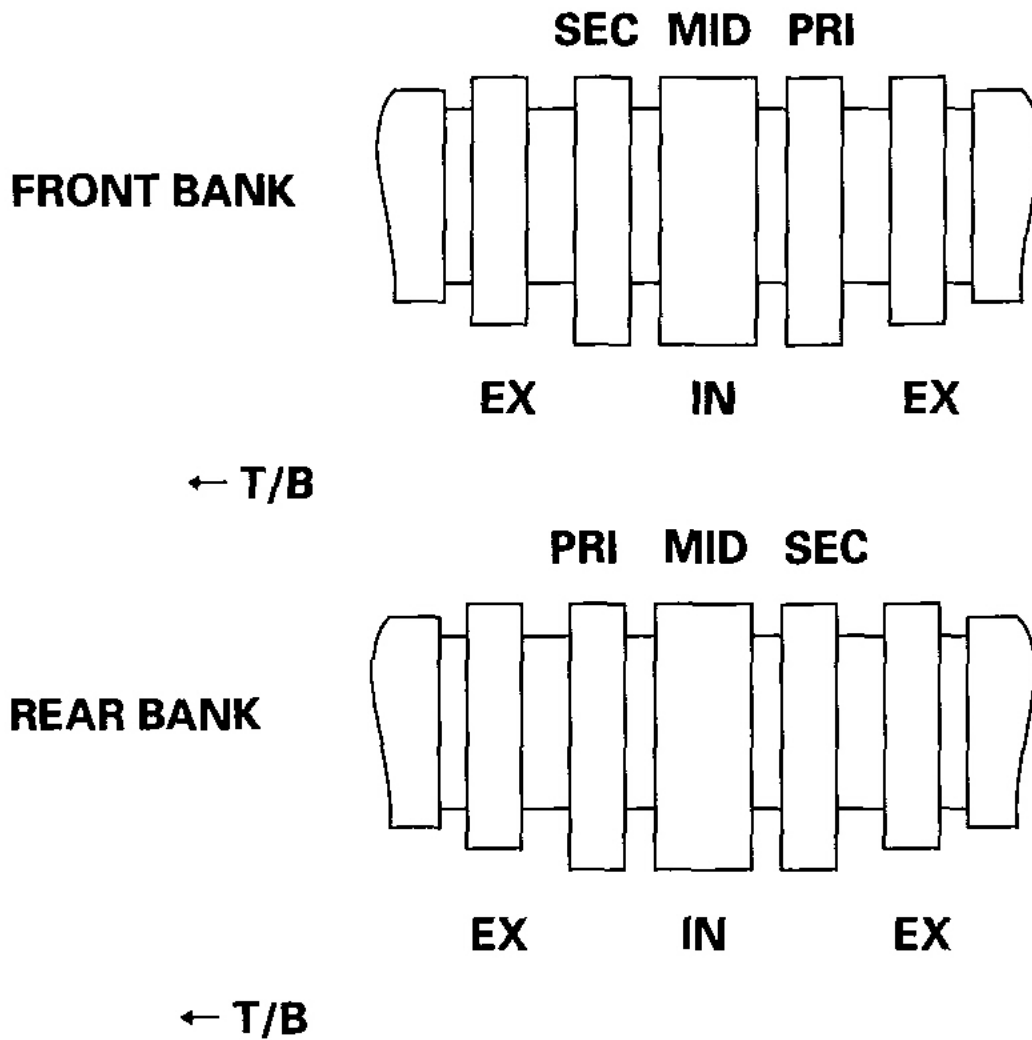
MID: Mid

SEC: Secondary

IN: Intake

EX: Exhaust

T/B: Timing belt



G03658932

Fig. 111: Measuring Cam Lobe Height

Courtesy of AMERICAN HONDA MOTOR CO., INC.

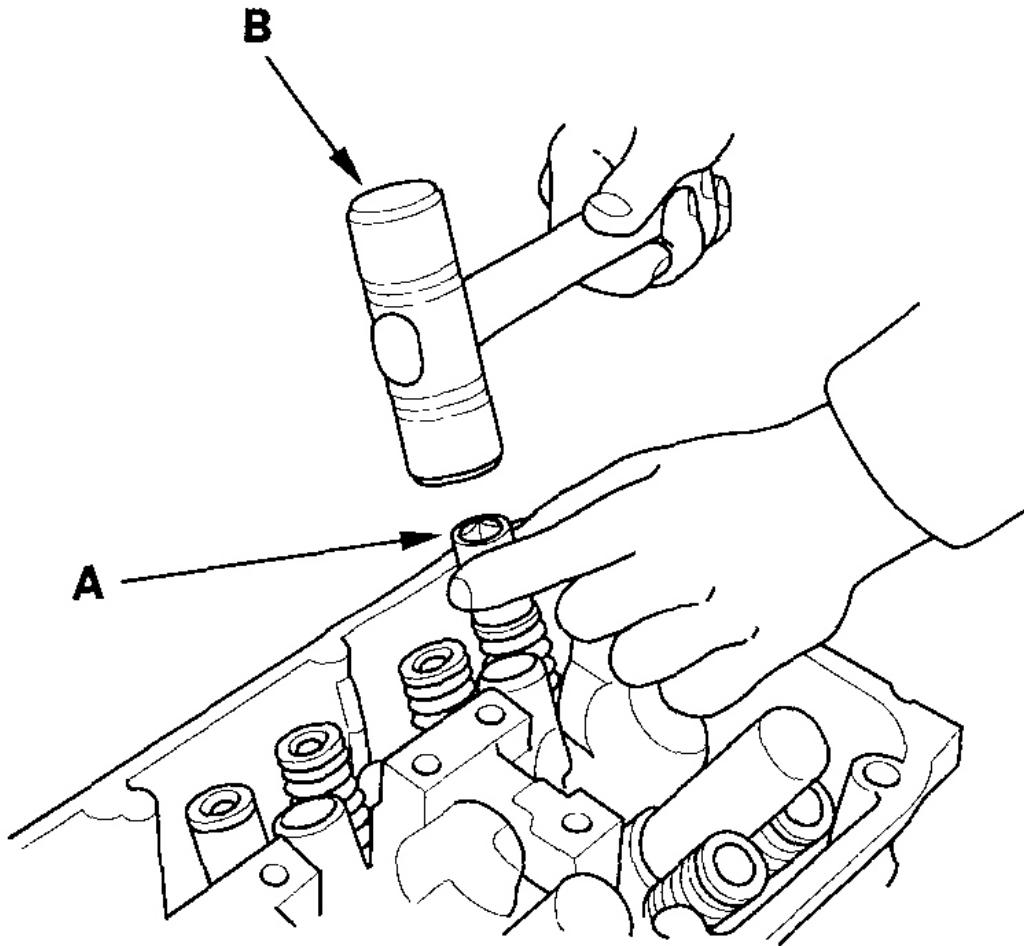
VALVE, SPRING, AND VALVE SEAL REMOVAL

Special Tools Required

Valve spring compressor attachment 07757-PJ1010A

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

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



G03658933

Fig. 112: Taping Valve Retainer Using A Socket (A) And Plastic Mallet (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

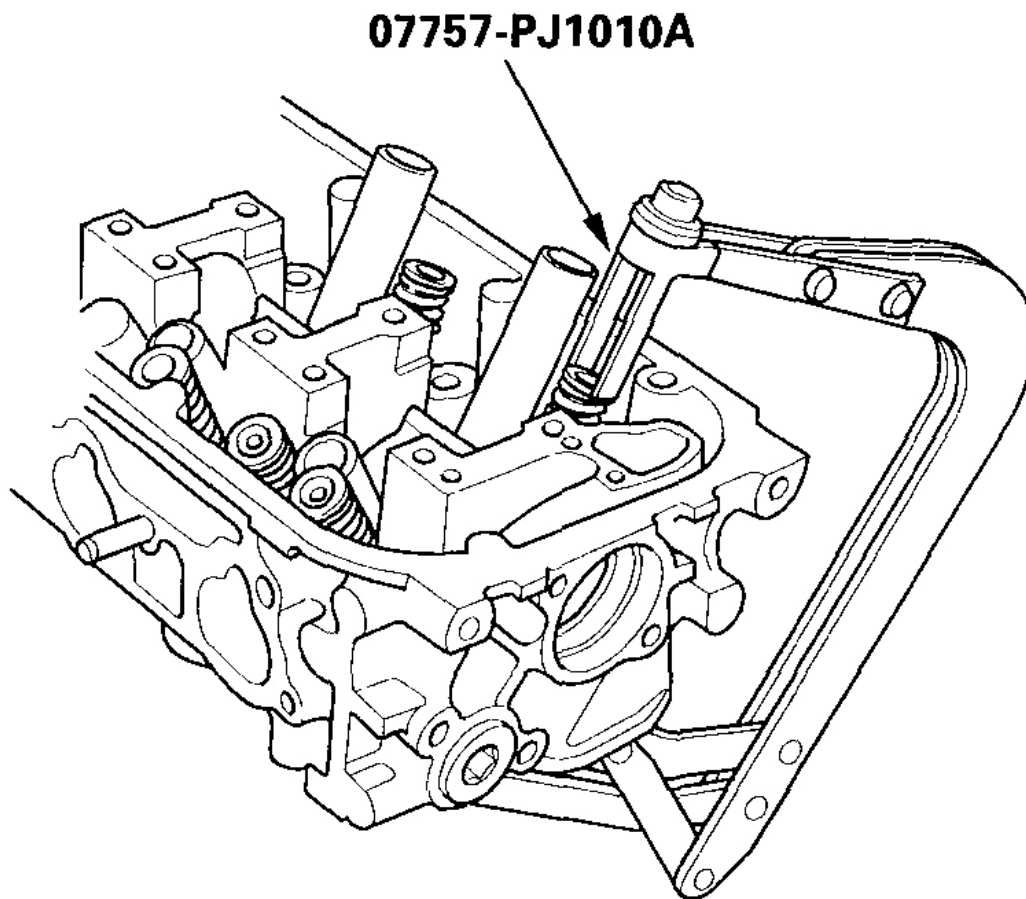
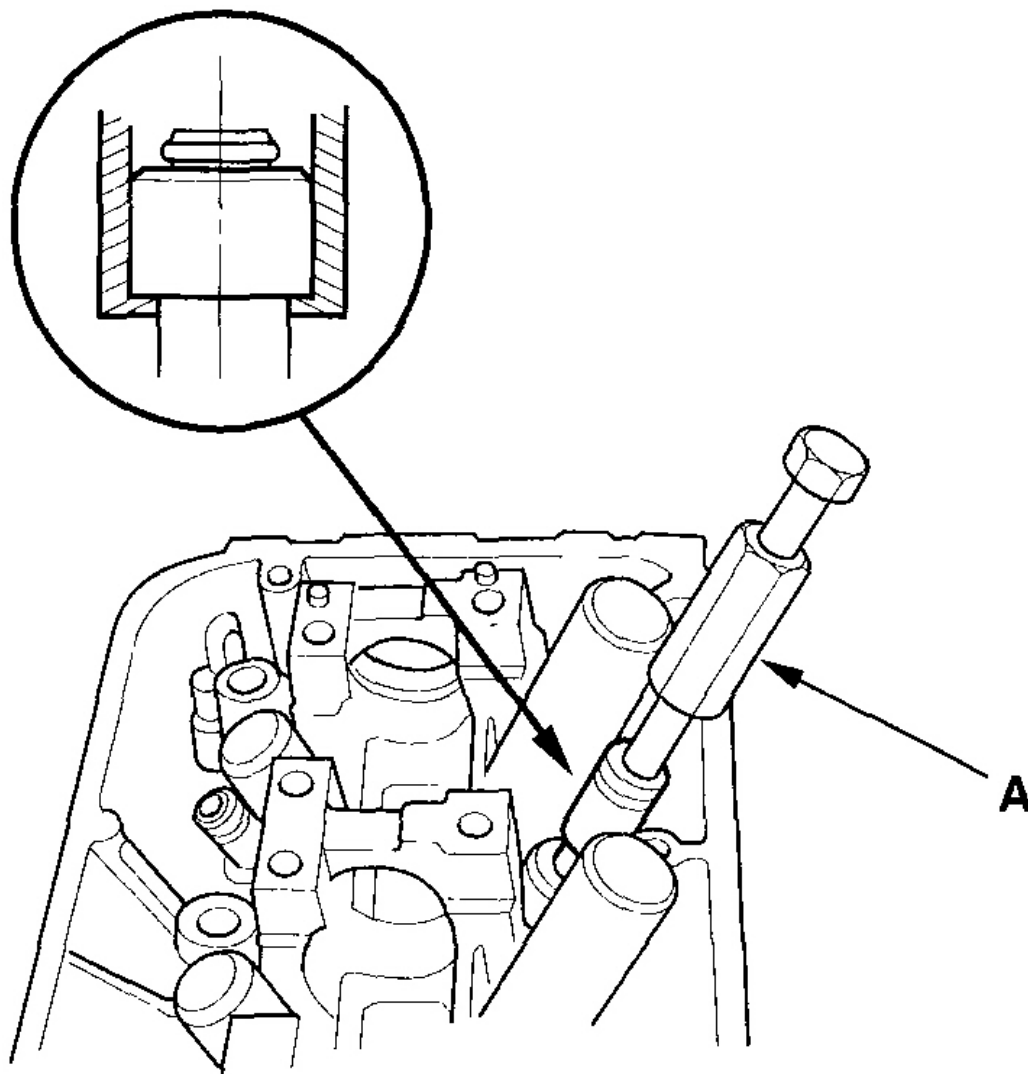


Fig. 113: Identifying Valve Spring Compressor Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

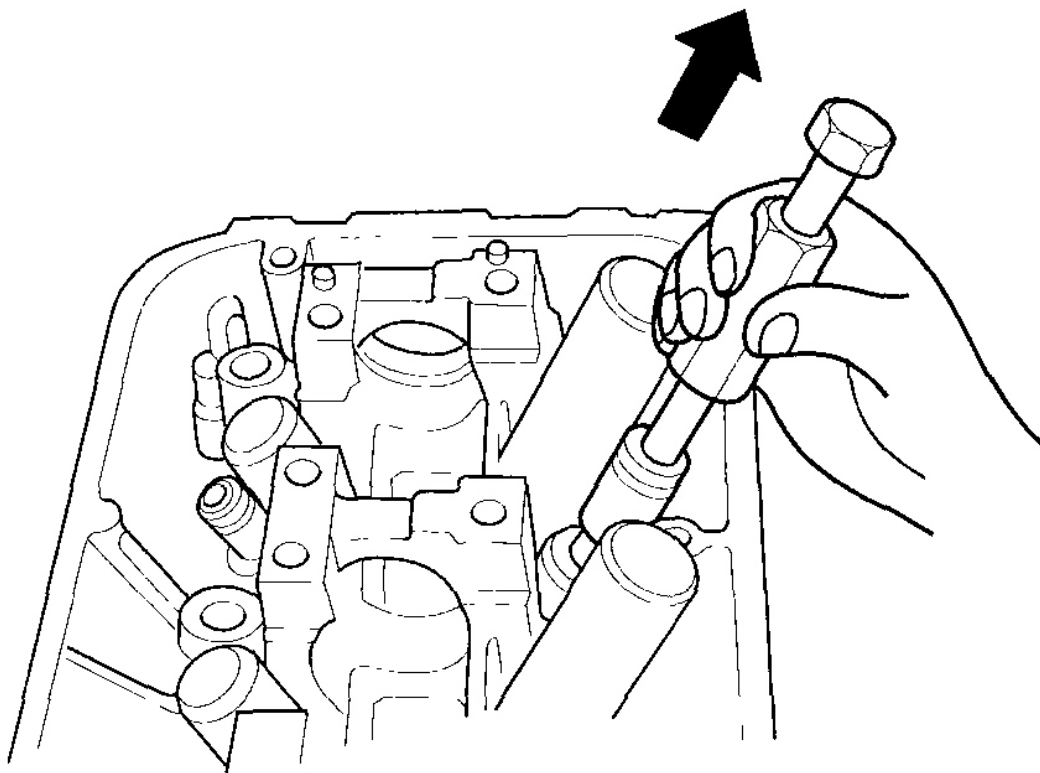
4. Remove the valve spring compressor, valve spring compressor attachment, spring retainer, and spring.
5. Install the valve guide seal remover (A).



G03658935

Fig. 114: Identifying Valve Guide Seal Remover (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove the valve seal.



G03658936

Fig. 115: Removing Valve Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Remove the valve spring seat and valve.

VALVE INSPECTION

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

Intake Valve Dimensions

A Standard (New):

34.90-35.10 mm (1.374-1.382 in.)

B Standard (New):

115.70-116.30 mm (4.555-4.579 in.)

C Standard (New):

5.485-5.495 mm (0.2159-0.2163 in.)

C Service Limit:

5.455 mm (0.2148 in.)

Exhaust Valve Dimensions

A Standard (New):

29.90-30.10 mm (1.177-1.185 in.)

B Standard (New):

113.90-114.50 mm (4.484-4.508 in.)

C Standard (New):

5.450-5.460 mm (0.2146-0.2150 in.)

C Service Limit:

5.420 mm (0.2134 in.)

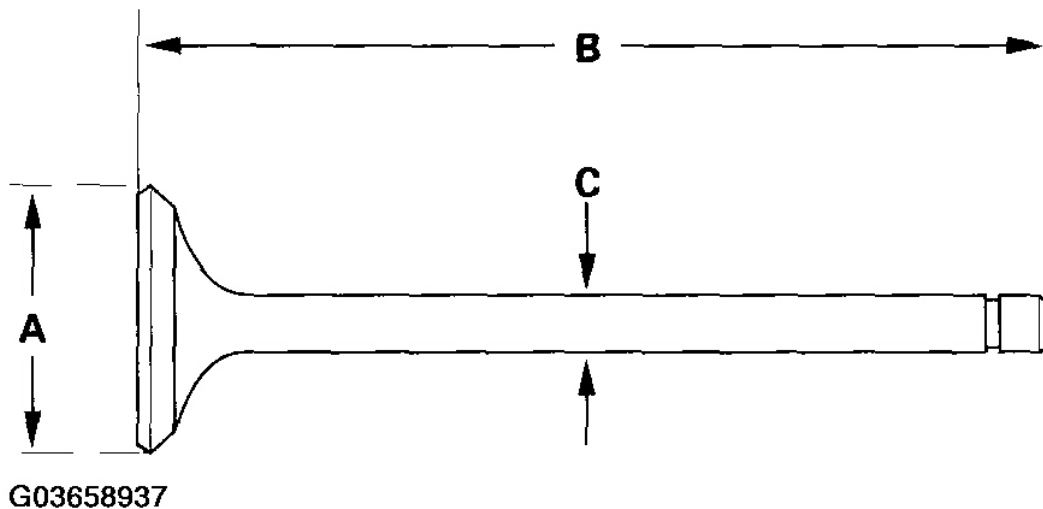


Fig. 116: Identifying Intake Valve Dimensions
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE STEM-TO-GUIDE CLEARANCE INSPECTION

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

Intake Valve Stem-to-Guide Clearance

Standard (New):

0.04-0.09 mm (0.002-0.004 in.)

Service Limit:

0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance

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

Service Limit:

0.22 mm (0.009 in.)

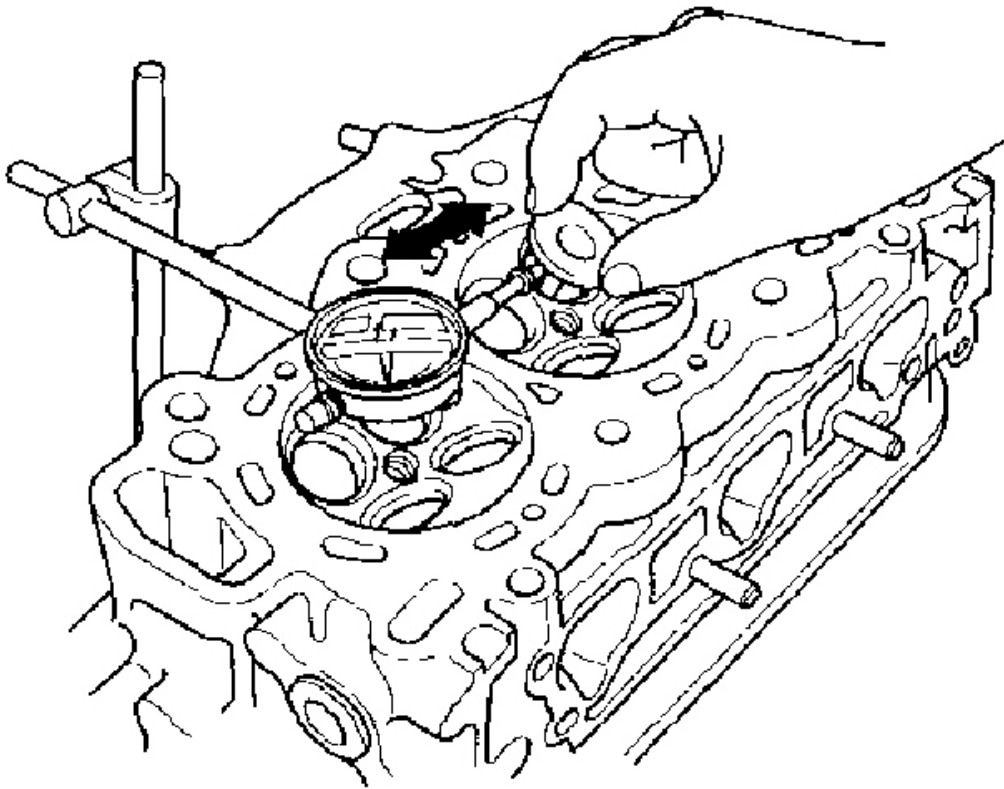
**G03658938**

Fig. 117: Measuring Guide-To-Stem Clearance With Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Intake Valve Stem-to-Guide Clearance

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

Service Limit: 0.08 mm (0.003 in.)

Exhaust Valve Stem-to-Guide Clearance Standard (New): 0.055-0.080 mm (0.0022-0.0031 in.)

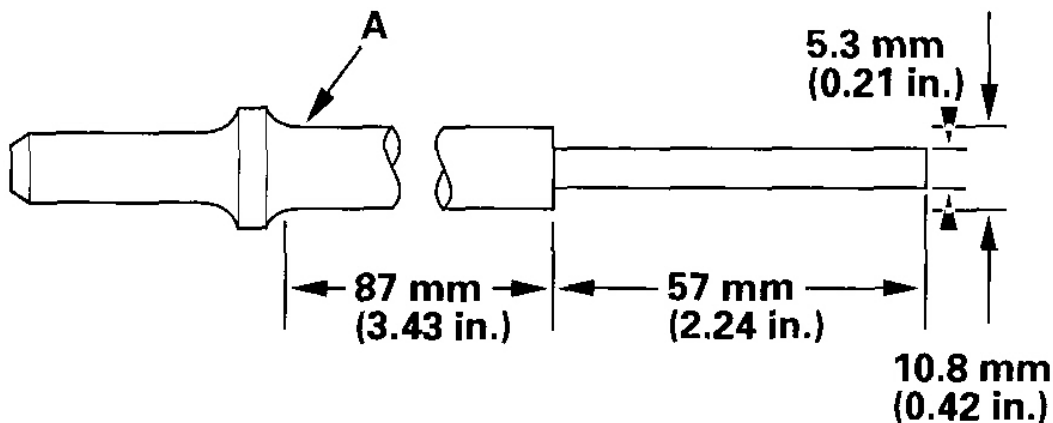
Service Limit: 0.11 mm (0.004 in.)

VALVE GUIDE REPLACEMENT

Special Tools Required

- Valve guide driver, 5.5 mm 07742-0010100
- Valve guide reamer, 5.5 mm 07HAH-PJ7A100

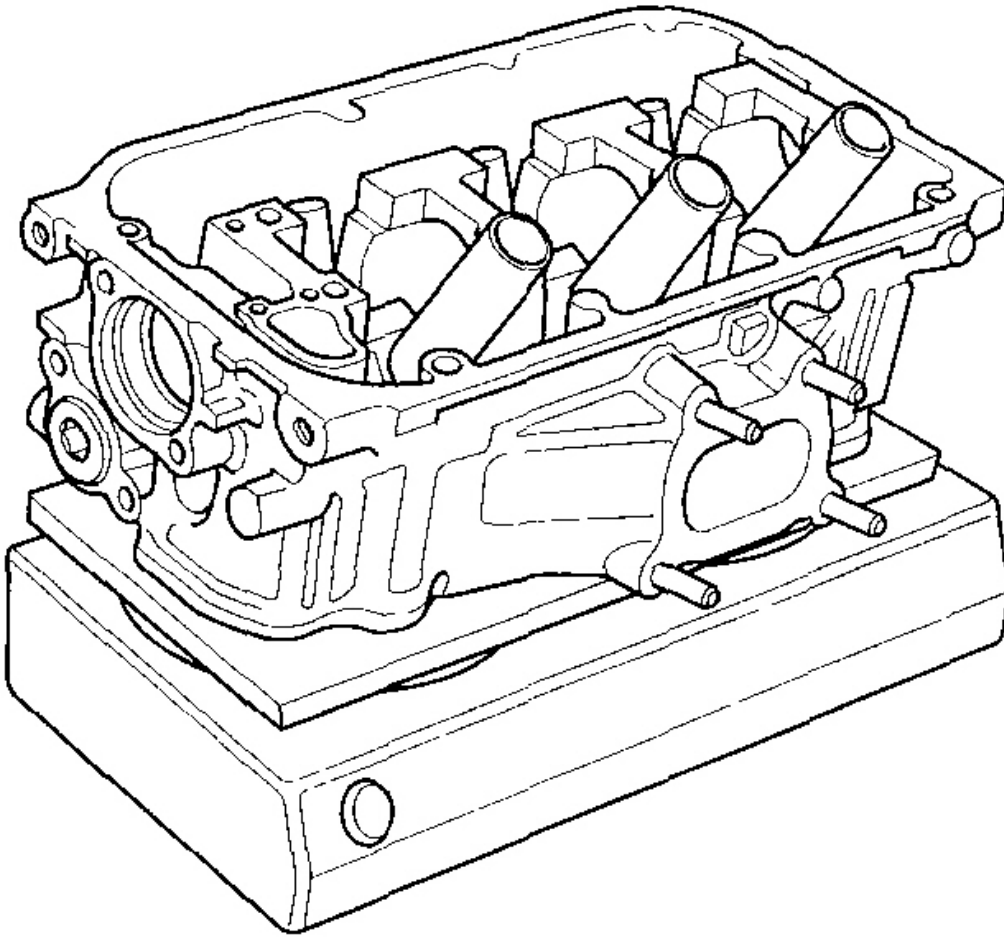
1. Inspect valve stem-to-guide clearance (see **VALVE INSPECTION**).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the special tool and a conventional hammer.



G03658939

Fig. 118: Inspecting Valve Stem-To-Guide Clearance Using An Air-Impact Valve Guide Driver (A)
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.

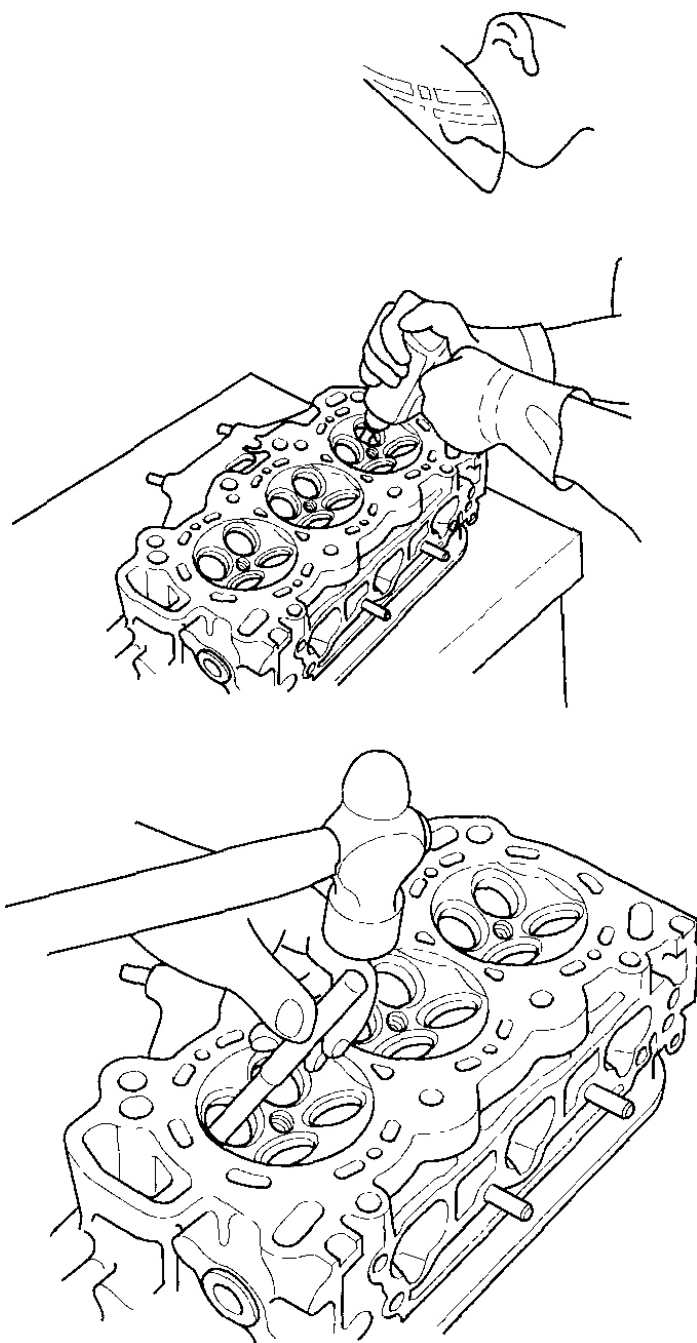


G03658940

Fig. 119: Heating Cylinder Head

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658941

Fig. 120: Driving Guide Towards Combustion Chamber Using An Air Hammer And Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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

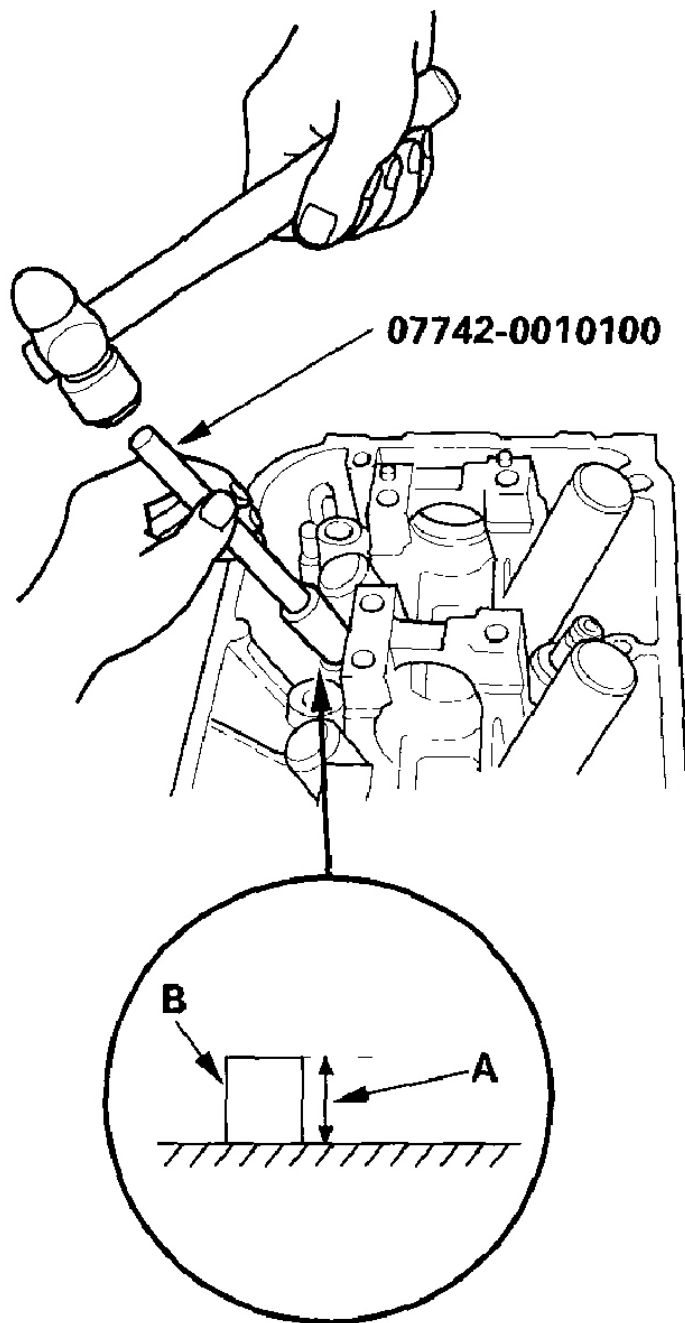
8. Take out the new guide(s) from the freezer, one at a time, as you need them.
9. Apply a thin coat of clean engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the special tool to drive the guide to the specified installed height (A) of the guide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

Valve Guide Installed Height

Intake:

21.20-22.20 mm (0.835-0.874 in.)

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

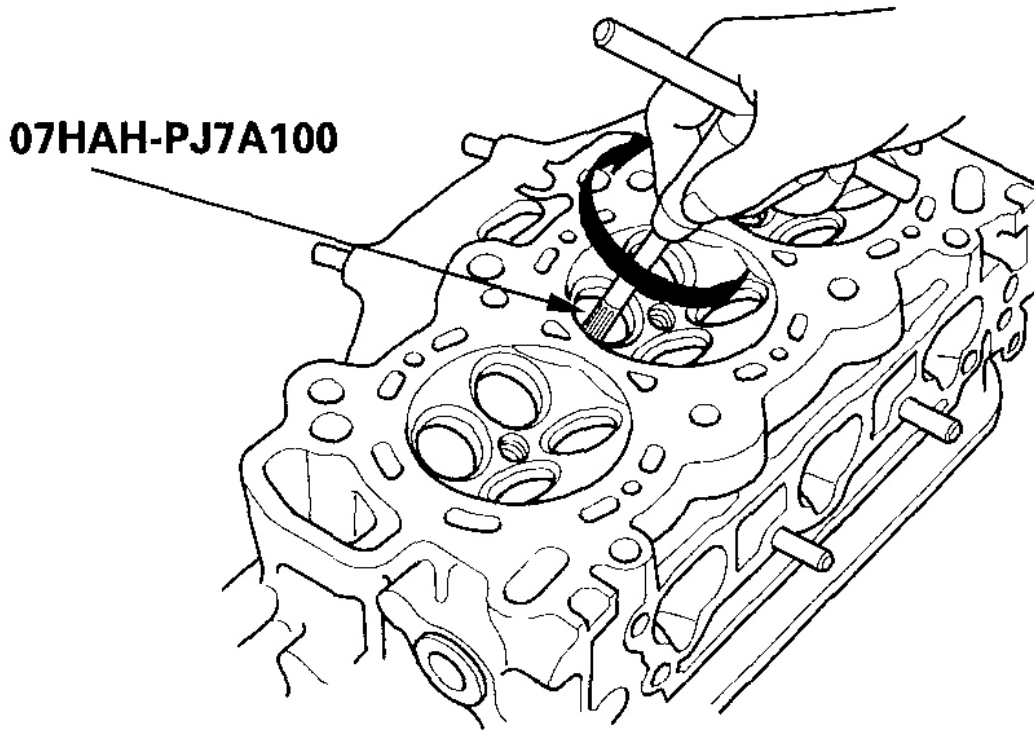


G03658942

Fig. 121: Installing Guide (B) To Specified Installed Height (A) Using Special Tool
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Coat both the reamer and the valve guide with cutting oil.

11. Rotate the reamer clockwise the full length of the valve guide bore.



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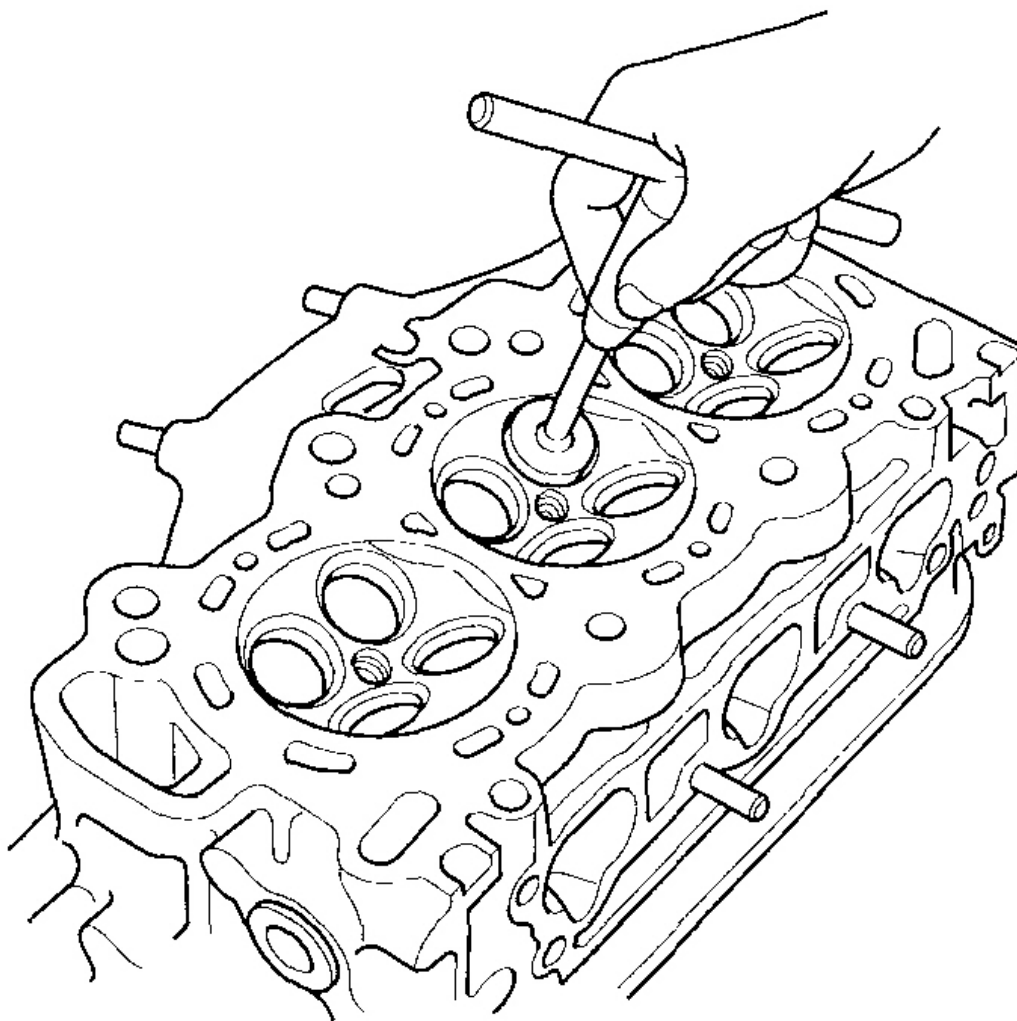
Fig. 122: Rotating Reamer Clockwise

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Continue to rotate the reamer clockwise while drawing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearance with a valve (see **VALVE INSPECTION**). Verify that a valve slides in the intake and exhaust valve guides without being stuck.
15. Inspect the valve seating, if necessary renew the valve seat using a valve seat cutter (see **VALVE SEAT RECONDITIONING**).

VALVE SEAT RECONDITIONING

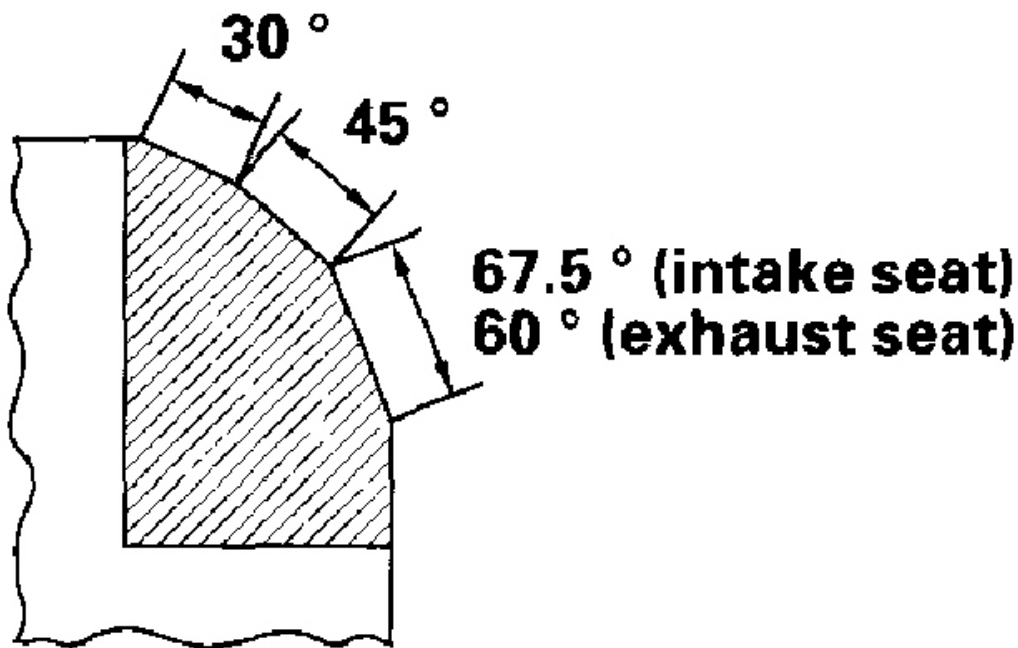
1. Inspect valve stem-to-guide clearance (see **VALVE STEM-TO-GUIDE CLEARANCE INSPECTION**). If the valve guides are worn, replace them (see **VALVE GUIDE REPLACEMENT**) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



G03658944

Fig. 123: Renewing Valve Seats In Cylinder Head Using Valve Seat Cutter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658945

Fig. 124: Identifying Valve Seat Measurements
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

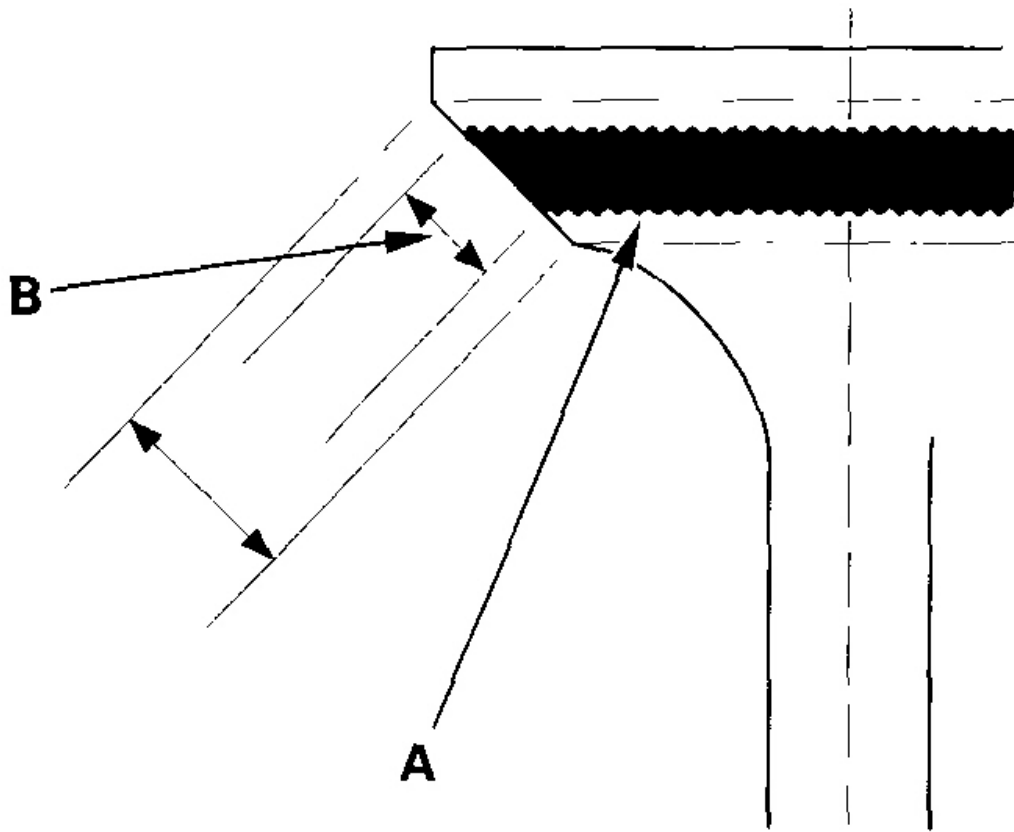
Valve Seat Width

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

Service Limit:

2.00 mm (0.079 in.)

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



G03658946

Fig. 125: Checking 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 (intake seat) or the 60 ° cutter (exhaust seat) to move it down, then one more cut with the 45 ° cutter to restore seat width.
 - If it is too low (closer to the valve edge), you must make a second cut with the 30 ° cutter to move it up, then one more cut with the 45 ° cutter to restore seat width.

