1973 LOTUS EUROPA 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
1973	95.06	1558	2x1-Bbl.	.....	.....	9.5-1	3.25	82.55	2.86	72.75

ENGINE IDENTIFICATION

Engine may be identified by a number stamped on rear of cylinder head. Example: FT 210.

ENGINE REMOVAL

1) Remove hood and disconnect battery cables. Disconnect bottom radiator hose and allow cooling system to drain. Remove timing cover and thermostat water hoses. Drain transaxle and disconnect air cleaner hose.

2) Remove rear luggage carrier. Disconnect the following from their engine attachments; water temperature line, oil pressure pipe, alternator cables, ignition cables, distributor cables, starter cable, choke cable, throttle and clutch cable.

3) Remove starter and drive shafts. Disconnect fuel inlet line from fuel pump. Disconnect gearshift linkage and back-up switch.

4) Remove bolts attaching upper end of rear shock absorbers to chassis crossmember. Remove bolts at forward ends of diagonal cross-brace to chassis and center bolt attaching brace to crossmember, remove brace. Remove crossmember from chassis.

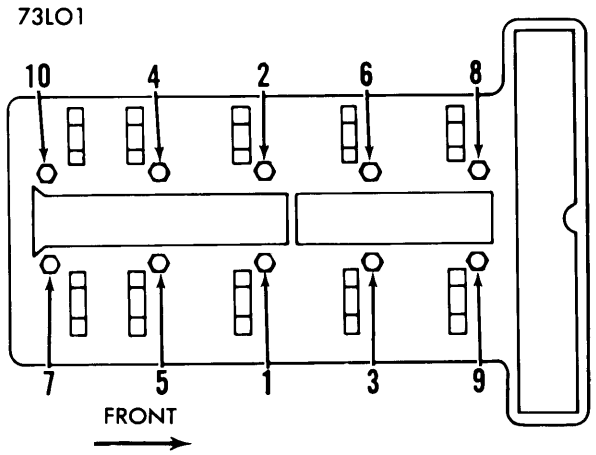
5) Install suitable lifting sling and lift engine/transaxle assembly out of vehicle. To install, reverse removal procedure.

CYLINDER HEAD REMOVAL

1) Drain cooling system and remove carburetor air box. Disconnect top radiator and heater hoses from cylinder head. Disconnect water temperature sending unit. Disconnect throttles, choke cables and fuel lines from carburetors and exhaust manifold.

2) Remove camshaft covers, camshaft sprockets and alternator drive belt. Pull leads from spark plugs. Loosen head bolts evenly and progressively working from center outward in order of tightening sequence (see illustration). To install, reverse removal procedures. *NOTE — Washers with flats go under bolts number 7 and 8.*

CAUTION — Do not lay heads down without supporting ends with wooden blocks. With camshafts installed, valves protrude below face of head.



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)
1973 1558 cc							
Intake	1.560-1.566 (39.62-39.78)	45°	45°	.....	.310-.311 (7.87-7.90)	.0003-.0023 (.007-.058)	.....
Exhaust	1.321-1.325 (33.55-33.66)	45°	45°	.....	.310-.311 (7.87-7.90)	.0025-.0030 (.063-.076)	.....

VALVE ARRANGEMENT

Right Side — All Intake.

Left Side — All Exhaust.

VALVE GUIDE SERVICING

1) With valves removed, heat cylinder head to 212-303°F. Using suitable drift, drive valve guides out camshaft side of head. Standard and .006" oversize valve guides are available. If oversize guides are installed, ream valve guide bore in head to .505-.5055".

2) Reheat head to 212-303°F and press in new guides until lock ring just touches head. Guide should protrude .320" above cylinder head. Ream guide I.D. to .3113-.3123" after installation. Reface valve seats.

Copyright (c) 2003 Mitchell Repair Information Company

1973 LOTUS EUROPA 4 CYLINDER (Cont.)

VALVE SPRINGS			
Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1973 1558 cc			
Inner	1.130 (28.70)	12.3@.92 (5.6@23.4)	33.5@.58 (15.2@14.7)
Outer	1.450 (36.83)	45@1.17 (20.4@29.7)	109@.83 (49.4@21.1)

VALVE SPRINGS

With cylinder head and camshaft removed, lift out cam followers with a rubber suction cup (valve lapping tool). Remove adjusting shims and set aside cam followers and shims in proper assembly order. Install suitable spring compressor and remove valve keepers and collars. Inspect springs for alignment and fatigue, replace as necessary. To install, reverse removal procedure making sure cam followers return to their original bore.

