ABC123	Entire Article 2000 Chevrolet Camaro

ARTICLE BEGINNING

2000-01 ENGINES
General Motors 5.7L V8

Chevrolet; Camaro
Pontiac; Firebird

*** 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

VEHICLE IDENTIFICATION NUMBER (VIN)

Engine can be identified by eighth character of Vehicle Identification Number (VIN) which is stamped on a metal pad located near lower left corner of windshield. A "G" in eighth character of VIN indicates 5.7L V-8 (LS1). A "Y" in tenth character of VIN indicates 2000 model year. A "1" in tenth character indicates 2001 model year. Engine can also be identified by a 3-character engine code (RPO code). This code may be stamped on engine, at flange where engine and transmission meet.

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

NOTE: Engine is equipped with non-adjustable hydraulic valve lifters.

TROUBLE SHOOTING

NOTE: For trouble shooting engine noise and common mechanical faults, see appropriate table in TROUBLE SHOOTING in GENERAL INFORMATION.

REMOVAL & INSTALLATION

WARNING: To avoid injury from accidental air bag deployment, read and carefully follow all SERVICE PRECAUTIONS and DISABLING & ACTIVATING AIR BAG SYSTEM procedures in appropriate AIR BAG RESTRAINT SYSTEMS article in ACCESSORIES & EQUIPMENT.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See COMPUTER RELEARN PROCEDURES article in GENERAL INFORMATION

before disconnecting battery.

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

FUEL PRESSURE RELEASE

Disconnect negative battery cable. Loosen fuel tank filler cap. Connect Fuel Gauge (J-34730-1A) to fuel pressure connection (wrap shop towel around fitting to avoid spillage). Install bleed hose. Turn gauge valve, and drain fuel into an appropriate container.

COOLING SYSTEM BLEEDING

1) Fill radiator to base of fill neck. Fill coolant recovery reservoir to full HOT mark. Install coolant recovery reservoir cap. With radiator pressure cap removed, run engine until normal operating temperature is reached (radiator inlet hose hot).
2) With engine idling, add coolant to radiator until coolant level reaches base of fill neck. Install pressure cap.

ENGINE

Removal
1) Relieve fuel system pressure. See FUEL PRESSURE RELEASE. Discharge A/C system using approved refrigerant recovery/recycling equipment. Disconnect negative and positive battery cables. Raise and support vehicle.
2) Remove front wheels. Drain coolant and engine oil. Remove fan and fan shroud. Remove radiator. Remove both oxygen sensors from oxidation converters. Remove right side oxidation converter. Remove front fascia lower deflectors.
3) Remove stabilizer bar bolts. Disconnect A/C hoses from condenser and compressor. Plug openings. Disconnect electrical ground straps from left side of frame rail.
4) Disconnect shift linkage from transmission. Mark drive shaft for reassembly reference. Remove drive shaft. Separate torque arm from transmission. Separate intermediate steering shaft from rack and pinion assembly. Disconnect electrical connectors from wheel speed sensor assemblies. Lower vehicle.
5) Disconnect fuel lines from fuel rail and fuel tank. Disconnect heater hoses from water pump. Remove accelerator control/cruise control servo cable adjuster assembly (if equipped). Disconnect cruise and accelerator control cables from throttle body assembly.
6) Disconnect brake booster vacuum hose. Remove brake lines from brake pressure modulator valve. Disconnect forward lighting harness from engine harness. Disconnect PCM connectors from PCM. Remove engine wire harness through front of dash. Place harness on top of engine. Remove positive lead from generator. Remove positive lead from stud on fuse block. Remove negative lead from stud on wheelwell.
7) Raise and support vehicle. Remove right and left lower

shock bolts from lower control arms. Remove nut from upper control arm ball stud. Remove upper control arm ball stud from steering knuckle. Using Engine Support Table (J-39580) and Table Top (J-39580-500), position table under front crossmember and transmission. Remove front crossmember bolts. Remove transmission support bolts. Raise vehicle from front crossmember and transmission. Secure struts to front crossmember.

8) Remove starter. Remove left and right side flywheel covers. Remove flywheel-to-torque converter bolts (A/T), and transmission. Remove clutch housing and clutch (M/T). Remove power steering lines from power steering pump. Remove A/C compressor bolts and compressor. Remove engine mount through-bolts. Remove engine from crossmember.

Installation

To install, reverse removal procedure. Evacuate and recharge A/C system. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING . Bleed brake system. See BLEEDING BRAKE SYSTEM in appropriate DISC & DRUM article in BRAKES. Bleed power steering system. See HYDRAULIC SYSTEM BLEEDING in POWER RACK & PINION article in STEERING.

INTAKE MANIFOLD

NOTE: Ensure injector connectors are marked for installation reference prior to removal. Performance and emissions will be affected if injector connectors are not positioned correctly.

Removal

1) Disconnect negative battery cable, and drain cooling system. Relieve fuel pressure. See FUEL PRESSURE RELEASE. Disconnect fuel lines from fuel rail. Disconnect IAT and MAF sensor connectors. Remove air intake duct assembly. Disconnect TP sensor and IAC valve connectors at throttle body. Remove drive belt. Disconnect EGR valve connector and remove EGR valve pipe. Disconnect cruise control and accelerator cables from throttle lever. Remove the accelerator control cable and cruise control servo bracket.

2) Disconnect fuel injector connectors. Disconnect MAP sensor connector and vacuum hose. Disconnect knock sensor connector and any remaining electrical connectors. Remove knock sensor jumper wire from PCV hose. Remove PCV valve pipe. Disconnect fresh air hose from throttle body and from coil assembly. Remove coolant air bleed hose from throttle body. Remove heater outlet hose from throttle body. Remove EVAP canister purge tube. Remove canister purge valve and bracket. Remove intake manifold bolts. Remove intake manifold.

