# Section V
# COOLING SYSTEM
## CONTENTS



## DATA AND SPECIFICATIONS

| MODELS | LC-1, 2 | LC-3, LY-1 |
|---|---|---|
| **COOLING** | | |
| Type | Pressure Vent | |
| Capacity: | | |
| With Heater | 22 qts. | 25 qts. |
| Without Heater | 21 qts. | 24 qts. |
| Radiator Cap Relief: | | |
| Valve Pressure—psi | 14 | |
| With Air Conditioning | 14 | |
| **WATER PUMP** | | |
| Type | Centrifugal | |
| Bearing Type | Ball Bearing | |
| **THERMOSTAT** | | |
| Type | Choke | |
| Starts to Open (up to) | 158° to 162° F. | (Air Cond. 177° to 182° F.) |
| Fully Open | 185° F. | (Air Cond. 202° F.) |
| **FAN BELT** | | |
| Number Used (Standard Steering) | one | |
| (Power Steering) | two | |
| Type | V | |
| Tension | See Accessory Belt Drive Section IV | |

# DATA AND SPECIFICATIONS (Cont'd)

| MODELS | LC-1, LC-2 LC-3, LY-1 |
|---|---|
| **FAN** | |
| Number of Blades | *Six |
| Diameter | 18 in. |
| **RADIATOR-TO-BLADE** | |
| Clearance | Top—¾ inch<br>Bottom—¾ inch |
| **RADIATOR** | |
| Type | Cellular Tubular or<br>Fin and Tube |
| Thickness (Standard) | 2 inch Cellular Tubular or<br>2 inch Fin and Tube |
| With Air Conditioning | 2¼ inch Cellular Tubular 2½ inch Fin and Tube |

*LC-1 with Air Conditioning have ring shroud, six blade Silent Flite fan with 2½ inch Fin and Tube.
*LC-2, LC-3, LY-1 with Air Conditioning have a box type fan shroud, five blade Silent Flite fan.
*On LC-1 5 blade Silent Flite fan is not available.

# SPECIAL TOOLS

| Tool Number | |
|---|---|
| C-311 | Flushing Gun |
| C-3208 | Remover—Water Pump Shaft Bushing |
| C-3476 | Puller—Plastic Water Pump Impeller Insert |
| C-3468 | Sleeve—Water Pump Bearing and Shaft Installing |
| C-551 | Refacer—Water Pump Housing Seat |

# TIGHTENING REFERENCES

| | (Foot-Pounds) |
|---|---|
| Water Pump Body to Housing | 30 |
| Water Pump Body Bolt | 30 |
| Water Pump Inlet Elbow Bolt | 30 |

# Section V
# COOLING SYSTEM

The cooling system incorporates a cellular tubular or fin and tube type, full flow radiator and a centrifugal water pump. On cars equipped with Air Conditioning—Heater Unit, the engine cooling system has an 180° F. thermostat, 14 pound radiator pressure cap and sufficient permanent type anti-freeze to insure the engine coolant 20° F. in the summer time, and greater strength of anti-freeze in the winter according to the atmospheric temperatures. **The 180° F. thermostat and the 14 pound radiator pressure cap is for year around operation and sufficient permanent type anti-freeze to insure the engine coolant to 20° F. is required for the summer time.**

### 1. SILENT FLITE FLUID FAN DRIVE (FIGS. 1 AND 2) (All Models with Air Conditioning)

The fluid fan drive consists of a rotor driven by the shaft which is secured to the water pump flange. The rotor is enclosed by the housing to which the fan is bolted. This housing is mounted on the shaft through two single row, sealed-for-life, ball bearings.

A nominal clearance space is maintained between the housing and rotor. The rotor is free to float along the axis of the shaft and anti-friction material has been applied to its faces in case of contact of these faces and the housing. The housing is partially filled with a special, heavy fluid and the drag of the fluid between the housing and rotor provides the driving force rotating the fan.

The power required to rotate the fan increases very rapidly with speed. The fluid fan drive has been designed to provide the necessary driving force to maintain cooling at low speeds and to limit the top speed of the fan at higher engine speeds, thus making more power available to the wheels and eliminating the fan noise encountered at higher engine speeds.

