## 610, 620, 710 4 CYLINDER (Cont.)

**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 | | | | | | | | | | |
| L18 | 108.1 | 1770 | 1x2 Bbl. | ... | ... | 8.5-1 | 3.346 | 85 | 3.07 | 78 |
| L20B | 119.1 | 1952 | 1x2 Bbl. | ... | ... | 8.5-1 | 3.346 | 85 | 3.39 | 86 |

### ENGINE IDENTIFICATION

Engine number stamped in rear right side of cylinder block at cylinder head contact surface. The number is preceded by engine model, L-18 or L-20B.

### ENGINE REMOVAL

*NOTE — It is recommended that engine and transmission be removed as a unit. Engine can then be separated from transmission.*

1) Mark alignment marks on hood and hood hinges and remove hood. Drain cooling system, engine crankcase and transmission. Remove blow-by hose from rocker cover and remove air cleaner. Remove radiator grille and disconnect battery cables and remove battery. Disconnect ground cable at engine.

2) Remove upper and lower radiator hoses, loosen attaching bolts and remove radiator. *NOTE — If equipped with automatic transmission, remove torque converter cooling pipes from radiator.*

3) If equipped with heater, remove hoses at engine. Disconnect fuel line from fuel pump and disconnect accelerator and choke control linkage from carburetor.

4) Disconnect wiring from starter, alternator, ignition coil, oil pressure switch and thermal transmitter. Remove clutch slave cylinder and return spring. Disconnect speedometer cable and disconnect flat attaching plug connector from back-up light switch.

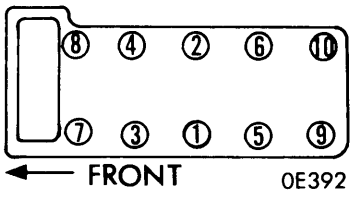
5) Disconnect transmission control shift rods and selector rods and remove cross shaft assembly by removing bracket from side member. On floor shift models, remove rubber boot and disconnect shift lever. Disconnect front exhaust pipe from exhaust manifold.

6) Disconnect propeller shaft by disconnecting it from companion flange of gear carrier. Jack up transmission a little and remove rear engine mount crossmember by removing bolts of engine mount insulator. Remove crossmember and handbrake cable clamp.

7) Use suitable engine hoist and hook hoist to attachmemt points provided on engine. As engine is raised, lower jack a little at a time. Tilt engine up and remove from vehicle. To install, reverse removal procedure.

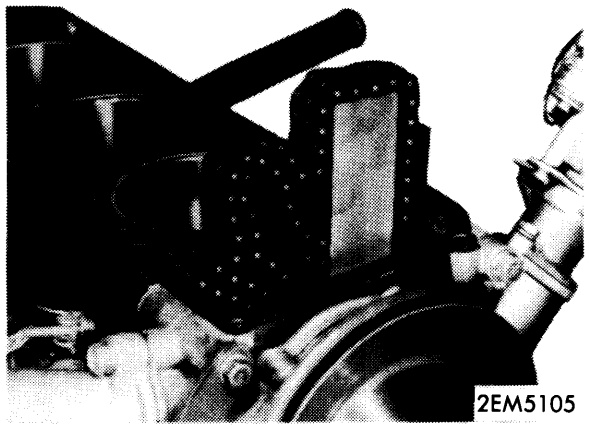
### CYLINDER HEAD REMOVAL

Remove ignition coil, spark plug wires, and spark plugs. Remove distributor wiring, remove distributor. Remove thermostat housing, intake and exhaust manifolds, and fuel pump. Remove fan belt, pulley and water pump. Remove rocker cover, remove chain tensioner at cylinder head front cover. Disconnect fuel pump drive cam and camshaft sprocket. Remove cylinder head assembly.




