1.3L & 1.6L 4-CYL VINS [0,3]

1997-98 ENGINES Suzuki 1.3L & 1.6L 4-Cylinder

ENGINE IDENTIFICATION

Engine code is stamped on rear portion of cylinder block at bellhousing, exhaust side. Vehicle Identification Number (VIN) is stamped on a metal tag attached to left side of instrument panel near pillar. The sixth character of VIN identifies engine model.

ENGINE IDENTIFICATION CODE

Application	VIN
Esteem, Sidekick & X90 (1.6L 16-Valve)	0
Swift (1.3L 16-Valve)	3

ADJUSTMENTS

NOTE: Swift 1.3L 8 valve engine uses hydraulic lash adjusters and does not require valve adjustment.

VALVE CLEARANCE ADJUSTMENT

Esteem, Sidekick, Swift & X90 16-Valve

1. Remove rocker cover. Remove right side undercover (if necessary). Remove necessary items to view "V" mark on crankshaft. Rotate crankshaft until "V" mark of crankshaft pulley is in line with "0" (zero) mark on timing belt cover. Cylinder No. 1 should be on compression stroke.
2. Remove distributor cap, and ensure rotor is pointed upward at distributor hold-down bolt and to No. 1 terminal of distributor cap. If not correctly oriented, rotate crankshaft 360 degrees.

IMPORTANT: When checking valve clearance, insert the feeler gauge between the camshaft and the cam-riding face of the rocker arm.

3. Using thickness gauge, measure clearance between cam-riding rocker arm face and camshaft lobe. Check valve clearance at positions No. 1, 2, 5 and 7. See **Fig. 1**. Indicated rocker arms should be off of camshaft lobes.
4. Turn crankshaft clockwise one complete revolution (360 degrees). Check valve clearance at positions No. 3, 4, 6 and 8. See **Fig. 1**. Ensure clearance is within specification. See **VALVE CLEARANCE SPECIFICATIONS**.
5. Using Tappet Adjuster Wrench (09917-18210), adjust valve clearance as necessary. After adjusting clearance, tighten adjusting screw lock nut to 106 INCH lbs. (12 N.m). Recheck clearance.

VALVE CLEARANCE SPECIFICATIONS

Application	In. (mm)

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Esteem, Sidekick & X90	
1997	
Engine Cold	
Intake & Exhaust	.005-.007 (.13-.18)
Engine Hot	
Intake & Exhaust	.007-.008 (.18-.20)
1998	
Engine Cold	
Intake	.005-.007 (.13-.18)
Exhaust	.009-.010 (.23-.25)
Engine Hot	
Intake	.007-.008 (.18-.20)
Exhaust	.010-.012 (.25-.30)
Swift (1.3L)	
1998	
Engine Cold	
Intake	.005-.007 (.13-.18)
Exhaust	.009-.011 (.23-.28)
Engine Hot	
Intake	.007-.009 (.18-.23)
Exhaust	.010-.013 (.25-.33)

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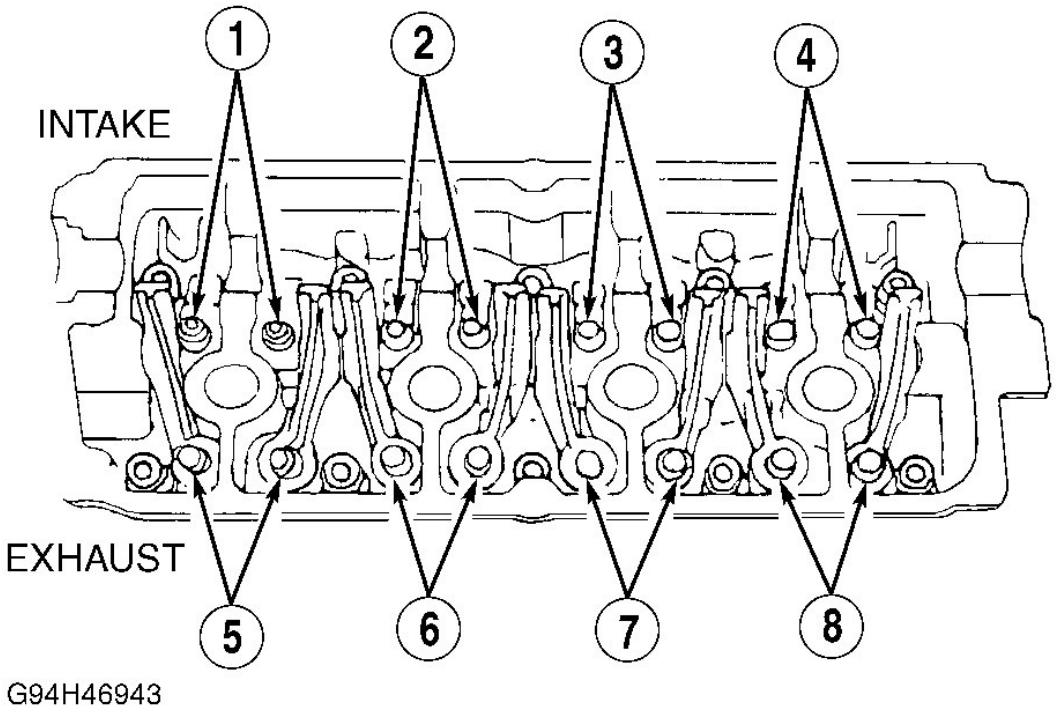

Fig. 1: Checking Valve Clearance
Courtesy of SUZUKI OF AMERICA CORP.

REMOVAL & INSTALLATION

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.

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

FUEL PRESSURE RELEASE

1. Place transmission in Neutral (M/T) or Park (A/T). Set parking brake and block drive wheels.
2. On Esteem, disconnect fuel pump relay connector. Fuel pump relay is located in relay box, near battery. See **Fig. 2**.
3. On Sidekick & X90, remove fuel pump relay connector (relay with Pink wire). Fuel pump relay is located on heater unit. See **Fig. 3**.
4. On Swift, remove relay box cover near battery. Disconnect fuel pump relay connector. See **Fig. 4**.

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5. On all models, remove fuel filler cap to release pressure. Reinstall fuel filler cap. Start engine, and idle until engine dies. Crank engine 2 or 3 times to ensure lines are empty. Reconnect fuel pump relay connector.

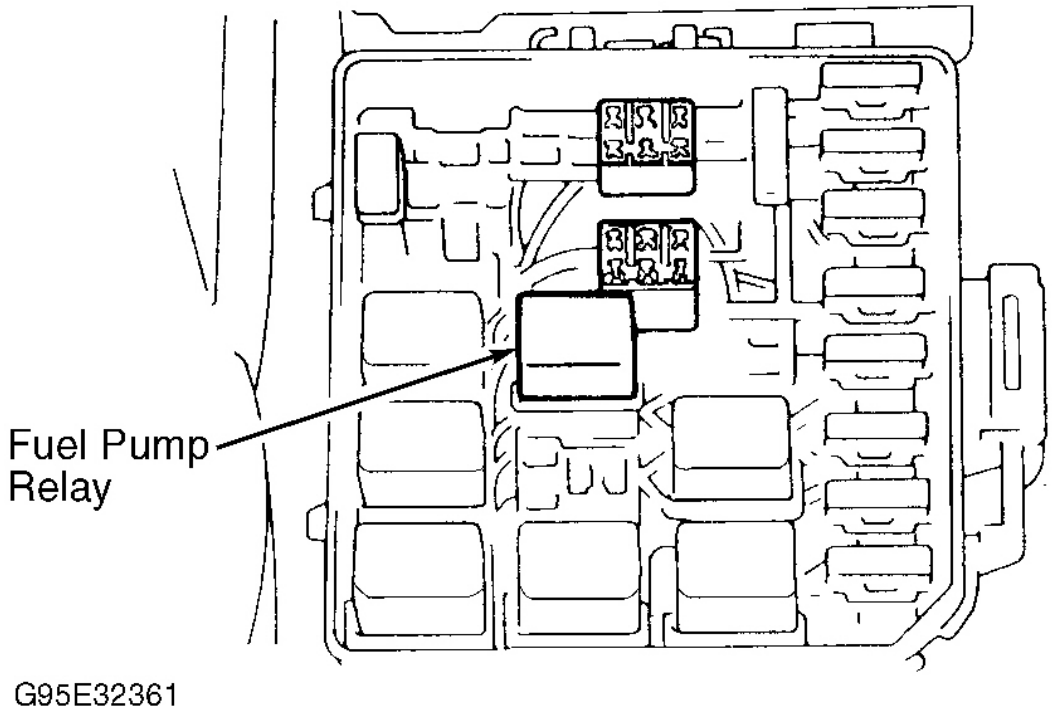

Fig. 2: Locating Fuel Pump Relay (Esteem)
Courtesy of SUZUKI OF AMERICA CORP.

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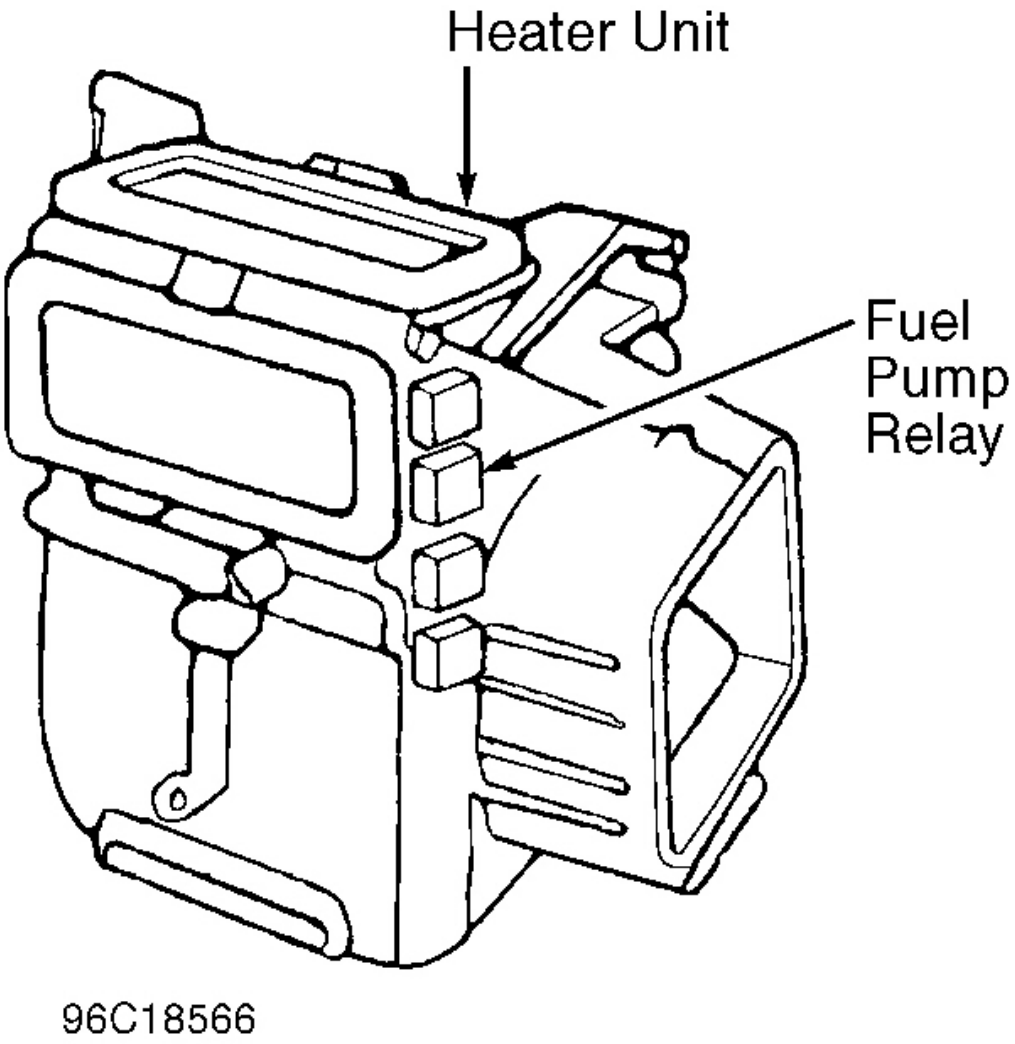

Fig. 3: Locating Fuel Pump Relay (Sidekick & X90)
Courtesy of SUZUKI OF AMERICA CORP.

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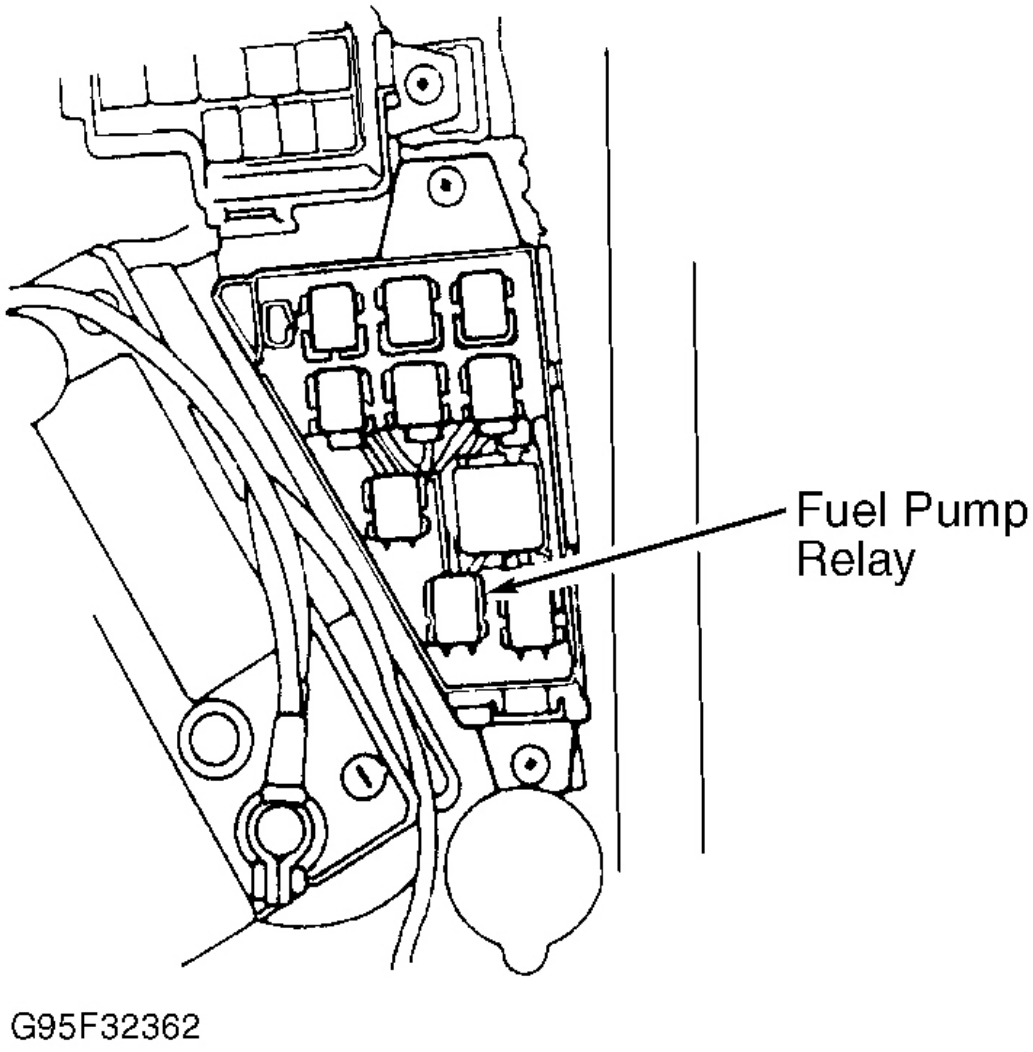

Fig. 4: Locating Fuel Pump Relay (Swift)
Courtesy of SUZUKI OF AMERICA CORP.