#### a. Engine Overheating

If the fan drive operates below its minimum design speed, excessive engine heating may occur. Check as follows: (1) The water pump to engine speed ratio is 1.1 to 1. The drive characteristics are such that a 1 to 1 ratio between the crank pulley and the fan should be obtained at an engine speed of 1400 R.P.M. or above. This can be checked with a timing light. The speed of the fan and crank shaft pulley is the same when both components are stopped by the timing light. If both components are stopped by the timing light at 1400 Engine R.P.M. or

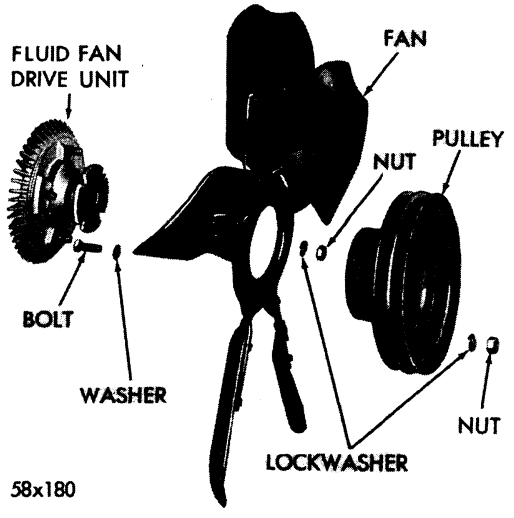


Fig. 1—Silent Flite Fluid 5 Blade Fan Drive (Used On Air Conditioning Only) Exploded View

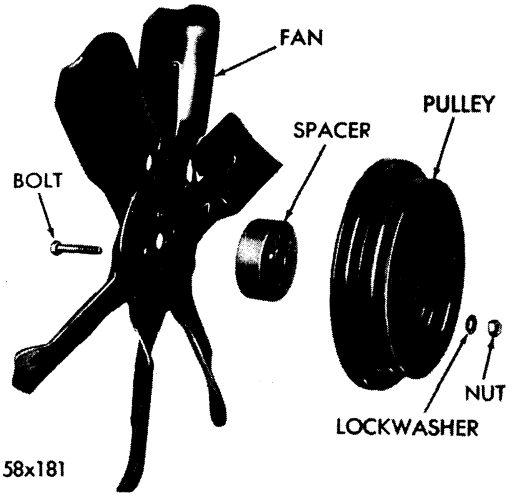


Fig. 2—Standard Fan Drive (Exploded View) (Used without Air Conditioning)

at a higher engine speed, the drive is satisfactory. If, however, the engine speed at which this occurs is less than 1400 R.P.M. the drive is operating below minimum speed and must be replaced with a new unit. **Do Not Remove Filler Plug or Add Fluid to Drive Unit.**

**b. Excessive Fan Noise**

Should the drive lock-up, excessive fan noise will result. This may occur if a bearing fails or if drive is binding internally. On a properly functioning unit the fan can be rotated relative to the water pump pulley with only light finger pressure. When rotating the fan by hand there will be a marked decrease in the effort to rotate it after the fan has been turned through several complete revolutions. If there is excessive fan noise, and if the drive cannot be rotated relative to the pump pulley, it is defective and must be replaced.

**2. WATER PUMP**

**a. Removal from Car (See Fig. 3)**

Drain cooling system and remove upper half of fan shroud (Air Conditioning Models only). Loosen the power steering pump or idler pulley, generator, and remove all belts. Remove fan, spacer and pulley. On Air Conditioning Models, remove the pulley from water pump fan hub, loosen all nuts from fan to remove the fluid fan drive, as shown in Figure 1. Remove bolts holding water pump body to housing and remove water pump.

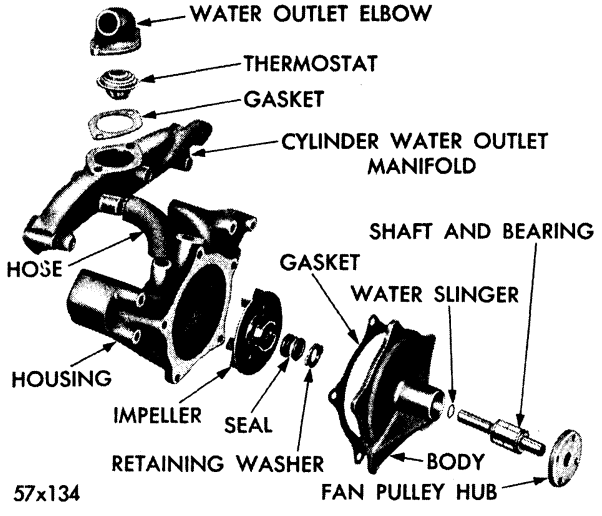


Fig. 3—Water Pump Assembly (Exploded View)