**CYLINDER HEAD TIGHTENING SEQUENCE**

*NOTE — Special tool ST17420001 is available to support timing chain during cylinder head removal. Use of tool eases work needed for aligning timing marks when reinstalling timing chain.*




**SPECIAL TOOL (TIMING CHAIN SUPPORT)**

## 610, 620, 710 4 CYLINDER (Cont.)

| 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) |
| L18 & L20B | | | | | | | |
| Int. | 1.654-1.661 (42.0-42.2) | 45.5° | 45° | ... | .3136-.3142 (7.695-7.980) | .0008-.0021 (.020-.053) | ... |
| Exh. | 1.378-1.386 (35.0-35.2) | 45.5° | 45° | ... | .3128-.3134 (7.945-7.960) | .0008-.0021 (.020-.053) | ... |

### VALVE ARRANGEMENT

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

### VALVE STEM CLEARANCE

1) Measure clearance between valve stem and valve guide with aid of micrometer and hole gauge. Check diameter of valve stem in three places: top, center and bottom.

2) Insert hole gauge in valve guide bore and measure at center. Subtract highest reading of valve stem diameter from valve guide bore to obtain clearance.

*NOTE — As a quick check, a valve may be inserted into valve guide and moved either left or right (parallel with rocker arm). If tip moves about .0079" or more, clearance is beyond maximum limit of .0039".*

### VALVE GUIDE REPLACEMENT

1) Remove old guide with press and drift pin. Although this procedure may be carried out at room temperature, higher temperatures will aid removal.

2) Ream cylinder head guide hole to provide an interference fit of .0011-.0019" (.027-.049 mm). Press new guide into cylinder head so that it will fit smoothly when cylinder head is heated to 302-392°

3) Ream bore of valve guides to .3150-.3157" (8.000-8.018 mm). Correct valve seat surface using new valve guide as axis.

### VALVE SEAT INSERTS

1) Check valve seats for pitting at valve contact surface. Valve seat inserts of .0197" oversize are available if necessary. To remove old inserts, bore out until old insert collapses. The depth stop on machine should be set so that boring cannot continue beyond bottom face of insert recess in cylinder head.

2) Machine cylinder head recess diameter to concentric circles to valve guide center so that insert will have correct fit. Heat cylinder head to 302-392°F and install insert making sure that it beds on bottom face of recess.

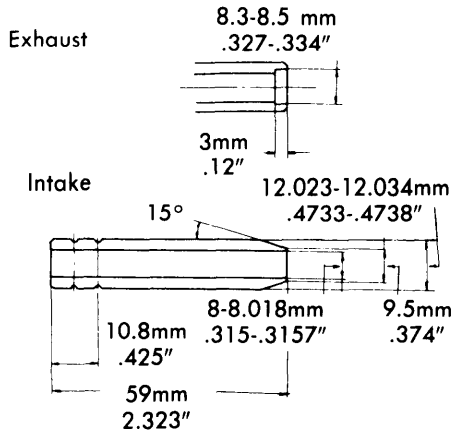
3) Valve seats should be cut or ground to correct face angle and seat width and to head diameter of valve to be installed.

### VALVE SPRING INSTALLED HEIGHT

With valves closed, inner spring should have a height of 1.378" (35.0 mm) and outer spring should have a height of 1.575" (40.0 mm). See specifications for pressure with valves opened or closed.

| VALVE SPRINGS | | | |
|---|---|---|---|
| Engine | Free Length In. (mm) ① | PRESSURE Lbs. @ In. (kg @ mm) | |
| | | Valve Closed | Valve Open |
| L18 & L20B | | | |
| Inner | 1.766 (44.85) | 27.1 @ 1.378 (12.3 @ 35.0) | 56.2 @ .965 (25.5 @ 24.5) |
| Outer | 1.968 (49.98) | 47 @ 1.575 (21.3 @ 40.0) | 108 @ 1.161 (49.0 @ 29.5) |

① — If valve spring is out-of-square more than .063" (1.6 mm), replace spring.

