

Engine Mechanical



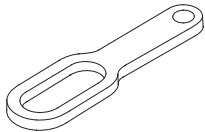
Engine Assembly

Special Tools	5-2
Engine Removal	5-3
Engine Installation	5-13
Side Engine Mount Replacement	5-24
Transmission Mount Replacement	5-29
Lower Torque Rod Replacement	5-32
Upper Torque Rod Replacement	5-34
Side Engine Mount Bracket Replacement	5-35
Front Engine Mount Replacement	5-40

Engine Assembly

Special Tools

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



①



Engine Removal

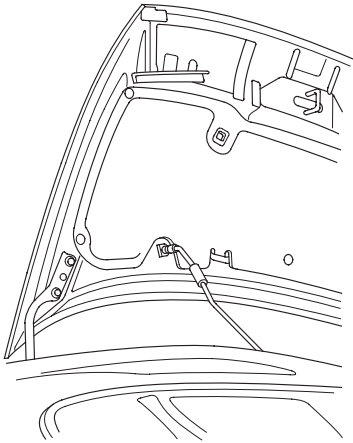
Special Tools Required

- Engine hanger adapter VSB02C000015 *
 - Engine support hanger, A and Reds AAR-T1256 *
 - 2006 Civic engine hanger VSB02C000025 *
 - Front subframe adapter VSB02C000016 *
 - Universal lifting eyelet 07AAK-SNAA120
- * : These special tools are available through Honda Canada Inc. Technical Tools Department; FAX # 866-398-8665/e-mail: ch_technicaltools@ch.honda.com

NOTE:

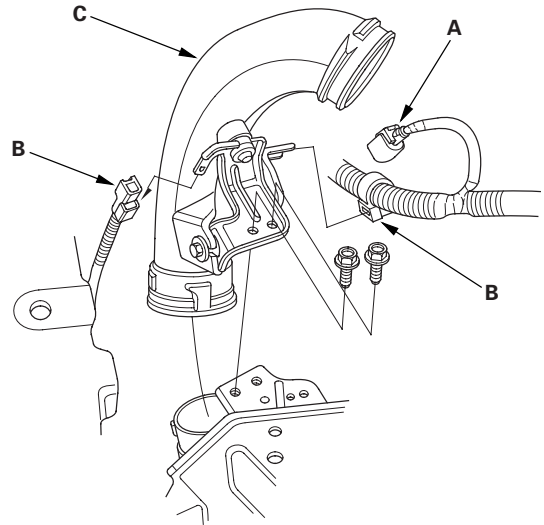
- Use fender covers to avoid damaging painted surfaces.
- To avoid damaging the wire and terminals, unplug the wiring connectors carefully while holding the connector portion.
- Mark all wiring and hoses to avoid misconnection. Also, be sure that they do not contact other wiring or hoses, or interfere with other parts.

1. Secure the hood in the wide open position (support rod in the lower hole).

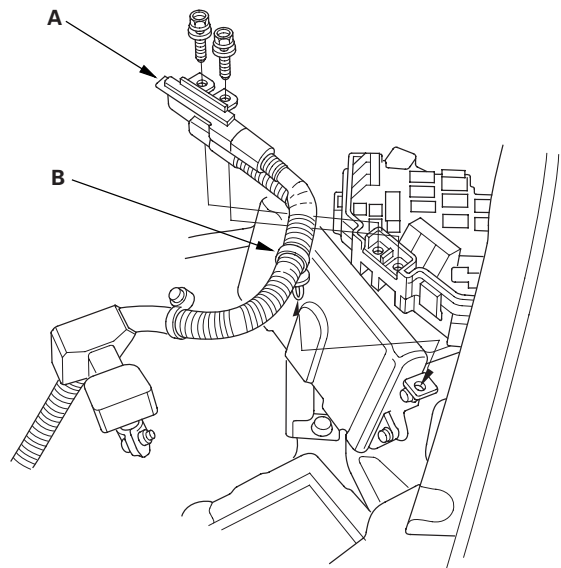


2. Relieve the fuel pressure (see page 11-322).
3. Do the battery removal procedure (see page 22-69).
4. Disconnect the vacuum hose and the breather pipe, then remove the intake air duct (see step 2 on page 9-3).
5. Remove the air cleaner assembly (see page 11-345).
6. Remove the under-cowl panel (see step 4 on page 20-164).

7. Disconnect the connector (A), and remove the harness clamps (B), then remove the pipe (C).



8. Disconnect the battery cables (A) from the under-hood fuse/relay box.



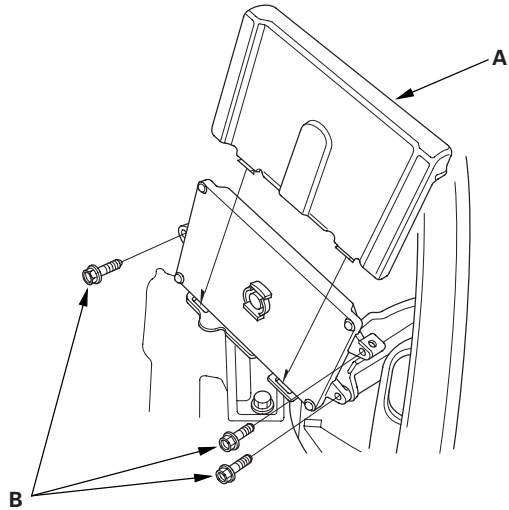
9. Remove the harness clamp (B).

(cont'd)

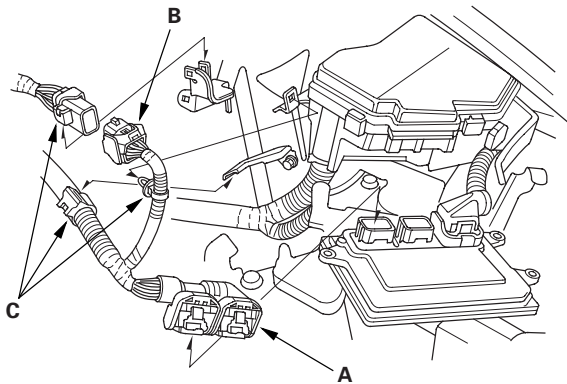
Engine Assembly

Engine Removal (cont'd)

10. Remove the engine control module (ECM)/powertrain control module (PCM) cover (A), then remove the three bolts (B) securing the ECM/PCM.

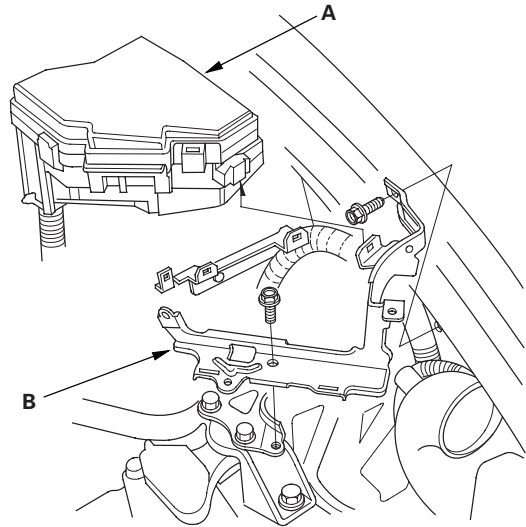


11. Disconnect the ECM/PCM connectors (A) and the engine wire harness connector (B).

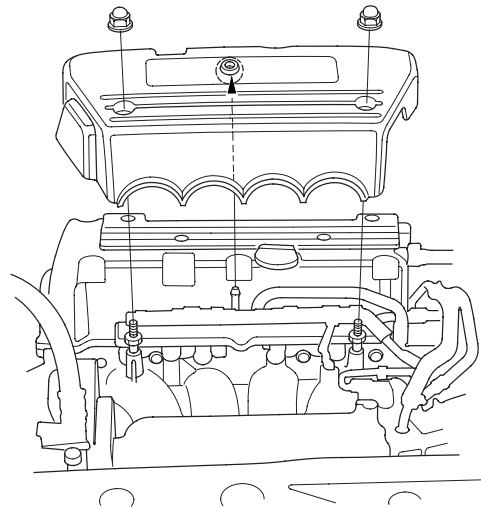


12. Remove the harness clamps (C).

13. Remove the under-hood fuse/relay box (A) from the ECM/PCM bracket (B), then remove the ECM/PCM bracket.

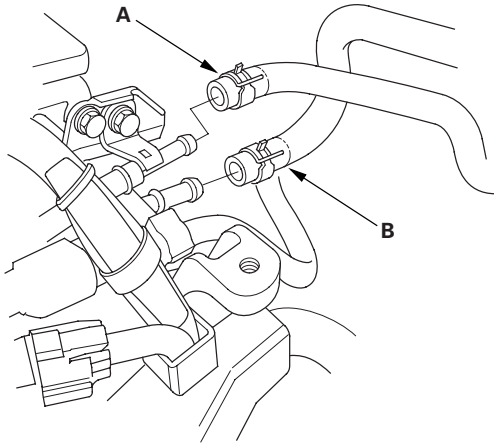


14. K20Z3 engine: Remove the engine cover.

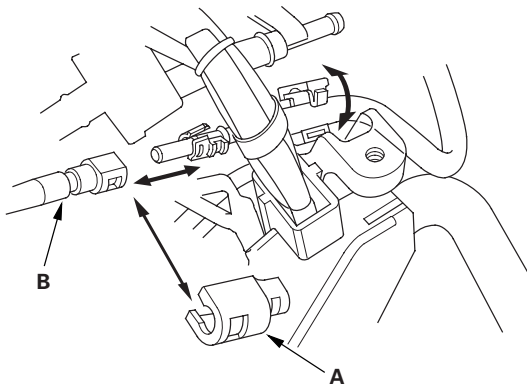




15. Disconnect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).

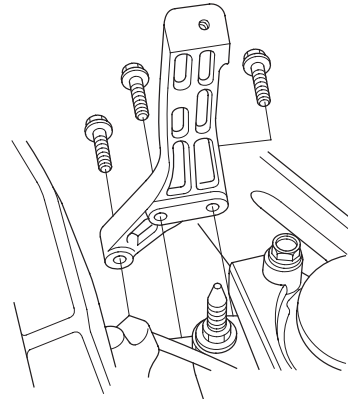


16. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-329).

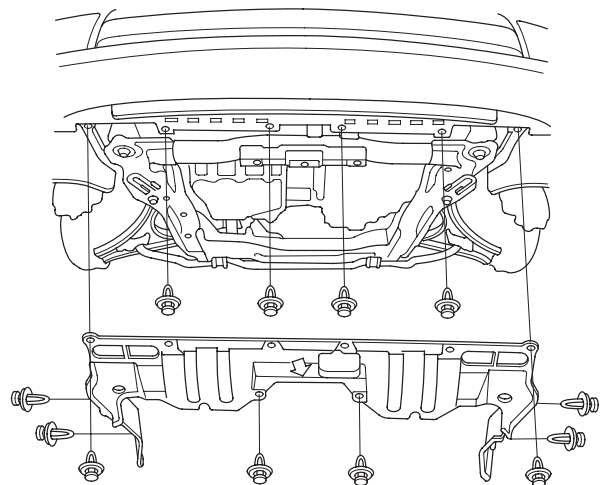


17. M/T model: Remove the shift cables. Do not bend the cables excessively (see step 7 on page 13-8).
18. M/T model: Remove the clutch slave cylinder, and the clutch line bracket mounting bolt (see step 5 on page 13-7).

19. M/T model: Remove the air cleaner bracket.



20. Remove the drive belt (see page 4-31).
21. Remove the idler pulley base (see step 2 on page 4-32).
22. Wait until the engine is cool, then carefully remove the radiator cap.
23. Raise the vehicle on the lift.
24. Remove the front wheels.
25. Remove the splash shield.



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

(cont'd)

Engine Assembly

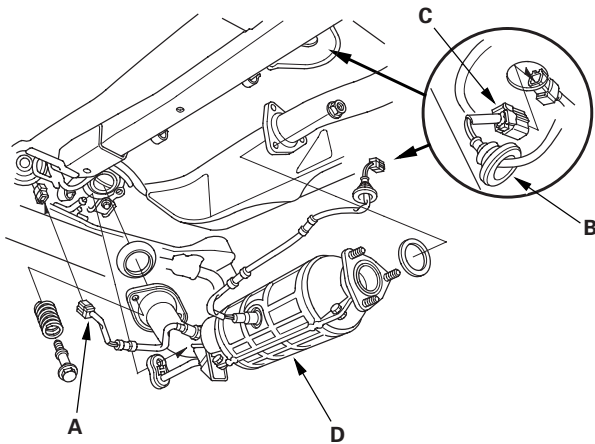
Engine Removal (cont'd)

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

28. Drain the transmission fluid:

- Manual transmission (see step 3 on page 13-5)
- Automatic transmission (see step 3 on page 14-232)

29. Disconnect the air fuel ratio (A/F) sensor connector (A).



30. Remove the grommet (B), then disconnect the secondary heated oxygen sensor (secondary HO2S) connector (C).

31. Remove the three way catalytic converter (TWC) (D).

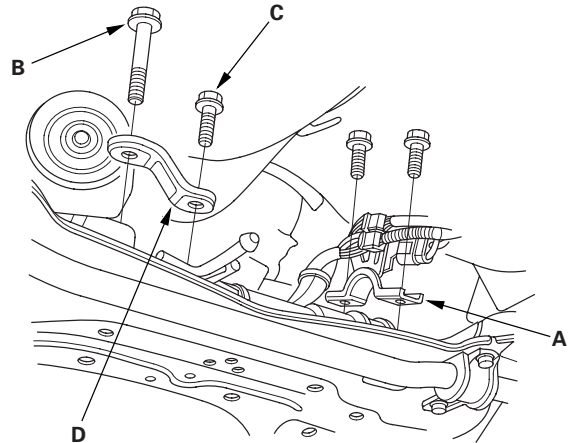
32. A/T model: Remove the shift cable. Do not bend the cables excessively (see step 39 on page 14-239).

33. Separate the stabilizer links (see page 18-25).

34. Separate the knuckles from the lower arms (see step 6 on page 18-21).

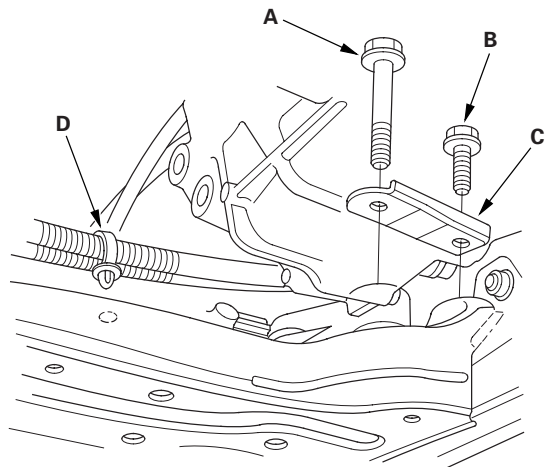
35. Remove the driveshafts (see page 16-4). Coat all precision-finished surfaces with new engine oil. Tie plastic bags over the driveshaft ends.

36. Remove the steering gearbox bracket (A).



37. Remove the steering gearbox mounting bolt (B), the stiffener mounting bolt (C), and the stiffener (D).

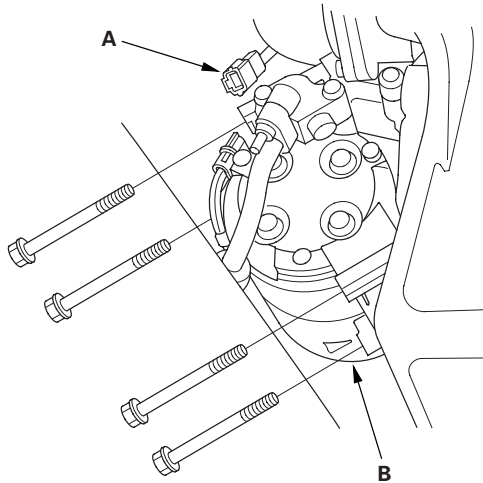
38. Remove the steering gearbox mounting bolt (A), the stiffener mounting bolt (B), and the stiffener (C).



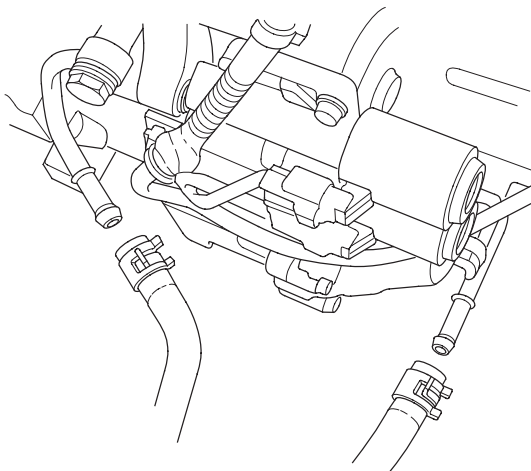
39. Remove the harness clamp (D) from the subframe.



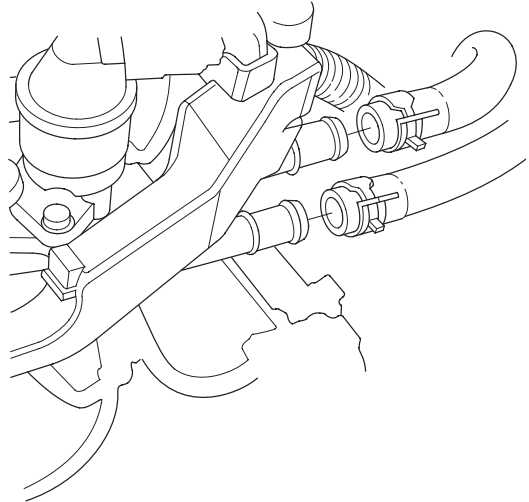
40. Disconnect the A/C compressor clutch connector (A), then remove the A/C compressor (B) without disconnecting the A/C hoses.



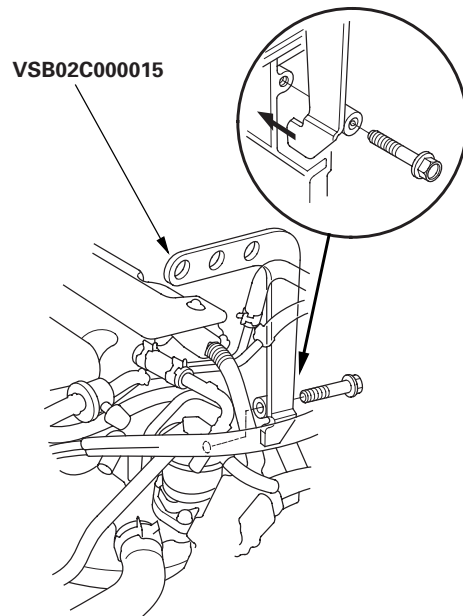
41. Lower the vehicle on the lift.
42. Remove the radiator (see page 10-19).
43. A/T model: Disconnect the automatic transmission fluid (ATF) cooler hoses from the transmission, then plug the lines and hoses.



44. Disconnect the heater hoses.



45. Install the bulkhead (see step 13 on page 10-21).
46. Attach the engine hanger adapter (VSB02C000015) to the threaded hole in the cylinder head.



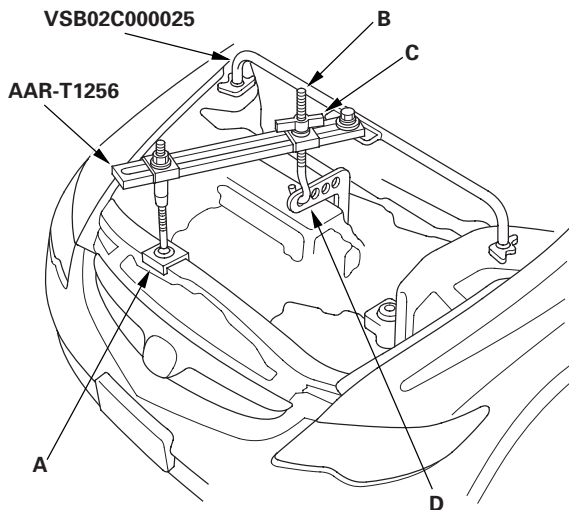
(cont'd)

Engine Assembly

Engine Removal (cont'd)

47. Install the front leg assembly (A), the hook (B), and the wing nut (C) to an A and Reds engine support hanger (AAR-T1256) onto the 2006 civic engine hanger (VSB02C000025). Carefully position the engine hanger on the vehicle, and attach the hook to the forward hole in the engine hanger adapter (D). Tighten the wing nut by hand to lift and support the engine/transmission.

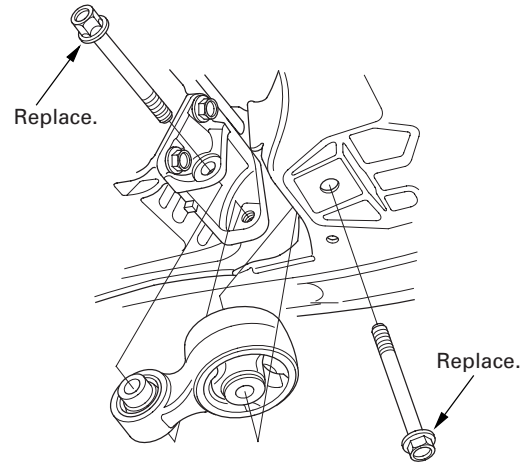
NOTE: Be careful when working around the windshield.



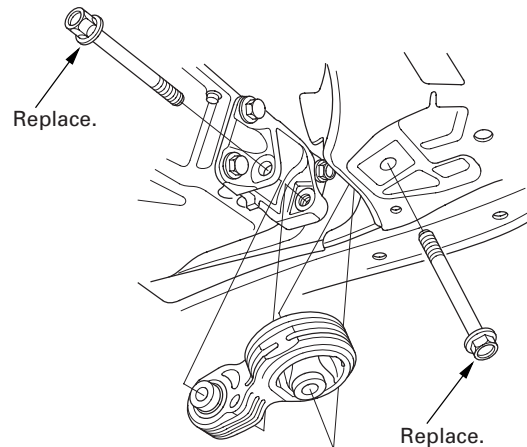
48. Raise the vehicle on the lift.

49. Remove the lower torque rod.

M/T model

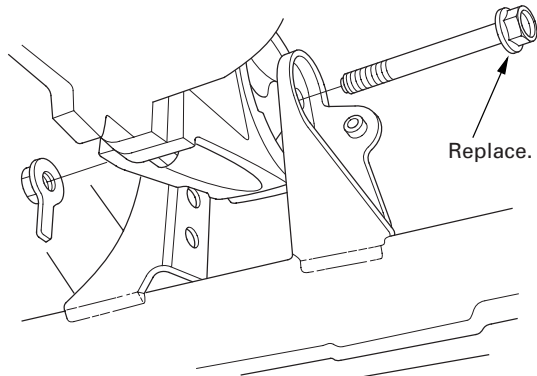


A/T model

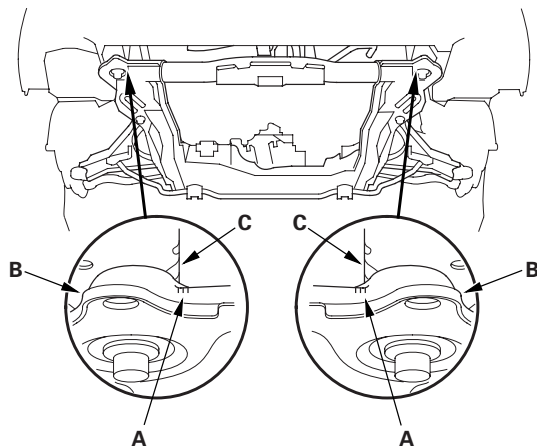




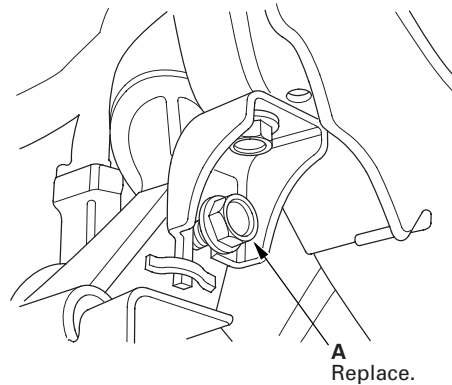
50. M/T model: Remove the front mount mounting bolt.



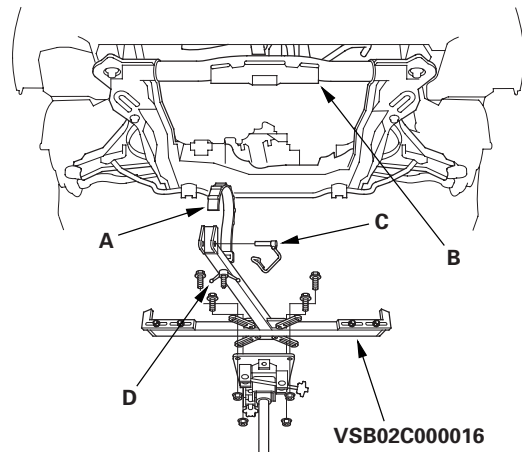
51. Make appropriate reference lines (A) at both sides of the front subframe (B) that line up with the edges (C) on the body.



52. Loosen the mid-stiffener mounting bolts (A) on both sides.



53. Attach the front subframe adapter (VSB02C000016) to the subframe, and hang the belt (A) of the front subframe adapter over the front of the subframe (B). Secure the belt with its stop (C), then tighten the wing nut (D).



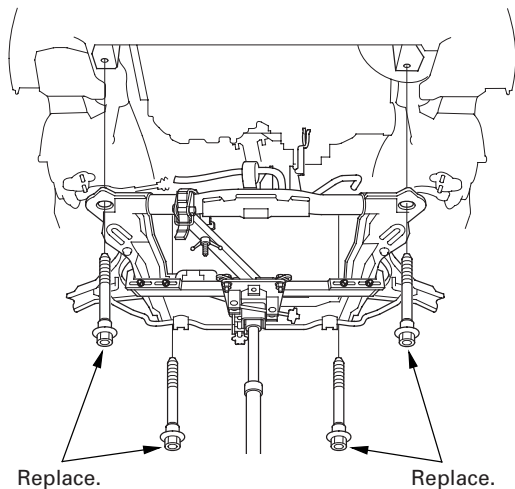
54. Raise the jack, and line up the slots in the front subframe adapter arms with the bolt holes on the jack base, then securely attach them with four bolts.

(cont'd)

Engine Assembly

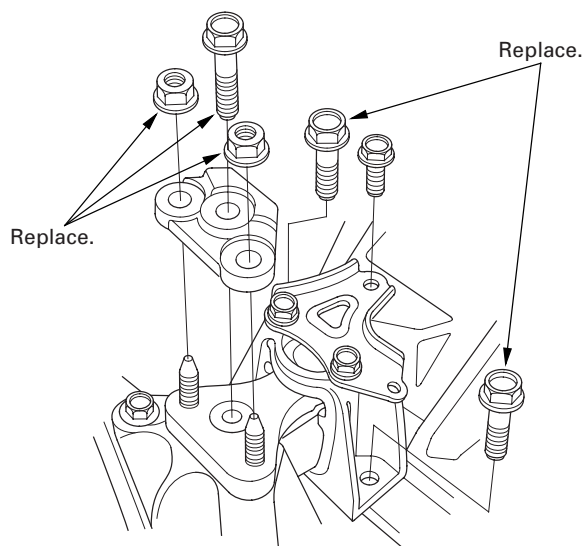
Engine Removal (cont'd)

55. Remove the front subframe.

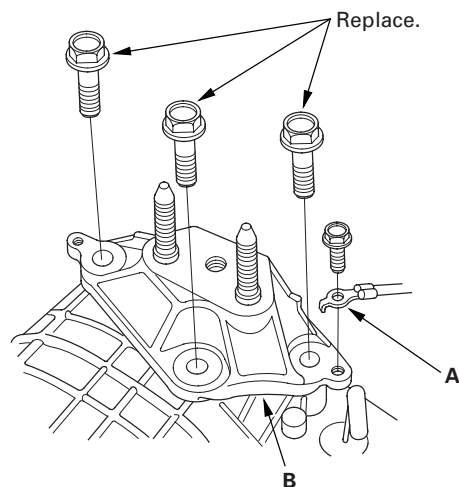


56. Lower the vehicle on the lift.

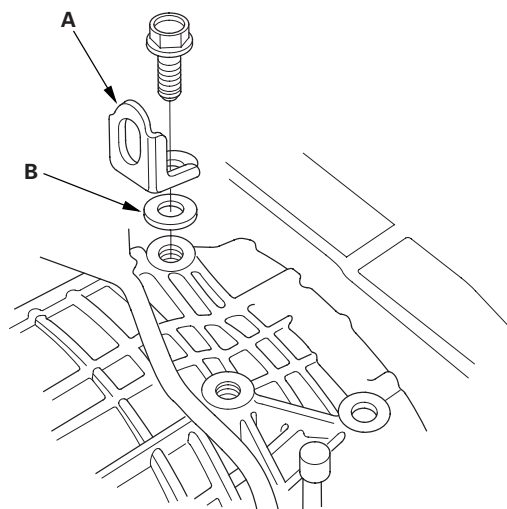
57. A/T model: Remove the transmission mount.



58. A/T model: Remove the ground cable (A), then remove the transmission mount bracket (B).

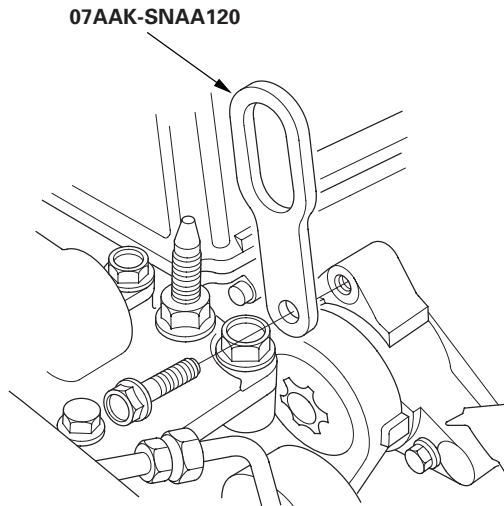


59. A/T model: Install the transmission hanger bracket (P/N 21232-RCT-A00) (A) and a washer (B) on the transmission.

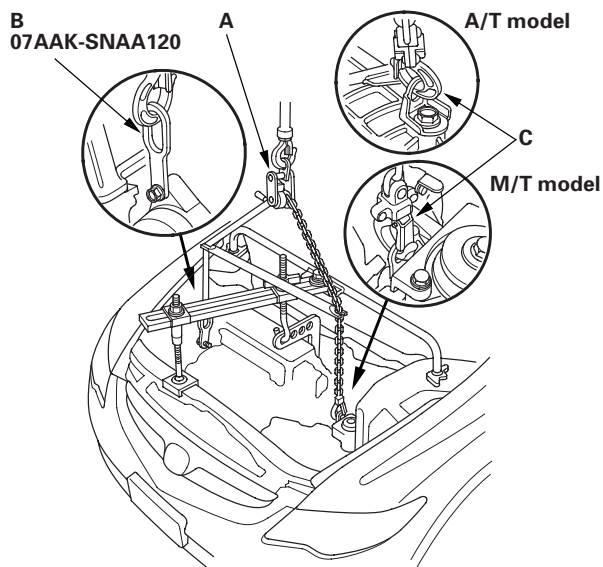




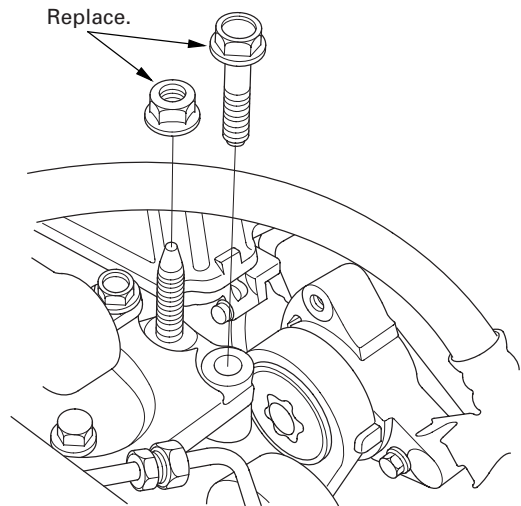
60. Install the universal lifting eyelet (07AAK-SNAA120).



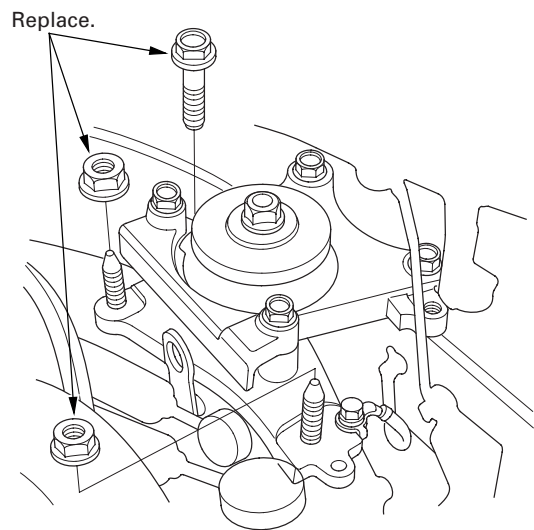
61. Attach a chain hoist (A) to the universal lifting eyelet (B) and the transmission hook (C), then lift the engine/transmission until it's securely supported by the chain hoist, and remove the engine hanger.



62. Remove the side engine mount bracket mounting bolt and nut.



63. M/T model: Remove the transmission mount bracket mounting bolt and nuts.



(cont'd)

Engine Assembly

Engine Removal (cont'd)

64. Check that the engine/transmission is completely free of vacuum hoses, fuel and coolant hoses, and electrical wiring.
65. Slowly lower the engine/transmission about 150 mm (6 in.). Check once again that all hoses and electrical wiring are disconnected and free from the engine/transmission, then lower it all the way.
66. Disconnect the chain hoist from the engine/transmission.
67. Raise the vehicle on the lift, then remove the engine/transmission from under the vehicle.



Engine Installation

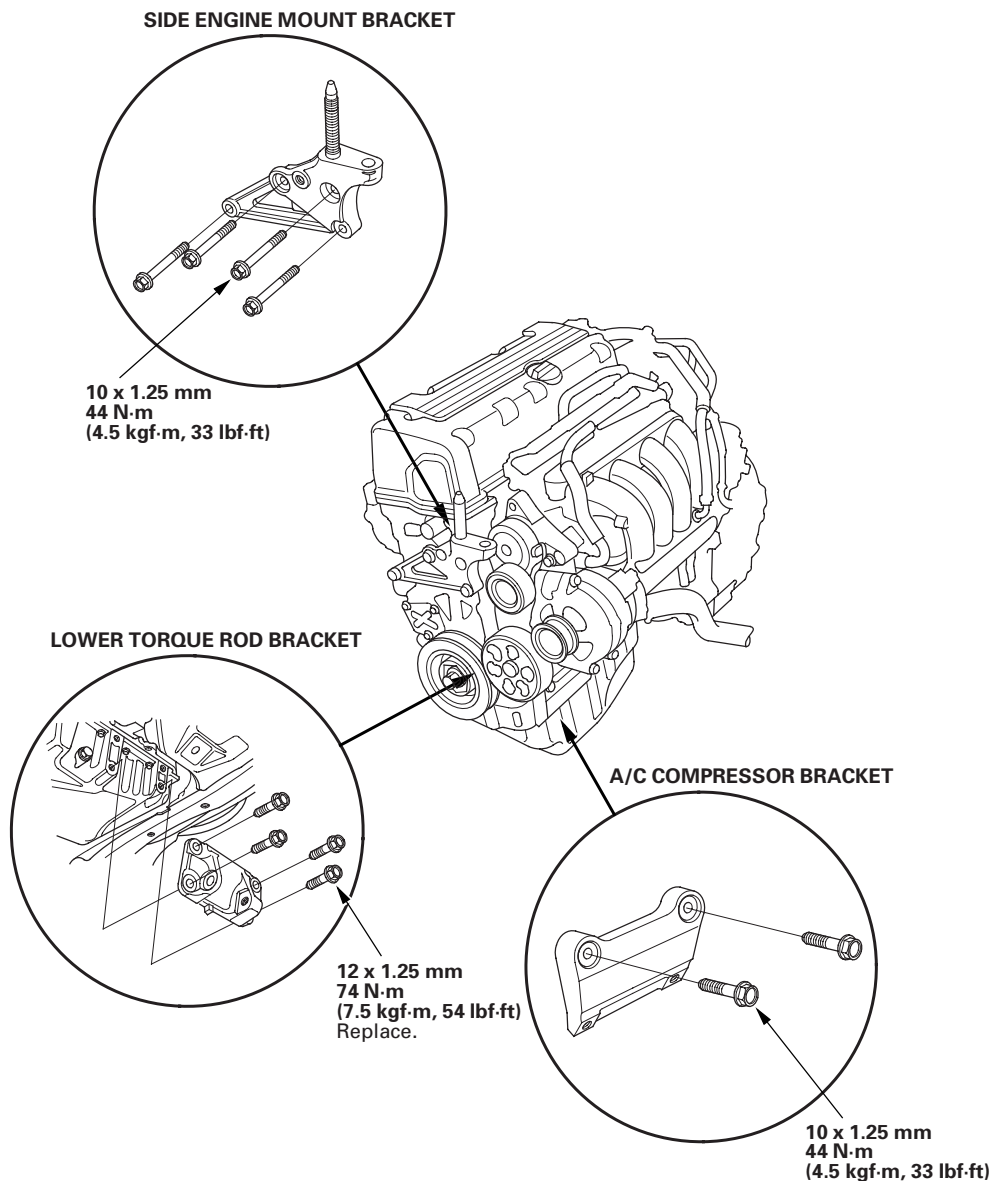
Special Tools Required

- Universal lifting eyelet 07AAK-SNAA120
- Engine hanger adapter VSB02C000015 *
- Engine support hanger, A and Reds AAR-T1256 *
- 2006 Civic engine hanger VSB02C000025 *
- Front subframe adapter VSB02C000016 *

* : These special tools are available through Honda Canada Inc. Technical Tools Department; FAX # 866-398-8665/
e-mail: ch_technicaltools@ch.honda.com

1. Install the engine mount brackets and the accessory brackets, then tighten their bolts to the specified torque.

K20Z2 engine

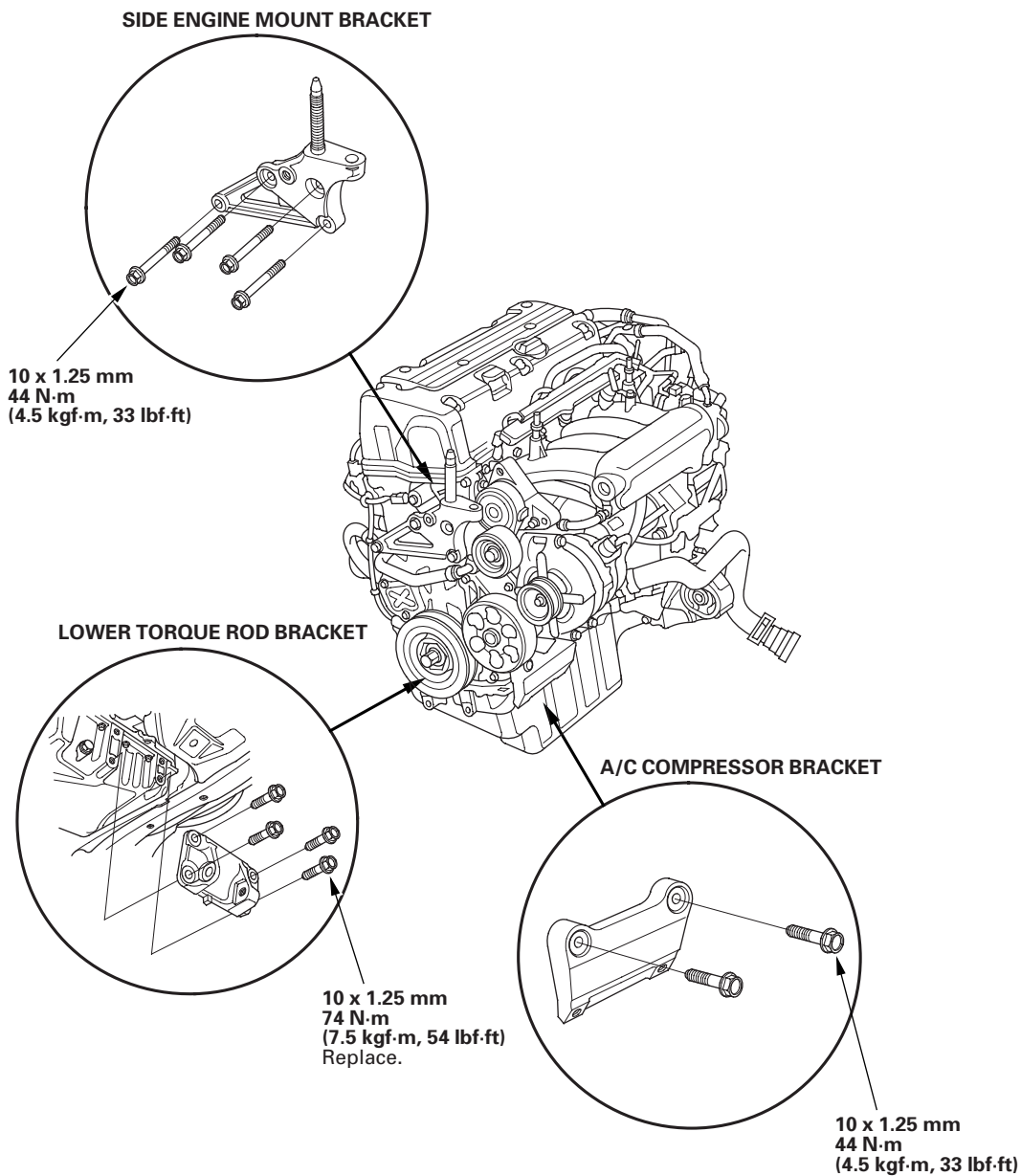


(cont'd)

Engine Assembly

Engine Installation (cont'd)

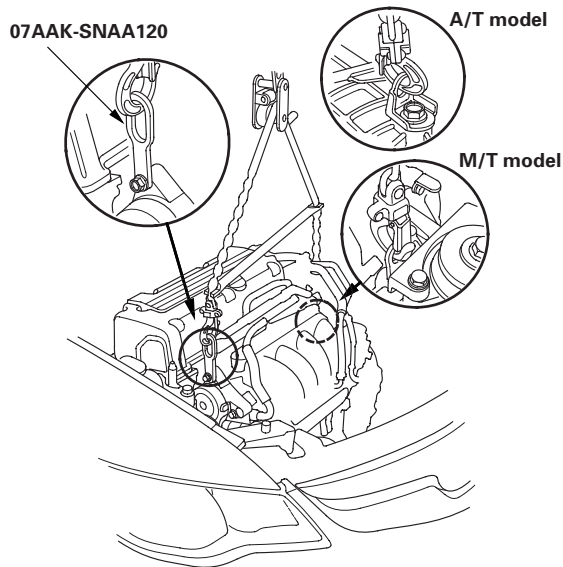
K20Z3 engine



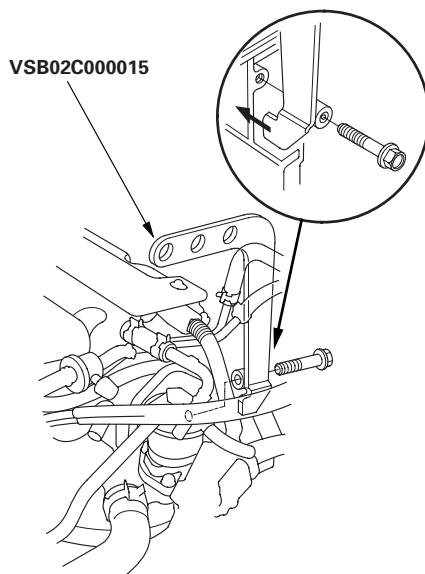


2. Raise the vehicle on the lift, and position the engine/transmission under the vehicle. Lower the vehicle, and install the universal lifting eyelet (07AAK-SNAA120). Attach a chain hoist to the universal eyelet and the transmission hook, then lift the engine into position in the vehicle.

NOTE: Reinstall the mounting bolts/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.

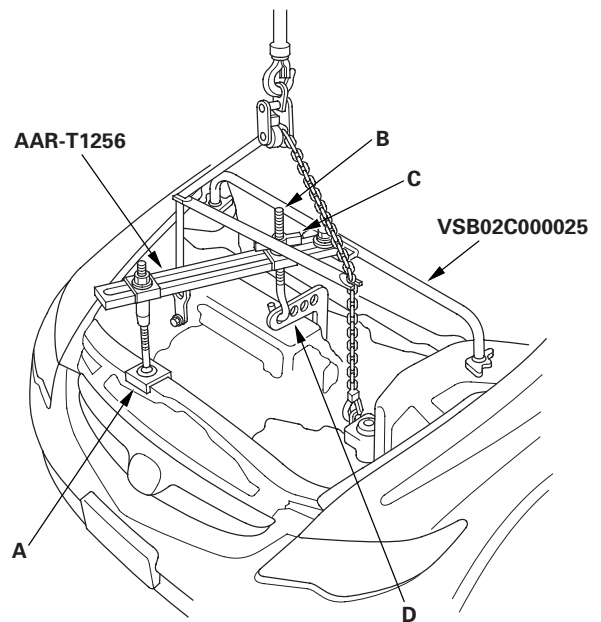


3. Attach the engine hanger adapter (VSB02C000015) to the threaded hole in the cylinder head.

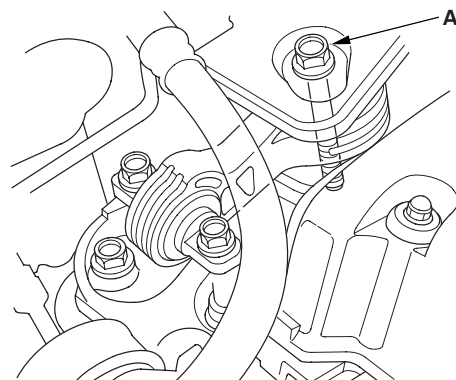


4. Install the front leg assembly (A), the hook (B), and the wing nut (C) to an A and Reds engine support hanger (AAR-T1256) onto the 2006 civic engine hanger (VSB02C000025). Carefully position the engine hanger on the vehicle, and attach the hook to the forward hole in the engine hanger adapter (D). Tighten the wing nut by hand to lift and support the engine/transmission.

NOTE: Be careful when working around the windshield.



5. Loosen the upper torque rod mounting bolt (A).



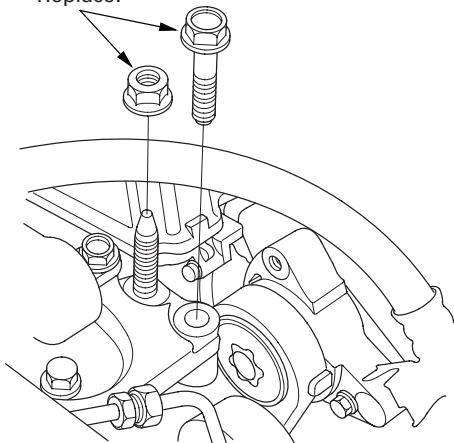
(cont'd)

Engine Assembly

Engine Installation (cont'd)

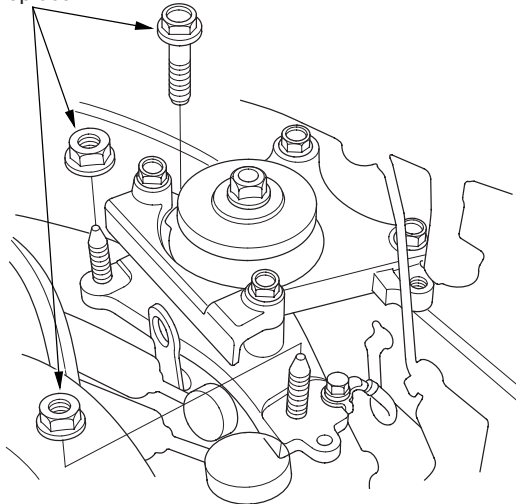
6. Tighten the new side engine mount bracket mounting bolt and nut.

14 x 1.5 mm
74 N·m (7.5 kgf·m, 54 lbf·ft)
Replace.



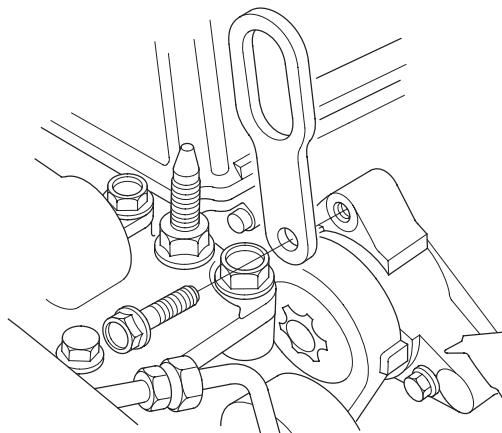
7. M/T model: Tighten the new transmission mounting bolt and nuts.

12 x 1.25 mm
74 N·m (7.5 kgf·m, 54 lbf·ft)
Replace.

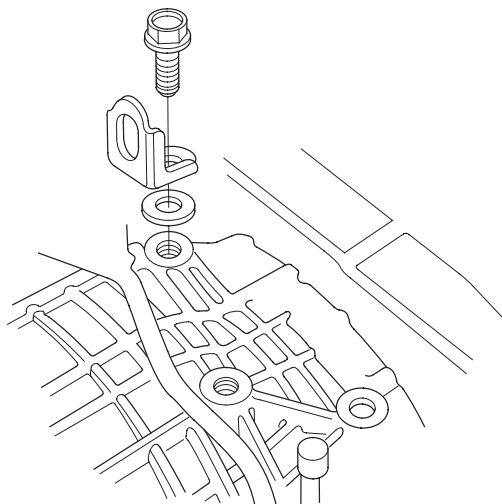


8. Remove the chain hoist.

9. Remove the universal lifting eyelet.

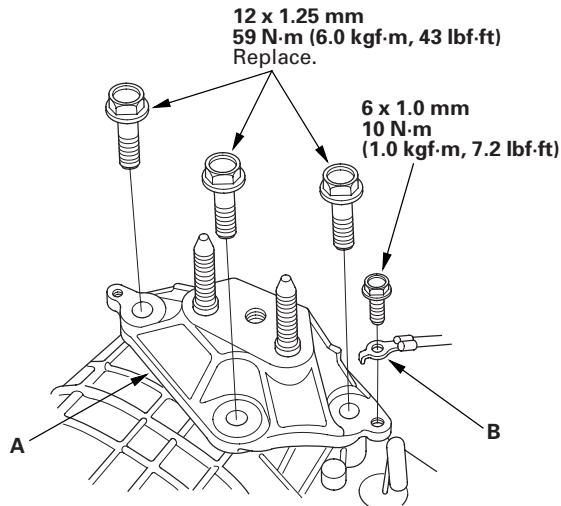


10. A/T model: Remove the transmission hanger bracket (P/N 21232-RCT-A00).

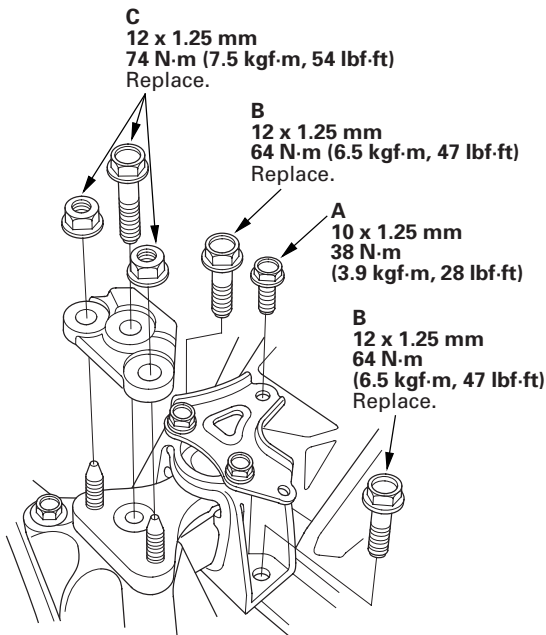




11. A/T model: Install the transmission mount bracket (A), then install the ground cable (B).



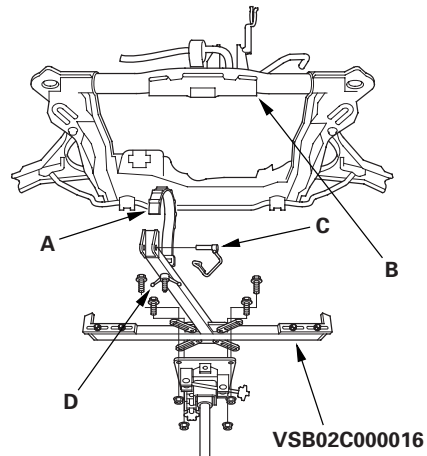
12. A/T model: Install the transmission mount, then tighten the transmission mount stiffener mounting bolt (A) and the new transmission mount mounting bolts (B).



13. A/T model: Tighten the new transmission mounting bolt and nuts (C).

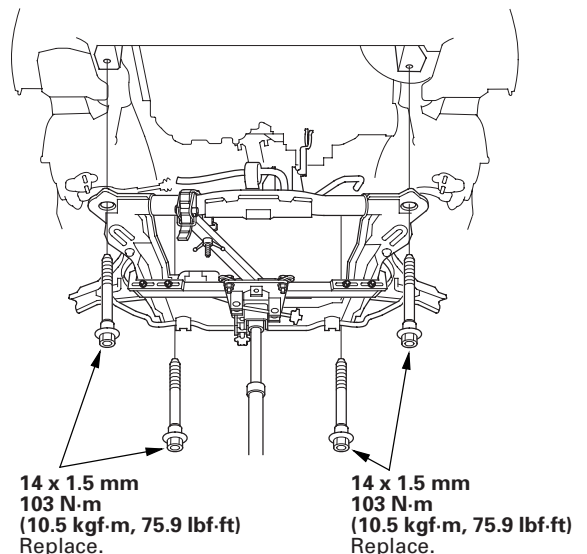
14. Raise the vehicle on the lift.

15. Attach the front subframe adapter (VSB02C000016) to the front subframe, and hang the belt (A) of the front subframe adapter over the front of the subframe (B). Secure the belt with its stop (C), then tighten the wing nut (D).



16. Line up the slots in the front subframe adapter arms with the bolt holes on the corner of the jack base, then securely attach them with four bolts. Lift the subframe up to the body.

17. Loosely install the new front subframe mounting bolts.

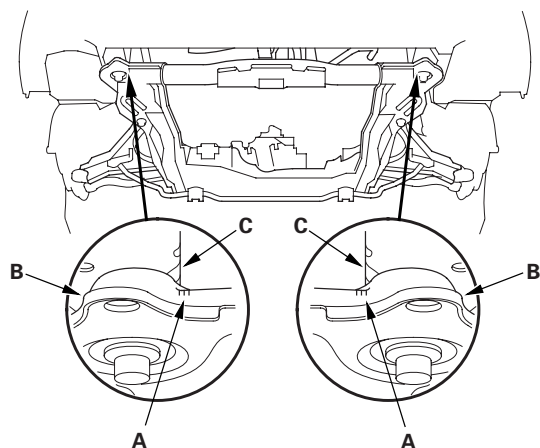


(cont'd)

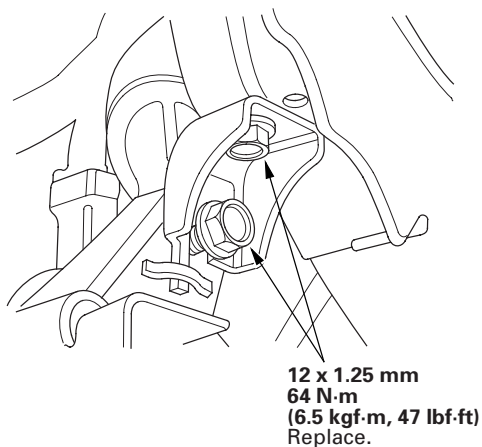
Engine Assembly

Engine Installation (cont'd)

18. Align all reference marks (A) on the front subframe (B) with the edges of the body (C), then tighten the bolts on the front subframe to the specified torque.

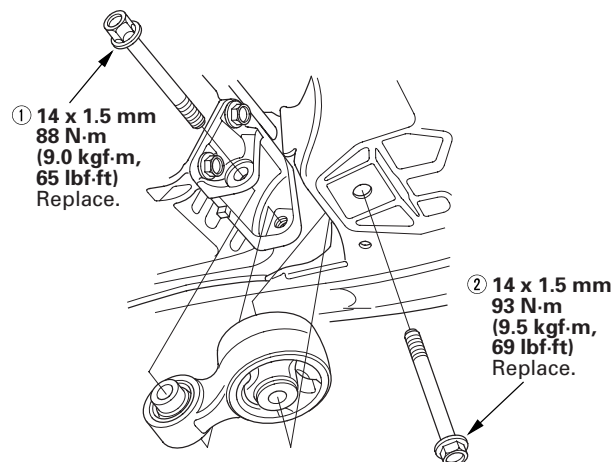


19. Remove the jack and the front subframe adapter.
20. Tighten the new mid-stiffener mounting bolts on both side.

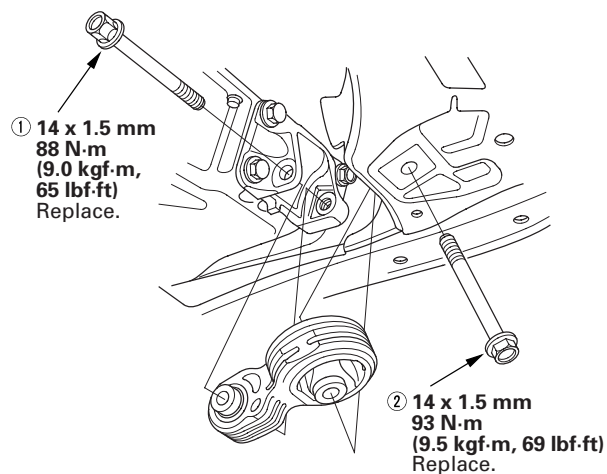


21. Install the lower torque rod, then tighten the new lower torque rod mounting bolts in the numbered sequence shown.

M/T model

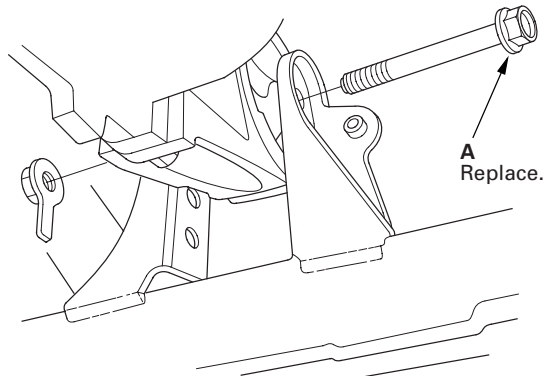


A/T model

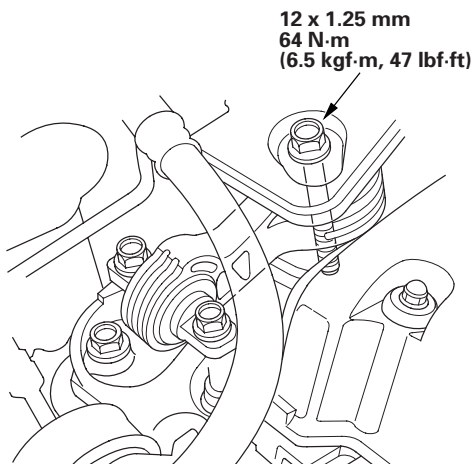




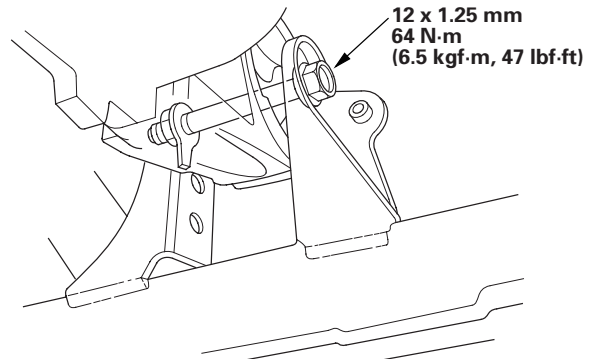
22. M/T model: Loosely tighten the new front mount mounting bolt (A).



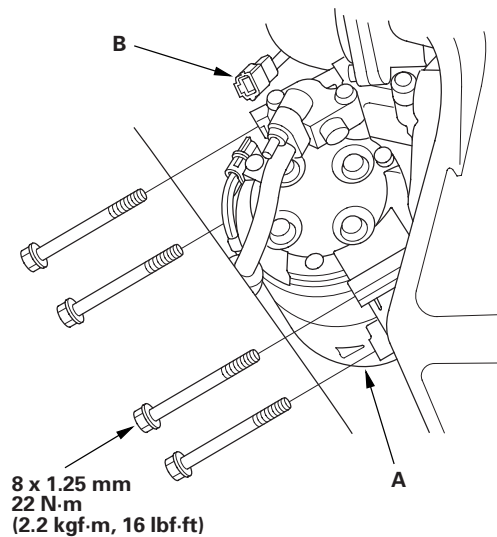
23. Lower the vehicle on the lift.
24. Remove the engine support hanger and the engine hanger adapter from the engine and the vehicle.
25. Tighten the upper torque rod mounting bolt.



26. Raise the vehicle on the lift.
27. M/T model: Tighten the front mount mounting bolt.



28. Install the A/C compressor (A), then connect the A/C compressor clutch connector (B).

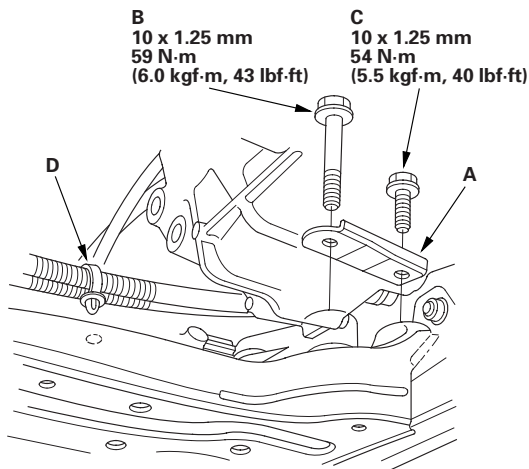


(cont'd)

Engine Assembly

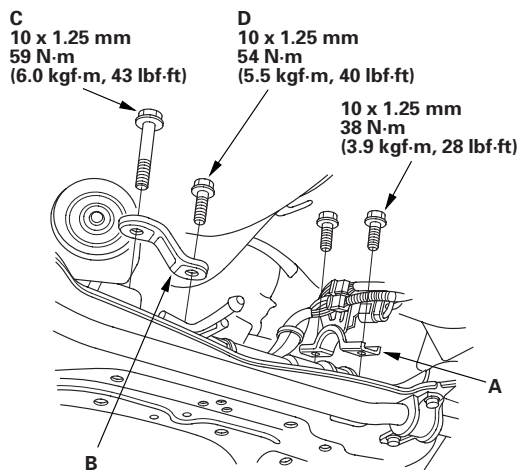
Engine Installation (cont'd)

29. Install the stiffener (A), then tighten the steering gearbox mounting bolt (B) and the stiffener mounting bolt (C).



30. Install the harness clamp (D) to the subframe.

31. Install the steering gearbox bracket (A).



32. Install the stiffener (B), then tighten the steering gearbox mounting bolt (C) and the stiffener mounting bolt (D).

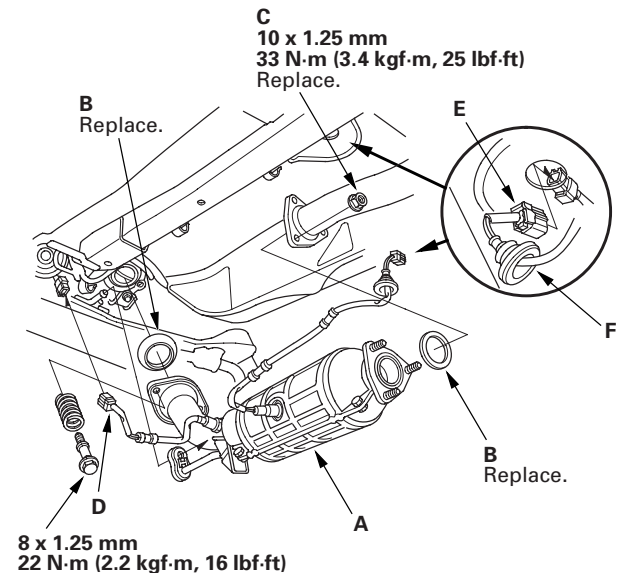
33. A/T model: Install the shift cable (see step 19 on page 14-245).

34. Install a new set ring on the end of each driveshaft, then install the driveshafts (see page 16-20). Make sure each ring "clicks" into place in the differential and the intermediate shaft.

35. Connect the lower arms to the knuckles (see step 9 on page 18-16).

36. Connect the stabilizer links (see page 18-25).

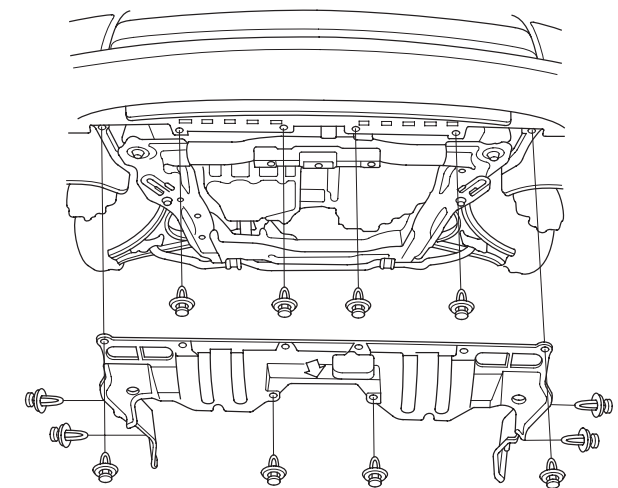
37. Install the three way catalytic converter (TWC) (A). Use the new gaskets (B) and the new self-locking nuts (C).



38. Connect the air fuel ratio (A/F) sensor connector (D).

39. Connect the secondary heated oxygen sensor (secondary HO2S) connector (E), then install the grommet (F).

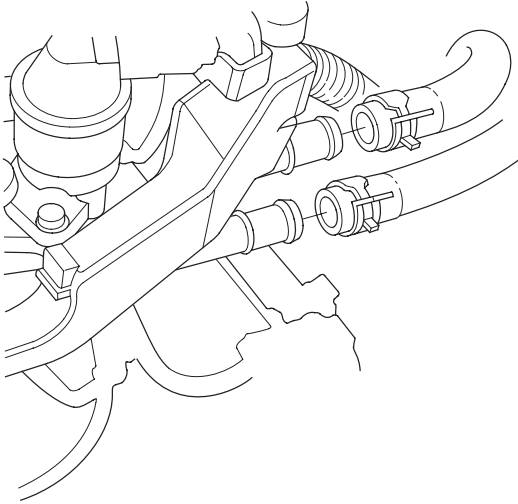
40. Install the splash shield.



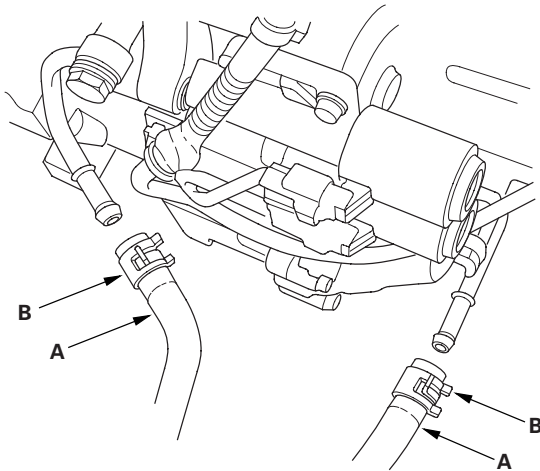


41. Lower the vehicle on the lift.

42. Connect the heater hoses.



43. A/T model: Connect the automatic transmission fluid (ATF) cooler hoses (A) to the transmission, and secure the hoses with the clips (B) (see page 14-253).



