

Alfa Romeo Engines

2000 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	119.7	1962	①	.....	129@5800	.....	3.30	84	3.48	88.5

① – Fuel injection.

ENGINE IDENTIFICATION

Engine number is stamped on right side of crankcase, near front of engine.

ENGINE REMOVAL

1) Drain cooling system, crankcase and disconnect battery cables. From underside of engine disconnect drive shaft, cross plate, speedometer cable, and exhaust pipe from transmission. Also disconnect shift and clutch linkage, back-up light lead, tachometer, and exhaust pipe from manifold.

2) From top side of engine remove air cleaner. Disconnect fuel inlet line, all necessary water hoses, electrical leads, vacuum lines, and carburetor linkage. Remove radiator. Attach suitable hoist and take up weight of engine. Disconnect transmission crossmember and engine mounts. Carefully extract engine, tilting it as necessary. To install, reverse removal procedure.

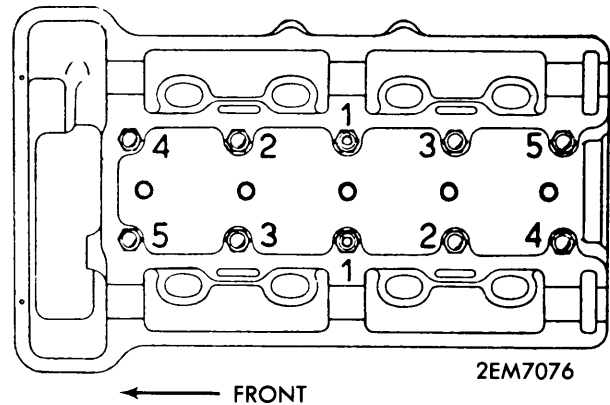
CYLINDER HEAD REMOVAL

1) Drain cooling system. Disconnect all necessary water hoses, vacuum and fuel lines, and fuel injection. Disconnect exhaust pipe from manifold.

2) Remove camshaft cover from cylinder head. Disconnect timing chain at master link and retain end from falling into engine.

3) Remove cylinder head nuts in three steps, reversing tightening sequence, until all nuts are removed. Extract two bolts mounting engine front cover. To install, reverse removal procedure and tighten all nuts to specification.

NOTE – To prevent cylinder head deformation do not remove head when hot.



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)
2000 Int.	1.7322-1.7381 (43.997-44.147)	30°	30°	.5508-.5519 (13.99-14.1)	.3532-.3538 (8.97-8.99)	.0005-.0016 (.012-.040)	.008 (.203)
Exh.	1.5748-1.5807 (39.999-40.149)	30°	30°	.5508-.5519 (13.99-14.1)	.3517-.3527 (8.933-8.959)	.0015-.0031 (.038-.079)	.006 (.152)

VALVE ARRANGEMENT

Right Side – All Intake.
Left Side – All Exhaust.

VALVE GUIDE SERVICING

1) With cylinder head removed and suitably supported, inspect valve guide bores for signs of seizing. It is possible to clean gum and/or carbon deposits from guides.

2) Using suitable gauge (C.5.0115), check inside diameter of guides (.3544-.3549"). If any guide is worn, remove it using suitable tool (A.3.0134). Also remove valve guide seals with suitable tool (A.3.0247).

