LUV 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	110.8	1816	1x2-Bbl.	75 @ 5000	88 @ 3000	8.2-1	3.31	84	3.23	82

ENGINE IDENTIFICATION

Engine number is located in casting on right upper center portion of cylinder head.

ENGINE REMOVAL

1) Disconnect battery cables, drain crankcase and cooling system. Disconnect carburetor linkage, all necessary water and fuel hoses, vacuum lines, and electrical leads. Also disconnect exhaust pipe at manifold flange. Remove radiator.

2) Disconnect drive shaft, clutch slave cylinder and speedometer cable. Remove gearshift lever assembly and exhaust pipe bracket. Attach suitable hoist and take up weight of engine. Remove front and rear engine mounts. Carefully pull engine forward adjusting hoist to clear stationary components.

INTAKE & EXHAUST MANIFOLD REMOVAL

1) Remove air cleaner and carburetor. Disconnect PCV valve, power brake vacuum line and exhaust pipe from exhaust manifold. Note for reinstallation position of lifting hanger.

2) Remove nuts, lock washers and flat washers holding manifolds to cylinder head. Slide manifolds off together. Once off, manifolds can be separated by removing exhaust manifold mounting studs. To install, reverse removal procedure.

CYLINDER HEAD REMOVAL

1) Disconnect all necessary water hoses, vacuum lines, carburetor linkage, and electrical leads. Remove spark plugs, intake and exhaust manifolds.

2) Remove valve cover and bolts securing timing cover to cylinder head. Using suitable tool (J-24239), loosen cylinder head bolts in progressional sequence. Lift cylinder head and gasket from block. To install, reverse removal procedure.

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)
1816cc							
Int.	1.69 (42.9)	45°	45°	.047-.063 (1.194-1.600)	.315 (8.0)	.0016 (.0406)	.....
Exh.	1.30 (33.0)	45°	45°	.047-.063 (1.194-1.600)	.315 (8.0)	.0020 (.0508)	.....

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E

VALVE GUIDE REMOVAL

1) Inspect inner face of valve guide for grooves or uneven wear. Check clearance between valve stem and valve guide. Replace both guide and valve if clearance is beyond .008" (intake) or .010" (exhaust).

2) Drive valve guides toward upper face of cylinder head, using suitable valve guide replacer (J-24237). *NOTE — Valve guides can not be driven downward; they are held in position by snap rings.*

3) To install, oil circumference of valve guide. Press new guide into place against snap ring, using suitable tool (J-24237). *NOTE — Maximum interference between valve guide and cylinder head is .0016".*

VALVE STEM OIL SEALS

Inspect intake and exhaust valve stem oil seal lips and inner face. Replace valve stem oil seals at time of reassembly, if wear is noticable.

VALVE SPRINGS			
Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1816cc			
Inner	1.78 (45.2)	17.8 @ 1.50 (8.1 @ 38.1)	....
Outer	2.05 (52.1)	47.4 @ 1.58 (22 @ 40.1)	....

VALVE SPRING REMOVAL

Using suitable valve compressor tool (J-8062), remove spring retainer half clip. Remove upper valve seat, inner valve spring, outer valve spring and lower valve seat. *NOTE — Ensure screw rod of valve replacer is in contact with center portion of valve head.* Remove pivot only if necessary.

LUV PICKUP 4 CYLINDER (Cont.)

VALVE SPRING INSTALLED HEIGHT

Visually check valve springs for damage and replace as necessary. Measure free length of valve springs using suitable calipers and replace if measured value is beyond limit. With a valve spring tester check valve spring tension and compare it with values in chart, replace as necessary.

NOTE — Install springs with close wound coils next to cylinder head.

ROCKER ARM ASSEMBLY

Remove rocker arm positioning spring. Lift rocker arm from pivot bolt. Inspect pivot socket and cam shoe for wear or damage. To install, reverse removal procedure.

ROCKER ARM STUDS

With rocker arms removed, inspect pivot studs for wear, damage or looseness. Do not remove pivot stud, unless it is to be replaced.

