TM 3-4240-264-34

TECHNICAL MANUAL

# DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

# FOR

# SHELTER SYSTEM,

# COLLECTIVE PROTECTION,

# CHEMICAL-BIOLOGICAL:

# INFLATABLE,

# TRAILER-TRANSPORTED, M51

## (NSN 4240-00-854-4144)

HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1975

## WARNINGS

When using adhesive and cleaning solvent, keep open flame away from working area. Have working area well ventilated, DEATH or severe burns may result if personnel fail to observe safety precautions.

There is 208 VAC present at the power supply. Be careful to avoid contact with high voltage. Contact with high voltage could cause DEATH.

Be sure electrical system is turned off before attempting to remove the power supply. In operation, 208 VAC is present at electrical lead connections. Contact with the high voltage could cause DEATH.

When replacing fuel system components, keep open flame away from work area. DEATH, or severe bums, may result if personnel fail to observe safety precautions.

The unit commander or senior officer in charge of personnel assigned to remove and dispose of contaminated gas and particulate filters must prescribe the necessary protective clothing to be worn during this operation. He must also prescribe the necessary safety measures to be followed, including the decontamination operations that must be performed before new filters are installed in the filter unit (TM 3-220).

To prevent injury to personnel, if system has been operating in heating mode, do not proceed with servicing operations until heater blower shuts down and heater is cool enough to handle.

To prevent explosion of flashfire, be sure system is inoperative and heater has not been operating for approximately ten minutes before attempting to remove heater or replace any component.

To prevent explosion or flashfire, the gas and particulate filters must be replaced if gasoline leakage has occurred during heating system operation.

Be careful to avoid spilling gasoline when disconnecting heater fuel tube. Keep open flame away from work area. DEATH or severe burns may result if personnel fail to observe these safety precautions.

Refrigerant is at a high pressure; to prevent injury open suction service valve slowly.

To avoid eye injury, wear protective goggles when handling refrigerant-12.

The halogen leak detector uses an open flame and should not be used in the presence of explosive or flammable gases.

To avoid eye injury wear protective goggles when discharging air conditioning system.

Be careful to avoid contact with high voltage and with moving belts and pulleys when testing generator. Contact with high voltage could cause DEATH.

TM 3-4240-264-34
C3

CHANGE

NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 4 June 1990

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL
FOR
SHELTER SYSTEM COLLECTIVE PROTECTION
CHEMICAL-BIOLOGICAL: INFLATABLE TRAILER-TRANSPORTED, M51

TM 3-4240-264-34, 5 December 1975, with changes 1 and 2 are changed as follows:

1. The purpose of this change is to update guidance for disposal, handling, and storage of filters.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. Delete entire warning page on inside cover with pen and ink.

4. Remove old pages and insert new pages as follows:

| Remove Pages | Insert Pages |
|---|---|
| a | a and b |
| 2-53 and 2-54 | 2-53 and 2-54 |
| A-1 and A-2 | A-1 and A-2 |

4. File this change sheet in front of the publication for reference purposes.

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CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-28 (block 140), maintenance requirements for TM 3-4240-264-34.

CHANGE
No. 2

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DEPARTMENT OF THE ARMY
**WASHINGTON DC,** *7 October 1981*

# Direct Support and General Support Maintenance Manual
# SHELTER SYSTEM, COLLECTIVE PROTECTION, CHEMICAL-BIOLOGICAL: INFLATABLE, TRAILER-TRANSPORTED, M51 (NSN 4240-00-854-4144)

TM 3-4240-264-34, 5 December 1975, is changed as follows:

1. This change is prepared for the replacement of the aluminum fuel tank with a steel fuel tank and inclusion of the fuel tank drain valve procedure.
2. New or changed material is indicated by a vertical bar in the margin of the page.
3. Illustration changes are indicated by a miniature pointing hand.
4. Added illustrations are indicated by a vertical bar next to the illustration identification number.
5. Remove old pages and insert new pages as indicated below.

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| 2-53 through 2-64 | 2-53 through 2-64 |
| 2-153 | 2-153 |

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*The Adjutant Genera!*

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To be distributed in accordance with DA Form 12-28 , Direct and General Support Maintenance requirements for Collective Protection Equipment, Field and Shelters.

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DEPARTMENT OF THE ARMY
WASHINGTON, DC, *24 August 1979*

**Direct Support and General Support**

**Maintenance Manual For**

# SHELTER SYSTEM, COLLECTIVE PROTECTION, CHEMICAL-BIOLOGICAL: INFLATABLE, TRAILER-TRANSPORTED, M51

**(NSN 4240-00-854-4144)**

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| Remove Pages | Insert Pages |
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| 2-121 and 2-122 | 2-121 and 2-122 |
| None | 2-145 through2-153 |
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Be sure electrical system is turned off before attempting to remove the power supply. In operation, 208 VAC is present at electrical lead connections. Contact with the high voltage could cause DEATH.

When replacing fuel system components, keep open flame away from work area. DEATH, or severe burns, may result if personnel fail to observe safety precautions.

The unit commander or senior officer in charge of maintenance personnel assigned to remove the contaminated gas and particulate filters must prescribe the necessary protective clothing (TM 10-277) to be worn during this operation. He must also prescribe the necessary safety measures to be followed including the NBC decontamination (FM 3-5). This must be performed before the new filters are installed. Failure to wear protective clothing or follow safety measures may result in injury or death.

To prevent injury to personnel, if system has been operating in heating mode, do not proceed with servicing operations until heater blower shuts down and heater is cool enough to handle.

To prevent explosion or flashfire, be sure system is inoperative and heater has not been operating for approximately ten minutes before attempting to remove heater or replace any component.

To prevent explosion or flashfire, the gas and particulate filters must be replaced if gasoline leakage has occurred during heating system operation.

Be careful to avoid spilling gasoline when disconnecting heater fuel tube. Keep open flame away from work area. DEATH or severe burns may result if personnel fail to observe these safety precautions.

Refrigerant is at a high pressure; to prevent injury open suction service valve slowly.

To avoid eye injury, wear protective goggles when handling refrigerant-12.

The halogen leak detector uses an open flame and should not be used in the presence of explosive or flammable gases.

To avoid eye injury wear protective goggles when discharging air conditioning system.

Be careful to avoid contact with high voltage and with moving belts and pulleys when testing generator. Contact with high voltage could cause DEATH.

When operating the gasoline engine indoors insure that proper ventilation is provided. Carbon monoxide gas can cause DEATH.

Avoid contact with main control panel electrical connections. High voltage can cause DEATH or severe injury when cover is removed.

The trailer rear support leg should be lowered and secured. This will prevent trailer overturning, injury to personnel, and damage to equipment.

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HEALTH/ENVIRONMENTAL HAZARD

Filters use ASC Whetlerite Carbon which contains Chromium VI. Chromium VI is a known carcinogen if inhaled or swallowed. Damaged or unusable filters are classified as hazardous waste:

DO NOT throw away damaged or unusable filters as ordinary trash.

DO turn in damaged or unusable filters to your hazardous waste management office or Defense Reutilization and Marketing Office (DRMO).

Filters are completely safe to handle and use if they are not damaged in such away that carbon leaks from them. In unlikely event that carbon should leak, use protection such as a dust respirator to cover nose and mouth and put carbon in container such as self-sealing plastic bag; turn in to hazardous waste management office or DRMO.

Disposal of hazardous waste is restriced by the Resource Conservation and Recovery Act as amended (42 U.S.C.A sec 6901 et seq). Violation of these laws is subject to severe criminal penalties.

TECHNICAL MANUAL
No. 3-4240-264-34

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *5 December 1975*

## DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

# SHELTER SYSTEM, COLLECTIVE PROTECTION, CHEMICAL-BIOLOGICAL: INFLATABLE, TRAILER-TRANSPORTED, M51 (NSN 4240-00-854-4144)


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# CHAPTER 1

# INTRODUCTION

## Section I. GENERAL

### 1-1. Scope

These instructions are for use by direct support and general support maintenance personnel. They apply to the M51 Trailer-Mounted Inflatable Chemical-Biological Collective Protection Shelter System, hereinafter referred to as the shelter system.

### 1-2. Record and Report Forms

*a.* Equipment maintenance forms and procedures for their use are prescribed in TM 38-750.

*b.* You can improve this manual by recommending changes using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual. Mail the form direct to Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS-CM, Aberdeen Proving Ground, MD 21010. A reply will be furnished direct to you.

## Section II. DESCRIPTION AND DATA

### 1-3. Description

A general description of the shelter system and its component parts is contained in TM 3-4240-264-12. TM 5-2805-259-14 contains a description of the military standard gasoline engine model 4A084–3. TM 9-2330-213–14 contains a description of the M105A2 1 1/2 ton trailer.

### 1-4. Tabulated Data

TM 3-4240-264-12 contains tabulated data for the shelter system.

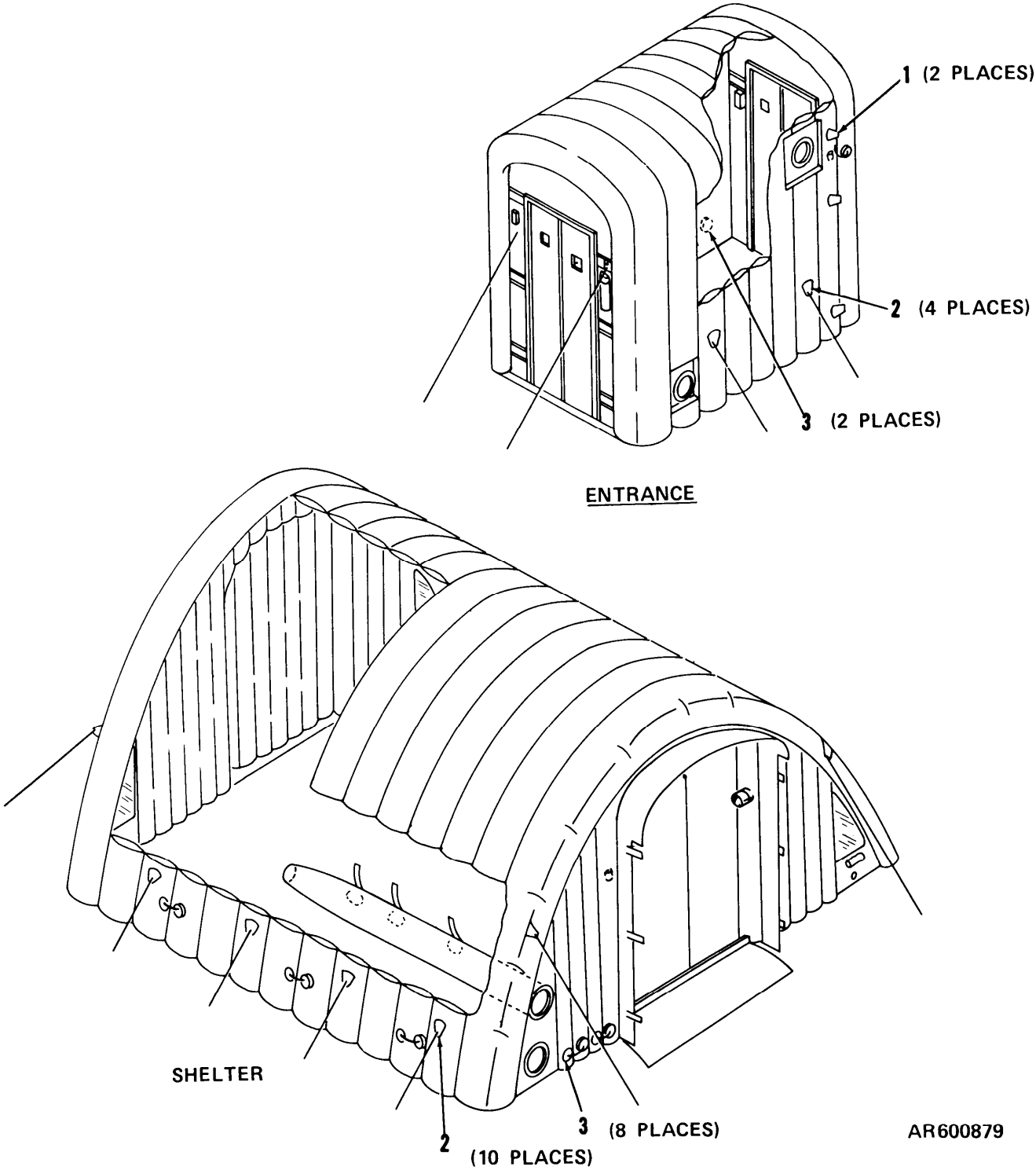
# CHAPTER 2

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

## Section I. INFLATABLE SHELTER

**2-1. Evacuation Outlet Covers**

Direct support maintenance personnel are authorized to replace the evacuation outlet covers (3, fig. 2-1).




1 Ring patches 2 Anchor patches 3 Evacuation outlet covers

*Figure 2-1. Inflatable entrance and shelter.*

*a. Removal.*

**WARNING**

HIGHLY INFLAMMABLE MATERIAL
When using the adhesive and cleaning solvent, keep open flame away from working area. Have working area well ventilated. DEATH or severe burns may result if personnel fail to observe safety precautions.

**NOTE**

Adhesive must be applied uniformly to avoid puddles and dry spots to obtain a necessary uniform adhesive surface.

**NOTE**

Humid weather and damp areas may cause moisture to condense on cemented surfaces because of rapid evaporation of the solvents. If possible, keep cemented area warm.

(1) Saturate edge of evacuation outlet cover patch with technical toluene (item 1, table 2-1) unitl adhesive adhering patch to shelter becomes pliable. Check softness of adhesive by pulling edge of patch away from shelter with fingernails or suitable tool.

(2) Begin to pull patch from shelter and at the same time apply technical toluene to the adhesive. Maintain tension and continue to apply solvent until patch is removed.

*b. Installation.*

(1) Remove dirt and adhesive residue from contact surface of shelter wall with a rough rag dampened with technical toluene. Use a clean area of rag with each wipe.

(2) Roughen contact surface of the evacuation outlet cover patch. Do not roughen contact surface of shelter wall.

(3) Mark a general outline on the shelter wall where the patch will be attached.

(4) Apply an even coat of adhesive (item 2, table 2-1) to contact surface of patch and contact surface on shelter wall. On the shelter wall, apply the adhesive to an area slightly larger than the general outline of the patch.

(5) Allow first coat of adhesive to dry completely before applying second coat.

(6) Apply second coat of adhesive to contact surfaces. Allow adhesive to become tacky. Check tackiness by pressing knuckles on adhesive to insure a good aggressive tack. Adhesive should not pull off onto the knuckles.

**NOTE**

Take care to properly position patch on shelter wall.

(7) Starting with the top of the patch, apply patch to shelter wall with a rolling action of the hand to eliminate trapping air.

(8) Allow adhesive to dry for 24 hours to develop full strength before subjecting the shelter to normal inflation pressure.

## 2-2. Anchor Patches

Direct support maintenance personnel are authorized to replace the anchor patches (2, fig. 2-1). The anchor patches are removed and installed by the same procedures as given for the evacuation outlet covers (para 2-1).

## 2-3. Ring Patches

Direct support maintenance personnel are authorized to replace the ring patches (1, fig. 2-1). The ring patches are removed and installed by the same procedures as given for the evacuation outlet covers (para 2-1).

Table 2-1. Expendable Items

| Item | Nomenclature | NSN or MFR Part No. |
|---|---|---|
| 1 | Technical toluene | 6810-00-290-0048 |
| 2 | Adhesive | 8040-00-165-8614 |
| 3 | Adhesive sealant | 8040-00-880-7332 |
| 4 | Decreasing solvent cleaning compound | 6850-00-224-6665 |
| 5 | Adhesive sealant | 8040-00-723-3038 |
| 6 | Antiseize compound | 8030-00-209-8005 |
| 7 | Tape, antiseizing | 8030-00-889-3535 |
| 8 | Coating compound, bituminous, solvent | 8030-00-221-1834 |
| 9 | Adhesive | 8040-00-145-0153 |
| 10 | Tape | 5970-00-644-3167 |
| 11 | Tape, insulation, electrical | 5970-00-419-3164 |
| 12 | Rag, wiping | 7920-00-205-1711 |
| 13 | Antifouling paint | 8010-00-290-4247 |

Table 2-1. Expendable Items—Continued

| Item | Nomenclature | NSN or MFR Part No. |
|---|---|---|
| 14 | Enamel, olive drab | 8010-00-290-6648 |
| 15 | Enamel, yellow | 8010-0286-7758 |
| 16 | Lubrication oil, hydraulic | 9150-00-009-0217 |
| 17 | Fuel, engine primer | 6850-00-823-7861 |
| 18 | Gasoline, automotive | 9130-00-160-1817 |
| 19 | Gasoline, automotive (temperatures consistently below 32°F) | 9130-00-240-8201 |
| 20 | Strap, tie down, electrical | 5975-00-074-2072 |

## Section II. INFLATABLE ENTRANCE

### 2-4. Evacuation Outlet Covers, Anchor Patches, and Ring Patches

The entrance evacuation-outlet covers, anchor and ring patches are removed and installed by the same procedures as given for the shelter evacuation outlet covers (para 2-l).

### 2-5. Fabric Retainer Frame and Door Zipper

Direct support maintenance personnel are authorized to replace the fabric retainer frame, door zipper, and retaining hardware.

*a. Removal.*

(1) Remove two tiedown ropes (1, fig. 2-2).

(2) Remove 13 binder posts (6), lockwashers (7), and lockwashers (15).

(3) Remove cave trough (3) and zipper retainer (12).

(4) Remove 62 binder posts (4), lockwashers (5). and lockwashers (14).

(5) Remove fabric retainer frame (13) and zipper (11).

*b. Installation.*

Installation is the reverse of removal *(a* above), except for the following procedures:

(1) Be sure mounting holes of items (2), (9), (10), (11), (12), and (13) are alined before inserting mounting hardware.

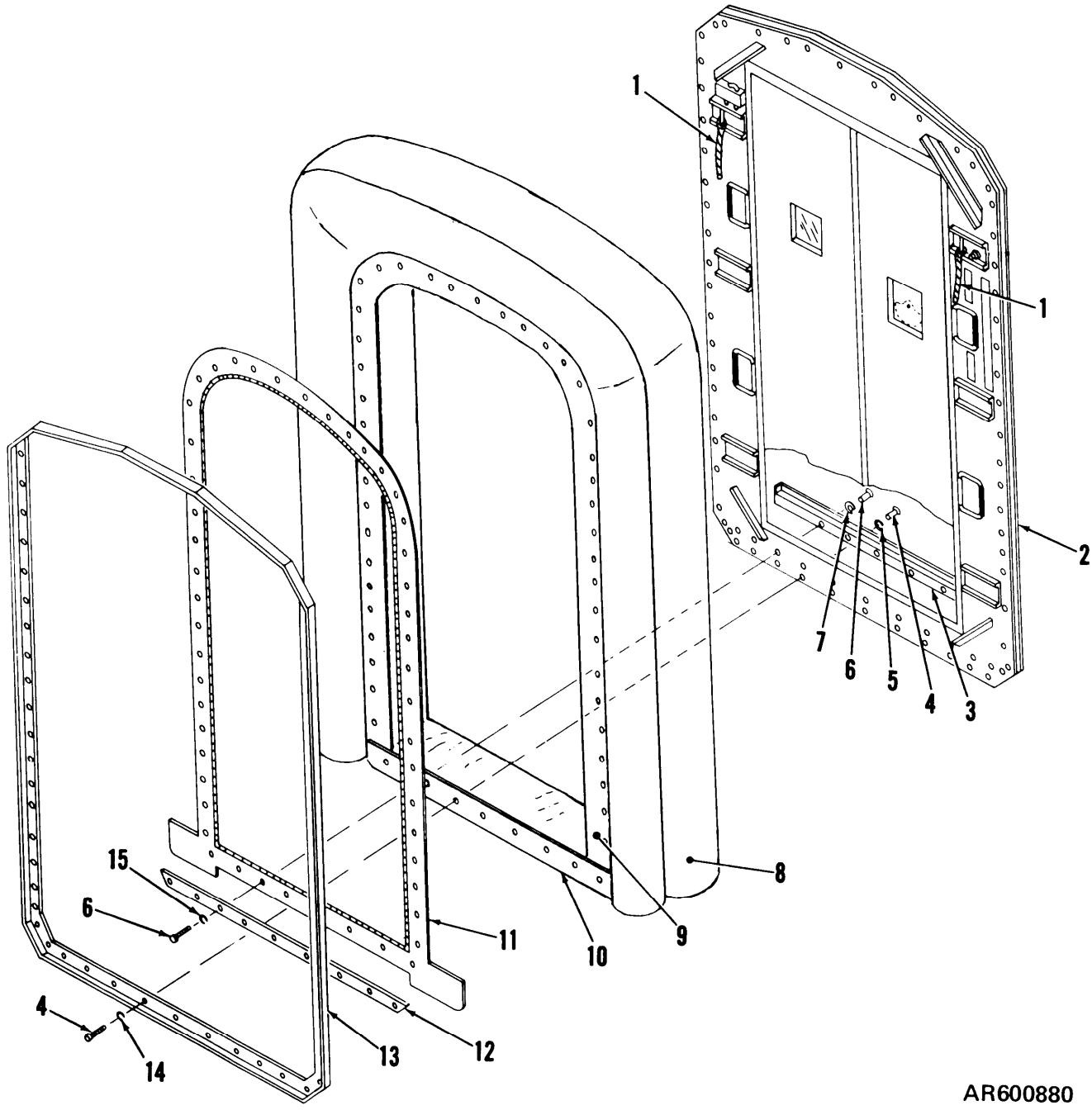
(2) Replace an unserviceable binder post with a screw, two washers, and a locknut.

### 2-6. Exterior Frame and Door Assembly

Direct support maintenance personnel are authorized to replace the exterior frame and door assembly and retaining hardware.

*a. Removal.*

(1) If necessary, inflate entrance (8, fig. 2-2).




1 Tiedown ropes
2 Frame and door assembly
3 Eave trough
4 Binder posts
5 Lockwashers
6 Binder posts
7 Lockwashers
8 Entrance
9 Mounting fabric
10 Floor fabric
11 Zipper
12 Zipper retainer
13 Fabric retainer frame
14 Lockwashers
15 Lockwashers

*Figure 2-2. Exterior frame and door assembly, exploded view.*

(2) Remove fabric retainer frame and door zipper (para 2-5).

**CAUTION**

Be careful not to damage entrance fabric when removing the frame and door assembly.

(3) Remove frame and door assembly (2).

*b. Installation.* Installation is the reverse of

removal (a above), except for the following procedures:

(1) Be sure mounting holes of items (2), (9), (10), (11), (12), and (13) are alined before inserting mounting hardware.

(2) Replace an unserviceable binder post with a screw, two washers, and a locknut.

## 2-7. Interior Frame and Door Assembly

Direct support maintenance personnel are authorized to replace the interior frame and door assembly and attaching hardware.

*a. Removal.*

(1) If necessary, inflate entrance (2, fig. 2-3).

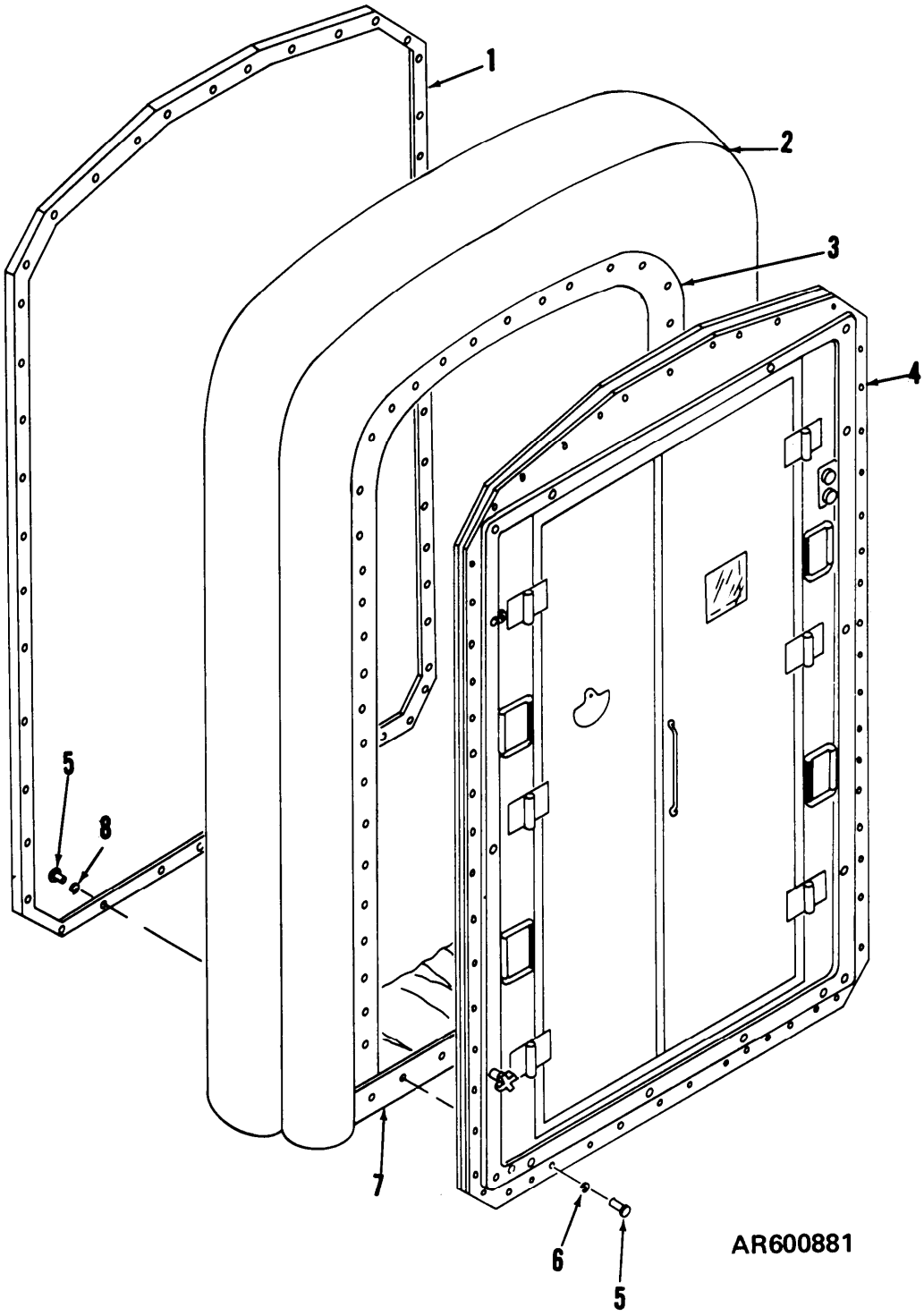



*Figure 2-3. Interior frame and door assembly, exploded view.*

Legend for fig. 2-3:

| | |
|---|---|
| 1 Fabric retainer frame | 5 Binder posts |
| 2 Entrance | 6 Lockwashers |
| 3 Mounting fabric | 7 Floor fabric |
| 4 Frame and door assembly | 8 Lockwashers |

(2) Remove 62 binder posts (5) and lockwashers (6), and (8).