ENGINE

CAUTION: When raising or supporting engine or automatic transmission for any reason, DO NOT use a floor jack under oil pan. Damage to oil pump and pick-up strainer could result.

NOTE: On Esteem, remove engine and transmission as an assembly. Engine and transmission assembly must be lowered from vehicle.

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Removal (Esteem)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect battery cables. Mark and remove hood. Drain coolant and remove radiator hoses.
2. Disconnect cooling fan wires. Remove air cleaner assembly. Remove radiator and cooling fan as an assembly. Disconnect fuel lines and heater hoses. Identify, mark and remove vacuum lines and hoses at engine.
3. Disconnect accelerator cable at throttle body. On M/T models, disconnect clutch cable at transmission. On A/T models, disconnect gear select cable from transmission. On all models, label and disconnect all engine and transmission wiring.
4. Raise vehicle. Remove right and left engine undercovers. Disconnect exhaust pipe at manifold. Loosen A/C compressor pivot bolt. Remove A/C drive belt and compressor mounting bracket (if equipped).
5. On A/T models, disconnect gearshift control shaft and gearshift extension rod at transaxle. On all models, drain transmission and engine oil. Disconnect ball joints, and remove drive axles. See **AXLE SHAFTS - FRONT** article in DRIVE AXLES.
6. Attach hoist to engine. Disconnect crossmember from frame rails. Disconnect left and right side engine mounts. Lower engine and transmission as an assembly.

Installation

Raise engine/transmission unit into vehicle. Install engine/transmission mountings to brackets. Install bolts into frame brackets. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

Removal (Sidekick & X90)

1. Relieve fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect battery cables and remove battery. Mark and remove hood. Remove air cleaner and ducting. Drain radiator. Remove cooling fan and clutch.
2. Remove fan shroud and radiator. Remove A/C condenser (if equipped). Disconnect accelerator cable and kickdown cable (if equipped). Disconnect throttle opener and EGR vacuum switching valves. Remove intake manifold brace.
3. Disconnect connectors from fuel injector, TPS and idle speed control solenoid. Mark and remove fuel and vacuum hoses from engine. Remove coolant and heater hoses. Unplug oxygen sensor and distributor primary wires.
4. Disconnect air temperature sensor, coolant temperature sensor, coolant temperature switch and oil pressure sensor. Mark and disconnect all remaining wire connectors from intake manifold and throttle body.
5. Disconnect wires from starter motor and generator terminals. Remove starter. Raise vehicle. Drain engine oil. Disconnect exhaust pipe from exhaust manifold.
6. On manual transmission models, remove clutch cable. On automatic transmission models, remove automatic transmission cooling hoses from clamps. Remove left side transmission stiffener and torque converter housing lower cover.
7. On all models, lower vehicle. Remove nuts and bolts fastening engine to transmission. Support transmission. Attach hoist to engine. Remove engine mounting bolts, and remove engine from body and

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transmission.

Installation

Lower engine and transmission (if removed with engine) into vehicle. Install engine mountings to brackets. Install bolts into frame brackets. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Replace cooling system, engine and transmission fluids. To complete installation, reverse removal procedure.

NOTE: On Swift, remove engine and transmission as an assembly.

Removal (Swift)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect battery cables. Remove battery, battery tray and hood. Drain coolant and remove radiator hoses.
2. Disconnect cooling fan wires. Remove air cleaner assembly. Remove radiator and cooling fan as an assembly. Disconnect fuel lines and heater hoses. Identify, mark and remove vacuum lines and hoses at engine.
3. Disconnect accelerator cable at throttle body. Remove fresh air duct. Disconnect speedometer and clutch cable with bracket at transmission. Label and disconnect all engine and transmission wiring.
4. Loosen A/C compressor adjusting bolt. Remove drive belt splash shield. Raise vehicle and disconnect exhaust pipe at manifold. Loosen A/C compressor pivot bolt. Remove A/C drive belt and compressor mounting bracket (if equipped).
5. On automatic transmission, disconnect gearshift control shaft and gearshift extension rod at transaxle. Remove engine torque rod bracket. On manual transmission, disconnect clutch control cable.
6. On all models, drain transmission and engine oil. Remove charcoal canister. Disconnect ball joints, and remove drive axles. See **AXLE SHAFTS - FRONT** article in DRIVE AXLES.
7. Lower vehicle. Attach hoist to engine. Disconnect rear and side engine mounts with brackets. Remove engine and transmission as an assembly.

Installation

Lower engine/transmission unit into vehicle. Install engine mountings to brackets. Install bolts into frame brackets. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

INTAKE MANIFOLD

Removal

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Drain cooling system. Remove air intake hoses and air breather hoses.

WARNING: To avoid severe burns, DO NOT remove radiator drain plug or cap while engine and radiator are still hot.

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2. Remove air cleaner assembly. Label and disconnect all electrical connections from intake manifold, injectors and throttle body. Label and disconnect vacuum hoses from intake manifold.
3. Disconnect coolant hoses from manifold and throttle body and remove upper radiator hose. Remove fuel supply and return lines from delivery pipe. On all models, disconnect all control cables.
4. Remove intake manifold-to-cylinder head bolts. Remove intake manifold and throttle body and gasket. Remove remaining components from intake manifold as required.

Installation

To install, reverse removal procedure. Use NEW gaskets. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. Adjust all control cables and fill cooling system.

EXHAUST MANIFOLD

Removal

1. Disconnect negative battery cable. Remove air cleaner assembly (if necessary). Disconnect oxygen sensor wire connector.
2. Disconnect exhaust pipe from exhaust manifold. Remove exhaust manifold cover. Remove exhaust manifold stiffener. Remove exhaust manifold-to-cylinder head bolts. Remove exhaust manifold and gasket.

Installation

To install, reverse removal procedure. Use NEW exhaust manifold gasket. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

CYLINDER HEAD

Removal (Esteem, Sidekick & X90)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Drain cooling system and remove necessary coolant hoses from cylinder head. Remove intake manifold brace. Label and remove hoses, lines and electrical connectors from cylinder head, intake manifold and exhaust manifold. Disconnect exhaust pipe from exhaust manifold and remove brace.
2. Removing exhaust and intake manifolds is not necessary. Remove rocker arm cover. Fully loosen all rocker arm adjustment screws. Remove timing belt. See **TIMING BELT**. Remove air conditioner compressor and/or generator adjusting arm from cylinder head (if equipped).
3. Loosen cylinder head bolts in reverse order of tightening sequence. See **Fig. 5**. Loosen head bolts in 2 or 3 steps to prevent cylinder head warpage. Remove head bolts. Using a lifting device, remove cylinder head with intake and exhaust manifolds attached.

Removal (Swift)

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Label and remove hoses, lines and electrical connectors for intake and exhaust manifold removal. Disconnect exhaust pipe from manifold.

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2. Removing exhaust and intake manifolds is not necessary. Remove timing belt. See **TIMING BELT**. Remove air conditioner compressor and/or generator adjusting arm from cylinder head (if equipped).
3. Loosen all valve adjusting screws fully. Loosen cylinder head bolts in reverse order of tightening sequence. See **Fig. 5**. Loosen head bolts in 2 or 3 steps to prevent cylinder head warpage. Remove bolts and cylinder head with intake and exhaust manifolds.

Inspection (All Models)

1. Check cylinder head for evidence of water leakage or damage. Remove carbon from combustion chambers. Check cylinder head for cracks in intake and exhaust ports, combustion chambers and head surface.
2. Check head warpage at 6 locations. If warpage exceeds specification, cylinder head should be machined or replaced. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.
3. Check intake and exhaust manifold seating faces on cylinder head for warpage. Warpage limit for manifold seating faces is .004" (.10 mm). If warpage exceeds specification, machine or replace cylinder head.

Installation (All Models)

To install cylinder head, reverse removal procedure. Use NEW head and manifold gaskets. Tighten cylinder head bolts to specification in 3 steps using proper sequence. See **Fig. 5**. See **TORQUE SPECIFICATIONS**. Adjust valve clearance (except Swift). See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

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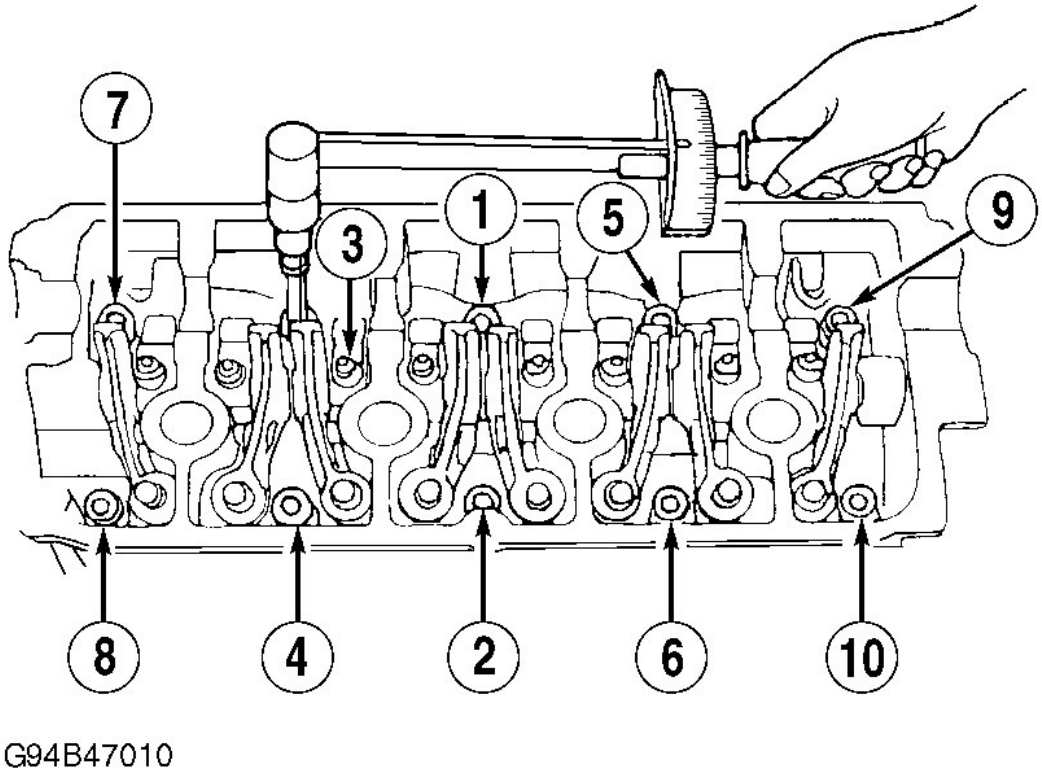

Fig. 5: Cylinder Head Bolt Tightening Sequence
Courtesy of SUZUKI OF AMERICA CORP.

FRONT COVER OIL SEAL

Removal

1. Remove water pump, crankshaft pulley and generator. Remove timing belt cover and timing belt. See **TIMING BELT**.
2. Drain engine oil. Remove oil dipstick and oil pan. Remove oil pump pick-up screen. Remove oil pump assembly. Remove oil pump rotor plate.
3. Using felt pen, mark outer gear for reassembly reference. Remove inner and outer oil pump gears. Remove plug, relief spring and relief valve. Drive out oil seal.

Installation

1. Drive in new oil seal. Ensure gears are assembled in same direction as originally installed. Apply thin coat of engine oil to lip portion of oil seal and inside surfaces of oil pump case and plate. Install inner and outer rotors.
2. Install rotor plate. Tighten 5 screws. Install 2 oil pump pins, NEW dipstick "O" ring, NEW seal for oil

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pick-up tube and NEW oil pump gasket. Use Oil Seal Guide (09926-18210) to prevent damage to oil seal during installation of oil pump. See **Fig. 6**.

3. Apply engine oil to guide and install oil pump. Install dipstick guide with NEW seal. Install oil pan using silicone-type sealant. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

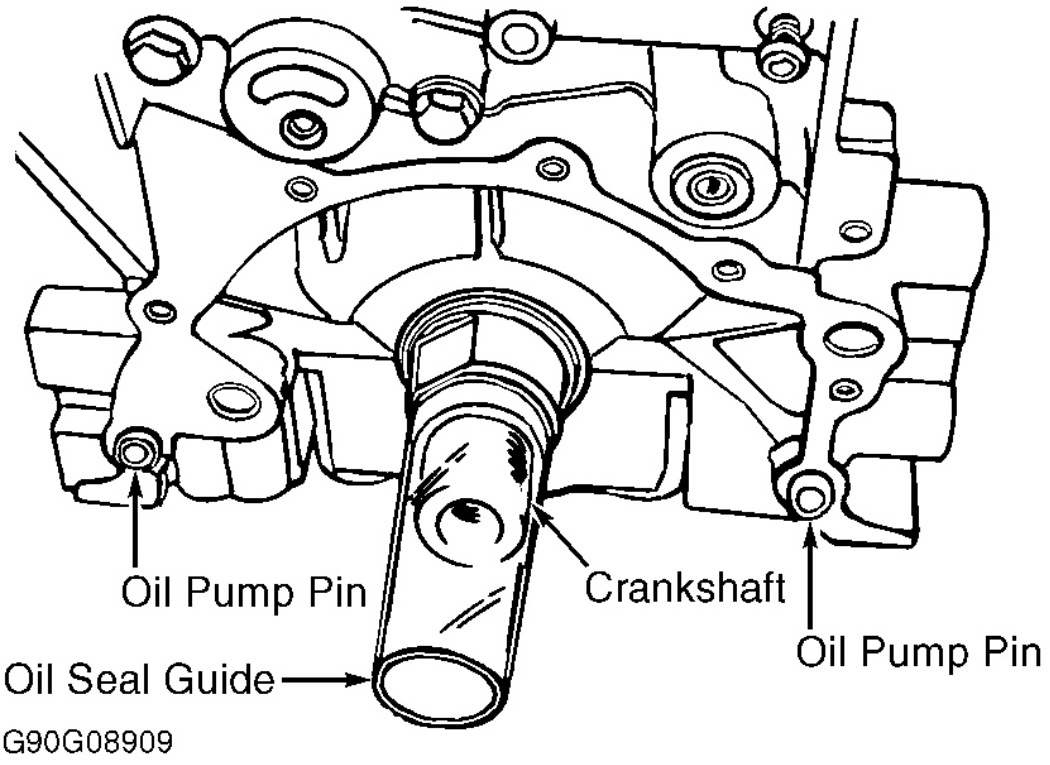

Fig. 6: Installing Oil Seal Guide
Courtesy of SUZUKI OF AMERICA CORP.

