2.5L 5-CYL

1997-98 ENGINES Acura - 2.5L 5-Cylinder

ENGINE IDENTIFICATION

NOTE: For repair procedures not covered in this article, see ENGINE OVERHAUL PROCEDURES article in GENERAL INFORMATION.

Engine identification code is stamped on block, below cylinder head mating surface. First 5 characters of code indicate engine type. Sixth and seventh digits identify emissions group. Last 5 digits represent engine serial number.

ENGINE IDENTIFICATION CODE

Application	Code
2.5L	G25A4

ENGINE MOUNT CONTROL SYSTEM

NOTE: Engine mount control system is designed to help control excessive engine vibration at idle. System is controlled by the ECM through the engine mount diaphragm actuator.

ENGINE MOUNT CONTROL SYSTEM CHECK

1. Warm engine to normal operating temperature. Ensure idle speed is about 800 RPM. Adjust idle speed as necessary. With engine at idle, depress brake pedal. Place transmission is gear.
2. Have an assistant disconnect 2-pin engine mount control solenoid connector located near center of engine. If sensed idle vibration changes noticeably, system is working properly. If sensed idle vibration does not change, check control solenoid circuit. See CONTROL SOLENOID CIRCUIT CHECK.

ENGINE MOUNT DIAPHRAGM ACTUATOR CHECK

Ensure engine mount diaphragm actuator is working properly. To test actuator diaphragm, use a hand-held vacuum pump and apply about 9 in. Hg to actuator diaphragm. Actuator rod should move smoothly and diaphragm should hold vacuum. Replace as necessary. If engine mount is okay, go to next step.

CONTROL SOLENOID CIRCUIT CHECK

1. Shift transmission to Park or Neutral. With engine idling, disconnect engine mount control solenoid harness connector.
2. Check voltage between chassis ground and engine mount control solenoid harness connector Black/Yellow wire terminal. Battery voltage should be present. If battery voltage is present, go to next step. If battery voltage is not present, check circuit between solenoid harness connector Black/Yellow terminal and ECM fuse.

 © 2011 Mitchell Repair Information Company, LLC.

3. Check voltage between engine mount solenoid harness connector Black/Yellow wire and Green/White wire terminals. Battery voltage should be present. If battery voltage is present, go to next step. If battery voltage is not present, check circuit between solenoid harness connector Green/White wire terminal and ECM. If circuit is okay, substitute with a known-good ECM and retest.
4. Increase engine to speed to greater than 1000 RPM. Check voltage between solenoid harness connector Black/Yellow wire and Green/White wire terminals. Battery voltage should not be present. If battery voltage is present, go to next step. If battery voltage is not present, check engine mount vacuum supply. See ENGINE MOUNT VACUUM SUPPLY CHECK.
5. Check for short to ground in Green/White wire between ECM and engine mount control solenoid harness connector. Repair as necessary. If circuit is okay, substitute with a known-good ECM and retest.

ENGINE MOUNT VACUUM HOSE CHECK

1. Disconnect upper vacuum hose from engine mount control solenoid valve. Install a hand-held vacuum pump to upper vacuum hose. Apply 20 in. Hg. Vacuum should hold. If vacuum holds, go to next step. If vacuum does not hold, check vacuum hose for leaks. If vacuum hose is okay, replace affected engine mount.
2. Release and apply vacuum. Repeat a few times. If sensed idle vibration does not change with or without vacuum applied, replace affected engine mount. If sensed idle vibration changes noticeably with or without vacuum, test engine mount control solenoid valve. See ENGINE MOUNT CONTROL SOLENOID VALVE TEST.

ENGINE MOUNT CONTROL SOLENOID VACUUM SUPPLY TEST

Disconnect lower vacuum hose from engine mount control solenoid. Connect a vacuum gauge to hose. With engine idling, manifold vacuum should be present. If manifold vacuum is present, replace engine mount control solenoid. If manifold vacuum is not present, check for leaking vacuum hose or plugged vacuum port.

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

CAUTION: Always rotate engine in direction of normal rotation (counterclockwise as viewed from front of engine). Backward rotation may cause timing belt to jump teeth on camshaft pulley.

1. Adjust valves when engine temperature is less than 100°F (38°C). Remove cylinder head cover. Rotate crankshaft counterclockwise until No. 1 piston is at TDC of compression stroke.
2. Ensure No. 1 mark on camshaft pulley aligns with TDC groove on cam holder. See **Fig. 1**. Adjust clearance on valves for No. 1 cylinder. Slide feeler gauge between camshaft lobe and rocker arm. Loosen lock nuts, and turn adjustment screw until clearance is correct. Tighten lock nuts. See **VALVE CLEARANCE SPECIFICATIONS**.
3. Rotate crankshaft 144 degrees counterclockwise (camshaft pulley turns 72 degrees) so No. 2 piston is at TDC of compression stroke. Ensure No. 2 mark on camshaft pulley aligns with TDC groove on cam holder. Adjust clearance on valves for No. 2 cylinder.

 © 2011 Mitchell Repair Information Company, LLC.

4. Rotate crankshaft 144 degrees counterclockwise (camshaft pulley turns 72 degrees) so No. 4 piston is at TDC of compression stroke. Ensure No. 4 mark on camshaft pulley aligns with TDC groove on cam holder. Adjust clearance on valves for No. 4 cylinder.
5. Rotate crankshaft 144 degrees counterclockwise (camshaft pulley turns 72 degrees) so No. 5 piston is at TDC of compression stroke. Ensure No. 5 mark on camshaft pulley aligns with TDC groove on cam holder. Adjust clearance on valves for No. 5 cylinder.
6. Rotate crankshaft 144 degrees counterclockwise (camshaft pulley turns 72 degrees) so No. 3 piston is at TDC of compression stroke. Ensure No. 3 mark on camshaft pulley aligns with TDC groove on cam holder. Adjust clearance on valves for No. 3 cylinder.

VALVE CLEARANCE SPECIFICATIONS

Application	In. (mm)
Exhaust	0.011-0.013 (0.28-0.32)
Intake	0.009-0.011 (0.24-0.28)

 © 2011 Mitchell Repair Information Company, LLC.

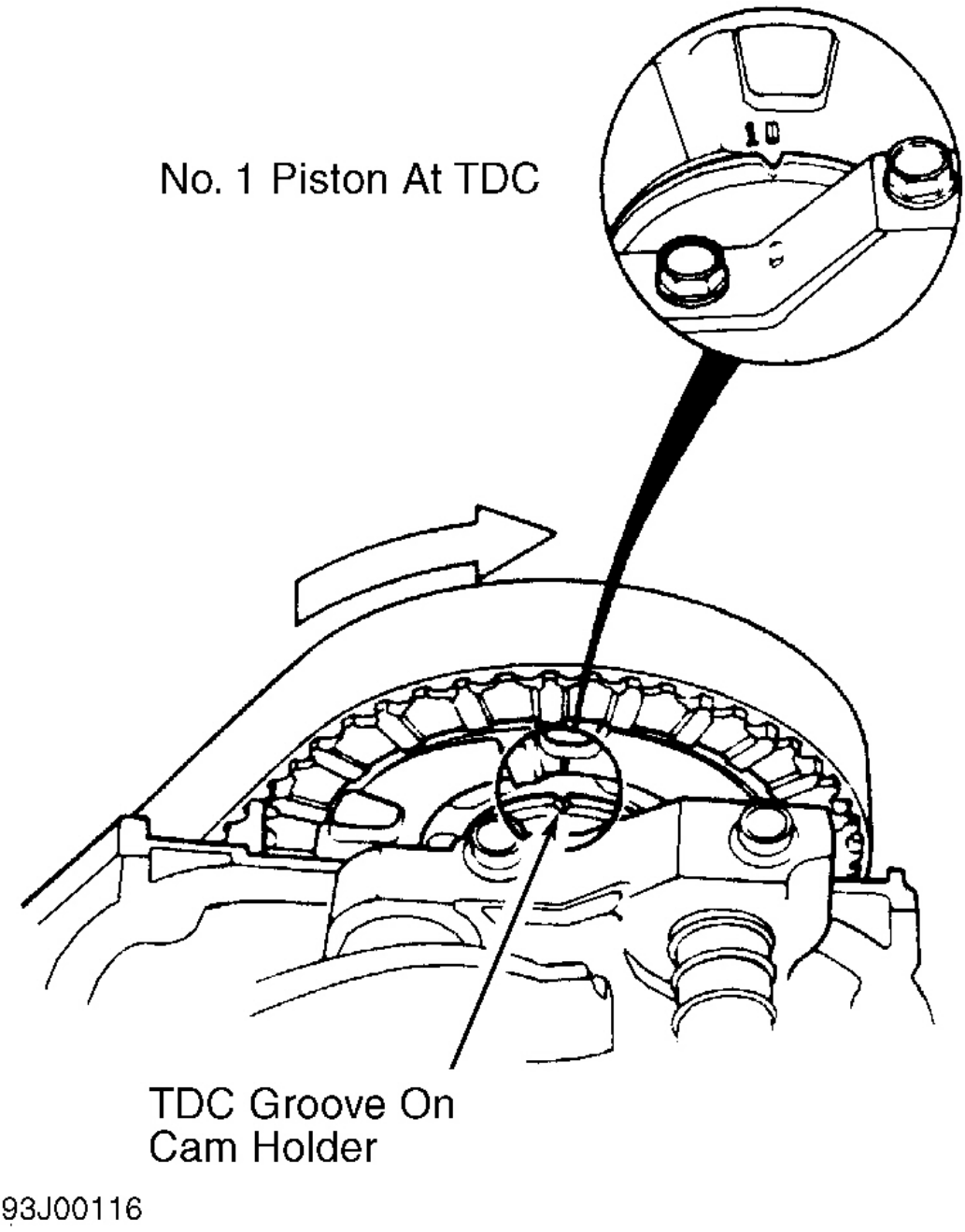


Fig. 1: Positioning Camshaft For Valve Adjustment (No. 1 Cylinder Shown; Others Similar)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

THROTTLE CABLE ADJUSTMENT

 © 2011 Mitchell Repair Information Company, LLC.

1. Warm engine to normal operating temperature or until cooling fan comes on. With engine at idle, check throttle cable for binding or sticking. Replace as necessary. If throttle cable is okay, go to next step.
2. Turn engine off. Check throttle cable free play at throttle linkage. Cable deflection should be .39-.47" (10-12 mm). See **Fig. 2**. To adjust, loosen lock nut on cable bracket and turn adjusting nut until cable deflection is as specified. Retighten lock nut.
3. Check throttle valve to ensure it opens fully when accelerator pedal is fully depressed, and if throttle valve returns to idle position when accelerator pedal is released.

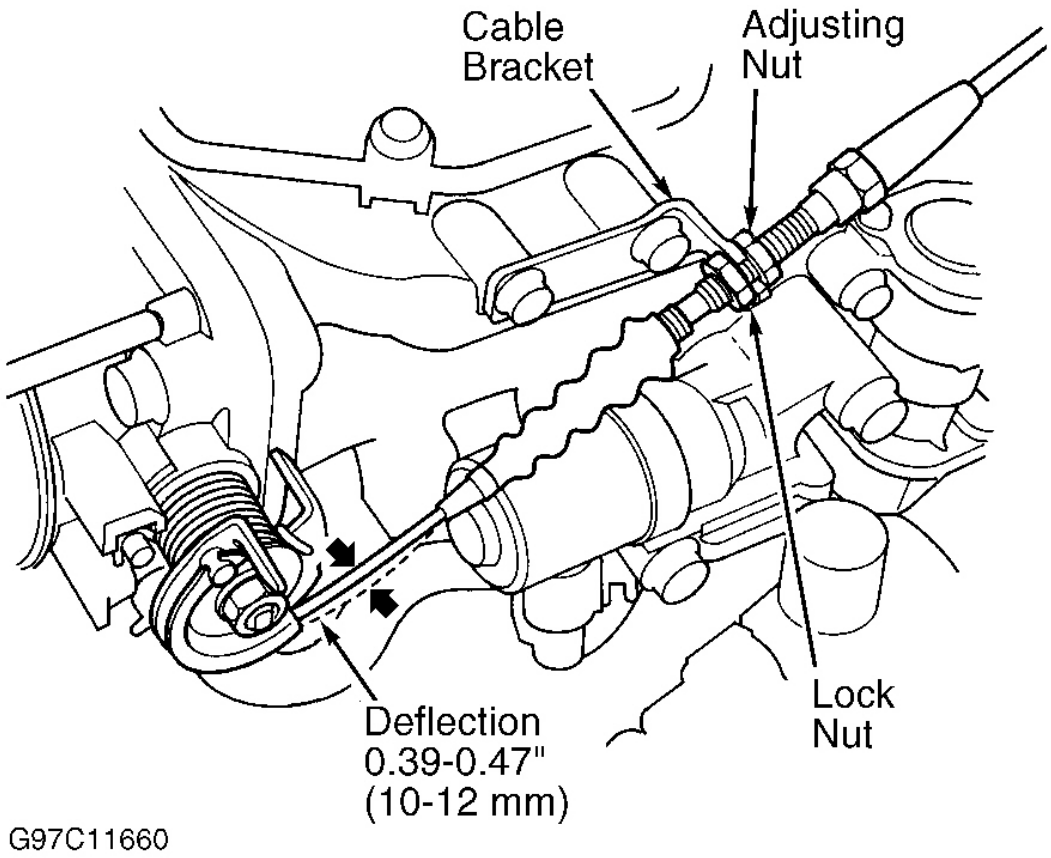


Fig. 2: Adjusting Throttle Cable
Courtesy of AMERICAN HONDA MOTOR CO., INC.

SHIFT LINK ADJUSTMENT (A/T)

1. Apply parking brakes and block drive wheels. Place transmission in Neutral. Remove center console. Remove lock pin from link adjuster. Insert a 0.16" (4.0 mm) pin into shift lever bracket through the "N" position cutout on shift lever position hole.
2. From under vehicle, verify control lever is in Neutral position on transmission. Turn ignition on. Verify the "N" indicator light on instrument panel comes on.

 © 2011 Mitchell Repair Information Company, LLC.

3. Ensure hole in link adjuster is perfectly aligned with hole in link rod. There are 2 holes positioned 90 degrees apart on link rod to allow link adjustments in 1/4-turn increments. To align, loosen lock nut on link adjuster and adjust as required. Ensure lock pin is seated securely in adjuster. Replace lock pin if it does not snap securely over link adjuster.
4. Move shift lever to each gear and verify gear position indicator follows gear position switch. Start engine and check shift lever in all gears. Install center console cover. Insert ignition key into key cylinder on gear position indicator panel and verify shift lock lever is released.

TIMING BELT TENSION ADJUSTMENT

CAUTION: Adjust timing belt with engine cold. DO NOT rotate crankshaft with timing belt tension adjuster bolt loose.

1. Remove cylinder head cover. Remove upper timing belt cover. Inspect timing belt. Replace belt if cracked, or if oil or coolant soaked. Rotate crankshaft counterclockwise 5 or 6 revolutions to set belt. Rotate crankshaft counterclockwise until No. 1 piston is at TDC.
2. Loosen adjuster bolt 180 degrees. See **Fig. 3**. Rotate crankshaft counterclockwise 3 teeth on camshaft pulley. Tighten adjuster bolt to 33 ft. lbs. (44 N.m). Using Holder Handle (07JAB-001020A) and Holder Attachment (07NAB-001040A) to hold crankshaft pulley, retighten crankshaft pulley bolt to 181 ft. lbs. (245 N.m).

 © 2011 Mitchell Repair Information Company, LLC.

