232" & 258" 6-CYL.

GENERAL SPECIFICATIONS						
Engine	Net HP At RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore	Stroke	Displ. Cu. Ins.
232" 1-Bbl.	90 @3050	163 @2200	8.0-1	3.75"	3.50"	232
258" 1-Bbl.	95 @3050	179 @2100	8.0-1	3.75"	3.895"	258
258" 2-Bbl.	120 @3600	200 @2000	8.0-1	3.75"	3.895"	258

► *NET HORSEPOWER & TORQUE 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

Engine number is located on machined pad on cylinder block between number two and three cylinders. Letter contained in code number identifies engine by CID, carburetor type and compression ratio.

Code	CID	Carb.	Comp. Ratio
A	258	1-Bbl.	8.0-1
C	258	2-Bbl.	8.0-1
E	232	1-Bbl.	8.0-1

SPECIAL ENGINE MARKS

Some engines are produced at factory with oversize or undersize components. These engines are identified by a letter code stamped on boss between ignition coil and distributor. Letters are decoded as follows:

B — All cylinder bores .010" oversize.
C — All camshaft bearing bores .010" oversize.
M — All main bearing journals .010" undersize.
P — All connecting rod journals .010" undersize.

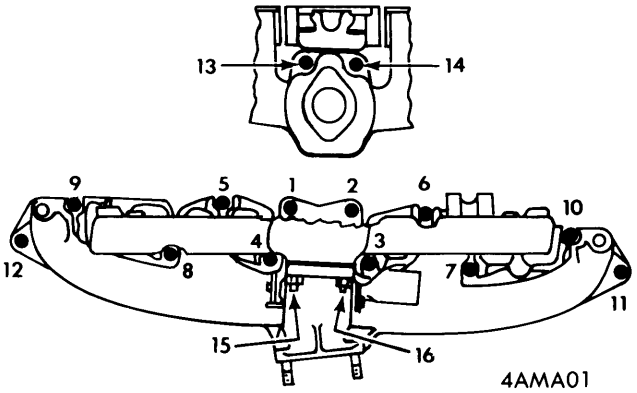
ENGINE REMOVAL

See Engine Removal at end of ENGINE Section.

INTAKE & EXHAUST MANIFOLDS

Removal — Remove air cleaner and carburetor. Disconnect accelerator cable from accelerator bellcrank. Disconnect PCV vacuum hose from intake manifold. Remove spark CTO vacuum tubes and disconnect TCS solenoid vacuum valve wiring (if equipped). Disconnect vacuum hose from back-pressure sensor. Take off Air Guard hoses at air pump and air injection manifold check valve. Disconnect diverter valve with hoses if equipped. Remove air pump/power steering bracket, air pump, and detach and set aside power steering pump if vehicle is equipped with any of these items. If equipped with air conditioning, remove drive belt idler assembly from cylinder head. Take off exhaust back pressure sensor and EGR valve. Disconnect exhaust pipe from manifold flange and remove all attaching bolts, nuts, and clamps to take off intake and exhaust manifold as an assembly. Separate manifolds at riser area.

Installation — Clean all mating surfaces of manifolds and cylinder head. Assemble manifolds and finger tighten heat riser retaining nuts. Position new intake manifold gasket on cylinder head and install manifold assembly. Tighten manifold attaching bolts and nuts in sequence (see illustration). To complete assembly, reverse removal procedure.

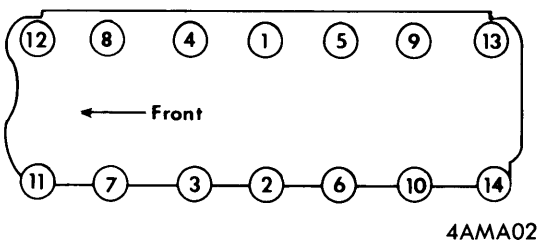


INTAKE MANIFOLD TIGHTENING SEQUENCE

CYLINDER HEAD

Removal — Drain cooling system and disconnect hoses at thermostat housing. Remove rocker arm cover, rocker arms and bridged pivot assembly (back off each screw one turn at a time to avoid breaking bridge). Remove push rods. *NOTE — Retain push rods, bridged pivots, and rocker arms in same order and position as removed.* Take off intake and exhaust manifold assembly. If equipped with air conditioning, remove drive belt idler bracket from cylinder head. Loosen alternator drive belt, remove bolts from air compressor mounting bracket and set compressor aside. Disconnect ignition wires and remove spark plugs. Take off temperature sending unit wire and battery ground cable. Remove ignition coil and bracket assembly, remove cylinder head bolts and lift off cylinder head.

