

# Triumph Engines

## TR6 6 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
1976	152	2498	2x1-Bbl.	106@4900	135@3000	7.5-1	2.94	74.7	3.74	95

### ENGINE IDENTIFICATION

Engine number is stamped on left side of engine, just below number six spark plug.

#### CF1234UE

- 1st and 2nd Digits – Model range.
- 3rd through 6th Digits – Sequence build number.
- 7th Digit – Built to USA specifications.
- 8th Digit – Engine unit.

### ENGINE

**NOTE** – Manufacturer recommends *ONLY* removing engine and transmission as an assembly.

**Removal** – 1) Disconnect battery. Mark hood and remove. Drain cooling system and remove radiator. Disconnect fuel evaporation hoses. Disconnect coolant hoses. Take off air cleaner.

2) Disconnect all necessary engine electrical wires, fuel lines, carburetor linkage, any vacuum hoses or coolant hoses and control cables that might interfere with removal operation. Relieve load on crossmember by raising frame. Disconnect front crossmember supports. Remove 6 crossmember to frame mounting bolts.

3) Raise vehicle and support. Remove slave cylinder. Disconnect exhaust pipe at manifold. Lower vehicle. Remove tunnel cover. Take off gear lever selector. Separate electrical leads on transmission. Remove propeller shaft and speedometer cable. Remove engine/transmission rear mount bolts.

4) Hook up hoist. Take weight of engine off front mounts. Disconnect driver's side engine mount. Remove passenger side mount from frame. Engine is clear for removal.

**Installation** – To install, reverse removal procedure.

### INTAKE MANIFOLD REMOVAL

1) Disconnect battery, drain cooling system and remove air cleaner. Disconnect throttle linkage, choke controls and fuel lines to carburetors.

2) Disconnect vacuum lines, brake servo pipe and water hoses to rear of manifold. Disconnect exhaust pipe at manifold and remove intake and exhaust manifolds.

3) To install, reverse removal procedure. Use new gasket and tighten manifold nuts to specifications. **NOTE** – Do not over tighten manifold nuts.

### CYLINDER HEAD

**Removal** – 1) Disconnect battery. Drain cooling system. Disconnect any electrical leads, water hoses, vacuum lines, throttle linkage or drive belts that might interfere with cylinder head removal.

2) Remove air pump. Swing alternator out of way. Remove water pump. Remove rocker arm shaft. Take out push rods and index mark for reinstallation.

3) Separate exhaust manifold from head (leave attached to pipe) and place out of way. Remove intake manifold (with carburetor and air cleaner) from head. Loosen head nuts in reverse of tightening sequence.

**Installation** – To install, reverse removal procedure and note following: Make sure mating surfaces are clean. Retorque head after engine is hot. Loosen one turn and torque to specification.

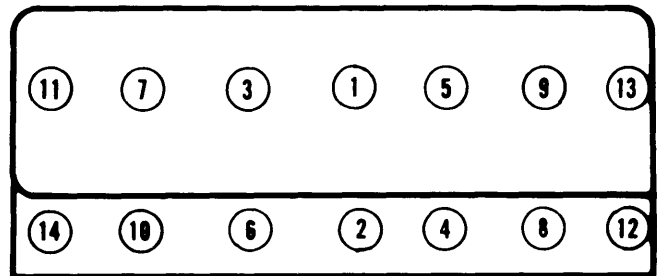


Fig. 1 Cylinder Head Bolt Tightening Sequence

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)
2498cc Int.	1.443-1.447 (36.65-36.75)	45°	45°	...	.3107-.3113 (7.892-7.907)	.0008-.0023 (.020-.060)	...
Ext.	1.193-1.197 (30.30-30.40)	45°	45°	...	.3100-.3105 (7.874-7.887)	.0015-.0030 (.038-.076)	...

## TR6 6 CYLINDER (Cont.)

### VALVE ARRANGEMENT

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

### VALVE GUIDE SERVICING

1) Remove cylinder head. Disassemble valves. Insert new valve into guide. Check "rock" of valve in guide. If head of valve moves more than .02" (.5 mm) across seat, valve guide must be replaced.