VALVE CLEARANCE ADJUSTMENT

With No. 1 or No. 4 cylinder piston at TDC, loosen lock nut and adjust intake valves to .004" and exhaust valve to .006". When valves are correctly adjusted reset lock nut.

Valve Adjustment Sequence

Application	Intake/Cylinder	Exhaust/Cylinder
No. 1 @ TDC	1,2	1,3
No. 4 @ TDC	3,4	2,4

PISTONS, PINS, RINGS

Engine	PISTONS Clearance In. (mm)	PINS Piston Fit In. (mm)	PINS Rod Fit In. (mm)	RINGS Rings	RINGS End Gap In. (mm)	RINGS Side Clearance In. (mm)
1816 cc	.0018-.0026 (.0457-.0660)	①	.0024 (.0610)	1	.008-.016 (.203-.406)	.0012-.0028 (.0305-.0711)
				2	.008-.016 (.203-.406)	.0012-.0028 (.0305-.0711)
				3	.012-.039 (.305-.991)	.0008-.0024 (.0203-.0610)

① — Press fit.

OIL PAN REMOVAL

Drain oil and remove mounting bolts. Carefully insert a screwdriver between oil pan and crankcase and pry downward to break gasket seal. Lower pan from vehicle, rotating it as necessary. To install, reverse removal procedure.

CRANKCASE REMOVAL

To remove crankcase, invert engine and withdraw oil pan (if applicable). Extract bolts securing crankcase. Insert edge of screwdriver into cutaway portions of crankcase and pry downward. To install, reverse removal procedure.

PISTON & ROD ASSEMBLY

1) Position cylinder body so flywheel side is down. Using suitable tool, scrape carbon from upper part of cylinder wall.

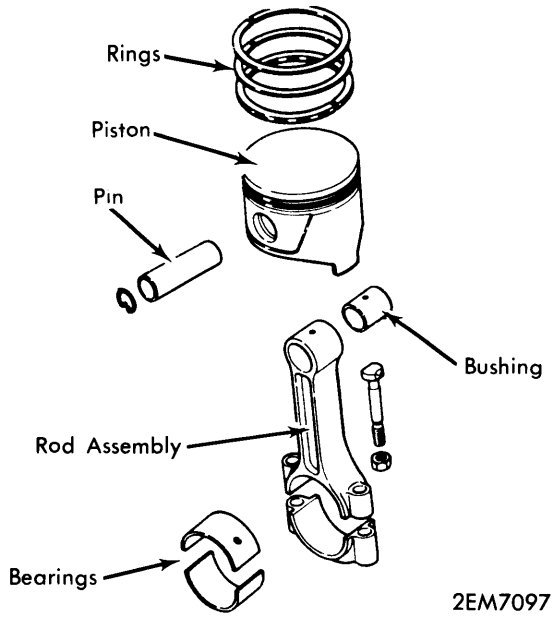
2) Remove connecting rod bearing cap nuts and bearing cap. Using a wood rod, push piston, together with connecting rod, upward. Removal sequence is 1, 4, 2, & 3. *NOTE — Ensure piston and connecting rod are pulled parallel to cylinder wall.*

3) To install piston and rod assembly, position piston so notch mark on crown of piston is facing front of engine. Align cylinder number marks on connecting rods so they will be on right-hand side of front mark on piston.

PISTON PIN REMOVAL

1) With piston and rod assembly installed in vise, remove piston pin snap rings. Drive out piston pin with a hammer and punch. Piston and rod can now be separated.

2) Inspect inner surface of connecting rod bushing, if it is worn or grooved, replace bushing. After installing new bushing ream to .8662-.8665".



PISTON ASSEMBLY

3) To assemble rod and piston, heat piston to 158-212°F and insert snap ring. Align rod so index mark is on right side of groove in piston crown. Push pin into bore until seated and install second snap ring.

LUV PICKUP 4 CYLINDER (Cont.)

4) Using suitable ring expander, assemble rings to piston. Insert rings into grooves so "NPR" or "TOP" mark faces up. Coat whole piston assembly with engine oil and ensure each ring is free to turn.