**CAUTION**

Be careful not to damage entrance fabric when removing the fabric retainer frame and the frame and door assembly.

(3) Remove the frame and door assembly (4), and fabric retainer frame (1).

*b. Installation.* Installation is the reverse of removal (a above), except for the following procedures:

(1) Be sure mounting holes of items (1), (3), (4), and (7) are alined before inserting mounting hardware.

(2) Replace an unserviceable binder post with a screw, two washers, and a locknut.

## Section III. SWITCH BOX

### 2-8. Receptacle Connector

Direct support maintenance personnel are authorized to replace the receptacle connector and attaching hardware.

*a. Removal.*

(1) Remove four screws (1, fig. 2-4) and access cover (2) with gasket (16) attached.

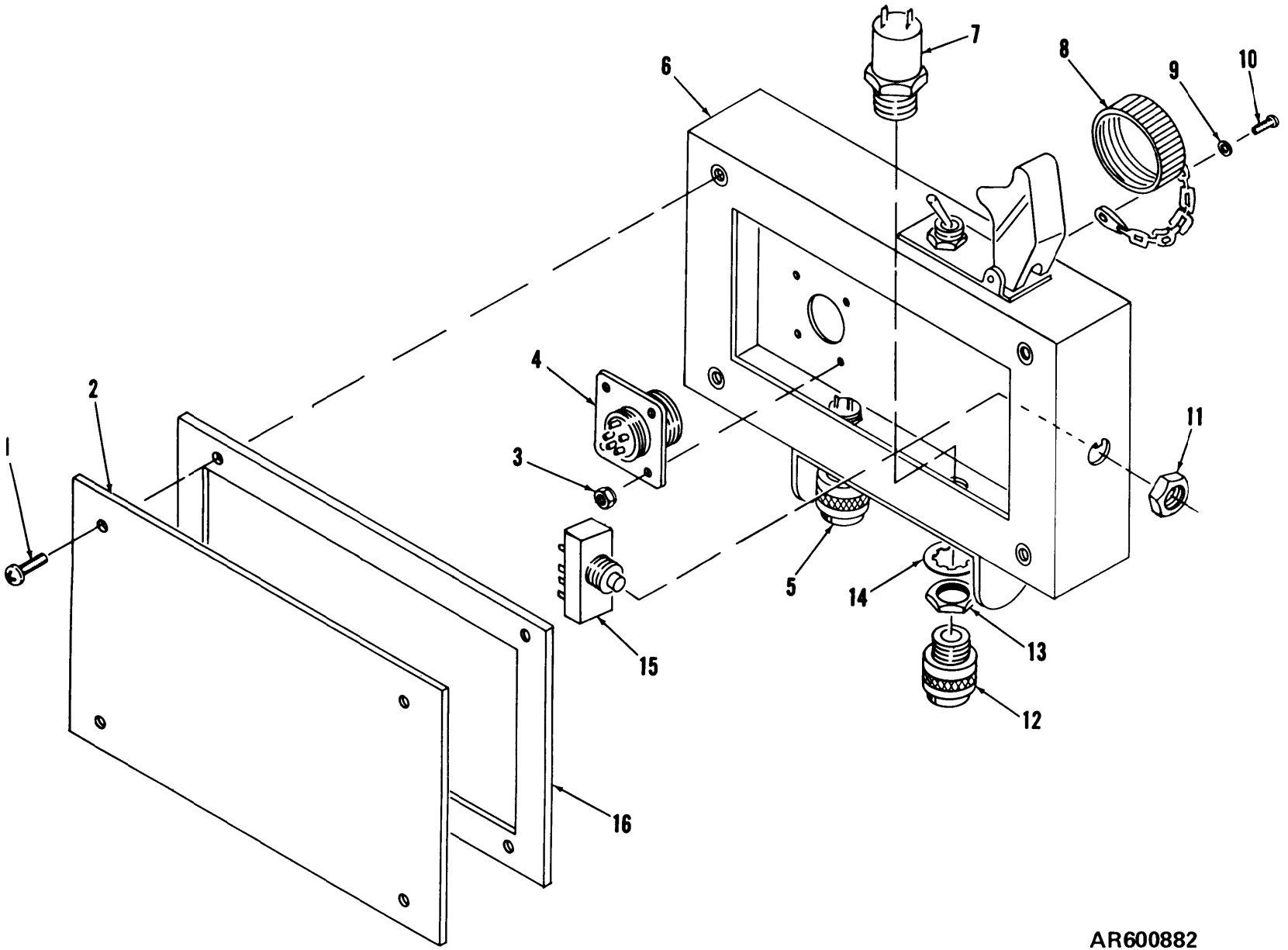


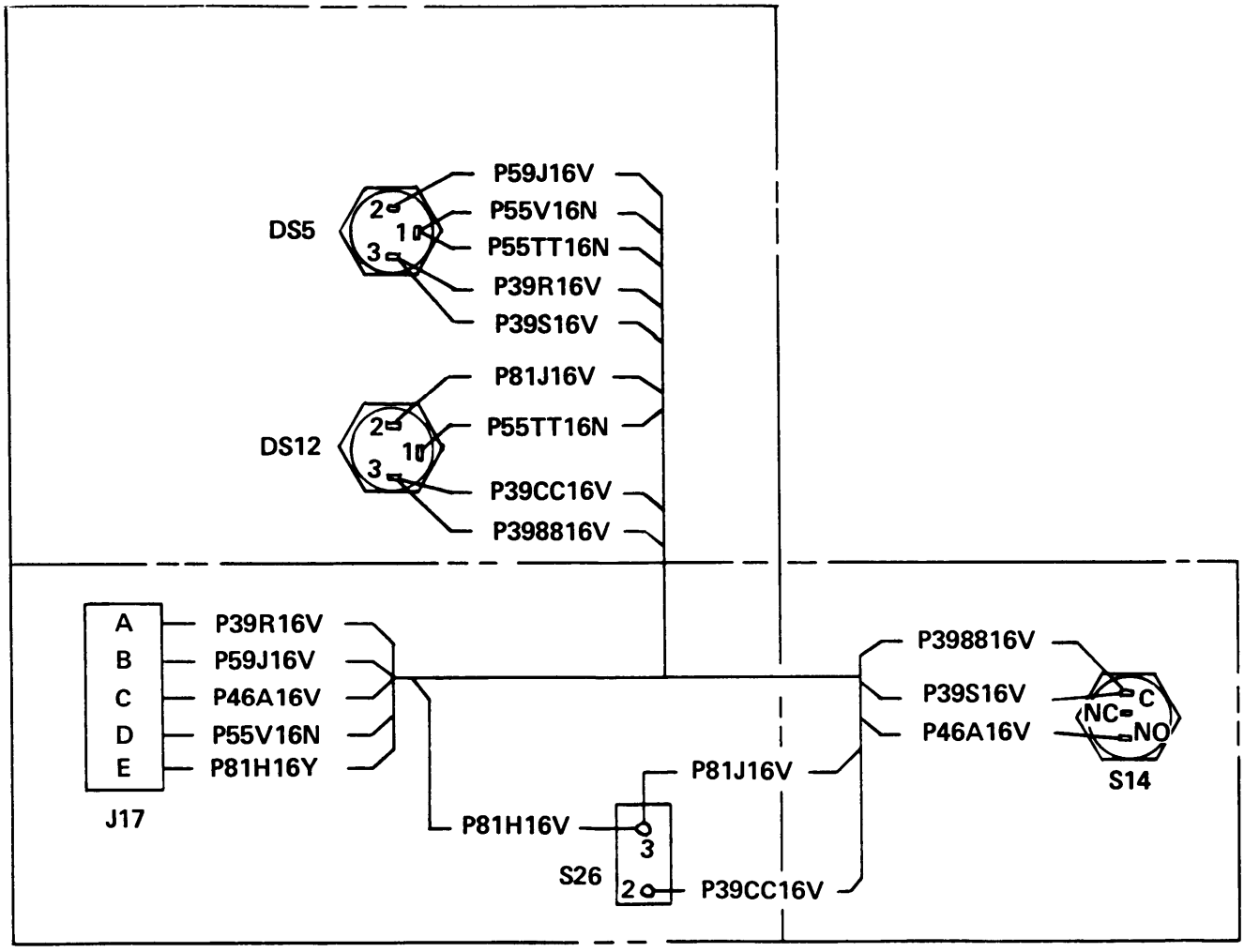

*Figure 2-4. Switch box, exploded view.*

Legend for fig. 2-4:
1 Screws
2 Cover
3 Locknuts
4 Receptacle connector
5 Indicator light
6 Enclosure
7 Indicator light
8 Cover
9 Washers
10 Screws
11 Nut
12 Lens
13 Nut
14 Lockwasher
15 Switch
16 Gasket

(2) Remove four locknuts (3), screws (10), washers (9), and cover (8).

(3) Remove receptacle connector (4).

(4) Identify, tag, and disconnect electrical leads (fig. 2-5 and 2-6).




LEGEND:

DS5 – INDICATOR LIGHT
DS12– INDICATOR LIGHT
J17 – RECEPTACLE CONNECTOR
S14 – PUSH BUTTON SWITCH
S26 – TOGGLE SWITCH

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DS5 - INDICATOR LIGHT
DS12 - INDICATOR LIGHT
J17 - RECEPTACLE CONNECTOR
S14 - PUSH BUTTON SWITCH
S26 - TOGGLE SWITCH

*Figure 2-5. Switch Box wiring diagram.*

Figure 2-6. Electrical wiring diagram (Located in back of manual.)

*b. installation.* Installation is the reverse of removal (a above).

2-9. Indicator Lights

Direct support maintenance personnel are authorized to replace indicator lights and attaching hardware. The instructions to replace one indicator light are typical for both.

*a. Removal.*

*(1) Remove* four screws (1, fig. 2-4) and access cover (2) with gasket (16) attached.

(2) Remove lens (12), nut (13), and lockwasher (14).

(3) Remove indicator light (5) or (7).

(4) Identify, tag, and disconnect electrical leads (fig. 2-5 and 2-6).

*b. Installation.* Installation is the reverse of removal, ( *a* above).

**2-10. Push Button Switch**

Direct support maintenance personnel are authorized to replace the push button switch and attaching hardware.

*a. Removal.*

(1) Remove four screws (1, fig. 2-4) and access cover (2) with gasket (16) attached.

(2) Remove nut (11) and push button switch (15).

(3) Identify, tag, and disconnect electrical leads (fig. 2-5 and 2-6).

*b. Installation.* Installation is the reverse of removal *(a* above).

**2-11. Electrical Leads**

Direct support maintenance personnel are authorized to test, manufacture, and replace electrical leads and attaching hardware.

*a. Test.*

*(1) Remove* four screws (1, fig. 2-4) and access cover (2) with gasket (16) attached.

(2) Test by making continuity checks. Use figure 2-6 to locate check points.

(3) If repair is required proceed to *b* below. If not, install access cover (2, fig. 2-4), gasket (16), and secure with four screws (1).

*b. Repair.*

*(1)* If a terminal lug is faulty, replace terminal lug.

(2) If electrical lead is faulty, identify and tag. electrical lead to be removed (figs. 2-5 and 2-6). Remove faulty electrical lead.

(3) Fabricate electrical lead from 600V in sulated copper conductor wire, Military Specification MIL-W-5086/1-16. Refer to table 2-2 for connecting points, connection type, and length of wire.

(4) Attach lead to appropriate connections.

(5) Make continuity check of the newly installed electrical lead.

(6) Install access cover (2, fig. 2-4), gasket (16), and secure with four screws (1).

*Table 2-2. Switch Box Wire Listing.*

| *Wire Run Number* (fig. 2-5) | *Cut Length Inches* | *Connecting Points from 1st end* | *to 2nd end* | *Connection Type 1st end* | *2nd end* |
|---|---|---|---|---|---|
| P39BB16V | 3 | DS12-3 | S14-C | S | S |
| P39CC16V | 4 | DS12-3 | S26-2 | S | TL |
| P39R16V | 3 | DS5-3 | J17-A | S | S |
| P39S16V | 2 | DS5-3 | S14-C | S | S |
| P46A16V | 3.5 | S14 N.O. | J17-C | S | S |
| P55TT16N | 2 | DS5-1 | DS12-1 | S | S |
| P55V16N | 3 | DS5-1 | J17-D | S | S |
| P59J16V | 3 | DS5-2 | J17-B | S | S |
| P81H16V | 3.5 | J17-E | S26-3 | S | TL |
| P81J16V | 4 | DS12-2 | S26-3 | S | TL |

LEGEND:
S—Solder
TL—Terminal lug

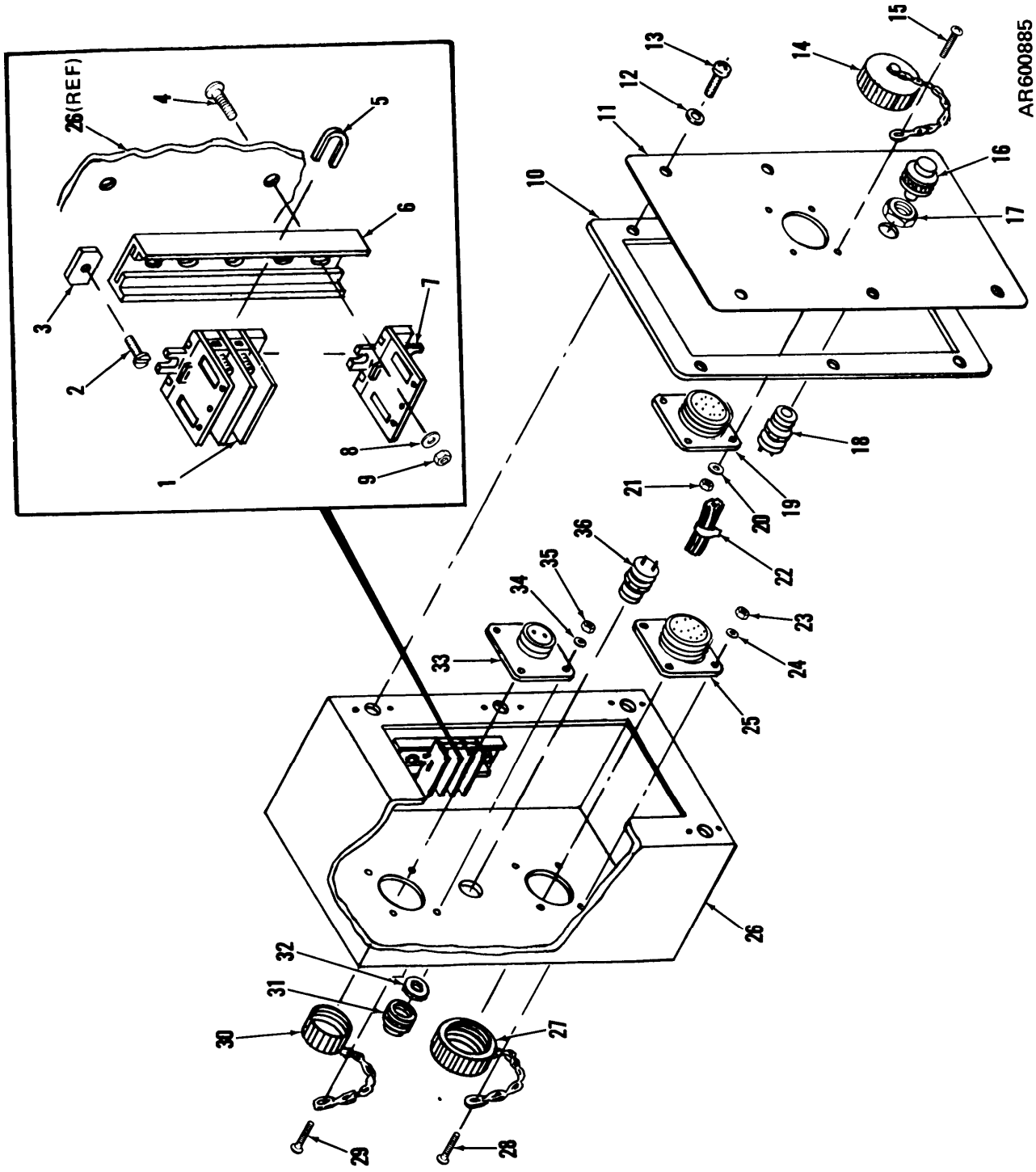
## Section IV. DISTRIBUTION BOX

**2-12. Receptacle Connectors**

Direct support maintenance personnel are authorized to replace the receptacle connectors and attaching hardware. The instructions to replace one receptacle connector are typical for all three.

*a. Removal.*

(1) Remove six screws (13, fig. 2-7) and washers (12).



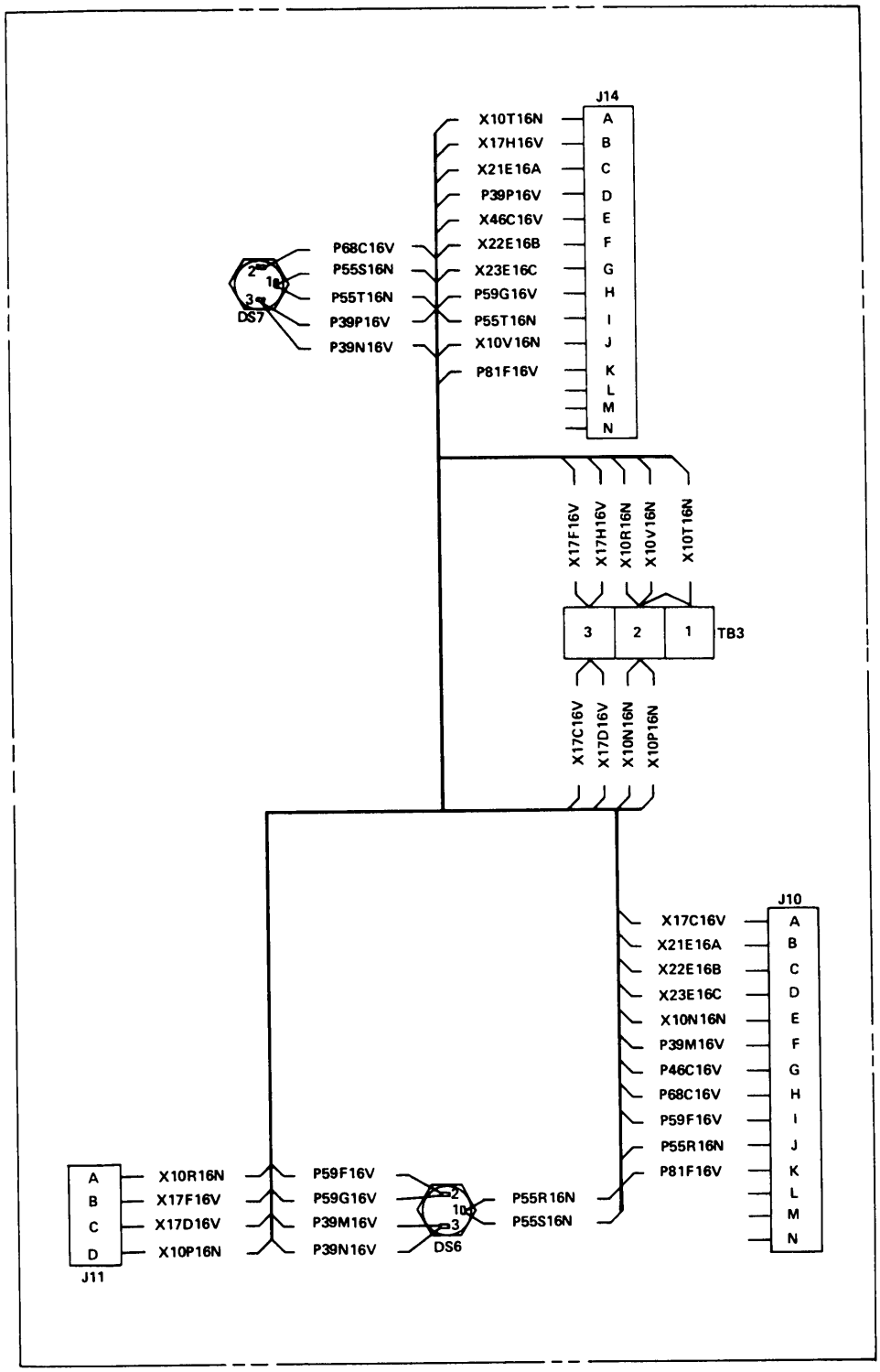

| | | | | |
|---|---|---|---|---|
| 1 Terminal board | 9 Locknuts | 16 Lens | 23 Locknuts | 30 Cover |
| 2 Screws | 10 Gasket | 17 Nut | 24 Washers | 31 Lens |
| 3 Clamps | 11 Cover | 18 Indicator light | 25 Receptacle connector | 32 Nut |
| 4 Screws | 12 Washers | 19 Receptacle connector | 26 Enclosure | 33 Receptacle connector |
| 5 Jumper | 13 Screws | 20 Washers | 27 Cover | 34 Washers |
| 6 Channel | 14 Cover | 21 Locknuts | 28 Screws | 35 Locknuts |
| 7 Terminal end | 15 Screws | 22 Straps | 29 Screws | 36 Indicator light |

*Figure 2-7. Distribution box, exploded view.*

(2) Separate access cover (11 ) with gasket (l0) attached from enclosure (26). Be careful not to damage gasket (10) when separating access cover from enclosure.

(3) Remove connector cover (14), four locknuts (21), washers (20), screws (15), and receptacle connector (19).

(4) Remove electric wire straps (22), as necessary. Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-8) from receptacle connector.




J11—RECEPTACLE CONNECTOR
J14—RECEPTACLE CONNECTOR
TB3—TERMINAL BOARD
DS6—INDICATOR LIGHT
DS7—INDICATOR LIGHT
J10—RECEPTACLE CONNECTOR

*Figure 2-8. Distribution box wiring diagram.*

LEGEND:

DS6–INDICATOR LIGHT
DS7–INDICATOR LIGHT
J10–RECEPTACLE CONNECTOR
J11–RECEPTACLE CONNECTOR
J14–RECEPTACLE CONNECTOR
TB3–TERMINAL BOARD

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(5) If necessary, remove indicator light (18 or 36) (para 2-13a), step 3.

*b. Installation.* Installation is the reverse of removal ( *a* above). Except, replace wire straps with insulating electrical tape.

**2-13. Indicator Lights**

Direct support maintenance personnel are authorized to replace the indicator lights and attaching hardware. The instructions to replace one indicator light are typical for both.

*a. Removal.*

(1) Remove six screws (13, fig. 2-7) and washers (12).

(2) Separate access cover (11) with gasket (10) attached from enclosure (26). Be careful not to damage gasket (10) when separating cover from enclosure.

(3) Remove lens (16), nut (17) and indicator light (18).

(4) Remove electric wire straps (22) as necessary. Identify, tag, and disconnect electrical leads from indicator light (figs. 2-6 and 2-8).

*b. Installation.* Installation is the reverse of removal ( *a* above). Except, replace wire straps with insulating electrical tape.

**2-14. Terminal Board**

Direct support maintenance personnel are authorized to replace the terminal board and attaching hardware.

*a. Removal.*

(1) Remove six screws (13, fig. 2-7) and washers (12).

(2) Separate access cover (11) with gasket (10) attached from enclosure (26). Be careful not to damage gasket (10) when separating access cover from enclosure.

(3) Loosen screws (2), clamp (3), and remove terminal end (7).

(4) Remove electric wire straps, (22), as necessary. Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-8).

(5) If necessary, remove jumper (5, fig. 2-7).

(6) Snap faulty terminal board (1) from channel (6). Disconnect electrical leads from terminal.

*b. Installation.* Installation is the reverse of removal (a above) except, label new terminal board with proper identification number, and replace wire straps with insulating electrical tape.

**2-15. Electrical Leads**

Direct support maintenance personnel are authorized to test, manufacture, and replace electrical leads.

*a. Test.*

(1) Remove six screws (13, fig. 2-7) and washers (12).

(2) Separate access cover (11) with gasket (10) attached from enclosure (26). Be careful not ; to damage gasket (10) when separating access cover and enclosure.