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

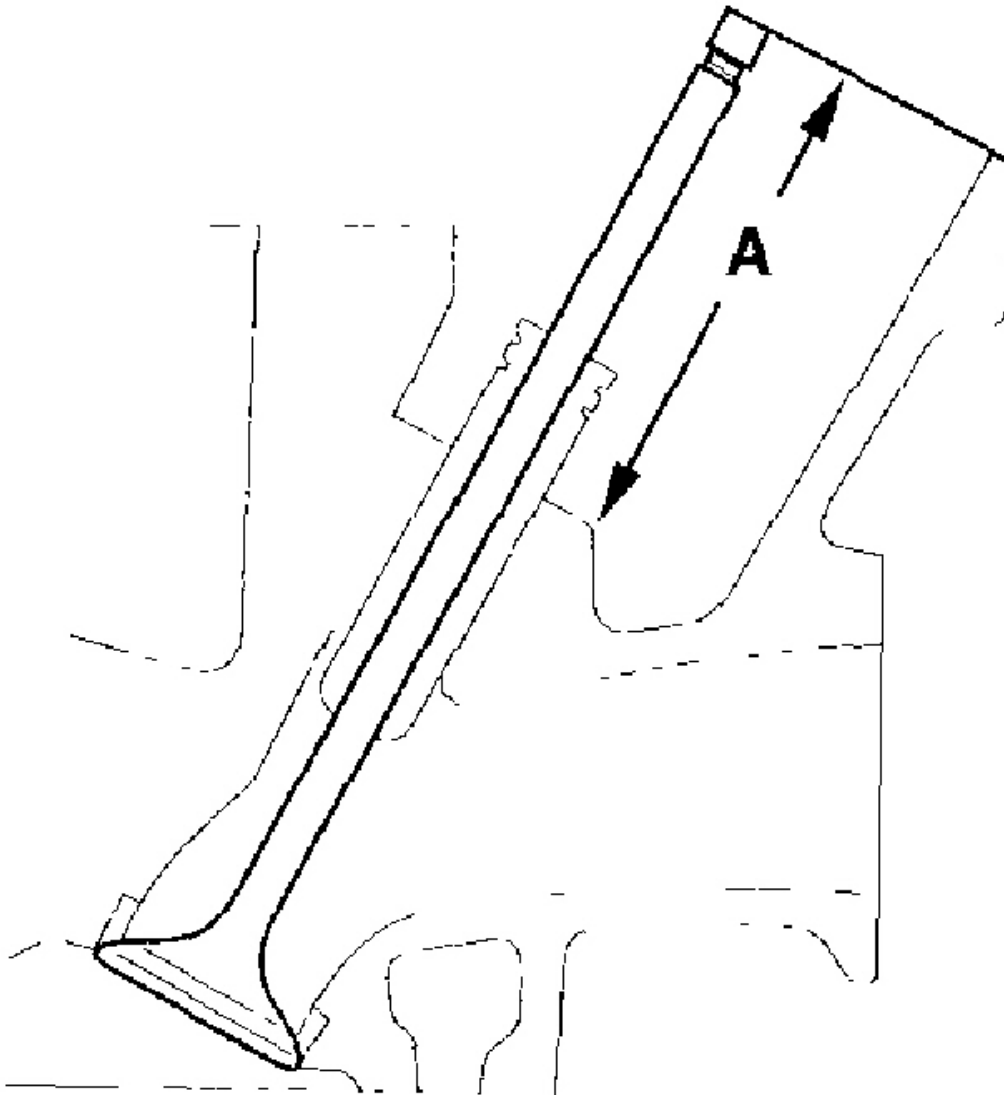
8. Insert the intake and exhaust valves in the head, and measure the valve stem installed height (A).

Intake Valve Stem Installed Height Standard (New): 46.75-47.55 mm (1.841-1.872 in.)

Service Limit: 47.80 mm (1.882 in.)

Exhaust Valve Stem Installed Height Standard (New): 46.68-47.48 mm (1.838-1.869 in.)

Service Limit: 47.73 mm (1.879 in.)



G03658947

Fig. 126: Measuring Valve Stem Installed Height (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

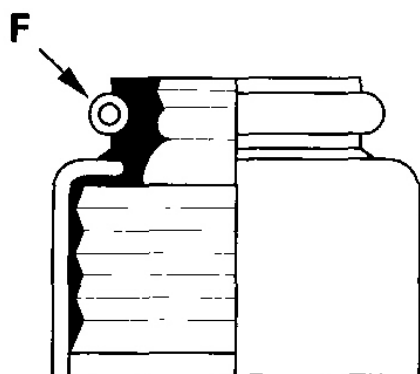
9. If the valve stem installed height is over the service limit, replace the valve and recheck. If it is still over the service limit, replace the cylinder head; the valve seat in the head is too deep.

VALVE, SPRING, AND VALVE SEAL INSTALLATION

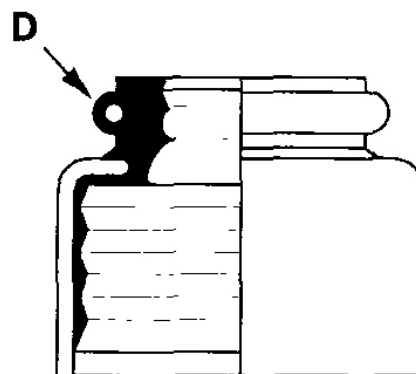
Special Tools Required

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

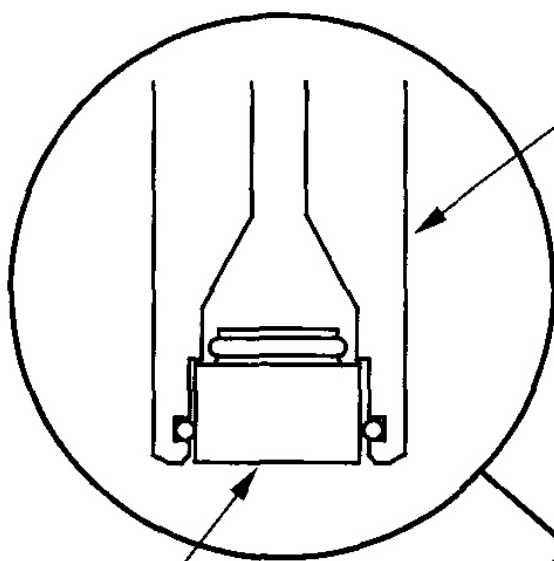
NOTE: Exhaust valve seals (C) have a black spring (D) and intake valve seals (E) have a white spring (F); they are not interchangeable.



E



C

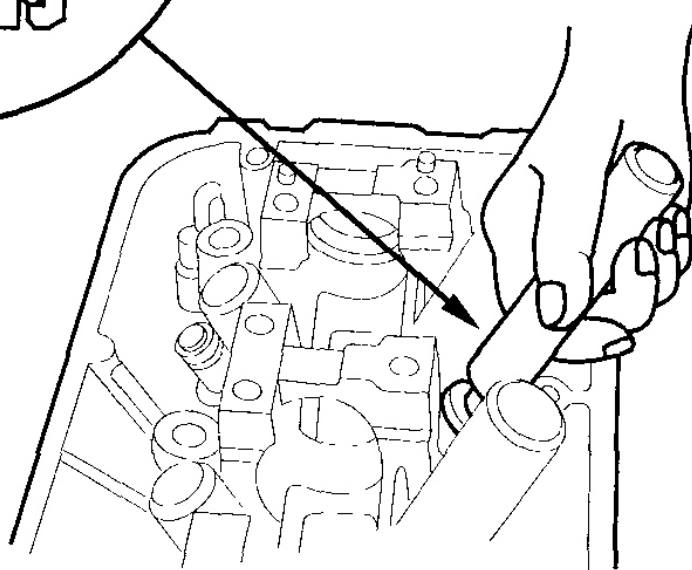


B

07PAD-0010000

NOTE: Use 5.5 mm side.

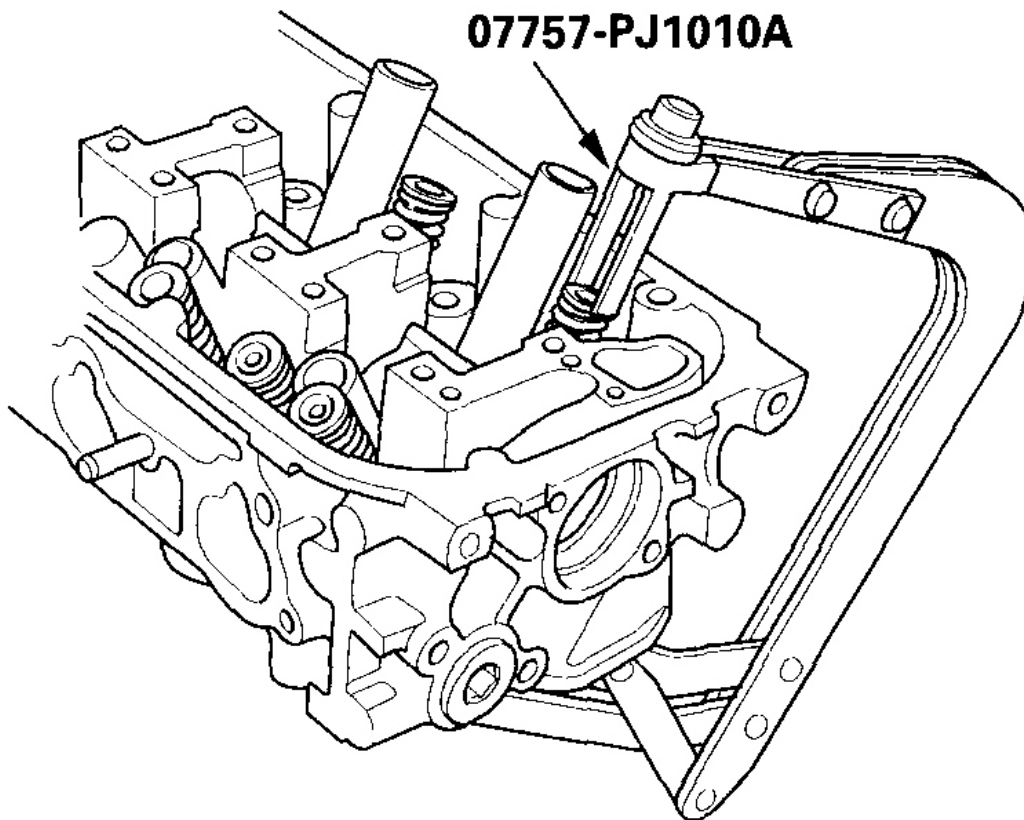
A



G03658948

Fig. 127: Installing New Valve Seals (A) Using Stem Seal Driver (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

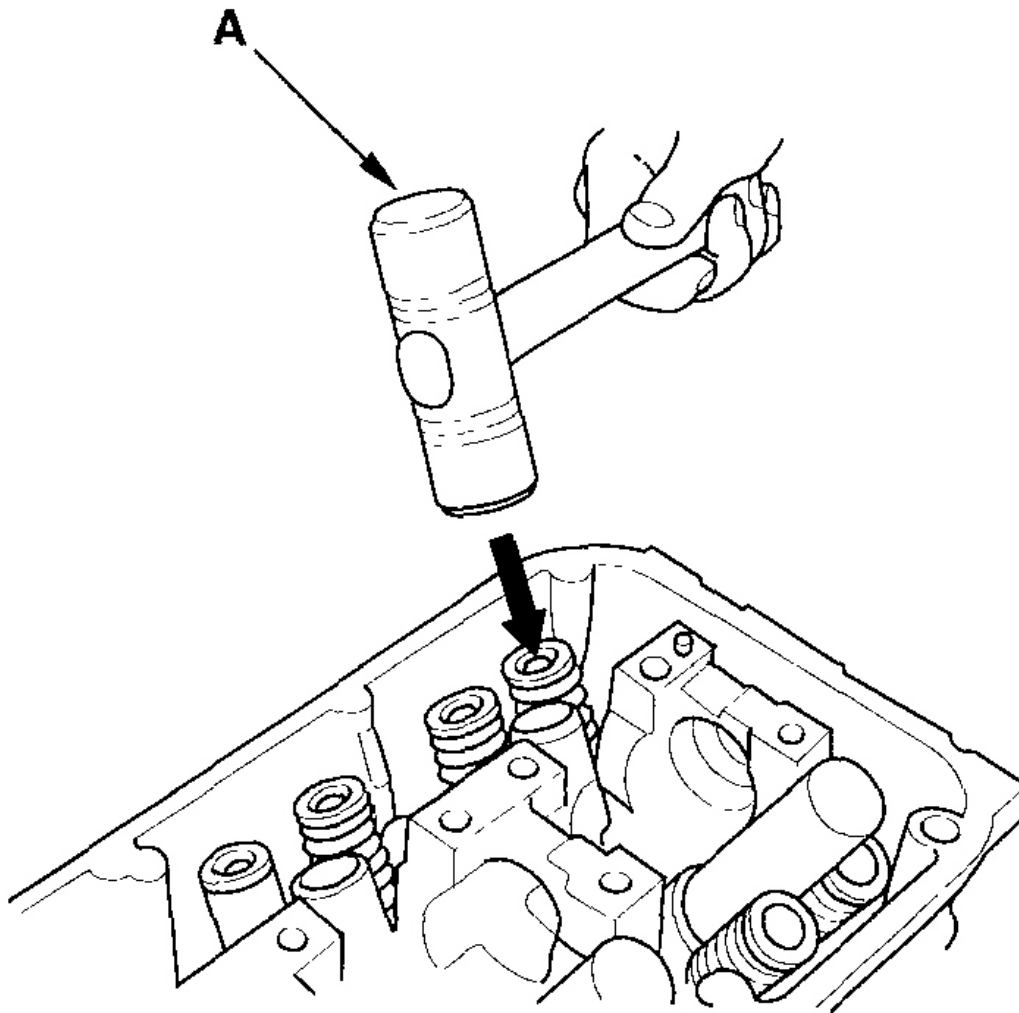
5. Install the valve spring and valve retainer. Place the end of the valve spring with closely wound coils toward the cylinder head.
6. Install the valve spring compressor attachment and valve spring compressor. Compress the spring and install the valve cotters.



G03658949

Fig. 128: Identifying Valve Spring Compressor Attachment
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

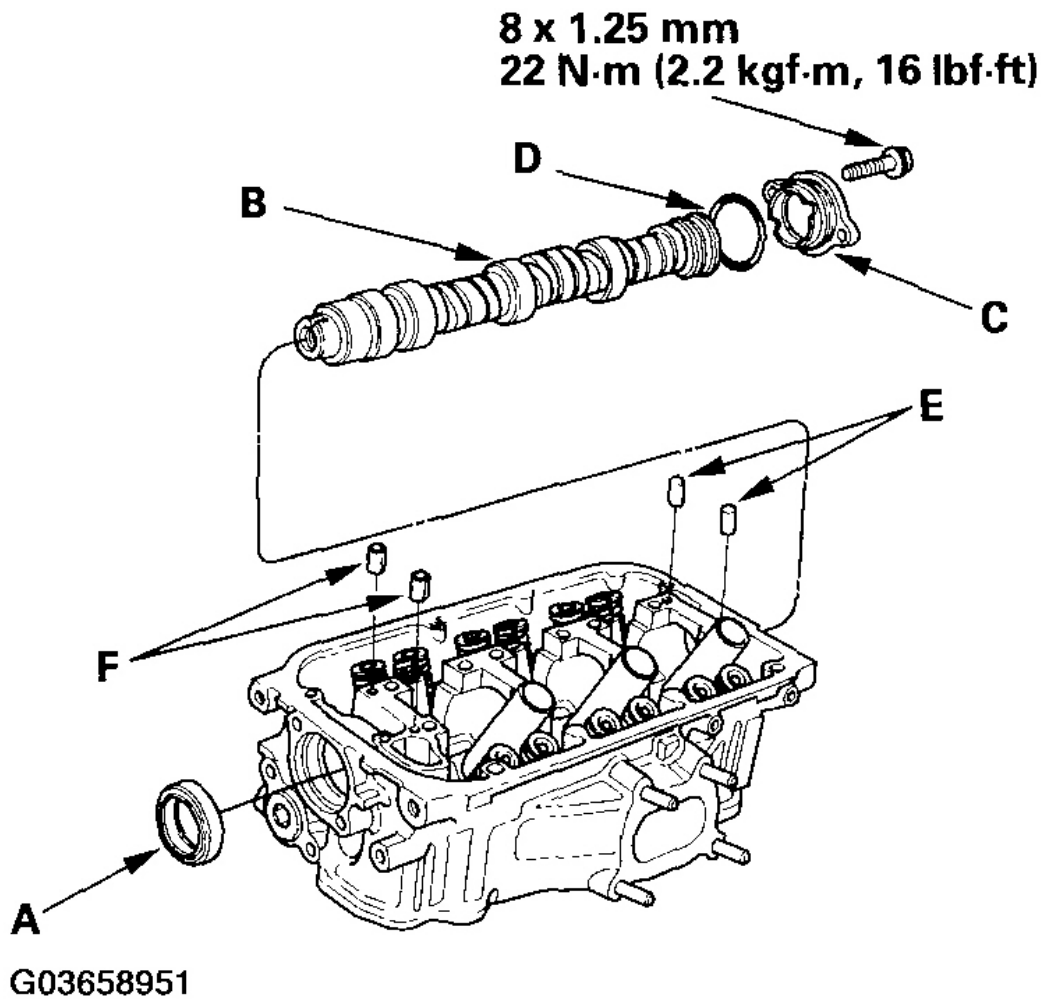


G03658950

Fig. 129: Taping End Of Valve Stem With Plastic Mallet (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

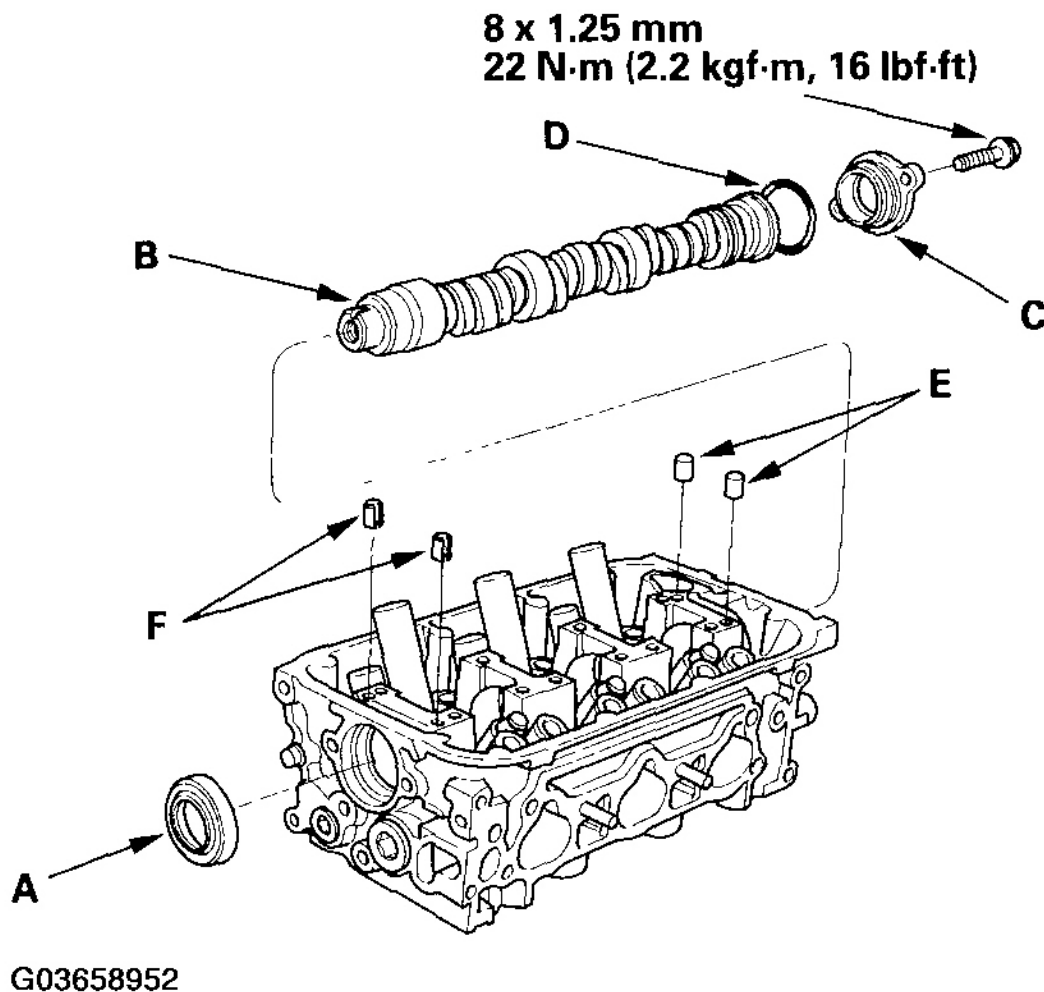
CAMSHAFT, ROCKER ARM, CAMSHAFT SEAL, AND PULLEY INSTALLATION

1. Apply a light coat of new engine oil around the camshaft oil seal.
2. Gently tap the new camshaft oil seal (A) into the cylinder head.
 - 1 Tap the camshaft oil seal in squarely.
 - 2 Install the oil seal about 0.5-1.5 mm (0.02-0.06 in.) below the surface of the cylinder head.

FRONT:**Fig. 130: Installing Oil Seal - Front**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:

**Fig. 131: Installing Oil Seal - Rear**

Courtesy of AMERICAN HONDA MOTOR CO., INC.

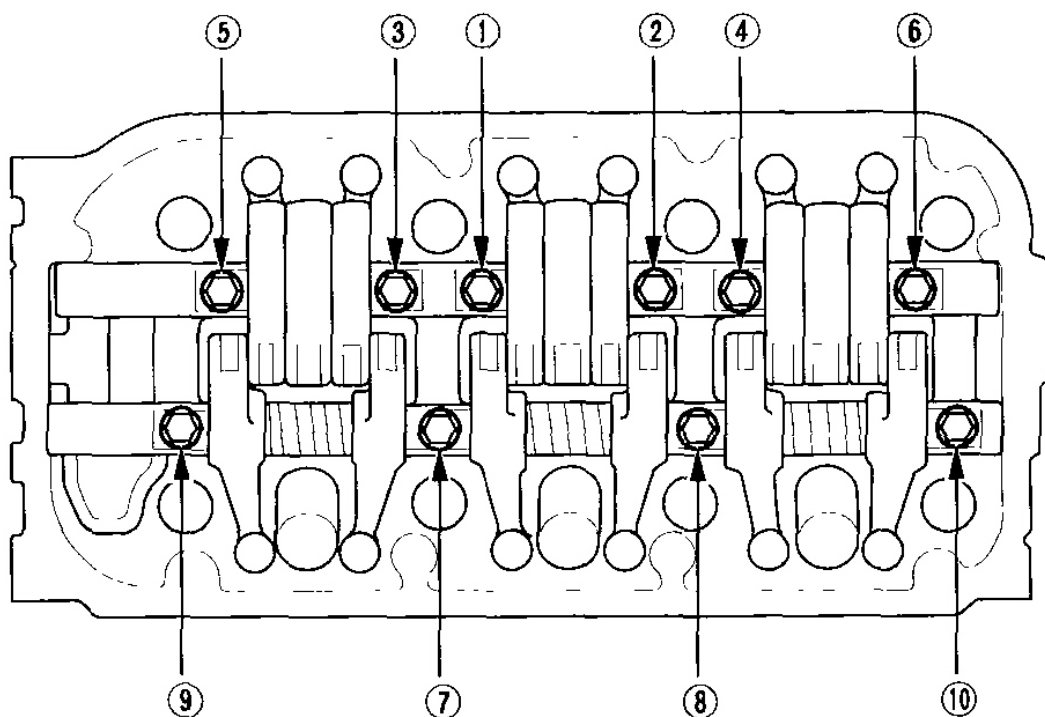
3. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and cam lobes.
4. Check that the oil seal lips are not distorted.
5. Install the solid dowel pins (E) and the hollow dowel pins (F).
6. Loosen the valve adjusting screws.
7. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see **ROCKER ARM AND SHAFT DISASSEMBLY/REASSEMBLY**).
8. Set the rocker arm assembly in place, and loosely install the bolts. Make sure that the rocker arms are properly positioned on the valve stems.
9. Tighten each bolt two turns at a time in the sequence as shown to ensure that the rockers do not bind on

the valves.

NOTE: Apply new engine oil to the threads and flange of the exhaust rocker shaft mounting bolts.

Specified Torque

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

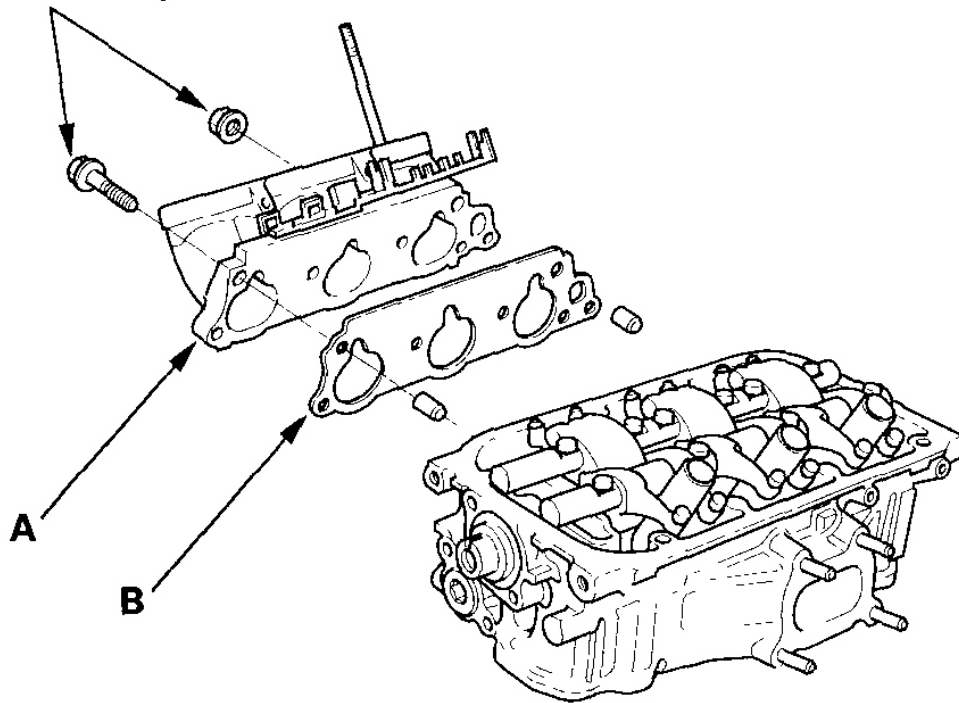


G03658953

Fig. 132: Identifying Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

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



G03658954

Fig. 133: Identifying Injector Base (A) And Gasket (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

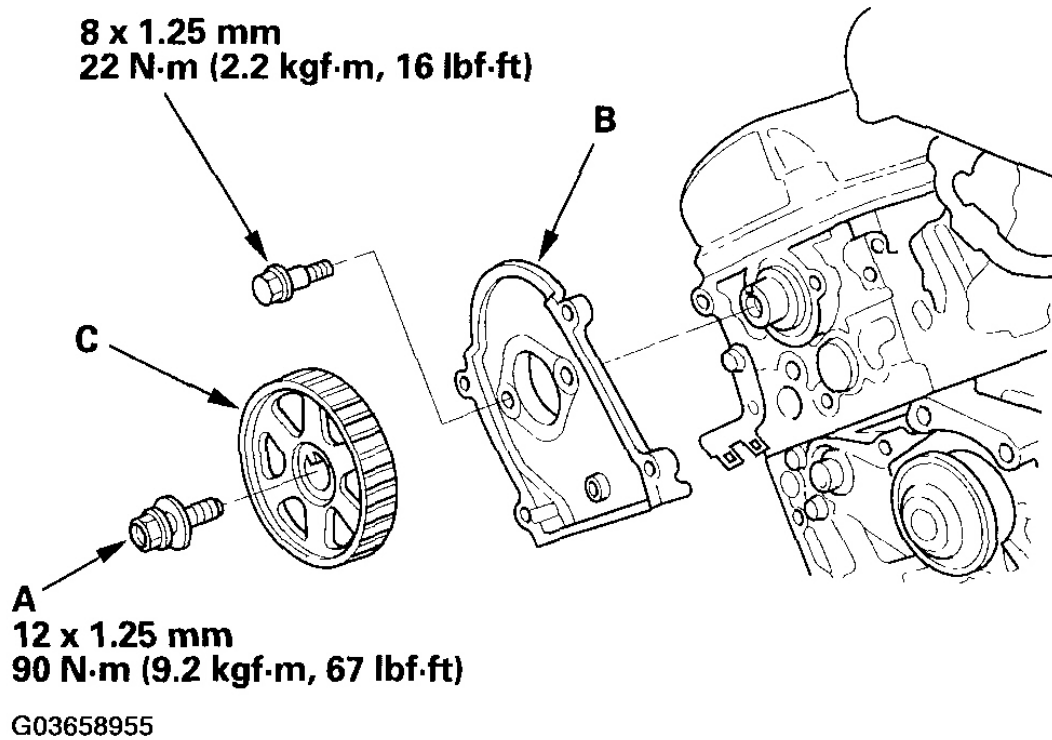


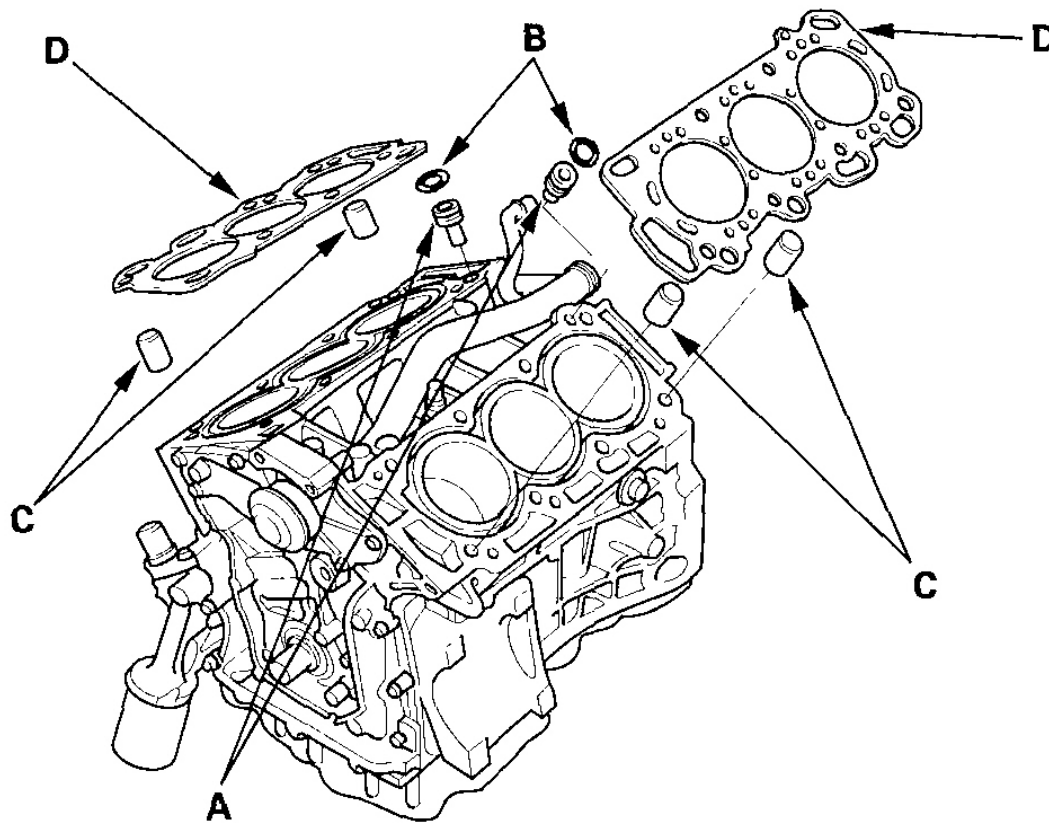
Fig. 134: Identifying Mounting Bolt (A), Back Cover (B) And Camshaft Pulley (C) With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. Set the camshaft pulleys to top dead center (TDC) before bolting them onto the engine block (see step 7).

CYLINDER HEAD INSTALLATION

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

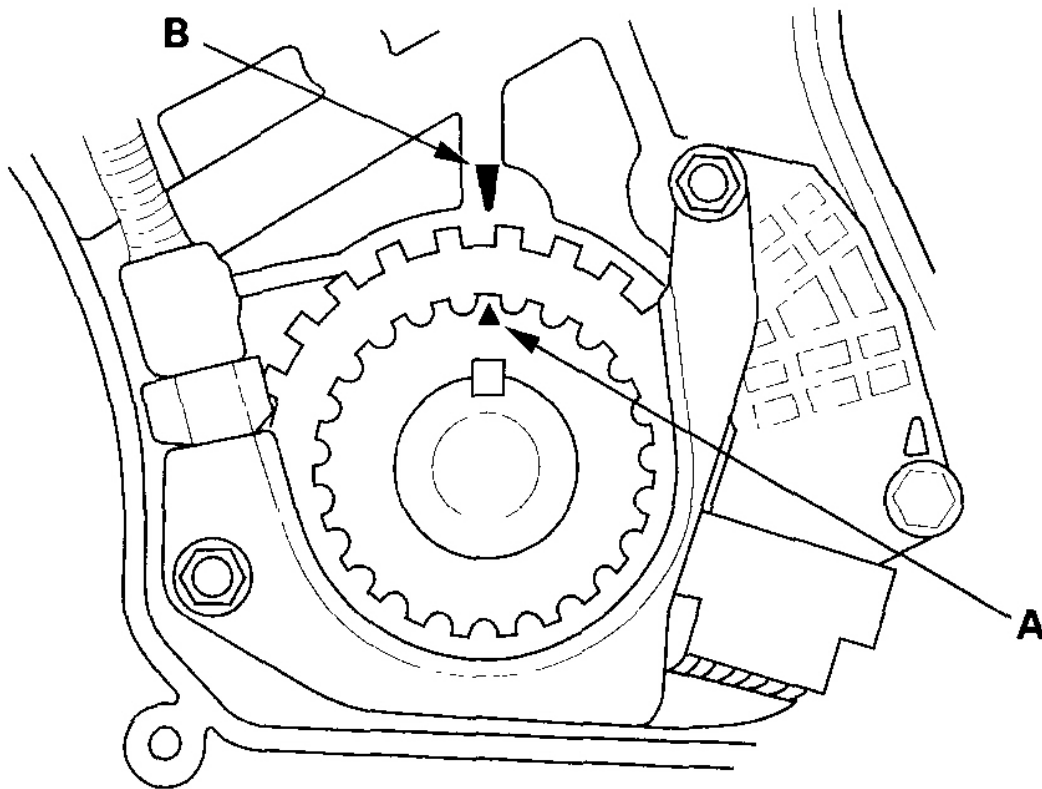


G03658956

Fig. 135: Identifying Oil Control Orifices (A), O-Rings (B), Dowel Pins (C) And Cylinder Head Gaskets (D)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

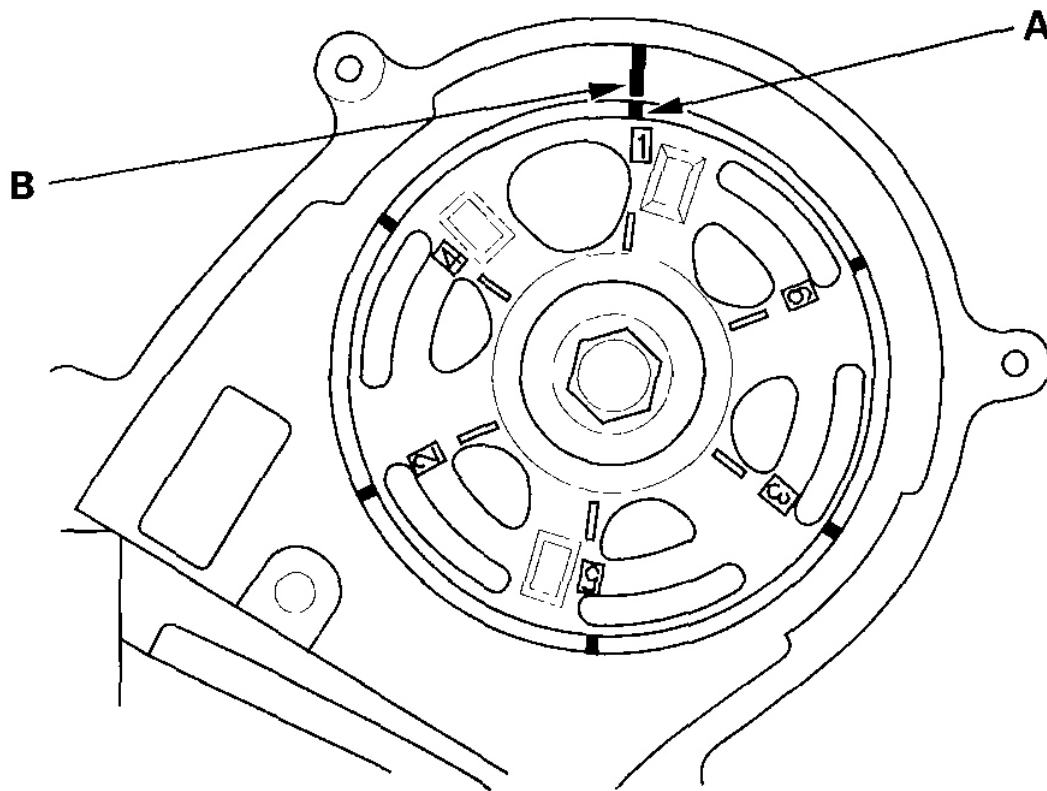


G03658957

Fig. 136: Aligning TDC Mark (A) With Pointer (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

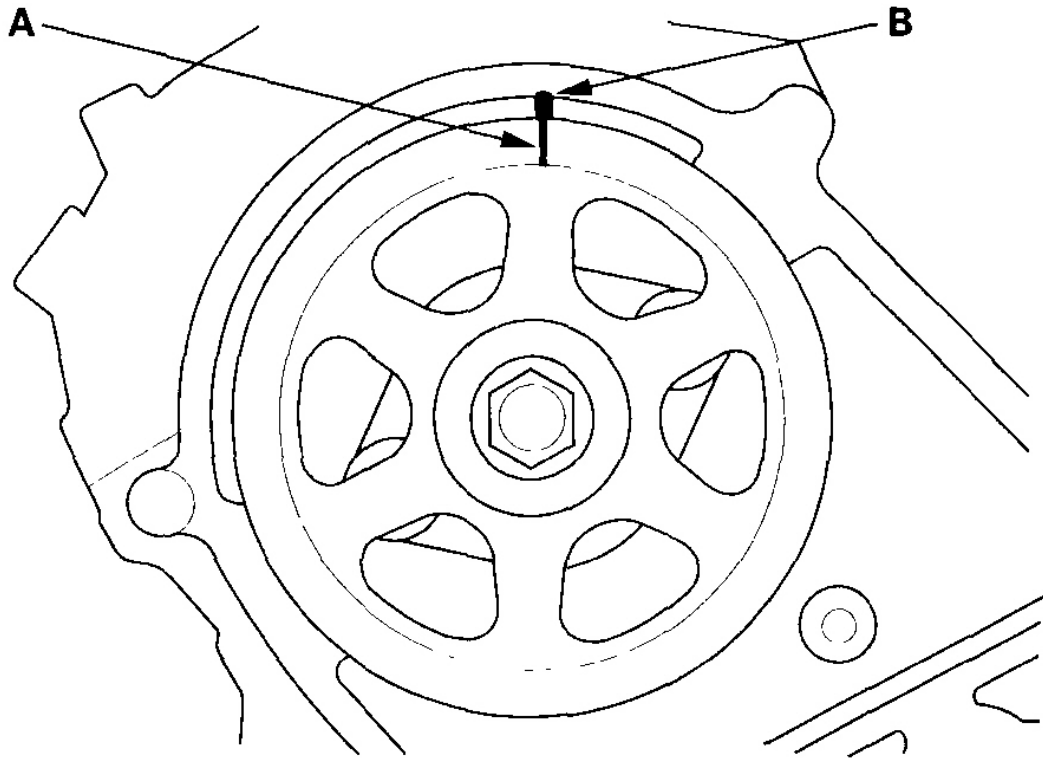
FRONT:



G03658958

Fig. 137: Aligning TDC Marks (A) With Pointers (B) - Front
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:



G03658959

Fig. 138: Aligning TDC Marks (A) With Pointers (B) - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Install the cylinder head bolts:
 - 6 point bolt: Go to step 9
 - 12 point bolt: Go to step 11.

Tightening sequence for 6 point bolts

9. Apply new engine oil to the threads and flanges of the cylinder head bolts.
10. Tighten the cylinder head bolts sequentially in three steps, then go to step 16.

NOTE: Perform each step twice.

1st Step Torque:

39 N.m (4.0 kgf.m, 29 lbf.ft)

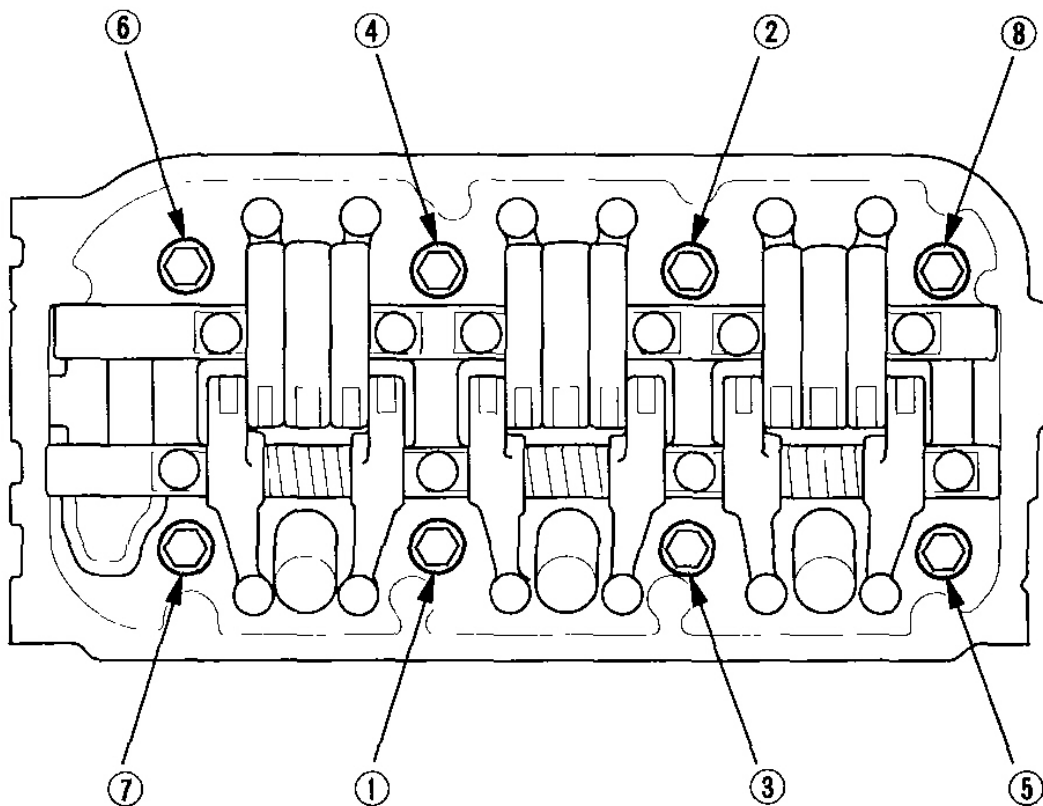
2nd Step Torque:

69 N.m (7.0 kgf.m, 51 lbf.ft)

3rd Step Torque:

98.1 N.m (10.0 kgf.m, 72.3 lbf-ft)

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

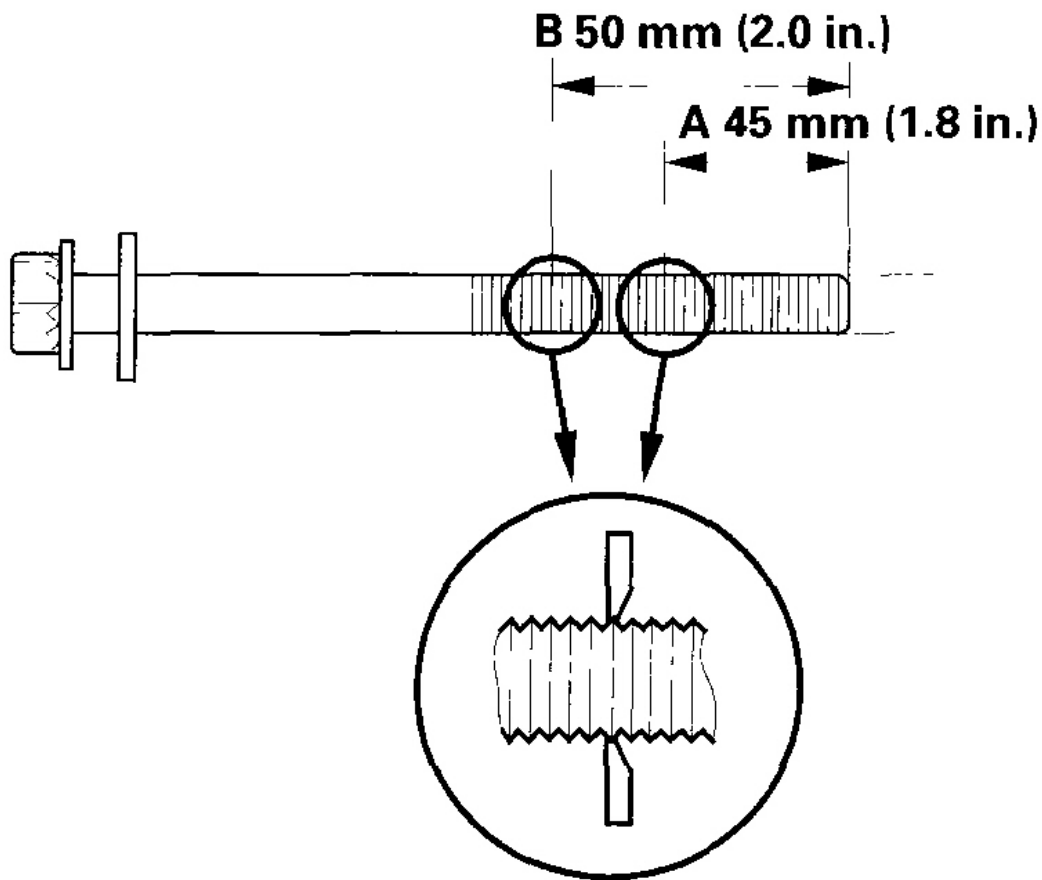


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Fig. 139: Identifying Tightening Sequence For 6 Point Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Tightening sequence for 12 point bolts

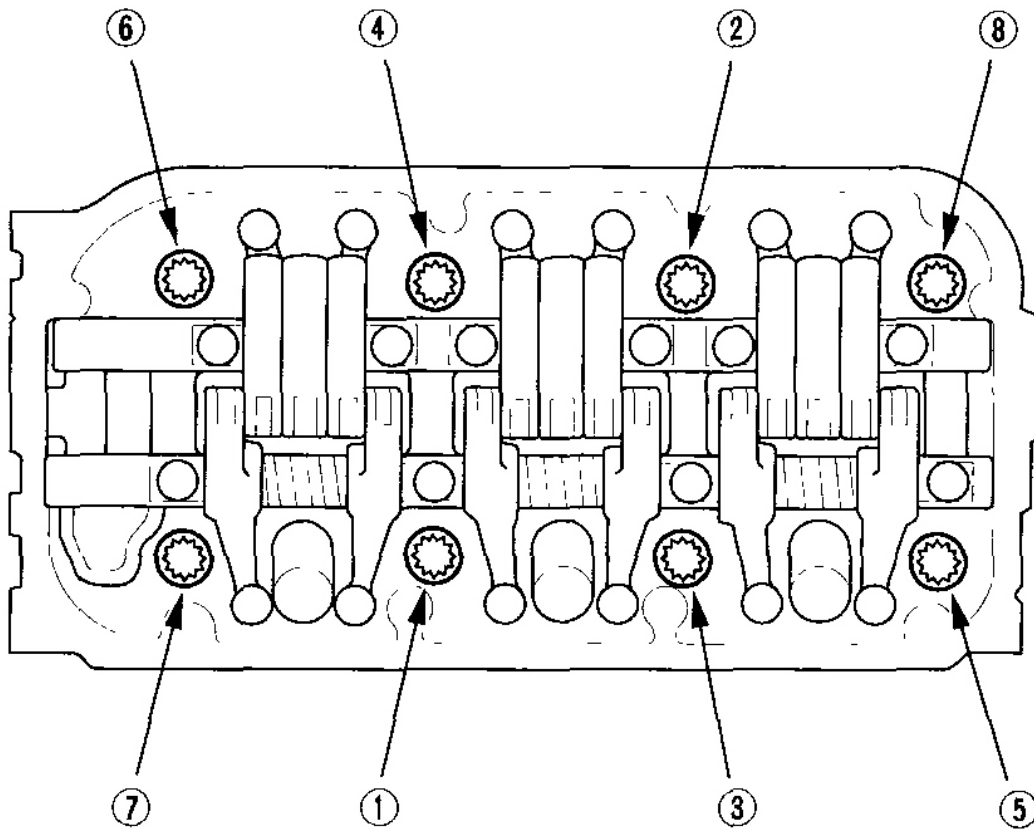
11. Measure the diameter of each cylinder head bolt at point A and point B.



