

## Group 13 Cooling System

**GENERAL:** This group contains information on the automotive engine cooling system from the engine water pump to the radiator and return. It also includes the transmission oil cooler lines and fittings, fan blade and fan drive belts.

**SPECIFICS:** As applicable

- ...Engine Water Pump
- ...Fan Drive Belts
- ...Radiator and Mounting
- ...Radiator Hoses
- ...Thermostat and Housing
- ...Transmission Oil Hoses and Fittings



GROUP 13

COOLING SYSTEM

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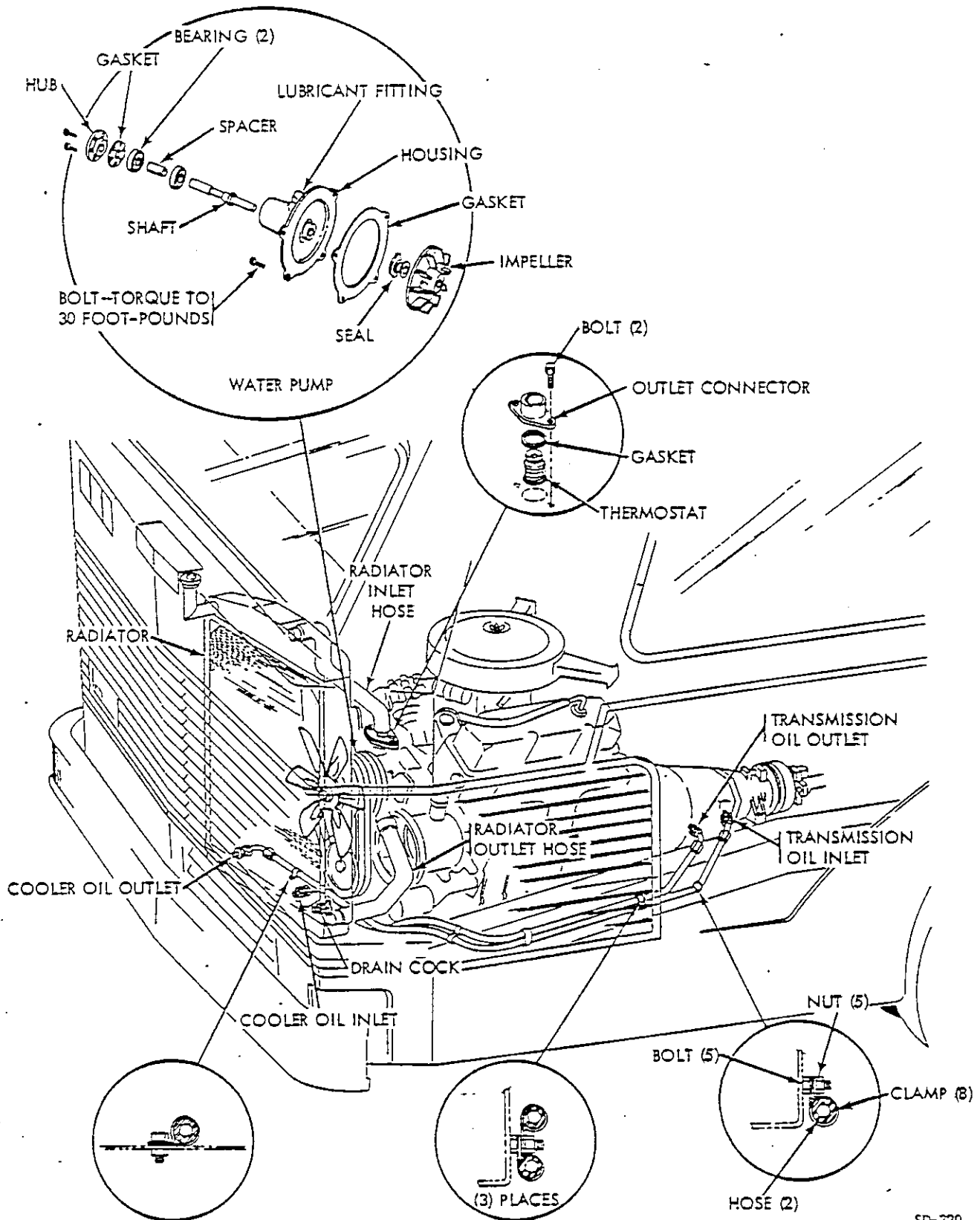


Figure 13-1. Cooling System

SD-220

## GROUP 13

### COOLING SYSTEM

#### 13-1. DESCRIPTION

a. General (fig. 13-1). The coach incorporates a liquid cooling system to maintain engine and transmission temperatures within efficient operating ranges. The system consists of a radiator with an integral automatic transmission oil cooler located in the bottom tank, coolant pump, hoses, fan, thermostat, and a system of jackets and passages in the engine.

The cooling system is pressurized to 7 psi (classified as a partial pressure system); the pressure is controlled by the radiator cap. In the partial pressure system, pressure does not become a factor until coolant temperature builds up to approximately 177 to 184 degrees F and the engine-mounted thermostat begins routing the coolant to the radiator.

An engine-driven dual set of V-belts turns the coolant pump and the six-blade fan. The centrifugal type coolant pump circulates coolant from the radiator to the engine cylinder blocks completely around each cylinder bore, out the top of the cylinder block into the cylinder heads, around the exhaust valve ports, into special passages to the thermostat housing, for recirculation through the engine or return to the radiator. Cooling of the engine parts is accomplished by keeping the coolant circulating and in contact with the metal surfaces to be cooled. The pump draws the coolant from the bottom of the radiator, forces it through the engine jackets and passages, and ejects it into the upper hose to the top of the radiator. The coolant passes down through sets of tubes and fins in the radiator and is recirculated through the engine by the action of the pump. A fan draws air over the outside of the fins and tubes in the radiator, thus cooling the liquid as it flows downward. The liquid is pumped through the radiator from the top down. The reason for this direction of flow is that thermosiphon action aids the pump to circulate the coolant. As it is heated in the jackets of the engine, the coolant expands, becomes lighter, and flows upward to the top of the radiator. As it is cooled in the radiator tubes, the coolant contracts, becomes heavier, and sinks to the radiator bottom. This desirable thermosiphon action cannot take place if the level of the coolant is permitted to become excessively low.

Three drains are provided for draining the cooling system, one in the radiator and one at each side of the cylinder block near the exhaust manifold outlet. All three must be open to drain the system completely.

This group provides service instructions for the cooling system, for information on related systems such as Transmission (Group 16) or Engine (Group 15), refer to the applicable group. For information on part numbers and procurement of replacement parts, refer to Group 13 in 2900R Parts Catalog.

b. Water Pump. The water pump is located on the aft end of the engine, and receives coolant from the lower radiator tank and forces it through the engine water jacket and out into the upper radiator tank. The water pump is a centrifugal type and has an eight blade impeller, the rotation of which forces the coolant to flow. The pump and fan are rotated by a dual set of V-belts which are driven by a pulley at the end of the engine crankshaft. The water pump is equipped with a "zerk" type lubrication fitting.

c. Radiator and Transmission Oil Cooler Assembly (fig. 13-2). The radiator and transmission oil cooler assembly incorporates integral top and bottom tanks. The top tank contains a coolant inlet tube and a filler neck with a pressure cap. The coolant inlet tube is connected to the top fitting of the engine water pump by a hose. An overflow hose connects to the upper cap area in the filler neck. The lower tank incorporates a coolant outlet tube which connects the base of the radiator to the lower fitting of the engine block water jacket. The six-plate transmission oil cooler fits into the base of the radiator bottom tank. The radiator coolant keeps the transmission oil temperatures below 225 degrees F during normal operations. Inlet and outlet hoses route the transmission oil from the transmission to the cooler and return.

The radiator upper tank collects incoming coolant and distributes it across the top of the tubular radiator cores, which consist of numerous vertical coolant tubes surrounded by horizontal air fins. The coolant tubes contain narrow passages and are made of thin metal. The core divides the coolant into very thin columns or ribbons, thus

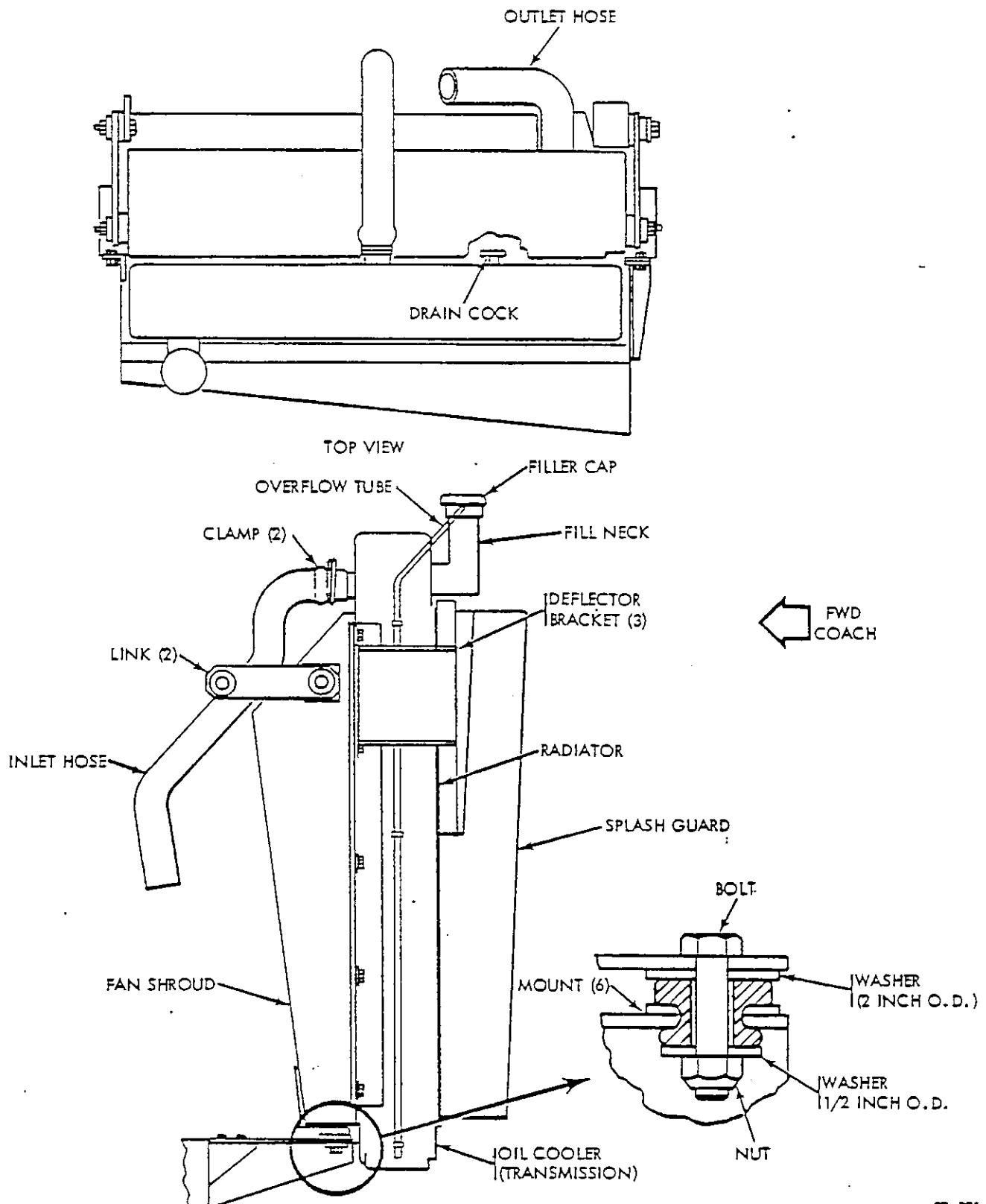


Figure 13-2. Radiator and Transmission Oil Cooler Assembly

exposing a large radiating surface to the volume of liquid to be cooled. A deaeration system in the upper tank functions to distribute the coolant to the coolant tubes and to assist in preventing coolant from being thrown out of the radiator.