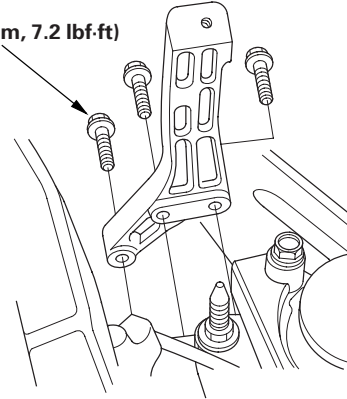
44. Remove the bulkhead, then install the radiator (see page 10-19).

45. Install the idler pulley base (see step 2 on page 4-34).

46. Install the drive belt (see page 4-31).

47. M/T model: Install the air cleaner bracket.

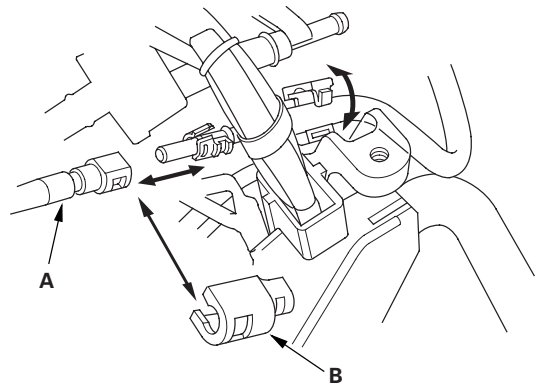
6 x 1.0 mm
10 N·m
(1.0 kgf·m, 7.2 lbf·ft)



48. M/T model: Install the shift cables (see step 37 on page 13-20).

49. M/T model: Install the clutch slave cylinder and the clutch line bracket mounting bolt (see step 40 on page 13-21).

50. Connect the fuel feed hose (A) (see page 11-331), then install the quick-connect fitting cover (B).

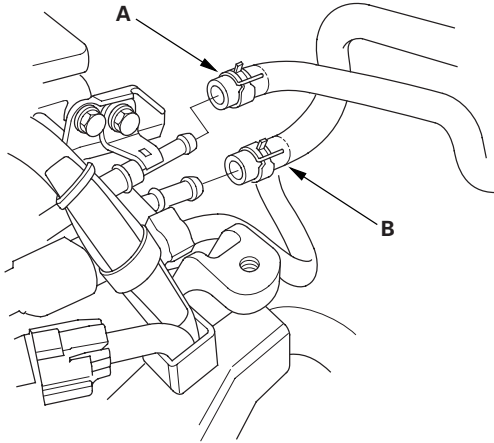


(cont'd)

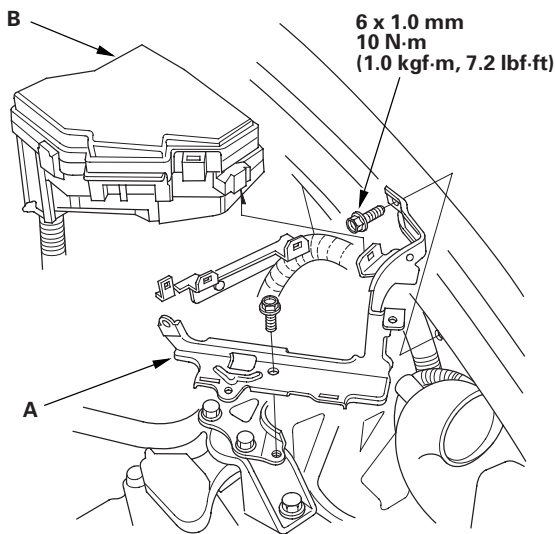
Engine Assembly

Engine Installation (cont'd)

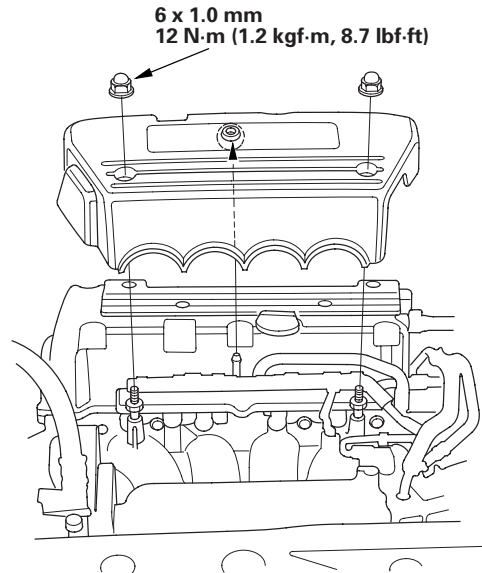
51. Connect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).



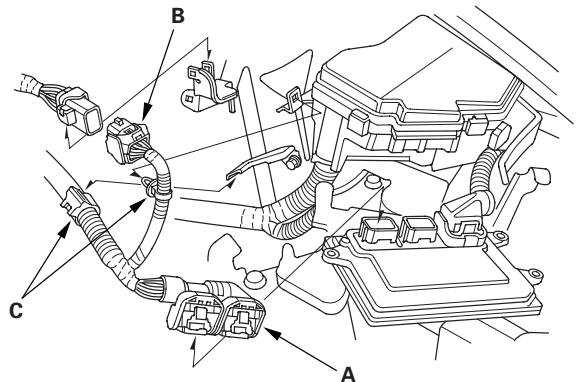
52. Install the engine control module (ECM)/powertrain control module (PCM) bracket (A), then install the under-hood fuse/relay box (B) to the ECM/PCM bracket.



53. K20Z3 engine: Install the engine cover.



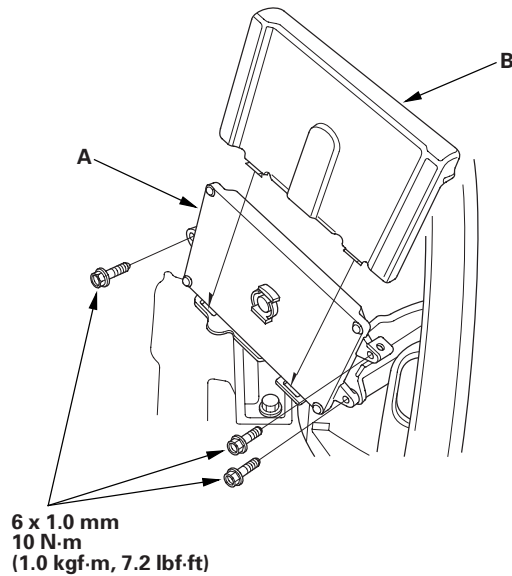
54. Connect the ECM/PCM connectors (A) and the engine wire harness connector (B).



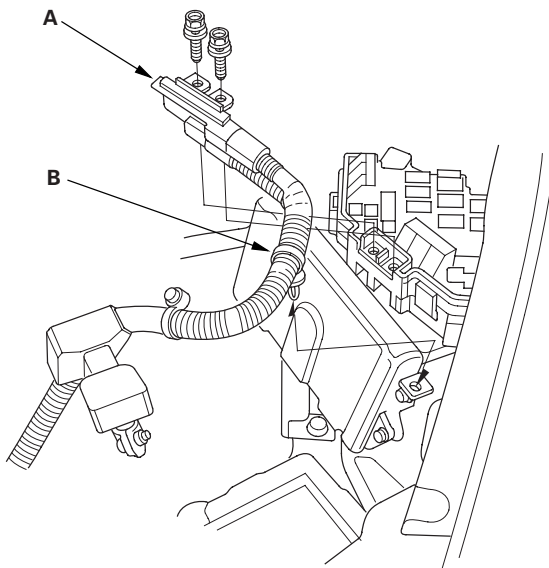
55. Install the harness clamps (C).



56. Install the ECM/PCM (A), then install the ECM/PCM cover (B).

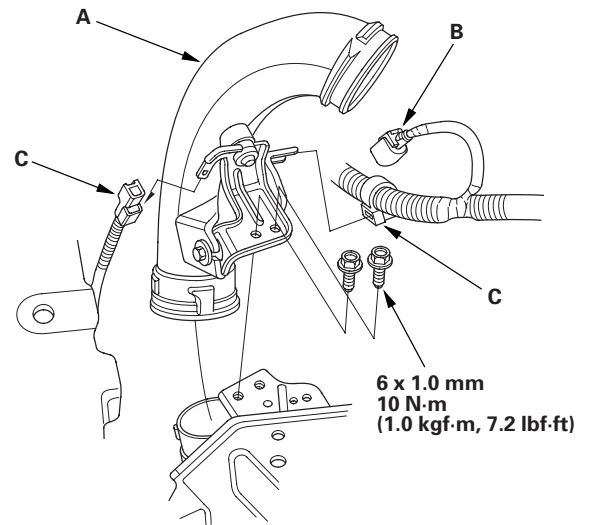


57. Connect the battery cables (A) to the under-hood fuse/relay box.



58. Install the harness clamp (B).

59. Install the pipe (A).



60. Connect the connector (B), and install the harness clamps (C).

61. Install the under cowl-panel (see step 4 on page 20-164).

62. Install the air cleaner assembly (see page 11-345).

63. Install the front wheels.

64. Do the battery installation procedure (see page 22-69).

65. 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.

66. Refill the engine with engine oil (see step 4 on page 8-10).

(cont'd)

Engine Assembly

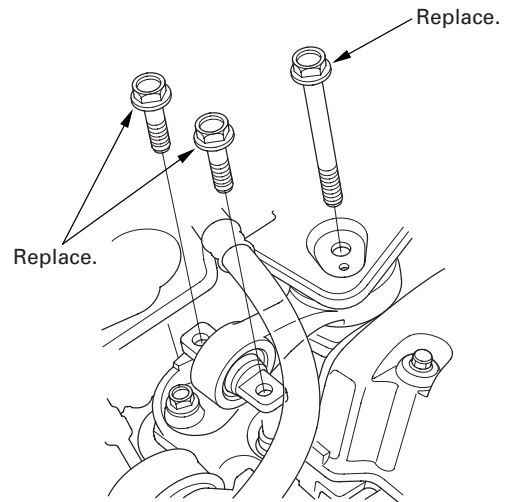
Engine Installation (cont'd)

67. Refill the transmission with fluid:
 - Manual transmission (see step 3 on page 13-5)
 - Automatic transmission (see step 3 on page 14-232)
68. A/T model: Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.
69. M/T model: Check that the transmission shifts into gear smoothly.
70. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).
71. Do the ECM/PCM reset procedure (see page 11-4).
72. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-4).
73. Inspect the idle speed (see page 11-309).
74. Inspect the ignition timing (see page 4-20).
75. Check the wheel alignment (see page 18-5).

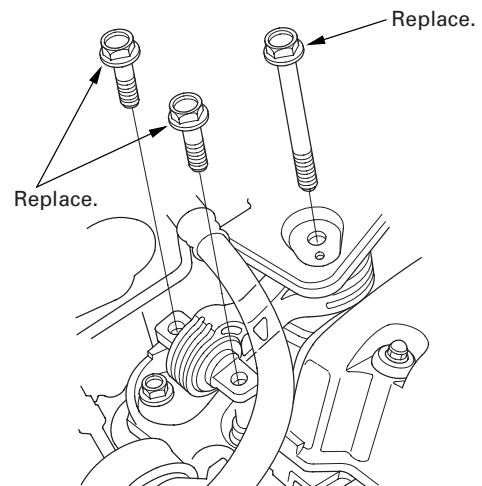
Side Engine Mount Replacement

1. Support the engine with a jack and wood block under the oil pan.
2. Remove the upper torque rod.

M/T model



A/T model



Engine Assembly

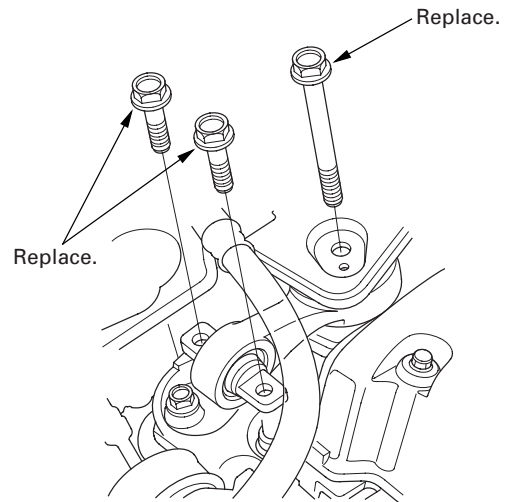
Engine Installation (cont'd)

67. Refill the transmission with fluid:
 - Manual transmission (see step 3 on page 13-5)
 - Automatic transmission (see step 3 on page 14-232)
68. A/T model: Move the shift lever to each gear, and verify that the A/T gear position indicator follows the transmission range switch.
69. M/T model: Check that the transmission shifts into gear smoothly.
70. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).
71. Do the ECM/PCM reset procedure (see page 11-4).
72. Do the crankshaft position (CKP) pattern clear/CKP pattern learn procedure (see page 11-4).
73. Inspect the idle speed (see page 11-309).
74. Inspect the ignition timing (see page 4-20).
75. Check the wheel alignment (see page 18-5).

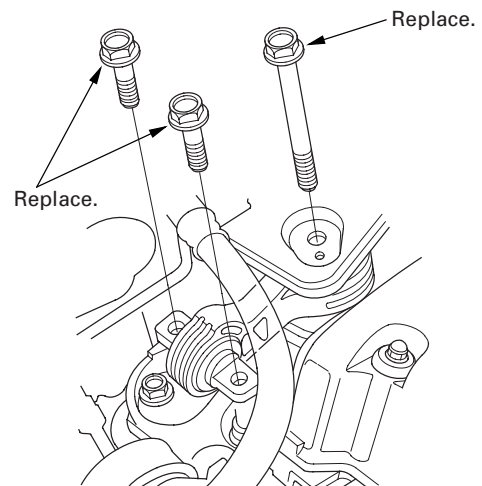
Side Engine Mount Replacement

1. Support the engine with a jack and wood block under the oil pan.
2. Remove the upper torque rod.

M/T model

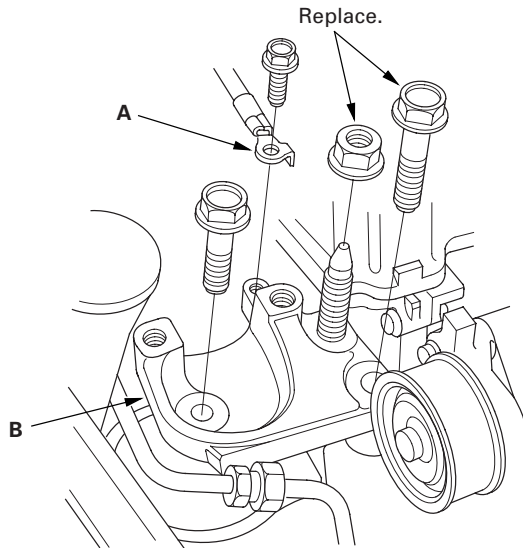


A/T model

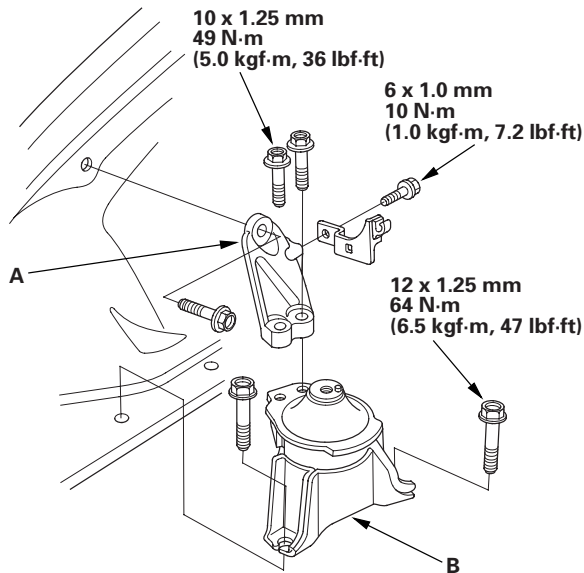




3. Remove the ground cable (A), then remove the side engine mount bracket (B).

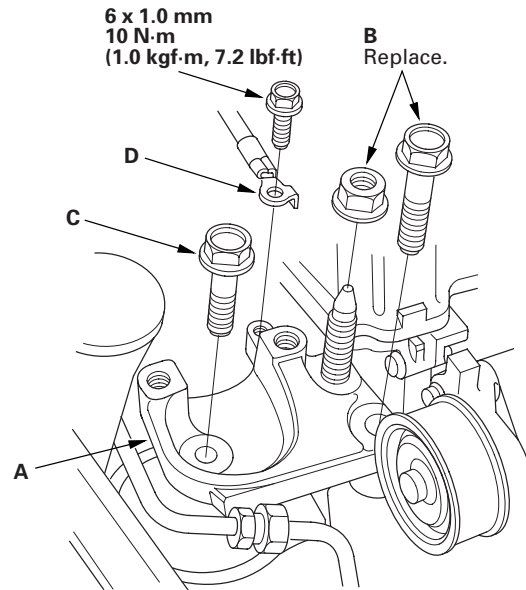


4. Remove the side engine mount stiffener (A), then remove the side engine mount (B).



5. Install the side engine mount, then install the side engine mount stiffener.

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



7. Install the ground cable (D).

8. Remove the air cleaner assembly (see page 11-345).

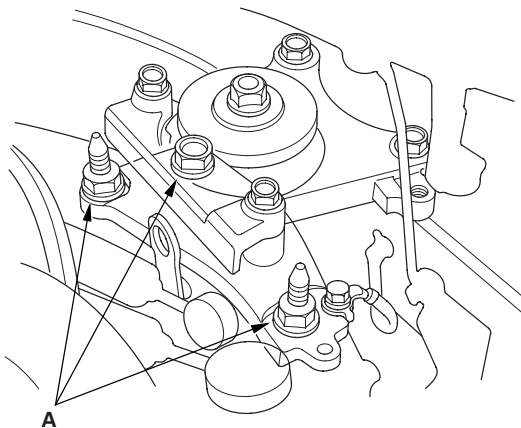
(cont'd)

Engine Assembly

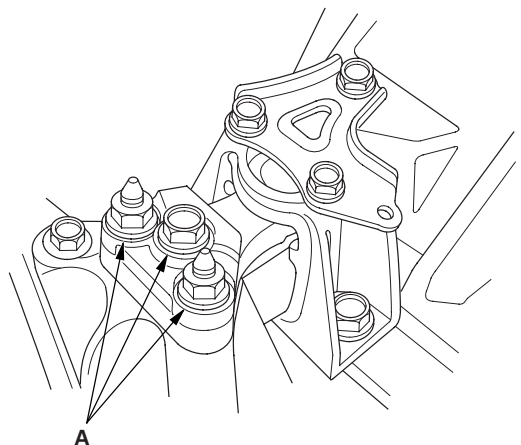
Side Engine Mount Replacement (cont'd)

9. Loosen the transmission mounting bolt and nuts (A).

M/T model



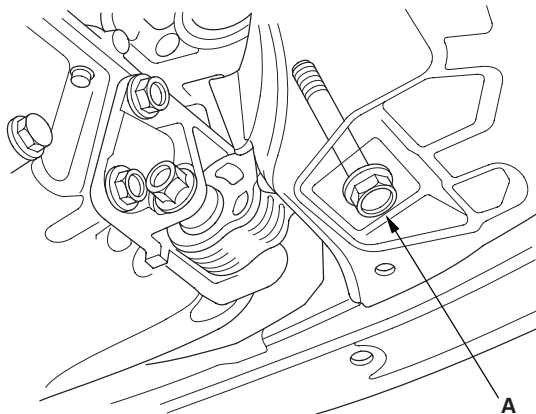
A/T model



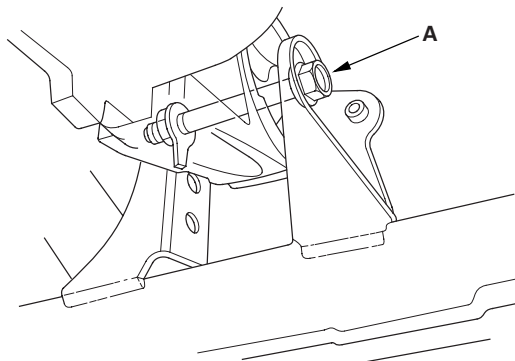
10. Raise the vehicle on the lift.

11. Remove the splash shield (see step 25 on page 5-5).

12. Loosen the lower torque rod mounting bolt (A).



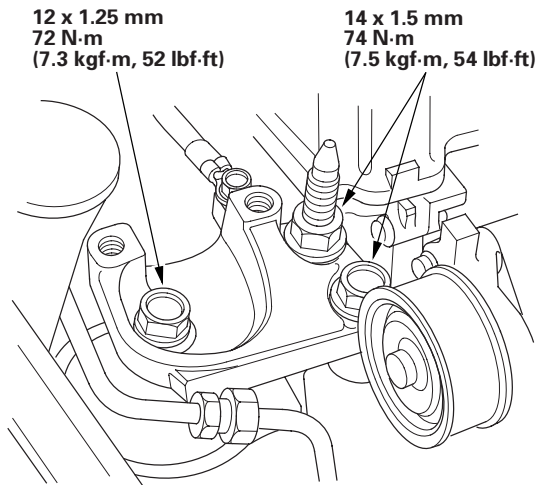
13. M/T model: Loosen the front mount mounting bolt (A).





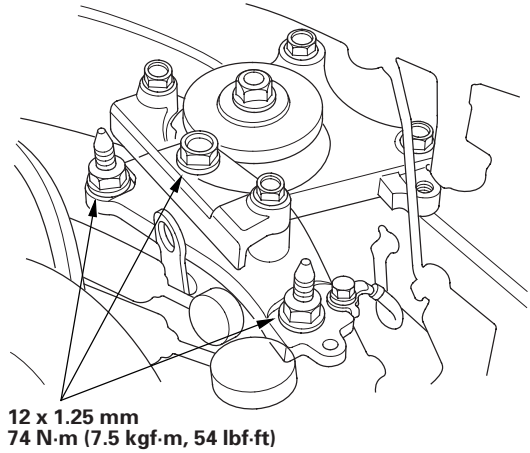
14. Lower the vehicle on the lift.

15. Tighten the side engine mount mounting bolts and nut.

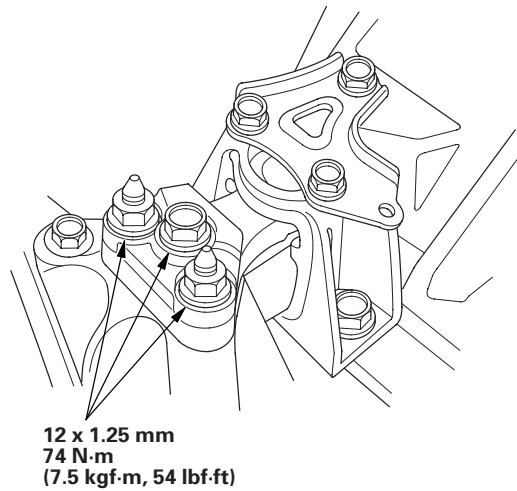


16. Tighten the transmission mounting bolt and nuts.

M/T model



A/T model



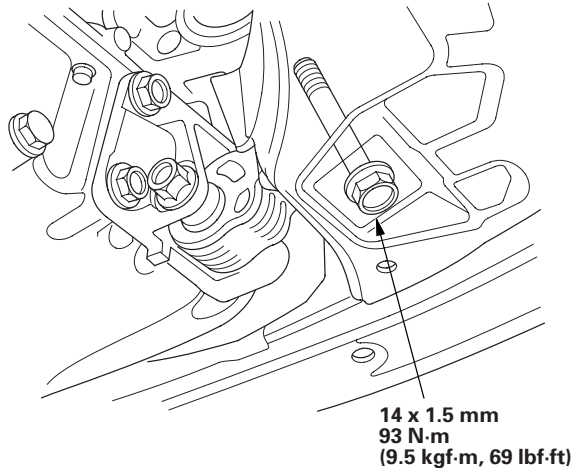
(cont'd)

Engine Assembly

Side Engine Mount Replacement (cont'd)

17. Raise the vehicle on the lift.

18. Tighten the lower torque rod mounting bolt.

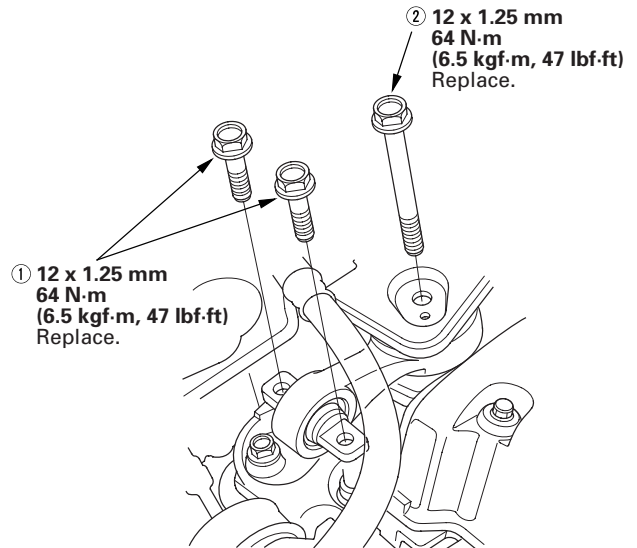


19. Lower the vehicle on the lift.

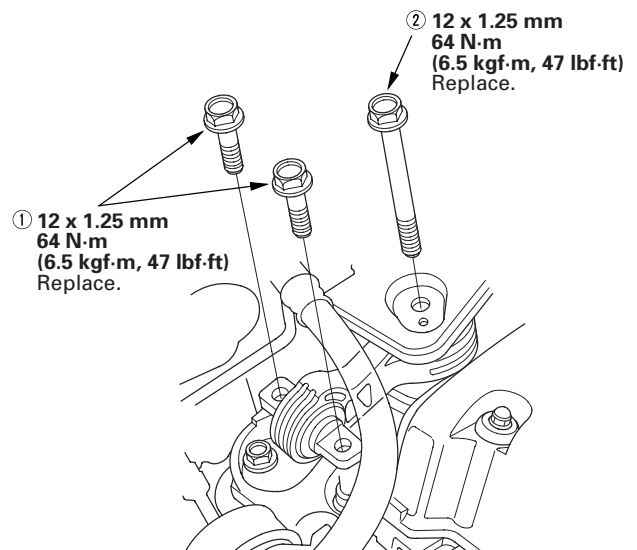
20. Install the air cleaner assembly (see page 11-345).

21. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.

M/T model



A/T model

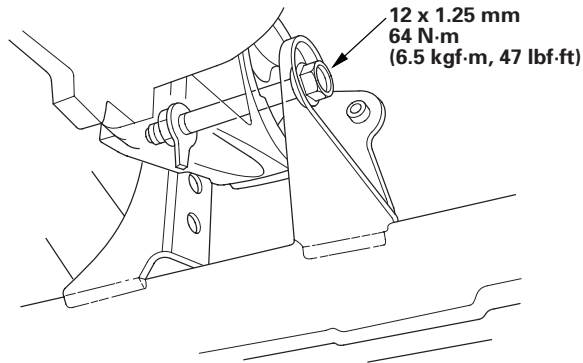




Transmission Mount Replacement

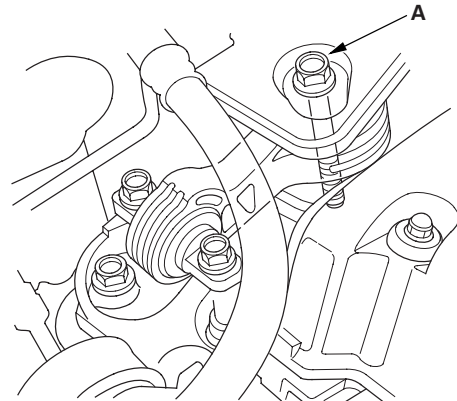
22. Raise the vehicle on the lift.

23. M/T model: Tighten the front mount mounting bolt.



24. Install the splash shield (see step 40 on page 5-20).

1. Loosen the upper torque rod mounting bolt (A).



2. Remove the air cleaner assembly (see page 11-345).

3. Remove the engine control module (ECM)/powertrain control module (PCM) cover, then remove the three bolts securing the ECM/PCM (see step 10 on page 5-4).

4. Remove the under hood fuse/relay box from the ECM/PCM bracket, then remove the ECM/PCM bracket (see step 13 on page 5-4).

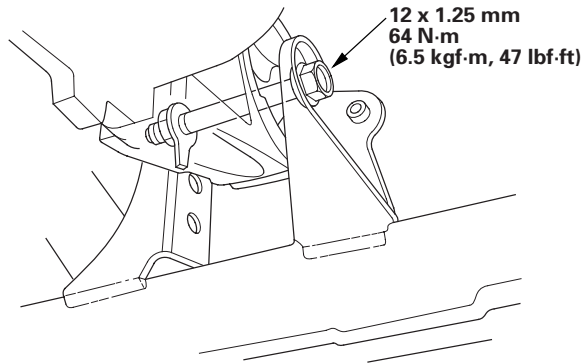
(cont'd)



Transmission Mount Replacement

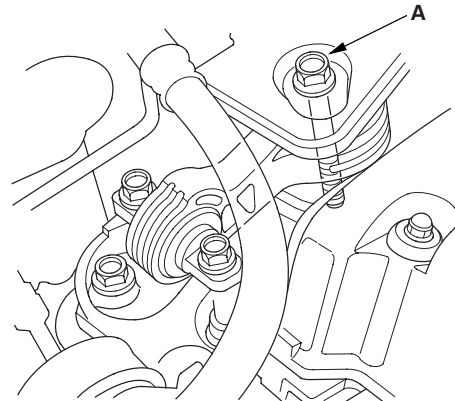
22. Raise the vehicle on the lift.

23. M/T model: Tighten the front mount mounting bolt.



24. Install the splash shield (see step 40 on page 5-20).

1. Loosen the upper torque rod mounting bolt (A).



2. Remove the air cleaner assembly (see page 11-345).

3. Remove the engine control module (ECM)/ powertrain control module (PCM) cover, then remove the three bolts securing the ECM/PCM (see step 10 on page 5-4).

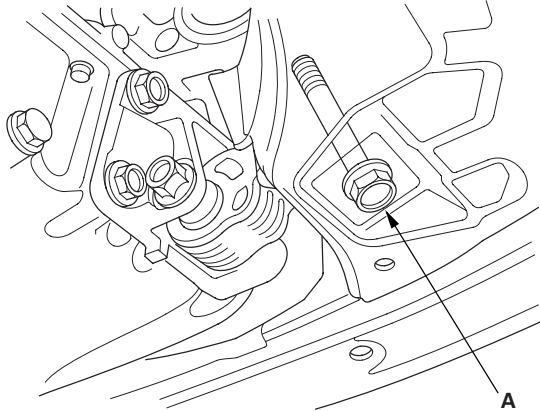
4. Remove the under hood fuse/relay box from the ECM/PCM bracket, then remove the ECM/PCM bracket (see step 13 on page 5-4).

(cont'd)

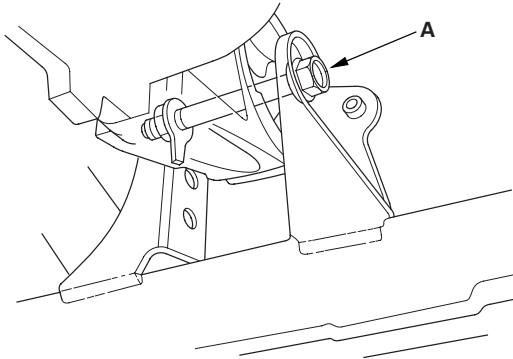
Engine Assembly

Transmission Mount Replacement (cont'd)

5. Raise the vehicle on the lift.
6. Remove the splash shield (see step 25 on page 5-5).
7. Loosen the lower torque rod mounting bolt (A).



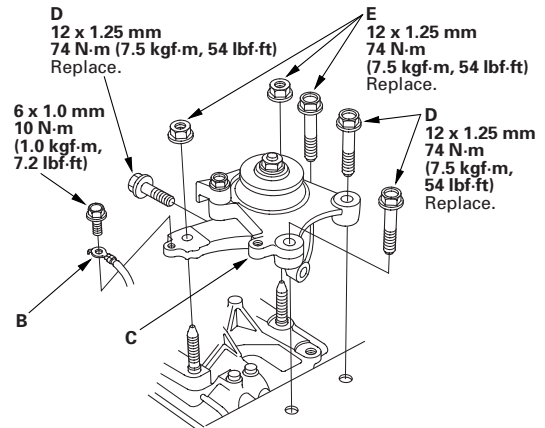
8. M/T model: Loosen the front mount mounting bolt (A).



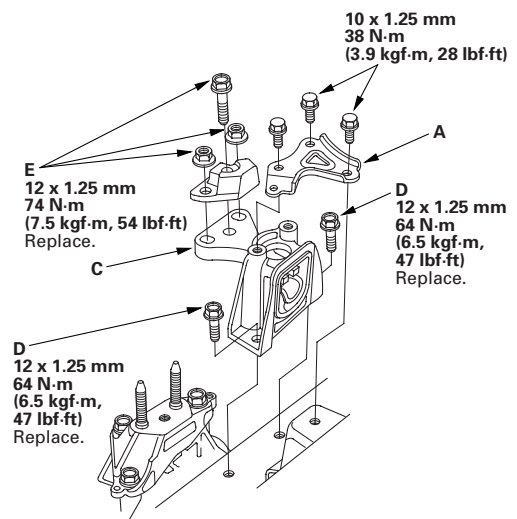
9. Lower the vehicle on the lift.

10. A/T model: Remove the transmission mount stiffener (A).

M/T model



A/T model

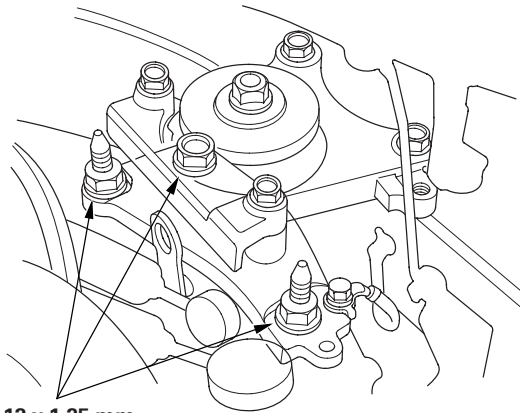


11. M/T model: Remove the ground cable (B).
12. Remove the transmission mount (C).
13. Install the transmission mount, and tighten the transmission mount mounting bolts (D).
14. A/T model: Install the transmission mount stiffener.
15. Loosely tighten the new transmission mounting bolt and nuts (E).
16. M/T model: Install the ground cables.



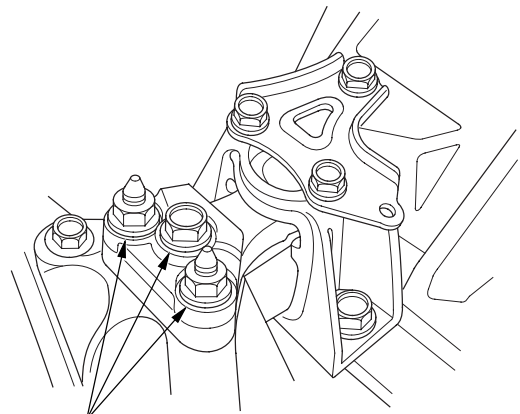
17. Tighten the transmission mounting bolt and nuts.

M/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

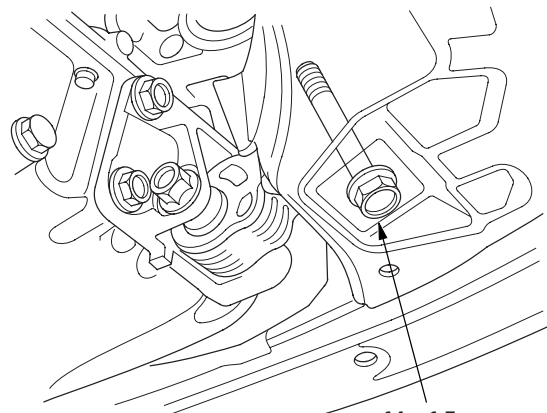
A/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

18. Raise the vehicle on the lift.

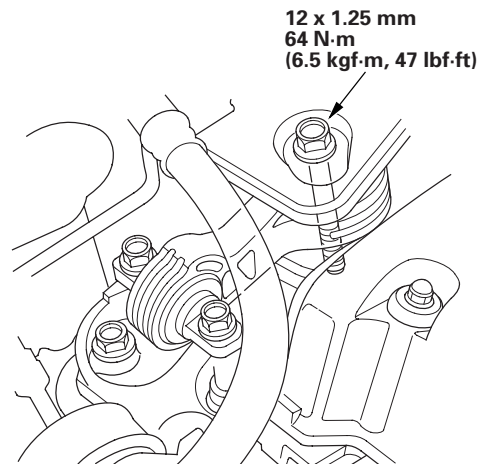
19. Tighten the lower torque rod mounting bolt.



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

20. Lower the vehicle on the lift.

21. Tighten the upper torque rod mounting bolt.



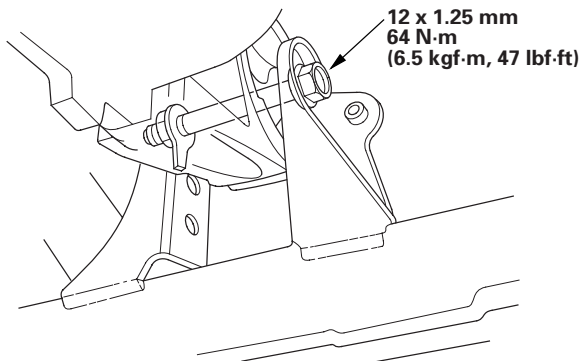
12 x 1.25 mm
64 N·m
(6.5 kgf·m, 47 lbf·ft)

(cont'd)

Engine Assembly

Transmission Mount Replacement (cont'd)

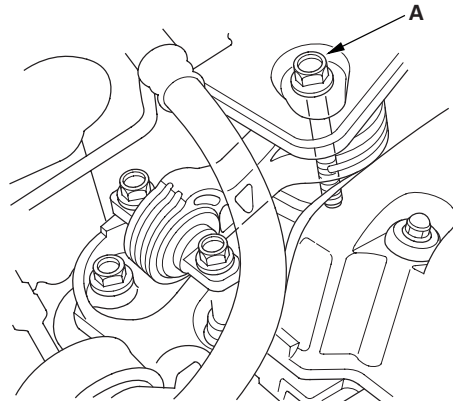
22. Install the ECM/PCM bracket, then install the underhood fuse/relay box to the ECM/PCM bracket (see step 52 on page 5-22).
23. Install the ECM/PCM, then install the ECM/PCM cover (see step 56 on page 5-23)
24. Install the air cleaner assembly (see page 11-345).
25. Raise the vehicle on the lift.
26. M/T model: Tighten the front mount mounting bolt.



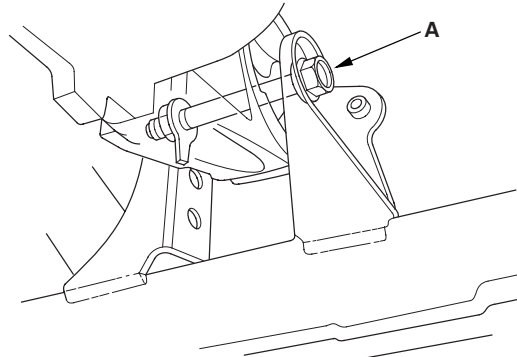
27. Install the splash shield (see step 40 on page 5-20).

Lower Torque Rod Replacement

1. Loosen the upper torque rod mounting bolt (A).



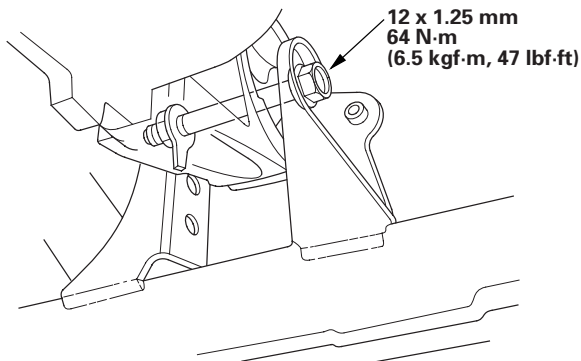
2. Raise the vehicle on the lift.
3. Remove the splash shield (see step 25 on page 5-5).
4. M/T model: Loosen the front mount mounting bolt (A).



Engine Assembly

Transmission Mount Replacement (cont'd)

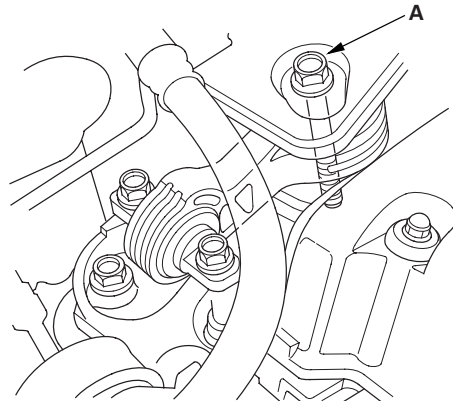
22. Install the ECM/PCM bracket, then install the underhood fuse/relay box to the ECM/PCM bracket (see step 52 on page 5-22).
23. Install the ECM/PCM, then install the ECM/PCM cover (see step 56 on page 5-23)
24. Install the air cleaner assembly (see page 11-345).
25. Raise the vehicle on the lift.
26. M/T model: Tighten the front mount mounting bolt.



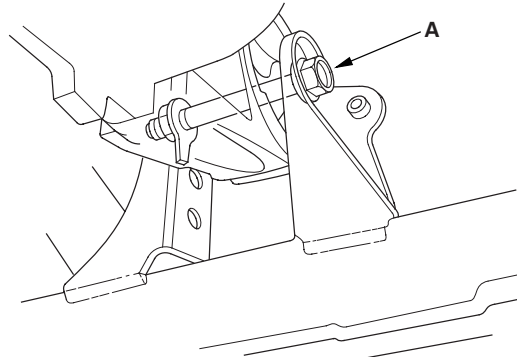
27. Install the splash shield (see step 40 on page 5-20).

Lower Torque Rod Replacement

1. Loosen the upper torque rod mounting bolt (A).



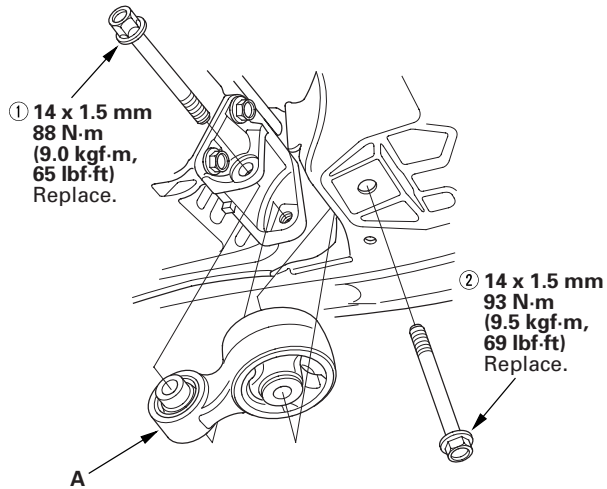
2. Raise the vehicle on the lift.
3. Remove the splash shield (see step 25 on page 5-5).
4. M/T model: Loosen the front mount mounting bolt (A).



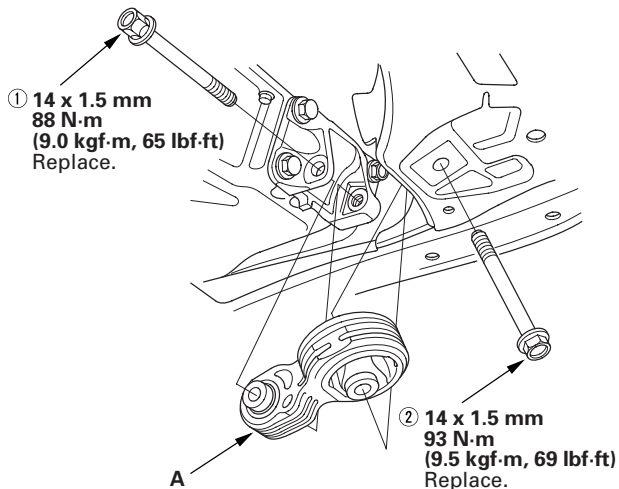


5. Remove the lower torque rod (A).

M/T model



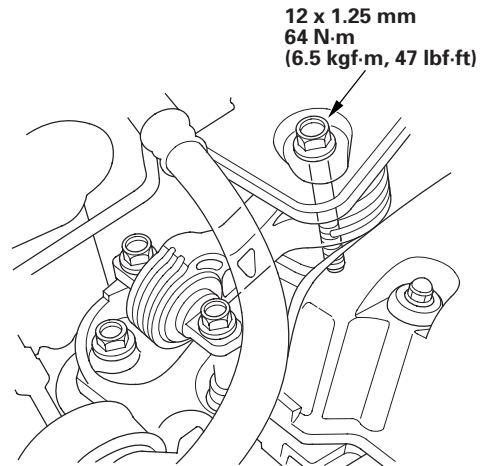
A/T model



6. Install the lower torque rod, then tighten the new lower torque rod mounting bolts in the numbered sequence shown.

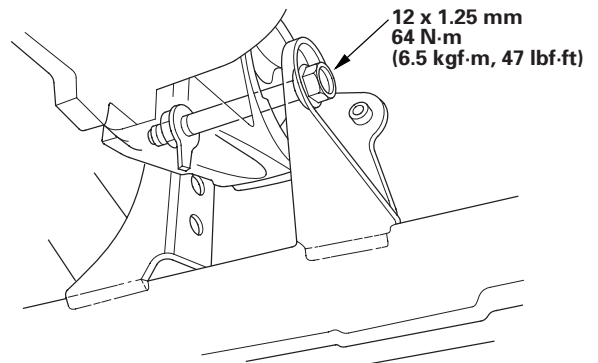
7. Lower the vehicle on the lift.

8. Tighten the upper torque rod mounting bolt.



9. Raise the vehicle on the lift.

10. M/T model: Tighten the front mount mounting bolt.

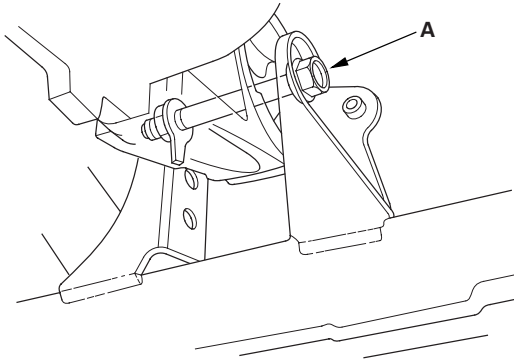


11. Install the splash shield (see step 40 on page 5-20).

Engine Assembly

Upper Torque Rod Replacement

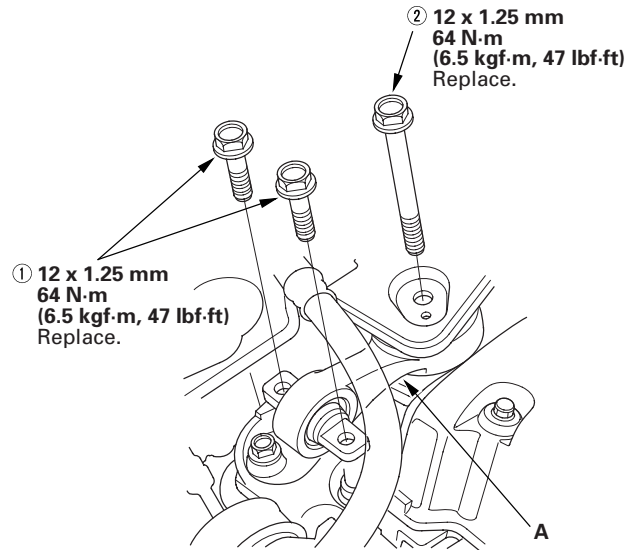
1. Raise the vehicle on the lift.
2. Remove the splash shield (see step 25 on page 5-5).
3. M/T model: Loosen the front mount mounting bolt (A).



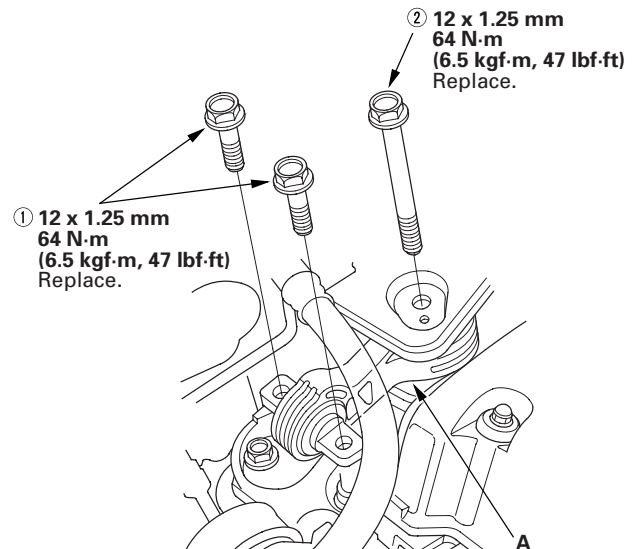
4. Lower the vehicle on the lift.

5. Remove the upper torque rod (A).

M/T model



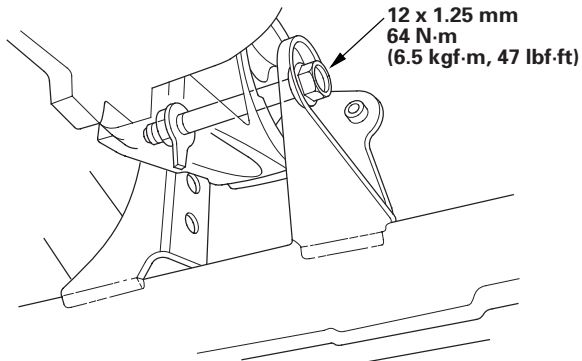
A/T model



6. Install the upper torque rod, then tighten the new bolts in the numbered sequence shown.



7. Raise the vehicle on the lift.
8. M/T model: Tighten the front mount mounting bolt.

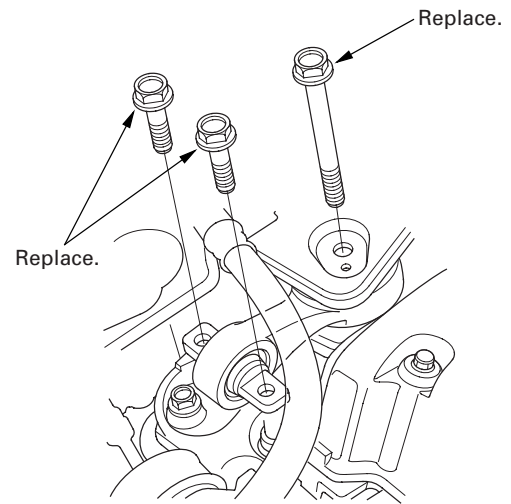


9. Install the splash shield (see step 40 on page 5-20).

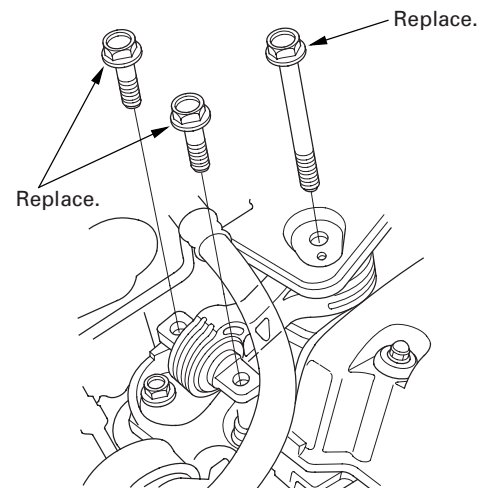
Side Engine Mount Bracket Replacement

1. Support the engine with a jack and wood block under the oil pan.
2. Remove the upper torque rod.

M/T model



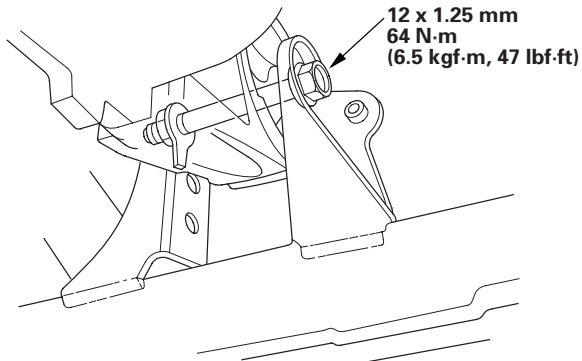
A/T model



(cont'd)



7. Raise the vehicle on the lift.
8. M/T model: Tighten the front mount mounting bolt.

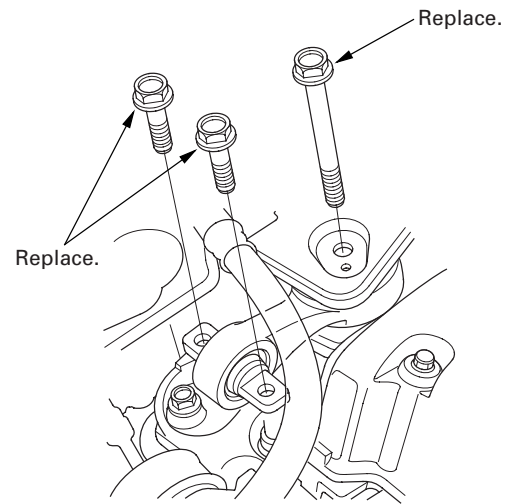


9. Install the splash shield (see step 40 on page 5-20).

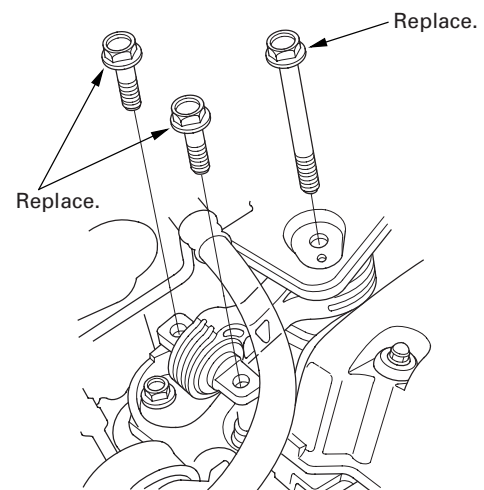
Side Engine Mount Bracket Replacement

1. Support the engine with a jack and wood block under the oil pan.
2. Remove the upper torque rod.

M/T model



A/T model

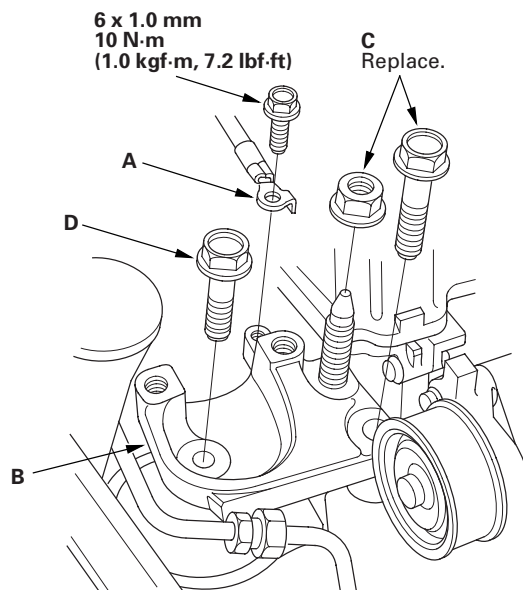


(cont'd)

Engine Assembly

Side Engine Mount Bracket Replacement (cont'd)

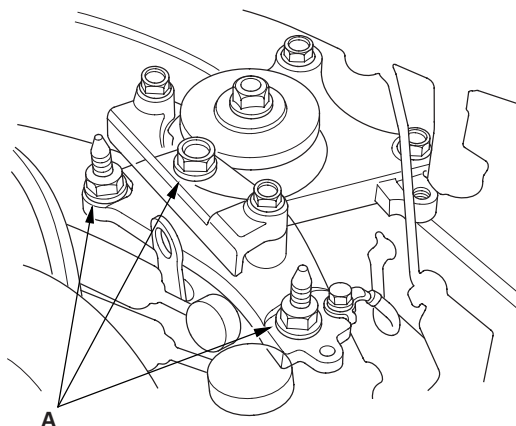
3. Remove the ground cable (A), then remove the side engine mount bracket (B).



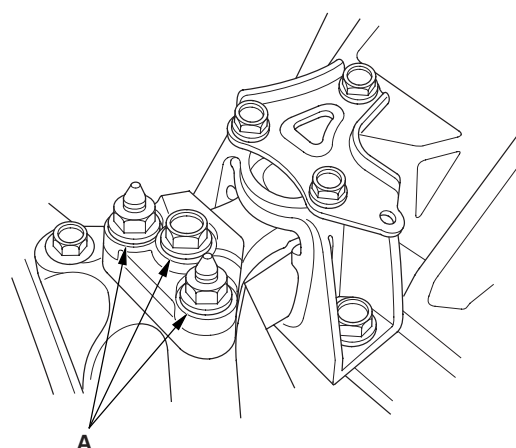
4. Install the side engine mount bracket, then loosely tighten the new bolt and nut (C), then loosely tighten the bolt (D).
5. Install the ground cable.
6. Remove the air cleaner assembly (see page 11-345).

7. Loosen the transmission mounting bolt and nuts (A).

M/T model

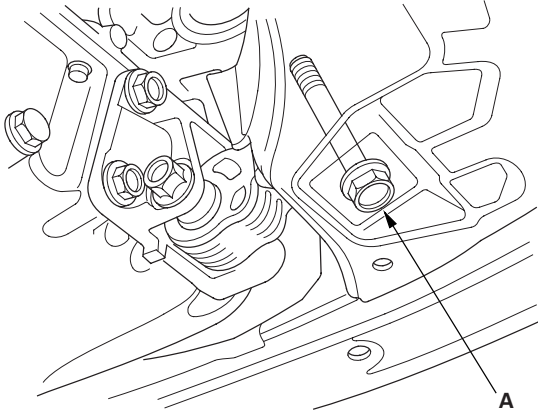


A/T model

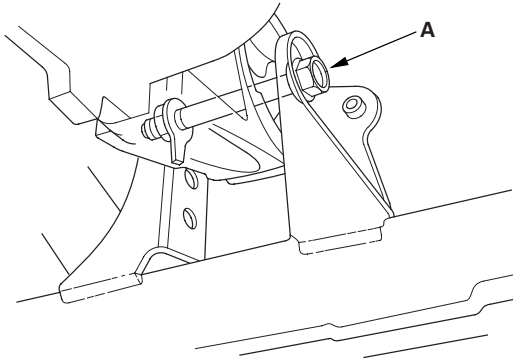




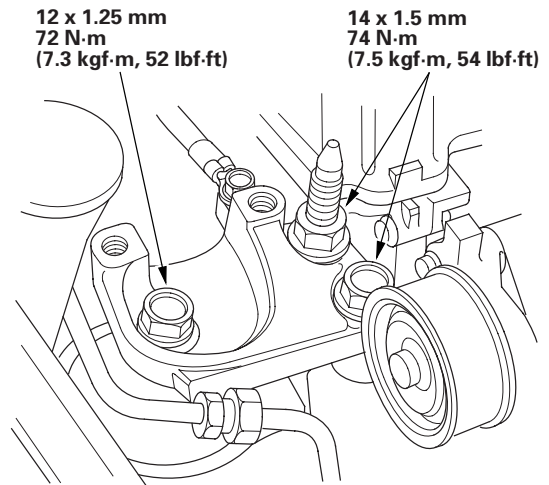
8. Raise the vehicle on the lift.
9. Remove the splash shield (see step 25 on page 5-5).
10. Loosen the lower torque rod mounting bolt (A).



11. M/T model: Loosen the front mount mounting bolt (A).



12. Lower the vehicle on the lift.
13. Tighten the side engine mount mounting bolts and nut.



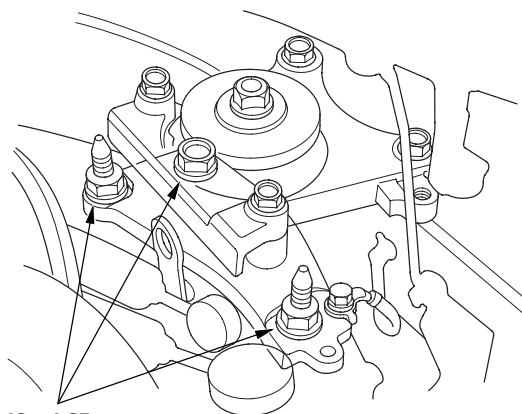
(cont'd)

Engine Assembly

Side Engine Mount Bracket Replacement (cont'd)

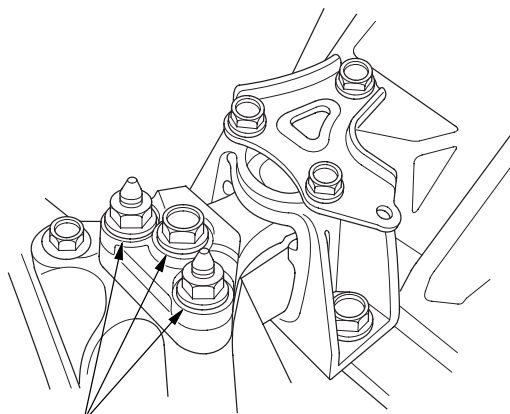
14. Tighten the transmission mounting bolt and nuts.

M/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

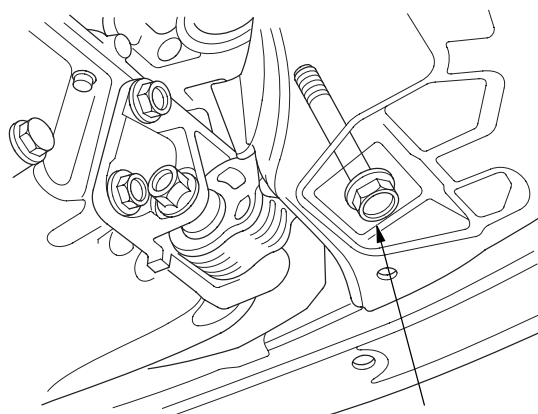
A/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

15. Raise the vehicle on the lift.

16. Tighten the lower torque rod mounting bolt.



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

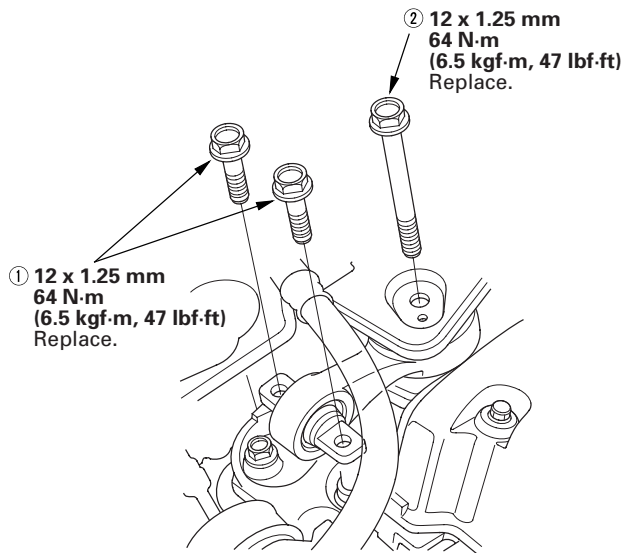
17. Lower the vehicle on the lift.

18. Install the air cleaner assembly (see page 11-345).

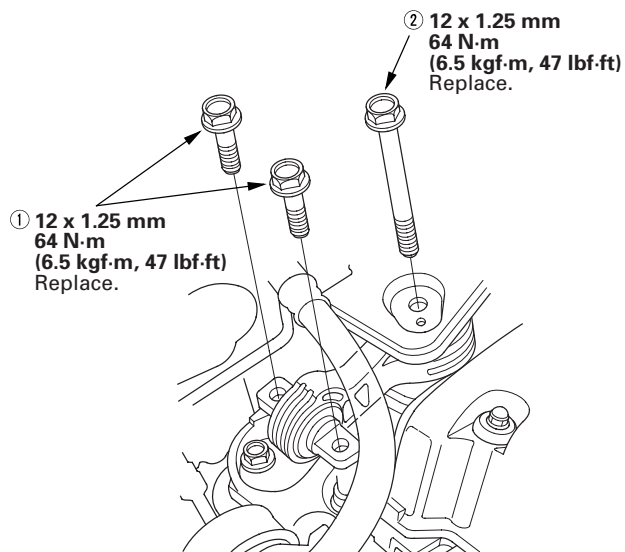


19. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.

M/T model

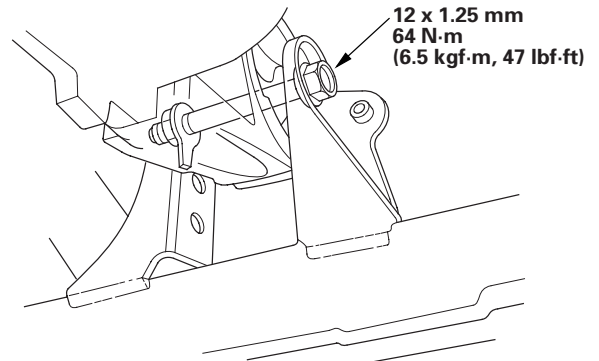


A/T model



20. Raise the vehicle on the lift.

21. M/T model: Tighten the front mount mounting bolt.



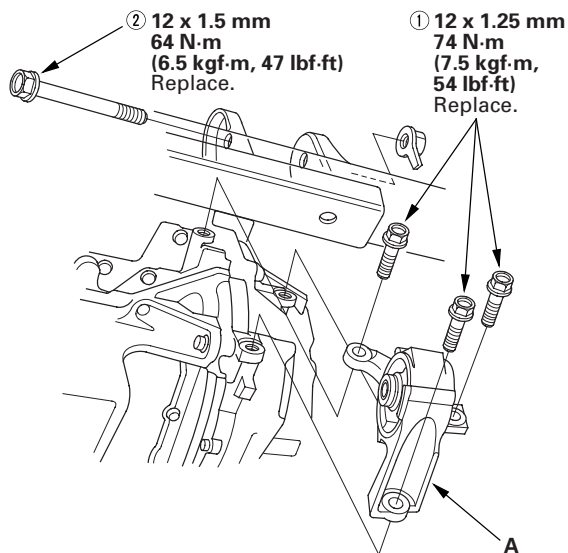
22. Install the splash shield (see step 40 on page 5-20).

Engine Assembly

Front Engine Mount Replacement

M/T model

1. Raise the vehicle on the lift.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the front mount (A).



4. Install the front mount, then tighten the new front mount mounting bolts in the numbered sequence shown.
5. Install the splash shield (see step 40 on page 5-20).

