

1973 TRIUMPH SPITFIRE 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	91	1493	1x1-Bbl.	57@5000	73@3000	7.5-1	2.90	73.7	3.44	87.5

ENGINE IDENTIFICATION

Engine number is stamped on left side of block beneath No. 4 spark plug.

FM1234UE

1st & 2nd Digits – Model range.

3rd, 4th, 5th & 6th Digits – Serial number.

7th Digit – Compression ratio.

8th Digit – Engine unit.

ENGINE REMOVAL

1) Remove hood and battery. Drain coolant and engine oil. Disconnect top, bottom and expansion hoses from engine. Remove radiator and disconnect heater hoses at engine.

2) Disconnect throttle cable at linkage and choke cable from rocker cover and carburetor. Separate exhaust pipe from manifold. Disconnect high and low tension leads at distributor.

3) Disconnect starter cable, alternator harness connector, temperature sensing wire, oil pressure wire and ground strap at alternator bracket. Disconnect fuel line at pump and plug line.

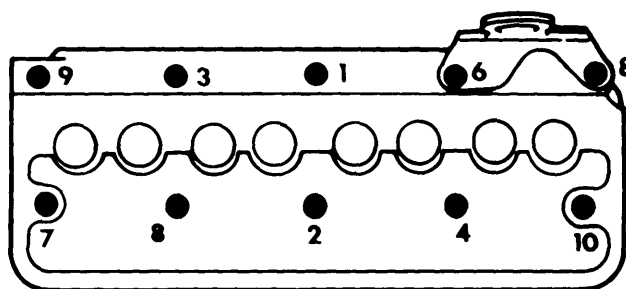
4) Remove transmission tunnel cover and disconnect propeller shaft at transmission. Remove top cover. Disconnect rear mount-to-transmission bracket. Remove nut and bolt attaching exhaust pipe clamp to transmission.

5) Disconnect speedometer cable. Unbolt clutch slave cylinder from transmission and hang to one side. Remove front engine mount bolts. Raise engine to clear oil pan, pull forward and raise engine/transmission assembly clear of vehicle. To install, reverse removal procedures.

INTAKE MANIFOLD

1) Remove air cleaner and disconnect fuel line. Disconnect hose to rocker cover. Unhook throttle return spring. Disconnect and remove throttle cable. Disconnect choke cable, ignition vacuum line and water hoses.

2) Unscrew manifold bolts connecting intake to exhaust manifold. Remove manifold-to-engine bolts and lift out manifold assembly.



← FRONT

73TR1

CYLINDER HEAD TIGHTENING SEQUENCE

CYLINDER HEAD

1) Disconnect battery and drain cooling system. Remove intake and exhaust manifold assemblies. Disconnect spark plug wires.

2) Remove rocker shaft assembly. Remove push rods and suitably mark them for reinstallation. Remove water pump housing and alternator. Remove cylinder head nuts, loosening them in progressive sequence. 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)
1493 cc Int.	45°	45°	....	.310-.311 (7.87-7.90)	.0008-.0023 (.02-.06)	....
Exh.	45°	45°	....	.310-.3105 (7.87-7.89)	.0015-.0030 (.04-.08)	....

VALVE ARRANGEMENT

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

VALVE GUIDE SERVICING

1) Inspect valve guide wear by inserting a new valve, lifting it 1/8" (3.2 mm) from its seat, and rocking sideways. Movement of valve head across seat should not exceed .020" (.51 mm).

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2) If replacement is required, use suitable tool (S.60A-6) to remove and replace valve guide. Valve guide protrusion above top face of cylinder head must lie between .749-.751" (19.02-19.08 mm).

VALVE SPRINGS			
Engine	Free Length In. (mm)	PRESSURE (LBS.) Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
1493 cc	1.61 (40.9)	27-30 @ 1.36 (12.2-13.6 @ 34.5)	.....

