1.6L 4-CYL VINS [1,3,4]

1995-96 Engines - 1.6L 4-Cylinder

ENGINE IDENTIFICATION

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

Engine can be identified by the eighth character of the Vehicle Identification Number (VIN) stamped on metal plate located on left side of dash panel. The VIN is also stamped into passenger side of engine compartment bulkhead.

ENGINE IDENTIFICATION CODE

Application	Code
1995	
1.6L SOHC	1
1.6L DOHC	3
1995-96	
1.8L DOHC	5
1996-96	
1.6L B6 DOHC	4

ADJUSTMENTS

VALVE CLEARANCE ADJUSTMENT

All engines are equipped with Hydraulic Lash Adjusters (HLA). No adjustment is required.

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.

FUEL PRESSURE RELEASE

To release fuel pressure, remove rear seat cushion. Disconnect fuel pump connector. See **Fig. 1**. Start and run engine until it stalls. Turn ignition off. Connect fuel pump connector. Install rear seat cushion.

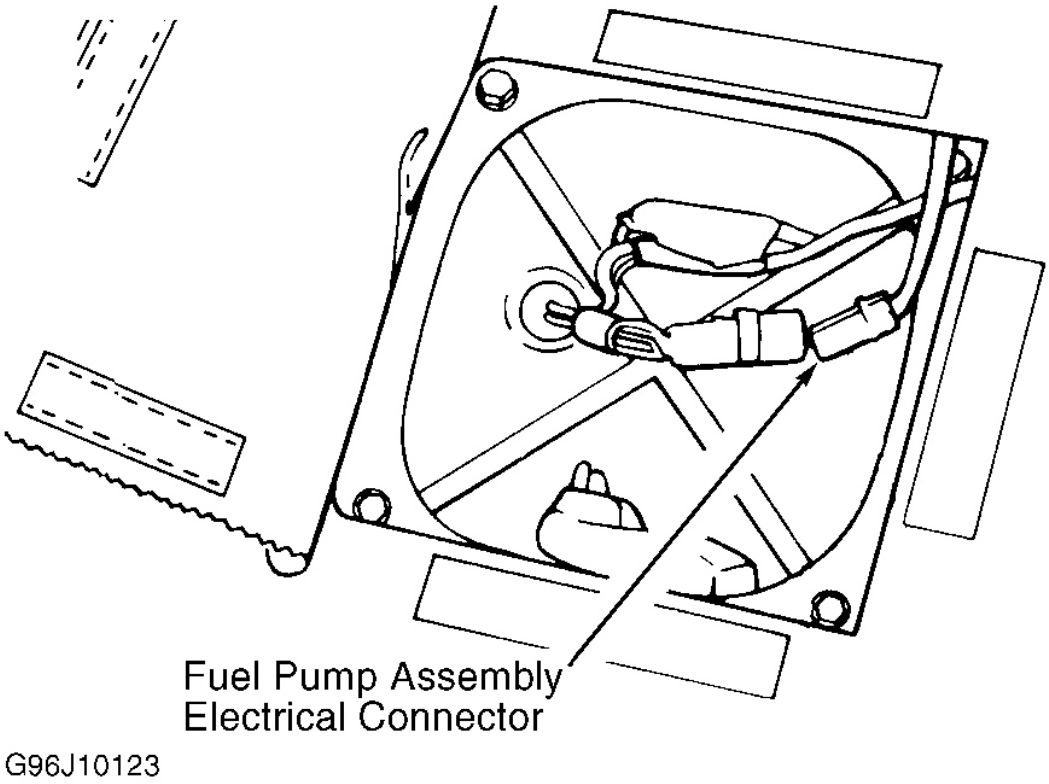
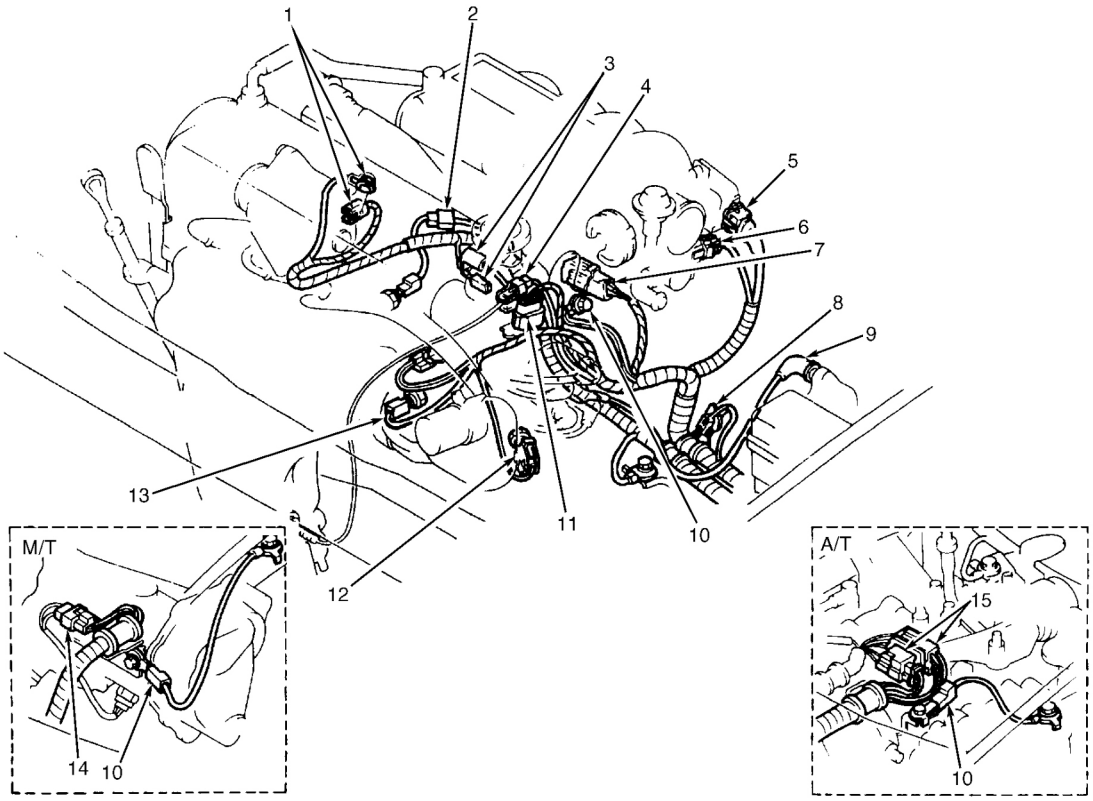


Fig. 1: Locating Fuel Pump Electrical Connector
Courtesy of KIA MOTORS AMERICA, INC.

ENGINE

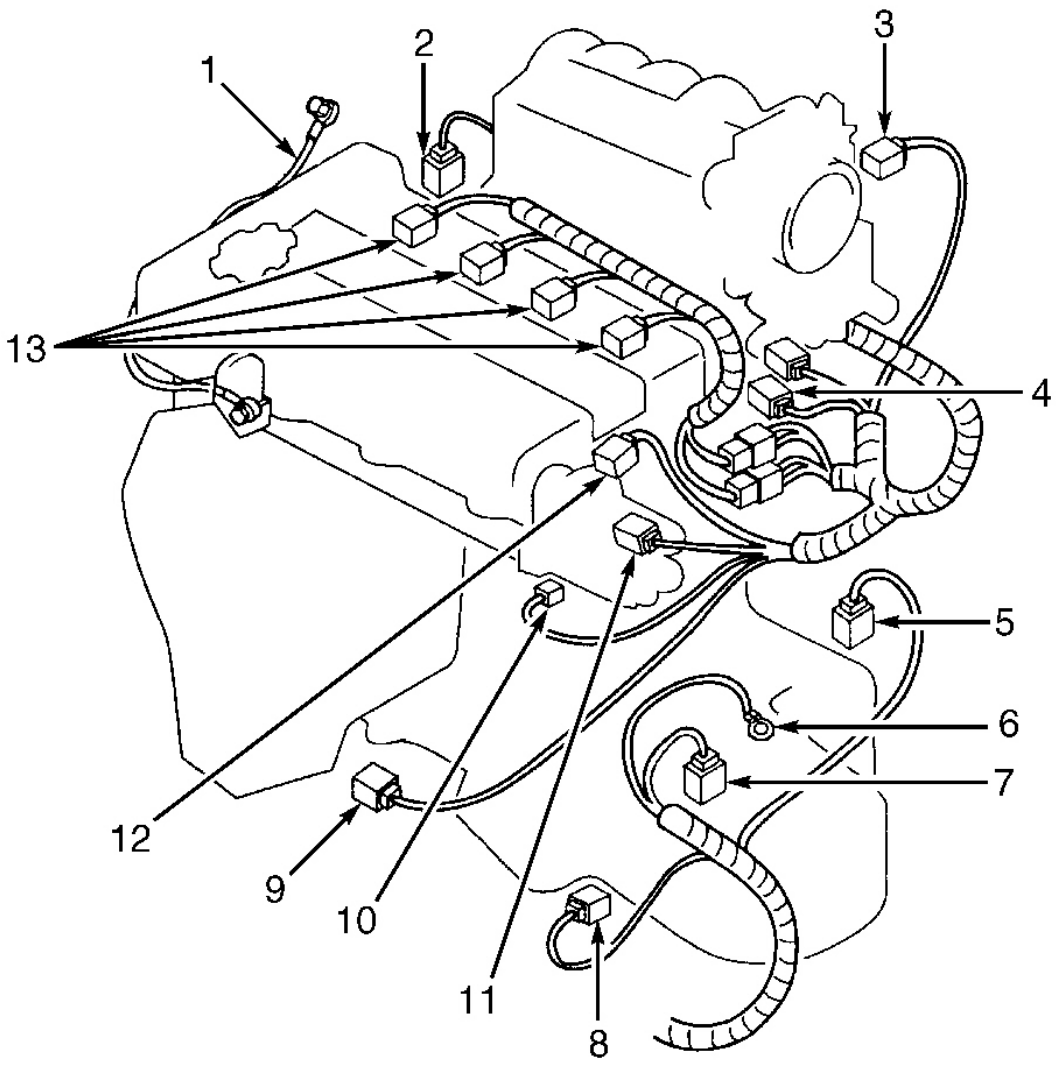
Removal & Installation

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect battery cables. Remove battery cover, battery and battery tray. Drain engine coolant and transaxle oil. Remove air cleaner assembly. Disconnect radiator hoses and coolant reservoir hose.
2. Disconnect electric cooling fan connector. On A/T models, disconnect oil cooler hose. On all models, remove radiator and cooling fan assembly. Remove accessory drive belts. Remove power steering pump and A/C compressor from engine with hoses attached, and secure units away from engine.
3. Note locations and disconnect all necessary electrical connectors and ground wires. See **Fig. 2** or **Fig. 3** . Note locations and disconnect vacuum hoses, fuel hoses, coolant hoses and control cables for engine removal. Plug all fuel hoses to avoid leakage. Disconnect all oil cooler hoses (engine and transmission oil). Plug all oil cooler hoses to avoid leakage. Raise and support vehicle. Disconnect exhaust manifold downpipe. On A/T models, remove shift control cable.



1. Generator
2. Oil Pressure Switch
3. Starter
4. Oxygen Sensor
5. Throttle Position (TP) Sensor
6. Idle Air Control (IAC) Valve
7. Fuel Injector Harness Connector
8. Neutral Position Switch (M/T)
9. Ignition Coil
10. Ground Junction
11. Distributor Connector
12. Engine Coolant Temperature Switch
13. Engine Coolant Temperature Sender
14. Back-Up Light Switch (M/T)
15. Transaxle Range (TR) Switch (A/T)

Fig. 2: Wiring Harness Electrical Connector Locations (SOHC)
Courtesy of KIA MOTORS AMERICA, INC.



1. Ground Strap
2. Generator Connector
3. Throttle Position (TP) Sensor
4. EGR Valve Connector
5. Neutral Position Switch (M/T)
6. Ground
7. Back-Up Light Switch (M/T)
8. Transaxle Range (TR) Switch (A/T)
9. Oxygen Sensor Connector
10. Coolant Temperature Sending Unit
11. Engine Coolant Temperature (ECT) Sensor
12. Distributor Connector
13. Fuel Injector Connectors

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Fig. 3: Wiring Harness Electrical Connector Locations (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

4. On M/T models, remove shift control linkage and extension bar. Remove clutch slave cylinder and fluid line bracket from transaxle housing, leaving fluid line connected to cylinder. Secure cylinder away from transaxle.
5. On all models, remove transmission wiring harness connectors and speedometer cable. Remove wheel assemblies and axle shaft nuts from hubs. Disconnect stabilizer bar from lower control arms. Separate lower ball joints and steering tie-rod ends from steering knuckles.
6. Pry axle shafts out of transaxle. Remove and discard circlip from axle shafts. For further information on axle shafts, see AXLE SHAFTS - FWD article in DRIVE AXLES section. Remove engine mount nuts from crossmember, and loosen crossmember bolts. **DO NOT** remove crossmember bolts at this time.
7. Lower vehicle, and attach engine hoist for engine removal. Remove engine front mount and transaxle top mount from inner fender panels. Remove engine crossmember. Remove engine and transaxle assembly from top of vehicle.
8. To install, reverse removal procedure. Tighten bolts and nuts to specifications. See **TORQUE SPECIFICATIONS**. Add all fluids as necessary.

INTAKE MANIFOLD

Removal & Installation

1. Release fuel system pressure. See **FUEL PRESSURE RELEASE**. Disconnect negative battery cable. Drain cooling system. Remove air cleaner. Disconnect throttle cable, kickdown cable (A/T models), wiring, and fuel lines from throttle body. Remove lower intake manifold bolts. Remove intake manifold support bracket. Mark and remove vacuum hoses and electrical connectors as necessary. Remove vacuum reservoir (if equipped).
2. Remove PCV valve and hose. Remove transaxle vent tube from upper intake manifold. Remove fuel rail. Remove upper intake manifold bolts. Remove upper and lower manifolds as an assembly. If upper and lower manifolds are separated, replace gasket. Remove intake manifold gasket.

