GENERAL SPECIFICATIONS						
Engine	Net HP At RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke	Displ. Cu. Ins.
472"	205 @ 3600	365 @ 2000	8.25-1	4.300"	4.060"	472
500"	210 @ 3600	380 @ 2000	8.25-1	4.300"	4.304"	500

NOTE — Horsepower and Torque figures given above are NET. Net Horsepower and Torque represents power at the flywheel when the engine is installed in a vehicle, with wide open throttle and all systems operating such as; air cleaner, exhaust system, water pump, generator, oil pump and air conditioning.

ENGINE IDENTIFICATION

Vehicle Identification Number — Located on forward lower edge of windshield trim molding on drivers side of car and visible from outside of car. The number is decoded as follows:

6C47R4Q100001

First Digit — Indicates Cadillac Division.

Second Digit — Car Line Series.

Third & Fourth Digits — Body Type.

Fifth Digit — Engine Designation (**R-472"**) & (**S-500"**).

Sixth Digit — Model Year.

Seventh Digit — Plant Designation.

Remaining Digits — Sequence Built Number.

Additional Engine Coding — An identification letter is stamped on cylinder head face of cylinder block. Letter is located directly below cylinder bore and denotes cylinder-piston size as shown in following table:

Letter	Cyl. Size	Piston Size
A	4.3000-4.3002"	4.2992-4.2994"
B	4.3002-4.3004"	4.2994-4.2996"
C	4.3004-4.3006"	4.2996-4.2998"
D	4.3006-4.3008"	4.2998-4.3000"
E	4.3008-4.3010"	4.3000-4.3002"
H	4.3010-4.3012"	4.3002-4.3004"
J	4.3012-4.3014"	4.3004-4.3006"
K	4.3014-4.3016"	4.3006-4.3008"
L	4.3016-4.3018"	4.3008-4.3010"
M	4.3018-4.3020"	4.3010-4.3012"

If double letters appear on cylinder block they indicate that cylinder bore is .010" over that of single letter.

ENGINE REMOVAL

All Except Eldorado — 1) Disconnect battery and remove hood (marking hinge positions to aid in realignment), air cleaner and inlet resonator assembly. Drain cooling system and remove attaching screws for each wheelhousing strut-to-radiator cover and position struts to side. Remove radiator hoses, radiator cover and fan.

2) Disconnect wiring harness and all electrical leads to engine. Disconnect Cruise Control servo from left cylinder head and brake hose from brake pipe. Disconnect carburetor linkage and vapor canister hose. Disconnect power steering pump and A/C compressor and position to one side (with hoses attached), then disconnect spark plug wires from right side of engine.

3) Disconnect vacuum lines, heater hose at right cylinder head and loosen tie struts (swing to one side). Remove two upper transmission-to-engine screws and raise car on hoist. Remove nuts securing front engine mounts to frame, starter, flywheel inspection cover and screws securing flywheel to converter. Remove bolts securing engine to transmission.

4) Disconnect exhaust pipes at manifolds, fuel line and vapor return line (A/C cars only) at fuel pump and lower car. Position lifting brackets, support transmission with floor jack and remove engine. *NOTE — Pull engine forward to disengage transmission.*

Eldorado — 1) Remove hood (marking hinge positions to aid in realignment) and drain radiator. Remove air cleaner, inlet resonator assembly, hot air duct and vacuum hoses. Remove upper radiator hose, radiator cover and fan assembly. Disconnect battery, alternator wires, right hand spark plug wires and heater turn-on switch. Disconnect water control valve hose and starter motor wiring harness. Remove power steering pump (with hoses attached) and position to one side.

2) Remove A/C compressor mounts, disconnect electrical lead and move compressor to top of battery. Disconnect carburetor linkage, wiring harness on left side of engine and vacuum lines. Remove left hand exhaust manifold flange nuts and transmission cooler line bracket screw and filler pipe nut from exhaust manifold. Position right hand engine lift hook to position over No. 1 intake port. Remove upper screw securing steering gear flex coupling shroud to frame.

