

3.2L V6**1997-98 ENGINES Acura - 3.2L V6****ENGINE IDENTIFICATION**

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 CODES

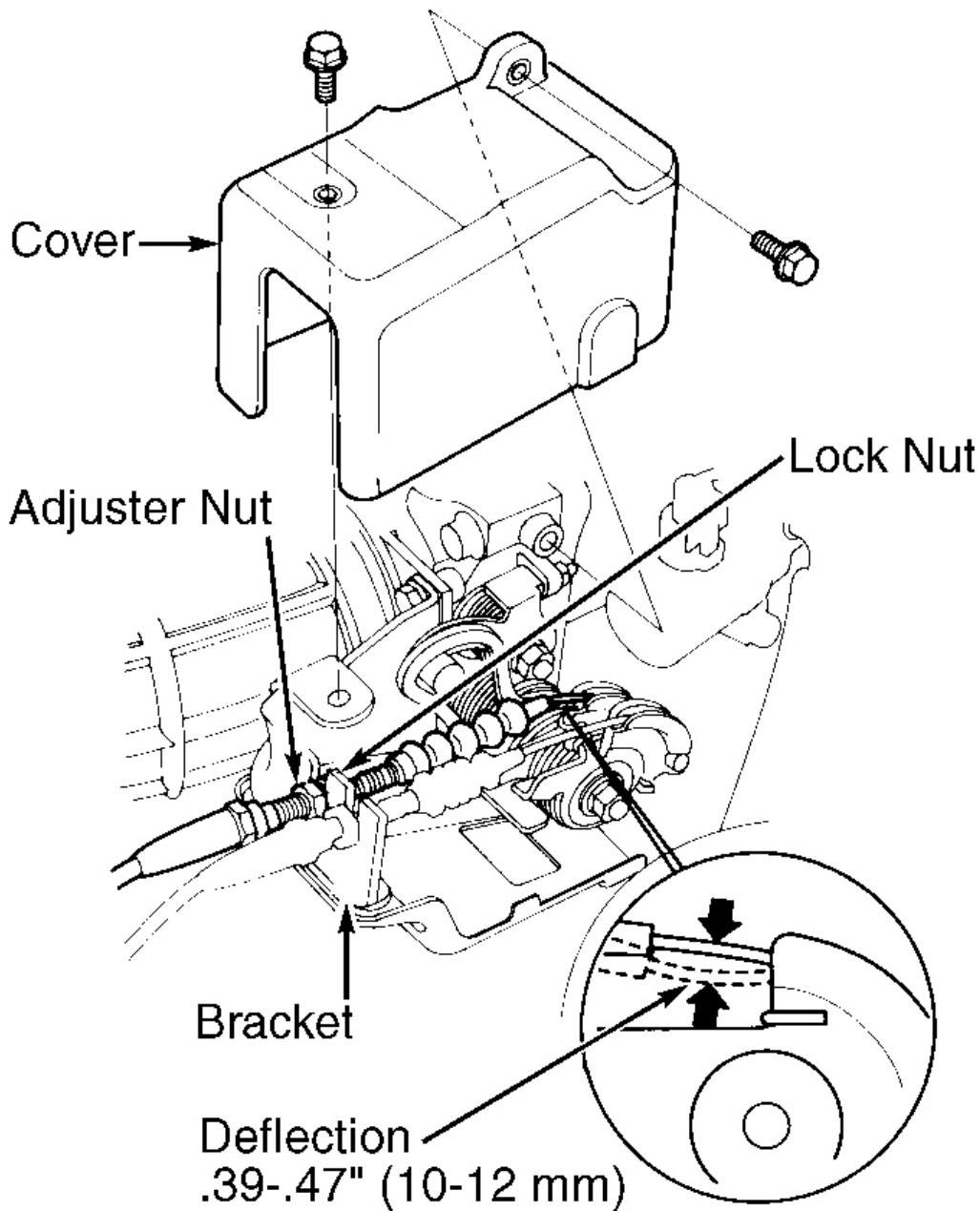
Application	Code
3.2L	C32A6

ADJUSTMENTS**VALVE CLEARANCE ADJUSTMENT**

NOTE: Hydraulic valve lifters are used. Valve clearance adjustment is not necessary.

THROTTLE CABLE ADJUSTMENT

1. Remove throttle linkage cover. 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. 1**. 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 returns to idle position when accelerator pedal is released.



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Fig. 1: Adjusting Throttle Cable

Courtesy of AMERICAN HONDA MOTOR CO., INC.

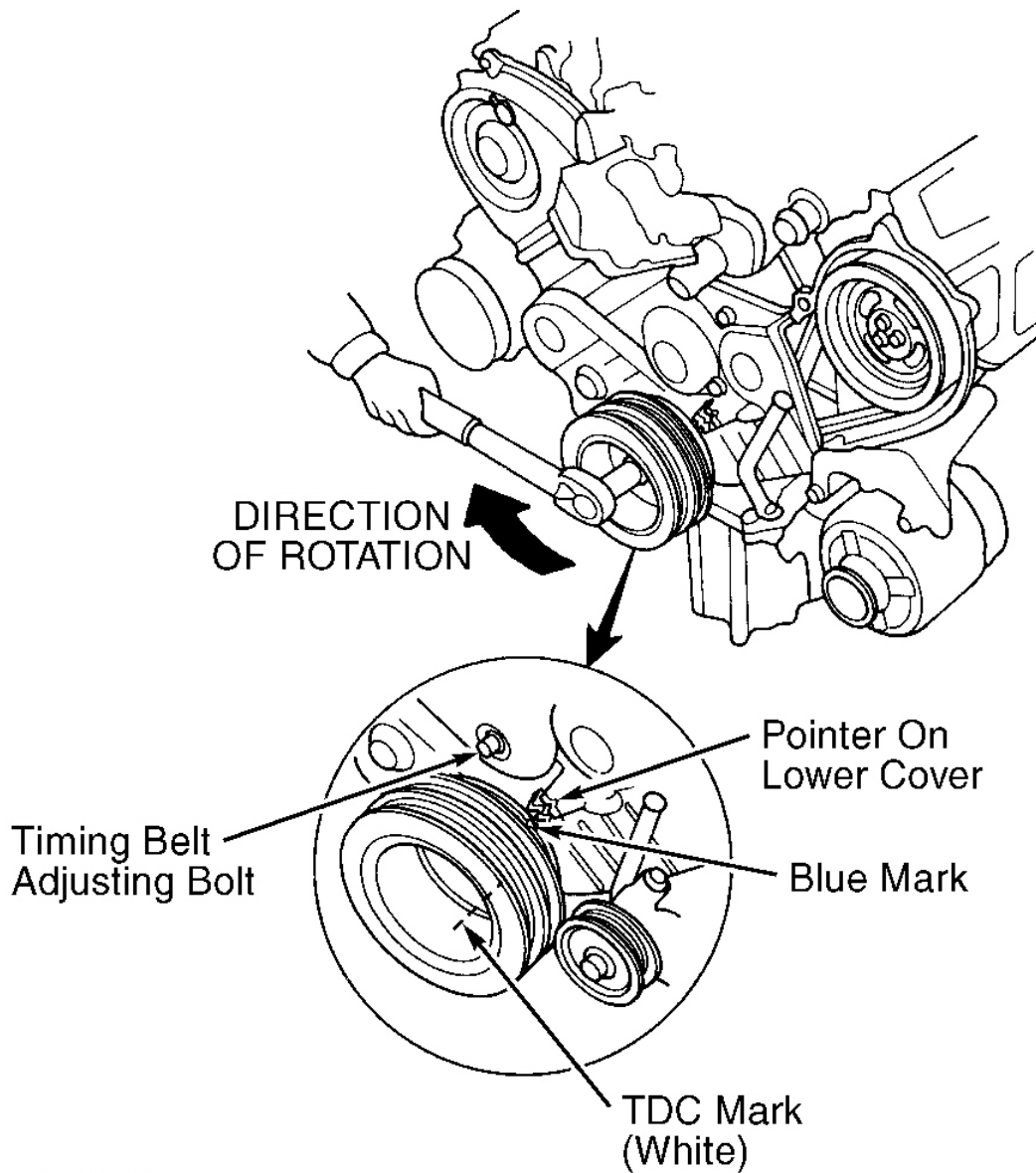
SHIFT LINK ADJUSTMENT (A/T)

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 the vehicle, verify control lever is in Neutral position on transmission. Turn ignition on. Verify "N" indicator light on instrument panel comes on.
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 over the link adjuster securely.
4. Move shift lever to each gear and verify gear position indicator follows the 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 that shift lock lever is released.

TIMING BELT TENSION ADJUSTMENT

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

1. Remove left upper cover. Inspect timing belt. Replace belt if cracked, or if oil or coolant soaked. Remove center bracket. Rotate crankshaft clockwise until No. 1 piston is at TDC of compression stroke.
2. Rotate crankshaft 9 teeth clockwise on crankshaft pulley. Align Blue mark on crankshaft pulley with pointer on lower cover. See **Fig. 2**. Loosen timing belt tensioner adjusting bolt 1/2 turn (180 degrees), and then tighten bolt to 31 ft. lbs. (42 N.m).



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Fig. 2: Aligning Timing Marks For Timing Belt Tension Adjustment
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.

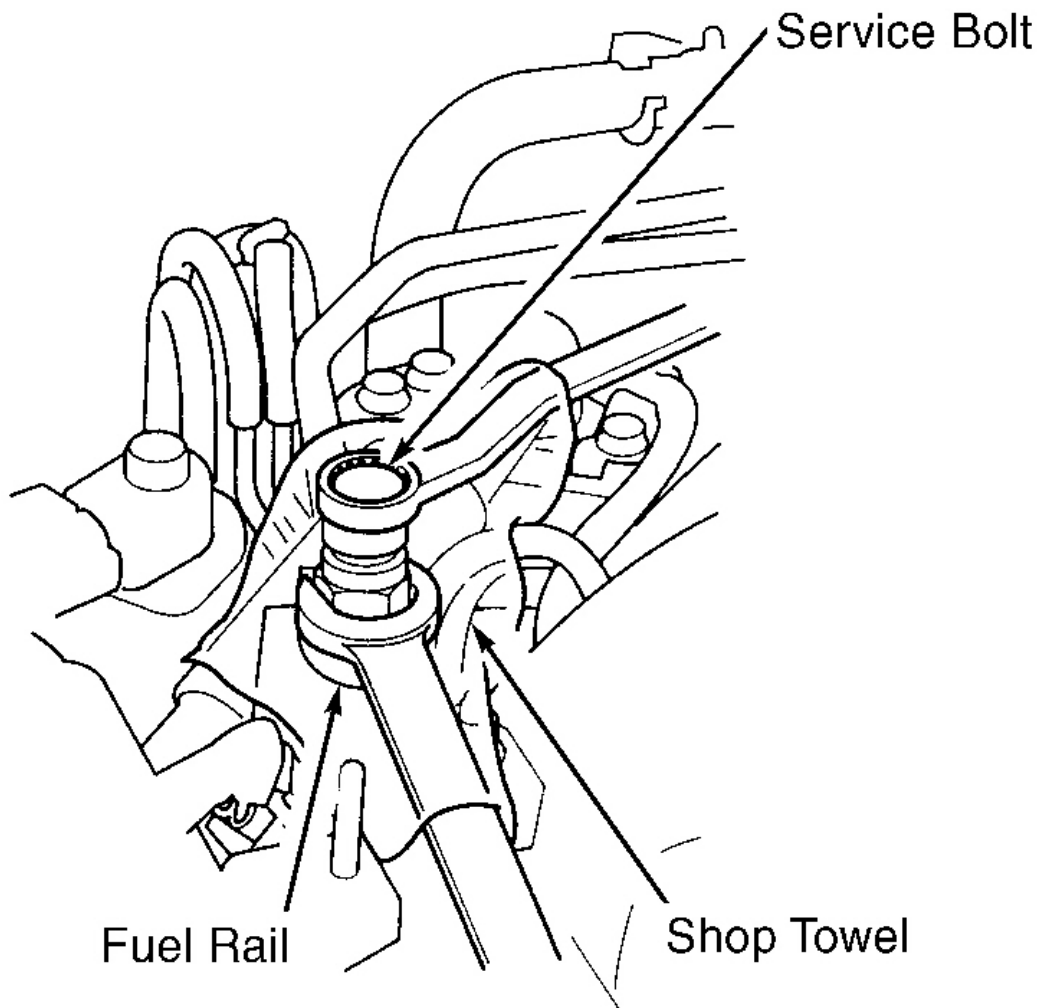
NOTE: Radio/cassette or radio/CD player is equipped with an anti-theft protection circuit. Whenever battery is disconnected, radio will go into anti-theft mode. When battery is reconnected, radio will display CODE, and will be inoperative until proper code number is entered. Obtain code number before disconnecting battery.

FUEL PRESSURE RELEASE

CAUTION: 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. 3**. Fuel filter is located next to brake booster.

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



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Fig. 3: 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 ENGINE COOLING.

ENGINE

NOTE: Engine and transmission are removed as an assembly.