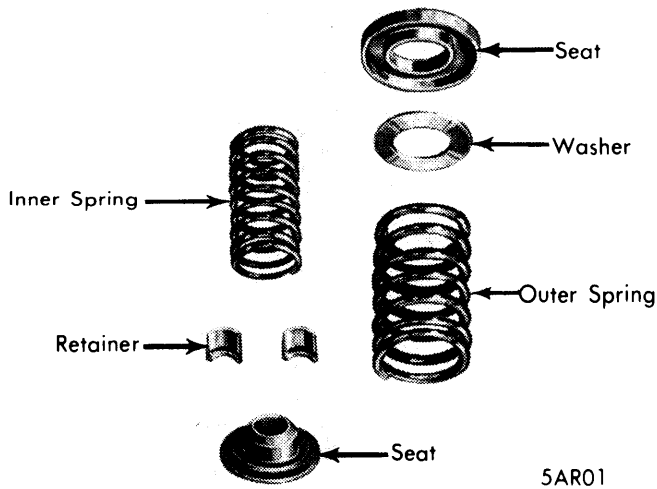
3) Before installing new valve guides, check inside diameter and heat cylinder head to 212°F. **NOTE** – Ensure correct tool is used for installing intake (A.3.0264) and exhaust (A.3.0133) valve guides. Drive in guides until they are properly seated. It may be necessary to ream new valve guides.

VALVE SPRING REMOVAL

1) Using suitable tool, compress valve spring. Remove upper spring seats, springs, shims, and lower spring seats. Remove tool and withdraw valve out bottom.

2) After visually inspecting valve springs, use a valve spring tester to determine spring condition. After reassembling, ensure valve spring allows valve to fully seat.

2000 4 CYLINDER (Cont.)



VALVE SPRING
Valve Spring Table

Application	Free Length In. (mm)	Measurement In. (mm)
Inner.....	1.850..... (46.99).....	1.023 @ 49-50 Lbs. (25.98 @ 22-23 mkg)
Outer.....	1.952..... (49.58).....	1.063@85-88 Lbs. (27.0@39-40 mkg)

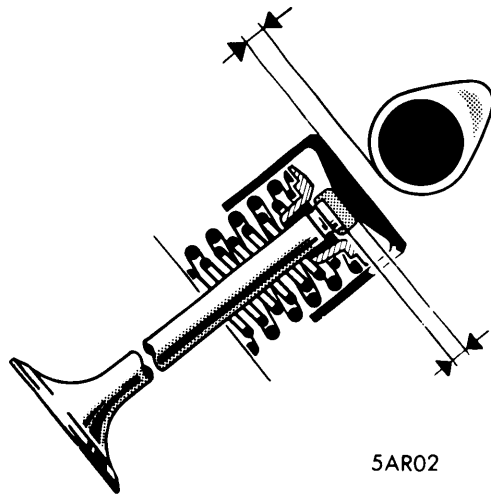
1) Remove valve cover and check clearance between valve tappet and heel of camshaft with engine cold. Check clearance of all valves and note measurement.

2) Remove camshaft and tappets. Remove valve cap on valve stem and measure thickness. If valve clearance is not to

specifications, a valve cap of suitable thickness must be installed.

Valve Clearance Adjustment

Application	Intake In. (mm)	Exhaust In. (mm)
2000.....	.019-.020..... (.483-.508).....	.021-.022..... (.053-.559)



VALVE CLEARANCE

3) Various thickness valve caps are available. With correct valve cap thickness determined and installed, reposition camshaft and tappets. Recheck valve clearance. Use same procedure for adjusting valve clearance on both sides.

PISTONS, PINS, RINGS						
Engine	PISTONS Clearance In. (mm)	PINS		RINGS		
		Piston Fit In. (mm)	Rod Fit In. (mm)	Rings	End Gap In. (mm)	Side Clearance In. (mm)
2000	.0015-.0023 (.038-.058)	Push	⓪	Comp.	.012-.018 (.305-.457)	.0013-.0026 (.033-.066)
				1		
				2	.012-.018 (.305-.457)	.0013-.0026 (.033-.066)
				Oil			.010-.016 (.254-.406)	.0010-.0022 (.025-.056)

⓪ — Black .0003-.0008" (.008-.020 mm).
White .0001-.0007" (.003-.018 mm).

OIL PAN REMOVAL

Drain crankcase and withdraw nuts securing pan (sump). It may be necessary to tilt pan to remove from vehicle. **NOTE** — Pan is divided into an upper and lower section. Before replacing, ensure all gasket surfaces are clean.

