

1999-2000 ENGINES

1.6L 4-Cylinder

ENGINE IDENTIFICATION

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

Engine identification number is located on exhaust side of engine block, below cylinder head, near bellhousing. The first 5 characters of engine identification number identify engine type. See **ENGINE IDENTIFICATION CODES** table. The last 7 characters of engine identification number represent the serial number.

The fourth, fifth and sixth characters of Vehicle Identification Number (VIN) identify car line, body style and engine type. See **ENGINE IDENTIFICATION CODES** table. VIN is located at left front corner of dashboard and on upper portion of firewall.

ENGINE IDENTIFICATION CODES

Application	VIN Code	Engine Code
1.6L DOHC (16-Valve VTEC)	EM1	B16A2
1.6L SOHC (16-Valve)	EJ6	D16Y7
1.6L SOHC (16-Valve VTEC)	EJ8	D16Y8
1.6L SOHC (16-Valve VTEC-E)	EJ7	D16Y5

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

CAUTION: Always rotate engine in direction of normal rotation (counterclockwise as viewed from front of engine). Reverse rotation may cause timing belt to jump time.

CAUTION: Rocker arms are made of aluminum and can be damaged if lock nuts are overtightened.

NOTE: Valves should only be adjusted when engine temperature is less than 100°F (38° C). After adjusting valves, retighten crankshaft pulley bolt to specification. See **TORQUE SPECIFICATIONS**.

1. Remove valve cover. On SOHC engines, remove upper timing belt cover. Rotate crankshaft counterclockwise until No. 1 piston is at TDC of compression stroke. UP mark on camshaft pulley should be on top, and TDC marks should align with cylinder head upper surface. See **Fig. 1** and **Fig. 2**.
2. Loosen adjusting screw lock nut on cylinder No. 1. Adjust valve clearance to specification on all valves for No. 1 cylinder. Turn adjustment screw until a feeler gauge slides back and forth with a slight drag. See

1999 Honda Civic EX

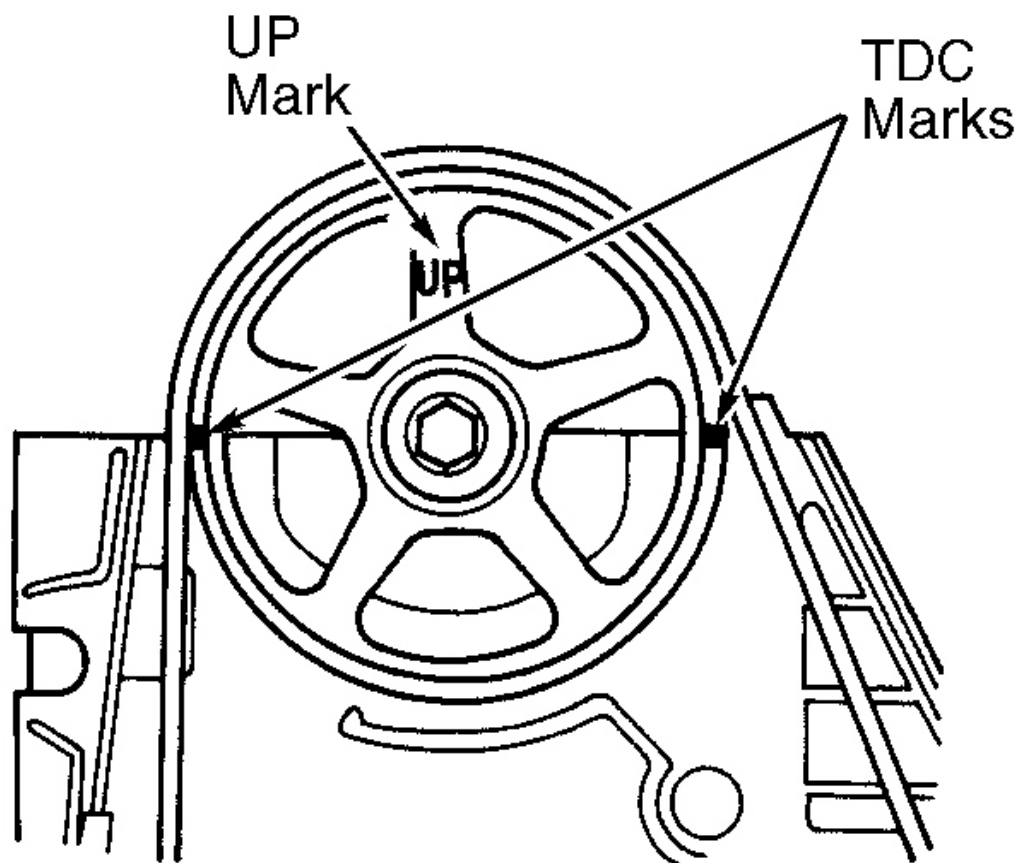
1999-2000 ENGINES 1.6L 4-Cylinder

VALVE CLEARANCE SPECIFICATIONS table. Tighten lock nut to specification, and recheck valve clearance.

3. Rotate crankshaft counterclockwise 180 degrees (camshaft pulley rotates 90 degrees). UP mark on camshaft pulley should be on exhaust side. Adjust all valves for No. 3 cylinder to specification. Tighten lock nuts to specification, and recheck valve adjustment. See **TORQUE SPECIFICATIONS**.
4. Rotate crankshaft counterclockwise 180 degrees (camshaft pulley rotates 90 degrees). UP mark on camshaft pulley should be down (both TDC grooves will be visible again). Adjust all valves for No. 4 cylinder to specification. Tighten lock nuts to specification, and recheck valve adjustment.
5. Rotate crankshaft counterclockwise 180 degrees (camshaft pulley rotates 90 degrees). UP mark on camshaft pulley should be on intake side. Adjust all valves for No. 2 cylinder to specification. Tighten lock nuts to specification, and recheck valve adjustment.
6. Ensure crankshaft pulley bolt is tightened to specification after adjustment procedure. See **TORQUE SPECIFICATIONS**. Apply liquid gasket within 5 minutes of installing valve cover, to 4 corners, (8 corners on DOHC engine) of valve cover camshaft recesses. Install valve cover. Tighten nuts to specification.

VALVE CLEARANCE SPECIFICATIONS

Application	In. (mm)
DOHC	
Intake	0.006-0.007 (0.15-0.19)
Exhaust	0.007-0.008 (0.17-0.21)
SOHC	
Intake	0.007-0.009 (0.18-0.22)
Exhaust	0.009-0.011 (0.23-0.27)



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Fig. 1: Positioning Camshaft For Valve Adjustment (SOHC)

Courtesy of AMERICAN HONDA MOTOR CO., INC.

TIMING BELT ADJUSTMENT

CAUTION: Always rotate engine in direction of normal rotation (counterclockwise as viewed from front of engine). Reverse rotation may cause timing belt to jump time.

NOTE: Timing belt should be adjusted when engine temperature is less than 100°F (38° C). Timing belt tensioner is spring-loaded to apply proper tension to belt after adjustment.

1. Remove valve cover. On SOHC engines remove upper timing belt cover. Inspect timing belt for cracks

and oil or coolant soaking. Inspect trailing edge of timing belt teeth for damage. Replace timing belt as necessary. See **TIMING BELT** under REMOVAL & INSTALLATION. Rotate crankshaft counterclockwise 5 or 6 revolutions and set No. 1 cylinder at TDC of compression stroke. See **Fig. 1**, **Fig. 2** and **Fig. 3**. Loosen timing belt adjuster bolt 180 degrees. See **Fig. 4**.

2. Rotate crankshaft 3 teeth counterclockwise on camshaft pulley to create tension on timing belt. Tighten adjuster bolt to specification. Ensure crankshaft pulley bolt is tightened to specification. See **TORQUE SPECIFICATIONS**. Apply liquid gasket, within 5 minutes of installing valve cover, to 4 corner (8 corners on DOHC engine) of valve cover camshaft recesses. Install valve cover.

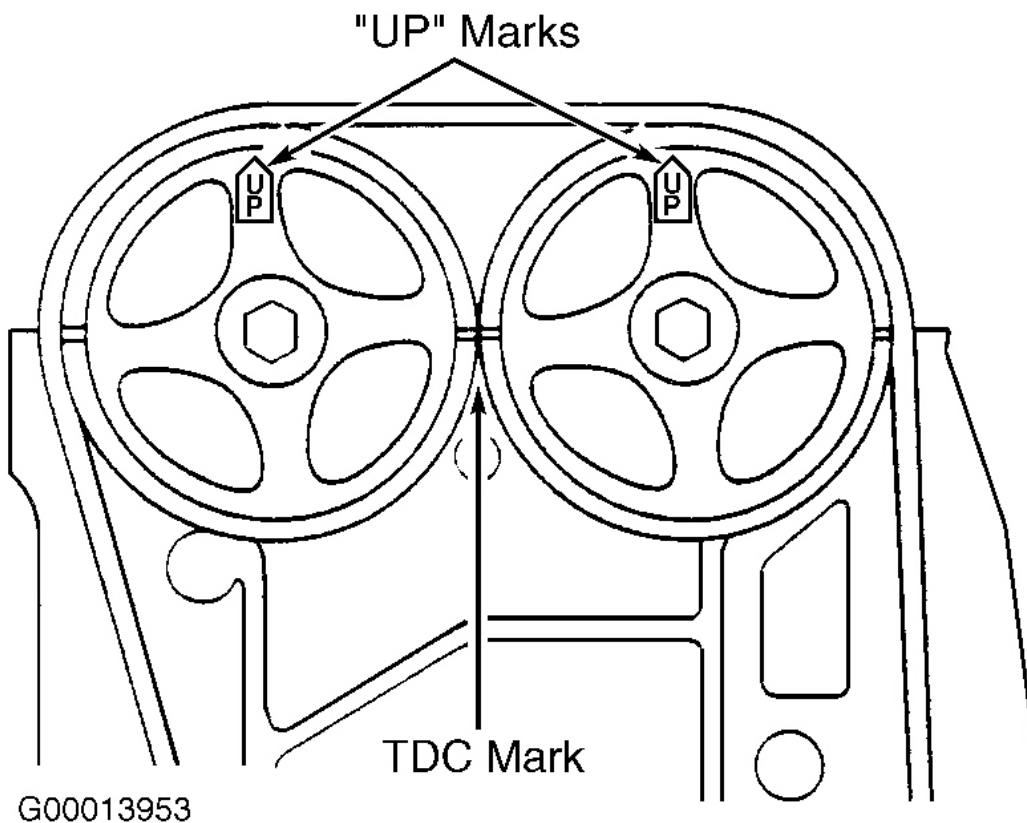
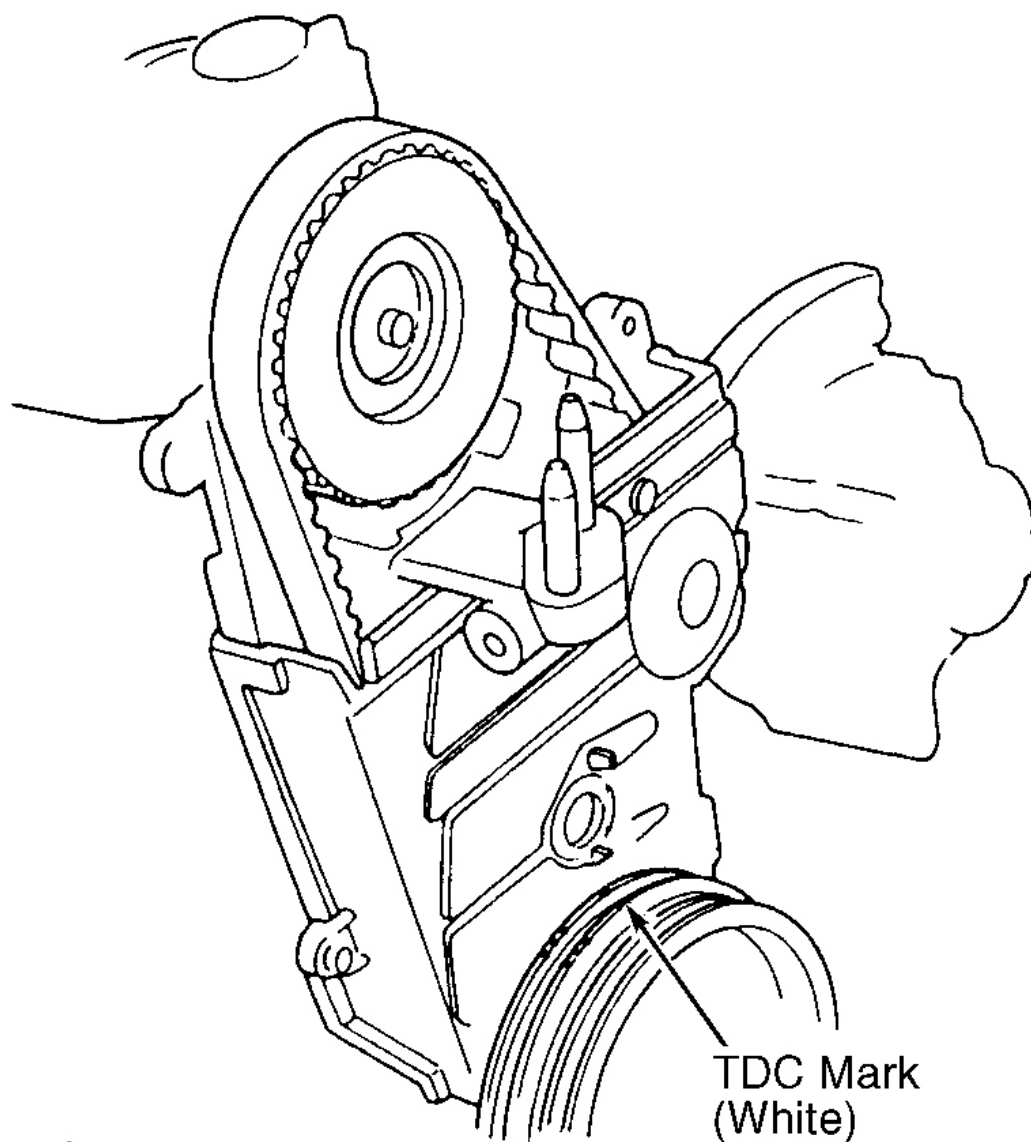


Fig. 2: Positioning Camshaft For Valve Adjustment (DOHC); TDC No. 1 Cylinder Shown
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 3: Positioning Crankshaft At TDC
Courtesy of AMERICAN HONDA MOTOR CO., INC.

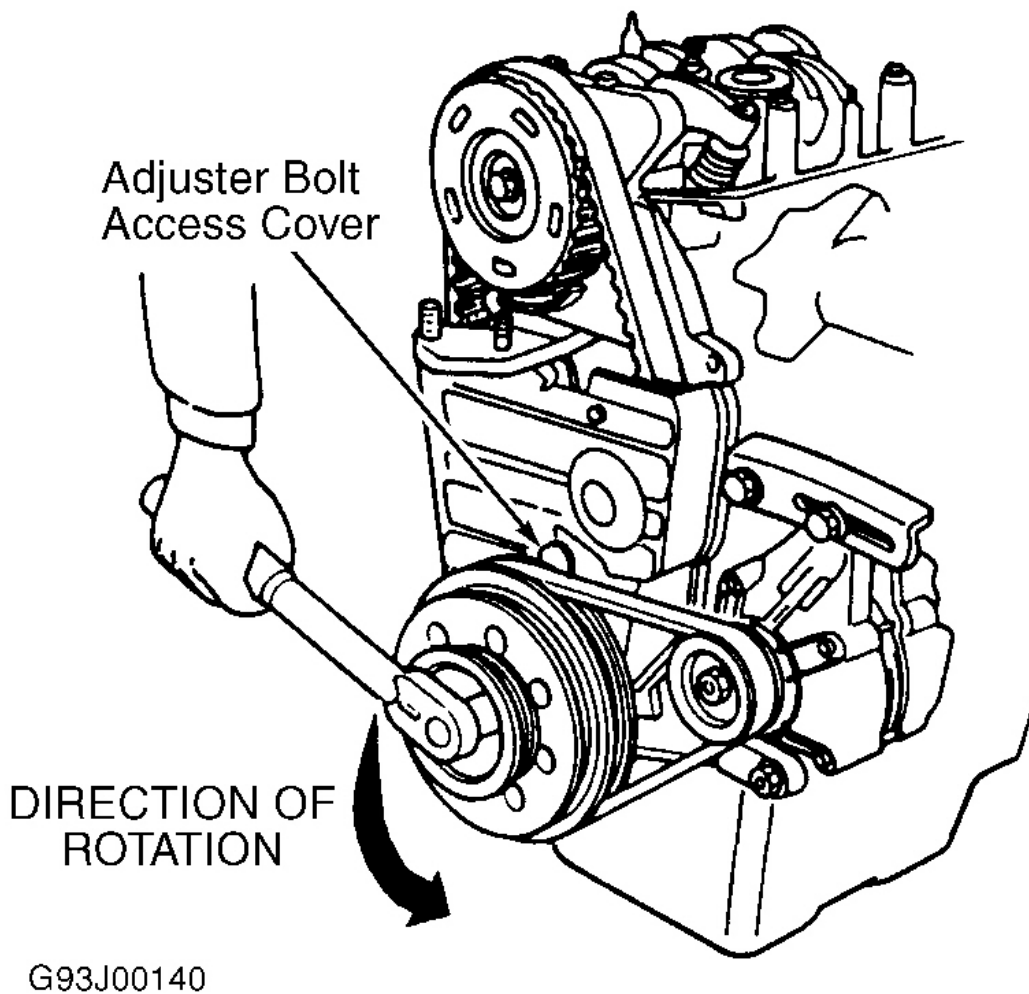


Fig. 4: Locating Timing Belt Adjuster Bolt
Courtesy of AMERICAN HONDA MOTOR CO., INC.

TROUBLE SHOOTING

To trouble shoot engine mechanical components, see appropriate table in TROUBLE SHOOTING article in GENERAL INFORMATION.

REMOVAL & INSTALLATION

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle.

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

FUEL PRESSURE RELEASE

WARNING: Always relieve fuel pressure before disconnecting any fuel injection related component. DO NOT allow fuel to contact engine or electrical components.

1. Remove fuel tank filler cap. Place a shop towel on top of fuel filter. Release fuel system pressure by slowly loosening 12-mm banjo bolt. See **Fig. 5**. Always replace washer(s) between service bolt and banjo bolt whenever bolt is loosened.
2. After completing fuel system repairs or servicing, turn ignition on and off 2-3 times to operate fuel pump and pressurize fuel system. Check fuel system for leaks without starting engine.

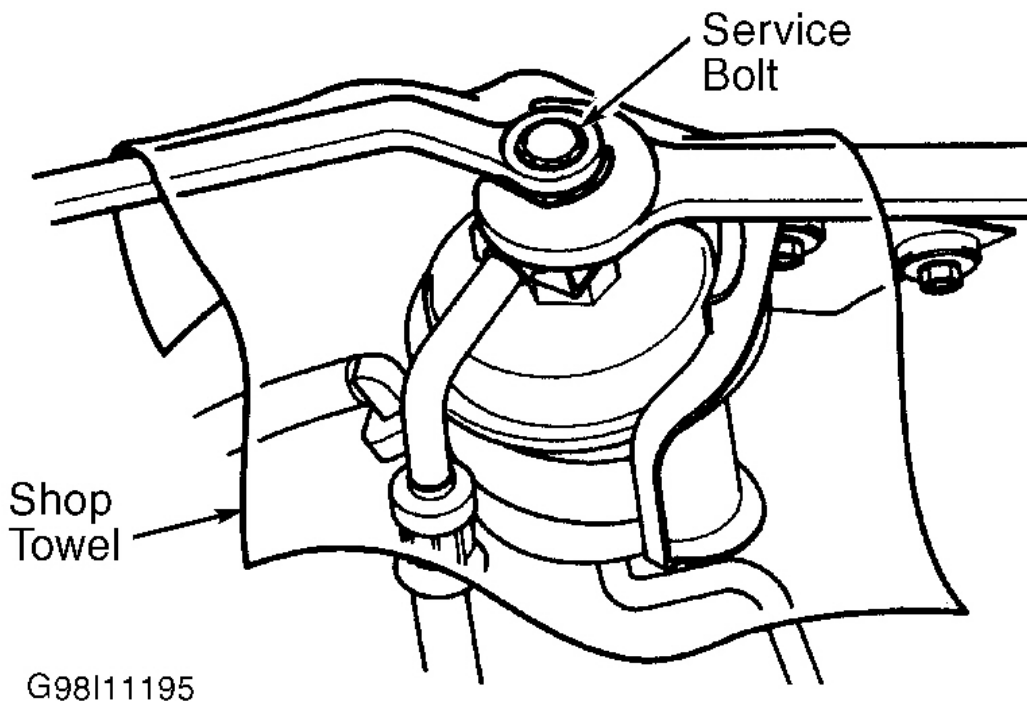


Fig. 5: Releasing Fuel System Pressure
Courtesy of AMERICAN HONDA MOTOR CO., INC.

COOLING SYSTEM BLEEDING

CAUTION: DO NOT allow coolant to spill on electrical parts or vehicle paint. If coolant spills, rinse with water immediately.

1. Set heater control to maximum heat. Ensure engine block and radiator drain plugs have been reinstalled with liquid gasket and NEW washers. Fill cooling system with a 50/50 mixture of coolant and water to bottom of filler neck. Loosen bleed bolt located on coolant outlet housing. Tighten bleed bolt when coolant flows from bleed bolt in a steady stream without bubbles.
2. Install radiator cap, but tighten it only to first stop. Start and operate engine until fan comes on at least twice. Stop engine. Add coolant as necessary. Install radiator cap. Fill reservoir to MAX mark with 50/50 mixture of coolant and water.

