COOLING SYSTEM AND RADIATOR GROUP

INDEX

SECTION "A"

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COOLING SYSTEM SPECIFICATIONS

MODEL:	L-110	L-120 L-130	L-110 L-120 L-130	L-150 L-153	L-150 L-153	L-160 L-163 L-164	L-160 L-163 L-164	L-165
ENGINE:	SD-220	SD-220	SD-220	SD-220	SD-220	SD-240	SD-240	SD-240
TYPE OF COOLING:	STD.	STD.	INCR.	STD.	INCR.	STD.	INCR.	STD. & INCR.
COOLING SYSTEM: Capacity (qts.)	17	17	17	18	18	18	18	18
FAN BELT: Type	V	V	V	V	V	V	V	V
Number used	1	1	1	1	1	1	1	1
RADIATOR HOSE: Inlet (upper)	2x8-7/8	2x8-7/8	2x8-7/8	2x8-7/8	2x8-7/8	2x8-7/8	2x8-7/8	2x8-7/8
Outlet (lower)	2x11-13/32	2x11-13/32	2x11-13/32	2x11-13/32	2x11-13/32	2x11-13/32	2x11-13/32	2x11-13/32
I.H.: Core number								
Thickness	1-25/32	1-25/32	1-25/32	2-9/32	2-9/32	2-9/32	3	3
Fins per inch	7	7	9	8	8	8	9	9
Shroud dia.	18-1/2	18-1/2	18-1/2	18-1/2	20	20	20	20
Fan	16-28°	17x30°	17x30°	17x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°
Pulley	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1
MODINE: Core number								
Thickness	1-25/32	1-25/32	1-25/32	2-9/32	2-9/32	2-9/32	3	3
Fins per inch	7	7	9	8	8	8	9	9
Shroud dia.	18-1/2	18-1/2	18-1/2	18-1/2	20	20	20	20
Fan	16x28°	17x30°	17x30°	17x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°
Pulley	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1
McCORD: Core number								
Thickness	1-3/4	1-3/4	1-3/4	2-1/4	2-1/4	2-1/4	3	3
Fins per inch	7	7	8	8	8	8-1/2	9	9
Shroud dia.	18-1/2	18-1/2	18-1/2	18-1/2	20	20	20	20
Fan	16x28°	17x30°	17x30°	17x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°	18-1/2x30°
Pulley	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1	1.21-1

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COOLING SYSTEM SPECIFICATIONS

MODEL:	LB-140	LM-120 LM-250	LM-120 LM-150	L-170-3-4 L-180-3-4 LF-170 LF-180	L-170-3-4 L-180-3-4 LF-170 LC-180	L-175	L-185 L-190 L-193 L-194	L-185 L-190 L-193 L-194
ENGINE:	SD-220	SD-220	BD-269	BD-269	BD-269	BD-269	RD-372	RD-372
TYPE OF COOLING:	STD. & INCR.	STD.	INCR.	STD.	INCR.	STD. & INCR.	STD.	INCR.
COOLING SYSTEM: Capacity (qts.)	. . . . .	17	18	21	21	21	28	28
FAN BELT: Type	V	V	V	V	V	V	V	V
Number used	1	1	1	1	1	1	1	1
RADIATOR HOSE: Inlet (upper)	2x8-7/8	2x8-7/8	2x8-7/8	2x13-1/4	2x13-1/4	2x13-1/4	2x11-1/2	2x11-1/2
Outlet (lower)	2x11-13/32	2x11-13/32	2x11-13/32	2x10-13/32	2x10-13/32	2x10-13/32	2-1/8x13-1/16	2-1/8x13-1/16
I.H.: Core number								8103-1-1
Thickness	3	1-25/32	2-1/4	2-1/4	3	3	3	3
Fins per inch	9	7	8	7	9	9	8	10
Shroud dia.	20	18-1/2	18-1/2	18-3/4	18-3/4	18-3/4	22-1/2	22-1/2
Fan	18-1/2x30°	17x30°	17x30°	17-3/4x35°	17-3/4x35°	17-3/4x35°	20x30°	20x30°
Pulley	1.21-1	1.21-1	1.21-1	1.11-1	1.11-1	1.11-1	1.13-1	1.3-1
MODINE: Core number								
Thickness	3	1-25/32	2-1/4	2-9/32	3	3	3	3
Fins per inch	9	7	8	7	9	9	8	10
Shroud dia.	20	18-1/2	18-1/2	18-3/4	18-3/4	18-3/4	22-1/2	22-1/2
Fan	18-1/2x30°	17x30°	17x30°	17-3/4x35°	17-3/4x35°	17-3/4x35°	20x30°	20x30°
Pulley	1.21-1	1.21-1	1.21-1	1.11-1	1.11-1	1.11-1	1.13-1	1.3-1
McCORD: Core number								
Thickness	3	1-3/4	2-1/4	2-1/4	3	3	3	3
Fins per inch	9	7	8	7	9	9	8	10
Shroud dia.	20	18-1/2	18-1/2	18-3/4	18-3/4	18-3/4	22-1/2	22-1/2
Fan	18-1/2x30°	17x30°	17x30°	17-3/4x35°	17-3/4x35°	17-3/4x35°	20x30°	20x30°
Pulley	1.21-1	1.21-1	1.21-1	1.11-1	1.11-1	1.11-1	1.13-1	1.3-1