(3) Test by making continuity checks. Use figures 2-6 and 2-8 to locate check points.

(4) If repair is required, proceed to *b* below, if not, install access cover (11, fig. 2-7) gasket (10), to enclosure (26) and secure with six screws (13) and washers (12).

*b. Repair.*

(1) If electrical lead is faulty, remove necessary wiring straps, identify and tag electrical lead to be removed (figs. 2-6 and 2-8).

(2) Remove faulty electrical lead.

(3) Fabricate electrical lead from 600V insulated copper conductor wire, Military Specification, MIL-W-5086/1-16.

(4) Refer to Table 2-3 for connecting points, connection type, and length of wire.

(5) Attach lead to appropriate connections.

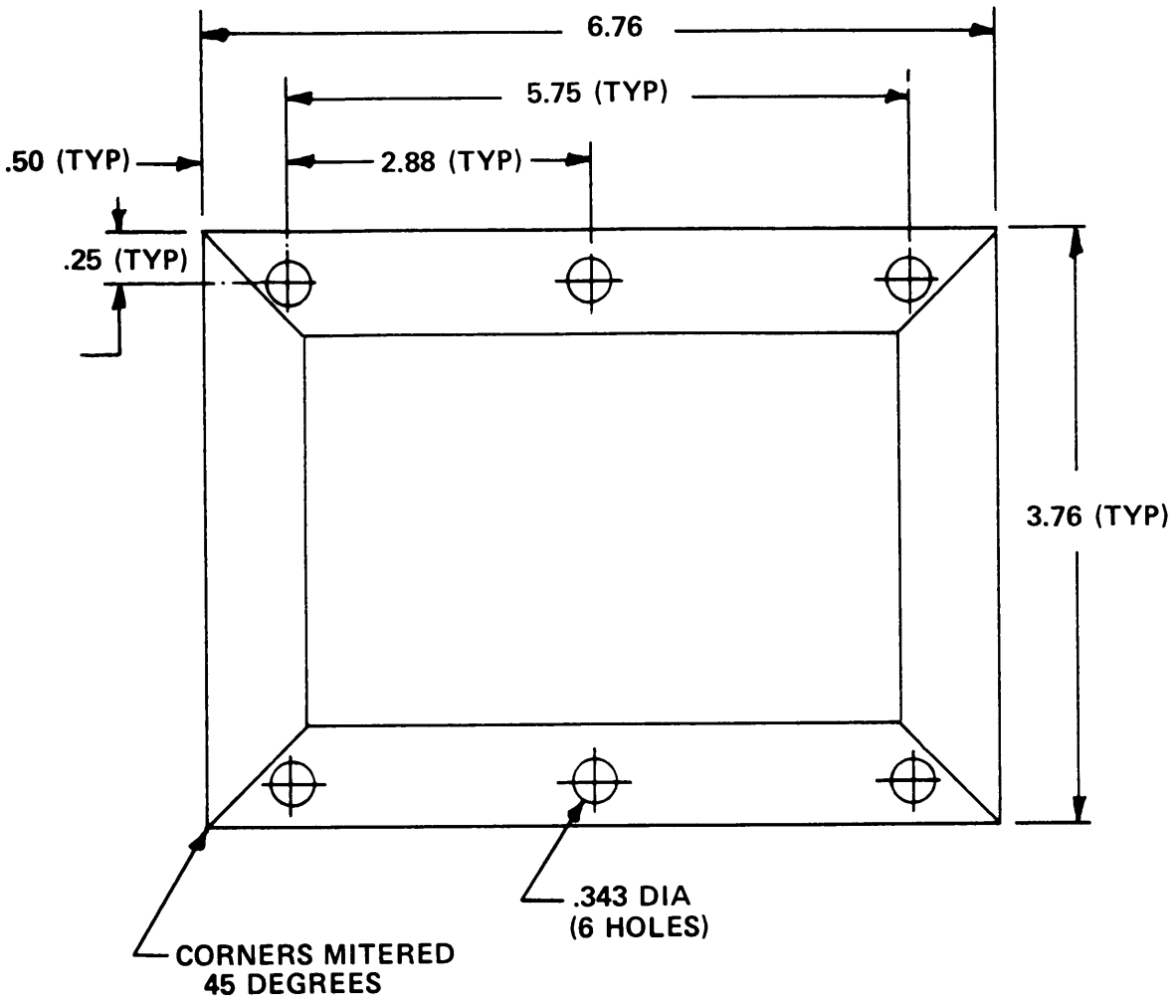
(6) Make continuity check of the newly installed electrical lead.

(7) Use insulating electrical tape to bundle leads together, in place of removed straps.

**2-16. Cover Gasket.**

Direct support maintenance personnel are authorized to manufacture and replace the distribution box cover gasket.

*a. Manufacture.* Fabricate gasket (fig. 2-9).




**NOTE:**

1. **MATERIAL. SILICONE SPONGE RUBBER, 0.187 THICK.**
2. **DIMENSIONS IN INCHES.**

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*Figure 2-9. Distribution box cover gasket, fabrication.*

*b. Removal.*

(1) Remove six screws (13, fig. 2-7) and washers (12).

(2) Separate access cover (11) with gasket (10) attached from enclosure (26).

(3) Remove gasket (10) from access cover (11).

(4) Clean gasket and adhesive residue from cover with degreasing solvent (item 4, table 2-1).

*c. Installation.*

(1) Install gasket (10) on access cover (11) with adhesive sealant (item 5, table 2-1).

(2) Install access cover on distribution box with six screws (13) and washers (12).

*Table 2-3. Distribution Box Wire Listing.*

| *Wire Run Number (fig. 2-8)* | *Cut Length Inches* | *Connecting Points from 1st end* | *to 2nd end* | *Connection Type 1st end* | *2nd end* |
|---|---|---|---|---|---|
| P39M16V | 3 | DS6-3 | J10-F | S | S |
| P39N16V | 9 | DS6-3 | DS7-3 | S | S |
| P39P16V | 3 | DS7-3 | J14-D | S | S |
| P46C16V | 7 | J10-G | J14-E | S | S |
| P55R16N | 2 | DS6-1 | J10-J | S | S |
| P55S16N | 9 | DS6-1 | DS7-1 | S | S |
| P55T16N | 3 | DS7-1 | J14-I | S | S |
| P59F16V | 3 | DS6-2 | J10-I | S | S |
| P59G16V | 9 | DS6-2 | J14-H | S | S |
| P68C16V | 8.5 | DS7-2 | J10-H | S | S |
| P81F16V | 7 | J10-F | J14-K | S | S |
| X10N16N | 4 | TB3-2 | J10-E | TL | S |
| X10P16N | 3.5 | TB3-2 | J11-D | TL | S |
| X10R16N | 3.5 | TB3-2 | J11-A | TL | S |
| X10T16N | 9 | TB3-1 | J14-A | TL | S |
| X10V16N | 9 | TB3-2 | J14-J | TL | S |
| X17C16V | 4.5 | TB3-3 | J10-A | TL | S |
| X17D16V | 3.5 | TB3-3 | J11-C | TL | S |
| X17F16V | 3.5 | TB3-3 | J11-B | TL | S |
| X17H16V | 9 | TB3-3 | J14-B | TL | S |
| X21E16A | 7 | J10-B | J14-C | S | S |
| X22E16B | 7 | J10-C | J14-F | S | S |
| X23E16C | 7 | J10-D | J14-G | S | S |

LEGEND:
S—Solder
TL—Terminal lug

## Section V. TAILGATE EXTENSION AND SUPPORT RACK

### 2-17. Tailgate Extension

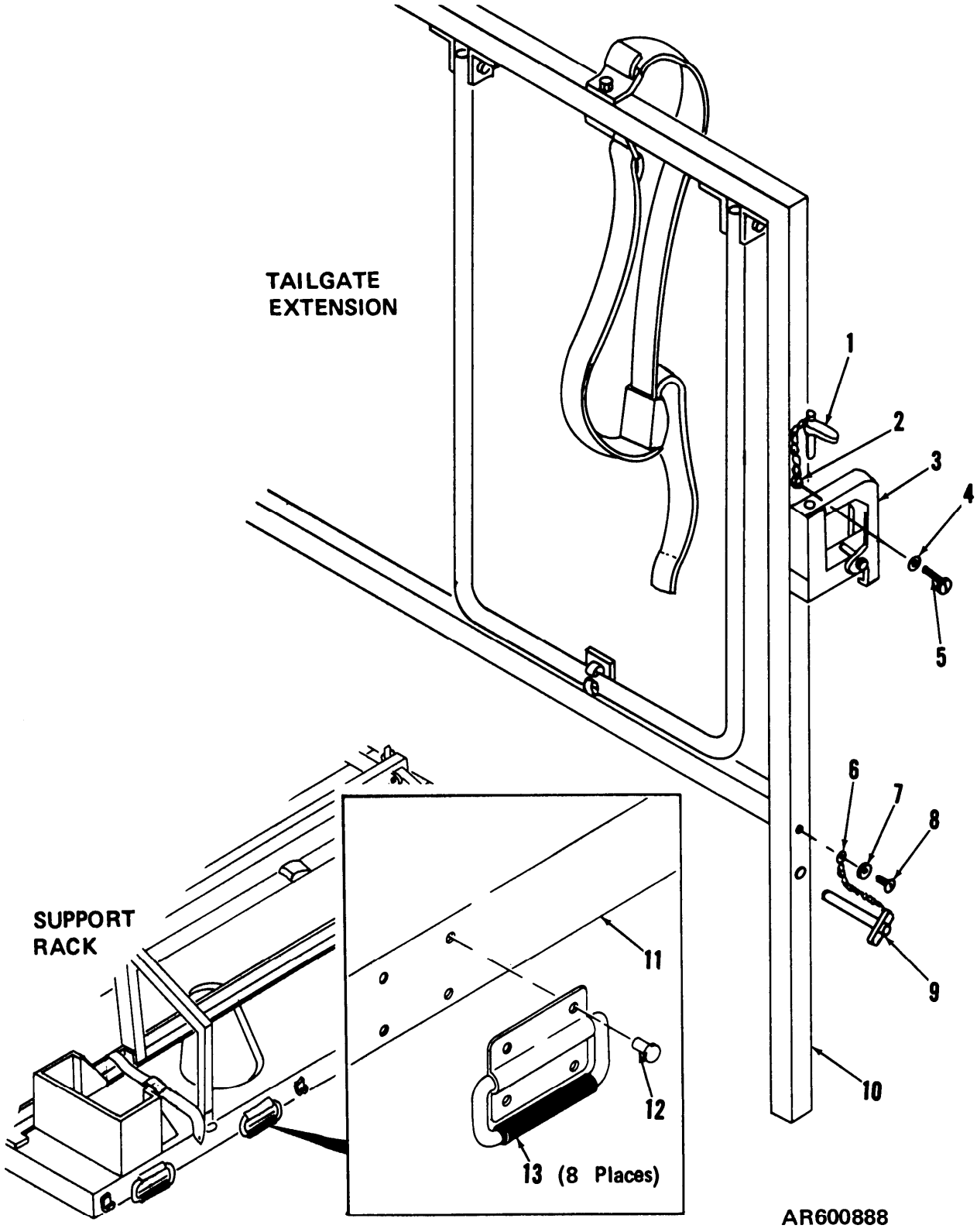
*a. Bracket Ball Lock Pin.*
Direct support maintenance personnel are authorized to replace the bracket ball lock pins and attaching hardware. The instructions for replacing one bracket ball lock pin are typical for both.

(1) *Removal.*

(a) If necessary, remove ball lock pin (1, fig. 2-10) from bracket (3).

(b) Remove rivet (5) and washer (4) securing chain (2).

(2) *Installation.* Installation is the reverse of removal [(1) above].




1. Ball lock pin
2 Chain
3 Bracket
4 [illegible]
[illegible]eat type)
6 Chain
7 Washer
8 Rivet (heat type)
9 Ball lock pin
10 Tailgate extension
11 Support rack
12 Rivet (heat type)
13 Handle

*Figure 2-10. Tailgate extension and support rack, exploded view.*

*b. Tailgate Ball Lock Pin.*

Direct support maintenance personnel are authorized to replace the tailgate ball lock pins and attaching hardware. The instructions for replacing one tailgate ball lock pin are typical for both.

(1) *Removal.*

(a) If necessary, remove ball lock pin (9) from tailgate extension (10).

(b) Remove rivet (8) and washer (7) securing chain (6).

(2) *Installation.* Installation is the reverse of removal [(1) above].

### 2-18. Support Rack Handles

Direct support maintenance personnel are authorized to replace the support rack handles and attaching hardware.

*a. Removal.*

Remove four rivets (12, fig. 2-10) and handle (13) from support rack (11).

*b. Installation.* Installation is the reverse of removal (a above).

## Section VI. ENTRANCE GAS-PARTICULATE FILTER UNIT

### 2-19. Dummy Receptacle Connector

Direct support maintenance personnel are authorized to replace the dummy receptacle connector and attaching hardware.

*a. Removal.*

(1) Remove gas and particulate filters (TM 3-4240-264-12).

(2) Remove four nuts (1, fig. 2-11), screws (5), washers (4) and dummy connector (3) from inlet plenum (2).

*b. Installation.* Installation is the reverse of removal (a above).

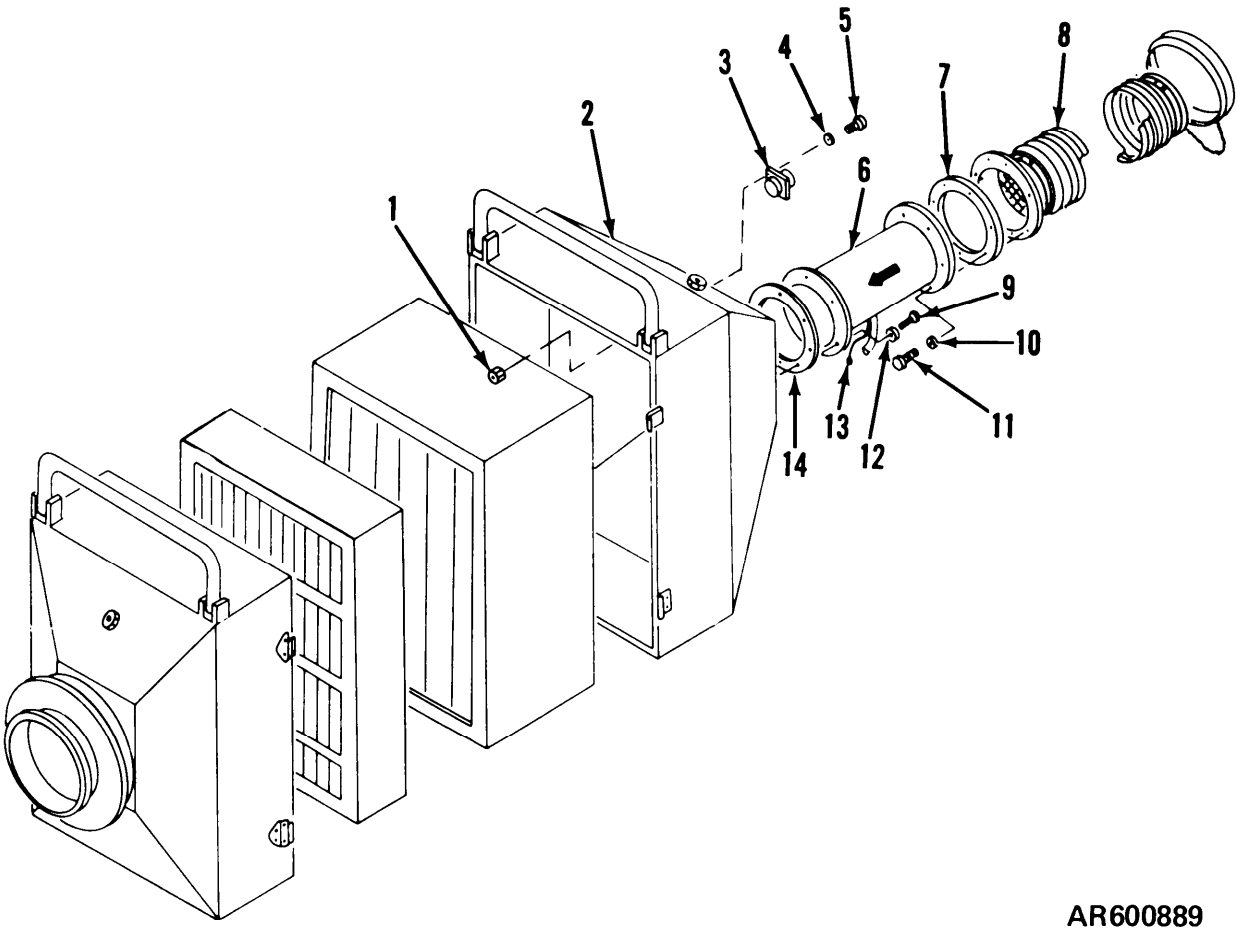



*Figure 2-11. Entrance gas-particulate filter unit, exploded view.*

Legend for fig. 2-11:

1 Nuts
2 Inlet plenum
3 Dummy connector
4 Washer
5 Screws
6 Fan
7 Gasket
8 Air-duct hose assembly
9 Screws
10 Washers
11 Screws
12 Washers
13 Terminal
14 Gasket

**2-20. Entrance Fan**

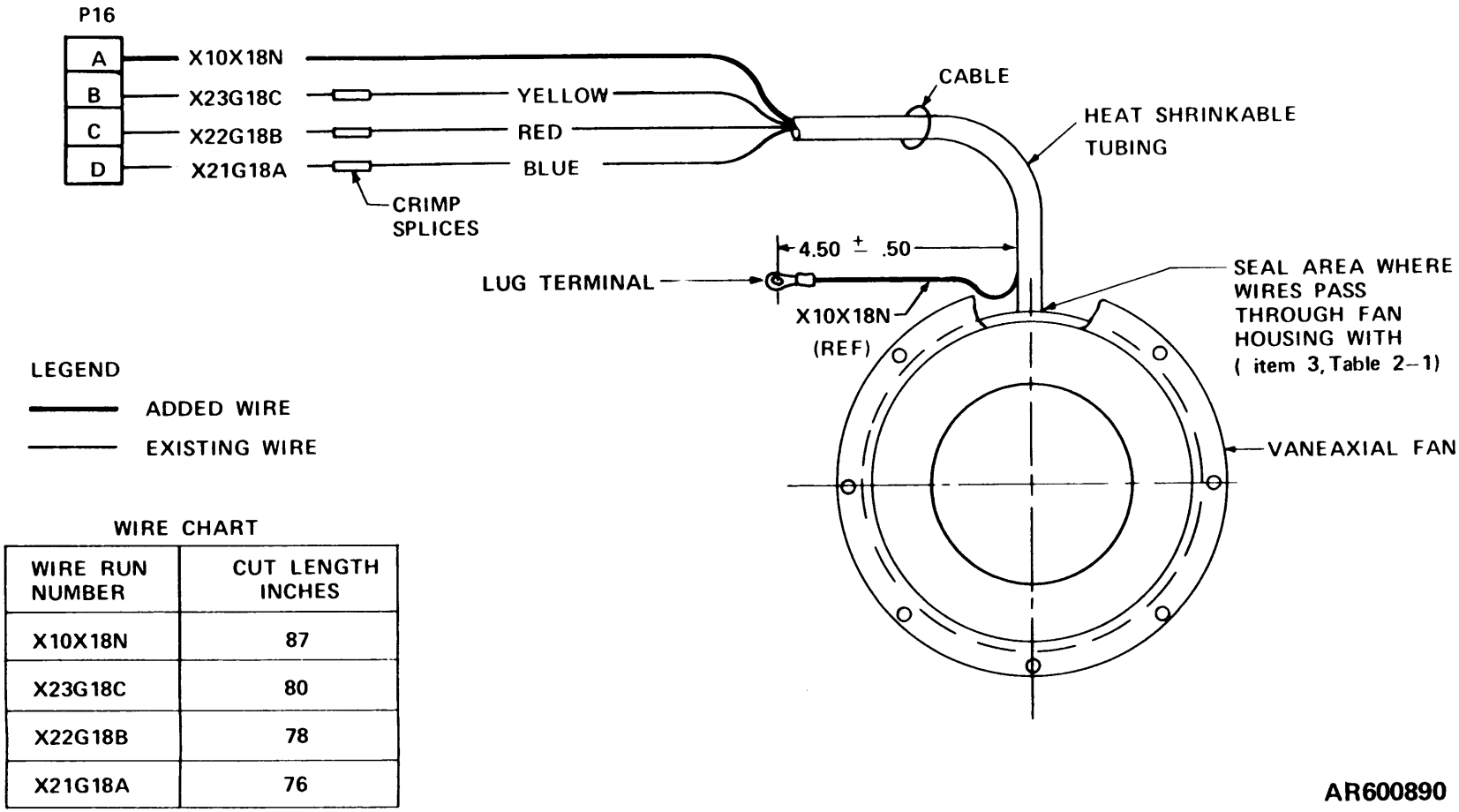
Direct support maintenance personnel are authorized to test, and replace the entrance fan.

*a. Test.* Check for continuity between pins B and C, B and D, and C and D of plug connector P 16 (fig. 2-12). Continuity should exist in each check, otherwise replace fan.

*b. Removal.*

(1) Remove eight screws (11, fig. 2-11), washers (10), air duct hose assembly (8), and gasket (7).

(2) Remove eight screws (9), washers (12), lug terminal (13), entrance fan (6), and gasket (14).




WIRE CHART

| WIRE RUN NUMBER | CUT LENGTH INCHES |
|---|---|
| X10X18N | 87 |
| X23G18C | 80 |
| X22G18B | 78 |
| X21G18A | 76 |

*Figure 2-12. Entrance fan wiring diagram.*

*c. Installation.* Installation is the reverse of removal (para 2-20b) above, except for the following procedures:

(1) Add the necessary electrical leads (figs. 2-6 and 2-12).

*(2)* Cover electrical leads with heat shrinkable tubing before attaching plug connector P16.

(3) Be sure terminal lug is at the distance shown from the cable.

**2-21. Electric Motor**

Direct support maintenance personnel are authorized to replace the electric motor, attaching hardware, and ancillary items.

*a. Removal.*

(1) Remove plug connector (19, fig. 2-13).

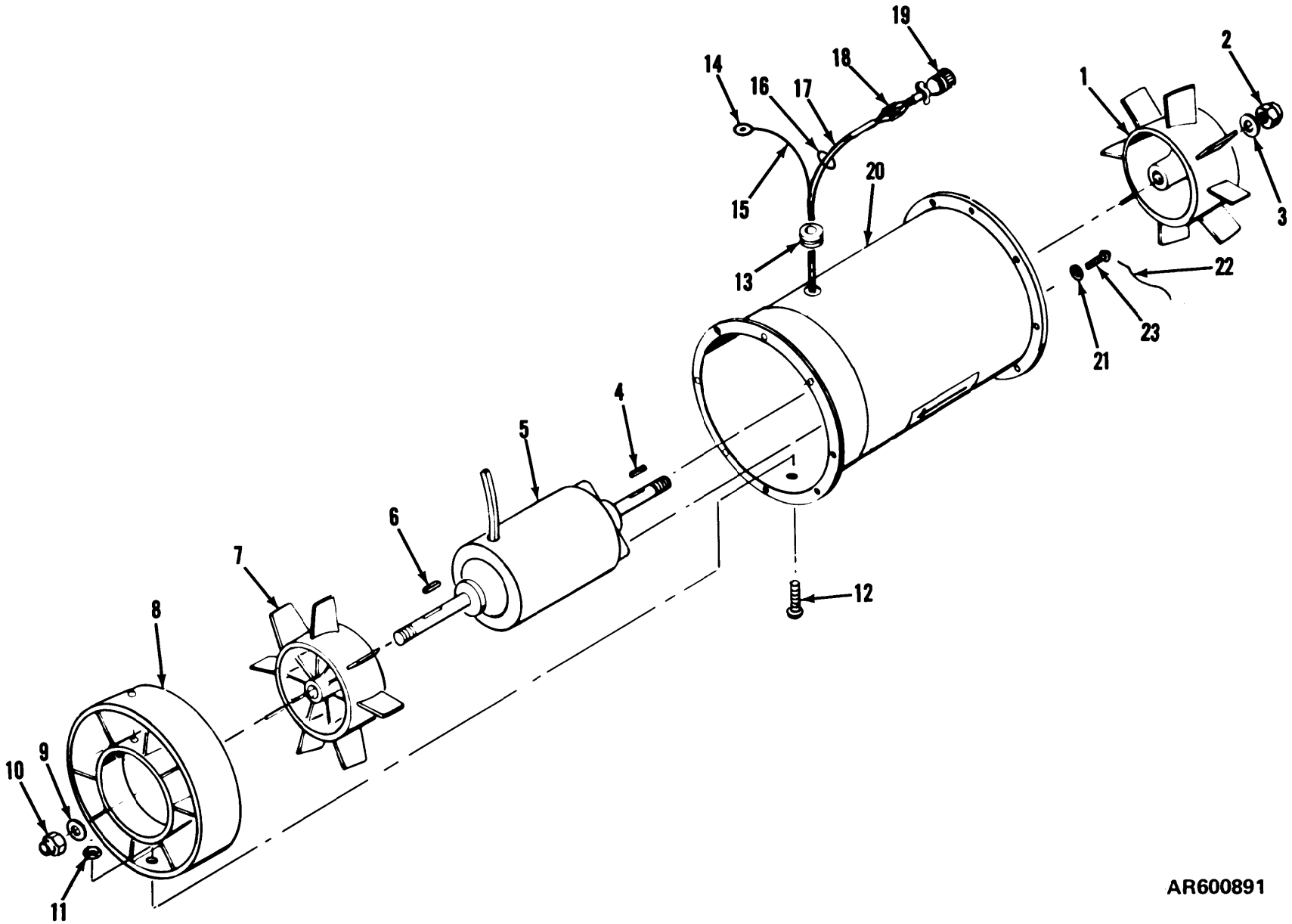



*Figure 2-13. Entrance fan, exploded view.*

Legend for fig. 2-13:
1 Impeller
2 Locknut
3 Washer
4 Key
5 Motor
6 Key
7 Impeller
8 Vane
9 Washer
10 Locknut
11 Locknut
12 Screw
13 Grommet
14 Terminal
15 Electrical lead
16 Cable
17 Heat shrinkable tubing
18 Crimp splices
19 Plug connector
20 Housing
21 Lockwashers
22 Lockwire
23 Screws

(2) Cut cable (16) between crimp splices (18) and housing (20).