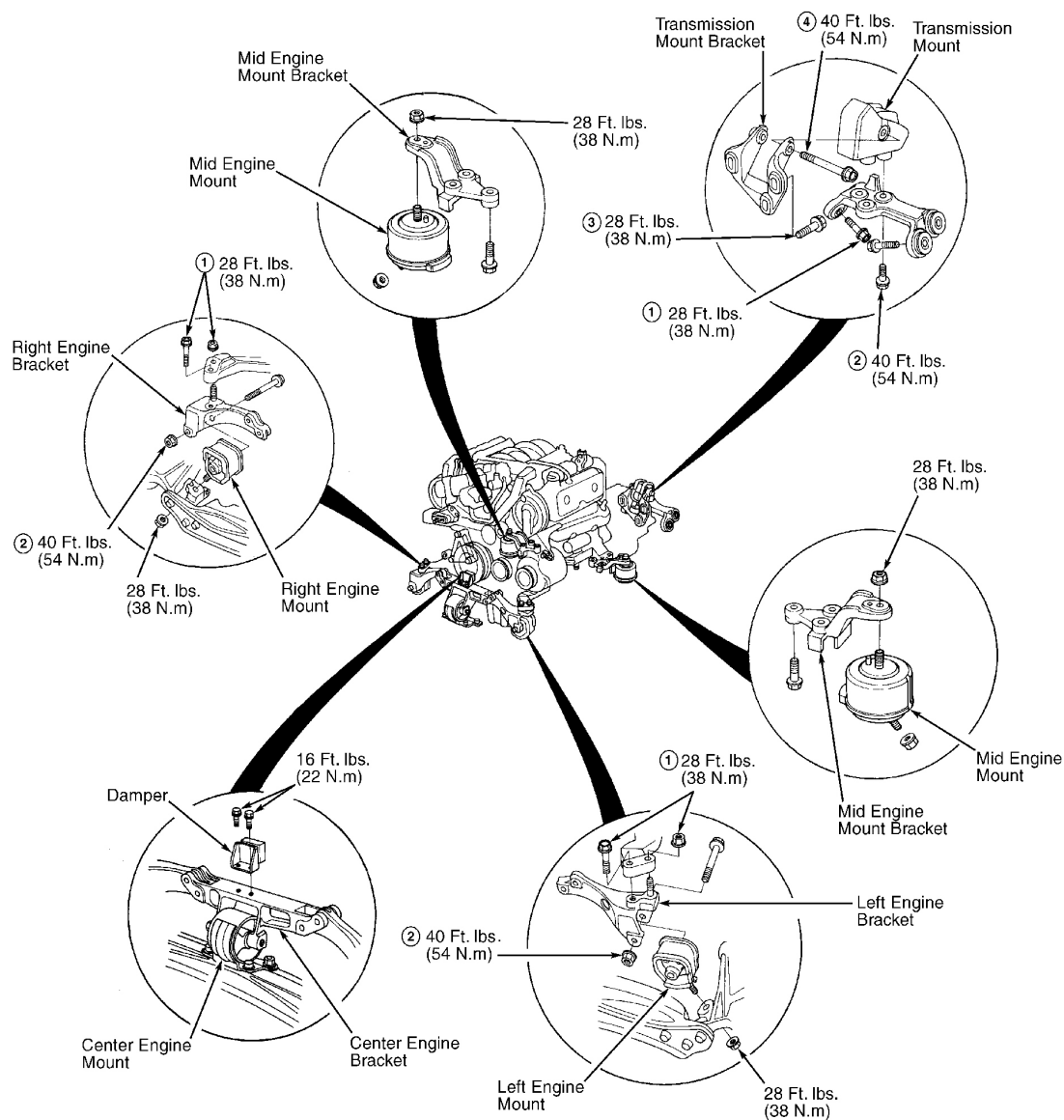
Removal

1. Remove hood support mount bolts. Support hood in a vertical position and reinstall hood support in lower hole on hood. Disconnect negative battery cable. Disconnect positive battery cable. Remove engine cover from intake manifold. Remove intake air duct and air cleaner assembly. Remove throttle cover. Disconnect throttle and cruise control cables. DO NOT bend cables. Replace cable if kinked. Remove battery and battery tray. Disconnect engine wiring harness connector on left side of engine compartment. Remove engine ground cable and wire harness clamps.
2. Remove vacuum hoses and clamp from underhood fuse/relay box. Remove battery cables from underhood fuse/relay box. Remove underhood fuse/relay box. Disconnect engine wiring harness connector from underhood fuse/relay box. Raise power steering fluid reservoir and remove vacuum hoses, vacuum pipe and vacuum tank. DO NOT disconnect power steering hoses.
3. Disconnect ignition control module connector and remove engine ground cable. Disconnect engine wiring harness connector on right side of engine compartment. Remove ground cable and wire harness clamp. Disconnect control box and solenoid valve connectors. Remove control box and solenoid valve. Disconnect brake booster vacuum hose and remove heater valve.
4. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect fuel feed hose, fuel return hose, vacuum hose, and EVAP control canister hose. Disconnect transmission sub-harness connector and remove wiring harness clamp. Loosen generator pulley mounting bolt, lock bolt, adjusting rod. Remove generator belt. Loosen idler pulley center nut and adjusting bolt. Remove A/C compressor belt.
5. Disconnect power steering switch connector. Remove adjusting bolt, lock nut and mounting bolt. Remove power steering belt and pump. DO NOT disconnect power steering hoses. Move passenger's seat fully forward. Pull back carpet behind seat, exposing secondary heated O2 sensor connector and disconnect connector. Remove radiator cap. Raise and support vehicle. Remove front wheels and engine splash shield.
6. Drain engine coolant, engine oil, differential oil and Automatic Transmission Fluid (ATF). Reinstall drain plugs using NEW washers. Remove damper forks. Disconnect suspension lower arm ball joints. Remove axle shafts. Coat finished surfaces with oil and cover axle shaft ends with plastic bags. Disconnect A/C compressor clutch connector and remove A/C compressor. DO NOT disconnect A/C hoses.
7. Disconnect Vehicle Speed Sensor (VSS) connector and remove VSS/power steering speed sensor. DO NOT disconnect fluid hoses. Remove heat shields from exhaust pipe "A" and remove exhaust pipe "A". Remove wiring harness cover, grommet, three-way catalytic converter and heat shield. Remove and plug ATF cooler hoses and pipes.
8. Remove shift cable cover mounting bolts. Remove A/T gear position switch harness clamp and shift control solenoid valve/linear solenoid harness connector from shift cable cover. Remove shift cable cover from transmission housing. Remove shift cable and cable holder assembly from shift cable holder base. Remove control lever from control shaft.
9. Lower vehicle. Remove upper and lower radiator hoses and radiator assembly. Remove heater hoses. Attach chain hoist to engine. Remove engine center bracket and center mount. See **Fig. 4**. Separate left and right engine mount brackets from left and right brackets. Raise chain hoist. Remove shift cable guide bracket. Remove transmission beam from body and loosen 3 bolts on transmission bracket.
10. Remove stop holder, mid-engine mount stops and mid-engine mounts. Remove all slack from chain hoist by lowering or raising. Ensure engine and transmission are free of all hoses and wiring. Slowly raise engine approximately 6". Verify engine and transmission are still free from hoses and electrical wiring. Remove left and right brackets. Raise engine completely and remove engine and transmission from vehicle.

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

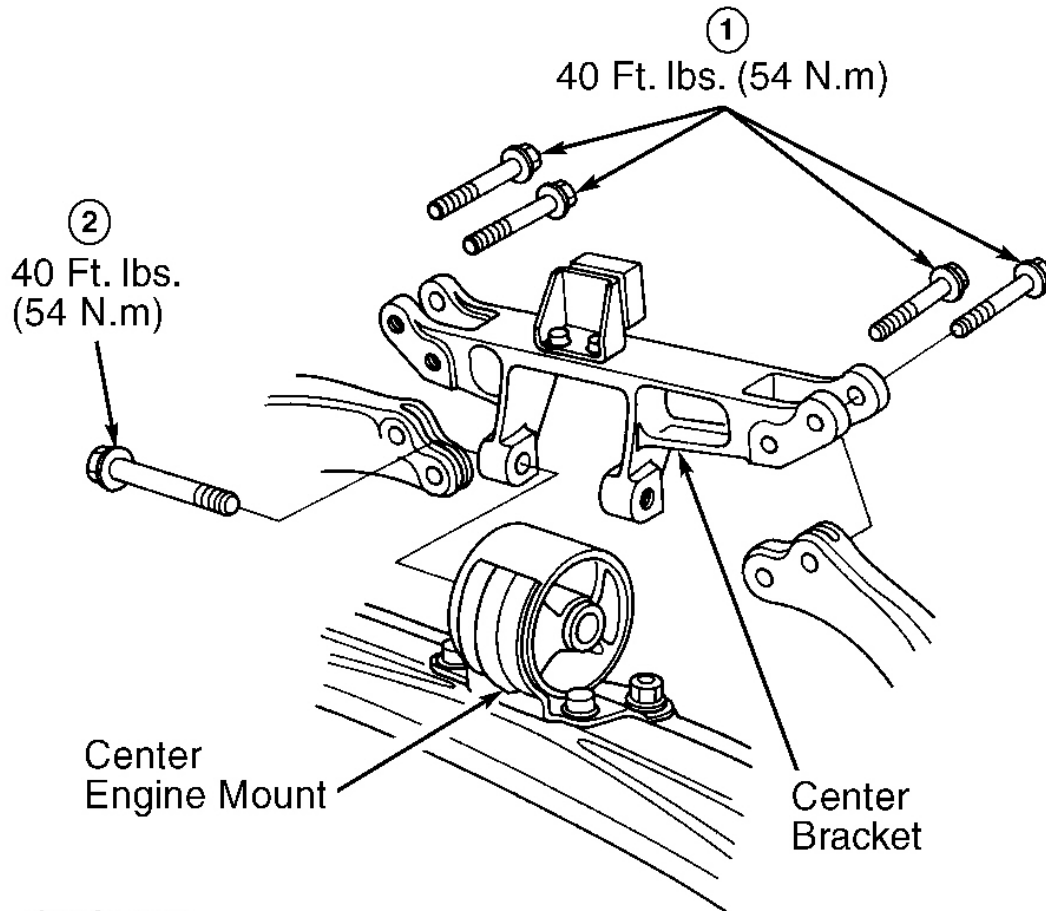
Installation

1. To install, reverse removal procedure. Install center engine mount and tighten bolts. Install left bracket and bolts/nuts, DO NOT tighten. Install right bracket and bolts/nuts, DO NOT tighten. Install center bracket and tighten bolts in sequence. See **Fig. 5**. Install transmission beam mounting bolts, and then loosen mount bolts. DO NOT tighten transmission beam mounting bolts.
2. Install mid-engine mounts and mid-engine mount stops on mid-engine mounts. Tighten 8-mm bolts loosely and install stop holder. Tighten bolts first, and then tighten nuts. Tighten bolts and nuts on left bracket in sequence. See **Fig. 4**. Tighten bolts and nuts on right bracket in sequence. Tighten bolts and nuts on transmission bracket/mount and transmission beam in sequence.
3. When installing axle shafts, use NEW spring clips. Insert each axle shaft until spring clip clicks into groove of differential side gear. 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**. Check for fluid leaks.



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Fig. 4: Engine Mount Tightening Sequence
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 5: Center Bracket Tightening Sequence

Courtesy of AMERICAN HONDA MOTOR CO., INC.

INTAKE MANIFOLD

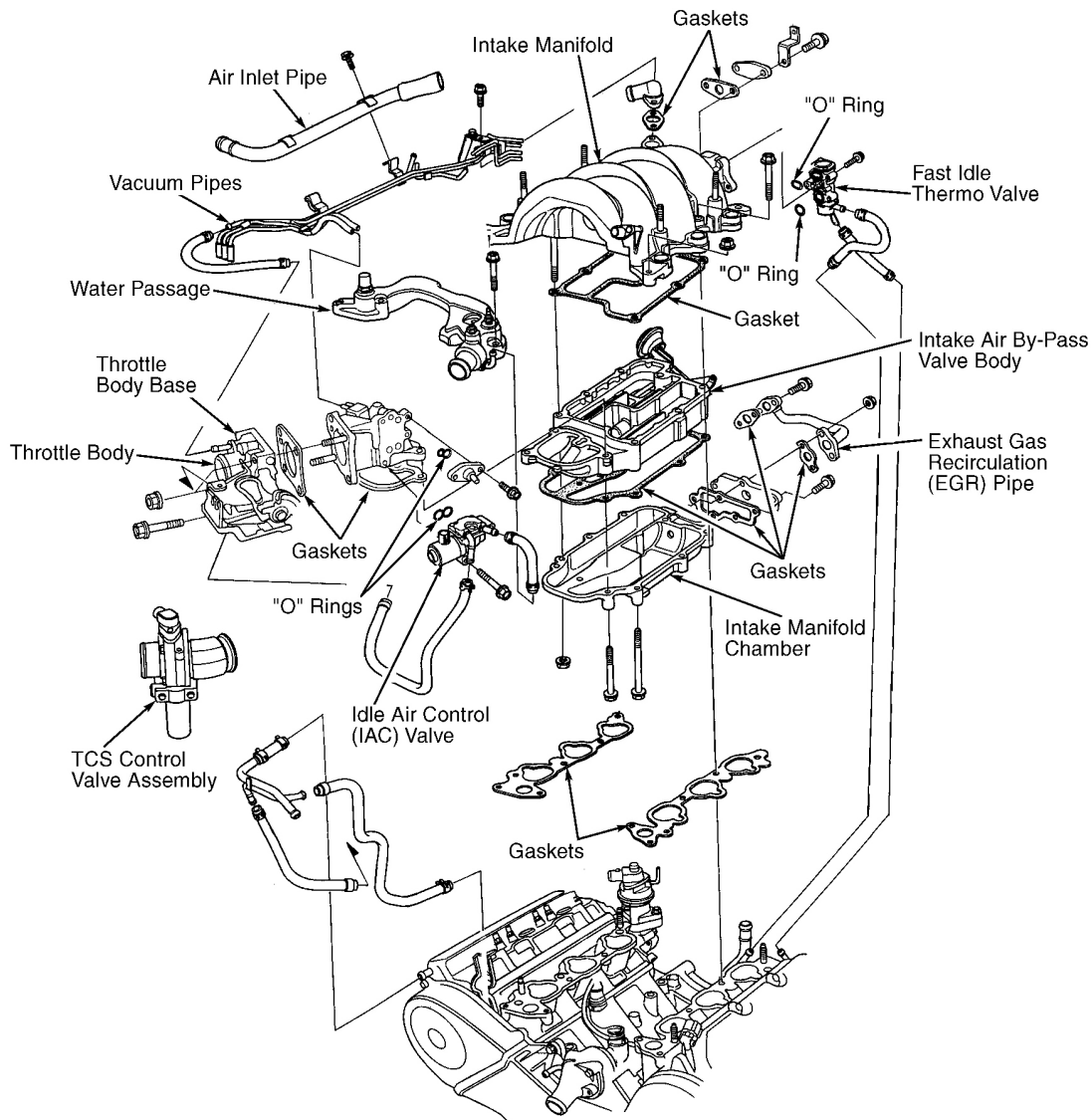
NOTE: Reference mark all emission hoses and harness connectors before disconnecting.

Removal

Allow engine to cool. Disconnect negative battery cable. Disconnect positive battery cable. Remove battery and battery tray. Disconnect all electrical harness connectors and hoses to intake manifold. Remove throttle cover. Remove throttle and cruise control cables. **DO NOT** bend cables. 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**.