3) Raise car on hoist and remove steering gear shroud. Remove bolt securing final drive to motor mount and disconnect fuel pump lines. Remove front engine mount nuts, lower radiator hose, right exhaust manifold flange nuts and starter motor (do not disconnect wiring from terminals).

4) Remove flywheel inspection cover, flywheel-to-converter screws, two lower transmission-to-block screws and right hand output shaft screws. Remove two output shaft bracket-to-block screws and one screw securing bracket to final drive.

5) Loosen right hand shock absorber lower mounting nut and move outward on stud. Move drive axle as far back as possible and remove output shaft. Lower car and place support under transmission. Remove bolts securing transmission-to-block. Install lifting chain and remove engine. *NOTE — Pull forward to disengage transmission.*

INTAKE MANIFOLD

Removal — 1) Disconnect negative battery cable and remove air cleaner and heat tube. Disconnect carburetor linkage, all coil wires (HEI connector if equipped), anti-dieseling solenoid, downshift switch wires and temperature sending unit wire. Remove distributor cap, ignition coil, anti-dieseling solenoid and bracket.

2) Disconnect all vacuum lines to carburetor and manifold, fuel line at carburetor, and PCV valve at right rocker arm cover. Disconnect A/C wiring and mounts, then position compressor to one side (with hoses connected). Remove nuts and bolts securing intake manifold and remove manifold. Remove sheet metal manifold shield and gasket, then remove front and rear manifold to block gaskets.

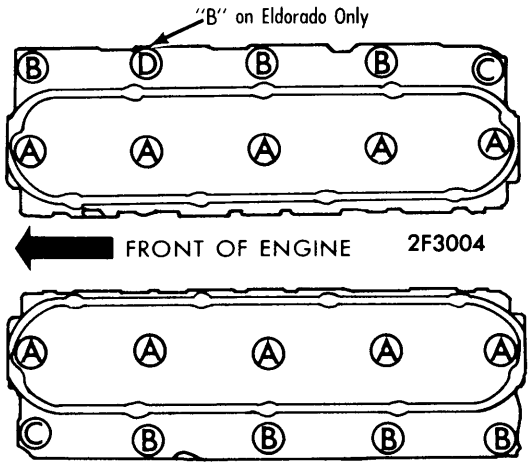
Installation – Position rubber seals over rails at front and rear of cylinder block. Tabs on gasket should be positioned in holes in rails and beveled ends of gasket tucked into slot at mating of head and rail. Use suitable sealer and position sheet metal gasket and shield on engine. *NOTE – Holes in gasket should engage dowel pins on cylinder heads.* Install manifold and tighten nuts and bolts.

CYLINDER HEAD

Removal – Drain cooling system and remove intake and exhaust manifolds. Disconnect electrical and ground connections from heads. Remove power steering pump and position to one side. Remove alternator and A.I.R. pump. Remove rocker arm covers, rocker arm assemblies (must be installed in original positions) and push rods. Remove cylinder head bolts and lift heads from block.

Installation – Clean all gasket surfaces and position cylinder head and gasket over dowels on block. Install ten head bolts in locations as shown in illustration and table. Tighten head bolts, starting from center of head and working toward both ends.

Bolt Location	Length
A (Bolt)	4.36" (Medium)
B (Bolt)	4.77" (Long)
C (Bolt)	3.02" (Short)
D (Bolt/stud)	4.77" (Long)



CYLINDER HEAD BOLT LOCATION

VALVES							
Engine & Valve	Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
472" & 500" Int.	2.000"	44°	45°	1/16"	.3413-.3420"	.001-.0027"	.457"
Exh.	1.625"	44°	45°	1/16"	.3413-.3420"	.001-.0027"	.473"

