PICKUP 4 CYLINDER

GENERAL SPECIFICATIONS										
Year	Displ.		Carburetor	HP at RPM	Torque (Ft. Lbs. at RPM)	Compr. Ratio	Bore		Stroke	
	cu. ins.	cc					in.	mm	in.	mm
1974	109.6	1796	2-Bbl.	.....	.....	8.6-1	3.07	78	3.70	94

ENGINE IDENTIFICATION

Vehicle engine information is stamped on a plate riveted to body at right rear of engine compartment.

Year	Engine Code
1974	VB

ENGINE REMOVAL

1) Remove hood and drain cooling system. Remove air cleaner assembly. Disconnect upper radiator hose at engine and lower hose at radiator. Unbolt and remove radiator.

2) Disconnect accelerator linkage and fuel line at carburetor. Disconnect linkage from intake manifold, cable at air by-pass valve, choke cable, battery cables, coil wires at distributor and coil lead wires.

3) Remove fan, loosen alternator retaining bolts and remove alternator belt. If equipped with Thermactor (air pump), remove mounting bolts and pump drive belt. Remove alternator bracket and adjusting arm bolts and position alternator out of the way. Pull Thermactor hoses off pump, remove bracket and position pump aside. Disconnect heater hoses from intake manifold and Thermactor air hose from by-pass valve.

4) Disconnect lead wire and boot from oil pressure sending unit, battery cable from block and wires from starter solenoid. Raise vehicle and drain oil. Remove splash shield and separate exhaust pipe from manifold. Remove clutch housing and bottom starter bolts.

5) Lower vehicle, remove upper starter bolts and withdraw starter. Place a floor stand under transmission. Connect a lifting sling to engine hanger brackets. Disconnect engine mounts and pull engine forward until clear of transmission shaft. Lift engine from vehicle. To install, reverse removal procedures.

INTAKE MANIFOLD REMOVAL

1) Drain cooling system. Remove air cleaner assembly and accelerator linkage. Disconnect choke cable and fuel line at carburetor.

2) Disconnect Thermactor hoses (if equipped), crankcase ventilation hose, heater return hose and by-pass hose. Remove attaching nuts and lift manifold, with carburetor, off studs.

CYLINDER HEAD REMOVAL

1) Drain cooling system. Remove hood and air cleaner assembly. Disconnect lead wire and vacuum line from distributor.

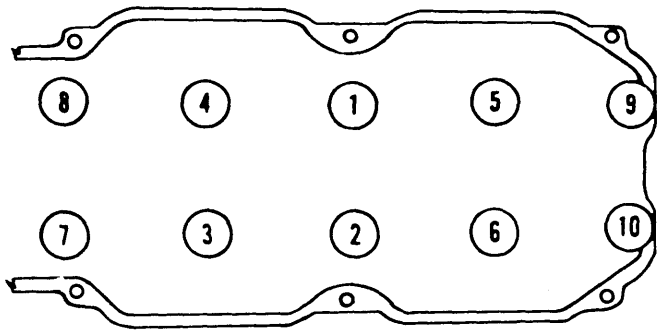
2) Rotate crankshaft until number one cylinder piston is at TDC. Remove plug wires and cap from distributor as an assembly. Remove distributor and rocker arm cover. Raise vehicle and disconnect exhaust pipe from manifold.

3) Lower vehicle and remove accelerator linkage. Disconnect temperature sending wire, throttle cable at air by-pass valve, choke cable and fuel line from carburetor.

4) Disconnect Thermactor hoses (if equipped), heater return hose at intake manifold, by-pass, water pump hose and upper radiator hose at engine.

5) Disconnect lead wire from slow fuel valve. Remove intake manifold bracket and lower front cylinder head bolt.

6) Remove nut, washer and distributor gear from camshaft, then remove nut, washer and camshaft sprocket. Remove cylinder head bolts. Remove rocker assembly and camshaft. Lift head assembly off of engine block. Relieve tension from timing chain by removing tensioner cover and loosening tensioner attaching bolts.