Installation

Clean gasket mating surfaces. Position new gasket on cylinder head studs. Install upper and lower intake manifolds as an assembly. To complete installation, reverse removal procedure. See **Fig. 4** or **Fig. 5** . Tighten bolts to specification in sequence. See **TORQUE SPECIFICATIONS**.

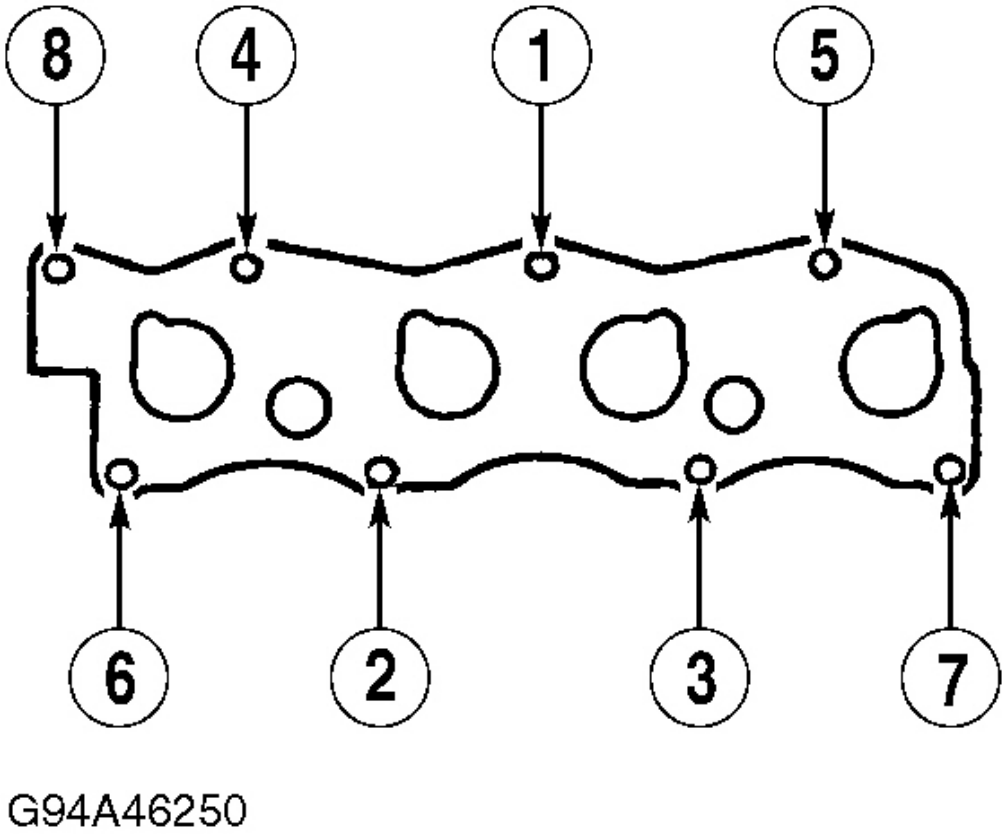


Fig. 4: Intake Manifold Nut Tightening Sequence (SOHC)
Courtesy of KIA MOTORS AMERICA, INC.

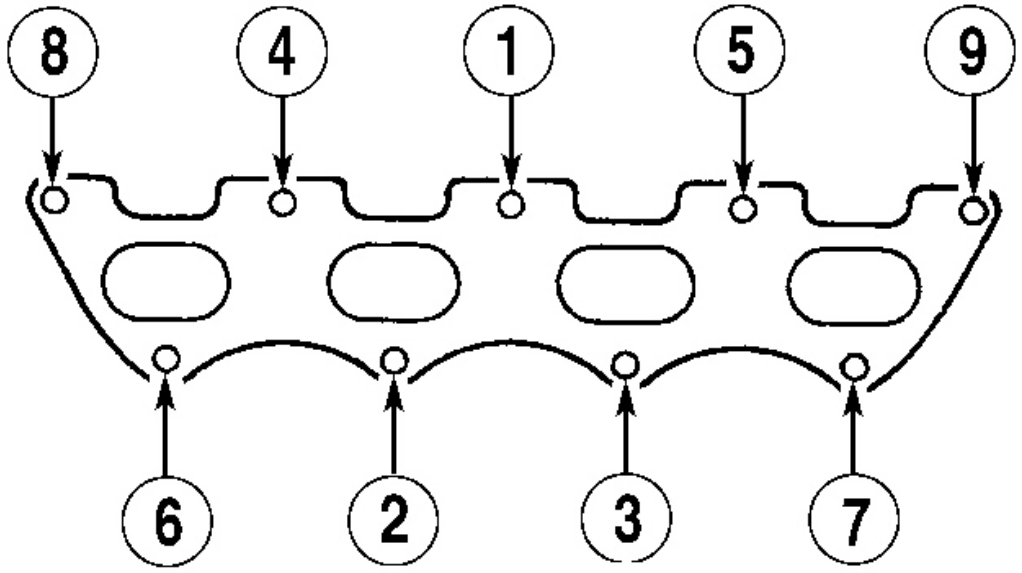


Fig. 5: Intake Manifold Nut Tightening Sequence (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

EXHAUST MANIFOLD

Removal & Installation

1. Disconnect oxygen sensor. Remove exhaust manifold heat shield. Disconnect downpipe and support bracket from exhaust manifold. Remove exhaust manifold.
2. To install, reverse removal procedure. Ensure gasket mating surfaces are clean and flat. Install gasket to cylinder head. Install manifold and tighten manifold nuts/bolts evenly to specification, starting from center bolt and alternating outward. Install NEW donut gasket between header pipe and manifold. See **TORQUE SPECIFICATIONS**.

CYLINDER HEAD

CAUTION: Rotate crankshaft in clockwise direction only.

Removal

1. Release fuel pressure. See **FUEL PRESSURE RELEASE**. Disconnect fuel inlet and return lines. Plug

all fuel hoses to avoid leakage. Disconnect negative battery cable. Drain cooling system. Remove air inlet duct. Note locations and disconnect all necessary electrical connectors, ground wires, vacuum hoses, coolant hoses and control cables for cylinder head removal. Rotate crankshaft clockwise until timing mark is at TDC. Remove timing covers.

2. Remove spark plug wires and spark plugs. Remove distributor. Remove all drive belts. Remove water pump pulley. Remove timing belt cover(s). Loosen timing belt tensioner bolt, relieve timing belt tension and tighten tensioner bolt. Remove timing belt from camshaft sprocket(s). Secure timing belt aside. Remove valve cover.
3. Remove exhaust downpipe and support bracket from exhaust manifold. Remove intake manifold support bracket. Loosen all cylinder head bolts evenly, in reverse order of tightening sequence, in 2-3 steps. Remove bolts. Remove cylinder head and manifolds as an assembly.

Inspection

Carefully clean carbon and gasket material from all mating surfaces. Clean threads of cylinder head bolts. Use tap to clean threads in engine block. Check cylinder head for warpage and cracks. Resurface or replace head if it is not within specification. Check valve train components. Replace or resurface components if they are not within specification. See **CYLINDER HEAD** and VALVES & VALVE SPRINGS tables under ENGINE SPECIFICATIONS.

NOTE: If intake and exhaust manifolds were remove for machining, install manifolds onto cylinder head before installing cylinder head onto block.

Installation

1. Install cylinder head gasket. Install cylinder head assembly and cylinder head bolts. See **Fig. 6** or **Fig. 7** . Using 2 steps, tighten cylinder head bolts in specified sequence. See **TORQUE SPECIFICATIONS**.
2. Ensure No. 1 piston is at TDC and timing mark is aligned. Install timing belt. Ensure timing belt has no slack at idler pulley or between camshaft sprockets (DOHC). Release timing belt tensioner and tighten tensioner bolt. Rotate crankshaft 2 full revolutions (clockwise), and verify all timing marks are aligned. See **TIMING BELT**. To complete installation, reverse removal procedure.

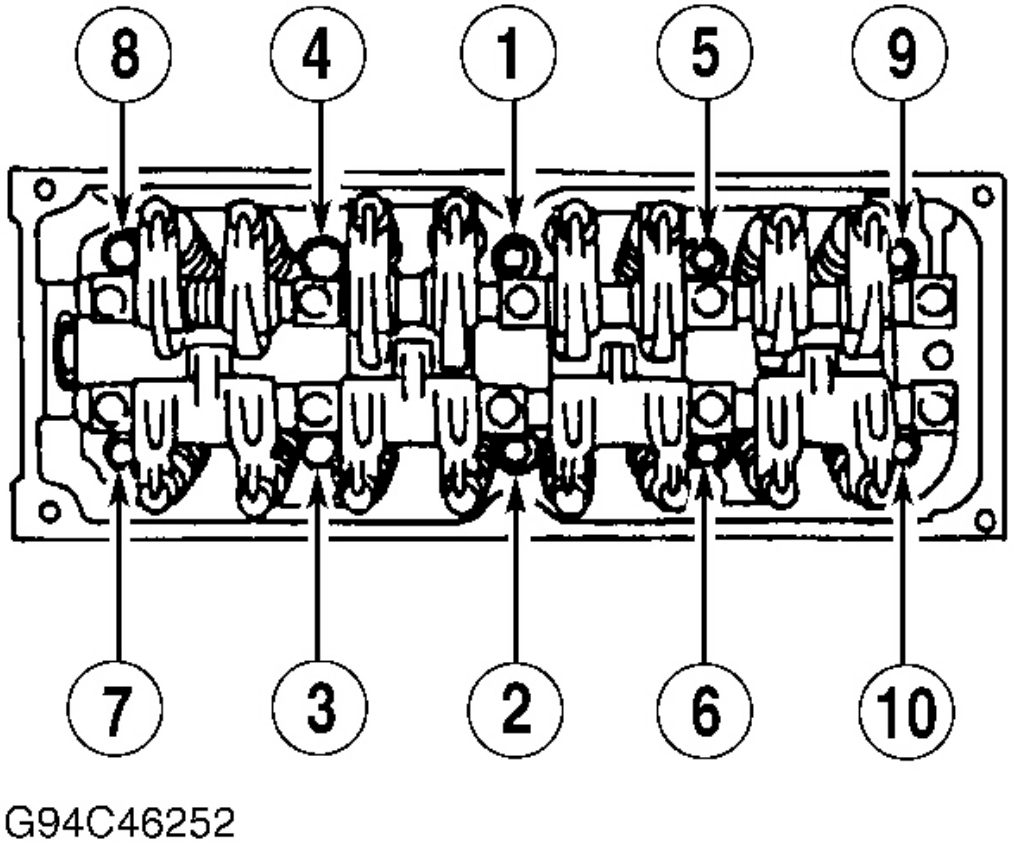


Fig. 6: Cylinder Head Bolt Tightening Sequence (SOHC)
Courtesy of KIA MOTORS AMERICA, INC.

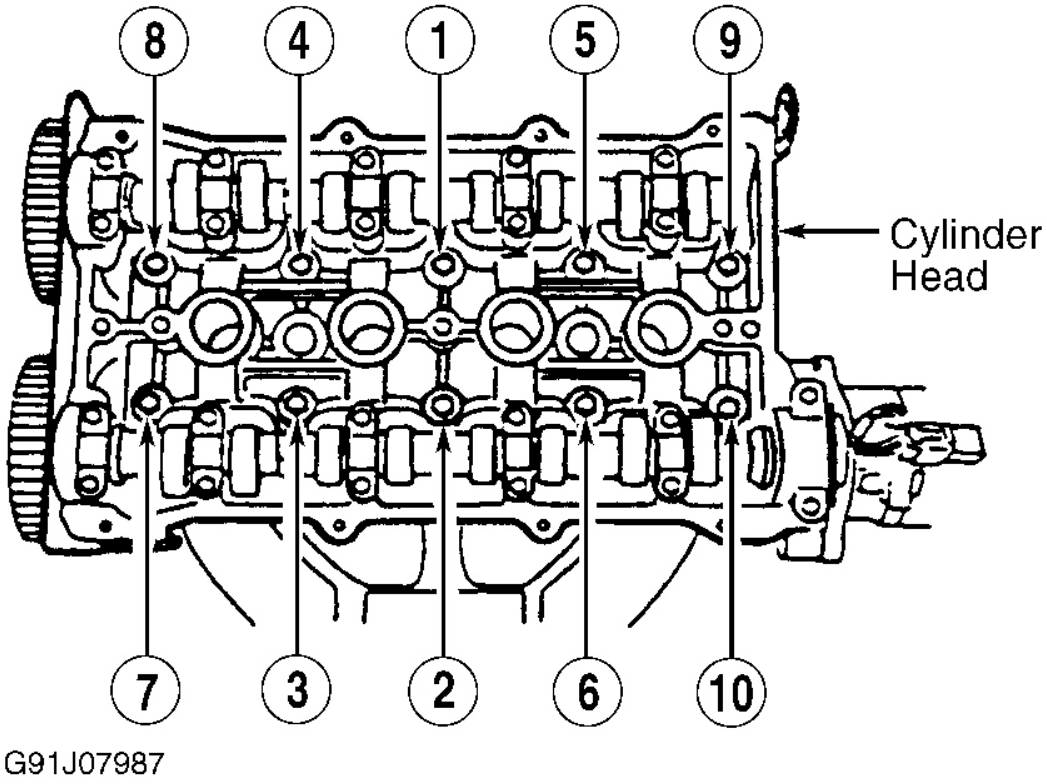


Fig. 7: Cylinder Head Bolt Tightening Sequence (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

CRANKSHAFT FRONT SEAL

Removal SOHC

1. Disconnect negative battery cable. Remove drive belts and crankshaft pulley. Remove timing belt covers and timing belt. See **TIMING BELT**.
2. Use Crankshaft Sprocket Lock Tools (OK130-111-003 and OK130-111-004) to lock crankshaft sprocket into position. Remove crankshaft sprocket bolt. Remove crankshaft sprocket using steering wheel puller. Remove Woodruff key. Pry out seal.