The lower tank collects coolant flowing from the core and discharges it through the radiator outlet into a hose which connects to the engine inlet. A drain cock is installed at the base of the radiator lower tank.

d. Fan and Shroud. The engine-driven fan circulates a large volume of air aft through the radiator core. To provide maximum cooling, a shroud is installed around and behind the fan, directing the air flow to pass evenly through all areas of the radiator core.

e. Pressure Radiator Cap. The cooling system uses a 7 psi radiator cap installed on the top of the filler neck. The cap-pressure-valve head seats below the outlet hole in the filler neck for the overflow drain. This prevents the coolant from overflowing out the drain tube due to surging caused by coach movement.

The pressure cap functions to prevent overflow loss of coolant during all normal operations. The cap allows 7 (+1, minus 1/2) psi pressure to build up in the cooling system, thus further raising the boiling point of the anti-freeze and summer coolant prescribed for the coach; thereby the engine is permitted to operate at higher temperatures without coolant overflow from boiling. The cap contains two spring-loaded valves, normally closed, to seal the system. The larger valve is the pressure valve and the smaller valve is the vacuum valve. The pressure valve acts to relieve pressure within the system. The vacuum valve opens only when the pressure within the cooling system drops below the outside air pressure as the engine cools off. Higher outside pressure then forces the vacuum valve to open, allowing air to enter the system by way of the overflow hose.

f. Coolant. The coach engine/transmission-oil cooling system liquid capacity is 25 quarts. The anti-freeze and summer coolant used in the cooling system is the "year round" type, 50 percent ethylene-glycol based compound mixed with 50 percent water. This coolant mixture prevents internal rust and corrosion, and provides anti-freeze protection to a minus 34 degrees F. The summer coolant function of the liquid is to act in conjunction with the 7 psi radiator pressure cap to raise the boiling-point to a higher tempera-

ture. This minimizes the chance of boil-over, coolant loss and engine overheat due to severe heat driving conditions, such as extensive idling during traffic snarls in hot weather, etc.

### *Caution*

The prescribed coolant mixture must be maintained in the cooling system at all times and drained and replaced each year. This will reduce the chance of engine and transmission damage due to overheat and ensure that the heater core, located in the heater-cooler unit under the dash panel, will not rupture due to freezing of its liquid contents when the automotive air conditioner is operated.

g. Thermostat. The thermostat is installed below the engine outlet adapter, to prevent engine over-cooling in cold weather and to ensure rapid engine warmup. The thermostat regulates engine temperature by automatically controlling the amount of engine coolant flowing from the engine block through the radiator core. The thermostat is a heat-operated unit with an integral valve that controls coolant flow between the engine water jacket and the radiator. When the engine is cold, the thermostat valve is closed, and the coolant recirculates through the engine water jacket without entering the radiator. As the engine and coolant warm to 177 to 184 degrees F, the valve opens and the coolant begins to flow through the radiator, where it is cooled.

h. Temperature Sensing System. The temperature sensor for the engine cooling system consists of a 12-volt DC temperature sender, located to protrude into the engine water jacket just above the water pump, and is electrically connected to a gauge on the coach dash panel. The sender varies electrical current flow in proportion to water temperature to move the gauge indicator needle. The gauge is a dial-type instrument with markings to indicate temperatures ranging from 120 to 300 degrees F.

## 13-2. TROUBLESHOOTING

Instructions for troubleshooting the engine cooling system are contained in table 13-1. Prior to troubleshooting, a preliminary visual inspection to assist in locating the problem should be made as outlined in paragraph 13-5.

Table 13-1. Troubleshooting Engine Cooling System

Malfunction (symptoms)	Probable causes	Corrective action (remedies)
Engine overheats	Coolant level too low	Replenish coolant
	Radiator pressure cap malfunctioning	Pressure test cap; refer to paragraph 13-5h; replace if defective
	Belts on water pump/fan slipping	Tighten each belt to 100 pounds tension; refer to paragraph 13-5d
	Thermostat defective	Replace; refer to paragraphs 13-3j and 13-3k
	Filler neck cap seat corroded	Clean, replenish coolant, then replace cap
	Radiator hose collapsed (a defective bottom hose could collapse at high engine speed)	Replace; refer to paragraphs 13-3b and 13-c
	Coolant pump impeller defective	Replace pump; refer to paragraphs 13-3l and 13-3m
Excessive coolant overflow	Pressure cap defective	Replenish coolant and replace cap
	Pressure cap missing	Replenish coolant and install replacement cap
External coolant leakage	Hoses or clamps loose	Tighten loose clamps; replace if defective; refer to paragraphs 13-3b and 13-3c
	Coolant pump gasket defective	Replace; refer to paragraphs 13-3l and 13-3m
External oil leakage in transmission oil cooler system	End fittings loose or defective	Tighten loose fittings; replace hose assembly if defective
Slow engine warm-up	Hose defective	Replace; refer to paragraphs 13-3b and 13-3c
	Thermostat defective	Install serviceable thermostat; refer to paragraphs 13-3j and 13-3k
Coolant pump noisy	Impeller bearing lacks lubricant	Lubricate pump with water pump grease

### 13-3. REMOVAL/INSTALLATION

a. General. Step-by-step instructions for replacement of the cooling system components are provided in this section. Replacement parts should be procured from those listed in the 2900R Parts Catalog.

#### b. Radiator Hose Removal (fig. 13-2).

(1) Loosen mounting and adjustment bolts on power steering pump and move, as required, for work clearance.

(2) Open radiator drain cock.

(3) While radiator is draining, loosen upper hose clamps.

(4) Loosen lower hose clamps.

(5) When engine coolant has drained sufficiently, remove upper and lower hose assemblies.

#### c. Radiator Hose Installation (fig. 13-2).

(1) Position clamp on each end of hose.

(2) Install upper and lower hoses, then tighten clamps on each end.

(3) Fill system with coolant.

(4) Reposition power steering pump to normal mount position.

#### NOTE

Adjust the power steering belt using 1/2-inch socket in the square hole at the top of the mount bracket. Press in toward the engine to obtain 70 pounds tension. Tighten bolt in slotted hole and pivot bolt.

(5) Operate engine and check for leaks; refer to paragraph 13-4b.

#### d. Transmission Oil Cooler Hose Removal (fig. 13-1).

(1) Drain engine transmission; refer to Group 16.

(2) Remove nuts from hose clamps.

(3) Place suitable drain container under coolant hoses at transmission.

(4) Disconnect hose ends from transmission; remove hoses.

#### e. Transmission Oil Cooler Hose Installation (fig. 13-1).

(1) Position hose, attaching clamps on hoses at mounting points shown in figure.

(2) Install one hose so that 90 degree end fitting is at oil cooler left-hand outlet and 45 degree end fitting is at transmission rear inlet.

(3) Install other hose with 90 degree fitting at cooler right-hand outlet and 45 degree fitting at transmission front inlet.

(4) Attach hoses to coach frame with previously installed clamps at points shown in the figure. Torque attaching nuts 46 to 52 INCH-pounds.

(5) Fill transmission; refer to Group 16.

(6) Operate engine and check for oil leaks; refer to paragraph 13-5g.

#### f. Fan Belt Removal (fig. 13-1).

(1) Loosen bolt in slotted hole of fan belt idler arm, then loosen pivot bolt.

(2) Retract idler arm pulley to clear fan belts.

(3) Detach belts from fan pulley and crankshaft pulley, then remove belts by passing them over fan blades.

(4) If necessary, clean pulley grooves of any dirt, oil, or other contamination.

#### g. Fan Belt Installation (fig. 13-1).

(1) Install new matched set of belts over fan blades, then seat in grooves of crankshaft and fan pulleys.

(2) Extend idler arm to seat belts in pulley grooves.

(3) Insert a 1/2-inch socket drive in square hole of idler arm, then press idler arm toward engine center to tighten belts to 100 foot-pounds tension. Torque lock-bolt idler arm slotted hole to 100 foot-pounds.

(4) Tighten pivot bolt.



h. Radiator and Transmission Oil Cooler Assembly Removal (fig. 13-2).

(1) Open rear and right engine access doors; then open radiator drain cock.

(2) Remove attaching bolts and nuts, then remove radiator grill; note position and number of removed shim washers.

(3) Remove two bolts and nuts then radiator skirt.

(4) Remove power steering reservoir; refer to Group 7.

(5) Remove coolant and transmission oil hoses from radiator according to paragraphs 13-3b and 13-3d.

(6) Remove second support-link mount from each side of deflector.

(7) Remove mount from bottom of each side of deflector.

(8) Move radiator outward and down, then twist it to clear opening in rear of vehicle; remove radiator.

(9) If shroud is to be removed, remove six screws, nuts, and washers from three support brackets, then remove shroud.

(10) If air deflector is to be removed, remove remaining eight cap screws, washers, and nuts along each side of radiator, then remove deflector.

(11) If radiator guard is to be removed, remove four screws from brackets, then remove guard.

i. Radiator and Transmission Oil Cooler Assembly Installation (fig. 13-2).

(1) If radiator guard was removed, install it with four screws in brackets.

(2) If air deflector was removed, install it with eight cap screws, washers, and nuts. Leave two top right holes open. Torque screws 25 to 27 foot-pounds.

(3) If shroud was removed, install it with six cap screws, washers, and nuts. Torque screws 73 to 78 INCH-pounds.

(4) Align radiator to pass through vehicle opening, move it in, down, and then up onto mounting points on coach frame.

(5) Install mount at each bottom hole with small washer, large washer, bolt, and nut. Add washers, as required, to obtain a fan clearance of 0.62 ( $\pm 0.12$ ) inch. Torque bolts 61 to 66 foot-pounds.

(6) At each side of radiator, secure link to vehicle structure with mount, small washer, large washer, bolt and nut. Torque bolts 61 to 66 foot-pounds.

(7) Install coolant and transmission oil hoses on radiator according to paragraphs 13-3c and 13-3e.

(8) Install and fill power steering reservoir; refer to Group 7.

(9) Service radiator; refer to paragraph 13-5j.

