

1.3L 4-CYL - VIN [3] & 1.6L 4-CYL - VIN [0]

1992 Suzuki Swift

1992 SUZUKI ENGINES
1.3L & 1.6L 4-Cylinder

Samurai, Sidekick, Swift

* PLEASE READ THIS FIRST *

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

ENGINE IDENTIFICATION

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

ENGINE IDENTIFICATION CODES TABLE

Application	VIN Code
1.3L 4-Cylinder SOHC	
Samurai	3
Swift	3
1.3L 4-Cylinder DOHC	
Swift	3
1.6L 4-Cylinder 8-Valve TBI SOHC	
Sidekick	0
1,6L 4-Cylinder 16-Valve PFI SOHC	
Sidekick	0

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

NOTE: Swift DOHC uses hydraulic lifters. Adjustment is not required.

Samurai & Sidekick

1) Remove rocker cover. Rotate crankshaft until zero degree (TDC) timing mark of timing belt cover is in line with timing mark on crankshaft pulley.

2) Cylinder No. 1 should be at TDC on compression stroke.

Remove distributor cap, and ensure rotor is pointed upward at distributor hold-down bolt and to No. 1 terminal of distributor cap. If not as described, rotate crankshaft 360 degrees.

3) Measure valve clearance between adjustment screw and valve stem using thickness gauge. Check intake valve clearance of cylinders No. 1 and 2 and exhaust valve clearance of cylinders No. 1 and 3.

4) Turn crankshaft one complete revolution (360 degrees). Check intake valve clearance of cylinders No. 3 and 4 and exhaust valve clearance of cylinders No. 2 and 4. Ensure clearance is within specification. See VALVE CLEARANCE SPECIFICATIONS table.

5) If clearance adjustment is necessary, loosen lock nut and turn adjusting screw. After adjusting clearance, tighten adjusting

screw lock nut to 11-14 ft. lbs. (15-19 N.m) on Samurai or 90-108 INCH lbs. (10-13 N.m) on Sidekick. On all models, recheck clearance.

VALVE CLEARANCE SPECIFICATIONS TABLE

Application	In. (mm)
SOHC Engines	
Samurai, Sidekick 8-Valve TBI & Swift (1)	
Engine Cold	
Exhaust	.006-.008 (.15-.20)
Intake	.005-.007 (.13-.17)
Engine Hot	
Exhaust	.010-.012 (.25-.30)
Intake	.009-.011 (.23-.27)
Sidekick 16-Valve PFI	
Engine Cold	
Exhaust & Intake	.0031-.0047 (.08-.12)
Engine Hot	
Exhaust & Intake	.0047-.0063 (.12-.16)
DOHC Engine	
Swift (1)	(2)

(1) - Swift is available with 1.3L DOHC and SOHC engines.

(2) - Hydraulic valve lash adjusters are used. Adjustment is not required.

Swift SOHC

1) Remove rocker cover. Remove right side inner fender apron extension to enable timing marks to be seen. Align crankshaft pulley timing mark with TDC mark on timing belt cover.

2) Remove distributor cap. Ensure rotor is pointing upward toward distributor hold-down bolt and to No. 1 terminal of distributor cap. If not as described, rotate crankshaft 360 degrees.

3) Measure valve clearance between adjustment screw and valve stem using thickness gauge. Check intake valve clearance of cylinders No. 1 and 2 and exhaust valve clearance of cylinders No. 1 and 3. Turn crankshaft one complete revolution (360 degrees). Check intake valve clearance of cylinders No. 3 and 4 and exhaust valve clearance of cylinders No. 2 and 4.

4) Ensure clearance is within specification. See VALVE CLEARANCE SPECIFICATIONS table. If clearance adjustment is necessary, loosen lock nut and turn adjusting screw. Hold adjusting screw while tightening lock nut to 11-14 ft. lbs. (15-19 N.m). Recheck clearance.

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.

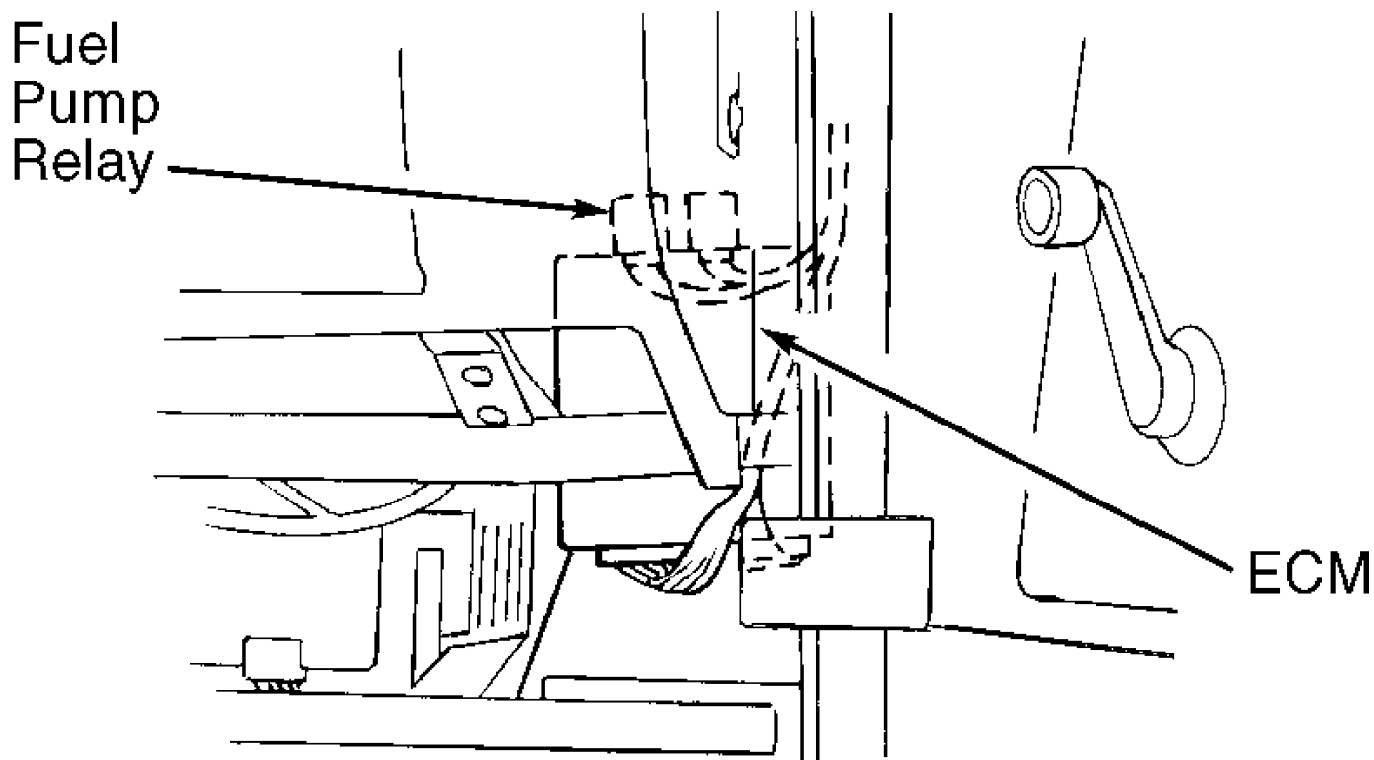
2) On Samurai, disconnect fuel pump relay connector. Fuel

pump relay is located on right kick panel, above ECM. See Fig. 1.

3) On Sidekick, disconnect control relay connector "A" (relay with Pink wire). Control relay is located on left kick panel. See Fig. 2.

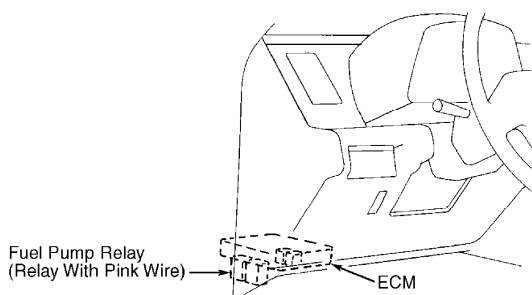
4) On Swift, remove engine coolant reservoir from bracket. Remove main fuse box cover, located near battery. Remove main fuse box from body to access fuel pump relay connector. Disconnect fuel pump relay connector. See Fig. 3.

5) On all models, remove fuel filler cap to release fuel vapor 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.



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Fig. 1: Locating Fuel Pump Relay (Samurai)
Courtesy of Suzuki of America Corp.



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Fig. 2: Locating Fuel Pump Relay (Sidekick)
Courtesy of Suzuki of America Corp.