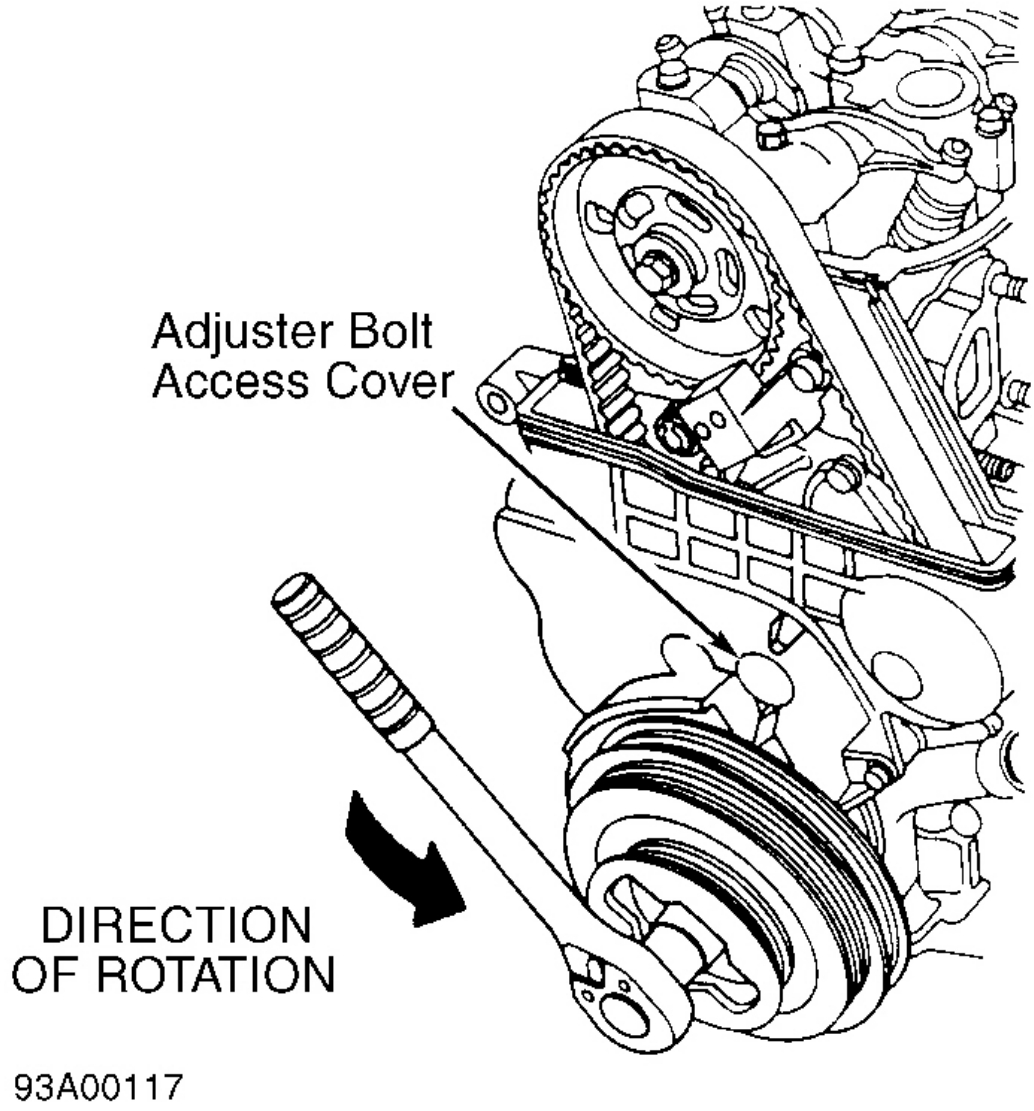


Fig. 3: Locating Timing Belt Adjuster Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REMOVAL & INSTALLATION

NOTE: **For reassembly reference, label all electrical connectors, vacuum hoses, and fuel lines before removal. Also place mating marks on other major assemblies before removal.**

NOTE: **Radio/cassette or radio/CD player is equipped with an anti-theft protection**

 © 2011 Mitchell Repair Information Company, LLC.

circuit. Whenever battery is disconnected, radio will go into anti-theft mode. When battery is reconnected, radio will display CODE, and will be inoperative until proper code number is entered. Obtain anti-theft security code before disconnecting battery.

FUEL PRESSURE RELEASE

WARNING: Fuel system is under pressure. Pressure must be released before servicing fuel system components.

Disconnect negative battery cable. Remove fuel tank filler cap. Place shop towel over fuel filter to absorb excess fuel. Slowly loosen fuel filter service bolt one complete turn while holding banjo bolt. See **Fig. 4**. Fuel filter is located on left side of firewall.

NOTE: Replace washer between service bolt and banjo bolt whenever service bolt is loosened. Replace all washers if both bolts are removed.

© 2011 Mitchell Repair Information Company, LLC.

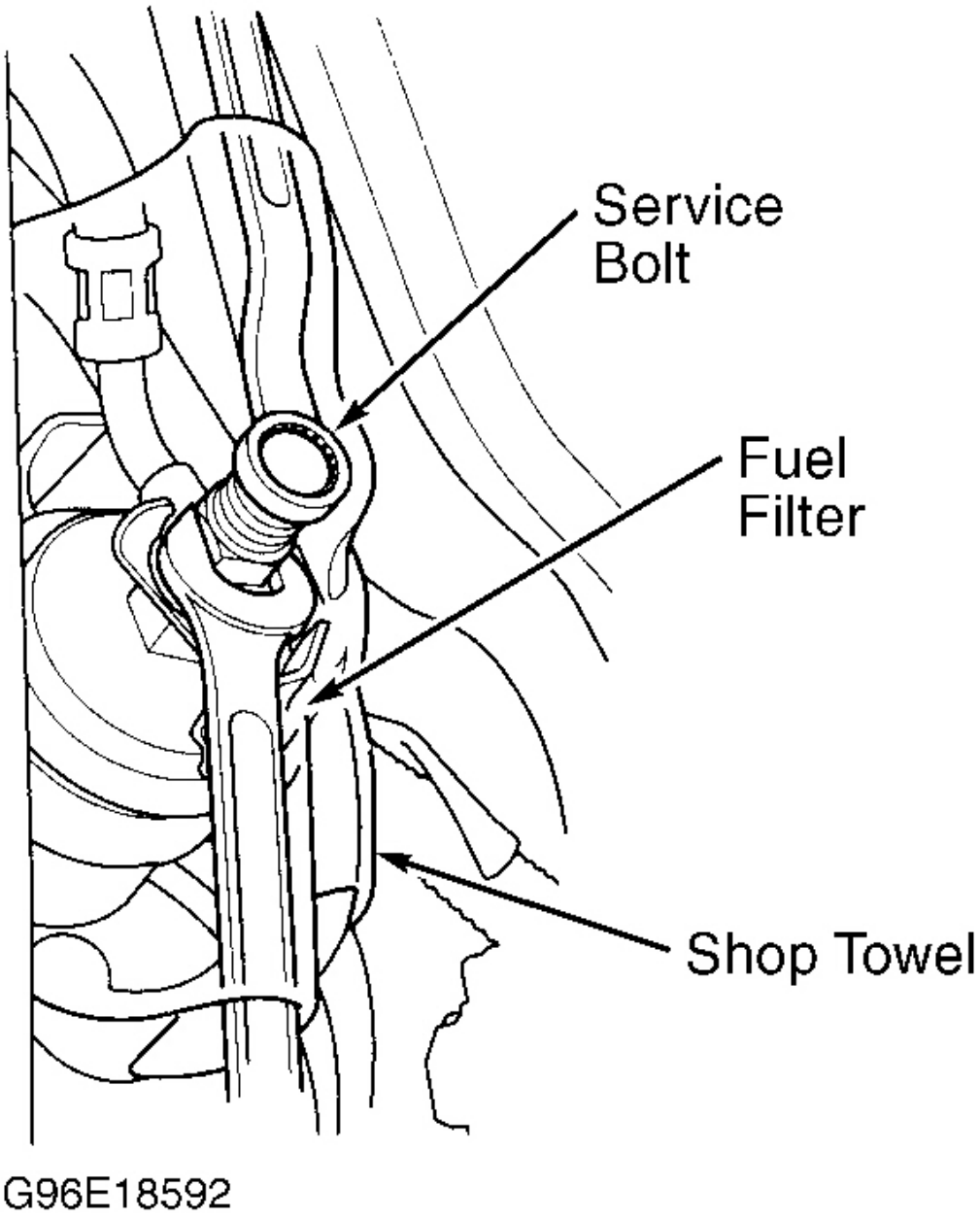


Fig. 4: Releasing Fuel System Pressure
Courtesy of AMERICAN HONDA MOTOR CO., INC.

BLEEDING COOLING SYSTEM

See BLEEDING COOLING SYSTEM in SPECIFICATIONS & ELECTRIC COOLING FANS article in

 © 2011 Mitchell Repair Information Company, LLC.

ENGINE COOLING.

ENGINE

Removal

1. Open hood as far as possible. Disconnect negative battery cable. Disconnect positive battery cable. Remove engine ground cables and ignition coil wire. Remove battery and heat shields. Remove battery tray. Remove battery cables from underhood fuse/relay box. Disconnect engine wiring harness connector on right side of engine compartment. Remove battery cable from underhood ABS fuse/relay box.
2. Remove intake air duct and vacuum hose. Remove power steering pump belt adjusting bolt, lock nut and mounting bolt. Remove power steering pump belt and power steering pump. Loosen idler pulley center nut and adjusting bolt, and remove A/C compressor belt.
3. Disconnect throttle cable. DO NOT bend cable. Replace cable if kinked. Disconnect engine wiring harness connectors on left side of engine compartment. Remove brake booster vacuum hose, and EVAP control canister hose and vacuum hose. Relieve fuel pressure. See **FUEL PRESSURE RELEASE**. Remove fuel feed hose, return hose and vacuum hose. Remove engine wire harness clamp, wire harness stay and ground cable.
4. Remove A/C compressor and lay aside. DO NOT disconnect A/C hoses. Remove Vehicle Speed Sensor (VSS)/power steering speed sensor. DO NOT disconnect fluid hoses. Remove torque converter cover. Remove drive plate bolts one at a time while rotating crankshaft pulley. Remove transmission housing bolts and 26-mm shim. Remove transmission sub-harness connector.
5. Remove radiator cap. Raise and support vehicle. Remove front wheels and splash shield. Drain engine coolant, engine oil, differential oil and Automatic Transmission Fluid (ATF). Reinstall drain plugs using NEW washers. Remove damper fork. Disconnect suspension lower arm ball joints. Remove axle shafts. Coat finished surfaces with oil and cover axle shaft ends with plastic bags. Remove wire harness covers and disconnect primary heated O2 sensor connector.
6. Remove exhaust pipe "A" and exhaust manifold brackets. Remove transmission mount and mount bracket. Shift transmission to Park. Remove 33-mm transmission sealing bolt. Remove extension shaft from differential using extension shaft puller. Lower vehicle. Remove upper and lower radiator hoses, and radiator. Remove heater hoses.
7. Attach chain hoist to engine. Disconnect vacuum hoses and remove front engine mounts. Raise hoist and remove mid-engine mounts. Remove transmission housing mount bolts and torque converter cover. Separate engine and transmission. Attach transmission jack with wooden block to protect transmission housing. Install mid-engine mounts to transmission and re-torque mounting bolts.
8. Raise chain hoist to remove slack from chain. Ensure engine is free from all hoses and wiring. Slowly raise engine about 6". Verify engine is still free from all hoses and electrical wiring. Raise engine completely and remove from vehicle.

NOTE: Perform the following installation procedure in specified order to eliminate excessive noise and vibration, and to prevent reduction in bushing life.

Installation

1. To install, reverse removal procedure. Remove mid-engine mounts. Tighten transmission housing mounting bolts and torque converter cover. Install mid-engine mounts, and tighten bolts and nuts in

 © 2011 Mitchell Repair Information Company, LLC.

sequence. See **Fig. 5**.

2. Install left front engine mount and vacuum hose, and tighten bolts. See **TORQUE SPECIFICATIONS**. DO NOT tighten nut. Install right front engine mount and vacuum hose, and tighten bolts. DO NOT tighten nut. Tighten left front engine mount nut. Tighten right front engine mount nut.
3. Install extension shaft. Install transmission mount and mount bracket. Tighten bolts in sequence. See **Fig. 5**. When installing axles shafts, use NEW spring clips. Insert axles shafts until spring clips click into grooves of differential side gears. Ensure all wire harness connectors and hoses are connected properly.
4. Check throttle cable adjustment. See **THROTTLE CABLE ADJUSTMENT** under ADJUSTMENTS. Adjust transmission shift link. See SHIFT LINK ADJUSTMENT (A/T) under ADJUSTMENTS. Adjust accessory drive belt tension. Fill all fluids to proper level. Bleed air from cooling system. See BLEEDING COOLING SYSTEM in SPECIFICATIONS & ELECTRIC COOLING FANS article in ENGINE COOLING. Check for fluid leaks.

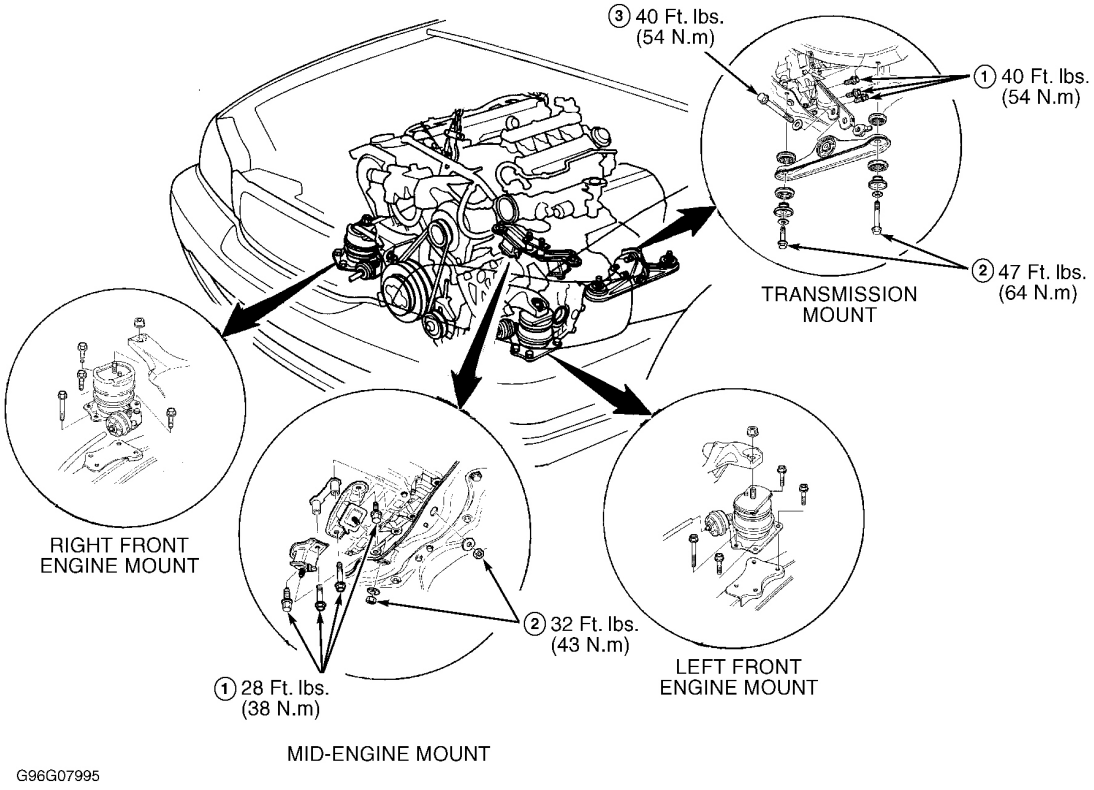


Fig. 5: Engine/Transmission Mount Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

INTAKE MANIFOLD

NOTE: Reference mark all emission hoses and harness connectors before disconnecting.

Removal

 © 2011 Mitchell Repair Information Company, LLC.

Allow engine to cool. Disconnect negative battery cable. Disconnect all electrical harness connectors and hoses to intake manifold. Remove throttle cable. DO NOT bend cable. Remove air cleaner assembly and intake air duct. Remove intake manifold assembly. See **Fig. 6**.

Installation

To install, reverse removal procedure. Clean intake manifold gasket mating surfaces. Install NEW gaskets. Install and tighten manifold bolts to specification. See **TORQUE SPECIFICATIONS**. Check throttle cable adjustment. See THROTTLE CABLE ADJUSTMENT under ADJUSTMENTS. Fill and bleed air from cooling system. See BLEEDING COOLING SYSTEM in SPECIFICATIONS & ELECTRIC COOLING FANS article in ENGINE COOLING.

 © 2011 Mitchell Repair Information Company, LLC.

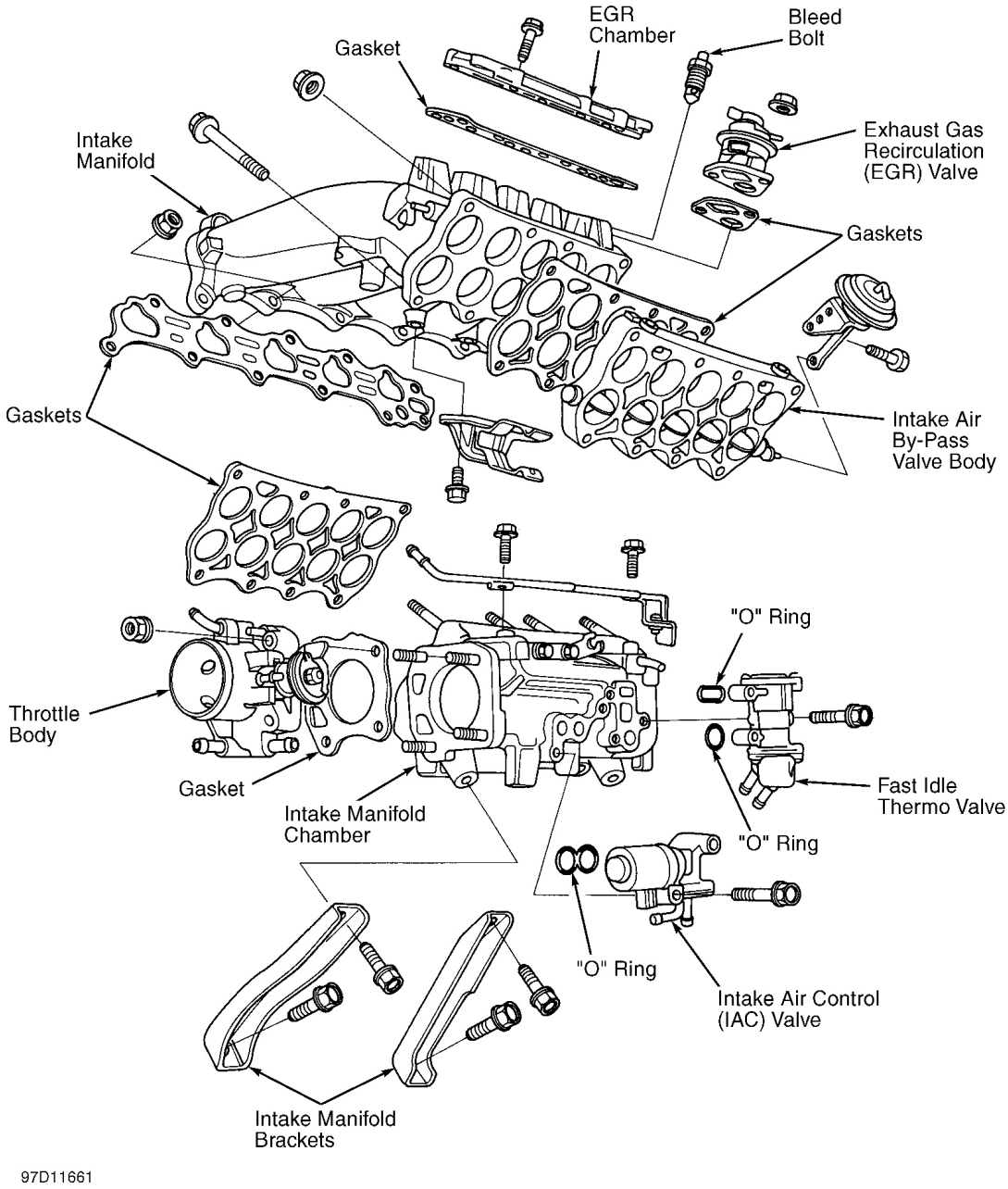


Fig. 6: Exploded View Of Intake Manifold Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

EXHAUST MANIFOLD

Removal & Installation

Allow engine to cool. Disconnect negative battery cable. Disconnect positive battery cable. Remove battery and battery tray. Remove exhaust manifold covers. Disconnect primary heated oxygen sensor harness connector.