(10) Operate engine and correct any leaks; refer to paragraph 13-5f.

j. Thermostat Removal (fig. 13-1).

(1) Open radiator drain cock until coolant drains below level of thermostat, then close cock.

(2) Remove upper hose from coolant outlet connection.

(3) Remove two bolts, coolant outlet connector, and thermostat (with gasket) from engine.

(4) If thermostat is suspected of being defective, perform test step 5; refer to paragraph 13-5i.

(5) Remove and discard gasket.

k. Thermostat Installation (fig. 13-1).

(1) Install new gasket at engine coolant outlet.

(2) Seat thermostat on gasket with cone end up.

**Caution**

Install the thermostat cone end up, as reverse installation can cause thermostat failure and possible engine overheating.

(3) Install coolant outlet connector over thermostat, then secure with two bolts.

(4) Install upper radiator hose on coolant outlet connector; secure with clamp.

(5) Test thermostat and cooling system; refer to paragraph 13-5i.

L. Water Pump Removal.

(1) Drain cooling system.

(2) Remove fan belts according to paragraph 13-3f.

(3) Remove attachment, four bolts, and washers, then fan, shim, and pulley.

(4) Remove four water pump attaching bolts, then pump and gasket.

m. Water Pump Installation.

(1) Install serviceable water pump gasket.

(2) Mount pump on engine with four bolts; lubrication fitting must point up and outboard. Torque bolts to 30 foot-pounds.

(3) Position fan, pulley, and shim on pump shaft, then secure them with four washers and screws. Hold fan in position while torquing screws 15 to 18 foot-pounds.

(4) Install fan belts according to paragraph 13-3g.

(5) Service cooling system according to paragraph 13-5j.

n. Temperature Sender Removal.

(1) Disconnect electrical lead from end of terminal on sender.

(2) Use a 1/2-inch socket wrench to remove sender from engine.

o. Temperature Sender Installation.

(1) Use a 1/2-inch socket wrench to install sender into threaded hole just above water pump.

(2) Connect electrical lead to end of terminal on sender.

p. Temperature Gauge Replacement. Replace a faulty coolant temperature gauge in the coach dash panel according to instructions contained in Group 4.

13-4. INSPECTION/CLEANING

a. General. The engine cooling system should be inspected before servicing or troubleshooting. Functional checks should also be performed, if indicated by troubles or suspected troubles.

b. Component Inspection. Inspect cooling system components as outlined in table 13-2.

c. Cleaning. Cleaning of the cooling system and components consists of removal of dirt and grease from the fan belt and crankshaft pulleys. The radiator pressure cap should be washed once a year with plain water and inspected according to table 13-2. The internal cooling system must be drained of used coolant once a year and refilled with new coolant solution; refer to paragraph 13-5j.

Table 13-2. Cooling System Component Inspection

Component/Item	Inspect for (Visual, except as noted)	Corrective action
Fan drive belts	Damage, deterioration, excessive wear, glazing, and looseness	Replace if unserviceable; refer to paragraphs 13-3f and 13-3g  Tighten if loose; refer to paragraph 13-5d

Table 13-2. Cooling System Component Inspection (Continued)

Component/Item	Inspect for (Visual, except as noted)	Corrective action
<p>Pressure cap</p> <p><b>NOTE</b></p> <p>Normal wear on locking rims won't affect sealing of the cap, but a bent rim can cock the cap on the radiator filler neck and affect the spring pressure enough to cause the cap to leak. If rims are bent toward top of cap, the system will operate at a higher pressure than the system is designed for</p>	<p>Plugged vacuum vent, damaged seating surfaces gasket, or locking rims</p> <p>Pressure valve spring for weak tension</p> <p>Vacuum valve spring; pull out on valve head with finger tips to check tension</p>	<p>Replace cap if unserviceable</p> <p>To test cap, refer to paragraph 15-5h; if defective, replace</p> <p>Should pull out without binding about 1/8 inch and reseal by spring action; replace cap if faulty</p>
<p>Water pump</p>	<p>Damage, leakage, and mounting bolts</p>	<p>Replace if unserviceable; refer to paragraphs 13-3l and 13-3m</p> <p>Tighten loose mounting bolts; refer to table 13-4</p>
<p>Water pump gasket</p>	<p>Evidence of leaks</p>	<p>Replace; refer to paragraphs 13-3l and 13-3m</p>
<p>Pulleys</p>	<p>Excessive wear, and damage</p> <p>Dirt or oil in grooves</p>	<p>Replace if unserviceable</p> <p>Clean as necessary</p>
<p>Radiator</p>	<p>Evidence of leakage and damage</p> <p>Filler neck for corrosion and damage</p> <p>Filler neck for obstruction of outlet to overflow hose</p> <p>Overflow hose for condition and secure mounting</p>	<p>Replace if unserviceable, refer to paragraphs 13-3h and 13-3i</p> <p>Remove corrosion; replace radiator if damaged</p> <p>Remove obstruction</p> <p>Repair or replace if unserviceable</p>
<p>Radiator coolant hoses</p>	<p>Evidence of leakage, damage and deterioration</p> <p>Loose clamps</p>	<p>Replace unserviceable hoses; refer to paragraphs 13-3b and 13-3c</p> <p>Tighten clamps</p>
<p>Oil hoses</p>	<p>Evidence of leakage and damage</p> <p>Loose fittings (use wrench to check)</p>	<p>Replace unserviceable hose; refer to paragraphs 13-3d and 13-3e</p> <p>Tighten fittings</p>

Table 13-2. Cooling System Component Inspection (Continued)

Component/Item	Inspect for (Visual, except as noted)	Corrective action
Temperature gauge (on coach dash panel)	With engine operating in normal temperature range, place an accurate thermometer beside radiator fill neck. Indications on thermometer and gauge should be the same within approximately 10 degrees F	Replace inoperative or out-of-tolerance gauge; refer to Group 4
Temperature sender	Integrity of wiring and connections	Repair defective wiring
Thermostat outlet connector	Integrity of wiring and connections	Repair defective wiring
	Damage and looseness	Tighten if loose; refer to table 13-4  Replace if unserviceable; refer to paragraphs 13-3j and 13-3k

13-5. GENERAL INFORMATION

a. General. This section contains general information related to the engine cooling system and to data contained in the previous paragraphs.

b. Cooling System Data. Data covering the cooling system is contained in table 13-3.

c. Torque Requirements. Torque requirements for the cooling system are listed in table 13-4.

Table 13-3. Cooling System Data

Item	Data	Item	Data
Capacity system	25 quarts (U. S.)	Water pump:	
Pressure (cap setting)	7 psi	Impeller	Eight-bladed
Thermostat:		Drive belts	Matched set (two)
Operating temperature	177 to 184 degrees	Lubrication fitting	One: grease every 4,000 miles or 6 months
Full-opening temperature	184 degrees		
Fan:		Radiator	Flush periodically: at least every 12,000 miles or yearly; also recommended after long storage
Blades	Six		
Shroud opening	21.25 inches		

Table 13-3. Cooling System Data (Continued)

Item	Data	Item	Data
Core		Filler neck .....	Access: coach aft end, near center
Tubes .....	182	Drain cock .....	Location: right bottom of radiator
Fins .....	298	Transmission oil cooler:	
Thickness .....	3 inches	Plates .....	Six
Area .....	878 square inches		
Deaerator .....	In top tank		

Table 13-4. Torque Requirements

Part secured	Attaching part(s)	Size	Torque range
Water pump housing to engine	Bolts	3/8-16	30 foot-pounds
Fan to pulley hub	Bolts	5/16-18	15 to 18 foot-pounds
Clamps securing oil cooler hoses to coach frame	Nuts		46 to 52 INCH-pounds
Radiator deflector to frame	Bolts		25 to 27 foot-pounds
Radiator shroud to frame	Bolts		73 to 78 INCH-pounds
Radiator link to frame	Bolts		61 to 66 foot-pounds

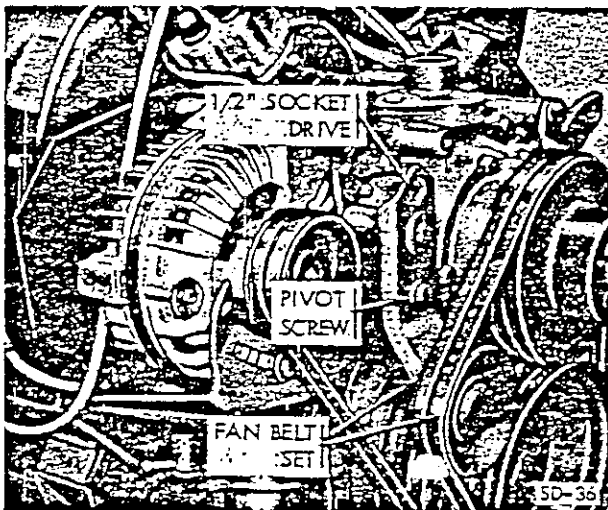


Figure 13-3. Fan Belt Adjustment

d. Fan Belt Adjustment (fig. 13-3). This procedure requires the use of a belt tension gauge.

(1) Loosen bolt in slotted hole of fan belt idler arm, then loosen pivot bolt.

(2) Insert a 1/2-inch socket drive in square hole of idler arm, then press idler arm toward center of engine to tighten each belt to 100 foot-pounds tension. Torque lock-bolt in idler arm slotted hole to 100 foot-pounds.

(3) Tighten pivot bolt.

e. Coolant (Anti-freeze) Testing. This test requires the use of coolant tester such as the GA-298 tester, or equivalent, available from the Snap-on Tools Corporation in Kenosha, Wis. This bulb-and-syringe type tester has five balls inside a graduated glass viewing tube. The tester may be

used to test either hot or cold coolant solutions by the following procedures. Remove pressure radiator cap and insert tube end of tester into coolant in radiator filler neck, then press and release bulb to fill glass tube with coolant fluid. The anti-freeze protection of the coolant is shown by its buoyancy effects.

- No balls floating in the coolant indicates zero protection against freezing.

- One ball floating indicates protection extends down to 20 degrees F.

- Two balls floating indicates protection down to 5 degrees F.

- Three balls floating indicates protection down to minus 10 degrees F.

- Four balls floating indicates protection down to minus 25 degrees F.

- Five balls floating indicates protection down to minus 40 degrees F.

The anti-freeze protection specified for the coach cooling system is a minus 34 degrees F, which is provided when using a coolant mixture of 50 percent ethylene glycol and 50 percent water.

f. Cooling System Pressure Test. This test requires the use of a pressure tester and adapter cap to seal the radiator fill neck and to apply and measure air pressure.

- (1) Remove radiator pressure cap.

- (2) Check that radiator coolant level is about 3-1/2 inches below top of filler neck.

- (3) Wipe filler neck interior clean, then attach pressure tester adapter cap to filler neck.

- (4) Apply air to system. If test gauge indication remains steady, no leaks are present. If gauge indication drops noticeably, check system for external leaks and correct leaks. Reapply pressure; if pressure still drops, leakage is inside engine.

- (5) Relieve pressure, remove tester, then install radiator pressure cap.

g. Transmission Oil Cooler Test (fig. 13-1).