COOLING SYSTEM SPECIFICATIONS

MODEL:	L-190 L-194 L-195 LF-190 L-200 L-204	L-190 L-194 L-195 LF-190 L-200 L-204	L-200 L-210	L-200 L-210	L-220 L-225	LD-230	LD-230
ENGINE:	RD-406	RD-406	RD-450	RD-450	R-6602	HRBB-600	NHB-600
TYPE OF COOLING:	STD.	INCR.	STD.	INCR.	STD. & INCR.	STD. & INCR.	STD. & INCR.
COOLING SYSTEM: Capacity (qts.)	28	28	28	28			
FAN BELT: Type	V	V	V	V			
Number used	2	2	2	2			
RADIATOR HOSE: Inlet (upper)	2x11-1/2	2x11-1/2	2x11-1/2	2x11-1/2			
Outlet (lower)	2-1/8x13-1/16	2-1/8x13-1/16	2-1/8x13-1/16	2-1/8x13-1/16			
I.H.: Core number	8103-3-1	8103-1-1	8103-1-1	8103-1-1			
Thickness	3	3	3	3	3	3	3
Fins per inch	8	10	10	10			
Shroud dia.	22-1/2	22-1/2	22-1/2	22-1/2			
Fan	20x30°	20x30°	30x30°	21x30°			
Pulley	1.13-1	1.3-1	1.13-1	1.3-1			
MODINE: Core number							
Thickness	3	3	3	3	3	3	3
Fins per inch	8	10	10	10			
Shroud dia.	22-1/2	22-1/2	22-1/2	22-1/2			
Fan	20x30°	20x30°	20x30°	21x30°			
Pulley	1.13-1	1.3-1	1.13-1	1.3-1			
McCORD: Core number							
Thickness	3	3	3	3	3	3	3
Fins per inch	8	10	10	10			
Shroud dia.	22-1/2	22-1/2	22-1/2	22-1/2			
Fan	20x30°	20x30°	20x30°	21x30°			
Pulley	1.13-1	1.3-1	1.13-1	1.3-1			

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COOLING SYSTEM AND RADIATORS

COOLING SYSTEM AND RADIATORS

Rust Prevention

(Also see "Cooling System Servicing" paragraphs.)

One of the common causes of engine overheating is a rust-clogged cooling system. Rust is the result of water action on steel and iron when air is present. Scales originate from impurities in the water used in cooling system. Rust and scales interferes with circulation and cooling, causing overheating.

Rust and corrosion formation can be prevented by maintaining full strength corrosion protection at all times.

For rust protection during the winter months, a fresh filling of an anti-freeze containing an effective corrosion preventive should be installed in the fall. In the spring, drain and discard the old anti-freeze solution because the cooling liquid may have become contaminated by corrosive impurities during use, and the rust preventives or "inhibitors" in the anti-freeze solution may have become weakened and exhausted in continual driving.

During the summer, a rust preventive should be added to the cooling system to protect the system against corrosion during warm weather operation. This inhibitor solution should be drained in the fall and a fresh filling of chemically treated anti-freeze solution again installed.

Cleaning The Cooling System

(Also see "Cooling System Servicing" paragraphs.)

Approximately twice a year, or oftener, depending upon kind of cooling water used, the cooling system should be drained and thoroughly flushed out. This is particularly important before using an anti-freeze solution.

Unless the cooling water is treated with a corrosion preventive, rust and scale will eventually clog up passages in radiator and water jackets. This condition is aggravated in some localities by the formation of insoluble salts from the water used.

Cleaning solutions are available which have proven very successful in removing the accumulation of rust, scale, sludge and grease. These solutions should be used according to the manufacturer's recommendation.

If no commercial cleaning solution is available, dissolve about 4 pounds of ordinary washing soda in sufficient water to fill the complete cooling system. Leave radiator filler cap off and run engine for about 1/2 hour or until engine gets hot. Then drain and flush thoroughly with clean water.

When draining the cleaning solution, disconnect the radiator outlet hose, as large particles of sediment will not pass through the drain cock.

