

Cylinder Head - J35Z6 engine

Cylinder Head

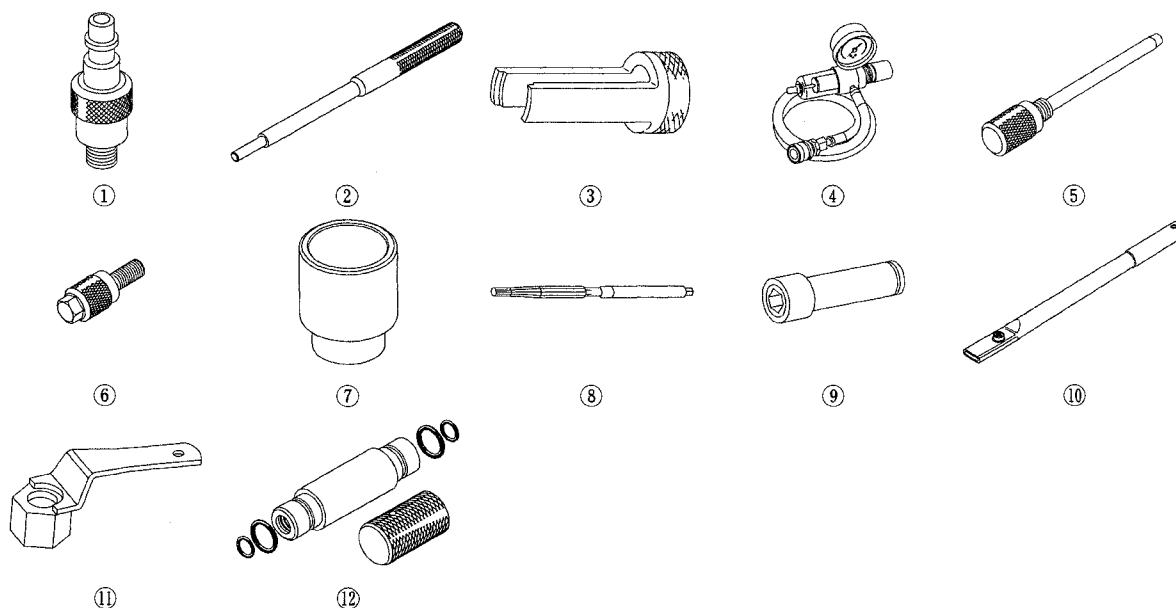
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Cylinder Head

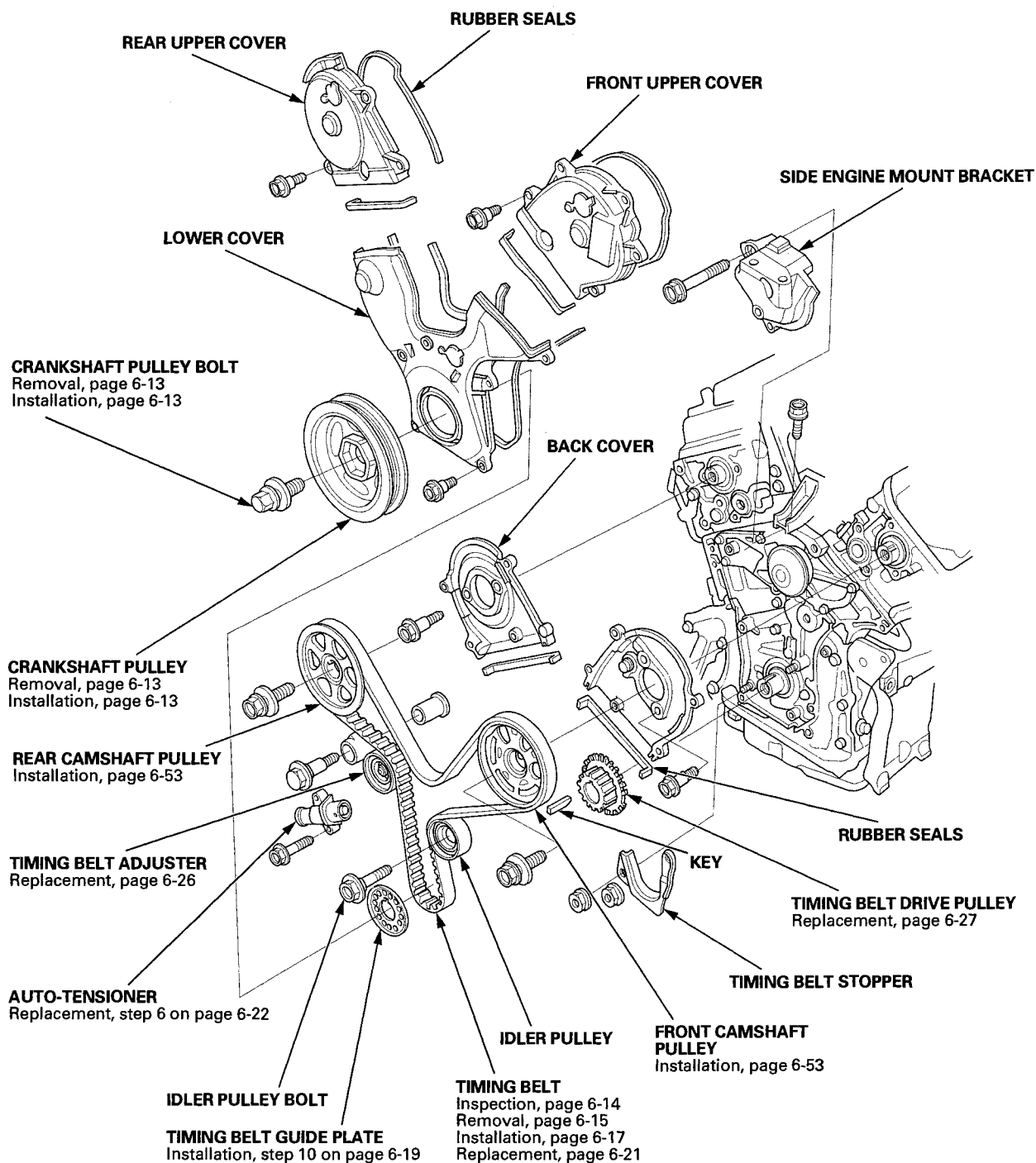
Special Tools

Ref.No.	Tool Number	Description	Qty
①	070AJ-001A101	VCM Air Adapter	1
②	07742-0010100	Valve Guide Driver, 5.35 x 9.7 mm	1
③	07757-PJ1010A	Valve Spring Compressor Attachment	1
④	07AAJ-PNAA101	Air Pressure Regulator	1
⑤	07AAJ-R70A100	VTEC Air Stop Tool A	1
⑥	07AAJ-R70A200	VTEC Air Stop Tool B	1
⑦	07GAF-SD40330	Ball Joint Remover/Installer	1
⑧	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
⑨	07JAA-001020A	Socket, 19 mm	1
⑩	07JAB-001020B	Handle, 6-25-660L	1
⑪	07MAB-PY3010A	Holder Attachment, 50 mm, Offset	1
⑫	07PAD-0010000	Stem Seal Driver, 30 mm	1





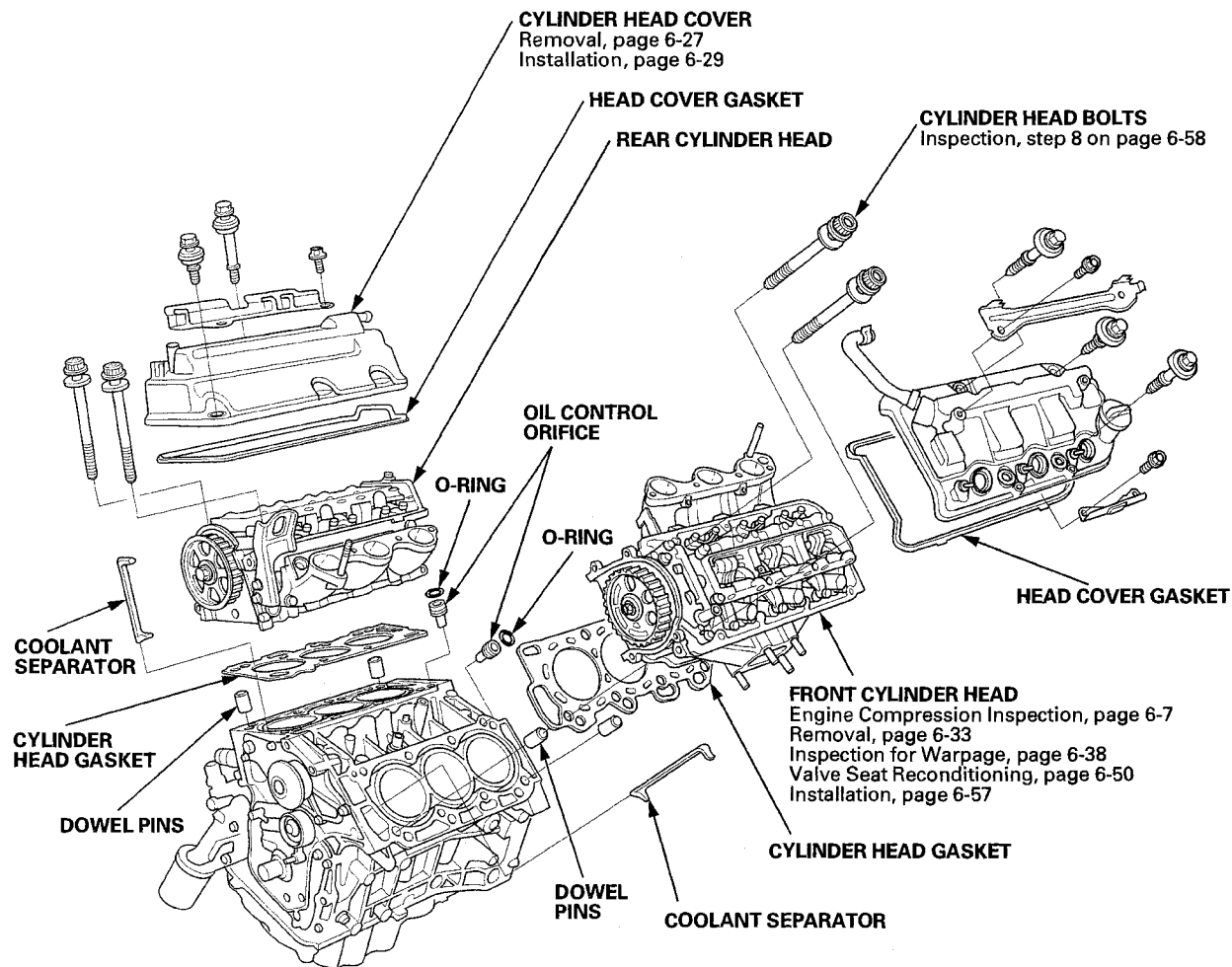
Component Location Index



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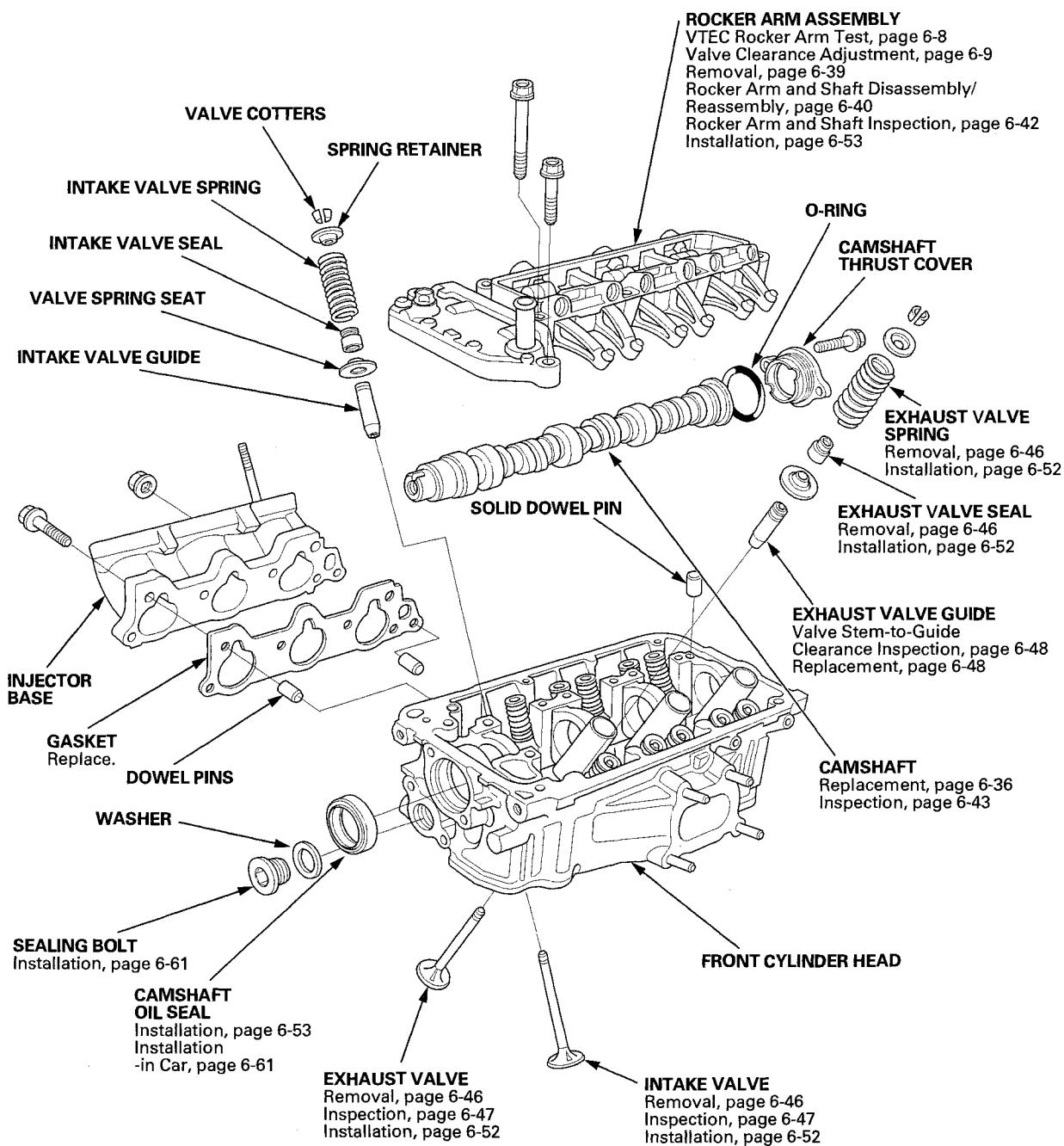
Cylinder Head

Component Location Index (cont'd)





FRONT

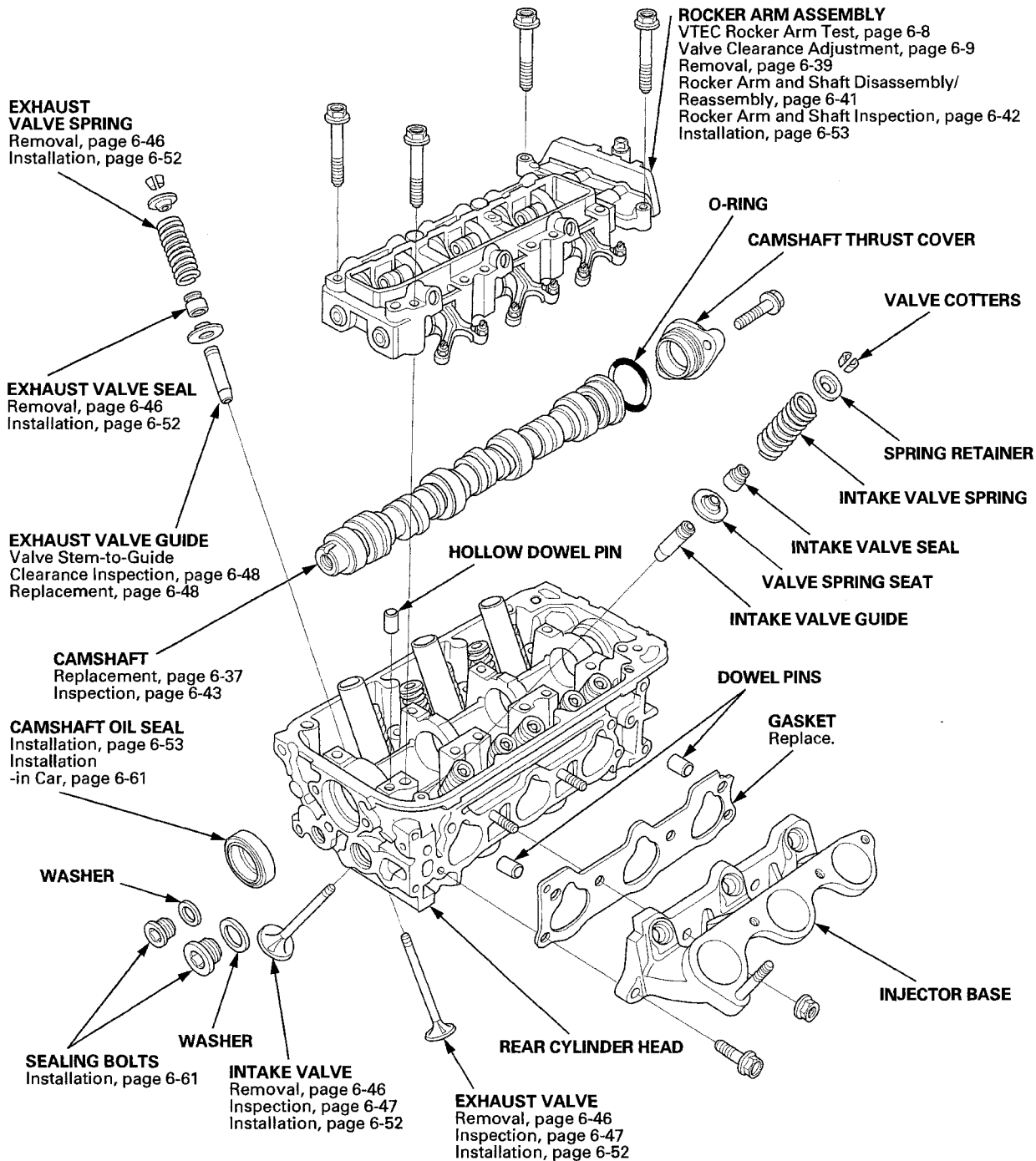


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Cylinder Head

Component Location Index (cont'd)

REAR

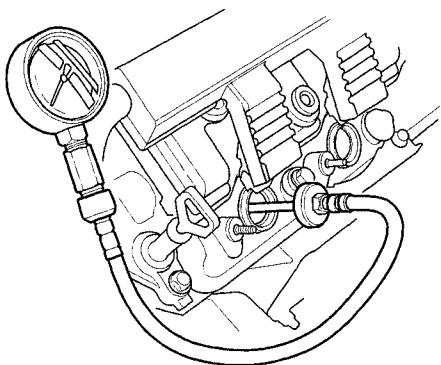




Engine Compression Inspection

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

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
3. Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3).
4. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode.
5. Make sure the HDS communicates with the vehicle and the PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-258).
6. Select ALL INJECTORS STOP in the PGM-FI INSPECTION menu with the HDS.
7. Turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
8. Remove the six ignition coils (see page 4-33).
9. Remove the six spark plugs.
10. Attach the compression gauge to a spark plug hole.



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

Compression Pressure:
Above 932 kPa (9.5 kgf/cm², 135 psi)

12. Measure the compression on the remaining cylinders.

Maximum Variation:
Within 196 kPa (2.0 kgf/cm², 28 psi)

13. If the compression is not within specifications, check the following items, then remeasure the compression.
 - Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats
 - Damaged cylinder head gaskets
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore
14. Remove the compression gauge from the spark plug hole.
15. Install the six spark plugs.
16. Install the six ignition coils (see page 4-33).
17. Select PCM reset (see page 11-4) in the PGM-FI INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.

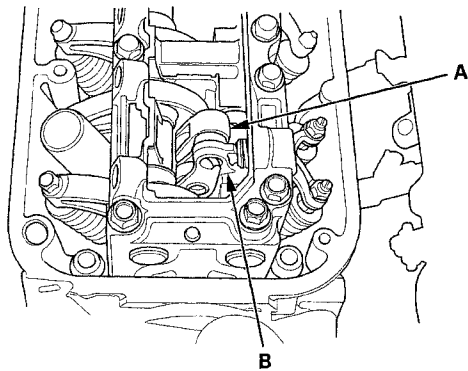
Cylinder Head

VTEC Rocker Arm Test

Special Tools Required

- VTEC Air Stop Tool B 07AAJ-R70A200
- VCM Air Adapter 070AJ-001A101
- Air Pressure Regulator 07AAJ-PNAA101
- VTEC Air Stop Tool A 07AAJ-R70A100

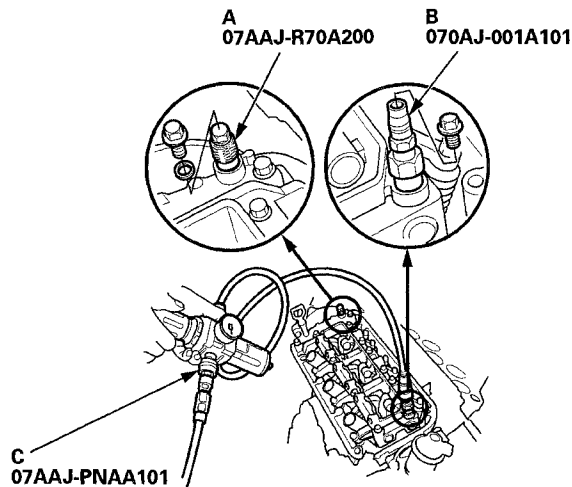
1. Start the engine and let it run for 5 minutes, then turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
2. Remove the six spark plugs.
3. Remove the cylinder head covers (see page 6-27).
4. Rotate the crankshaft pulley clockwise, and visually check all the intake primary rocker arms (A) and the intake secondary rocker arms (B) moves independently.
 - If the intake primary rocker arm and the intake secondary rocker arm move together, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the intake primary rocker arm and the intake secondary rocker arm move independently, go to step 5.



5. Check that the air pressure on the shop air compressor gauge indicates over 981 kPa (10.0 kgf/cm², 142 psi).
6. Inspect the valve clearance (see page 6-9).

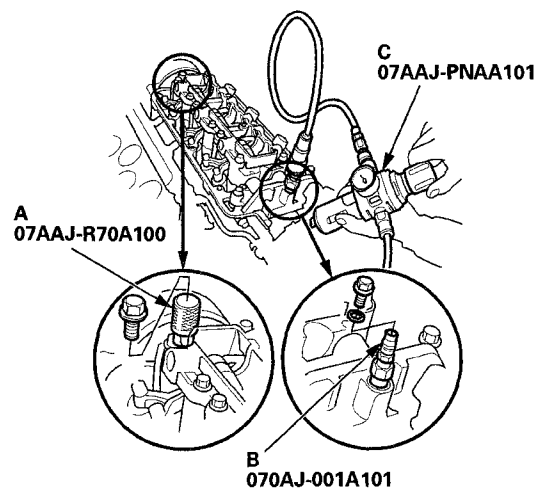
7. Remove the sealing bolts, then install the VTEC air stop tool B (A) and the VCM air adapter (B) to the inspection hole, then connect the air pressure regulator (C) as shown.

FRONT



8. Remove the sealing bolts, then install the VTEC air stop tool A (A) and the VCM air adapter (B) to the inspection hole, then connect the air pressure regulator (C) as shown.

REAR





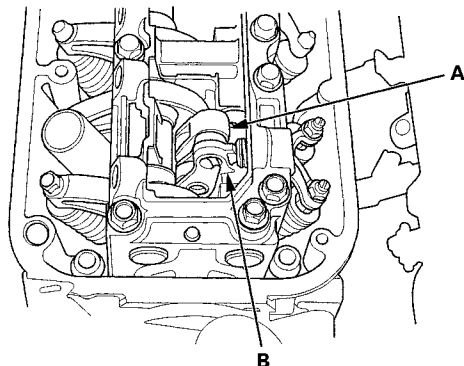
Valve Clearance Adjustment

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

Specified Air Pressure:

550—690 kPa (5.6—7.0 kgf/cm², 80—100 psi)

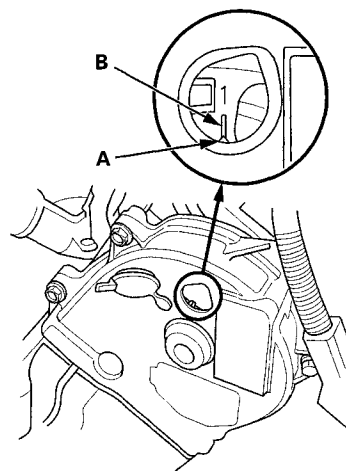
10. With the specified air pressure applied, rotate the crankshaft pulley clockwise, and visually check all the intake primary rocker arms (A) and the intake secondary rocker arms (B) move together.
- If the intake primary rocker arm and the intake secondary rocker arm move independently, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the intake primary rocker arm and the intake secondary rocker arm move together, go to step 11.



11. Remove the air pressure regulator, the VCM air adapter, the VTEC air stop tool A, and the VTEC air stop tool B.
12. Torque the sealing bolts to 22 N·m (2.2 kgf·m, 16 lbf·ft).
13. Install the cylinder head covers (see page 6-29).
14. Install the six spark plugs.

NOTE: Connect the Honda Diagnostic System (HDS) to the data link connector (DLC), and monitor the engine coolant temperature (ECT) sensor 1. Adjust the valve clearance only when the ECT sensor 1 is less than 100 °F (38 °C).

1. Remove the cylinder head covers (see page 6-27).
2. 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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Cylinder Head

Valve Clearance Adjustment (cont'd)

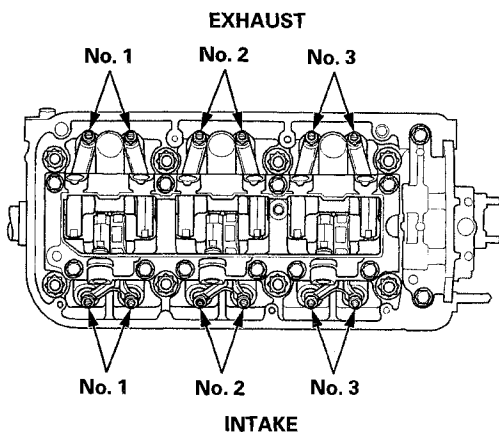
3. Select the correct feeler gauge for the valve clearance you are going to check.

Valve Clearance

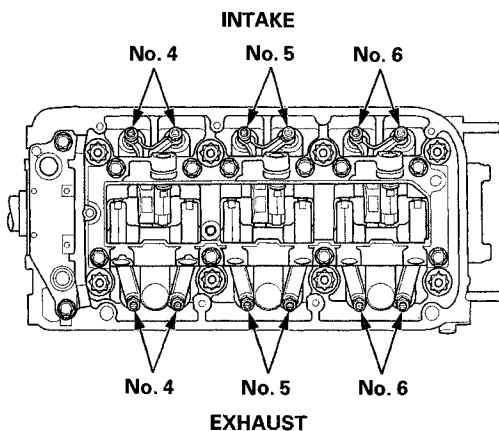
Intake: 0.20–0.24 mm (0.008–0.009 in)

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

REAR

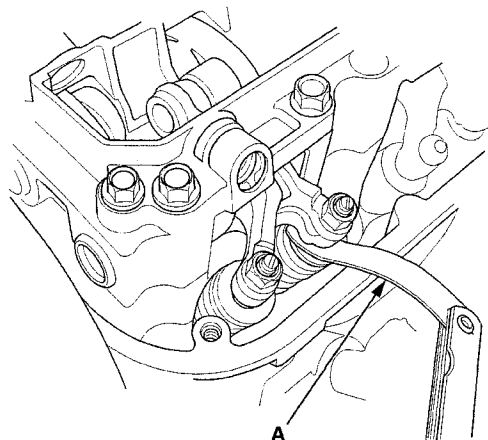


FRONT

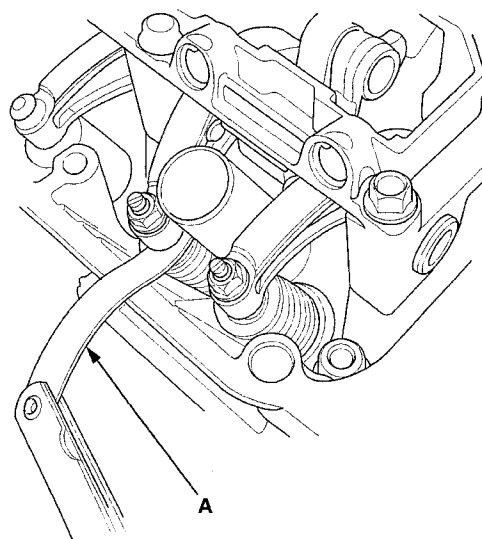


4. Insert the feeler gauge (A) between the adjusting screw and the end of the valve stem on the No. 1 cylinder, and slide it back and forth; you should feel a slight amount of drag.

INTAKE



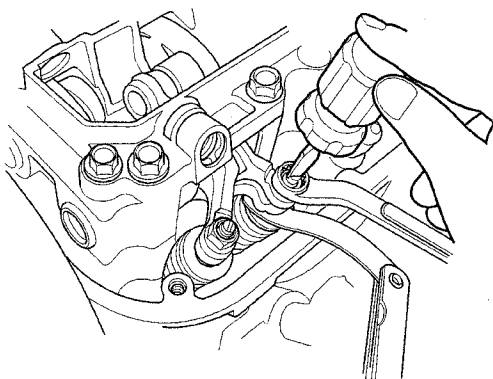
EXHAUST



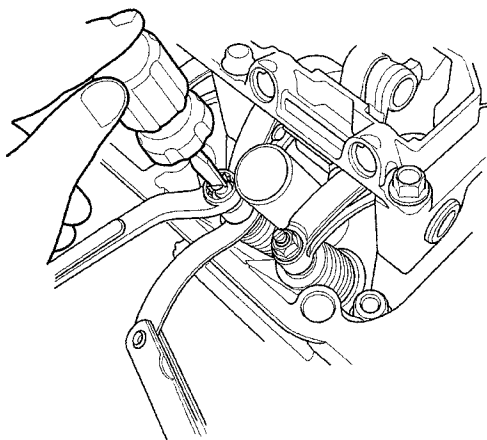


5. If you feel too much or too little drag, loosen the locknut, and turn the adjusting screw until the drag on the feeler gauge is correct.

INTAKE



EXHAUST



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

Specified Torque

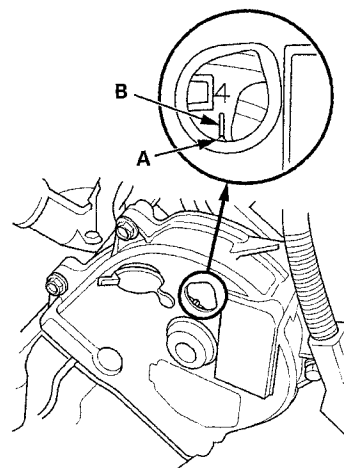
Intake: 20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply new engine oil to the nut threads.

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

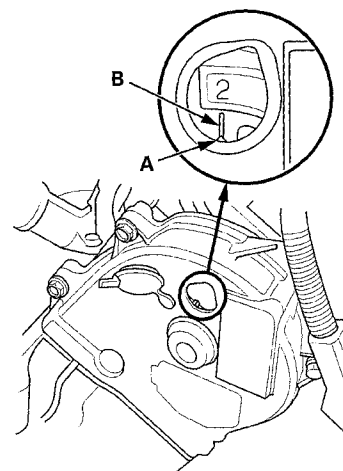
Apply new engine oil to the nut threads.

7. 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.



8. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.

9. 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.



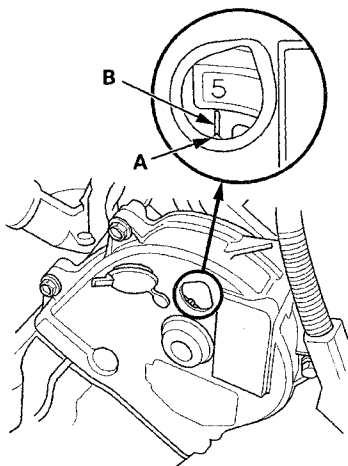
10. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.

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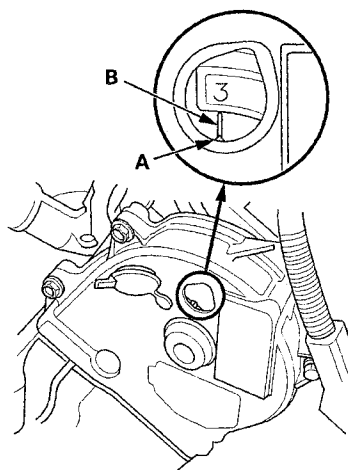
Cylinder Head

Valve Clearance Adjustment (cont'd)

11. 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.

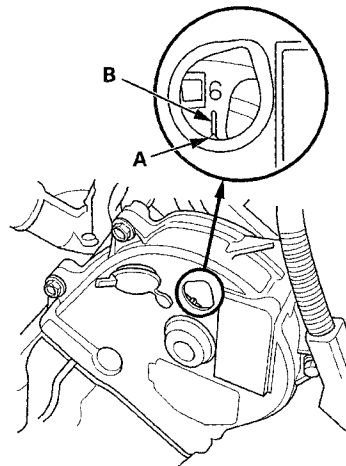


12. Check and, if necessary, adjust the valve clearance on the No. 5 cylinder.
13. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 3 piston TDC mark (B) on the front camshaft pulley.



14. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.

15. 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.



16. Check and, if necessary, adjust the valve clearance on the No. 6 cylinder.
17. Install the cylinder head covers (see page 6-29).



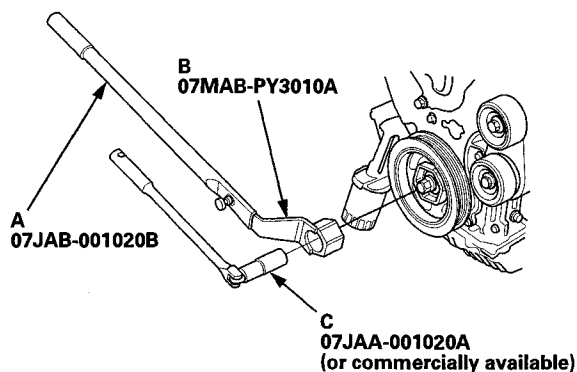
Crankshaft Pulley Removal and Installation

Special Tools Required

- Handle, 6-25-660L 07JAB-001020B
- Holder Attachment, 50 mm, Offset 07MAB-PY3010A
- Socket, 19 mm 07JAA-001020A or equivalent

Removal

1. Raise the vehicle on the lift.
2. Remove the right front wheel.
3. Remove the splash shield (see page 20-205).
4. Remove the drive belt (see page 4-44).
5. Hold the pulley with the handle, 6-25-660L (A) and the holder attachment, 50 mm offset (B).

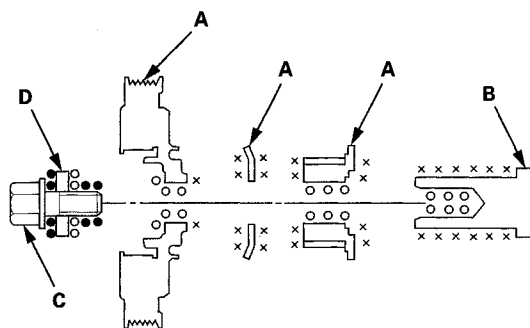


6. Remove the bolt with a heavy duty 19 mm socket (C) and a breaker bar, then remove the crankshaft pulley.

Installation

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

- × : Remove any oil
○ : Clean
● : Lubricate with new engine oil



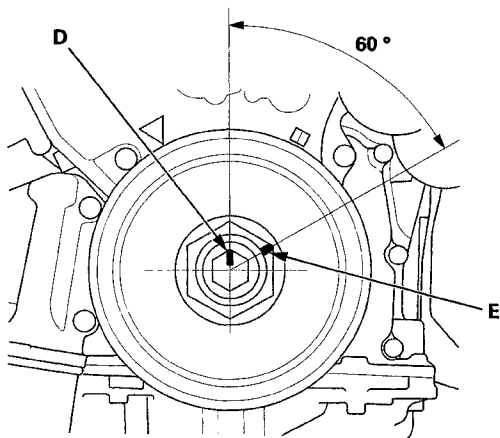
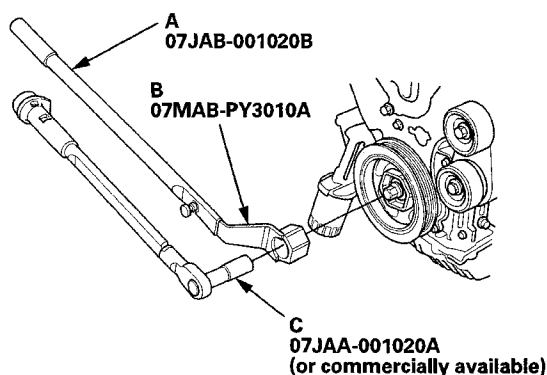
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Cylinder Head

Crankshaft Pulley Removal and Installation (cont'd)

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

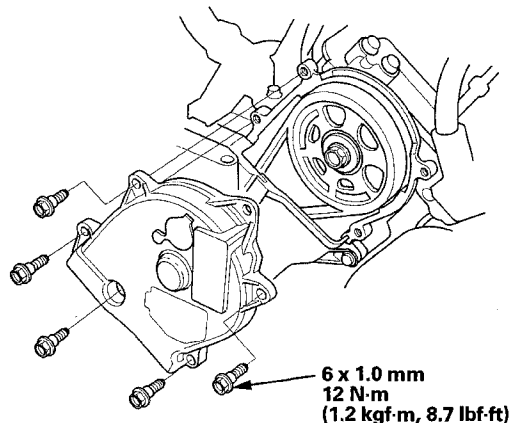
- 1. Hold the pulley with the handle (A) and the holder attachment (B). Torque the bolt to 64 N·m (6.5 kgf·m, 47 lbf·ft) with a torque wrench and a 19 mm socket (C).
- 2. Mark the bolt head (D) and the crankshaft pulley (E) as shown, then tighten the bolt an additional 60° (The mark on the bolt head lines up with the mark on the crankshaft pulley).



- 3. Install the drive belt (see page 4-44).
- 4. Install the splash shield (see page 20-205).
- 5. Install the right front wheel.

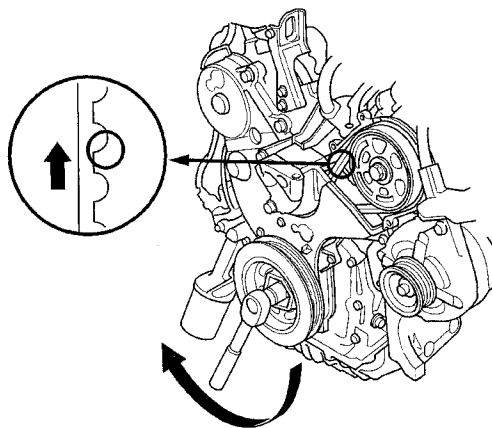
Timing Belt Inspection

- 1. Remove the drive belt (see page 4-44).
- 2. Remove the front upper cover.



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

NOTE: If there is any leakage, repair them before replacing the timing belt.

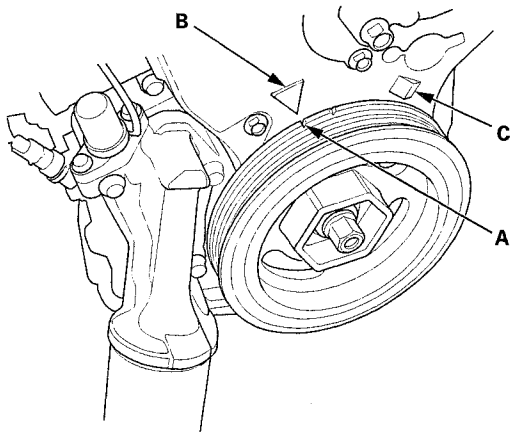




Timing Belt Removal

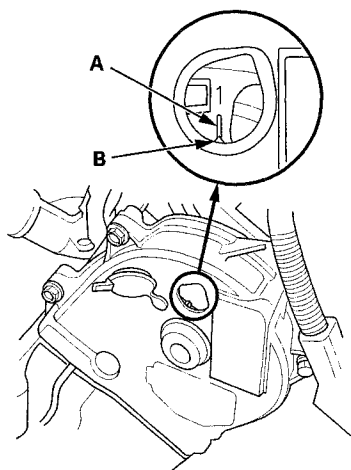
1. Remove the engine compartment covers (see page 20-186).
2. Turn the crankshaft so its white mark (A) lines up with the pointer (B).

NOTE: The other pointer (C) is not used.

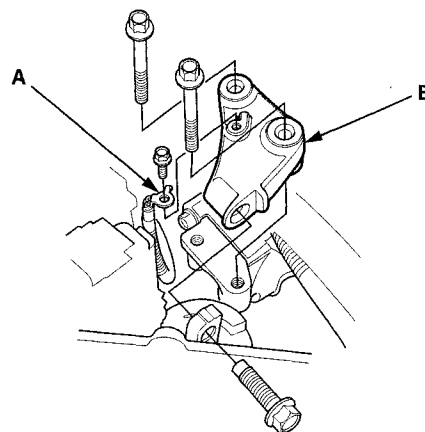


3. Check that the No. 1 piston top dead center (TDC) mark (A) on the front camshaft pulley and the pointer (B) on the front upper cover are aligned.