 © 2011 Mitchell Repair Information Company, LLC.

Disconnect exhaust pipe from manifold. Remove exhaust manifold assembly. See **Fig. 7**. To install, reverse removal procedure. Tighten exhaust manifold nuts and bolts to specification. See **TORQUE SPECIFICATIONS**.

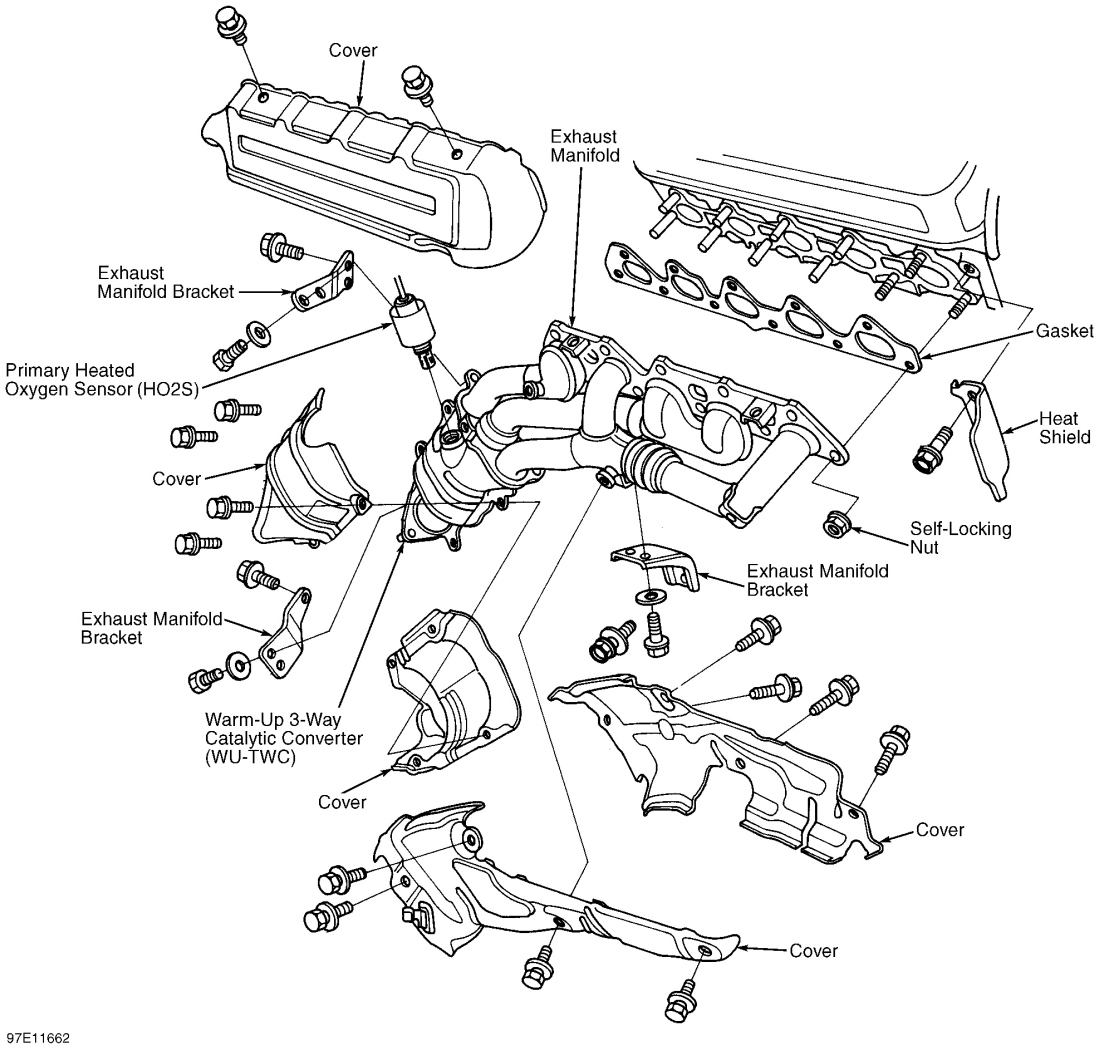


Fig. 7: Exploded View Of Exhaust Manifold Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER HEAD

NOTE: To prevent cylinder head damage, DO NOT remove cylinder head until coolant temperature is less than 100°F (38°C).

Removal

1. Disconnect negative battery cable. Drain coolant. Remove ground cable and ignition coil wire. Remove heat shields. Remove intake air duct. Loosen power steering pump belt adjusting bolt, lock nut and

 © 2011 Mitchell Repair Information Company, LLC.

mounting bolt. Remove power steering pump belt. Loosen idler pulley center nut and adjusting bolt. Remove A/C compressor belt. Loosen generator belt adjusting bolt, lock bolt and mounting bolt. Remove generator belt.

2. Remove throttle cable. Remove brake booster vacuum hose, EVAP control canister hose and vacuum hose. Relieve fuel pressure. See **FUEL PRESSURE RELEASE**. Remove fuel feed hose and fuel return hose. Remove upper radiator hose and water by-pass hose. Remove heater hoses and wiring harness clamps. Remove breather hose, vacuum hoses, water by-pass hose and wiring harness holder.
3. Remove spark plug wires and distributor. Remove ground cables from cylinder head. Remove wiring harness covers and PCV hose. Remove engine wiring harness connectors and clamps from cylinder head and intake manifold. Remove ground cable. Remove intake manifold.
4. Remove wiring harness covers and disconnect primary HO2S sensor connector. Remove self-locking nut and exhaust manifold brackets. Remove exhaust manifold. Remove ground cables and cylinder head cover. Remove timing belt. See **TIMING BELT**.
5. Remove Cylinder Position (CYP) sensor and camshaft pulley. Remove Crankshaft Speed Fluctuation (CKF) sensor. Remove timing belt back cover and remove Top Dead Center (TDC)/Crankshaft Position (CKP) sensor. Remove cylinder head bolts, in sequence, 1/3 turn at a time. Repeat procedure until all bolts are loose. See **Fig. 8**. Remove cylinder head.

Inspection

1. Clean gasket mating surfaces. Check camshaft-to-holder oil clearance. Cylinder head cannot be resurfaced if clearance is not within specification. See **CAMSHAFT** under ENGINE SPECIFICATIONS.
2. Measure cylinder head warpage. If warpage is less than 0.002" (0.05 mm), resurfacing is not required. If warpage is 0.002-0.008" (0.05-0.20 mm), resurface cylinder head. Maximum resurface limit is 0.008" (0.20 mm). Remove and clean oil control orifices. See **Fig. 9**.

Installation

1. Clean oil control orifice. Install oil control orifice, "O" ring, cylinder head dowel pins and NEW cylinder head gasket. See **Fig. 9**. Rotate crankshaft counterclockwise and set No. 1 piston to TDC. Rotate camshaft until keyway is facing up (No. 1 piston at TDC). Tighten cylinder head bolts in sequence, in 3 steps. See **Fig. 10**.
2. Install NEW intake manifold gasket. Install intake manifold and tighten nuts using crisscross pattern, in 2 or 3 steps, starting with inner nuts. Install NEW exhaust manifold gasket. Install exhaust manifold and tighten nuts using crisscross pattern, in 2 or 3 steps, starting with inner nuts. Install exhaust manifold brackets and tighten self-locking nuts. See **TORQUE SPECIFICATIONS**.
3. Install TDC/CKP sensor and timing belt back cover. Install camshaft pulley and CYP sensor. Install CKF sensor and timing belt. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. Install cylinder head gasket in groove of cylinder head cover. Ensure gasket is fully seated in corners of recesses for camshaft.
4. Apply liquid gasket sealer to valve cover gasket at 4 corners of recesses. See **Fig. 11**. Install valve cover within 5 minutes. Tighten valve cover nuts, in sequence, in 2 or 3 steps. See **Fig. 12**. Tighten nuts during last step to specified torque. See **TORQUE SPECIFICATIONS**. Check that all tubes, hoses and wiring harness connectors are installed/connected properly.

 © 2011 Mitchell Repair Information Company, LLC.

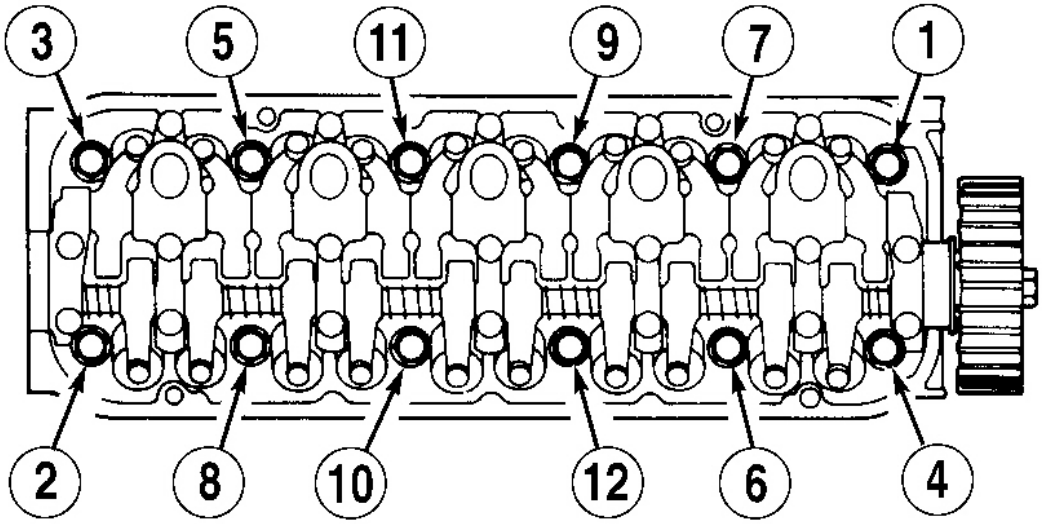
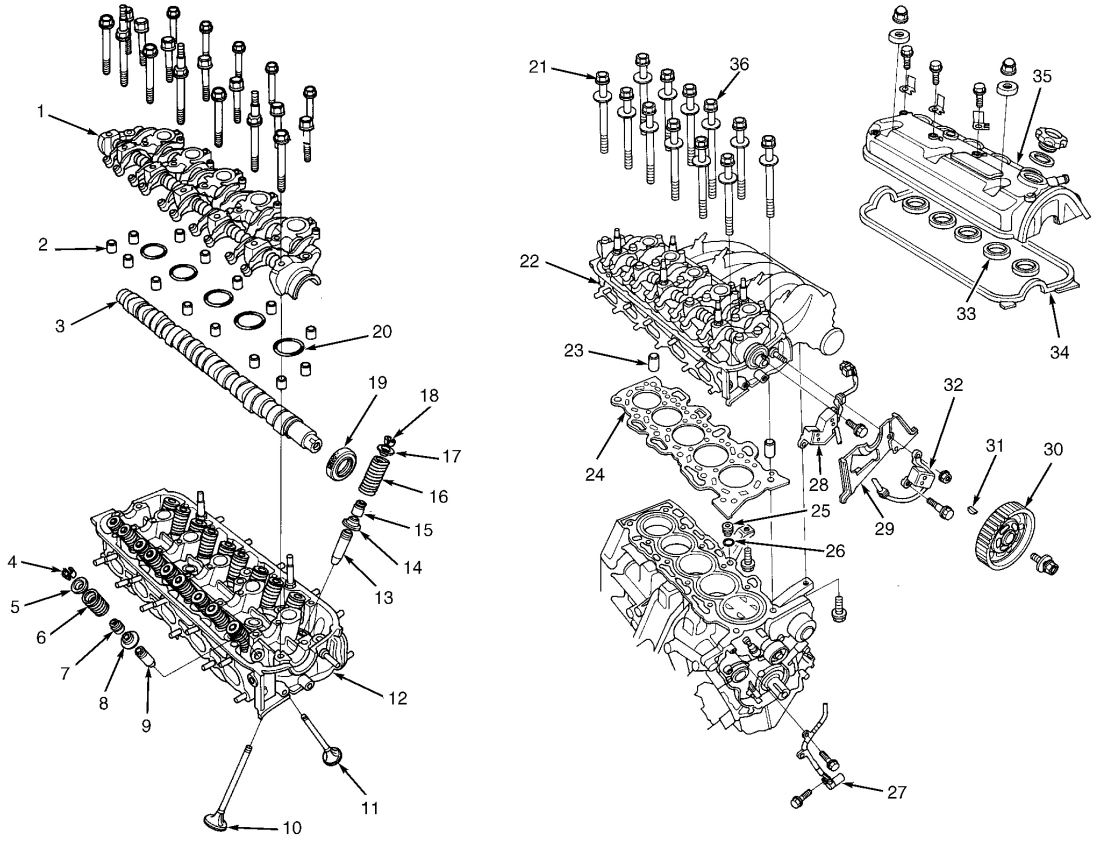


Fig. 8: Cylinder Head Bolt Loosening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.



1. Rocker Arm Assembly
2. Dowel Pin
3. Camshaft
4. Valve Keepers
5. Spring Retainer
6. Exhaust Valve Spring
7. Exhaust Valve Seal
8. Valve Spring Seat
9. Exhaust Valve Guide
10. Intake Valve
11. Exhaust Valve
12. Cylinder Head
13. Intake Valve Guide
14. Valve Spring Seat
15. Intake Valve Seal
16. Intake Valve Spring
17. Spring Retainer
18. Valve Keepers
19. Oil Seal
20. "O" Ring
21. Cylinder Head Bolt
22. Cylinder Head
23. Dowel Pin
24. Cylinder Head Gasket
25. Oil Control Orifice
26. "O" Ring
27. Crankshaft Speed Fluctuation (CKF) Sensor
28. Top Dead Center (TDC)/Crankshaft Position (CKP) Sensor
29. Back Cover
30. Camshaft Pulley
31. Key
32. Cylinder Position (CYP) Sensor
33. Rubber Seal
34. Head Cover Gasket
35. Cylinder Head Cover
36. Longer Bolt

97F11663

Fig. 9: Exploded View Of Cylinder Head
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.

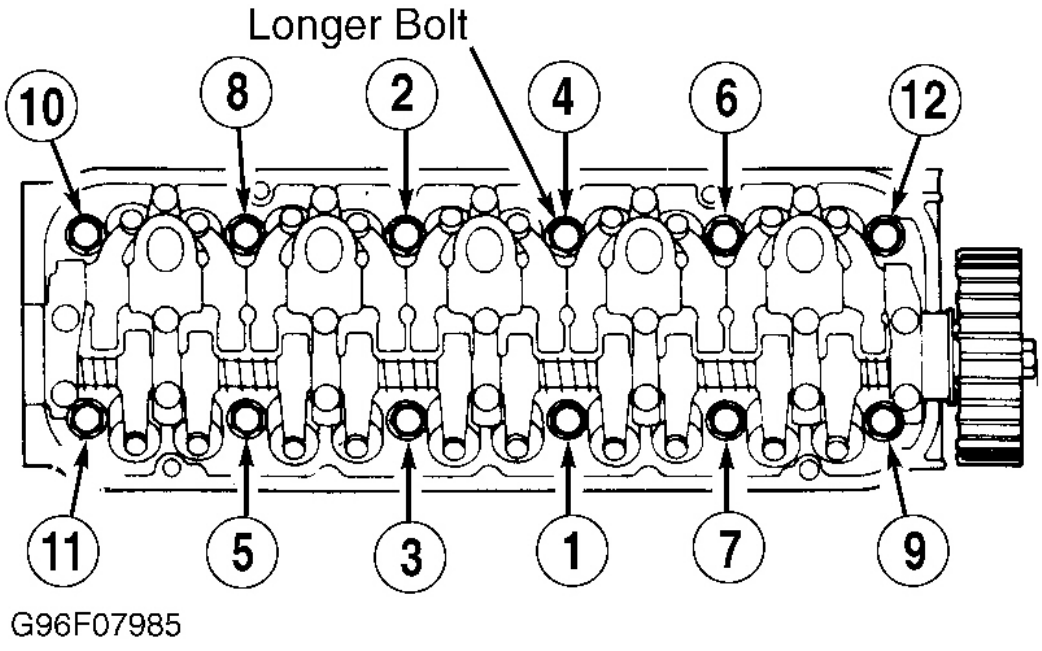
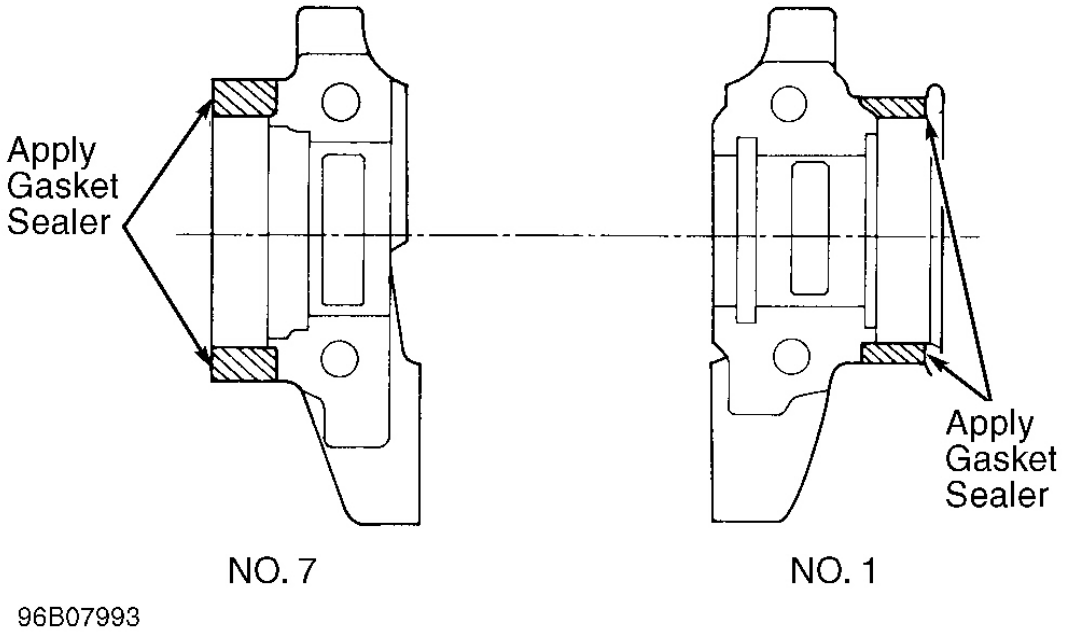


Fig. 10: Cylinder Head Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.