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### VALVES GUIDES

### VALVE ADJUSTMENT

Loosen pivot locking nut and turn pivot screw until specified clearance is obtained with engine cold. Tighten pivot locking nut after adjustment and recheck clearance. Warm up engine. With engine stopped, measure valve clearance and reset to hot clearances if necessary.

| Valve | Hot | Cold |
|---|---|---|
| Intake | .010" | .008" |
| Exhaust | .012" | .010" |

## 610, 620, 710 4 CYLINDER (Cont.)

| 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) |
| L18 & L20B | .0010-.0018 (.025-.045) | .0001-.0006 (.003-.015) | ① .0006-.0013 (.015-.033) | No. 1<br>No. 2<br>Oil | .010-.016 (.25-.40)<br>.012-.020 (.30-.50)<br>.012-.032 (.30-.90) | .0016-.0029 (.040-.073)<br>.0012-.0028 (.030-.070)<br>..... |

① — Interference fit.

### PISTON & ROD ASSEMBLY

**Removal** — Remove connecting rod nuts and bearing caps. Push piston and rod assembly out top of cylinder, using care not to damage any bearing surface. Retain all components in proper order for reassembly in original location.

**Installation** — Reassemble piston and rod so that oil hole in connecting rod is facing right side of engine and notch on top of piston is facing forward. Install connecting rods on original journal with rod and cap marks on same side. Tighten connecting rod nuts and check rod side play.

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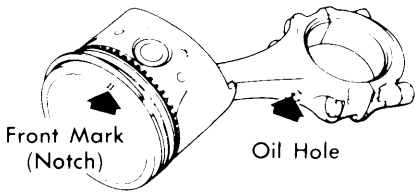



PISTON & ROD ASSEMBLY INSTALLATION MARKS

### FITTING PISTONS

1) Measure cylinder bores for wear or taper at top, bottom and middle on thrust face and at 90° to thrust face. If excessive wear is found, rebore cylinder and install oversize pistons. Oversize pistons are available as shown in table.

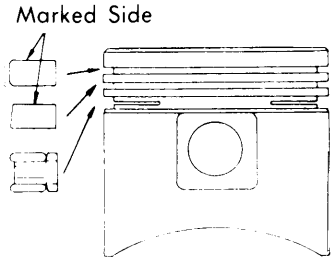
2) When boring cylinders, use cylinder order of 2-4-1-3 to prevent heat distortion. After honing cylinder to final fit, check piston fit using spring tension pull scale. A force of .44-3.31 lbs. (.2-1.5 kg) should be obtained extracting a .0016" (.04 mm) feeler gauge.

3) Measure piston ring end gap and side clearance and replace as necessary. Install rings on piston with end gaps 180° apart and so no end gap is inline with thrust face. Install rings with top mark facing upward.

*NOTE — If only piston ring is to be replaced, measure gap at bottom of bore. Oversize rings are available in .020" (.50 mm) and .040" (1.00 mm).*

**Piston Specifications**

| Application In. (mm) | Piston Size In. (mm) |
|---|---|
| Standard | 3.3541-3.3470 (84.965-85.015) |
| .020 (.50) | 3.3648-3.3667 (85.465-85.515) |
| .040 (1.00) | 3.3844-3.3864 (85.965-86.015) |

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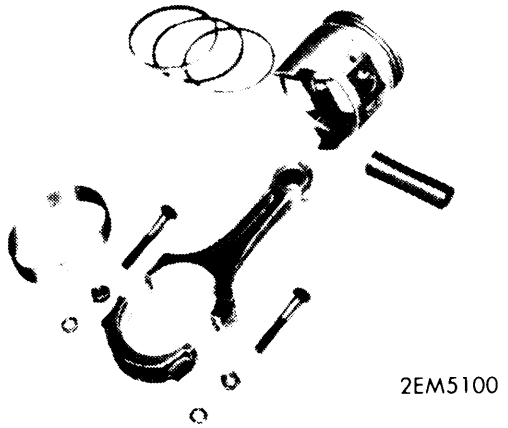
PISTON RING INSTALLATION

### PISTON PINS

Pin must be a tight press fit in connecting rod, pressing force is from one to one and a half tons. When pressing pin into connecting rod, oil pin and press pin so that oil jet of connecting rod large end is directed toward right side of cylinder block.



