

Honda CR-Z 2011-2012

Engine Mechanical



Engine Mechanical

Engine Assembly	5-1
Cylinder Head	6-1
Engine Block	7-1
Engine Lubrication	8-1
Intake Air System and Exhaust System	9-1



Engine Mechanical

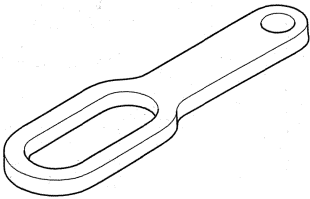
Engine Assembly

Special Tools	5-2
Engine Removal	5-3
Engine Installation	5-11
Side Engine Mount Replacement	5-20
Transmission Mount Replacement	5-24
Torque Rod Replacement	5-28
Side Engine Mount Bracket Replacement	5-29
Transmission Mount Bracket Replacement	5-32
Torque Rod Bracket Replacement	5-35

Engine Assembly

Special Tools

Ref.No.	Tool Number	Description	Qty
①	07AAK-SNAA120	Universal Lifting Eyelet	2



①





Engine Removal

Special Tools Required

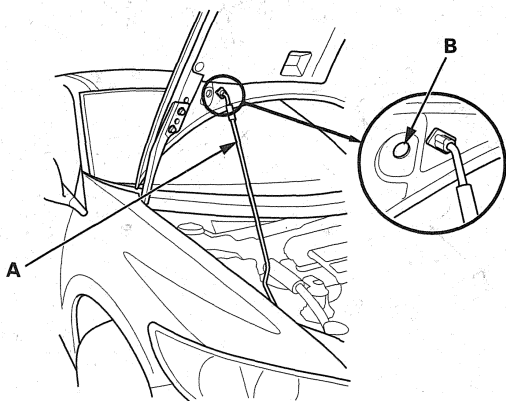
- Universal Lifting Eyelet 07AAK-SNAA120
- Engine Support Hanger, A and Reds AAR-T1256*
- Engine Hanger Adapter VSB02C000026*

*: Available through the Honda Tool and Equipment Program 888-424-6857

NOTE:

- IMA components are located in this area. The IMA is a high-voltage system. You must be familiar with the IMA system before working on or around it. Make sure you have read the IMA service precaution before doing repairs or service (see page 12-3).
- 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.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Turn the battery module switch OFF (see page 12-4).
2. Before removing the engine/transmission, read the Service Precautions for the IMA System (see page 12-3).
3. Open the hood, and secure it with the hood support rod (A) in the wide-open position (B).

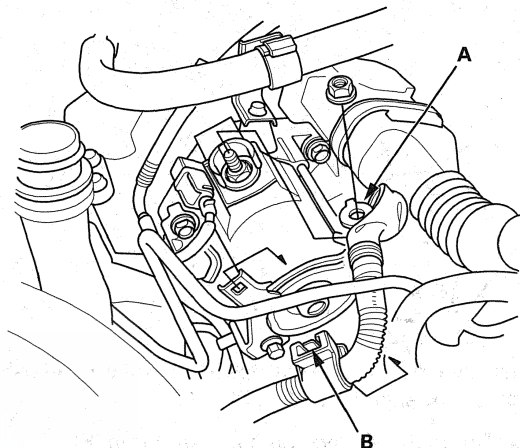


4. Relieve fuel pressure (see page 11-287).
5. Do the 12 volt battery removal procedure (see page 22-87).
6. Remove the cowl cover and the under-cowl panel (see page 20-153).
7. Remove the front bumper center upper beam (see page 20-149).

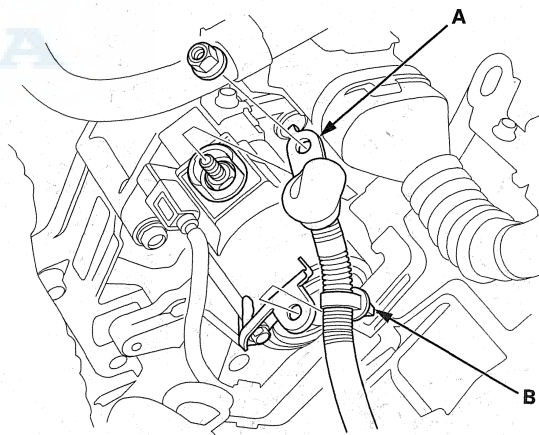
8. Remove the air cleaner (see page 9-3).

9. Remove the starter cable (A) and the harness clamp (B).

M/T model



CVT model

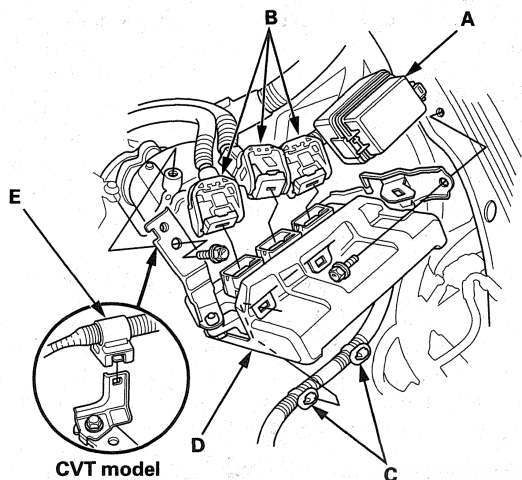


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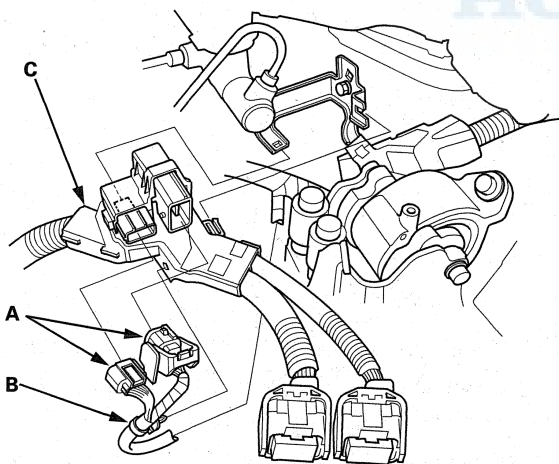
Engine Assembly

Engine Removal (cont'd)

10. Disconnect the ECM/PCM connectors (B).

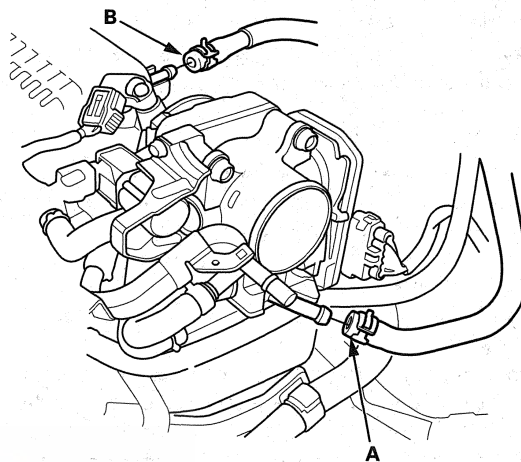


11. Remove the harness clamps (C), auxiliary under-hood relay box A, and the ECM/PCM (D).
12. CVT model: Remove the harness clamp (E).
13. Disconnect the engine compartment wire harness connectors (A).

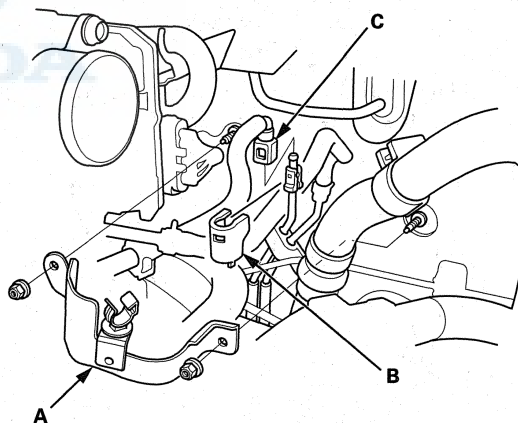


14. Remove the harness clamp (B) and the harness holder (C).

15. Disconnect the EVAP canister hose (A) and the brake booster vacuum hose (B).

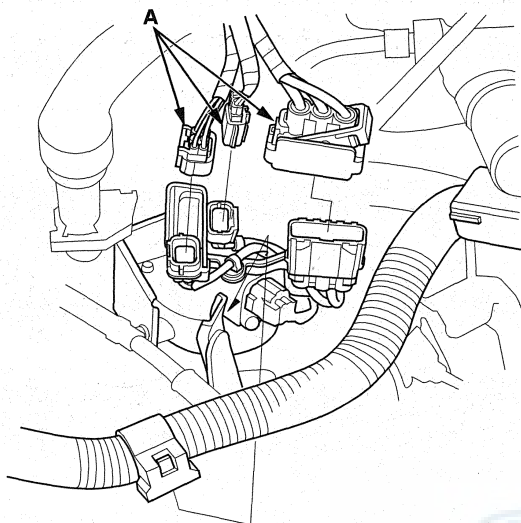


16. Remove the fuel feed hose clamp bracket (A) and the quick-connect fitting cover (B), then disconnect the fuel feed hose (C) (see page 11-295).

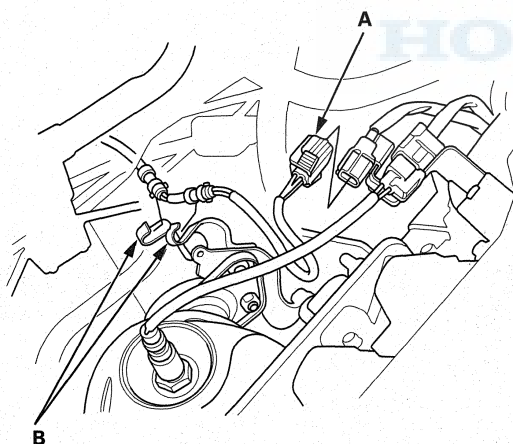




17. Disconnect the EPS connectors (A).



18. Disconnect the secondary HO2S connector (A), then remove the secondary HO2S harness from the clamps (B).



19. Remove the steering joint cover, then disconnect the steering joint from the steering gearbox pinion shaft (see page 17-64).

NOTE:

- Hold the steering wheel in the steering wheel holder tool
- Hold the lower slide shaft on the column with a piece of wire between the joint yokes.

20. M/T model: Remove the cable guard bracket and the clutch line bracket (see step 7 on page 13-44).

21. M/T model: Remove the slave cylinder, then carefully move the slave cylinder out of the way to avoid bending the clutch line (see step 8 on page 13-44).

NOTE:

- Do not disconnect the clutch line joints.
- Do not press the clutch pedal after the slave cylinder has been removed.

22. M/T model: Remove the harness bracket (see step 9 on page 13-44).

23. M/T model: Remove the lock pins and the shift cable bracket bolts, then carefully remove both cables and the shift cable bracket together out of the way to avoid bending the cables (see step 10 on page 13-44).

24. M/T model: Disconnect the reverse lockout solenoid 2P connector (see step 11 on page 13-44).

25. CVT model: Remove the clamp bracket (see step 24 on page 14-159).

26. CVT model: Remove the lock pin and the control pin from the selector control lever (see step 25 on page 14-159).

27. CVT model: Remove the bolts securing the shift cable holder, then separate the shift cable end from the selector control lever (see step 26 on page 14-159).

28. Remove the drive belt (see page 10-17).

29. Remove the radiator cap.

NOTE: Wait until the engine is cool, then carefully remove the radiator cap.

30. Raise the vehicle on the lift.

31. Remove the front wheels.

32. Remove the splash shield (see page 20-163).

33. Loosen the drain plug in the radiator, and drain the engine coolant (see page 10-8).

34. Drain the engine oil (see page 8-10).

35. Drain the transmission fluid:

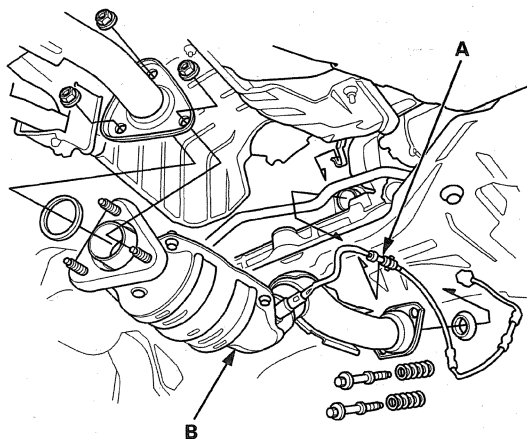
- M/T model (see page 13-41)
- CVT model (see page 14-154)

(cont'd)

Engine Assembly

Engine Removal (cont'd)

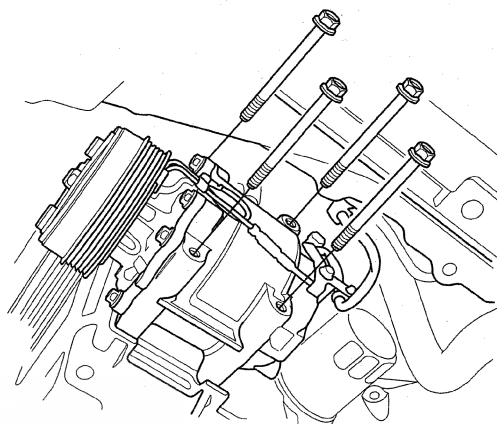
36. Remove the harness clamp (A).

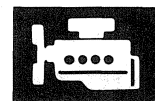


37. Remove the under-floor TWC (B).
38. Remove the stabilizer links from the stabilizer bar on both sides (see page 18-20).
39. Remove the cotter pin from the tie-rod end ball joint, then remove the nut on both sides (see step 11 on page 17-65).
40. Disconnect the tie-rod end ball joint from the knuckle using the ball joint remover and the ball joint thread protector on both sides (see step 12 on page 17-65).
41. Remove the lock pin from the lower arm ball joint, and remove the castle nut from both sides (see step 13 on page 17-66).
42. Disconnect the lower arm ball joint from the knuckle using the ball joint remover and the ball joint thread protector on both sides (see step 14 on page 17-66).
43. Remove the driveshafts (see page 16-4). Coat all precision-finished surfaces with clean engine oil. Tie a plastic bags over the driveshaft ends.

44. Remove the A/C compressor without disconnecting the A/C hoses. Do not bend the A/C hoses excessively.

NOTE: Hang the A/C compressor with a wire tie.



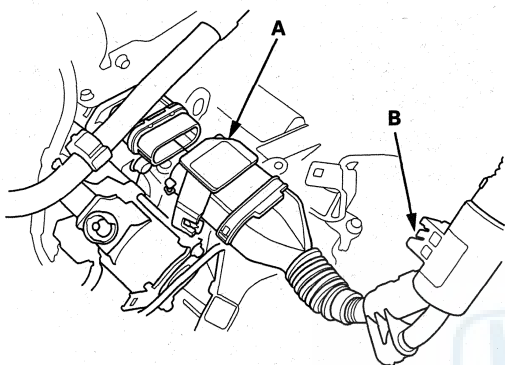


45. Lower the vehicle on the lift.

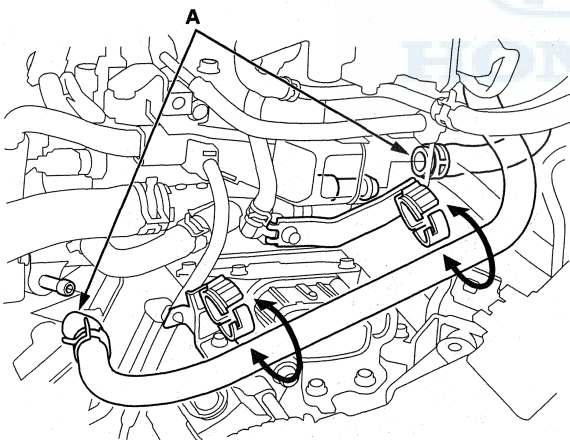
46. Remove the radiator (see page 10-24).

47. Disconnect the IMA motor power cable connector (A) and the harness clamp (B).

NOTE: Make sure you have read the IMA system service precautions (see page 12-3).

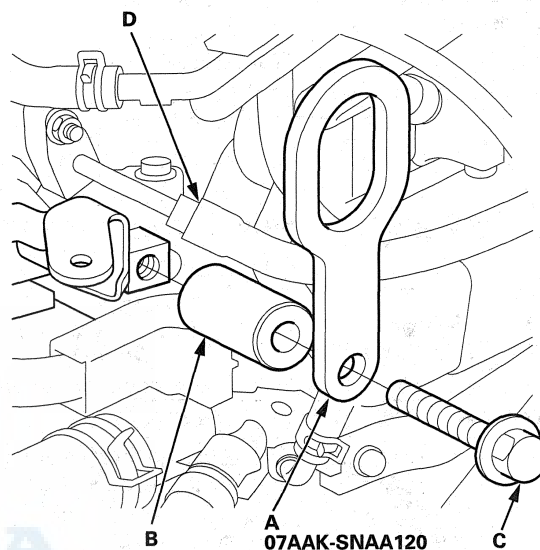


48. Disconnect the heater hoses (A).



49. Attach the first universal lifting eyelet (A) to the cylinder head with a spacer (B) and an 8 x 1.25 mm bolt (C).

NOTE: Select a spacer that is long enough that the universal lifting eyelet does not interfere with the fuel feed tube (D).



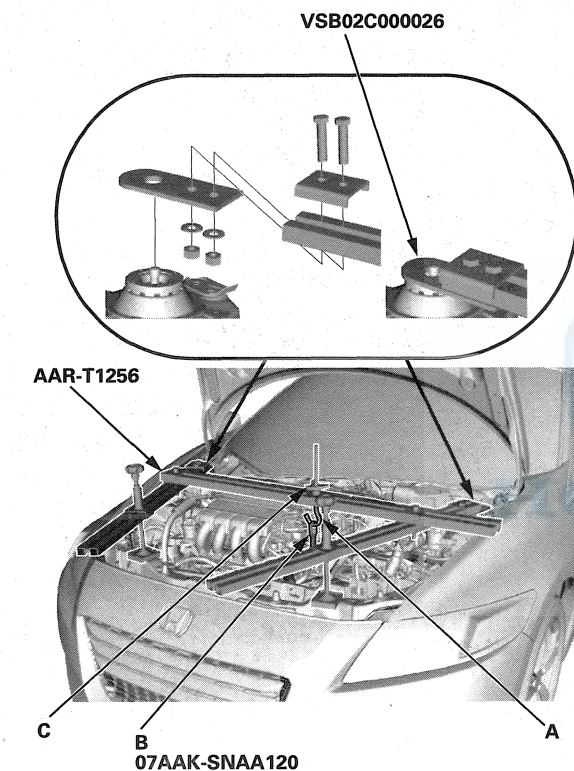
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Engine Assembly

Engine Removal (cont'd)

50. Install the engine hanger adapter (VSB02C000026) to the engine support hanger (AAR-T1256), then install the engine support hanger onto the vehicle, and attach the hook (A) to the first universal lifting eyelet (B). Tighten the wing nut (C) by hand, and lift and support the engine/IMA motor/transmission.

NOTE: Be careful when working around the windshield.



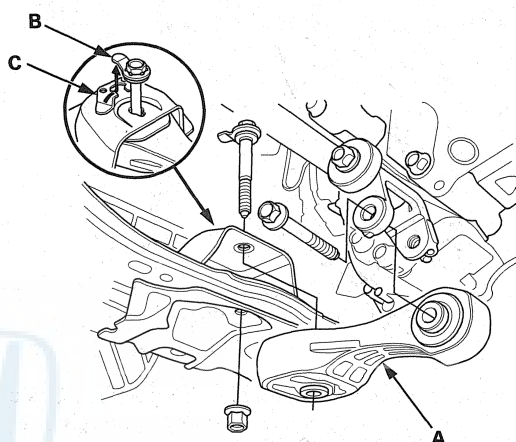
51. Raise the vehicle on the lift.

52. Support the transmission with a transmission jack and a wood block under the transmission.

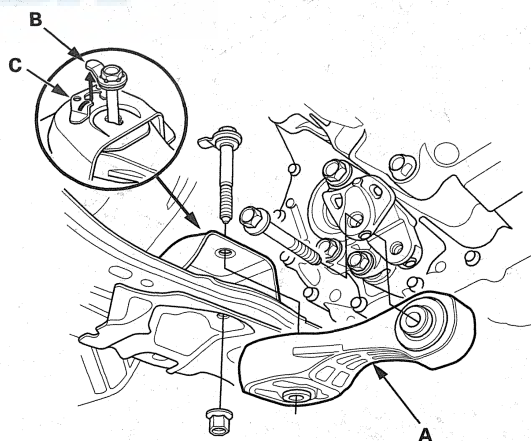
53. Remove the torque rod (A).

NOTE: Make sure the tab (B) on the bolt head aligned with the guide (C) on the front subframe.

M/T model

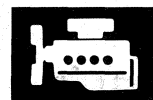


CVT model

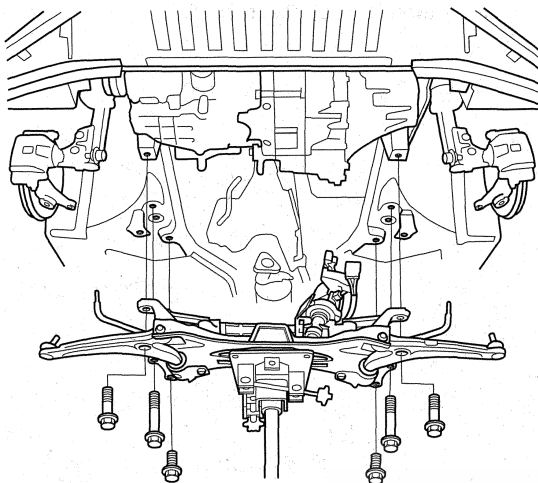


54. Remove the transmission jack and the wood block from under the transmission.

55. Support the front subframe with a transmission jack and a wood block under the front subframe.



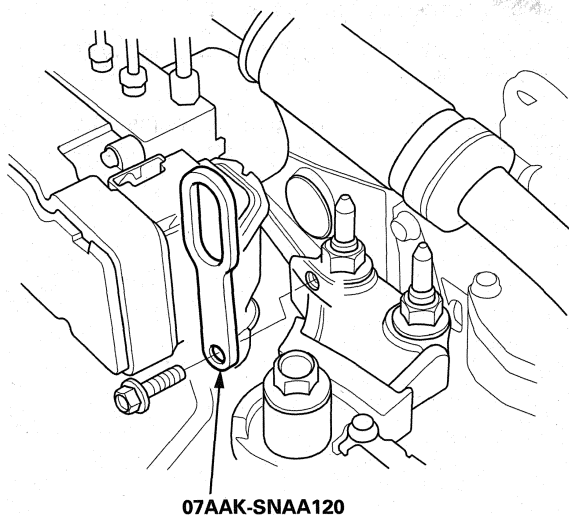
56. Remove the front subframe bolts.



57. Lower the front subframe and steering gearbox as an assembly by lowering the jack slowly, then remove the assembly from under the vehicle.

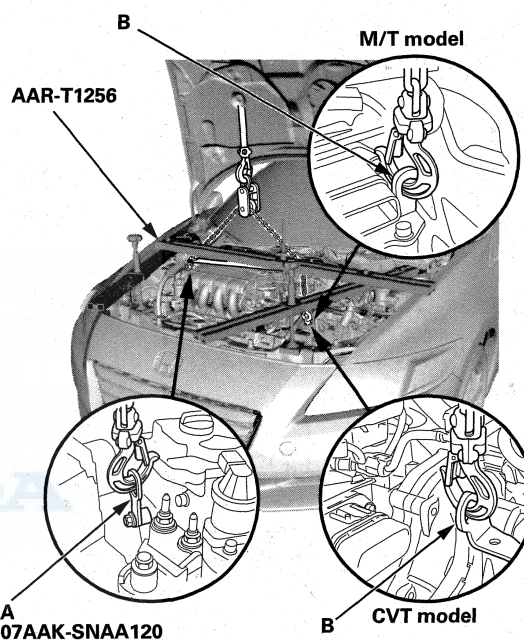
58. Lower the vehicle on the lift.

59. Attach the second universal lifting eyelet to the chain case.



60. Attach a chain hoist to the second universal lifting eyelet (A) and the transmission hanger (B), then lift the engine/IMA motor/transmission until it is securely supported by the chain hoist, then remove the engine support hanger.

NOTE: Wrap the VSA modulator-control unit with the clean shop towel.



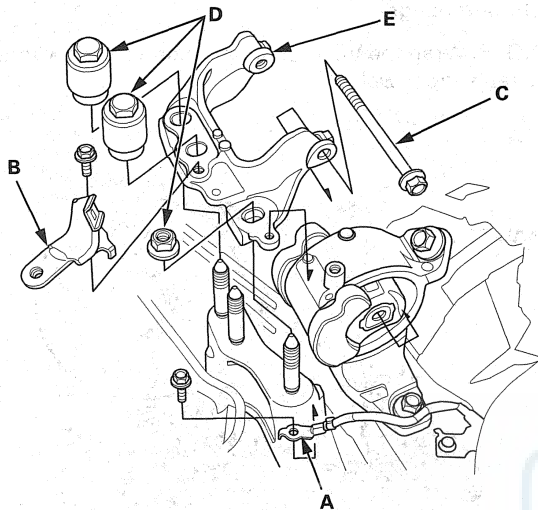
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Engine Assembly

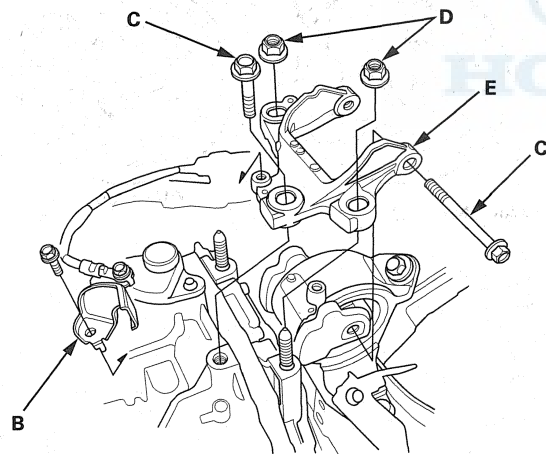
Engine Removal (cont'd)

61. Remove the ground cable (A) and the harness holder (B).

M/T model

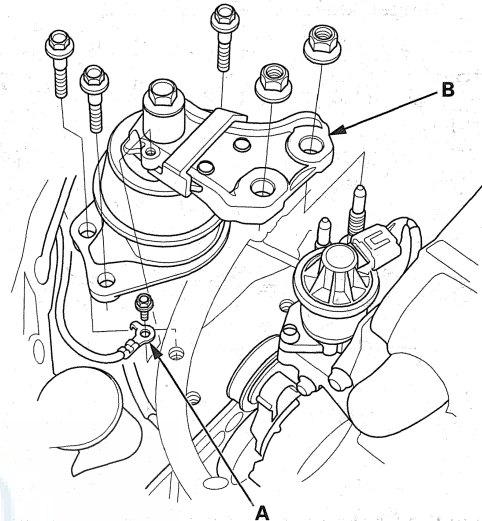


CVT model



62. Remove the transmission mount bolts (C) and nuts (D), then remove the transmission mount bracket (E).

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



64. Check that the engine/IMA motor/transmission is completely free of the vacuum hoses, the fuel hoses, the coolant hoses, and electrical wiring.
65. Slowly lower the engine/IMA motor/transmission about 150 mm (5.91 in). Check once again that all the hoses and the electrical wiring are disconnected and free from the engine/IMA motor/transmission, then lower it all the way and support it.
66. Disconnect the chain hoist from the engine/IMA motor/transmission.
67. Raise the vehicle, and remove the engine/IMA motor/transmission from under the vehicle.



Engine Installation

Special Tools Required

- Universal Lifting Eyelet 07AAK-SNAA120
- Engine Support Hanger, A and Reds AAR-T1256*
- Engine Hanger Adapter VSB02C000026*

*: Available through the Honda Tool and Equipment Program 888-424-6857

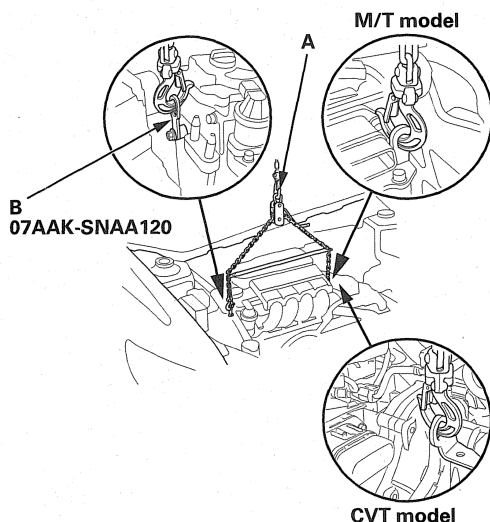
NOTE: IMA components are located in this area. The IMA is a high-voltage system. You must be familiar with the IMA system before working on or around it. Make sure you have read the IMA service precaution before doing repairs or service (see page 12-3).

1. Raise the vehicle on the lift, and position the engine/IMA motor/transmission under the vehicle.

Be sure that they are properly aligned. Carefully lower the vehicle until the engine/IMA motor/transmission are properly positioned in the engine compartment. Make sure the vehicle is not resting on any part of the engine/IMA motor/transmission. Support the engine/IMA motor/transmission with a chain hoist (A) and carefully raise the engine/IMA motor/transmission into place.

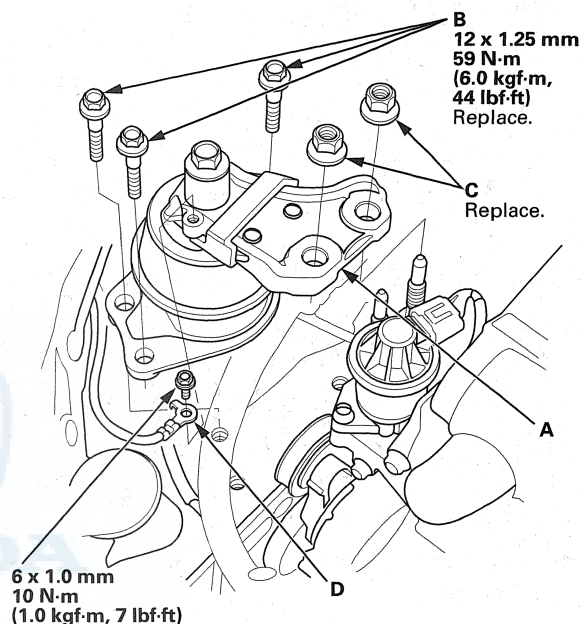
NOTE:

- Attach the first universal lifting eyelet (B) to the chain case (see step 59 on page 5-9).
- Reinstall the mounting bolts and support nuts in the sequence given in the following steps. Failure to follow this sequence may cause excessive noise and vibration, and reduce engine mount life.
- Wrap the VSA modulator-control unit with the clean shop towel.



2. Install the side engine mount/bracket assembly (A), then tighten new side engine mount/bracket assembly mounting bolts (B).

NOTE: Refer to the installation of the side engine mount bracket if you take the side engine mount and the side engine mount bracket apart (see page 5-20).



3. Loosely install new side engine mount/bracket assembly mounting nuts (C).
4. Install the ground cable (D).

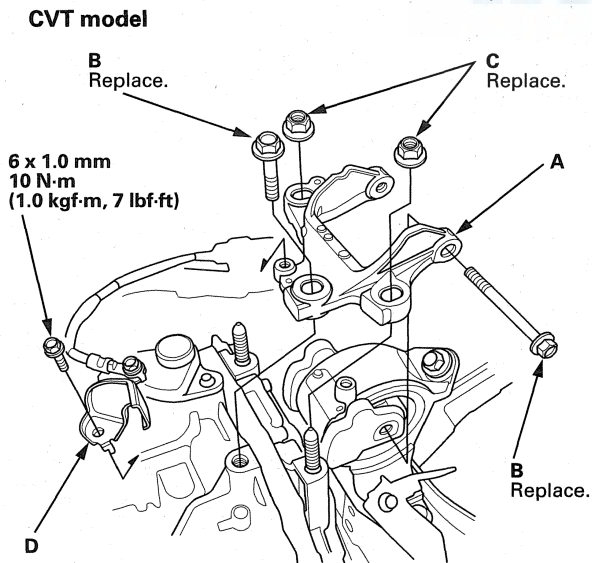
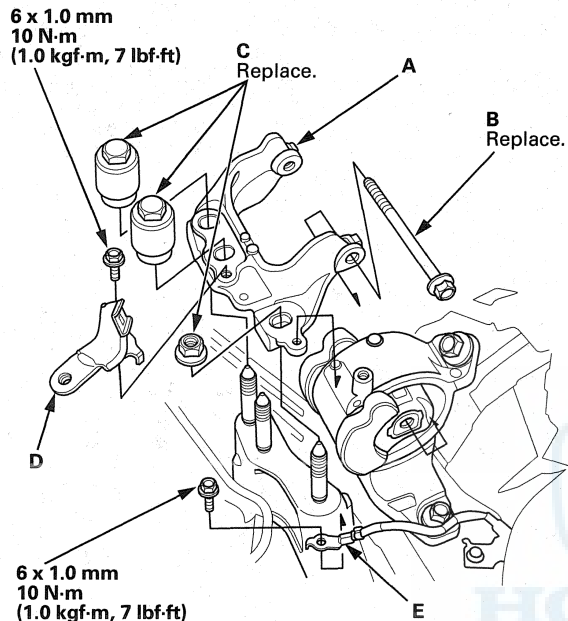
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Engine Assembly

Engine Installation (cont'd)

5. Install the transmission mount bracket (A), and loosely install new transmission mount bracket mounting bolts (B) and nuts (C).

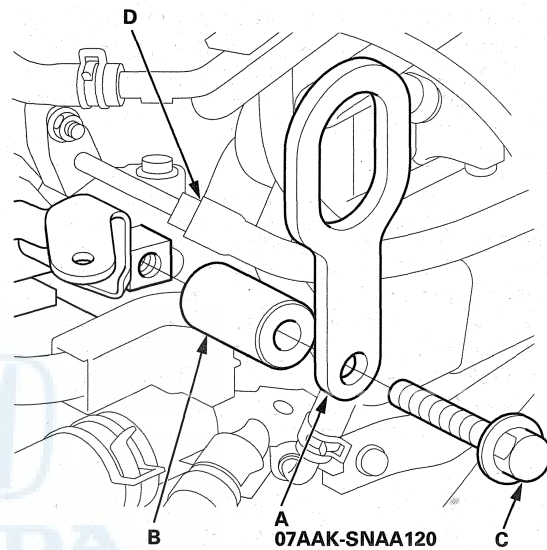
M/T model



6. Install the harness holder (D) and the ground cable (E).

7. Attach the second universal lifting eyelet (A) to the cylinder head with a spacer (B) and an 8 x 1.25 mm bolt (C).

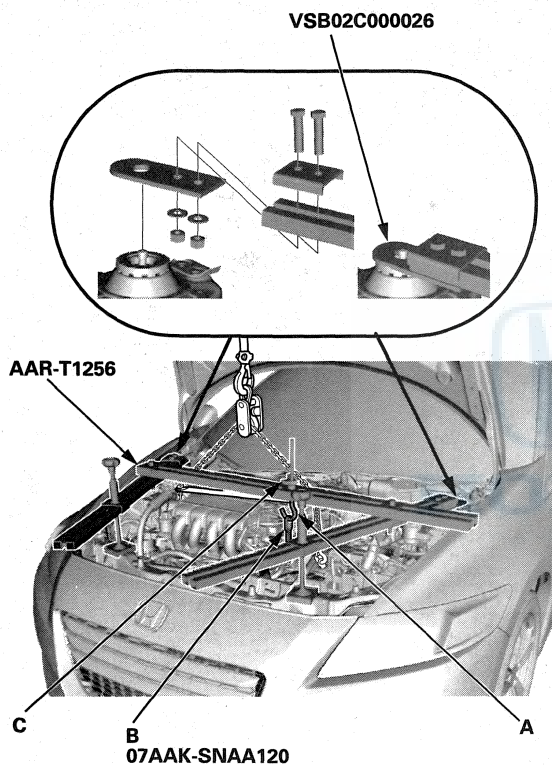
NOTE: Select a spacer that is long enough that the universal lifting eyelet does not interfere with the fuel feed tube (D).





8. Install the engine hanger adapter (VSB02C000026) to the engine support hanger (AAR-T1256), then install the engine support hanger onto the vehicle, and attach the hook (A) to the second universal lifting eyelet (B). Tighten the wing nut (C) by hand, and lift and support the engine/IMA motor/transmission.

NOTE: Be careful when working around the windshield.

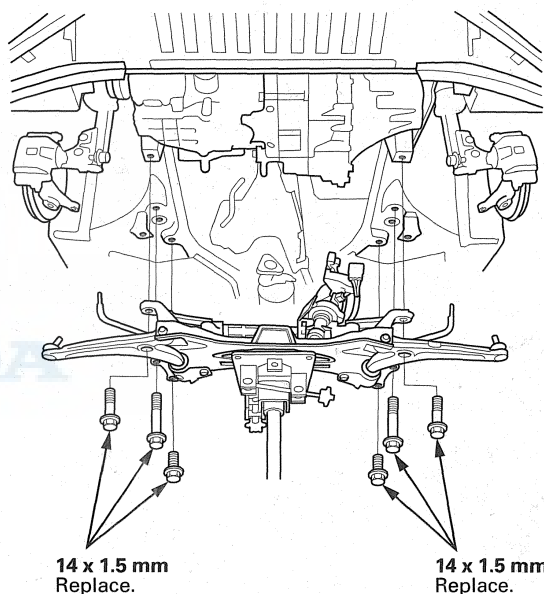


9. Remove the chain hoist from the engine/IMA motor/transmission, then remove the first universal lifting eyelet from the chain case.
10. Raise the vehicle on the lift.

11. Support the front subframe with a transmission jack and a wood block under the front subframe.
12. Install the front subframe, then loosely install the new front subframe mounting bolts.

NOTE:

- Be sure that the pinion shaft grommet is in place securely. Make sure the pinion shaft grommet is not turned up. Incorrect installation can cause leakage of water or mud, and noise.
- Take care not to damage the lower arm ball joint boot with the edge of the knuckle, etc.



13. Align the front subframe, then torque the subframe mounting bolts to specification (see page 20-173).
14. Remove the transmission jack and the wood block from under the subframe.

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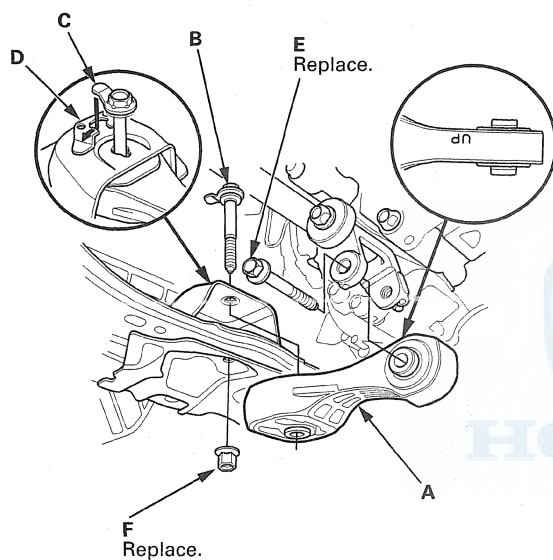
Engine Assembly

Engine Installation (cont'd)

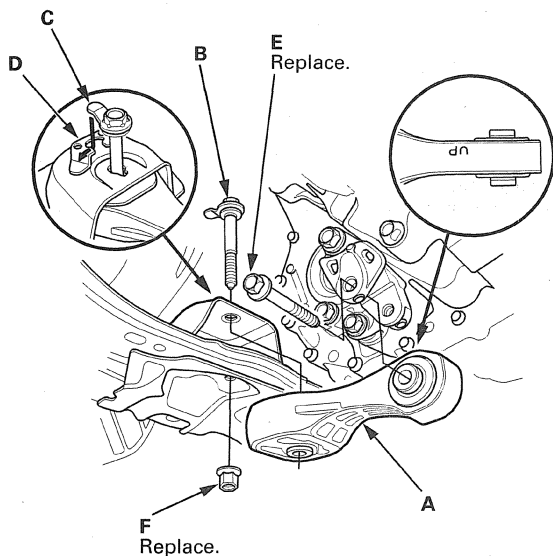
15. Support the transmission with a transmission jack and a wood block under the transmission.
16. Install the torque rod (A). Install the bolt (B) with the tab (C) on the bolt head aligned with the guide (D) on the front subframe, then loosely install a new torque rod mounting bolt (E) and nut (F).

NOTE: Be sure to install the torque rod with the "UP" mark facing up.

M/T model

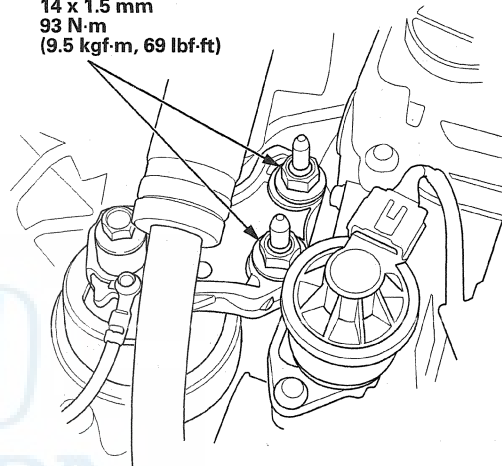


CVT model



17. Remove the transmission jack and the wood block from under the transmission.
18. Lower the vehicle on the lift.
19. Remove the engine support hanger and the second universal lifting eyelet.
20. Tighten the side engine mount/bracket assembly mounting nuts.

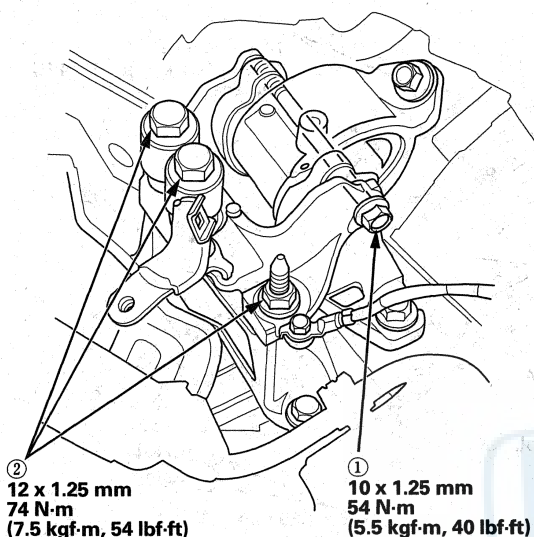
14 x 1.5 mm
93 N·m
(9.5 kgf-m, 69 lbf-ft)



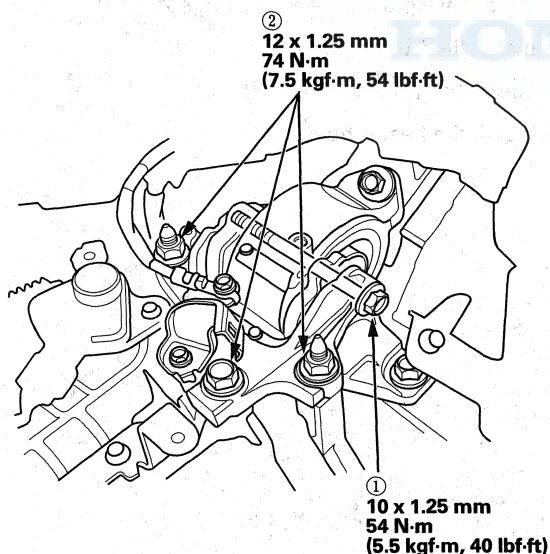


21. Tighten the transmission mount mounting bolts and nuts in the numbered sequence shown.

M/T model



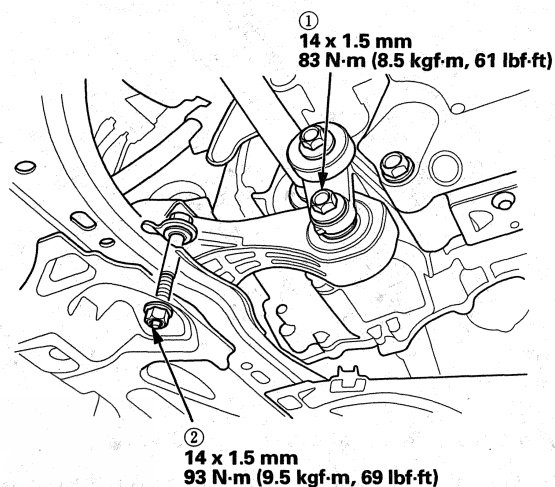
CVT model



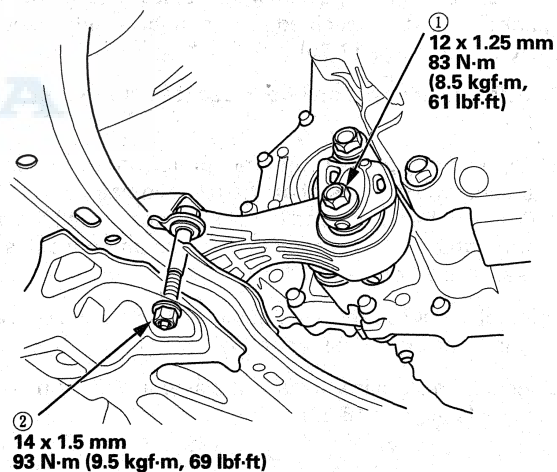
22. Raise the vehicle on the lift.

23. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



CVT model



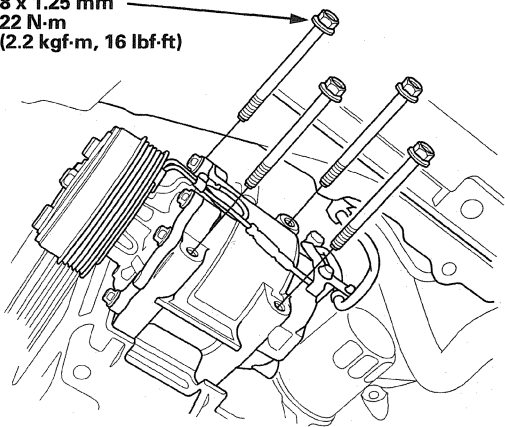
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Engine Assembly

Engine Installation (cont'd)

24. Install the A/C compressor.

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



25. Install the driveshafts (see page 16-19).

26. Wipe off any grease contamination from the tapered section and threads of the ball joint. Connect the lower arm to the knuckle. Install a new castle nut, and tighten it to the specified torque on both sides (see step 18 on page 17-70).

27. Install the lock pin on both sides (see step 19 on page 17-70).

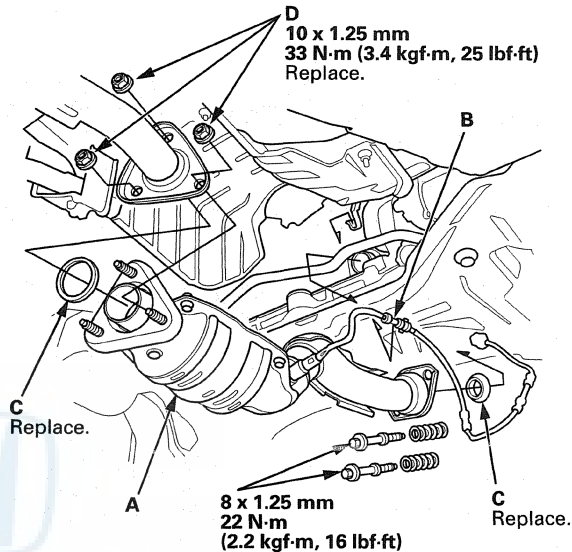
28. Wipe off any grease contamination from the tapered section and threads of the tie-rod end ball joint. Connect the tie-rod end to the knuckles. Install the nut, and tighten it to the specified torque on both sides (see step 20 on page 17-71).

29. Install a new cotter pin, and bend it as shown on both sides (see step 21 on page 17-71).

30. Install the stabilizer links to the stabilizer bar on both sides (see page 18-20).

31. Install the under-floor TWC (A) and the harness clamp (B).

NOTE: Use new gaskets (C) and new self-locking nuts (D).

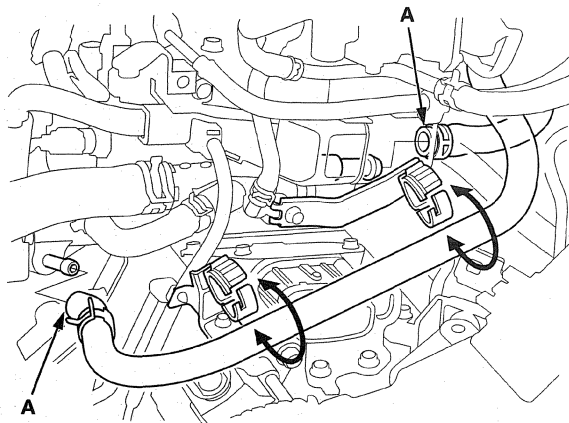


32. Install the splash shield (see page 20-163).

33. Install the front wheels.

34. Lower the vehicle on the lift.

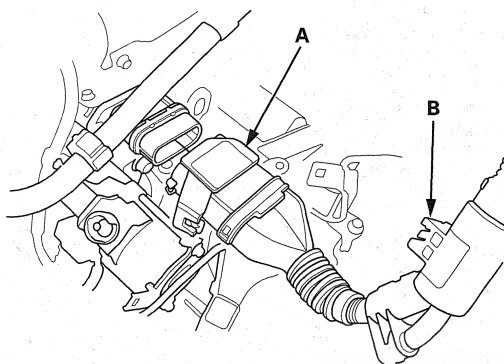
35. Install the heater hoses (A).



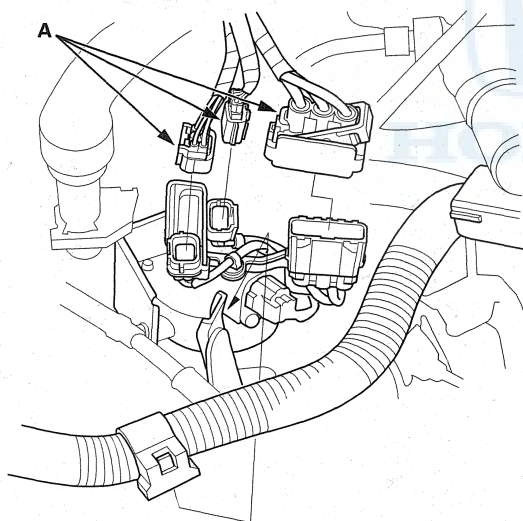


36. Connect the IMA motor power cable connector (A) and the harness clamp (B).

NOTE: Make sure you have read the IMA system service precautions (see page 12-3).



37. Connect the EPS connectors (A).



38. Install the radiator (see page 10-24).

39. Install the drive belt (see page 10-17).

40. M/T model: Connect the reverse lockout solenoid 2P connector (see step 38 on page 13-54).

41. M/T model: Apply a light coat of silicone grease (P/N 08C30-B0234M) to the cable ends, and connect the cable end to the change lever assembly, then install the shift cable bracket, the harness bracket, and the lock pins. Do not bend or damage the shift cables. (see step 39 on page 13-54).

NOTE: Make sure not to get any silicone grease on the terminal part of the connectors and switches, especially if you have silicone grease on your hands or gloves.

42. M/T model: Apply a light coat of super high temp urea grease (P/N 08798-9002) to the end of the slave cylinder push rod. Install the slave cylinder. Be careful not to bend the clutch line (see step 40 on page 13-55).

43. M/T model: Install the cable guard bracket and the clutch line bracket (see step 41 on page 13-55).

44. CVT model: Secure the shift cable holder on the transmission with the bolts (see step 36 on page 14-171).

45. CVT model: Install the clamp bracket (see step 37 on page 14-171).

46. CVT model: Apply molybdenum grease to the hole in the shift cable end collar (A). Attach the shift cable end to the selector control lever. Insert the control pin through the selector control lever hole, through the shift cable end collar hole, and into the selector control lever slotted hole in the direction shown. Push the control pin until its flange contacts the selector control lever surface (see step 38 on page 14-171).

47. CVT model: Insert the lock pin in the direction shown through the control pin hole and out the opening of the selector control lever so that the hooked end of the lock pin locks into the countersunk hole of the control pin (see step 39 on page 14-171).

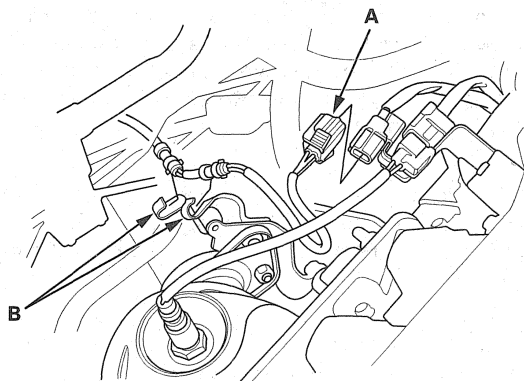
48. Connect the steering joint onto the steering gearbox pinion shaft, then install the steering joint cover (see page 17-64), then remove the steering wheel holder tool.

(cont'd)

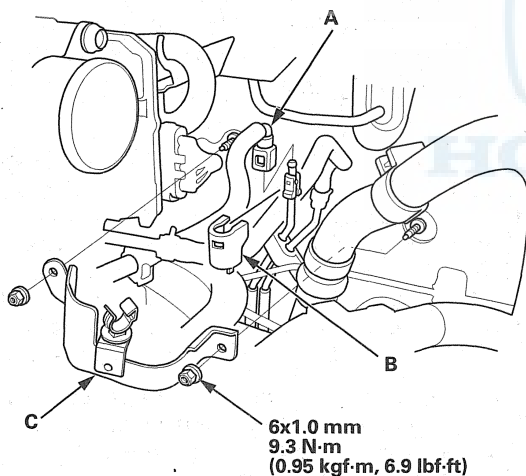
Engine Assembly

Engine Installation (cont'd)

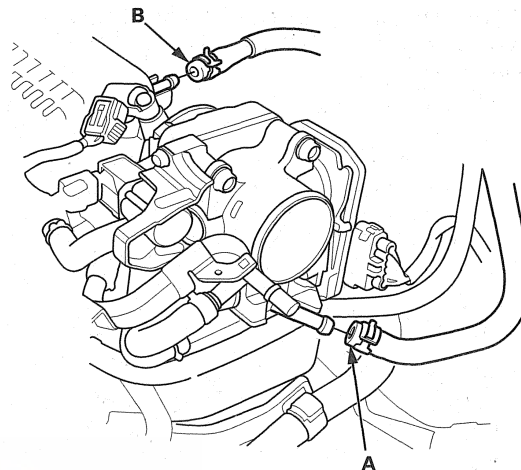
49. Connect the secondary HO2S connector (A), then install the secondary HO2S harness to the clamps (B).



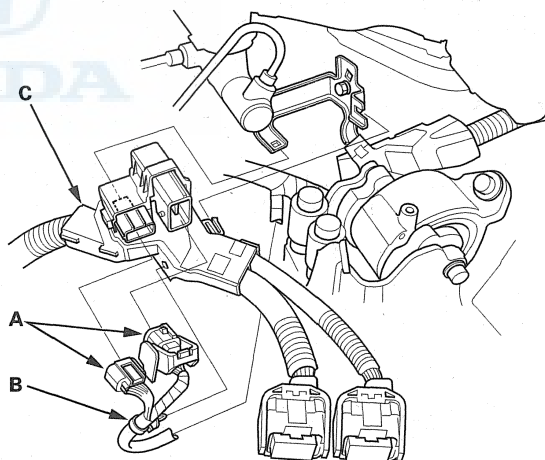
50. Connect the fuel feed hose (A) (see page 11-297), then install the quick-connect fitting cover (B) and the fuel feed hose clamp bracket (C).



51. Install the EVAP canister hose (A) and the brake booster vacuum hose (B).



52. Connect the engine compartment wire harness connectors (A), then install the harness clamp (B).

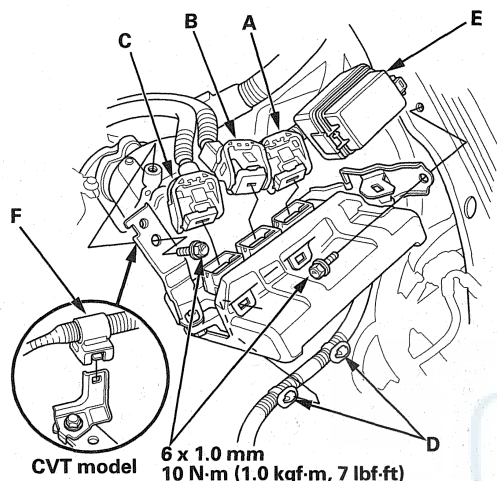


53. Install the harness holder (C).



54. Install the ECM/PCM with the bracket, then connect ECM/PCM connectors A, B, and C.

NOTE: ECM/PCM connectors A, B, and C have symbols (A=□, B=△, C=○) embossed on them for identification.

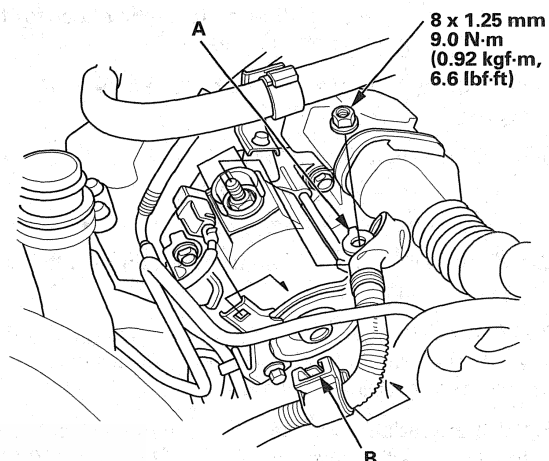


55. Install the harness clamps (D) and auxiliary under-hood relay box A (E).

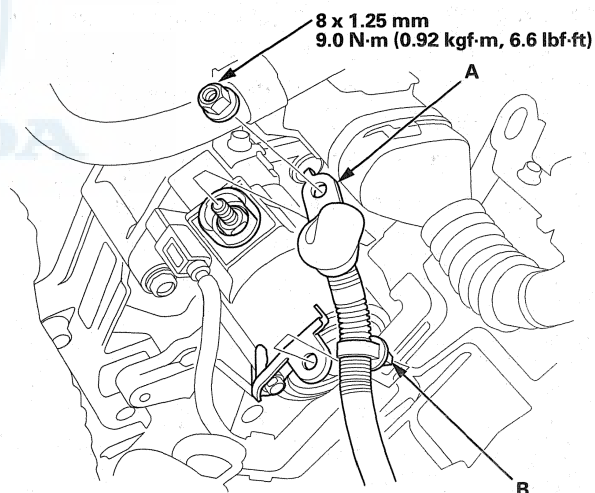
56. CVT model: Install the harness clamp (F).

57. Install the starter cable (A) and the harness clamp (B).

M/T model



CVT model



58. Install the air cleaner (see page 9-3).

59. Install the front bumper center upper beam (see page 20-149).

60. Install the cowl cover and the under-cowl panel (see page 20-153).

61. Do the 12 volt battery installation procedure (see page 22-88).

62. Turn the battery module switch ON (see page 12-4).

(cont'd)

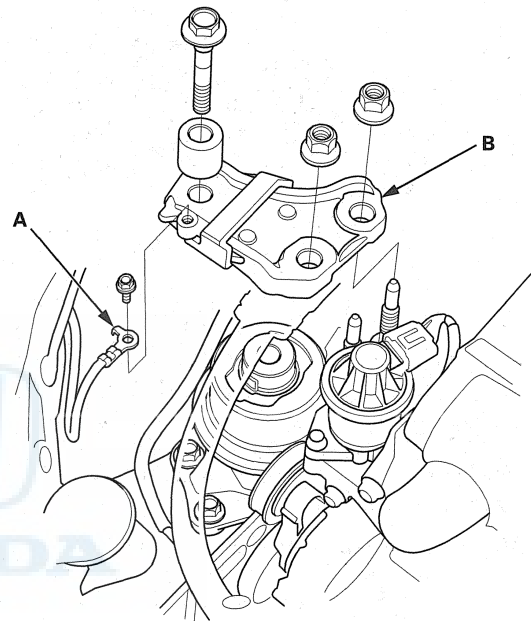
Engine Assembly

Engine Installation (cont'd)

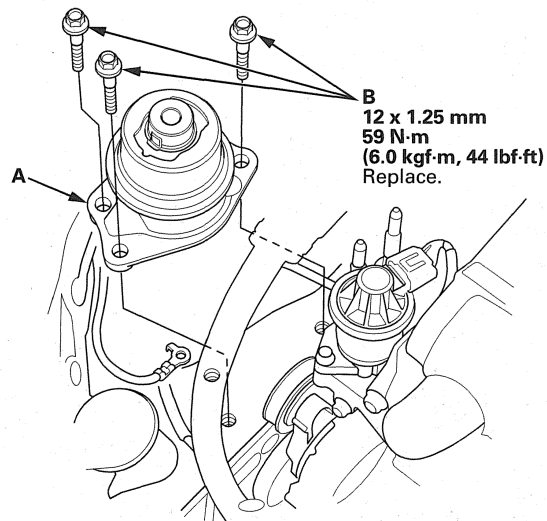
63. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.
64. Refill the engine with engine oil (see step 6 on page 8-10).
65. Refill the transmission fluid:
 - M/T model (see step 5 on page 13-41)
 - CVT model (see step 9 on page 14-155)
66. M/T model: Check that the transmission shifts into all gears smoothly.
67. CVT model: Move the shift lever to each gear, and verify that the CVT gear position indicator follows the transmission range switch.
68. Refill the radiator with engine coolant, and bleed air from the cooling system (see step 8 on page 10-9).
69. Do the ECM/PCM reset procedure (see page 11-4).
70. Do the CKP pattern clear/CKP pattern learn procedure (see page 11-5).
71. Do the IMA motor rotor position calibration procedure (see page 12-7).
72. Inspect the idle speed (see page 11-273).
73. Inspect the ignition timing (see page 4-20).

Side Engine Mount Replacement

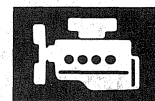
1. Support the engine with a jack and a wood block under the oil pan.
2. Remove the ground cable (A), then remove the side engine mount bracket (B).



3. Remove the side engine mount (A).

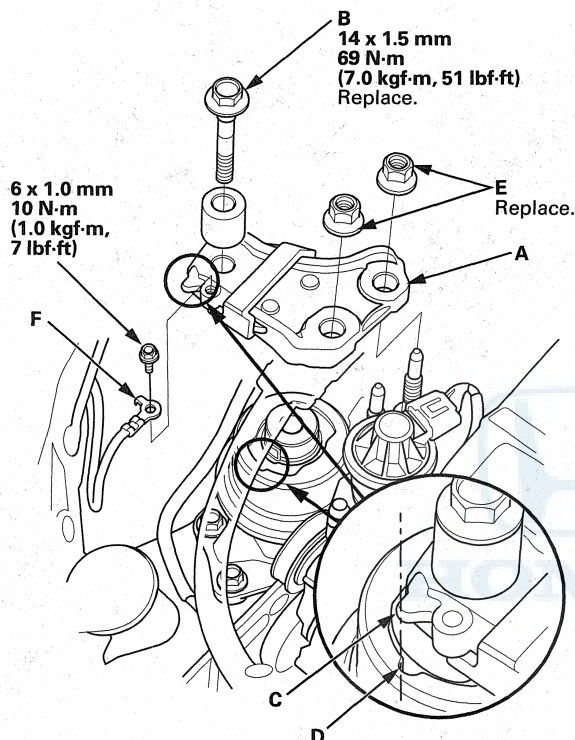


4. Install the side engine mount, then tighten new side engine mount mounting bolts (B).



5. Install the side engine mount bracket (A) with a new bolt (B).

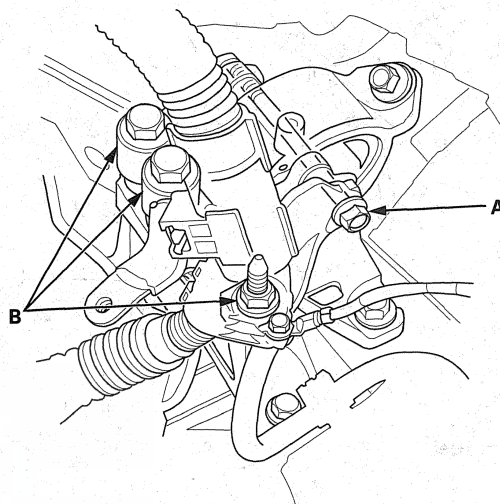
NOTE: Make sure to align the projection (C) with the mark (D) when you install the bracket as shown in the illustration.