FITTING PISTONS

1) Check piston clearance by inserting piston pull-scale with .0018-.0026" feeler gauge, one inch long, into cylinder. Fit piston, crown first, into cylinder so feeler gauge is wedged by piston.

2) Holding piston to prevent side thrust, withdraw gauge with a steady pull on scale. Clearance is correct when gauge reads 1.1-2.2 lbs. *NOTE — It is advisable to take several readings.*

3) Measure weight of assembled pistons and compare the values. Ensure values between pistons are within .2 ozs. If value is exceeded, make necessary adjustments by selecting a connecting rod of suitable weight or by grinding.

Piston Class

Piston Size	Piston Grade	Piston Diameter
Standard	A	3.3049-3.3053"
Standard	B	3.3053-3.3057"
Standard	C	3.3057-3.3061"
Standard	D	3.3061-3.3065"

NOTE — Pistons are available in .005", .010", .020", .030", .040", .050" and .060".

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)
1816 cc	2.205 (56.01)	.0016 (.0406)	No. 3	.006 (.1524)	1.929 (48.997)	.0020 (.0508)	.011 (.2794)

MAIN & CONNECTING ROD BEARING SERVICE

1) Remove engine, clutch, flywheel, timing cover, timing sprockets, chains, oil pan, and oil pump. Remove main and connecting rod bearing caps, marking them for reinstallation.

2) Inspect connecting rod and main bearing inner surfaces for score marks, pin holes or separations. If any one bearing is bad, replace all bearings.

3) Check surfaces of connecting rod and main bearing journals for signs of scoring or seizing. If journals are severly damaged they must be ground to accept any one of five undersize bearings.

4) Using Plastigage method, check connecting rods and main bearing clearances. Refer to the following table and determine if bearings need replacing.

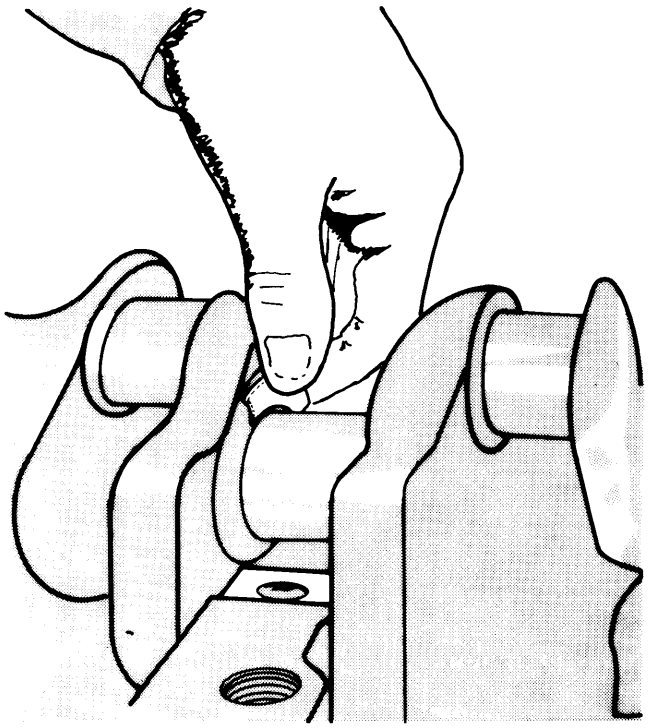
Plastigage Chart

Plastigage	Clearance
Type PR-1 (Red)	.0020-.0060"
Type PB-1 (Blue)	.0040-.0090"
Type PG-1 (Green)	.0010-.0030"

5) Place crankshaft on two "V" shaped blocks at No. 1 and No. 5 journals. Hold dial indicator in contact with No. 3 journal and slowly turn crankshaft, recording highest point on journal. Replace crankshaft if bend exceeds .0039". Standard assembly value is .0012" or less.

6) To check crankshaft end play, place bearings and crankshaft in crankcase. Install thrust bearing on both sides of No. 3 crankshaft journal. Shift crankshaft endwise and measure clearance between thrust bearing and journal side face. If clearance exceeds .0059", install oversize thrust bearings.