2) Use special tool 60A (or equivalent) to replace valve guide. Fit guide so top of guide protrudes .63" (16 mm) out of top of head.

VALVE SPRINGS			
Engine	Free Length In. (mm)	PRESSURE Lbs. @ In. (kg @ mm)	
		Valve Closed	Valve Open
2498 cc	1.52 (38.61)	.....	.....

### VALVE SPRINGS

**Removal** - 1) Remove cylinder head. Compress valve spring. Remove valve keepers and release spring compressor.

2) Remove spring retainer, spring, and lower seat. Check springs for wear or cracking. Put springs in a tester and check tension. If free length of spring is less than specified, replace spring.

**Installation** - To install, reverse removal procedure.

### ROCKER ARM ASSEMBLY

**Removal** - Remove valve cover. Remove nuts and washers mounting rocker shaft pedestals to head.

**Disassembly** - 1) Thoroughly clean and inspect all components. Clean oil passages in rocker shaft. Measure shaft diameter on rocker arm running surface, if less than .561" (14.24 mm), replace shaft.

2) Measure bore in rocker arms and pedestals. If bore exceeds .564" (14.32 mm), replace rocker arm. If valve contact tip of rocker arm is worn, replace rocker arm. DO NOT reface tip.

**Reassembly** - Reverse disassembly procedure. Make sure reassembly order is correct.

**Installation** - To install, reverse removal procedure and note: Make sure rocker adjustment screw ball ends squarely locate in push rod cups. Adjust valves. See *Valve Adjustment*.

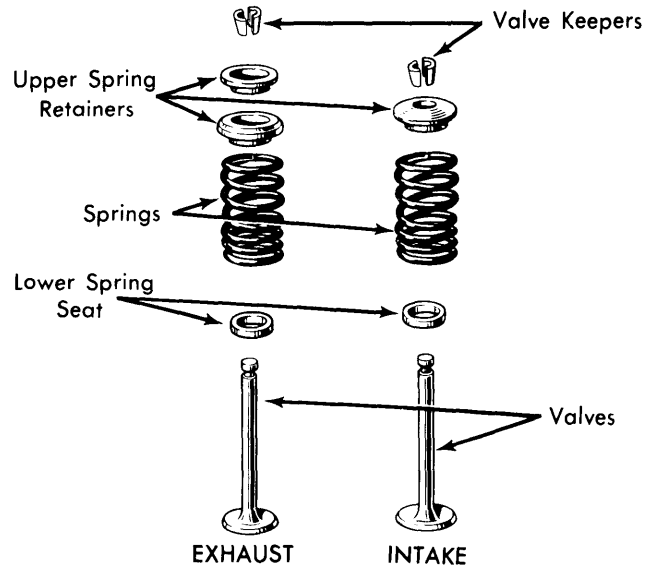


Fig. 2 Expanded View of Intake and Exhaust Valves

### VALVE TAPPET SERVICE

Inspect face of tappets for wear or chipping. Lubricate tappets before installing. Make sure tappets rotate freely in bore of crankcase.

### VALVE ADJUSTMENT

Disconnect battery. Remove spark plugs. Rotate crankshaft until valves in column one are open. Adjust valves in column two. All valves must be adjusted to .010" (.25 mm).

#### Valves Open

#### Valves to Adjust

Nos. 1 & 3 .....	Nos. 1 & 3
Nos. 8 & 11 .....	Nos. 2 & 5
Nos. 4 & 6 .....	Nos. 7 & 9
Nos. 10 & 12 .....	Nos. 10 & 12
Nos. 2 & 5 .....	Nos. 8 & 11
Nos. 7 & 9 .....	Nos. 4 & 6

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)
2498 cc	.0020-.0028 (.051-.071)	①	①	No. 1	.012-.017 (.305-.432)	.0015-.0035 (.038-.089)
				No. 2	.008-.013 (.203-.330)	.0015-.0035 (.038-.089)
				Oil	②	.....