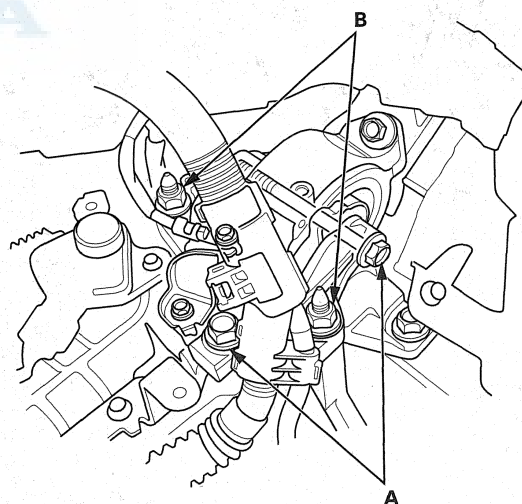
6. Loosely install new side engine mount/bracket assembly mounting nuts (E), and install the ground cable (F).
7. Remove the jack and the wood block from under the oil pan.
8. Remove the air cleaner (see page 9-3).

9. Loosen the transmission mount bracket mounting bolts (A) and nuts (B).

M/T model



CVT model



10. Raise the vehicle on the lift.

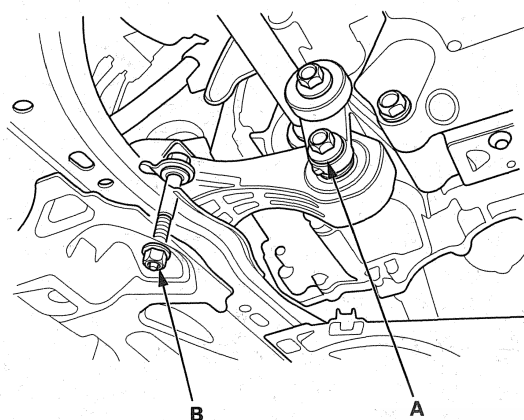
(cont'd)

Engine Assembly

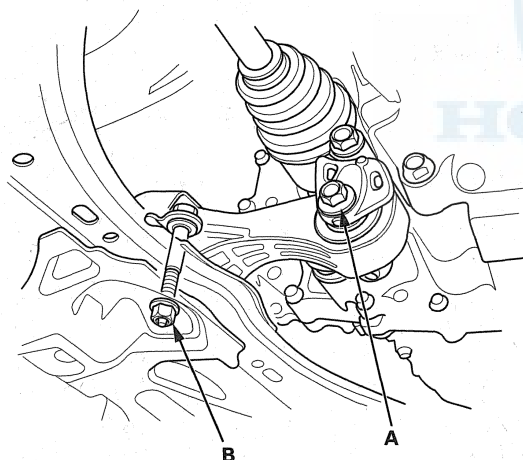
Side Engine Mount Replacement (cont'd)

11. Loosen the torque rod mounting bolt (A) and nut (B).

M/T model



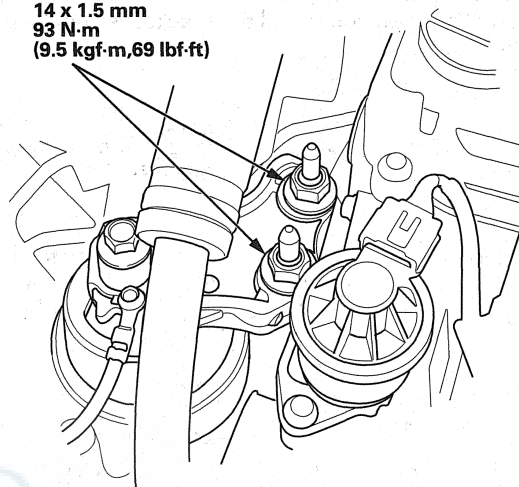
CVT model

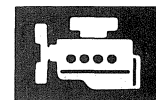


12. Lower the vehicle on the lift.

13. Tighten the side engine mount/bracket assembly mounting nuts.

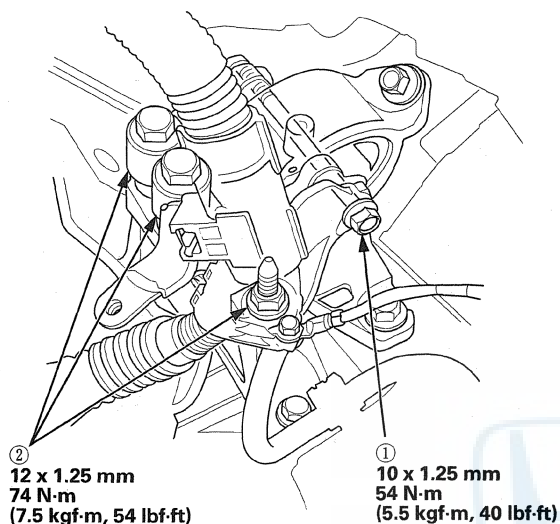
14 x 1.5 mm
93 N·m
(9.5 kgf·m, 69 lbf·ft)



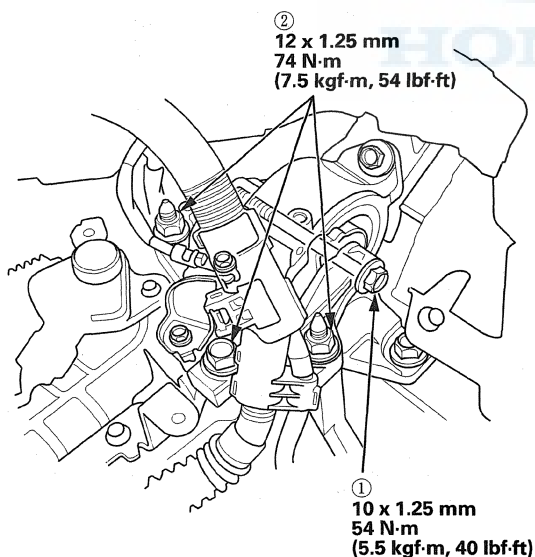


14. Tighten the transmission mount mounting bolts and nuts in the numbered sequence shown.

M/T model



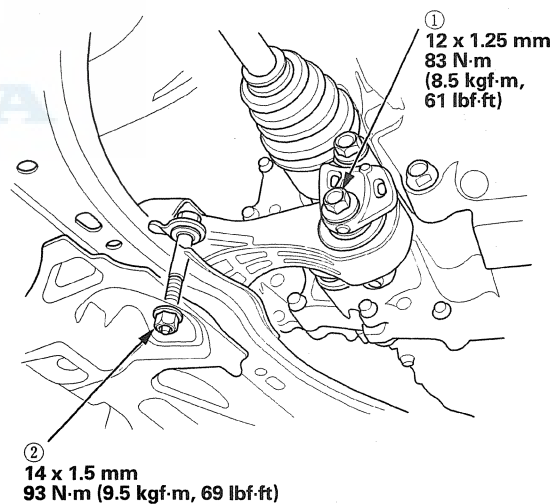
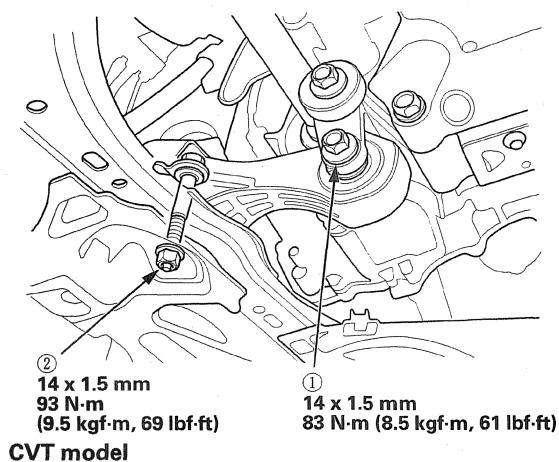
CVT model



15. Raise the vehicle on the lift.

16. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



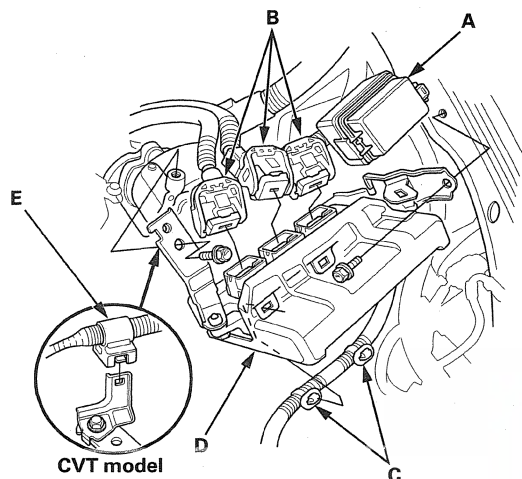
17. Lower the vehicle on the lift.

18. Install the air cleaner (see page 9-3).

Engine Assembly

Transmission Mount Replacement

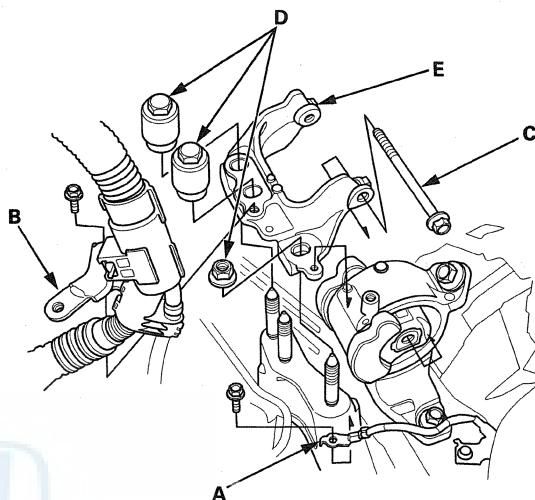
1. Do the 12 volt battery removal procedure (see page 22-87).
2. Remove the air cleaner (see page 9-3).
3. Disconnect the ECM/PCM connectors (B).



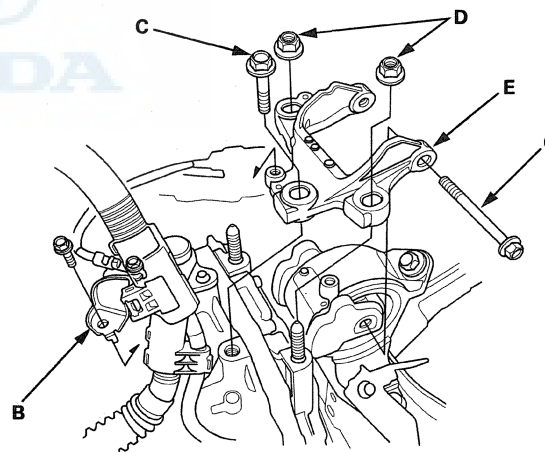
4. Remove the harness clamps (C), auxiliary under-hood relay box A, and the ECM/PCM (D).
5. CVT model: Remove the harness clamp (E).
6. Support the transmission with a jack and a wood block under the transmission.

7. Remove the ground cable (A) and the harness holder (B).

M/T model



CVT model

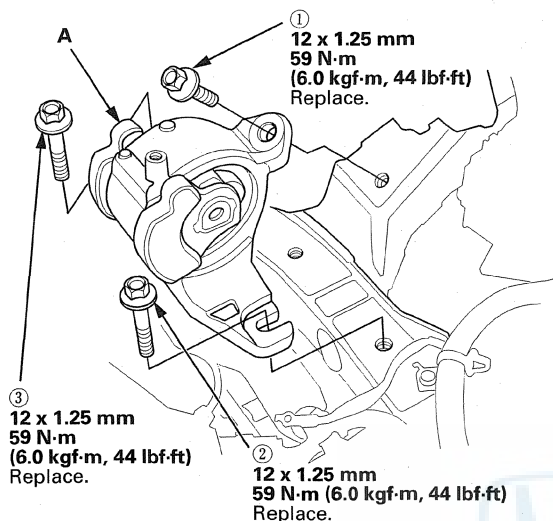


8. Remove the transmission mount bolts (C) and nuts (D), then remove the transmission mount bracket (E).

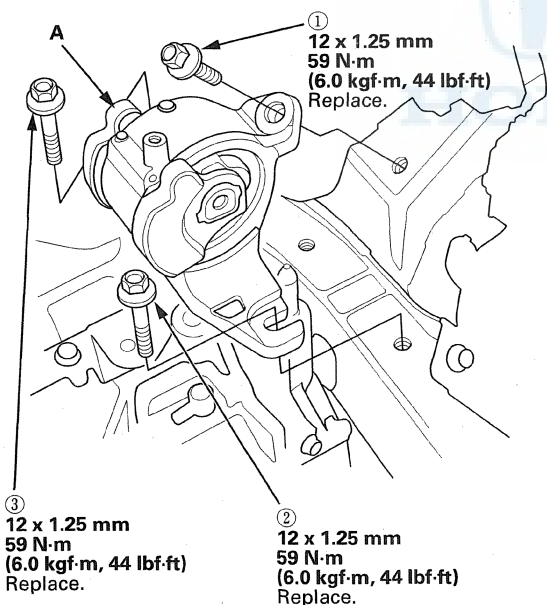


9. Remove the transmission mount (A).

M/T model



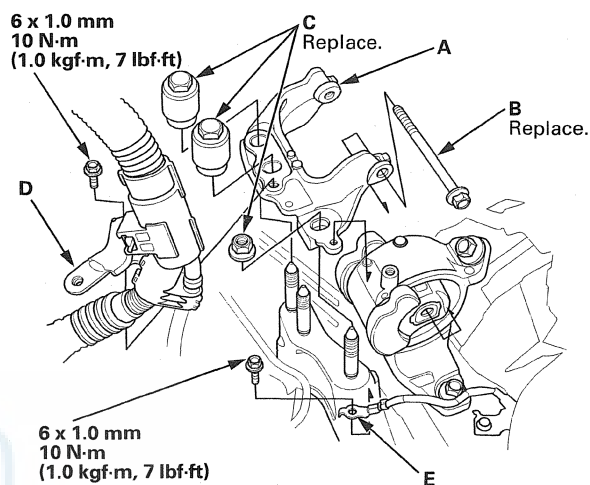
CVT model



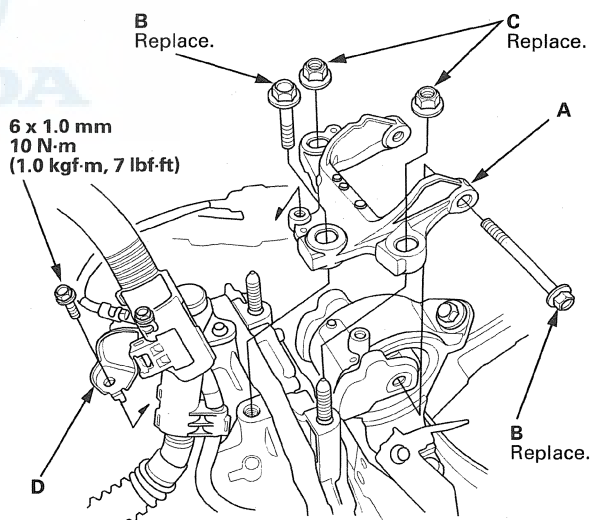
10. Install the transmission mount, and loosely install new transmission mount mounting bolts, then tighten the transmission mount mounting bolts in the numbered sequence shown.

11. Install the transmission mount bracket (A), and loosely install new transmission mount bracket mounting bolts (B) and nuts (C).

M/T model



CVT model



12. Install the harness holder (D) and the ground cable (E).

13. Remove the jack and the wood block from under the transmission.

14. Raise the vehicle on the lift.

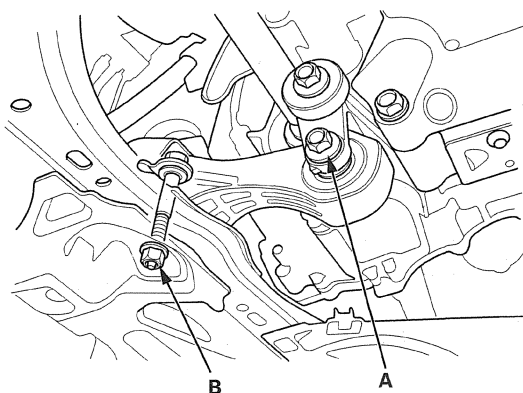
(cont'd)

Engine Assembly

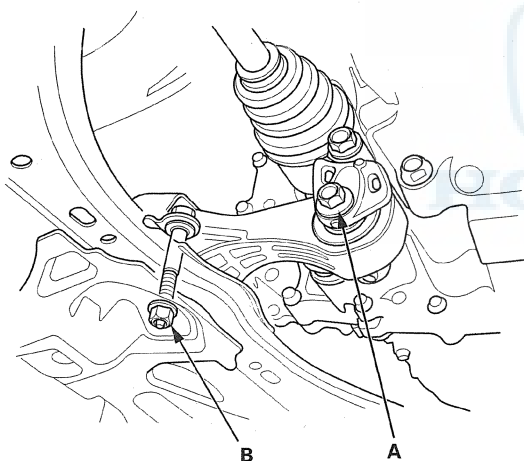
Transmission Mount Replacement (cont'd)

15. Loosen the torque rod mounting bolt (A) and nut (B).

M/T model



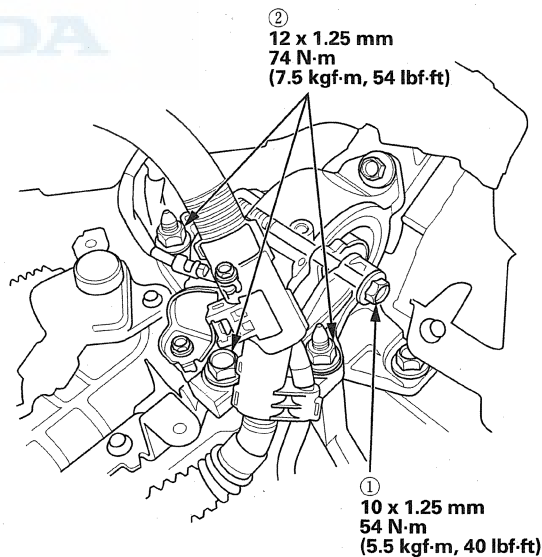
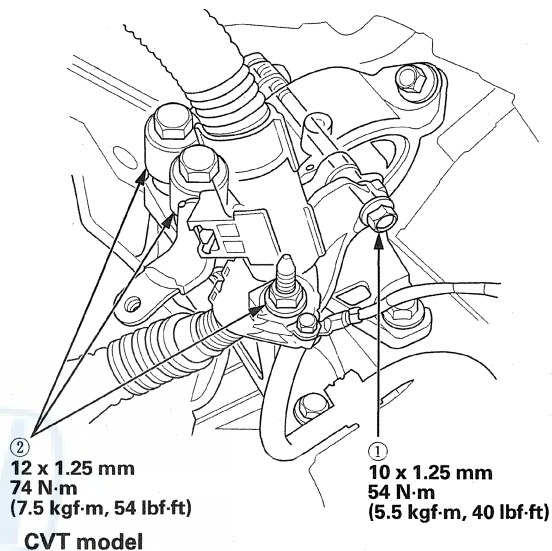
CVT model



16. Lower the vehicle on the lift.

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

M/T model

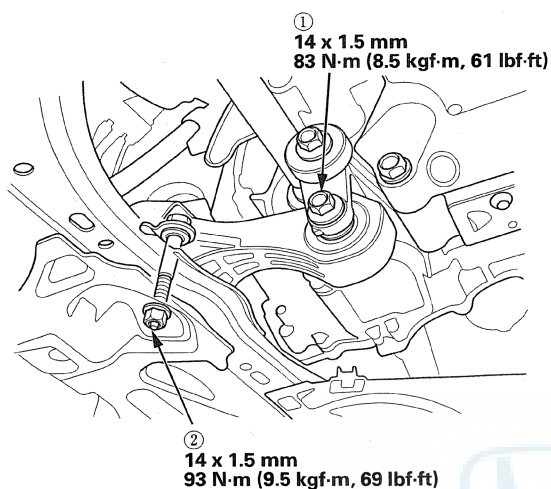


18. Raise the vehicle on the lift.

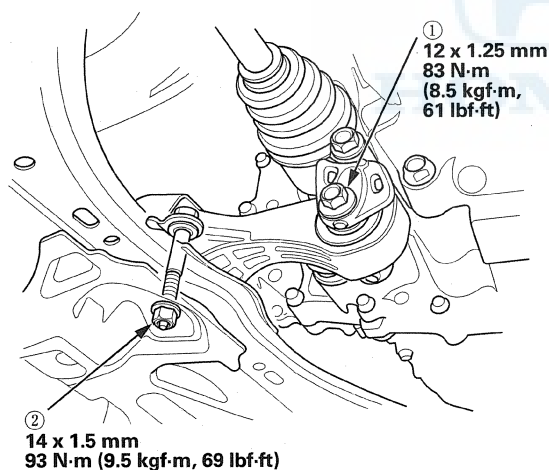


19. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model

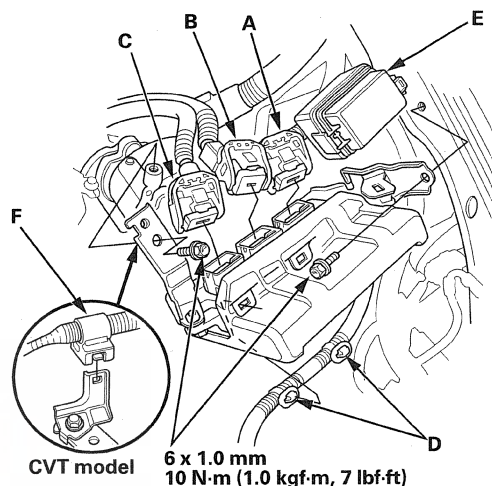


CVT model



20. Install the ECM/PCM with the ECM/PCM bracket. Then connect ECM/PCM connectors A, B, and C.

NOTE: ECM/PCM connectors A, B, and C have symbols (A=□, B=△, C=○) embossed on them for identification.



21. Install the harness clamps (D) and auxiliary under-hood relay box A (E).

22. CVT model: Install the harness clamp (F).

23. Do the 12 volt battery installation procedure (see page 22-88).

24. Install the air cleaner (see page 9-3).

25. Do the ECM/PCM reset procedure (see page 11-4).

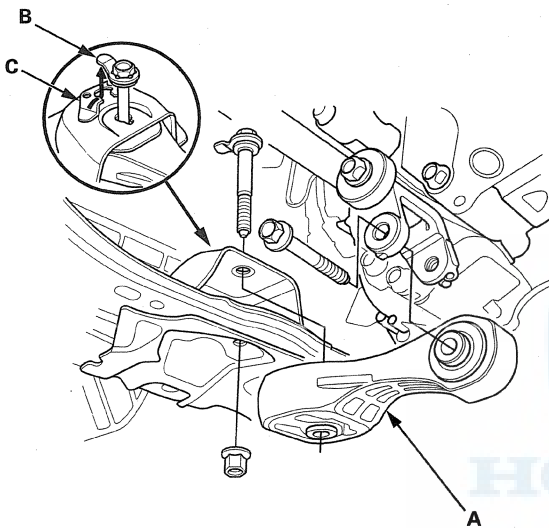
Engine Assembly

Torque Rod Replacement

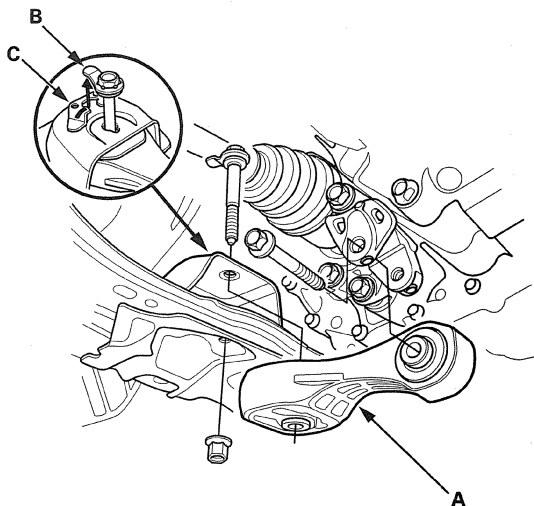
1. Raise the vehicle on the lift.
2. Support the transmission with a transmission jack and a wood block under the transmission.
3. Remove the torque rod (A).

NOTE: Make sure the tab (B) on the bolt head aligned with the guide (C) on the front subframe.

M/T model



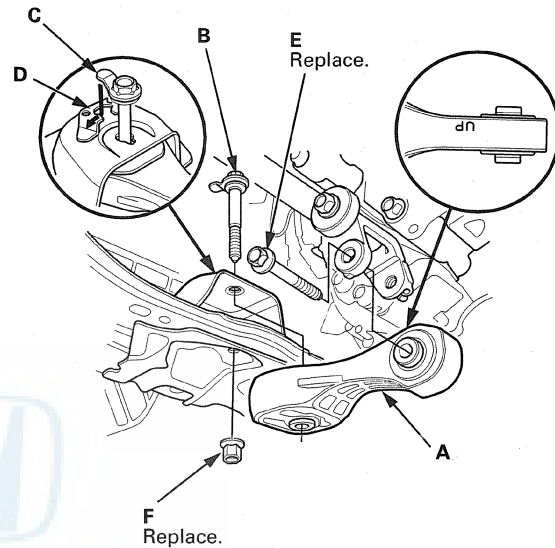
CVT model



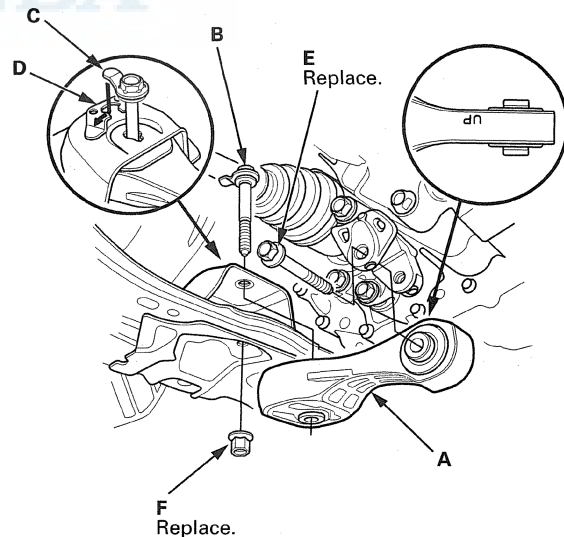
4. Install the torque rod (A).

NOTE: Be sure to install the torque rod with the "UP" mark facing up.

M/T model



CVT model

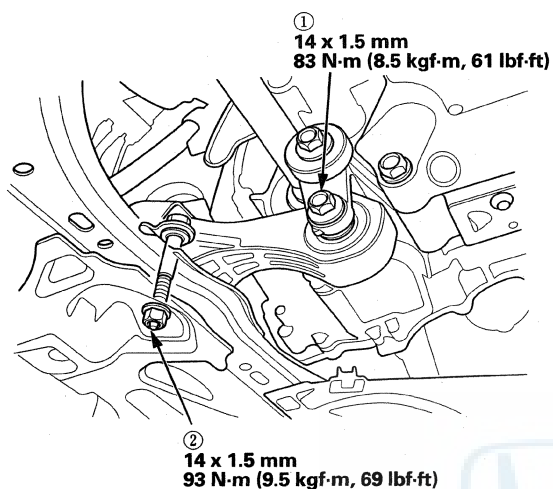


5. Install the bolt (B) with the tab (C) on the bolt head aligned with the guide (D) on the front subframe, then loosely install a new torque rod mounting bolt (E) and nut (F).
6. Remove the transmission jack and the wood block from under the transmission.

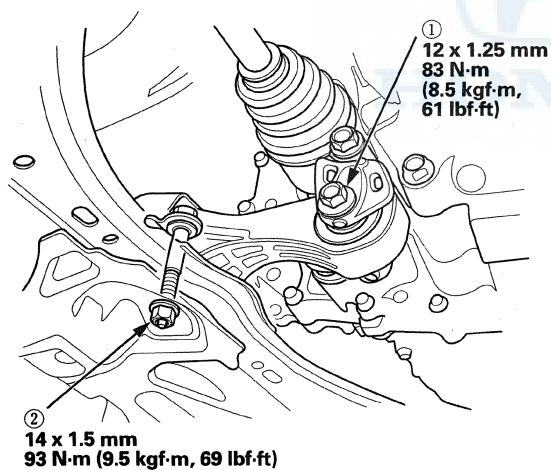


7. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model

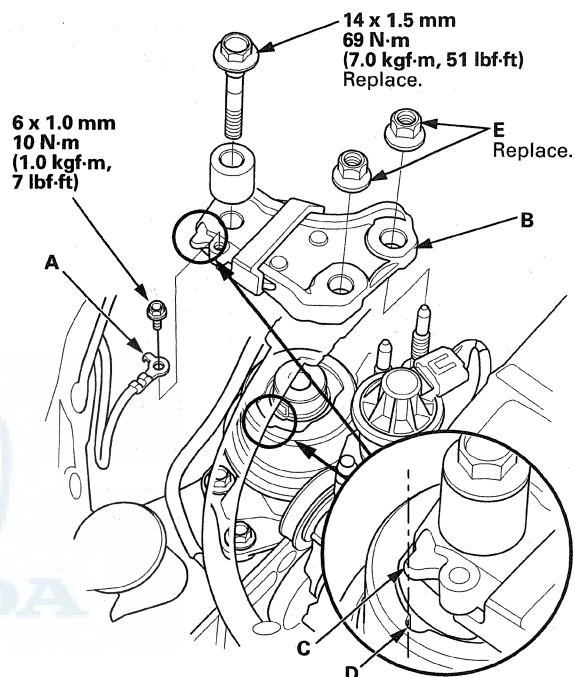


CVT model



Side Engine Mount Bracket Replacement

1. Support the engine with a jack and a wood block under the oil pan.
2. Remove the ground cable (A) and the side engine mount bracket (B)



3. Install the side engine mount bracket with a new bolt.

NOTE: Make sure to align the projection (C) with the mark (D) when you install the bracket as shown in the illustration.

4. Loosely install new side engine mount/bracket assembly mounting nuts (E), and install the ground cable.
5. Remove the jack and the wood block from under the oil pan.
6. Remove the air cleaner (see page 9-3).

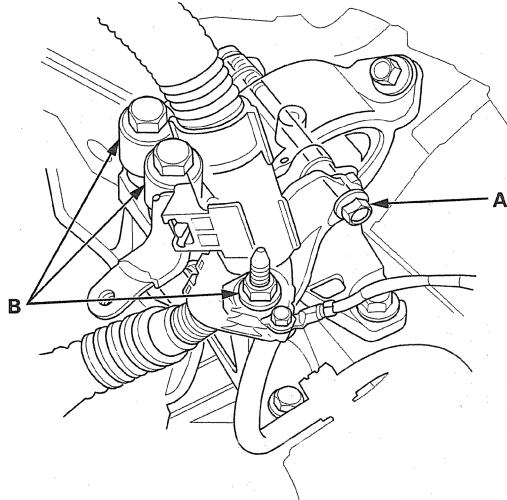
(cont'd)

Engine Assembly

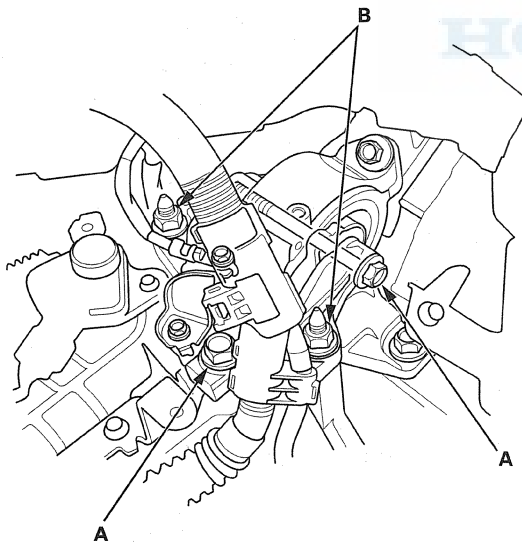
Side Engine Mount Bracket Replacement (cont'd)

7. Loosen the transmission mount bracket mounting bolts (A) and nuts (B).

M/T model



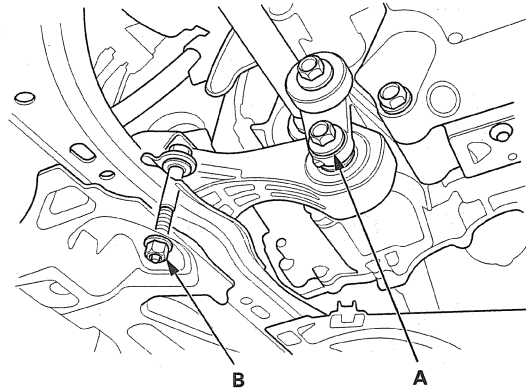
CVT model



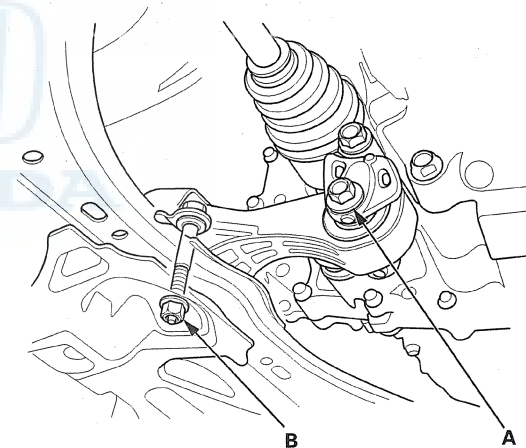
8. Raise the vehicle on the lift.

9. Loosen the torque rod mounting bolt (A) and nut (B).

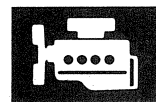
M/T model



CVT model

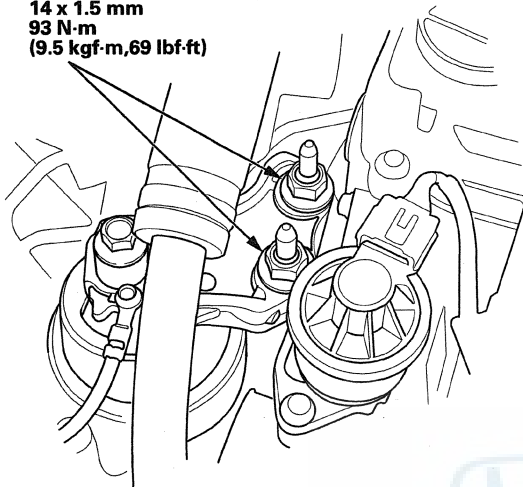


10. Lower the vehicle on the lift.



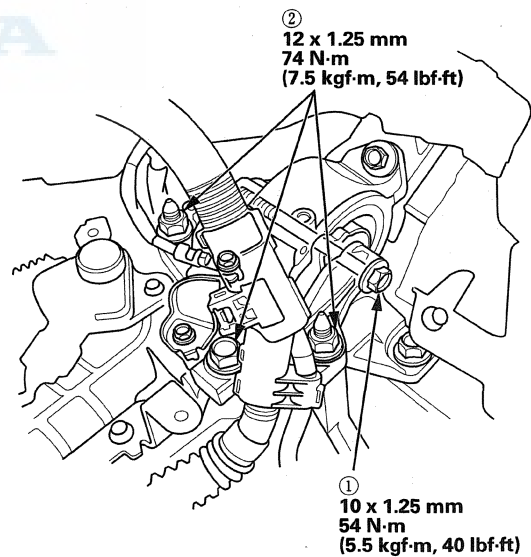
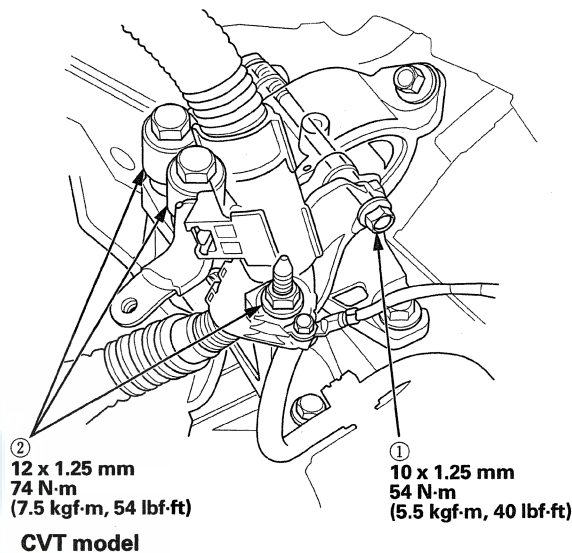
11. Tighten the side engine mount/bracket assembly mounting nuts.

14 x 1.5 mm
93 N·m
(9.5 kgf·m, 69 lbf·ft)



12. Tighten the transmission mount mounting bolt and nuts in the numbered sequence shown.

M/T model



13. Raise the vehicle on the lift.

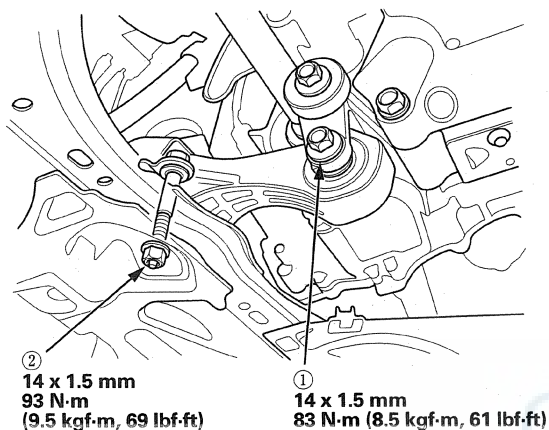
(cont'd)

Engine Assembly

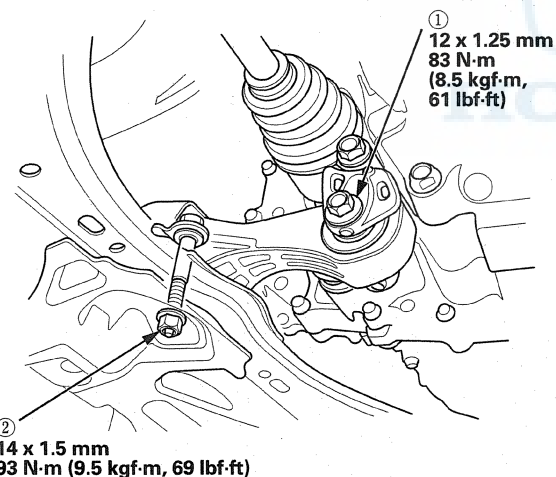
Side Engine Mount Bracket Replacement (cont'd)

14. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



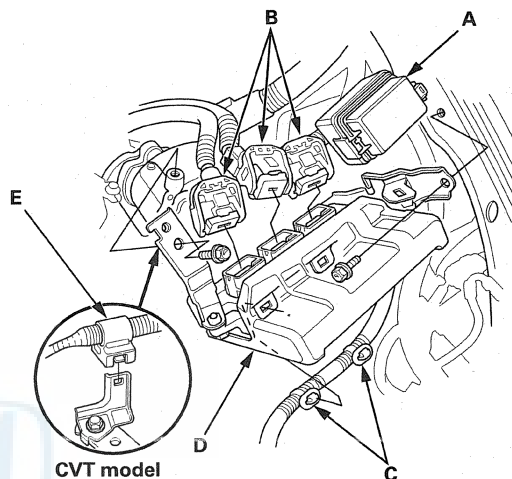
CVT model



15. Lower the vehicle on the lift.
16. Install the air cleaner (see page 9-3).

Transmission Mount Bracket Replacement

1. Do the 12 volt battery removal procedure (see page 22-87).
2. Remove the air cleaner (see page 9-3).
3. Disconnect the ECM/PCM connectors (B).

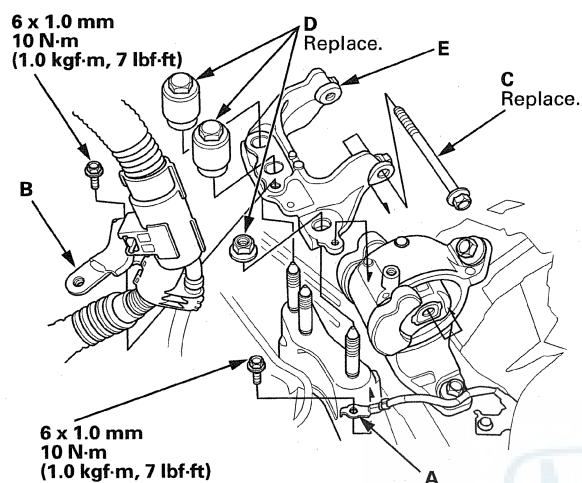


4. Remove the harness clamps (C), auxiliary under-hood relay box A, and the ECM/PCM (D).
5. CVT model: Remove the harness clamp (E).
6. Support the transmission with a jack and a wood block under the transmission.

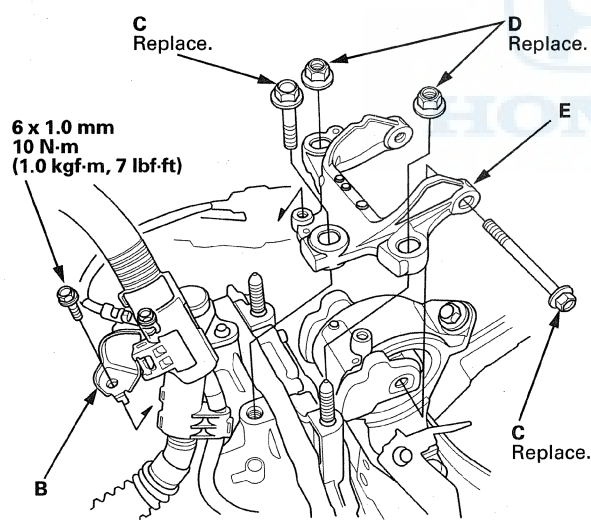


7. Remove the ground cable (A) and the harness holder (B).

M/T model



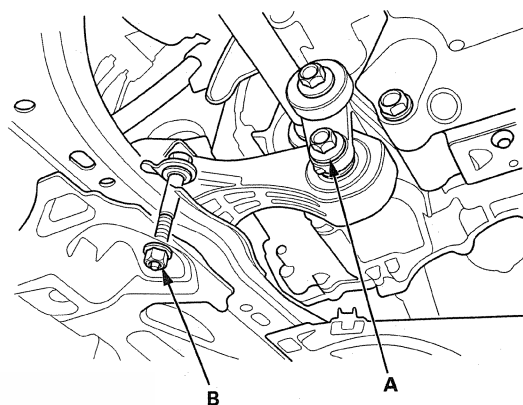
CVT model



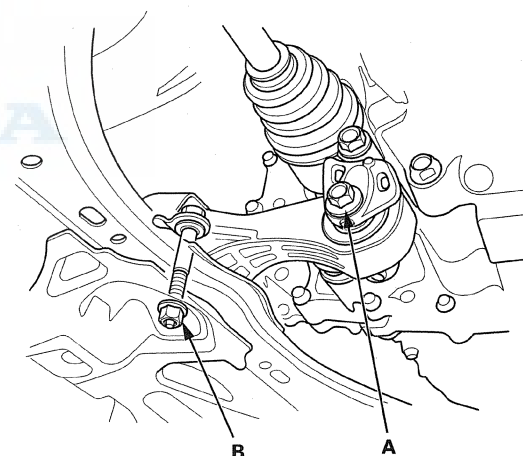
8. Remove the transmission mount bolts (C) and nuts (D), then remove the transmission mount bracket (E).
9. Install the transmission mount bracket, and loosely install new transmission mount bracket mounting bolts and nuts.
10. Install the harness holder and the ground cable.
11. Remove the jack and the wood block from under the transmission.
12. Raise the vehicle on the lift.

13. Loosen the torque rod mounting bolt (A) and nut (B).

M/T model



CVT model



14. Lower the vehicle on the lift.

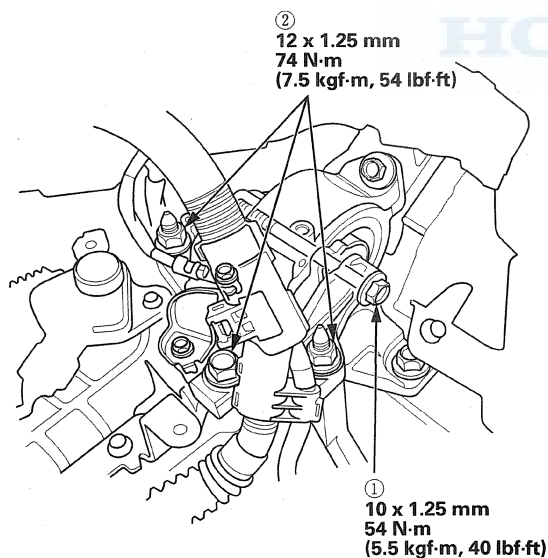
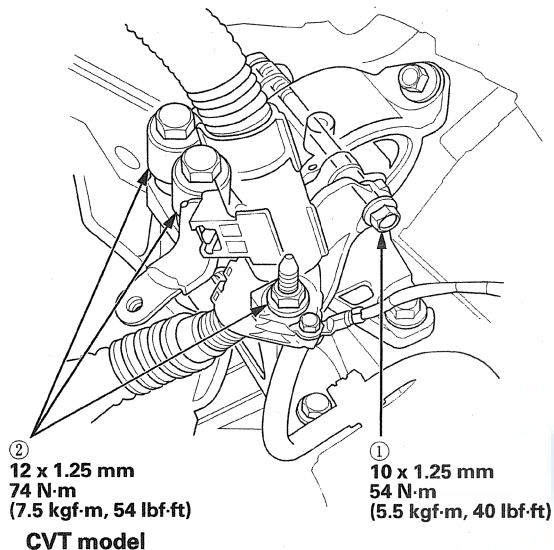
(cont'd)

Engine Assembly

Transmission Mount Bracket Replacement (cont'd)

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

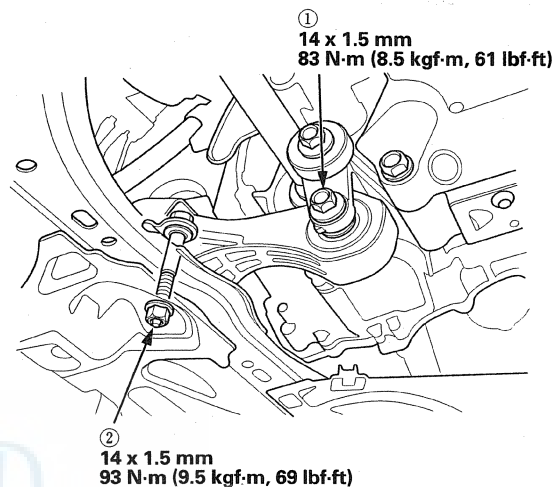
M/T model



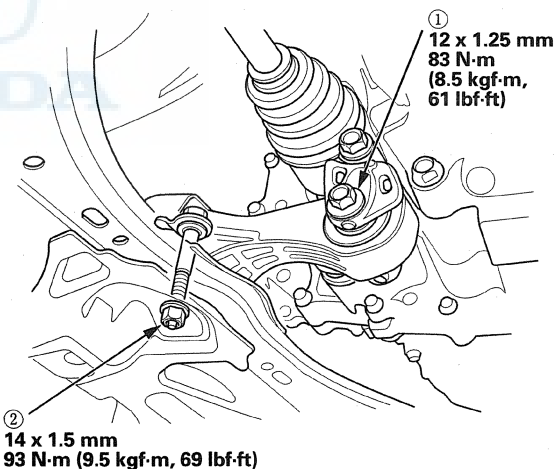
16. Raise the vehicle on the lift.

17. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



CVT model



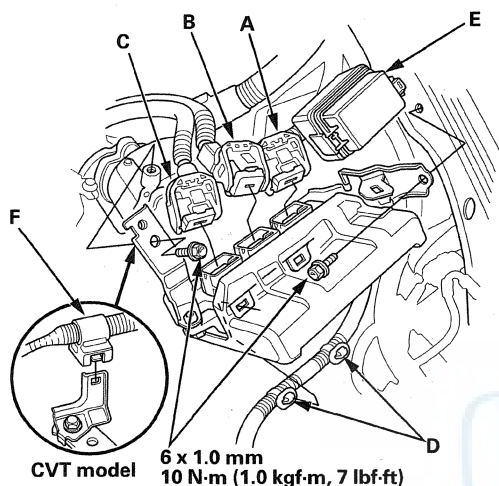
18. Lower the vehicle on the lift.



Torque Rod Bracket Replacement

19. Install the ECM/PCM with the ECM/PCM bracket. Then connect ECM/PCM connectors A, B, and C.

NOTE: ECM/PCM connectors A, B, and C have symbols (A=□, B=△, C=○) embossed on them for identification.



20. Install the harness clamps (D) and auxiliary under-hood relay box A (E).

21. CVT model: Install the harness clamp (F).

22. Do the 12 volt battery installation procedure (see page 22-88).

23. Install the air cleaner (see page 9-3).

24. Do the ECM/PCM reset procedure (see page 11-4).

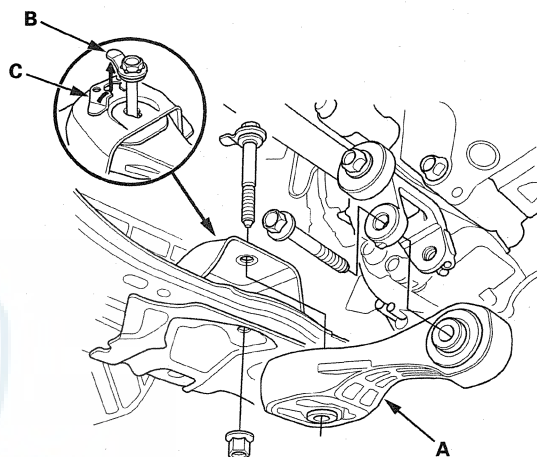
1. Raise the vehicle on the lift.

2. Support the transmission with a transmission jack and a wood block under the transmission.

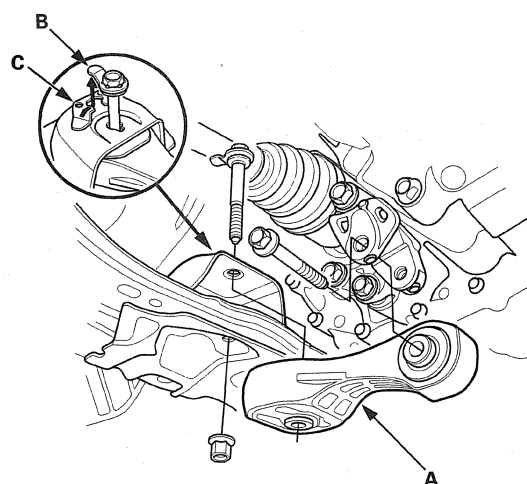
3. Remove the torque rod (A).

NOTE: Make sure the tab (B) on the bolt head aligned with the guide (C) on the front subframe.

M/T model



CVT model



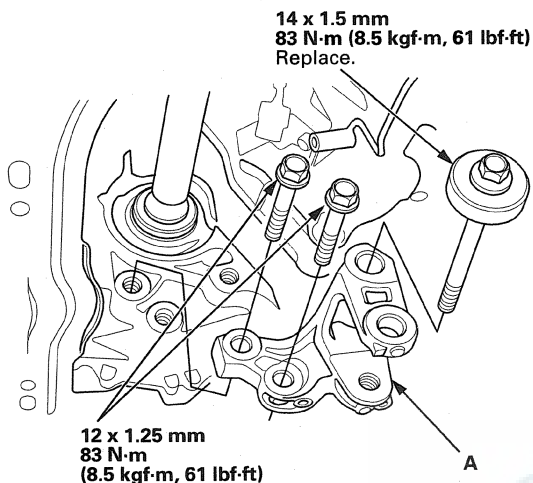
(cont'd)

Engine Assembly

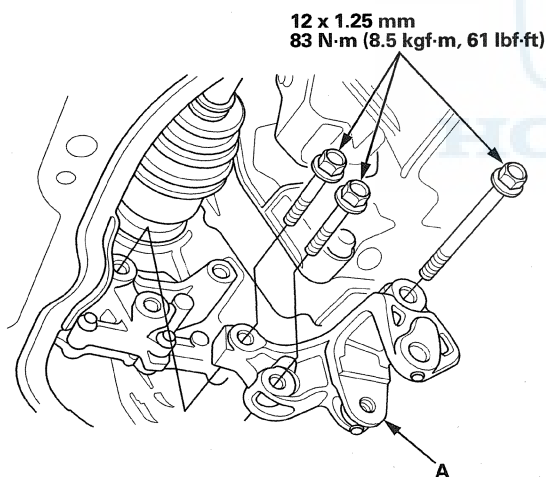
Torque Rod Bracket Replacement (cont'd)

4. Remove the torque rod bracket (A).

M/T model



CVT model

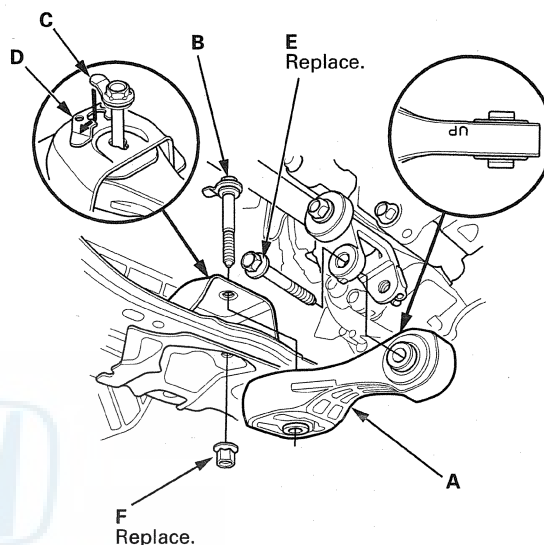


5. Install the torque rod bracket.

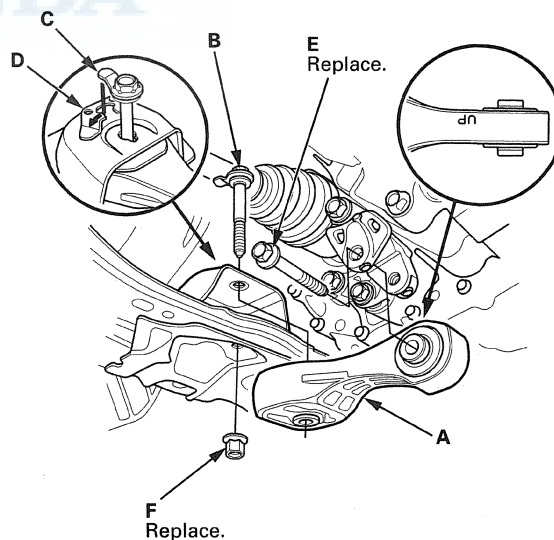
6. Install the torque rod (A).

NOTE: Be sure to install the torque rod with the "UP" mark facing up.

M/T model



CVT model



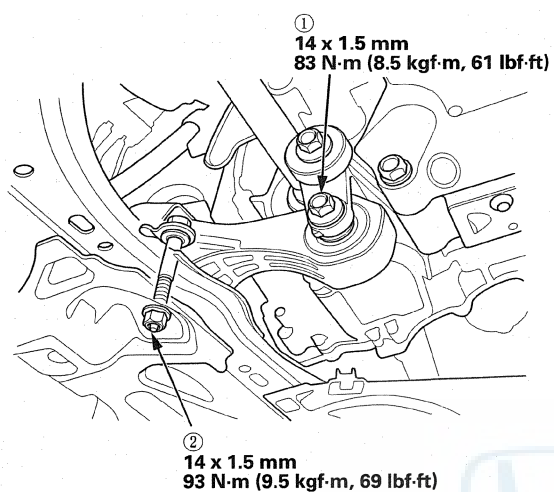
7. Install the bolt (B) with the tab (C) on the bolt head aligned with the guide (D) on the front subframe, then loosely install a new torque rod mounting bolt (E) and nut (F).

