4.1 LITER V8

IDENTIFICATION CODING

ENGINE IDENTIFICATION

Engine may be identified from the Vehicle Identification Number (VIN) stamped on a metal tab located on top of instrument panel at lower left of windshield. VIN number code also appears on a pad attached to left rear corner of crankcase. The VIN number contains 17 digits. The 8th digit identifies the engine and the 10th digit establishes the model year.

Engine Code

Engine	Code
4.1L (250") Digital Fuel Injection	8

SPECIAL ENGINE MARKS

Information identifying oversize components are stamped in following location:

Oversize Valve Guides – On cylinder head gasket surface in line with oversize valves. Number indicates amount guide is oversize ("3" indicates .003" oversize).

ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

CYLINDER HEAD & MANIFOLDS

INTAKE MANIFOLD

Removal – 1) Remove air cleaner. Drain cooling system. Disconnect upper radiator hose from upper thermostat housing. Disconnect the following electrical connections and position wiring harnesses out of the way: Coolant sensor, MAT sensor, throttle position sensor, 12 volt feed and 4-way connector from distributor, ISC motor and fuel injectors.

2) Disconnect heater hose at rear of intake manifold. Disconnect fuel lines at throttle body. Remove distributor and rocker arm covers. Remove rocker arm support and rocker arms as an assembly by removing 5 nuts mounting support to head bolt studs. Remove push rods and mark for reinstallation in same location.

NOTE – *A thrust washer is used between distributor drive gear and crankcase. This thrust washer may stick to bottom of distributor.*

3) Loosen A/C compressor without discharging system and power steering pump enough to facilitate removal of manifold. Remove vacuum harness connections from TVS at rear of intake manifold. Remove 16 intake manifold bolts and 2 bolts securing thermostat housing to front cover.

4) Bend engine lifting brackets enough to remove manifold. Remove intake manifold and lower thermostat housing as an assembly by lifting straight up off of dowels. Remove and discard manifold gaskets and 3 thermostat housing "O" rings. Clean gasket surfaces as required.

NOTE – *Soft wire brushes or dull scrapers should be used to clean gasket surfaces of aluminum parts to prevent damage to surface.*

Installation – 1) Install new intake manifold gaskets with locating pins engaged with holes in cylinder head. Apply RTV sealant to each corner of end seals where the seals meet side gaskets. Apply a light coat of grease to new thermostat housing "O" rings and assemble lower thermostat housing and water transfer pipe to intake manifold.

2) Lightly coat new water pump-to-thermostat "O" ring with grease and position "O" ring on water pump outlet; do not insert "O" ring into thermostat housing bore. Carefully lower intake manifold and thermostat housing assembly onto engine so crankcase dowel pins engage manifold and thermostat housing is positioned over water pump outlet.

NOTE – *Do not damage thermostat housing "O" ring during installation. By removing thermostat, evidence of "O" ring damage can be seen if "O" ring is squeezed out of position.*

3) Loosely install 16 intake manifold bolts as shown in *Fig. 1*. Tightening of intake manifold bolts must be done in the following sequence: Tighten bolts 1 through 4 in sequence to 11-15 ft. lbs. (15-20 N·m); tighten bolts 5 through 16 in sequence to 18-22 ft. lbs. (24-30 N·m); tighten all bolts in sequence to 18-22 ft. lbs. (24-30 N·m).

NOTE – *Final intake manifold bolt torque must not exceed 22 ft. lbs. (30 N·m).*

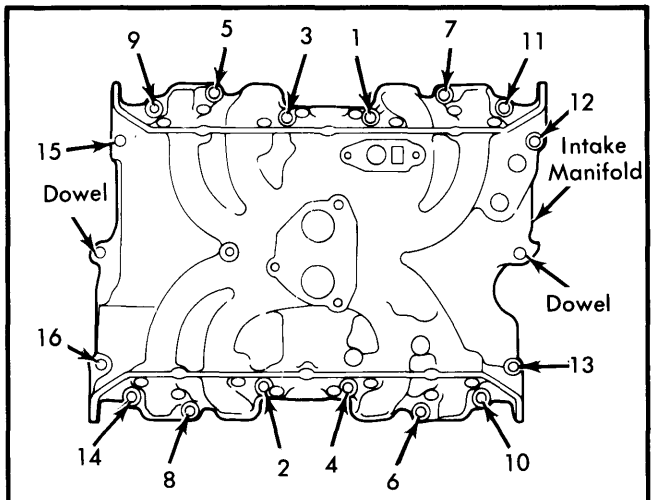


Fig. 1 Intake Manifold Tightening Sequence

4) Install lower thermostat housing and secure with 2 bolts. Tighten bolts. Install distributor and A/C compressor. Install push rods in original positions and make sure push rods are seated in valve lifters.

5) Assemble rocker arms and pivots to valve train support and install assembly over head bolts. Carefully position push rods into rocker arm seats and loosely install rocker arm assembly retaining nuts. Recheck push rods for correct positioning and tighten retaining nuts alternately and evenly until seated. After seating retaining nuts, tighten nuts. To complete installation, reverse removal procedure.

4.1 LITER V8 (Cont.)

EXHAUST MANIFOLD

Removal (Left Side) – 1) Remove air cleaner and tube assembly from air preheat stove. Remove oil dipstick tube retaining screw from preheat stove. Remove preheat stove screws and remove stove from exhaust manifold.

2) On Eldorado and Seville models, remove 2 nuts securing transmission linkage support to manifold. On all models, disconnect "Y" pipe from exhaust manifold. Remove oxygen sensor, exhaust manifold bolts and exhaust manifold.

Removal (Right Side) – 1) On Fleetwood and DeVille models only, remove transmission cooler line bracket bolt from exhaust manifold. On all models, remove 2 nuts securing AIR valve bracket to exhaust manifold. Remove upper exhaust manifold bolts.

2) Raise vehicle on a hoist and remove lower exhaust manifold bolts. Disconnect "Y" pipe from exhaust manifold. Lower vehicle and remove exhaust manifold.