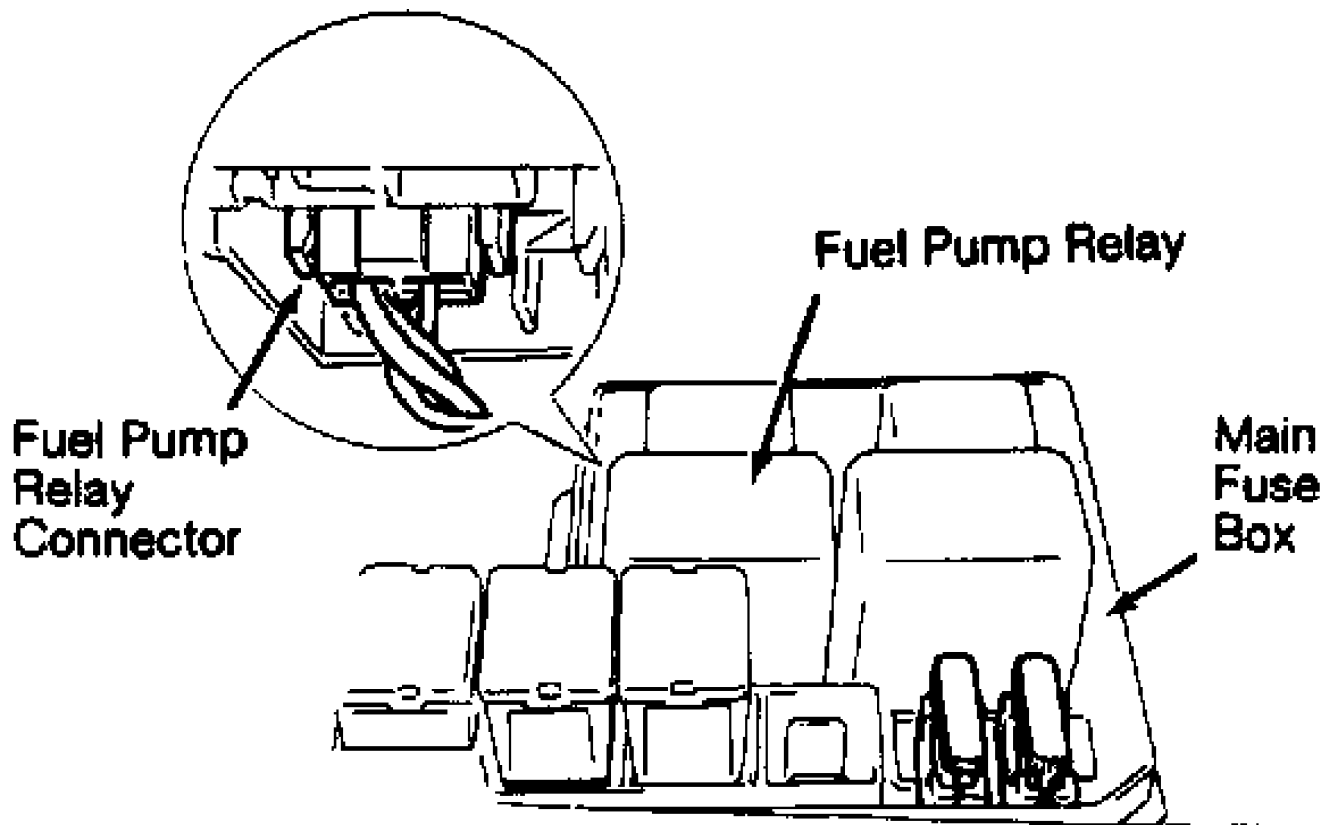


Fig. 3: Locating Fuel Pump Relay (Swift)
 Courtesy of Suzuki of America Corp.

ENGINE

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

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

Removal (Samurai)

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Disconnect battery cables. Mark and remove hood. Remove warm air hose. Disconnect breather hose from air cleaner case. Remove air cleaner case from throttle body and air inlet hose.

2) Mark all remaining connectors and disconnect from throttle body and intake manifold. Disconnect accelerator cable from throttle body. Disconnect and mark wires from starter motor and alternator terminals. Mark and disconnect vacuum hoses.

3) Disconnect fuel supply line and return hoses from throttle body. Disconnect wire connector from oil pressure sending unit and oxygen sensor. Disconnect wire connector from back-up light switch and 5th gear switch.

4) Disconnect distributor primary lead wires at distributor. Remove high tension wire from ignition coil. Drain radiator. Disconnect hoses from thermostat cap and inlet pipe. Remove cooling fan and clutch.

5) Remove fan shroud and radiator. Disconnect brake booster vacuum hose. Remove 4 bolts fastening gearshift No. 2 lever boot, and move boot upward. Move gearshift No. 1 to upper side of shift lever.

6) Loosen 3 bolts on gearshift lever case, and remove shift

lever from lever case. Raise vehicle. Disconnect exhaust pipe from exhaust manifold. Disengage clutch cable from clutch release lever. Drain transmission oil.

7) Remove drive shaft connecting transmission case to transfer case. Install chain hoist on hooks provided. One hook is mounted on intake manifold side and another on exhaust manifold side of engine.

8) Remove exhaust center pipe mounting bracket and 4 transmission mount bolts. Remove pipe connected to chassis under transmission. Lower vehicle. Remove 4 bolts securing right and left engine mounting brackets.

9) Ensure all hoses, electrical wires and cables are disconnected. Remove engine. Remove clutch lower plate. Separate engine from transmission (if necessary).

Installation

Lower engine and transmission into vehicle. Install engine mountings to brackets. Install bolts into frame brackets. Tighten bolts to specifications. See TORQUE SPECIFICATIONS table at end of article. Replace cooling system, engine and transmission fluids. To complete installation, reverse removal procedure.

Removal (Sidekick)

1) Relieve fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Disconnect battery cables. 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.

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. Disconnect and mark all remaining wire connectors from intake manifold and throttle body.

5) Disconnect wires from starter motor and alternator 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 torque converter housing lower plate.

7) On all models, lower vehicle. Remove nuts and bolts fastening engine to transmission. Support transmission. Attach chain hoist to engine. Remove engine mounting bolts, and remove engine from body and transmission.

Installation

Lower engine and transmission into vehicle. Install engine mountings to brackets. Install bolts into frame brackets. Tighten bolts to specifications. See TORQUE SPECIFICATIONS table at end of article. 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 under REMOVAL & INSTALLATION. 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 FRONT WHEEL DRIVE AXLES SHAFTS article in the DRIVE AXLES Section.

7) Lower vehicle. Attach chain hoist to engine. Disconnect rear and side engine mounts with brackets. Remove engine and transmission as an assembly.

Installation

Lower engine or engine and transmission into vehicle. Install engine mountings to brackets. Install bolts into frame brackets. Tighten bolts to specifications. See TORQUE SPECIFICATIONS table at end of article. To complete installation, reverse removal procedure.

INTAKE MANIFOLD

Removal

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. 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.

2) Remove air cleaner assembly. Disconnect all electrical connections from intake manifold, injectors and throttle body. 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 using NEW gaskets. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article. 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-to-cylinder head bolts. Remove exhaust manifold and gasket.

Installation

To install, reverse removal procedure using NEW exhaust

manifold gasket. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article.

CYLINDER HEAD

Removal (Samurai)

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Remove intake and exhaust manifolds. See INTAKE MANIFOLD and EXHAUST MANIFOLD under REMOVAL & INSTALLATION.

2) Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Loosen cylinder head bolts in reverse order of tightening sequence. See Fig. 4. Loosen head bolts in 2 or 3 steps to prevent cylinder head warpage. Remove bolts and cylinder head.

Removal (Sidekick & Swift)

1) Release fuel pressure. See FUEL PRESSURE RELEASE under REMOVAL & INSTALLATION. Label and remove hoses, lines and electrical connectors for intake and exhaust manifold removal. Disconnect exhaust pipe from manifold.

2) Removing exhaust and intake manifolds is not necessary yet. Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Remove air conditioner compressor and/or alternator adjusting arm from cylinder head (if equipped).

3) Loosen cylinder head bolts in reverse order of tightening sequence. See Fig. 4. 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 table under ENGINE SPECIFICATIONS at end of article.

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 specifications in 3 steps using proper sequence. See Fig. 4. See TORQUE SPECIFICATIONS table at end of article. Adjust timing belt.

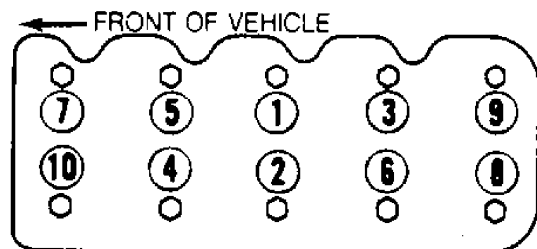


Fig. 4: Cylinder Head Bolt Tightening Sequence
Courtesy of Suzuki of America Corp.

FRONT COVER OIL SEAL

Removal

1) Remove water pump, crankshaft pulley and alternator. Remove timing belt cover and timing belt. See TIMING BELT under REMOVAL & INSTALLATION.

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) Mark outer gear using felt pen 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 gear plate. Tighten 5 screws. Install 2 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. See Fig. 5.

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 table at end of article.