CYLINDER HEAD TIGHTENING SEQUENCE

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)
1800 cc							
Int.	1.6497-1.6575 (41.90-42.10)	45°	45°	.055 (1.397)	.3161-.3167 (8.029-8.044)	.0007-.0021 (.017-.053)	.....
Exh.	1.2953-1.3031 (32.90-33.09)	45°	45°	.055 (1.397)	.3159-.3161 (8.024-8.029)	.0007-.0023 (.017-.058)	.....

PICKUP 4 CYLINDER (Cont.)

VALVE ARRANGEMENT

Intake – Left side.
Exhaust – Right side.

VALVE GUIDE SERVICING

Check guides for wear or damage, replace as necessary. With valves removed, using suitable tool (T72J-6510), drive valve guides out top of cylinder head. Install new guides, making sure exhaust and intake guides are in proper locations. Drive guide in until ring around guide touches head.

VALVE STEM OIL SEALS

With valves and springs removed, pull oil seals off valve guides using suitable tools (T72J-6571 and T59L-100-B). Install new seals on valve guides with large diameter hole facing cylinder head.

VALVE SPRINGS

Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1800 cc			
Inner	1.438 (36.52)	20.9@1.250 (9.5@31.75)	.....
Outer	1.469 (37.31)	31.5@1.344 (14.3@34.13)	.....

VALVE SPRINGS

Check valve spring pressure at specified height, replace if not within specifications. Measure free length of spring, if not within three percent, replace spring. Using a square, check that spring is not more than 1/16" out-of-square.

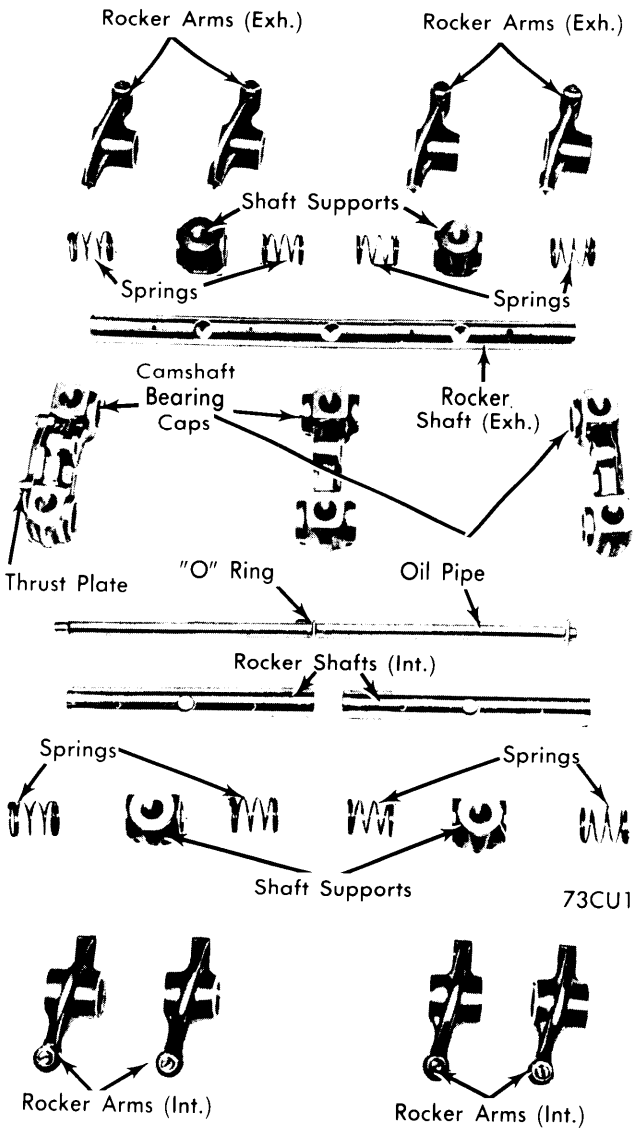
ROCKER ARM ASSEMBLY

1) Remove front bearing cap from rocker shafts. Slide rocker arms, springs, supports and bearing caps (with oil pipe) off both shafts, keeping parts in order for reassembly.

2) Remove oil pipe from bearing caps. Remove camshaft thrust plate from front bearing cap, if necessary. Prior to reassembly, lubricate arms and shafts with heavy (MS) motor oil. When installing shafts in intake side, ensure ends with longer length between oil hole and tip are turned inward, toward each other. Make sure "O" ring on oil pipe is centered in middle bearing cap passage.