Engine Mechanical

Cylinder Head

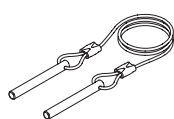
Special Tools	6-2
Component Location Index	6-3
Engine Compression Inspection	6-7
VTEC Rocker Arm Test	6-8
VTC Actuator Inspection	6-11
Valve Clearance Adjustment	6-12
Crankshaft Pulley Removal and Installation	6-16
Cam Chain Removal	6-18
Cam Chain Installation	6-21
Auto-tensioner Removal and Installation	6-29
Chain Case Oil Seal Installation	6-31
Cam Chain Inspection	6-32
CKP Pulse Plate Replacement	6-34
Cylinder Head Cover Removal	6-36
Cylinder Head Cover Installation	6-37
Cylinder Head Removal	6-38
CMP Pulse Plate A Replacement	6-41
CMP Pulse Plate B Replacement	6-41
VTC Actuator, Exhaust Camshaft Sprocket Replacement	6-42
Cylinder Head Inspection for Warp	6-43
Rocker Arm Assembly Removal	6-43
Rocker Arm and Shaft Disassembly/Reassembly	6-46
Rocker Arm and Shaft Inspection	6-48
Camshaft Inspection	6-50
Valve, Spring, and Valve Seal Removal	6-54
Valve Inspection	6-55
Valve Stem-to-Guide Clearance Inspection	6-55
Valve Guide Replacement	6-56
Valve Seat Reconditioning	6-58
Valve, Spring, and Valve Seal Installation	6-59
Rocker Arm Assembly Installation	6-60
Cylinder Head Installation	6-62
Sealing Bolt Installation	6-66



Cylinder Head

Special Tools

Ref. No.	Tool Number	Description	Qty
①	07AAB-RWCA120	Camshaft Lock Pin Set	1
②	07AAJ-PNAA101	Air Pressure Regulator	1
③	07HAH-PJ7A100	Valve Guide Reamer, 5.5 mm	1
④	07JAA-001020A	Socket, 19 mm	1
⑤	07JAB-001020A	Holder Handle	1
⑥	07MAA-PR70110	Adjuster	1
⑦	07MAA-PR70120	Locknut Wrench	1
⑧	07NAB-001040A	Holder Attachment, 50 mm	1
⑨	07PAD-0010000	Stem Seal Driver	1
⑩	07ZAJ-PNAA101	VTEC Air Adapter	2
⑪	07ZAJ-PNAA200	VTEC Air Stopper	1
⑫	07ZAJ-PNAA300	Air Joint Adapter	1
⑬	07742-0010100	Valve Guide Driver, 5.5 mm	1
⑭	07746-0010400	Attachment, 52 x 55 mm	1
⑮	07749-0010000	Driver	1
⑯	07757-PJ1010A	Valve Spring Compressor Attachment	1



①



②



③



④



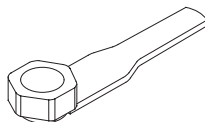
⑤



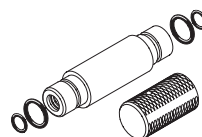
⑥



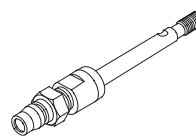
⑦



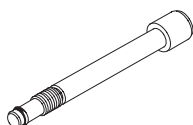
⑧



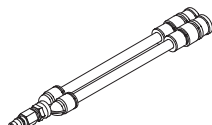
⑨



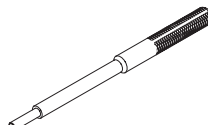
⑩



⑪



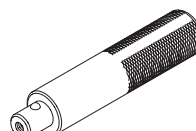
⑫



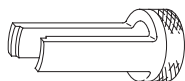
⑬



⑭



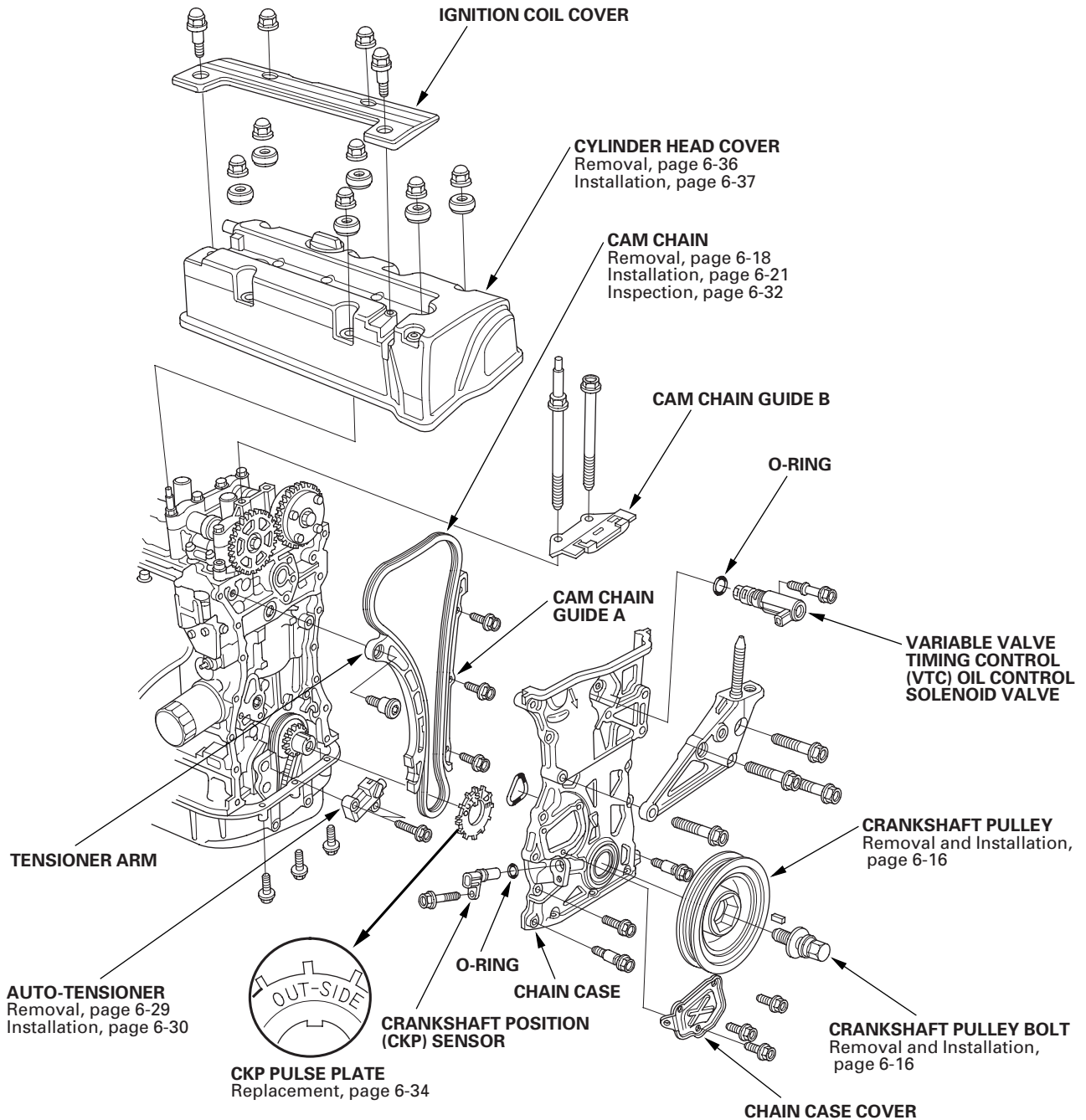
⑮



⑯



Component Location Index

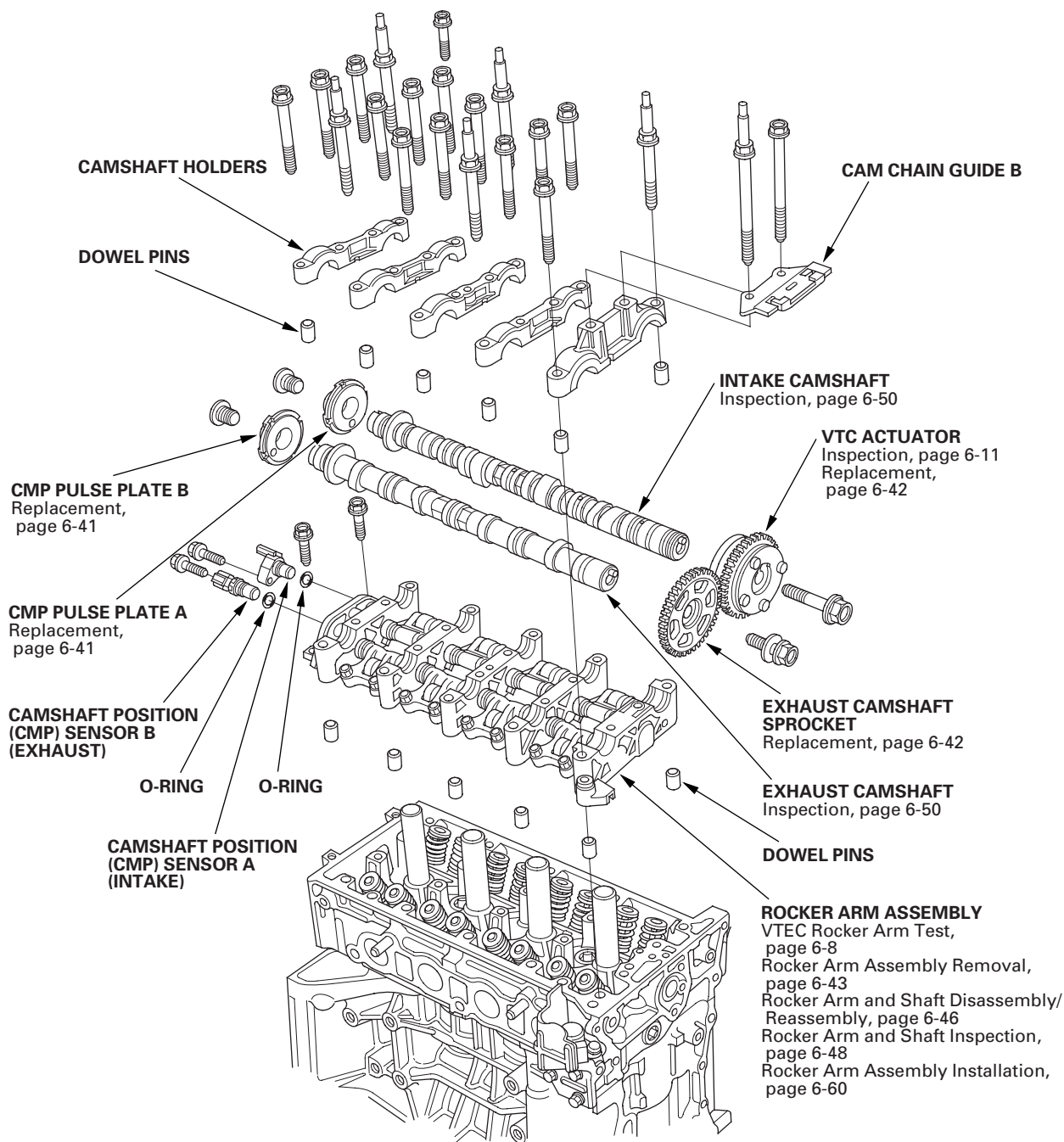


(cont'd)

Cylinder Head

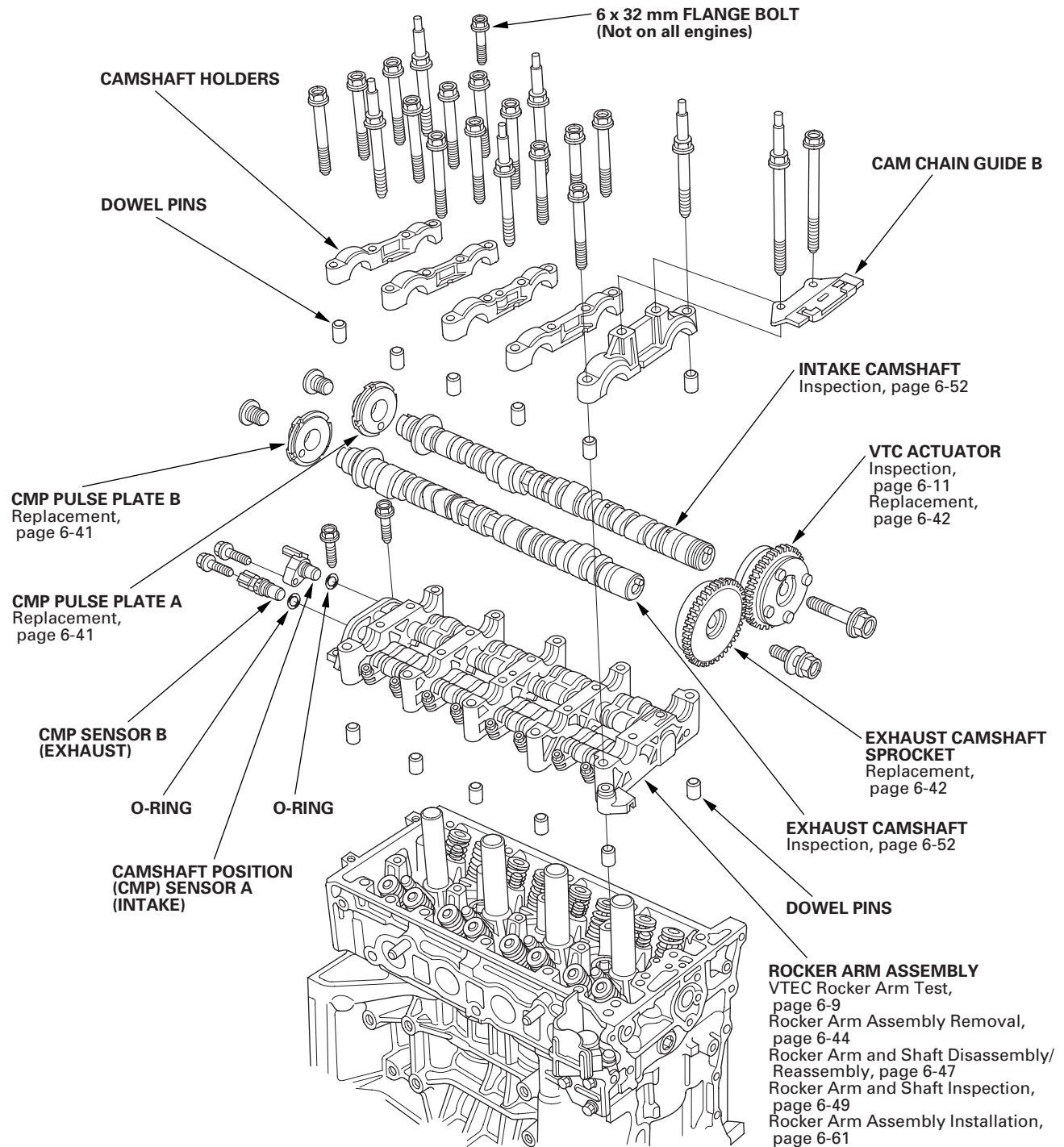
Component Location Index (cont'd)

K20Z2 engine





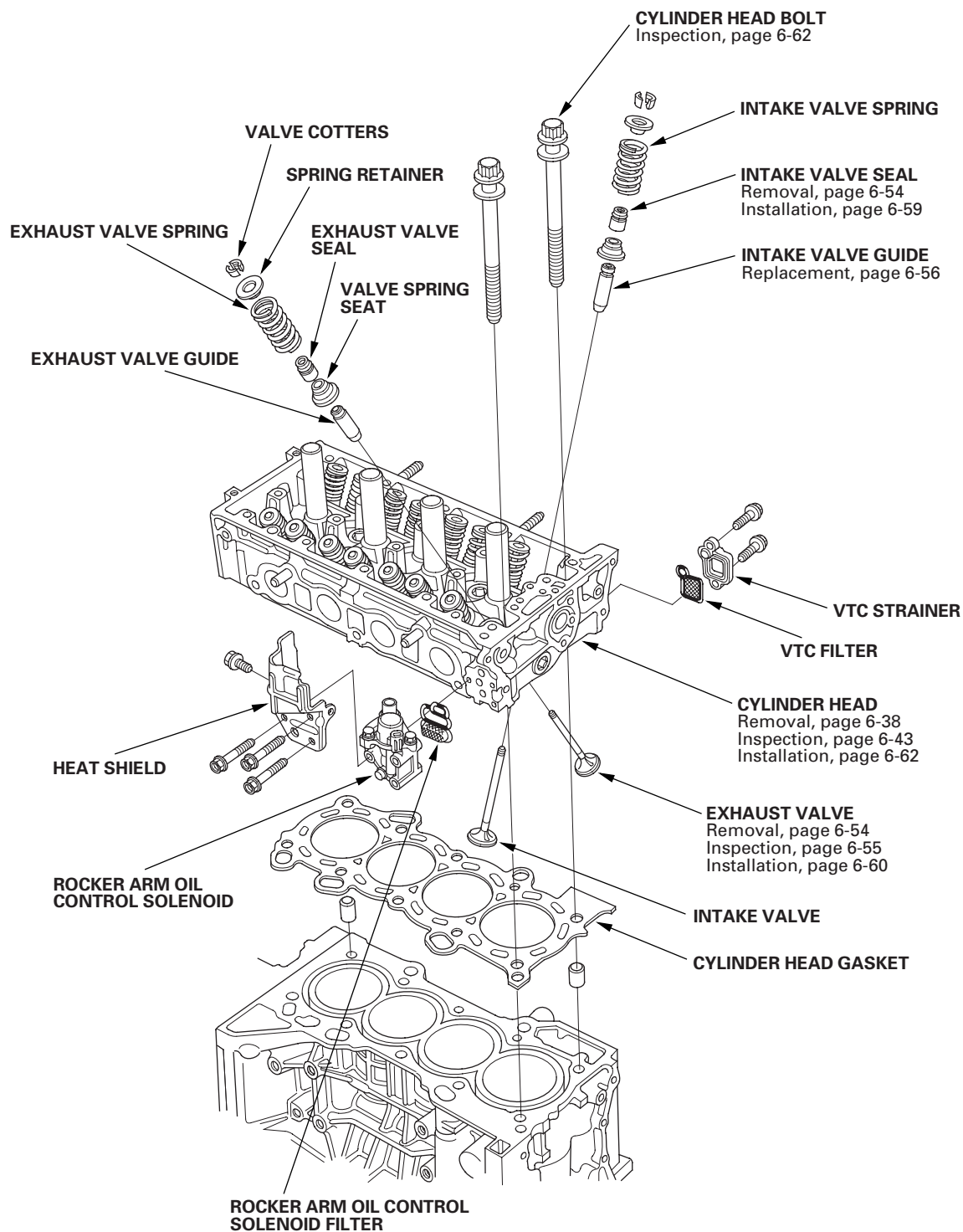
K20Z3 engine



(cont'd)

Cylinder Head

Component Location Index (cont'd)

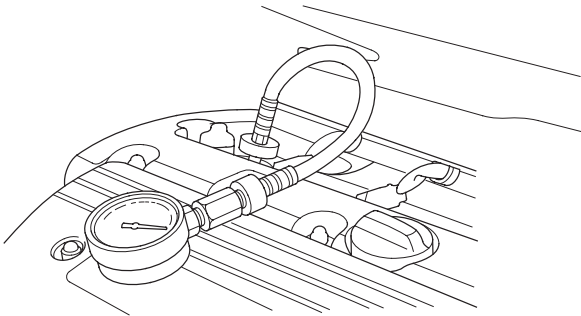




Engine Compression Inspection

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

1. Warm up the engine to normal operating temperature (cooling fan comes on).
2. Turn the ignition switch to LOCK (0).
3. Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3).
4. Turn the ignition switch to ON (II).
5. Make sure the HDS communicates with the vehicle and the ECM/PCM. If it does not communicate, troubleshoot the DLC circuit (see page 11-204).
6. Select ALL INJECTORS STOP in the PGM-FI, INSPECTION menu with the HDS.
7. Turn the ignition switch to LOCK (0).
8. Remove the four ignition coils (see page 4-21).
9. Remove the four spark plugs.
10. Attach the compression gauge to a spark plug hole.



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

Compression Pressure:

Above 930 kPa (9.5 kgf/cm², 135 psi)

12. Measure the compression on the remaining cylinders.

Maximum Variation:

Within 200 kPa (2.0 kgf/cm², 28 psi)

13. If the compression is not within specifications, check the following items, then remeasure the compression.
 - Incorrect valve clearance
 - Confirmation of cam timing
 - Damaged or worn cam lobes
 - Damaged or worn valves and seats
 - Damaged cylinder head 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.
16. Install the four ignition coils (see page 4-21).
17. Select the ECM/PCM reset (see page 11-4) in the PGM-FI INSPECTION menu to cancel ALL INJECTORS STOP with the HDS.

Cylinder Head

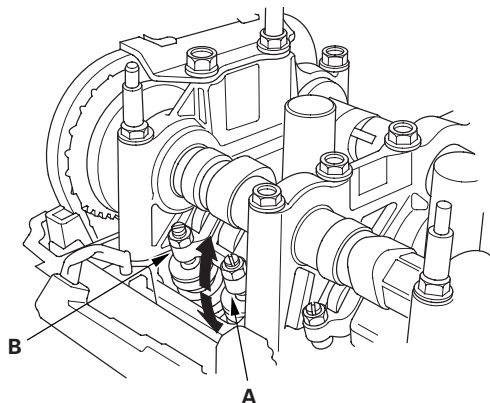
VTEC Rocker Arm Test

Special Tools Required

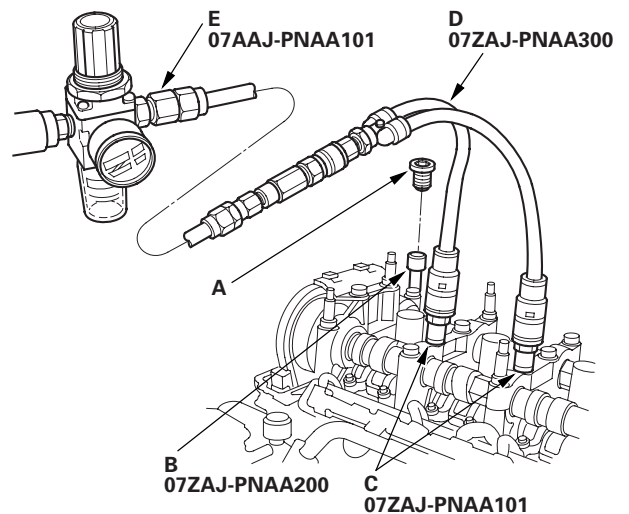
- VTEC air stopper 07ZAJ-PNAA200
- VTEC air adapter 07ZAJ-PNAA101
- Air joint adapter 07ZAJ-PNAA300
- Air pressure regulator 07AAJ-PNAA101

K20Z2 engine

1. Start the engine, and let it run for 5 minutes, then turn the ignition switch to LOCK (0).
2. Remove the cylinder head cover (see page 6-36).
3. Set the No. 1 piston at top dead center (TDC) (see step 5 on page 6-18).
4. Move the intake primary rocker arm (A) for the No. 1 cylinder. The primary rocker arm should move independently of the intake secondary rocker arm (B).
 - If the intake primary rocker arm moves freely, go to step 5.
 - If the intake primary rocker arm do not move independently, remove the primary and secondary rocker arms as an assembly and check that the pistons in the secondary and primary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.



5. Repeat step 4 on the remaining intake primary rocker arms with each piston at TDC. When all the primary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4 kgf/cm², 57 psi).
7. Inspect the valve clearance (see page 6-12).
8. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).



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

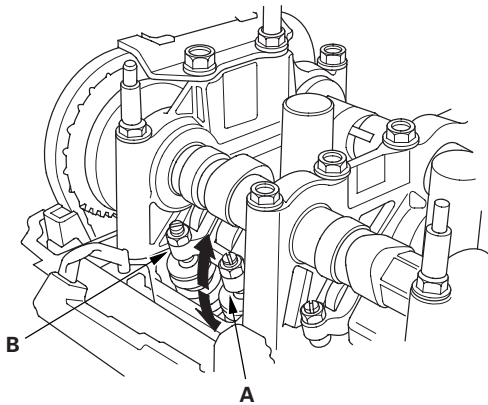
Specified Air Pressure:
290 kPa (3.0 kgf/cm², 42 psi)

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



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

- If the primary and the secondary rocker arm move together, go to step 13.
- If the intake secondary rocker arm do not move together, remove the primary and secondary rocker arms as an assembly, and check that the pistons in the primary and secondary rocker arms move smoothly. If any rocker arm needs replacing, replace the primary and secondary rocker arms as an assembly, then retest.



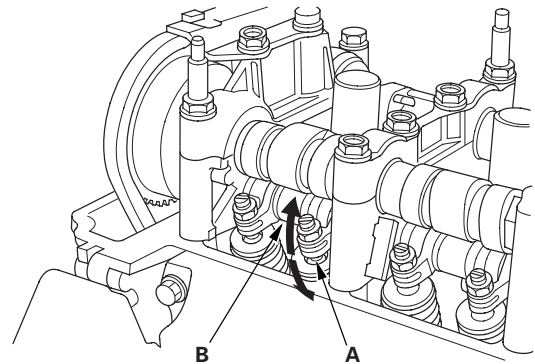
13. Repeat step 12 on the remaining primary rocker arms with each piston at TDC. When all the primary rocker arms pass the test, go to step 14.
14. Remove the air pressure regulator, the air joint adapter, the VTEC air stopper and VTEC air adapters.
15. Tighten the camshaft holder mounting bolts to 22 N·m (2.2 kgf·m, 16 lbf·ft).
16. Tighten the sealing bolt to 20 N·m (2.0 kgf·m, 14 lbf·ft).
17. Install the cylinder head cover (see page 6-37).

Special Tools Required

- VTEC air stopper 07ZAJ-PNAA200
- VTEC air adapter 07ZAJ-PNAA101
- Air joint adapter 07ZAJ-PNAA300
- Air pressure regulator 07AAJ-PNAA101

K20Z3 engine

1. Start the engine and let it run for 5 minutes, then turn the ignition switch to LOCK (0).
 2. Remove the cylinder head cover (see page 6-36).
 3. Set the No. 1 piston at TDC (see step 5 on page 6-18).
 4. Move the secondary rocker arm (A) for No. 1 cylinder. The secondary rocker arm should move independently of the mid rocker arm (B).
- If the secondary rocker arm moves freely, go to step 5.
 - If the secondary rocker arm do not move independently, remove the mid, primary, and secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, then retest.



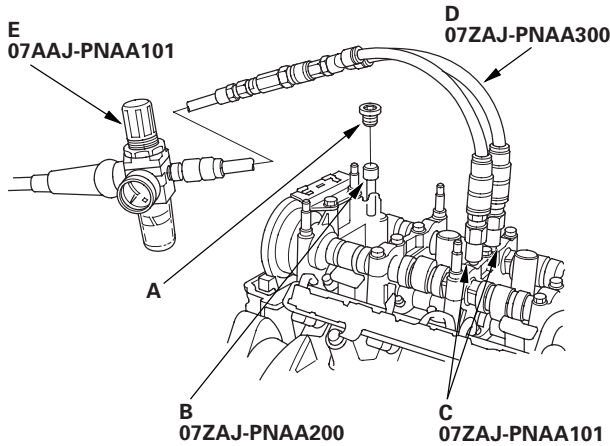
5. Repeat step 4 on the remaining secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 6.
6. Check that the air pressure on the shop air compressor gauge indicates over 400 kPa (4.0 kgf/cm², 57 psi).
7. Inspect the valve clearance (see page 6-14).

(cont'd)

Cylinder Head

VTEC Rocker Arm Test (cont'd)

8. Remove the sealing bolt (A) from the relief hole, and install the VTEC air stopper (B).



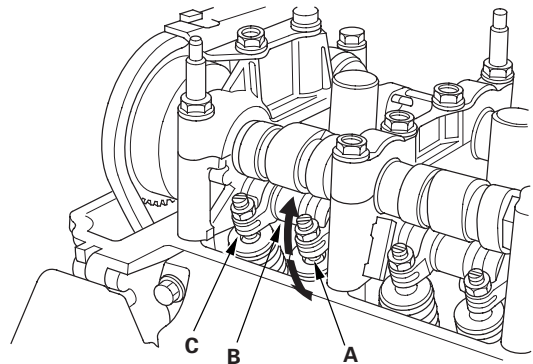
9. Remove the No. 3 camshaft holder bolts, and install the VTEC air adapters (C) finger-tight.
10. Connect the air joint adapter (D) and the air pressure regulator (E).
11. Loosen the valve on the air pressure regulator, and apply the specified air pressure.

Specified Air Pressure:
290 kPa (3.0 kgf/cm², 42 psi)

NOTE: If the rocker arm piston does not move after applying air pressure, move the rocker arm up and down manually by rotating the crankshaft clockwise.

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

- If the mid, primary, and secondary rocker arms move together, go to step 13.
- If the mid and primary rocker arms do not move together with the secondary rocker arm, remove the mid, primary, and secondary rocker arms as an assembly, and check that the pistons in the rocker arms move smoothly. If any rocker arm needs replacing, replace the mid, primary, and secondary rocker arms as an assembly, then retest.

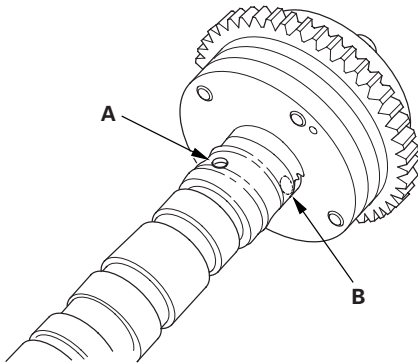


13. Repeat step 12 on the remaining secondary rocker arms with each piston at TDC. When all the secondary rocker arms pass the test, go to step 14.
14. Remove the air pressure regulator, air joint adapter, and the VTEC air stopper and VTEC air adapters.
15. Tighten the camshaft holder mounting bolts to 22 N·m (2.2 kgf·m, 16 lbf·ft).
16. Tighten the sealing bolt to 20 N·m (2.0 kgf·m, 14 lbf·ft).
17. Install the cylinder head cover (see page 6-37).

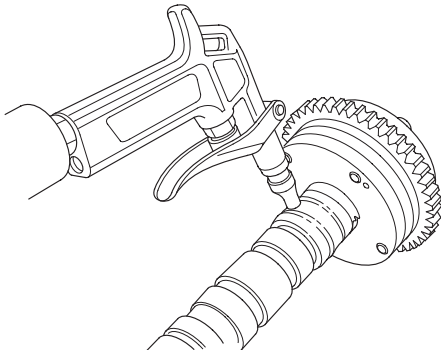


VTC Actuator Inspection

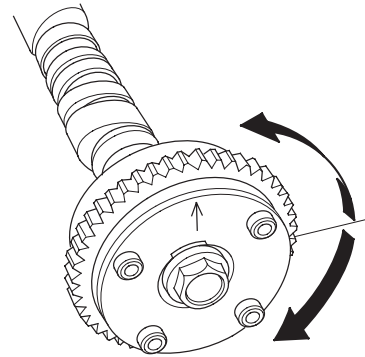
1. Remove the cam chain (see page 6-18).
2. Loosen the rocker arm adjusting screws:
 - K20Z2 engine (see step 2 on page 6-43)
 - K20Z3 engine (see step 2 on page 6-44)
3. Remove the camshaft holder:
 - K20Z2 engine (see step 3 on page 6-43)
 - K20Z3 engine (see step 3 on page 6-44)
4. Remove the intake camshaft.
5. Check that the variable valve timing control (VTC) actuator is locked by turning the VTC actuator counterclockwise. If not locked, turn the VTC actuator clockwise until it stops, then recheck it. If it is still not locked, replace the VTC actuator.
6. Seal the advance holes (A) and the retard holes (B) in the No. 1 camshaft journal with tape.



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



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



10. Remove the tape and adhesive residue from the No. 1 camshaft journal.
11. Make sure the punch marks on the VTC actuator and the exhaust camshaft sprocket are facing up, then set the camshafts in the rocker shaft holder:
 - K20Z2 engine (see step 6 on page 6-61)
 - K20Z3 engine (see step 6 on page 6-62)
12. Set the camshaft holders and cam chain guide B in place:
 - K20Z2 engine (see step 7 on page 6-61)
 - K20Z3 engine (see step 7 on page 6-62)
13. Tighten the camshaft holder bolts to the specified torque:
 - K20Z2 engine (see step 8 on page 6-61)
 - K20Z3 engine (see step 8 on page 6-62)
14. Hold the camshaft, and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
15. Install the cam chain (see page 6-21).
16. Adjust the valve clearance:
 - K20Z2 engine (see page 6-12)
 - K20Z3 engine (see page 6-14)

Cylinder Head

Valve Clearance Adjustment

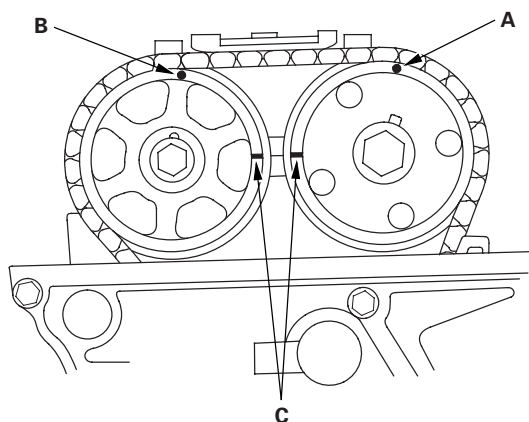
Special Tools Required

- Locknut wrench 07MAA-PR70120
- Adjuster 07MAA-PR70110

K20Z2 engine

NOTE: Connector the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3), and monitor the engine coolant temperature (ECT) sensor 1 with the HDS. Adjust the valve clearance only when the engine coolant temperature is less than 38 °C (100 °F).

1. Remove the cylinder head cover (see page 6-36).
2. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

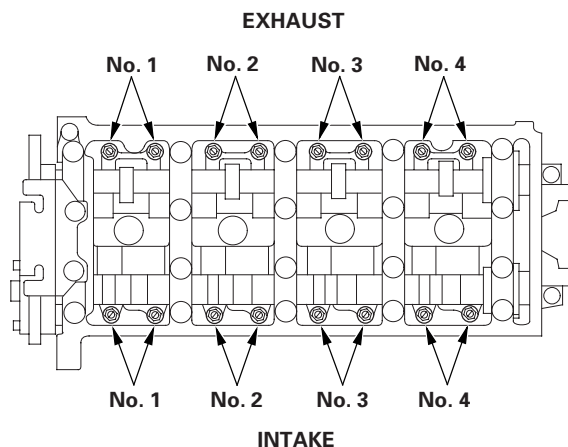


3. Select the correct feeler gauge for the valve clearance you are going to check.

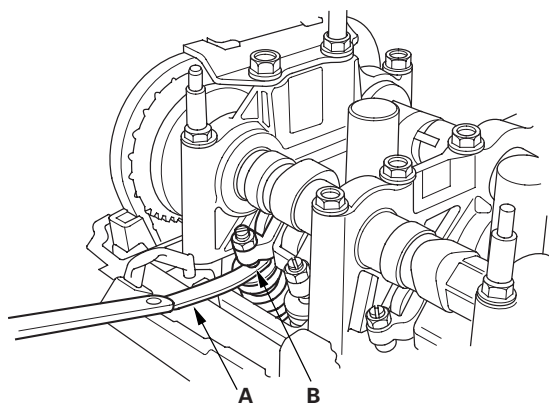
Valve Clearance

Intake: 0.21—0.25 mm (0.008—0.010 in.)

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

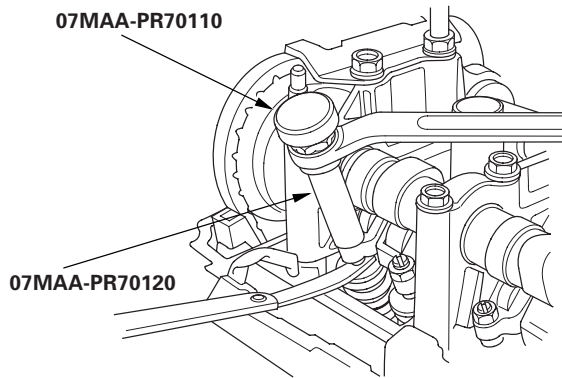


4. Insert the feeler gauge (A) between the adjusting screw (B) and the end of the valve stem, then slide it back and forth, you should feel a slight amount of drag.





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



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

Specified Torque

Intake:

7 x 0.75 mm

20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply new engine oil to the nut threads.

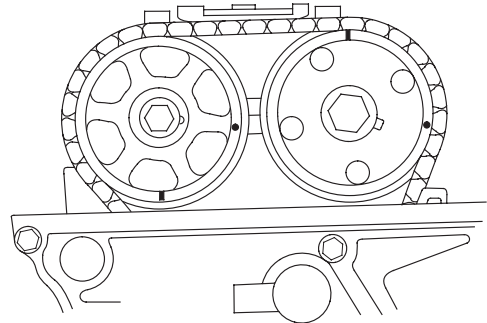
Exhaust:

7 x 0.75 mm

14 N·m (1.4 kgf·m, 10 lbf·ft)

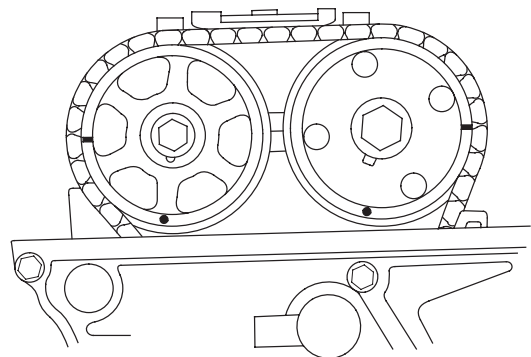
Apply new engine oil to the nut threads.

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



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

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



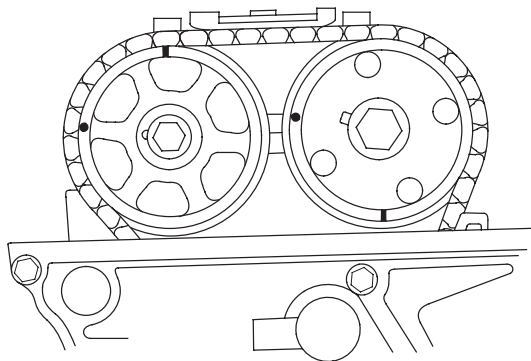
10. Check and, if necessary, adjust the valve clearance on the No. 4 cylinder.

(cont'd)

Cylinder Head

Valve Clearance Adjustment (cont'd)

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



12. Check and, if necessary, adjust the valve clearance on the No. 2 cylinder.
13. Install the cylinder head cover (see page 6-37).

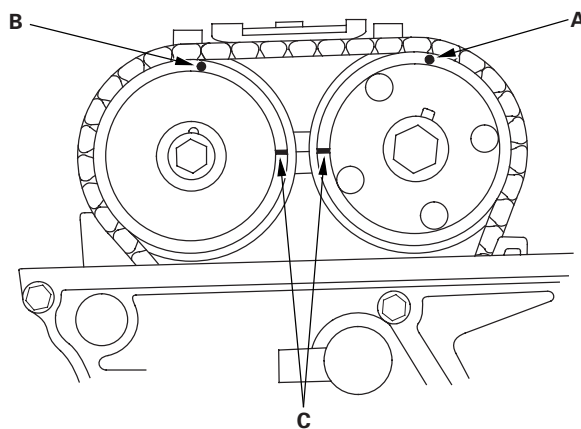
Special Tools Required

- Locknut wrench 07MAA-PR70120
- Adjuster 07MAA-PR70110

K20Z3 engine

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

1. Remove the cylinder head cover (see page 6-36).
2. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.



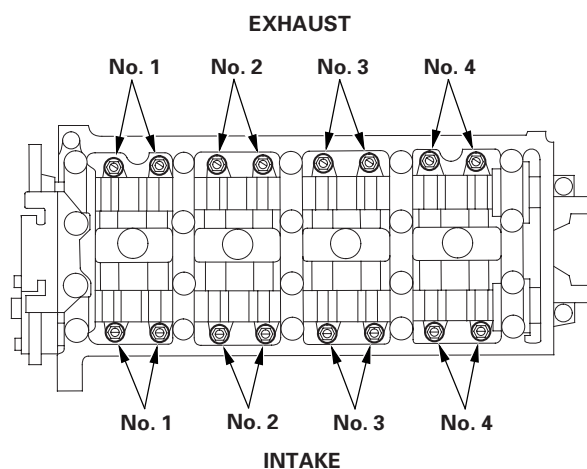


3. Select the correct feeler gauge for the valve clearance you are going to check.

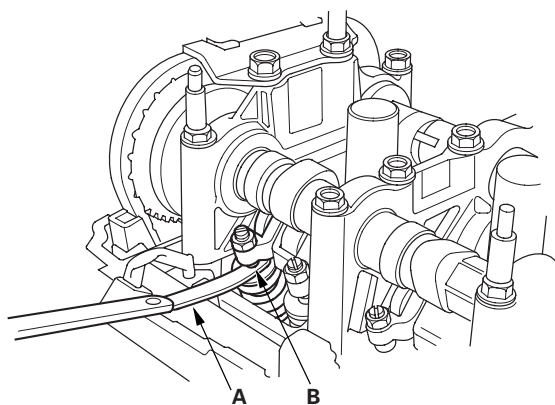
Valve Clearance

Intake: 0.21—0.25 mm (0.008—0.010 in.)

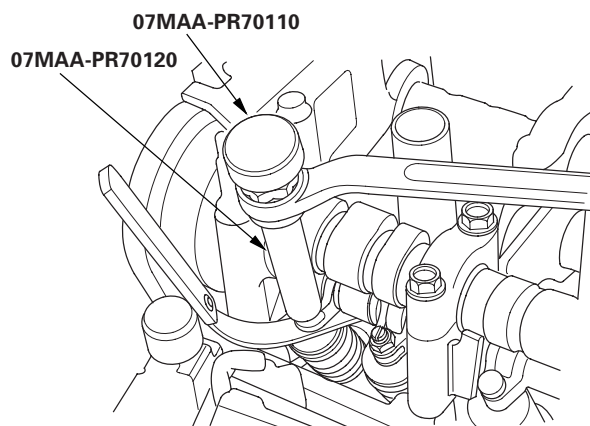
Exhaust: 0.25—0.29 mm (0.010—0.011 in.)



4. Insert the feeler gauge (A) between the adjusting screw (B) and the end of the valve stem, then 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 with the locknut wrench and the adjuster, and turn the adjusting screw until the drag on the feeler gauge is correct.



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

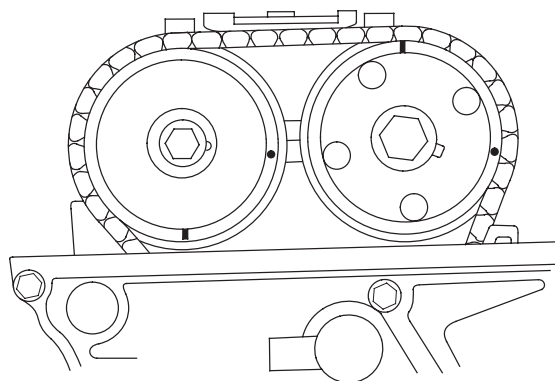
Specified Torque

7 x 0.75 mm

20 N·m (2.0 kgf·m, 14 lbf·ft)

Apply new engine oil to the nut threads.

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



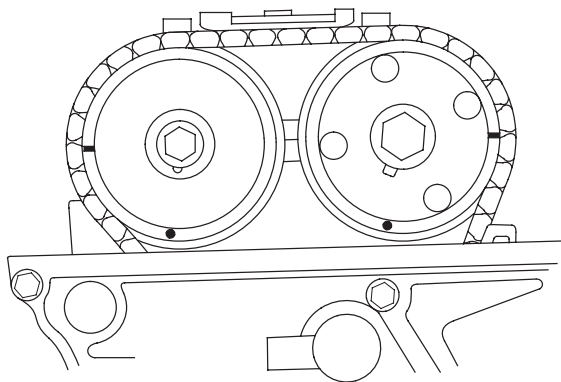
8. Check and, if necessary, adjust the valve clearance on the No. 3 cylinder.

(cont'd)

Cylinder Head

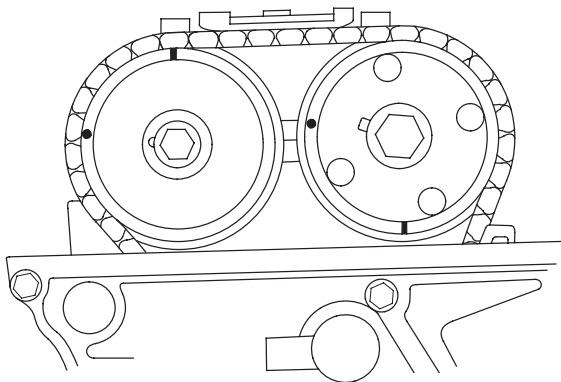
Valve Clearance Adjustment (cont'd)

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



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

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



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

13. Install the cylinder head cover (see page 6-37).

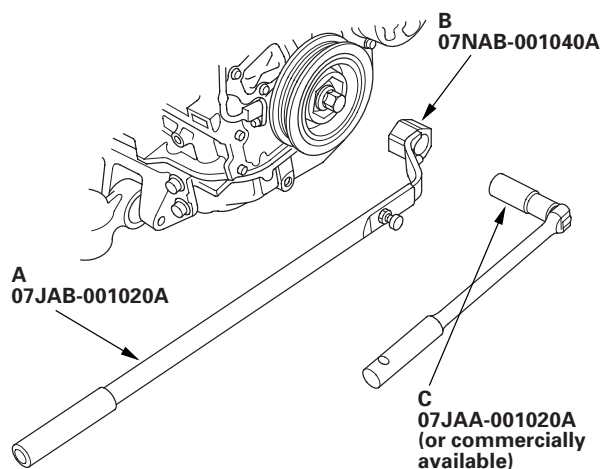
Crankshaft Pulley Removal and Installation

Special Tools Required

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

Removal

1. Remove the right front wheels.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the drive belt (see page 4-31).
4. Hold the crankshaft pulley with holder handle (A) and holder attachment (B).

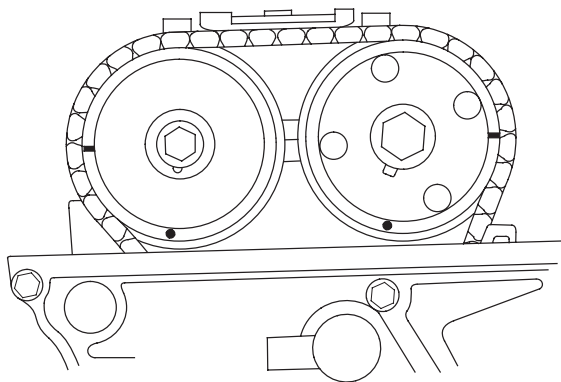


5. Remove the bolt with a socket, 19 mm (C) and a breaker bar, then remove the crankshaft pulley.

Cylinder Head

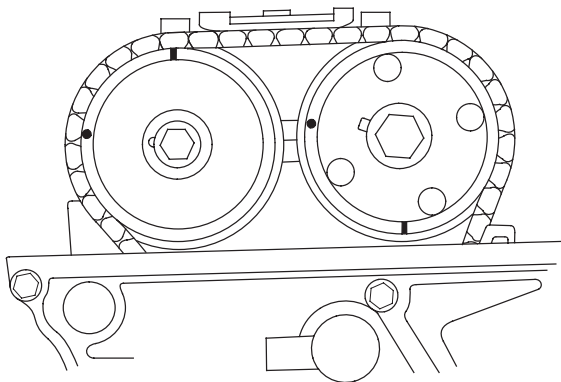
Valve Clearance Adjustment (cont'd)

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



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

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



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

13. Install the cylinder head cover (see page 6-37).

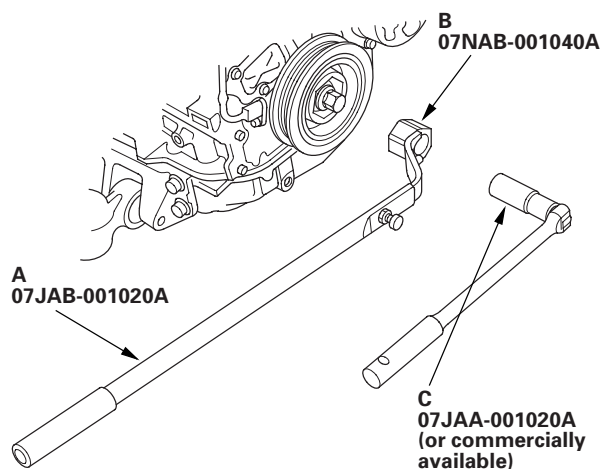
Crankshaft Pulley Removal and Installation

Special Tools Required

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

Removal

1. Remove the right front wheels.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the drive belt (see page 4-31).
4. Hold the crankshaft pulley with holder handle (A) and holder attachment (B).



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

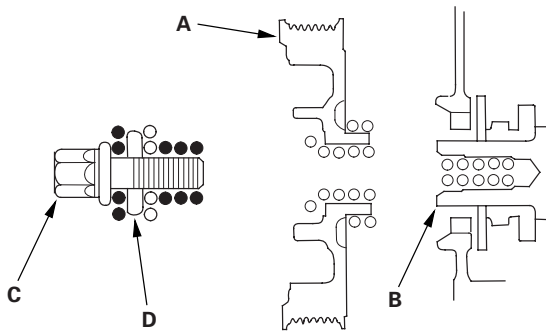


Installation

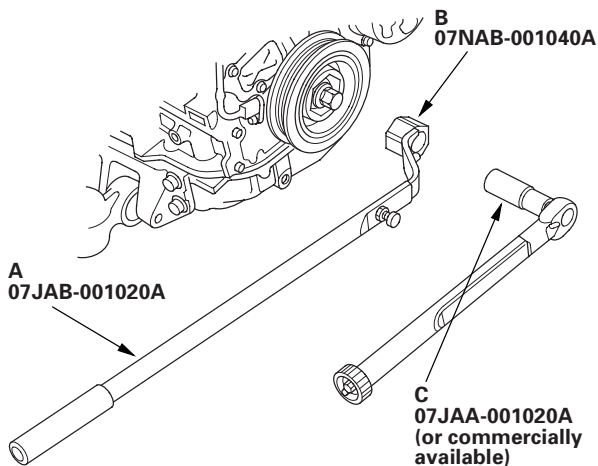
1. Clean the crankshaft pulley (A), crankshaft (B), bolt (C), and washer (D). Lubricate with new engine oil as shown.

○: Clean

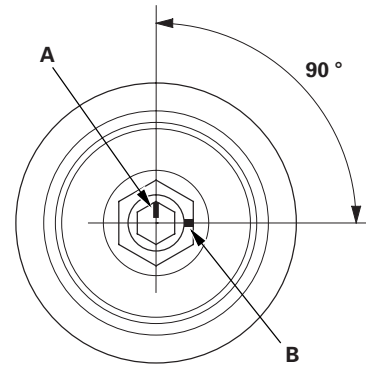
●: Lubricate with the new engine oil



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



3. Tighten the bolt to 49 N·m (5.0 kgf·m, 36 lbf·ft) with a torque wrench and the socket, 19 mm (C). Do not use an impact wrench. If the pulley bolt or crankshaft are new, tighten the bolt to 177 N·m (18.0 kgf·m, 130 lbf·ft), then remove the bolt and tighten it to 49 N·m (5.0 kgf·m, 36 lbf·ft).
4. Mark the bolt head (A) and the crankshaft pulley (B) as shown, then tighten the bolt an additional 90° (The mark on the bolt head line up with the mark on the crankshaft pulley).



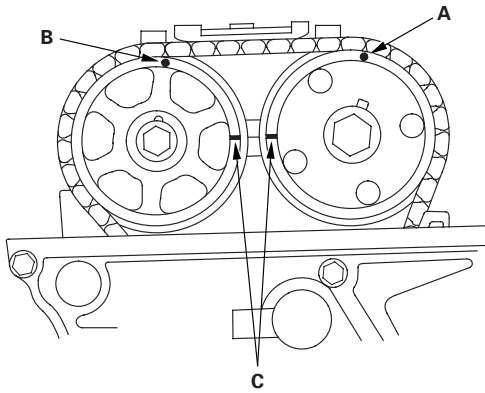
5. Install the drive belt (see page 4-31).
6. Install the splash shield (see step 40 on page 5-20).
7. Install the right front wheels.

Cylinder Head

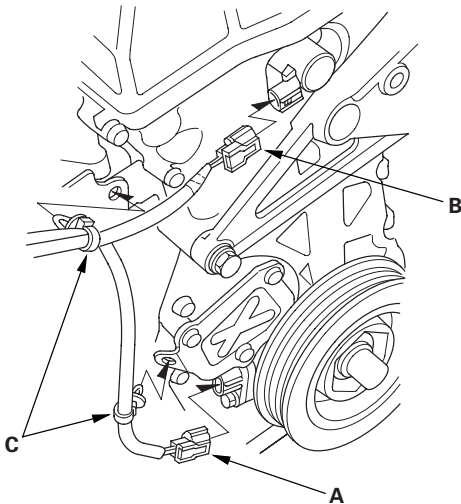
Cam Chain Removal

NOTE: Keep the cam chain away from magnetic fields.

1. Remove the front wheels.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the drive belt (see page 4-31).
4. Remove the cylinder head cover (see page 6-36).
5. Set the No. 1 piston at top dead center (TDC). The punch mark (A) on the variable valve timing control (VTC) actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.

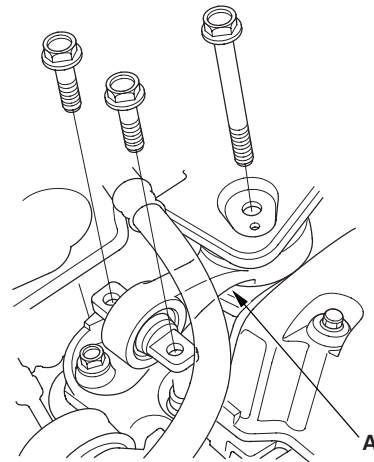


6. Disconnect the crankshaft position (CKP) sensor connector (A) and the VTC oil control solenoid valve connector (B), and remove the harness clamps (C).

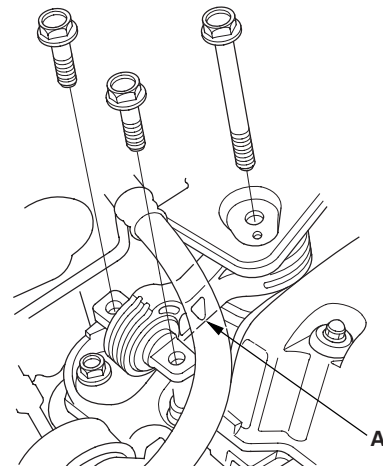


7. Remove the VTC oil control solenoid valve (see page 11-294).
8. Remove the crankshaft pulley (see page 6-16).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod (A).

M/T model

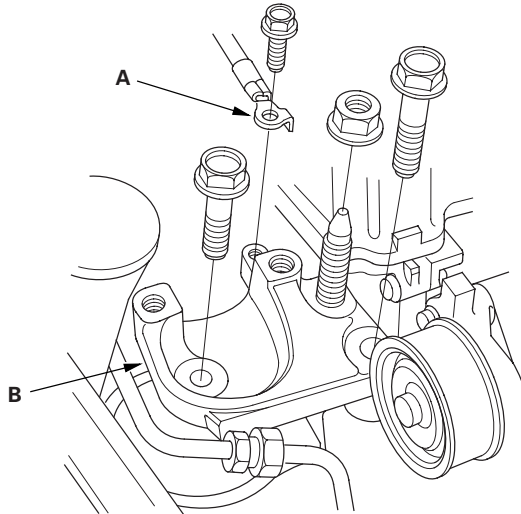


A/T model

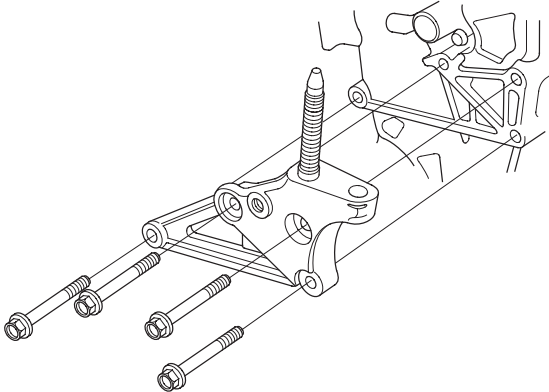




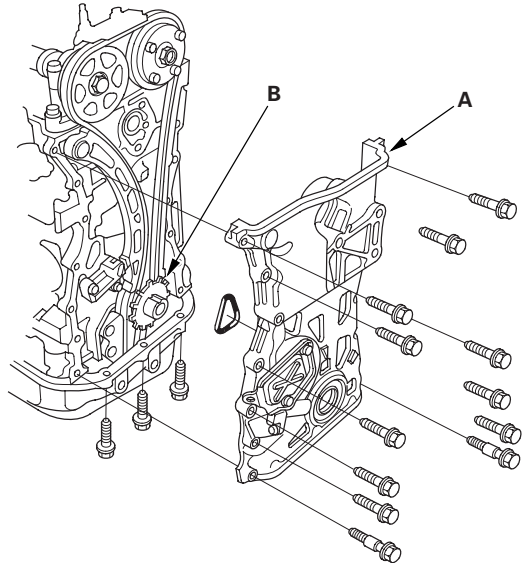
11. Remove the ground cable (A), then remove the side engine mount bracket (B).



12. Remove the side engine mount bracket.

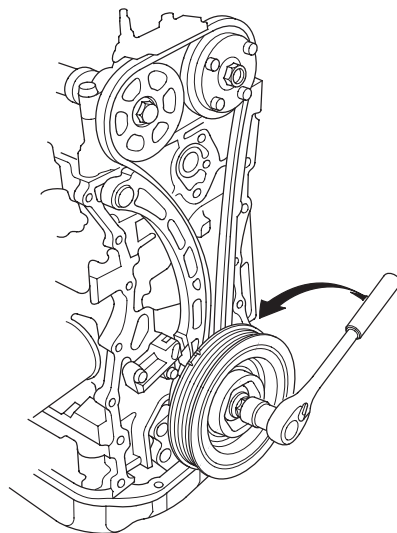


13. Remove the cam chain case (A), then remove the CKP pulse plate (B).



14. Loosely install the crankshaft pulley.

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



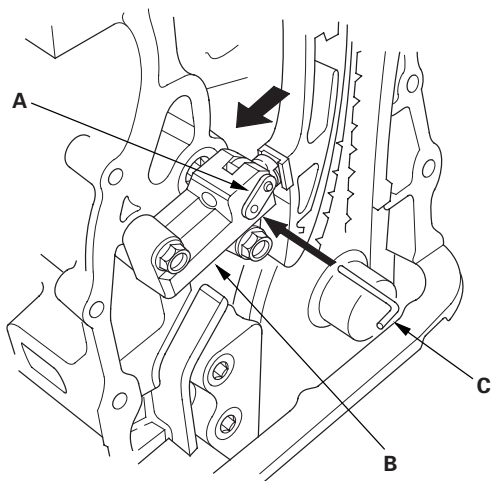
(cont'd)

Cylinder Head

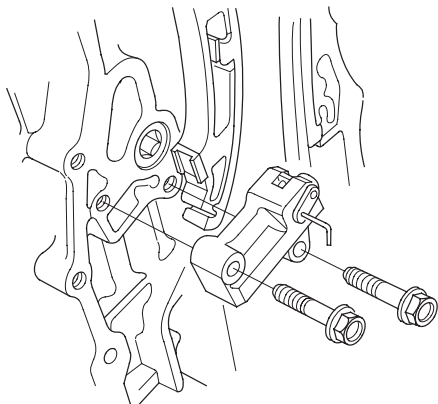
Cam Chain Removal (cont'd)

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

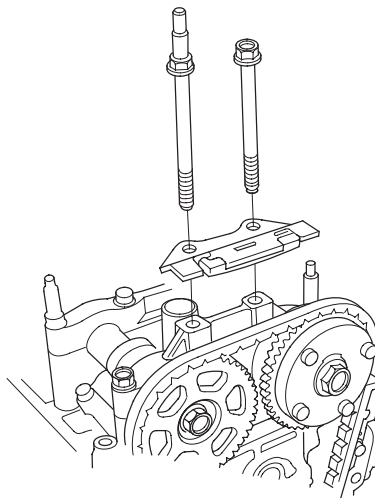
NOTE: Check the auto-tensioner cam position. If the position is not aligned, set the first cam to the first edge of the rack (see step 8 on page 6-22).



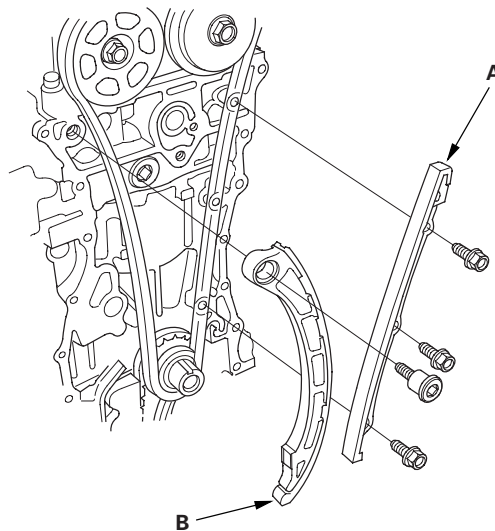
17. Remove the auto-tensioner, then remove the crankshaft pulley.



18. Remove cam chain guide B.



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



20. Remove the cam chain.



Cam Chain Installation

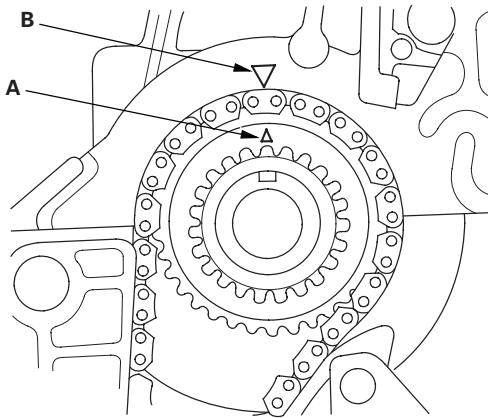
Special Tools Required

Camshaft lock pin set 07AAB-RWCA120

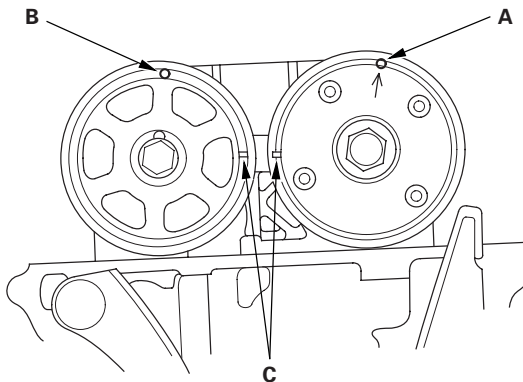
NOTE:

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

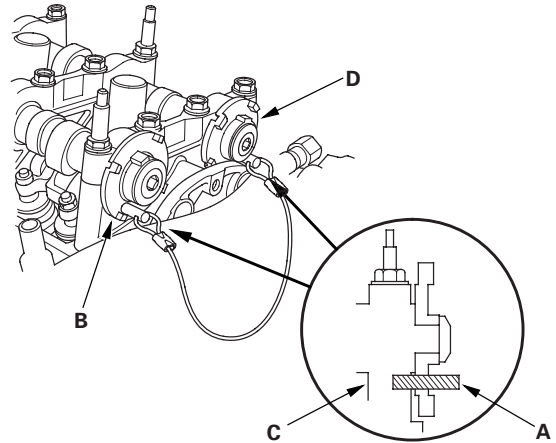
1. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.



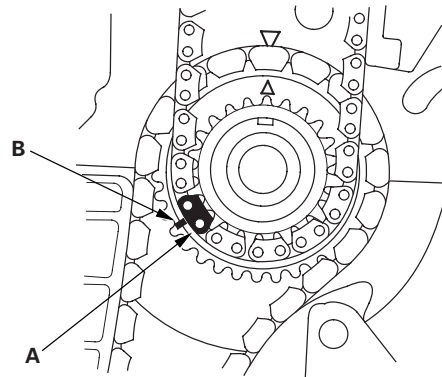
2. Set the camshafts to TDC. The punch mark (A) on the VTC actuator and the punch mark (B) on the exhaust camshaft sprocket should be at the top. Align the TDC marks (C) on the VTC actuator and the exhaust camshaft sprocket.



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



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

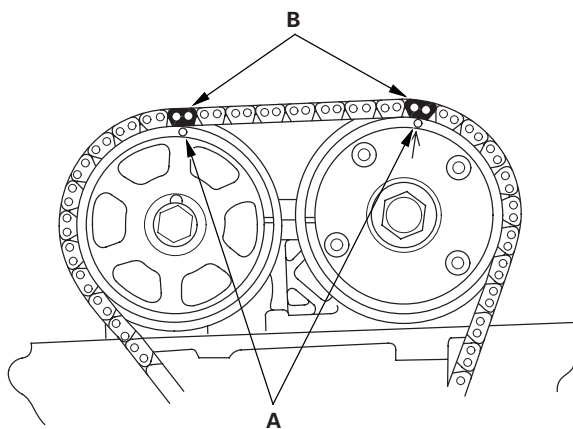


(cont'd)

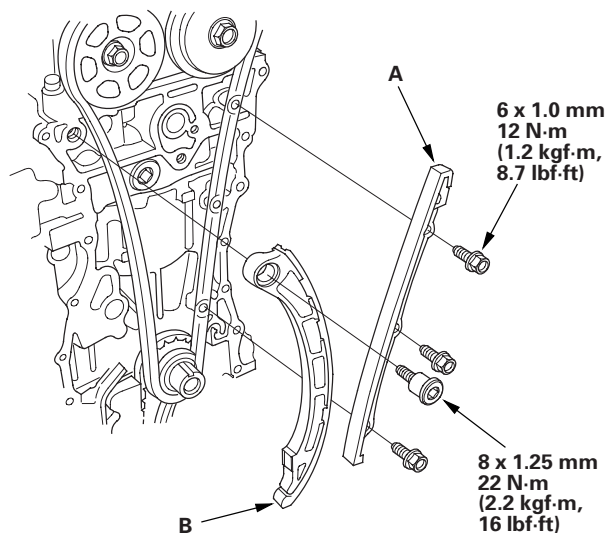
Cylinder Head

Cam Chain Installation (cont'd)

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

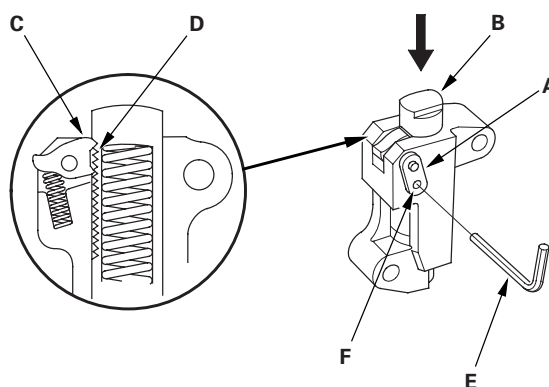


7. Install cam chain guide A and the tensioner arm (B).

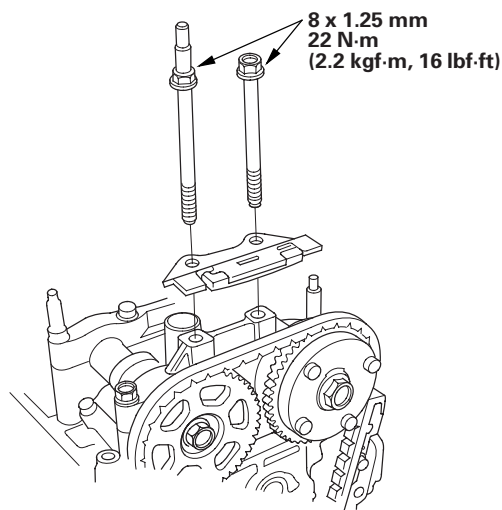


8. Compress the auto-tensioner when replacing the cam chain. Remove the pin from the auto-tensioner. Turn the plate (A) counterclockwise, to release the lock, then press the rod (B), and set the first cam (C) to the first edge of the rack (D). Insert the 1.2 mm (0.05 in.) diameter pin (E) into the holes (F).

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

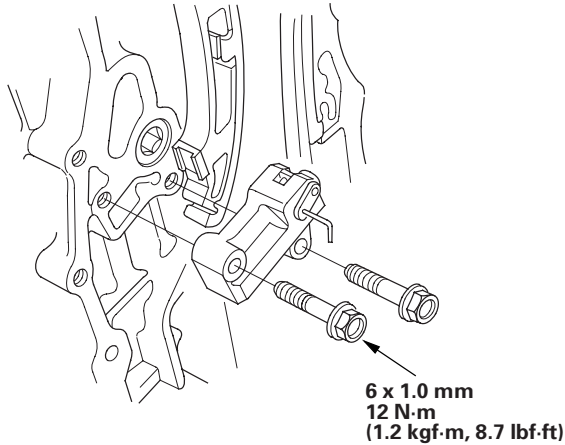


9. Install cam chain guide B.

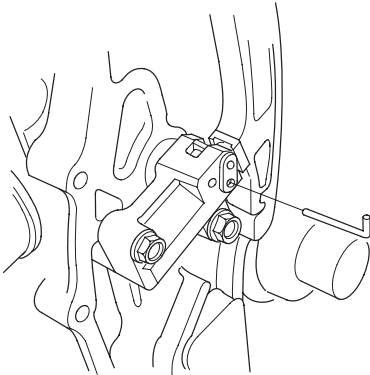




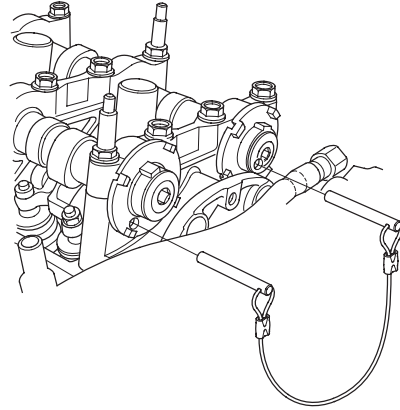
10. Install the auto-tensioner.