Installation

1. Apply light coat of oil to lip of seal, and push seal over crankshaft. Tap seal into oil pump body until it is flush with edge of pump body. **DO NOT** bottom seal in pump body. Align keyway slots, and install crankshaft sprocket by tapping lightly using brass hammer.
2. Install Woodruff key with tapered side toward oil pump body. Install crankshaft sprocket lock bolt. Using crankshaft sprocket lock tools, lock crankshaft sprocket into position. Tighten lock bolt to specification.

See **TORQUE SPECIFICATIONS**.

3. Install timing belt. See **TIMING BELT**. Install timing belt covers, pulleys and drive belts. Reconnect negative battery cable, and ensure timing is correct.

TIMING BELT

Removal

1. Disconnect negative battery cable. Remove all accessory drive belts. Remove water pump pulley. Remove crankshaft pulley bolt, and remove pulley only. Remove upper and lower timing belt covers. On DOHC models, remove upper, middle and lower timing covers. See **Fig. 8**. Disconnect spark plug wires and remove spark plugs.
2. Rotate crankshaft clockwise until No. 1 piston is at TDC of compression stroke. Ensure camshaft sprocket(s) and crankshaft sprocket timing marks align. See **Fig. 9** or **Fig. 10** . Lower timing marks are similar on all applications.
3. If timing belt is to be reused, mark direction of timing belt rotation before removal. Loosen timing belt tensioner lock bolt. Move tensioner away from belt with spring fully extended. Tighten tensioner bolt while belt tension is released. Remove timing belt.

Inspection

Check timing belt for cracks, peeling, abrasion or other damage. Check tensioner bearing for looseness or roughness of rotation. Inspect tensioner spring for stretching. Replace parts as necessary.

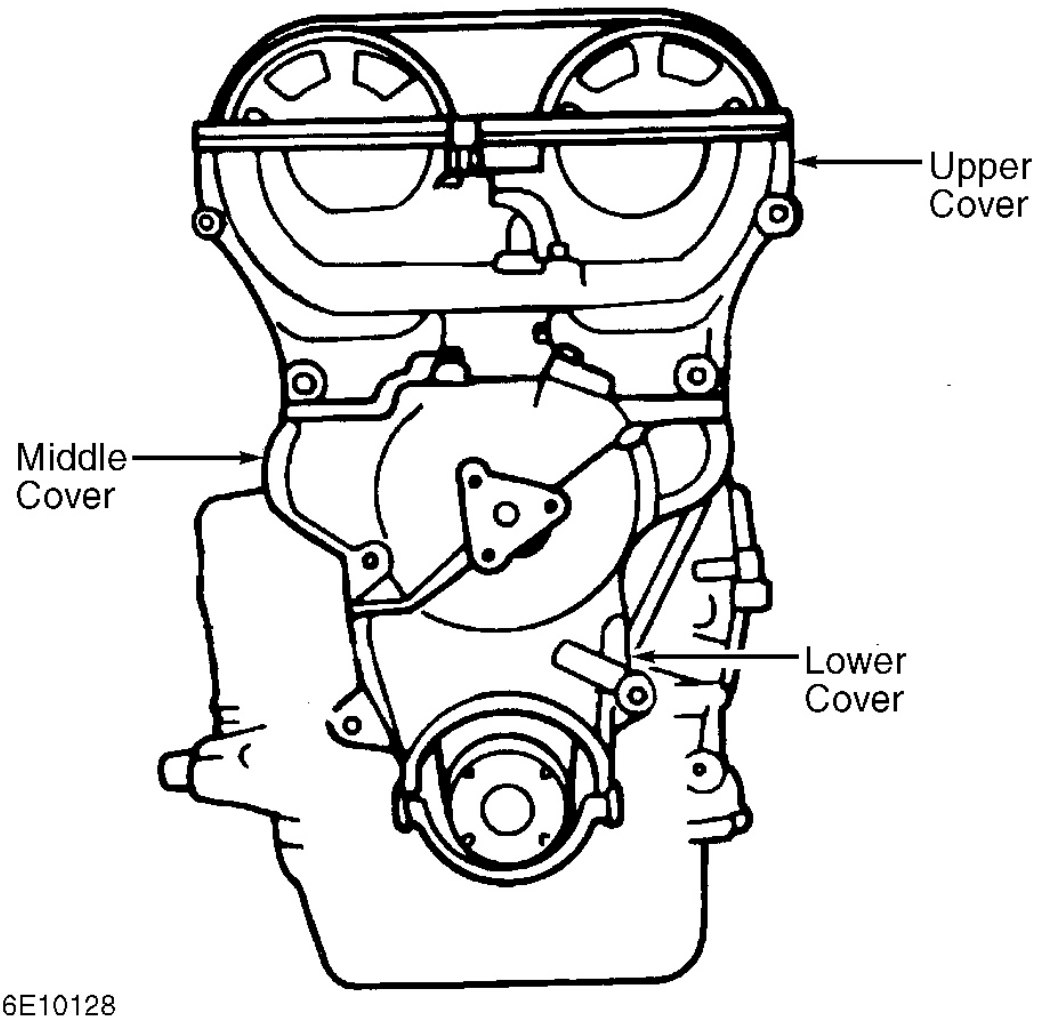
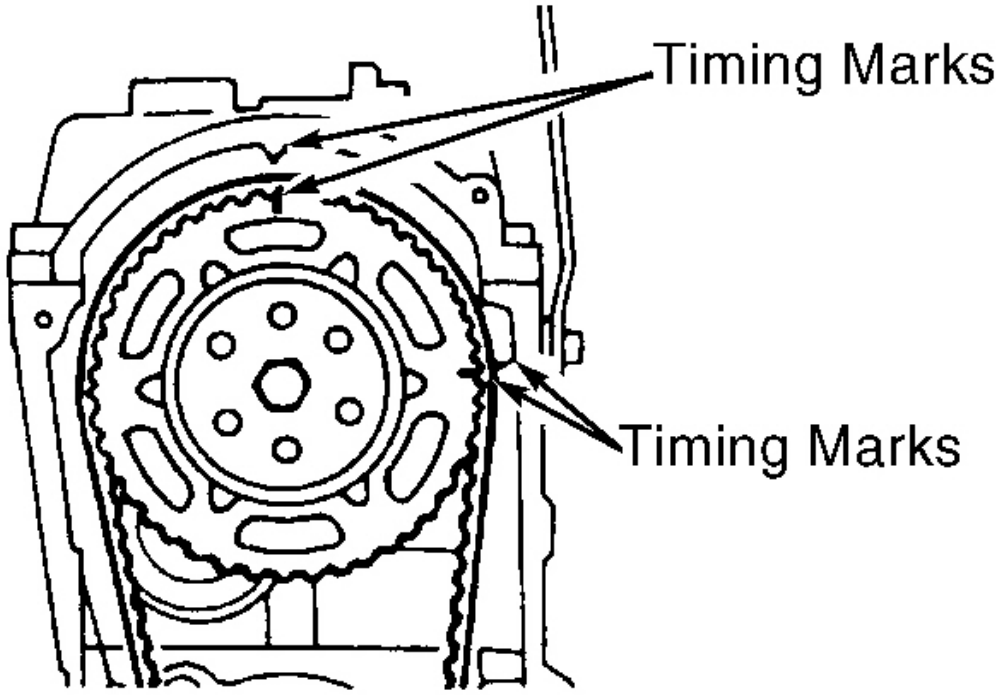


Fig. 8: Identifying Timing Belt Covers (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.



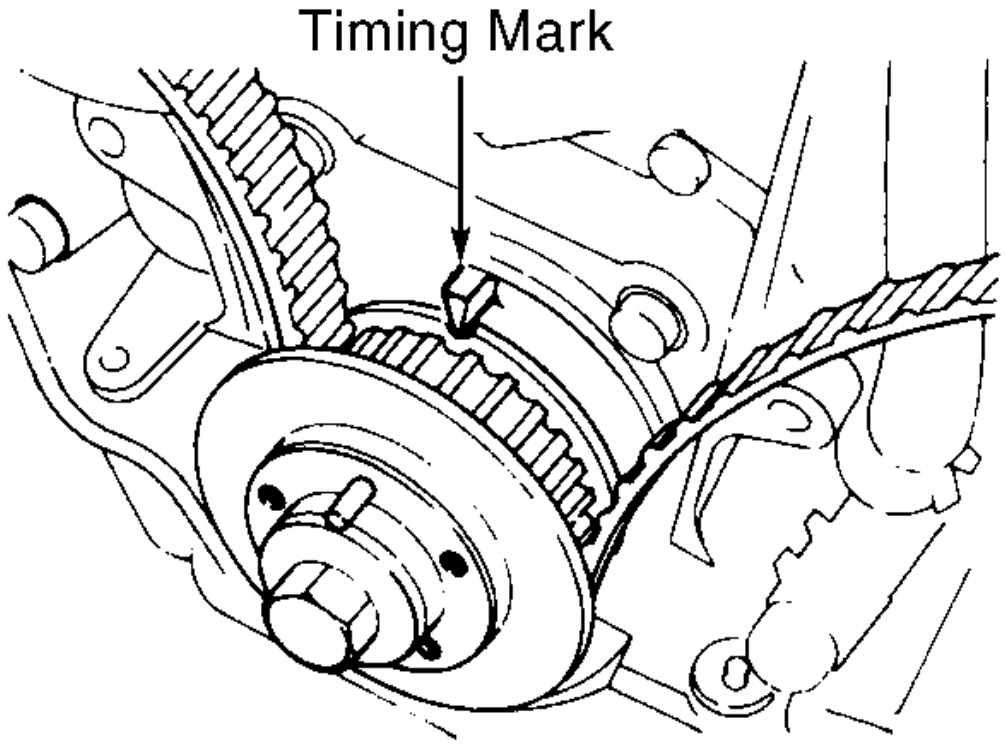


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Fig. 9: Aligning Timing Marks (SOHC)
Courtesy of KIA MOTORS AMERICA, INC.

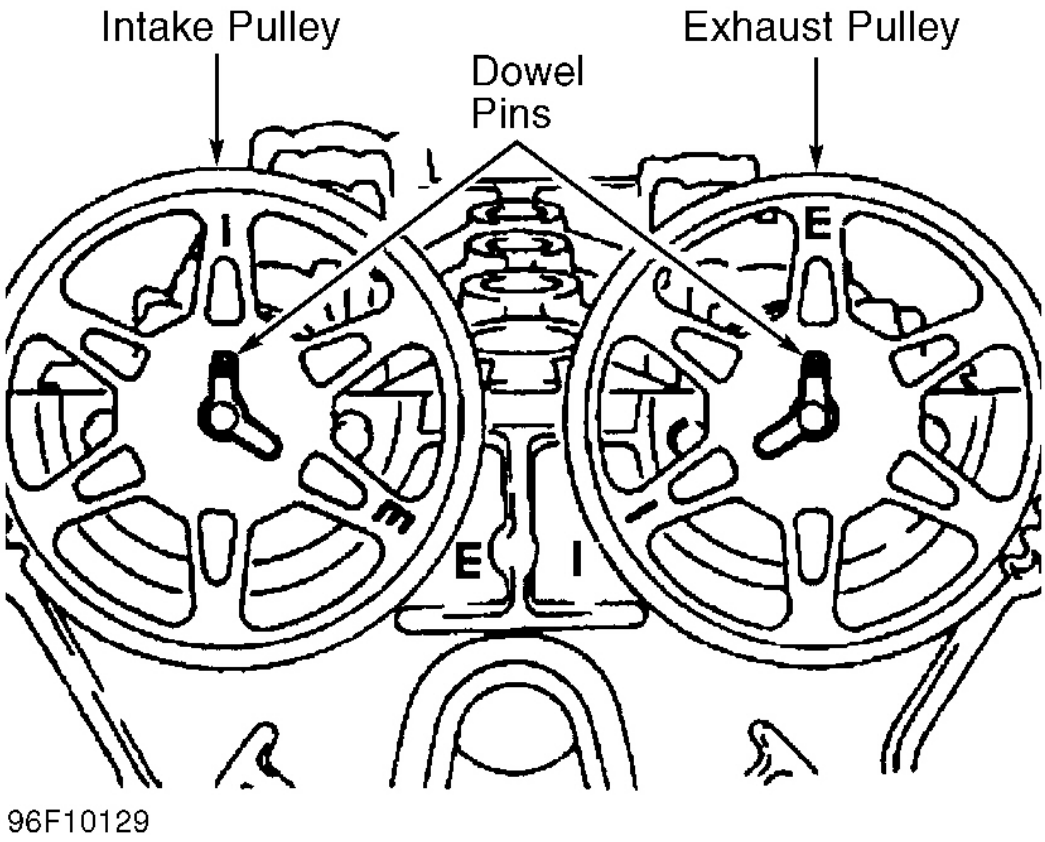

Fig. 10: Aligning Timing Marks (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

Installation

1. Ensure camshaft and crankshaft timing marks are still aligned. See **Fig. 9** or **Fig. 10** . Install belt around crankshaft sprocket. Keeping belt pulled tight on right side (facing engine), route belt around camshaft sprocket(s).
2. Loosen timing belt tensioner lock bolt, and allow spring to apply tension on belt. Snug tensioner lock bolt. Rotate crankshaft clockwise 2 complete revolutions. Ensure timing marks align. If timing marks are not aligned, remove belt, realign all timing marks, and repeat installation procedure.
3. Check timing belt deflection. Check timing belt deflection with 22 lbs. (10 kg) of pressure applied to belt. Timing belt deflection should be .36-.45" (9.0-10.7 mm). If timing belt deflection is not within specification, repeat steps 2) and 3) and/or replace timing belt tensioner spring. If timing belt deflection is within specification, reverse removal procedure to complete installation.