Installation

To install, reverse removal procedure. Tighten bolts to specification. See TORQUE SPECIFICATIONS. See Fig. 1. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

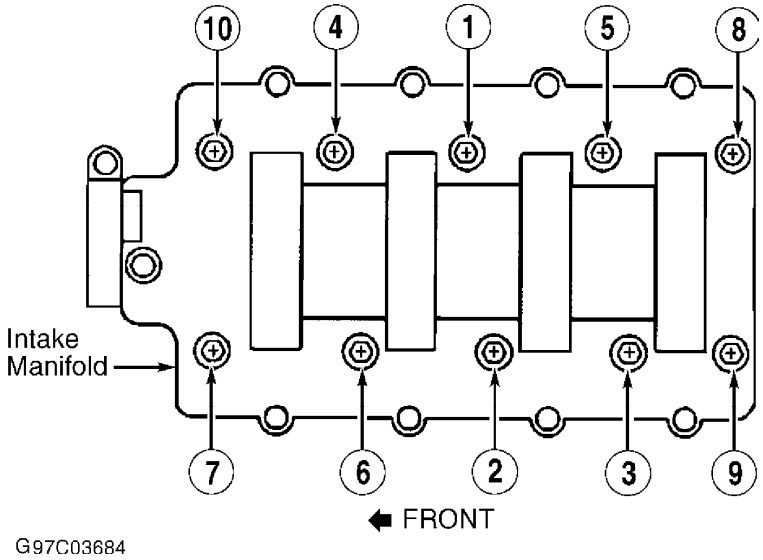

Fig. 1: Intake Manifold Bolt Tightening Sequence
Courtesy of General Motors Corp.

EXHAUST MANIFOLD

Removal (Left)

Disconnect negative battery cable. Relieve fuel pressure. See FUEL PRESSURE RELEASE. Disconnect fuel lines from fuel rail and frame. Remove fuel hoses. Remove PCV hose from valve cover. Remove spark plug wires and spark plugs. Loosen air injection hose clamps and remove hose. Remove air injection pipe (with check valve) from exhaust manifold. Remove coolant sensor, and exhaust manifold bolts. Raise and support vehicle. Remove oxygen sensor. Remove manifold-to-exhaust pipe nuts. Remove catalytic converter nuts. Remove exhaust manifold and gasket.

Removal (Right)

Disconnect negative battery cable. Remove oil dipstick tube. Raise and support vehicle. Remove manifold-to-exhaust pipe nuts. Lower vehicle. Loosen air injection hose clamps, and remove hose. Remove air injection pipe (with check valve) from exhaust manifold. Disconnect ignition coil main harness connector. Remove spark plug wires and spark plugs. Remove valve cover. Disconnect EGR valve connector. Remove EGR valve pipe. Remove exhaust manifold bolts, exhaust manifold and gasket.

Installation

1) To install exhaust manifold(s), reverse removal procedure. Apply sealant to bolt threads.

NOTE: DO NOT apply sealant to the first 3 threads of the exhaust manifold bolts. Apply a 1/4 inch wide band of Threadlock (12345493) or equivalent to bolt threads.

2) Tighten nuts and bolts to specification. See TORQUE SPECIFICATIONS.

VAPOR VENT PIPE

Removal & Installation

Remove intake manifold. See INTAKE MANIFOLD. Disconnect knock sensor wire harness retaining clips, and position harness aside. Remove vapor vent pipe bolts, vent pipe and gaskets. To install, reverse removal procedure.

VALLEY COVER

Removal & Installation

Remove intake manifold. See INTAKE MANIFOLD. Remove vapor vent pipe. See VAPOR VENT PIPE. Unplug knock sensor connectors, and position knock sensor harness aside. Remove engine valley cover bolts and valley cover. To install, reverse removal procedure.

CYLINDER HEADS

CAUTION: Ensure engine is completely cold prior to removing cylinder head.

Removal (Right)

1) Disconnect negative battery cable. Remove intake manifold, exhaust manifold and valve cover. See the following:

* INTAKE MANIFOLD
* EXHAUST MANIFOLD
* VALVE COVERS

2) Remove rocker arms, and pushrods. See ROCKER ARMS & PUSH RODS. Remove vapor vent pipe. See VAPOR VENT PIPE. Remove cylinder head bolts and cylinder head.

Removal (Left)

1) Disconnect negative battery cable. Remove intake manifold, exhaust manifold and valve cover. See the following:

* INTAKE MANIFOLD
* EXHAUST MANIFOLD
* VALVE COVERS

2) Remove rocker arms, and pushrods. See ROCKER ARMS & PUSH RODS. Remove vapor vent pipe. See VAPOR VENT PIPE. Remove ground wires and bolts from rear of head. Remove power steering pump pulley using Pump Pulley Remover (J-25034-B). Remove power steering pump mounting bolts.

3) Remove power steering pump assembly, and set aside. Remove power steering pump mounting bracket bolts and bracket. Remove cylinder head bolts and cylinder head.

Inspection

See CYLINDER HEAD under OVERHAUL.

Installation

1) Clean cylinder head bolt holes and threads. DO NOT coat composition-type head gaskets with sealer. Install head gasket onto cylinder block. Install cylinder head.

CAUTION: DO NOT reuse M11 cylinder head bolts. Install NEW M11 cylinder head bolts during reassembly. See Fig. 2.

2) Install NEW M11 cylinder head bolts. Apply a 1/4 inch band of Threadlock (12345493) to threads of M8 cylinder head bolts. Tighten M11 bolts 1-10 to 22 ft. lbs. (30 N.m) in sequence. Tighten M11 bolts 1-10 an additional 90 degrees in sequence. Tighten M11 bolts 1-8 an additional 90 degrees in sequence, and M11 bolts 9 and 10 an additional 50 degrees. Tighten M8 bolts 11-15 in sequence to 22 ft. lbs. (30 N.m). See Fig. 2. To complete installation, reverse removal procedure. See TORQUE SPECIFICATIONS. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