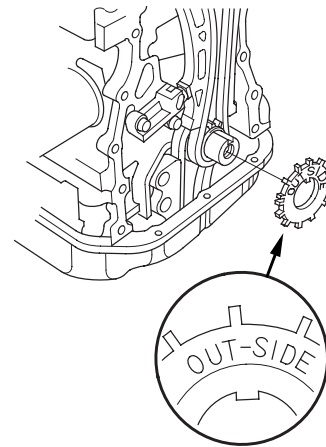
11. Remove the pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.



12. Remove the camshaft lock pin set (07AAB-RWCA120).



13. Install the crankshaft position (CKP) pulse plate.



14. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see page 6-31).
15. Remove all of the old liquid gasket from the chain case mating surfaces, bolts, and bolt holes.

(cont'd)

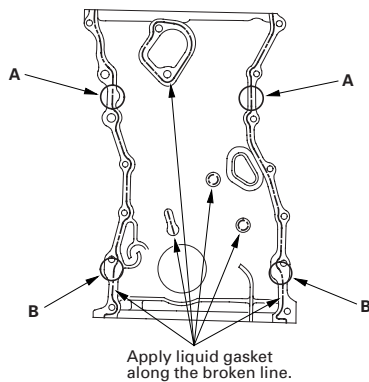
Cylinder Head

Cam Chain Installation (cont'd)

16. Clean, and dry the chain case mating surfaces.
17. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

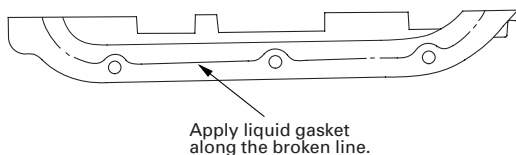
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



18. Apply liquid gasket to the engine block upper surface contact areas (A) on the chain case and lower block upper surface contact areas (B) on the chain case.
19. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

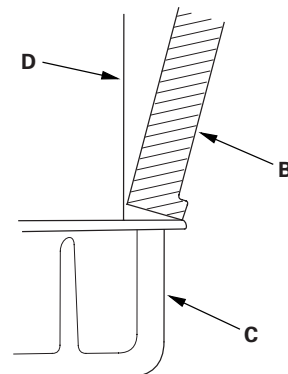
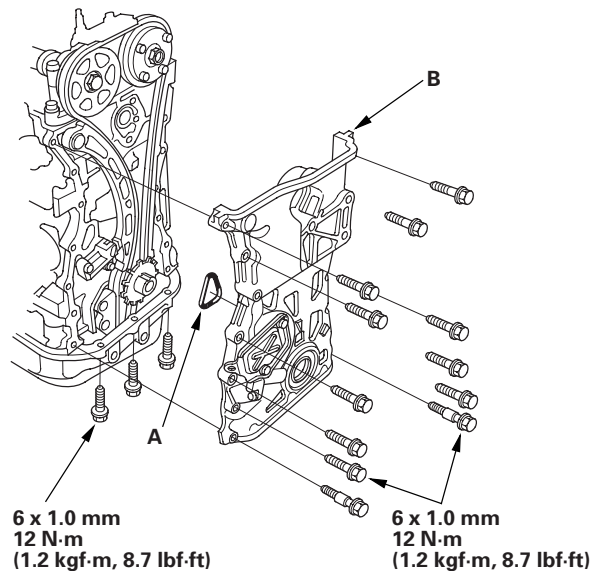
- If you apply liquid gasket P/N 08718-0012, the component must be install within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



20. Install the new O-ring (A) on the chain case. Set the edge of the chain case (B) to the edge of the oil pan (C), then install the chain case on the engine block (D). Wipe off the excess liquid gasket on the oil pan and chain case mating surface.

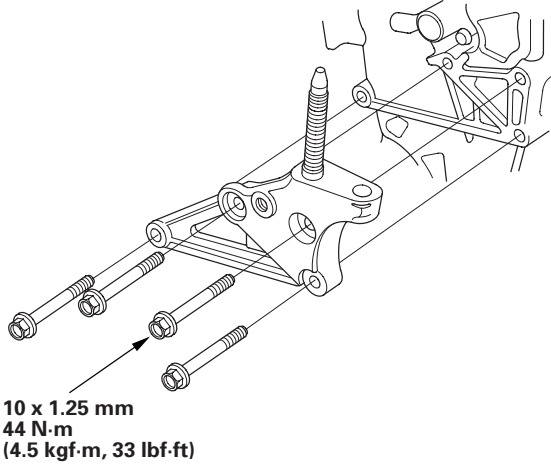
NOTE:

- 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.

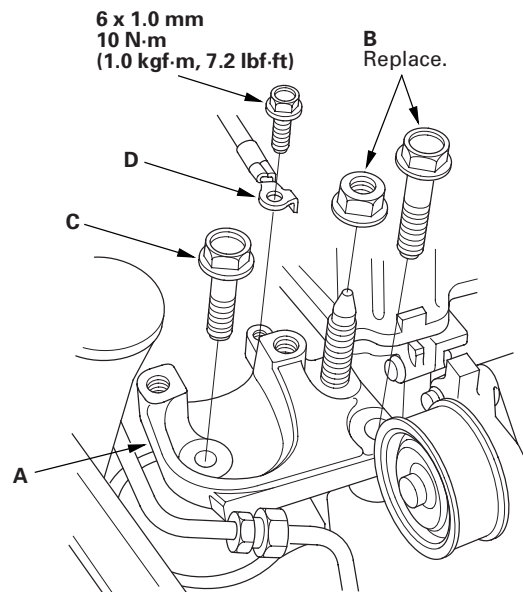




21. Install the side engine mount bracket.



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

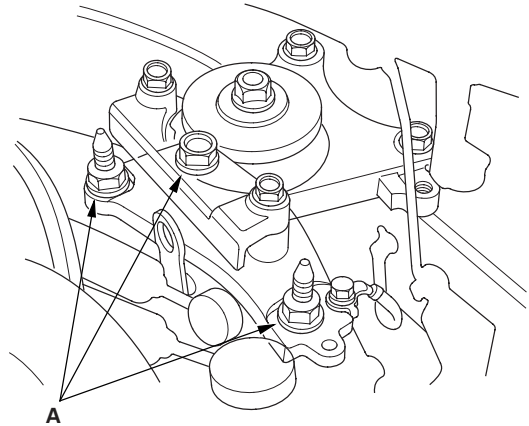


23. Install the ground cable (D).

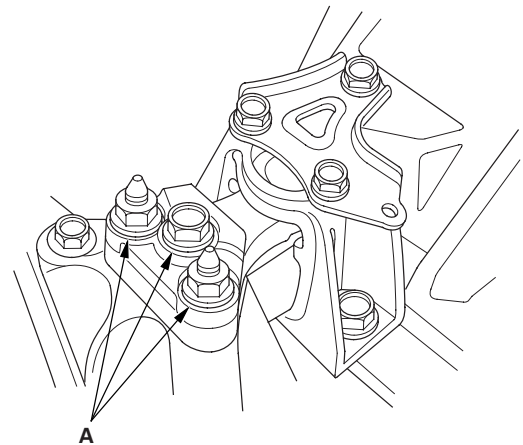
24. Remove the air cleaner assembly (see page 11-345).

25. Loosen the transmission mounting bolt and nuts (A).

M/T model



A/T model



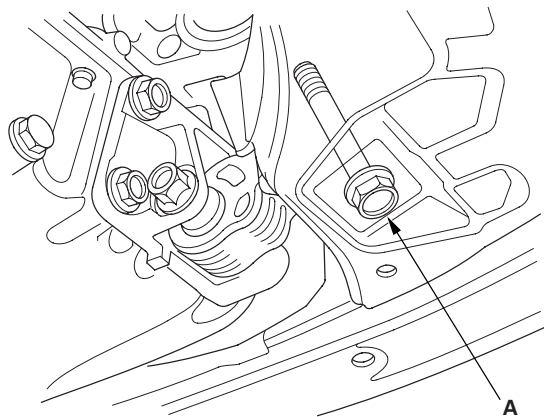
(cont'd)

Cylinder Head

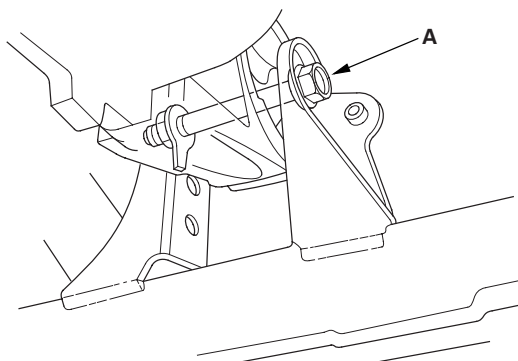
Cam Chain Installation (cont'd)

26. Raise the vehicle on the lift.

27. Loosen the lower torque rod mounting bolt (A).

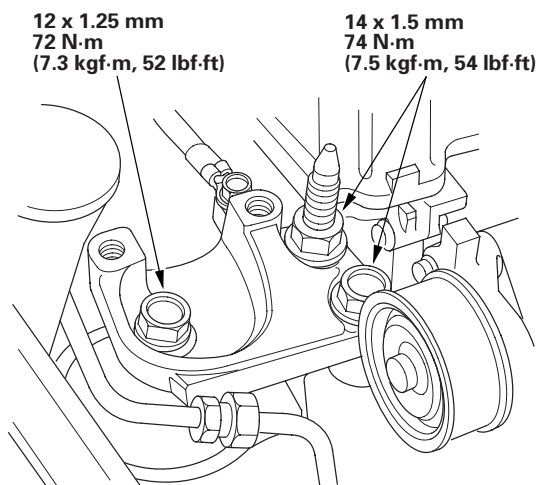


28. M/T model: Loosen the front mount mounting bolt (A).



29. Lower the vehicle on the lift.

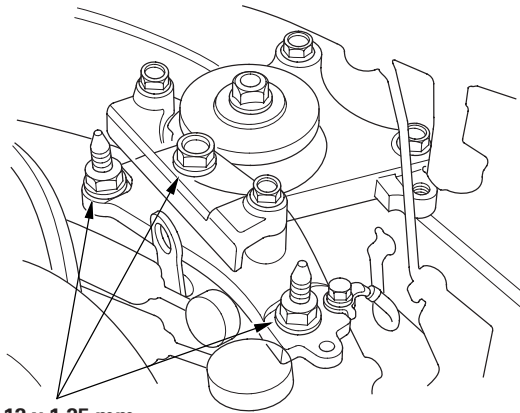
30. Tighten the side engine mount mounting bolts and nut.





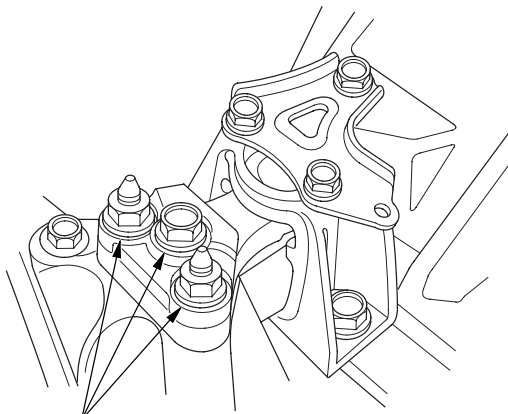
31. Tighten the transmission mounting bolt and nuts.

M/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

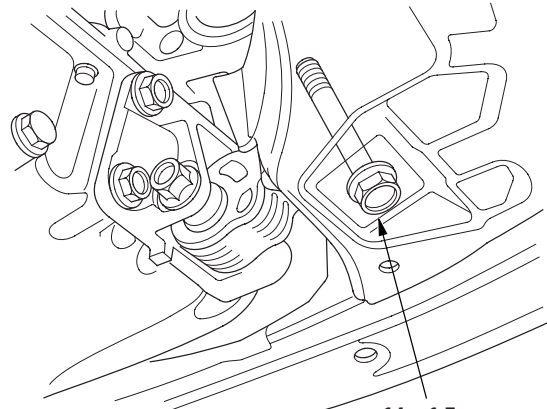
A/T model



12 x 1.25 mm
74 N·m
(7.5 kgf·m, 54 lbf·ft)

32. Raise the vehicle on the lift.

33. Tighten the lower torque rod mounting bolt.



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

34. Lower the vehicle on the lift.

35. Install the air cleaner assembly (see page 11-345).

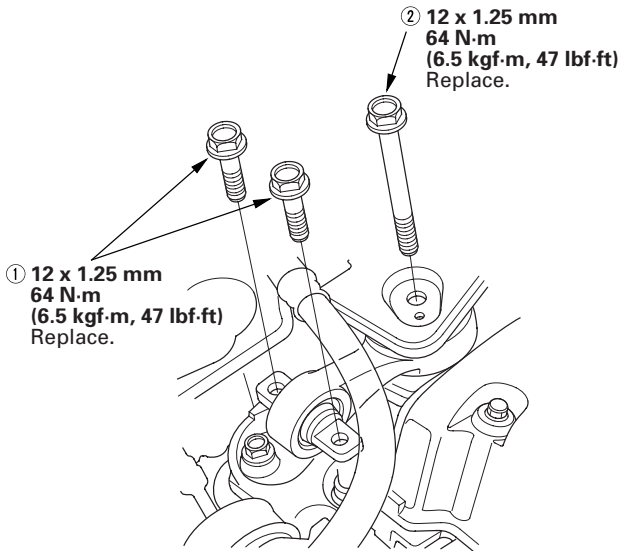
(cont'd)

Cylinder Head

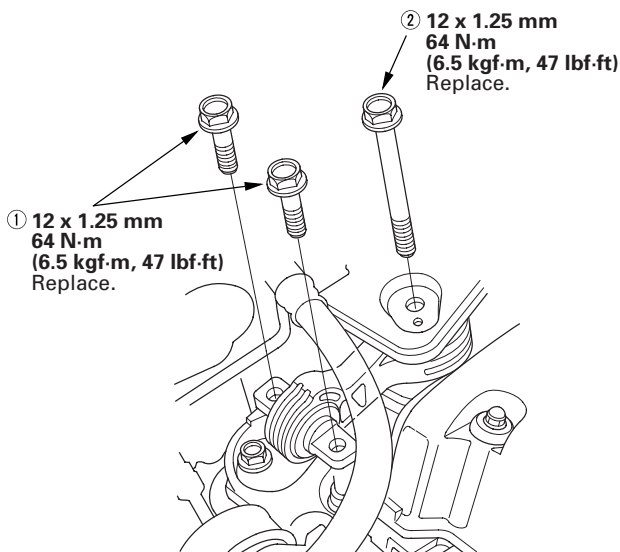
Cam Chain Installation (cont'd)

36. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown.

M/T model

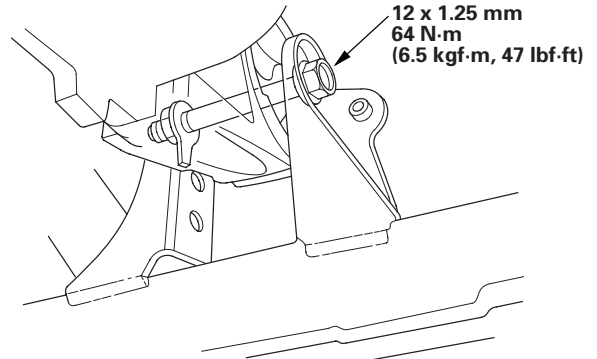


A/T model



37. Raise the vehicle on the lift.

38. M/T model: Tighten the front mount mounting bolt.

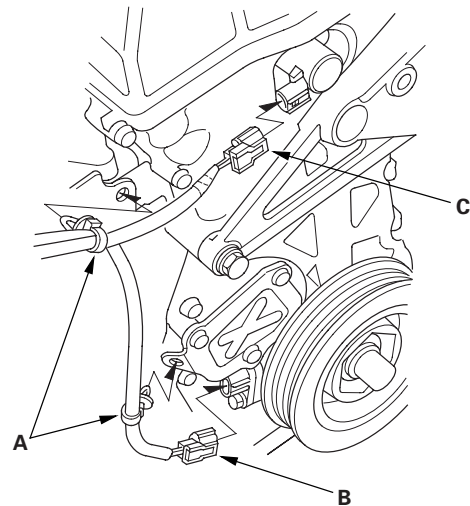


39. Install the splash shield (see step 40 on page 5-20).

40. Lower the vehicle on the lift.

41. Install the variable valve timing control (VTC) oil control solenoid valve (see page 11-294).

42. Install the harness clamps (A), and connect the CKP sensor connector (B) and the VTC oil control solenoid valve connector (C).



43. Install the crankshaft pulley (see page 6-17).

44. Install the cylinder head cover (see page 6-37).

45. Install the drive belt (see page 4-31).

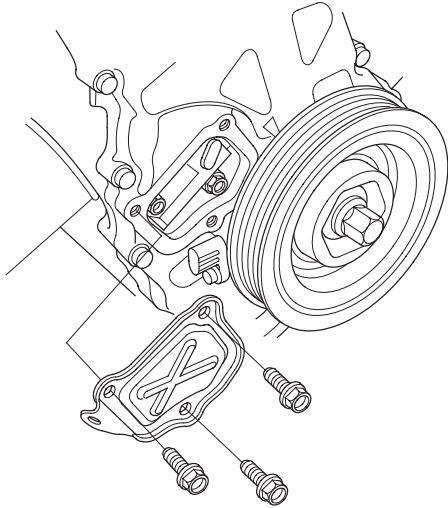
46. Do the CKP pattern clear/CKP learn procedure (see page 11-4).



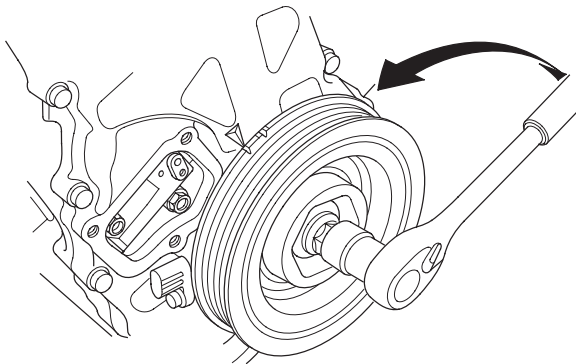
Auto-tensioner Removal and Installation

Removal

1. Remove the chain case cover.

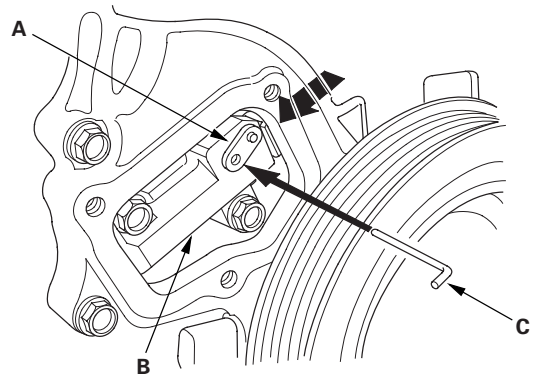


2. Turn the crankshaft counterclockwise to compress the auto-tensioner.

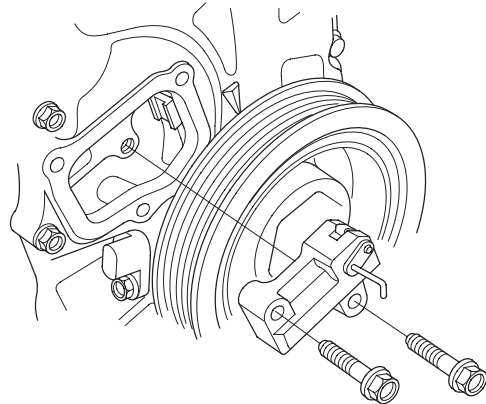


3. Align the holes on the lock (A) and the auto-tensioner (B), then insert a 1.2 mm (0.05 in.) diameter pin or lock pin (P/N 14511-PNA-003) (C) into the holes. Turn the crankshaft clockwise to secure the pin.

NOTE: Check the auto-tensioner cam position. If the position is not aligned, set the first cam to the first edge of the rack (see step 8 on page 6-22).



4. Remove the auto-tensioner.



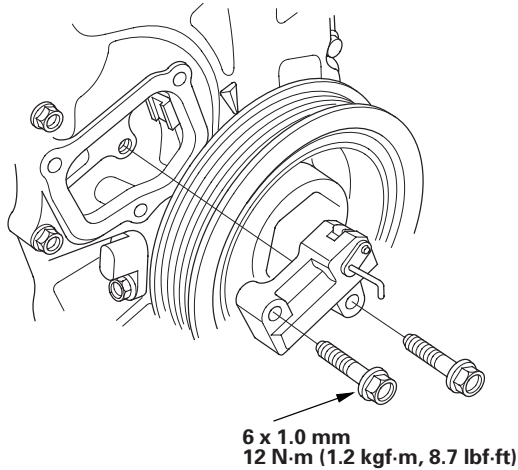
(cont'd)

Cylinder Head

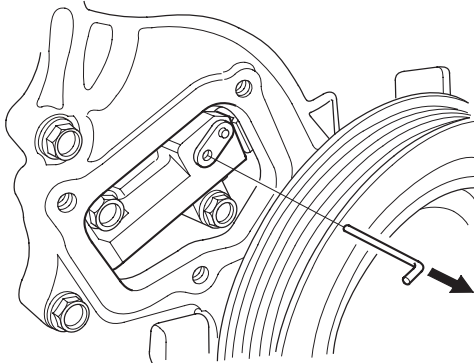
Auto-tensioner Removal and Installation (cont'd)

Installation

1. Install the auto-tensioner.



2. Remove the 1.2 mm (0.05 in.) diameter pin or lock pin (P/N 14511-PNA-003) from the auto-tensioner.

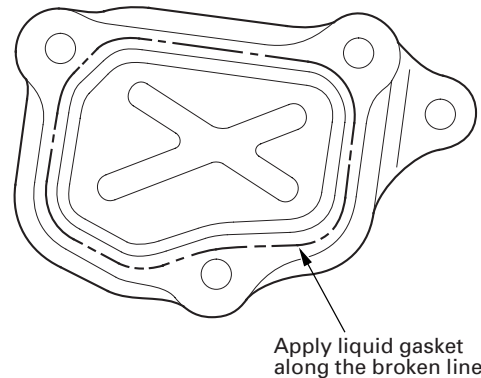


3. Remove all of the old liquid gasket from the chain case cover mating surfaces, the bolts, and the bolt holes.
4. Clean, and dry the chain case cover mating surfaces.

5. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the chain case mating surface of the chain case cover, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

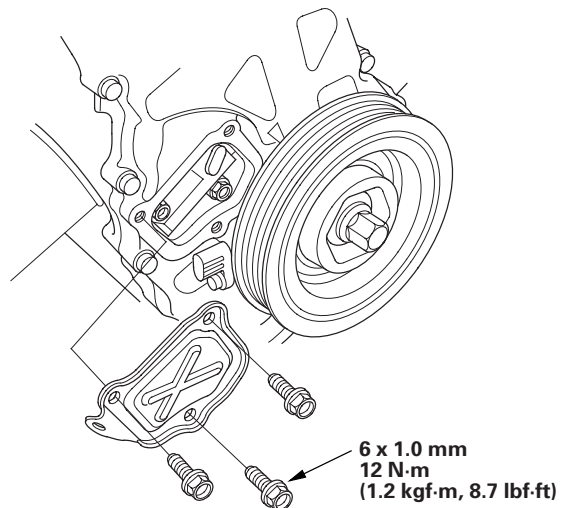
- If you apply liquid gasket P/N 08718-0012, the component must be install within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



6. Install the chain case cover.

NOTE:

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



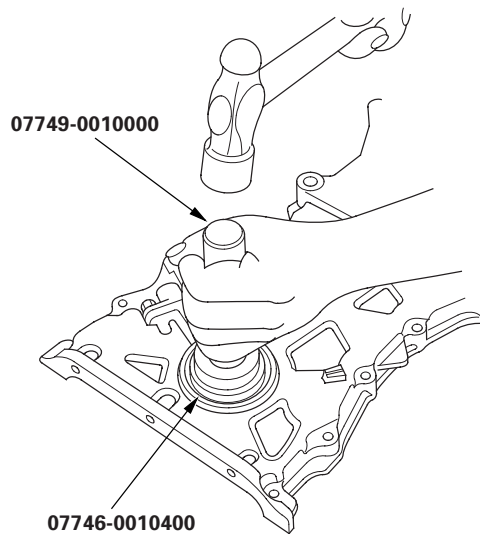


Chain Case Oil Seal Installation

Special Tools Required

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

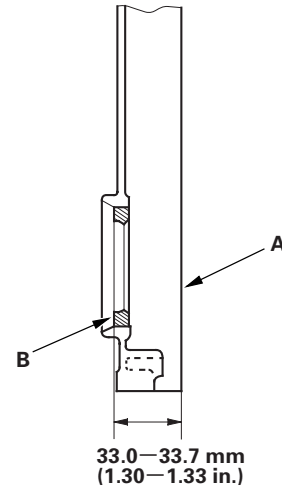
1. Apply light coat of new engine oil around the chain case oil seal.
2. Apply light coat of new engine oil to the lip of the chain case oil seal.
3. Use the driver and the attachment, 52 x 55 mm to drive a new oil seal squarely into the chain case to the specified installed height.



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

Oil Seal Installed Height:

33.0—33.7 mm (1.30—1.33 in.)



Cylinder Head

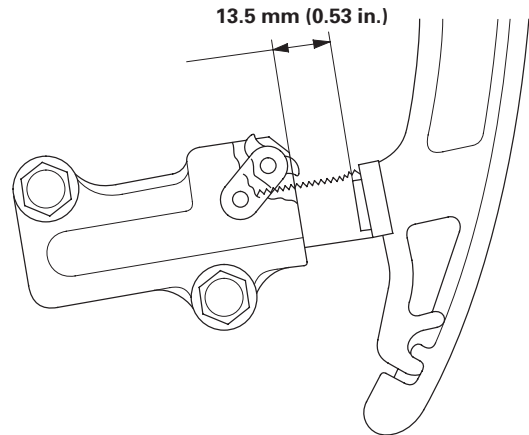
Cam Chain Inspection

1. Remove the right front wheels.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the drive belt (see page 4-31).
4. Remove the cylinder head cover (see page 6-36).
5. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC marks on the VTC actuator and the exhaust camshaft sprocket (see step 5 on page 6-18).
6. Disconnect the crankshaft position (CKP) sensor connector and the VTC oil control solenoid valve connector, and remove the harness clamps (see step 6 on page 6-18).
7. Remove the VTC oil control solenoid valve (see page 11-294).
8. Remove the crankshaft pulley (see page 6-16).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod (see step 10 on page 6-18).
11. Remove the ground cable, then remove the side engine mount bracket (see step 11 on page 6-19).
12. Remove the side engine mount bracket (see step 12 on page 6-19).
13. Remove the cam chain case (see step 13 on page 6-19).

14. Measure the tensioner rod length between the tensioner body and bottom of the flat surface section on the tensioner rod. If the length is more than the service limit, replace the cam chain and the oil pump chain.

Tensioner Rod Length

Service Limit: 13.5 mm (0.53 in.)



15. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see page 6-31).
16. Remove all of the old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
17. Clean, and dry the chain case mating surfaces.
18. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket (see step 17 on page 6-24).

NOTE:

- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
 - If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.
19. Apply liquid gasket to the engine block upper surface contact areas on the chain case and lower block upper surface contact areas on the chain case (see step 18 on page 6-24).



20. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case, and to the inside edge of the thread bolt holes. Install the component within 5 minutes of applying the liquid gasket (see step 19 on page 6-24).

NOTE:

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

21. Install the new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 20 on page 6-24). Wipe off the excess liquid gasket on the oil pan and chain case mating surface.

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.

22. Install the side engine mount bracket (see step 21 on page 6-25).
23. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 22 on page 6-25).
24. Remove the air cleaner assembly (see page 11-345).
25. Loosen the transmission mounting bolt and nuts (see step 25 on page 6-25).
26. Raise the vehicle on the lift.
27. Loosen the lower torque rod mounting bolt (see step 27 on page 6-26).
28. M/T model: Loosen the front mount mounting bolt (see step 28 on page 6-26).

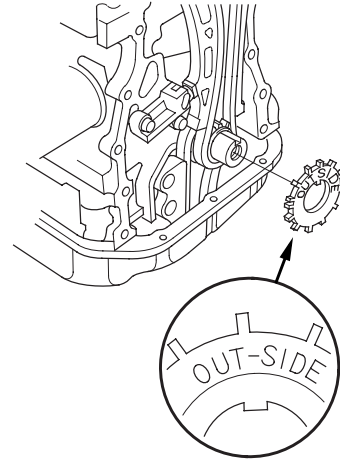
29. Lower the vehicle on the lift.
30. Tighten the side engine mount mounting bolts and nut (see step 30 on page 6-26).
31. Tighten the transmission mounting bolt and nuts (see step 31 on page 6-27).
32. Raise the vehicle on the lift.
33. Tighten the lower torque rod mounting bolt (see step 33 on page 6-27).
34. Lower the vehicle on the lift.
35. Install the air cleaner assembly (see page 11-345).
36. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 36 on page 6-28).
37. Raise the vehicle on the lift.
38. M/T model: Tighten the front mount mounting bolt (see step 38 on page 6-28).
39. Install the splash shield (see step 40 on page 5-20).
40. Lower the vehicle on the lift.
41. Install the VTC oil control solenoid valve (see page 11-294).
42. Install the harness clamps, and connect the CKP sensor connector and the VTC oil control solenoid valve connector (see step 42 on page 6-28).
43. Install the crankshaft pulley (see page 6-17).
44. Install the cylinder head cover (see page 6-37).
45. Install the drive belt (see page 4-31).
46. Do the CKP pattern clear/CKP learn procedure (see page 11-4).

Cylinder Head

CKP Pulse Plate Replacement

1. Remove the right front wheels.
2. Remove the splash shield (see step 25 on page 5-5).
3. Remove the drive belt (see page 4-31).
4. Remove the cylinder head cover (see page 6-36).
5. Set the No. 1 piston at top dead center (TDC). The punch mark on the variable valve timing control (VTC) actuator and the punch mark on the exhaust camshaft sprocket should be at the top. Align the TDC marks on the VTC actuator and the exhaust camshaft sprocket (see step 5 on page 6-18).
6. Disconnect the crankshaft position (CKP) sensor connector and the variable valve timing control (VTC) oil control solenoid valve connector, and remove the harness clamps (see step 6 on page 6-18).
7. Remove the VTC oil control solenoid valve (see page 11-294).
8. Remove the crankshaft pulley (see page 6-16).
9. Support the engine with a jack and a wood block under the oil pan.
10. Remove the upper torque rod (see step 10 on page 6-18).
11. Remove the ground cable, then remove the side engine mount bracket (see step 11 on page 6-19).
12. Remove the side engine mount bracket (see step 12 on page 6-19).
13. Remove the cam chain case (see step 13 on page 6-19).

14. Remove the CKP pulse plate.



15. Install the CKP pulse plate.
 16. Check the chain case oil seal for damage. If the oil seal is damaged, replace the chain case oil seal (see page 6-31).
 17. Remove all of the old liquid gasket from the chain case mating surfaces, bolt and bolt holes.
 18. Clean, and dry the chain case mating surfaces.
 19. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket (see step 17 on page 6-24).
- NOTE:**
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
 - If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.
20. Apply liquid gasket to the engine block upper surface contact areas on the chain case and lower block upper surface contact areas on the chain case (see step 18 on page 6-24).



21. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the oil pan mating surface of the chain case, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket (see step 19 on page 6-24).

NOTE:

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

22. Install the new O-ring on the chain case. Set the edge of the chain case to the edge of the oil pan, then install the chain case on the engine block (see step 20 on page 6-24). Wipe off the excess liquid gasket on the oil pan and chain case mating surface.

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.

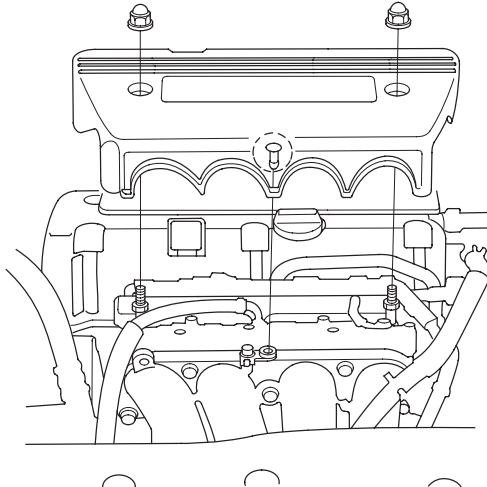
23. Install the side engine mount bracket (see step 21 on page 6-25).
24. Install the side engine mount bracket, then loosely tighten the new bolt and nut, and loosely tighten the bolt. Install the ground cable (see step 22 on page 6-25).
25. Remove the air cleaner assembly (see page 11-345).
26. Loosen the transmission mounting bolt and nuts (see step 25 on page 6-25).
27. Raise the vehicle on the lift.
28. Loosen the lower torque rod mounting bolt (see step 27 on page 6-26).
29. M/T model: Loosen the front mount mounting bolt (see step 28 on page 6-26).

30. Lower the vehicle on the lift.
31. Tighten the side engine mount mounting bolts and nut (see step 30 on page 6-26).
32. Tighten the transmission mounting bolt and nuts (see step 31 on page 6-27).
33. Raise the vehicle on the lift.
34. Tighten the lower torque rod mounting bolt (see step 33 on page 6-27).
35. Lower the vehicle on the lift.
36. Install the air cleaner assembly (see page 11-345).
37. Install the upper torque rod, then tighten the new upper torque rod mounting bolts in the numbered sequence shown (see step 36 on page 6-28).
38. Raise the vehicle on the lift.
39. M/T model: Tighten the front mount mounting bolt (see step 38 on page 6-28).
40. Install the splash shield (see step 40 on page 5-20).
41. Lower the vehicle on the lift.
42. Install the VTC oil control solenoid valve (see page 11-294).
43. Install the harness clamps, and connect the CKP sensor connector and the VTC oil control solenoid valve connector (see step 42 on page 6-28).
44. Install the crankshaft pulley (see page 6-17).
45. Install the cylinder head cover (see page 6-37).
46. Install the drive belt (see page 4-31).
47. Do the CKP pattern clear/CKP learn procedure (see page 11-4).

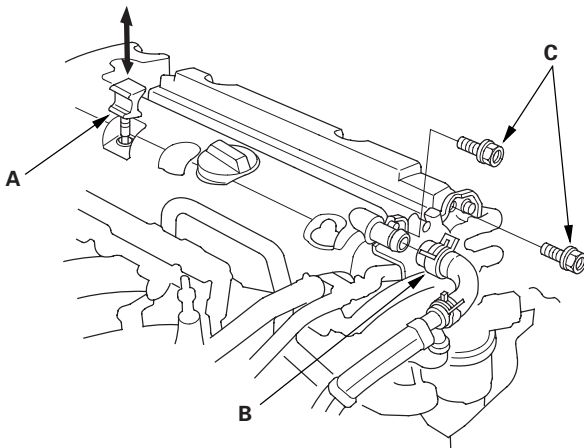
Cylinder Head

Cylinder Head Cover Removal

1. Remove the engine cover.

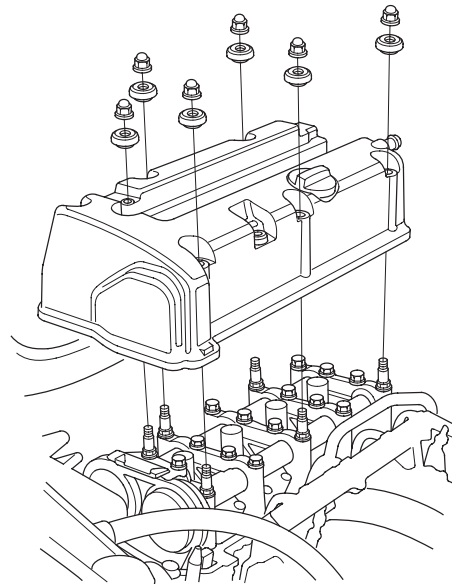


2. Remove the four ignition coils (see page 4-21).
3. Disconnect the evaporative emission (EVAP) canister purge valve connector.
4. Remove the dipstick (A), and disconnect the breather hose (B).



5. Remove two bolts (C) securing the evaporative emission (EVAP) canister purge valve bracket.

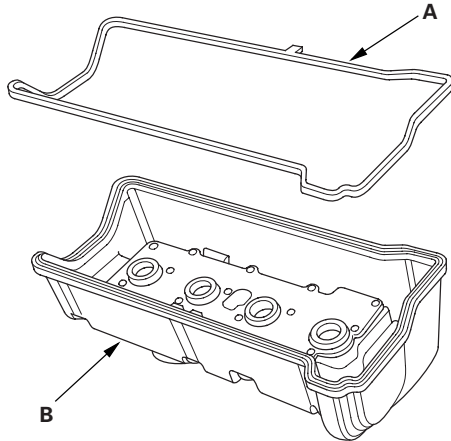
6. Remove the cylinder head cover.





Cylinder Head Cover Installation

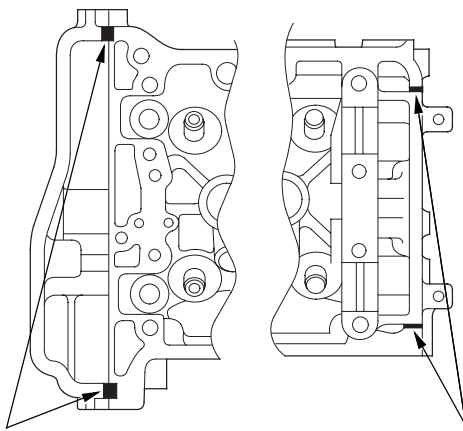
1. Thoroughly clean the head cover gasket and the groove.
2. Install the head cover gasket (A) in the groove of the cylinder head cover (B).



3. Check that the mating surfaces are clean and dry.
4. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the chain case and the No. 5 rocker shaft holder mating areas. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

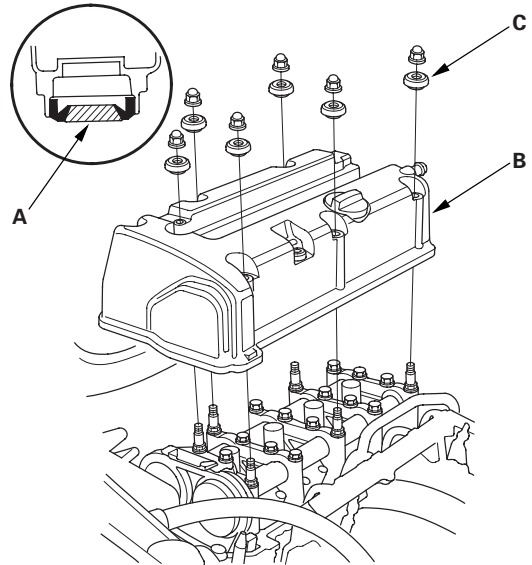
- If you apply liquid gasket P/N 08718-0012, the component must be installed within 4 minutes.
- If too much time has passed after applying the liquid gasket, remove the old liquid gasket and residue, then reapply new liquid gasket.



Apply liquid gasket to these points.

Apply liquid gasket to these points.

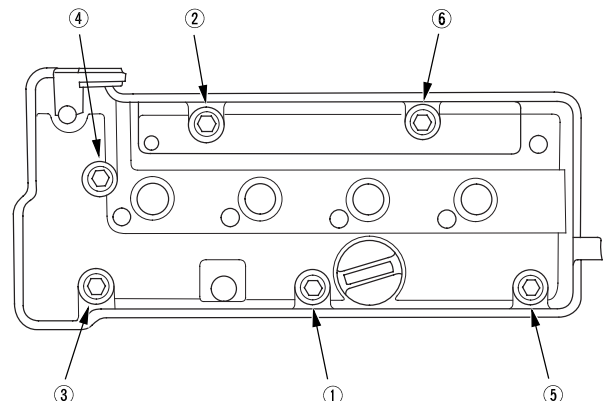
5. Set the spark plug seals (A) on the spark plug tubes. Place the cylinder head cover (B) on the cylinder head, then slide the cover slightly back and forth to seat the head cover gasket.



6. Inspect the cover washers (C). Replace any washer that is damaged or deteriorated.
7. Tighten the bolts in three steps. In the final step tighten all bolts, in sequence, to 12 N·m (1.2 kgf·m, 8.7 lbf·ft).

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.

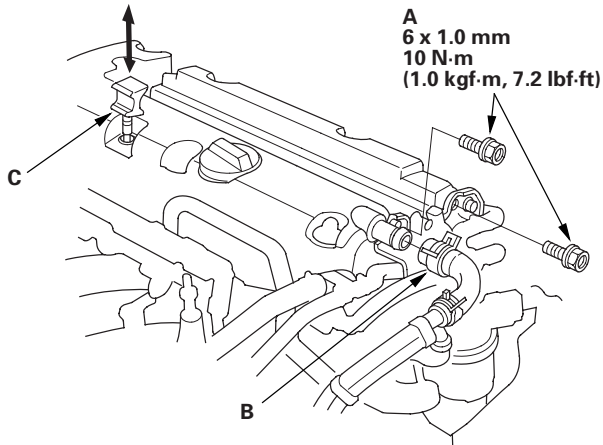


(cont'd)

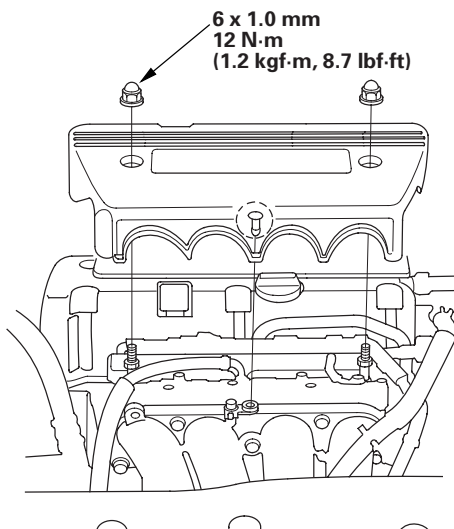
Cylinder Head

Cylinder Head Cover Installation (cont'd)

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



9. Connect the breather hose (B), and install the dipstick (C).
10. Connect the evaporative emission (EVAP) canister purge valve connector.
11. Install the four ignition coils (see page 4-21).
12. Install the engine cover.

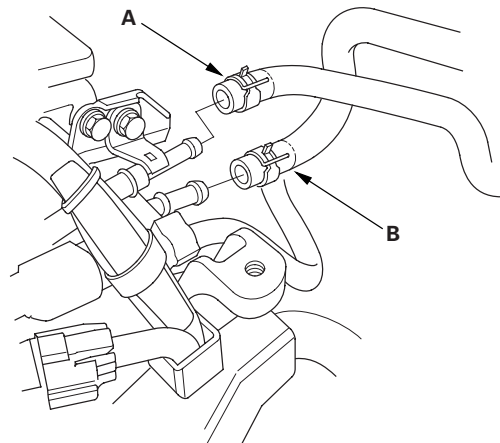


Cylinder Head Removal

NOTE:

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

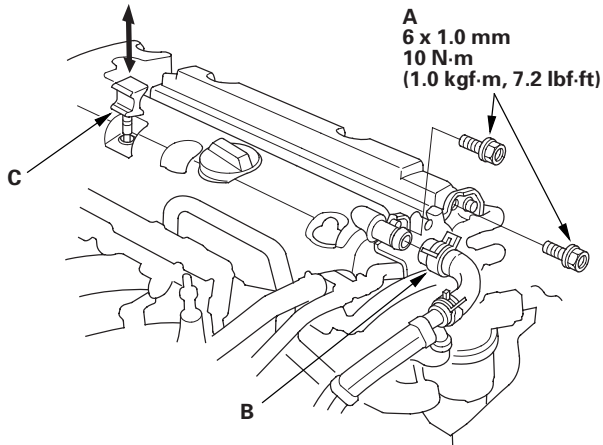
1. Relieve the fuel pressure (see page 11-322).
2. Drain the engine coolant (see page 10-8).
3. Remove the air cleaner assembly (see page 11-345).
4. Remove the drive belt (see page 4-31).
5. Remove the intake manifold:
 - K20Z2 engine (see page 9-3)
 - K20Z3 engine (see page 9-7)
6. Remove the exhaust manifold (see page 9-11).
7. Disconnect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).



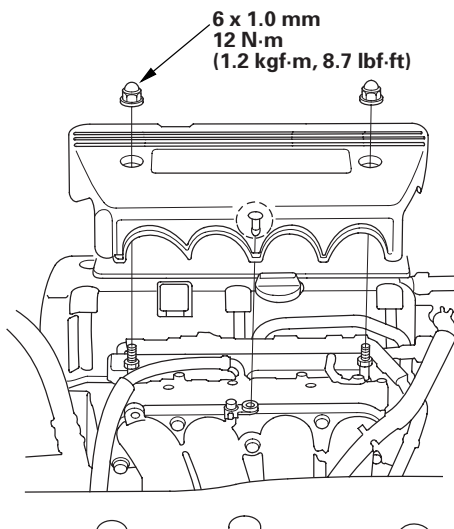
Cylinder Head

Cylinder Head Cover Installation (cont'd)

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



9. Connect the breather hose (B), and install the dipstick (C).
10. Connect the evaporative emission (EVAP) canister purge valve connector.
11. Install the four ignition coils (see page 4-21).
12. Install the engine cover.

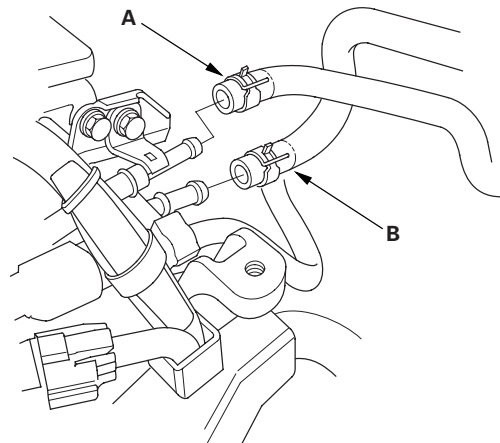


Cylinder Head Removal

NOTE:

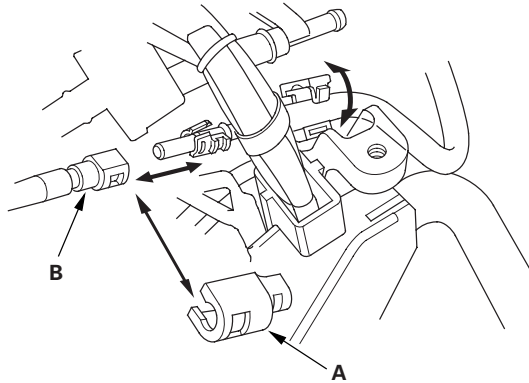
- Use fender covers to avoid damaging the painted surfaces.
- To avoid damaging the wire and terminals, unplug the wiring connectors carefully while holding the connector portion.
- Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3), and monitor the engine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

1. Relieve the fuel pressure (see page 11-322).
2. Drain the engine coolant (see page 10-8).
3. Remove the air cleaner assembly (see page 11-345).
4. Remove the drive belt (see page 4-31).
5. Remove the intake manifold:
 - K20Z2 engine (see page 9-3)
 - K20Z3 engine (see page 9-7)
6. Remove the exhaust manifold (see page 9-11).
7. Disconnect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).

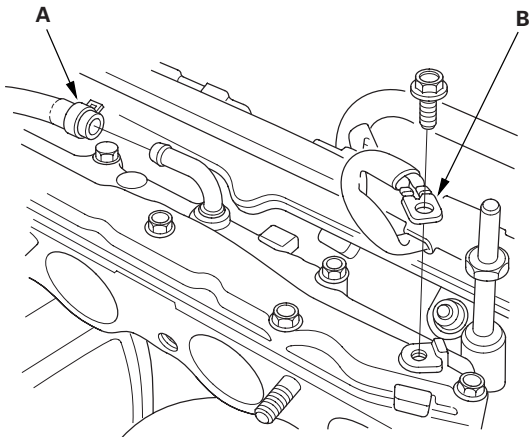




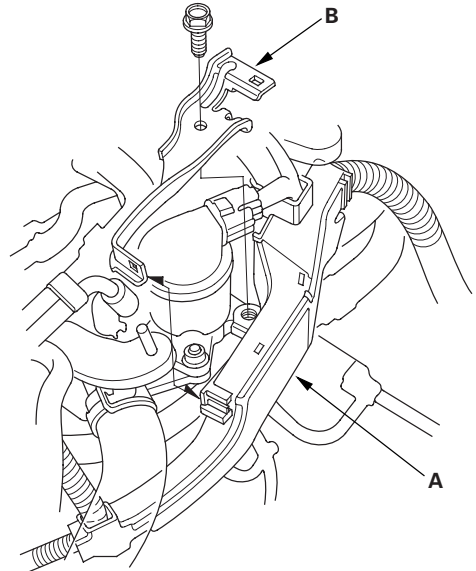
8. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-329).



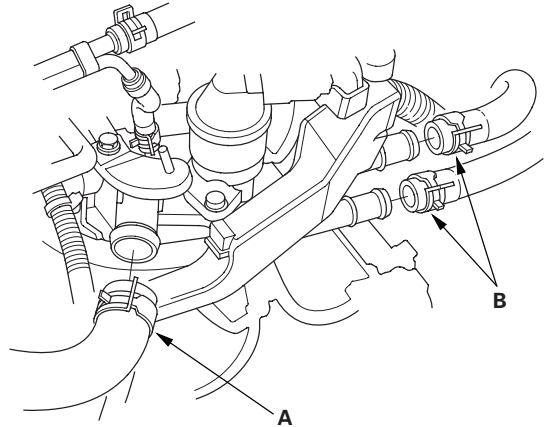
9. Disconnect the positive crankcase ventilation (PCV) hose (A) (K20Z2 engine) and remove the ground cable (B).



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



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

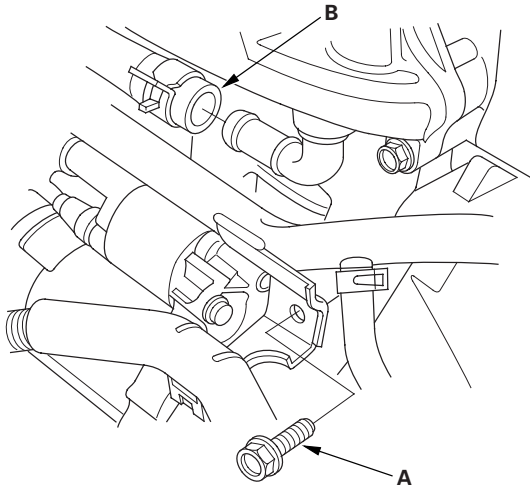


(cont'd)

Cylinder Head

Cylinder Head Removal (cont'd)

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



13. Disconnect the water bypass hose (B).

14. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the cylinder head.

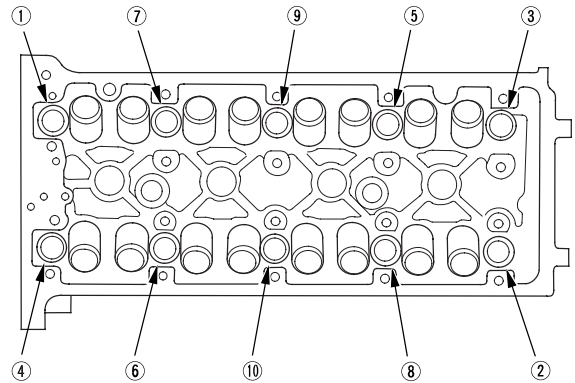
- Four fuel injector connectors
- Engine coolant temperature (ECT) sensor 1 connector
- Camshaft position (CMP) sensor A (Intake) connector
- Camshaft position (CMP) sensor B (Exhaust) connector
- Rocker arm oil control valve connector
- Rocker arm oil pressure switch connector
- EVAP canister purge valve connector
- Variable valve timing control (VTC) oil control solenoid valve connector
- Exhaust gas recirculation (EGR) valve connector (K20Z2 engine)
- Engine oil pressure switch connector

15. Remove the cam chain (see page 6-18).

16. Remove the rocker arm assembly:

- K20Z2 engine (see page 6-43)
- K20Z3 engine (see page 6-44)

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

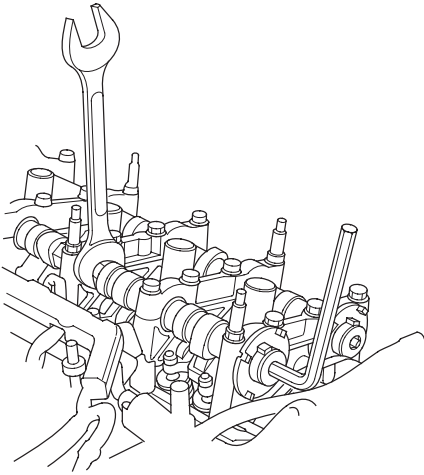


18. Remove the cylinder head.

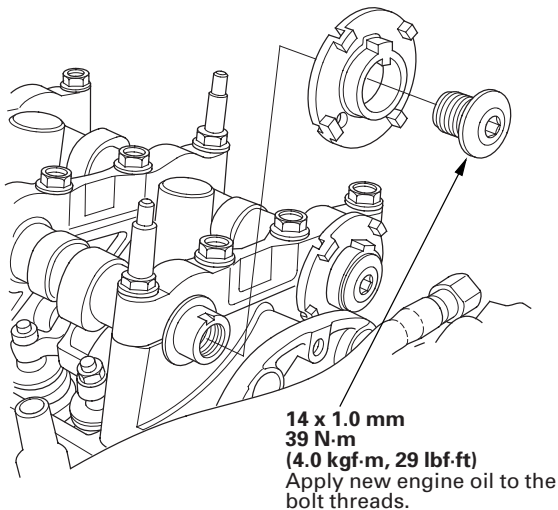


CMP Pulse Plate A Replacement

1. Remove the cylinder head cover (see page 6-36).
2. Remove camshaft position (CMP) sensor A (see page 11-295).
3. Hold the intake camshaft with an open-end wrench, then loosen the bolt.



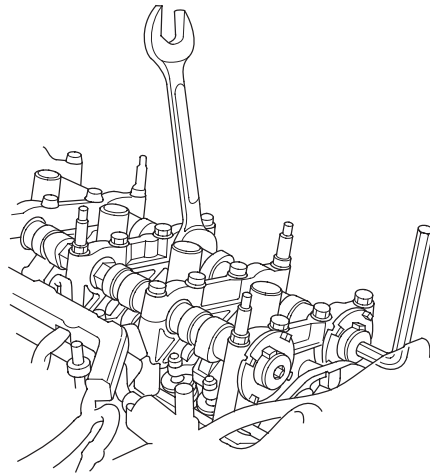
4. Remove CMP pulse plate A.



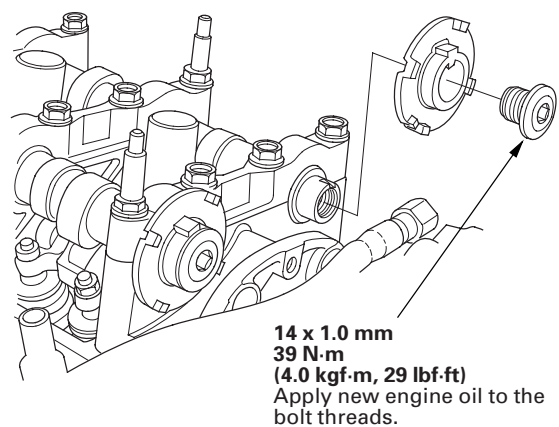
5. Install CMP pulse plate A in the reverse order of removal.

CMP Pulse Plate B Replacement

1. Remove the cylinder head cover (see page 6-36).
2. Remove camshaft position (CMP) sensor B (see page 11-222).
3. Hold the exhaust camshaft with an open-end wrench, then loosen the bolt.



4. Remove CMP pulse plate B.



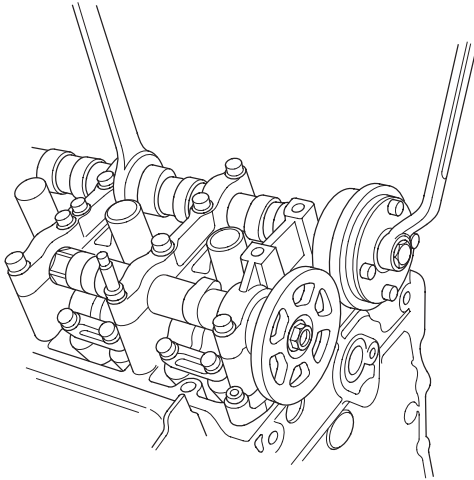
5. Install CMP pulse plate B in the reverse order of removal.

Cylinder Head

VTC Actuator, Exhaust Camshaft Sprocket Replacement

Removal

1. Remove the cam chain (see page 6-18).
2. Hold the exhaust camshaft with an open-end wrench, then loosen the variable valve timing control (VTC) actuator mounting bolt and the exhaust camshaft sprocket mounting bolt.



3. If the VTC actuator is reused, do these steps.
 - 1 Remove the intake camshaft, and seal the advance holes and retard holes in the No. 1 camshaft journal with tape (see step 6 on page 6-11).
 - 2 Punch a hole in the tape over one of the advance holes (see step 7 on page 6-11).
 - 3 Apply air to the advance hole to release the lock (see step 8 on page 6-11).
 - 4 Remove the tape from the No. 1 camshaft journal.
4. Remove the VTC actuator and the exhaust camshaft sprocket.

Installation

1. Install the variable valve timing control (VTC) actuator and exhaust camshaft sprocket.

NOTE: Install the VTC actuator to unlock position.
2. Apply new engine oil to the threads of the VTC actuator mounting bolt and the exhaust camshaft mounting bolt, then install them.
3. Hold the exhaust camshaft with an open-end wrench, then tighten the mounting bolts.

Specified Torque

VTC Actuator Mounting Bolt:

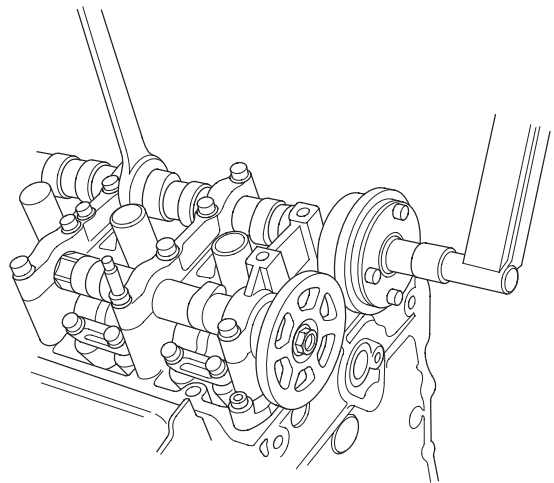
12 x 1.25 mm

113 N·m (11.5 kgf·m, 83 lbf·ft)

Exhaust Camshaft Sprocket Mounting Bolt:

10 x 1.25 mm

72 N·m (7.3 kgf·m, 53 lbf·ft)



4. Hold the exhaust camshaft with an open-end wrench, and turn the VTC actuator clockwise until you hear it click. Make sure to lock the VTC actuator by turning it.
5. Install the cam chain (see page 6-21).

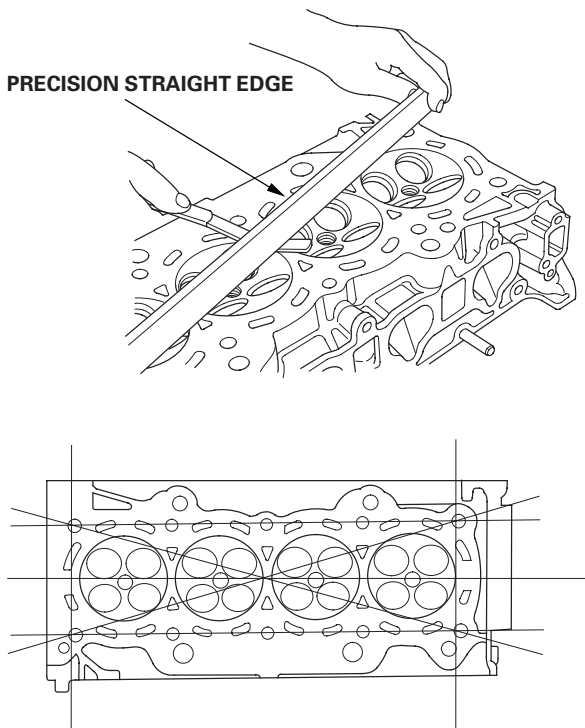


Cylinder Head Inspection for Warp

1. Remove the cylinder head (see page 6-38).
2. Inspect the camshaft:
 - K20Z2 engine (see page 6-50)
 - K20Z3 engine (see page 6-52)
3. Check the cylinder head for warp. Measure along the edges, and three ways across the center.
 - If warp is less than 0.05 mm (0.002 in.) cylinder head resurfacing is not required.
 - If warp is between 0.05 mm (0.002 in.) and 0.2 mm (0.008 in.), resurface the cylinder head.
 - Maximum resurface limit is 0.2 mm (0.008 in.) based on a height of 104 mm (4.09 in.).

Cylinder Head Height

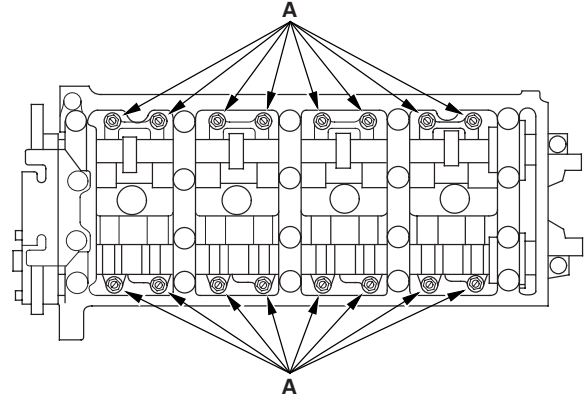
**Standard (New): 103.95—104.05 mm
(4.093—4.096 in.)**



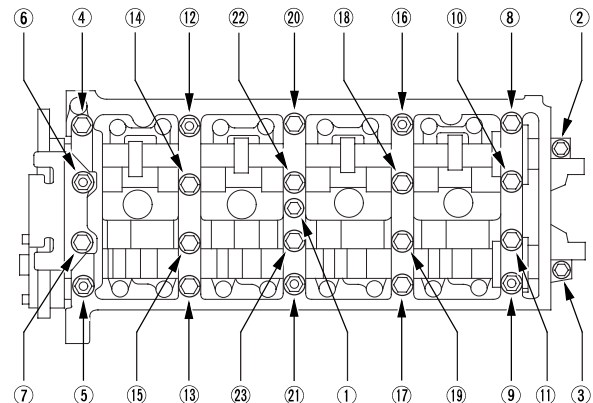
Rocker Arm Assembly Removal

K20Z2 engine

1. Remove the cam chain (see page 6-18).
2. Loosen the rocker arm adjusting screws (A).



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

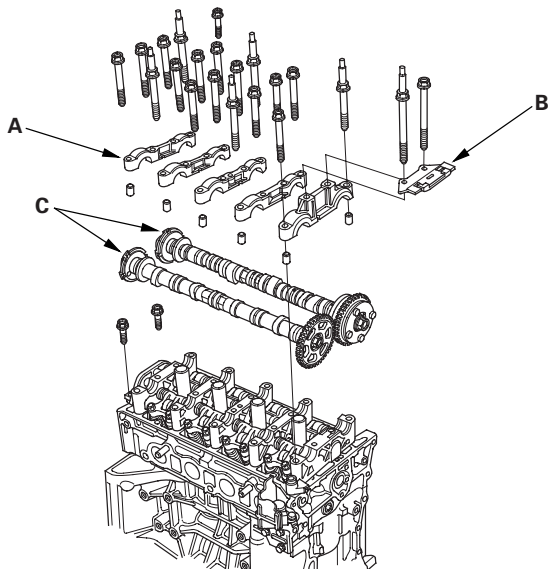


(cont'd)

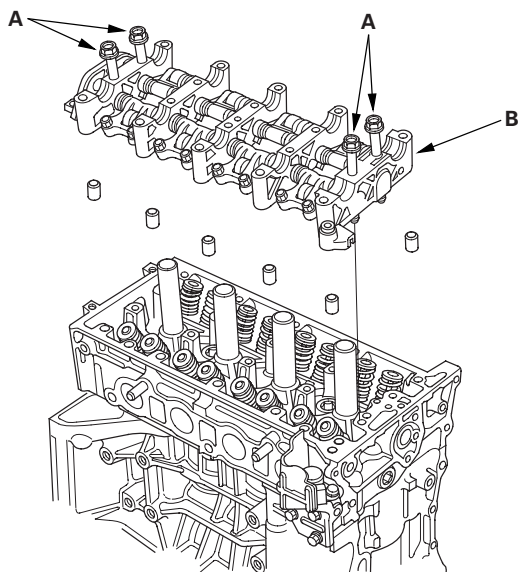
Cylinder Head

Rocker Arm Assembly Removal (cont'd)

4. Remove cam chain guide B, the camshaft holders (A), and the camshafts (C).

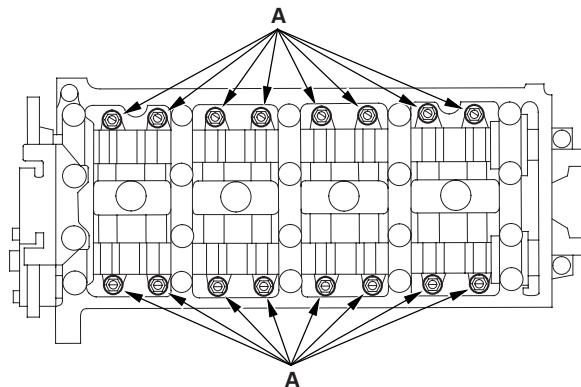


5. Insert the bolts (A) into the rocker shaft holder, then remove the rocker arm assembly (B).



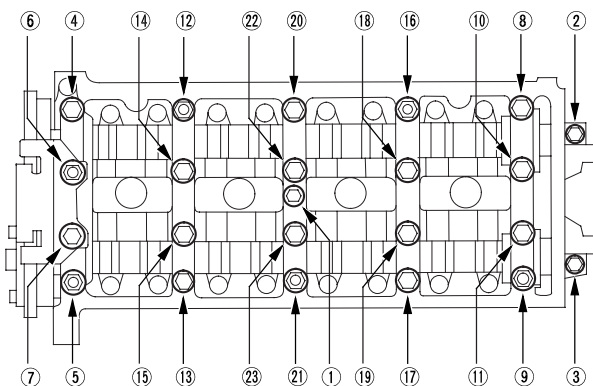
K20Z3 engine

1. Remove the cam chain (see page 6-18).
2. Loosen the rocker arm adjusting screws (A).



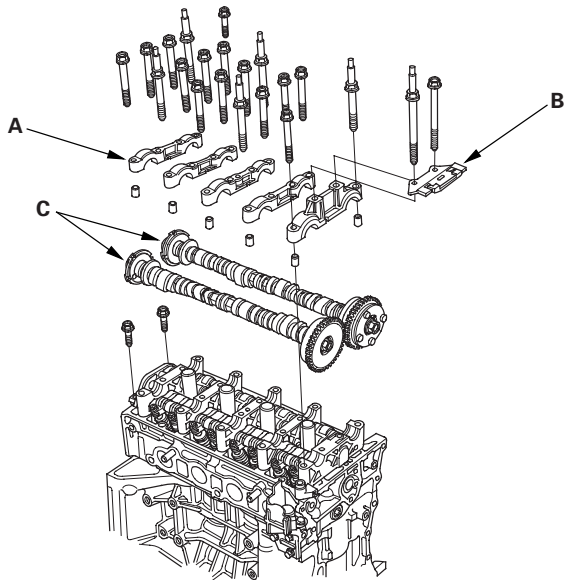
3. Remove the camshaft holder bolts. To prevent damaging the camshafts, loosen the bolts, in sequence, two turns at a time in a crisscross pattern.