TIMING BELT

Removal

1. Disconnect negative battery cable. On Sidekick and X90, remove cooling fan and fan shroud. Remove power steering and A/C compressor belt (if equipped).
2. On Esteem and Swift, raise vehicle and remove fender apron extension by pushing center pin into clip. DO NOT push in too far as pin may fall into fender. On all models, loosen generator, and remove water pump pulley and belt.
3. Remove crankshaft pulley. On Swift, remove center bolt to remove crankshaft pulley if engine is in vehicle. On all models, remove timing belt cover. Align all sprocket timing marks with timing marks on engine. See **Fig. 7**. Move up and secure timing belt tensioner.

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4. If timing belt is to be reused, mark belt with an arrow indicating direction of rotation. Remove timing belt from camshaft and crankshaft sprockets.

CAUTION: DO NOT turn crankshaft more than 90 degrees in either direction from aligned position. Doing so could damage piston(s) and/or valve(s) by interference. Also, DO NOT bend timing belt.

Installation

1. Loosen all valve adjusting screws fully before installing timing belt. Allow camshaft to rotate freely during belt tension adjustment. Align timing mark on camshaft sprocket with "V" mark on timing belt inner cover. See **Fig. 7**.
2. Turn crankshaft clockwise until punch mark on crankshaft sprocket is aligned with arrow mark on oil pump. With timing marks aligned, install timing belt. Ensure direction arrow mark on timing belt is pointed in direction of crankshaft rotation. Ensure drive side of belt is free of slack.
3. Move tensioner plate up with finger pressure, and loosely secure tensioner bolt. Turn crankshaft 2 revolutions clockwise to remove all slack from belt. Tighten tensioner nut and then tensioner bolt. See **TORQUE SPECIFICATIONS**.
4. Ensure timing marks are aligned. Install timing belt outer cover and tighten to specification. See **TORQUE SPECIFICATIONS**. Reverse removal procedure to complete installation. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS.

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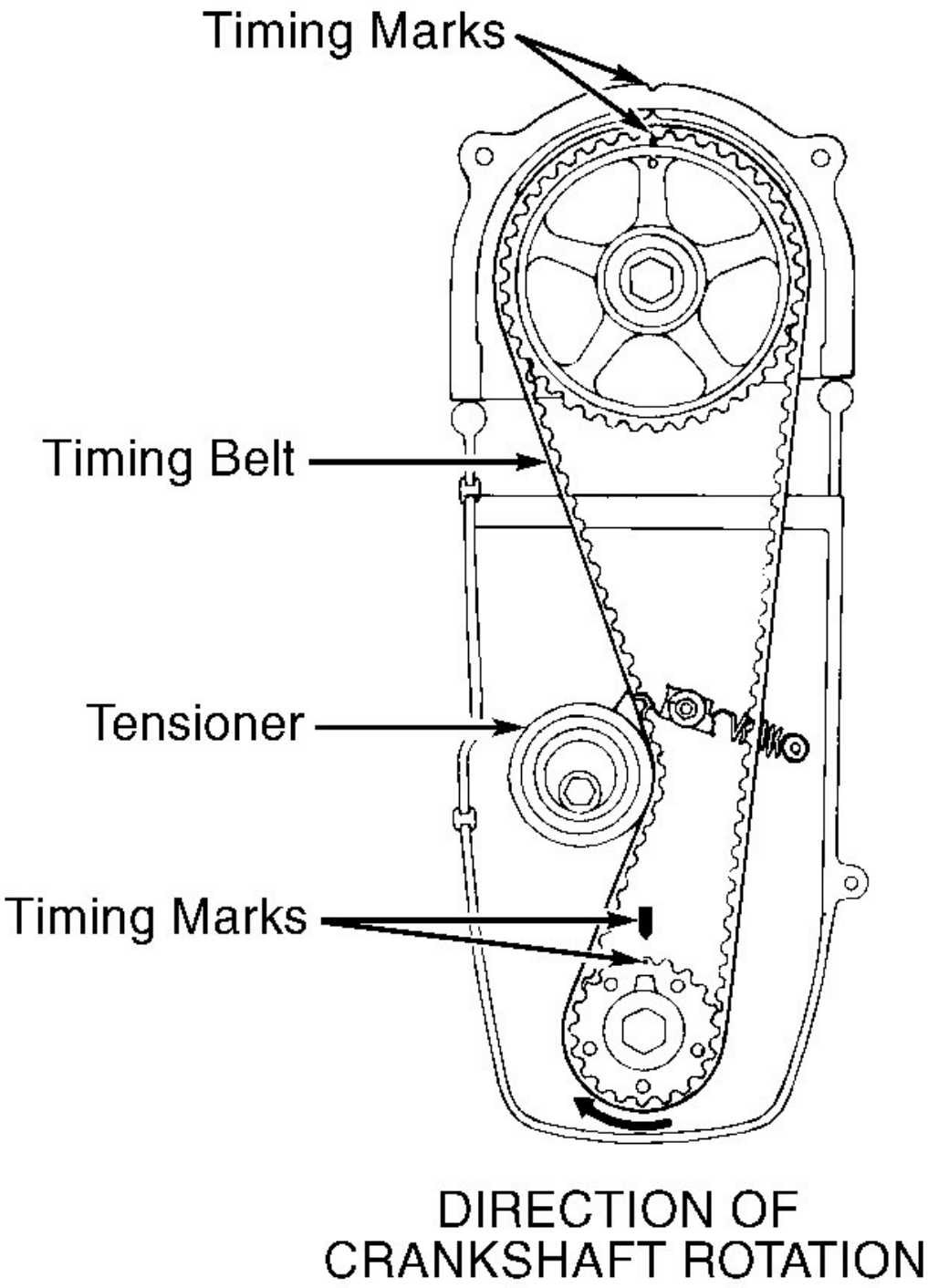

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Fig. 7: Aligning Timing Belt & Tensioner (Typical)
Courtesy of SUZUKI OF AMERICA CORP.

ROCKER ARM & VALVE LASH ADJUSTER

Removal

1. Disconnect negative battery cable. Remove front grille. Remove hood lock and hood lock support member and disconnect lead wire from horn. Push center pin of clips to release grille clips.
2. Drain cooling system. Remove radiator, cooling fan and shroud. Remove A/C condenser and compressor (if equipped), leaving hoses connected. Remove air cleaner assembly and rocker arm cover.
3. Remove water pump belt and pulley. Remove timing belt. See **TIMING BELT**. Use Camshaft Pulley Holder (09917-68220) to secure camshaft pulley. Remove camshaft sprocket bolt and sprocket.
4. Remove CMP sensor (if equipped). Loosen all valve adjustment lock nuts and valve adjusting screws to allow rocker arms to move freely.
5. Loosen camshaft bearing caps in reverse order of tightening sequence. See **Fig. 8**. Loosen bolts in 2 or 3 steps. Remove camshaft bearing caps and camshaft. Remove rocker arm shaft plug and timing belt inside cover.
6. Remove intake rocker arms, with clip, from rocker arm shaft. Remove rocker arm shaft bolts. Push rocker arm shaft slightly to rear and remove "O" ring from shaft. Remove exhaust rocker arms and springs while pushing rocker arm shaft toward front of engine.

Installation

1. To install, reverse removal procedure. Install NEW "O" ring on rear of rocker arm shaft. Ensure flat surface of rocker arm shaft is facing down and is parallel with cylinder head gasket mating surface. Tighten camshaft bearing caps in 3 or 4 steps in sequence, finishing with final torque specification. See **Fig. 8**. Install CMP sensor (if equipped). See **TORQUE SPECIFICATIONS**.
2. Adjust valve clearance. See **VALVE CLEARANCE ADJUSTMENT** under ADJUSTMENTS. To complete installation, reverse removal procedure.

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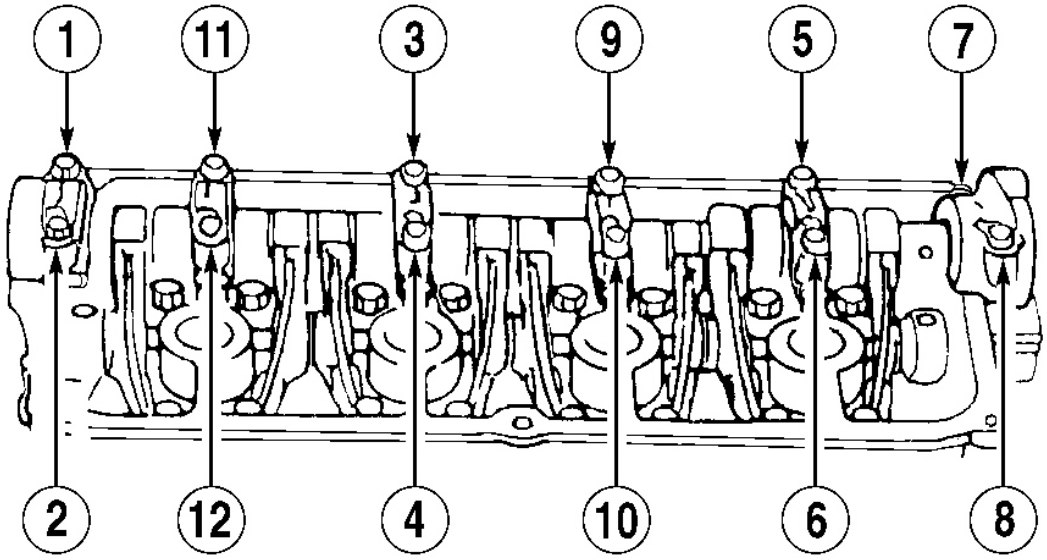

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Fig. 8: Camshaft Bearing Cap Bolt Tightening Sequence
Courtesy of SUZUKI OF AMERICA CORP.

CAMSHAFT

Removal

For camshaft removal, see **ROCKER ARM & VALVE LASH ADJUSTER**.

Inspection (All Models)

1. Check cam lobes and journals for wear and damage. Use Plastigage to check bearing clearance. If wear exceeds specification, repair or replace as necessary. See **CAMSHAFT** under ENGINE SPECIFICATIONS.
2. Use dial indicator and "V" blocks to measure camshaft runout at center of shaft. If wear exceeds specification, repair or replace as necessary. See **CAMSHAFT**.

Installation (All Models)

Lubricate camshaft lobes and camshaft bearing journals. Install camshaft and NEW oil seal in cylinder head. Install camshaft sprocket. Ensure camshaft sprocket timing marks align with timing marks on cylinder head. See **Fig. 7**. To complete installation, reverse removal procedure.

REAR CRANKSHAFT OIL SEAL

Removal

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Remove engine or engine and transmission. See ENGINE. Separate transmission from engine (if necessary). Remove flywheel. Remove oil seal housing. Remove seal. Inspect oil seal housing for wear or damage. Repair or replace as necessary.

Installation

Install oil seal in housing. Apply oil to seal lip. Install oil seal housing with NEW gasket. Tighten housing bolts to specification. See **TORQUE SPECIFICATIONS**. Oil seal housing gasket will bulge after mounting bolts have been tightened. Trim excess gasket material even with oil pan gasket surface.

THERMOSTAT

Removal

1. Disconnect negative cable at battery.
2. Drain cooling system and tighten drain plug.
3. Remove outlet pipe bracket (2) bolt.
4. Disconnect thermostat cap (1) from thermostat case.

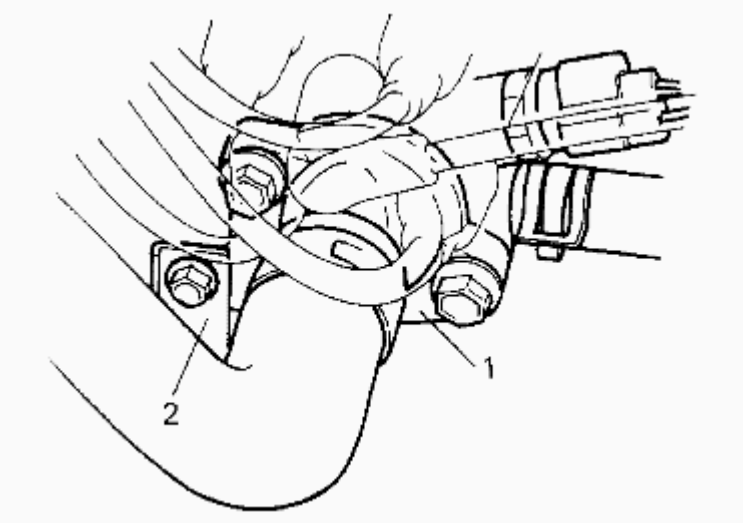

Fig. 9: Thermostat Cap & Outlet Pipe Bracket
Courtesy of SUZUKI OF AMERICA CORP.