ENGINE

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

Removal

1. Secure engine hood in highest vertical position. Disconnect battery cables from battery and underhood fuse/relay box. On DOHC engine remove strut brace. Remove battery and battery tray. Disconnect wire connectors from PCM. Remove air cleaner and air intake hose. On D16Y5, D16Y8 and B16A2 engines disconnect IAT sensor connector, then remove intake air duct and air cleaner housing.
2. Disconnect engine wire harness connector on left side of engine compartment. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect fuel and EVAP hoses. Disconnect brake booster vacuum hose and any other vacuum hoses interfering with engine removal. Disconnect throttle cable from throttle body. DO NOT bend cable.
3. Remove PCM wire harness nuts and brackets. Pull PCM harness out of firewall. Remove accessory drive belts. Remove power steering pump with hoses attached, and set aside. Remove transmission ground cable. On M/T models, remove clutch slave cylinder with fluid line attached. On models with Continuously Variable Transmission (CVT), remove shift cable.
4. On all models, remove all remaining electrical connectors interfering with engine removal. Remove radiator cap. Raise and support vehicle. Remove front wheels and engine splash shield. Loosen radiator drain plug. Drain coolant, and tighten drain plug. Drain engine oil and transaxle fluid. Remove engine block coolant drain plug located on side of block next to oil filter, or under thermostat housing.
5. Reinstall drain plugs using NEW washers, and tighten to specification. See **TORQUE SPECIFICATIONS**. On M/T models, disconnect shift rod and extension rod. On A/T models, remove shift cable. DO NOT bend cable. On all models, remove A/C compressor with hoses attached, and set aside. Remove front exhaust pipe. Remove axle shafts. See FWD AXLE SHAFTS article in DRIVE AXLES.
6. Lower vehicle. Remove radiator and heater hoses. Remove ATF cooler hoses, if equipped. Attach engine hoist to engine lift hooks. Remove left and right front engine mounts and brackets. Remove rear engine mount bracket. Remove upper bracket. Remove transmission mount bracket, then transmission mount. See **Fig. 6**.
7. Raise chain hoist to remove slack from chain. Ensure engine/transaxle assembly is free of all connections.

Slowly raise engine about 6 inches and again ensure all hoses and wires have been disconnected from engine and transaxle. Lift engine and transaxle from vehicle.

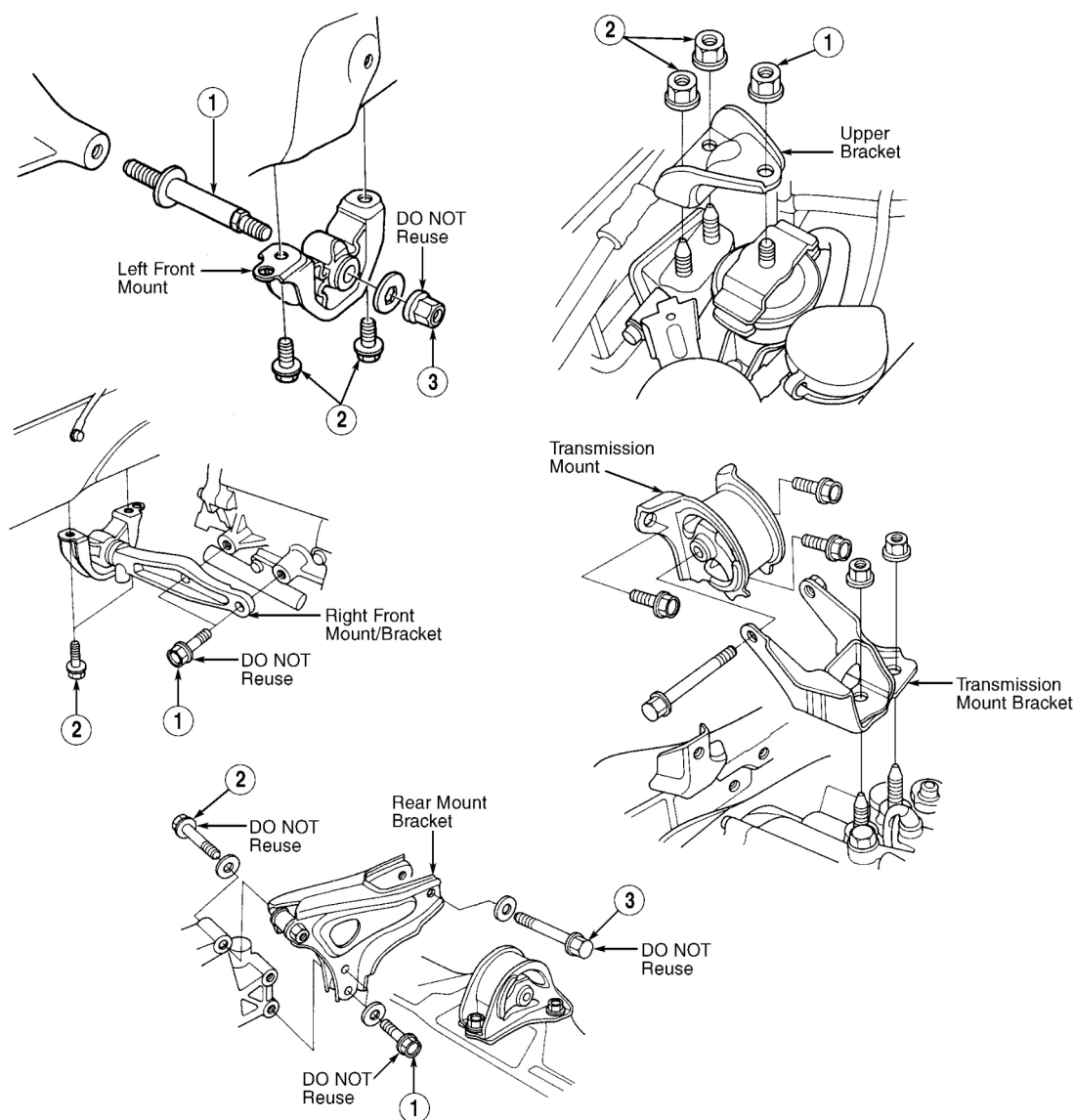
Installation

1. To install, reverse removal procedure. After engine is in place, install mounts and tighten fasteners in proper sequence. Install transmission mount and tighten bolts on frame side. **DO NOT** tighten bolts on transmission side. See **TORQUE SPECIFICATIONS**. Install upper bracket and tighten nuts in the sequence shown. See **Fig. 6**.
2. Install rear mount bracket and tighten bolts in the sequence shown. See **Fig. 6**. Tighten transmission mount nuts on transmission side. Tighten transmission mount through bolt. See **TORQUE SPECIFICATIONS**. Tighten right front mount/bracket bolts in the sequence shown. See **Fig. 6**. Tighten left front mount fasteners in the sequence shown. See **Fig. 6**.

NOTE: **Improper tightening of engine mounts will result in engine vibration and premature mount wear. Ensure mount bushings are not twisted or offset. Some engine mount nuts and bolts are not reusable. See Fig. 6. See TORQUE SPECIFICATIONS.**

3. Use NEW spring clips when installing drive axles. Install drive axles until spring clip clicks into groove of differential side gear. Ensure all wires and hoses are connected properly. Ensure cables are adjusted properly. Adjust accessory drive belts to proper tension. Fill fluids to proper level. Bleed cooling system. See **COOLING SYSTEM BLEEDING**. Turn ignition on and off 2-3 times to operate fuel pump and pressurize fuel system. Check fuel system for leaks, without starting engine. If there are no leaks, start engine and ensure correct operation.

NOTE: **If engine has been overhauled, after reassembly, run engine at idle until it reaches normal operation temperature (cooling fan operates twice). Continue to run engine at idle for approximately 15 minutes more.**



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Fig. 6: Identifying & Tightening Engine/Transaxle Mounts
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

INTAKE MANIFOLD

NOTE: Mark all emission hoses, vacuum hoses and electrical connectors before disconnecting.

Removal

Disconnect negative battery cable. Remove radiator cap, and drain engine coolant. Remove intake air duct and air cleaner housing. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect fuel feed and EVAP canister vacuum hose. Loosen throttle cable and throttle control cable lock nuts. Slip cable end out of

throttle linkage. Remove brake booster vacuum hose, fuel return hose, vacuum hoses, water by-pass hose and PCV hose. Disconnect harness connectors. Remove any other hoses, wire harnesses and/or harness clamps. Remove intake manifold bracket and intake manifold.

Installation

Clean gasket surfaces. Install intake manifold, using NEW gasket. Using a crisscross pattern, tighten nuts to specification in 3 stages, starting with inner nuts. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure. Check fuel system for leaks. See **FUEL PRESSURE RELEASE**.

EXHAUST MANIFOLD

Removal

Remove exhaust manifold shroud. Disconnect exhaust pipe from exhaust manifold. Disconnect oxygen sensor electrical connector. Remove exhaust manifold bracket. Remove manifold nuts and manifold.

Installation

Clean gasket surfaces. DO NOT reuse 8-mm self-locking exhaust manifold nuts or 10-mm self-locking exhaust pipe flange nuts. Install exhaust manifold, using NEW gasket and NEW self-locking nuts. Starting with inner nuts, tighten intake manifold nuts to specification in 3 stages using a crisscross pattern. See **TORQUE SPECIFICATIONS**.

CYLINDER HEAD

CAUTION: To avoid damaging cylinder head, DO NOT remove cylinder head bolts until engine coolant temperature is less than 100°F (38°C).

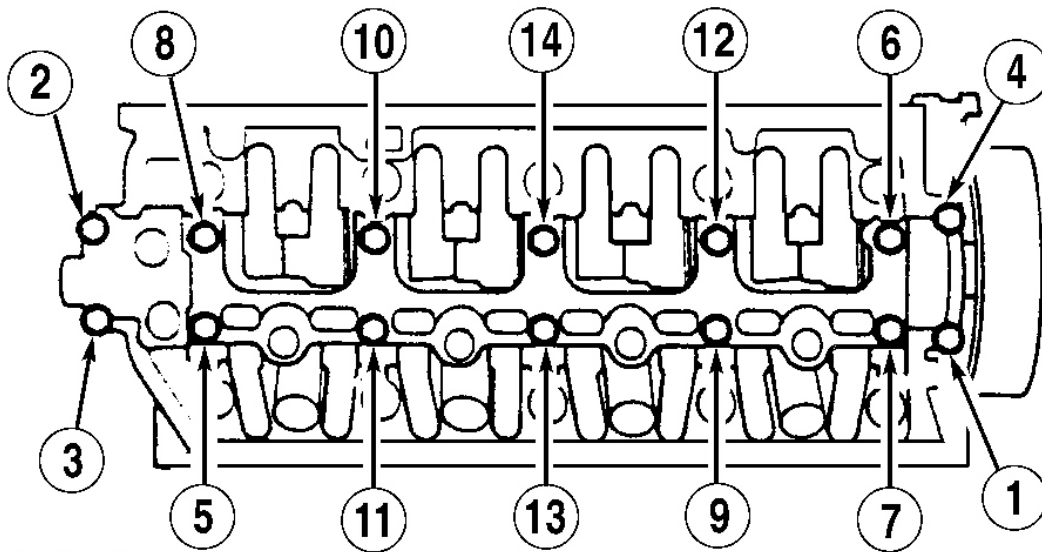
NOTE: Ensure all emission hoses, vacuum hoses and electrical connectors are marked for reassembly.

Removal

1. Inspect timing belt before removing cylinder head. See **TIMING BELT ADJUSTMENT** under ADJUSTMENTS. Ensure No. 1 piston is at Top Dead Center (TDC) of compression stroke. See **Fig. 1** and **Fig. 3**. Disconnect negative battery cable. Remove radiator cap, and drain cooling system. Remove air intake duct and air cleaner housing.
2. Remove all accessory drive belts. Remove P/S pump leaving hoses attached, and set aside. Remove P/S pump bracket. Loosen throttle cable lock nut, and slip cable end out of throttle linkage. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Remove EVAP control canister hose, fuel feed hose and breather hose.
3. Remove brake booster vacuum hose, fuel return hose and vacuum hose from throttle body. Remove coolant by-pass hose from throttle body, and PCV hose from intake manifold. Remove upper radiator hose, heater hose and coolant by-pass hose.
4. Label and disconnect all electrical wiring harness connectors and harness clamps from cylinder head and

intake manifold. Remove spark plug wires and distributor from cylinder head. Support engine under oil pan using a pad and jack. Remove upper engine bracket from side engine mount.

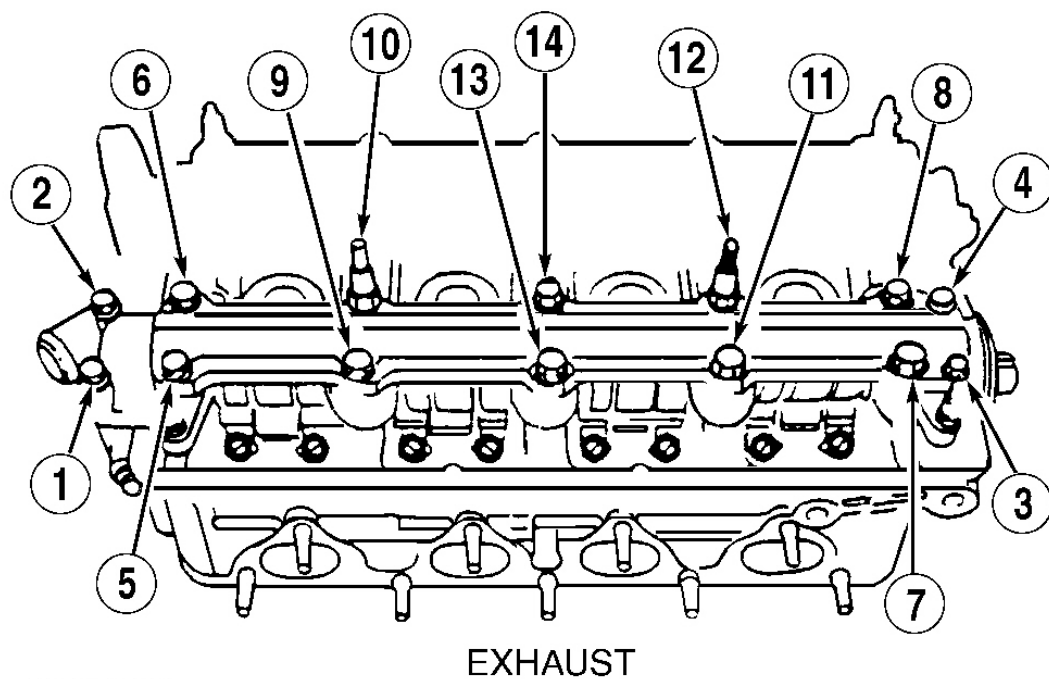
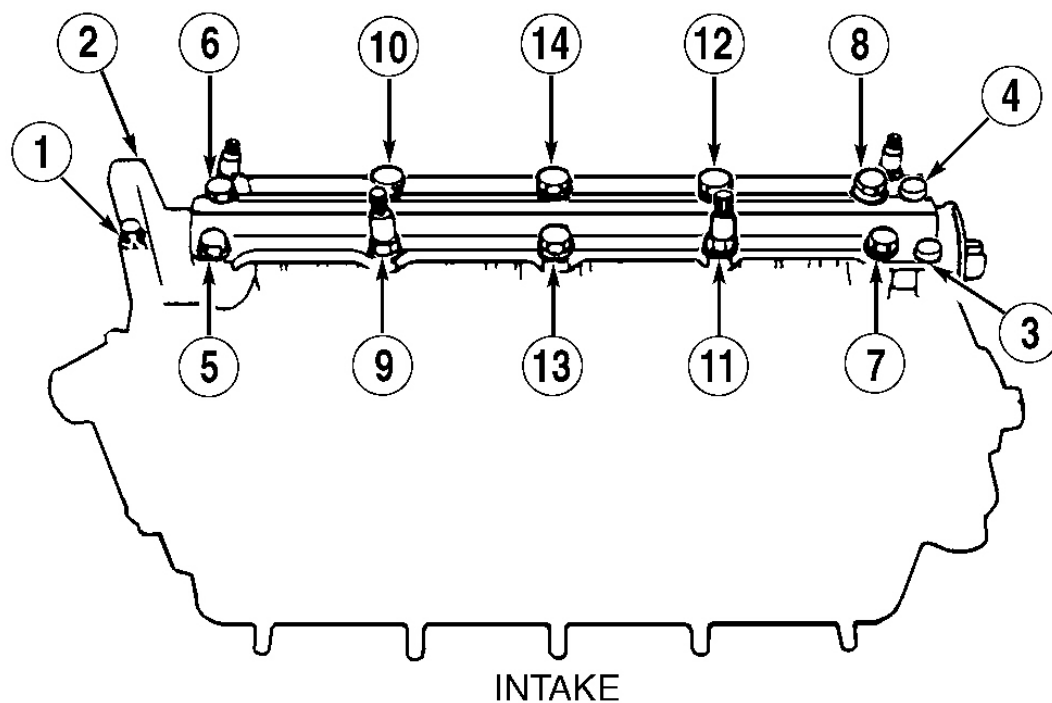
5. Remove valve cover. Remove timing belt. See **TIMING BELT**. Remove camshaft pulley(s) and back cover. Remove exhaust manifold. See **EXHAUST MANIFOLD**. Remove intake manifold. See **INTAKE MANIFOLD**. Loosen valve adjustment screws. On all engines, loosen and remove camshaft holder bolts in sequence. See [Fig. 7](#) and [Fig. 8](#). Remove camshaft holder plate(s), camshaft holder(s) and camshaft(s). Remove cylinder head bolts, 1/3 turn at a time, in proper sequence. See [Fig. 9](#). Remove cylinder head and gasket.



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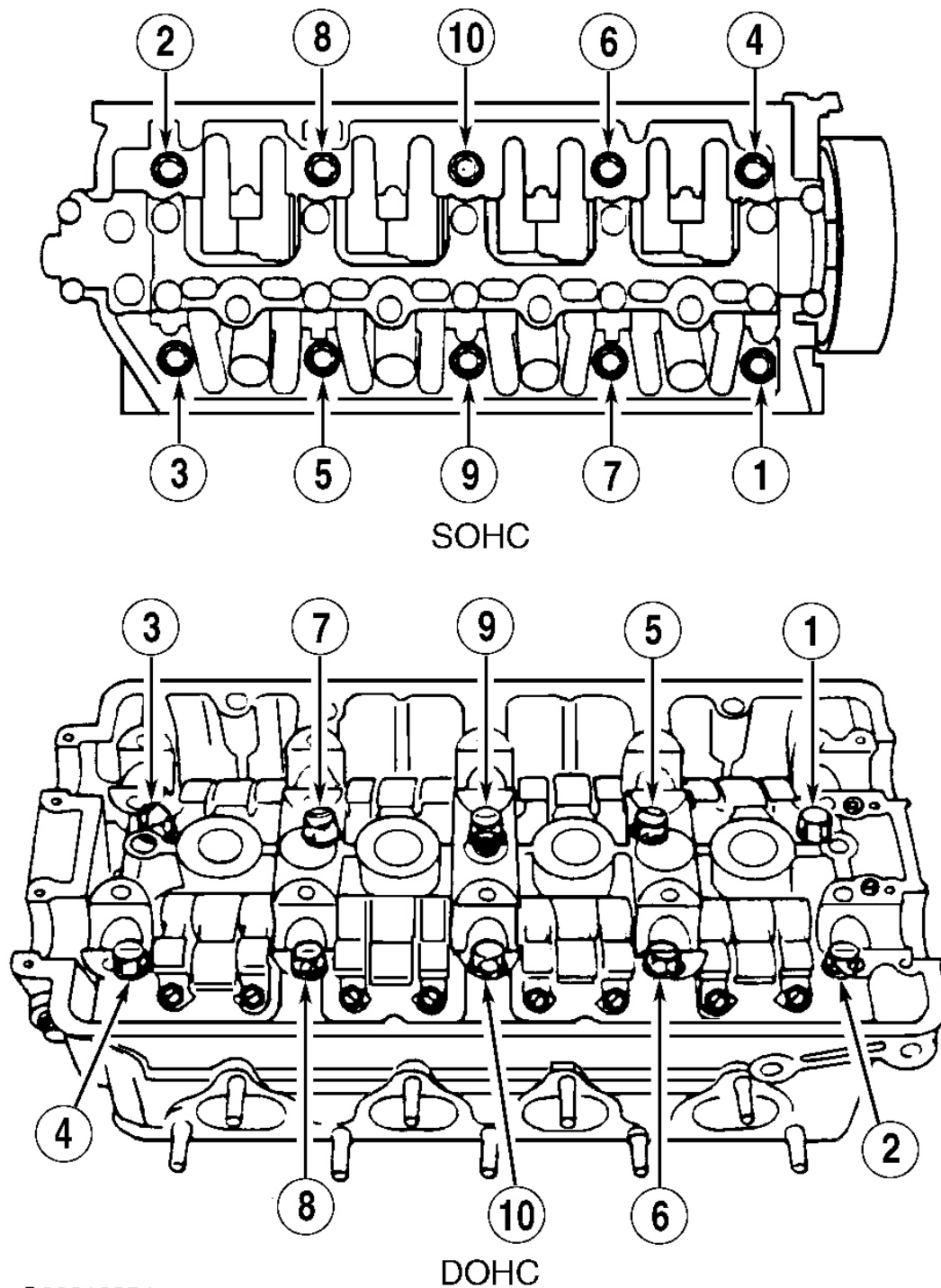
Fig. 7: Camshaft Holder Plate Bolt Loosening Sequence (SOHC)

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 8: Camshaft Holder Plate Bolt Loosening Sequence (DOHC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 9: Loosening Sequence For Cylinder Head Bolts (DOHC & SOHC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection

Ensure all mating surfaces are clean. Check intake and exhaust rocker arms at contact points for pitting, scoring or wear. Check camshaft-to-holder oil clearances. If camshaft-to-holder oil clearance is within specification, check cylinder head for warpage. See **CAMSHAFT** under REMOVAL & INSTALLATION. If oil clearance is not within specification, cylinder head cannot be resurfaced. Measure cylinder head for warpage along edges, and 3 ways across center. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Resurface head if not within specification.

NOTE: Always use a NEW cylinder head gasket. Ensure No. 1 piston is at TDC of compression stroke. Ensure oil control orifice is clean before installing in head, if equipped.

Installation

1. Ensure mating surfaces are clean. Ensure cylinder head dowel pins are installed in cylinder block and align with NEW gasket. Set No. 1 piston to TDC of compression stroke. Position camshaft pulley(s) with UP mark facing up. See **Fig. 1**, **Fig. 2** and **Fig. 3**.