NOTE — Main bearing caps are installed with marks on bottom of caps facing forward. Number two and three bearing caps can be distinguished by an "A" stamped on caps.



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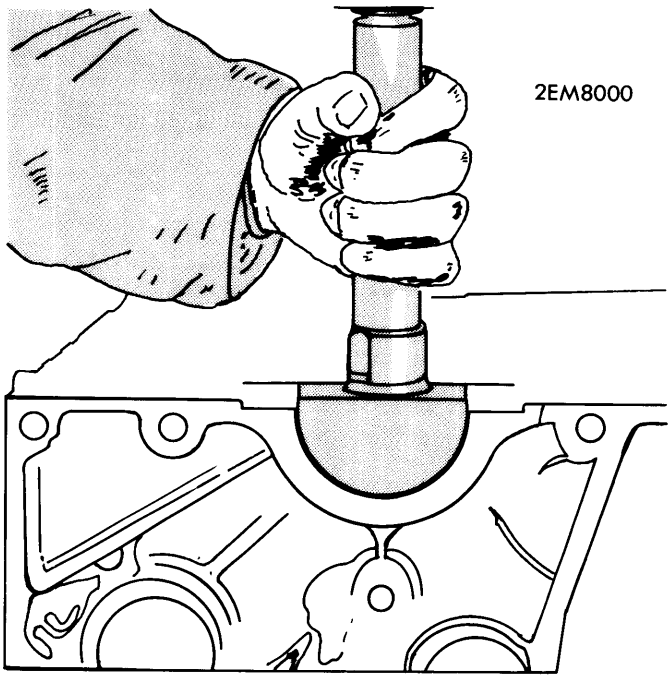
INSTALLING THRUST BEARING

REAR MAIN OIL SEAL SERVICE

Using suitable tool (J-24272), seat new seal. Holding seal with tool, trim excessive portion of seal. Seal is properly installed when only 15-22 ft. lbs. are required to turn crankshaft.

LUV PICKUP 4 CYLINDER (Cont.)



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SEATING REAR MAIN SEAL

TIMING CHAIN COVER & OIL SEAL

1) Drain cooling system. Remove radiator and fan belt. Extract crankshaft pulley, lower timing cover bolts, access cover, and bolt on inner face of cover.

2) Insert screwdriver into cutaway sections and free timing gear cover. Remove upper camshaft cover by extracting six mounting bolts.

3) After removing worn oil seal and inspecting cover, install new seal. Fill lips of oil seal with grease and, using suitable tool (J-24273), install new seal. To install timing gear cover, reverse removal procedure.

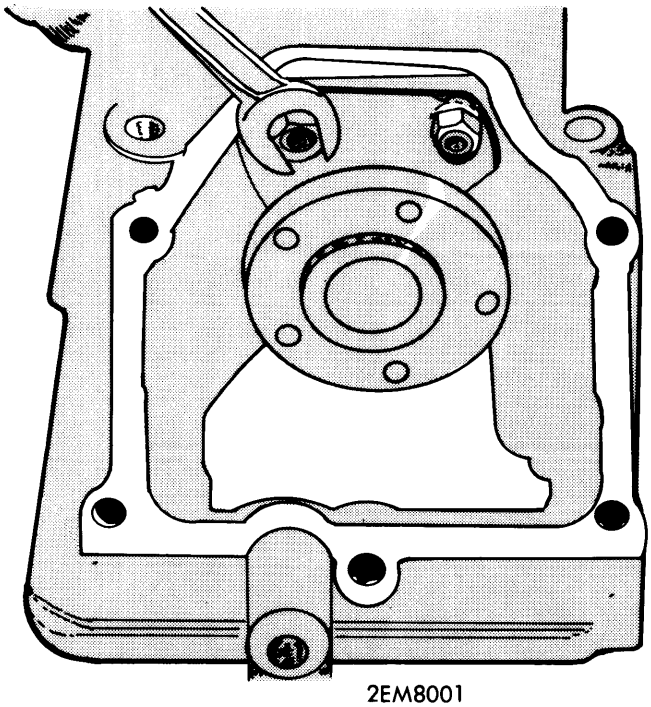
CAMSHAFT			
Engine	Journal Diam. In. (mm)	① Clearance In. (mm)	Lobe Lift In. (mm)
1816 cc	1.89 (48.00)	.0024 (.0610)	②

① — End play is .0032" (.0813 mm).
② — Lobe height from heel to toe is 1.53" (38.96 mm).