MECHANICAL VALVE LIFTER ASSEMBLY

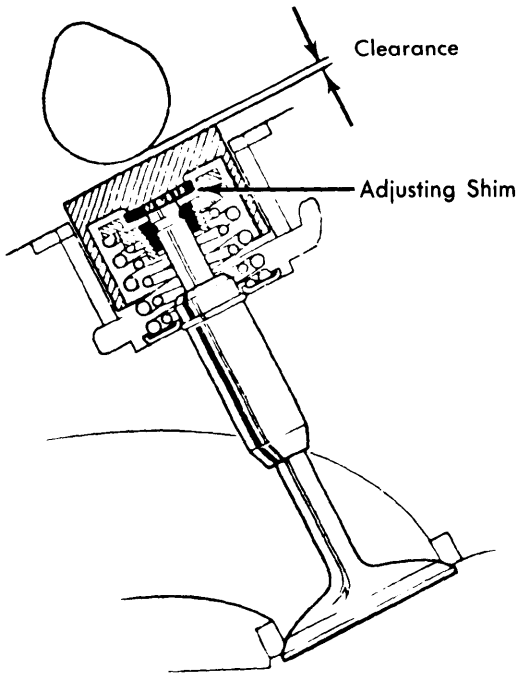
1) With camshaft removed, lift out cam follower with a suction cup (valve lapping tool). Remove adjusting shim and set aside. Inspect cam follower and follower sleeves for wear or damage. If cam follower sleeve replacement is necessary, cut a groove next to each scallop. Using a sharp chisel remove sleeve.

2) Heat cylinder head to 302°F and press in new sleeve. Machine sleeve bore I.D. to 1.375-1.3756" and recut scallops. The O.D. of cam followers is 1.3742-1.2745" with an operating clearance of .0005-.0014".

VALVE CLEARANCE ADJUSTMENT

1) Remove camshaft covers. Rotate crankshaft until heel of cam is directly over cam follower. Using a feeler gauge, measure valve clearance. Note clearance of each valve and remove camshaft. Lift out cam follower and adjusting shim. Measure thickness of existing shim and determine how much thicker or thinner shim is required.

2) Lightly sand new shim to remove roughness. Using a micrometer, measure new shim (do not rely on thickness etched on shim). Install shims, followers and camshaft and recheck valve clearances. Valve clearances are intake .005-.007" (.13-.18 mm) and exhaust .009-.011" (.23-.28 mm), adjusted cold.



73LO2

VALVE CLEARANCE ADJUSTMENT

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)
1973 1558 cc	.003-.004 (.08-.09)	Push Fit	Push Fit	Comp.	.009-.014 (.23-.36)	.002-.004 (.04-.09)
				Oil	.010-.020 (.25-.51)	002-.004 (.05-.10)

OIL PAN

Drain engine oil. Remove starter, lower clutch housing cover, oil filter, exhaust pipe and muffler. Remove attaching screws and drop oil pan from block. To install, reverse removal procedure using a new gasket and sealing compound.

PISTON & ROD ASSEMBLY

Removal – Remove cylinder head and oil pan. Loosen rod bolts two or three turns and tap them to release cap. Remove rod bolts and push piston and rod assembly out of cylinder. Note position and location of each piston and rod assembly for proper reassembly.

Copyright (c) 2003 Mitchell Repair Information Company

1973 LOTUS EUROPA 4 CYLINDER (Cont.)

Installation – Using a ring compressor, install piston and rod assembly in original cylinder facing proper direction. Reinstall rod caps and tighten rod bolts. Install remaining components in reverse of removal.

FITTING PISTONS

Inspect pistons and cylinders for wear or taper. Four grades of pistons are available for standard bores. Maximum recommended oversize piston is .015". Install rings on piston with correct side facing upward.

Standard Grade Piston Diameters

Grade	In. (mm)
No. 1	3.2467-3.2470 (82.466-82.474)
No. 2	3.2470-3.2473 (82.474-82.481)
No. 3	3.2473-3.2476 (82.481-82.489)
No. 4	3.2476-3.2479 (82.489-82.497)

PISTON PINS

Remove circlips from piston and push piston pin out of piston and connecting rod. Inspect pin and rod bushing for wear or damage, replace as necessary. Two grades of piston pins and connecting rod bushings are available.