G03658961

Fig. 140: Measuring Diameter Of Cylinder Head Bolt At Points A And B
Courtesy of AMERICAN HONDA MOTOR CO., INC.

12. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.
13. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
14. Tighten the cylinder head bolts in sequence to 29 N.m (30 kgf.m, 22 lbf.ft). Use a beam-type torque wrench. When using a preset-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.

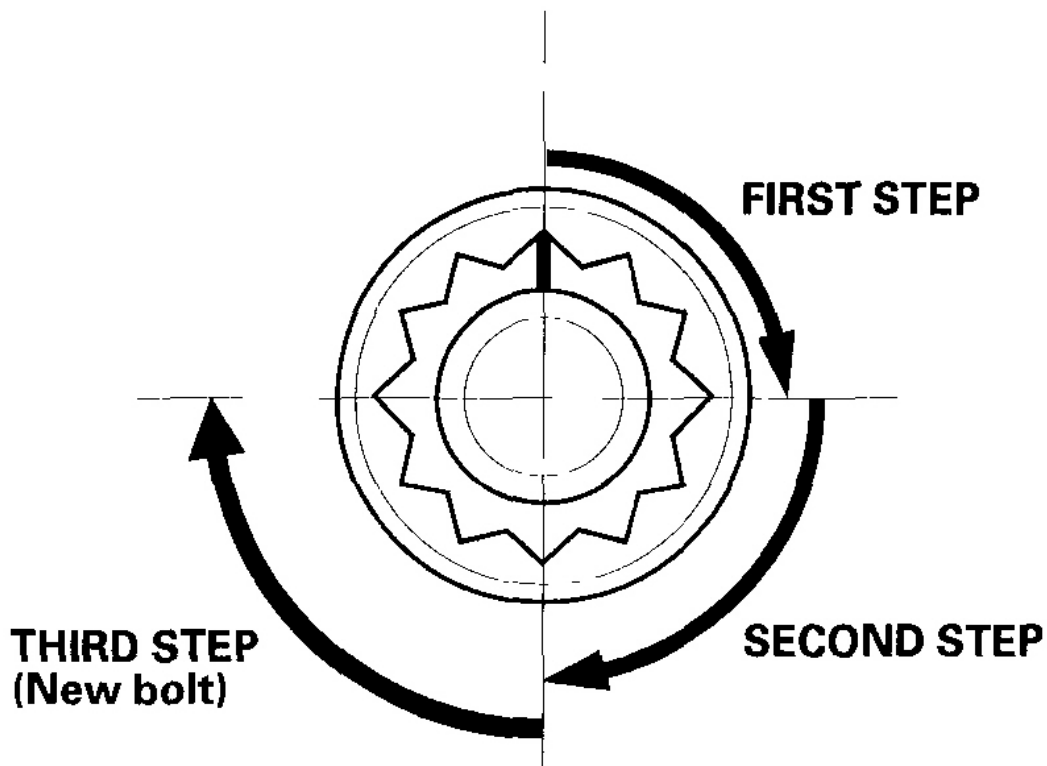


G03658962

Fig. 141: Identifying Tightening Sequence For 12 Point Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

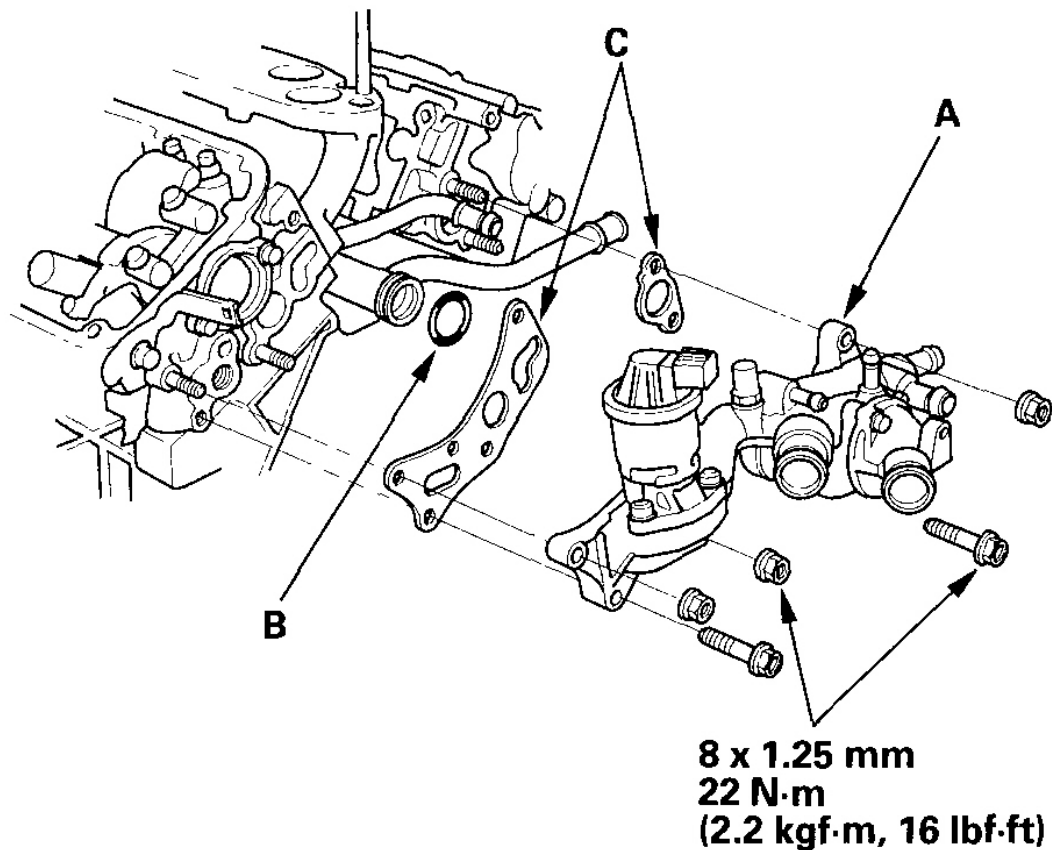
NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angel, and go back to step 11 of the procedure. Do not loosen it back to the specified angel.



G03658963

Fig. 142: Identifying Cylinder Head Bolt Tightening Steps
Courtesy of AMERICAN HONDA MOTOR CO., INC.

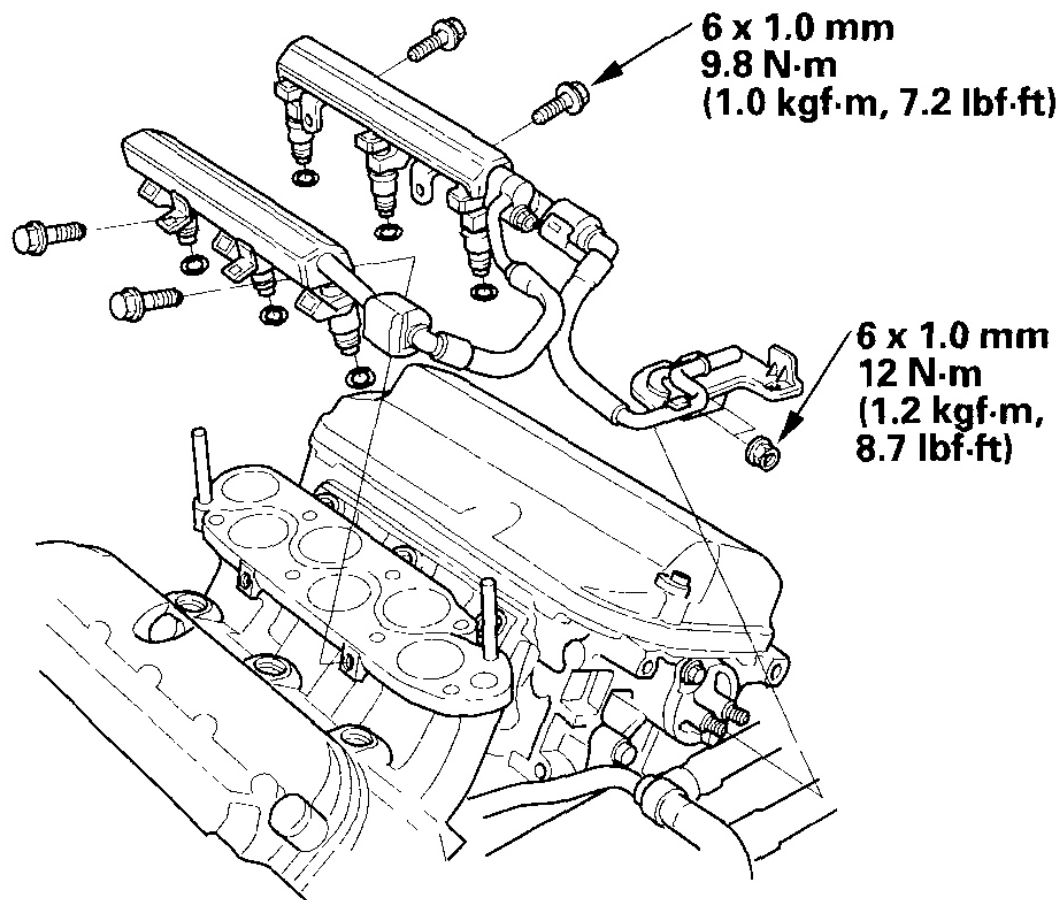
16. Install the timing belt (see **TIMING BELT INSTALLATION**).
17. Adjust the valve clearance (see **VALVE CLEARANCE ADJUSTMENT**).
18. Install the cylinder head covers (see **CYLINDER HEAD COVER INSTALLATION**).
19. Install the water passage (A). Always use a new O-ring (B) and new gaskets (C).



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Fig. 143: Identifying Water Passage (A), O-Ring (B) And Gaskets (C) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

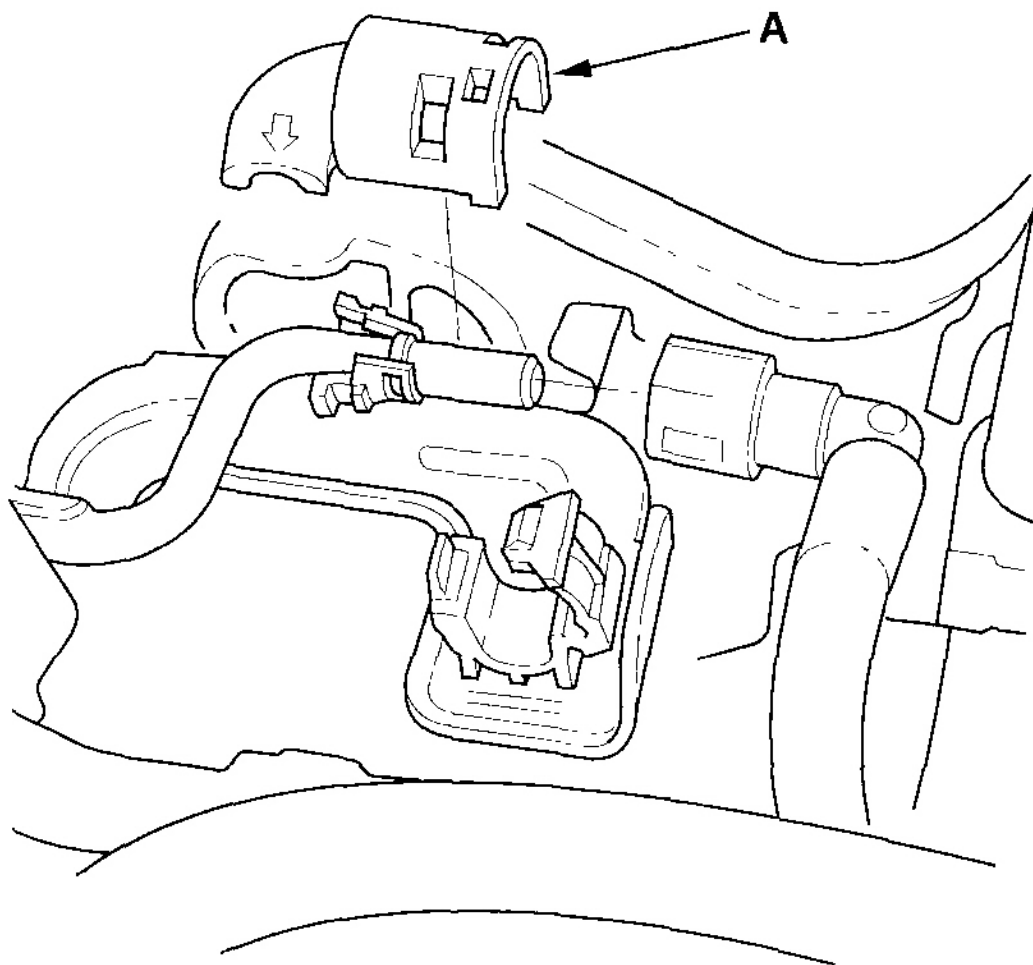
20. Install the front and rear warm up three way catalytic converter (WU-TWC) (see **WARM UP TWC REMOVAL/INSTALLATION**).
21. Set the new O-rings to the injectors, then install the fuel rails.



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Fig. 144: Setting O-Rings To Injectors And Installing Fuel Rails With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

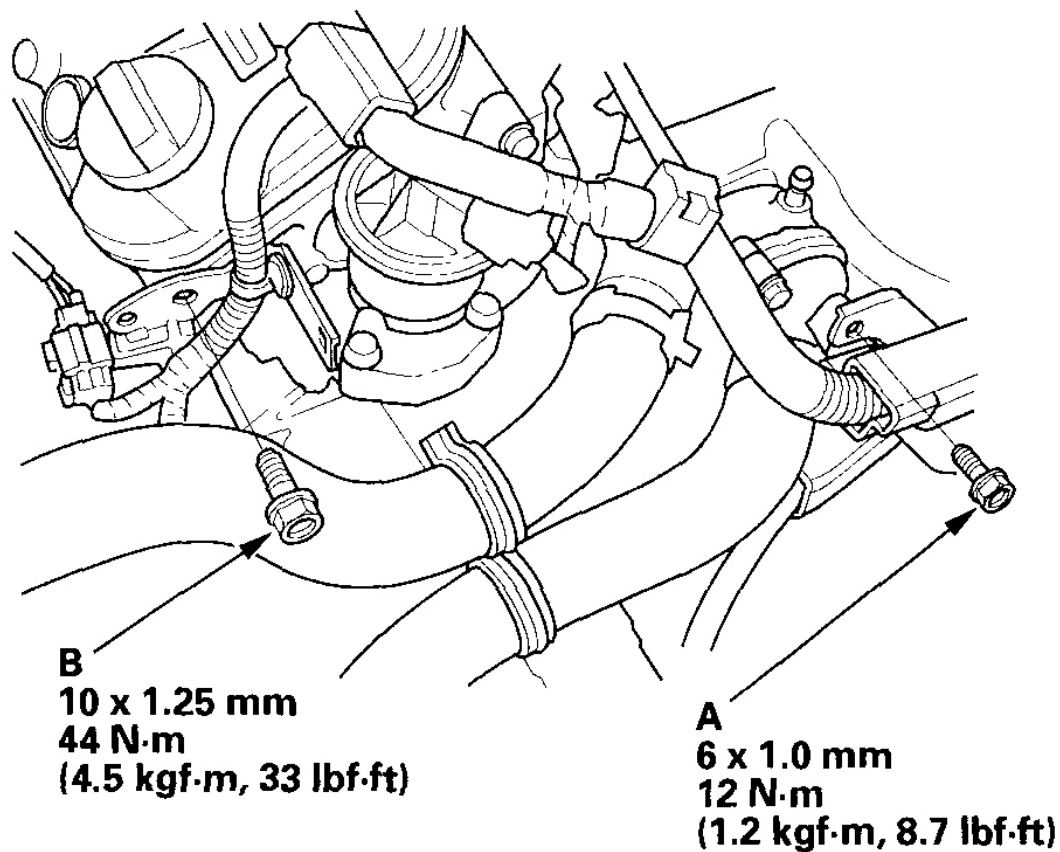
22. Connect the fuel feed hose (see **FUEL LINE/QUICK-CONNECT FITTING INSTALLATION**), then install the quick-connect fitting cover (A).



G03658966

Fig. 145: Installing Quick-Connect Fitting Cover (A)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Tighten the bolt (A) securing the harness holder.

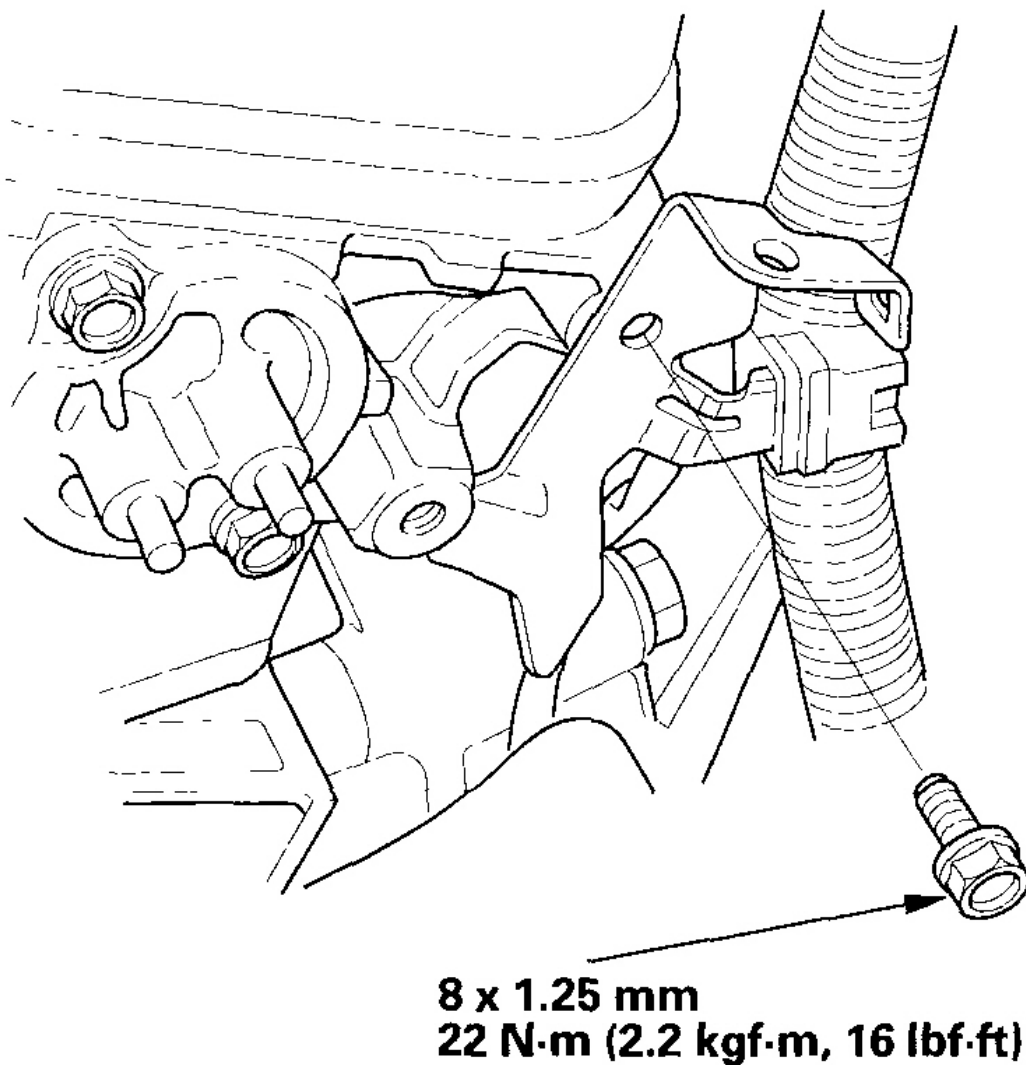


G03658967

Fig. 146: Identifying Harness Holder Bolt (A) And Harness Bracket Bolt (B) With Torque Specifications

Courtesy of AMERICAN HONDA MOTOR CO., INC.

24. Tighten the bolt (B) securing the harness bracket.
25. Tighten the bolt securing the harness bracket.

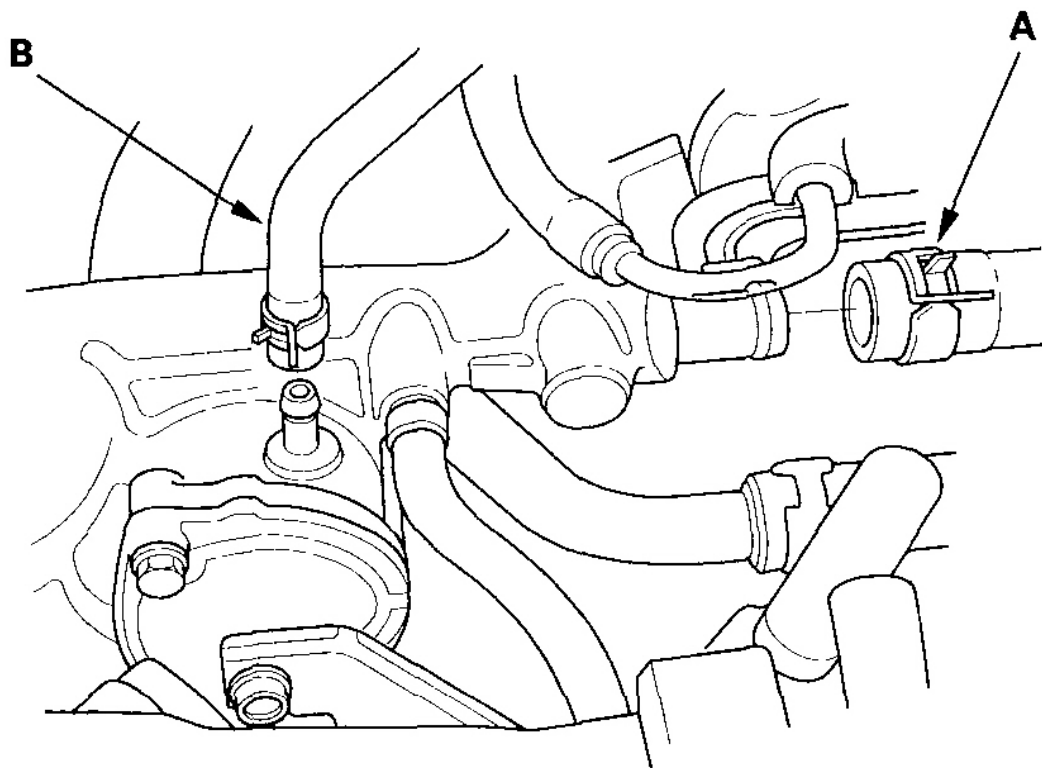


G03658968

Fig. 147: Identifying Harness Bracket Bolt With Torque Specifications With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

26. Install the heater hose (A) and water bypass hose(s) (B).

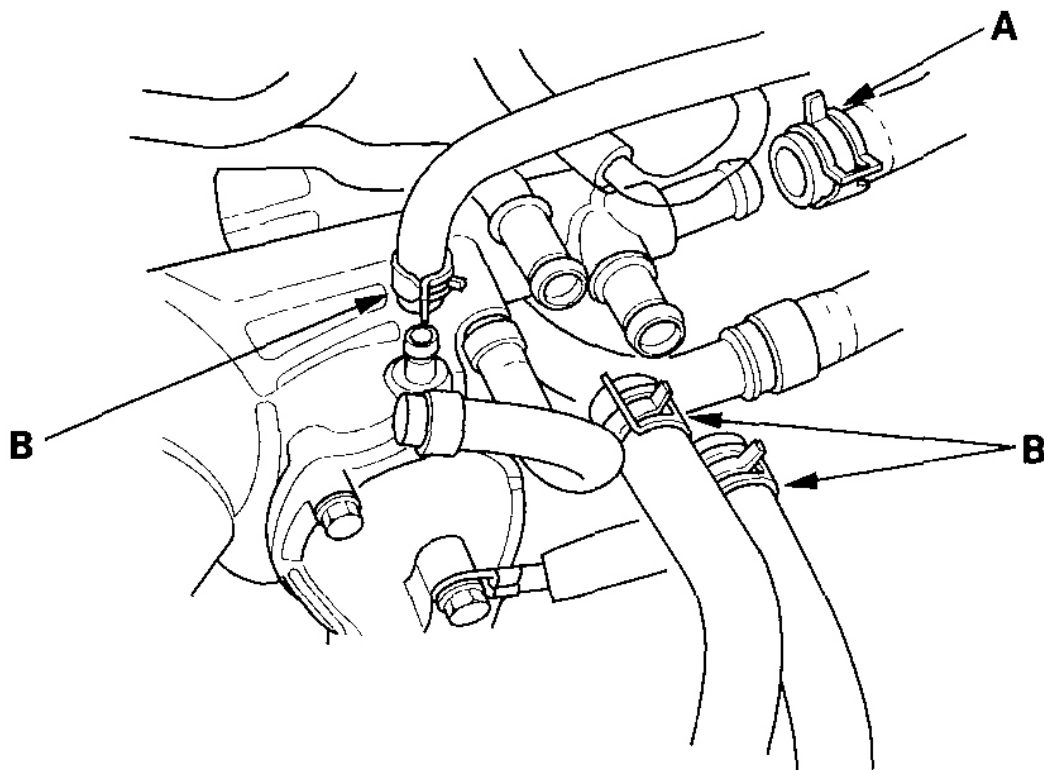
M/T model:



G03658969

Fig. 148: Installing Heater Hose (A) And Water Bypass Hose (B) - M/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

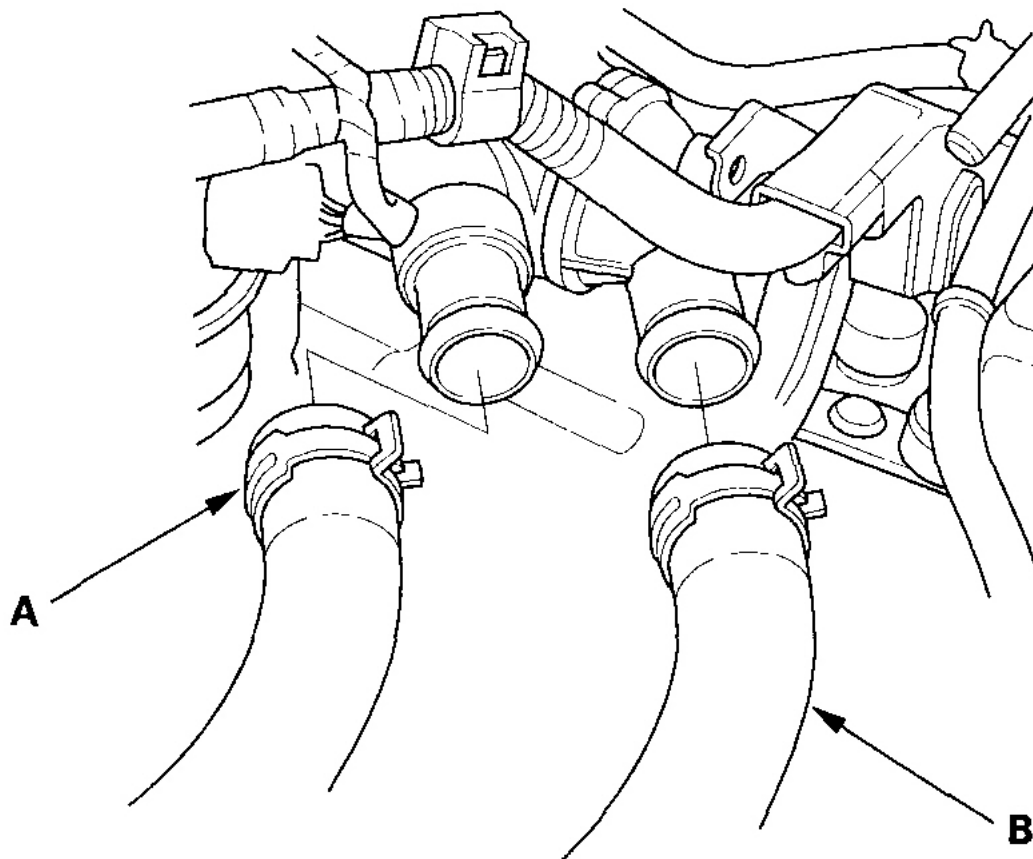
A/T model:



G03658970

Fig. 149: Installing Heater Hose (A) And Water Bypass Hoses (B) - A/T Model
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

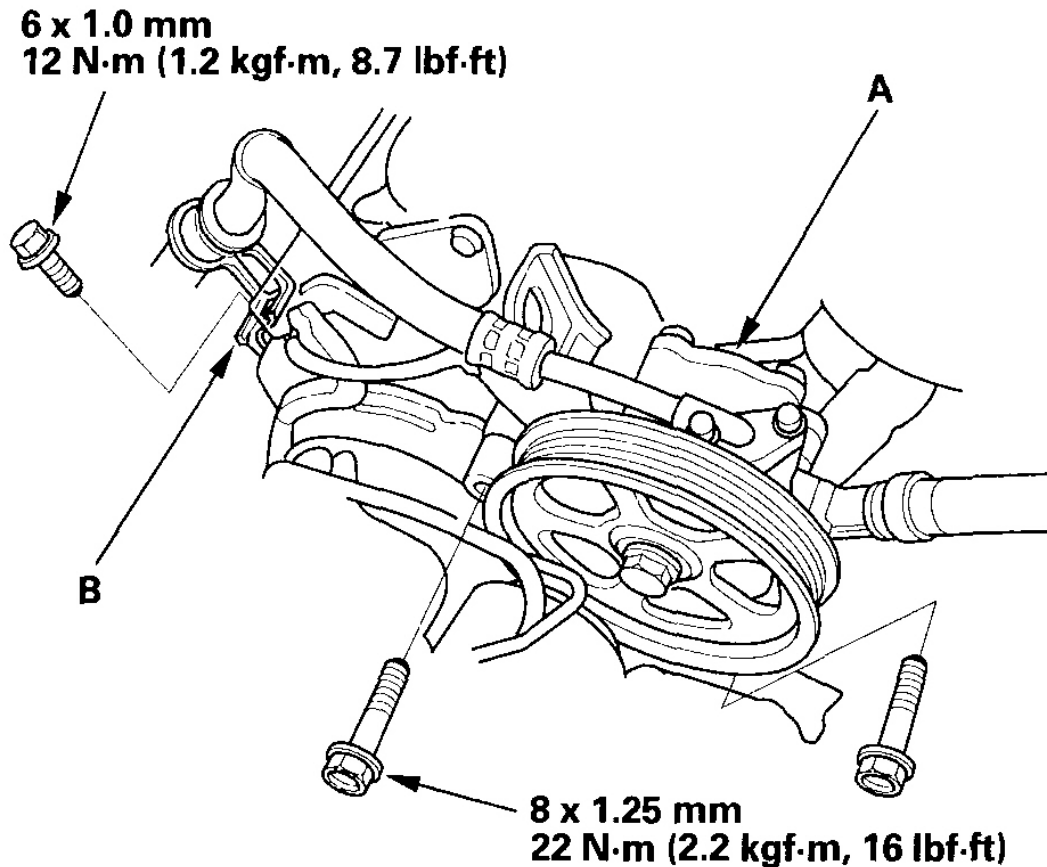


G03658971

Fig. 150: Installing Upper Radiator Hose (A) And Lower Radiator Hose (B)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

28. Install the engine wire harness connectors and wire harness clamps to the cylinder head.
- Six injector connectors
 - Engine coolant temperature (ECT) sensor connector
 - Camshaft position (CMP) sensor connector
 - Crankshaft position (CKP) sensor A/B connector
 - Exhaust gas recirculation (EGR) valve connector
 - Rocker arm oil control solenoid (VTEC solenoid valve) connector
 - Rocker arm oil pressure switch (VTEC oil pressure switch) connector
 - Oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors

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



G03658972

Fig. 151: Identifying P/S Pump (A) And P/S Hose Bracket (B) With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

30. Install the six ignition coils (see **IGNITION COIL REMOVAL/INSTALLATION**).
31. Install the intake manifold (see **INSTALLATION**).
32. Install the alternator (see **ALTERNATOR REMOVAL AND INSTALLATION**).
33. Install the drive belt (see **DRIVE BELT INSPECTION**).
34. Clean the battery posts and cable terminals with sandpaper. Assemble them and apply grease to prevent corrosion.
35. After installation, check that all tubes, hoses and connectors are installed correctly.
36. Inspect for fuel leaks. Turn the ignition switch ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.

37. Refill the radiator with engine coolant, and bleed air from the cooling system with the heater valve open (see step 8 on **COOLANT CHECK**).
38. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see **CRANK (CKP) PATTERN CLEAR/CRANK (CKP) PATTERN LEARN**).
39. Inspect the idle speed (see **IDLE SPEED INSPECTION**).
40. Inspect the ignition timing (see **IGNITION TIMING INSPECTION**).
41. Enter the anti-theft codes for the radio and the navigation system, then enter the audio presets.
42. Set the clock.

CAMSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

Camshaft oil seal driver 07PAF-0030100

1. Remove the timing belt (see **TIMING BELT REMOVAL**).
2. Remove the camshaft pulley and back cover (see step 21).
3. Remove the camshaft oil seal.
4. Dry the camshaft oil seal housing.
5. Apply a light coat of multipurpose grease to the lip of the camshaft oil seal.
6. Using the special tool (A), washer (B), and a 12 x 75 x 1.25 mm bolt (C), press in the camshaft oil seal (D) about 0.5-1.5 mm (0.02-0.06 in.) below the surface of the cylinder head.

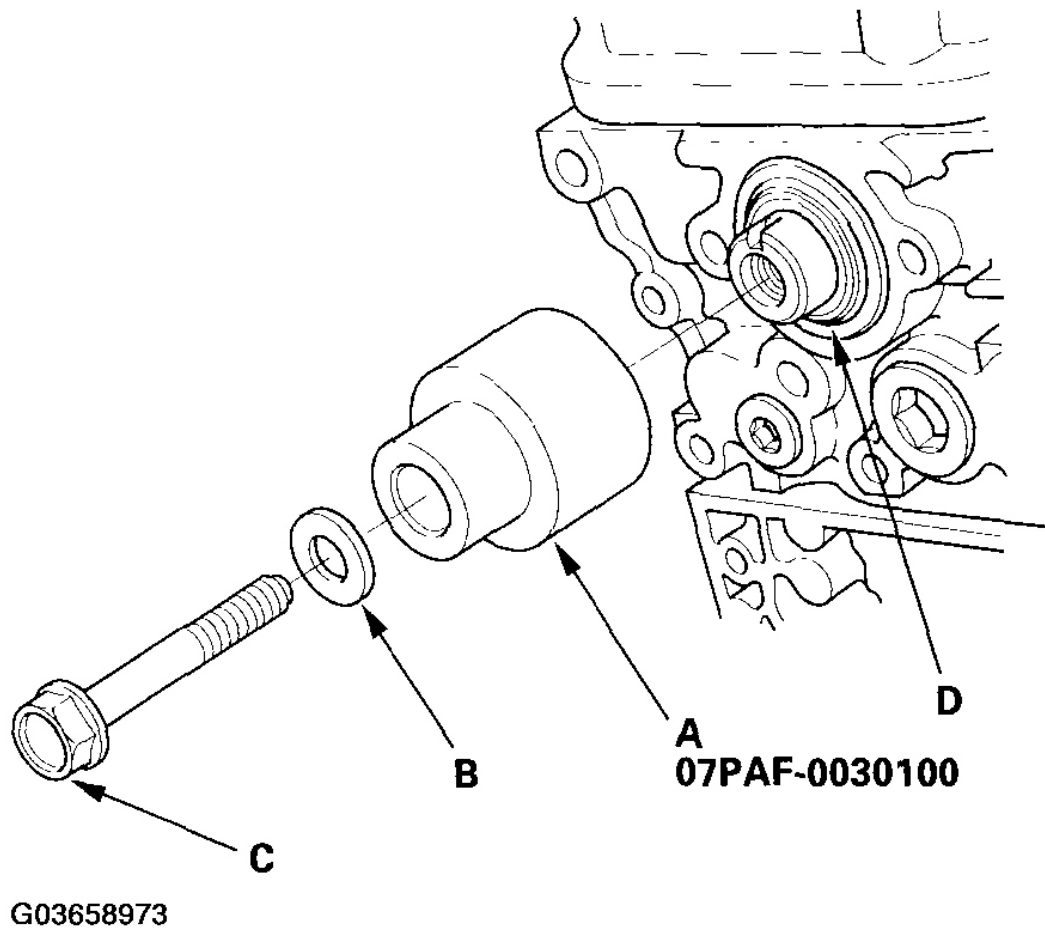


Fig. 152: Identifying Special Tool (A), Washer (B), Bolt (C) And Camshaft Oil Seal (D)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Apply new engine oil to the threads of the camshaft pulley mounting bolt. Install the back cover, then install the camshaft pulley (see step 11).
8. Install the timing belt (see **TIMING BELT INSTALLATION**).

SEALING BOLT INSTALLATION

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

FRONT:

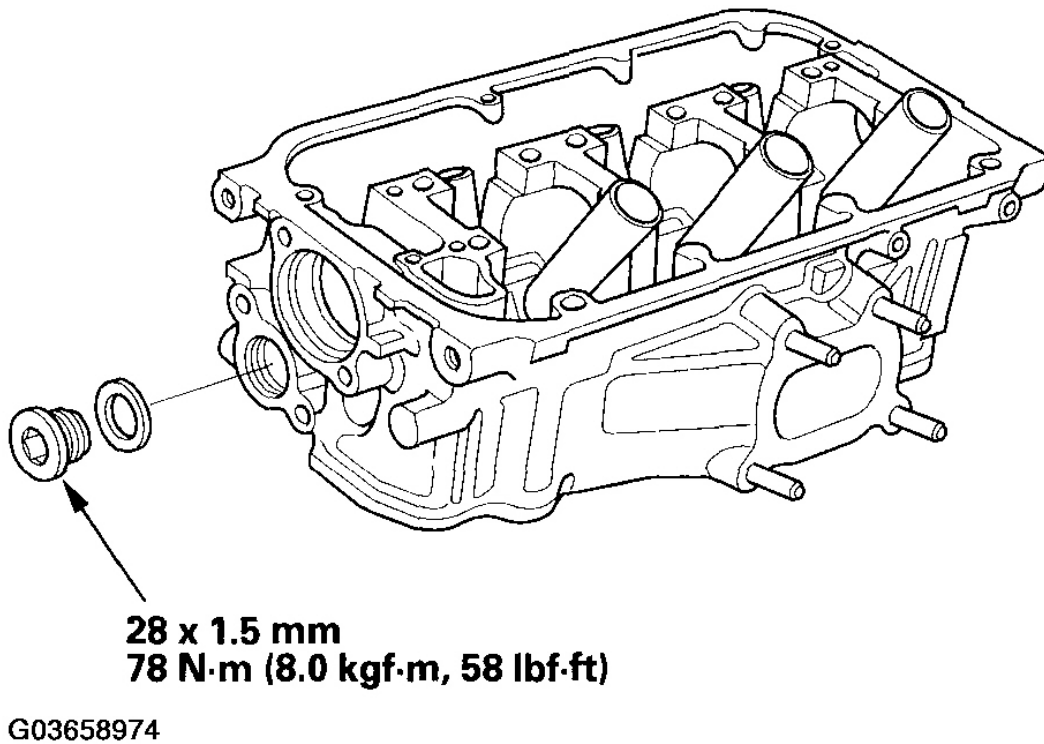
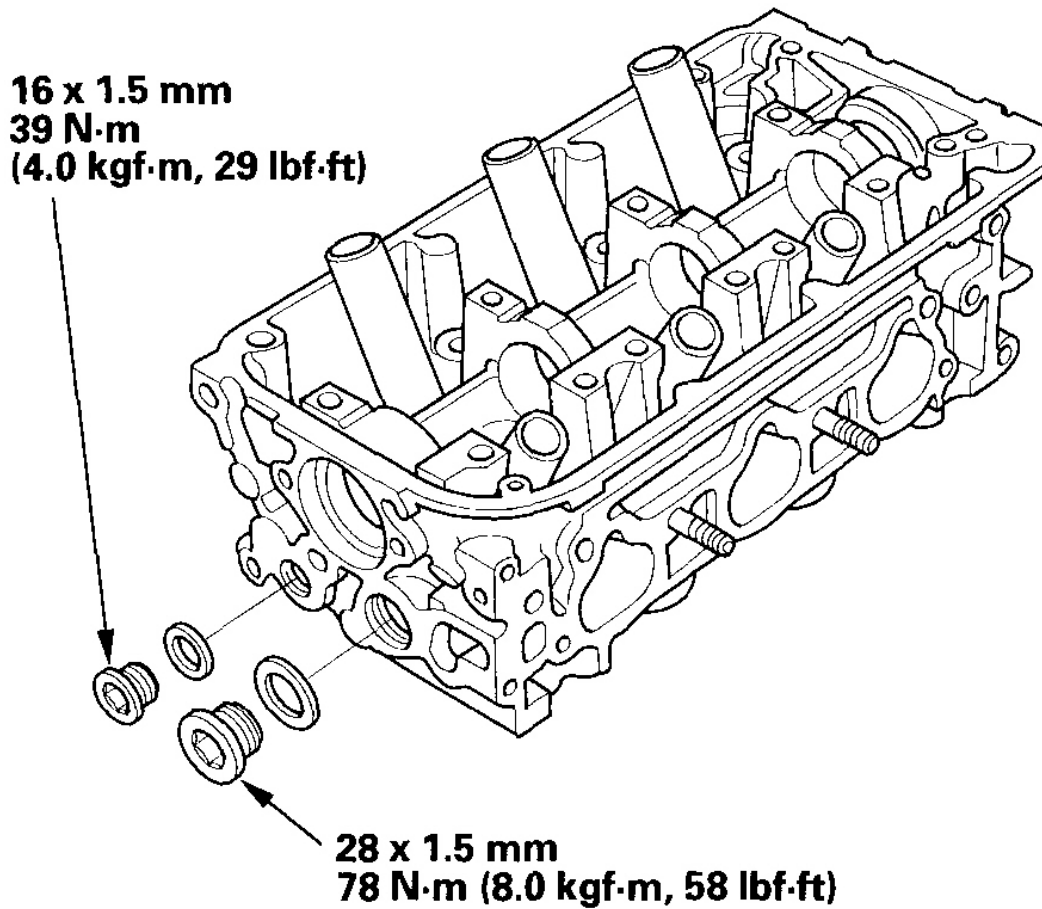


Fig. 153: Identifying Sealing Bolt And Washer With Torque Specifications - Front
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR:



G03658975

Fig. 154: Identifying Sealing Bolts And Washers With Torque Specifications - Rear
Courtesy of AMERICAN HONDA MOTOR CO., INC.

