TB 9-2855-43 TO 36A12-1A-381

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

1/4-TON 4 X 4 UTILITY TRUCK M38A1 AND 1/4-TON 4 X 4 FRONT LINE AMBULANCE M170: INSTRUCTIONS FOR THE INSTALLATION OF PERSONNEL HOT-WATER HEATER KIT

Departments of the Army and the Air Force
21 November 1956

Washington 25, D. C.

This bulletin is correct to 9 November 1956

		Paragraphs	Pag
SECTION I.	INTRODUCTION Scope Application		2
II.	DESCRIPTION Personnel heater kit Packaging of kit		6
III.	INSTALLATION INSTRUCTIONS Personnel heater and defroster Winterfront cover	5 6	15
IV.	OPERATION AND ADJUSTMENT Defrosting the windshield Adjustment of radiator	7	16
	winterfront cover	_ 8	16

SECTION I

INTRODUCTION

- 1. Scope. α . These instructions are published for the use of all personnel concerned with the installation of the personnel hotwater heater kit for the $\frac{1}{4}$ -ton 4 x 4 utility truck M38A1 and the $\frac{1}{4}$ -ton 4 x 4 front line ambulance M170.
- b. In case of conflict between data in this bulletin and earlier publications, including the manufacturer's instruction manual, the data in this bulletin will govern.

- c. TM 9-2855, instruction guide: operation and maintenance of Ordnance materiel in extreme cold (0° to -65° F.) contains information as outlined in (1) through (5) below.
 - (1) Winterization equipment and processing, installation instructions, and methods.
 - (2) Operation and maintenance in extreme cold.
 - (3) Preparation of cooling systems for low temperatures.
 - (4) Storage, handling, and use of fuels, lubricants, and antifreeze compounds.
 - (5) Method of adjusting specific gravity readings of batteries exposed to low temperatures.

Note. TM 9-2855 contains general information on operation and maintenance of ordnance materiel in extreme cold, which is applicable to these vehicles as well as to all other vehicles. This bulletin and TM 9-2855 must be considered as one publication, not merely explanatory supplements to each other.

- d. Reference will also be made to the publications listed in (1) through (7) below.
 - (1) TM 9-850, Abrasive, Cleaning, Preserving, Sealing, Adhesive, and Related Materials Issued for Ordnance Materiel.
 - (2) TM 9-2835, Lubrication.
 - (3) TM 9-2857, Storage Batteries: Lead-Acid Type.
 - (4) TM 9-2858, Cooling Systems: Vehicles and Powered Ground Equipment.
 - (5) FM 31-70, Basic Arctic Manual.
 - (6) FM 31-71, Operations in the Arctic.
 - (7) TM 9-8014, ¼-ton 4 x 4 Utility Truck M38A1 and ¼-ton 4 x 4 Front Line Ambulance M170.
- **2. Application.** a. The hot-water personnel heater kit is for use in areas where the normal temperature during the coldest period of the year is between $+40^{\circ}$ and -20° F.
- b. The kit is to be installed by ordnance maintenance units or by troop units under the supervision of ordnance mechanics.
- c. The sequence of operations given herein is the result of trial installations; however, deviation from a strict adherence thereto to suit individual conditions is permissible. When interference is encountered during the installation of the kit because of the peculiar shape of the vehicle due to modifications or damage, a field expedient will be resorted to by the installing personnel to correct the particular interference.

SECTION II

DESCRIPTION

- **3.** Personnel Heater Kit. a. General. The major components of the personnel heater kit are described in b through d below and illustrated in figure 1.
- b. Personnel Heater. The personnel heater is of the hot-water blower type. It is mounted in the engine compartment on the right front fender splash shield and distributes heated air through ducts and a heat diverter to the crew compartment and/or the wind-shield glass for defrosting purposes.
- c. Heat Diverter. The heat diverter is mounted on the crew compartment side of the firewall. A manually controlled damper in the heat diverter provides distribution of heated air to the crew compartment and/or windshield glass in the proportions desired.
- d. Radiator Winterfront Cover. A radiator winterfront cover is provided to control the flow of cold air through the radiator. An adjustable flap permits manual control of the flow of cold air through the radiator, in accordance with the readings on the engine temperature gage.
- 4. Packaging of Kit. a. The personnel heater kit is packaged under the label of "Hot-Water Personnel Heater Kit" and bears the stock number G249-5702002 and the Ordnance part number 8710625. The kit is composed of—