Piston Pins & Connecting Rod Bushings

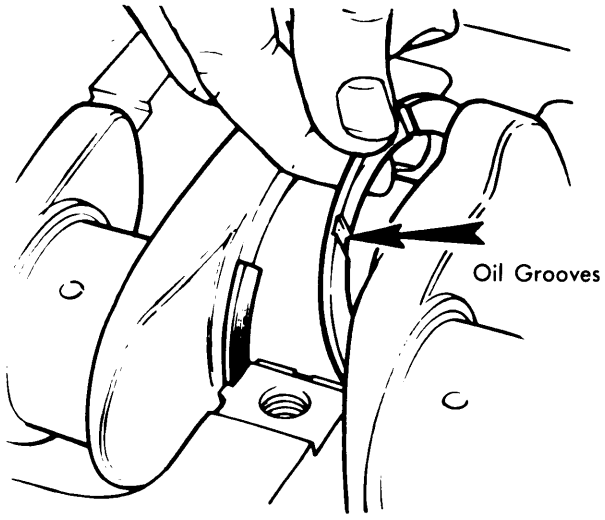
Grade	Bushing Dia. In. (mm)	Pin Dia. In. (mm)
"A"	(Silver) .8124-.8125 (20.635-20.637)	.8121-.8122 (20.627-20.630)
"B"	(Green) .8125-.8126 (20.637-20.640)	.8122-.8123 (20.630-20.632)

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)
1973 1558 cc	2.1255-2.1260 (53.99-54.00)	.0016-.0031 (.04-.08)	Center	.003-.008 (.08-.20)	1.9370-1.9375 (49.20-49.21)	.0004-.0020 (.01-.05)	.004-.010 (.10-.25)

MAIN & CONNECTING ROD BEARINGS

Remove oil pan and mark bearings and block for reassembly. Inspect bearings and journals for wear or damage. Starting with number one journal, replace bearings as required. Maximum undersize is .030". Replace bearing caps in their original positions and tighten bolts.



73LO3

THRUST BEARING INSTALLATION

THRUST BEARING ALIGNMENT

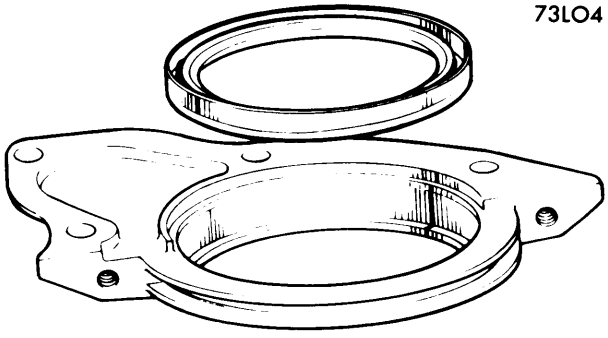
Using a feeler gauge, measure crankshaft end play between thrust washers and crankshaft on center main bearing. If required, replace thrust washers, installing them with oil grooves facing crankshaft.

REAR MAIN BEARING OIL SEAL

Removal – Separate engine and transaxle. Remove flywheel and oil pan. Remove bolts attaching rear oil seal carrier. Using an extractor, remove oil seal from carrier.

Installation – Press new seal into carrier (see illustration). Coat new carrier gasket with sealer. Place gasket and carrier in position and tighten attaching bolts. Install remaining components in reverse of removal procedure.

73LO4



REAR MAIN BEARING OIL SEAL

Copyright (c) 2003 Mitchell Repair Information Company

1973 LOTUS EUROPA 4 CYLINDER (Cont.)

ENGINE FRONT COVER

1) Remove engine/transaxle assembly from vehicle. Remove cylinder head, water pump pulley and belt, crankshaft pulley, oil pan and timing chain tensioner.

2) Remove attaching bolts and separate front cover from backplate. Pull oil slinger from crankshaft. Disconnect timing chain, take care not to rotate crankshaft or camshafts so valve timing will not be altered.

3) Remove auxiliary shaft sprocket. Remove backplate and gasket by unscrewing single screw immediately below water pump opening. Remove water pump bearing circlip from slot in front cover housing and remove water pump.