(3) Cut terminal (14) from electrical lead (15).

(4) Remove two locknuts (11) and screws (12).

(5) Pull vane (8) from housing (20).

(6) Remove locknut (2), washer (3), and impeller (1).

(7) Cut two lockwires (22) securing screws (23).

**(8)** Remove four screws (23) and washers (21).

(9) Remove assembled impeller (7) and motor (5) from housing (20).

(10) Remove nut (10), washer (9), and impeller (7) from motor (5).

(11) Remove two woodruff keys (4 and 6).

(12) If necessary, remove grommet (13).

*b. Installation.* Installation is the reverse of removal (a above), except for the following procedures:

(1) Add the necessary electrical leads (figs. 2-6 and 2-12).

(2) Cover electrical leads with heat shrinkable tubing (17) before attaching plug connector P16.

(3) Be sure terminal lug is at the distance shown from the cable.

## Section VII. AUXILIARY CONTROL INDICATOR

### 2-22. Access Cover Gasket

Direct support maintenance personnel are authorized to manufacture and replace the access cover gasket if damaged or deteriorated.

*a. Manufacture.* Fabricate gasket (fig. 2-14).

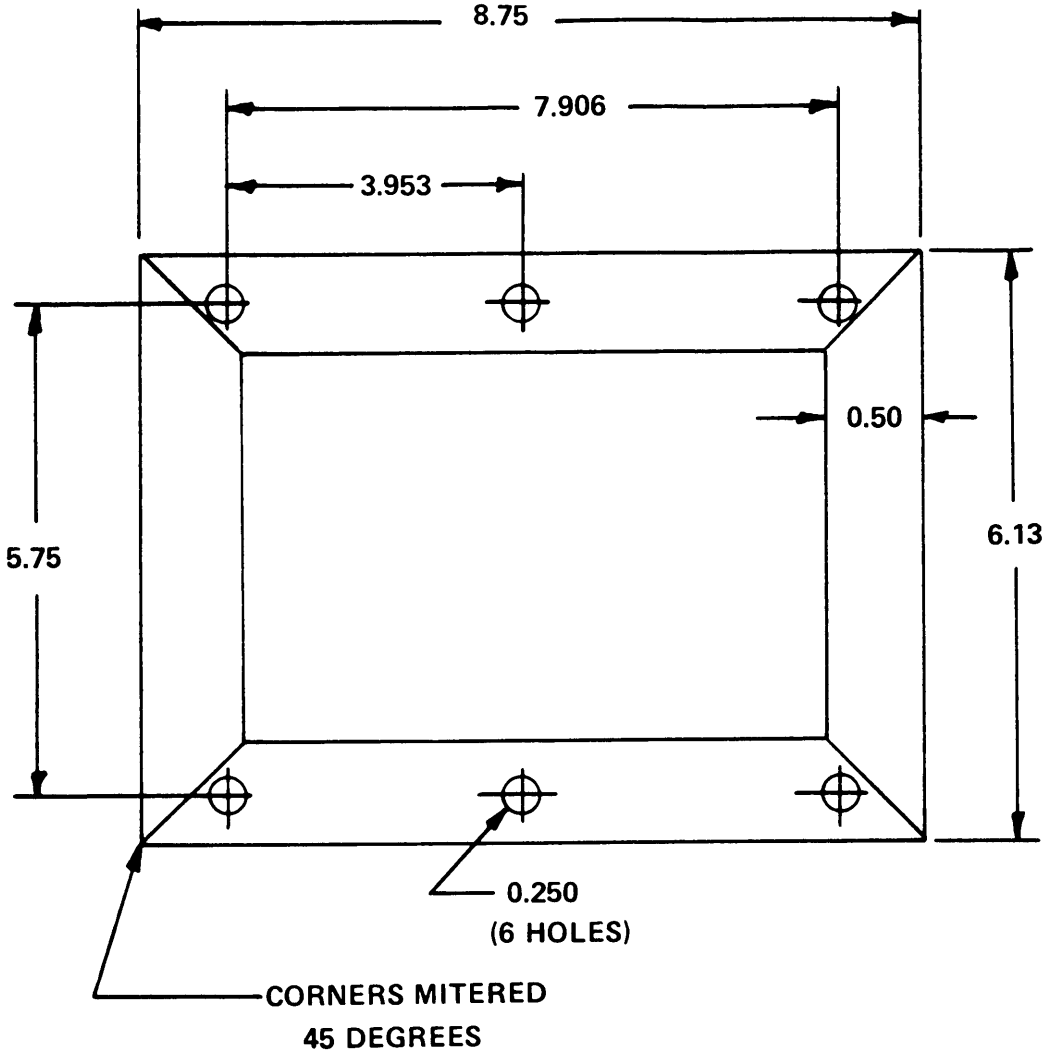



*Figure 2-14. Auxiliary control indicator access cover gasket fabrication.*

*b. Removal.*

(1) Remove six screws (18, fig. 2-15) and washers (19).

(2) Separate access cover (20) from auxiliary control indicator (22).

(3) Remove gasket (21) from access cover (20).

(4) Clean gasket and adhesive residue from cover with degreasing solvent (item 4, table 2-1).

Legend for fig. 2-15:

1 Washers
2 Screws
3 Screws
4 Washers
5 Armature relay
6 Clip
7 Locknuts
8 Washers
9 Locknuts
10 Receptacle connector
11 Washers
12 Locknuts
13 Nut
14 Buzzer
15 Nut
16 Washers
17 Screws
18 Screws
19 Washers
20 Access cover
21 Gasket
22 Auxiliary control indicator
23 Locknuts
24 Receptacle connector
25 Washers
26 Screws
27 Indicator light
28 Nut
29 Nut
30 Incandescent lamp
31 Lens
32 Relay
33 Locknuts
34 Washers
35 Washers
36 Screws

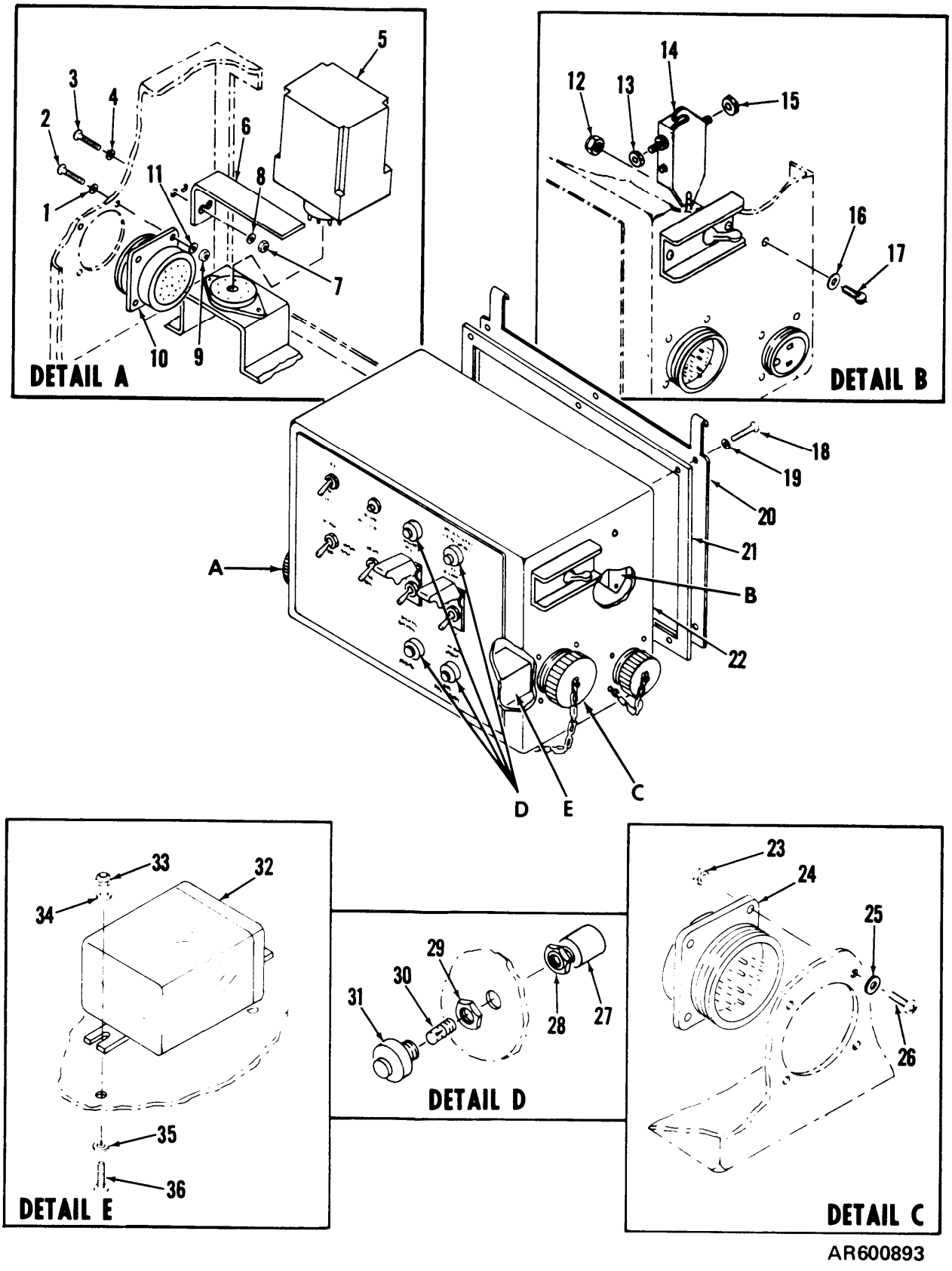



*Figure 2-15. Auxiliary control indicator, exploded view.*

*c. Installation.*

(1) Attach gasket (21) on access cover (20) with adhesive sealant (item 5, table 2-l).

(2) Install access cover (20) with six screws (18) and washers (19).

## 2-23. Buzzer

Direct support maintenance personnel are authorized to replace the buzzer and attaching hardware.

*a. Removal.*

(1) Remove six screws (18, fig. 2-15), washers (19) and access cover (20). Be careful not to damage gasket (21 ) when removing access cover.

(2) Identify and tag electrical leads (figs. 2-6 and 2-16).

(3) Remove two locknuts (12, fig. 2-15), screws (17), washers (16), and buzzer (14).

(4) Remove nuts (13) and (15). Remove electrical leads.

*b. Installation.* Installation is the reverse of removal (a above).

Legend for fig. 2-16:
CB7 – Circuit breaker
DS4 – HEATER ON indicator light
DS8 – Buzzer
DS9 – MASK light indicator
DS10 – LOW OIL PRESSURE indicator light
DS13 – Purge mode indicator light
J9 – Receptacle connector
J22 – Receptacle connector (110 vac)
K5 – Armature relay
K11 – Relay
R11 – Time delay resistor
R12 – Time delay resistor
S2 – Shelter light switch
S4 – Environmental control switch
S9 – HIGH-LOW HEAT switch
S21 – HEATER RESTART switch
S23 – Buzzer silence switch
S25 – Time delay mode switch
TB2 – Terminal block

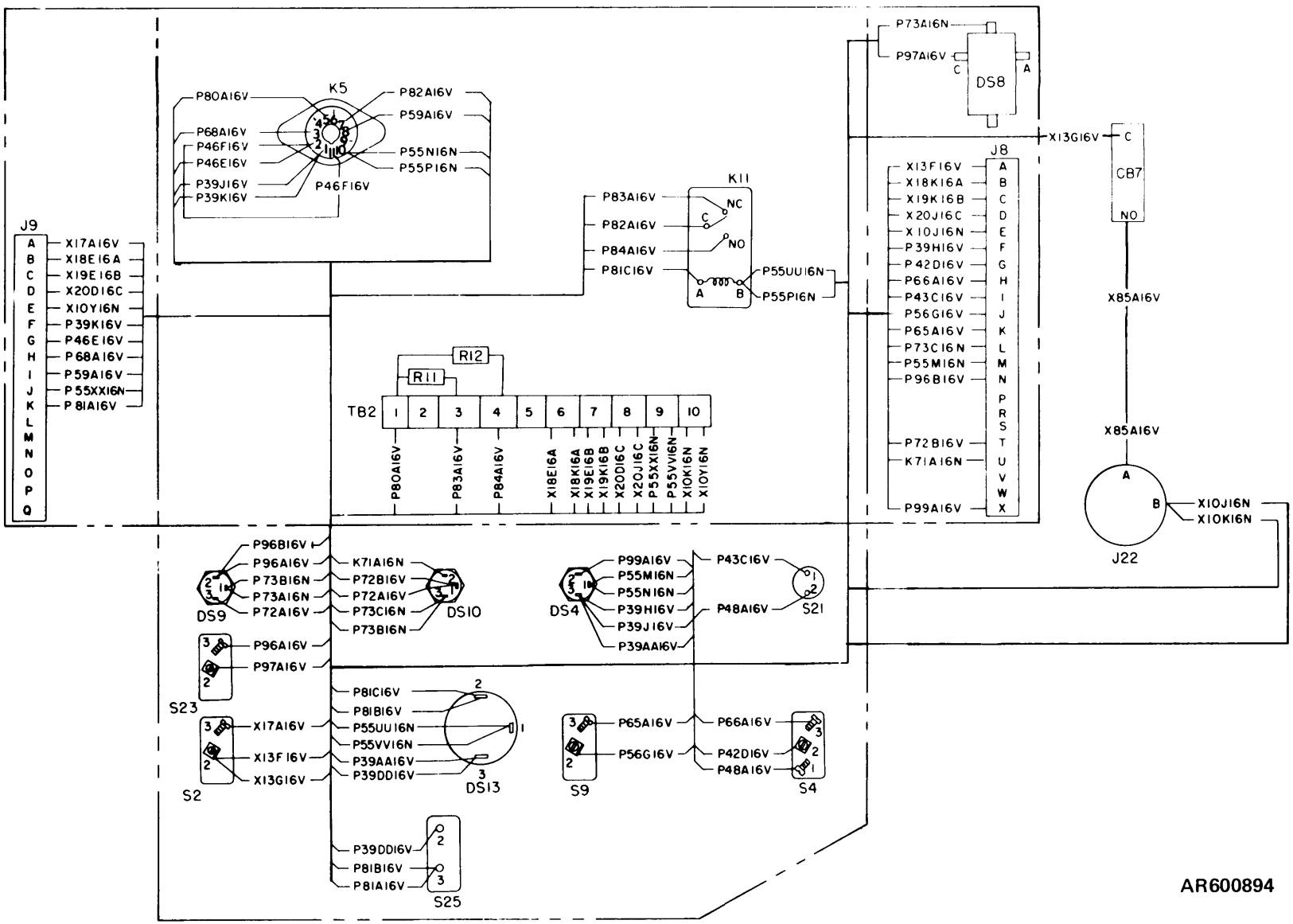



*Figure 2-16. Auxiliary control indicator wiring diagram legend.*

### 2-24. HEATER ON Indicator Light

Organizational maintenance personnel are authorized to inspect, test, and replace the HEATER ON indicator light and attaching hardware.

*a. Inspect and Test.*

(1) Remove six screws (18, fig. 2-15), washers (19), and access cover (20). Be careful not to damage gasket (21) when removing access cover.

(2) Visually inspect for loose and disconnected electrical leads.

(3) Visually inspect for damaged or missing incandescent lamp, broken or missing lens.

(4) Test indicating light (27) for continuity. If no continuity, replace indicating light ( *b* below).

*b. Removal.*

(1) Remove lens (31).

(2) Remove nut (29) and indicator light (27).

(3) Identify and tag electrical leads (figs. 2-6 and 2-16).

(4) Disconnect electrical leads from indicator light.

*c. Installation.*

(1) Remove lens (31) from new indicator light (27) and install an incandescent lamp (30).

(2) Adjust nut (28) so threaded portion of indicator light will be flush with nut (29) when installed.

(3) Install indicator light and secure with nut (29).

(4) Connect electrical leads to indicator light terminals.

(5) Install assembled lens and incandescent lamp.

(6) Install access cover (20) and secure with six screws (18) and washers (19).

### 2-25. EMERGENCY ENTRY MODE Indicator Light

The EMERGENCY ENTRY MODE indicator light is inspected, tested, removed and installed by the same procedures as the HEATER ON indicator light, paragraph 2-24.

### 2-26. LOW OIL PRESSURE Indicator Light

The LOW OIL PRESSURE Indicator light is inspected, tested, removed, and installed by the same procedures as the HEATER ON indicator light, paragraph 2-24.

### 2-27. MASK Indicator Light

The MASK indicator light is inspected, tested, removed, and installed by the same procedures as the HEATER ON indicator light, paragraph 2-24.

### 2-28. Relay

Direct support maintenance personnel are authorized to inspect, test, and replace the relay (32, fig. 2-15) and attaching hardware.

*a. Inspect.*

(1) Remove six screws ( 18), washers (19), and access cover (20). Be careful not to damage gasket (21) when removing access cover.

(2) Visually inspect for loose and disconnected electrical leads.

(3) Visually inspect for bent and broken relay terminals.

*b. Removal and Continuity Test.*

(1) Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-16).

(2) Remove two locknuts (33), washers (34), screws (36), and washers (35).

(3) Remove relay (32),

(4) Check for continuity of relay between pins 2 and 7. There should be continuity between these two points. If no continuity, install new relay.

c. *Installation.*

(1) Install relay (32) using two screws (36), washers (34) and (35) and locknuts (33).

(2) Connect electrical leads (figs. 2-6 and 2-16).

### 2-29. Electrical Receptacle Connector

Direct support maintenance personnel are authorized to inspect and replace the electrical receptacle connector (24, fig. 2-15) and attaching hardware.

*a. Inspect.*

(1) Remove six screws (18), washers (19), and access cover (20). Be careful not to damage gasket (21) when removing access cover.

(2) Visually inspect for bent, broken, and missing contact pins.

(3) Visually inspect for loose and disconnected electrical leads.

(4) If receptacle connector is faulty, replace receptacle connector (b below).

*b. Removal.*

(1) Remove locknuts (23), screws (26), and washers (25).

(2) Identify and tag electrical leads (figs. 2-6 and 2-16).

(3) If necessary, remove wire straps.

(4) Disconnect electrical leads from the receptacle connector.

c. *Installation.* Installation is the reverse of removal ( *b* above), except for the following procedures:

(1) Use insulating electrical tape in place of the removed wire straps.

(2) Install access cover (20), and secure with six screws (18) and washers (19).

### 2-30. Electrical Receptacle Connector

Direct support maintenance personnel are authorized to inspect and replace the electrical receptacle connector (10, fig. 2-15) and attaching hardware.

*a. Inspect.*

(1) Remove six screws (18), washers (19), and access cover (20). Be careful not to damage gasket (21) when removing access cover.

(2) Visually inspect for bent, broken, and missing contact pins.

(3) Visually inspect for loose and disconnected electrical leads.

(4) If receptacle connector is faulty replace receptacle connector ( *b* and c below).

b. *Removal.*

(1) Remove two locknuts (7), washers (8), screws (3), washers (4), and clip (6).

(2) Unplug armature relay (5).

(3) Remove four locknuts (9), washers (11), screws (2), and washers (1).

(4) Identify and tag electrical leads (figs. 2-6 and 2-16).

(5) If necessary, remove wire straps.

(6) Disconnect electrical leads from the receptacle connector.

c. *Installation.* Installation is the reverse of removal (b above), except for the following procedures:

(1) Use insulating electrical tape in place of the removed wire straps.

(2) Install access cover (20), and secure with six screws (18), and washers (19).

### 2-31. Electrical Leads

Direct support maintenance personnel are authorized to test, manufacture and replace electrical leads.

*a. Test.*

(1) Remove six screws (18, fig. 2-15), washers (19), and access cover (20). Be careful not to damage gasket (21) when removing access cover.

(2) Test by making continuity checks. Use figure 2-6 and 2-16 to locate check points.

(3) If repair is required, proceed to *b* below. If not, reinstall access cover to inclosure.

*b. Repair.*

(1) If electrical lead is faulty, remove the wiring strap, identify and tag electrical lead to be removed.

(2) Remove faulty electrical lead.

(3). Fabricate electrical lead from 600V insulated copper conductor wire, Military Specification, MIL-W-5086/1-16.

(4) Refer to table 2-4 for connecting points, connection type, and length of wire.

(5) Attach lead to appropriate connection.

(6) Make continuity check of the newly installed electrical lead.

(7) Use insulating electrical tape to bundle leads together, in place of removed straps.

*Table 2-4. Auxiliary Control Indicator Wire Listing*

| *Wire Run Number (fig. 2-16)* | *Cut Length Inches* | *Connecting Points* | | *Connection Type* | |
|---|---|---|---|---|---|
| | | *1st end* | *to 2nd end* | *1st end* | *2nd end* |
| X10Y16N | 9 | J9-E | TB2-10 | S | S |
| P73A16N | 9 | DS8-GRD | DS9-1 | TL | TL |
| P73B16N | 3 | DS9-1 | DS10-3 | TL | S |
| X13F16V | 12 | J8-A | S2-2 | S | TL |
| X10J16N | 4 | J8-E | J22-B | S | TL |
| P99A16V | 7 | J8-X | DS4-2 | S | S |
| P96B16V | 5 | J8-N | DS9-2 | S | TL |
| P39H16V | 7 | J8-F | DS4-3 | S | S |
| P39J16V | 11 | K5-1 | DS4-3 | S | S |
| P39K16V | 7 | J9-F | K5-1 | S | S |
| P42D16V | 11 | J8-G | S4-2 | S | TL |
| P66A16V | 10 | J8-H | S4-3 | S | TL |
| P48A16V | 3 | S21-2 | S4-1 | S | TL |
| P82A16V | 7 | K5-7 | K11-C | S | TL |
| P43C16V | 8 | J8-I | S21-1 | S | S |
| P56G16V | 11 | J8-J | S9-2 | S | TL |
| P96A16V | 4 | DS9-2 | S23-3 | TL | TL |
| P65A16V | 9 | J8-K | S9-3 | S | TL |
| P59A16V | 7 | J9-I | K5-8 | S | S |
| P81B16V | 3 | DS13-2 | S25-3 | S | TL |
| P68A16V | 7 | J9-H | K5-3 | S | S |

*Table 2-4* Auxiliary Control Indicator Wire Listing - Continued.

| *Wire Run Number (fig. 2-16)* | *Cut Length Inches* | *Connecting Points from 1st end* | *to 2nd end* | *Connection Type 1st end* | *2nd end* |
|---|---|---|---|---|---|
| P55M16N | 8 | J8-M | DS4-1 | S | S |
| P55N16N | 11 | DS4-1 | K5-10 | S | S |
| P55P16N | 7 | K11 | K5-10 | S | S |
| X17A16V | 5 | J9-A | S2-3 | S | TL |
| P73C16N | 5 | J8-L | DS10-3 | S | S |
| P97A16V | 8 | S23-2 | DS8-C | TL | TL |
| X18E16A | 7 | J9-B | TB2-6 | S | S |
| P72B16V | 5 | J8-T | DS10-1 | S | S |
| K71A16N | 6 | J8-U | DS10-2 | S | S |
| P46E16V | 7 | J9-G | K5-2 | S | S |
| P46F16V | 2 | K5-11 | K5-2 | S | S |
| P72A16V | 3 | DS9-3 | DS10-1 | TL | S |
| P80A16V | 6 | K5-5 | TB2-1 | S | S |
| X20D16C | 8 | J9-D | TB2-8 | S | S |
| X19E16B | 7 | J9-C | TB2-7 | S | S |
| P83A16V | 4 | TB2-3 | K11-NC | S | S |
| P81A16V | 8 | J9-K | S25-3 | S | S |
| P81C16V | 9 | DS13-2 | K11 | S | S |
| X10K16N | 5 | TB2-10 | J22-B | S | TL |
| X20J16C | 8 | TB2-8 | J8-D | S | S |
| P84A16V | 4 | TB2-4 | K11-NO | S | S |
| P55XX16N | 8 | TB2-9 | J9-J | S | S |
| P55VV16N | 8 | TB2-9 | DS13-1 | S | S |
| X18K16A | 8 | TB2-6 | J8-B | S | S |
| X19K16B | 8 | TB2-7 | J8-C | S | S |
| X13G16V | 10 | S2-2 | CB7-C | TL | TL |
| P55UU16N | 9 | K11 | DS13-1 | S | S |
| P39AA16V | 3 | DS13-3 | DS4-3 | S | S |
| P39DD16V | 2 | DS13-3 | S25-2 | S | TL |
| X85A16V | 8 | CB7-NO | J22-A | TL | TL |

LEGEND:
S—Solder
TL—Terminal lug

## Section VIII. ARCTIC BLANKET (ELECTRIC)

### 2-32. Electrical Receptacle Connector

Direct support maintenance personnel are authorized to replace the electrical receptacle connector.