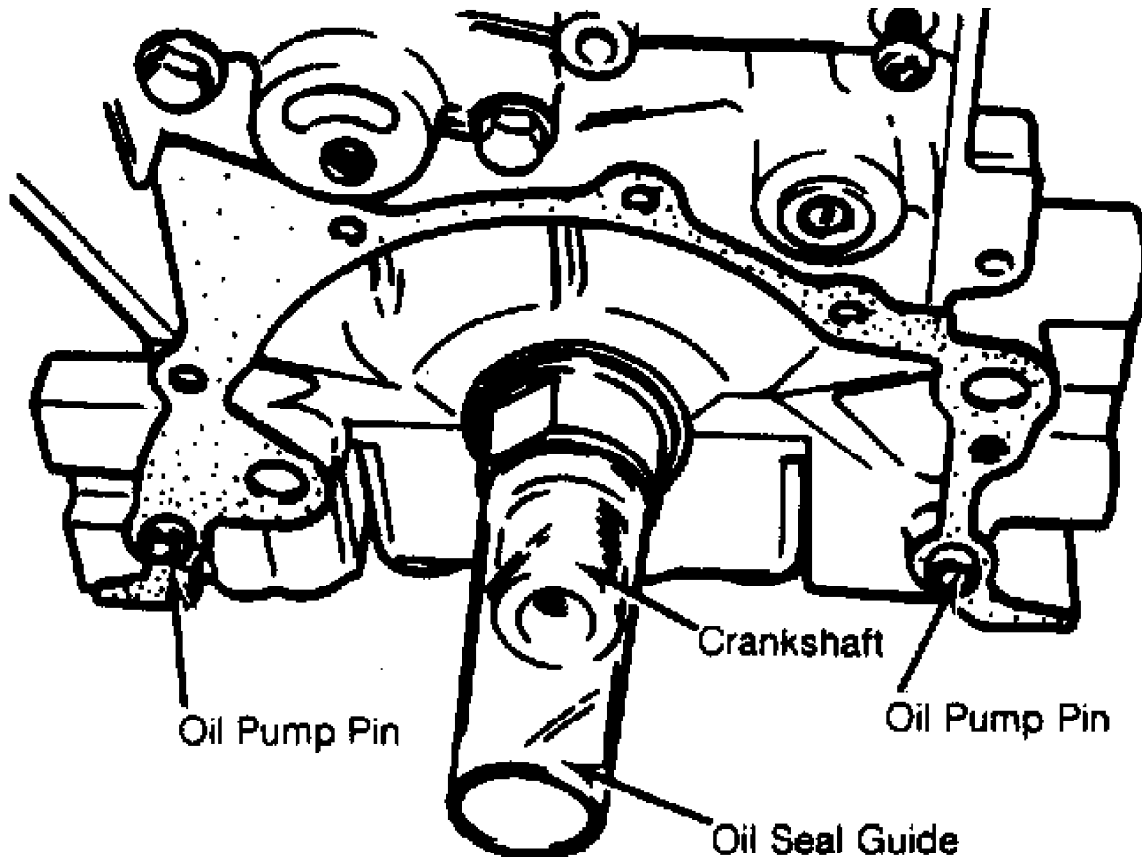


Fig. 5: Installing Oil Seal Guide
Courtesy of Suzuki of America Corp.

Removal (1.3L SOHC & 1.6L)

1) On Sidekick and Samurai, remove cooling fan and fan shroud. Discharge A/C system using approved refrigerant recovery/recycling equipment and disconnect compressor flexible suction hose from suction pipe (if equipped). Remove A/C compressor belt (if equipped).

2) On 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. DO NOT discharge A/C. On all models, loosen alternator, 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. Remove timing belt cover. Move up and secure timing belt tensioner.

4) Mark belt with an arrow indicating direction of rotation for installation reference. Remove timing belt from camshaft and crankshaft sprockets.

CAUTION: With timing belt removed, DO NOT turn camshaft sprocket more than 20 degrees in either direction from aligned position. 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. 6.

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 table at end of article.

4) Ensure timing marks are aligned. Install timing belt outer cover and tighten to specification. See TORQUE SPECIFICATIONS table. Reverse removal procedure to complete installation. Adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

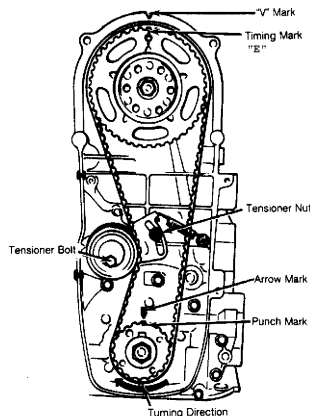


Fig. 6: Aligning Timing Belt & Tensioner (Typical SOHC)
Courtesy of Suzuki of America Corp.

Removal (1.3L DOHC)

1) Remove negative battery cable. Remove air cleaner and

airflow meter assembly. Raise vehicle and remove right fender apron extension by pushing center pin into clip. DO NOT push in too far, as pin may fall into fender. Remove water pump pulley and belt.

2) Remove crankshaft pulley 5-mm hexagon bolts. If engine is in vehicle, remove crankshaft pulley center bolt. Remove crankshaft pulley. Loosen right engine mount bolt, and push air cleaner bracket away from work area. Remove timing belt covers.

3) Align all sprocket timing marks with timing marks on engine. See Fig. 7. Move timing belt tensioner up and secure. Mark timing belt for direction of rotation if belt is to be reused. Remove timing belt from sprockets.

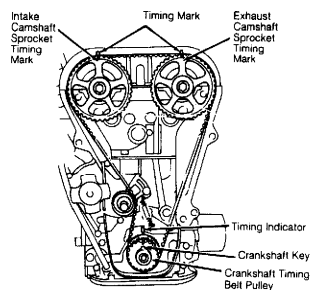


Fig. 7: Aligning Timing Belt Marks (DOHC)
Courtesy of Suzuki of America Corp.

Installation

1) Align timing marks. Bolts with flanged nuts may be wedged between cam sprocket teeth to hold camshaft on timing mark during belt installation (if necessary). See Fig. 8.

CAUTION: While aligning timing marks, DO NOT turn camshaft sprockets more than 20 degrees in either direction from aligned position. DO NOT turn crankshaft more than 90 degrees in either direction from aligned position.

2) Install timing belt so no slack exists on drive side of belt. Adjust tensioner to remove timing belt slack from other side of belt, and hand tighten tensioner bolt and nut. Turn crankshaft 2 revolutions to seat timing belt, and readjust tensioner.

3) Tighten tensioner bolt and nut. Ensure drive side of belt is free of slack. Ensure timing marks are aligned. Install timing belt outer covers and tighten to specification. See TORQUE SPECIFICATIONS table at end of article. To complete installation, reverse removal procedure. Tighten bolts to specification.

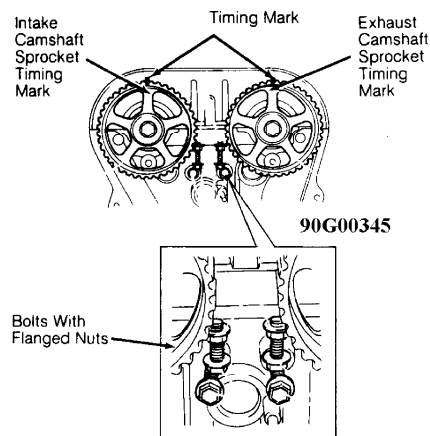


Fig. 8: Securing Intake & Exhaust Camshaft Sprockets For Timing Belt Installation (DOHC)

Courtesy of Suzuki of America Corp.

ROCKER ARM & VALVE LASH ADJUSTER

Removal (1.3L SOHC)

1) Remove cylinder head valve cover. Remove distributor and distributor case.

2) Loosen all valve adjustment lock nuts and valve adjusting screws. Leave screws in place. Remove 10 rocker arm shaft retaining screws. Slide rocker arm shaft(s) out of rear side of head assembly. Remove rocker arms and springs.

Removal (1.6L)

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. On A/C-equipped vehicles, discharge refrigerant using approved refrigerant recovery/recycling equipment and disconnect compressor flexible suction hose from pipe. Remove air cleaner assembly and rocker arm cover.

3) Remove water pump belt and pulley. Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Insert .35" (9 mm) rod into hole on front part of camshaft to lock camshaft, and remove camshaft sprocket bolt and sprocket.

4) Loosen all valve adjustment lock nuts and valve adjusting screws. Remove rocker arm shaft retaining screws. Slide rocker arm shaft(s) out of front side of head assembly. Remove rocker arms and springs.

Installation (1.3L SOHC & 1.6L)

To install, reverse removal procedure. Intake rocker shaft has a .55" (14 mm) stepped end. Exhaust rocker shaft has a .59" (15 mm) stepped end. Ensure intake rocker shaft stepped end faces front of engine and exhaust rocker shaft stepped end faces rear of engine. Adjust valve clearance. See VALVE CLEARANCE ADJUSTMENT under ADJUSTMENTS.

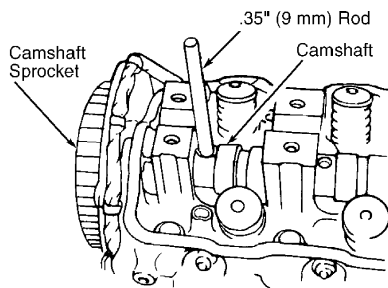
CAMSHAFT

NOTE: On SOHC models, cylinder head removal is necessary to obtain enough clearance for camshaft removal.

Removal (SOHC)

1) Remove cylinder head. See CYLINDER HEAD under REMOVAL & INSTALLATION. Remove rocker arms and shafts. See ROCKER ARM & VALVE LASH ADJUSTER under REMOVAL & INSTALLATION.

2) Use .35" (9 mm) rod to lock camshaft. See Fig. 9. Remove camshaft sprocket. Remove camshaft from rear of head. Remove oil seal.



91C00168
Fig. 9: Locking Camshaft For Timing Belt Sprocket Removal (SOHC)
Courtesy of Suzuki of America Corp.

Removal (DOHC)

1) Remove negative battery cable. Remove timing belt. See TIMING BELT under REMOVAL & INSTALLATION. Turn crankshaft timing belt sprocket key to horizontal position, 180 degrees away from dipstick guide tube. See Fig. 10.

2) Remove cylinder head cover. Remove distributor. Remove camshaft sprockets. Install a brass rod under camshaft in groove between lobes to lock camshaft into position. Remove camshaft sprocket bolts. Remove camshaft sprockets.

3) Remove camshaft bearing cap bolts in reverse order of tightening sequence. See Fig. 11. Loosen bolts in 2 or 3 steps to prevent warpage. Remove camshaft and oil seals. Lift valve lash adjusters out of cylinder head (if necessary).

CAUTION: Hydraulic valve lash adjusters cannot be disassembled or repaired. DO NOT apply force to adjuster body. If removed, keep immersed in container of clean engine oil.

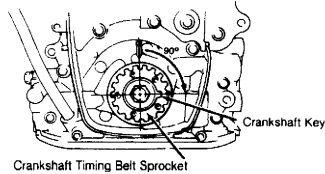


Fig. 10: Positioning Crankshaft Timing Belt Sprocket For Camshaft Removal (DOHC)
Courtesy of Suzuki of America Corp.