VALVE SPRINGS

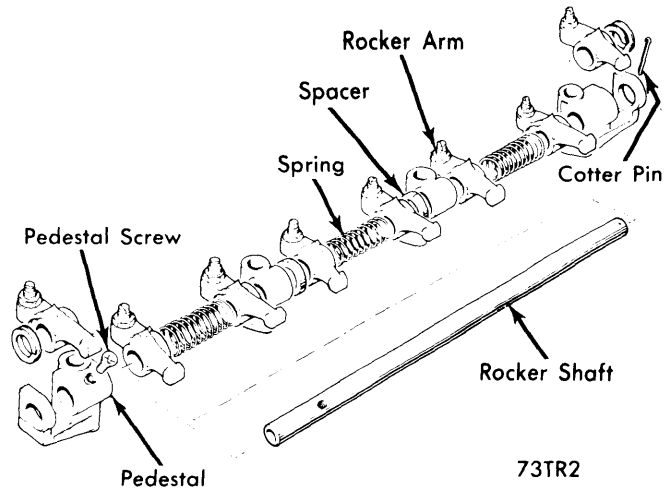
Using suitable valve spring compressor, remove valve retainers. Withdraw collars and valves. Check valve springs for cracks, distortion and load length. When any one spring is defective, it is advisable to replace all springs.

ROCKER ARM ASSEMBLY

Remove rocker arm cover. Progressively and evenly remove rocker arm pedestal nuts. Lift off rocker arm assembly. Pull cotter pin from front end of rocker shaft. Slide rockers, pedestals, springs and spacers from shaft, noting order for reassembly. Remove screw locating rear pedestal to shaft. Inspect and replace excessively worn parts. To install, reverse removal procedure making sure rear pedestal screw correctly engages rocker shaft.

VALVE TAPPETS

Check valve tappets for chips, score marks, ridges or excessive wear. Replace as necessary and ensure tappets are free to slide and rotate in their positions.



ROCKER ARM ASSEMBLY

VALVE CLEARANCE ADJUSTMENT

Disconnect battery, remove rocker cover and remove spark plugs. Make necessary adjustment after first referring to chart below. Turning adjustment pin clockwise will decrease gap and turning it counterclockwise will increase gap. Intake and exhaust clearance is .010" (.25 mm).

Valves Open ①

Valves to Adjust

No. 8 & 6.....	No. 1 & 3
No. 4 & 7.....	No. 5 & 2
No. 1 & 3.....	No. 8 & 6
No. 5 & 2.....	No. 4 & 7

① - Counting from front.

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)
1493 cc	.0014-.0019 (.04-.05)	.....	.0003 (.008)	No. 1&2	.....	.002 (.05)
				Oil	.....	.0038 (.097)

OIL PAN REMOVAL

Drain crankcase. Remove bolts attaching pan to crankcase. Raise engine sufficiently to lower pan. Turn pan sideways and withdraw. To install, reverse removal procedure with long bolts at rear of oil pan.

PISTON & ROD ASSEMBLY

1) Disconnect battery ground cable and drain engine oil. Remove oil pan and cylinder as previously described.

2) Remove pickup strainer and bring No. 1 & No. 4 connecting rods to accessible position. Index bearing caps and connecting rods.

3) Remove connecting rod bolts and withdraw bearing caps. Push pistons and connecting rods upward, withdrawing them out top of cylinder. Attach bearing cap to respective connecting rod.

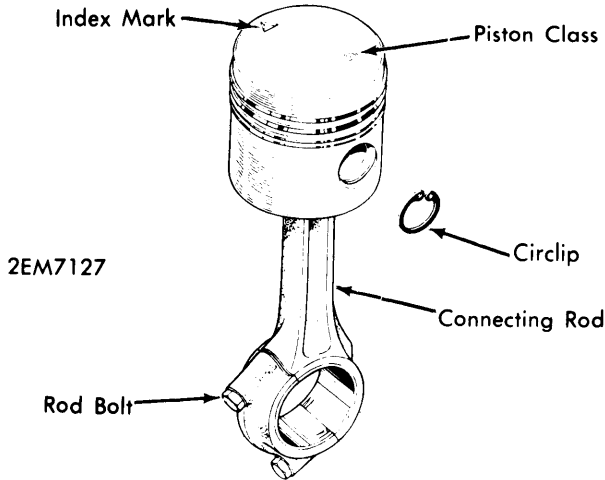
4) To install, position No. 1 and No. 4 connecting rods at BDC and lubricate journals with engine oil. Coat piston and connecting rod assemblies with engine oil. Carefully insert connecting rod and piston into cylinder ensuring arrow is pointing toward front of engine and piston rings are staggered.