2004 Acura TL

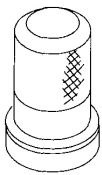
2006 ENGINE Engine Block - TL

2006 ENGINE

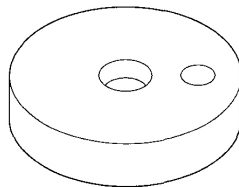
Engine Block - TL

SPECIAL TOOLS

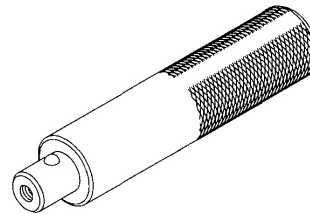
Ref. No.	Tool Number	Description	Qty
①	070AD-RCAA100	Oil Seal Driver, 64 mm	1
②	070AD-RCAA200	Driver Attachment, 106 mm	1
③	07749-0010000	Driver	1



①



②



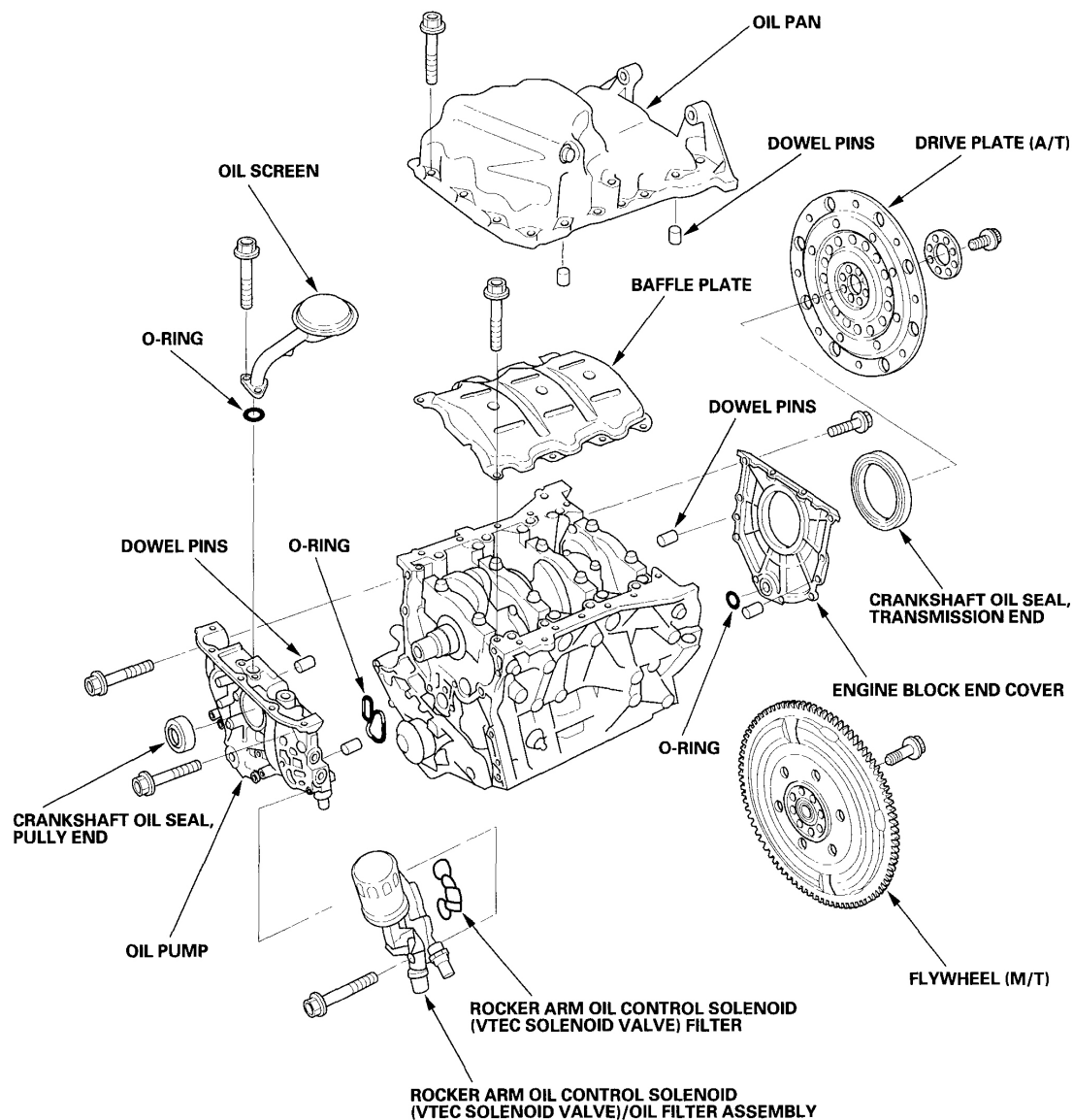
③

G03658976

Fig. 1: Identifying Special Tool

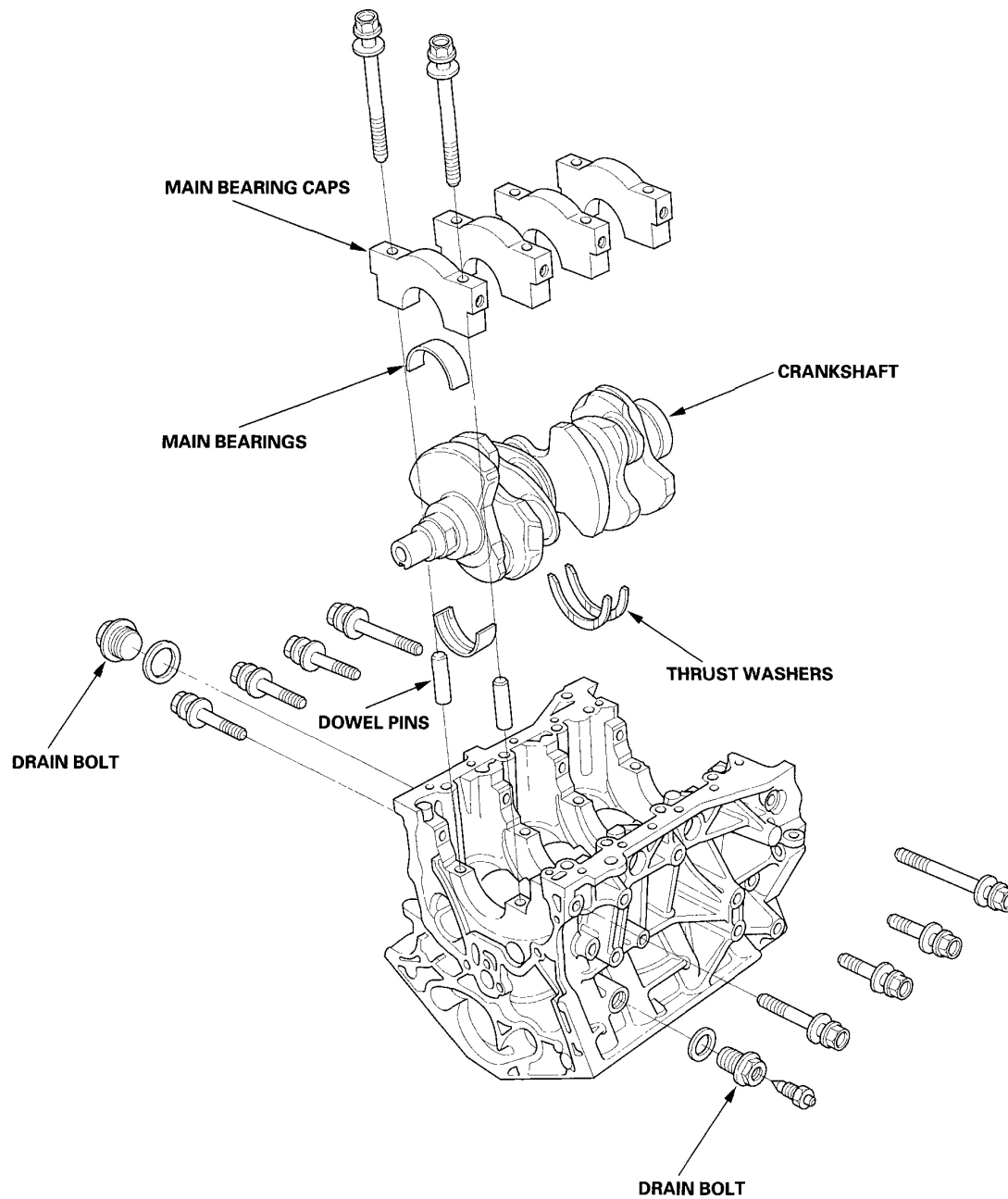
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COMPONENT LOCATION INDEX



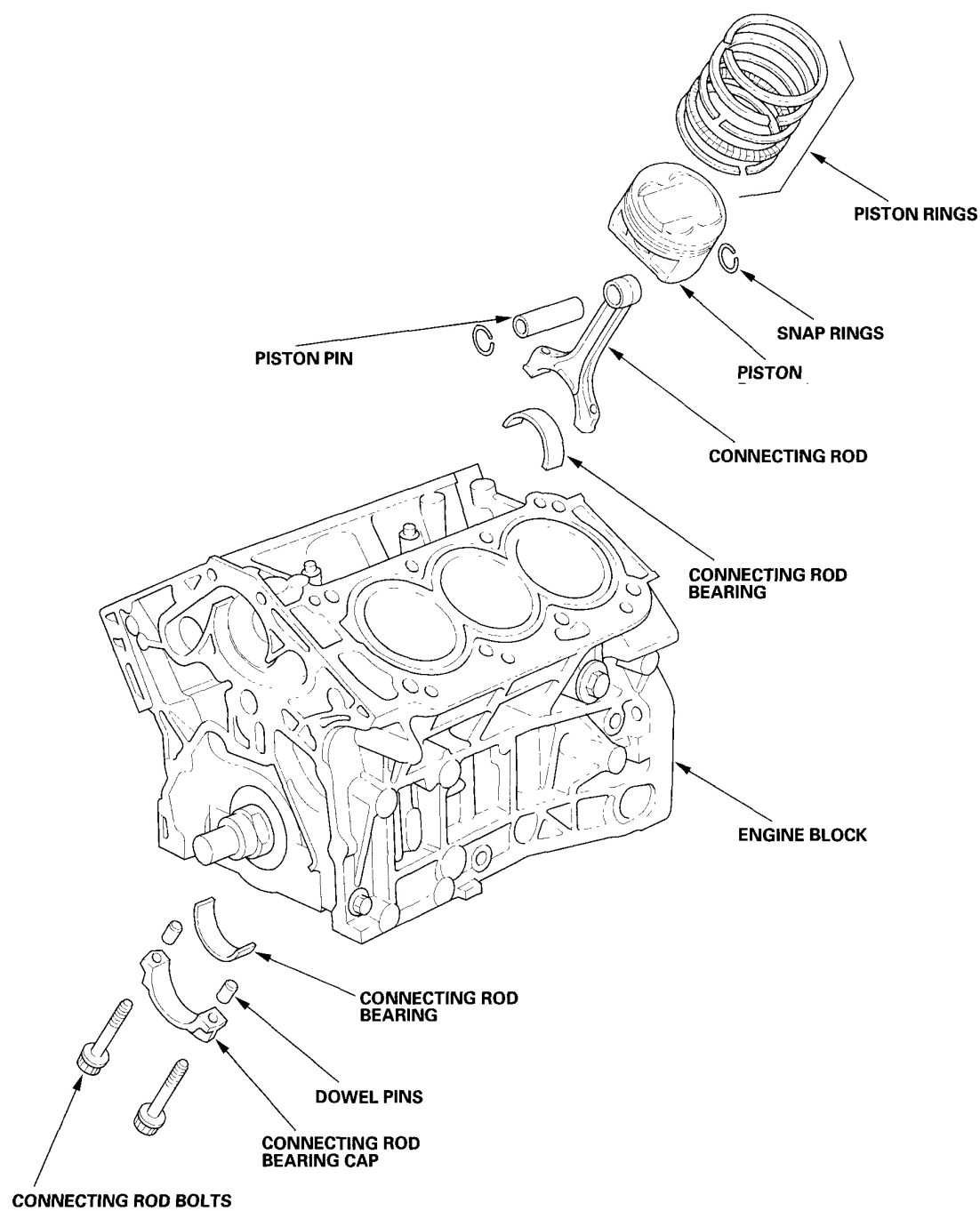
G03658977

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



G03658978

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



G03658979

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

CONNECTING ROD AND CRANKSHAFT END PLAY INSPECTION

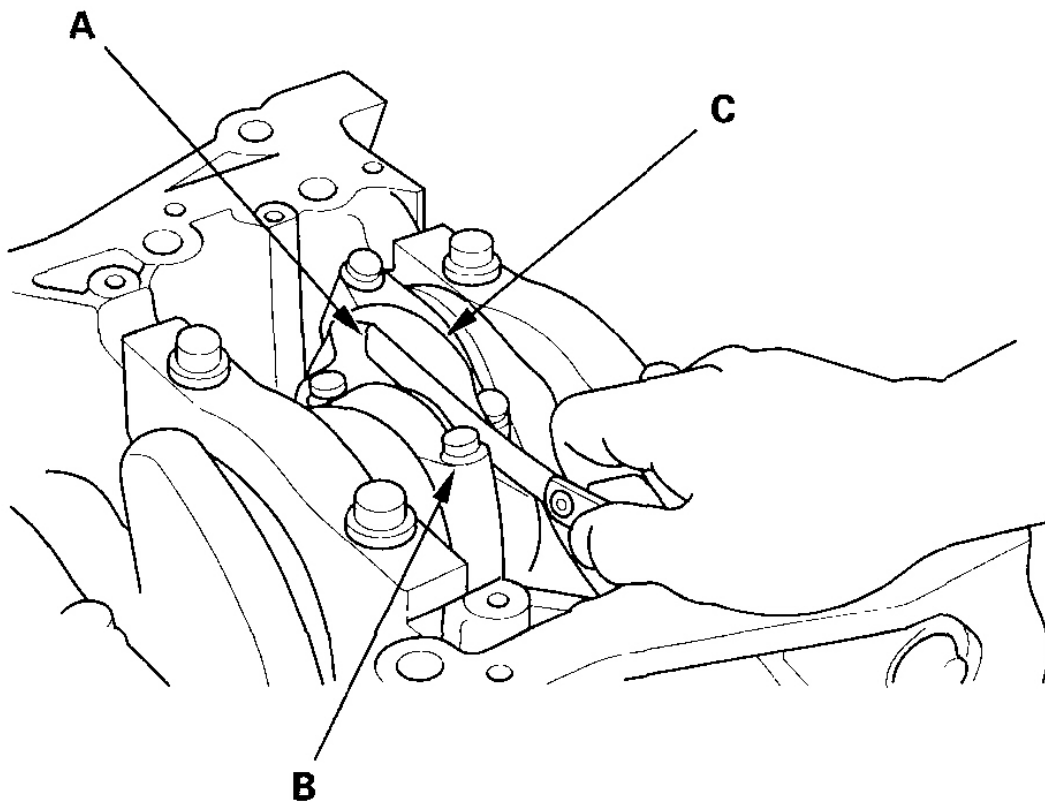
1. Remove the oil pump (see **REMOVAL**).

2. Remove the baffle plate (see step 11).
3. Measure the connecting rod end play with a feeler gauge (A) between the connecting rod (B) and crankshaft (C).

Connecting Rod End Play

Standard (New): 0.15-0.35 mm (0.006-0.014 in.)

Service Limit: 0.45 mm (0.018 in.)



G03658980

Fig. 5: Measuring Connecting Rod End Play

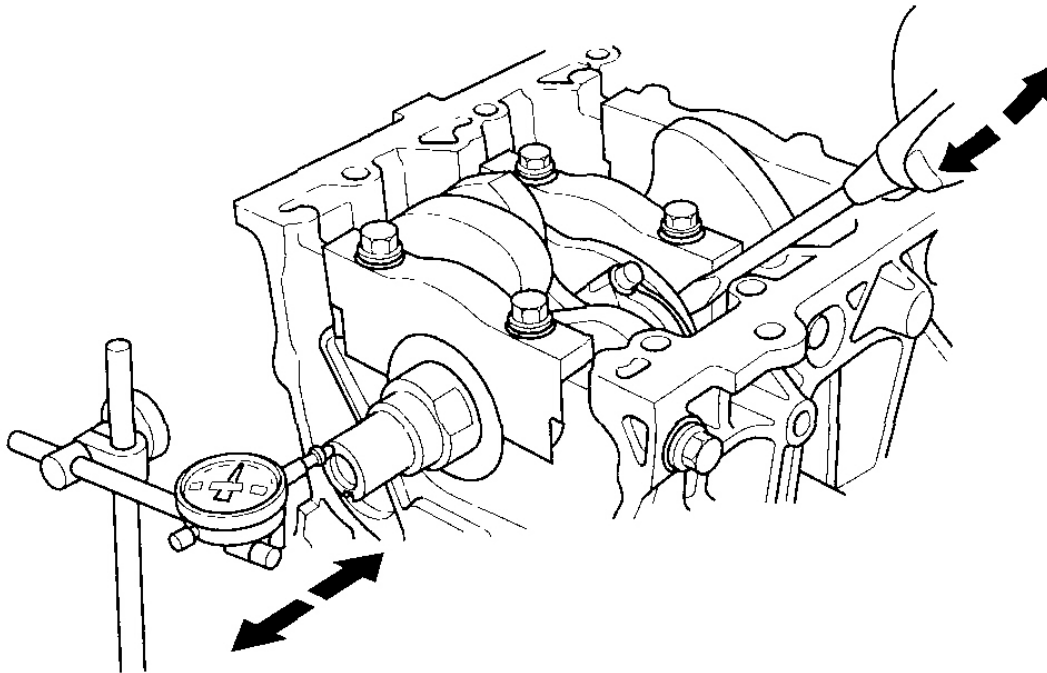
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 AND PISTON REMOVAL**).
5. 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.)



G03658981

Fig. 6: Pushing Crankshaft Away From Dial Indicator
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

CRANKSHAFT MAIN BEARING REPLACEMENT

MAIN BEARING CLEARANCE INSPECTION

1. Remove the main bearing caps and bearing halves (see **CRANKSHAFT AND 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.

NOTE: If the engine is still in the vehicle when you bolt the main cap down to check the clearance, the weight of the crankshaft and drive plate will

flatten the plastigage further than just the torque on the cap bolt, and give you an incorrect reading. For an accurate reading, support the crank with a jack under the counterweights, and check only one bearing at a time.

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

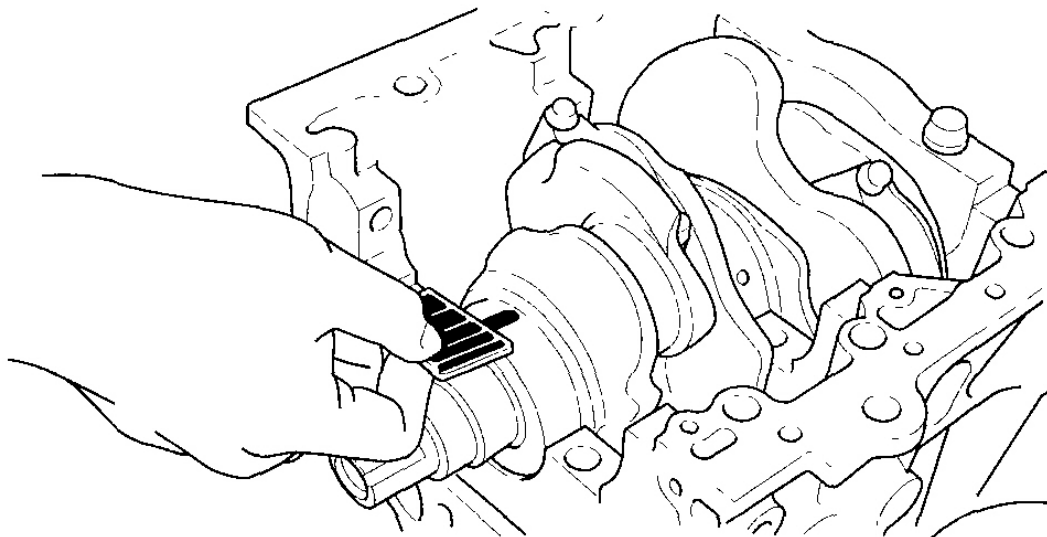
NOTE: Do not rotate the crankshaft during inspection.

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

Main Bearing-to-Journal Oil Clearance

Standard (New): 0.020-0.044 mm (0.0008-0.0017 in.)

Service Limit: 0.050 mm (0.0020 in.)



G03658982

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

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

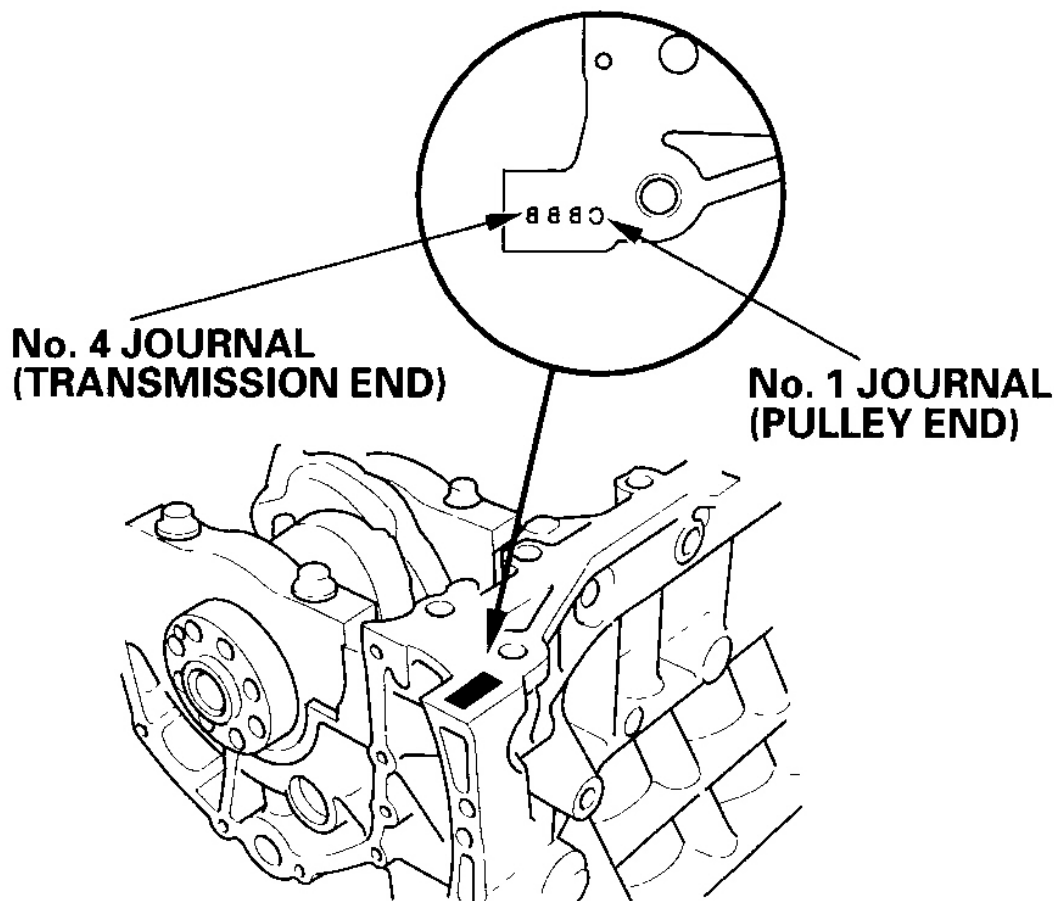
REMOVAL) and start over.

MAIN BEARING SELECTION

Crankshaft Bore Code Location

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

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



G03658983

Fig. 8: Locating Crankshaft Bore Code Location
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Bearing Identification

Color code is on the edge of the bearing

➔ Larger crank bore

A or I	B or II	C or III	D or IIII
--------	---------	----------	-----------

➔ Smaller bearing (Thicker)

1 or I
2 or II
3 or III
4 or IIII
5 or IIIII
6 or IIIIII

Red/ Pink	Pink	Pink/ Yellow	Yellow
Pink	Pink/ Yellow	Yellow	Yellow/ Green
Pink/ Yellow	Yellow	Yellow/ Green	Green
Yellow	Yellow/ Green	Green	Green/ Brown
Yellow/ Green	Green	Green/ Brown	Brown
Green	Green/ Brown	Brown	Brown/ Black

Smaller
main
journal

Smaller
bearing
(Thicker)

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

G03658984

Fig. 9: Bearing Identification & Color Code Reference Chart

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Main Journal Code Locations (Numbers or Bars)

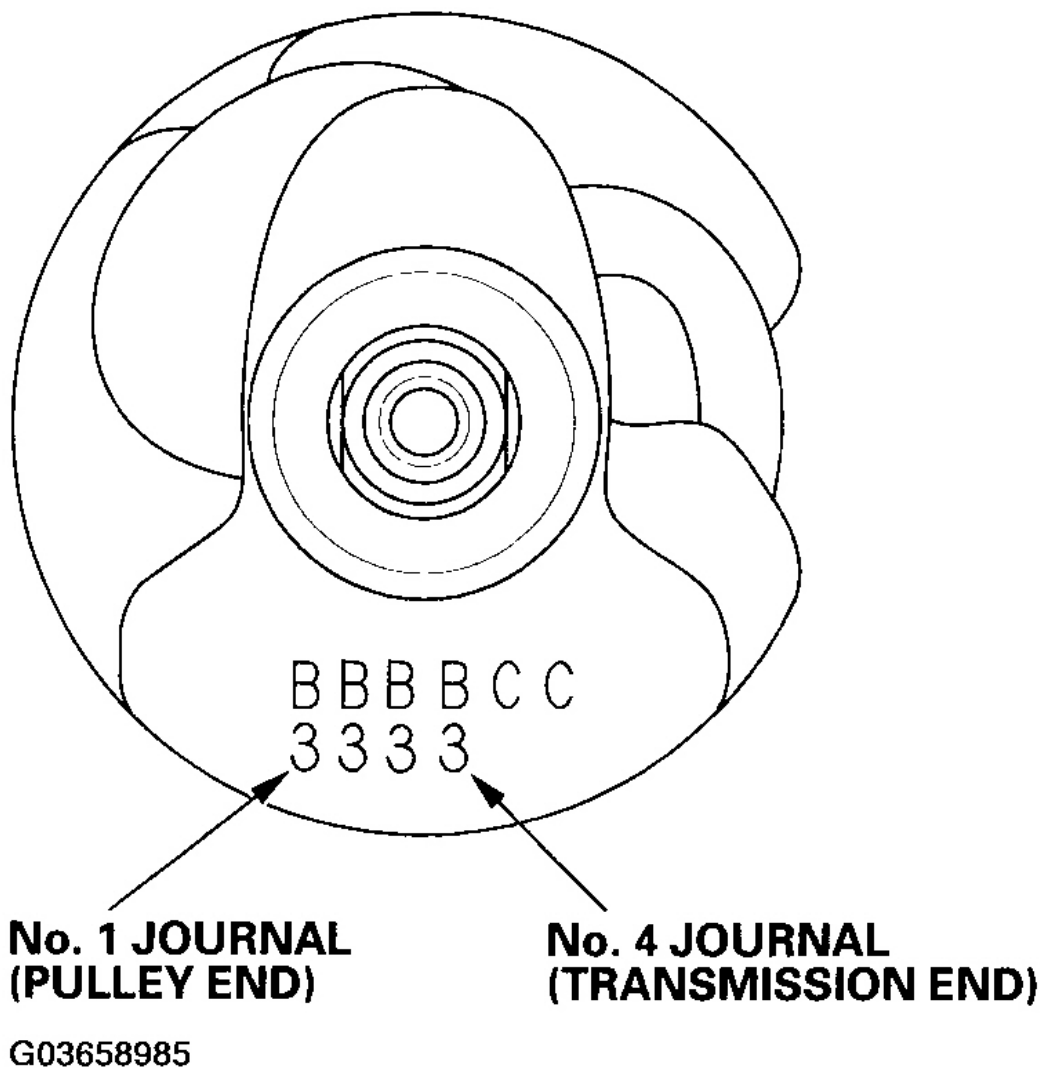


Fig. 10: Locating Main Journal Code

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CONNECTING ROD BEARING REPLACEMENT

ROD BEARING CLEARANCE INSPECTION

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

NOTE:

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

Tightening Torque:

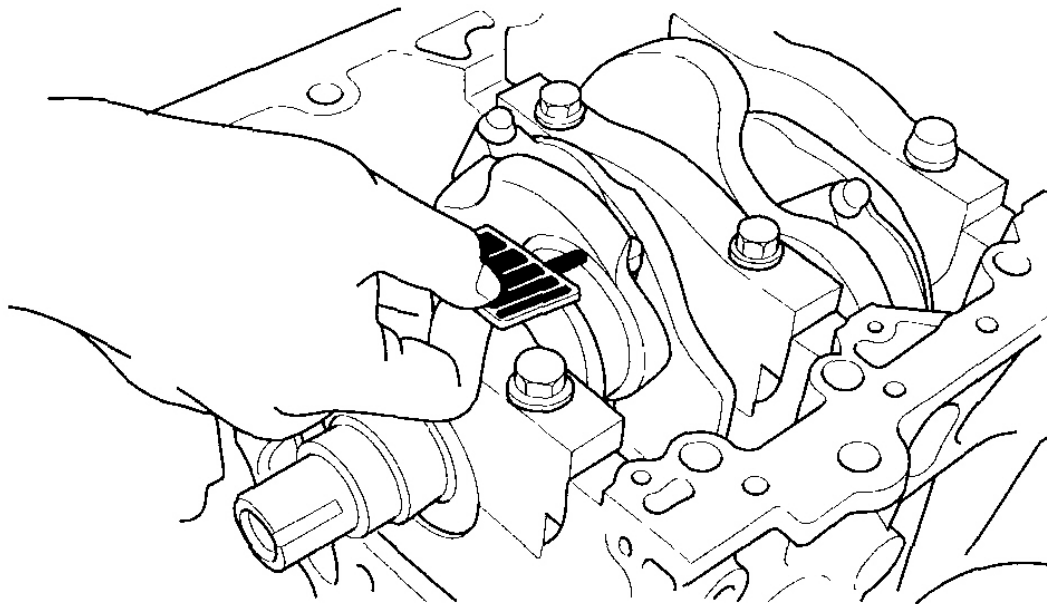
20 N.m (2.0 kgf.m, 14 lbf.ft) +90°

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.020-0.044 mm (0.0008-0.0017 in.)

Service Limit: 0.050 mm (0.0020 in.)



G03658986

Fig. 11: Measuring Widest Part Of Plastigage

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

using the appropriate larger or smaller bearings, replace the crankshaft (see **CRANKSHAFT AND PISTON REMOVAL**) and start over.

ROD BEARING SELECTION

Each rod falls into one of four tolerance ranges (from 0 to 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 1, 2, 3, or 4/I, II, III, or IIII in any engine.

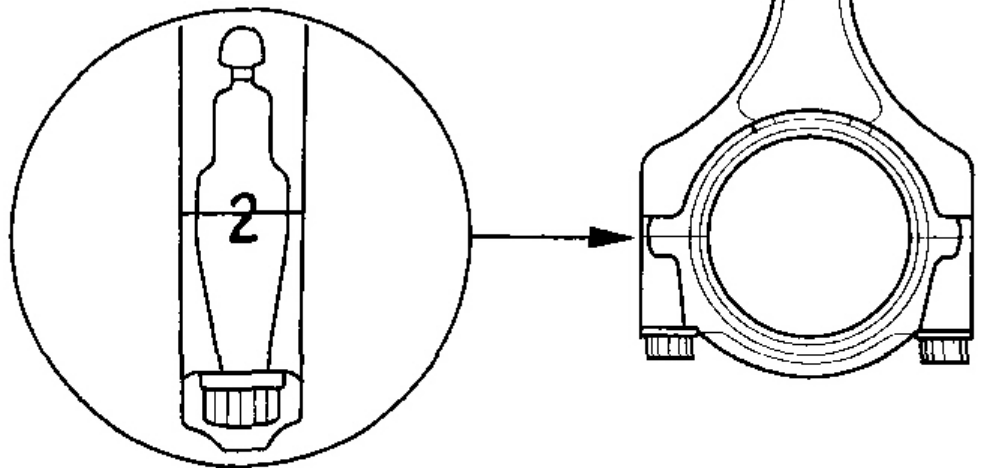
Normal Bore Size: 58.0 mm (2.28 in.)

Inspect the connecting rod for cracks and heat damage.

Connecting Rod Bore Code Locations

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

Half of number or bar
is stamped on bearing cap
and the other half is
stamped on rod.



G03658987

Fig. 12: Locating Connecting Rod Bore Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Bearing Identification

Color code is on the edge of the bearing

→ Larger big end bore

1 or I	2 or II	3 or III	4 or IIII
--------	---------	----------	-----------

→ Smaller bearing (Thicker)

A or I	Smaller rod journal
B or II	Smaller bearing (Thicker)
C or III	
D or IIII	
E or IIIII	
F or IIIII	

Pink	Pink/ Yellow	Yellow	Yellow/ Green
Pink/ Yellow	Yellow	Yellow/ Green	Green
Yellow	Yellow/ Green	Green	Green/ Brown
Yellow/ Green	Green	Green/ Brown	Brown
Green	Green/ Brown	Brown	Brown/ Black
Green/ Brown	Brown	Brown/ Black	Black

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

G03658988

Fig. 13: Bearing & Color Code Identification Chart
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Connecting Rod Journal Code Locations (Letters or Bars)

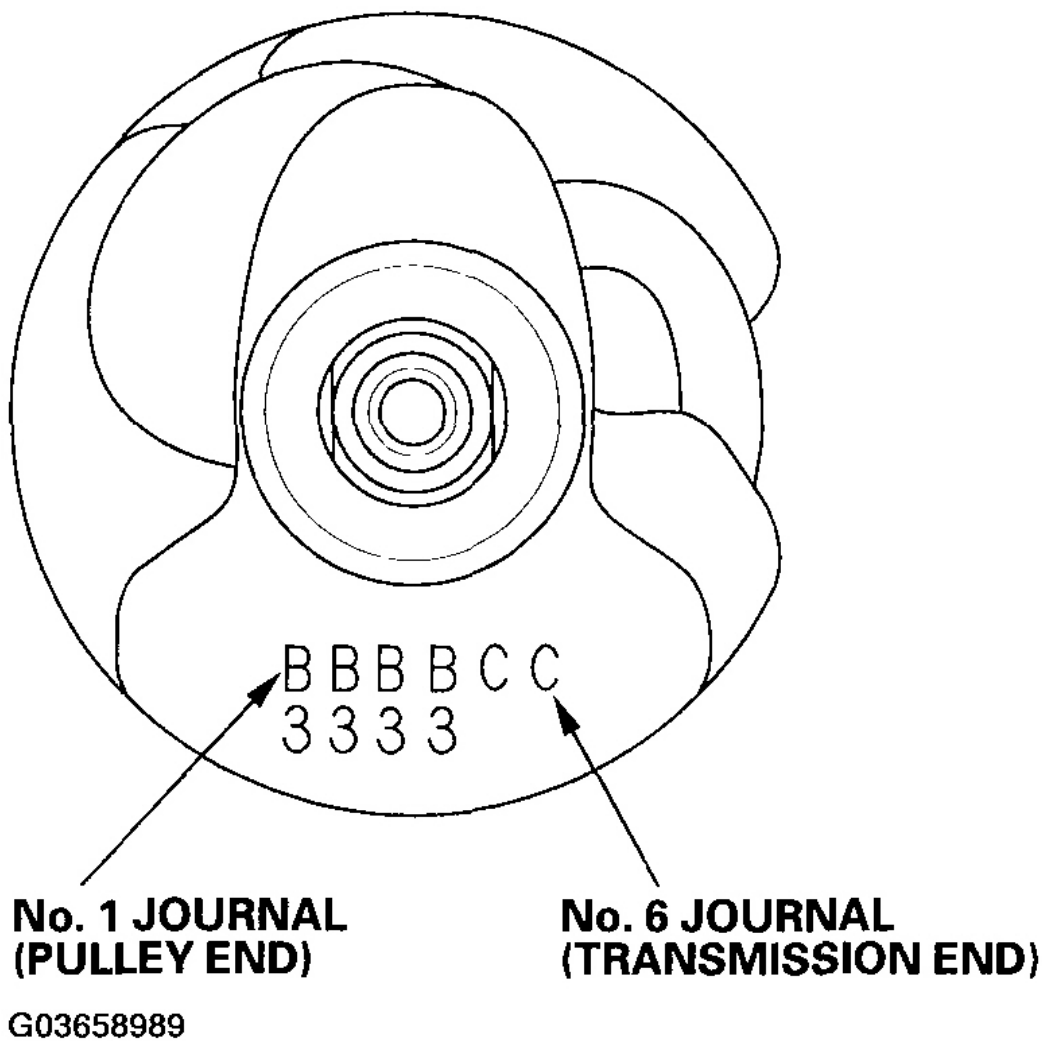
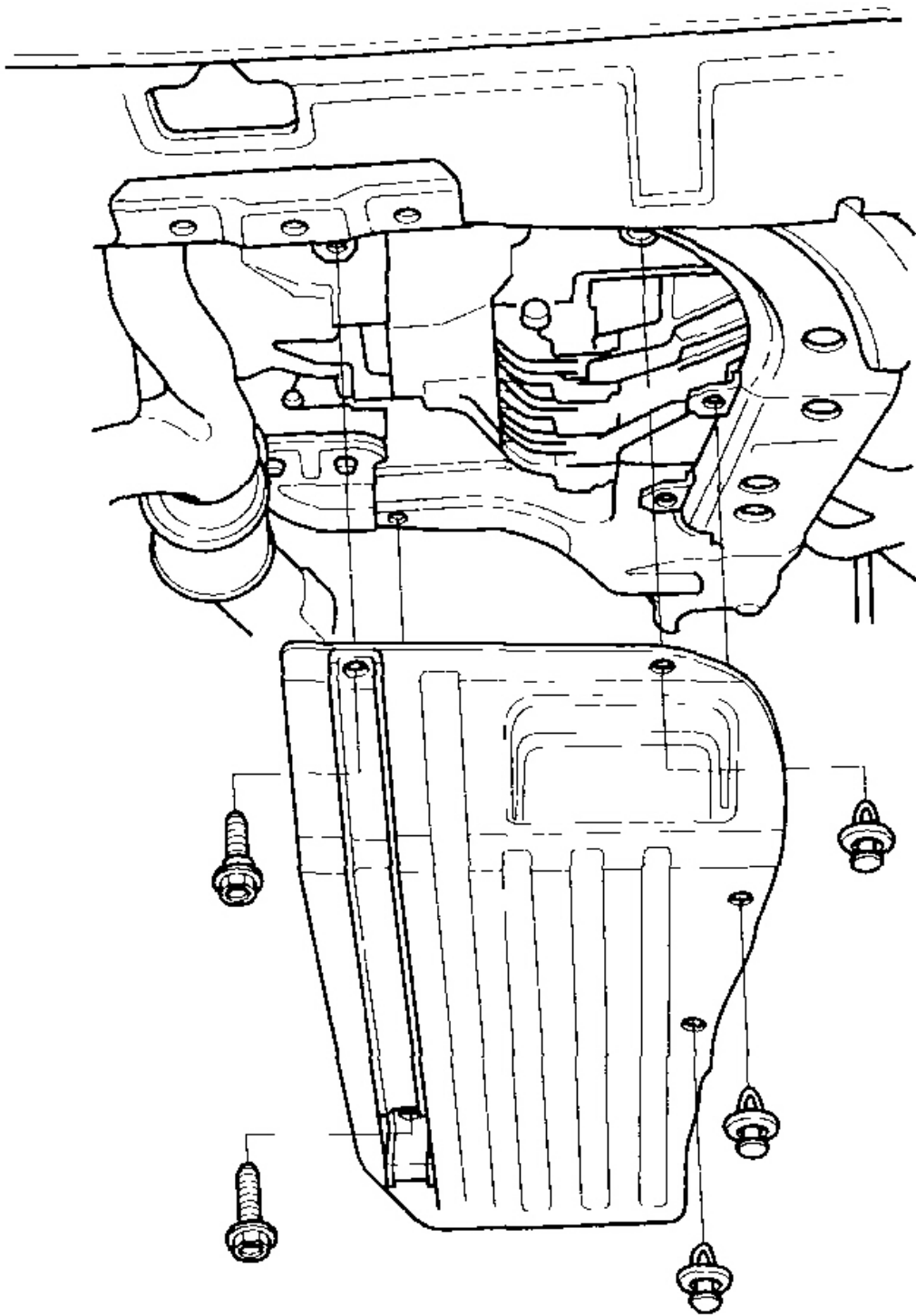


Fig. 14: Locating Connecting Rod Journal Code Locations
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PAN REMOVAL

1. If the engine is out of the vehicle, go to step 7.
2. Raise the vehicle on the hoist to full height.
3. Drain the engine oil (see **OIL PRESSURE TEST**).
4. Remove the splash shield (see step 35 on **ENGINE REMOVAL**).
5. Remove the under cover.

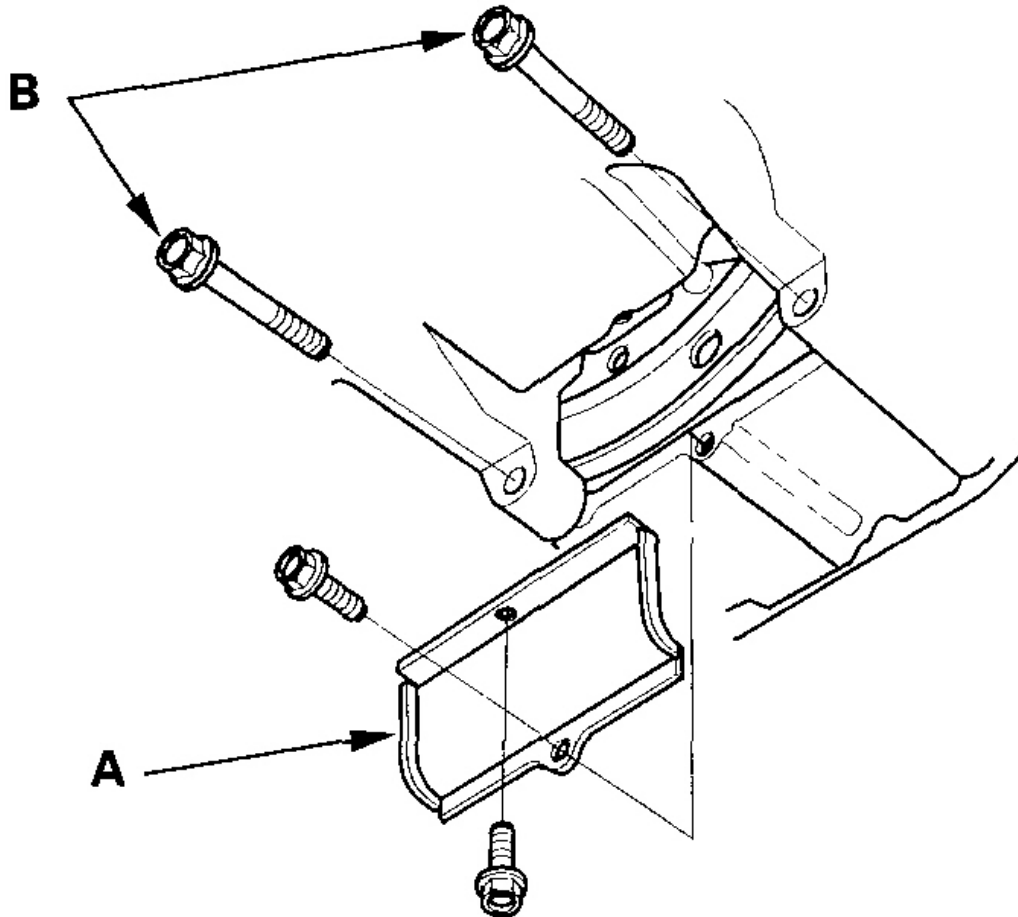


G03658990

Fig. 15: Removing Under Cover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Remove exhaust pipe A (see step 45 on **ENGINE REMOVAL**).
7. Remove the torque converter cover (A) and the two bolts (B) securing the transmission.