VALVE ARRANGEMENT

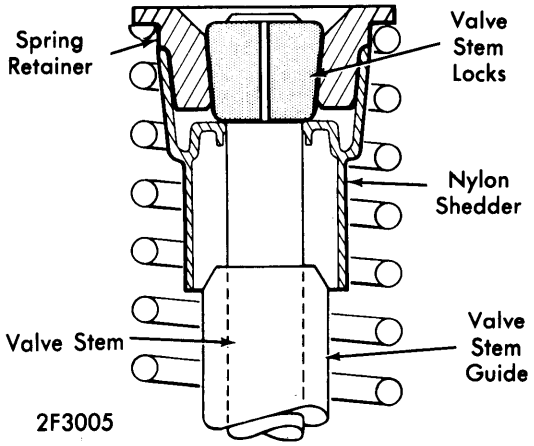
E-I-E-I-E-I-E-I (Right bank front to rear).
I-E-I-E-I-E-I-E (Left bank front to rear).

VALVE GUIDE SERVICING

If stem-to-guide clearance exceeds specifications, valve guide should be reamed to next oversize and valve with corresponding oversize stem installed. Service valves are available in standard .003", .006", and .013" oversize. Use suitable reamers to obtain correct clearance. *NOTE – Valve guides and valves .003" oversized may be installed at factory and indicated by a "3" stamped on cylinder head gasket surface in line with oversize valve. Oversize valves are marked on valve head.*

VALVE STEM SEALS

A nylon oil shedder is used which is part of valve spring retainer (see illustration). Replace any time valve spring is removed.



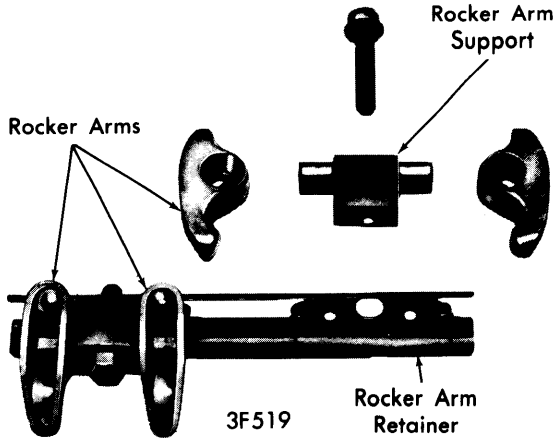
VALVE SPRING RETAINER & OIL SHEDDER

VALVE SPRINGS			
Engine	Free Length	PRESSURE (LBS.) Valve Closed	Valve Open
472" & 500" Int. & Exh.	2.250"	60-65 @ 1.946"	155-165 @ 1.496"

VALVE SPRINGS

Removal – Remove air cleaner, rocker arm cover, rocker arm assembly, push rods and spark plug on cylinder to be serviced. Install suitable adapter (J-22794) to spark plug port and supply air to cylinder. Install rocker arm support bolt and position suitable valve spring compressor (J-22765) over bolt. Compress valve spring, remove locks from valve stem and lift out spring retainer with nylon shedder, then remove spring.

Installation – Install valve spring and new retainer with nylon shedder. Use suitable valve spring compressor to compress spring and install locks.



ROCKER ARM ASSEMBLY

ROCKER ARM ASSEMBLY

Ensure that all parts are replaced in original order (see illustration).

HYDRAULIC VALVE LIFTER ASSEMBLY

Valve plungers and bodies are matched sets and parts are not interchangeable. Replace any lifter found to be defective.

HYDRAULIC VALVE LIFTER LEAKDOWN RATE CHECK

Use suitable leakdown rate tester (J-3074) to check for faulty lifters without disassembling engine. Tool uses a feeler gauge between rocker arm and valve stem which causes valve spring pressure to force oil out of lifters. When lifter has leaked down enough for valve to seat, a spring on tool which is compressed against valve spring retainer, ejects feeler gauge. Noisy lifter(s) will be those which have shortest leakdown rate. Run engine to allow lifters to fill up with oil and check lifters in following order: *NOTE – Insert feeler gauge of tool quickly to avoid unnecessary leakdown.*

1) With rotor at No. 1 firing position, check:

No. 1 Intake	No. 1 Exhaust
No. 2 Intake	No. 3 Exhaust
No. 5 Intake	No. 5 Exhaust
No. 7 Intake	No. 6 Exhaust
No. 8 Intake	No. 8 Exhaust

2) With rotor at No. 4 firing position, check:

No. 3 Intake	No. 2 Exhaust
No. 4 Intake	No. 4 Exhaust
No. 6 Intake	No. 7 Exhaust

PISTONS, PINS, RINGS						
	PISTONS	PINS		RINGS		
Engine	① Clearance	Piston Fit	Rod Fit	Ring	End Gap	Side Clearance
472", 500"	.0006-.0010"	.0002-.0004"	Press Fit	Comp. Oil	.013-.025" .015-.055"	.0017-.0040" None

① Piston measured at top of skirt.

OIL PAN

Removal (Except Eldorado) – Disconnect battery cable and drain oil. Remove starter assembly, exhaust pipe from manifolds and idler arm support mounting screws from frame side member and lower support. Disconnect pitman arm at center link and lower steering linkage, then remove transmission lower cover. Remove oil pan attaching screws and remove oil pan.

Removal (Eldorado) – Remove engine before attempting to remove oil pan.

Installation – Cement gasket to both sides of oil pan. Install pan end seals on ends of pan by pulling locating tangs on seal through locating holes in pan. Be sure seals are firmly positioned with ends of each seal properly located in cut-out notches in side gaskets. Using suitable cement, seal all four corner notch openings. Clean notches in cylinder block where ends of oil pan rear end seal fit and fill this cavity with Transmission Cooler Hose Cement. Install oil pan by reversing removal procedure.

PISTON & ROD ASSEMBLY

Removal – With cylinder heads, oil pan and oil pickup tube assembly removed, use a suitable ridge reamer to remove any ridge or deposits on upper end of cylinder bore. *NOTE – Piston must be at bottom of stroke and covered with cloth to collect cuttings.* Remove rod cap and install suitable tool on connecting rod studs to protect crankshaft. Push piston and rod assembly out top of cylinder block.

Installation – Lightly coat pistons, rings and cylinder walls with engine oil. Ensure compression rings are installed with dimple on ring facing top of piston. Install suitable ring compressor on piston and connecting rod stud guides. Install piston and rod assembly in cylinder bore with notch on top of piston towards front of engine (letter "R" on piston toward rear). Guide connecting rod onto crankshaft journal while tapping piston head with hammer handle to seat connecting rod against crankshaft. Remove tool from connecting rod studs and install mating rod cap ensuring that numbered side of cap is on same side as numbered side of rod. *NOTE – Numbered sides of connecting rods on Nos. 1,3,5,7 rods must be on right side of engine and Nos. 2,4,6,8 on left side of engine.* Install rod cap nuts and tighten.

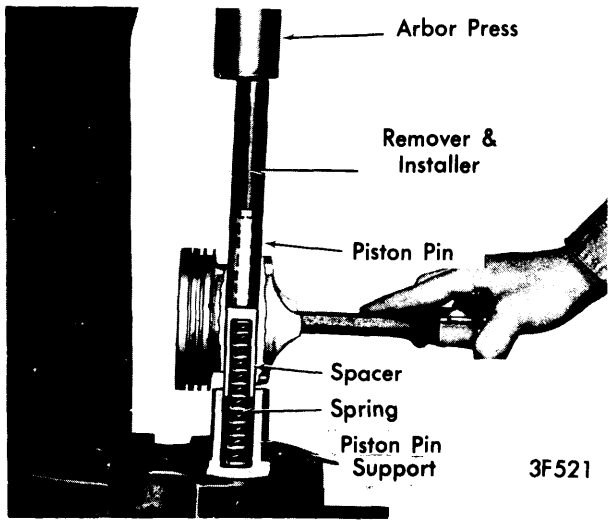
FITTING PISTONS

Measure pistons 3/16" below upper cross slot or 1/4" below oil ring groove. Measure cylinders 1 1/8" from top of bore, crosswise to cylinder block.