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PISTON & ROD ASSEMBLY

## 610, 620, 710 4 CYLINDER (Cont.)

| CRANKSHAFT MAIN & CONNECTING ROD BEARINGS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | MAIN BEARINGS | | | | CONNECTING ROD BEARINGS | | |
| Engine | 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) |
| L18 & L20B | 2.1631-2.1636 (59.942-59.955) | .0008-.0024 (.020-.061) | No. 3 | .002-.007 (.05-.18) | 1.9670-1.9675 (49.961-49.974) | .001-.002 (.025-.055) | .0079-.0118 (.20-.30) |

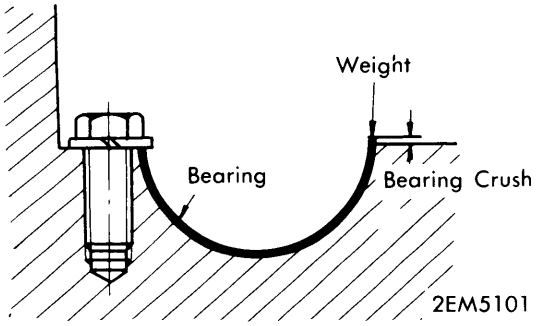
### MAIN & CONNECTING ROD BEARING CLEARANCE

Check all bearings and bushings for wear or damage. Wipe off all oil or dirt and set main bearing on cap block. Cut a Plastigage to width of bearing and place in parallel with crank pin. Do not block oil hole. Install cap assembly and tighten to specified torque. Remove cap and measure width of Plastigage with Plastigage scale.

### BEARING CRUSH

1) Set bearing on main bearing cap and cylinder block bearing recess. Tighten bolts to specified torque. Loosen cap bolt on one side and measure clearance between cap and block side.

2) Clearance should be within 0-.0012" (0-.03 mm) for main bearings and .0006-.0018" (.015-.045 mm) for connecting rod bearings.




CHECKING BEARING CRUSH

### REAR OIL SEAL

With cylinder block on bench or stand, oil seal may be installed with aid of suitable tool (ST15310000). Coat lip of seal with lithium grease.

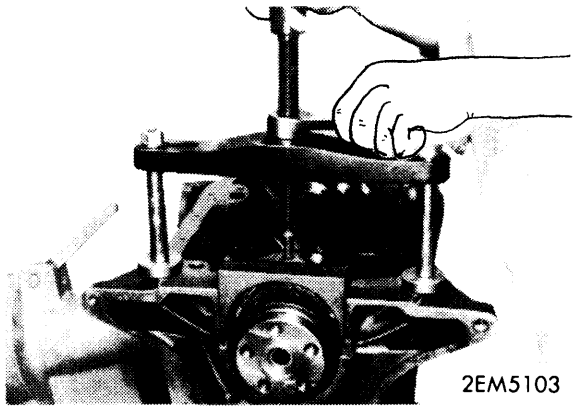
### FRONT COVER OIL SEAL

New front cover oil seal may be installed by pressing into front cover. Seal should be replaced whenever front cover has been removed.

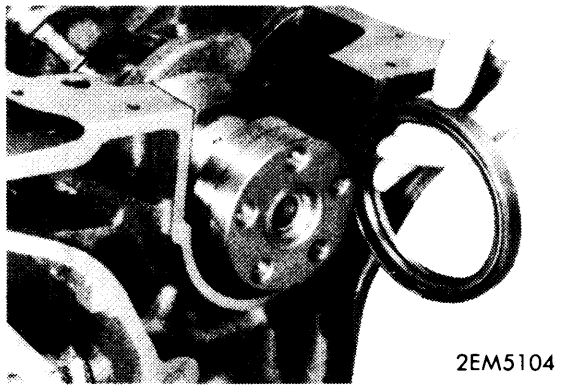
### CRANKSHAFT

1) With engine inverted on work bench or engine stand, remove oil pan and oil strainer. Remove oil pump, drive gear, front cover, chain tensioner and timing chain.