Inspection (All Models)

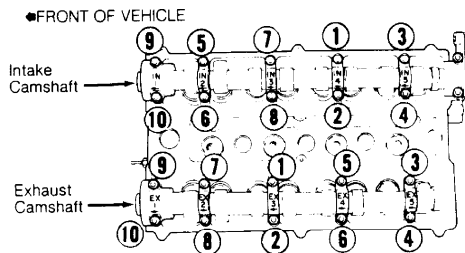
1) Check cam lobes and journals for wear and damage. Use Plastigage to check bearing clearance. If wear exceeds specification, repair or replace as necessary. See CAMSHAFT table under ENGINE SPECIFICATIONS at end of article.

2) Use dial indicator and "V" blocks to measure camshaft runout at center of shaft. If wear exceeds specifications, repair or replace as necessary. See CAMSHAFT table.

Installation (All Models)

1) Lubricate camshaft lobes and camshaft bearing journals. Install camshaft and NEW oil seal in cylinder head. On DOHC model, install oil seal flush with bearing cap surface. Install camshaft bearing caps and tighten in sequence. See Fig. 11.

2) On all models, install camshaft sprocket. Ensure camshaft sprocket marks align with timing marks on cylinder head. See Figs. 6 and 7. To complete installation, reverse removal procedure.



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Fig. 11: Camshaft Bearing Cap Bolt Tightening Sequence (DOHC)
Courtesy of Suzuki of America Corp.

REAR CRANKSHAFT OIL SEAL

Removal

Remove engine or engine and transmission. See ENGINE under REMOVAL & INSTALLATION. Separate transmission from engine. Remove flywheel. Remove oil seal housing. Remove seal. Inspect oil seal housing for wear or damage. Repair or replace as necessary. See Fig. 12.

Installation

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

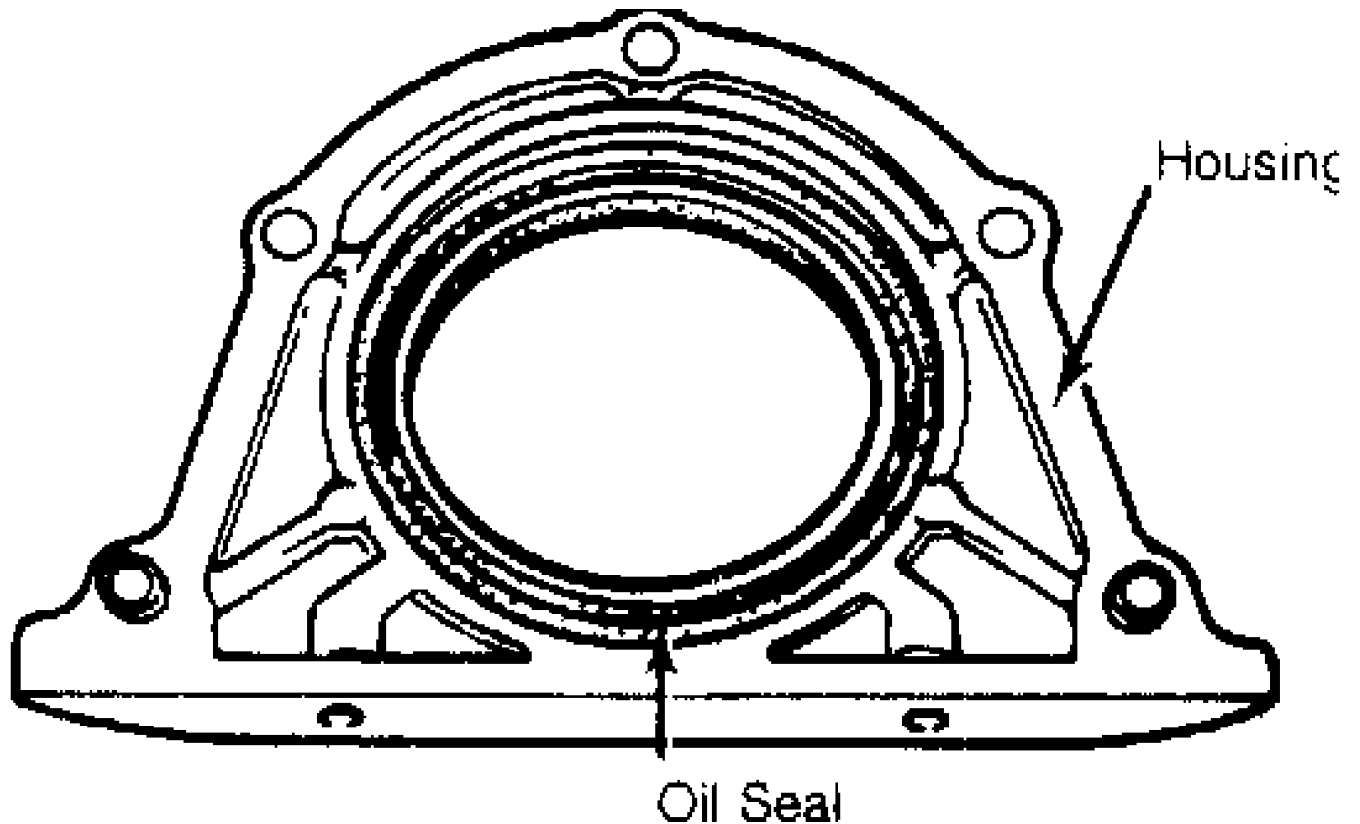


Fig. 12: Identifying Rear Crankshaft Oil Seal & Housing
Courtesy of Suzuki of America Corp.

WATER PUMP

Removal

1) Drain cooling system. Disconnect negative battery cable. Remove drive belts. Discharge A/C system using approved refrigerant recovery/recycling equipment and disconnect compressor flexible suction hose from suction pipe (if equipped). On Samurai and Sidekick, 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. See TIMING BELT under REMOVAL & INSTALLATION. Remove dipstick and tube. Remove alternator mounting bracket. Remove water pump.

Installation

To install, reverse removal procedure. Ensure all mating surfaces are clean. Use NEW gasket.

NOTE: For further information on cooling systems, see COOLING SYSTEM SPECIFICATIONS & ELECTRIC COOLING FANS article in the ENGINE COOLING Section.

OIL PAN

Removal

1) Raise vehicle. On Samurai and Sidekick 4WD, remove front differential assembly. See appropriate article in the DRIVE AXLES Section. On all models, drain engine oil.

2) Remove clutch housing lower plate or torque convertor housing lower plate. Remove oil pan nuts and bolts. Remove oil pan.

Installation

To install, reverse removal procedure. Install oil pan using silicone-type sealant. Tighten bolts to specification. See TORQUE SPECIFICATIONS table at end of article.

OVERHAUL

CYLINDER HEAD

Cylinder Head Disassembly (1.3L SOHC & 1.6L)

1) Remove cylinder head. See CYLINDER HEAD under REMOVAL & INSTALLATION. Remove manifolds and distributor assembly. Remove rocker arms and shafts. Remove camshaft. See CAMSHAFT under REMOVAL & INSTALLATION.

2) Use a Valve Spring Compressor (09916-14510) and Valve Lifter Attachment (09916-48210) to remove retainer locks. See Fig. 13. Remove retainers, springs, spring seats and valves. Keep all components in order for reassembly reference.

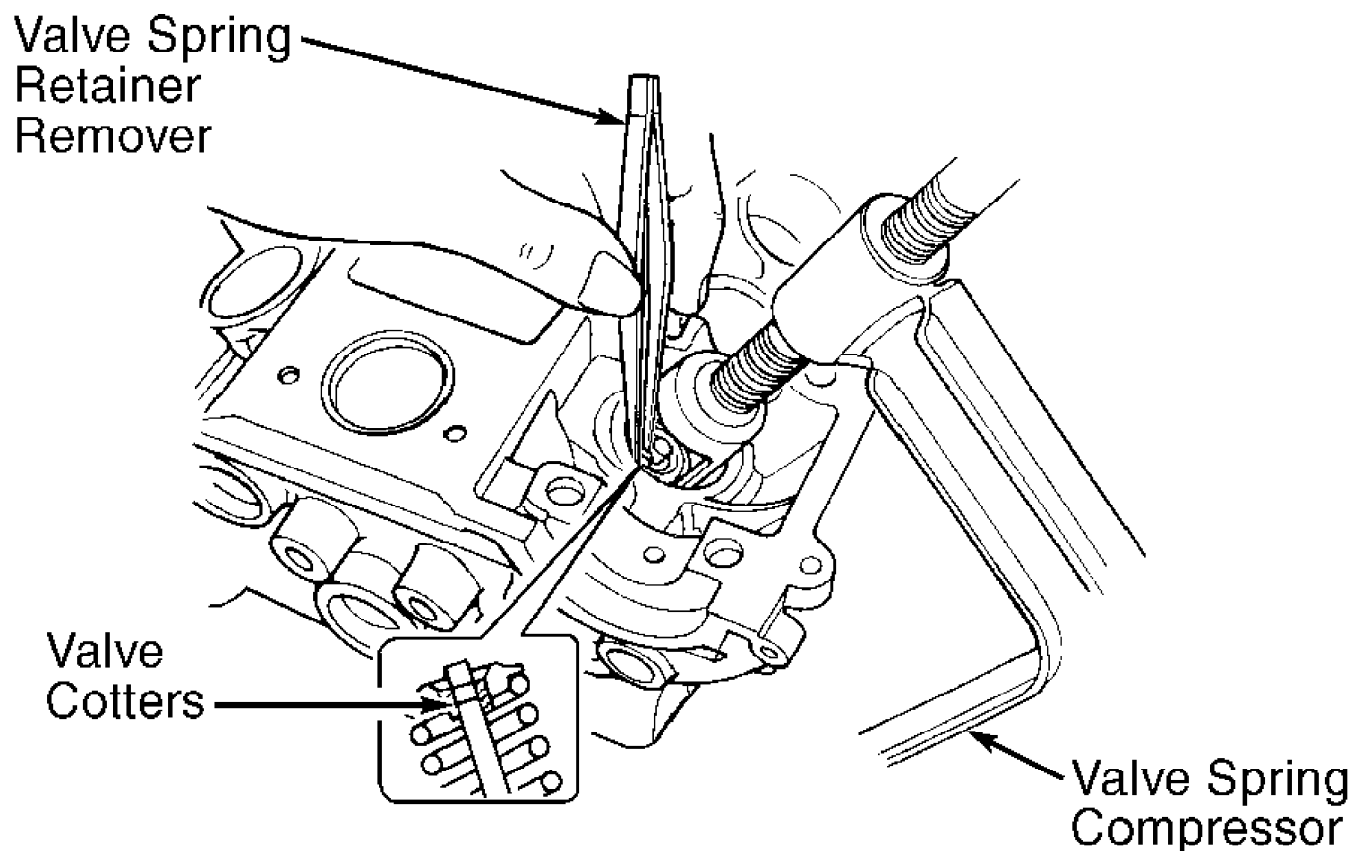
Cylinder Head Disassembly (1.3L DOHC)