- (1) Drain transmission oil; refer to Group 16.

- (2) Disconnect tubes from oil cooler section of radiator.

- (3) Connect a pressure gauge to oil cooler outlet (inboard fitting).

- (4) Connect a shutoff valve to oil cooler inlet; close valve, then connect an air pressure source.

- (5) Brush a thin layer of oil on all oil cooler connectors.

- (6) Gradually open valve to apply air pressure while checking for bubbles. If bubbles are not present, increase pressure, then close air valve. Gauge pressure indicated should not decrease. Open valve at oil cooler outlet to relieve pressure. If leaks are present, replace radiator.

- (7) If clogging of oil cooler passages is suspected, or indicated by test, remove gauge and valve at cooler outlet and blow out passages with low-pressure air.

- (8) Remove test equipment and connect oil hoses to oil cooler.

- (9) Service transmission; refer to Group 16.

h. Pressure Cap Test. This test requires the use of a cap pressure tester and an adapter to apply and measure air pressure to the cap. The pressure test will help eliminate the changes for loss of coolant through leakage, and will aid in determining the true condition of the cooling system.

- (1) Moisten cap pressure valve head seal, then attach it to tester with the adapter.

- (2) Apply pressure to cap with tester. When cap pressure valve actuates to relieve pressure, the tester gauge should indicate 7 ( $\pm 1$ , minus 1/2) psi. Remove cap from tester adapter.

- (3) Replace cap if it fails test.

i. Thermostat Test (Removed). This test requires a feeler gauge, a thermometer (to 200 degrees F), a water container, and hot water.

- (1) Remove thermostat; refer to paragraph 13-3j.

- (2) Check thermostat sealing edges for damage and foreign matter.

(3) Visually check that thermostat valve closes tightly.

(4) Completely immerse thermostat in a container of warm water. Place a thermometer in container, away from contact with thermostat.

(5) Heat water and continuously stir while checking valve for opening to 0.001 inch with a feeler gauge. When gauge passes freely through thermostat opening, temperature should be 177 to 184 degrees F. (Thermostat nominal rating is 180 degrees F.) If thermostat opens outside of this range, discard.

(6) Increase water temperature to 200 degrees F, replace thermostat if not fully open at this temperature.

(7) Install serviceable thermostat; refer to paragraph 13-3k.

j. Servicing the Cooling System. Servicing of the cooling system consists of a once-a-year complete draining of used coolant and filling with new anti-freeze and summer coolant of the "year-round" type, comprised of 50 percent ethylene-glycol based compound mixed with 50 percent water. Coolant system capacity is 25 quarts.

Lubrication of the coolant pump is required every 4000 miles or every 6 months. Lubricated with water pump grease (NLGI Grade 2).

(1) Draining. Completely drain used coolant from the coolant system including the radiator, hoses, engine coolant jacket, and the automotive heater core and lines as follows:

**Warning**  
Dispose of drained coolant solution immediately as coolant is harmful if swallowed.

(a) Drain radiator by removing pressure cap and opening drain cock; close drain cock when

complete. Drain upper coolant hose by disconnecting at engine and allow fluid to run out, then reinstall and tighten clamp.

(b) Drain engine jacket by removing the drain plugs from both sides of the block just below the horizontal centerline; reinstall plugs when completely drained.

(c) Drain heater core and lines by removing the hose clamps at the engine connector tubes and disconnecting hoses. The hose ends must be lowered below frame level by detaching the support clamps that hold the lines in place to allow gravity-draining of coolant from heater core. Reinstall hose supports and connect hoses.

(2) Filling. The cooling system should be filled with specified coolant as follows:

(a) Check that radiator drain cock is closed, engine drain plugs are installed and hoses are properly connected.

**Warning**  
Do not swallow coolant solution. If swallowed, induce vomiting immediately and see a physician as soon as possible. Do not store solution in an open or unlabeled container.

(b) With engine cool, pour 50 percent ethylene-glycol based compound and 50 percent water into radiator filler neck until full, with coolant visible in neck.

(c) With pressure cap still removed, start engine and warm-up to approximately 180 degrees F. Thermostat should actuate. While warming-up, operate heater by setting SELECT lever to HEAT and heater lever to HIGH to allow coolant to flow through the heater system.

(d) After thermostat actuates following warm-up, pour in additional coolant until visible approximately 3-1/2 inches below filler neck top. Install pressure cap and run-up engine. Visually check for leaks, then shut-down engine.



URGENT

ROUTINE

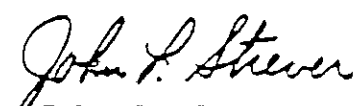
MANDATORY

INFORMATIONAL

# Service Bulletin

DATE 23 August 1973

NUMBER 2913 20001

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
<u>DESCRIPTION</u> These instructions replace the present radiator filler neck 7 psi pressure cap with a 13 psi pressure cap (RVD part number 5101957, AC part number RC 25). Combined with the prescribed coolant, the replacement cap minimizes the possibility of coolant loss due to overflow.	13 COOLING SYSTEM
	SUBJECT  RADIATOR PRESSURE CAP REPLACEMENT
<u>COMPLIANCE</u> Dealers should comply with this bulletin before coach is again operated and before delivery of coach to owner. Present owners should accomplish this modification immediately.	MODEL (S) AFFECTED  2900R
	(Factory Use Only) Information added to:  OWNER MANUAL (S)  SERVICE MANUAL (S)  PARTS MANUAL (S)  WARRANTY MANUAL (S)  OTHER
<u>MANPOWER</u> Estimated accomplishment time negligible.	
<u>MATERIAL</u> One 13 psi pressure cap per coach; RVD part number 5101957.	
<u>ACCOMPLISHMENT INSTRUCTIONS</u> With engine cool, remove present cap and check that coolant is at proper level, then install new cap on the radiator filler neck.  <p style="text-align: center;">NOTE</p> If coolant replenishment is needed, refer to Owner's Manual pages 4-34 and 4-35. The proper 50 percent mixture of ethylene glycol and water should always be maintained to ensure proper year round anti-freeze and summer coolant protection.	
 John L. Strever Service Manager	





FMC Corporation  
 Recreational Vehicle Division  
 223 Broward Road Box 564 Santa Clara, California 95052

URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE 4 September, 1973

NUMBER 2913 40002

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
<u>DESCRIPTION</u>	13
<p>This bulletin has been issued to cover the flushing and reserVICING of the FMC 2900R engine cooling system.</p> <p><u>COMPLIANCE</u></p> <p>Dealers should comply with this bulletin before coach is operated and before delivery of coach to an owner. Present owner should have these procedures accomplished as soon as possible.</p>	<p>SUBJECT</p> <p>FLUSHING AND RESERVICING THE ENGINE COOLING SYSTEM</p>
<p style="text-align: center;">CAUTION</p> <p>On any coach engine that has shown a tendency to run hot, these procedures should be accomplished as expeditiously as possible.</p> <p><u>MANPOWER</u></p> <p>Estimated accomplishment time is three-quarters of an hour.</p> <p><u>MATERIAL</u></p> <p>Ethylene glycol anti-freeze/summer coolant of the "year-round" type. A 50% ethylene glycol and 50% water mixture is required in the 33<math>\frac{1}{2}</math>-quart cooling system both summer and winter. Facilities for using an air/water (hydro-air) pressure gun with nozzle adapter are preferred, but city water supply pressure with makeshift adapter, can be used as an alternate method.</p>	<p>MODEL (S) AFFECTED</p> <p>2900R</p>
<p><u>ACCOMPLISHMENT INSTRUCTIONS</u></p> <p>(1) <u>Draining</u>. Completely drain used coolant from the coolant system including the radiator, hoses, engine block water jacket, and the automotive heater core and lines as follows:</p>	<p>(Factory Use Only) Information added to:</p> <p>OWNER MANUAL (S)</p> <p>SERVICE MANUAL (S)</p> <p>PARTS MANUAL (S)</p> <p>WARRANTY MANUAL (S)</p>
<p style="text-align: center;">WARNING</p> <p>DISPOSE OF DRAINED COOLANT SOLUTION IMMEDIATELY AS COOLANT IS HARMFUL IF SWALLOWED.</p> <p>(a) Drain radiator by removing pressure cap and opening drain cock; close drain cock when completed.</p>	



FMC Corporation  
 Recreational Vehicle Division  
 233 Brewer Road Box 664 Santa Clara, California 95052

URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE 4 September, 1973

NUMBER 2913 40002

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
	13
<p>(b) Disconnect lower coolant hose by loosening clamp at radiator end. Allow fluid to drain out.</p> <p>(c) Drain engine block water jacket by removing the drain plugs from both the LH and RH sides of the block just below the horizontal centerline; retain plugs.</p> <p>(d) Detach the heater core supply and return lines by loosening the hose clamps at the engine aft connector tubes and disconnecting hoses.</p>	SUBJECT FLUSHING AND RESERVICING THE ENGINE COOLING SYSTEM
<p>(2) <u>Reverse Flushing Radiator.</u> Reverse flush radiator as follows:</p> <p>(a) Remove pressure cap from the filler neck.</p> <p>(b) Position adapter into radiator lower tube from which hose was removed.</p> <p>(c) Connect water/air gun to air and water supply and insert air/water gun into hole in adapter in radiator lower tube; hold snugly in place. As an alternate method, use city water pressure by wrapping a cloth around hose end to serve as an adapter, then hold snug against tube.</p> <p>(d) Open water valve on air/water gun (or city water supply) and inject water into radiator. If gun is used, intermittently apply short-duration air blasts as water is being injected.</p>	MODEL (S) AFFECTED  2900R
<p style="text-align: center;">CAUTION</p> <p>Do not permit pressure in cooling system to exceed 20 psi, or damage can result.</p> <p>(e) Repeat step (d) until water at filler neck is clean and flows out clear, then remove flushing equipment from radiator and allow to completely drain.</p>	(Factory Use Only) Information added to:  OWNER MANUAL (S) SERVICE MANUAL (S)
<p>(3) <u>Reverse Flushing Engine Block Water Jacket.</u> Reverse flush engine block water jacket and passageways as follows:</p> <p>(a) Insert adapter into the engine lower coolant inlet hose, then insert air/water gun in adapter and hold snugly in place. As an alternate method, use city water supply by wrapping cloth around hose end to serve as an adapter.</p>	PARTS MANUAL (S) WARRANTY MANUAL (S) OTHER