PISTON PINS

Removal – Using suitable tool (J-8390), position piston and connecting rod assembly on support with side of piston marked with "R" upward. Press pin from assembly. *NOTE – Keep pins in order so they may be installed in piston from which they were removed.*

Installation – Lubricate piston pin and pin holes in piston with engine oil. Position connecting rod in its respective piston so when assembly installed in engine, side of piston stamped with "R" is toward rear of engine and number on lower end of rod is down. Press pin until it bottoms on spacer in support (see illustration).



PISTON PIN INSTALLATION

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS

	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	②Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	①Sideplay
472" & 500"	3.250"	.0003-.0026"	No.3	.002-.012"③	2.500"	.0005-.0028"④	.011-.021"

① – Total, 2 Rods. ③ – Wear limit .015"

② – Wear limit .0045" ④ – Wear limit .0035"

MAIN & CONNECTING ROD BEARINGS

NOTE – Following procedures are performed with oil pan and oil pickup tube assembly removed.

Connecting Rod Bearings – After ensuring rod caps are marked for cylinder identification, remove rod caps. Use Plastigage method for checking proper bearing clearances. If clearance is not within specifications, replace bearings. If new bearings (standard bearings only size available) do not bring clearances within specifications, crankshaft must be replaced. *NOTE – When installing bearings, tangs on bearings must match notches in rod and cap.*

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 (place strip of .005" brass shim stock between lower bearing half and crankshaft bearing journal in bearing caps adjacent to bearing being checked). If clearance is not within specifications, replace bearings. If new bearings (standard bearings only size available) do not bring clearances within specifications, crankshaft must be replaced.

2) No. 1 upper and lower bearings are interchangeable and No. 2 and 4 upper bearings are interchangeable. No. 2 and 4 lower bearings are interchangeable. No. 3 and 5 bearings are not interchangeable and must be reinstalled in original positions.

3) To change main bearing upper halves, insert suitable tool in oil hole of crankshaft journal and rotate crankshaft clockwise to roll bearing from engine. Oil new upper bearing and with locating tang in correct position, rotate crankshaft counterclockwise to position bearing (with suitable tool in oil hole). *CAUTION – Main bearing caps must be installed in same position they were removed from and facing same direction.*

THRUST BEARING ALIGNMENT

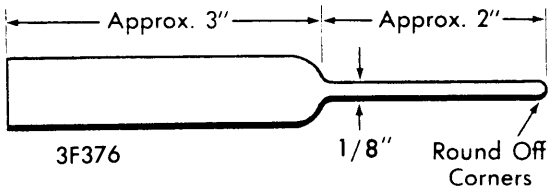
With all main bearing cap bolts finger tight, tap crankshaft forward, then rearward several times to align (No. 3) thrust bearings. Tighten all main bearing cap bolts.

REAR MAIN BEARING OIL SEAL

Removal – Remove engine oil pan. Remove rear main bearing cap and discard lower seal half removed from bearing cap. Rotate upper seal half by pushing on one end with sharp

object and remove seal half from cylinder block. Inspect grooves in bearing cap and cylinder block to ensure they are clean, dry and free from burrs.

Installation – 1) *NOTE – Two seal halves are identical and pre-lubricated with a film of wax for break-in. Do not remove or damage this film.* To install lower half of seal in bearing cap, slide end of seal into position at one end of cap and place suitable tool (see illustration) made from 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.



OIL SEAL INSTALLING TOOL

2) To install upper half of seal in cylinder block, position tool in groove of block. Lubricate seal with Lubriplate and start into groove in block with lip facing forward. Rotate seal into position using care not to distort it. Ensure that seal ends are flush at split line, install main bearing cap and tighten cap bolts.