NOTE: Manufacturer recommends using a beam-type torque wrench to tighten cylinder head bolts. If a beam-type torque wrench is not available, tighten bolts slowly. DO NOT overtighten. If bolt makes any noise during tightening, loosen bolt and retighten from step No. 1.

2. Install cylinder head. Install cylinder head bolts. On SOHC engine, tighten cylinder head bolts to specification, in 4 steps, in sequence. Steps No. 1, 2 and 3 include all 10 bolts. Step No. 4 includes only bolts No. 1 and 2. On DOHC engine, tighten cylinder head bolts 2 steps in sequence. See **Fig. 22**. See **TORQUE SPECIFICATIONS**.
3. Install intake manifold using a NEW gasket. Tighten nuts in a crisscross pattern in 2-3 steps starting with inner nut. See **TORQUE SPECIFICATIONS**. Install exhaust manifold, using NEW self-locking nuts and gasket. Tighten nuts in a crisscross pattern in 2-3 steps starting with inner nut. See **TORQUE SPECIFICATIONS**. Install exhaust manifold bracket, front exhaust pipe and bracket, and cover. Use NEW exhaust manifold-to-exhaust pipe self-locking nuts.
4. Install timing belt. See **TIMING BELT**. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. Before installing valve cover, clean seal and seal groove. When installing valve cover, apply liquid gasket to valve cover gasket at 4 corners (8 corners on DOHC engine) of recesses within 5 minutes of valve cover installation. Tighten bolts in 2-3 steps to specification. See **TORQUE SPECIFICATIONS**. Ensure all electrical connections and hoses are installed correctly. To complete installation, reverse removal procedure.

VALVE SEALS (SOHC)

NOTE: On SOHC engine, cylinder head removal is not necessary in order to replace valve seals. Procedure will require an in-car valve spring compressor and an air adapter for keeping valves closed while compressing springs. For valve seal replacement on DOHC engine, see **CYLINDER HEAD** under OVERHAUL.

Removal

1. Rotate crankshaft counterclockwise until No. 1 and 4 pistons are at TDC of compression stroke. Remove valve cover. Remove rocker arms. See **ROCKER ARM ASSEMBLY**. Remove fuel injector wire harness and fuel injectors.
2. Using 8-mm bolts supplied, install In-Car Valve Spring Compressor (YA-8845) to cylinder head. To compress intake valve spring, use 7/8" diameter short compressor attachment (YA-8845-2A 7/8") anchored to lever arm hole No. 4. To compress exhaust valve spring, anchor the same attachment to lever arm hole No. 2. Position front slot of lever arm under cross shaft so that compressor attachment rests on top of spring to be compressed.

NOTE: **Using shop towels, cover oil passages to prevent valve keepers from falling into cylinder head.**

3. Insert an air adapter into cylinder No. 1 spark plug hole and pressurize cylinder to prevent valves from dropping while compressing springs. Compress No. 1 cylinder intake valve spring and remove keepers from valve stem. Slowly release pressure on valve spring. Using Valve Guide Seal Remover (KD-3350), remove valve seals. Place each cylinder at TDC of its compression stroke and repeat removal procedure.

Installation

Coat valve stems with clean engine oil. Using Valve Guide Seal Installer (KD-2899), install new valve seals. Intake valve seals have a White spring, and exhaust valve seals have a Black spring. Valve seals are not interchangeable. Install springs in reverse order of removal and repeat procedure for each valve.

FRONT CRANKSHAFT SEAL**Removal**

Disconnect negative battery cable. Raise and support vehicle. Remove left front wheel. Remove wheelwell splash shield. Remove all drive belts. Remove power steering pump with hoses attached, and set aside. Remove timing belt. See **TIMING BELT**. Remove crankshaft pulley. Remove front crankshaft oil seal.

Installation

Apply light coating of grease to crankshaft and lip of new seal. Tap seal into place using Seal Driver (07749-SB00200). Ensure seal is fully seated. To complete installation, reverse removal procedure.

REAR CRANKSHAFT OIL SEAL**Removal**

1. Disconnect battery negative cable. Remove transaxle assembly. For M/T vehicles, see FWD article in **CLUTCHES**. For A/T vehicles, see **TRANSMISSION REMOVAL & INSTALLATION** article in **TRANSMISSION SERVICING**.
2. Mark clutch pressure plate (manual transaxle) and flywheel for installation reference. Remove pressure plate and clutch disc (if equipped), and remove flywheel. Pry seal from cover.

Installation

Apply light coating of grease to crankshaft and lip of seal. Using Seal Driver (07749-0010000) and Driver Attachment (07948-SB00101), install seal. Ensure seal is fully seated and clearance between right side cover and seal is 0.02-0.03" (0.5-0.8 mm). To complete installation, reverse removal procedure.

TIMING BELT

NOTE: When timing belt is removed, inspect water pump. Ensure water pump pulley turns freely and that there is no more than a small amount of weeping from water pump bleed hole. Replace water pump if necessary. See **WATER PUMP**.

Removal

1. On all engines rotate crankshaft counterclockwise until No. 1 piston is at TDC of compression stroke. Remove splash shield. Remove accessory drive belts. Remove power steering pump with hoses attached, and set aside. Remove A/C belt idler pulley and bracket.
2. Remove valve cover and upper timing belt cover. Support engine under oil pan using a pad and jack. Remove side engine mount upper bracket. Remove crankshaft pulley. Remove lower timing belt cover. On SOHC engine, remove dipstick tube.
3. On SOHC engine, remove Crankshaft Speed Fluctuation (CKF) sensor from oil pump. On all engines, loosen timing belt tension adjuster bolt 180 degrees. Push tensioner to release belt tension. Retighten tension adjuster bolt. Mark timing belt for direction of rotation if belt is to be reused. Remove timing belt from pulleys.

Installation

1. Ensure crankshaft drive pulley and camshaft pulley are clean. Ensure crankshaft and camshaft pulleys are aligned with TDC position. See **Fig. 1****Fig. 2** and **Fig. 10** . Rotate crankshaft until No. 1 piston is at TDC if necessary. Loosen timing belt tension adjuster bolt.
2. Install timing belt in sequence onto timing belt crankshaft drive pulley, tension adjuster pulley, water pump pulley, and camshaft(s) pulley(s). See **Fig. 11**. DO NOT bend or twist belt excessively. Ensure arrow on used belt points in original rotation direction. Ensure crankshaft drive pulley and camshaft timing marks are aligned. See **Fig. 1**, **Fig. 2** and **Fig. 10** .

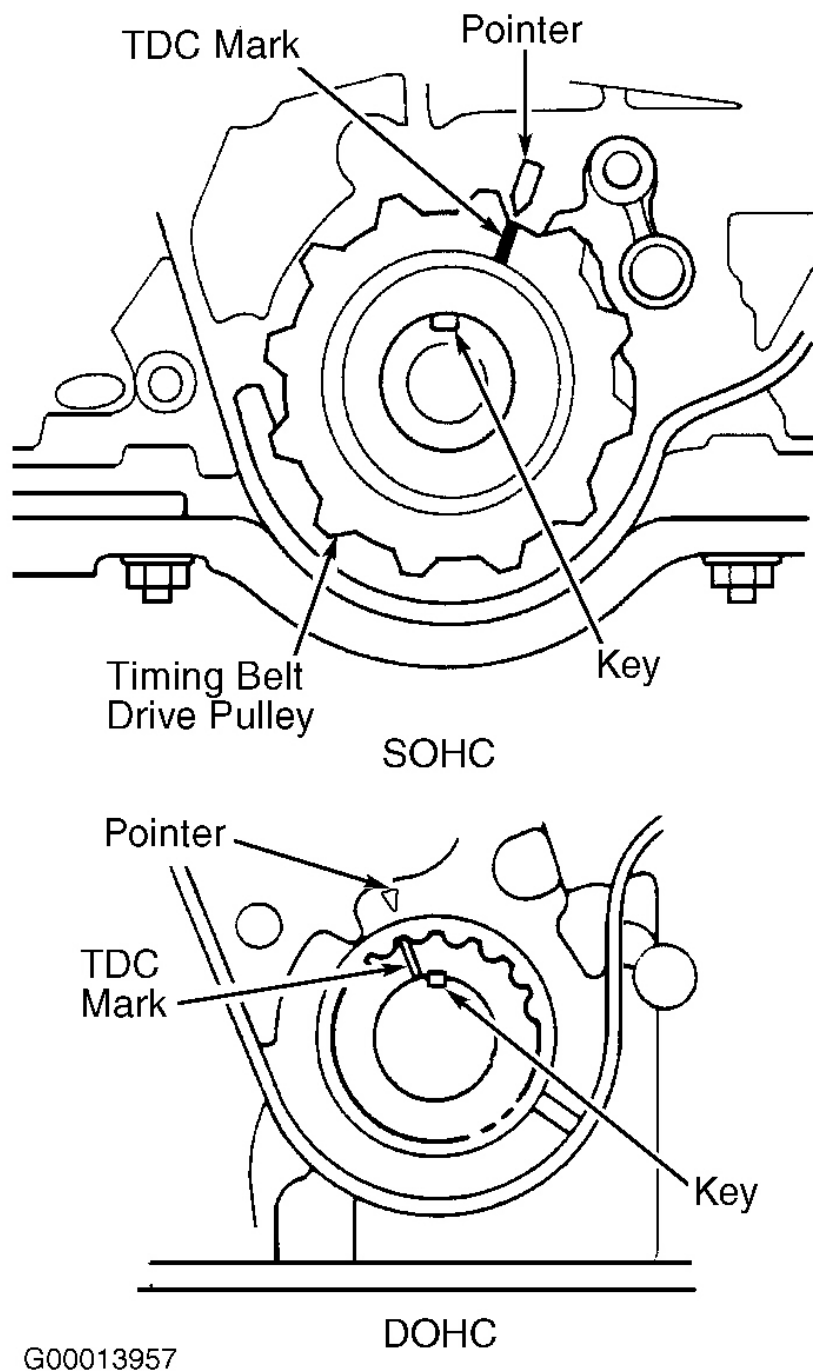
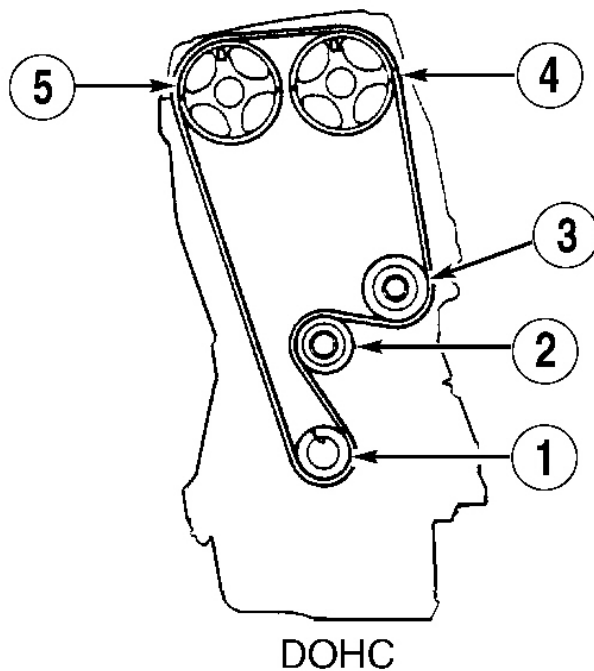
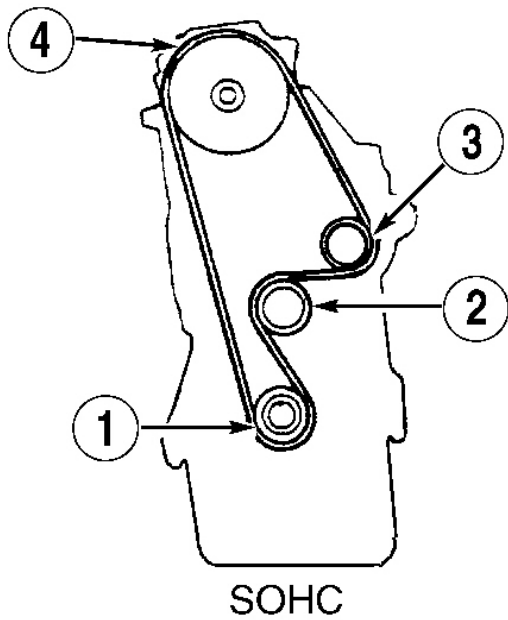


Fig. 10: Aligning Timing Belt Drive Pulley
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 11: Timing Belt Installation Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

3. Adjust timing belt tension. See **TIMING BELT ADJUSTMENT** under ADJUSTMENTS. Rotate crankshaft 5-6 times counterclockwise to position timing belt on pulleys. When installing valve cover,

apply liquid gasket to valve cover gasket at 4 corners (8 corners on DOHC engine) of recesses within 5 minutes of valve cover installation. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

ROCKER ARM ASSEMBLY

NOTE: As rocker arm assembly components are removed, identify original location for reinstallation. Ensure components that are reused are reinstalled in original location. When removing rocker arm assembly, leave camshaft holder bolts in place to keep camshaft holders, springs, and rocker arms on shaft.

NOTE: On non-VTEC engines, ensure valve clearance is correct. See **VALVE CLEARANCE SPECIFICATION** under ADJUSTMENTS. See **ENGINE IDENTIFICATION CODES** table under ENGINE IDENTIFICATION.

NOTE: VTEC engine rocker arm assembly has 3 rocker arms (primary, mid and secondary) and 2 synchronizing pistons. VTEC-E engine rocker arm assembly has 2 rocker arms (primary and secondary), one synchronizing piston and a spring-loaded timing plate.

On-Vehicle Manual Inspection (VTEC & VTEC-E Engines)

1. Set No. 1 piston at Top Dead Center (TDC) and remove valve cover. See **Fig. 1** and **Fig. 3**. Ensure valve clearance is correct. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. On VTEC engines, manually push intake mid rocker arm on No. 1 cylinder. On VTEC-E engines, manually push and pull intake secondary rocker arm on No. 1 cylinder. See **Fig. 12** or **Fig. 13**. On all models, rocker arm being moved should move independent of other intake rocker arm(s) for same cylinder. Rotate crankshaft counterclockwise and repeat test for each cylinder at TDC.
2. On VTEC engines, if intake mid rocker arm does not move, remove intake mid, primary and secondary rocker arms as an assembly. A rubber band can be used to hold rocker arms together. See **Fig. 14**. Ensure pistons in mid and primary rocker arms move smoothly. On VTEC-E engine, if secondary rocker arm does not move, remove primary and secondary intake rocker arms as an assembly. A rubber band can be used to hold rocker arms together. See **Fig. 15**. Ensure pistons in rocker arms move smoothly. On all models, if any rocker arm needs replacing, replace all rocker arms as an assembly.

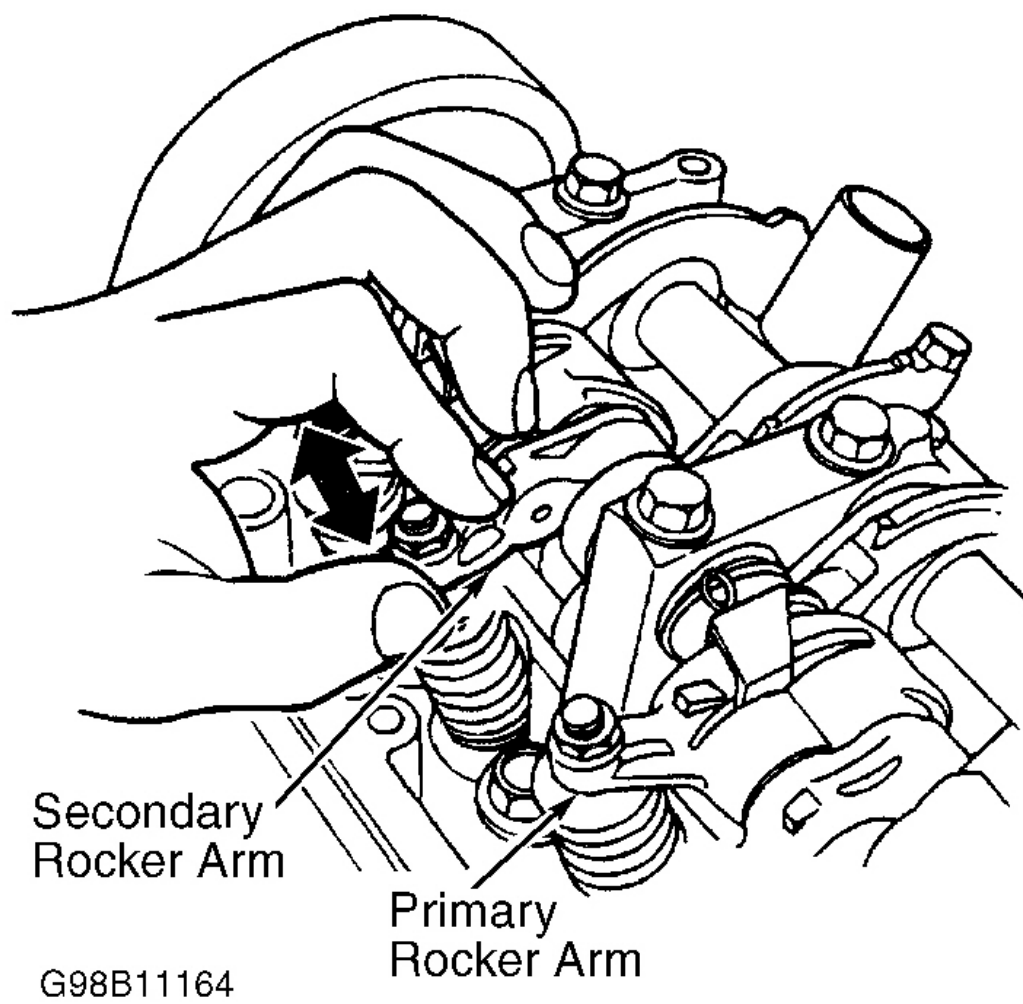


Fig. 12: Checking Intake Rocker Arms (VTEC-E)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

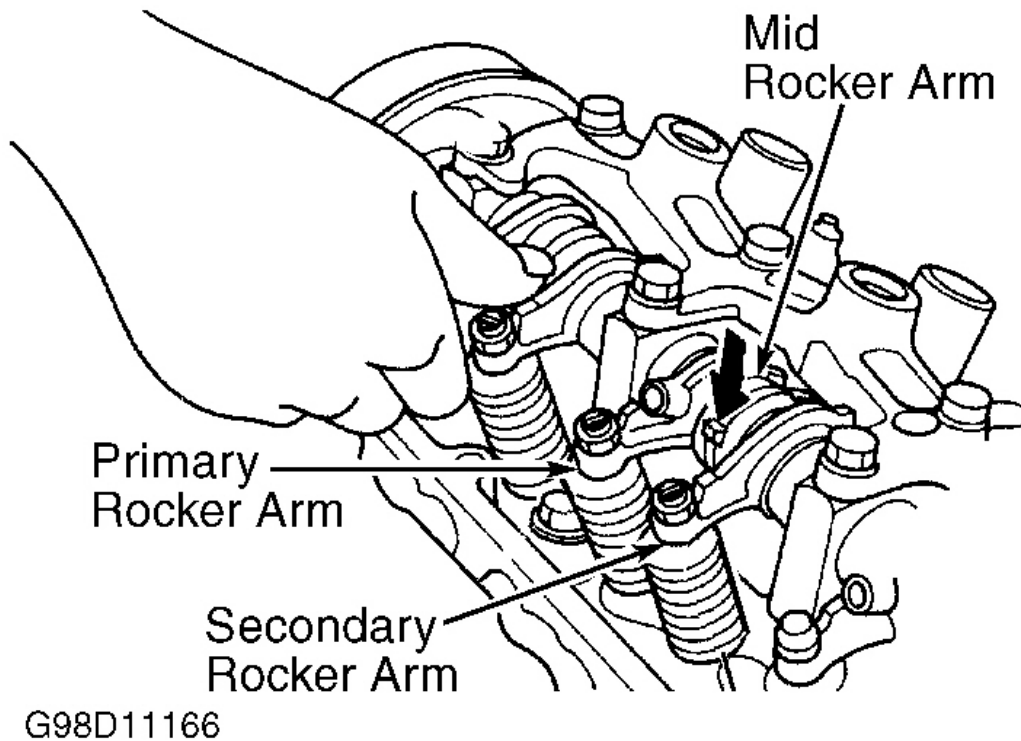


Fig. 13: Checking Intake Rocker Arms (VTEC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

On-Vehicle Air Pressure Inspection (VTEC & VTEC-E Engines)

1. Set No. 1 cylinder at Top Dead Center (TDC) and remove valve cover. See **Fig. 1** and **Fig. 3**. Ensure valve clearance is correct. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. Using Air Stopper (07LAJ-PR3020B), plug relief hole. Remove sealing bolt from inspection hole and connect air pressure valve inspection tool. See **Fig. 18**.
2. Cover timing belt with shop towel. Ensure available air pressure is greater than 57 psi (3.6 kg/cm²). Apply 36 psi (2.5 kg/cm²) air pressure to rocker arm synchronizing piston(s). If checking VTEC engine, go to next step. If checking VTEC-E engine, go to step 5.
3. On VTEC engine, ensure intake primary and secondary rocker arms are mechanically connected by synchronizing pistons. Ensure mid rocker arm does not move when pushed manually. If any intake mid rocker arm moves independent of primary and secondary rocker arms, replace rocker arms as a set. See **Fig. 13** and **Fig. 14**. Repeat procedure for each cylinder, with cylinder at TDC. If rocker arm operation is as specified, go to next step.
4. Turn off air pressure and remove air stopper and valve inspection tool. Ensure smooth operation of lost motion assemblies located above camshaft in lost motion assembly holder. Lost motion assembly should be slightly compressed when intake mid rocker arm is lightly pushed. Lost motion assembly should be

almost fully compressed when mid rocker arm is firmly pushed. If lost motion assembly plunger does not move smoothly, replace assembly. When inspection is complete, ensure Malfunction Indicator Light (MIL) does not come on.

