TB 9-2855-40

DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

2½–TON 6 x 6 CARGO TRUCKS M135 AND M211, DUMP TRUCK M215, SHOP VAN TRUCK M220, 1200-GAL GASOLINE TANK TRUCK M217, 1000-GAL WATER TANK TRUCK M222, AND TRUCK TRACTOR M221 (SNL G–749): INSTRUCTIONS FOR THE INSTALLATION OF PERSONNEL HEATER KIT (HOT WATER) (24V)

Department of the Army, Washington 25, D. C. 29 June 1956

This bulletin is correct to 14 June 1956

SECTION I

GENERAL

1. Scope. *a* These instructions are published for the use of all personnel concerned with the installation of personnel heater kit (hot water) for 2½-ton 6 x 6 vehicles (SNL G–749).

b. The sequence of operations given is the result of a trial installation. Interference may be encountered due to modification or damage to a vehicle, and it may be difficult or impossible to install the heater kit as outlined in this bulletin. In such cases, a field

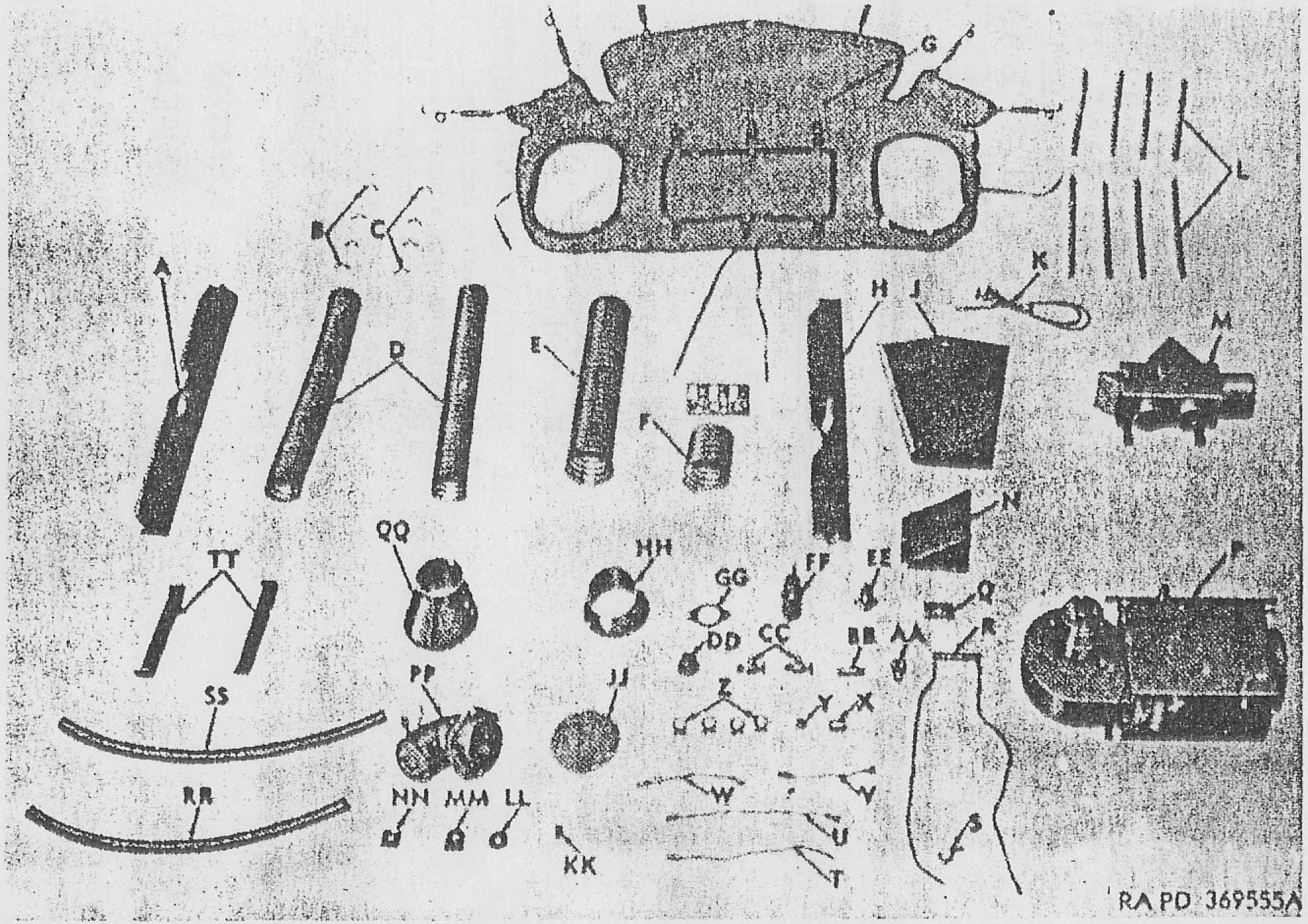

Figure 1. Personnel heater kit components.

GPO 801—114—1

A--DEFLECTOR, HEAT (1) --*7951679*
B--LOOP (4) --*7716428*
C--LOOP (4) --*7717706*
D--DUCT, 3-IN., 24 IN. LONG (2) --*7951671*
E--DUCT, 4-IN., 12 IN. LONG (1) --*7401297*
F--DUCT, 4-IN., 4 IN. LONG (1) --*7951053*
G--COVER, WINTERFRONT, ASSY (1) --*8710616*
H--DEFLECTOR, HEAT (1) --*7951681*
J--PLATE, HEATER SUPPORT (1) --*8710977*
K--CABLE, CONTROL, HEAT (2) --*8719921*
L--CLAMPS, DUCT (8) --*7537473*
M--DIVERTER, HEAT, ASSY (1) --*7951657*
N--HOOD, AIR SCOOP (1) --*7951670*
P--HEATER. PERSONNEL, ASSY (1) --*8380651*
Q--BRACKET, HEATER SWITCH (1) --*8710612*
R--RESISTOR, BLOWER MOTOR, 5-Ω (1) --*8710856*
S--SWITCH, HEATER, TOGGLE, SINGLE-POLE DOUBLE-THROW (1) --*502676*
T--CABLE, WIRING (13-IN. LONG) (1) --8710670
U--CABLE, WIRING (13-IN. LONG) (1) --*8710636*
V--CABLE, WIRING (8-IN. LONG) (1) --*8710639*
W--CABLE, WIRING (8-IN. LONG) (1) --*8710638*
X--COUPLING, PIPE, STGHT, ⅜-IN. (1) --*144069*
Y--BUSHING, PIPE ½ X ⅜ (1) --*144039*
Z--CLAMP, HOSE, 1⅛-IN. (4) --*502913*
AA--CONNECTOR, DOUBLE CABLE, ASSY (1) --*7982404*
BB--NIPPLE, 2½ IN. LONG (1) --*452585*
CC--COCK, SHUTOFF (2) --*7524043*
DD--THERMOSTAT (1) --*7954461*
EE--CIRCUIT BREAKER (1) --*88376915*
FF--CABLE, WIRING (91-IN.), ASSY (1) --*8710632*
GG--GASKET, THERMOSTAT (1) --*5281448*
HH--INLET, AIR (1) --*8710975*
JJ--SCREEN, AIR INLET (1) --*7390375*
KK--CLAMP, CABLE (1) --*7724765*
LL--PLATE, NAME, DEFROSTER (1) --*7700351*
MM--PLATE, NAME, AIR (1) --*7951468*
NN--PLATE, NAME, HEATER SWITCH (1) --*7986147*
PP--ELBOW, ADAPTER (1) --*7524078*
QQ--ADAPTER, HEATER OUTLET (1) --*7700374*
RR--HOSE, HEATER (1) --*8710560*
SS--HOSE, HEATER (1) --*8710559*
TT--BRACE, SUPPORT PLATE, HEATER (2) --*8710978*

expedient may be resorted to by the installation personnel to overcome the interference found on the particular vehicle, and the installation procedure altered accordingly.

c. TM 9–2855, Instruction Guide: Operation and Maintenance of Ordnance Materiel in Extreme Cold (0° to —65° F.), contains the following pertinent information:

Winterization equipment and processing, installation instructions, and methods.
Operation and maintenance in extreme cold.
Preparation of cooling systems for low temperatures.
Storage, handling, and use of fuels, lubricants, and antifreeze compounds.
Method of adjusting specific gravity readings of batteries exposed to low temperatures.

Note. TM 2855 is applicable to this vehicle 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 is made to the following publications:

TM 9–8024, 2½-ton 6 x 6 Truck Cargo M135 and M211; Dump Truck M215; Gasoline Tank Truck M217; Shop Van Truck M220; Truck Tractor M221; and Water Tank Truck M222.
TM 9–2857, Storage Batteries, Lead-Acid Type.
TM 9–2858, Cooling Systems: Vehicles and Powered Ground Equipment.
TB ORD 390, Cold-Starting Aid Kit (Slave Kit) M40; Operation and Maintenance.
SB 9–16, General Supply, Winterization Equipment for Automotive Materiel.
FM 31–70, Basic Arctic Manual.
FM 31–71, Operations in the Arctic.

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.

2. Application. *a.* The personnel heater kit is for use in areas where the normal ambient temperature is from 40° F. to as low as —20° F. It is installed on vehicles provided with soft- or hard-top closure kits.

b. The kit is to be installed by ordnance maintenance units or by troop units under supervision of ordnance mechanics.