NOTE: Bolt ① is not on all engines.

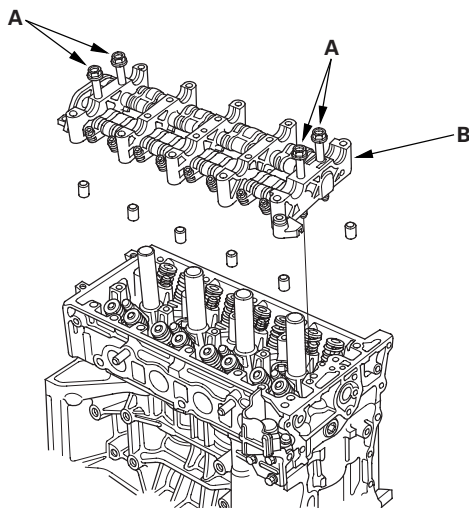




4. Remove cam chain guide B, the camshaft holders (A), and the camshafts (C).



5. Insert the bolts (A) into the rocker shaft holder, then remove the rocker arm assembly (B).



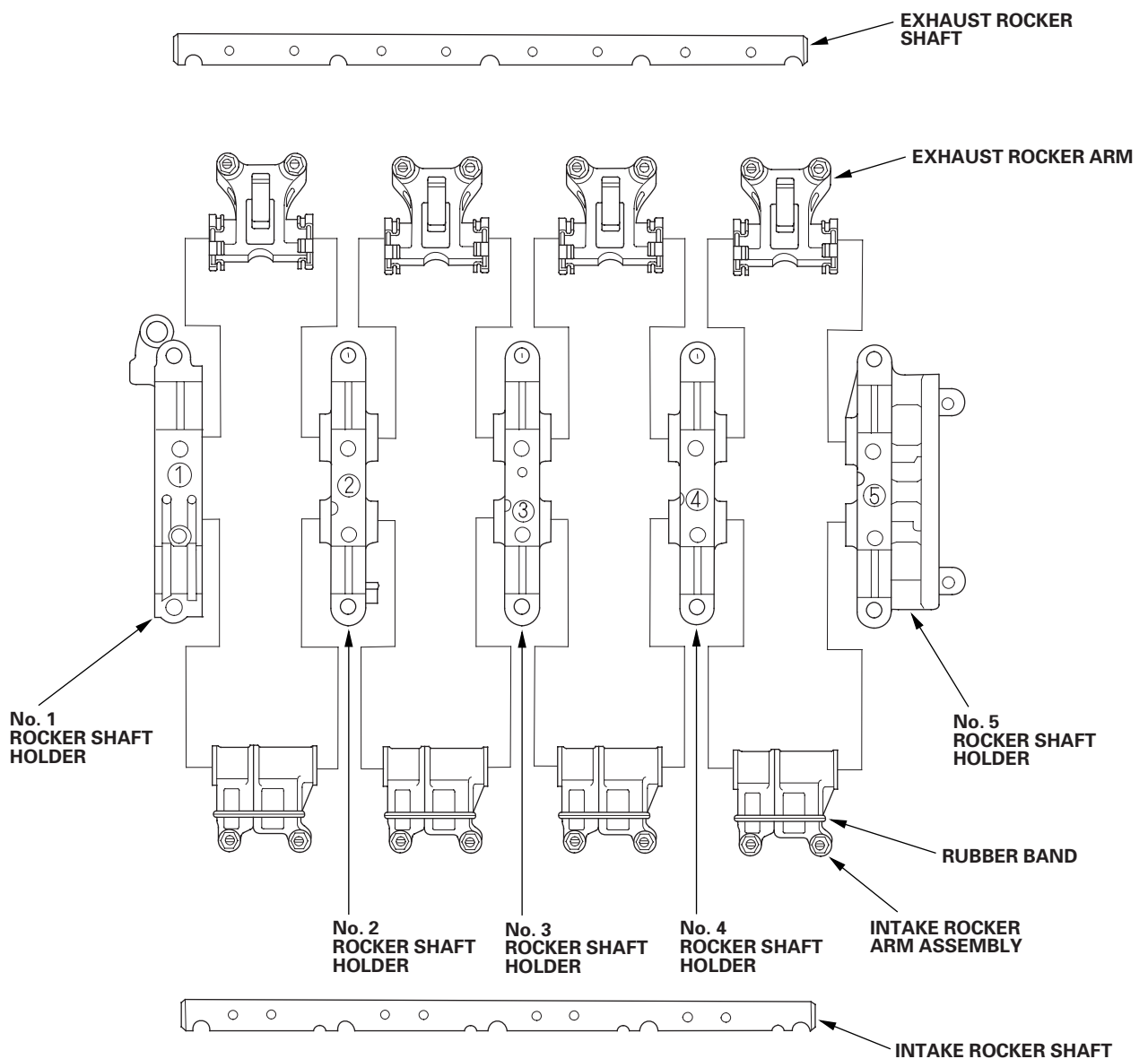
Cylinder Head

Rocker Arm and Shaft Disassembly/Reassembly

K20Z2 engine

NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original position.
- Inspect the rocker shafts and the rocker arms (see page 6-48).
- If reused, the rocker arms must be installed in the same positions.
- When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points.
- Bundle the intake rocker arms with rubber bands to keep them together as a set.
- When replacing the intake rocker arm assembly, remove the fastening hardware from the new intake rocker arm assembly.

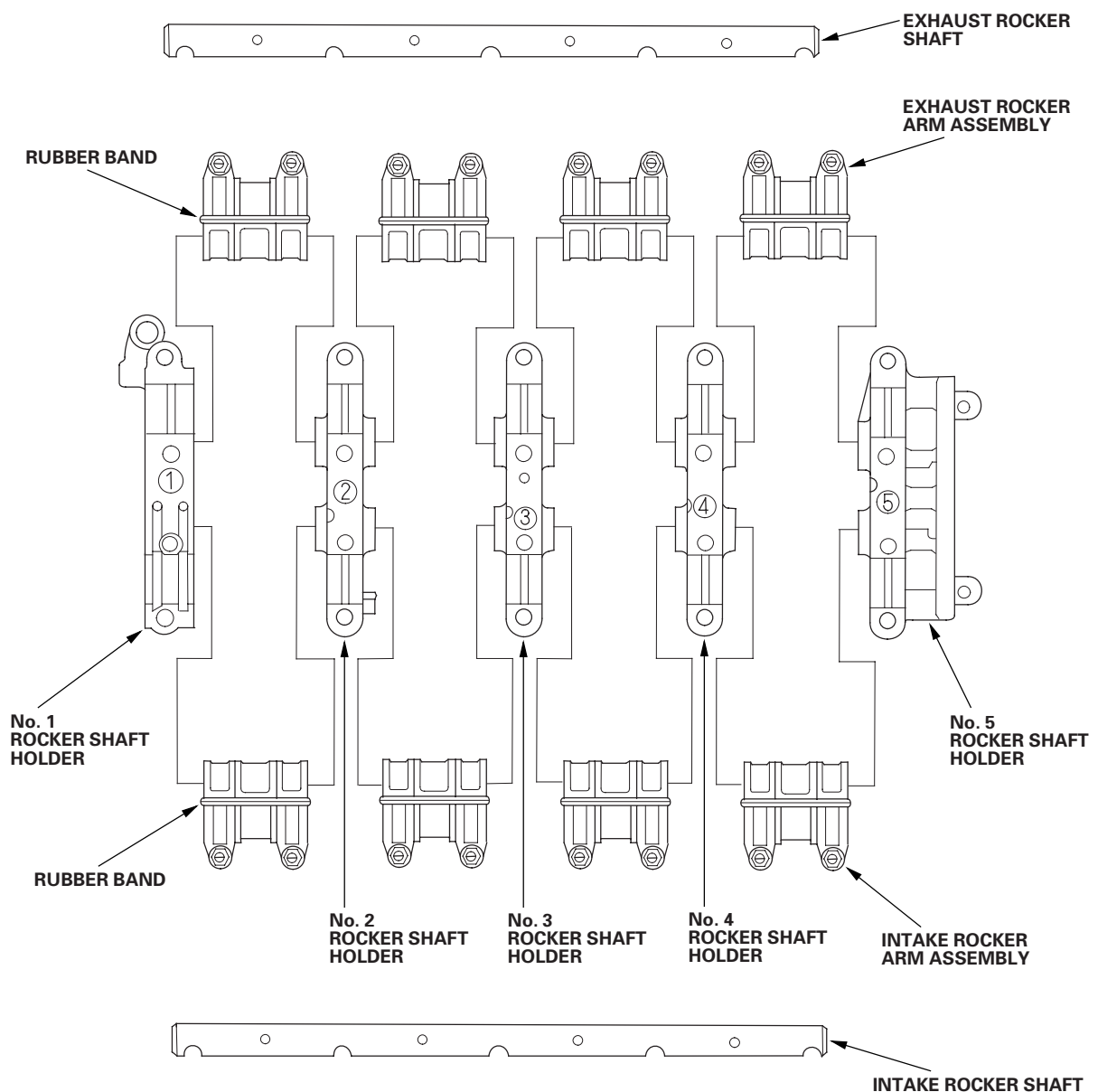




K20Z3 engine

NOTE:

- Identify each part as it is removed so that each item can be reinstalled in its original position.
- Inspect the rocker shafts and the rocker arms (see page 6-49).
- If reused, the rocker arms must be installed in the same positions.
- When removing, or installing the rocker arm assembly, do not remove the camshaft holder bolts. The bolts will keep the holders and rocker arms on the shaft.
- Prior to reassembling, clean all the parts in solvent, dry them, and apply new engine oil to any contact points.
- Bundle the rocker arms with rubber bands to keep them together as a set.
- When replacing the VTEC rocker arm assembly, remove the fastening hardware from the new VTEC rocker arm assembly.

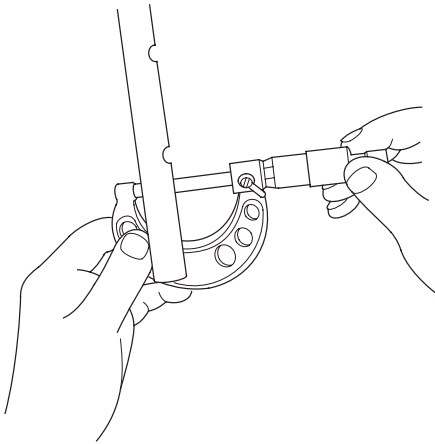


Cylinder Head

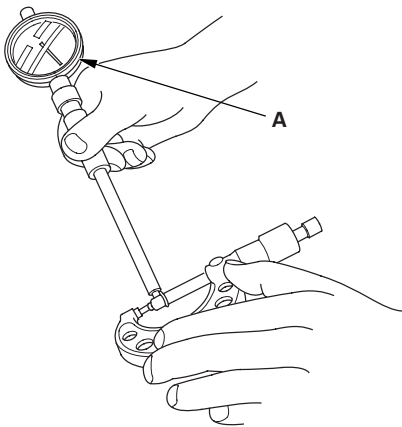
Rocker Arm and Shaft Inspection

K20Z2 engine

1. Remove the rocker arm assembly (see page 6-43).
2. Disassemble the rocker arm assembly (see page 6-46).
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.

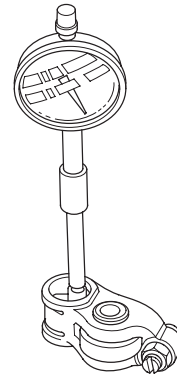
Rocker Arm-to-Shaft Clearance

Standard (New):

Intake: 0.025—0.052 mm
(0.0010—0.0020 in.)

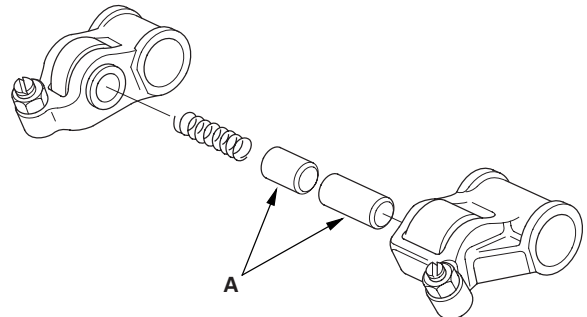
Exhaust: 0.018—0.056 mm
(0.0007—0.0022 in.)

Service Limit: 0.08 mm (0.003 in.)



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

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

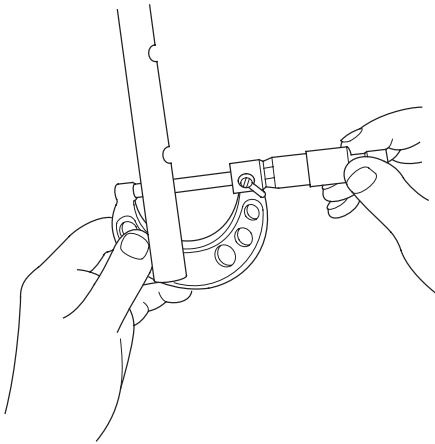


8. Install the rocker arm assembly (see page 6-60).

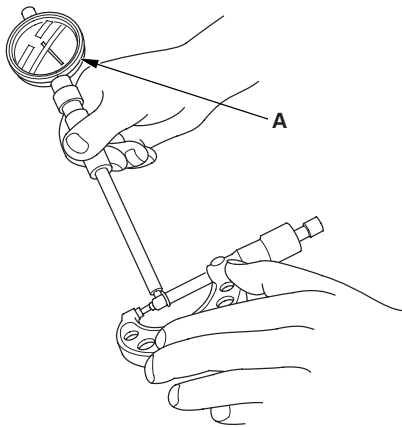


K20Z3 engine

1. Remove the rocker arm assembly (see page 6-44).
2. Disassemble the rocker arm assembly (see page 6-47).
3. Measure the diameter of the shaft at the first rocker location.



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

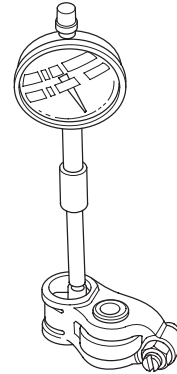


5. Measure the inside diameter of the rocker arm, and check it for an out-of-round condition.

Rocker Arm-to-Shaft Clearance

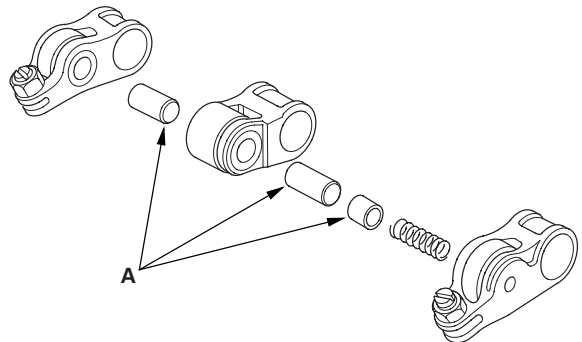
Standard (New): 0.025—0.052 mm
(0.0010—0.0020 in.)

Service Limit: 0.08 mm (0.003 in.)



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

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



8. Install the rocker arm assembly (see page 6-61).

Cylinder Head

Camshaft Inspection

K20Z2 engine

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see page 6-43).
2. Put the rocker shaft holders, the camshaft, and the camshaft holders on the cylinder head, then tighten the bolts, in sequence, to the specified torque.

Specified Torque

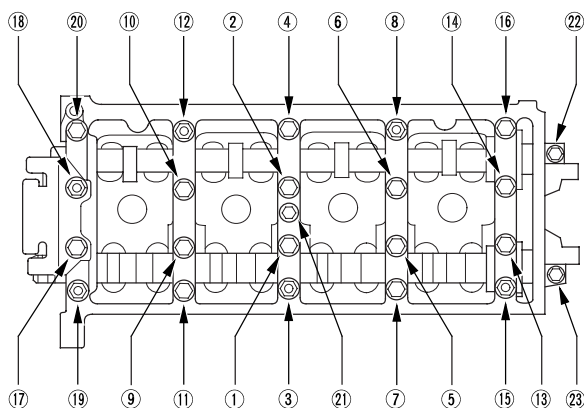
8 x 1.25 mm

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 x 1.0 mm

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 x 1.0 mm Bolts: 21, 22, 23



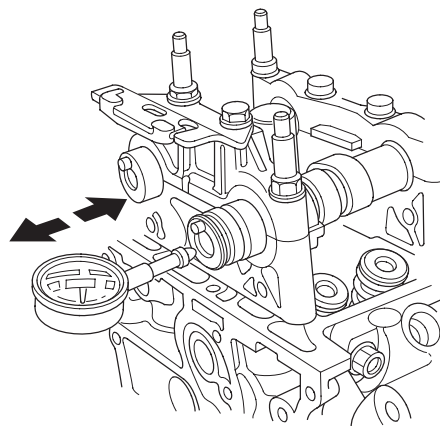
3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth, and read the end play. If the end play is beyond the service limit, replace the cylinder head and recheck. If it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

Camshaft End Play

Standard (New): 0.05—0.20 mm

(0.002—0.008 in.)

Service Limit: 0.4 mm (0.02 in.)





5. Loosen the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
6. Lift the camshafts out of the cylinder head, wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft journal surfaces in the cylinder head, then set the camshafts back in place. Place a plastigage strip across each journal.
8. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 2.
9. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.
 - If the camshaft-to-holder clearance is within the service limits, go to step 11.
 - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has been replaced, replace the cylinder head.
 - If the camshaft-to-holder clearance is beyond the service limit, and the camshaft has not been replaced, go to step 10.

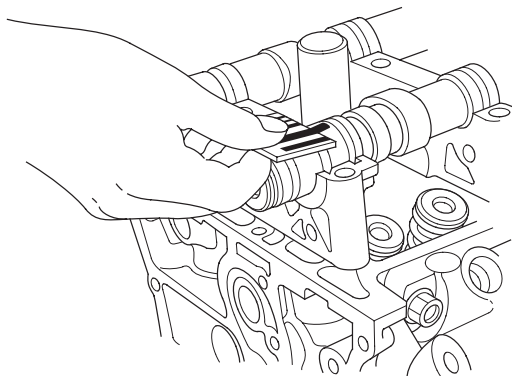
Camshaft-to-Holder Oil Clearance

Standard (New):

No. 1 Journal: 0.030—0.069 mm
(0.001—0.003 in.)

No. 2, 3, 4, 5 Journals: 0.060—0.099 mm
(0.002—0.004 in.)

Service Limit: 0.15 mm (0.006 in.)



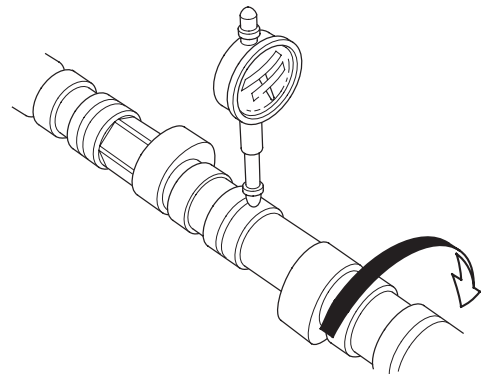
10. Check the total runout with the camshaft supported on V-blocks.

- If the total runout of the camshaft is within the service limit, replace the cylinder head.
- If the total runout is beyond the service limit, replace the camshaft, and recheck the camshaft-to-holder oil clearance. If the oil clearance is still beyond the service limit, replace the cylinder head.

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.002 in.)



11. Measure the cam lobe height.

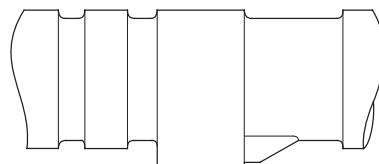
Cam Lobe Height Standard (New):

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

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

INTAKE

SEC PRI



← C/C

Cylinder Head

Camshaft Inspection (cont'd)

K20Z3 engine

NOTE: Do not rotate the camshaft during inspection.

1. Remove the rocker arm assembly (see page 6-44).
2. Put the rocker shaft holders, camshaft, and camshaft holders on the cylinder head, then tighten the bolts in sequence to the specified torque.

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

Specified Torque

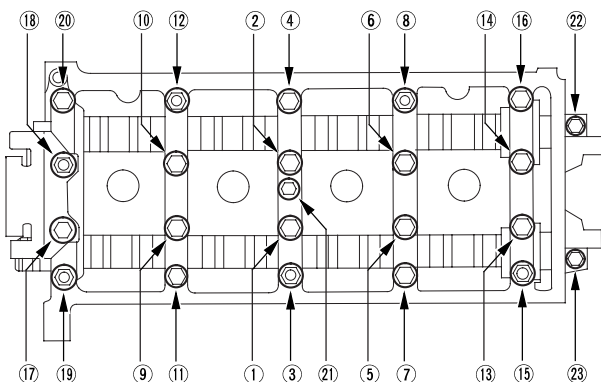
8 x 1.25 mm

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 x 1.0 mm

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

6 x 1.0 mm Bolts: ②①, ②②, ②③

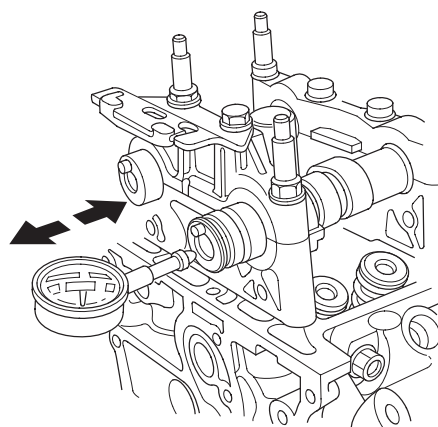


3. Seat the camshaft by pushing it away from the camshaft pulley end of the cylinder head.
4. Zero the dial indicator against the end of the camshaft, then push the camshaft back and forth and read the end play. If the end play is beyond the service limit, replace the cylinder head and recheck. If it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

Camshaft End Play

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

Service Limit: 0.4 mm (0.02 in.)





5. Loosen the camshaft holder bolts two turns at a time, in a crisscross pattern. Then remove the camshaft holders from the cylinder head.
6. Lift the camshafts out of the cylinder head, wipe them clean, then inspect the lift ramps. Replace the camshaft if any lobes are pitted, scored, or excessively worn.
7. Clean the camshaft journal surfaces in the cylinder head, then set the camshafts back in place. Place a plastigage strip across each journal.
8. Install the camshaft holders, then tighten the bolts to the specified torque as shown in step 2.
9. Remove the camshaft holders. Measure the widest portion of plastigage on each journal.
 - If the camshaft-to-holder clearance is within the service limits, go to step 11.
 - If the camshaft-to-holder clearance is beyond the service limit and the camshaft has been replaced, replace the cylinder head.
 - If the camshaft-to-holder clearance is beyond the service limit and the camshaft has not been replaced, go to step 10.

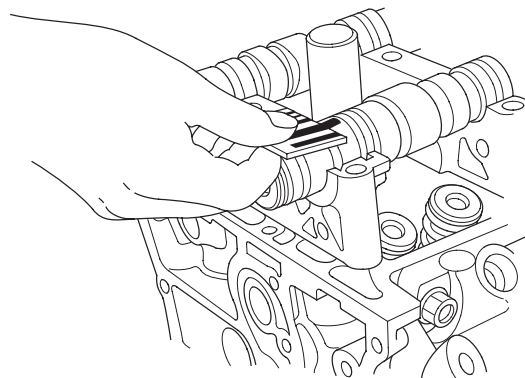
Camshaft-to-Holder Oil Clearance

Standard (New):

No. 1 Journal: 0.030—0.069 mm
(0.001—0.003 in.)

No. 2, 3, 4, 5 Journals: 0.060—0.099 mm
(0.002—0.004 in.)

Service Limit: 0.15 mm (0.006 in.)



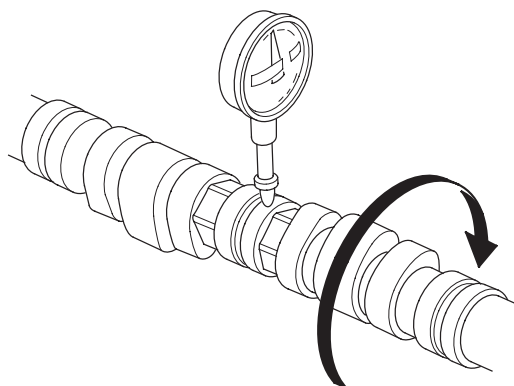
10. Check the total runout with the camshaft supported on V-blocks.

- If the total runout of the camshaft is within the service limit, replace the cylinder head.
- If the total runout is beyond the service limit, replace the camshaft and recheck the camshaft-to-holder oil clearance. If the oil clearance is still beyond the service limit, replace the cylinder head.

Camshaft Total Runout

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

Service Limit: 0.04 mm (0.002 in.)

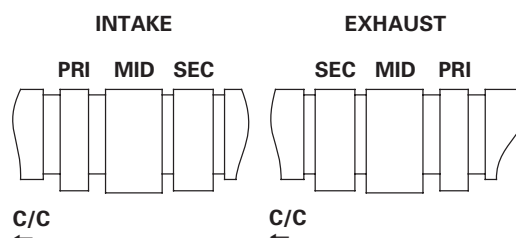


11. Measure the cam lobe height.

Cam Lobe Height Standard (New):

	INTAKE	EXHAUST
PRI	32.791 mm (1.2910 in.)	32.772 mm (1.2902 in.)
MID	35.534 mm (1.3990 in.)	34.768 mm (1.3688 in.)
SEC	32.678 mm (1.2865 in.)	32.661 mm (1.2859 in.)

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



Cylinder Head

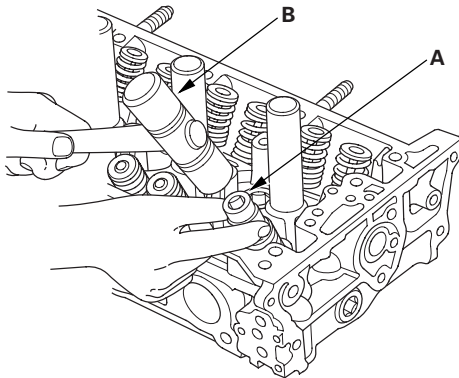
Valve, Spring, and Valve Seal Removal

Special Tools Required

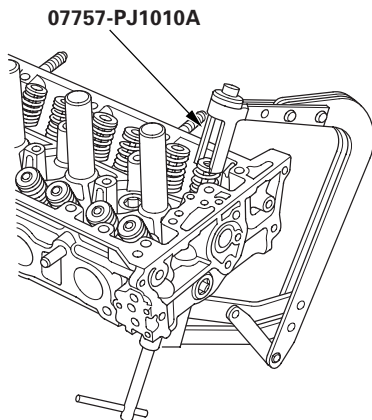
Valve spring compressor attachment 07757-PJ1010A

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 6-38).
2. Remove the rocker arm assembly:
 - K20Z2 engine (see page 6-43)
 - K20Z3 engine (see page 6-44)
3. Using an appropriate-sized socket (A) and plastic mallet (B), lightly tap the spring retainer to loosen the valve cotters.

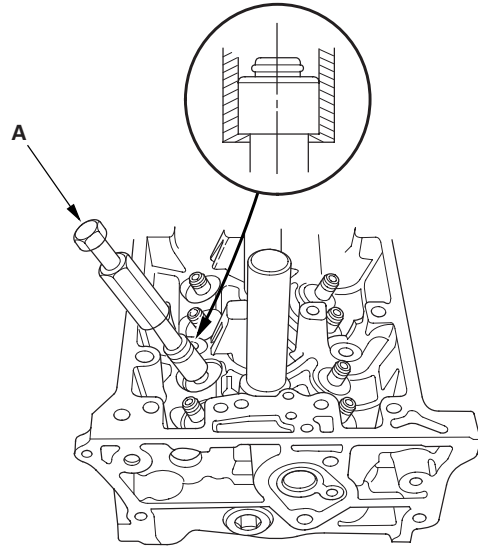


4. Install the valve spring compressor attachment and the valve spring compressor. Compress the valve spring, and remove the valve cotters.

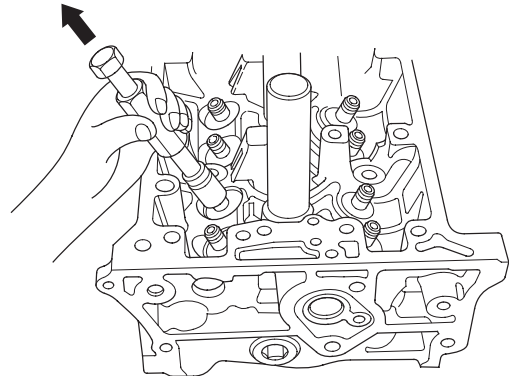


5. Remove the valve spring compressor, the valve spring compressor attachment, the spring retainer, the valve spring and the valve.

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



7. Remove the valve seal.



8. Remove the valve spring seat.



Valve Inspection

1. Remove the valves (see page 6-54).
2. Measure the valve in these areas.

K20Z2 engine

Intake Valve Dimensions

- A Standard (New):** 34.85—35.15 mm
(1.372—1.384 in.)
- B Standard (New):** 108.7—109.5 mm
(4.280—4.311 in.)
- C Standard (New):** 5.475—5.485 mm
(0.2156—0.2159 in.)
- C Service Limit:** 5.445 mm (0.214 in.)

Exhaust Valve Dimensions

- A Standard (New):** 29.85—30.15 mm
(1.175—1.187 in.)
- B Standard (New):** 108.3—109.1 mm
(4.264—4.295 in.)
- C Standard (New):** 5.450—5.460 mm
(0.2146—0.2150 in.)
- C Service Limit:** 5.420 mm (0.213 in.)

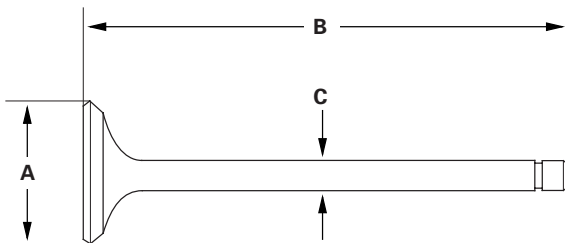
K20Z3 engine

Intake Valve Dimensions

- A Standard (New):** 34.85—35.15 mm
(1.372—1.384 in.)
- B Standard (New):** 108.5—109.1 mm
(4.272—4.295 in.)
- C Standard (New):** 5.475—5.485 mm
(0.2156—0.2159 in.)
- C Service Limit:** 5.445 mm (0.214 in.)

Exhaust Valve Dimensions

- A Standard (New):** 29.85—30.15 mm
(1.175—1.187 in.)
- B Standard (New):** 108.4—109.0 mm
(4.268—4.291 in.)
- C Standard (New):** 5.450—5.460 mm
(0.2146—0.2150 in.)
- C Service Limit:** 5.420 mm (0.213 in.)



Valve Stem-to-Guide Clearance Inspection

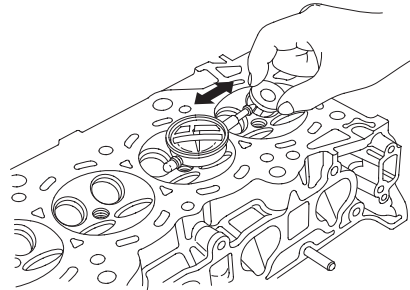
1. Remove the valves (see page 6-54).
2. Slide the valve out of its guide about 10 mm (0.39 in.), then measure the stem-to-guide clearance with a dial indicator while rocking the stem in the direction of normal thrust (wobble method).
 - If the measurement exceeds the service limit, recheck it using a new valve.
 - If the measurement is now within the service limit, reassemble using a new valve.
 - If the measurement with a new valve still exceeds the service limit, go to step 3.

Intake Valve Stem-to-Guide Clearance

- Standard (New):** 0.06—0.11 mm
(0.002—0.004 in.)
- Service Limit:** 0.16 mm (0.006 in.)

Exhaust Valve Stem-to-Guide Clearance

- Standard (New):** 0.11—0.16 mm
(0.004—0.006 in.)
- Service Limit:** 0.22 mm (0.009 in.)



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

Intake Valve Stem-to-Guide Clearance

- Standard (New):** 0.030—0.055 mm
(0.0012—0.0022 in.)
- Service Limit:** 0.08 mm (0.003 in.)

Exhaust Valve Stem-to-Guide Clearance

- Standard (New):** 0.055—0.080 mm
(0.0022—0.0031 in.)
- Service Limit:** 0.11 mm (0.004 in.)

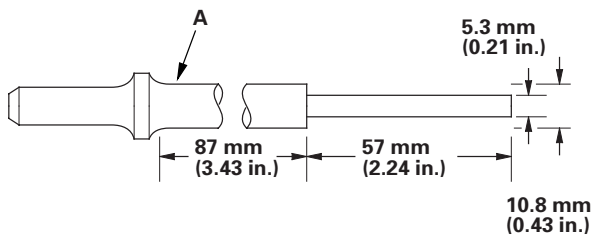
Cylinder Head

Valve Guide Replacement

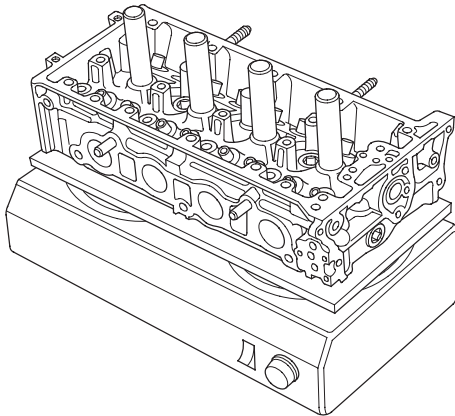
Special Tools Required

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

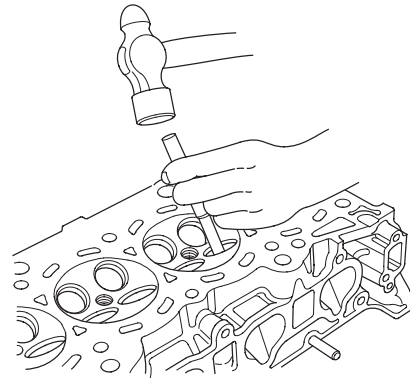
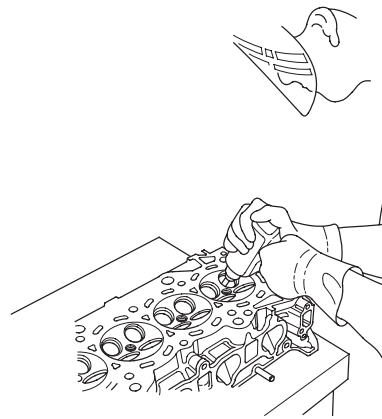
1. Inspect the valve stem-to-guide clearance (see page 6-55).
2. As illustrated, use a commercially available air-impact valve guide driver (A) modified to fit the diameter of the valve guides. In most cases, the same procedure can be done using the valve guide driver and a conventional hammer.



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



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



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

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

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

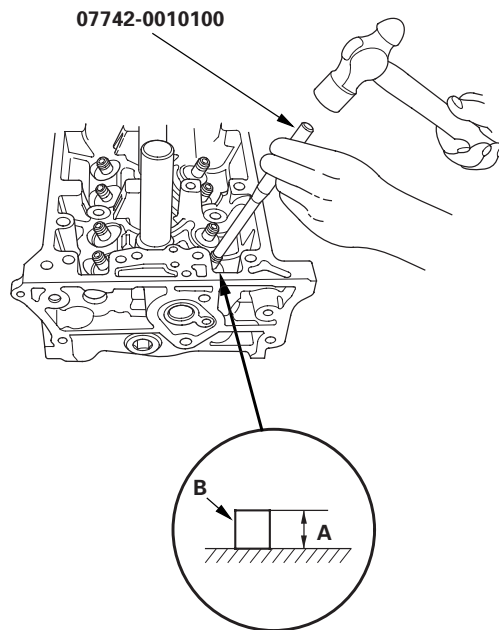


9. Apply a thin coat of new engine oil to the outside of the new valve guide. Install the guide from the camshaft side of the head, use the valve guide driver to drive the guide in to the specified installed height (A) of the guide (B). If you have all 16 guides to do, you may have to reheat the head.

Valve Guide Installed Height

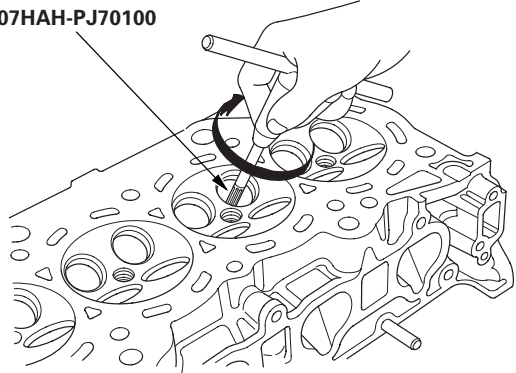
Intake: 15.2—16.2 mm (0.598—0.638 in.)

Exhaust: 15.5—16.5 mm (0.610—0.650 in.)



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

07HAH-PJ70100

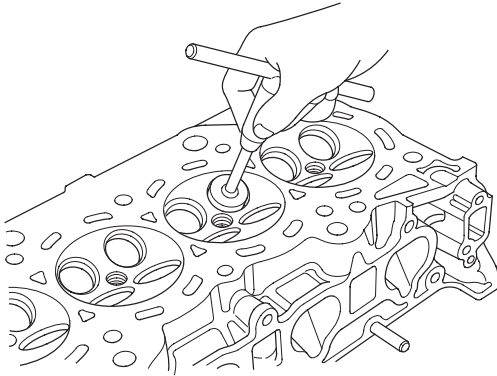


12. Continue to rotate the reamer clockwise while removing it from the bore.
13. Thoroughly wash the guide in detergent and water to remove any cutting residue.
14. Check the clearances with a valve (see page 6-55). Verify that a valve slides into the intake and exhaust valve guides without sticking.
15. Inspect the valve seating, if necessary renew the valve seat using a valve seat cutter (see page 6-58).

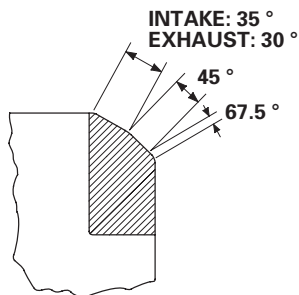
Cylinder Head

Valve Seat Reconditioning

1. Inspect the valve stem-to-guide clearance (see page 6-55). If the valve guides are worn, replace them (see page 6-56) before cutting the valve seats.
2. Renew the valve seats in the cylinder head using a valve seat cutter.



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



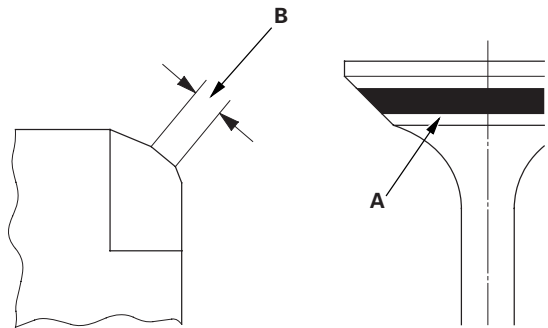
5. Make one more very light pass with the 45 ° cutter to remove any possible burrs caused by the other cutters.

Valve Seat Width

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

Service Limit: 2.00 mm (0.079 in.)

6. After resurfacing the seat, inspect 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 to move it down, then one more cut with the 45 ° cutter to restore seat width.
- If it is too low (close to the valve edge), you must make a second cut with the 35 ° cutter (intake side) or the 30 ° cutter (exhaust side) to move it up, then make one more cut with the 45 ° cutter to restore seat width.

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



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

Intake Valve Stem Installed Height

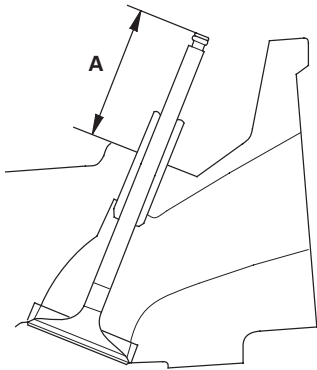
Standard (New): 44.0—44.5 mm (1.73—1.75 in.)

Service Limit: 44.7 mm (1.76 in.)

Exhaust Valve Stem Installed Height

Standard (New): 44.1—44.6 mm (1.74—1.76 in.)

Service Limit: 44.8 mm (1.76 in.)



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

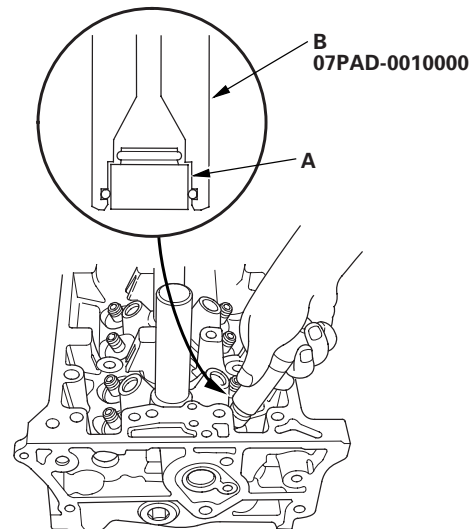
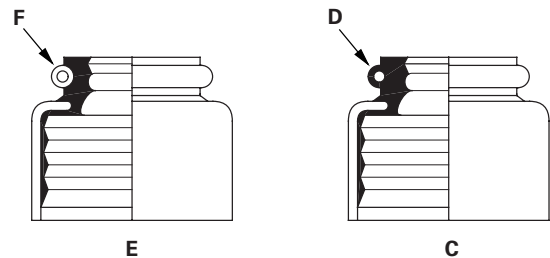
Valve, Spring, and Valve Seal Installation

Special Tools Required

- Stem seal driver 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 spring (F). They are not interchangeable.



(cont'd)



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

Intake Valve Stem Installed Height

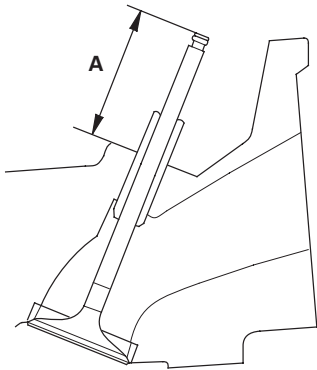
Standard (New): 44.0—44.5 mm (1.73—1.75 in.)

Service Limit: 44.7 mm (1.76 in.)

Exhaust Valve Stem Installed Height

Standard (New): 44.1—44.6 mm (1.74—1.76 in.)

Service Limit: 44.8 mm (1.76 in.)



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

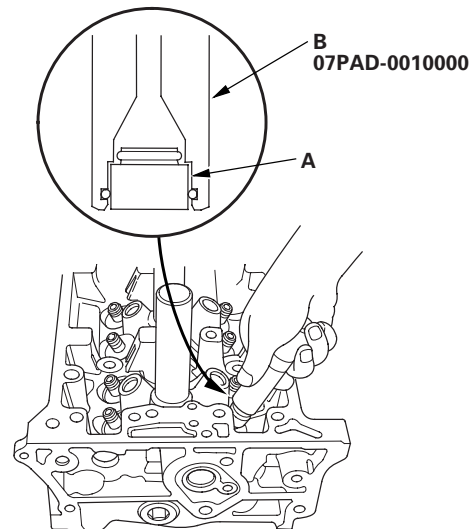
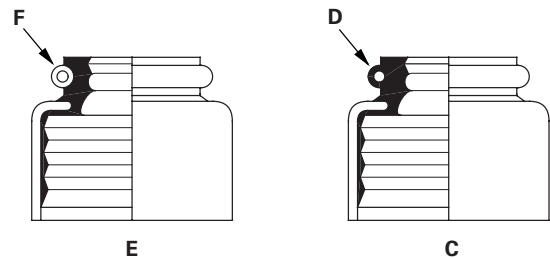
Valve, Spring, and Valve Seal Installation

Special Tools Required

- Stem seal driver 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 spring (F). They are not interchangeable.

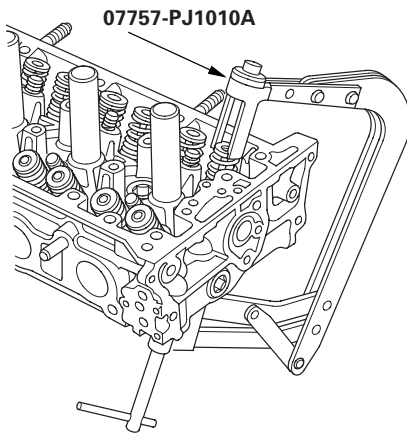


(cont'd)

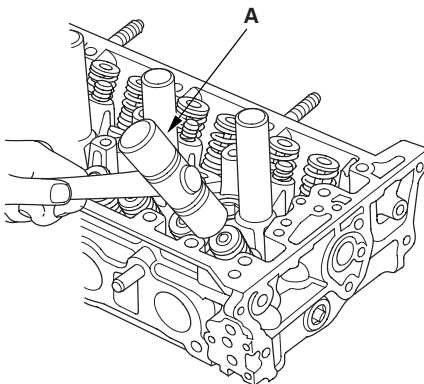
Cylinder Head

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

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



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



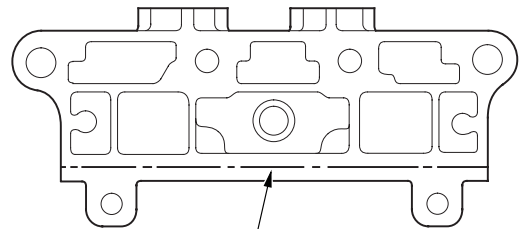
Rocker Arm Assembly Installation

K20Z2 engine

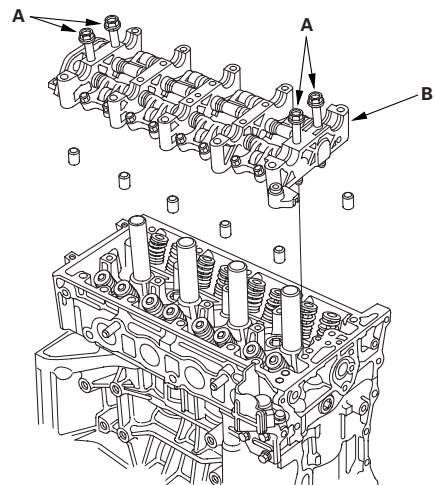
1. Reassemble the rocker arm assembly (see page 6-46).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



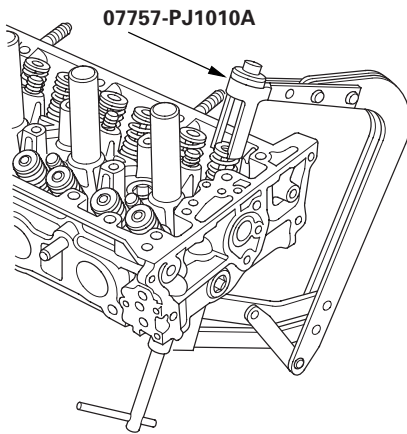
4. Insert the bolts (A) into the rocker shaft holder, then install the rocker arm assembly (B) on the cylinder head.



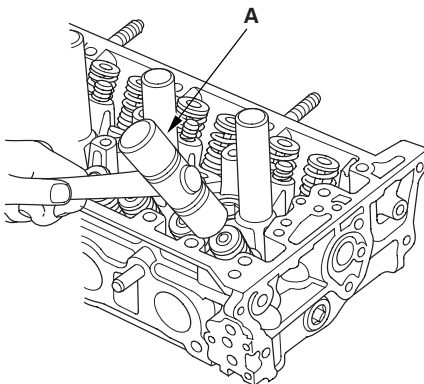
Cylinder Head

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

5. Install the valve spring and the spring retainer. Place the end of the valve spring with the closely wound coils toward the cylinder head.
6. Install the valve spring compressor attachment and the valve spring compressor. Compress the 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 valve keepers. Tap the valve stem only along its axis so you do not bend the stem.



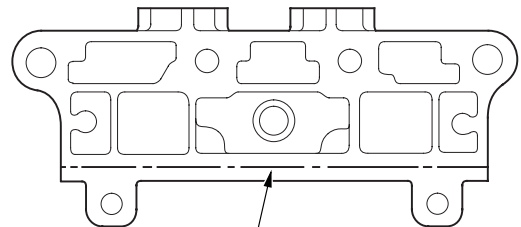
Rocker Arm Assembly Installation

K20Z2 engine

1. Reassemble the rocker arm assembly (see page 6-46).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder. Install the component within 5 minutes of applying the liquid gasket.

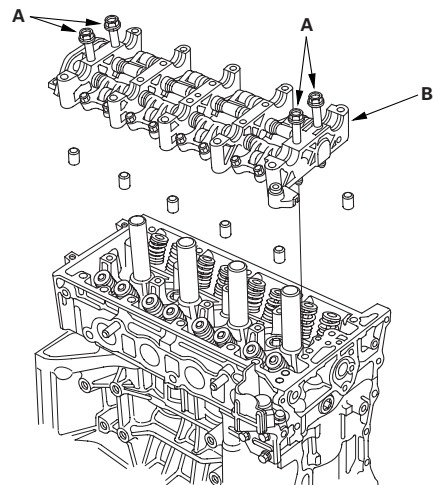
NOTE:

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



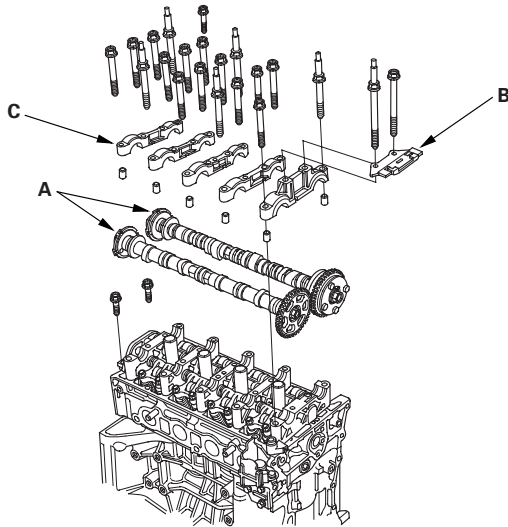
Apply liquid gasket
along the broken line.

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





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



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

Specified Torque

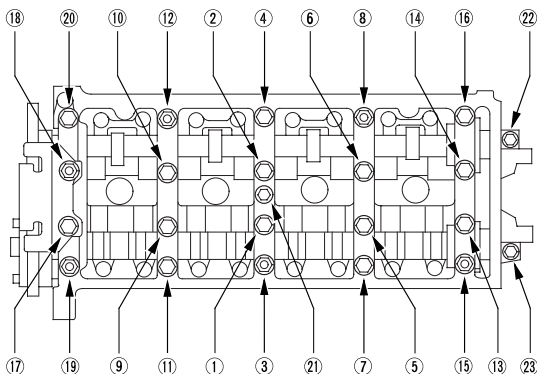
8 x 1.25 mm

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 x 1.0 mm

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

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



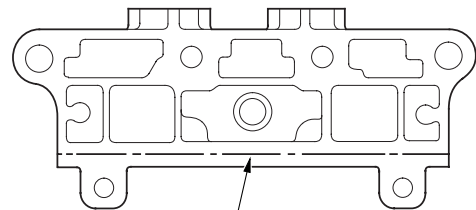
9. Install the cam chain (see page 6-21), then adjust the valve clearance (see page 6-12).

K20Z3 engine

1. Reassemble the rocker arm assembly (see page 6-47).
2. Clean and dry the No. 5 rocker shaft holder mating surface.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the cylinder head mating surface of the No. 5 rocker shaft holder. Install the component within 5 minutes of applying the liquid gasket.

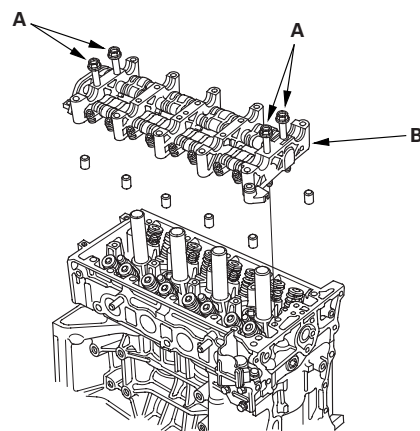
NOTE:

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



Apply liquid gasket along the broken line.

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



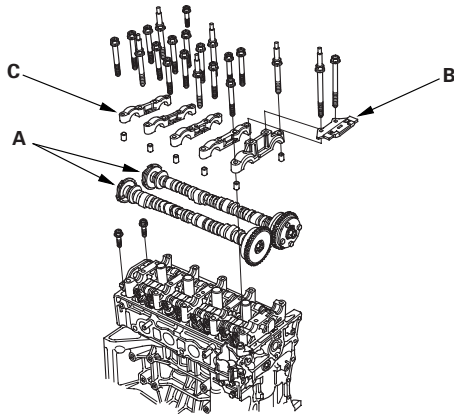
5. Remove the bolts from the rocker shaft holder.

(cont'd)

Cylinder Head

Rocker Arm Assembly Installation (cont'd)

6. Make sure the punch marks on the variable valve timing control (VTC) actuator and the exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder. Apply new engine oil to the camshaft journals and lobes.



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

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

Specified Torque

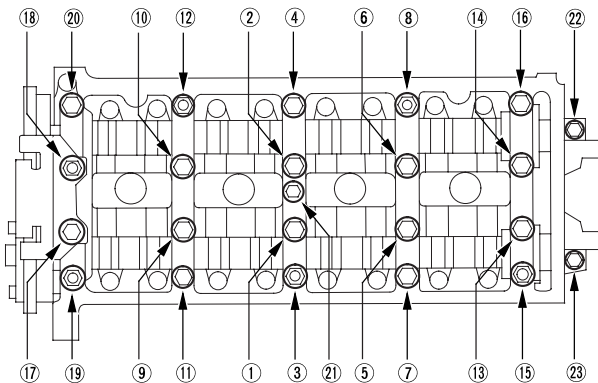
8 x 1.25 mm

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 x 1.0 mm

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

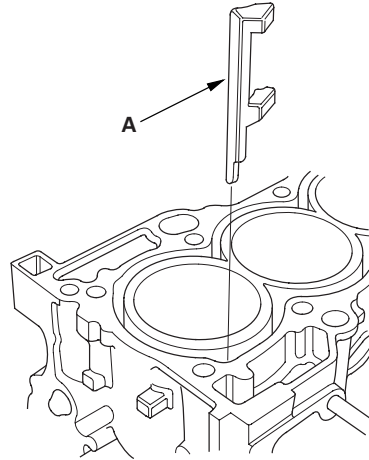
6 x 1.0 mm Bolts: ②①, ②②, ②③



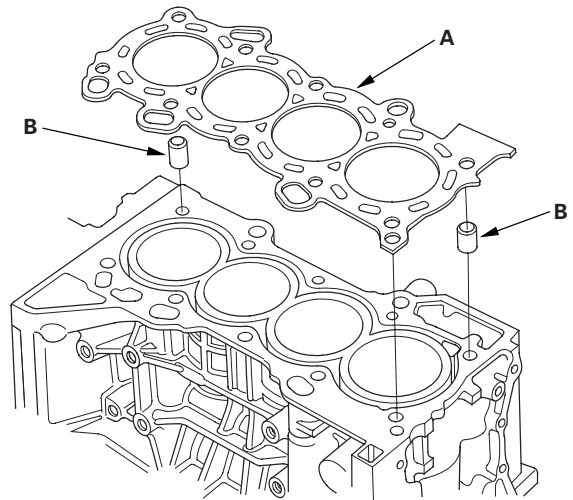
9. Install the cam chain (see page 6-21), then adjust the valve clearance (see page 6-14).

Cylinder Head Installation

1. Install a new coolant separator (A) in the engine block whenever the engine block is replaced.



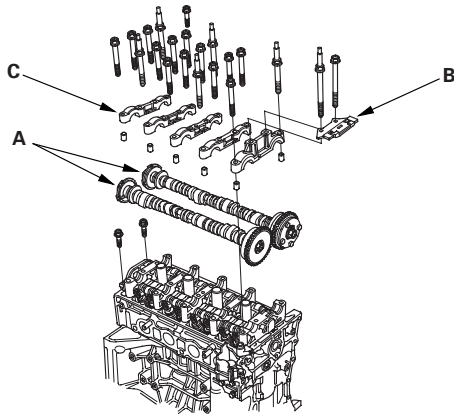
2. Clean the cylinder head and the engine block surface.
3. Install the new cylinder head gasket (A) and the dowel pins (B) on the engine block. Always use a new cylinder head gasket.



Cylinder Head

Rocker Arm Assembly Installation (cont'd)

6. Make sure the punch marks on the variable valve timing control (VTC) actuator and the exhaust camshaft sprocket are facing up, then set the camshafts (A) in the holder. Apply new engine oil to the camshaft journals and lobes.



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

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

Specified Torque

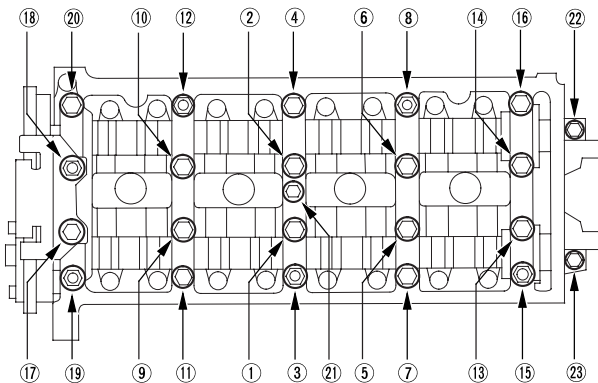
8 x 1.25 mm

22 N·m (2.2 kgf·m, 16 lbf·ft)

6 x 1.0 mm

12 N·m (1.2 kgf·m, 8.7 lbf·ft)

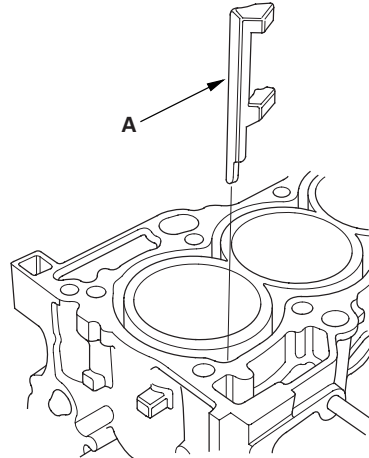
6 x 1.0 mm Bolts: ②①, ②②, ②③



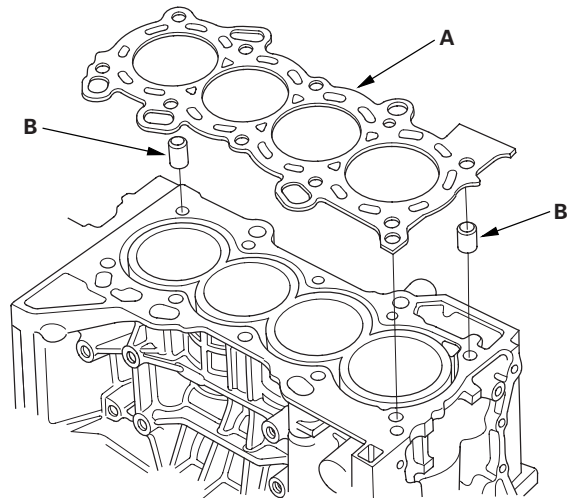
9. Install the cam chain (see page 6-21), then adjust the valve clearance (see page 6-14).

Cylinder Head Installation

1. Install a new coolant separator (A) in the engine block whenever the engine block is replaced.

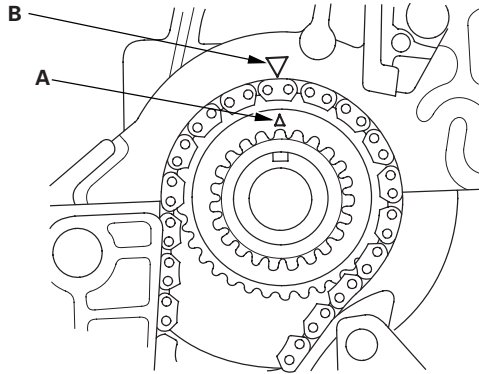


2. Clean the cylinder head and the engine block surface.
3. Install the new cylinder head gasket (A) and the dowel pins (B) on the engine block. Always use a new cylinder head gasket.

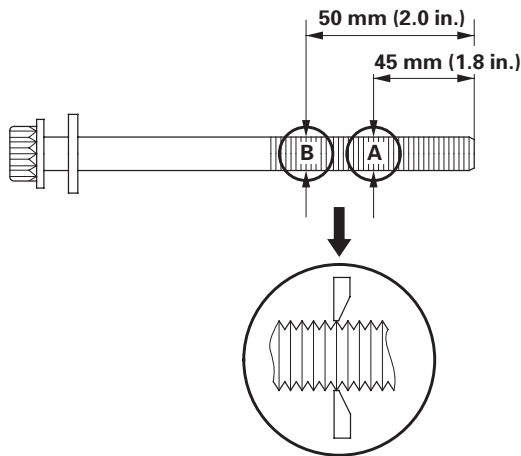




4. Set the crankshaft to top dead center (TDC). Align the TDC mark (A) on the crankshaft sprocket with the pointer (B) on the engine block.

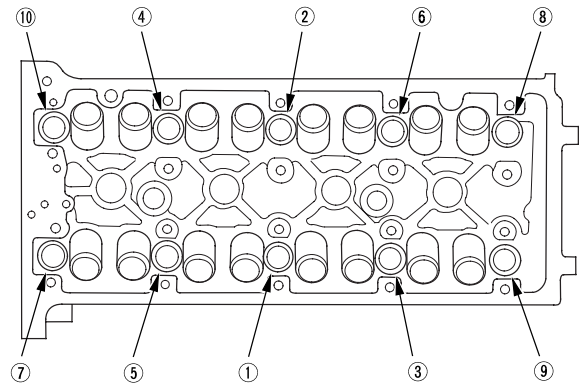


5. Set the camshaft pulley to TDC (see step 2 on page 6-21).
6. Install the cylinder head on the engine block.
7. Measure the diameter of each cylinder head bolt at point A and point B.



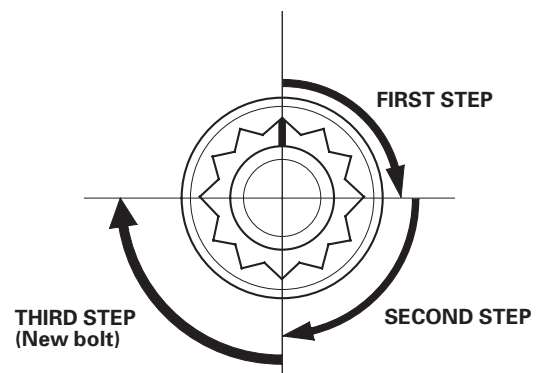
8. If either diameter is less than 10.6 mm (0.42 in.), replace the cylinder head bolt.

9. Apply new engine oil to the threads and under the bolt heads of all cylinder head bolts.
10. Tighten the cylinder head bolts in sequence to 39 N·m (4.0 kgf·m, 29 lbf·ft). Use a beam-type torque wrench. When using a preset click-type torque wrench, be sure to tighten slowly and do not overtighten. If a bolt makes any noise while you are torquing it, loosen the bolt and retighten it from the first step.



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

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



(cont'd)

Cylinder Head

Cylinder Head Installation (cont'd)

12. Install the rocker arm assembly:

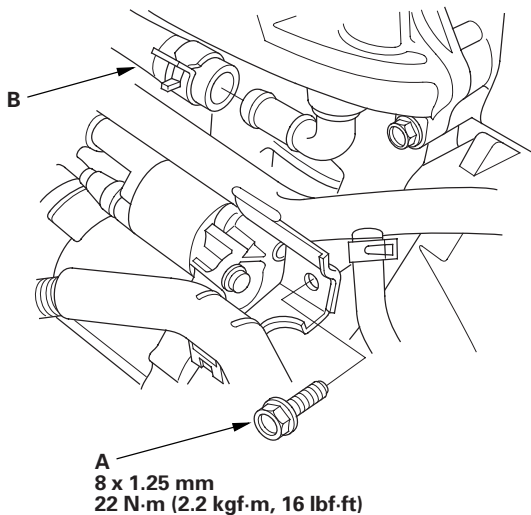
- K20Z2 engine (see page 6-60)
- K20Z3 engine (see page 6-61)

13. Install the cam chain (see page 6-21).

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

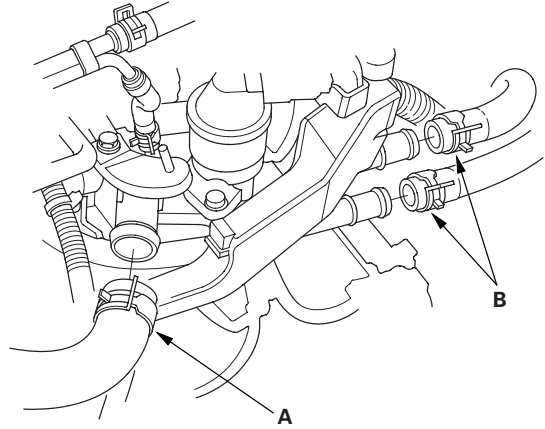
- Four fuel injector connectors
- Engine coolant temperature (ECT) sensor 1 connector
- Camshaft position (CMP) sensor A (Intake) connector
- Camshaft position (CMP) sensor B (Exhaust) connector
- Rocker arm oil control valve connector
- Rocker arm oil pressure switch connector
- EVAP canister purge valve connector
- Variable valve timing control (VTC) oil control solenoid valve connector
- Exhaust gas recirculation (EGR) valve connector (K20Z2 engine)
- Engine oil pressure switch connector

15. Install the bolt (A) securing the connecting pipe.

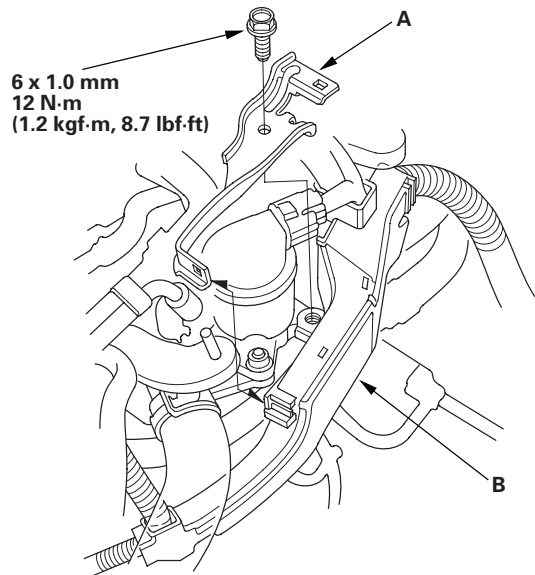


16. Connect the water bypass hose (B).

17. Connect the upper radiator hose (A) and the heater hoses (B).

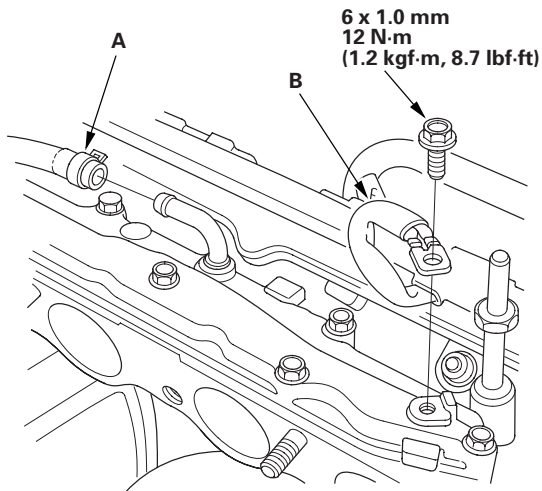


18. Install the harness holder bracket (A), then install the harness holder (B).

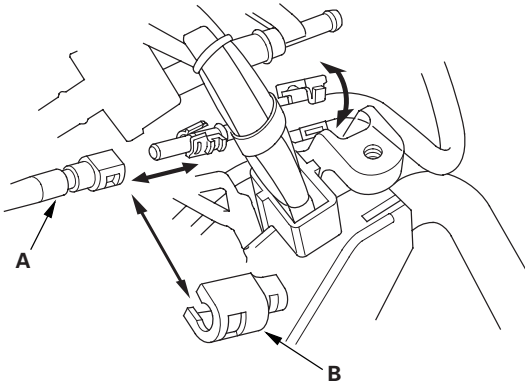




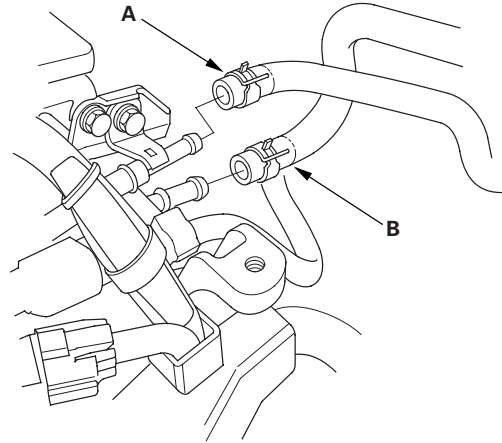
19. Connect the positive crankcase ventilation (PCV) hose (A) (K20Z2 engine) and install the ground cable (B).