CAMSHAFT REMOVAL & INSPECTION

1) Drain and remove radiator, upper timing sprocket, spring tensioner and damper brackets. Loosen rocker arms until there is no spring load on camshaft. Remove two bolts retaining thrust plate in position on front camshaft carrier. Remove thrust plate and withdraw camshaft toward front of engine.

2) Check camshaft journals and cams for wear or damage. Measure height of cams with a micrometer and replace if height is less than 1.514". If working faces of cams have slight scores or steps, eliminate them by honing. Measure outside diameter of camshaft journals in two directions, using a micrometer. If any of measured values are beyond 1.87", replace camshaft.



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INSTALLING CAMSHAFT THRUST PLATE

CAMSHAFT END PLAY

Measure camshaft end play with thrust plate installed in thrust groove. Replace thrust plate if end play is found to exceed .008". Standard assembly value is .0032".

CAMSHAFT BEARING REPLACEMENT

Camshaft bearings are not replaceable. Camshaft rides in a carrier. If clearance is beyond limits, replace camshaft carrier.

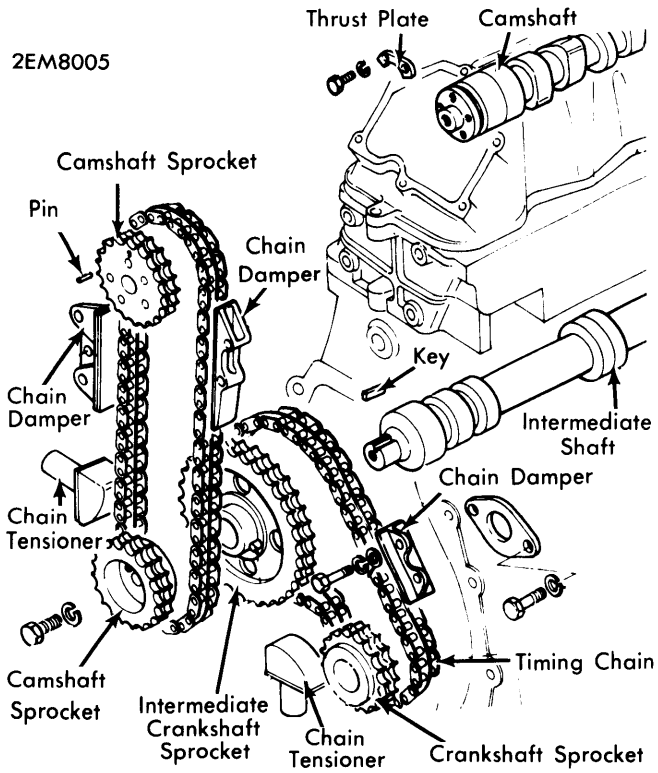
VALVE TIMING				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1816 cc	31°	67°	59°	23°

TIMING CHAIN REPLACEMENT

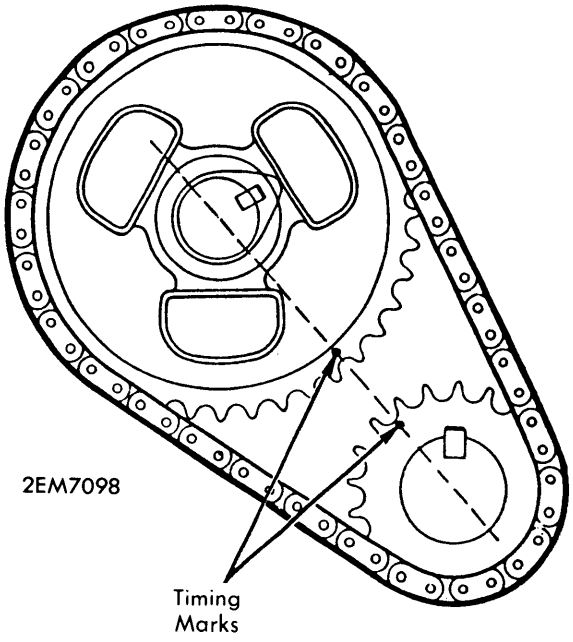
1) To remove camshaft pulley and chain, disconnect oil line from camshaft chain tensioner and remove tensioner with chain. Remove damper. Remove upper and lower camshaft sprocket bolts and pull sprockets and chain forward.