Installation – Apply a thin layer of graphite dry film lubricant to exhaust manifold surfaces which contact cylinder head and heat stove. Position manifold on cylinder head and tighten bolts. To complete installation, reverse removal procedure.

CYLINDER HEAD

Removal – 1) Drain cooling system and remove rocker arm covers and intake manifold. Remove generator, AIR pump and ground strap from right cylinder head. Remove vacuum pump and bracket, and power steering pump from left cylinder head. Remove exhaust manifolds and heat stoves, if equipped.

2) Remove AIR pipe attaching component from each head. Remove head bolts and cylinder head. Discard cylinder head gaskets. Carefully remove all gasket material from cylinder head and block, without damaging aluminum surfaces.

Installation – Blow out head bolt holes with compressed air. Coat manifold surfaces of cylinder heads with graphite lubricant. Install new head gaskets over dowels. Install cylinder head and tighten bolts finger tight. Install bolts and tighten in 2 steps in sequence shown in *Fig. 3*.

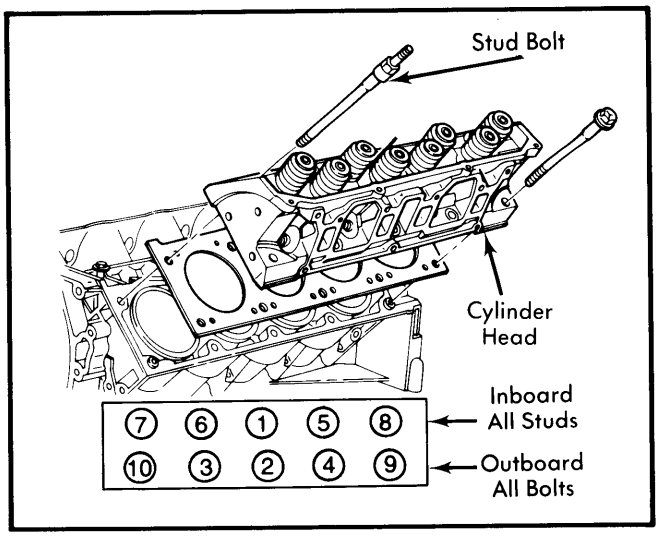


Fig. 3 Cylinder Head Bolt Location and Tightening Sequence

VALVES

VALVE ARRANGEMENT

I-E-I-E-E-I-E-I (Front to rear, both banks).

VALVE GUIDE SERVICING

Service valves are available in standard, .003" and .006" oversize. If clearance is not within specifications, guide should be reamed to next oversize using appropriate reamer and valve having corresponding oversize stem should be installed. When installing oversize valves and guides, stamp oversize on cylinder head gasket surface.

VALVE STEM OIL SEALS

Oil seals are installed on all valve guides. A new seal should be installed whenever valve spring is removed. To install new seals, coat seal with engine oil, carefully slide seal over valve stem and push down until it contacts valve guide. Using seal installer (J-29790 or equivalent), push seal onto guide until seal installer bottoms out.

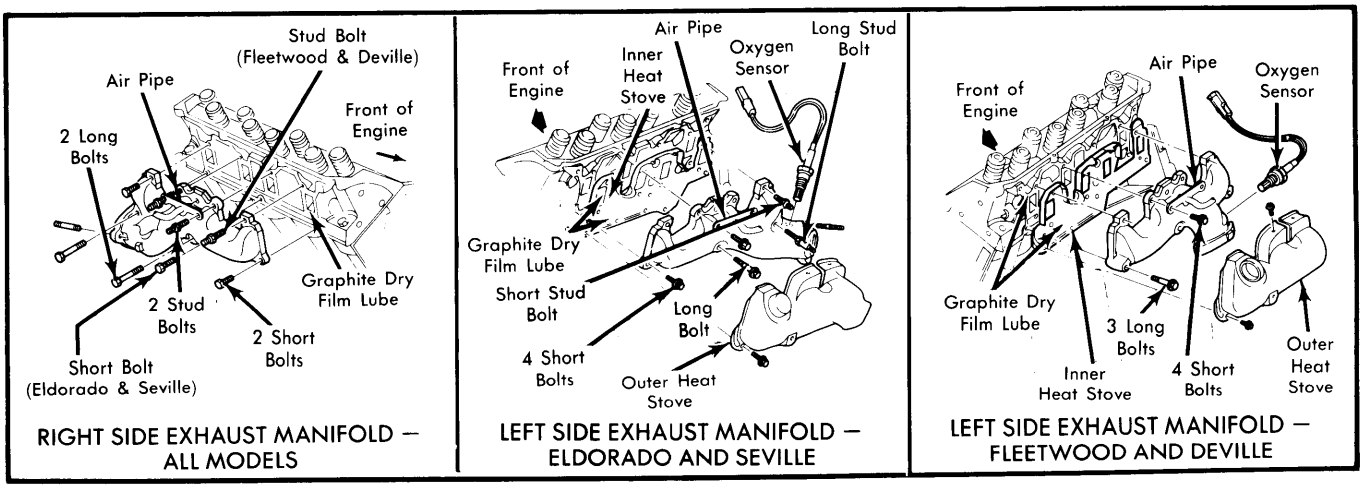


Fig. 2 4.1 Liter Exhaust Manifold

4.1 LITER V8 (Cont.)

VALVE SPRINGS

Removal – 1) Remove rocker arm covers. Remove 5 nuts from valve train studs and remove valve train support assembly with rocker arms and pivots attached. Remove spark plug from cylinder to be serviced. Install air line adapter (J-22794 or equivalent) finger tight and apply compressed air to hold valves closed.

2) Using valve spring compressor (J-26513), compress spring until valve stem locks can be removed. Remove retainer and valve spring/damper assembly. Pry valve stem seal off guide with a small screwdriver and discard seal.

Installation – To install, reverse removal procedure and ensure that close-type coil end of springs are installed against cylinder head.

ROCKER ARM ASSEMBLY

Removal – Remove rocker arm covers. Remove 5 nuts securing valve train support to stud bolts and remove valve train assembly with rocker arms and pivots attached. Secure support in vise and remove rocker arms and pivots.