1) Remove cylinder head. See CYLINDER HEAD under REMOVAL & INSTALLATION. Remove manifolds with throttle body, distributor assembly and delivery pipe with injectors. Remove camshaft. See CAMSHAFT under REMOVAL & INSTALLATION.

2) Use Valve Spring Compressor (09916-14510) and Valve Spring Retainer Remover (09916-84510) to remove retainer locks. See Fig. 13. Remove retainers, springs, spring seats and valves. Keep all components in order for reassembly reference.

Cylinder Head Reassembly (All Models)

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



90H00346

Fig. 13: Removing Valve Lock (DOHC Shown; SOHC Is Similar)
 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 table under ENGINE SPECIFICATIONS at end of article. Replace any weak 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 (09917-98220 on DOHC, 09917-98210 on 8-valve SOHC or 09916-58210 on 16-valve SOHC). Press seal on valve guide using hand pressure only. When installer bottoms on head, seal is positioned properly. 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 table under ENGINE SPECIFICATIONS at end of article.

2) On Sidekick (8-valve) and Swift SOHC, use Valve Guide Remover (09916-46010). On Swift DOHC and Sidekick (16-valve), use Valve Guide Remover (09916-44910). On Samurai, use Valve Guide Remover (09916-44511). Drive out old guide.

3) Ream guide bore in cylinder head with 12-mm Reamer (09916-37310) for 8-valve SOHC engines and 11-mm Reamer (09916-38210) for DOHC and 16-valve SOHC engines. Heat cylinder head to 176-212°F (80-

100°C).

4) Using Valve Guide Installer Attachment (09917-88210 for 8-valve SOHC, 09916-56020 for DOHC and 09916-58210 for 16-valve SOHC), drive in new oversized valve guide until valve guide installer contacts cylinder head.

5) Valve guide protrusion is .55" (14.0 mm) for 8-valve SOHC, .91" (23.0 mm) for DOHC and .45" (11.5mm) for 16-valve SOHC. Ream valve guide with 7-mm Reamer (09916-34520) for 8-valve SOHC or 5.5-mm Reamer (09916-34550) for DOHC and 16-valve SOHC.

6) Clean valve guide bore after reaming. Install valve and ensure valve stem oil clearance is correct. See CYLINDER HEAD table.

Valve Seat (8-Valve SOHC)

1) Inspect valve seats for damage or wear. If exhaust valve seat rework is necessary, use 3 cutters to obtain required angles. The first cut should be 15 degrees. Second cut should be 75 degrees for Samurai and Swift or 60 degrees for Sidekick. Third cut should be 45 degrees to obtain correct seat angle.

2) For intake valves, procedure is the same, except second cut should be 60 degrees for all models. After cutting valve seats to correct angles, lap valve seat in 2 steps. Use course compound for first step and fine compound for second step.

Valve Seat (DOHC & 16-Valve SOHC)

1) 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.

2) After cutting valve seats to correct angles, lap valve seat in 2 steps. Use a course compound for first step and a fine compound for second step.

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 .14" (3.6 mm) is removed from valve length. See VALVES & VALVE SPRINGS table under ENGINE SPECIFICATIONS at end of article. Using "V" block and dial gauge, check valve head radial runout. Maximum limit is .003 (.08 mm). If runout exceeds limit, replace valve.

Seat Correction Angles

On 8-valve SOHC exhaust valves, use 15-degree stone and 75-degree stone to narrow seat and 45-degree stone to widen seat. On 8-valve SOHC intake valves, use 15-degree stone and 60-degree stone to narrow seat and 45-degree stone to widen seat. On DOHC and 16-valve SOHC 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 .004" (.10 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 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.

4) Use Piston Pin Remover/Installer (09910-38211) on 1.3L SOHC engines. On 1.3L DOHC and 1.6L 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 1.3L SOHC. Press pin into piston and rod using a hydraulic press. See Fig. 14. On 1.3L DOHC and 1.6L engines, install circlips and piston pin.

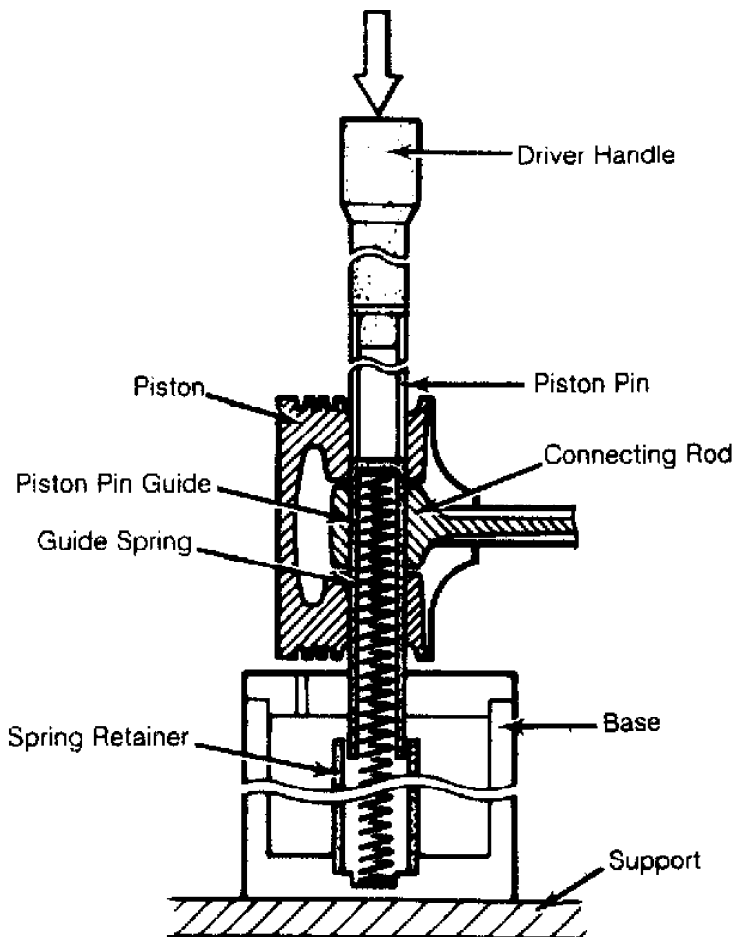


Fig. 14: Installing Piston Pin (1.3L SOHC)
Courtesy of Suzuki of America Corp.

Fitting Pistons

1) Check cylinder bore for damage, wear and taper. See

CYLINDER BLOCK under CYLINDER BLOCK ASSEMBLY under OVERHAUL. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS at end of article to determine if block must be rebored.

2) Pistons are available in .0098" (.25 mm) and .0196" (.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 .59" (15.0 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. 15.

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. 15.

5) When installing piston into cylinder, ensure piston numerical mark matches cylinder bore numerical mark to provide correct piston-to-cylinder clearance.

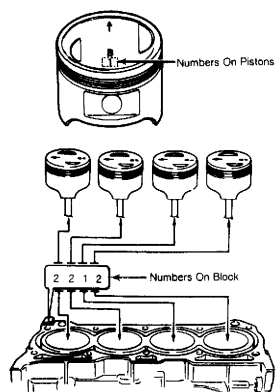


Fig. 15: Matching Pistons To Cylinders
Courtesy of Suzuki of America Corp.

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. Position piston ring gaps. See Fig. 16. 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.

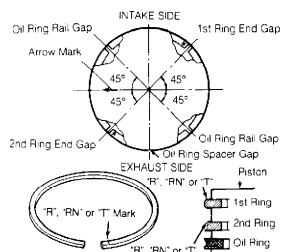


Fig. 16: Positioning Piston Ring Gaps
Courtesy of Suzuki of America Corp.

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 table under ENGINE SPECIFICATIONS at end of article.

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 measuring method. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS table. Standard connecting rod side play is .0039-.0078" (.10-.20mm), with a service limit of .0137" (.35 mm).

4) To install, reverse removal procedure. Tighten rod nuts to specification. See TORQUE SPECIFICATIONS table at end of article.

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 table under ENGINE SPECIFICATIONS at end of article.

4) Standard main bearings are color-coded. See Fig. 19. 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) On SOHC engines, 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. 17. On DOHC engines, numerical mark ("1", "2" or "3") is stamped crankshaft web of cylinder No. 1. See appropriate CRANKSHAFT JOURNAL DIAMETERS table.

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. 18. 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. 19. See COLOR CODE FOR STANDARD BEARINGS table.

10) Use numerical marks on crankshaft webs and letters stamped on cylinder block mating surface to determine correct replacement bearing. See STANDARD BEARING APPLICATION table.