ROCKER ARM SHAFT ASSEMBLY

Removal & Installation (SOHC)

1. Remove valve cover. Loosen rocker arm shaft bolts evenly and in reverse order of tightening sequence. Note component location for installation reference. Rocker arms are not interchangeable.
2. Remove rocker arm shaft assembly and bolts. Inspect all components for wear or damage. See **ROCKER ARM SHAFT ASSEMBLY** under ENGINE SPECIFICATIONS.
3. To install, reverse removal procedure. Ensure oil holes in rocker arm shafts face down. Evenly tighten bolts to specification in 2-3 steps in sequence. See **Fig. 11**. See **TORQUE SPECIFICATIONS**.

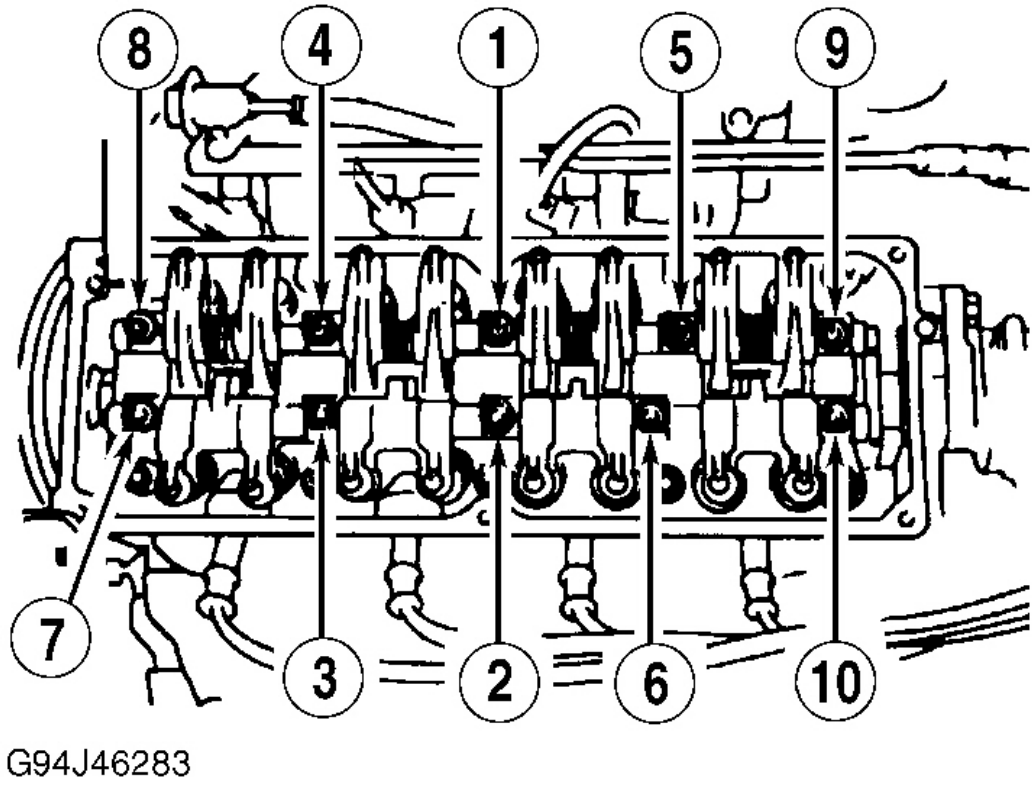

Fig. 11: Rocker Arm Tightening Sequence (Typical)
Courtesy of KIA MOTORS AMERICA, INC.

HYDRAULIC LASH ADJUSTER (HLA)

Removal

1. Disconnect negative battery cable. Remove valve cover. See **Fig. 11**. Loosen rocker arm shaft bolts evenly in 2-3 steps in reverse order of tightening sequence. See **ROCKER ARM SHAFT ASSEMBLY**.

CAUTION: If HLA is difficult to remove from rocker arm, pliers may be used for removal; however, HLA or "O" ring may be damaged during removal and require replacement.

2. Mark all parts for installation reference. Remove rocker arm shaft assembly from cylinder head. On SOHC engines, disassemble rocker arm shaft assembly. Remove HLA from rocker arm. On DOHC engines, remove HLA from bores in cylinder head.

Inspection

Inspect face of HLA for wear or damage, replace as necessary.

Installation

1. On SOHC engines, pour engine oil into oil reservoir in rocker arm. On DOHC engines, pour engine oil into bores of cylinder head. On both engines, apply engine oil to HLA. On SOHC engines, install HLA in rocker arm. On DOHC engines, install HLA in bores of cylinder head, being careful to not damage "O" ring during installation.

NOTE: On SOHC engines, intake rocker arm shaft has a Yellow/Green identification mark and exhaust rocker arm shaft has a Pink/Blue identification mark. Ensure identification marks face upward.

2. On SOHC engines, assemble rocker arms to original location on rocker arm shafts. Install rocker arm shaft assemblies to cylinder head. See **Fig. 11**. Tighten rocker arm shaft bolts to specification in sequence. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.
3. On DOHC engines, install camshafts. Install camshaft bearing caps to their original locations. See **Fig. 12**. Install and tighten bolts in sequence to torque specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

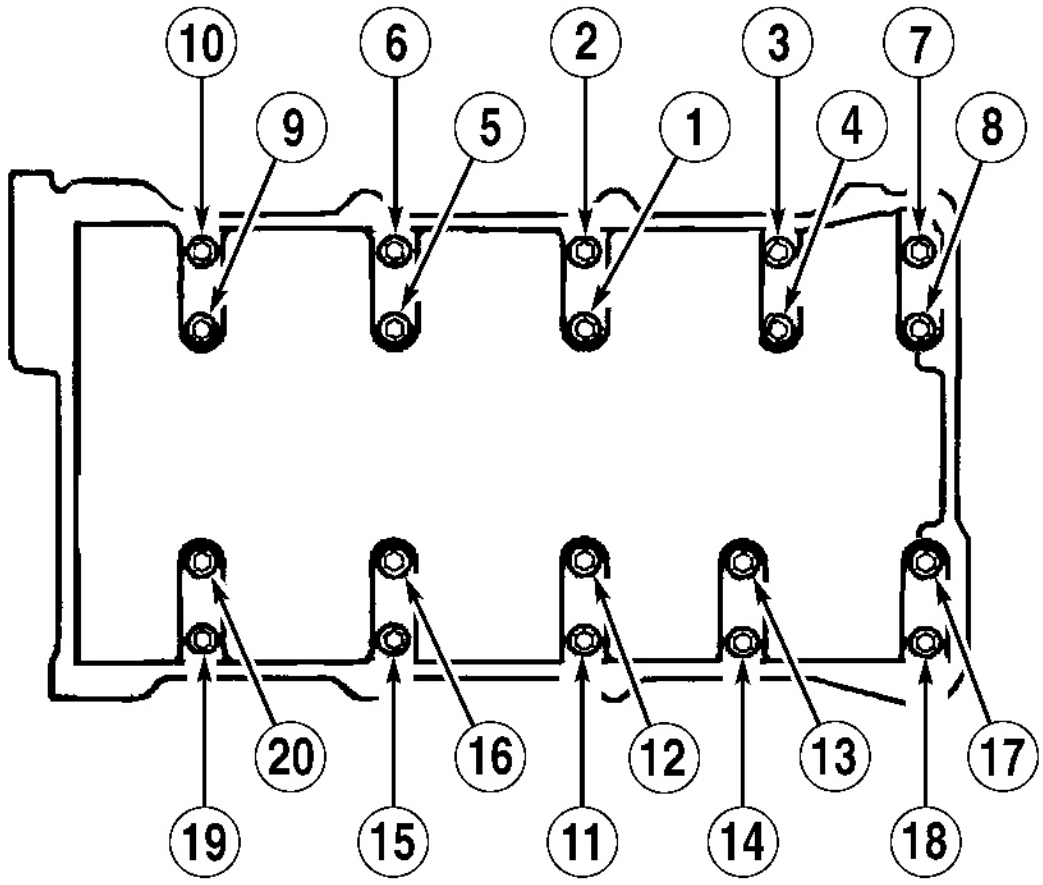

Fig. 12: Tightening Sequence For Camshaft Bearing Caps (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

CAMSHAFT

Removal (SOHC)

1. Disconnect negative battery cable. Remove cylinder head valve cover. Remove upper timing cover. Set timing marks to No. 1 TDC. Remove timing belt from camshaft sprocket. Remove rocker arm shaft assembly by loosening rocker arm shaft bolts evenly in 2-3 steps, in reverse order of tightening sequence. See **Fig. 11**.
2. Mark each component for installation reference. Rocker arms are not interchangeable. Remove distributor. Using dial indicator, check camshaft end play. If camshaft end play is out of specification, replace camshaft thrust plate during installation. Remove camshaft sprocket. Remove camshaft thrust plate, and slide camshaft out of head. Remove oil seal from head.

Inspection

Check camshaft journals and bearings for wear. Check camshaft lobes for wear and damage. Check camshaft runout. Clean and check all measurements of camshaft and cylinder head. See **CAMSHAFT** under ENGINE SPECIFICATIONS. If any measurements are not within specification, replace camshaft, thrust plate, camshaft bearings and/or cylinder head as necessary.

Installation

Apply camshaft lube or engine oil to camshaft and bearings before installing. Tap camshaft oil seal in until flush with head. Install camshaft and pulley with dowel pin straight up. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

Removal (DOHC)

1. Disconnect negative battery cable. Remove timing belt upper and middle covers. Set timing marks to No. 1 TDC. See **TIMING BELT**. Loosen timing belt tensioner and tighten tensioner bolt with tension removed from timing belt. Remove timing belt from camshaft sprockets. Disconnect spark plug wires. Remove distributor. Remove valve cover.
2. Using a wrench to hold camshaft stationary, remove camshaft sprocket retaining bolts. Remove camshaft sprockets. Remove camshaft bearing caps in reverse order of tightening sequence. See **Fig. 12**. Note bearing cap locations for installation. Remove camshaft and oil seal.

Inspection

Check camshaft journals and bearings for wear. Check camshaft lobes for wear and damage. Check camshaft runout. See **CAMSHAFT** under ENGINE SPECIFICATIONS. If any measurements are not within specifications, replace camshaft and/or cylinder head.

Installation

1. Apply clean engine oil to camshaft journals and bearings. Install camshaft. Apply silicone sealant to areas shown. See **Fig. 13**. Install camshaft bearing caps in their original locations.
2. Install camshaft bearing cap bolts and tighten in sequence to specification. See **TORQUE SPECIFICATIONS**. Apply clean engine oil to lip of new camshaft oil seal and install. See **Fig. 12**. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

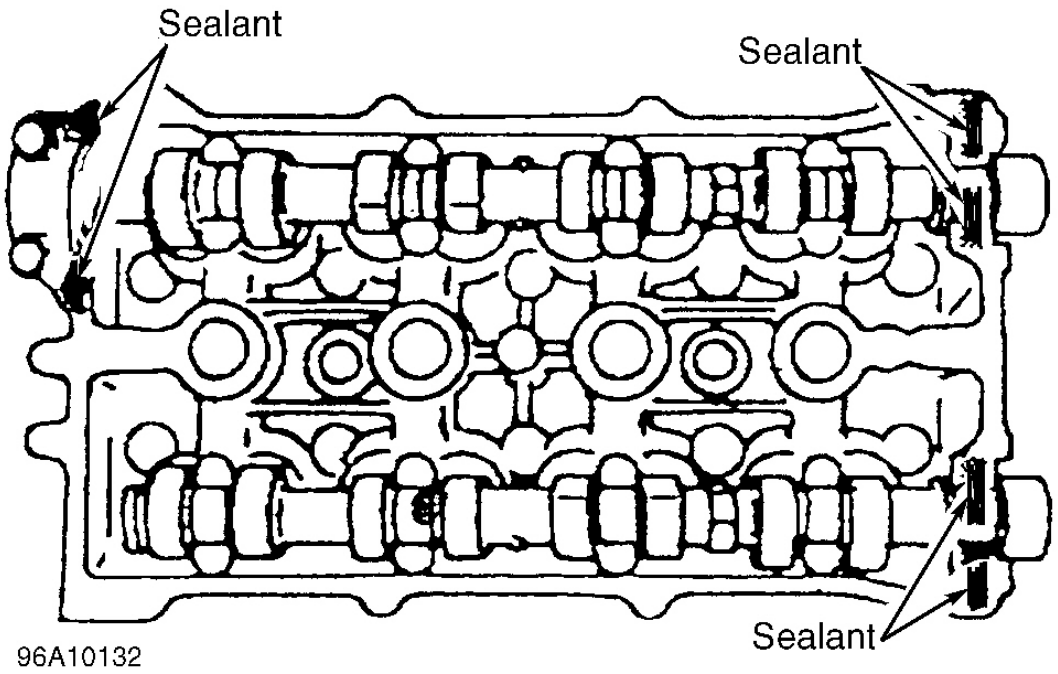

Fig. 13: Silicone Sealant Application Locations
Courtesy of KIA MOTORS AMERICA, INC.

REAR CRANKSHAFT OIL SEAL

NOTE: Rear crankshaft oil seal can be removed without removing oil pan or crankshaft.

Removal

Remove transaxle. See TRANSMISSION REMOVAL & INSTALLATION - A/T article in AUTOMATIC TRANS SERVICE section or TRANSMISSION REMOVAL & INSTALLATION - M/T article in MANUAL TRANS SERVICE section. Mark all parts for reassembly reference. On A/T models, remove flex plate. On M/T models, remove clutch assembly and flywheel. Remove rear cover. On all models, use a seal remover to remove oil seal from rear cover.