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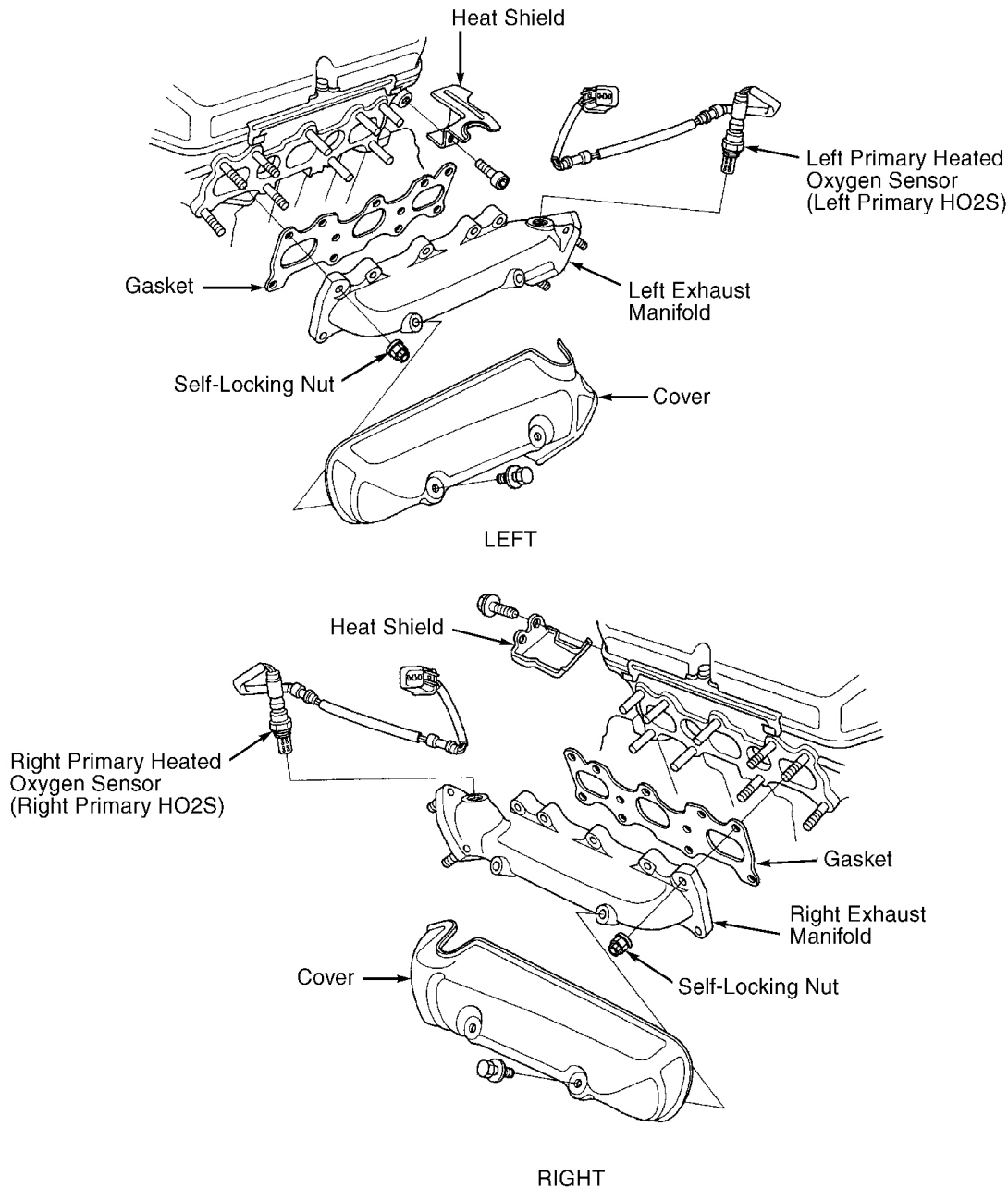
Fig. 6: Exploded View Of Intake Manifold Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

EXHAUST MANIFOLD

Removal & Installation

Allow engine to cool. Disconnect negative battery cable. Disconnect positive battery cable. Remove battery and

battery tray. Disconnect primary heated oxygen sensor harness connectors. 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**.



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

CYLINDER HEAD

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

Removal

1. Drain coolant. Remove intake manifold. See **INTAKE MANIFOLD**. Remove exhaust manifold. See **EXHAUST MANIFOLD**. Remove timing belt. See **TIMING BELT**. If reusing timing belt, mark direction of belt rotation for installation reference.
2. Remove upper radiator hose and water by-pass hoses. Remove vacuum hoses, and then remove clamp from underhood fuse/relay box. Remove battery cables from underhood fuse/relay box, and then remove underhood fuse/relay box. Remove engine wiring harness connector.
3. Disconnect connectors, and then remove control box, vacuum hose and solenoid valve. Disconnect brake booster vacuum hose. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Remove fuel feed hose, fuel return hose, vacuum hose, and EVAP control canister hose. Remove water by-pass hoses and heater hose.
4. Remove engine ground cable and wiring harness clamps. Remove PCV hose. Remove bolt retaining A/T dipstick bracket. Disconnect all electrical harness connectors and hoses to cylinder head. Remove inlet pipe mounting bolts from right cylinder head cover. Remove vacuum hoses and breather hose.
5. Remove ignition coil packs from right and left cylinder head covers. Remove left and right camshaft sprockets, and then remove left and right back covers. Remove crank/cylinder sensor from left cylinder head. Remove left and right cylinder head covers. Remove generator mounting bracket bolts and power steering pump mounting bracket bolts. 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.

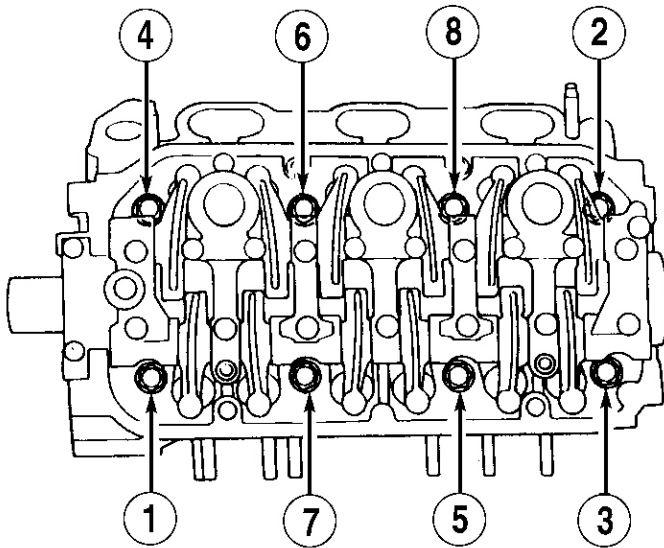
Inspection

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**.

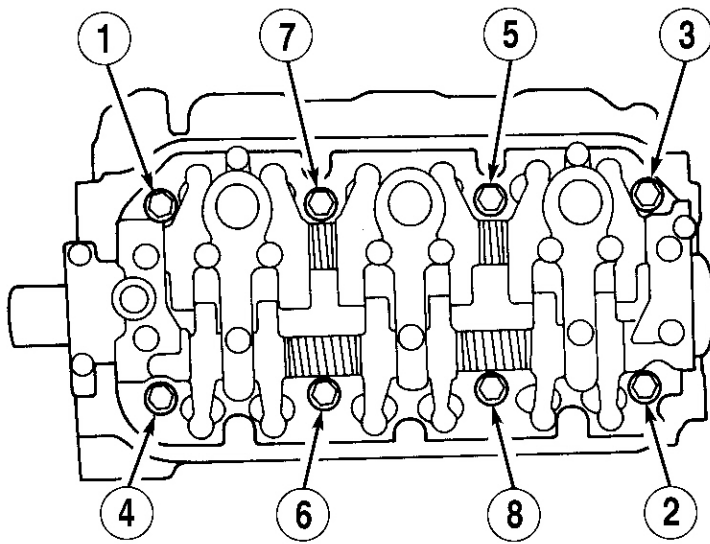
Installation

1. To install, reverse removal procedure. Ensure cylinder heads and cylinder block surface are clean. Install left and right exhaust manifolds using NEW gaskets. Apply oil to threads of exhaust manifold self-locking nuts. Using crisscross pattern, tighten self-locking nuts to specification in 2 or 3 steps, starting with inner nut. See **TORQUE SPECIFICATIONS**. Install exhaust manifold covers.
2. Install oil control orifices with NEW "O" rings. Install cylinder head dowel pins with NEW cylinder head gaskets. Ensure oil control orifices and dowel pins are aligned.
3. Install cylinder heads on engine block. Apply clean engine oil to cylinder head bolt threads and washer contact surfaces. Tighten cylinder head bolts to specification, in sequence, in 2 or 3 steps. See **Fig. 10**. See **TORQUE SPECIFICATIONS**.
4. Apply liquid gasket sealer to indicated areas (head mating surface of No. 1 and 7 camshaft holders USA

engine No. 1300001-1309262 and Canada engine No. 1700001-1700751; No. 1 and 5 camshaft holders USA engine No. 1309263-up, 2300001-up, 3300001-up, and Canada engine No. 1700752-up, 2700001-up, 3700001-up). See **Fig. 11**. Install cylinder head cover. Adjust timing belt tension. See **TIMING BELT TENSION ADJUSTMENT** under ADJUSTMENTS. Fill and bleed cooling system. See BLEEDING COOLING SYSTEM in SPECIFICATIONS & ELECTRIC COOLING FANS article in ENGINE COOLING.



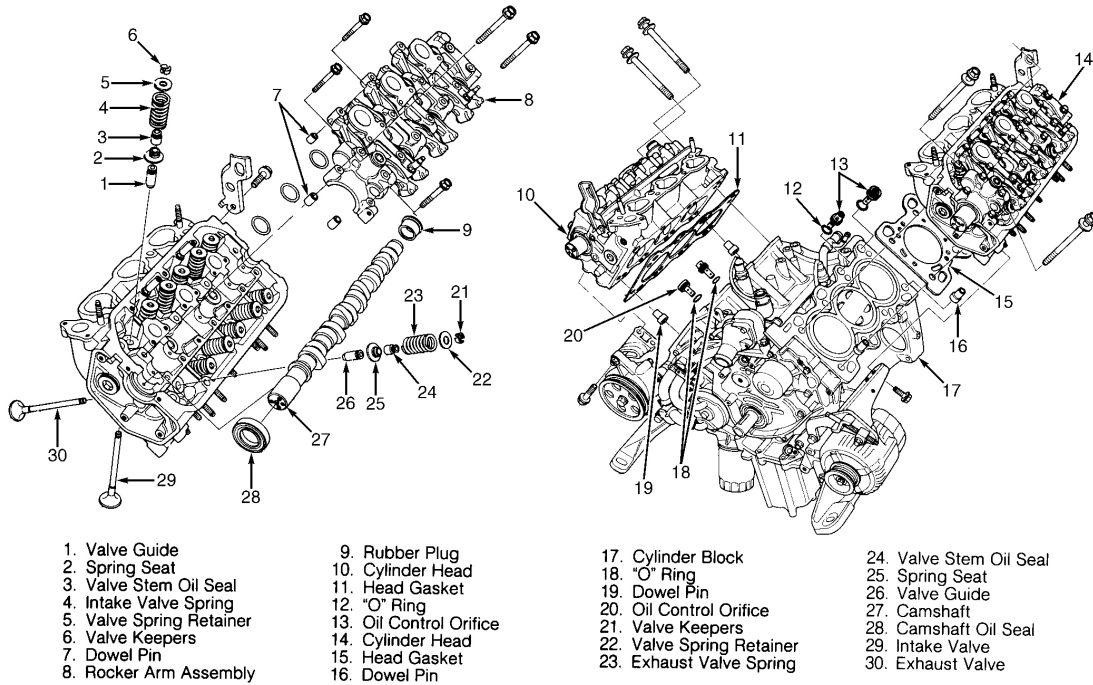
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CANADA ENGINE NO. 1700001-1700751



USA ENGINE NO. 1309263-2300001
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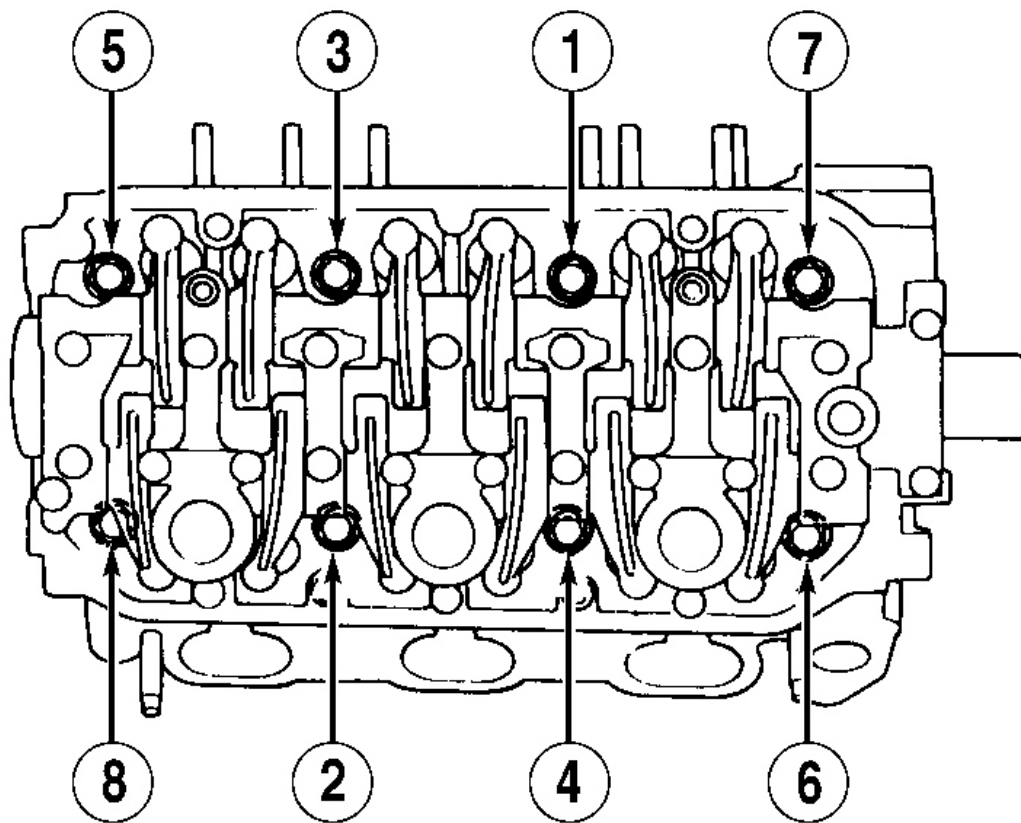
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Fig. 8: Cylinder Head Bolt Removal Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.



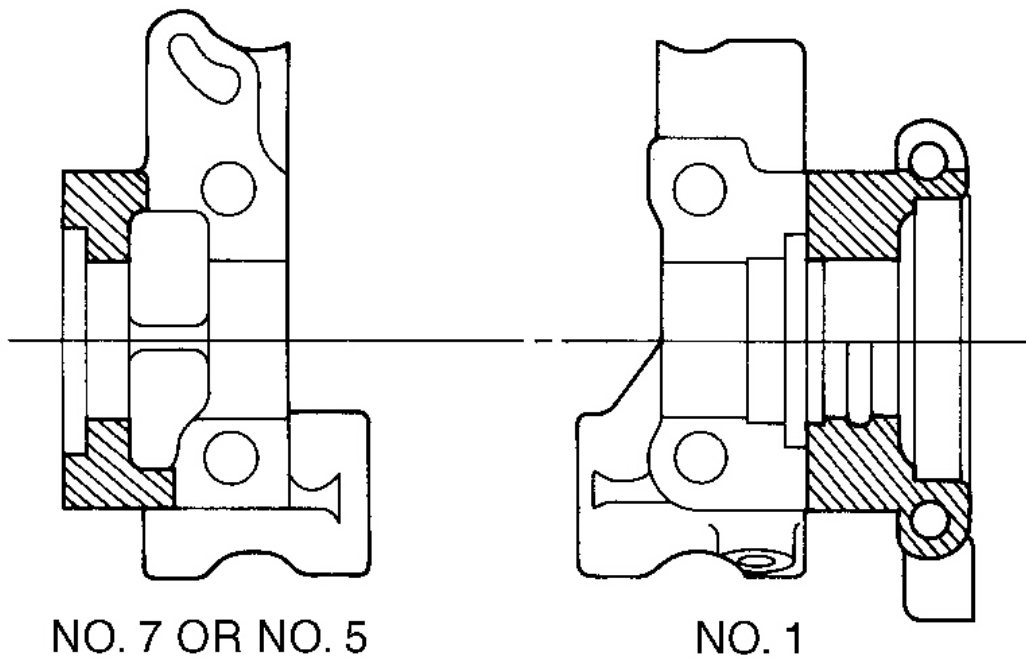
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Fig. 9: Exploded View Of Cylinder Head Components
Courtesy of AMERICAN HONDA MOTOR CO., INC.