① - Push Fit at 68°F (20°C).

② - Ring ends butt together.

## TR6 6 CYLINDER (Cont.)

### OIL PAN REMOVAL

- 1) Disconnect battery and drain oil pan. Remove dipstick and oil pan retaining bolts. Remove oil pan.
- 2) To install, reverse removal procedure. Clean mating surfaces, use new gasket with sealer and tighten bolts to specifications. Install long bolts in pan reinforcing plate.

### PISTON & ROD ASSEMBLY

**Removal** — 1) Disconnect battery. Remove oil pan. Remove cylinder head. Remove oil pickup strainer.

2) Bring No. 1 connecting rod to accessible position. Remove connecting rod cap. Force piston and connecting rod out top of cylinder. Attach bearing cap back to rod. Repeat procedure on all connecting rods, in sequence.

**Installation** — 1) Position No. 1 connecting rod journal at bottom dead center (most accessible position). Lube journals and connecting rod assemblies with engine oil. Insert connecting rod assembly into cylinder. Make sure connecting rod bearing is away from thrust side of cylinder bore. Make sure arrow on piston head faces FRONT of engine. Stagger ring gaps away from thrust side of piston.

2) Use a ring compressor and carefully push piston into bore. Fit upper bearing in connecting rod. Pull rod over crankshaft journal. Fit bearing and cap. Tighten to specifications. Repeat procedure for each connecting rod and piston assembly.

### PISTON PIN REPLACEMENT

- 1) Remove piston and rod assembly. Remove two circlips retaining piston pin. Push out pin. Mark piston and rod for reassembly.
- 2) Pin should push fit through connecting rod with slight thumb pressure at room temperature (68°F). If a dry pin will fall through under its own weight, fit is too loose.
- 3) If pin fit in rod is too loose, bushing must be replaced. Drive out old bushing and install new one, making sure oil holes align with oil holes in rod.
- 4) Position piston on rod so that when arrow on top of piston is facing front of engine, connecting rod bolts are facing camshaft. Install circlip in one side of piston.