Installation

To install, lubricate seal lip with light coat of oil. Tap seal into oil seal holder until it is flush with edge of seal holder (1995 models). On 1996 models, tap seal in until nearly flush with surface of rear cover, 0-.02" (0-.5 mm). **DO NOT** bottom seal in holder. On M/T models, install flywheel and clutch assembly. On A/T models, install flex plate. Reverse removal procedures to complete installation. On all models, tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

CAUTION: Always replace flywheel or flex plate bolts. DO NOT reuse old bolts.

THERMOSTAT

Inspection

1. Visually check that the thermostat valve airtight.
2. Place the thermostat and a thermometer in water.
3. Heat the water and check the following :

   Initial-opening temperature :

   Main : 188-193°F (86.5-89.5°C)

   Sub : 182-188°F (83.5-86.5°C)

   Full-open temperature : 212°F (100°C)

   Full-open lift :

   Main : 0.30 in (8.0mm) minimum

   Sub : 0.06 in (1.5mm) minimum

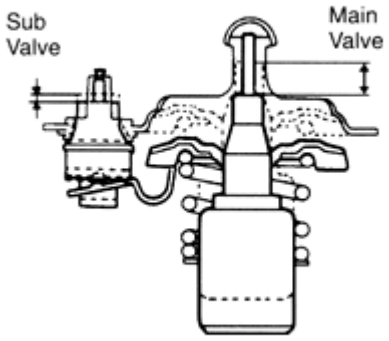

Fig. 14: Sub Valve And Main Valve
Courtesy of KIA MOTORS AMERICA, INC.

Installation

1. Install the thermostat into cylinder head with the jiggle pin at the top.

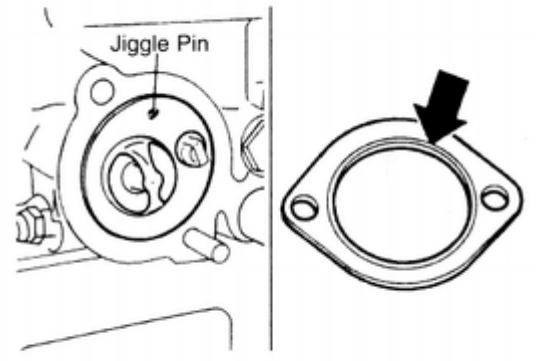

Fig. 15: Thermostat And Jiggle Pin
Courtesy of KIA MOTORS AMERICA, INC.

Thermostat gasket

Install a new gasket with the print side facing the cylinder head.

Steps after installation

1. Fill the radiator with the specified amount and type of engine coolant.
2. Connect the negative battery cable.
3. Start the engine and check for leaks.

WATER PUMP

Removal

Disconnect negative battery cable. Drain coolant. Remove timing belt. See **TIMING BELT**. Remove water inlet pipe and gasket. Remove "O" ring from coolant by-pass pipe. Remove water pump bolts and remove water pump. Remove gasket and clean gasket mating surface of engine block.

Installation

Ensure all gasket mating surfaces are clean. Install new "O" ring on water by-pass pipe. Install water pump gasket on water pump. Install new gasket on coolant inlet pipe. Install water pump and inlet pipe. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

OIL PAN

Removal

1. Disconnect negative battery cable. Raise and support vehicle. Remove engine splash covers. Drain engine

oil. Remove exhaust header pipe and support brackets from front exhaust system. Remove oil pan-to-transaxle bolts. Remove oil pan stiffener (if equipped). See **Fig. 16**. Support oil pan. Remove oil pan-to-engine block retaining bolts.

CAUTION: DO NOT force pry bar between engine block and oil pan contact surfaces when removing oil pan.

2. **DO NOT** damage sealant contact surfaces. Remove oil pan. Remove oil pan upper block (1.6L DOHC), or remove main bearing support plate (1.8L DOHC) retaining bolts from main bearing caps, and pry plate from engine block. **DO NOT** deform support plate. Replace plate if it is deformed. Clean sealant from oil pan, bolts, engine block and both sides of upper block or support plate.

CAUTION: If reusing oil pan mounting bolts, ensure old sealant is completely removed from bolt threads. Failure to do so may cause bolt holes to crack.

Installation

Apply oil resistant sealant to both sides of MBSP. Install MBSP. Align engine block/oil pan holes, and tighten MBSP bolts 12-15 ft. lbs. (16-20 N.m). Apply sealant, and install oil pan. To complete installation, reverse removal procedure. Tighten all bolts to specification. See **TORQUE SPECIFICATIONS**. Fill engine with oil to specification.

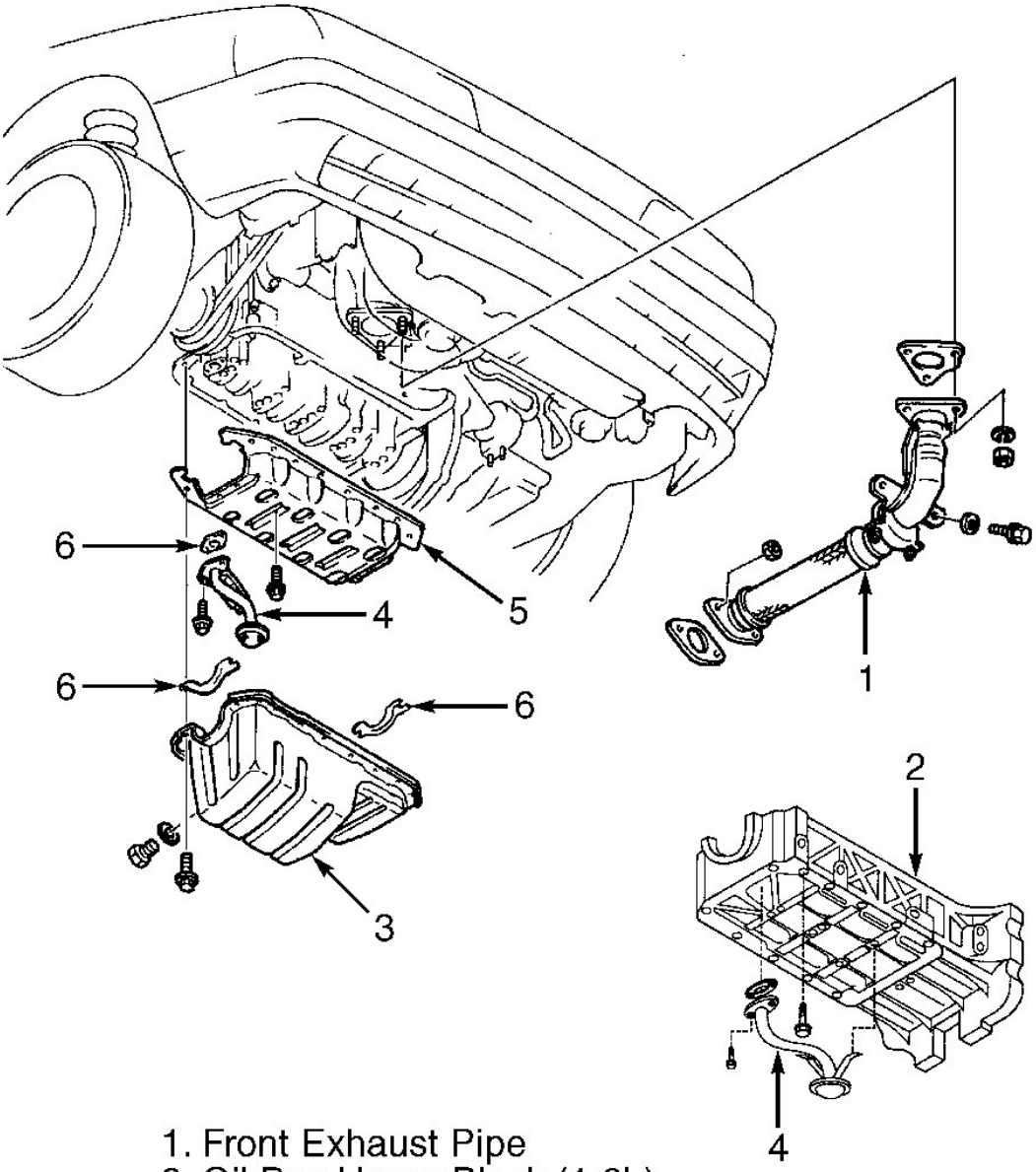

Fig. 16: Exploded View Of Oil Pan & Components
Courtesy of KIA MOTORS AMERICA, INC.

OVERHAUL

CYLINDER HEAD

Cylinder Head

Ensure all mating surfaces are clean. Check cylinder head for warpage. Resurface cylinder head if warpage exceeds .004" (.10 mm). Check manifold contact surfaces for warpage. Resurface manifold surfaces or replace cylinder head if warpage exceeds .006" (.15 mm). Check cylinder head height. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS. If measurements are not as specified, replace cylinder head.

Valve Springs

Ensure valve spring free length and out-of-square are within specification. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS. Replace valve spring as necessary.

Valves

Check valve face angle, margin thickness and stem diameter. Service or replace valves if measurements are not within specifications. See **VALVES & VALVE SPRINGS** under ENGINE SPECIFICATIONS.

Valve Guides

1. Check valve stem to valve guide oil clearance. Ensure valve guide inside diameter is within specification. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.
2. To replace valve guide, completely disassemble cylinder head. Working from combustion chamber side of cylinder head, install Valve Guide Remover (OK130-120-006) into valve guide. Drive valve guide out of cylinder head.
3. If necessary, install new circlip on guide. Using proper components of Valve Guide Installer (OK993-120-AA0), adjust installer guide depth (dimension "L") to specification using depth micrometer or caliper. See **Fig. 17**.
4. Insert guide into pre-adjusted installer. Drive guide into cylinder head from camshaft side until guide circlip and/or installer contact cylinder head. Measure dimension "L" to determine guide installed height. See **Fig. 17**.
5. If installed height is not within specification, adjust or replace valve guide or cylinder head as necessary. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS.

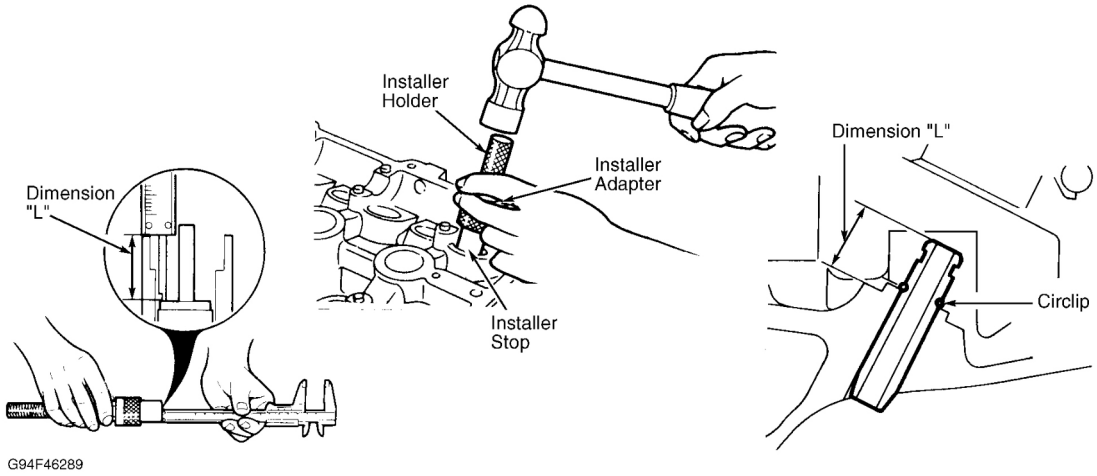

Fig. 17: Adjusting Valve Guide Installer & Installing Guide
Courtesy of KIA MOTORS AMERICA, INC.

Valve Seat

1. Service valve guide as needed before servicing valve seat. Valve seat replacement information is not available at time of publication. Inspect valve seat for roughness, pitting, cracks and damage. Check valve seat angle and seat width.
2. Measure seat contact width on valve, and note that seat contact position should be in center of valve face. Service seat if angle and width are not within specification. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS. Measure valve installed height after servicing valve seat.

Valve Seat Correction Angles

1. Measure seat contact width on valve. See **CYLINDER HEAD** under ENGINE SPECIFICATIONS. Ensure valve/seat contact position is at center of valve face. If width and position are not within specifications, cut seats as follows.
2. If seat contact position is too high, correct using 75-degree stone (intake) or 70-degree stone (exhaust). Finish angle using 45-degree stone until contact width is corrected.
3. If seat contact position is too low, correct using 0-degree stone. Finish angle using 45-degree stone until contact width is corrected. Seat valve to valve seat using lapping compound.

Valve Stem Installed Height

1. After servicing valves, measure valve stem installed height. See **VALVE INSTALLED HEIGHT**. If the installed valve height is within standard specification, no adjustment is necessary. See **Fig. 18**.
2. If installed valve height exceeds standard specification but does not exceed service limit specification, install adjusting shim on spring seat to bring installed height back within standard specification.
3. If valve stem installed height exceeds specification, replace valve. If valve stem installed height still exceeds limit, replace cylinder head. See **VALVE INSTALLED HEIGHT**.