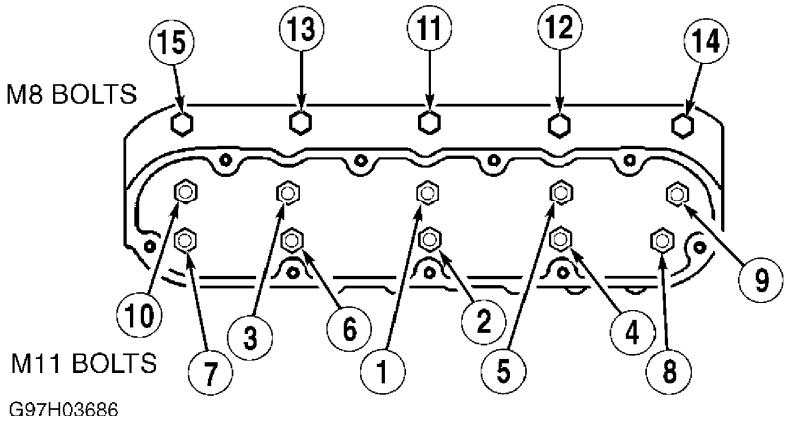

Fig. 2: Cylinder Head Bolt Tightening Sequence
Courtesy of General Motors Corp.

CRANKSHAFT FRONT OIL SEAL

NOTE: Front oil seal can be replaced without removing front cover.

Removal

1) Disconnect negative battery cable. Release accessory drive belt tensioner. Remove drive belt. Release A/C belt tensioner, and remove belt. Raise and support vehicle. Remove starter. Remove right flywheel cover bolt and cover.

2) Remove transmission cooler lines from radiator (A/T). If more room is needed, remove power steering cooler from plastic support (if equipped). Remove crankshaft balancer. Carefully pry seal from timing cover.

Installation

Install front oil seal into timing cover using Front Cover Seal Installer (J-41478). See Fig. 3. To complete installation, reverse removal procedure.

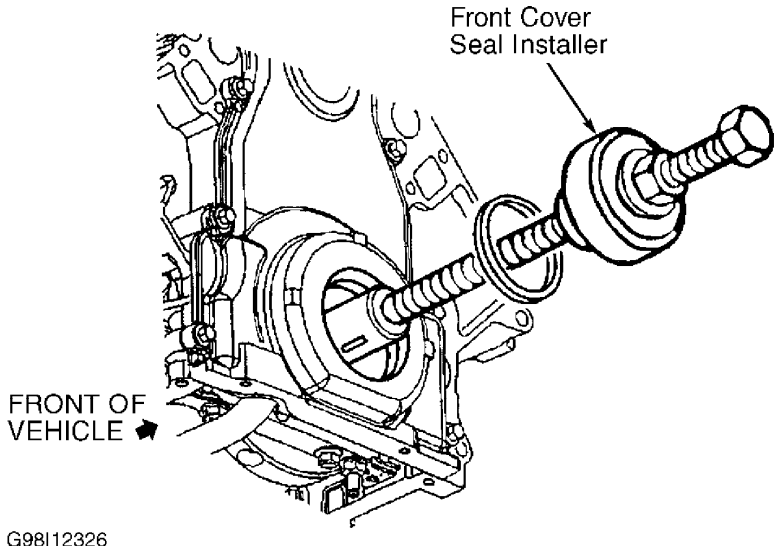

Fig. 3: Installing Timing Cover Oil Seal
Courtesy of General Motors Corp.

FRONT COVER

Removal

1) Disconnect negative battery cable. Raise and support vehicle. Drain coolant. Disconnect electric cooling fans, and remove wiring from fan shroud. Drain engine oil. Lower vehicle. Disconnect IAT and MAF sensor connectors. Remove air intake duct assembly. Remove drive belts.

2) Disconnect radiator hoses from engine. Remove fan shroud. Remove accessory drive belt tensioner. Remove overflow hose from radiator. Remove throttle body heater hose from radiator. Remove drive belt idler pulley. Remove water pump. See WATER PUMP. Raise and support vehicle. Remove starter. Remove right flywheel cover bolt and flywheel cover. Remove crankshaft balancer. Loosen oil pan bolts. Remove front cover bolts, front cover and gasket.

Installation

1) Apply a 1/4 inch bead of Sealer (12378190) to corners where oil pan meets block. Install front cover, leaving bolts finger tight.

NOTE: Align tapered legs of Front/Rear Cover Alignment (J-41476) with machined alignment surfaces on front cover. See Fig. 4.

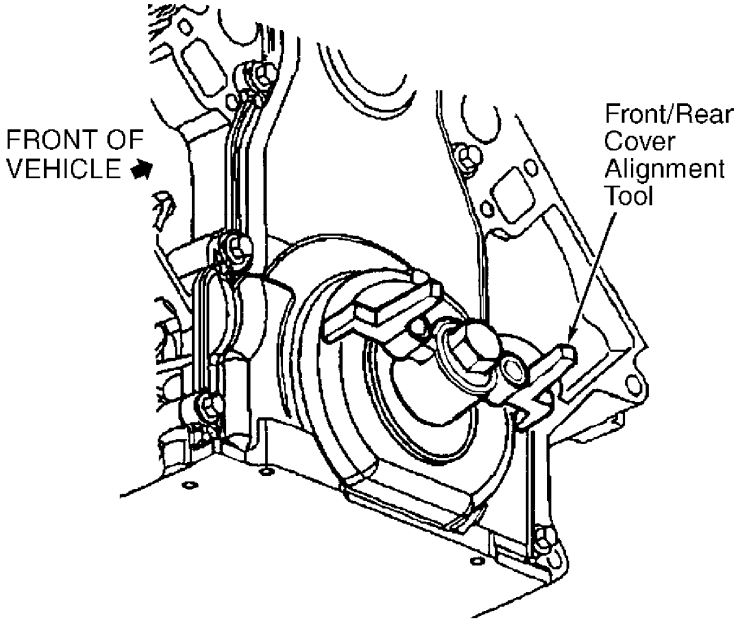

Fig. 4: Installing Front Cover & Alignment Tool
Courtesy of General Motors Corp.