FRONT COVER OIL SEAL

Removal – Remove crankshaft pulley. Using a suitable extractor, remove oil seal. Use care not to damage front cover.

Installation – Position oil seal on crankshaft. Using a hollow drift of same size as the seal, drive seal into front cover. Replace crankshaft pulley and tighten attaching bolt.

CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm) ①	Lobe Lift In. (mm)
1973 1558 cc	1.0000-1.0005 (25.40-25.41)	.0005-.0020 (.013-.050)	.....

① – End play is .003-.010" (.08-.25 mm).

TIMING CHAIN

Adjust timing chain slack by loosening tensioner lock nut and screwing in adjusting screw until there is approximately ½" (12.7 mm) total movement of chain between camshaft sprockets. *NOTE – To remove timing chain, see Engine Front Cover.*

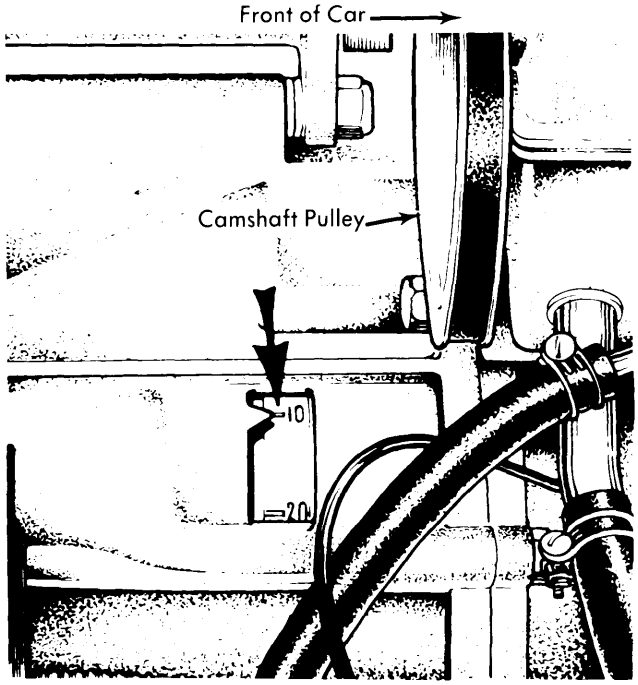
CAMSHAFTS & BEARINGS

Removal – 1) Remove camshaft covers and rotate crankshaft until timing mark in clutch cover housing is aligned with pointer (see illustration). Now timing marks on camshaft sprockets should be next to each other and level with camshaft cover mounting face.

2) Remove chain tensioner. Unscrew camshaft sprocket bolts and remove camshaft sprockets, using care not to drop camshaft dowels into timing cover. Remove alternator drive belt.

3) Mark bearing caps for correct reassembly. Starting at ends of camshaft, progressively loosen bearing cap bolts. Remove bearing caps and lift camshaft and bearings from cylinder head. Remove oil seal from rear of intake camshaft.

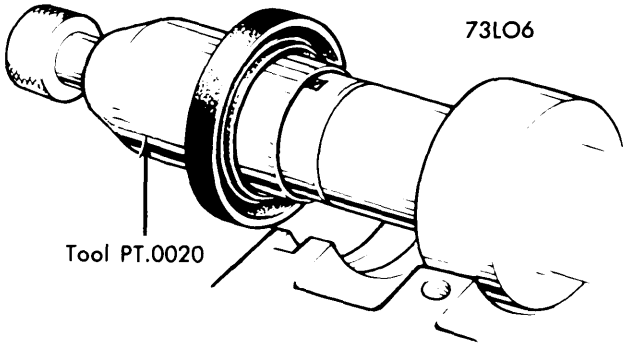
Installation – 1) Install new oil seal on intake camshaft using suitable tool (PT.0020) (see illustration). Install new bearing halves (if required). Place camshaft on cylinder head with dowel hole in same position as during disassembly.



73LO5

FLYWHEEL TIMING MARK

2) Install bearing caps and tighten, starting from the center and working outward. Install camshaft sprockets with timing marks properly aligned. Adjust timing chain tension. Replace alternator drive belt.



CAMSHAFT OIL SEAL INSTALLATION

AUXILIARY SHAFT

Removal – With front cover removed, remove sprocket and thrust plate. Carefully withdraw auxiliary shaft. Using suitable tools (P.6031 and P.6031-3), draw bearings from crankcase (if required).