Installation — Clean and inspect all parts thoroughly. *NOTE — Due to emission control regulations, cylinder heads which exceed specifications for flatness must be replaced, milling is*



CYLINDER HEAD TIGHTENING SEQUENCE

232" & 258" 6-CYL. (Cont.)

not recommended. Transfer all attached components from original head not included with replacement head. Clean block and cylinder head surfaces carefully, apply even coat of sealing compound to both sides of new head gasket and position on block assembly with word "TOP" facing upward. Install cylinder head and tighten head bolts (in sequence) to 105 ft. lbs. torque. Reverse removal procedure to replace all remaining components.

VALVES

Engine & Valve		Head Diam.	Face Angle	Seat Angle	Seat Width	Stem Diameter	Stem Clearance	Valve Lift
All Engines	Int.	1.787"	29°	30°	.040-060"	.3715-.3725"	.001-.003"	.....
	Exh.	1.406"	44°	44°	.040-060"	.3715-.3725"	.001-.003"	.....

VALVE ARRANGEMENT

E-I-I-E-I-E-E-I-E-I-I-E (front to rear).

VALVE GUIDE SERVICING

Valve guides are integral with cylinder head. If valve stem-to-guide clearance is not within specifications, ream guide to install valve with oversize stem. Valves are available in .003", .015" and .030" oversize. *CAUTION — Ream valve guides in steps, starting with .003" reamer and progressing to size required.*

VALVE STEM OIL SEALS

Nylon oil deflectors are used on all valves. These oil deflectors should always be replaced whenever valve service is performed.

VALVE SPRINGS

Engine	Free Length	PRESSURE (LBS.)	
		Valve Closed	Valve Open
232" & 258" (W/1-Bbl.)	2.234"	90-105 @ 1 3/16"	188-202 @ 1 1/16"
258" 2-Bbl.	1.99"	64-72 @ 1 25/32"	196-210 @ 1 25/64"

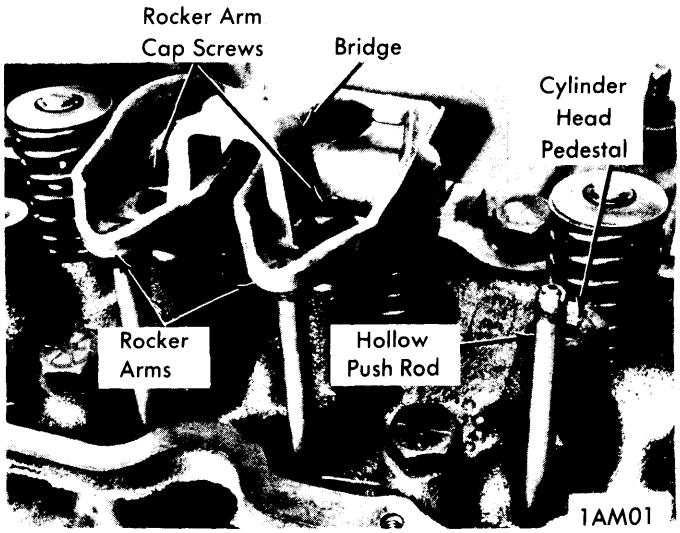
VALVE SPRINGS

Removal — Remove rocker arm cover, rocker arms and bridged pivot assemblies. Remove push rods and spark plug on cylinder to be worked on. Install suitable air line adapter to spark plug hole and apply air pressure to hold valve in place. Using suitable tools (J22534 and J21931-1), compress valve spring and remove valve locks. Remove valve spring and retainer.