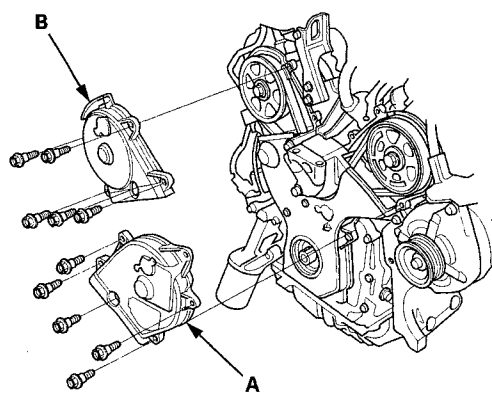
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.



4. Raise the vehicle on the lift, then remove the right front wheel.
5. Remove the splash shield (see page 20-205).
6. Remove the drive belt auto-tensioner (see page 4-46).
7. Support the engine with a jack and a wood block under the oil pan.
8. Remove the ground cable (A), then remove the upper half of the side engine mount bracket (B).



9. Remove the crankshaft pulley (see page 6-13).
10. Remove the front upper cover (A) and the rear upper cover (B).

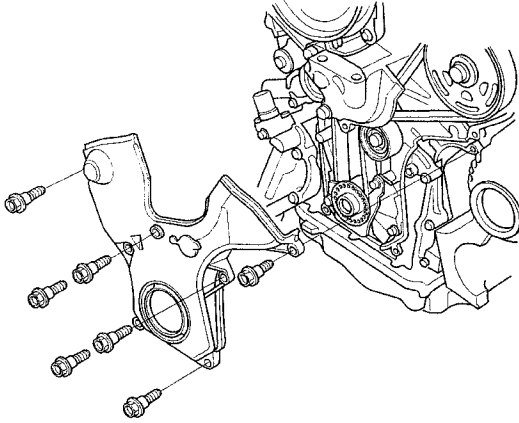


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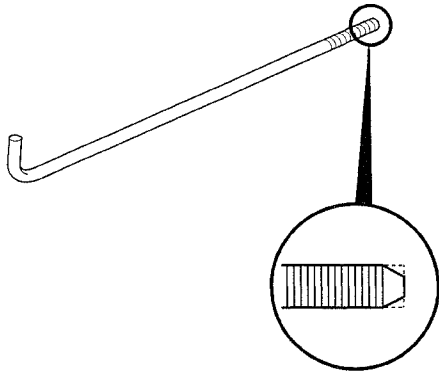
Cylinder Head

Timing Belt Removal (cont'd)

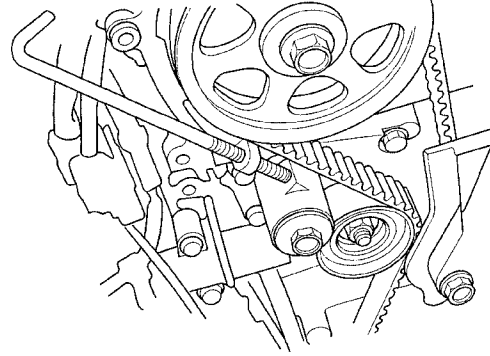
11. Remove the lower cover.



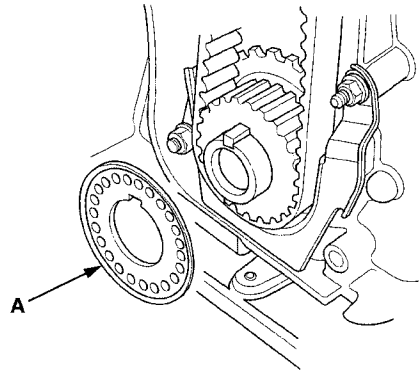
12. Remove one of the battery clamp bolts from the battery tray, and grind the end of it as shown.



13. Thread 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.



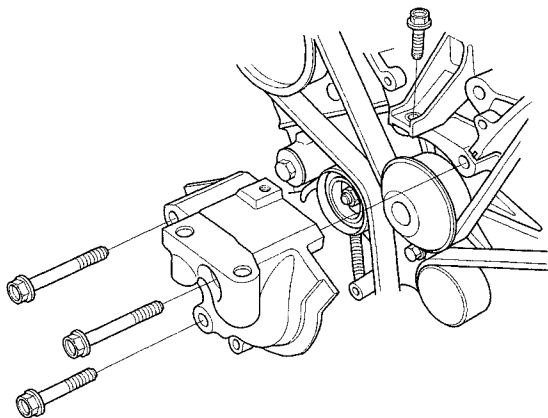
14. Remove the timing belt guide plate (A).



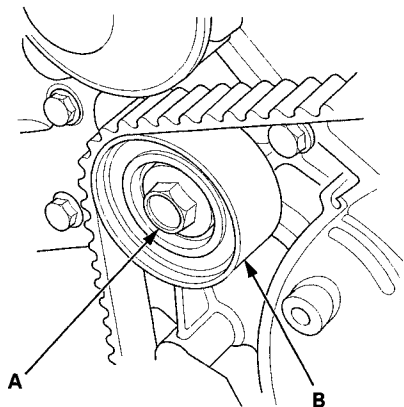


Timing Belt Installation

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

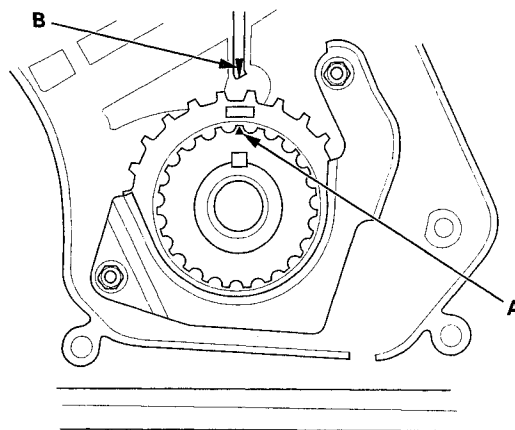


16. Remove the idler pulley bolt (A) and the idler pulley (B), then remove the timing belt. Discard the idler pulley bolt.



NOTE: The following procedure is for installing a used timing belt. If you are installing a new belt, refer to the timing belt replacement procedure (see page 6-21).

1. Clean the timing belt pulleys, the 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.



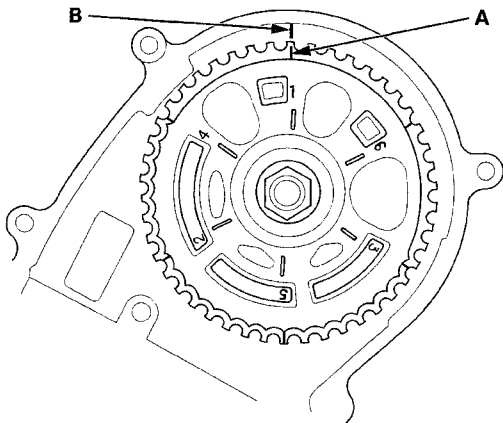
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Cylinder Head

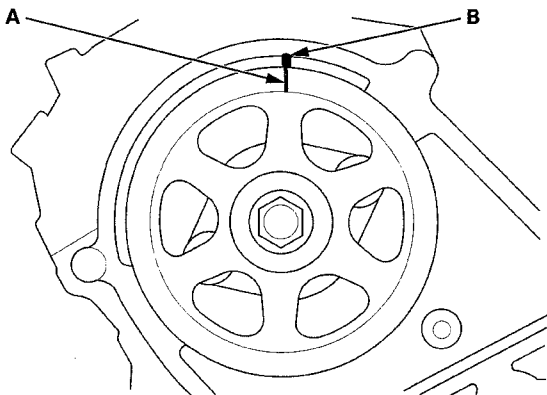
Timing Belt Installation (cont'd)

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



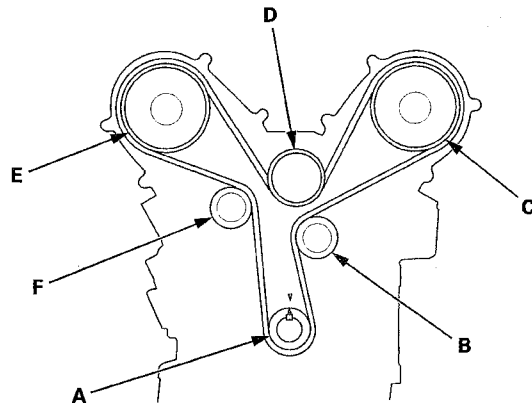
REAR



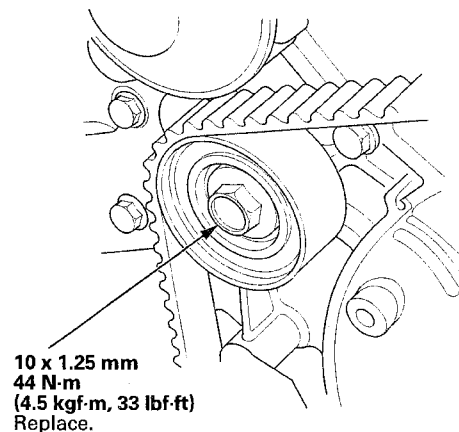
4. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.
5. If the auto-tensioner has extended and the timing belt cannot be installed, do the timing belt replacement procedure (see page 6-21).

6. Install the timing belt in a counterclockwise sequence starting with the drive pulley. Take care not to damage the timing belt during installation.

- 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)

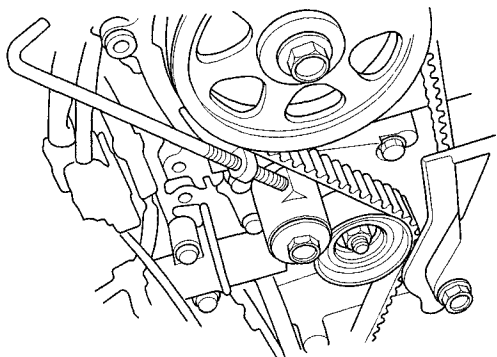


7. Tighten the idler pulley bolt.

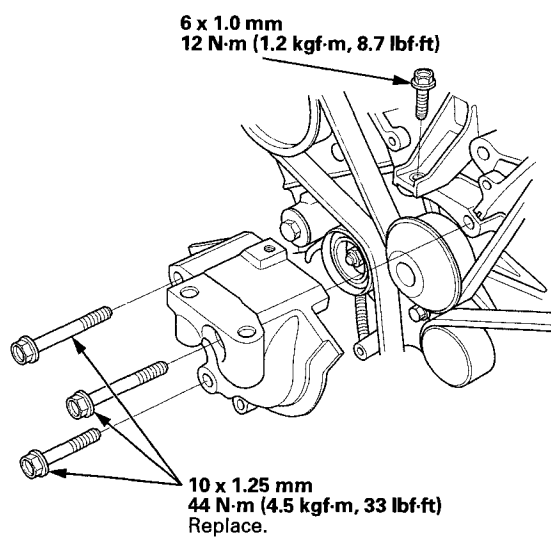




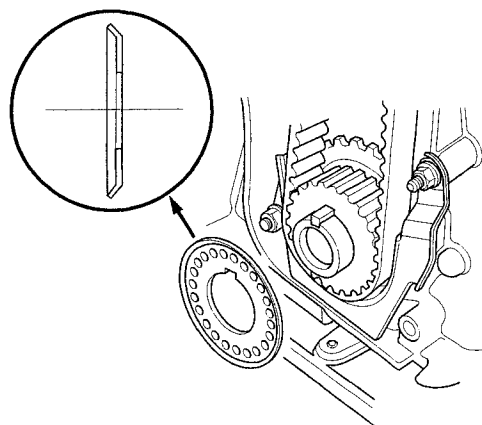
8. Remove the battery clamp bolt from the back cover.



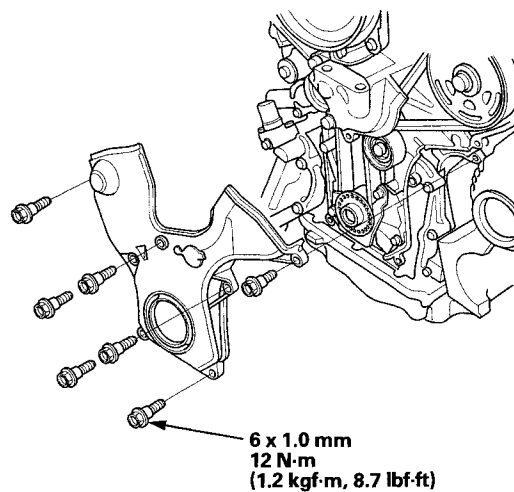
9. Install the lower half of the side engine mount bracket.



10. Install the timing belt guide plate as shown.



11. Install the lower cover.

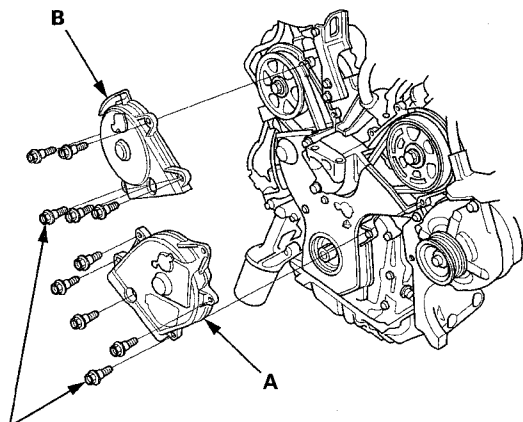


(cont'd)

Cylinder Head

Timing Belt Installation (cont'd)

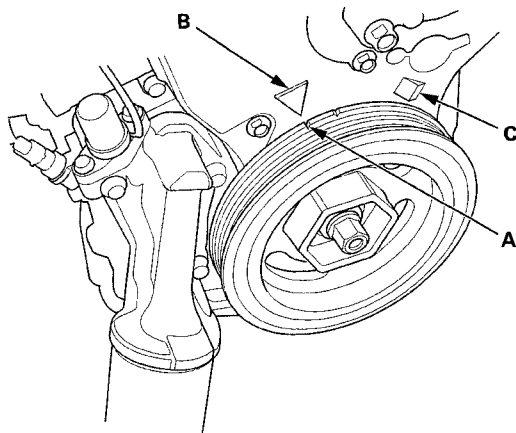
12. Install the front upper cover (A) and the rear upper cover (B).



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

13. Install the crankshaft pulley (see page 6-13).
14. Rotate the crankshaft pulley about 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).

NOTE: The other pointer (C) is not used.

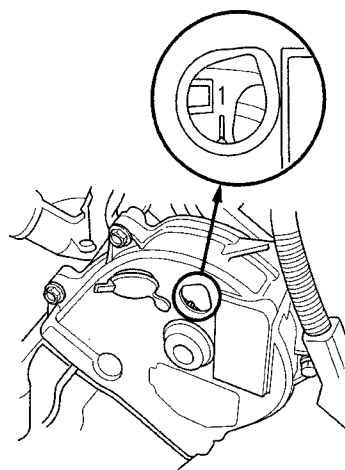


16. Check the camshaft pulley marks.

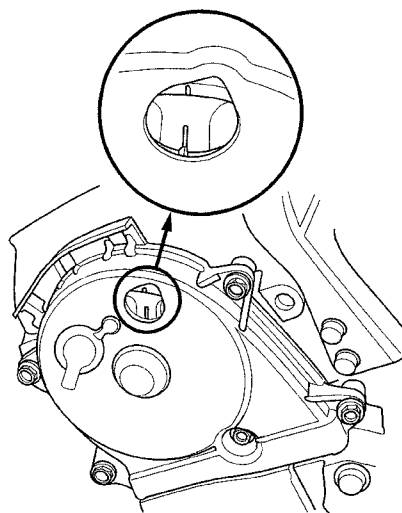
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- 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



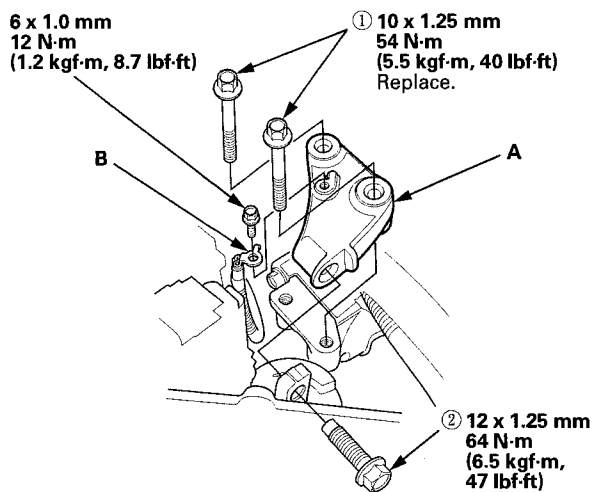
REAR





Timing Belt Replacement

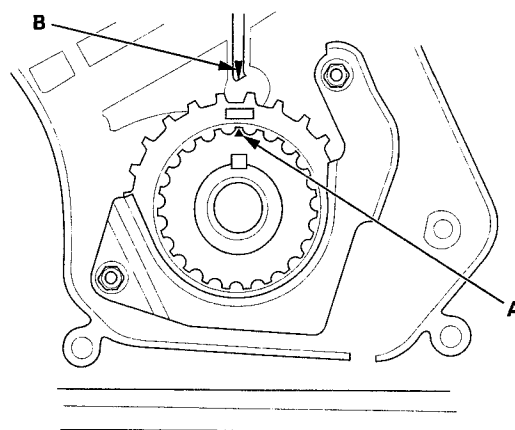
17. Install the upper half of the side engine mount bracket (A), then tighten the mounting bolts in the numbered sequence shown.



18. Install the ground cable (B).
19. Install the drive belt auto-tensioner (see page 4-46).
20. Install the splash shield (see page 20-205).
21. Install the right front wheel.
22. Install the engine compartment covers (see page 20-186).
23. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

NOTE: The following procedure is for installing a new timing belt. If you are installing a used belt, refer to the timing belt installation procedure (see page 6-17).

1. Remove the timing belt (see page 6-15).
2. Clean the timing belt pulleys, the 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.



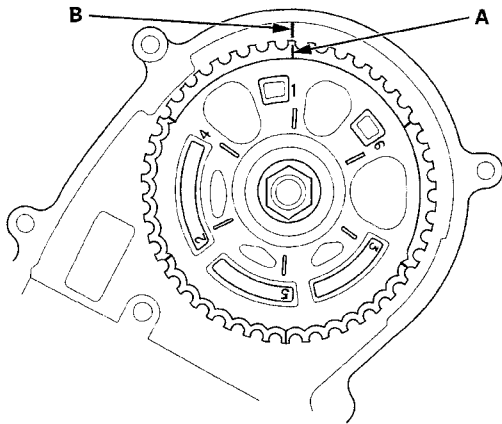
(cont'd)

Cylinder Head

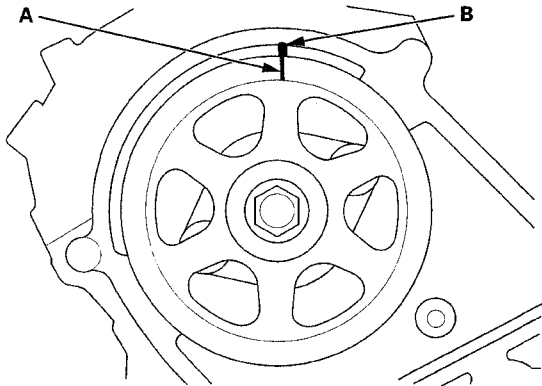
Timing Belt Replacement (cont'd)

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

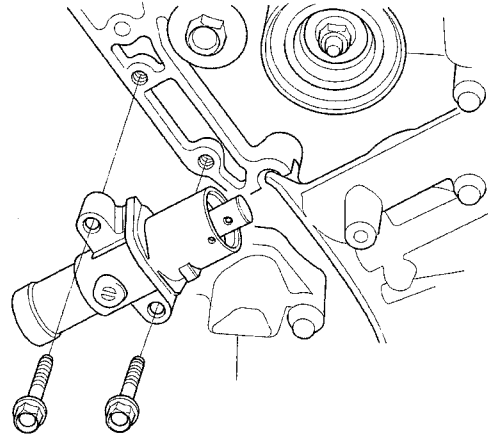


REAR

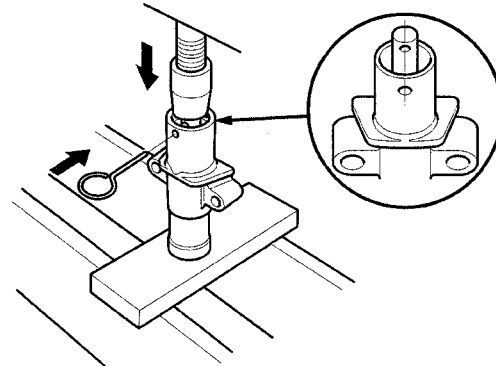


5. Remove the battery clamp bolt from the back cover.

6. Remove the auto-tensioner.



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



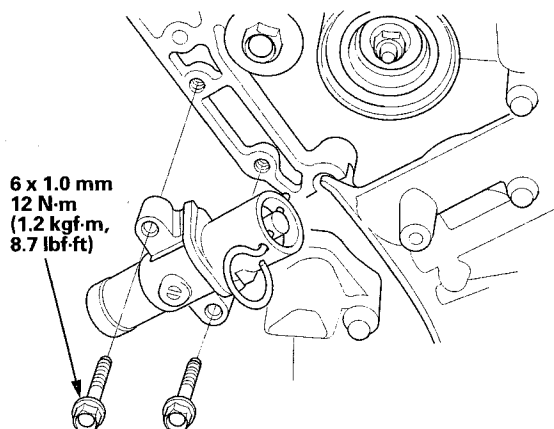
8. Use a hydraulic press to slowly compress the auto-tensioner. Insert a 2.0 mm (0.08 in) pin through the housing and the rod.

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

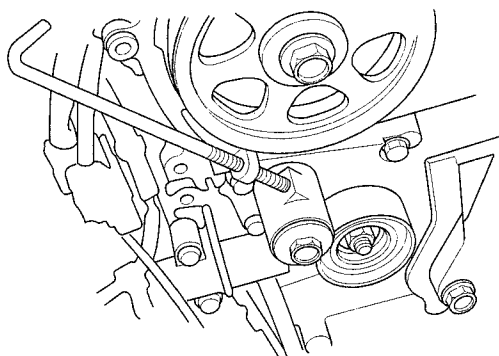


9. Install the auto-tensioner.

NOTE: Make sure the pin stays in place.



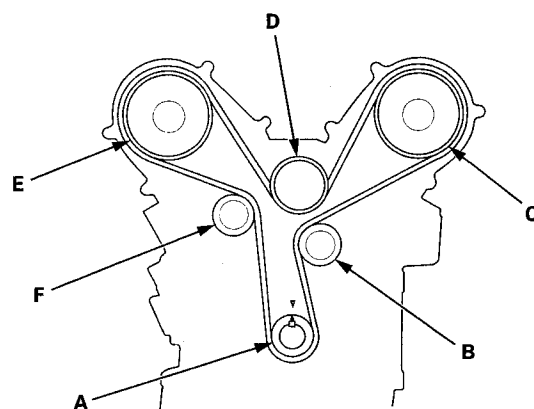
10. Thread the battery clamp bolt in as shown to hold the timing belt adjuster. Tighten it by hand, do not use a wrench.



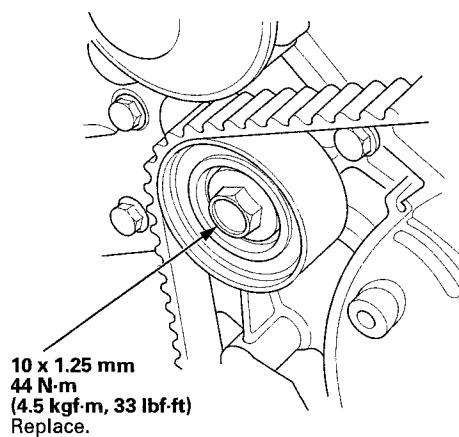
11. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.

12. Install the timing belt in a counterclockwise sequence starting with the drive pulley.

- 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)



13. Tighten the idler pulley bolt.

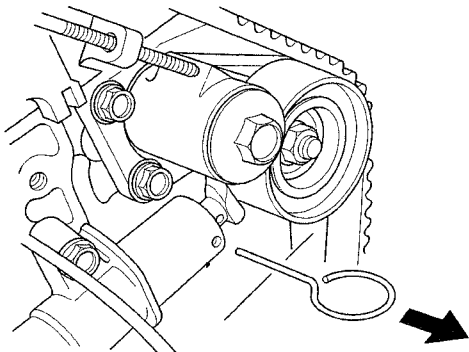


(cont'd)

Cylinder Head

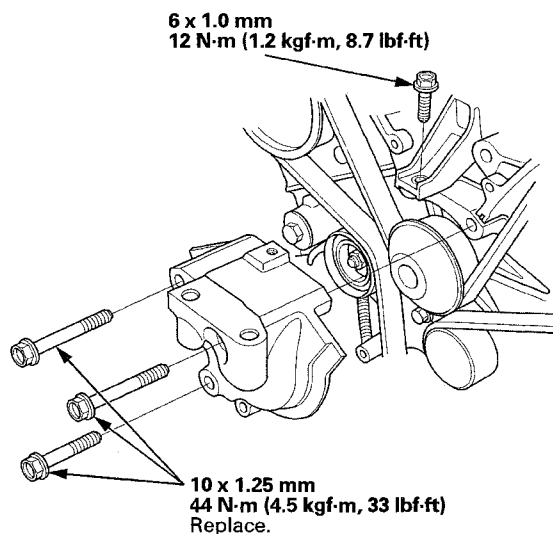
Timing Belt Replacement (cont'd)

14. Remove the pin from the auto-tensioner.

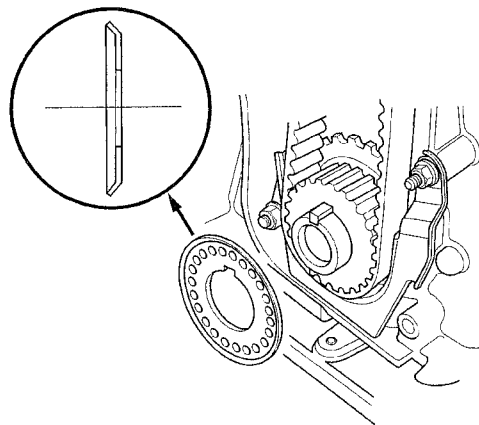


15. Remove the battery clamp bolt from the back cover.

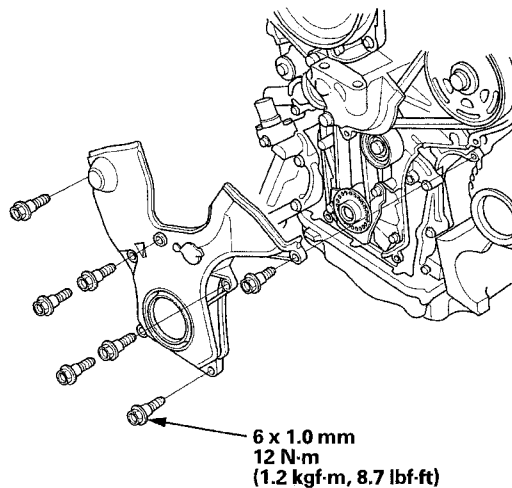
16. Install the lower half of the side engine mount bracket.



17. Install the timing belt guide plate as shown.

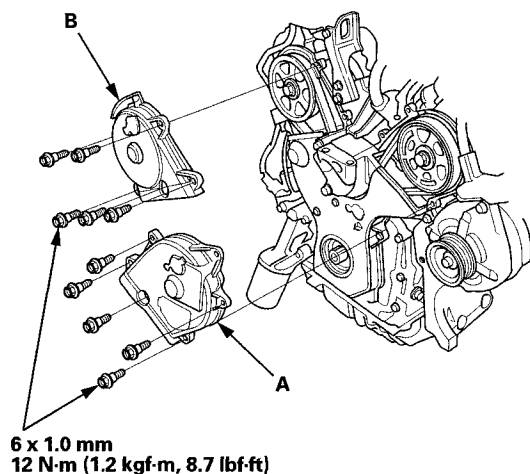


18. Install the lower cover.





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

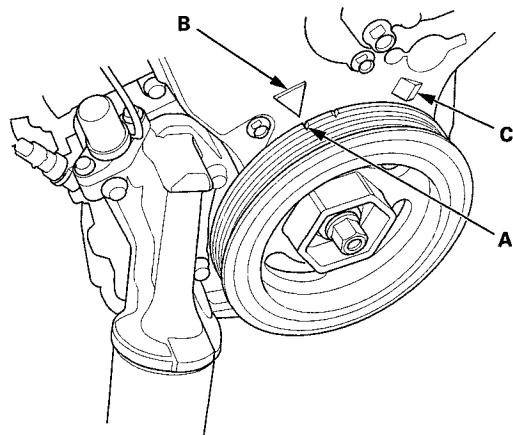


20. Install the crankshaft pulley (see page 6-13).

21. Rotate the crankshaft pulley about 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).

NOTE: The other pointer (C) is not used.

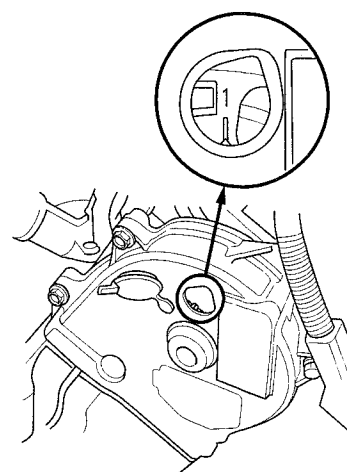


23. Check the camshaft pulley marks.

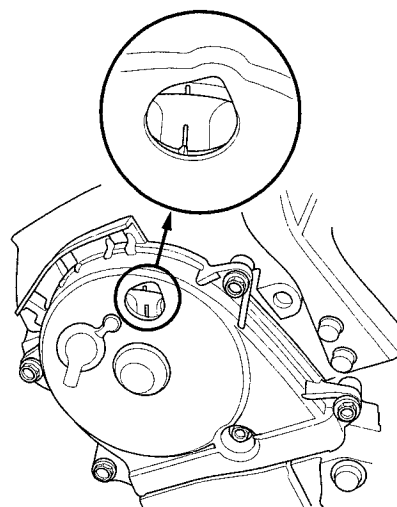
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- 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



REAR

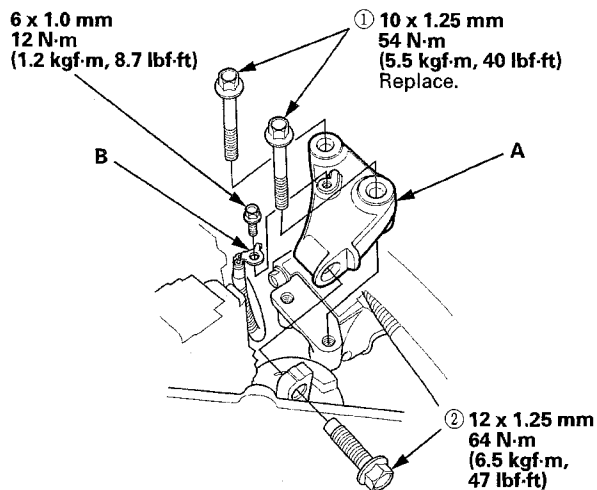


(cont'd)

Cylinder Head

Timing Belt Replacement (cont'd)

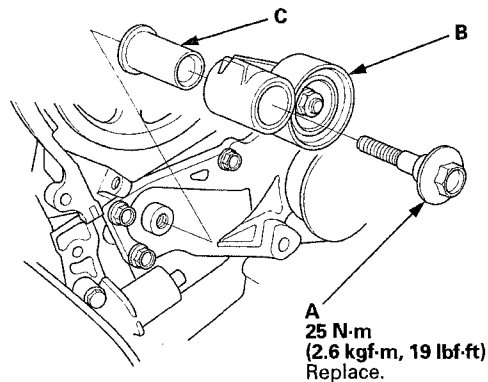
24. Install the upper half of the side engine mount bracket (A), then tighten the mounting bolts in the numbered sequence shown.



25. Install the ground cable (B).
26. Install the drive belt auto-tensioner (see page 4-46).
27. Install the splash shield (see page 20-205).
28. Install the right front wheel.
29. Install the engine compartment covers (see page 20-186).
30. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

Timing Belt Adjuster Replacement

1. Remove the timing belt (see page 6-15).
2. Remove the battery clamp bolt from the back cover.
3. Remove the auto-tensioner (see step 6 on page 6-22).
4. Remove the bolt (A), then remove the timing belt adjuster (B) and the collar (C).

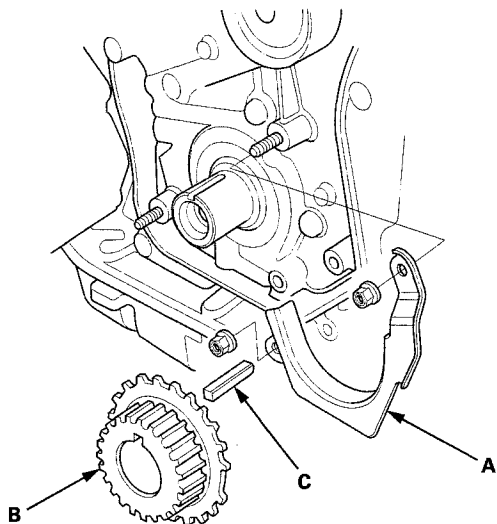


5. Install the timing belt adjuster in the reverse order of removal.
6. Install the timing belt (see page 6-17).



Timing Belt Drive Pulley Replacement

1. Remove the timing belt (see page 6-15).
2. Remove the timing belt stopper (A), then remove the timing belt drive pulley (B) and the key (C).

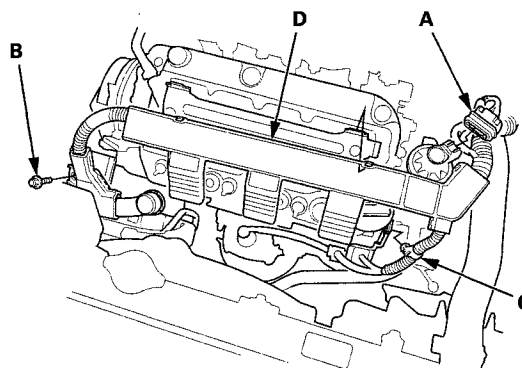


3. Inspect the timing belt drive pulley and the key for damage. If it is cracked or damaged, replace the timing belt drive pulley.
4. Install the new timing belt drive pulley and the key, then install the timing belt stopper.
5. Install the timing belt (see page 6-17).
6. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

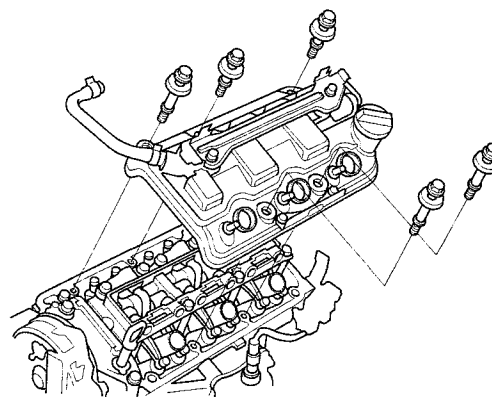
Cylinder Head Cover Removal

Front

1. Remove the intake manifold (see page 9-4).
2. Remove the three ignition coils from the front cylinder head (see page 4-33).
3. Disconnect the exhaust recirculation (EGR) valve connector (A) and remove the harness holder mounting bolt (B) and the harness clamp (C).



4. Remove the harness holder (D) from the bracket.
5. Remove the front cylinder head cover.



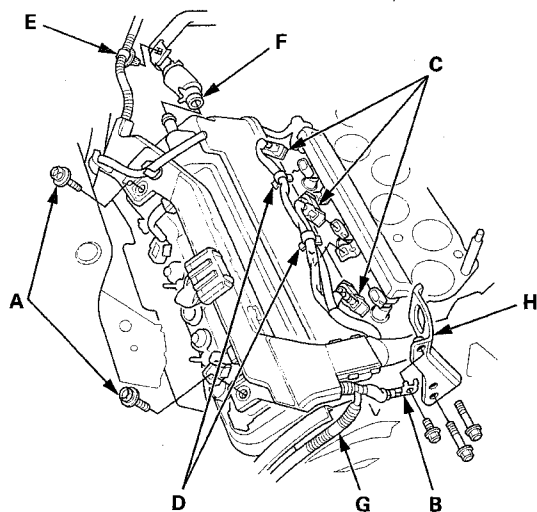
(cont'd)

Cylinder Head

Cylinder Head Cover Removal (cont'd)

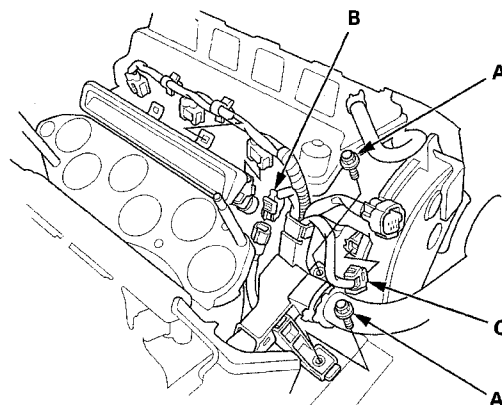
Rear

1. Remove the strut brace (see page 20-210).
2. Remove the intake manifold (see page 9-4).
3. Remove the three ignition coils from the rear cylinder head (see page 4-33).
4. Remove the harness holder mounting bolts (A) and the engine ground cable (B).

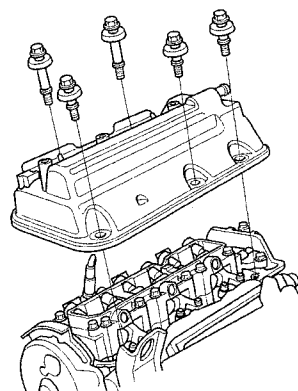


5. Disconnect the three injector connectors (C) and the two harness clamps (D).
6. Remove the harness clamp (E) and disconnect the breather hose (F).
7. Remove the harness (G) from the upper cover.
8. Remove the engine hanger bracket (H).

9. Remove the harness holder mounting bolts (A) and disconnect the knock sensor connector (B) and the camshaft position (CMP) sensor connector (C).



10. Remove the rear cylinder head cover.

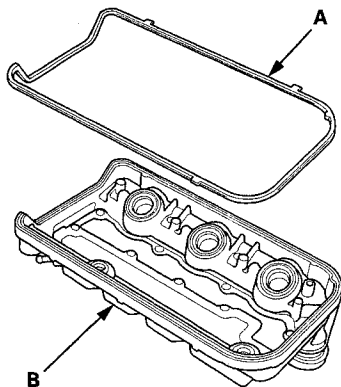




Cylinder Head Cover Installation

Front

1. Check the spark plug seals for damage. If any seal is damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove.
3. Install the head cover gasket (A) in the groove of the cylinder head cover (B). Make sure the head cover gasket is seated securely.

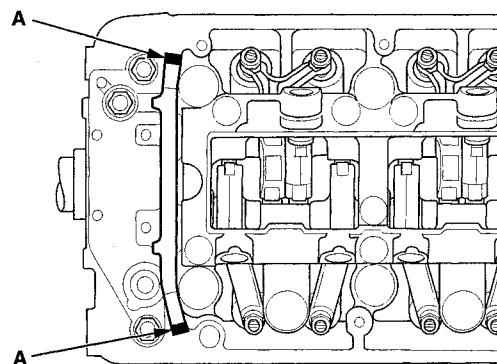


4. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.

6. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



(cont'd)

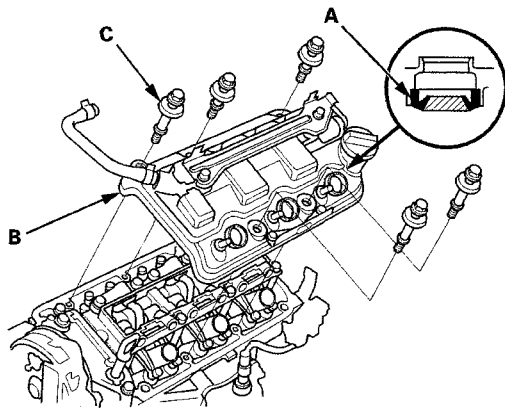
Cylinder Head

Cylinder Head Cover Installation (cont'd)

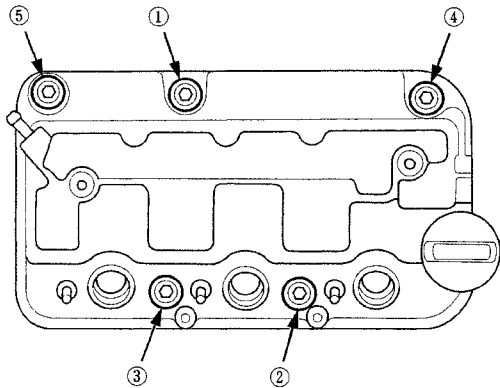
7. Set the spark plug seals (A) on the spark plug tubes, and install the front cylinder head cover (B).