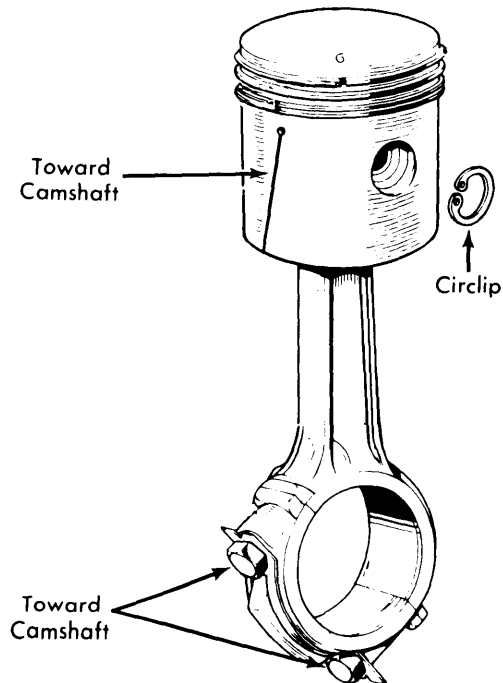


Fig. 4 Piston and Rod Assembly with Detail for Installation

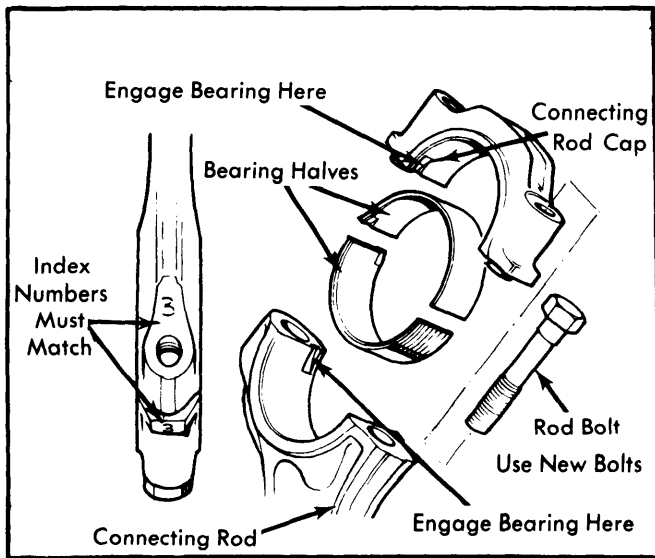


Fig. 3 Exploded View of Connecting Rod Bearing Location

5) Lubricate and install piston pin until it contacts circlip. Install remaining circlip, making sure both circlips are seated in grooves in piston.

### FITTING PISTONS

1) Pistons are manufactured in one size, designated by letter "B" stamped on piston. Piston diameter (measured at top) is 2.9369-2.9374" (74.597-74.610 mm). Code mark "B" is on block. Bore diameter is 2.9411-2.9416" (74.704-74.717 mm).

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)
2498 cc	2.311-2.315 (58.699-58.801)	.....	No. 4	.006-.008 (.15-.20)	1.875-1.8755 (47.625-47.638)	.....	.....

## TR6 6 CYLINDER (Cont.)

2) If a piston is replaced, one of corresponding class must be installed. Weight of all six pistons must not vary more than seven grams.

3) Measure cylinder bore at different heights in bore. If bore is worn excessively, it must be rebored for oversize pistons. Pistons are available in .020" (.51 mm) oversize.

4) Rings are available .010", .020" and .030" oversize. Check ring gap in cylinder with ring 1/4" from top of bore. Check ring side clearance in piston. Install rings with word "TOP" up.

### MAIN & CONNECTING ROD BEARING SERVICE

1) With crankshaft removed, thoroughly clean and blow out all oil passages with compressed air. Check crankshaft for runout with a dial indicator on center bearing journal. If runout exceeds .002" (.05 mm), crankshaft must be straightened.

2) Measure bearing journals for taper or out-of-round. If found excessive, crankshaft must be ground for next oversize bearings. Main bearings are available in .010", .020" and .030" oversize.

3) Rod bearings are available in .010", .020" and .030" oversizes. When installing crankshaft, fit main bearing caps with numbers aligned with index numbers cast into crankcase.

### THRUST BEARING ALIGNMENT

Measure crankshaft end play. If end play exceeds .006-.008" (.15-.20 mm), fit oversize thrust washers at number four main bearing (rear main bearing). Oversize thrust washer is available in .005" (.127 mm).

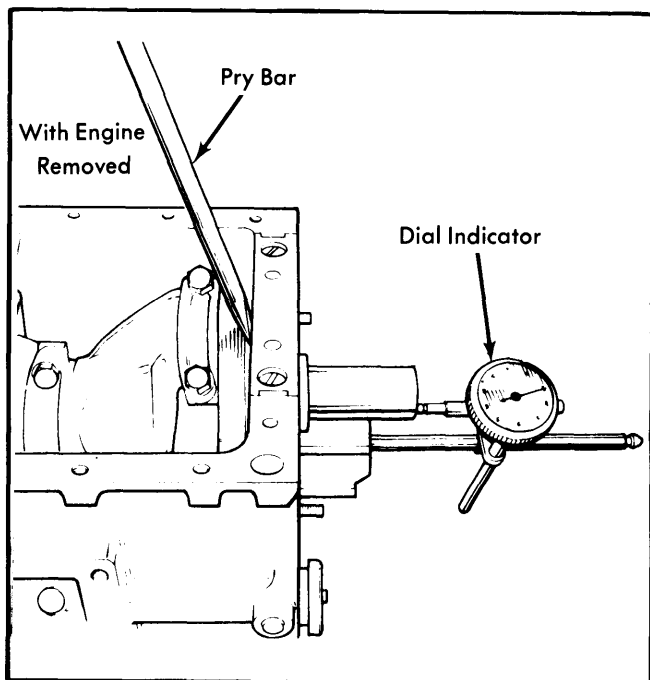


Fig. 5 Dial Indicator Set-Up to Measure End Play

### REAR MAIN BEARING OIL SEAL SERVICE

**NOTE** — Oil seal can be removed and replaced with engine installed in vehicle. Following procedure is with engine removed.