Installation — Install valve spring and retainer. Using suitable tools (same tools used for removal), compress valve spring, insert valve locks and release spring tension. Tap spring from side to side to insure that spring is properly seated. Reverse removal procedure to complete installation.

ROCKER ARM ASSEMBLY

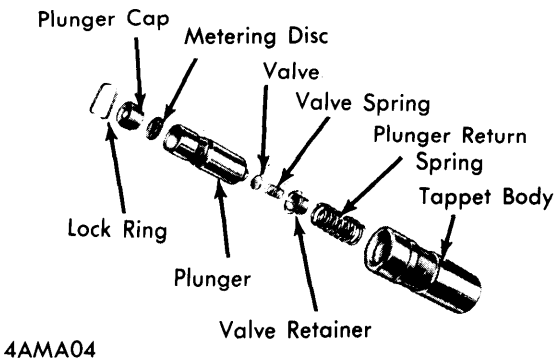
Rocker arm assemblies consist of stamped rocker arms, bridged pivot assembly and rocker arm cap screws. When removing or installing bridged pivot, loosen or tighten rocker arm cap screws only one turn at a time to avoid breaking bridge.



BRIDGED PIVOT ASSEMBLY

HYDRAULIC VALVE LIFTER ASSEMBLY

Lifters are serviced as complete assemblies only and parts are not interchangeable between lifters. Inspect for signs of scuffing on barrel and face of tappet body. Inspect tappet face for concave wear and if present, replacement of camshaft and tappets is necessary. If lifters are disassembled for cleaning and inspection, after reassembly (see illustration for arrangement of parts), they should be tested using suitable leak-down tester according to manufacturer's instructions. Leak-down should take 20-110 seconds with a load travel of .125". Discard tappets not within specifications. *NOTE — Do not fill tappet assemblies with engine oil prior to installation as they will charge themselves with 3-8 minutes of engine operation.*



HYDRAULIC VALVE LIFTER ASSEMBLY

232" & 258" 6-CYL. (Cont.)

PISTONS, PINS, RINGS						
	PISTONS	PINS		RINGS		
Engine	①Clearance	Piston Fit	Rod Fit	Rings	End Gap	Side Clearance
All Engines	.0009-.0017"	.0003-.0005"	Press Fit	1 2 3	.010-.020" .010-.020" .010-.025"	.0015-.003" .0015-.003" .001-.008"

① – Right angle to center line of piston pin.

OIL PAN

See Oil Pan Removal at end of ENGINE Section.

PISTON & ROD ASSEMBLY

NOTE – New pistons must be installed in same cylinders for which they were fitted, and used pistons in same cylinder from which they were removed.

Removal – With cylinder head and oil pan 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 connecting rod bearing caps and retain in same order as removed. *NOTE – Caps and rods are stamped with corresponding cylinder number.* Install rubber hose over connecting rod studs to protect cylinder walls and push piston and rod assembly out top of cylinder block.

Installation – 1) Piston rings must be positioned as follows: No. 1 compression ring gap must be 180° from No. 2 compression ring gap. Oil control ring spacer expander gap must be at least 90° from No. 2 compression ring gap. Oil control ring gaps must be 90° from expander gap with at least 30° between each ring gap. Upper and lower compression ring markings indicate top side of ring .

2) Lightly coat pistons, rings, and cylinder walls with engine oil. Install suitable ring compressor on pistons ensuring that ring gap positions do not change. With connecting rod studs covered for cylinder wall protection, install each piston and rod assembly ensuring that notch on piston dome faces front of engine and that each piston is fitted to appropriate bore. *NOTE – Oil holes in connecting rods must face toward camshaft.* Guide connecting rod onto crankshaft journal while tapping down on piston using a suitable tool. Carefully seat connecting rod against crankshaft and install mating rod cap, tighten connecting rod nuts to specified torque.