Installation – Prior to assembly of rocker arms and pivots to valve train assembly, lubricate all parts with an "EP" lubricant (or equivalent). Assemble rocker arms and pivots to valve train and reverse removal procedure to install valve train assembly.

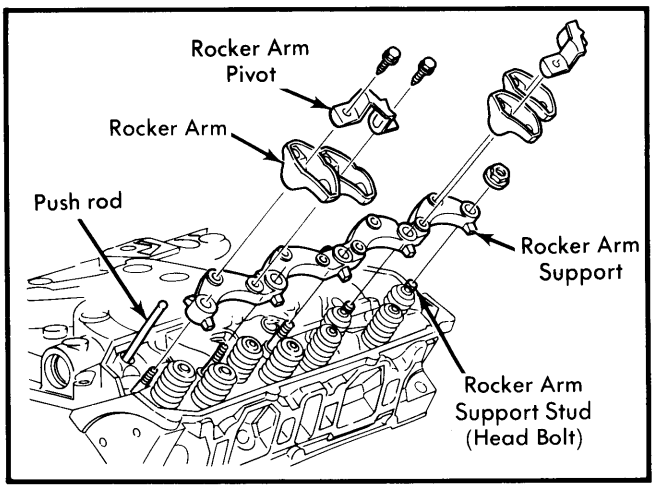


Fig. 4 Rocker Arm Assembly

HYDRAULIC VALVE LIFTER ASSEMBLY

1) Using a small screwdriver or pointed tool, remove valve lifter assemblies. Keep in sequence for installation in original location. Use valve lifter remover (J-29834 or equivalent) to remove any stuck lifters, rotating lifter back and forth during removal.

NOTE – *Do not score aluminum lifter bores during removal and installation of valve lifters.*

2) Valve lifter body and plunger assemblies are matched pairs and are not interchangeable between other valve lifters. If valve lifters require replacement, ensure replacement lifters are specifically listed for the 4.1L V8 engine.

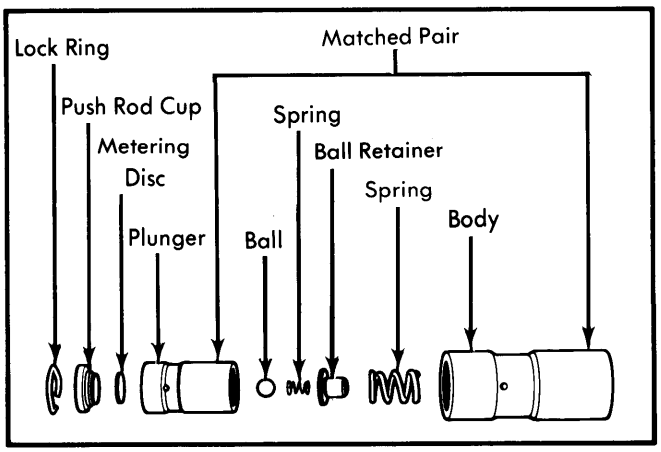


Fig. 5 Hydraulic Valve Lifter Assembly

HYDRAULIC VALVE LIFTER LEAKDOWN TESTING

1) Use valve lifter leakdown rate tester (J-3074) to check for faulty lifters without removal from engine. Tool uses a feeler gauge of specific thickness placed between rocker arm and valve stem, causing valve spring pressure to force oil out of lifter.

2) A spring, attached to tool and compressed against the valve spring retainer, ejects the feeler gauge when lifter has leaked down enough to allow valve to seat. Faulty lifter(s) can be easily located by observing length of time required for each lifter to leakdown thickness of feeler gauge. Run engine to allow lifters to fill with oil and check lifters as follows:

3) Remove distributor cap and align rotor to No. 1 firing position. Remove air cleaner. Disconnect negative battery cable, spark plug wires at plugs and remove wiring from tabs on rocker arm covers.

4) Remove rocker arm covers and check cylinder Nos. 1, 2, 5, 7 and 8 intake valves and Nos. 1, 2, 3, 4 and 8 exhaust valves.

5) Insert feeler gauge of tool between valve stem and at same time compress tool "popout" spring to its stop against valve spring retainer.

NOTE – *Install tool as quickly as possible to avoid unnecessary lifter leakdown.*

6) Note interval that tool is held in place by valve spring pressure. Noisy lifter(s) will have shortest leakdown time.

7) Install components previously removed and start engine to fill lifters with oil. Repeat removal of components in step **3**).

8) With distributor rotor in No. 6 firing position, check Nos. 3, 4 and 6 intake valves and Nos. 5, 6 and 7 exhaust valves, observing time. Install components by reversing removal procedure.

PISTONS, PINS & RINGS

OIL PAN

See oil pan removal at end of ENGINE Section.

4.1 LITER V8 (Cont.)

PISTON & ROD ASSEMBLY

Removal – 1) Remove cylinder head(s) and oil pan. Install cylinder liner holder (J-29775) along top of cylinder liners to hold liners in position.

2) Mark connecting rods and caps for cylinder identification. Remove rod cap and push rubber hose onto connecting rod bolts to protect crankshaft and cylinder liner bore. Push piston and rod assembly out top of cylinder liner. Install cap on mating rod.

Installation – 1) When installing piston rings, make sure markings (dimples) on top of compression rings face up (top of piston). Lightly coat pistons, rings and cylinder liner bores with motor oil. Compress piston rings using suitable ring compressor.

2) Install piston and rod assembly in cylinder liner bore, making sure notch in top of piston faces front of engine. Lubricate bearing, install rod cap with bearing lock tangs aligned on same side of rod. Install rod cap nuts and tighten. Remove cylinder liner holder.

CYLINDER LINERS

CAUTION – *Cylinder liners must be matched with corresponding piston as matched pair. Ink mark assemblies for identification; do not mark with a punch. Liners which will be reused must be ink marked to show original orientation within cylinder block.*

Removal – After removing piston assemblies, remove cylinder liner holder and pull liners from cylinder block. Discard "O" ring from bottom of cylinder liner. Minor nicks or burrs on mating surfaces of cylinder block and cylinder liner can be polished out with crocus cloth.