If radiator is clogged with insoluble salt formations it should be taken to a reputable concern specializing in the removal of such formations. Reliable radiator service stations are familiar with local conditions and are equipped to apply the proper treatment.

Draining Cooling System

(Also see "Cooling System Servicing" paragraphs.)

During freezing weather, if anti-freeze solutions are not used, the entire cooling system should be drained when truck is not in use. On the Silver Diamond and Blue Diamond Series engines, it is necessary to remove the pipe or drain cock located on the right side of the crankcase between the generator and starter. On the Red Diamond and R-6602 engines this plug is located on the right rear of crankcase.

Opening the radiator drain cock on these engines will only drain the water that is in the radiator and cylinder head, leaving the water jackets in the cylinder block, full, and if freezing occurs, damage to the block will result. Be sure to replace plug (or close drain cock) before refilling system. Engines should be level when drained in order that all water in the system can flow out. BE SURE TO REFILL COOLING SYSTEM BEFORE STARTING ENGINE.

Anti-Freeze Solutions

IMPORTANT: Do not under any circumstances use Honey -- Salt -- Kerosene -- Glucose or Sugar, in the cooling water as an anti-freeze.

These at the best are poor substitutes and will cause trouble due to corrosion, clogging of the system, and deterioration of the rubber hose connections. Use only anti-freeze solutions manufactured by a reputable concern.

Before installing any anti-freeze solution the following items should be checked:

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1. Tighten all water connections. Hose connections should be in good condition inside and out.

2. Inspect water pump for leaks. A leaking water pump indicates need of water pump over-haul since no packing nut or adjusting seal is provided.

3. Adjust fan belt to proper tension. Replace if necessary.

4. Drain and clean cooling system.

Radiator Mountings

For detailed information on radiator mountings and installations, see illustrations (Fig. 2 to 6 inclusive) covering all L-line trucks. Mounting insulators are required to provide a specific amount of flexibility in radiator mounting, otherwise premature failure will result.

Radiator Cap (Pressure Type)

Radiator caps of pressure-sealing type, as shown in Fig. 1, are used to hold the cooling

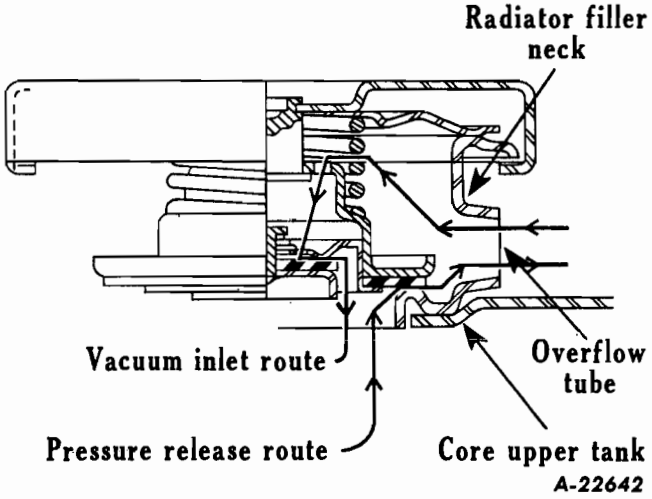

Fig. 1 - Radiator Cap (Pressure Type).