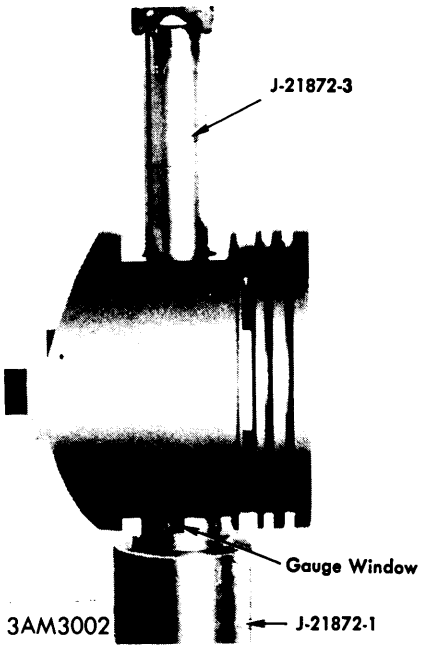
FITTING PISTONS

Measure cylinder bore diameter 2 5/16" below top of cylinder bore. Measure piston at right angles to piston pin at centerline of pin.

PISTON PINS

Removal – Place piston on suitable support and using suitable tool (J-21872) press pin from piston and rod with arbor press. Note position of pin through gauge window of remover support.

Installation – Using suitable pilot, driver and support (J-21872) press piston pin through connecting rod and piston until pin pilot indexes with mark on support. Pin should be centered in rod plus or minus 1/32". *NOTE – If little effort is required to install piston pin in connecting rod, or if rod moves along pin, a new connecting rod is required.* Check piston for freedom of movement on pin.



PISTON PIN REMOVAL AND INSTALLATION

CRANKSHAFT MAIN & CONNECTING ROD BEARINGS							
	MAIN BEARINGS				CONNECTING ROD BEARINGS		
Engine	Journal Diam.	Clearance	Thrust Bearing	Crankshaft Endplay	Journal Diam.	Clearance	Sideplay
All Engines	2.4994"	.001-.003"	3	.0015-.0065"	2.0944"	.001-.003"	.005-.014"

232" & 258" 6-CYL. (Cont.)

MAIN & CONNECTING ROD BEARINGS

Connecting Rod Bearings – After ensuring rod caps are marked for cylinder identification, remove rod caps. Use Plastigage method to check for proper bearing clearances. If not within specifications, new bearings must be installed. New bearings are available in .001", .002", .010" and .012" undersize. Selective fitting is required on each connecting rod. A standard bearing may be used in combination with a .001" undersize or a .002" undersize in combination with a .001" undersize. *NOTE – Never use a new bearing with a used bearing. Never use a pair of bearings with more than .001" difference in size on same journal.* Coat bearing surfaces with oil, install rod cap and tighten nuts.

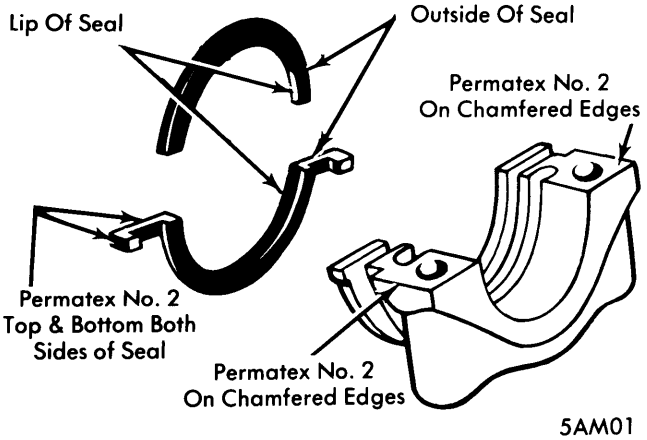
Main Bearings – 1) Support crankshaft at counterweight adjacent to main bearing being checked and ensure that all bearing caps other than one being checked are tight. Starting with rear main bearing cap and working forward, remove one cap at a time and check bearing clearances using Plastigage method.