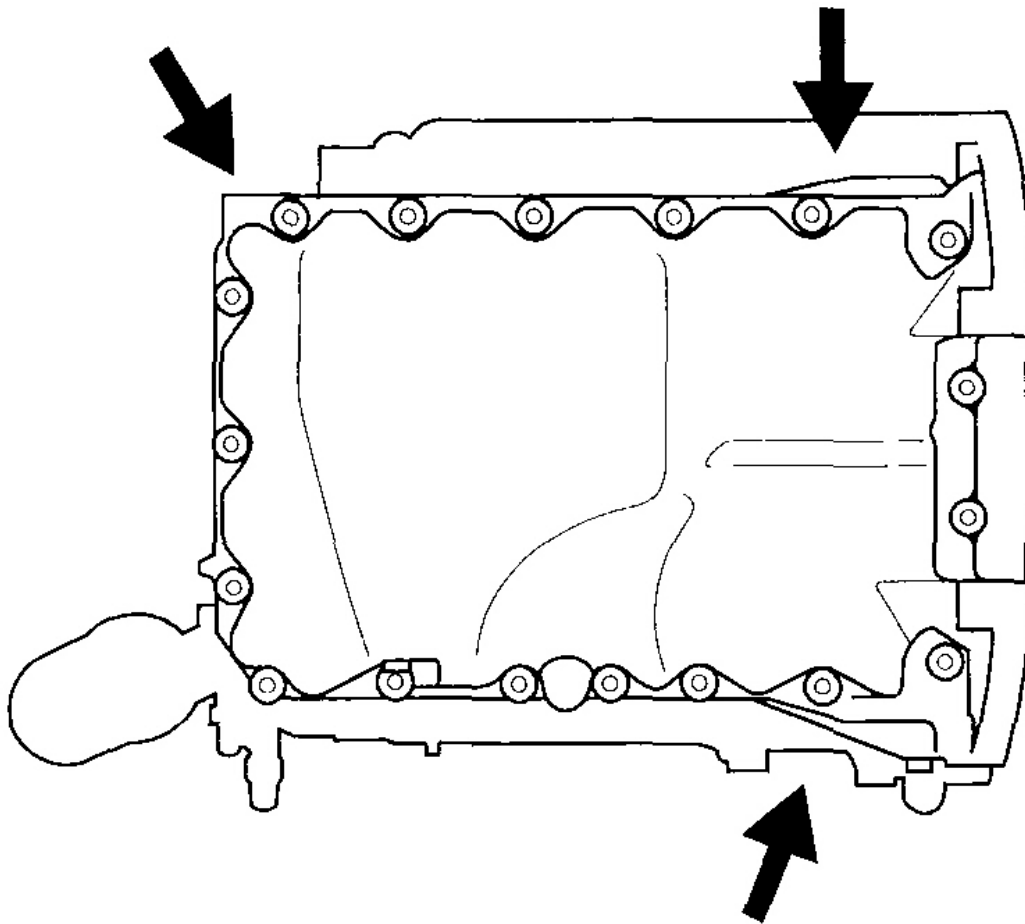


G03658991

Fig. 16: Removing Torque Converter Cover And Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03658992

Fig. 17: Removing Bolts Oil Pan

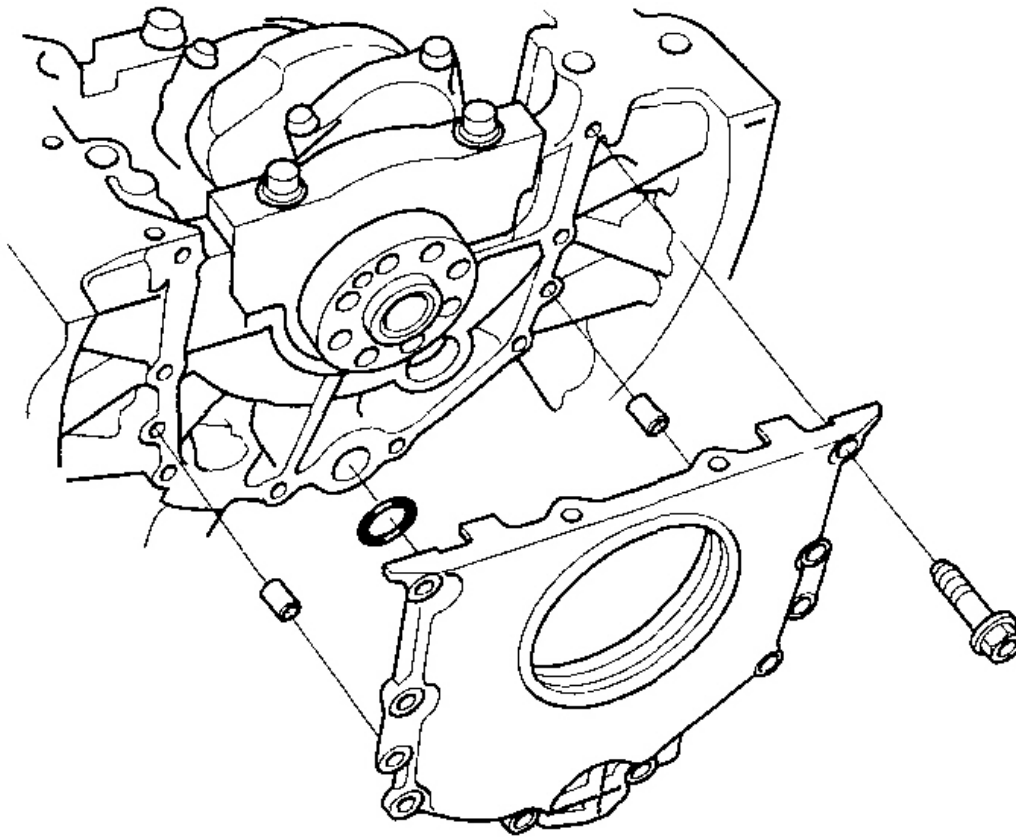
Courtesy of AMERICAN HONDA MOTOR CO., INC.

10. Remove the oil pan.

CRANKSHAFT AND PISTON REMOVAL

1. Remove the engine assembly (see ENGINE REMOVAL).
2. Remove the transmission:
 - Manual transmission (see TRANSMISSION REMOVAL)
 - Automatic transmission (see TRANSMISSION REMOVAL)
3. M/T model: Remove the flywheel (see FLYWHEEL AND PILOT BEARING REPLACEMENT).
4. A/T model: Remove the drive plate (see DRIVE PLATE REMOVAL AND INSTALLATION).

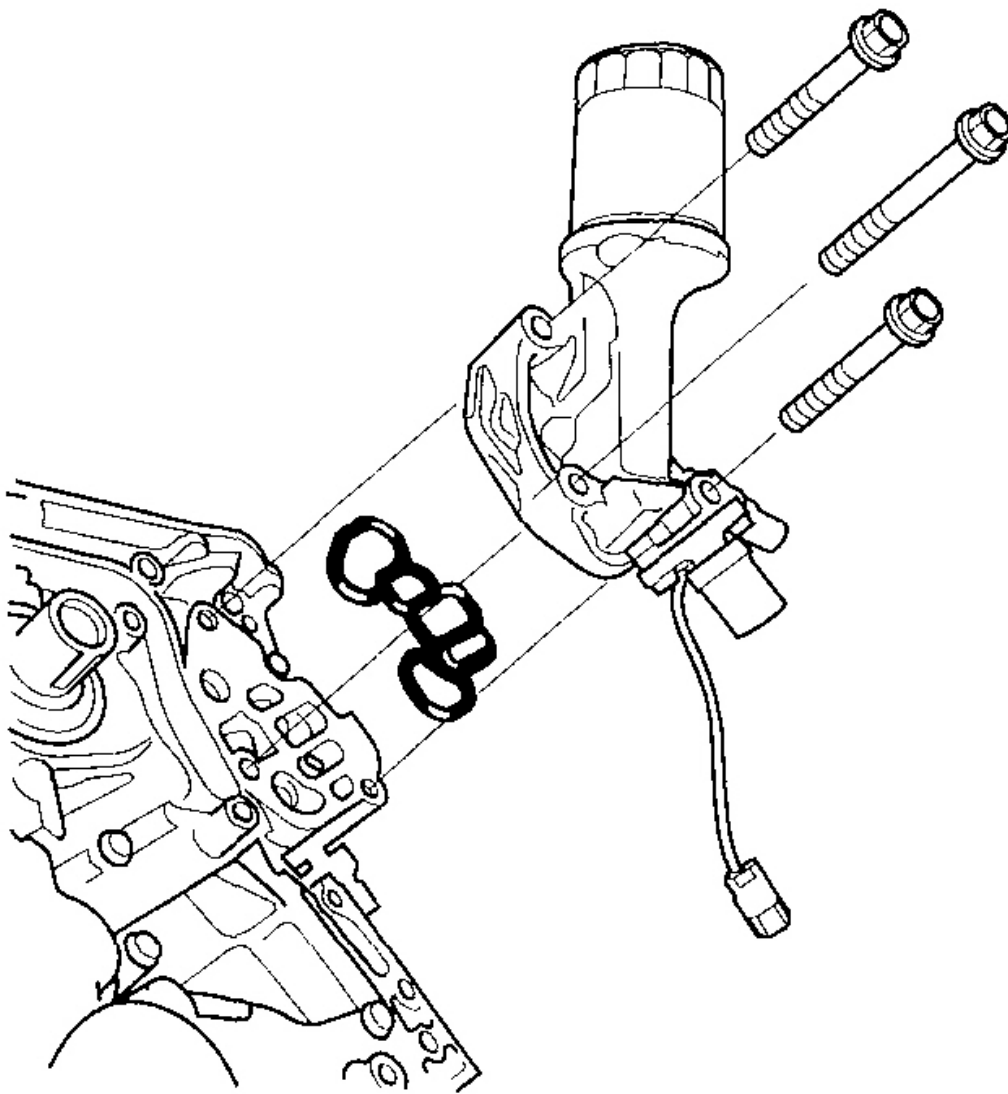
5. Remove the cylinder heads (see **CYLINDER HEAD REMOVAL**).
6. Remove the crankshaft position (CKP) sensor A/B (see **MAP SENSOR REPLACEMENT**).
7. Remove the timing belt drive pulley from the crankshaft.
8. Remove the oil pan (see **OIL PAN REMOVAL**).
9. Remove the engine block end cover.



G03658993

Fig. 18: Removing Engine Block End Cover
Courtesy of AMERICAN HONDA MOTOR CO., INC.

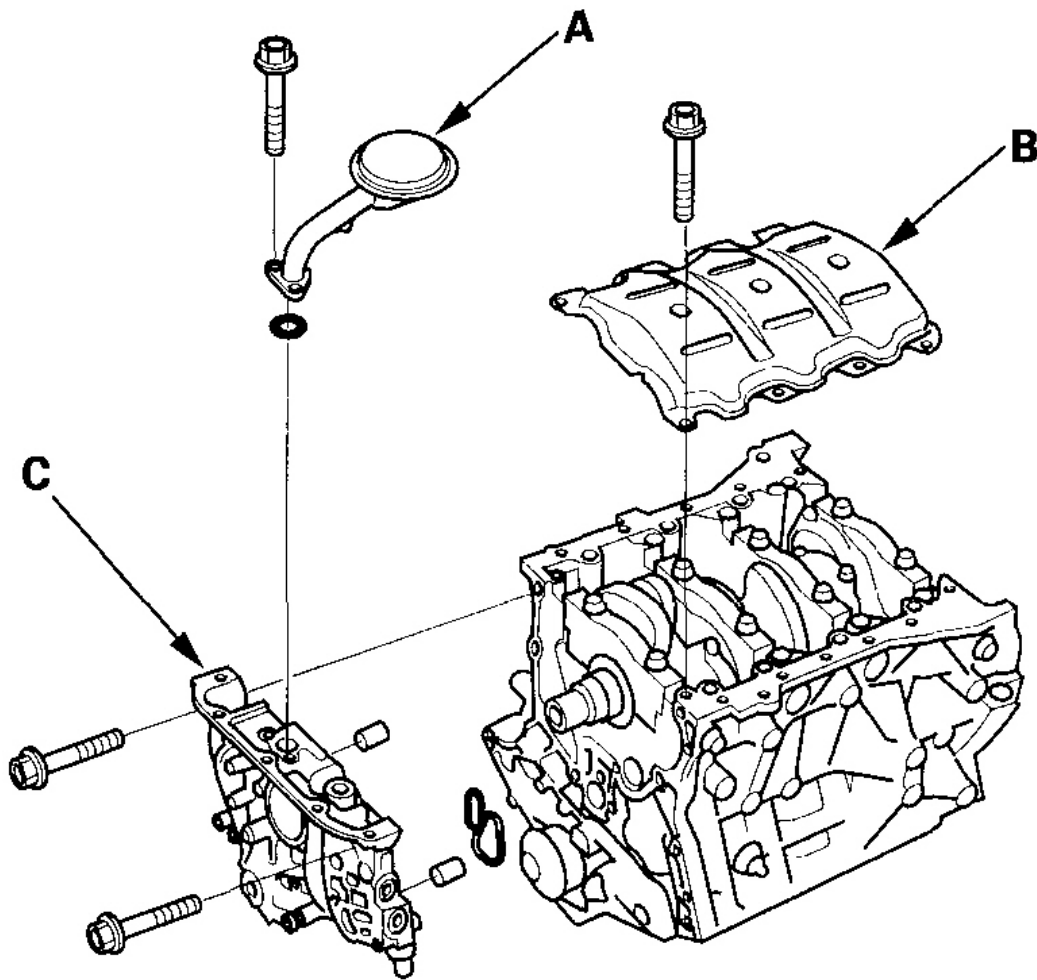
10. Remove the rocker arm oil control solenoid (VTEC solenoid valve)/oil filter assembly.



G03658994

Fig. 19: Removing Rocker Arm Oil Control Solenoid
Courtesy of AMERICAN HONDA MOTOR CO., INC.

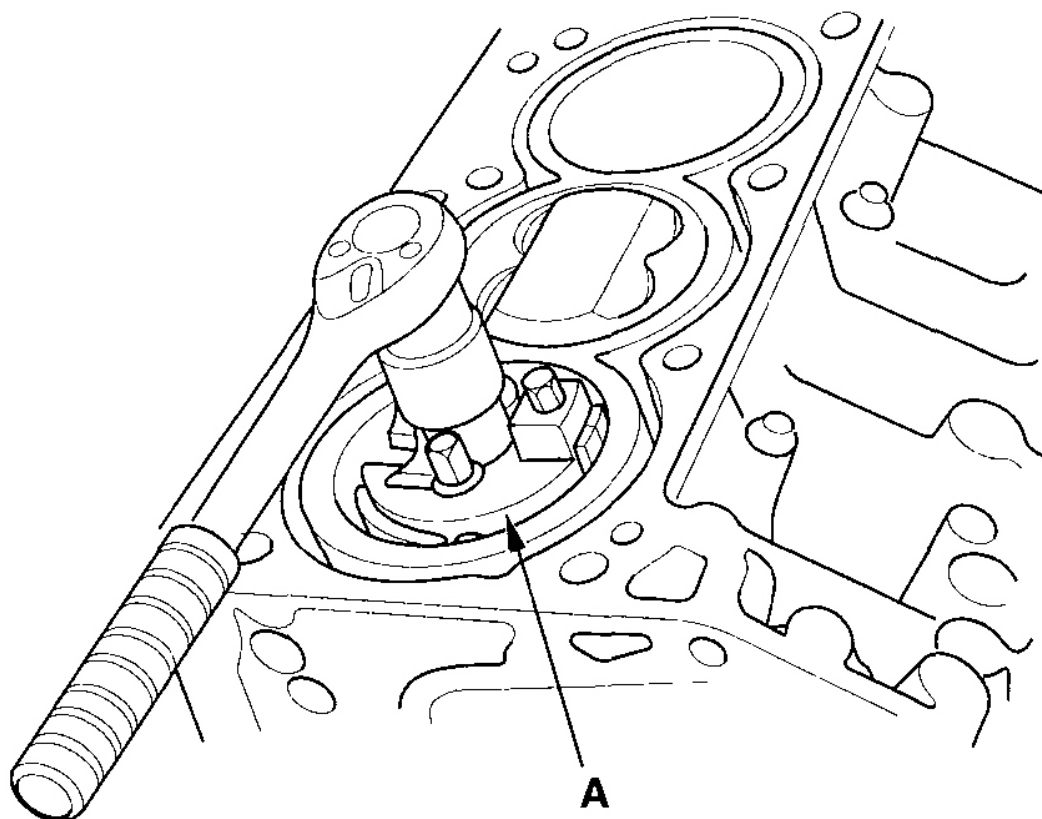
11. Remove the oil screen (A), baffle plate (B), and oil pump (C).



G03658995

Fig. 20: Removing Oil Screen, Baffle Plate & Oil Pump
Courtesy of AMERICAN HONDA MOTOR CO., INC.

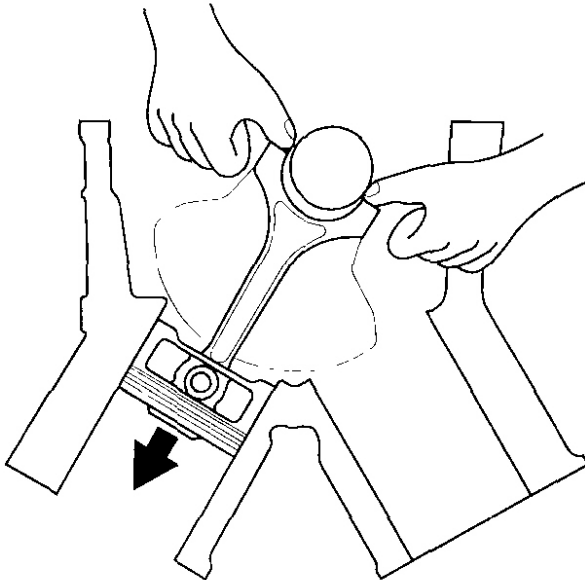
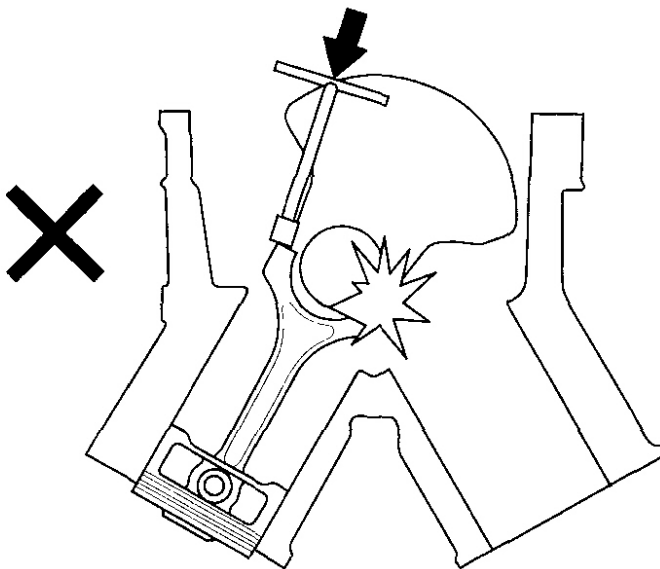
12. If you can feel a ridge of metal or hard carbon around the top of any cylinder, remove it with a ridge reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the piston as it's pushed out.



G03658996

Fig. 21: Removing Ridge Of Metal Or Hard Carbon
Courtesy of AMERICAN HONDA MOTOR CO., INC.

13. Remove the connecting rod caps after setting the crank pin at bottom dead center (BDC) for each cylinder. Remove the piston/connecting rod assembly by pushing on the connecting rod. Take care not to damage the crank pin or cylinder with the connecting rod.

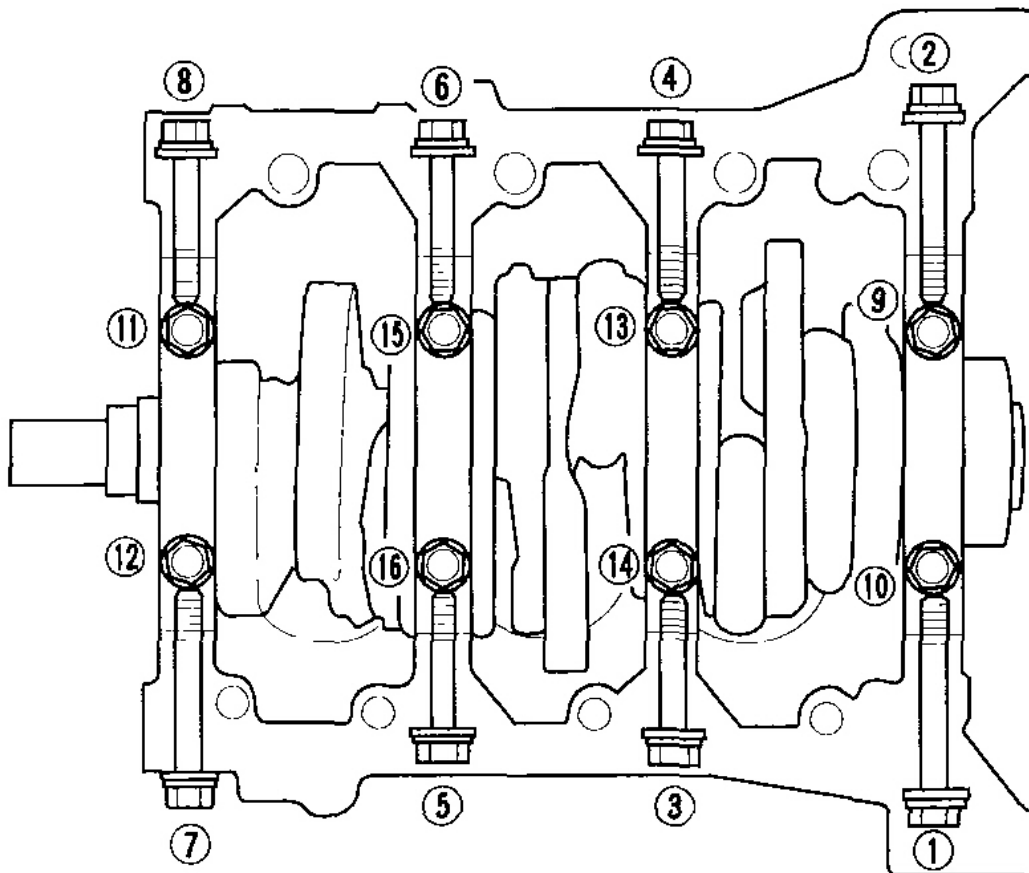
CORRECT**INCORRECT**

G03658997

Fig. 22: Removing Piston/Connecting Rod Assembly By Pushing - Correct Method
Courtesy of AMERICAN HONDA MOTOR CO., INC.

14. Remove the bearing from the cap. Keep all caps/bearings in order.

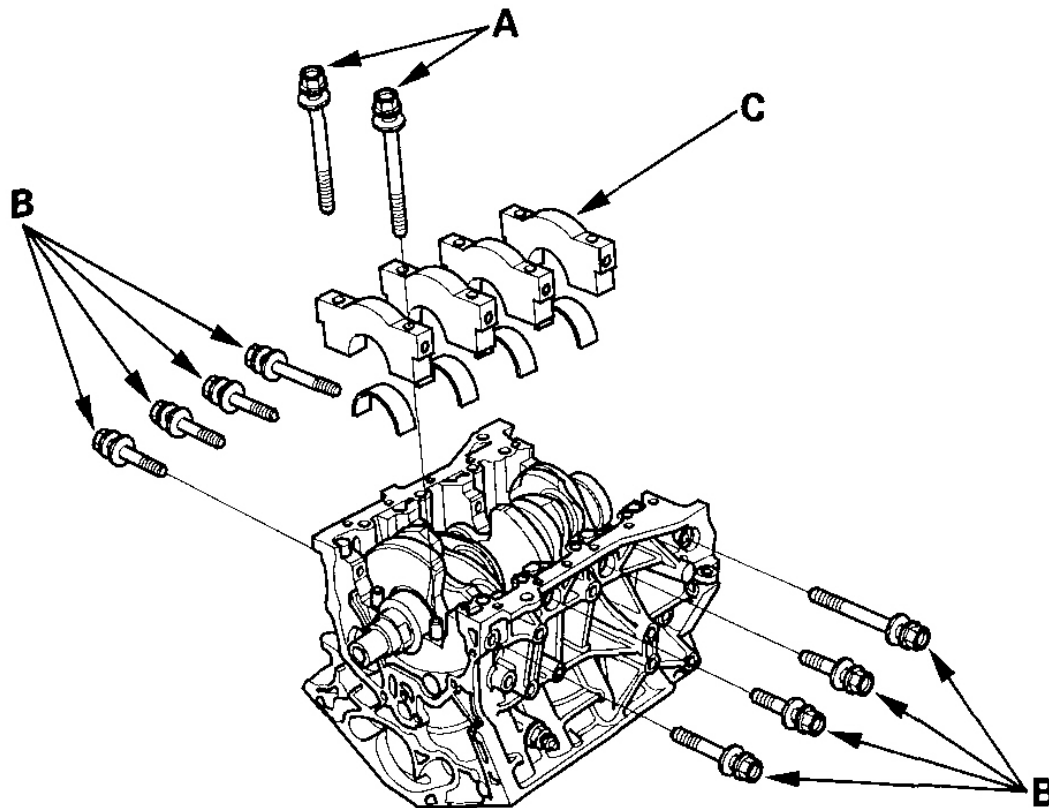
15. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.
16. After removing a piston/connecting rod assembly, reinstall the cap on the rod.
17. To avoid confusion during reassembly, mark each piston/connecting rod assembly with its cylinder number.
18. Unscrew the bearing cap bolts and bearing cap side bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



G03658998

Fig. 23: Tightening Bearing Cap Bolts & Bearing Cap Side Bolts In Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

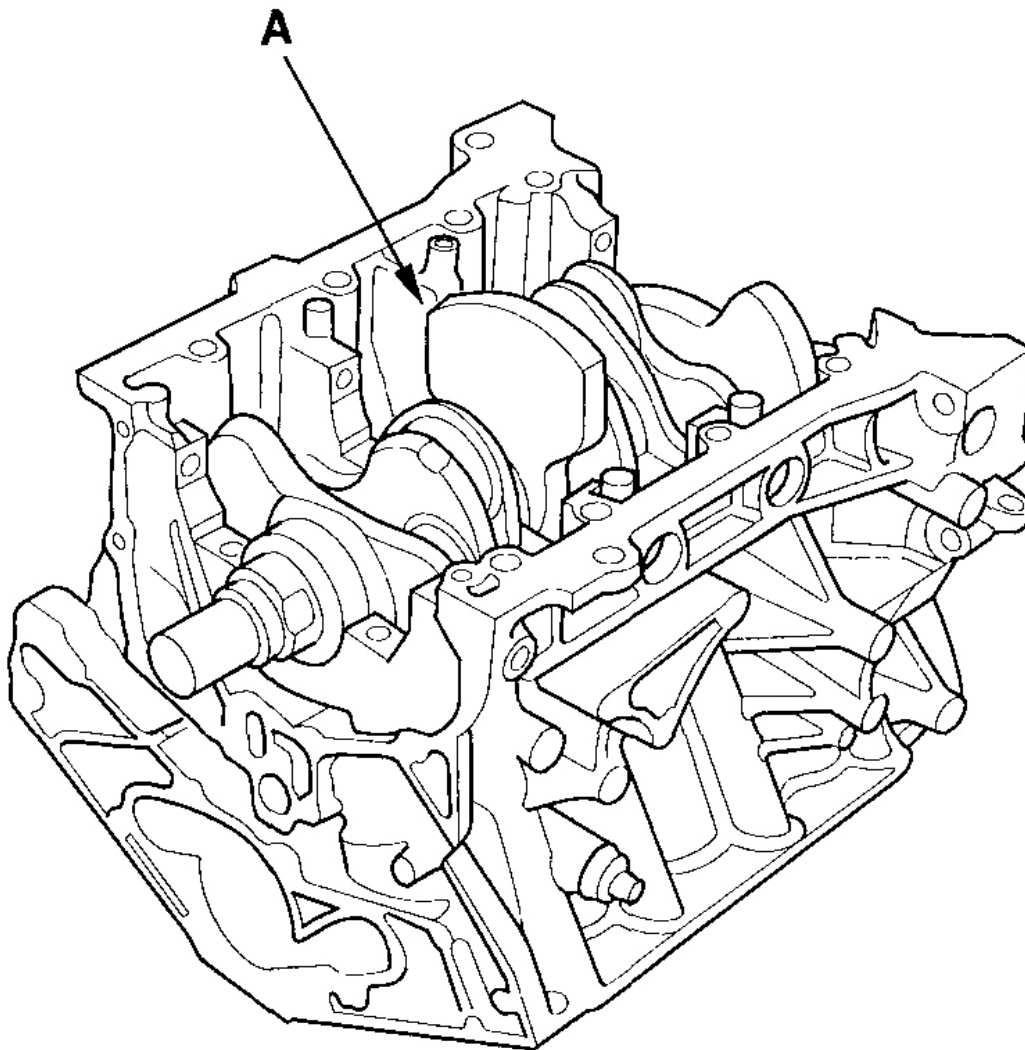
19. Remove the bearing cap bolts (A) and bearing cap side bolts (B), then remove the bearing cap (C).



G03658999

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

20. Lift the crankshaft (A) out of the engine block, being careful not to damage the journals.



G03659000

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

21. Reinstall the main caps and bearings on the engine block in the proper order.

CRANKSHAFT INSPECTION

Out-of-Round and Taper

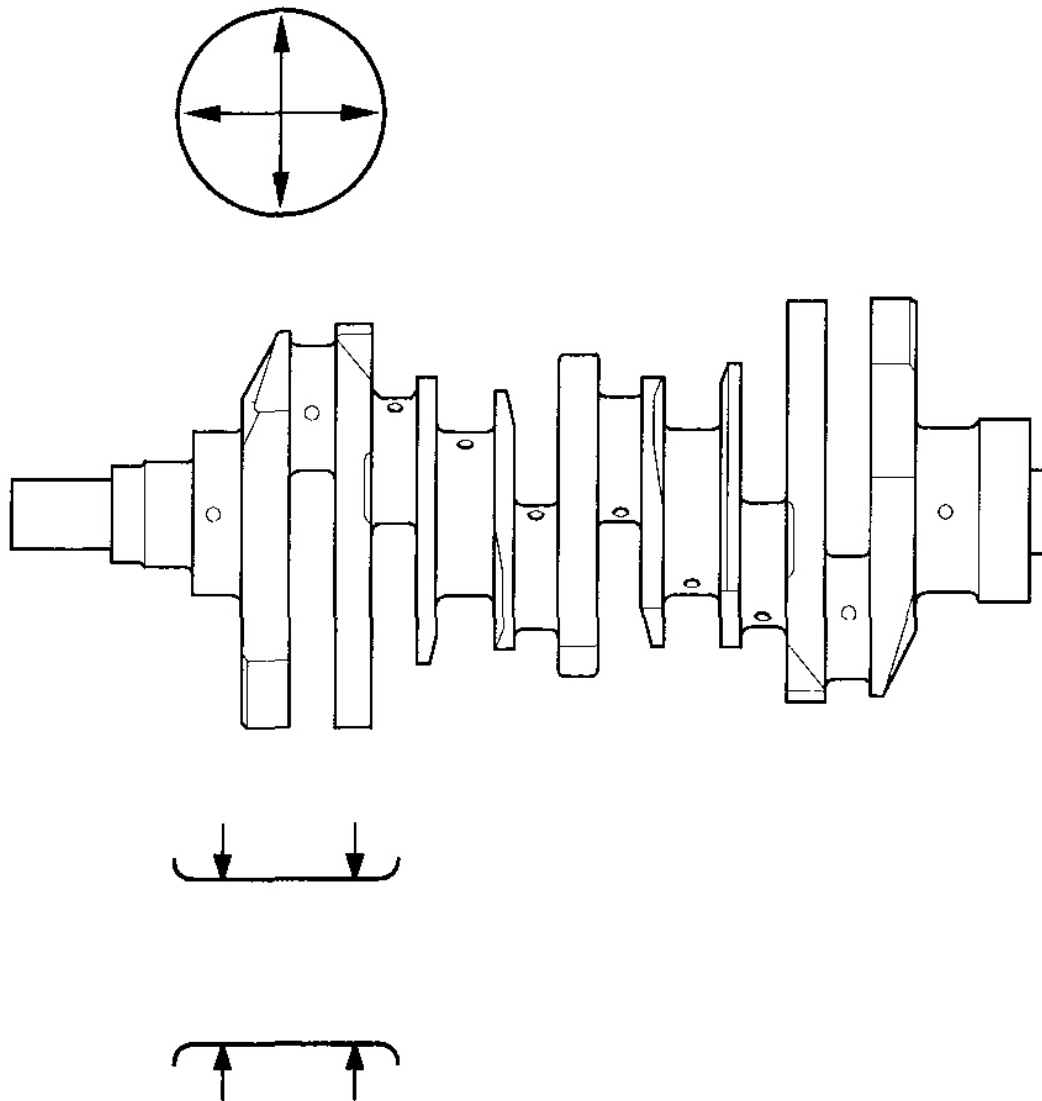
1. Remove the crankshaft from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).

2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Check the keyway and threads.
4. Measure out-of-round at the middle of each rod and main journal in two place. 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.)



G03659001

Fig. 26: Measuring Out-Of-Round At Middle Of Each Rod & Main Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Measure 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.)

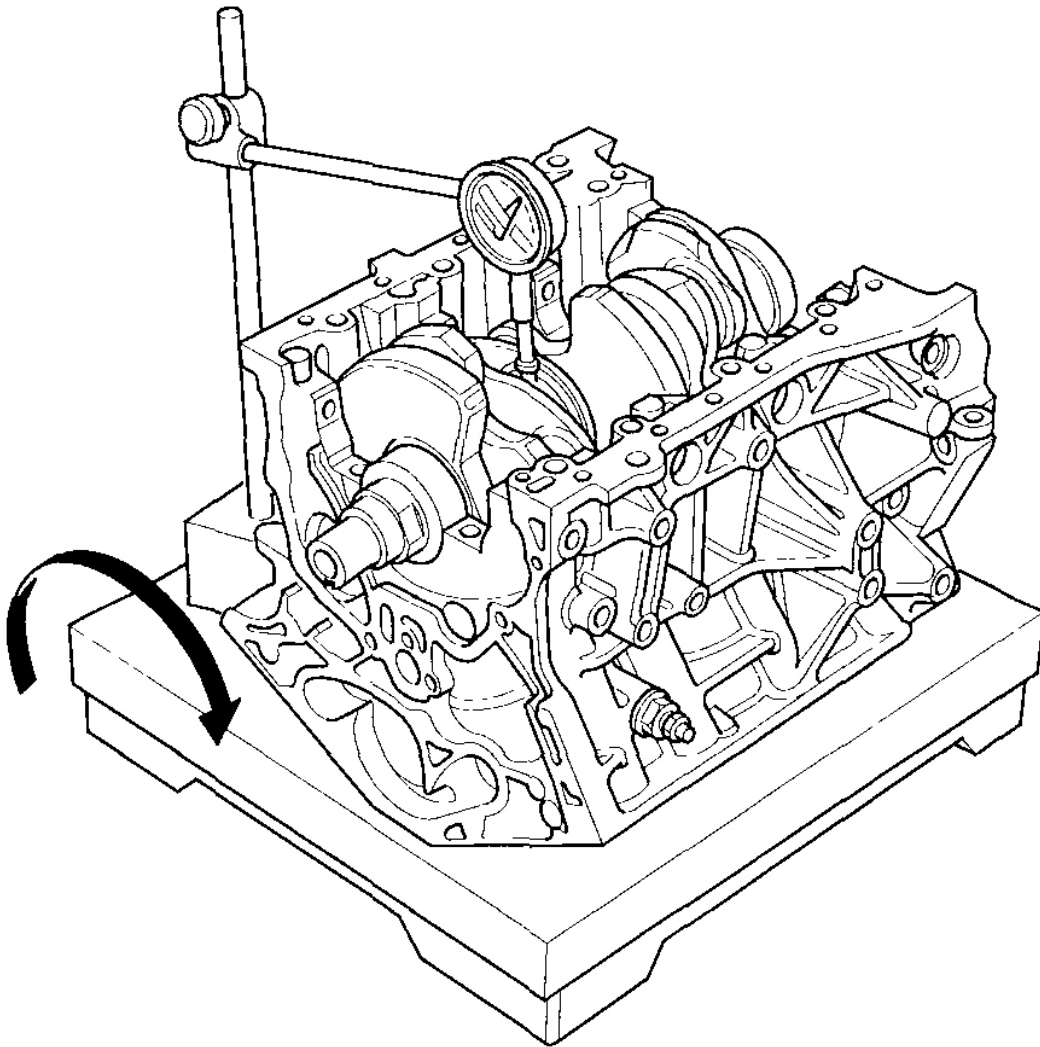
Straightness

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

Crankshaft Total Runout

Standard (New): 0.025 mm (0.0010 in.) max.

Service Limit: 0.030 mm (0.0012 in.)



G03659002

Fig. 27: Measuring Runout On All Of Main Journals
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLOCK AND PISTON INSPECTION

1. Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
2. Check the piston for distortion or cracks.
3. Measure the piston diameter at a point 16.0 mm (0.63 in.) from the bottom of the skirt.

Piston Diameter

2004 Acura TL

2006 ENGINE Engine Block - TL

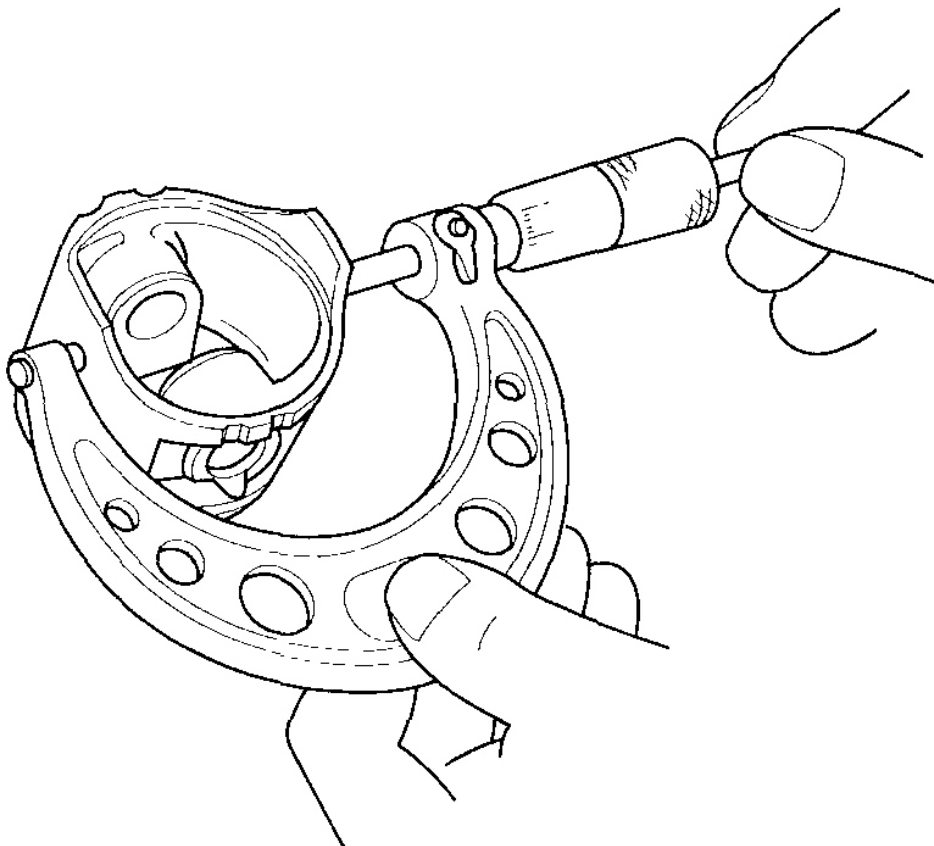
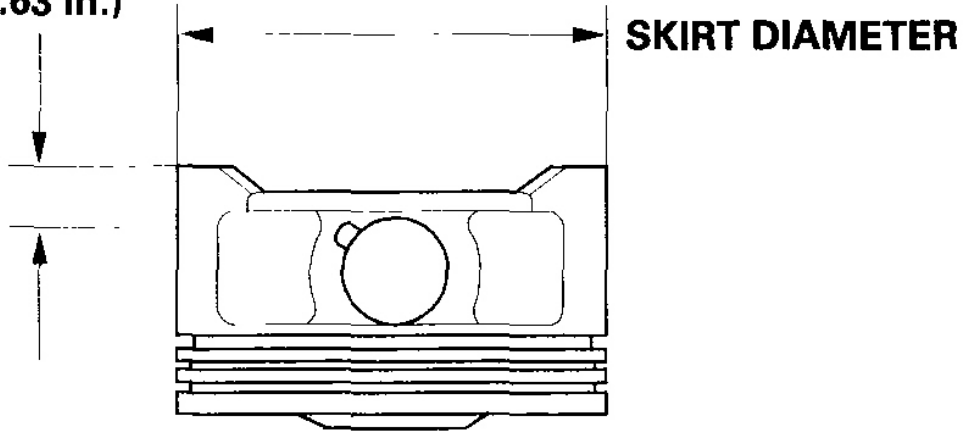
Standard (New): 88.975-88.985 mm (3.5029-3.5033 in.)

Service Limit: 88.965 mm (3.5026 in.)

Oversize Piston Diameter

0.25: 89.225-89.235 mm (3.5128-3.5132 in.)

16.0 mm
(0.63 in.)



G03659003

Fig. 28: Measuring Piston Diameter At Point
Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Measure 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 engine block. If the engine block has to be rebored, refer to step 7 after reboring.

Cylinder Bore Size

Standard (New): 89.000-89.015 mm (3.5039-3.5045 in.)

Service Limit: 89.065 mm (3.5065 in.)

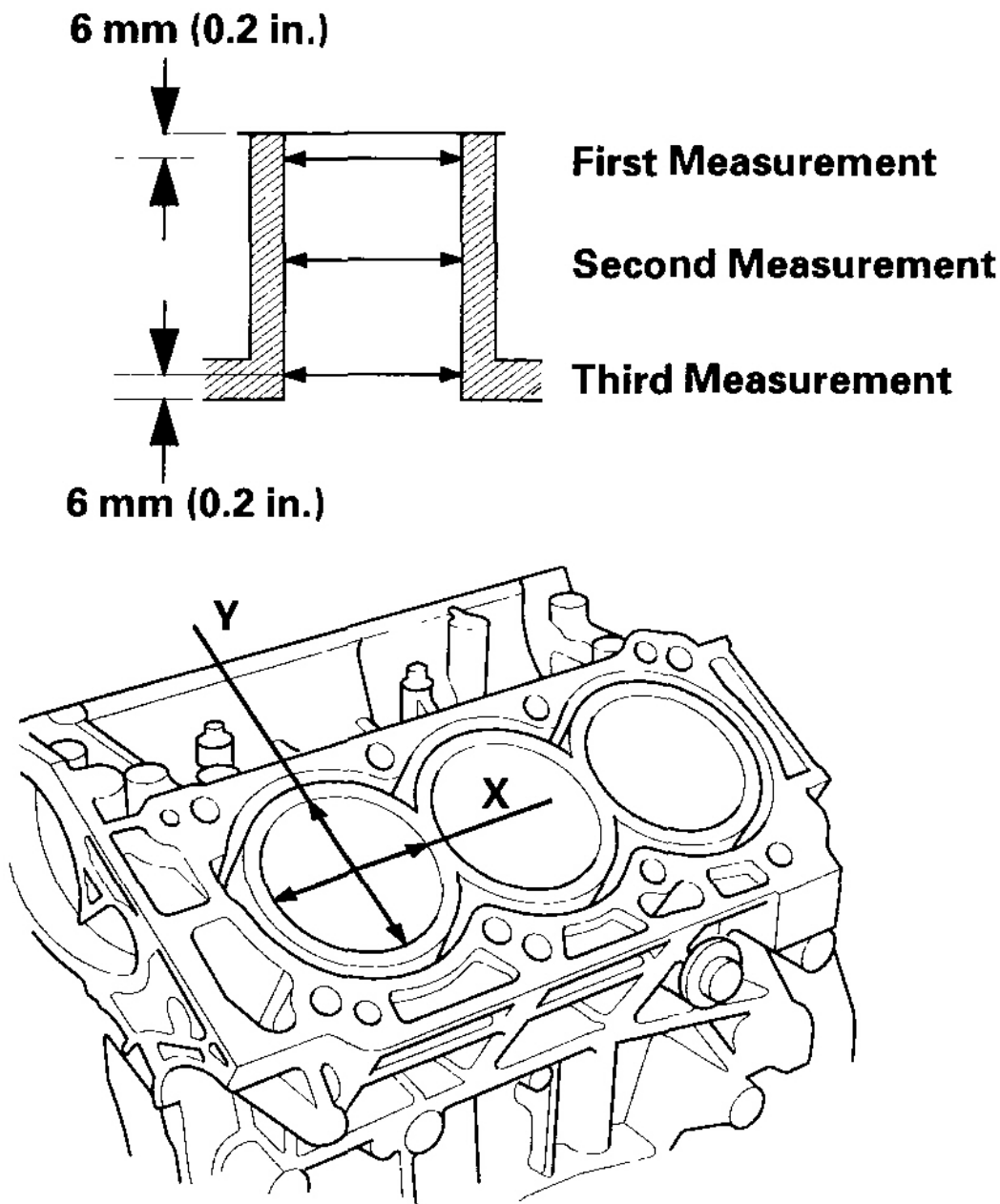
Oversize

0.25: 89.250-89.265 mm (3.5138-3.5144 in.)