3. Description. *a.* The personnel heater is a blower-type hot-water heater. It is bolted to a heater support plate which is braced and attached to the left vehicle fender skirt in the engine compartment. Heated air is distributed from the heater, by a blower

and a heat diverter, to vehicle cab, windshield defroster assembly, or to both. Heat is controlled by "Air" and "Defroster" knobs on the instrument panel, which in turn operate butterfly or damper valves in the heater outlet adapter elbow and heat diverter assembly.

b. A canvas winterfront radiator cover is supplied with the heater kit to reduce the flow of air to the engine compartment. An adjustable aperture flap in the cover permits manual regulation of cold air flow through the radiator, as conditions demand, in accordance with reading of the engine temperature gage.

c. The personnel heater kit is packaged under the title "Kit, Hot Water, Personnel Heater" and bars the stock number G249–5702005.

d. The following attaching hardware is packaged, identified, and made a part of the personnel heater kit:

Nut, Pl, hex, No. 8 (0.164)–32NC-2B, $1\frac{1}{32}$-in. wd, $\frac{1}{8}$-in thk (2)—120622
Nut, Pl, hex, $\frac{1}{4}$–2ounc–2B, $\frac{7}{16}$-in. wd, $\frac{7}{32}$-in. thk (12)—120375
Screw, Mach, $\frac{1}{4}$–2ounc–2A x $\frac{5}{16}$ (4)—9407634
Screw, Cap, hex-hd, $\frac{1}{4}$–2ounc–2A x $\frac{5}{8}$ (6)—120854
Screw, Cap, hex-hd, $\frac{1}{4}$–2ounc–2A x $\frac{3}{4}$ (4)—121887
Screw, Mach, rd-hd, No. 8 (0.164)–32NC–2A x $\frac{7}{8}$ (2)—132772
Screw, Tapping, No. 6 (0.138) (2)—164327
Screw, Tapping, No. 8 (0.164)–32 x $\frac{3}{8}$ (4)—170466
Screw, Cap, hex-hd, $\frac{1}{4}$–2ounc–2A x $\frac{1}{2}$ (2)—120706
Screw, Pan-hd, thd-cutting, No. 10 (0.190)–32 x $\frac{3}{8}$ (5)—171730
Washer, Lock, int-teeth, $\frac{1}{4}$-in. (4)—120423
Washer, Lock, int-ext-teeth, No. 8 screw size (4)—178364
Washer, Lock, int-ext-teeth, $\frac{1}{4}$-in. (12)—174916
Washer, Lock, int-teeth, No. 8 screw size (2)—138530
Washer, Lock, int-teeth, No. 6 screw size (2)—138526

SECTION II

INSTALLATION INSTRUCTIONS

Note. Before starting heater kit installation, refer to figure 1 which will provide identification of the parts referred to in the installation procedure.

4. Personnel Heater Assembly. *a.* To provide ample working space for installing the personnel heater kit, raise the hood to the "completely raised" position as instructed in (1) and (2) below.

(1) Release the hood clasp on each side of hood and raise to "first raised" position. Telescoping side supports will automatically lock and hold hood in this position.

(2) Press release button on each side support and raise hood to "completely raised" position.

b. Open drain cock, located at front lower portion of radiator, and drain contents into a suitable container.

c. Remove square-head plug H106–0143980 from tee below water bypass line on right side of engine and install shutoff cock (CC, fig. 1 and fig. 2). From manifold side of engine, remove similar plug and install pipe bushing (Y, fig. 1), 2½ inch nipple (BB, fig. 1), straight coupling (X, fig. 1), and shutoff cock (CC, fig. 1 and fig. 2).

Note. Apply sealing compound to threads before installation.

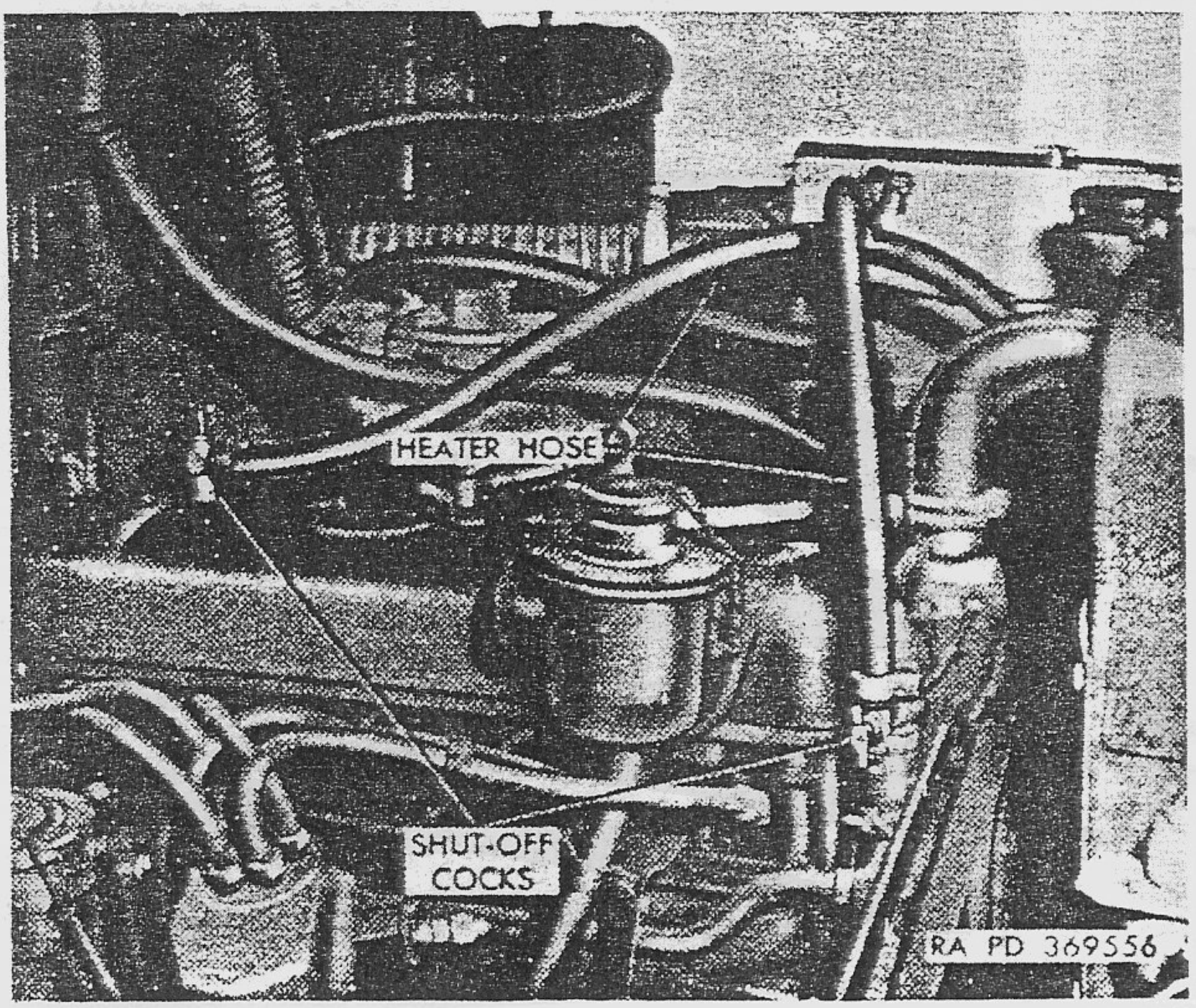

Figure 2. Shutoff cocks installed.

d. To install heater support plate braces (TT, fig. 1), remove nuts and washers from fender bolts (fig. 3). Position heater support plate (J, fig. 1) on the fender bolts with the plate level as shown in figure 4. Secure with nuts and washers. Temporarily secure the two heater support braces (TT, fig. 1) to underside of the support plate at the left and right front holes. Position

braces so that sloping arms of braces are in full contact with surface of fender skirt. Scribe, detach braces, and drill two ¼-inch holes in fender skirt. Secure brace to fender skirt with two ¼–20 x ⅝ cap screws 120854, internal-external teeth lockwashers 174916, and hex nuts 120375, as shown in figure 3. Install air

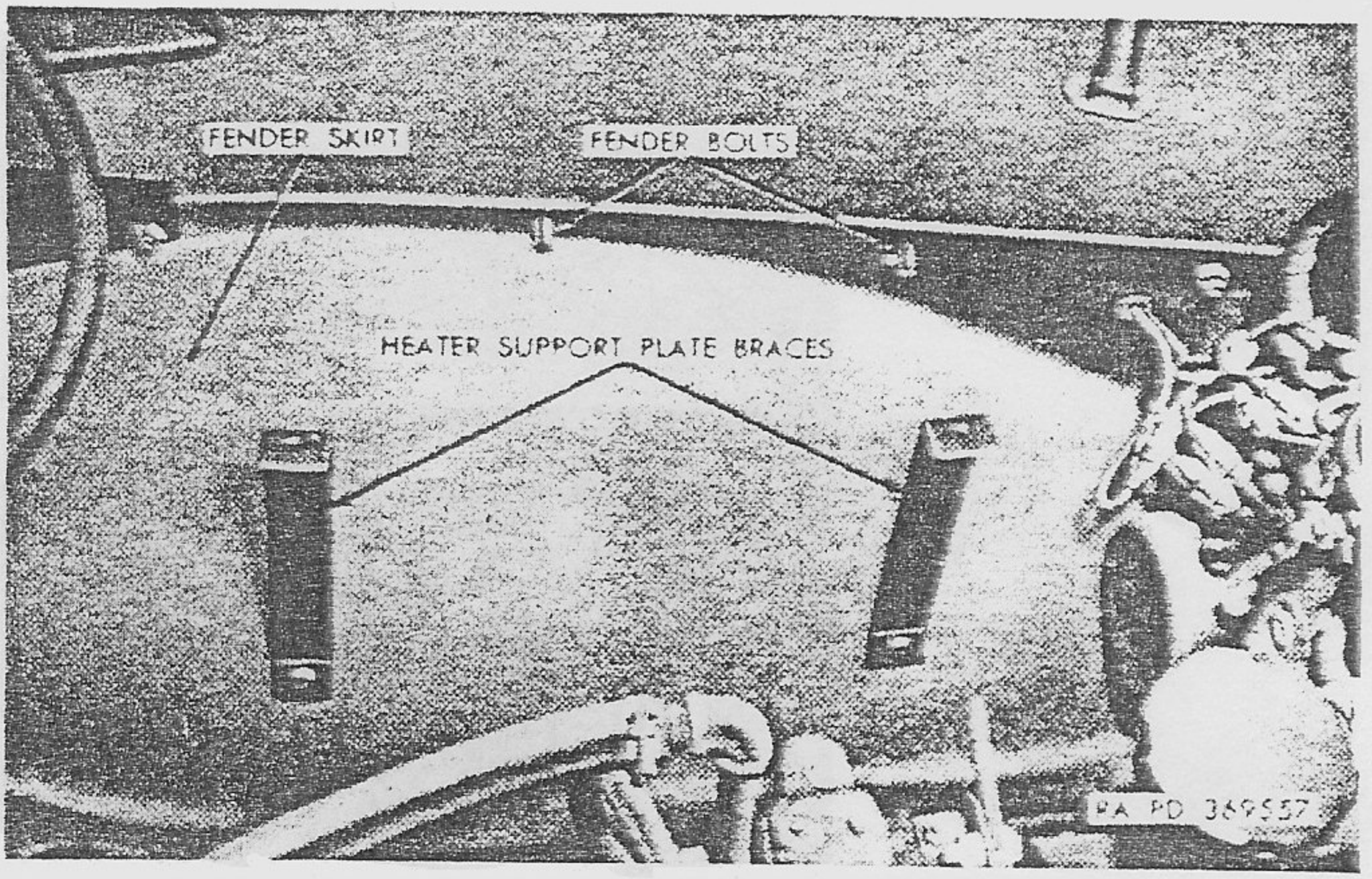

Figure 3. Heater support plate braces installed.