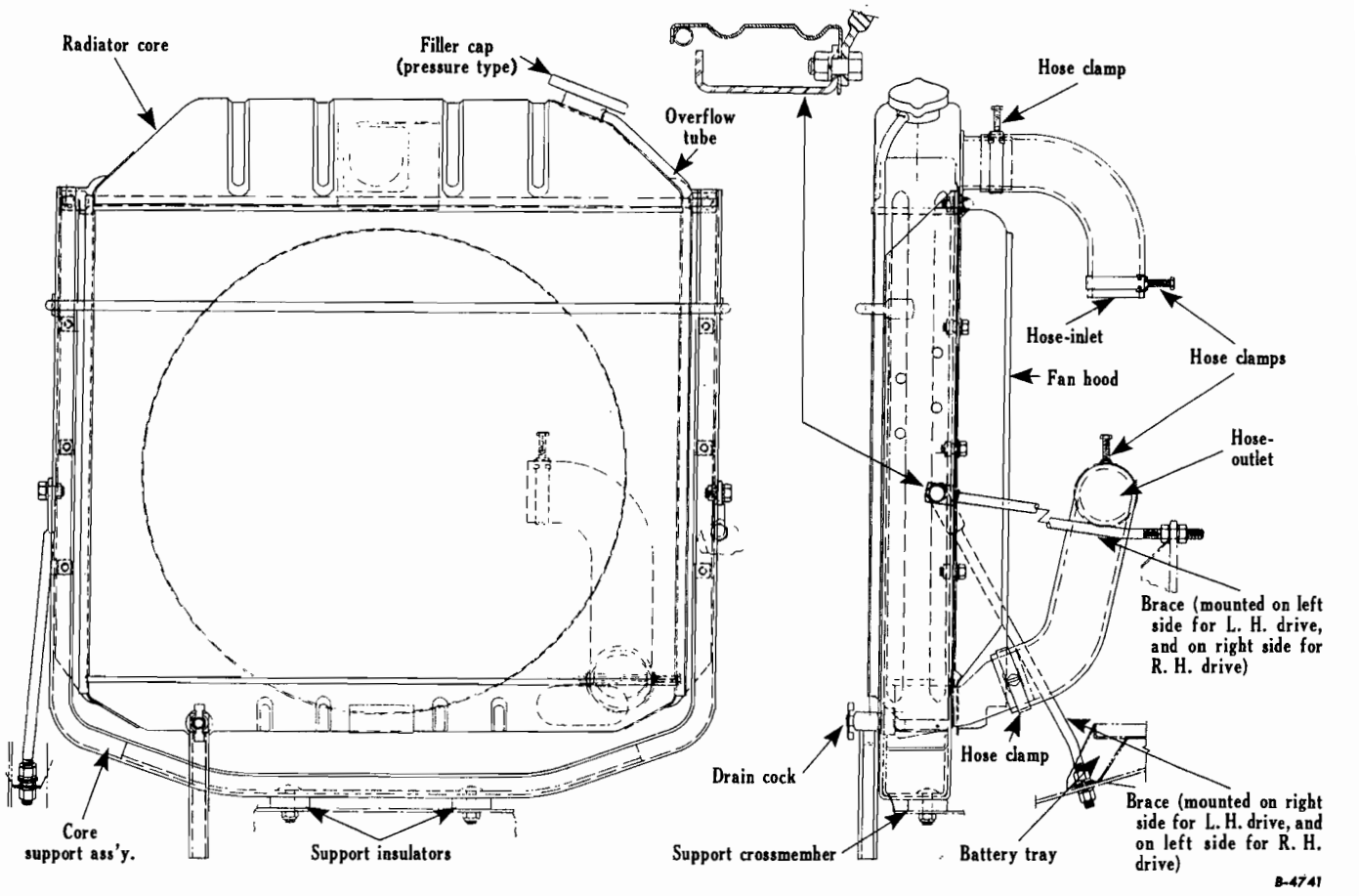

Fig. 2 - Radiator Mounting, L-110, L-120, L-130, LB-140.

system under a slight pressure, increasing the boiling point of the cooling solution, and preventing loss of the solution due to evaporation and overflow.

The cap has a spring-loaded valve, the seat of which is below the over-flow tube in the filler neck. This prevents the escape of air or liquid while the cap is in position. When the cooling system pressure reaches a predetermined point, the cap valve opens and will again close when the pressure drops to the predetermined point.

This cap is also equipped with spring-loaded valve, to release the vacuum during the cooling period while engine is not in use. The vacuum valve releases at approximately 5/8 pounds per square inch.

When removing the pressure-type cap from the radiator, perform the operation in two steps. Loosening the cap to its first notch raises the valve from the gasket and releases the pressure through the over-flow pipe. In the first stage position of the cap, it should be possible to depress the cap approximately 1/8 inch. The prongs on the cap can be bent to adjust this condition. Care must be taken that the cap is not too loose, as this would prevent proper sealing.

In removing the cap loosen it slowly, and then pause a moment. This will avoid possible burning by hot water or steam. Then continue to turn the cap to the left until you can remove it.

NOTE: REMOVE CAP WHEN DRAINING COOLING SYSTEM TO ASSURE PROPER DRAINING.

Cooling System Servicing

1. CLEANING:

   (a) Coolant shut-off cocks to heaters and other accessories should be open to allow complete circulation during cleaning, flushing, and draining. Run