8. Remove the transmission jack and the wood block from under the transmission.

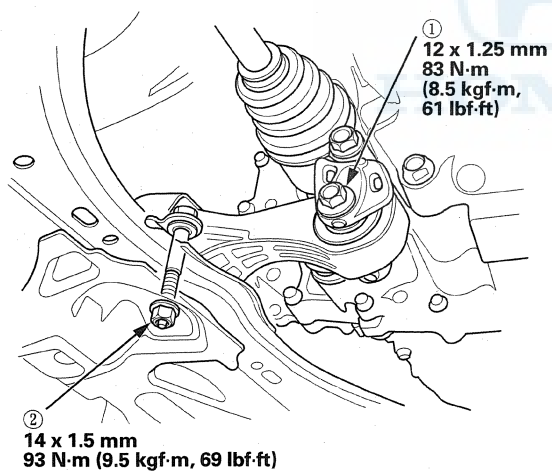


9. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



CVT model



Engine Mechanical

Cylinder Head

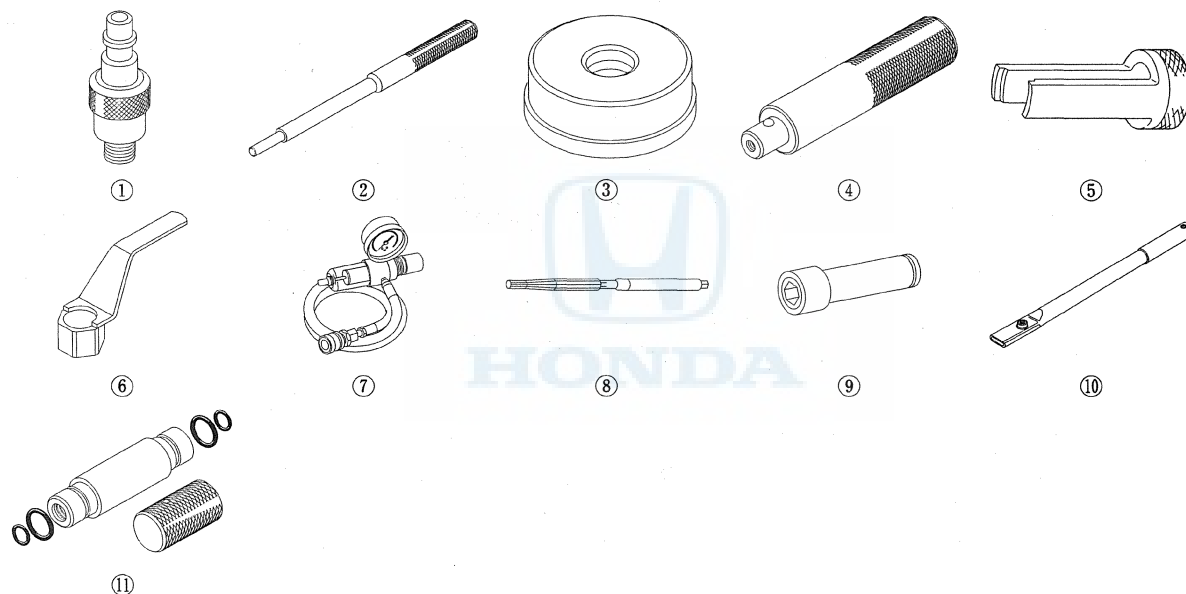
Special Tools	6-2
Component Location Index	6-3
Engine Compression Inspection	6-6
VTEC Rocker Arm Test	6-7
Valve Clearance Adjustment	6-8
Crankshaft Pulley Removal and Installation	6-10
Cam Chain Removal	6-12
Cam Chain Installation	6-14
Cam Chain Case Oil Seal Installation	6-21
Cylinder Head Cover Removal	6-22
Cylinder Head Cover Installation	6-22
Cylinder Head Removal	6-24
CMP Pulse Plate Removal and Installation	6-26
Camshaft Sprocket Removal	6-29
Camshaft Sprocket Installation	6-30
Cylinder Head Inspection for Warpage	6-32
Rocker Arm Assembly Removal	6-32
Rocker Arm and Shaft Disassembly/Reassembly	6-34
Rocker Arm and Shaft Inspection	6-35
Camshaft Removal	6-36
Camshaft Inspection	6-37
Valve, Spring, and Valve Seal Removal	6-39
Valve Inspection	6-40
Valve Stem-to-Guide Clearance Inspection	6-40
Valve Guide Replacement	6-41
Valve Seat Reconditioning	6-43
Valve, Spring, and Valve Seal Installation	6-44
Camshaft Installation	6-45
Rocker Arm Assembly Installation	6-46
Cylinder Head Installation	6-46

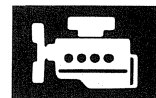


Cylinder Head

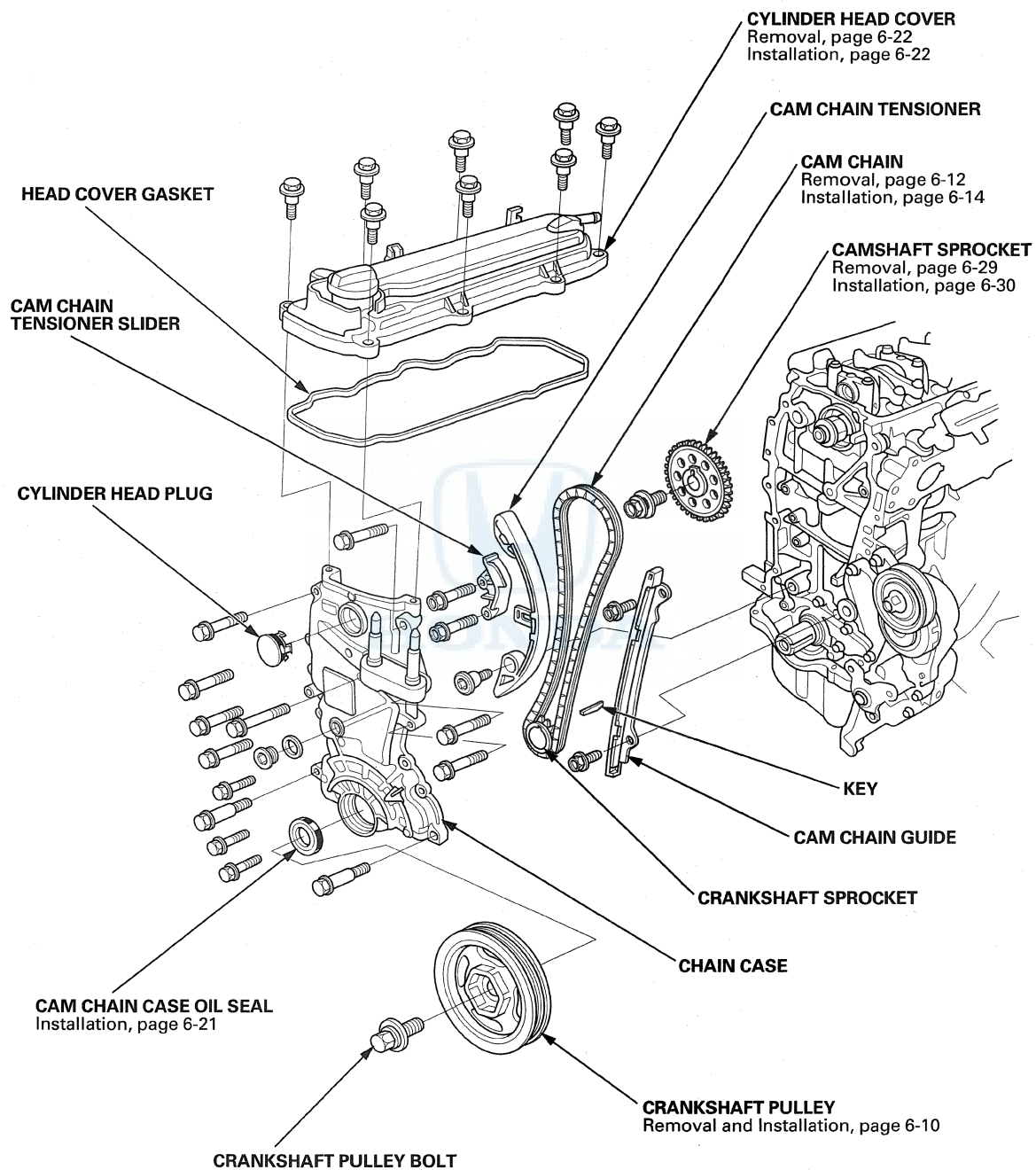
Special Tools

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	07746-0010400	Bearing Driver Attachment, 52 x 55 mm	1
④	07749-0010000	Driver Handle, 15 x 135L	1
⑤	07757-PJ1010A	Valve Spring Compressor Attachment	1
⑥	07AAB-RJAA100	Crankshaft Pulley Holder	1
⑦	07AAJ-PNAA101	Air Pressure Regulator	1
⑧	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
⑨	07JAA-001020A	Socket, 19 mm	1
⑩	07JAB-001020B	Holder Handle	1
⑪	07PAD-0010000	Stem Seal Driver	1





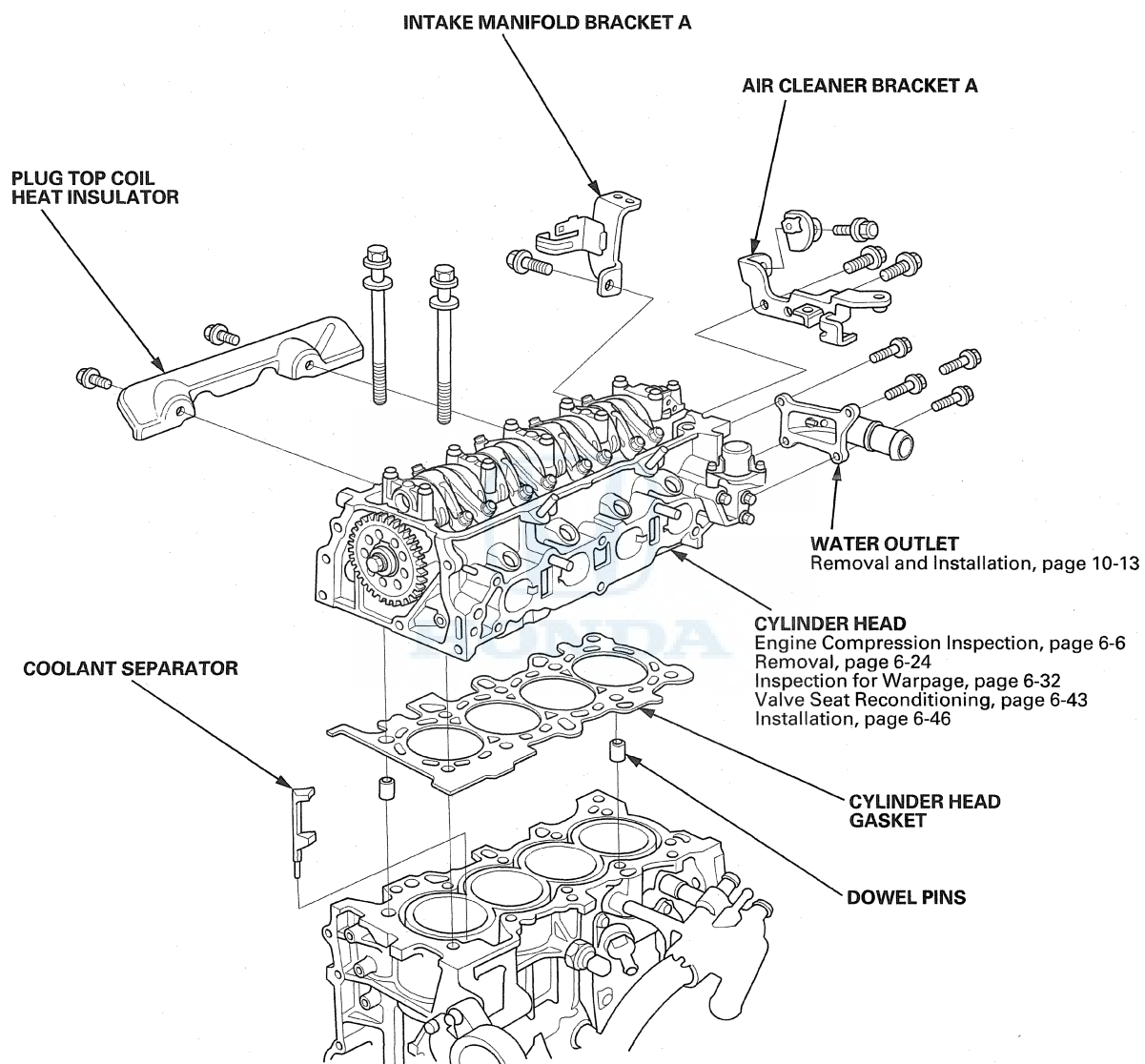
Component Location Index

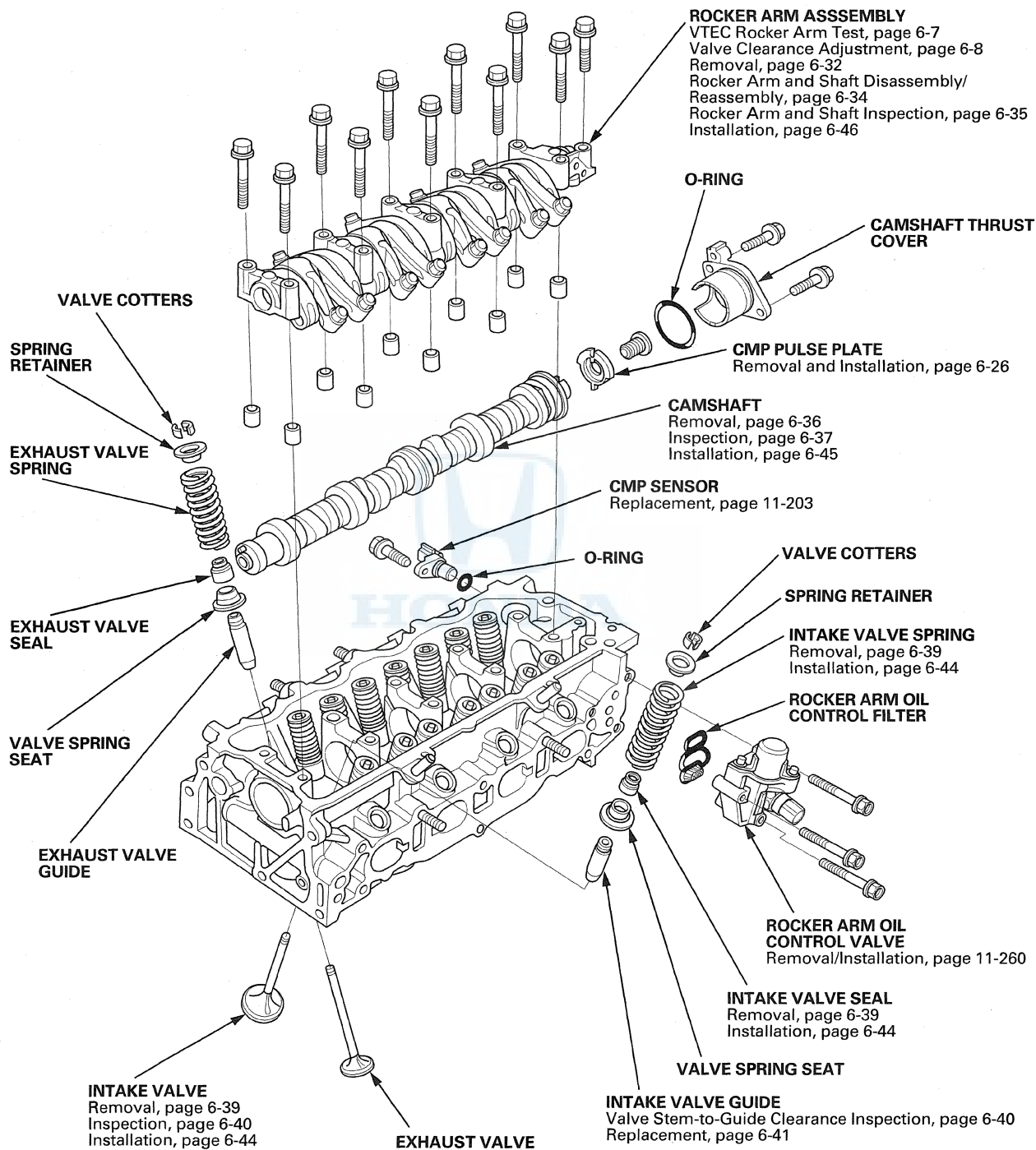


(cont'd)

Cylinder Head

Component Location Index (cont'd)



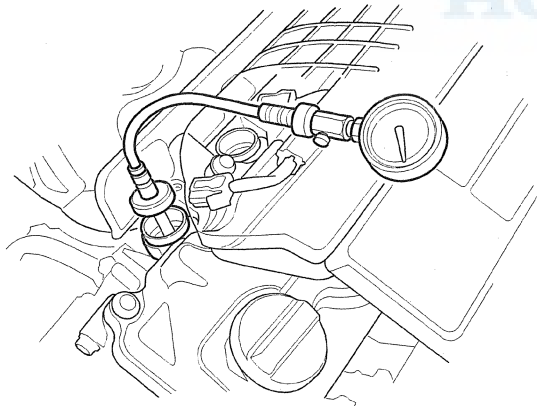


Cylinder Head

Engine Compression Inspection

NOTE: After this inspection, you must reset PGM-FI ECM/PCM in the PGM-FI INSPECTION menu with the HDS to cancel ALL INJECTORS and STARTER TEST functions.

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0).
3. Connect the HDS to the DLC (see step 2 on page 11-3).
4. Turn the ignition switch to ON (II).
5. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-383).
6. Select ALL INJECTORS STOP in the PGM-FI INSPECTION menu with the HDS.
7. Select STARTER TEST in the PGM-FI INSPECTION menu with the HDS.
8. Turn the ignition switch to LOCK (0).
9. Remove the four ignition coils and the four spark plugs (see page 4-21).
10. Attach the compression gauge to the 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: 980 kPa (9.99 kgf/cm², 142.1 psi)

12. Measure the compression on the remaining cylinders.

Maximum Variation

Within 200 kPa (2.04 kgf/cm², 29.0 psi)

13. If the compression is not within specifications, perform a cylinder leak down test to determine the problem area. Then check the following items, and remeasure the compression:
 - Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats
 - Damaged cylinder head gasket
 - 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 four spark plugs and the four ignition coils (see page 4-21).
16. Select PGM-FI ECM/PCM reset (see page 11-4) in the PGM-FI INSPECTION menu with the HDS to cancel ALL INJECTORS STOP and STARTER TEST.

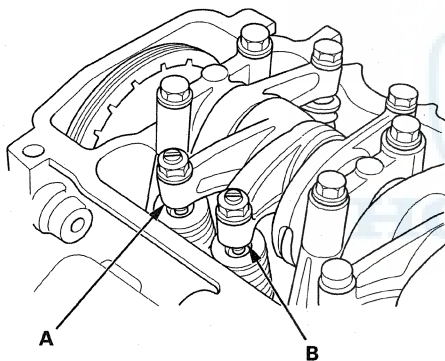


VTEC Rocker Arm Test

Special Tools Required

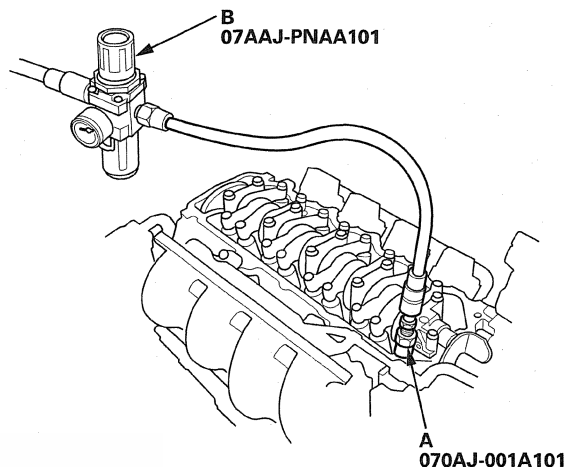
- Air Pressure Regulator 07AAJ-PNAA101
- VCM Air Adapter 070AJ-001A101

1. Remove the cylinder head cover (see page 6-22).
2. Rotate the crankshaft pulley clockwise. Make sure that the primary rocker arm (A) and the secondary rocker arm (B) are separated and that the primary rocker arm should move independently:
 - If the primary rocker arm and the secondary rocker arm move together, remove the primary rocker arm and the secondary rocker arm as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly (see page 6-36). If any rocker arm needs replacing, replace the rocker arm set, then retest.
 - If all the primary rocker arms and the secondary rocker arms move independently, go to step 3.



3. Check that the air pressure on the shop air compressor gauge indicates over 340 kPa (3.47 kgf/cm², 49.3 psi).
4. Inspect the valve clearance (see page 6-8).

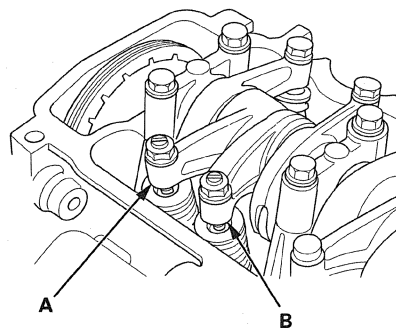
5. Install the VCM air adapter (A) to the inspection hole, then connect the air pressure regulator (B).



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

Specified Air Pressure:
340 kPa (3.47 kgf/cm², 49.3 psi)

7. With the specified air pressure applied, rotate the crankshaft pulley clockwise. The primary rocker arm (A) should move together with the secondary rocker arm (B):
 - If the primary rocker arm and the secondary rocker arm move independently of each other, remove the primary rocker arm and the secondary rocker arm as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly (see page 6-36). If any rocker arm needs replacing, replace the rocker arm set, then retest.
 - If all the primary rocker arms and the secondary rocker arms move together, go to step 8.



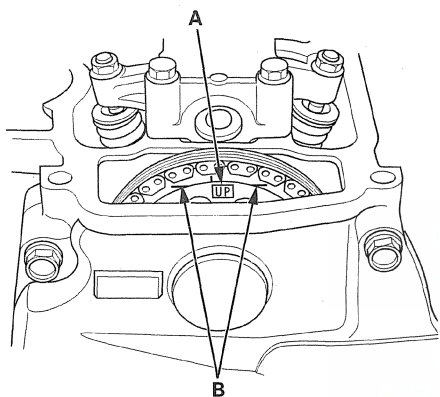
8. Remove the air pressure regulator and the VCM air adapter.
9. Install the cylinder head cover (see page 6-22).

Cylinder Head

Valve Clearance Adjustment

NOTE: Connect the HDS to the DLC (see step 2 on page 11-3), and monitor ECT SENSOR 1. Adjust the valve clearance only when the engine coolant temperature is less than 100 °F (38 °C).

1. Remove the cylinder head cover (see page 6-22).
2. Set the No. 1 piston at top dead center (TDC). The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

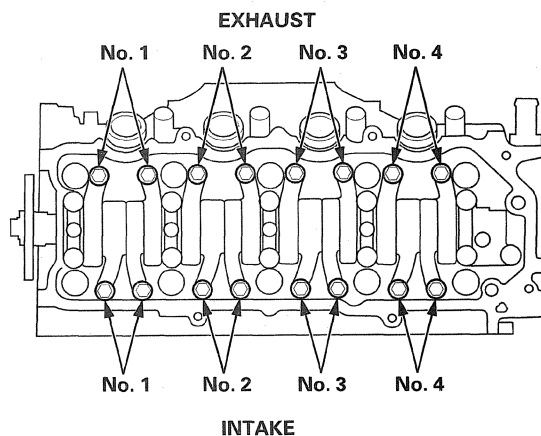


3. Select the correct feeler gauge for the valve clearance you are going to check.

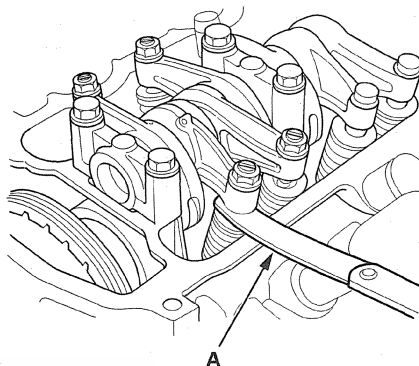
Valve Clearance

Intake: 0.15–0.19 mm (0.006–0.007 in)

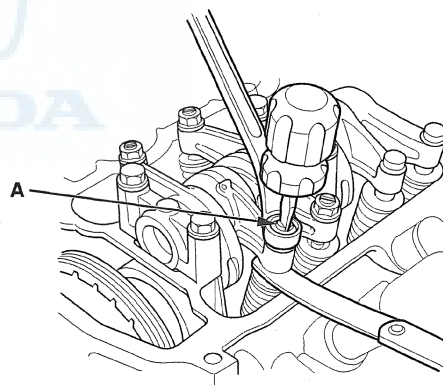
Exhaust: 0.26–0.30 mm (0.011–0.011 in)



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



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



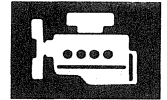
6. While holding the adjusting screw with the screw driver, tighten the locknut, then recheck the clearance. Repeat the adjustment, if necessary.

Specified Torque

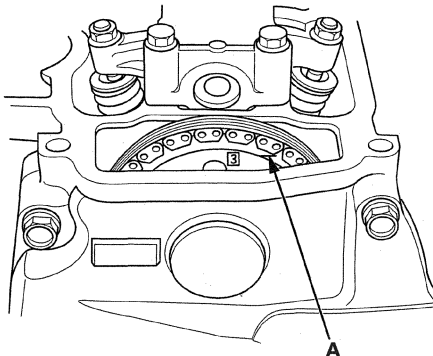
7 x 0.75 mm

14 N·m (1.4 kgf·m, 10 lbf·ft)

Apply new engine oil to the nut threads.

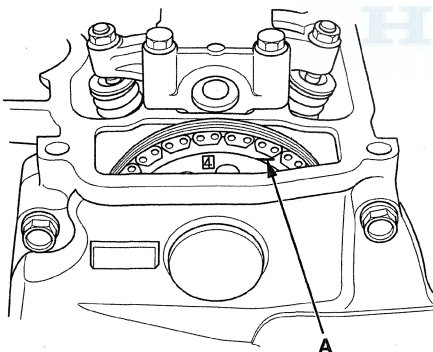


7. Rotate the crankshaft pulley clockwise. Align the No. 3 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.



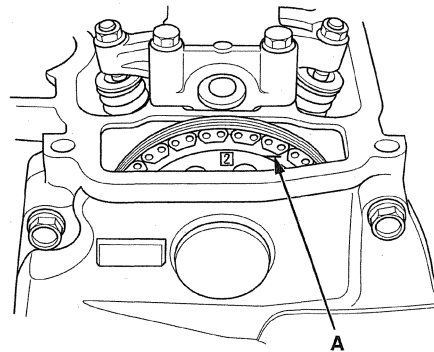
8. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.

9. Rotate the crankshaft pulley clockwise. Align the No. 4 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.



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

11. Rotate the crankshaft pulley clockwise. Align the No. 2 piston TDC groove (A) on the camshaft sprocket with the top edge of the head.



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

13. Install the cylinder head cover (see page 6-22).

Cylinder Head

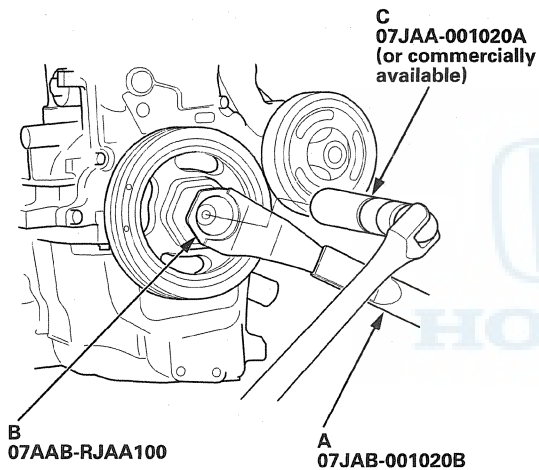
Crankshaft Pulley Removal and Installation

Special Tools Required

- Holder Handle 07JAB-001020B
- Crankshaft Pulley Holder 07AAB-RJAA100
- 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 20-163).
4. Remove the drive belt (see page 10-17).
5. Hold the pulley with the holder handle (A) and the crankshaft pulley holder (B).



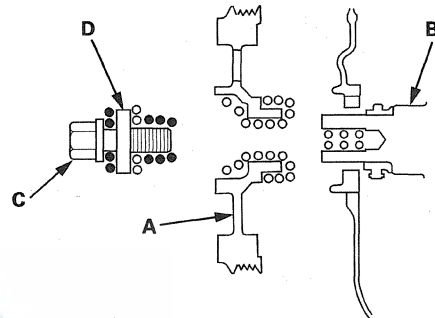
6. Remove the bolt with a socket, 19 mm (C) and a breaker bar, then remove the crankshaft pulley.

Installation

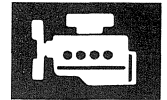
1. Remove any oil and clean the crankshaft pulley (A), the crankshaft (B), the bolt (C), and the washer (D). Lubricate with new engine oil as shown.

○: Clean

●: Lubricate with new engine oil

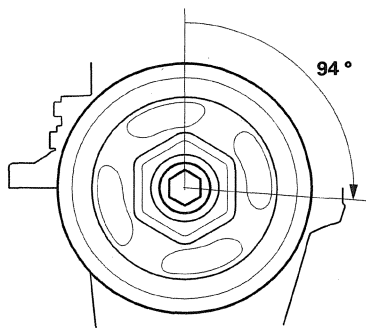
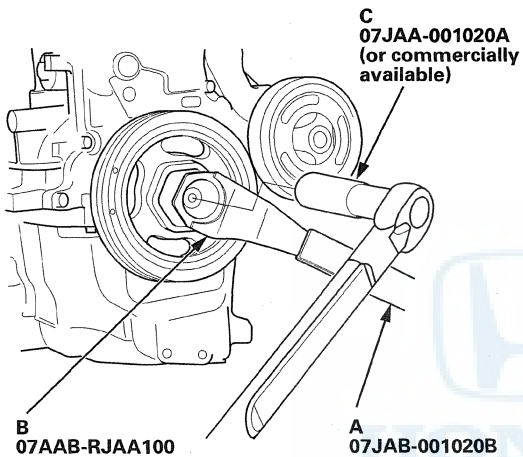


2. Install the crankshaft pulley.



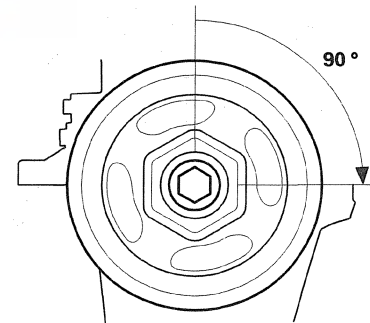
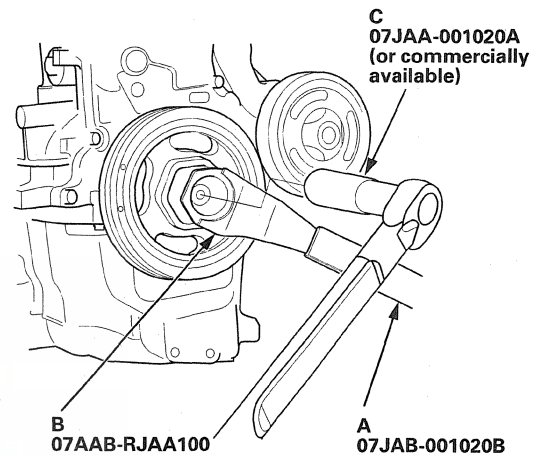
3. When a new crankshaft or a new pulley bolt is installed: Tighten the crankshaft pulley bolt. Do not use an impact wrench.

- 1. Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), torque the bolt to 177 N·m (18.0 kgf·m, 130 lbf·ft) with a torque wrench and a socket (C), then remove the bolt.
- 2. Torque the bolt to 39 N·m (4.0 kgf·m, 29 lbf·ft) with a torque wrench and a socket.
- 3. Tighten the bolt an additional 94 °.



4. When the crankshaft or the pulley bolt is reused: Tighten the crankshaft pulley bolt. Do not use an impact wrench.

- 1. Hold the pulley with the holder handle (A) and crankshaft pulley holder (B), then torque the bolt to 37 N·m (3.8 kgf·m, 27 lbf·ft) with a torque wrench and a socket (C).
- 2. Tighten the bolt an additional 90 °.



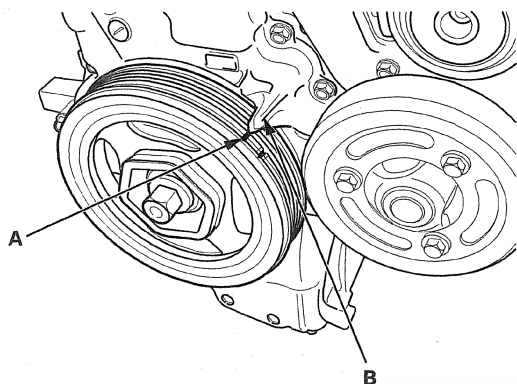
- 5. Install the drive belt (see page 10-17).
- 6. Install the splash shield (see page 20-163).
- 7. Install the right front wheel.

Cylinder Head

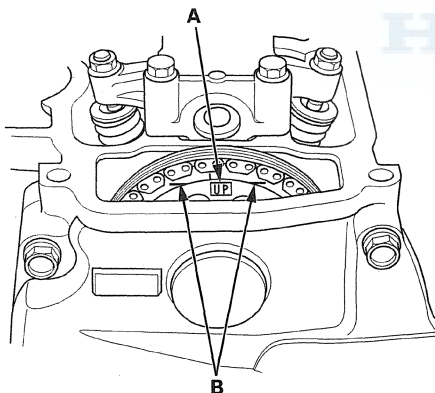
Cam Chain Removal

NOTE: Keep the cam chain away from magnetic fields.

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

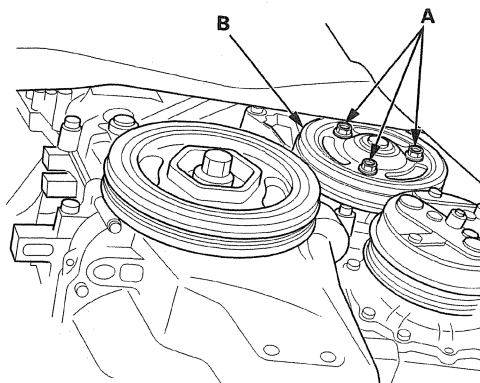


2. Remove the cylinder head cover (see page 6-22).
3. Check the No. 1 piston at TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.

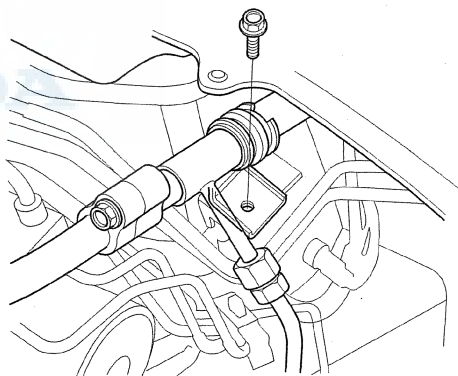


4. Remove the right front wheel.
5. Remove the splash shield (see page 20-163).

6. Loosen the water pump pulley mounting bolts (A).



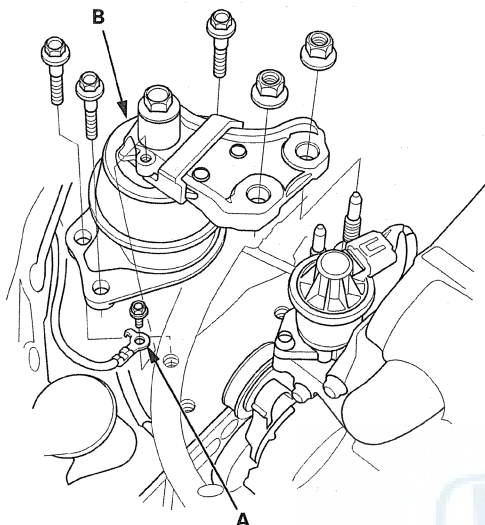
7. Remove the drive belt (see page 10-17).
8. Remove the water pump pulley (B).
9. Remove the crankshaft pulley (see page 6-10).
10. Remove the A/C line bracket mounting bolt.



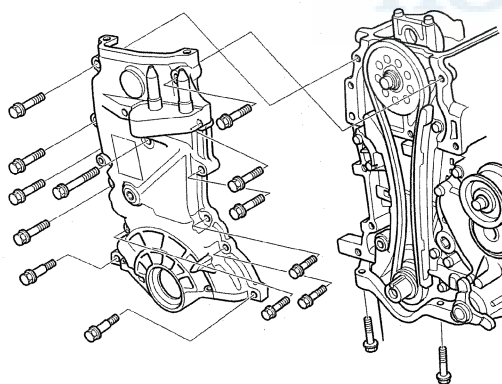
11. Support the engine with a jack and a wood block under the oil pan.



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

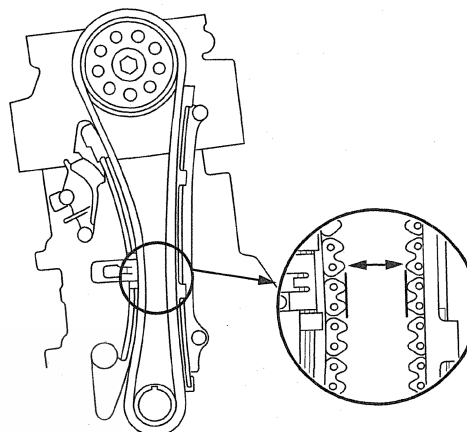


13. Remove the chain case.

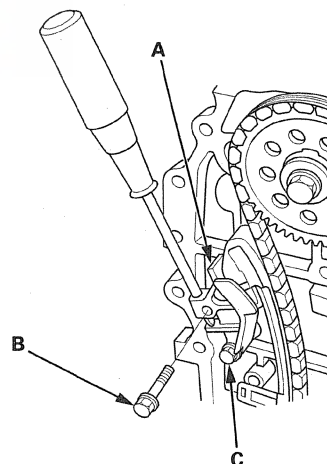


14. Measure the cam chain separation. If the distance is less than the service limit, replace the cam chain and the cam chain tensioner.

Standard Distance: 19 mm (0.75 in)
Service Limit: 15 mm (0.59 in)



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



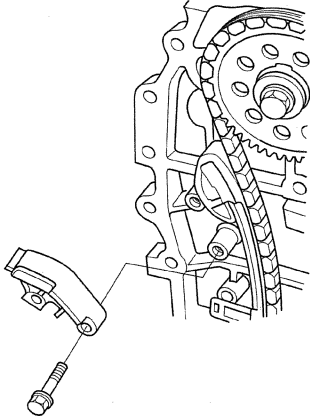
16. Hold the cam chain tensioner slider with a screwdriver, then remove the upper bolt (B), and loosen the lower bolt (C).

(cont'd)

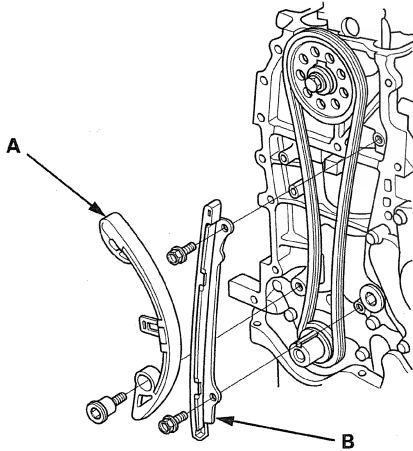
Cylinder Head

Cam Chain Removal (cont'd)

17. Remove the cam chain tensioner slider.



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

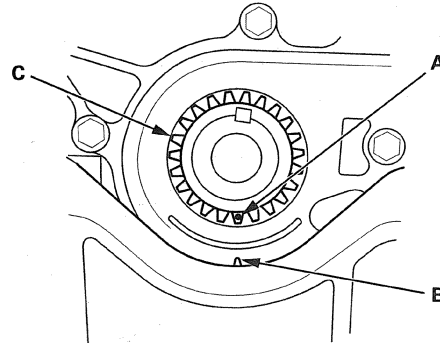


19. Remove the cam chain.

Cam Chain Installation

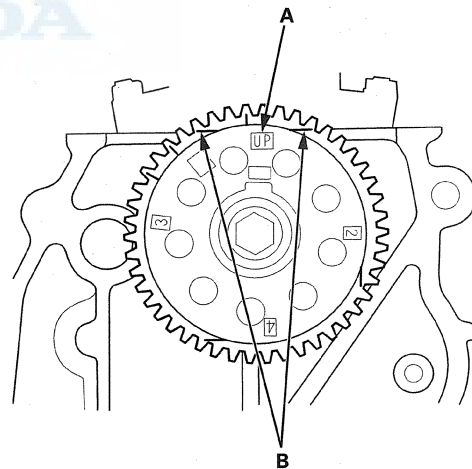
NOTE: Keep the cam chain away from magnetic fields.

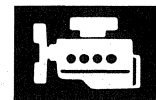
1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the oil pump.



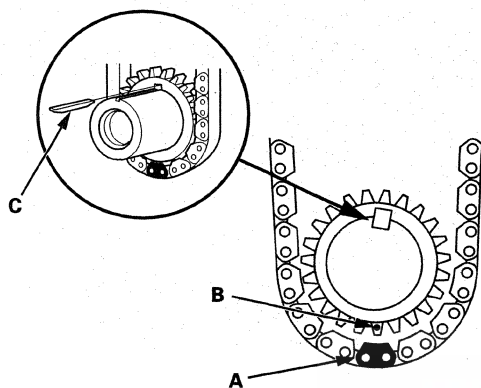
2. Remove the crankshaft sprocket (C).

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

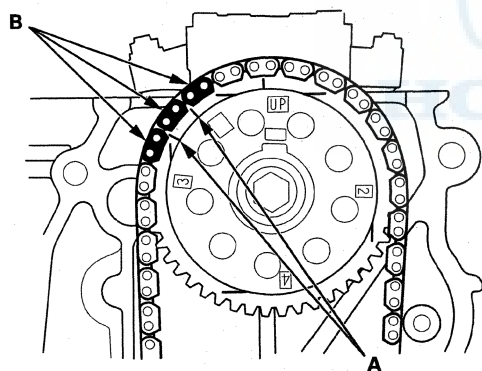




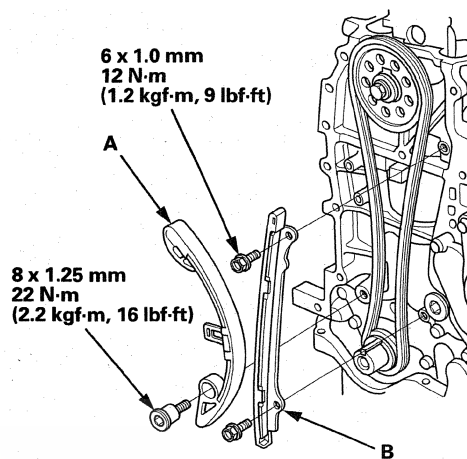
4. Install the cam chain on the crankshaft sprocket with the colored piece (A) aligned with the TDC mark (B) on the crankshaft sprocket, then install the crankshaft sprocket with the special key (C) to the crankshaft.



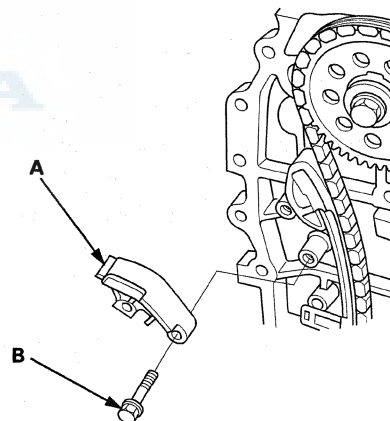
5. Install the cam chain on the camshaft sprocket with the pointers (A) aligned with the three colored pieces (B) as shown.



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



7. Install the cam chain tensioner slider (A), and loosely install the bolt (B).

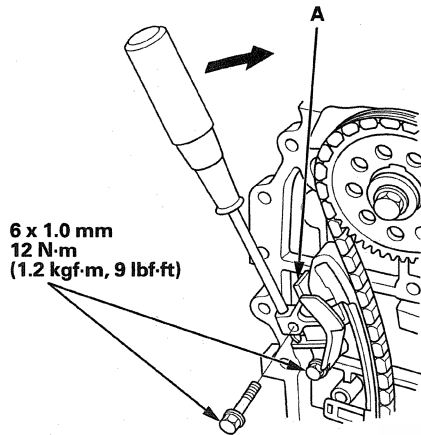


(cont'd)

Cylinder Head

Cam Chain Installation (cont'd)

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

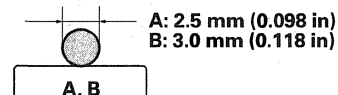
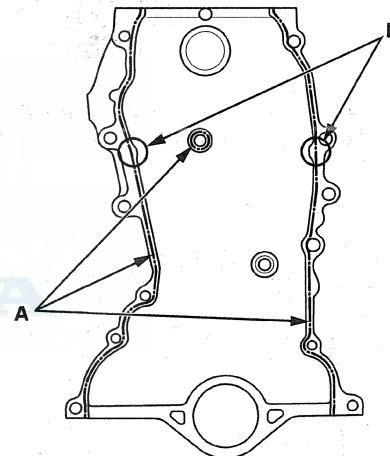


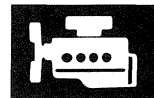
9. Rotate the cam chain tensioner slider clockwise to compress the cam chain tensioner, and install the remaining bolt, then tighten the bolts to the specified torque.
10. Check the cam chain case oil seal for damage. If the oil seal is damaged, replace the cam chain case oil seal (see page 6-21).
11. Remove all of the old liquid gasket from the chain case mating surfaces, the bolts, and the bolt holes.
12. Clean and dry the chain case mating surfaces.

13. Apply liquid gasket (P/N 08718-0004) to the cylinder head and the engine block mating surfaces of the chain case and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket to the upper surface contact areas of the engine block (B).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

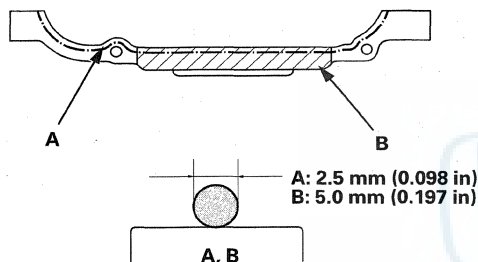




14. Apply liquid gasket (P/N 08718-0004) to the oil pan mating surface of the chain case and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

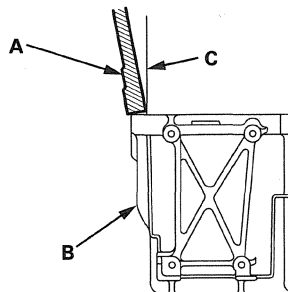
- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 5.0 mm (0.197 in) diameter bead of liquid gasket to the shaded area (B).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



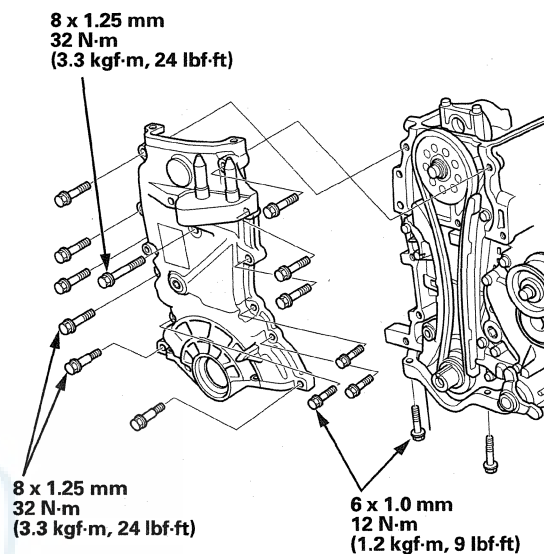
15. Set the edge of the chain case (A) on the edge of the oil pan (B), then install the chain case on the engine block (C).

NOTE:

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



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



17. Install the cylinder head cover (see page 6-22).

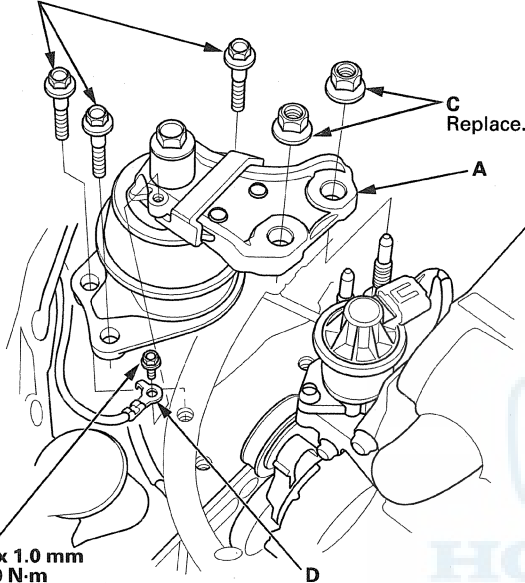
(cont'd)

Cylinder Head

Cam Chain Installation (cont'd)

18. Install the side engine mount/bracket assembly (A), then tighten new side engine mount/bracket assembly mounting bolts (B).

B
12 x 1.25 mm
59 N·m (6.0 kgf·m, 44 lbf·ft)
Replace.

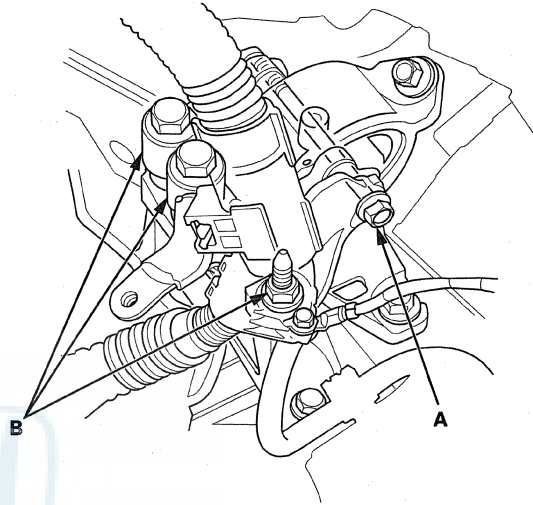


D
6 x 1.0 mm
10 N·m
(1.0 kgf·m, 7 lbf·ft)

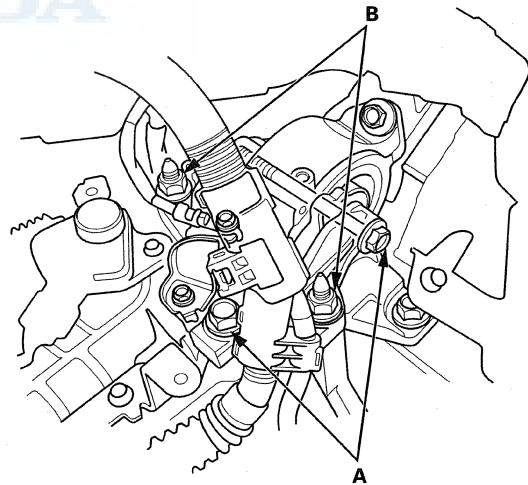
19. Loosely install new side engine mount/bracket assembly mounting nuts (C).
20. Install the ground cable (D).
21. Remove the jack and the wood block from under the oil pan.
22. Remove the air cleaner (see page 9-3).

23. Loosen the transmission mount bracket mounting bolts (A) and nuts (B).

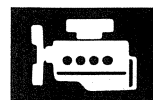
M/T model



CVT model

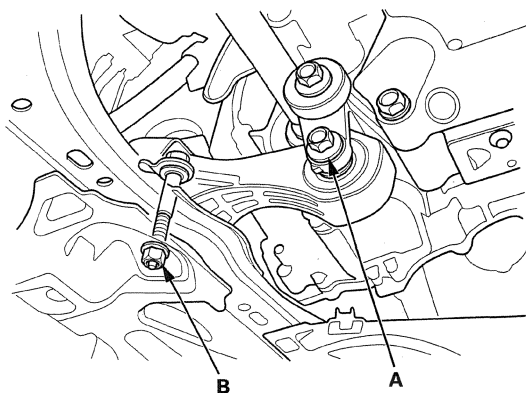


24. Raise the vehicle on the lift.

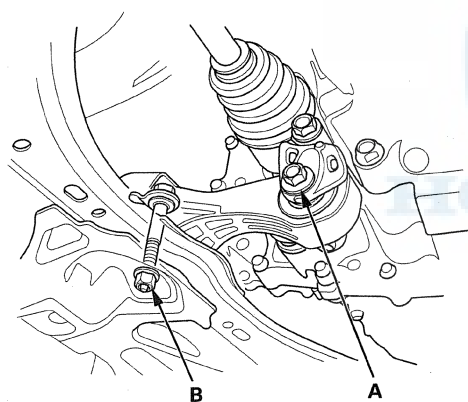


25. Loosen the torque rod mounting bolt (A) and nut (B).

M/T model



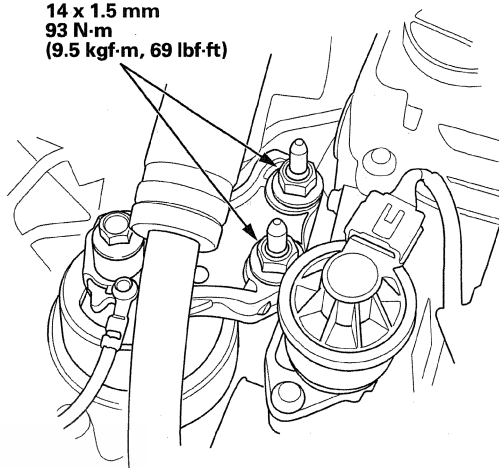
CVT model



26. Lower the vehicle on the lift.

27. Tighten the side engine mount/bracket assembly mounting nuts.

14 x 1.5 mm
93 N·m
(9.5 kgf-m, 69 lbf-ft)



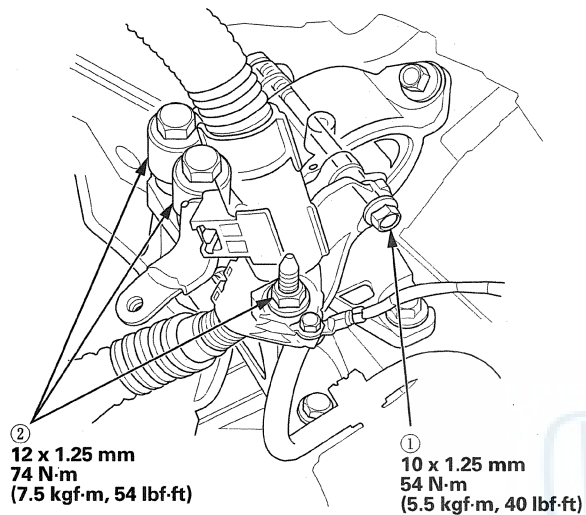
(cont'd)

Cylinder Head

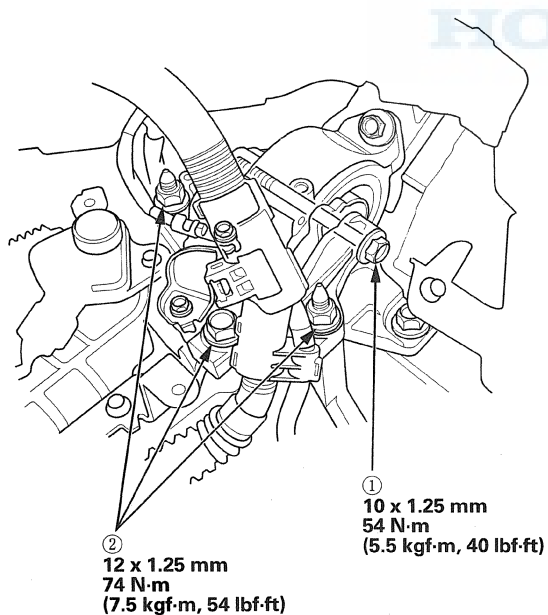
Cam Chain Installation (cont'd)

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

M/T model



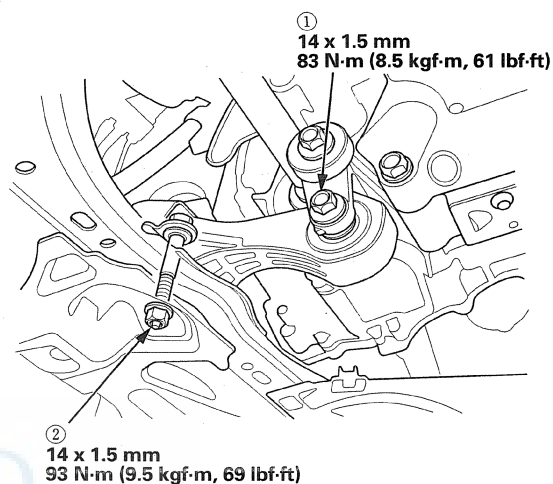
CVT model



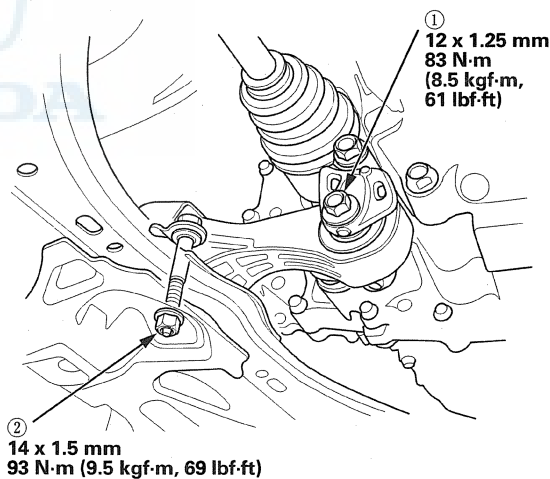
29. Raise the vehicle on the lift.

30. Tighten the torque rod mounting bolt and nut in the numbered sequence shown.

M/T model



CVT model



31. Lower the vehicle on the lift.

32. Install the air cleaner (see page 9-3).



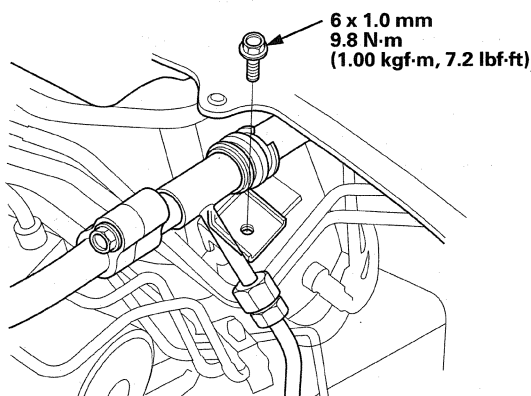
Cam Chain Case Oil Seal Installation

Special Tools Required

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

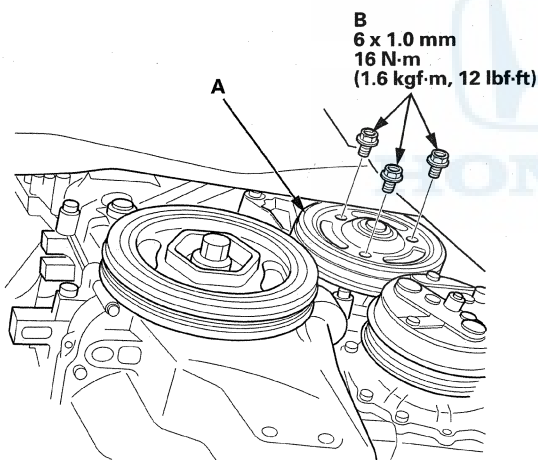
1. Clean and dry the cam chain case oil seal housing.
2. Apply a light coat of new engine oil to the lip of the cam chain case oil seal.
3. Use the driver handle, 15 x 135 L, and the bearing driver attachment, 52 x 55 mm, to drive a new oil seal squarely into the chain case to the specified installed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

33. Install the A/C line bracket mounting bolt.



34. Install the crankshaft pulley (see page 6-10).

35. Install the water pump pulley (A), and loosely install the water pump pulley mounting bolts (B).



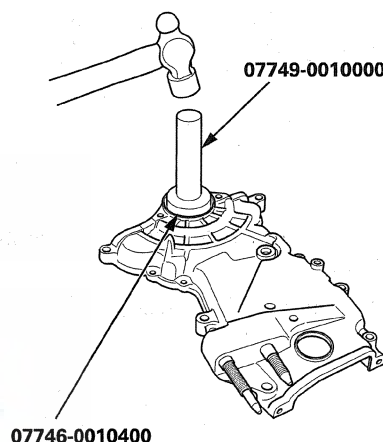
36. Install the drive belt (see page 10-17).

37. Tighten the water pump pulley mounting bolts.

38. Install the splash shield (see page 20-163).

39. Install the right front wheel.

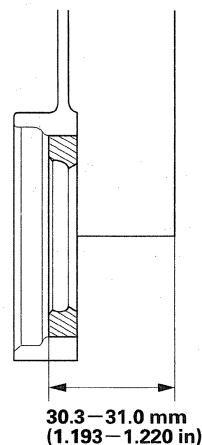
40. Do the CKP pattern clear/CKP pattern learn procedure (see page 11-5).



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

Oil Seal Installed Height

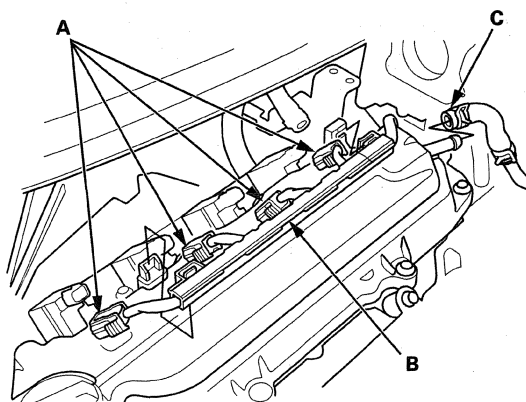
30.3—31.0 mm (1.193—1.220 in)



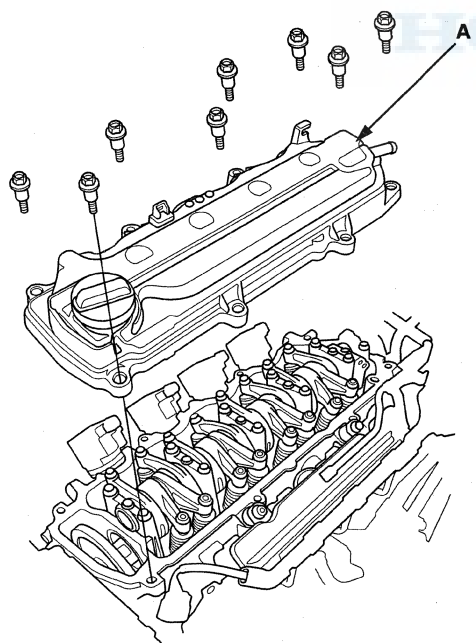
Cylinder Head

Cylinder Head Cover Removal

1. Remove the intake manifold chamber (see page 9-6).
2. Disconnect the four ignition coil connectors (A).



3. Remove the harness holder (B), and disconnect the breather hose (C).
4. Remove the cylinder head cover (A).

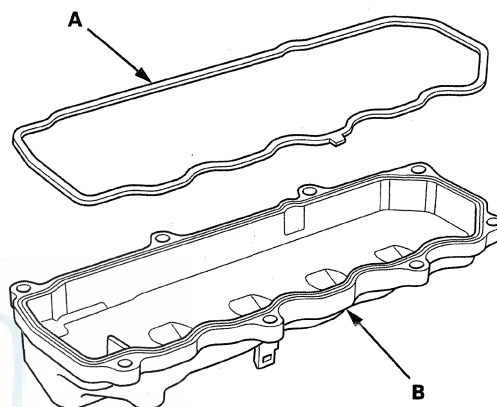


Cylinder Head Cover Installation

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

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

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



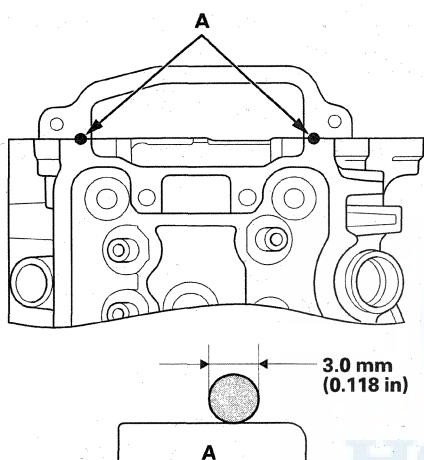
3. Remove all of the old liquid gasket from the cylinder head.
4. Clean the head cover contacting surfaces with a shop towel.



5. Apply liquid gasket (P/N 08718-0004) to the chain case contact areas (A). Install the component within 5 minutes of applying the liquid gasket.

NOTE:

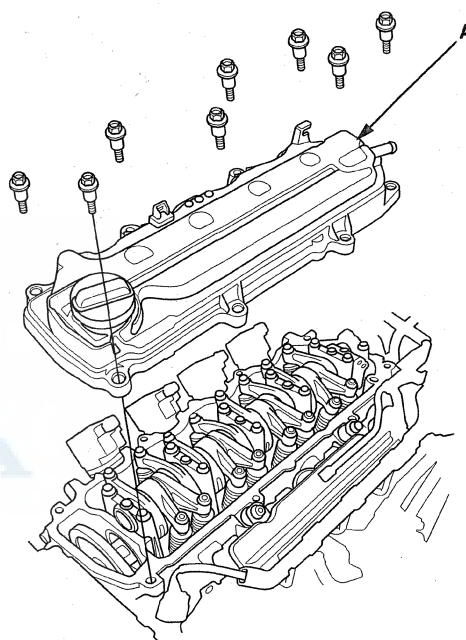
- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket to the chain case contact areas.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



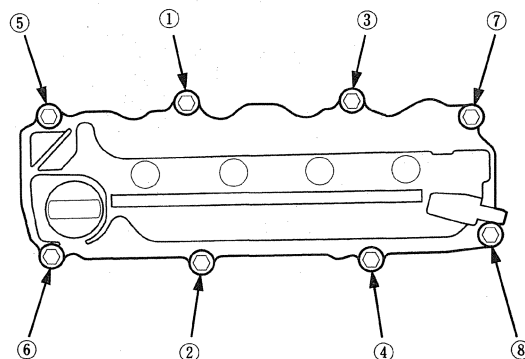
6. Place the cylinder head cover (A) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.

NOTE:

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



7. Tighten the bolts in three steps. In the final step, torque all bolts, in sequence, to 10 N·m (1.0 kgf·m, 7 lbf·ft).

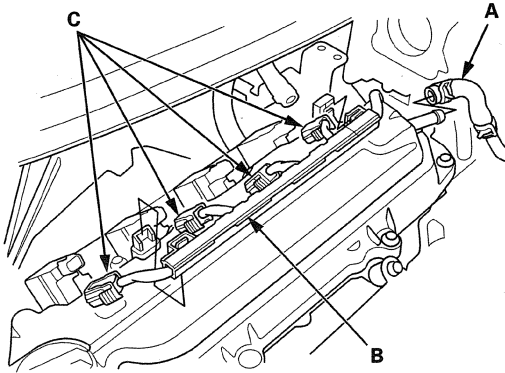


(cont'd)

Cylinder Head

Cylinder Head Cover Installation (cont'd)

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



9. Connect the four ignition coil connectors (C).

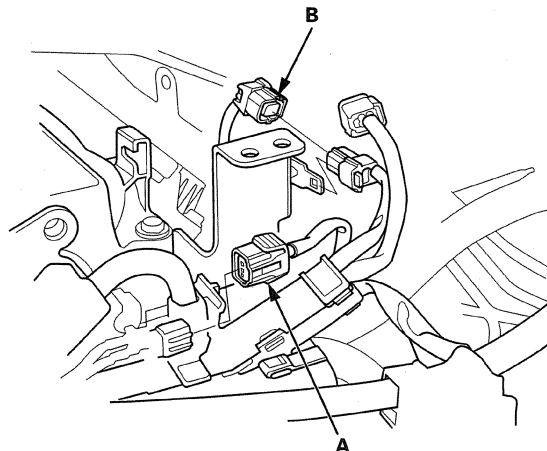
10. Install the intake manifold chamber (see page 9-11).

Cylinder Head Removal

NOTE:

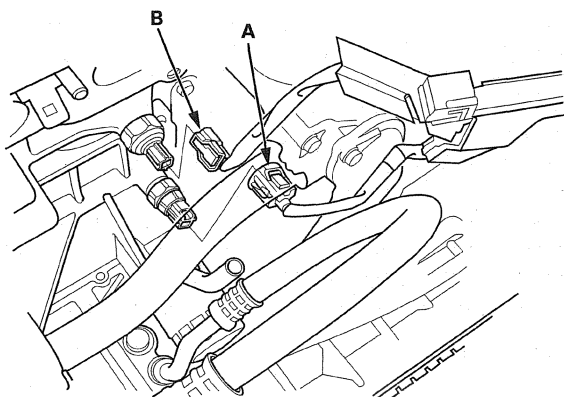
- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.
- Connect the HDS to the DLC (see step 2 on page 11-3), and monitor ECT SENSOR 1. To avoid damaging the cylinder head, wait until the engine coolant temperature drops below 100 °F (38 °C) before loosening the cylinder head bolts.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.
- Keep the cam chain away from magnetic fields.

1. Remove the cowl cover and the under-cowl panel (see page 20-153).
2. Relieve the fuel pressure (see page 11-287).
3. Drain the engine coolant (see page 10-8).
4. Do the 12 volt battery removal procedure (see page 22-87).
5. Remove the throttle body (see page 11-248).
6. Remove the intake manifold/chamber assembly (see page 9-13).
7. Remove the injectors (see page 11-200).
8. Remove the four ignition coils (see page 4-21).
9. Remove the warm-up TWC (see page 11-313).
10. Disconnect the CMP sensor connector (A) and the secondary HO2S connector (B).