5. On VTEC-E engine, timing plate is used to lock synchronizing piston inward or outward. See **Fig. 15**. Push timing plate up and ensure synchronizing piston pops out and engages intake secondary rocker arm. Ensure intake primary and secondary rocker arms are mechanically connected by synchronizing piston. Synchronizing piston should be visible between rocker arms. With timing plate engaged in timing piston groove, synchronizing piston should be locked in outward position.
6. Turn off air pressure and remove air stopper and valve inspection tool. Push timing plate up and ensure synchronizing piston snaps back to original position. If intake rocker arms do not operate as specified, replace as an assembly.

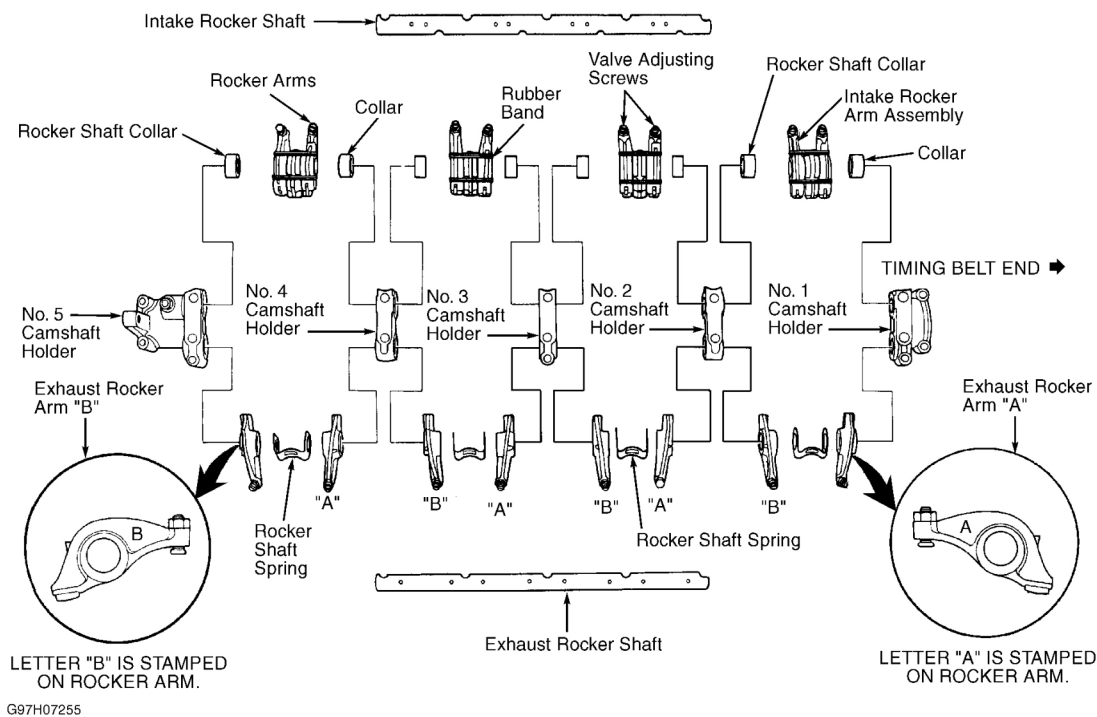


Fig. 14: Identifying Rocker Arm Assembly Components (D16Y8 Engine - VTEC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

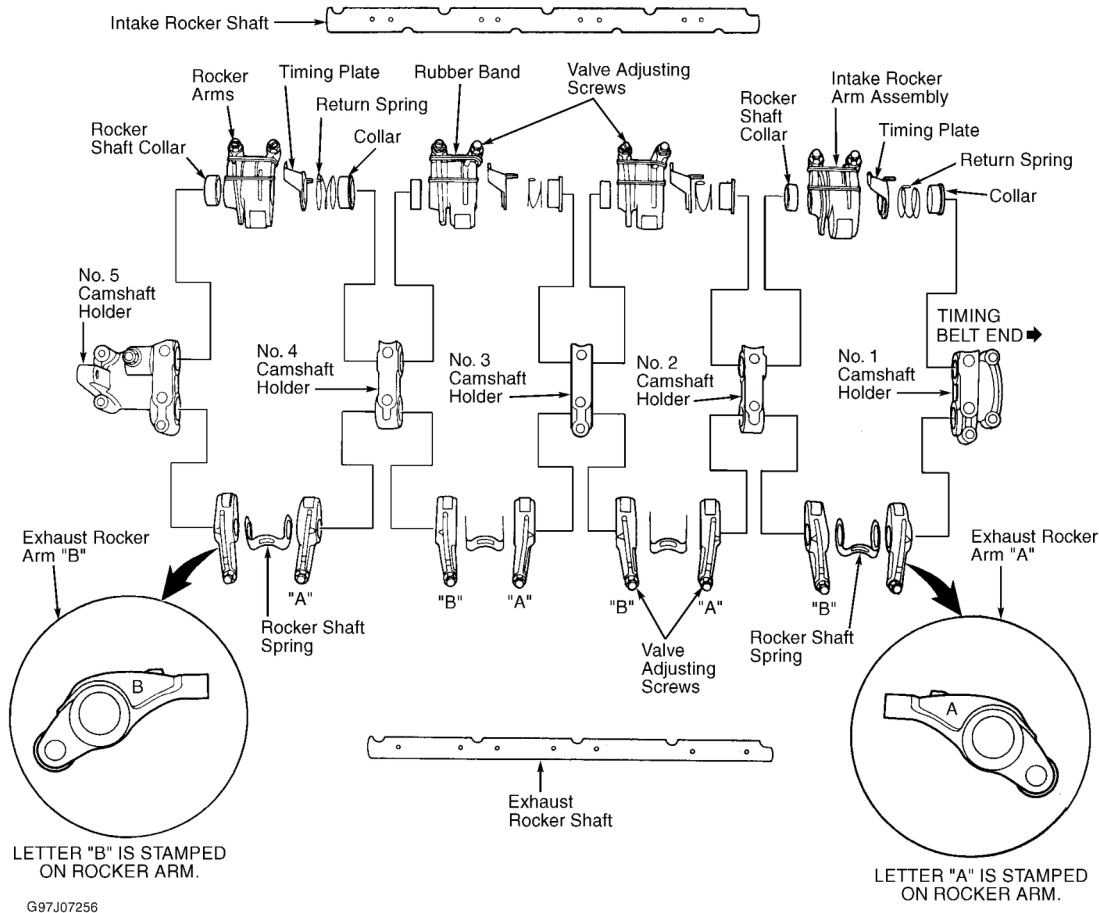


Fig. 15: Identifying Rocker Arm Assembly (D16Y5 Engine - VTEC-E)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

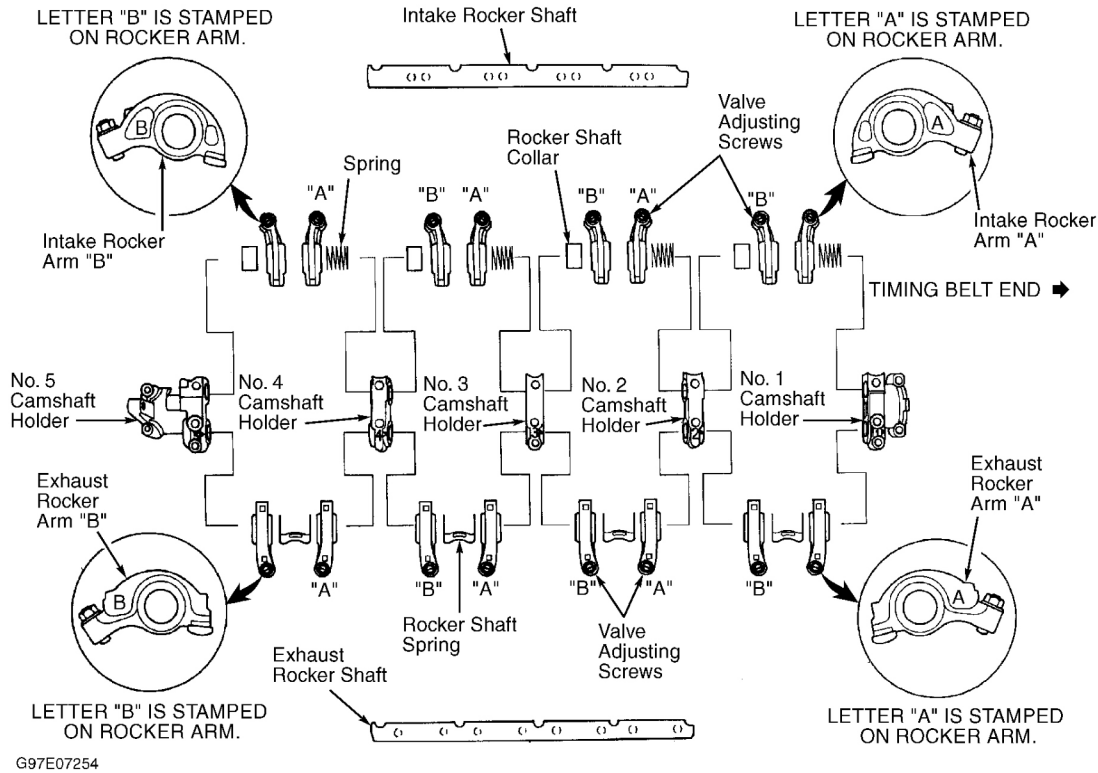
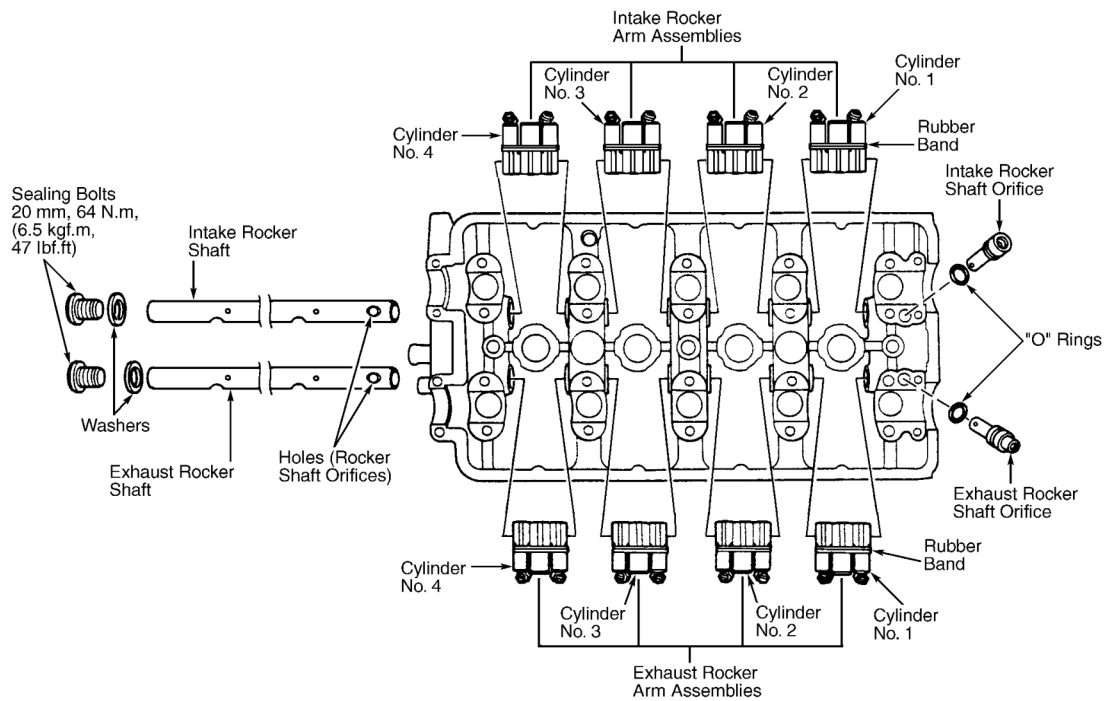


Fig. 16: Identifying Rocker Arm Assembly Components (D16Y7 Engine)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

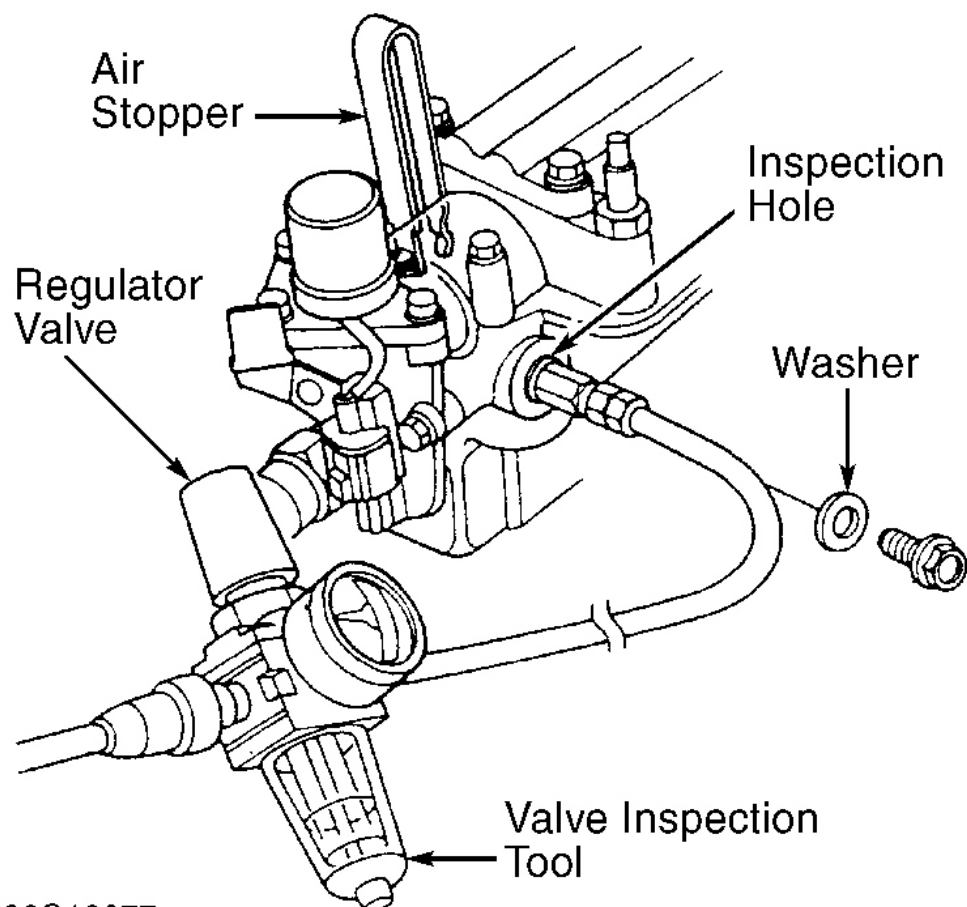
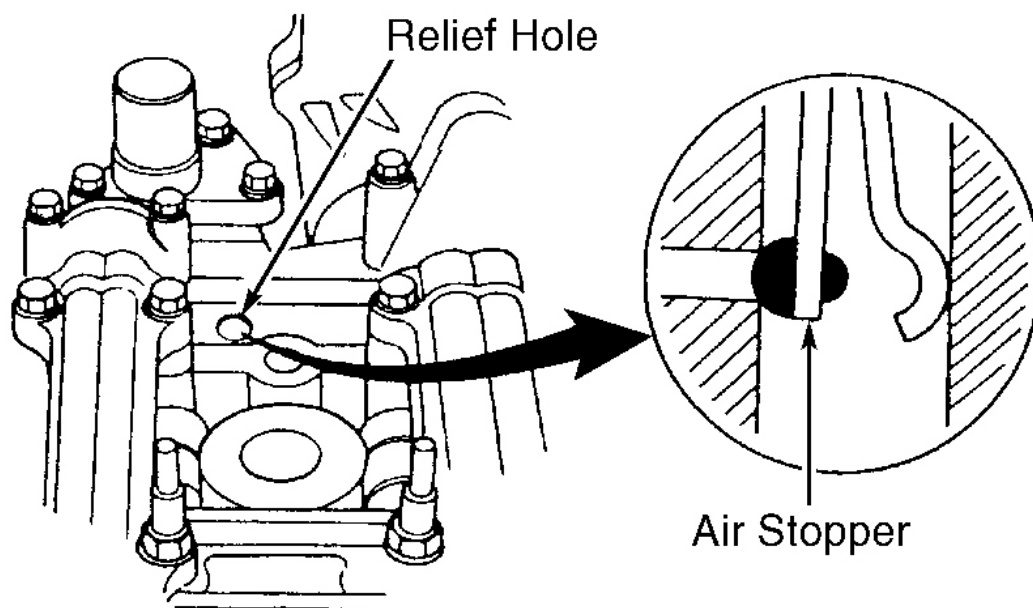
1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder



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Fig. 17: Identifying Rocker Arm Assembly Components (B16A2 Engine)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

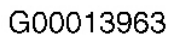


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Fig. 18: Installing Air Stopper & Valve Inspection Tool (VTEC Shown; VTEC-E Is Similar)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection VTEC Intake Rocker Arm & Lost Motion Assemblies (DOHC)

1. Before rocker arms are removed, set cylinder No. 1 to TDC. Ensure mid (connecting) rocker arm on cylinder No. 1 moves independent of primary and secondary intake rocker arms. See **Fig. 19**. Check remaining mid rocker arms with corresponding cylinder at TDC. If mid rocker arm does not move independent of primary and secondary rocker arms, remove suspect rocker arm assembly. Check movement of timing piston and synchronizing pistons.
2. Timing piston and synchronizing pistons should move smoothly when pushed into rocker arms. Inspect rocker arm pistons for signs of scoring or damage. Replace rocker arms as an assembly if necessary. Apply oil to pistons when reassembling rocker arms. When assembling primary rocker arm, carefully apply air pressure to primary rocker arm oil passage.
3. Remove lost motion assembly from cylinder head. Lost motion assembly should be slightly compressed when plunger is lightly pushed. Lost motion assembly should be almost fully compressed when plunger is firmly pushed. If lost motion assembly plunger does not move smoothly, replace lost motion assembly.



Courtesy of AMERICAN HONDA MOTOR CO., INC.

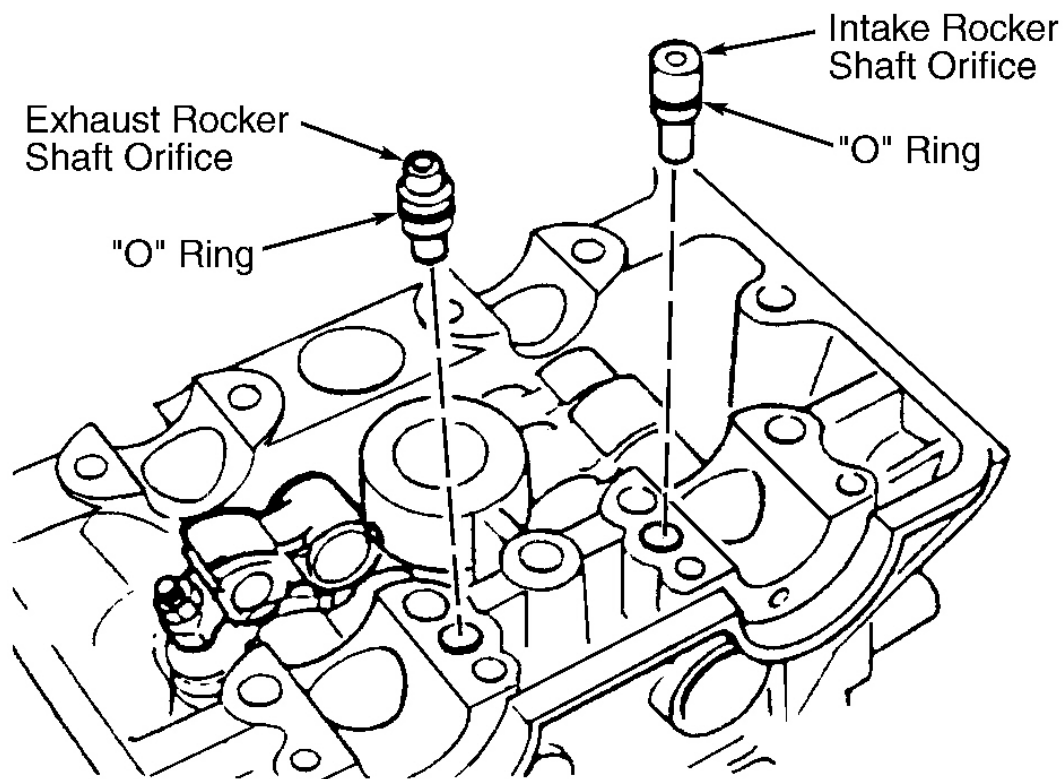
NOTE: DO NOT rotate camshaft during inspection. Do not inspect camshaft oil clearance with rocker arms installed.

Removal (SOHC)

Remove valve cover. Loosen all valve adjuster screws. Loosen camshaft holder bolts 2 turns at a time in proper sequence, but DO NOT remove holder bolts. See **Fig. 7**. Remove rocker arm assembly with camshaft holder bolts in place. See **Fig. 14 Fig. 15** and **Fig. 16**. Camshaft holder bolts will keep camshaft holders, springs and rocker arms on rocker shaft. Bundle rocker arms with a rubber band to keep assembly together. Ensure components that are reused are installed in original locations.