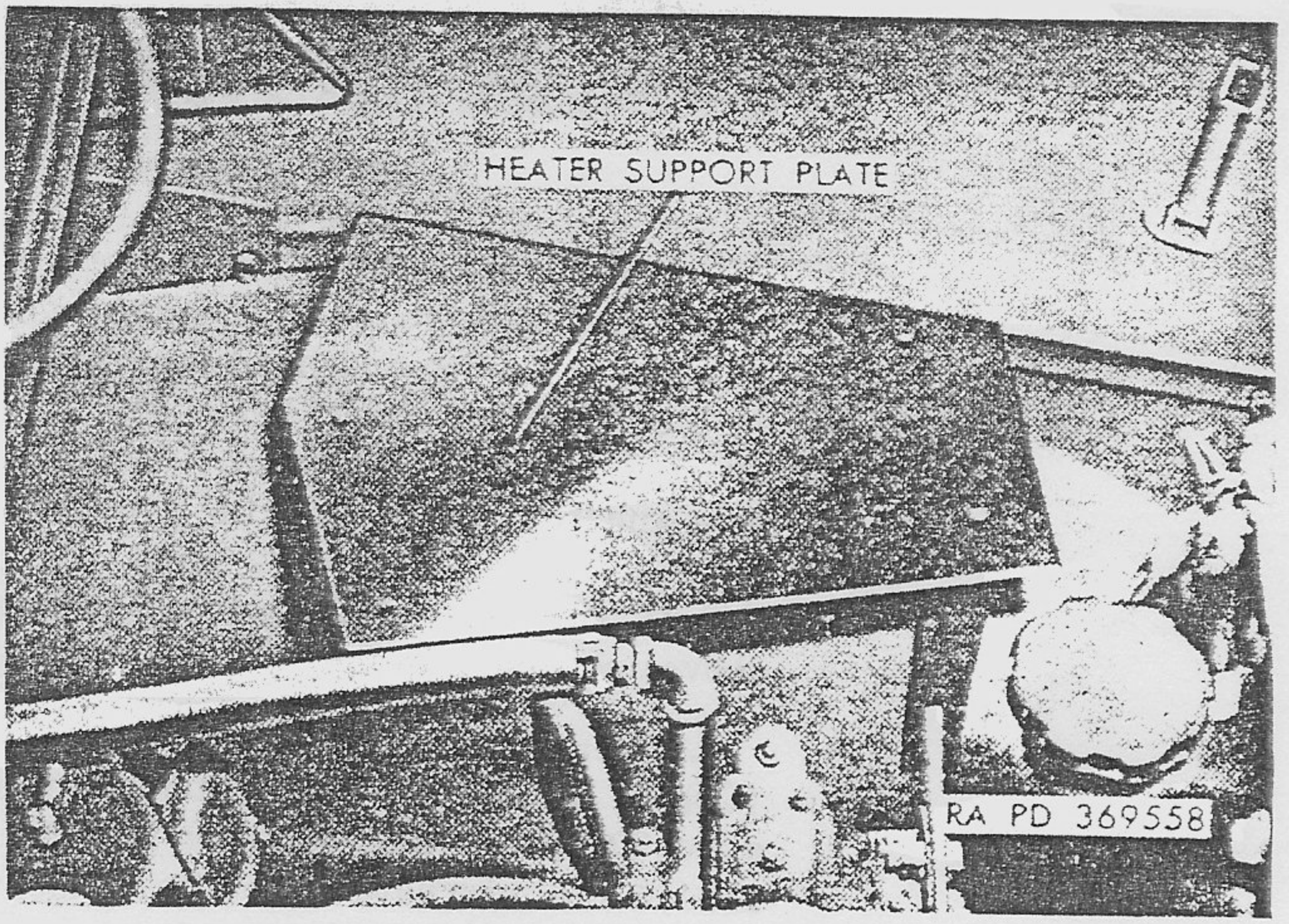

Figure 4. Heater support plate installed.

inlet screen (JJ, fig. 1) and air inlet (HH, fig. 1) over the heater blower fan (fig. 5) with four ¼–20 x 5/16 machine screws 9407634 and four internal-teeth lockwashers 120423. Position personnel heater assembly (P, fig. 1 and fig. 5) on the heater support plate and secure to support plate and braces with four ¼–20 x ⅝ hex-head cap screws 120854, ¼-inch hex nuts 120375, and ¼-inch internal-external-teeth lockwashers 174916 as shown in figure 5.

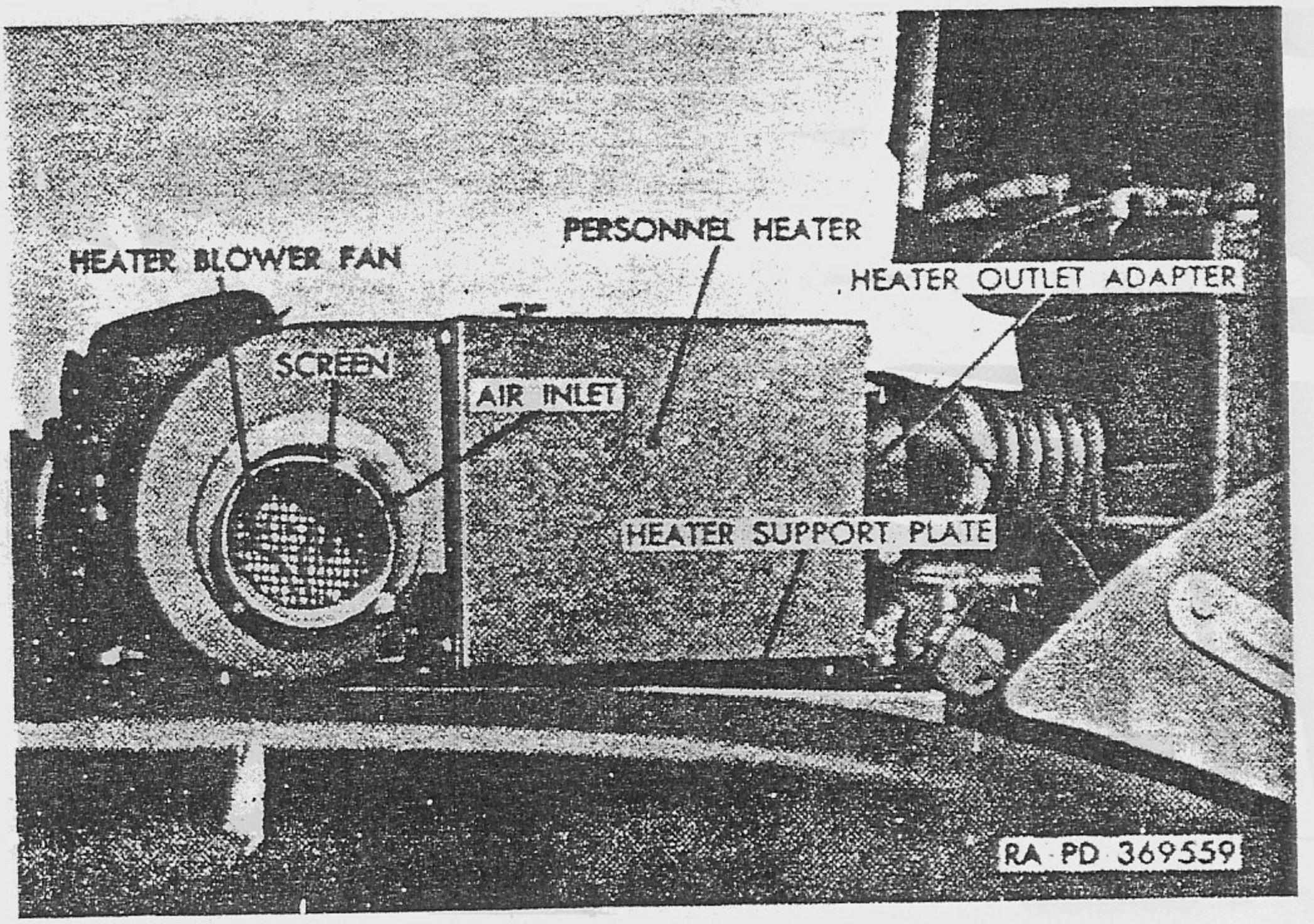

Figure 5. Personnel heater installed.

e. Lower vehicle hood and remove hood heater cover and four cross-recess screws, nuts, and lockwashers. Secure hood and note if heater air inlet and hood hole (fig. 6) aline. Mark and drill a ¼-inch hole 1¾ inches back from right screw hole as shown in figure 6. Use air scoop hood (N, fig. 1) as a template over drilled hole and mark and drill the two remaining holes as shown in figure 6. Install air scoop hood with three of the cross-recess screws, nuts, and lockwashers (removed from hood heater cover above) as shown in figure 7.

5. Ducts, Hose, and Adapters. *a.* Install heater outlet adapter (QQ, fig. 1 and fig. 5) on heater outlet, drill four screw holes with a No. 32 drill, and secure with four No. 8–32 x ⅜ tapping screws 170466 and internal-external-teeth lockwashers 178364.

b. Remove four screws, nuts, and washers which attach cover plate (fig. 8) over opening in firewall. Install adapter elbow (PP,