# Service Bulletin

DATE 4 September, 1973

NUMBER 2913 40002

<p>ATTENTION: SERVICE MANAGERS AND OWNERS</p>	<p>GROUP</p>
	<p>13</p>
<p>(b) Open water valve on air/water gun (or city water supply) and inject water into engine block water jacket. If gun is used, intermittently apply short-duration air blasts as water is being injected. Continue until water flows out of both the LH and RH drain openings clean and clear.</p> <p>(c) Remove flushing equipment and allow water to completely drain out of engine.</p> <p>(d) Install both LH and RH drain plugs in engine, retained from previous steps.</p> <p>(e) Reconnect lower coolant hose to radiator connector tube; tighten clamp.</p>	<p>SUBJECT</p> <p>FLUSHING AND RESERVICING THE ENGINE COOLING SYSTEM</p>
<p>(4) <u>Flushing Heater Lines and Core.</u> Flush heater core and lines as follows:</p> <p>(a) Insert nozzle of air/water gun into end of the heater return hose and hold snugly in place. As an alternate method use city water supply and hose to inject water.</p> <p>(b) Inject water into end of return line until water flows out of the end of the supply line clean and clear.</p> <p>(c) Remove gun and lower hoses to allow complete gravity drain of water from heater and hoses.</p> <p>(d) Reconnect heater supply and return hoses to the connector tubes in the engine, making sure that supply hose is connected to supply outlet tube and return hose to inlet tube; tighten hose clamps.</p>	<p>MODEL (S) AFFECTED</p> <p>2900R</p>
<p>(5) <u>Reservicing.</u> The cooling system should be filled with specified coolant as follows:</p> <p>(a) Check that radiator drain cock is closed, engine RH and LH drain plugs are installed and hoses are properly connected.</p> <p>(b) Pour 50% ethylene-glycol based compound and 50% water (preferably premixed) into radiator filler neck until full, with coolant visible in neck.</p> <p>(c) With pressure cap removed, start engine and warm-up to approximately 180 degrees F. Thermostat should open. While warming-up, operate heater by setting SELECT lever to HEAT and heater lever to HIGH, and run in this position for a few minutes after warm-up to allow coolant to flow through the heater system.</p>	<p>(Factory Use Only) Information added to:</p> <p>OWNER MANUAL (S)</p>
	<p>SERVICE MANUAL (S)</p>
	<p>PARTS MANUAL (S)</p>
	<p>WARRANTY MANUAL (S)</p>
	<p>OTHER</p>



FMC Corporation  
 Recreational Vehicle Division  
 222 Brockway Road Box 684 Santa Clara, California 95052

URGENT       ROUTINE  
 MANDATORY     INFORMATIONAL

# Service Bulletin

DATE 4 September, 1973

NUMBER 2913 40002

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
<p>(d) After thermostat opens following warm-up and heater and lines are filled, pour in additional coolant until visible approximately 3½ inches below filler neck top. Install the 13 psi pressure cap (identified by the number "13# RC-25" metal stamped on the top) supplied with Service Bulletin 2913 20001 and run-up engine. Visually check cooling system for leaks, then shut-down engine.</p>	13
<p style="text-align: center;">CAUTION</p> <p>Total cooling system (including heater core and hoses) capacity is approximately 33½-quarts of coolant mixture. Any substantial variations from this figure means that air is trapped in the system. In this case, run engine at 2000 rpm until air is expelled, then add coolant until visible approximately 3½ inches below filler neck top.</p>	<p>SUBJECT</p> <p>FLUSHING AND RESERVICING THE ENGINE COOLANT SYSTEM</p>
<p style="text-align: center;">NOTE</p> <p>Affected 2900R manuals will be changed to reflect the cooling system information contained in this bulletin during forthcoming revisions.</p> <p style="text-align: center;"><i>John L. Strever</i>        John L. Strever        Service Manager</p>	<p>MODEL (S) AFFECTED</p> <p style="text-align: center;">2900R</p> <p>(Factory Use Only)        Information added to:</p> <p>OWNER MANUAL (S)</p> <hr/> <p>SERVICE MANUAL (S)</p> <hr/> <p>PARTS MANUAL (S)</p> <hr/> <p>WARRANTY MANUAL (S)</p> <hr/> <p>OTHER</p>



URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE 9 October 1973

NUMBER 2913 20003

ATTENTION: SERVICE MANAGERS AND OWNERS		GROUP 13																					
<p>1. <u>DESCRIPTION</u></p> <p>To prevent damage to radiators on the coaches listed below, splash guard kits are being supplied to dealers and owners for those coaches that were not equipped with these items.</p> <p>Coaches Affected:</p> <p>00227, 00231, 00236, 00239, 00240, 00241, 00242, 00243, 00247, 00248, 00250, 00251, 00252, 00253, 00255, 00256, 00260, 00262, 00263, 00269, 00270, 00272, 00273, 00276, 00277, 00278, and 00281.</p>		SUBJECT RADIATOR SPLASH GUARD INSTALLA- TION																					
<p>2. <u>MANPOWER</u></p> <p>Estimated accomplishment time for one mechanic is one-half hour.</p>		MODEL (S) AFFECTED  2900R																					
<p>3. <u>MATERIAL</u></p> <p>Parts required are as follows:</p> <table border="1"> <thead> <tr> <th><u>TITLE</u></th> <th><u>RVD P/N</u></th> <th><u>QTY PER COACH</u></th> </tr> </thead> <tbody> <tr> <td>GUARD, Radi-ator splash</td> <td>5100917</td> <td>1 (For coaches listed in step B note only, Page 2)</td> </tr> <tr> <td>BOLT, 5/16-24 x 3/4</td> <td>M18058</td> <td>4 (For coaches listed in step B note only, Page 2)</td> </tr> <tr> <td>GUARD, Radi-ator splash</td> <td>5101633</td> <td>1 (For coaches listed in step C note only, Page 2)</td> </tr> <tr> <td>WASHER, Flat, 1/4 ID</td> <td>M17045</td> <td>4 (For coaches listed in step C note only, Page 2)</td> </tr> <tr> <td>WASHER, Lock, 1/4 ID</td> <td>M17024</td> <td>4 (For coaches listed in step C note only, Page 2)</td> </tr> <tr> <td>NUT, Hex, 1/4-20</td> <td>M17070</td> <td>4 (For coaches listed in step C note only, Page 2)</td> </tr> </tbody> </table>		<u>TITLE</u>	<u>RVD P/N</u>	<u>QTY PER COACH</u>	GUARD, Radi-ator splash	5100917	1 (For coaches listed in step B note only, Page 2)	BOLT, 5/16-24 x 3/4	M18058	4 (For coaches listed in step B note only, Page 2)	GUARD, Radi-ator splash	5101633	1 (For coaches listed in step C note only, Page 2)	WASHER, Flat, 1/4 ID	M17045	4 (For coaches listed in step C note only, Page 2)	WASHER, Lock, 1/4 ID	M17024	4 (For coaches listed in step C note only, Page 2)	NUT, Hex, 1/4-20	M17070	4 (For coaches listed in step C note only, Page 2)	(Factory Use Only) Information added to:  OWNER MANUAL (S)  SERVICE MANUAL (S)  PARTS MANUAL (S)  WARRANTY MANUAL (S)  OTHER
<u>TITLE</u>	<u>RVD P/N</u>	<u>QTY PER COACH</u>																					
GUARD, Radi-ator splash	5100917	1 (For coaches listed in step B note only, Page 2)																					
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URGENT

ROUTINE

MANDATORY

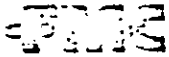
INFORMATIONAL

# Service Bulletin

DATE 9 October 1973

NUMBER 2913 20003

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP  13
<p>4. <u>ACCOMPLISHMENT INSTRUCTIONS</u></p> <p>The procedure for installing the radiator guard is as follows:</p> <p>A. Gain access to guard mounting brackets welded to engine support aft cross beam from rear underneath coach.</p> <p>B. Position radiator guard (5100917) on top of brackets and align holes in guard with holes in brackets. Install four bolts (M18058) from top of guard through bracket into nut welded to bottom of bracket.</p> <p style="text-align: center;">NOTE</p> <p>Step B above is effective on coaches 00227, 00231, 00236, 00239, 00240, 00241, and 00242.</p>	SUBJECT  RADIATOR SPLASH GUARD INSTALLA- TION
<p>C. Align cutout in radiator guard (5101633) with lower radiator hose, placing guard over studs welded to guard mounting brackets. Fasten guard using four each flat washers (M17045), lock washers (M17024), and nuts (M17070).</p> <p style="text-align: center;">NOTE</p> <p>Step C above is effective on coaches 00243, 00247, 00248, 00250, 00251, 00252, 00253, 00255, 00256, 00260, 00262, 00263, 00269, 00270, 00272, 00273, 00276, 00277, 00278, and 00281.</p>	MODEL (S) AFFECTED  2900R
<p>5. <u>SERVICE MANAGERS</u></p> <p>Make certain guards are installed on coaches now in your possession before delivery.</p>	(Factory Use Only) Information added to:  OWNER MANUAL (S)
<p>6. <u>OWNERS</u></p> <p>Make an appointment with your dealer to have radiator guards installed.</p> <p style="text-align: center;"><i>John L. Strever</i> John L. Strever Service Manager</p>	SERVICE MANUAL (S)  PARTS MANUAL (S)  WARRANTY MANUAL (S)  OTHER



URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE 10 December 1973

NUMBER 2913 20004

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
	13
<p><u>DESCRIPTION</u></p> <p>Recent tests indicate that a 50% mixture of uninhibited ethylene glycol and water did not provide the anti-foam nor the corrosion inhibiting protection necessary for the coach engine. Some coaches were initially serviced with the above mixture (coolant). The coolant must be inspected by observing the color and replaced if required.</p>	<p>SUBJECT</p> <p>COOLANT INSPECTION AND REPLACEMENT IF REQUIRED</p>
<p><u>COMPLIANCE</u></p> <p>Dealers should comply with this bulletin before delivery of coach to an owner. Present owner should have this work accomplished as soon as possible.</p> <p><u>MANPOWER</u></p> <p>Estimated accomplishment time is three-quarters of an hour.</p>	<p>MODEL (S) AFFECTED</p> <p>2900R</p>
<p><u>MATERIAL</u></p> <p>Ethylene glycol anti-freeze/summer coolant of the "year-round" type. A 50% mixture of coolant and water is required in the 33 1/2-quart cooling system both summer and winter.</p>	<p>(Factory Use Only) Information added to:</p> <p>OWNER MANUAL(S)</p>
<p>The following coolants, or equivalent, are recommended:</p> <p>Telar, from Du Pont (red)</p> <p>Peak, from Northern PetroChemical (pink)</p> <p>Prestone II, from Union Carbide (green)</p> <p>SuperCoolant, from Dow Chemical (blue)</p>	<p>SERVICE MANUAL(S)</p> <p>PARTS MANUAL(S)</p> <p>WARRANTY MANUAL(S)</p>
<p><u>ACCOMPLISHMENT INSTRUCTIONS</u></p> <p>1. Inspect coolant by draining a small amount from the radiator drain cock into a clear glass jar or bottle and observing whether it is clear (except for possible rust or scale) or if it resembles one of the above colors. If colored, no further action is necessary, if clear do steps 2 and 3.</p>	<p>OTHER</p>