5) Fit upper bearing and pull connecting rod over crankshaft. Install lower bearing cap and torque bolts to specifications.

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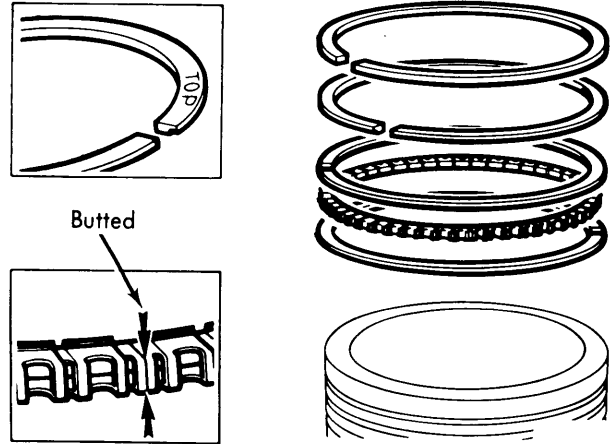
PISTON PIN REPLACEMENT

1) Remove circlips from pistons and extract piston pin. Separate piston from connecting rod. Inspect connecting rod bushing for wear and replace if necessary.



PISTON & ROD ASSEMBLY

expanding ring in bottom groove of piston with ends butting but not overlapping. From bottom of piston install bottom rail and from top upper rail. Install middle ring with word "TOP" facing upward (see illustration). Install upper compression ring and stagger ring gaps on non-thrust sides of piston.



73TR3

PISTON RING INSTALLATION

2) Using suitable press, remove worn bushing and install replacement. Ensure oil hole in new bushing is aligned with hole in connecting rod. Ream bushing to fit piston pin. Piston pin diameter is .8123-.8125" (20.63-20.64 mm). Piston pin is a thumb push fit at 68°F (20°C).

FITTING PISTONS

Inspect and measure cylinder for wear or taper. Measure piston diameter and determine if clearance is correct. Install

	Piston Class	
Application	Cylinder Diameter	Piston Diameter
F.....	2.899-2.900" (73.63-73.66 mm)	2.8976-2.8981" (73.60-73.61 mm)
G.....	2.9001-2.9005" (73.66-73.67 mm)	2.8982-2.8987" (73.61-73.63 mm)

NOTE — Pistons are available in .020" (.51 mm) oversize.

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)
1493 cc	2.3115-2.3120 (58.71-58.72)	....	Rear	.006-.014 (.15-.36)	1.8750-1.8755 (47.63-47.64)	....	....

MAIN & CONNECTING ROD BEARINGS

1) Remove engine, cylinder head and oil pan. Remove main and rod bearing caps. Slightly push up connecting rod assembly but do not dislodge it from cylinder. Remove upper connecting rod bearings.

2) Remove crankshaft and upper main bearings. Remove thrust washers from rear main bearing. Examine all bearing journals and determine if regrinding is necessary.

3) Examine each bearing half and replace any having score marks, deep grooves or scratches. Bearings are available in various undersizes. Also, any undersize crankshaft that may

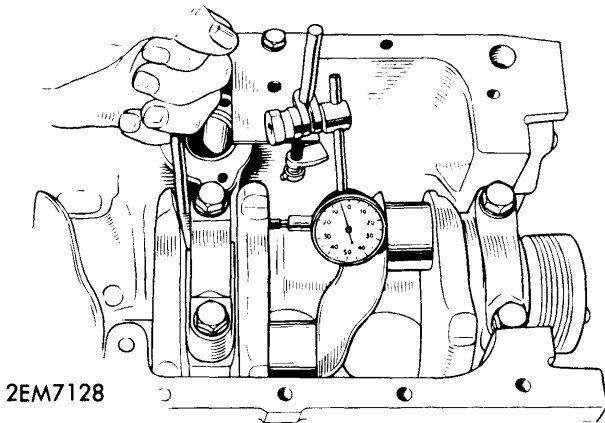
have been installed in service will have the same identification mark that its bearings have. NOTE — Amount of bearing or crankshaft undersize is stamped on part.