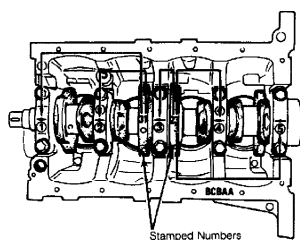


Fig. 17: Locating Numerical Marks On Crankshaft Webs (SOHC)
Courtesy of Suzuki of America Corp.

CRANKSHAFT JOURNAL DIAMETERS TABLE (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 TABLE (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)

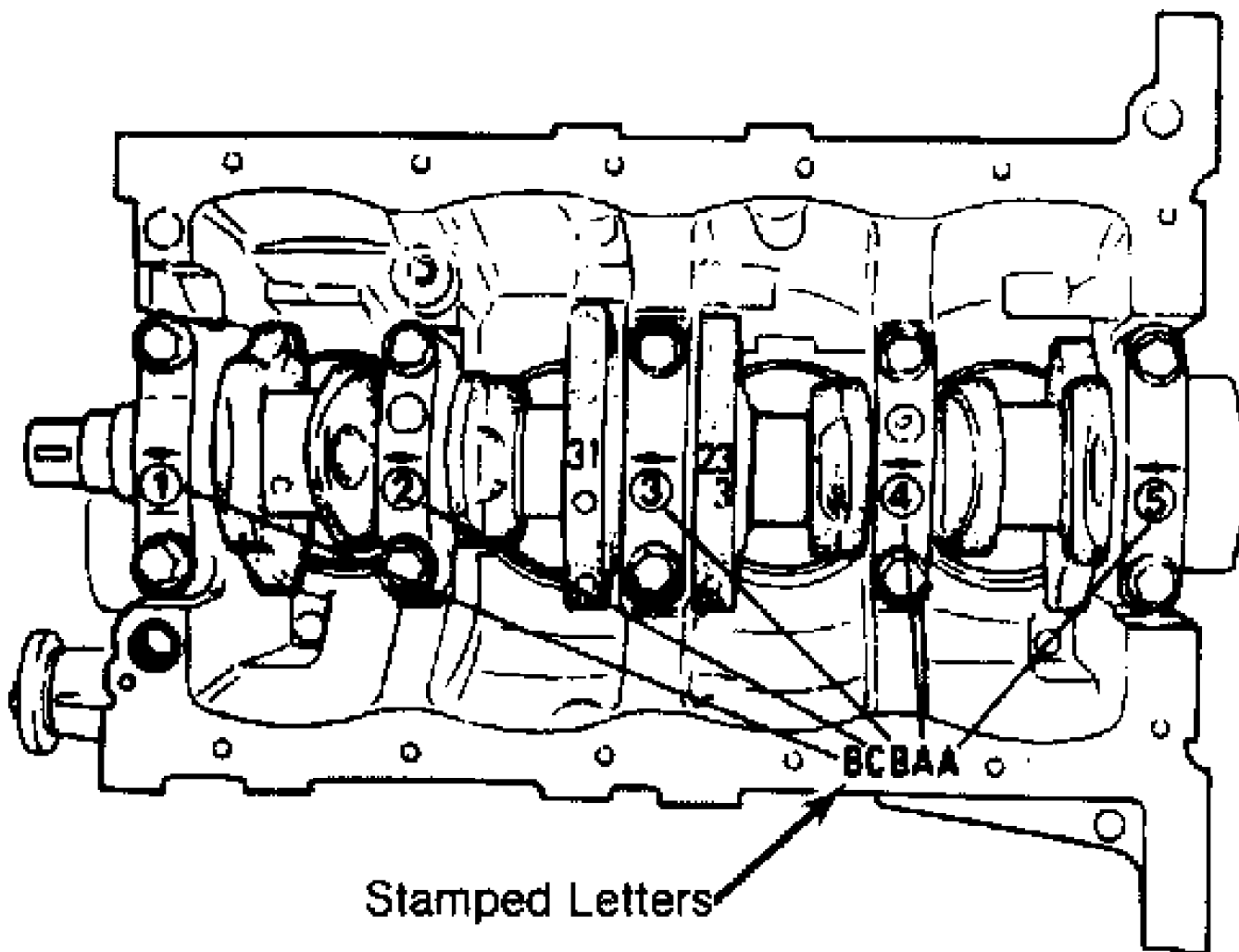


Fig. 18: Locating Letters Stamped On Cylinder Block
 Courtesy of Suzuki of America Corp.

BEARING CAP BORE DIAMETERS TABLE (1.3L)

Letters Stamped On Block	In. (mm)
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"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 TABLE (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)

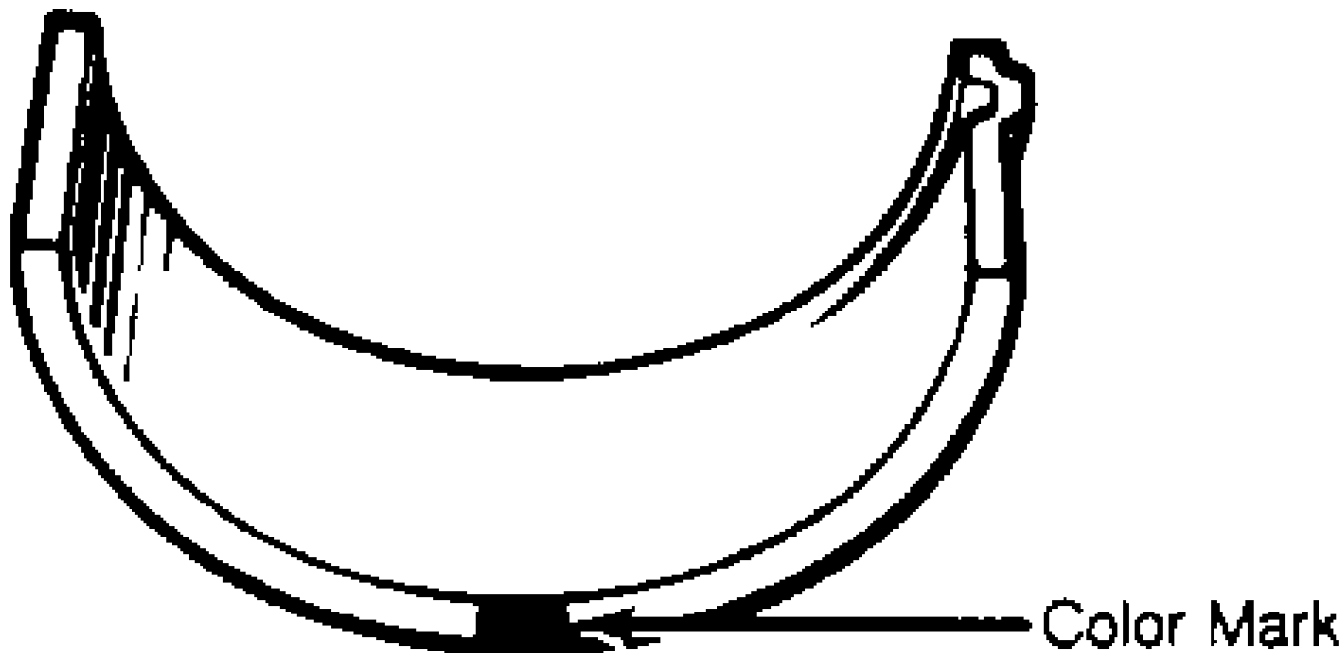


Fig. 19: Identifying Standard Main Bearing Color Mark
 Courtesy of Suzuki of America Corp.

COLOR CODE FOR STANDARD BEARINGS TABLE

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

STANDARD BEARING APPLICATION TABLE

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

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

NOTE: Manufacturer does not recommend grinding crankshaft on DOHC engine. Crankshaft surface has been treated to provide a hard surface. Grinding will reduce journal hardness and service life.

Undersize Bearings

- 1) Bearings are available in .010" (.25 mm) undersize. Undersize bearing thickness is determined by 2 color marks. See Fig. 20. See COLOR CODE FOR UNDERSIZE BEARINGS table.
- 2) Use journal finished diameters, 1.7612-1.7618" (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) Use Plastigage method 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 table at end of article.

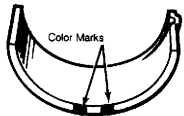


Fig. 20: Identifying Undersize Main Bearing Color Marks
Courtesy of Suzuki of America Corp.

COLOR CODE FOR UNDERSIZE BEARINGS TABLE

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

UNDERSIZE BEARING APPLICATION TABLE (1.3L SOHC)

Measured Journal Diameter - In. (mm)	Letter Stamped On Block	Color
1.7616-1.7618 (44.744-44.750)	"A"	Green & Red
	"B"	Black & Red
	"C"	Red Only
1.7614-1.7616 (44.738-44.744)	"A"	Black & Red
	"B"	Red Only
	"C"	Yellow & Red
1.7612-1.7614 (44.732-44.78)	"A"	Red Only
	"B"	Yellow & Red
	"C"	Blue & Red

UNDERSIZE BEARING APPLICATION TABLE (1.6L)

Measured Journal Diameter - In. (mm)	Letter Stamped On Block	Color
2.0371-2.0373 (51.744-51.750)	"A" "B" "C"	Green & Red Black & Red Red Only
2.0369-2.0371 (51.738-51.744)	"A" "B" "C"	Black & Red Red Only Yellow & Red
2.0367-2.0369 (51.732-51.78)	"A" "B" "C"	Red Only Yellow & Red 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 table under ENGINE SPECIFICATIONS at end of article.