NOTE:

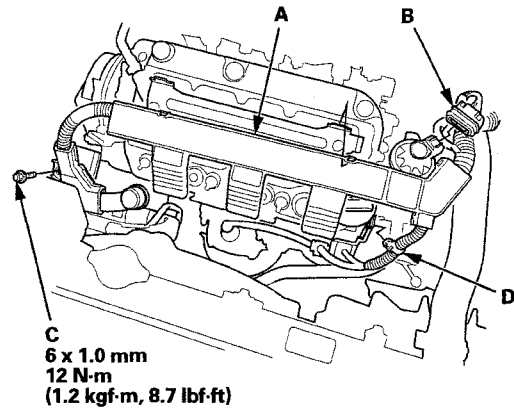
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the cylinder head cover.



8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N·m (1.2 kgf·m, 8.7 lbf·ft).



11. Install the harness holder (A) to the bracket.

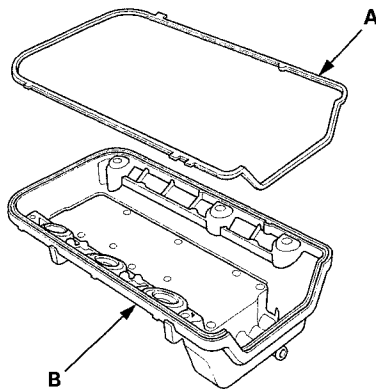


12. Connect the exhaust gas recirculation (EGR) valve connector (B) and install the harness holder mounting bolt (C) and the harness clamp (D).
13. Install the three ignition coils to the front cylinder head (see page 4-33).
14. Install the intake manifold (see page 9-5).



Rear

1. Check the spark plug seals for damage. If any seal is damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove.
3. Install the head cover gasket (A) in the groove of the cylinder head cover (B). Make sure the head cover gasket is seated securely.

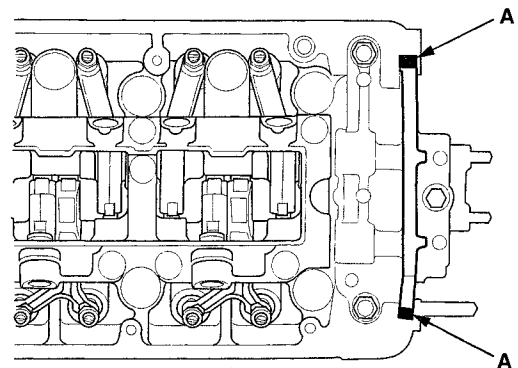


4. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.

6. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



(cont'd)

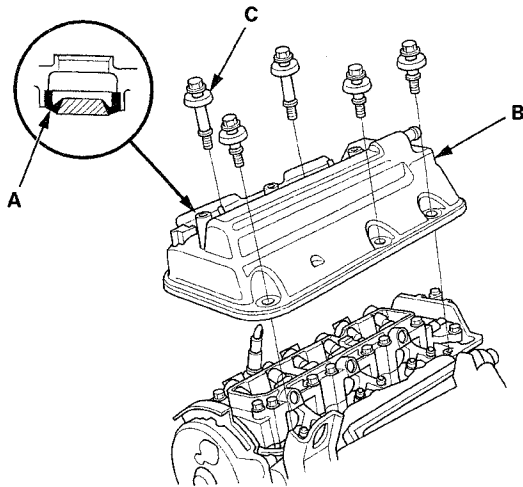
Cylinder Head

Cylinder Head Cover Installation (cont'd)

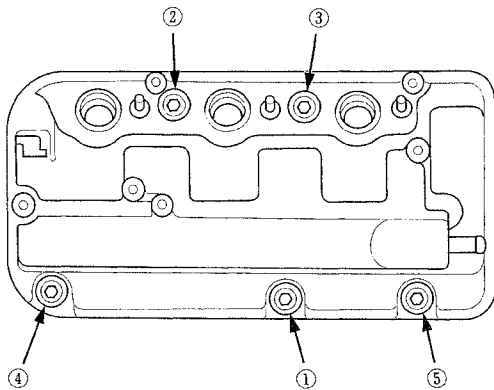
7. Set the spark plug seals (A) on the spark plug tubes, and install the rear cylinder head cover (B).

NOTE:

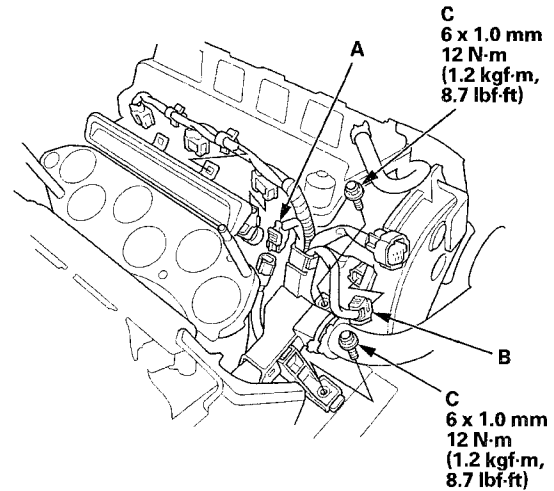
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the cylinder head cover.



8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N·m (1.2 kgf·m, 8.7 lbf·ft).



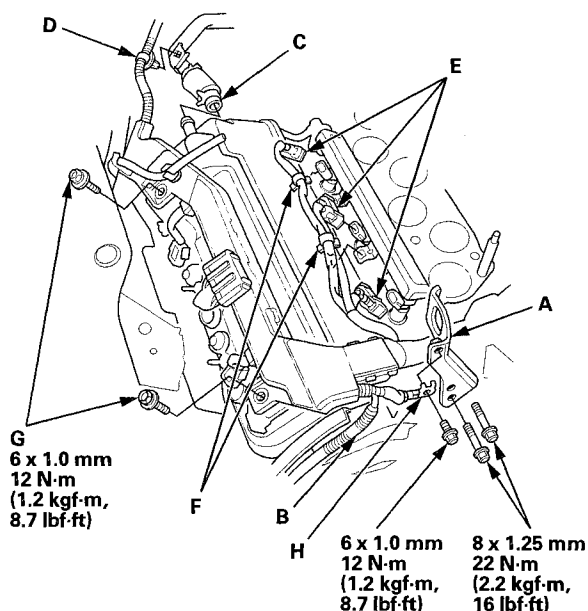
11. Connect the knock sensor connector (A) and the camshaft position (CMP) sensor connector (B) and install the harness holder mounting bolts (C).





Cylinder Head Removal

12. Install the engine hanger bracket (A).



13. Install the harness (B) to the upper cover.

14. Connect the breather hose (C) and install the harness clamp (D).

15. Reconnect the three injector connectors (E) and the two harness clamps (F).

16. Install the harness holder mounting bolts (G) and the engine ground cable (H).

17. Install the three ignition coils to the rear cylinder head (see page 4-33).

18. Install the intake manifold (see page 9-5).

19. Install the strut brace (see page 20-210).

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wiring and terminals, unplug the wiring connectors carefully while holding the connector portion.
- Connect the Honda Diagnostic System (HDS) to the data link connector (DLC), and monitor the engine coolant temperature (ECT) sensor 1. To avoid damaging the cylinder head, wait until the ECT sensor 1 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 any other wiring or hoses, or interfere with any other parts.

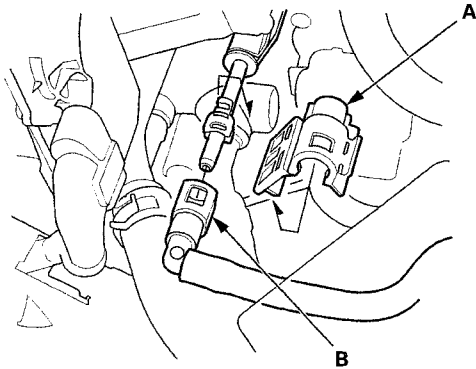
1. Remove the engine compartment covers (see page 20-186).
2. Relieve the fuel pressure (see page 11-366).
3. Do the battery terminal disconnection procedure (see page 22-86).
4. Drain the engine coolant (see page 10-6).
5. Remove the alternator (see page 4-47).
6. Remove the intake manifold (see page 9-4).
7. Remove the six ignition coils (see page 4-33).
8. Remove the timing belt (see page 6-15).

(cont'd)

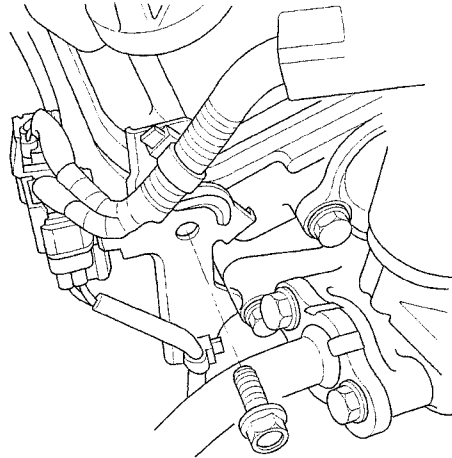
Cylinder Head

Cylinder Head Removal (cont'd)

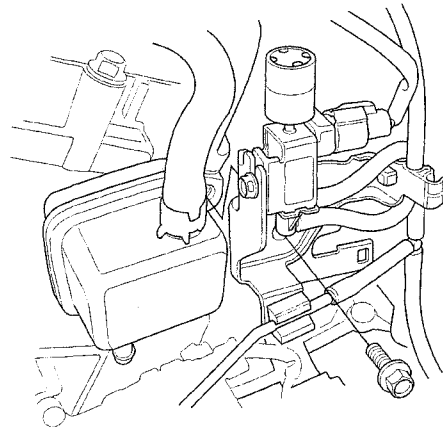
9. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the cylinder head:
- Six injector connectors
 - Knock sensor connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Engine mount control solenoid valve connector
 - Camshaft position (CMP) sensor connector
 - Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors
10. Remove the front warm up three way catalytic converter (front WU-TWC) (see page 11-429) and the rear warm up three way catalytic converter (rear WU-TWC) (see page 11-430).
11. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-379).



12. Remove the connector bracket from the front cylinder head.



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

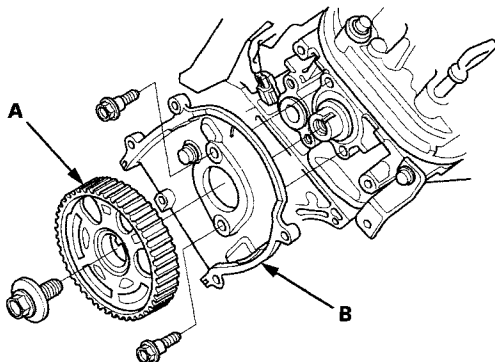


14. Remove the evaporative emission (EVAP) canister joint with the bracket (see step 9 on page 6-37).
15. Remove the injector bases (see page 9-7).
16. Remove the water passage (see page 10-9).

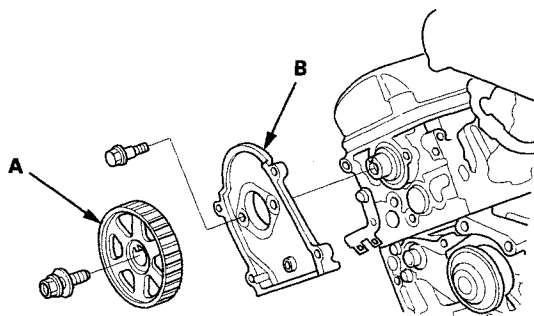


17. Remove the camshaft pulleys (A) and the back covers (B).

FRONT



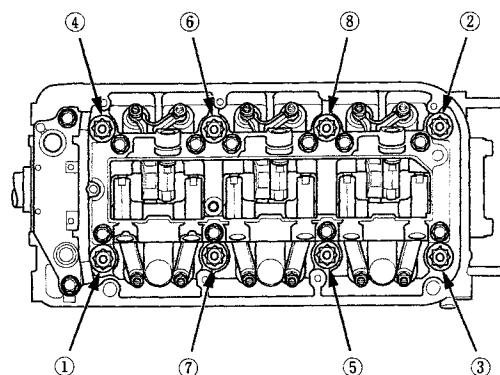
REAR



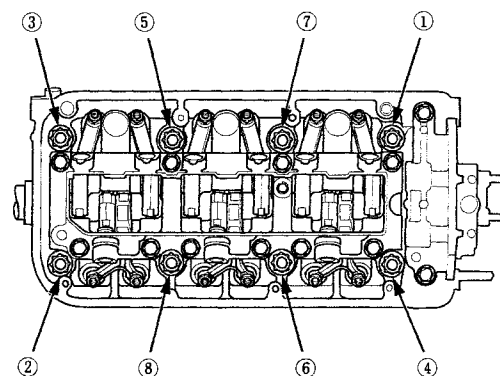
18. Remove the cylinder head covers (see page 6-27).

19. Remove the cylinder head bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

FRONT



REAR



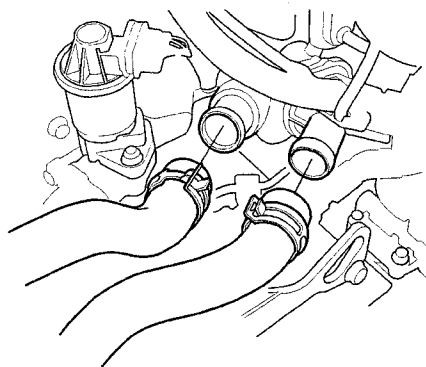
20. Remove the cylinder heads.

Cylinder Head

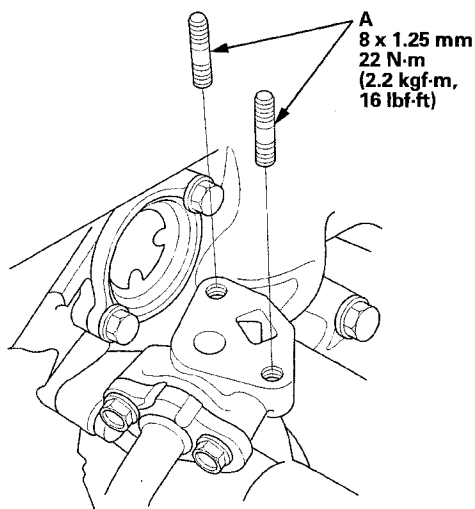
Camshaft Replacement

Front

1. Remove the engine compartment covers (see page 20-186).
2. Do the battery removal procedure (see page 22-87).
3. Drain the engine coolant (see page 10-6).
4. Disconnect the radiator hoses.

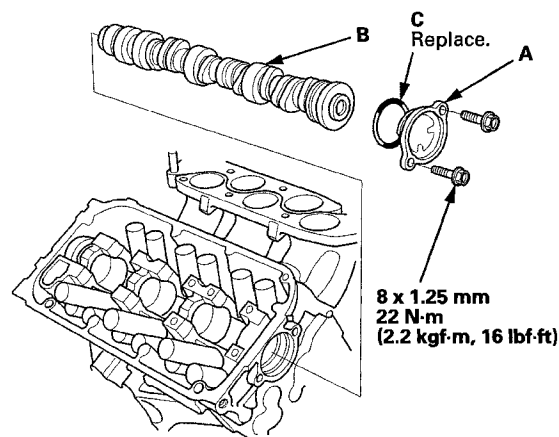


5. Remove the exhaust gas recirculation (EGR) valve (see page 11-444).
6. Remove the EGR valve stud bolts (A).



7. Remove the timing belt (see page 6-15).
8. Remove the front rocker arm assembly (see page 6-39).
9. Remove the front camshaft pulley.

10. Remove the thrust cover (A), then remove the front camshaft (B).

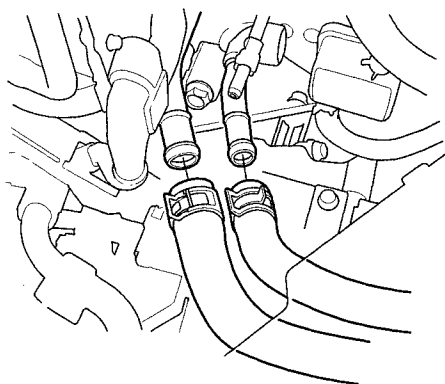


11. Install the front camshaft in the reverse order of removal. Always use a new O-ring (C). Apply new engine oil to the journals and the cam lobes.
12. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 14 on page 6-54).
13. Install the front rocker arm assembly, then tighten the mounting bolts (see step 12 on page 6-54).
14. Install the timing belt (see page 6-17).
15. Adjust the valve clearance (see page 6-9).
16. Install the EGR valve stud bolts, then install the EGR valve (see page 11-444).
17. Connect the radiator hoses.
18. Do the battery installation procedure (see page 22-87).
19. Fill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).
20. Install the engine compartment covers (see page 20-186).
21. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

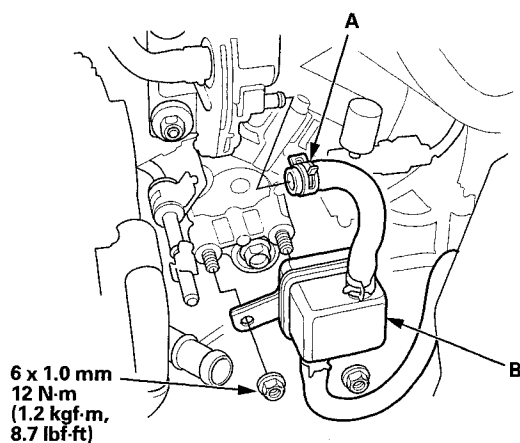


Rear

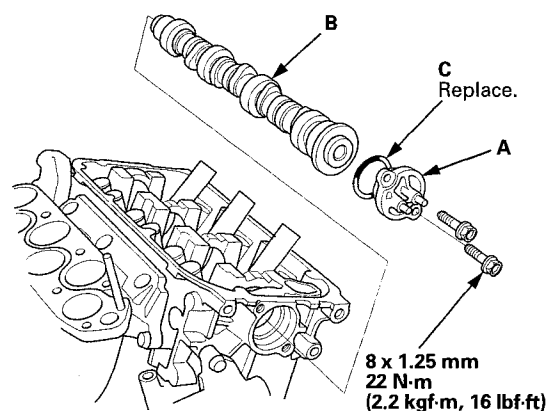
1. Remove the engine compartment covers (see page 20-186).
2. Relieve the fuel pressure (see page 11-366).
3. Do the battery removal procedure (see page 22-87).
4. Drain the engine coolant (see page 10-6).
5. Remove the under-hood fuse/relay box from the bracket.
6. Remove the air cleaner assembly (see page 11-421).
7. Remove the quick-connect fitting cover, then disconnect the fuel feed hose (see step 11 on page 6-34).
8. Disconnect the heater hoses.



9. Disconnect the evaporative emission (EVAP) canister hose (A), then remove the EVAP canister joint (B) with the bracket.



10. Remove the timing belt (see page 6-15).
11. Remove the rear rocker arm assembly (see page 6-39).
12. Remove the rear camshaft pulley.
13. Remove the thrust cover (A), then remove the rear camshaft (B).



14. 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.
15. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the rear camshaft pulley (see step 14 on page 6-56).
16. Install the rear rocker arm assembly, then tighten the mounting bolts (see step 12 on page 6-56).
17. Install the timing belt (see page 6-17).
18. Adjust the valve clearance (see page 6-9).
19. Install the EVAP canister joint with the bracket, then connect the EVAP canister hose.
20. Connect the heater hoses.
21. Connect the fuel feed hose, then install the quick-connect fitting cover (see step 21 on page 6-60).
22. Install the air cleaner assembly (see page 11-421).

(cont'd)

Cylinder Head

Camshaft Replacement (cont'd)

23. Install the under-hood fuse/relay box to the bracket.
24. Do the battery installation procedure (see page 22-87).
25. Inspect for fuel leaks. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
26. Fill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).
27. Install the engine compartment covers (see page 20-186).
28. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

Cylinder Head Inspection for Warp

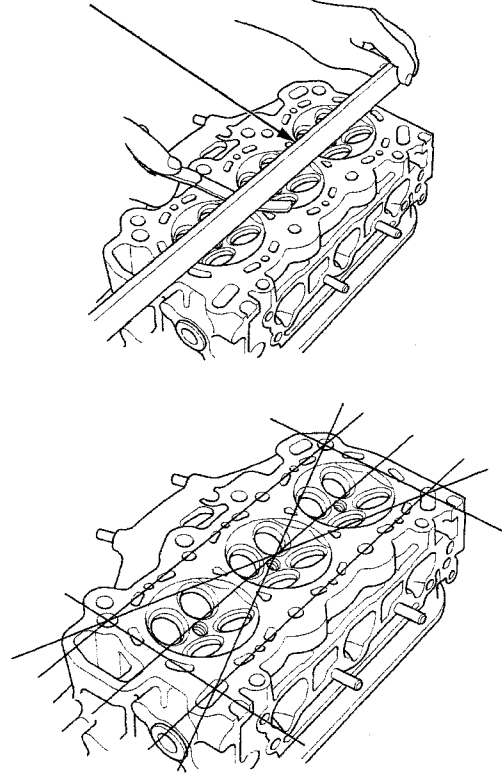
1. Remove the cylinder head (see page 6-33).
2. Inspect the camshaft (see page 6-43).
3. Check the cylinder head for warp. Measure along the edges, and three ways across the center.
 - If warp is less than 0.05 mm (0.002 in), cylinder head resurfacing is not required.
 - If warp is between 0.05 mm (0.002 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)

Service Limit: 120.8 mm (4.76 in)

PRECISION STRAIGHT EDGE

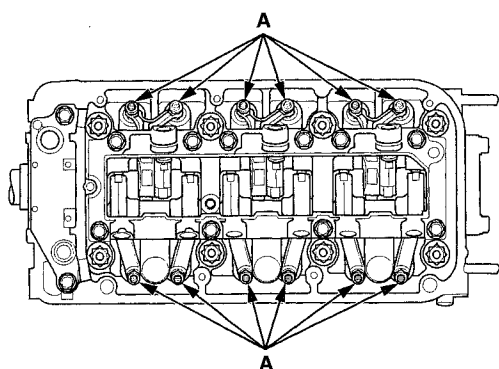




Rocker Arm Assembly Removal

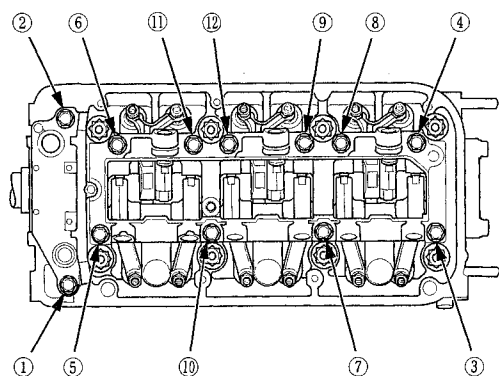
Front

1. Remove the cylinder head cover (see page 6-27).
2. Loosen the locknuts and the adjusting screws (A).



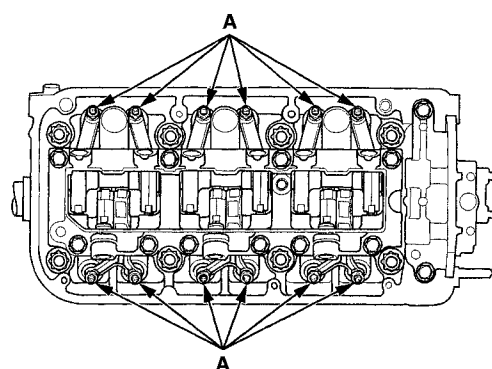
3. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.

- 1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
- 2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the rocker arms on the shafts.



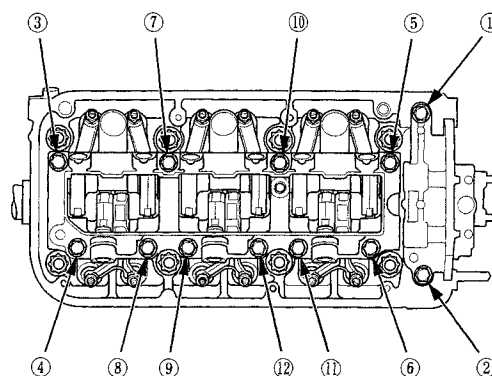
Rear

4. Remove the cylinder head cover (see page 6-27).
5. Loosen the locknuts and the adjusting screws (A).



6. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.

- 1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
- 2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the rocker arms on the shafts.



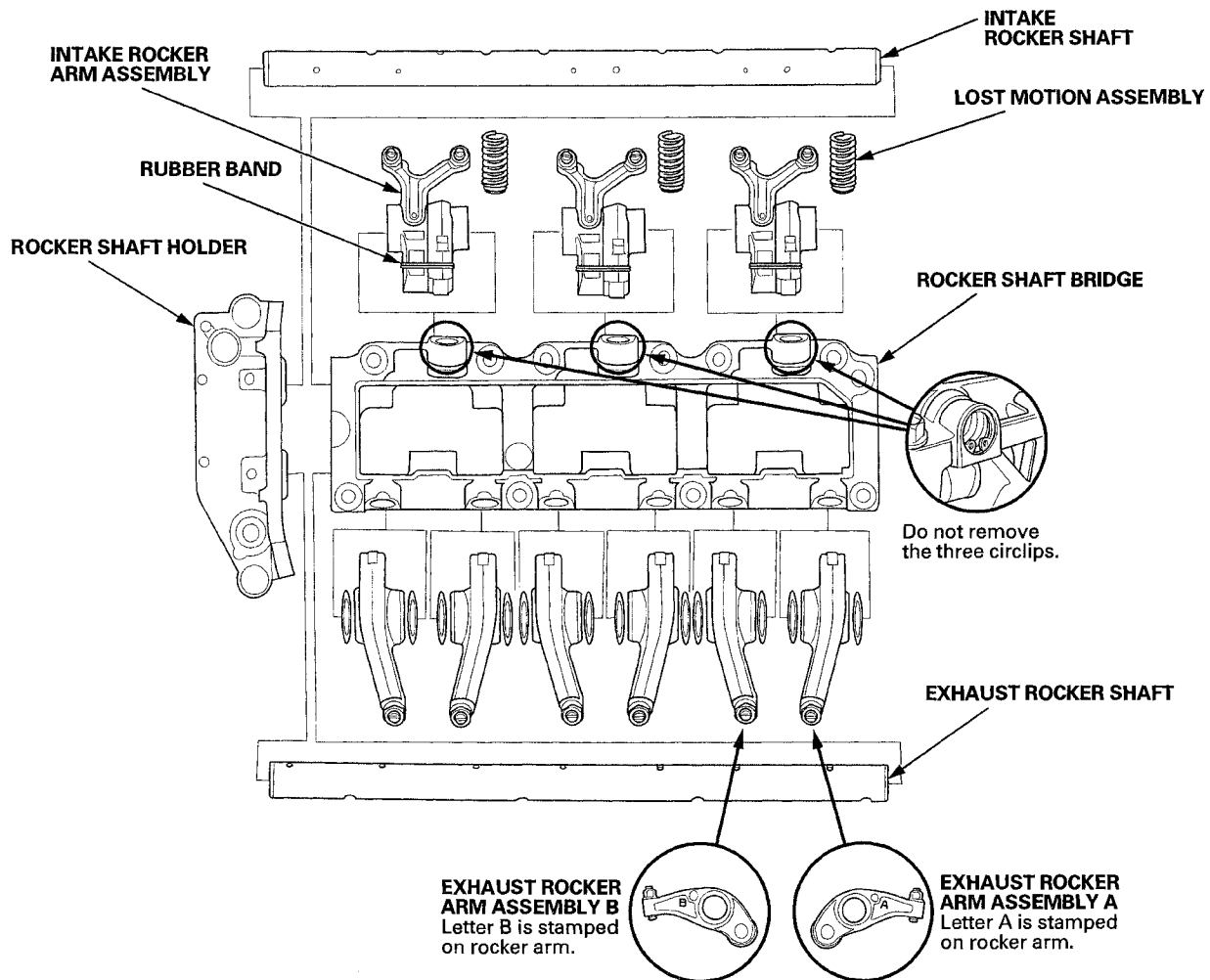
Cylinder Head

Rocker Arm and Shaft Disassembly/Reassembly

Front

NOTE:

- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see page 6-42).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft cannot be removed or installed by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points and bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.

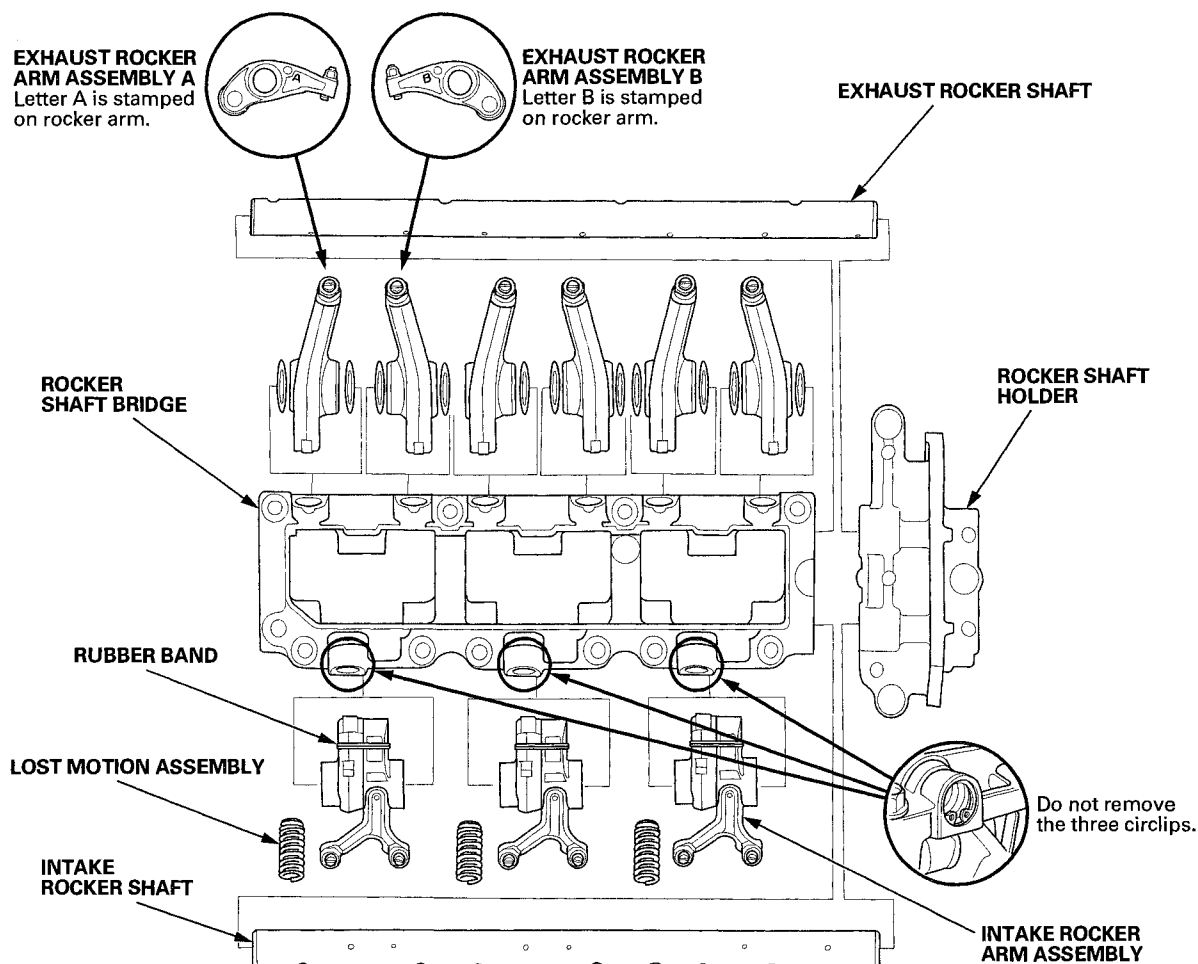




Rear

NOTE:

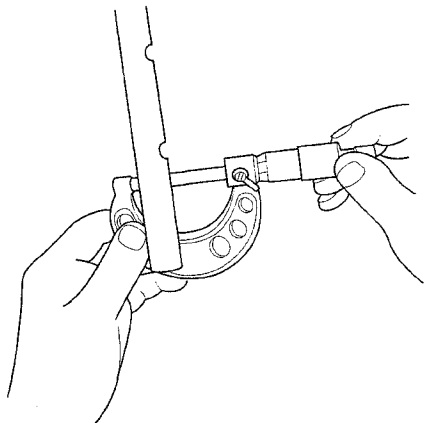
- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see page 6-42).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft cannot be removed or installed by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points and bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.



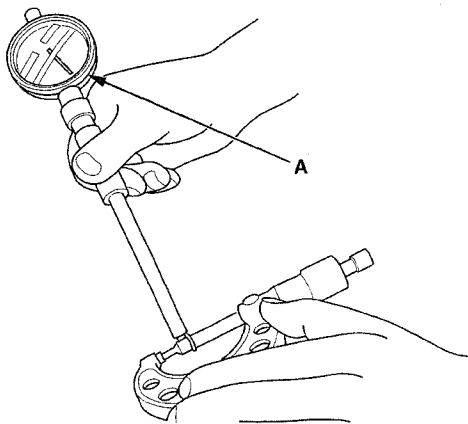
Cylinder Head

Rocker Arm and Shaft Inspection

1. Remove the rocker arm assembly (see page 6-39).
2. Disassemble the rocker arm assembly (see page 6-40).
3. Measure the diameter of the shaft at the first rocker location.



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



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

Intake Rocker Arm-to-Shaft Clearance:

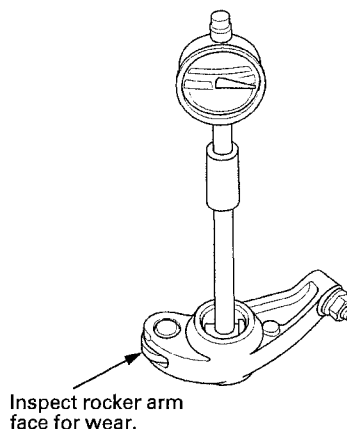
Standard (New): 0.015—0.046 mm (0.0006—0.0018 in)

Service Limit: 0.046 mm (0.0018 in)

Exhaust Rocker Arm-to-Shaft Clearance:

Standard (New): 0.018—0.047 mm (0.0007—0.0019 in)

Service Limit: 0.047 mm (0.0019 in)



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 rocker arms in that set (primary and secondary).



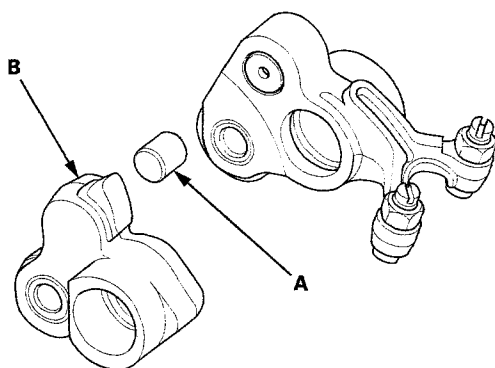
Camshaft Inspection

VTEC Rocker Arms

7. Inspect the rocker arm piston (A). Slide them into the rocker arms. If they do not move smoothly, replace the rocker arm set.

NOTE:

- Apply new engine oil to the rocker arm piston when reassembling.
- When removing the rocker arm piston from the intake secondary rocker arm (B), carefully apply air pressure to the oil passage of the rocker arm.

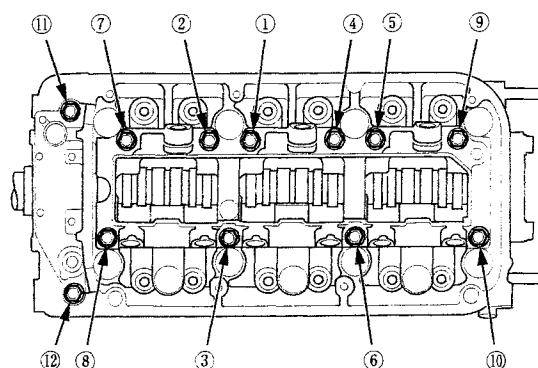


8. Reassemble the rocker arm assembly (see page 6-40).
9. Install the rocker arm assembly (see page 6-53).

1. Remove the cylinder head (see page 6-33).
2. Remove the rocker arm assembly (see page 6-39).
3. Disassemble the rocker arm assembly (see page 6-40).
4. Front: Put the rocker shafts bridge and the rocker shaft holder on the front cylinder head, then tighten the bolts to the specified torque.

Specified Torque

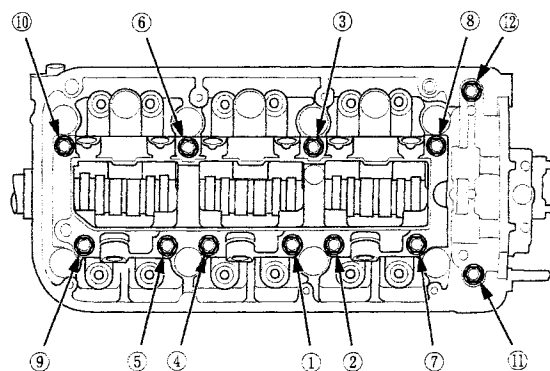
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



5. Rear: Put the rocker shaft bridge and the rocker shaft holder on the rear cylinder head, then tighten the bolts to the specified torque.

Specified Torque

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



(cont'd)

Cylinder Head

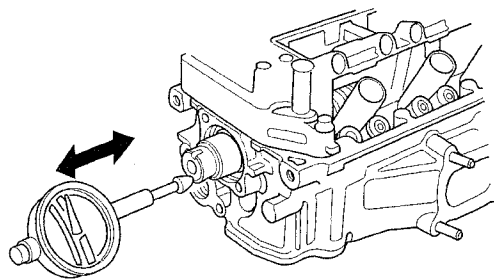
Camshaft Inspection (cont'd)

6. Seat the camshaft by pushing it toward the rear of the cylinder head.
7. 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.

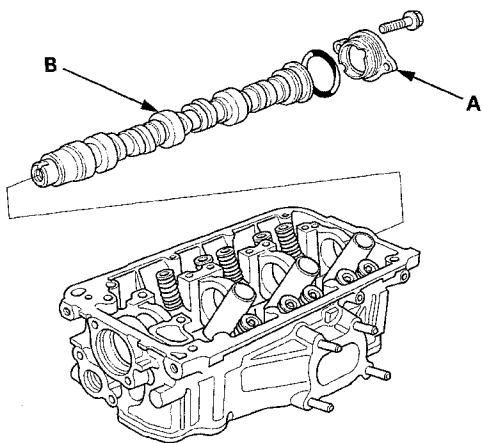
Camshaft End Play

Standard (New): 0.05—0.20 mm (0.002—0.008 in)

Service Limit: 0.20 mm (0.008 in)

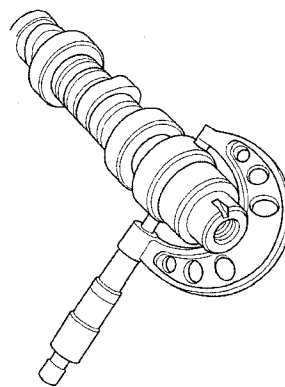


8. Remove the camshaft thrust cover (A), then pull out the camshaft (B).

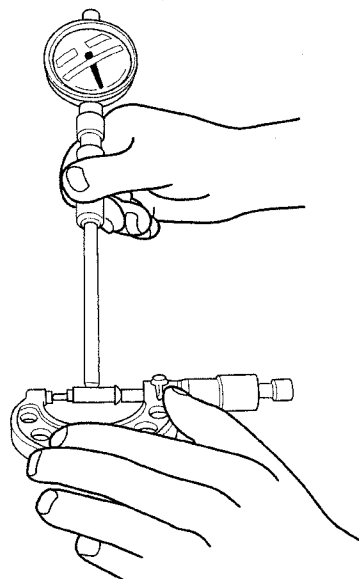


9. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.

10. Measure the diameter of each camshaft journal.



11. Zero the gauge to the journal diameter.





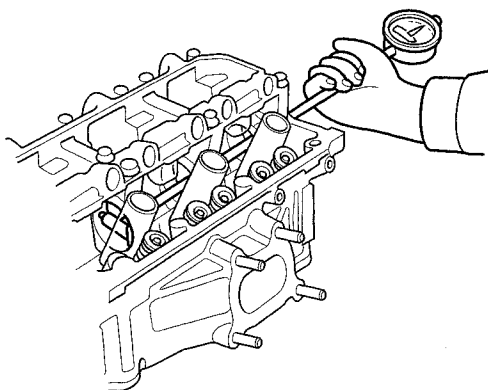
12. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round condition.

- If the camshaft-to-holder clearance is within limits, go to step 14.
- 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 13.

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)



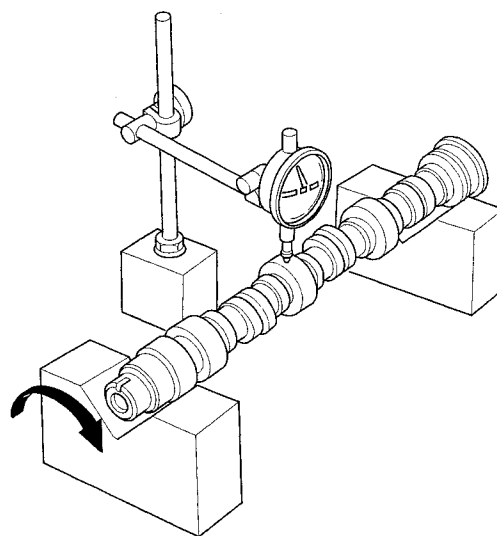
13. Check total runout with the camshaft supported on V-blocks.