Reboring Limit: 0.25 mm (0.01 in.)

Bore Taper

Limit: (Difference between first and third measurement) 0.05 mm (0.002 in.)

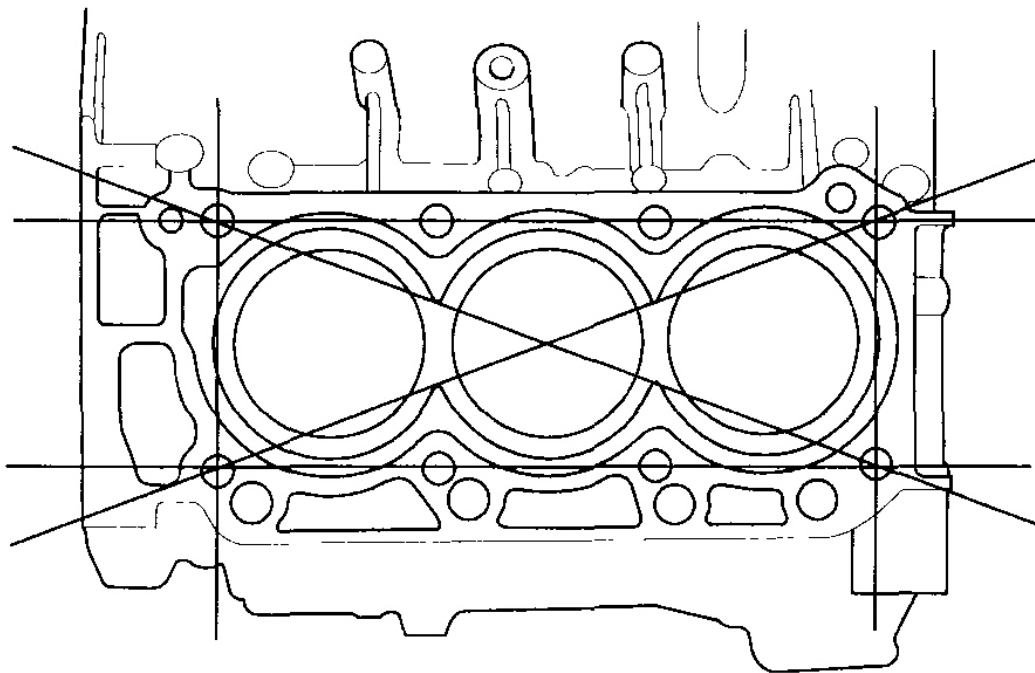


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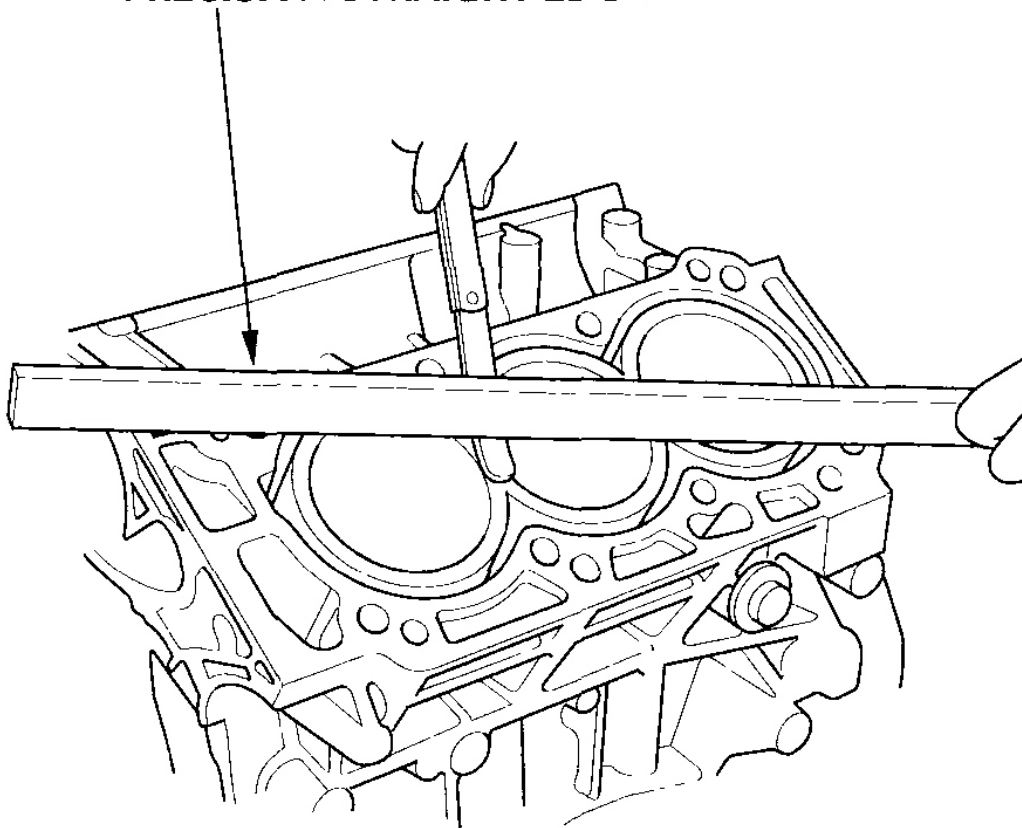
Fig. 29: Measuring Wear & Taper In Direction
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Scored or scratched cylinder bores must be honed (see **CYLINDER BORE HONING**).
6. Check the top of the engine block for warpage. Measure along the edges and across the center as shown.

Engine Block Warpage**Standard (New): 0.07 mm (0.003 in.) max.****Service Limit: 0.10 mm (0.004 in.)**



PRECISION STRAIGHT EDGE



G03659005

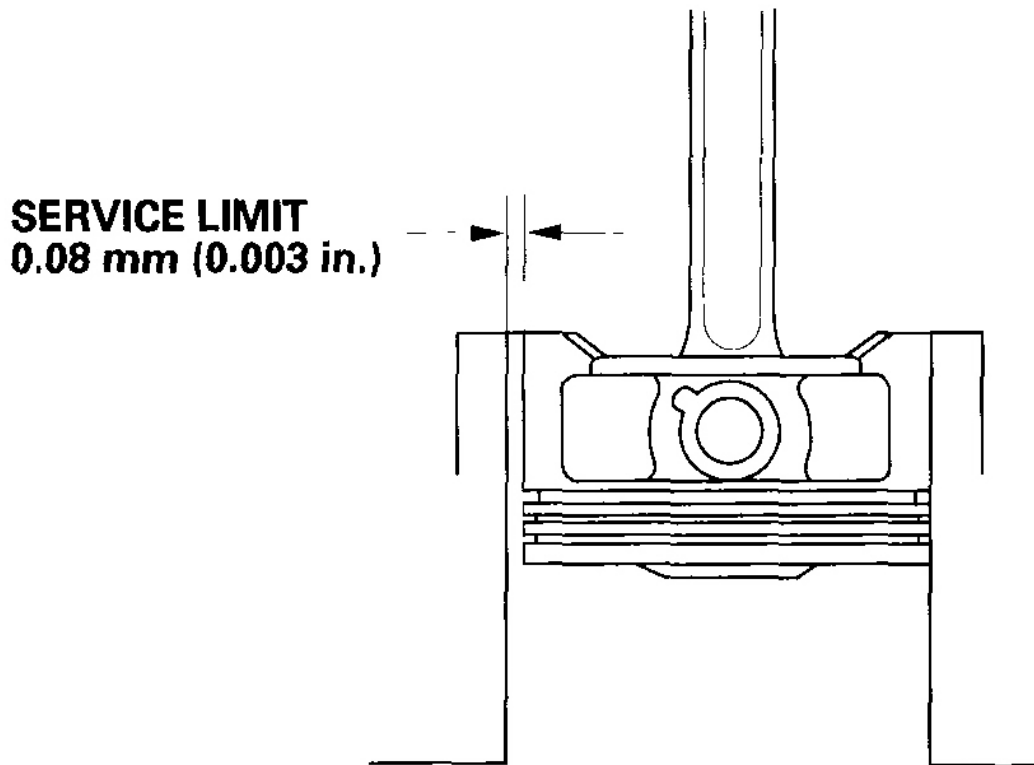
Fig. 30: Checking Top Of Engine Block For Warpage
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston-to-Block Clearance

Standard (New): 0.015-0.040 mm (0.0006-0.0016 in.)

Service Limit: 0.08 mm (0.003 in.)



G03659006

Fig. 31: Calculating Difference Between Cylinder Bore Diameter & Piston Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

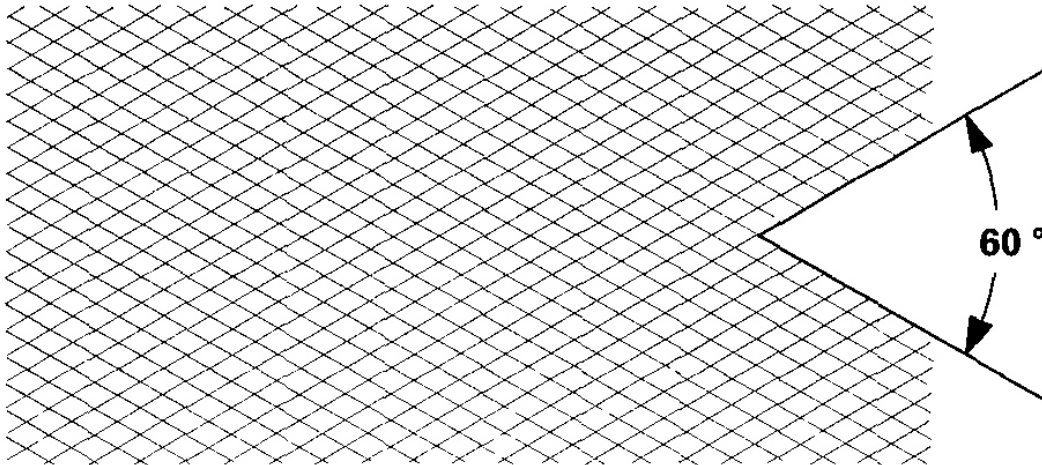
CYLINDER BORE HONING

1. Measure the cylinder bores (see step 4). If the engine block is to be reused, hone the cylinders and remeasure the bores. Only scored or scratched cylinder bores must be honed.

- Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree crosshatch pattern.

NOTE:

- 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.



G03659007

Fig. 32: Identifying Honing Oil & Fine Stone In 60 Degree Crosshatch Pattern
Courtesy of AMERICAN HONDA MOTOR CO., INC.

- 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.
- If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the engine 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, AND CONNECTING ROD REPLACEMENT

DISASSEMBLY

- Remove the piston from the engine block (see **CRANKSHAFT AND PISTON REMOVAL**).
- 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.

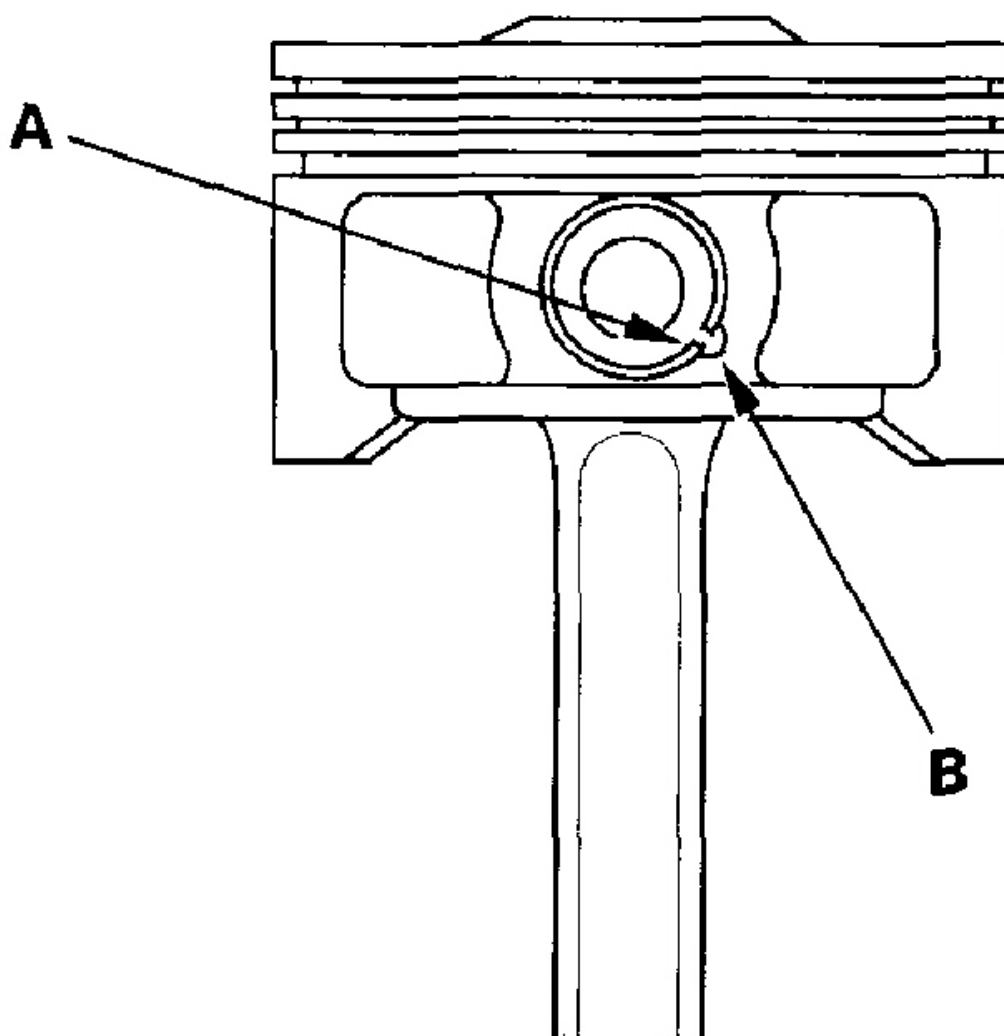
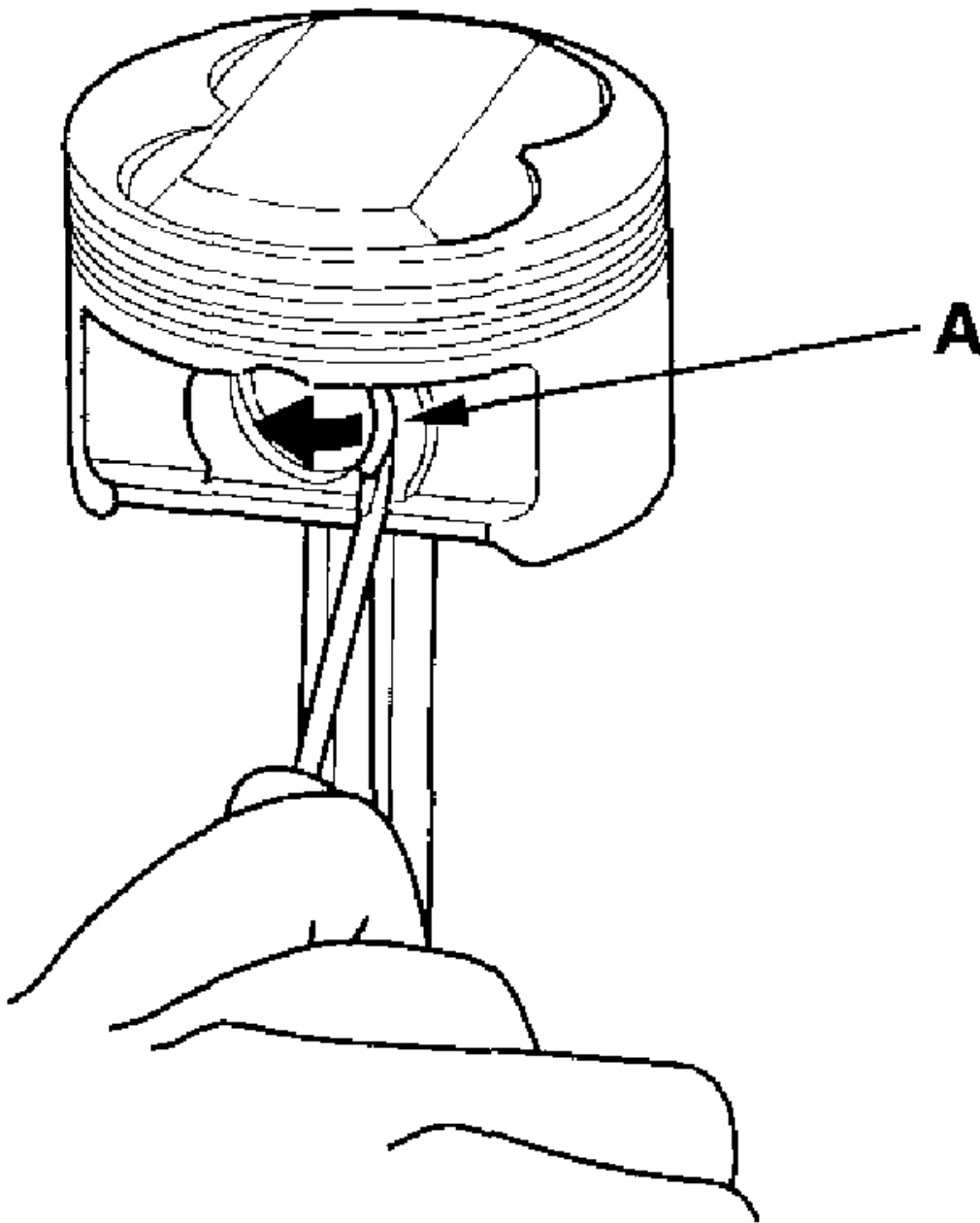
**G03659008**

Fig. 33: Applying Engine Oil To Piston Pin Snap Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

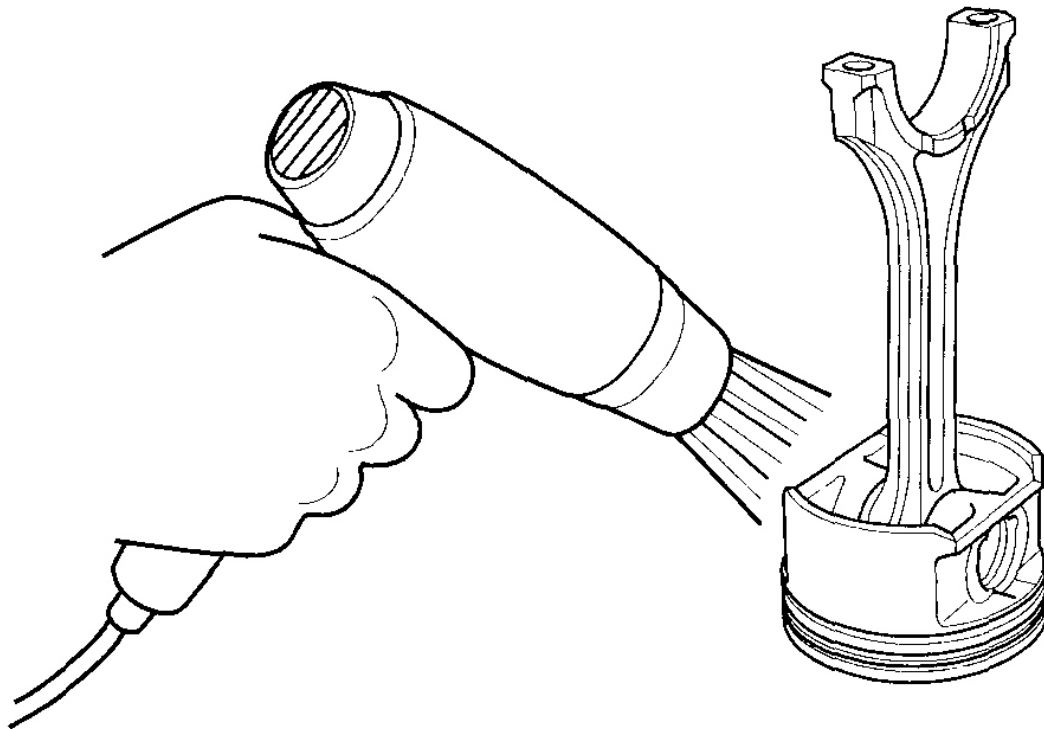


G03659009

Fig. 34: Removing 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.



G03659010

Fig. 35: Heating Piston & Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INSPECTION

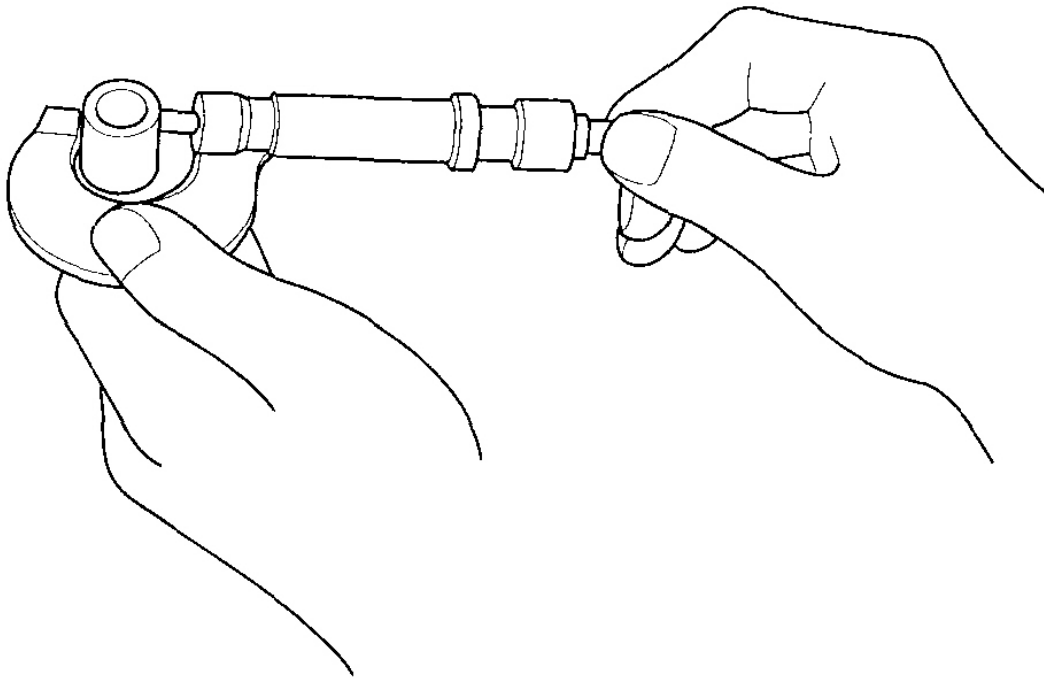
NOTE: Inspect the piston, piston pin, and connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New): 21.962-21.965 mm (0.8646-0.8648 in.)

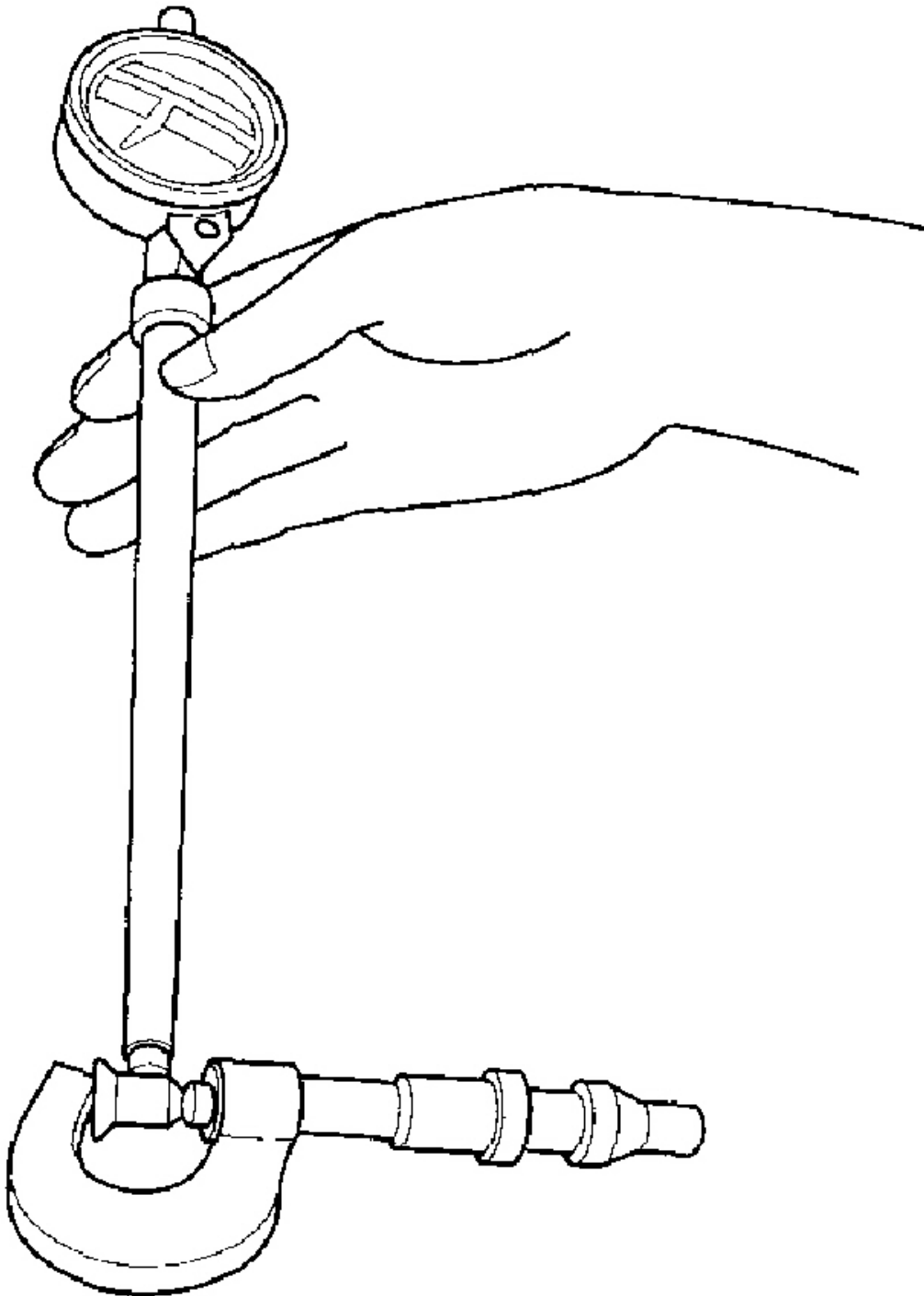
Service Limit: 21.954 mm (0.8643 in.)



G03659011

Fig. 36: Measuring Diameter Of Piston Pin
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03659012

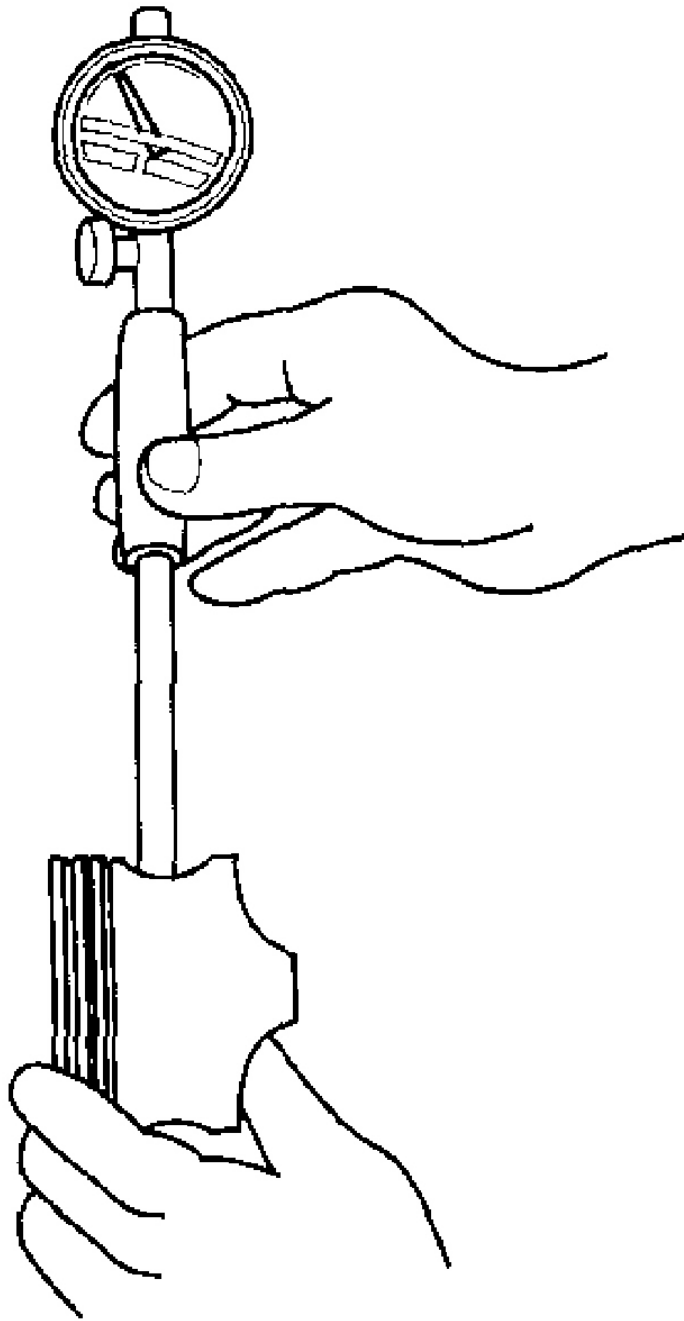
Fig. 37: Setting Zero Dial Indicator To Piston Pin Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Piston Clearance

Standard (New): -0.0050 to +0.0010 mm (-0.00020 to +0.00004 in.)

Service Limit: 0.004 mm (0.0002 in.)



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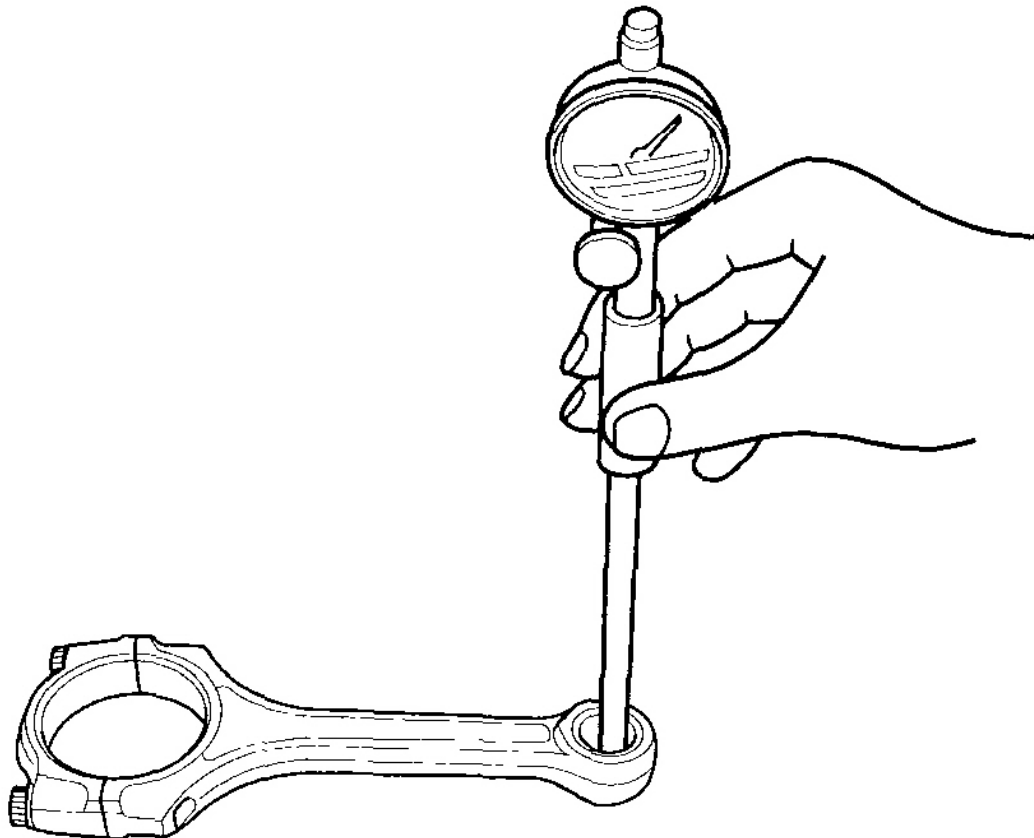
Fig. 38: Checking Difference Between Piston Pin Diameter & Piston Pin Hole Diameter
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

Piston Pin-to-Connecting Rod Clearance

Standard (New): 0.005-0.014 mm (0.0002-0.0006 in.)

Service Limit: 0.019 mm (0.0007 in.)

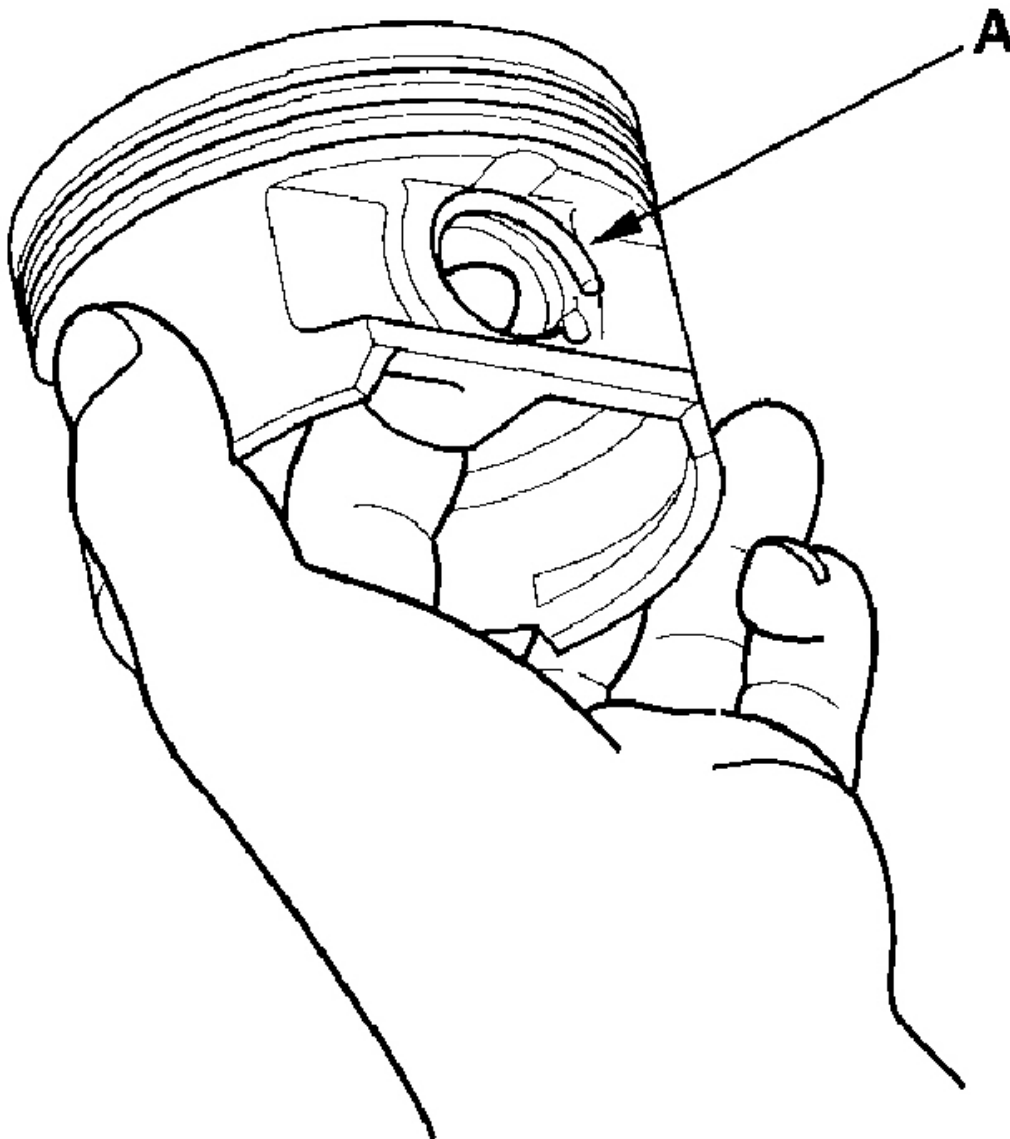


G03659014

Fig. 39: Measuring Piston Pin-To-Connecting Rod Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REASSEMBLY

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

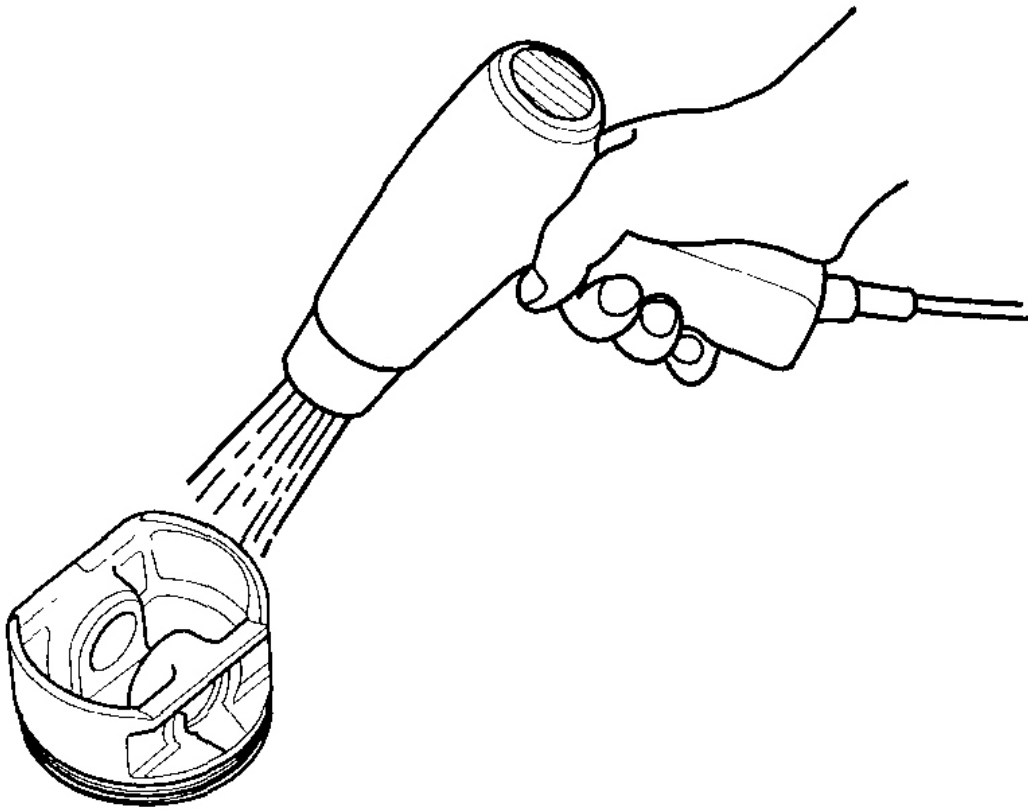


G03659015

Fig. 40: Installing Piston Pin Snap Ring

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

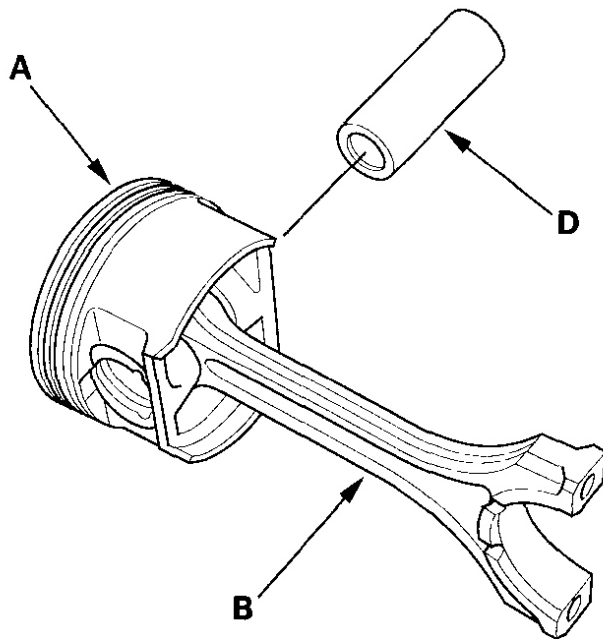
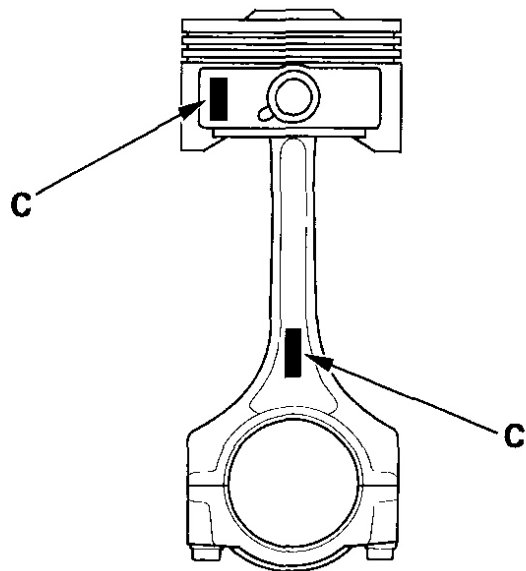


G03659016

Fig. 41: Heating Piston

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



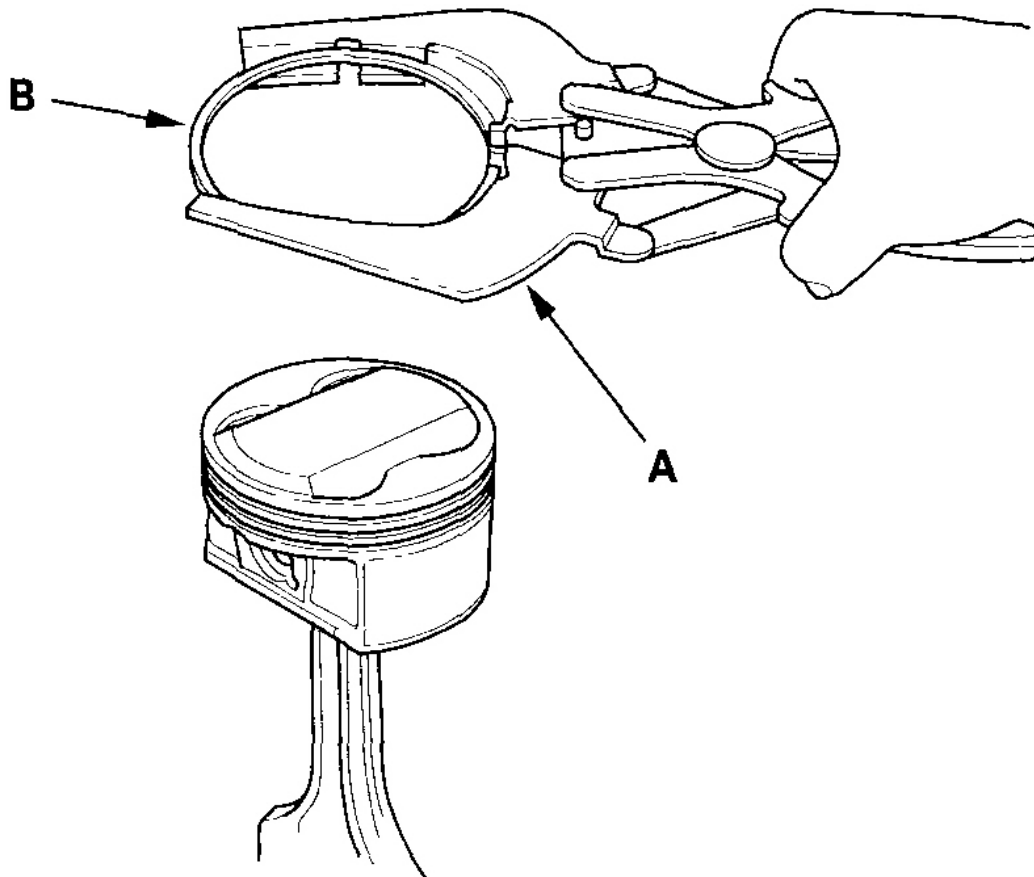
G03659017

Fig. 42: Assembling Piston & Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

5. Install the remaining snap ring.

PISTON RING REPLACEMENT

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



G03659018

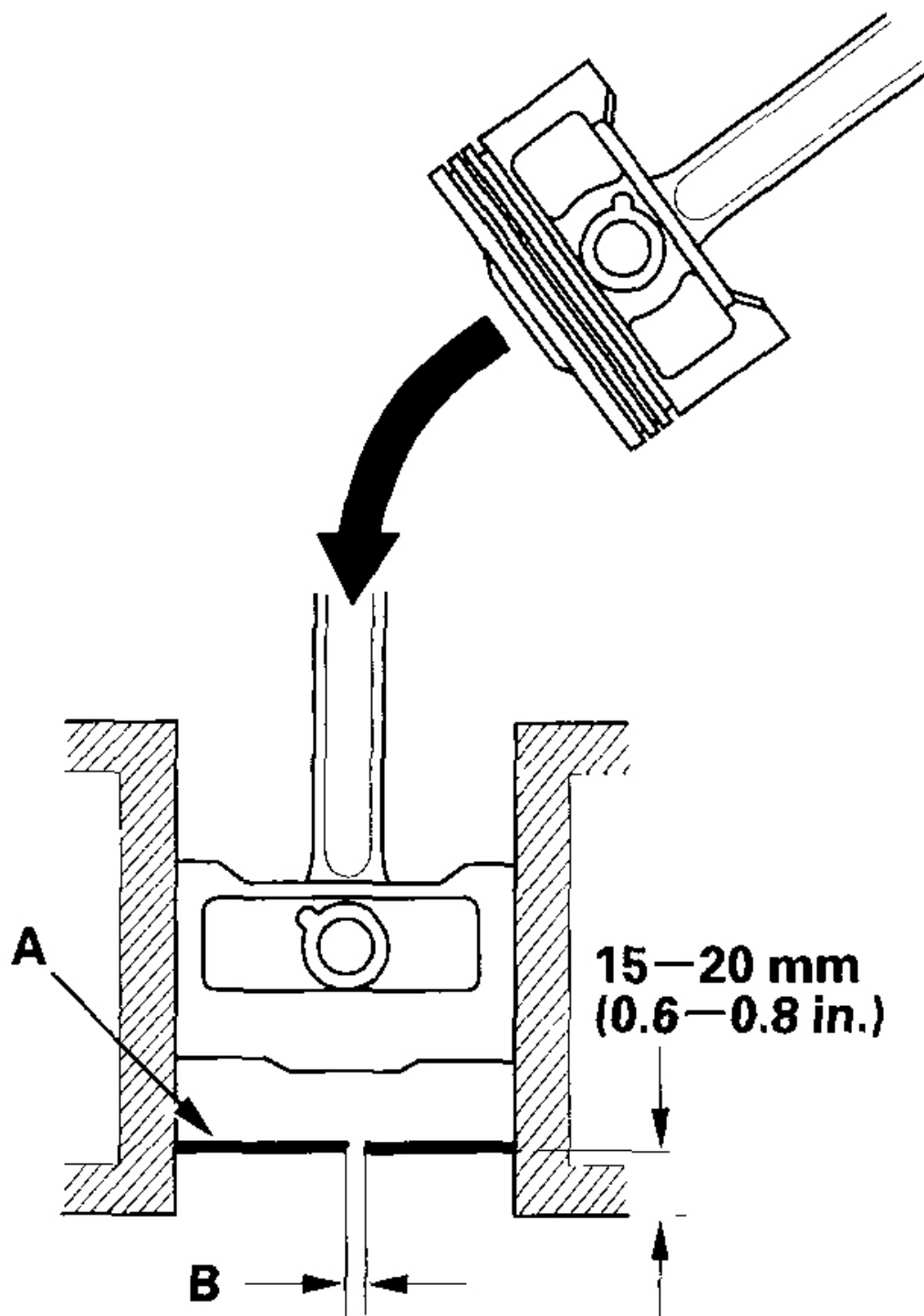
Fig. 43: Removing Piston Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Clean all the ring grooves thoroughly with a squared-off broken ring, or a ring groove cleaner with a blade to fit the piston grooves. File down the blade, if necessary. The top ring and second ring grooves are 1.2 mm (0.05 in.) wide, and the oil ring groove is 2.8 mm (0.11 in.) wide. Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tool.