CAUTION – *Engines which experienced overheating prior to removal of cylinder liners, require same measurements as outlined for installation of new piston/liner assembly.*

Installation (Original Liners) – If liners are reused, install new "O" ring on bottom of cylinder liner. Position liner in original position with orientation marks aligned. Seat liners and install cylinder liner holder. Install pistons in corresponding liner.

Installation (New Liners) – 1) Position new liner in block without "O" ring installed on liner. Place cylinder liner gauge (J-29776 or equivalent) on a flat surface. Using moderate pressure, zero gauge indicator.

2) Measure liner height by inserting spring loaded guide pins of gauge into liner so machined pads rest on edge of liner and indicator pointer of gauge touches cylinder head mating surface of cylinder block. See *Fig. 6*. Apply moderate pressure to gauge until pointer stops moving.

3) Read and record dial indicator reading. If reading is positive value, liner is higher than cylinder head mounting surface of block; if negative value, liner is lower than cylinder head mounting surface.

NOTE – *Indicator readings are graduated in millimeters (+1 = .01 mm, −3 = −.03 mm).*

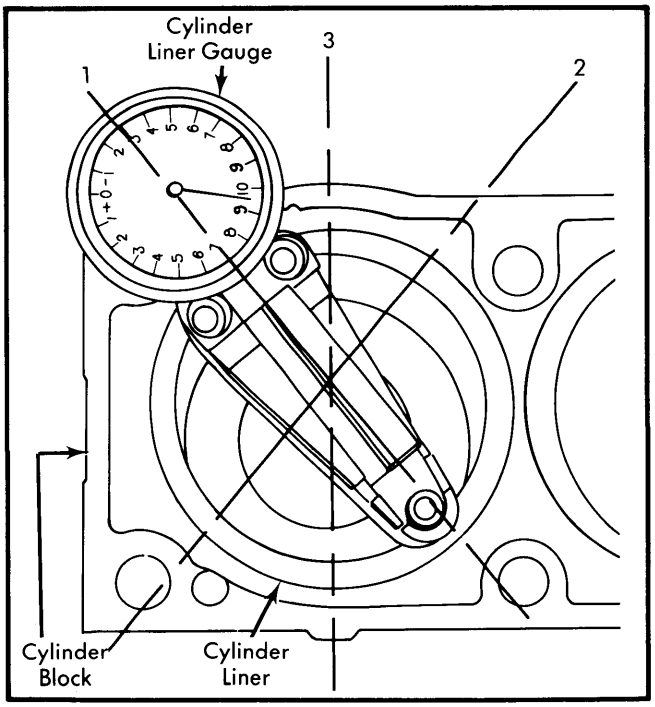


Fig. 6 Measuring Height of New Cylinder Liners

4) Repeat steps 2) and 3) at locations shown in *Fig. 6* and record readings. Determine actual liner height by calculating average of all 3 readings (add readings and divide sum by 3).

5) Correct liner height is .01-.08 mm above cylinder head mounting surface of block. Any liner below .01 mm or above .08 mm specification must be replaced with new liner. After establishing liner height within specifications, liner-to-liner dimension must be measured.

NOTE – *Liners may be rotated within cylinder block. After determining final position of liner, mark orientation of liner in block.*

6) To determine liner-to-liner height, install adjacent liner in block in its original position and orientation without "O" ring installed. Using cylinder liner gauge, place indicator pointer on upper surface of adjacent liner and hold second liner in position. See *Fig. 7*.

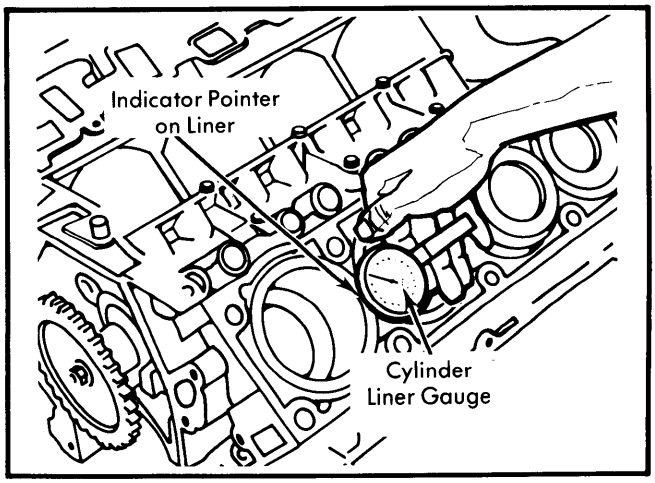


Fig. 7 Measuring Liner-to-Liner Height

4.1 LITER V8 (Cont.)

7) Liner-to-liner reading must be within +.05 mm (+5 on gauge). After setting liner-to-liner height, mark liner orientation for final reassembly and complete measurement process on all other liners. After measurement operation is completed, remove liner, install "O" ring, install liner holder and install piston assemblies.

FITTING PISTONS

With piston and rod assembly removed, thoroughly clean cylinder liner bore. Inspect bore for scoring or grooves. Measure liner bore for out-of-round. If liner out-of-round exceeds .0008" (.020 mm), new piston and liner must be installed. Measure piston diameter at right angle to piston pin, 3/8" below oil ring groove and at piston skirt. If piston taper exceeds .0005-.0020" (.013-.050 mm), piston and liner must be replaced.

NOTE – *No attempt should be made to hone or rebore cylinder liners.*

PISTON PINS

NOTE – *If piston will be discarded, use "V" block to support piston instead of piston pin remover/installer assembly.*

Removal – 1) Place adapter (J-24086-50) on support assembly at piston boss and support fork of holder (J-24086-11) between connecting rod and piston.

2) Install removal arbor (J-24086-8) through alignment hole in base of remover/installer assembly. Center piston assembly with removal arbor and press piston pin out of connecting rod.