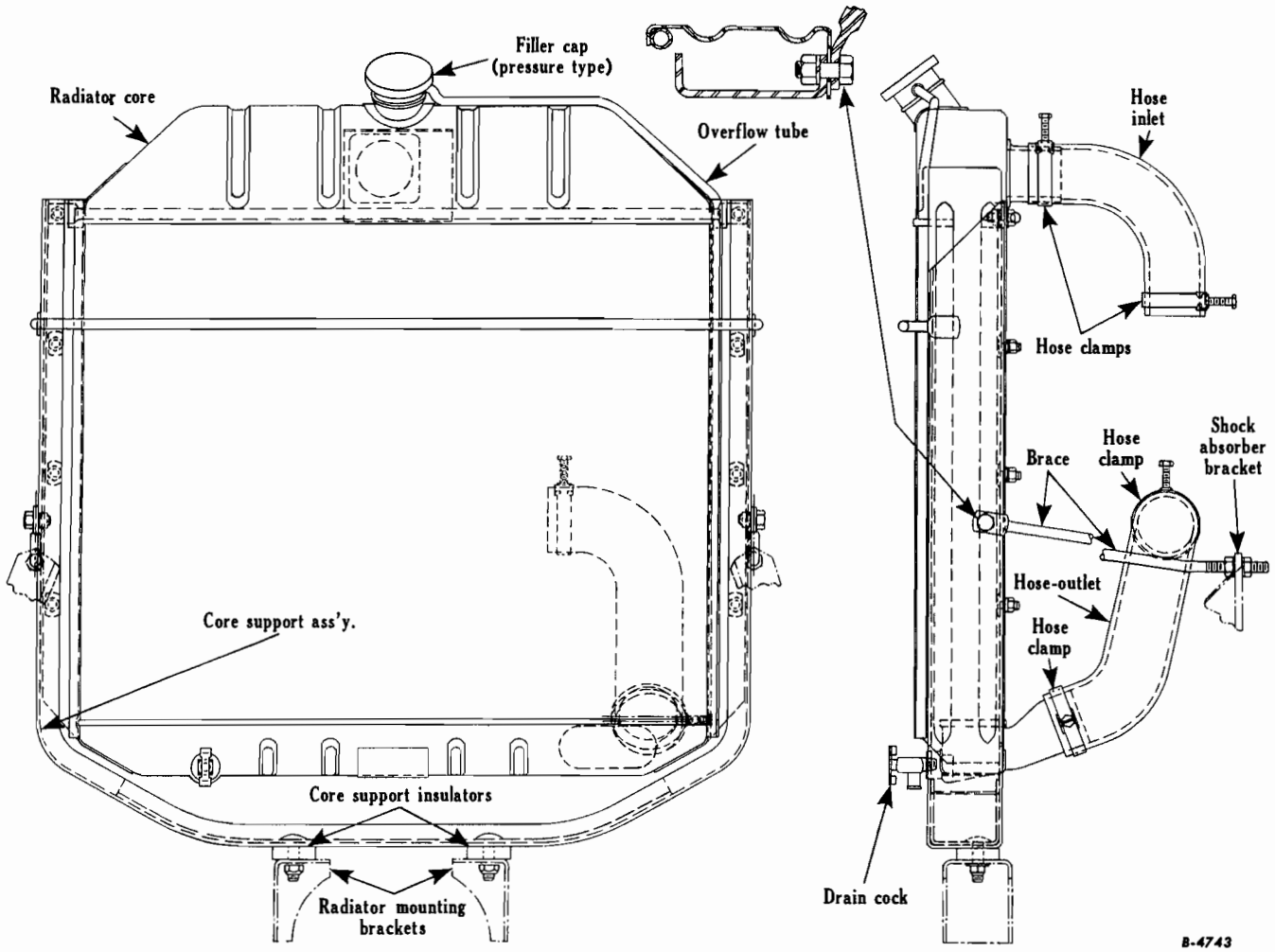

Fig. 3 - Radiator Mounting, LM-120, LM-150.

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the engine, with radiator covered if necessary, until temperature is up to operating range (160° F to 180° F). Stop engine, remove radiator cap, and drain system by opening drain cocks in radiator and cylinder block.

(b) Allow engine to cool, close drain cocks, and pour cleaning compound into radiator according to directions. Fill system with water.

(c) Place a clean drain pan to catch overflow, and use to maintain level in radiator. Do not spill solution on vehicle paint.

(d) Replace radiator cap, and run engine at moderate speed, covering radiator if necessary, so that radiator core reaches a temperature of 180° F or above, but does not reach boiling point. Allow the engine to run at least two hours at 180° F so that cleaning solution may take effect. Do not drive vehicle or allow liquid level in radiator to drop low enough to interfere with circulation.

(e) Stop engine as often as necessary to prevent boiling.

(f) With the engine stopped, feel the radiator core with bare hands to check for cold spots, and watch temperature gauge. When there is no change in temperature for some time, drain the cleaning solution.

(g) If clogging of core is relieved but not fully corrected, allow the engine to cool, pressure-flush the system (step 3 below), and repeat cleaning operation.

(h) If clogging of core, indicated by low temperature spots on core, is not relieved, radiator core must be removed for mechanical cleaning. Mechanical cleaning requires removal of upper and lower tanks and rodding out the accumulated rust and scale from the water passages of the core.

2. NEUTRALIZING:

(a) Allow engine to cool, close drain cocks, and pour neutralizer compound into radiator. Use as directed. Fill system with water.

(b) Run engine, with radiator covered if necessary, until radiator reaches operating temperature (160° F to 180° F).