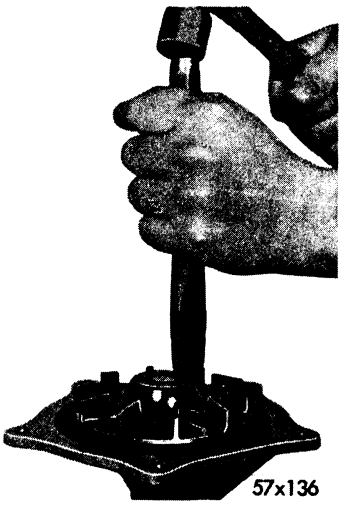


Fig. 4—Removing Plastic Impeller

**b. Disassembly (Fig. 3)**

Support pump body on hub end and remove impeller by breaking the plastic away from metal insert, as shown in Figure 4. Remove impeller metal insert using Tool C-3476.

**NOTE: Shaft and bearing assembly do not have to be removed to service a leaking pump.**

Support body on fan hub end and press out shaft and bearing assembly.

**CAUTION**

**Shaft and bearing assembly can be removed only in the direction described. If an attempt is made to remove shaft in opposite direction, damage to water pump body will result.**

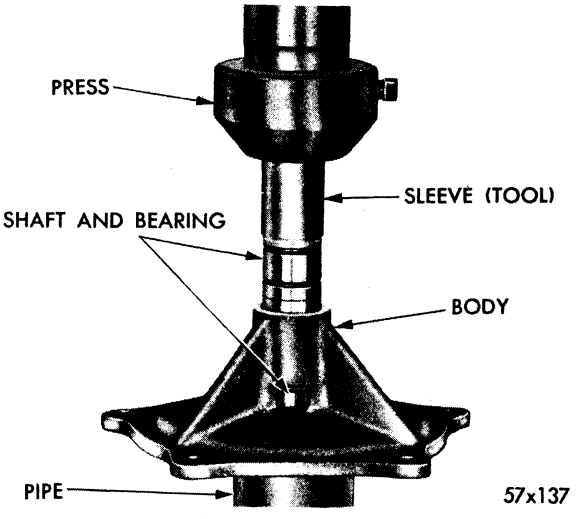


Fig. 5—Installing Shaft and Bearing Assembly (Tool C-3468)

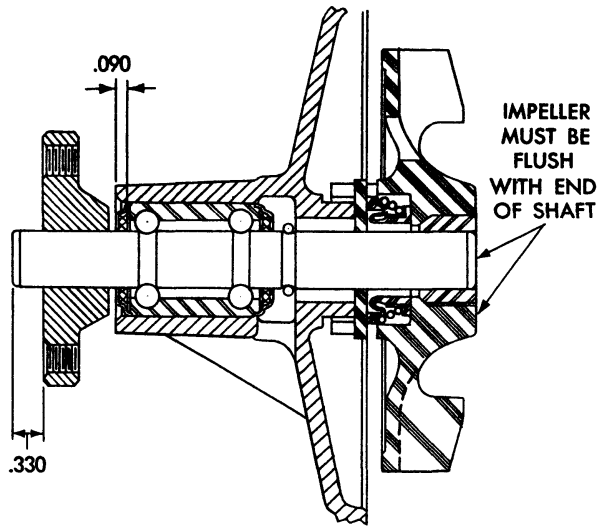


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Fig. 6—Schematic Drawing (Water Pump)

**NOTE: Bearing and hub assemblies removed from water pumps for any reason should not be used again because damage to bearings and hub usually results during removal.**

Clean parts thoroughly. Inspect condition of seal seat and recondition using refacing Tool C-551.

**c. Assembly (Fig. 1)**

Support pump body as close to center bore as possible in an arbor press. **DO NOT SUPPORT BODY ON ATTACHING FACE, OR ON SEAL SEAT.** Press shaft and bearing assembly into body, using Tool C-3468, as shown in Figure 5.

**NOTE: The .090 inch dimension must be maintained when installing new shaft and bearing assembly, as shown in Figure 6.**

**CAUTION**

**When pressing on impeller, support the pump body so that pressure is applied to the shaft and not to the pump body. If pressure is applied to pump body, damage to bearings will result. Press impeller on evenly to prevent breakage.**

Install fan hub while supporting pump body on impeller and on shaft, as this will apply pressure to the end of shaft, and not to the body. Maintain .330 inch dimension, as shown in Figure 6.