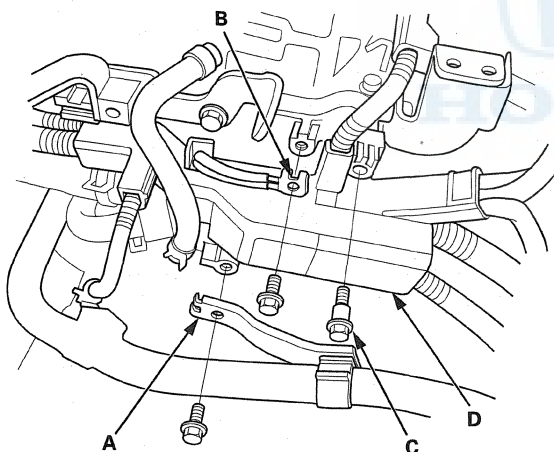




11. Disconnect the oil pressure switch connector (A) and the knock sensor connector (B).

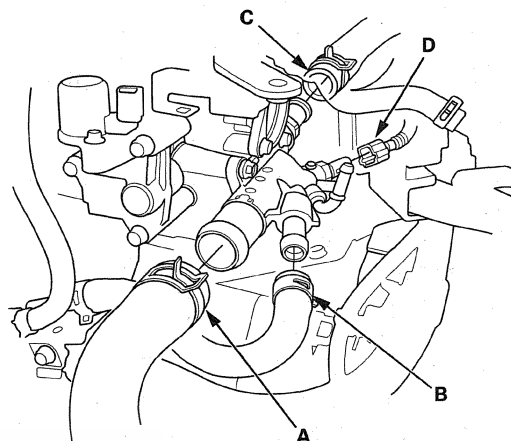


12. Remove the heater hose bracket (A) and the ground cable (B).



13. Remove the harness holder bolt (C), then remove the harness holder (D) from the bracket.

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

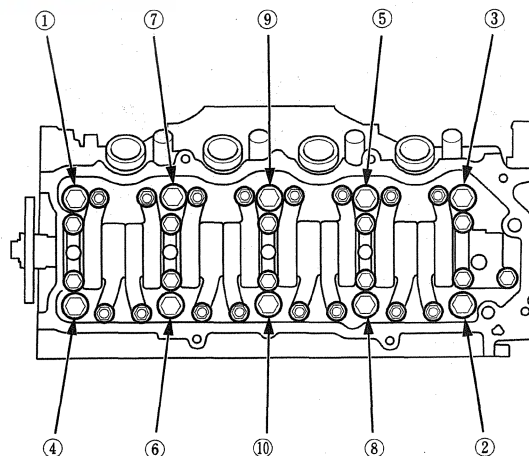


15. Disconnect the ECT sensor 1 connector (D).

16. Remove the cylinder head cover (see page 6-22).

17. Remove the cam chain (see page 6-12).

18. 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.



19. Remove the cylinder head.

Cylinder Head

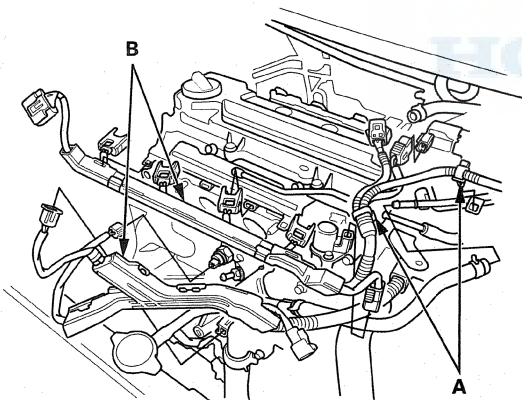
CMP Pulse Plate Removal and Installation

Removal

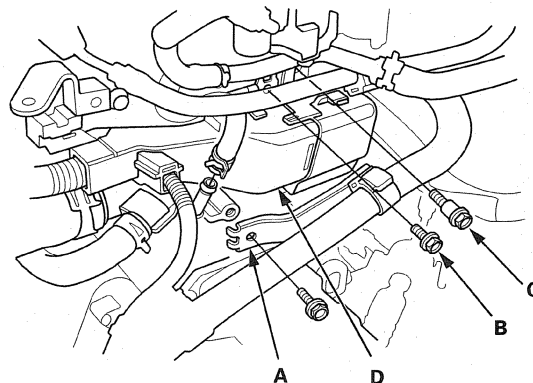
1. Remove the throttle body (see page 11-248).

NOTE: Plug the water bypass hoses.

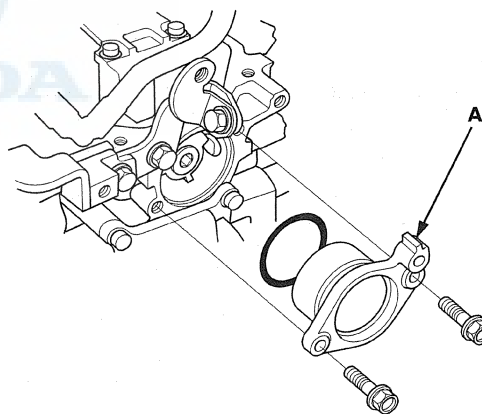
2. Remove the intake manifold/chamber assembly (see page 9-13).
3. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the cylinder head:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector
4. Remove the harness clamps (A) with the harness holders (B).

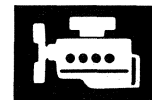


5. Remove the heater hose bracket (A) and the ground cable bolt (B).

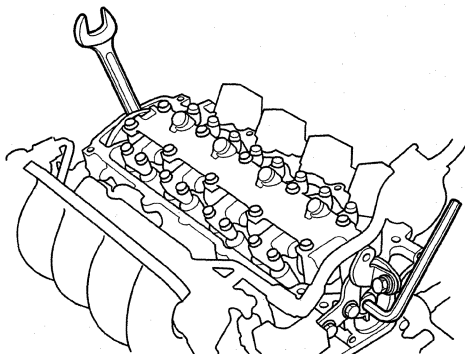


6. Remove the harness holder bolt (C), then remove the harness holder (D) from the bracket.
7. Remove the cylinder head cover (see page 6-22).
8. Remove the camshaft thrust cover (A).

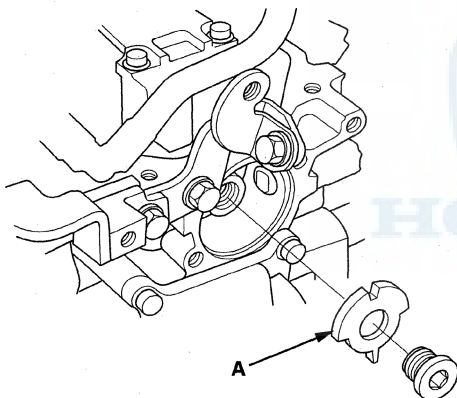




9. Hold the camshaft with an open-end wrench, then loosen the bolt.

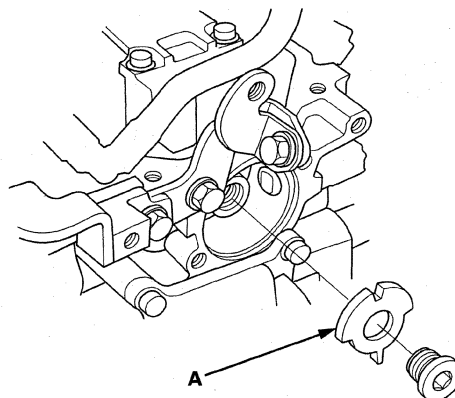


10. Remove the CMP pulse plate (A).



Installation

1. Install the CMP pulse plate (A).

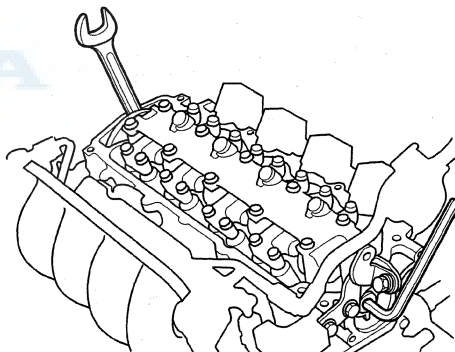


2. Hold the camshaft with an open-end wrench, then tighten the bolt.

Specified Torque

14 x 1.5 mm

35 N·m (3.6 kgf·m, 26 lbf·ft)

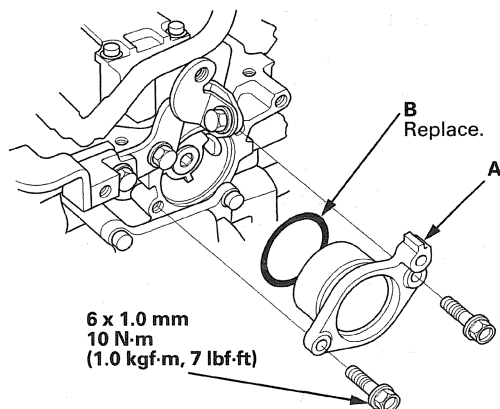


(cont'd)

Cylinder Head

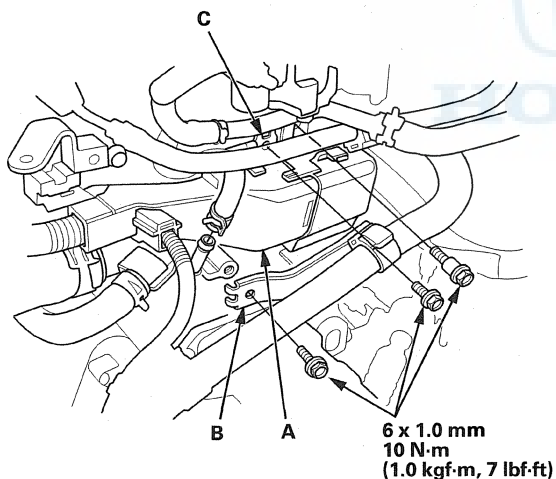
CMP Pulse Plate Removal and Installation (cont'd)

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



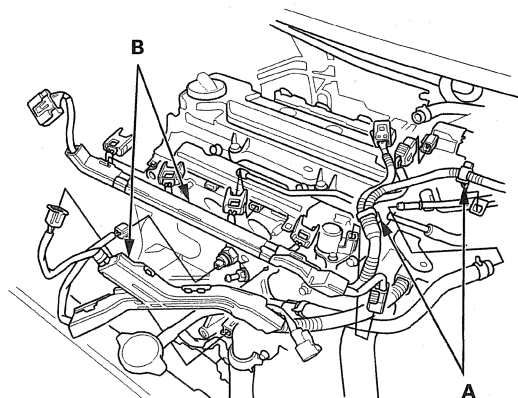
4. Install the cylinder head cover (see page 6-22).

5. Install the harness holder (A).



6. Install the heater hose bracket (B) and the ground cable (C).

7. Install the harness clamps (A) with the harness holders (B).



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

- Four injector connectors
- Rocker arm oil control valve connector
- Rocker arm oil pressure switch connector
- ECT sensor 1 connector
- CMP sensor connector
- A/F sensor connector
- Secondary HO2S connector
- Oil pressure switch connector
- Knock sensor connector

9. Install the intake manifold/chamber assembly (see page 9-14).

10. Install the throttle body (see page 11-248).

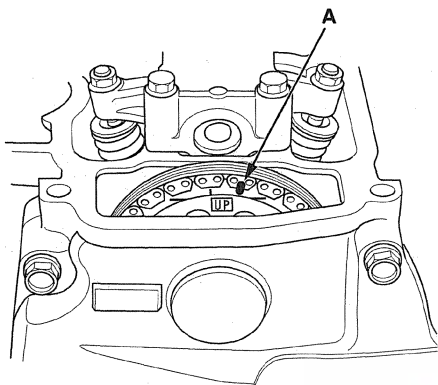
11. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).



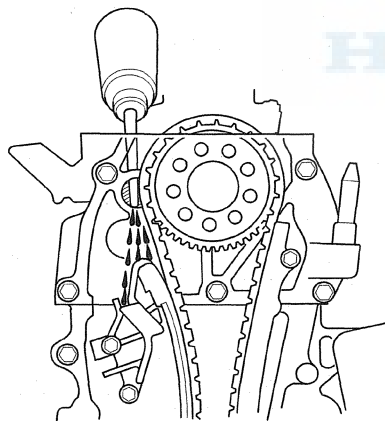
Camshaft Sprocket Removal

NOTE: Keep the cam chain away from magnetic fields.

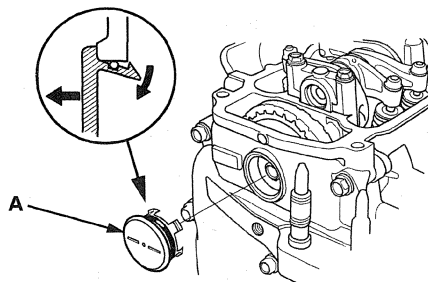
1. Remove the cylinder head cover (see page 6-22).
2. Make a reference mark (A) across the camshaft sprocket and the cam chain.



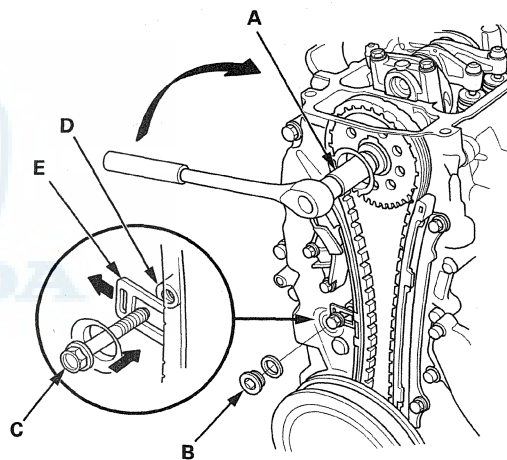
3. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.



4. Remove the cylinder head plug (A).



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



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

NOTE:

- The turning torque should not exceed 57 N·m (5.8 kgf·m, 42 lbf·ft) when turning the camshaft.
- Do not turn the camshaft counterclockwise.

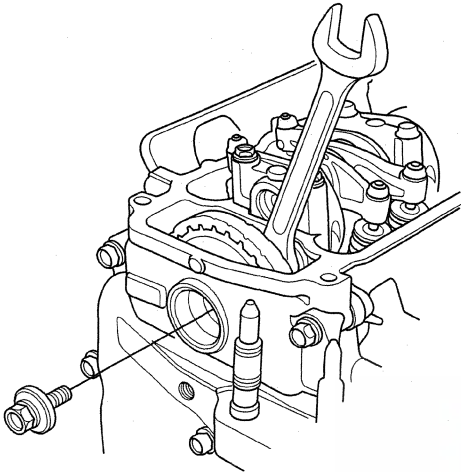
(cont'd)

Cylinder Head

Camshaft Sprocket Removal (cont'd)

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

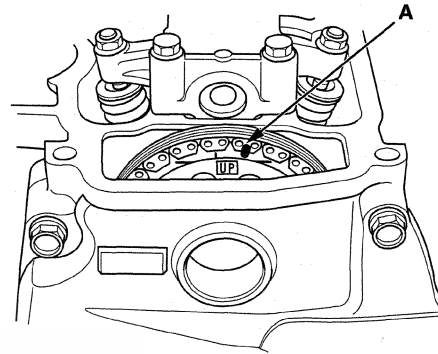
NOTE: Hang the cam chain with a wire.



Camshaft Sprocket Installation

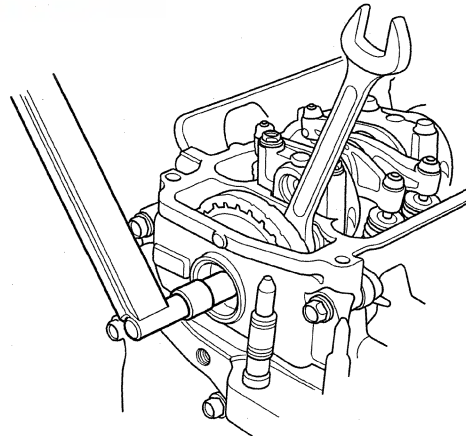
NOTE: Keep the cam chain away from magnetic fields.

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



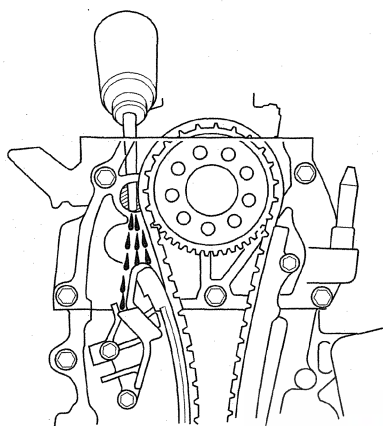
2. Apply new engine oil to the threads and flange of camshaft sprocket bolt.
3. Hold the camshaft with an open-end wrench, then tighten the bolt.

Specified Torque
57 N·m (5.8 kgf·m, 42 lbf·ft)

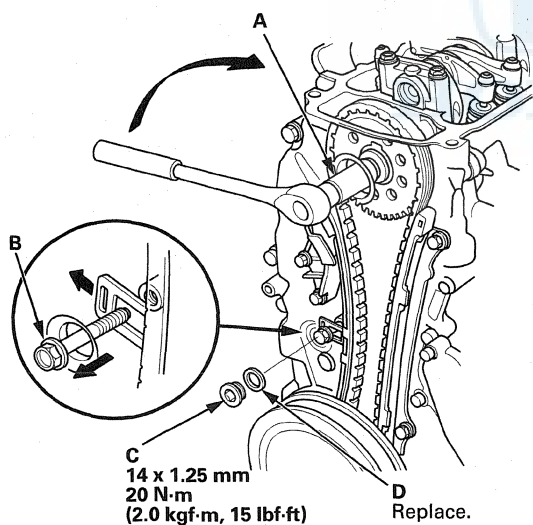




4. Apply new engine oil to the slider surface of the cam chain tensioner slider through the oil return hole in the cylinder head.



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



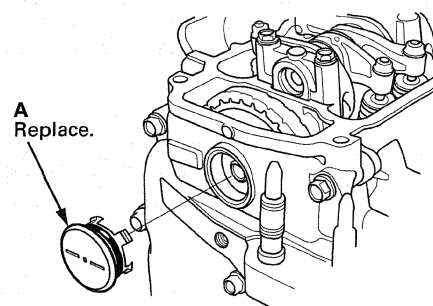
6. Turn the camshaft clockwise to compress the cam chain tensioner, then remove the 6 x 1.0 mm bolt (B).

NOTE:

- The turning torque should not exceed 57 N·m (5.8 kgf·m, 42 lbf·ft) when turning the camshaft.
- Do not turn the camshaft counterclockwise.

7. Install the maintenance bolt (C) with a new washer (D).

8. Install a new cylinder head plug (A).



9. Install the cylinder head cover (see page 6-22).

Cylinder Head

Cylinder Head Inspection for Warp

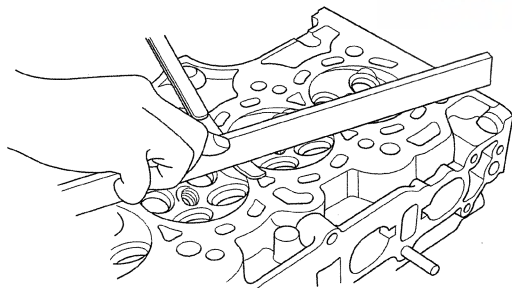
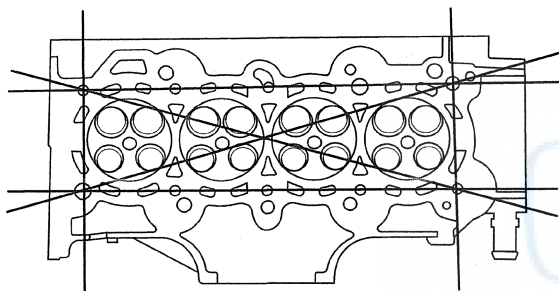
1. Remove the cylinder head (see page 6-24).
2. Inspect the camshaft (see page 6-37).
3. Check the cylinder head for warp. Measure along the edges, and three ways across the center.
 - If warp is less than 0.08 mm (0.003 in) cylinder head resurfacing is not required.
 - Maximum resurface is limited to the cylinder head height standard as shown.

Cylinder Head Warp

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

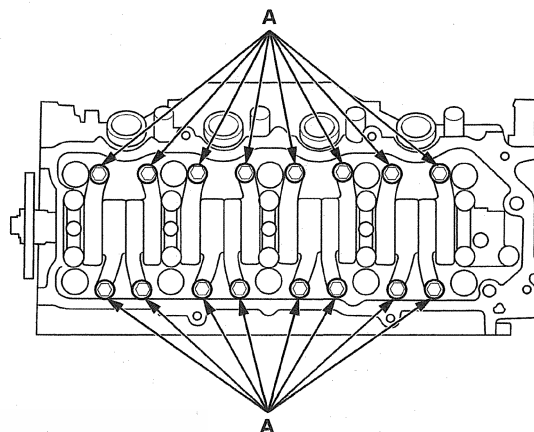
Cylinder Head Height

Standard (New): 119.9–120.1 mm (4.720–4.728 in)



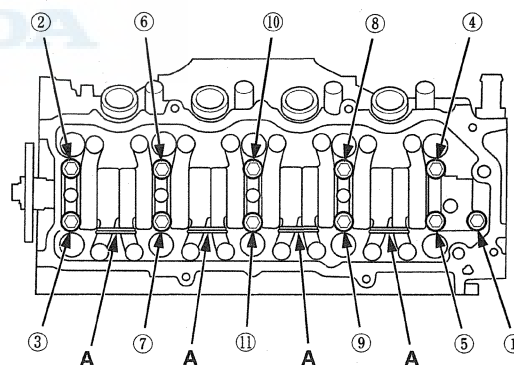
Rocker Arm Assembly Removal

1. Remove the cylinder head cover (see page 6-22).
2. Loosen the rocker arm adjusting screws (A).



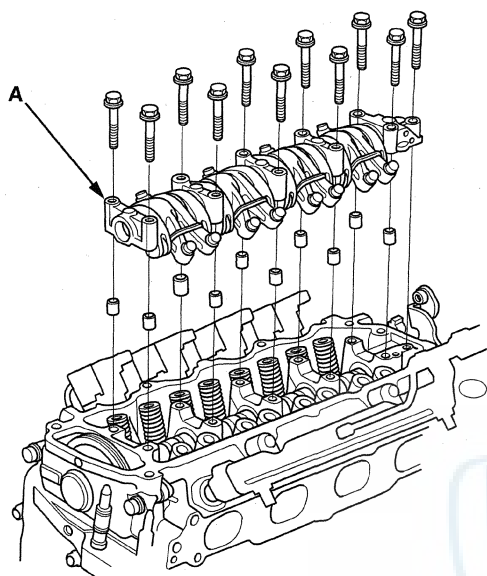
3. Unscrew the rocker shaft mounting bolts two turns at a time, in the sequence below.

NOTE: Bundle the intake rocker arms with rubber bands (A) to keep them together as a set.





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

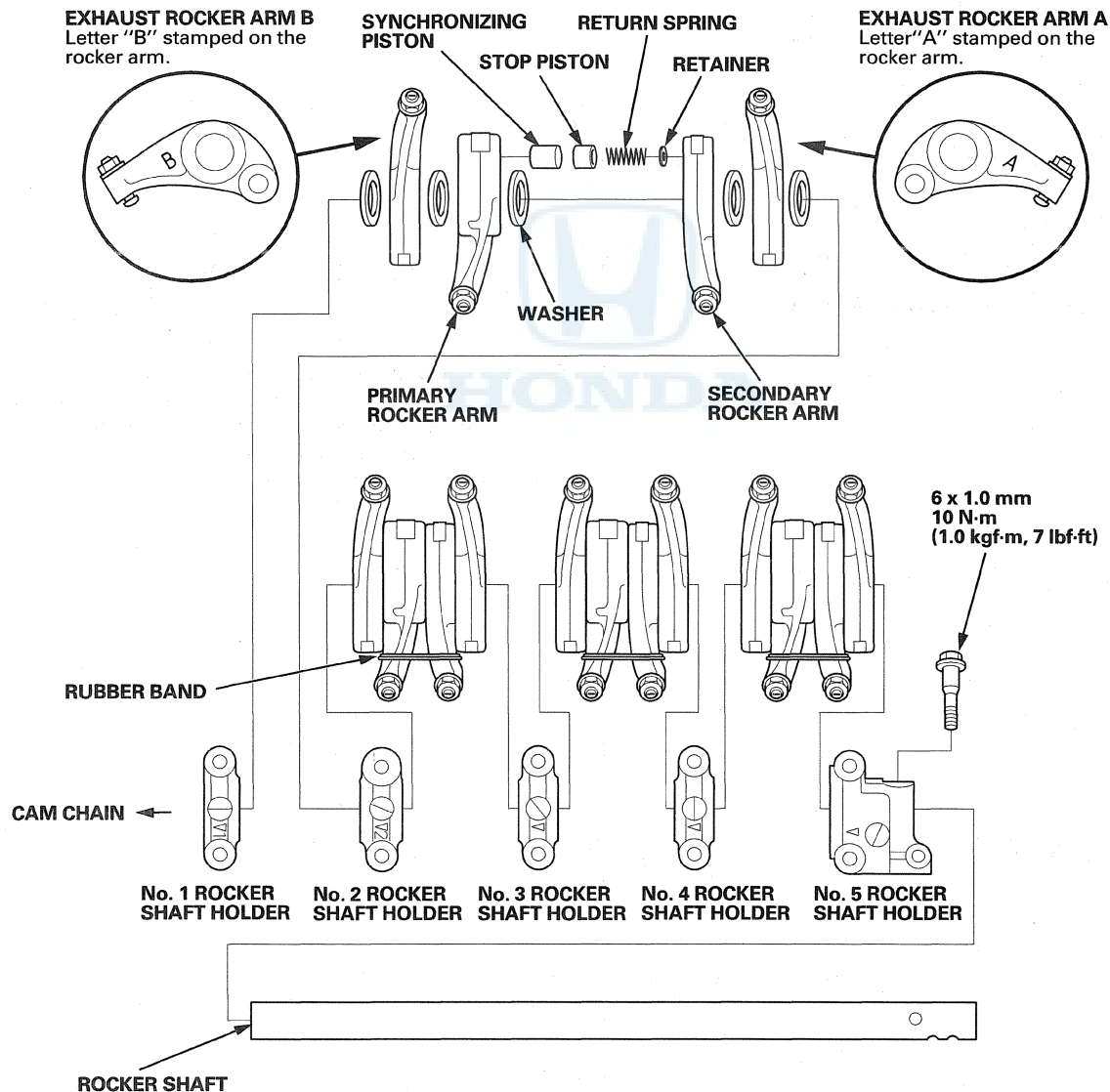


Cylinder Head

Rocker Arm and Shaft Disassembly/Reassembly

NOTE:

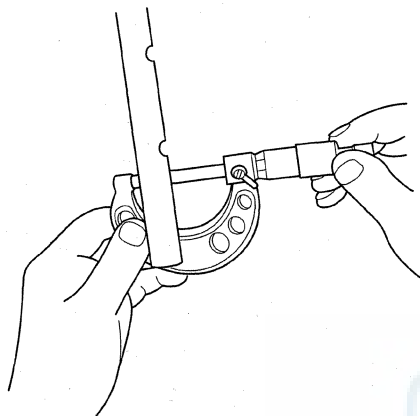
- Identify each part as it is removed so that each item can be reinstalled in its original location.
- Inspect the rocker arm shaft and the rocker arms (see page 6-35).
- If reused, the rocker arms must be installed in their original locations.
- Bundle the rocker arms with rubber bands to keep them together as a set, and remove the bands after the rocker arms have been installed.
- Remove the rocker shaft bolt before removing the rocker shaft from the No. 5 rocker shaft holder.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points, the bearing surfaces.
- When replacing the rocker arm assembly, remove the fastening hardware from new rocker arm assembly.
- When reassembling the rocker arm and shaft assembly, position the arrows on the rocker shaft holders facing the cam chain side.



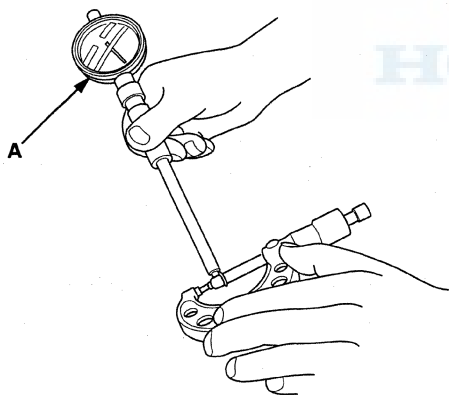


Rocker Arm and Shaft Inspection

1. Remove the rocker arm assembly (see page 6-32).
2. Disassemble the rocker arm assembly (see page 6-34).
3. Measure the diameter of the shaft at the first rocker location.

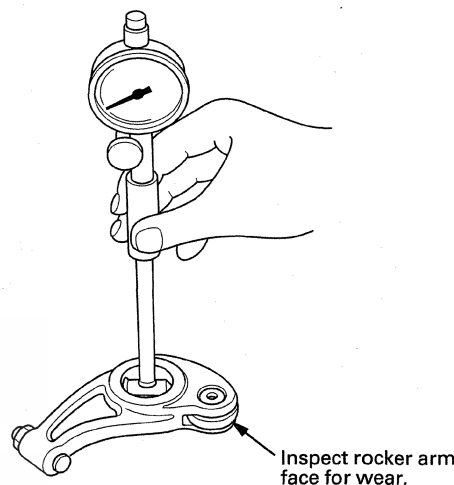


4. Zero the gauge (A) to the shaft diameter.



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

Rocker Arm-to-Shaft Clearance
Standard (New): 0.019–0.050 mm
(0.00075–0.00197 in)
Service Limit: 0.08 mm (0.0031 in)



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

(cont'd)

Cylinder Head

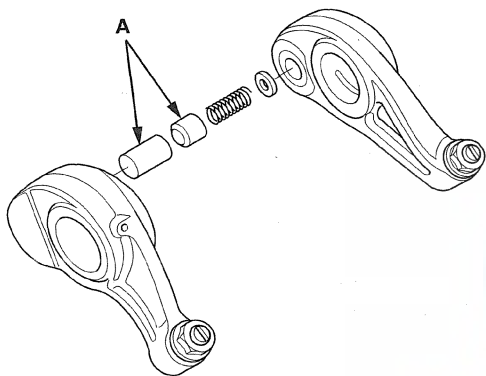
Rocker Arm and Shaft Inspection (cont'd)

VTEC Rocker Arms

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

NOTE:

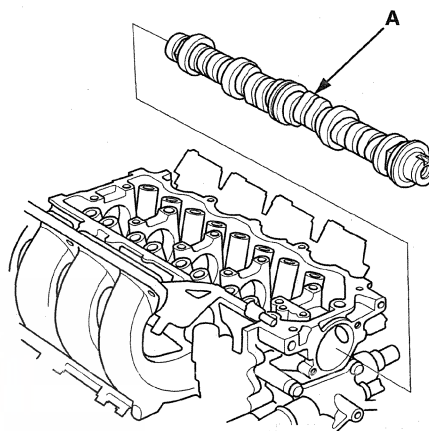
- When removing the rocker arm piston from the primary rocker arm, carefully apply air pressure to the oil passage of the rocker arm.
- Apply new engine oil to the rocker arm pistons when reassembling.

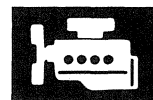


8. Reassemble the rocker arm assembly (see page 6-34).
9. Install the rocker arm assembly (see page 6-46).

Camshaft Removal

1. Remove the camshaft sprocket (see page 6-29).
2. Remove the rocker arm assembly (see page 6-32).
3. Remove the CMP sensor (see page 11-203).
4. Remove the CMP pulse plate (see page 6-26).
5. Remove the camshaft (A).





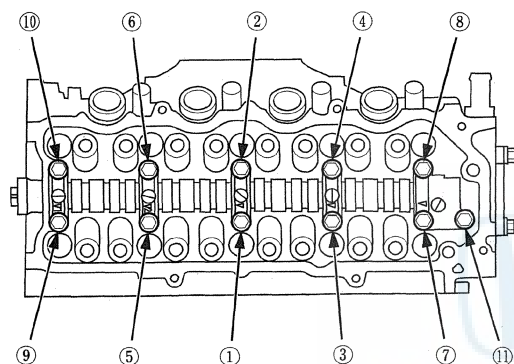
Camshaft Inspection

1. Remove the camshaft sprocket (see page 6-29).
2. Remove the rocker arm assembly (see page 6-32).
3. Disassemble the rocker arm (see page 6-34).
4. Put the rocker shaft holder bridge/rocker shaft holders on the cylinder head, then tighten the bolts to the specified torque.

Specified Torque

6 x 1.0 mm

- ①—⑩: 15 N·m (1.5 kgf·m, 11 lbf·ft)
⑪: 10 N·m (1.0 kgf·m, 7 lbf·ft)



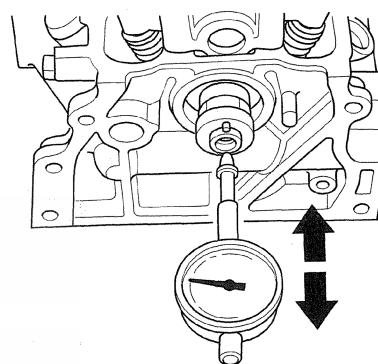
5. Seat the camshaft by pushing it toward the rear of the cylinder head.

6. 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 cylinder head. If it is still beyond the service limit, replace the camshaft.

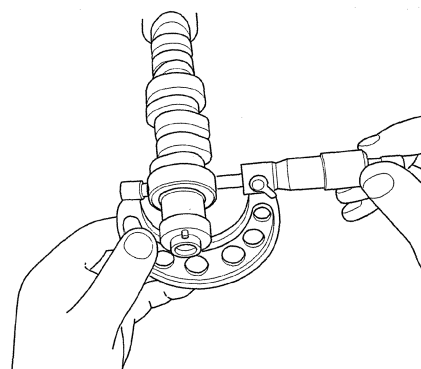
Camshaft End Play

Standard (New): 0.05—0.25 mm (0.0020—0.0098 in)

Service Limit: 0.5 mm (0.020 in)



7. Remove the camshaft (see page 6-36).
8. Wipe the camshaft clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
9. Measure the diameter of each camshaft journal.

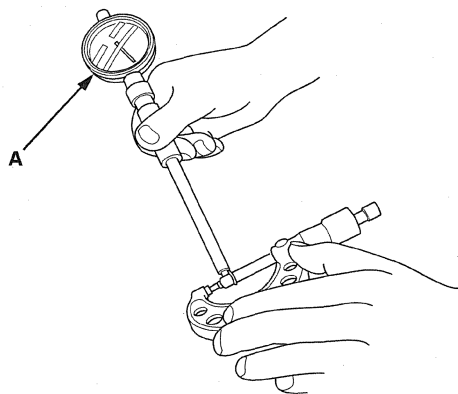


(cont'd)

Cylinder Head

Camshaft Inspection (cont'd)

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



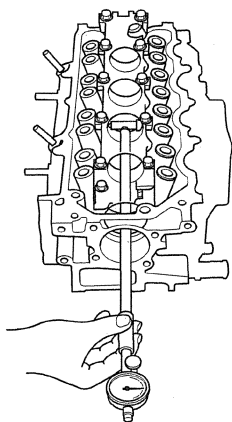
11. Clean the camshaft bearing surfaces in the cylinder head. Measure the inside diameter of each camshaft bearing surface, and check for an out-of-round condition:

- If the camshaft-to-holder clearance is within limits, go to step 13.
- 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 12.

Camshaft-to-Holder Oil Clearance

Standard (New): 0.045–0.084 mm
(0.00177–0.00331 in)

Service Limit: 0.100 mm (0.00394 in)

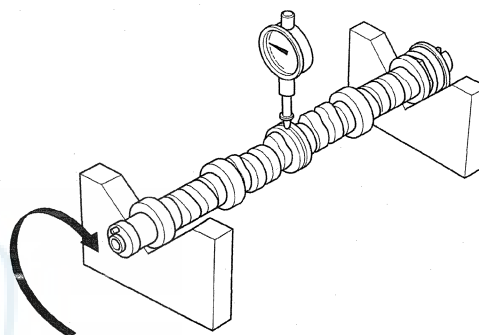


12. Check the total runout with the camshaft supported on V-blocks:

- If the total runout is within the standard, replace the cylinder head.
- If the total runout is not within the standard, replace the camshaft, and recheck the oil clearance. If the oil clearance is still out of tolerance, replace the cylinder head.

Camshaft Total Runout

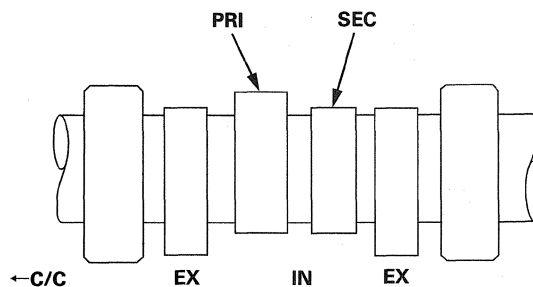
Standard (New): 0.03 mm (0.0012 in) max.



13. Measure the cam lobe height.

Cam Lobe Height Standard (New)

	INTAKE	EXHAUST
PRI	34.945 mm (1.37578 in)	35.614 mm (1.40212 in)
SEC	30.529 mm (1.20193 in)	



PRI: Primary
EX: Exhaust

SEC: Secondary
C/C: Cam Chain

IN: Intake



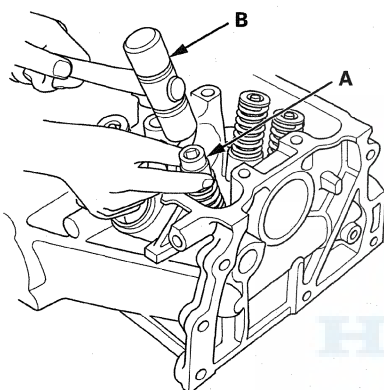
Valve, Spring, and Valve Seal Removal

Special Tools Required

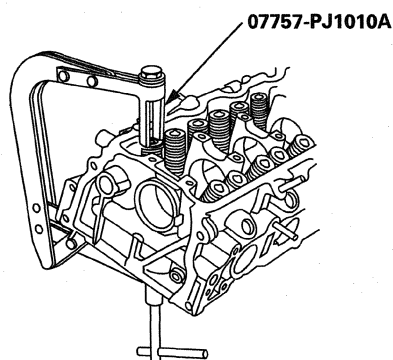
Valve Spring Compressor Attachment 07757-PJ1010A

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 6-24).
2. Remove the rocker arm assembly (see page 6-32).
3. Remove the camshaft (see page 6-36).
4. Using an appropriate-sized socket (A), and a plastic mallet (B), lightly tap the valve retainer to loosen the valve cotters.

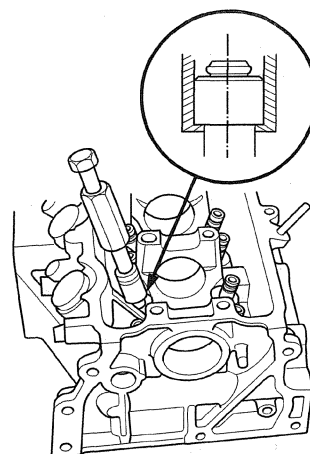


5. Install the valve spring compressor and the attachment. Compress the valve spring, and remove the valve cotters.

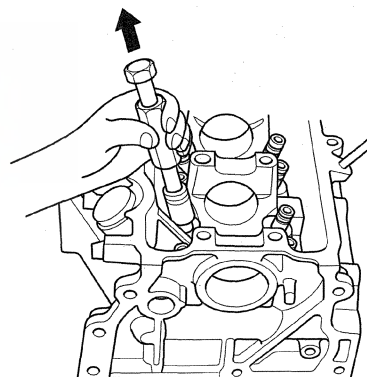


6. Remove the valve spring compressor and the valve spring compressor attachment, then remove the spring retainer, the valve spring, and the valve.

7. Install the valve guide seal remover.



8. Remove the valve seal.



9. Remove the valve spring seat.

Cylinder Head

Valve Inspection

1. Remove the valves (see page 6-39).
2. Measure the valve in these areas.

Intake Valve Dimensions

A Standard (New): 118.55—119.15 mm
(4.6673—4.6910 in)

B Standard (New): 27.85—28.15 mm
(1.0965—1.1083 in)

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

C Service Limit: 5.45 mm (0.2146 in)

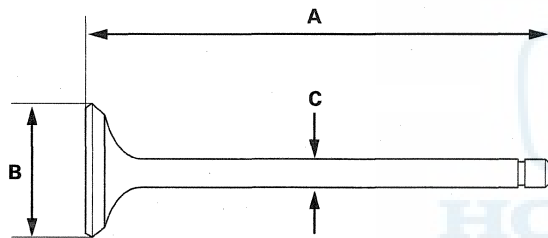
Exhaust Valve Dimensions

A Standard (New): 117.25—117.85 mm
(4.6161—4.6398 in)

B Standard (New): 22.85—23.15 mm
(0.8996—0.9114 in)

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

C Service Limit: 5.42 mm (0.2134 in)



Valve Stem-to-Guide Clearance Inspection

1. Remove the valves (see page 6-39).
2. Subtract the O.D. of the valve stem, measured with a micrometer, from the I.D. of the valve guide, measured with an inside micrometer or ball gauge.

Take the measurements in three places along the valve stem and three places inside the valve guide.

The difference between the largest guide measurement and the smallest stem measurement should not exceed the service limit.

Intake Valve Stem-to-Guide Clearance

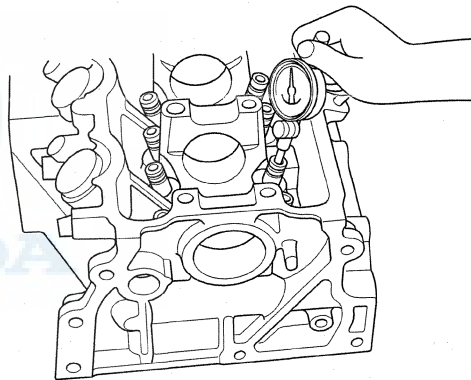
Standard (New): 0.02—0.05 mm (0.0008—0.0020 in)

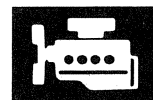
Service Limit: 0.08 mm (0.0031 in)

Exhaust Valve Stem-to-Guide Clearance

Standard (New): 0.05—0.08 mm (0.0020—0.0031 in)

Service Limit: 0.11 mm (0.0043 in)



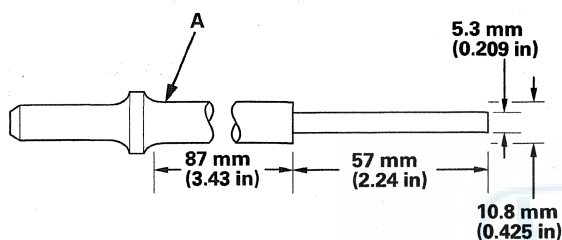


Valve Guide Replacement

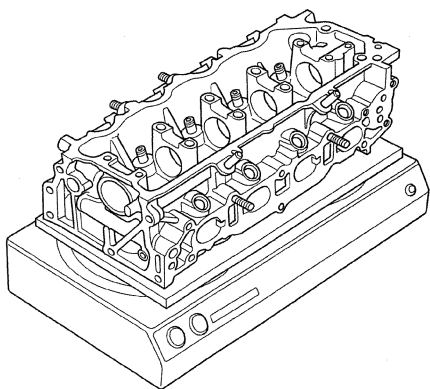
Special Tools Required

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

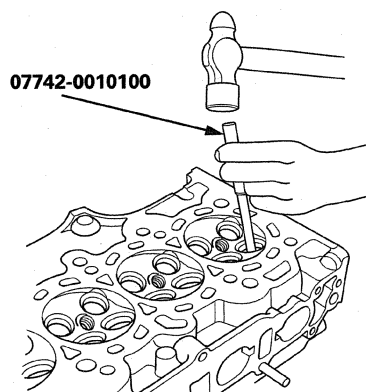
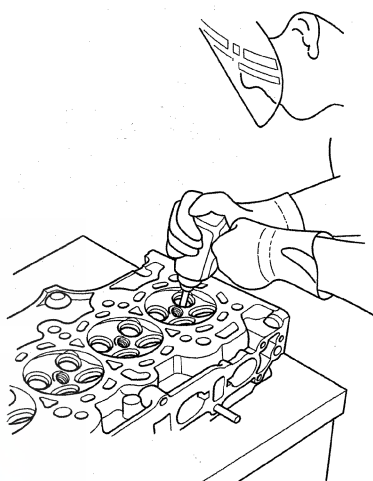
1. Inspect valve stem-to-guide clearance (see page 6-40).
2. As illustrated below, use a commercially available air-impact valve guide driver, 5.35 x 9.7 mm (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver and a conventional 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 valve guide driver and an air hammer to drive the guide about 2 mm (0.08 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 will not move, drill it out with an 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.

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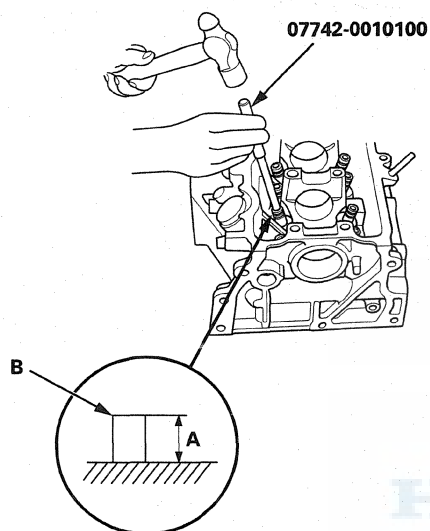
Cylinder Head

Valve Guide Replacement (cont'd)

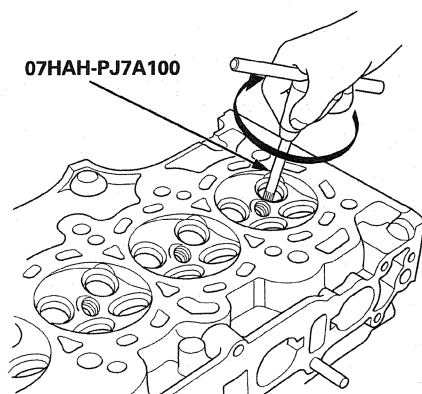
9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head; use the valve guide driver to drive the guide in to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

Valve Guide Installed Height

15.85—16.35 mm (0.6240—0.6437 in)



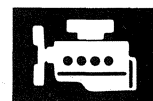
10. Coat both the valve guide reamer, 5.5 mm and the valve guide with cutting oil.
11. Rotate the reamer clockwise the full length of the valve guide bore.



12. Continue to rotate the valve guide reamer, 5.5 mm clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.

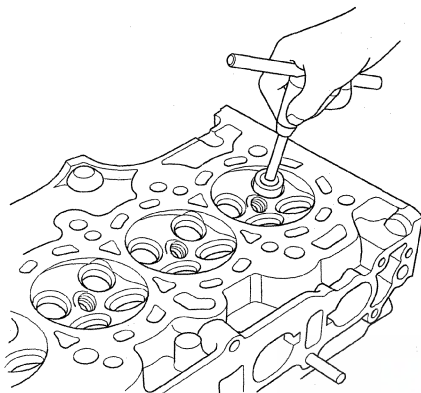
14. Check the clearances with a valve (see page 6-40). Verify that a valve slides in the intake and exhaust valve guides without sticking.

15. Inspect the valve seat. If necessary renew the valve seat using a valve seat cutter (see page 6-43).

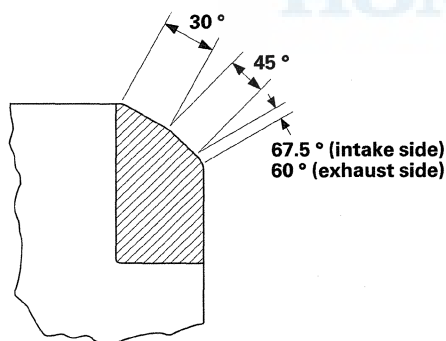


Valve Seat Reconditioning

1. Inspect valve stem-to-guide clearance (see page 6-40). If the valve guides are worn, replace them (see page 6-41) 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 passes with the 45° cutter to remove any possible burrs caused by the other cutters.

Intake Valve Seat Width

Standard (New): 0.850–1.150 mm
(0.03346–0.04528 in)

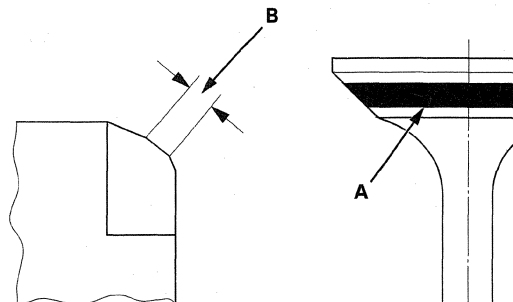
Service Limit: 1.60 mm (0.0630 in)

Exhaust Valve Seat Width

Standard (New): 1.250–1.550 mm
(0.04921–0.06102 in)

Service Limit: 2.00 mm (0.0787 in)

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



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 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 (close to the valve edge), you must make a second cut with the 30° cutter to move it up, then make one more cut with the 45° cutter to restore seat width.

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

(cont'd)

Cylinder Head

Valve Seat Reconditioning (cont'd)

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

Intake Valve Stem Installed Height

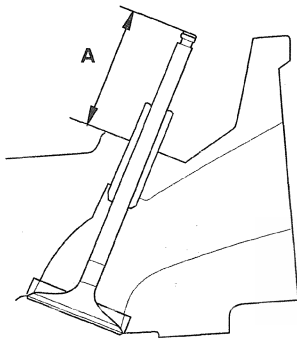
Standard (New): 46.1–46.5 mm (1.815–1.831 in)

Service Limit: 46.8 mm (1.843 in)

Exhaust Valve Stem Installed Height

Standard (New): 46.2–46.6 mm (1.819–1.835 in)

Service Limit: 46.9 mm (1.846 in)



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

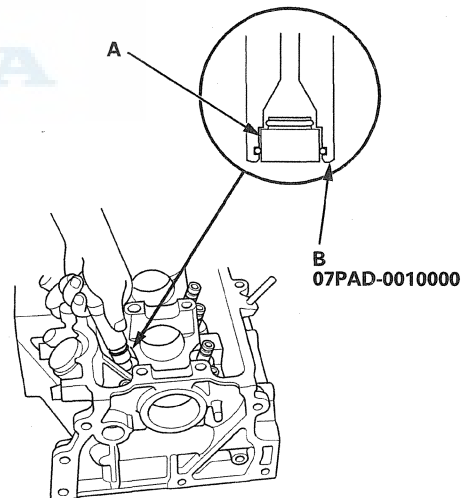
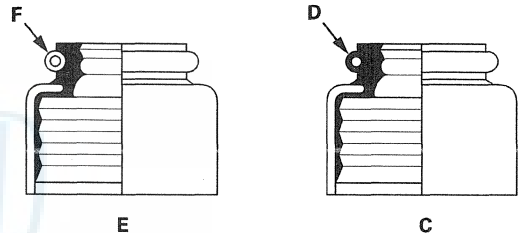
Valve, Spring, and Valve Seal Installation

Special Tools Required

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

1. Coat the valve stems with new engine oil. Install the valves in the valve guides.
2. Check that the valves move up and down smoothly.
3. Install the spring seats on the cylinder head.
4. Install the new valve seals (A) using the 5.5 mm side of the stem seal driver (B).

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

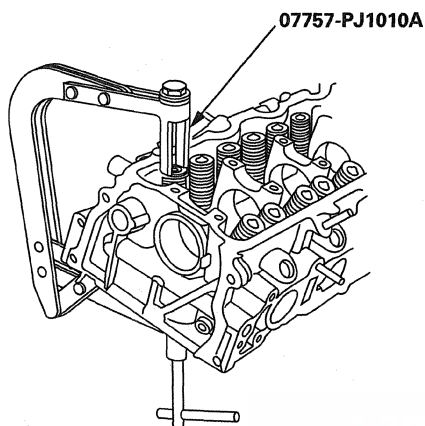


5. Install the valve spring and the spring retainer. Place the end of the valve spring with closely wound coils toward the cylinder head.



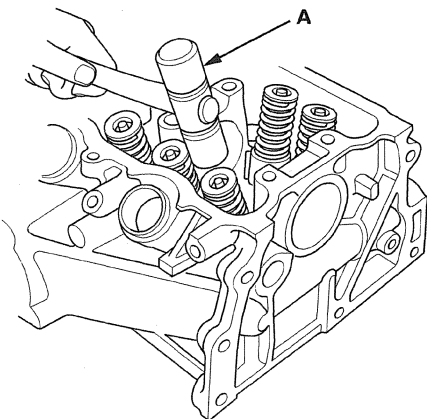
Camshaft Installation

6. Install the valve spring compressor attachment and the valve spring compressor. Compress the valve spring and install the valve cotters.

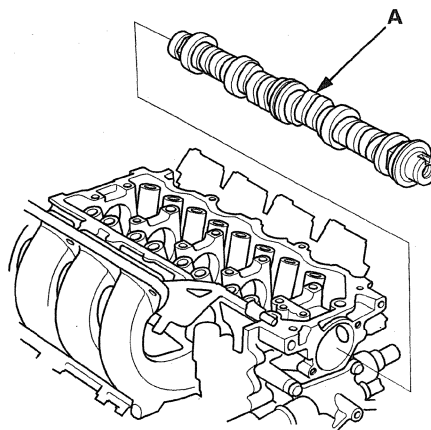


7. Remove the valve spring compressor and the valve spring compressor attachment.
8. Lightly tap the end of each valve stem two or three times with a plastic mallet (A) to ensure proper seating of the valve and the valve cotters. Tap the valve stem only along its axis so you do not bend the stem.

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



1. Install the camshaft (A).

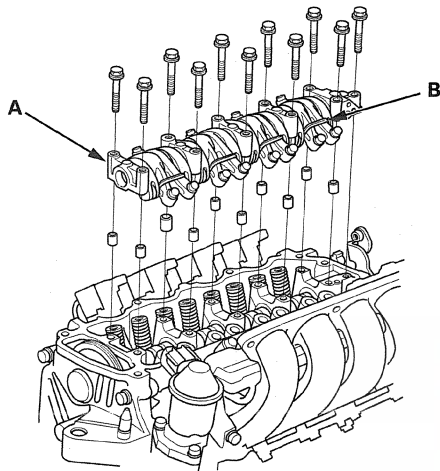


2. Install the CMP pulse plate (see page 6-27).
3. Install the CMP sensor (see page 11-203).
4. Install the rocker arm assembly (see page 6-46).
5. Install the camshaft sprocket (see page 6-30).

Cylinder Head

Rocker Arm Assembly Installation

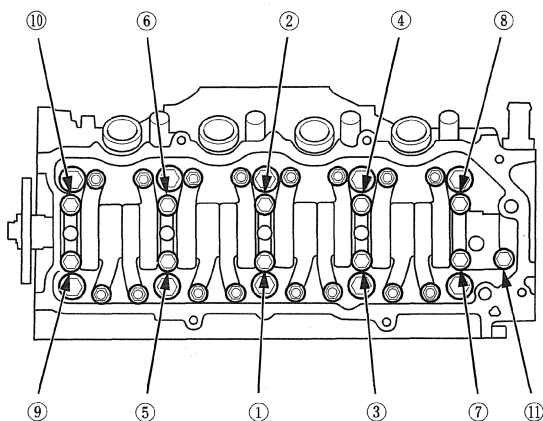
1. If the rocker arm assembly is disassembled, reassemble the rocker arm assembly (see page 6-34).
2. Apply engine oil to the end of the valve stem.
3. Install the rocker arm assembly (A), then remove the rubber bands (B).



4. Tighten each bolt two turns at a time in sequence.

Specified Torque 6 x 1.0 mm

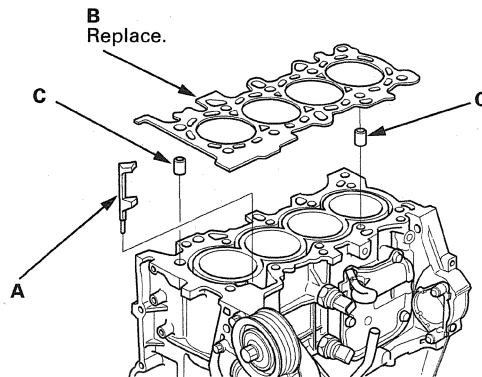
- ①—⑩: 15 N·m (1.5 kgf·m, 11 lbf·ft)
⑪: 10 N·m (1.0 kgf·m, 7 lbf·ft)



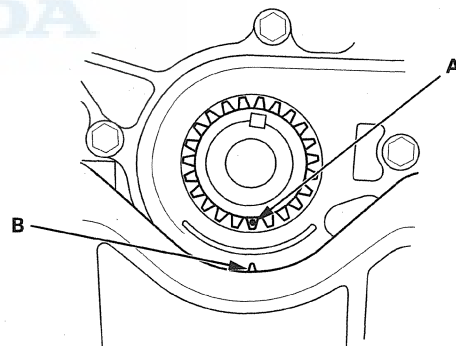
5. Adjust the valve clearance (see page 6-8).
6. Install the cylinder head cover (see page 6-22).

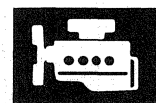
Cylinder Head Installation

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

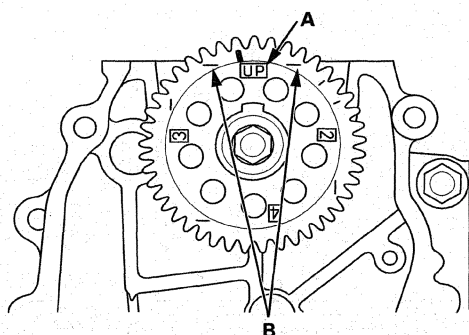


3. Install a new cylinder head gasket (B) and the dowel pins (C) on the engine block. Always use a new cylinder head gasket.
4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the oil pump.

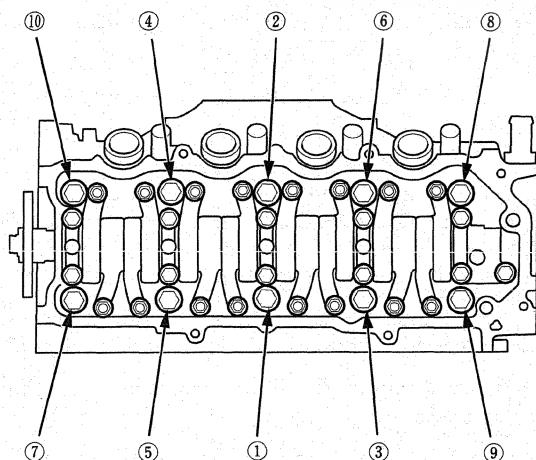




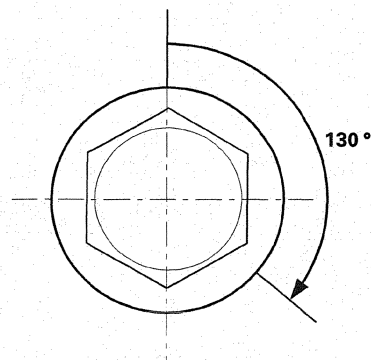
5. Set the camshaft TDC. The "UP" mark (A) on the camshaft sprocket should be at the top, and the TDC grooves (B) on the camshaft sprocket should line up with the top edge of the head.



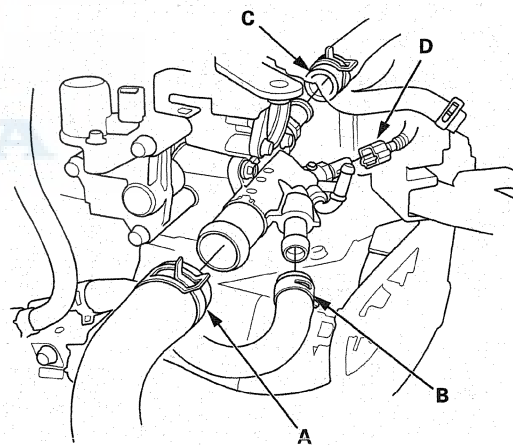
6. Install the cylinder head on the engine block.
7. Apply new engine oil to the threads and flange of all cylinder head bolts.
8. Torque the cylinder head bolts in sequence to 29 N·m (3.0 kgf·m, 22 lbf·ft) with a beam-type torque wrench if possible. When using a preset-click-type torque wrench, be sure 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.



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



10. Install the cam chain (see page 6-14).
11. Install the cylinder head cover (see page 6-22).
12. Connect the upper radiator hose (A), the water bypass hose (B), and the heater hose (C).



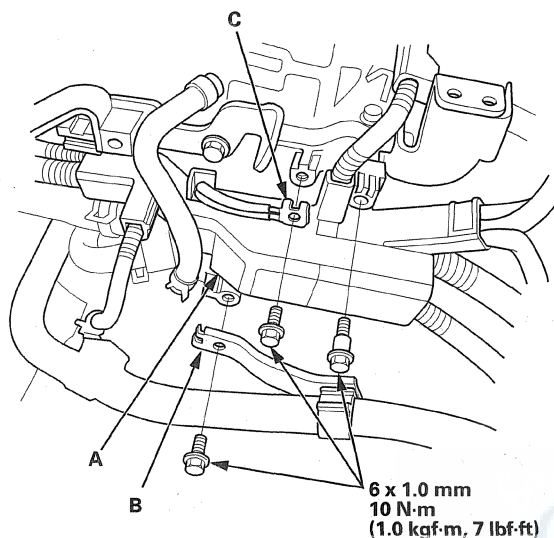
13. Connect the ECT sensor 1 connector (D).

(cont'd)

Cylinder Head

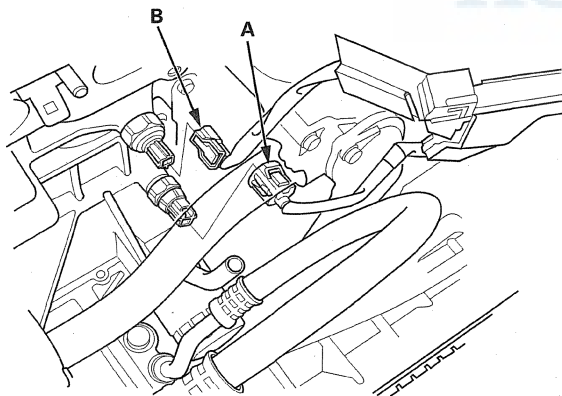
Cylinder Head Installation (cont'd)

14. Install the harness holder (A).

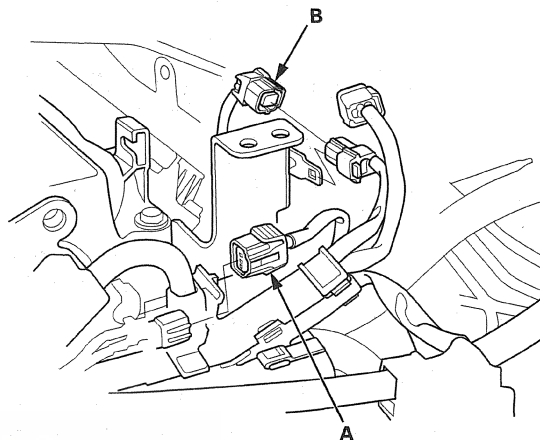


15. Install the heater hose bracket (B) and the ground cable (C).

16. Connect the oil pressure switch connector (A) and the knock sensor connector (B).



17. Connect the CMP sensor connector (A) and the secondary HO2S connector (B).



18. Install the warm-up TWC (see page 11-313).

19. Install the four ignition coils (see page 4-21).

20. Install the injectors (see page 11-200).

21. Install the intake manifold/chamber assembly (see page 9-14).

22. Install the throttle body (see page 11-248).

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

24. Do the 12 volt battery installation procedure (see page 22-88).

25. Inspect for fuel leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump runs for about 2 seconds and pressurizes the fuel line. Repeat this operation three times, then check for fuel leakage at any point in the fuel line.

26. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).

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

28. Inspect the idle speed (see page 11-273).

29. Inspect the ignition timing (see page 4-20).

Engine Mechanical

Engine Block

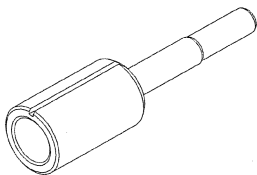
Special Tools	7-2
Component Location Index	7-3
Connecting Rod and Crankshaft End Play Inspection	7-5
Crankshaft Main Bearing Replacement	7-6
Connecting Rod Bearing Replacement	7-8
Oil Pan Removal	7-10
Crankshaft and Piston Removal	7-11
Crankshaft Inspection	7-13
Block and Piston Inspection	7-14
Cylinder Bore Honing	7-16
Piston, Pin, and Connecting Rod Replacement	7-17
Piston Ring Replacement	7-19
Piston Installation	7-21
Connecting Rod Bolt Inspection	7-23
Crankshaft Installation	7-23
CKP Pulse Plate Replacement	7-27
Oil Pan Installation	7-27
Transmission End Crankshaft Oil Seal Installation - In Car	7-30
Drain Bolt/Sealing Bolt Installation	7-31
Block Cover Removal and Installation	7-32



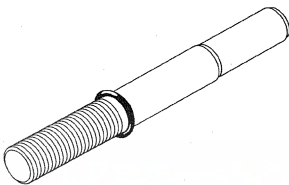
Engine Block

Special Tools

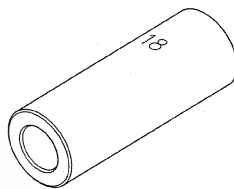
Ref.No.	Tool Number	Description	Qty
①	070AF-PWC0110	Pilot Pin	1
②	070AF-PWC0120	Insert Adjust	1
③	070AF-PWC0130	Pilot Collar, O.D. 18 mm	1
④	07749-0010000	Driver Handle, 15 x 135L	1
⑤	07973-6570500	Piston Base	1
⑥	07973-6570600	Piston Base Spring	1
⑦	07PAF-0010700	Insert Pin	1
⑧	07TGF-001000A	Piston Base Head	1
⑨	07ZAD-PNAA100	Oil Seal Driver Attachment, 96 mm	1



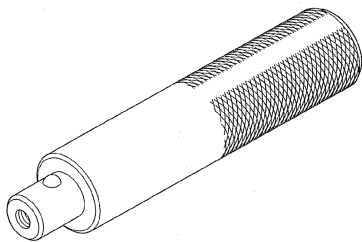
①



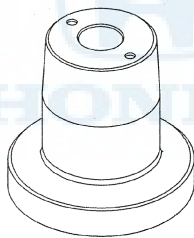
②



③



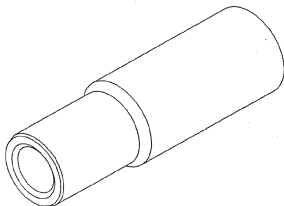
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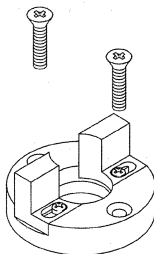
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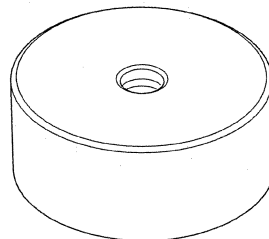
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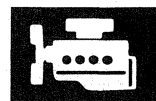
⑦



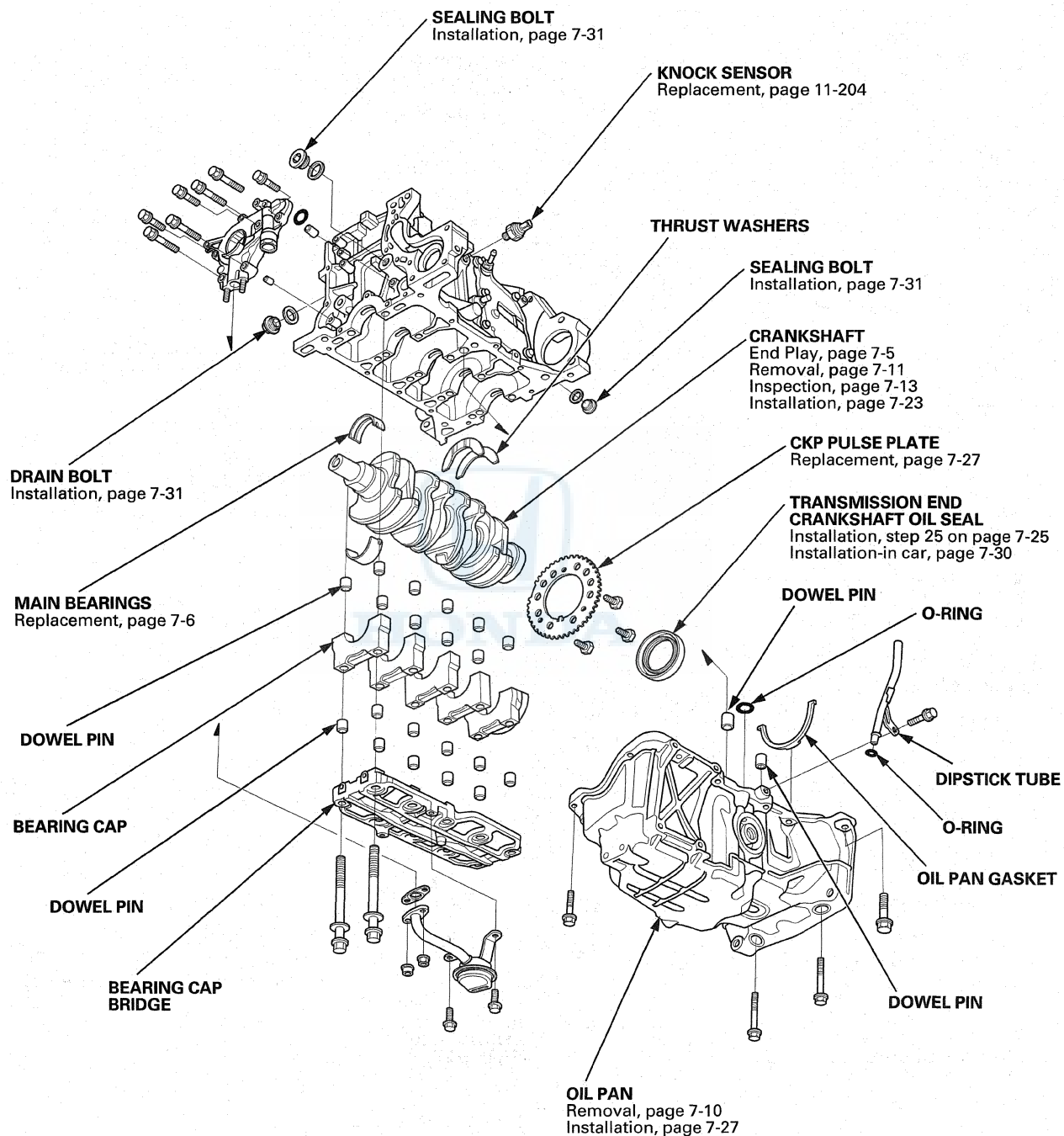
⑧



⑨



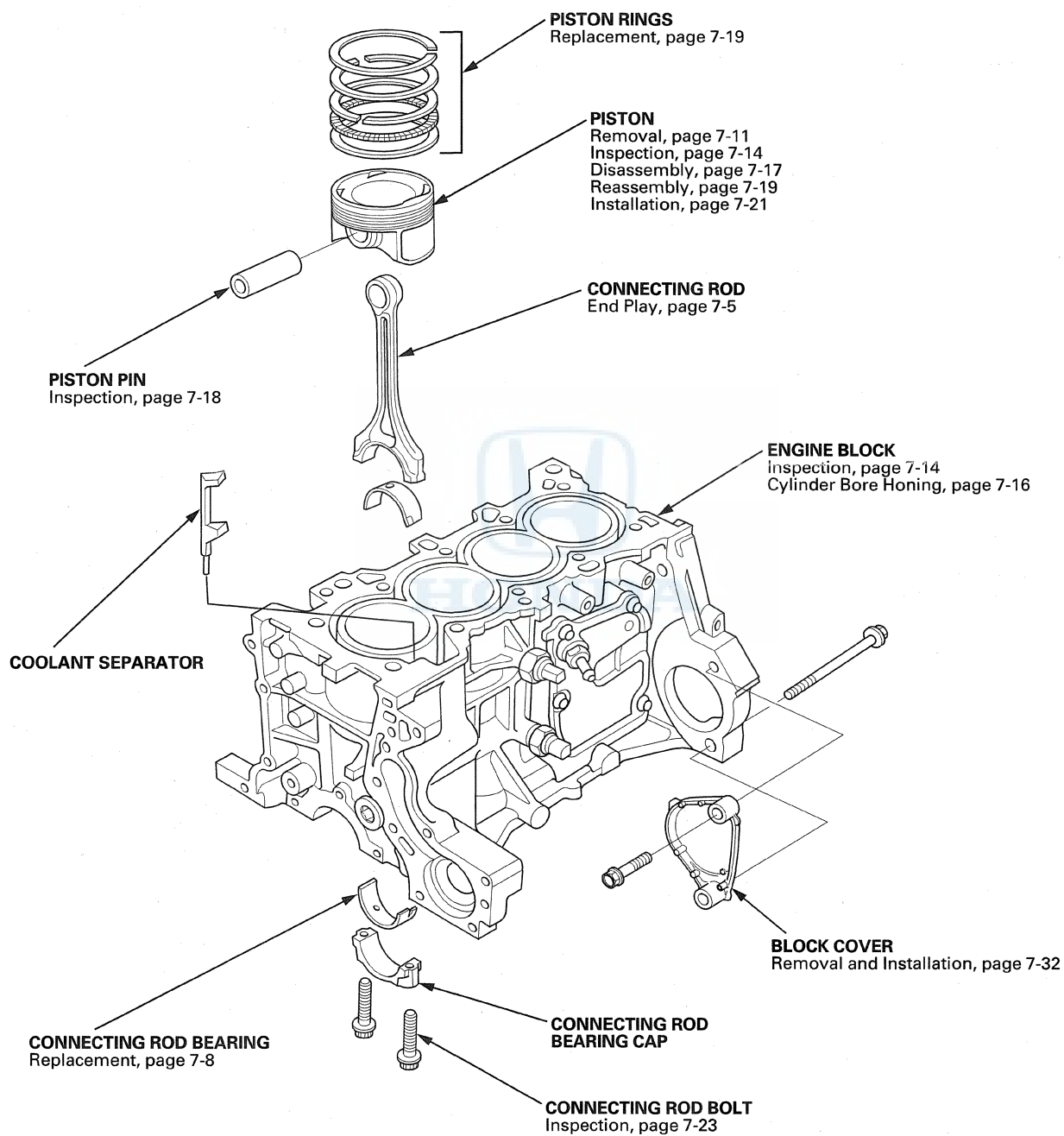
Component Location Index

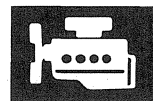


(cont'd)

Engine Block

Component Location Index (cont'd)





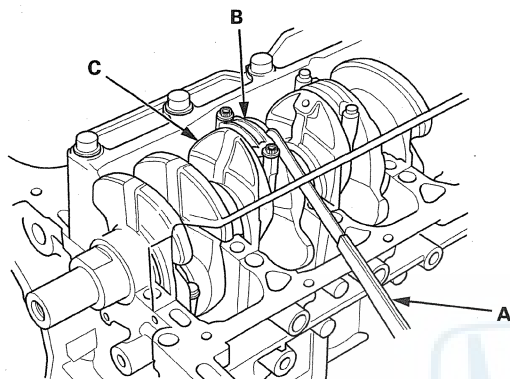
Connecting Rod and Crankshaft End Play Inspection

1. Remove the oil pump (see page 8-14).
2. Measure the connecting rod end play with a feeler gauge (A) between the connecting rod (B) and the crankshaft (C).

Connecting Rod End Play

Standard (New): 0.15–0.35 mm (0.006–0.013 in)

Service Limit: 0.40 mm (0.015 in)

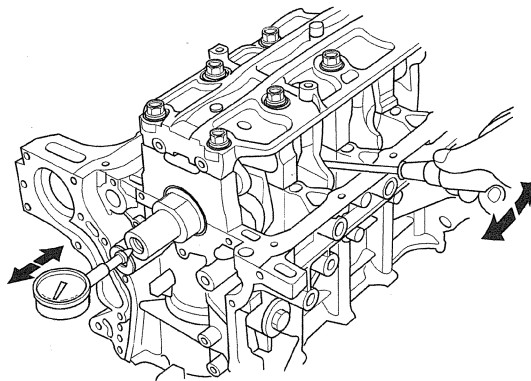


3. If the connecting rod end play is beyond the service limit, install a new connecting rod, and recheck. If it is still beyond the service limit, replace the crankshaft (see page 7-11).
4. To check crankshaft end play, push the crankshaft firmly away from the dial indicator by prying, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator by prying; the dial reading should not exceed the service limit.

Crankshaft End Play

Standard (New): 0.10–0.35 mm (0.0039–0.0138 in)

Service Limit: 0.45 mm (0.0177 in)



5. If the end play is beyond the service limit, replace the thrust washers, and recheck. If it is still beyond the service limit, replace the crankshaft (see page 7-11).

Engine Block

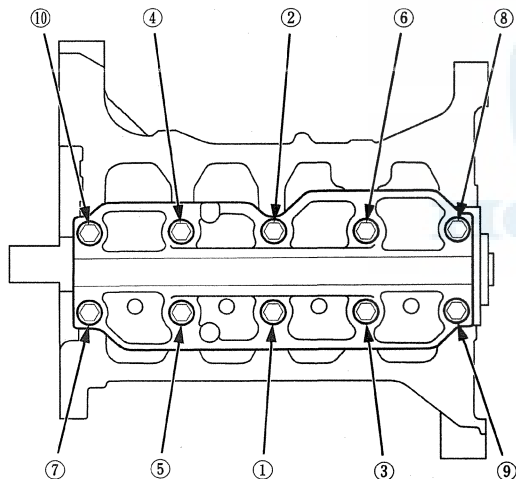
Crankshaft Main Bearing Replacement

Main Bearing Clearance Inspection

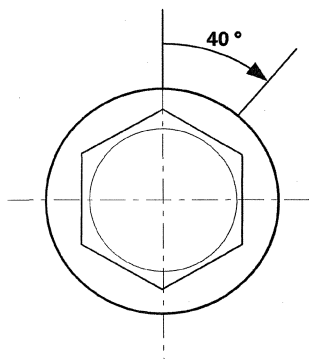
1. Remove the bearing cap bridge, the main bearing caps, and the main bearing halves (see page 7-11).
2. Clean each main journal and main bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the main bearings, the main bearing caps, and bearing cap bridge, then torque the bearing cap bolts to 25 N·m (2.5 kgf·m, 18 lbf·ft) in the proper sequence.

NOTE:

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



5. Tighten the bearing cap bolts an additional 40°.

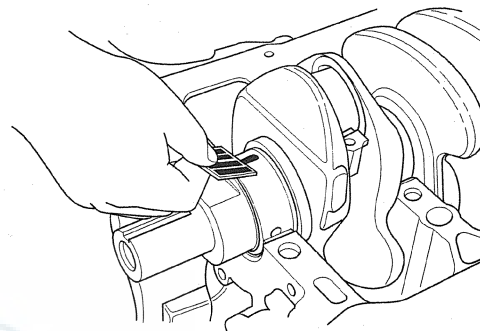


6. Remove the bearing cap bridge, the main bearing caps, and the main bearing halves, and measure the widest part of the plastigage.

Main Bearing-to-Journal Oil Clearance

Standard (New): 0.016–0.034 mm
(0.00063–0.00134 in)

Service Limit: 0.050 mm (0.00197 in)



7. If the plastigage measures too wide or too narrow, remove the crankshaft, and remove the upper half of the main bearing. Install a new, complete main bearing with the same color code, and recheck the clearance. Do not file, shim, or scrape the main bearings or the main bearing caps to adjust clearance.
8. If the plastigage shows the clearance is still incorrect, try the next larger or smaller main bearing (the color listed above or below that one), and check the clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller main bearings, replace the crankshaft (see page 7-11) and start over.

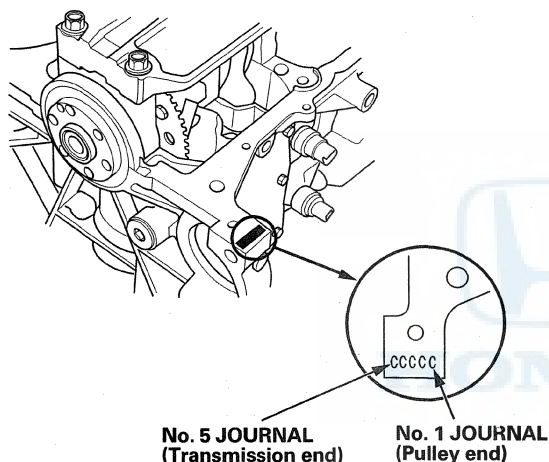


Main Bearing Selection

Block Bore Code Location

Letters have been stamped on the end of the engine block as a code for the size of each of the five main journal bores.

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

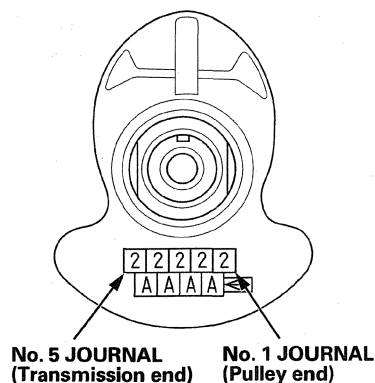


Bearing Identification

Color code is on the edge of the bearing

		Larger block bore			
		A	B	C	D
Smaller main journal	1	Red	Pink	Yellow	Green
	2	Pink	Yellow	Green	Brown
	3	Yellow	Green	Brown	Black
	4	Green	Brown	Black	Blue
		Smaller bearing (Thicker)			

Main Journal Code Location



Engine Block

Connecting Rod Bearing Replacement

Connecting Rod Bearing Clearance Inspection

1. Remove the bearing cap bridge (see page 7-11).
2. Remove the connecting rod cap and the connecting rod bearing half.
3. Clean the connecting rod journal and the connecting rod bearing half with a clean shop towel.
4. Place one strip of plastigage across the connecting rod journal.
5. Reinstall the connecting rod bearing half and connecting rod cap, and torque the bolts to 10 N·m (1.0 kgf·m, 7 lbf·ft) $\pm 90^\circ$.

NOTE:

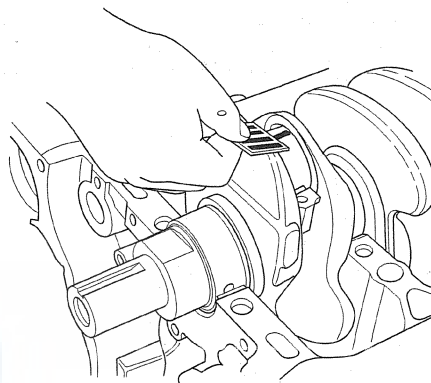
- Apply new engine oil to the bolt threads and flanges.
- Do not rotate the crankshaft during inspection.

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

Connecting Rod Bearing-to-Journal Oil Clearance

Standard (New): 0.020–0.038 mm
(0.00079–0.00150 in)

Service Limit: 0.050 mm (0.00197 in)



7. If the plastigage measures too wide or too narrow, remove the upper half of the connecting rod bearing, install a new, complete connecting rod bearing with the same color code, and recheck the clearance. Do not file, shim, or scrape the connecting rod bearings or the connecting rod caps to adjust clearance.
8. If the plastigage shows the clearance is still incorrect, try the next larger or smaller connecting rod bearing (the color listed above or below that one), and check clearance again. If the proper clearance cannot be obtained by using the appropriate larger or smaller connecting rod bearing, replace the crankshaft (see page 7-11) and start over.



Connecting Rod Bearing Selection

Each connecting rod falls into one of four tolerance ranges (from 0 to 0.024 mm (0.0009 in), in 0.006 mm (0.0002 in) increments) depending on the size of its big end bore.

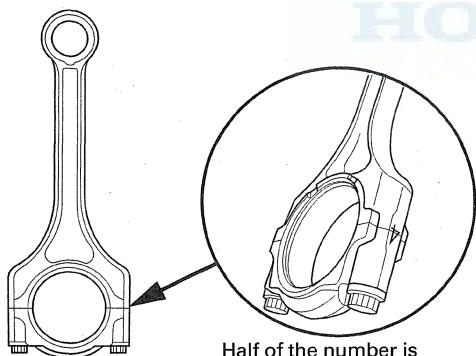
It's then stamped with a number (1, 2, 3, or 4) indicating the range. You may find any combination of 1, 2, 3, or 4 in any engine.

Big End Bore Size: 43.0 mm (1.693 in)

Inspect each connecting rod for cracks and heat damage.

Connecting Rod Big End Bore Code Locations

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



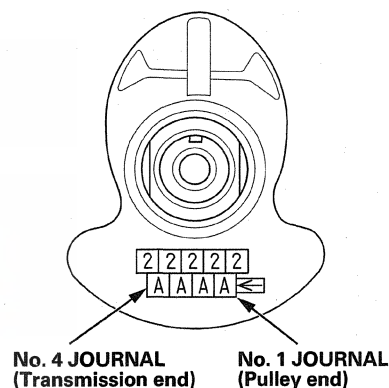
Half of the number is stamped on the connecting rod and the other half is stamped on the rod cap.

Bearing Identification

Color code is on the edge of the bearing

		Larger big rod bore			
		1	2	3	4
Smaller rod journal	A	Smaller bearing (Thicker)			
	B	Red	Pink	Yellow	Green
	C	Pink	Yellow	Green	Brown
	D	Yellow	Green	Brown	Black
		Green	Brown	Black	Blue

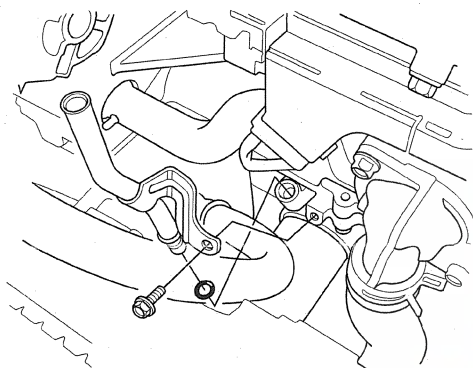
Connecting Rod Journal Code Location



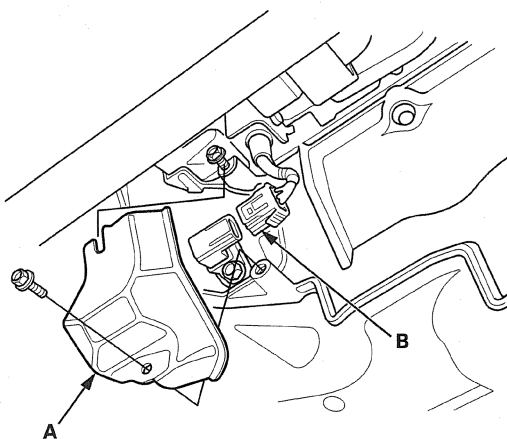
Engine Block

Oil Pan Removal

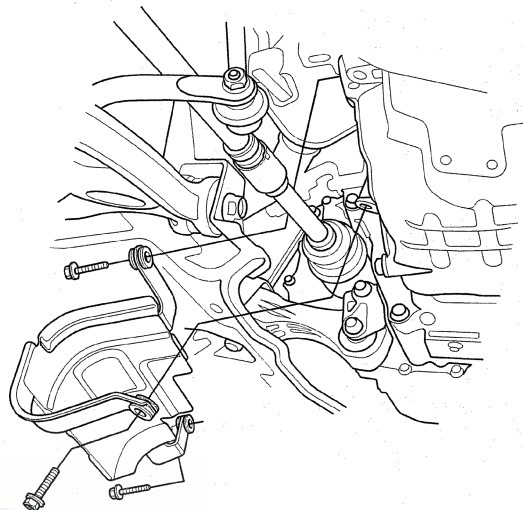
1. If the engine is already out of the vehicle, go to step 7.
2. Remove the splash shield (see page 20-163).
3. Drain the engine oil (see page 8-10).
4. Remove the drive belt (see page 10-17).
5. Remove the A/C compressor without disconnecting the A/C hoses (see step 44 on page 5-6).
6. Remove the torque rod (see page 5-28).
7. Remove the dipstick, then remove the dipstick tube.



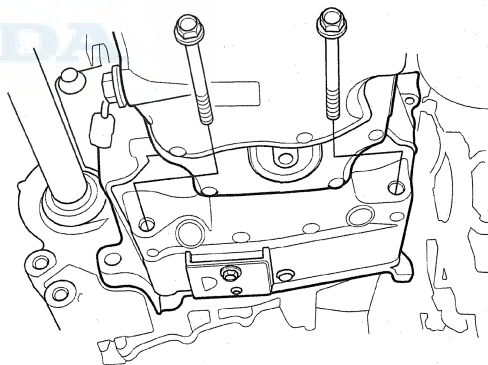
8. Remove the CKP sensor cover (A), then disconnect the CKP sensor connector (B).

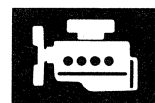


9. CVT model: Remove the driveshaft heat shield.



10. Remove the torque rod bracket (see page 5-35).
11. Remove the transmission mounting bolts.

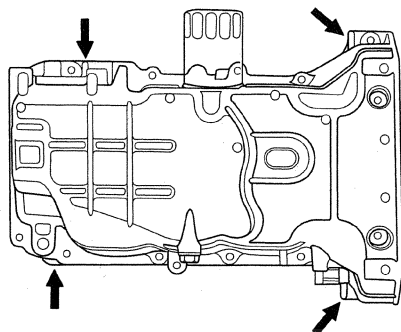




Crankshaft and Piston Removal

12. Remove the oil pan bolts.

13. Using a flat blade screwdriver, separate the oil pan from the engine block in the places shown.



14. Remove the oil pan.

NOTE: Lower the oil pan carefully so as not to damage the IMA motor (resolver stator).

1. Remove the engine/IMA motor/transmission assembly (see page 5-3).

2. Remove the transmission:

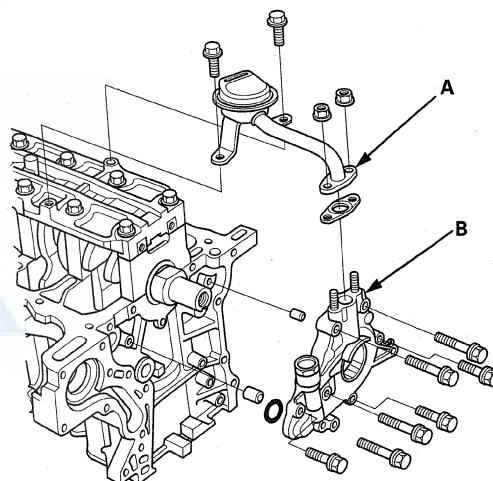
- M/T model (see page 13-43)
- CVT model (see page 14-156)

3. Remove the IMA motor rotor (see page 12-224), the IMA motor housing (see page 12-227), and the IMA motor rotor position sensor (see page 12-228).

4. Remove the cylinder head (see page 6-24).

5. Remove the oil pan (see page 7-10).

6. Remove the oil screen (A), then remove the oil pump (B).

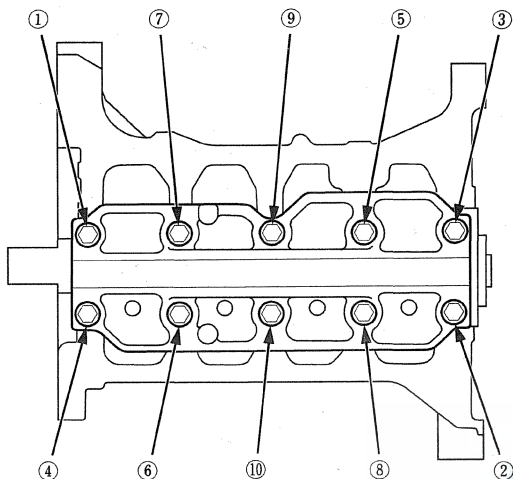


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Engine Block

Crankshaft and Piston Removal (cont'd)

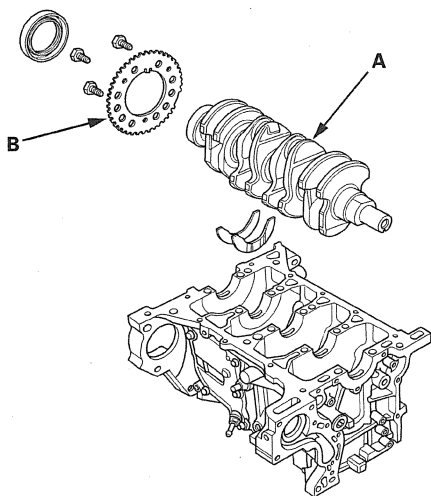
7. Remove the bearing cap bolts. To prevent warpage, loosen the bolts in sequence 1/3 turn at a time; repeat the sequence until all bolts are loosened.



8. Remove the bearing cap bridge and the main bearing caps.

9. Remove the connecting rod caps/bearings. Keep all connecting rod caps/bearings in order.

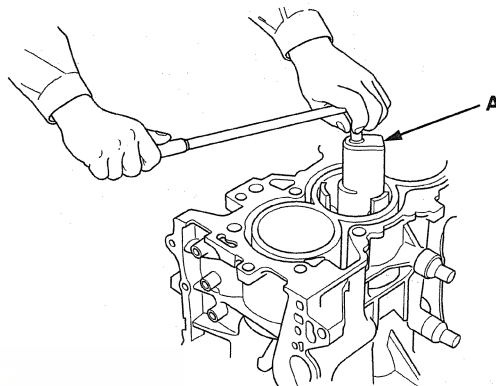
10. Lift crankshaft (A) out of the engine block, being careful not to damage the journals and the CKP pulse plate (B).



11. Remove the CKP pulse plate.

12. Remove the upper connecting rod bearing halves from the connecting rods, and set them aside with their respective caps.

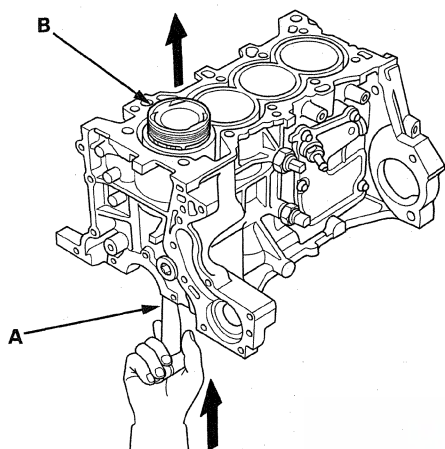
13. If you can feel a ridge of metal or hard carbon around the top of each cylinder, remove it with a ridge reamer (A). Follow the reamer manufacturer's instructions. If the ridge is not removed, it may damage the pistons as they are pushed out.





Crankshaft Inspection

14. Use the wooden handle of a hammer (A) to drive out the piston/connecting rod assembly (B). Take care not to damage the cylinder with the connecting rod.



15. Reinstall the bearing cap bridge, the main bearing caps, and the main bearings on the engine block in the proper order.
16. Reinstall the connecting rod bearings and the connecting rod caps after removing each piston/connecting rod assembly.
17. Mark each piston/connecting rod assembly with its cylinder number to make sure they are reused in original order.

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

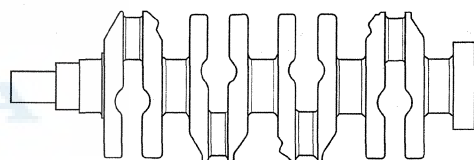
Out-of-Round and Taper

1. Remove the crankshaft from the engine block (see page 7-11).
2. Clean the crankshaft oil passages with pipe cleaners or a suitable brush.
3. Check the keyway slot and threaded holes for damage.
4. Measure the out-of-round at the middle of each connecting rod and the main journal in two places. The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round

Standard (New): 0.005 mm (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)



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

Journal Taper

Standard (New): 0.005 mm (0.00020 in) max.

Service Limit: 0.010 mm (0.00039 in)

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Engine Block

Crankshaft Inspection (cont'd)

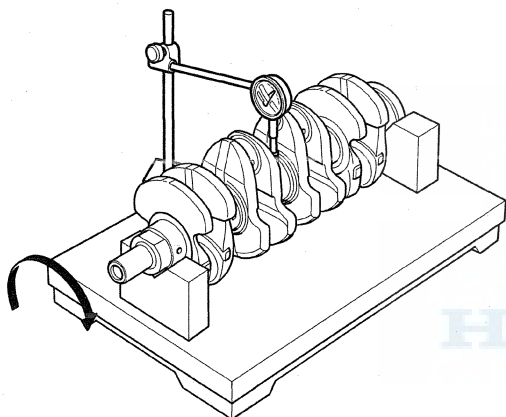
Straightness

6. Place the V-blocks on a flat surface.
7. Check the total runout with the crankshaft supported on V-blocks.
8. Measure the runout on all of the main journals. Rotate the crankshaft two complete revolutions. The difference between measurements on each main journal must not be more than the service limit.

Crankshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in)



Block and Piston Inspection

1. Remove the crankshaft and the pistons (see page 7-11).
2. Check the piston for distortion or cracks.
3. Measure the piston skirt diameter (A) at a point 16 mm (0.63 in) from the bottom of the skirt.

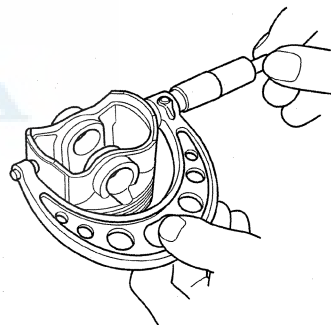
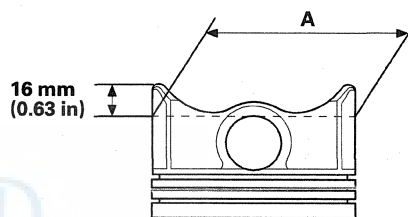
Piston Diameter

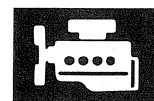
Standard (New): 72.98–72.99 mm
(2.8732–2.8736 in)

Service Limit: 72.97 mm (2.8728 in)

Oversize Piston Diameter

0.25: 73.23–73.24 mm (2.8831–2.8835 in)





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

Cylinder Bore Size

Standard (New): 73.000–73.015 mm
(2.87401–2.87460 in)

Service Limit: 73.065 mm (2.87657 in)

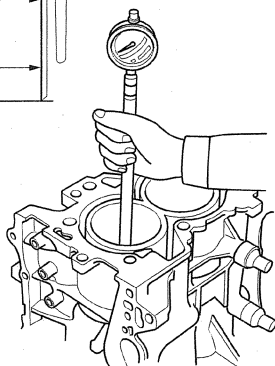
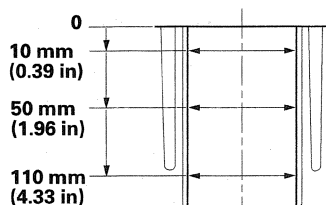
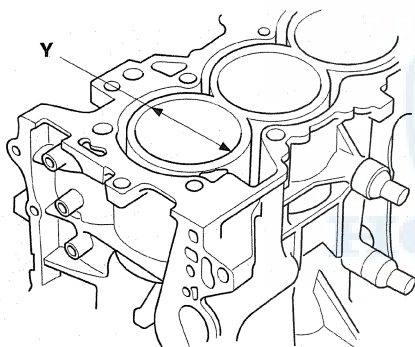
Oversize

0.25: 73.250–73.265 mm (2.8839–2.8844 in)

Reboring limit: 0.25 mm (0.0098 in) max.

Bore Taper

Limit: (Difference between first and third measurement)
0.05 mm (0.0020 in)

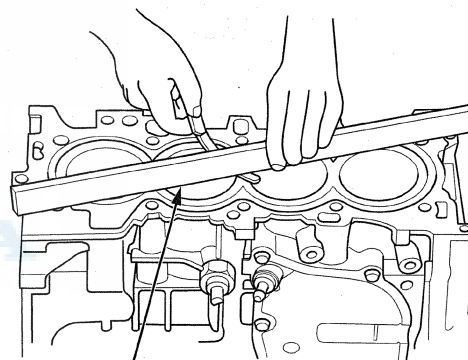
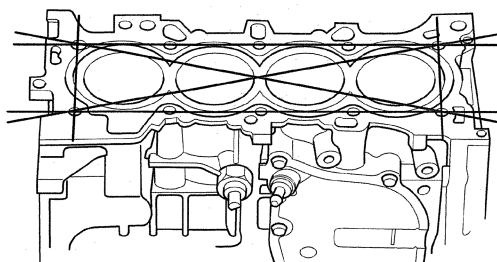


5. Scored or scratched cylinder bore must be honed.

6. Check the top of the engine block for warpage. Measure along the edges and across the center as shown.

Engine Block Warpage

Standard (New): 0.07 mm (0.002 in) max.



PRECISION STRAIGHT EDGE

(cont'd)

Engine Block

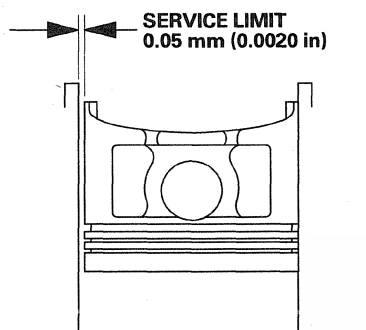
Block and Piston Inspection (cont'd)

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

Piston-to-Cylinder Clearance

Standard (New): 0.010–0.035 mm
(0.00039–0.00138 in)

Service Limit: 0.05 mm (0.0020 in)



Cylinder Bore Honing

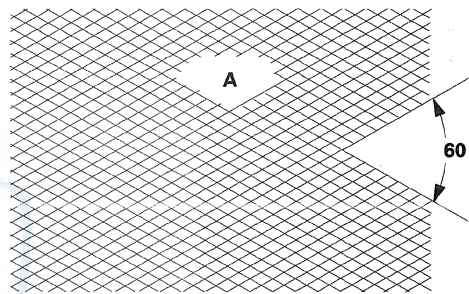
1. Measure the cylinder bores (see page 7-14).

If the engine block is to be reused, hone the cylinders and remeasure the bores. Only scored or scratched cylinder bore must be honed.

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

NOTE:

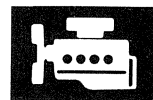
- Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent.
- Do not use stones that are worn or broken.



3. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting.

NOTE: Never use solvent, it will only redistribute the grit on the cylinder walls.

4. If scoring or scratches are still present in the cylinder bores after honing to the service limit, rebore the engine block. Some light vertical scoring and scratching is acceptable if it is not deep enough to catch your fingernail and does not run the full length of the bore.



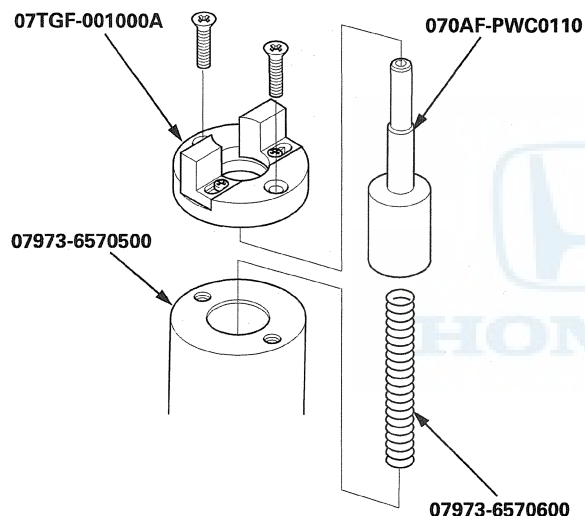
Piston, Pin, and Connecting Rod Replacement

Special Tools Required

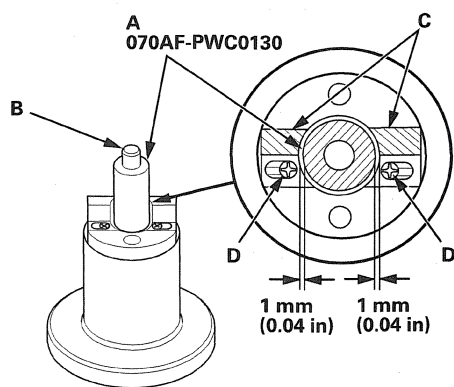
- Pilot Pin 070AF-PWC0110
- Piston Base 07973-6570500
- Piston Base Spring 07973-6570600
- Piston Base Head 07TGF-001000A
- Pilot Collar, O.D. 18 mm 070AF-PWC0130
- Insert Adjust 070AF-PWC0120
- Insert Pin 07PAF-0010700

Disassembly

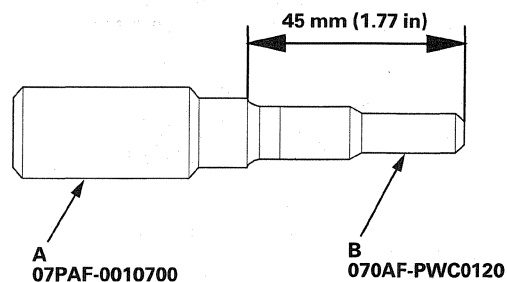
1. Remove the piston from the engine block (see page 7-11).
2. Assemble the special tool as shown.



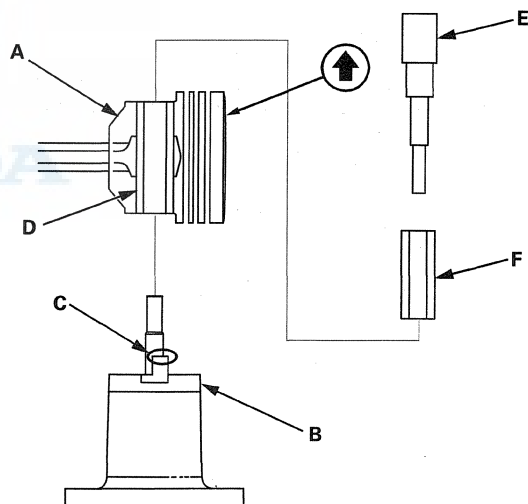
3. Temporarily install the pilot collar, O.D. 18 mm (A) over the pilot pin (B), and adjust the piston base head (C) as shown, then tighten the screws (D). Remove the pilot collar.



4. Assemble and adjust the length of the insert pin (A) and the insert adjust (B) to 45 mm (1.77 in).



5. With the arrow on top of the piston pointing up, place the piston assembly (A) on the piston base head (B). Be sure you position the recessed flat area of the piston against the area of the piston base head (C) as shown.



6. Press the piston pin (D) out with the insert pin and the insert adjust (E), the pilot collar (F), and a hydraulic press.

(cont'd)

Engine Block

Piston, Pin, and Connecting Rod Replacement (cont'd)

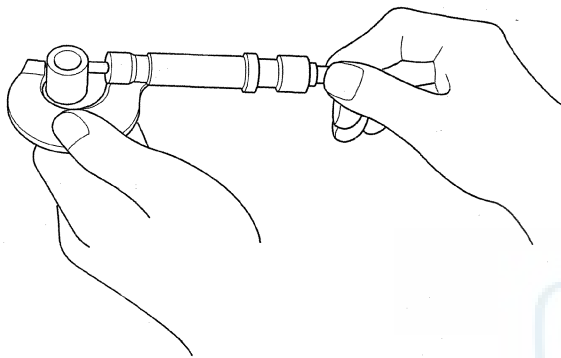
Inspection

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

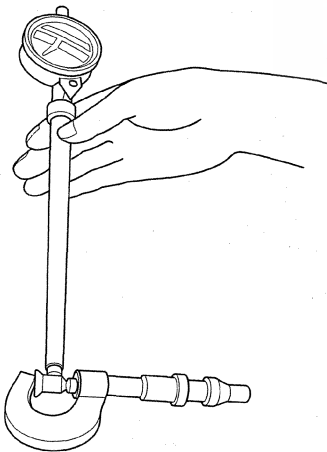
1. Measure the diameter of the piston pin.

Piston Pin Diameter

Standard (New): 17.996–18.000 mm
(0.70850–0.70866 in)



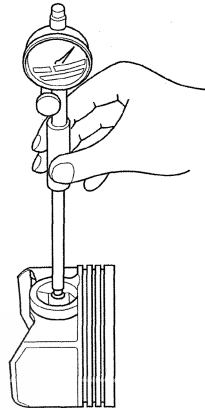
2. Zero the dial indicator to the piston pin diameter.



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

Piston Pin-to-Piston Clearance

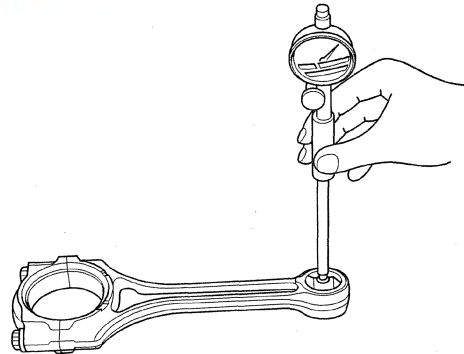
Standard (New): 0.010–0.017 mm
(0.00039–0.00067 in)



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

Piston Pin-to-Connecting Rod Clearance

Standard (New): -0.036–-0.019 mm
(-0.00142–-0.00075 in)

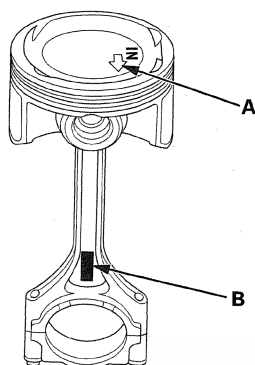




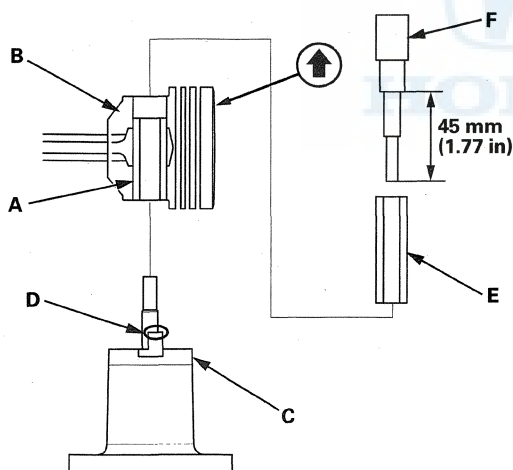
Piston Ring Replacement

Reassembly

1. Assemble the piston and the connecting rod with the arrow (A) and the embossed mark (B) on the same side.

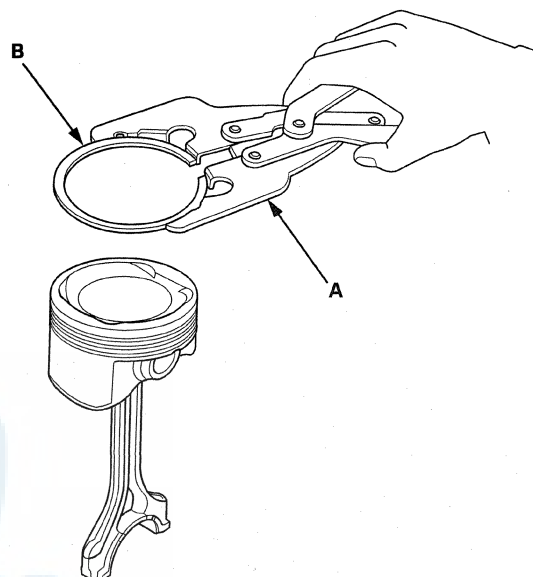


2. Insert the pilot collar (A) into the piston and the connecting rod.



3. With the arrow on top of the piston and the embossed mark on the connecting rod facing up, place the piston assembly (B) on the piston base head (C). Be sure you position the recessed flat area of the piston against the area of the piston base head (D) as shown.
4. Press the piston pin (E) in with the insert pin and the insert adjust (F) and a hydraulic press.

1. Remove the piston from the engine block (see page 7-11).
2. Using a ring expander (A), remove the old piston rings (B).



3. Clean all the ring grooves thoroughly with a squared-off broken ring, or a ring groove cleaner with a blade to fit the piston grooves. File down the blade, if necessary. The top and second ring grooves are 1.0 mm (0.039 in) wide, and the oil ring groove is 2.0 mm (0.079 in) wide. Do not use a wire brush to clean the ring grooves, or cut the ring grooves deeper with the cleaning tool.

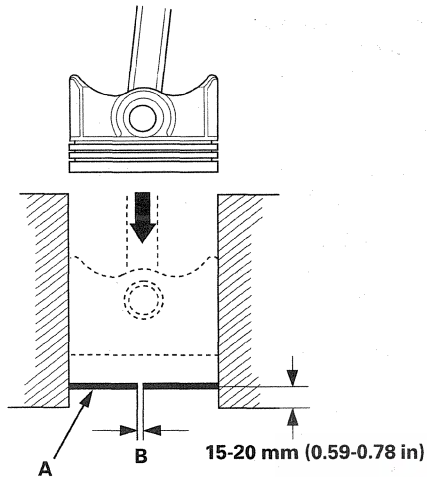
NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

(cont'd)

Engine Block

Piston Ring Replacement (cont'd)

4. Using a piston, push a new ring (A) into the cylinder bore 15–20 mm (0.59–0.78 in) from the bottom.



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

- If the gap is too small, check to see if you have the proper rings for your engine.
- If the gap is too large, recheck the cylinder bore diameter against the wear limits (see page 7-14). If the bore is over the service limit, the engine block must be rebored.

Piston Ring End-Gap

Top Ring:

Standard (New): 0.15–0.30 mm (0.006–0.011 in)

Service Limit: 0.60 mm (0.023 in)

Second Ring:

RIKEN

Standard (New): 0.30–0.42 mm (0.012–0.016 in)

Service Limit: 0.65 mm (0.025 in)

NIPPON

Standard (New): 0.35–0.50 mm (0.014–0.019 in)

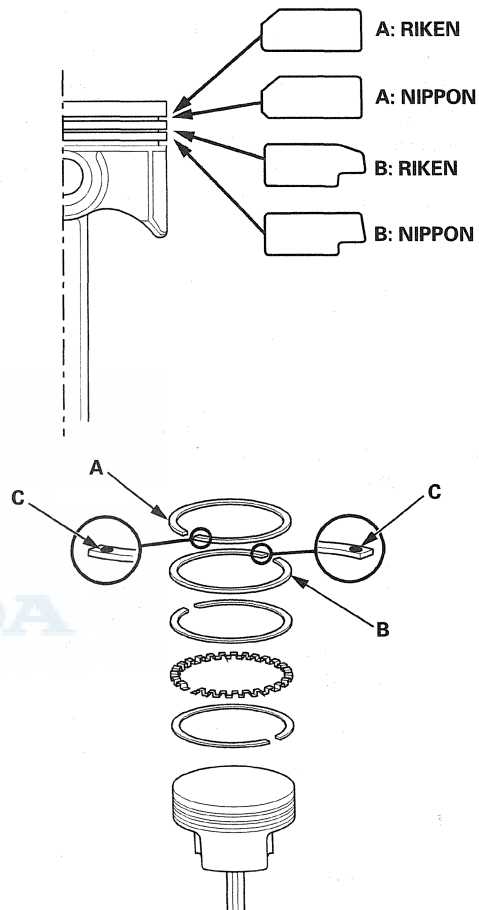
Service Limit: 0.65 mm (0.025 in)

Oil Ring:

Standard (New): 0.20–0.70 mm (0.008–0.027 in)

Service Limit: 0.80 mm (0.031 in)

6. Install the rings as shown. The top ring (A) has a R or 1N mark, and the second ring (B) has a 2R or 2N mark. The manufacturing marks (C) must be facing upward.





Piston Installation

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

Top Ring Clearance

RIKEN

Standard (New): 0.065—0.090 mm (0.003—0.003 in)

Service Limit: 0.15 mm (0.005 in)

NIPPON

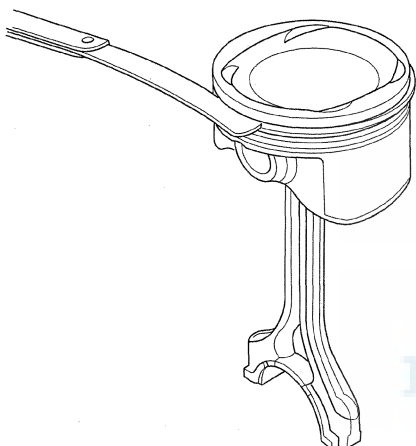
Standard (New): 0.061—0.090 mm (0.003—0.003 in)

Service Limit: 0.15 mm (0.005 in)

Second Ring Clearance

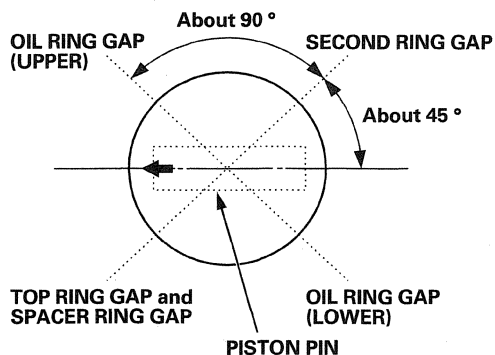
Standard (New): 0.030—0.055 mm (0.002—0.002 in)

Service Limit: 0.12 mm (0.004 in)



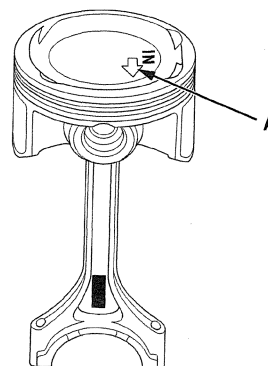
8. Rotate the rings in their grooves to make sure they do not bind.

9. Position the ring end gaps as shown:



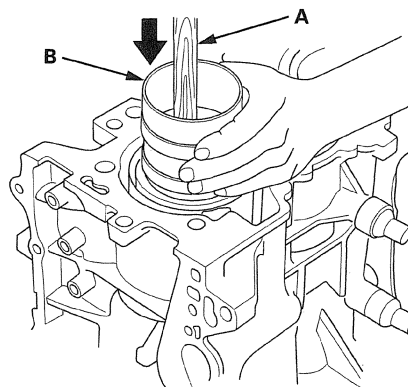
If the Crankshaft is Already Installed

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Remove the connecting rod caps, and check that the connecting rod bearing is securely in place.
3. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
4. Position the piston/connecting rod assembly with the arrow (A) facing the cam chain side of the engine block.



5. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A).

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



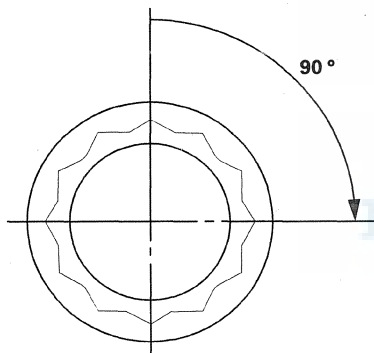
(cont'd)

Engine Block

Piston Installation (cont'd)

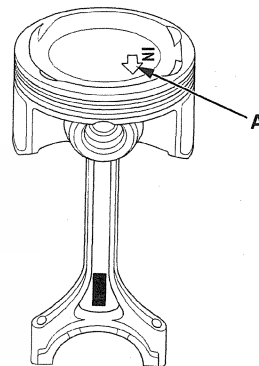
6. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.
7. Check the connecting rod bearing clearance with plastigage (see page 7-8).
8. Inspect the connecting rod bolts (see page 7-23).
9. Apply new engine oil to the connecting rod bolt threads, then install the connecting rod caps with the connecting rod bearings. Torque the bolts to 10 N·m (1.0 kgf·m, 7 lbf·ft).
10. Tighten the connecting rod bolts an additional 90°.

NOTE: Remove the connecting rod 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.



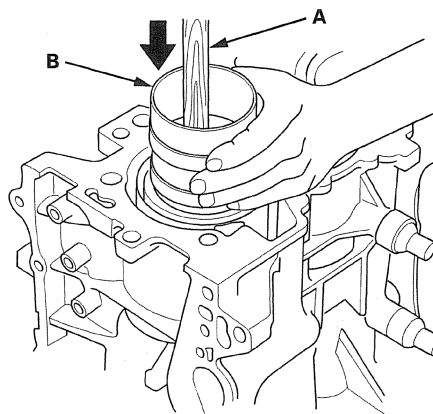
If the Crankshaft is Not Installed

1. Remove the connecting rod caps, and check that the connecting rod bearing is securely in place.
2. Apply new engine oil to the piston, inside of the ring compressor, and the cylinder bore, then attach the ring compressor to the piston/connecting rod assembly.
3. Position the piston/connecting rod assembly with the arrow (A) facing the cam chain side of the engine block.



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

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

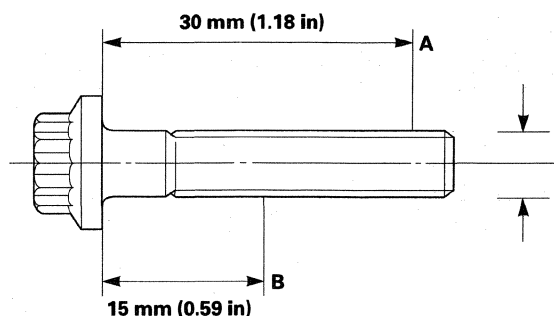


5. Position all pistons at top dead center (TDC).



Connecting Rod Bolt Inspection

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



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

Point A—Point B = Difference in Diameter

Difference in Diameter

Specification: 0—0.05 mm (0—0.0019 in)

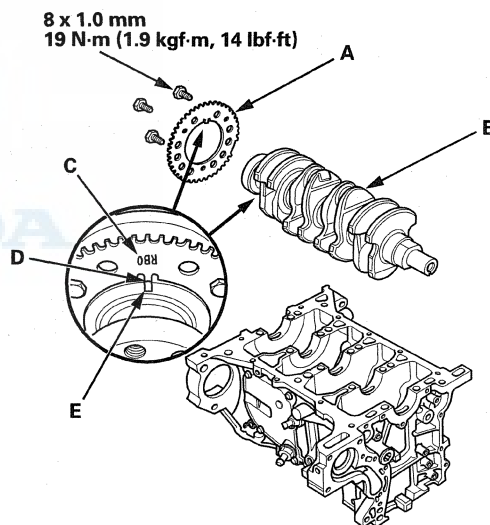
3. If the difference in diameter is out of tolerance, replace the connecting rod bolt.

Crankshaft Installation

Special Tools Required

- Driver Handle, 15 x 135L 07749-0010000
- Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100

1. Check the main bearing clearance with plastigage (see page 7-6).
2. Check the connecting rod bearing clearance with plastigage (see page 7-8).
3. Install the bearing halves in the engine block and the connecting rods.
4. Apply new engine oil to the inside of the main bearings and the connecting rod bearings.
5. Install the CKP pulse plate (A) on the crankshaft (B); face the marked side (C) toward the transmission, and align the tab (D) on the CKP pulse plate with the groove (E) on the crankshaft.



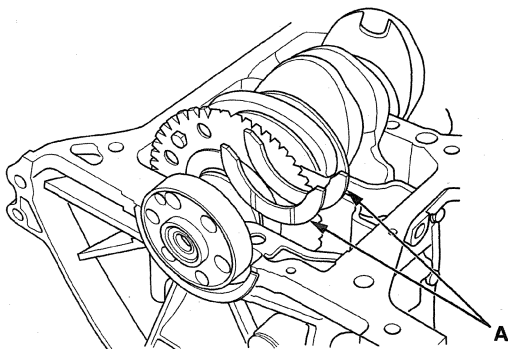
6. Hold the crankshaft so connecting rod journal No. 2 and connecting rod journal No. 3 are straight up, and lower the crankshaft into the engine block.

(cont'd)

Engine Block

Crankshaft Installation (cont'd)

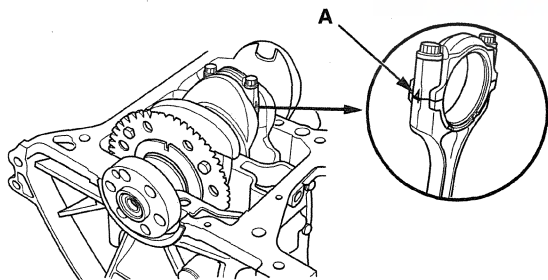
7. Apply new engine oil to the side with the thrust washer groove. Install the thrust washers (A) in the No. 4 journal.



8. Inspect the connecting rod bolts (see page 7-23).

9. Apply new engine oil to the threads and flanges of the connecting rod bolts.

10. Seat the connecting rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (A) on the connecting rod and the connecting rod cap, then install the connecting rod caps and the connecting rod bolts finger-tight.

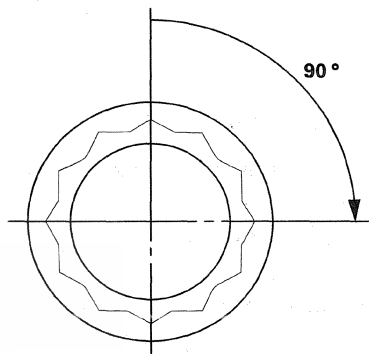


11. Rotate the crankshaft clockwise, and seat the connecting rod journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and the connecting rod cap, then install the connecting rod caps and the connecting rod bolts finger-tight.

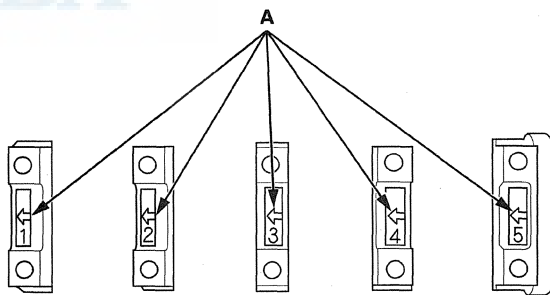
12. Torque the connecting rod bolts to 10 N·m (1.0 kgf·m, 7 lbf·ft).

13. Tighten the connecting rod bolts an additional 90°.

NOTE: Remove the connecting rod 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.



14. Install the main bearing caps with the arrows facing (A) the cam chain side on the bearing cap bridge.



15. Remove old liquid gasket from the bearing cap bridge/No. 5 main bearing cap mating surfaces.

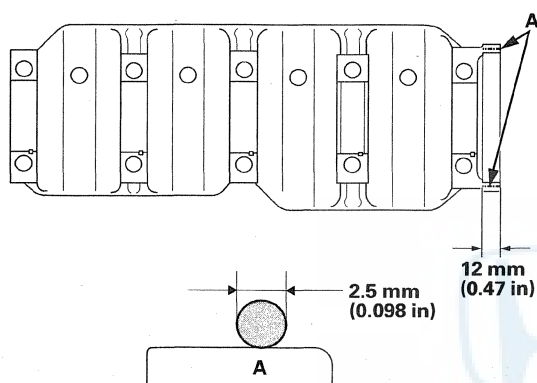
16. Clean and dry the bearing cap bridge/No. 5 main bearing cap mating surfaces.