4) To install main and connecting rod bearings, reverse removal procedure, noting the following: bend over locking tabs, if equipped.

THRUST BEARING ALIGNMENT

Using a dial gauge as shown in illustration, measure crankshaft end play. Value obtained must lie between .006-.014" (.15-.36 mm). To bring end play within specifications, oversize thrust washers are available.

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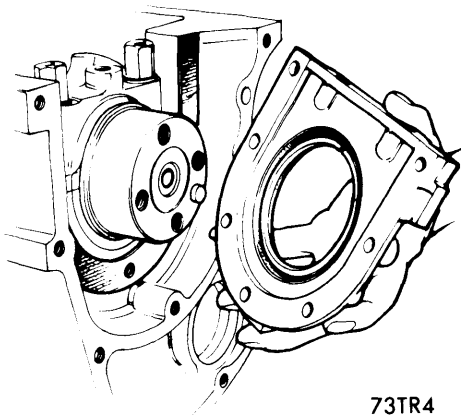
2EM7128

CHECKING CRANKSHAFT END PLAY

REAR MAIN BEARING OIL SEAL

1) Remove rear transmission adaptor plate. Remove two bolts attaching oil pan to seal housing and seven bolts attaching seal housing to crankcase. Remove seal housing and press out old seal.

2) Coat O.D. of seal with grease and press seal into housing with lip facing crankshaft. Install a new gasket coated with sealing compound. Carefully install seal housing with a plain copper washer on top bolt.



73TR4

REAR MAIN BEARING SEAL HOUSING

ENGINE FRONT COVER & OIL SEAL

1) Remove fan belt, fan and crankshaft pulley. Remove attaching bolts and timing cover. Press out old seal and install new seal with open side facing toward engine.

2) Using a bent piece of steel rod to hold chain tensioner clear of chain, place timing cover in position and then carefully remove bent wire. Install attaching bolts and tighten.

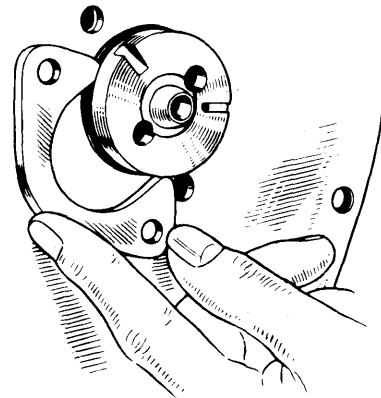
CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
1493 cc	1.8402-1.8407 (46.74-46.75)	.....	.....

CAMSHAFT REMOVAL

Disconnect battery, remove cylinder head and timing cover. Withdraw camshaft sprocket and timing chain. Lift out valve tappets. Remove distributor, drive gear and fuel pump. Remove camshaft thrust plate. Carefully extract camshaft taking care to avoid damage to cams and bearings. To install, reverse removal procedure.

CAMSHAFT END THRUST

End play is compensated for by a thrust plate placed in front of camshaft. If camshaft end play is beyond specifications of .004-.008" (.10-.20 mm), replace thrust plate with one of correct oversize dimensions.



2EM7131

CAMSHAFT THRUST PLATE

VALVE TIMING				
Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
1493cc	18°	58°	58°	18°

TIMING CHAIN REPLACEMENT

1) Remove timing cover and straighten locking tabs on camshaft sprocket bolts. Bring No. 1 cylinder to TDC and loosen camshaft sprocket bolts. Withdraw camshaft sprocket, timing chain and crankshaft sprocket.

2) To install, fit crankshaft sprocket, ensuring it is properly aligned and shimmed. Position timing chain and camshaft sprocket by rotating sprocket and chain as necessary to obtain alignment of camshaft mounting holes. **NOTE - Do not disturb position of camshaft.** Fit lock plate to camshaft sprocket.

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3) Install timing cover, crankshaft pulley, fan belt, and radiator assembly. Connect battery and refill cooling system.