Name	$Part\ No.$	Quantity
ADAPTER, diverter-to-firewall	8359639	1
ADAPTER, heat duct-to-firewall	8359644	1
ADAPTER, heater-to-heat duct	7537537	1
BOX, diverter, assy		1
BRACKET, support, heater		
mounting plate	8359665	1
BUSHING, pipe, shoulder, MI,		
glvd, ½ x 3/8	144039	2
CABLE, assy		1
CABLE, assy		1
CABLE, assy	0.004.0.0.0.0	1
CABLE, assy	8710639	1
CABLE, assy		1
CIRCUIT BREAKER	8376915	1
CLAMP, heat duct	7537473	4
CLAMP, hose, S, cd- or zn-pltd, 1 in.	502913	4
CLAMP, wiring harness	7385176	3
COCK, shutoff		2
CONNECTOR, Y	THE COLD HER A	1
COVER, winterfront assy	8710614	Ĺ
DUCT, defroster, assy	8359645	1
DUCT, flexible, 4 id x 13 lg	7384219	1



3

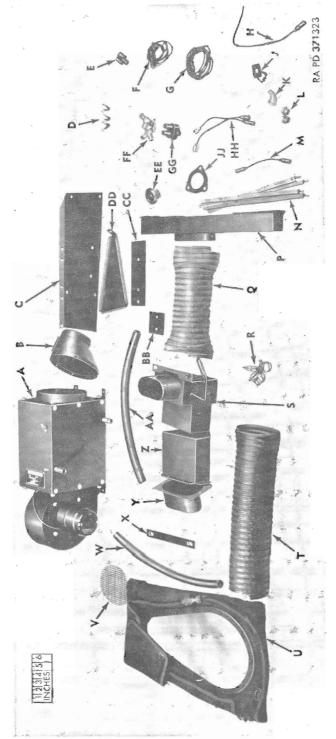


Figure 1. Hot-water personnel heater kit—major components.

M

A—Heater assy—8386435 B—Heater-to-heat duct adapter—7537537 C—Heater mounting plate—8710641 D—Wiring harness clamp—7385176 E-Y-connector-7982404 F-Resistor assy-8710856 G—Cable assy—8710633 H—Cable assy—8710670 J__ | Heater switch-502676 (Heater switch nameplate—7986147 K—45-Deg street elbow—144119 L--1/2 x % pipe bushing-144039 M-Cable assy-8710635 N—Heat duct clamp—7537473 P—Defroster duct assy—8359645 Q—Flexible heat duct—7384219 R—Coolant hose clamp—502913 S—Diverter box assy—8359661 T—Flexible heat duct—*EAL-10602-4 U—Winterfront cover assy—8710614 V—Heater air inlet screen—7390375 W-Coolant hose-8710557 X---Plate assy---8359649 Y—Heat duct-to-firewall adapter—8359644 Z—Diverter-box-to-firewall adapter—8359639 AA-Coolant hose-8710558 BB—Backing plate—8359651 CC—Backing plate—8359652 DD—Heater mounting plate support bracket—8359665 EE—Coolant thermostat—7954461 FF—Shutoff cock—7524043 GG-Circuit breaker-8376915 HH—{Cable assy—8710638 Cable assy—8710639 JJ—Thermostat gasket—8328456

Figure 1.—Continued.

Name	Part No.	Quantity
DUCT, flexible, 4 id x 19½ lg	*EAL-10602-4	1 1
ELBOW, pipe, street, 45 deg,		
MI, glvd, % in.	144119	1
GASKET, thermostat		1
GROMMET	7951712	1
HEATER, assy	8386435	1
HOSE, coolant, % id x 161/2 lg		1
HOSE, coolant, % id x 19½ lg.	8710558	1
NUT, PLAIN, HEXAGON: S, cd- or	120622	2
zn-pltd, No. 8 (0.164)-32NC-2B,		
¹ 1/ ₃₂ w, ½ thk.		
NUT, PLAIN, HEXAGON: S, cd- or	120614	4
zn-pltd, No. 10 (0.190)-32NF-2B,		
3% w, 1% thk.		
NUT, PLAIN, HEXAGON: S, cd- or	120375	12
zn-pltd, ¼-20UNC-2B, ¾6 w,		
7/32 thk.		