2) Remove oil thrower, crankshaft worm gear and chain drive sprocket. Remove piston and rods and take off connecting rod bearings making sure to keep them in correct order for reassembly. Remove flywheel. Using suitable tool (ST1651S000) remove rear main bearing cap. Remove rear oil seal and lift out crankshaft.




REAR MAIN BEARING CAP REMOVAL




REAR OIL SEAL REMOVAL

3) With crankshaft removed, inspect each journal for signs of wear or scoring, replace as necessary. Using a micrometer, check main and connecting rod journals for taper or out-of-round. Taper is measured along journal and out-of-round is measured around journal. Maximum allowable tolerance is .0 (.025 mm). Replace or refinish crankshaft as required.

4) Place crankshaft in "V" blocks and using a dial indicator with finger resting on center journal, measure crankshaft bend. Maximum allowable bend is .003" (.10 mm). Replace or refinish crankshaft as required.

5) At end of crankshaft, inspect pilot bushing for wear or damage and replace as necessary using suitable bushing puller (ST16610001). Install new bushing with a press fit so height above flange is .177-.197" (4.6-5.0 mm).

6) To install crankshaft, reverse removal procedure and inspect endplay using a feeler gauge (see specifications).

## 610, 620, 710 4 CYLINDER (Cont.)

### CAMSHAFT

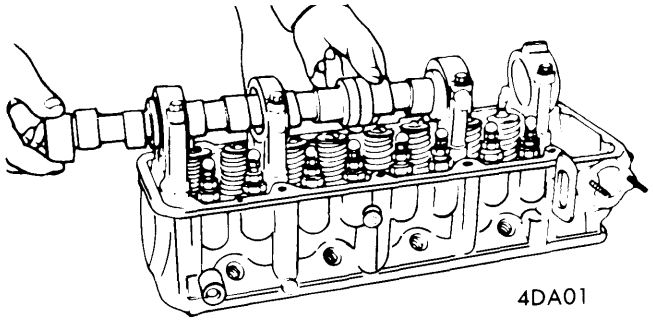
Remove cylinder head. Remove valve rocker spring. Loosen valve rocker pivot lock nut and remove rocker arms by pressing down on spring. Use care not to lose valve rocker guides. Remove camshaft. Do not let camshaft scratch cam bushing during removal.

*NOTE – Do not remove camshaft bearings. If bearings are removed bearing centers will be out of alignment and proper reassembly will be difficult without center boring.*

**CAMSHAFT**

| Engine | Journal Diam. In. (mm) | Clearance In. (mm)① | Lobe Lift In. (mm) |
|---|---|---|---|
| L18 & L20B | 1.8877-1.8883 (47.949-47.962) | .0015-.0026 (.038-.067) | .276 (7.0) |

① – End play is .003-.015" (.08-.38 mm).




**CAMSHAFT REMOVAL**

### ENGINE FRONT COVER

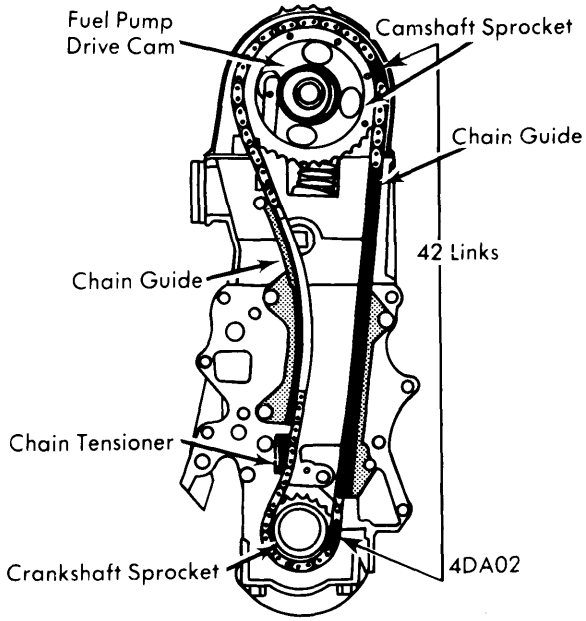
1) Drain cooling system, disconnect hoses and remove radiator from vehicle. Remove fan belt, fan, air pump belt and air pump. Remove wiring from distributor and remove distributor.