NOTE – *Do not exceed load limit stamped on piston pin support tool or damage to tool may result.*

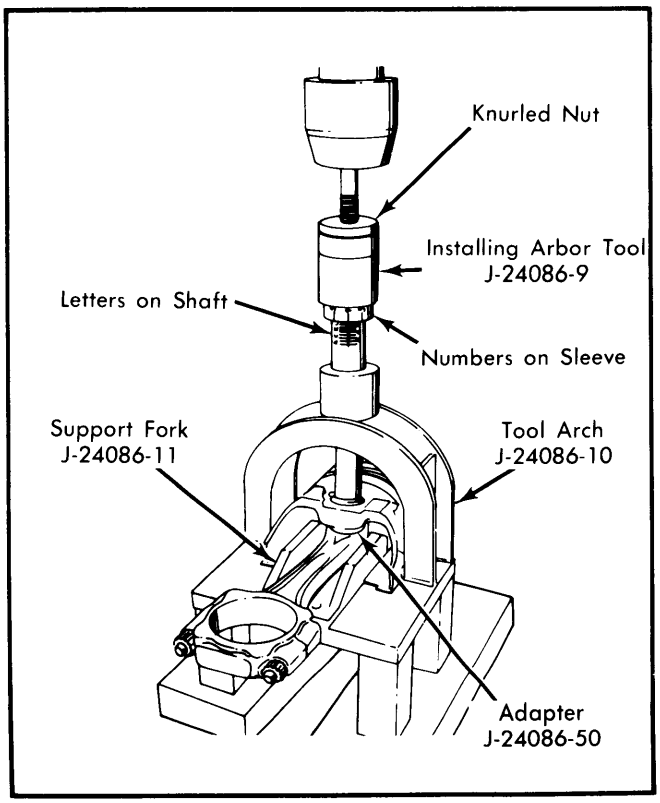


Fig. 8 Piston Pin Installation Tools

Installation – 1) Install blue pin guide (J-24086-5) through piston and into connecting rod. Hand tap pin guide into position for proper retention. Adapter (J-24086-50) must be positioned between connecting rod and piston pin boss.

NOTE – *Pin guide centers connecting rod in piston. When piston and components are positioned on fork of tool, pin guide will center assembly in tool. Using too small a pin guide will not center piston assembly in tool and damage may occur.*

2) Install piston assembly into fork assembly of tool. Tool will support connecting rod at piston pin. Piston assembly must slide onto fork until pin guide contacts fork.

3) Adjust installing arbor (J-24086-9) to "12" by turning numbered sleeve on lettered shaft. Turn knurled nut to lock numbered sleeve. See *Fig. 8*.

4) Insert installing arbor through hole in tool arch. Press piston pin into connecting rod until sleeve on installing arbor contacts top of tool arch. Pin guide will fall out of connecting rod as piston pin is pressed in.

NOTE – *Do not exceed 5000 lbs. force when seating arbor sleeve against arch.*

CRANKSHAFT & ROD BEARINGS

MAIN AND CONNECTING ROD BEARINGS

Main Bearings – 1) Check main bearing clearances one at a time using Plastigage method. If bearings are being checked with engine in vehicle, crankshaft must be supported to take up clearance between upper bearing half and crankshaft.

2) To support crankshaft, place strip of .005" (.13 mm) brass shim stock between lower bearing half and crankshaft journal in bearing caps adjacent to bearing being checked.

NOTE – *When reinstalling bearing caps with shims, lightly tighten attaching bolts to avoid damaging bearing caps.*

3) If clearance is not within specifications, replace bearings. If new bearings do not bring clearance within specifications, replace crankshaft.

4) Nos. 1, 2 and 4 upper and lower bearing halves are interchangeable; No. 3 upper and lower bearing halves are interchangeable. No. 5 upper and lower bearing halves are not interchangeable and must be installed in original positions.

5) Remove caps and lower bearing shell. Remove upper bearing by inserting suitable tool in oil hole of crankshaft journal and rotate crankshaft clockwise (viewed from front of engine) to roll bearing from engine. Oil new upper bearing and insert plain end of bearing at indented side of bearing seal. Rotate crankshaft counterclockwise to install. Install lower bearing in cap so indentation in bearing and cap coincide. Install bearing cap and tighten bolts.

NOTE – *Bearing caps have cast numbers (1/8, 2/8, 3/8, 4/8, and 5/8) on the bottom starting from front of engine. Bearing caps can not be interchanged; ensure caps are installed in proper locations. The number above the line denotes cap position and number below the line denotes VIN code of engine.*

Connecting Rod Bearings – After ensuring rod caps are marked for cylinder identification, remove rod caps (crankshaft

4.1 LITER V8 (Cont.)

journal of cylinder to be checked at bottom of throw). Use Plastigage method to check for proper bearing clearances. If clearance is not within specifications, replace bearings. If new bearings do not bring clearance within specifications, replace crankshaft. If new bearings and new crankshaft are installed, clearance should be .0005-.0028" (.012-.071 mm). Coat bearing surfaces with oil, install rod cap and tighten nuts. Rotate crankshaft after bearing replacement to ensure that bearings are not tight.

THRUST BEARING ALIGNMENT

With all main bearing cap bolts finger tight, tap crankshaft forward, then rearward several times to align thrust bearings. Tighten all main bearing cap bolts.

REAR MAIN BEARING OIL SEAL

Removal – 1) Disconnect spark plug wires and remove spark plugs. Raise vehicle on a hoist and remove oil pan and oil pump. Remove rear main bearing cap and screws together as an assembly. Remove and discard lower seal half from bearing cap.

NOTE – *Use caution if pry bars are used to loosen rear main bearing cap. Do not force anything down between block and cap to break seal.*

2) Clean RTV sealant from grooves in sides of crankcase and corresponding sides of main bearing cap. Rotate upper seal half by pushing on one end with sharp object and remove upper seal half from cylinder block. Inspect grooves in bearing cap and cylinder block to ensure both are clean, dry and free from burrs.