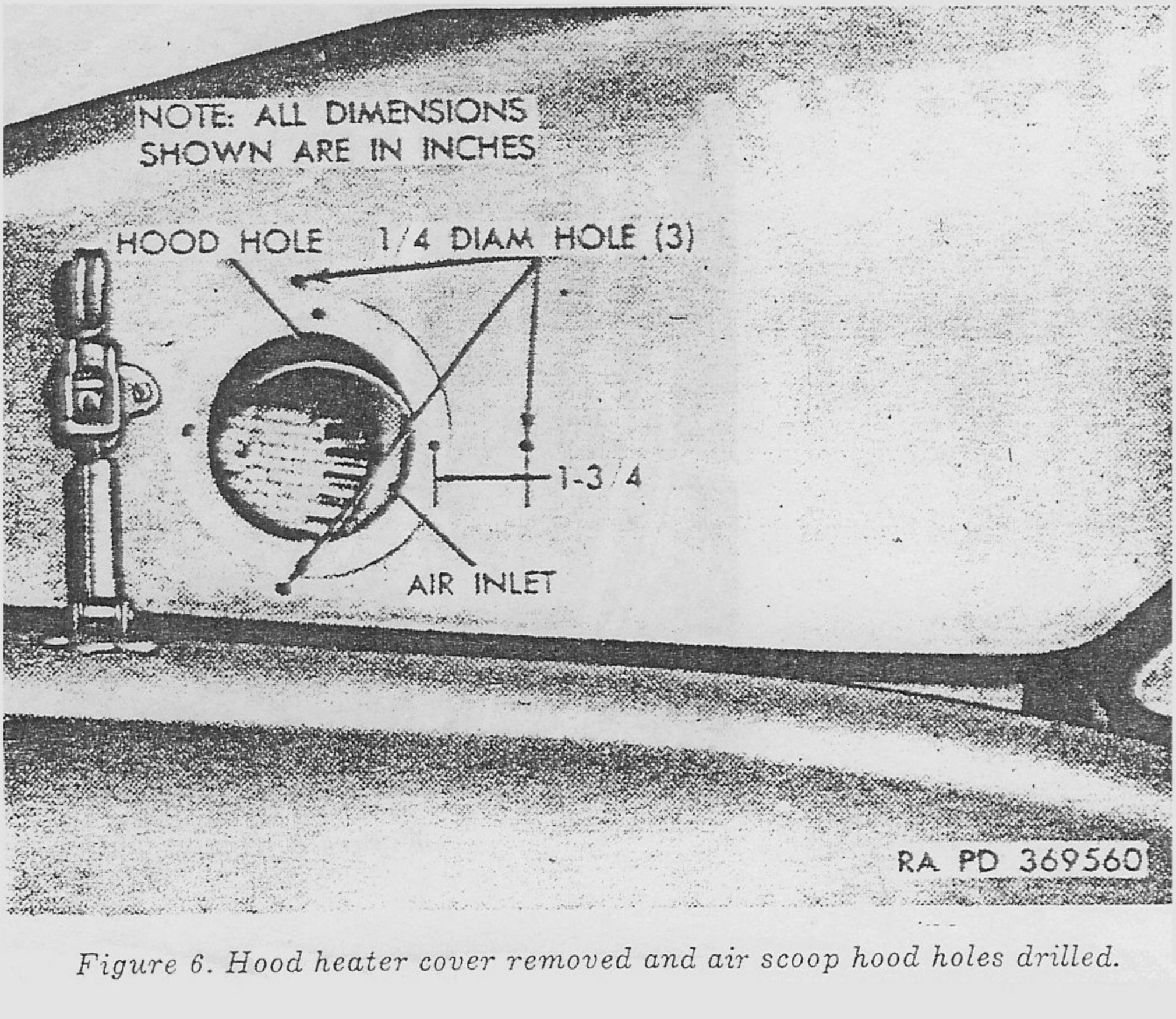

Figure 6. Hood heater cover removed and air scoop hood holes drilled.

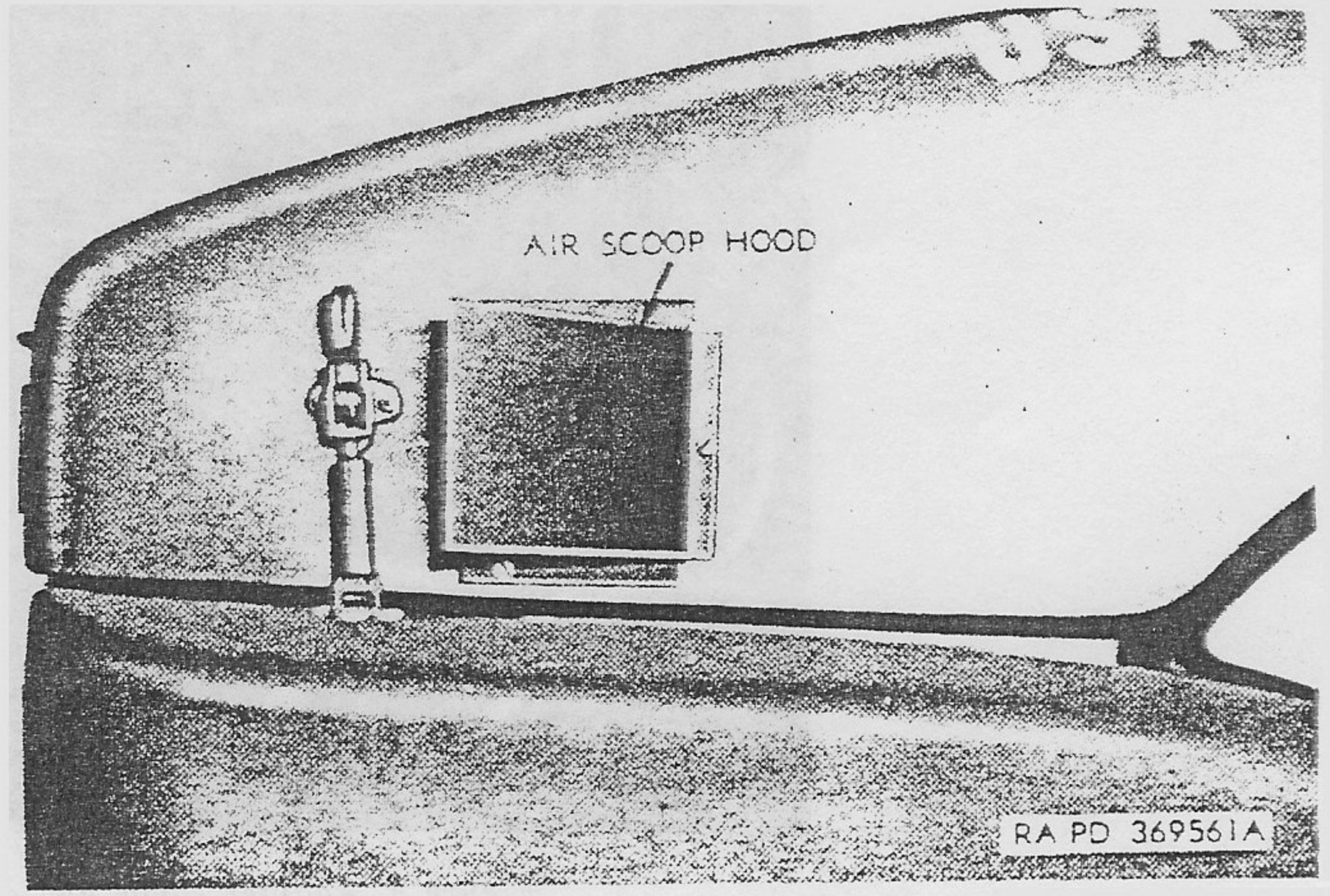

Figure 7. Air scoop hood installed.

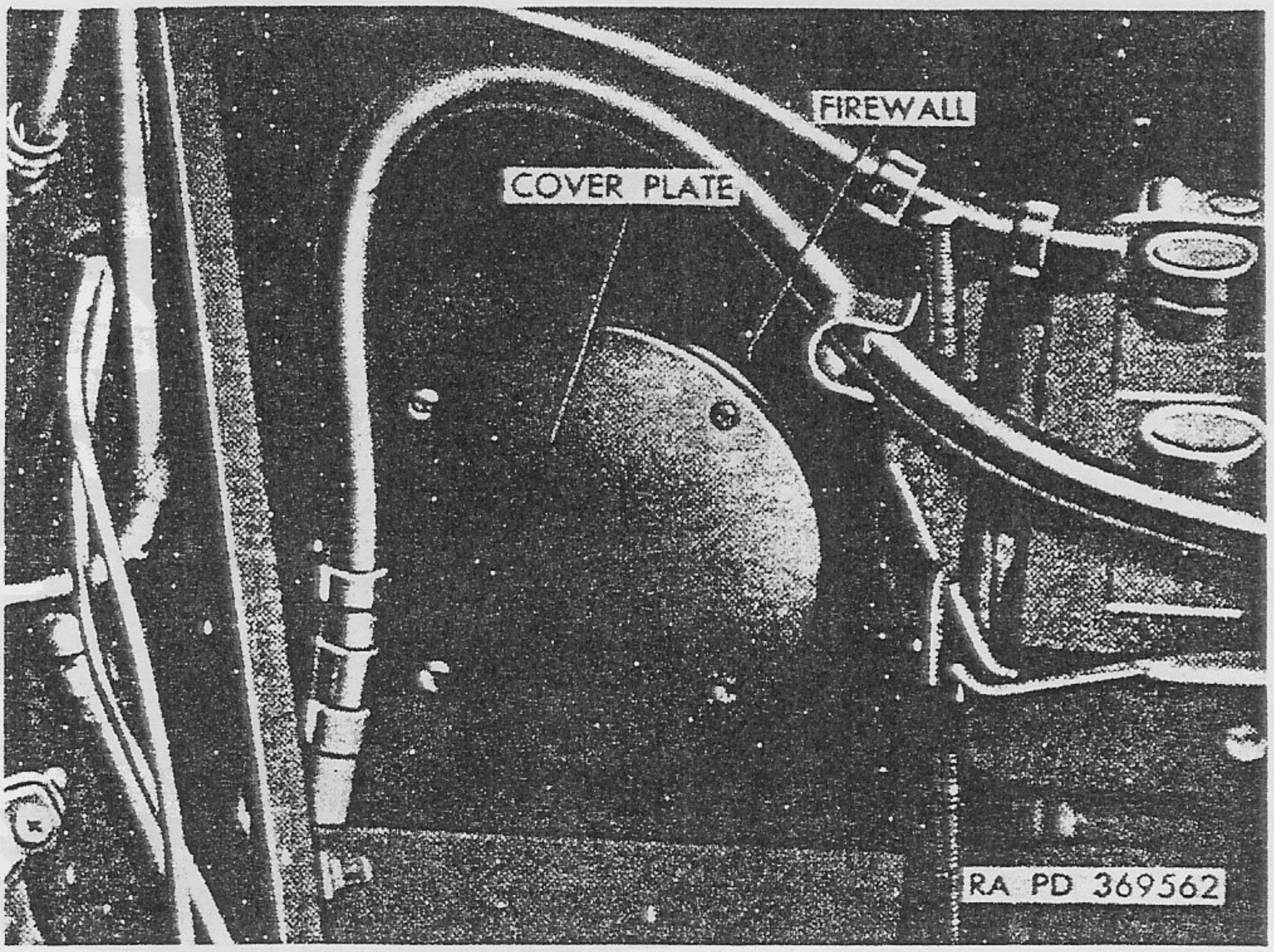

Figure 8. Heater outlet cover plate.