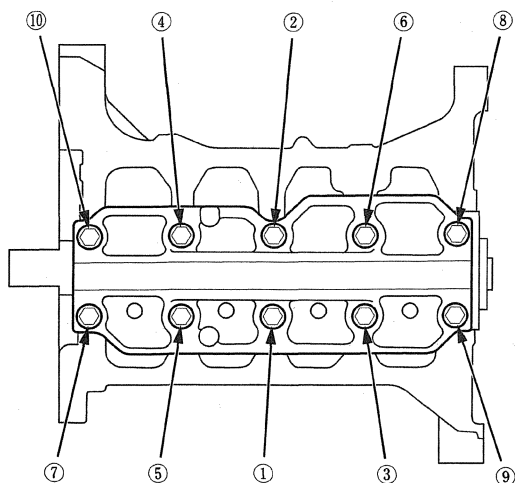
17. Apply liquid gasket (P/N 08718-0004) to the engine block mating surface of the bearing cap bridge/No. 5 main bearing cap. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

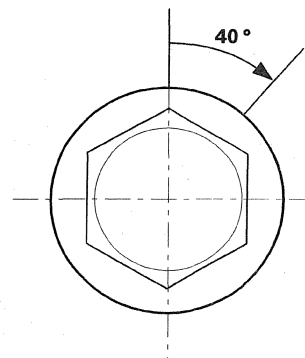
- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



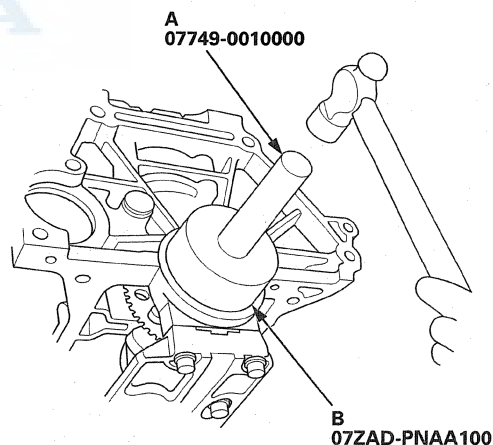
18. Put the bearing cap bridge on the engine block.
19. Apply new engine oil to the threads and flange of the bearing cap bolts.
20. Torque the bearing cap bolts in sequence to 25 N·m (2.5 kgf·m, 18 lbf·ft).



21. Tighten the bearing cap bolts an additional 40°.



22. Clean the excess liquid gasket off the engine block.
23. Clean and dry the crankshaft oil seal housing.
24. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
25. Use the driver handle, 15 × 135 L (A), and the oil seal driver attachment, 96 mm (B), to drive a new crankshaft oil seal squarely into the block to the specified installed height.



(cont'd)

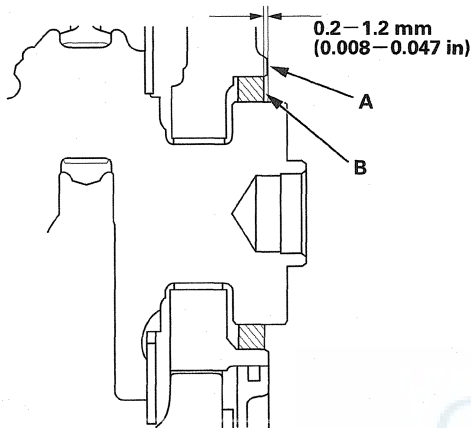
Engine Block

Crankshaft Installation (cont'd)

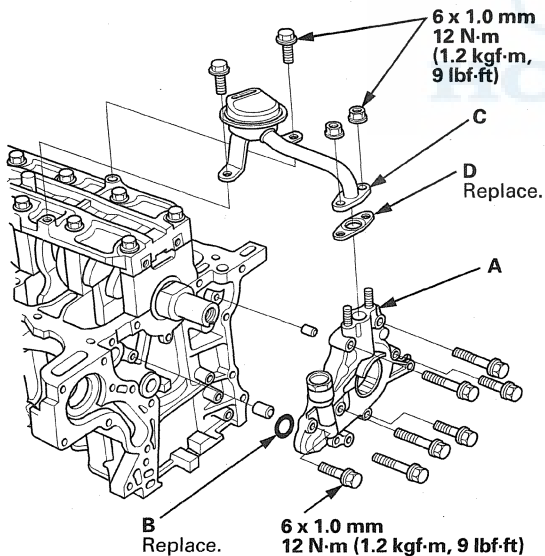
26. Measure the distance between the cylinder block (A) and the oil seal (B).

Oil Seal Installed Height

0.2—1.2 mm (0.008—0.047 in)



27. Install the oil pump (A) with a new O-ring (B).



28. Install the oil screen (C) with a new gasket (D).

29. Install the oil pan (see page 7-27).

30. Install the cylinder head (see page 6-46).

31. Install the IMA motor rotor position sensor (see page 12-228), the IMA motor housing (see page 12-227), and the IMA motor rotor (see page 12-224).

32. Install the transmission:

- M/T model (see page 13-49)
- CVT model (see page 14-165)

33. Install the engine/IMA motor/transmission (see page 5-11).

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

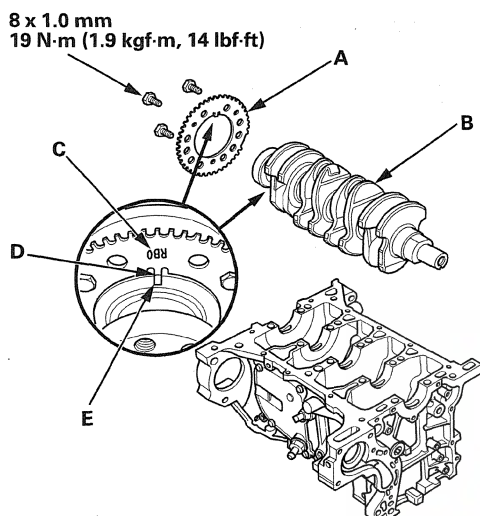


CKP Pulse Plate Replacement

1. Remove the crankshaft from the engine block (see page 7-11).

2. Remove the CKP pulse plate (A).

NOTE: Be careful not to damage the journals and the CKP pulse plate.



3. Install the CKP pulse plate on the crankshaft (B); face the marked side (C) toward the transmission, and align the tab (D) on the CKP pulse plate with the groove (E) on the crankshaft.

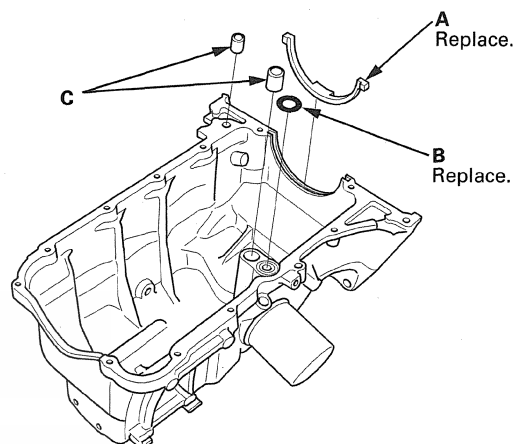
4. Install the crankshaft on the engine block (see page 7-23).

Oil Pan Installation

1. Remove all of the old liquid gasket from the oil pan mating surfaces, the bolts, and the bolt holes.

2. Clean and dry the oil pan mating surfaces and the O-ring groove.

3. Install a new oil pan gasket (A), a new O-ring (B), and the dowel pins (C) on the oil pan.



(cont'd)

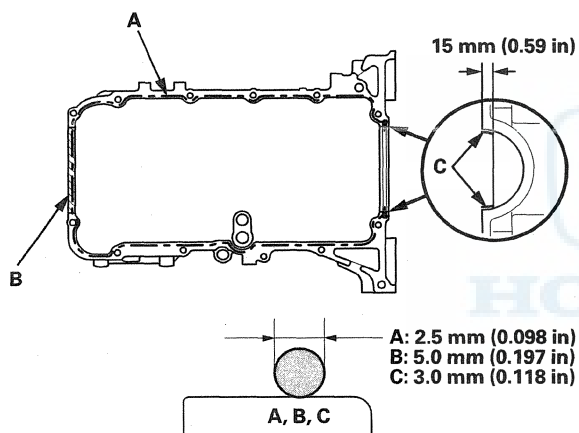
Engine Block

Oil Pan Installation (cont'd)

4. Apply liquid gasket (P/N 08718-0004) to the engine block mating surface of the oil pan and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

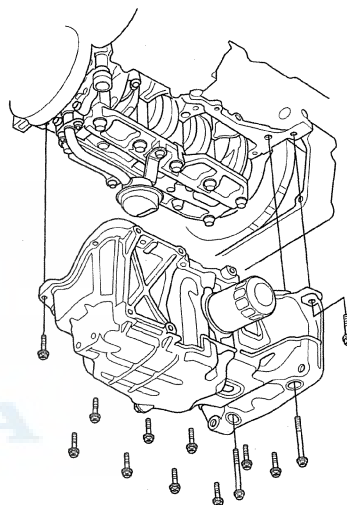
- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- Apply a 5.0 mm (0.197 in) diameter bead of liquid gasket to the shaded area (B).
- Apply a 3.0 mm (0.118 in) diameter bead of liquid gasket along the broken line (C).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.

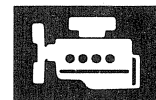


5. Install the oil pan.

NOTE:

- Raise the oil pan carefully not to damage IMA motor rotor position sensor.
- Wait at least 30 minutes before filling the engine with oil.
- Do not run the engine for at least 3 hours after installing the oil pan.
- Make sure to install the bolts in the correct locations according to size.



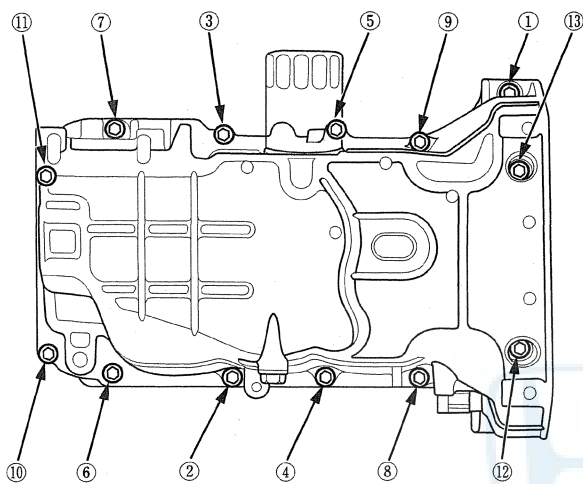


6. Tighten the bolts in three steps. Wipe off the excess liquid gasket from crankshaft pulley end and the drive plate end.

Specified torque

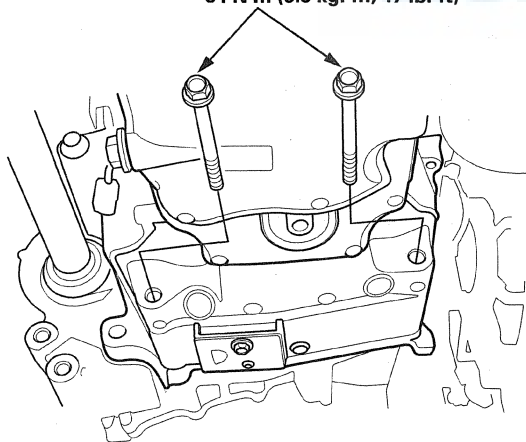
①: 24 N·m (2.4 kgf·m, 18 lbf·ft)

②-⑬: 12 N·m (1.2 kgf·m, 9 lbf·ft)



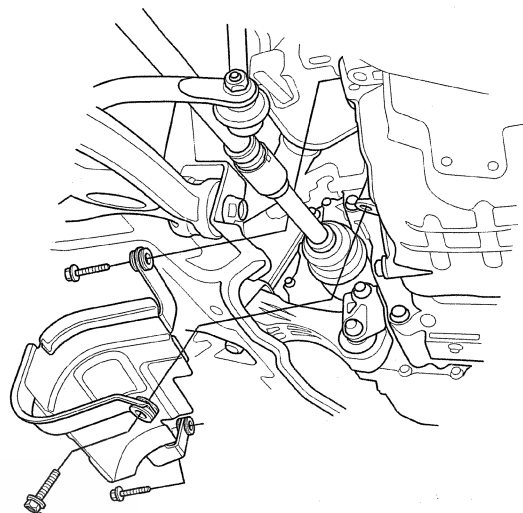
7. Install the transmission mounting bolts.

12 x 1.25 mm
64 N·m (6.5 kgf·m, 47 lbf·ft)



8. Install the torque rod bracket (see page 5-35).

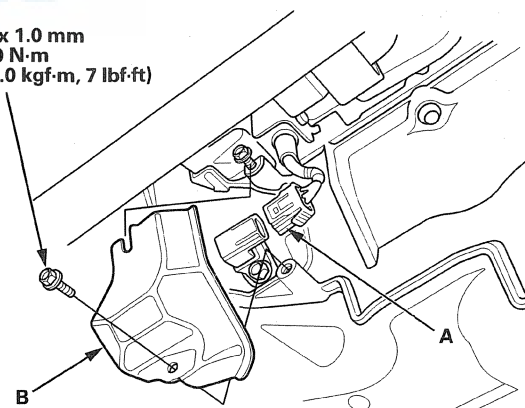
9. CVT model: Install the driveshaft heat shield.



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

10. Connect the CKP sensor connector (A), then install the CKP sensor cover (B).

6 x 1.0 mm
10 N·m
(1.0 kgf·m, 7 lbf·ft)

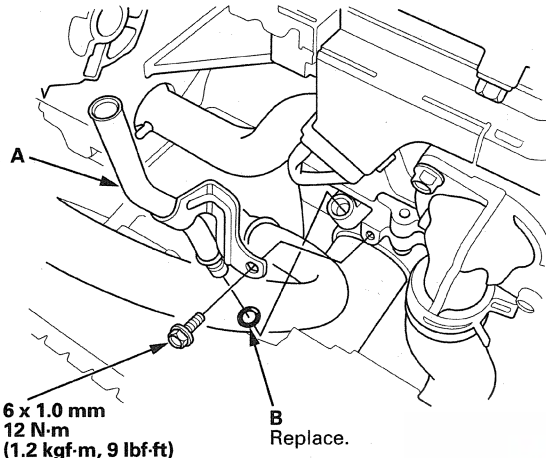


(cont'd)

Engine Block

Oil Pan Installation (cont'd)

11. Install the dipstick tube (A) with a new O-ring (B), then install the dipstick.



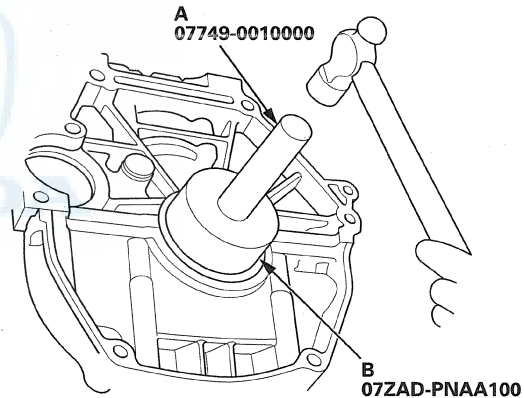
12. If the engine is still in the vehicle, do steps 14 through 17.
13. Install the torque rod (see page 5-28).
14. Install the A/C compressor (see step 24 on page 5-16).
15. Install the drive belt (see page 10-17).
16. Install the splash shield (see page 20-163).
17. Refill the engine with engine oil (see step 6 on page 8-10).

Transmission End Crankshaft Oil Seal Installation - In Car

Special Tools Required

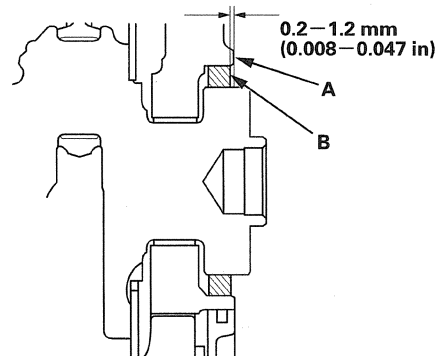
- Driver Handle, 15 x 135L 07749-0010000
- Oil Seal Driver Attachment, 96 mm 07ZAD-PNAA100

1. Remove the transmission:
 - M/T model (see page 13-43)
 - CVT model (see page 14-156)
2. Remove the IMA motor rotor (see page 12-224), the IMA motor housing (see page 12-227), and the IMA motor rotor position sensor (see page 12-228).
3. Clean and dry the crankshaft oil seal housing.
4. Apply a light coat of new engine oil to the lip of the crankshaft oil seal.
5. Use the driver handle, 15 × 135 L (A), and the oil seal driver attachment, 96 mm (B), to drive a new crankshaft oil seal squarely into the block to the specified installed height.



6. Measure the distance between the cylinder block (A) and the oil seal (B).

Oil Seal Installed Height
0.2–1.2 mm (0.008–0.047 in)





Drain Bolt/Sealing Bolt Installation

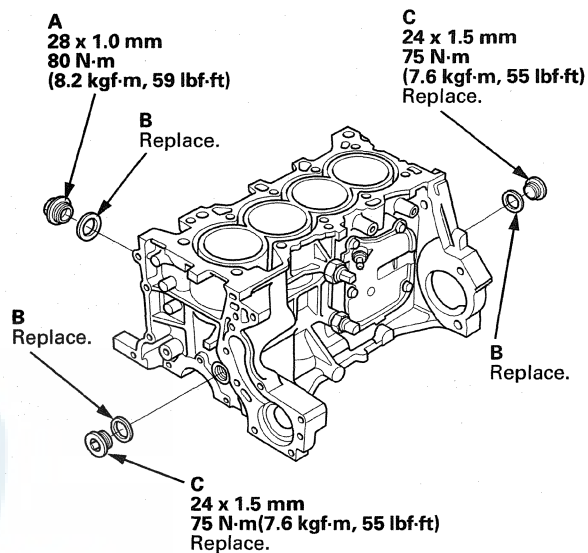
7. Install the IMA motor rotor position sensor (see page 12-228), the IMA motor housing (see page 12-227), and the IMA motor rotor (see page 12-224).

8. Install the transmission:

- M/T model (see page 13-49)
- CVT model (see page 14-165)

NOTE:

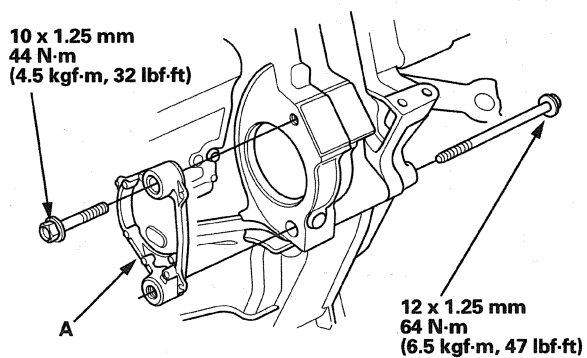
- When installing the drain bolt (A), always use a new washer (B).
- When installing the sealing bolt(s) (C), always use a new bolt(s) and washer(s).



Engine Block

Block Cover Removal and Installation

1. Remove the block cover (A).



2. Install the block cover in the reverse order of removal.



Engine Mechanical



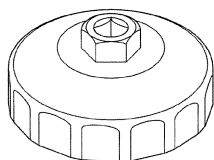
Engine Lubrication

Special Tools	8-2
Component Location Index	8-3
Symptom Troubleshooting Index	8-4
Low Oil Pressure Indicator Circuit Diagram	8-5
Low Oil Pressure Indicator Circuit Troubleshooting (Open)	8-6
Low Oil Pressure Indicator Circuit Troubleshooting (Short)	8-7
Oil Pressure Switch Test	8-8
Oil Pressure Switch Replacement	8-8
Oil Pressure Test	8-9
Engine Oil Level Check	8-9
Engine Oil Replacement	8-10
Engine Oil Filter Replacement	8-11
Oil Filter Feed Pipe Replacement	8-12
Oil Pump Overhaul	8-13
Oil/Air Separator Removal/Installation	8-17

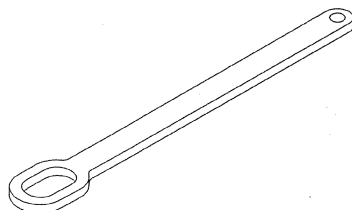
Engine Lubrication

Special Tools

Ref.No.	Tool Number	Description	Qty
①	07AAA-PLCA100	Oil Filter Wrench	1
②	07AAK-SNAA600	Support Eyelet	1

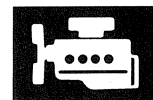


①

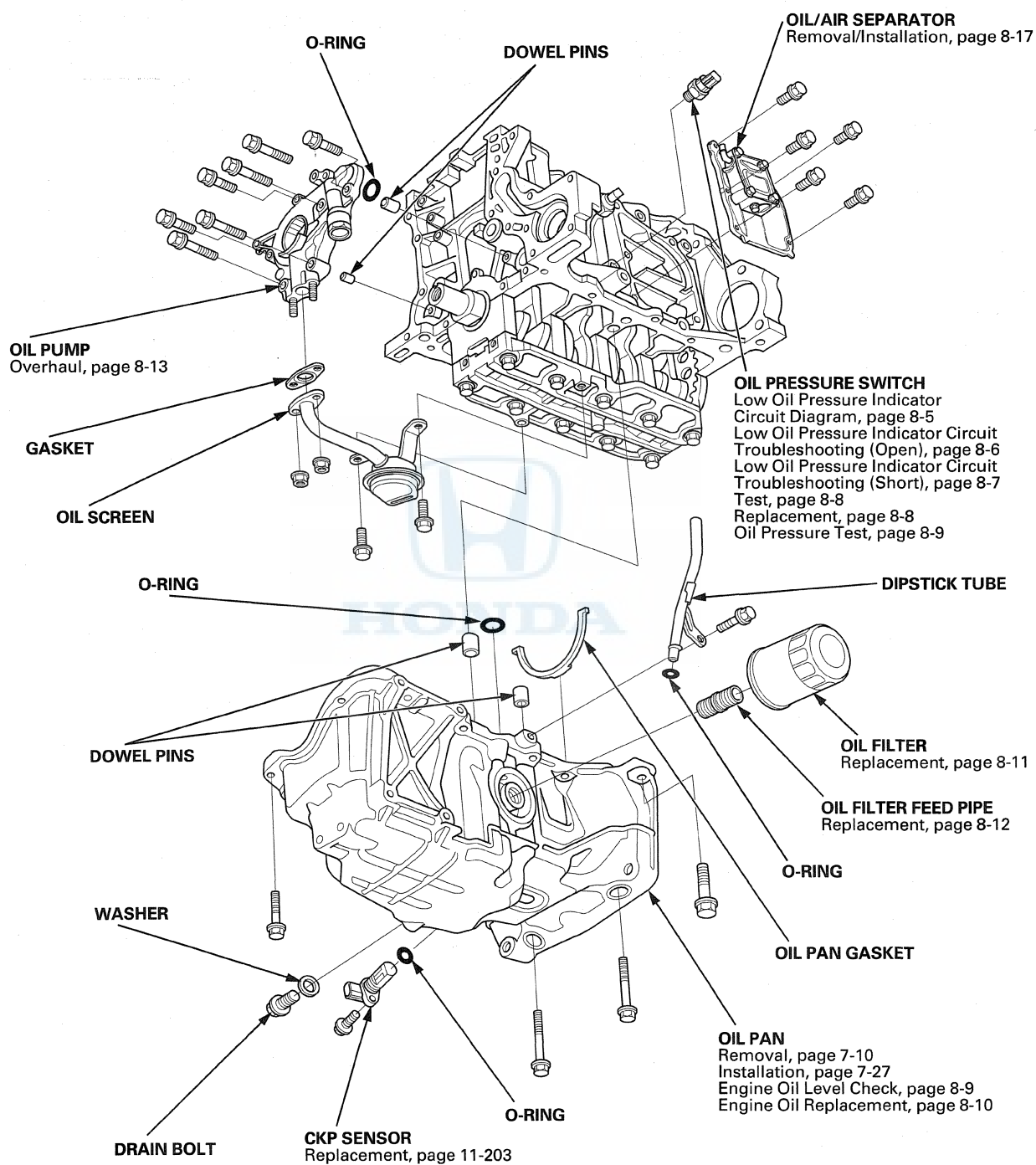


②





Component Location Index

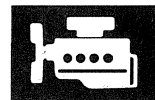


Engine Lubrication

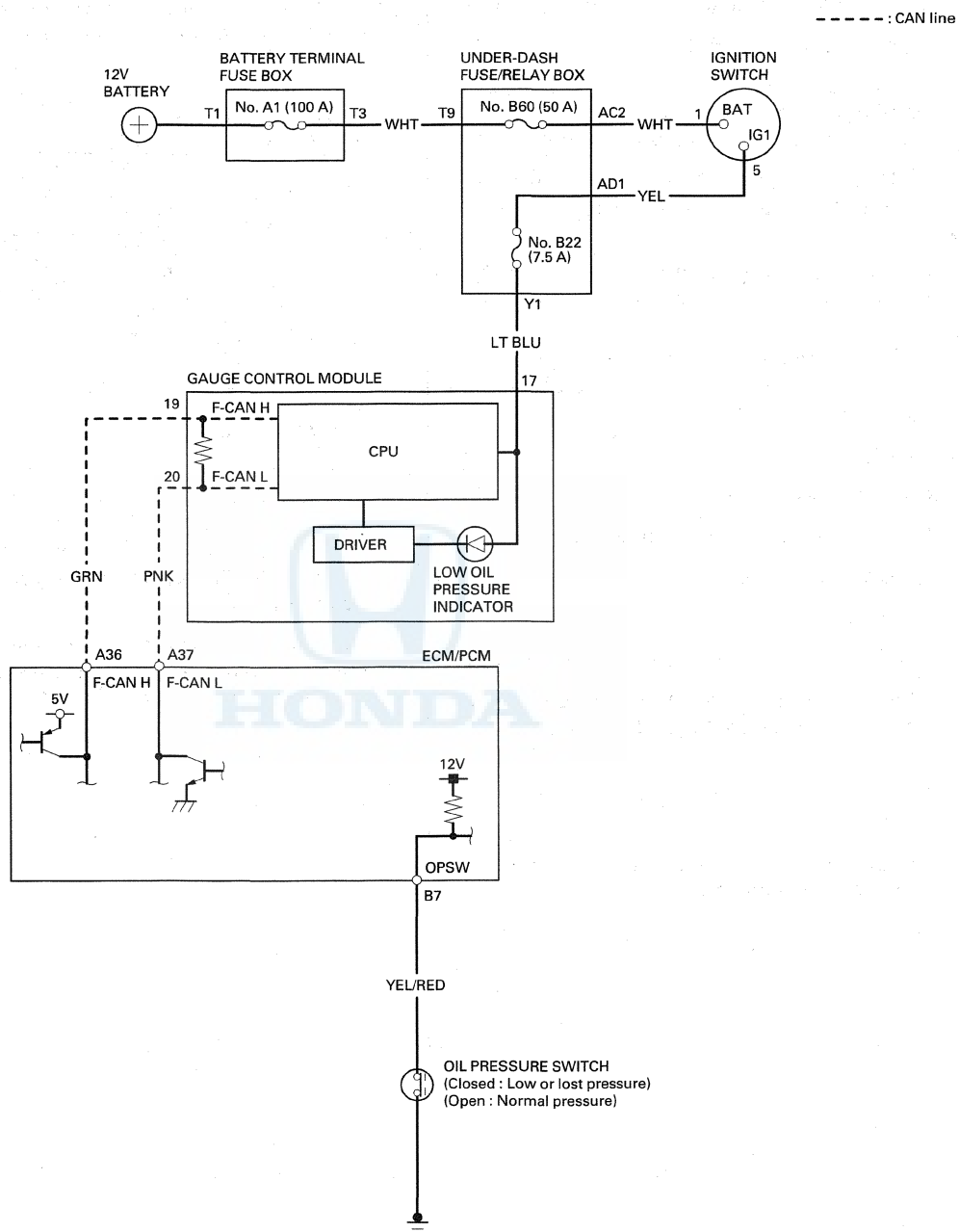
Symptom Troubleshooting Index

Symptom	Diagnostic procedure	Also check for
Excessive engine oil consumption	1. Check for oil leaks. 2. Check for worn valve guide(s) (see page 6-40) or worn valve stem seal(s) (see page 6-40). 3. Check for damaged or worn piston ring(s) (see page 7-19). 4. Check for damaged or worn engine internal parts (cylinder wall, pistons, etc.) (see page 7-14).	Check the maintenance records as engine oil that is worn out burns off at a higher rate
Low oil pressure indicator stays on	1. Check the engine oil level (see page 8-9). 2. Do the low oil pressure indicator circuit troubleshooting (Short) (see page 8-7).	A wire shorted to ground between the ECM/PCM and the oil pressure switch
Low oil pressure indicator does not come on with the ignition switch in ON (II)	1. Do the low oil pressure indicator circuit troubleshooting (Open) (see page 8-6). 2. Test the oil pressure switch (see page 8-8).	An open in the wire between the ECM/PCM and the oil pressure switch





Low Oil Pressure Indicator Circuit Diagram

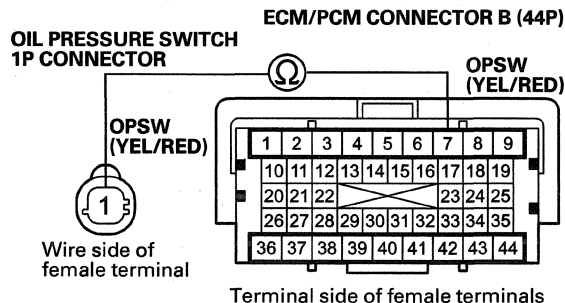


Engine Lubrication

Low Oil Pressure Indicator Circuit Troubleshooting (Open)

1. Connect the HDS to the DLC (see step 2 on page 11-3).
2. Turn the ignition switch to ON (II).
3. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-383).
4. Check for DTCs (see page 11-3). If a DTC is present, diagnose, and repair the cause before continuing with this test.
5. Turn the ignition switch to ON (II), and check the OIL PRESSURE SWITCH in the DATA LIST with the HDS.
Is ON indicated?
YES—Replace the gauge control module (see page 22-354). ■
NO—Go to step 6.
6. Turn the ignition switch to LOCK (0).
7. Check the oil pressure switch (see page 8-8).
Is the oil pressure switch OK?
YES—Go to step 8.
NO—Replace the oil pressure switch (see page 8-8). ■
8. Turn the ignition switch to ON (II), and jump the SCS line with the HDS, then turn the ignition switch to LOCK (0).
NOTE: This step must be done to protect the ECM/PCM from damage.
9. Disconnect ECM/PCM connector B (44P) and the oil pressure switch 1P connector.

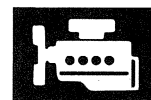
10. Check for continuity between ECM/PCM connector terminal B7 and the oil pressure switch 1P connector terminal No. 1.



Is there continuity?

YES—Update the ECM/PCM if it does not have the latest software (see page 11-207), or substitute a known-good ECM/PCM (see page 11-7), then recheck. If the symptom/indication goes away with a known-good ECM/PCM, replace the original ECM/PCM (see page 11-209). ■

NO—Repair an open in the wire between ECM/PCM connector terminal B7 and oil pressure switch 1P connector terminal No. 1. ■



Low Oil Pressure Indicator Circuit Troubleshooting (Short)

1. Connect the HDS to the DLC (see step 2 on page 11-3).
2. Turn the ignition switch to ON (II).
3. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-383).
4. Check for DTCs (see page 11-3). If a DTC is present, diagnose, and repair the cause before continuing with this test.
5. Start the engine and check the OIL PRESSURE SWITCH in the DATA LIST with the HDS.

Is OFF indicated?

YES—Replace the gauge control module (see page 22-354). ■

NO—Go to step 6.

6. Turn the ignition switch to LOCK (0).
7. Check the oil pressure switch (see page 8-8).

Is the oil pressure switch OK?

YES—Go to step 8.

NO—Do the pressure test (see page 8-9). If the oil pressure is OK, replace the oil pressure switch (see page 8-8). ■

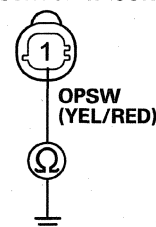
8. Turn the ignition switch to ON (II), and jump the SCS line with the HDS, then turn the ignition switch to LOCK (0).

NOTE: This step must be done to protect the ECM/PCM from damage.

9. Disconnect ECM/PCM connector B (44P) and the oil pressure switch 1P connector.

10. Check for continuity between oil pressure switch 1P connector terminal No. 1 and body ground.

OIL PRESSURE SWITCH 1P CONNECTOR



Wire side of female terminal

Is there continuity?

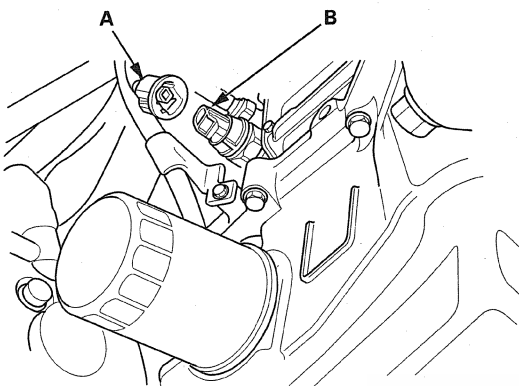
YES—Repair a short to ground in the wire between ECM/PCM connector terminal B7 and oil pressure switch 1P connector terminal No.1. ■

NO—Update the ECM/PCM if it does not have the latest software (see page 11-207), or substitute a known-good ECM/PCM (see page 11-7), then recheck. If the symptom/indication goes away with a known-good ECM/PCM, replace the original ECM/PCM (see page 11-209). ■

Engine Lubrication

Oil Pressure Switch Test

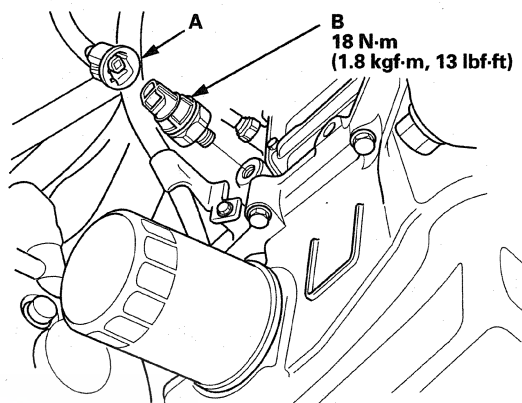
1. Remove the engine undercover (see page 20-163).
2. Disconnect the oil pressure switch connector (A) from the oil pressure switch (B).



3. Check for continuity between the oil pressure switch terminal and the engine (ground). There should be continuity with the engine stopped. There should be no continuity with the engine running.
4. Connect the oil pressure switch connector to the oil pressure switch.
5. Install the engine undercover (see page 20-163).

Oil Pressure Switch Replacement

1. Remove the engine undercover (see page 20-163).
2. Disconnect the oil pressure switch connector (A), then remove the oil pressure switch (B).



3. Remove all of the old liquid gasket from the oil pressure switch mounting hole.
4. Clean and dry the oil pressure switch mounting hole.
5. Apply liquid gasket (P/N 08718-0004) to the new oil pressure switch threads. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

- Using too much liquid gasket may cause liquid gasket to enter the oil passage or the end of the oil pressure switch.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply the new liquid gasket.

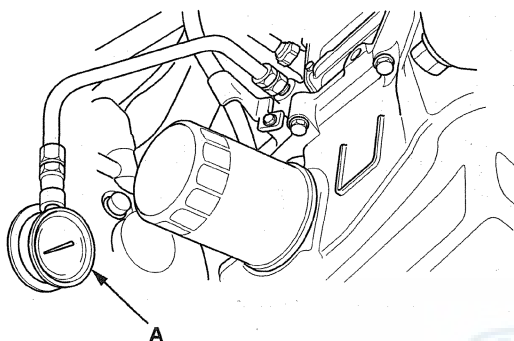
6. Install the oil pressure switch.
7. Connect the oil pressure switch connector.
8. Install the engine undercover (see page 20-163).



Oil Pressure Test

If the low oil pressure indicator stays on with the engine running, check the engine oil level (see page 8-9). If the oil level is correct:

1. Remove the oil pressure switch (see page 8-8), then install the oil pressure gauge (A).



2. Start the engine. Shut it off immediately if the gauge registers no oil pressure. Repair the problem before continuing.
3. Allow the engine to reach operating temperature (fan comes on at least twice). The pressure should be:

Engine Oil Temperature: 176 °F (80 °C)

Engine Oil Pressure:

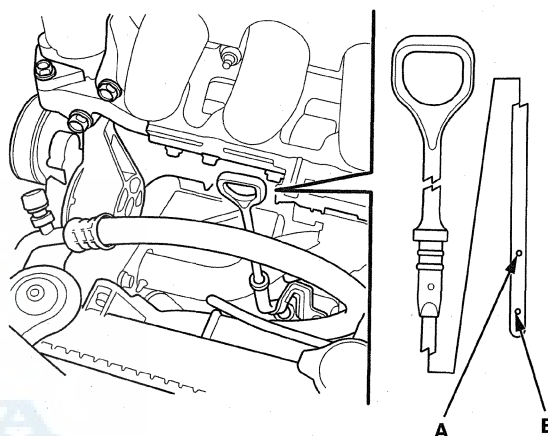
At Idle: 69 kPa (0.70 kgf/cm², 10.0 psi) min.

At 3,000 rpm: 343 kPa (3.50 kgf/cm², 49.8 psi) min.

4. If the oil pressure is not within specifications, inspect these items:
 - Blocking of oil filter.
 - Blocking of oil screen.
 - Inspect the oil pressure relief valve (see page 8-13).
 - Inspect the oil pump (see page 8-15).
5. Remove the oil pressure gauge and the oil pressure gauge attachment, then install the engine oil pressure switch (see page 8-8).

Engine Oil Level Check

1. Park the vehicle on level ground, and start the engine. Hold the engine at 3,000 rpm with no load (M/T in neutral, A/T in P or N) until the radiator fan comes on, then turn off the engine, and wait a few minutes.
2. Remove the dipstick, and wipe off the dipstick, then reinstall the dipstick.
3. Remove the dipstick, and check the engine oil level. It should be between the upper mark (A) and lower mark (B).

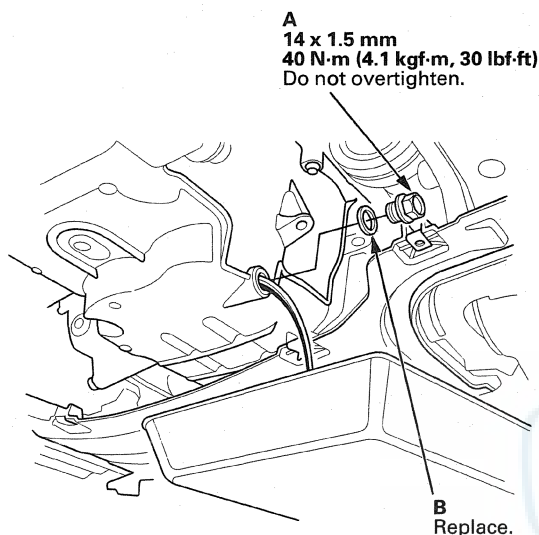


4. If the engine oil level is near or below the lower mark, check for oil leakage, and add engine oil (see page 8-10) to bring it to the upper mark.

Engine Lubrication

Engine Oil Replacement

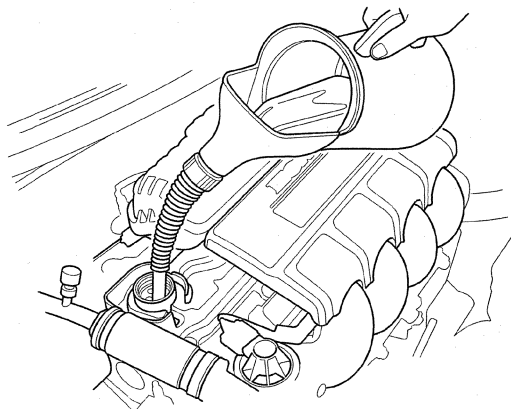
1. Allow the engine to reach operating temperature (fan comes on at least twice).
2. Remove the splash shield (see page 20-163).
3. Remove the drain bolt (A), and drain the engine oil.



4. Reinstall the drain bolt with a new washer (B) and torque to specification.
5. Install the splash shield (see page 20-163).
6. Refill the engine with the recommended engine oil (see page 3-2).

Capacity

At Oil Change:	3.4 L (3.6 US qt)
At Oil Change Including Filter:	3.6 L (3.8 US qt)
After Engine Overhaul:	4.2 L (4.4 US qt)



7. Run the engine for more than 3 minutes, then check the oil level (see page 8-9) and for any oil leakage.
8. If the Maintenance Minder required replacing the engine oil, reset the Maintenance Minder (see page 3-4), when this procedure is complete. If the Maintenance Minder did not require engine oil replacement, go to step 9.
9. Turn the ignition switch to LOCK.
10. Connect the HDS to the DLC (see step 2 on page 11-3).
11. Turn the ignition switch to ON (II).
12. Make sure the HDS communicates with the vehicle and ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-383).
13. Select GAUGE in the BODY ELECTRICAL with the HDS.
14. Select ADJUSTMENT in GAUGES with the HDS.
15. Select MAINTENANCE MINDER in the ADJUSTMENT with the HDS.
16. Select RESET in the MAINTENANCE MINDER with the HDS.
17. Select RESETTING THE ENGINE OIL LIFE with the HDS.

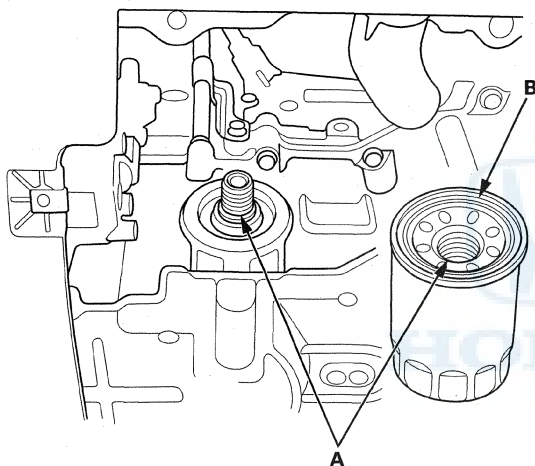


Engine Oil Filter Replacement

Special Tools Required

Oil Filter Wrench 07AAA-PLCA100

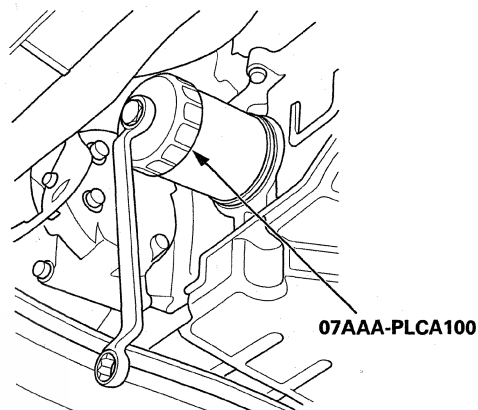
1. Drain the engine oil (see page 8-10).
2. Remove the oil filter with the oil filter wrench.
3. Inspect the filter to make sure the rubber seal is not stuck to the oil filter seating surface of the engine.
4. Inspect the threads (A) and the rubber seal (B) on the new filter. Clean the seat on the oil pan, then apply a light coat of new engine oil to the filter rubber seal. Use only filters with a built-in bypass system.



5. Install the oil filter by hand.

6. After the rubber seal seats, tighten the oil filter clockwise with the oil filter wrench to the specified torque.

Tighten: 3/4 Turn Clockwise
Tightening Torque: 12 N·m (1.2 kgf-m, 9 lbf-ft)



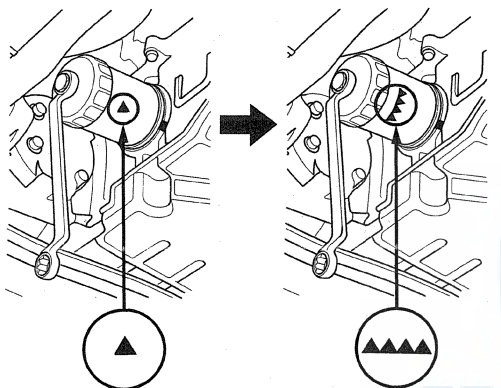
(cont'd)

Engine Lubrication

Engine Oil Filter Replacement (cont'd)

7. If four numbers or marks (1 to 4 or ▼ to ▼▼▼▼) are printed around the outside of the filter, you can use the following procedure to tighten the filter.

- Spin the filter on until its seal lightly seats against the oil pan, and note which number or mark is at the bottom.
- Tighten the filter by turning it clockwise three numbers or marks from the one you noted. For example, if mark ▼ is at the bottom when the seal is lightly seated, tighten the filter until the mark ▼▼▼▼ comes around the bottom.



Mark when rubber seal is seated.

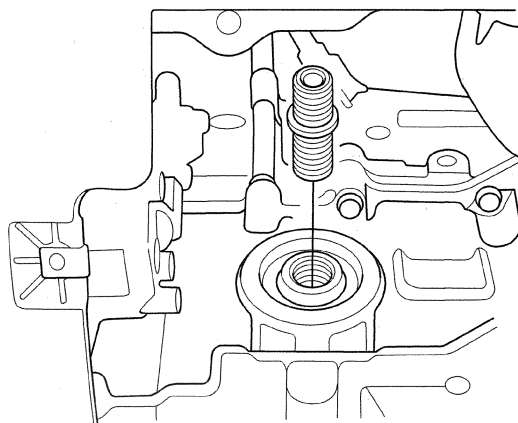
Mark after tightening.

Number or Mark when rubber seal is seated	1 or ▼	2 or ▼▼	3 or ▼▼▼	4 or ▼▼▼▼
Number or Mark after tightening	4 or ▼▼▼▼	1 or ▼	2 or ▼▼	3 or ▼▼▼

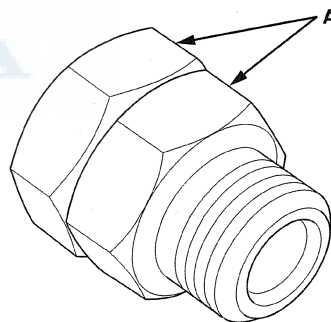
8. After installation, fill the engine with the engine oil up to the specified level (see page 8-9), run the engine for more than 3 minutes, then check for oil leakage.

Oil Filter Feed Pipe Replacement

1. Remove the oil filter (see page 8-11).
2. Remove the oil filter feed pipe.



3. Install two 20 x 1.5 mm nuts (A) onto the new oil filter feed pipe, and hold one nut with a wrench, then tighten the other nut.



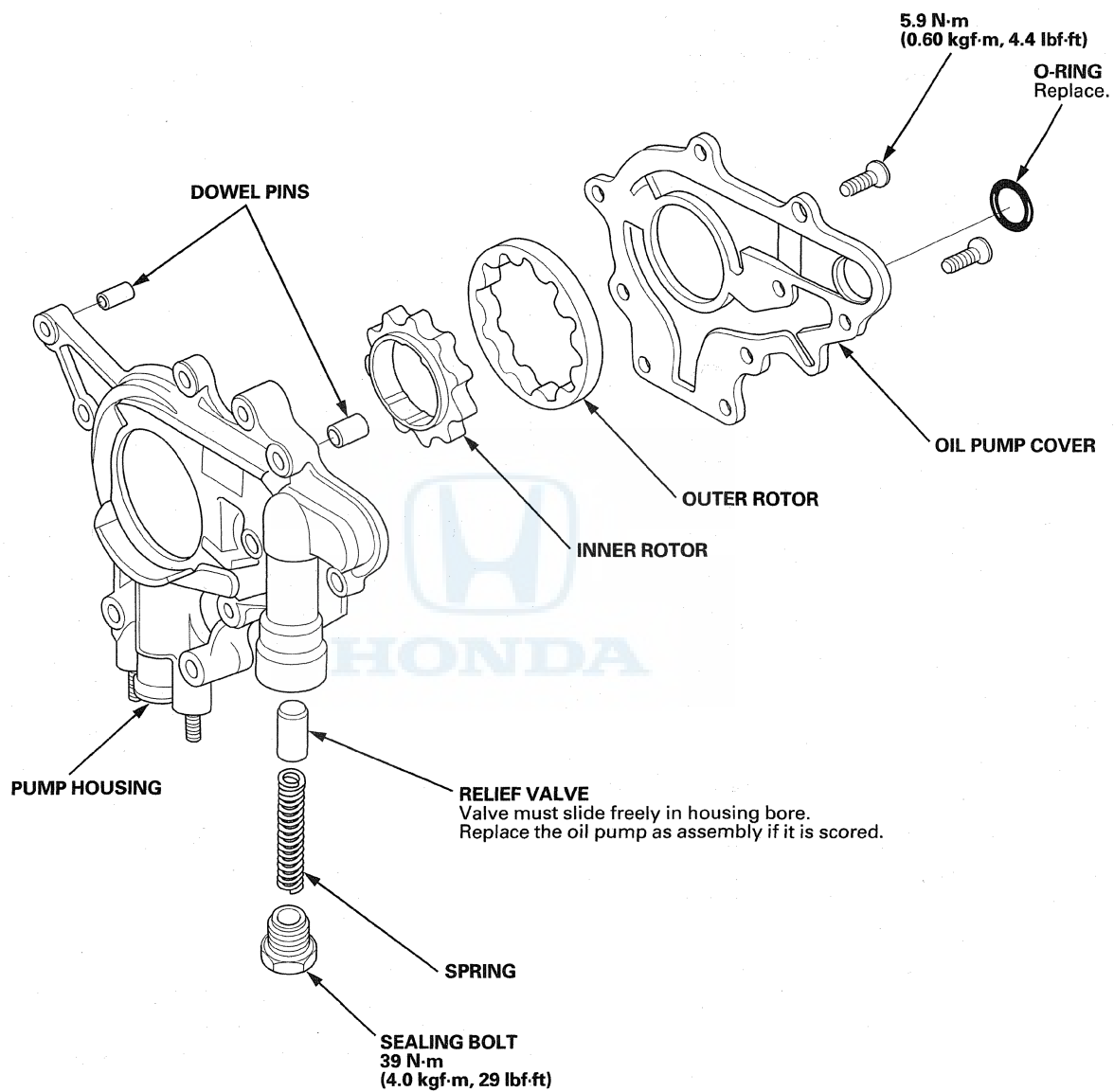
4. Apply new engine oil to the oil filter feed pipe threads, then torque the oil filter feed pipe to 40 N·m (4.1 kgf·m, 30 lbf·ft), then remove the nuts from the oil filter feed pipe.

5. Install the oil filter (see page 8-11).



Oil Pump Overhaul

Exploded View



(cont'd)

Engine Lubrication

Oil Pump Overhaul (cont'd)

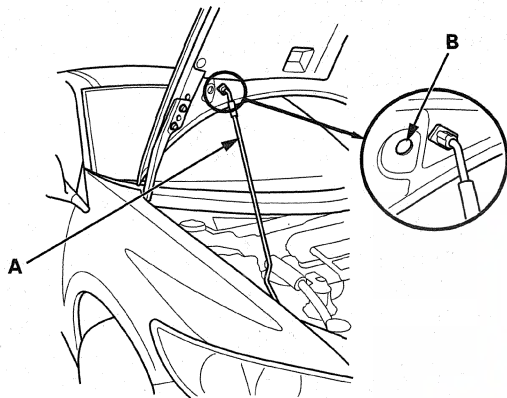
Special Tools Required

- Support Eyelet 07AAK-SNAA600
- Engine Support Hanger, A and Reds AAR-T1256*
- Engine Hanger Adapter VSB02C000026*

*Available through the Honda Tool and Equipment Program 888-424-6857

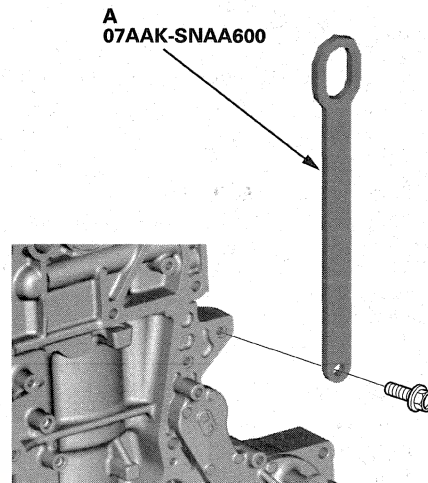
Removal

1. Open the hood, and secure it with the hood support rod (A) in the wide-open position (B).

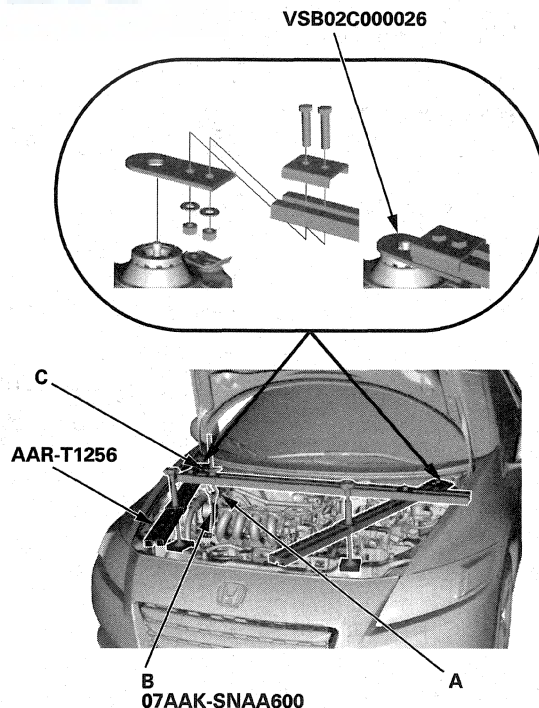


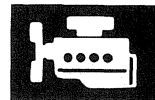
2. Drain the engine oil (see page 8-10).
3. Remove the cowl cover and the under-cowl panel (see page 20-153).
4. Support the engine with a jack and a wood block under the oil pan.
5. Remove the cam chain (see page 6-12).
6. Remove the drive belt auto-tensioner (see page 10-20).

7. Attach the support eyelet (A) to the cylinder block.

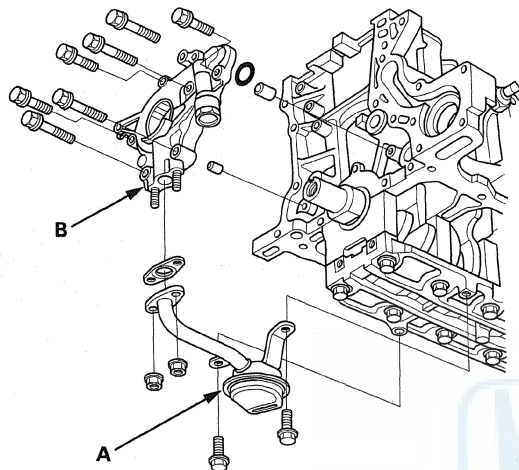


8. Install the engine hanger adapter (VSB02C000026) to the engine support hanger (AAR-T1256), then install the engine support hanger onto the vehicle, and attach the hook (A) to the support eyelet (B). Tighten the wing nut (C) by hand, and lift and support the engine/IMA motor/transmission.





9. Remove the jack and the wood block from under the oil pan.
10. Remove the oil pan (see page 7-10).
11. Remove the oil screen (A), then remove the oil pump (B).

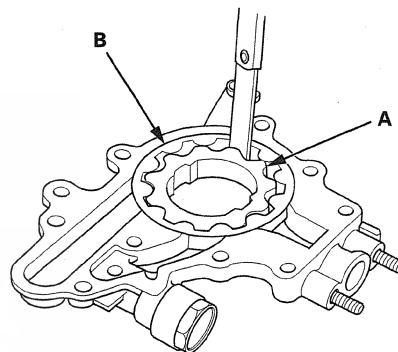


Inspection

NOTE: Refer to the Exploded View if needed during this procedure.

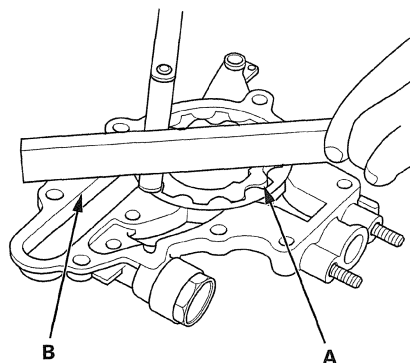
1. Remove the screws from the pump housing, then separate the housing and the cover.
2. Check the inner-to-outer rotor radial clearance between the inner rotor (A) and the outer rotor (B). If the inner-to-outer rotor radial clearance exceeds the service limit, replace the oil pump assembly.

Inner Rotor-to-Outer Rotor Radial Clearance
Standard (New): 0.06–0.16 mm (0.003–0.006 in)
Service Limit: 0.20 mm (0.007 in)



3. Check the pump housing-to-rotor axial clearance between the rotors (A) and the pump housing (B). If the pump housing-to-rotor axial clearance exceeds the service limit, replace the oil pump assembly.

Housing-to-Rotor Axial Clearance
Standard (New): 0.02–0.06 mm (0.001–0.002 in)
Service Limit: 0.15 mm (0.005 in)



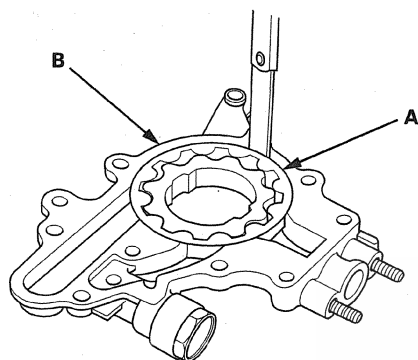
(cont'd)

Engine Lubrication

Oil Pump Overhaul (cont'd)

4. Check the pump housing-to-outer rotor radial clearance between the outer rotor (A) and the pump housing (B). If the pump housing-to-outer rotor radial clearance exceeds the service limit, replace the oil pump assembly.

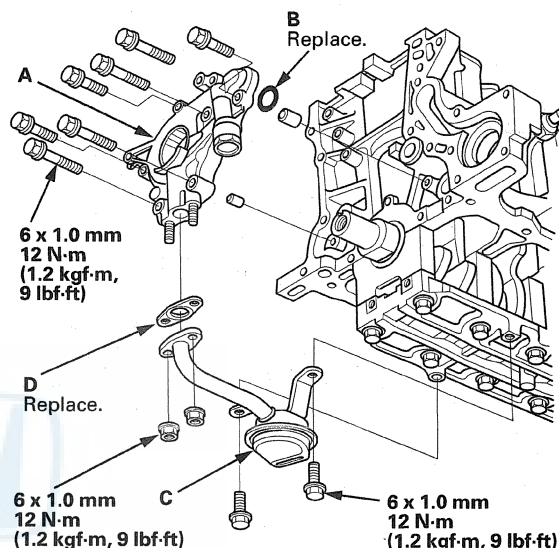
Pump Housing-to-Outer Rotor Radial Clearance
Standard (New): 0.100–0.175 mm (0.004–0.006 in)
Service Limit: 0.20 mm (0.007 in)



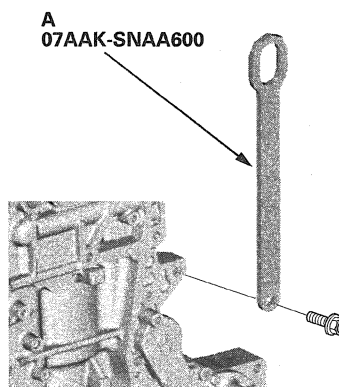
5. Inspect both rotors and the pump housing for scoring or other damage. Replace the oil pump assembly, if necessary.
6. Check that the oil pump turns freely.

Installation

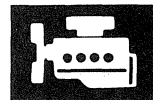
1. Clean the O-ring groove and the mating surface of the engine block.
2. Install the oil pump (A) with a new O-ring (B).



3. Install the oil screen (C) with a new gasket (D).
4. Install the oil pan (see page 7-27).
5. Support the engine with a jack and a wood block under the oil pan.
6. Remove the engine support hanger and the support eyelet (A) from the cylinder block.



7. Install the auto-tensioner (see page 10-20).
8. Install the cam chain (see page 6-14).
9. Remove the jack and the wood block from under the oil pan.

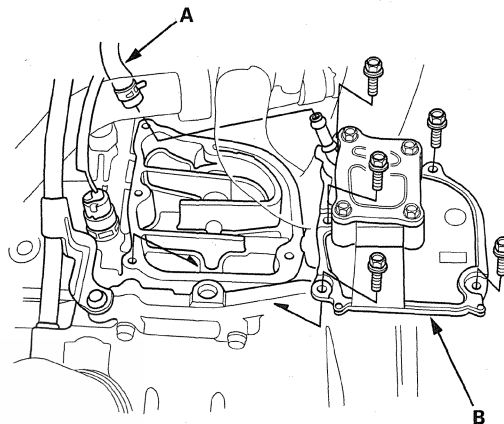


10. Install the cowl cover and the under-cowl panel (see page 20-153).

11. Refill the engine with engine oil (see step 6 on page 8-10).

Oil/Air Separator Removal/Installation

1. Raise the vehicle on the lift.
2. Remove the splash shield (see page 20-163).
3. Remove the thermostat housing (see page 10-11).
4. Disconnect the PCV hose (A).



5. Remove the oil/air separator (B).
6. Remove all of the old liquid gasket from the oil/air separator mating surfaces, the bolts, and the bolt holes.
7. Clean and dry the oil/air separator mating surfaces.

(cont'd)

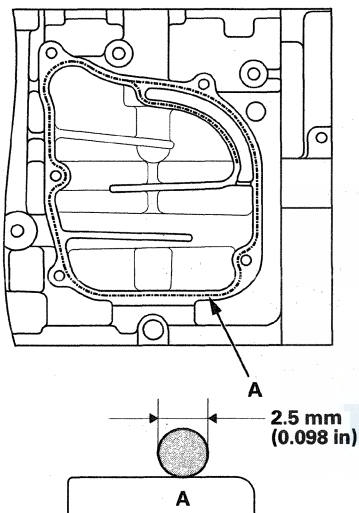
Engine Lubrication

Oil/Air Separator Removal/Installation (cont'd)

8. Apply liquid gasket (P/N 08718-0004) to the engine block mating surface of the oil/air separator and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

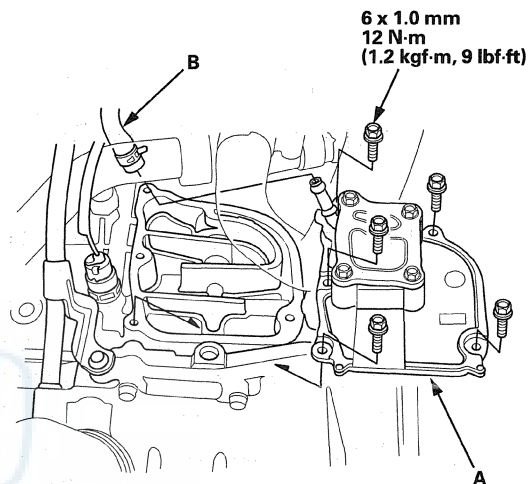
- Apply a 2.5 mm (0.098 in) diameter bead of liquid gasket along the broken line (A).
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



9. Install the oil/air separator (A).

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 oil/air separator.



10. Connect the PCV hose (B).
11. Install the thermostat housing (see page 10-12).
12. Install the splash shield (see page 20-163).
13. Lower the vehicle on the lift.