^{*}E. A. Laboratories Inc. Part Number.

^{*} E. A. Laboratories Inc. Part Number.

Name	Part No.	Quantity
NUT, PLAIN, HEXAGON: S, cd- or	134556	4
zn-pltd, $\frac{5}{16}$ -18UNC-2B, $\frac{9}{16}$ w,		
7/32 thk.		
PLATE, name, heater switch		1
PLATE, assy	8359649	1
PLATE, backing		1
PLATE, backing		1
PLATE, mounting, heater	8710641	1
RESISTOR, blower motor (5 ohm)	8710856	1
SCREEN, heater air inlet		1
SCREW, CAP, HEXAGON HEAD: low-	120854	2
carb-S, cd- or zn-pltd, 1/4-		
20UNC-2A x %.		
SCREW, CAP, HEXAGON HEAD: low-	121887	9
carb-S, cd- or zn-pltd,		
$\frac{1}{4}$ -20UNC-2A x $\frac{3}{4}$.		
SCREW, CAP, HEXAGON HEAD: low-	121940	1
carb-S, cd- or zn-pltd, 1/4-		
20UNC-2A x ¾.		
SCREW, mach, 1/4-20 x 1/16		4
SCREW, mach, ¼-20 x ¾	453050	2
SCREW, MACHINE: fil-hd, S, ed-	120216	4
or zn-pltd, No. 10 (0.190)-		
$32NF-2A \times \frac{1}{2}$.		
SCREW, MACHINE: rd-hd, S, ed-	132772	2
or zn-pltd, No. 8 (0.164)-32		
NC-2A x %.		
SCREW, tapping, No. 6 (0.138) x ½	164327	2
SCREW, tapping, No. 8 (0.164) x %	170466	4
SCREW, TAPPING, THREAD CUTTING:	172223	3
fil-hd, sltd-blunt-pt, S, ed-		
or zn -pltd, $\frac{1}{4}$ -2ONC-2 x $\frac{1}{2}$.		
SWITCH, toggle, single-pole-	502676	ĺ
double throw, ST40E.		
THERMOSTAT, engine coolant	7954461	1
WASHER, FLAT: S, cd- or zn-pltd,	120392	4
%2 id, % od, 0.065 thk.		
WASHER, FLAT: S, cd- or zn-pltd,	446363	4
% id, % od, 0.083 thk.		
WASHER, LOCK: int-ext-teeth, S,	178364	4
cd- or zn-pltd, No. 8 screw		7
size x 0.610-in. od.		
WASHER, LOCK: int-ext-teeth, S,	178378	4
cd- or zn-pltd, No. 10 screw		_
size x 0.610-in, od.		
WASHER, LOCK: int-ext-teeth, S,	174916	12
cd- or zn-pltd, ¼ bolt size	211010	
x 0.760 od.		
WASHER, LOCK: int-teeth, S, cd-	138526	2
or zn-pltd, No. 6 screw size.	100000	4
WASHER, LOCK: int-teeth, S, cd-	138530	2
or zn-pltd. No. 8 screw size.	100000	4
or mighted, tro. o octor bine.		

b. If it is anticipated that the winterization equipment will subsequently be removed from the vehicle at the same station where installed, store the boxes, cartons, and packing materials for use in future storage or shipment. In repacking, all openings in tubes and hose should be plugged to prevent entrance of foreign matter.

SECTION III

INSTALLATION INSTRUCTIONS

Note. The key letters shown below in parentheses refer to figure 1.

5. Personnel Heater and Defroster.

- a. Remove canvas top, hood, and batteries in accordance with TM 9-8014.
- b. Drain coolant from radiator and remove pipe plugs from water pump and engine head.

Note. Save pipe plugs for installation when heater kit is removed from vehicle.