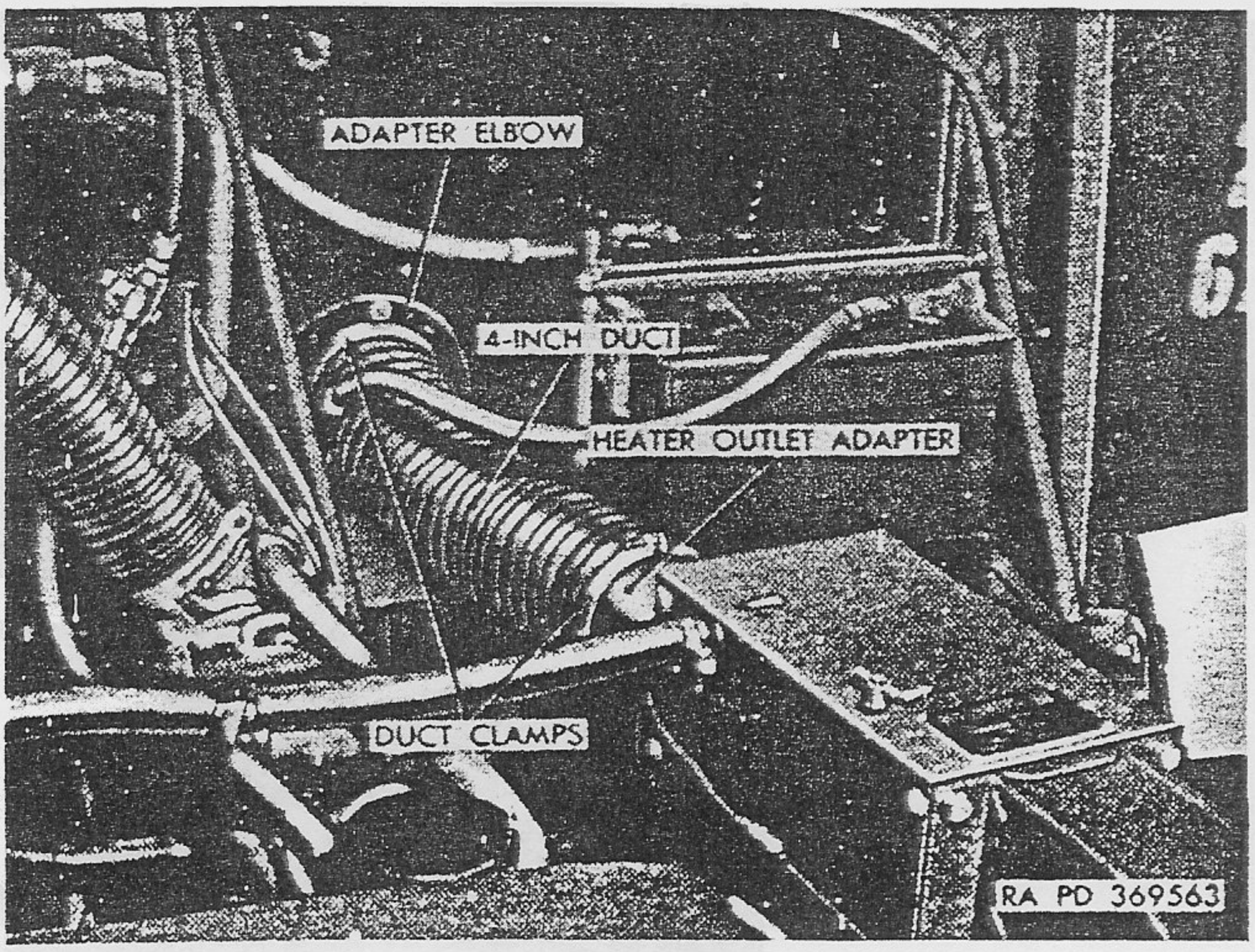

Figure 9. Adapter elbow and duct installed.

fig. 1 and fig. 9) in opening, from engine side of the firewall, with air outlet toward passenger side of cab. Secure with two of the screws, nuts, and washers removed above. If existing cover plate holes do not aline with holes in adapter elbow, mark and drill new holes.

c. Install 12-inch long duct (E, fig. 1) on end of heater outlet adapter and on adapter elbow and secure with two duct clamps (L, fig. 1) as shown in figure 9.

d. Install heater hose (RR, fig. 1) on top outlet of heater (fig. 10) and on shutoff cock on right side of engine as shown in figure 2. Install heater hose (SS, fig. 1) on bottom inlet of heater and on shutoff cock on left rear of engine as shown in figure 2. Secure hose to inlet and outlet of heater and to shutoff cocks with four hose clamps (Z, fig. 1) as shown in figures 2 and 10.

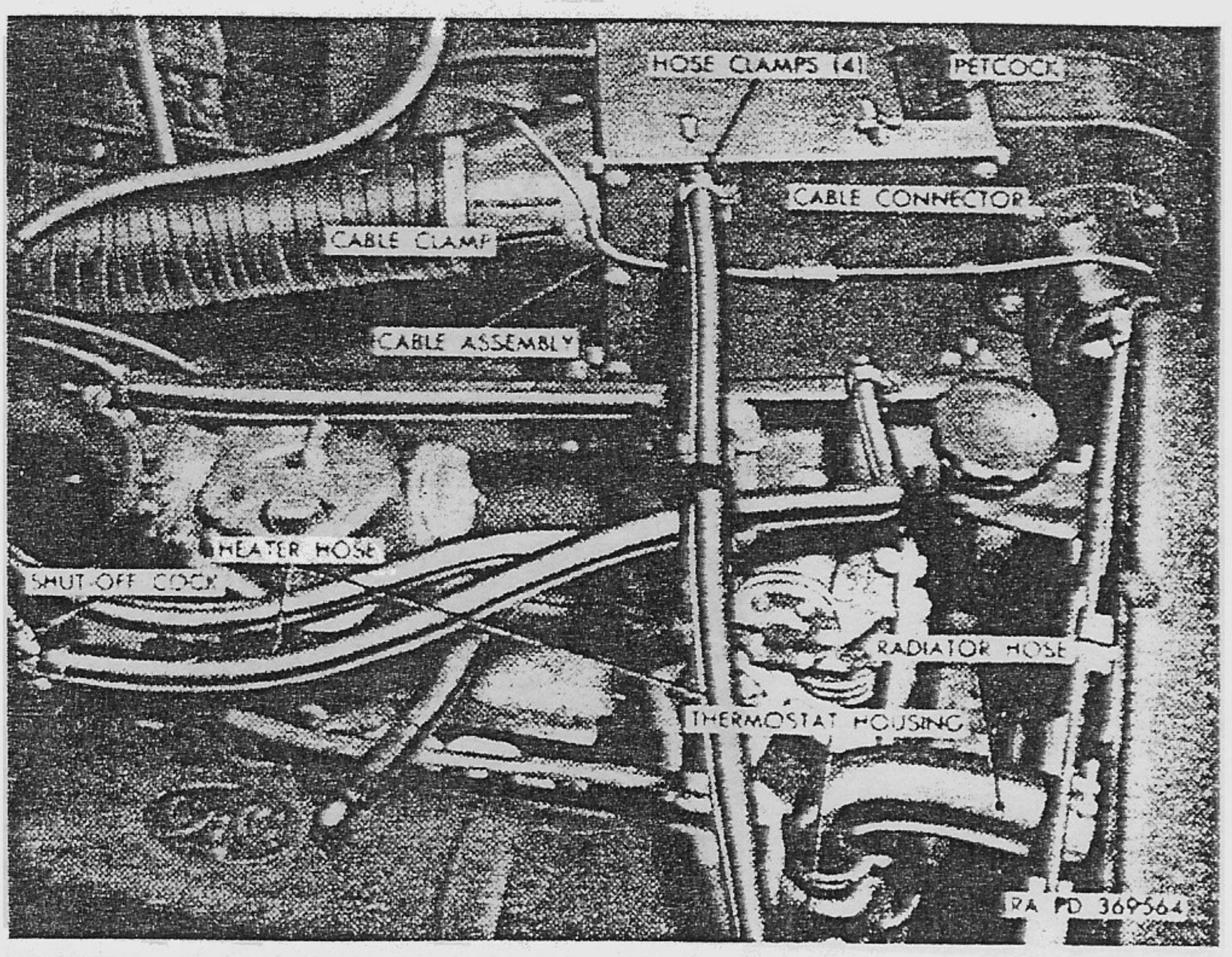

Figure 10. Heater hose and wiring cables installed.

e. Remove radiator hose (fig. 10). Remove thermostat housing and gasket and replace thermostat with a new thermostat (DD, fig. 1) and thermostat gasket (GG, fig. 1). Install thermostat housing and radiator hose.

Note. Return removed thermostat to stock.

f. Fill radiator with solution applicable to existing or anticipated temperatures in accordance with TM 9–2855. Start and

run engine until thermostat has opened and circulation of cooling liquid is satisfactory. Open petcock (fig. 10) on top of personnel heater to make certain all air has escaped from heater and lines. Inspect and secure all connections against possible leaks.

6. Heat Diverter Assembly. *a.* Position 4-inch duct (F, fig. 1) on adapter elbow (fig. 11) and secure with duct clamp (L, fig. 1 and fig. 11). Attach diverter assembly to other end of 4-inch duct and secure with duct clamp (L, fig. 1 and fig. 11). Aline heat diverter assembly (M, fig. 1 and fig. 11) with four existing holes in firewall and attach diverter assembly brackets to firewall as shown in figure 11. Use four 1/4–20 x 3/4 cap screws 121887, hex nuts 120375, and internal-external-teeth lockwashers 174916 to secure brackets.