2) If clearances are not within specifications, bearings are available in .001", .002", .010" and .012" undersize. A standard bearing may be used in combination with a .001" undersize or a .002" undersize in combination with a .001" undersize. *NOTE – Never use a new bearing with a used bearing. Never use a pair of bearings with more than .001" difference in size on same journal.*

3) Remove all upper bearings by inserting suitable tool in oil hole of crankshaft journal and rotating crankshaft clockwise to roll bearing from engine. Oil new bearing and rotate crankshaft so bearing will rotate in direction of its locating tang. Install bearing cap with lower bearing and tighten bolts.

THRUST BEARING ALIGNMENT

When replacing thrust bearings (located at No. 3 main bearing journal), crankshaft should be moved fore and aft to align thrust faces of bearings.



REAR MAIN BEARING OIL SEAL

REAR MAIN BEARING OIL SEAL

Removal – Remove oil pan and rear main bearing cap. Loosen all remaining main bearing bolts. Using a brass drift, tap upper seal until seal is protruding enough to permit pulling it out completely. Remove lower seal from bearing cap.

Installation – Reverse removal procedure while noting following: Lip of seal must face toward front of engine. Ensure seal is firmly seated in bearing cap recess. Use suitable sealer and apply as indicated in illustration.

ENGINE FRONT COVER

Removal – Remove drive belt(s), fan and hub assembly, accessory pulley (if equipped) and vibration damper. Remove oil pan-to-timing chain cover screws and cover-to-block screws. Raise cover enough to detach retaining tips of oil pan seal from bottom side of cover. Remove cover and gasket from engine. Cut off oil pan seal end tabs flush with front face of cylinder block and remove seal.

Installation – Clean all gasket mounting surfaces. Apply suitable sealing compound to both sides of cover gasket and position on cylinder block. Cut end tabs of a new oil pan seal as described under removal and position seal on cover after using suitable sealer on seal end tabs. Position engine front cover on cylinder block. Use suitable tool to align front cover and install cover-to-block screws and oil pan-to-cover screws. Tighten all screws. Remove alignment tool and install vibration damper, pulley, fan and hub assembly and drive belt(s).

FRONT COVER OIL SEAL

Removal & Installation – Remove drive belt(s), accessory drive pulley and vibration damper. Remove oil seal using suitable tool (J-9256). To install new seal, apply light film of suitable sealer on outside diameter of seal and position on cover with seal lip facing outward. Use suitable tool (J-9163) to press seal into cover until it bottoms. Apply light film of engine oil on seal lip and install vibration damper, accessory drive and drive belt(s).

CAMSHAFT			
Engine	**Journal Diam.**	**Clearance**	**Lobe Lift**
No. 1 No. 2 No. 3 No. 4	2.029-2.030" 2.0219-2.020" 2.009-2.010" 1.999-2.000"	.001-.003"	① .232" ② .248"

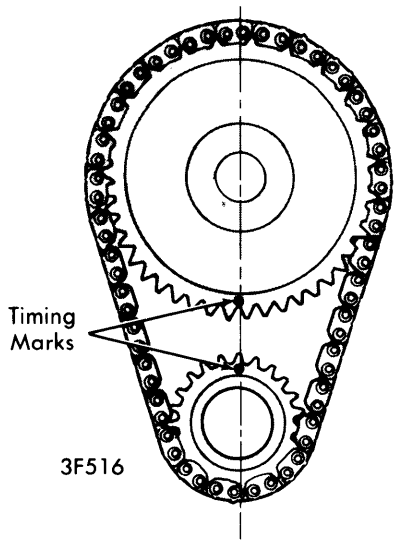
①– 232" & 258" engines w/1-Bbl. Carburetor.
②– 258" engine w/2-Bbl. Carburetor.

TIMING CHAIN

Removal – Remove engine front cover. Remove camshaft sprocket retaining bolt and washer. Rotate crankshaft until

232" & 258" 6-CYL. (Cont.)

timing mark on sprocket is aligned with camshaft sprocket timing mark (see illustration). Remove sprockets and timing chain as an assembly.