2) Install Front/Rear Cover Alignment (J-41476) onto front of crankshaft. Install and hand tighten crankshaft balancer bolt. Tighten front cover bolts. Tighten oil pan-to-front cover and oil pan-to-block bolts. Tighten oil pan-to-rear cover bolts. See TORQUE SPECIFICATIONS. Remove tool from front of crankshaft. Install NEW front seal into cover using Front Crankshaft Oil Seal Installer (J-41478). To complete installation, reverse removal procedure. Fill crankcase. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

CRANKSHAFT REAR OIL SEAL

NOTE: Rear oil seal can be replaced without removing rear oil seal cover.

Removal

Remove transmission. For A/T, see appropriate TRANSMISSION REMOVAL & INSTALLATION article in TRANSMISSION SERVICING. For M/T, see appropriate clutch article in CLUTCHES. Note position of flywheel before removal. Mark or scribe end of flywheel for proper reinstallation. Remove flywheel. Remove rear crankshaft oil seal and discard.

Installation

Install rear seal using Rear Seal Installer (J-41479). See Fig. 5. Reinstall flywheel and transmission. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

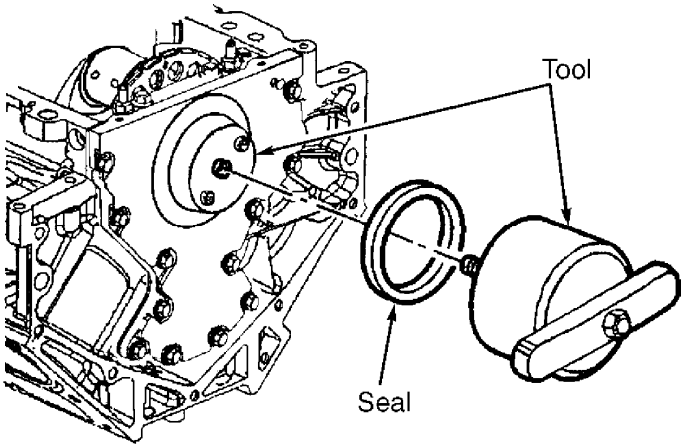

Fig. 5: Installing Crankshaft Rear Oil Seal.
Courtesy of General Motors Corp.

REAR COVER

Removal

Remove transmission and flywheel. See CRANKSHAFT REAR OIL SEAL. Remove rear cover-to-block bolts. Loosen oil pan bolts. Remove rear cover and gasket. Remove rear seal from cover, and discard.

Installation

1) Apply a 1/4 inch bead of Sealer (12378190) to corners where oil pan meets block. Install rear cover and NEW gasket, leaving bolts finger tight. Rotate the crankshaft until the 2 opposing flywheel bolts are parallel to oil pan surface. See Fig. 6.

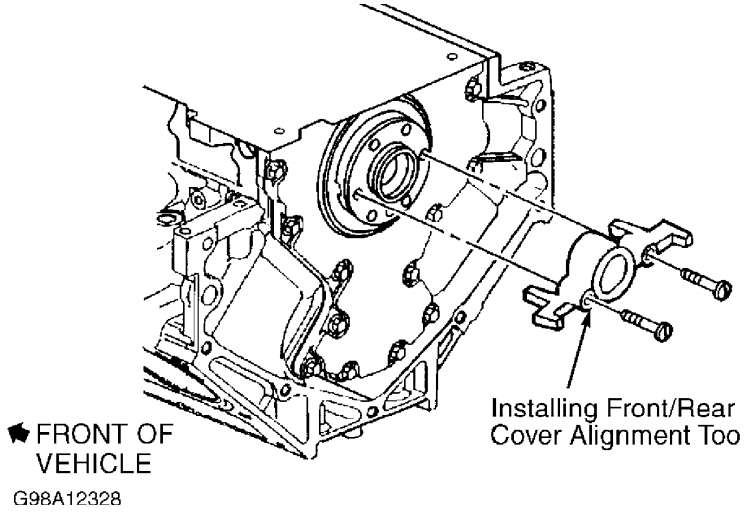

Fig. 6: Installing Front/Rear Cover Alignment Tool
Courtesy of General Motors Corp.

2) Install Front/Rear Cover Alignment (J-41476) onto rear of crankshaft. Tighten tool retaining bolts until snug. Tighten rear cover-to-block bolts to 18 ft. lbs. (24 N.m). Tighten oil pan-to-rear

cover bolts to 106 INCH lbs. (12 N.m). Tighten oil pan-to-front cover and oil pan-to-block bolts to 18 ft. lbs. (24 N.m). Remove front/rear cover alignment tool from crankshaft. Install NEW rear seal using Rear Oil Seal Installer (J-41479). Reinstall flywheel and transmission. Tighten bolts to specification. See TORQUE SPECIFICATIONS.

TIMING CHAIN

Removal & Installation

1) Disconnect negative battery cable. Remove crankshaft balancer and front cover. See FRONT COVER. Remove oil pan. See OIL PAN. Remove oil pump. Rotate crankshaft until camshaft sprocket and crankshaft sprocket timing marks line up with shaft centers. See Fig. 7.

2) Remove timing chain and camshaft sprocket. If replacing crankshaft sprocket, use Sprocket Remover (J-41558), and Sprocket Installer (J-41665). Ensure timing marks on crankshaft sprocket and camshaft sprocket are as close together as possible, and lined up with shaft centers.

3) To complete installation, reverse removal procedure. Fill crankcase. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

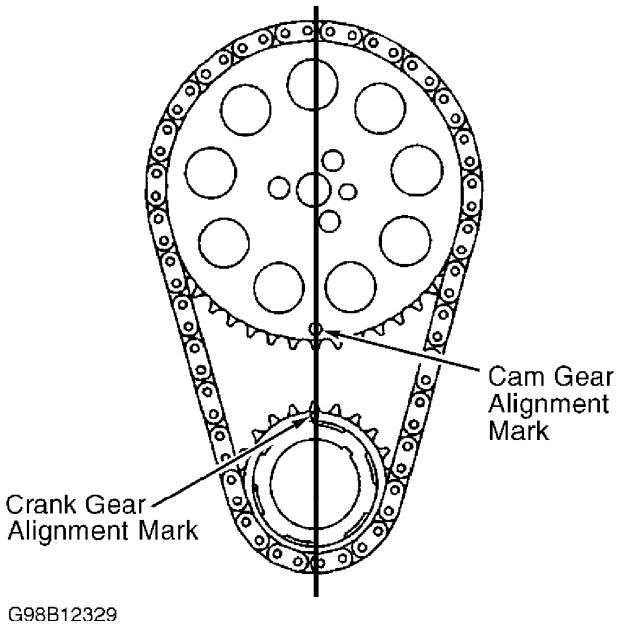

Fig. 7: Identifying Timing Chain Alignment Marks
Courtesy of General Motors Corp.