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



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

FRONT CRANKSHAFT OIL SEAL

Removal & Installation

Remove crankshaft pulley and timing belt. See **TIMING BELT**. Pry oil seal from oil pump housing. Apply light coating of grease to crankshaft and lip on new seal. Using Seal Driver (07GAD-PH70201), install oil seal with part number facing out. Ensure seal is fully seated into housing and oil seal lip is not distorted. To complete installation, reverse removal procedure.

TIMING BELT

CAUTION: DO NOT turn crankshaft or camshafts with timing belt removed, because pistons may hit valves, causing damage.

Removal

1. Disconnect negative battery cable. Rotate crankshaft clockwise until No. 1 piston is at TDC of compression stroke. Using a jack, support engine prior to removing center bracket. Place a cushion

between oil pan and jack. Remove center bracket.

2. Loosen mounting bolts and adjusting rod, and then remove generator belt. Loosen idler pulley center nut and adjusting bolt, and then remove A/C compressor belt. Loosen mounting nut/bolt and adjusting bolt, and then remove power steering pump belt.
3. Remove Traction Control System (TCS) upper and lower brackets. Disconnect TCS throttle sensor and actuator connectors. Remove TCS control valve assembly. See **Fig. 12**. DO NOT disconnect breather pipe by-pass hose. Remove engine wiring harness cover. Remove oil pressure switch connector. Remove engine ground cable.
4. Remove idler pulley, dipstick and tube. Remove crankshaft pulley. Remove upper and lower timing belt covers. See **Fig. 13**. If reusing timing belt, mark direction of belt rotation for installation reference. Loosen timing belt tensioner adjusting bolt 180 degrees. Push tensioner to release belt tension, and then retighten adjusting bolt. Remove timing belt.

NOTE: For easier installation, turn right camshaft pulley clockwise about half a tooth from TDC position. Ensure crankshaft pulley and left camshaft pulley are at TDC.

Installation

1. To install, reverse removal procedures. Remove all spark plugs. 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, left camshaft pulley, water pump pulley, and right camshaft pulley in that order. See **Fig. 15**. Loosen and retighten timing belt idler pulley adjusting bolt to tension the timing belt. Install crankshaft pulley. Rotate crankshaft clockwise 5-6 turns to properly position timing belt on pulleys. Adjust timing belt tension. See **TIMING BELT TENSION ADJUSTMENT** under ADJUSTMENTS.
3. Remove crankshaft pulley. Install lower cover. Install crankshaft pulley. Rotate crankshaft clockwise 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. To complete installation, reverse removal procedure.

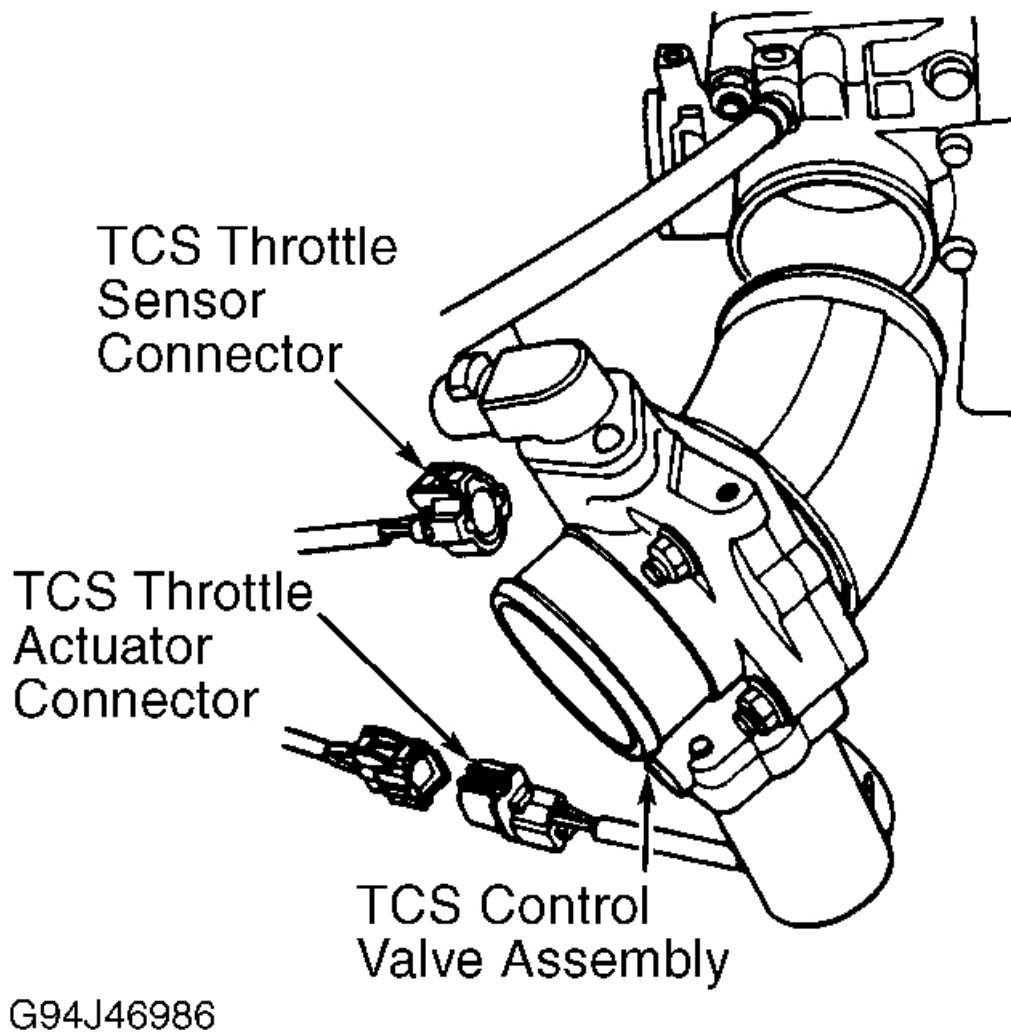


Fig. 12: Locating TCS Connectors & Control Valve Assembly
Courtesy of AMERICAN HONDA MOTOR CO., INC.

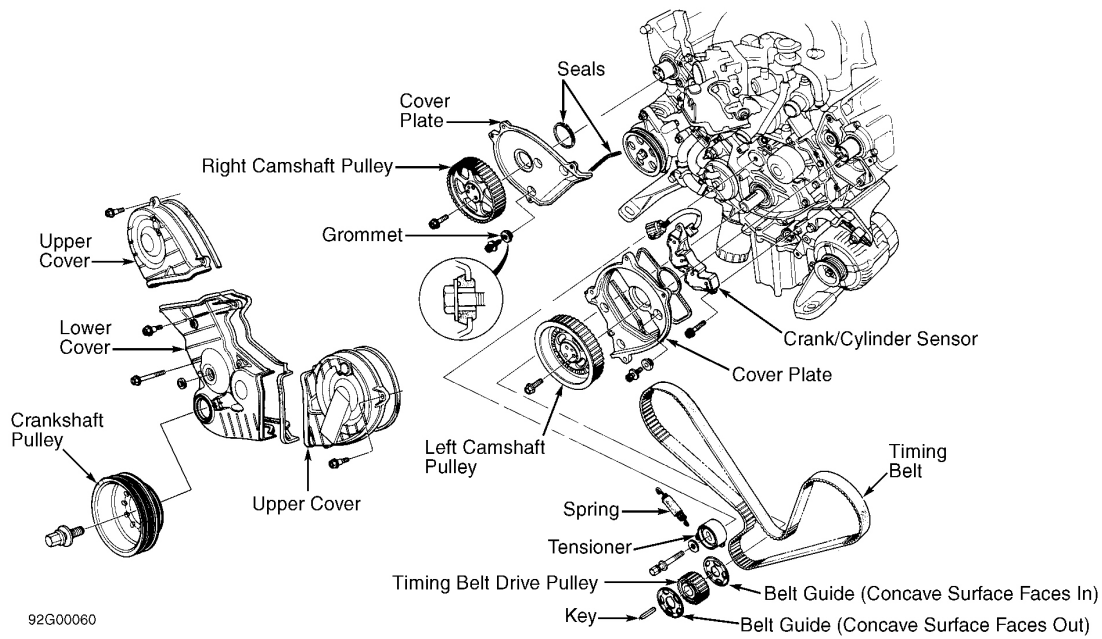
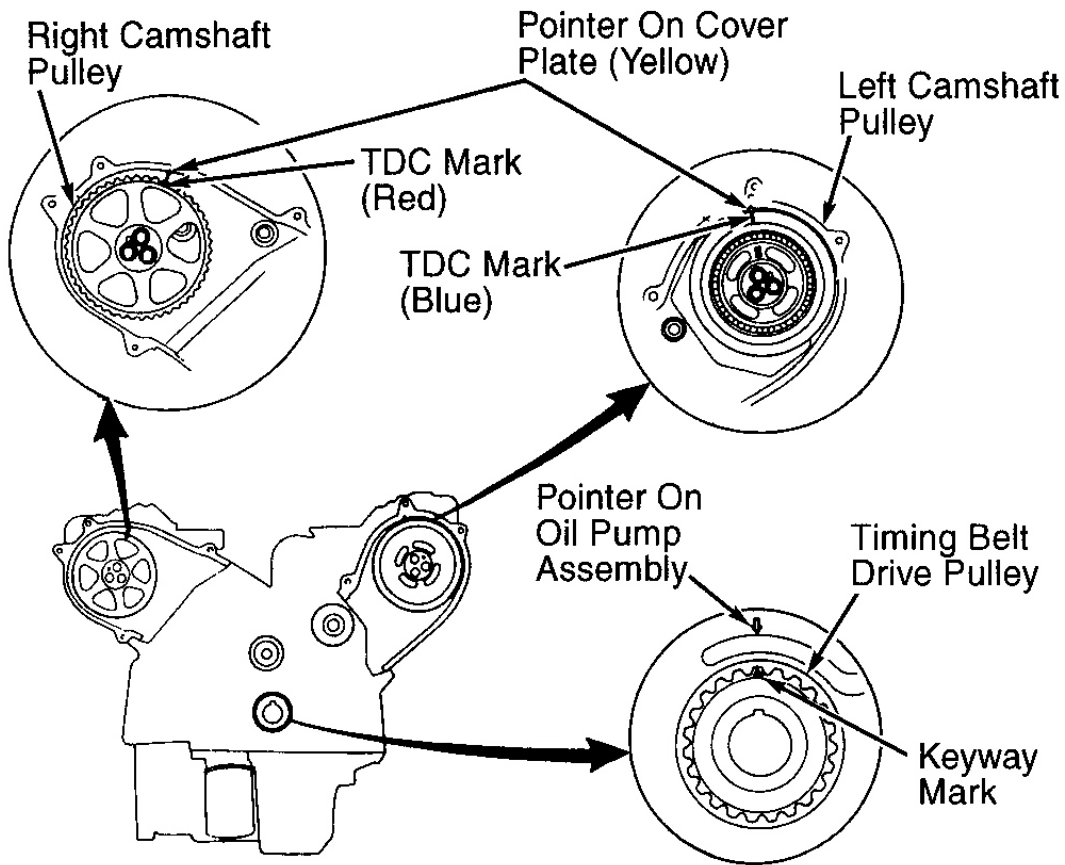


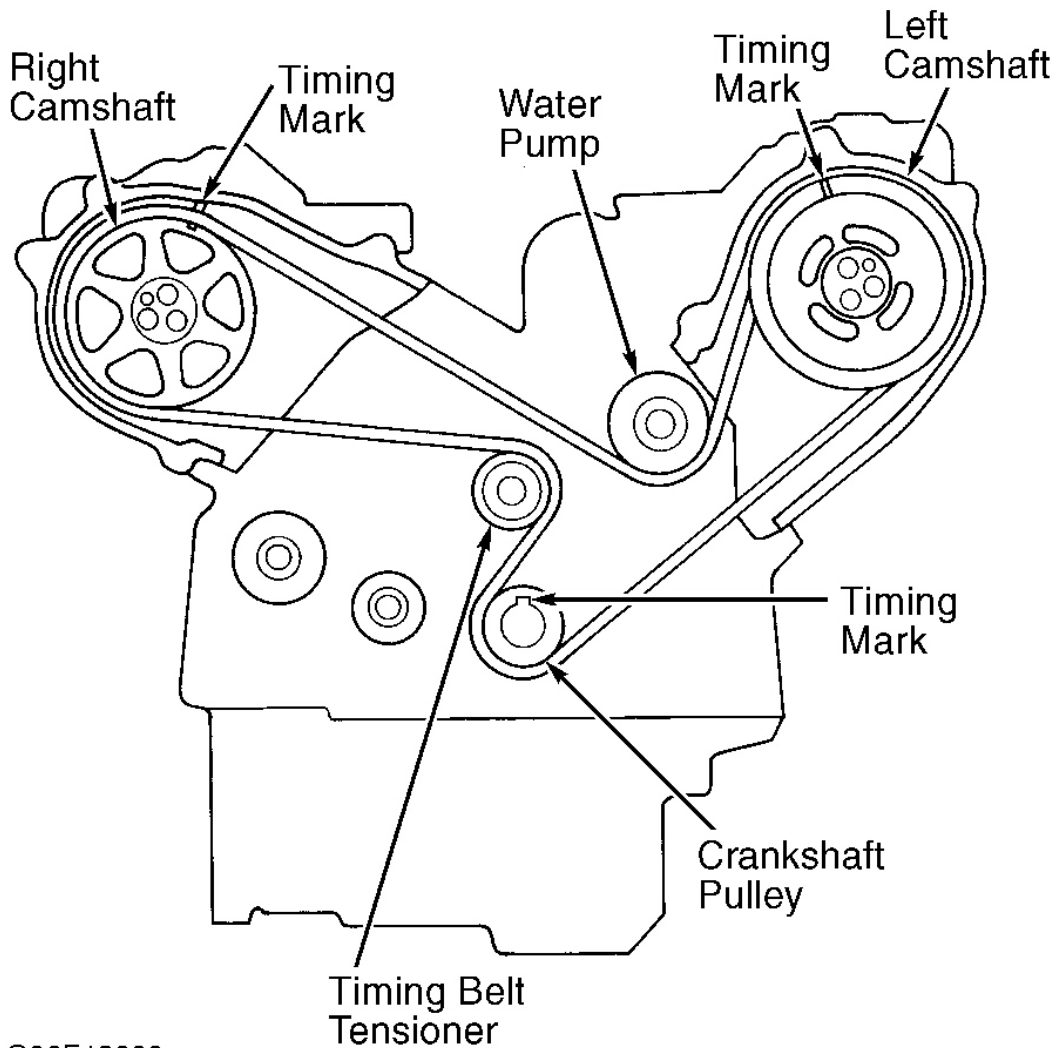
Fig. 13: Exploded View Of Timing Belt & Components
 Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 14: Aligning Timing Marks (TDC)

Courtesy of AMERICAN HONDA MOTOR CO., INC.



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Fig. 15: Timing Belt Routing

Courtesy of AMERICAN HONDA MOTOR CO., INC.