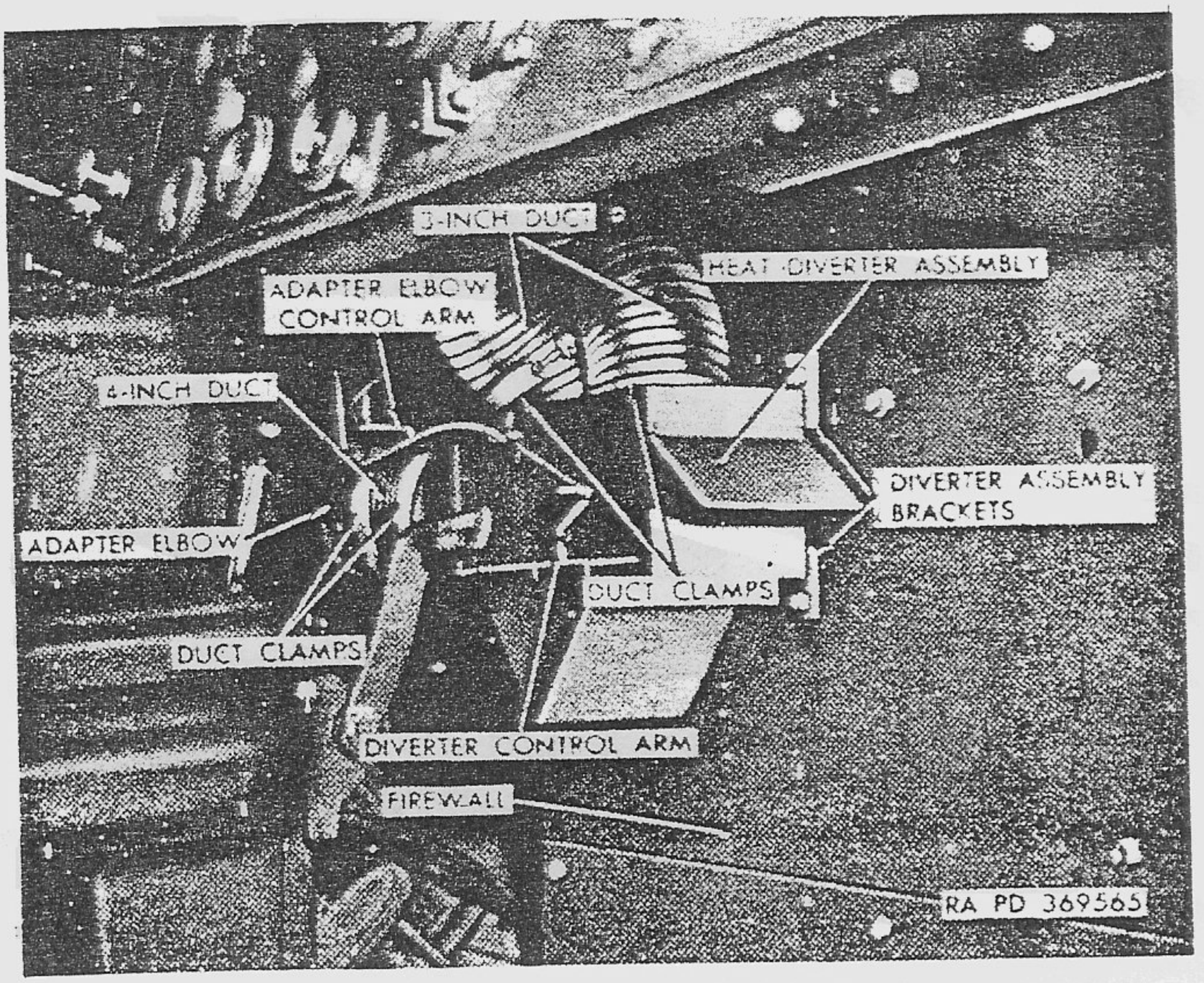

Figure 11. Installation of diverter assembly and duct.

b. Attach one 24-inch length of 3-inch duct (D, fig. 1) to left outlet collar and the other 24-inch length to the right outlet collar on the heat diverter assembly (fig. 11). Secure both lengths of duct to the diverter collars with duct clamps (L, fig. 1 and fig. 11). Connect the duct from the left collar to the right inlet of the built-in air chamber under the windshield and connect the duct from the right collar to the left inlet of air chamber. The two ducts will

then cross above the diverter assembly. Secure both lengths of duct to the air chamber inlets with duct clamps (L, fig. 1).

c. Remove the two plugs from the instrument panel below the vehicle instruction plate. These holes are provided for the heater control cables. Mount the "Defroster" name plate (LL, fig. 1) under the right control knob and the "Air" name plate (MM, fig. 1) under the left control knob of the two heat control cables (K, fig. 1). Insert the cables in the holes. Connect the "Air" control cable to the adapter elbow control arm (fig. 11). Clamp the "Air" control cable in position, with the "Air" control knob in and the butterfly valve of the adapter elbow in "fully closed" position. Connect the "Defroster" control cable to the diverter control arm (fig. 11) and clamp in position, with diverter control arm to extreme right.

Note. Cut the control cables and cable housings to fit, if too long.

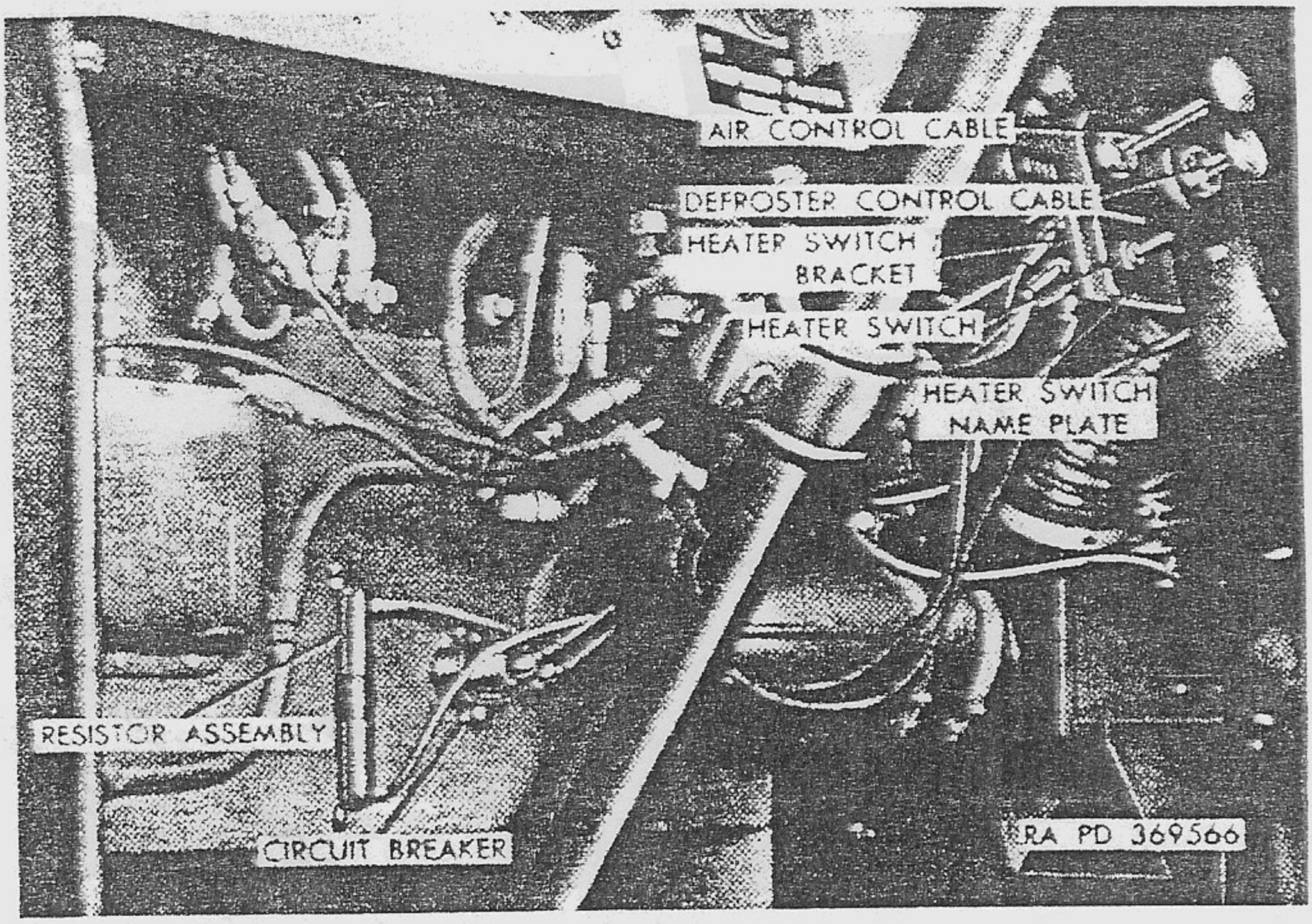

Figure 12. Installation of heater control cables, switch, resistor, and circuit breaker.

7. Wiring Instructions.

Note. Refer to wiring diagrams (fig. 13).

a. Connect heater cable (with cable connector) to 91-inch wiring cable assembly (FF, fig. 1) as shown in figure 10. Secure cable to heater outlet adapter with cable clamp (KK, fig. 1) and existing outlet adapter screw. Run cable through the choke grommet in vehicle firewall.

b. Drill two holes in firewall with a No. 30 drill and install the resistor assembly (R, fig. 1) with two No. 6 tapping screws 164327 and internal-teeth lockwashers 138526 as shown in figure 12. Drill two holes in firewall with a No. 30 drill and install circuit breaker (EE, fig. 1) with two No. 8 machine screws 132772, hex nuts 120622, and internal-teeth lockwashers 138530 as shown in figure 12. Drill two holes directly under control cable "Air" name plate and install heater switch bracket (Q, fig. 1) with two ¼–20 x ⅝ hex-head cap screws 120706, hex nuts 120375, and internal-external-teeth lockwashers 174916 as shown in figure 12.

c. From the left side of the vehicle cab, break the connection on vehicle wiring harness cable No. 11. Connect the 8-inch wiring cables (V and W, fig. 1) to No. 11 cable at this point. Install connector (AA, fig. 1) to the other ends of 8-inch cables. Attach 13-inch wiring cable (U, fig. 1) to connector and run opposite end to one terminal post of circuit breaker (fig. 12). Connect 13-inch wiring cable (T, fig. 1) to remaining terminal post on circuit breaker and run it to "OFF"-position terminal of the