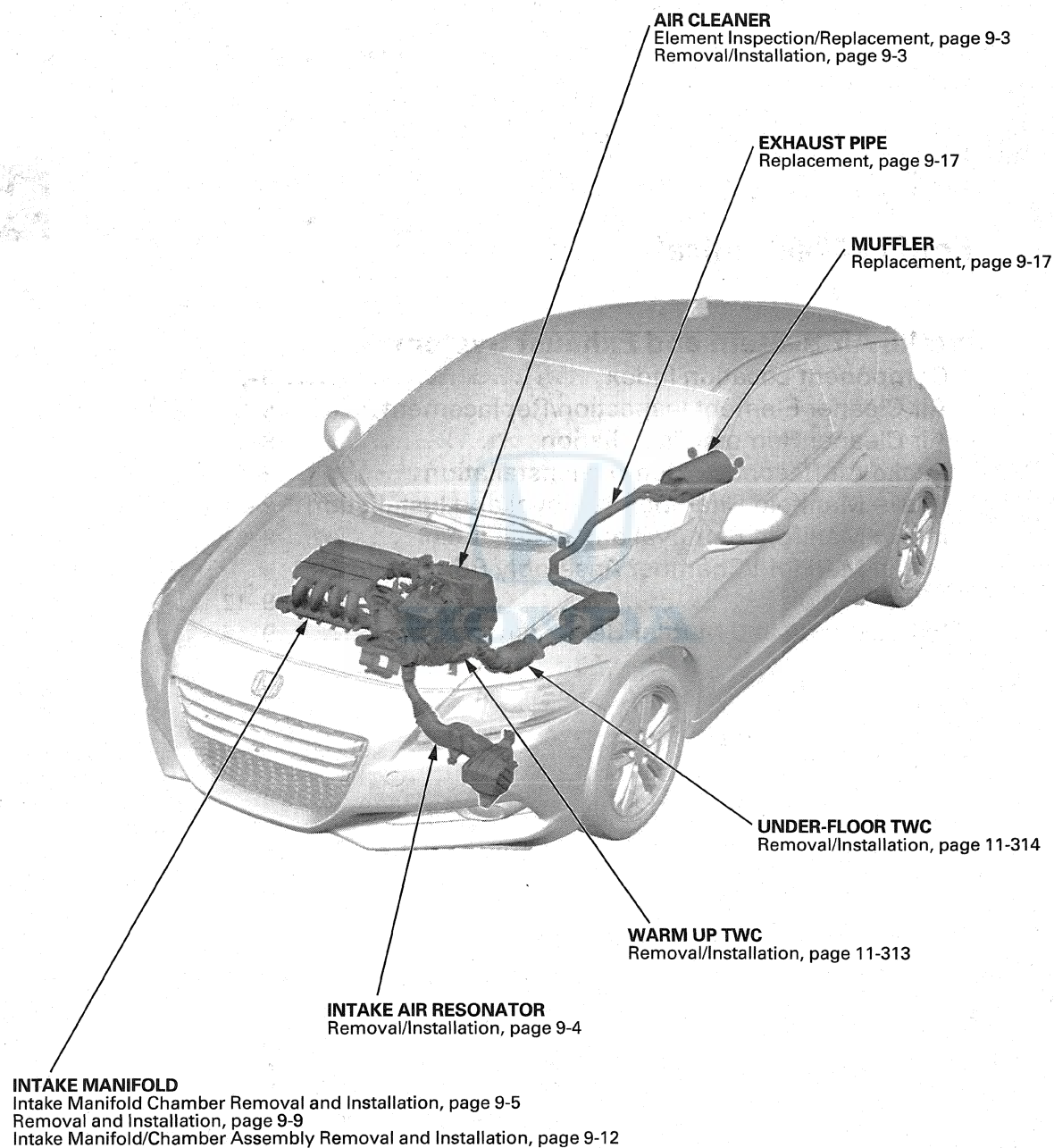
Engine Mechanical

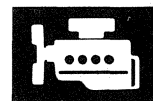
Intake Air System and Exhaust System

Component Location Index	9-2
Air Cleaner Element Inspection/Replacement	9-3
Air Cleaner Removal/Installation	9-3
Intake Air Resonator Removal/Installation	9-4
Intake Manifold Chamber Removal and Installation	9-5
Intake Manifold Removal and Installation	9-9
Intake Manifold/Chamber Assembly Removal and Installation	9-12
Exhaust Pipe and Muffler Replacement	9-17

Intake Air System and Exhaust System

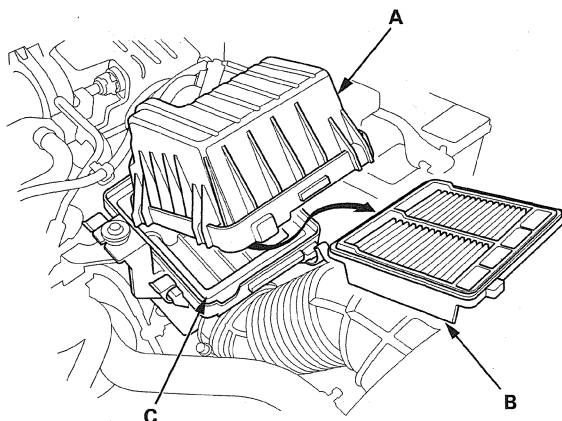
Component Location Index





Air Cleaner Element Inspection/Replacement

1. Open the air cleaner housing cover (A).



2. Remove the air cleaner element (B) from the air cleaner housing (C).
3. Check the air cleaner element for damaged, dirt, or clogging. If it is damaged or clogged, replace it.

NOTE: Do not use compressed air to clean the air cleaner element.

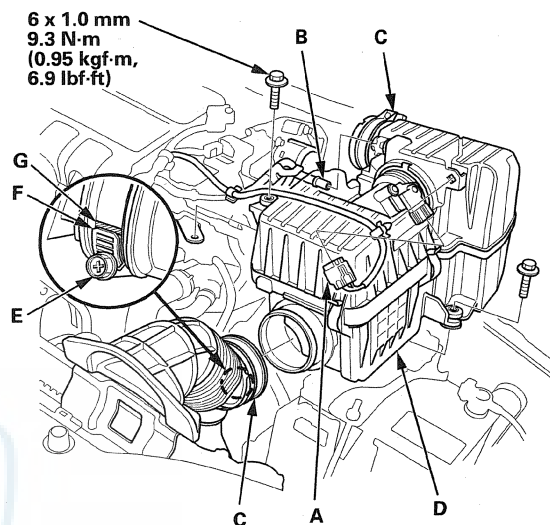
4. Clean and remove any debris from inside the air cleaner housing.
5. Install the parts in the reverse order of removal.

If the idle speed fluctuates, do the idle speed inspection (see page 11-273).

Air Cleaner Removal/Installation

1. Disconnect the MAF sensor/IAT sensor connector (A), and remove the harness clips.

NOTE: Be careful not to damage the MAF sensor/IAT sensor on the air cleaner cover.



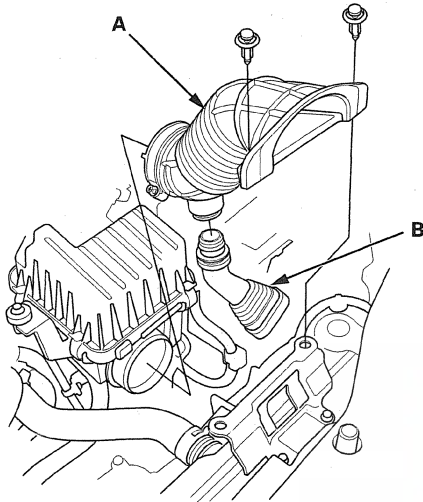
2. Disconnect the breather hose (B).
3. Loosen the hose bands (C) and remove the bolts, then remove the air cleaner (D) from the throttle body and the intake air tube.
4. Install the parts in the reverse order of removal.

NOTE: When tightening the screw (E) of the hose band, align the edge of the hose band (F) with the mark (G) painted on the hose band. If you tighten the screw over the mark, replace the hose band.

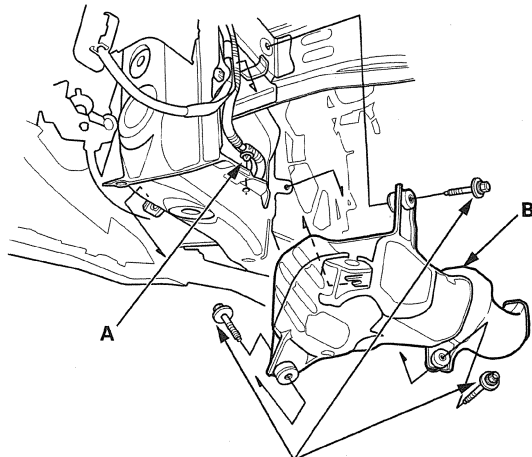
Intake Air System and Exhaust System

Intake Air Resonator Removal/Installation

1. Do the 12 volt battery removal procedure (see page 22-87).
2. Remove the intake air tube (A) and the resonator chamber joint (B).



3. Remove the left side front inner fender (see page 20-162).
4. Remove the harness clamp (A) and the intake air resonator (B).

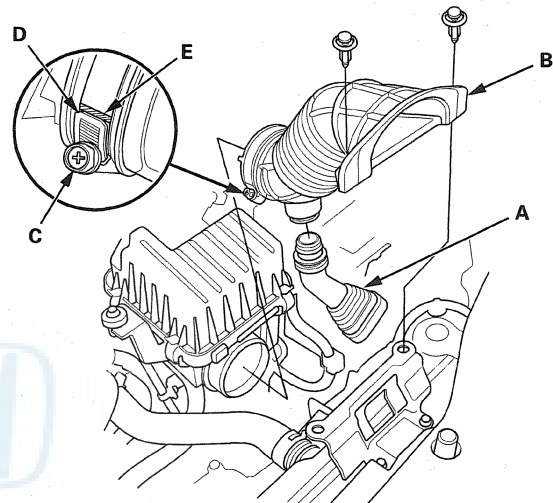


6 x 1.0 mm
9.3 N·m
(0.95 kgf·m, 6.9 lbf·ft)

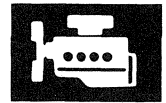
5. Install the intake air resonator and the harness clamp.
6. Install the left side front inner fender (see page 20-162).

7. Install the resonator chamber joint (A) and the intake air tube (B).

NOTE: When tightening the screw (C) of the hose band, align the edge of the hose band (D) with the mark (E) painted on the hose band. If you tighten the screw over the mark, replace the hose band.

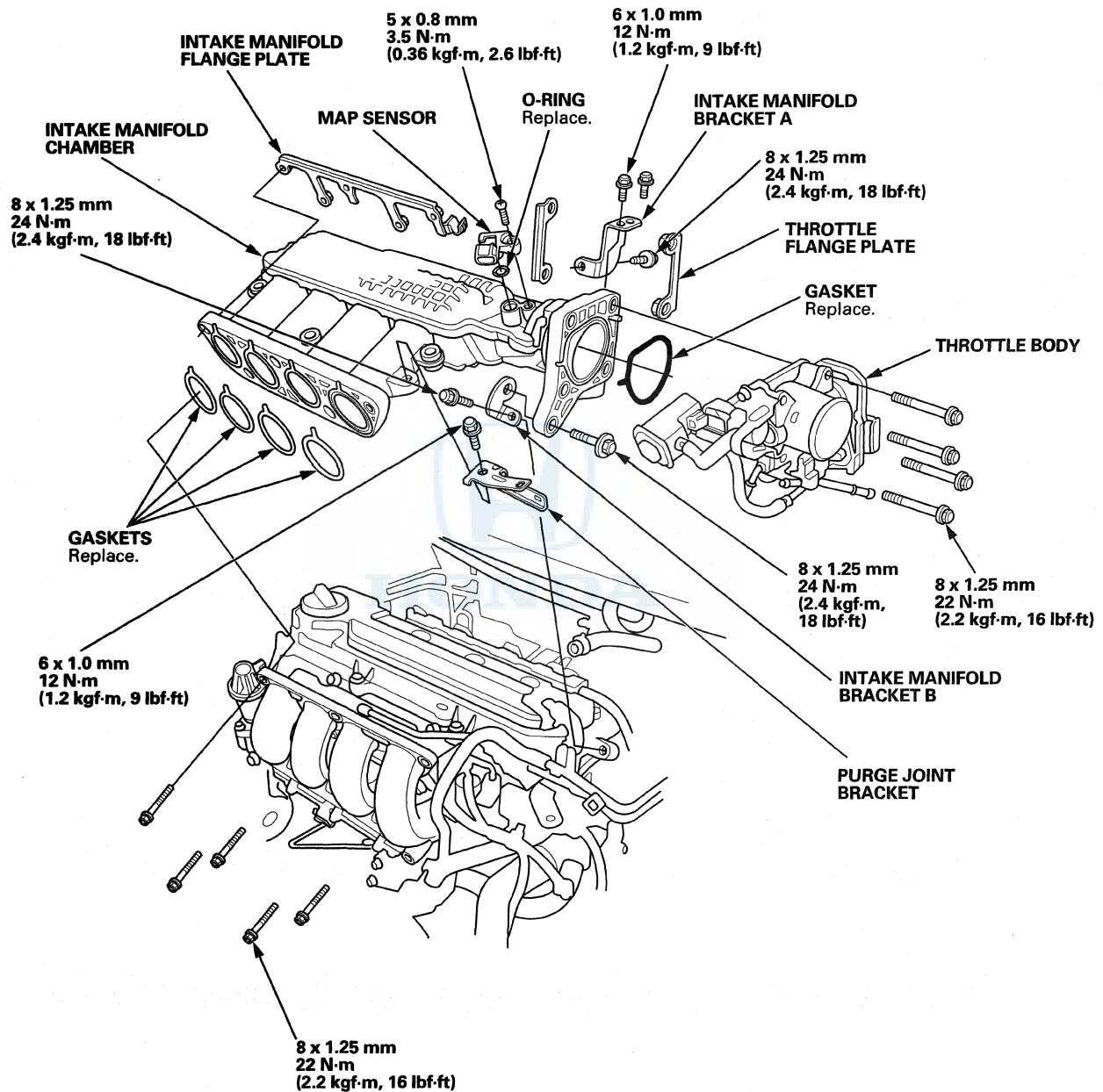


8. Do the 12 volt battery installation procedure (see page 22-87).



Intake Manifold Chamber Removal and Installation

Exploded View



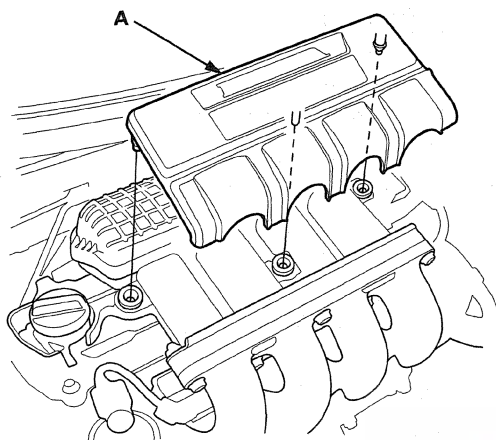
(cont'd)

Intake Air System and Exhaust System

Intake Manifold Chamber Removal and Installation (cont'd)

Removal

1. Remove the engine cover (A).

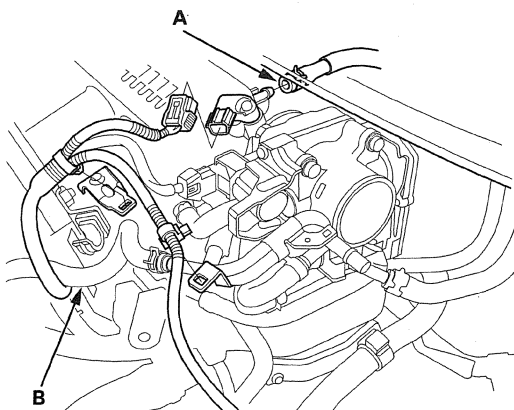


2. Remove the air cleaner (see page 9-3).

3. Disconnect the engine wire harness connectors, and remove the wire harness clamps from the intake manifold chamber:

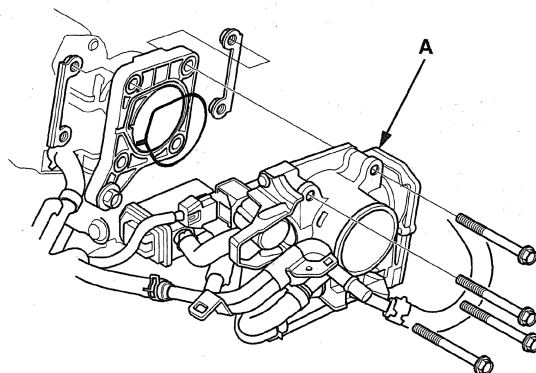
- Throttle actuator connector
- MAP sensor connector

4. Disconnect the brake booster vacuum hose (A).

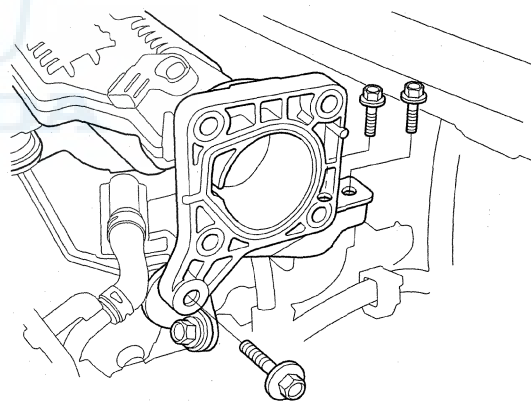


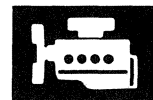
5. Remove the water bypass hose (B) from the clamp.

6. Remove the throttle body (A) without disconnecting the water bypass hoses.

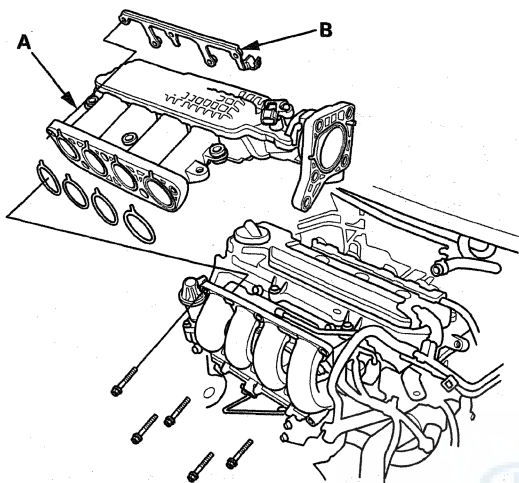


7. Remove the intake manifold mounting bolts.





8. Remove the intake manifold chamber (A) and the intake manifold flange plate (B).



9. Disassemble the intake manifold chamber.

NOTE: Refer to the Exploded View if needed during this procedure.

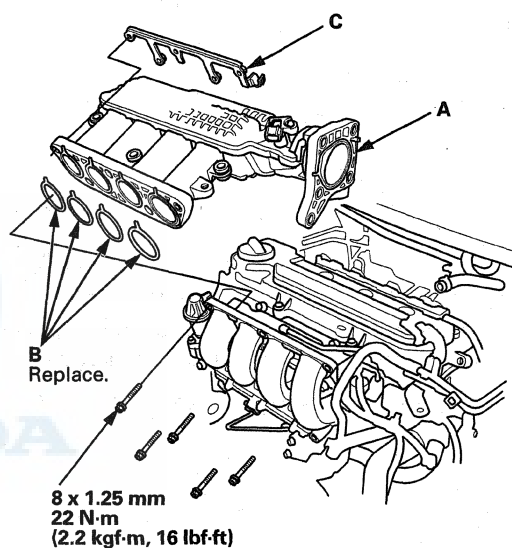
Installation

1. Reassemble the intake manifold chamber.

NOTE: Refer to the Exploded View if needed during this procedure.

2. Install the intake manifold chamber (A) with new gaskets (B), and the intake manifold flange plate (C).

NOTE: Tighten the bolts in a crisscross pattern in three steps, beginning with the inner bolt.

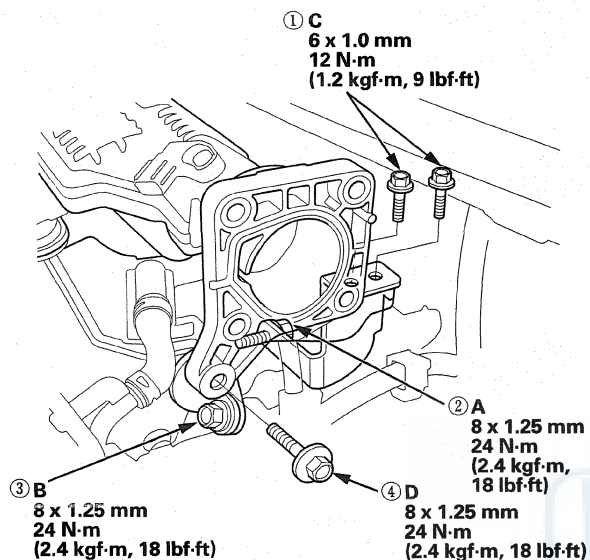


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Intake Air System and Exhaust System

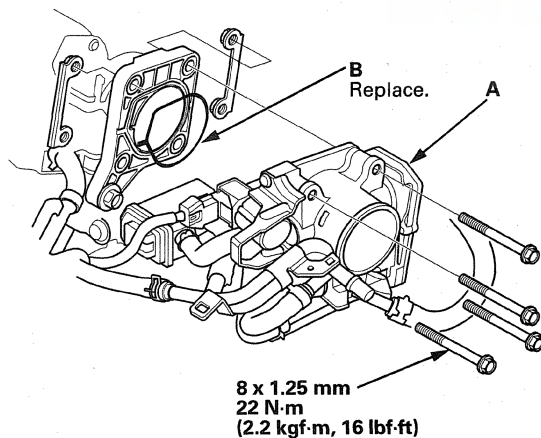
Intake Manifold Chamber Removal and Installation (cont'd)

3. Loosen the intake manifold bracket mounting bolts (A, B), then loosely install the intake manifold mounting bolts (C, D).

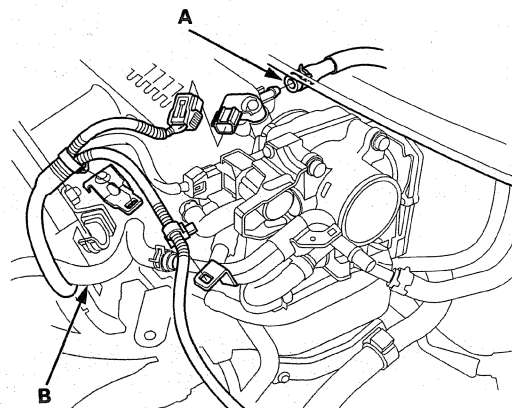


4. Tighten the bolts in the numbered sequence shown.

5. Install the throttle body (A) with a new gasket (B).



6. Connect the brake booster vacuum hose (A), and install the water bypass hose (B) to the clamp.

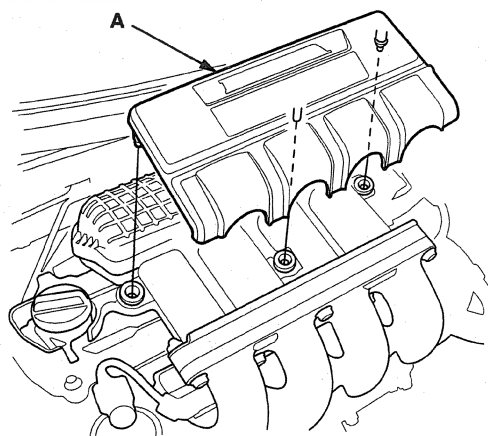


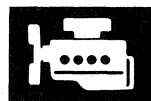
7. Connect the engine wire harness connectors, and install the wire harness clamps to the intake manifold chamber:

- Throttle actuator connector
- MAP sensor connector

8. Install the air cleaner (see page 9-3).

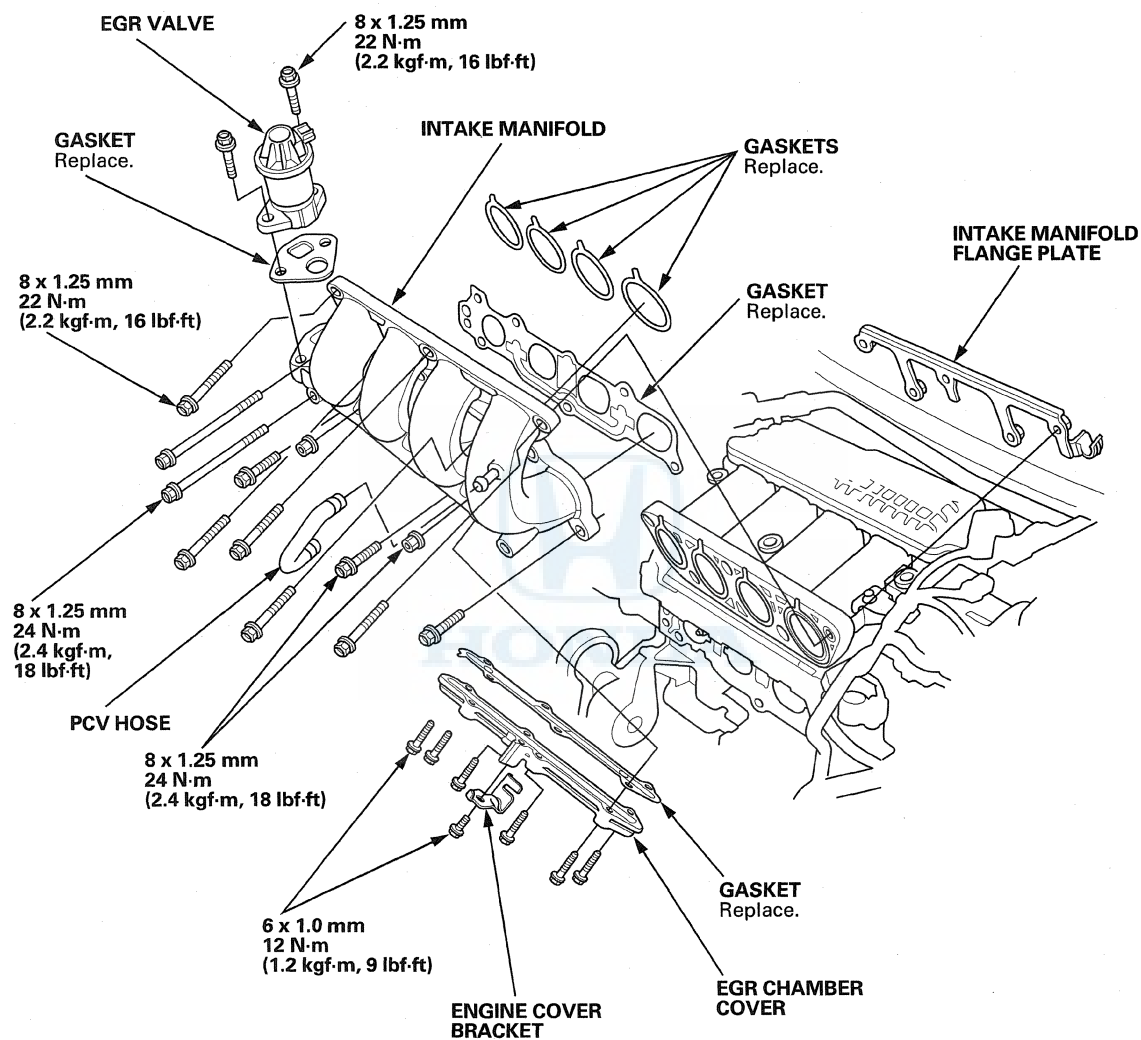
9. Install the engine cover (A).





Intake Manifold Removal and Installation

Exploded View



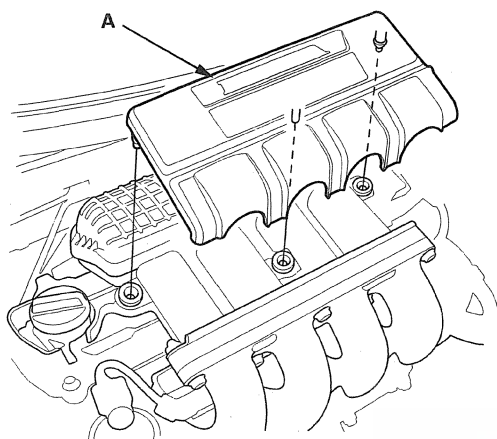
(cont'd)

Intake Air System and Exhaust System

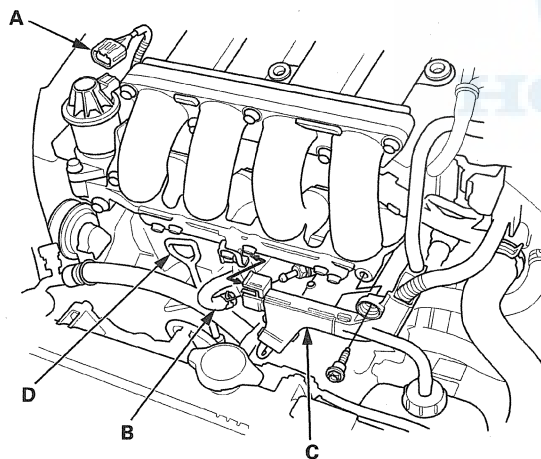
Intake Manifold Removal and Installation (cont'd)

Removal

1. Remove the engine cover (A).

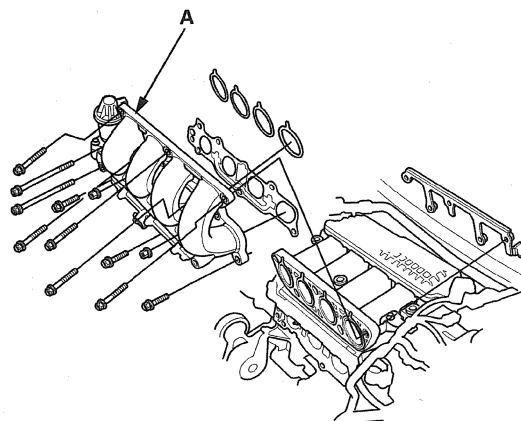


2. Disconnect the EGR valve connector (A) and the PCV hose (B).



3. Remove the engine wire harness holder (C) and the dipstick (D).

4. Remove the intake manifold (A).



5. Disassemble the intake manifold.

NOTE: Refer to the Exploded View if needed during this procedure.



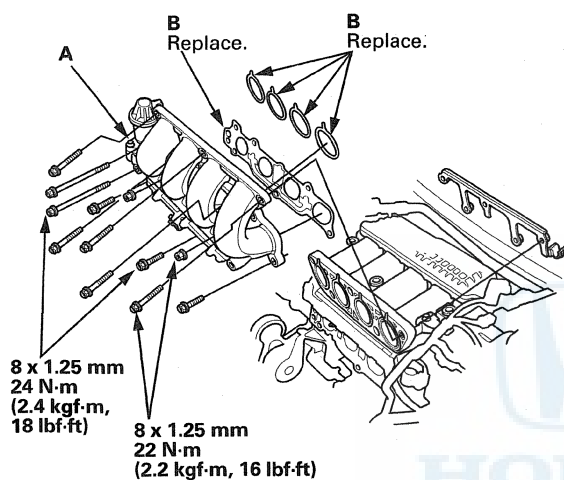
Installation

1. Reassemble the intake manifold.

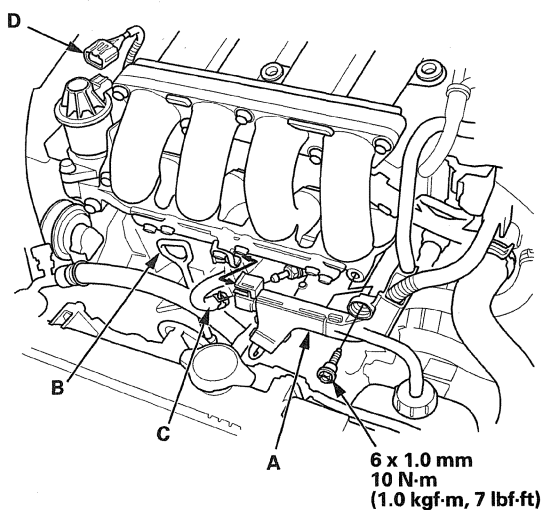
NOTE: Refer to the Exploded View if needed during this procedure.

2. Install the intake manifold (A) with new gaskets (B).

NOTE: Tighten the bolts and nuts in a crisscross pattern in three steps, beginning with the inner bolt.

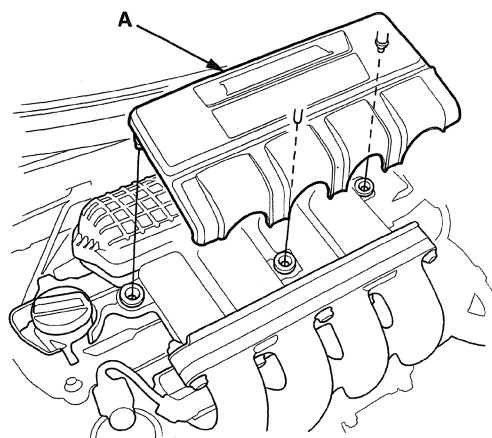


3. Install the engine wire harness holder (A) and the dipstick (B).



4. Connect the PCV hose (C) and the EGR valve connector (D).

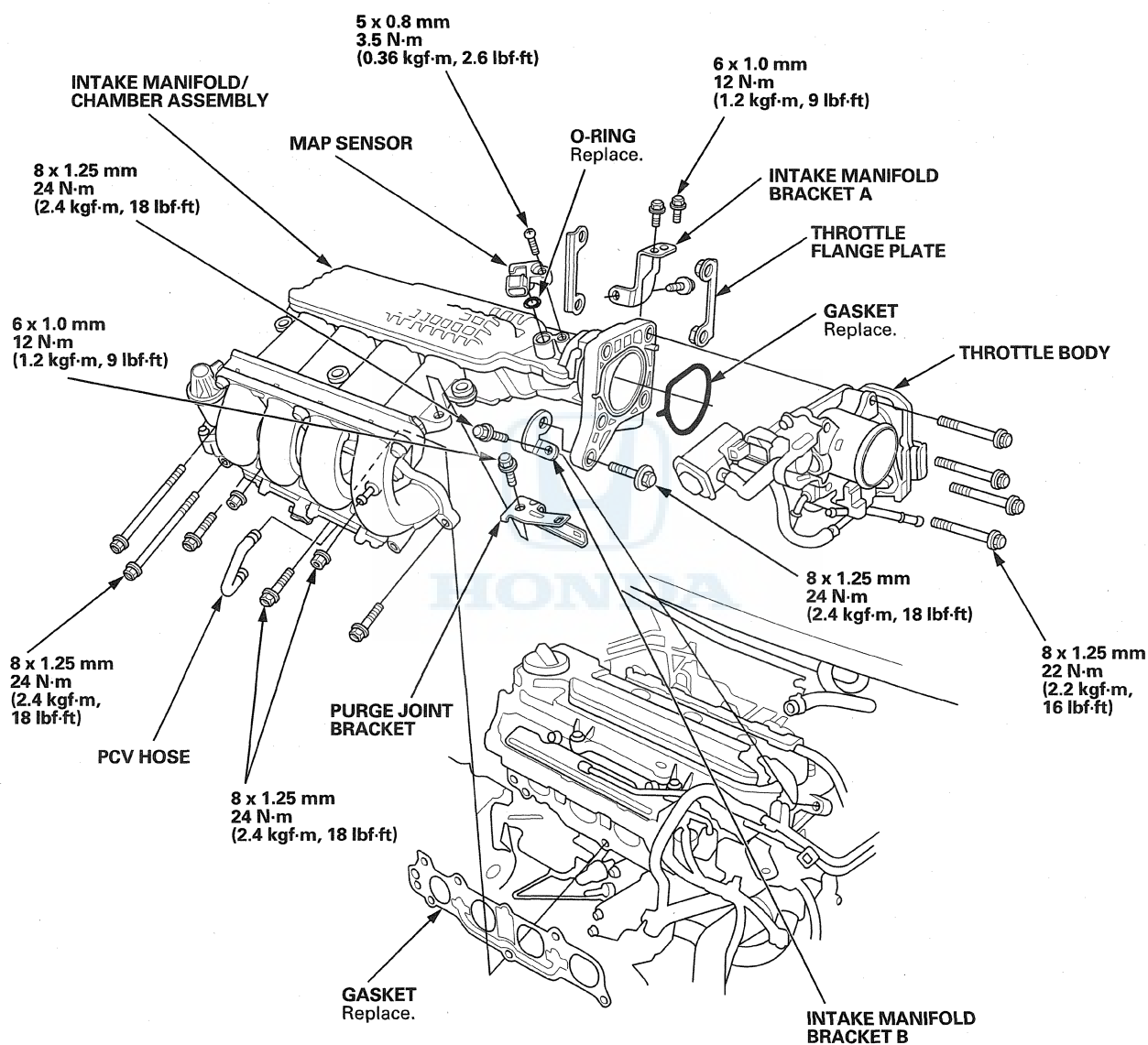
5. Install the engine cover (A).



Intake Air System and Exhaust System

Intake Manifold/Chamber Assembly Removal and Installation

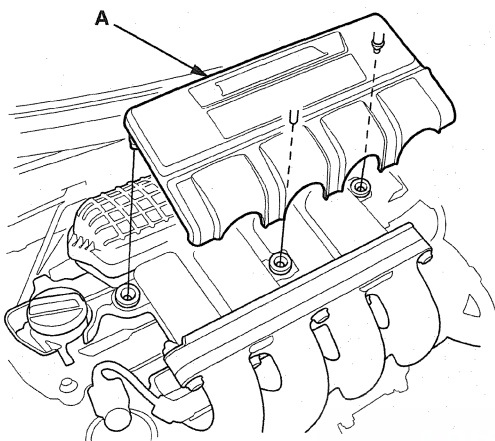
Exploded View



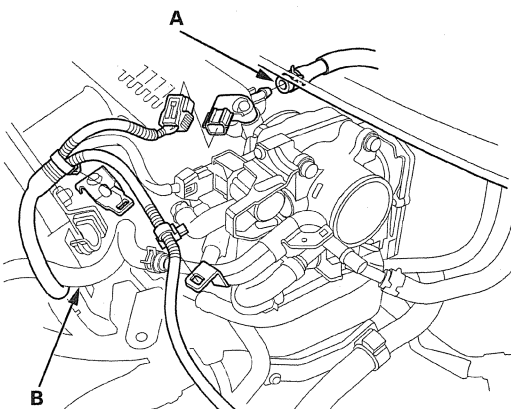


Removal

1. Remove the engine cover (A).

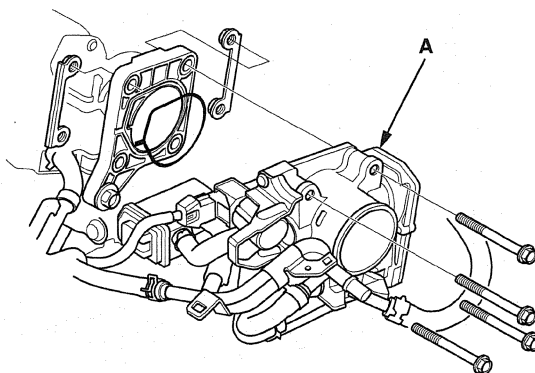


2. Remove the air cleaner (see page 9-3).
3. Disconnect the engine wire harness connectors, and remove the wire harness clamps from the intake manifold chamber:
 - Throttle actuator connector
 - MAP sensor connector
4. Disconnect the brake booster vacuum hose (A).

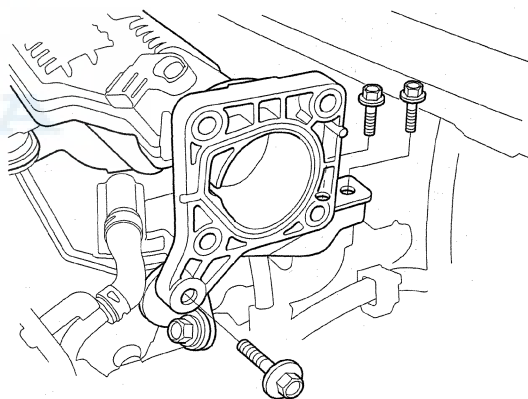


5. Remove the water bypass hose (B) from the clamp.

6. Remove the throttle body (A) without disconnecting the water bypass hoses.



7. Remove the intake manifold mounting bolts.

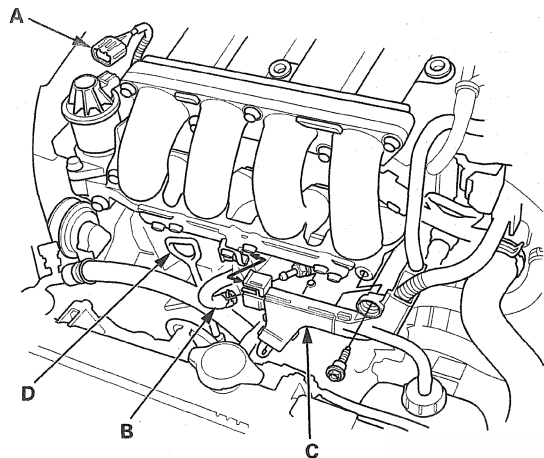


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Intake Air System and Exhaust System

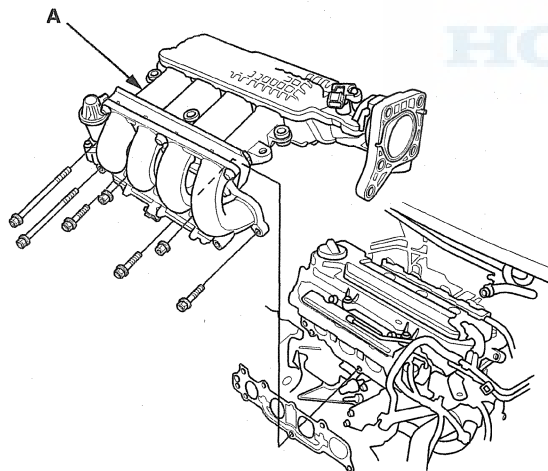
Intake Manifold/Chamber Assembly Removal and Installation (cont'd)

8. Disconnect the EGR valve connector (A) and the PCV hose (B).



9. Remove the engine wire harness holder (C) and the dipstick (D).

10. Remove the intake manifold/chamber assembly (A) from the cylinder head.



11. Disassemble the intake manifold/chamber assembly.

NOTE: Refer to the Exploded View if needed during this procedure.

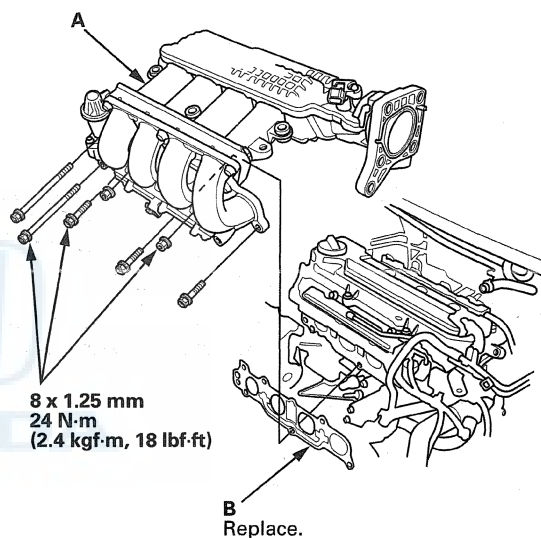
Installation

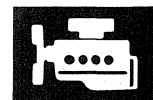
1. Reassemble the intake manifold/chamber assembly.

NOTE: Refer to the Exploded View if needed during this procedure.

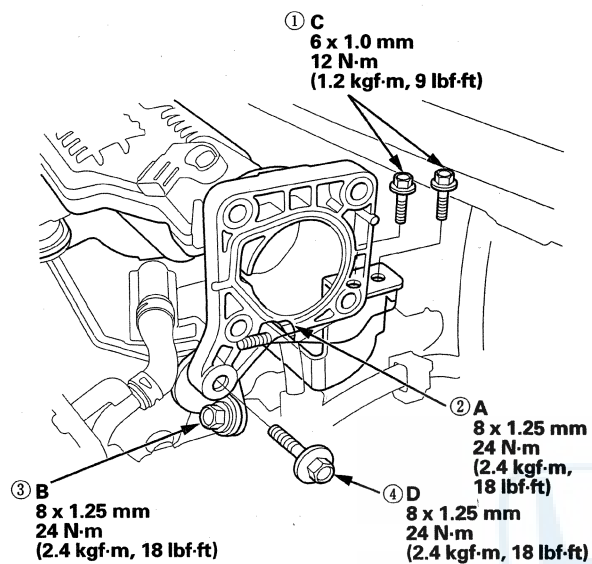
2. Install the intake manifold/chamber assembly (A) with a new gasket (B).

NOTE: Tighten the bolts and nuts in a crisscross pattern in three steps, beginning with the inner bolt.



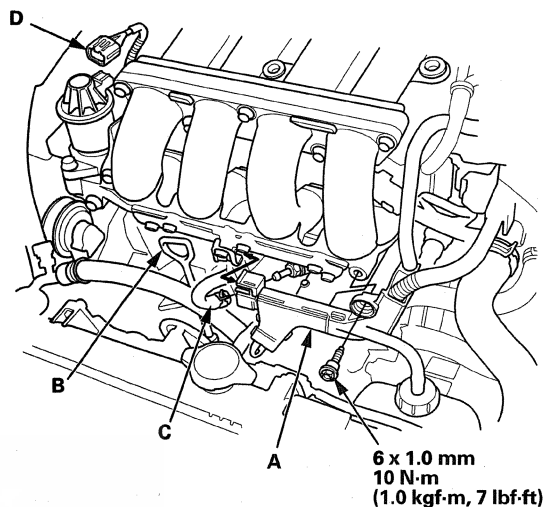


3. Loosen the intake manifold bracket mounting bolts (A, B), then loosely install the intake manifold mounting bolts (C, D).



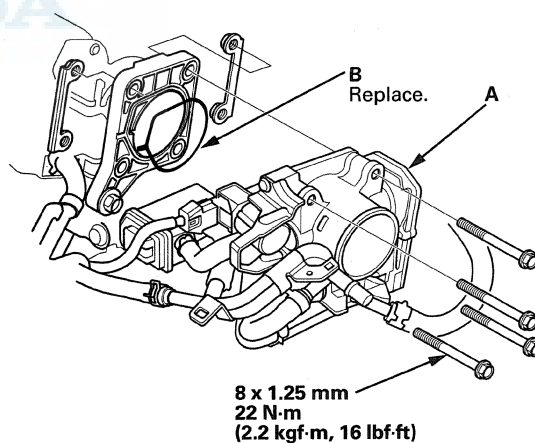
4. Tighten the bolts in the numbered sequence shown.

5. Install the engine wire harness holder (A) and the dipstick (B).



6. Connect the PCV hose (C) and the EGR valve connector (D).

7. Install the throttle body (A) with a new gasket (B).

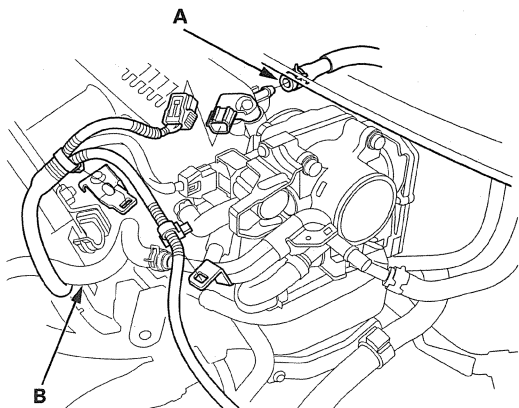


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Intake Air System and Exhaust System

Intake Manifold/Chamber Assembly Removal and Installation (cont'd)

8. Connect the brake booster vacuum hose (A), and install the water bypass hose (B) to the clamp.

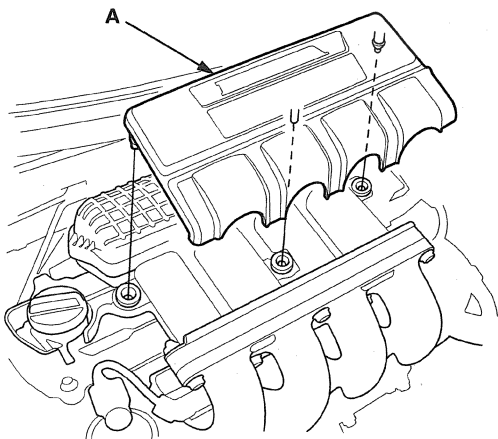


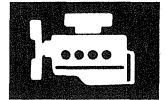
9. Connect the engine wire harness connectors, and install the wire harness clamps to the intake manifold chamber:

- Throttle actuator connector
- MAP sensor connector

10. Install the air cleaner (see page 9-3).

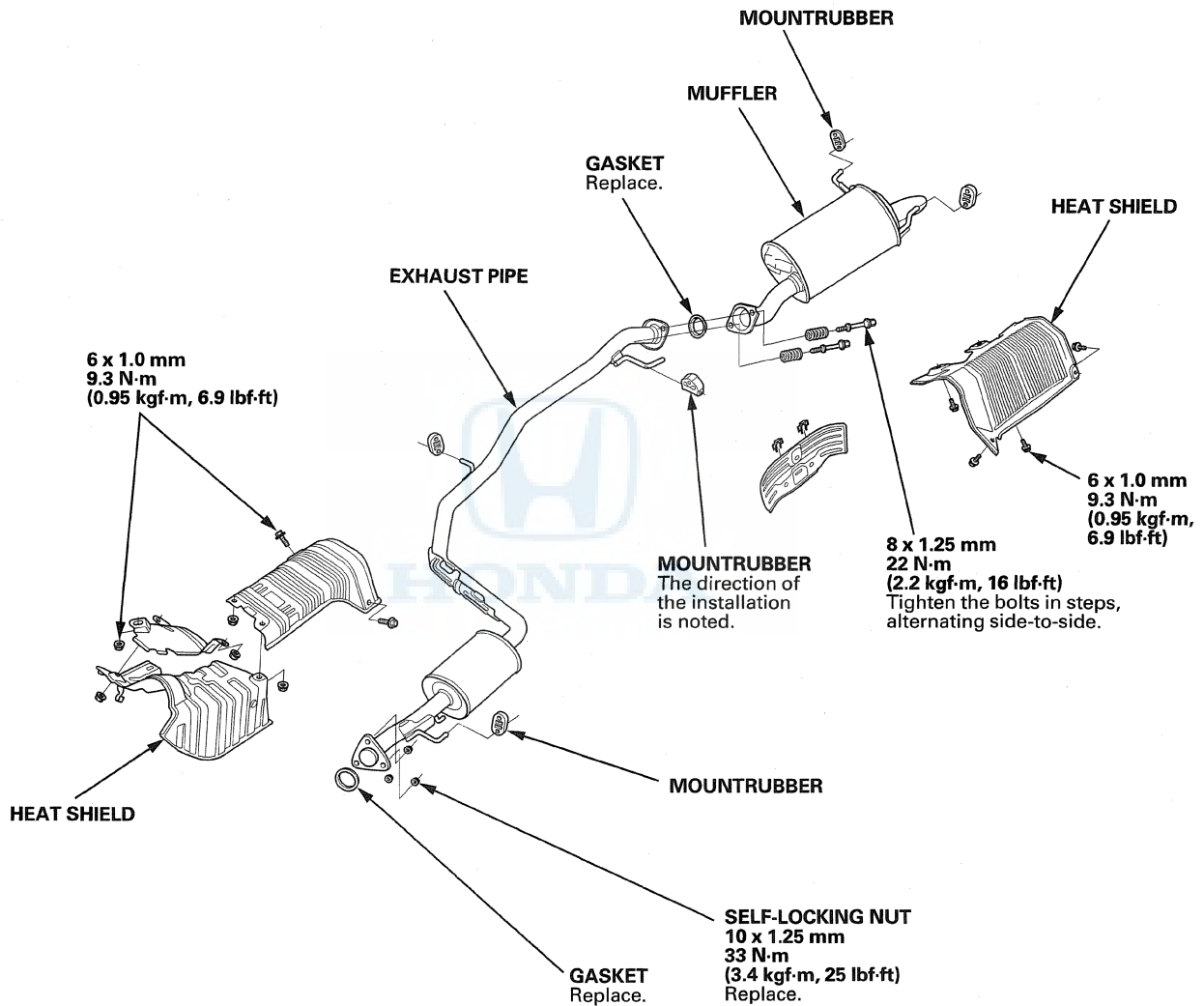
11. Install the engine cover (A).





Exhaust Pipe and Muffler Replacement

NOTE: Use new gaskets and self-locking nuts when reassembling.



Engine Cooling

Cooling System

Component Location Index	10-2
Radiator Cap Test	10-4
Radiator Test	10-4
Fan Motor Test	10-5
Thermostat Test	10-5
Water Pump Inspection	10-6
Water Pump Replacement	10-7
Coolant Check	10-8
Coolant Replacement	10-8
Thermostat Replacement	10-10
Thermostat Housing Removal and Installation	10-11
Water Outlet Removal and Installation	10-13
Connecting Pipe Replacement	10-16
Drive Belt Inspection	10-17
Drive Belt Replacement	10-17
Drive Belt Auto-Tensioner Inspection	10-18
Drive Belt Auto-Tensioner Replacement	10-20
Tensioner Pulley Replacement	10-20
Fan, Fan Motor, and Shroud Removal and Installation	10-21
Radiator Replacement	10-24

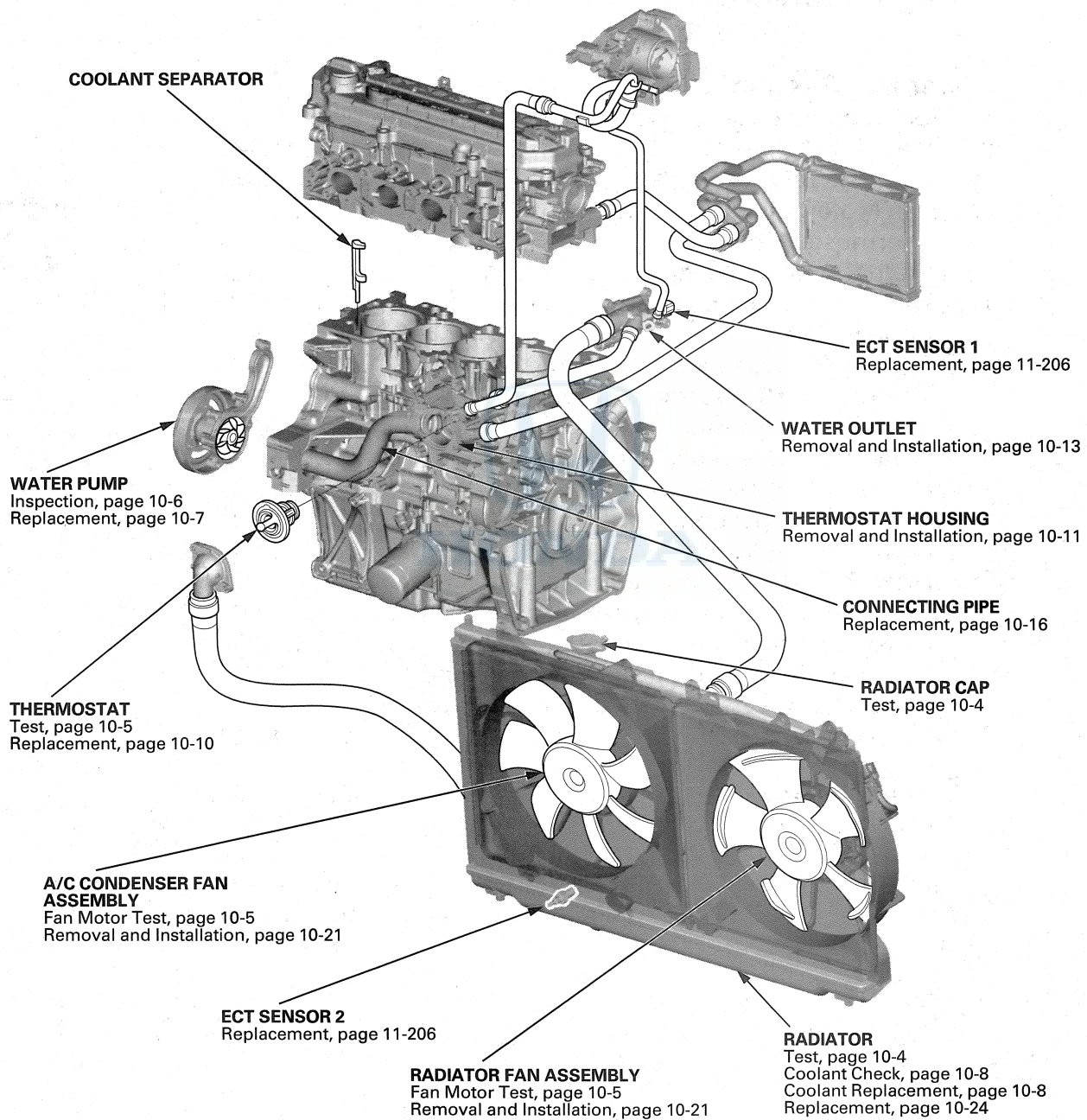
Fan Controls

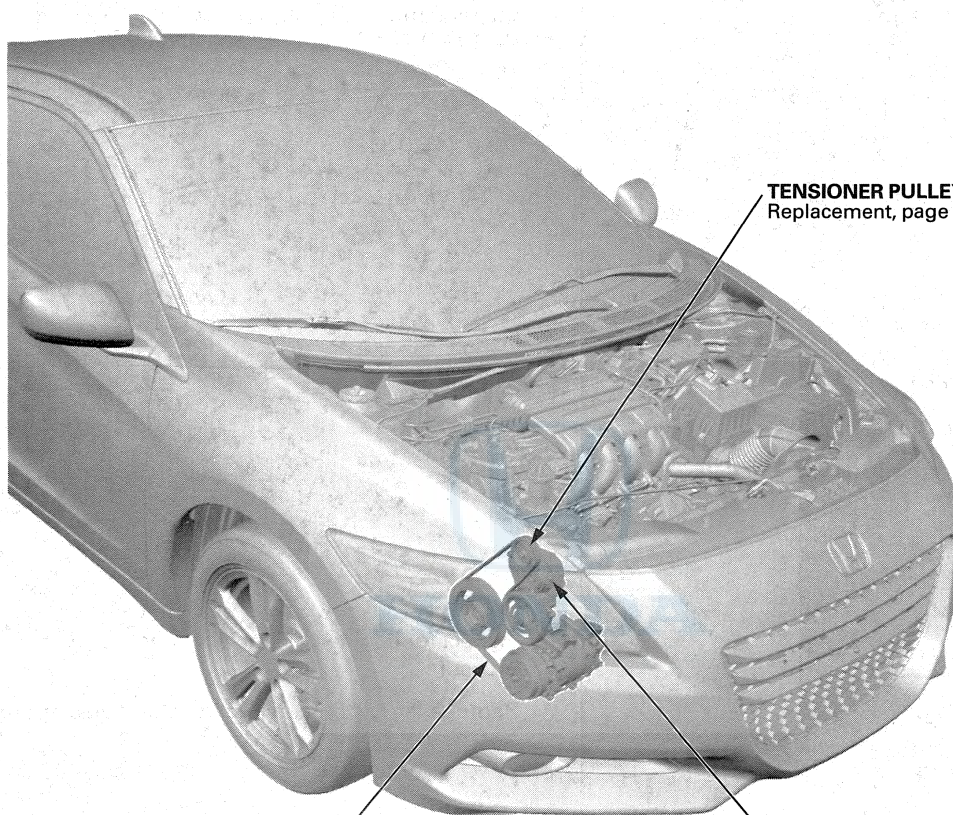
Component Location Index	10-29
Symptom Troubleshooting Index	10-30
Circuit Diagram	10-31
Radiator Fan High Speed Circuit Troubleshooting	10-32



Cooling System

Component Location Index





TENSIONER PULLEY
Replacement, page 10-20

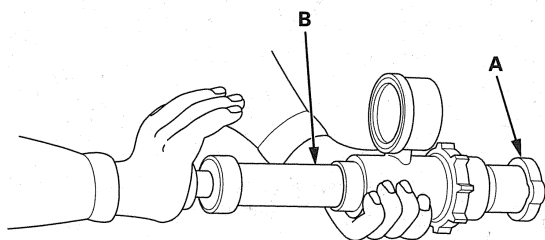
DRIVE BELT
Inspection, page 10-17
Replacement, page 10-17

DRIVE BELT AUTO-TENSIONER
Inspection, page 10-18
Replacement, page 10-20

Cooling System

Radiator Cap Test

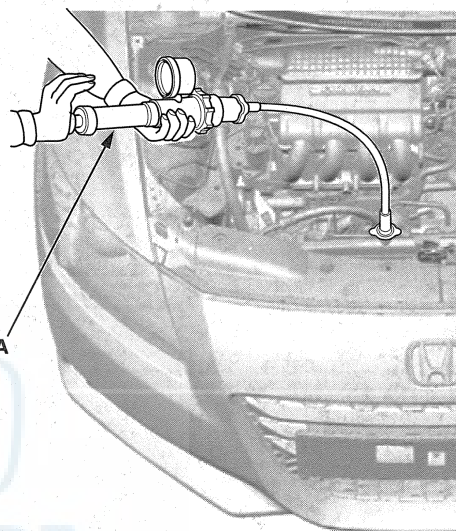
1. Wait until the engine is cool, then carefully remove the radiator cap (A). Wet the radiator cap seal with engine coolant, then install it on a commercially available pressure tester (B).



2. Apply a pressure of 93.3–122.7 kPa (0.951–1.251 kgf/cm², 13.53–17.79 psi).
3. Check for a drop in pressure.
4. If the pressure drops, replace the radiator cap.

Radiator Test

1. Wait until the engine is cool, then carefully remove the radiator cap, and fill the radiator with engine coolant to the base of the filler neck.
2. Attach a commercially available pressure tester (A) to the radiator, and apply a pressure of 93.3–122.7 kPa (0.951–1.251 kgf/cm², 13.53–17.79 psi).

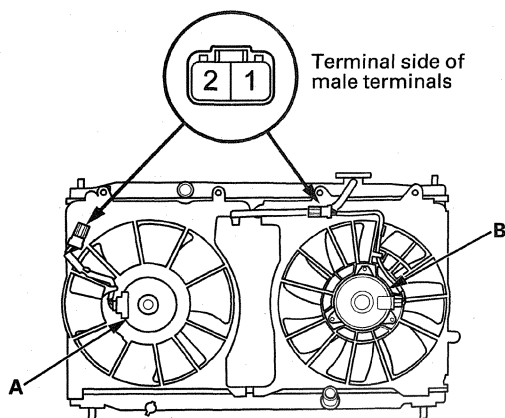


3. Inspect for engine coolant leaks and a drop in pressure.
4. Remove the tester, and reinstall the radiator cap.



Fan Motor Test

1. Disconnect the 2P connectors from the radiator fan motor (A) and the A/C condenser fan motor (B).



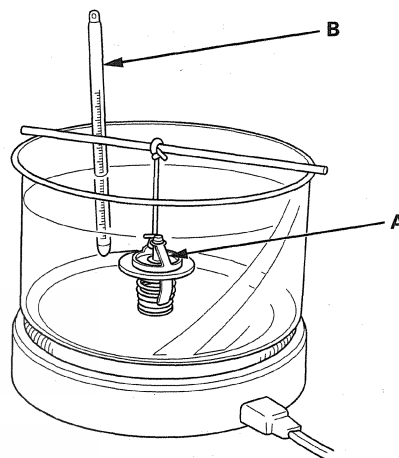
2. Test each motor by connecting battery power to terminal No. 1 and ground to terminal No. 2.
3. If either motor fails to run, or does not run smoothly, replace it (see page 10-21).

Thermostat Test

Replace the thermostat if it is stuck in the open position at room temperature.

To test a closed thermostat:

1. Suspend the thermostat (A) in a container of water. Do not let the thermostat and the thermometer (B) touch the bottom of the hot container.



2. Heat the water, and check the temperature with a thermometer. Check the temperature at which the thermostat first opens, and at which it is fully open.
3. Measure the lift height of the thermostat when it is fully open.