CAMSHAFTS & ROCKER ARMS**Removal**

Remove timing belt. See **TIMING BELT**. Remove camshaft sprockets and back cover plates. Remove cylinder head covers. Loosen camshaft holder bolts, 2 turns at a time in crisscross pattern. When removing rocker arm assembly, do not remove camshaft holder bolts. Bolts keep 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 specified torque. Seat camshaft by pushing it toward rear of cylinder head. Zero dial indicator against rear end. 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 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 exceeds 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** or **Fig. 17**. If lifters were replaced or removed from rocker arms, bleed air from lifters. Fill container with 10W-30 oil. Place lifter into container. Using a thin wire and a vertical motion, pump lifter plunger until no air bubbles emerge from lifter.
2. Install and lubricate NEW "O" ring onto lifter. Install lifter into rocker arm. Lubricate camshaft journals and journal surfaces in caps and cylinder head. Position camshaft with pin hole at top. Install camshaft and camshaft seal. Apply gasket sealer to cylinder head mating surfaces of No. 1 and 7 camshaft holders USA engine No. 1300001-1309262 and Canada engine No. 1700001-1700751, or No. 1 and 5 camshaft holders USA engine No. 1309263-up, 2300001-up, 3300001-up, and Canada engine No. 1700752-up, 2700001-up, 3700001-up. See **Fig. 11**.
3. 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. 18**. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

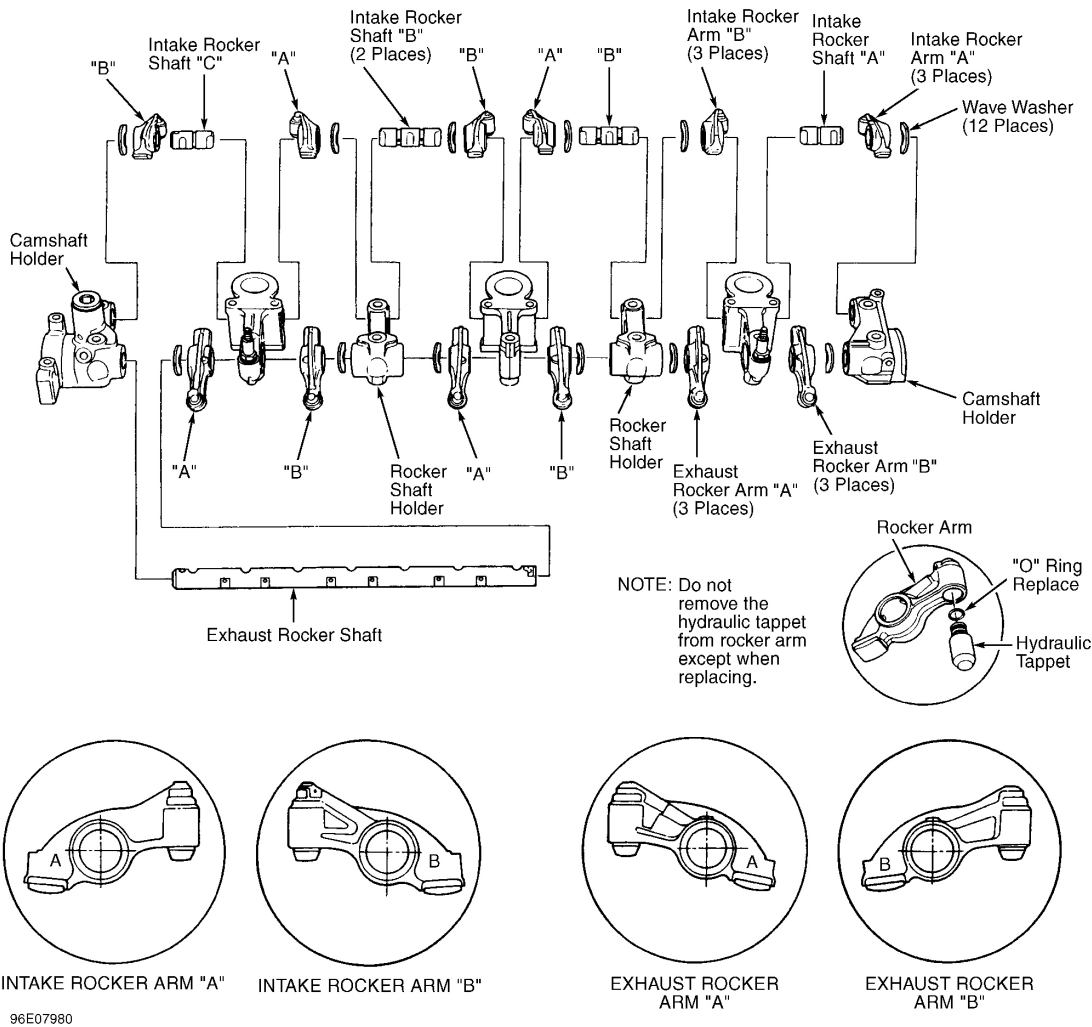
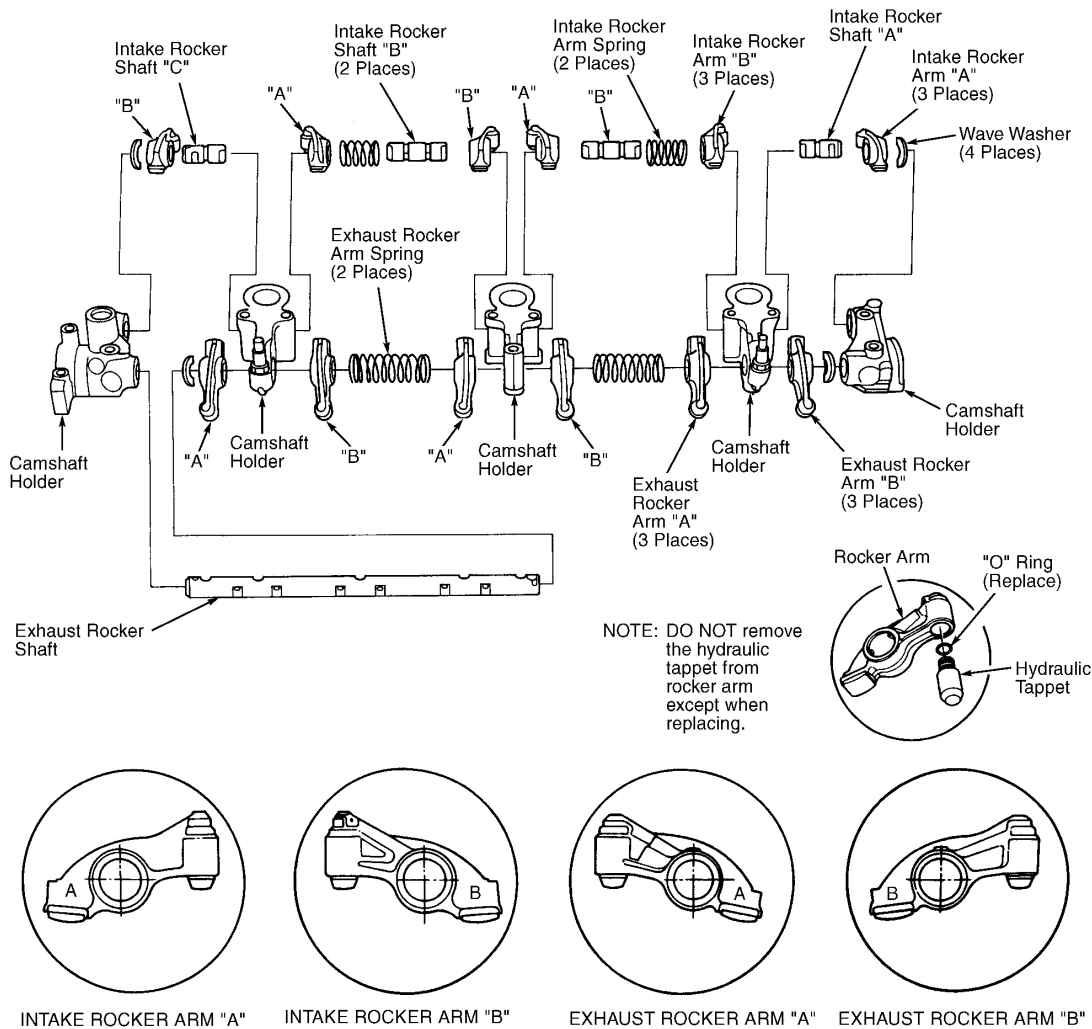


Fig. 16: Exploded View Of Rocker Arm Assembly (USA Engine No. 1300001-1309262 & Canada Engine No. 1700001-1700751)

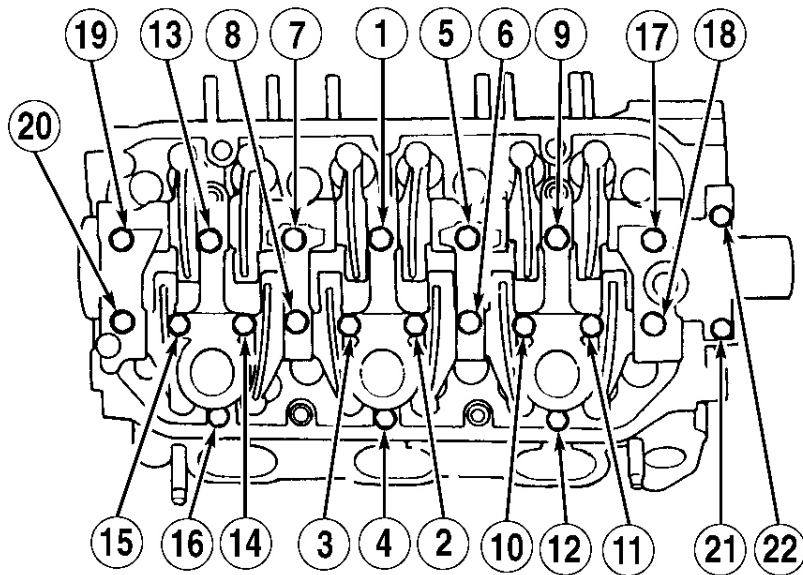
Courtesy of AMERICAN HONDA MOTOR CO., INC.



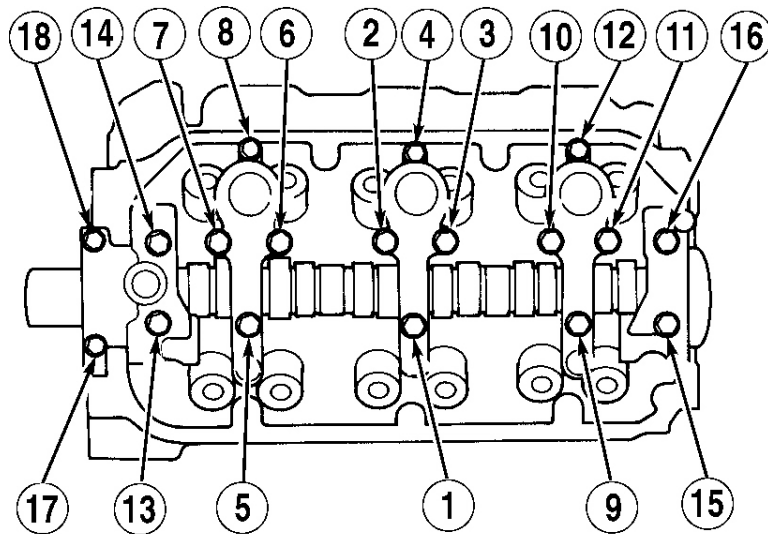
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Fig. 17: Exploded View Of Rocker Arm Assembly (USA Engine No. 1309263-up, 2300001-up, 3300001-up, & Canada Engine No. 1700752-up, 2700001-up, 3700001-up)

Courtesy of AMERICAN HONDA MOTOR CO., INC.



USA ENGINE NO. 1300001-1309262
CANADA ENGINE NO. 1700001-1700751



USA ENGINE NO. 1309263-UP, 2300001-UP, 3300001-UP
CANADA ENGINE NO. 1700752-UP, 2700001-UP, 3700001-UP

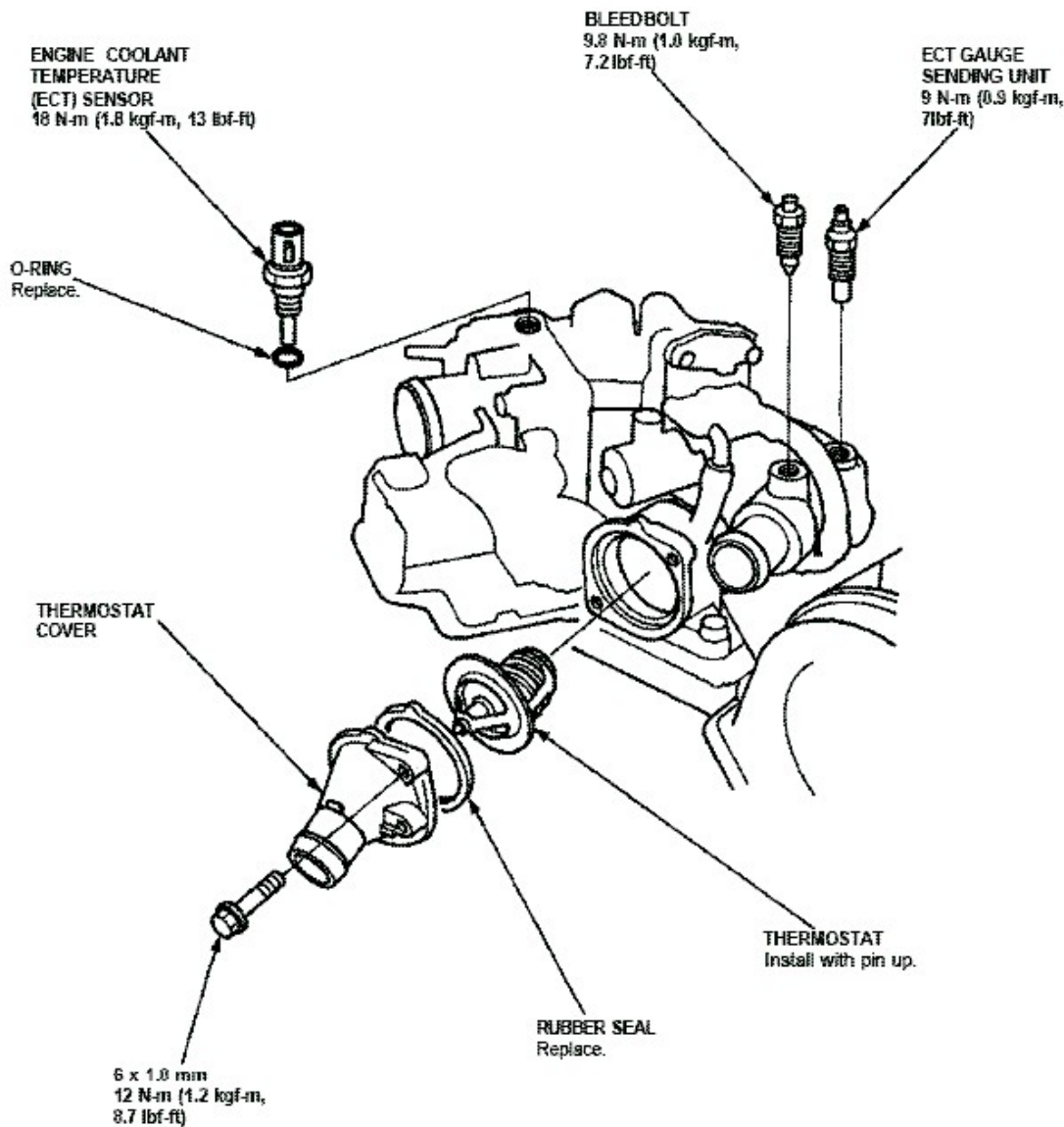
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Fig. 18: Camshaft Bearing Cap Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.