20. Connect the fuel feed hose (A) (see page 11-331), then install the quick-connect fitting cover (B).



21. Connect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).



22. Install the exhaust manifold (see page 9-11).

23. Install the intake manifold:

- K20Z2 engine (see page 9-4)
- K20Z3 engine (see page 9-9)

24. Install the drive belt (see page 4-31).

25. Install the air cleaner assembly (see page 11-345).

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

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

(cont'd)

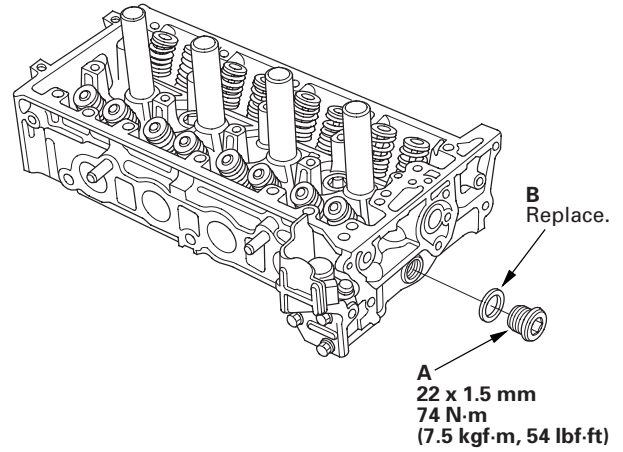
Cylinder Head

Cylinder Head Installation (cont'd)

28. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).
29. Do the engine control module (ECM)/powertrain control module (PCM) idle lean procedure (see page 11-310).
30. Do the crankshaft position (CKP) pattern clear/CKP pattern lean procedure (see page 11-4).
31. Inspect the idle speed (see page 11-309).
32. Inspect the ignition timing (see page 4-20).

Sealing Bolt Installation

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



Engine Mechanical

Engine Block

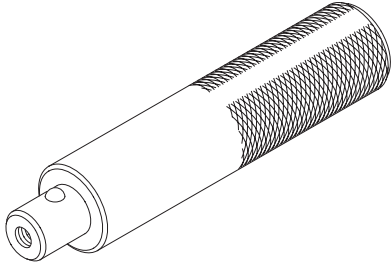
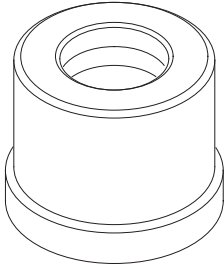
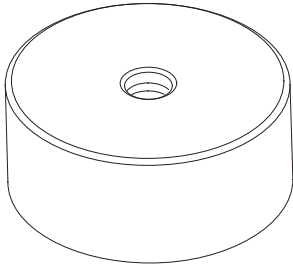
Special Tools	7-2
Component Location Index	7-3
Connecting Rod and Crankshaft End Play	
Inspection	7-5
Crankshaft Main Bearing Replacement	7-6
Connecting Rod Bearing Replacement	7-8
Oil Pan Removal	7-11
Crankshaft and Piston Removal	7-13
Crankshaft Inspection	7-15
Block and Piston Inspection	7-16
Cylinder Bore Honing	7-18
Piston, Pin, and Connecting Rod Replacement	7-18
Piston Ring Replacement	7-21
Piston Installation	7-23
Connecting Rod Bolt Inspection	7-25
Crankshaft Installation	7-25
Oil Pan Installation	7-29
Transmission End Crankshaft Oil Seal	
Installation - In Car	7-32
Sealing Bolt Installation	7-33



Engine Block

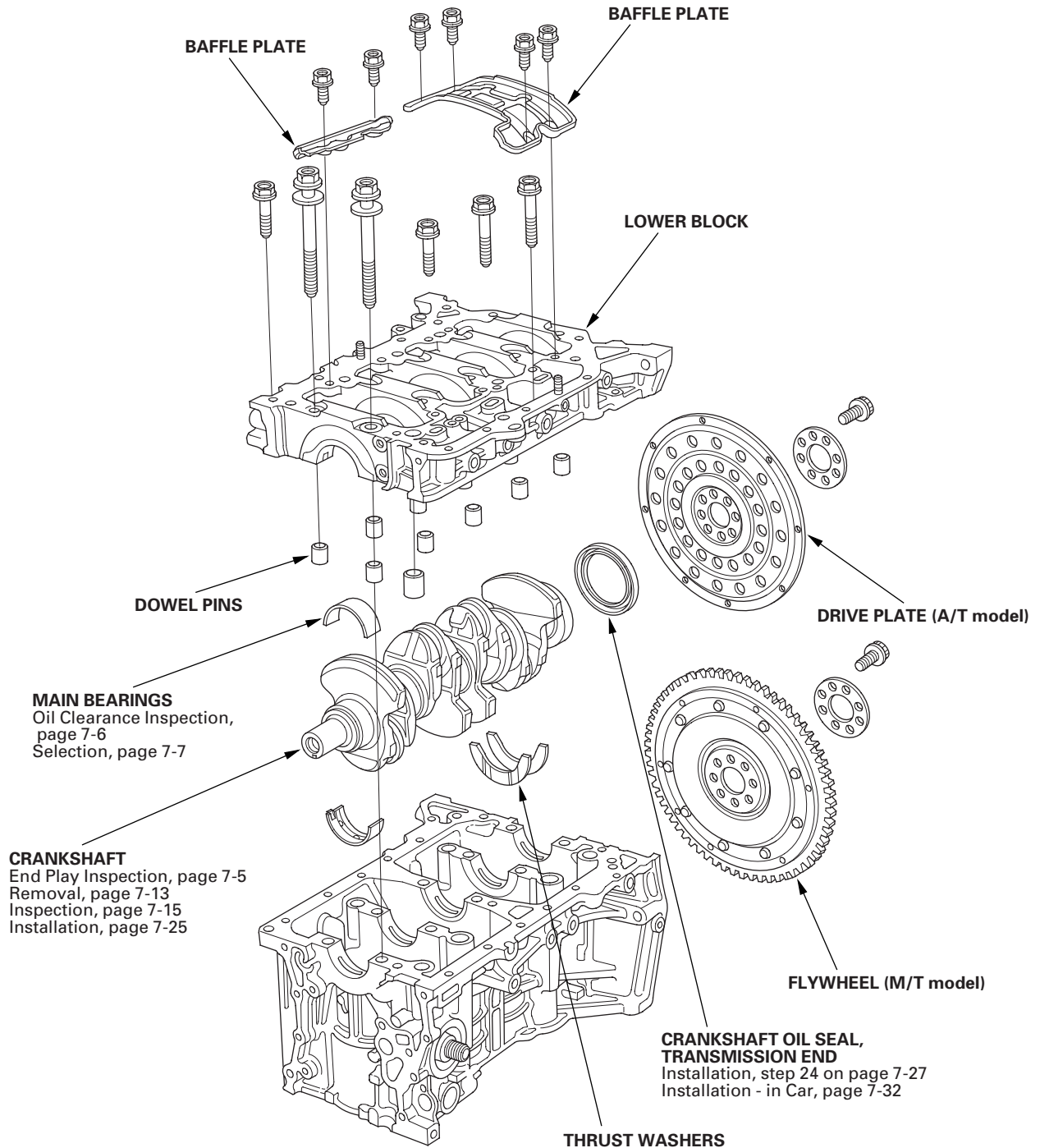
Special Tools

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





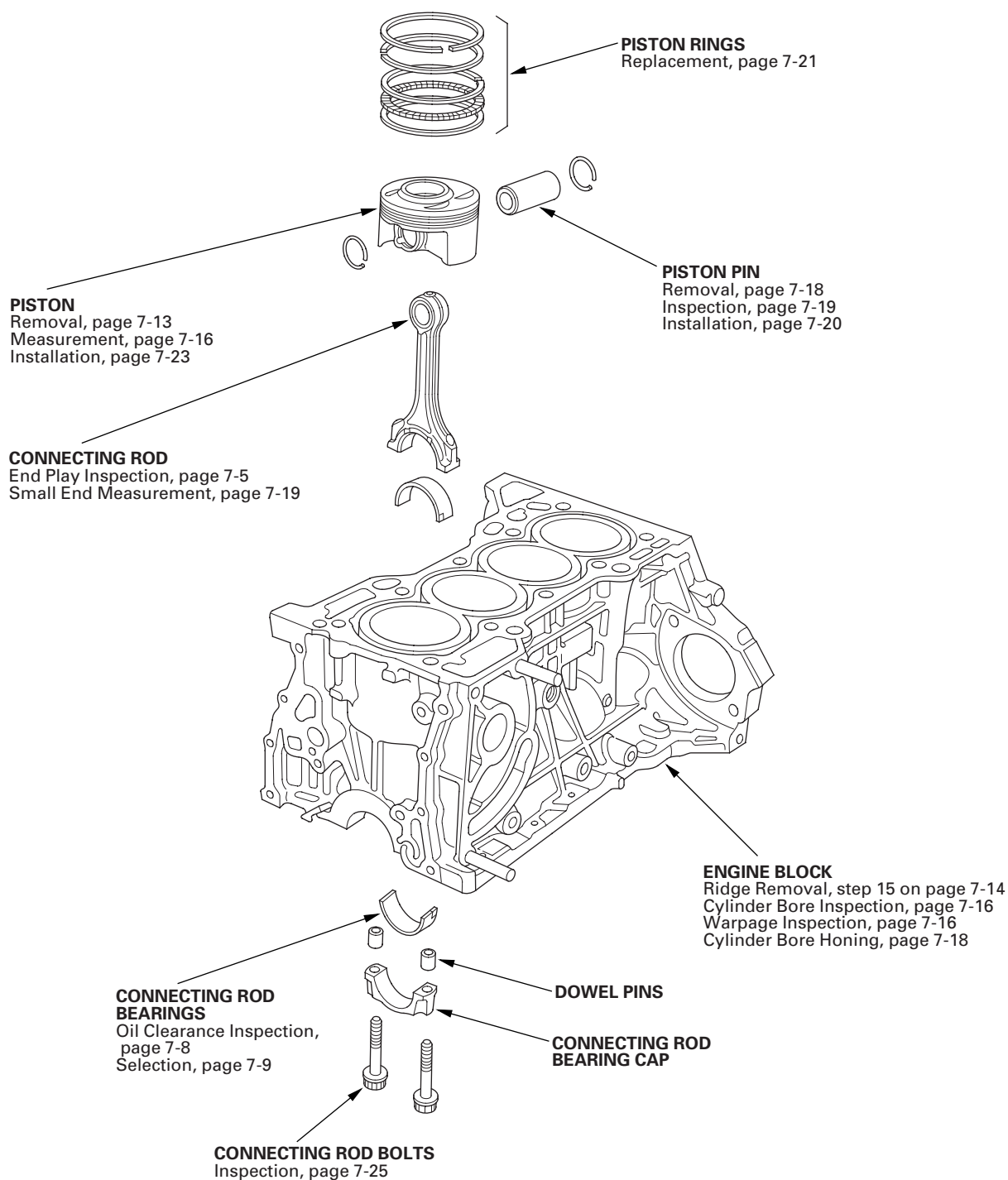
Component Location Index



(cont'd)

Engine Block

Component Location Index (cont'd)





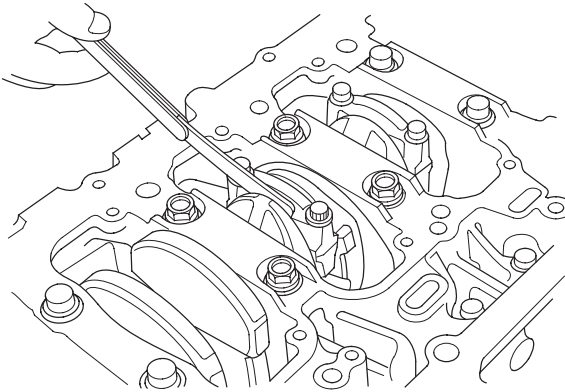
Connecting Rod and Crankshaft End Play Inspection

1. Remove the oil pump (see page 8-16).
2. Remove the baffle plates (see step 8 on page 7-13).
3. Measure the connecting rod end play with a feeler gauge between the connecting rod and the crankshaft.

Connecting Rod End Play

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

Service Limit: 0.40 mm (0.016 in.)



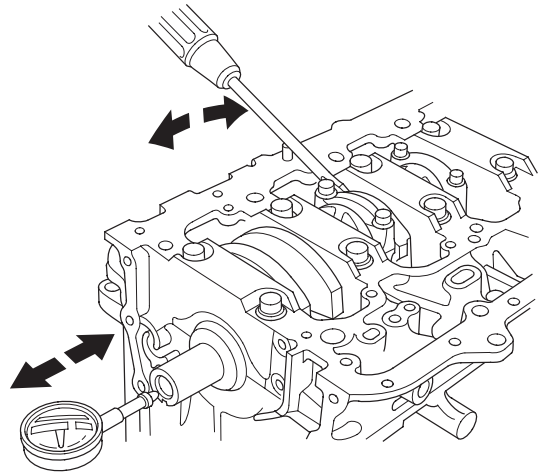
4. If the connecting rod end play is beyond the service limit, install a new connecting rod, and recheck. If it is still beyond the service limit; replace the crankshaft (see page 7-13).

5. Push the crankshaft firmly away from the dial indicator, and zero the dial against the end of the crankshaft. Then pull the crankshaft firmly back toward the indicator, the dial reading should not exceed the service limit.

Crankshaft End Play

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

Service Limit: 0.45 mm (0.018 in.)



6. 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 7-13).

Crankshaft Main Bearing Replacement

Main Bearing Clearance Inspection

1. To check the main bearing-to-journal oil clearance, remove the lower block and the bearing halves (see page 7-13).
2. Clean each main journal and bearing half with a clean shop towel.
3. Place one strip of plastigage across each main journal.
4. Reinstall the bearings and lower block, then tighten the bolts to 29 N·m (3.0 kgf·m, 22 lbf·ft) $\pm$ 56 ° in the proper sequence (see step 19 on page 7-27).

NOTE:

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

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

Main Bearing-to-Journal Oil Clearance

No. 1, 2, 4, 5 Journals:

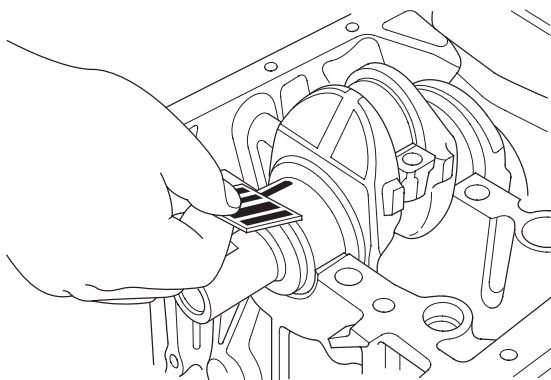
Standard (New): 0.017—0.041 mm
(0.0007—0.0016 in.)

Service Limit: 0.050 mm (0.0020 in.)

No. 3 Journal:

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

Service Limit: 0.055 mm (0.0022 in.)



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

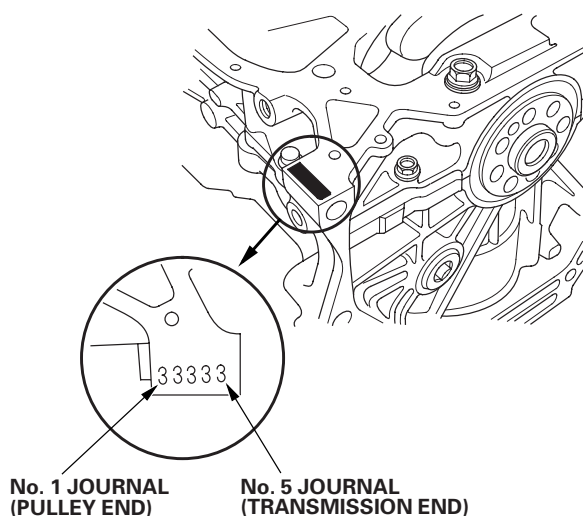


Main Bearing Selection

Crankshaft Bore Code Location

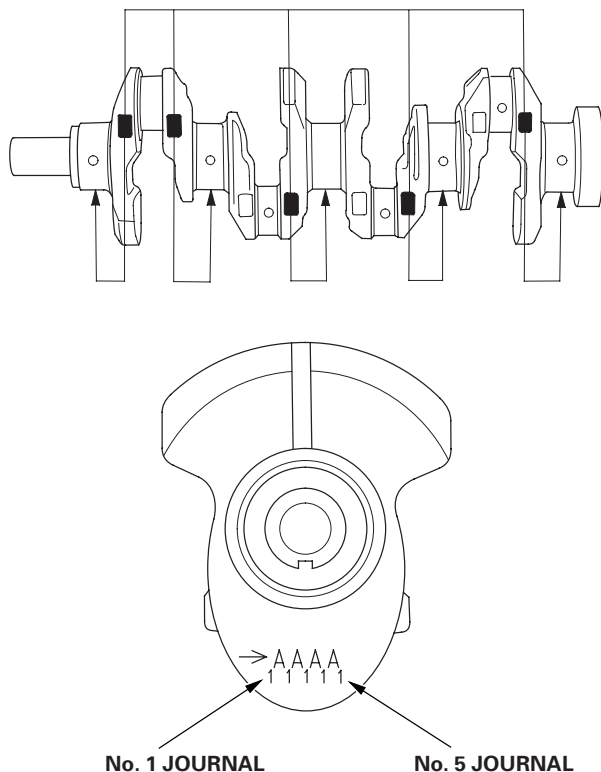
1. Numbers, letters or bars have been stamped on the end of the engine block as a code for the size of each of the five main journal bores. Write down the crank bore codes.

If you cannot read the codes because of accumulated dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.



Main Journal Code Location

2. The main journal codes are stamped on the crankshaft in either location.



(cont'd)

Engine Block

Crankshaft Main Bearing Replacement (cont'd)

- Use the crank bore codes and crank journal codes to select the appropriate replacement bearings from the following table.

NOTE:

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

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

Smaller main journal Smaller bearing (Thicker)

Connecting Rod Bearing Replacement

Connecting Rod Bearing Clearance Inspection

- Remove the oil pump (see page 8-16).
- Remove the baffle plates (see step 8 on page 7-13).
- Remove the connecting rod cap and the bearing half.
- Clean the crankshaft rod journal and the bearing half with a clean shop towel.
- Place plastigage across the rod journal.
- Reinstall the bearing half and connecting rod cap, and tighten the bolts to 20 N·m (2.0 kgf·m, 14 lbf·ft) + 90 ° (K20Z2 engine) or 29 N·m (3.0 kgf·m, 22 lbf·ft) + 90 ° (K20Z3 engine).

NOTE:

- Apply new engine oil to the bolt threads and flanges.
 - Do not rotate the crankshaft during inspection.
- Remove the connecting rod cap and the bearing half, and measure the widest part of the plastigage.

Connecting Rod Bearing-to-Journal Oil Clearance K20Z2 engine

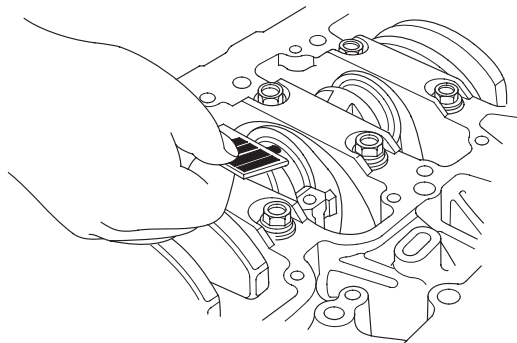
Standard (New): 0.020—0.050 mm
(0.0008—0.0020 in.)

Service Limit: 0.060 mm (0.0024 in.)

K20Z3 engine

Standard (New): 0.032—0.066 mm
(0.0013—0.0026 in.)

Service Limit: 0.077 mm (0.0030 in.)





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

Connecting Rod Bearing Selection

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

Connecting Rod Big End Bore Code Locations

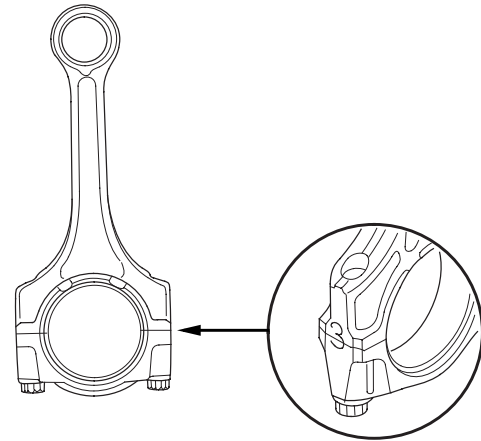
2. Each rod has a tolerance range from 0 to 0.024 mm (0.0009 in.), in 0.006 mm (0.0002 in.) increments, depending on the size of its big end bore. It is then stamped with a number or bar (1, 2, 3, or 4/I, II, III, or IIII) indicating the range. You may find any combination of numbers and bars in any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

If you cannot read the code because of an accumulation of oil and varnish, do not scrub it with a wire brush or scraper. Clean it only with solvent or detergent.

Normal Bore Size

K20Z2 engine: 48.0 mm (1.89 in.)

K20Z3 engine: 51.0 mm (2.01 in.)



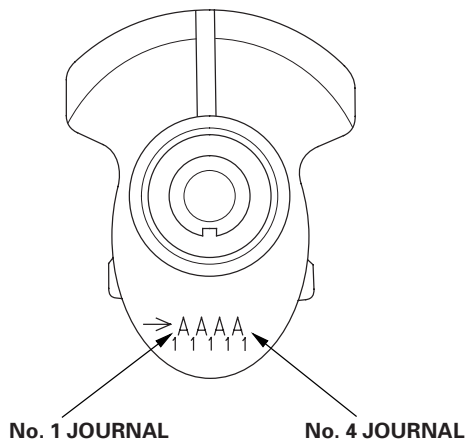
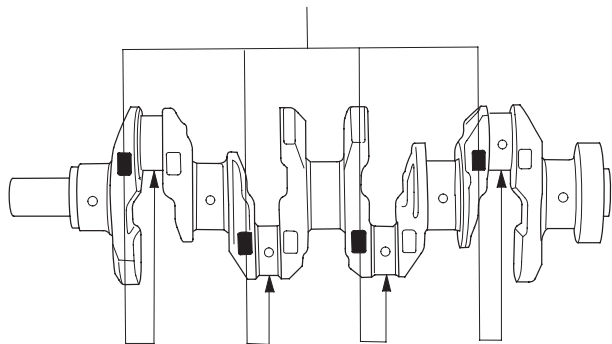
(cont'd)

Engine Block

Connecting Rod Bearing Replacement (cont'd)

Connecting Rod Journal Code Location

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



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

NOTE:

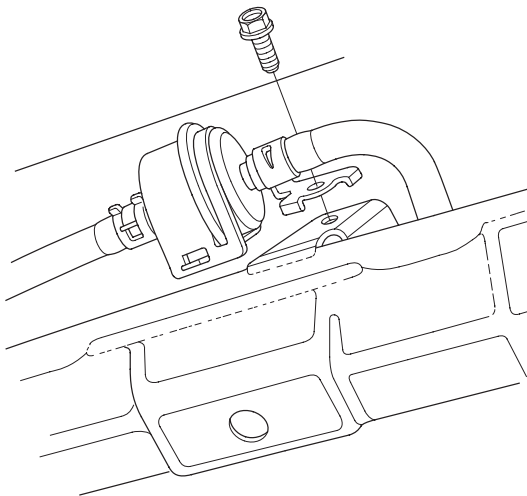
- Color code is on the edge of the bearing.
- When using bearing halves of different colors, it does not matter which color is used in the top or bottom.

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



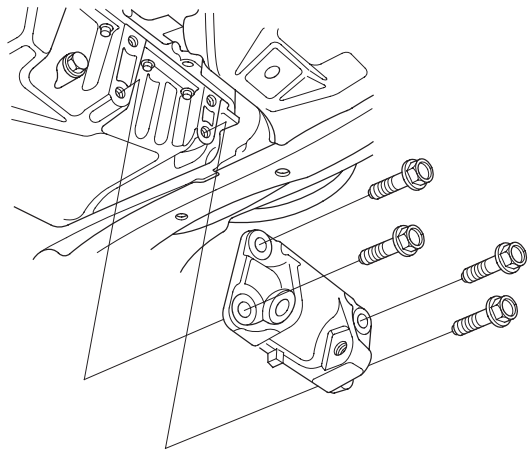
Oil Pan Removal

1. If the engine is already out of the vehicle, go to step 18.
2. Raise the vehicle on the lift.
3. Drain the engine oil (see page 8-10).
4. Remove the front wheels.
5. Remove the splash shield (see step 25 on page 5-5).
6. Separate the stabilizer links (see page 18-25).
7. Separate the knuckles from the lower arms (see step 6 on page 18-21).
8. Remove the steering gearbox bracket. Remove the steering gearbox mounting bolt, the stiffener mounting bolt, and the stiffener (see step 36 on page 5-6).
9. Remove the steering gearbox mounting bolt, the stiffener mounting bolt, and the stiffener. Remove the harness clamp from the front subframe (see step 38 on page 5-6).
10. A/T model: Remove the bolt securing the automatic transmission fluid (ATF) filter.



11. Install the front leg assembly, the hook, and the wing nut to an A and Reds engine support hanger (AAR-T1256) onto the 2006 Civic engine hanger (VSB02C000025). Carefully position the engine hanger on the vehicle, and attach the hook to the slotted hole in the support eyelet. Tighten the wing nut by hand to lift and support the engine/transmission (see step 47 on page 5-8).

12. Remove the lower torque rod (see step 49 on page 5-8).
13. M/T model: Remove the front mount mounting bolt (see step 50 on page 5-9).
14. Make the appropriate reference line at both sides of the front subframe that line up with the edges on the body (see step 51 on page 5-9).
15. Loosen the mid-stiffener mounting bolts on both sides (see step 52 on page 5-9).
16. Attach the front subframe adapter (VSB02C000016) to the front subframe, and hang the belt of the front subframe adapter over the front of the subframe. Secure the belt with its stop, then tighten the wing nut (see step 53 on page 5-9).
17. Remove the front subframe (see step 55 on page 5-10).
18. Remove the lower torque rod bracket.

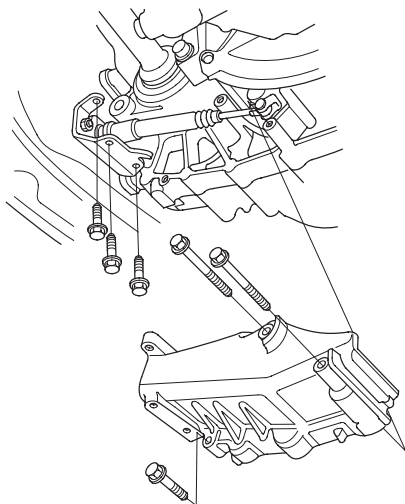


(cont'd)

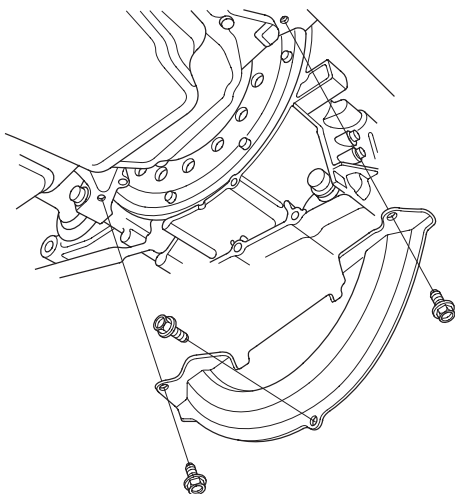
Engine Block

Oil Pan Removal (cont'd)

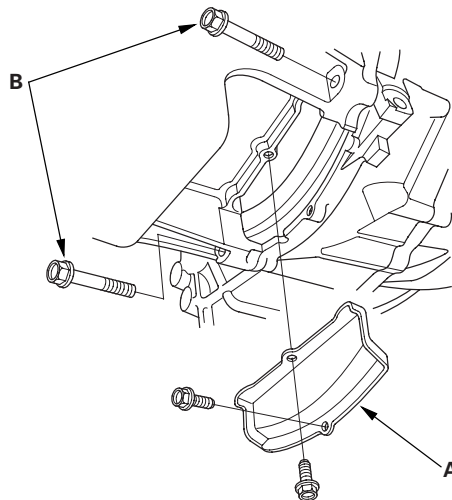
19. A/T model: Remove the shift cable cover.



20. K20Z2 engine: Remove the torque converter cover/clutch cover.

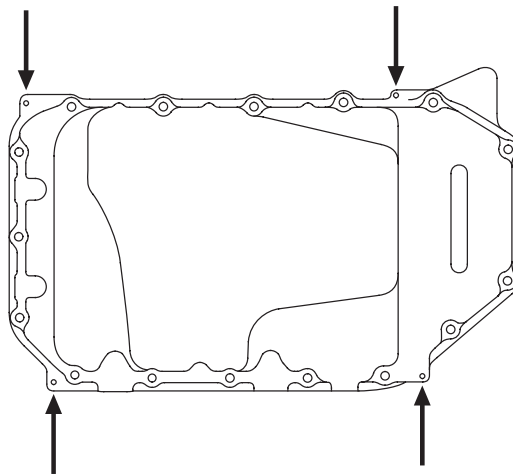


21. K20Z3 engine: Remove the clutch cover (A) and the transmission mounting bolts (B).



22. Remove the bolts securing the oil pan.

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

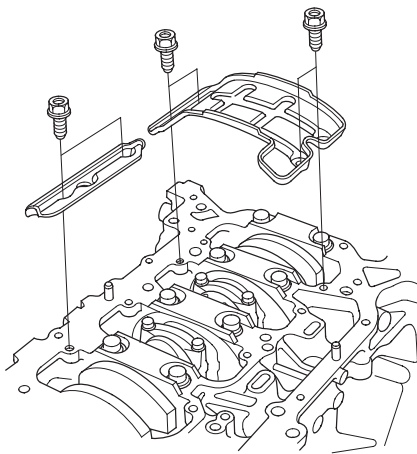


24. Remove the oil pan.

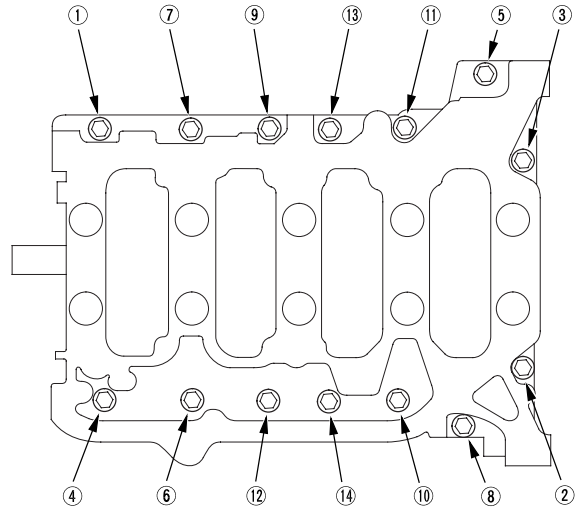


Crankshaft and Piston Removal

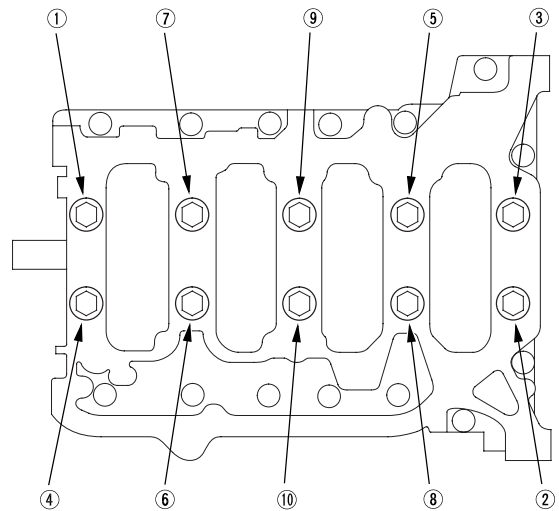
1. Remove the engine/transmission (see page 5-3).
2. Remove the transmission:
 - Manual transmission (see page 13-7)
 - Automatic transmission (see page 14-233)
3. M/T model: Remove the pressure plate (see page 12-19), the clutch disc (see page 12-20), and the flywheel (see page 12-21).
4. A/T model: Remove the drive plate (see page 14-242).
5. Remove the oil pan (see page 7-11).
6. Remove the oil pump (see page 8-16).
7. Remove the cylinder head (see page 6-38).
8. Remove the baffle plates.



9. Remove the 8 mm bolts in sequence.



10. 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.

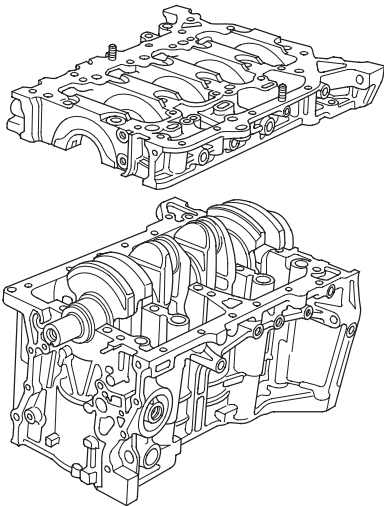


(cont'd)

Engine Block

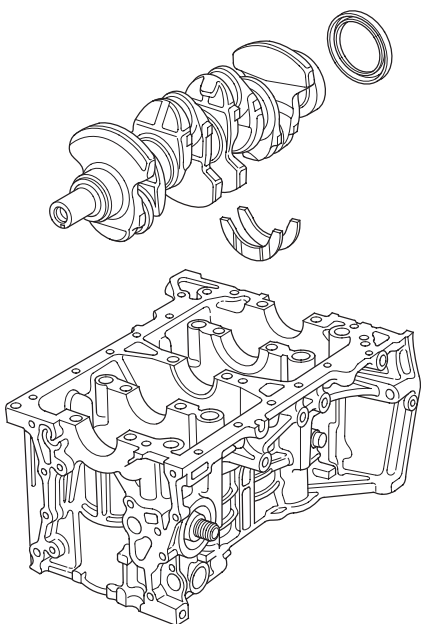
Crankshaft and Piston Removal (cont'd)

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



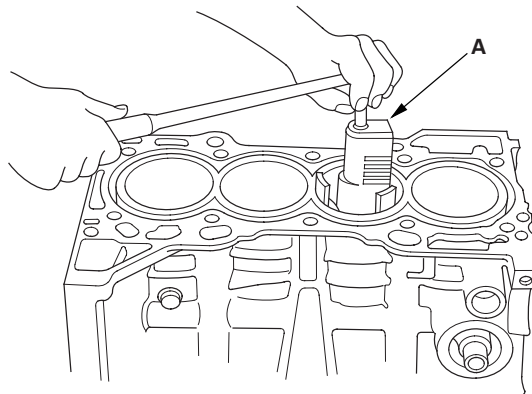
12. Remove the connecting rod caps/bearing halves. Keep all connecting rod caps/bearing halves in order.

13. Lift the crankshaft out of the engine. Be careful not to damage the journals.

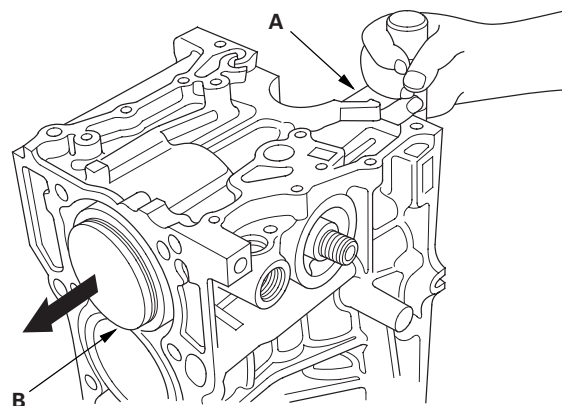


14. Remove the upper bearing halves from the connecting rods, and set them aside with their respective caps.

15. 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.



16. Use the wooden handle of a hammer (A) to drive out the piston/connecting rod assembly (B).



17. Reinstall the lower block and the bearings on the engine in the proper order.

18. Reinstall the connecting rod bearings and the caps after removing each piston/connecting rod assembly.

19. Mark each piston/connecting rod assembly with its cylinder number to make sure they are reused in the original order.

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



Crankshaft Inspection

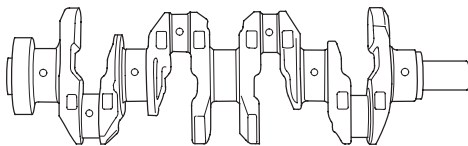
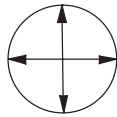
Out-of-Round and Taper

1. Remove the crankshaft from the engine block (see page 7-13).
2. Clean the crankshaft oil passages with pipe cleaners or suitable brush.
3. Clean the keyway and the threads, and check for damage.
4. Measure the out-of-round at the middle of each rod and main journal in two places. The difference between measurements on each journal must not be more than the service limit.

Journal Out-of-Round

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

Service Limit: 0.010 mm (0.0004 in.)



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

Journal Taper

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

Service Limit: 0.010 mm (0.0004 in.)

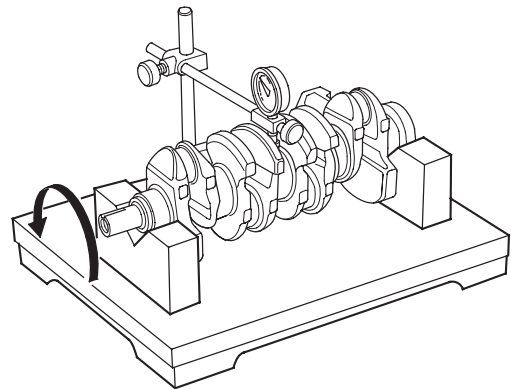
Straightness

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

Crankshaft Total Runout

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

Service Limit: 0.04 mm (0.0016 in.)



Engine Block

Block and Piston Inspection

1. Remove the crankshaft and the pistons (see page 7-13).
2. Check the piston for distortion or cracks.
3. Measure the piston skirt diameter at a point 11 mm (0.4 in.) from the bottom of the skirt. There are two standard-size pistons (No Letter or A, and B). The letter is stamped on the top of the piston. Letters are also stamped on the engine block as the cylinder bore sizes.

Piston Skirt Diameter

Standard (New):

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

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

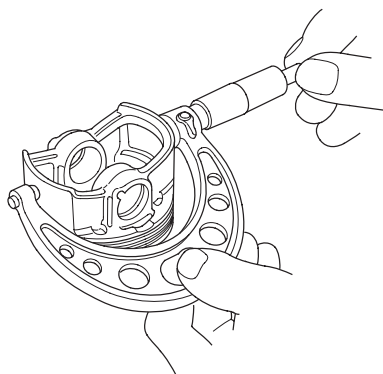
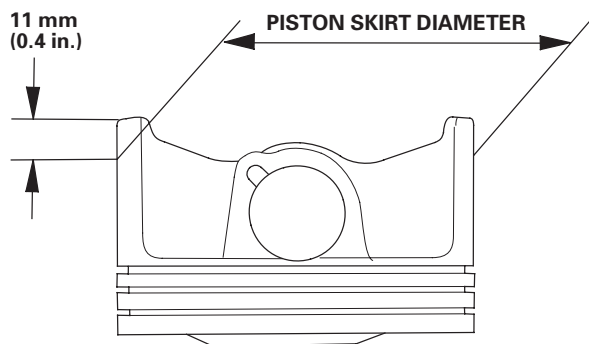
Service Limit:

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

B: 85.920 mm (3.3827 in.)

Oversize Piston Skirt Diameter

0.25: 86.230—86.240 mm (3.3949—3.3953 in.)



4. Measure the wear and taper in direction X and Y at three levels inside each cylinder as shown. If the measurements in any cylinder are beyond the Oversize Bore Service Limit, replace the engine block. If the engine block is being rebored, refer to step 7 after reboring.

Cylinder Bore Size

Standard (New):

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

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

Service Limit: 86.070 mm (3.3886 in.)

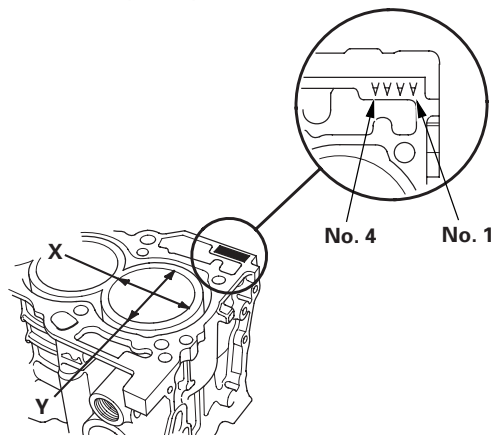
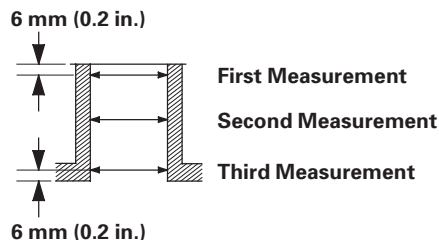
Oversize Bore

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

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

Bore Taper

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



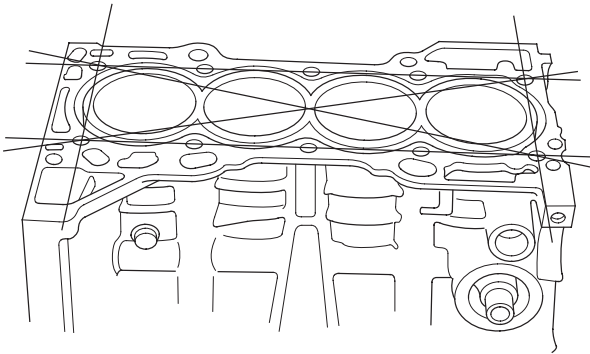


5. Scored or scratched cylinder bores must be honed.
6. Check the top of the engine block for warpage. Measure along the edges, and across the center as shown.

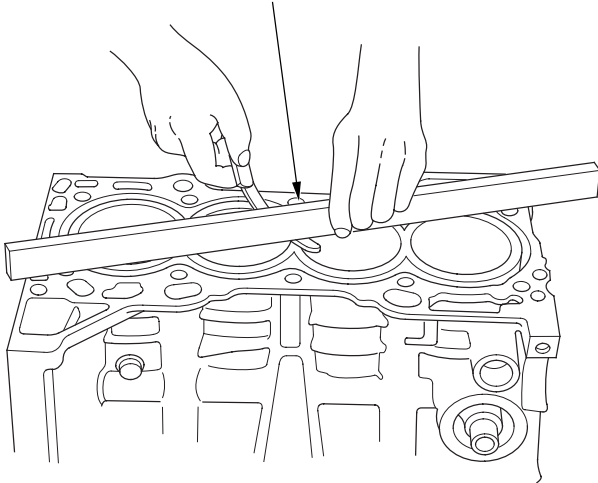
Engine Block Warpage

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

Service Limit: 0.10 mm (0.004 in.)



PRECISION STRAIGHT EDGE

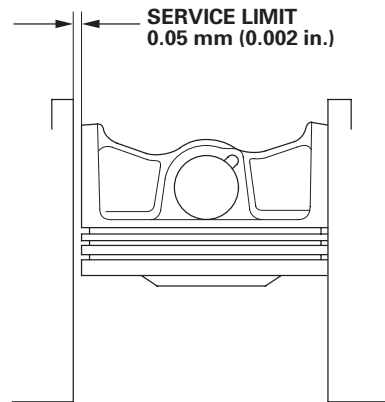


7. Calculate the difference between the cylinder bore diameter and the piston diameter. If the clearance is near, or exceeds the service limit, inspect the piston and the cylinder bore for excessive wear.

Piston-to-Cylinder Bore Clearance

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

Service Limit: 0.05 mm (0.002 in.)

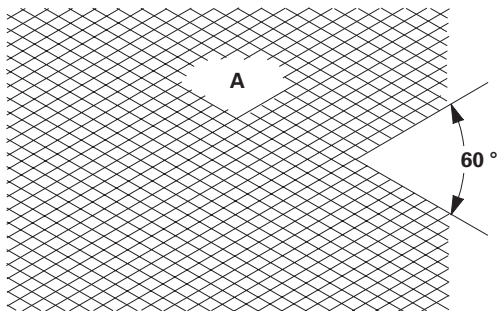


Engine Block

Cylinder Bore Honing

Only a scored or scratched cylinder bore must be honed.

1. Measure the cylinder bores (see page 7-16).
If the engine block is to be reused, hone the cylinders, and remeasure the bores.
2. K20Z3 engine: Remove the oil jets (see page 8-13).
3. Hone the cylinder bores with honing oil and a fine (400 grit) stone in a 60 degree cross-hatch pattern (A). Use only a rigid hone with 400 grit or finer stone such as Sunnen, Ammco, or equivalent. Do not use stones that are worn or broken.



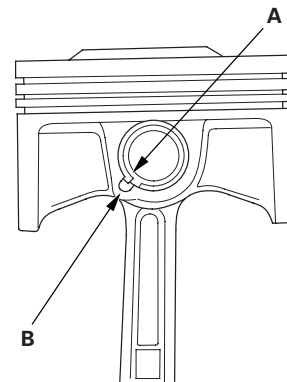
4. When honing is complete, thoroughly clean the engine block of all metal particles. Wash the cylinder bores with hot soapy water, then dry and oil them immediately to prevent rusting. Never use solvent, it will only redistribute the grit on the cylinder walls.
5. If scoring or scratches are still present in the cylinder bores after honing the engine block 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.
6. K20Z3 engine: Install the oil jets (see page 8-13).

Piston, Pin, and Connecting Rod Replacement

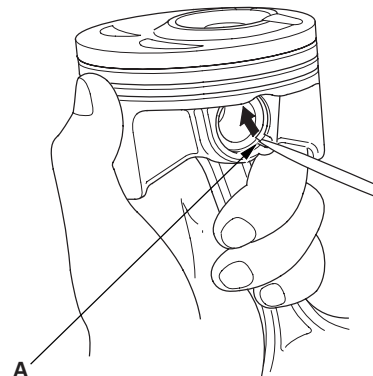
Disassembly

1. Remove the piston from the engine block (see page 7-13).
2. Apply new engine oil to the piston pin snap rings (A), and turn them in the ring grooves until the end gaps are lined up with the cutouts in the piston pin bores (B).

NOTE: Take care not to damage the ring grooves.

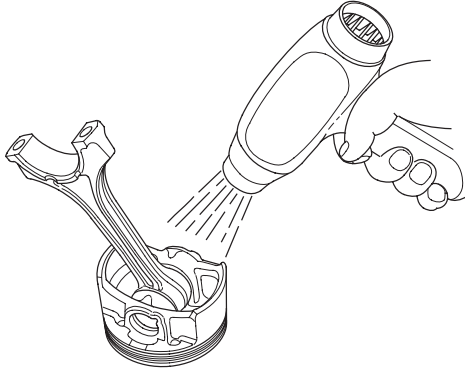


3. Remove both snap rings (A). Start at the cutout in the piston pin bore. Remove the snap rings carefully so they do not go flying or get lost. Wear eye protection.





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



Inspection

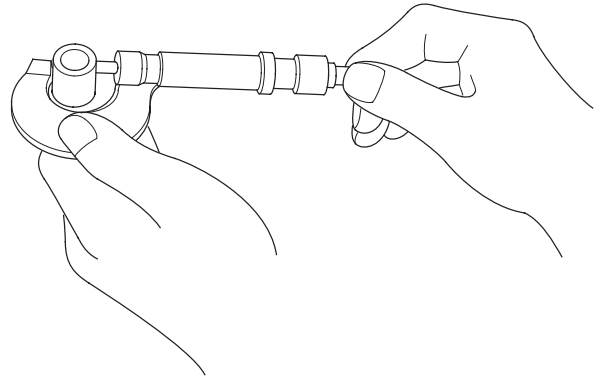
NOTE: Inspect the piston, the piston pin, and the connecting rod when they are at room temperature.

1. Measure the diameter of the piston pin.

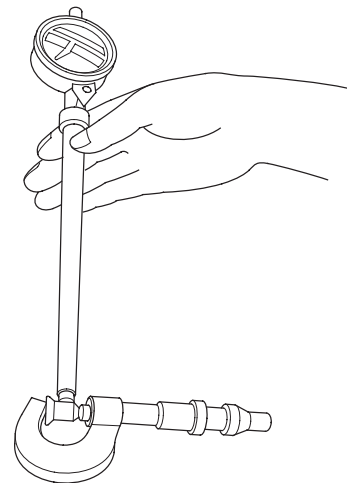
Piston Pin Diameter

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

Service Limit: 21.953 mm (0.8643 in.)



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



(cont'd)

Engine Block

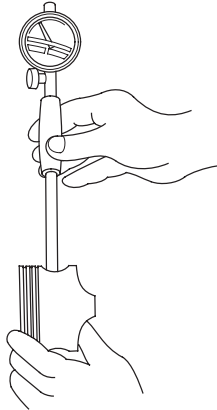
Piston, Pin, and Connecting Rod Replacement (cont'd)

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): -0.005 to $+0.002$ mm
(-0.00020 to $+0.00008$ in.)

Service Limit: 0.005 mm (0.0002 in.)

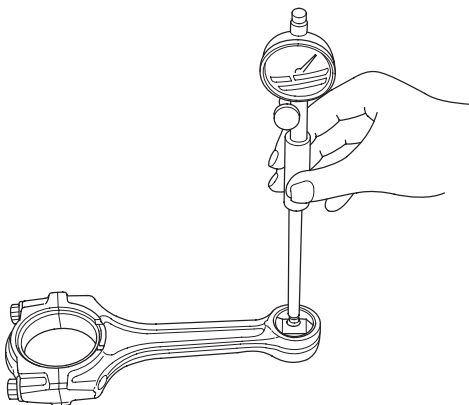


4. Measure the piston pin-to-connecting rod clearance.

Piston Pin-to-Connecting Rod Clearance

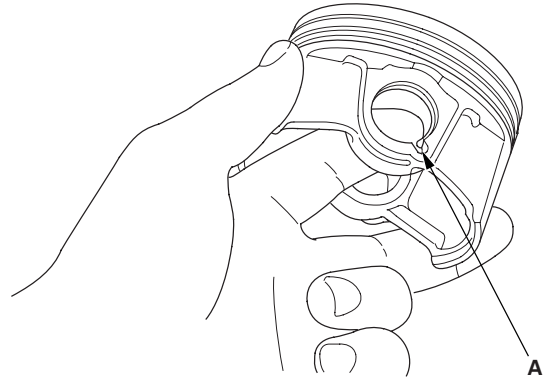
Standard (New): 0.005 — 0.015 mm
(0.0002 — 0.0006 in.)

Service Limit: 0.02 mm (0.0008 in.)



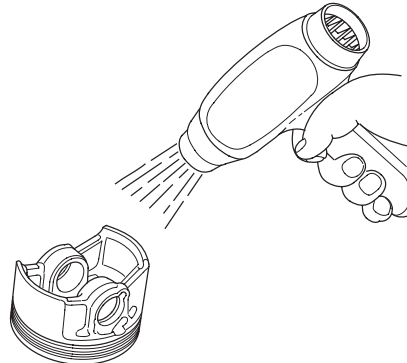
Reassembly

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



2. Coat the piston pin bore in the piston, the bore in the connecting rod, and the piston pin with new engine oil.

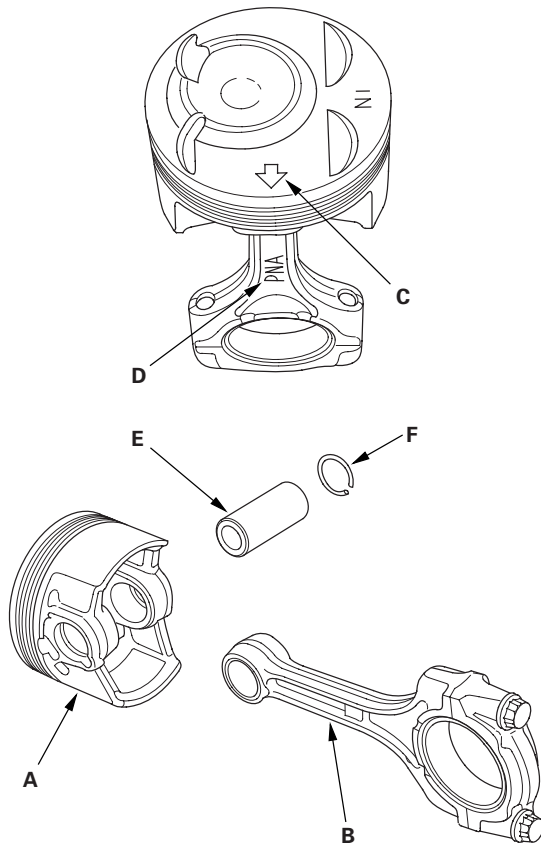
3. Heat the piston to about 70°C (158°F).





Piston Ring Replacement

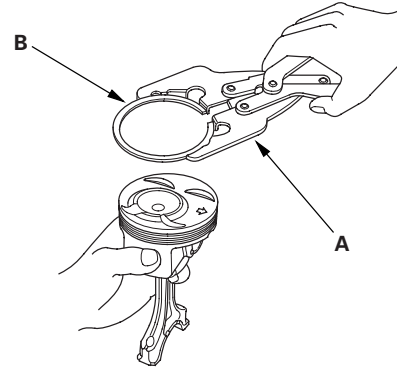
4. Assemble the piston (A) and the connecting rod (B) with the arrow (C) and the embossed mark (D) on the same side. Install the piston pin (E).



This illustration shows K20Z2 engine.

5. Install the remaining snap ring (F).
6. Turn the snap rings in the ring grooves until the end gaps are positioned at the bottom of the piston.

1. Remove the piston from the engine block (see page 7-13).
2. Using a ring expander (A), remove the old piston rings (B).



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

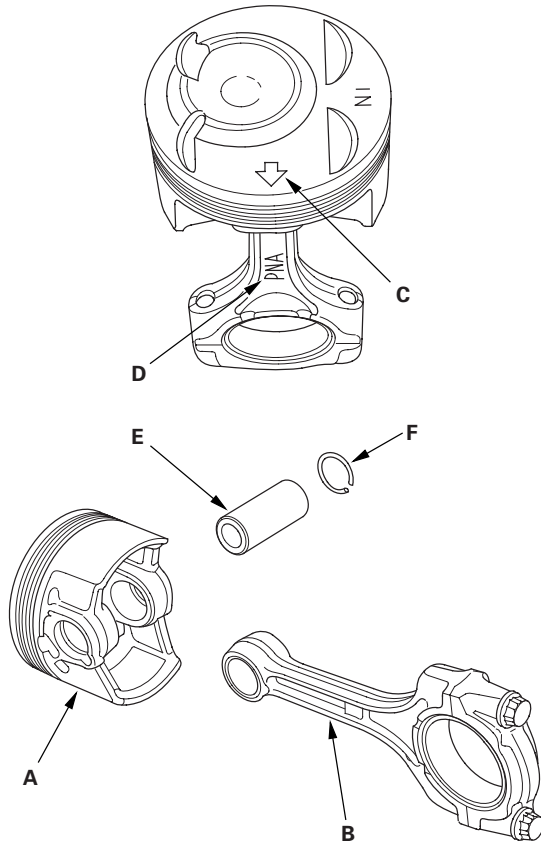
NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

(cont'd)



Piston Ring Replacement

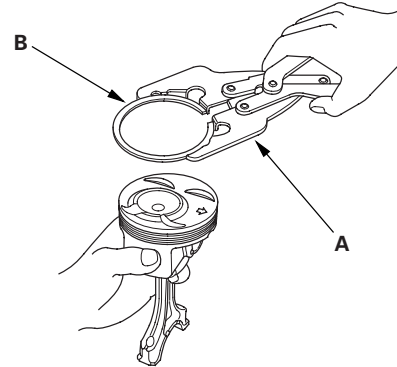
4. Assemble the piston (A) and the connecting rod (B) with the arrow (C) and the embossed mark (D) on the same side. Install the piston pin (E).



This illustration shows K20Z2 engine.

5. Install the remaining snap ring (F).
6. Turn the snap rings in the ring grooves until the end gaps are positioned at the bottom of the piston.

1. Remove the piston from the engine block (see page 7-13).
2. Using a ring expander (A), remove the old piston rings (B).



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

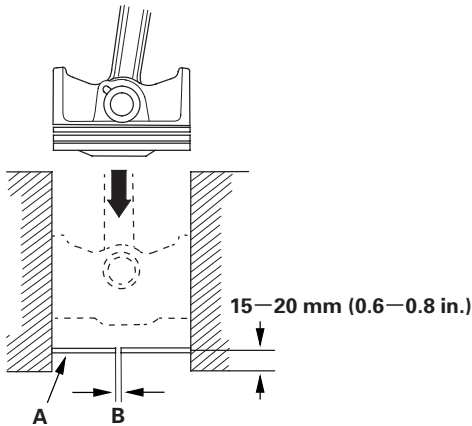
NOTE: If the piston is to be separated from the connecting rod, do not install new rings yet.

(cont'd)

Engine Block

Piston Ring Replacement (cont'd)

4. Using a piston that has its rings removed, push a new ring (A) into the cylinder bore 15–20 mm (0.6–0.8 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 7-16). If the bore is beyond the service limit, the engine block must be rebored.

Piston Ring End-Gap

Top Ring:

Standard (New): 0.20–0.35 mm
(0.008–0.014 in.)
Service Limit: 0.60 mm (0.024 in.)

Second Ring:

K20Z2 engine:

Standard (New): 0.40–0.55 mm
(0.016–0.022 in.)
Service Limit: 0.70 mm (0.028 in.)

K20Z3 engine:

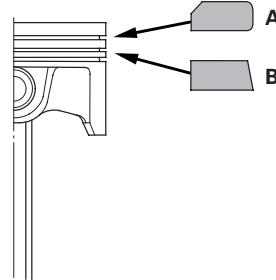
Standard (New): 0.50–0.65 mm
(0.020–0.026 in.)
Service Limit: 0.75 mm (0.030 in.)

Oil Ring:

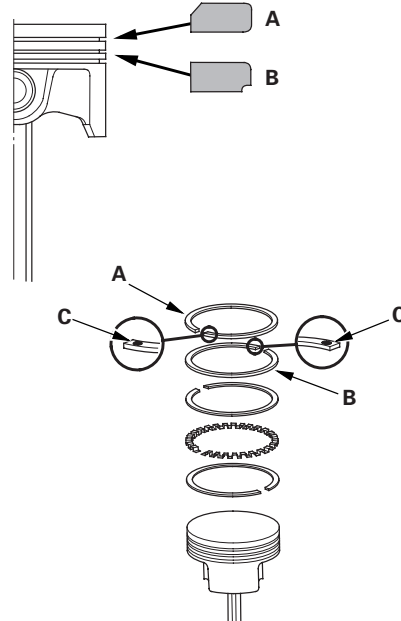
Standard (New): 0.20–0.70 mm
(0.008–0.028 in.)
Service Limit: 0.80 mm (0.031 in.)

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

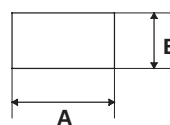
K20Z2 engine:



K20Z3 engine:



Piston Ring Dimensions



Top Ring (Standard):
A: 3.1 mm (0.12 in.)
B: 1.2 mm (0.05 in.)

Second Ring (Standard):
A: 3.4 mm (0.13 in.)
B: 1.2 mm (0.05 in.)



Piston Installation

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

Top Ring Clearance

K20Z2 engine:

Standard (New): 0.035—0.060 mm
(0.0014—0.0024 in.)

Service Limit: 0.13 mm (0.005 in.)

K20Z3 engine:

Standard (New): 0.045—0.070 mm
(0.0018—0.0028 in.)

Service Limit: 0.13 mm (0.005 in.)

Second Ring Clearance

K20Z2 engine:

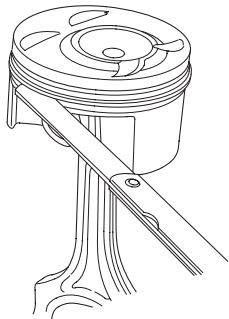
Standard (New): 0.030—0.055 mm
(0.0012—0.0022 in.)

Service Limit: 0.13 mm (0.005 in.)

K20Z3 engine:

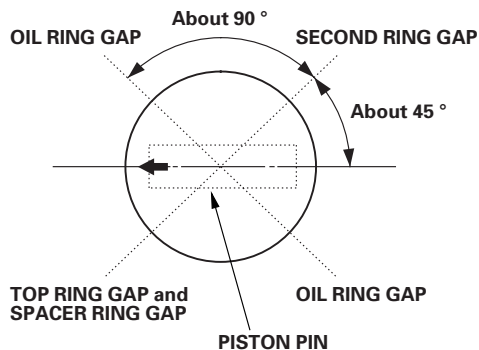
Standard (New): 0.040—0.065 mm
(0.0016—0.0026 in.)

Service Limit: 0.13 mm (0.005 in.)



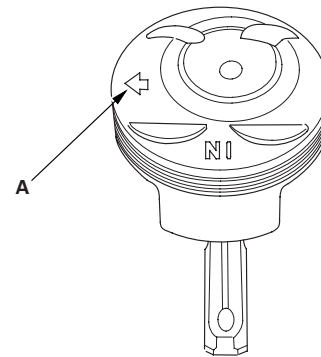
8. Rotate the rings in their grooves to make sure they do not bind.

9. Position the ring end gaps as shown:



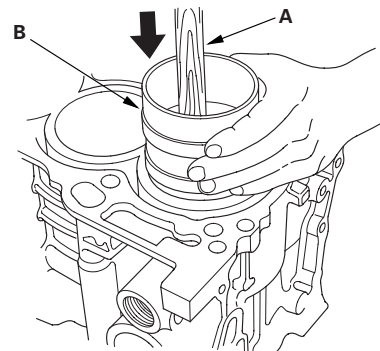
If the Crankshaft is Already Installed

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Remove the connecting rod caps, then install the ring compressor. Check that the 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 mark (A) to face the cam chain side of the engine block.



This illustration shows K20Z2 engine.

5. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



6. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.

(cont'd)



Piston Installation

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

Top Ring Clearance

K20Z2 engine:

Standard (New): 0.035—0.060 mm
(0.0014—0.0024 in.)

Service Limit: 0.13 mm (0.005 in.)

K20Z3 engine:

Standard (New): 0.045—0.070 mm
(0.0018—0.0028 in.)

Service Limit: 0.13 mm (0.005 in.)

Second Ring Clearance

K20Z2 engine:

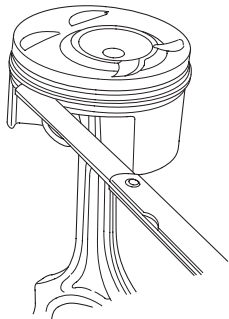
Standard (New): 0.030—0.055 mm
(0.0012—0.0022 in.)

Service Limit: 0.13 mm (0.005 in.)

K20Z3 engine:

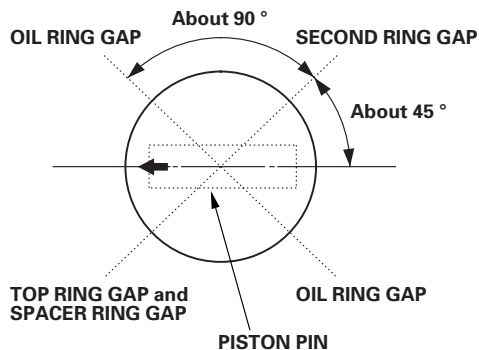
Standard (New): 0.040—0.065 mm
(0.0016—0.0026 in.)

Service Limit: 0.13 mm (0.005 in.)



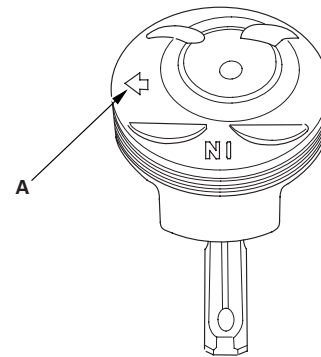
8. Rotate the rings in their grooves to make sure they do not bind.

9. Position the ring end gaps as shown:



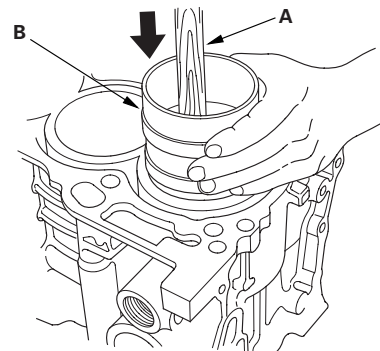
If the Crankshaft is Already Installed

1. Set the crankshaft to bottom dead center (BDC) for each cylinder as its piston is installed.
2. Remove the connecting rod caps, then install the ring compressor. Check that the 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 mark (A) to face the cam chain side of the engine block.



This illustration shows K20Z2 engine.

5. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.



6. Stop after the ring compressor pops free, and check the connecting rod-to-rod journal alignment before pushing the piston into place.

(cont'd)

Engine Block

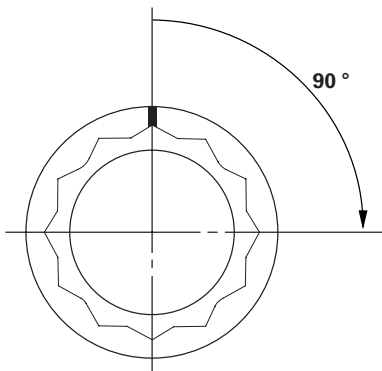
Piston Installation (cont'd)

7. Check the connecting rod bearing clearance with plastigage (see page 7-8).
8. Inspect the connecting rod bolts (see page 7-25).
9. Install the rod caps with bearings. Tighten the bolts to 20 N·m (2.0 kgf·m, 14 lbf·ft) (K20Z2 engine) or 29 N·m (3.0 kgf·m, 22 lbf·ft) (K20Z3 engine).

NOTE: Apply new engine oil to the bolt threads and flanges.

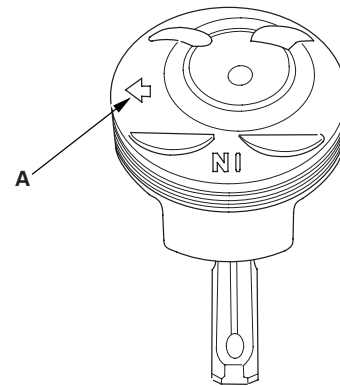
10. Tighten the connecting rod bolts an additional 90°.

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.



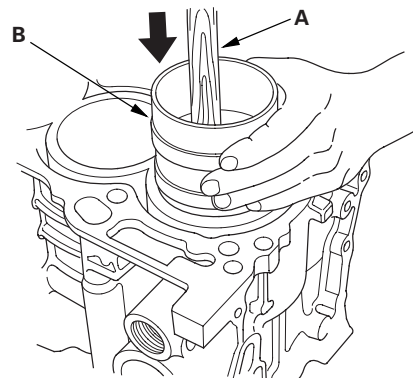
If the Crankshaft is Not Installed

1. Remove the connecting rod caps, then install the ring compressor, and check that the 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 mark (A) to face the cam chain side of the engine block.



This illustration shows K20Z2 engine.