1) Remove adaptor plate. Remove the 2 rear, center pan bolts. Remove 7 oil seal housing bolts. Remove seal and housing. Press out seal.

2) Clean mating surface of housing and crankcase. Fit oil seal in housing with lip side trailing. Apply sealer to housing gasket. Lightly coat crankshaft and seal with engine oil. Install housing. Note that top bolt has copper washer, remaining bolts have spring washers.

### TIMING COVER & OIL SEAL

**Removal** — Disconnect battery. Remove radiator. Remove fan. Take out chassis crossmember (support). Remove steering rack "U" bolts and slide rack forward. Remove crankshaft pulley. Remove timing chain cover mounting bolts. Pull cover off dowels. Press out old seal.

**Installation** — Note for installation, use a short piece of welding rod bent 90° to hold tensioner in cover away from chain. Fit new oil seal in timing cover. Seal chamfer edge presses into cover.

CAMSHAFT			
Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
2498 cc	1.8402-1.8407 (46.741-46.754)	.0026-.0040 (.066-.102)	.....

### CAMSHAFT

**Removal** — 1) Remove radiator and grille work. Remove cylinder head. Take out cam followers; index mark for installation. Remove fuel pump. Disconnect tachometer. Remove distributor. Note position of distributor drive slot for installation.

2) Remove timing chain and sprockets. Take off camshaft keeper (lock) plate. Loosen the left side engine mount from chassis bracket. Lift engine enough to extract camshaft through grille opening.

**NOTE** — DO NOT crush speedometer cable when lifting engine.

**Installation** — To install, reverse removal procedure and note following: Make sure No. 1 and No. 6 pistons are at TDC, No. 1 firing. Time valves and refit timing chain with sprockets aligned. See *Timing Chain and Valve Timing*.

### CAMSHAFT END PLAY

Check camshaft end play. Take feeler gauge reading between camshaft and lock plate. If end play is more than .004-.008" (.10-.20 mm), replace lock plate.