# Service Bulletin

DATE 10 December 1973

NUMBER 2913 20004

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP  13
<p>2. <u>Draining</u>. Completely drain used coolant including the radiator, hoses, engine block water jacket, and the automotive heater core and lines as follows:</p> <p>a. Drain radiator by removing pressure cap and opening drain cock; close drain cock when completed.</p> <p>b. Drain upper coolant hose by disconnecting at engine and allow fluid to run out, then reinstall and tighten clamp.</p> <p>c. Drain engine jacket by removing the drain plugs from both sides of the block just below the horizontal centerline; reinstall plugs when completely drained.</p> <p>d. Drain heater core and lines by removing the hose clamps at the engine connector tubes and disconnecting hoses. The hose ends must be lowered below frame level by detaching the support clamps that hold the lines in place to allow gravity-draining of coolant from heater core. Reinstall hose supports and connect hoses.</p>	SUBJECT  COOLANT INSPECTION AND REPLACEMENT IF REQUIRED
<p style="text-align: center;">WARNING</p> <p style="text-align: center;">Dispose of drained coolant immediately as it is harmful if swallowed.</p>	MODEL (S) AFFECTED  2900R
<p>3. <u>Reservicing</u>. The cooling system should be filled with specified coolant as follows:</p>	(Factory Use Only) Information added to:
<p>a. Check that radiator drain cock is closed, engine RH and LH drain plugs are installed and hoses are properly connected.</p>	OWNER MANUAL(S)
<p>b. Pour the mixture of 50% coolant and water (pre-mixed) into radiator filler neck until full, with coolant visible in neck.</p>	SERVICE MANUAL(S)
<p>c. With pressure cap removed, start engine and warm-up to approximately 180 degrees F. Thermostat should open. While warming-up, operate heater by setting SELECT lever to HEAT and heater lever to HIGH, and run in this position for a few minutes after warm-up to allow coolant to flow through the heat system.</p>	PARTS MANUAL(S)
	WARRANTY MANUAL(S)
	OTHER



# Service Bulletin

DATE 10 December 1973

NUMBER 2913 20004

ATTENTION: SERVICE MANAGERS AND OWNERS	GROUP
<p>d. After thermostat opens following warm-up and heater and lines are filled, pour in additional coolant until visible approximately 3½ inches below filler neck top. Install the 13 psi pressure cap (identified by the number "13½ RC-25" metal stamped on the top) supplied with Service Bulletin 2913 20001 and run-up engine. Visually check cooling system for leaks, then shut-down engine.</p> <p style="text-align: center;"><b>CAUTION</b></p> <p>Total cooling system capacity (including heater core and hoses) is approximately 33½-quarts. Any substantial variations from this figure means that air is trapped in the system. In this case, run engine at 2000 rpm until air is expelled, then add coolant until visible approximately 3½ inches below filler neck top.</p> <p style="text-align: center;"><i>John L. Strever</i>          JOHN L. STREVER          Service Manager</p>	13
	SUBJECT COOLANT INSPECTION AND REPLACEMENT IF REQUIRED
	MODEL (S) AFFECTED  2900R
	(Factory Use Only) Information added to:  OWNER MANUAL (S)  SERVICE MANUAL (S)  PARTS MANUAL (S)  WARRANTY MANUAL (S)  OTHER



# Service Bulletin

DATE February 12, 1976

NUMBER 2913 30001

<p>ATTENTION: SERVICE MANAGERS AND OWNERS -</p>	<p>GROUP  13</p>
<p><u>DESCRIPTION</u></p> <p>This Service Bulletin contains procedures for periodic (every 12,000 miles) cleaning of any accumulations of oil, mud, bugs, leaves, grass, etc, residue which may have become lodged between the fins of the radiator core. Excessive dirt accumulations can impair engine cooling. Prior to cleaning, inspect for the presence of excessive oil build-up on the core <del>for</del> surfaces. If evident, check for source of leak and repair before cleaning.</p> <p><u>RADIATOR CORE CLEANING INSTRUCTIONS</u></p> <p style="text-align: center;"><u>NOTE</u></p> <p>On any coach engine that has shown a tendency to run hot, these procedures should be accomplished as expeditiously as possible.</p> <ol style="list-style-type: none"> <li>1. Prepare the radiator for cleaning by opening the engine compartment access doors. Temporarily cover the distributor cap.</li> <li>2. Use high-pressure spray type washing equipment. Conventional drive-in, do-it-yourself, high pressure spray type washing will normally provide sufficient cleaning.</li> <li>3. Direct spray from front side of coach radiator, through the shroud behind the fan, to wash the residue out the rear of coach.</li> <li>4. Direct spray from rear of coach through the grill (behind radiator) to wash the residue out the forward side of radiator.</li> <li>5. Repeat directing spray into core from front side. Also clean aft end of engine and areas, as required.</li> </ol> <p style="text-align: center;"><u>NOTE</u></p> <p>Do not spray the firewall or areas other than those specified. Spraying with a soap solution should be followed by a water rinse to remove all traces of the solution.</p> <ol style="list-style-type: none"> <li>6. Following washing, clean the V-belts and pulley grooves after they are dry with alcohol, benzene or gasoline. Remove temporary cover from distributor and close engine compartment doors.</li> </ol>	<p><u>SUBJECT</u></p> <p>CLEANING OIL/DIRT ACCUMULATIONS FROM RADIATOR CORE/FINS</p>
<p style="text-align: right;"><i>Wayne J. Biondi</i></p> <p>WAYNE J. BIONDI SERVICE MANAGER</p>	<p><u>MODEL (S) AFFECTED</u></p> <p>ALL COACHES</p>



FMC Corporation  
Motor Coach Division  
333 Brokaw Road Box 664 Santa Clara California 95052

URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE May 20, 1976

NUMBER 2913-40004

ATTENTION: SERVICE MANAGERS	GROUP 13
<u>DESCRIPTION</u>	Cooling
This bulletin provides instructions for the installation of service replacement radiator kits due to re-design of radiator on the motorhome series of coaches.	<u>SUBJECT</u>
<u>EFFECTIVITY</u>	Service Replacement Radiator Kits
This bulletin is to be used when replacing the radiator on all motorhome coaches between serial numbers 00223 to 00964.	Motorhome Coaches 00223 to 00964 (Kit 5109233)
<u>MATERIAL</u>	<u>MODEL (S) AFFECTED</u>
Service Kit #5109233 consisting of:	Motorhome Series 00223 to 00964
1 5109230 Radiator w/Cap	
1 5109067 Panel, Mounting-right hand	
1 5109069 Panel, MOUNTing-upper	
1 5109068 Panel, Mounting-left hand	
5 M25046 Rivet, Mounting Panel	
2 5100573-01 Adapter, Transmission Oil Hoses	
NOTE: Coaches 00965 & up were equipped with 5109230 Radiator during the production process.	
<u>INSTRUCTIONS</u>	
(See Figure 1)	
1. Remove old radiator in accordance with instructions in Group 13 of the Motorhome Service Manual.	
2. Remove existing fan shroud and air deflectors (panels) from radiator.	
3. Mount existing fan shroud to new radiator (5109230) by using the top mounting hole and securing shroud to radiator at this point. Use a 3/8" drill and drill the remaining shroud mounting holes in radiator by using existing shroud holes as a template.	
4. Assemble the new radiator mounting panels (Air deflectors) using rivets (M25046) and bolt to radiator using bolts removed from old radiator.	
5. Install two adapters (5100573-01) in lower tank of radiator to enable existing transmission oil hoses to be connected.	
6. Install radiator and shroud assembly in coach and tighten all attaching bolts to proper torque as listed in Group 13 of Motorhome Service Manual.	
7. Check fan tip to shroud clearance per Figure 1.	



URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE May 20, 1976

NUMBER 2913-40004

ATTENTION: SERVICE MANAGERS

GROUP 13

Cooling

SUBJECT

Service Replacement Radiator Kits

Motorhome Coaches 00223 to 00964 (Kit 5109233)