VALVE CLEARANCE ADJUSTMENT

1) With engine at normal operating temperature, rotate crankshaft until number one piston is at TDC of compression stroke. Check clearance with feeler gauge at either camshaft or valve.



ROCKER ARM ASSEMBLY

2) If clearance is not .012" (.305 mm), loosen adjusting screw lock nut and turn adjusting screw with feeler gauge in place. Hold screw in position and tighten lock nut. Adjust remaining valves in firing order sequence; 1-3-4-2.

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)
1800 cc	.0022-.0028 (.056-.071)	.0002-.0006 (.005-.015)	.0004-.0012 (.010-.030)	1	.008-.016 (.203-.406)	.0014-.0028 (.036-.071)
				2	.008-.016 (.203-.406)	.0012-.0025 (.030-.064)
				Oil	.008-.016 (.203-.406)	.0012-.0024 (.030-.061)

PICKUP 4 CYLINDER (Cont.)

OIL PAN

Raise vehicle on hoist. Remove front lower engine shield. Drain crankcase and remove clutch slave cylinder. Remove rear engine brace mounting bolts. Disconnect emission line from oil pan. Remove attaching nuts and bolts and lower pan onto crossmember. Disconnect oil pump pick-up tube and remove pan from vehicle.

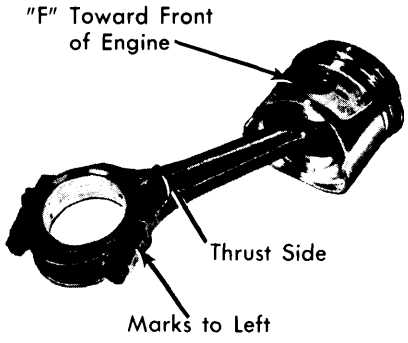
PISTON & ROD ASSEMBLY

Removal – 1) With cylinder head and oil pan removed, rotate crankshaft until piston to be removed is at bottom of travel. Place a cloth on piston to collect cuttings, then using a suitable ridge reamer, remove any ridge or deposits from upper end of cylinder.

NOTE – Do not cut into ring travel area in excess of 1/32".

2) Make sure connecting rod caps are marked so they may be replaced in their original positions, then remove rod caps. Push piston and rod assembly out top of cylinder. Take care not to damage bearing journal.

Installation – 1) With rings properly spaced, install piston and rod assembly into proper cylinder. Make sure connecting rod marks are facing left side of engine and "F" mark on piston is facing forward (see illustration). Install rod caps and tighten rod bolts.



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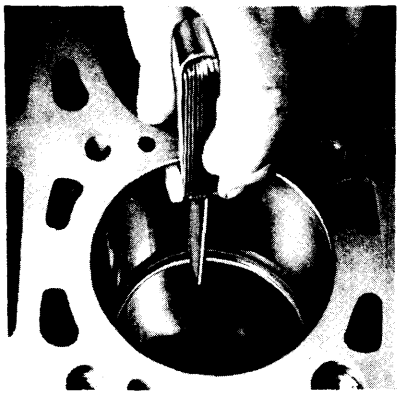
PISTON & ROD ASSEMBLY INSTALLATION

FITTING PISTONS

1) Determine piston-to-cylinder bore clearance. Check cylinder for out-of-round or taper. Fit new pistons if necessary. Pistons are available in .010", .020", .030" and .040" oversizes.

2) Place rings in cylinder near bottom of bore and measure end gaps. Place rings on piston and measure side clearance. If high steps have developed on lower back side of ring lands replace piston.

3) Place rings on piston with end gaps 120° apart so that no gap is located on thrust face or piston pin bore. Using suitable ring compressor, install piston in proper bore with "F" marking facing forward.