NOTE – *Seal halves are identical and pre-lubricated with a film of wax for break-in. Do not remove or damage film.*

Installation – 1) To install lower half of seal, slide either end into position at one end of bearing cap and place oil seal tool made fom shim stock in groove at other end of bearing cap. Lip of seal must face front of engine. Install seal half using tool as a shoehorn, ensuring seal is flush on each side. See *Fig. 9*.

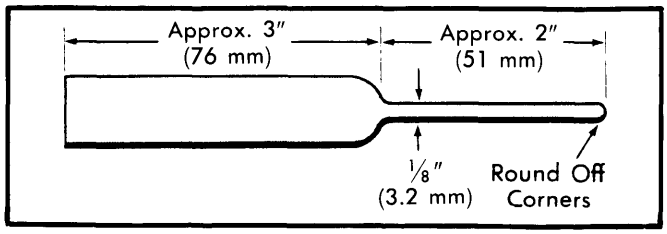


Fig. 9 Rear Main Bearing Oil Seal Installing Tool

2) To install upper half of seal, position tool in groove of block. Lubricate seal with Lubriplate and start into groove with lip facing forward. Rotate seal into position by turning crankshaft, using care not to distort seal.

NOTE – *Lubriplate (or equivalent) is only lubricant recommended to ease installation of both seal halves. Do not use silicone or an oil leak may result.*

3) Fill groove on each side of rear main bearing cap with RTV sealer until RTV is forced out between block and main bearing cap at the split line (either flywheel side or crankshaft side). Groove must be completely filled with RTV sealer or an oil leak may result. Rotate crankshaft 1 complete revolution to make sure it is not binding. Complete installation by reversing removal procedure.

CAMSHAFT

ENGINE FRONT COVER

Removal – 1) Disconnect negative battery cable. Drain cooling system. On Fleetwood and DeVille models, loosen and remove radiator support rod screws and move support rods out of the way.

2) On all models, remove 2 screws from upper fan shroud and remove wiring harness from upper fan shroud clamps. Remove 2 power steering pump reservoir-to-upper fan shroud screws and reservoir. Remove upper fan shroud-to-lower fan shroud staples and upper fan shroud.

3) Remove clutch fan assembly, drive belts, generator and generator support bracket. Partially remove A/C compressor unit without discharging system. Disconnect coolant hoses. Drain crankcase oil. Remove water pump and crankshaft pulleys, A/C bracket at water pump and timing mark tab from front cover. Remove 4 crankshaft pulley-to-hub bolts and pulley.

4) Remove plug from end of crankshaft. Install puller pilot (J-21052-4) in crankshaft bore. Install holder base (J-21052-02) on front of hub with 2 holes on base aligned with 2 holes on hub. Install 2 screws and washers and tighten finger tight. Using puller screw (J-21052-2), remove hub. Remove front cover bolts. Remove front cover, water pump and lower thermostat housing as an assembly.

NOTE – *To prevent rotation of crankshaft during hub removal, remove spark plug and install air line adapter (J-22794) finger tight. Apply air pressure to hold piston on compression stroke.*

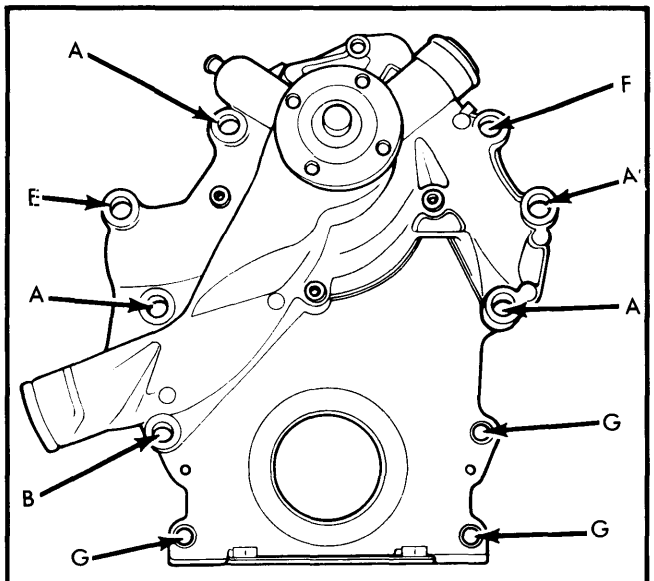
Installation – 1) Clean gasket material and RTV sealant from front cover surfaces and oil pan front lip. Coat oil pan front lip with RTV sealant. Position new front cover gasket over dowels on block. Lubricate lower thermostat housing-to-intake manifold tube "O" ring seal with chassis grease.

2) Install front cover assembly over crankshaft end into position on oil pan while inserting water tube into intake manifold. Align dowel holes in cover with dowels on block. Install retaining bolts in proper locations and tighten. See *Fig. 10*.

3) Lubricate bore of crankshaft hub and seal with extreme pressure lubricant to prevent seizure to crankshaft and to lubricate oil seal lip. Using air pressure to prevent crankshaft from turning, install hub on crankshaft and insert installer thread (J-29774) into crankshaft. Position thrust bearing (inner race forward) onto installer thread followed by washer and installer nut.

4) Install hub onto crankshaft by turning installer nut until hub bottoms out on crankshaft. Remove installer tools. Complete installation by reversing removal procedures. Fill cooling system and crankcase.

4.1 LITER V8 (Cont.)



Key	(No.)	Size (Metric)
A	4	M10 x 1.50 x 45
B	1	M8 x 1.25 x 35
E (Nut)	1	M10 x 1.50
F	1	M10 x 1.50 x 50
G	3	M8 x 1.25 x 20

Fig. 10 Engine Front Cover Bolt Locations

FRONT COVER OIL SEAL

Removal & Installation – With belts, crankshaft pulley and hub removed, remove oil seal from front cover using a puller. To install, lubricate new oil seal lips with engine oil and position seal on end of crankshaft with garter spring side toward engine. Using seal installer (J-29667) and hammer, drive seal into front cover until installer bottoms against front cover. Install crankshaft hub and pulley and belts.

TIMING CHAIN

Removal – Remove front cover and oil slinger. Rotate crankshaft until timing marks are aligned with No. 1 cylinder at TDC. See *Fig. 11*. Remove camshaft sprocket retaining screw. Remove timing chain and sprockets from crankshaft and camshaft at same time.