Installation – 1) Using suitable tools (P.6031 and P.6031-3), install new bearings with split in bearing facing upward at a 45° angle. Install oil gallery plugs with sealing compound.

2) Install a new dowel in auxiliary shaft and slide into crankcase. Install thrust plate in shaft groove and check that end play is .0025-.0075". Install sprocket as originally positioned.

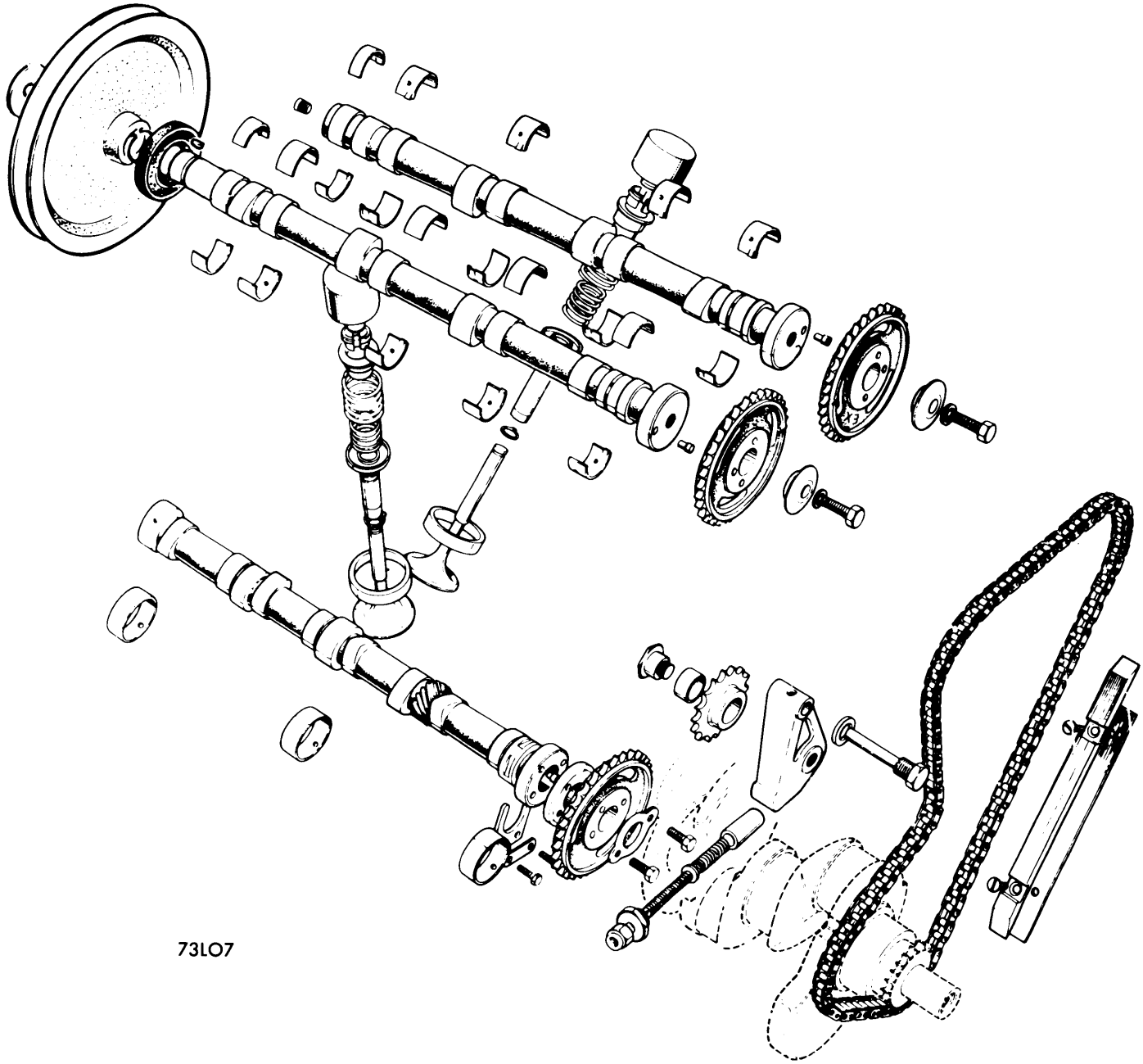
Copyright (c) 2003 Mitchell Repair Information Company

1973 LOTUS EUROPA 4 CYLINDER (Cont.)

VALVE TIMING				
	INTAKE		EXHAUST	
Engine	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1973 1558 cc	26°	66°	66°	26°

VALVE TIMING

Rotate crankshaft until timing mark is aligned with pointer in clutch housing opening (see illustration). Camshaft sprockets timing marks should be facing each other and parallel with camshaft cover mounting face.