- c. Remove thermostat housing, gasket, and thermostat. Discard gasket and thermostat.
- d. Remove the heater opening plate WO-681268 from the firewall.
- e. Remove and discard the left batteries box-to-dash panel brace.
- f. Install bolts that secured brace (e above) to batteries box in original locations and secure, using $\frac{3}{8}$ -inch flatwashers and $\frac{5}{16}$ -inch hexagon nuts.
- g. Save $\frac{5}{16}$ x $\frac{3}{4}$ machine bolts and lockwashers that secured brace to dash panel, for diverter box installation.
- h. Cut an additional hot air outlet opening in the cowl in accordance with figure 2, using a $1\frac{1}{2}$ -inch hole saw and a hacksaw. Cut a mating hole in the windshield weatherstrip and defroster chamber.
- i. Drill two $\frac{5}{16}$ -inch diameter holes in cowl in accordance with figure 2.
- j. Assemble wide end of heater mounting plate support bracket (DD) to heater mounting plate (C), using two $\frac{1}{4}$ x $\frac{5}{8}$ cap screws, lockwashers, and hexagon nuts.
- k. Assemble narrow end of heater mounting plate support bracket (fig. 3) to right front fender splash shield by drilling a $\frac{9}{32}$ -inch diameter hole through splash shield and fender brace, 1 inch up from vehicle frame; secure with $\frac{1}{4}$ x $1\frac{3}{4}$ cap screw, lockwasher, and hexagon nut.

7

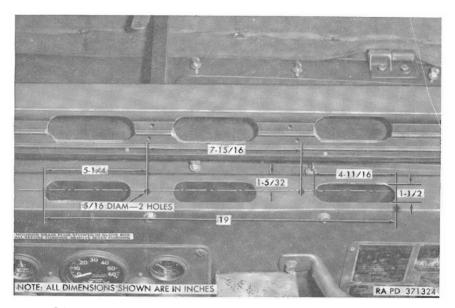


Figure 2. Cowl and windshield defroster chamber modification.

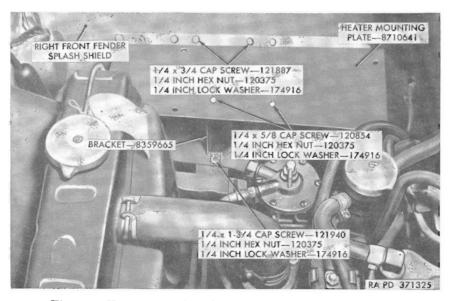


Figure 3. Heater mounting plate and support bracket installed.

8

- l. Position heater mounting plate on a level plane and drill five $\frac{9}{32}$ -inch diameter holes in splash shield, using mounting plate as a template.
- m. Position two backing plates (fig. 4) on wheel side of splash shield and secure heater mounting plate and backing plates to splash shield, using five $\frac{1}{4}$ x $\frac{3}{4}$ cap screws, lockwashers, and hexagon nuts.

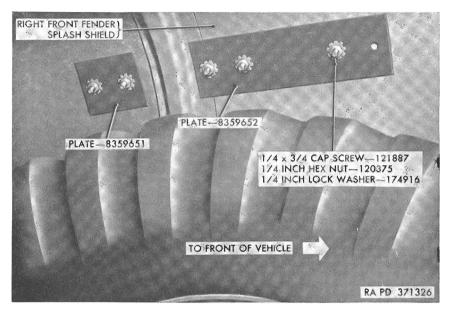


Figure 4. Backing plates installed.

n. Drill two $\frac{5}{32}$ -inch diameter holes (fig. 5) in dash panel, between light switch and instrument cluster, using circuit breaker (GG) as a template.

Note. Do not install circuit breaker at this time.