PISTON & ROD ASSEMBLY

With engine, cylinder head and oil pan removed, extract connecting rod caps. Withdraw piston assembly upward through cylinder head by pushing from bottom. **NOTE** — Avoid any contact with cylinder liner.

PISTON PIN REPLACEMENT

1) Release pin retaining clips and, using suitable drift, extract piston pin. Check for signs of scoring or seizing.

2) Inspect inner surface of connecting rod bushing for signs of seizing. Using a dial gauge, measure inside diameter of connecting rod bushing. If bore exceeds tolerance, replace bushing. After installing new bushing, ream it to .8664-.8867". To install pin, reverse removal procedure.

2000 4 CYLINDER (Cont.)

Piston Pin Class

Application	Pin Size In. (mm)	Piston Bore In. (mm)
All		
Black .....	.8659-.8660..... (21.994-21.996).....	.8661-.8662 (21.998-22.001)
White .....	.8660-.8661..... (21.996-21.998).....	.8662-.8664 (22.001-22.006)

FITTING PISTONS

- 1) Using a micrometer, measure outside diameter of piston across thrust face .470" from lower edge of skirt.
- 2) If clearance between cylinder liners and pistons is not .0012-.0019", replace piston and rod assembly.
- 3) Using suitable scale, ensure weight difference between connecting rods (with bearing caps) does not exceed .07 ozs.

Install piston and recheck weight of each assembly. Weight difference must be less than .17 ozs.

- 4) When assembling, ensure reference marks are properly aligned and piston ring gaps are staggered.

Piston Class

Color Code	Bore Size In. (mm)	Piston Size In. (mm)
Blue	3.3064-3.068..... (83.982-83.992).....	3.3045-3.3049 (83.934-83.944)
Pink	3.3068-3.3072..... (83.992-84.002).....	3.3049-3.3053 (83.944-83.954)
Green.....	3.3072-3.3076..... (84.002-84.013).....	3.3053-3.3057 (83.954-83.964)

CYLINDER LINER INSTALLATION

Insert liners into cylinder block, with seals, according to reference numbers. Using suitable dial gauge (C.6.0148), check liner protrusion, it should not exceed .000-.002".

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)
2000 Red	2.3608-2.3610 (59.964-59.979)	.0010-.0026 ① (.025-.066)	Center	.003-.010 (.076-.254)	1.9680-1.9684 (49.987-49.997)	.0009-.0022 (.023-.056)	.....
Blue	2.3602-2.3606 (59.949-59.959)	.0009-.0025 ② (.023-.064)	Center	.003-.010 (.076-.254)	1.9676-1.9680 (49.977-49.987)	.0008-.0022 (.020-.056)	.....

① - Clevite bearings .0006-.0022" (.015-.056 mm).

② - Clevite bearings .0005-.0021" (.013-.053 mm).

CONNECTING ROD & MAIN BEARING SERVICE

Connecting Rod Bearings - 1) With connecting rod assembly removed, check bearing surface for scoring or seizing.

2) Check clearance between crankshaft journals and connecting rods, using the following factory recommended procedure: Using a dial gauge, measure inside diameter of connecting rod. With a micrometer, obtain crankcase journal diameter at two different points. Measure actual bearing thickness, using a steel ball between bearing and gauge to provide an even surface. Clearance is difference between bearing seat diameter and crankshaft journals, plus twice bearing thickness.

NOTE - Plastigage method may also be an acceptable substitute procedure.

3) If clearance is in excess of .0059". Crankshaft must be reground to fit .005" or .010" undersize bearings.