**d. Installation on Car (Fig. 7)**

Install water pump body on housing, using new gasket. Tighten bolts to 30 foot-pounds torque. Install pulley, spacer and fan. (On Air Conditioning Models, assemble the fan to the fluid fan drive and pulley, and attach the assembly to the water pump. Tighten nuts to 15 foot-pounds torque. Install the upper half of fan shroud, run the engine, and check for leaks.

**3. RADIATOR**

The Torque Converter oil cooler is now located in the bottom of the pan in the radiator tank, which is an integral part of the radiator. The bottom of the radiator tank therefore, acts in the capacity of a heat exchanger in that the oil flowing from the torque converter is directed thru a tube into the bottom of the radiator pan, coming out on the opposite side of the radiator to be returned to the torque converter. See Transmission Section XI, for operation.

**a. Removal**

Remove the two oil cooler connections at the bottom of the radiator and drain the oil from the tank. Drain the cooling system, remove hoses, fan shroud (On Air Conditioning Models only), and radiator support bolts. Remove the radiator.

**b. Installation**

Attach radiator to radiator support bolts and reconnect the two oil cooler connections. Install fan shroud (if so equipped) connect hoses and refill cooling system. Check for leaks. Add

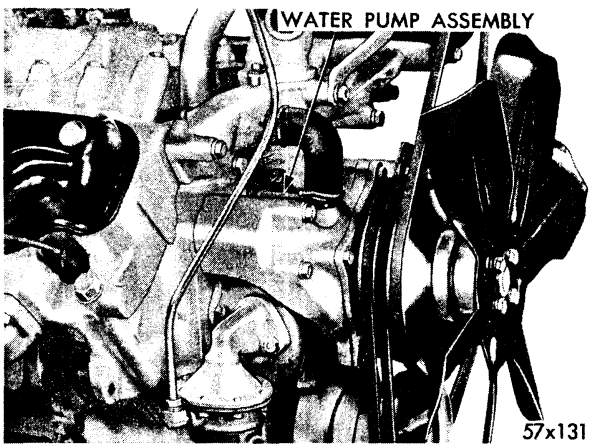


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Fig. 7—Water Pump Installed (Spitfire Engine)

sufficient oil to the transmission to refill the system.

**c. Cleaning Radiator**

Drain cooling system and refill with clean SOFT water and add the contents of one can (No. 1 top-compartment) of MOPAR Cooling System Cleaner. Run engine at a fast idle for ½ to ¾ hour.

Drain cooling system and refill with clean water. Pour conditioner (No. 2 bottom-compartment) into radiator and run engine for ten minutes. Flush entire cooling system until water runs clean. Refill radiator with clean SOFT water. Use MOPAR Radiator Rust Inhibitor during the summer months.

**4. REVERSE FLUSHING**

Reverse flushing of the cooling system is the forcing of water through the cooling system, using air pressure, in a direction opposite to that of the normal flow of water.

**a. Cylinder Block**

Drain radiator and remove hoses at radiator. Remove thermostat and reinstall thermostat housing. Install flushing gun Tool C-311, or other suitable flushing gun to the inlet hose. Connect water hose of gun to a pressure water source and the air hose of gun to a pressure air source. Turn on water, and when cylinder block is filled, turn on the air in short blasts. Allow cylinder block to fill between the blasts of air. Continue this procedure until water runs clean. Check thermostat and if satisfactory, reinstall; otherwise, replace. Use a new thermostat housing gasket. Refill cooling system.

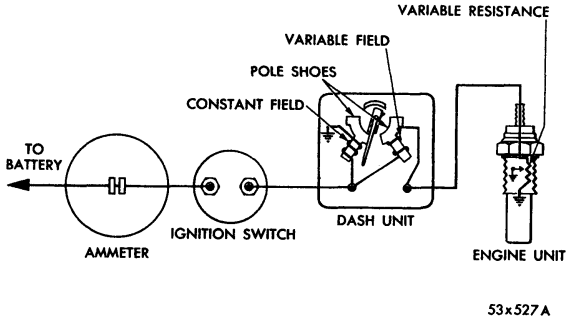


Fig. 8—Water Temperature Gauge

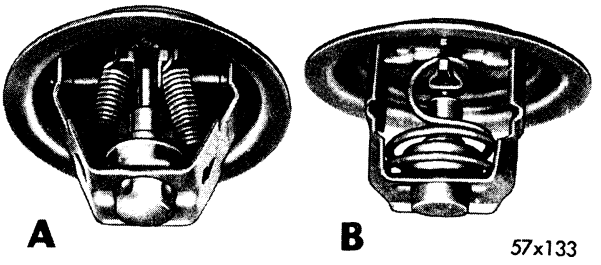


Fig. 9—Thermostat Assembly

**b. Radiator**

Drain cooling system and remove hoses from engine. Install flushing gun Tool C-311, or other suitable flushing gun in radiator outlet neck. Fill radiator and turn on air in short blasts.