2) Remove fuel pump and thermostat housing. Using suitable puller, remove crank pulley. Remove front cover attaching bolts and remove engine front cover. To install, reverse removal procedure. Replace oil seal when cover is removed.

### TIMING CHAIN & GEARS

Remove engine front cover and camshaft drive sprocket and fuel pump cam. Remove timing chain, tensioner and chain guide. Remove oil thrower, crankshaft worm gear and crankshaft chain drive gear. To install, reverse removal procedure.

*NOTE – When installing timing chain, camshaft gear or crankshaft gear, make sure camshaft and crankcase keys point upward. Set timing chain so that mating marks match marks on crankshaft and camshaft sprockets. There are 42 chain links between the two timing chain marks.*




**L-18 TIMING CHAIN**

## ENGINE OILING

**Crankcase Capacity** – 610 & 620 4.5 qts.; 710 5 qts. with filter.

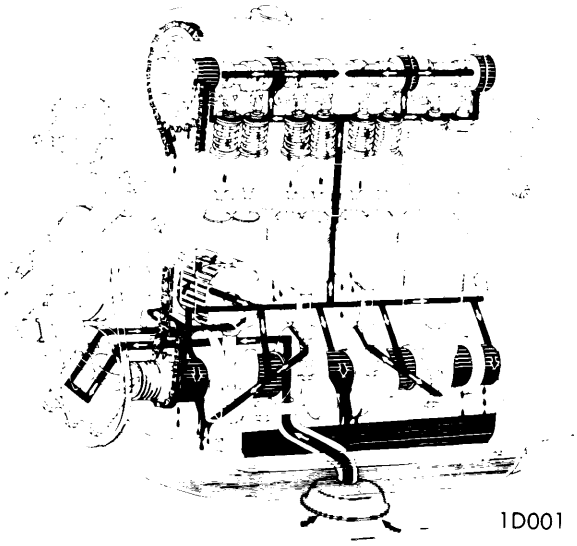
**Oil Filter** – Full-flow, disposable cartridge.

**Oil Pressure** – 11-40 psi (.8-2.8 kg/cm²) @idle, 50-70 psi (3.5-5.0 kg/cm²) @maximum.

**Pressure Relief Valve** – Non-adjustable.

### ENGINE OILING SYSTEM

Oil drawn from oil pan passes through screen to oil pump and is delivered to full flow oil filter and to main oil gallery. Main oil gallery supplies oil to crankshaft main bearings and drilled passages in crankshaft. Oil sprayed from jet holes on connecting rods lubricates cylinders and piston pins. Oil from main gallery lubricates chain tensioner and timing chain. A center oil hole in crankshaft center bearing feeds camshaft bearings on cylinder head. Valve rocker mechanism is lubricated through oil gallery in camshaft and through a small channel at base circle portion of each cam. Rocker arms and valves are lubricated intermittenly through small holes or oil pipe.