5. Remove thermostat (1).

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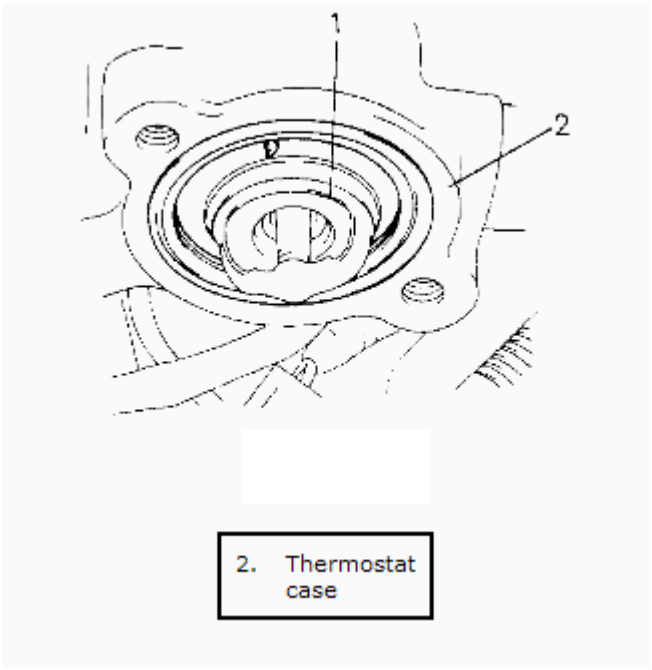

Fig. 10: Thermostat & Thermostat Case
Courtesy of SUZUKI OF AMERICA CORP.

Installation

1. When positioning thermostat (1) on thermostat case (3), be sure to position it so that air bleed valve (2) comes uppermost and into the recession of thermostat case.

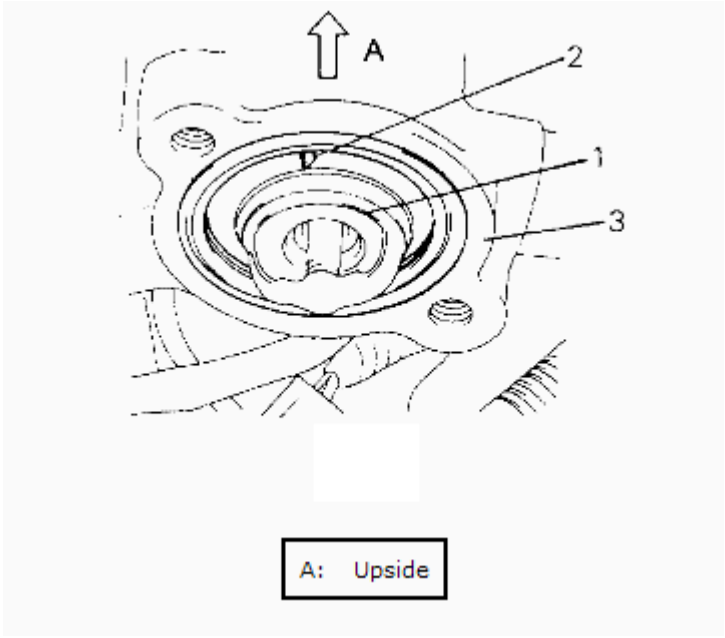

Fig. 11: Thermostat, Air Bleed Valve & Thermostat Case
Courtesy of SUZUKI OF AMERICA CORP.

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2. Install thermostat cap to thermostat case. When installing cap, align arrow marks on cap and case.
3. Install outlet pipe bracket bolt.
4. Fill cooling system.
5. Connect negative cable.
6. After installation, check each part for leakage.

Thermostat inspection

1. Make sure that air bleed valve (1) of thermostat is clean.

   Should this valve be clogged, engine would tend to overheat.

2. Check to make sure that valve seat is free from foreign matters which would prevent valve from seating tight.
3. Check thermostat seal (2) for breakage, deterioration or any other damage.

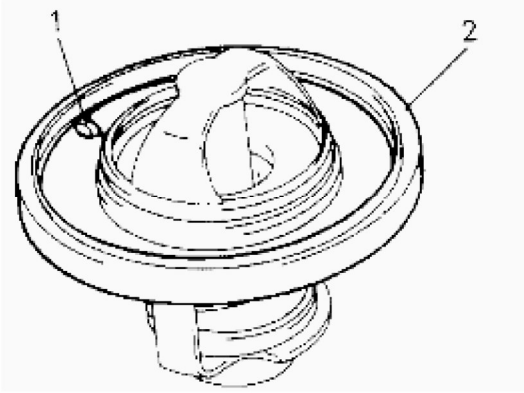

Fig. 12: Air Bleed Valve & Thermostat Seal
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4. Check thermostatic movement of wax pellet as follows:
   a. Immerse thermostat (1) in water, and heat water gradually.

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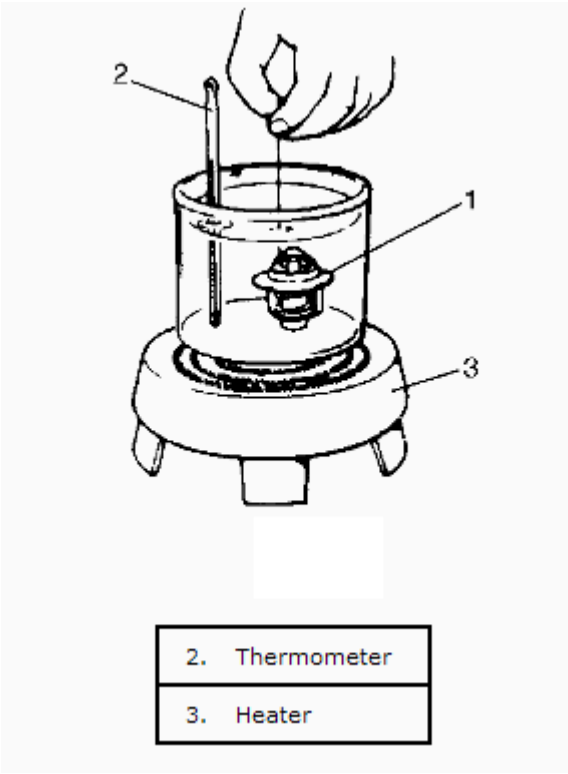

Fig. 13: Checking Thermostatic Movement Of Wax Pellet
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b. Check that valve starts to open at specific temperature.
c. If valve starts to open at a temperature substantially below or above specific temperature, thermostat unit should be replaced with a new one. Such a unit, if reused, will bring about overcooling or overheating tendency.

WATER PUMP

Removal

1. Drain cooling system. Disconnect negative battery cable. Remove drive belts. Remove A/C compressor (if equipped), leaving hoses connected. On Sidekick and X90, remove cooling fan, fan shroud and fan clutch.
2. On all models, remove pump pulley. Ensure No. 1 piston is at TDC of compression stroke. Remove crankshaft pulley bolts and crankshaft pulley. Remove timing belt cover, tensioner and timing belt. See **TIMING BELT**. Remove dipstick and tube. Remove generator mounting bracket. Remove water pump.

Installation

To install, reverse removal procedure. Ensure all mating surfaces are clean. Use NEW water pump gasket and NEW dipstick tube "O" ring.

NOTE: For further information on cooling systems, see COOLING SYSTEM

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SPECIFICATIONS & ENGINE COOLING FANS article in ENGINE COOLING.

OIL PAN

Removal (Except Esteem)

1. Raise and support vehicle. On Sidekick and X90 4WD, remove front differential assembly. See appropriate article in DRIVE AXLES. On all models, drain engine oil.
2. Remove clutch housing lower cover or torque convertor housing lower cover. Remove crankshaft position sensor from oil pan. Remove oil pan nuts and bolts. Remove oil pan then oil pump strainer.

Removal (Esteem)

Raise and support vehicle. Drain engine oil. Remove engine undercovers. Remove exhaust pipe No. 1. Remove transmission stiffener. Support engine/transmission assembly. Remove crossmember. Remove crankshaft position sensor from oil pan. Remove oil pan nuts and bolts. Remove oil pan then oil pump strainer.

Installation

To install, reverse removal procedure. Install oil pan using silicone-type sealant. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

OVERHAUL

CYLINDER HEAD

Disassembly

1. Remove cylinder head. See CYLINDER HEAD under **REMOVAL & INSTALLATION**. Remove intake and exhaust manifolds. Remove camshaft. See CAMSHAFT. Remove rocker arms and shaft. See **ROCKER ARM & VALVE LASH ADJUSTER** under REMOVAL & INSTALLATION.
2. Using Valve Spring Compressor (09916-14510) and Valve Lifter Attachment (09916-14910), compress valve spring. Using Valve Spring Retainer Remover (09916-84510), remove retainer locks. See **Fig. 14**. Remove retainers, springs, valve stem oil seals, spring seats and valves. Keep all components in order for reassembly reference.

Reassembly

To assemble, reverse disassembly procedure. Ensure valve springs are installed with close coiled (small pitch) end down, toward cylinder head.

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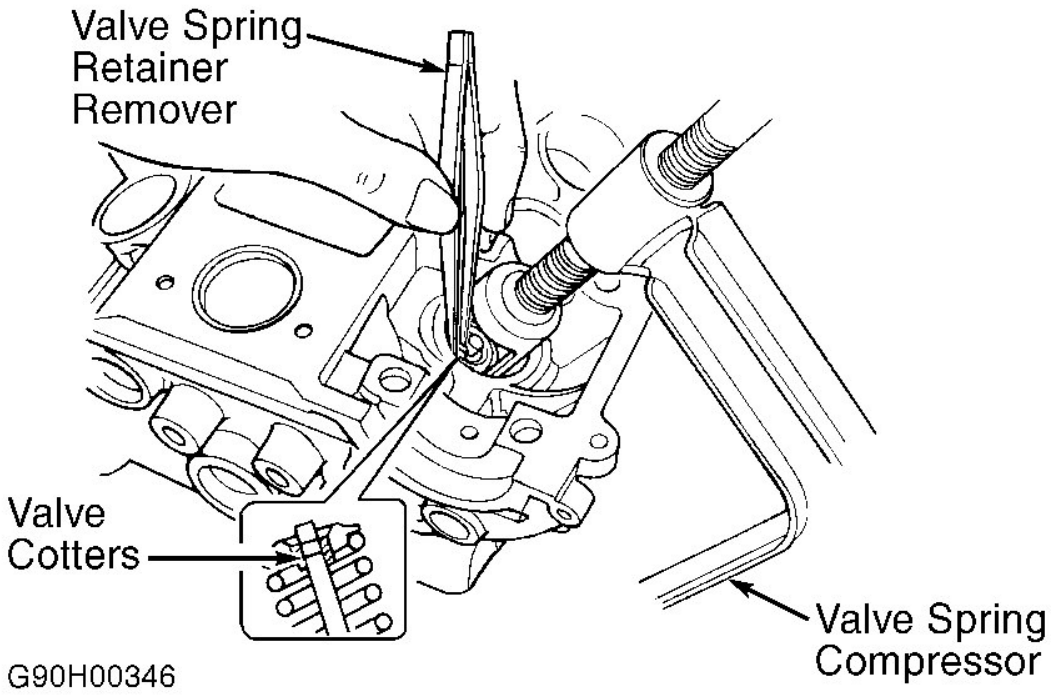

Fig. 14: Removing Valve Lock
Courtesy of SUZUKI OF AMERICA CORP.

Valve Springs

Check valve springs for damage. Use a square and flat surface plate to check spring squareness. Maximum out-of-square is .079" (2.00 mm). Using valve spring tester, check valve spring preload pressure. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS. Replace any weak or out of square springs.

NOTE: DO NOT reuse old valve stem oil seals

Valve Stem Oil Seals

Place NEW lubricated stem seal on valve guide. Use Valve Stem Seal Installer Set (09917-98221 and 09916-58210). Press seal on valve guide using hand pressure only. When installer bottoms on head, seal is properly positioned. Avoid twisting seals during installation.

Valve Guides

1. Check valve stem-to-guide clearance. If clearance exceeds specification, replace with oversize valve guide. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.
2. Using Valve Guide Remover (09916-44910), drive out old guide. Ream guide bore in cylinder head with 11-mm Reamer (09916-38210). Heat cylinder head to 176-212°F (80-100°C).

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3. Using Valve Guide Installer Attachment Set (09916-56011 and 09916-58210), drive in new oversized valve guide until valve guide installer contacts cylinder head.
4. Valve guide protrusion is .45" (11.5mm). Ream valve guide with 5.5-mm Reamer (09916-34550).
5. Clean valve guide bore after reaming. Install valve and ensure valve stem oil clearance is correct. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS. Install new valve stem oil seals. See VALVE STEM OIL SEALS.

Valve Seat

Inspect valve seats for damage or wear. If valve seat rework is necessary, use 2 cutters to obtain required angles. On intake and exhaust valves, first cut should be 15 degrees. Second cut should be 45 degrees to obtain correct seat angle. After cutting valve seats to correct angles, lap valve seat.

Valves

1. Remove carbon deposits. Inspect for wear, burns or distortion at face and stem. Replace as necessary. Measure valve head margin. Check valve stem end for pitting or wear.
2. Measure valve length. Valve stem end may be resurfaced if no more than .19" (4.8 mm) is removed from valve length. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS.

Seat Correction Angles

On intake and exhaust valves, use 15-degree stone to narrow seat and 45-degree stone to widen seat.

VALVE TRAIN

Rocker Arm Shaft Assembly

Check rocker arm-to-shaft oil clearance. Maximum clearance is .0035 (.09). Check rocker arm shaft runout. Rocker arm shaft runout limit is .008" (.20 mm).

Lash Adjusters

If tip of rocker arm adjusting screw is worn, replace screw. If cam riding face of rocker arm is badly worn, replace rocker arm.

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1. Remove cylinder head. See CYLINDER HEAD under **REMOVAL & INSTALLATION**. Remove oil dipstick guide, oil pan and screen. See OIL PAN under REMOVAL & INSTALLATION.
2. Ensure pistons, connecting rods and rod caps are marked for reassembly reference. Remove carbon from top of cylinder bores. Remove connecting rod caps. Install protective hose over connecting rod bolts.
3. Remove connecting rod and piston assembly through top of cylinder block. Mark cylinder number on piston crown. Remove piston rings.

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NOTE: On some 1.3L engines, pistons may be retained by circlips; others may be press fit.

4. Use Piston Pin Remover/Installer (09910-38211) on 1.3L engine with press fit piston pins. On 1.6L engines (and some 1.3L engines), remove circlips, and push piston pin out by hand.
5. Check piston pin-to-bore fit. Pin should press in piston smoothly by hand at room temperature. When assembling, apply engine oil to outside of pin and to piston pin bore.
6. Position piston upward. Align piston, pin and rod with Piston Pin Remover/Installer (09910-38211) for press fit 1.3L pistons. Press pin into piston and rod using a hydraulic press. See **Fig. 15**. On 1.6L engines (and some 1.3L engines), install circlips and piston pin. Install circlips with opening facing either up or down.