*a. Removal.*

(1) Disassemble receptacle connector (1, fig. 2-17).

(2) Identify, tag, and disconnect electrical leads.

*b. Installation.* Installation is the reverse of removal ( *a* above).

Legend for fig. 2-17:

1 Receptacle connector
2 Jumpers
3 Terminal board
4 Cover
5 Screws
6 Locknuts
7 Distribution box
8 Terminal board
9 Jumpers
10 Panels
11 Cord
12 Tape

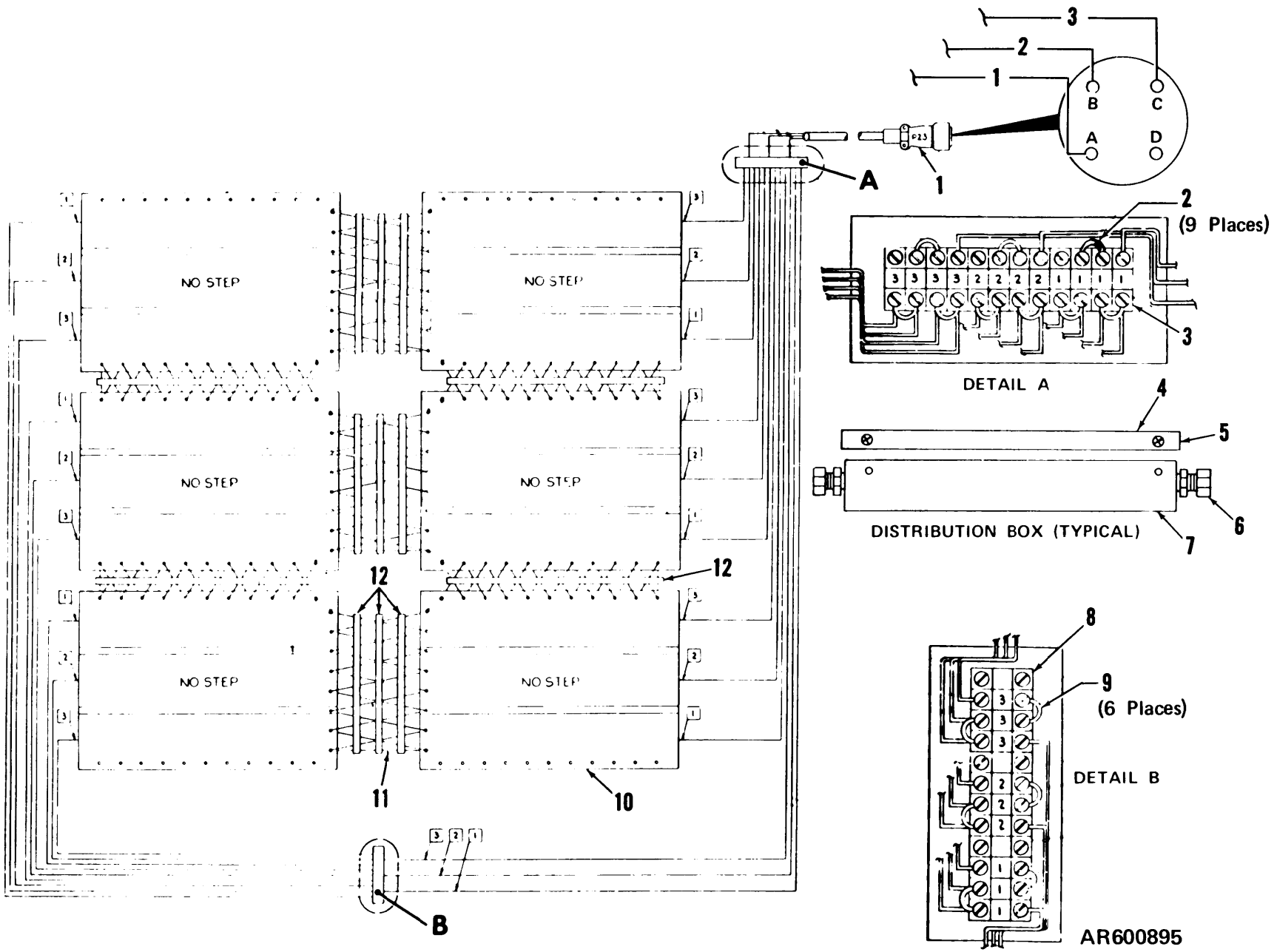



*Figure 2-17. Arctic blanket (electric).*

### 2-33. Distribution Boxes

Direct support maintenance personnel are authorized to replace the distribution boxes. The instructions for replacing one distribution box are typical for both.

*a. Removal.*

(1) Loosen two locknuts (6, fig. 2-17).

(2) Loosen four screws (5), and remove cover (4).

(3) Identify and tag electrical leads.

(4) Using figure 2-17 as a guide, remove jumpers (2) or (9).

(5) Remove electrical leads from terminal boards (3) or (8).

(6) Remove electrical leads from distributio, box (7).

*b. Installation.* Installation is the reverse of removal (a above).

### 2-34. Blanket Panels

Direct support maintenance personnel are authorized to replace the blanket panels. The instructions to replace one panel are typical for all six .

*a. Removal.*

(1) Loosen four screws (5, fig. 2-17) and remove cover (4).

(2) Loosen locknut (6) from distribution box (7).

(3) If present, remove tape and clamp securing electrical leads.

(4) Using figure 2-17 as a guide, disconnect electrical leads from faulty panel (10) to terminal boards (3) or (8).

(5) Cut and remove cord (11) securing faulty panel (10) to adjacent panels.

(6) Remove faulty panel ( 10).

*b. Installation.* Installation is the reverse of removal (a above) except for the following procedures:

(1) Use figure 2-17 as a guide for replacing panel. Lacing cord shall be 0.12 inches diameter (type 1, MIL-C-7515).

(2) Place pressure sensitive adhesive tape (12) (MIL-I-19166, 3/4 inches wide) on both sides of cord as shown.

## Section IX. ARCTIC BLANKET (ELECTRIC) DISTRIBUTION BOX

### 2-35. Distribution Box

Direct support maintenance personnel are authorized to replace the distribution box and attaching hardware.

*a. Removal.*

**NOTE**

Be sure system is not operating before attempting removal.

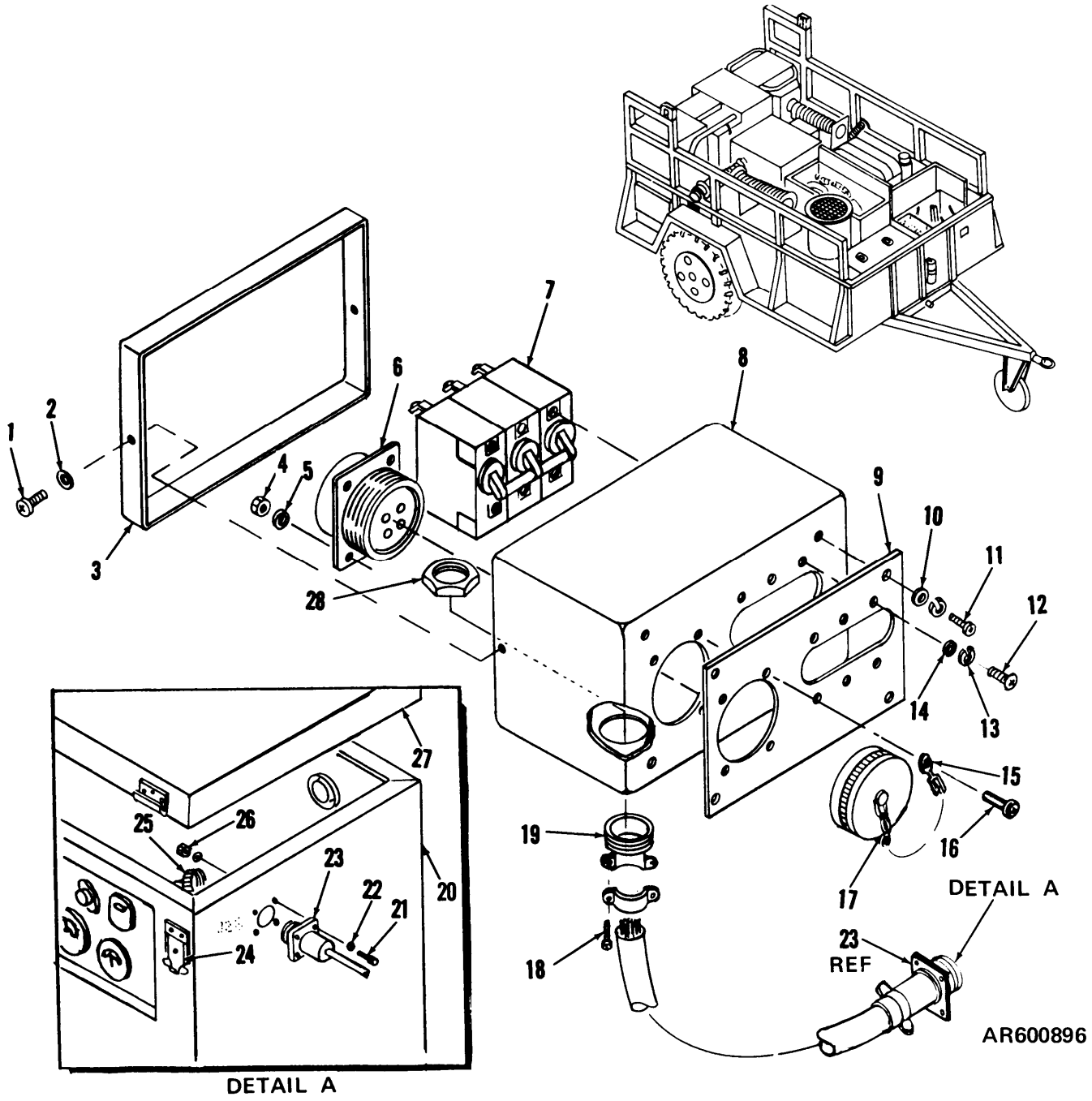
(1) Release four latches (24, fig. 2-18) and remove access cover (27).

(2) Disconnect plug receptacle (25) from receptacle connector (23).

(3) Remove four locknuts (26), screws (21), washers (22), and receptacle connector (23) from cabinet (20).

(4) Remove four screws (11) and washers (10) securing distribution box (8) to trailer. Remove distribution box.

*b. Installation.* Installation is the reverse of removal (a above).




1 Screws
2 Washers
3 Cover
4 Locknuts
5 Washers
6 Receptacle connector
7 Circuit breaker
8 Distribution box
9 Instruction plate
10 Washers
11 Screws
12 Screws
13 Lockwashers
14 Washers
15 Chain
16 Screws
17 Cover
18 Screws
19 Connector
20 Cabinet
21 Screws
22 Washers
23 Receptacle connector
24 Latches
25 Plug receptacle
26 Locknuts
27 Cover
28 Nut

*Figure 2-18. Arctic blanket (electric) distribution box, exploded view.*

**2-36. Electrical Connector Cover**

Direct support maintenance personnel are authorized to replace the electrical connector cover and attaching hardware.

*a. Removal.*

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Remove four screws (11, fig. 2-18) and washers (10) securing distribution box (8) to trailer. Remove distribution box.

(2) Remove two screws (l), washers (2), and cover (3).

(3) Remove one locknut (4), washer (5), and screw (16) securing chain (15).

*b. Installation.* Installation is the reverse of removal (a above).

### 2-37. Electrical Receptacle Connector

Direct support maintenance personnel are authorized to replace the receptacle connector and attaching hardware.

*a. Removal.*

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Remove four screws (11, fig. 2-18) and washers (10) securing distribution box (8) to trailer. Remove distribution box.

(2) Remove two screws (l), washers (2), and cover (3).

(3) Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-19).

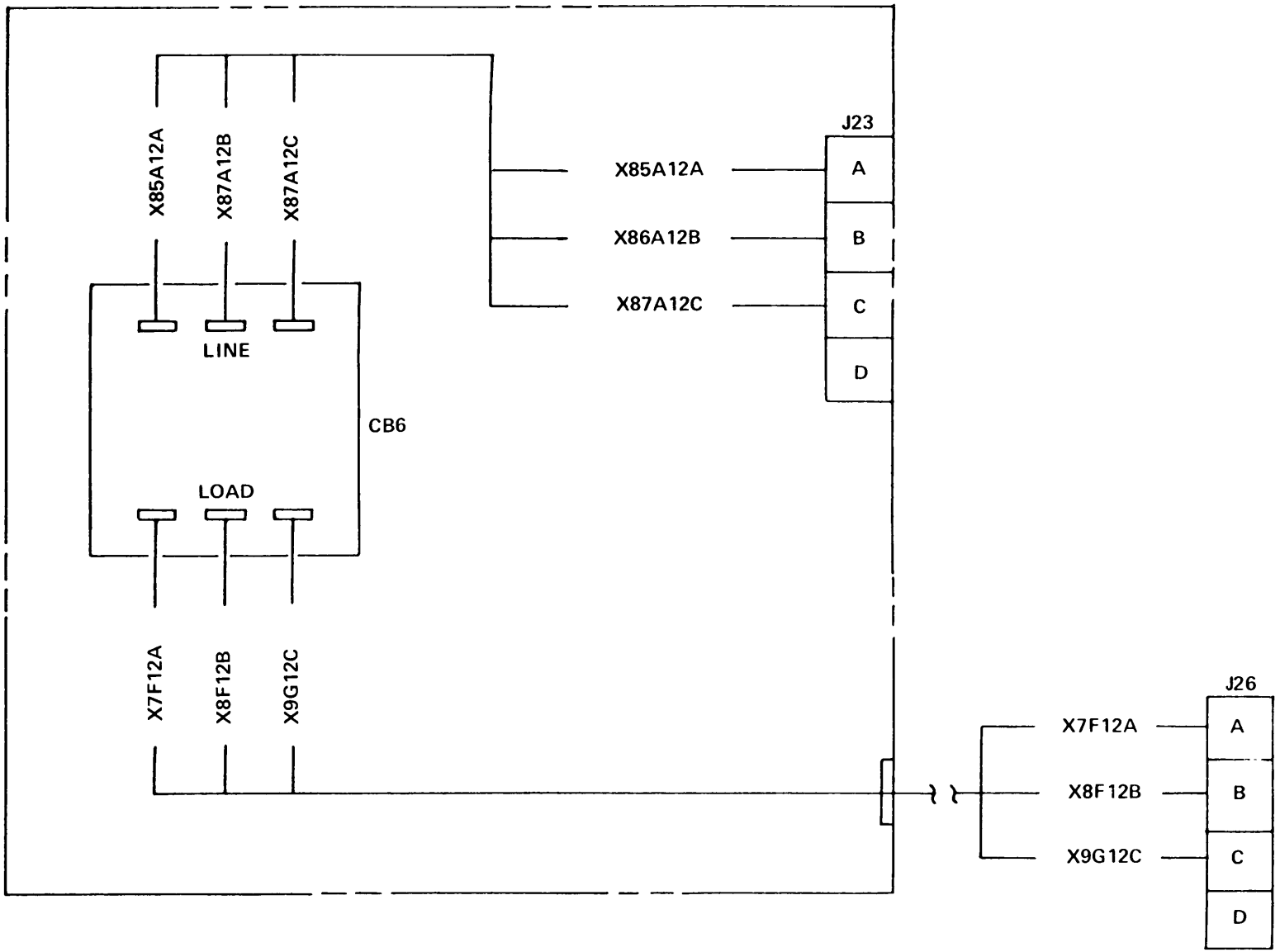



*Figure 2-19. Arctic blanket (electric) distribution box wiring diagram.*

(4) Remove four locknuts (4, fig. 2-18), washers (5), screws (16), and cover ((17).

(5) Remove receptacle connector (6).

*b. Installation.* Installation is the reverse of removal ( a above).

**2-38. Circuit Breaker**

Direct support maintenance personnel are authorized to replace the circuit breaker and attaching hardware.

a. Removal.

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Remove four screws (11, fig. 2-18) and washers (10) securing distribution box (8) to trailer. Remove distribution box.

(2) Remove two screws (1), washers (2), and cover (3).

(3) Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-19).

(4) Remove six screws (12), lockwashers (13), and washers (14). Remove circuit breaker (7) from distribution box (8).

(5) If terminal lugs on electrical leads are damaged or loose, remove and install new terminal lugs.

*b. Installation.* Installation is the reverse of removal ( a above).

**2-39. Identification Plate**

Direct support maintenance personnel are authorized to replace the identification plate.

a. Removal.

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Remove four screws (11, fig. 2-18) and washers (10), securing distribution box (8) to trailer. Remove distribution box.

(2) Remove two screws (1), washers (2), and cover (3).

(3) Remove four locknuts (4), washers (5), and screws (16), and cover (17).

(4) Remove six screws (12), lockwashers (13), and washers (14).

*b. Installation.* Installation is the reverse of removal (a above).

**2-40. Receptacle Connector**

Direct support maintenance personnel are authorized to replace the receptacle connector and attaching hardware.

*a. Removal.*

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Release four latches (24, fig. 2-18) and remove access cover (27).

(2) Disconnect plug receptacle (25) from receptacle connector (23).

(3) Remove four locknuts (26), screws (21), washers (22), and receptacle connector (23) from cabinet (20).

(4) Disassemble receptacle connector. Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-19).

b. Installation. Installation is the reverse of removal ( a above).

**2-41. Squeeze Connector**

Direct support maintenance personnel are authorized to replace the squeeze connector.

*a. Removal.*

**NOTE**

Be sure system is inoperative before attempting removal.

(1) Remove four screws (11, fig. 2-18) and washers (10), securing distribution box (8) to trailer. Remove distribution box.

(2) Remove two screws (1), washers (2), and cover (3).

(3) Identify, tag, and disconnect electrical leads passing through connector (19).

(4) Remove nut (28), connector (19), and electrical leads.

(5) Loosen two screws (18) and remove connector from electrical leads.

*b. Installation.* Installation is the reverse of removal (a above).

## Section X. POWER SUPPLY, ACCESS COVER, AND GASKET

**2-42. Power Supply**

Direct support maintenance personnel are authorized to test and replace the power supply and attaching hardware.

*a. Test.*

NOTE

System must be operating to test power supply .

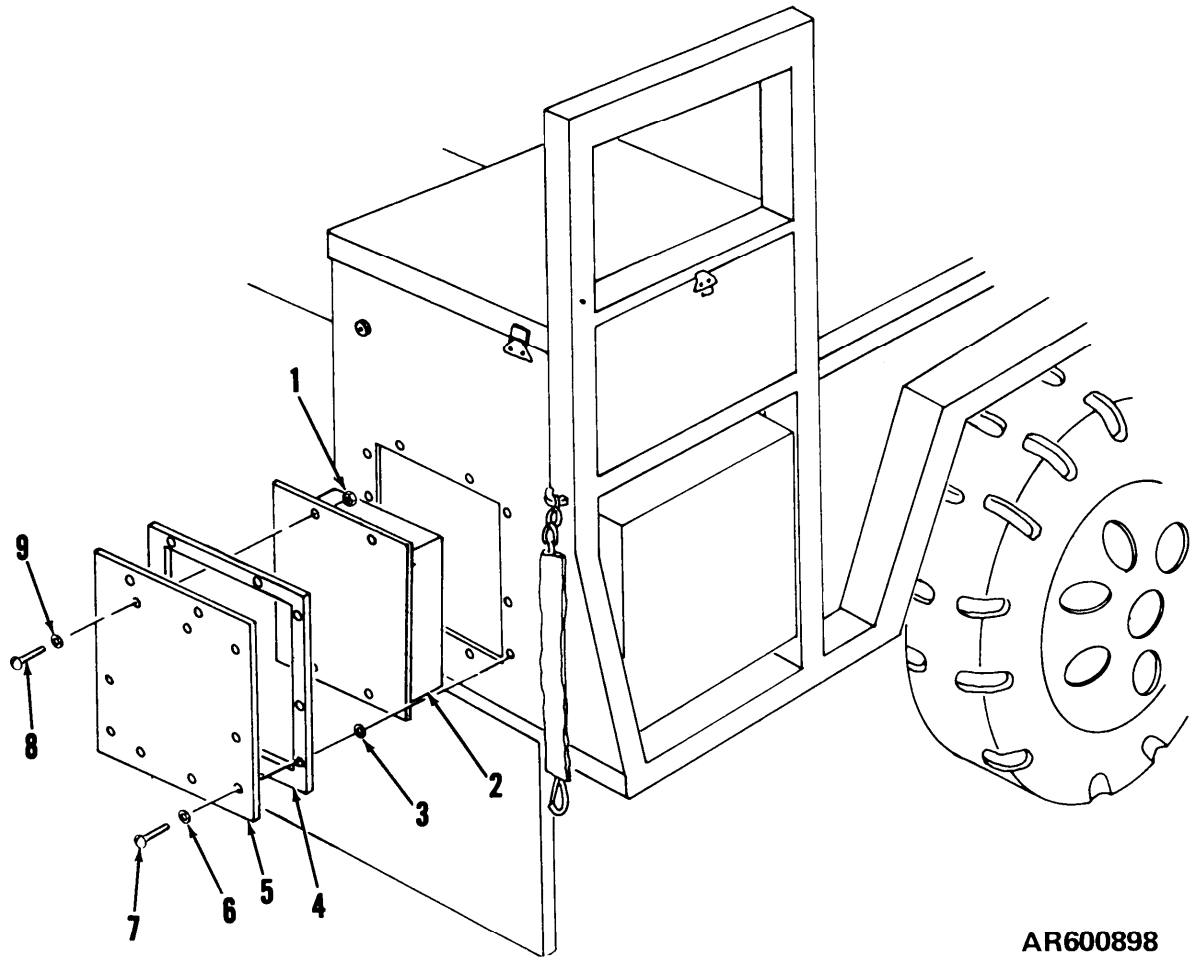
**WARNING**

There is 208 VAC present at the power supply. Be careful to avoid contact with high voltage. Contact with high voltage could cause DEATH.

(1) Remove sound-attenuating plenum (TM 3-4240-264-12).

(2) Check for 208 (±10) vac present across marked terminals A-B, A-C, and B-C on power supply (2, fig. 2-20). If 208 vac is not present, there is a malfunction in the generator or in the line between the generator and power supply.

(3) Check for 26 (± 2.6) vdc across the terminals labeled 26 vdc. If voltage is not present, replace the power supply.




1 Locknuts
2 Power supply
3 Nonmetallic washers
4 Gasket
5 Access cover
6 Washers
7 Screws
8 Screws
9 Washers

Figure 2-20. Power supply, exploded view.

*b. Removal.*

WARNING

Be sure electrical system is turned off before attempting to remove the power supply. In operation, 208 vac is present at electrical lead connections. Contact with the high voltage could cause DEATH.

(1) Perform shutdown procedures (TM 3-4240-264-12).

**NOTE**

Screws securing the power supply assembly to the cabinet are held to the access cover by nonmetallic washers.

**CAUTION**

Do not allow power supply assembly to drop or fall from mounting position. Damage to the assembly and connecting electrical leads could occur.

(2) Loosen eight screws (7, fig. 2-20).

(3) Lean top of power supply away from cabinet to expose electrical connections.

(4) Identify, tag, and disconnect electrical leads (figs. 2-6 and 2-21).

Figure 2-21. Electrical schematic. ( Located in back of manual. )

(5) Remove power supply (2, fig. 2-20) attached to access cover (5) from cabinet.

(6) Remove four locknuts (1), screws (8), washers (9), separate access cover (5) and power supply (2).

c. *Installation*. Installation is the reverse of removal ( *a* above).

**2-43. Access Cover**

Direct support maintenance personnel are authorized to replace the access cover and attaching hardware.

*a*. *Removal.*

(1) Remove power supply (para 2-42 *b)*.