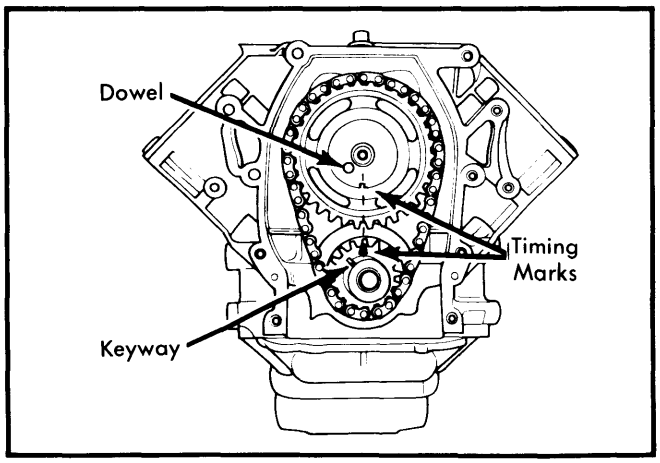


Fig. 11 Timing Chain Sprocket Alignment

Installation – Install timing chain, crankshaft sprocket and camshaft sprocket so that timing marks are aligned as shown in *Fig. 11*. Ensure camshaft dowel aligns with camshaft sprocket hole. Install oil slinger and front cover.

CAMSHAFT

Removal & Installation – Drain cooling system and remove radiator. Remove distributor, lifters and timing chain. Install long bolt or reinstall camshaft sprocket and carefully pull camshaft from engine. To install, apply rear axle lubricant to all camshaft lobes, distributor gear teeth and bearing journals. Carefully guide camshaft into engine and reverse removal procedures to complete installation.

CAMSHAFT BEARINGS

NOTE – *Camshaft bearing diameters decrease in size from front to rear of engine. Universal puller (J-33049) or 5 different bearing pushers must be used to replace bearings.*

Removal – Bearings must be replaced as a complete set. Using the appropriate tool, remove bearings in order (No. 1 first, No. 2 second, etc.). Do not remove lifter carrier to ease cam bearing replacement. Cam bearing bores are machined with this casting in place and correct alignment can not be assured once removed.

Installation – To install bearings, reverse removal procedure and note the following: It is not necessary to align cam bearing oil hole with corresponding oil hole in block. The block contains an oil groove around the bearing. It is only necessary to align bearing oil hole in fore and aft direction so it is aligned with groove. Side-to-side position of oil hole is not critical. When properly installed, cam bearing oil hole should be fully exposed to oil groove.

ENGINE OILING

Crankcase Capacity – 4 quarts (Fleetwood and DeVille), 5 quarts (Eldorado and Seville) with or without filter change.

Oil Filter – Replace at first oil change and then every other oil change thereafter.

Normal Oil Pressure – Oil pressure should be 30 psi at 30 MPH.

Pressure Regulator Valve– Located in oil pump, nonadjustable.

ENGINE OILING SYSTEM

Lubrication is force-feed type. Oil is supplied under full pressure to crankshaft, connecting rods, camshaft bearings and valve lifters. Controlled volume of oil is supplied to rocker arms and push rods. All other parts are lubricated by splash or gravity flow. An oil cooler is used to cool oil.

4.1 LITER V8 (Cont.)

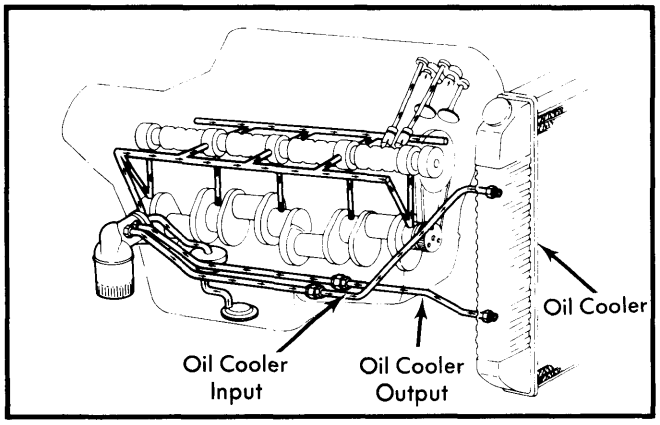


Fig. 12 Engine Oiling System

OIL COOLER

A partial by-pass oil cooler is mounted in right side of radiator. A by-pass valve located in the oil filter adapter forces all oil supplied by oil pump to flow out the cooler inlet port when oil pressure is below a specified value. Above this value, some of the oil is forced to by-pass the cooler and flow directly to the cooler outlet (filter inlet) port.

OIL PUMP

NOTE – *Oil pan must be removed to gain access to oil pump. See Oil Pan Removal at end of ENGINE Section.*

Removal & Disassembly – Raise vehicle on hoist, drain oil and remove oil pan. Remove oil pump mounting hardware and oil pump assembly. Remove and discard oil pump outlet pipe "O" ring. To disassemble, remove 4 oil pump-to-housing bolts. Remove cover and discard gasket. Slide drive shaft, drive gear and driven gear out of pump housing. Remove oil pressure regulator valve and spring from housing bore.

NOTE – *Oil pickup tube is staked to pump housing and should not be removed.*

Inspection – Thoroughly clean all components and inspect for wear or damage. Check free length of regulator valve spring. Check fit of valve in bore. Clearance should be .0020-.0035" (.05-.09 mm). If clearance exceeds .005" (.13 mm), replace valve or pump assembly.

Reassembly & Installation – Position drive gear over shaft nearest regulator bore. Slide driven gear into position, meshing driven gear with drive gear. Hex on gears must be installed in direction of cover assembly. Install oil pressure regulator spring and valve into pump housing. Install new gasket, position cover on pump and tighten cover retaining bolts. To install, reverse removal procedure and note the following: Install new outlet pipe "O" ring and position pump on block by engaging drive shaft with distributor gear.