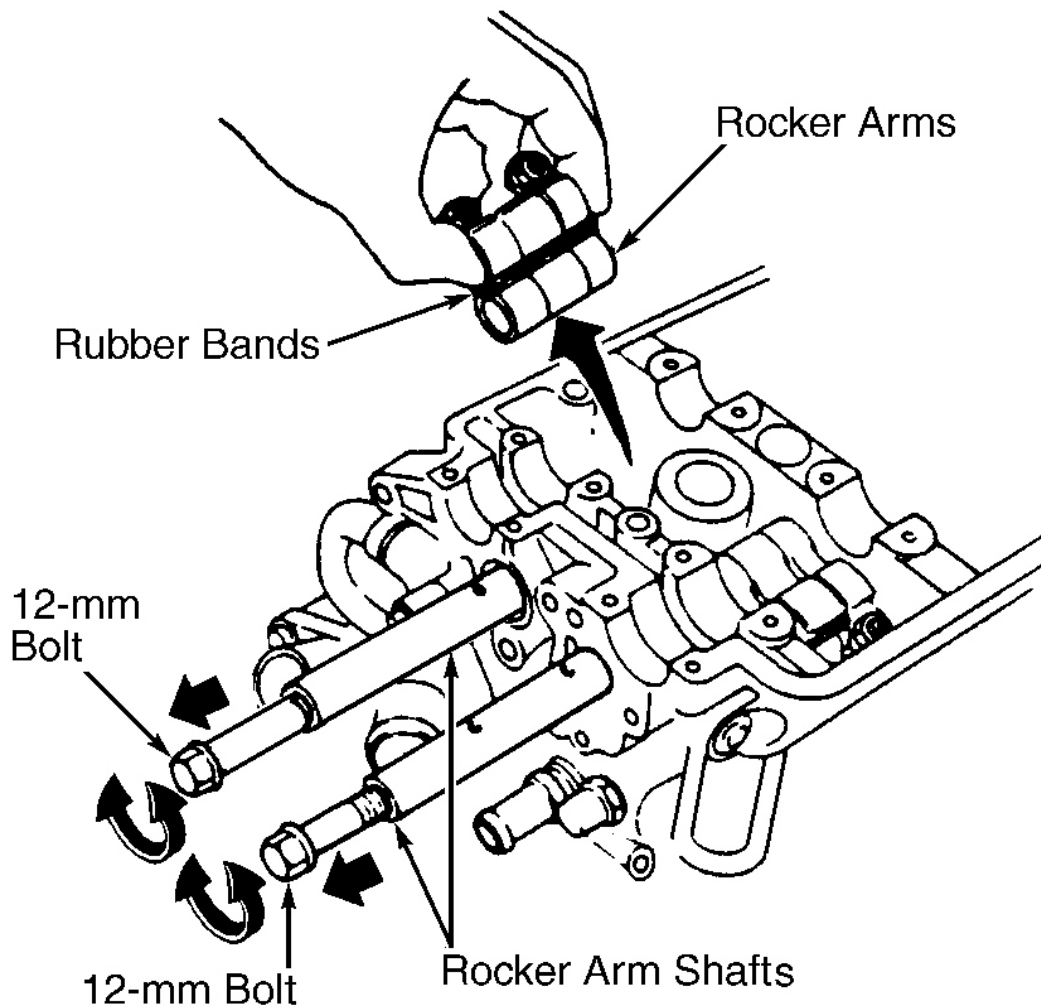
Removal (DOHC)

1. Remove timing belt. See **TIMING BELT**. Remove side engine mount upper bracket, camshaft pulleys and back cover.
2. Loosen all valve adjuster screws. Loosen camshaft holder bolts 2 turns at a time in proper sequence. See **Fig. 8**. Remove VTEC solenoid valve and 20-mm sealing bolt located under distributor. Remove camshaft holder plates, camshaft holders and camshafts. See **Fig. 17**.
3. Remove intake and exhaust rocker shaft orifices located at timing belt end of cylinder head, under camshaft holders. See **Fig. 20**. Rocker shaft orifices are shaped differently. Ensure components are returned to original locations during reinstallation. Remove sealing bolts for rocker arm shafts located at distributor end of cylinder head.
4. Install rubber bands around rocker arms assemblies to keep them together. Install 12-mm bolt into threaded end of each rocker arm shaft. See **Fig. 21**. Remove each rocker arm assembly while slowly pulling out intake and exhaust shafts.



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Fig. 20: Locating Exhaust & Intake Rocker Shaft Orifices (DOHC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 21: Removing Rocker Arm Assemblies (DOHC)
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Inspection (SOHC)

1. On VTEC and VTEC-E engines, manually push rocker arm synchronizing pistons. If pistons do not move smoothly, replace rocker arm assembly. Remove lost motion assembly from holder, push plunger with finger. Replace lost motion assembly, if plunger does not move smoothly.
2. On all engines, measure diameter of rocker shaft at each rocker arm location. Inspect rocker shaft for a smooth surface. Using a cylinder bore gauge, measure inside diameter of rocker arm and check for an out-of-round condition. Compare diameter of rocker shaft with corresponding rocker arm inside diameter. See **ROCKER ARM & ROCKER ARM SHAFT** table under ENGINE SPECIFICATIONS for rocker arm-to-shaft clearance.

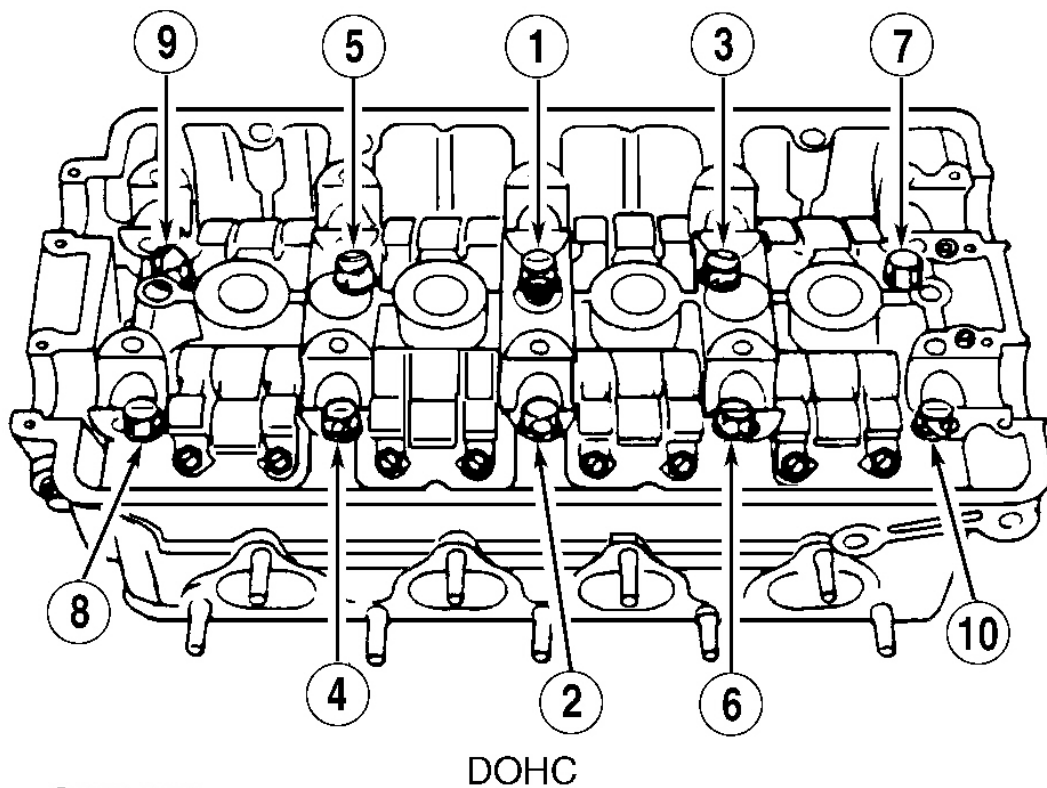
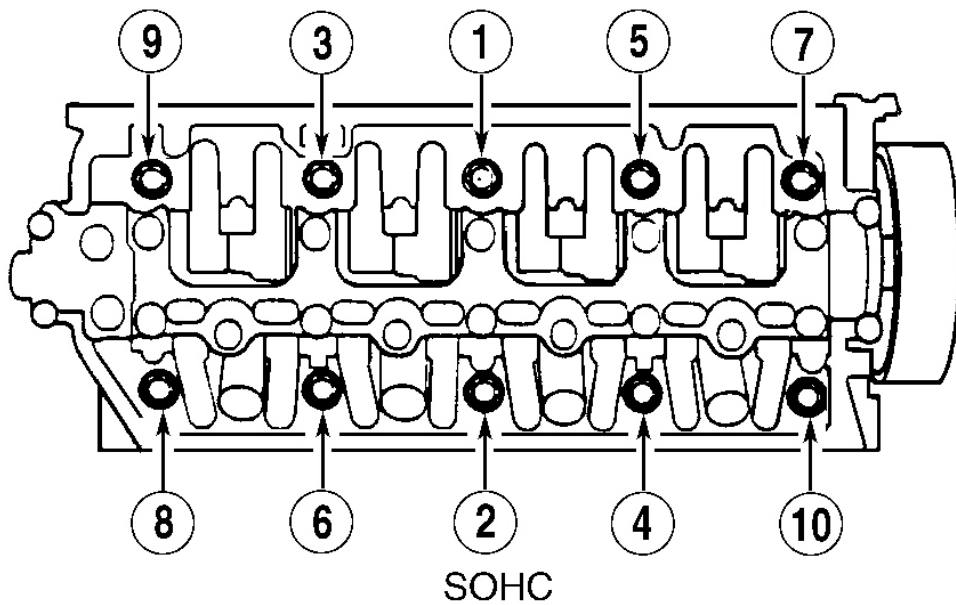
3. Repeat procedure for all rocker arms. If clearance is over service limit, replace rocker shaft and all rocker arm assemblies not within specification. Inspect rocker arm face for cracking and wear.

Inspection (DOHC)

1. Ensure synchronizing pistons move smoothly within rocker arms. If pistons do not move smoothly, replace rocker arm assembly. When assembling primary rocker arm, carefully apply air pressure to oil passage of rocker arm. Remove lost motion assembly from holder, push plunger with finger. Replace lost motion assembly if plunger does not move smoothly.
2. Inspect rocker shaft for a smooth surface. Measure diameter of rocker shaft at each rocker arm location. Using a cylinder bore gauge, measure inside diameter of rocker arm and check for an out-of-round condition. Compare diameter of rocker shaft with corresponding rocker arm inside diameter. See **ROCKER ARM & ROCKER ARM SHAFT** table under ENGINE SPECIFICATIONS for rocker arm-to-shaft clearance.
3. Repeat procedure for all rocker arms. If clearance is not within specification, replace rocker shaft and all rocker arm assemblies not within specification. Inspect rocker arm face and adjusting screw face for cracking and wear.

Installation (SOHC)

1. To install, reverse removal procedure, ensuring all reused components are installed in original positions. Clean all parts in solvent, and lubricate contact points. Install camshaft. See **CAMSHAFT**. Clean and install rocker shaft oil control orifice with NEW "O" ring. Ensure valve adjusting lock nuts are loose, and adjusting screws are backed off.
2. Set rocker arm assembly in place and loosely install camshaft holder bolts. Ensure all rocker arms are in alignment with proper valves when tightening camshaft holder bolts. Tighten bolts in sequence, 2 turns at a time, to specification. See **Fig. 23**. See **TORQUE SPECIFICATIONS**. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.



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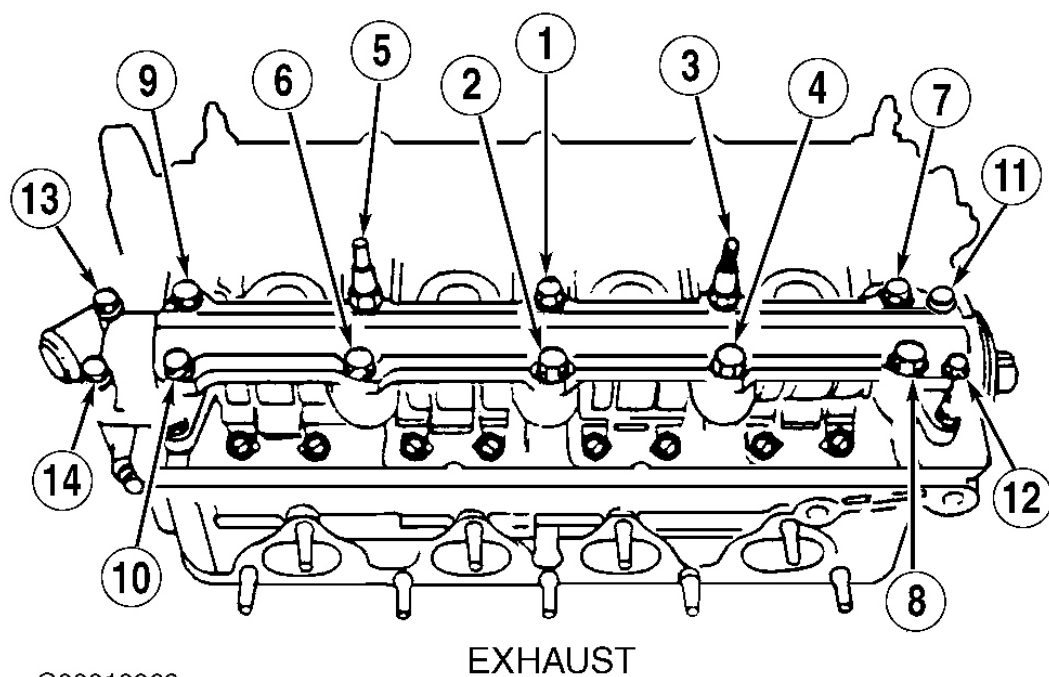
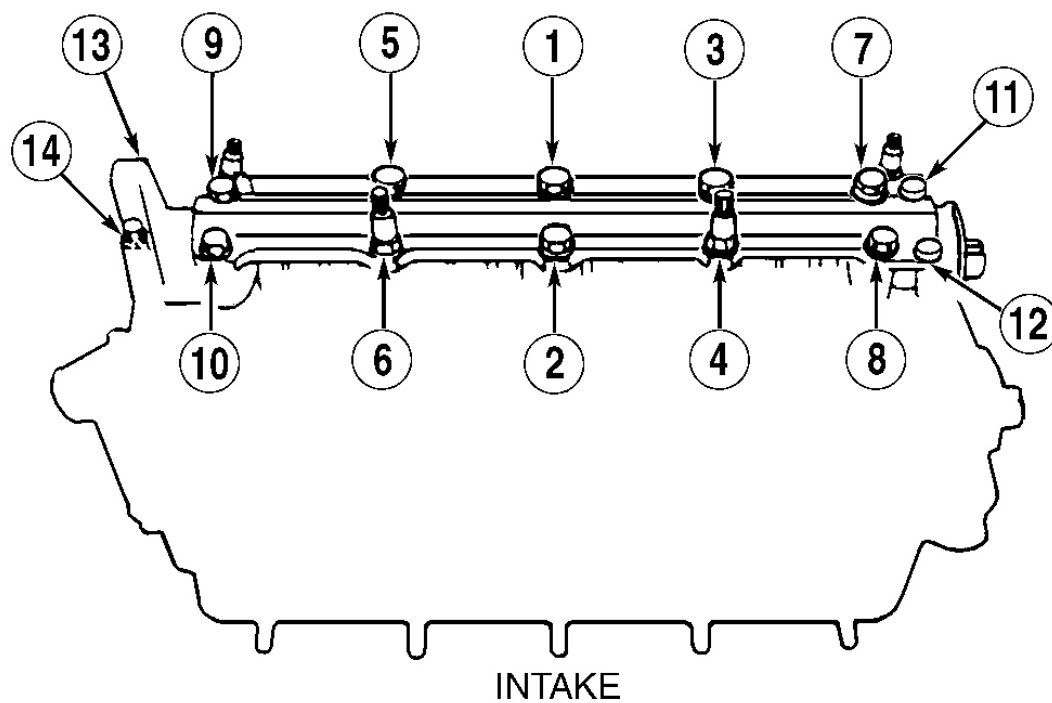
Fig. 22: Cylinder Head Bolt Tightening Sequence (DOHC & SOHC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

Installation (DOHC)

1. Loosen rocker arm valve adjusting lock nuts and back off adjusting screws. Ensure all reused components are installed in original positions. Clean and lubricate all moving components. Install lost motion assemblies.
2. Install rocker arm assemblies while inserting rocker arm shaft through cylinder head. Remove rubber bands after installing rocker arms. Clean and install rocker shaft oil control orifices with NEW "O" rings. Oil control orifices are different sizes and must be installed in original locations. Ensure hole in rocker arm shaft is aligned with rocker shaft oil control orifice. If necessary, use 12-mm bolt to rotate rocker shaft.

NOTE: **Cylinder head, and intake and exhaust manifolds must be installed before camshafts are installed. Ensure oil control orifice, located under No. 3 camshaft holder, is cleaned and installed using a NEW "O" ring.**

3. Install VTEC solenoid valve and rocker arm shaft 20-mm sealing bolts. Install cylinder head and manifolds if necessary. See **CYLINDER HEAD**. Install camshafts and seals with keyway facing up, and seals with spring side facing inward. Ensure seal housing is clean and dry.
4. Apply gasket sealer to rubber cap and install in cylinder head at distributor end of intake camshaft. Apply gasket sealer to cylinder head mating surfaces of intake and exhaust camshaft holders No. 1 and 5.
5. Ensure camshaft keyways are facing up, and install camshaft holders. Ensure arrows marked on holders point toward timing belt. Tighten holder bolts to specification in sequence. See **TORQUE SPECIFICATIONS**. See **Fig. 23**.
6. Install timing belt back cover, camshaft pulleys and side engine mount upper bracket. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Install timing belt. See **TIMING BELT & TIMING BALANCER BELT**. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under **ADJUSTMENTS**. To complete installation, reverse removal procedure.



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Fig. 23: Camshaft Holder Plate Bolt Tightening Sequence (DOHC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

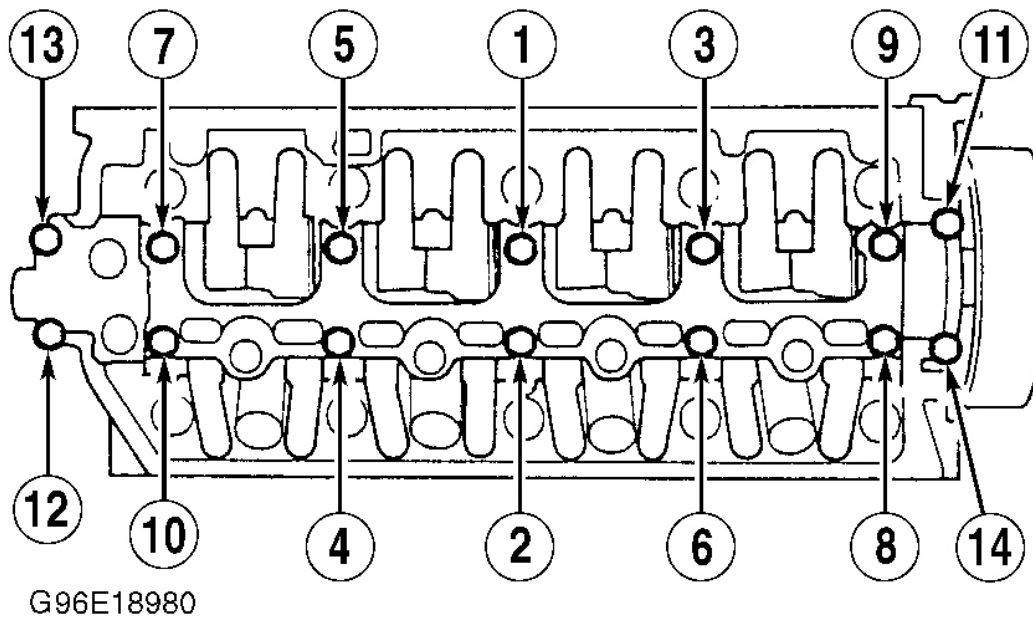


Fig. 24: Camshaft Holder Plate Bolt Tightening Sequence (SOHC)
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFT

NOTE: DO NOT remove camshaft holder bolts from rocker arm assembly. Bolts keep cam holders, springs, and rocker arms on shaft.

Removal

1. Ensure No. 1 piston is at Top Dead Center (TDC) of compression stroke. Position UP mark on camshaft pulley at top. Remove valve cover. Remove timing belt. See **TIMING BELT**. Mark distributor for installation reference. Remove distributor. Remove camshaft pulley and timing belt back cover.
2. Loosen all valve adjusting screws. Remove rocker arm assembly. See **ROCKER ARM ASSEMBLY**. Remove camshaft bearing cap bolts by turning bolts 2 turns at a time in proper sequence. See **Fig. 7** and **Fig. 8**. Remove camshaft.

Inspection

1. Remove rocker arm assembly. Install camshaft and camshaft holders on cylinder head and tighten bolts in sequence to specification. See **Fig. 23** and **Fig. 24**. See **TORQUE SPECIFICATIONS**.
2. Seat it by pushing toward distributor end of cylinder head. Zero a dial indicator against pulley end of camshaft. Without rotating camshaft, push it back and forth, and read camshaft end play on dial indicator. See **CAMSHAFT** table under ENGINE SPECIFICATIONS for end play specification.

3. Remove camshaft bolts 2 turns at time in sequence. Remove camshaft, and wipe clean. Inspect camshaft lift ramps. If any lobes are pitted, scored, or excessively worn, replace camshaft. Clean camshaft bearing surfaces in cylinder head, and install camshaft. Place Plastigage across each camshaft journal, and measure camshaft-to-holder oil clearance. Install camshaft holders and tighten bolts in sequence to specification. See **TORQUE SPECIFICATIONS**.
4. Remove camshaft holders and measure widest portion of Plastigage on each journal. See **CAMSHAFT** table under ENGINE SPECIFICATIONS for camshaft-to-holder oil clearance specification. If oil clearance is not as specified, go to next step. If oil clearance is as specified, go to step 7.
5. If camshaft-to-holder clearance is not within specification, and camshaft has been replaced, replace cylinder head. If oil clearance is not within specification and camshaft has not been replaced, check camshaft total runout. See **CAMSHAFT** table under ENGINE SPECIFICATIONS.
6. Place camshaft on "V" blocks, and measure runout. If camshaft total runout is within specification, replace cylinder head. If total runout is not within specification, replace camshaft and recheck oil clearance. If oil clearance is still not within specification, replace cylinder head.
7. Check cam lobe height wear. Check primary, mid (on VTEC engines) and secondary cam lobes of intake and exhaust camshafts. See **CAMSHAFT** table under ENGINE SPECIFICATIONS for cam lobe height specification. If cam lobe height exceeds specification, replace camshaft.