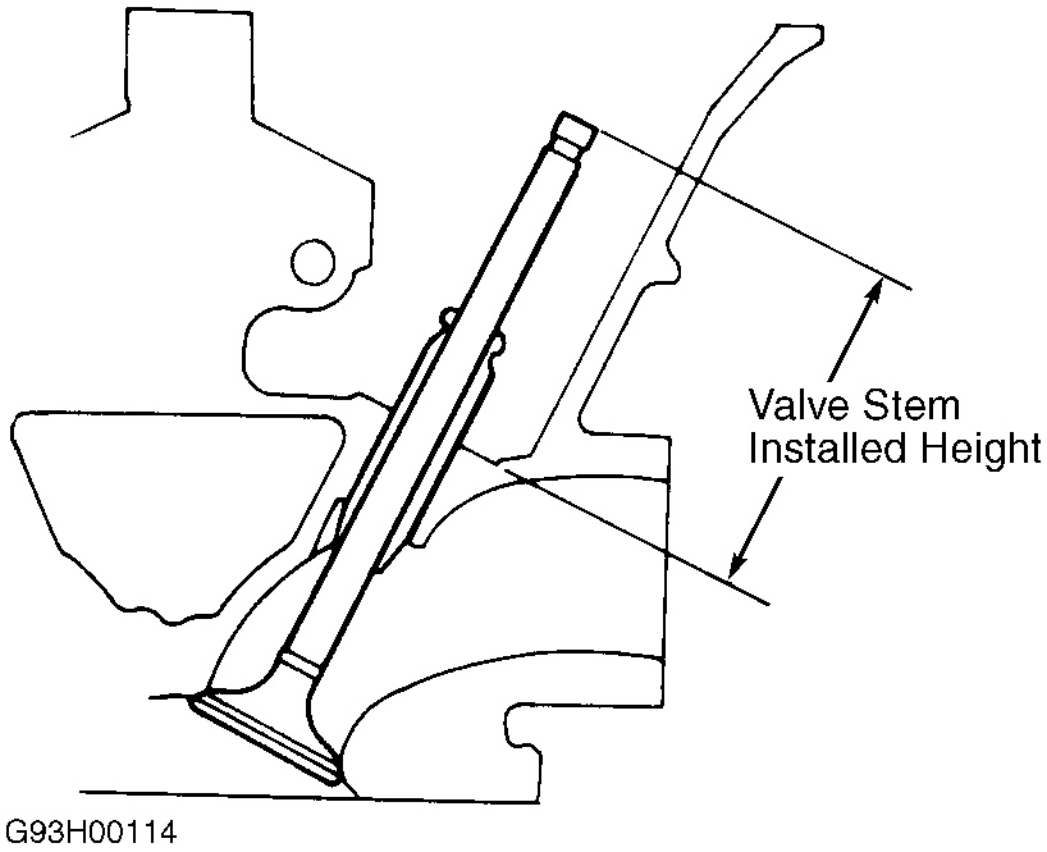

Fig. 18: Measuring Valve Stem Installed Height (Typical)
Courtesy of KIA MOTORS AMERICA, INC.

VALVE INSTALLED HEIGHT

Application	In. (mm)
1.6L SOHC 8-Valve	
Intake & Exhaust Valve	
Standard	1.535-1.555 (39.0-39.5)
Service Limit	(1) 1.555-1.594 (39.5-40.5)
Beyond Limit	(2) 1.594 (40.5)
1.6L SOHC 16-Valve	
Intake Valve	
Standard	1.673-1.693 (42.5-43.0)
Service Limit	(2) 1.732 (44.0)
Exhaust Valve	
Standard	1.614-1.634 (41.0-41.5)

Service Limit	(2) 1.673 (42.5)
1.6L DOHC	
Intake & Exhaust Valve	
Standard	1.737-1.771 (44.1-45.0)
Service limit	(1) 1.772-1.830 (45.1-46.5)
Beyond Limit	(2) 1.831 (46.5)
1.8L DOHC	
Intake & Exhaust Valve	
Standard	1.772-1.791 (45.0-45.5)
Service limit	(1) 1.792-1.830 (45.5-46.5)
Beyond Limit	(2) 1.831 (46.5)

(1) If installed height exceeds specification, adjust with washer on spring seat area of cylinder head.

(2) If installed height exceeds specification, replace cylinder head.

CYLINDER BLOCK ASSEMBLY

NOTE: During disassembly, match mark components for reassembly reference.

Piston & Connecting Rod Assembly

1. Before removing rod cap from crankshaft, measure and record rod side play. See **CONNECTING RODS** under ENGINE SPECIFICATIONS. Ensure all rods, pistons, and caps are marked before removal to match upon reassembly.
2. Before removing rod from crankshaft, check and record rod bearing oil clearance. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS.
3. Remove rod cap from crankshaft. Install short pieces of rubber hose over connecting rod studs. Ensure cylinder does not have excessive ring ridge at top of cylinder. If excessive ring ridge is present, remove it with appropriate ring ridge remover. Push piston and rod assembly out of block.
4. To install, ensure parts are matched to cylinder. Ensure piston, rod, rings and bearings are properly fitted and in related positions. See **Fig. 19**. Install piston and rod assembly into block.

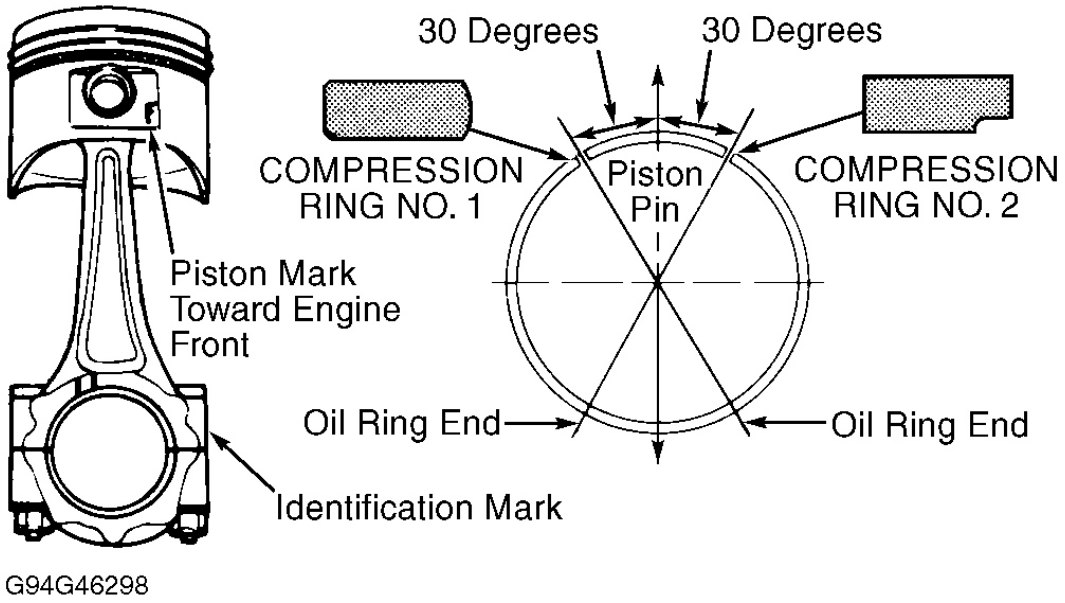

Fig. 19: Locations & Marks For Assembling Pistons, Rod & Rings
Courtesy of KIA MOTORS AMERICA, INC.

Piston Pin Replacement

1. Match mark piston pin and rod piston for reassembly reference. Using arbor press and piston pin removal/installation set, press piston pin through rod and out of piston.
2. Check piston-to-pin clearance, and rod-to-pin interference fit. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS. Ensure piston mark and rod identification mark are in proper position. Press pin into piston and rod until pin is centered. Piston should pivot freely.

Fitting Pistons

1. Ensure pistons are not scored or damaged. Measure piston diameter on piston skirt at .65" (16.5 mm) below oil ring land. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS.
2. Check piston-to-cylinder wall clearance in 3 different vertical places of piston travel. If clearance is not within specification, rebore cylinders to fit oversize pistons.
3. Using NEW piston ring, measure piston ring side clearance around entire piston circumference. If clearance is not within specification, replace piston. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS.

NOTE: Pistons and rings are available in .010" (.25 mm) and .020" (.50 mm) oversize.

Piston Rings

Insert NEW piston ring into cylinder, and measure ring end gap. Grind ring ends or replace piston ring if ring

end gap is not within specification. See **PISTONS, PINS & RINGS** under ENGINE SPECIFICATIONS.

Connecting Rod Bearings

Check crankshaft connecting rod journals for wear, out-of-round, taper and undersize. Machine or replace crankshaft and/or bearings as necessary. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS.

Crankshaft & Main Bearings

1. Before removing main caps, measure and record crankshaft end play. Using Plastigage, measure and record main bearing oil clearance. **DO NOT** rotate crankshaft when measuring oil clearances.
2. Remove crankshaft. Measure and record each main journal diameter in 2 places. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS. Machine or replace crankshaft as necessary. Main bearing upper halves are grooved.
3. Main bearing caps are marked and must be installed in original position. Tighten bearing cap bolts in sequence and to specification. See **Fig. 20**. See **TORQUE SPECIFICATIONS**.

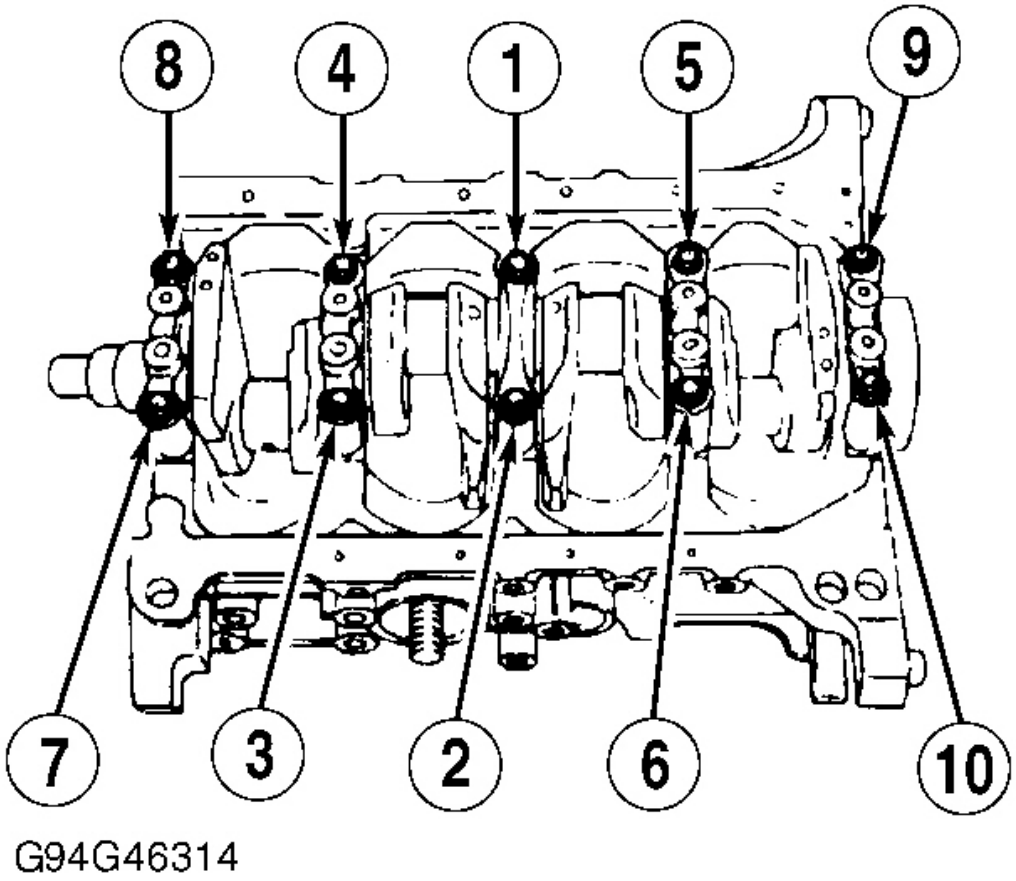

Fig. 20: Main Bearing Cap Tightening Sequence
Courtesy of KIA MOTORS AMERICA, INC.

Thrust Bearings

1. Check crankshaft end play with crankshaft bearings and caps installed, but without connecting rods attached to crankshaft.
2. Replace thrust bearing if end play is not within specification. See **CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS** under ENGINE SPECIFICATIONS. Ensure thrust bearings are installed with oil groove facing crankshaft. Oversize thrust bearings are available.

Cylinder Block

Check cylinder bore out-of-round, taper, and piston-to-cylinder bore clearance. Check head gasket surface for warpage. If warpage is not within specification, machine or replace cylinder block as necessary. See **CYLINDER BLOCK** under ENGINE SPECIFICATIONS.

ENGINE LUBRICATION

Oil pressure is provided by a rotor-type pump. Driven by the crankshaft, pump draws oil from oil pan through oil strainer. From oil pump, oil is sent through oil filter then to cylinder block and up to cylinder head. Oil drains back to oil pan. See **Fig. 21** and **Fig. 22** .

Crankcase Capacity

See **CRANKCASE CAPACITY**.

CRANKCASE CAPACITY

Engine Size/Application	Without Oil Filter Quarts (Liters)	With Oil Filter Quarts (Liters)
1.6L		
SOHC	3.2 (3.0)	3.4 (3.2)
DOHC	3.4 (3.2)	3.6 (3.4)
1.8L		
DOHC	3.8 (3.6)	4.0 (3.6)

Oil Pressure

With engine at operating temperature, oil pressure should be 28-43 psi (2.0-3.0 kg/cm^2) at 1000 RPM, and 43-57 psi(3.0-4.0 kg/cm^2) at 3000 RPM.

Oil Pressure Relief Valve

Pressure relief valve is located in oil pump body and is not adjustable.