VALVE TIMING

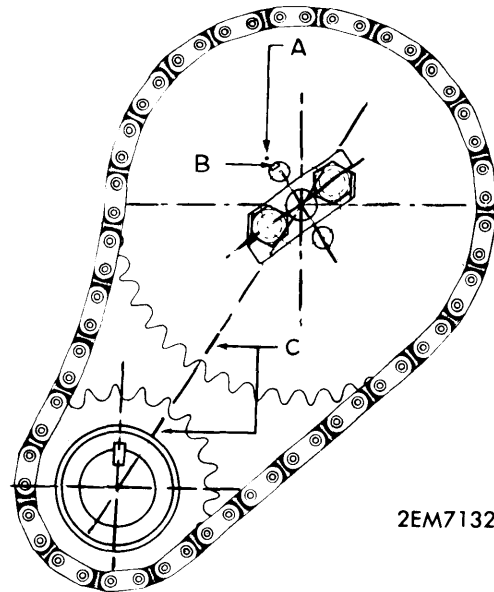
Sprockets With Index Marks – If original, indexed sprockets are being used, assemble as shown in illustration.

Sprockets Without Index Marks – 1) Bring No. 1 piston to TDC. Rotate camshaft until No. 1 push rod reaches highest point of travel. Adjust clearance of No. 8 valve to .050" (1.27 mm). Again rotate camshaft, this time until No. 2 push rod is to the top of its travel. Adjust No. 7 valve to .050" (1.27 mm).

2) With number one piston at TDC, check that number one and two valves are fully closed by inserting feeler gauges to determine clearances.

3) Using same two feeler gauges, check that valves number seven and eight have the same clearances as numbers one and two.

NOTE – Camshaft timing sprocket has four holes which are equally spaced but offset. Timing variations of $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ of a sprocket tooth may be achieved by using different set of holes or turning sprocket back side to front. If new sprockets are installed, punch new timing marks per illustration after correctly timing engine.



2EM7132

VALVE TIMING MARKS

ENGINE OILING

ENGINE OILING SYSTEM

Oil is drawn from engine by a rotor type pump which discharges via a nonadjustable relief valve to a full-flow filter. Cylinder bores, pistons and piston pins are splash lubricated all other components are oiled through drilled passages.

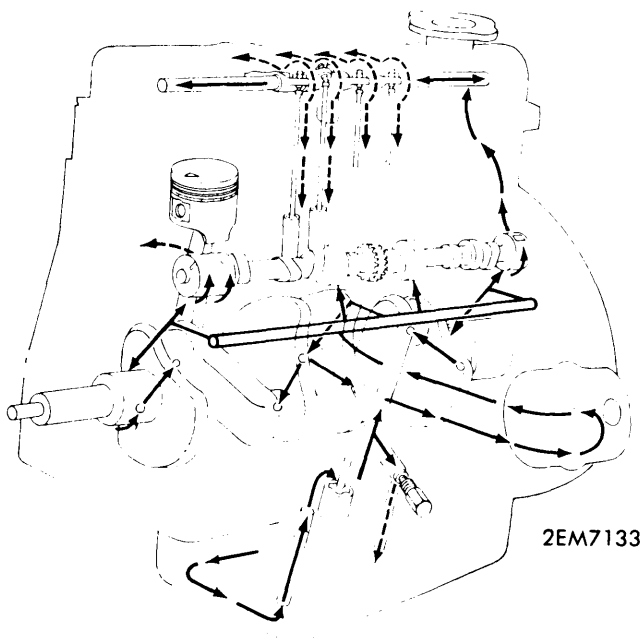
Crankcase Capacity – 4 qts. (including filter).

Oil Filter – Disposable cannister type.

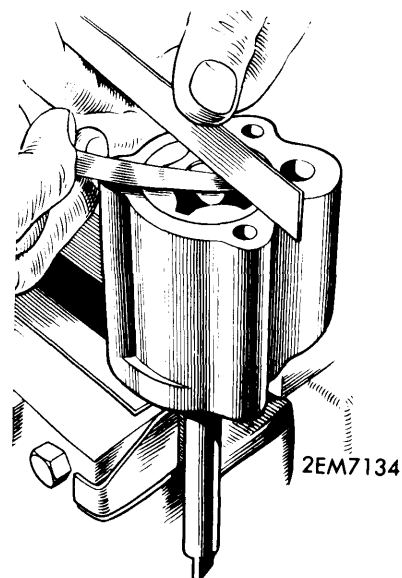
Oil Pressure Relief Valve – Unscrew relief valve body from cylinder block. Remove washer, take out plunger and remove spring. Ensure free length of spring is 1.53" (38.9 mm). To install, reverse removal procedure.