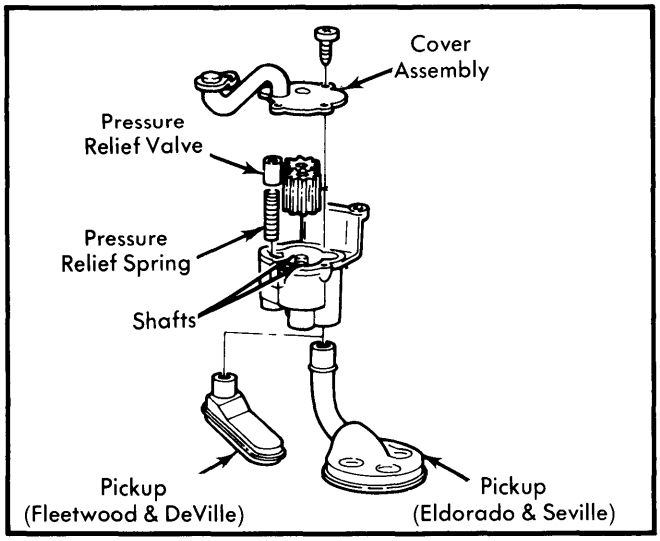


Fig. 13 Oil Pump and Components

ENGINE COOLING

WATER PUMP

Removal – 1) Disconnect negative battery cable. Drain cooling system. On Fleetwood and DeVille models, loosen and remove radiator support rod screws and move support rods out of the way.

2) On all models, remove 2 screws from upper fan shroud and remove wiring harness from upper fan shroud clamps. Remove 2 power steering pump reservoir-to-upper fan shroud screws and reservoir. Remove upper fan shroud-to-lower fan shroud staples and upper fan shroud.

3) Remove clutch fan assembly, drive belts, generator and generator support bracket. Partially remove A/C compressor unit without discharging system (do not remove lines from compressor rear head). Disconnect coolant hoses.

4) Remove water pump and crankshaft pulleys, A/C bracket at water pump and timing mark tab from front cover. Remove water pump bolts and nuts. Remove water pump from front cover. Discard gasket and clean gasket surfaces.

Installation – To install, mount new gasket on water pump flange and reverse removal procedure.

NOTE – *For further information on cooling system capacities and other cooling system components, see appropriate article in ENGINE COOLING SYSTEMS Section.*

ENGINE SPECIFICATIONS

GENERAL SPECIFICATIONS

Engine	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke		Displ.	
				in.	mm	in.	mm	cu. ins.	cc
4.1L (250")	125 @ 4200	192 @ 2000	8.5:1	3.47	88	3.31	84	250	4100

4.1 LITER V8 (Cont.)

ENGINE SPECIFICATIONS (Cont.)

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

Engine	MAIN BEARINGS				CONNECTING ROD BEARINGS		
	Journal Diam. In. (mm)	Clearance In. (mm)	Thrust Bearing	Crankshaft End Play In. (mm)	Journal Diam. In. (mm)	Clearance In. (mm)	Side Play In. (mm)
4.1L (250")	2.64 (67)	① .003-.0004 (.068-.009)	No. 3	② .001-.007 (.026-.177)	1.93 (49)	.0005-.0028 (.012-.071)	③ .008-.020 (.20-.50)

① — Wear limit .0045" (.115 mm)
② — Wear limit .015" (.40 mm)
③ — Wear limit .0035" (.095 mm)

VALVES

Engine & Valve	Head Diam. In. (mm)	Face Angle	Seat Angle	Seat Width In. (mm)	Stem Diameter In. (mm)	Stem Clearance In. (mm)	Valve Lift In. (mm)
4.1L (250")							
Int.	1.54 (39)	44°	45°	.....	.3413-.3420 (8.67-8.69)	① .001-.003 (.03-.07)	.384 (9.75)
Exh.	1.30 (33)	44°	45°	.....	.3411-.3418 (8.66-8.68)	① .001-.003 (.03-.07)	.396 (10.06)

① — Wear limit .005" (.12 mm)

PISTONS, PINS, RINGS

Engine	PISTONS	PINS		RINGS		
	Clearance In. (mm)	Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
4.1L (250")	.0010-.0018 (.025-.045)	.0002-.0004 (.005-.010)	Press Fit	1	.009-.020 (.23-.50)	.002-.004 (.04-.10)
				2	.009-.020 (.23-.50)	.002-.004 (.04-.10)
				3	.010-.050 (.25-1.27)	None

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
4.1L (250")	.....	① .0018-.0037 (.045-.095)	.....

① Wear limit .004" (.10 mm)

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
4.1L (250")	2.09 (53)	76-84 @ 1.73 (35-84 @ 44)	175-189 @ 1.28 (79-86 @ 32.5)

4.1 LITER V8 (Cont.)

ENGINE SPECIFICATIONS (Cont.)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (N·m)
Cylinder Head	
1st Step	45 (60)
2nd Step	90 (120)
Connecting Rod	22 (30)
Main Bearing Caps	85 (115)
Crankshaft Pulley-to-Harmonic Hub	19 (25)
Flywheel-to-Crankshaft Bolts	37 (50)
Intake Manifold	①
Exhaust Manifold	19 (25)
Front Engine Cover & Lower Thermostat Hsg. Assy.	
Nut	30 (40)
M8 Bolts	15 (20)
M10 Bolts	30 (40)
Camshaft Sprocket Bolt	37 (50)
Rocker Arm Support Nuts	37 (50)
Rocker Arm Pivot-to-Support	22 (30)
Oil Pump-to-Block Bolts	15 (20)
Oil Pump-to-Main Bearing Cap Nut	22 (30)
Timing Sprocket-to-Crankshaft	37 (50)
Oil Filter Adapter-to-Block	15 (20)

Application	INCH Lbs. (N·m)
Oil Pump Cover Bolts	62 (7)
Water Pump Bolts	
M6 Nut	62 (7)
Special Bolt	89 (10)
M8 Bolt	177 (20)
All Others	354 (40)

① – See text. Final torque must not exceed 22 ft. lbs. (30 N·m).