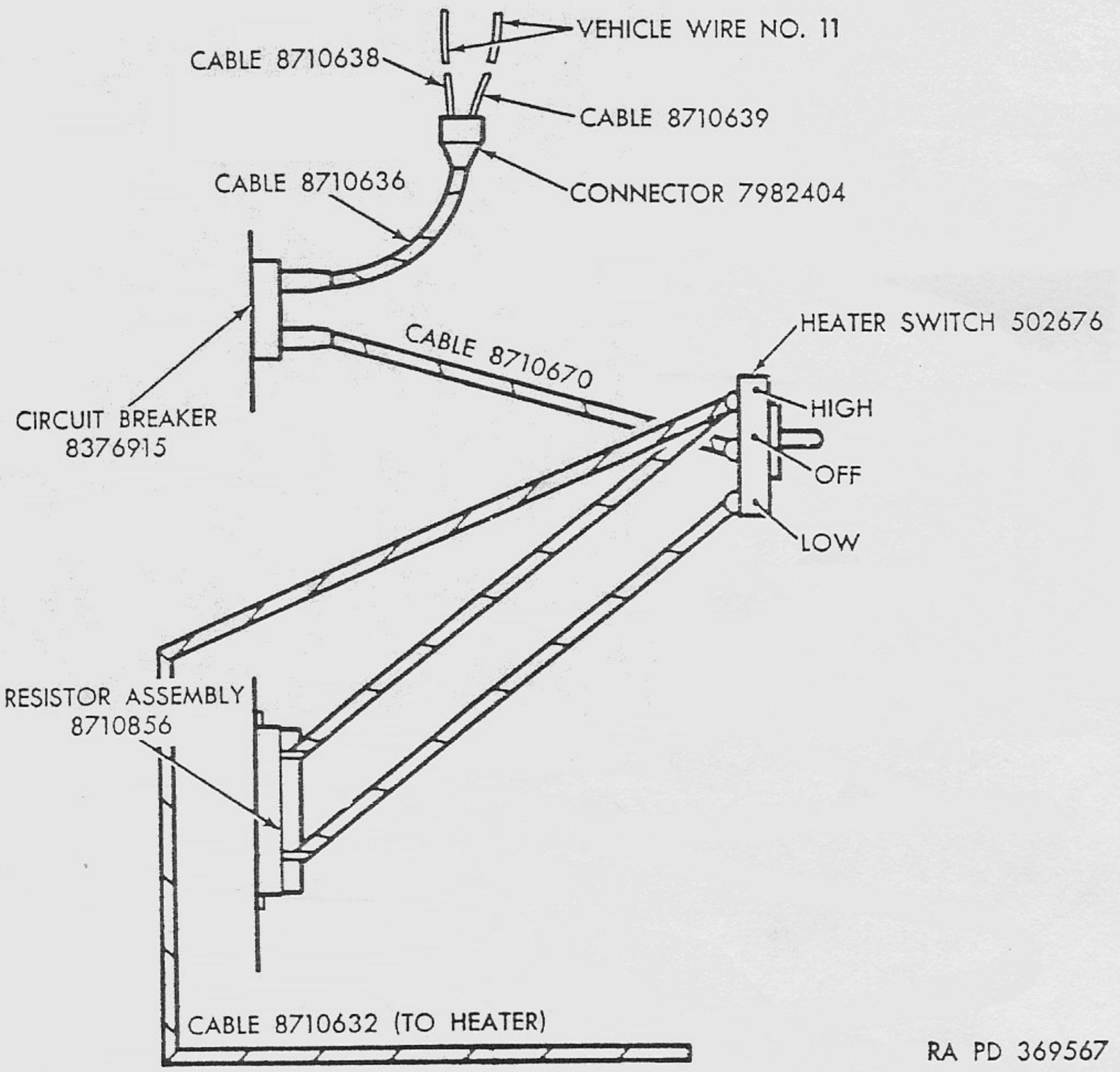

Figure 13. Wiring diagram.

heater switch (S, fig. 1). Connect the top cable from the resistor assembly to "HIGH" position terminal of the heater switch, also connect the free end of the 91-inch wiring cable assembly (FF, fig. 1) which enters the cab through the firewall, to "HIGH" position terminal on heater switch. Connect the lower cable from the resistor assembly to "LOW" position terminal on heater switch. After all wiring is secured to heater switch, install switch onto the heater switch bracket (fig. 12). Position heater switch name plate (NN, fig. 1) on top of switch and secure switch and plate with locking nut as shown in figure 12.

8. **Defroster Assembly.** *a.* To install the windshield defroster assembly which consists of right heat deflector (A, fig. 1) and left heat deflector (H, fig. 1), place the right and left deflectors in position on the lower windshield frame and mark for drilling the mounting screw holes. Drill five holes with a No. 21 drill (0.159) and attach the deflectors with five No. 10–32 x ⅜ pan-head thread-cutting screws 171730 as shown in figure 14.

b. Dampers, within the heat diverter and adapter elbow, are operated by the "Defroster" and "Air" heater control cables. Follow instructions on the control cable name plates. With the "Defroster" knob pulled all the way out, the diverter damper completely closes the heat outlet to the cab and directs the heated air onto the windshield. With both knobs in, the heated air is

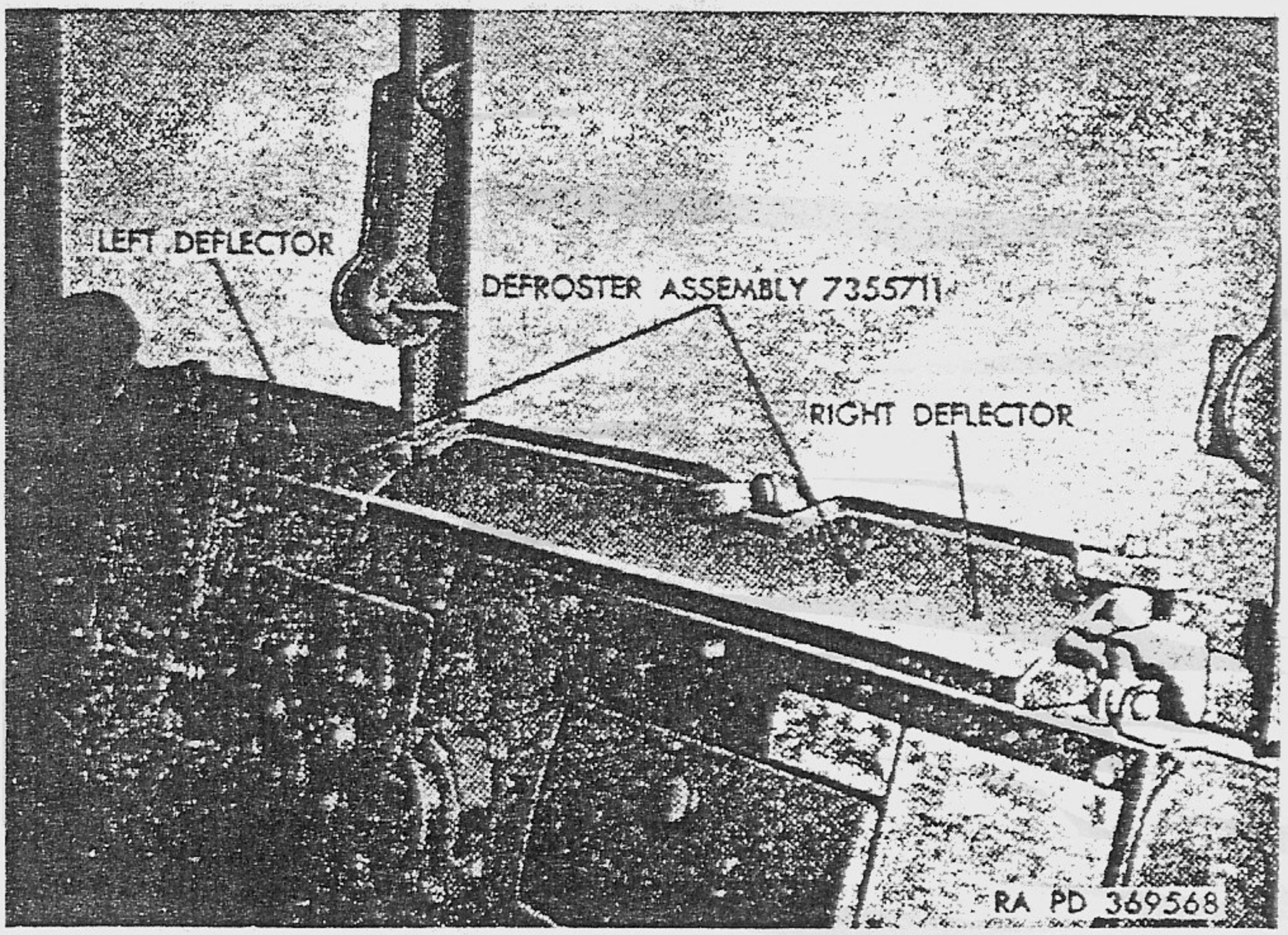

Figure 14. Defroster assembly installation.

directed into the cab. Intermediate positions of the control knobs will distribute heated air to both windshield and cab, as desired.

Caution: When the windshield is heavily ice-coated and the temperature near 0° F., direct more heat into the cab to avoid damage to the glass from the extreme temperature change.

9. Winterfront Cover Assembly. *a.* Use the winterfront cover (G, fig. 1) as a template and mark through the eight brass slotted grommets in top and sides, for drilling. Hold the loops (B and C, fig. 1) at each marking and scribe two screw-hole marks for each loop. Make certain the flat loops are installed at the top. If only one type loop is supplied, bend the screw holes so the loops lay flat on top of grille.

b. Drill the 16 holes with a No. 17 drill and install the eight loops (fig. 15) with two self-tapping screws 141592 for each loop. These 16 screws are packaged as a part of the winterfront cover assembly.

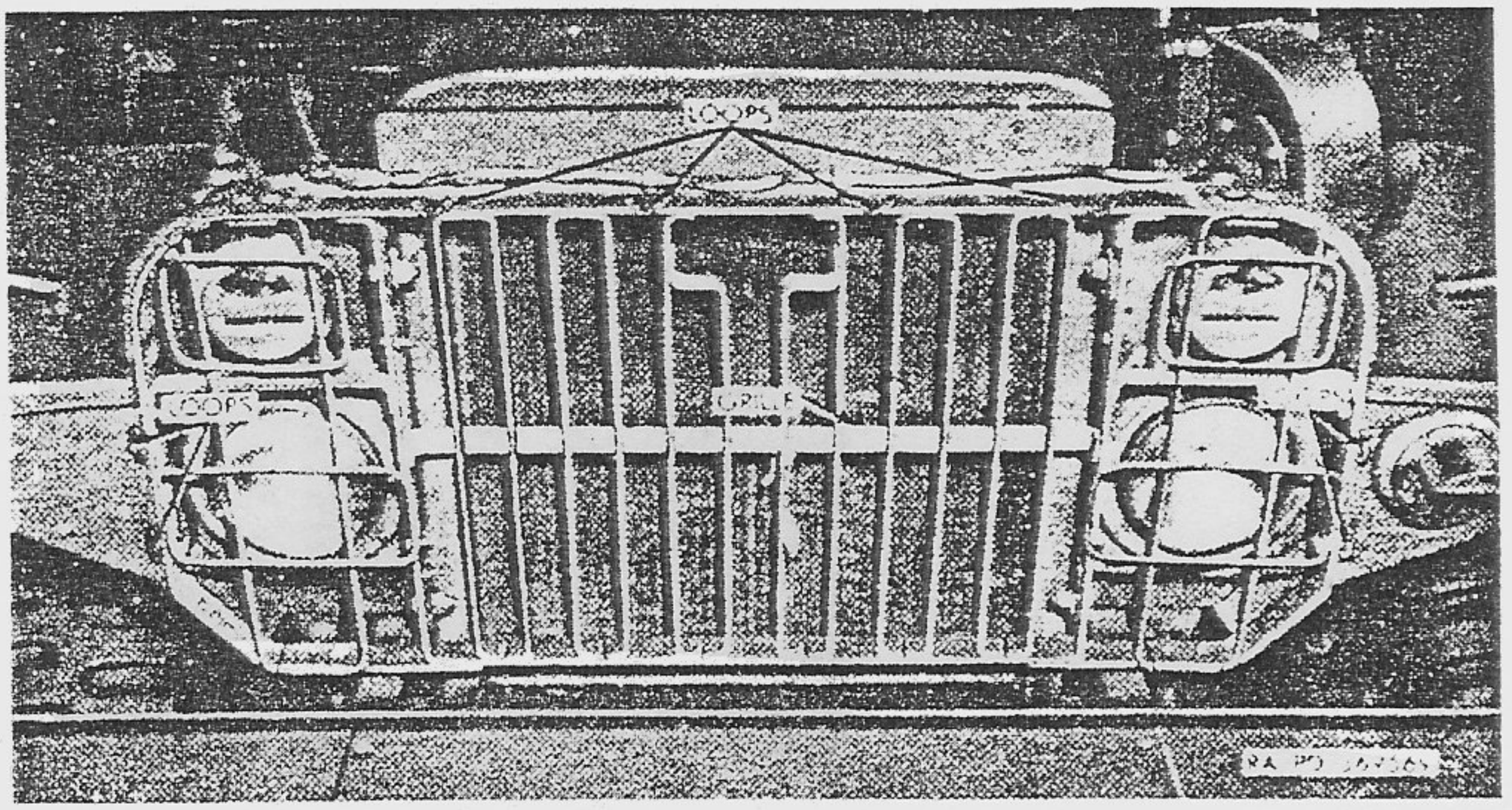

Figure 15. Installation of winterfront cover loops.