 © 2011 Mitchell Repair Information Company, LLC.

Fig. 11: Identifying Liquid Gasket Application Points
Courtesy of AMERICAN HONDA MOTOR CO., INC.

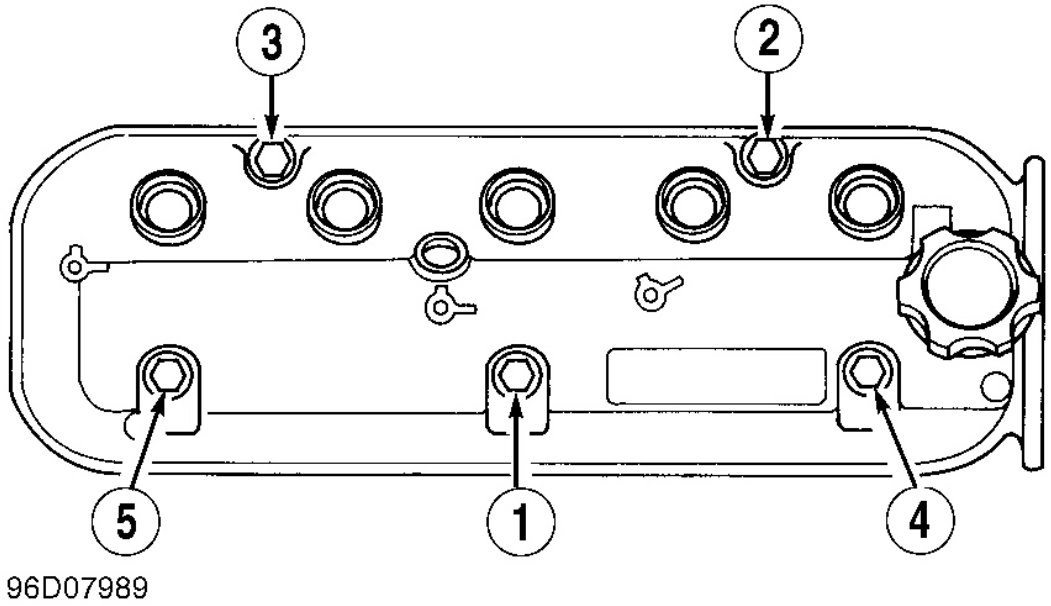


Fig. 12: Valve Cover Bolt Tightening Sequence.
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CRANKSHAFT FRONT OIL SEAL

Removal

Disconnect negative battery cable. Remove timing belt. See TIMING BELT. Remove crankshaft pulley. Remove crankshaft front oil seal.

Installation

Apply a light coating of grease to crankshaft and lip of new seal. Install front seal using Seal Driver (07LAD-PT3010A). Ensure seal is fully seated. Clean excess grease from crankshaft. Ensure oil seal lip is not distorted. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

TIMING BELT

Removal

1. Disconnect negative battery cable. Rotate crankshaft counterclockwise until No. 1 piston is at TDC of compression stroke. Loosen power steering pump belt adjusting bolt, lock nut and mounting bolt.

 © 2011 Mitchell Repair Information Company, LLC.

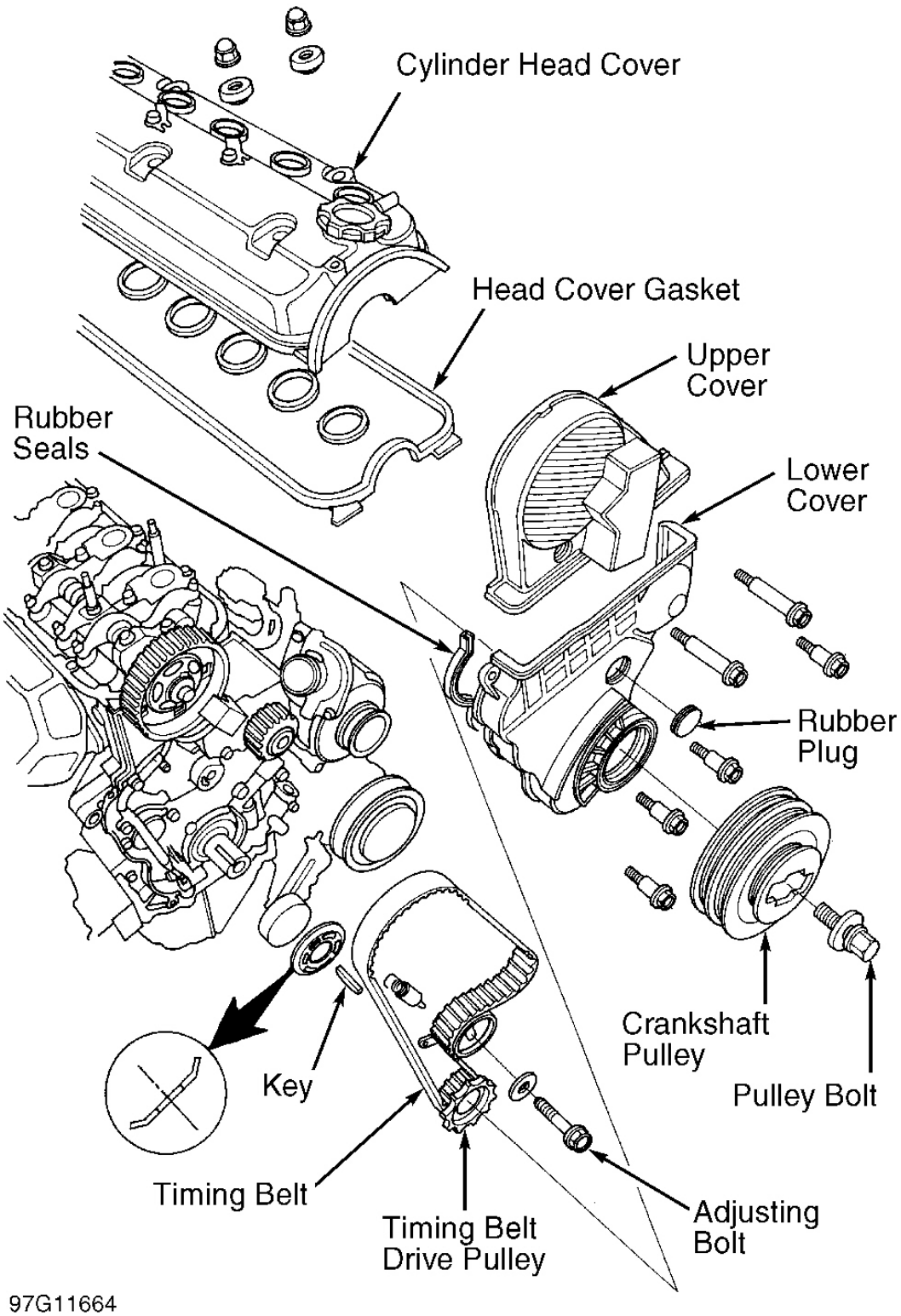
Remove power steering pump belt. Loosen idler pulley center nut and adjusting bolt. Remove A/C compressor belt. Loosen generator belt adjusting bolt, lock bolt and mounting bolt. Remove generator belt.

2. Remove crankshaft pulley. Remove dipstick and pipe. Remove valve cover. Remove upper and lower timing belt covers. See **Fig. 13**. If reusing timing belt, mark direction of belt rotation for in stallation reference. Loosen camshaft timing belt adjuster bolt 180 degrees. Push on tensioner to release belt tension, then retighten adjusting bolt. Remove timing belt.

Installation

1. To install, reverse removal procedure. Ensure No. 1 piston is at TDC of compression stroke. Position crankshaft and camshaft pulleys as shown prior to timing belt installation. See **Fig. 14**.
2. Install timing belt onto crankshaft pulley, tension adjuster pulley, water pump pulley and camshaft pulley, in that order. See **Fig. 15**. Loosen and retighten timing belt idler pulley adjusting bolt to apply tension to timing belt. Install upper and lower timing belt covers.
3. Install crankshaft pulley and rotate crankshaft 5-6 turns to properly position timing belt on pulleys. Adjust timing belt tension. See **TIMING BELT TENSION ADJUSTMENT** under ADJUSTMENTS. Rotate crankshaft counterclockwise until No. 1 piston is at TDC of compression stroke. Verify timing marks are aligned. If timing marks are not aligned, repeat timing belt installation procedure. Adjust generator belt, A/C compressor belt, and power steering pump belt tension.
4. Using Holder Handle (07JAB-001020A) and Holder Attachment (07NAB-001040A) to hold crankshaft pulley, retighten crankshaft pulley bolt to 181 ft. lbs. (245 N.m). To complete installation, reverse removal procedure.

 © 2011 Mitchell Repair Information Company, LLC.



 © 2011 Mitchell Repair Information Company, LLC.

Fig. 13: Exploded View Of Timing Belt Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.

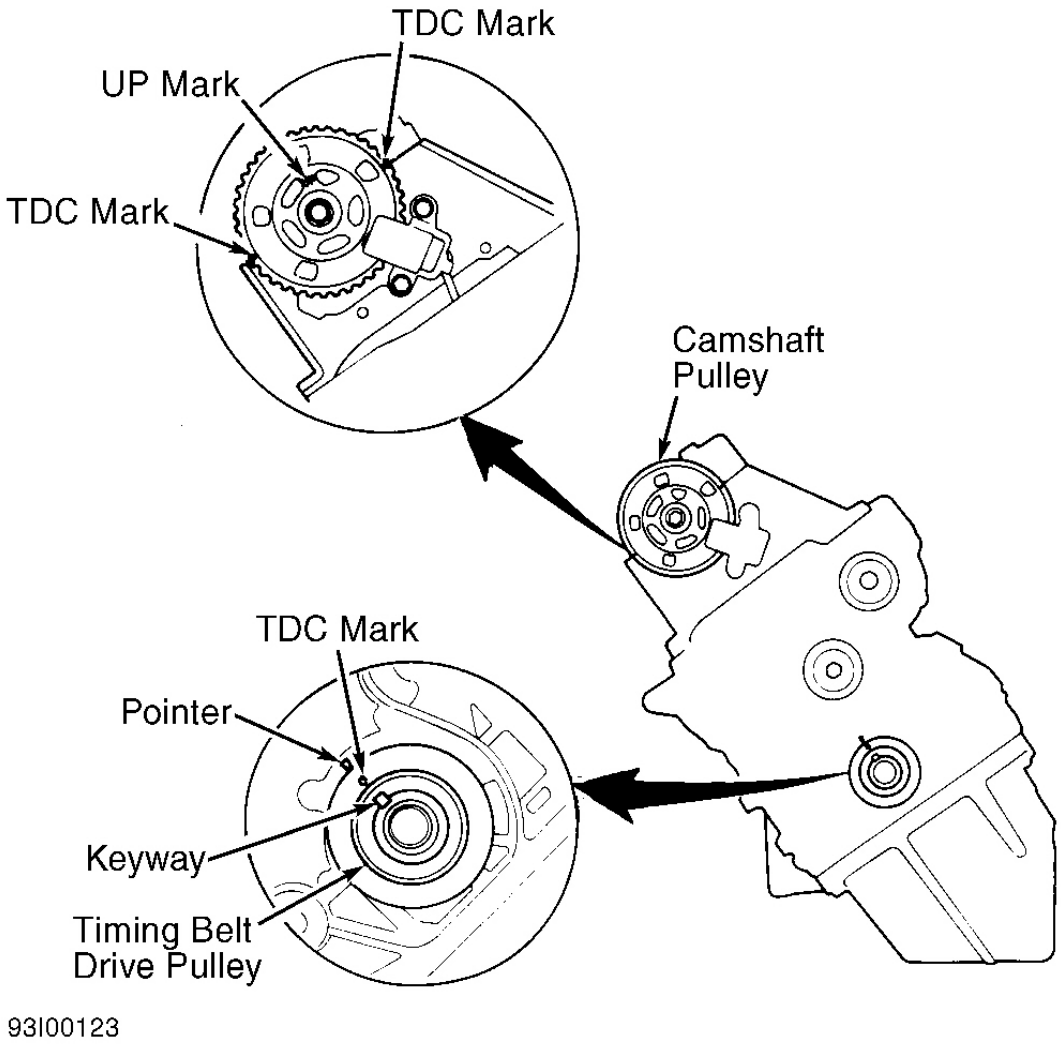


Fig. 14: Aligning Timing Marks (TDC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.

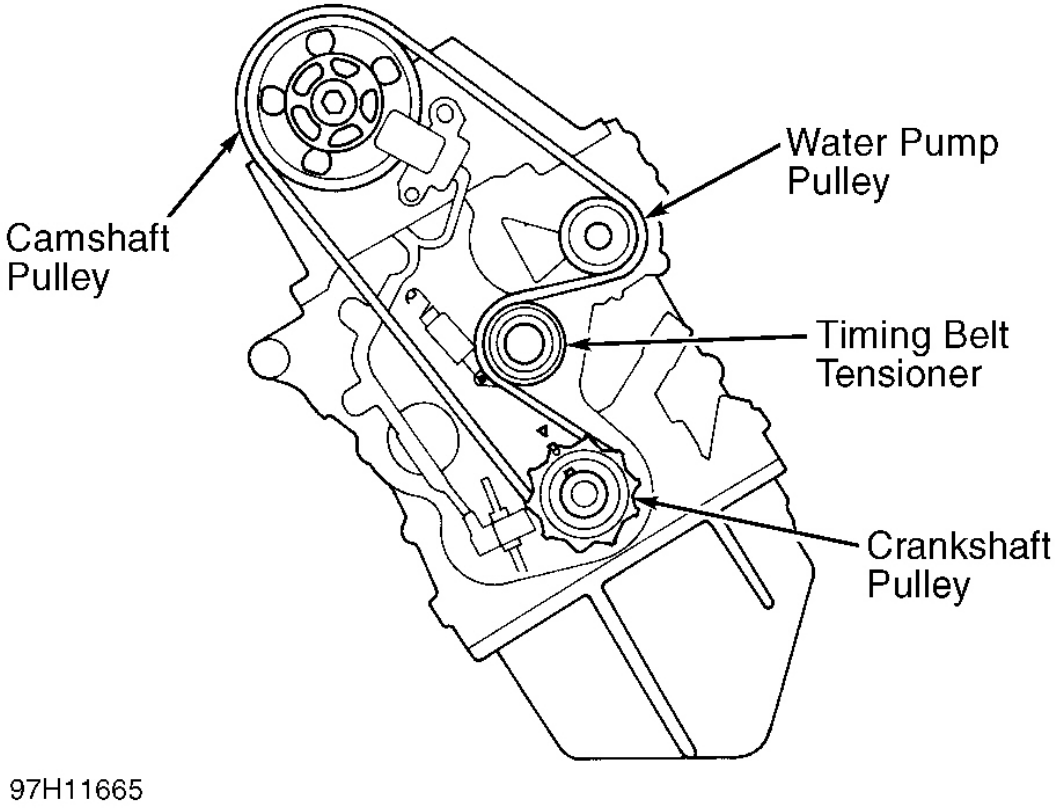


Fig. 15: Timing Belt Routing
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT & ROCKER ARMS

Removal

Remove timing belt. See **TIMING BELT**. Remove camshaft pulley, CYP sensor, back cover plate and TDC/CKP sensor. Remove valve cover. Loosen camshaft holder bolts, 2 turns at a time, in crisscross pattern. When removing rocker arm assembly, DO NOT remove camshaft holder bolts. Bolts retain camshaft holders, springs and rocker arms on shaft. Remove camshaft and oil seal.