REAR CRANKSHAFT OIL SEAL

Removal & Installation

1. Disconnect negative battery cable. Remove transmission. See TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING.
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 in crankshaft oil seal into rear cover with part number facing out. Using a feeler gauge, check that there is an equal clearance of .01-.02" (.2-.5 mm) all around between the oil seal and rear cover. To complete installation, reverse removal procedure.

THERMOSTAT**Fig. 19: 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 left camshaft pulley and back cover. 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 in SPECIFICATIONS & ELECTRIC COOLING FANS article in ENGINE COOLING.

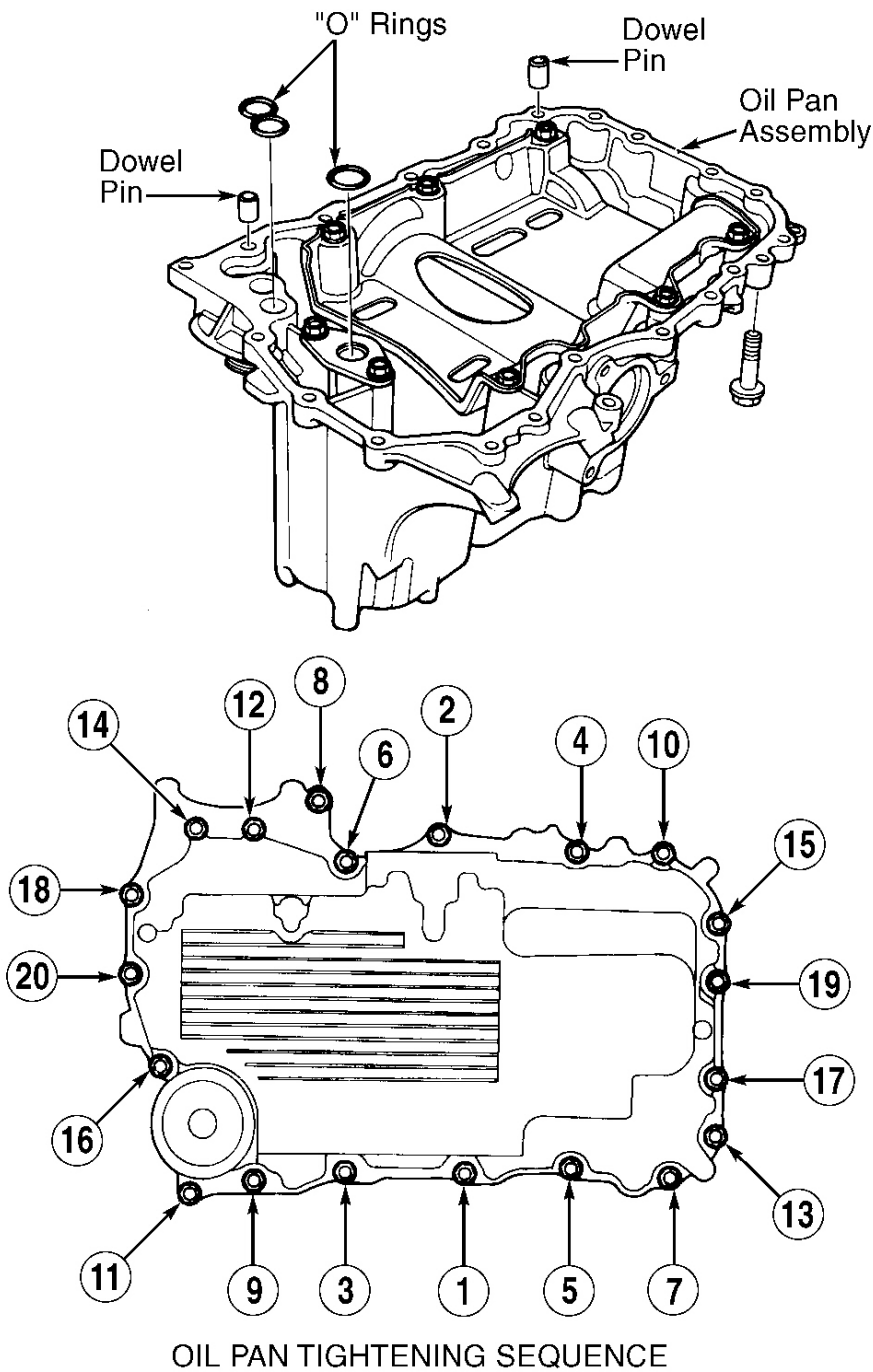
OIL PAN

Removal

1. Disconnect negative battery cable. Disconnect positive battery cable. Loosen idler pulley center nut and adjusting bolt. Remove A/C compressor belt. Raise and support vehicle. Remove front wheels and splash shield. Remove damper forks. Disconnect suspension lower arm ball joints. See appropriate article in SUSPENSION.
2. Remove axle shafts and intermediate shaft. See AXLE SHAFTS - FRONT article in DRIVE AXLES. Drain engine oil and differential oil. Install drain bolts using NEW washers. DO NOT overtighten drain bolts.
3. Remove Vehicle Speed Sensor (VSS)/power steering speed sensor, but DO NOT disconnect fluid hoses. Remove right front beam bridge. Remove lower plate from rear beam, and then retighten steering gearbox mounting bolts.
4. Place transmission in Park to lock secondary shaft. Remove 36-mm extension shaft sealing bolt. Disconnect extension shaft from differential using Extension Shaft Puller (07LAC-PW50101). Remove differential mounting bolts and 26-mm shim. Remove differential assembly.
5. Disconnect compressor clutch connector and remove A/C compressor. DO NOT remove A/C hoses. Remove engine stiffener. Remove drive plate cover. Remove oil pan and "O" rings. See **Fig. 20**.

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. 20**. See TORQUE SPECIFICATIONS. Fill or top off all fluids. Wait a minimum of 30 minutes before filling crankcase with engine oil.



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Fig. 20: 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 clearance is not within specification. See **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 plastic 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 stem seals are not interchangeable. Intake valve stem seals have a White spring around neck of seal. Exhaust valve stem seals have a Black spring around neck of seal.

Valve Guide Inspection

1. Place dial indicator against valve head. Lift valve 0.4" (10 mm) from seat. Rock valve stem from side to side, and measure valve wobble.
2. If wobble exceeds 0.006" (0.16 mm) for intake valves or 0.009" (0.22 mm) for exhaust valves, install new valve and recheck clearance. 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. 21**. 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 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. Valve guide (intake and exhaust) height should be 0.62-0.64" (15.75-16.25 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.

Valves

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

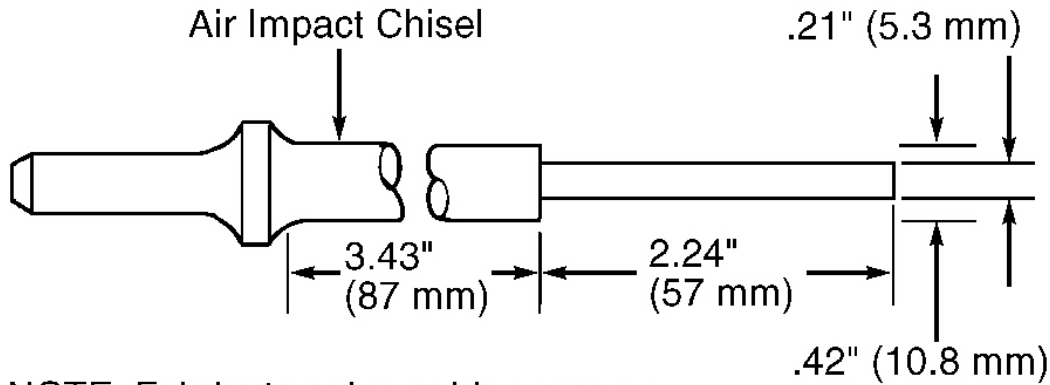
Valve Stem Installed Height

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. 22**.
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.

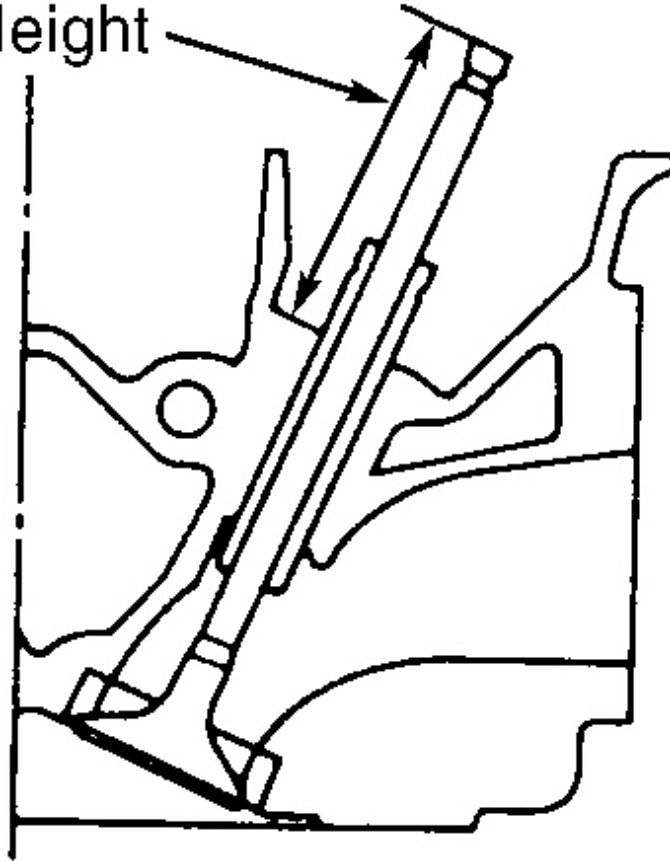


NOTE: Fabricate valve guide remover to dimensions shown.

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Fig. 21: Fabricating Valve Guide Driver
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Valve Stem
Installed Height



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Fig. 22: 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.

- Nominal connecting rod's big end bore is 2.24" (57 mm). Install piston and connecting rod with arrow on top of piston toward front of engine, and connecting rod oil hole toward offset mark on piston. See **Fig. 23**.

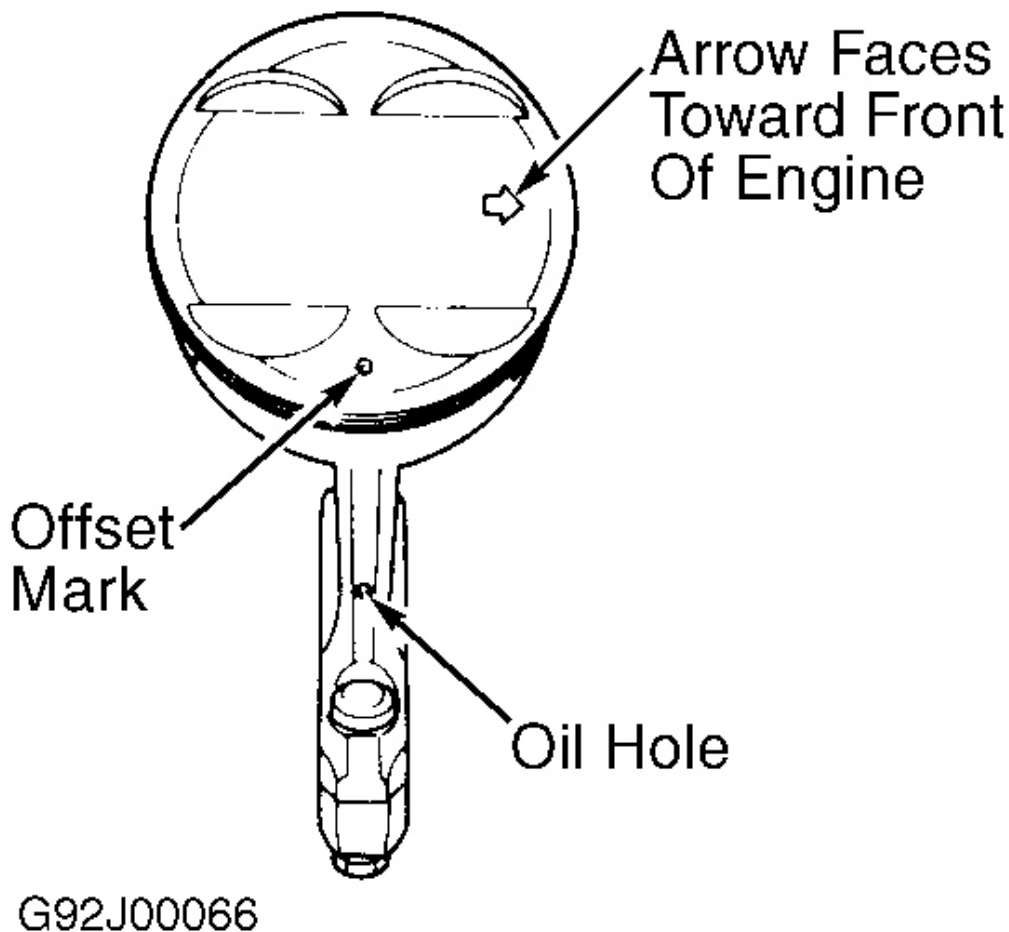


Fig. 23: Positioning Piston Onto Connecting Rod
Courtesy of AMERICAN HONDA MOTOR CO., INC.