4. Position the piston/connecting rod assembly in the cylinder, and tap it in using the wooden handle of a hammer (A). Push down on the ring compressor (B) to prevent the rings from expanding before entering the cylinder bore.

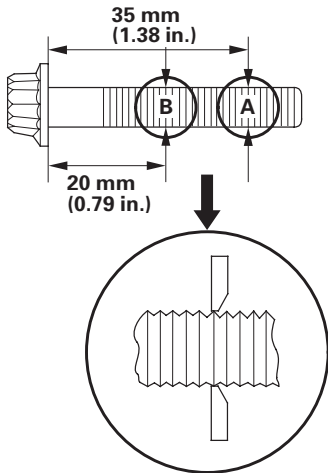


5. Position all pistons at top dead center (TDC).



Connecting Rod Bolt Inspection

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



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

Point A—Point B = Difference in Diameter

Difference in Diameter

Specification: 0—0.1 mm (0—0.004 in.)

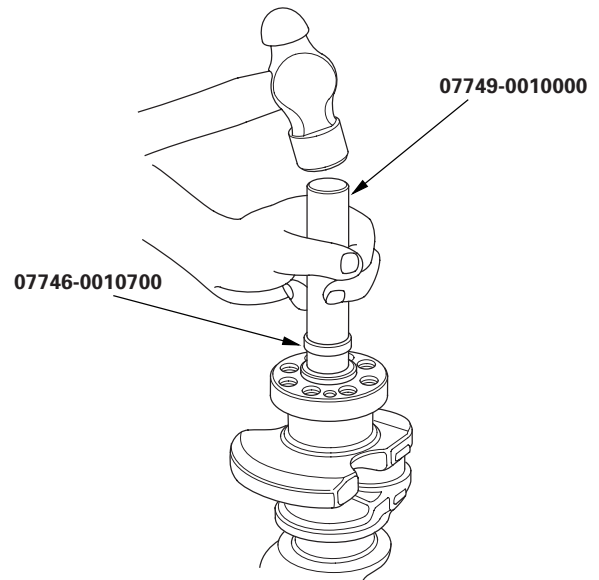
3. If the difference in diameter is out of specification, replace the connecting rod bolt.

Crankshaft Installation

Special Tools Required

- Driver 07749-0010000
- Attachment, 24 x 26 mm 07746-0010700
- Oil seal driver attachment 96 07ZAD-PNAA100

1. M/T model: Install the crankshaft end bushing when replacing the crankshaft.
Using the driver and the attachment, 24 x 26 mm drive in the crankshaft end bushing until the driver and the attachment bottom against the crankshaft.



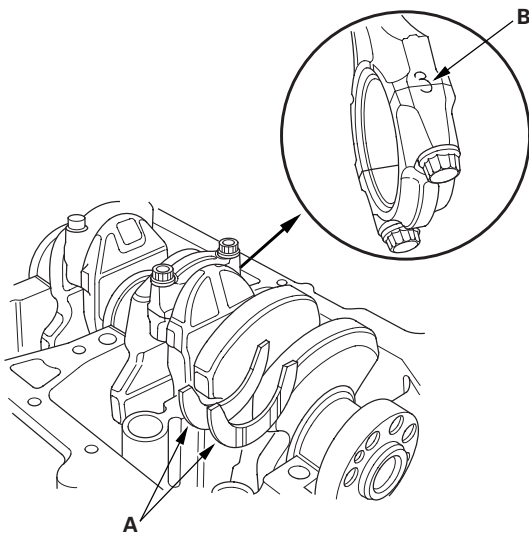
2. Check the connecting rod bearing clearance with plastigage (see page 7-8).
3. Check the main bearing clearance with plastigage (see page 7-6).

(cont'd)

Engine Block

Crankshaft Installation (cont'd)

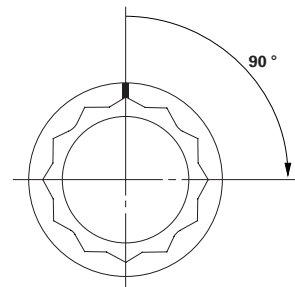
4. Install the bearing halves in the engine block and the connecting rods.
5. Apply new engine oil to the main bearings and the rod bearings.
6. Hold the crankshaft so rod journal No. 2 and rod journal No. 3 are straight up, then lower the crankshaft into the engine block.
7. Apply new engine oil to the thrust washer surfaces. Install the thrust washers (A) in the No. 4 journal of the engine block.



8. Inspect the connecting rod bolts (see page 7-25).
9. Apply new engine oil to the threads of the connecting rod bolts.
10. Seat the rod journals into connecting rod No. 1 and connecting rod No. 4. Line up the mark (B) on the connecting rod and the cap, then install the caps and the bolts finger-tight.
11. Rotate the crankshaft clockwise, and seat the journals into connecting rod No. 2 and connecting rod No. 3. Line up the mark on the connecting rod and the cap, then install the caps and the bolts finger-tight.

12. Tighten the connecting rod bolts to 20 N·m (2.0 kgf·m, 14 lbf·ft) (K20Z2 engine) or 29 N·m (3.0 kgf·m, 22 lbf·ft) (K20Z3 engine).
13. Tighten the connecting rod bolts an additional 90°.

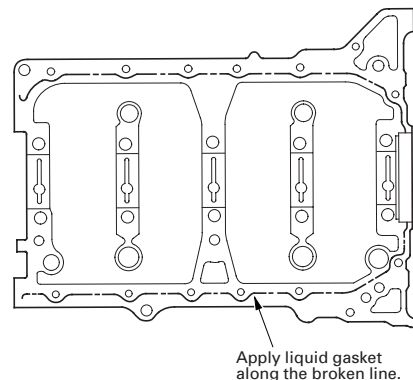
NOTE: Remove the connecting rod bolt if you tightened it beyond the specified angle, and go back to step 8 of the procedure. Do not loosen it back to the specified angle.



14. Remove all of the old liquid gasket from the lower block mating surfaces, the bolts, and the bolt holes.
15. Clean, and dry the lower block mating surfaces.
16. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the engine block mating surface of the lower block, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

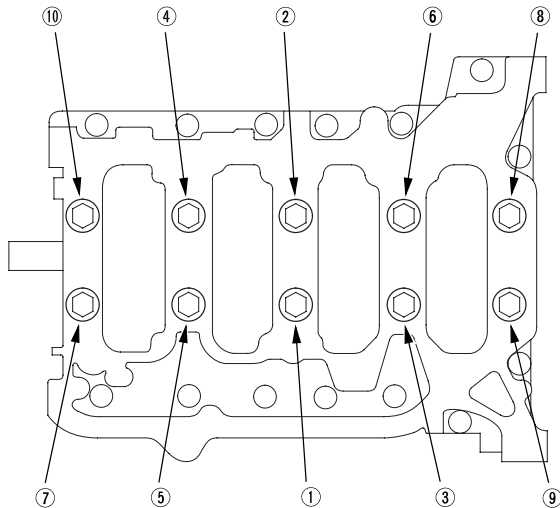
NOTE:

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

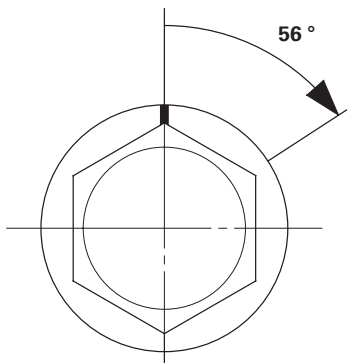




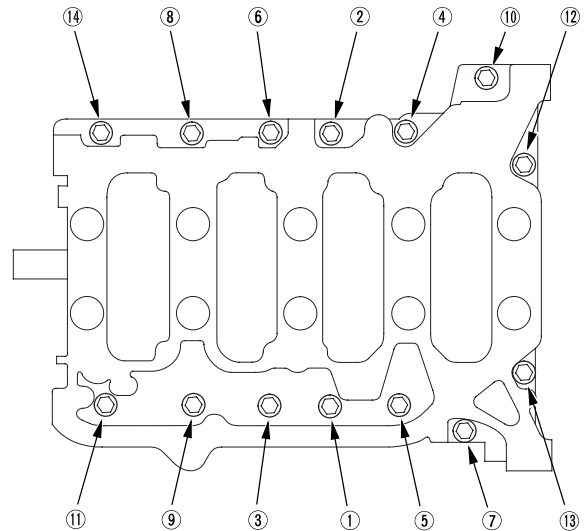
17. Install the main bearings, then put the lower block on the engine block.
18. Apply new engine oil to the threads of the bearing cap bolts.
19. Tighten the bearing cap bolts, in sequence, to 29 N·m (3.0 kgf·m, 22 lbf·ft).



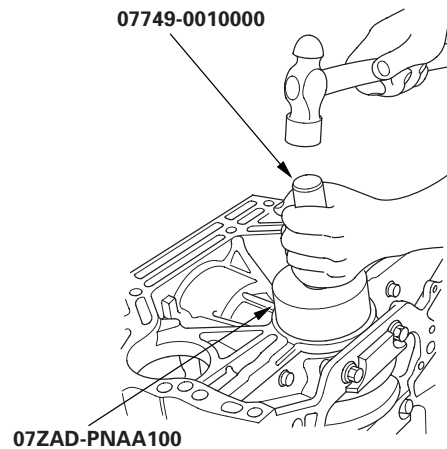
20. Tighten the bearing cap bolts an additional 56°.



21. Tighten the 8 mm bolts, in sequence, to 22 N·m (2.2 kgf·m, 16 lbf·ft).



22. Apply a light coat of new engine oil around the crankshaft oil seal.
23. Apply a light coat of new engine oil to the crankshaft and the lip of the crankshaft oil seal.
24. Use the driver and the oil seal driver attachment 96 to drive a new oil seal squarely into the engine block to the specified installed height.



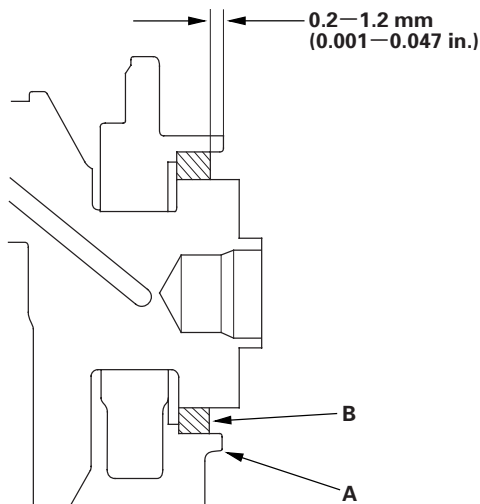
(cont'd)

Engine Block

Crankshaft Installation (cont'd)

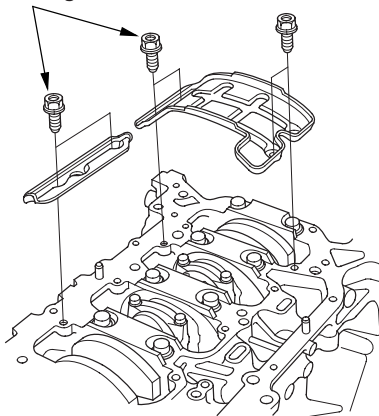
25. Measure the distance between the engine block (A) and the crankshaft oil seal (B).

**Oil Seal Installed Height: 0.2—1.2 mm
(0.001—0.047 in.)**



26. Install the baffle plates.

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



27. Install the oil pump (see page 8-21).
28. Install the oil pan (see page 7-29).
29. Install the cylinder head (see page 6-62).
30. M/T model: Install the flywheel (see page 12-21), the clutch disc (see page 12-23), and the pressure plate (see page 12-23).
31. A/T model: Install the drive plate (see page 14-242).
32. Install the transmission:
- Manual transmission (see page 13-14)
 - Automatic transmission (see page 14-242)
33. Install the engine assembly (see page 5-13).

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

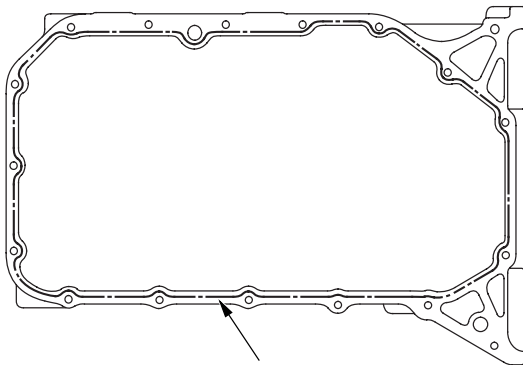


Oil Pan Installation

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.
3. Apply liquid gasket, P/N 08717-0004, 08718-0001, 08718-0003, or 08718-0009, evenly to the lower engine block mating surface, and to the inside edge of the threaded bolt holes. Install the component within 5 minutes of applying the liquid gasket.

NOTE:

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



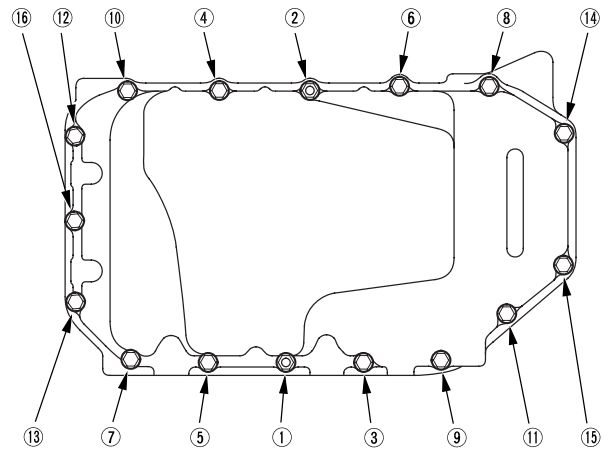
Apply liquid gasket
along the broken line.

4. Install the oil pan.

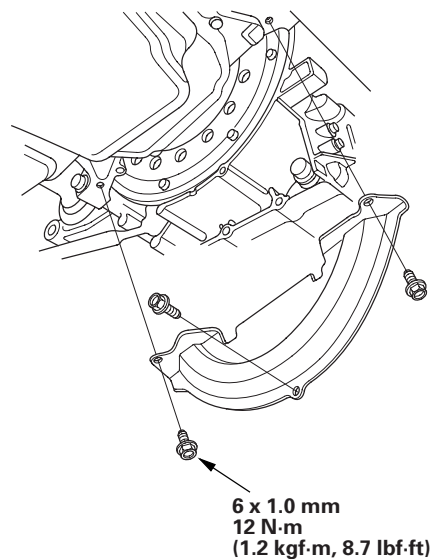
5. Tighten the bolts/nuts in three steps. In the final step, tighten all bolts/nuts, in sequence, to 12 N·m (1.2 kgf·m, 8.7 lbf·ft). Wipe off the excess liquid gasket on the each side of crankshaft pulley and the flywheel/drive plate.

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 pan.



6. K20Z2 engine: Install the torque converter cover/ clutch cover.

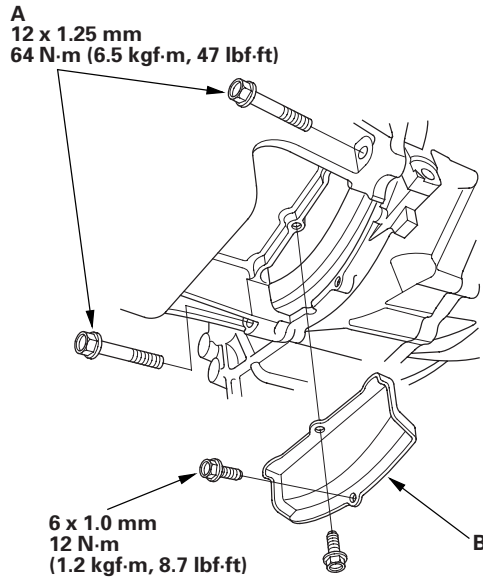


(cont'd)

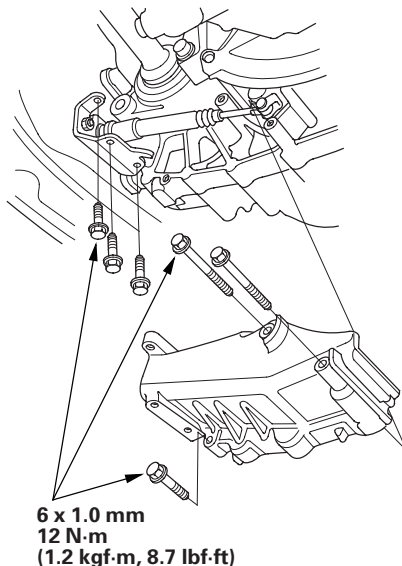
Engine Block

Oil Pan Installation (cont'd)

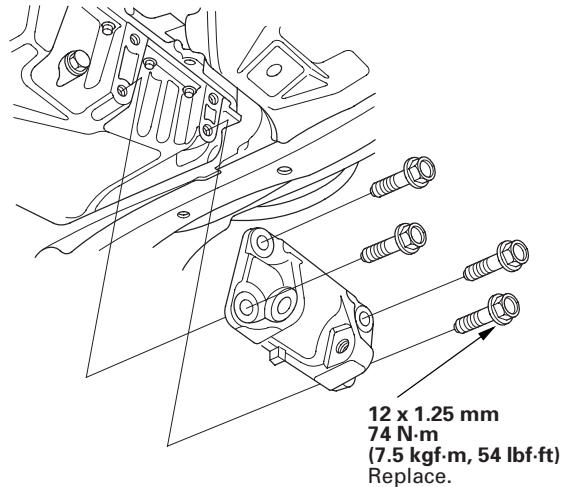
7. K20Z3 engine: Install the transmission mounting bolts (A) and the clutch cover (B).



8. A/T model: Install the shift cable cover.



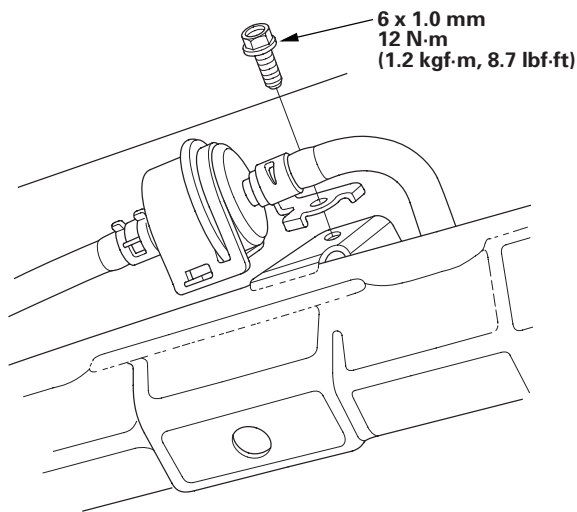
9. Install the lower torque rod bracket.



10. If the engine is still in the vehicle, do the following steps.
11. Attach the front subframe adapter (VSB02C000016) to the front subframe, and hang the belt of the front subframe adapter over the front of the subframe. Secure the belt with its stop, then tighten the wing nut (see step 53 on page 5-9).
12. Line up the slots in the front subframe adapter arms with the bolt holes on the jack base, then securely attach them with four bolts. Lift the front subframe up to the body.
13. Loosely install the new front subframe mounting bolts (see step 17 on page 5-17).
14. Align all reference marks on the front subframe with the edges of the body, then tighten the bolts on the front subframe to the specified torque (see step 18 on page 5-18).
15. Remove the jack and the front subframe adapter.
16. Tighten the new mid-stiffener mounting bolts on both sides (see step 20 on page 5-18).
17. Lower the vehicle on the lift.
18. Loosen the upper torque rod mounting bolt (see step 5 on page 5-15).



19. Raise the vehicle on the lift.
20. Install the lower torque rod, then tighten the new lower torque rod mounting bolts in the numbered sequence shown (see step 21 on page 5-18).
21. M/T model: Loosely tighten the new front mount mounting bolt (see step 22 on page 5-19).
22. Lower the vehicle on the lift.
23. Remove the engine support hanger and engine hanger adapter.
24. Tighten the upper torque rod mounting bolt (see step 25 on page 5-19).
25. Raise the vehicle on the lift.
26. M/T model: Tighten the front mount mounting bolt (see step 27 on page 5-19).
27. A/T model: Install the bolt securing the automatic transmission fluid (ATF) filter.



28. Install the stiffener, then tighten the steering gearbox mounting bolt and the stiffener mounting bolt. Install the harness clamp to the front subframe (see step 29 on page 5-20).
29. Install the steering gearbox bracket. Install the stiffener, then tighten the steering gearbox mounting bolt and the stiffener mounting bolt (see step 32 on page 5-20).
30. Connect the lower arms to the knuckles (see step 9 on page 18-16).
31. Connect the stabilizer links (see page 18-25).
32. Install the splash shield (see step 40 on page 5-20).
33. Install the front wheels.
34. Refill the engine with engine oil (see step 4 on page 8-10).

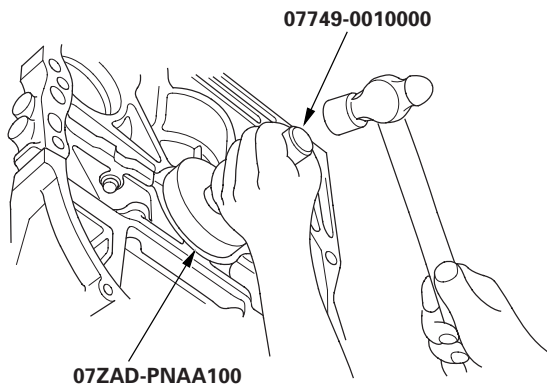
Engine Block

Transmission End Crankshaft Oil Seal Installation - In Car

Special Tools Required

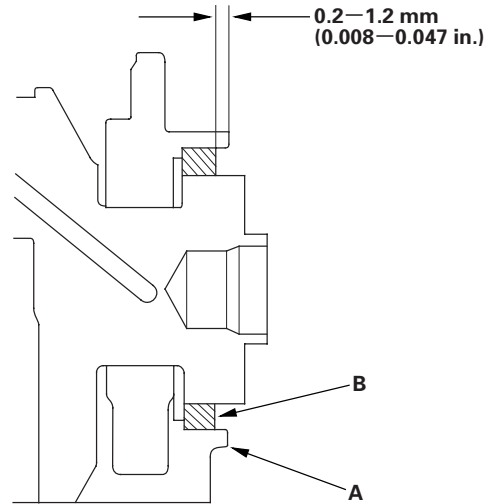
- Driver 07749-0010000
- Oil seal driver attachment 96 07ZAD-PNAA100

1. Remove the transmission:
 - Manual transmission (see page 13-7)
 - Automatic transmission (see page 14-233)
2. M/T model: Remove the pressure plate (see page 12-19), the clutch disc (see page 12-20), and the flywheel (see page 12-21).
3. A/T model: Remove the drive plate (see page 14-242).
4. Clean, and dry the crankshaft oil seal housing.
5. Apply a light coat of new engine oil around the crankshaft oil seal.
6. Apply a light coat of new engine oil to the crankshaft and to the lip of the crankshaft oil seal.
7. Use the driver and the oil seal driver attachment 96 to drive a new oil seal squarely into the engine block to the specified installed height.



8. Measure the distance between the engine block (A) and the crankshaft oil seal (B).

Oil Seal Installed Height: 0.2—1.2 mm
(0.008—0.047 in.)



9. M/T model: Install the flywheel (see page 12-21), the clutch disc (see page 12-23), and the pressure plate (see page 12-23).
10. A/T model: Install the drive plate (see page 14-242).
11. Install the transmission:
 - Manual transmission (see page 13-14)
 - Automatic transmission (see page 14-242)

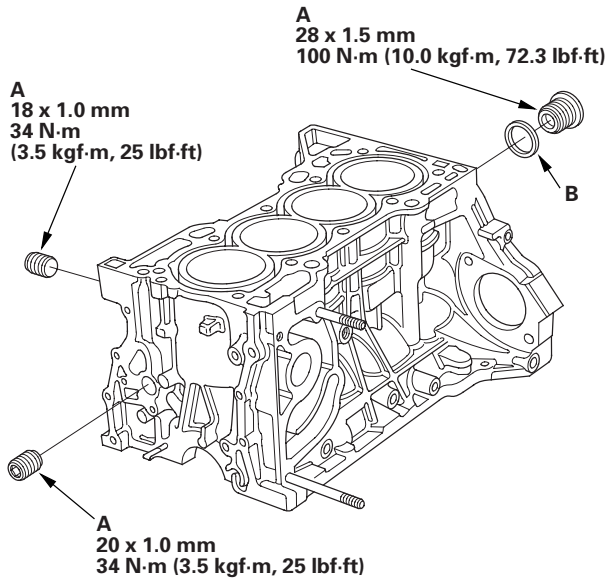


Sealing Bolt Installation

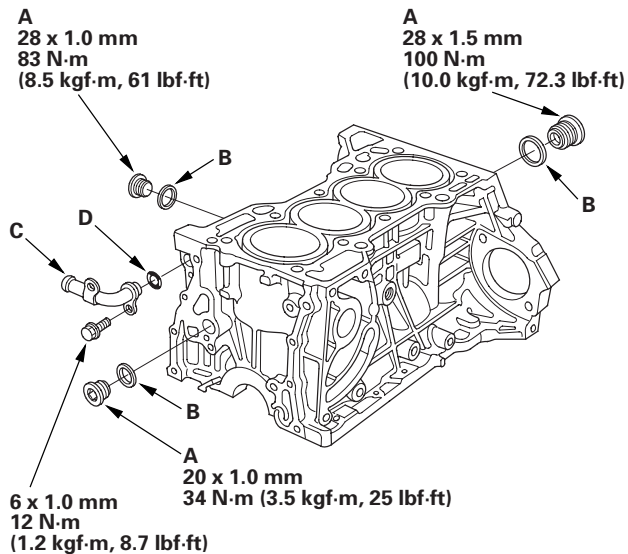
NOTE:

- When installing the sealing bolts (A), always use a new washer (B).
- When installing the joint pipe (C), always use a new O-ring (D).

K20Z2 engine



K20Z3 engine



Engine Mechanical

Engine Lubrication

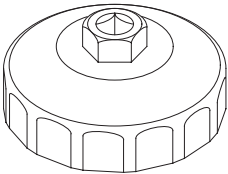
Special Tools	8-2
Component Location Index	8-3
Symptom Troubleshooting Index	8-5
Low Oil Pressure Indicator Circuit Diagram	8-6
Low Oil Pressure Indicator Circuit Troubleshooting (Open)	8-7
Low Oil Pressure Indicator Circuit Troubleshooting (Short)	8-8
Oil Pressure Switch Test	8-9
Oil Pressure Switch Replacement	8-9
Oil Pressure Test	8-10
Engine Oil Replacement	8-10
Engine Oil Filter Replacement	8-11
Oil Filter Feed Pipe Replacement	8-12
Oil Cooler Replacement	8-13
Oil Jet Replacement	8-13
Oil Jet Inspection	8-14
Oil Pump Overhaul	8-15



Engine Lubrication

Special Tools

Ref. No.	Tool Number	Description	Qty
①	07HAA-PJ70101	Oil Filter Wrench	1

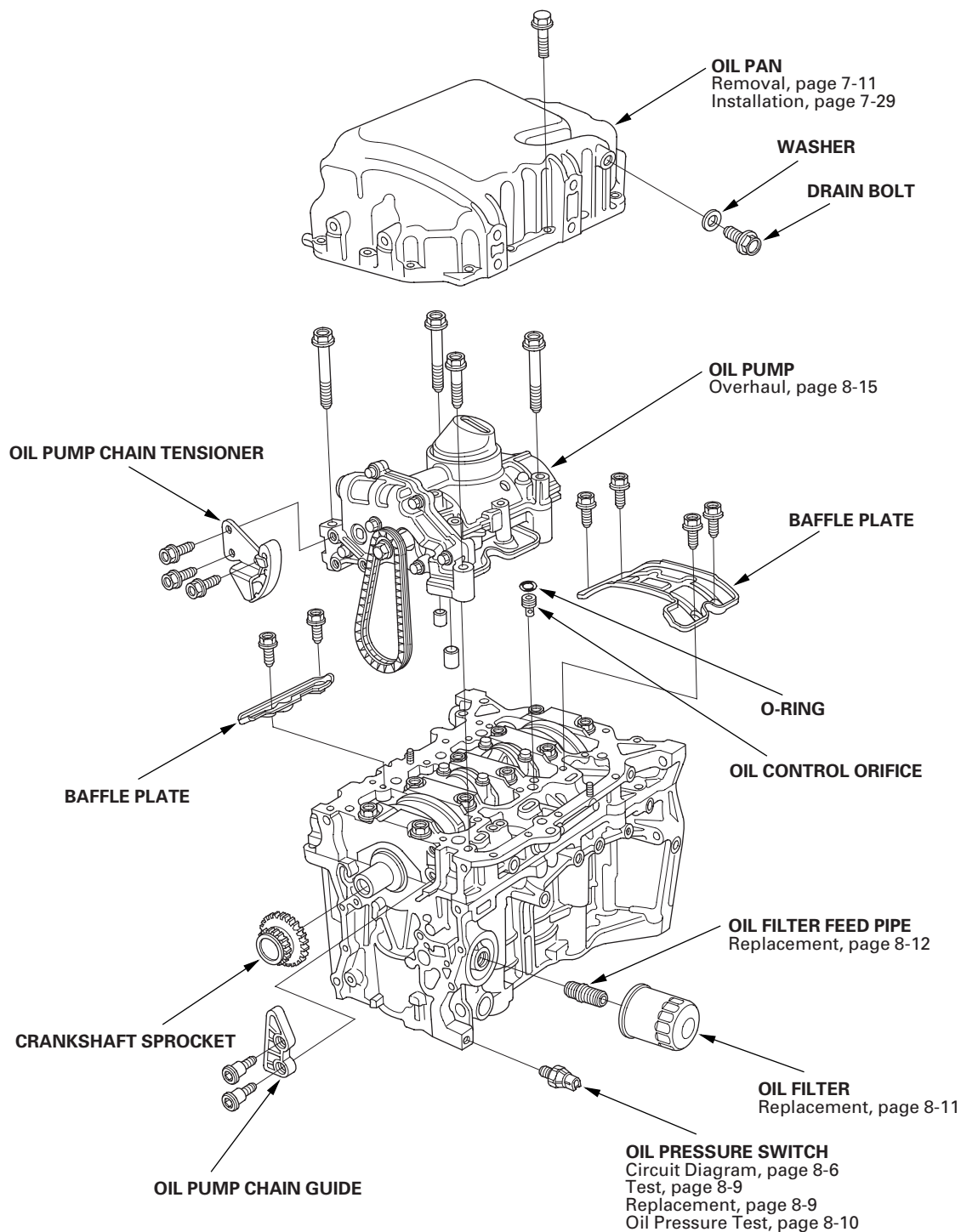


①



Component Location Index

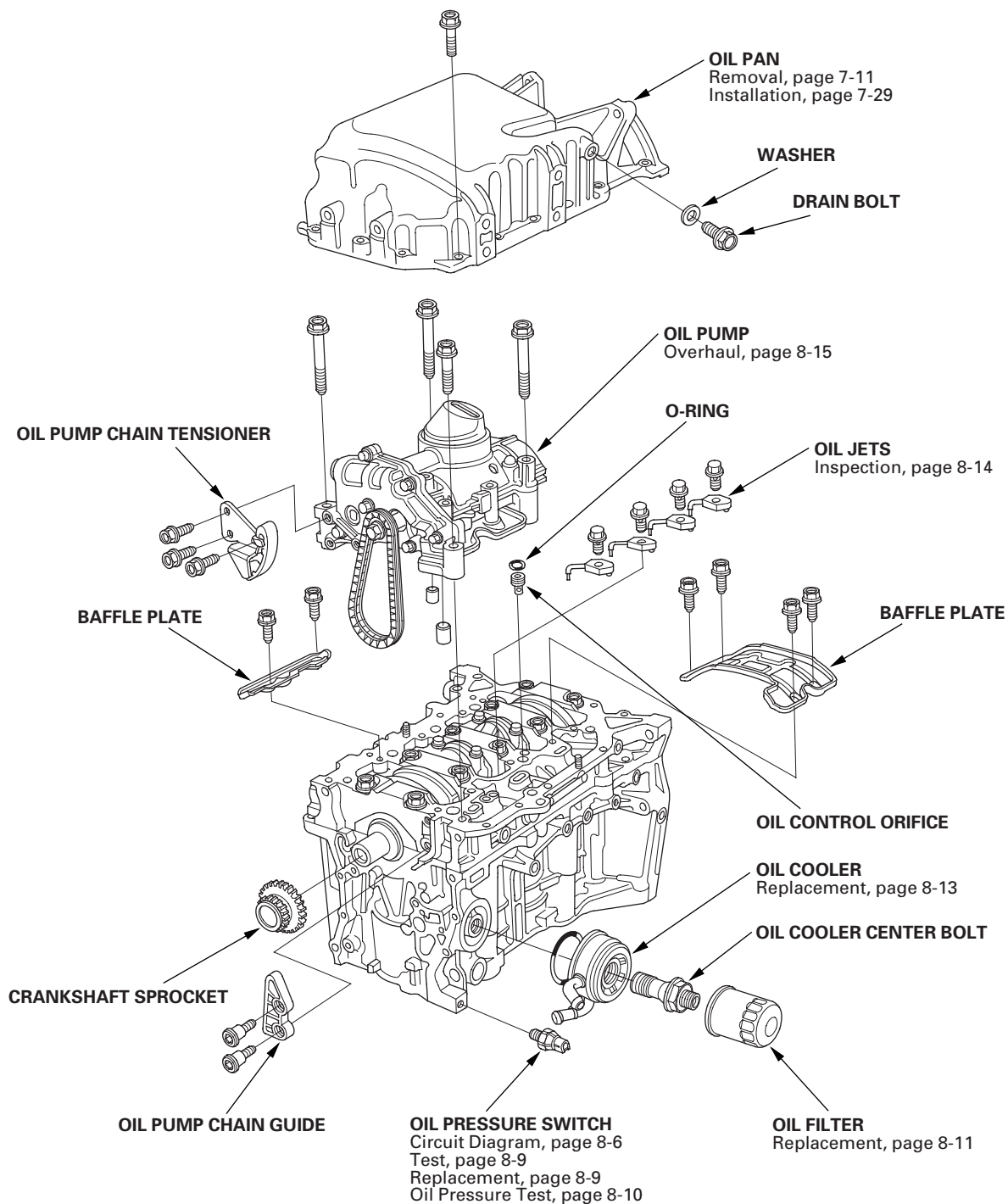
K20Z2 engine



Engine Lubrication

Component Location Index (cont'd)

K20Z3 engine



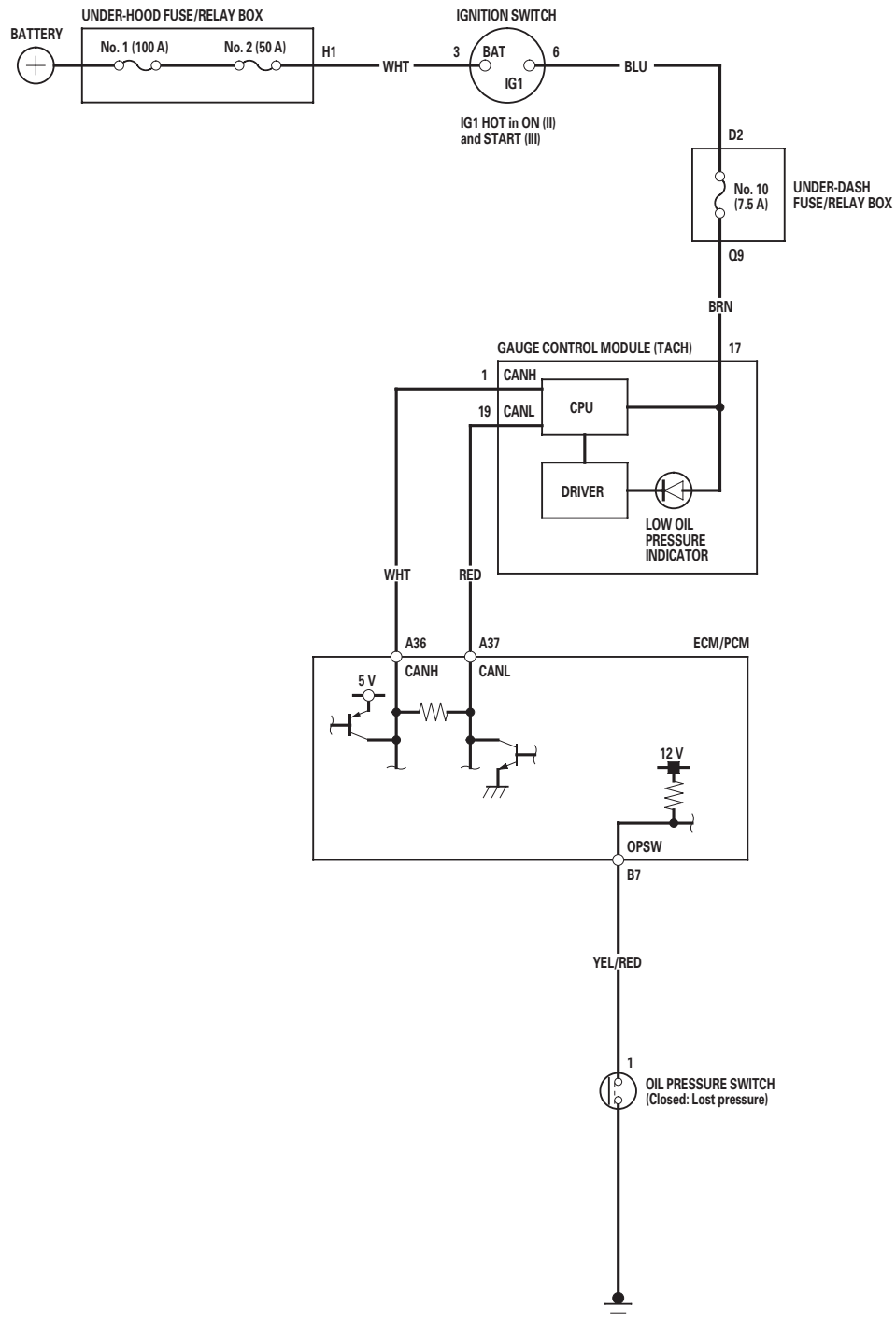


Symptom Troubleshooting Index

Symptom	Diagnostic procedure	Also check for
Excessive engine oil consumption	1. Verify that the engine oil filler cap, the oil drain bolt, and the oil filter are tight. 2. Check for oil leaks. 3. Check for worn valve guide(s) (see page 6-55) or worn valve stem seal(s) (see page 6-54). 4. Check for damaged or worn piston ring(s) (see page 7-21). 5. Check for damaged or worn engine internal parts (cylinder wall, pistons, etc.) (see page 7-16).	
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 8-7). 2. Test the oil pressure switch (see page 8-9).	An open in the wire between the engine control module (ECM)/ powertrain control module (PCM) and the oil pressure switch
Low oil pressure indicator stays on	1. Check the engine oil level. 2. Do the low oil pressure indicator circuit troubleshooting (Short) (see page 8-8). 3. Test the oil pressure switch (see page 8-9). 4. Check the engine oil pressure (see page 8-10). 5. Check the oil filter for clogging. 6. Check the oil screen for clogging. 7. Check the relief valve (see page 8-15). 8. Test the oil pump (see page 8-17).	A wire shorted to ground between the ECM/PCM and the oil pressure switch

Engine Lubrication

Low Oil Pressure Indicator Circuit Diagram





Low Oil Pressure Indicator Circuit Troubleshooting (Open)

1. Connect the Honda Diagnostic System (HDS) to the data link connector (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 engine control module (ECM)/powertrain control module (PCM). If it does not communicate, troubleshoot the DLC circuit (see page 11-204).
4. Check for DTCs (see page 11-3). If a DTC is present, diagnose, and repair the cause before continuing with this test.

5. Check the OIL PRESSURE SWITCH in the PGM-FI DATA LIST with the HDS.

Is ON indicated?

YES—Replace the gauge control module (tach) (see page 22-277). ■

NO—Go to step 6.

6. Turn the ignition switch to LOCK (0).
7. Check the oil pressure switch (see page 8-9).

Is the oil pressure switch OK?

YES—Go to step 8.

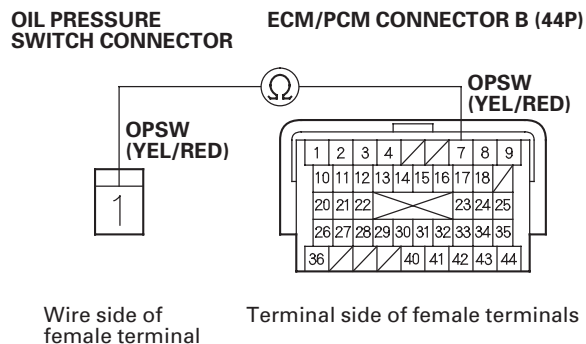
NO—Replace the oil pressure switch (see page 8-9). ■

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 connector.

10. Check for continuity between ECM/PCM connector terminal B7 and the oil pressure switch connector.



Is there continuity?

YES—Update the ECM/PCM if it does not have the latest software (see page 11-227), 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 11-228). ■

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

Engine Lubrication

Low Oil Pressure Indicator Circuit Troubleshooting (Short)

1. Connect the Honda Diagnostic System (HDS) to the data link connector (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 engine control module (ECM)/powertrain control module (PCM). If it does not communicate, troubleshoot the DLC circuit (see page 11-204).
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 PGM-FI DATA LIST with the HDS.

Is OFF indicated?

YES—Replace the gauge control module (tach) (see page 22-277). ■

NO—Go to step 6.

6. Turn the ignition switch to LOCK (0).
7. Disconnect the oil pressure switch connector.
8. Start the engine, and check the OIL PRESSURE SWITCH in the PGM-FI DATA LIST with the HDS.

Is OFF indicated?

YES—Turn the ignition switch to LOCK (0), then go to step 9.

NO—Turn the ignition switch to LOCK (0), then go to step 10.

9. Check the oil pressure switch (see page 8-9).

Is the oil pressure switch OK?

YES—Do the oil pressure test (see page 8-10).

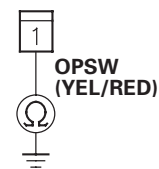
NO—Replace the oil pressure switch (see page 8-9). ■

10. 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.

11. Disconnect ECM/PCM connector B (44P).
12. Check for continuity between the oil pressure switch connector and body ground.

OIL PRESSURE SWITCH CONNECTOR



Wire side of female terminal

Is there continuity?

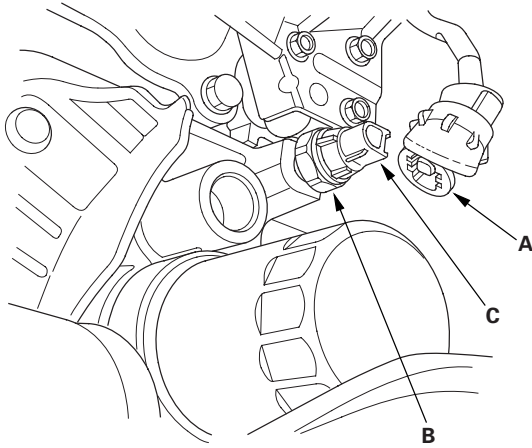
YES—Repair a short to ground in the wire between the oil pressure switch and ECM/PCM connector terminal B7. ■

NO—Update the ECM/PCM if it does not have the latest software (see page 11-227), 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 11-228). ■



Oil Pressure Switch Test

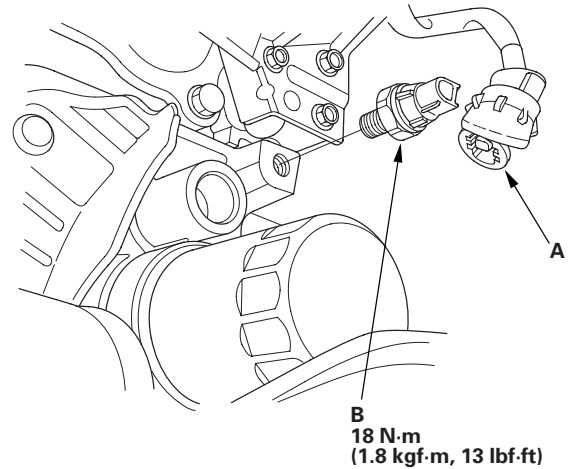
1. Disconnect the oil pressure switch connector (A) from the oil pressure switch (B).



2. Check for continuity between the positive terminal (C) and the engine (ground). There should be continuity with the engine stopped. There should be no continuity with the engine running.

Oil Pressure Switch Replacement

1. Disconnect the oil pressure switch connector (A), then remove the oil pressure switch (B).



2. Remove any old liquid gasket from the switch and the switch mounting hole.
3. Apply a very small amount of liquid gasket to the oil pressure switch threads, then install the oil pressure switch.

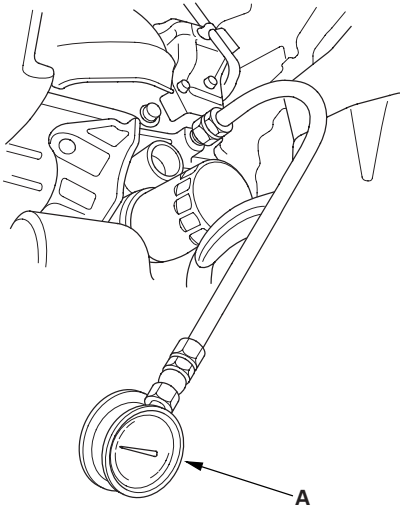
NOTE: Using too much liquid gasket may cause liquid gasket to enter the oil passage or the end of the new oil pressure switch.

Engine Lubrication

Oil Pressure Test

NOTE: If the oil pressure warning indicator stays on with the engine running, check the engine oil level. If the oil level is correct do the following test:

1. With the engine stopped, remove the oil pressure switch (see page 8-9), then install an 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: 80 °C (176 °F)

Engine Oil Pressure:

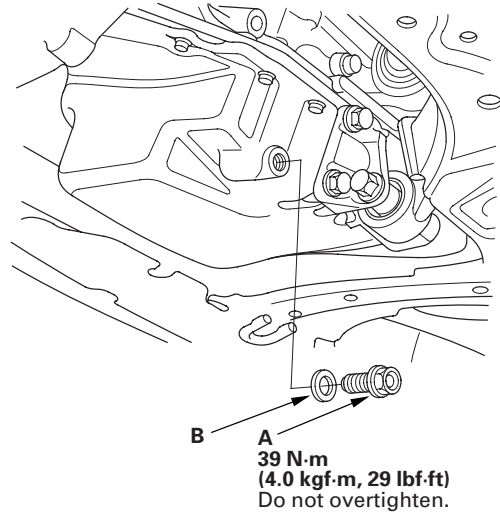
At Idle: 70 kPa (0.7 kgf/cm², 10 psi) min.

At 3,000 rpm: 300 kPa (3.1 kgf/cm², 44 psi) min.

4. If the oil pressure is out of specifications, inspect these items:
 - Blocking of oil filter (see page 8-11).
 - Blocking of oil screen.
 - Inspect the oil pressure relief valve (see page 8-15).
 - Inspect the oil pump (see page 8-17).

Engine Oil Replacement

1. Warm up the engine.
2. Remove the drain bolt (A), and drain the engine oil.



3. Reinstall the drain bolt with a new washer (B).
4. Refill the engine with the recommended oil (see page 3-2).

K20Z2 engine

Capacity

At Oil Change: 4.0 L (4.2 US qt)

At Oil Change including Filter: 4.2 L (4.4 US qt)

After Engine Overhaul: 5.3 L (5.6 US qt)

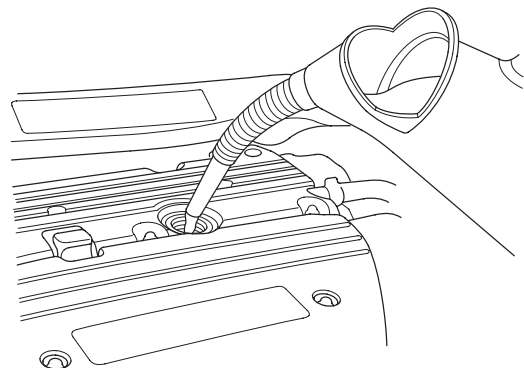
K20Z3 engine

Capacity

At Oil Change: 4.2 L (4.4 US qt)

At Oil Change including Filter: 4.4 L (4.6 US qt)

After Engine Overhaul: 5.5 L (5.8 US qt)





Engine Oil Filter Replacement

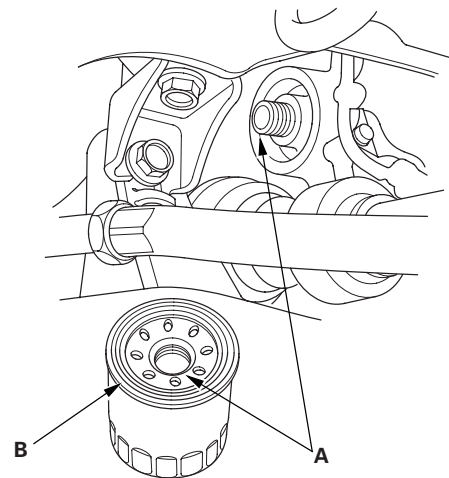
5. Run the engine for more than 3 minutes, then check for oil leakage.
6. Turn the ignition switch to LOCK (0).
7. Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3).
8. Turn the ignition switch to ON (II).
9. Make sure the HDS communicates with the vehicle and the engine control module (ECM)/powertrain control module (PCM). If it does not communicate, troubleshoot the DLC circuit (see page 11-204).
10. Select GAUGES in the BODY ELECTRICAL menu with the HDS.
11. Select ADJUSTMENT in the GAUGES menu with the HDS.
12. Select SERVICE REMINDER in the ADJUSTMENT menu with the HDS.
13. Select RESET in the SERVICE REMINDER menu with the HDS.
14. Select RESETTING THE ENGINE OIL LIFE with the HDS.

NOTE: If you changed the automatic transmission fluid (ATF) at the same time with the engine oil, select RESETTING THE ENGINE OIL LIFE AND ATF with the HDS instead.

Special Tools Required

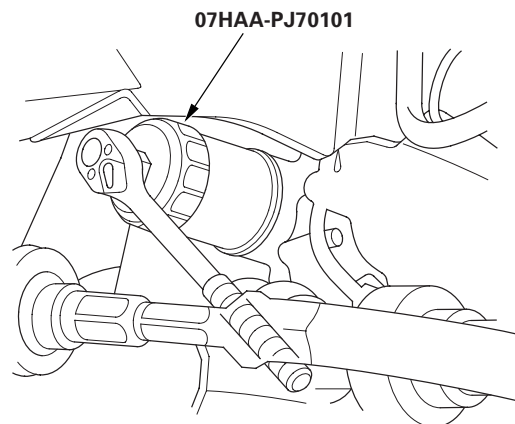
Oil filter wrench 07HAA-PJ70101

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



4. Install the oil filter by hand.
5. After the rubber seal seats, tighten the oil filter clockwise with the oil filter wrench.

Tighten: 3/4 Turn Clockwise
Tightening Torque: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)



(cont'd)



Engine Oil Filter Replacement

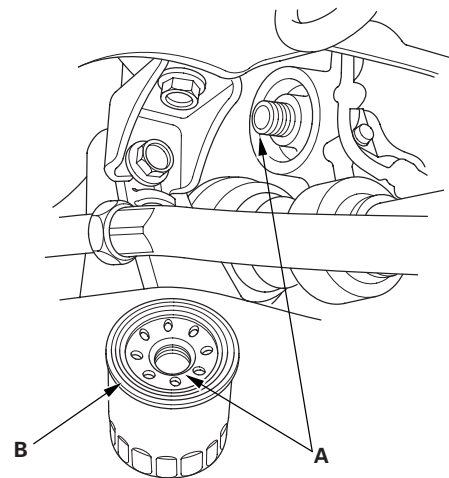
5. Run the engine for more than 3 minutes, then check for oil leakage.
6. Turn the ignition switch to LOCK (0).
7. Connect the Honda Diagnostic System (HDS) to the data link connector (DLC) (see step 2 on page 11-3).
8. Turn the ignition switch to ON (II).
9. Make sure the HDS communicates with the vehicle and the engine control module (ECM)/powertrain control module (PCM). If it does not communicate, troubleshoot the DLC circuit (see page 11-204).
10. Select GAUGES in the BODY ELECTRICAL menu with the HDS.
11. Select ADJUSTMENT in the GAUGES menu with the HDS.
12. Select SERVICE REMINDER in the ADJUSTMENT menu with the HDS.
13. Select RESET in the SERVICE REMINDER menu with the HDS.
14. Select RESETTNG THE ENGINE OIL LIFE with the HDS.

NOTE: If you changed the automatic transmission fluid (ATF) at the same time with the engine oil, select RESETTNG THE ENGINE OIL LIFE AND ATF with the HDS instead.

Special Tools Required

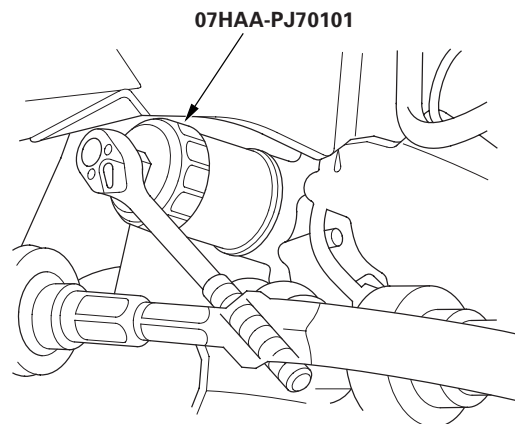
Oil filter wrench 07HAA-PJ70101

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



4. Install the oil filter by hand.
5. After the rubber seal seats, tighten the oil filter clockwise with the oil filter wrench.

Tighten: 3/4 Turn Clockwise
Tightening Torque: 12 N·m (1.2 kgf·m, 8.7 lbf·ft)



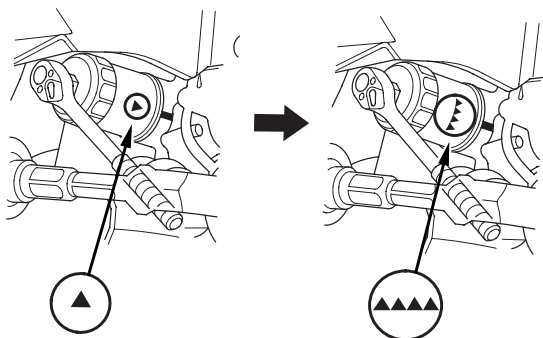
(cont'd)

Engine Lubrication

Engine Oil Filter Replacement (cont'd)

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

- Spin the filter on until its seal lightly seats against the engine block, 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 number 2 is at the bottom when the seal is seated, tighten the filter until the number 1 comes around the bottom.



Mark when rubber seal is seated.

Mark after tightening.

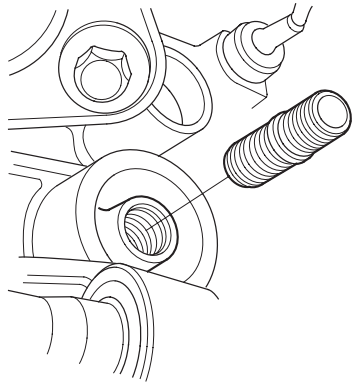
Number or Mark when rubber seal is seated	1 or ▼	2 or ▼▼	3 or ▼▼▼	4 or ▼▼▼▼
Number or Mark after tightening	4 or ▼▼▼▼	1 or ▼	2 or ▼▼	3 or ▼▼▼

7. After installation, fill the engine with oil up to the specified level, run the engine for more than 3 minutes, then check for oil leakage.

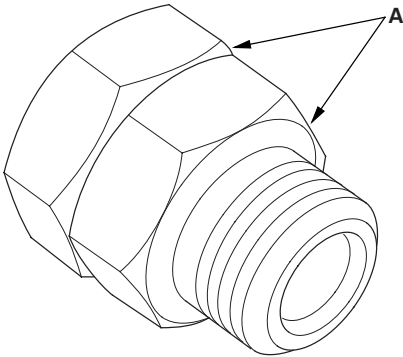
Oil Filter Feed Pipe Replacement

K20Z2 engine

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



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



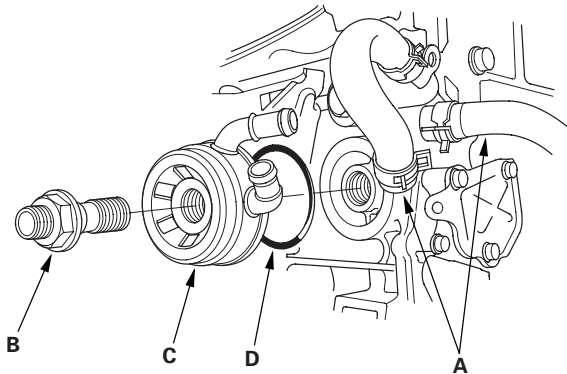
4. Tighten the oil filter feed pipe to the block to 49 N·m (5.0 kgf·m, 36 lbf·ft), then remove the nuts from the oil filter feed pipe.
5. Install the oil filter (see page 8-11).



Oil Cooler Replacement

K20Z3 engine

1. Remove the oil filter (see page 8-11).
2. Disconnect the oil cooler bypass hoses (A) and remove the oil cooler center bolt (B), then remove the oil cooler (C).

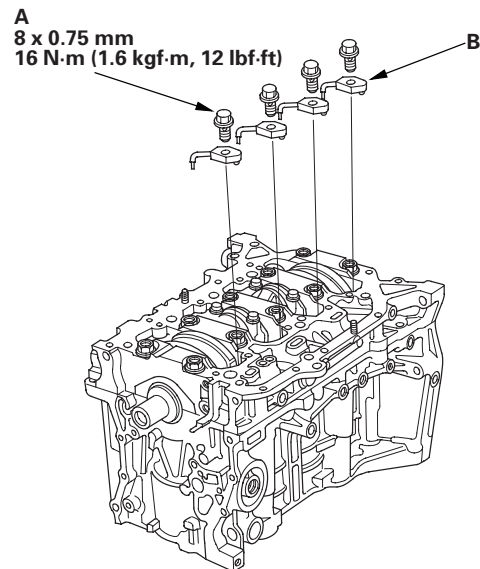


3. Install the oil cooler using a new O-ring (D). Tighten the oil cooler center bolt to 74 N·m (7.5 kgf·m, 54 lbf·ft).
4. Connect the oil cooler bypass hoses.
5. Install the oil filter (see page 8-11).

Oil Jet Replacement

K20Z3 engine

1. Remove the oil pump (see page 8-16).
2. Remove the baffle plate (see step 8 on page 7-13).
3. Remove the oil jet bolt (A), then remove the oil jet (B).



4. Carefully install the oil jet, and tighten the oil jet bolt.
5. Install the baffle plate (see step 26 on page 7-28).
6. Install the oil pump (see page 8-21).

Engine Lubrication

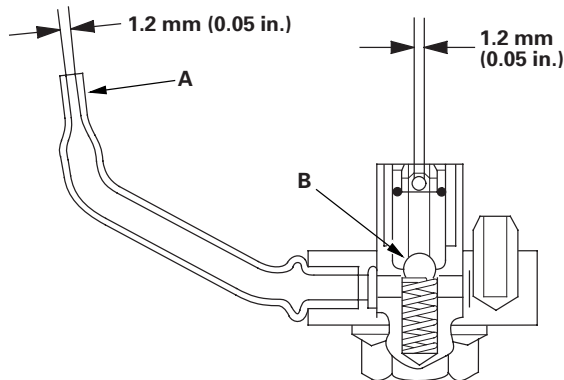
Oil Jet Inspection

K20Z3 engine

1. Remove the oil jet, and inspect it as follows.

- Make sure that a 1.1 mm (0.04 in.) diameter drill will go through the nozzle hole (A) (1.2 mm (0.05 in.) diameter).
- Insert the other end of a 1.1 mm (0.04 in.) drill into the oil intake (1.2 mm (0.05 in.) diameter). Make sure the check ball (B) moves smoothly and has a stroke of approximately 4.0 mm (0.16 in.).
- Check the oil jet operation with an air nozzle. It should take at least 200 kPa (2.0 kgf/cm², 28 psi) to unseat the check ball.

NOTE: Replace the oil jet assembly if the nozzle is damaged or bent.



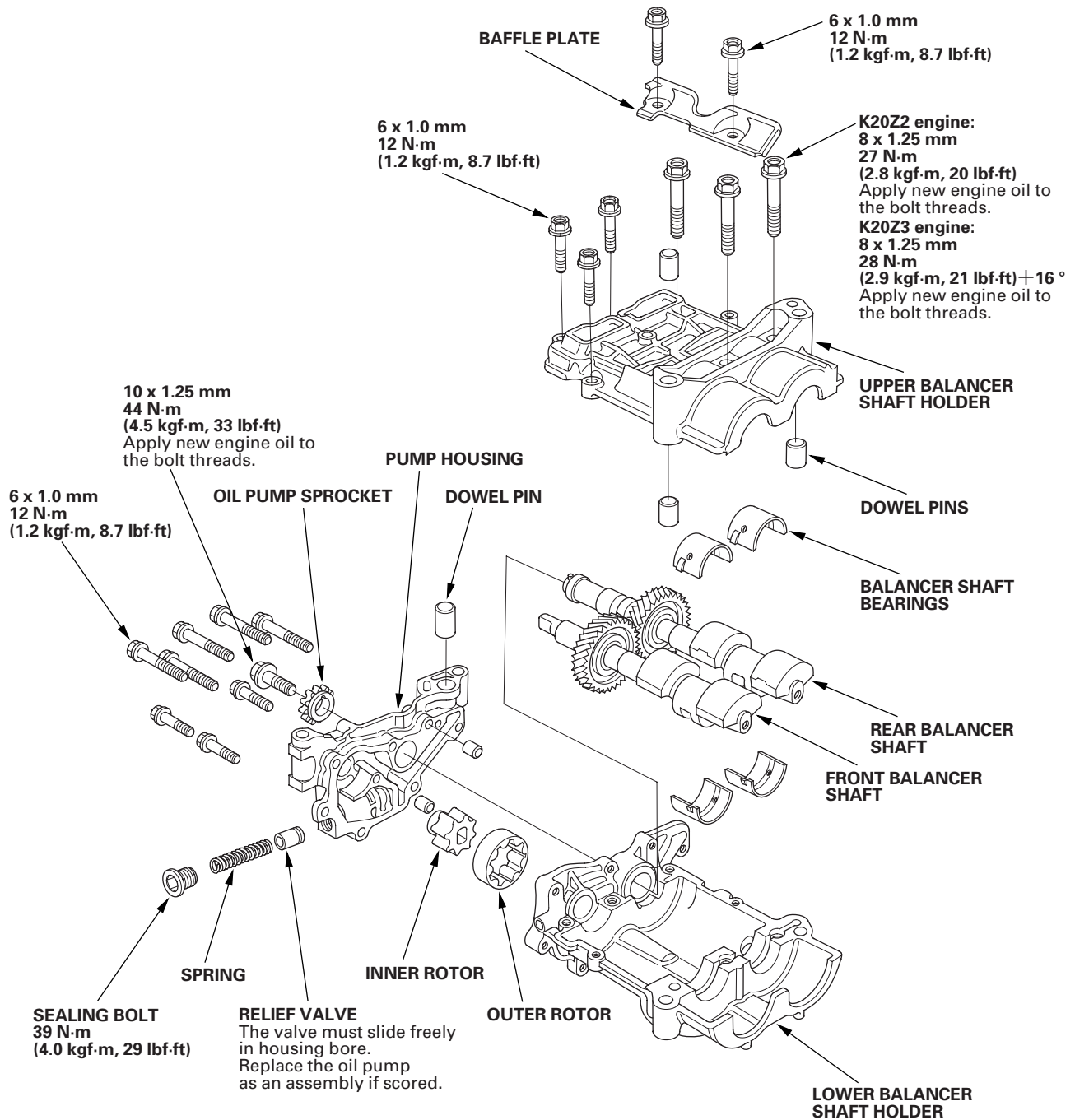
2. Carefully install the oil jet. The mounting torque is critical.

Torque: 16 N·m (1.6 kgf·m, 12 lbf·ft)



Oil Pump Overhaul

Exploded View



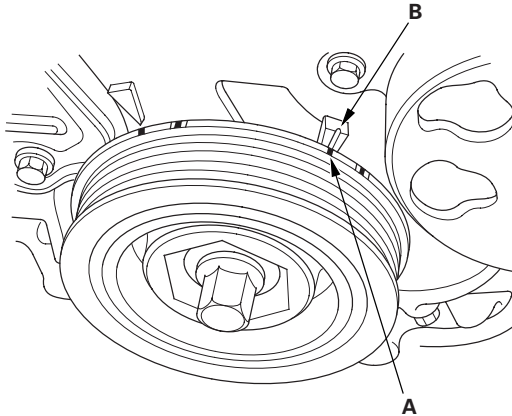
(cont'd)

Engine Lubrication

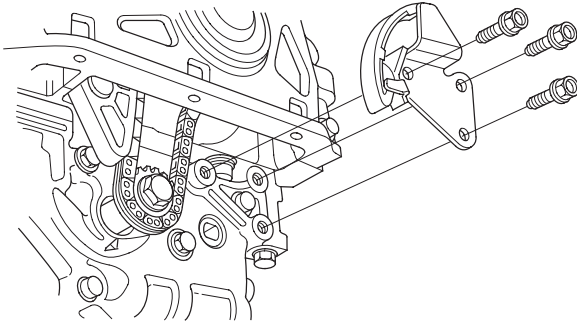
Oil Pump Overhaul (cont'd)

Oil Pump Removal

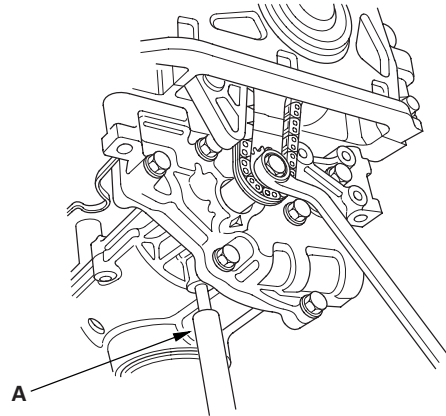
1. Turn the crankshaft pulley so its top dead center (TDC) mark (A) lines up with the pointer (B).



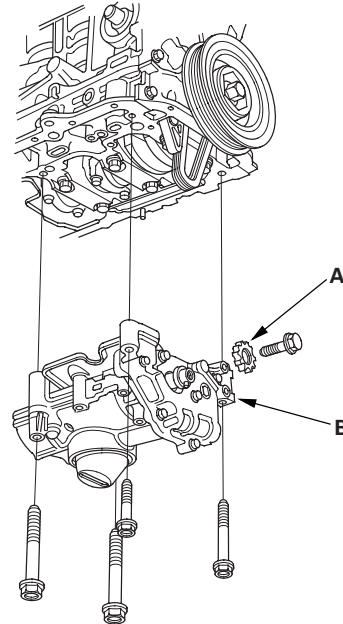
2. Remove the oil pan (see page 7-11).
3. Remove and discard the oil pump chain tensioner.



4. To hold the rear balancer shaft, insert a 6 mm long pin punch (Snap-on PPC108LA or equivalent) (A) into the maintenance hole in the lower balancer shaft holder and through the rear balancer shaft.



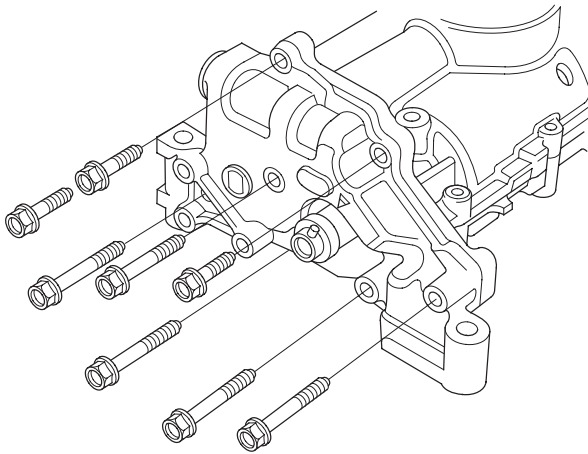
5. Loosen the oil pump sprocket mounting bolt.
6. Remove the oil pump sprocket (A), then remove the oil pump (B).