Inspection

1. DO NOT rotate camshaft during inspection. Remove rocker arms and shafts. Place camshaft and camshaft holders on cylinder head, and tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Seat camshaft by pushing it toward distributor end of cylinder head. Zero dial indicator against end of distributor drive. Measure end play by pushing camshaft back and forth. See **CAMSHAFT** under ENGINE SPECIFICATIONS.
2. Remove bolts and camshaft holders from cylinder head. Remove camshaft from cylinder head and wipe

 © 2011 Mitchell Repair Information Company, LLC.

clean. Replace camshaft if lobes and bearing journals show excessive wear, pitting or scoring. Clean camshaft bearing surfaces in cylinder head and set camshaft back in place. Insert Plastigage across each journal. Install camshaft holders and tighten bolts. See **TORQUE SPECIFICATIONS**.

3. Measure widest portion of Plastigage on each journal. If camshaft-to-holder oil clearance is out of specification and camshaft has already been replaced, cylinder head must be replaced. If camshaft has not been replaced, place camshaft onto "V" blocks, and measure runout. See **CAMSHAFT** under ENGINE SPECIFICATIONS. If runout is within specification, replace cylinder head. If runout exceeds specification, replace camshaft and recheck. If oil clearance still exceeds specification, replace cylinder head.
4. If rocker arms must be removed from rocker shafts, note location of rocker arms for installation reference. Measure diameter of intake and exhaust rocker shafts at first rocker arm location. Measure inside diameter of rocker arm, and check for out-of-round condition. Difference between the 2 measurements is rocker arm-to-shaft clearance. Repeat procedure for all rocker arms. If clearance exceeds specification, replace rocker shaft and any over-tolerance rocker arms. Inspect rocker arm faces for wear. Replace as necessary.

Installation

1. Ensure rocker arms are assembled correctly onto rocker shaft. See **Fig. 16**. Lubricate camshaft journals and journal surfaces in caps and cylinder head. Position camshaft with keyway pointing up. Install camshaft and camshaft seal with spring facing up. Apply liquid gasket sealer to cylinder head mating surfaces of No. 1 and 7 camshaft holders. See **Fig. 11**.
2. Install rocker arm assembly, and tighten bolts finger tight. Ensure rocker arms are properly positioned onto valve stems. Tighten camshaft bearing cap bolts to specification, in sequence, 2 turns at a time. See **Fig. 17**. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

 © 2011 Mitchell Repair Information Company, LLC.

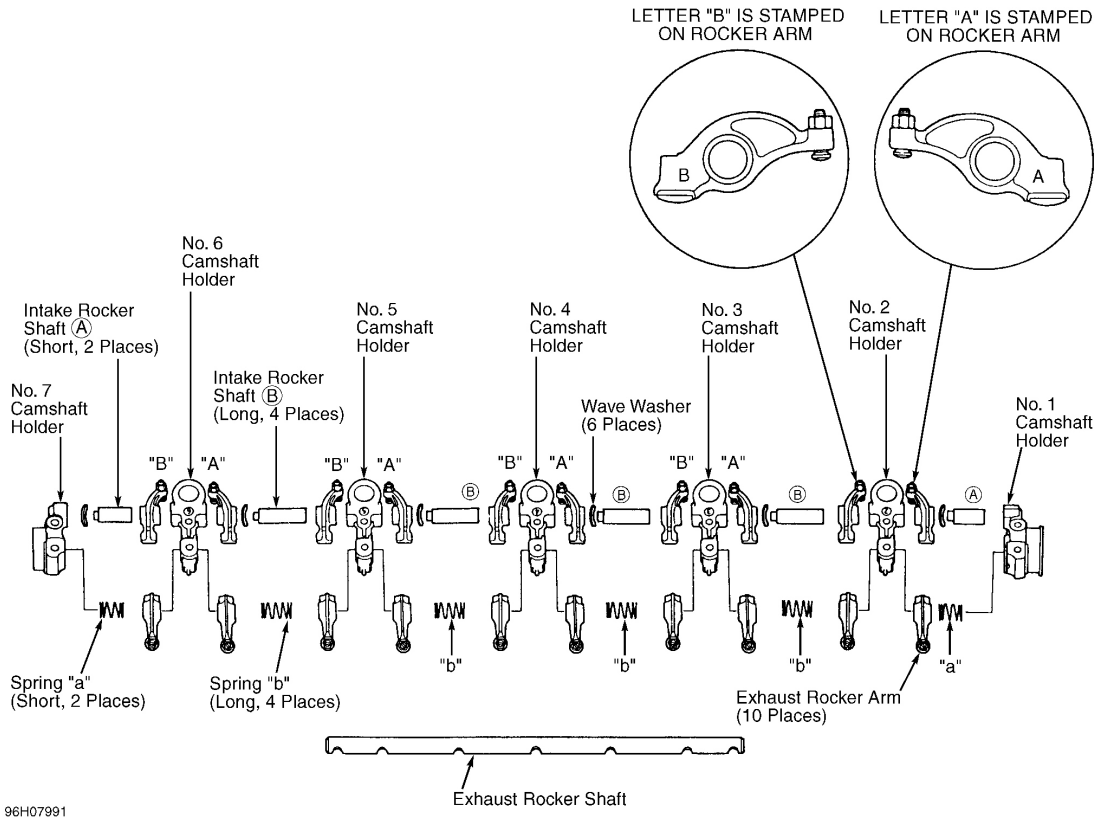


Fig. 16: Exploded View Of Rocker Arm Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.

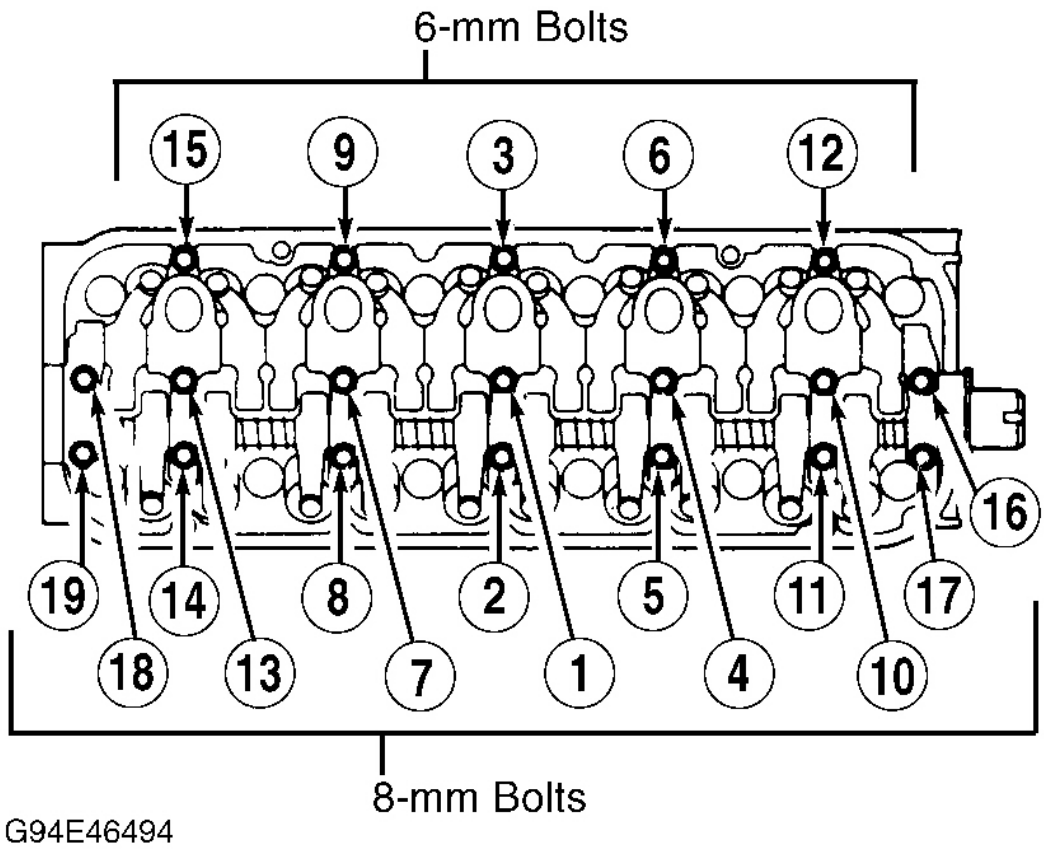


Fig. 17: Camshaft Bearing Cap Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR CRANKSHAFT OIL SEAL

Removal & Installation

1. Disconnect negative battery cable. Remove transmission. On A/T models, see TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T models, see appropriate article in CLUTCHES.
2. Remove flexplate. Pry oil seal from rear oil seal cover. If oil seal cover is removed, use non-hardening liquid gasket to seal block mating surface. Apply light coat of oil to seal lip and crankshaft.
3. Align hole in Driver Attachment (07948-SB00101) with pin on crankshaft. Using Driver (07749-0010000) and Driver Attachment (07948-SB00101), drive crankshaft oil seal into rear cover with part number facing out. Using a feeler gauge, ensure there is an equal clearance of .02-.03" (.5-.8 mm) all around between oil seal and rear cover. To complete installation, reverse removal procedure.

THERMOSTAT

 © 2011 Mitchell Repair Information Company, LLC.

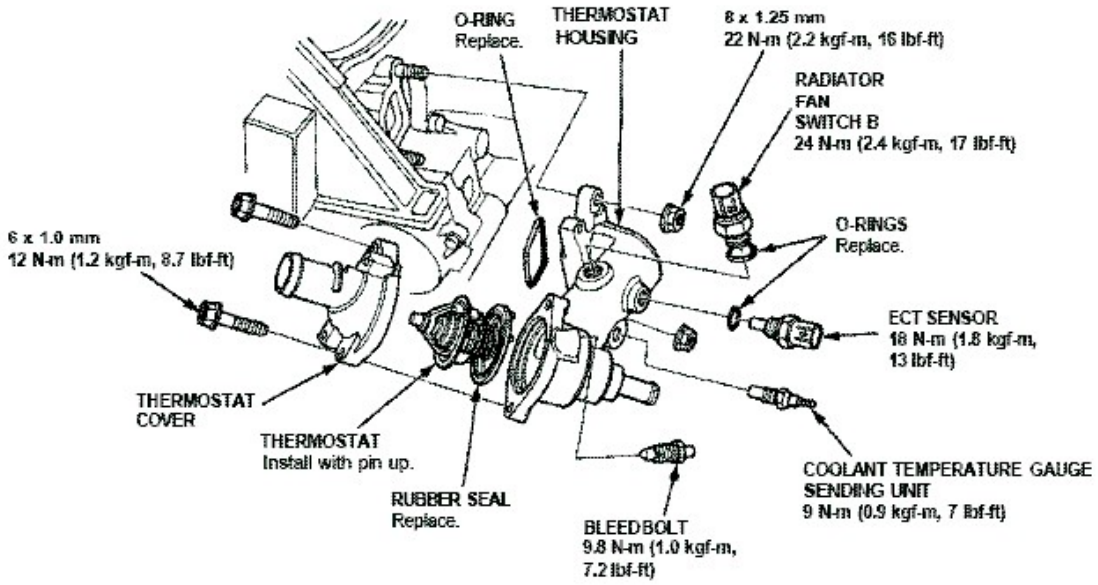


Fig. 18: Exploded View Of Thermostat
Courtesy of AMERICAN HONDA MOTOR CO., INC.

WATER PUMP

Removal & Installation

Drain cooling system. Remove timing belt. See **TIMING BELT**. Remove water pump. To install, reverse removal procedure. Replace all "O" rings. Ensure "O" ring groove and mating surfaces are clean. Fill and bleed air from cooling system. See **BLEEDING COOLING SYSTEM**.

OIL PAN

Removal

1. Disconnect negative battery cable. Drain engine coolant. Remove intake air duct. Loosen idler pulley center nut and adjusting bolt. Remove A/C compressor belt and A/C compressor. DO NOT disconnect A/C hoses.
2. Raise and support vehicle. Remove front wheels. Remove damper forks. Disconnect suspension lower arm ball joints. See appropriate SUSPENSION article. Drain engine oil and differential oil. Install drain bolts using NEW washers. DO NOT overtighten drain bolts. Attach chain hoist to engine. Remove transmission mount and mount bracket. Remove 33-mm extension shaft sealing bolt.
3. Place transmission in Park to lock secondary shaft. Disconnect extension shaft from differential using Extension Shaft Puller (07LAC-PW50101). Remove splash guard. Remove left front engine mount bracket. Remove vehicle speed sensor/power steering speed sensor. DO NOT disconnect fluid hoses. Disconnect oil cooler hose and breather hose. Remove differential mounting bolts and 26-mm shim. Remove differential assembly.
4. Remove intermediate shaft. Remove A/C compressor bracket. Remove set plate and oil pan inner pipe.

 © 2011 Mitchell Repair Information Company, LLC.

Remove oil pan and "O" rings.

Installation

1. To install, reverse removal procedure. Clean oil pan and cylinder block mating surface. Apply a continuous bead of Liquid Gasket Sealer (08718-0001) to engine block and inner threads of bolt holes. Apply liquid gasket sealer to bolt threads.
2. Coat NEW "O" rings with engine oil. Install oil pan and "O" rings. Tighten bolts in sequence as specified. See **Fig. 19**. See **TORQUE SPECIFICATIONS**. Fill or top off all fluids. Wait a minimum of 30 minutes before filling crankcase with engine oil.

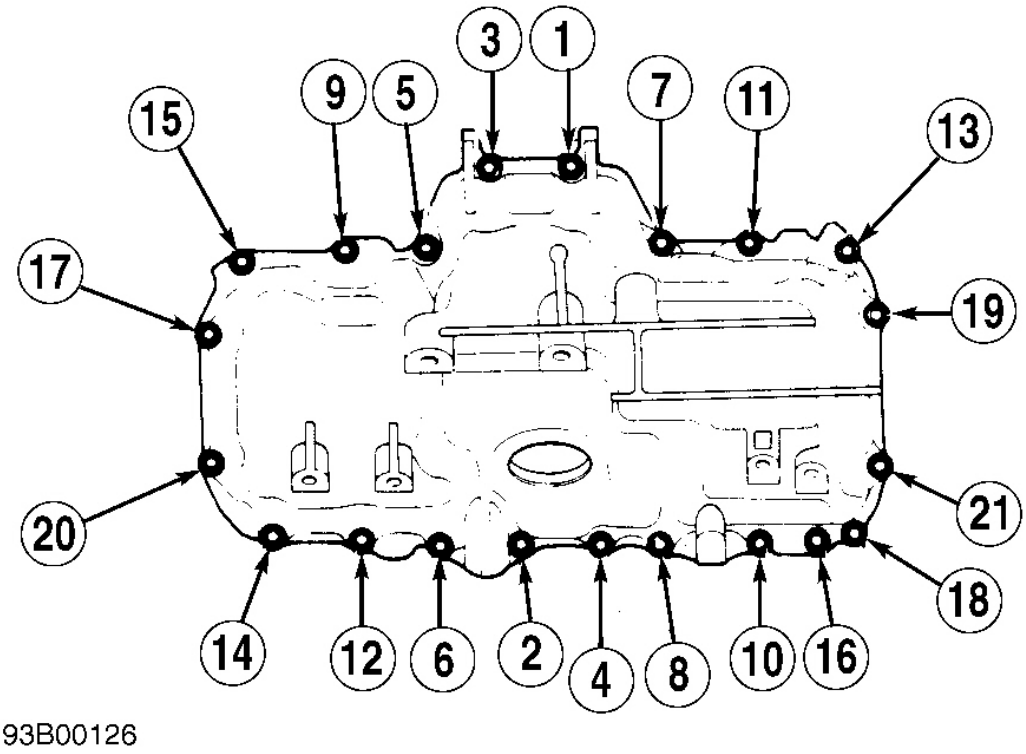


Fig. 19: Oil Pan Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OVERHAUL

CYLINDER HEAD

Cylinder Head

1. After cylinder head has been disassembled, clean mating surfaces. Check camshaft-to-holder oil clearance. Cylinder head cannot be resurfaced if oil clearance is not within specification. See

 © 2011 Mitchell Repair Information Company, LLC.

CAMSHAFT under ENGINE SPECIFICATIONS.

2. Measure cylinder head warpage. Resurface cylinder head if warpage is 0.002-0.008" (0.05-0.20 mm). If warpage is less than 0.002" (0.05 mm), resurfacing is not required. Maximum resurface limit is 0.008" (0.20 mm).

NOTE: Identify valve and valve springs as they are removed so they may be reinstalled in their original position.

Valve Springs

Using a socket and mallet, lightly tap valve retainer to loosen valve keeper. Using a valve spring compressor, remove valve keepers. Remove valve seal using valve guide seal remover. Measure free length of valve springs. If spring free length is not within specification, replace valve springs. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS. Install springs with closely wound end toward cylinder head.

Valve Stem Oil Seals

Intake and exhaust valve seals are not interchangeable. Intake valve seals have White spring around neck of seal. Exhaust valve seals have Black spring around neck of seal.

Valve Guide Inspection

1. Lift valve 0.4" (10 mm) from seat. Place dial indicator against lip (outside diameter) of valve head. Rock valve stem from side to side, and measure valve wobble.
2. If wobble exceeds 0.006" (0.16 mm) for intake valves or 0.008" (0.20 mm) for exhaust valves, install new valve and recheck. If wobble still exceeds limit, go to next step.
3. Measure Outside Diameter (O.D.) of valve stem and Inside Diameter (I.D.) of valve guide, in 3 places. Difference between valve stem O.D. and valve guide I.D. is stem-to-guide oil clearance. Subtract smallest measured valve stem O.D. from largest measured valve guide I.D. If difference exceeds service limit, replace valve and valve guide. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.