2) If necessary crankshaft chain can now be removed. Disengage crankshaft chain tensioner. Pull both intermediate and crankshaft sprockets forward with chain.

LUV PICKUP 4 CYLINDER (Cont.)



TIMING & DRIVE CHAIN COMPONENTS



CRANKSHAFT & INTERMEDIATE SPROCKET ALIGNMENT

3) When installing intermediate and crankshaft sprockets ensure No. 1 and No. 4 pistons are at TDC. Install both sprockets with chain (see illustration).

4) When fitting camshaft sprockets, bring No. 4 piston to TDC. Align index marks on camshaft and thrust plate (12 o'clock). Insert timing chain through access cover and hold in place. Install intermediate sprocket so index mark on sprocket faces key on intermediate shaft.

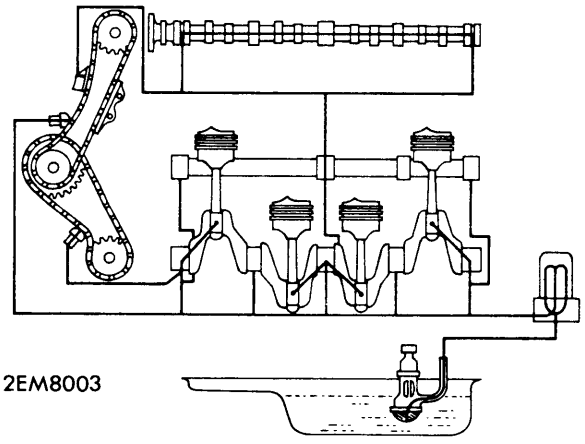
5) Align one of five holes in camshaft sprocket with camshaft flange and insert pin. Torque intermediate shaft and camshaft sprockets to specification.

NOTE — When camshaft timing sprocket is correctly installed, punch mark on sprocket is brought to a position 6°20' from top in direction of rotation.

ENGINE OILING

ENGINE OILING SYSTEM

Trochoid type oil pump is designed to deliver 4.75 gallons of oil per minute through the engine at a pump speed of 1400 RPM. At normal operating temperature, using 30 SAE oil, temperature will be 122°F. Lubricating system is designed to deliver oil at a rate of 57 psi.



OILING CIRCUIT

Crankcase Capacity – 4.2 quarts.

Oil Filter – Full-flow disposable canister type.

Normal Oil Pressure – 57 psi.

Relief Valve – Located on side of cylinder block near oil filter. Opening pressure of relief valve is 61-67 psi.

OIL PUMP

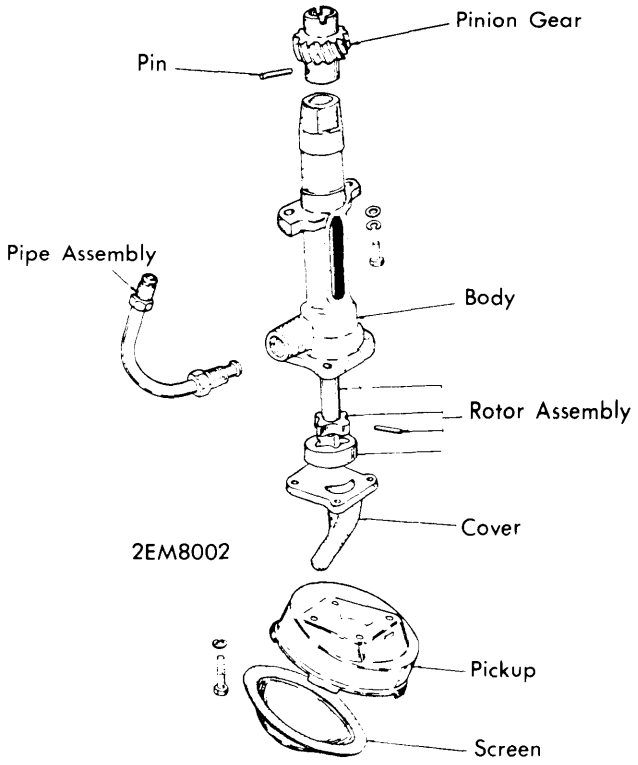
1) Drain crankcase and remove oil pan. Disconnect oil feed pipe. Remove two oil pump mounting bolts and lift out oil pump.