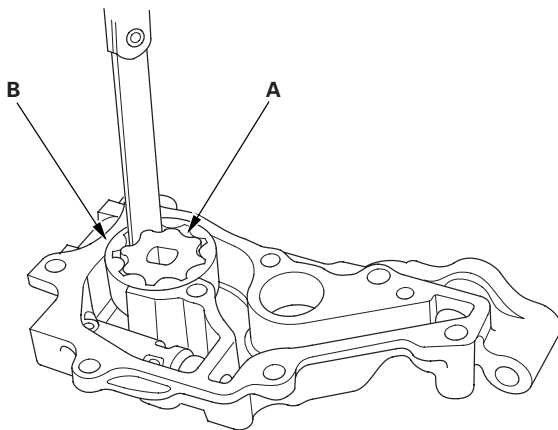
Oil Pump Inspection

1. Remove the pump housing.



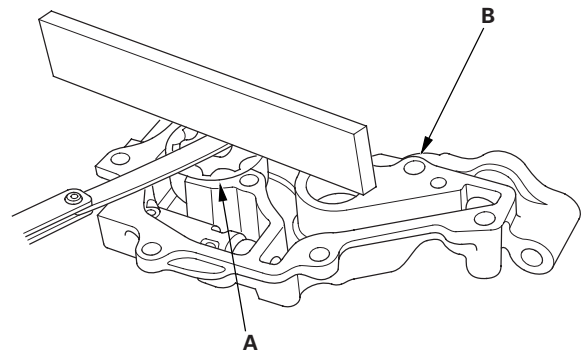
2. Check the inner-to-outer rotor radial clearance between the inner rotor (A) and the outer rotor (B). If the inner-to-outer rotor radial clearance exceeds the service limit, replace the oil pump.

Inner Rotor-to-Outer Rotor Radial Clearance
Standard (New): 0.06—0.16 mm (0.002—0.006 in.)
Service Limit: 0.20 mm (0.008 in.)



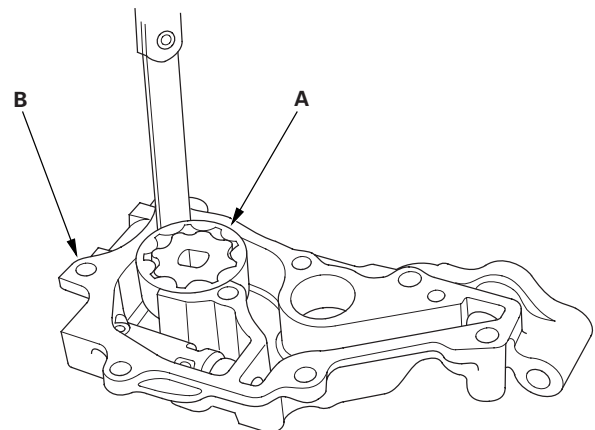
3. Check the pump housing-to-rotor axial clearance between the rotor (A) and the pump housing (B). If the pump housing-to-rotor axial clearance exceeds the service limit, replace the oil pump.

Pump Housing-to-Rotor Axial Clearance
Standard (New): 0.035—0.070 mm
(0.0014—0.0028 in.)
Service Limit: 0.12 mm (0.005 in.)



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.

Pump Housing-to-Outer Rotor Radial Clearance
Standard (New): 0.15—0.21 mm (0.006—0.008 in.)
Service Limit: 0.23 mm (0.009 in.)



5. Inspect both rotors and the pump housing for scoring or other damage. Replace parts if necessary.

(cont'd)

Engine Lubrication

Oil Pump Overhaul (cont'd)

Balancer Shaft Inspection

1. Seat the balancer shaft by pushing it away from the oil pump sprocket end of the oil pump.
2. Zero the dial indicator against the end of the balancer shaft, then push the balancer shaft back and forth and read the end play.

Balancer Shaft End Play

Front Balancer Shaft:

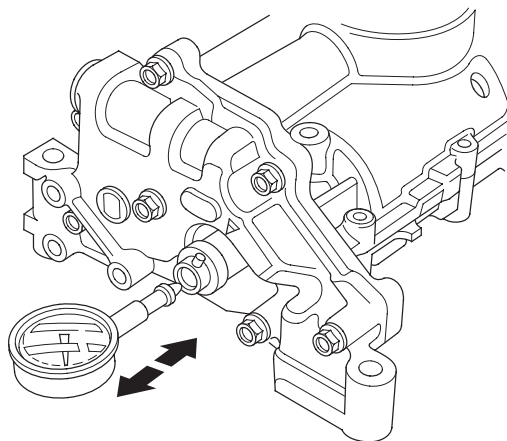
Standard (New): 0.063—0.108 mm
(0.0025—0.0043 in.)

Service Limit: 0.14 mm (0.0055 in.)

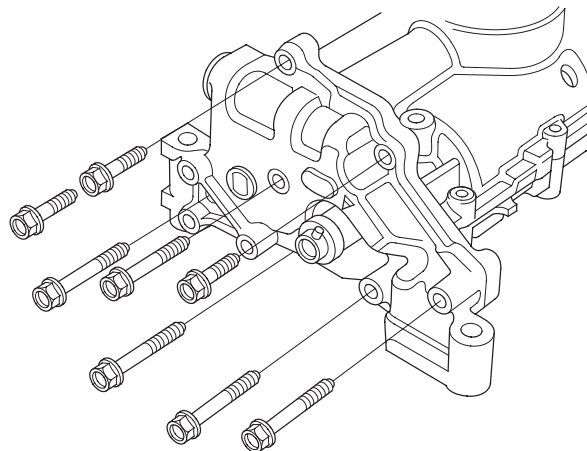
Rear Balancer Shaft:

Standard (New): 0.063—0.108 mm
(0.0025—0.0043 in.)

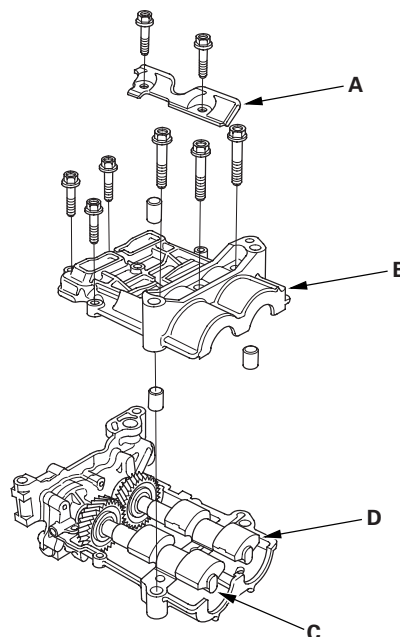
Service Limit: 0.14 mm (0.0055 in.)



3. Remove the pump housing.



4. Remove the baffle plate (A) and the upper balancer shaft holder (with bearings) (B), then remove the front balancer shaft (C) and the rear balancer shaft (D).





5. Measure the inner diameter of the No. 1 bearing for the front balancer shaft hole and the rear balancer shaft hole.

Bearing Inner Diameter

Front:

Standard (New): 20.000—20.020 mm
(0.7874—0.7882 in.)

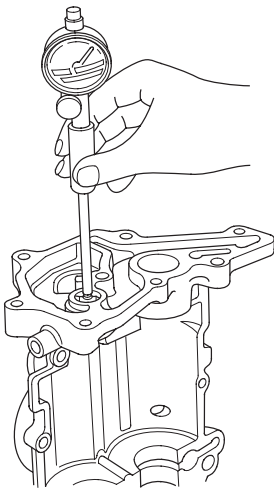
Service Limit: 20.03 mm (0.789 in.)

Rear:

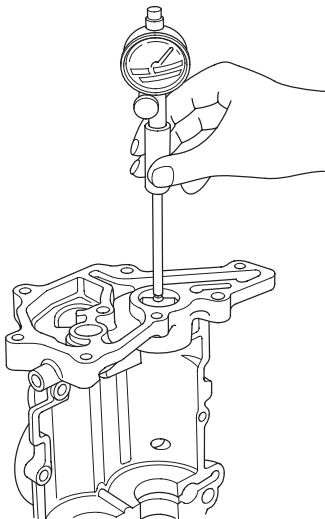
Standard (New): 24.000—24.020 mm
(0.9449—0.9457 in.)

Service Limit: 24.03 mm (0.946 in.)

Front



Rear



6. Measure the diameters of the No. 1 journals on the front balancer shaft and the rear balancer shaft.

Journal Diameter

Front:

Standard (New): 19.938—19.950 mm
(0.7850—0.7854 in.)

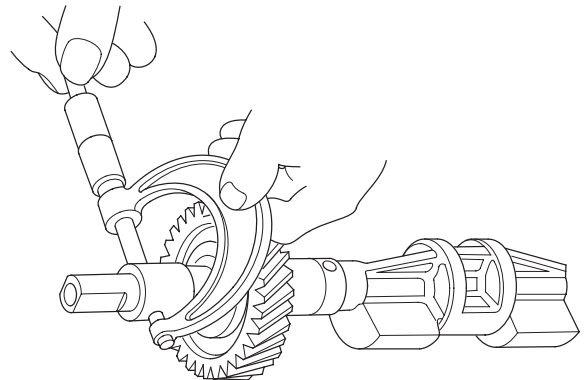
Service Limit: 19.92 mm (0.784 in.)

Rear:

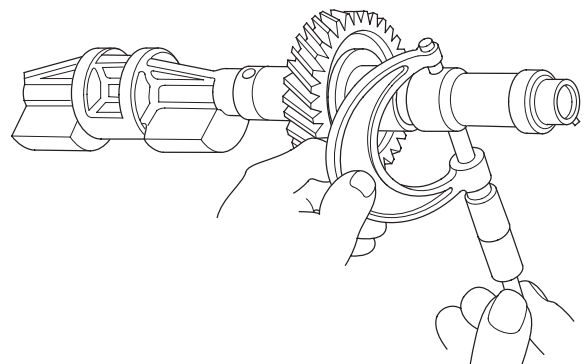
Standard (New): 23.938—23.950 mm
(0.9424—0.9429 in.)

Service Limit: 23.92 mm (0.942 in.)

Front



Rear



(cont'd)

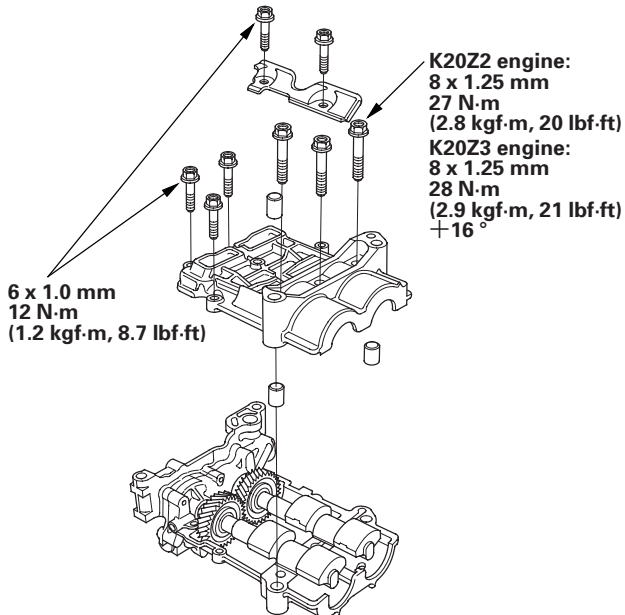
Engine Lubrication

Oil Pump Overhaul (cont'd)

7. Clean both balancer shaft No. 2 journals and the bearing halves with a clean shop towel, then install the balancer shafts into the lower balancer shaft holder.
8. Place one strip of plastigage across each No. 2 journal.
9. Reinstall the bearings and the upper balancer shaft holder, then tighten the bolts.

NOTE:

- Do not rotate the balancer shafts during inspection.
- After torquing, tighten the three 8 mm bolts extra 16° (K20Z3 engine).

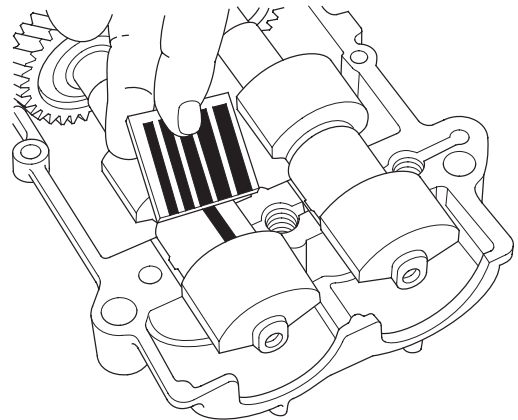


10. Remove the upper balancer shaft holder and the bearings again, and measure the widest part with the plastigage. If the balancer shaft No. 2 journal oil clearance is out-of-tolerance, install new bearings, and recheck. If it is still out-of-tolerance, replace the balancer shafts.

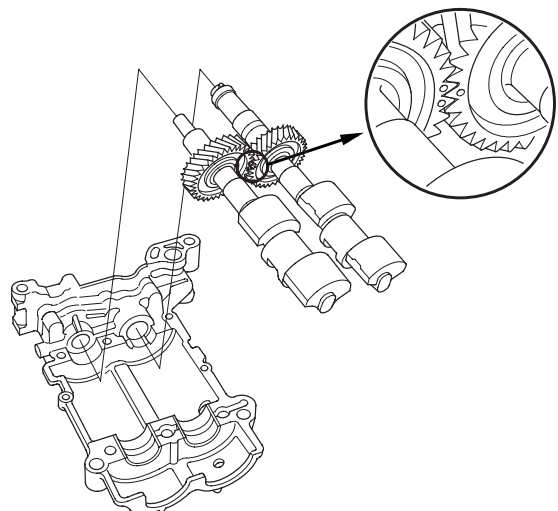
No. 2 Journal Oil Clearance

Standard (New): 0.060—0.120 mm
(0.0024—0.0047 in.)

Service Limit: 0.15 mm (0.006 in.)



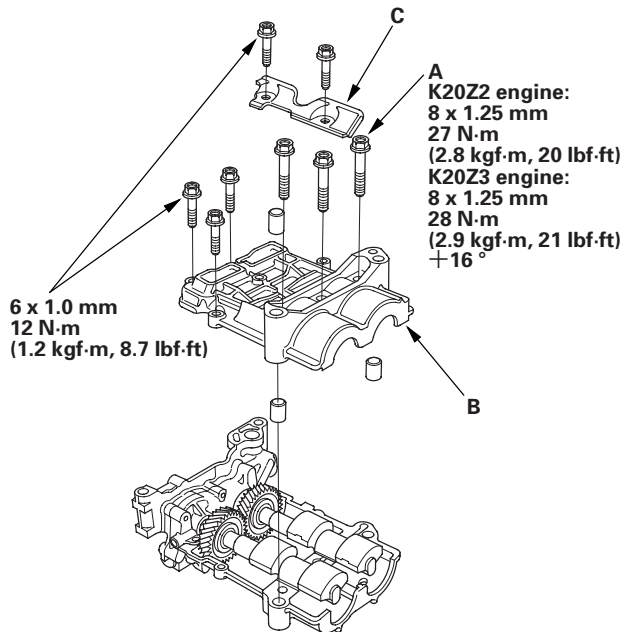
11. Align the punch mark on the rear balancer shaft in the center of the two punch marks on the front balancer shaft, then install the balancer shafts on the lower balancer shaft holder.





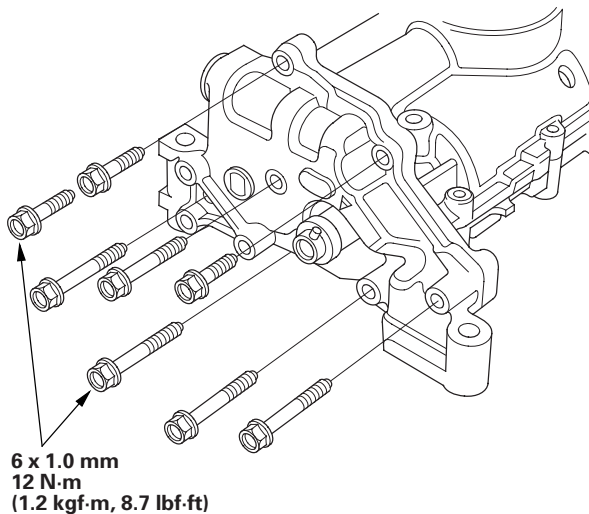
12. Apply new engine oil to the threads of the 8 mm bolts (A).

NOTE: After torquing, tighten the three 8 mm bolts extra 16° (K20Z3 engine).



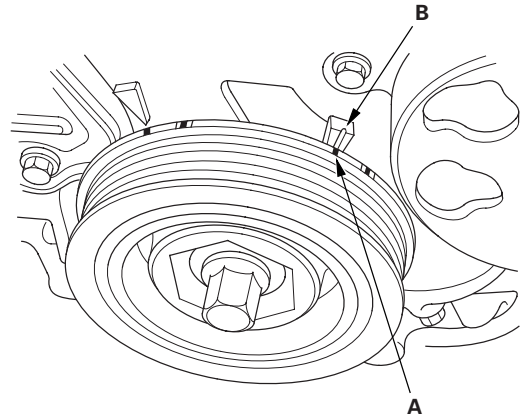
13. Install the upper balancer shaft holder (B) and the baffle plate (C).

14. Install the pump housing.

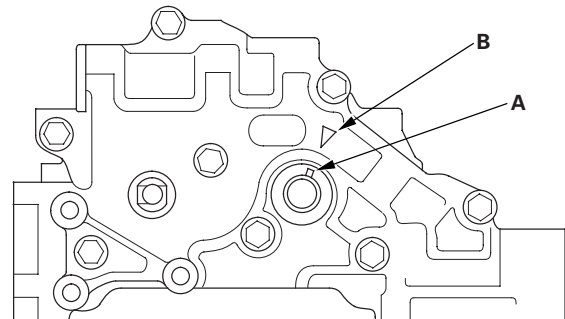


Oil Pump Installation

1. Make sure the No. 1 piston top dead center (TDC) mark (A) lines up with the pointer (B).



2. Align the dowel pin (A) on the rear balancer shaft with the mark (B) on the oil pump.

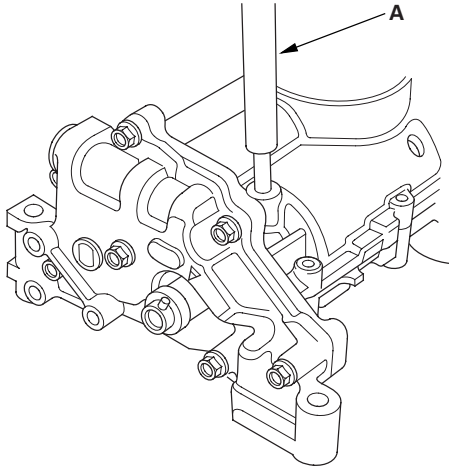


(cont'd)

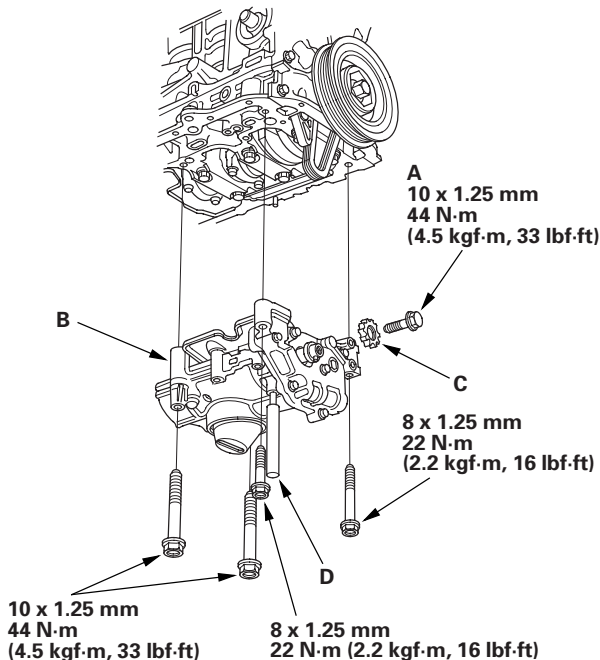
Engine Lubrication

Oil Pump Overhaul (cont'd)

3. To hold the rear balancer shaft, insert a 6 mm long pin punch (Snap-on PPC108LA or equivalent) (A) into the maintenance hole in the lower balancer shaft holder and through the rear balancer shaft.



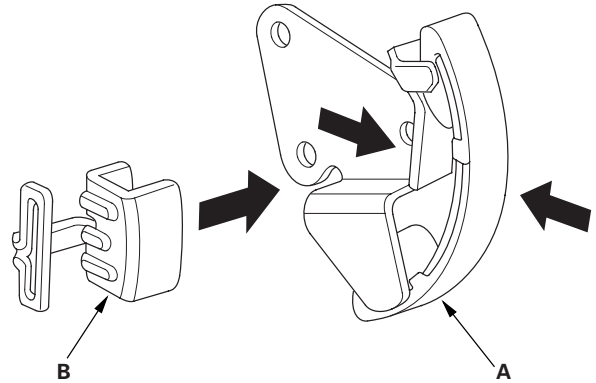
4. Apply new engine oil to the threads of the oil pump sprocket mounting bolt (A).



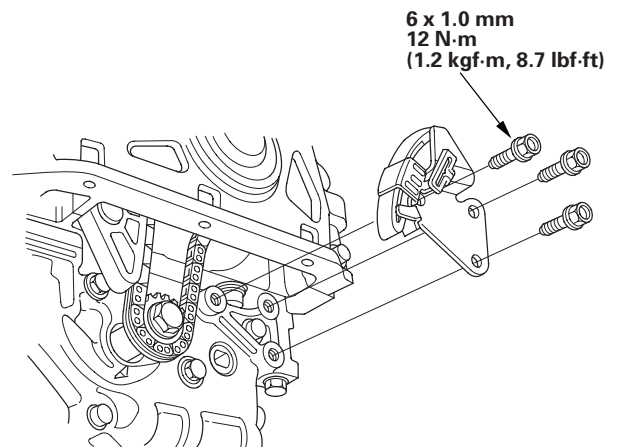
5. Loosely install the oil pump (B), then install the oil pump sprocket (C).
6. Tighten the oil pump mounting bolts and the oil pump sprocket mounting bolt.
7. Remove the 6 mm long pin punch (D).

8. Squeeze the new oil pump chain tensioner (A), then install the set clip (B) on it as shown.

NOTE: The set clip is supplied with the oil pump chain tensioner.

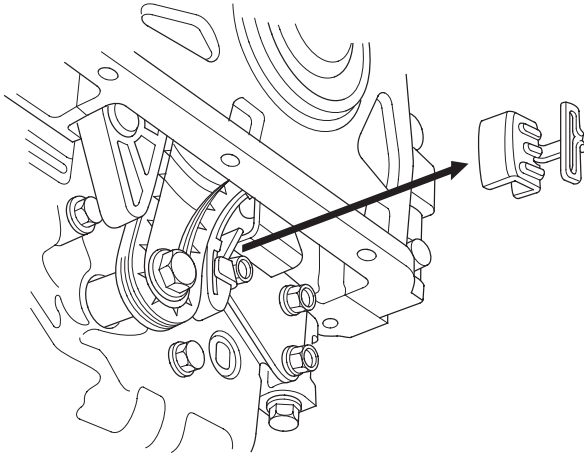


9. Install the new oil pump chain tensioner.





10. Remove the set clip from the oil pump chain tensioner.



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

Engine Mechanical



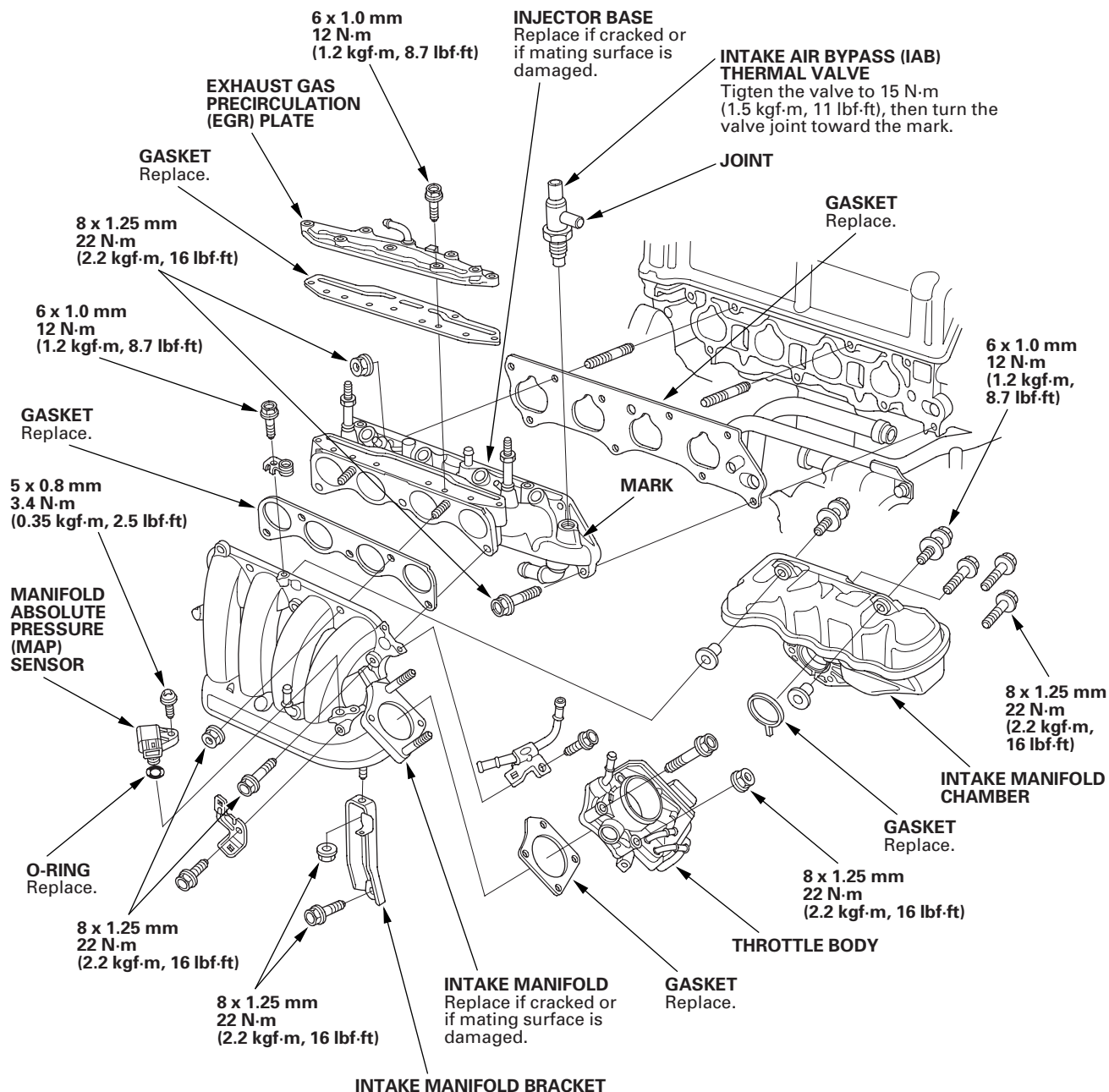
Intake Manifold and Exhaust System

Intake Manifold Removal and Installation	9-2
Exhaust Manifold Removal and Installation	9-11
Exhaust Pipe and Muffler Replacement	9-13

Intake Manifold and Exhaust System

Intake Manifold Removal and Installation

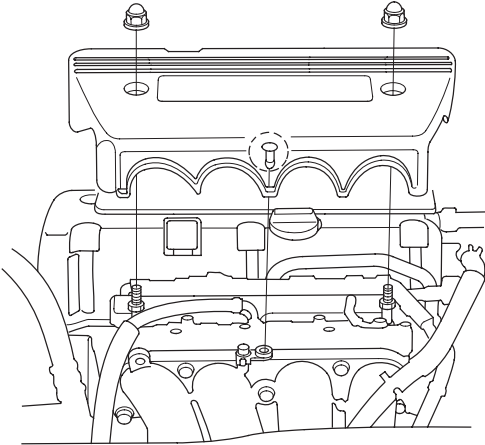
Exploded View - K20Z2 engine



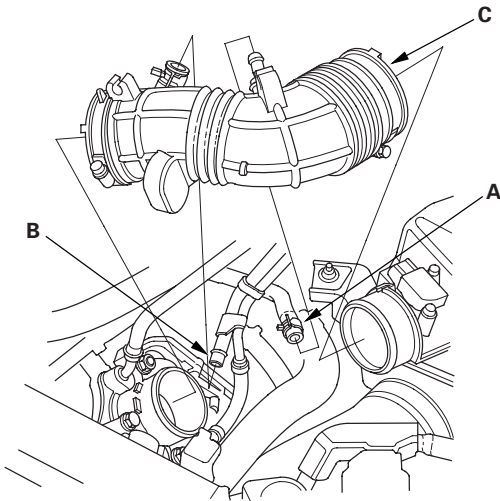


Removal - K20Z2 engine

1. Remove the engine cover.



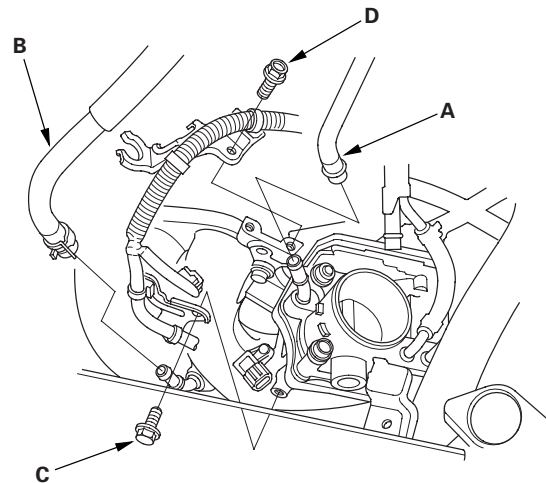
2. Disconnect the vacuum hose (A) and the breather pipe (B), then remove the intake air duct (C).



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

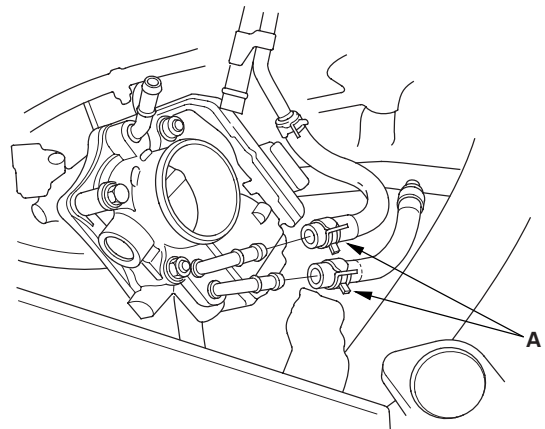
- Manifold absolute pressure (MAP) sensor connector
- Throttle actuator connector

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



5. Remove the harness bracket mounting bolt (C) and the brake booster vacuum line bracket mounting bolt (D).

6. Disconnect the water bypass hoses (A), then plug the water bypass hoses.

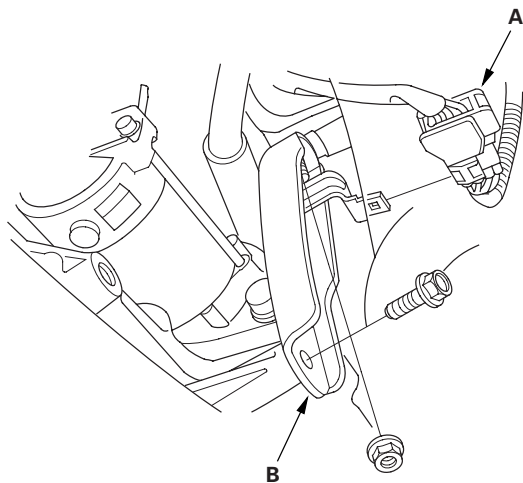


(cont'd)

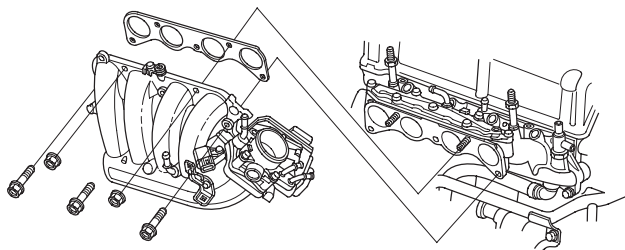
Intake Manifold and Exhaust System

Intake Manifold Removal and Installation (cont'd)

7. Raise the vehicle on the lift to full height.
8. Remove the splash shield (see step 25 on page 5-5).
9. Remove the connector (A) from the intake manifold bracket (B), then remove the intake manifold bracket.

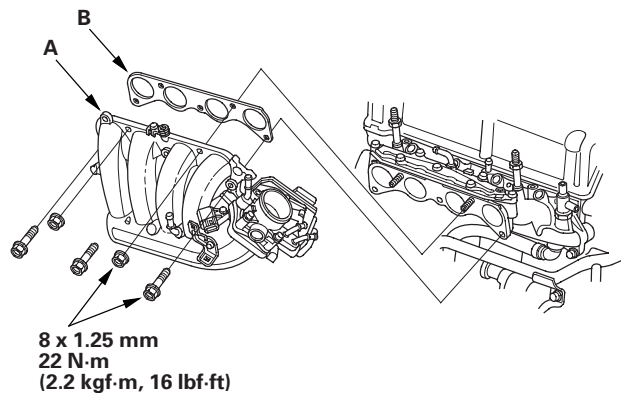


10. Lower the vehicle on the lift.
11. Remove the intake manifold.

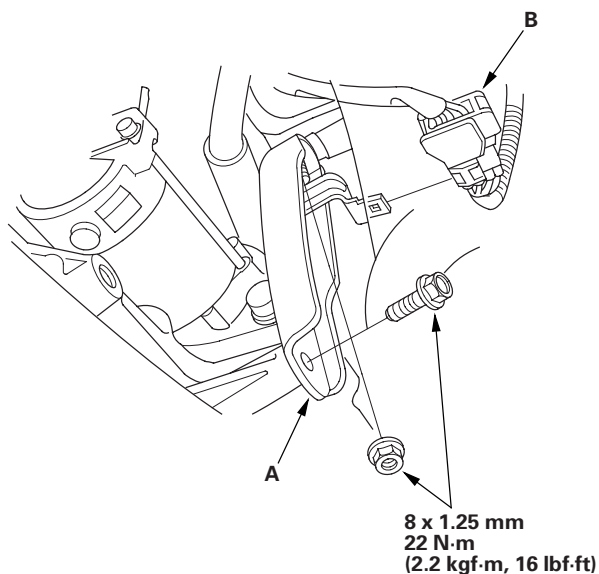


Installation - K20Z2 engine

1. Install the intake manifold (A) with a new gasket (B), and tighten the bolts and the nuts in a crisscross pattern in three steps, beginning with the inner bolt.



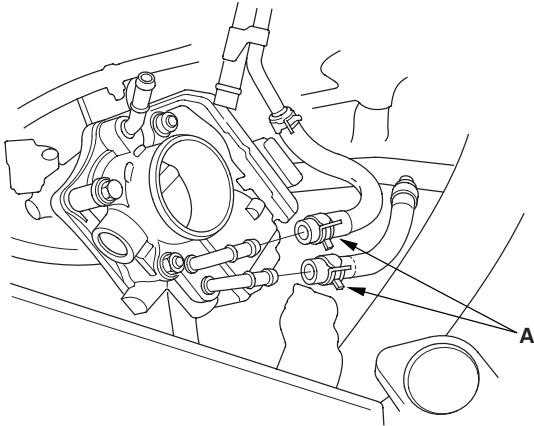
2. Raise the vehicle on the lift.
3. Install the intake manifold bracket (A), then install the connector (B) to the intake manifold bracket.



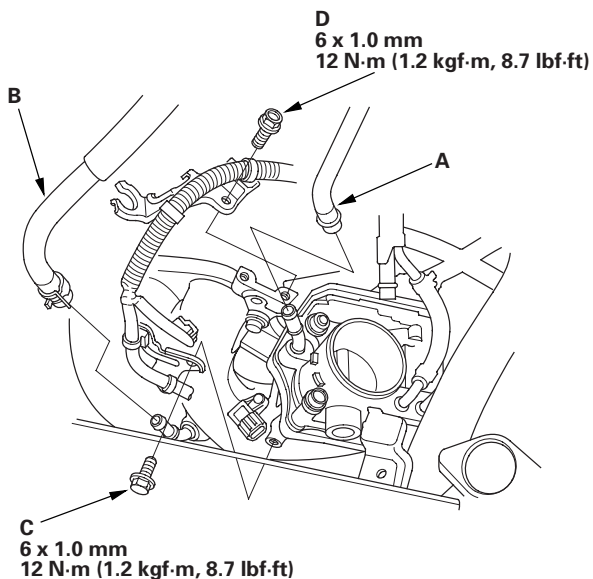
4. Install the splash shield (see step 40 on page 5-20).
5. Lower the vehicle on the lift.



6. Connect the water bypass hoses (A).

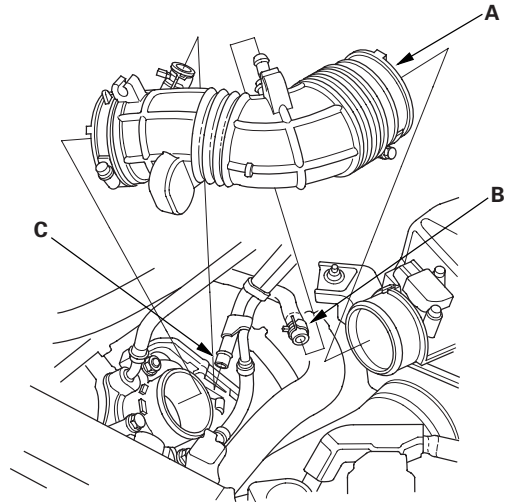


7. Connect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).

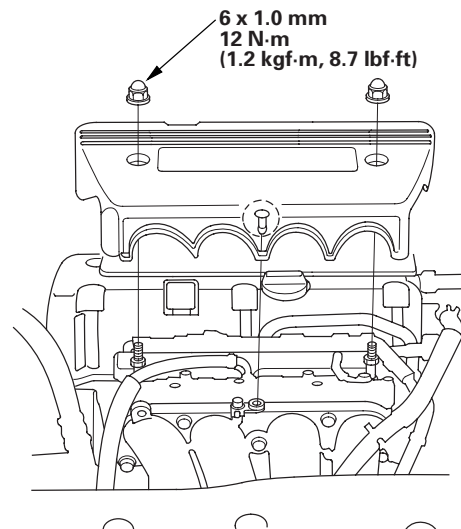


8. Install the harness bracket mounting bolt (C) and the brake booster vacuum line bracket mounting bolt (D).
9. Connect the engine wire harness connectors, and install the wire harness clamps to the intake manifold.
- Manifold absolute pressure (MAP) sensor connector
 - Throttle actuator connector

10. Install the intake air duct (A), then connect the vacuum hose (B) and the breather pipe (C).



11. Install the engine cover.

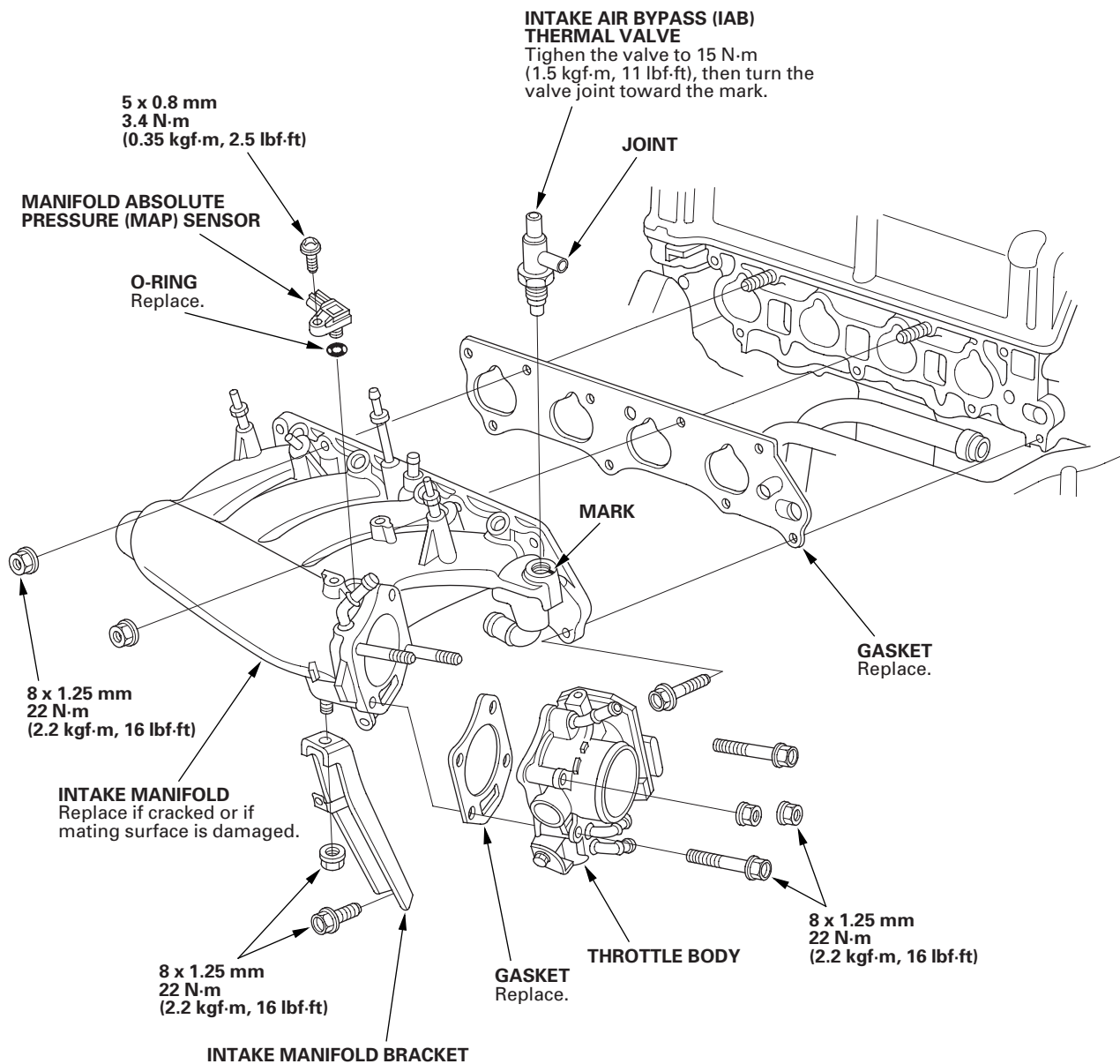


12. After installation, check that all tubes, hoses and connectors are installed correctly.
13. Clean up any spilled engine coolant.
14. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).

Intake Manifold and Exhaust System

Intake Manifold Removal and Installation (cont'd)

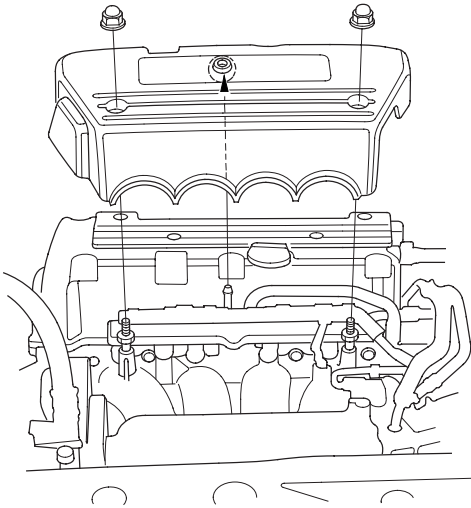
Exploded View - K20Z3 engine



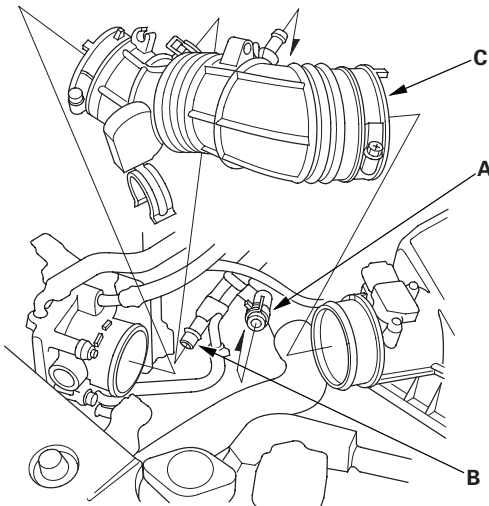


Removal - K20Z3 engine

1. Remove the engine cover.



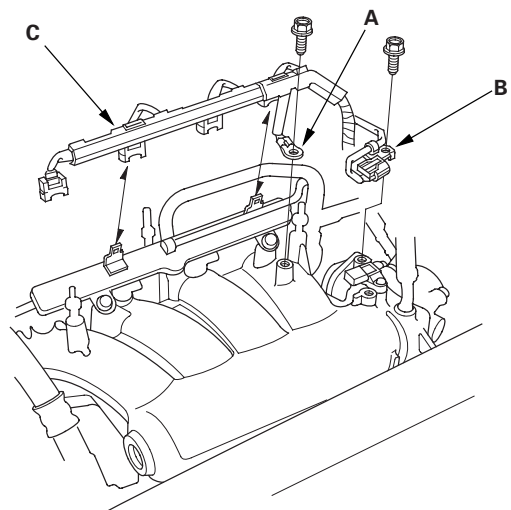
2. Relieve the fuel pressure (see page 11-322).
3. Disconnect the vacuum hose (A) and the breather pipe (B), then remove the intake air duct (C).



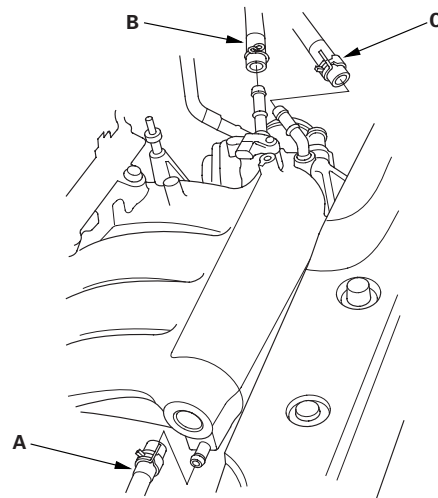
4. Disconnect the following engine wire harness connectors, and remove the wire harness clamps from the intake manifold:

- Four fuel injector connectors
- Manifold absolute pressure (MAP) sensor connector
- Throttle actuator connector

5. Remove the ground cable (A) and the harness clamp bracket (B), then remove the harness holder (C) from the bracket.



6. Disconnect the positive crankcase ventilation (PCV) hose (A), the evaporative emission (EVAP) canister hose (B) and the brake booster vacuum hose (C).

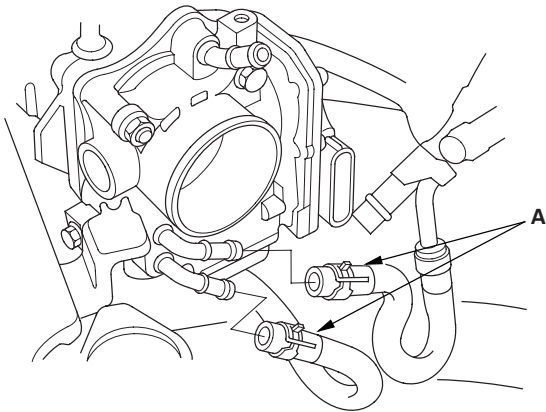


(cont'd)

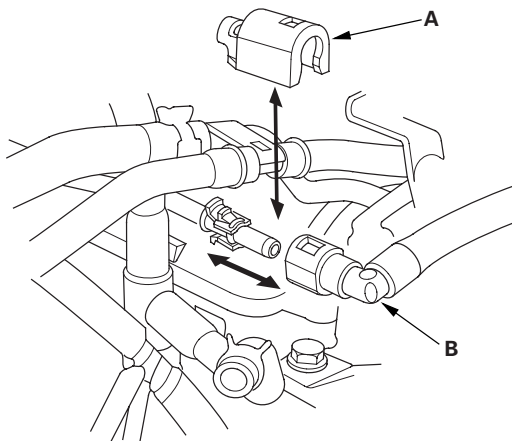
Intake Manifold and Exhaust System

Intake Manifold Removal and Installation (cont'd)

7. Disconnect the water bypass hoses (A), then plug the water bypass hoses.



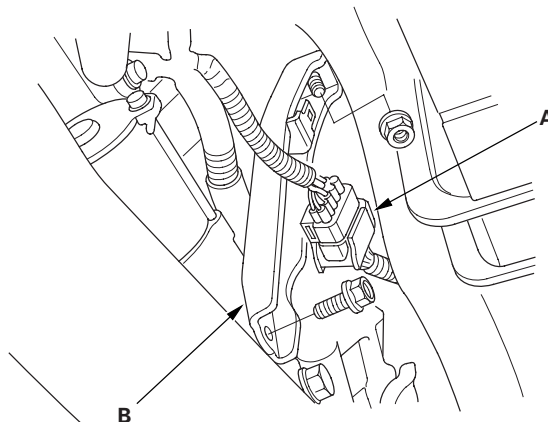
8. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-329).



9. Raise the vehicle on the lift.

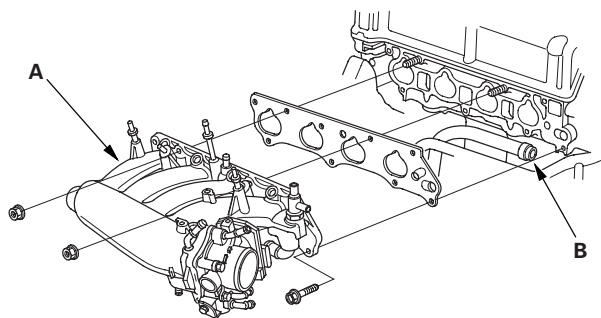
10. Remove the splash shield (see step 25 on page 5-5).

11. Remove the connector (A) from the intake manifold bracket (B), then remove the intake manifold bracket.



12. Lower the vehicle on the lift.

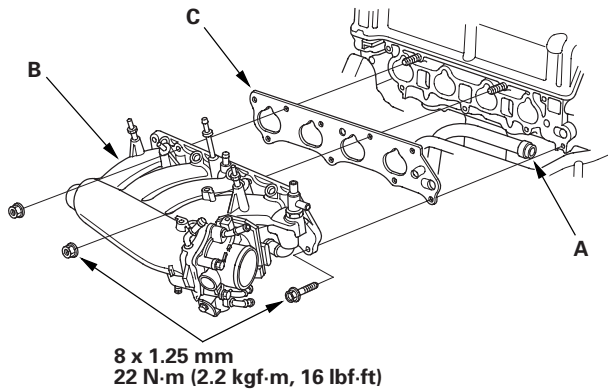
13. Remove the intake manifold (A) from the cylinder head, then disconnect the water bypass hose (B).



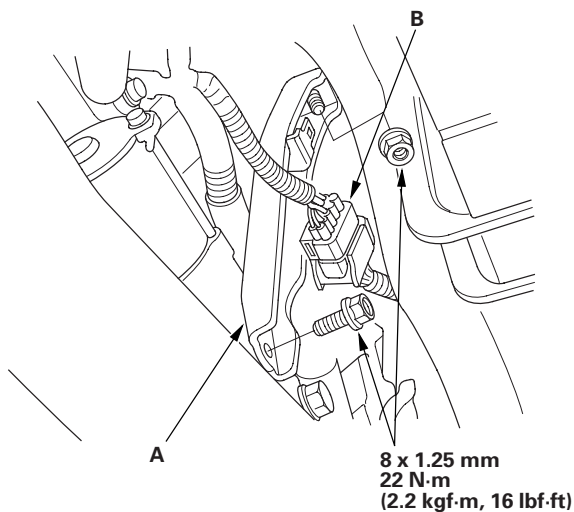


Installation - K20Z3 engine

1. Connect the water bypass hose (A) to the intake manifold (B), then install the intake manifold with a new gasket (C), and tighten the bolts and the nuts in a crisscross pattern in three steps, beginning with the inner bolt.

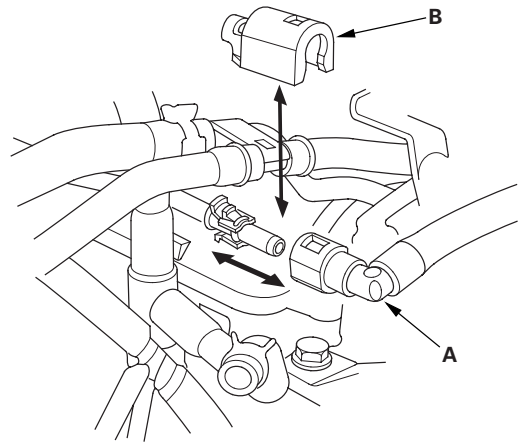


2. Raise the vehicle on the lift.
3. Install the intake manifold bracket (A), then install the connector (B) to the intake manifold bracket.

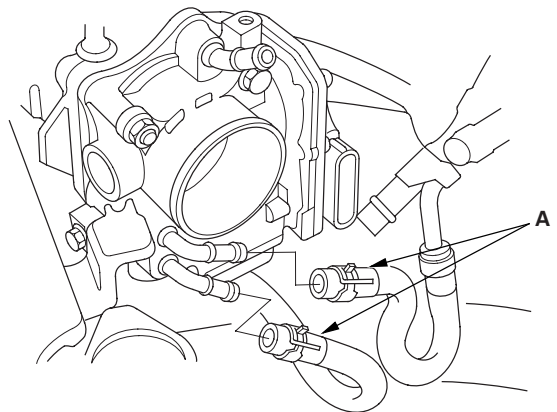


4. Install the splash shield (see step 40 on page 5-20).
5. Lower the vehicle on the lift.

6. Connect the fuel feed hose (A) (see page 11-331), then install the quick-connect fitting cover (B).



7. Connect the water bypass hoses (A).

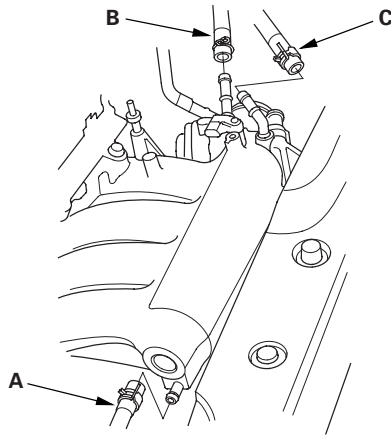


(cont'd)

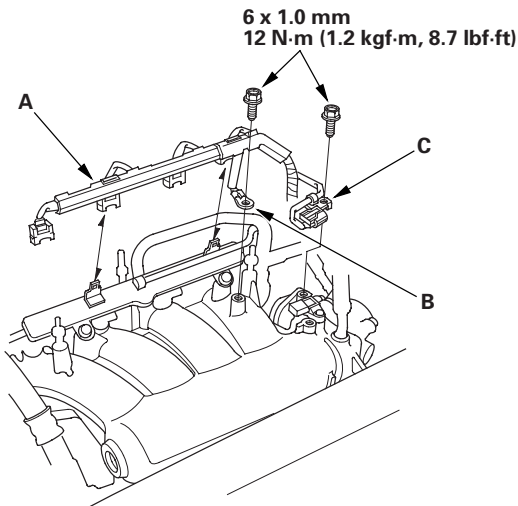
Intake Manifold and Exhaust System

Intake Manifold Removal and Installation (cont'd)

8. Connect the positive crankcase ventilation (PCV) hose (A), the evaporative emission (EVAP) canister hose (B) and the brake booster vacuum hose (C).



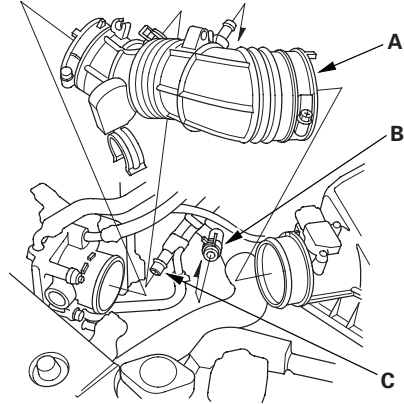
9. Install the harness holder (A) to the bracket, then install the ground cable (B) and the harness clamp bracket (C).



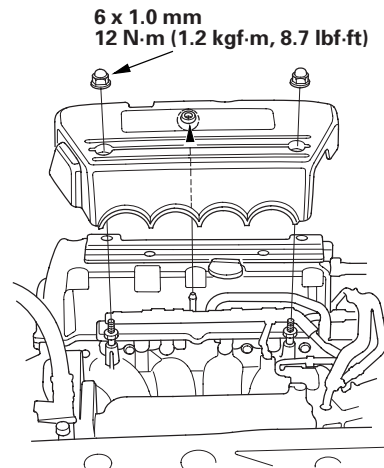
10. Connect the engine wire harness connectors, and install the wire harness clamps to the intake manifold:

- Four fuel injector connectors
- Manifold absolute pressure (MAP) sensor connector
- Throttle actuator connector

11. Install the intake air duct (A), then connect the vacuum hose (B) and breather pipe (C).



12. Install the engine cover.



13. 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.

14. Clean up any spilled engine coolant.

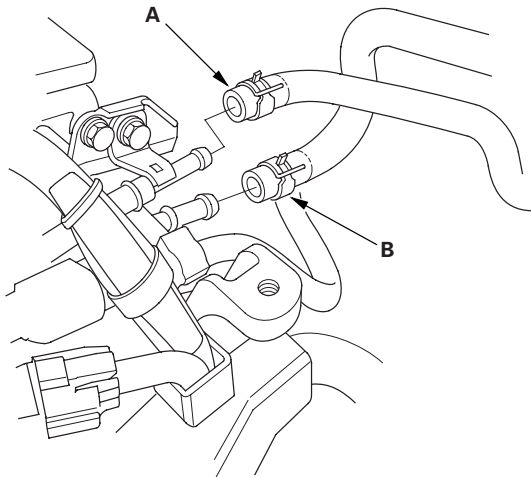
15. After installation, check that all tubes, hoses and connectors are installed correctly.

16. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).

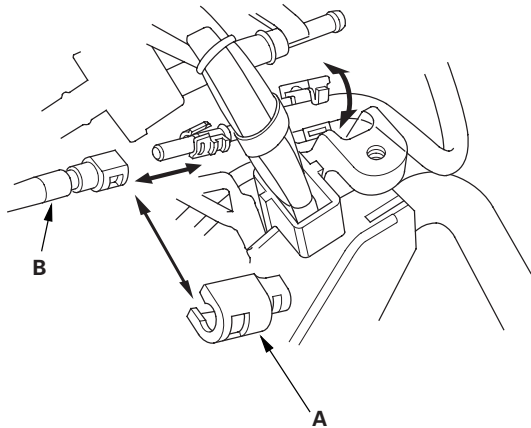


Exhaust Manifold Removal and Installation

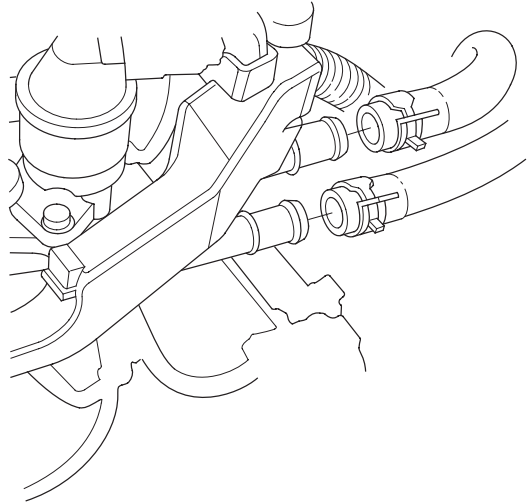
1. Relieve the fuel pressure (see page 11-322).
2. Loosen the drain plug in the radiator, and drain the engine coolant (see page 10-8).
3. Remove the under-cowl panel (see step 4 on page 20-164).
4. Disconnect the evaporative emission (EVAP) canister hose (A) and the brake booster vacuum hose (B).



5. Remove the quick-connect fitting cover (A), then disconnect the fuel feed hose (B) (see page 11-329).



6. Disconnect the heater hoses.



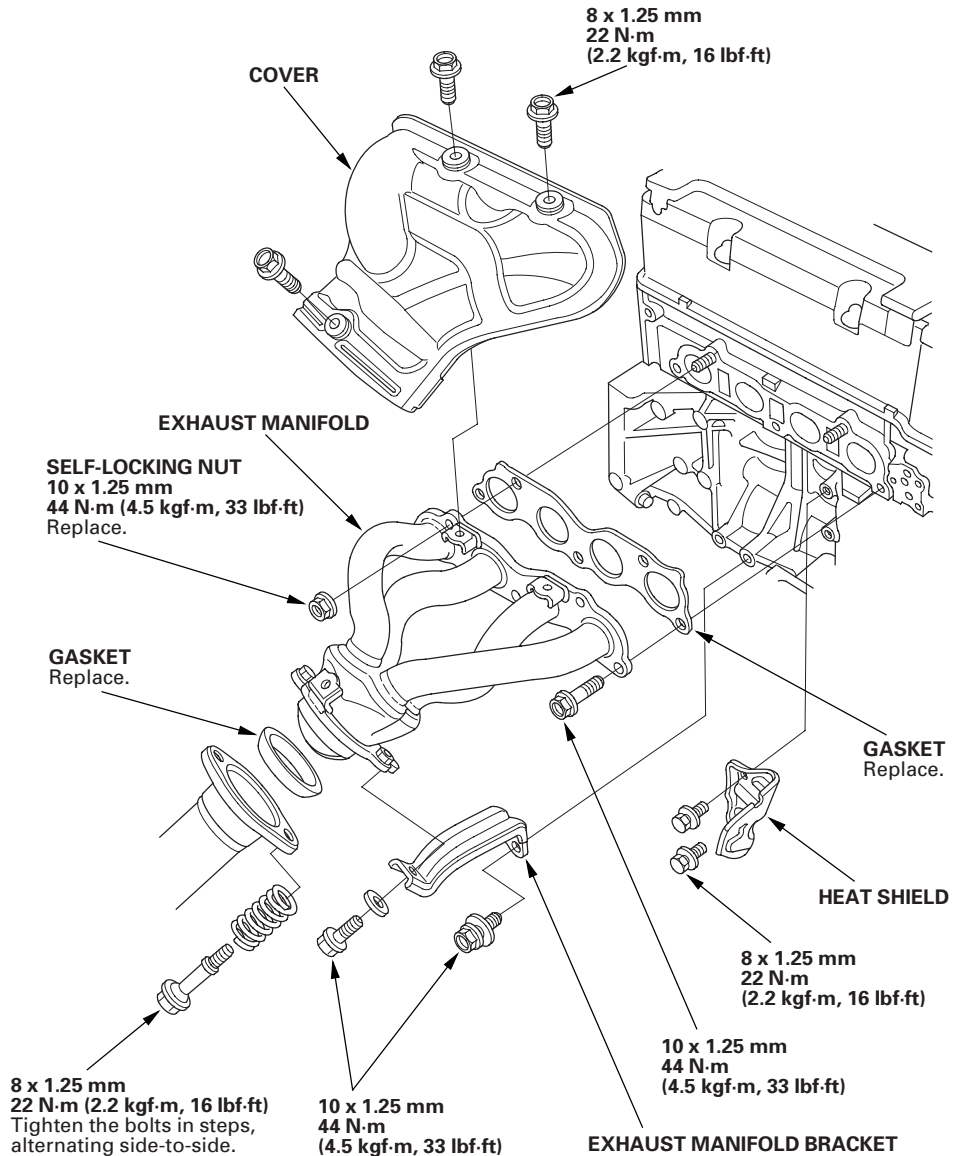
7. Remove the rocker arm oil control valve (see page 11-296).
8. Remove the intermediate shaft heat shield (see step 3 on page 16-23).

(cont'd)

Intake Manifold and Exhaust System

Exhaust Manifold Removal and Installation (cont'd)

9. Remove the cover and the exhaust manifold bracket, then remove the exhaust manifold.



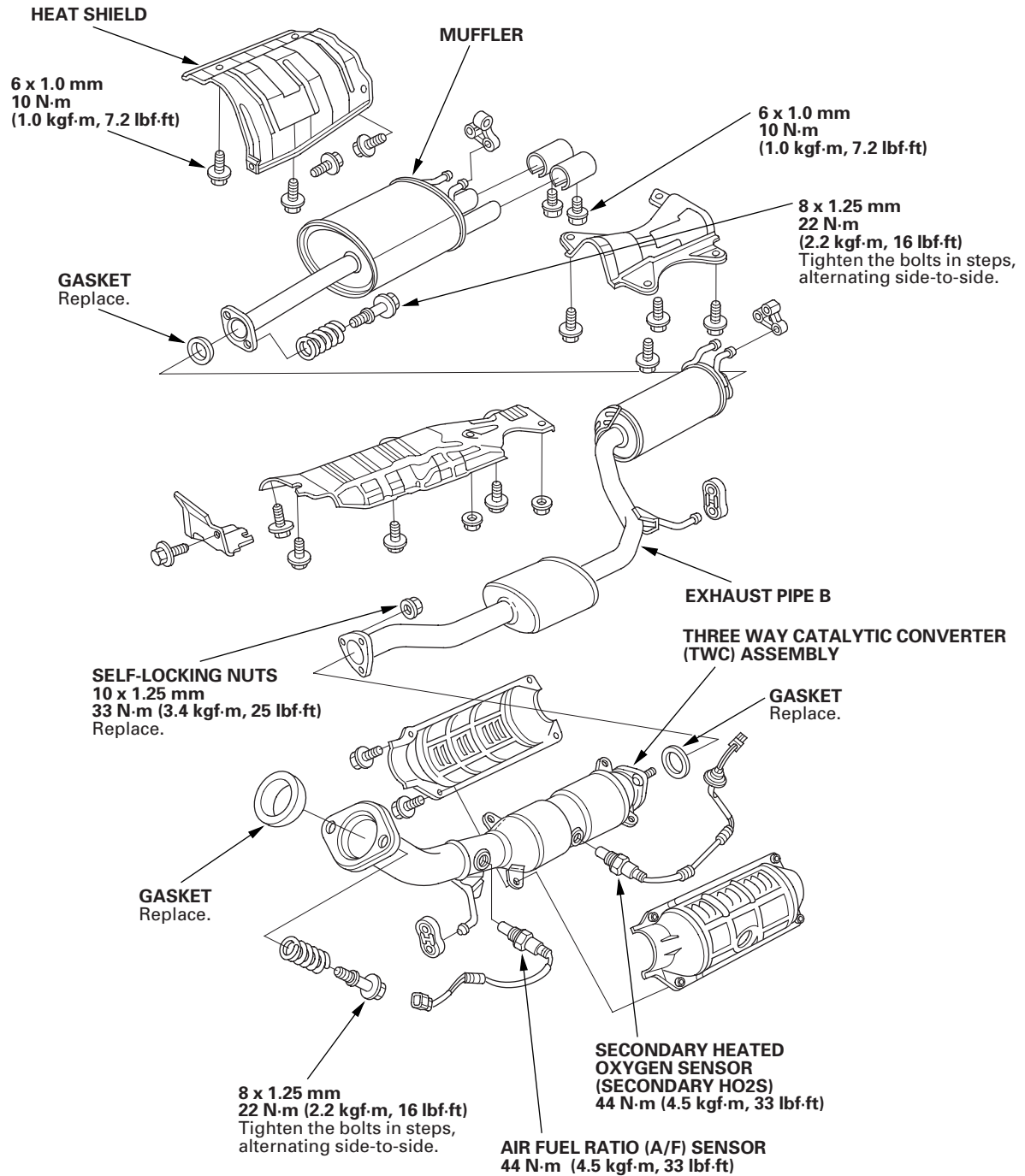
10. Install the exhaust manifold, and tighten the bolts and nuts in a crisscross pattern in three steps, beginning with the inner bolt.
11. Install the other parts in the reverse order of removal.
12. Inspect for leaks. Turn the ignition switch to ON (II) (do not operate the starter) so the fuel pump 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.
13. Refill the radiator with engine coolant, and bleed the air from the cooling system with the heater valve open (see step 6 on page 10-8).



Exhaust Pipe and Muffler Replacement

K20Z2 engine

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



Intake Manifold and Exhaust System

Exhaust Pipe and Muffler Replacement (cont'd)

K20Z3 engine

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