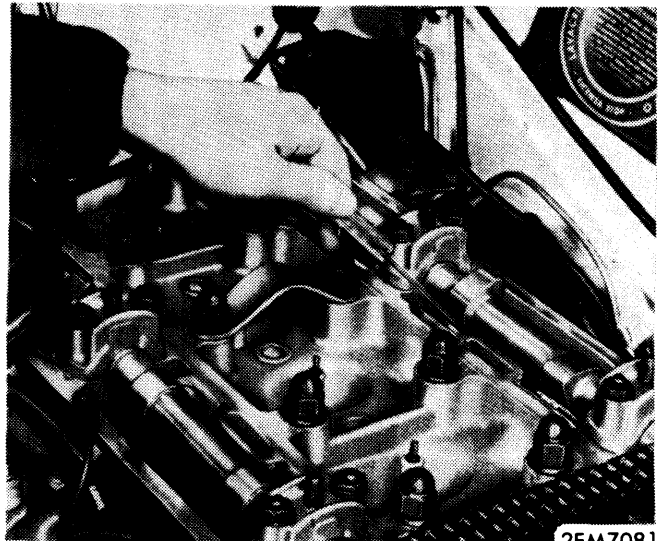
Main Bearings - 1) With crankshaft removed and main bearings index marked, magnaflux crankshaft. Discard any crankshaft having cracks.

2) Check surfaces of main journals for signs of scoring or seizing. Light scoring may be corrected with a hone. If journals are severely damaged, they may be ground to accept .005" or .010" undersize bearings.

3) Check main bearing clearance, using same procedure as for connecting rods; except, clearance is the difference between bearing housing diameter and crankshaft journal diameter plus twice bearing thickness.

4) Inspect crankshaft parallelism. Set crankshaft on two "V" shaped blocks. Using a dial gauge attempt to obtain a value not to exceed .0059". Replace crankshaft as necessary.

5) After installing crankshaft and main bearings, check end play. Play should not exceed .003-.010"; thrust washers must be replaced if end play reaches .019". Thrust washers are available in two oversizes.

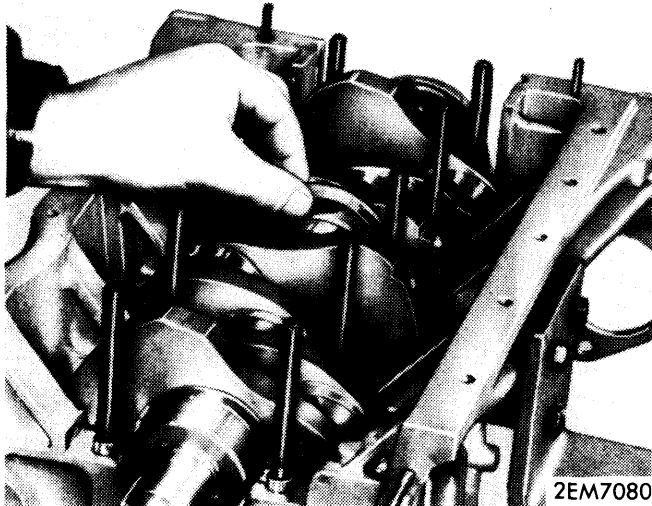


CHECKING VALVE ADJUSTMENT

2000 4 CYLINDER (Cont.)

THRUST WASHER INSTALLATION

Upper thrust washers are fitted to center main bearing by slipping into place around center main bearing. Oil grooves on thrust washers should be turned toward working face on crankshaft.

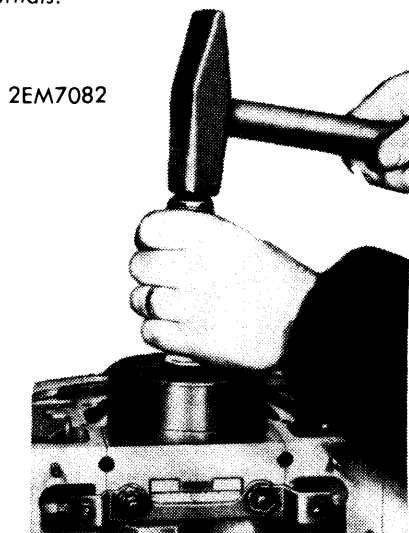


THRUST WASHER ALIGNMENT

2EM7080

REAR MAIN OIL SEAL

With engine removed, crankshaft installed, and cylinder block flywheel-end up, use suitable tool (A.3.0178) to seat oil seal. For connect procedure, see illustration. **NOTE** — When refitting flywheel, place No. 1 piston TDC and align reference marks on flywheel with center line on No. 1 and No. 4 connecting rod journals.