VALVE COVERS

Removal (Left)

1) Disconnect negative battery cable. Remove left side fuel rail cover (if equipped). Relieve fuel pressure. See FUEL PRESSURE RELEASE. Disconnect fuel lines from fuel rail. Disconnect generator and coolant temperature sensor connectors. Disconnect brake booster hose from brake booster. Disconnect PCV hose from valve cover. Remove spark plug wires at coils. Disconnect ignition coil main connector. Disconnect any interfering air injection

hoses.
2) Remove valve cover bolts, valve cover and gasket.

Removal (Right)
Disconnect negative battery cable. Remove right side fuel rail cover (if equipped). Remove crankcase vent hose. Remove air injection pipe (with check valve) from exhaust manifold (if equipped). Disconnect ignition coil harness main connector. Remove spark plug wires from ignition coils. Remove valve cover bolts, valve cover and gasket.

Installation
To install, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

ROCKER ARMS & PUSH RODS

Removal
Remove valve covers. See VALVE COVERS. Mark components for installation in original locations. Remove rocker arm bolts, rocker arms, rocker arm pivot support and push rods.

Installation
1) Lubricate rocker arms and pushrods with clean engine oil. Lubricate flange of rocker arm bolt and any contacting surfaces. Install rocker arm pivot support. Install pushrods, making sure they seat properly into lifter sockets. Install rocker arms and bolts. DO NOT fully tighten bolts at this time.

CAUTION: Rocker arm bolts must be tightened to specification with appropriate piston at TDC of compression stroke to avoid damage to valve train.

2) Rotate crankshaft so No. 1 cylinder is at TDC of compression stroke. Tighten rocker arms in order listed. See ROCKER ARM TIGHTENING SEQUENCE table. Tighten to specification. See TORQUE SPECIFICATIONS.
3) Rotate crankshaft so No. 6 cylinder is at TDC of compression stroke. Tighten appropriate rocker arms. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

ROCKER ARM TIGHTENING SEQUENCE

Application	Adjust Cylinders No.
Cylinder No. 1 (1)	
Exhaust	1, 2, 7 & 8
Intake	1, 3, 4 & 5
Cylinder No. 6 (1)	
Exhaust	3, 4, 5 & 6
Intake	2, 6, 7 & 8

(1) - Piston at TDC of compression stroke.

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CAMSHAFT

CAUTION: Rotate crankshaft in direction of normal operation only.

NOTE: It is necessary to remove the cylinder heads on this engine for lifter removal.

Removal

1) Remove valve covers and rocker arms. DO NOT remove push rods. Keep components in order for installation reference. See VALVE COVERS. See ROCKER ARMS & PUSH RODS. Measure lobe lift of camshaft with push rods installed.

2) To measure lobe lift, attach dial indicator to cylinder head. Position indicator pointer onto tip of a push rod. Rotate crankshaft until push rod is at lowest point. Zero indicator. Rotate crankshaft until push rod is at highest point. Record reading, and repeat procedure for remaining lobes.

3) Remove cylinder heads. See CYLINDER HEADS. Remove oil pan. See OIL PAN. Remove front cover, oil pump and timing chain. See TIMING CHAIN. Remove camshaft retaining plate. Remove lifter guide bolts. Remove lifter guide and valve lifters. Using three M8 5/16" x 4" bolts as a handle, carefully pull camshaft from engine.

Inspection

Check camshaft for scratches, pits and loose fit in bearings. Check camshaft journal diameter and lobe lift (recorded earlier). Replace camshaft if damaged, or not to specification. See CAMSHAFT SPECIFICATIONS table under ENGINE SPECIFICATIONS. If replacing camshaft, replace lifters.

Installation

Apply Camshaft Prelube (1052365) to camshaft lobes. Apply engine oil to bearings and camshaft bearing journals. Change engine oil and filter. To complete installation, reverse removal procedure. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING.

WATER PUMP

Removal

1) Disconnect negative battery cable. Raise and support vehicle. Disconnect electric cooling fans, and remove wiring from fan shroud. Drain coolant. Lower vehicle. Disconnect IAT and MAF sensor connectors. Remove air intake duct. Disconnect radiator hoses at thermostat housing and water pump. Remove air cleaner assembly and upper radiator support. Remove upper hose from radiator.

2) Remove cooling fans. Remove accessory drive belts. Remove drive belt tensioner pulley from water pump. Remove vent hose from radiator. Remove water pump pulley. Remove water pump bolts, water pump and gasket.

Installation
To install, reverse removal procedure. Use NEW gasket. Fill and bleed cooling system. See COOLING SYSTEM BLEEDING. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

OIL PAN

CAUTION: Alignment of oil pan is critical. Oil pan has mounting points for transmission bellhousing. It is important that oil pan and rear of block/rear seal cover are flush, and that rear of oil pan does not protrude beyond engine block.

Removal
1) Disconnect negative battery cable. Support engine using the following equipment:

* Engine Support Adapter (J-41044)
* Engine Support Adapter Kit (J-42451)
* Engine Support Adapter Leg (J-36462-A)
* Universal Support Fixture (J-28467-B)

Raise and support vehicle. Drain crankcase. Remove oil filter. Remove all engine mount-to-cradle bolts. Remove all lower shock bolts. Remove intermediate steering shaft bolt.
2) Support the engine cradle using Engine Support Table (J-39580) and Table Top (J-39580-500), or equivalent. Disconnect oil level sensor connector. Remove oil level sensor. Remove starter. Remove left and right flywheel covers. Loosen 6 cradle bolts. Remove oil pan bolts and oil pan. Lower cradle to obtain clearance for oil pan removal. If additional clearance is needed, it may be necessary to raise engine.