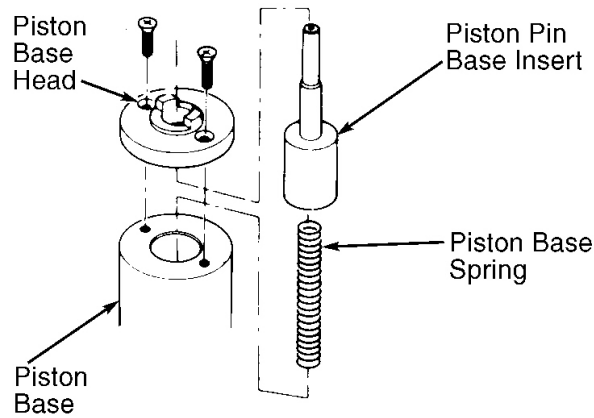
Piston Pin Removal

- 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-

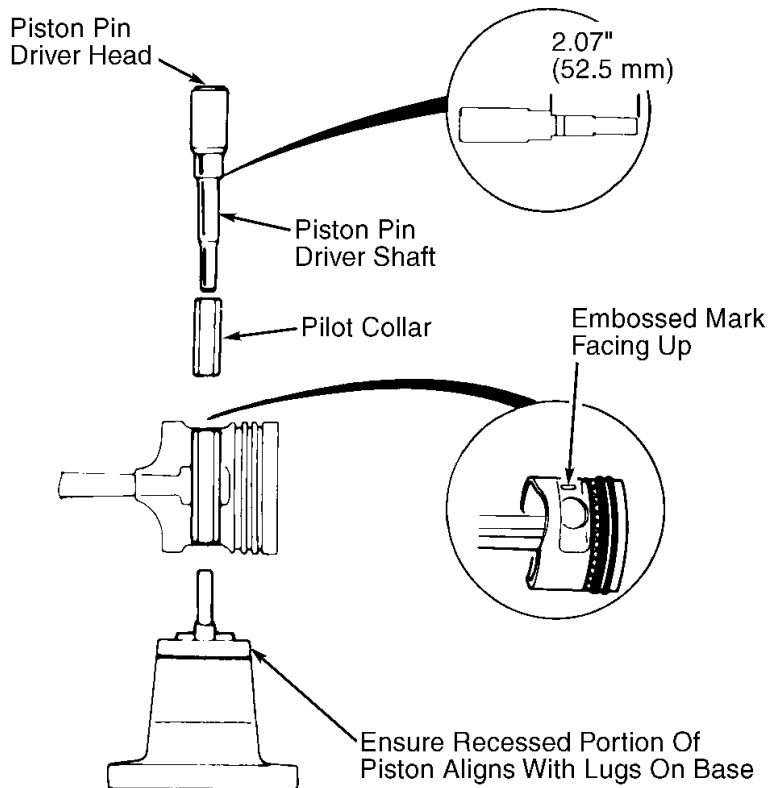
6570500). See **Fig. 24**. Adjust Piston Pin Driver Head (07973-PE00320) so piston driver length is 2.07" (52.5 mm).

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 lugs on base insert. Press out piston pin.

1. Assemble Special Tool As Shown



2. Adjust The Length Of Piston Pin Driver To 2.07" (52.5 mm) As Shown



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Fig. 24: Removing & Installing Piston Pin

Courtesy of AMERICAN HONDA MOTOR CO., INC.

NOTE: All replacement piston pins are oversize.

Piston Pin Inspection

1. Measure diameter of piston pin. Zero dial indicator to piston pin diameter. Check piston for cracks or distortion. Measure piston pin bore in piston. Difference between the 2 measurements is pin-to-piston clearance.
2. Ensure clearance is 0.0004-0.0007" (0.010-0.019 mm). If clearance is greater than 0.0009" (0.024 mm), install an oversize piston pin and re-measure 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

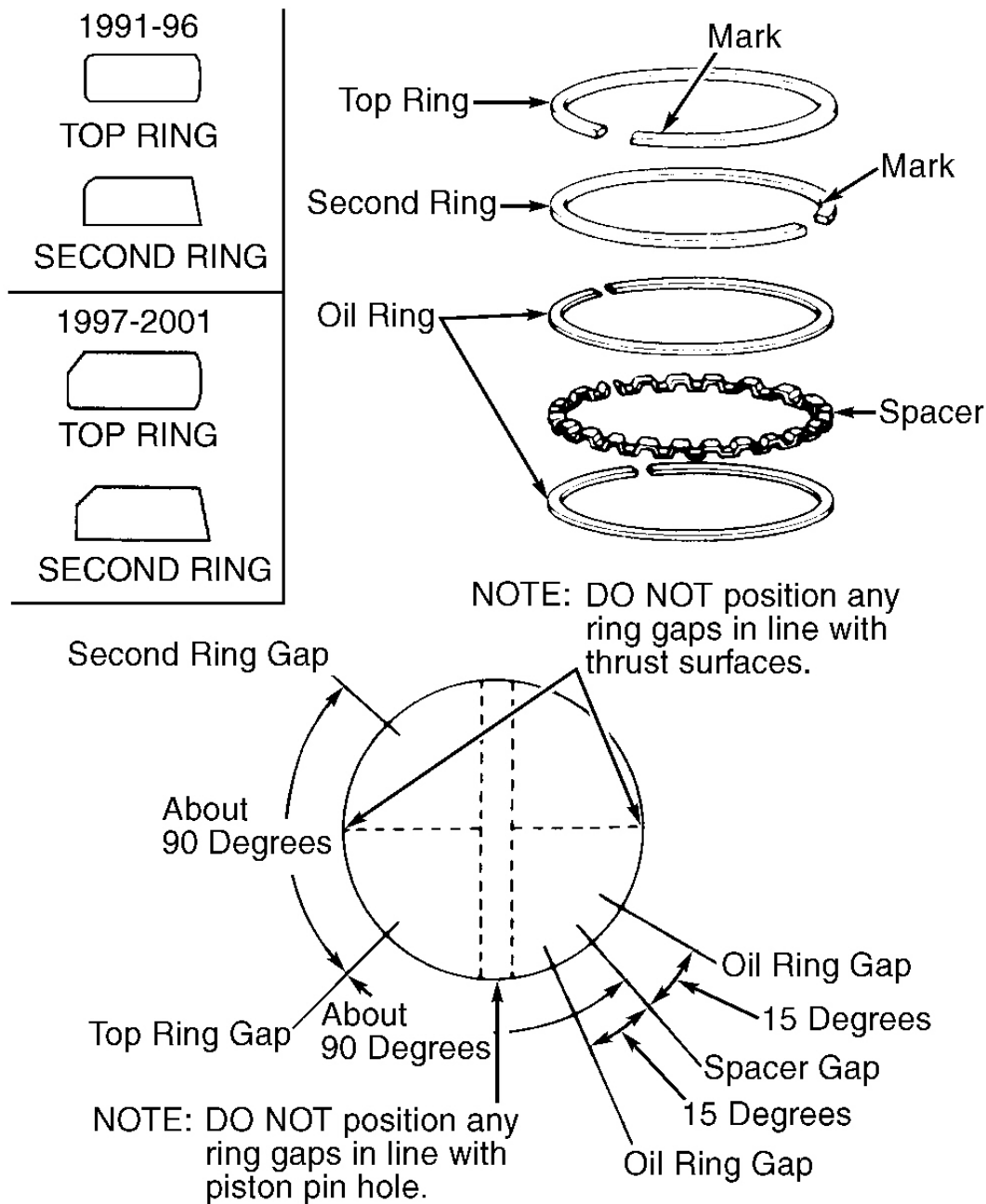
1. Use a hydraulic press for piston pin installation. Install piston with its offset mark and oil hole in connecting rod on the same side. See **Fig. 23**. Adjust Piston Pin Driver Head (07973-PE00320) so piston driver length is 2.07" (52.5 mm). See **Fig. 24**.
2. Install Pilot Collar (07GAF-PH70100) into piston and connecting rod. Lubricate new piston pin lightly. Position piston onto base with embossed mark facing up. Align recessed part of piston with lugs on base insert. Press in piston pin.

Fitting Pistons

1. Using a feeler gauge, measure clearance between piston and cylinder bore. If clearance exceeds 0.003" (0.08 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 0.67" (17 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 lack of marking, or letter "A" or "B" stamped on cylinder block. Identification letters on block read from front cylinder to rear cylinder. Letters for No. 1 through No. 3 cylinders are on first line, and letters for No. 4 through No. 6 cylinders are on second line. 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 end gaps are properly spaced around piston. See **Fig. 25**.



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Fig. 25: Installing Piston Rings

Courtesy of AMERICAN HONDA MOTOR CO., INC.

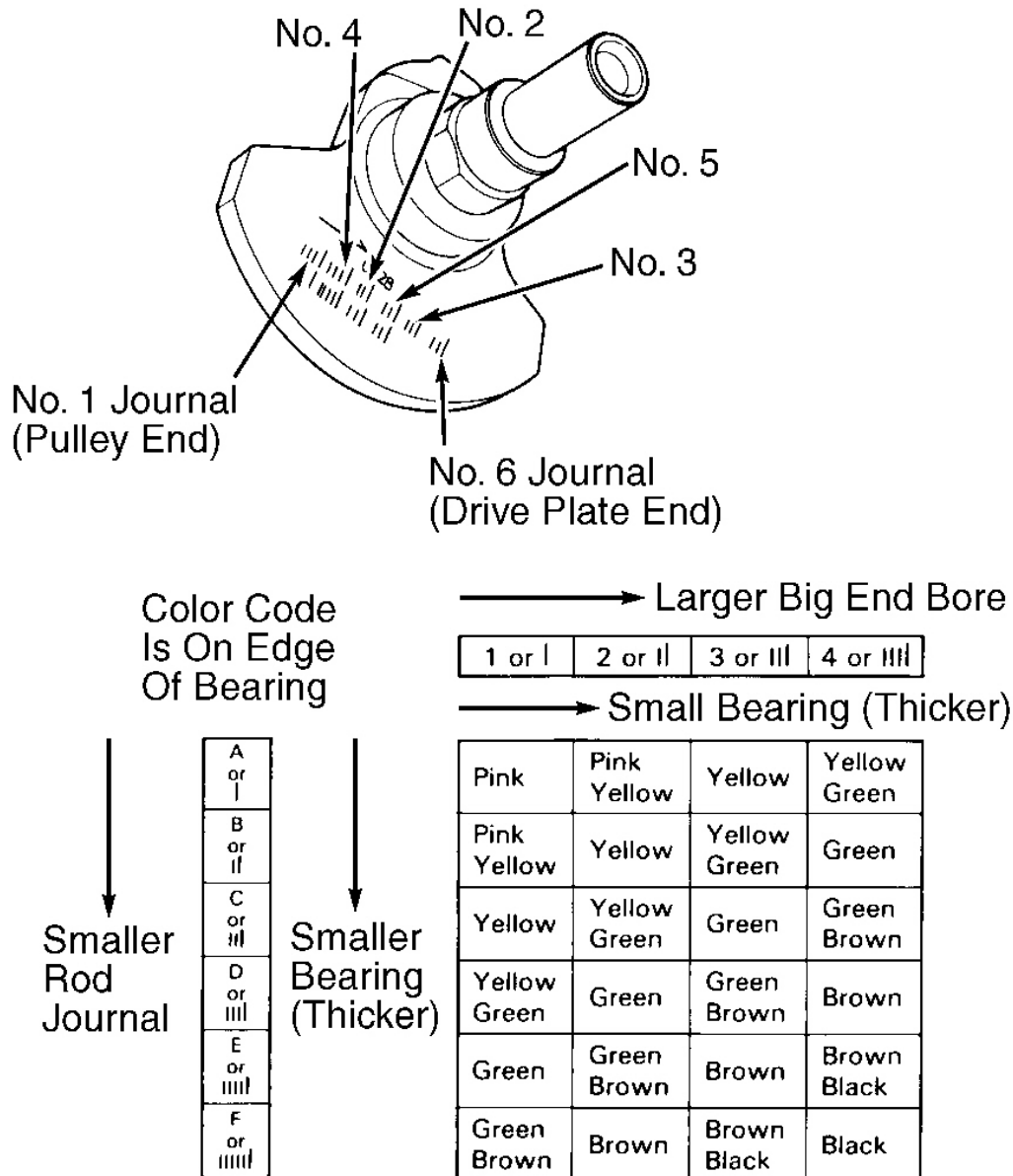
Rod Bearings

1. Measure oil clearance using Plastigage. Tighten bearing cap to 33 ft. lbs. (45 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. 26. Use both codes when ordering replacement bearings.



NOTE: On bearing sets with 2 colors, such as Green/Brown, it does not matter which color is in top or bottom as long as set has one of each bearing.

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Fig. 26: Identifying Connecting Rod Journal & Bearing Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

Crankshaft & Main Bearings

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. Measure 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. 27**. 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. 28. Use both codes when ordering replacement bearings.**

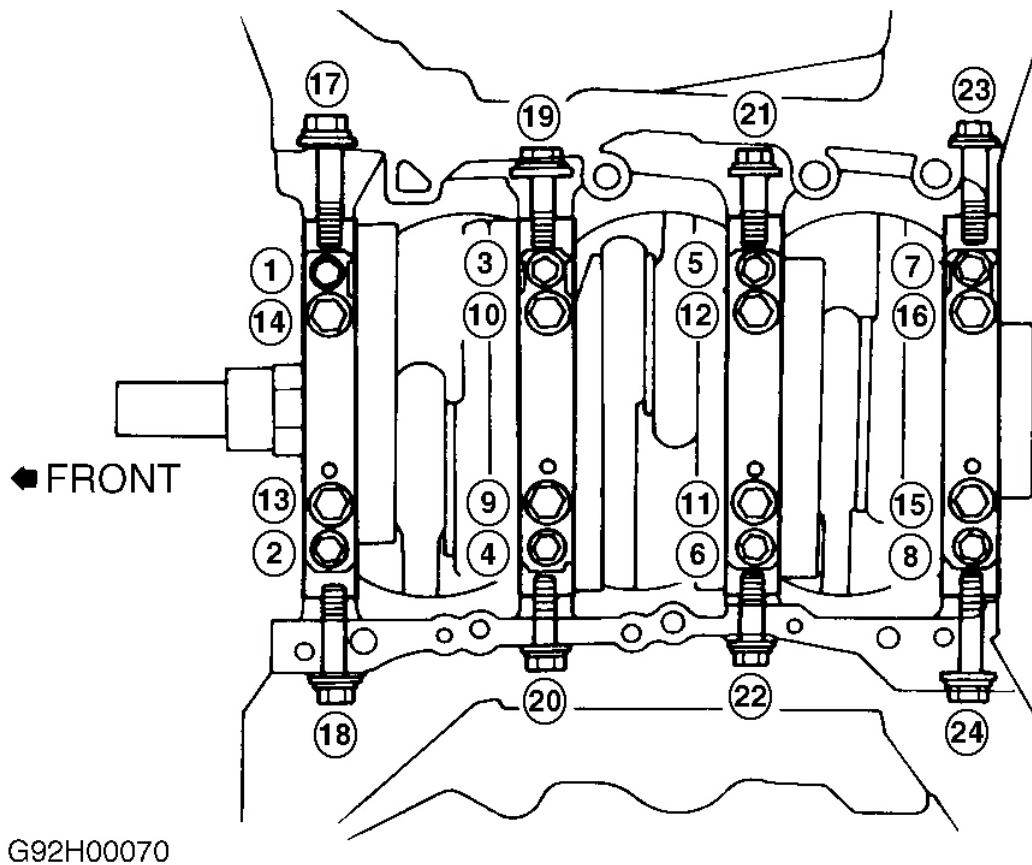
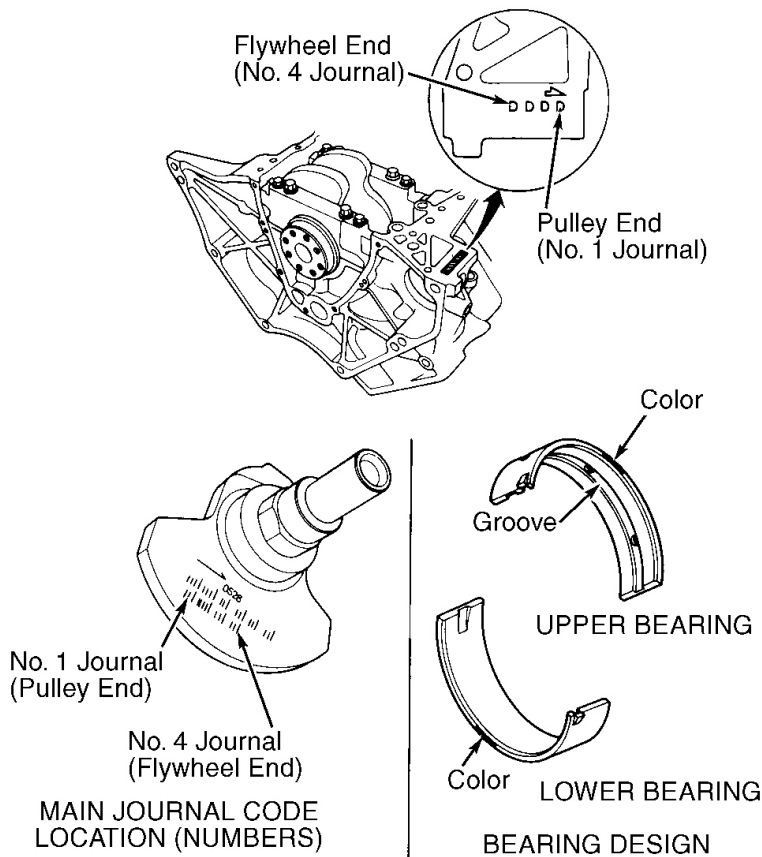


Fig. 27: Crankshaft Main Bearing Cap Bolt Tightening Sequence
Courtesy of AMERICAN HONDA MOTOR CO., INC.