Installation

1. Lubricate camshaft journals and journal surfaces in bearing caps and cylinder head. Apply a light coat of oil to camshaft seal lip and camshaft. Seal housing surface should be dry. Install camshaft with keyway pointing upward (No. 1 piston at TDC). Clean and install oil control orifice (if equipped) with a NEW "O" ring.
2. Apply liquid gasket to head mating surfaces of No. 1 and 5 camshaft holders. Loosely install camshaft holders in original positions. Install rocker arms and shafts. See **ROCKER ARM ASSEMBLY**. Ensure rocker arms valve adjuster screw lock nuts are loose, and adjusting screws are backed off. Ensure rocker arms are aligned with corresponding valves.
3. Tighten camshaft holder bolts in sequence 2 turns at a time, to specification. See **Fig. 23** and **Fig. 24**. Ensure rocker arms do not bind on valves. Install timing belt back cover and camshaft pulley(s). Tighten pulley bolt to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

WATER PUMP

Removal

Disconnect battery negative cable. Drain cooling system. Remove timing belt. See **TIMING BELT**. Remove water pump bolts, water pump, and "O" ring.

Installation

Clean "O" ring groove and mating surface of cylinder block. Install NEW water pump "O" ring. Install water pump. To complete installation, reverse removal procedure. Tighten bolts to specifications. See **TORQUE SPECIFICATIONS**. Fill and bleed cooling system. See **COOLING SYSTEM BLEEDING**.

OIL PAN

Removal & Installation

Raise and support vehicle. Drain engine oil. Remove oil pan bolts and oil pan. Clean gasket surfaces. Before installing oil pan, apply liquid gasket to front and rear of gasket, where curved area mates with side rail surfaces of oil pan gasket. If oil pan is not installed within 5 minutes of applying liquid gasket, remove old residue and reapply liquid gasket. Install oil pan. Tighten 6 bolts finger tight, in sequence. See **Fig. 25**. Install remaining bolts. Starting from bolt No. 1 and moving clockwise, tighten all bolts in 3 steps. See **TORQUE SPECIFICATIONS**. Overtighten bolts can cause oil pan gasket to distort and leak. Wait at least 20 minutes before adding oil to engine.

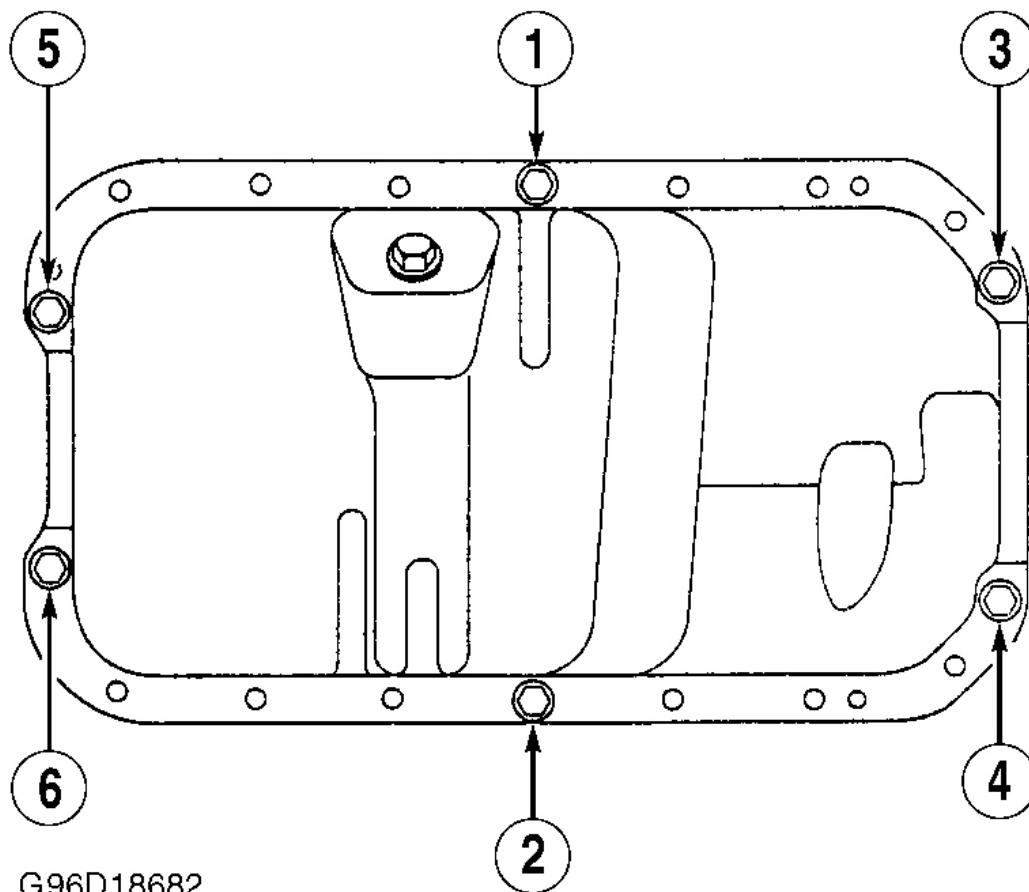


Fig. 25: Tightening Sequence For Oil Pan Bolts
Courtesy of AMERICAN HONDA MOTOR CO., INC.

OVERHAUL

CYLINDER HEAD

Cylinder Head

Ensure all mating surfaces are clean. Measure cylinder head warpage. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

Valve Springs

Before installing valve spring compressor and removing valve springs, using a socket and a plastic mallet, lightly tap valve retainer to loosen valve keepers. Measure free length of valve springs. If free length is not within specification, replace valve spring. See appropriate **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS.

Valve Stem Oil Seals

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

Valve Guide Inspection

Measure valve guide inside diameter. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Measure valve stem outer diameter. See appropriate **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS. Subtract valve stem measurement from valve guide inside diameter measurement. Replaced valve or guide if valve clearance is not within specification.

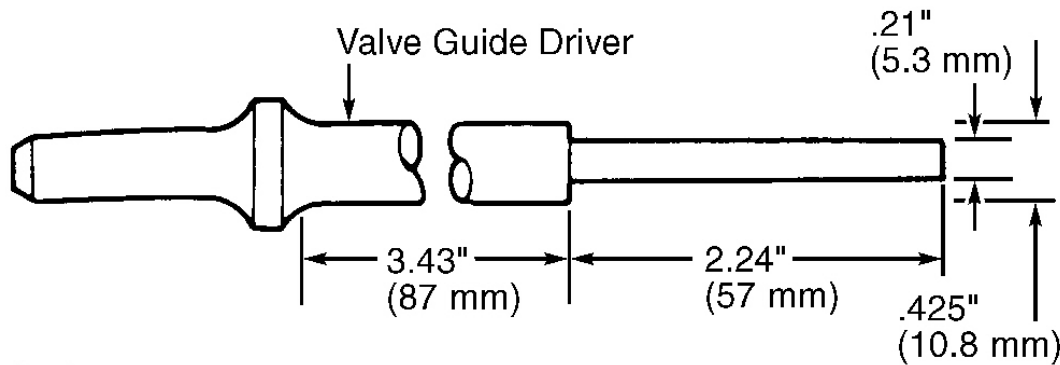
Valve Guide Removal

1. Use a hot plate or oven to heat cylinder head to 300°F (150°C). Use valve guide driver, or fabricate valve guide remover from an air impact chisel. See **Fig. 26**. Using an air hammer and valve guide remover, drive valve guide 3/32" (2 mm) toward combustion chamber. This will knock off carbon and make removal easier.

CAUTION: DO NOT heat cylinder head with a torch because it may warp head because of uneven heat. DO NOT heat cylinder head to a temperature greater than 300°F (150°C) because it may loosen valve seats.

2. Turn head over. Working from combustion chamber side of head, drive valve guide out toward camshaft side of head. Ensure hammer force is directly in line with valve guide to prevent damaging driver. If valve guide does not move, drill valve guide using a 5/16" (8 mm) drill bit, then try to drive it out again.

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



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Fig. 26: Fabricating Valve Guide Remover

Courtesy of AMERICAN HONDA MOTOR CO., INC.

Valve Guide Installation

1. Chill new valve guides in freezer for about one hour. Remove new valve guides from freezer one at a time, as needed. Lubricate new valve guides with engine oil and install from camshaft side of cylinder head. Using Valve Guide Driver (07742-0010100), drive each guide into heated head until washer bottoms against head. If replacing all valve guides, reheat cylinder head as necessary.
2. Ensure valve guide installed height is as specified. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Using cutting oil, ream new valve guides by rotating Valve Guide Reamer (07HAH-PJ7010B) clockwise the full length of valve guide bore. Measure valve stem oil clearance. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS.

NOTE: Always reface valve seat after replacing valve guide.

Valve Seat

Valve seat replacement procedure is not available from manufacturer.

Valve Seat Correction Angles

If valve guides are to be replaced, perform replacement before refacing valve seats. After refacing, if seat width is too wide, use 60-degree stone to raise seat, or 30-degree stone to lower seat. Ensure valve seat width is within specification. See **CYLINDER HEAD** table under ENGINE SPECIFICATIONS. Use 45-degree stone to remove burrs.

Valve Stem Installed Height

After servicing valves, measure valve stem installed height. See **Fig. 27**. If valve stem installed height exceeds specification for any valve, replace valve. See appropriate **VALVES & VALVE SPRINGS** table under ENGINE SPECIFICATIONS. If valve stem installed height still exceeds limit, replace cylinder head.

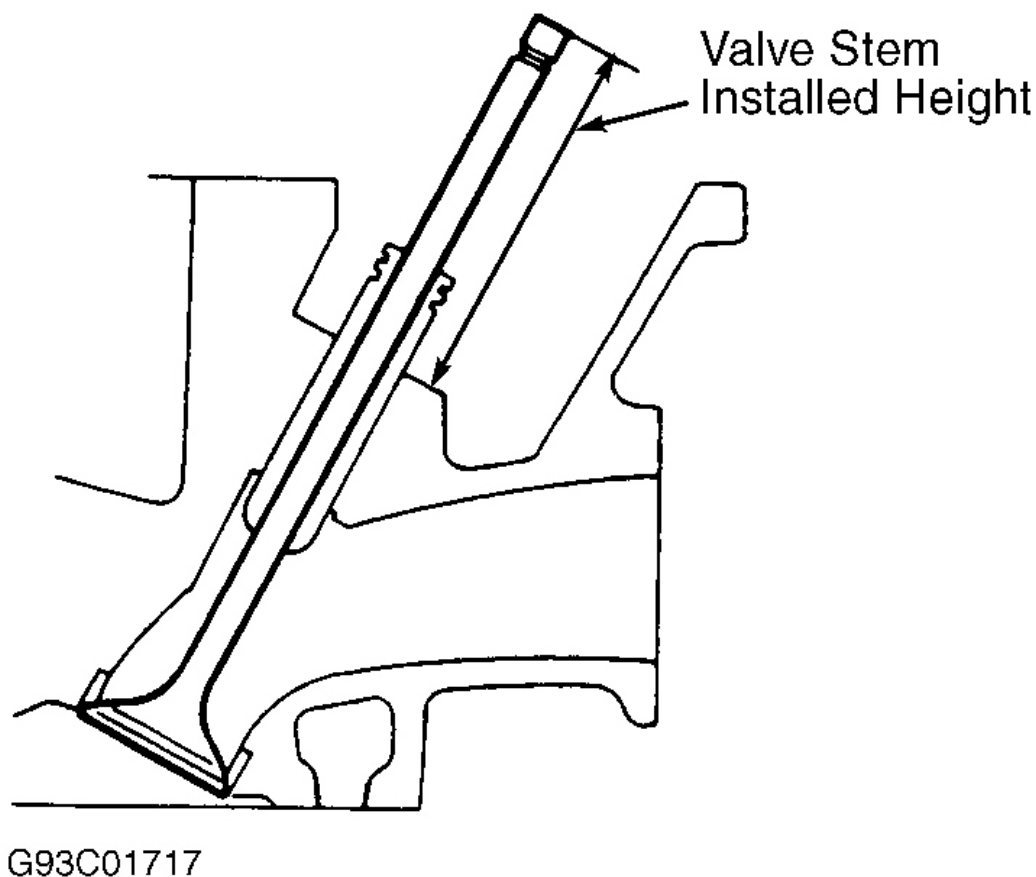


Fig. 27: Measuring Valve Stem Installed Height
Courtesy of AMERICAN HONDA MOTOR CO., INC.

VALVE TRAIN

Rocker Arm Shaft Assembly

1. Label and remove all rocker arm components from shafts. Inspect shafts for signs of scoring or damage. Ensure all oil passages are clear. Inspect rocker arms for wear in cam and valve contact areas. See **Fig. 14 Fig. 15 Fig. 16** or **Fig. 17** . Replace if damaged. Measure oil clearance between rocker arms and rocker shafts. Replace rocker arm assemblies and/or shaft if clearance exceeds limits. See **CAMSHAFT** table under ENGINE SPECIFICATIONS.
2. Lubricate rocker arms, and install all components onto shaft in original locations. Lubricate camshaft lobes. Apply sealing compound to mating surfaces of No. 1 and 5 camshaft holders. Loosen rocker arm lock nuts before installing rocker arm assembly. Tighten bolts to specification, in sequence. See. **Fig. 23** and **Fig. 24** .

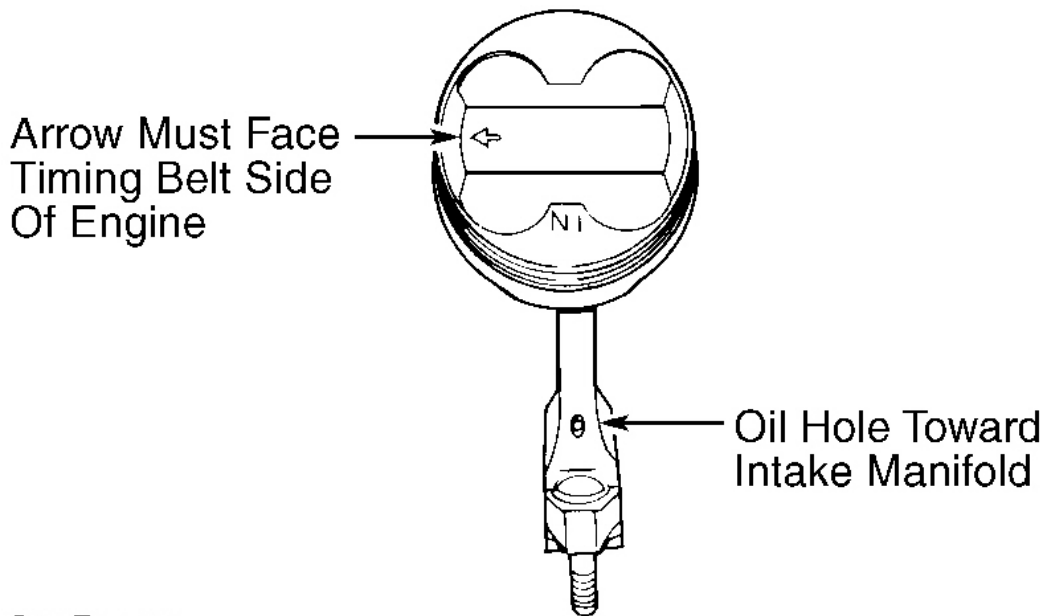
CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1. Each rod is sized into 1 of 4 tolerance ranges. Size depends on crank journal bore. A number between 1 and 4 is stamped on side of rod big end. Any combination of numbers between 1 and 4 may be found in any engine.

NOTE: Reference numbers are for big end bore code, and do not indicate rod position in engine.

2. Install piston and connecting rod so arrow on top of piston points toward timing belt, and connecting rod oil hole points toward intake manifold side of engine. See **Fig. 28**.



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Fig. 28: Positioning Piston On Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Piston Pin Removal

1. Install Piston Base Head (07973-SB00100) and Piston Pin Base Insert (07973-PE00400) into Base (07973-6570500). Turn handle on Piston Pin Driver (07973-PE00320) to adjust piston pin driver length to 2.09" (53.0 mm).
2. Insert Piston Pin Driver Shaft (07973-PE00310) into Pilot Collar (07973-PE00200). Place piston onto base with embossed side facing up. Press out piston pin. Ensure recessed part of piston aligns with lugs

on collar.

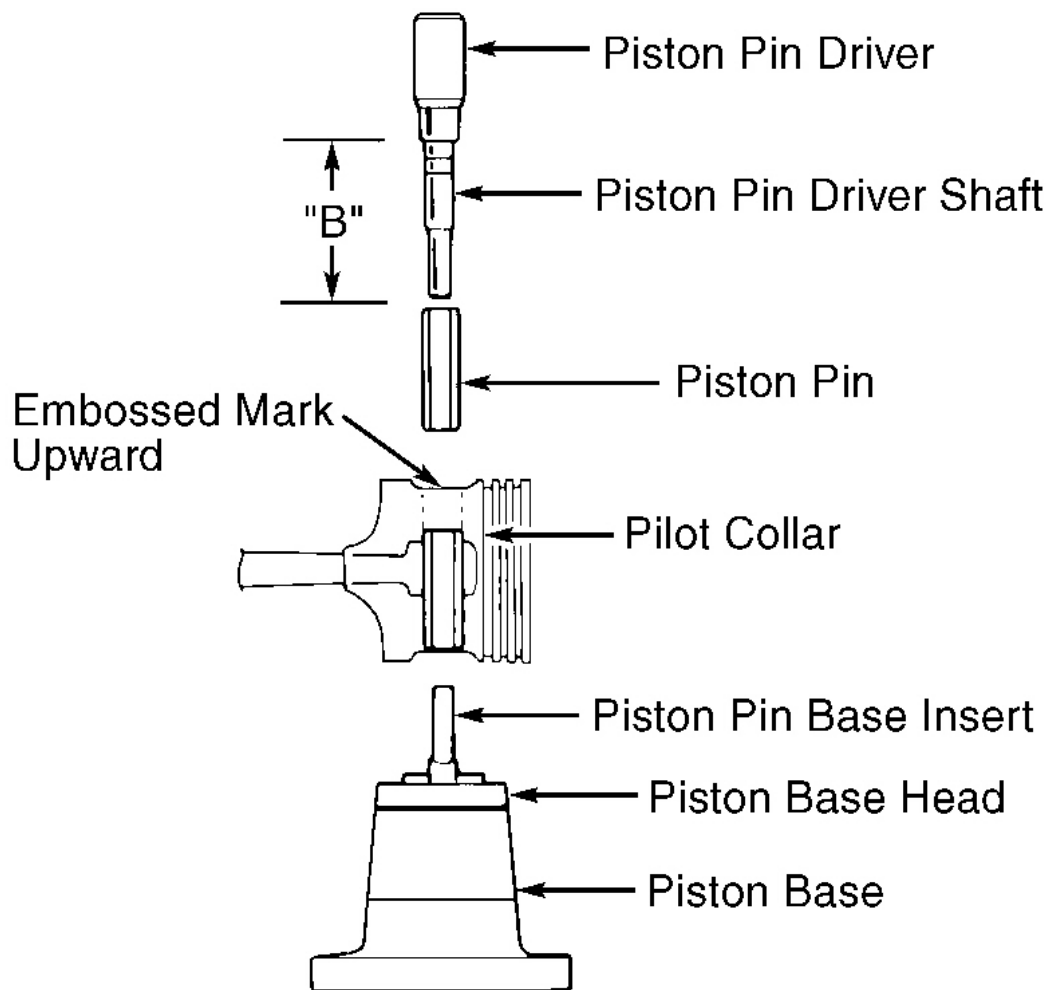
NOTE: **All replacement piston pins are oversize.**

Piston Pin Inspection

1. Measure diameter of piston pin. Measure diameter of piston pin bore in piston. Piston pin clearance is difference between the 2 measurements.
2. If piston pin clearance is greater than specification, recheck clearance using an oversized piston pin. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
3. Determine difference between piston pin diameter and connecting rod small end bore. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.

Piston Pin Installation

1. Ensure piston and connecting rod are positioned as shown. See **Fig. 29**. Turn handle on Piston Pin Driver (07973-PE00320) to adjust piston pin driver length to 2.09" (53.0 mm).
2. Install Pilot Collar (07973-PE00200) into piston and connecting rod. Lightly lubricate new piston pin. Place piston onto base with embossed side facing up and press in piston pin.



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Fig. 29: Installing Piston Pin

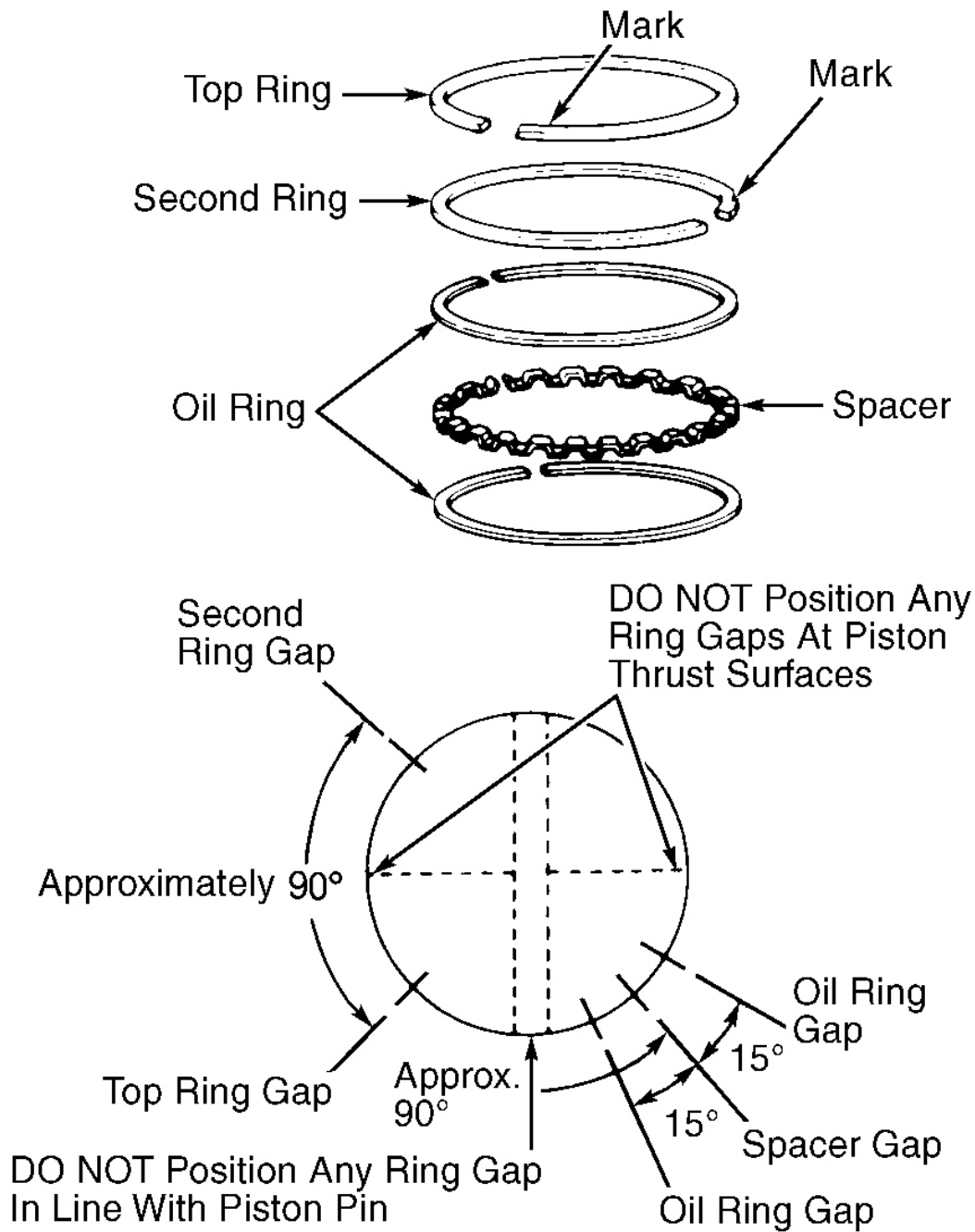
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Fitting Pistons

1. Clean piston thoroughly. Check piston for distortion or cracks. Measure piston diameter on SOHC engine at 0.20" (5 mm), or on DOHC engine at 0.60" (15 mm) from bottom of piston skirt. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. If diameter is not within specification, replace piston.
2. Determine piston-to-cylinder clearance by comparing piston diameter and cylinder bore diameter. If clearance is near or exceeds limit specification, check each piston and cylinder for excessive wear. If piston clearance exceeds service limit, rebore cylinder and install oversize piston. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Pistons are available on SOHC engine in 0.010" (0.25 mm) and 0.020" (0.50 mm) oversize, and on DOHC engine in 0.010" (0.25 mm) oversize.