TIMING CHAIN SPROCKET ALIGNMENT

Installation – Assemble timing chain, crankshaft sprocket and camshaft sprocket with timing marks aligned (see illustration). Install assembly to crankshaft and camshaft. Install camshaft sprocket retaining bolt and washer, then tighten.

CAMSHAFT

Removal – Drain cooling system and remove radiator. Remove hood (Pacer only). Lift off air conditioning condensor and receiver assembly as a charged unit (if equipped), then remove rocker arm cover and valve assembly components. Lift off cylinder head and remove hydraulic tappets. Remove drive belt(s), fan and hub assembly, damper drive pulley (if equipped), timing case cover and fuel pump, and distributor with wiring. Rotate crankshaft until 0° timing mark on crankshaft is closest to and in centerline with timing pointer of camshaft sprocket. Remove crankshaft sprocket, camshaft sprocket, timing chain as an assembly. On Pacer only, support front of engine with suitable lifting device and disconnect front support cushions from crossmember, lift engine enough to allow camshaft removal. On all other models, remove bumper or grille as required and remove camshaft.

Installation – Reverse removal procedure while noting following: Lubricate camshaft with suitable oil supplement and install camshaft carefully to avoid damage to camshaft lobes.

CAMSHAFT BEARINGS

Removal & Installation – With camshaft removed, remove bearings using suitable bearing remover. Bearing bores are step-bored (largest at front, smallest at rear). Install bearings using suitable bearing installer and install camshaft.

CAM LOBE LIFT

Remove rocker arm cover, rocker arm assembly and spark plugs. Proceed as follows:

1) Using suitable clamping or mounting fixture, attach dial indicator to cylinder head so indicator probe rests on top of push rod with indicator and probe in a vertical position over push rod.

2) Rotate crankshaft slowly until valve lifter is on heel of cam lobe. At this point, push rod will be at its lowest point. *CAUTION – If using an auxiliary starter switch, distributor primary lead must be disconnected from negative post of coil.*

3) With push rod at lowest position, zero dial indicator and rotate engine until push rod is in fully raised position. Compare total lift recorded with specifications. If less than specifications, camshaft is defective. Check all remaining lobes of camshaft in same manner.

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ALDC)	Open (BLDC)	Close (ATDC)
232" & 258" 1-Bbl.	12°	65°	53°	24°
258" 2-Bbl.	15°	69°	56°	28°

VALVE TIMING

Remove spark plugs and rocker arm cover. Rotate crankshaft until No. 6 piston is at TDC on compression stroke. Rotate crankshaft counterclockwise 90°. Install dial indicator with indicator point touching No. 1 cylinder intake rocker arm at push rod end and set dial indicator to zero. Rotate crankshaft clockwise until dial indicator shows .016" lift. Timing mark on vibration damper should index with TDC mark on engine front cover. If timing mark is more than ½" off TDC in either direction, valve timing is incorrect.

ENGINE OILING

Crankcase Capacity – 4 quarts. Add 1 quart with filter change.

Oil Filter – Replace every 5000 miles or 5 months, whichever comes first.

Normal Oil Pressure – 13 psi minimum at 600 RPM and 37-75 psi maximum at 1600+ RPM.

Pressure Regulator Valve – Located in pump body. Not adjustable.

ENGINE OILING SYSTEM

Oil under pressure is directed from oil pump to a full-flow oil filter. In case filter becomes clogged and restricts full flow of oil, a by-pass valve is located in filter mounting base. From oil filter, oil flow is directed as follows:

Crankshaft & Camshaft Bearings – Main and camshaft bearings receive oil from main oil gallery. From main bearings oil passes through passage in crankshaft to connecting rod

232" & 258" 6-CYL. (Cont.)