MODEL (S) AFFECTED

Motorhome Series 00223 to 00964

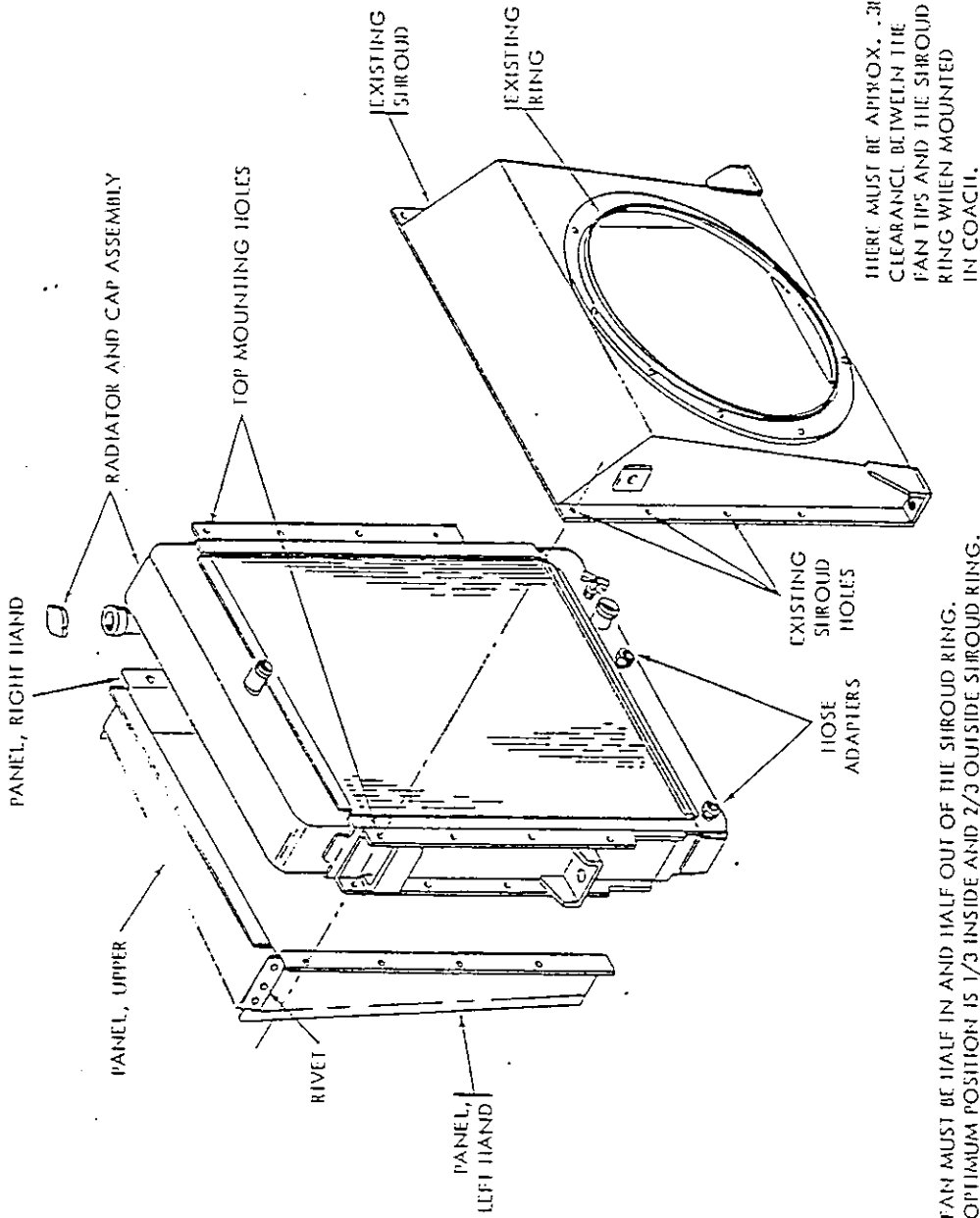


FIGURE 1



URGENT

ROUTINE

MANDATORY

INFORMATIONAL

# Service Bulletin

DATE May 20, 1976

NUMBER 2913-40003

<p>ATTENTION: SERVICE MANAGERS.</p>	<p>GROUP 13</p>
<p><u>DESCRIPTION</u></p>	<p>Cooling</p>
<p>This bulletin provides instructions for the installation of service replacement radiator kits due to re-design of radiator on transit series of coaches.</p>	<p>SUBJECT Service Replacement Radiator Kits</p>
<p><u>EFFECTIVITY</u></p>	<p>Transit Coaches 00530 to 00599 (Kit 5109233)</p>
<p>This bulletin is to be used when replacing the radiator on transit coaches between serial numbers 00530 to 00964.</p>	<p>00600 to 00964 (Kit 5109232)</p>
<p><u>MATERIAL</u></p>	<p>MODEL (S) AFFECTED</p>
<p>Coaches 00530 to 00599 use Service-Kit #5109233 consisting of:</p>	<p>Transit Series Coaches 00530 to 00964.</p>
<ul style="list-style-type: none"> <li>1 5109230 Radiator w/Cap</li> <li>1 5109067 Panel, Mounting-right hand</li> <li>1 5109069 Panel, Mounting-upper</li> <li>1 5109068 Panel, Mounting-left hand</li> <li>5 M25046 Rivet, Mounting Panel</li> <li>2 5100573-01 Adapter, Transmission Oil Hoses</li> </ul>	
<p>Coaches 00600 to 00964 use Service Kit #5109232 consisting of:</p>	
<ul style="list-style-type: none"> <li>1 5109229 Radiator w/Cap</li> <li>2 5100570-02 Washer, Radiator to Frame</li> <li>2 5100573-01 Adapter, Transmission Oil Hoses</li> <li>2 5109096 Link, Radiator to Frame</li> <li>12 M25056 Rivet, Shroud Ring Attaching</li> </ul>	
<p>NOTE: Coaches 00965 &amp; up were equipped with 5109229 Radiator during the production process.</p>	
<p><u>INSTRUCTIONS</u></p>	
<p>A. <u>Coaches 00530 to 00599; See Figure 1</u></p>	
<ol style="list-style-type: none"> <li>1. Remove old radiator in accordance with instructions in Group 13 of the Transit Service Manual.</li> <li>2. Remove existing fan shroud and air deflectors (panels) from radiator.</li> <li>3. Mount existing fan shroud to new radiator (5109230) by using the top mounting hole and securing shroud to radiator at this point. Use a 3/8" drill and drill the remaining shroud mounting holes in radiator by using existing shroud holes as a template.</li> </ol>	<p style="writing-mode: vertical-rl; transform: rotate(180deg);"> <b>F.M.C., AS OF 10/1/76, HAS BEEN HONORING PARTS OF THE TRANSPORTATION INDUSTRY AS OBTAINED IN THIS BULLETIN</b> </p>



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MANDATORY

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# Service Bulletin

DATE May 20, 1976

NUMBER 2913-40003

ATTENTION: SERVICE MANAGERS

GROUP 13

Cooling

SUBJECT

Service Replacement Radiator Kits

Transit Coaches 00530 to 00599 (Kit 5109233)

00600 to 00964 (Kit 5109232)

MODEL (S) AFFECTED

Transit Series

Coaches 00530 to 00964

SD-990

THERE MUST BE APPROX. .38 IN. CLEARANCE BETWEEN THE FAN TIPS AND THE SHROUD RING WHEN MOUNTED IN COACH.

FAN MUST BE HALF IN AND HALF OUT OF THE SHROUD RING. OPTIMUM POSITION IS 1/3 INSIDE AND 2/3 OUTSIDE SHROUD RING.

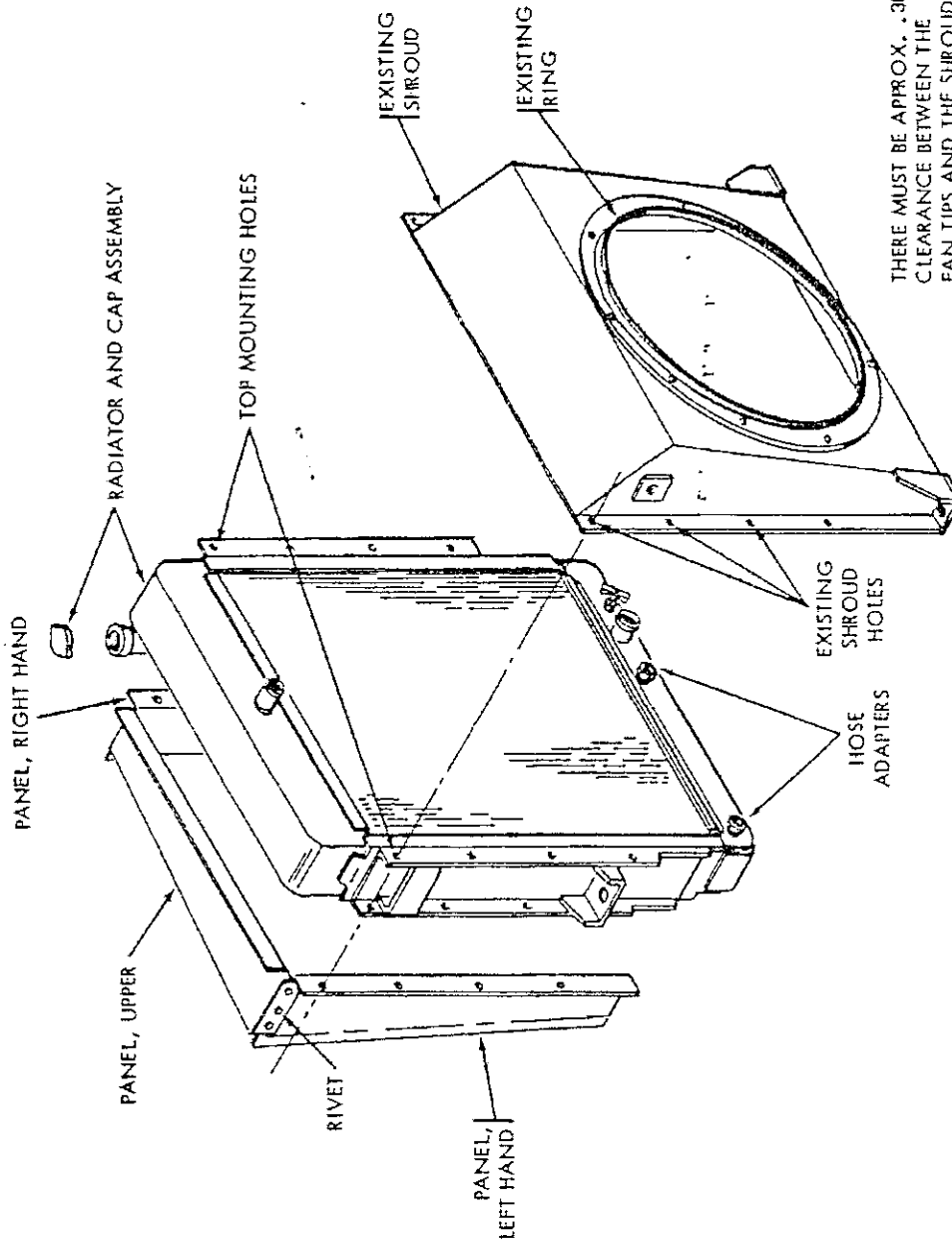
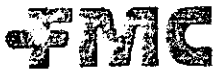


FIGURE 1



URGENT

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NUMBER 2913-40003

<p>ATTENTION: SERVICE MANAGERS</p>	<p>GROUP 13</p>
<p>4. Assemble the new radiator mounting panels (Air deflectors) using rivets (M25046) and bolt to radiator using bolts removed from old radiator.</p>	<p>Cooling</p>
<p>5. Install two adapters (5100573-01) in lower tank of radiator to enable existing transmission oil hoses to be connected.</p>	<p>SUBJECT</p>
<p>6. Install radiator and shroud assembly in coach and tighten all attaching bolts to proper torque as listed in Group 13 of Transit Service Manual.</p>	<p>Service Replacement Radiator Kits</p>
<p>7. Check fan tip to shroud clearance per Figure 1.</p>	<p>Transit Coaches 00530 to 00599 (Kit 5109233)</p>
<p><u>B. Coaches 00600 to 00964, See Figure 2</u></p>	<p>00600 to 00964 Kit 5109232)</p>
<p>1. Remove old radiator in accordance with instructions in Group 13 of Transit Service Manual.</p>	<p>MODEL(S) AFFECTED</p>
<p>2. Remove existing fan shroud and air deflectors (panels) from old radiator.</p>	<p>Transit Series Coaches 00530 to 00964.</p>
<p>3. Discard the existing radiator to frame mounting bracket (Figure 2).</p>	
<p>4. Remove tie rod links from old rod and install new links (5109096) to accommodate the new position of the radiator in the coach. New radiator sets 1" higher.</p>	
<p>5. Remove the fibreglass ring on the existing radiator fan shroud by drilling out the old rivets.</p>	
<p>6. Reposition fibreglass ring one inch lower than its old position by drilling new holes using existing ring as a template.</p>	
<p>7. Attach fibreglass ring in its new position with rivets (M25056).</p>	
<p>8. Mount existing fan shroud to new radiator (5109229) by using the top mounting hole and securing shroud to radiator at this point. Use a 3/8" drill and drill the remaining shroud mounting holes using the existing shroud holes as a template.</p>	
<p>9. Install two adapters (5100573-01) in lower tank of radiator to enable existing transmission oil hoses to be connected.</p>	
<p>10. Install air deflectors (panels) on new radiator.</p>	



URGENT

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# Service Bulletin

DATE May 20, 1976

NUMBER 2913-40003

ATTENTION: SERVICE MANAGERS

GROUP 13

Cooling

SUBJECT

Service Replacement Radiator Kits

Transit Coaches 00530 to 00599 (Kit 5109233)

00600 to 00964 (Kit 5109232)