- 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)



Cylinder Head

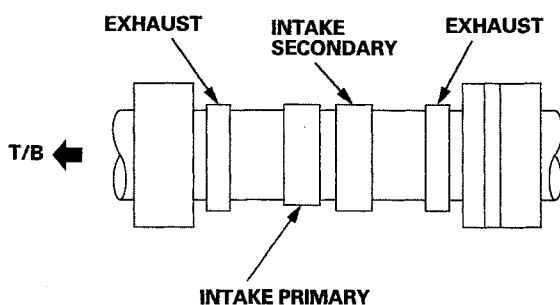
Camshaft Inspection (cont'd)

14. Measure the cam lobe height.

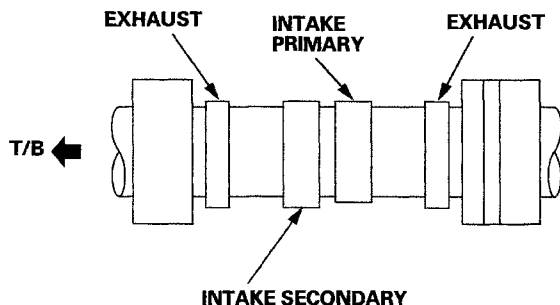
Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRI	34.299 mm (1.3504 in)	36.760 mm (1.4472 in)
SEC	35.621 mm (1.4024 in)	

FRONT



REAR



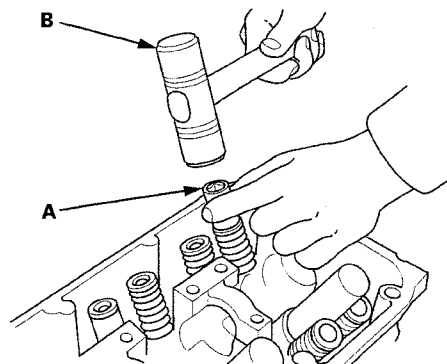
Valve, Spring, and Valve Seal Removal

Special Tools Required

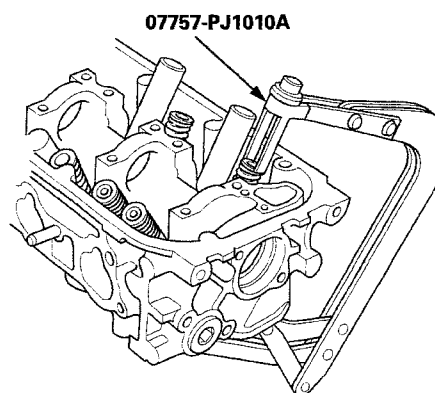
Valve Spring Compressor Attachment 07757-PJ1010A

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

1. Remove the cylinder head (see page 6-33).
2. Remove the rocker arm assembly (see page 6-39).
3. Using an appropriate-sized socket (A) and a plastic mallet (B), lightly tap the spring retainer to loosen the valve cotters.



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

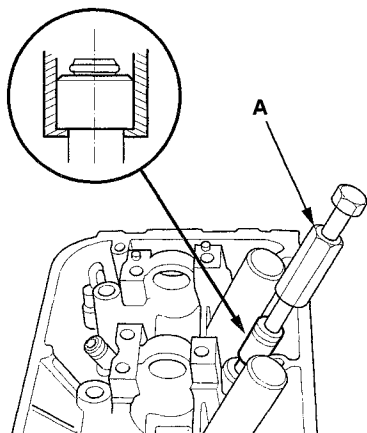


5. Remove the valve spring compressor and the valve spring compressor attachment, then remove the spring retainer, the valve spring, and the valve.

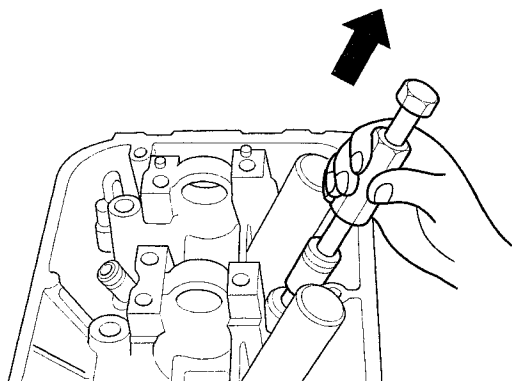


Valve Inspection

6. Install the valve guide seal remover (A).



7. Remove the valve seal.



8. Remove the valve spring seat.

1. Remove the valves (see page 6-46).

2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 35.90—36.01 mm
(1.413—1.421 in)

B Standard (New): 116.55—117.15 mm
(4.589—4.612 in)

C Standard (New): 5.485—5.495 mm
(0.2159—0.2163 in)

C Service Limit: 5.455 mm (0.2148 in)

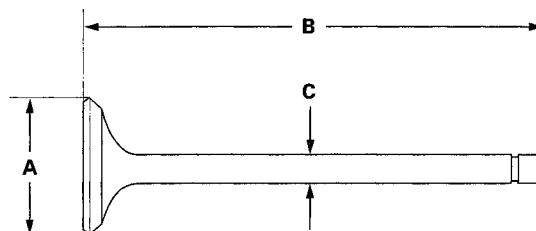
Exhaust Valve Dimensions

A Standard (New): 29.90—30.10 mm
(1.177—1.185 in)

B Standard (New): 113.90—114.50 mm
(4.484—4.508 in)

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

C Service Limit: 5.420 mm (0.2134 in)



Cylinder Head

Valve Stem-to-Guide Clearance Inspection

1. Remove the valves (see page 6-46).
2. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or a 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

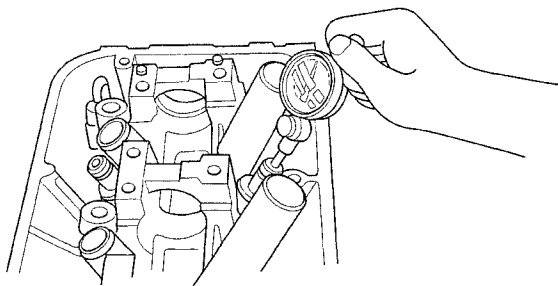
Standard (New): 0.020–0.045 mm (0.0008–0.0018 in)

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)

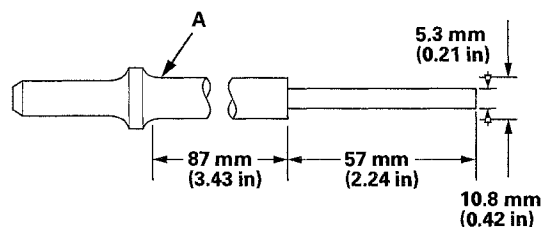


Valve Guide Replacement

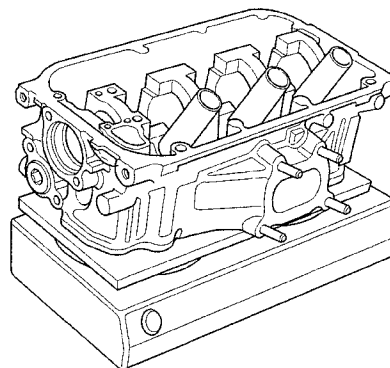
Special Tools Required

- Valve Guide Driver, 5.35 x 9.7 mm 07742-0010100
- Valve Guide Reamer, 5.5 mm 07HAH-PJ7A100

1. Inspect the valve stem-to-guide clearance (see page 6-48).
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 valve guide driver and a conventional hammer.



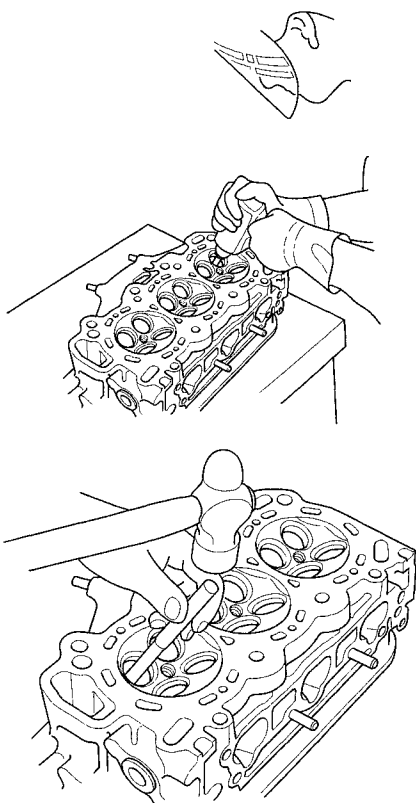
3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for at least an hour.
4. Use a hot plate or oven to evenly heat the cylinder head to 300 °F (150 °C). Monitor the temperature with a cooking thermometer. Do not get the head hotter than 300 °F (150 °C); excessive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





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.



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

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

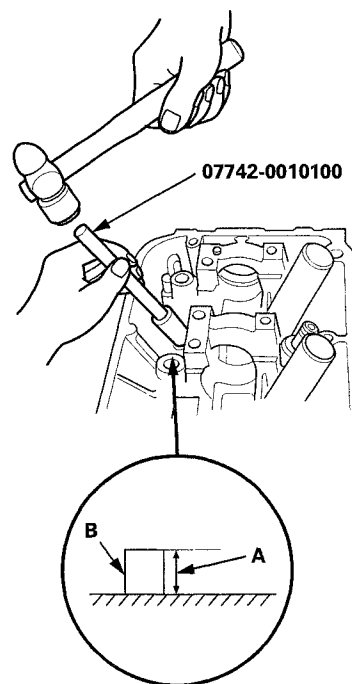
8. Remove the new guide(s) from the freezer, one at a time, as you need them.

9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the valve guide driver, 5.35 x 9.7 mm 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)

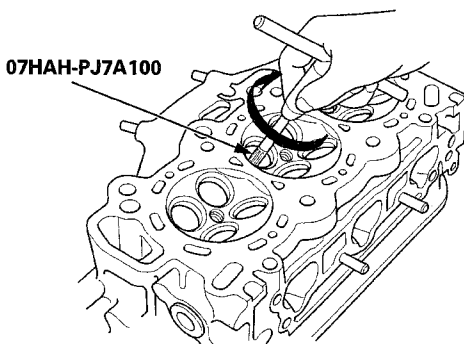


(cont'd)

Cylinder Head

Valve Guide Replacement (cont'd)

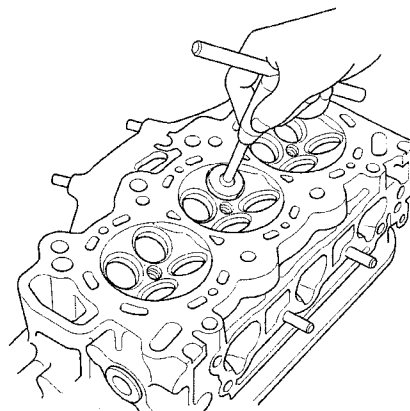
10. Coat both the valve guide reamer, 5.5 mm and the valve guide with cutting oil.
11. Rotate the reamer clockwise the full length of the valve guide bore.



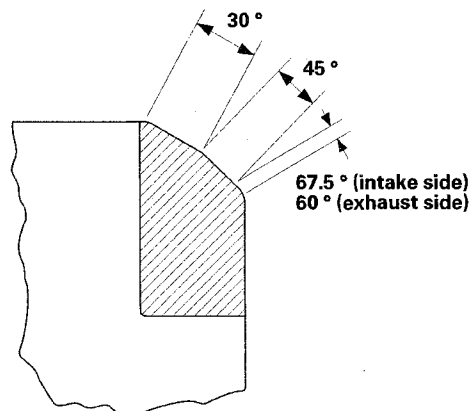
12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearance with a valve (see page 6-48). Verify that a valve slides in the intake and exhaust valve guides without sticking.
15. Inspect the valve seating. If necessary renew the valve seat using a valve seat cutter (see page 6-50).

Valve Seat Reconditioning

1. Inspect valve stem-to-guide clearance (see page 6-48). If the valve guides are worn, replace them (see page 6-48) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



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



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

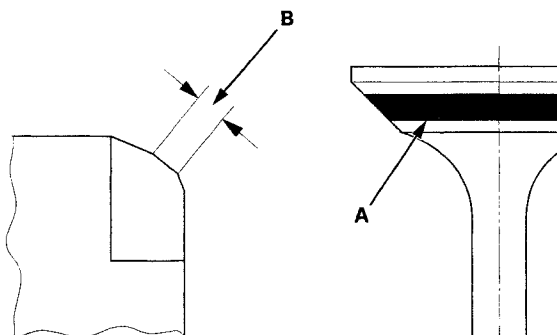
Valve Seat Width

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.



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

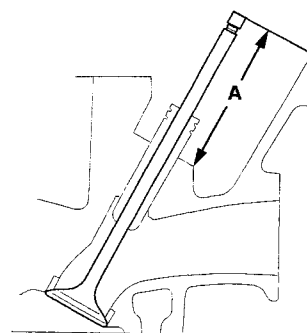
Standard (New): 46.75–47.55 mm (1.841–1.872 in)

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)



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.

Cylinder Head

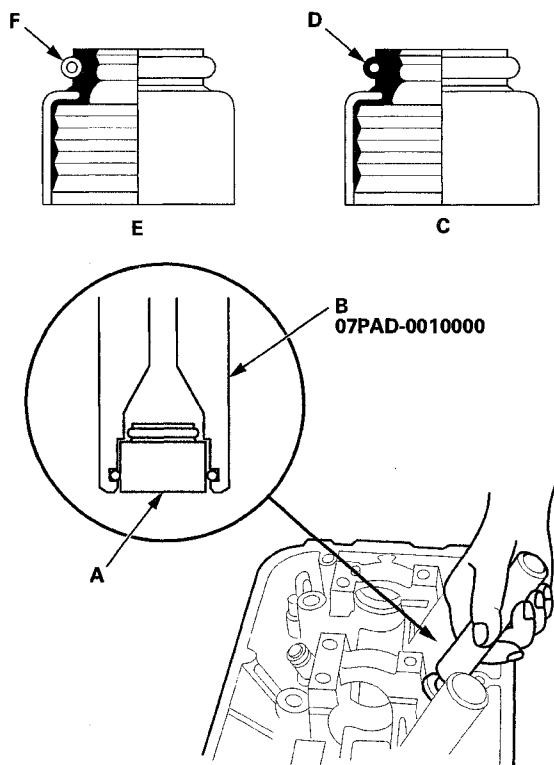
Valve, Spring, and Valve Seal Installation

Special Tools Required

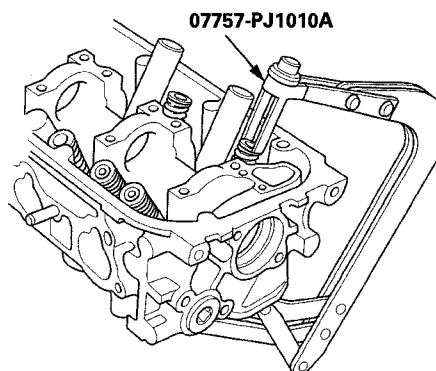
- Stem Seal Driver, 30 mm 07PAD-0010000
- Valve Spring Compressor Attachment 07757-PJ1010A

1. Coat the valve stems with 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 5.5 mm side of the stem seal driver, 30 mm (B).

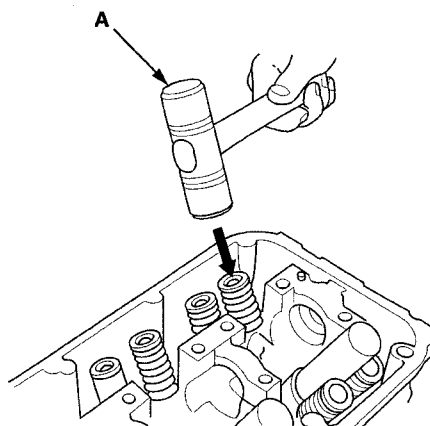
NOTE: Exhaust valve seals (C) have a black spring (D) and intake valve seals (E) have a white or silver spring (F). They are not interchangeable.



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



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

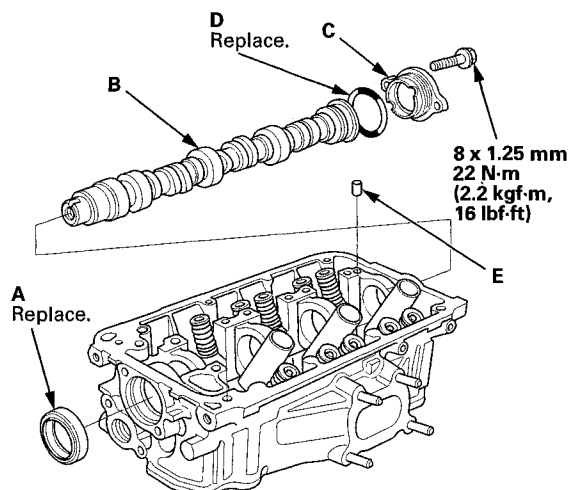




Camshaft, Rocker Arm Assembly, Camshaft Seal, and Pulley Installation

Front

1. Loosen the locknuts and the adjusting screws.
2. Dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. 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.

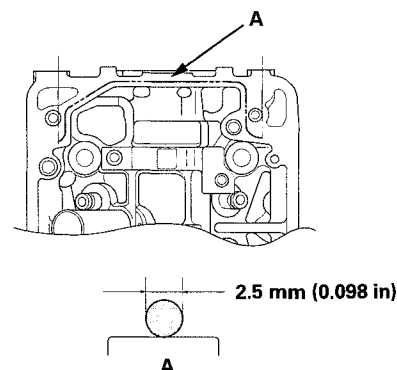


5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and the cam lobes.
6. Check that the oil seal lips are not distorted.
7. Install the solid dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see page 6-40).

9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



11. 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.

NOTE:

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

(cont'd)

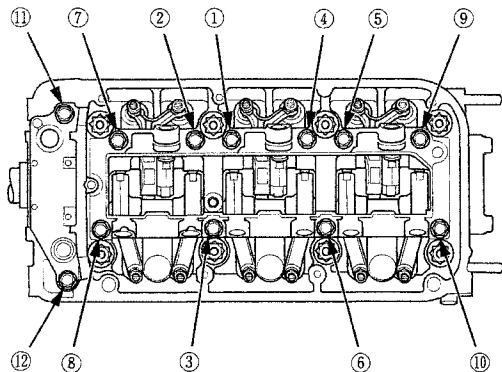
Cylinder Head

Camshaft, Rocker Arm Assembly, Camshaft Seal, and Pulley Installation (cont'd)

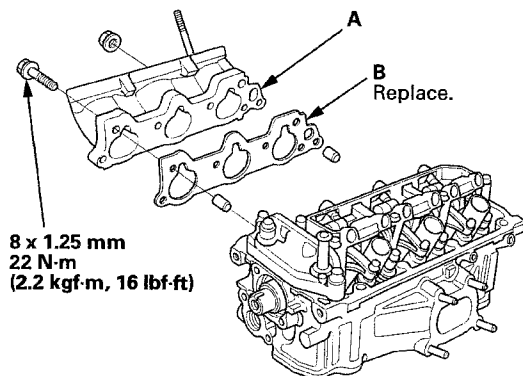
12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

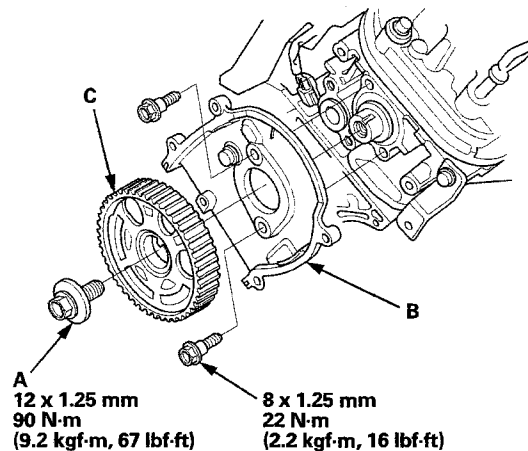
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



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



14. 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).

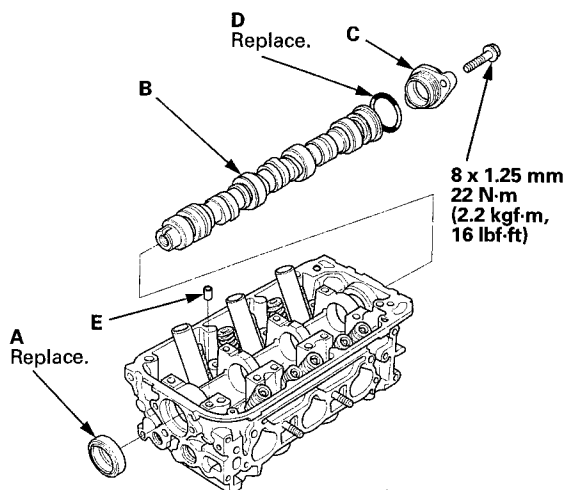


15. Set the camshaft pulleys to top dead center (TDC) before bolting them onto the engine block (see step 6 on page 6-57).



Rear

1. Loosen the locknuts and the adjusting screws.
2. Dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. 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.

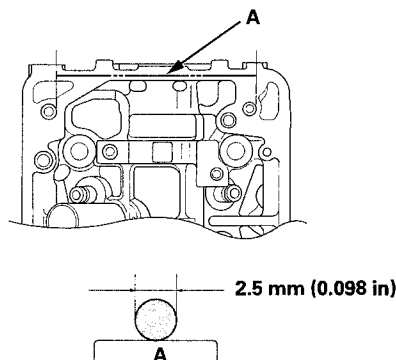


5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and the cam lobes.
6. Check that the oil seal lips are not distorted.
7. Install the hollow dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see page 6-41).

9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



11. 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.

NOTE:

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

(cont'd)

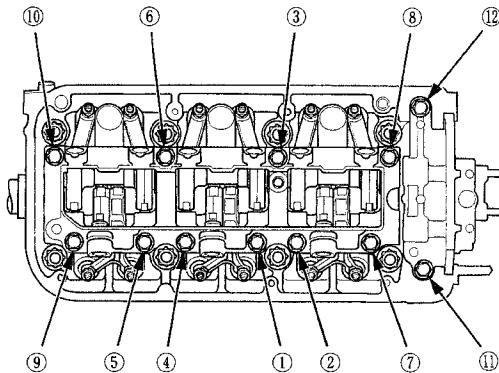
Cylinder Head

Camshaft, Rocker Arm Assembly, Camshaft Seal, and Pulley Installation (cont'd)

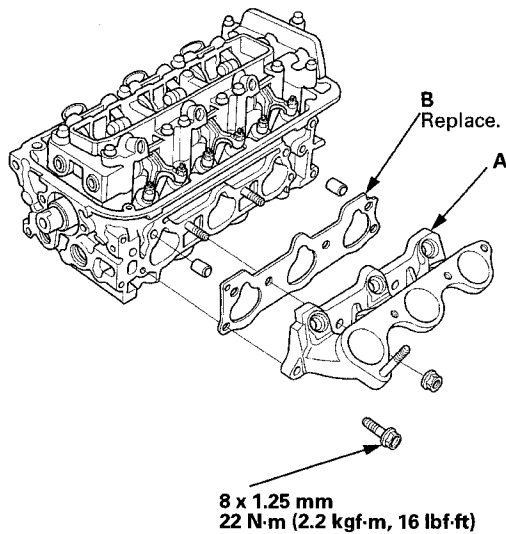
12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

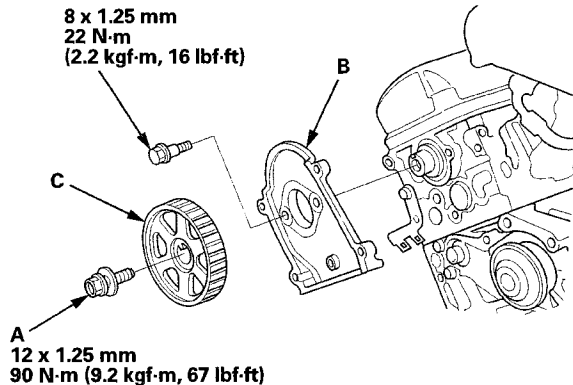
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



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



14. 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).

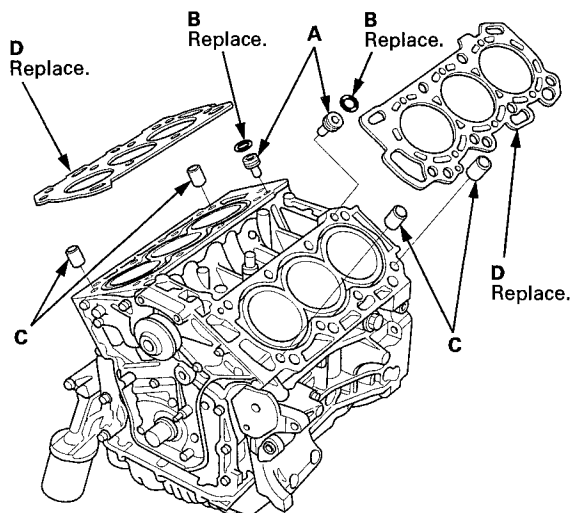


15. Set the camshaft pulleys to TDC before bolting them onto the engine block (see step 6 on page 6-57).

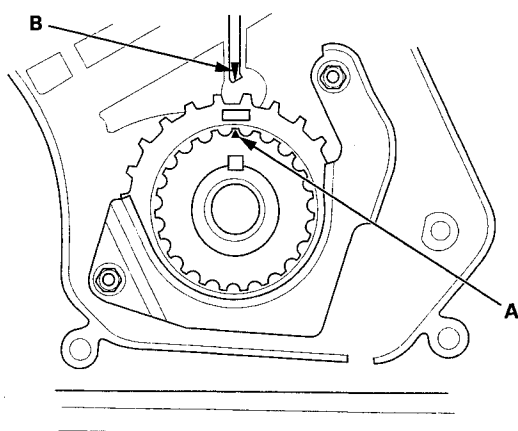


Cylinder Head Installation

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

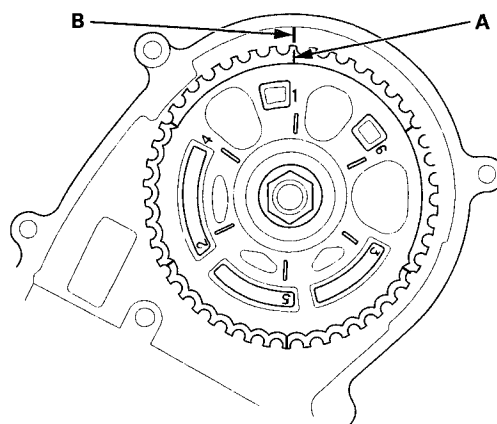


3. Install the dowel pins (C) and the new cylinder head gaskets (D).
4. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
5. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with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

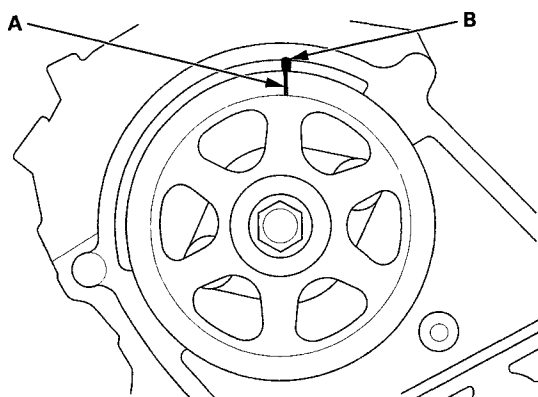


6. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

FRONT



REAR



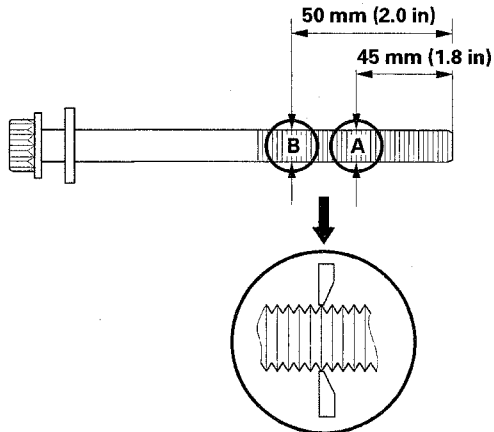
7. Install the cylinder heads on the engine block.

(cont'd)

Cylinder Head

Cylinder Head Installation (cont'd)

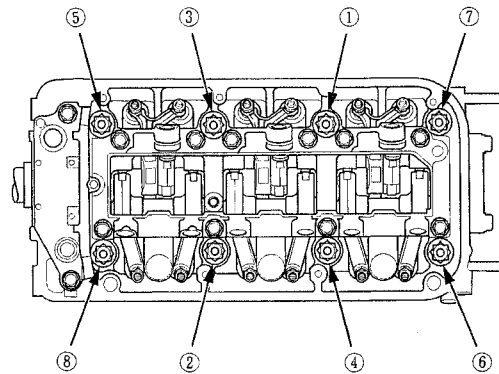
8. Measure the diameter of each cylinder head bolt at point A and point B.



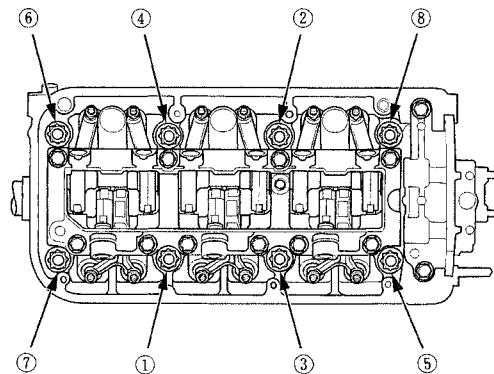
9. If either diameter is less than 11.3 mm (0.44 in), replace the cylinder head bolt.
10. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.

11. Torque the cylinder head bolts in sequence to 29 N·m (3.0 kgf·m, 22 lbf·ft) using a beam-type torque wrench. When using a preset click-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.

FRONT



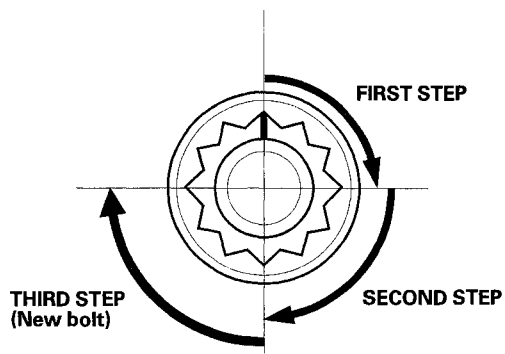
REAR





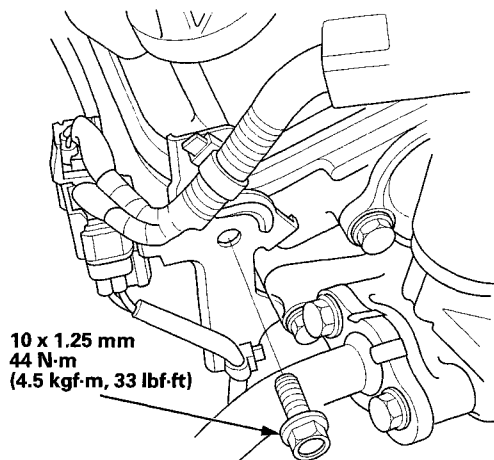
12. After torquing, tighten all cylinder head bolts in two steps (90° per step) using the sequence shown in step 11. If you are using a new cylinder head bolt, tighten the bolt an extra 90°.

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 8 of the procedure. Do not loosen it back to the specified angle.



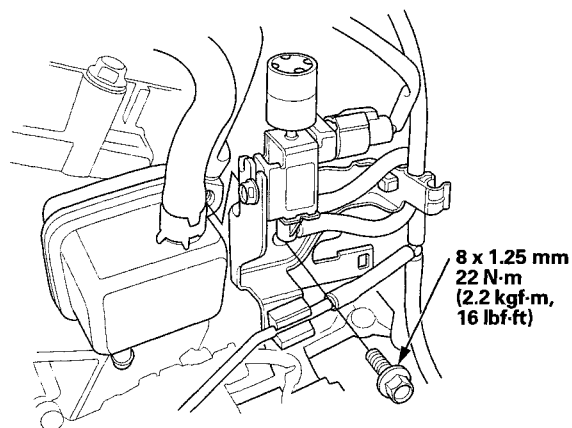
13. Install the timing belt (see page 6-17).
14. Adjust the valve clearance (see page 6-9).
15. Install the cylinder head covers (see page 6-29).
16. Install the water passage (see page 10-9).
17. Install the injector bases (see page 9-7).

18. Install the connector bracket to the front cylinder head.



19. Install the evaporative emission (EVAP) canister joint with the bracket (see step 9 on page 6-37).

20. Install the engine mount control solenoid valve bracket to the rear cylinder head.

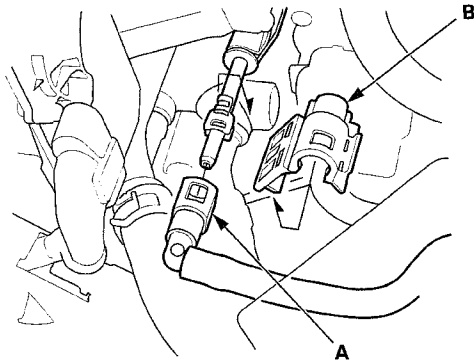


(cont'd)

Cylinder Head

Cylinder Head Installation (cont'd)

21. Connect the fuel feed hose (A) (see page 11-383), then install the quick-connect fitting cover (B).



22. Install the front warm up three way catalytic converter (front WU-TWC) (see page 11-429) and the rear warm up three way catalytic converter (rear WU-TWC) (see page 11-430).

23. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:

- Six injector connectors
- Knock sensor connector
- Engine coolant temperature (ECT) sensor 1 connector
- Engine mount control solenoid valve connector
- Camshaft position (CMP) sensor connector
- Rocker arm oil control solenoid connector
- Rocker arm oil pressure switch connector
- Two air fuel ratio (A/F) sensor connectors
- Two secondary heated oxygen sensor (secondary HO2S) connectors

24. Install the six ignition coils (see page 4-33).

25. Install the intake manifold (see page 9-5).

26. Install the alternator (see page 4-48).

27. Do the battery terminal reconnection procedure (see page 22-86).

28. After installation, check that all tubes, hoses, and connectors are installed correctly.

29. Inspect for fuel leaks. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.

30. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).

31. Check for fluid leaks.

32. Do the powertrain control module (PCM) idle learn procedure (see page 11-337).

33. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

34. Inspect the idle speed (see page 11-336).

35. Inspect the ignition timing (see page 4-32).

36. Install the engine compartment covers (see page 20-186).

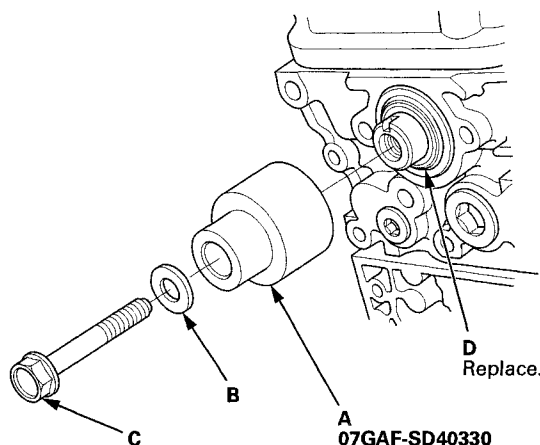


Camshaft Oil Seal Installation - In Car

Special Tools Required

Ball Joint Remover/Installer 07GAF-SD40330

1. Remove the timing belt (see page 6-15).
2. Remove the camshaft pulley and the back cover (see step 17 on page 6-35).
3. Remove the camshaft oil seal.
4. Clean and dry the camshaft oil seal housing.
5. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
6. Using the ball joint remover/installer (A), a washer (B), and a 12 x 75 x 1.25 mm bolt (C), press in the new camshaft oil seal (D) about 0.5–1.5 mm (0.02–0.06 in) below the surface of the cylinder head.

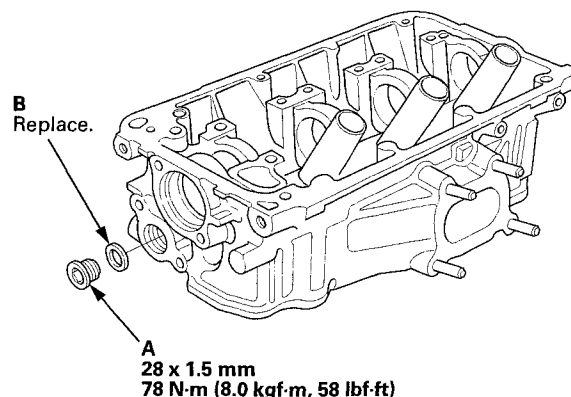


7. Apply new engine oil to the threads of the camshaft pulley mounting bolt. Install the back cover, then install the camshaft pulley.
 - Front (see step 14 on page 6-54)
 - Rear (see step 14 on page 6-56)
8. Install the timing belt (see page 6-17).

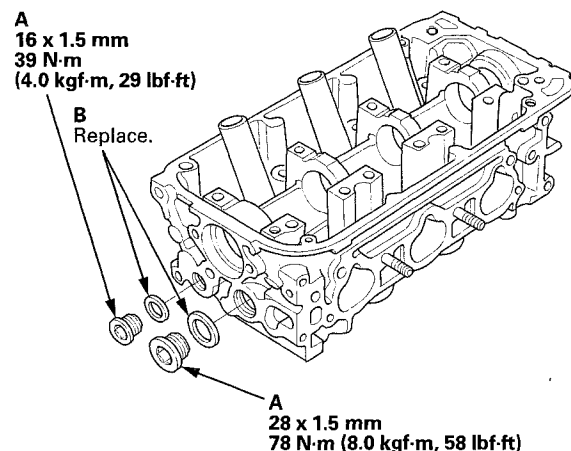
Sealing Bolt Installation

NOTE: When installing the sealing bolts (A), always use a new washer (B).