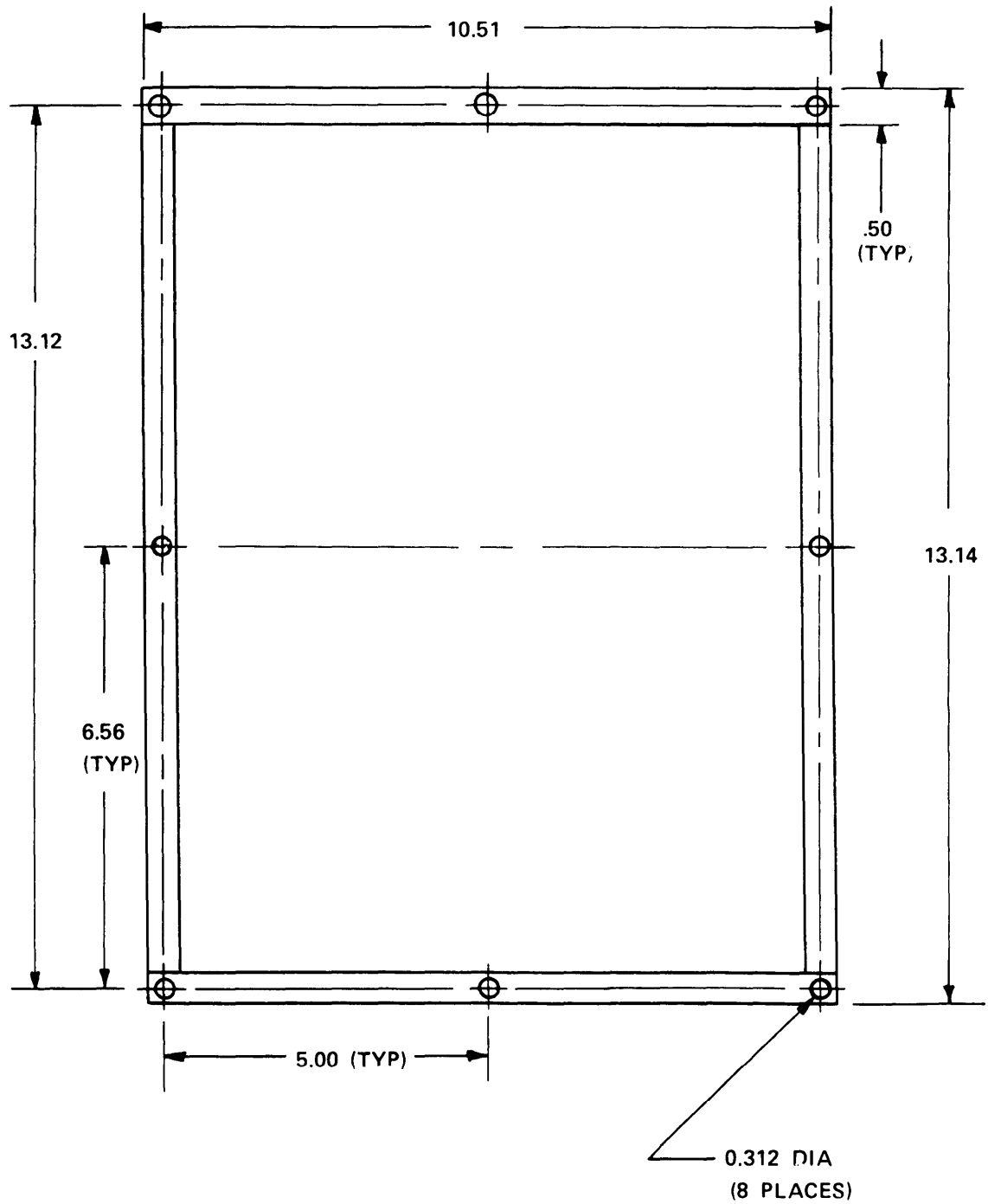
(2) Remove eight nonmetallic washers (3, fig. 2-20), screws (7), and washers (6).

*b. Installation.* Installation is the reverse of removal ( *a* above) except fabricate new gasket (4) (para 2-44).

**2-44. Access Cover Gasket**

Direct support maintenance personnel are authorized to manufacture and replace the access cover gasket.

*a. Manufacture.* Fabricate gasket (fig. 2-22).




NOTES:

1. MATERIAL – SILICONE SPONGE RUBBER
   0.187 INCHES THICKNESS

2. DIMENSIONS IN INCHES

AR600900

*Figure 2-22. Power supply access cover gasket fabrication.*

*b. Removal.*

(1) Remove power supply (para 2-42 *b),* steps (1) through (5).

(2) Remove eight nonmetallic washers (3, fig. 2-20), screws (7), and washers (6).

(3) Remove damaged gasket (4). Clean adhesive and gasket residue from access cover with decreasing solvent (item 4, table 2-1).

c. *Installation.* Installation is the reverse of removal (b above), except use adhesive sealant (item 3, table 2-1) to secure gasket to access cover.

## Section XI. MAIN CONTROL INDICATOR

### 2-45. DC POWER SUPPLY Circuit Breaker

Direct support maintenance personnel are authorized to inspect, test, and replace the DC POWER SUPPLY circuit breaker and attaching hardware.

*a. Inspect and Test.*

(1) Visually inspect DC POWER SUPPLY circuit breaker (34, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

(3) Test circuit breaker for continuity as follows :

(a) Position circuit breaker to ON. There should be continuity across terminals.

(b) Position circuit breaker to OFF. Check for open circuit (no continuity).

(c) If circuit breaker is faulty, remove circuit breaker ( *b* below).

*b. Removal.* Remove six screws (27, fig. 2-23), lockwashers (28), washers (29), and circuit breaker (34).

Legend for fig. 2-23:

1 Nut,
2 Hourmeter
3 Gasket
4 Locknut
5 Washer
6 Gasket
7 Hourmeter face plate
8 Screw
9 Screw
11 Fuze holder
11 Ammeter
12 Push switch
13 Shield
14 Generator frequency meter
15 Generator frequency meter face plate
16 Screw
17 Washer
18 Nut.
19 Nut
20 Light assembly
21 Nut
22 Push switch
23 Push switch
24 Washer
25 Lockwasher
26 Screw
27 Screw
28 Lockwasher
29 Washer
30 Rivet
31 Instruction plate
32 Panel
33 Panel gasket
34 Circuit breaker
35 Circuit breaker
36 Circuit. breaker
37 Circuit breaker
38 Nuts
39 Nonmetallic washer
40 Support
41 Switch
42 Nut
43 Lockwasher
44 Switch
45 Nut
46 Lockwasher
47 Lockwasher
48 Nut

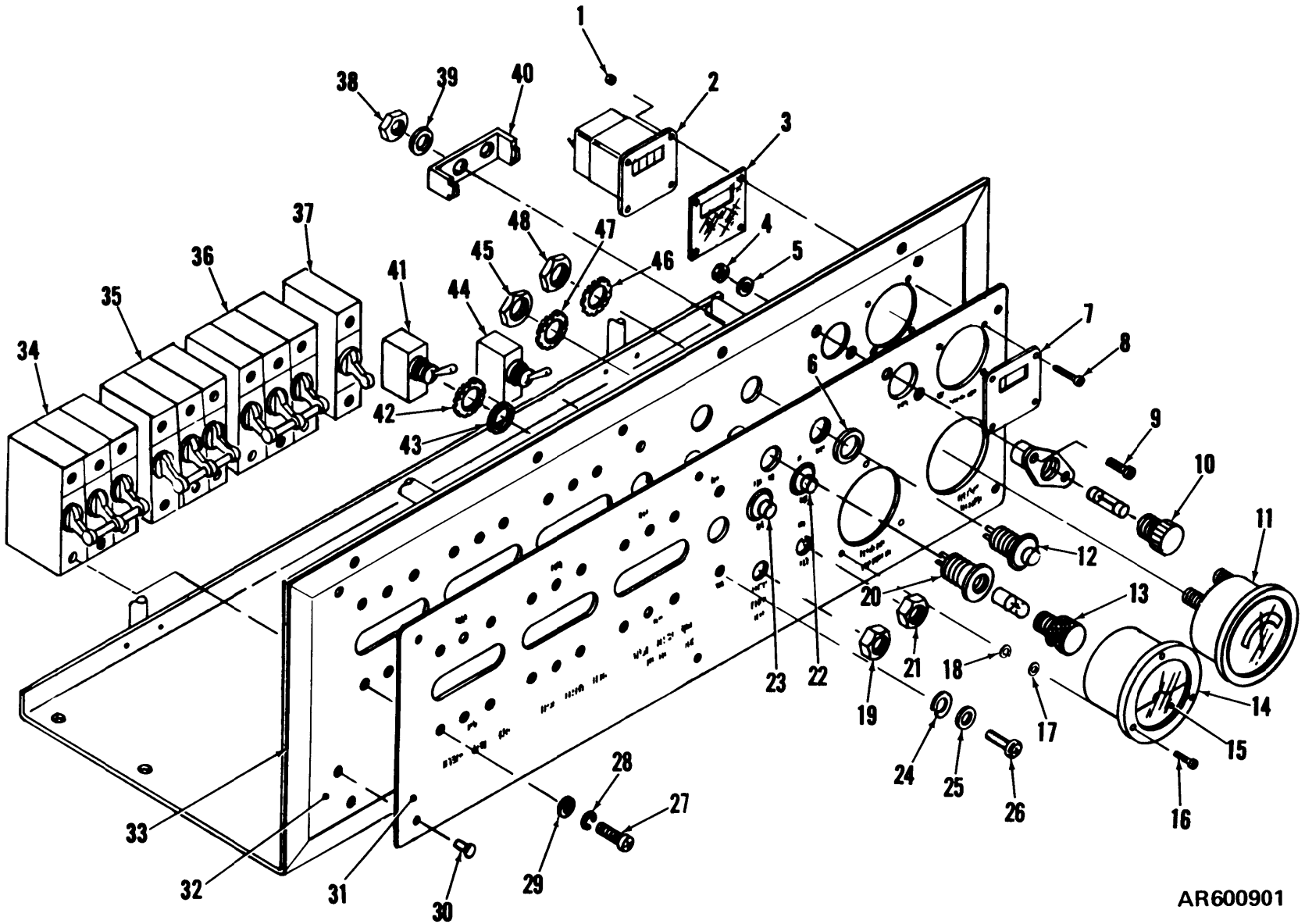



*Figure 2-23. Main control indicator, front, exploded view.*

c. *Installation.*

(1) Install circuit breaker (34) and secure with six screws (27), lockwashers (28), and washers (29).

(2) Install electrical connector adapter kit furnished with new circuit breaker.

(3) Connect electrical leads to circuit breaker (fig. 2-24).

(4) Seal all interfaces, separations and terminals with adhesive sealant (item 5, table 2-1) to prevent leakage of air from cabinet to atmosphere.

Figure 2-24. Main control indicator wiring diagram. (Located in back of manual.)

**2-46. Test Procedures for Condenser Fan**

The procedures to inspect, test, remove, and install the CONDENSER FAN circuit breaker (35, fig. 2-23) are the same as those for the DC POWER SUPPLY circuit breaker (para 2-45).

**2-47. RECIRCULATION and ENTRANCE FAN Circuit Breaker**

The procedures to inspect, test, remove, and install the RECIRCULATION and ENTRANCE FAN circuit breaker (36, fig. 2-23) are the same as those for the DC POWER SUPPLY circuit breaker (para 2-45).

**2-48. AUXILIARY 120 VAC Circuit Breaker**

Direct support maintenance personnel are authorized to inspect, test, and replace the AUXILIARY 120 VAC circuit breaker and attaching hardware.

*a. Inspect and Test.*

(1) Visually inspect AUXILIARY 120 VAC circuit breaker (37, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

(3) Test circuit breaker for continuity as follows :

(a) Position circuit breaker to ON. There should be continuity across terminals.

(b) Position circuit breaker to OFF. Check for open circuit (no continuity).

(c) If circuit breaker is faulty, remove circuit breaker ( *b* below).

*b. Removal.* Remove two screws (26, fig. 2-23), lockwashers (25), and washers (24).

c. *Installation:*

(1) Install circuit breaker (37), and secure with two screws (26), Iockwashers (25), and washers (24).

(2) Install electrical connector adapter kit furnished with new circuit breaker.

(3) Connect electrical leads to circuit breaker (fig. 2-24).

(4) Seal all interfaces, separations and terminals wi th adhesive sealant (item 5, table 2-1) to prevent leakage of air from cabinet to atmosphere.

**2-49. ENGINE CONTROL Switch**

Direct support maintenance personnel are authorized to inspect, test, and replace the ENGINE CONTROL switch and attaching hardware.

*a. Inspect and Test.*

(1) Visually inspect ENGINE CONTROL switch (41, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

(3) Test switch for continuity as follows:

(a) Remove frequency converter (para 2-64a).

(b) Position switch to OFF. There should be continuity across the two middle terminals.

(c) Position switch to ON. There should be continuity across the two bottom terminals.

(d) If switch is faulty, remove switch (b below).

(e) If switch is functioning, replace frequency converter.

*b. Removal.* Remove nut (19, fig. 2-23) lockwasher (43), nut (42), and switch (41).

c. *Installation.*

(1) Adjust nut (42, fig. 2-23) so threaded portion of switch (41) will be flush with nut (19) when installed.

(2) Install lockwasher (43), switch (41) and secure with nut (19).

(3) Connect electrical leads to switch terminals.

(4) Install frequency converter (para 2-64b).

**2-50. MANUAL FIELD FLASH Switch**

The procedures to inspect, test, remove and install the MANUAL FIELD FLASH Switch (44, fig. 2-23) are the same as those for the ENGINE CONTROL Switch (para 2-49).

**2-51. PANEL LIGHT Switch**

Direct support maintenance personnel are authorized to inspect, test and replace the PANEL LIGHT switch.

*a. Inspect and Test.*

(1) Visually inspect PANEL LIGHT switch (12, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

(3) Test switch for continuity as follows:

(a) Identify, tag, and disconnect electrical lead from one terminal (fig. 2-24).

(b) Check for an open circuit between switch terminals. There should be no continuity.

(c) Depress switch and check for continuity between switch terminals. There should be continuity.

(d) If switch is functioning, reconnect electrical lead.

*b. Removal.*

(1) Identify, tag, and disconnect remaining electrical lead (fig. 2-24).

(2) Remove nut (45, fig. 2-23) and lockwasher (46).

(3) Remove switch (12) and gasket (6).

c. *Installation.*

(1) With gasket (6) under flange of switch, install switch in main control indicator panel. Place gasket (6) over switch body and against panel. Secure switch with lockwasher (46) and nut (45).

(2) Connect electrical leads to switch terminals.

**2-52. ENGINE START Switch**

The procedures to inspect, test, remove and install the ENGINE START switch (22, fig. 2-23) are the same as those for the PANEL LIGHT switch (para 2-51).

**2-53. PRESS TO INFLATE Switch**

The procedures to inspect, test, remove and install the PRESS TO INFLATE switch (23, fig. 2-23) are the same as those for the PANEL LIGHT switch (para 2-51).

**2-54. Panel Light**

Direct support maintenance personnel are authorized to inspect, and replace the panel light.

*a. Inspect.*

(1) Visually inspect panel light (20, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

(3) Visually inspect for a missing or damaged lamp shield (13).

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove nut (48), lockwasher (47), and panel light (20).

c. *Installation.* Installation is the reverse of removal (b above), except be sure aperture in shield (13) is directed downward.

**2-55. FUSE Holder**

Direct support maintenance personnel are authorized to inspect and replace the FUSE holder and attaching hardware.

*a. Inspect.*

(1) Visually inspect fuse holder (10, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove two locknuts (4, fig. 2-23), washers (5), and screws (9).

(3) Remove fuse holder (10).

*c. Installation.* Installation is the reverse of ( *b* above) except, insert new fuse in holder.

2-56. SYSTEM HOURMETER

Direct support maintenance personnel are authorized to inspect and replace the SYSTEM HOURMETER and attaching hardware.

*a. Inspect.*

(1) Visually inspect SYSTEM HOURMETER (2, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove four nuts (1, fig. 2-23), screws (8), face plate (7), and SYSTEM HOURMETER (2), and gasket (3).

c. *Installation.* Installation is the reverse of removal (b above), except for the following procedures:

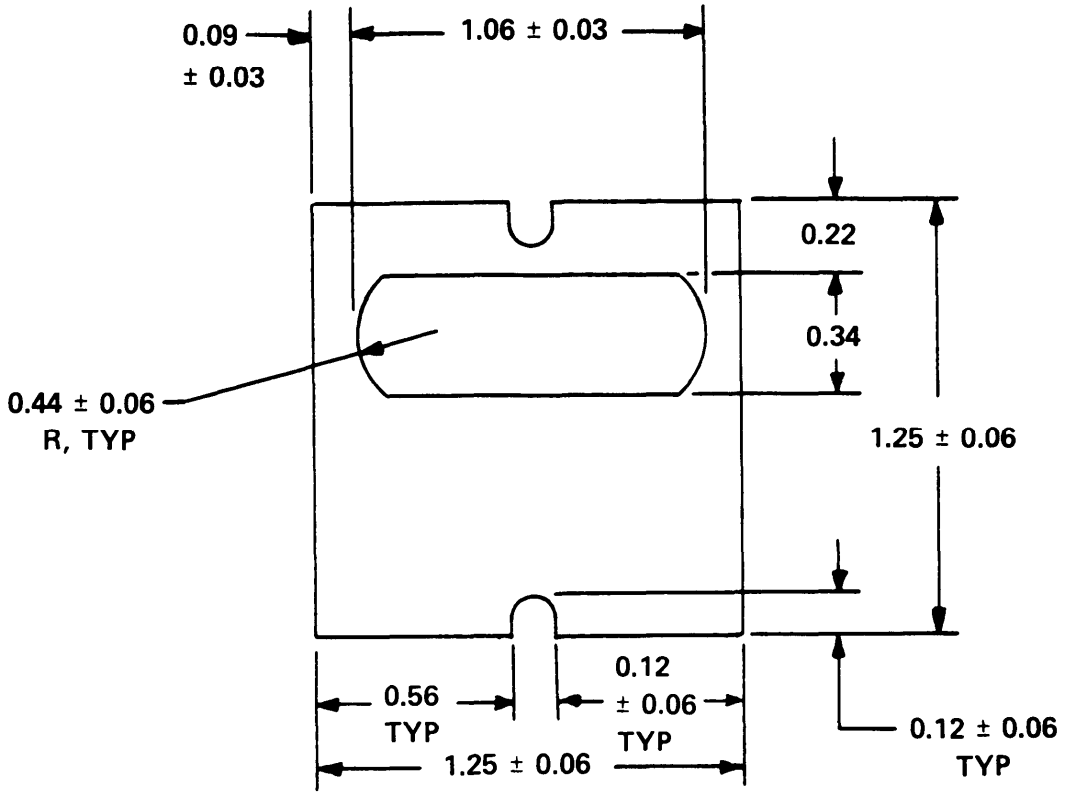
(1) Fabricate new gasket (para 2-57).

(2) Attach gasket to SYSTEM HOURMETER with adhesive sealant (item 5, table 2-1) before installing meter to panel.

**2-57. SYSTEM HOURMETER Gasket**

Direct support maintenance personnel are authorized to manufacture and replace the SYSTEM HOURMETER gasket.

*a. Manufacture.* Fabricate SYSTEM HOURMETER gasket (fig. 2-25).




NOTE:

1. MATERIAL. SILICONE SPONGE RUBBER, 0.187 INCH THICK.
2. DIMENSIONS IN INCHES.

AR600903

Figure 2-25. System hourmeter gasket fabrication.

*b. Removal.* Remove SYSTEM HOURMETER (para 2-56b).

c. *Installation.* Installation is the reverse of removal (b above), except for the following procedures:

(1) Remove gasket and adhesive sealant residue from the SYSTEM HOURMETER with decreasing solvent (item 4, table 2-1).

(2) Attach gasket to SYSTEM HOURMETER with adhesive sealant (item 5, table 2-1) before installing meter to panel.

**2-58. ENGINE AMMETER**

Direct support maintenance personnel are authorized to inspect and replace the ENGINE AMMETER and attaching hardware.

a. *Inspect.*

(1) Visually inspect ENGINE AMMETER (11, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove two nuts (38, fig. 2-23), nonmetallic washers (39), support (40), AMMETER (11).

*c. Installation.* Installation is the reverse of removal ( *b* above).

**2-59. Generator FREQUENCY METER**

Direct support maintenance personnel are authorized to inspect and replace the generator FREQUENCY METER and attaching hardware.

a. *Inspect.*

*(1)* Visually inspect generator FREQUENCY METER (15, fig. 2-23) for damage.

(2) Visually inspect for loose or disconnected electrical leads.

*b. Removal.*

(1) Identify, tag, and disconnect electrica leads (fig. 2-24).

(2) Remove three nuts (18, fig. 2-23), lockwashers (17), screws (16), face plate (14), and generator FREQUENCY METER (15).

c. *Installation*. Installation is the reverse of removal ( *b* above).

**2-60. Heater Time Delay Relay (K7)**

Direct support maintenance personnel are authorized to inspect, test, and replace the heater time delay relay.

*a. Inspect.* Visually inspect heater time delay relay (33, fig. 2-26) for damage and deterioration.

*b. Removal.*

(1) Remove screw (36), washer (35) and angle bracket (34).

(2) Unplug relay from socket (30).

c. *Test*.

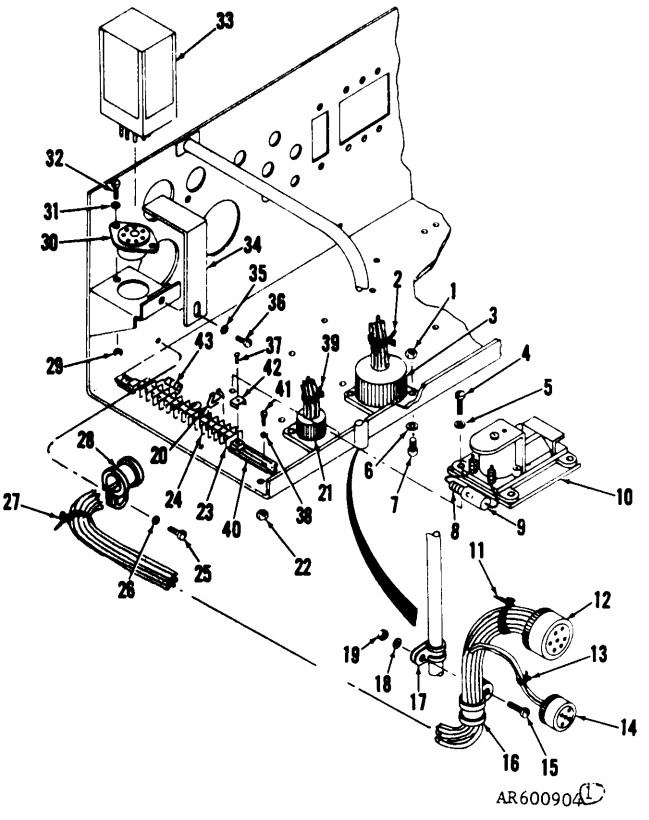
(1) Apply 26-vdc to relay at terminals 10 and 11. Check for continuity between terminals 1 and 4, and terminals 8 and 11.

(2) Check for open circuit (no continuity) between terminals 1 and 3 and terminals 9 and 11.

(3) After 26-vdc has been applied for 5 minutes, check for continuity between terminals 1 and 3 and terminals 9 and 11.

(4) Check for open circuit (no continuity) between terminals 1 and 4 and terminals 8 and 11.

*d. Installation.* Installation is the reverse of removal ( *b* above).



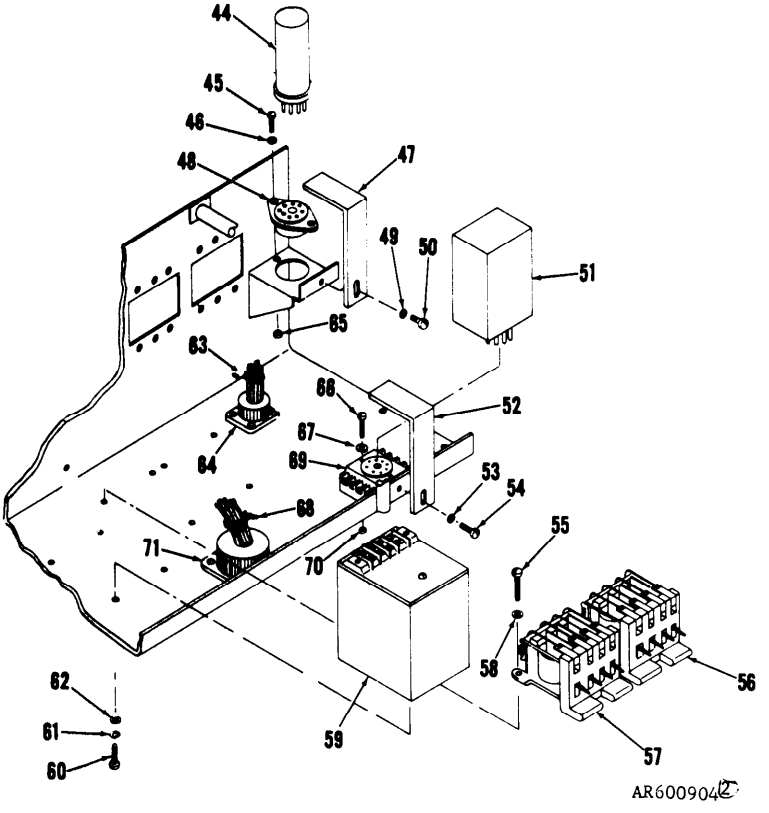




*Figure 2-26 ① , ② . Main control indicator, rear, exploded view*

Legend for fig. 2-26:
1 Locknut
2 Wire strap
3. Receptacle Connector
4 Screw
5 Washer
6 Washer
7 Screw
8 Resistor
9 Capacitor
10 Relay
11 Wire strap
12 Plug connector
13 Wire strap
14 Plug connector
15 Screw
16 Clamp
17 Clamp
18 Washer
19 Locknut
20 Jumper
21 Receptacle connector
22 Locknut
23 End section
24 Terminal
25 Screw
26 Washer
27 Wire strap
28 Clamp
29 Nut
30 Socket
31 Washer
32 Screw
33 Relay
34 Bracket
35 Washer
36 Screw
37 Screw
38 Washer
39 Wire strap
40 Channel
41 Screw
42 Clamp
43 Resistor
44 Relay
45 Screw
46 Washer
47 Bracket
48 Socket
49 Washer
50 Screw
51 Relay
52 Bracket
53 Washer
54 Screw
55 Screw
56 Relay
57 Relay
58 Washer
59 Converter
60 Screw
61 Lockwasher
62 Washer
63 Wire strap
64 Receptacle connector
65 Nut
66 Screw
67 Washer
68 Wire strap
69 Socket
70 Nut
71 Receptacle connector

### 2-61. Heater Time Delay Relay Socket

Direct support maintenance personnel are authorized to inspect and replace the relay socket and attaching hardware.

*a. Inspect.*

(1) Remove heater time delay relay (para 2-*60 b).*

(2) Visually inspect relay socket (30, fig. 2-26) for damaged or disconnected electrical leads.