2) Bend out tab from case. Remove bolts, strainer case and pump body. Carefully remove vane to prevent scratching it. Remove pin and pinion from rotor shaft. Drive pin from rotor and remove rotor from shaft.

3) Measure tip clearance with a feeler gauge and replace rotor or vane if measured value is beyond .0059". Standard assembly value is .0012-.0059".

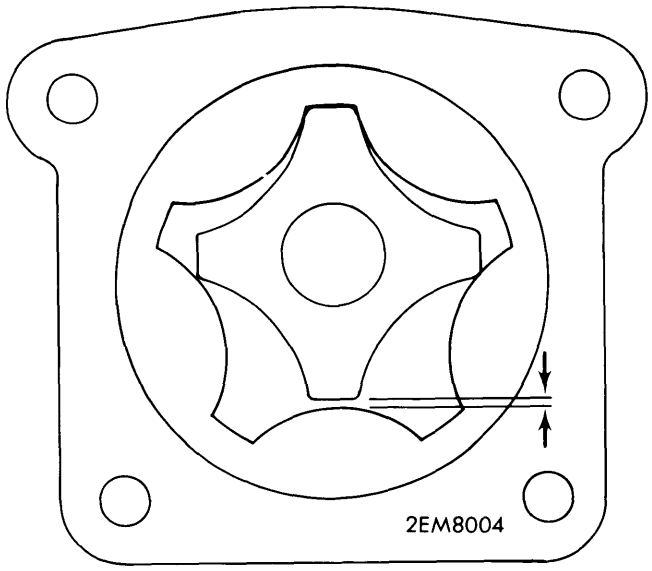
LUV PICKUP 4 CYLINDER (Cont.)

ENGINE OILING (Cont.)



OIL PUMP ASSEMBLY

4) Measure clearance between vane and inner wall of pump body with a feeler gauge. Replace either pump body or vane if clearance exceeds .008-.011".



MEASURING TIP CLEARANCE

5) Using a straightedge and a feeler gauge, measure clearance between rotor, vane and pump body. If clearance exceeds .006", replace necessary components. Standard assembly clearance is .0016-.0035".

6) Using a micrometer, measure outside diameter of rotor and inside of rotor shaft bore. Clearance should not exceed .008". Standard assembly clearance is .0016".

ENGINE COOLING

WATER PUMP

Disconnect battery positive cable and drain cooling system. Disconnect upper and lower radiator hoses. Remove radiator and shroud. Remove drive belts, fan, pulley and spacer. Remove lower radiator and heater hoses at water pump. Loosen, but do not remove bolt behind timing gear cover. Remove water pump and gasket.

Thermostat – Thermostat begins to open at 177-182°F and is fully open at approximately 203°F.

Cooling System Capacity – 6.4 quarts.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head	
Step 1	43 (19.51)
Step 2	58 (26.31)
Main Bearings	72 (32.66)
Connecting Rod Bearings	43 (19.51)
Flywheel	69 (31.30)
Camshaft Carrier	15 (6.8)
Intermediate Timing Sprockets	33 (14.97)
Camshaft Sprocket	33 (14.97)
Oil Pan	15 (6.8)
Rocker Arm Pivot Bolts	90 (12.4)