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

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



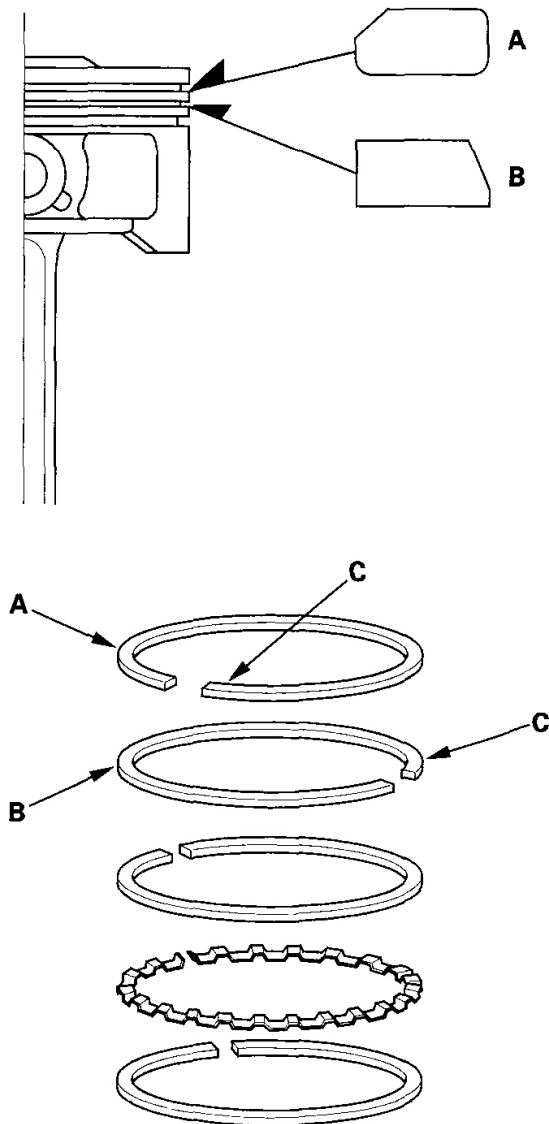
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Fig. 44: Pushing Ring Into Cylinder Bore**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

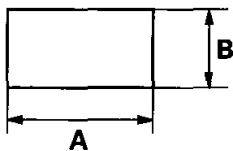
5. Measure the piston ring end-gap (B) with a feeler gauge:
 - If the gap is too small, check to see if you have the proper rings for your engine.
 - If the gap is too large, recheck the cylinder bore diameter against the wear limits (see step 4). If the bore is over the service limit, the engine block 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:****Standard (New): 0.20-0.70 mm (0.008-0.028 in.)****Service Limit: 0.80 mm (0.031 in.)**

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

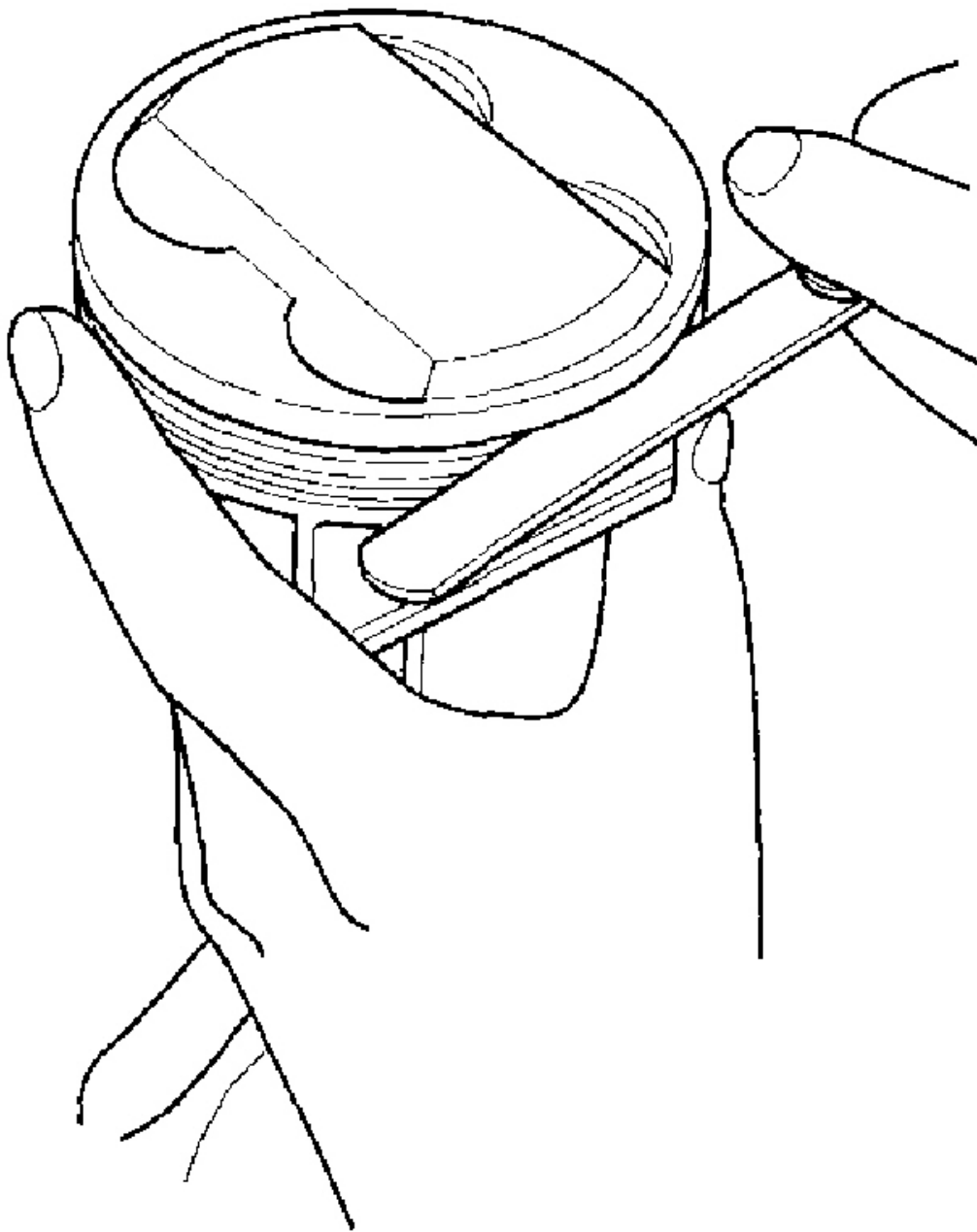
G03659020

Fig. 45: Installing Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

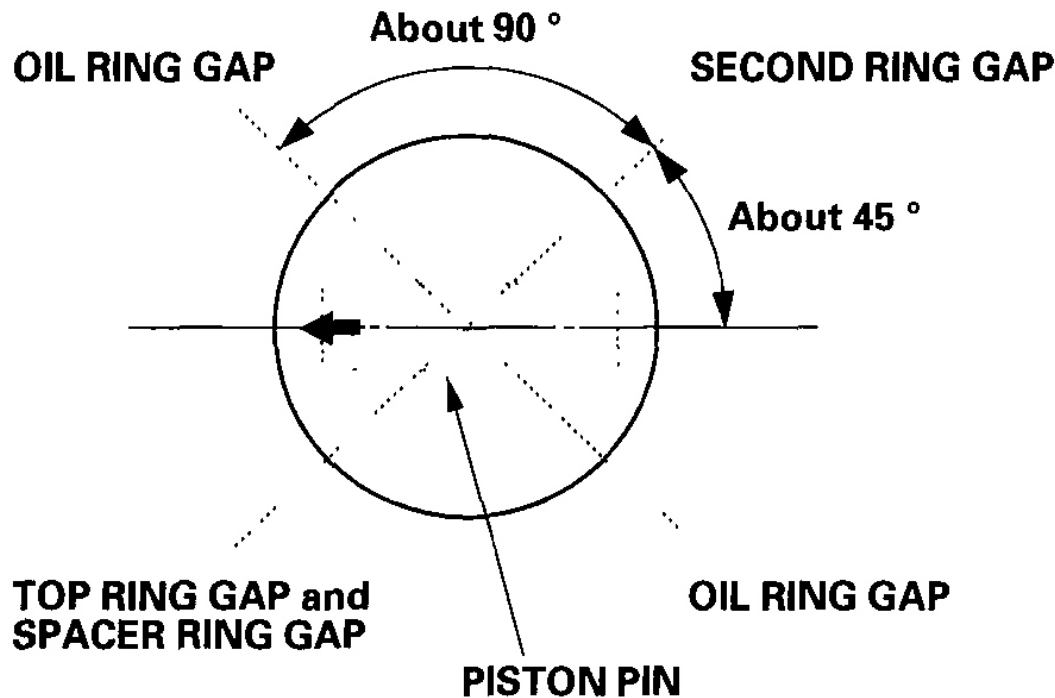
Top Ring Clearance**Standard (New): 0.055-0.080 mm (0.0022-0.0031 in.)****Service Limit: 0.15 mm (0.006 in.)****Second Ring Clearance****Standard (New): 0.030-0.055 mm (0.0012-0.0022 in.)****Service Limit: 0.13 mm (0.005 in.)**



G03659021

Fig. 46: Measuring Ring-To-Groove Clearance
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



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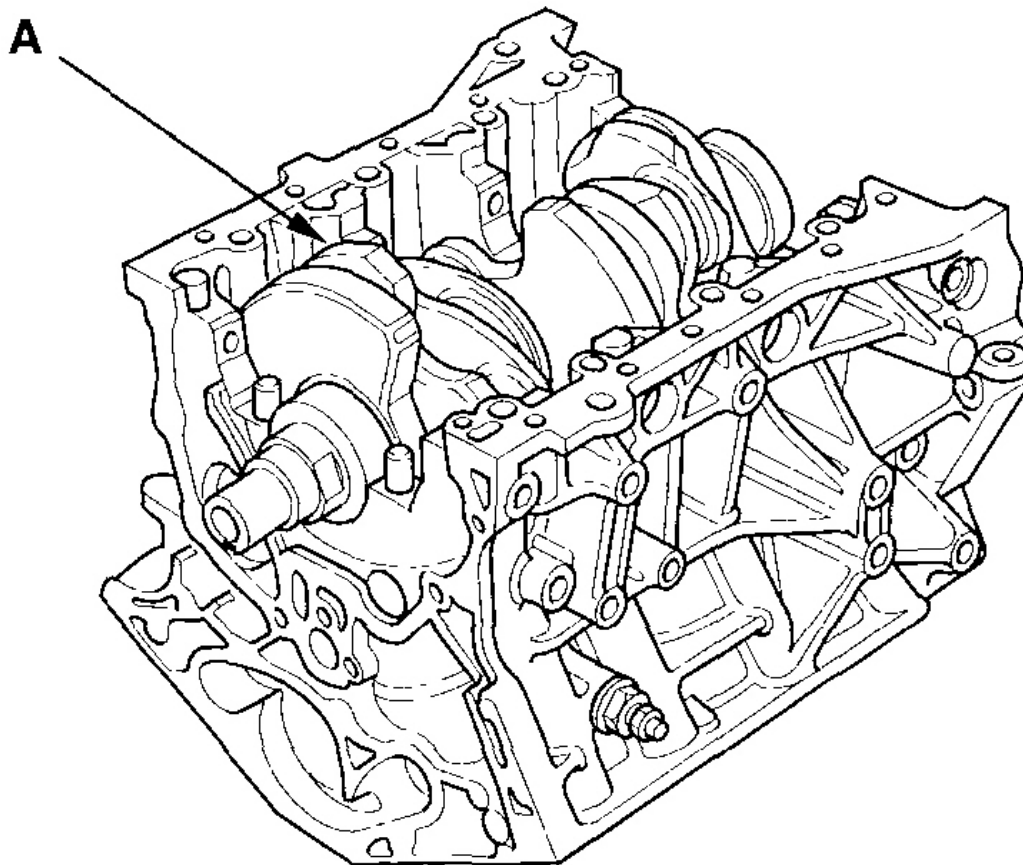
Fig. 47: Positioning Ring End Gaps

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CRANKSHAFT AND PISTON INSTALLATION

Special Tools Required

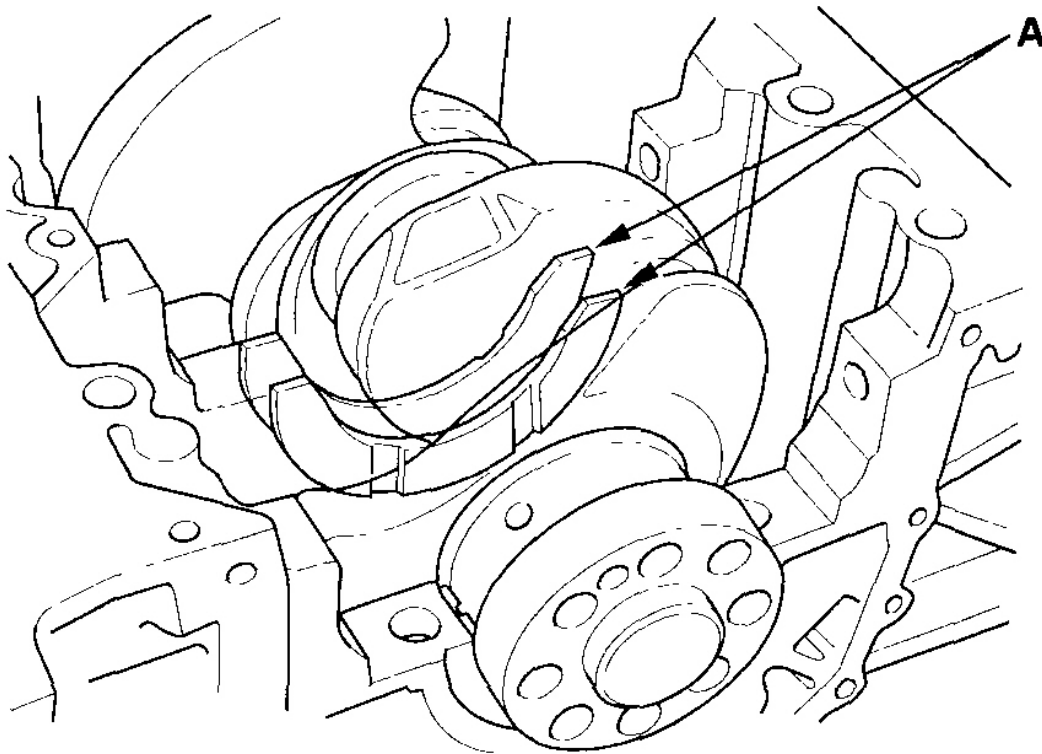
- Driver 07749-0010000
- Driver attachment, 106 mm 070AD-RCAA200
 1. Check the connecting rod bearing clearance with plastigage (see **CONNECTING ROD BEARING REPLACEMENT**).
 2. Check the main bearing clearance with plastigage (see **CRANKSHAFT MAIN BEARING REPLACEMENT**).
 3. Install the bearing halves in the engine block and connecting rods.
 4. Apply new engine oil to inside of the main bearings and rod bearings.
 5. Lower the crankshaft (A) into the engine block.



G03659023

Fig. 48: Lowering Crankshaft Into Engine Block
Courtesy of AMERICAN HONDA MOTOR CO., INC.

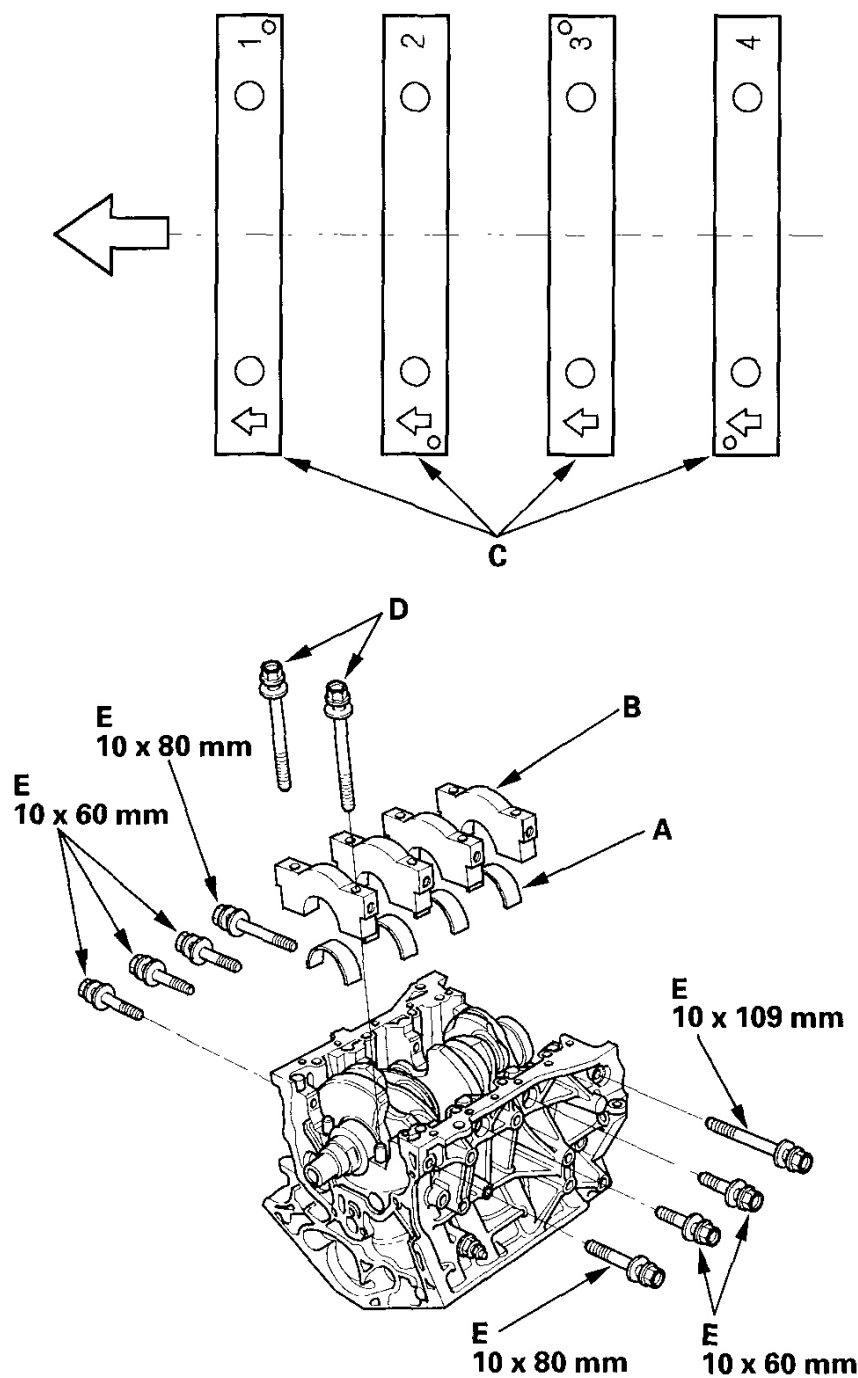
6. Apply new engine oil to the side with the thrust washer groove. Install the thrust washers (A) in the No. 3 journal.



G03659024

Fig. 49: Installing Thrust Washers In No. 3 Journal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Install the bearings (A) and bearing caps (B) with the arrow (C) facing the timing belt end of the engine.

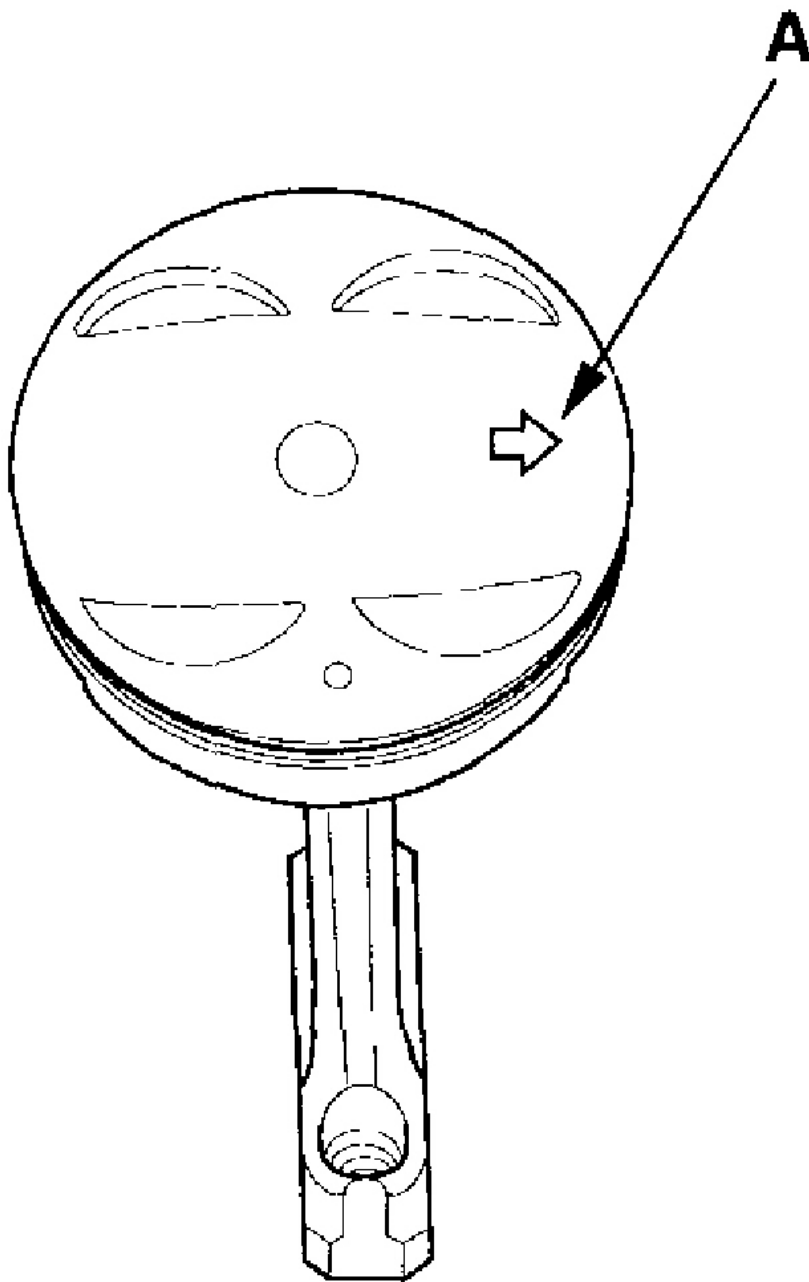


G03659025

Fig. 50: Installing Bearings & Bearing Caps
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

8. Apply new engine oil to the bolt threads and flanges, then loosely install the bearing cap bolts (D) and bearing cap side bolts (E).

9. Set the crankshaft to bottom dead center (BDC) for the cylinder you are installing the piston in.
10. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore.
11. Attach the ring compressor to the piston/connecting rod assembly, and check that the bearing is securely in place.
12. Position the piston/connecting rod assembly with the arrow (A) facing the timing belt side of the engine.

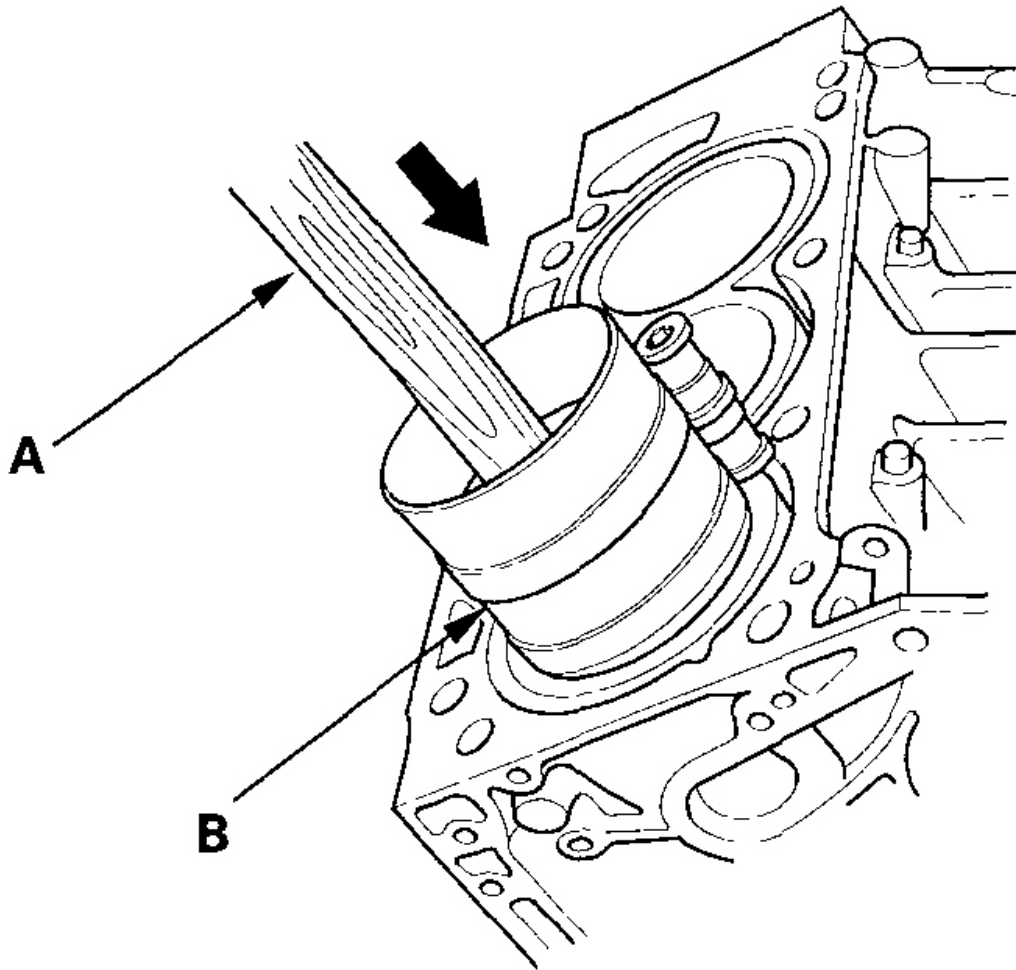


G03659026

Fig. 51: Positioning Piston/Connecting Rod Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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

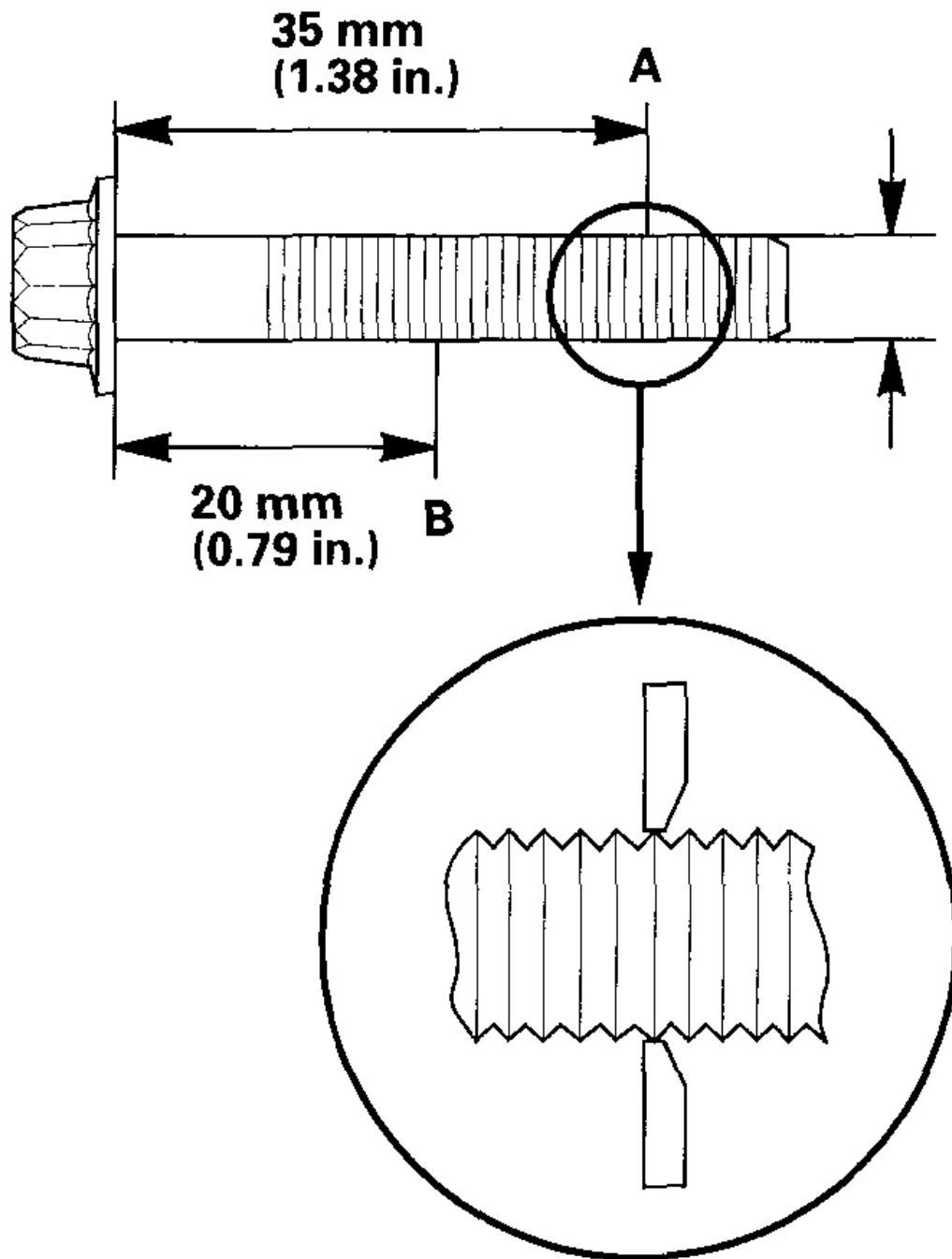
expanding before entering the cylinder bore.



G03659027

Fig. 52: Positioning Piston/Connecting Rod Assembly In Cylinder & Tap
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03659028

Fig. 53: Measuring Diameter Of Each Connecting Rod Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

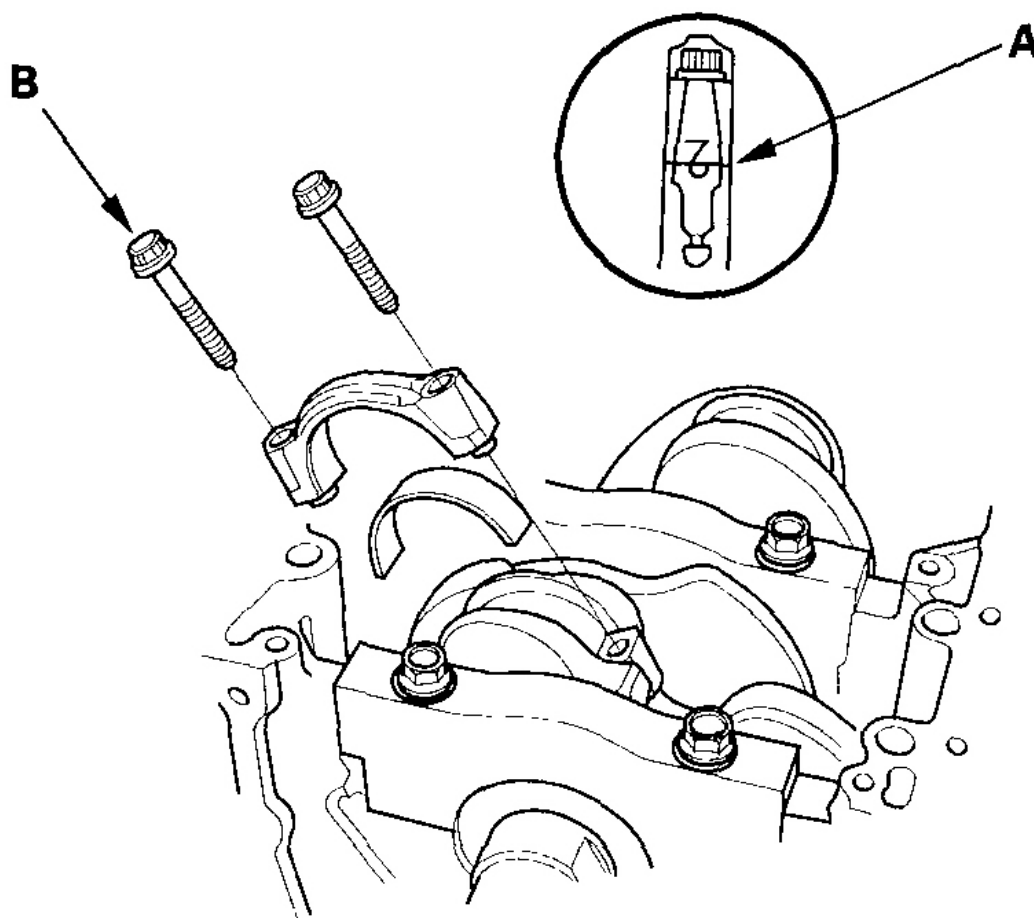
16. Calculate the difference in diameter between point A and point B.

Point A-Point B = Difference in Diameter

Difference in Diameter

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

17. If the difference in diameter is out of tolerance, replace the connecting rod bolt.
18. Line up the mark (A) on the connecting rod and cap, then install the cap.



G03659029

Fig. 54: Lining Up Mark On Connecting Rod & Cap
Courtesy of AMERICAN HONDA MOTOR CO., INC.

19. Apply new engine oil to the bolt threads and flanges. Torque the bolts (B) to 20 N.m (2.0 kgf.m, 14 lbf.ft).
20. Mark the connecting rod (A) and bolt head (B) as shown.

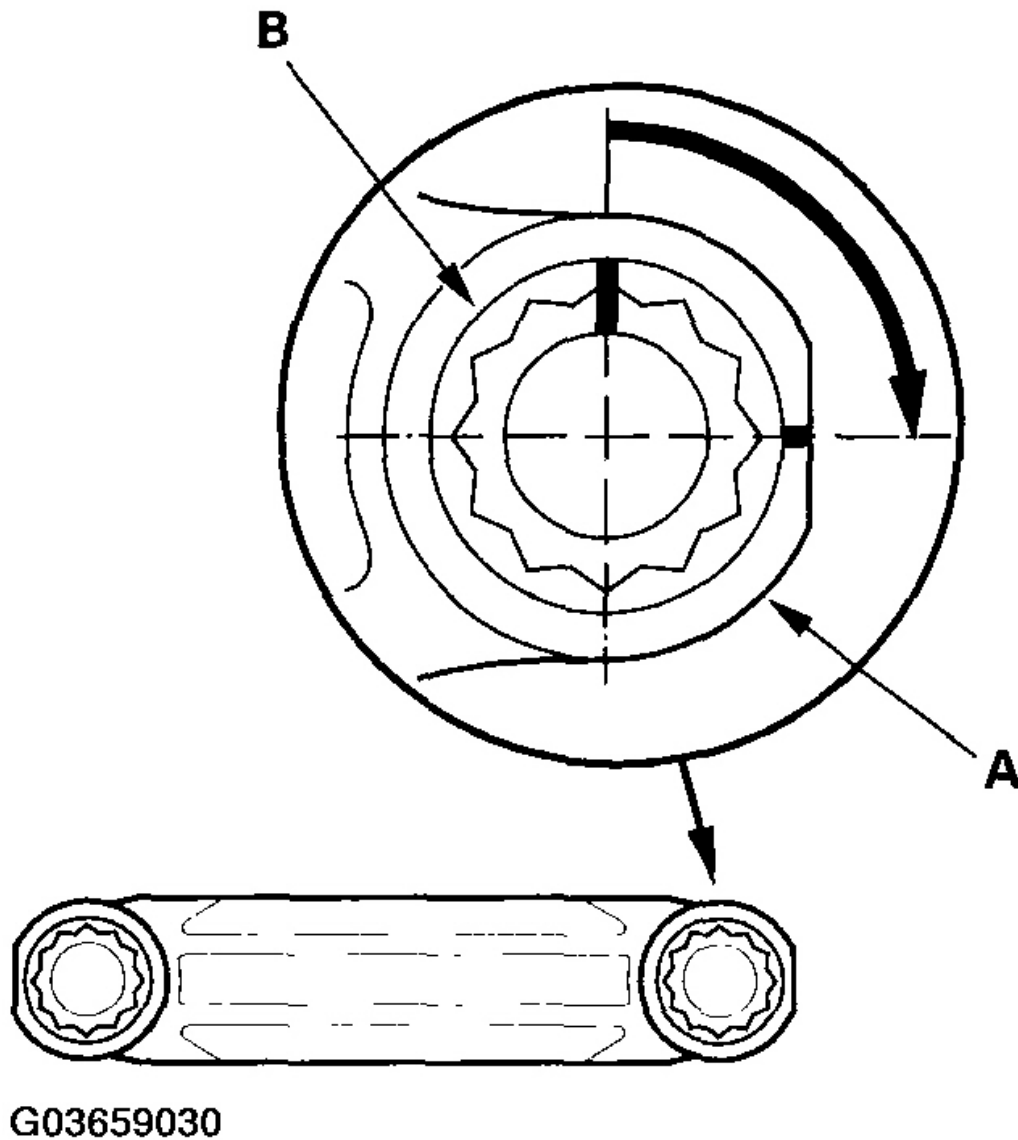
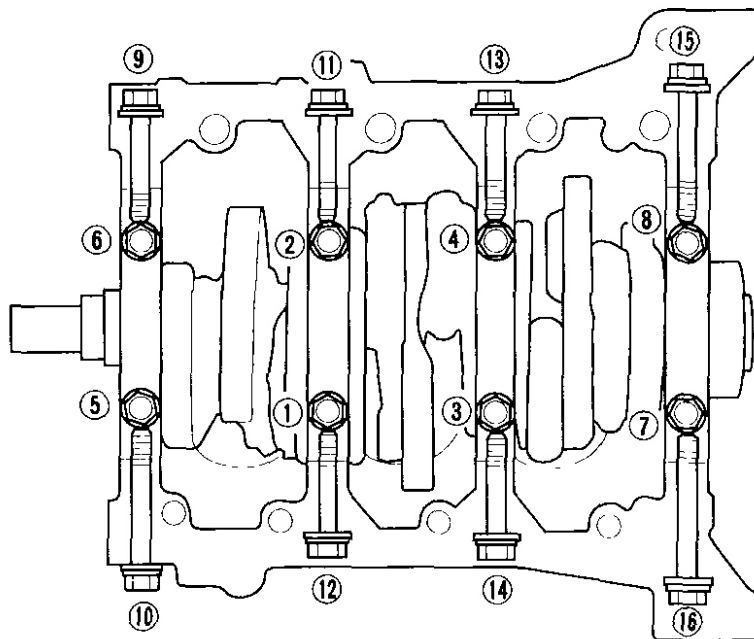
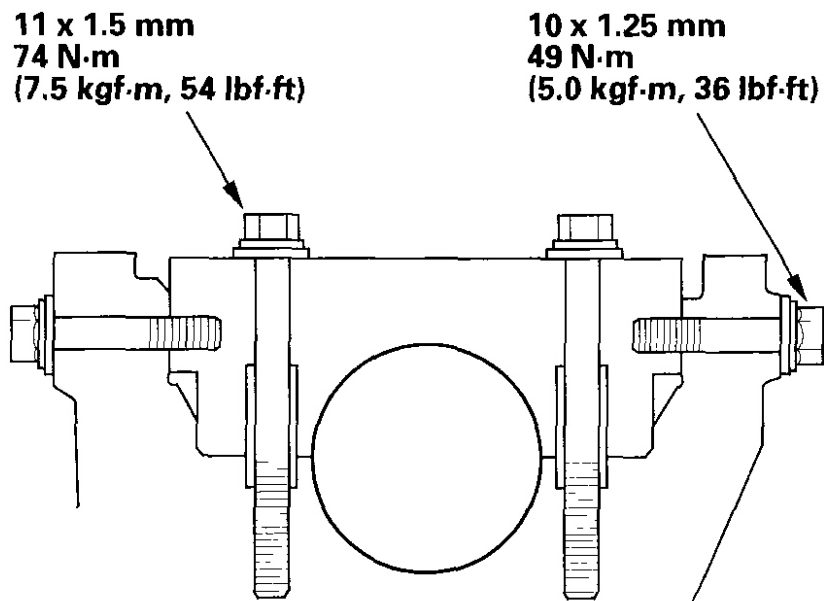


Fig. 55: Marking Connecting Rod & Bolt Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

21. Tighten the bolt until the mark on the bolt head lines up with the mark on the connecting rod (turn the bolt 90°).

NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 15 of the procedure. Do not loosen it back to the specified angle.

22. Tighten the bearing cap bolts, and then the bearing cap side bolts to the specified torque in the sequence as shown. Repeat the torque sequence again to measure the bolts are properly torqued.