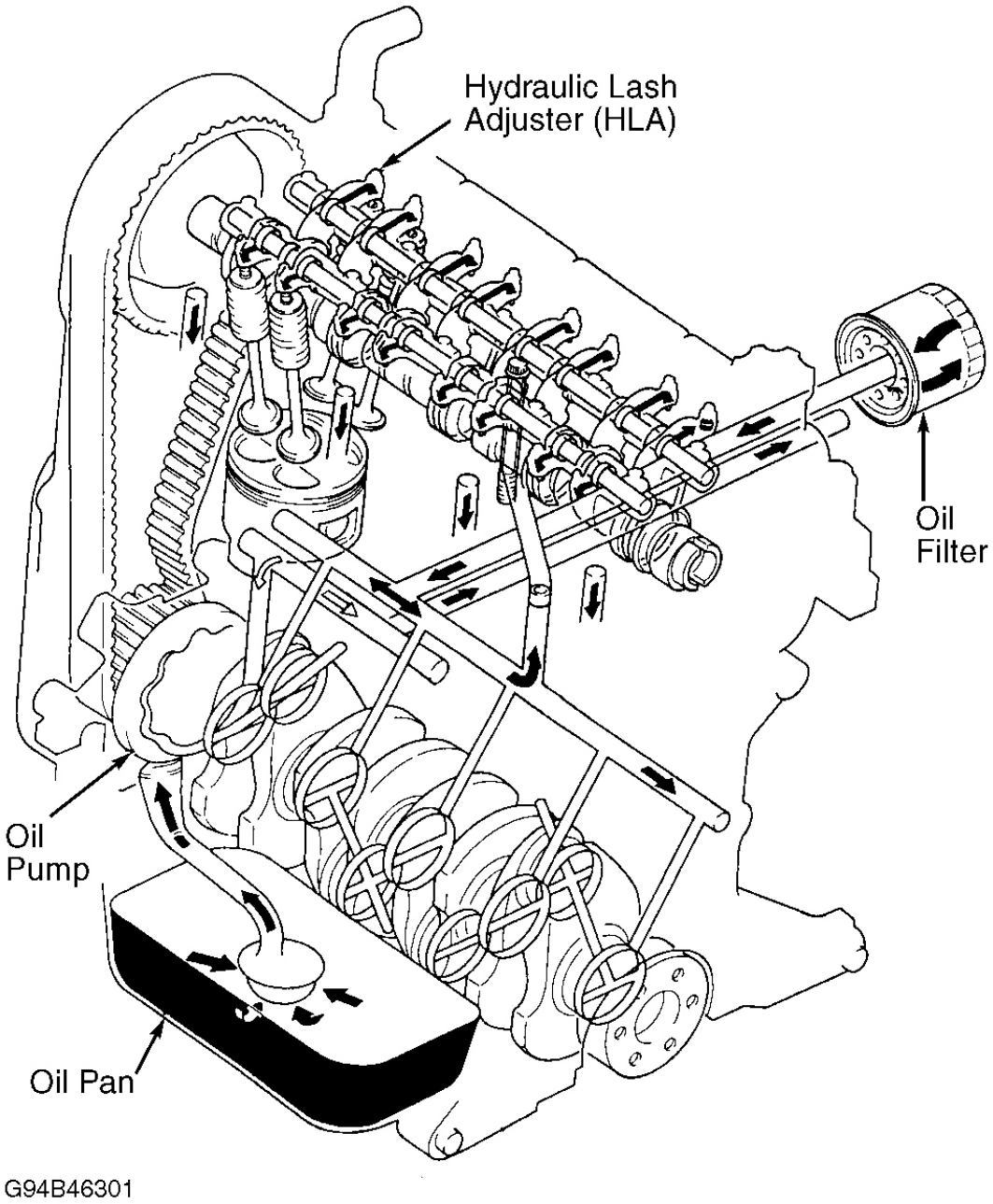

Fig. 21: Cross-Sectional View Of Engine Oil Circuit (SOHC)
Courtesy of KIA MOTORS AMERICA, INC.

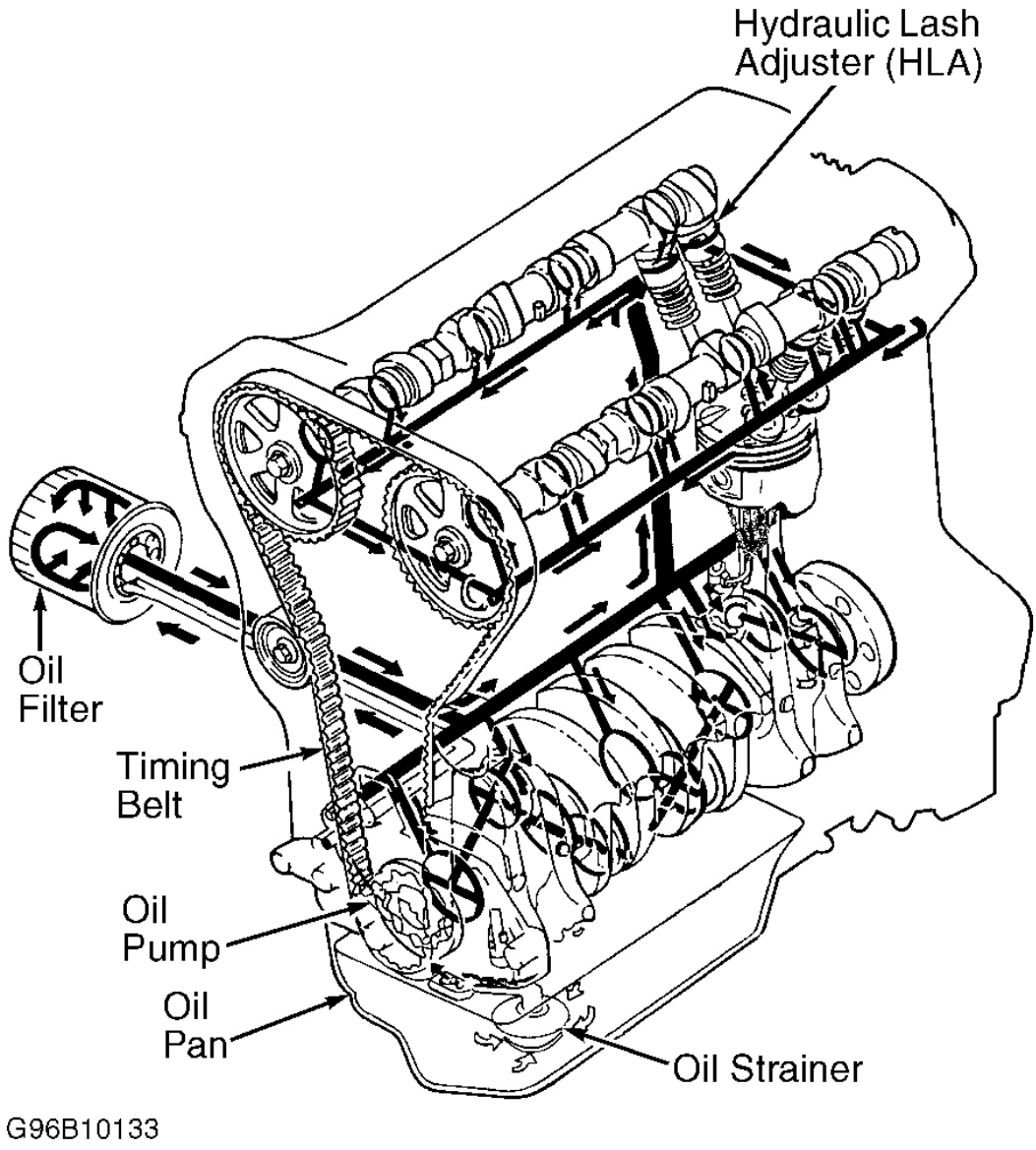

Fig. 22: Cross-Sectional View Of Engine Oil Circuit (DOHC)
Courtesy of KIA MOTORS AMERICA, INC.

OIL PUMP

Removal

1. Disconnect negative battery cable. Remove timing belt. See TIMING BELT & SPROCKETS under REMOVAL & INSTALLATION. Remove crankshaft sprocket and Woodruff key. Remove oil pan and Main Bearing Support Plate (MBSP). See **OIL PAN** under REMOVAL & INSTALLATION.

2. Remove oil pump pick-up tube. Remove A/C compressor and mounting bracket (if equipped) from engine block. Remove dipstick tube. Remove generator lower mounting bolt and position generator away from oil pump. Remove oil pump bolts. Remove oil pump and gasket.
3. Remove front oil seal. Carefully clean all gaskets and sealant from mating surfaces without damaging sealing/mating surfaces. Remove all sealant from components and bolts. Check oil pump clearances. See **OIL PUMP SPECIFICATIONS**. Replace oil pump as necessary.

Installation

1. Use NEW gaskets when installing oil pump and pick-up tube. Tighten oil pump bolts to specification. See **TORQUE SPECIFICATIONS**. Apply light oil coat of clean oil to oil seal lip, and tap oil seal into oil pump body until it is flush with edge of pump body. **DO NOT** bottom seal in pump body.
2. Align keyway slots, and install crankshaft sprocket by tapping lightly using brass hammer. Install Woodruff key with tapered side toward oil pump body. Install crankshaft sprocket lock bolt and tighten to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

OIL PUMP SPECIFICATIONS

Application	Max. Clearance In. (mm)
Inner Gear Tip-To-Outer Gear Clearance	.0079 (.201)
Outer Gear-To-Pump Body Clearance	.0087 (.221)
Gear Side-To-Pump Body Clearance	.0055 (.140)
Pressure Spring Length	
1995	1.791 (45.49)
1996	1.807 (45.9)

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
A/C Compressor Belt Tension Pulley Bolt	23-25 (31-34)
A/C Compressor Mounting Bolt	27-38 (37-52)
Ball Joint	32-43 (43-59)
Camshaft Sprocket Bolt	37-45 (50-61)
Clutch Cover	13-20 (18-26)
Connecting Rod Nut	35-37 (47-50)
Crankshaft Pulley Lock Bolt	80-87 (108-118)
Crankshaft Sprocket Bolt	116-123 (157-167)
Cylinder Head Bolt (1) (2)	
Step 1	35-40 (47-54)
Step 2	56-60 (76-81)
Distributor Bolt	14-18 (19-25)
Dynamic Damper Bolt	55-76 (74-103)

Engine Crossmember Bolt	47-66 (64-89)
Engine Hanger	
Front	27-46 (37-63)
Rear	14-19 (19-26)
Engine Mount-To-Block	68-83 (93-113)
Engine Mount-To-Crossmember Nut	27-38 (37-52)
Engine Mount-To-Frame Through Bolt	49-69 (67-93)
Exhaust Downpipe Nut	27-38 (37-52)
Exhaust Manifold-To-Head Nut/Bolt	
1.6L	12-17 (16-23)
1.8L	28-34 (38-46)
Extension Bar (M/T)	23-34 (31-46)
Flywheel/Flex Plate Bolt (3)	71-76 (96-103)
Fuel Rail Bolt	14-19 (19-26)
Generator Adjusting Bolt	14-19 (19-26)
Generator Mounting Bolt	27-38 (37-52)
Intake Manifold Bolt (1) (2)	14-19 (19-26)
Intake Manifold Support Bracket	
1.6L DOHC	14-18 (19-25)
1.8L DOHC	23-34 (31-46)
Main Bearing Cap Bolt (1) (2)	40-44 (54-59)
Main Bearing Support Plate	12-15 (16-21)
Oil Cooler Mounting Nut	22-29 (30-39)
Oil Pan Stiffener-To-Transaxle Bolt	27-38 (37-52)
Oil Pump Bolt	14-19 (19-26)
Power Steering Pump Adjusting Bolt	14-19 (19-26)
Power Steering Pump Mounting Bolt	28 (38)
Pressure Plate Bolt	13-20 (18-26)
Rocker Arm Shaft Bolt (1) (2)	16-21 (22-28)
Shift Control Rod (M/T)	12-17 (16-23)
Slave Cylinder	12-17 (16-23)
Spark Plug	11-17 (15-23)
Starter Bolt	
1.6L	14-18 (19-25)
1.8L	27-38 (37-52)
Thermostat Housing	14-18 (19-25)
Timing Belt Tensioner Bolt	
SOHC	14-18 (19-25)
DOHC	28-38 (38-51)
Torque Converter Nuts	26-36 (35-49)

Transaxle-To-Engine Bolt	
Automatic Transaxle	41-59 (56-60)
Manual Transaxle	47-66 (64-89)
Water Pump Bolt	14-19 (19-26)
	INCH Lbs. (N.m)
Camshaft Bearing Cap Bolt (2)	
SOHC	100-126 (11-14)
DOHC	109-156 (12-18)
Camshaft Thrust Plate Bolt	69-97 (7.8-11)
Crankshaft Pulley Bolt	109-152 (12-17)
End Plate	69-97 (7.8-11)
Engine Coolant Temperature Sensor	57-82 (6.4-9.3)
Exhaust Manifold Insulator	69-97 (7.8-11)
Oil Dipstick Tube	70-97 (8-11)
Oil Jet	109-156 (12-18)
Oil Pan Bolt	69-97 (7.8-11)
Oil Pressure Switch	109-156 (12-18)
Oil Pump Pick-up Tube Bolt	69-97 (7.8-11)
Rear Cover Bolt	69-109 (7.8-12)
Timing Belt Cover Bolt	69-97 (7.8-11)
Valve Cover	43-78 (4.9-8.8)
Vehicle Speed Sensor	69-97 (7.8-11)
Water Pump Pulley Bolt	69-97 (7.8-11)
(1) Tighten bolts in two or three steps.	
(2) Tighten bolts in proper sequence.	
(3) Tighten in a crisscross pattern.	

ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

GENERAL ENGINE SPECIFICATIONS

Application	Specification
Displacement	
1.6L	97.4 Cu. In.
1.8L	112 Cu. In.
Bore	
1.6L	3.07" (78.0 mm)
1.8L	3.27" (83 mm)
Stroke	

1.6L	3.29" (83.6 mm)
1.8L	3.35" (85 mm)
Compression Ratio	
2-Valve	9.3:1
4-Valve	9.0:1
Fuel System	SFI
Horsepower @ RPM	
1.6L	88 @ 5000
1.8L	127 @ 6500
Torque Ft. Lbs. @ RPM	
1.6L	98 @ 4000
1.8L	114 @ 4500

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS SPECIFICATIONS

CRANKSHAFT, MAIN & CONNECTING ROD BEARINGS

Application	In. (mm)
Crankshaft End Play	
Standard	.0032-.0111 (.080-.282)
Service Limit	.012 (.30)
Maximum Runout	.0016 (.040)
Main Journal Bearings	
Journal Diameter	1.9660-1.9668 (49.936-49.956)
Journal Out-Of-Round & Taper	.002 (.051)
Oil Clearance	
1995 1.6L SOHC	
Standard	.0007-.0014 (.018-.036)
Service Limit	.004 (.10)
1996 1.6L & 1.8L DOHC	
Standard	.0008-.0014 (.020-.036)
Service Limit	.004 (.10)
Connecting Rod Bearings	
Journal Diameter	1.7693-1.7699 (44.940-44.956)
Journal Out-Of-Round & Taper	.002 (.051)
Oil Clearance	
1995	
Standard	.0011-.0027 (.028-.068)
Service Limit	.004 (.10)
1996	
1.6L - Standard	.0012-.0026 (.030-.066)
1.8L - Standard	.0008-.0017 (.020-.043)

Service Limit (1.6L & 1.8L)	.004 (.10)

CONNECTING RODS SPECIFICATIONS

CONNECTING RODS

Application	In. (mm)
Bore Diameter	
Connecting Rod Bearing Bore	1.8898-1.8904 (48.000-48.016)
Piston Pin Bore	
1.6L SOHC	.7852-.7859 (19.944-19.961)
1.6L & 1.8L DOHC	.7876-.7879 (20.005-20.012)
Center-To-Center Length	5.230-5.234 (132.84-132.94)
Maximum Bend (1)	.003 (.08)
Side Play	
Standard	.0043-.0103 (.110-.262)
Service Limit	.012 (.30)
(1) Maximum bend per 1.97" (50 mm)	

PISTONS, PINS & RINGS SPECIFICATIONS

PISTONS, PINS & RINGS

Application	In. (mm)
Piston Clearance	
1.6L	
Standard	.0015-.0020 (.038-.051)
Service Limit	.006 (.15)
1.8L	
Standard	.0013-.0023 (.033-.058)
Service Limit	.006 (.15)
Piston Diameter	
1.6L	3.0690-3.0698 (77.953-77.973)
1.8L	3.2660-3.2666 (82.956-82.972)
Pin Diameter	
1.6L SOHC	.7864-.7866 (19.974-19.980)
1.6L & 1.8L DOHC	.7869-.7871 (19.987-19.992)
Piston Fit	
1.6L SOHC	.0003-.0020 (.008-.051)
1.6L & 1.8L DOHC	.0001-.0005 (.005-.013)

Rod Fit	
1.6L	.0005-.0015 (.013-.038)
1.8L	.0004-.0011 (.010-.027)
Rings	
1.6L	
No. 1	
End Gap	
Standard	.006-.012 (.15-.30)
Service Limit	.039 (1.0)
Side Clearance	
SOHC - Standard	.0012-.0028 (.030-.071)
DOHC - Standard	.0012-.0025 (.030-.064)
Service Limit	.006 (.15)
No. 2	
End Gap	
Standard	.012-.018 (.300-.46)
Service Limit	.039 (1.0)
Side Clearance	
Standard	.0012-.0028 (.030-.071)
Service Limit	.006 (.15)
No. 3 (Oil)	
End Gap	
Standard	.008-.028 (.20-.71)
Service Limit	.039 (1.0)
1.8L	
No. 1 & No. 2	
End Gap	
Standard	.006-.012 (.150-.300)
Service Limit	.039 (1.0)
Side Clearance	
Standard	.0012-.0028 (.030-.071)
Service Limit	.006 (.15)
No. 3 (Oil)	
End Gap	
Standard	.008-.027 (.20-.69)
Service Limit	.039 (1.0)

CYLINDER BLOCK SPECIFICATIONS

CYLINDER BLOCK

Application	In. (mm)

Cylinder Bore Standard Diameter	
1.6L	3.0711-3.0714 (78.006-78.014)
1.8L	3.2678-3.2684 (83.002-83.018)
Maximum Taper & Out-Of-Round	.0007 (.018)
Deck Height	
Standard	8.728 (221.7)
Minimum	8.720 (221.5)
Maximum Deck Warpage	
1.6L SOHC	(1) .006 (.15)
1.6L DOHC	(2) .002 (.05)
1.8L DOHC	(1) .006 (.15)
(1) Replace cylinder block if material removed from deck is more than .008" (20 mm)	
(2) Replace cylinder block if material removed from deck is more than .004" (10 mm)	

VALVES & VALVE SPRINGS SPECIFICATIONS

VALVES & VALVE SPRINGS

Application	Specification
Valves	
Face Angle	45°
Head Diameter	
1.6L	(1)
1.8L	
Intake	1.295-1.303" (32.9-33.1 mm)
Exhaust	1.096-1.108" (27.85-28-15 mm)
Minimum Margin	
1995	
2-Valve	
Intake	.031" (0.8)
Exhaust	.043" (1.1)
4-Valve	
Intake	035" (0.9 mm)
Exhaust	.039" (1.0 mm)
1996	
1.6L	
Intake	.040" (1.1 mm)
Exhaust	.045" (1.2 mm)
1.8L	

Intake	.035" (0.9 mm)
Exhaust	.039" (1.0 mm)
Minimum Refinish Length	
1995	
2-Valve	
Intake	
Standard	4.085" (103.76 mm)
Minimum	4.066" (103.27 mm)
Exhaust	
Standard	4.042" (102.67 mm)
Minimum	4.022" (102.16 mm)
4-Valve	
Intake	
Standard	4.088" (103.84 mm)
Minimum	4.068" (103.33 mm)
Exhaust	
Standard	4.181" (106.20 mm)
Minimum	4.112" (104.44 mm)
1996	
1.6L	
Intake	
Standard	4.1453" (105.29 mm)
Minimum	4.1295" (104.89 mm)
Exhaust	
Standard	4.1492" (105.39 mm)
Minimum	4.1334" (104.99 mm)
1.8L	
Intake	
Standard	4.0114" (101.89 mm)
Minimum	3.9524" (100.39 mm)
Exhaust	
Standard	4.0153" (101.99 mm)
Minimum	3.9563" (100.49 mm)
Stem Diameter	
1995	
2-Valve	
Intake	.2744-.2750" (6.970-6.985 mm)
Exhaust	.2742-.2748" (6.965-6.980 mm)
1995 4-Valve, 1996 1.6L & 1.8L	
Intake	.2350-.2356" (5.970-5.985 mm)
Minimum (1996)	.2331" (5.920 mm)
Exhaust	

	.2348-.2354" (5.964-5.979 mm)
Minimum (1996)	.2329" (5.915 mm)
Installed Height (2)	
1.6L SOHC 8-Valve	
Intake & Exhaust	1.535-1.555" (39.00-39.50 mm)
1.6L SOHC 16-Valve	
Intake	1.673-1.693" (42.50-43.00 mm)
Exhaust	1.614-1.634" (41.00-41.50 mm)
1.6L DOHC	
Intake & Exhaust	1.737-1.771" (44.1-45.0 mm)
1.8L DOHC	
Intake & Exhaust	1.771-1.791" (45.0-45.5 mm)
Valve Springs	
Intake	
Free Length	
1.6L SOHC 8-Valve	
Standard	1.7165" (43.60 mm)
Minimum Limit	1.398" (35.50 mm)
1.6L SOHC 16-Valve	
Standard	1.815" (46.10 mm)
Minimum Limit	(3) 1.535" (38.99 mm)
1.6L DOHC	
Standard	1.890" (48.01 mm)
Minimum	1.555" (39.50 mm)
1.8L DOHC	
Standard	1.821" (46.25 mm)
Minimum Limit	1.561" (39.65 mm)
Exhaust	
Free Length	
1.6L SOHC 8-Valve	
Standard	1.7165" (43.60 mm)
Minimum Limit	1.398" (35.51 mm)
1.6L SOHC 16-Valve	
Standard	1.687" (42.85 mm)
Minimum Limit	(4) 1.496" (38.00 mm)
1.6L DOHC	
Standard	1.903" (48.34 mm)
Minimum	1.555" (39.50 mm)
1.8L DOHC	
Standard	1.821" (46.25 mm)
Minimum Limit	1.561" (39.65 mm)

Out-Of-Square	
SOHC 8-Valve	
Intake & Exhaust	.060" (1.52 mm)
SOHC 16-Valve	
Intake	.063" (1.60 mm)
Exhaust	.059" (1.50 mm)
DOHC Intake & Exhaust	.064" (1.63 mm)

(1) Information is not available at time of publication.

(2) Valve height is measured from top of installed valve to spring seat.

(3) Measure with 46-52 lbs. (20.9-23.6 kg) of pressure applied to spring.

(4) Measure with 30-40 lbs. (13.6-18.1 kg) of pressure applied to spring.

CYLINDER HEAD SPECIFICATIONS

CYLINDER HEAD

Application	Specification
Cylinder Head Height	
SOHC	4.228-4.236" (107.39-107.59 mm)
DOHC	5.268-5.275" (133.81-134.00 mm)
Maximum Warpage	
SOHC	.006" (.15 mm)
DOHC	.004" (.10 mm)
Valve Seats	
Seat Angle	45°
Seat Width	
SOHC	.047-.063" (1.2-1.6 mm)
DOHC	.031-.055" (.79-1.40 mm)
Valve Guides	
1.6L SOHC 8-Valve I.D.	.2760-.2768" (7.01-7.03 mm)
1.6L SOHC 16-Valve, 1.6L & 1.8L DOHC	
Valve Guide I.D.	.2366-.2374" (6.010-6.030 mm)
Installed Height	(1)
SOHC 8-Valve	
Intake & Exhaust	.520-.543" (13.2-13.8 mm)
1.6L SOHC 16-Valve & DOHC	
Intake & Exhaust	.661-.685" (16.79-17.40 mm)
1.8L DOHC	

Intake & Exhaust	.720-.744" (18.29-18.90 mm)
Valve Stem-To-Guide Oil Clearance	
Intake	.0010-.0024" (.025-.060 mm)
Exhaust	.0012-.0026" (.030-.066 mm)
Service Limit	.008" (.20 mm)
(1) Valve guide installed height is measured from top of installed guide to spring seat.	

CAMSHAFT SPECIFICATIONS

CAMSHAFT

Application	In. (mm)
Bore Diameter	
SOHC	
8-Valve	
Front & Rear	1.7132-1.7139 (43.515-43.533)
Center	1.7132-1.7139 (43.515-43.533)
End Play	.0020-.0071 (.050-.180)
16-Valve	
No. 1 & 5	1.7126-1.7132 (43.500-43.515)
No. 2, 3 & 4	1.7120-1.7128 (43.485-43.505)
End Play	.0024-.0075 (.061-.191)
DOHC - 16-Valve End Play	.003-.008 (.08-.20)
Journal Diameter	
SOHC	
8-Valve	
Front & Rear	1.7102-1.7110 (43.440-43.460)
Center	1.7098-1.7108 (43.430-43.454)
16-Valve	
Journals No. 1 & 5	1.7102-1.7110 (43.440-43.460)
Journals No. 2 & 4	1.7096-1.7106 (43.425-43.450)
Journal No. 3	1.7091-1.7100 (43.410-43.434)
1.6L DOHC	1.3371-1.3385 (33.962-34.000)
1.8L DOHC	1.0213-1.0222 (25.940-25.964)
Maximum Journal Out-Of-Round	
SOHC & DOHC	.002 (.05)
Maximum Journal Runout	
SOHC	.0004 (.010)
DOHC	.0012 (.030)
Journal Oil Clearance	
SOHC	
8-Valve	

Front & Rear	.0021-.0037 (.055-.094)
Center	.0023-.0041 (.058-.104)
Service Limit	.006 (.15)
16-Valve	
No. 1 & 5	.0016-.0030 (.040-.076)
No. 2 & 4	.0014-.0031 (.036-.079)
No. 3	.0020-.0037 (.050-.094)
Service Limit	.006 (.15)
DOHC	.0014-.0032 (.036-.081)
Lobe Height	
SOHC	
8-Valve	
Intake & Exhaust	
Standard	1.4351 (36.451)
Service Limit	1.4272 (36.251)
16-Valve	
Intake	
Standard	1.4106 (35.829)
Service Limit	1.4027 (35.629)
Exhaust	
Standard	1.4039 (35.659)
Service Limit	1.3960 (35.459)
1.6L DOHC	
Intake	
Standard	1.6098 (40.888)
Service Limit	1.6019 (40.688)
Exhaust	
Standard	1.6097 (40.886)
Service Limit	1.6018 (40.686)
1.8L DOHC	
Intake	
Standard	1.7360 (44.094)
Service Limit	1.7281 (43.894)
Exhaust	
Standard	1.7560 (44.602)
Service Limit	1.7480 (44.400)

ROCKER ARM SHAFT ASSEMBLY SPECIFICATIONS

ROCKER ARM SHAFT ASSEMBLY

Application	In. (mm)

8-Valve	
Rocker Arm I.D.	.7087-.7097 (18.000-18.026)
Rocker Arm Shaft O.D.	.7070-.7079 (17.958-17.980)
Rocker Arm-To-Shaft Clearance	
Standard	.0008-.0027 (.0203-.0685)
Service Limit	.004 (.10)
16-Valve	
Rocker Arm I.D.	.7480-.7493 (19.000-19.033)
Rocker Arm Shaft O.D.	.7464-.7472 (18.959-18.980)
Rocker Arm-To-Shaft Clearance	
Standard	.0008-.0029 (.0203-.0737)
Service Limit	.004 (.10)