2EM7082

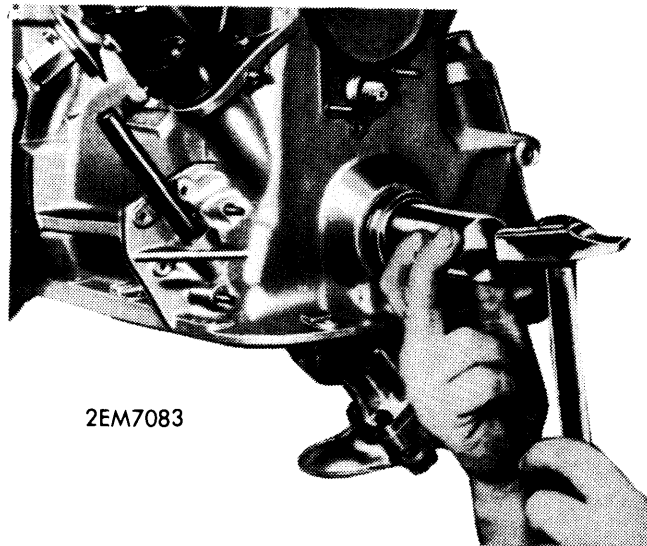
INSTALLING REAR MAIN OIL SEAL

ENGINE FRONT COVER & OIL SEAL

1) Remove radiator, water pump, generator and flange mount, cylinder head, oil pan (sump), fuel pump, and crankshaft pulley.

2) Remove nuts mounting front cover and carefully slide cover off. Cover gasket and front oil seal can now be removed and replaced.

3) To install, reverse removal procedure. **NOTE** — Ensure front cover is not distorted before installing.



2EM7083

INSTALLING FRONT COVER OIL SEAL

CAMSHAFT

Engine	Journal Diam. In. (mm)	Clearance In. (mm)	Lobe Lift In. (mm)
2000	1.0613-1.0622 (26.957-26.979)	.0007-.0029 (.018-.074)	.....

CAMSHAFT REMOVAL

- 1) Back off chain tensioner and remove camshaft cover. Rotate engine until master link of timing chain is visible.
- 2) Remove master link and separate timing chain. Secure both ends of chain to prevent it from dropping into engine.
- 3) Extract distributor, bearing caps, and camshaft. Removal procedure is same for both sides.
- 4) To install camshaft, reverse removal procedure. Ensure timing chain and sprockets are correctly positioned. See *Valve Timing*.

CAMSHAFT BEARING INSPECTION

Check camshaft at both lobes and journal surfaces for signs of scoring or seizing. Superficial scoring can be eliminated by honing. Badly damaged or heavily scored parts must be replaced. Replace camshaft bearings, install and evenly tighten bearing caps. Check end play, play must not exceed .002-.007".

VALVE TIMING

Engine	INTAKE		EXHAUST	
	Open (BTDC)	Close (ABDC)	Open (BBDC)	Close (ATDC)
2000	21°54'	69°54'	51°14'	27°14'

2000 4 CYLINDER (Cont.)