- o. Drill a $^{15}/_{32}$ -inch diameter hole (fig. 5) in dash panel, below and to the left of primer pump hole, for the heater switch.
- p. Turn each of the four instrument cluster mounting plate studs one-half turn counterclockwise and pull instrument cluster away from dash panel.
- q. Drill $\frac{5}{64}$ -inch diameter hole in firewall, two inches below the deep water fording valve cable hole.
- r. Assemble resistor assembly (F) to the crew compartment side of firewall, using a No. 6 x $\frac{1}{2}$ tapping screw and lockwasher, in hole drilled in q above. Position resistor assembly horizontally so that free end is toward center of vehicle and drill an additional

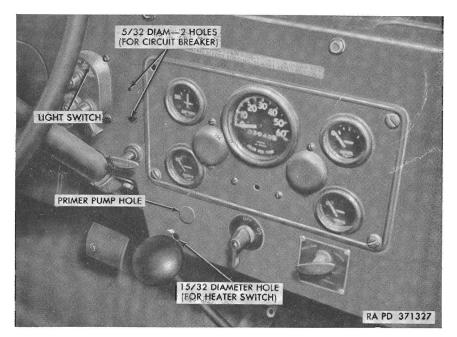


Figure 5. Location of circuit breaker and heater switch mounting holes.

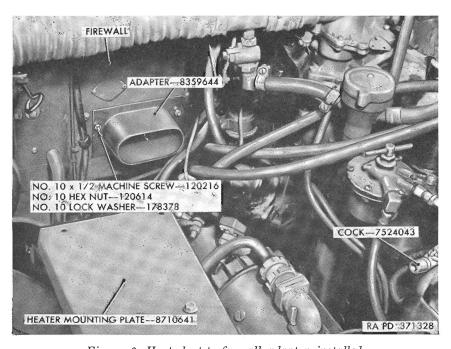


Figure 6. Heat duct-to-firewall adapter installed.

 $\frac{5}{64}$ -inch diameter hole, using resistor assembly as a template. Secure resistor assembly, using an additional No. 6 x $\frac{1}{2}$ tapping screw and lockwasher.

s. Position heat duct-to-firewall adapter (Y) over heater opening in firewall (fig. 6), and drill four $\frac{3}{16}$ -inch diameter holes in firewall, using adapter as a template.

Note. Do not install adapter at this time.

- t. Install coolant thermostat (EE) in thermostat housing and secure with retainer. Assemble thermostat housing and gasket (JJ) to engine, using original attaching parts.
- u. Install $\frac{1}{2}$ x $\frac{3}{8}$ pipe bushing (L) and shutoff cock (FF) in tapped hole at rear of cylinder head (fig. 7).
- v. Install $\frac{1}{2}$ x $\frac{3}{3}$ pipe bushing, 45-degree street elbow (K) and shutoff cock in tapped hole in water pump (fig. 7).
- w. Assemble 13-inch long flexible heat duct (Q) to defroster duct assembly (P), using heat duct clamp (N).
- x. Assemble opposite end of flexible heat duct to diverter box assembly (S), using heat duct clamp.

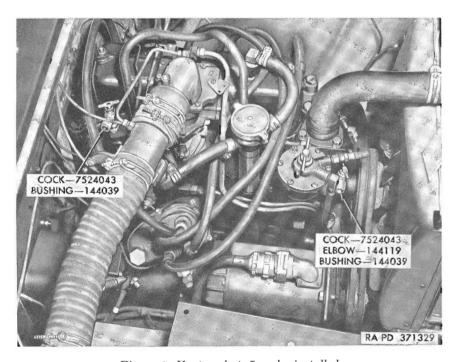


Figure 7. Heater shutoff cocks installed.

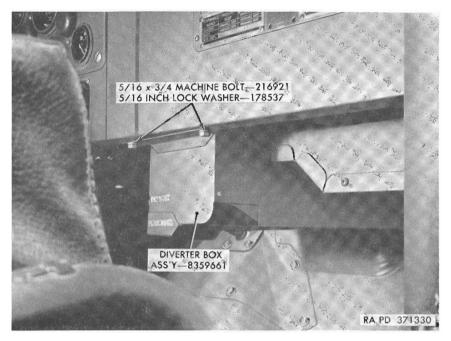


Figure 8. Diverter box assembly installed.

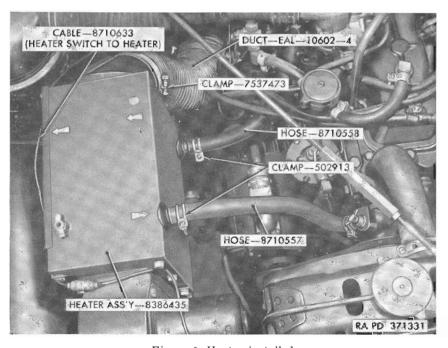


Figure 9. Heater installed.