*b. Removal.*

*(1)* Remove two locknuts (29), screws (32), washers (31 ) and relay socket (30).

(2) Identify, tag, and disconnect electrical leads (fig. 2-24).

c. *Installation.* Installation is the reverse of removal ( *b* above), except replace insulation sleeves over electrical lead connections. Fabricate insulation sleeves from ½-inch diameter heat shrinkable rubber tubing (MIL-R-46846, type 1, class 1).

### 2-62. Terminal Board

Direct support maintenance personnel are authorized to replace the terminal board and attaching hardware.

*a. Removal.*

(1) Loosen screw (37, fig. 2-26) and remove terminal clamp (42) and end section (23).

(2) If necessary, remove wire strap (27).

(3) Identify, tag and disconnect electrical leads (fig. 2-24). If present, remove jumper (20), and resistor (43).

(4) Snap faulty terminal board (24) from channel (40).

*b. Installation.* Installation is the reverse of removal ( *a* above) except label new terminal board with proper identification number and replace wire straps with insulating electrical tape.

### 2-63. Terminal Channel

Direct support maintenance personnel are authorized to replace the terminal channel and attaching hardware.

*a. Removal.*

(1) Loosen two screws (37, fig. 2-26) and snap terminal boards (24) off channel (40).

(2) Remove two screws (41), washers (38), locknuts (22) and channel (40).

*b. Installation.* Installation is the reverse of removal (a above).

### 2-64. Frequency Converter (FC1)

Direct support maintenance personnel are authorized to replace the frequency converter and attaching hardware.

*a. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove four screws (60, fig. 2-26), lockwashers (61), washers (62), and frequency converter (59).

*b. Installation.* Installation is the reverse of removal (a above).

### 2-65. Heater Relay (K4)

Direct support maintenance personnel are authorized to inspect, test, and replace the heater relay and attaching hardware.

*a. Inspect and Test.*

(1) Visually inspect heater relay (10, fig. 2-26) for damage,

(2) Visually inspect for loose and disconnected electrical leads.

(3) Identify electrical leads (fig. 2-24).

(4) Apply 26-vdc to terminals Xl and X2.

(5) Check for continuity at terminals T1 and L1.

(6) Test resistor (8) and capacitor (9).

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads from terminals T1, Ll, Xl, and X2 (fig. 2-24).

(2) Remove four screws (4, fig. 2-26), washers (5), and heater relay (10).

(3) If present, remove wire strap and remove resistor (8) and capacitor (9).

(4) Remove heat shrinkable tubing from resistor-capacitor wire.

(5) Disconnect soldered joint between resistor and capacitor.

c. *Installation.*

(1) Replace heater relay (10), washers (5), and four screws (4).

(2) Solder wires between resistor (8) and capacitor (9).

(3) Replace heat shrinkable ½-inch diameter tubing MIL-R-46846T1C1 over resistor-capacitor wire.

(4) Replace resistor terminal leads on terminals T1 and L1.

(5) Connect electrical leads to terminals T1, Ll, Xl, and X2.

(6) Replace wire strap with electrical insulating tape.

**2-66. Recirculation Fan Relay (K8)**

Direct support maintenance personnel are authorized to inspect, test, and replace the recirculation fan relay and attaching hardware.

*a. Inspect and Test.*

(1) Visually inspect relay (57, fig. 2-26) for damage and deterioration.

(2) Visually inspect for loose or disconnected electrical lead terminal lugs.

(3) Apply 26-vdc across the coil terminals, and visually check that relay contacts close. If relay does not close, replace.

*b. Removal.*

(1) Identify, tag, and disconnect electrical leads (fig. 2-24).

(2) Remove three screws (55, fig. 2-26), washers (58), and relay (57).

c. *Installation.* Installation is the reverse of removal ( *b* above).

**2-67. Condenser Fan Relay (K3)**

Direct support maintenance personnel are authorized to inspect, test, and replace the condenser fan relay and attaching hardware. The procedures to inspect, test, and remove the condenser fan relay (56, fig. 2-26) are the same as those for the recirculation fan relay (para 2-66).

**2-68. Clutch Time Delay Relay (K10)**

Direct support maintenance personnel are authorized to inspect, test, and replace the clutch time delay relay and attaching hardware.

*a. Removal.*

(1) Remove screw (54, fig. 2-26) washer (53), and angle bracket (52).

(2) Unplug relay (51) from socket (69).

*b. Inspect and Test.*

(1) Visually inspect the clutch time delay relay (51, fig. 2-26) for damage and deterioration.

(2) Test relay for continuity as follows:

(a) Check for continuity between pins 1 and 4, and pins 5 and 8.

(b) Apply 26-vdc to pins 2 and 7.

(c) After 26-vdc has been applied for 10 seconds, check for continuity between pins 1 and 3, and pins 6 and 8.

*c. Installation.* Installation is the reverse of removal ( *a* above).

**2-69. Clutch Time Delay Relay Socket**

Direct support maintenance personnel are authorized to replace the relay socket and attaching hardware.

*a. Removal.*

(1) Remove relay (para *2-68a).*

(2) Remove two nuts (70, fig. 2-26), screws (66), washers (67), and relay socket (69).

(3) Identify, tag, and disconnect electrical leads (fig. 2-24).

*b. Installation.* Installation is the reverse of removal ( *a* above).

**2-70. Time Delay Relay (K1)**

Direct support maintenance personnel are authorized to inspect, test, and replace the time delay relay and attaching hardware.

*a. Removal.*

*(1)* Remove screw (50, fig. 2-26), washer (49), and angle bracket (47).

(2) Unplug relay (44) from socket (48).

*b. Inspect and Test.*

(1) Visually inspect relay (44, fig. 2-27) for damage and deterioration.

(2) Apply 120-vac to relay pins 2 and 3 for five seconds, and check for continuity across pins 5 and 7.

c. *Installation.* Installation is the reverse of removal ( *a* above).

**2-71. Time Delay Relay Socket**

Direct support maintenance personnel are authorized to replace the relay socket and attaching hardware.

*a. Removal.*

(1) Remove relay (para *2-70a).*

(2) Remove two locknuts (65, fig. 2-26) screws (45), washers (46), and relay socket (48).

(3) Identify, tag, and disconnect electrical leads (fig. 2-24).

*b. Installation.* Installation is the reverse of removal (a above) except, replace insulation sleeves over socket and electrical lead con-

nections. Fabricate insulation sleeves from ½-inch diameter heat-shrinkable-rubber-tubing (MIL-R-46846, type 1, class 1).

**2-72. Electrical Receptacle Connectors**

Direct support maintenance personnel are authorized to replace the electrical receptacle connectors (3, 21, 64, and 71 fig. 2-26) and attaching hardware. The instructions to replace one connector are typical for all four.

*a. Removal.*

(1) Remove four locknuts (1), screws (7), and washers (6).

(2) If necessary, remove wire straps (2).

(3) Identify, tag, and disconnect electrical leads from the connector (fig. 2-24).

*b. Installation.* Installation is the reverse of removal (a above) except, where necessary, electrical insulating tape may be used to bundle leads together in place of removed straps.

**2-73. Electrical Plug Connectors**

Direct support maintenance personnel are authorized to replace the electrical plug connectors (12 and 14 fig. 2-26). The instructions to replace one connector are typical for both.

*a. Removal.*

(1) If necessary, remove wire straps (11 and 13).

(2) Identify and tag electrical leads (fig. 2-24).

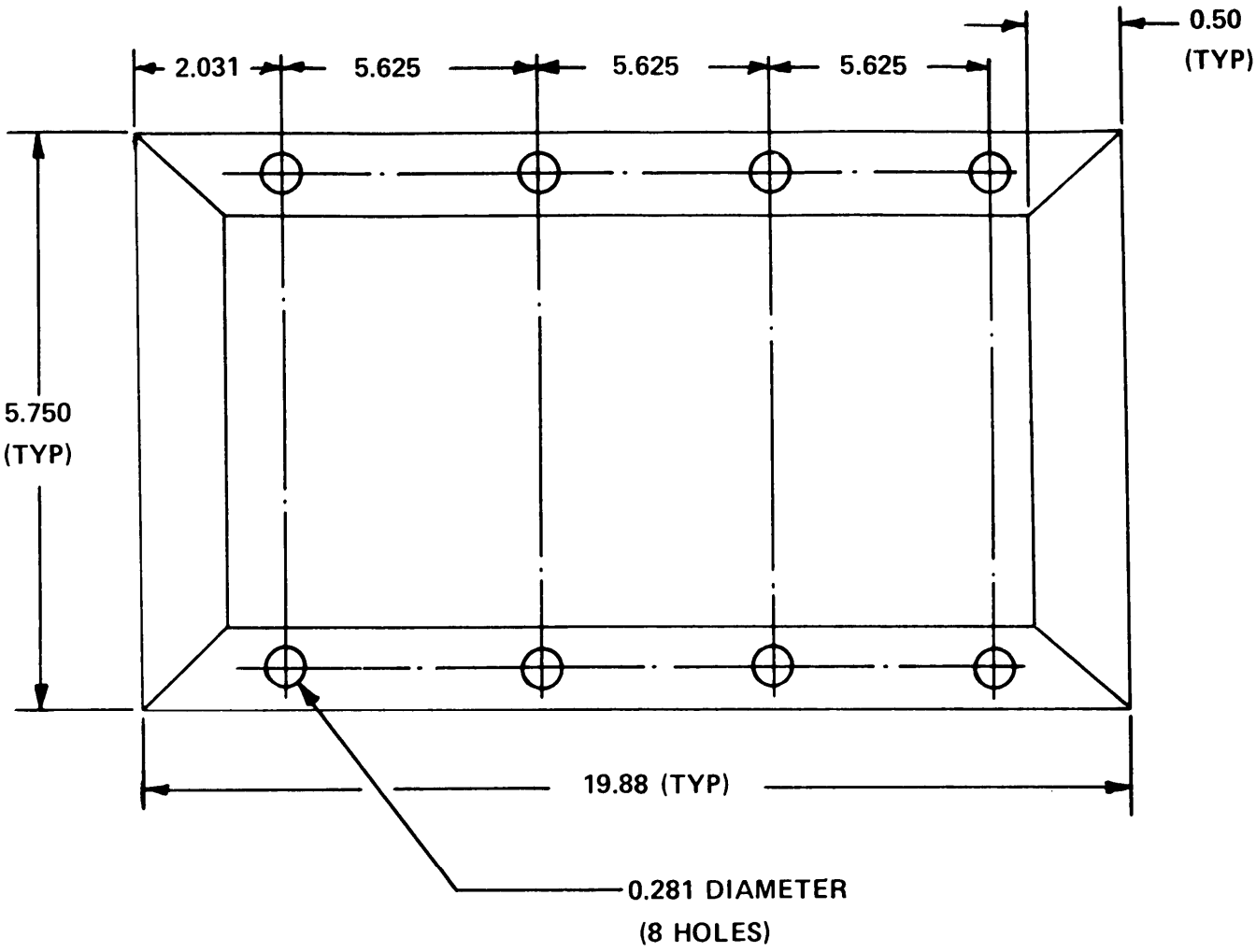
(3) Remove plug connector (12 or 14).

*b. Installation.* Installation is the reverse of removal ( *a* above) except, where necessary, electrical insulating tape may be used to bundle leads together in place of the removed straps,

**2-74. Main Control Indicator Gasket**

Direct support maintenance personnel are authorized to manufacture and replace the main control indicator gasket.

*a. Manufacture.* Fabricate main control indicator gasket (fig. 2-27).




NOTE:

1. MATERIAL. SILICONE SPONGE RUBBER, 0.187 INCH THICK.
2. DIMENSIONS IN INCHES.

AR600905

Figure 2-27. Main control indicator gasket fabrication

*b. Removal.*

(1) Remove gasket (33, fig. 2-23) from main control indicator panel (32).

(2) Clean adhesive sealant residue from the main control indicator panel with degreasing solvent (item 4, table 2-1).

c. *Installation.* Attach gasket to main control indicator panel with adhesive sealant (item 5, table 2-l).

**2-75. Identification Plate**

Direct support maintenance personnel are authorized to replace the identification plate and attaching hardware.

*a. Removal.*

(1) Remove gasket (para 2-74b).

(2) Remove 18 screws (27, fig. 2-23), lockwashers (28), and washers (29).

(3) Remove two screws (26), lockwashers (25), and washers (24).

(4) Remove nuts (19) and (21).

(5) Remove FUZE HOLDER (para *2-55b).*

(6) Remove PANEL LIGHT (para *2-54b).*

**(7)** Remove PANEL LIGHT switch (para 2-51 b).

(8) Remove ENGINE START switch (para 2-52).

(9) Remove PRESS TO INFLATE switch (para 2-53).

(10) Remove ENGINE AMMETER (para 2-*58 b).*

(11) Remove generator FREQUENCY METER (para *2-59b).*

*b. Installation.* Installation is the reverse of removal ( *a* above).

**2-76. Electrical Leads**

Direct support maintenance personnel are authorized to test, manufacture, and replace electrical leads and attaching hardware.

*a. Test.* Test by making continuity checks. Use figure 2-24 to locate check points.

*b. Repair.*

(1) If a terminal lug is faulty, replace terminal lug.

(2) If electrical lead is faulty, identify and tag electrical lead to be removed.

(3) If necessary, remove straps (2, 11, 13, 27, 39, 63, 68, fig. 2-26).

(4) If necessary, remove loop clamps ( 16, 17, 28, fig. 2-26).

(5) Disconnect and remove faulty electrical lead.

(6) Fabricate electrical lead from 600V insulated copper conductor wire, Military Specification MIL-W-5086/12. Refer to Table 2-5 for connecting points, connection type, and length of wire.

(7) Attach lead to appropriate connections.

(8) Make continuity check of newly installed electrical lead.

(9) Where necessary, use electrical insulating tape to bundle leads in place of the removed strap.

(10) If removed, replace loop clamps (16, 17, 28).

Table 2-.5. Main control indicator wire listing.

| *Wire Run Number (fig. 2-24)* | *Cut Length Inches* | *Connecting Points from 1st end* | *to 2nd end* | *Connection Type from 1st end* | *to 2nd end* |
|---|---|---|---|---|---|
| K11B16N | 24 | P2-L | S1-1 | S | TL |
| K12B16V | 23 | P2-M | S1-4 | S | TL |
| K69B16V | 23 | P2-A | S15-2 | S | TL |
| K69C16V | 4 | S15-2 | S17-2 | TL | S |
| K69D16V | 4 | S1-5 | S17-2 | TL | S |
| K69E16V | 14 | J6-T | S1-5 | S | TL |
| K70B16N | 25.5 | P2-D | S15-5 | S | TL |
| K71C16N | 17.25 | P2-C | J7-U | S | S |
| K72C16V | 14 | J7-T | M2+ | S | TL |
| K72D16V | 11 | M2+ | S15-3 | TL | TL |
| K73F16N | 4.5 | S15-6 | S1-2 | TL | TL |
| K73J16N | 25.5 | P2-E | S15-6 | S | TL |
| K74A16V | 19.75 | P2-F | M2- | S | TL |
| K75A16V | 27 | P2-B | S17-1 | S | S |
| P38A12V | 20 | J6-J | XF2-1 | S | S |
| P39A12V | 10 | XF2-2 | TB1-7 | S | TL |
| P39B12V | 8.50 | TB1-8 | K4-T1 | TL | TL |
| P39C12V | 20.50 | P2-U | K4-T1 | S | TL |
| P39F16V | 15 | J7-F | TB1-8 | S | TL |
| P39T16V | 23 | J6-R | TB1-7 | S | TL |
| P39W16V | 15.75 | TB1-7 | S3-1 | TL | S |
| P39X16V | 19.5 | TB1-8 | CB2-C | TL | TL |
| P39Y16V | 27 | K10-1 | TB1-8 | S | TL |
| P39Z16V | 43 | P2-D | K10-3 | S | S |
| P40A16V | 33 | P2-0 | CB3-NO | S | TL |
| P42A16V | 17.5 | TB1-2 | CB2-NO | TL | TL |
| P42B16V | 17 | J7-G | TB1-2 | S | TL |
| P42E16V | 19.5 | J6-N | TB1-2 | S | TL |
| P43A16V | 13.5 | J7-1 | TB1-1 | S | TL |
| P43D16V | 4 | K7-11 | TB1-1 | S | TL |
| P43E16V | 3 | K7-11 | K7-2 | S | TL |
| P43F16V | 15.25 | P2-W | TB1-1 | S | TL |
| P47B16V | 22 | J6-S | TB1-6 | S | TL |
| P47C16V | 14 | P2-Z | TB1-6 | S | TL |
| P47E16V | 15 | TB1-6 | S3-2 | TL | S |
| P50A16V | 3 | K7-3 | K7-8 | S | S |
| P50B16V | 7.50 | K7-8 | K4-X1 | S | TL |
| P51A16V | 8.5 | K7-5 | TB1-12 | S | TL |
| K11B16N | 24 | P2-L | S1-1 | S | TL |

Table 2-5. Main control indicator *wire* listing– Continued.

| *Wire Run Number (fig. 2-24)* | *cut length Inches* | *Connecting Points from 1st end* | *to 2nd end* | *Connection Type from 1st end* | *to 2nd end* |
|---|---|---|---|---|---|
| K12B16V | 23 | P2-M | S1-4 | S | TL |
| K69B16V | 23 | P2-A | S15-2 | S | TL |
| K69C16V | 4 | S15-2 | S17-2 | T1 | S |
| K69D16V | 4 | S1-5 | S17-2 | TL | S |
| K69E16V | 14 | J6-T | S1-5 | S | TL |
| K70B16N | 25.5 | P2-D | S15-5 | S | TL |
| K71C16N | 17.25 | P2-C | J7-U | S | S |
| K72C16V | 14 | J7-T | M2+ | S | S |
| K72D16V | 11 | M2+ | S15-3 | TL | TL |
| K73F16N | 4.5 | S15-6 | S1-2 | TL | TL |
| K73J16N | 25.5 | P2-E | S15-6 | S | TL |
| K74A16V | 19.75 | P2-F | M2- | S | TL |
| K75A16V | 27 | P2-B | S17-1 | S | S |
| P38A12V | 20 | J6-J | XF2-1 | S | S |
| P39A12V | 10 | XF2-2 | TB1-7 | S | TL |
| P39B12V | 8.50 | TB1-8 | K4-T1 | TL | TL |
| P39C12V | 20.50 | P2-U | K4-T1 | S | TL |
| P52A16V | 5.50 | K7-7 | TB1-10 | S | TL |
| P53A16V | 6.50 | J6-P | K8-X2 | S | TL |
| P54A12V | 19.50 | P2-T | K4-L1 | S | TL |
| P55B12N | 11.50 | J6-K | K8-X1 | S | TL |
| P55C12N | 18.5 | K8-X1 | TB1-4 | TL | TL |
| P55E16N | 33.5 | K8-X1 | P2-E | TL | S |
| P55K16N | 17.5 | J7-M | TM1-5 | S | TL |
| P55W16N | 15.25 | P2-Y | TB1-5 | S | TL |
| P55Y16N | 14.25 | P2-X | TB1-4 | S | TL |
| P55BB16N | 6.5 | TB1-3 | K7-10 | TL | S |
| P55DD16N | 9.25 | TB1-5 | L21-B | TL | S |
| P55GG16N | 7.5 | K4-X2 | J21-A | TL | S |
| P55HH16N | 6 | K4-X2 | TB1-11 | S | S |
| P55KK16N | 14 | P2-G | J21-G | S | S |
| P55NN16N | 40 | P2-F | K10-F | S | S |
| P55RR16N | 13 | K1-7 | K3-X1 | S | TL |
| P55SS16N | 21 | K1-5 | TBL-3 | S | TL |
| P55YY12N | 7 | TB1-3 | GROUND | TL | TL |
| P56A16V | 7.5 | K7-1 | TB1-9 | S | TL |
| P56B16V | 12.50 | TB1-9 | P2-V | TL | S |
| P56E16V | 18.5 | TB1-9 | J7-J | TL | S |
| P60A16V | 5.50 | FC1+ | M1+ | TL | TL |
| P61A16N | 4.75 | FC1– | M1– | TL | TL |
| P62A16V | 15 | CB3-C | K3-X2 | TL | TL |
| P62B16V | 7 | K10-2 | K3-X2 | S | TL |
| P65C16V | 17.25 | J7-K | P2-S | S | S |
| P66C16V | 17.25 | J7-H | P2-R | S | S |
| P69F16V | 4 | DS11-2 | S1-5 | S | TL |
| P73E16N | 12 | J7-L | S1-2 | S | TL |
| P73G16N | 4.5 | S1-2 | S24-1 | TL | S |
| P73H16N | 3 | DS11-1 | S24-2 | S | S |
| P96D16V | 20 | J7-N | J6-U | S | S |
| P99C16V | 19 | J7-X | TB1-13 | S | TL |
| P99D16V | 12.5 | P2-N | TB1-13 | S | TL |
| X7B12A | 29 | P2-H | CB2-1 | S | TL |
| X7C16A | 5 | CB2-1 | CB3-1 | TL | TL |
| X7D16A | 5 | CB3-1 | CB4-1 | TL | TL |
| X7E12A | 34.5 | P26-A | CB2-1 | S | TL |
| X8B12B | 28 | P2-1 | CB2-2 | S | TL |
| X8C16B | 5 | CB2-2 | CB3-2 | TL | TL |
| X8D16B | 5 | CB3-2 | CB4-2 | TL | TL |
| X8E12B | 35.5 | P26-B | CB2-2 | S | TL |
| X9B12C | 28 | P2-J | CB1-1 | S | TL |
| X9C12C | 5 | CB1-1 | CB2-3 | TL | TL |
| X9D16C | 5 | CB2-3 | CB3-3 | TL | TL |
| X9E16C | 5 | CB3-3 | CB4-3 | TL | TL |

*Table 2-5. Main control indicator wire listing—Continued.*

| Wire Run Number (fig. 2-24) | cut length Inches | Connecting Points from 1st end | Connecting Points to 2nd end | Connection Type from 1st end | Connection Type to 2nd end |
|---|---|---|---|---|---|
| X9F12C | 36.5 | P26-C | CB2-3 | S | TL |
| X10B12N | 13 | P2-K | TB1-15 | S | TL |
| X10C16N | 16 | TB1-14 | FC1-L | TL | TL |
| X10D16N | 10.5 | J6-G | FC1-L | S | TL |
| X10F16N | 25 | TB1-15 | K1-3 | TL | S |
| X10G16N | 18.75 | TB1-14 | J7-E | TL | S |
| X10Y16N | 11 | TB1-14 | M3-2 | TL | S |
| X10AA16N | 27.5 | TB1-15 | J27D | TL | S |
| X13A16V | 5.50 | CB1-2 | FC1-L | TL | TL |
| X13D16V | 17.25 | J7-A | CB1-2 | S | TL |
| X18A16V | 14.75 | K1-2 | CB2-5 | S | TL |
| X18B16B | 3 | CB2-5 | K8-2 | TL | TL |
| X18C16B | 18.5 | K8-1 | J7-C | TL | S |
| X18M16B | 11 | J27-B | CB2-5 | S | TL |
| X19A16V | 15.5 | M3-1 | CB2-4 | S | TL |
| X19B16A | 3 | CB2-4 | K8-1 | TL | TL |
| X19C16A | 18 | K8-2 | J7-B | TL | S |
| X19M16A | 11 | J27-A | CB2-4 | S | TL |
| X20A16C | 3 | CB2-6 | K8-3 | TL | TL |
| X20B16C | 19 | K8-3 | J7-D | TL | S |
| X20L16C | 10 | J27C | CB2-6 | S | TL |
| X24A16A | 3 | K3-1 | CB3-4 | TL | TL |
| X25A16B | 3 | K3-2 | CB3-5 | TL | TL |
| X26A16C | 3 | K3-3 | CB3-6 | TL | TL |
| X27A16A | 33 | P2-C | K3-5 | S | TL |
| X28A16B | 34 | P2-B | K3-6 | S | TL |
| X29A16C | 32 | P2-A | K3-7 | S | TL |
| X30A16A | 8.5 | K6-A | K8-5 | S | TL |
| X31A16B | 9 | J6-B | K8-6 | S | TL |
| X32A16C | 11 | J6-C | K8-7 | S | TL |
| X33A16A | 18 | J6-D | CB4-4 | S | TL |
| X34A16B | 18 | J6-E | CB4-5 | S | TL |
| X35A16C | 18.5 | J6-F | CB4-6 | S | TL |

LEGEND:
S—Solder
TL—Terminal lug

## Section XII. GAS-PARTICULATE FILTER ASSEMBLY

### 2-77. Lower Enclosure

Direct support maintenance personnel are authorized to replace the lower enclosure and attaching hardware.

**WARNING**

The unit commander or senior officer in charge of maintenance personnel assigned to remove the contaminated gas and particulate filters must prescribe the necessary protective clothing (TM 10-277) to be worn during this operation. He must also prescribe the necessary safety measures to be followed including the NBC decontamination (FM 3-5). This must be performed before the new filters are installed. Failure to wear protective clothing or follow safety measures may result in injury or death.

**CAUTION**

Handle filters with care to prevent damage.