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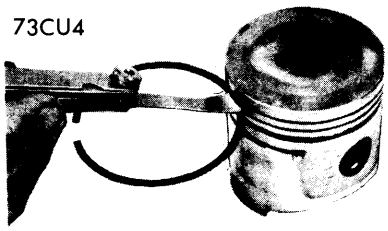
CHECKING RING GAP

73CU4



CHECKING SIDE CLEARANCE

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)
1800 cc	2.4779-2.4785 (62.93-62.95)	① .0005-.0015 (.013-.038) ② .0012-.0024 (.030-.061)	5	.003-.01 (.076-.254)	2.0842-2.0848 (2.0842-2.0848)	① .001-.0011 (.025-.028) ② .001-.003 (.025-.076)	.004-.008 (.102-.203)

① – Desired.
② – Allowable.

MAIN & CONNECTING ROD BEARINGS

1) Inspect each bearing for scored, chipped or worn surface and replace if condition exists. If copper base is visible through bearing overlay, replacement is not necessary, if within specifications.

2) When installing new bearings, fit bearings to minimum specified clearance. Use Plastigage method to determine bearing clearances. Inserts are available in .010", .020" and .030" undersizes.

PICKUP 4 CYLINDER (Cont.)

THRUST BEARING ALIGNMENT

Push crankshaft to one side to take up end play. Insert a feeler gauge between thrust washers and crankshaft. Replace thrust washers if measurement is not within specifications. Install new thrust washers with oil groove facing crankshaft thrust side.

REAR MAIN BEARING OIL SEAL

NOTE — If rear main bearing seal replacement is only operation being performed, it can be done in vehicle; however if it is being replaced in conjunction with rear main bearing, engine must be removed.

Remove transmission and clutch assembly. Using an awl, punch two holes in seal and install sheet metal screws. Using a pair of levers, pry out old seal. Press in new seal, reinstall clutch and transmission.

ENGINE FRONT COVER

Drain cooling system, disconnect upper radiator hose at engine and lower hose at radiator. Remove radiator, drive belts, crankshaft pulley and water pump. Remove front cover bolts from cylinder head. Raise vehicle and remove front shield. Disconnect emission line from oil pan, then remove pan. Lower vehicle, disconnect alternator bracket from block. Remove Thermactor (if equipped) and steel tube from front of engine. Remove remaining cover bolts and cover.

FRONT COVER OIL SEAL

Drain cooling system, disconnect radiator hoses and remove radiator. Loosen alternator and Thermactor attaching bolts (if equipped). Remove drive belts. Remove crankshaft pulley, then pull seal from shaft, using suitable tool (T72J-6700). Install new seal using suitable tool (T72J-6700-A). Reverse removal procedures for remaining components.

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1800 cc			
Front	1.7695-1.7701 (44.945-44.960)	.0007-.0027 (.018-.069)	②
Center	1.7691-1.7697 (44.945-44.950)	.0011-.0031 (.028-.079)	②
Rear	1.7695-1.7701 (44.945-44.960)	.0007-.0027 (.018-.069)	②

① — End play is .001-.007" (.025-.178 mm).
② — See Cam Lobe Lift Procedure.

TIMING CHAIN

1) With cylinder head and front cover removed, remove oil pump, chain and timing chain tensioner. Loosen timing chain guide strip screws. Remove oil slinger, oil pump gear and chain.

2) Remove timing chain, crankshaft sprocket and camshaft sprocket. To install, reverse removal procedures. For correct valve timing, See *Valve Timing*.

TIMING CHAIN TENSION

1) Remove crankshaft pulley and water pump. Remove cover from tensioner. Rotate crankshaft slightly in direction of engine rotation. Lift release on tensioner and compress snubber spring fully. Install wedge in tensioner so it will not release.

2) Remove two access plugs and aluminum washers from holes in timing chain cover and side of head. Loosen guide strip attaching screws. Press top of strip with lever inserted through access hole in head.

3) Tighten guide strip attaching screws with screwdriver inserted through hole in cover. Remove wedge from tensioner, allowing snubber to take up chain slack.

4) Install access plugs and aluminum washers to their respective holes. Replace chain tensioner cover and gasket. Install water pump. Tighten bolts and adjust belt tension.

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TIMING CHAIN ADJUSTMENT

CAMSHAFT

1) Drain cooling system, remove lower hose from water pump, loosen drive belts and remove water pump.