Color Code
Is On Edge
Of Bearing

1 or I	→ Larger Big End Bore	A or I	B or II	C or III	D or IIII
2 or II	→ Smaller Bearing (Thicker)	Pink	Pink Yellow	Yellow	Yellow Green
3 or III		Pink Yellow	Yellow	Yellow Green	Green
4 or IIII		Yellow	Yellow Green	Green	Green Brown
5 or IIIII		Yellow Green	Green	Green Brown	Brown
6 or IIIII		Green	Green Brown	Brown	Brown Black
		Green Brown	Brown	Brown Black	Black

Smaller
Main
Journal

Smaller
Bearing
(Thicker)

NOTE: On bearing sets with 2 colors, such as Green/Brown, it does not matter which color is in top or bottom as long as set has one of each bearing.

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Fig. 28: Identifying Crankshaft Main Journal & Bearing Codes
Courtesy of AMERICAN HONDA MOTOR CO., INC.

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 pistons. 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/cm²). Minimum oil pressure at 3000 RPM should be 50 psi (3.5 kg/cm²).

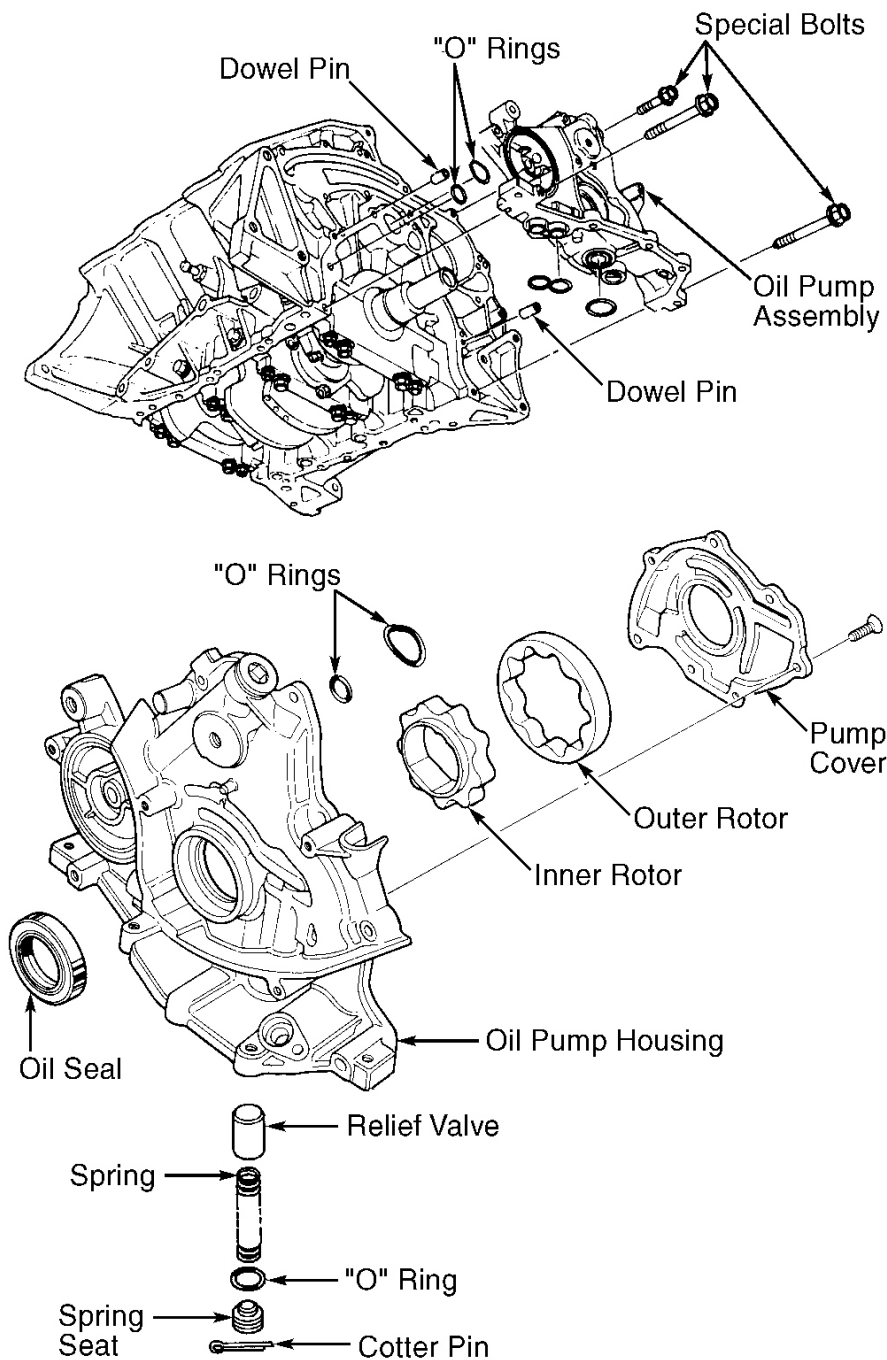
OIL PUMP

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 special bolts and oil pump. See **Fig. 29**. Remove screen screws from oil pump housing. Separate pump cover from pump housing. Using a screwdriver, pry oil seal from oil pump housing.

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.



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Fig. 29: Exploded View Of Oil Pump Assembly

Courtesy of AMERICAN HONDA MOTOR CO., INC.

OIL PUMP SPECIFICATIONS

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 (07749-0010000) and Attachment (07746-0010500), install oil seal. Ensure seal is fully seated into oil pump housing.
2. Reassemble oil pump. Apply Liquid Gasket Sealer (08718-00001) 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)
Camshaft Bearing Cap Bolts ⁽¹⁾	
6-mm Bolts	(2)
8-mm Bolts	16 (22)
Camshaft Pulley Bolts	23 (31)
Connecting Rod Cap Nuts	33 (44)
Crankshaft Pulley Bolt	181 (245)
Cylinder Head Bolts ⁽³⁾	56 (76)
Differential-To-Oil Pan Bolts	47 (64)
Engine Block-To-Transmission Housing Bolts	47 (64)
Engine Mounts	(4)

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Exhaust Manifold	
Self-Locking Nuts	22 (30)
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)
Lower Plate-To-Rear Beam Bolts	28 (38)
Main Bearing Cap Bolts ⁽⁶⁾	
9-mm Bolts	29 (39)
10-mm Side Bolts	36 (49)
11-mm Bolts	56 (76)
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	33 (44)
TCS Control Valve Bracket Bolts	
Lower Bracket	16 (22)
Upper Bracket	(2)
Timing Belt Tension Adjuster Bolt	31 (42)
Transmission Mount	(4)
Water Pump Bolts	
6-mm Bolts	(2)
8-mm Bolts	16 (22)
INCH Lbs. (N.m)	
Coolant Passage Manifold Bolts	106 (12)
Crankshaft Rear Seal Cover Bolts	106 (12)
Cylinder Head Cover Nuts	106 (12)
Fuel Filter Service Bolt	106 (12)
Timing Belt Cover Bolts	106 (12)
Valve Cover Nuts	106 (12)
(1) Tighten bolts 2 turns at a time in sequence. See Fig. 18 .	
(2) Tighten to 106 INCH lbs. (12 N.m).	

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- (3) Tighten in sequence, in 2-3 steps. See **Fig. 10**.
- (4) Tighten in sequence to specification. See **Fig. 4** and **Fig. 5**.
- (5) Tighten in a crisscross pattern.
- (6) Tighten in sequence. See **Fig. 27**.
- (7) Tighten in sequence. See **Fig. 20**.

ENGINE SPECIFICATIONS**GENERAL SPECIFICATIONS**

Application	Specification
Displacement	195 Cu. In. (3.2L)
Bore	3.54" (90 mm)
Stroke	3.31" (84 mm)
Compression Ratio	9.6:1
Fuel System	PGM-FI
Horsepower @ RPM	200 @ 5300
Torque Ft. Lbs. @ RPM	210 @ 4500

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

Application	In. (mm)
Crankshaft	
End Play	
Standard	0.004-0.011 (0.10-0.29)
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	0.0008 (0.020)
Service Limit	0.0012 (0.030)
Main Bearings	
Journal Diameter	2.6762-2.6772 (67.976-68.000)
Oil Clearance	
Standard	0.0008-0.0017 (0.020-0.044)
Service Limit	0.002 (0.05)

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Connecting Rod Bearings

Journal Diameter	2.1248-2.1257 (53.970-53.994)
Oil Clearance	
Standard	0.0009-0.0018 (0.022-0.046)
Service Limit	0.002 (0.05)

CONNECTING RODS**CONNECTING RODS**

Application	In. (mm)
Bore Diameter	
Crank Pin Bore	2.24 (57.0)
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	0.001-0.002 (0.02-0.05)
Service Limit	0.003 (0.08)
Diameter	
Standard ⁽¹⁾	
"A" Or No Marking Piston	3.5425-3.5429 (89.980-89.990)
Service Limit	3.5421 (89.970)
"B" Piston	3.5421-3.5425 (89.970-89.980)
Service Limit	3.5417 (89.960)
Oversize	
.010" (0.25 mm)	3.5520-3.5524 (90.220-90.230)
.020" (0.50 mm)	3.5618-3.5622 (90.470-90.480)
Piston Pins	
Diameter	
Standard	0.8659-0.8661 (21.994-22.000)

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Oversize	0.8660-0.8663 (21.997-22.003)
Pin-To-Piston Clearance	0.0004-0.0007 (0.010-0.019)
Rod Interference Fit	0.0005-0.0013 (0.013-0.032)
Rings	
No. 1	
End Gap	
Standard	0.010-0.016 (0.25-0.40)
Service Limit	0.028 (0.70)
Side Clearance	0.0022-0.0031 (0.055-0.080)
Service Limit	0.005 (0.13)
No. 2	
End Gap	
Standard	0.016-0.022 (0.40-0.55)
Service Limit	0.033 (0.85)
Side Clearance	0.0012-0.0022 (0.030-0.055)
Service Limit	0.005 (0.13)
No. 3 (Oil)	
End Gap	
Standard ⁽²⁾	0.008-0.028 (0.20-0.70)
Standard ⁽³⁾	0.008-0.020 (0.20-0.50)
Service Limit	0.031 (0.80)
(1) Piston identification letter is located on top of piston.	
(2) RIKEN manufactured piston ring.	
(3) TEIKOKU manufactured piston ring.	

CYLINDER BLOCK**CYLINDER BLOCK**

Application	In. (mm)
Cylinder Bore	
Standard ⁽¹⁾	
"A" Cylinder	3.5437-3.5441 (90.010-90.020)
Service Limit	3.5461 (90.070)
"B" Cylinder	3.5433-3.5437 (90.000-90.010)
Service Limit	3.5461 (90.070)
Oversize	
.010" (0.25 mm)	3.5531-3.5539 (90.250-90.270)

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.020" (0.50 mm)	3.5630-3.5638 (90.500-90.520)
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.	

VALVES & VALVE SPRINGS**VALVES & VALVE SPRINGS**

Application	Specification
Intake Valves	
Face Angle	45°
Head Diameter	1.295-1.303" (32.90-33.10 mm)
Margin	
Standard	0.033-0.045" (0.85-1.15 mm)
Service Limit	0.026" (0.65 mm)
Stem Diameter	
Standard	0.2157-0.2161" (5.480-5.490 mm)
Service Limit	0.215" (5.450 mm)
Valve Length	4.472-4.483" (113.58-113.88 mm)
Valve Stem Installed Height	
Standard	1.8478-1.8671" (46.935-47.425 mm)
Service Limit	1.8750" (47.625 mm)
Exhaust Valves	
Face Angle	45°
Head Diameter	1.098-1.106" (27.90-28.10 mm)
Margin	
Standard	0.053-0.065" (1.35-1.65 mm)
Service Limit	0.045" (1.15 mm)
Stem Diameter	
Standard	0.2146-0.2150" (5.450-5.460 mm)
Service Limit	0.213" (5.42 mm)
Valve Length	4.568-4.580" (116.03-116.33 mm)
Valve Stem Installed Height	

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Standard	1.8852-1.9045" (47.885-48.375 mm)
Service Limit	1.9124" (48.575 mm)
Valve Springs Free Length	
Intake	
NH ⁽¹⁾	1.975" (50.16 mm)
CH ⁽²⁾	1.975" (50.17 mm)
Exhaust	1.983" (50.36 mm)
(1) NIHAN 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	
Intake	
Standard	0.031-0.039" (0.80-1.00 mm)
Service Limit	0.060" (1.50 mm)
Exhaust	
Standard	0.049-0.061" (1.25-1.55 mm)
Service Limit	0.080" (2.00 mm)
Valve Guides	
Intake & Exhaust	
Valve Guide I.D.	
Standard	0.217-0.218" (5.51-5.53 mm)
Service Limit	0.219" (5.55 mm)
Valve Guide	
Installed Height	0.620-0.640" (15.75-16.25 mm)
Valve Stem-To-Guide Oil Clearance	
Intake	
Standard	0.001-0.002" (0.02-0.05 mm)
Service Limit	0.003" (0.08 mm)
Exhaust	
Standard	0.002-0.003" (0.05-0.08 mm)

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Service Limit

0.004" (0.11 mm)

(1) Maximum resurface limit is 0.008" (0.20 mm).

CAMSHAFT**CAMSHAFT**

Application	In. (mm)
End Play	
Standard	0.002-0.006 (0.05-0.15)
Service Limit	0.006 (0.15)
Journal Runout	
Standard	0.001 (0.03)
Service Limit	0.002 (0.05)
Lobe Height	
Intake	1.5750 (40.005)
Exhaust	1.4868 (37.766)
Oil Clearance	
Standard	0.0020-0.0035 (0.050-0.089)
Service Limit	0.004 (0.10)