Installation
Install Front/Rear Cover Alignment (J-41480) to check for proper alignment of front and rear covers. If it is necessary to realign covers, see FRONT COVER and
REAR COVER for alignment procedures. Apply a 1/4 inch bead of Sealant (12378190) at the point where front and rear covers meet block. Install oil pan with NEW oil pan gasket. Tighten oil pan-to-front cover and oil pan-to-block bolts to 18 ft. lbs. (25 N.m). Tighten oil pan-to-rear cover bolts to 106 INCH lbs. (12 N.m). To complete installation, reverse removal procedure. Fill crankcase. Align front suspension as necessary. See appropriate SPECIFICATIONS & PROCEDURES article in WHEEL ALIGNMENT. Tighten bolts and nuts to specification. See TORQUE SPECIFICATIONS.

OVERHAUL

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

CYLINDER HEAD

Valve Guides

Check and service guides before servicing valve and seat. Guide replacement information not available at time of publication. If valve stem clearance is .0037" (.093 mm) or more, valve and/or guide must be repaired or replaced.

Valve Seat

Valve seat replacement information not available at time of publication. Valve seat runout should not exceed .0021" (.05 mm). Follow instructions of tool manufacturer for servicing valve seats. If seats are serviced, service or replace valves.

Valves

Check valves before servicing. Replace valves as necessary. DO NOT reface intake valves. See VALVES & VALVE SPRINGS SPECIFICATIONS table under ENGINE SPECIFICATIONS. Exhaust valve face may be machined if margin is .050" (1.25 mm) or more prior to grinding.

CYLINDER BLOCK ASSEMBLY

Piston & Rod Assembly

1) Before disassembling, mark rod and rod cap with matching cylinder number. Mark piston-to-rod relationship for reassembly reference. Notch or dot on piston top should face front of engine. Piston pin is a press fit.

2) When measuring, ensure pin bore and piston pin are free of varnish and scuffing. If clearance between piston and pin exceeds specification, replace piston and pin as an assembly. See PISTONS, PINS & RINGS SPECIFICATIONS table under ENGINE SPECIFICATIONS.

3) The powdered metal rod is not repairable. Inspect rod bolt hole threads and mating surfaces, and rod bore for out-of-round condition. Check for rod twist, nicks, gouging and any other damage. If any damage exists, replace rod.

Fitting Pistons

Ensure notch or dot on piston top faces front of engine. Check pistons for wear and damage. Replace pistons as necessary. Check piston-to-cylinder bore clearance. A .010" (.25 mm) oversize piston is available.

Piston Rings

Install marked side of ring toward top of piston. Ensure end gaps are evenly spaced on piston. See Fig. 8.

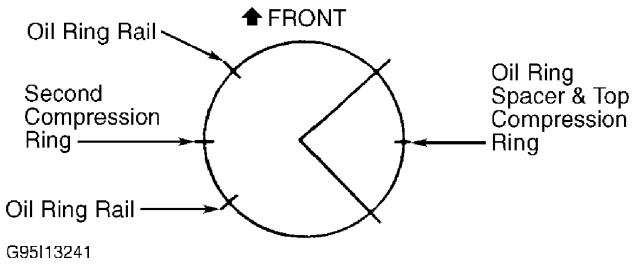

Fig. 8: Positioning Piston Ring End Gaps. Courtesy of General Motors Corp.

Rod Bearings

Ensure bearing cap bolt holes and mating surfaces are clean and dry. Use connecting rod stud protectors on rod cap bolts. Install inserts into connecting rod and cap. Lubricate bearings and crank pin. Install bearing cap. Tighten rod bearing cap bolts to specification. See TORQUE SPECIFICATIONS.

Crankshaft & Main Bearings

NOTE: Prior to main bearing cap removal, note installed direction and location for installation reference.

1) Remove bearing cap M8 side bolts prior to cap removal. Remove bearing cap M10 bolts and studs. Install Crankshaft Bearing Cap Remover (J-41818) to bearing cap. Tighten bearing cap remover bolts to 100 INCH lbs. (11 N.m). Install Slide Hammer (J-6125-1B) onto bearing cap remover to remove cap. Check bearing clearance using Plastigage. Tighten main bearing cap bolts to specification in sequence. See Fig. 9. See TORQUE SPECIFICATIONS. If bearing clearance is greater than specification, replace with undersize bearings.

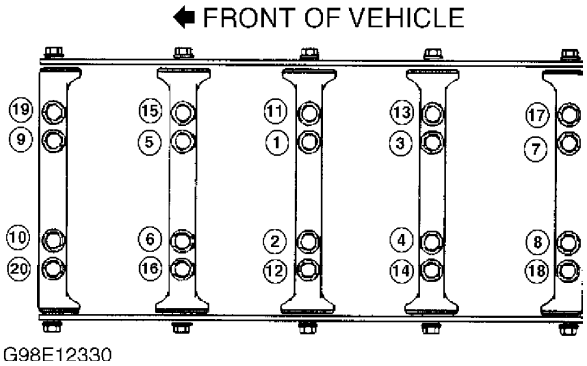

Fig. 9: Main Cap Bolt Tightening Sequence. Courtesy of General Motors Corp.

2) Retighten main bearing caps to specification. See TORQUE SPECIFICATIONS. During final main bearing cap installation, install NEW M8 main cap side bolts.

Thrust Bearing

Check crankshaft end play by forcing crankshaft to extreme forward position. Measure end play at front of rear main bearing using a feeler gauge. If end play is not within specification, replace thrust bearing and/or crankshaft. See CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS SPECIFICATIONS table under ENGINE SPECIFICATIONS.