CAUTION: DO NOT heat cylinder head with a torch, as head may warp. DO NOT heat cylinder head to more than 300°F (150°C). This may loosen valve seats.

Valve Guide Replacement

1. Use an air hammer and Valve Guide Driver (07742-0010100) to remove and install valve guides. See **Fig. 20**. Chill replacement guides in a freezer for about an hour. Use a hot plate or oven to heat cylinder head evenly to 300°F (150°C).

CAUTION: Drill guides only in extreme cases. Cylinder head damage can occur if valve guide breaks.

2. Working from camshaft side, drive valve guide about 5/64" (2 mm) toward combustion chamber to dislodge carbon and make removal easier. Turn cylinder head over, and drive valve guide out toward

 © 2011 Mitchell Repair Information Company, LLC.

camshaft side. If guide does not move, drill guide with 5/16" drill, and then try again.

3. Individually remove new guides, as needed, from freezer. Coat outside of new valve guide with a thin coat of engine oil. Using Valve Guide Driver (07742-0010100), install valve guide into heated cylinder head. Install guides from camshaft side of head. Intake valve guide installed height should be 0.974-0.994" (24.75-25.25 mm). Exhaust valve guide installed height should be 0.632-0.652" (16.05-16.55 mm).
4. If replacing all valve guides, reheat cylinder head as necessary. Using cutting oil, ream new valve guides by rotating Valve Guide Reamer (07HAH-PJ7010B) clockwise the full length of valve guide bore.
5. Continue rotating reamer clockwise while removing it from bore. Thoroughly wash guide in detergent and water to remove any cutting residue. Check valve stem-to-guide oil clearance. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.

NOTE: Always reface valve seat after replacing valve guide.

Valve Seat

Valve seat replacement procedure is not available from manufacturer.

Valves

Measure valve stem diameter and margin. Replace valve if not within specifications. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS.

Valve Stem Installed Height

1. Insert valve into cylinder head. Holding valve closed, measure valve stem installed height from base of valve guide to tip of valve stem. See **Fig. 21**.
2. If valve stem installed height is not within specification, replace valve and re-measure. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS. If installed height is still not within specification, valve seat is too deep. Replace cylinder head.

Valve Seat Correction Angle

1. Using a valve seat cutter, carefully cut a 45 degree seat, removing only enough material to ensure a smooth and concentric seat. Bevel upper edge of seat with 30-degree cutter and lower edge of seat with 60-degree cutter. Check width of seat and adjust accordingly. Make one more pass using 45-degree cutter lightly to remove burrs caused by other cutters. Verify seat width is within tolerance. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.
2. After resurfacing valve seat, inspect for even valve seating. Apply Prussian Blue compound to valve face. Insert valve in its original location in head. Lift valve and snap closed against seat several times. Actual valve seating will be indicated by location of compound on seat. If valve seating is too high, make a second cut with 60-degree cutter. If valve seating is too low, make a second cut with 30-degree cutter. After either cutter is used, make final cut using 45-degree cutter to restore seat width.

 © 2011 Mitchell Repair Information Company, LLC.

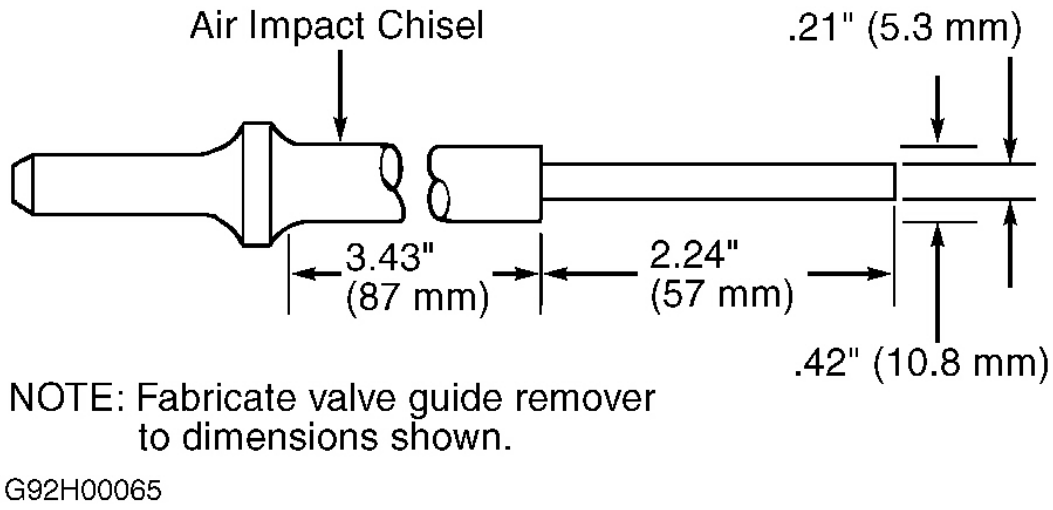


Fig. 20: Fabricating Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.

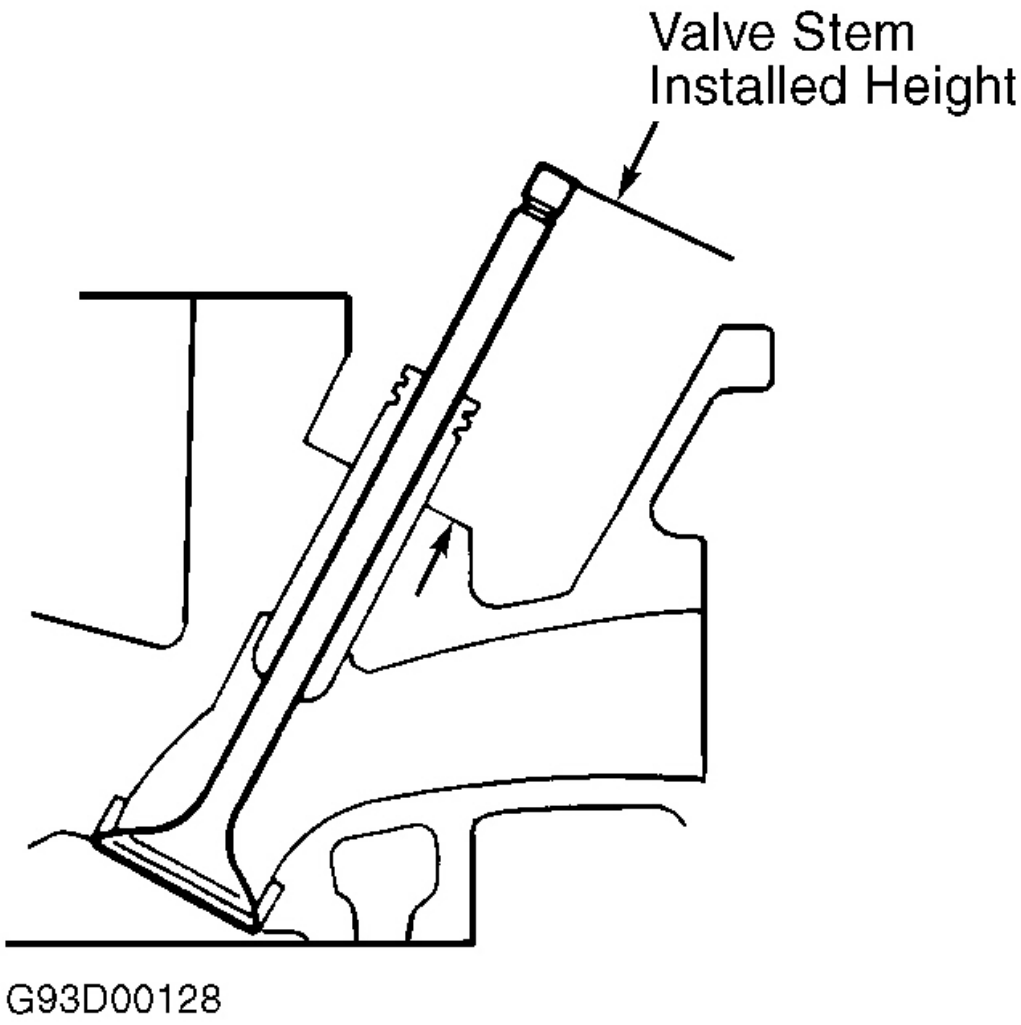


Fig. 21: Measuring Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1. Connecting rods are available in 4 tolerance ranges. Rod size depends on crank journal bore. A reference number between 1 and 4 is stamped on side of rod's big end bore. Any combination of numbers between 1 and 4 may be found in engine.

NOTE: Reference numbers are for big end bore code. Numbers DO NOT indicate rod position in engine.

© 2011 Mitchell Repair Information Company, LLC.

2. Nominal connecting rod's big end bore is 1.89" (48 mm). Install piston and connecting rod with arrow on top of piston, toward front of engine, and connecting rod oil hole toward intake manifold. See **Fig. 22**.

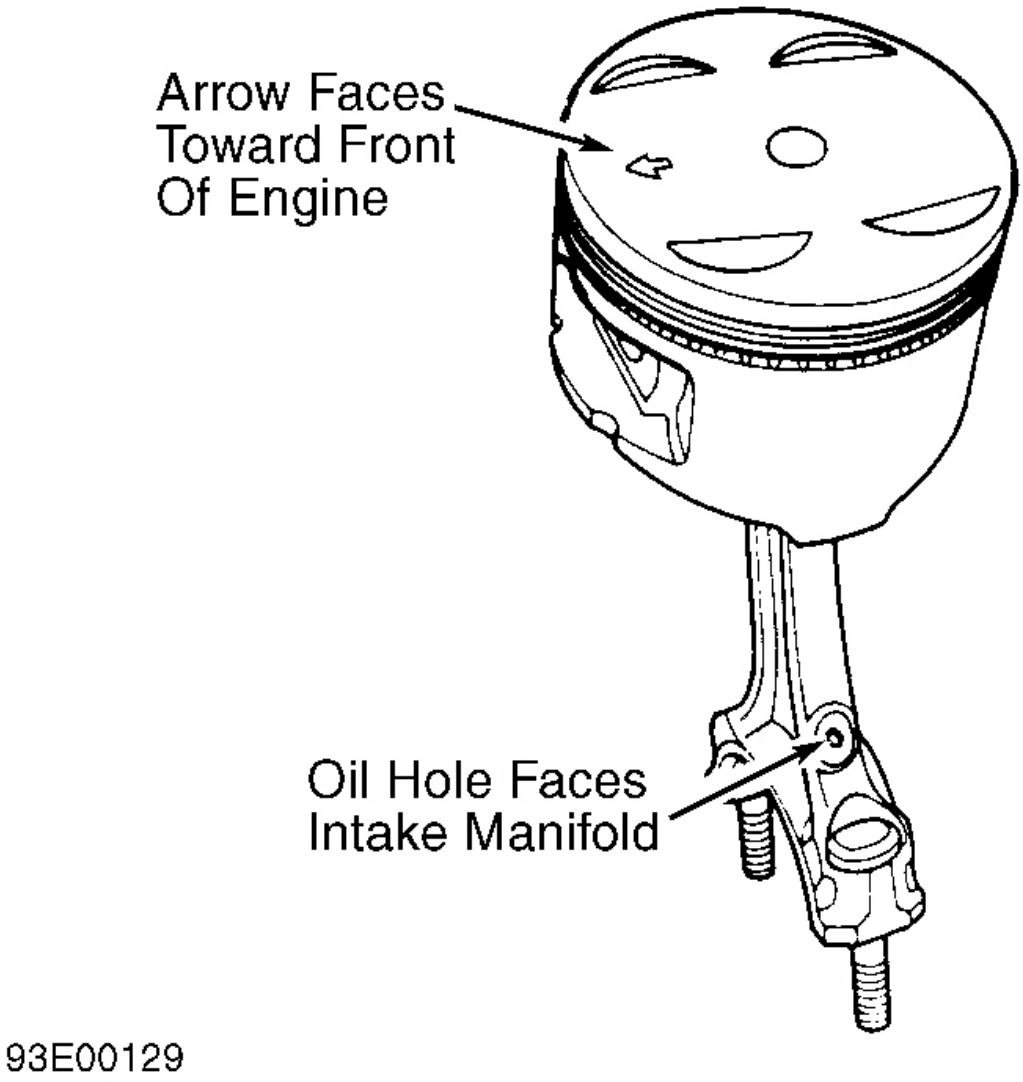


Fig. 22: Positioning Piston Onto Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Piston Pin Removal

1. Use a hydraulic press for piston pin removal. Install Piston Base Head (07HAF-PL20102), Piston Base Spring (07973-6570600), and Piston Pin Base Insert (07GAF-PH60300) into Piston Base (07973-6570500). See **Fig. 23**. Adjust Piston Pin Driver Head (07973-PE00320) so piston driver length is

 © 2011 Mitchell Repair Information Company, LLC.

2.03" (51.5 mm).

2. Insert Piston Pin Driver Shaft (07973-PE00310) into Pilot Collar (07GAF-PH70100). Position piston onto base with embossed mark facing up. Align recessed part of piston with lips on collar. Press out piston pin.

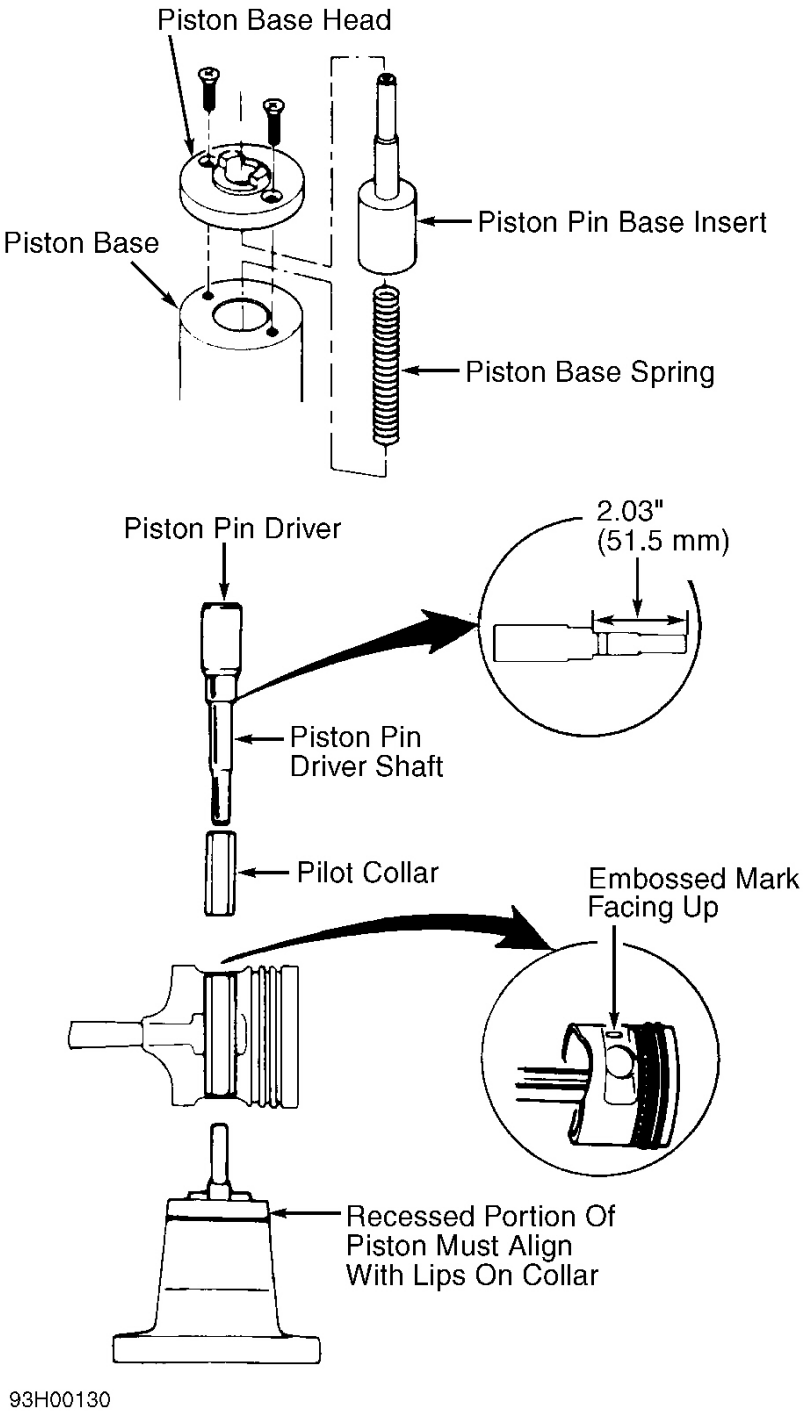


Fig. 23: Removing & Installing Piston Pin

 © 2011 Mitchell Repair Information Company, LLC.

Courtesy of AMERICAN HONDA MOTOR CO., INC.

NOTE: All replacement piston pins are oversize.

Piston Pin Inspection

1. Check piston for cracks or distortion. Measure diameter of piston pin. Zero dial indicator to piston pin diameter. Measure piston pin bore in piston. Difference between the 2 measurements is pin-to-piston clearance.
2. Ensure clearance is 0.0005-0.0009" (0.012-0.024 mm). If clearance is greater than 0.0009" (0.024 mm), install an oversize piston pin and recheck clearance.
3. Measure difference between piston pin diameter and connecting rod's small end bore. Interference fit between piston pin and connecting rod should be 0.0005-0.0013" (0.013-0.032 mm).