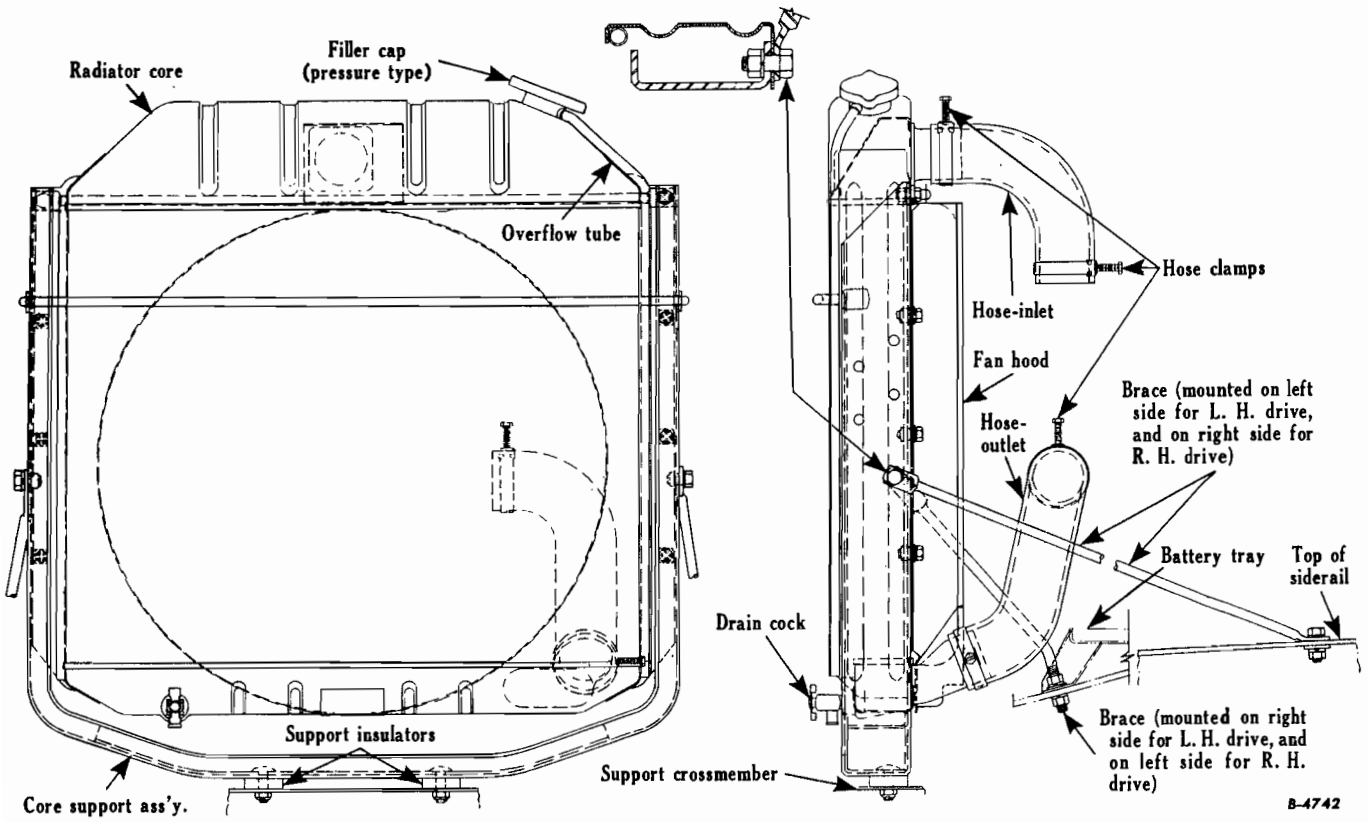

Fig. 4 - Radiator Mounting, L-150, L-153, L-160, L-163, L-164, L-165, LC-160.

(c) Drain the system by removing radiator cap and opening drain cocks.

3. PRESSURE FLUSHING:

(a) Disconnect the upper radiator hose which connects radiator core to engine water outlet and remove thermostat from engine water outlet.

(b) Clamp a convenient length of hose to radiator core outlet opening, and attach another suitable length of hose to the radiator inlet opening to carry away the flushing stream.

(c) Connect flushing gun to compressed air and water pressure, and clamp the gun nozzle to the hose attached to the radiator outlet opening.

(d) With radiator cap on tight, fill core with water. Turn on air pressure in short blasts to prevent core damage.

(e) Continue filling radiator with water and applying air pressure as above until the water comes out clear.

(f) Clamp the flushing gun nozzle firmly to a hose attached securely to the engine water outlet opening. Fill engine block with water, partly covering water inlet opening to facilitate complete filling.

(g) Turn on compressed air to blow out water and loose sediment. Continue filling with water and blowing out with air until flushing stream comes out clear.