**ENGINE OILING SYSTEM**

## 610, 620, 710 4 CYLINDER (Cont.)

### ENGINE OILING (Cont.)

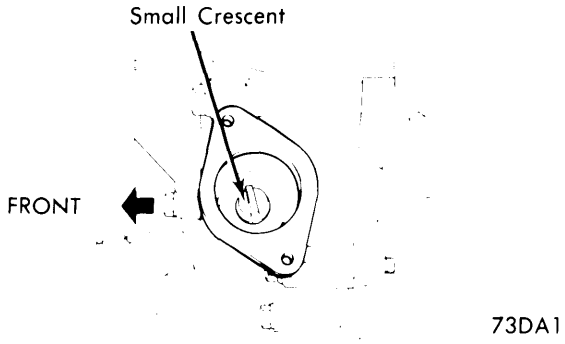
#### OIL PUMP

Pump assembly is installed to bottom of front cover by four bolts. Pump driven by distributor drive shaft is rotor type. To remove, first remove distributor. Drain engine oil, remove splash shield and stabilizer. Remove oil pump body together with drive shaft. To disassemble proceed as follows:

1) Separate body cover from oil pump body by unscrewing attaching screws. Take out pump drive and driven gears from pump body.

2) Clean parts with cleaning solvent, and inspect for wear or damage. Make sure clearances are to specifications. Pump is serviced as an assembly only. Replace pump if any part is worn or damaged.

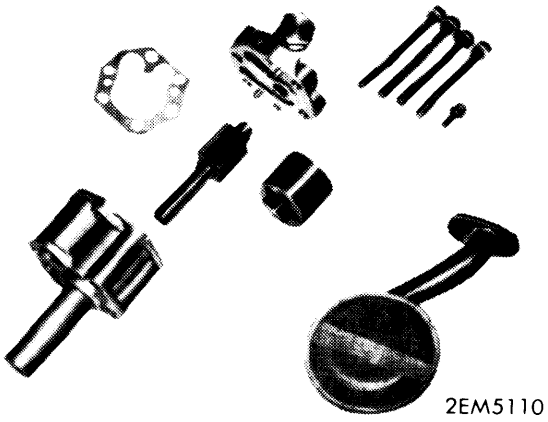
3) Rotate engine until number one piston is at TDC. Fill pump housing with oil and align punch mark on shaft with hole in pump (see illustration). Using a new gasket, install oil pump and drive shaft assembly so that tongue is positioned at 11:25 o'clock. Small crescent will be facing forward (see illustration). Check drive gear engagement through distributor mounting hole.



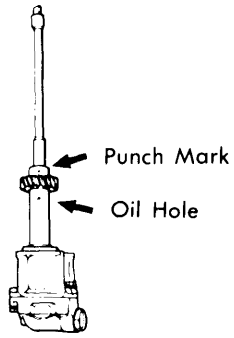

OIL PUMP DRIVE SHAFT INSTALLATION

**Oil Pump Specifications**

| Application | Clearance In. (mm) |
|---|---|
| Inner-to-Outer Rotor | .0.005 (.05-.12) |
| Tip Clearance | Less Than .005 (.12) |
| Outer Rotor-to-Body | .006-.008 (.15-.21) |
| Rotor-to-Bottom Cover | .001-.005 (.03-.12) |




OIL PUMP




OIL PUMP TIMING MARKS

### ENGINE COOLING

**Thermostat** – Opens @ 180°F (82°C).

**Cooling System Capacity** – 610 & 710 7 qts.; 620 6.25 qts.

**Radiator Cap** – 13 psi.

#### WATER PUMP

Centrifugal type pump with aluminum body. To remove, drain cooling system and remove fan belt, fan, and pulley. Remove pump attaching bolts and remove water pump.

**TIGHTENING SPECIFICATIONS**

| Application | Ft. Lbs. (mkg) |
|---|---|
| Cylinder Head | |
| Step One | 29 (4.0) |
| Step Two | 43 (6.0) |
| Step Three | 47-61 (6.5-8.4) |
| Connecting Rods | 33-40 (4.6-5.5) |
| Flywheel | 101-116 (14.0-16.0) |
| Main Bearings | 33-40 (4.6-5.5) |
| Camshaft Sprocket | 86-116 (12.0-16.0) |
| Oil Pan | 8-11 (1.1-1.5) |
| Crankshaft Pulley | 86-115 (12.0-15.9) |
| Manifolds | 9-12 (1.2-1.7) |