Piston Pin Installation

1. Use a hydraulic press for piston pin installation. Adjust Piston Pin Driver Head (07973-PE00320) so piston driver length is 2.03" (51.5 mm). See **Fig. 23**.
2. Install Pilot Collar (07GAF-PH70100) into piston and connecting rod. Lightly lubricate new piston pin. Position piston onto base with embossed mark facing up. Align recessed part of piston with lips on collar. Press in piston pin.

Fitting Pistons

1. Using a feeler gauge, measure clearance between piston and cylinder bore. If clearance exceeds 0.002" (0.05 mm), recheck piston clearance by measuring diameter of each piston and cylinder bore.
2. Clean piston thoroughly and inspect for distortion and cracks. Measure piston diameter 0.83" (21 mm) from bottom of piston skirt. Replace piston if diameter is not within specification. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS.
3. Standard size pistons have no marking or are stamped with letter "A" or "B" on piston top. Cylinder block bore size is determined by no marking or letter "A" or "B" stamped on cylinder block. Identification letters on block read from front cylinder to rear cylinder. To maintain proper clearance, ensure letters on cylinder block and piston match.
4. Subtract piston diameter from cylinder bore diameter to obtain piston clearance. If clearance exceeds service limit, re-bore cylinder and install oversize piston. See **PISTONS, PINS & RINGS**. See CYLINDER BLOCK. Pistons are available in 0.010" (0.25 mm) and 0.020" (0.50 mm) oversize.

Piston Rings

1. Using inverted piston, push NEW piston ring into cylinder bore 0.6-0.8" (15-20 mm) from bottom. Using a feeler gauge, measure ring end gap. If gap is too large, check cylinder bore diameter and re-bore if necessary. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS. If gap is too small, check if ring size is correct.
2. Clean piston ring grooves thoroughly. Install rings onto piston with identification mark toward top of piston. Using a feeler gauge, measure side clearance between ring and ring groove.
3. If ring grooves are excessively worn, replace piston. See **PISTONS, PINS & RINGS**. Ensure piston ring

© 2011 Mitchell Repair Information Company, LLC.

end gaps are properly spaced around piston. See **Fig. 24**.

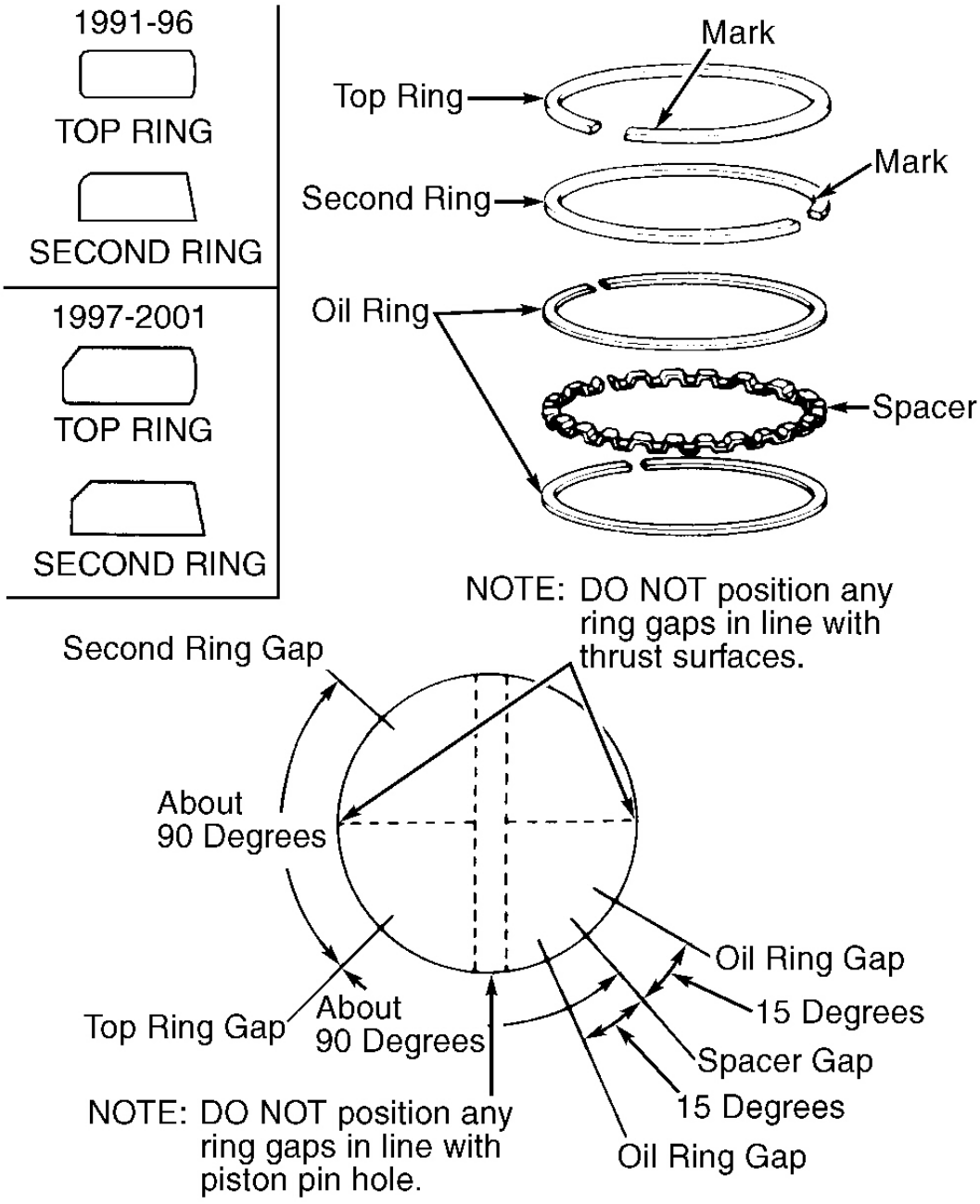


Fig. 24: Installing Piston Rings
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Rod Bearings

 © 2011 Mitchell Repair Information Company, LLC.

1. Measure oil clearance using Plastigage. Tighten bearing cap to 24 ft. lbs. (32 N.m). If oil clearance is not within specification, install a new bearing set (same color code) and recheck oil clearance. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under **ENGINE SPECIFICATIONS**. DO NOT shim or file cap to adjust oil clearance.
2. If oil clearance is still incorrect, try next larger or smaller bearing and measure oil clearance again. If proper oil clearance cannot be obtained using different size bearings, replace crankshaft and repeat procedure.

NOTE: A number code, indicating connecting bore, is stamped on side of each connecting rod and cap. Connecting rod journal diameter codes (letters) are stamped on front crankshaft counterweight pad. See Fig. 25. Use both codes when ordering replacement bearings.

© 2011 Mitchell Repair Information Company, LLC.

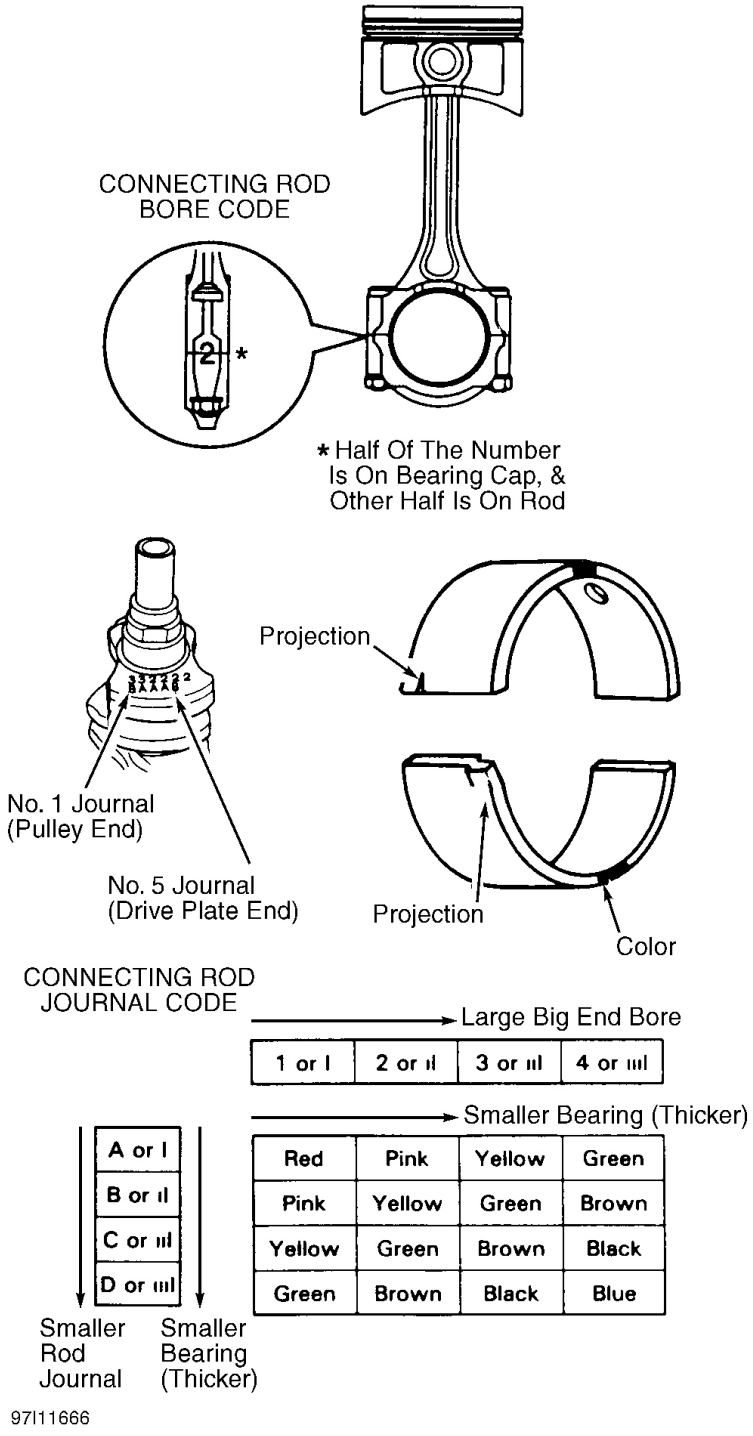


Fig. 25: Identifying Connecting Rod Journal & Bearing Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Crankshaft & Main Bearings

 © 2011 Mitchell Repair Information Company, LLC.

1. Mark connecting rod and main bearing caps for identification. Remove all connecting rod caps and bearings. Remove main bearing caps and bearing halves. Lift crankshaft from block, being careful not to damage journals.
2. Using a lathe or "V" blocks to support crankshaft, measure crankshaft runout, out-of-round, and taper. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS. If any measurement exceeds service limit, replace crankshaft.
3. Install crankshaft into block. Measure main bearing oil clearance using Plastigage. If engine is in vehicle, support counterweights and measure only one bearing at a time. Tighten main bearing cap bolts in sequence to specification. See **Fig. 26**. See **TORQUE SPECIFICATIONS**.
4. If oil clearance is not within specification, install a new bearing set (same color code) and re-measure oil clearance. DO NOT file or shim bearing to adjust clearance. If oil clearance is still incorrect, try next larger or smaller bearing. If specified oil clearance cannot be obtained by using different size bearings, replace crankshaft and repeat procedure.

NOTE: A letter code, indicating main journal bore diameters, is stamped on cylinder block. Main journal diameter codes (numbers) are stamped on front crankshaft counterweight pad. See Fig. 27. Use both codes when ordering replacement bearings.

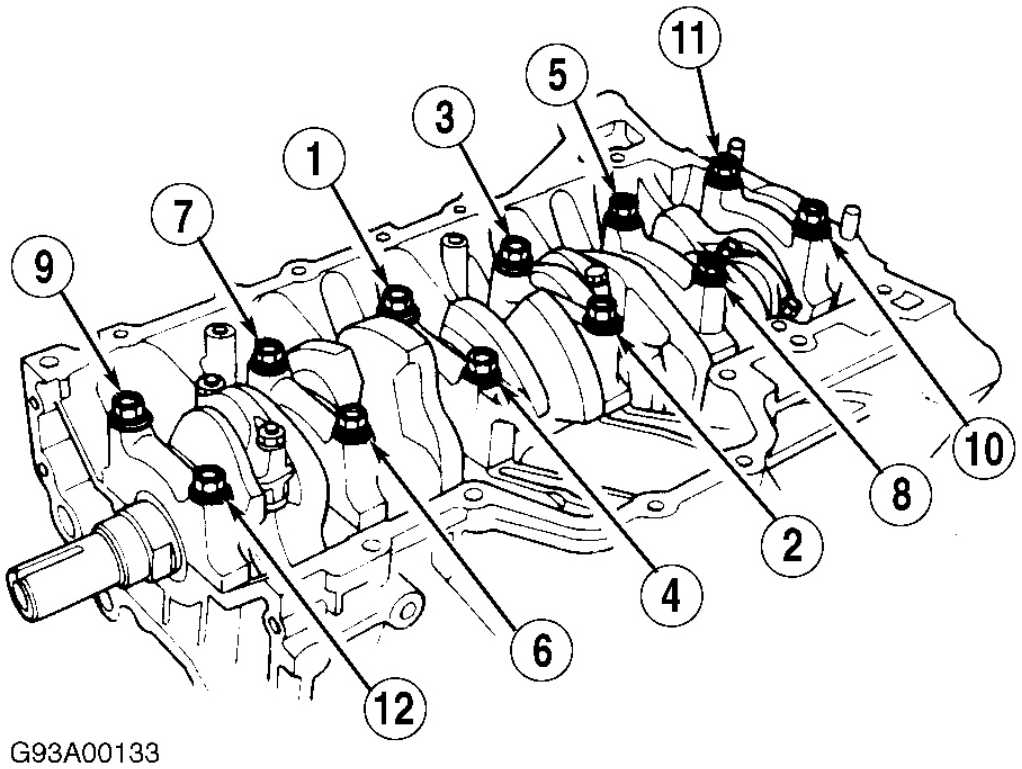


Fig. 26: Main Bearing Cap Bolt Tightening Sequence

 © 2011 Mitchell Repair Information Company, LLC.

Courtesy of AMERICAN HONDA MOTOR CO., INC.

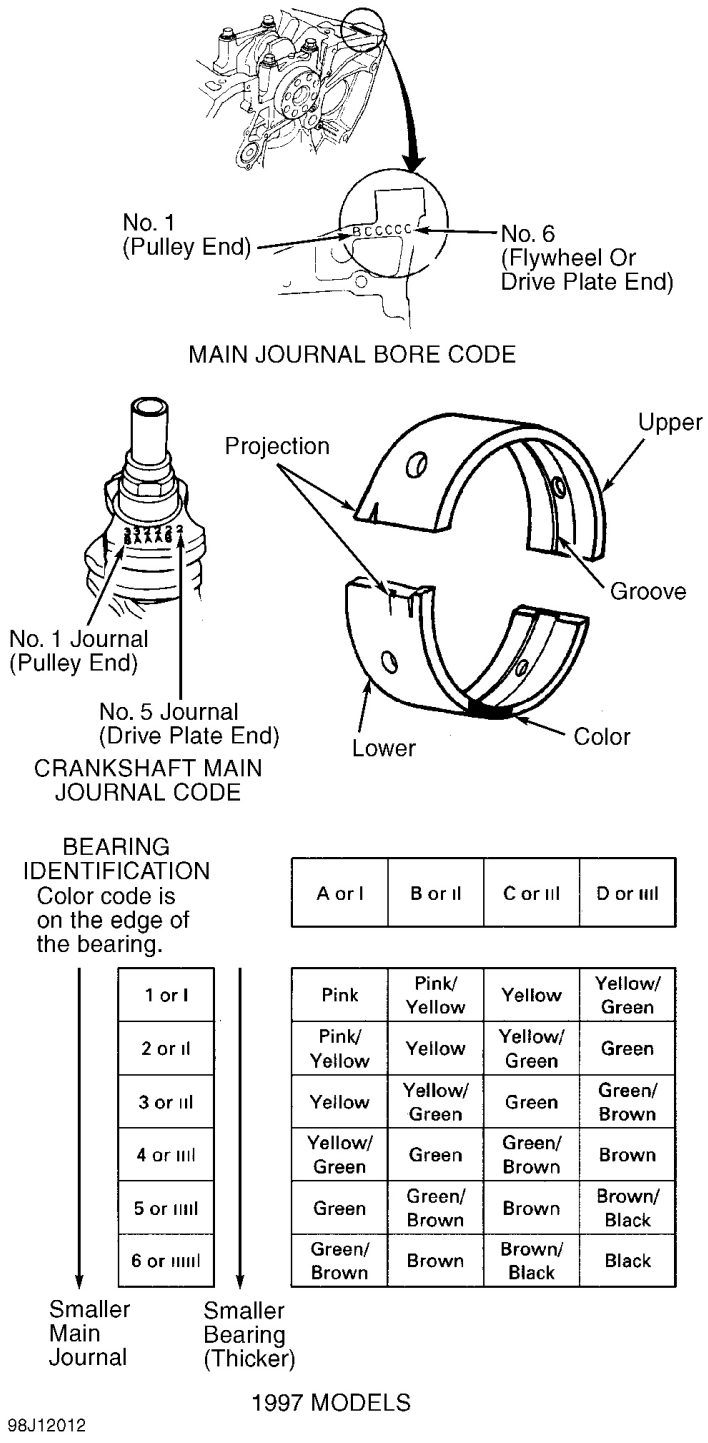


Fig. 27: Identifying Crankshaft Main Journal & Bearing Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

 © 2011 Mitchell Repair Information Company, LLC.

Thrust Bearing

1. Measure crankshaft end play with a dial indicator. If end play exceeds specification, inspect thrust washers and thrust surface of crankshaft. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS. Crankshaft thrust washers are located at No. 4 main bearing journal.
2. Replace worn parts as necessary. Thrust washer thickness is fixed. DO NOT change thrust washer thickness by grinding or shimming. Install thrust washers with grooved side facing out.