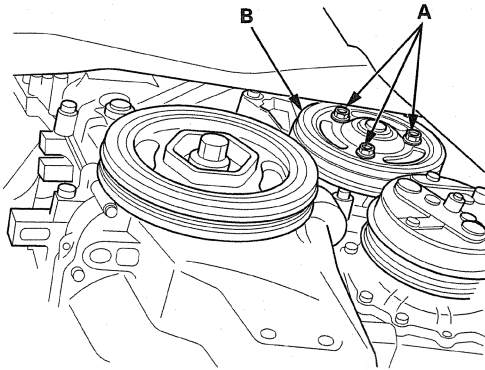
Standard Thermostat

Lift Height: Above 8.0 mm (0.315 in)
Starts Opening: 169–176 °F (76–80 °C)
Fully Open: 194 °F (90 °C)

Cooling System

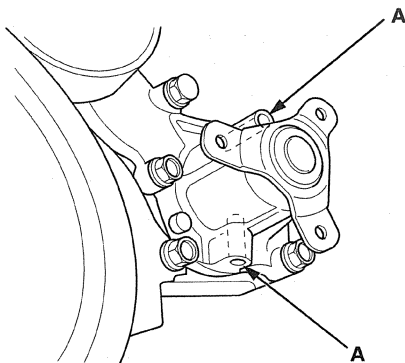
Water Pump Inspection

1. Remove the right front wheel.
2. Remove the splash shield (see page 20-163).
3. Loosen the water pump pulley mounting bolts (A).

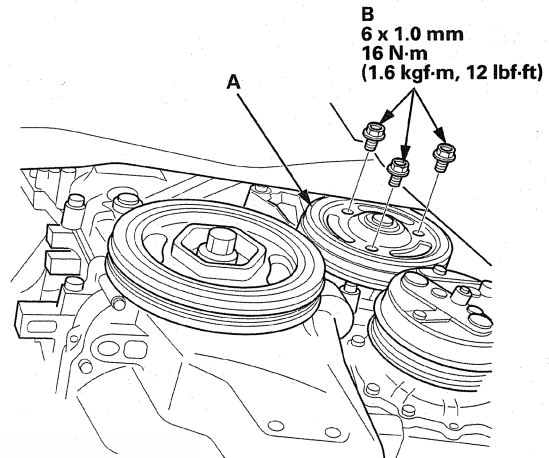


4. Remove the drive belt (see page 10-17).
5. Remove the water pump pulley (B).
6. Turn the water pump pulley counterclockwise, and check that it turns freely. If it does not turn freely, replace the water pump (see page 10-7).

NOTE: When you check the water pump, you may see a small amount of "weeping" from the bleed holes (A). This is normal.



7. Install the water pump pulley (A), and loosely install the water pump pulley mounting bolts (B).

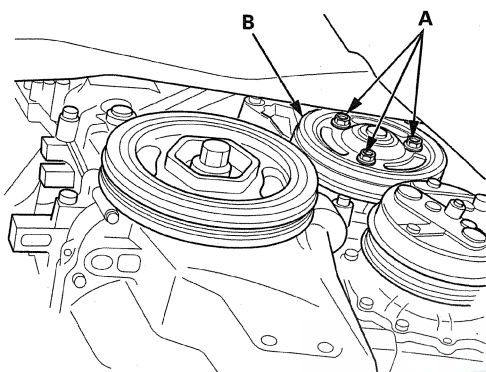


8. Install the drive belt (see page 10-17).
9. Tighten the water pump pulley mounting bolts.
10. Install the splash shield (see page 20-163).
11. Install the right front wheel.

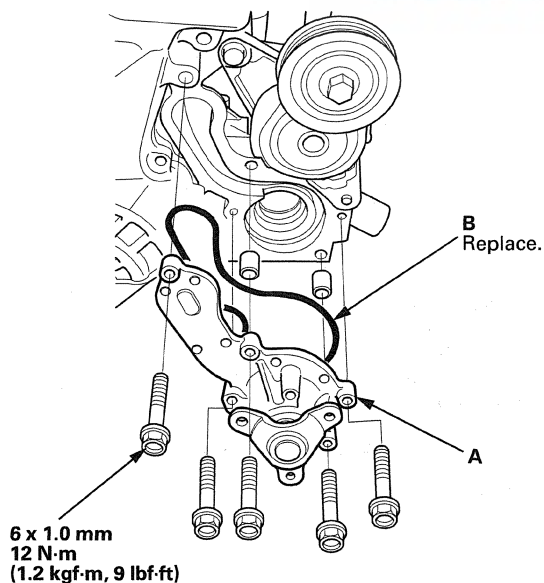


Water Pump Replacement

1. Remove the right front wheel.
2. Remove the splash shield (see page 20-163).
3. Drain the engine coolant (see page 10-8).
4. Loosen the water pump pulley mounting bolts (A).

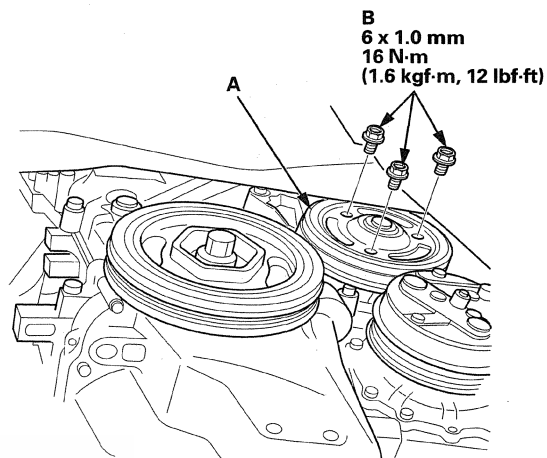


5. Remove the drive belt (see page 10-17).
6. Remove the water pump pulley (B).
7. Remove the five bolts securing the water pump (A), then remove the water pump.



8. Inspect and clean the mating surface with the engine block.
9. Install the water pump with a new O-ring (B) in the reverse order of removal.

10. Install the water pump pulley (A), and loosely install the water pump pulley mounting bolts (B).

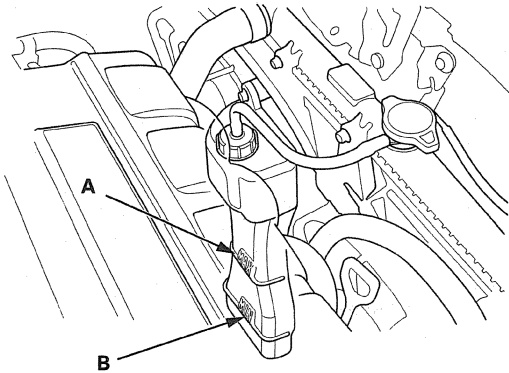


11. Install the drive belt (see page 10-17).
12. Tighten the water pump pulley mounting bolts.
13. Install the splash shield (see page 20-163).
14. Install the right front wheel.
15. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
16. Clean up any spilled engine coolant.

Cooling System

Coolant Check

1. Check the coolant level in the coolant reservoir. Make sure it is between the MAX mark (A) and the MIN mark (B).



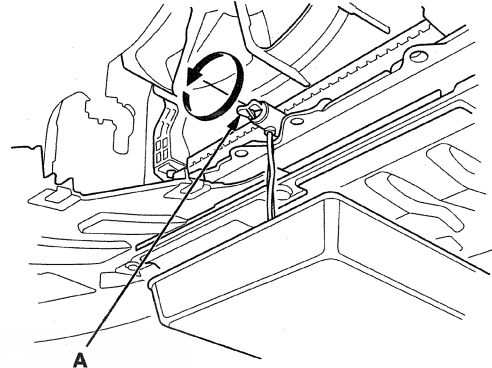
2. If the coolant level in the coolant reservoir is at or below the MIN mark, add coolant to bring it between the MIN and MAX marks, then inspect the cooling system for leaks.
3. Check the coolant level in the radiator, and add Honda Long Life Antifreeze/Coolant Type 2 into the radiator up to the base of the filler neck, if needed.

NOTE

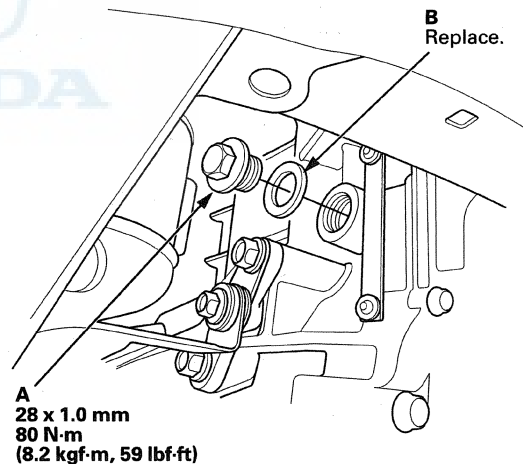
- Always use Honda Long Life Antifreeze/Coolant Type 2. Using a non-Honda coolant can result in corrosion, causing the cooling system to malfunction or fail.
- Honda Long Life Antifreeze/Coolant Type 2 is a mixture of 50 % antifreeze and 50 % water. Do not add water.

Coolant Replacement

1. Wait until the engine is cool, then carefully remove the radiator cap.
2. Remove the splash shield (see page 20-163).
3. Loosen the drain plug (A), and drain the coolant.



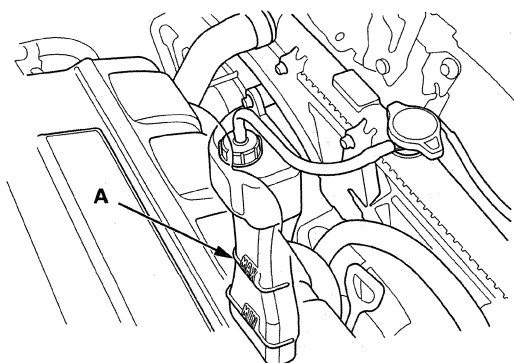
4. Remove the drain bolt (A) from the rear side of the engine block.



5. After the coolant has drained, reinstall the drain bolt with a new washer (B).
6. Tighten the radiator drain plug securely.
7. Remove, drain, and reinstall the coolant reservoir.



8. Fill the coolant reservoir to the MAX mark (A) with Honda Long Life Antifreeze/Coolant Type 2.



9. Pour Honda Long Life Antifreeze/Coolant Type 2 into the radiator up to the base of the filler neck.

NOTE:

- Always use Honda Long Life Antifreeze/Coolant Type 2. Using a non-Honda coolant can result in corrosion, causing the cooling system to malfunction or fail.
- Honda Long Life Antifreeze/Coolant Type 2 is a mixture of 50 % antifreeze and 50 % water. Do not add water.

Engine Coolant Refill Capacities (Including the coolant reservoir capacity of 0.44 L (0.116 US gal)):

M/T model:

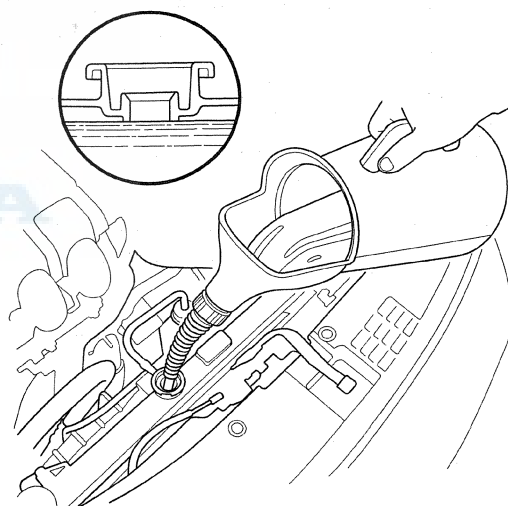
At Coolant Change: 4.42 L (1.168 US gal)

After Engine Overhaul: 4.92 L (1.300 US gal)

CVT model:

At Coolant Change: 4.35 L (1.149 US gal)

After Engine Overhaul: 4.84 L (1.279 US gal)



(cont'd)

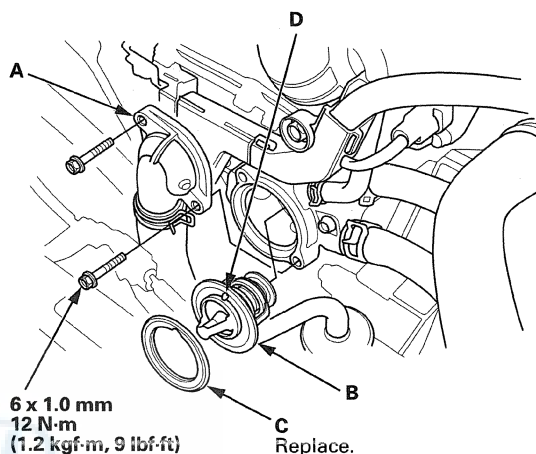
Cooling System

Coolant Replacement (cont'd)

10. Loosely install the radiator cap.
11. Start the engine, and let it run until it warms up (the radiator fan comes on at least twice).
12. Turn off the engine. Check the level in the radiator, and add the recommended coolant, if needed.
13. Put the radiator cap on securely, then start the engine again, and check for leaks.
14. Clean up any spilled engine coolant.
15. If the Maintenance Minder required replacing the engine coolant, reset the Maintenance Minder (see page 3-4), and this procedure is complete. If the Maintenance Minder did not require engine coolant replacement, go to step 16.
16. Turn the ignition switch to LOCK (0).
17. Connect the HDS to the DLC (see step 2 on page 11-3).
18. Turn the ignition switch to ON (II).
19. Make sure the HDS communicates with the vehicle and ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-383).
20. Select GAUGES in the BODY ELECTRICAL with the HDS.
21. Select ADJUSTMENT in the GAUGE with the HDS.
22. Select MAINTENANCE MINDER in the ADJUSTMENT with the HDS.
23. Select RESET in the MAINTENANCE MINDER with the HDS.
24. Select MAINTENANCE SUB ITEM 5 RESET with the HDS.
25. Install the splash shield (see page 20-163).

Thermostat Replacement

1. Drain the engine coolant (see page 10-8).
2. Remove the thermostat cover (A), then remove the thermostat (B).



3. Install a new thermostat with a new rubber seal (C), then install the thermostat cover.

NOTE: Install the thermostat with the pin (D) up.

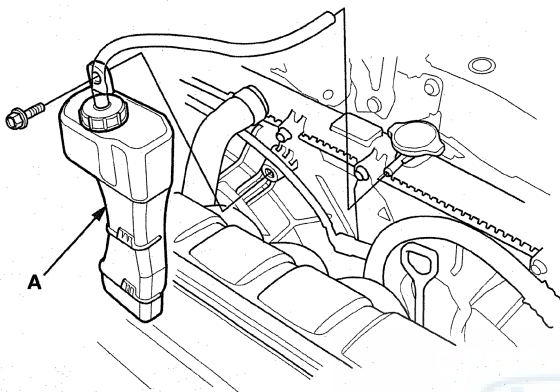
4. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
5. Clean up any spilled engine coolant.



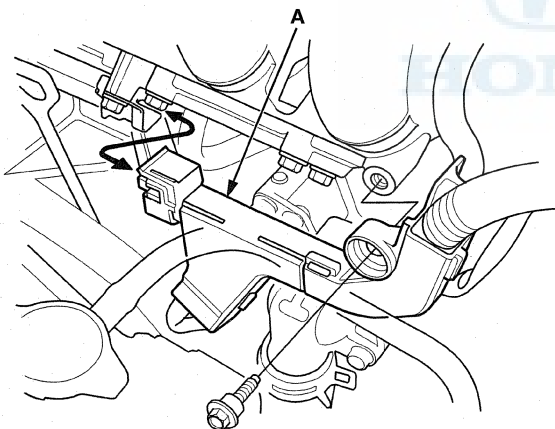
Thermostat Housing Removal and Installation

Removal

1. Drain the engine coolant (see page 10-8).
2. Remove the coolant reservoir (A).

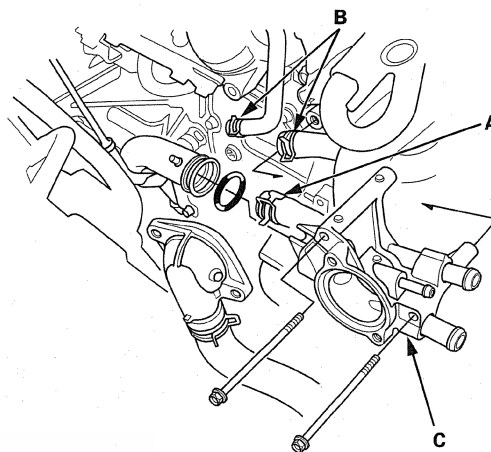


3. Remove the harness holder (A).



4. Remove the thermostat (see page 10-10).

5. Disconnect the heater hose (A) and the water bypass hoses (B).



6. Remove the thermostat housing (C).

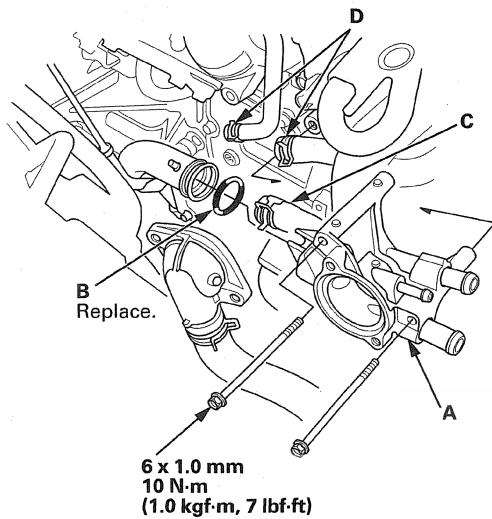
(cont'd)

Cooling System

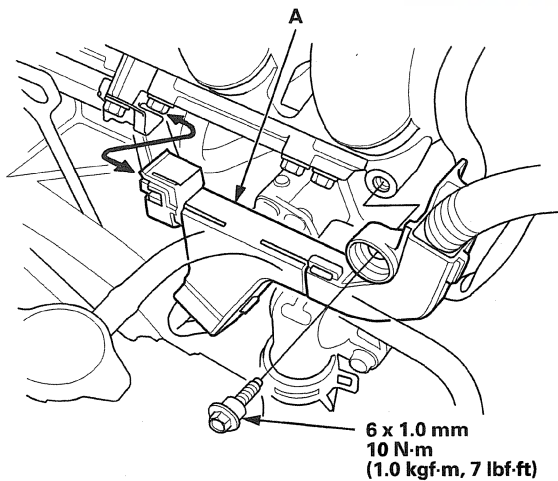
Thermostat Housing Removal and Installation (cont'd)

Installation

1. Install the thermostat housing (A) with a new connecting pipe O-ring (B).

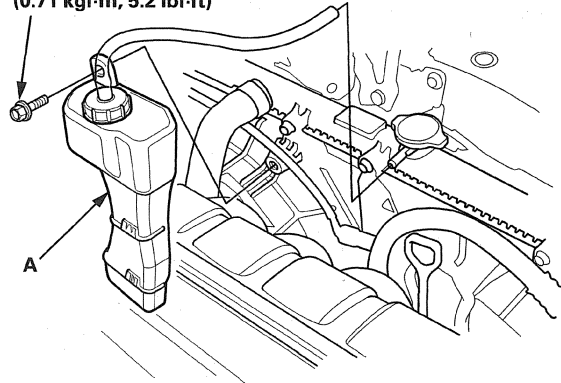


2. Connect the heater hose (C) and the water bypass hoses (D).
3. Install the thermostat (see page 10-10).
4. Install the harness holder (A).



5. Install the coolant reservoir (A).

6 x 1.0 mm
7.0 N·m
(0.71 kgf·m, 5.2 lbf·ft)



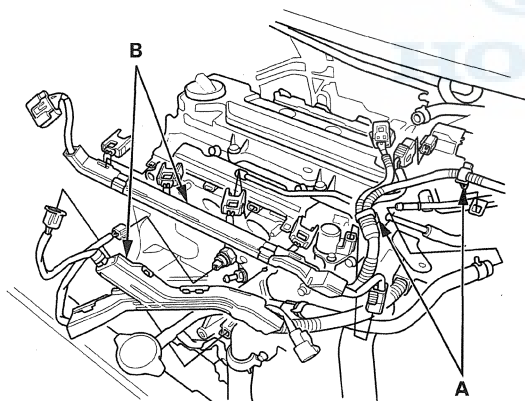
6. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
7. Clean up any spilled engine coolant.



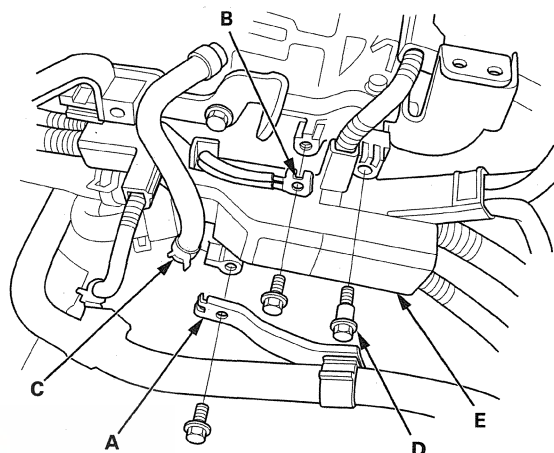
Water Outlet Removal and Installation

Removal

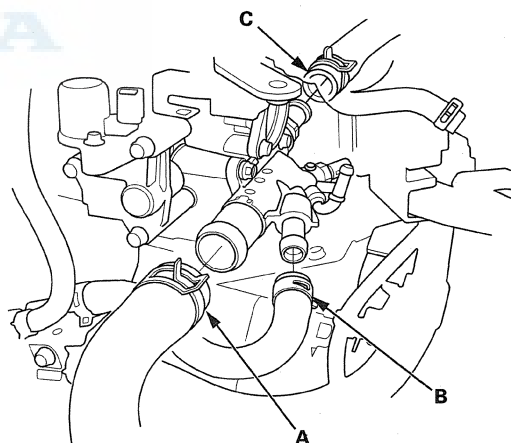
1. Drain the engine coolant (see page 10-8).
2. Remove the throttle body (see page 11-248).
3. Remove the intake manifold/chamber assembly (see page 9-13).
4. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the cylinder head:
 - Four injector connectors
 - Rocker arm oil control valve connector
 - Rocker arm oil pressure switch connector
 - ECT sensor 1 connector
 - CMP sensor connector
 - A/F sensor connector
 - Secondary HO2S connector
 - Oil pressure switch connector
 - Knock sensor connector
5. Remove the harness clamps (A) with the harness holders (B).



6. Remove the heater hose bracket (A) and the ground cable (B), then disconnect the water bypass hose (C) from the water outlet.



7. Remove the harness holder bolt (D), then remove the harness holder (E) from the bracket.
8. Disconnect the upper radiator hose (A), the water bypass hose (B), and the heater hose (C).

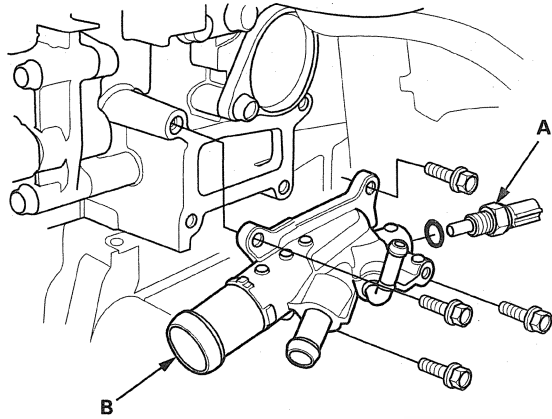


(cont'd)

Cooling System

Water Outlet Removal and Installation (cont'd)

9. Remove ECT sensor 1 (A), then remove the water outlet (B).

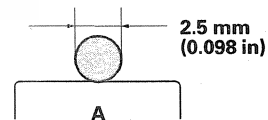
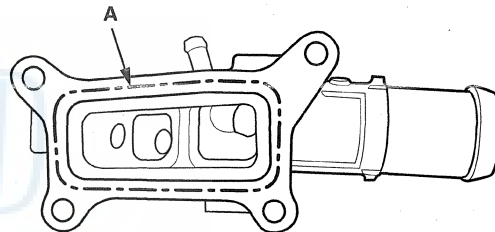


Installation

1. Remove all of the old liquid gasket from the water outlet mating surfaces, the bolts, and the bolt holes.
2. Clean and dry the water outlet mating surfaces.
3. Apply liquid gasket (P/N 08718-0004) to the cylinder head mating surface of the water outlet and to the inside edge of the bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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

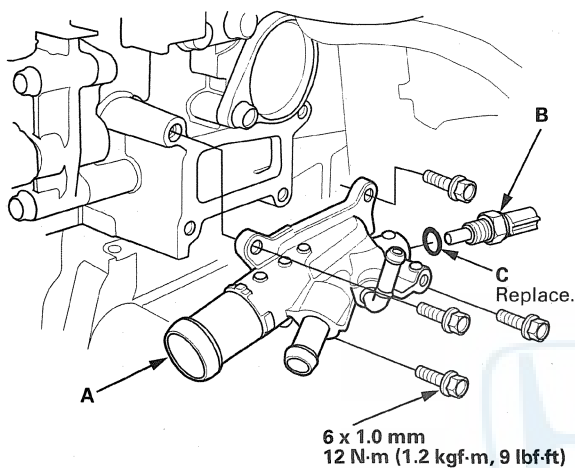




4. Install the water outlet (A).

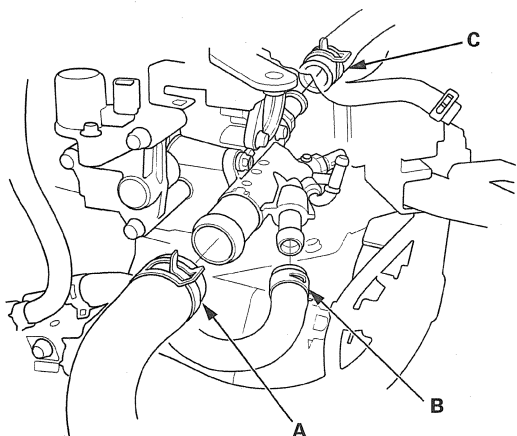
NOTE:

- After assembly, wait at least 30 minutes before filling the engine with coolant.
- Do not run the engine for at least 3 hours after installing the water outlet.

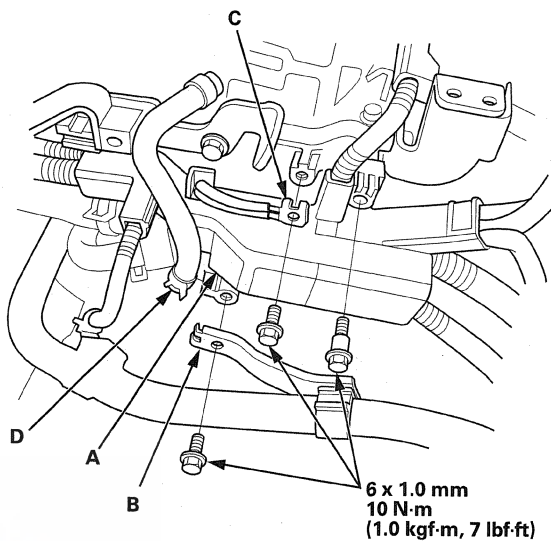


5. Install ECT sensor 1 (B) with a new O-ring (C) (see page 11-206).

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



7. Install the harness holder (A).



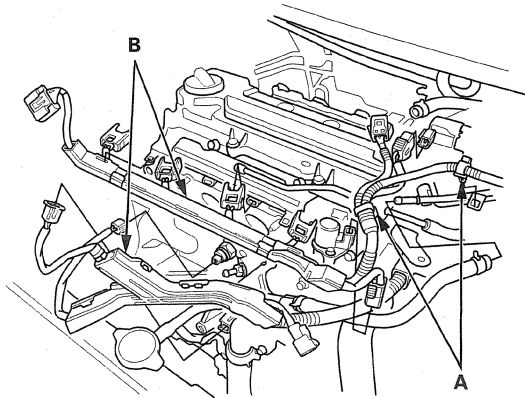
8. Install the heater hose bracket (B) and the ground cable (C), then connect the water bypass hose (D) to the water outlet.

(cont'd)

Cooling System

Water Outlet Removal and Installation (cont'd)

9. Install the harness clamps (A) with the harness holders (B).



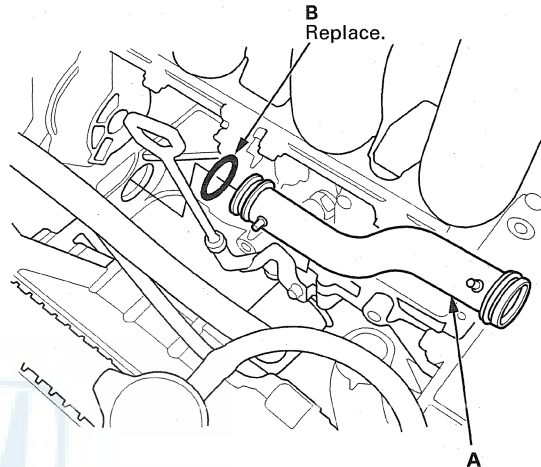
10. Connect the following engine wire harness connectors, and install the wire harness clamps to the cylinder head:

- Four injector connectors
- Rocker arm oil control valve connector
- Rocker arm oil pressure switch connector
- ECT sensor 1 connector
- CMP sensor connector
- A/F sensor connector
- Secondary HO2S connector
- Oil pressure switch connector
- Knock sensor connector

11. Install the intake manifold/chamber assembly (see page 9-14).
12. Install the throttle body (see page 11-248).
13. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
14. Clean up any spilled engine coolant.

Connecting Pipe Replacement

1. Drain the engine coolant (see page 10-8).
2. Remove the thermostat (see page 10-10).
3. Remove the thermostat housing (see page 10-11).
4. Remove the connecting pipe (A).



5. Install the connecting pipe with a new O-ring (B).
6. Install the thermostat housing (see page 10-12).
7. Install the thermostat (see page 10-10).
8. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
9. Clean up any spilled engine coolant.

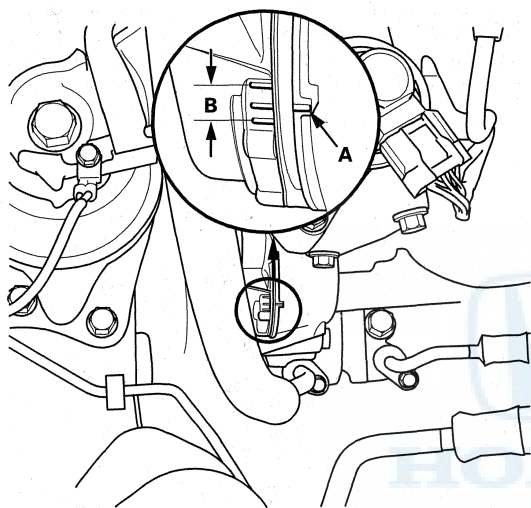


Drive Belt Inspection

1. Inspect the belt for cracks or damage.

NOTE: If the belt is cracked or damaged, replace it (see page 10-17).

2. Check the position of the drive belt auto-tensioner indicator (A) is within the standard range (B) as shown. If it is out of the standard range, replace the drive belt (see page 10-17), then check the drive belt auto-tensioner indicator position.



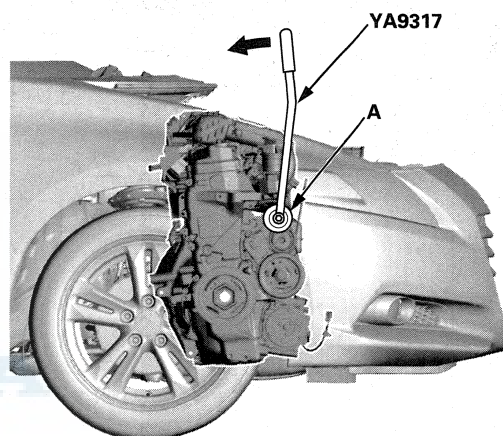
Drive Belt Replacement

Special Tools Required

Belt Tension Release Tool Snap-on YA9317*, commercially available

*: Available through the Honda Tool and Equipment Program 888-424-6857.

1. Move the drive belt auto-tensioner (A) using the belt tension release tool (YA9317) in the direction shown to relieve tension from the drive belt, then remove the drive belt.



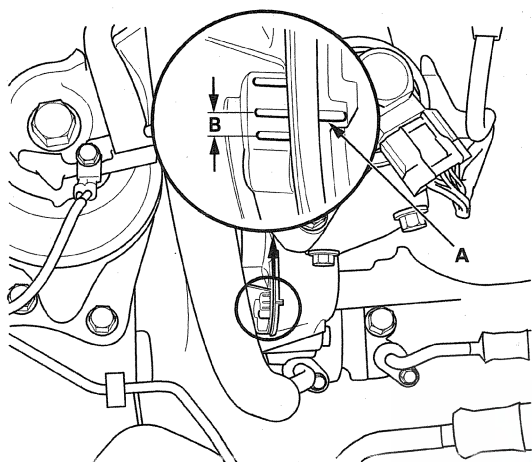
2. Install a new belt in the reverse order of removal.

(cont'd)

Cooling System

Drive Belt Replacement (cont'd)

3. Check the position of the drive belt auto-tensioner indicator (A) is within the standard range (B) as shown. If it is out of the standard range, check the drive belt auto-tensioner (see page 10-18).



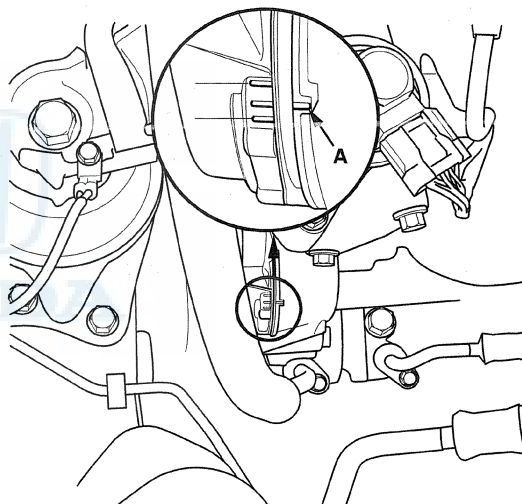
Drive Belt Auto-Tensioner Inspection

Special Tools Required

Belt Tension Release Tool Snap-on YA9317*, commercially available

*: Available through the Honda Tool and Equipment Program 888-424-6857.

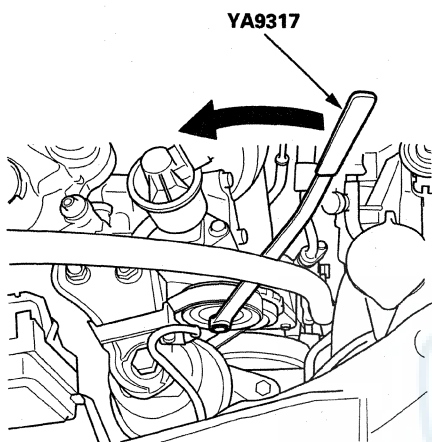
1. Turn the ignition switch to ON (II), and make sure to turn the A/C switch off. Turn the ignition switch to LOCK (0).
2. Check the position of the drive belt auto-tensioner indicator (A). Start the engine, then check the position again with the engine idling. If the position of the indicator moves or fluctuates very much, replace the drive belt auto-tensioner (see page 10-20).



3. Check for abnormal noise from the tensioner pulley. If you hear abnormal noise, replace the tensioner pulley (see page 10-20).
4. Remove the drive belt (see page 10-17).

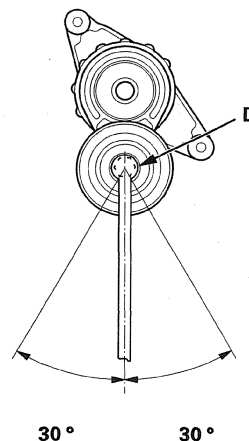
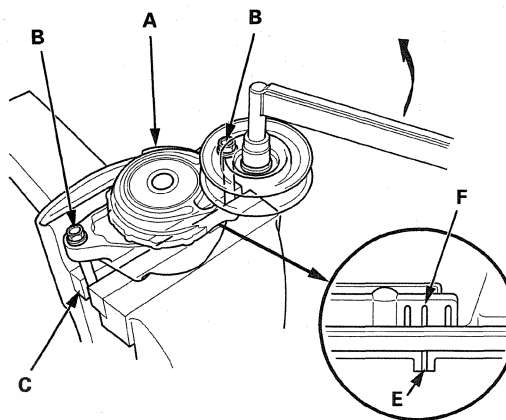


5. Move the drive belt auto-tensioner within its limit with the belt tension release tool (YA9317) in the direction shown. Check that the drive belt auto-tensioner moves smoothly and without any abnormal noise. If the drive belt auto-tensioner does not move smoothly or you hear abnormal noise, replace the drive belt auto-tensioner (see page 10-20).



6. Remove the drive belt auto-tensioner (see page 10-20).

7. Clamp the drive belt auto-tensioner (A) by using two 8 mm bolts (B) and a vise (C) as shown. Do not clamp the drive belt auto-tensioner itself.



8. Set the torque wrench (D) on the pulley bolt, and align it as shown.
9. Align the indicator (E) on the tensioner base with belt position mark (F) on the tensioner arm by using the torque wrench, and measure the torque. If the torque value is out of specification, replace the drive belt auto-tensioner (see page 10-20).

NOTE: If the indicator exceeds the belt position mark, recheck the torque.

Auto-Tensioner Spring Torque

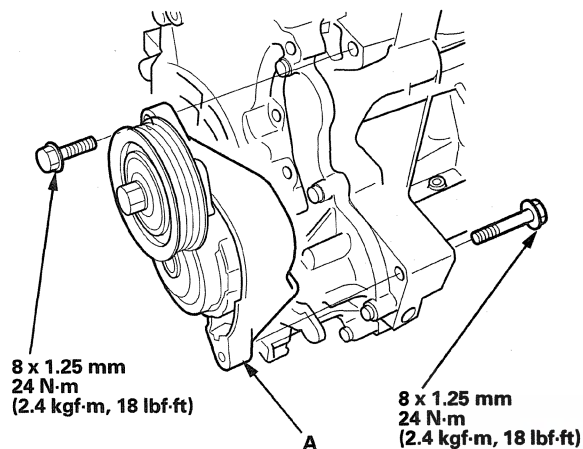
17.6—22.8 N·m

(1.79—2.32 kgf·m, 13.0—16.8 lbf·ft)

Cooling System

Drive Belt Auto-Tensioner Replacement

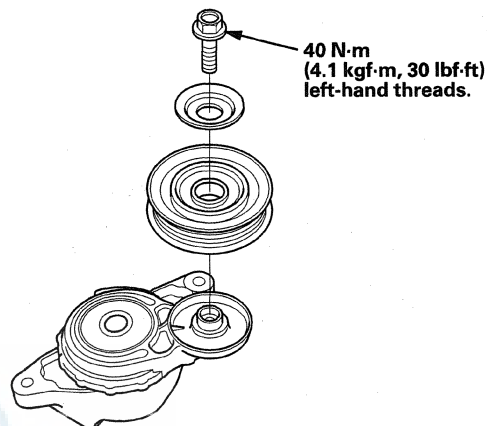
1. Remove the drive belt (see page 10-17).
2. Remove the drive belt auto-tensioner (A).



3. Install the drive belt auto-tensioner in the reverse order of removal.

Tensioner Pulley Replacement

1. Remove the drive belt auto-tensioner (see page 10-20).
2. Remove the tensioner pulley. The tensioner pulley bolt has left-hand threads.



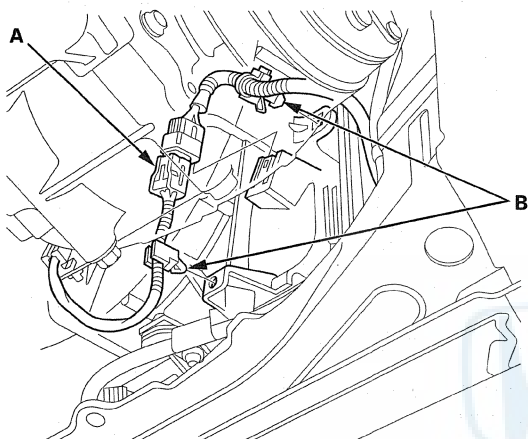
3. Install the tensioner pulley in the reverse order of removal.
4. Install the drive belt auto-tensioner (see page 10-20).



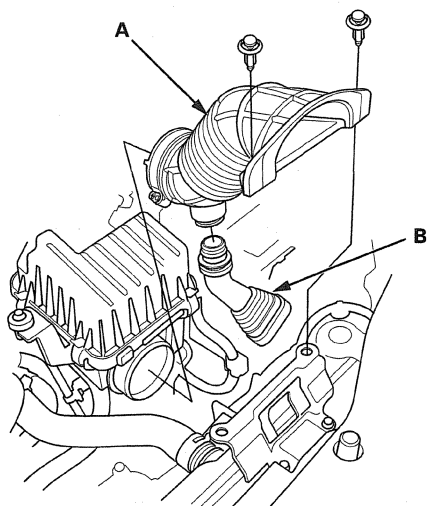
Fan, Fan Motor, and Shroud Removal and Installation

Removal

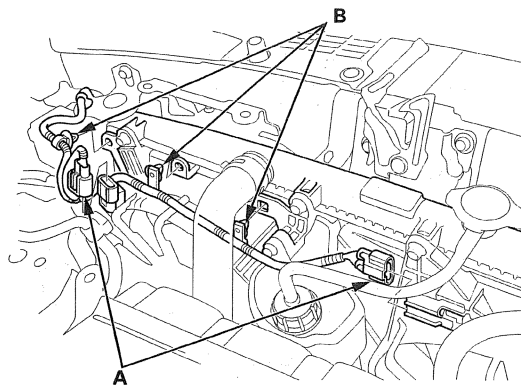
1. Raise the vehicle on the lift.
2. Remove the splash shield (see page 20-163).
3. Remove the A/C compressor clutch connector (A) from the clamp, then remove the harness clamps (B).



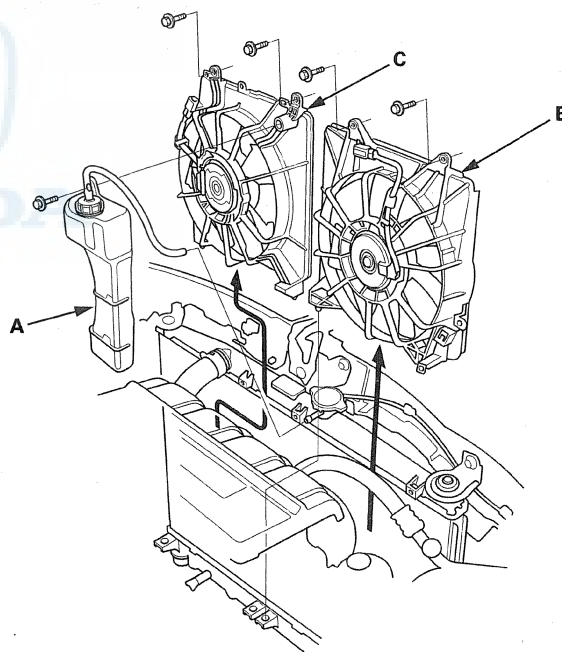
4. Lower the vehicle on the lift.
5. Remove the intake air tube (A) and the resonator chamber joint (B).



6. Disconnect the fan motor connectors (A), and remove the harness clamps (B).



7. Remove the coolant reservoir (A).



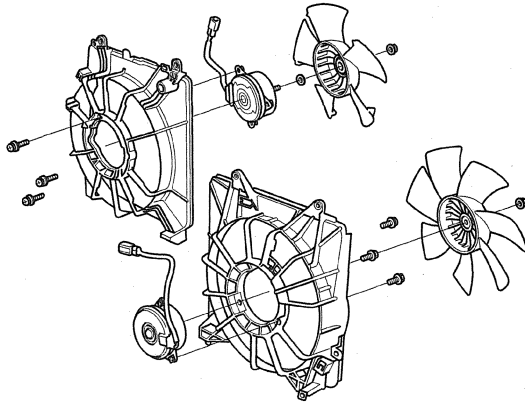
8. Remove the A/C condenser fan shroud assembly (B), then remove the radiator fan shroud assembly (C) from the A/C condenser fan shroud side.

(cont'd)

Cooling System

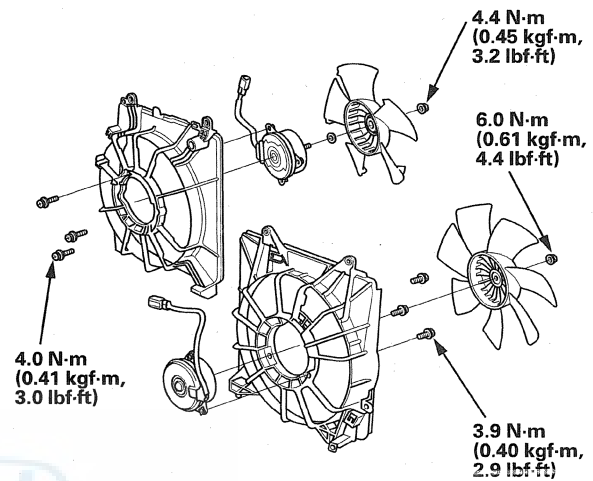
Fan, Fan Motor, and Shroud Removal and Installation (cont'd)

9. Disassemble the fan shrouds.

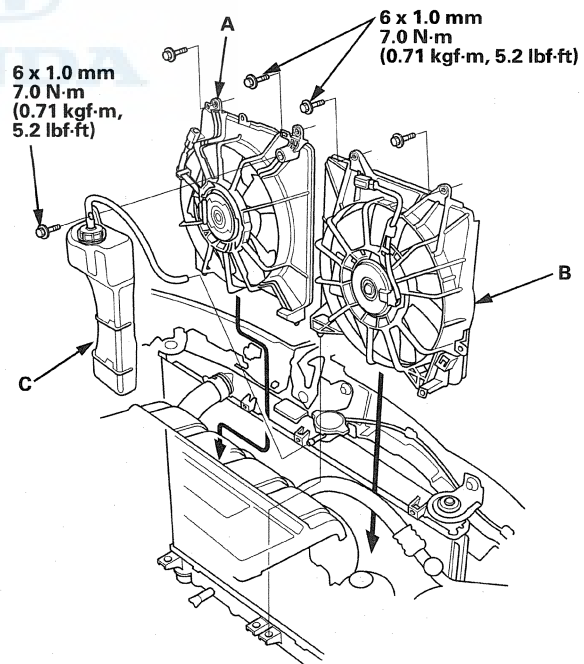


Installation

1. Assemble the fan shrouds.



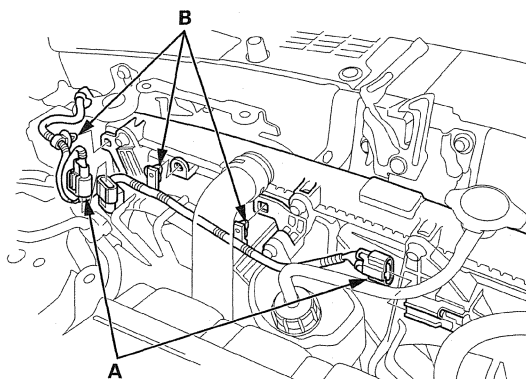
2. Install the radiator fan shroud assembly (A) onto the A/C condenser fan shroud side, then install the A/C condenser fan shroud assembly (B).



3. Install the coolant reservoir (C).

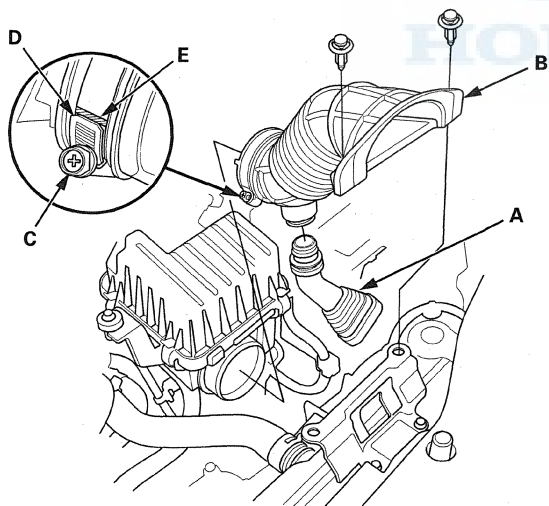


4. Connect the fan motor connectors (A), and install the harness clamps (B).



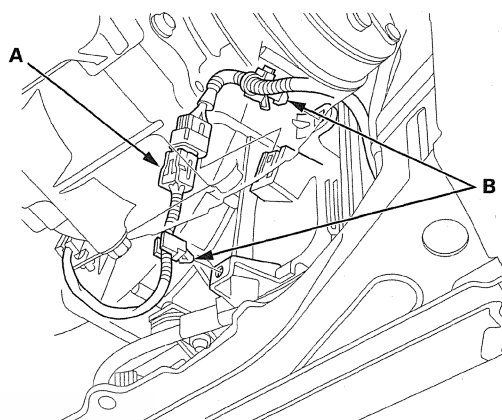
5. Install the resonator chamber joint (A) and the intake air tube (B).

NOTE: When tightening the screw (C) of the hose band, align the edge of the hose band (D) with the mark (E) painted on the hose band. If you tighten the screw over the mark, replace the hose band.



6. Raise the vehicle on the lift.

7. Install the A/C compressor clutch connector (A) to the clamp, then install the harness clamps (B).



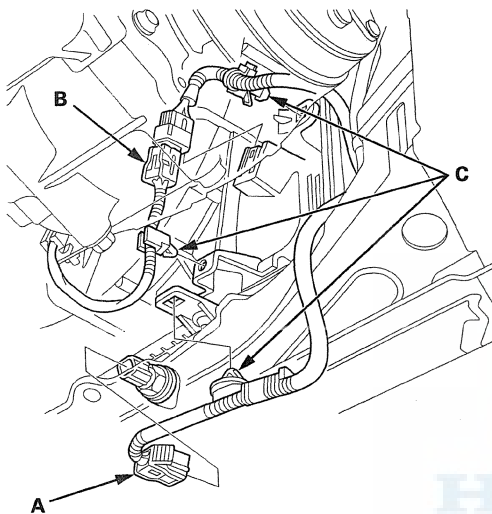
8. Install the splash shield (see page 20-163).

9. Lower the vehicle on the lift.

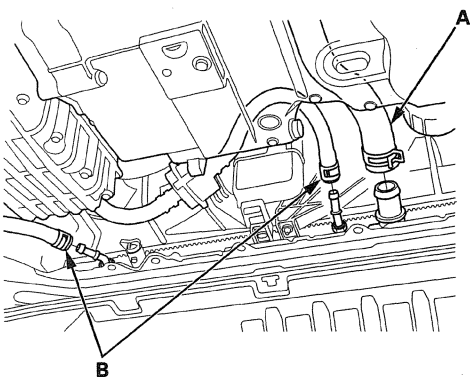
Cooling System

Radiator Replacement

1. Raise the vehicle on the lift.
2. Drain the engine coolant (see page 10-8).
3. Remove the splash shield (see page 20-163).
4. Disconnect the ECT sensor 2 connector (A), and remove the A/C compressor clutch connector (B) from the clamp.

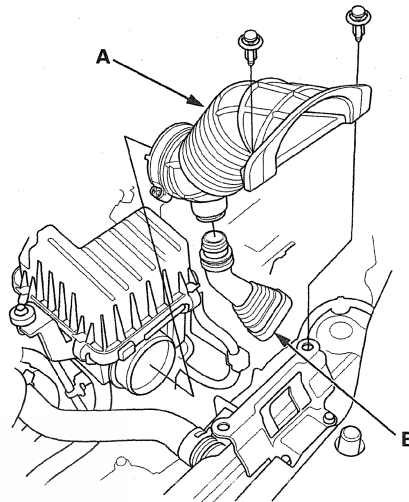


5. Remove the harness clamps (C).
6. Disconnect the lower radiator hose (A).

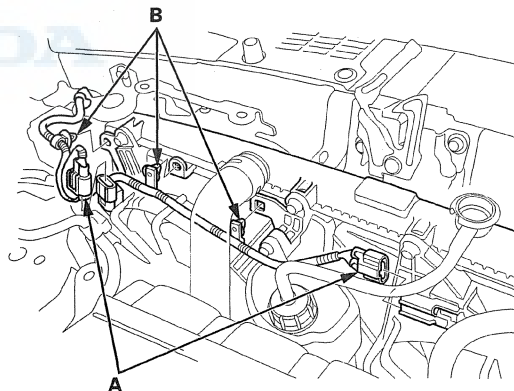


7. CVT model: Disconnect the CVTF cooler hoses (B), then plug the CVTF cooler hoses and lines.
8. Lower the vehicle on the lift.

9. Remove the intake air tube (A) and the resonator chamber joint (B).

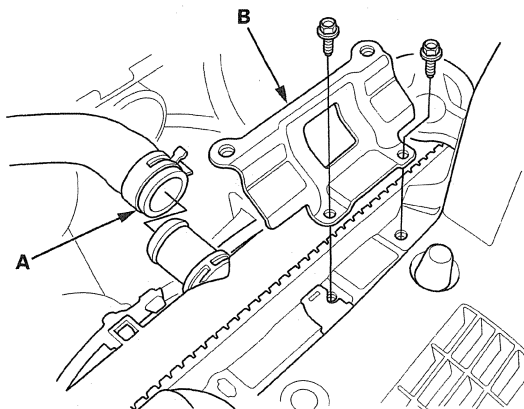


10. Disconnect the fan motor connectors (A), and remove the harness clamps (B).

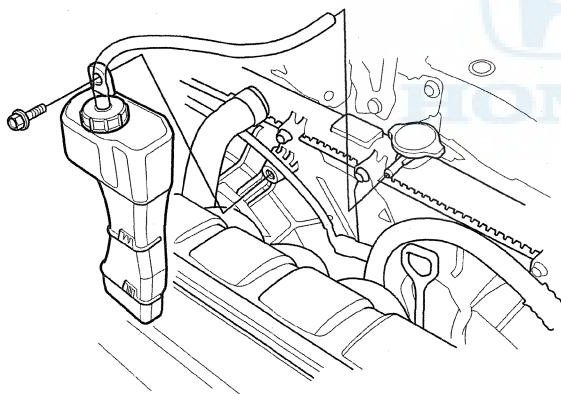




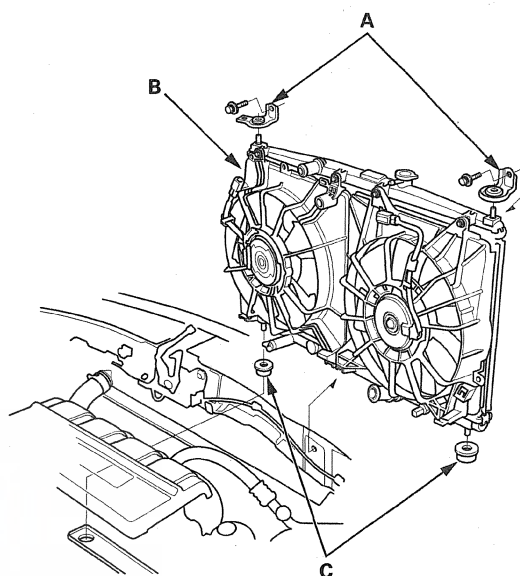
11. Disconnect the upper radiator hose (A), and remove the air intake tube bracket (B).



12. Remove the coolant reservoir.



13. Remove the upper radiator brackets (A), then pull up the radiator assembly (B) with the lower cushions (C).

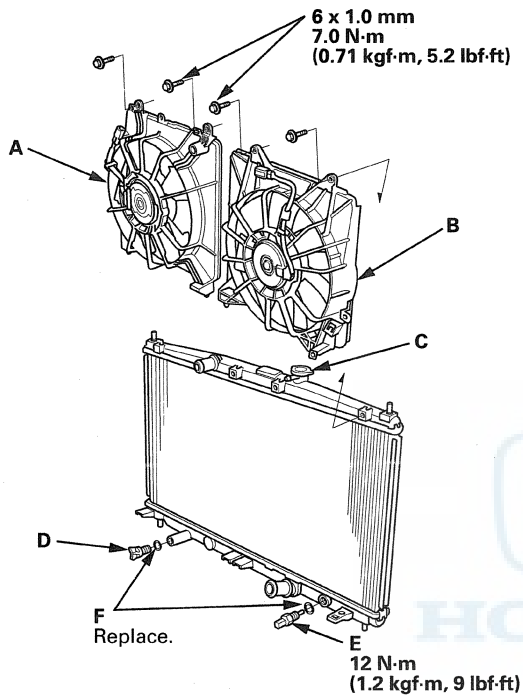


(cont'd)

Cooling System

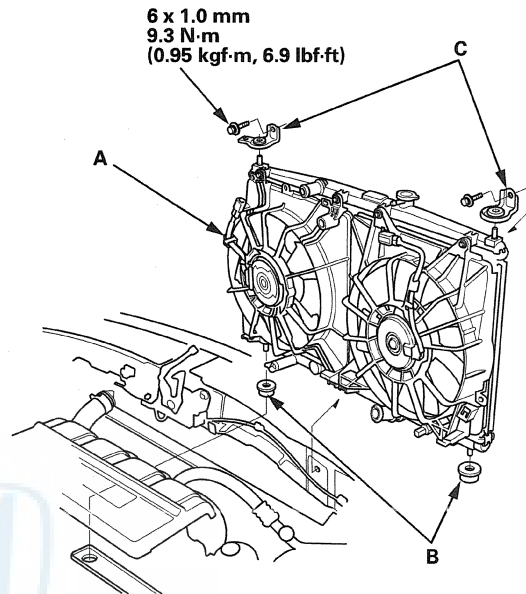
Radiator Replacement (cont'd)

14. Remove the radiator fan shroud assembly (A), the A/C condenser fan shroud assembly (B), the radiator cap (C), the drain plug (D) and ECT sensor 2 (E) (see page 11-206) from the radiator.



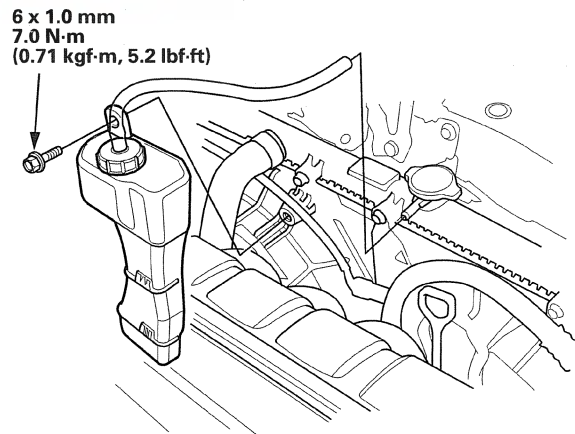
15. Reassemble the radiator with new O-rings (F).

16. Install the radiator assembly (A). Make sure the lower cushions (B) are set securely.



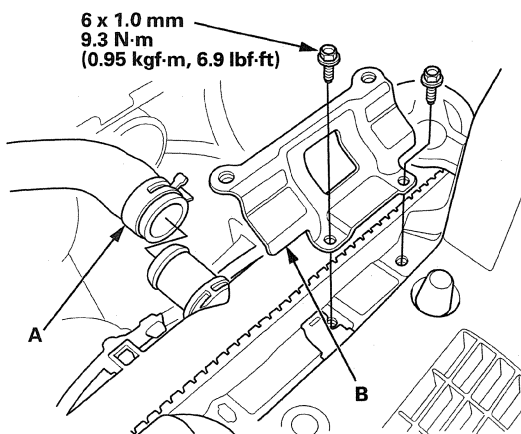
17. Install the upper radiator brackets (C).

18. Install the coolant reservoir.

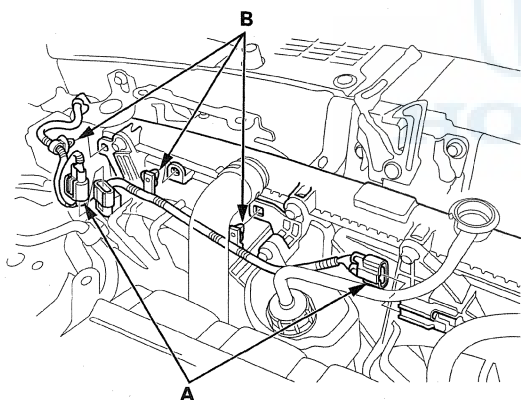




19. Connect the upper radiator hose (A), and install the air intake tube bracket (B).

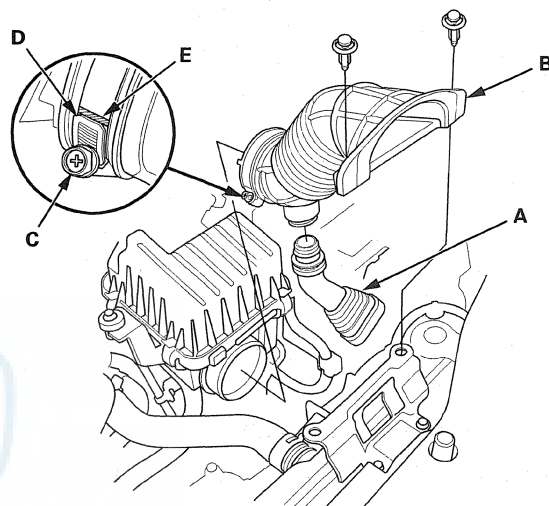


20. Connect the fan motor connectors (A), and install the harness clamps (B).



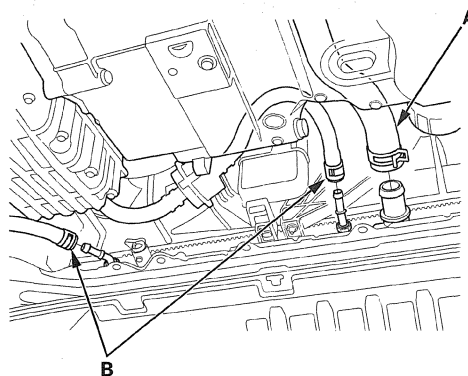
21. Install the resonator chamber joint (A) and the intake air tube (B).

NOTE: When tightening the screw (C) of the hose band, align the edge of the hose band (D) with the mark (E) painted on the hose band. If you tighten the screw over the mark, replace the hose band.



22. Raise the vehicle on the lift.

23. Connect the lower radiator hose (A).



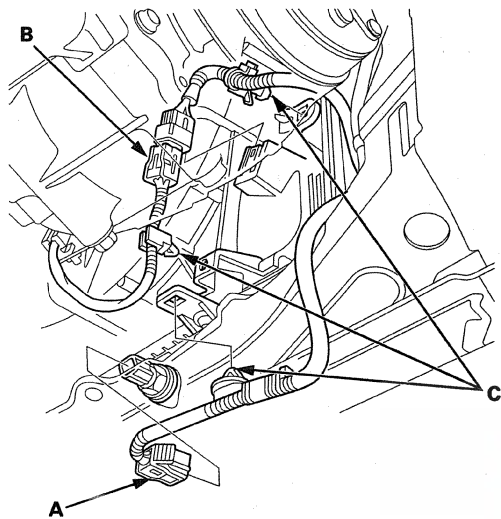
24. CVT model: Connect the CVTF cooler hoses (B).

(cont'd)

Cooling System

Radiator Replacement (cont'd)

25. Connect the ECT sensor 2 connector (A), and install the A/C compressor clutch connector (B) to the clamp.



26. Install the harness clamps (C).
27. Install the splash shield (see page 20-163).
28. Lower the vehicle on the lift.
29. CVT model: Refill the transmission with CVTF (see step 9 on page 14-155).
30. Refill the radiator with engine coolant, and bleed the air from the cooling system (see step 8 on page 10-9).
31. Clean up any spilled engine coolant.