Cylinder Block

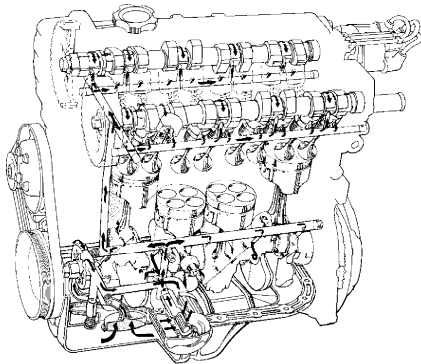
1) Inspect block for distortion of deck surface. Warpage limit is .0012-.0024" (.03-.06 mm). Inspect block for cracks, scratches and other defects. Measure bores at 3 levels for wear, taper and out-of-round condition.

2) If bore wear, taper or out-of-round exceed specification, rebore cylinders. See CYLINDER BLOCK table under ENGINE SPECIFICATIONS at end of article.

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. 21.



90A00349
Fig. 21: Cross-Sectional View Of Engine Oil Circuit (Typical)
Courtesy of Suzuki of America Corp.

Crankcase Capacity

Samurai crankcase capacity, including filter, is 3.7 qts. (3.

5L). Sidekick crankcase capacity, including filter, is 4.8 qts. (4.5L). Swift crankcase capacity, including filter, is 3.5 qts. (3.3L). Check dipstick to verify oil level is correct.

Oil Pressure

On Samurai, normal oil pressure is 42.7-59.7 psi (3.0-4.2 kg/cm²) at 3000 RPM. On Sidekick and Swift SOHC, normal oil pressure is 46.9-61.1 psi (3.3-4.3 kg/cm²) at 4000 RPM. On Swift DOHC, normal oil pressure is 54.1-68.2 psi (3.8-4.8 kg/cm²) at 4000 RPM.

OIL PUMP

Removal & Disassembly

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 alternator and bracket and air conditioner compressor bracket bolts (if equipped).

2) Raise vehicle and drain engine oil and front differential oil (if equipped). 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 Figs. 22 and 23. If clearance exceeds specification, replace outer rotor or case. See OIL PUMP SPECIFICATIONS table.

OIL PUMP SPECIFICATIONS TABLE

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 table.

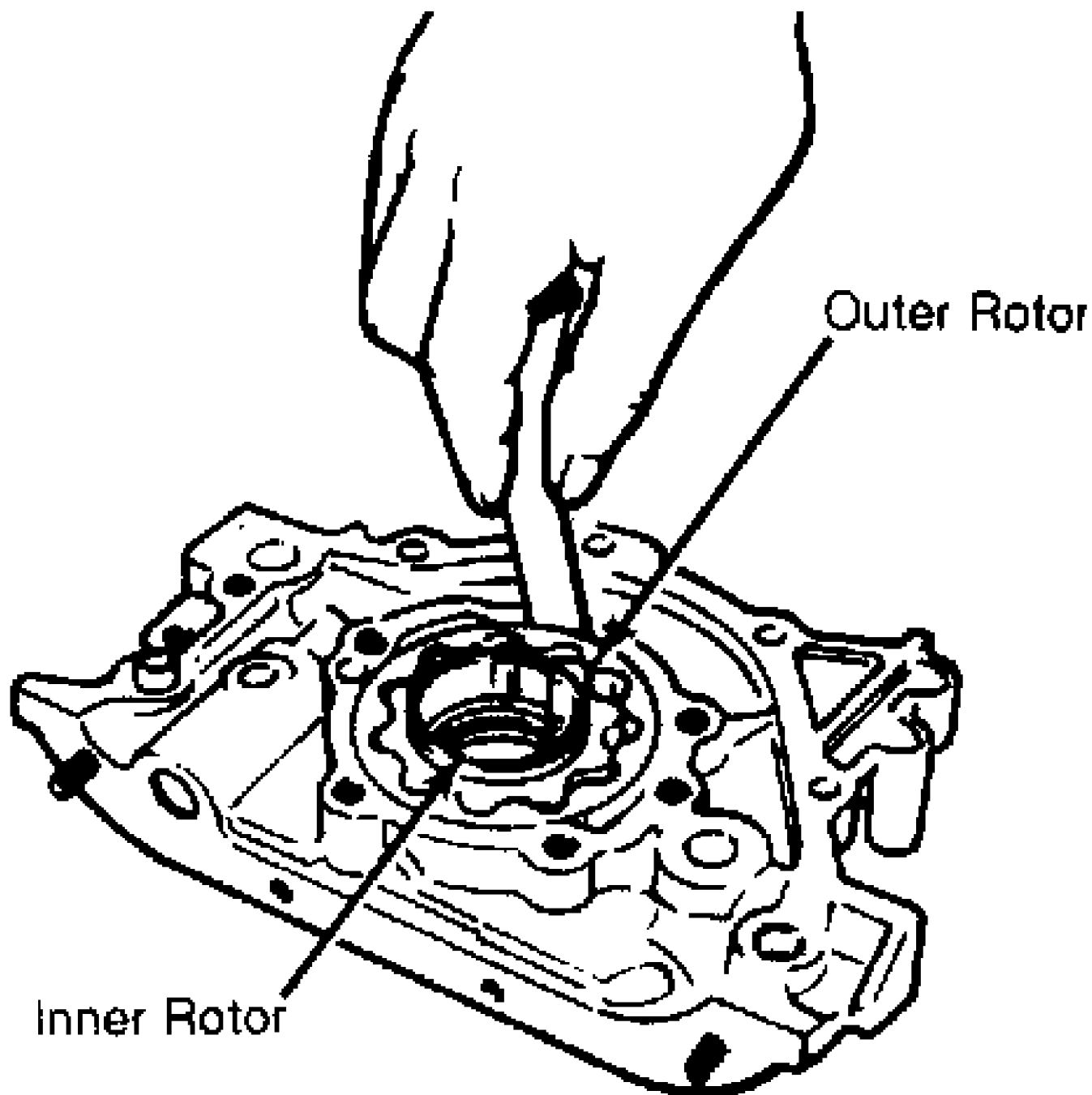


Fig. 22: Checking Oil Pump Radial Clearance
Courtesy of Suzuki of America Corp.

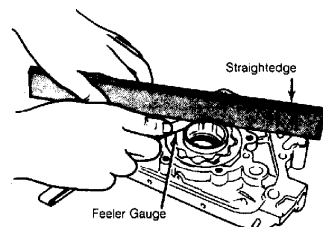


Fig. 23: Checking Oil Pump Side Clearance
Courtesy of Suzuki of America Corp.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS TABLE

Application	Ft. Lbs. (N.m)
Alternator Mount & Adjusting Bolts	13-21 (18-28)
Alternator Pulley Bolt	
Samurai	37-48 (50-65)
Sidekick	44-52 (60-70)
Swift	70-96 (95-130)
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 Sprocket Bolt	77-83 (105-115)
Cylinder Head Bolt (1)	
DOHC	48-52 (65-70)
SOHC	
8-Valve	52-55 (70-75)
16-Valve	48-52 (65-70)
Drive Plate-To-Torque Converter Bolt	
Sidekick 8-Valve	37-44 (50-60)
Sidekick 16-Valve	44-52 (60-70)
Swift	13-14 (18-19)
Engine-To-Transmission Bolt	
Samurai	16-26 (22-35)
Sidekick A/T	51-72 (69-98)
Sidekick M/T	52-74 (70-100)
Swift	30-44 (40-60)
Exhaust Manifold Bolt	13-21 (18-28)
Exhaust Pipe	
1.3L SOHC	26-36 (35-49)
1.3L DOHC & 1.6L	30-44 (40-60)
Flywheel Bolt (Drive Plate For A/T)	
Samurai	42-48 (57-65)
Sidekick	55-59 (75-80)
Swift	49-53 (66-71)
Intake Manifold Bolt	13-21 (18-28)
Intake Manifold Support	
Sidekick	30-43 (39-58)
Oil Pan Drain Plug	22-30 (30-40)
Oil Filter Mount	15-18 (20-25)
Rocker Arm Shaft Plug	
Sidekick	22-26 (30-35)
Spark Plug	15-22 (20-30)
Timing Belt Tensioner Bolt	18-22 (24-30)
Valve Adjusting Screw Lock Nut	
Samurai & Swift	11-14 (15-19)
	INCH Lbs. (N.m)
Camshaft Bearing Cap Bolt	80-106 (9-12)
Cooling Fan Nut	71-102 (8-12)
Crankshaft Pulley Bolt	80-106 (9-12)
Cylinder Head Venturi Plug	
Sidekick	36-48 (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	80-106 (9-12)
Rocker Cover Bolt	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. 4.