2) Disconnect lead wire and vacuum line from distributor. Rotate crankshaft to place number one cylinder at TDC. Remove plug wires and distributor cap (as an assembly). Remove distributor.

3) Remove rocker arm cover. Loosen timing chain tensioner. Remove rocker arm assembly and distributor gear. Remove camshaft sprocket with chain attached.

NOTE — Do not remove camshaft sprocket from chain. Ensure sprocket teeth and chain relationship remain the same.

4) During installation: Torque head bolts in proper sequence, adjust timing chain tension, check camshaft end play (if greater than .001-.007", replace thrust plate). Make cold and hot valve clearance adjustments.

CAMSHAFT BEARINGS

Remove camshaft and inspect bearings for wear or damage. Use Plastigage method to determine clearance. Replace bearings which do not meet specifications.

CAMSHAFT END THRUST

Check camshaft end play with a feeler gauge inserted between thrust plate and camshaft flange. End play should be checked at time of overhaul, before gear and sprocket are replaced.

CAM LOBE LIFT

Remove rocker arm cover. Measure distance between major and minor diameters (see illustration) of each lobe with a Ver-

PICKUP 4 CYLINDER (Cont.)

nier caliper. Difference between diameters of each cam is lobe lift. If lobe lift loss exceeds .005", replace camshaft. Check lift of each lobe in consecutive order and note each reading.

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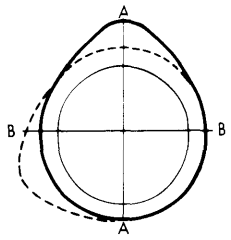
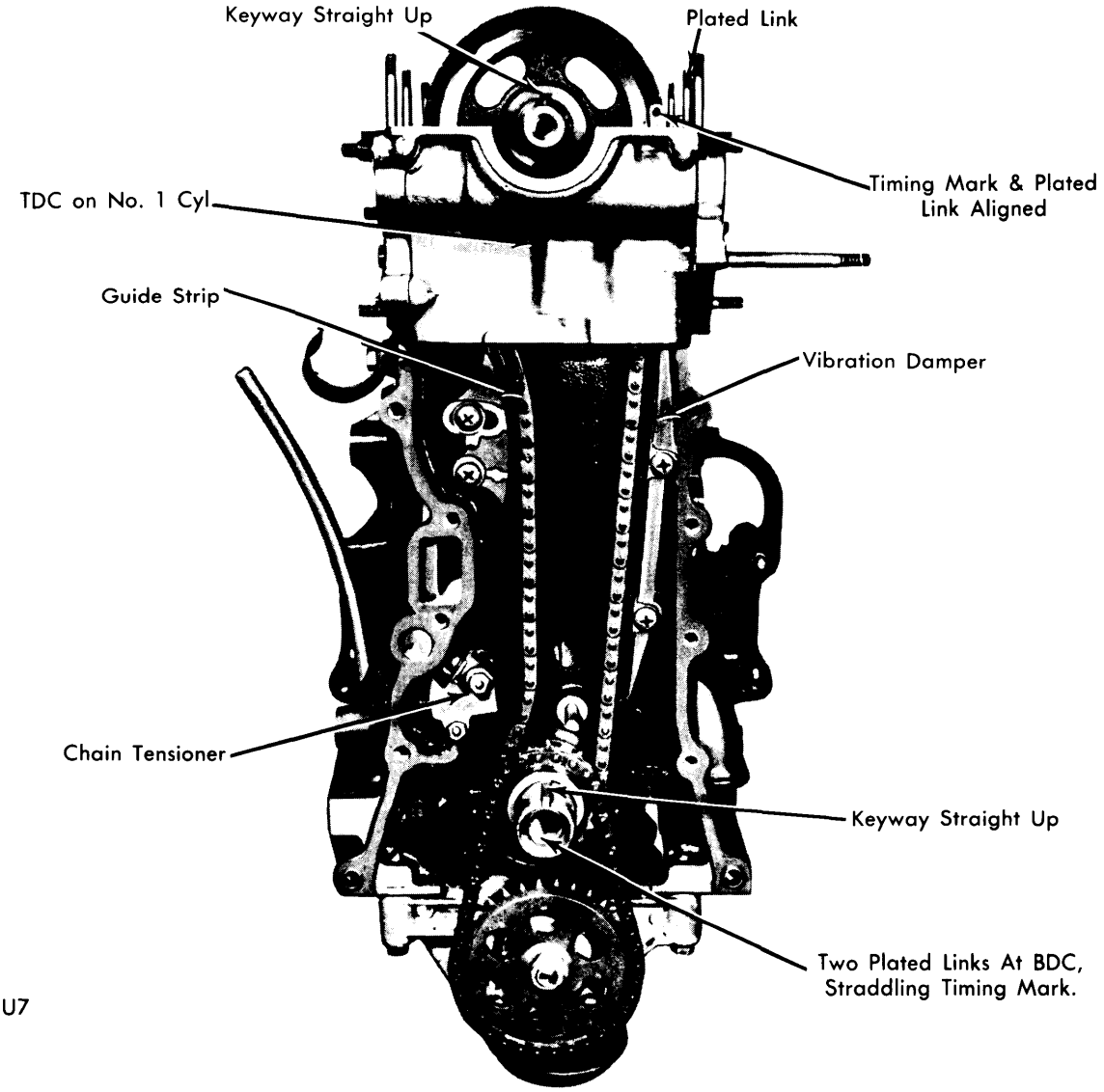