HARMONIC BALANCER

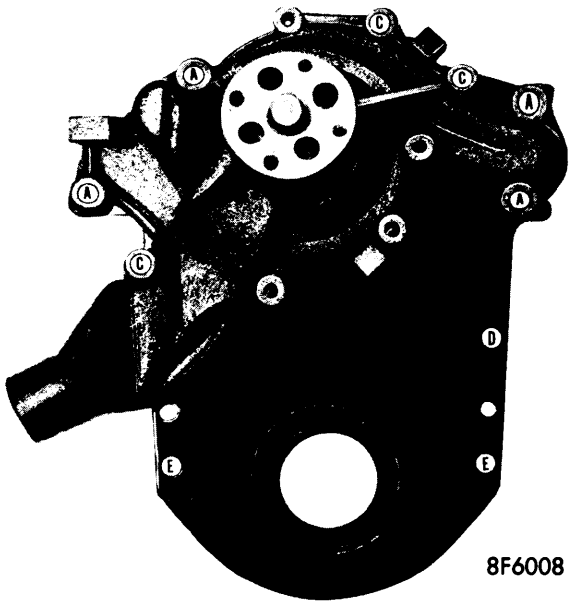
Removal – Disconnect negative battery cable and drain cooling system. Disconnect upper radiator hose at radiator and position out of way. Remove fan blade assembly, alternator belt and power steering belt. Remove four crankshaft pulley-to-harmonic balancer screws and remove pulley. Remove plug from end of crankshaft. Using suitable tool (J-21052), remove harmonic balancer hub from crankshaft. *NOTE – Use air pressure to hold one piston on its compression stroke to prevent crankshaft from turning.*

Installation – Lubricate bore of hub and seal with suitable lubricant to prevent seizure to crankshaft. Position hub on crankshaft, lining up key slot in hub with key on crankshaft. Use suitable tool (J-21052) to install hub on crankshaft. *NOTE – Do not attempt to install harmonic balancer all the way with tool or tool will be damaged.* With balancer positioned on crankshaft, install a 1962 harmonic balancer-to-crankshaft screw and washer in end of crankshaft and tighten to 125 ft. lbs. Remove screw and washer from end of crankshaft and install plug.

ENGINE FRONT COVER

Removal – *NOTE – On Eldorado models, engine must be removed from vehicle.* Remove harmonic balancer and loosen starter enough to gain access to oil pan bolts. Loosen oil pan bolts and lower front of oil pan. Remove lower radiator hose from water pump. Remove bolts securing front cover and remove front cover and water pump as an assembly.

Installation – Clean all gasket surfaces and install new front cover gasket over locating dowels on cylinder block using a small amount of suitable sealer to hold gasket in place. Install front cover and water pump assembly over end of crankshaft, lining up dowel holes in cover with dowels on cylinder block. Install bolts and tighten (see illustration and table for location of bolts and specifications).



Key	(No.)	Size	Torque
A	(4)	3/8-16 x 1-3/8	22 Foot-Pounds
C	(3)	5/16-18 x 1-1/4	10 Foot-Pounds
D	(1)	5/16-18 x 5/8	10 Foot-Pounds
E	(2)	3/8-16 x 5/8	22 Foot-Pounds

ENGINE FRONT COVER BOLT LOCATIONS & TORQUE SPECIFICATIONS

FRONT COVER OIL SEAL

Removal & Installation – Remove harmonic balancer and using thin-bladed screwdriver pry out front cover oil seal and discard. Lubricate new oil seal using wheel bearing grease. Position seal on end of crankshaft with spring side toward engine. Using suitable tool (J-22770) drive seal into front cover until it bottoms.

CAMSHAFT			
Engine	Journal Diam.	Clearance ①	Lobe Lift
472", 500"	- - - - - -	.001-.0022"	....