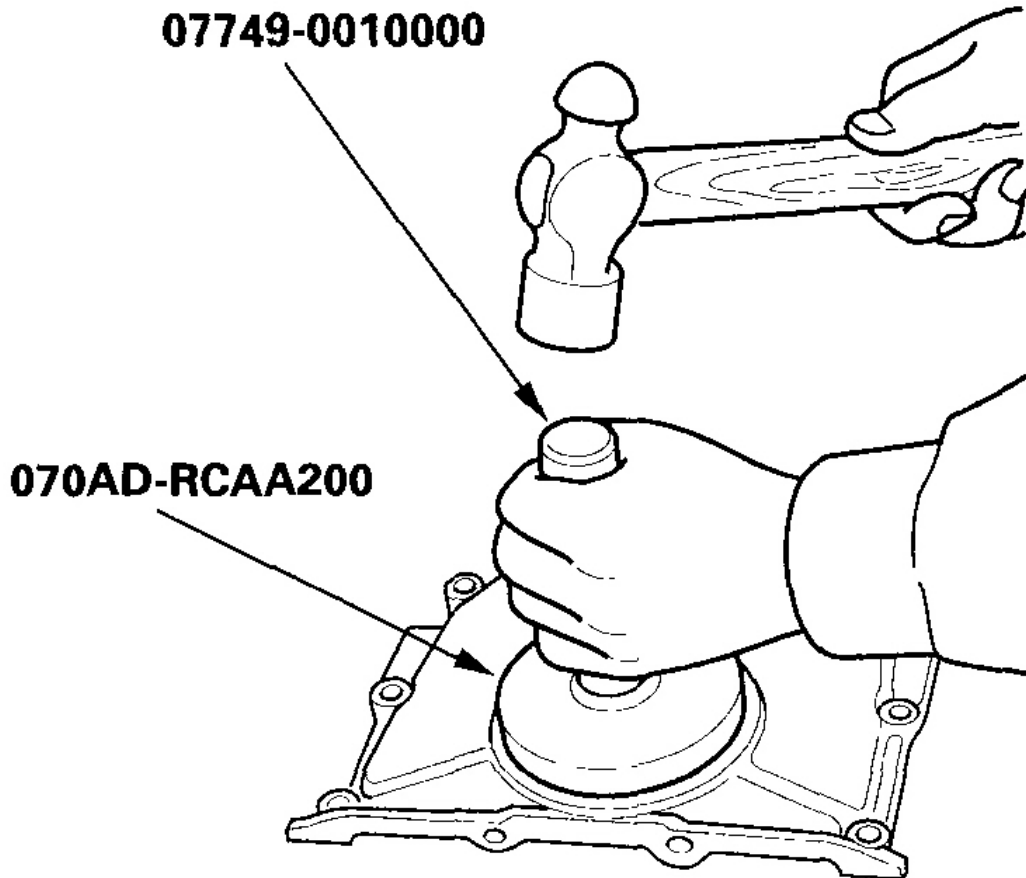


G03659031

Fig. 56: Tightening Bearing Cap Bolts With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

23. Remove any old liquid gasket from the engine block end cover mating surfaces, bolts, and bolt holes.

24. Clean and dry the engine block end cover mating surfaces.
25. The seal mating surface on the engine block end cover should be dry. Apply a light coat of multipurpose grease to the crankshaft and to the lip of the seal.
26. Drive the new crankshaft oil seal until the special tool bottoms on the engine block end cover.



G03659032

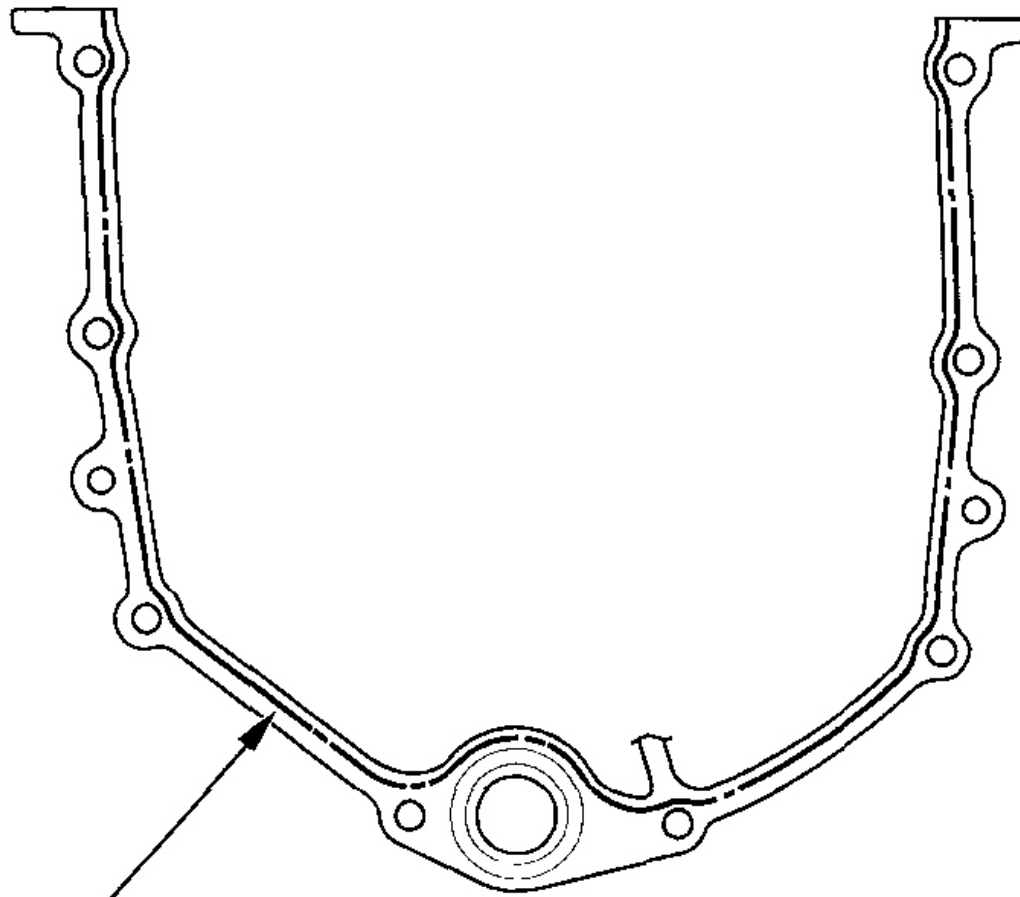
Fig. 57: Identifying Drive Crankshaft Oil Seal

Courtesy of AMERICAN HONDA MOTOR CO., INC.

27. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the engine block end cover.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and

reapply the liquid gasket.



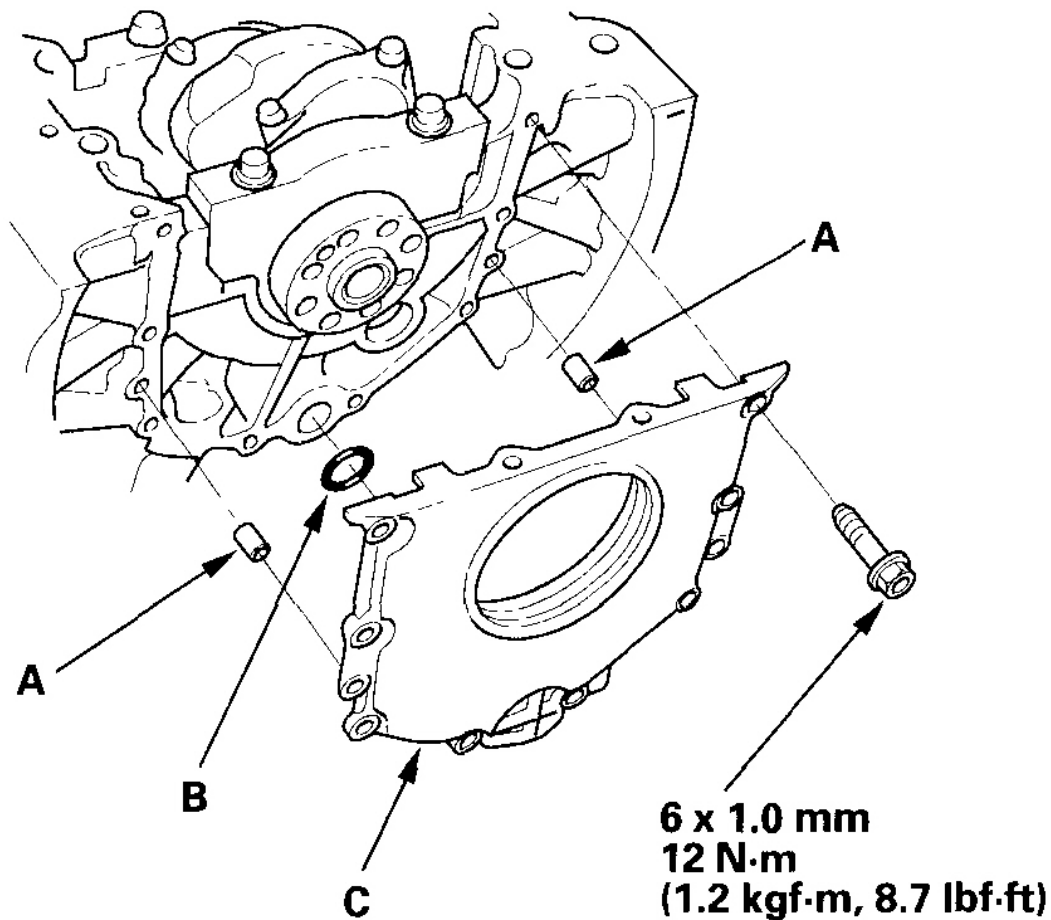
Apply liquid gasket
along the broken line.

G03659033

Fig. 58: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

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



G03659034

Fig. 59: Installing Dowel Pins With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

29. Clean the excess grease off the crankshaft, and check the seal for distortion.
30. Install a new crankshaft oil seal in the oil pump (see step 2 on **INSTALLATION**).
31. Remove all of the old liquid gasket from the oil pump mating surfaces, bolts, and bolt holes.
32. Clean and dry the oil pump mating surfaces.
33. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the oil pump.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.

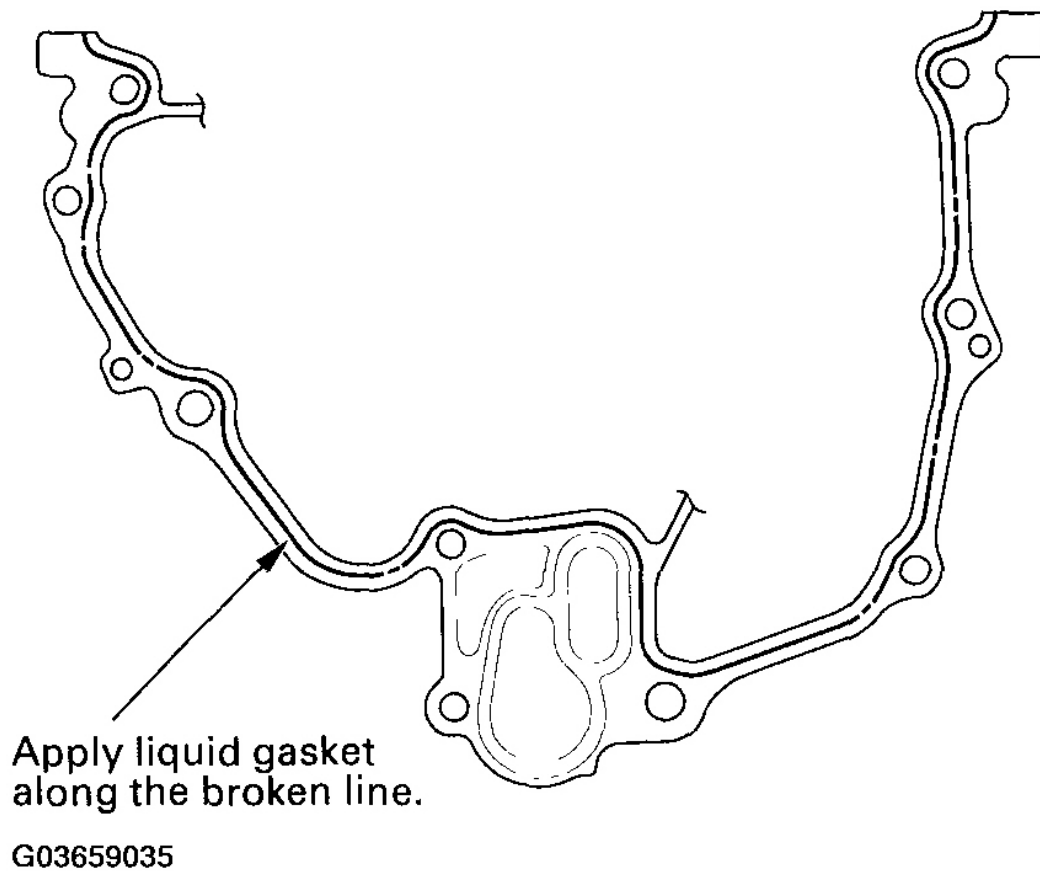


Fig. 60: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

34. Grease the lip of the oil seal, and apply oil to the new O-ring (A).

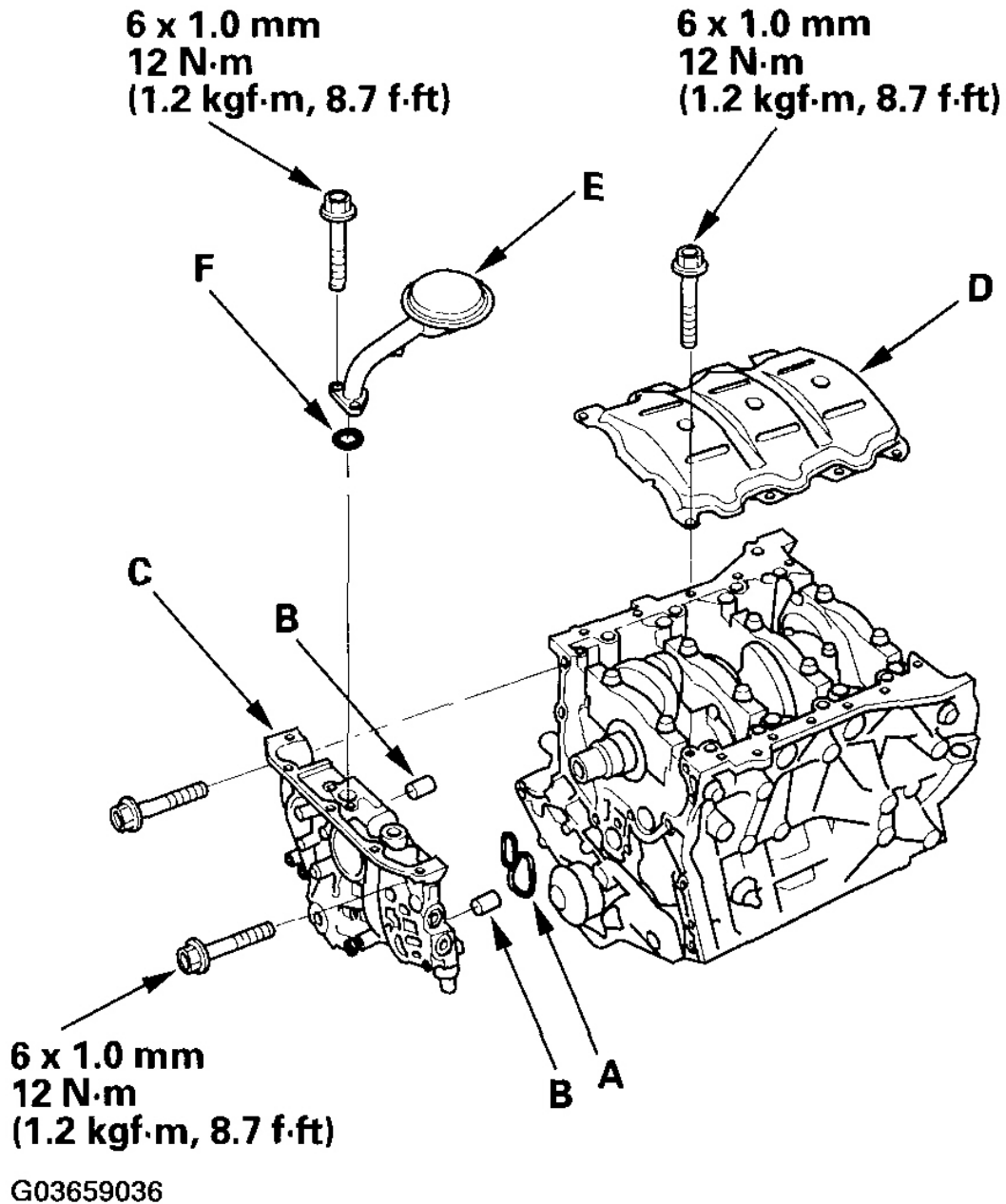


Fig. 61: Identifying Grease Lip Of Oil Seal With Torque Specifications
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

35. Install the dowel pins (B), then align the inner rotor with the crankshaft, and install the oil pump (C).
36. Clean the excess grease off the crankshaft, and check the seal for distortion.
37. Install the baffle plate (D), then install the oil screen (E) with new O-ring (F).

38. Install the rocker arm oil control solenoid (VTEC solenoid valve)/oil filter assembly (A), with a new rocker arm oil control solenoid (VTEC solenoid valve) filter (B).

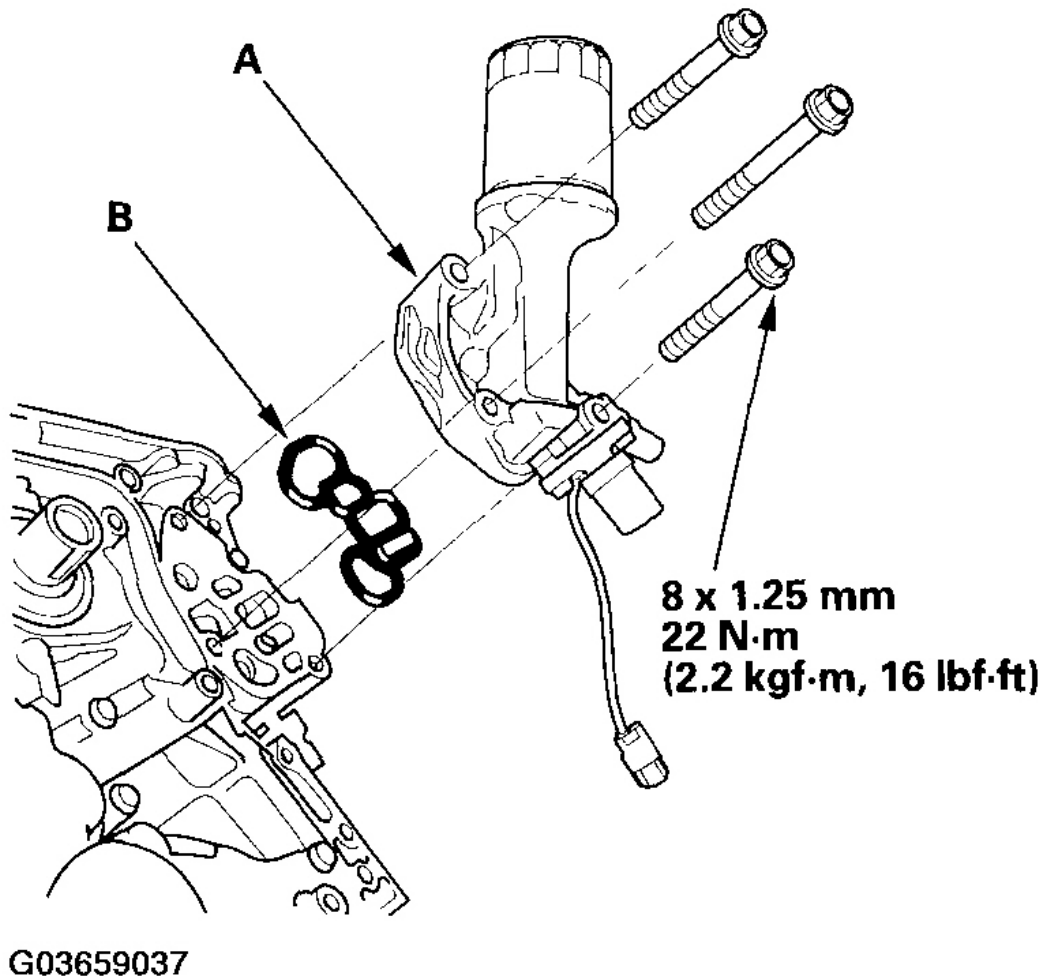


Fig. 62: Installing Rocker Arm Oil Control Solenoid With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

39. Install the oil pan (see **OIL PAN INSTALLATION**).
40. Install the crankshaft position (CKP) sensor (see **MAP SENSOR REPLACEMENT**).
41. Install the cylinder heads (see **CYLINDER HEAD INSTALLATION**).
42. M/T model: Install the flywheel (see **FLYWHEEL AND PILOT BEARING REPLACEMENT**).
43. A/T model: Install the drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
44. Install the transmission:

- Manual Transmission (see **TRANSMISSION INSTALLATION**)
- Automatic Transmission (see **TRANSMISSION INSTALLATION**)

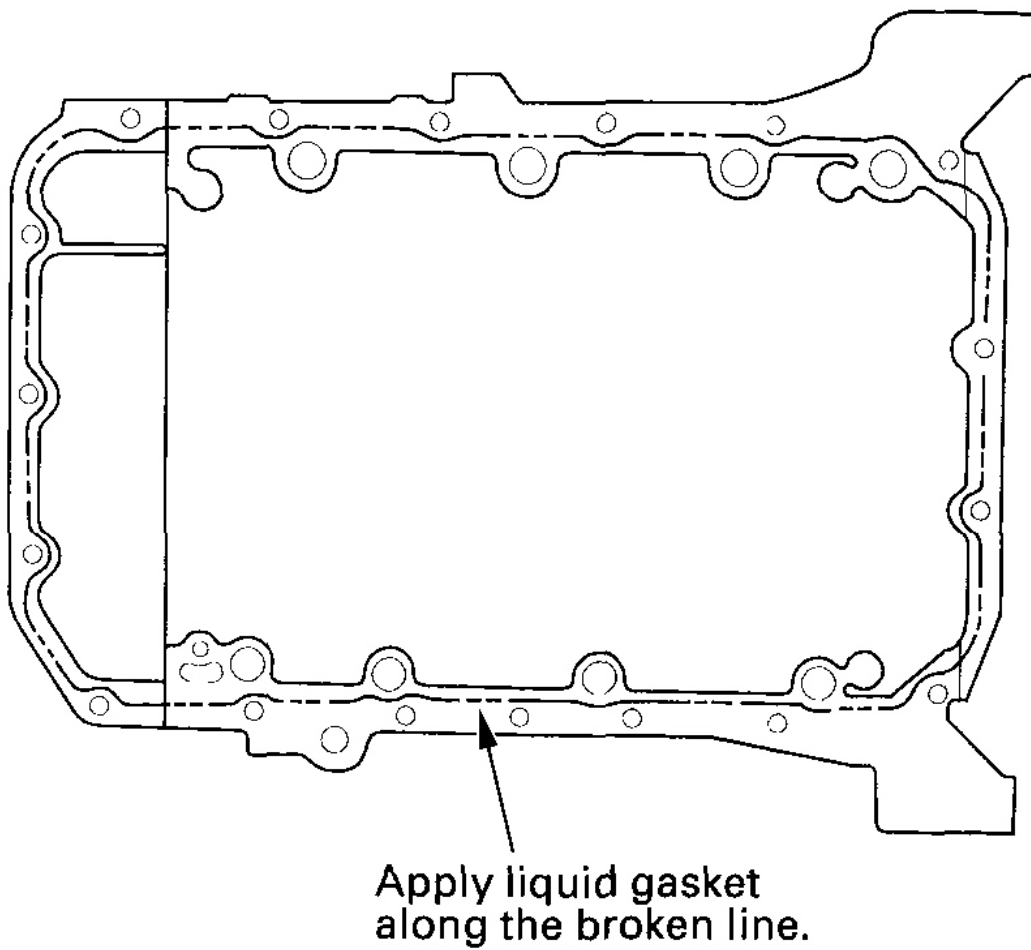
45. Install the engine assembly (see **ENGINE INSTALLATION**).

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

OIL PAN INSTALLATION

1. Remove all of the 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 08717-0004, 08718-0001, 08718-0002, 08718-0003, or 08718-009, evenly to the oil pan mating surface of the engine block.

NOTE: Do not install components if too much time has passed after applying the liquid gasket (for P/N 08718-0002, no more than 4 minutes, for all others, no more than 5 minutes). Instead, remove the old residue and reapply the liquid gasket.



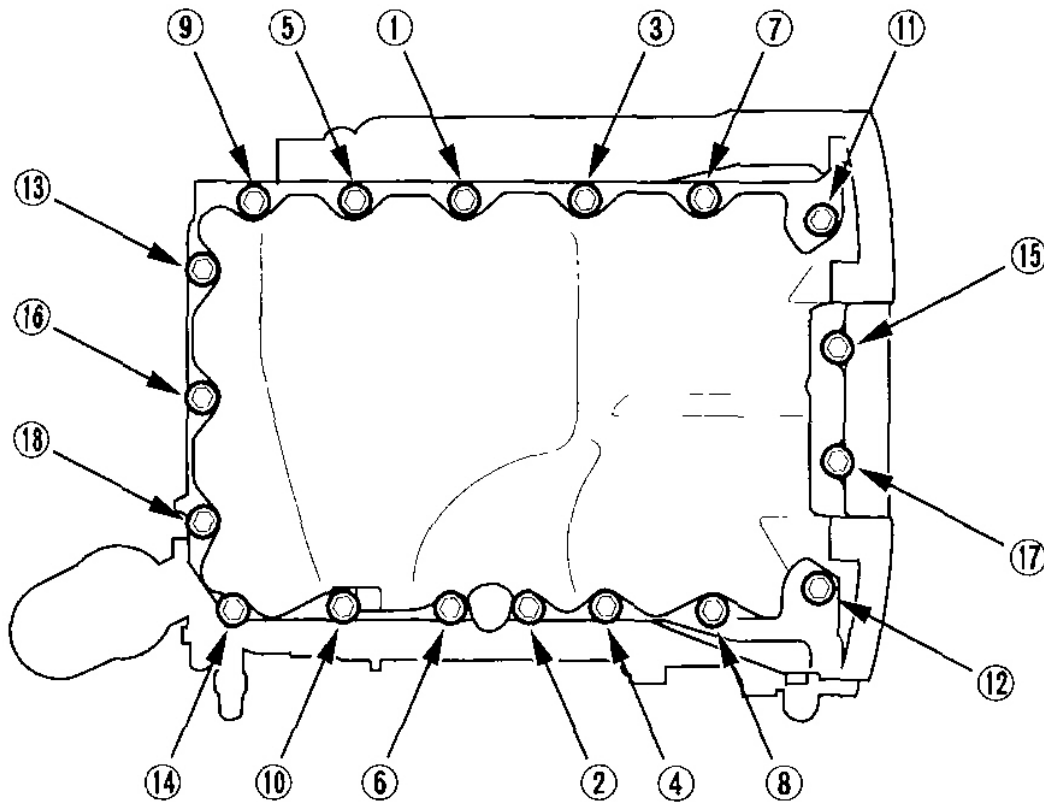
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Fig. 63: Applying Liquid Gasket

Courtesy of AMERICAN HONDA MOTOR CO., INC.

4. Install the oil pan on the engine block.
5. Tighten the bolts in two or three steps. In the final step, tighten all bolts, 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.

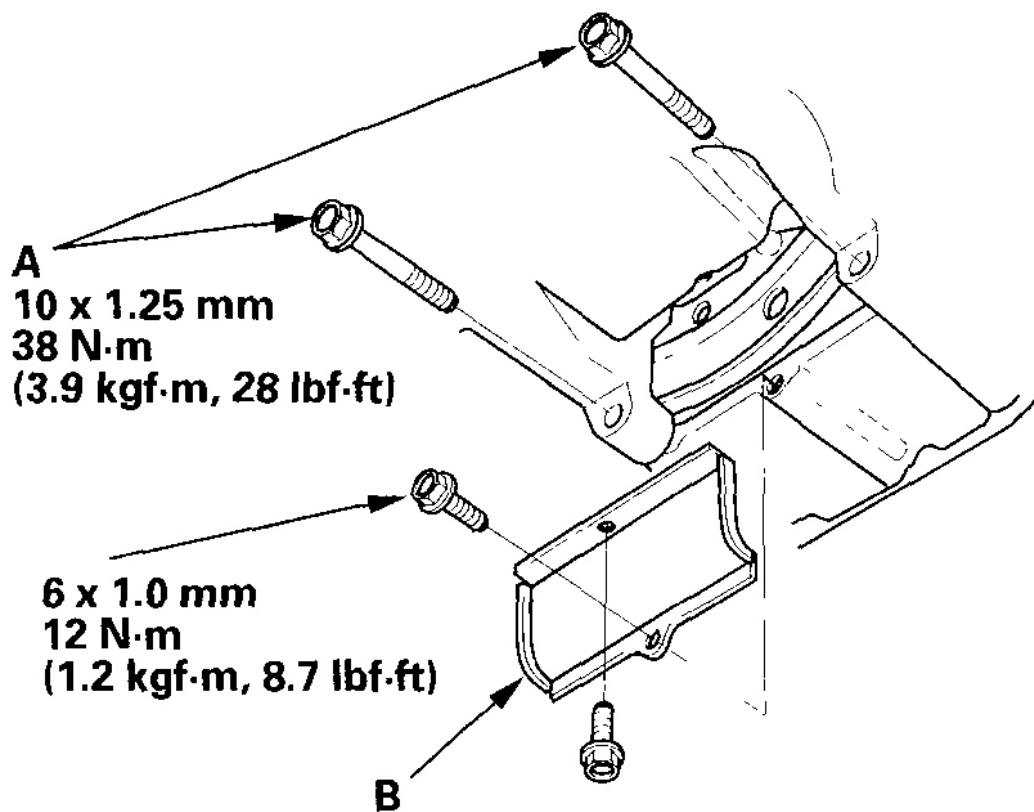


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Fig. 64: Tightening Bolts

Courtesy of AMERICAN HONDA MOTOR CO., INC.

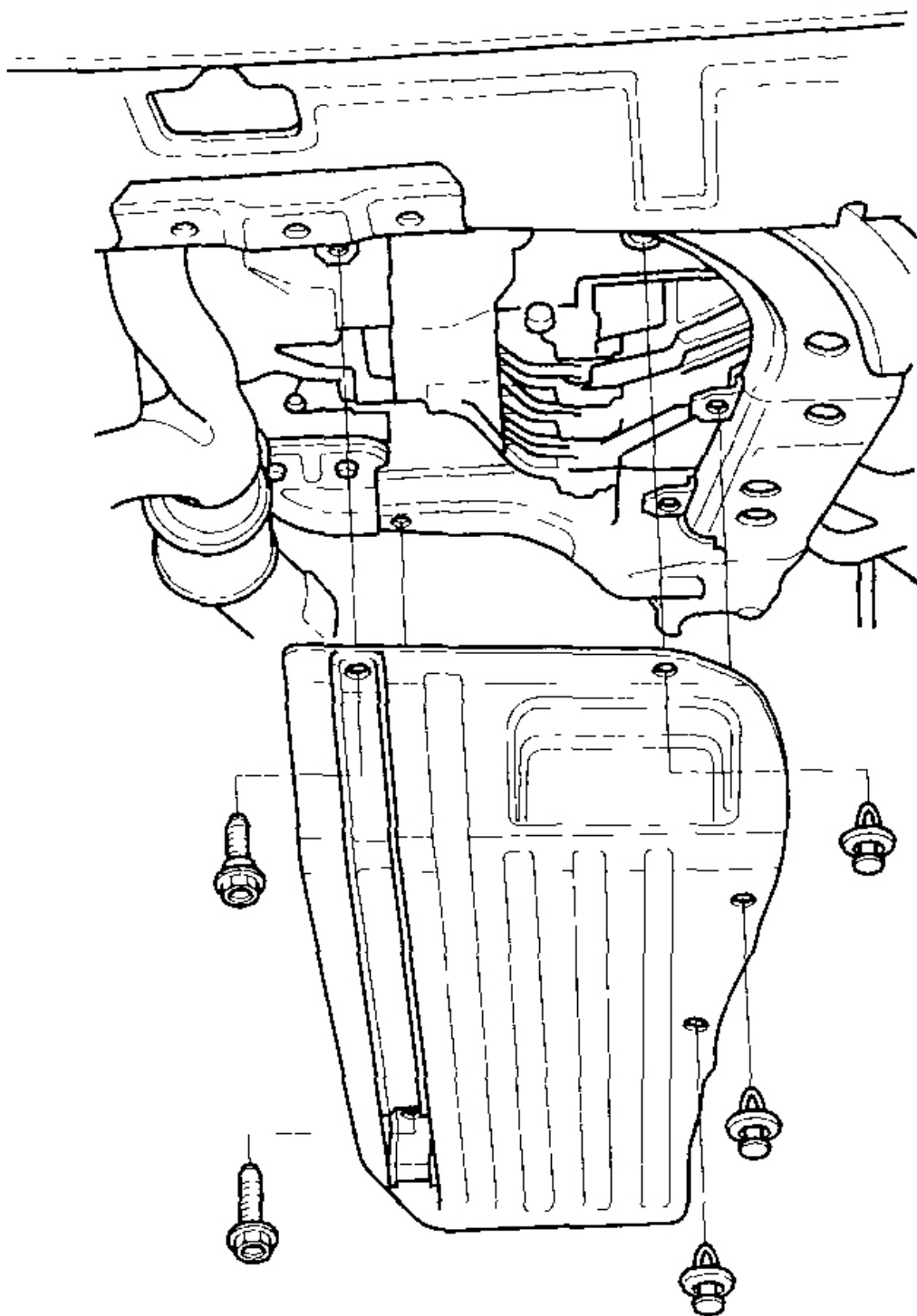
6. Tighten the two bolts (A) securing the transmission, then install the torque converter cover (B).



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Fig. 65: Installing Torque Converter Cover With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. If the engine is still in the vehicle, do the following steps.
8. Install exhaust pipe A using new gaskets and new self locking nuts (see step 28 on **ENGINE INSTALLATION**).
9. Install the engine under cover.



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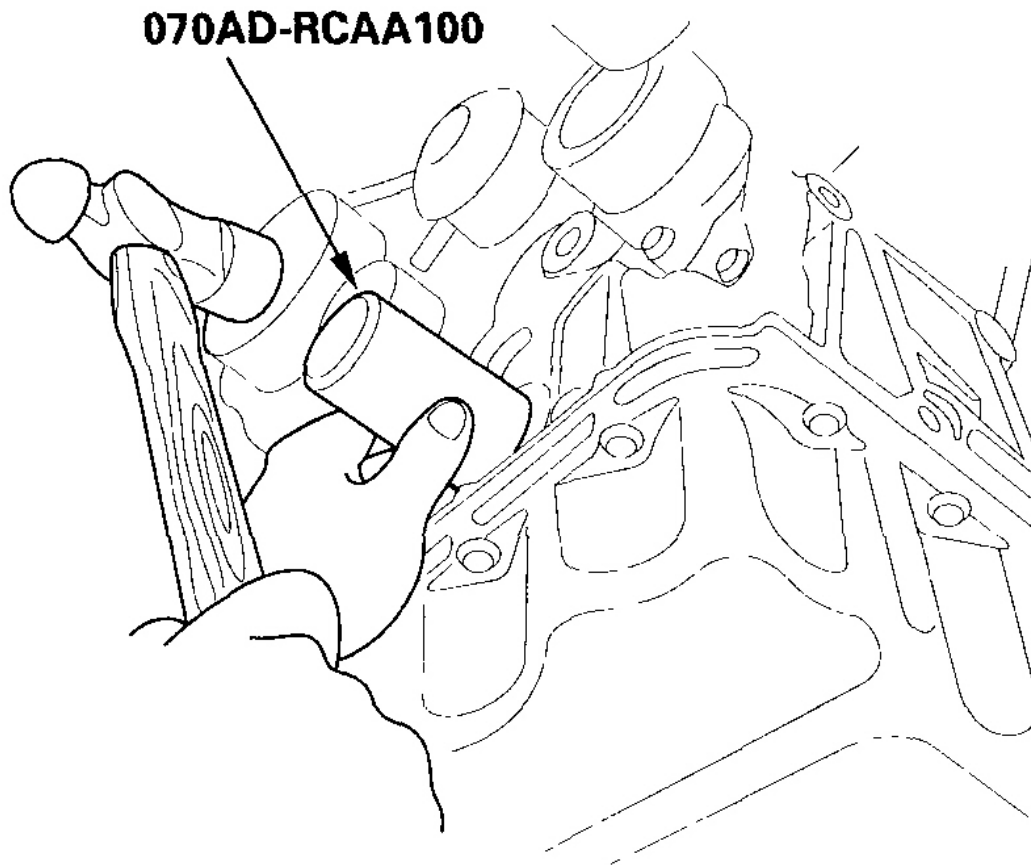
Fig. 66: Installing Engine Under Cover**Courtesy of AMERICAN HONDA MOTOR CO., INC.**

10. Install the splash shield (see step 35 on **ENGINE INSTALLATION**).
11. Refill the engine with oil (see step 3 on **OIL PRESSURE TEST**).
12. Lower the vehicle on the hoist.

PULLEY END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR**Special Tools Required**

Oil seal driver, 64 mm 070AD-RCAA100

1. Remove the crankshaft position (CKP) sensor A/B, timing belt, and timing belt drive pulley (see **TIMING BELT ADJUSTER REPLACEMENT**).
2. Remove the pulley end crankshaft oil seal.
3. Clean and dry the crankshaft oil seal housing.
4. Apply a light coat of multipurpose grease to the crankshaft and to the lip of the seal.
5. Using the seal driver, drive in the crankshaft oil seal until the driver bottoms against the oil pump. When the seal is in place, clean any excess grease off the crankshaft, and check that the oil seal lip is not distorted.



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Fig. 67: Identifying Drive In Crankshaft Oil Seal
Courtesy of AMERICAN HONDA MOTOR CO., INC.

6. Install the timing belt drive pulley, CKP sensor A/B, and timing belt (see **TIMING BELT ADJUSTER REPLACEMENT**).

TRANSMISSION END CRANKSHAFT OIL SEAL INSTALLATION - IN CAR

Special Tools Required

- Driver 07749-0010000
 - Driver attachment, 106 mm 070AD-RCAA200
1. M/T model: Remove the transmission (see **TRANSMISSION REMOVAL**), the clutch disc and pressure plate (see **CLUTCH REPLACEMENT**), and the flywheel (see **FLYWHEEL AND PILOT BEARING REPLACEMENT**).

2. A/T model: Remove the transmission (see **TRANSMISSION REMOVAL**) and drive plate (see **DRIVE PLATE REMOVAL AND INSTALLATION**).
3. Remove the transmission end crankshaft oil seal.
4. Clean and dry the crankshaft oil seal housing.
5. Apply a light coat of multipurpose grease to the crankshaft and to the lip of the seal.
6. Using the special tools, drive in the crankshaft oil seal until the driver attachment bottoms against the engine block end cover. Align the hole in the driver attachment with the pin on the crankshaft.

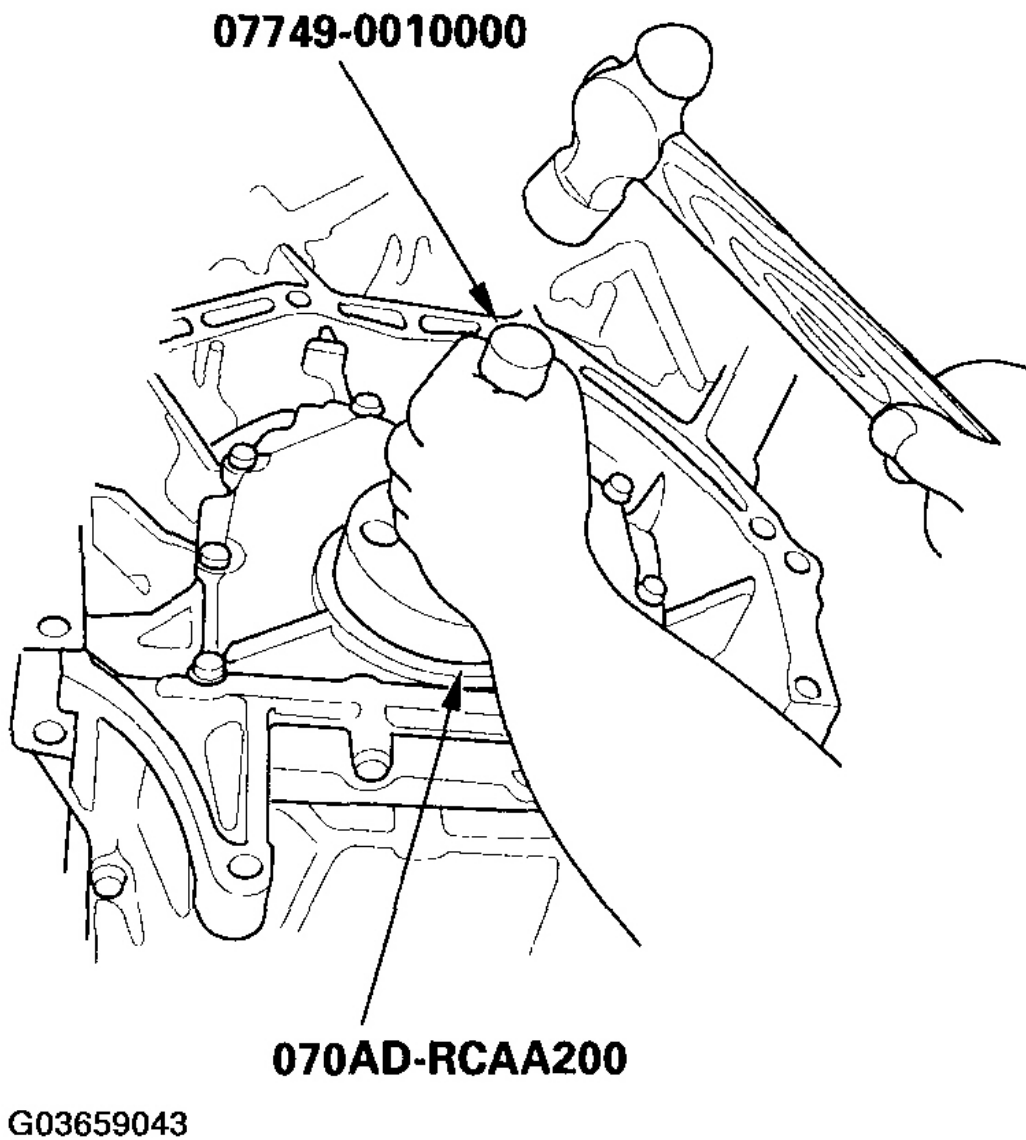


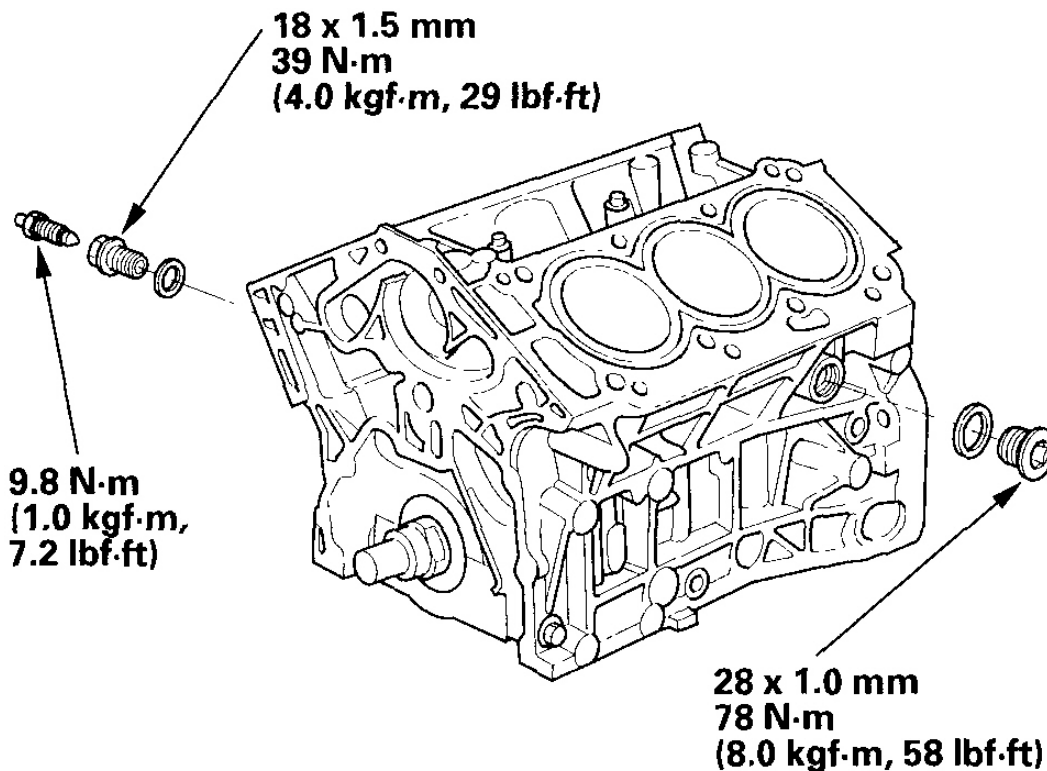
Fig. 68: Identifying Drive In Crankshaft Oil Seal Using Special Tools

Courtesy of AMERICAN HONDA MOTOR CO., INC.

7. Clean any excess grease off the crankshaft, and check that the oil seal lip is not distorted.
8. M/T model: Install the flywheel (see FLYWHEEL AND PILOT BEARING REPLACEMENT), the clutch disc and pressure plate (see CLUTCH DISC AND PRESSURE PLATE INSTALLATION), and the transmission (see TRANSMISSION INSTALLATION).
9. A/T model: Install the drive plate (see DRIVE PLATE REMOVAL AND INSTALLATION), and the transmission (see TRANSMISSION INSTALLATION).

DRAIN BOLT INSTALLATION

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



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Fig. 69: Installing Drain Bolt With Torque Specifications
Courtesy of AMERICAN HONDA MOTOR CO., INC.