- y. Assemble diverter-box-to-firewall adapter (Z) to hot air inlet opening in diverter box.
- z. Remove third and fourth dash-panel-to-cowl-bolts (counting from right side of vehicle).
- aa. Position defroster duct end of components assembled in w, x, and y above, between dash panel and batteries box.
- ab. Aline mounting holes in defroster duct with $\frac{5}{16}$ -inch diameter holes (fig. 2) drilled in cowl. Secure defroster duct to cowl, using two $\frac{1}{4}$ x $\frac{3}{4}$ machine screws.
- ac. Position plate assembly (X) on top of bottom flange of dash panel, with holes in plate alined with holes previously used for the batteries box-to-dash-panel brace.
- ad. Assemble diverter box assembly (fig. 8) to dash panel flange and plate assembly, using two $\frac{5}{16}$ x $\frac{3}{4}$ machine bolts and lockwashers previously removed.
- ae. Position diverter box-to-firewall adapter over heater opening in firewall and position heat-duct-to-firewall adapter over the same opening, but on engine side of firewall. Secure both adapters to firewall, using four No. 10 x $\frac{1}{2}$ machine screws, lockwashers, and hexagon nuts.
- af. Assemble heater-to-heat duct adapter (B) to heater, using four No. 8 x $\frac{3}{8}$ tapping screws and lockwashers.
- ag. Assemble heater air inlet screen (V) to heater using four $\frac{1}{4}$ x $\frac{3}{8}$ machine screws and $\frac{9}{32}$ -inch id flatwashers.
- ah. Assemble heater to heater mounting plate, using four $\frac{1}{4}$ x $\frac{3}{4}$ cap screws, $\frac{1}{4}$ -inch lockwashers, and $\frac{1}{4}$ -inch hexagon nuts.
- ai. Assemble 19-inch long flexible heat duct (T) to heat duct adapter on heater and to heat duct adapter on firewall, using two heat duct clamps (fig. 9).
- aj. Assemble $16\frac{1}{2}$ -inch coolant hose (W) to coolant outlet tube at top of heater side plate and to shutoff cock at water pump (fig. 9). Secure hose, using two hose clamps (R).
- ak. Assemble 19½-inch coolant hose (AA) to coolant inlet tube at bottom of heater side plate and to shutoff cock at rear of cylinder head (fig. 9). Secure hose, using two hose clamps.
- al. Position circuit breaker (GG) to back of dash panel between light switch and instrument cluster. Aline mounting holes in circuit breaker with holes drilled in n above and secure to dash panel, using two No. 8 x $\frac{7}{3}$ machine screws, No. 8 lockwashers, and No. 8 hexagon nuts.
- am. Assemble heater switch nameplate to heater switch (fig. 10), and assemble heater switch to dash panel using hole drilled in o above.



Figure 10. Wiring details for heater installation.

- an. Assemble cables in accordance with figure 10.
- ao. Install instrument cluster.
- ap. Secure cable asembly (G), to firewall, using three wiring harness clamps (D) and $\frac{1}{4}$ x $\frac{1}{2}$ tapping screws.
 - aq. Open heater shutoff cocks and close radiator drain cock.
 - ar. Fill radiator with specified coolant (TM 9-2855).
 - as. Install batteries and start engine.
- at. Inspect for coolant leaks and check operation of heater blower.
 - au. Stop engine and install hood and canvas top.
- **6.** Winterfront Cover. a. Position winterfront cover assembly (U, fig. 1) to front of vehicle so that windows provided for lights are in correct position (fig. 11).



Figure 11. Winterfront cover assembly installed.

b. Using cover as a template, mark locations for eight tie-down loops on brush guard.

Note. Eight tie-down loops, 16 No. $10 \times \%$ tapping screws, and two coverto-brush-guard springs are part of winterfront cover assembly.

- c. Use tie-down loops as templates and drill 16 holes, $\frac{1}{8}$ inch in diameter. Secure loops to brush guard, using 16 No. 10 x $\frac{3}{8}$ tapping screws.
- d. Assemble cover to brush guard by lacing the tie-down straps attached to cover through loops secured to brush guard.
 - e. Hook one end of each cover-to-brush-guard spring through

the eye of a $\frac{1}{8}$ x 2 cotter pin and clinch end of spring to secure cotter pin.