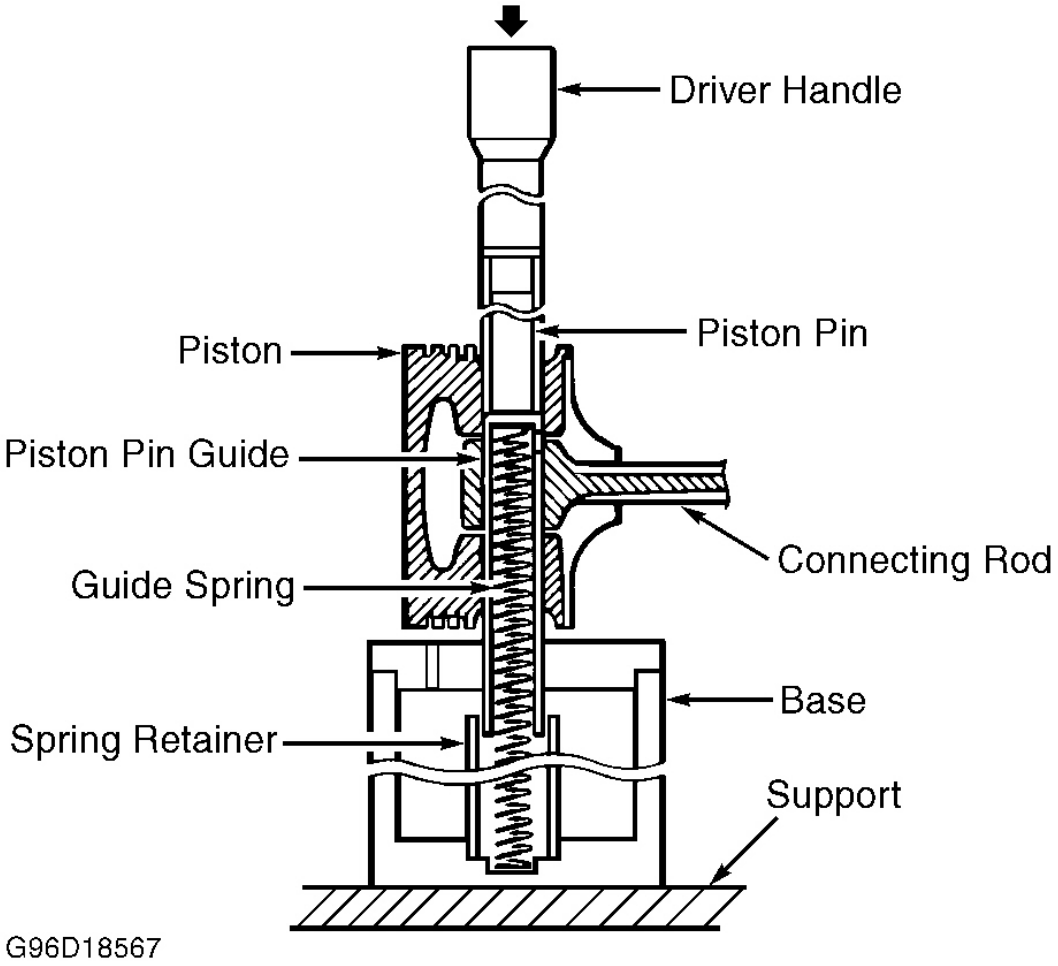

Fig. 15: Installing Piston Pin (1.3L - Press Fit)
Courtesy of SUZUKI OF AMERICA CORP.

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Fitting Pistons

1. Check cylinder bore for damage, wear and taper. See CYLINDER BLOCK under **CYLINDER BLOCK ASSEMBLY** under OVERHAUL. See **CYLINDER BLOCK** under ENGINE SPECIFICATIONS to determine if block must be rebored.
2. Pistons are available in .0098" (.25 mm) and .0197" (.50 mm) oversizes. Check outside diameter of piston. On 1.6L engine, measure at a point .63" (16.0 mm) from bottom of skirt and at 90 degrees to pin bore. On 1.3L engine, measure at a point .91" (23.0 mm) from bottom of skirt and at 90 degrees to pin bore.
3. On all models, standard pistons are available in 2 sizes. Piston diameter is determined by numerical mark ("1" or "2") stamped on piston crown. See **Fig. 16**.
4. Cylinder bore diameter is determined by numerical mark ("1" or "2") stamped on cylinder block. Numerical marks on cylinder block, read left to right, indicate bore sizes of cylinders No. 1, 2, 3 and 4, respectively. See **Fig. 16**.
5. When installing piston into cylinder, ensure piston numerical mark matches cylinder bore numerical mark to provide correct piston-to-cylinder clearance.

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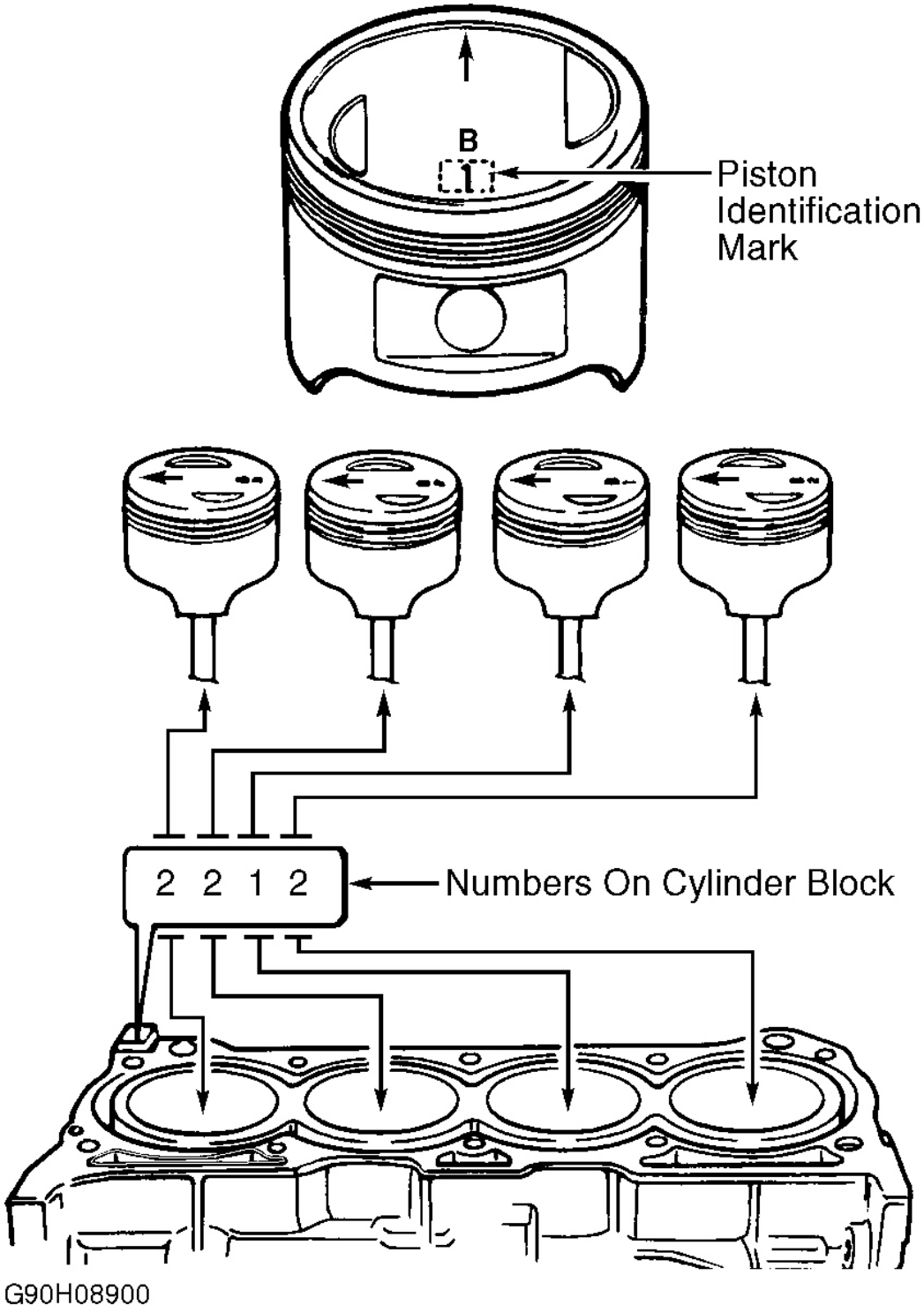

Fig. 16: Matching Pistons To Cylinders

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Courtesy of SUZUKI OF AMERICA CORP.

Piston Rings

1. Install rings with "R", "RN" or "T" mark facing upward. Some Samurai top rings are unmarked and can be installed either side upward. On all models, install oil ring spacer first, then rails. Position piston ring gaps. See Fig. 17. Lubricate all internal surfaces with engine oil before installation.
2. Ensure arrow on piston head faces front of engine. Ensure oil hole in connecting rod faces intake side of engine. Install cylinder head, oil pick-up screen and oil pan. To complete installation, reverse removal procedure.

CAUTION: Install spacer gap more than 45 degrees from side rail gaps. Rails should turn smoothly when installed.

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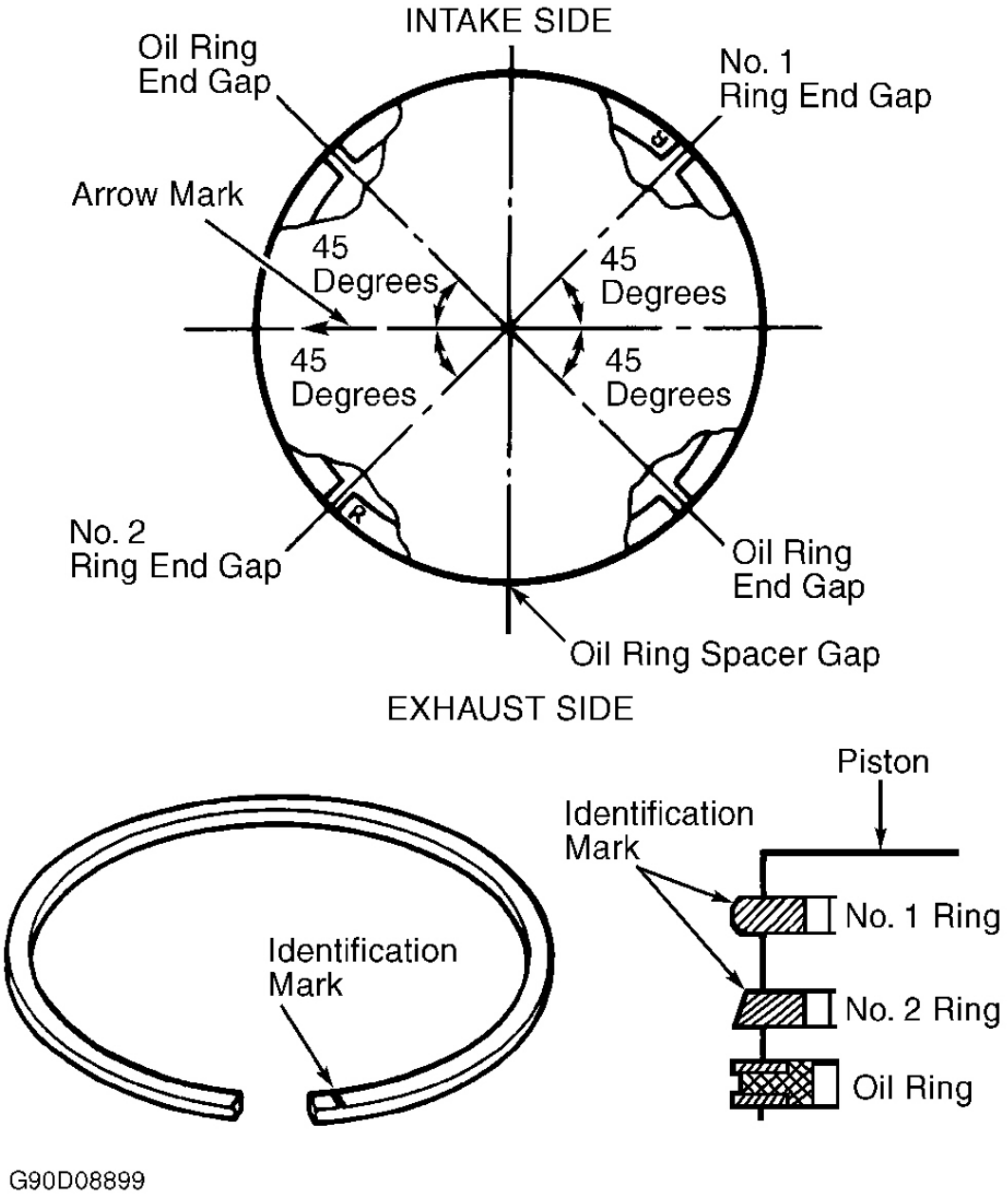

Fig. 17: Positioning Piston Ring Gaps
Courtesy of SUZUKI OF AMERICA CORP.

Rod Bearings

1. Inspect journals for wear, taper and out-of-round. If specifications are exceeded, grind journals to undersize or replace crankshaft. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS.

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2. Inspect bearing shells for signs of fusion, pitting, burning or flaking. Observe contact pattern. Standard bearings are unmarked. Undersized bearings are stamped US025 on back of bearing to indicate .010" (.25 mm) undersize.
3. Check bearing clearance using Plastigage. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS**. Standard connecting rod side play is .0039-.0078" (.10-.20mm), with a service limit of .0138" (.35 mm).
4. To install, reverse removal procedure. Tighten rod nuts to specification. See **TORQUE SPECIFICATIONS**.

Crankshaft & Main Bearings

1. Remove engine, or engine and transmission. See ENGINE under **REMOVAL & INSTALLATION**. Separate transmission from engine. Remove timing belt, sprockets, pulley and tensioner. See **TIMING BELT** under REMOVAL & INSTALLATION.
2. Remove flywheel and oil pan. Remove rear main oil seal housing. Remove connecting rod caps. Remove main bearing caps. Remove crankshaft.
3. Inspect journals for wear, taper and out-of-round condition. If specifications are exceeded, grind journals to undersize or replace crankshaft. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS.
4. Standard main bearings are color-coded. See **Fig. 20** and **Fig. 21** . Upper half of bearing has an oil groove. An arrow mark and number are embossed on each main bearing cap.
5. Ensure arrow mark on main bearing cap faces toward crankshaft pulley. Bearing No. 1 is at crankshaft pulley end of engine. Bearing No. 5 is at flywheel end of engine.
6. Main bearing journal diameter is determined by numerical mark ("1", "2" or "3") stamped on crankshaft webs of cylinders No. 2 and 3. See **Fig. 18**.
7. The numerical marks on crankshaft web, read left to right, indicate journal diameters of bearings No. 1, 2, 3, 4 and 5, respectively.
8. Determine bearing cap bore diameter with bearing removed. Bearing cap bore diameter is determined by letter ("A", "B" or "C") stamped on cylinder block mating surface. See **Fig. 19**. See appropriate BEARING CAP BORE DIAMETERS table.
9. The letters stamped on cylinder block mating surface, read left to right, indicate cap bore diameters of bearing caps No. 1, 2, 3, 4 and 5, respectively. Five standard main bearing sizes are available. Bearing thickness is determined by color code. See **Fig. 20** and **Fig. 21** . See **COLOR CODE FOR STANDARD BEARINGS**.
10. Use numerical marks on crankshaft webs and letters stamped on cylinder block mating surface to determine correct replacement bearing. See **STANDARD BEARING APPLICATION**.