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS TABLE

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	
DOHC	10:1
SOHC	9.5:1
Compression Pressure (1)	
Samurai Standard	199 psi (14 kg/cm ²)
Samurai Service Limit	171 psi (12 kg/cm ²)
Swift DOHC Standard	213 psi (15 kg/cm ²)
Swift DOHC Service Limit	156 psi (11 kg/cm ²)
Swift SOHC Standard	199 psi (14 kg/cm ²)
Swift SOHC Service Limit	156 psi (11 kg/cm ²)
Maximum Variation	14 psi (1 kg/cm ²)
Fuel System	
DOHC	PFI
SOHC	TBI
Horsepower HP @ RPM	
Samurai	66 @ 6000
Swift	
DOHC	100 @ 6500
SOHC	70 @ 6000
Torque Ft. Lbs. @ RPM	
Samurai	76 @ 3500
Swift	
DOHC	83 @ 5000
SOHC	74 @ 3500
1.6L	
Displacement	97.0 Cu. In. (1.6L)
Bore	2.95" (75.0 mm)
Stroke	3.54" (90.0 mm)
Compression Ratio	
8-Valve	8.9:1
16-Valve	9.5:1
Compression Pressure (1)	
Standard	199 psi (14 kg/cm ²)
Limit	171 psi (12 kg/cm ²)

Maximum Variation	14.2 psi (1.0 kg/cm ²)
Fuel System	
8-Valve	TBI
16-Valve	PFI
Horsepower HP @ RPM	
8-Valve	80 @ 5400
16-Valve	95 @ 5600
Torque Ft. Lbs. @ RPM	
8-Valve	94 @ 3000
16-Valve	98 @ 4000

(1) - Checked at 250 RPM or higher

CONNECTING RODS

CONNECTING RODS TABLE

Application	In. (mm)
Pin Bore	
1.3L	
DOHC .....	.7478-.7480 (18.995-19.000)
SOHC	(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 from manufacturer

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS TABLE

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 .....	.0012-.0020	(.030-.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	(51.994-52.000)
"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. 18

PISTONS, PINS & RINGS

PISTONS, PINS & RINGS TABLE

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		
DOHC .....	.7478-.7480	(18.995-19.000)
SOHC		(2)
Piston Fit		Slip
Rod Fit		
DOHC		
Standard .....	.0001-.0006	(.003-.016)
Service Limit .....	.0020	(.05)
SOHC		Interference

Rings	
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	
DOHC	
Standard	.0079-.0236 (.20-.60)
Service Limit	.0669 (1.7)
SOHC	
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. 15
(2) - Information is not available from manufacturer

VALVES & VALVE SPRINGS

VALVES & VALVE SPRINGS TABLE

Application	Specification
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1.3L	
Intake Valves	
Seat Angle	45°
Valve Head Thickness	
Standard	.039" (1.0 mm)
Service Limit	.024" (.6 mm)

Stem Diameter
 DOHC2152-.2157" (5.465-5.480 mm)
 SOHC2742-.2748" (6.965-6.980 mm)
 Valve Tip Maximum Refinish0197" (.5 mm)
 Maximum Head Radial Runout003" (.08 mm)

Exhaust Valves
 Seat Angle 45 °
 Valve Head Thickness

Standard
 DOHC047" (1.2 mm)
 SOHC039" (1.0 mm)
 Service Limit028" (.70 mm)

Stem Diameter
 DOHC2142-.2148" (5.440-5.455 mm)
 SOHC2736-.2742" (6.950-6.964 mm)
 Valve Tip Maximum Refinish0197" (.5 mm)
 Maximum Head Radial Runout003" (.08 mm)

Valve Springs
 Free Length
 DOHC Standard 2.0079" (51.00 mm)
 DOHC Limit 1.9567" (49.7 mm)
 SOHC Standard 1.9409" (49.30 mm)
 DOHC Limit 1.8937" (48.1 mm)
 Out-Of-Square079" (2.0 mm)

Lbs. @ In. (kg @ mm)

Valve Spring Preload
 DOHC Standard ... 60.6-73.8 @ 1.67 (27.5-33.5 @ 42.5)
 DOHC Service Limit 56.6 @ 1.67 (25.7 @ 42.5)
 SOHC Standard ... 54.7-64.3 @ 1.63 (24.8-29.2 @ 41.5)
 SOHC Service Limit 50.2 @ 1.63 (22.8 @ 41.5)

Specification

1.6L

Intake Valves
 Seat Angle 45 °
 Valve Head Thickness
 Standard03-.047" (.8-1.2 mm)
 Service Limit024" (.6 mm)
 Stem Diameter2742-.2748" (6.965-6.980 mm)
 Valve Tip Maximum Refinish0197" (.5 mm)
 Maximum Head Radial Runout003" (.08 mm)

Exhaust Valves
 Seat Angle 45 °
 Valve Head Thickness

Standard03-.047" (.8-1.2 mm)
 Service Limit028" (.70 mm)
 Stem Diameter2736-.2742" (6.950-6.965 mm)
 Valve Tip Maximum Refinish0197" (.5 mm)
 Maximum Head Radial Runout003" (.08 mm)

Valve Springs
 Free Length
 8-Valve Standard 1.9866" (50.46 mm)
 8-Valve Service Limit 1.9094" (48.50 mm)
 16-Valve Standard 1.4500" (36.83 mm)
 16-Valve Service Limit 1.4043" (35.67 mm)
 Out-Of-Square079" (2.00 mm)

Lbs. @ In. (kg @ mm)

Valve Spring Preload
 8-Valve Standard 54.7-64.3 @ 1.63
 (24.8-29.2 @ 41.5)
 8-Valve Service Limit 50.2 @ 1.63 (22.8 @ 41.5)

16-Valve Standard	23.6-27.5 @ 1.24
	(10.7-12.5 @ 31.5)
16-Valve Service Limit	20.5 @ 1.24 (9.3 @ 31.5)

CYLINDER BLOCK

CYLINDER BLOCK TABLE

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. 15

CYLINDER HEAD

CYLINDER HEAD TABLE

Application	Specification
Maximum Warpage	
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 8-Valve .....	.0512-.0591" (1.3-1.5 mm)
1.6L 16-Valve .....	.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.	
DOHC .....	.2165-.2170" (5.500-5.512 mm)
SOHC .....	.2756-.2762" (7.000-7.015 mm)
Valve Guide Installed Height	
1.3L DOHC .....	.91" (23.0 mm)
1.3L SOHC & 1.6L 8-Valve .....	.55" (14.0 mm)
1.6L 16-Valve .....	.45" (11.5 mm)
Valve Stem-To-Guide Oil Clearance	
1.3L DOHC &	

1.6L 16-Valve	.....	.0008-.0019"	(.020-.047 mm)
1.3L SOHC & 1.6L 8-Valve	.....	.0008-.0019"	(.020-.050 mm)
Service Limit	.....	.0035"	(.09 mm)
Exhaust Valve			
Valve Guide I.D.			
DOHC	.....	.2165-.2170"	(5.500-5.512 mm)
SOHC	.....	.2756-.2762"	(7.000-7.015 mm)
Valve Guide Installed Height			
DOHC	.....	.91"	(23.0 mm)
SOHC	.....	.55"	(14.0 mm)
Valve Stem-To-Guide Oil Clearance			
1.3L DOHC & 1.6L 16-Valve	.....	.0018-.0028"	(.045-.072 mm)
Service Limit	.....	.0035"	(.09 mm)
1.3L SOHC & 1.6L 8-Valve	.....	.0014-.0026"	(.035-.065 mm)

CAMSHAFT

CAMSHAFT TABLE

Application		In.	(mm)
Bore Diameter			
DOHC	.....	1.1024-1.1032	(28.000-28.021)
SOHC (1)			
8-Valve			
No. 1	.....	1.7402-1.7408	(44.200-44.216)
No. 2	.....	1.7480-1.7487	(44.400-44.416)
No. 3	.....	1.7560-1.7565	(44.600-44.616)
No. 4	.....	1.7638-1.7644	(44.800-44.816)
No. 5	.....	1.7717-1.7723	(45.000-45.016)
16-Valve	.....	1.1024-1.1032	(28.000-28.021)
Journal Diameter			
DOHC	.....	1.1007-1.1016	(27.959-27.980)
SOHC (1)			
8-Valve			
No. 1	.....	1.7372-1.7382	(44.125-44.150)
No. 2	.....	1.7451-1.7461	(44.325-44.350)
No. 3	.....	1.7530-1.7539	(44.525-44.550)
No. 4	.....	1.7608-1.7618	(44.725-44.750)
No. 5	.....	1.7687-1.7697	(44.925-44.950)
16-Valve	.....	1.1000-1.1008	(27.939-27.960)
Journal Runout	.....	.0039	(.10)
Lobe Height			
Samurai & Sidekick 8-Valve			
Standard	.....	1.4764	(37.500)
Service Limit	.....	1.4724	(37.400)
Sidekick 16-Valve			
Exhaust Standard	.....	1.4328-1.4335	(36.394-36.410)
Exhaust Service Limit	.....	1.4289	(36.294)
Intake Standard	.....	1.4551-1.4557	(36.960-36.976)
Intake Service Limit	.....	1.4512	(36.860)
Swift			
DOHC			
Exhaust Standard	.....	1.5917-1.5980	(40.429-40.589)
Exhaust Service Limit	.....	1.5878	(40.329)
Intake Standard	.....	1.5920-1.5983	(40.436-40.596)
Intake Service Limit	.....	1.5880	(40.336)
SOHC	.....	1.5014	(38.136)
Service Limit	.....	1.4975	(38.036)

Oil Clearance			
DOHC Standard	.....	.0008-.0024	(.020-.062)
DOHC Service Limit	.....	.0047	(.12)
SOHC			
8-Valve Standard	.....	.0020-.0036	(.050-.091)
8-Valve Service Limit	.....	.0059	(.15)
16-Valve Standard	.....	.0016-.0032	(.040-.082)
16-Valve Service Limit	.....	.0047	(.12)

(1) - Journals are numbered from front of engine

VALVE LIFTERS

VALVE LIFTERS TABLE

Application		In.	(mm)
1.3L DOHC			
Cylinder Head			
Bore Diameter	.....	1.2205-1.2215	(31.000-31.025)
Lifter Diameter	.....	1.2189-1.2195	(30.959-30.975)
Oil Clearance Standard	.....	.0010-.0026	(.025-.066)
Oil Clearance Service Limit	.....	.0059	(.15)

ROCKER ARM & ROCKER ARM SHAFT

ROCKER ARM & ROCKER ARM SHAFT TABLE

Application		In.	(mm)
Rocker Arm Inside Diameter	...	.6293-.6301	(15.985-16.005)
Rocker Arm Shaft			
Outside Diameter	.....	.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 DOHC	.....	.005	(.12)
1.3L SOHC & 1.6L 8-Valve	.....	.005	(.12)
1.6L 16-Valve	.....	.008	(.20)