Piston Rings

1. Using inverted piston, push NEW piston ring into cylinder bore 0.59-0.80" (15-20 mm) from bottom. Measure piston ring end gap, using a feeler gauge. Repeat for each ring. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS.
2. Clean piston ring grooves thoroughly using a squared-off broken ring or a ring groove cleaner. DO NOT use a wire brush to clean ring grooves. Install piston rings with identification mark toward top of piston. Using a feeler gauge, measure piston ring side clearance between ring and ring land.
3. If ring lands are excessively worn, replace piston. See **PISTONS, PINS & RINGS** table under ENGINE SPECIFICATIONS. Align piston ring end gaps properly on piston. See **Fig. 30**.



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Fig. 30: Installing Piston Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

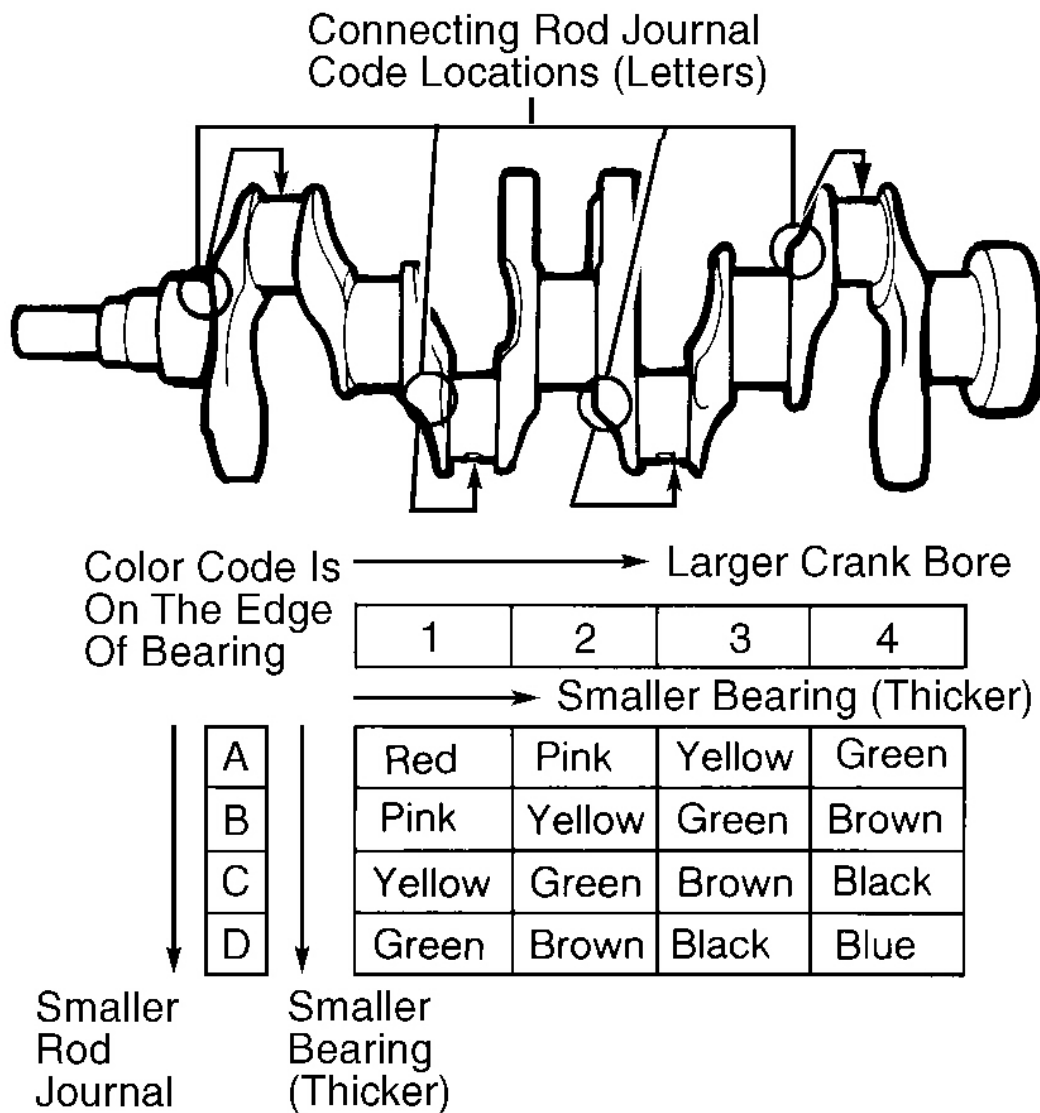
Connecting Rod Bearings

1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

1. Using Plastigage, measure connecting rod bearing oil clearance with connecting rod bearing cap tightened to specification. See **TORQUE SPECIFICATIONS**. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.
2. If oil clearance is incorrect, install a NEW bearing set (same color code), and recheck oil clearance. DO NOT shim or file cap to adjust oil clearance.
3. If oil clearance is still incorrect, try the next larger or smaller bearing. Measure oil clearance again. If proper oil clearance cannot be obtained by using larger or smaller 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 crankshaft counterweight pad, at pulley end. See **Fig. 31**. Use both codes when ordering replacement bearings.



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Fig. 31: Connecting Rod Journal & Bearing Identification Codes
 Courtesy of AMERICAN HONDA MOTOR CO., INC.

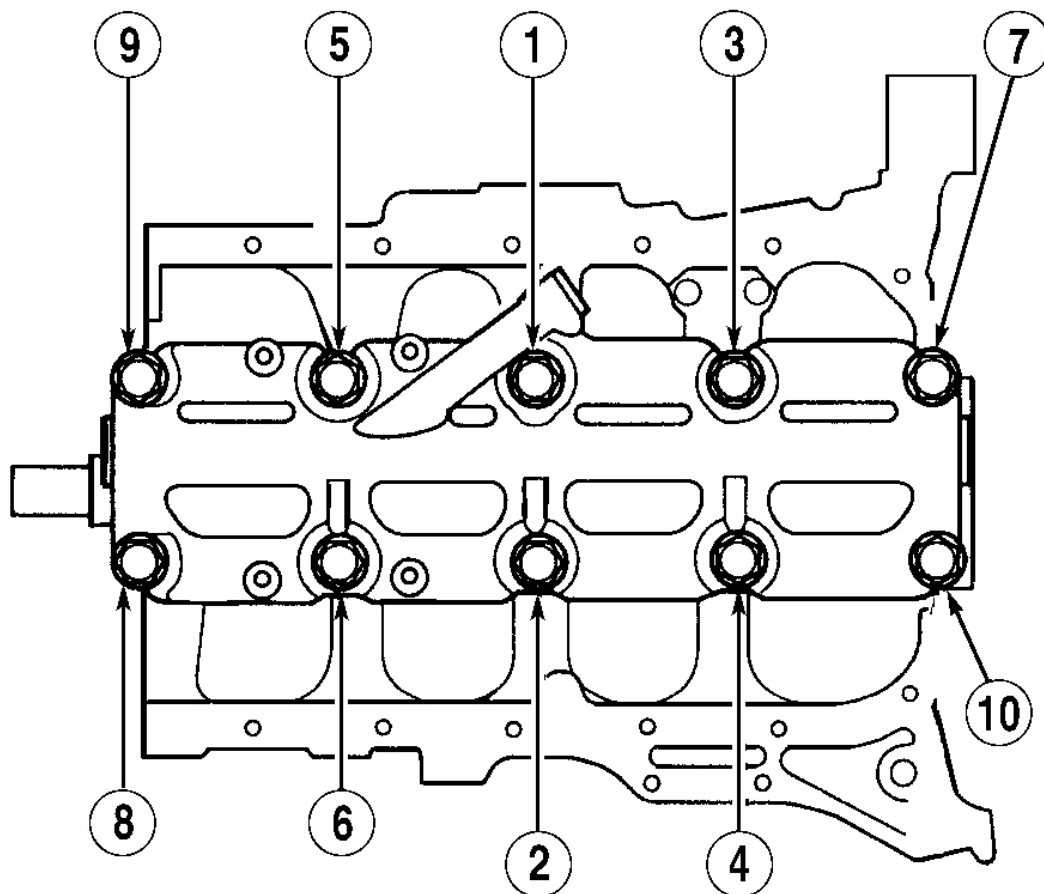
Crankshaft & Main Bearings

1. Remove rear crankshaft oil seal cover, oil screen, and oil pump. Remove connecting rod bearing caps and bearing halves. Loosen main bearing cap bolts 1/3 turn at a time, in reverse order of tightening sequence. See **Fig. 32**. Keep all bearings and caps in order. Carefully lift crankshaft from block. DO NOT damage journals.
2. Clean crankshaft oil passages using pipe cleaners or a suitable brush. Check keyway and threads. Using a

lathe or "V" blocks to support crankshaft, measure runout of crankshaft main journals to ensure crankshaft is not bent. Measure out-of-round in 2 places on each rod and main journal. Measure taper at edges of each rod and main journal. If any measurement exceeds service limit, replace crankshaft. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** table under ENGINE SPECIFICATIONS.

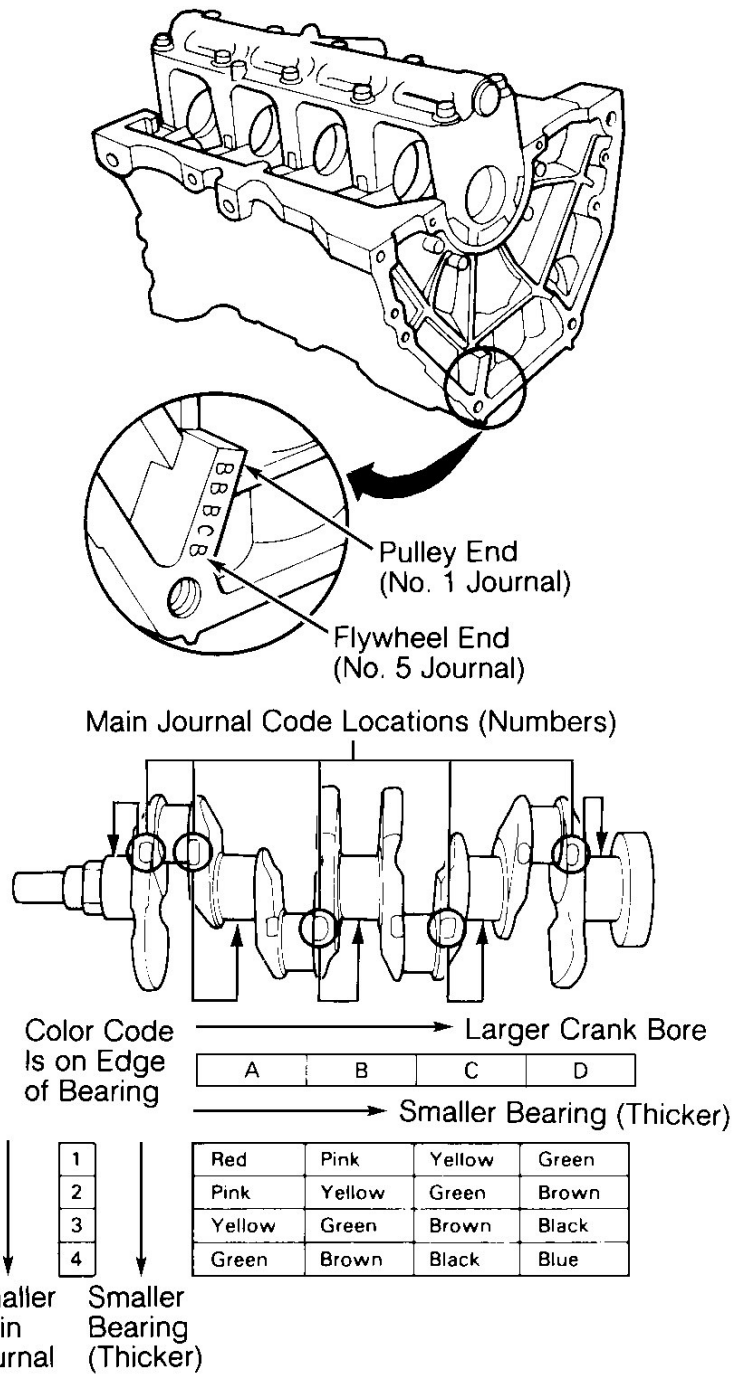
3. Install crankshaft into block. Measure main bearing oil clearance, using Plastigage. If engine is in vehicle, support counterweights using a jack, and measure only one bearing at a time. Tighten main bearing cap bolts to specification in 2 stages, in sequence. See **Fig. 32**. See **TORQUE SPECIFICATIONS**.
4. If oil clearance is incorrect, remove crankshaft upper bearing half (remove engine if still in vehicle). Install a complete new bearing pair (same color code), and measure oil clearance once again. If oil clearance is still incorrect, try next larger or smaller bearing, and measure oil clearance once more. If proper oil clearance cannot be achieved by using larger or smaller bearings, replace crankshaft and repeat procedure.

NOTE: Letter codes indicating main journal bore diameters are stamped on cylinder block. See **Fig. 33**. Main journal diameter codes (numbers) are stamped on crankshaft counterweight pad. Use both codes to order correct replacement bearings.



G98F11168

Fig. 32: Main Bearing Cap Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



G91101452

Fig. 33: Locating Crankshaft Main Journal & Bearing Identification Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Thrust Bearing

1. Measure crankshaft end play using a dial indicator. If end play exceeds specification, inspect thrust washers and thrust surface of crankshaft.
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 out-of-round and taper. If either out-of-round or taper exceeds specification, rebore cylinder for oversize pistons. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS. If measurements in any cylinder exceed oversize bore service limit, replace cylinder block.
2. Using a feeler gauge and straightedge, inspect cylinder block deck surface for warpage. See **CYLINDER BLOCK** table under ENGINE SPECIFICATIONS. If cylinder bore is okay, hone cylinder to obtain a 60-degree crosshatch pattern. After honing, wash cylinder bore with hot, soapy water. Air-dry cylinder bore, and coat with engine oil to prevent rusting.

ENGINE OILING**ENGINE LUBRICATION SYSTEM**

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

Crankcase Capacity

On B16A2 engines, crankcase capacity is 4.2 qts. (4.0L), including oil filter. Engine capacity after engine overhaul is 5.1 qts. (4.8L). On D16Y7 engines, crankcase capacity is 3.8 qts. (3.6L), including oil filter. Engine capacity after engine overhaul is 4.5 qts. (4.3L). On D16Y5 and D16Y8 engines, crankcase capacity is 3.5 qts. (3.3L), including oil filter. Engine capacity after engine overhaul is 3.9 qts. (3.7L).

Oil Pressure

With engine oil temperature at 176°F (80°C), oil pressure at idle should be 10 psi (0.7 kg/cm²) minimum. Oil pressure at 3000 RPM should be 50 psi (3.5 kg/cm²) minimum.

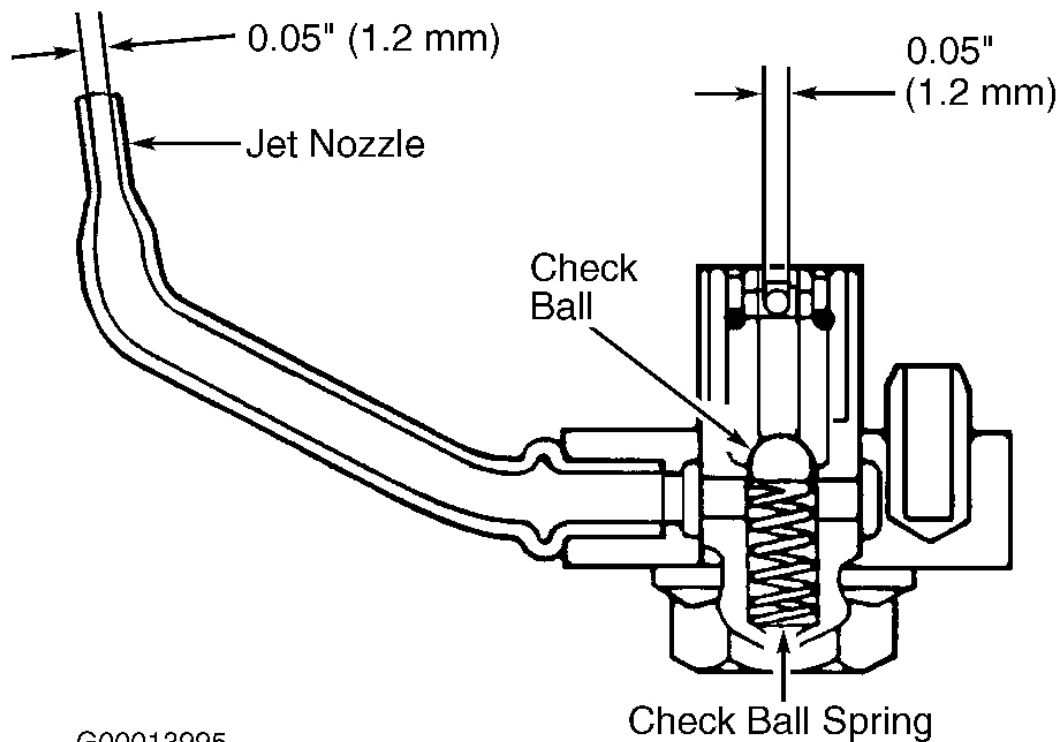
OIL JET (DOHC)**Removal & Installation**

Remove oil pan. Remove oil screen and baffle plate. Remove oil jet bolt and remove oil jet. To install, reverse removal procedures. Tighten oil jet mounting bolt to 12 ft. lbs. (16 N.m).

Inspection

1. Ensure a 1/32" (1.1 mm) drill bit will go through 0.05" (1.2 mm) hole in oil jet nozzle. Clean as necessary. If oil nozzle is damaged or bent, replace oil jet assembly. See **Fig. 34**.

2. Insert smooth end of 1/32" (1.1 mm) drill bit into 0.05" (1.2 mm) hole in oil jet intake. Ensure check ball at bottom of hole moves smoothly and has a stroke of about 0.16" (4.1 mm).
3. Using an air nozzle with regulated air supply, check oil jet operation. Apply low air pressure to oil jet intake and slowly increase until check ball is unseated. Check ball should not unseat until air pressure is at least 28 psi (2.0 kg/cm²). Replace oil jet assembly if operation is not as specified.



G00013995

Fig. 34: Inspecting Oil Jet

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP

Removal

1. Raise and support vehicle. Remove oil drain plug, drain engine oil and replace drain plug, using a NEW washer. Turn crankshaft counterclockwise until White mark on crankshaft pulley aligns with pointer on timing belt cover. Remove valve cover and upper timing belt cover. Remove accessory drive belts.
2. Remove crankshaft pulley and remove lower timing belt cover. Remove timing belt and drive pulley. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove oil pan and oil screen. If necessary, remove relief valve sealing bolt and ensure relief valve slides freely in housing bore and is not scored. Remove oil pump.

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1999-2000 ENGINES 1.6L 4-Cylinder

Disassembly & Inspection

Remove pump housing screws and separate housing and cover. Inspect both rotors and pump housing for scoring or other damage. Measure inner rotor-to-outer rotor radial clearance. Measure housing-to-outer rotor radial clearance. Using a precision straightedge, measure housing-to-rotor axial clearance between housing and outer rotor. Replace inner and outer rotors and/or pump housing if clearance exceeds specification. See **OIL PUMP SPECIFICATIONS** table.

Reassembly & Installation

1. Replace timing pulley-end oil seal. Reassemble oil pump, applying Loctite to pump cover screws and tighten to specification. See **TORQUE SPECIFICATIONS**. Ensure pump turns freely. Install dowel pins and NEW "O" ring on oil pump. Ensure oil pump mating surfaces are clean and dry.
2. Apply liquid gasket evenly, in a narrow bead, centered on cylinder block and oil pump mating surfaces. Apply liquid gasket to threads of inner bolt holes. Apply grease to timing pulley-end seal lip. Install oil pump and tighten bolts to specification. See **TORQUE SPECIFICATIONS**. If oil pump is not installed within 5 minutes of applying liquid gasket, remove old liquid gasket residue and reapply.
3. Install relief valve, relief valve spring, washer and sealing bolt. Tighten relief valve sealing bolt to specification. See **TORQUE SPECIFICATIONS**. Install oil screen and NEW gasket to oil pump. Wait at least 20 minutes before filling crankcase with oil. To complete installation, reverse removal procedure.