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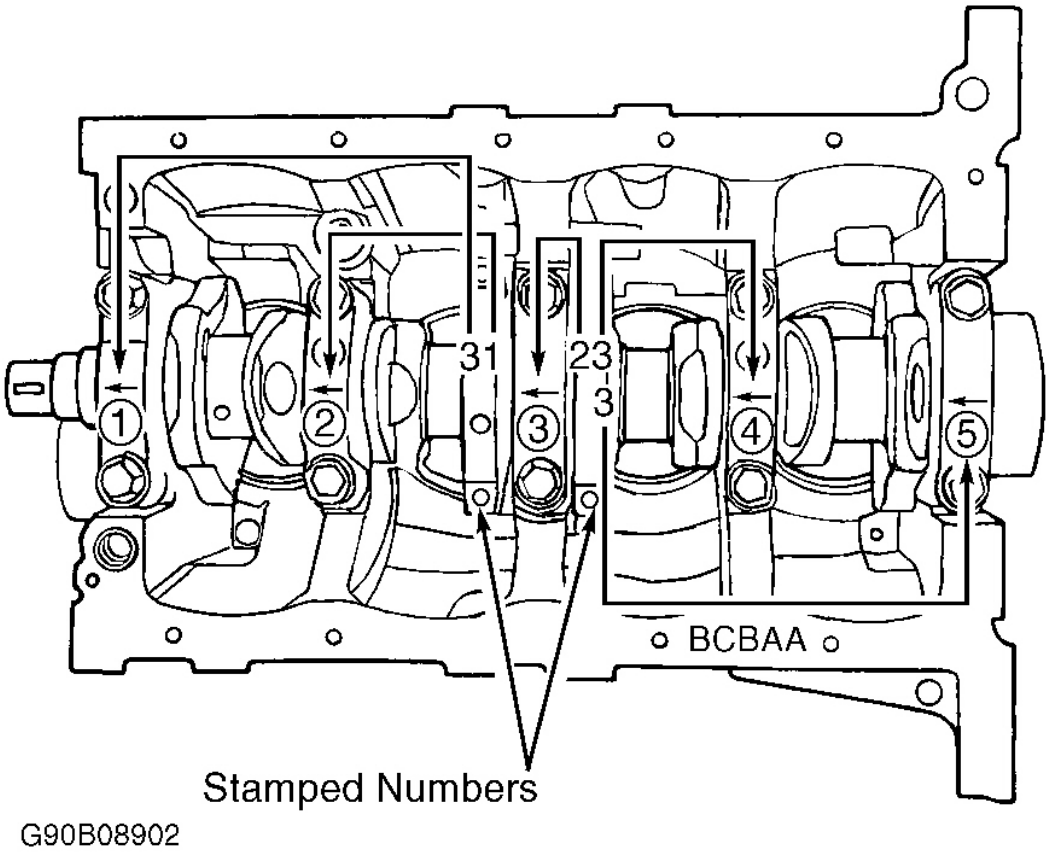

Fig. 18: Locating Numerical Marks On Crankshaft Webs (SOHC)
Courtesy of SUZUKI OF AMERICA CORP.

CRANKSHAFT JOURNAL DIAMETERS (1.3L)

Numbers Stamped On Webs	In. (mm)
"1"	1.7714-1.7716 (44.994-45.000)
"2"	1.7712-1.7714 (44.988-44.994)
"3"	1.7710-1.7712 (44.982-44.988)

CRANKSHAFT JOURNAL DIAMETERS (1.6L)

Numbers Stamped On Webs	In. (mm)
"1"	2.0470-2.0472 (51.994-52.000)
"2"	2.0468-2.0470 (51.988-51.994)
"3"	2.0465-2.0468 (51.982-51.988)

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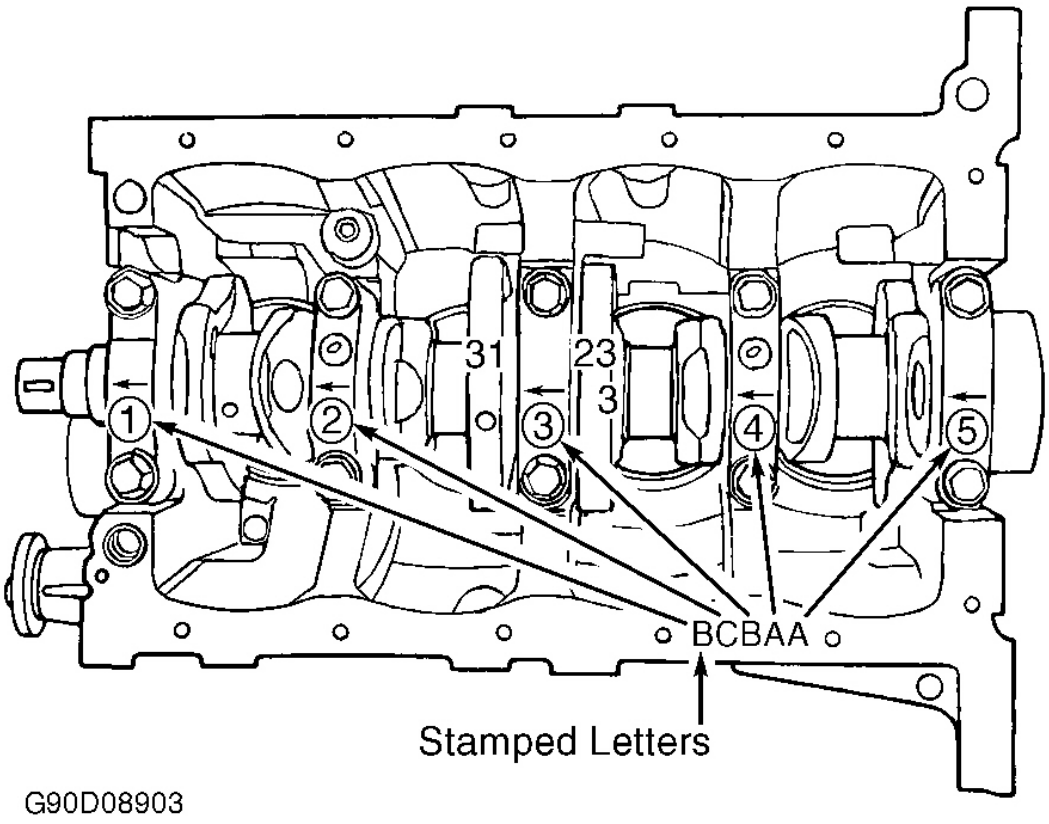

Fig. 19: Locating Letters Stamped On Cylinder Block
Courtesy of SUZUKI OF AMERICA CORP.

BEARING CAP BORE DIAMETERS (1.3L)

Letters Stamped On Block	In. (mm)
"A"	1.9292-1.9294 (49.000-49.006)
"B"	1.9294-1.9296 (49.006-49.012)
"C"	1.9296-1.9298 (49.012-49.018)

BEARING CAP BORE DIAMETERS (1.6L)

Letters Stamped On Block	In. (mm)
"A"	2.2047-2.2050 (56.000-56.006)
"B"	2.2050-2.2052 (56.006-56.012)
"C"	2.2052-2.2054 (56.012-56.018)

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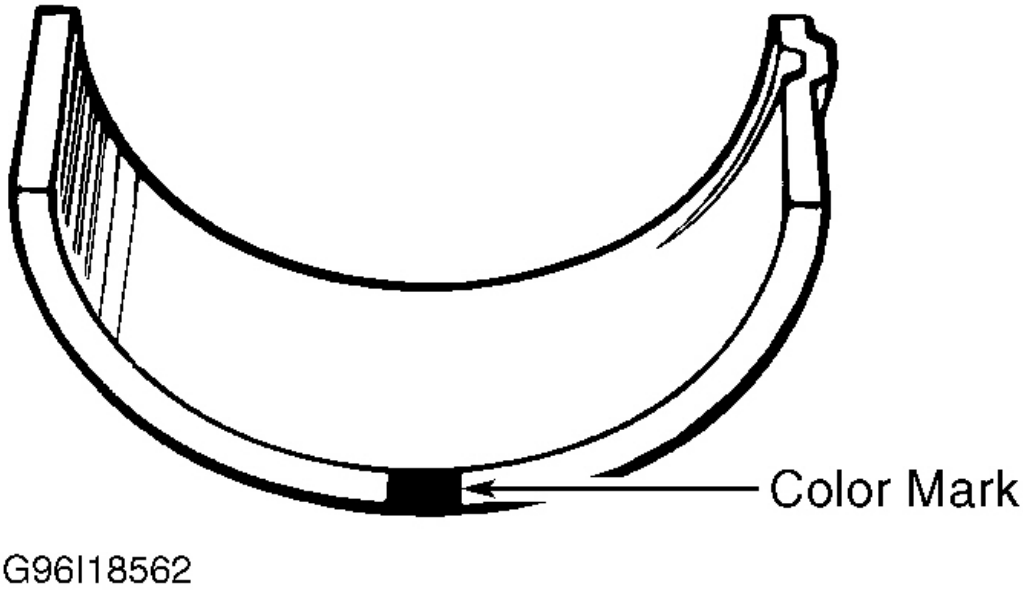

Fig. 20: Identifying Main Bearing Color Codes - Standard Bearing
Courtesy of SUZUKI OF AMERICA CORP.

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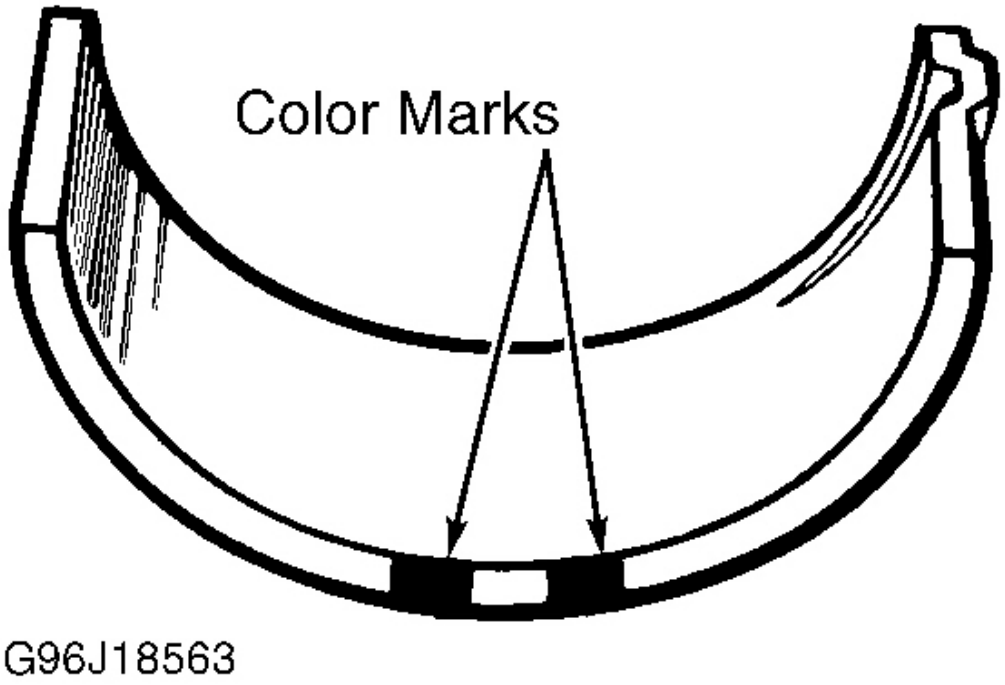

Fig. 21: Identifying Main Bearing Color Codes - Undersize Bearing
Courtesy of SUZUKI OF AMERICA CORP.

COLOR CODE FOR STANDARD BEARINGS

Color Painted	Thickness - In. (mm)
Green	.0786-.0787 (1.996-2.000)
Black	.0787-.0788 (1.999-2.003)
No Paint	.0788-.0789 (2.002-2.006)
Yellow	.0789-.0790 (2.005-2.009)
Blue	.0790-.0791 (2.008-2.012)

STANDARD BEARING APPLICATION

Letter Stamped On Block	Numbers Stapmed On Crankshaft Webs	Color
"A"	"1"	Green
"A"	"2"	Black
"A"	"3"	No Paint
"B"	1	Black
"B"	"2"	No Paint

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"B"	"3"	Yellow
"C"	1	No Paint
"C"	"2"	Yellow
"C"	"3"	Blue

Undersize Bearings

1. Bearings are available in .010" (.25 mm) undersize. Undersize bearing thickness is determined by 2 color marks. See **Fig. 20** and **Fig. 21** . See **COLOR CODE FOR UNDERSIZE BEARINGS**.
2. On 1.3L, use journal finished diameters, 1.7611-1.7618" (44.732-44.750 mm), and letters stamped on cylinder block mating surface to determine correct undersize bearing for replacement. See appropriate UNDERSIZE BEARING APPLICATION table.
3. On 1.6L, use journal finished diameters, 2.0367-2.0373" (51.732-51.747 mm), and letters stamped on cylinder block mating surface to determine correct undersize bearing for replacement. See appropriate UNDERSIZE BEARING APPLICATION table.
4. Use Plastigage to ensure correct clearance of installed undersize bearing. Lubricate bearings before installing. Tighten bolts to specification in 3 steps. Tighten main bearing caps in following order: center cap, No. 2 cap, No. 4 cap, front cap and rear cap. See **TORQUE SPECIFICATIONS**.