Cylinder Block

Check cylinder bore for wear, taper, out-of-round and piston fit. See CYLINDER BLOCK SPECIFICATIONS table under ENGINE SPECIFICATIONS. Cylinders with less than .010" (.25 mm) wear or taper can be honed. A .010" oversize piston and ring set is available for service. Cylinders with more than .010" (.25 mm) wear or taper are not

serviceable. DO NOT bore engine.

ENGINE OILING

ENGINE LUBRICATION SYSTEM

A gerotor-type oil pump provides pressurized lubrication through full-flow oil filter. Oil pump is bolted to front of cylinder block, behind front cover, and is driven directly by crankshaft. See Fig. 10.

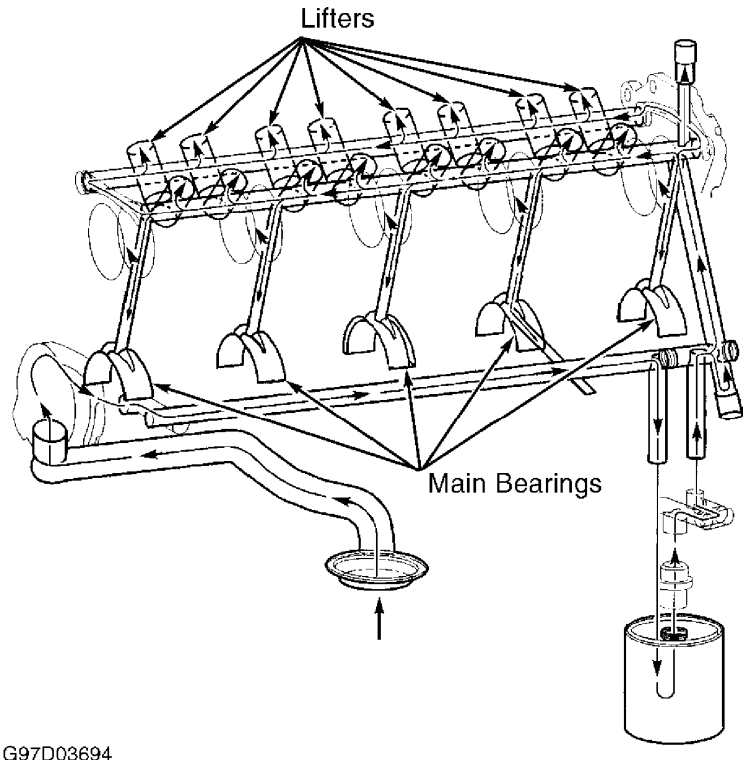

Fig. 10: Identifying Lubrication System
Courtesy of General Motors Corp.

Crankcase Capacity

Crankcase capacity is 5.0 qts. (4.7L) without oil filter change, or 5.5 qts. (5.2L) with oil filter change.

Oil Pressure

With engine at normal operating temperature, oil pressure should be at least 6 psi (0.4 kg/cmý) at 1000 RPM, 18 psi (1.3 kg/cmý) at 2000 RPM and 24 psi (1.7 kg/cmý) at 4000 RPM.

OIL PUMP

Removal & Disassembly

Remove front cover. See FRONT COVER. Remove oil pan. See OIL PAN. Remove oil pump, pump pick-up screen and deflector. Remove oil pump cover bolts and cover. Mark gear teeth for reassembly reference. Remove gears. Remove pressure regulator plug, spring and

valve from cover. Remove pick-up screen and pipe.

Inspection

Check oil pump housing and cover for cracks, wear, scoring and casting imperfections. Check oil pump housing-to-engine block oil gallery surface for scratches or gouging. If excess wear or damage is found, replace oil pump as an assembly. Oil pump clearance specifications not available at time of publication. Inspect pump screen for debris or restrictions. Inspect pump screen for broken or loose wire mesh. Oil pump pipe and pick-up screen are to be serviced as an assembly. DO NOT attempt to repair pipe and pick-up screen assembly.

Reassembly & Installation

Clean parts in solvent. Dry parts using compressed air. To assemble, reverse disassembly procedure. To install, reverse removal procedure. Tighten oil pump cover bolts to specification. See TORQUE SPECIFICATIONS.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Air Injection Pipe-To-Exhaust Manifold Bolts	15 (20)
Camshaft Retainer Bolt	18 (24)
Camshaft Sensor Bolt	18 (24)
Camshaft Sprocket Bolt	26 (35)
Connecting Rod Cap Bolts	
Step 1	15 (20)
Step 2	Additional 60 Degrees
Crankshaft Balancer Bolt	
With Original Bolt To Seat Balancer	240 (325)
Step 1 With New Bolt	37 (50)
Step 2 With New Bolt	Additional 140 Degrees
Crankshaft Oil Deflector Nuts	18 (24)
Crankshaft Oil Seal Cover To Block Bolt (Front & Rear)	18 (24)
Crankshaft Position Sensor Bolts	18 (24)
Cylinder Head Bolts	(1)
Drive Belt Idler Pulley Bolt	37 (50)
Drive Belt Tensioner Bolt	37 (50)
Engine Mount Through-Bolts	70 (95)
Exhaust Manifold Bolts	
Step 1	11 (15)
Step 2	18 (24)
Flexplate/Flywheel-To-Crankshaft Bolts (2)	
Step 1	15 (20)
Step 2	37 (50)
Step 3	74 (100)
Flexplate/Flywheel Housing Bolt	70 (95)
Knock Sensors	15 (20)


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Main Bearing Cap Bolts/Studs (3)
  Inner Bolts - M10 (Tighten First)
    Step 1 .................................................. 15 (20)
    Step 2 ...................................  Additional 80 Degrees
  Outer Studs - M10 (Tighten Second)
    Step 1 .................................................. 15 (20)
    Step 2 ...................................  Additional 53 Degrees
  Side Bolts - M8 (Tighten Last) (4) ........................ 18 (24)
Oil Level Sensor ............................................ 9 (12)
Oil Pan
  M6 Bolts .................................................... (5)
  M8 Bolts .................................................. 18 (24)
Oil Pump Screen Nuts ........................................ 18 (24)
Oil Pump Screen-To-Oil Pump Bolt ............................... (5)
Oil Pump-To-Block Bolt ...................................... 18 (24)
Oxygen Sensor ............................................... 31 (42)
Rocker Arm Bolts ............................................ 22 (30)
Spark Plugs ................................................. 12 (16)
Starter Bolts ............................................... 37 (50)
Transmission-To-Driveline Support
 Assembly Bolts ............................................. 37 (50)
Valley Cover Bolts .......................................... 18 (24)
Water Pump Bolts
  Step 1 .................................................... 11 (15)
  Step 2 .................................................... 22 (30)
Water Pump Cover Bolts ...................................... 11 (15)