OIL PUMP SPECIFICATIONS

Application	In. (mm)
Inner Rotor-To-Outer Rotor Radial Clearance	
DOHC	
Standard	0.002-0.006 (0.04-0.16)
Service Limit	0.008 (0.2)
SOHC	
Standard	0.0010-0.0060 (0.025-0.152)
Service Limit	0.0080 (0.203)
Housing-To-Outer Rotor Radial Clearance	
DOHC	
Standard	0.004-0.007 (0.1-0.19)
Service Limit	0.008 (0.2)
SOHC	
Standard	0.004-0.007 (0.1-0.19)
Service Limit	0.008 (0.2)
Housing-To-Rotor Axial Clearance	
DOHC	
Standard	0.0010-0.0030 (0.025-0.076)
Service Limit	0.006 (0.15)
SOHC	
Standard	0.0010-0.0030 (0.025-0.076)
Service Limit	0.0060 (0.152)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Compressor Bracket-To-Engine Bolts	33 (45)
A/C Compressor-To-Bracket Bolts	18 (24)
A/C Idler Pulley Bracket Bolts 8-mm	18 (24)
A/C Idler Pulley Center Nut	33 (45)
Battery Tray	18 (24)
Camshaft Holder Bolts	
DOHC 8-mm Bolts	20 (27)
SOHC 8-mm Bolts	15 (20)
Camshaft Pulley Bolt	
DOHC	41 (56)
SOHC	27 (37)
Catalytic Converter Flange Nuts	25 (34)
Clutch Slave Cylinder Line/Hose Bracket 8-mm Bolts	18 (24)
Clutch Slave Cylinder Mounting 8-mm Bolts	18 (24)
Connecting Rod Bearing Cap Nuts	
DOHC	30 (40)
SOHC	23 (31)
Crankshaft Pulley Bolt	
DOHC	130 (177)
SOHC	(1)
Cylinder Head Bolts	
DOHC	
First Step (Bolts 1-10)	22 (29)
Second Step	61 (83)
SOHC	
First Step (Bolts 1-10)	15 (20)
Second Step (Bolts 1-10)	36 (49)
Thrid Step (Bolts 1-10)	49 (67)
Forth Step (Bolts 1 & 2)	49 (67)
Distributor Mount Bolt	18 (24)
Drive Plate Bolts (A/T Or CVT)	54 (74)
EGR Valve Nuts	15 (20)
Engine Coolant Drain Plug	58 (79)
Engine Mounts ⁽²⁾	
Transaxle Mount	
10-mm Bolts	28 (38)
12-mm Bolts/Nuts	47 (64)

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12-mm Through-Bolt	54 (74)
Side Engine Mount 10-mm Nuts/Bolts	40 (54)
Engine Upper Mount Bracket	74 (54)
Rear Mount Bracket	
12-mm Bolts	43 (59)
14-mm Bolts	61 (83)
Left Front Mount	
10-mm Bolts	33 (44)
12-mm Bolts	43 (59)
Right Front Mount	
10-mm Bolts	33 (44)
12-mm Bolts	47 (64)
Engine Oil Drain Plug	33 (45)
Engine Front & Rear Stiffeners	
8-mm Bolts	18 (24)
10-mm Bolts	33 (44)
12-mm Bolts	42 (57)
Exhaust Manifold Bracket Bolt	
8-mm	18 (24)
10-mm	33 (45)
Exhaust Manifold Cover 8-mm Bolts	18 (24)
Exhaust Manifold-To-Cylinder Head Nuts ⁽³⁾	23 (31)
Exhaust Pipe Bracket 8-mm Nuts ⁽³⁾	12 (16)
Exhaust Pipe Flange 8-mm Bolts ⁽³⁾	16 (22)
Exhaust Pipe-To-Manifold/TWC ⁽³⁾	
D16Y5 & D16Y7 Engines	25 (33)
D16Y8 & B16A2 Engines	40 (54)
Flywheel Bolts (M/T)	87 (118)
Fuel Filter Banjo Bolt	25 (34)
Generator Adjustment Lock Bolt	18 (24)
Generator Bracket-To-Engine Bolts	33 (45)
Heated Oxygen Sensor (HO2S)	33 (45)
Inspection Hole Sealing Bolt (VTEC)	15 (20)
Intake Air Control (IAC) Valve Bolts	
D16Y5 Engine	16 (22)
D16Y8 Engine	18 (24)
Idle Pulley Bracket Bolt	
DOHC	33 (44)
SOHC	18 (24)
Intake Manifold Bracket 8-mm Bolts	18 (24)

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Intake Manifold-To-Cylinder Head 8-mm Nuts	17 (23)
Lost Motion Assembly Holder Bolts	15 (20)
Main Bearing Cap Bolts ⁽⁴⁾	
DOHC	
First Step	18 (25)
Second Step	56 (76)
SOHC	
First Step	18 (25)
Second Step	38 (51)
Oil Pressure Switch	13 (18)
Oil Pump Relief Valve Sealing Bolt	29 (39)
Power Steering Pump Bracket-To-Engine Bolts	
8-mm	17 (23)
10-mm	33 (45)
Power Steering Pump Mounting 8-mm Bolts	17 (23)
Shift Cable Cover 8-mm Bolts (A/T)	16 (22)
Shift Cable Lock Nut (CVT)	22 (30)
Shift Cable 6-mm Bolt	10 (14)
Throttle Body 8-mm Nuts/Bolts	16 (22)
Timing Belt Adjuster Bolt	
DOHC	40 (54)
SOHC	33 (45)
Transaxle Extension Rod (M/T)	16 (22)
Transaxle Oil Drain Plug (A/T & CVT)	36 (49)
Transaxle Oil Drain Plug (M/T)	29 (39)
Transaxle Oil Filler Plug (M/T)	33 (45)
Transaxle-To-Engine Block Bolts	43 (58)
Valve Adjustment Lock Nuts	
D16Y7	13 (18)
D16Y5, D16Y8 & B16A2	15 (20)
INCH Lbs. (N.m)	
Camshaft Holder Bolts ⁽²⁾	
DOHC (6-mm Bolts)	89 (10)
SOHC (6-mm Bolts)	104 (12)
Catalytic Converter Cover Bolts	96 (11)
Clutch Slave Cylinder Line Bracket	
6-mm Bolts	84-104 (9-12)
Crankshaft Position (CKP) Sensor Bolt	104 (12)
Crankshaft Rear Oil Seal Retainer Bolts	96 (11)
Crankshaft Speed Fluctuation (CKF) Sensor	104 (12)
EGR Chamber Bolts	104 (12)

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	52 (6)
Fast Idle Thermo Valve	96 (11)
Flywheel Cover Nuts	104 (12)
Fuel Filter Service Bolt	104 (12)
Intake Air Temperature (IAT) Sensor Bolts	52 (6)
Manifold Absolute Pressure (MAP) Sensor	17 (2)
Oil Breather Chamber Bolts	96 (11)
Oil Pan Baffle Plate 6-mm Bolts	96 (11)
Oil Pan 6-mm Nuts/Bolts	104 (12)
Oil Pump Cover Screws	60 (7)
Oil Pump Screen Bolts	96 (11)
Oil Pump 6-mm Bolts	96 (11)
PCM Harness Connector Nuts	96 (11)
Splash Shield	89 (10)
Thermostat Housing Bolt	89 (10)
Timing Belt Cover Bolt	89 (10)
Timing Belt Middle Cover Bolt (DOHC)	89 (10)
Timing Belt Lower Cover Bolt (DOHC)	89 (10)
Timing Bolt Back Plate Bolts	104 (12)
Transaxle Ground Cable Bolt	96 (11)
Valve Cover Nuts/Bolts	89 (10)
VTEC Solenoid Valve Assembly Bolts	104 (12)
Water Pump Bolts	104 (12)

(1) Clean bolt and washer. Lubricate bolt threads and area between washer and bolt flange. Tighten bolt to 15 ft. lbs. (20 N.m). Tighten bolt additional 90 degrees.

(2) Some bolts/nuts are not reusable. See **Fig. 6**. For tightening sequence, see ENGINE under REMOVAL & INSTALLATION.

(3) Use NEW bolts/nuts.

(4) Tighten in sequence. See **Fig. 32**.

ENGINE SPECIFICATIONS**GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Application	Specification
Displacement	
D16Y5,D16Y7 & D16Y8	97.0 Cu. In. (1.6L)
B16A2	97.3 Cu. In. (1.6L)
Bore	
D16Y5,D16Y7 & D16Y8	2.95" (75.0 mm)

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1999-2000 ENGINES 1.6L 4-Cylinder

B16A2	3.19" (81.0 mm)
Stroke	
D16Y5,D16Y7 & D16Y8	3.54" (90.0 mm)
B16A2	3.05" (77.4 mm)
Compression Ratio	
D16Y5,D16Y7	9.4:1
D16Y8	9.6:1
B16A2	10.2:1

CRANKSHAFT, MAIN BEARINGS & CONNECTING ROD BEARINGS SPECIFICATIONS**CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS**

Application	In. (mm)
Crankshaft	
End Play	
Standard	0.0004-0.0014 (0.010-0.035)
Service Limit	0.018 (0.46)
Total Runout	
DOHC	
Standard	0.008 (0.020)
Service Limit	0.012 (0.030)
SOHC	
Standard	0.001 (0.03)
Service Limit	0.002 (0.05)
Main & Rod Journal Out-Of-Round	
DOHC	
Standard	0.008 (0.020)
Service Limit	0.012 (0.030)
SOHC	
Standard	0.0001 (0.003)
Service Limit	0.0002 (0.005)
Main & Rod Journal Taper	
DOHC	
Standard	0.0002 (0.005)
Service Limit	0.0004 (0.010)
SOHC	
Standard	0.0001 (0.003)
Service Limit	0.0002 (0.005)
Rod Journal Diameter	1.7707-1.7717 (44.976-45.000)
Main Journal Diameter	
DOHC	

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No. 1, 2, 4 & 5 Journals	2.1644-2.1654 (54.976-55.000)
No. 3 Journal	2.1642-2.1651 (54.970-54.994)
SOHC	
All Journals	2.1644-2.1654 (54.976-55.000)
Connecting Rods	
End Play	
Standard	0.006-0.012 (0.15-0.30)
Service Limit	0.016 (0.40)
Large End Bore Diameter	1.89 (48.0)
Small End Bore Diameter	
DOHC	0.8255-0.8260 (20.968-20.981)
SOHC	0.746-0.747 (18.96-18.98)
Pin-To-Rod Interference	
DOHC	0.0005-0.0013 (0.013-0.032)
SOHC	0.0006-0.0016 (0.014-0.040)
Rod Bearing-To-Journal Oil Clearance	
DOHC	
Standard	0.0013-0.0020 (0.032-0.050)
Service Limit	0.002 (0.05)
SOHC	
Standard	0.0008-0.0015 (0.020-0.038)
Service Limit	0.0002 (0.005)
Main Bearing-To-Journal Oil Clearance	
DOHC	
Journals No. 1, 2, 4 & 5	
Standard	0.0009-0.0017 (0.024-0.042)
Service Limit	0.06 (0.002)
Journal No. 3	
Standard	0.0012-0.0019 (0.030-0.048)
Service Limit	0.06 (0.002)
SOHC	
Journals No. 1 & 5	
Standard	0.0007-0.0014 (0.018-0.036)
Service Limit	0.06 (0.002)
Journal No. 2, 3 & 4	
Standard	0.0009-0.0017 (0.024-0.042)
Service Limit	0.06 (0.002)

PISTONS, PISTON PINS & PISTON RINGS SPECIFICATIONS**PISTONS, PINS & RINGS**

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1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

Application	In. (mm)
Piston	
Piston-To-Cylinder Clearance	
DOHC	
Standard	0.0004-0.0016 (0.010-0.040)
Service Limit	0.0020 (0.060)
SOHC	
Standard	0.0004-0.0016 (0.010-0.040)
Service Limit	0.0020 (0.060)
Piston Diameter ⁽¹⁾	
DOHC	
Standard	3.1882-3.1886 (80.980-80.990)
Service Limit	3.1878 (80.970)
SOHC	
Standard	2.9520-2.9524 (74.981-74.991)
Service Limit	2.9516 (74.971)
Piston Pins	
Diameter	
DOHC	0.8265-0.8268 (20.994-21.000)
SOHC	0.7478-0.7480 (18.994-19.000)
Pin-To-Piston Clearance	
DOHC	0.0004-0.0009 (0.010-0.022)
SOHC	0.0004-0.0009 (0.010-0.023)
Rings	
DOHC	
Top Ring (Manufactured By RIKEN)	
End Gap	
Standard	0.008-0.014 (0.20-0.35)
Service Limit	0.024 (0.60)
Top Ring (Manufactured By TEIKOKU)	
End Gap	
Standard	0.008-0.012 (0.20-0.30)
Service Limit	0.024 (0.60)
Second Ring	
End Gap	
Standard	0.016-0.022 (0.40-0.55)
Service Limit	0.028 (0.71)
Oil Ring (Manufactured By RIKEN)	
End Gap	
Standard	0.008-0.020 (0.20-0.50)
Service Limit	0.028 (0.71)

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1999-2000 ENGINES 1.6L 4-Cylinder

End Gap	
Standard	0.008-0.018 (0.20-0.45)
Service Limit	0.028 (0.71)
SOHC	
Top Ring	
End Gap	
Standard	0.006-0.012 (0.15-0.30)
Service Limit	0.024 (0.61)
Second Ring	
End Gap	
Standard	0.012-0.018 (0.30-0.45)
Service Limit	0.028 (0.71)
Oil Ring	
End Gap	
Standard	0.008-0.028 (0.20-0.71)
Service Limit	0.031 (0.79)
Ring-To-Groove Clearance	
DOHC	
Top Ring	
Standard	0.0018-0.0028 (0.045-0.070)
Service Limit	0.005 (0.13)
Second Ring (Manufactured By RIKEN)	
Standard	0.0016-0.0026 (0.040-0.065)
Service Limit	0.005 (0.13)
Second Ring (Manufactured By TEIKOKU)	
Standard	0.0018-0.0028 (0.045-0.070)
Service Limit	0.005 (0.13)
SOHC	
Top Ring	
Standard	0.0014-0.0024 (0.035-0.061)
Service Limit	0.005 (0.13)
Second Ring	
Standard	0.0012-0.0022 (0.030-0.056)
Service Limit	0.005 (0.13)
(1) On DOHC engines, measure piston skirt diameter 0.59" (15.0 mm) from bottom of skirt. On SOHC engines, measure piston skirt diameter 0.63" (16 mm) from bottom of skirt.	

CYLINDER BLOCK SPECIFICATIONS**CYLINDER BLOCK**

Application	In. (mm)
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1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

Cylinder Bore

DOHC	
Standard Diameter	3.189-3.190 (81.00-81.02)
Service Limit	3.192 (81.07)
SOHC	
Standard Diameter	2.9528-2.9535 (75.000-75.020)
Service Limit	2.9555 (75.070)
Maximum Taper	0.002 (.05)
Maximum Deck Warpage	
DOHC	
Standard	0.002 (0.05)
Service Limit	0.03 (0.08)
SOHC	
Standard	0.0031 (0.079)
Service Limit	0.004 (0.10)
Rebore Limit	
DOHC	0.01 (.25)
SOHC	0.020 (.050)

CYLINDER HEAD SPECIFICATIONS**CYLINDER HEAD**

Application	In. (mm)
Cylinder Head	
Height	
DOHC	5.589-5.593 (141.95-142.05)
SOHC	3.659-3.663 (92.95-93.05)
Maximum Warpage	0.002 (0.05)
Maximum Resurface Limit	0.008 (0.20)
Valve Seats	
Intake Valve	
Seat Angle	(1)
Seat Width	
DOHC	
Standard	0.049-0.061 (1.25-1.55)
Service Limit	0.08 (2.0)
SOHC	
Standard	0.033-0.045 (0.85-1.15)
Service Limit	0.063 (1.60)
Exhaust Valve	
Seat Angle	(1)

1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

Seat Width	
Standard	0.049-0.061 (1.25-1.55)
Service Limit	0.079 (2.00)
Valve Guides	
Intake	
Valve Guide Inner Diameter	
Standard	0.217-0.218 (5.51-5.53)
Service Limit	0.219 (5.55)
Valve Guide Installed Height	
DOHC	0.494-0.514 (12.55-13.05)
SOHC	0.703-0.722 (17.85-18.35)
Exhaust	
Valve Guide Inner Diameter	
Standard	0.217-0.218 (5.51-5.54)
Service Limit	0.219 (5.56)
Valve Guide Installed Height	
DOHC	0.494-0.514 (12.55-13.05)
SOHC	0.734-0.754 (18.65-19.15)
Valve Stem-to-Guide Oil Clearance	
Intake Valve	
DOHC	
Standard	0.0010-0.0022 (0.025-0.056)
Service Limit	0.003 (0.076)
SOHC	
Standard	0.0010-0.0022 (0.025-0.056)
Service Limit	0.003 (0.076)
Exhaust Valve	
DOHC	
Standard	0.002-0.0031 (0.050-0.080)
Service Limit	0.004 (0.11)
SOHC	
Standard	0.002-0.003 (0.051-0.076)
Service Limit	0.004 (0.11)
(1) Valve seat angle is 45 degrees.	

CAMSHAFT SPECIFICATIONS**CAMSHAFT**

Application	In. (mm)
End Play	

1999 Honda Civic EX

1999-2000 ENGINES 1.6L 4-Cylinder

Standard	0.002-0.006 (0.05-0.15)
Service Limit	0.020 (0.50)
Camshaft Total Runout	
Standard	0.001 (0.025)
Service Limit	0.002 (0.05)
Camshaft-To-Holder Oil Clearance	
Standard	0.002-0.004 (0.05-0.10)
Service Limit	0.006 (0.15)
Cam Lobe Height	
B16A2 Engine	
Intake Lobe	
Primary Standard	1.3027 (33.088)
Mid Standard	1.4278 (36.267)
Secondary Standard	1.3771 (34.978)
Exhaust Lobe	
Primary Standard	1.2907 (32.785)
Mid Standard	1.4063 (35.720)
Secondary Standard	1.3658 (34.691)
D16Y5 Engine	
Intake Lobe	
Primary Standard	1.5129 (38.427)
Secondary Standard	1.2674 (32.193)
Exhaust Lobe Standard	1.5269 (38.784)
D16Y7 Engine	
Intake Lobe Standard	1.3897 (35.299)
Exhaust Lobe Standard	1.4678 (37.281)
D16Y8 Engine	
Intake Lobe	
Primary Standard	1.4479 (36.778)
Mid Standard	1.5068 (38.274)
Secondary Standard	1.4592 (37.065)
Exhaust Lobe Standard	1.4964 (38.008)

ROCKER ARM & ROCKER ARM SHAFT SPECIFICATIONS**ROCKER ARM & ROCKER ARM SHAFT**

Application	In. (mm)
Clearance	
Intake	
DOHC	
Standard	0.0010-0.0020 (0.025-0.052)

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1999-2000 ENGINES 1.6L 4-Cylinder

Service Limit	0.003 (0.08)
SOHC	
Standard	0.0007-0.0020 (0.018-0.051)
Service Limit	0.003 (0.08)
Exhaust	
DOHC	
Standard	0.0010-0.0020 (0.025-0.052)
Service Limit	0.003 (0.08)
SOHC	
Standard	0.0007-0.0021 (0.018-0.053)
Service Limit	0.003 (0.08)

ENGINE VALVES & VALVE SPRINGS SPECIFICATIONS**VALVES & VALVE SPRINGS**

Application	In. (mm)
Intake Valves	
Face Angle	(1)
Head Diameter	
DOHC	1.295-1.303 (32.90-33.10)
DOHC	1.18-1.19 (29.9-30.1)
Margin	
DOHC	
Standard	0.041-0.053 (1.05-1.35)
Service Limit	0.033 (0.85)
SOHC	
Standard	0.33-0.045 (0.85-1.15)
Service Limit	0.026 (0.66)
Stem Diameter	
DOHC	
Standard	0.2156-0.2159 (5.475-5.485)
Service Limit	0.2144 (5.445)
SOHC	
Standard	0.2157-0.2161 (5.479-5.489)
Service Limit	0.2146 (5.450)
Valve Stem Installed Height ⁽²⁾	
DOHC	
Standard	1.4750-1.4935 (37.465-37.935)
Service Limit	1.5033 (38.185)
SOHC	
Standard	2.0931-2.1116 (53.165-53.635)

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1999-2000 ENGINES 1.6L 4-Cylinder

Service Limit	2.1215 (53.886)
Exhaust Valves	
Face Angle	(1)
Head Diameter	
DOHC	1.098-1.106 (27.90-28.10)
SOHC	1.02-1.03 (25.9-26.2)
Margin	
DOHC	
Standard	0.065-0.077 (1.65-1.95)
Service Limit	0.057 (1.45)
SOHC	
Standard	0.041-0.053 (1.05-1.35)
Service Limit	0.037 (0.95)
Stem Diameter	
Standard	0.2146-0.2150 (5.451-5.461)
Service Limit	0.2134 (5.420)
Valve Stem Installed Height ⁽²⁾	
DOHC	
Standard	1.4632-1.4817 (37.165-37.635)
Service Limit	1.4915 (37.885)
SOHC	
Standard	2.0931-2.1116 (53.165-53.635)
Service Limit	2.1215 (53.886)
Valve Springs Free Length	
B16A2	
Intake	
Outer	1.611 (40.92)
Inner	1.445 (36.71)
Exhaust	
(3)	1.652 (41.96)
(4)	1.651 (41.94)
D16Y5	
Intake	2.2244 (56.500)
Exhaust	2.2795 (57.900)
D16Y7	
Intake	2.2795 (57.900)
Exhaust	2.2795 (57.900)
D16Y8	
Intake	2.2835 (58.000)
Exhaust	2.3110 (58.700)

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1999-2000 ENGINES 1.6L 4-Cylinder

- (1) Valve seat angle is cut at 45 degrees.
- (2) Measure from base of valve guide to tip of valve stem.
- (3) Manufactured by NIHON HATSUJO
- (4) Manufactured by CHUO HATSUJO