73LO7

VALVE GEAR ASSEMBLY

Copyright (c) 2003 Mitchell Repair Information Company

1973 LOTUS EUROPA 4 CYLINDER (Cont.)

ENGINE OILING

Crankcase Capacity – 4.2 qts. (4 ltr) including filter.

Oil Filter – Full-flow, disposable.

Normal Oil Pressure – 34-40 psi (2.4-2.8 kg/cm²) with engine hot.

Pressure Regulator Valve – Non-adjustable.

ENGINE OILING SYSTEM

Lubrication is achieved by an eccentric bi-rotor pump which force feeds oil to oiling system. Pump takes oil from oil pan and feeds it through oil filter to a short oil gallery on right-hand side of engine. A cross passage takes oil from short gallery to main oil gallery from where all main and connecting rod bearings are lubricated. Oil mist from an oil jet in connecting rod webs lubricates piston pins and non-thrust sides of cylinder walls. Auxiliary shaft bearings receives oil from passages in front, center and rear main bearings and a metered jet of oil from front passage oils chain and sprockets. Oil fed to overhead camshafts is controlled by flats machined on auxiliary shaft front journal.

OIL PUMP

Disassembly – 1) Remove three attaching screws and separate oil pump and filter as an assembly from engine block. Unscrew oil filter from pump. Remove end plate and withdraw "O" ring from groove in pump body.

2) Measure clearance between lobes of inner and outer rotors. If clearance is excessive, replace rotors as an assembly. Measure clearance between outer rotor and pump body. If clearance is excessive, replace rotor assembly or pump body.

3) Place a straight edge across face of pump body, using a feeler gauge, measure clearance between rotors and straight edge. If this clearance is excessive, carefully lap face of pump body on a flat surface.

4) To replace inner rotor or drive shaft, remove outer rotor. Drive pin out attaching drive gear. Pull off drive gear and withdraw shaft and inner rotor from pump body.

Assembly – 1) Install shaft and inner rotor in pump body. Press drive gear onto shaft. Press pin through gear and shaft and peen ends of pin. Install outer rotor with chamfered face inwards, toward pump body.

2) Place "O" ring in groove in pump body. Install end plate with machined face toward rotors. Screw new filter onto pump and replace pump assembly on engine block.

Oil Pump Specifications

Application	Clearance In. (mm)
Inner-to-Outer Rotor	.006 (.15)
Outer Rotor-to-Pump Body	.010 (.25)
Rotor End Play	.005 (.13)

ENGINE COOLING

Thermostat – Opens at 172°F.

Radiator Cap – 7 psi.

Cooling System Capacity – 11.4 qts. (with heater).

WATER PUMP

Removal – From beneath vehicle, remove attaching bolts and water pump pulley. To remove water pump, *See Engine Front Cover*. To install, reverse removal procedure.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head (Cold)	60-65 (8.3-9.0)
Cylinder Head-to-Front Cover	10-15 (1.4-2.1)
Camshaft Bearings	9 (1.2)
Camshaft Sprockets	25-30 (3.5-4.1)
Main Bearing Caps	55-60 (7.6-8.3)
Connecting Rod Caps	44-46 (6.1-6.4)
Crankshaft Pulley	24-28 (3.3-3.9)
Flywheel	45-50 (6.2-6.9)
Timing Cover	
1/4" Bolts	5-7 (0.7-1.0)
5/16" Bolts	10-15 (1.4-2.1)
Auxiliary Shaft Sprocket	12-15 (1.7-2.1)
Exhaust Manifolds	12-15 (1.7-2.1)
Rear Oil Seal Carrier	12-15 (1.7-2.1)
Oil Pan	6-8 (0.8-1.1)

Copyright (c) 2003 Mitchell Repair Information Company