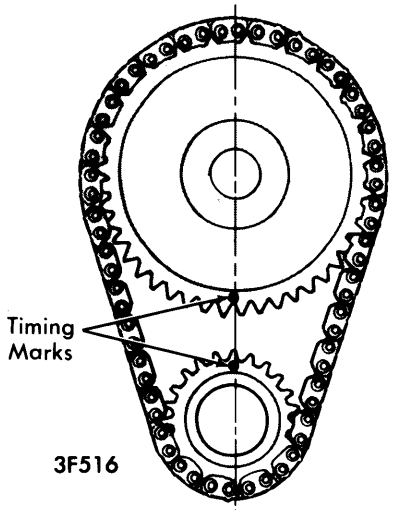
① Wear limit .004"

CAMSHAFT

Removal – *NOTE – On Eldorado models, engine must be removed from vehicle.* Remove radiator, front cover, ignition distributor, oil pump and fuel pump. Remove oil slinger from crankshaft. Remove bolt securing fuel pump eccentric to camshaft and remove eccentric. Remove bolts securing camshaft sprocket to camshaft and remove camshaft sprocket with chain attached. Remove valve lifters and slide camshaft forward carefully until free from engine.

Installation – Apply a thin coat of rear axle lubricant to all camshaft lobes and bearing journals and guide camshaft carefully into cylinder block. Reverse removal procedures while

noting following: Extreme care must be exercised to avoid nicking or scratching camshaft bearings. Install camshaft sprocket in timing chain with timing mark toward front, place chain over crankshaft sprocket and line up timing marks on both sprockets (see illustration). Index hole in camshaft must line up with index hole in sprocket.



TIMING CHAIN SPROCKET ALIGNMENT

CAMSHAFT BEARINGS

Removal – Remove camshaft and use suitable tool (J-21054) to remove bearings. Drive No. 1 bearing through rear face of bearing bore and remove from tool. Remove remaining bearings in same manner. *NOTE – When removing No. 5 bearing, drive out rear plug along with bearing.*

Installation – Install new plug in rear of No. 5 bearing bore and seal plug with suitable sealer. Scribe a reference mark on front face of each bore to indicate position of center oil passage. Using suitable tool install bearings, lining up oil hole in bearing with scribe mark on front face of bore.

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
472" & 500"	21°	111°	73°	55°