c. Install the winterfront cover assembly over the radiator and pass the lacing through the loops to secure the cover as shown in figure 16. Pull the bottom flap under the grille and hook the springs to the cross member. Pull the two side flaps back at the sides, locate and drill two ⅛-inch holes in each fender skirt, and hook the springs as shown in figure 17.

d. Adjust aperture flap (fig. 16) to suit the weather conditions. The most efficient engine operating temperature is 180° F. To reach this operating temperature, the winterfront cover assembly should be entirely closed.

e. When temperature reaches or exceeds 180° F., raise the aper-

ture flap and strap into position. If tmperature continues to increase, remove winterfront cover assembly.

f. When winterfront cover assembly is not in use, it must be carefully stowed in the vehicle, with the springs securely attached to the flaps.

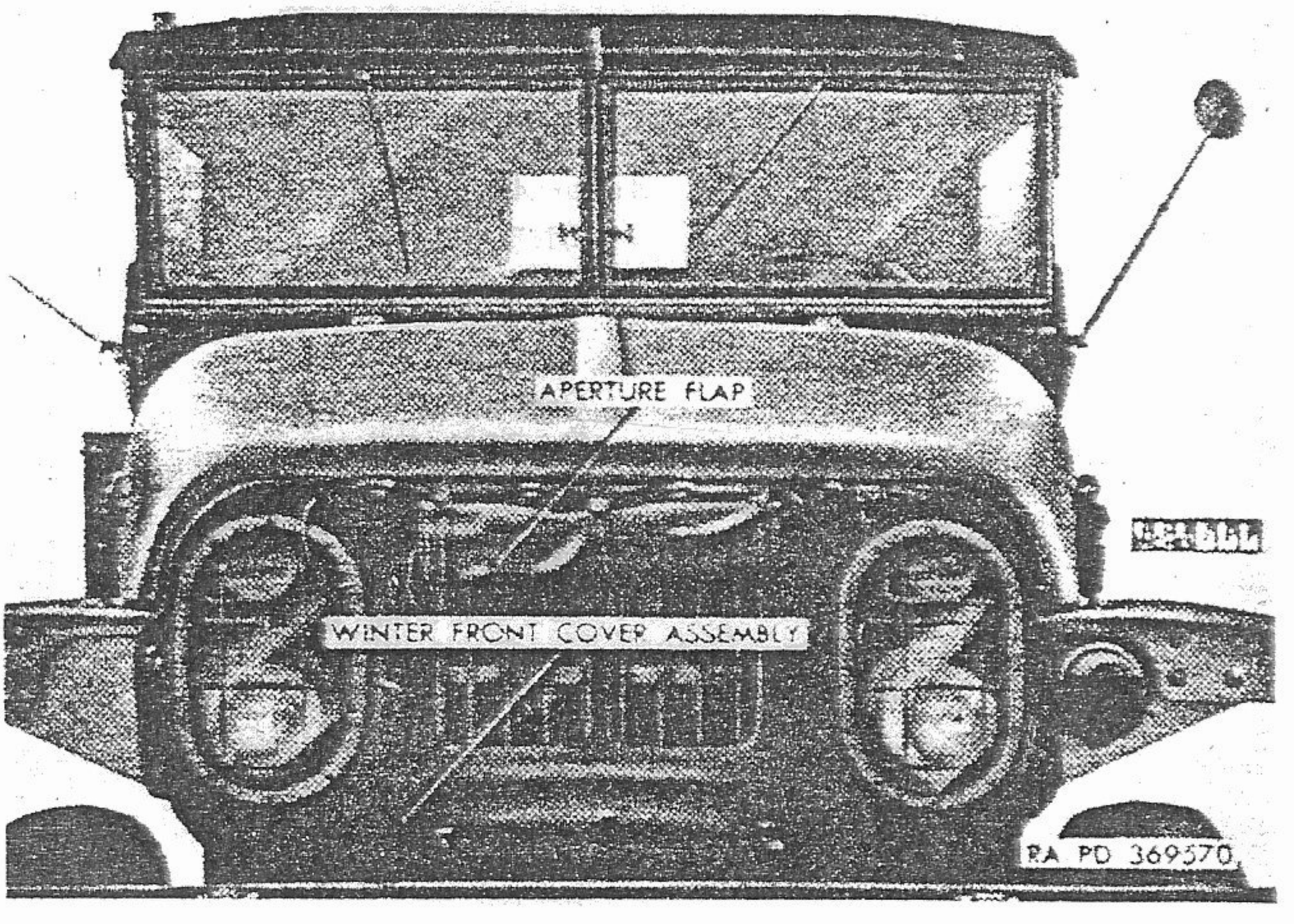

Figure 16. Winterfront cover assembly installed.

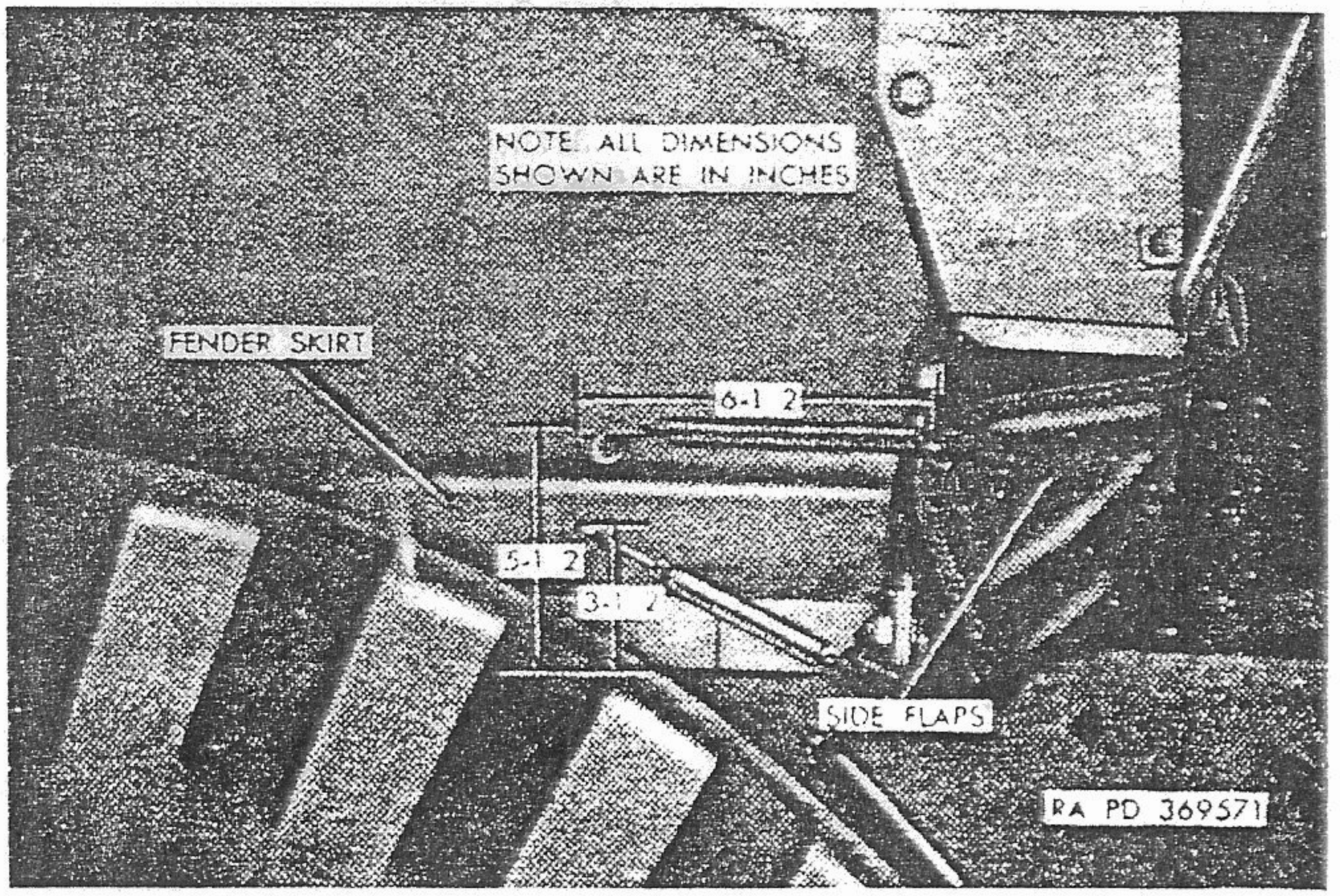

Figure 17. Side flaps secured.

By Order of *Wilber M. Brucker*, Secretary of the Army:

MAXWELL D. TAYLOR,
General, United States Army,
Chief of Staff.

Official:

JOHN A. KLEIN,
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  Rossford Ord Depot (12)
  Anniston Ord Depot (18)
POE (OS) (2)
Trans Terminal Comd (2)
Army Terminals (2)
OS Sup Agencies (1)
Ord PG (10)
Ord Arsenals (5) except
  Raritan Arsenal (200)
  Benicia Arsenal (20)
  Frankford Arsenal (15)
Mil Dist (1)
Ord Proc Dist (10)
MAAG (1)
Mil Msn (1)
JBUSMC (2)
JUSMAG (Greece) (2)
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 : 1965 O—755-020 (7473-B)
801—114—2