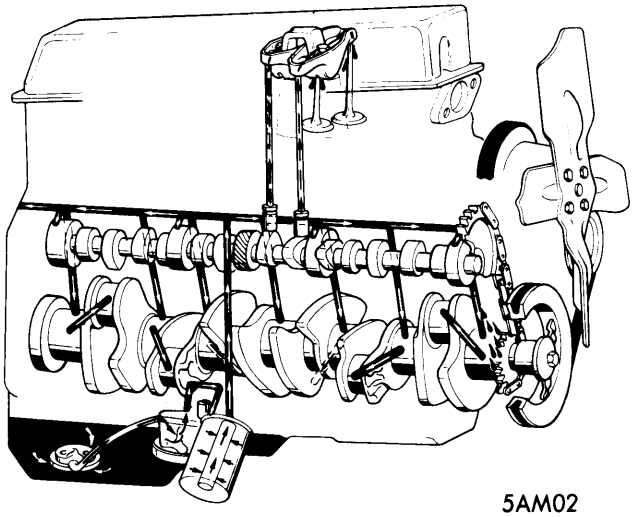
ENGINE OILING (Cont.)

bearings. Oil throw-off from each connecting rod bearing lubricates cylinder walls, piston pins, camshaft lobes and distributor drive gear.

Hydraulic Valve Tappets – Lubricated directly from main oil gallery.

Timing Chain & Sprockets – Oil is received from front camshaft bearing and returns to crankcase through cavity under front main bearing cap.

Rocker Arms & Bridged Pivot Assemblies – Oil is supplied to rocker arms from hydraulic valve lifters through hollow push rods to rocker arm assemblies. Oil from rocker arms lubricate valve train components, then passes down through push rod guides and into oil pan.

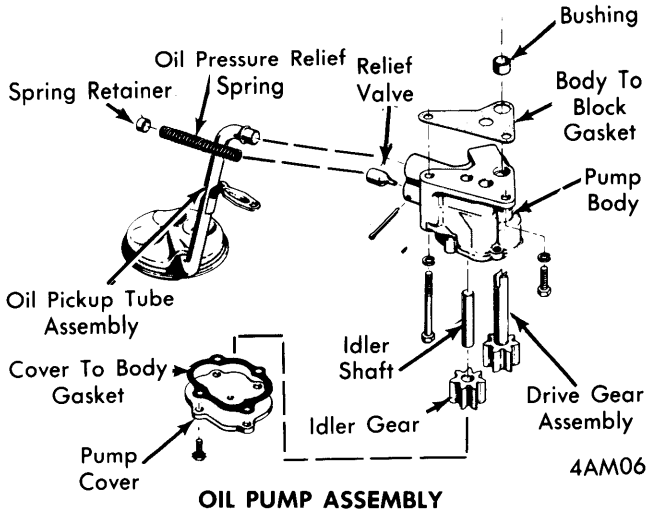


5AM02

ENGINE OILING SYSTEM

OIL PUMP

Oil pump is driven by distributor drive shaft. Removal of oil pump will not effect ignition timing as distributor gear remains meshed with camshaft gear. With pump cover and gasket removed, end clearance of pump gears can be measured by placing suitable straightedge across gears and pump body, then passing feeler gauge between straightedge and gears to determine clearance. Correct clearance is .002-.006" for Pacer only, and .001-.003" for all other models. In both clearances, the larger clearance is preferred. Oil pump gear-to-body clearance should be .0005-.0025" (with .0005" desired), for all applications, measurement should be made between gears and wall of gear cavity opposite point of gear mesh. Pump must be filled with petroleum jelly (or equivalent) prior to installation of oil pump cover. *CAUTION – Oil inlet tube position must be changed to allow removal of relief valve; therefore, pickup tube assembly must be replaced at installation using suitable sealer.*



OIL PUMP ASSEMBLY

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs.
Camshaft Sprocket	50
Clutch Housing-to-Block	
Top	27
Bottom	43
Connecting Rod Nuts	28
Cylinder Head	105
Drive Plate-to-Converter	22
Engine Front Cover	5
Exhaust Manifold	23
Flywheel-to-Crankshaft	105
Fuel Pump	16
Intake Manifold	23
Main Bearing Caps	80
Oil Pan	
1/4"	7
5/16"	11
Oil Pump Cover	6
Oil Pump Screw	
Short	10
Long	17
Thermostat Housing	13
Vibration Damper	55
Water Pump	13