MEASURING LOBE LIFT

VALVE TIMING				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ALDC)	Open (BLDC)	Close (ATDC)
1800 cc	13°	57°	62°	8°

VALVE TIMING

Rotate crankshaft and camshaft until keyways are straight up. Place timing chain on camshaft sprocket so single plated link is aligned with timing mark on right-hand side of camshaft sprocket at rocker arm cover joint face, while facing engine. The two plate links on timing chain must straddle timing mark on BDC of crankshaft sprocket. Crankshaft in this position will be TDC of number one cylinder.



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VALVE TIMING

PICKUP 4 CYLINDER (Cont.)

ENGINE OILING

Crankcase Capacity – 4 qts. (Add 1 qt. with filter change).
Oil Filter – Disposable type.
Oil Pressure – 50-64 psi @ 3000 RPM; 4.25 psi @ idle.

ENGINE OIL SYSTEM

Rotor type oil pump is chain driven by crankshaft. Timing chain is lubricated by oil jet in cylinder block and oil holes in slipper head of adjuster. Oil holes in large end of connecting rods align with oil holes in crankshaft to lubricate pistons and components.

OIL PUMP

1) Remove oil inlet tube from pump. Remove and discard gaskets. Remove cover, withdraw inner rotor and shaft assembly. Remove outer race. Remove cotter pin from body, pull cap out of chamber, and take out spring and plunger.

2) Assemble in reverse order. Rotor, shaft and outer race are serviced as an assembly. If one component is damaged, replace all three. Install new cotter pin and gasket. Prime pump with oil before installing unit in block.

Oil Pump Specifications

Application	Clearance In. (mm)
Lobe-to-Lobe	.002-.006 (.051-.152)
Rotor End Clearance	.002-.004 (.051-.102)
Outer Rotor-to-Housing	.006-.010 (.152-.254)

ENGINE COOLING

Thermostat – Begins to open at 180°F; fully open 203°F.

Cooling System Capacity – 7½ qts. (includes heater).

Radiator Cap – 13 psi.

WATER PUMP

Drain cooling system, remove lower hose from water pump, disconnect upper radiator hose at engine and lower hose at radiator. Loosen alternator and Thermactor pump (if equipped). Remove fan and pulley. Remove crankshaft pulley. Remove water pump.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Main Bearing Caps	60-65 (8.3-9.0)
Connecting Rod Caps	29-33 (4.0-4.6)
Cylinder Head	
Cold	60-65 (8.3-9.0)
Hot	70 (9.7)
Oil Pan	6 (.83)
Intake & Exhaust Manifilds	20 (2.8)
Flywheel	115 (15.9)
Distributor Drive Gear	55 (7.6)
Oil Pump-to-Block	13-20 (1.8-2.8)
Camshaft Sprocket	50-58 (6.9-8.0)
Rocker Arm Cover	1.5 (.21)
Oil Pump Sprocket	25 (3.5)