FRONT



REAR



Cylinder Head - J37A4 engine

Cylinder Head

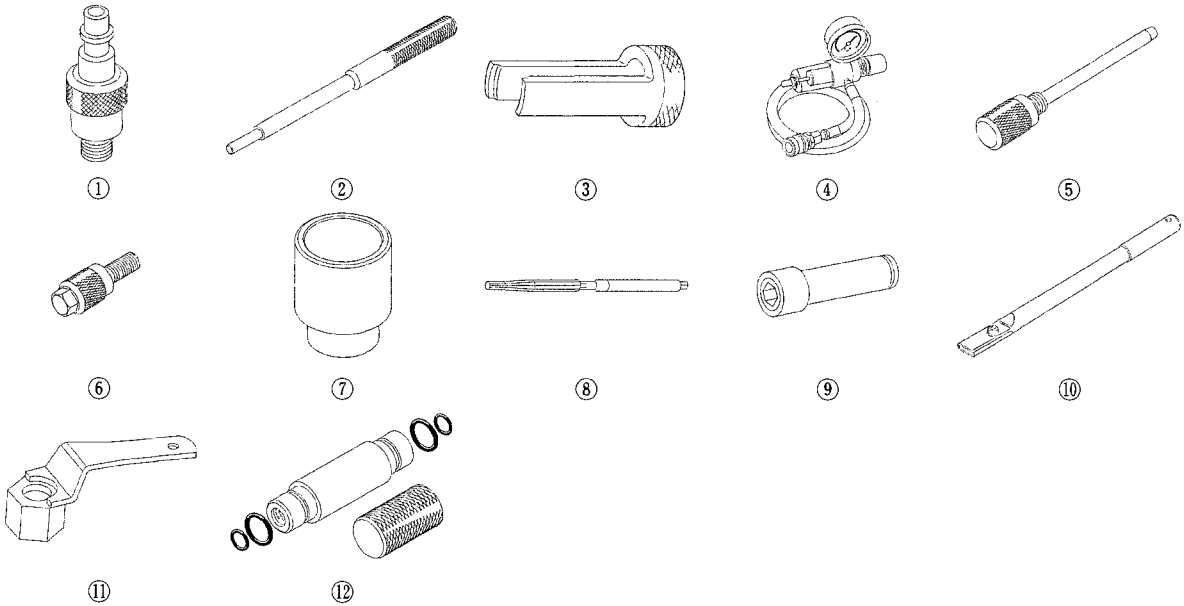
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Cylinder Head

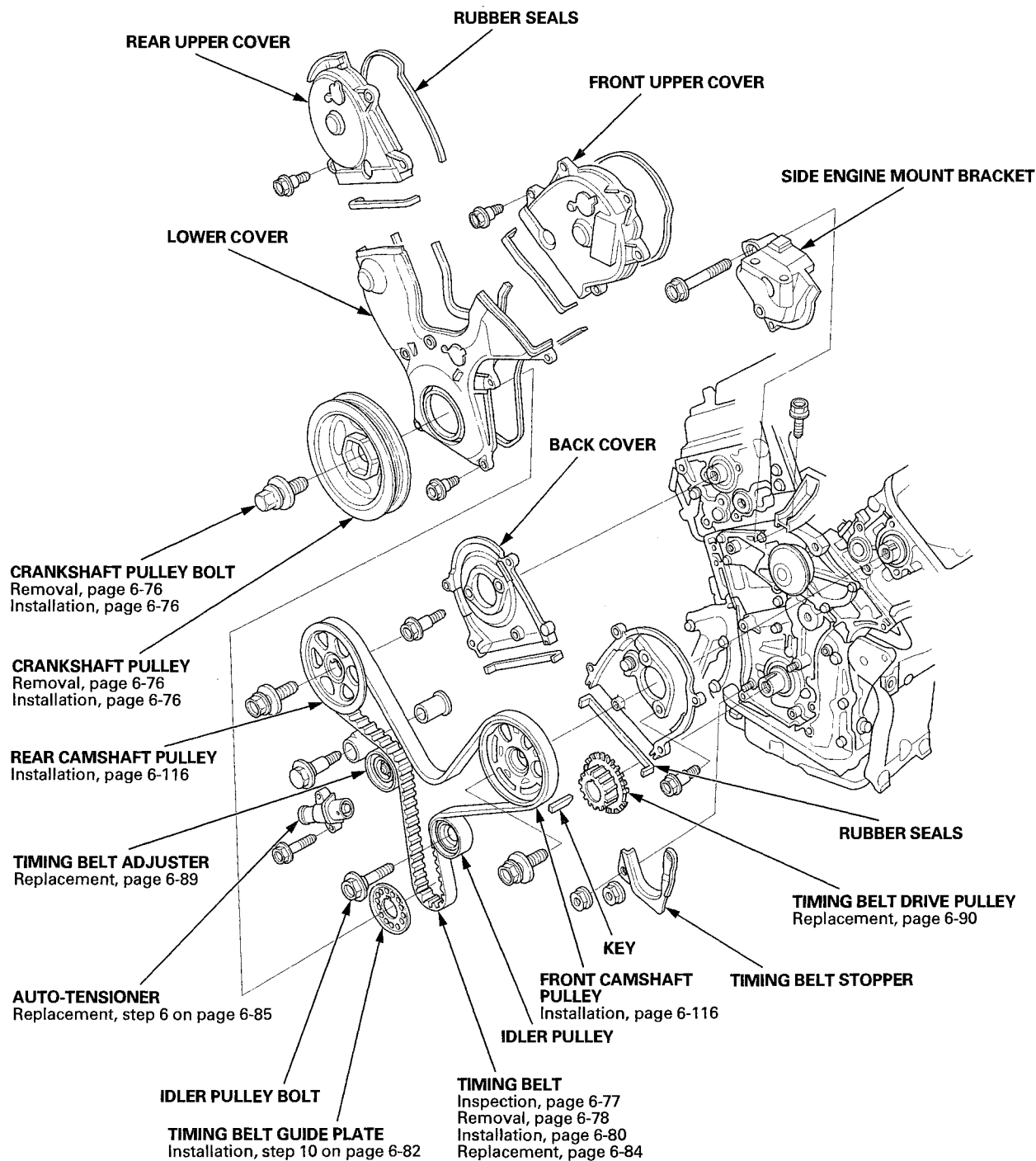
Special Tools

Ref.No.	Tool Number	Description	Qty
①	070AJ-001A101	VCM Air Adapter	1
②	07742-0010100	Valve Guide Driver, 5.35 x 9.7 mm	1
③	07757-PJ1010A	Valve Spring Compressor Attachment	1
④	07AAJ-PNAA101	Air Pressure Regulator	1
⑤	07AAJ-R70A100	VTEC Air Stop Tool A	1
⑥	07AAJ-R70A200	VTEC Air Stop Tool B	1
⑦	07GAF-SD40330	Ball Joint Remover/Installer	1
⑧	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
⑨	07JAA-001020A	Socket, 19 mm	1
⑩	07JAB-001020B	Handle, 6-25-660L	1
⑪	07MAB-PY3010A	Holder Attachment, 50 mm, Offset	1
⑫	07PAD-0010000	Stem Seal Driver, 30 mm	1





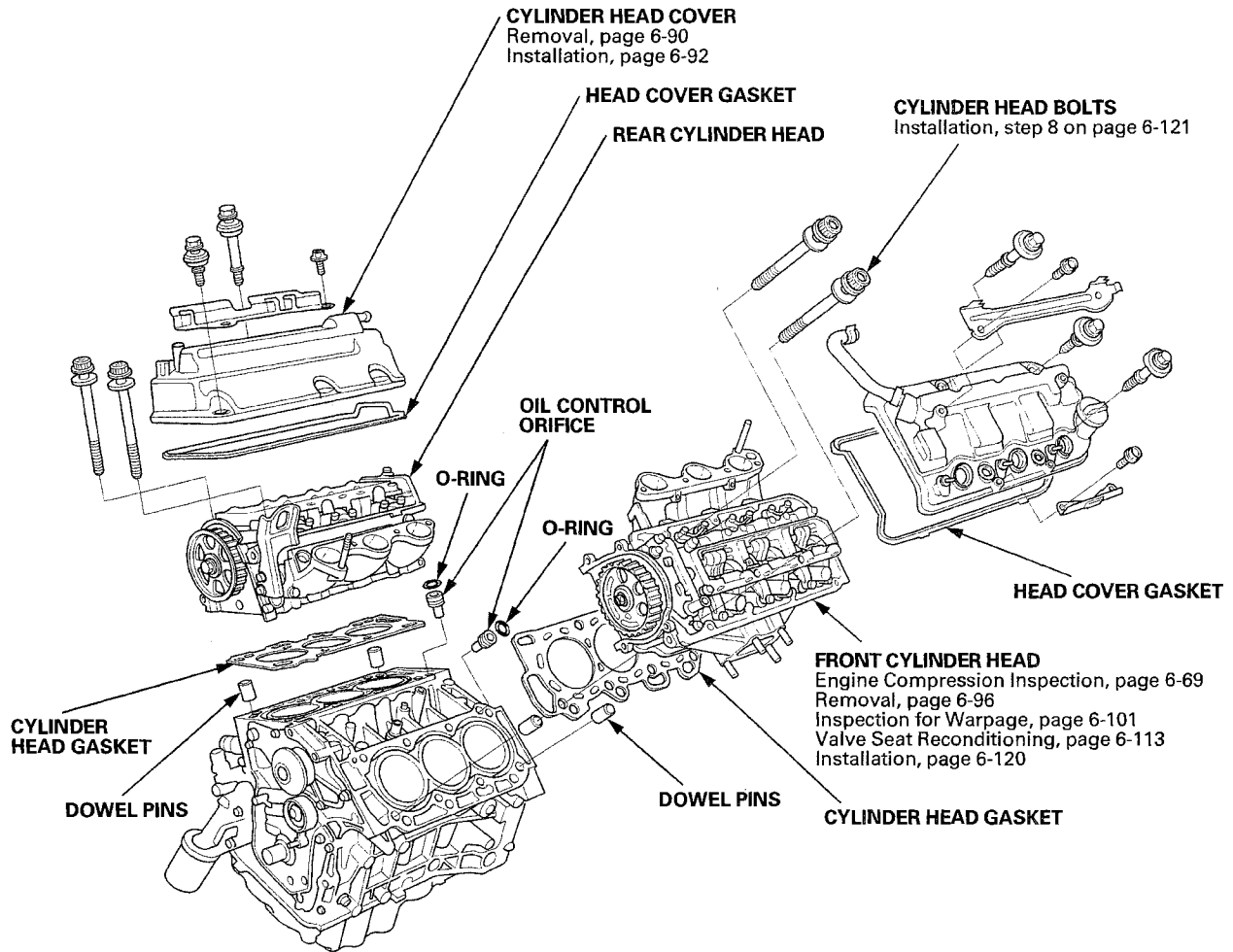
Component Location Index



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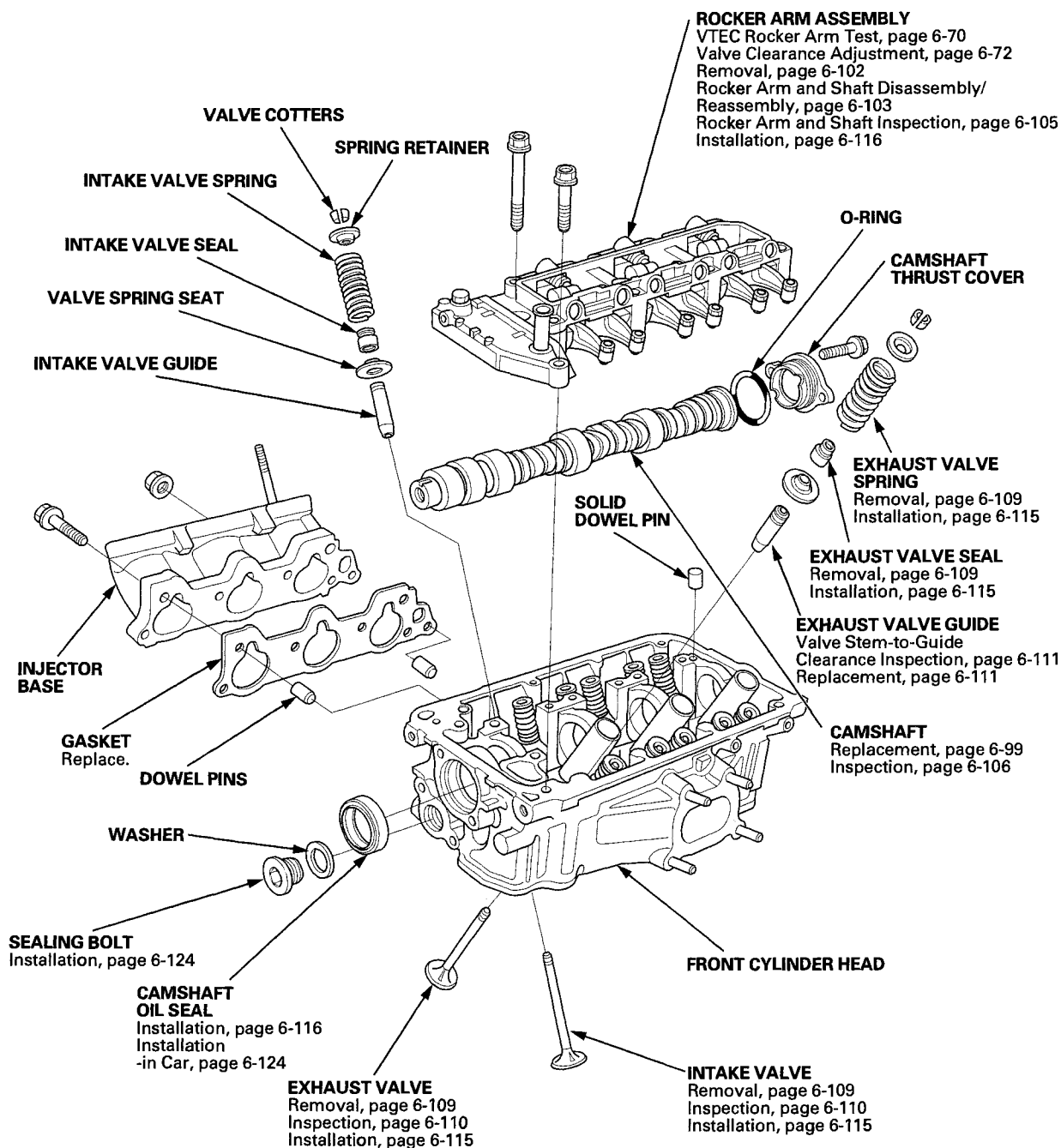
Cylinder Head

Component Location Index (cont'd)





FRONT

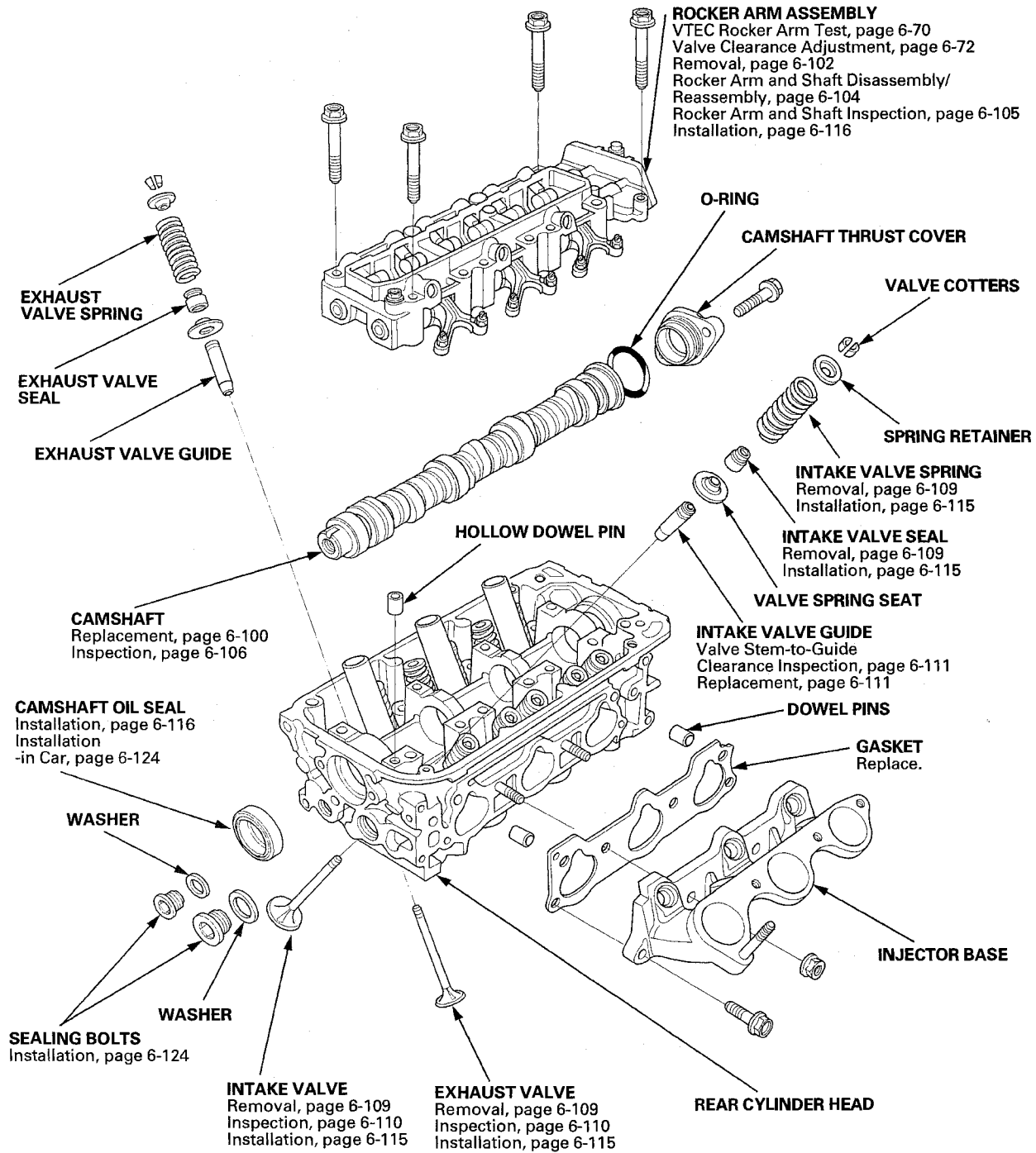


(cont'd)

Cylinder Head

Component Location Index (cont'd)

REAR

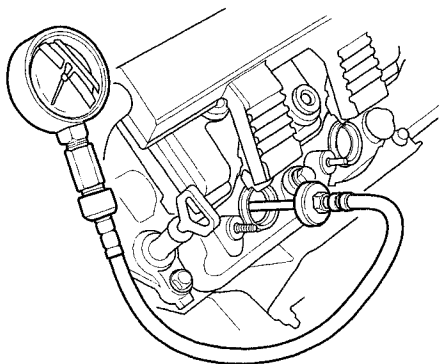




Engine Compression Inspection

NOTE: After the 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 operating.

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
3. Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3).
4. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode.
5. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-258).
6. Select ALL INJECTORS STOP in the PGM-FI INSPECTION menu with the HDS.
7. Turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
8. Remove the six ignition coils (see page 4-33).
9. Remove the six spark plugs.
10. Attach the compression gauge to a spark plug hole.



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

Compression Pressure:

Above 932 kPa (9.5 kgf/cm², 135 psi)

12. Measure the compression on the remaining cylinders.

Maximum Variation:

Within 196 kPa (2.0 kgf/cm², 28 psi)

13. If the compression is not within specifications, check the following items, then remeasure the compression.
 - Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats
 - Damaged cylinder head gaskets
 - Damaged or worn piston rings
 - Damaged or worn piston and cylinder bore
14. Remove the compression gauge from the spark plug hole.
15. Install the six spark plugs.
16. Install the six ignition coils (see page 4-33).
17. Select ECM/PCM reset (see page 11-4) in the PGM-FI INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.

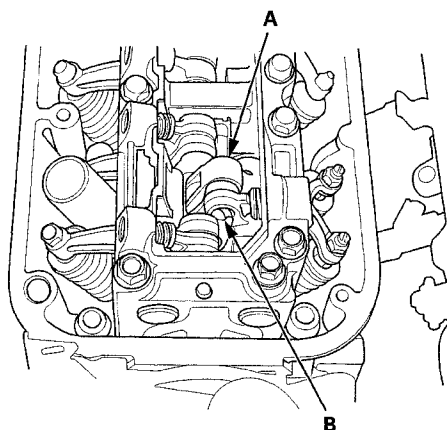
Cylinder Head

VTEC Rocker Arm Test

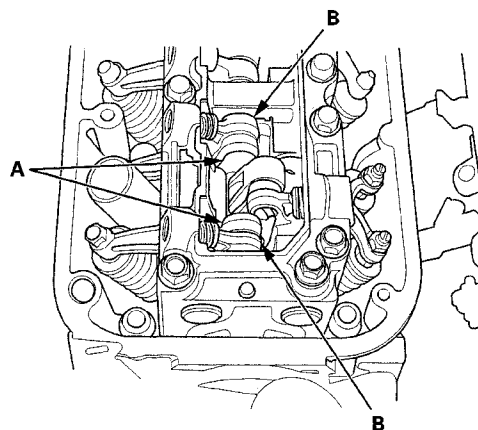
Special Tools Required

- VTEC Air Stop Tool B 07AAJ-R70A200
- VCM Air Adapter 070AJ-001A101
- Air Pressure Regulator 07AAJ-PNAA101
- VTEC Air Stop Tool A 07AAJ-R70A100

1. Start the engine and let it run for 5 minutes, then turn the ignition switch to LOCK (0), or press the engine start/stop button to select the OFF mode.
2. Remove the six spark plugs.
3. Remove the cylinder head covers (see page 6-90).
4. Rotate the crankshaft pulley clockwise, and visually check all the intake primary rocker arms (A) and the intake secondary rocker arms (B) moves independently.
 - If the intake primary rocker arm and the intake secondary rocker arm move together, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the intake primary rocker arm and the intake secondary rocker arm move independently, go to step 5.



5. Rotate the crankshaft pulley clockwise, and visually check all the exhaust primary rocker arms (A) and the exhaust secondary rocker arms (B) move independently.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move together, remove the exhaust primary rocker arm and the exhaust secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any exhaust rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move independently, go to step 6.

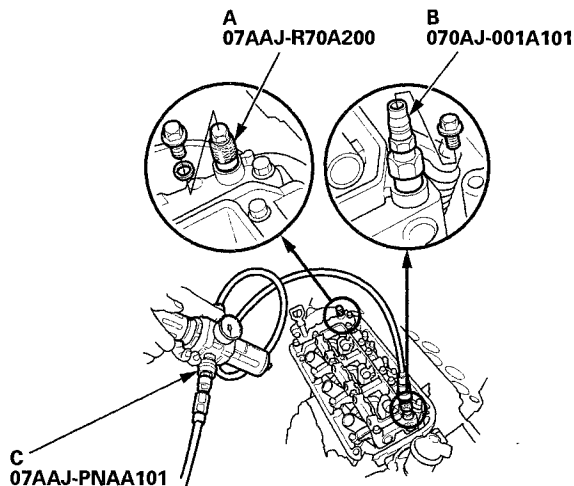


6. Check that the air pressure on the shop air compressor gauge indicates over 981 kPa (10.0 kgf/cm², 142 psi).
7. Inspect the valve clearance (see page 6-72).



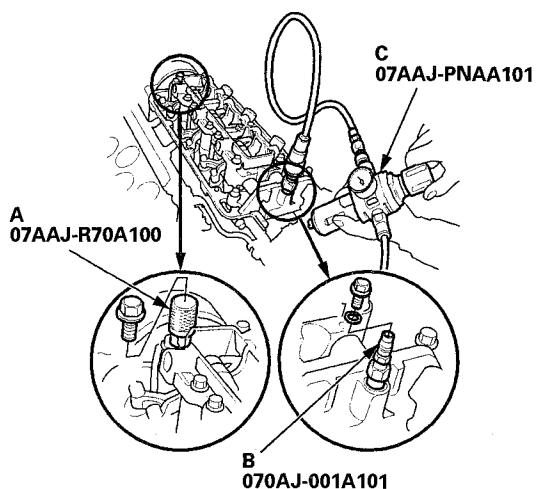
8. Remove the sealing bolts, then install the VTEC air stop tool B (A) and the VCM air adapter (B) to the inspection hole, then connect the air pressure regulator (C) as shown.

FRONT



9. Remove the sealing bolts, then install the VTEC air stop tool A (A) and the VCM air adapter (B) to the inspection hole, then connect the air pressure regulator (C) as shown.

REAR



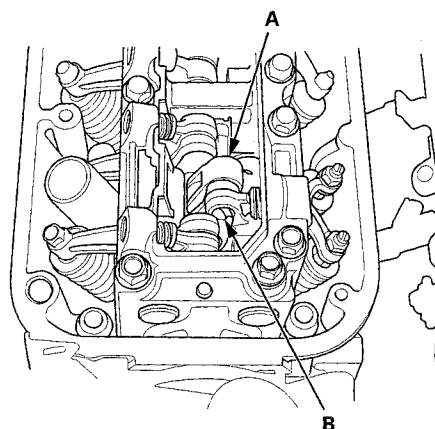
10. Loosen the valve on the regulator, and apply the specified air pressure.

Specified Air Pressure:

550—690 kPa (5.6—7.0 kgf/cm², 80—100 psi)

11. With the specified air pressure applied, rotate the crankshaft pulley clockwise, and visually check all the intake primary rocker arms (A) and the intake secondary rocker arms (B) move together.

- If the intake primary rocker arm and the intake secondary rocker arm move independently, remove the intake primary rocker arm and the intake secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any intake rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
- If the intake primary rocker arm and the intake secondary rocker arm move together, go to step 12.

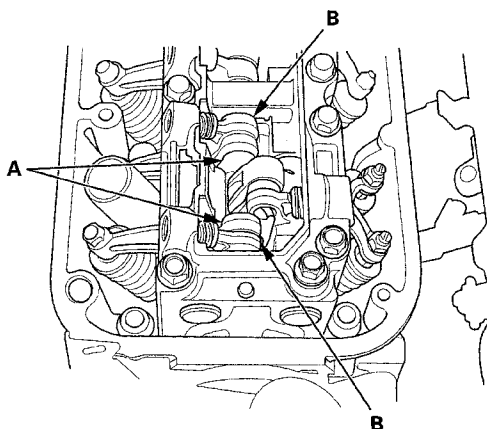


(cont'd)

Cylinder Head

VTEC Rocker Arm Test (cont'd)

12. With the specified air pressure applied, rotate the crankshaft pulley clockwise, and visually check all the exhaust primary rocker arms (A) and the exhaust secondary rocker arms (B) move together.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move independently, remove the exhaust primary rocker arm and the exhaust secondary rocker arm as an assembly, and check that the pistons in the rocker arms move smoothly. If any exhaust rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.
 - If the exhaust primary rocker arm and the exhaust secondary rocker arm move together, go to step 13.

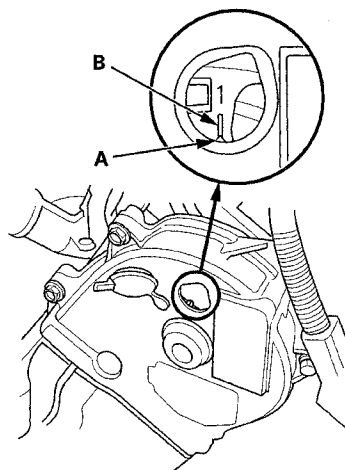


13. Remove the air pressure regulator, the VCM air adapter, the VTEC air stop tool A, and the VTEC air stop tool B.
14. Torque the sealing bolts to 22 N·m (2.2 kgf·m, 16 lbf·ft).
15. Install the cylinder head covers (see page 6-92).
16. Install the six spark plugs.

Valve Clearance Adjustment

NOTE: Connect the Honda Diagnostic System (HDS) to the data link connector (DLC), and monitor the engine coolant temperature (ECT) sensor 1. Adjust the valve clearance only when the ECT sensor 1 is less than 100 °F (38 °C).

1. Remove the cylinder head covers (see page 6-90).
2. 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.





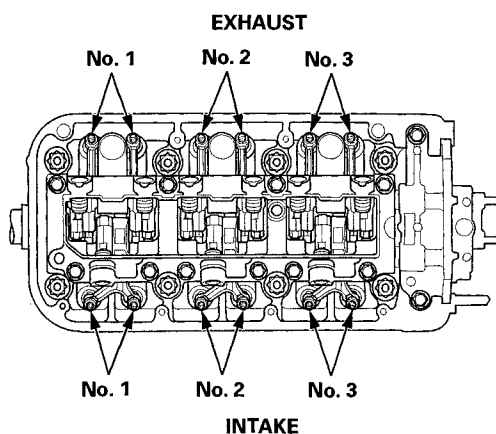
3. Select the correct feeler gauge for the valve clearance you are going to check.

Valve Clearance

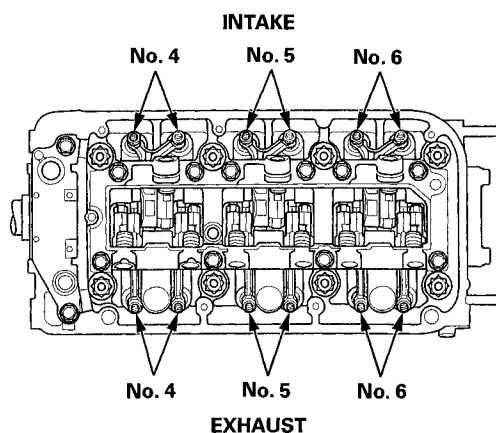
Intake: 0.20–0.24 mm (0.008–0.009 in)

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

REAR

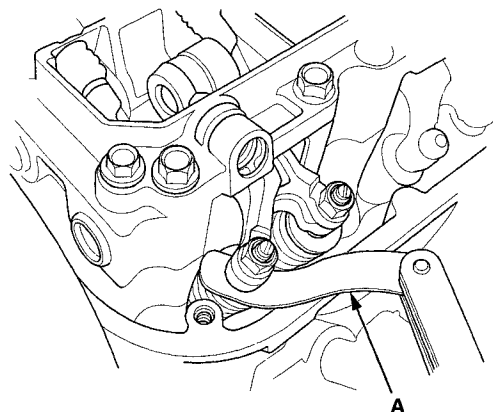


FRONT

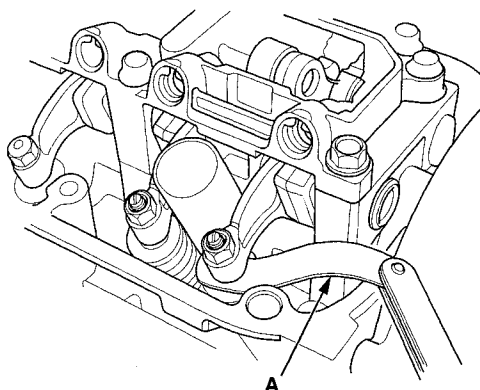


4. Insert the feeler gauge (A) between the adjusting screw and the end of the valve stem on the No. 1 cylinder, and slide it back and forth; you should feel a slight amount of drag.

INTAKE



EXHAUST



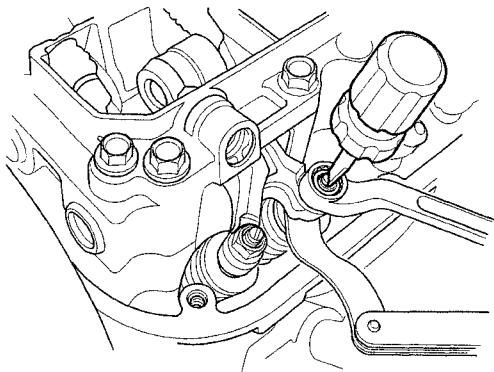
(cont'd)

Cylinder Head

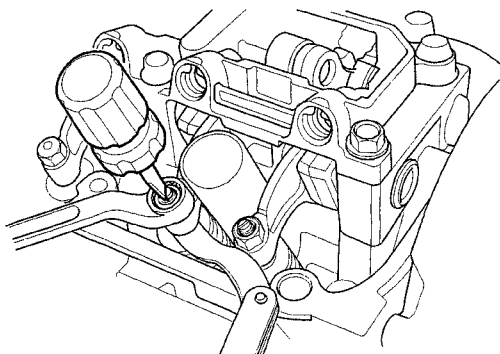
Valve Clearance Adjustment (cont'd)

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

INTAKE



EXHAUST



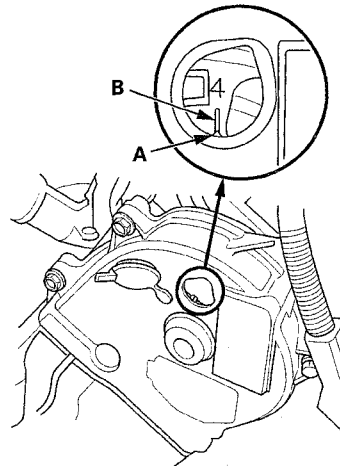
6. While holding the adjusting screw with the screw driver, tighten the locknut, then recheck the clearance. Repeat the adjustment, if necessary.

Specified Torque

20 N·m (2.0 kgf·m, 14 lbf·ft)

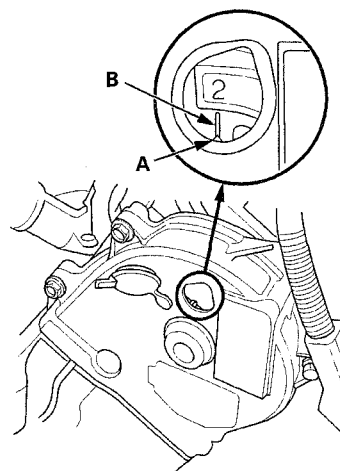
Apply new engine oil to the nut threads.

7. 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.



8. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.

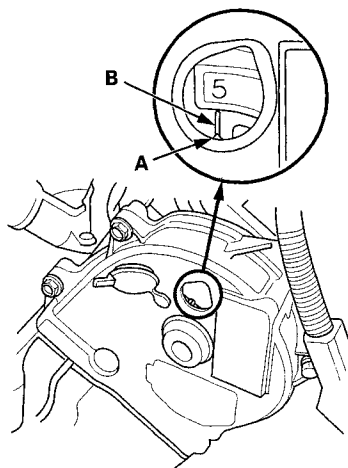
9. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 2 piston TDC mark (B) on the front camshaft pulley.



10. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.

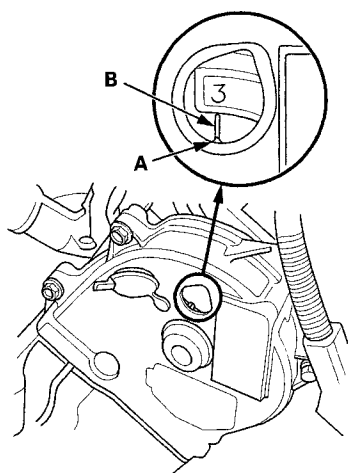


11. Rotate the crankshaft clockwise. Align the pointer (A) on the front upper cover with the No. 5 piston TDC mark (B) on the front camshaft pulley.



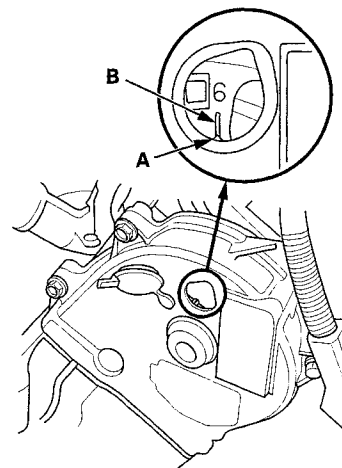
12. Check and, if necessary, adjust the valve clearance on the No. 5 cylinder.

13. 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.



14. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.

15. 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.



16. Check and, if necessary, adjust the valve clearance on the No. 6 cylinder.

17. Install the cylinder head covers (see page 6-92).

Cylinder Head

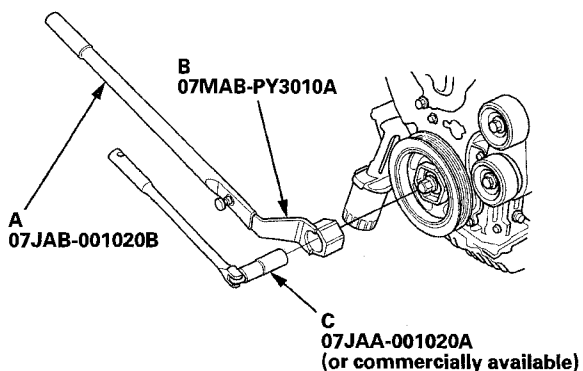
Crankshaft Pulley Removal and Installation

Special Tools Required

- Handle, 6-25-660L 07JAB-001020B
- Holder Attachment, 50 mm, Offset 07MAB-PY3010A
- Socket, 19 mm 07JAA-001020A or equivalent

Removal

1. Raise the vehicle on the lift.
2. Remove the right front wheel.
3. Remove the splash shield (see page 20-205).
4. Remove the drive belt (see page 4-44).
5. Hold the pulley with the handle, 6-25-660L (A) and the holder attachment, 50 mm offset (B).

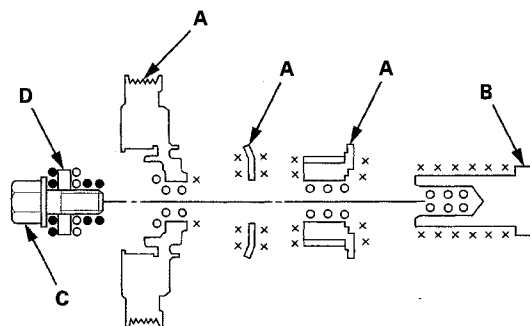


6. Remove the bolt with a heavy duty 19 mm socket (C) and a breaker bar, then remove the crankshaft pulley.

Installation

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

- × : Remove any oil
○ : Clean
● : Lubricate with new engine oil

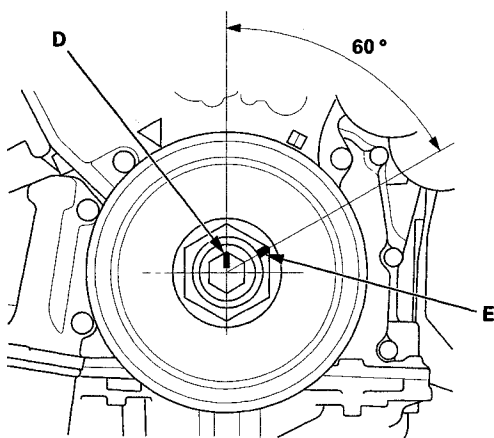
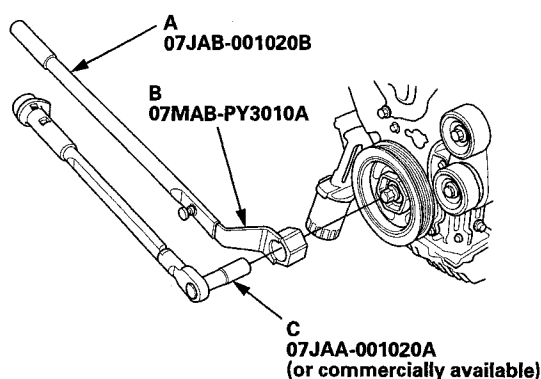




Timing Belt Inspection

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

- 1. Hold the pulley with the handle (A) and the holder attachment (B). Torque the bolt to 64 N·m (6.5 kgf·m, 47 lbf·ft) with a torque wrench and a 19 mm socket (C).
- 2. Mark the bolt head (D) and the 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).



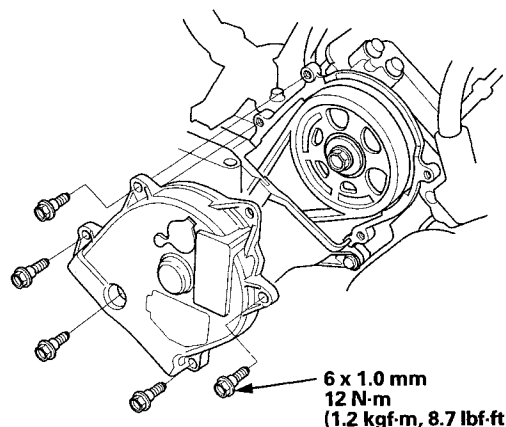
3. Install the drive belt (see page 4-44).

4. Install the splash shield (see page 20-205).

5. Install the right front wheel.

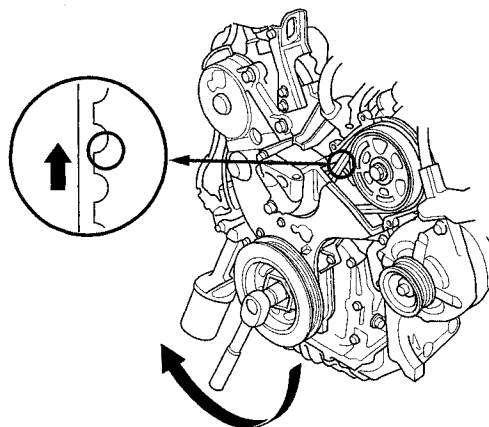
1. Remove the drive belt (see page 4-44).

2. Remove the front upper cover.



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

NOTE: If there is any leakage, repair them before replacing the timing belt.

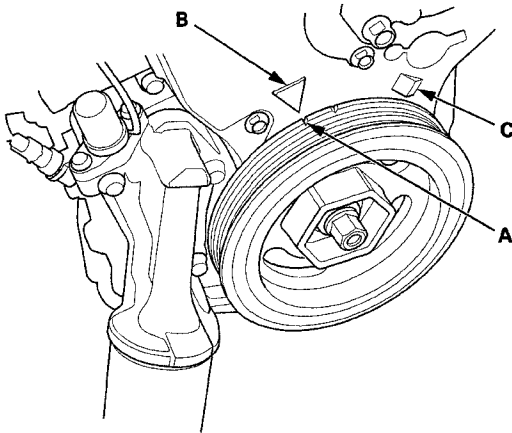


Cylinder Head

Timing Belt Removal

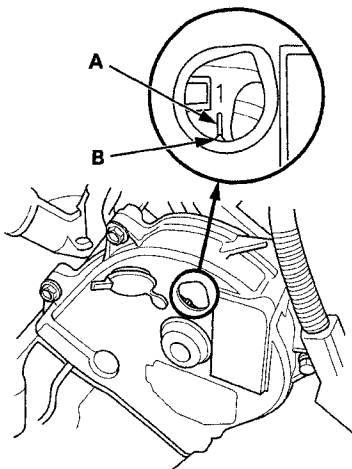
1. Remove the engine compartment covers (see page 20-186).
2. Turn the crankshaft so its white mark (A) lines up with the pointer (B).

NOTE: The other pointer (C) is not used.

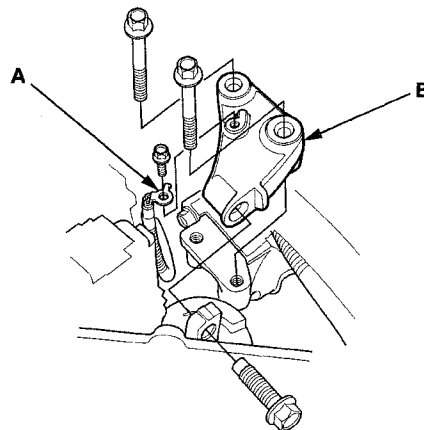


3. Check that the No. 1 piston top dead center (TDC) mark (A) on the front camshaft pulley and the pointer (B) on the front upper cover are aligned.

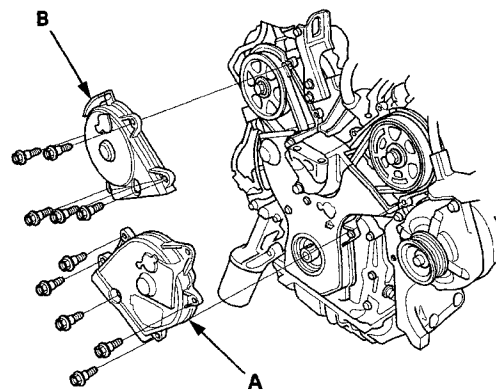
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.