MODEL (S) AFFECTED

Transit Series Coaches 00530 to 00964

SD-991

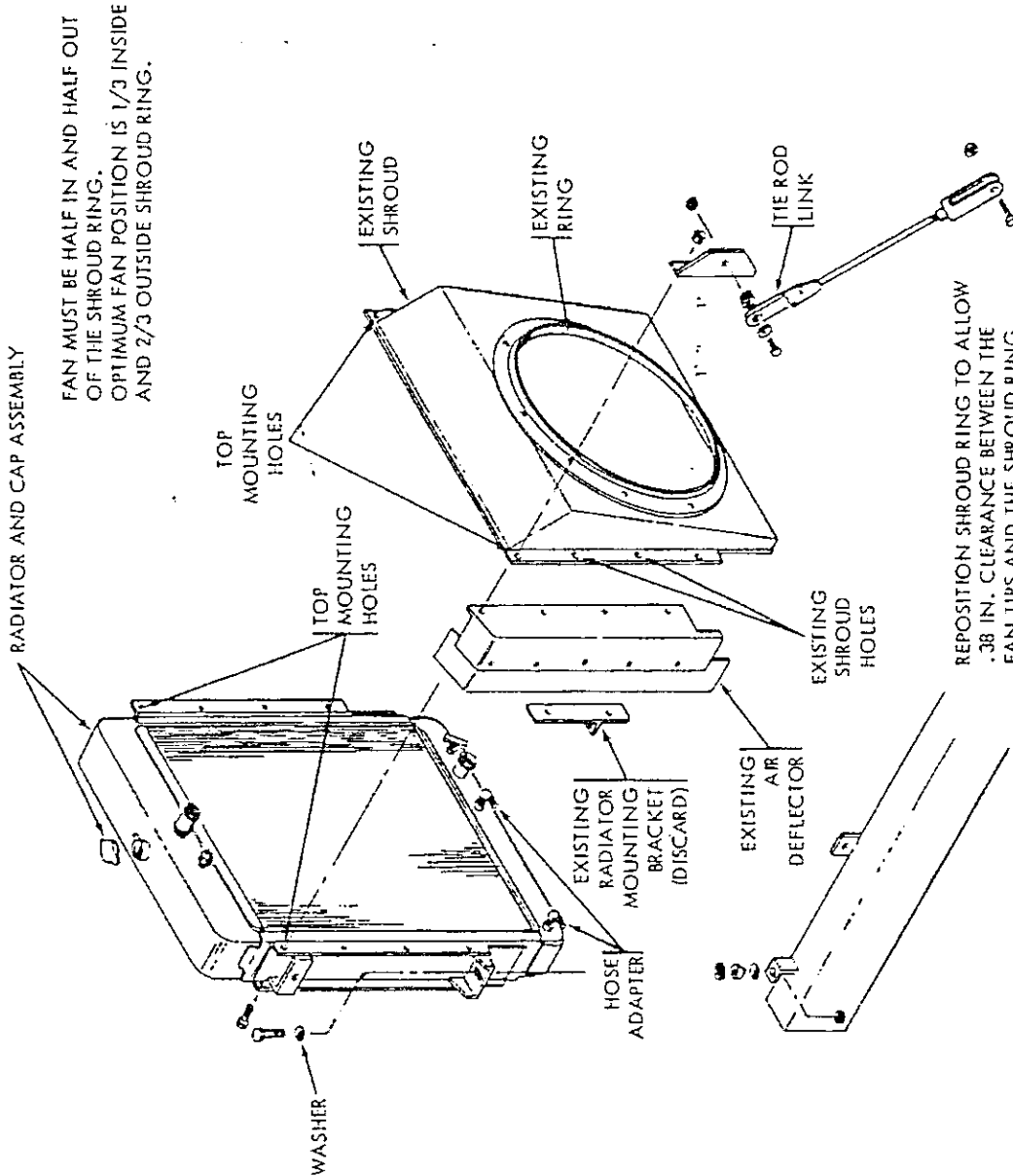


FIGURE 2





FMC Corporation  
 Motor Coach Division  
 333 Brokaw Road Box 564 Santa Clara California 95052

URGENT

ROUTINE

MANDATORY

INFORMATIONAL

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DATE May 20, 1976

NUMBER 2913-40003

ATTENTION: SERVICE MANAGERS	GROUP 13
11. Install radiator and shroud assembly in coach using two washers (5100570-02) on mounting bolts and tighten all bolts to proper torque as listed in Group 13 of Transit Service Manual. 12. Check fan tip to shroud clearance per Figure 2.	Cooling
	SUBJECT Service Replacement Radiator Kits  Transit Coaches 00530 to 00599 (Kit 5109233)  00600 to 00964 (Kit 5109232)
	MODEL (S) AFFECTED  Transit Series Coaches 00530 to 00964.



URGENT

ROUTINE

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INFORMATIONAL

# Service Bulletin

DATE March 1, 1977

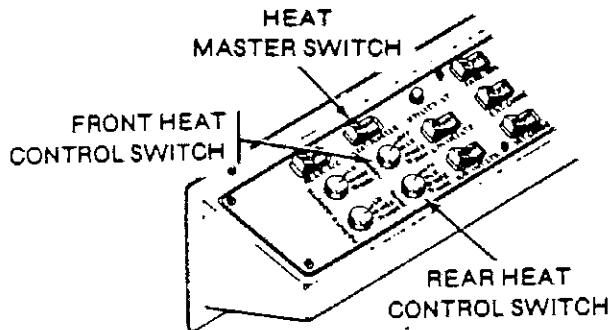
NUMBER 2913-30002

<p>ATTENTION: SERVICE MANAGERS</p>	<p>GROUP</p>
<p><u>DESCRIPTION</u></p>	<p>13</p>
<p>This bulletin provides instructions for proper bleeding of air when working on the cooling system.</p> <p>Any repairs to the coach cooling system may allow air to enter the system. If not properly bled off this trapped air could cause high temperatures, high pressures, and steam flashes within the system.</p> <p><u>COMPLIANCE</u></p> <p>Owners are urged to comply with this bulletin to avoid damage to coach components and subsequent delays due to coach being out of service.</p>	<p><u>SUBJECT</u></p> <p>Bleeding coolant of air in cooling system.</p>
<p><u>INSTRUCTIONS</u> (See attached illustration)</p> <ol style="list-style-type: none"> <li>1. Fill coolant system with a mixture of 50% water and ethylene glycol. Before doing this make sure all bleed valves are closed.</li> <li>2. Make certain rear heaters booster pump inlet control valve is ON.</li> <li>3. Start engine and run until temperature reaches 180 degrees.</li> <li>4. Open bleed valve on front heater-cooler unit. This bleed valve is located at front of coach near the master cylinder.</li> <li>5. Open bleed valve at each rear heater.</li> <li>6. Allow coolant to flow from bleed valves until no air bubbles appear in the coolant, then close each bleed valve.</li> <li>7. Replace any lost coolant by topping off at radiator.</li> </ol> <p><b>F.M.C., AS OF 12/31/75, NO LONGER HONORS PARTS OR LABOR REIMBURSEMENT AS OUTLINED IN THIS BULLETIN</b></p>	<p><u>MODEL (S) AFFECTED</u></p> <p>All transit coaches</p>

## Service Bulletin

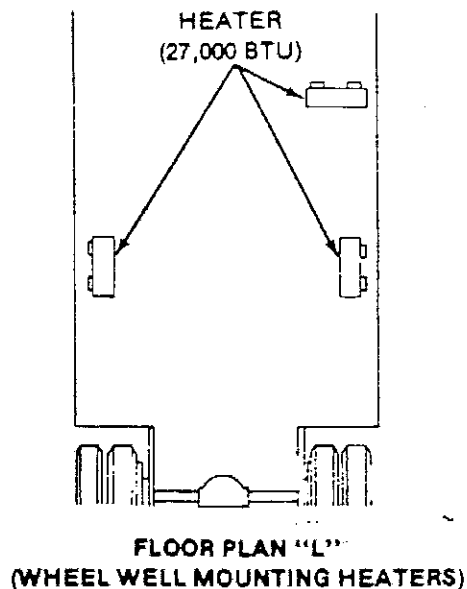
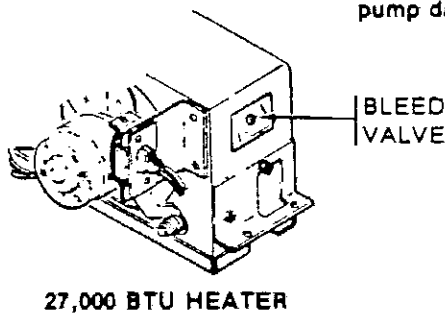
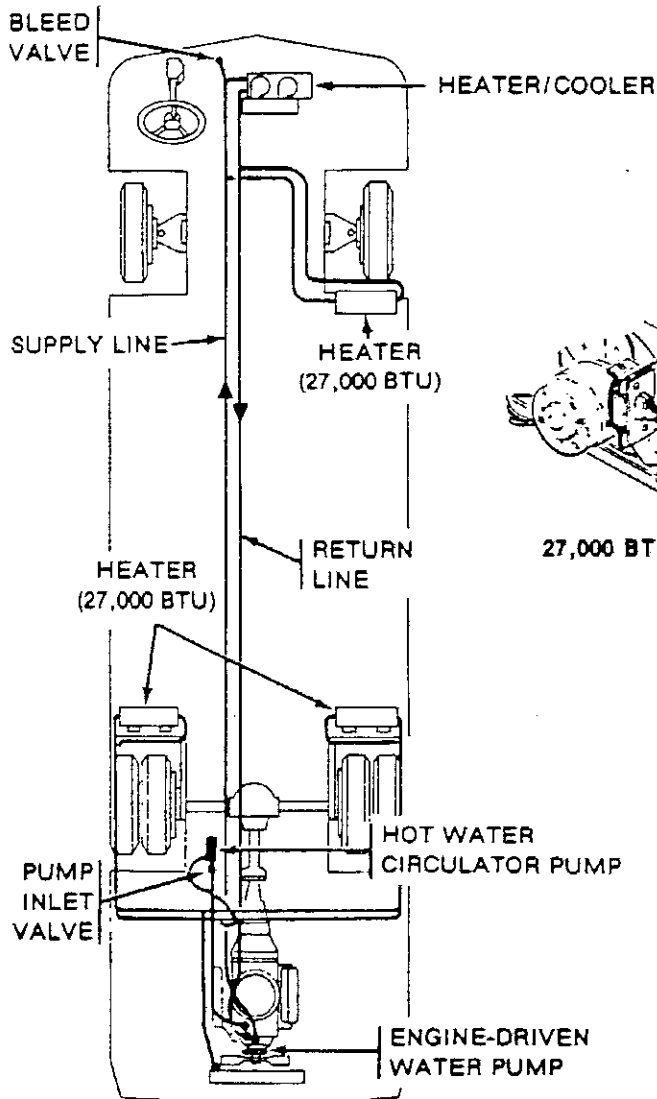
DATE March 1, 1977

NUMBER 2913-30002



### CAUTION

The hot water circulator pump must not be operated ("HEAT MASTER" switch must remain "OFF") while the hot water pump inlet valve is in shut-off position. Pump motor and seal damage could occur. It is recommended that the "HEAT MASTER" electrical circuit be deactivated by disconnecting (taping and tying back) the 12Vdc power supply lead at the switch, if coach is to be operated for an extensive period with the pump inlet valve off. This will eliminate the possibility of accidental movement of the switch which could result in pump damage.



(FLOOR PLAN "V" AND "R")  
(WHEEL WELL MOUNTING)