TIMING CHAIN REPLACEMENT

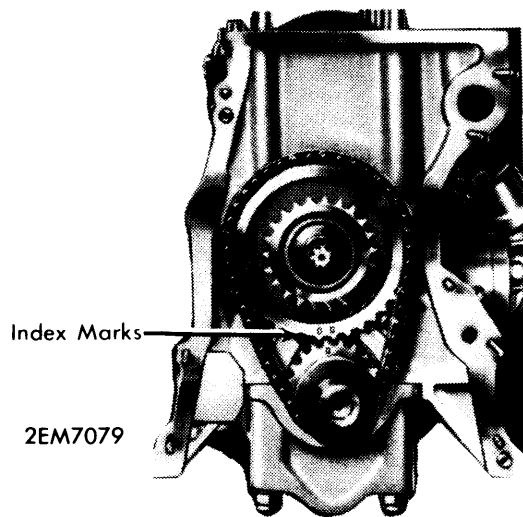
- 1) Remove valve cover and turn engine until No. 1 piston is at TDC (ignition stroke). Locate master link.
- 2) Loosen chain tensioner and move tensioner outward, slackening chain. Lock tensioner.
- 3) Remove master link and attach a copper wire approximately 58" long. Pull chain so wire follows same course. When chain is completely removed, disconnect wire and secure it in place.

NOTE — Do not rotate crankshaft until chain has been refitted, as reference marks are not visible with front cover in place.

- 5) With crankshaft in correct position, align camshaft and bearing cap index marks. Install master link and adjust chain tensioner.

CRANKSHAFT CHAIN REPLACEMENT

- 1) Remove radiator, cylinder head, oil pan (sump), and oil pump suction pipe.
- 2) Remove belt, fan, crankshaft pulley and water pump. Extract distributor and take off front cover, complete with oil pump. Remove sprockets and chain by sliding them off together (see illustration).

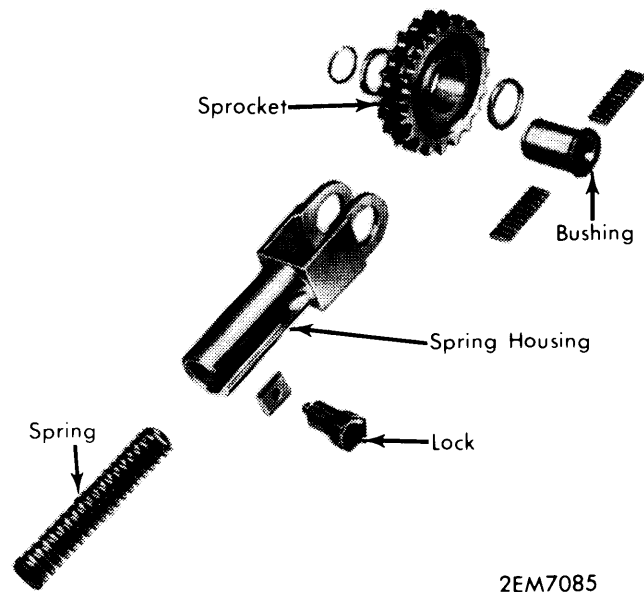
**CRANKSHAFT SPROCKET ALIGNMENT**

- 3) If spacer between idler sprocket shoulder and abutment on crankcase is worn, replace.
- 4) Measure diameters and calculate clearance between bushing in crankcase and idler shaft and clearance between idler shaft and bushing in front cover. Permissible clearance is .0016-.0029" replace as necessary.

- 5) To install, reverse removal procedure. Ensure sprocket index marks are properly aligned.

CAMSHAFT CHAIN TENSIONER

Remove timing chain tensioner spring. Visually inspect spring and relative components. Measure spring, referring to chart below. To install spring, seat cover plug, this should automatically adjust spring and chain.

**TIMING CHAIN TENSIONER****Spring Tension Chart**

Application	Free Length In. (mm)	Measurement In. (mm)
2000.....	3.858..... (97.99)	2.283 @ 46-50 Lbs. (57.98 @ 21-23 kg)

VALVE TIMING

- 1) Adjust all valve clearances and adjust chain tensioner. Rotate crankshaft until "P" (TDC) mark in crankshaft pulley aligns with mark cut in front cover.
- 2) Check that marks in camshaft flanges align with marks in bearing caps. If marks do not align, loosen sprocket screw and remove dowel bolt from sprocket and flange.
- 3) Rotate camshaft with suitable tool (A.5.0103), (without moving timing chain) until marks align. Install dowel bolt in holes that come closest to aligning. Tighten sprocket bolt.