## TR6 6 CYLINDER (Cont.)

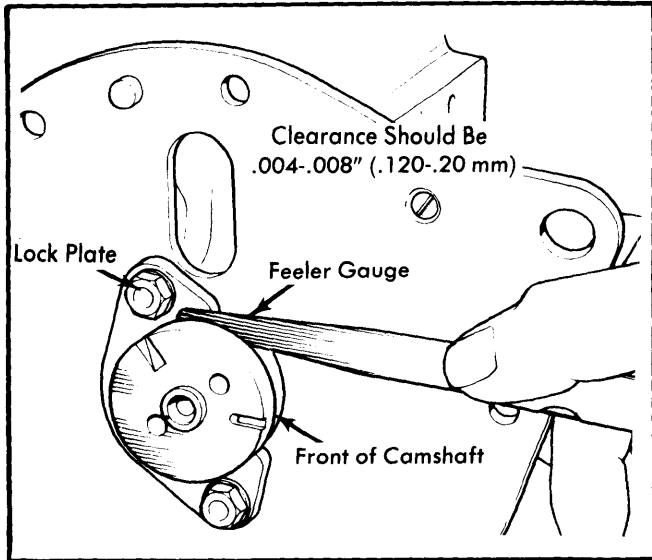


Fig. 6 Feeler Gauge Method of Measuring Camshaft End Play

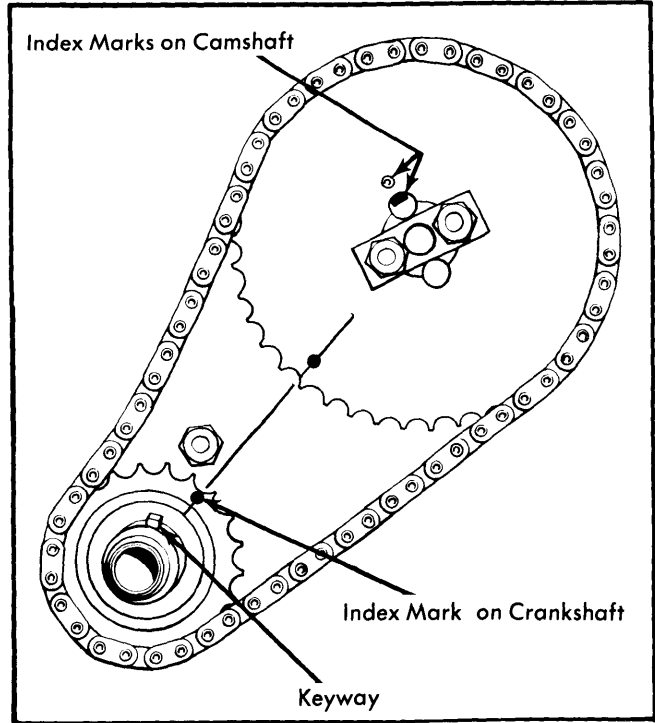


Fig. 7 Timing Chain Sprocket Alignment Marks

VALVE TIMING				
Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ALDC)	Open (BLDC)	Close (ATDC)
2498 cc	15°	58°	58°	15°

2) Make sure No. 1 and No. 2 valves are fully closed. Check clearance between No. 11 and No. 12 valves. Clearance must be same. Move crankshaft as necessary to maintain equality between valves. No other measurements must be altered when crankshaft is moved. Set all valve clearances to specifications. See Valve Clearance.

### TIMING CHAIN

**Removal** - Disconnect battery. Remove cover. Remove oil seal sleeve and oil thrower. Rotate engine until No. 1 and No. 6 pistons are at TDC, No. 1 firing. Make sure timing marks shown in Fig. 7 are aligned. Remove camshaft bolts. Remove chain with sprockets. DO NOT allow sprockets to be moved with chain removed.

**Installation** - 1) Temporarily refit sprockets without chain. Check sprocket alignment as shown in Fig. 8. Shim behind crankshaft sprocket. Shims are available in .004" (.10 mm) and .006" (.52 mm).

2) Remove sprockets. Refit chain. Refit sprocket; keep proper alignment. Reverse removal procedure for remaining components. Make sure oil thrower dished side faces cover.

### VALVE TIMING

1) Remove valve cover. Adjust No. 11 and No. 12 valves (count from front) as close as possible to .120" (3.04 mm). Rotate crankshaft until No. 1 piston is at TDC of compression stroke (mark on crankshaft pulley aligned with pointer on timing cover).

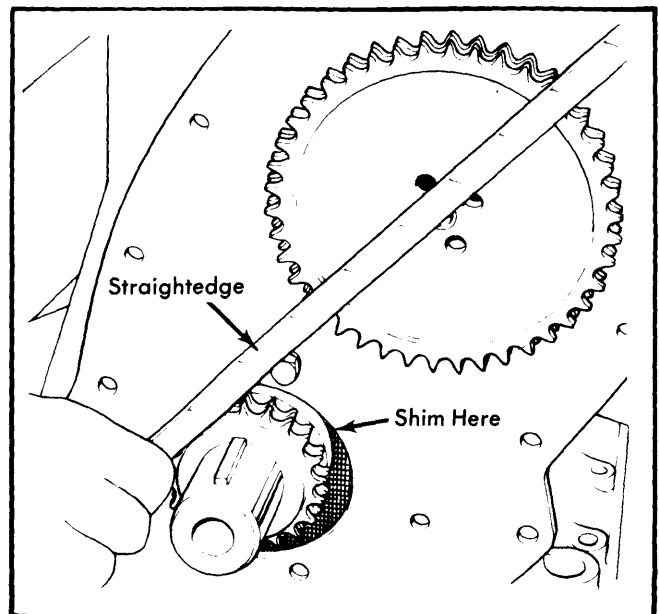


Fig. 8 Measuring Camshaft and Crankshaft Alignment

## TR6 6 CYLINDER (Cont.)

### ENGINE OILING

#### ENGINE OILING SYSTEM

Full pressure oil system, utilizing a rotor type oil pump driven by camshaft. A full-flow oil filter and a pressure regulator valve is also employed.