COLOR CODE FOR UNDERSIZE BEARINGS

Color Painted	Thickness - In. (mm)
Green & Red	.0835-.0836 (2.121-2.125)
Black & Red	.0836-.0837 (2.124-2.128)
Red Only	.0837-.0838 (2.127-2.131)
Yellow & Red	.0838-.0839 (2.130-2.134)
Blue & Red	.0839-.0840 (2.133-2.137)

UNDERSIZE BEARING APPLICATION (1.3L)

Measured Journal Diameter: In. (mm)	Letter Stamped On Block	Color
1.7616-1.7618 (44.744-44.750)	"A"	Green & Red
1.7616-1.7618 (44.744-44.750)	"B"	Black & Red
1.7616-1.7618 (44.744-44.750)	"C"	Red Only
1.7614-1.7616 (44.738-44.744)	"A"	Black & Red
1.7614-1.7616 (44.738-44.744)	"B"	Red Only
1.7614-1.7616 (44.738-44.744)	"C"	Yellow & Red
1.7612-1.7614 (44.732-44.738)	"A"	Red Only
1.7612-1.7614 (44.732-44.738)	"B"	Yellow & Red
1.7612-1.7614 (44.732-44.738)	"C"	Blue & Red

UNDERSIZE BEARING APPLICATION (1.6L)

Measured Journal Diameter: In. (mm)	Letter Stamped On Block	Color

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2.0371-2.0373 (51.744-51.750)	"A"	Green & Red
2.0371-2.0373 (51.744-51.750)	"B"	Black & Red
2.0371-2.0373 (51.744-51.750)	"C"	Red Only
2.0369-2.0371 (51.738-51.744)	"A"	Black & Red
2.0369-2.0371 (51.738-51.744)	"B"	Red Only
2.0369-2.0371 (51.738-51.744)	"C"	Yellow & Red
2.0367-2.0369 (51.732-51.78)	"A"	Red Only
2.0367-2.0369 (51.732-51.78)	"B"	Yellow & Red
2.0367-2.0369 (51.732-51.78)	"C"	Blue & Red

Thrust Bearing

1. With crankshaft bearing caps installed, check thrust clearance (end play) using dial gauge to read displacement in axial thrust direction of crankshaft.
2. Standard thickness of thrust bearing is .0984" (2.50 mm). Oversize thrust bearings are available in increments of .0049" (.125 mm). If clearance exceeds specification, replace thrust bearing. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS.

Cylinder Block

1. Inspect block for distortion of deck surface. Warpage limit is .0012-.0024" (.03-.06 mm). Inspect block for cracks, scratches and other defects. Measure bores at 3 levels for wear, taper and out-of-round condition.
2. If bore wear, taper or out-of-round exceed specification, rebore cylinders. See **CYLINDER BLOCK** under ENGINE SPECIFICATIONS.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

A force-feed type lubrication system is used. The oil pump is a trochoid-type pump mounted on the forward portion of the crankshaft. See **Fig. 22**.

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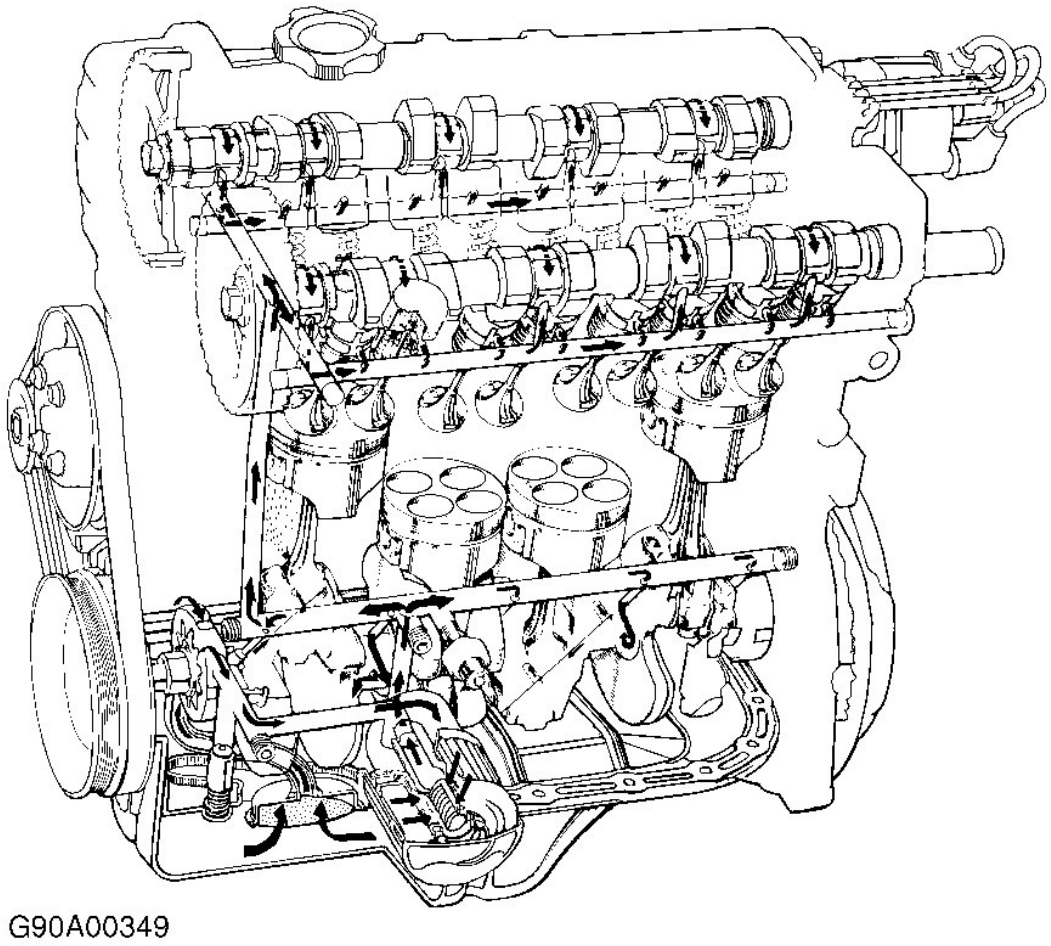

Fig. 22: Cross-Sectional View Of Engine Oil Circuit (Typical)
Courtesy of SUZUKI OF AMERICA CORP.

Crankcase Capacity

Sidekick and X90 crankcase capacity, including filter, is 4.8 qts. (4.5L). Esteem and Swift crankcase capacity, including filter, is 3.5 qts. (3.3L). Check dipstick to verify oil level is correct.

Oil Pressure

Normal oil pressure is 46.9-61.2 psi (3.3-4.3 kg/cm^2) at 4000 RPM.

OIL PUMP

Removal & Disassembly

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1. Disconnect negative battery cable. Remove radiator cooling fan, shroud, water pump pulley and drive belt. Remove timing belt cover, timing belt and tensioner. See **TIMING BELT** under REMOVAL & INSTALLATION. Remove generator and bracket and air conditioner compressor bracket bolts (if equipped).
2. Raise vehicle and drain engine oil. Remove oil dipstick and oil pan. Remove oil pump pick-up screen. Lock crankshaft with Gear Stopper (09927-56010) installed at flywheel ring gear. With crankshaft locked, remove timing belt pulley. Remove oil pan and oil pump strainer/pickup. Remove oil pump assembly. Remove dip stick guide. Remove oil pump rotor plate.
3. Mark outer gear with felt pen for reassembly reference. Remove inner and outer oil pump gears. Remove plug, relief spring and relief valve.

Inspection

1. Inspect oil pump housing for cracks or damage. Inspect oil screen for clogging or damage. Inspect oil screen "O" ring. Ensure relief valve slides smoothly in bore. Inspect pressure relief spring for damaged coils.
2. Inspect oil pump gears for wear or damage. Using a feeler gauge, measure radial and side clearance. See **Fig. 23** and **Fig. 24** . If clearance exceeds specification, replace outer rotor or case. See **OIL PUMP SPECIFICATIONS**.

OIL PUMP SPECIFICATIONS

Application	Radial Clearance: In. (mm)	Side Clearance: In. (mm)
All Models	.0122 (.310)	.0059 (.150)

Reassembly & Installation

1. Ensure gears are assembled in same direction as originally installed. Apply thin coat of engine oil to inner and outer rotors, lip portion of oil seal and inside surfaces of oil pump case and plate. Install inner and outer rotors.
2. Install gear plate. Ensure gears turn freely by hand after gear plate is installed. Install oil pump pins, NEW dipstick "O" ring, NEW seal for oil pick-up tube and NEW oil pump gasket. Use Oil Seal Guide (09926-18210) to prevent damage to oil seal during installation of oil pump.
3. Apply engine oil to guide, and install pump. Install dipstick guide with NEW seal. Install oil pan using silicone-type sealant. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

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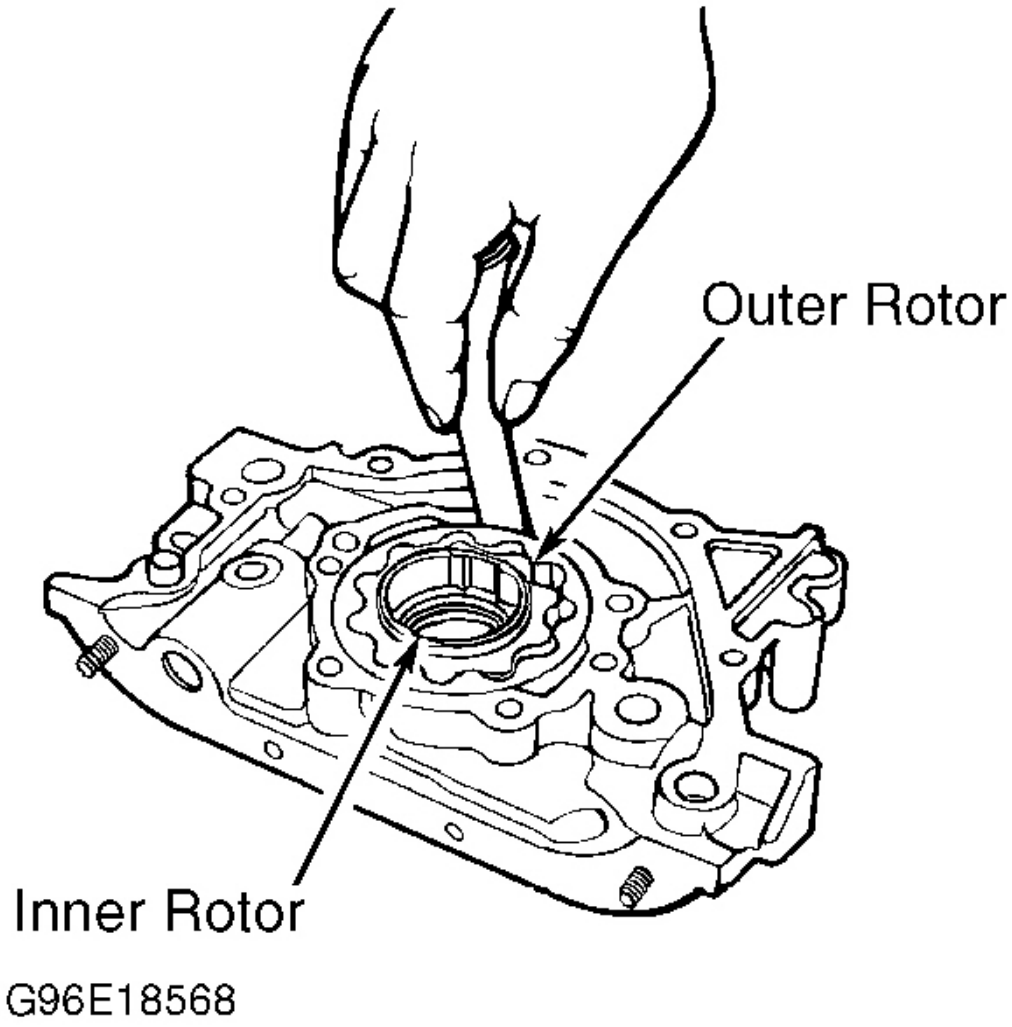

Fig. 23: Checking Oil Pump Radial Clearance
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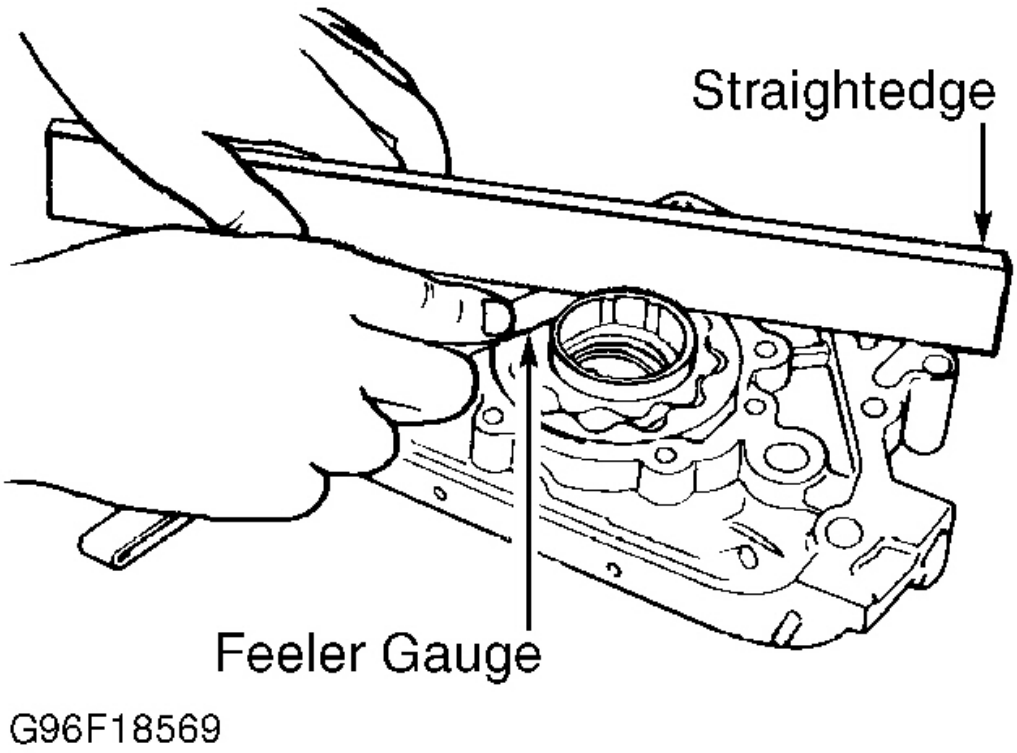

Fig. 24: Checking Oil Pump Side Clearance
Courtesy of SUZUKI OF AMERICA CORP.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Application	Specification
1.3L	
Displacement	79.2 Cu. In. (1.3L)
Bore	2.91" (74.0 mm)
Stroke	2.97" (75.5 mm)
Compression Ratio	9.5:1
Compression Pressure (1)	
Standard	199 psi (14 kg/cm^2)
Service Limit	156 psi (11 kg/cm^2)
Maximum Variation	

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	14.2 psi (1 kg/cm^2)
Fuel System	TBI
Horsepower HP @ RPM	70 @ 5500
Torque Ft. Lbs. @ RPM	74 @ 3000
1.6L	
Displacement	97.0 Cu. In. (1.6L)
Bore	2.95" (75.0 mm)
Stroke	3.54" (90.0 mm)
Compression Ratio	9.5:1
Compression Pressure (1)	
Standard	199 psi (14 kg/cm^2)
Limit	
Esteem	156 psi (11 kg/cm^2)
Sidekick & X90	171 psi (12 kg/cm^2)
Maximum Variation	14.2 psi (1 kg/cm^2)
Fuel System	SFI
Horsepower HP @ RPM	
Esteem	98 @ 6000
Sidekick & X90 16-Valve	95 @ 5600
Torque Ft. Lbs. @ RPM	
Esteem	96 @ 3000
Sidekick & X90	98 @ 4000
(1) Checked at 250 RPM or higher.	