2000 4 CYLINDER (Cont.)

ENGINE OILING

ENGINE OILING SYSTEM

Pressure lubrication, achieved by chain driven, gear-type oil pump.

Oil Filter – Full-flow type. Filter is fitted with a by-pass valve that is actuated when filter is clogged.

Normal Oil Pressure – Minimum of 7-14 psi at normal idle; minimum of 50 psi at full throttle.

OIL PUMP

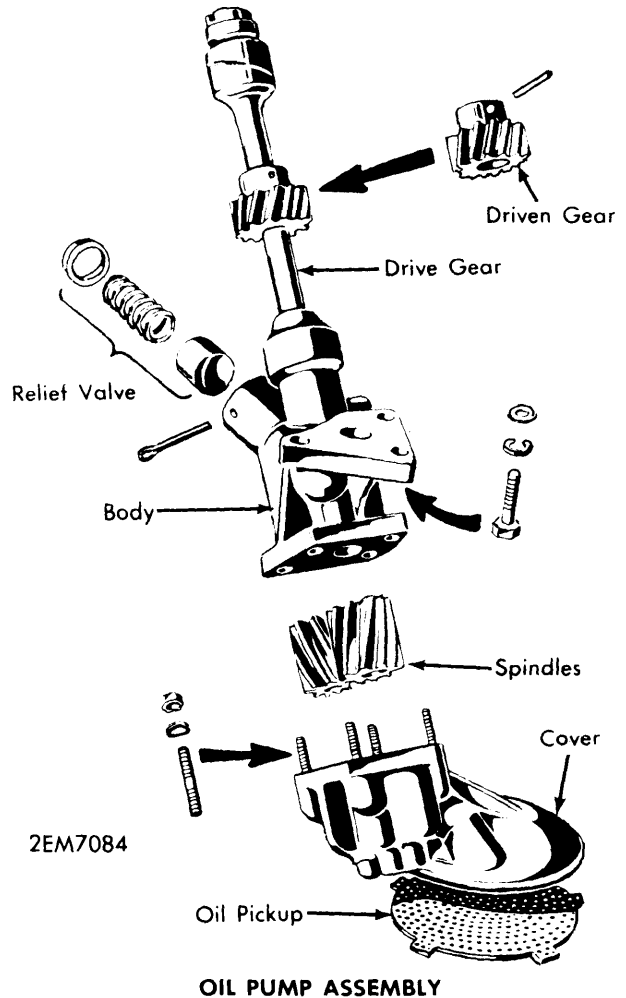
1) Remove oil pan (sump). Bring No. 1 piston to TDC (reference "P" on crankshaft pulley in line with index plate on front cover and distributor rotor pointing forward). Remove bolts mounting oil pump to crankcase and withdraw pump out bottom.

2) To disassemble, proceed as follows: Remove nuts securing gear housing to pump body. Withdraw pump driven gear, pump drive gear (using suitable press), and pin retaining driven pinion to pump shaft. Extract cotter pin from relief valve assembly and separate components.

3) Inspect gear end play and side clearance, using following information:

Oil Pump Specifications

Application	Measurement In. (mm)
End Play .....	.007-.020 (.178-.508)
Side Clearance .....	.0008-.0024 (.020-.061)



ENGINE COOLING

WATER PUMP

Remove radiator. Disconnect tachometer, all necessary water hoses, fan belt and slide generator outward. Remove water pump.

Thermostat – Begins to open at approximately 180-189°F.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Cylinder Head	
Cold	57-59 (7.8-8.2)
Hot	60-62 (8.3-8.6)
Camshaft Nuts	15-16 (2.1-2.2)
Connecting Rod	36-38 (5.0-5.3)
Main Bearings	34-36 (4.7-5.0)
Flywheel-to-Crankshaft	81-83 (11.2-11.5)
Crankshaft Pulley	138-144 (19.0-20.0)
Clutch-to-Engine	15-18 (2.1-2.5)