COOLING AND HEATING

SECTION I. TROUBLE SHOOTING

1-1. Engine Overheats.

a. Check radiator for:

(1) Insufficient coolant.

(2) Frozen coolant (winter) resulting from insufficient anti-freeze.

(3) Fins or cells obstructed. Clean radiator.

b. Check hoses and connections for:

(1) Leaks.

(2) Obstructions.

c. Inspect belt for correct tension.

d. Inspect thermostat for defective operation.

e. Inspect water pump for defects.

f. Check brakes for drag.

g. Check engine for correct timing (see Group 16, Electrical-Chassis).

h. Test radiator pressure cap for leaks.

i. With automatic transmission, check for correct transmission fluid level.

1-2. Engine Does Not Warm Up to Normal Operating Temperature.

a. Inspect thermostat for defective operation.

b. Check sending unit and temperature gage for defective operation.

SECTION II. WATER PUMP, FAN, AND BELT

See Group 10, Engine, for service instructions for these units.

SECTION III. DRAINING AND FLUSHING COOLING SYSTEM

3-1. Draining.

CAUTION

Cooling system is pressurized. Do not remove radiator cap if engine is warm.

a. Remove radiator cap (1-5). Open drain cock (1-7) located in bottom tank of radiator (1-1), near outlet hose.

b. Open drain cock at engine block.

c. Inspect drained water for signs of rust, scale, and sludge.

d. Close drain cocks. Flush cooling system if deposits of rust, scale, and sludge are heavy. Otherwise, fill radiator (1-1).

3-2. Reverse Flushing Radiator.

a. Cap the radiator tightly.

b. Disconnect radiator hoses at engine (1-13, 1-14).

c. Clamp a flushing gun in lower (outlet) hose. Turn on water and let it fill the radiator.

d. Apply air pressure gradually, to avoid radiator damage.

e. Shut off air. Fill the radiator with water again and apply air pressure. Repeat until flushing stream runs clear.

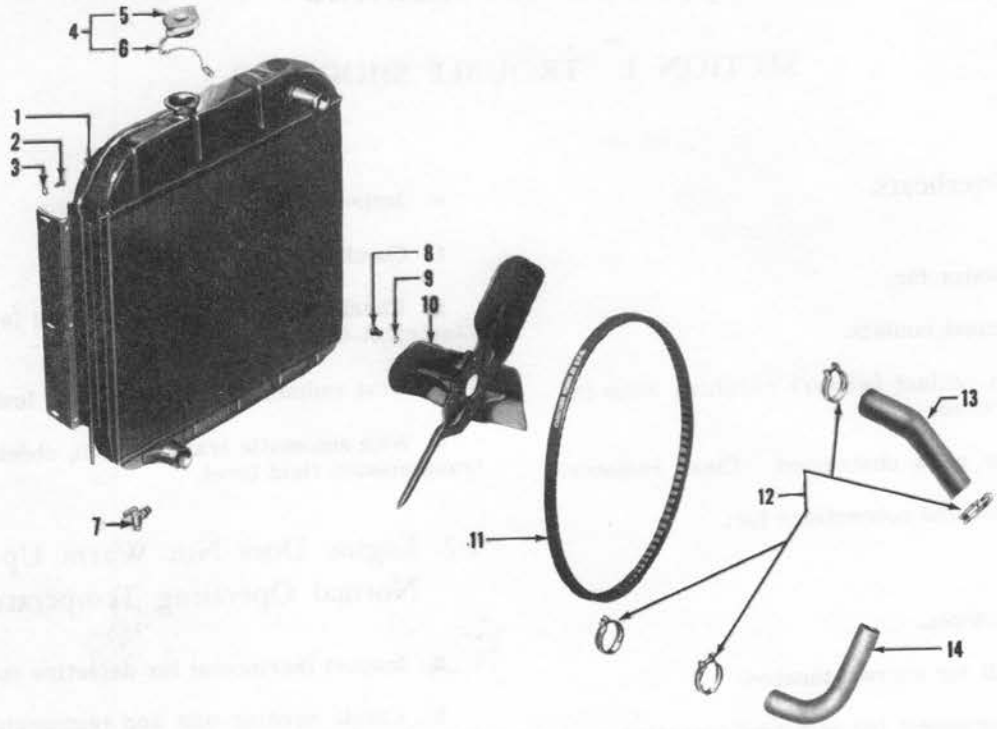

Fig. 1 - Radiator Assembly

3-3. Reverse Flushing Engine Water Jacket.

a. Remove radiator hoses (1-13, 1-14).

b. Remove the cooling system thermostat and reinstall upper hose (1-13) at engine.

c. Clamp flushing gun in upper hose.

d. Partly close the water pump opening and fill the engine jacket with water.

e. Apply air pressure gradually.

f. Alternately fill the water jacket with water and blow it out with air (80-pound pressure) until the flushing stream is clear.