4. Raise the vehicle on the lift, then remove the right front wheel.
5. Remove the splash shield (see page 20-205).
6. Remove the drive belt auto-tensioner (see page 4-46).
7. Support the engine with a jack and a wood block under the oil pan.
8. Remove the ground cable (A), then remove the upper half of the side engine mount bracket (B).

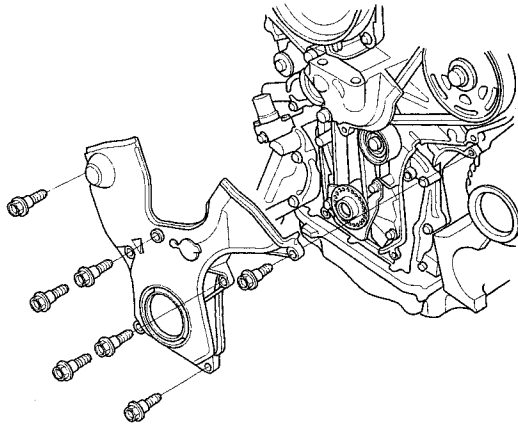


9. Remove the crankshaft pulley (see page 6-76).
10. Remove the front upper cover (A) and the rear upper cover (B).

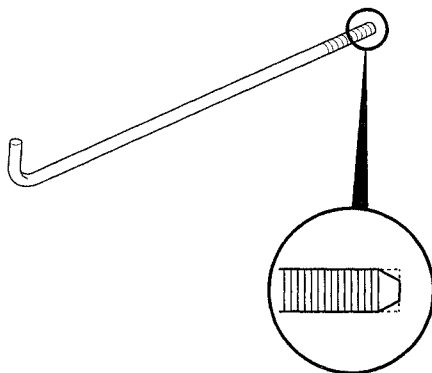




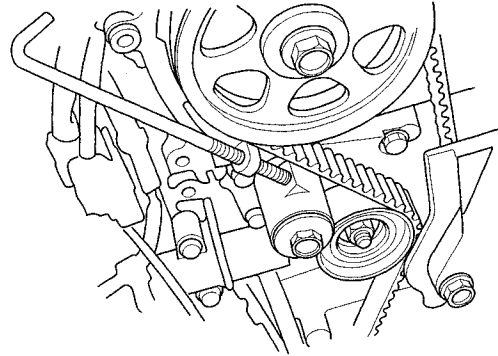
11. Remove the lower cover.



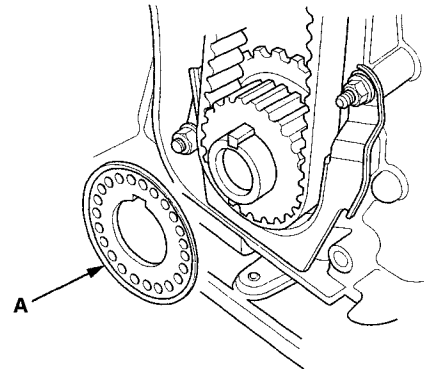
12. Remove one of the battery clamp bolts from the battery tray, and grind the end of it as shown.



13. Thread 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.



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

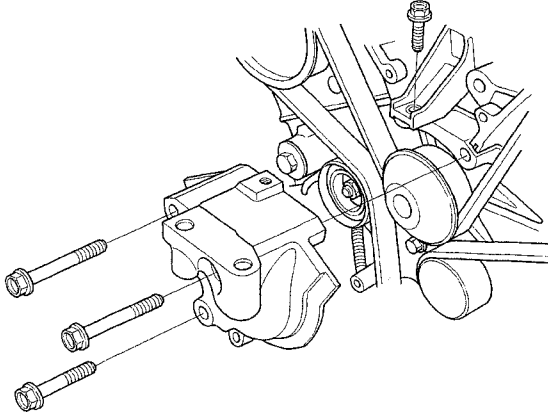


(cont'd)

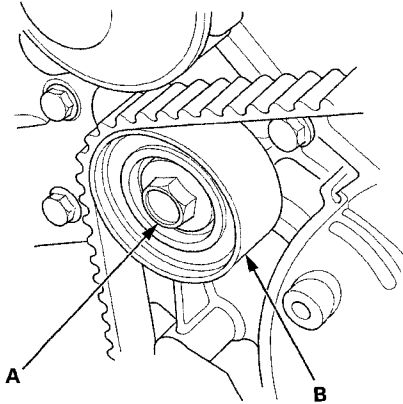
Cylinder Head

Timing Belt Removal (cont'd)

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



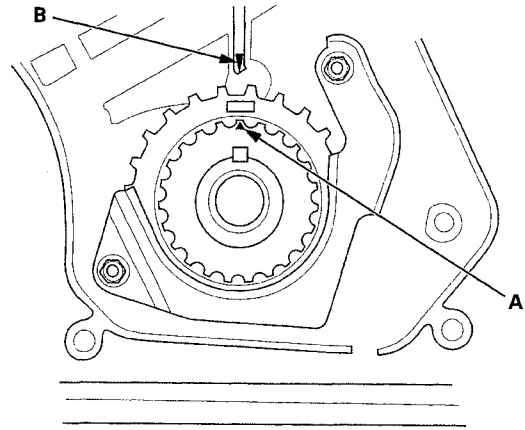
16. Remove the idler pulley bolt (A) and the idler pulley (B), then remove the timing belt. Discard the idler pulley bolt.



Timing Belt Installation

NOTE: The following procedure is for installing a used timing belt. If you are installing a new belt, refer to the timing belt replacement procedure (see page 6-84).

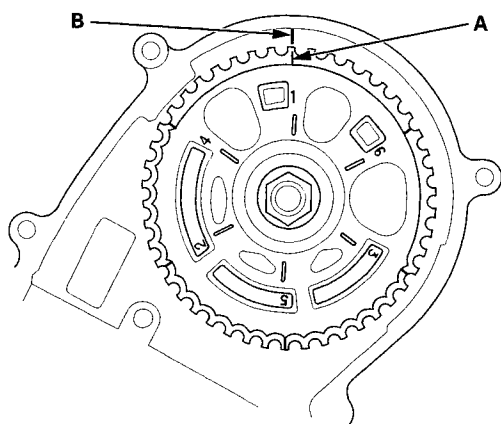
1. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
2. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with the pointer (B) on the oil pump.



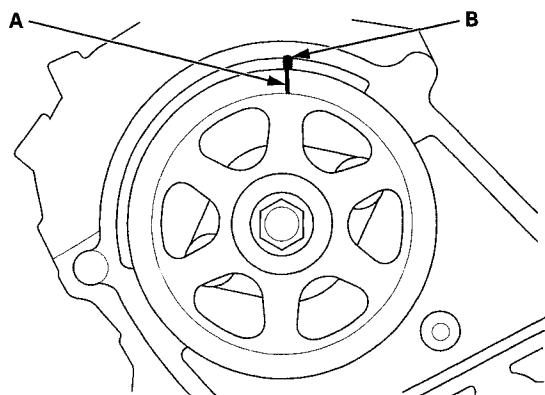


3. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

FRONT



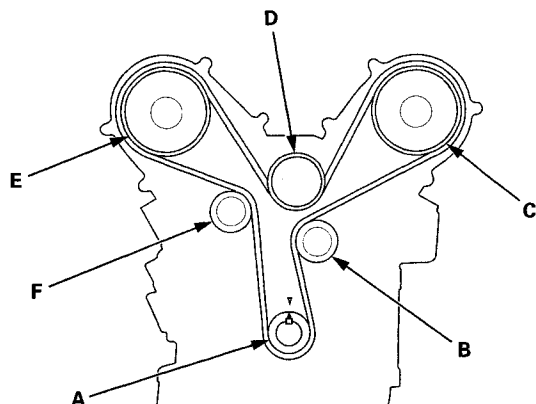
REAR



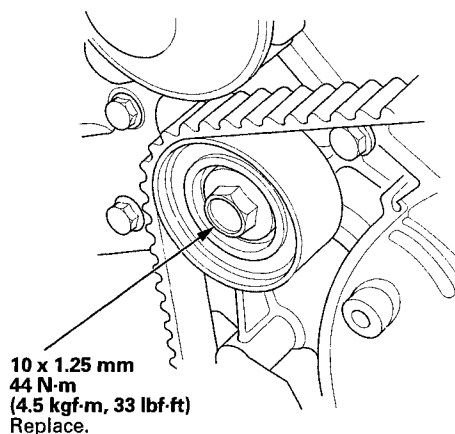
4. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.
5. If the auto-tensioner has extended and the timing belt cannot be installed, do the timing belt replacement procedure (see page 6-84).

6. Install the timing belt in a counterclockwise sequence starting with the drive pulley. Take care not to damage the timing belt during installation.

- 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)



7. Tighten the idler pulley bolt.

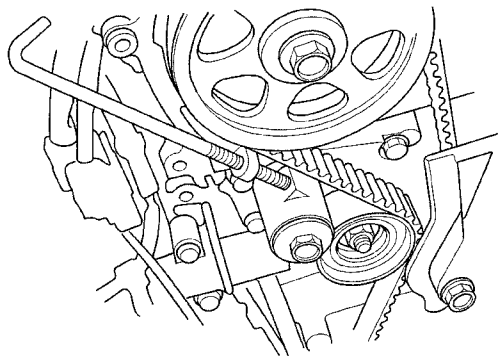


(cont'd)

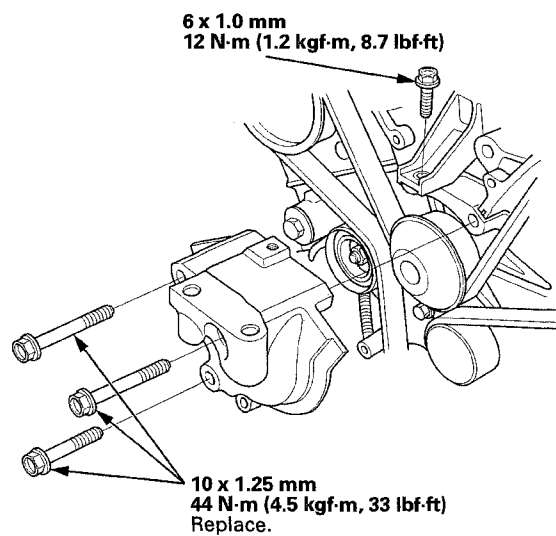
Cylinder Head

Timing Belt Installation (cont'd)

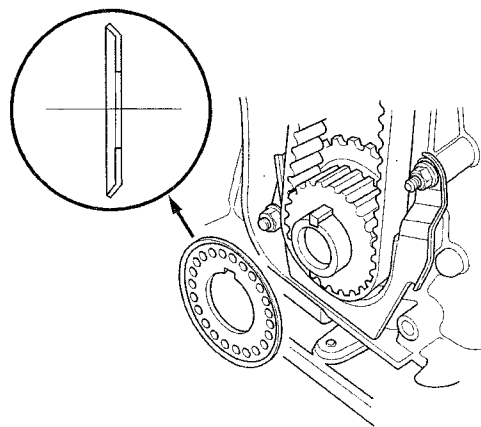
8. Remove the battery clamp bolt from the back cover.



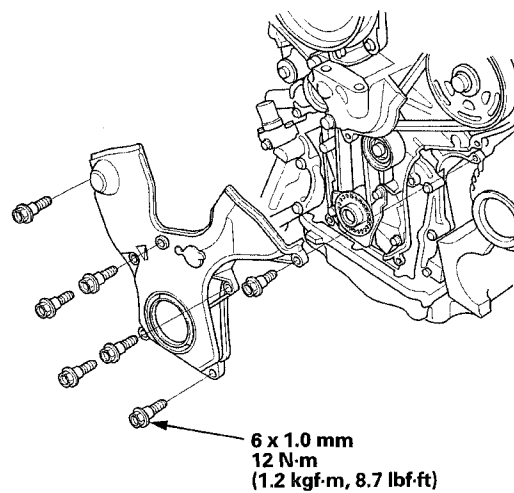
9. Install the lower half of the side engine mount bracket.



10. Install the timing belt guide plate as shown.

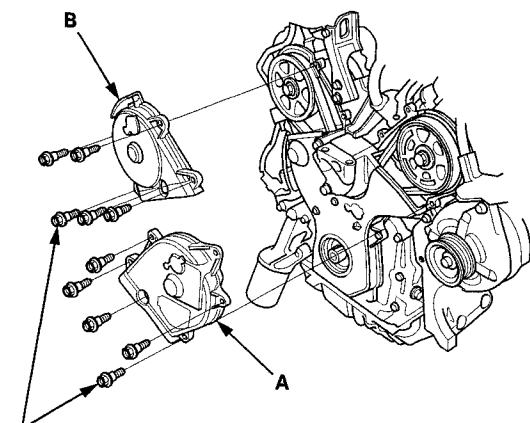


11. Install the lower cover.





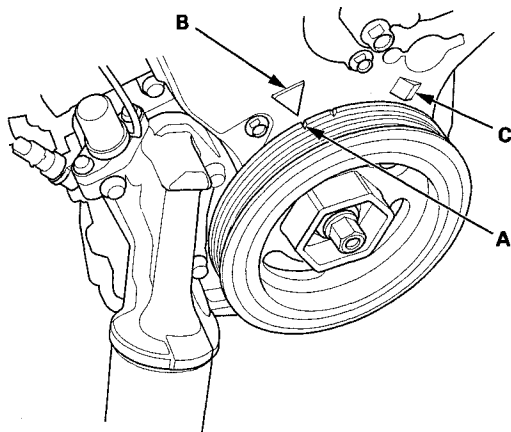
12. Install the front upper cover (A) and the rear upper cover (B).



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

13. Install the crankshaft pulley (see page 6-76).
14. Rotate the crankshaft pulley about 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).

NOTE: The other pointer (C) is not used.

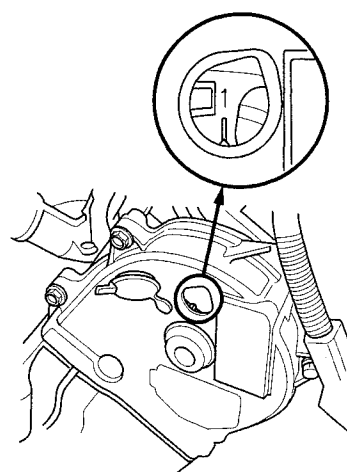


16. Check the camshaft pulley marks.

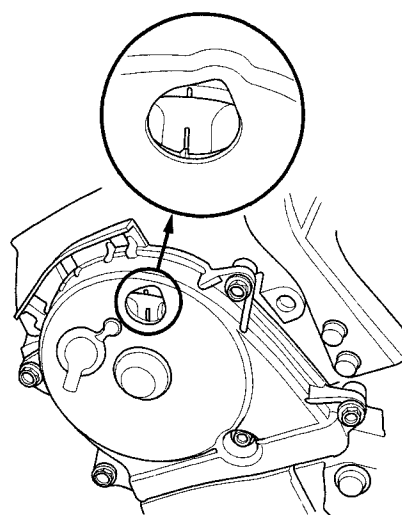
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- 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



REAR

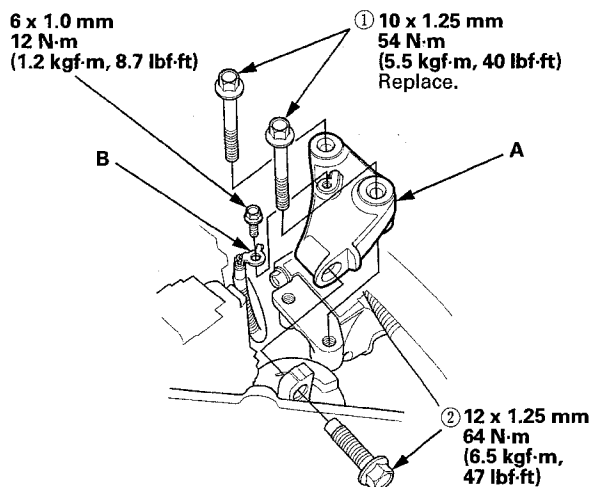


(cont'd)

Cylinder Head

Timing Belt Installation (cont'd)

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

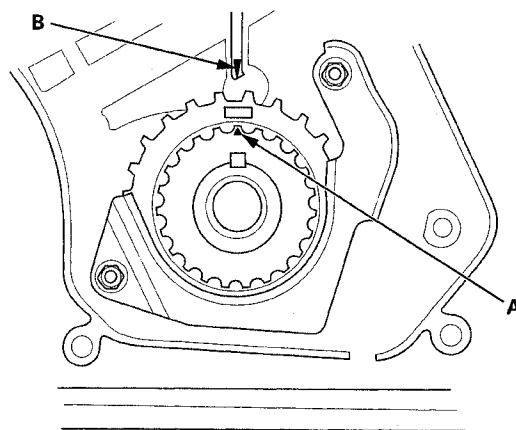


18. Install the ground cable (B).
19. Install the drive belt auto-tensioner (see page 4-46).
20. Install the splash shield (see page 20-205).
21. Install the right front wheel.
22. Install the engine compartment covers (see page 20-186).
23. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

Timing Belt Replacement

NOTE: The following procedure is for installing a new timing belt. If you are installing a used belt, refer to the timing belt installation procedure (see page 6-80).

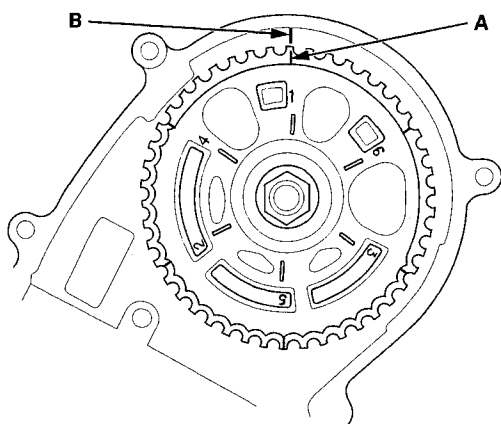
1. Remove the timing belt (see page 6-78).
2. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
3. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with the pointer (B) on the oil pump.



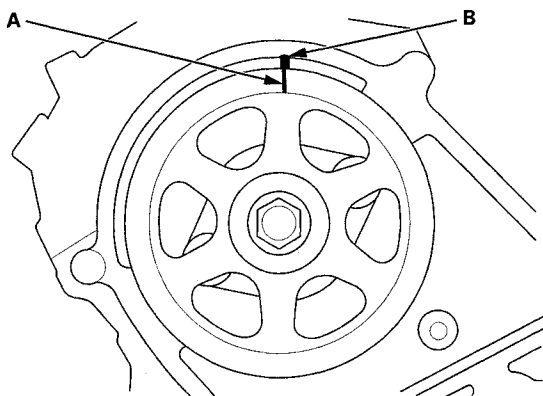


4. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

FRONT

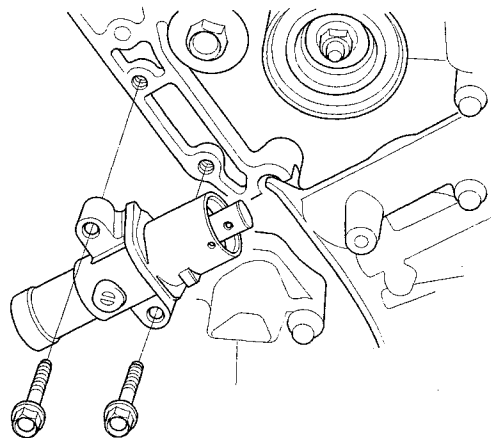


REAR

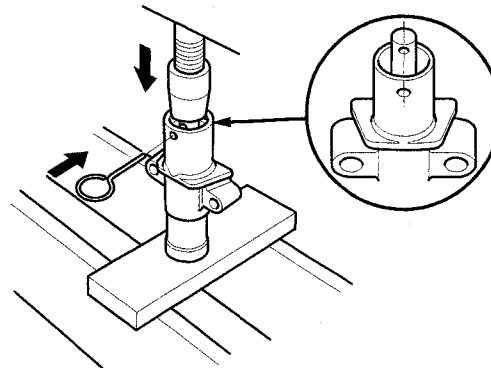


5. Remove the battery clamp bolt from the back cover.

6. Remove the auto-tensioner.



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



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).

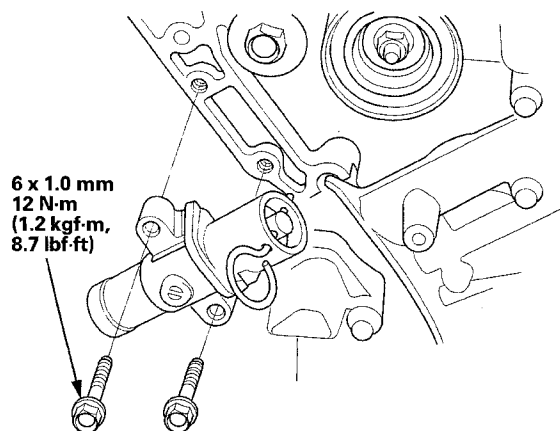
(cont'd)

Cylinder Head

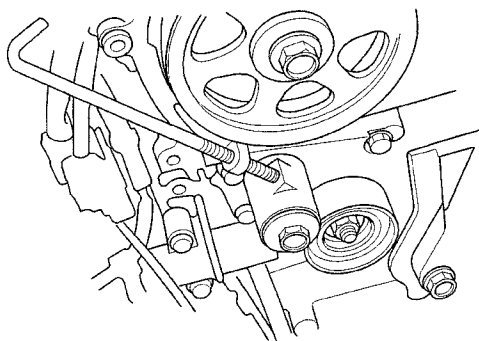
Timing Belt Replacement (cont'd)

9. Install the auto-tensioner.

NOTE: Make sure the pin stays in place.



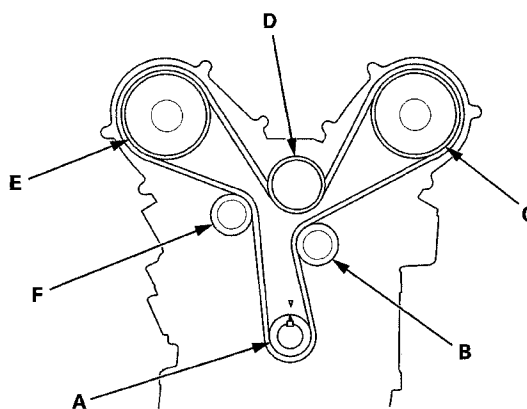
10. Thread the battery clamp bolt in as shown to hold the timing belt adjuster. Tighten it by hand, do not use a wrench.



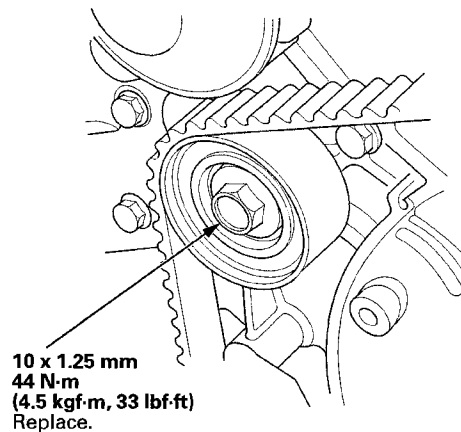
11. Loosely install the idler pulley with a new idler pulley bolt so the pulley can move but does not come off.

12. Install the timing belt in a counterclockwise sequence starting with the drive pulley.

- 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)

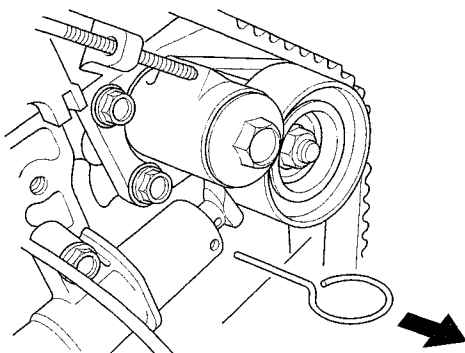


13. Tighten the idler pulley bolt.



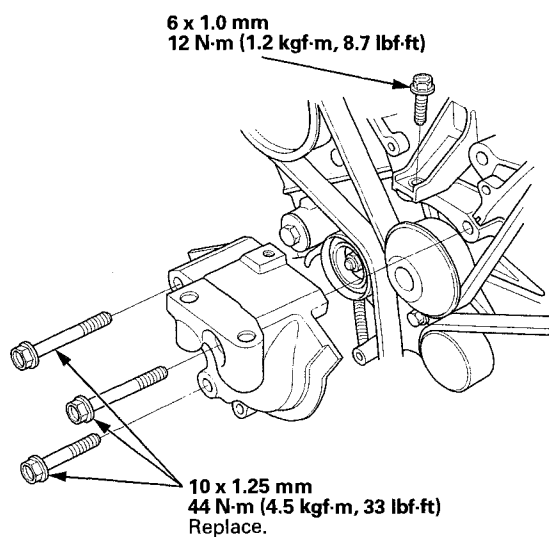


14. Remove the pin from the auto-tensioner.

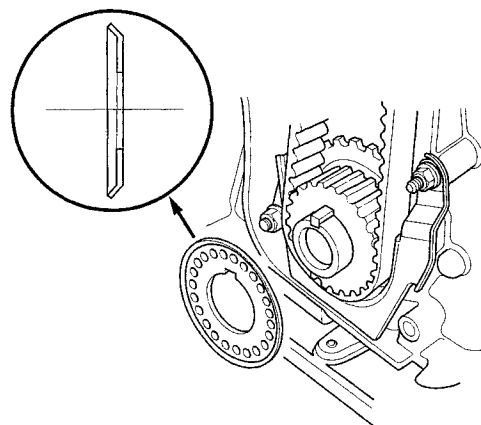


15. Remove the battery clamp bolt from the back cover.

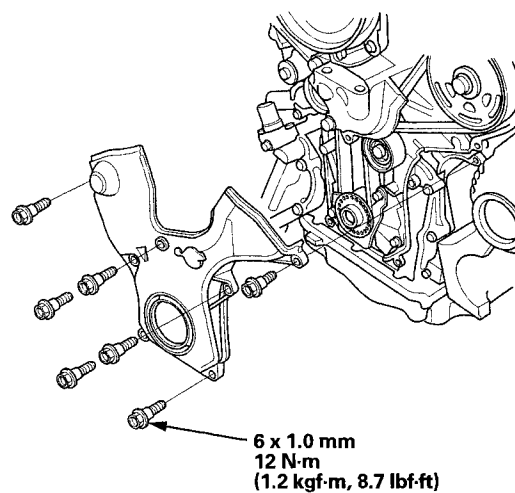
16. Install the lower half of the side engine mount bracket.



17. Install the timing belt guide plate as shown.



18. Install the lower cover.

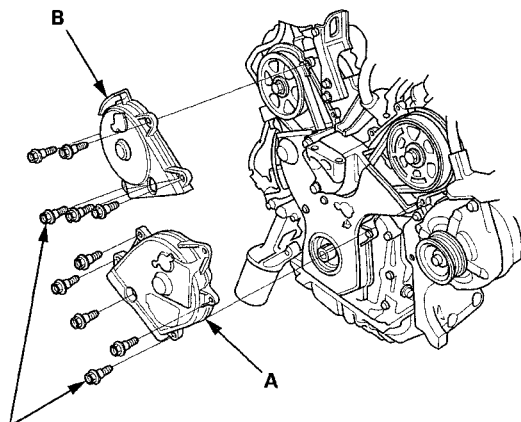


(cont'd)

Cylinder Head

Timing Belt Replacement (cont'd)

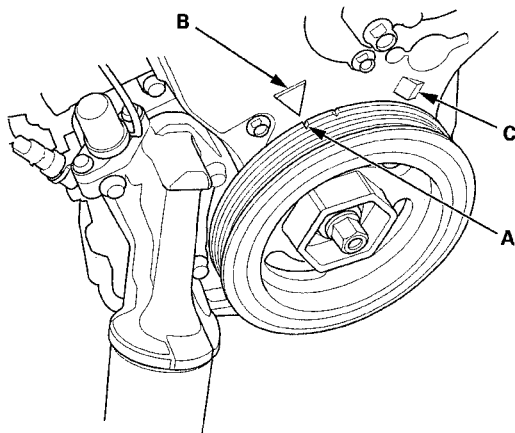
19. Install the front upper cover (A) and the rear upper cover (B).



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

20. Install the crankshaft pulley (see page 6-76).
21. Rotate the crankshaft pulley about 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).

NOTE: The other pointer (C) is not used.

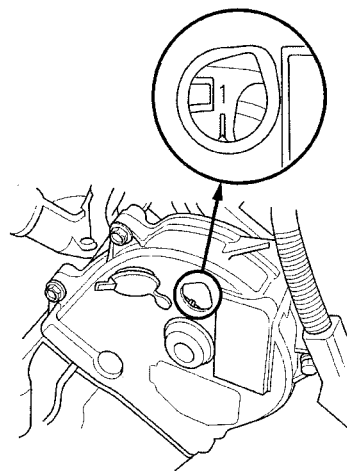


23. Check the camshaft pulley marks.

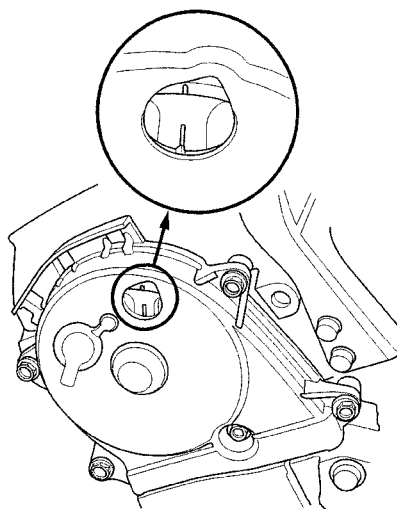
NOTE: If the marks are not aligned, rotate the crankshaft 360 degrees, and recheck the camshaft pulley mark.

- 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



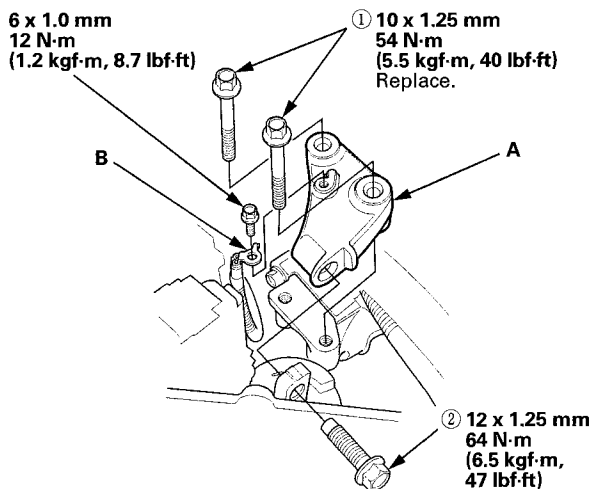
REAR





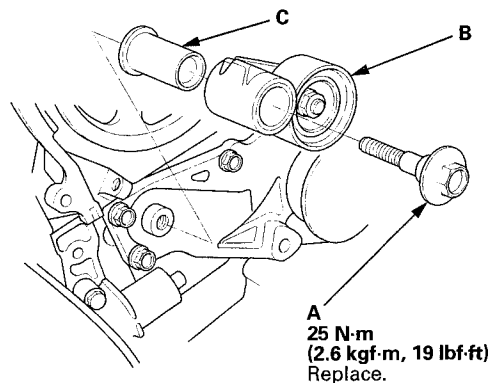
Timing Belt Adjuster Replacement

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



25. Install the ground cable (B).
26. Install the drive belt auto-tensioner (see page 4-46).
27. Install the splash shield (see page 20-205).
28. Install the right front wheel.
29. Install the engine compartment covers (see page 20-186).
30. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

1. Remove the timing belt (see page 6-78).
2. Remove the battery clamp bolt from the back cover.
3. Remove the auto-tensioner (see step 6 on page 6-85).
4. Remove the bolt (A), then remove the timing belt adjuster (B) and the collar (C).

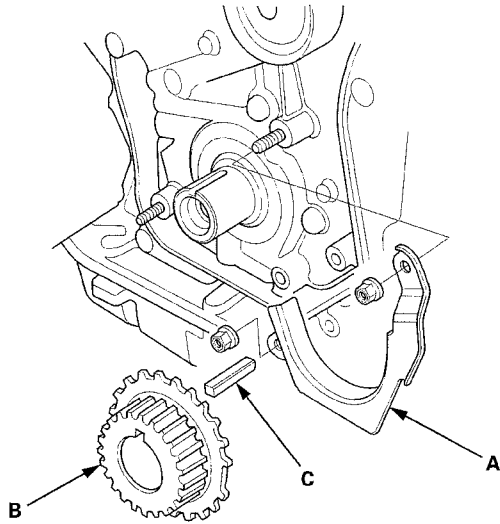


5. Install the timing belt adjuster in the reverse order of removal.
6. Install the timing belt (see page 6-80).

Cylinder Head

Timing Belt Drive Pulley Replacement

1. Remove the timing belt (see page 6-78).
2. Remove the timing belt stopper (A), then remove the timing belt drive pulley (B) and the key (C).

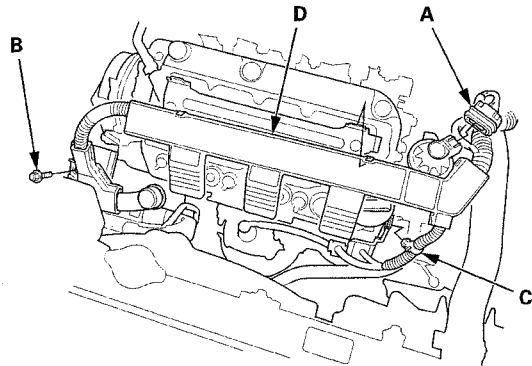


3. Inspect the timing belt drive pulley and the key for damage. If it is cracked or damaged, replace the timing belt drive pulley.
4. Install the new timing belt drive pulley and the key, then install the timing belt stopper.
5. Install the timing belt (see page 6-80).
6. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

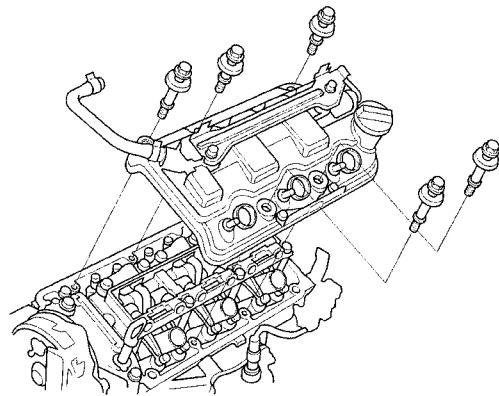
Cylinder Head Cover Removal

Front

1. Remove the intake manifold (see page 9-4).
2. Remove the three ignition coils from the front cylinder head (see page 4-33).
3. Disconnect the exhaust recirculation (EGR) valve connector (A) and remove the harness holder mounting bolt (B) and the harness clamp (C).



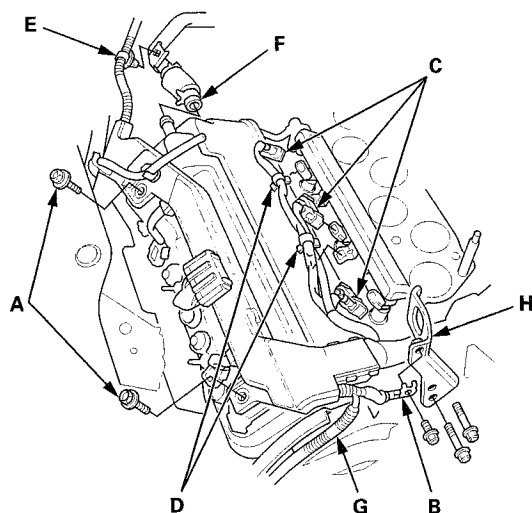
4. Remove the harness holder (D) from the bracket.
5. Remove the front cylinder head cover.





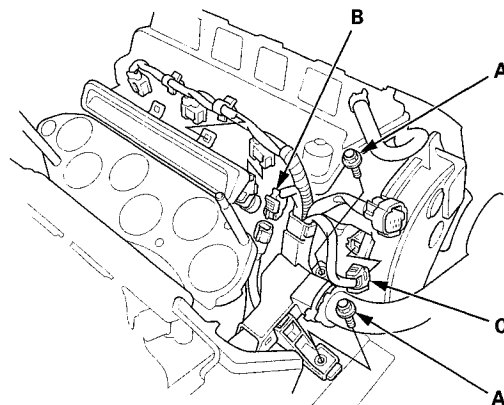
Rear

1. Remove the strut brace (see page 20-210).
2. Remove the intake manifold (see page 9-4).
3. Remove the three ignition coils from the rear cylinder head (see page 4-33).
4. Remove the harness holder mounting bolts (A) and the engine ground cable (B).

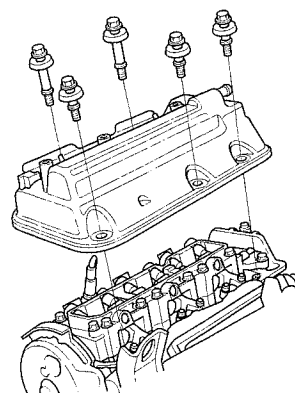


5. Disconnect the three injector connectors (C) and the two harness clamps (D).
6. Remove the harness clamp (E) and disconnect the breather hose (F).
7. Remove the harness (G) from the upper cover.
8. Remove the engine hanger bracket (H).

9. Remove the harness holder mounting bolts (A) and disconnect the knock sensor connector (B) and the camshaft position (CMP) sensor connector (C).



10. Remove the rear cylinder head cover.

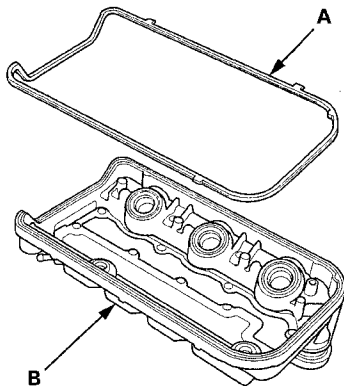


Cylinder Head

Cylinder Head Cover Installation

Front

1. Check the spark plug seals for damage. If any seal is damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove.
3. Install the head cover gasket (A) in the groove of the cylinder head cover (B). Make sure the head cover gasket is seated securely.

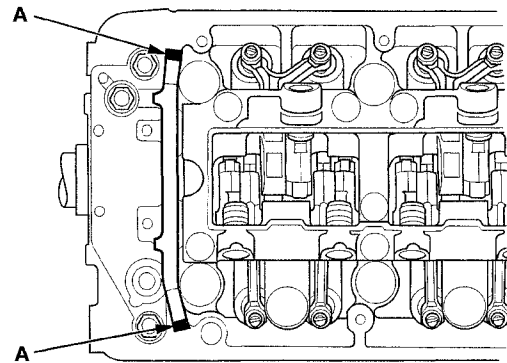


4. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.

6. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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

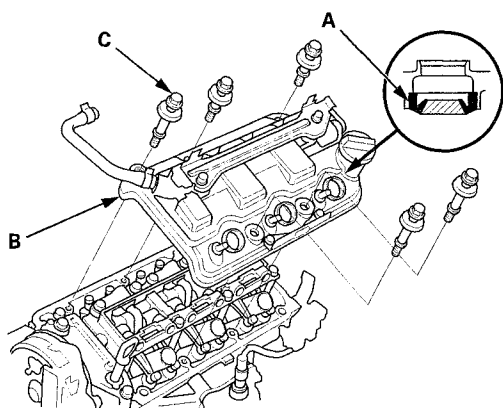




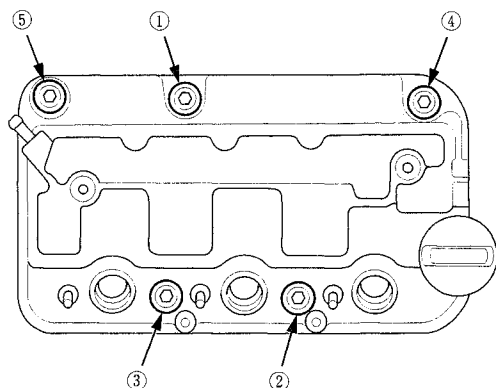
7. Set the spark plug seals (A) on the spark plug tubes, and install the front cylinder head cover (B).

NOTE:

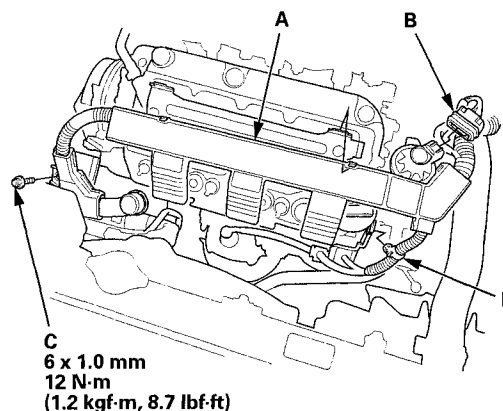
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the cylinder head cover.



8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N·m (1.2 kgf-m, 8.7 lbf-ft).



11. Install the harness holder (A) to the bracket.



12. Connect the exhaust gas recirculation (EGR) valve connector (B) and install the harness holder mounting bolt (C) and the harness clamp (D).
13. Install the three ignition coils to the front cylinder head (see page 4-33).
14. Install the intake manifold (see page 9-5).