(h) For badly clogged engine water jackets that do not respond to regular pressure flushing, remove engine cylinder head and core hole plugs and, with a suitable length of small copper tubing attached to the flushing gun nozzle, flush water jackets through openings.

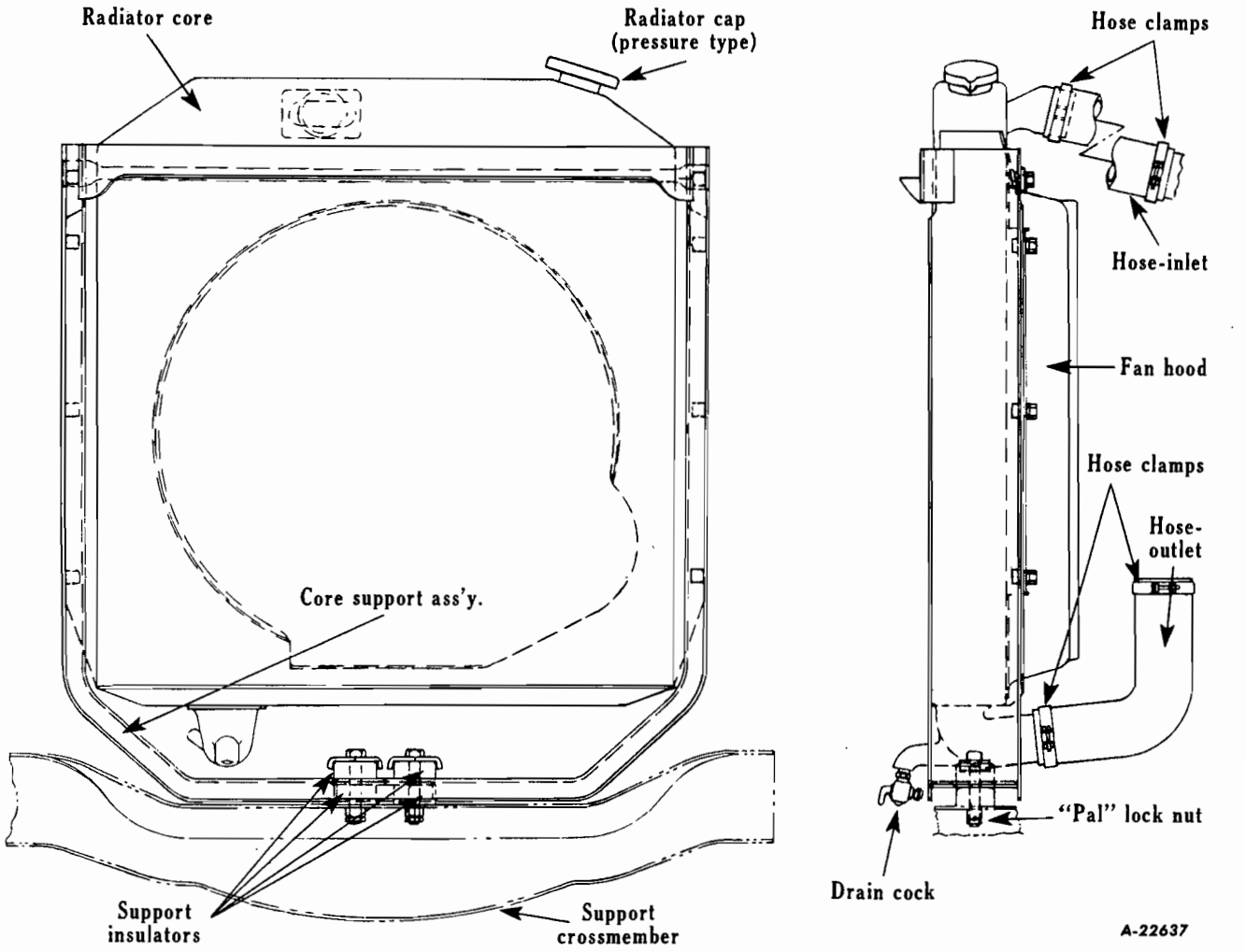

Fig. 5 - Radiator Mounting
L-170, L-173, L-174, L-175, LF-170, L-180, L-183, L-184, L-185.

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(i) When vehicle is equipped with a heater connected to the cooling system, flush the heater, following same procedure as for radiator core.

(j) After completing the flushing operation, clean out radiator overflow pipe, inspect the water pump, clean the thermostat, and radiator cap control valves. Check thermostat for proper operation before installation. (See "Engine" Section.)

(k) Blow insects and dirt from radiator core air passages, using water, if necessary, to soften obstructions.

4. LEAKS:

(a) Before pouring coolant into the cooling system a check should be made for leaks to avoid loss of solution, foaming and corrosion. Check tightness of cylinder head bolts, using tension wrench and tightening to specific number of foot-pounds with engine hot.