Cylinder Block

1. Measure cylinder bore taper. If taper exceeds specification, re-bore cylinder for oversize pistons. See **CYLINDER BLOCK** under ENGINE SPECIFICATIONS. If any cylinder bore exceeds oversize bore limit, replace cylinder block.
2. Cylinders can be bored for 0.010" (0.25 mm) and 0.020" (0.50 mm) oversize. Maximum re-boring is 0.020" (0.50 mm). Check piston-to-cylinder bore clearance after re-boring. See FITTING PISTONS procedure.
3. Using feeler gauge and straightedge, measure cylinder block deck warpage. Replace cylinder block if warped beyond service limit. See **CYLINDER BLOCK** under ENGINE SPECIFICATIONS.
4. If reusing cylinder block, hone cylinders to 60-degree crosshatch pattern. After honing, re-measure cylinder bores. Wash cylinder bore with hot soapy water. Air-dry cylinder bore, and apply engine oil to prevent rusting.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

Oil pump draws oil from oil pan and delivers it under pressure to main and connecting rod bearings. An oil hole in each connecting rod supplies oil to thrust side of piston and cylinder wall. An oil passage carries oil to camshaft and rocker arms. Oil spray lubricates valve stems.

Oil Pressure

Minimum oil pressure with engine at idle should be 10 psi (0.7 kg/cm^2). Minimum oil pressure at 3000 RPM should be 50 psi (3.5 kg/cm^2).

OIL PUMP

Removal & Disassembly

1. Raise and support vehicle. Drain engine oil and differential oil. Rotate crankshaft clockwise until No. 1 piston is at TDC of compression stroke. Remove timing belt. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove oil pan. See **OIL PAN** under REMOVAL & INSTALLATION.
2. Remove oil screen and remove oil pump. See **Fig. 28**. Remove screen screws from oil pump housing. Separate pump cover from pump housing. Using a screwdriver, pry oil seal from oil pump housing.

 © 2011 Mitchell Repair Information Company, LLC.

Inspection

Measure inner-to-outer rotor clearance. Measure housing-to-rotor axial clearance. Measure housing-to-outer rotor clearance. Replace components if not within specification. See **OIL PUMP SPECIFICATIONS**. Inspect both rotors and pump housing for scoring or other damage and replace if necessary.

 © 2011 Mitchell Repair Information Company, LLC.

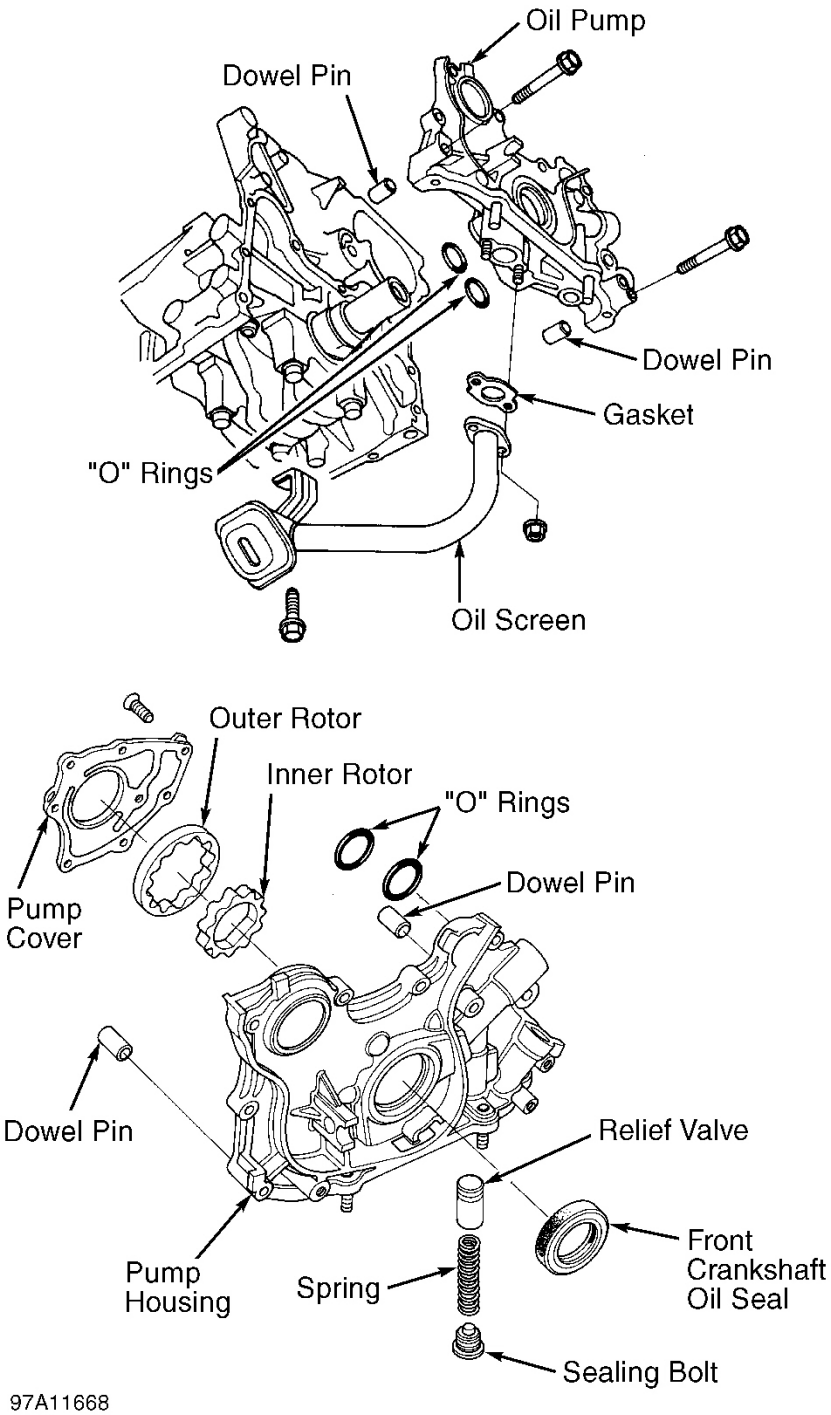


Fig. 28: Exploded View Of Oil Pump Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP SPECIFICATIONS

 © 2011 Mitchell Repair Information Company, LLC.

Application	In. (mm)
Inner Rotor-To-Outer Rotor Clearance	
Standard (New)	0.001-0.006 (0.02-0.16)
Service Limit	0.008 (0.20)
Housing-To-Rotor Axial Clearance	
Standard (New)	0.001-0.003 (0.02-0.07)
Service Limit	0.005 (0.12)
Housing-To-Outer Rotor Clearance	
Standard (New)	0.004-0.007 (0.10-0.18)
Service Limit	0.008 (0.20)

Reassembly & Installation

1. Lightly coat crankshaft and lip of NEW seal with engine oil. Using Seal Driver (07LAD-PT3010A), install oil seal. Ensure seal is fully seated into oil pump housing.
2. Reassemble oil pump. Apply Liquid Gasket Sealer (08718-0001) to pump housing screws. Ensure oil pump turns freely. Install dowel pins and NEW "O" rings into cylinder block. Clean oil pump and engine mating surfaces.
3. Apply liquid gasket sealer oil pump and cylinder block mating surface. Apply sealer to bolt hole threads. Install oil pump before sealant dries. Install oil pan. See **OIL PAN** under REMOVAL & INSTALLATION. Install timing belt. See **TIMING BELT** under REMOVAL & INSTALLATION. Wait at least 30 minutes before filling crankcase with oil. To complete installation, reverse removal procedure.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Compressor Mounting Bolts	16 (22)
A/C Compressor Bracket Bolts	36 (49)
Camshaft Bearing Cap Bolts (1)	
6-mm Bolts	(2)
8-mm Bolts	16 (22)
Camshaft Pulley Bolts	51 (69)
Connecting Rod Cap Nuts	24 (32)
Crankshaft Pulley Bolt	181 (245)
Cylinder Head Bolts (3)	
First Step	29 (39)
Second Step	51 (69)
Third Step	72 (98)
Differential-To-Oil Pan Bolts	47 (64)
Distributor Mounting Bolt	13 (18)

© 2011 Mitchell Repair Information Company, LLC.

Engine Block-To-Transmission	
Housing Bolts	47 (64)
Engine Mounts	(4)
Exhaust Manifold	
Self-Locking Nuts	23 (31)
Shroud Bolts	16 (22)
Exhaust Pipe Flange Nuts	40 (54)
Flexplate Bolts (5)	54 (74)
Generator	
Lock Bolt	16 (22)
Mounting Bolt	33 (44)
Idler Pulley Center Nut	33 (44)
Intake Manifold Bolts/Nuts	16 (22)
Main Bearing Cap Bolts (6)	
First Step	22 (29)
Second Step	54 (74)
Oil Pan Bolts (7)	16 (22)
Oil Pump Housing Bolts	
6-mm Bolts	(2)
8-mm Bolts	16 (22)
Power Steering Pump	
Lock Nut	16 (22)
Mounting Bolt	36 (49)
Timing Belt Tension Adjuster Bolt	33 (44)
Transmission Mount	(4)
	INCH Lbs. (N.m)
Crankshaft Rear Seal Cover Bolts	106 (12)
Cylinder Head Cover Nuts	106 (12)
Fuel Filter Service Bolt	106 (12)
Oil Pump Screen Nuts	106 (12)
Timing Belt Cover Bolts	106 (12)
Valve Cover Nuts	106 (12)
Water Pump Bolts	106 (12)

(1) Tighten bolts 2 turns at a time in sequence. See **Fig. 17**.

(2) Tighten to 106 INCH lbs. (12 N.m).

(3) Tighten in sequence, in 2 or 3 steps. See **Fig. 10**.

(4) Tighten in sequence to specification. See **Fig. 5**.

(5) Tighten in a crisscross pattern.

© 2011 Mitchell Repair Information Company, LLC.

(6) Tighten in sequence. See **Fig. 26**.

(7) Tighten in sequence. See **Fig. 19**.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification
Displacement	152 Cu. In. (2.5L)
Bore	3.35" (85.0 mm)
Stroke	3.40" (86.4 mm)
Compression Ratio	9.6:1
Fuel System	PGM-FI
Horsepower @ RPM	176 @ 6300
Torque Ft. Lbs. @ RPM	170 @ 3900

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
Crankshaft	
End Play	
Standard	0.004-0.014 (0.10-0.35)
Service Limit	0.018 (0.46)
Journal Out-Of-Round	
Standard	0.0002 (0.005)
Service Limit	0.0004 (0.010)
Journal Taper	
Standard	0.0002 (0.005)
Service Limit	0.0004 (0.010)
Runout	
Standard	0.001 (0.03)
Service Limit	0.002 (0.05)
Main Bearings	
Journal Diameter	2.1644-2.1654 (54.976-55.000)
Oil Clearance	
Standard	0.0007-0.0019 (0.018-0.048)
Service Limit	0.0021 (0.053)
Connecting Rod Bearings	
Journal Diameter	1.7707-1.7717 (44.976-45.000)
Oil Clearance	
Standard	0.0006-0.0017 (0.015-0.043)

© 2011 Mitchell Repair Information Company, LLC.

Service Limit	0.002 (0.05)

CONNECTING RODS

CONNECTING RODS

Application	In. (mm)
Bore Diameter	
Crank Pin Bore	1.89 (48.00)
Rod Pin Bore	0.8649-0.8654 (21-968-21-981)
End Play	
Standard	0.006-0.012 (0.15-0.30)
Service Limit	0.016 (0.40)

PISTONS, PINS & RINGS

PISTONS, PINS & RINGS

Application	In. (mm)
Pistons	
Clearance	
Standard	0.0004-0.0016 (0.01-0.04)
Service Limit	0.002 (0.05)
Diameter	
Standard (1)	
"A" Or No Marking Piston	3.3457-3.3461 (84.980-84.990)
Service Limit	3.3453 (84.970)
"B" Piston	3.3453-3.3457 (84.970-84.980)
Service Limit	3.3449 (84.960)
Oversize	
.010" (0.25 mm)	3.3555-3.3559 (85.230-85.240)
.020" (0.50 mm)	3.3653-3.3657 (85.480-85.490)
Piston Pins	
Diameter	
Standard	0.8659-0.8661 (21.994-22.000)
Oversize	0.8660-0.8663 (21.997-22.003)
Pin-To-Piston Clearance	0.0005-0.0009 (0.013-0.024)
Rod Interference Fit	0.0005-0.0013 (0.013-0.032)
Rings	

© 2011 Mitchell Repair Information Company, LLC.

No. 1	
End Gap	
Standard	0.008-0.012 (0.20-0.30)
Service Limit	0.020 (0.50)
Side Clearance	0.0018-0.0028 (0.045-0.070)
Service Limit	0.006 (0.14)
No. 2	
End Gap	
Standard	0.014-0.020 (0.35-0.50)
Service Limit	0.026 (0.65)
Side Clearance	0.0012-0.022 (0.030-0.055)
Service Limit	0.005 (0.13)
No. 3 (Oil)	
End Gap	
Standard	0.008-0.028 (0.20-0.70)
Service Limit	0.031 (0.80)
(1) Piston identification is located on top of piston.	

CYLINDER BLOCK

CYLINDER BLOCK

Application	**In. (mm)**
Cylinder Bore	
Standard (1)	
"A"	3.3468-3.3472 (85.010-85.020)
Service Limit	3.3492 (85.070)
"B"	3.3465-3.3468 (85.000-85.010)
Service Limit	3.3492 (85.070)
Oversize	
.010" (0.25 mm)	3.3563-3.3571 (85.250-85.270)
.020" (0.50 mm)	3.3661-3.3669 (85.500-85.520)
Maximum Taper	0.002 (0.05)
Maximum Re-Bore Limit	0.02 (0.5)
Deck Warpage	
Standard	0.003 (0.08)
Service Limit	0.004 (0.10)
(1) Cylinder bore identification letter is located on top of cylinder.	

© 2011 Mitchell Repair Information Company, LLC.

VALVES & VALVE SPRINGS

VALVES & VALVE SPRINGS

Application	Specification
Intake Valves	
Face Angle	45°
Head Diameter	1.33-1.34" (33.9-34.1 mm)
Margin	
Standard	0.033-045" (0.85-1.15 mm)
Service Limit	0.026" (0.65 mm)
Stem Diameter	
Standard	0.2156-0.2159" (5.475-5.485 mm)
Service Limit	0.2144" (5.445 mm)
Valve Length	4.365-4.377" (110.88-111.18 mm)
Valve Stem Installed Height	
Standard	1.9191-1.9376" (48.745-49.215 mm)
Service Limit	1.9474" (49.465 mm)
Exhaust Valves	
Face Angle	45°
Head Diameter	1.14-1.15" (28.9-29.1 mm)
Margin	
Standard	0.061-.073" (1.55-1.85 mm)
Service Limit	0.053" (1.35 mm)
Valve Length	4.848-4.860" (123.15-123.45 mm)
Stem Diameter	
Standard	0.2146-0.2150" (5.450-5.460 mm)
Service Limit	0.2134" (5.420 mm)
Valve Stem Installed Height	
Standard	2.0203-2.0238" (51.315-51.785 mm)
Service Limit	2.0486" (52.035 mm)
Valve Springs Free Length	
Intake	
NH (1)	2.052" (52.13 mm)
CH (2)	2.052" (52.12 mm)
Exhaust	
NH (1)	2.209" (56.10 mm)

© 2011 Mitchell Repair Information Company, LLC.

CH (2)	2.208" (56.08 mm)
(1) NIHON HATSUJO manufactured valve spring.	
(2) CHUO HATSUJO manufactured valve spring.	

CYLINDER HEAD

CYLINDER HEAD

Application	Specification
Cylinder Head Height	3.935-3.939" (99.95-100.05 mm)
Maximum Warpage (1)	0.002" (0.05 mm)
Valve Seats	
Intake & Exhaust	
Seat Angle	45°
Seat Width	
Standard	0.049-0.061" (1.25-1.55 mm)
Service Limit	0.079" (2.00 mm)
Valve Guides	
Intake	
Valve Guide I.D.	
Standard	0.2167-0.2173" (5.505-5.520 mm)
Service Limit	0.2181" (5.54 mm)
Valve Guide Installed Height	0.974-0.994" (24.75-25.25 mm)
Exhaust	
Valve Guide I.D.	
Standard	0.2169-0.2177" (5.51-5.53 mm)
Service Limit	0.2185" (5.55 mm)
Valve Guide Installed Height	0.632-0.652" (16.05-16.55 mm)
Valve Stem-To-Guide Oil Clearance	
Intake	
Standard	0.0008-0.0018" (0.02-0.045 mm)
Service Limit	0.003" (0.075 mm)
Exhaust	
Standard	0.002-0.003" (0.05-0.08 mm)
Service Limit	0.004" (0.10 mm)
(1) Maximum resurface limit is 0.008" (0.20 mm).	

CAMSHAFT

CAMSHAFT

© 2011 Mitchell Repair Information Company, LLC.

Application	In. (mm)
End Play	
Standard	0.002-0.006 (0.05-0.15)
Service Limit	0.02 (0.5)
Journal Runout	
Standard	0.001 (0.03)
Service Limit	0.002 (0.05)
Lobe Height	
Intake	1.5434 (39.203)
Exhaust	1.5305 (38.875)
Oil Clearance	
Standard	0.002-0.0035 (0.050-0.089)
Service Limit	0.006 (0.15)

© 2011 Mitchell Repair Information Company, LLC.