**NOTE: Do not apply more than 15 P.S.I. pressure when pressure flushing radiator, as damage to radiator may result.**

Continue this procedure until water runs clean. Refill cooling system. Run engine and check for leaks.

**5. WATER TEMPERATURE GAUGE (Fig. 8)**

**a. Dash Unit**

Consists of two electro-magnets, one connected to the ignition switch and ground, and the other electro-magnet between the ignition switch and a variable resistance to ground sending unit in the engine water. The temperature of the water varies the current in the one electro-magnet which pulls against the pointer

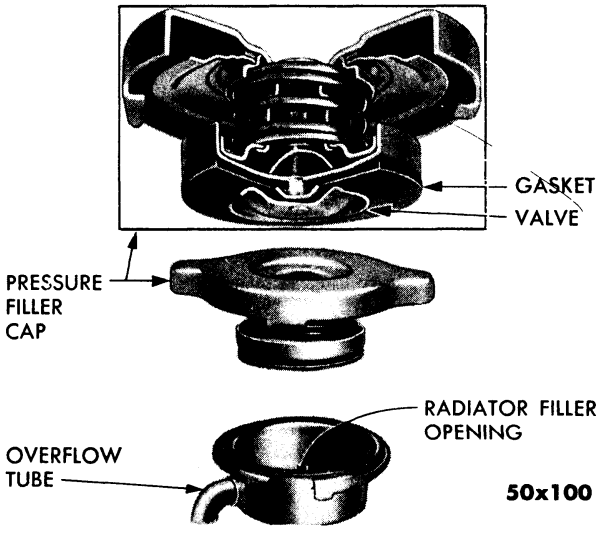


Fig. 10—Radiator Pressure Cap

(and other magnet) away from (C) cold position.

**b. Sending Unit**

The sending unit is located in the water outlet manifold and transmits the water temperature to dash unit.

**c. Electrical Circuit (Testing)**

Remove wire at sending unit and turn ignition switch on. Gauge hand should not move. If hand moves, the wire is grounded or gauge is defective. Remove wire at dash gauge terminal "GA," and if hand still moves, replace dash gauge; otherwise, replace wire. If gauge operates correctly and wire is not grounded, replace the engine unit.

**6. THERMOSTAT (Testing) (Fig. 9)**

The thermostat starts to open at 158-162 degrees F. (177-182 degrees F. for Air Conditioned) and is fully opened at 185° Std. (202° for Air Conditioned). Place thermostat in a pail of water with a thermometer and heat water until thermostat starts to open. Check thermometer and continue heating until thermostat is wide open, and again check thermometer. Replace thermostats that do not open completely, open at too low temperature or open at too high temperature.

**7. RADIATOR PRESSURE CAP**

Radiators are equipped with a 14 psi cap, as shown in Figure 10. Always check identification number on cap, when replacing.

**WARNING**

**When removing pressure cap, turn it counterclockwise to the stop, permitting built up pressure to escape through overflow tube. This will prevent hot water from spraying out of radiator filler opening.**

# SERVICE DIAGNOSIS

**8. POOR CIRCULATION**

**a.** Check for low coolant level and refill to 1¼ inches below filler neck.

**b.** Inspect and replace hoses if collapsed.

**c.** Check for plugged radiator or cylinder block and reverse flush as necessary.

**d.** Check for loose water pump impeller and repair as necessary.

**e.** Check for loose or defective fan belt, tighten or replace as necessary.

**9. OVERHEATING**

**a.** Refer to Poor Circulation listed in Paragraph 8.

**b.** Check for plugged air passages of radiator core and clean passages by applying air pressure on reverse side of radiator core.

**c.** Check for sticking thermostat and replace as necessary.

**d.** Check for excessive sludge in the crankcase. Drain and flush crankcase as necessary. In severe cases, remove oil pan and clean inside of block by hand.

**10. OVERCOOLING**

**a.** Check temperature gauges and replace as necessary.

**b.** Check operation of thermostat (could be sticking) in the open position.