NOTE: After tightening cylinder head on valve-in-head engines it will be necessary to recheck valve stem clearance. Adjust, if necessary.

5. COOLANT SERVICE:

(a) When servicing for summer, fill system with clean water and add rust inhibitor compound. Use as directed.

(b) When servicing for winter, refill system with clean water and sufficient antifreeze solution for protection to lowest temperature likely to be encountered.

6. GENERAL INFORMATION:

(a) Never mix cleaning solution with inhibitor or antifreeze compounds.

(b) Before dismantling an engine preliminary to grinding valves, removing carbon, or rebuilding, always clean the cooling system first.

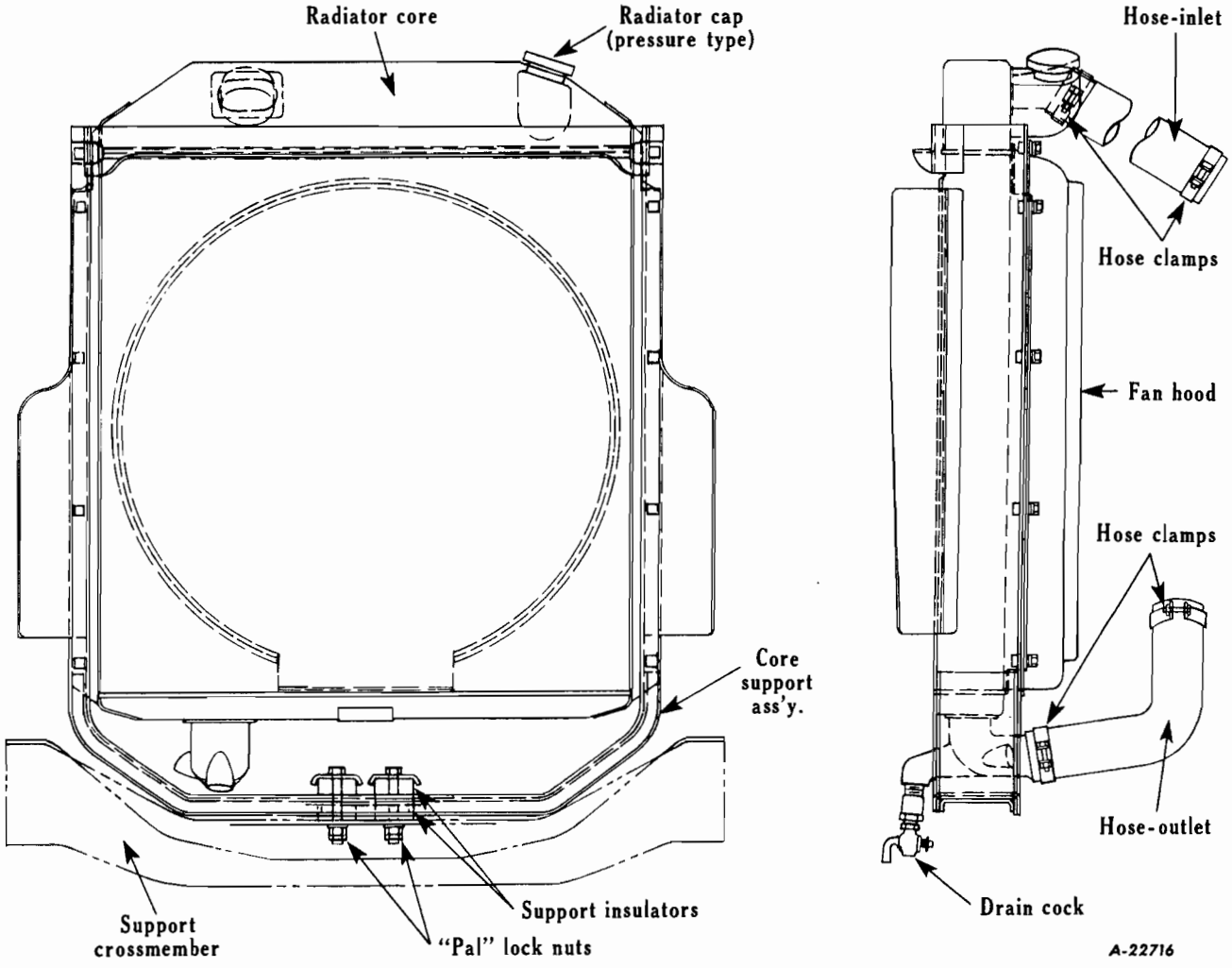

Fig. 6 - Radiator Mounting
L-190, LF-190, L-193, L-194, L-195, L-200, L-204, L-205, L-210, LF-210.