3-4. Filling Radiator.

a. Summer Conditions:

(1) Fill radiator with clean water to level slightly below vent tube opening.

(2) Add rust inhibitor and sealer.

b. Winter Conditions:

(1) Drain radiator and engine block.

(2) Add anti-freeze in volume indicated in Anti-Freeze Volume Table for temperature range anticipated.

(3) Add rust inhibitor and sealer.

(4) Fill radiator with clean water.

c. Test radiator cap (1-5) (see Section V) before replacing.

SECTION IV. RADIATOR REPLACEMENT

4-1. Removal.

a. Drain cooling system (see Section 3-1).

b. Disconnect water inlet and outlet hoses (1-13, 14) at radiator. On vehicles equipped with automatic transmissions, disconnect transmission fluid inlet and outlet lines at radiator.

c. Support radiator (1-1) and remove support bolts from mounting strip. Remove radiator.

4-2. Installation.

a. If new radiator is to be installed, remove drain cock (1-7) from old radiator and inspect. If in good condition, install drain cock on new radiator.

b. Install radiator and position mounting bolts (1-2) and lockwashers (1-3).

c. On vehicles with automatic transmission, connect transmission fluid lines to radiator. Check transmission fluid level and top off if necessary.

d. Tighten mounting bolts (1-2) and connect inlet and outlet hoses (1-13, 14).

ANTI-FREEZE VOLUME TABLE

		TEMPERATURE RANGE		
		32° to 10° F	10° to -10° F	-10° to -30° F
Ethylene Glycol and Methyl Alcohol Compounds	with heater	2 qt., 19 oz.	3 qt., 23 oz.	6 qt., 16 oz.
	no heater	2 qt., 13 oz.	3 qt., 13 oz.	6 qt.
Plain Alcohol*	with heater	3 qt., 8 oz.	4 qt.	5 qt.
	no heater	3 qt.	3 qt., 22 oz.	4 qt., 20 oz.

* Operate engine, then check plain alcohol with hydrometer. Record reading and recheck at frequent intervals. Replenish to same hydrometer reading.

SECTION V. RADIATOR CAP

5-1. Vacuum Test.

a. Fill the radiator with clean water.

b. Clean radiator cap (1-5) and tighten securely on radiator (1-1).

c. Open drain cock (1-7) and check water flow. If water dribbles out erratically due to air bubbling up through drain cock, replace radiator cap.

5-2. Pressure Test.

a. Remove radiator cap (1-5) and drain radiator (1-1).

b. Disconnect inlet (upper) hose (1-13) at radiator. Disconnect outlet (lower) hose (1-14) at engine.

c. Plug radiator inlet. Connect a flushing gun with a regulated air supply to the outlet hose. Fill the radiator with water and replace the radiator cap. Tighten cap securely.

d. Apply air pressure slowly, watching regulator gage. Listen for sound of escaping air at radiator overflow pipe. Air or water should escape at the following pressures:

(1) Vehicles without air conditioners, 3-1/2 to 4-1/2 PSI.

(2) Vehicles with air conditioners, 12 to 15 PSI.

e. If escape pressure is not within specifications, replace the radiator cap.

SECTION VI. HOSES AND CONNECTIONS

6-1. Removing Hoses.

a. Drain the radiator.

b. Loosen clamps (1-12) at each end of hose (1-13, 14).

c. Slide hoses off connections and remove clamps.

d. Inspect hoses for cracks, kinks, and obstructions. Replace if necessary.

6-2. Installing Hoses.

a. Position clamps (1-12) at each end of hose (1-13, 14).

b. Slide hose ends over connections and tighten clamps.

c. Fill the radiator and operate the engine. Check hoses and connections for leaks.

SECTION VII. THERMOSTAT

7-1. Replacement.

a. Disconnect radiator inlet hose (1-13) at engine. Remove two nuts and lockwashers to remove the water outlet elbow and gasket.

b. Remove thermostat and test it. Replace thermostat if necessary. Check the thermostat retainer ring.

c. Install thermostat, using a new gasket.

7-2. Testing.

a. Suspend thermostat by its frame in a container of water. Do not permit thermostat to touch sides or bottom of container.

b. Heat water in container. Check the temperature with a thermometer.

c. If thermostat valve opens before temperature reaches 150°F, replace the unit. If valve does not begin to open between 150°F and 185°F, replace the unit.