OIL PUMP

1) Remove oil pan previously described. Remove three bolts securing oil pump to crankcase. Lift from vehicle and place in a vise.



LUBRICATING CIRCUIT



ROTOR-TO-PUMP BODY CLEARANCE

Triumph Engines

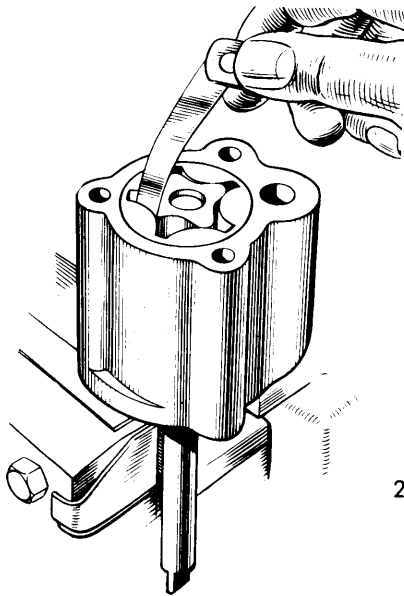
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ENGINE OILING (Cont.)

2) Place a straightedge across pump body and with a feeler gauge check clearance between rotor and straightedge. Clearance should be .004" (.10 mm).

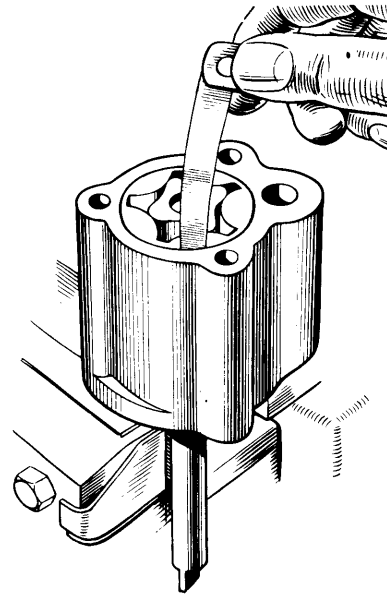
3) Check clearance between inner and outer rotors. Clearance must not exceed .010" (.25 mm).

4) Inspect clearance between outer rotor and body. Clearance must not exceed .008" (.20 mm).



2EM7135

INNER AND OUTER ROTOR CLEARANCE



2EM7136

OUTER ROTOR AND BODY CLEARANCE

5) Check cover plate for scoring, and test on a surface plate for distortion. Examine pump spindle bearing surface in body for excessive wear.

6) Reassemble oil pump installing any new parts as necessary to satisfy specifications. To install oil pump, reverse removal procedure.

ENGINE COOLING

WATER PUMP

Disconnect battery and drain cooling system. Remove fan belt. Disconnect hoses from water pump. Disconnect fuel and vacuum lines as necessary. Remove three bolts securing water pump to cylinder head and withdraw water pump. To install, reverse removal procedure.

Thermostat - Begins to open at approximately 180°F unless equipped with cold climate thermostat. Cold climate thermostat begins to open at approximately 190°F.

Cooling System Capacity - 4 qts. (including heater).

Radiator Cap - 13 psi.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head	38-46 (5.3-6.4)
Connecting Rods.....	38-46 (5.3-6.4)
Flywheel.....	38-45 (5.3-6.2)
Main Bearings.....	50-65 (6.9-9.0)
Manifold-to-Cylinder Head.....	20-25 (2.8-3.5)
Timing Cover	14-16 (1.9-2.2)
Water Pump-to-Block.....	15-20 (2.1-2.8)
Camshaft Sprocket	18-24 (2.5-3.3)
Crankshaft Pulley.....	120-150 (16.6-20.7)