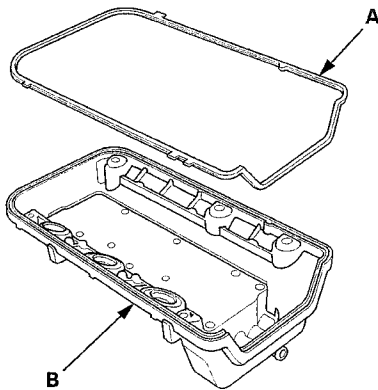
(cont'd)

Cylinder Head

Cylinder Head Cover Installation (cont'd)

Rear

1. Check the spark plug seals for damage. If any seal is damaged, replace it.
2. Thoroughly clean the head cover gasket and the groove.
3. Install the head cover gasket (A) in the groove of the cylinder head cover (B). Make sure the head cover gasket is seated securely.

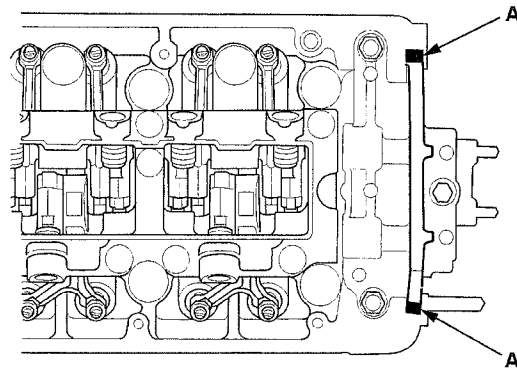


4. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
5. Clean the head cover contacting surfaces with a shop towel.

6. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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

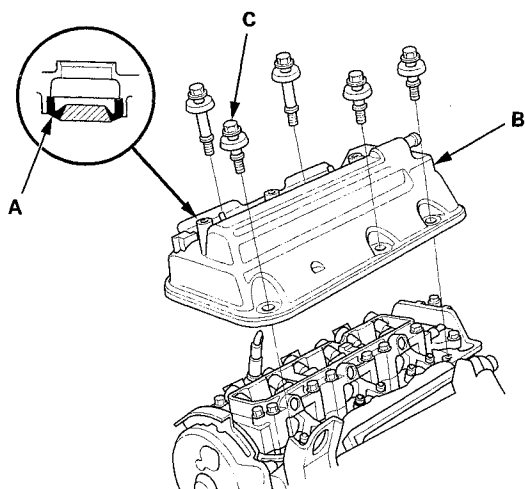




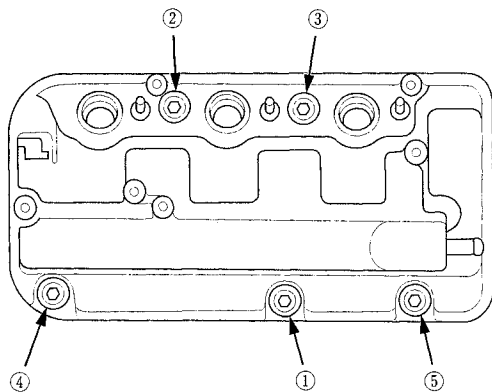
7. Set the spark plug seals (A) on the spark plug tubes, and install the rear cylinder head cover (B).

NOTE:

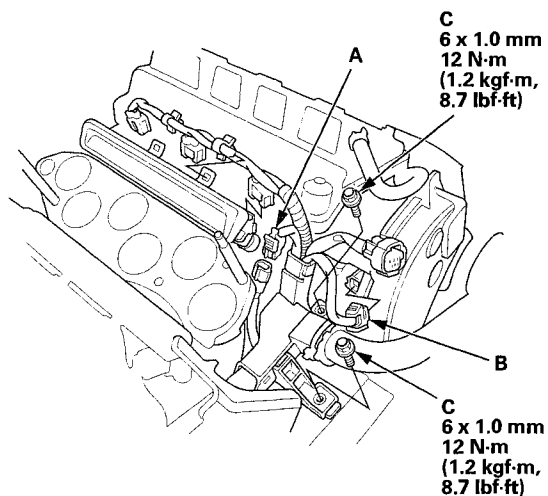
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the cylinder head cover.



8. Inspect the spark plug seals for damage.
9. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
10. Tighten the bolts in three steps. In the final step torque all bolts, in sequence, 12 N·m (1.2 kgf·m, 8.7 lbf·ft).



11. Connect the knock sensor connector (A) and the camshaft position (CMP) sensor connector (B) and install the harness holder mounting bolts (C).

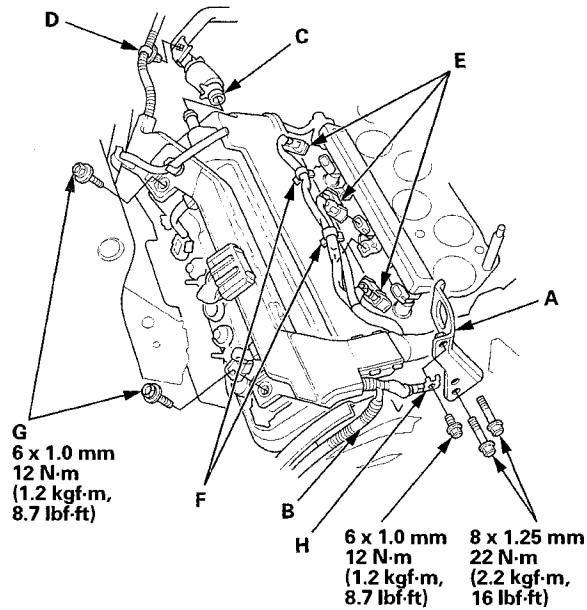


(cont'd)

Cylinder Head

Cylinder Head Cover Installation (cont'd)

12. Install the engine hanger bracket (A).



13. Install the harness (B) to the upper cover.

14. Connect the breather hose (C) and install the harness clamp (D).

15. Reconnect the three injector connectors (E) and the two harness clamps (F).

16. Install the harness holder mounting bolts (G) and engine ground cable (H).

17. Install the three ignition coils to the rear cylinder head (see page 4-33).

18. Install the intake manifold (see page 9-5).

19. Install the strut brace (see page 20-210).

Cylinder Head Removal

NOTE:

- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wiring and terminals, unplug the wiring connectors carefully while holding the connector portion.
- Connect the Honda Diagnostic System (HDS) to the data link connector (DLC), and monitor the engine coolant temperature (ECT) sensor 1. To avoid damaging the cylinder head, wait until the ECT sensor 1 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 any other wiring or hoses, or interfere with any other parts.

1. Remove the engine compartment covers (see page 20-186).

2. Relieve the fuel pressure (see page 11-366).

3. Do the battery terminal disconnection procedure (see page 22-86).

4. Drain the engine coolant (see page 10-6).

5. Remove the alternator (see page 4-47).

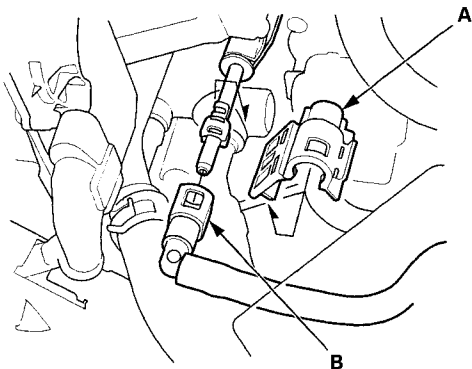
6. Remove the intake manifold (see page 9-4).

7. Remove the six ignition coils (see page 4-33).

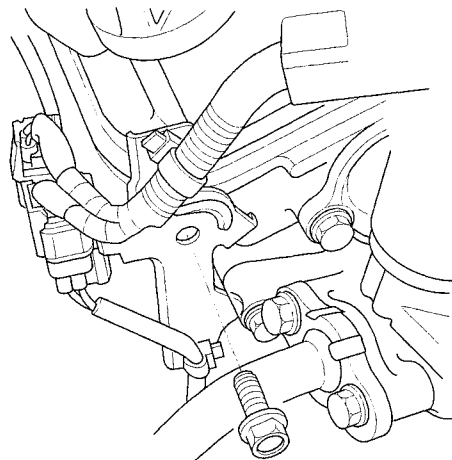
8. Remove the timing belt (see page 6-78).



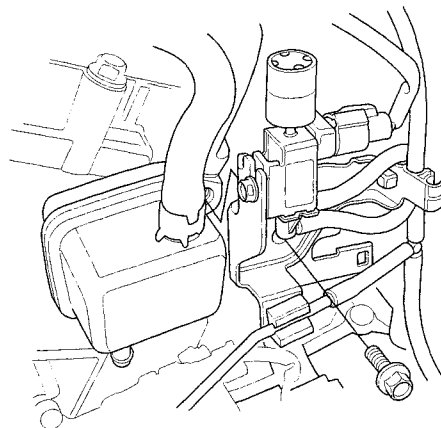
9. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the cylinder head:
- Six injector connectors
 - Knock sensor connector
 - Engine coolant temperature (ECT) sensor 1 connector
 - Engine mount control solenoid valve connector
 - Camshaft position (CMP) sensor connector
 - Rocker arm oil control solenoid connector
 - Rocker arm oil pressure switch connector
 - Two air fuel ratio (A/F) sensor connectors
 - Two secondary heated oxygen sensor (secondary HO2S) connectors
10. Remove the front warm up three way catalytic converter (front WU-TWC) (see page 11-429) and the rear warm up three way catalytic converter (rear WU-TWC) (see page 11-430).
11. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-379).



12. Remove the connector bracket from the front cylinder head.



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



14. Remove the evaporative emission (EVAP) canister joint with the bracket (see step 9 on page 6-100).
15. Remove the injector bases (see page 9-7).
16. Remove the water passage (see page 10-9).

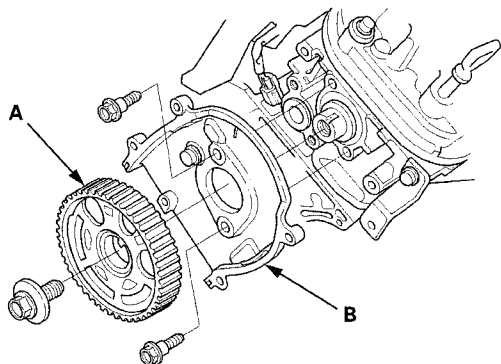
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Cylinder Head

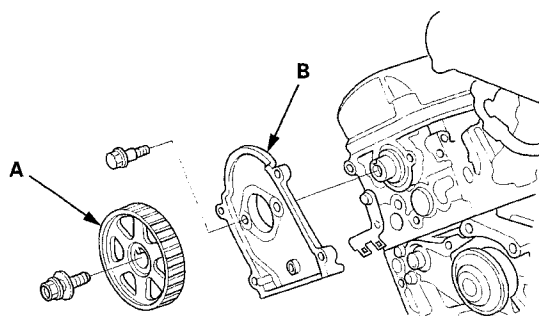
Cylinder Head Removal (cont'd)

17. Remove the camshaft pulleys (A) and the back covers (B).

FRONT



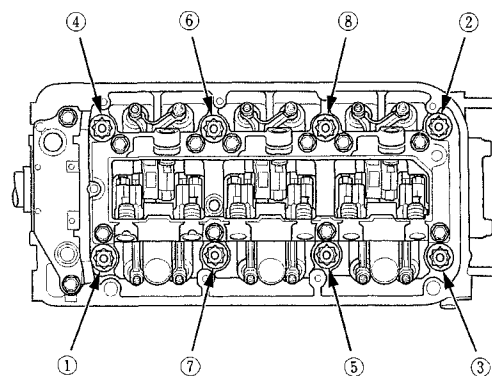
REAR



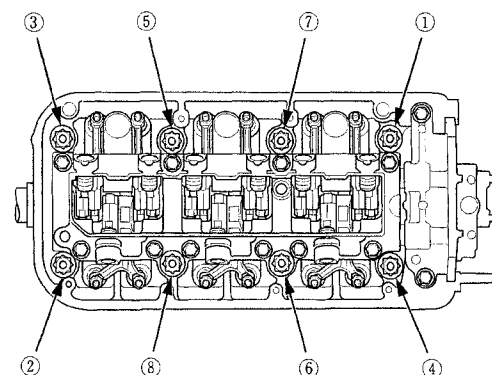
18. Remove the cylinder head covers (see page 6-90).

19. Remove the cylinder head bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.

FRONT



REAR



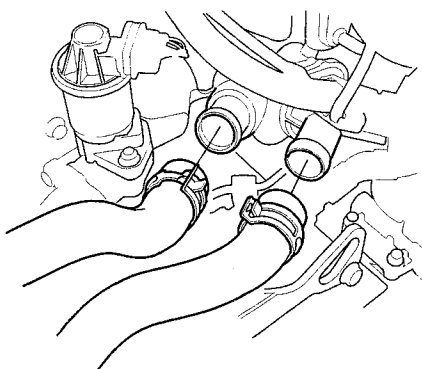
20. Remove the cylinder heads.



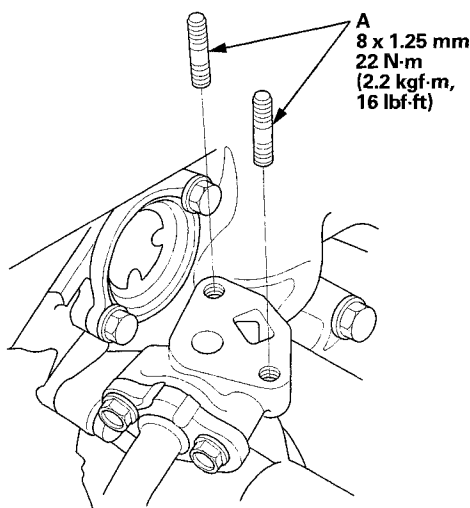
Camshaft Replacement

Front

1. Remove the engine compartment covers (see page 20-186).
2. Do the battery removal procedure (see page 22-87).
3. Drain the engine coolant (see page 10-6).
4. Disconnect the radiator hoses.

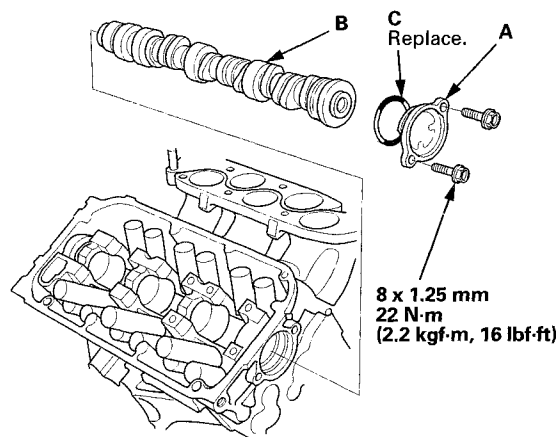


5. Remove the exhaust gas recirculation (EGR) valve (see page 11-444).
6. Remove the EGR valve stud bolts (A).



7. Remove the timing belt (see page 6-78).
8. Remove the front rocker arm assembly (see page 6-102).
9. Remove the front camshaft pulley.

10. Remove the thrust cover (A), then remove the front camshaft (B).



11. 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 the cam lobes.
12. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the front camshaft pulley (see step 14 on page 6-117).
13. Install the front rocker arm assembly, then tighten the mounting bolts (see step 12 on page 6-117).
14. Install the timing belt (see page 6-80).
15. Adjust the valve clearance (see page 6-72).
16. Install the EGR valve stud bolts, then install the EGR valve (see page 11-444).
17. Connect the radiator hoses.
18. Do the battery installation procedure (see page 22-87).
19. Fill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).
20. Install the engine compartment covers (see page 20-186).
21. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

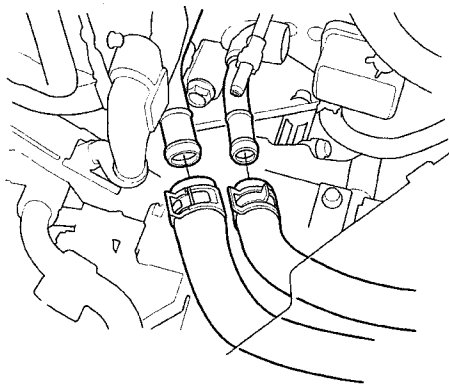
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Cylinder Head

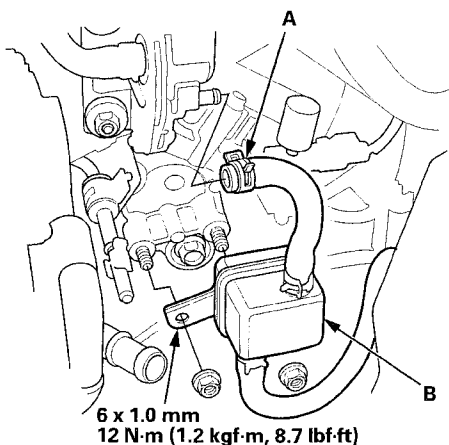
Camshaft Replacement (cont'd)

Rear

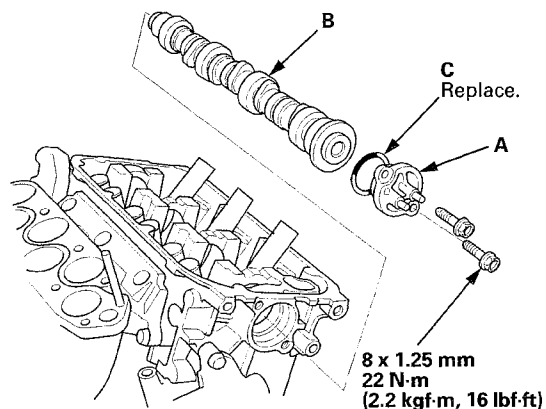
1. Remove the engine compartment covers (see page 20-186).
2. Relieve the fuel pressure (see page 11-366).
3. Do the battery removal procedure (see page 22-87).
4. Drain the engine coolant (see page 10-6).
5. Remove the under-hood fuse/relay box from the bracket.
6. Remove the air cleaner assembly (see page 11-421).
7. Remove the quick-connect fitting cover, then disconnect the fuel feed hose (see step 11 on page 6-97).
8. Disconnect the heater hoses.



9. Disconnect the evaporative emission (EVAP) canister hose (A), then remove the EVAP canister joint (B) with the bracket.



10. Remove the timing belt (see page 6-78).
11. Remove the rear rocker arm assembly (see page 6-102).
12. Remove the rear camshaft pulley.
13. Remove the thrust cover (A), then remove the rear camshaft (B).



14. 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.
15. Apply new engine oil to the threads of the camshaft pulley mounting bolt, then install the rear camshaft pulley (see step 14 on page 6-119).
16. Install the rear rocker arm assembly, then tighten the mounting bolts (see step 12 on page 6-119).
17. Install the timing belt (see page 6-80).
18. Adjust the valve clearance (see page 6-72).
19. Install the EVAP canister joint with the bracket, then connect the EVAP canister hose.
20. Connect the heater hoses.
21. Connect the fuel feed hose, then install the quick-connect fitting cover (see step 21 on page 6-123).
22. Install the air cleaner assembly (see page 11-421).



23. Install the under-hood fuse/relay box to the bracket.
24. Do the battery installation procedure (see page 22-87).
25. Inspect for fuel leaks. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
26. Fill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).
27. Install the engine compartment covers (see page 20-186).
28. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

Cylinder Head Inspection for Warpage

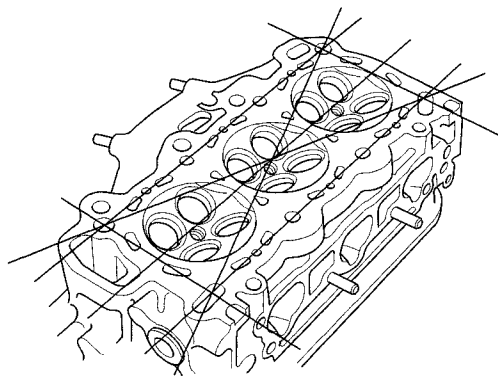
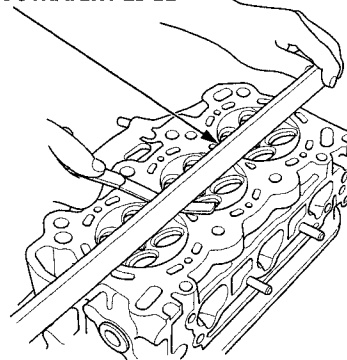
1. Remove the cylinder head (see page 6-96).
2. Inspect the camshaft (see page 6-106).
3. Check the cylinder head for warpage. Measure along the edges, and three ways across the center.
 - If warpage is less than 0.05 mm (0.002 in), cylinder head resurfacing is not required.
 - If warpage is between 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)

Service Limit: 120.8 mm (4.76 in)

PRECISION STRAIGHT EDGE

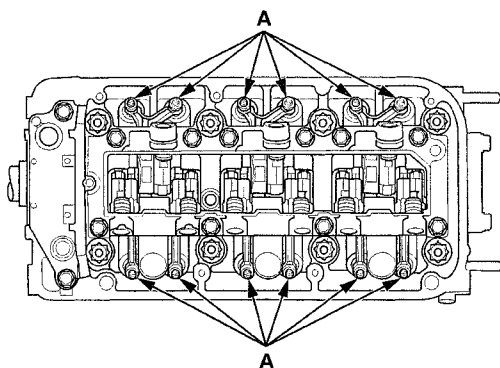


Cylinder Head

Rocker Arm Assembly Removal

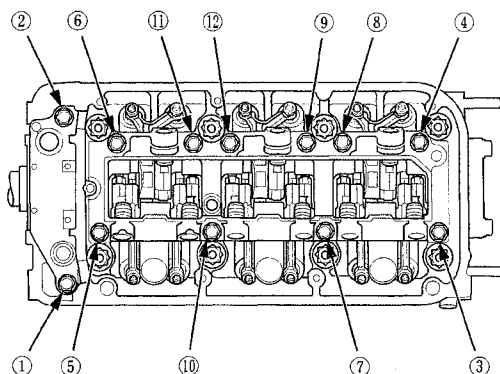
Front

1. Remove the cylinder head cover (see page 6-90).
2. Loosen the locknuts and the adjusting screws (A).



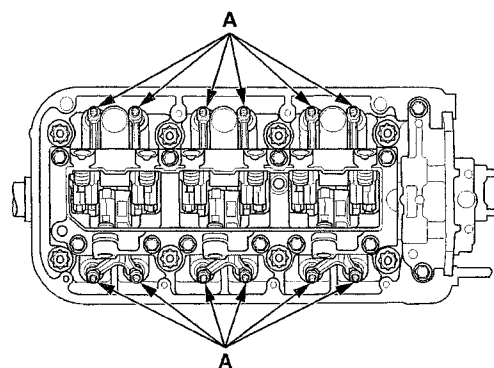
3. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.

- 1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
- 2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the rocker arms on the shafts.



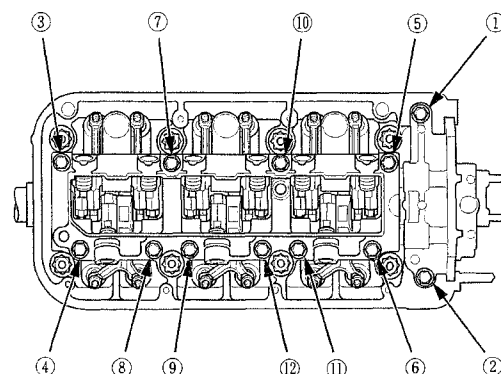
Rear

4. Remove the cylinder head cover (see page 6-90).
5. Loosen the locknuts and the adjusting screws (A).



6. Remove the rocker shaft bridge mounting bolts, the rocker shaft holder mounting bolts, and the rocker arm assembly.

- 1. Loosen the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts in sequence two turns at a time, to prevent damaging the valves or the rocker arm assembly.
- 2. When removing the rocker arm assembly, do not remove the rocker shaft bridge mounting bolts and the rocker shaft holder mounting bolts. The bolts will keep the rocker arms on the shafts.



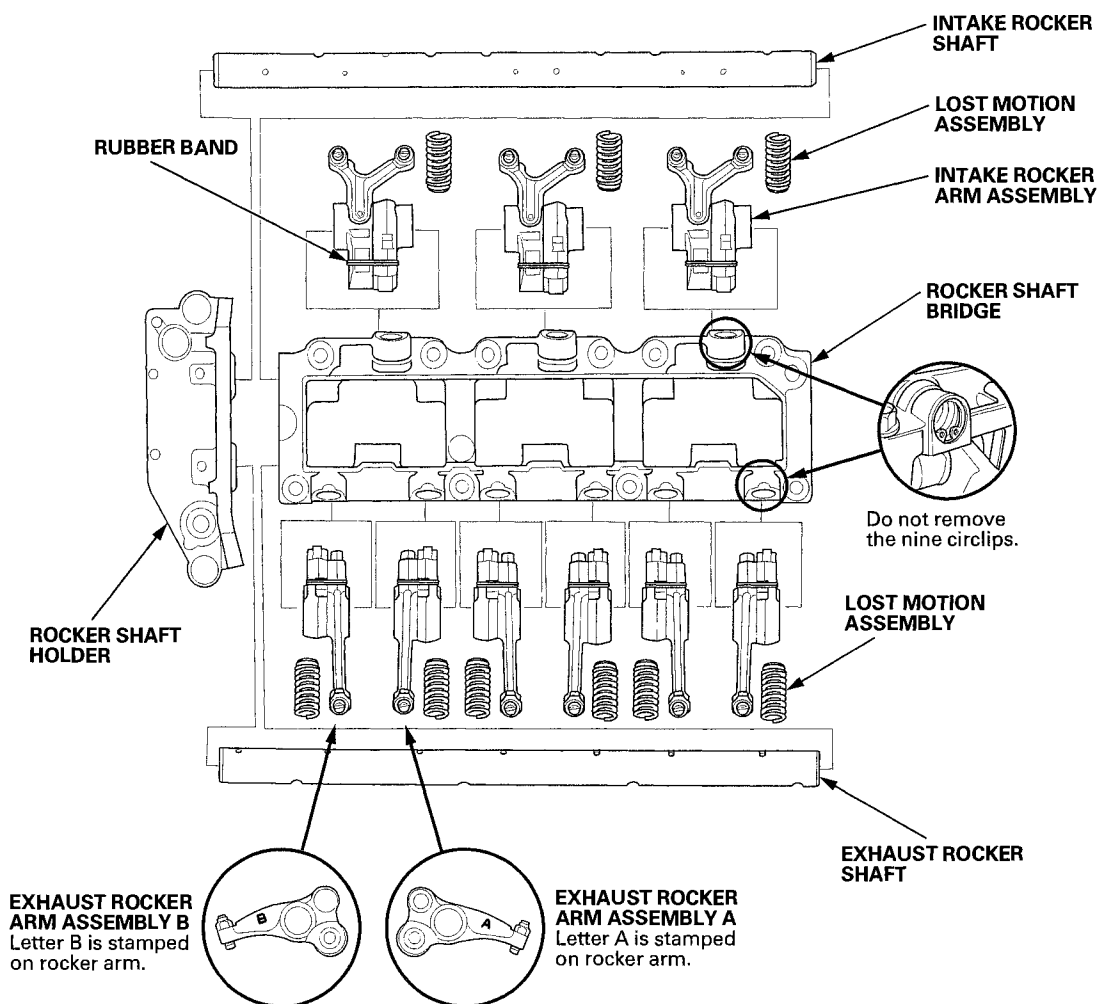


Rocker Arm and Shaft Disassembly/Reassembly

Front

NOTE:

- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see page 6-105).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft cannot be removed or installed by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points and bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.



(cont'd)

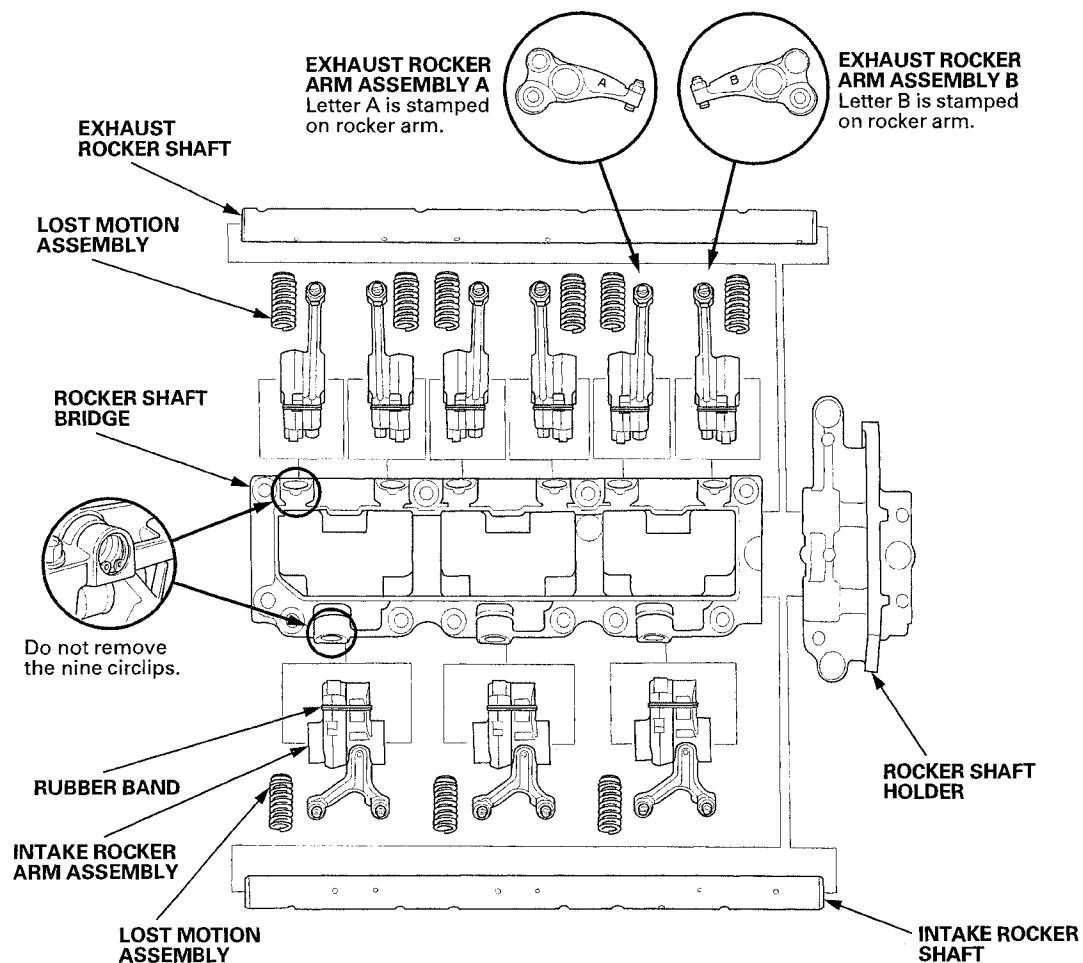
Cylinder Head

Rocker Arm and Shaft Disassembly/Reassembly (cont'd)

Rear

NOTE:

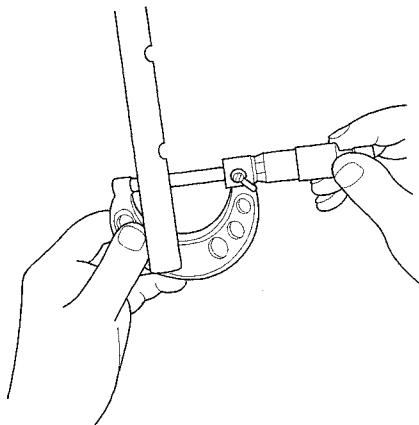
- Identify parts as they are removed so they can be reinstalled in their original locations.
- Inspect the rocker shafts and the rocker arms (see page 6-105).
- If reused, the rocker arms must be installed in their original locations.
- When removing or installing the rocker arm assembly, do not remove the mounting bolts. The bolts will keep the rocker arms, the rocker shaft bridge, and the rocker shaft holder on the shaft.
- If the rocker shaft cannot be removed or installed by hand, remove or install the rocker shaft by heating the rocker shaft bridge.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to all contact points and bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from the new rocker arm assembly.
- Never remove any of the circlips that retain the lost motion assemblies in the rocker shaft bridge. The circlips are not available separately, and are factory installed in the rocker shaft bridge. To remove the lost motion assemblies, first remove the rocker shafts and the rocker arms.



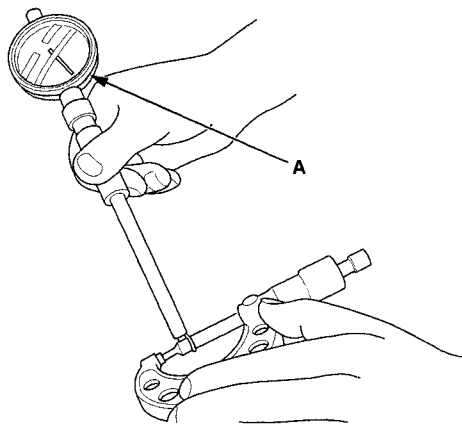


Rocker Arm and Shaft Inspection

1. Remove the rocker arm assembly (see page 6-102).
2. Disassemble the rocker arm assembly (see page 6-103).
3. Measure the diameter of the shaft at the first rocker location.



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



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

Intake Rocker Arm-to-Shaft Clearance:

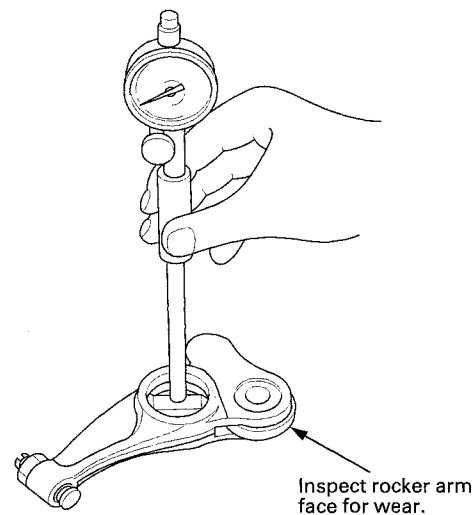
Standard (New): 0.015—0.046 mm (0.0006—0.0018 in)

Service Limit: 0.046 mm (0.0018 in)

Exhaust Rocker Arm-to-Shaft Clearance:

Standard (New): 0.015—0.046 mm (0.0006—0.0018 in)

Service Limit: 0.046 mm (0.0018 in)



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 VTEC rocker arm needs replacement, replace all rocker arms in that set (primary and secondary).

(cont'd)

Cylinder Head

Rocker Arm and Shaft Inspection (cont'd)

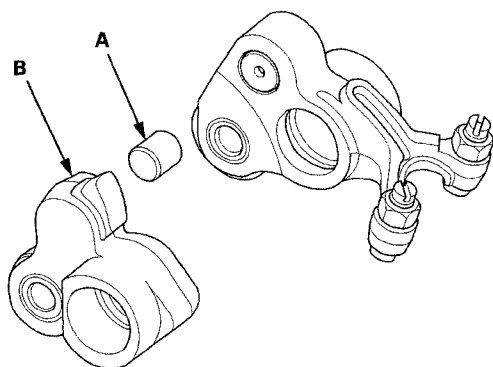
VTEC Rocker Arms

7. Inspect the rocker arm piston (A). Slide them into the rocker arms. If they do not move smoothly, replace the rocker arm set.

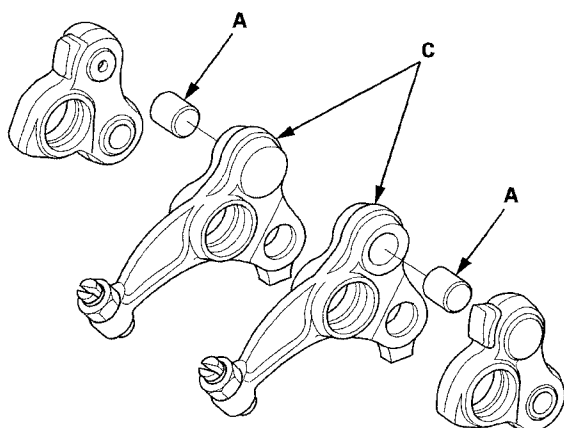
NOTE:

- Apply new engine oil to the rocker arm piston when reassembling.
- When removing the rocker arm piston from the intake secondary (B), and or the exhaust primary rocker arm (C), carefully apply air pressure to the oil passage of the rocker arm.

INTAKE



EXHAUST



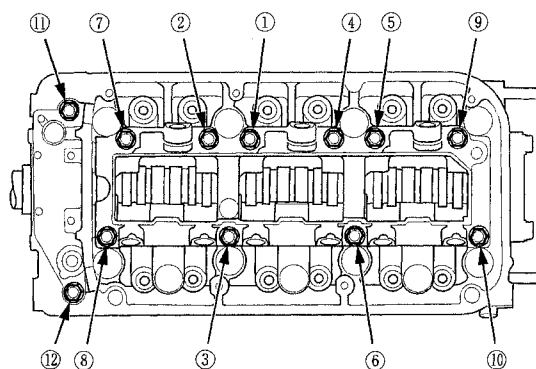
8. Reassemble the rocker arm assembly (see page 6-103).
9. Install the rocker arm assembly (see page 6-116).

Camshaft Inspection

1. Remove the cylinder head (see page 6-96).
2. Remove the rocker arm assembly (see page 6-102).
3. Disassemble the rocker arm assembly (see page 6-103).
4. Front: Put the rocker shafts bridge and the rocker shaft holder on the front cylinder head, then tighten the bolts to the specified torque.

Specified Torque

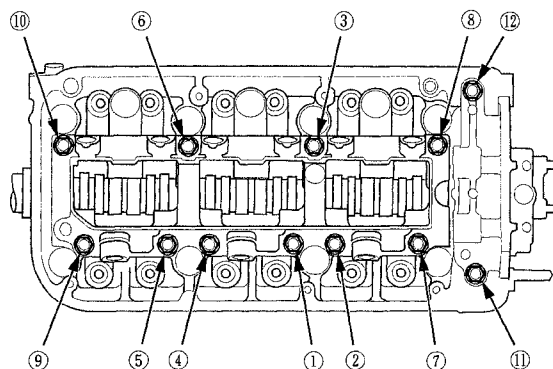
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



5. Rear: Put the rocker shaft bridge and the rocker shaft holder on the rear cylinder head, then tighten the bolts to the specified torque.

Specified Torque

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



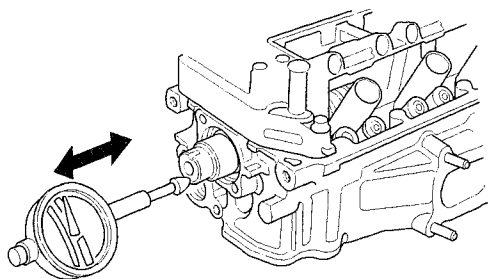


6. Seat the camshaft by pushing it toward the rear of the cylinder head.
7. Zero the dial indicator against the end of the camshaft. Push the camshaft back and forth and read the end play. If the end play is beyond the service limit, replace the thrust cover and recheck. If it is still beyond the service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

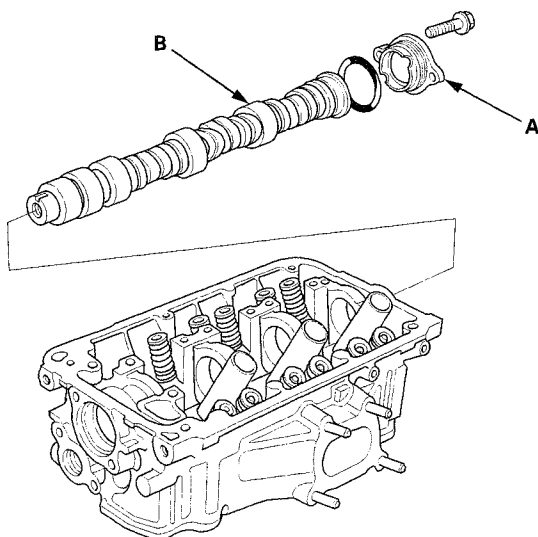
Camshaft End Play

Standard (New): 0.05–0.20 mm (0.002–0.008 in)

Service Limit: 0.20 mm (0.008 in)

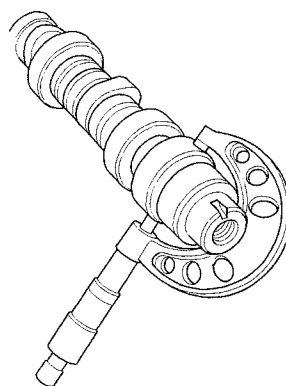


8. Remove the camshaft thrust cover (A), then pull out the camshaft (B).

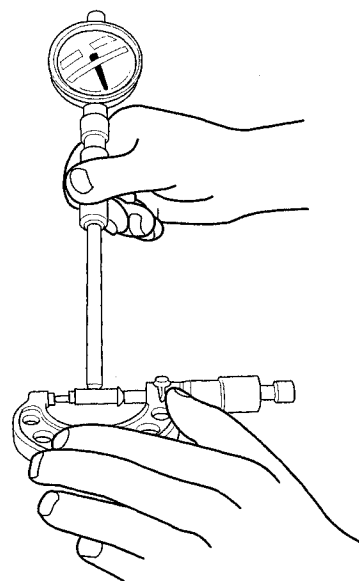


9. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.