**Crankcase Capacity** – 4 3/4 qts.

**Oil Filter** – Full-flow, paper element type filter.

**Normal Oil Pressure** – 60 psi @ 2000 RPM.

**Pressure Regulator Valve** – Located in side of crankcase next to oil filter. Remove plug and pull out spring and piston. Check spring free length and for wear or cracking. Lubricate piston and spring when installing. Install plug with new sealing ring.

#### OIL PUMP

Remove oil pan. Remove oil pump. Separate cover from housing. Pull inner and outer rotors. Thoroughly clean and inspect all components. Lubricate all components and assemble pump. Install cover on pump and position pump in crankcase. Tighten bolts evenly.

#### Oil Pump Specifications

Application	Measurement In. (mm)
Outer Rotor-to-Pump Body .....	.010 (.254)
Outer Rotor-to-Inner Rotor.....	.001-.004 (.254-.102)
Cover Plate-to-Rotor.....	.004 (.102)
Pressure Regulator Spring	
Free Length.....	1.53 (40) approx.

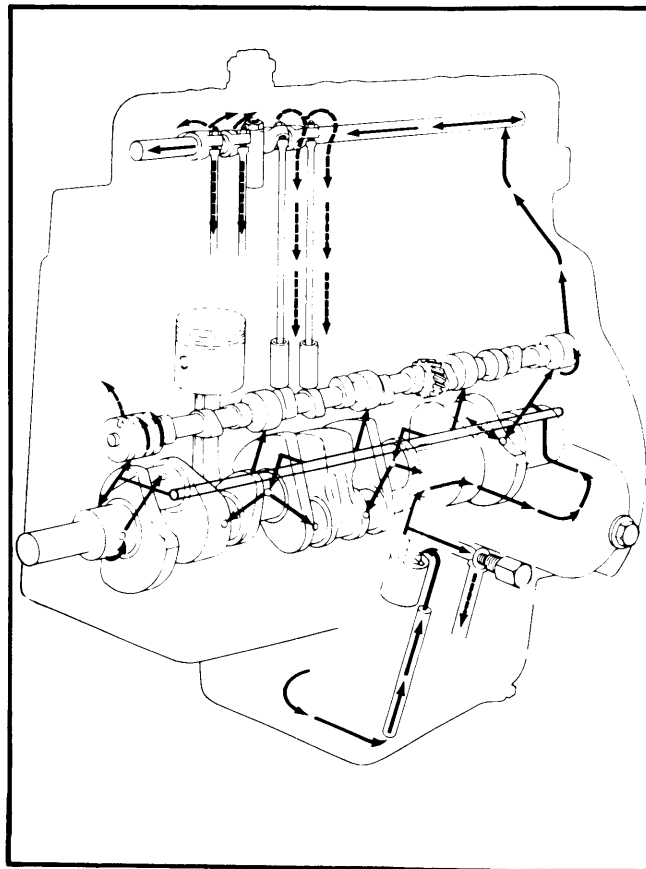


Fig. 9 Schematic Showing Direction of Engine Oil Flow

### ENGINE COOLING

#### WATER PUMP

- 1) Disconnect battery and drain cooling system. Disconnect hoses at water pump and temperature sending unit connection. Disconnect fuel and vacuum line clip, and remove water pump.
- 2) Clean mating surfaces and use new gasket with sealer. To install, reverse removal procedure.

**Thermostat** – Opening temperature fixed by manufacturer.

**Cooling System Capacity** – 6 3/4 qts.

#### TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Camshaft Sprocket .....	24 (3.3)
Connecting Rod .....	46 (6.4)
Cylinder Head .....	80 (11.1)
Main Bearings .....	65 (9.0)
Oil Pressure Relief Valve.....	35 (4.8)
Timing Cover .....	16 (2.2)