                                                   INCH Lbs. (N.m)

Fuel Rail Bolts ............................................. 89 (10)
Ignition Coil Bolts ........................................ 106 (12)
Intake Manifold Bolts (6)
  Step 1 ..................................................... 44 (5)
  Step 2 .................................................... 89 (10)
Oil Pump Cover Bolts ....................................... 106 (12)
Throttle Body Bolts ........................................ 106 (12)
Valve Cover Bolts .......................................... 106 (12)
Valve Lifter Guide Bolts ................................... 106 (12)
Vapor Vent Pipe Bolts ...................................... 106 (12)

(1) - See INSTALLATION under CYLINDER HEADS
      for procedure and specifications. See Fig. 2.
(2) - Tighten bolts evenly using a crisscross sequence.
(3) - Tighten bolts in sequence, Inner bolts first. See Fig. 9.
(4) - Use NEW bolt.
(5) - Tighten to 106 INCH lbs. (12 N.m)
(6) - Tighten bolts in sequence. See Fig. 1.
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ENGINE SPECIFICATIONS

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GENERAL SPECIFICATIONS
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Application                                                  Specification
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Displacement	346 Cu. In. (5.7L)
Bore	
2000	3.898" (99.00 mm)
2001	3.897-3.898 (99.000-99.018)
Stroke	3.622" (92.00 mm)
Compression Ratio	10.1:1

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS SPECIFICATIONS

Application	In. (mm)
Crankshaft	
End Play	.0015-.0078 (.040-.200)
Oil Clearance	.0007-.0021 (.018-.054)
Runout At Rear Flange (Maximum)	.0020 (.050)
Main Bearings	
Journal Diameter	2.558-2.559 (64.980-65.000)
Journal Out-Of-Round	
Standard	.0001 (.003)
Wear Limit	.0003 (.008)
Journal Taper	
Standard	.0004 (.010)
Wear Limit	.0008 (.020)
Reluctor Ring	
Runout	
2000	(1) .010 (.25)
2001	(1) .028 (.71)
Connecting Rod Bearings	
Journal Diameter	2.099 (53.31)
Journal Out-Of-Round	
Standard	.0002 (.005)
Wear Limit	.0004 (.010)
Journal Taper (2)	
Standard	.0002 (.005)
Wear Limit	.00078 (.020)
Oil Clearance	
2000	.0006-.0025 (.015-.063)
2001	.0009-.0025 (.023-.063)

(1) - Measured .40" (1 mm) below tooth diameter
(2) - Maximum for half of journal length.

CONNECTING RODS SPECIFICATIONS

Application	In. (mm)
Bearing Bore Diameter	2.224-2.225 (56.50-56.52)
Maximum Bend	(1)
Maximum Twist	(1)
Side Play	.004-.020 (.11-.51)

(1) - Replace rod if any bend or twist exists.

PISTONS, PINS & RINGS SPECIFICATIONS

Application	In. (mm)
Piston Clearance	
Standard	.0007-.0021 (.018-.054)
Wear Limit	.0007-.0021 (.018-.054)
Pins	
Diameter	.9447-.9448 (23.997-24.000)
Rod Fit (Interference)	.0008-.0017 (.020-.043)
Rings	
No. 1	
End Gap	.009-.015 (.23-.38)
Side Clearance	.00157-.00335 (.040-.085)
No. 2	
End Gap	.017-.025 (.44-.64)
Side Clearance	.00157-.00315 (.040-.080)
No. 3 (Oil)	
End Gap	.0070-.0271 (.178-.688)
Side Clearance	.0004-.0087 (.010-.220)

CYLINDER BLOCK SPECIFICATIONS

Application	In. (mm)
Cylinder Bore	
Diameter	3.897-3.898 (99.000-99.018)
Taper (Thrust Side)	.0007 (.018)
Deck Warpage (Maximum)	.008 (.22)

VALVES & VALVE SPRINGS SPECIFICATIONS

Application	Specification
Valves	
Face Angle	45ø
Margin (Minimum)	.050" (1.25 mm)
Stem Diameter	.313-.314" (7.96-7.98 mm)
Valve Springs	
Free Length	2.08" (52.9 mm)
Installed Height	1.80" (45.8 mm)
	Lbs. @ In. (N.m @ mm)
Valve Spring Pressure	
Valve Closed	76 @ 1.80 (340 @ 45.75)
Valve Open	220 @ 1.32 (980 @ 33.55)

CYLINDER HEAD SPECIFICATIONS

Application	Specification
Valve Seats	
Intake Valve	
Seat Angle	46ø
Seat Width	.040" (1.02 mm)
Exhaust Valve	
Seat Angle	46ø
Seat Width	.070" (1.78 mm)
Valve Guides	
Stem-To-Guide Oil Clearance	
Standard	.0010-.0026" (.025-.066 mm)
Wear Limit	.0037" (.093 mm)
Cylinder Head Surface Warpage (Maximum)	
Block Surface	.004 (.10
Intake Manifold	.008 (.22)
Exhaust Manifold	.008 (.22)

CAMSHAFT SPECIFICATIONS

Application	In. (mm)
End Play	.001-.012 (.025-.305)
Journal Diameter	2.164-2.166 (54.99-55.04)
Lobe Lift	
Intake	
2000	.292 (7.43)
2001	.274 (6.96)
Exhaust	
2000	.292 (7.43)
2001	.281 (7.13)

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END OF ARTICLE