- f. Insert the cotter pins through the brass grommets in each corner of the cover bottom flap from the front and open cotter pins to secure to cover.
- g. Pull springs back under radiator brush guard toward rear of vehicle, and drill 1/8-inch diameter holes in fender splash shields at points that will maintain a 1/4-inch elongation of springs. Hook springs into holes.

SECTION IV

OPERATION AND ADJUSTMENT

7. Defrosting the Windshield. A damper within the heat diverter is actuated by a manual control handle on diverter box. When the control handle is all the way up, the damper diverts the heated air up through the defroster duct and onto the windshield for defrosting purposes and from there into the crew compartment. When the control handle is all the way down, the damper diverts the heated air directly into the crew compartment. In this position, a small amount of heated air will still pass onto the windshield. Intermediate positions of the control handle will distribute the heated air to the windshield and to the crew compartment in varying proportions, as desired.

Caution: When the windshield glass is heavily coated with frost, ice, or snow, and the temperature is near or below 0° F., direct the heat into the crew compartment in greater proportion than onto the windshield. This is necessary to avoid damage to the glass.

- **8.** Adjustment of Radiator Winterfront Cover. a. During standby periods, the winterfront cover must be completely closed.
- b. During vehicle operation, the driver should constantly note the reading on the engine temperature gage. To perform in an efficient and economical manner, the engine must operate at temperatures ranging from 170° to 180° F. Extreme cold will adversely affect engine performance by preventing the coolant (and working parts) from attaining the desired temperature.
- c. Keep the winterfront cover fully closed until the engine temperature reaches normal operating temperature (170° to 180° F.). Adjust flap on winterfront cover to maintain normal operating temperature.
- d. If engine temperature continues to rise above 180° F., after winterfront cover flap is fully opened, remove winterfront cover to prevent overheating of engine.

BY ORDER OF THE SECRETARIES OF THE ARMY AND THE AIR FORCE:

MAXWELL D. TAYLOR,

General, United States Army, Chief of Staff.

OFFICIAL:

JOHN A. KLEIN,

Major General, United States Army, The Adjutant General.

N. F. TWINING

Official:

Chief of Staff, United States Air Force.

Gen & Br Svc Sch (2)

Ord Ammo Comd (1)

Depot (None)

POE (OS) (2)

Ord PG (10)

Mil Dist (1)

MAAG (1)

Mil Msn (1)

JBUSMC (2)

Ord Proc Dist (10)

except Ord Sch (50)

PMST Ord ROTC Units (1)

Gen Depots (2) except Atlanta Gen

Ord Depots (10) except Rossford Ord

(18) Pueblo Ord Depot (806)

Depot (1812) Anniston Ord Depot

Ord Tk Autmy Comd (55)

Ord Sec, Gen Depots (5)

Trans Terminal Comd (2)

Ord Arsenals (5) except

Benicia Arsenal (20)

Raritan Arsenal (999)

Frankford Arsenal (15)

Army Terminals (2)

OS Sup Agencies (1)

E. E. TORO,

Colonel, United States Air Force, Air Adjutant General.

Distribution:

Active Army: CNGB (1)

ASA (2)

Tec Svc, DA (1) except COFORD (27)

Ord Bd (2)

Hq CONARC (3)

CONARC Bd (3)

Army AA Comd (2)

OS Maj Comd (2)

OS Base Comd (2)

Log Comd (3) MDW (1)

Armies (3)

Corps (2)

Div (2)

Ord Gp (2)

Ord Bn (2) except TOE

9-45R (1)

Ord Co (2) except TOE

9-12R, 9-17R, 9-46R,

9-47R, 9-49R, 9-57R,

9-229R, 9-347R, 9-367R,

9-387R (1)

Ft & Cp (2) except Ft Hood

(7), Ft Bliss (7), Ft Sam

JUSMAG (Greece) (2) Houston (7), Ft Sill (7) Fld Comd, AFSWP (1)

NG: State AG (6); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used, see SR 320-50-1.

& U. S. Government Printing Office: 1956-400517