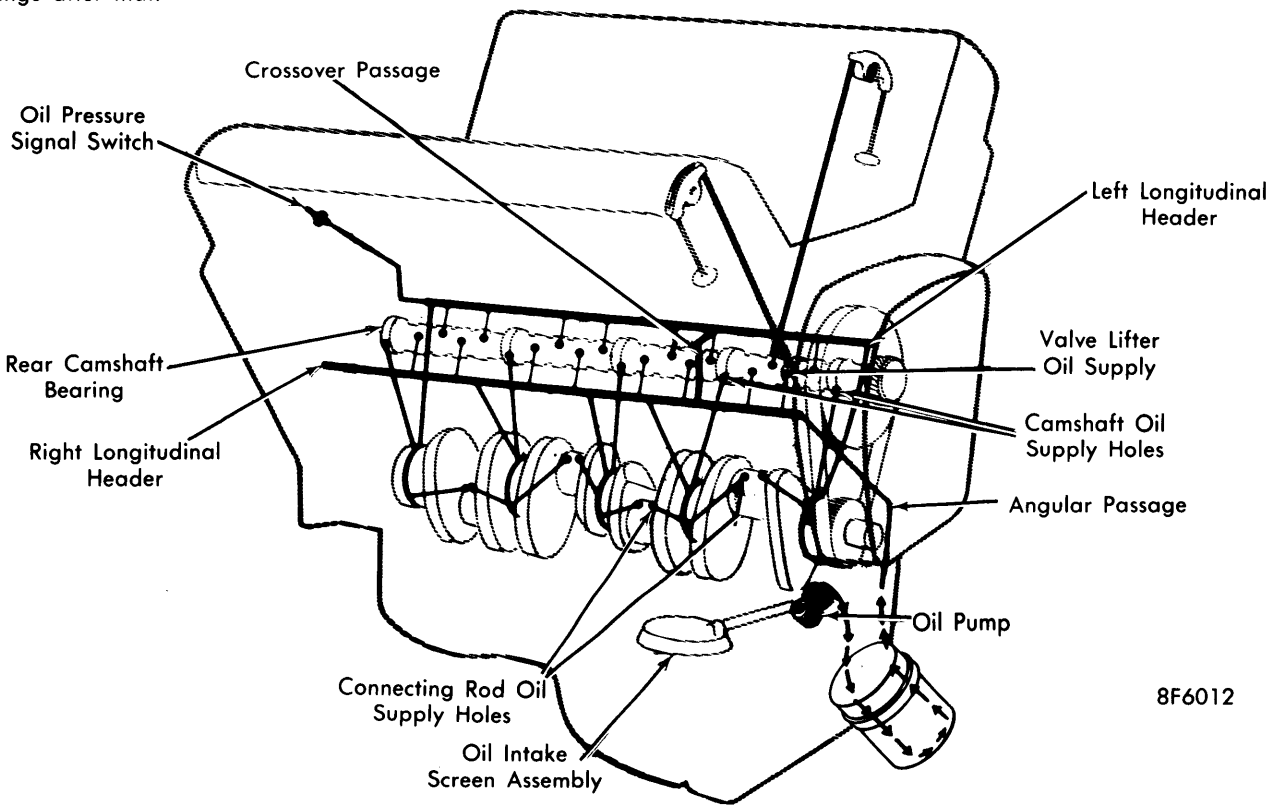
ENGINE OILING

Crankcase Capacity – 4 quarts except Eldorado which is 5 quarts. Add one quart with filter change.

Oil Filter – Change at first oil change and every second oil change after that.

Normal Oil Pressure – 35-40 psi at 30 MPH. Average pressure at idle is 10 psi.

Pressure Regulator Valve – Not adjustable.



ENGINE OILING SYSTEM

ENGINE OILING (Cont.)

ENGINE OILING SYSTEM

See Engine Oiling System Illustration. Right longitudinal header is fed through angular passage from oil filter and pump. Oil crosses to left longitudinal header through intersecting vertical passages above No. 2 camshaft bearing, continues up vertical header to oil pressure signal switch.

Crankshaft, Camshaft & Connecting Rods – Main bearings No. 2, 3 and 4 are lubricated from right longitudinal header through holes drilled in block. Main bearings No. 1 and 5 are lubricated in same manner from left header. Camshaft bearings are lubricated from corresponding main bearings through holes in block. Connecting rod bearings are lubricated from adjacent main bearing through holes in crankshaft.

Lifters, Rocker Arms, Pistons & Pins – Longitudinal headers feed hydraulic valve lifters under pressure through drilled passages. From lifters, oil flows through hollow push rods to rocker arms, controlled by metering disc in lifter. Oil comes through feed hole in rocker arm, flows onto arm, lubricating rocker arm pivot points, push rod tips, and valve tips. Pistons, pins and cylinder walls are lubricated by oil splashed up from crankcase. Oil drains from cylinder heads into valve lifter compartment, returns to crankcase through hole on bottom of compartment.

OIL PUMP

Oil pump is mounted on right side near front of engine. Remove oil filter. Remove five bolts securing pump to engine, leaving bolt nearest pressure regulator until last. Clean and inspect all parts (see Oil Pump Specifications). Before reinstalling pump, pack with petrolatum.

Oil Pump Specifications

Gear Backlash	.008-.012"
Gear-to-Body Clearance	.003-.005"
Reg. Valve-to-Bore Clearance	①.0020-.0035"
Reg. Valve Spring	
Free Length	.257-.269"
Pressure @ 1 1/16"	7.5-8.5 Lbs.

① – Wear limit .005".

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Camshaft Sprocket	18
Connecting Rod	40
Cylinder Head	115
Distributor Clamp	15
Exhaust Manifold	35
Flywheel-to-Converter	30
Flywheel-to-Crankshaft	75
Front Cover	①
Fuel Pump	12
Intake Manifold	30
Main Bearing	90
Oil Pan	10
Oil Pump	15
Rocker Arm Cover	INCH Lbs. 30
Thermostat Housing	10
Transmission Housing-to-Block	35
Water Pump	①

① – See separate illustration.