CONNECTING RODS

CONNECTING RODS

Application	In. (mm)
Pin Bore	
1.3L	(1)
1.6L	.7481-.7485 (19.003-19.011)
Maximum Bend	.0020 (.05)
Maximum Twist	.0039 (.10)
Side Play	
Standard	.0039-.0078 (.10-.20)
Service Limit	.0138 (.35)
(1) Information is not available.	

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

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CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
1.3L	
Crankshaft	
End Play	
Standard	.004-.012 (.11-.31)
Service Limit	.015 (.38)
Runout Limit	.002 (.06)
Main Bearings	
Journal Diameter (1)	
"1"	1.7714-1.7716 (44.994-45.000)
"2"	1.7712-1.7714 (44.988-44.994)
"3"	1.7710-1.7712 (44.982-44.988)
Journal Out-Of-Round	.0004 (.010)
Journal Taper	.0004 (.010)
Oil Clearance	
Standard	.0008-.0016 (.020-.040)
Service Limit	.0024 (.060)
Main Bearing Cap Bore Diameters (2)	
"A"	1.9292-1.9294 (49.000-49.006)
"B"	1.9294-1.9296 (49.006-49.012)
"C"	1.9296-1.9298 (49.012-49.018)
Connecting Rod Bearings	
Journal Diameter	1.6529-1.6535 (41.982-42.000)
Journal Out-Of-Round	.0004 (.010)
Journal Taper	.0004 (.010)
Oil Clearance	
Standard	.0008-.0020 (.020-.050)
Service Limit	.0031 (.080)
1.6L	
Crankshaft	
End Play	
Standard	.004-.012 (.11-.31)
Service Limit	.015 (.38)
Runout	.002 (.06)
Main Bearings	
Journal Diameter (1)	
"1"	2.0470-2.0472 (51.994-

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	52.000)
"2"	2.0468-2.0470 (51.988-51.994)
"3"	2.0465-2.0468 (51.982-51.988)
Journal Out-Of-Round	.0004 (.010)
Journal Taper	.0004 (.010)
Oil Clearance	
Standard	.0008-.0016 (.020-.040)
Service Limit	.0024 (.060)
Main Bearing Cap Bore Diameter (2)	
"A"	2.2047-2.2050 (56.000-56.006)
"B"	2.2050-2.2052 (56.006-56.012)
"C"	2.2052-2.2054 (56.012-56.018)
Connecting Rod Bearings	
Journal Diameter	1.7316-1.7323 (43.982-44.000)
Journal Out-Of-Round	.0004 (.010)
Journal Taper	.0004 (.010)
Oil Clearance	
Standard	.0008-.0020 (.020-.050)
Service Limit	.0031 (.080)

(1) Main bearing journal diameter is determined by numerical mark ("1", "2" or "3") stamped on crankshaft web.

(2) Main bearing cap bore diameter is determined by letter ("A", "B" or "C") stamped on cylinder block mating surface. See **Fig. 19**.

PISTONS, PINS & RINGS

PISTONS, PINS & RINGS

Application	**In. (mm)**
1.3L	
Pistons	
Clearance	.0008-.0016 (.02-.04)
Diameter (1)	
"1"	2.9126-2.9130 (73.980-73.990)
"2"	2.9122-2.9126 (73.970-73.980)
Pins	
Diameter	(2)
Piston Fit	Slip
Rod Fit	Interference
Rings	

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No. 1	
End Gap	
Standard	.0079-.0118 (.20-.30)
Service Limit	.0276 (.70)
Side Clearance	.0012-.0027 (.030-.070)
No. 2	
End Gap	
Standard	.0079-.0118 (.20-.30)
Service Limit	.0276 (.70)
Side Clearance	.0008-.0024 (.02-.06)
No. 3 (Oil)	
End Gap	
Standard	.0079-.0276 (.20-.70)
Service Limit	.0709 (1.8)
1.6L	
Pistons	
Clearance	.0008-.0016 (.02-.04)
Diameter (1)	
"1"	2.9520-2.9524 (74.980-74.990)
"2"	2.9516-2.9520 (74.970-74.980)
Pins	
Diameter	.7478-.7480 (18.995-19.000)
Piston Fit	Slip
Rod Fit	Slip
Rings	
No. 1	
End Gap	
Standard	.0079-.0138 (.20-.35)
Service Limit	.0276 (.70)
Side Clearance	.0012-.0028 (.030-.070)
No. 2	
End Gap	
Standard	.0079-.0138 (.20-.35)
Service Limit	.0276 (.70)
Side Clearance	.0008-.0024 (.02-.06)
No. 3 (Oil)	
End Gap	
Standard	.0079-.0276 (.20-.70)
Service Limit	.0669 (1.7)

(1) Piston diameter is determined by numerical mark ("1" or "2") stamped on piston. See **Fig. 16**.

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(2) Information is not available.

VALVES & VALVE SPRINGS

VALVES & VALVE SPRINGS

Application	Specification
1.3L	
Intake Valves	
Seat Angle	45°
Valve Head Thickness	
Standard	.039" (1.0 mm)
Service Limit	.024" (.6 mm)
Stem Diameter	.2742-.2748" (6.965-6.980 mm)
Exhaust Valves	
Seat Angle	45°
Valve Head Thickness	
Standard	.039" (1.0 mm)
Service Limit	.028" (.70 mm)
Stem Diameter	.2736-.2742" (6.950-6.964 mm)
Valve Springs	
Free Length	
Standard	1.9409" (49.30 mm)
Limit	1.8937" (48.1 mm)
Out-Of-Square	.079" (2.0 mm)
Valve Spring Preload	
Standard	54.7-64.3 @ 1.63 (24.8-29.2 @ 41.5)
Service Limit	50.2 @ 1.63 (22.8 @ 41.5)
1.6L	
Intake Valves	
Seat Angle	45°
Valve Head Thickness	
Standard	.03-.047" (.8-1.2 mm)
Service Limit	.024" (.6 mm)
Stem Diameter	.2152-.2157" (5.465-5.480 mm)
Exhaust Valves	
Seat Angle	45°
Valve Head Thickness	
Standard	.03-.047" (.8-1.2 mm)
Service Limit	.028" (.70 mm)
Stem Diameter	.2142-.2148" (5.440-5.455 mm)

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Valve Springs	
Free Length	
Standard	1.4500" (36.83 mm)
Service Limit	1.4043" (35.67 mm)
Out-Of-Square	.079" (2.00 mm)
Valve Spring Preload: Lbs. @ In. (kg @ mm)	
Standard	23.6-27.5 @ 1.24 (10.7-12.5 @ 31.5)
Service Limit	20.5 @ 1.24 (9.3 @ 31.5)

CYLINDER BLOCK

CYLINDER BLOCK

Application	In. (mm)
1.3L	
Cylinder Bore	
Standard Diameter (1)	
"1"	2.9138-2.9142 (74.010-74.020)
"2"	2.9134-2.9138 (74.000-74.010)
Maximum Taper	.0039 (.10)
Maximum Out-Of-Round	.0039 (.10)
Maximum Deck Warpage	.002 (.05)
1.6L	
Cylinder Bore	
Standard Diameter (1)	
"1"	2.9531-2.9535 (75.010-75.020)
"2"	2.9528-2.9531 (75.000-75.010)
Maximum Taper	.0039 (.10)
Maximum Out-Of-Round	.0039 (.10)
Maximum Deck Warpage	.002 (.05)

(1) Cylinder bore diameter is determined by numerical mark ("1" or "2") stamped on cylinder block. See **Fig. 16**.

CYLINDER HEAD

CYLINDER HEAD

Application	Specification
Maximum Warpage	

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Head-To-Block	.002" (.05 mm)
Manifold-To-Head	.004" (.10 mm)
Valve Seats	
Intake & Exhaust Valves	
Seat Angle	45°
Seat Width	
1.3L	.0512-.0591" (1.3-1.5 mm)
1.6L	.0433-.0512" (1.1-1.3 mm)
Valve Guides	
Valve Stem End Deflection Limit	
Intake	.006" (.14 mm)
Exhaust	.007" (.18 mm)
Intake Valve	
Valve Guide I.D.	
1.3L	.2756-.2762" (7.000-7.015 mm)
1.6L	.2165-.2170" (5.500-5.512 mm)
Valve Guide Installed Height	
1.3L	.55" (14.0 mm)
1.6L	.45" (11.5 mm)
Valve Stem-To-Guide Oil Clearance	
1.6L	.0008-.0020" (.020-.047 mm)
1.3L	.0008-.0019" (.020-.050 mm)
Service Limit	.0027" (.07 mm)
Exhaust Valve	
Valve Guide I.D.	
1.3L	.2756-.2762" (7.000-7.015 mm)
1.6L	.2165-.2170" (5.500-5.512 mm)
Valve Guide Installed Height	
1.3L	.55" (14.0 mm)
1.6L	.45" (11.5 mm)
Valve Stem-To-Guide Oil Clearance	
1.3L	.0014-.0026" (.035-.065 mm)
1.6L	.0018-.0028" (.045-.072 mm)
Service Limit	.0035" (.09 mm)

CAMSHAFT

CAMSHAFT

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Application	In. (mm)
Bore Diameter	1.1024-1.1032 (28.000-28.021)
Journal Diameter (1)	1.1000-1.1008 (27.939-27.960)
Journal Runout (1)	.0039 (.10)
Lobe Height	
Esteem, Sidekick & X90	
Exhaust Standard	1.4313-1.4376 (36.356-36.516)
Exhaust Service Limit	1.4273 (36.256)
Intake Standard	1.4240-1.4303 (36.171-36.331)
Intake Service Limit	1.4201 (36.071)
Swift	
Standard	1.4211 (36.097)
Service Limit	1.4172 (35.997)
Oil Clearance	
Standard	.0016-.0032 (.040-.082)
Service Limit	.0047 (.12)
(1) Journals are numbered from front of engine.	

ROCKER ARM & ROCKER ARM SHAFT

ROCKER ARM & ROCKER ARM SHAFT

Application	In. (mm)
Rocker Arm Inside Diameter	
1.3L	.6299-.6306 (16.000-16.018)
1.6L	.6293-.6301 (15.985-16.005)
Rocker Arm Shaft Outside Diameter	
1.3L	.6289-.6294 (15.973-15.988)
1.6L	.6287-.6293 (15.969-15.984)
Rocker Arm-To-Shaft Oil Clearance	
Standard	.0005-.0018 (.012-.045)
Service Limit	.0035 (.09)
Rocker Arm Shaft Runout	
1.3L	.005 (.12)
1.6L	.008 (.20)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)

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Camshaft Sprocket Bolt	41-47 (56-64)
Connecting Rod Cap Nut	24-27 (33-37)
Crankshaft Main Bearing Cap Bolt	37-42 (50-57)
Crankshaft Pulley Bolt	11-13 (15-18)
Crankshaft Sprocket Bolt	77-85 (105-115)
Cylinder Head Bolt (1)	48-52 (65-70)
Drive Plate-To-Torque Converter Bolt	
Esteem	70 (95)
Sidekick & X90	57 (77)
Swift	13-14 (18-19)
Engine Mounts-To-Block	33 (45)
Engine Mounts-To-Frame	37 (50)
Engine-To-Transmission Bolt	
Sidekick A/T	51-72 (69-98)
Sidekick M/T	37 (50)
Swift	30-44 (40-60)
Exhaust Manifold Bolt	13-21 (18-28)
Exhaust Pipe	
1.3L	26-36 (35-49)
1.6L	33 (45)
Flywheel Bolt (Drive Plate For A/T)	
Esteem, Sidekick & Swift	55-59 (75-80)
Generator Mount & Adjusting Bolts	13-21 (18-28)
Generator Pulley Bolt	
Esteem	82 (111)
Sidekick & X90	50 (68)
Swift	40-55 (54-75)
Intake Manifold Bolt	13-21 (18-28)
Intake Manifold Support (Stiffener)	
Sidekick	29-43 (39-58)
Fuel Feed Flare Nut	33 (45)
Oil Pan Drain Plug	22-30 (30-40)
Oil Filter Mount	15-18 (20-25)
Rocker Arm Adjustment Lock Nut	
Swift	11-14 (15-19)
Rocker Arm Shaft Plug	
Sidekick	22-26 (30-35)
Rocker Arm Shaft Screw (Swift)	16-21 (22-28)
Spark Plug	15-22 (20-30)
Timing Belt Tensioner Bolt	18-22 (24-30)
Torque Converter Bolts	47 (64)

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	INCH Lbs. (N.m)
Camshaft Bearing Cap Bolt	80-106 (9-12)
Camshaft Position Sensor	96 (11)
Cooling Fan Nut	71-106 (8-12)
Cylinder Head Venturi Plug	
Sidekick	35-53 (4-6)
Distributor Case Bolt	71-106 (8-12)
Oil Pan Bolt	80-106 (9-12)
Oil Pressure Switch	106-133 (12-15)
Oil Pump Mounting Bolt	80-106 (9-12)
Oil Pump Rotor Plate Screw	80-106 (9-12)
Oil Pump Strainer Bolt	80-106 (9-12)
Oil Seal Housing Bolt	80-106 (9-12)
Rear Main Seal Bolt	89-115 (10-13)
Rocker Arm Adjustment Lock Nut	
Sidekick	89-115 (10-13)
Rocker Arm Shaft Screw (Except Swift)	80-106 (9-12)
Rocker Cover Bolt	
Sidekick & X90	80-106 (9-12)
All Others	35-44 (4-5)
Timing Belt Outer Cover Bolt	80-106 (9-12)
Timing Belt Tensioner Stud Nut	80-106 (9-12)
Water Pump Mounting Bolt	80-106 (9-12)
Water Pump Pulley Bolt	89-115 (10-13)
(1) Tighten in sequence. See **Fig. 5**.	

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