10. Measure the diameter of each camshaft journal.



11. Zero the gauge to the journal diameter.



(cont'd)

Cylinder Head

Camshaft Inspection (cont'd)

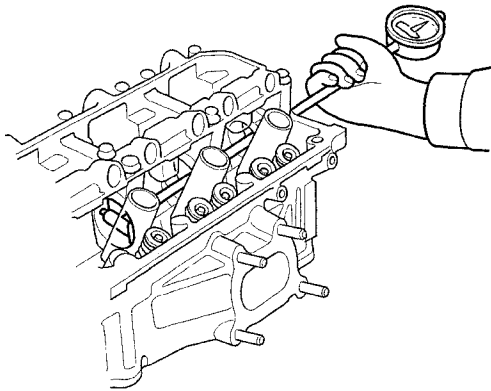
12. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round condition.

- If the camshaft-to-holder clearance is within limits, go to step 14.
- 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 13.

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)



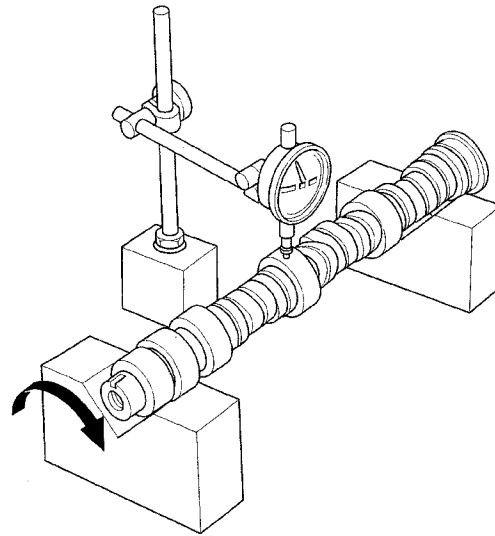
13. Check total runout with the camshaft supported on V-blocks.

- 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)



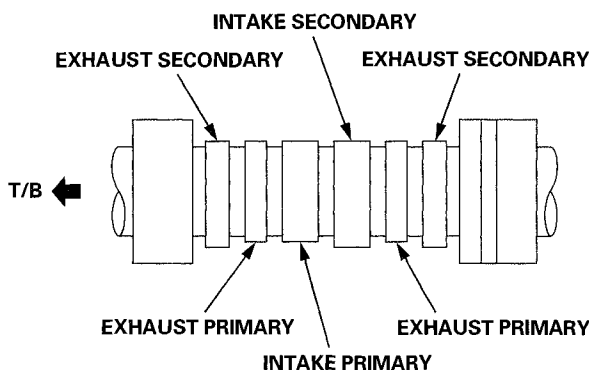


14. Measure the cam lobe height.

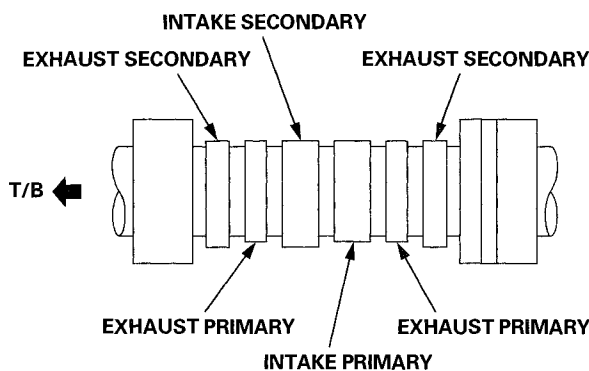
Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRI	34.299 mm (1.3504 in)	36.734 mm (1.4462 in)
SEC	35.932 mm (1.4146 in)	37.370 mm (1.4713 in)

FRONT



REAR



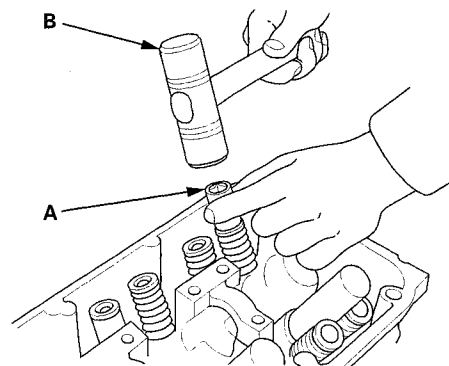
Valve, Spring, and Valve Seal Removal

Special Tools Required

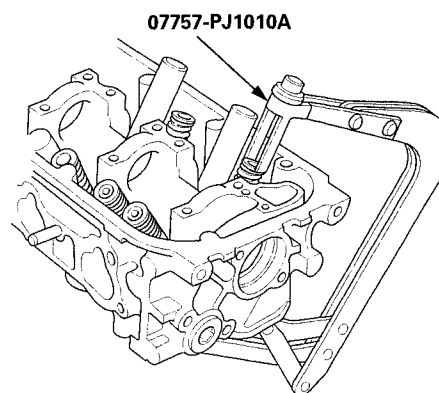
Valve Spring Compressor Attachment 07757-PJ1010A

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

1. Remove the cylinder head (see page 6-96).
2. Remove the rocker arm assembly (see page 6-102).
3. Using an appropriate-sized socket (A) and a plastic mallet (B), lightly tap the spring retainer to loosen the valve cotters.



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



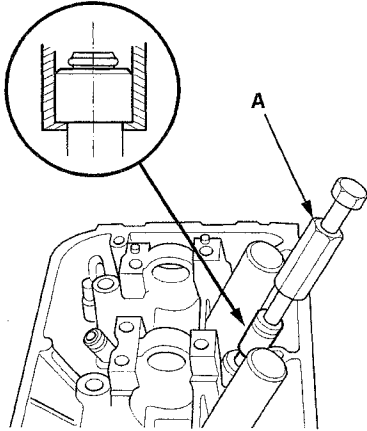
5. Remove the valve spring compressor and the valve spring compressor attachment, then remove the spring retainer, the valve spring, and the valve.

(cont'd)

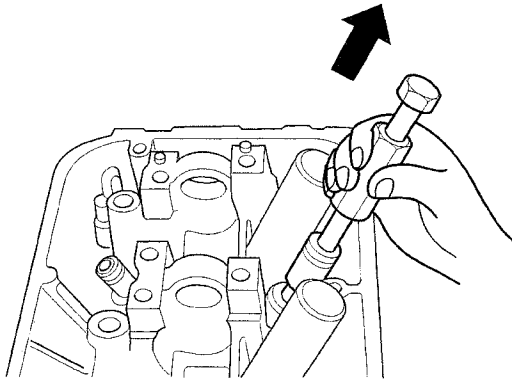
Cylinder Head

Valve, Spring, and Valve Seal Removal (cont'd)

6. Install the valve guide seal remover (A).



7. Remove the valve seal.



8. Remove the valve spring seat.

Valve Inspection

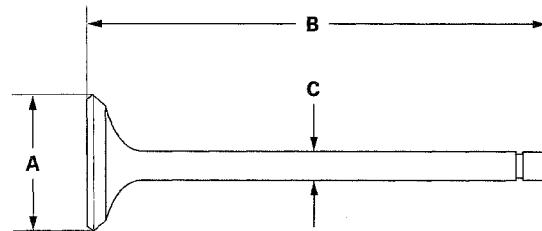
1. Remove the valves (see page 6-109).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 35.90—36.01 mm
(1.413—1.421 in)
B Standard (New): 116.55—117.15 mm
(4.589—4.612 in)
C Standard (New): 5.485—5.495 mm
(0.2159—0.2163 in)
C Service Limit: 5.455 mm (0.2148 in)

Exhaust Valve Dimensions

A Standard (New): 29.90—30.10 mm
(1.177—1.185 in)
B Standard (New): 113.90—114.50 mm
(4.484—4.508 in)
C Standard (New): 5.450—5.460 mm
(0.2146—0.2150 in)
C Service Limit: 5.420 mm (0.2134 in)





Valve Stem-to-Guide Clearance Inspection

1. Remove the valves (see page 6-109).
2. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or a 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

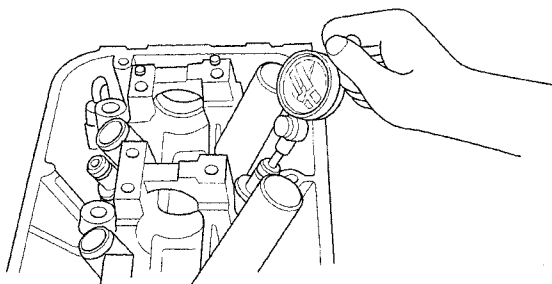
Standard (New): 0.020–0.045 mm (0.0008–0.0018 in)

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)

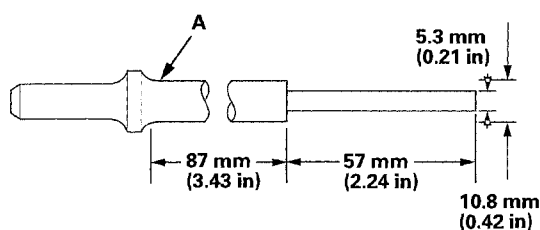


Valve Guide Replacement

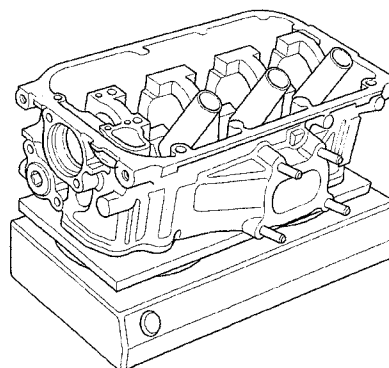
Special Tools Required

- Valve Guide Driver, 5.35 x 9.7 mm 07742-0010100
- Valve Guide Reamer, 5.5 mm 07HAH-PJ7A100

1. Inspect the valve stem-to-guide clearance (see page 6-111).
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 valve guide driver and a conventional hammer.



3. Select the proper replacement guides, and chill them in the freezer section of a refrigerator for at least 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.

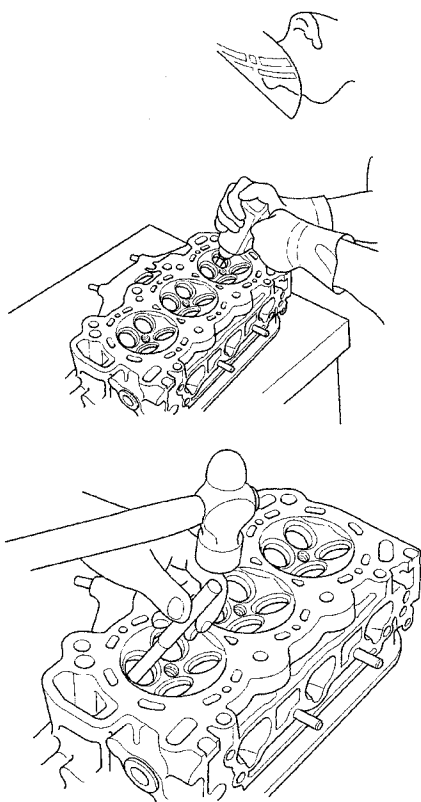


(cont'd)

Cylinder Head

Valve Guide Replacement (cont'd)

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.



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

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

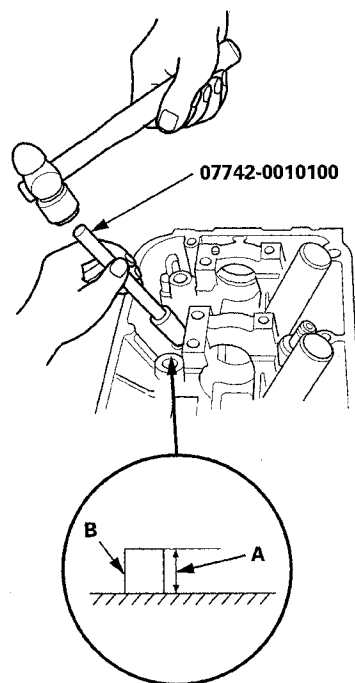
8. Remove the new guide(s) from the freezer, one at a time, as you need them.

9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the valve guide driver 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)

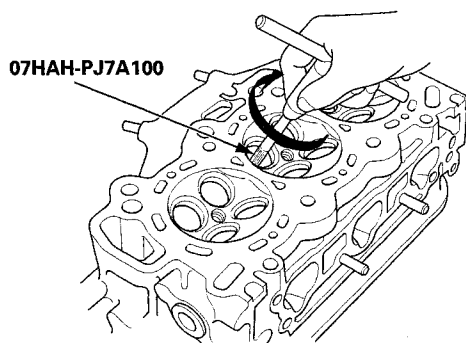
Exhaust: 20.60—21.60 mm (0.811—0.850 in)





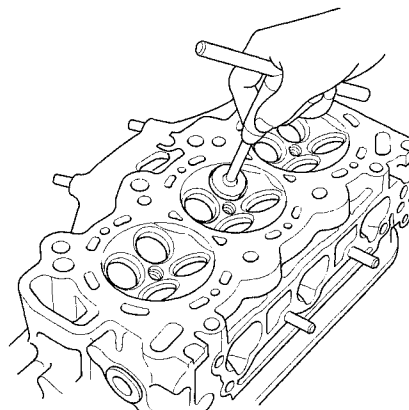
Valve Seat Reconditioning

10. Coat both the valve guide reamer, 5.5 mm and the valve guide with cutting oil.
11. Rotate the reamer clockwise the full length of the valve guide bore.

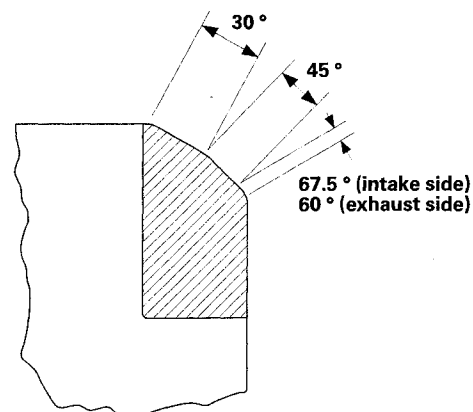


12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearance with a valve (see page 6-111). Verify that a valve slides in the intake and exhaust valve guides without sticking.
15. Inspect the valve seating. If necessary renew the valve seat using a valve seat cutter.

1. Inspect valve stem-to-guide clearance (see page 6-111). If the valve guides are worn, replace them (see page 6-111) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



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



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)

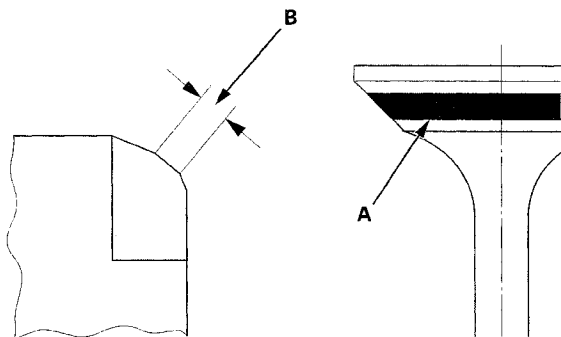
Service Limit: 2.00 mm (0.079 in)

(cont'd)

Cylinder Head

Valve Seat Reconditioning (cont'd)

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.



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

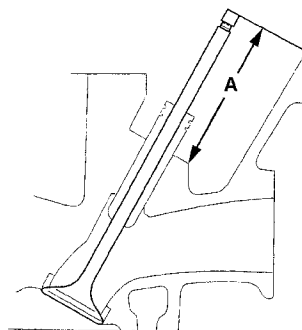
Standard (New): 46.75—47.55 mm (1.841—1.872 in)

Service Limit: 47.80 mm (1.882 in)

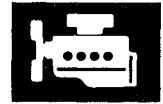
Exhaust Valve Stem Installed Height

Standard (New): 46.68—47.48 mm (1.838—1.869 in)

Service Limit: 47.73 mm (1.879 in)



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.



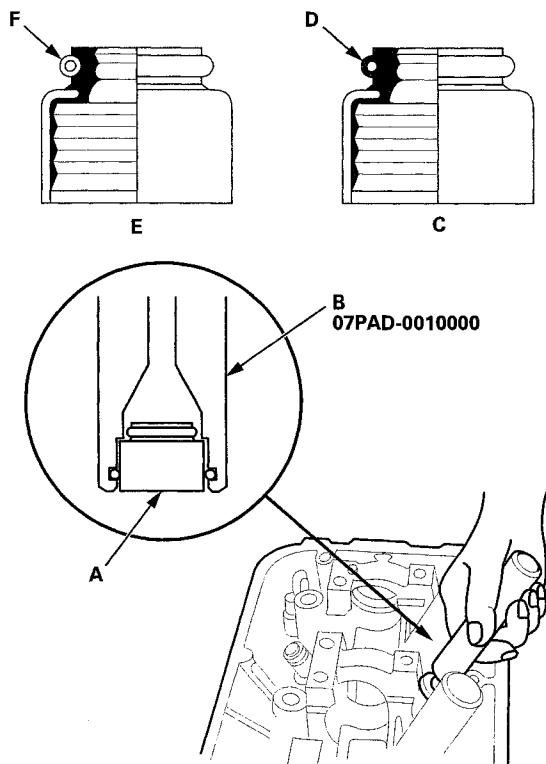
Valve, Spring, and Valve Seal Installation

Special Tools Required

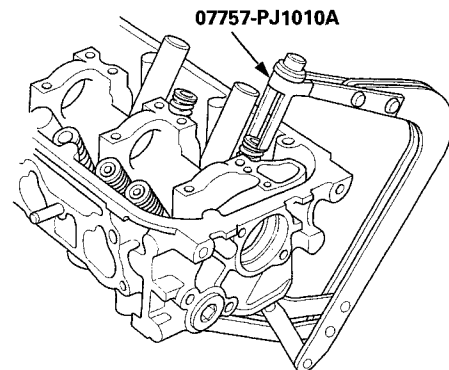
- Stem Seal Driver, 30 mm 07PAD-0010000
- Valve Spring Compressor Attachment 07757-PJ1010A

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 5.5 mm side of the stem seal driver, 30 mm (B).

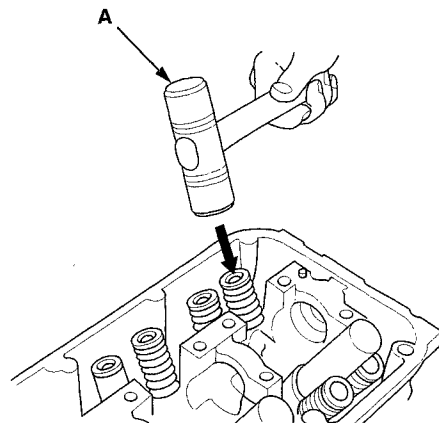
NOTE: Exhaust valve seals (C) have a black spring (D) and intake valve seals (E) have a white or silver spring (F). They are not interchangeable.



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



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

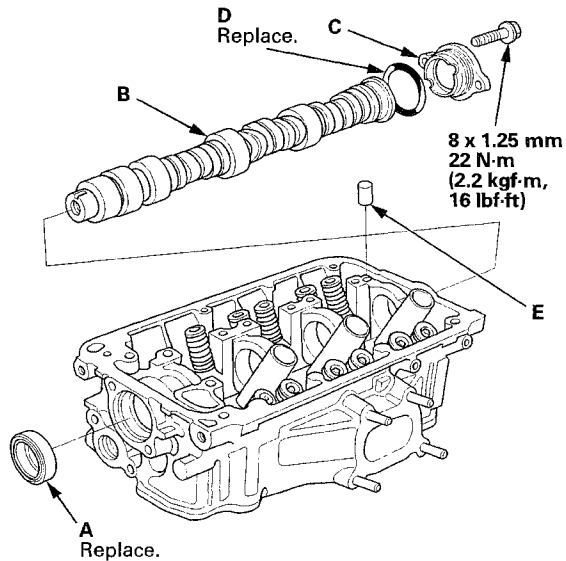


Cylinder Head

Camshaft, Rocker Arm Assembly, Camshaft Seal, and Pulley Installation

Front

1. Loosen the locknuts and the adjusting screws.
2. Dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. 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.

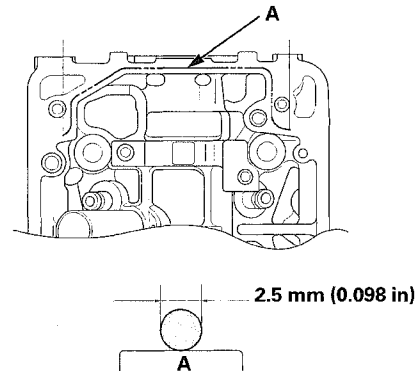


5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and the cam lobes.
6. Check that the oil seal lips are not distorted.
7. Install the solid dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see page 6-103).

9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



11. 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.

NOTE:

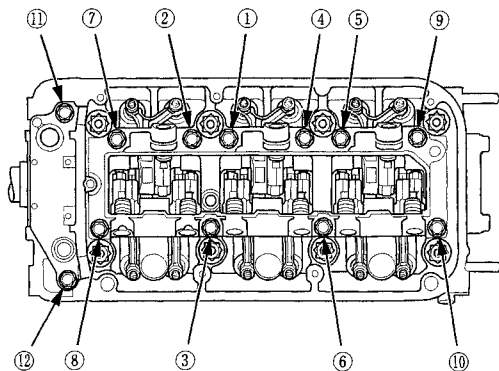
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the rocker arm assembly.



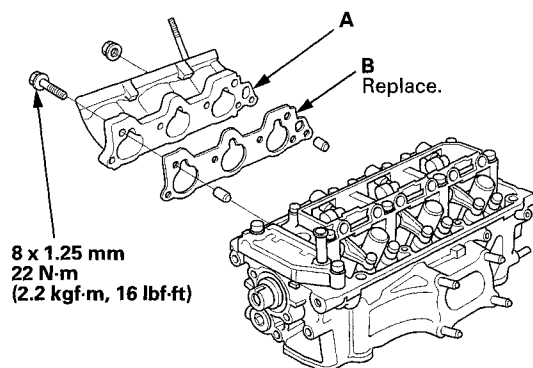
12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

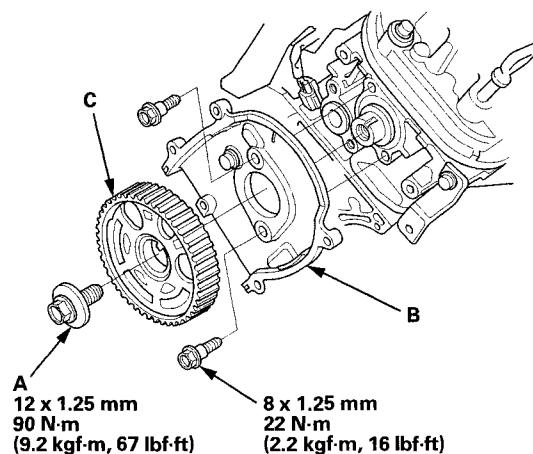
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



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



14. 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).



15. Set the camshaft pulleys to top dead center (TDC) before bolting them onto the engine block (see step 6 on page 6-120).

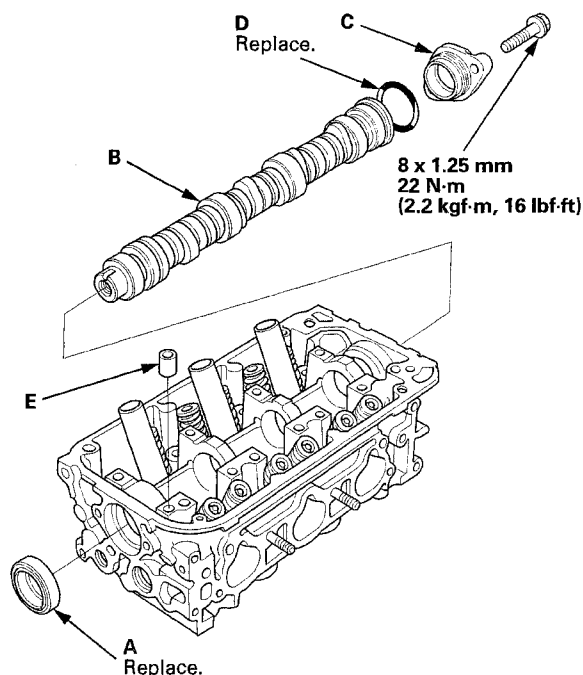
(cont'd)

Cylinder Head

Camshaft, Rocker Arm Assembly, Camshaft Seal, and Pulley Installation (cont'd)

Rear

1. Loosen the locknuts and the adjusting screws.
2. Dry the camshaft oil seal housing.
3. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
4. 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.

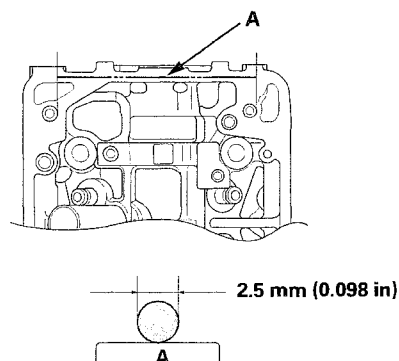


5. Insert the camshaft (B) into the cylinder head, then install the camshaft thrust cover (C). Always use a new O-ring (D). Apply new engine oil to the journals and the cam lobes.
6. Check that the oil seal lips are not distorted.
7. Install the hollow dowel pin (E).
8. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see page 6-104).

9. Remove all of the old liquid gasket from the rocker shaft holder and the cylinder head.
10. Apply liquid gasket, P/N 08717-0004, 08718-0003, or 08718-0009 to the rocker shaft holder mating surface of the cylinder head. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



11. 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.

NOTE:

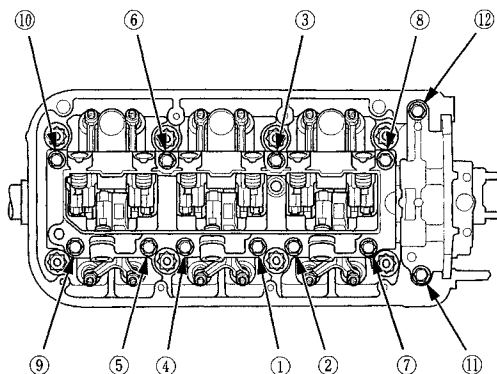
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the rocker arm assembly.



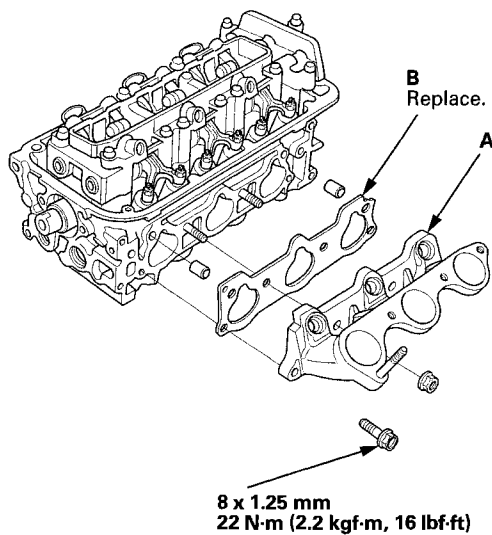
12. Tighten each bolt two turns at a time in the sequence shown to ensure that the rockers do not bind on the valves.

Specified Torque

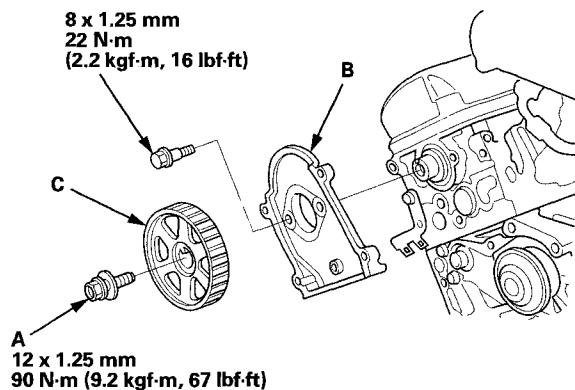
8 x 1.25 mm: 22 N·m (2.2 kgf·m, 16 lbf·ft)



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



14. 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).

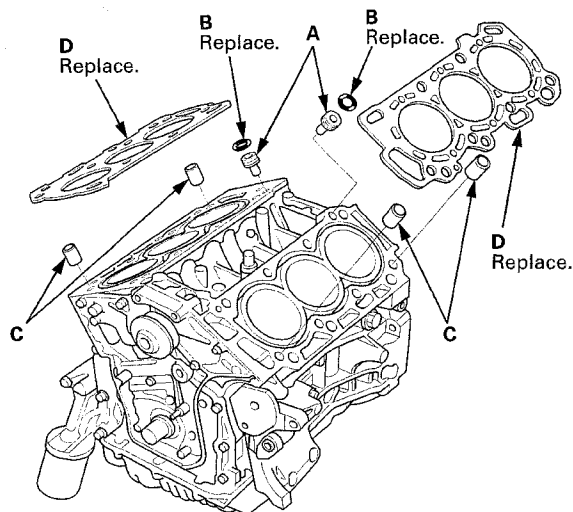


15. Set the camshaft pulleys to TDC before bolting them onto the engine block (see step 6 on page 6-120).

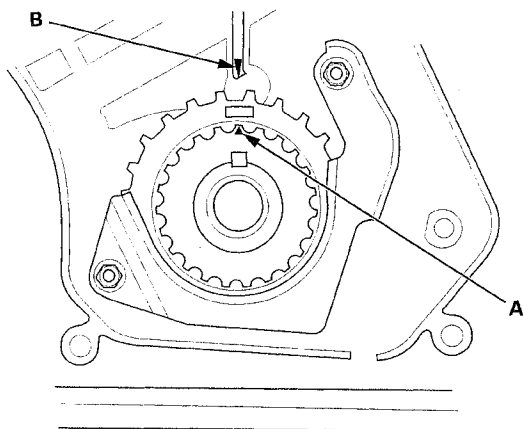
Cylinder Head

Cylinder Head Installation

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

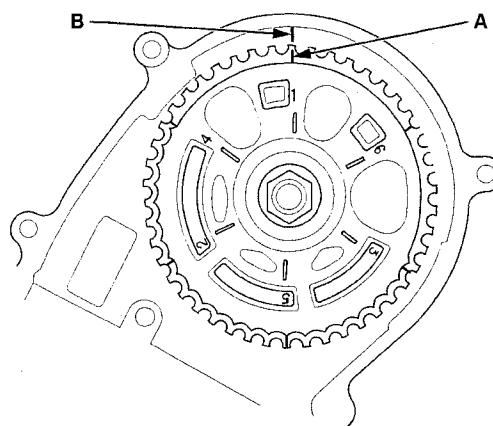


3. Install the dowel pins (C) and the new cylinder head gaskets (D).
4. Clean the timing belt pulleys, the timing belt guide plate, and the upper and lower covers.
5. Set the timing belt drive pulley to top dead center (TDC) by aligning the TDC mark (A) on the tooth of the timing belt drive pulley with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

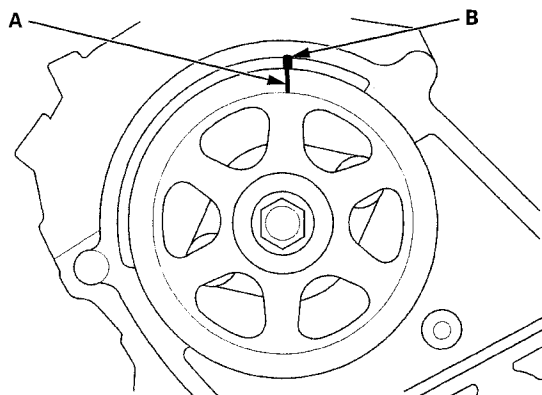


6. Set the camshaft pulleys to TDC by aligning the TDC marks (A) on the camshaft pulleys with the pointers (B) on the back covers.

FRONT



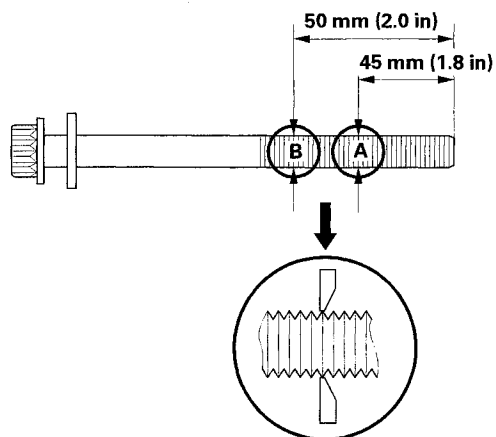
REAR



7. Install the cylinder heads on the engine block.



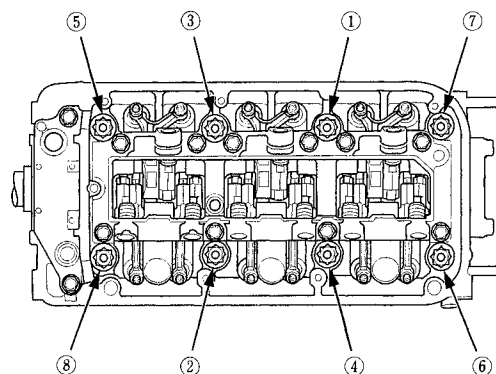
8. Measure the diameter of each cylinder head bolt at point A and point B.



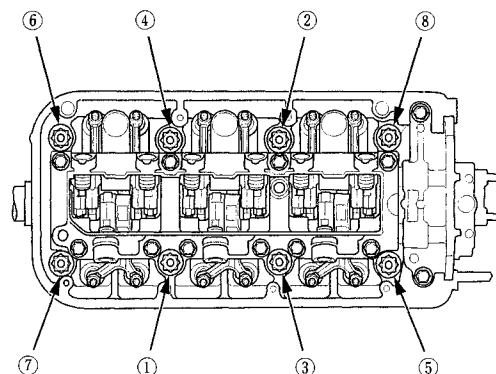
9. If either diameter is less than 11.3 mm (0.44 in), replace the cylinder head bolt.
10. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.

11. Torque the cylinder head bolts in sequence to 29 N·m (3.0 kgf·m, 22 lbf·ft) using a beam-type torque wrench. When using a preset click-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.

FRONT



REAR



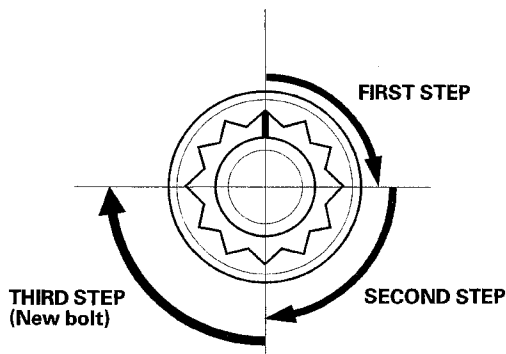
(cont'd)

Cylinder Head

Cylinder Head Installation (cont'd)

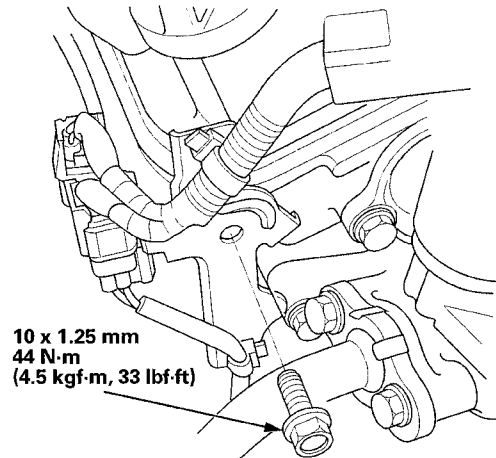
12. After torquing, tighten all cylinder head bolts in two steps (90 ° per step) using the sequence shown in step 11. If you are using a new cylinder head bolt, tighten the bolt an extra 90 °.

NOTE: Remove the cylinder head bolt if you tightened it beyond the specified angle, and go back to step 8 of the procedure. Do not loosen it back to the specified angle.



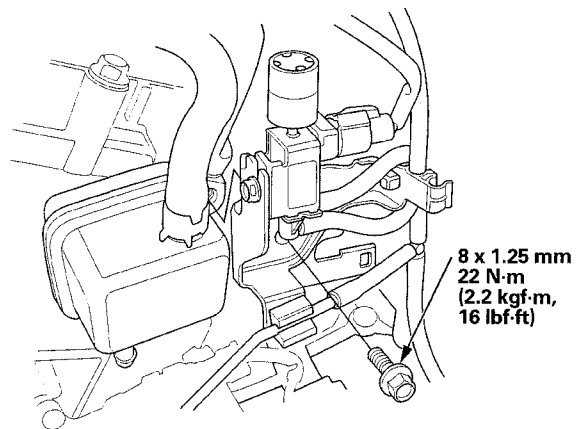
13. Install the timing belt (see page 6-80).
14. Adjust the valve clearance (see page 6-72).
15. Install the cylinder head covers (see page 6-92).
16. Install the water passage (see page 10-9).
17. Install the injector bases (see page 9-7).

18. Install the connector bracket to the front cylinder head.



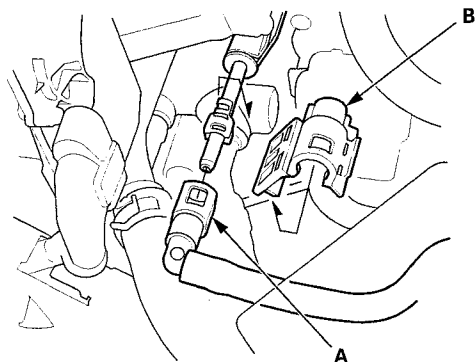
19. Install the evaporative emission (EVAP) canister joint with the bracket (see step 9 on page 6-100).

20. Install the engine mount control solenoid valve bracket to the rear cylinder head.





21. Connect the fuel feed hose (A) (see page 11-383), then install the quick-connect fitting cover (B).



22. Install the front warm up three way catalytic converter (front WU-TWC) (see page 11-429) and the rear warm up three way catalytic converter (rear WU-TWC) (see page 11-430).

23. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:

- Six injector connectors
- Knock sensor connector
- Engine coolant temperature (ECT) sensor 1 connector
- Engine mount control solenoid valve connector
- Camshaft position (CMP) sensor connector
- Rocker arm oil control solenoid connector
- Rocker arm oil pressure switch connector
- Two air fuel ratio (A/F) sensor connectors
- Two secondary heated oxygen sensor (secondary HO2S) connectors

24. Install the six ignition coils (see page 4-33).

25. Install the intake manifold (see page 9-5).

26. Install the alternator (see page 4-48).

27. Do the battery terminal reconnection procedure (see page 22-86).

28. After installation, check that all tubes, hoses, and connectors are installed correctly.

29. Inspect for fuel leaks. Turn the ignition switch to ON (II), or press the engine start/stop button to select the ON mode (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.

30. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-7).

31. Check for fluid leaks.

32. Do the engine control module (ECM)/powertrain control module (PCM) idle learn procedure (see page 11-337).

33. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-5).

34. Inspect the idle speed (see page 11-336).

35. Inspect the ignition timing (see page 4-32).

36. Install the engine compartment covers (see page 20-186).

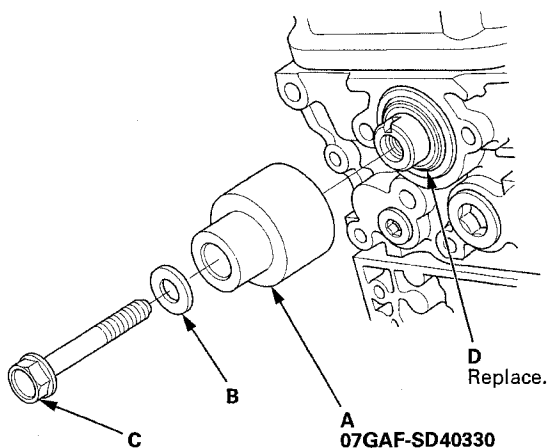
Cylinder Head

Camshaft Oil Seal Installation - In Car

Special Tools Required

Ball Joint Remover/Installer 07GAF-SD40330

1. Remove the timing belt (see page 6-78).
2. Remove the camshaft pulley and the back cover (see step 17 on page 6-98).
3. Remove the camshaft oil seal.
4. Clean and dry the camshaft oil seal housing.
5. Apply a light coat of new engine oil to the lip of the camshaft oil seal.
6. Using the ball joint remover/installer (A), a washer (B), and a 12 x 75 x 1.25 mm bolt (C), press in the new camshaft oil seal (D) about 0.5–1.5 mm (0.02–0.06 in) below the surface of the cylinder head.

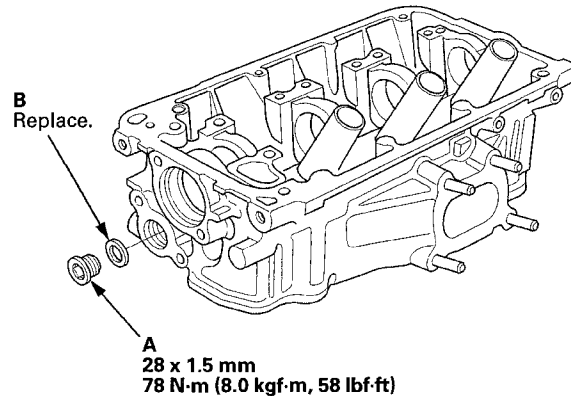


7. Apply new engine oil to the threads of the camshaft pulley mounting bolt. Install the back cover, then install the camshaft pulley.
 - Front (see step 14 on page 6-117)
 - Rear (see step 14 on page 6-119)
8. Install the timing belt (see page 6-80).

Sealing Bolt Installation

NOTE: When installing the sealing bolts (A), always use a new washer (B).

FRONT



REAR