### 2-78. Removal and Disassembly

**WARNING**

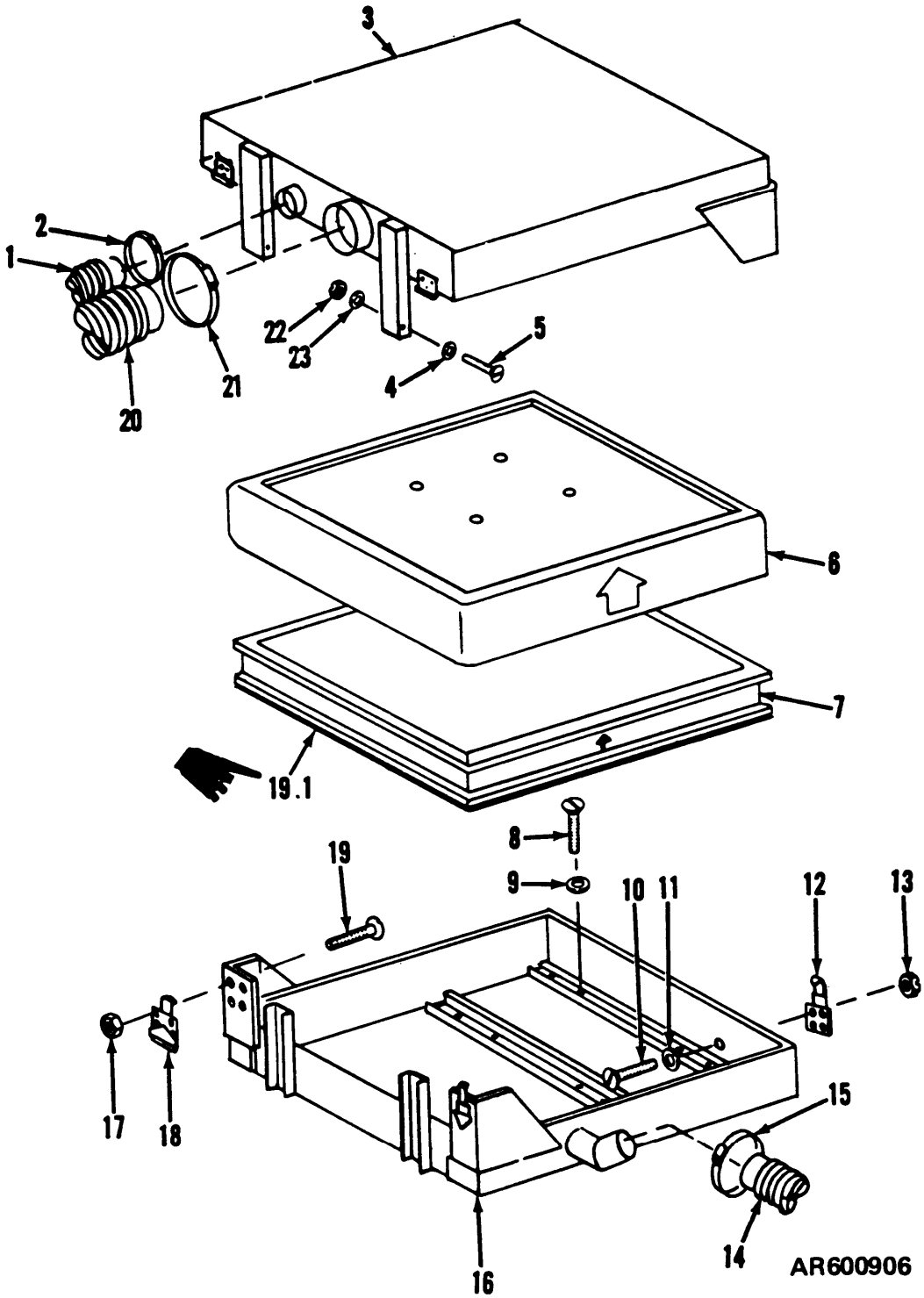
DO NOT throw away damaged or unusable filters as ordinary trash.

DO turn in damaged or unusable filters to your hazardous waste management office or Defense Reutilization and Marketing Office (DRMO).

*a.* Remove gas and particulate filters (6 and 7, fig. 2-28) and TM3-4240-264-12.

*b.* Loosen two clarnps (2 and 21, fig. 2-28), and remove two hoses (l) and (20) from upper enclosure (3).

*c.* Remove two nuts (22), washers, screws (5), and washers (4).




| | | | | | |
|---|---|---|---|---|---|
| 1 | Hose | 9 | Washer | 17 | Nut |
| 2 | Clamp | 10 | Screw | 18 | Fastener |
| 3 | Upper enclosure | 11 | Washer | 19 | Screw |
| 4 | Washer | 12 | Fastener | 19.1 | Gasket |
| 5 | Screw | 13 | Nut | 20 | Hose |
| 6 | Gas filter | 14 | Hose | 21 | Clamp |
| 7 | Particulate filter | 15 | Clamp | 22 | Nut |
| 8 | Screw | 16 | Lower enclosure | 23 | Washer |

*Figure 2-28. Gas-particulate filter assembly, exploded view.*

*d.* Remove upper enclosure (3).

*e.* Loosen clamp (15), and remove hose (14) from lower enclosure (16).

*f.* Remove 12 screws (8) washers (9), and enclosure (16).

*g.* Remove eight nuts (13), screws (10), washers (11), and two fasteners (12).

h. Remove eight nuts (17), screws (19), and two fasteners (18).

2-79. Assembly and Installation

Assembly and installation is the reverse of removal and disassembly (para 2-78).

**NOTE**

Be sure when installing the particulate filter (7, fig. 2-28) that gasket (19.1) is facing toward lower enclosure (16).

## Section XIII. FUEL SYSTEM

2-80. Fuel Pump

Direct support maintenance personnel are authorized to replace the fuel pump and attaching hardware.

a. Removal and Disassembly.

**WARNING**

HIGHLY INFLAMMABLE MATERIAL
When replacing fuel system components, keep open flame away from working area. DEATH or severe burns may result if personnel fail to observe safety precautions.

**NOTE**

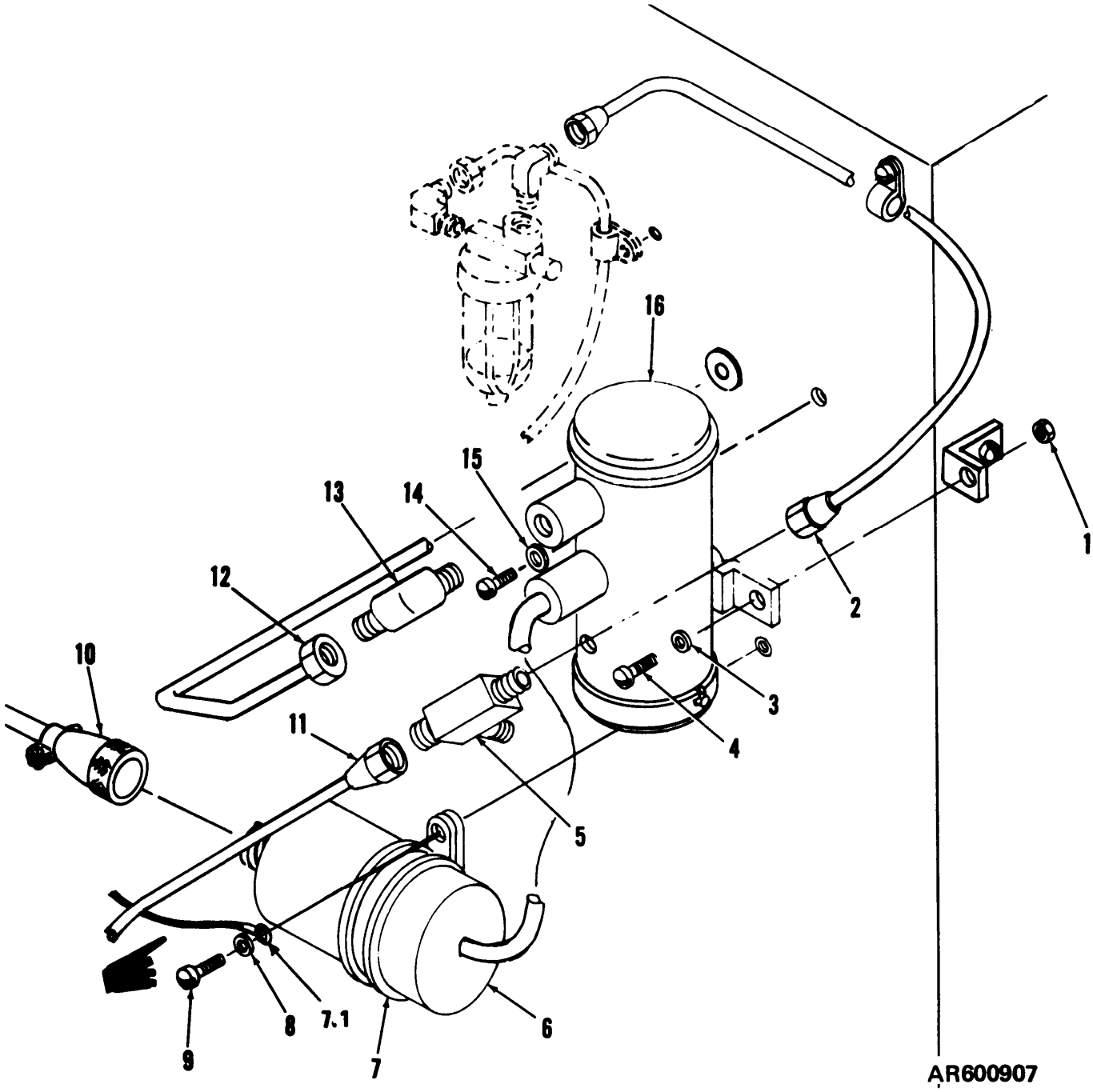
Be sure system is inoperative and heater has not been operating for approximately 10 minutes before attempting to replace the fuel pump.

(1) Perform shutdown procedures (TM 3-4240-264-12).

(2) Disconnect nut (12, fig. 2-29) from elbow (13).

(3) Disconnect nuts (2) and (11) from tee (5).

(4) Disconnect plug connector (10) from RFI filter (6).




| | | | |
|---|---|---|---|
| 1 | Locknut | 9 | Screw |
| 2 | Nut | 10 | Plug |
| 3 | Washer | 11 | Nut |
| 4 | Screw | 12 | Nut |
| 5 | Tee | 13 | Elbow |
| 6 | RFI filter | 14 | Screw |
| 7 | Clamp | 15 | Washer |
| 7.1 | Ground wire | 16 | Fuel pump |
| 8 | Washer | | |

*Figure 2-29. Fuel pump removal and installation, exploded view.*

(5) Remove screw (9), washer (8), ground wire (7. 1). Slide clamp (7) off of RFI filter (6).

(6) Remove screw (14) and washer (15).

(7) Remove locknut (l), screw (4), washer (3), and fuel pump (16).

(8) Remove elbow (13) and tee (5) from fuel pump (16).

*b. Reassembly and Installation.* Reassembly and installation is the reverse of removal and disassembly ***(a*** above), except apply a film of antiseize compound (item 6, table 2-1) or use antiseize tape (item 7, table 2-1) on pipe threads of elbow (13) and tee (5).

## 2-81. Air Vent Lines, Fuel Lines, Fittings, and Component Parts

Direct support maintenance personnel are authorized to manufacture and replace the fuel lines, air vent lines, and to replace the attaching fittings and component parts. Replacement consists of removing the damaged part and replacing it with a new part.

**WARNING**

HIGHLY INFLAMMABLE MATERIAL
When replacing fuel system components, keep open flame away from working area. DEATH or severe burns may result if personnel fail to observe safety precautions.

**NOTE**

Be sure system is inoperative and heater has not been operating for approximately 10 minutes before attempting to replace any component.

*a. Replacement.*

(1) Perform shutdown procedures (TM 3-4240-264-12).

(2) Using figure 2-30 as a guide, remove damaged fitting or tubing with suitable size tools. Avoid twisting or binding adjacent tubes when removing damaged tubing.

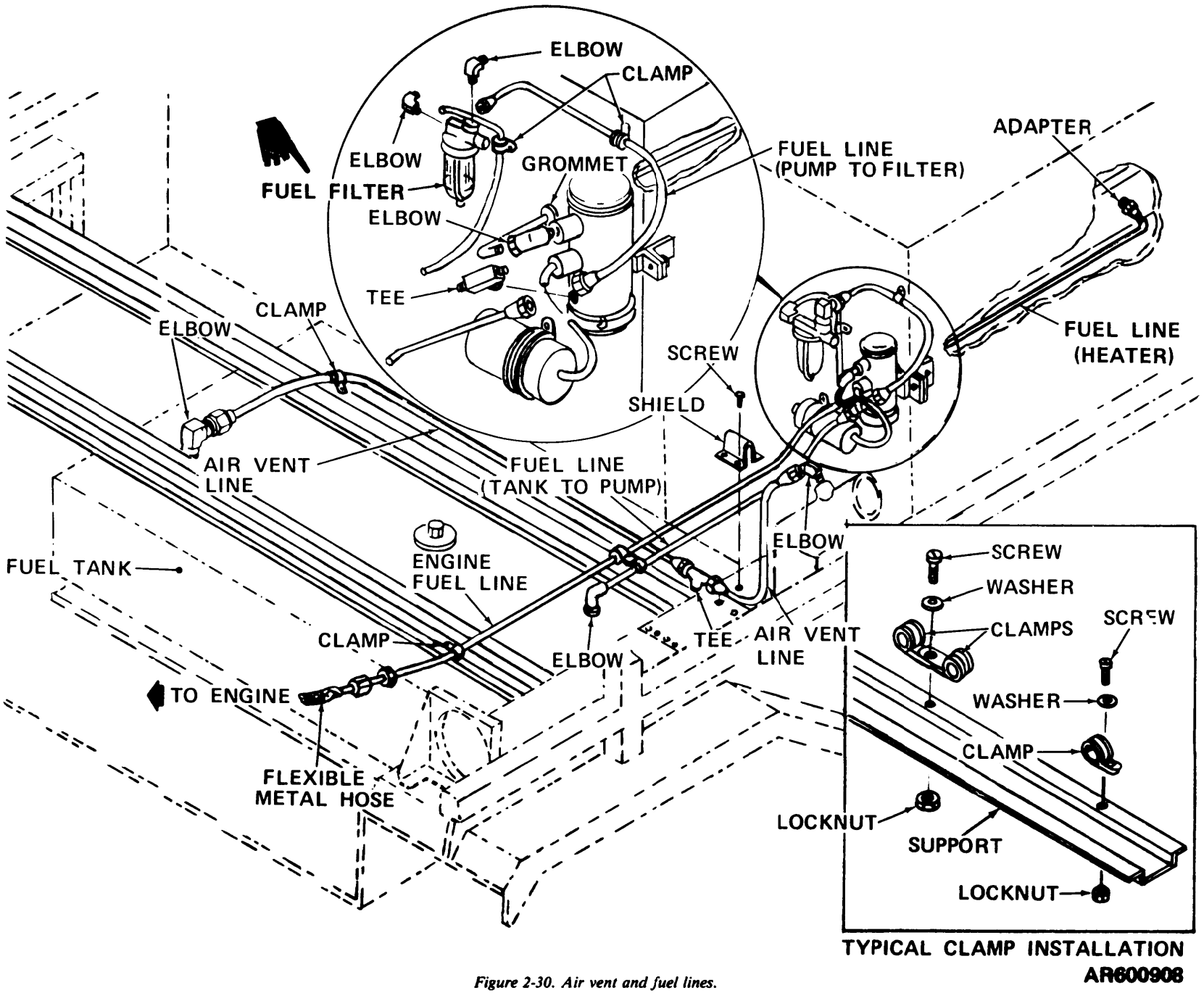



*Figure 2-30. Air vent and fuel lines.*

(3) If the grommet (fig. 2-30) on the heater fuel tubing has deteriorated due to dirt, aging, or exposure to fuel, it should be replaced.

(4) Using the damaged tube as a guide, cut and shape the bulk tubing to the same length and shape of the damaged tube.

(5) Ream the tubing ends open and file the ends square.

(6) As required, place a nut and ferrule on each end of the fabricated tube and flare ends.

(7) If ferrule type fittings are used, thread the nut on the applicable fittings and tighten to crimp the ferrule on the tube.

**NOTE**

Be sure that the tube is held in fully when tightening the nut.

(8) When replacing fittings be sure to use antiseize tape (item **7,** table 2-1) on all threads not receiving a compression or flared nut.

## 2-81.1. Drain Valve

Direct support maintenance personnel are authorized to replace the fuel tank drain valve.

*a. Shutdown Procedures.*

(1) Set cool, circulate, heat, switch (14, fig. 2-82) to CIRCULATE (center position).

**NOTE**

If system has been operating in heating mode, do not proceed until heater blower shuts down.

(2) Set circuit breakers (1, 2,3, and 4, fig. 2-33.3) to OFF.

(3) Pull out throttle (7) until idle speed is obtained. Turn throttle clockwise to lock in idle position. Idle engine 3 minutes, then set ENGINE CONTROL switch (6) to OFF. After engine stops, push throttle fully in and lock.

(4) If engine fails to stop, pull out choke control to stop engine (TM 5-2805-259-14).

**WARNING**

**HIGHLY FLAMMABLE MATERIAL.**

When draining gasoline from the fuel tank, keep open flame away from working area.

**DEATH**

or severe burns may result if personnel fail to observe safety precautions.

**WARNING**

When draining gasoline from the fuel tank, use an approved receptacle to catch the gasoline.

*b. Removal.*

(1) Drain fuel from fuel tank.

(2) Remove drain valve (7, fig. 2-32).

c. *Installation.* Installation is the reverse of removal *(b* above).

## 2-82. Fuel Quantity Transmitter

Direct support maintenance personnel are authorized to test and replace the fuel quantity transmitter and attaching hardware.

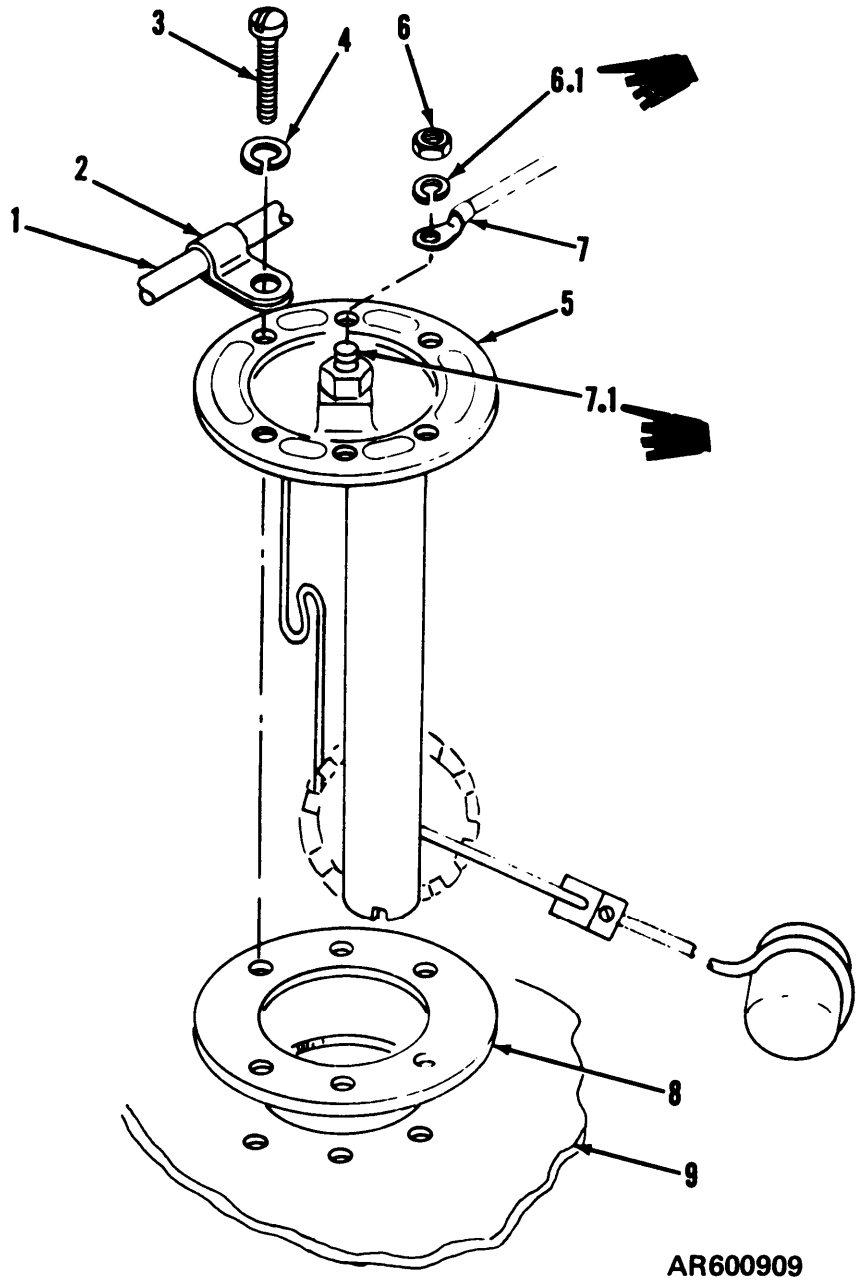
*a. Test.* Remove lead to transmitter and check across terminals for continuity. If no continuity, replace transmitter.

*b. Removal.*

(1) Disconnect battery cables (TM 3-4240-264-12).

(2) Remove gas particulate filters, para 2-78 *a* through e and TM 3-4240-264-12.

(3) Remove nut (6, fig. 2-31) and wire lead (7).




| | | | | | |
|---|---|---|---|---|---|
| 1 | Throttle cable | 5 | Fuel quantity transmitter | 7.1 | Stud |
| 2 | Clamp | 6 | Nut | 8 | Gasket |
| 3 | Screws | 6.1 | Lockwasher | 9 | Fuel tank |
| 4 | Lockwashers | 7 | Wire lead | | |

*Figure 2-31. Fuel quantity transmitter, exploded view.*

*(4)* Remove five screws (3) and lockwashers (4).

**CAUTION**

Prior to removal of transmitter, scribe position on fuel tank to ensure same position in reassembly.

(5) Move clamp (2) and throttle cable (1) to allow removal of transmitter (5). Remove transmitter (5) and gasket (8) from fuel tank (9).

*b. Installation.* Installation is the reverse of removal *(a* above), except arrange cover of fuel quantity transmitter and adjust float arm for 10 inch tank depth in accordance with manufacturers instructions furnished with each transmitter.

## 2-83. Aluminum Fuel Tank

**NOTE**

When manufactured, shelter systems with serial numbers M681 thru M68502 have aluminum fuel tanks. Shelter systems with serial numbers M68503 and above have steel fuel tanks.

*a. Removal.*

(1) Set Brakes. (TM 9-2330-213-14).

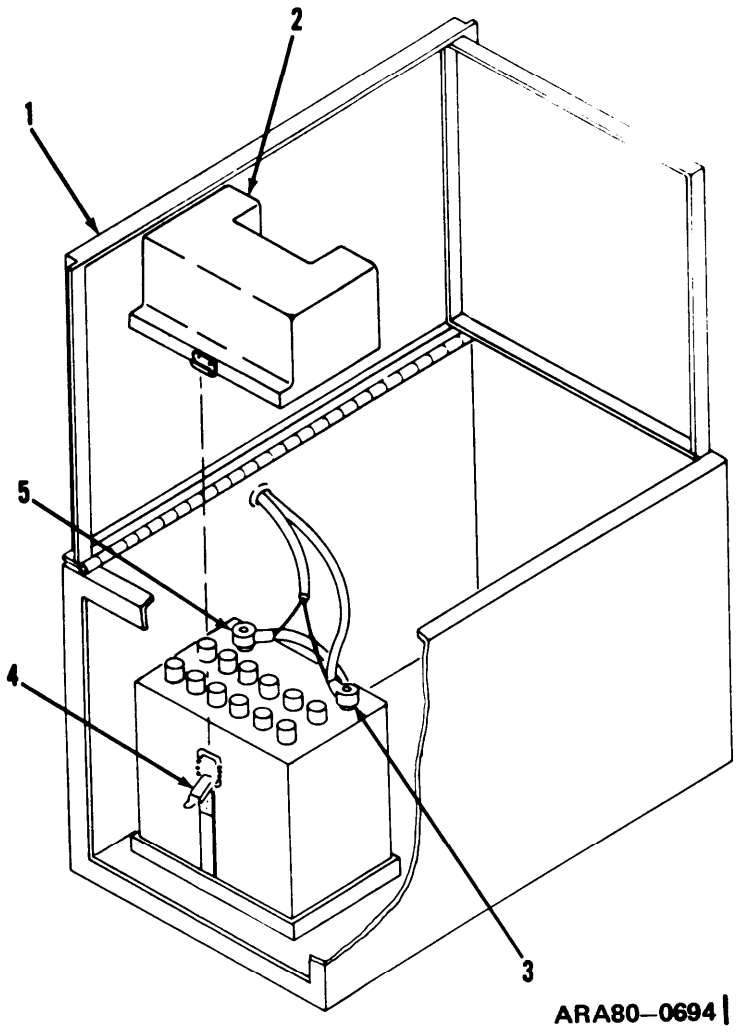
**WARNING**

The trailer rear support leg should be lowered and secured. This will prevent trailer overturning, injury to personnel, and damage to equipment.

(2) Lower trailer rear mounted support leg (TM 9-2330-213-14).

(3) Attach ground wire to suitable ground. If working area is dirt, use anchor as ground (TM 3-4240-264-12).

(4) Lift hinged baffle (1, fig. 2-31.1). Release fasteners (4) and remove battery cover (2).




1 Hinged baffle
2 Battery cover
3 Positive battery cable
4 Fastener
5 Negative battery cable

*Figure 2-31.1. Battery storage compartment.*

(5) Disconnect negative battery cable (5).

**WARNING**

When replacing fuel system components, keep open flame away from working area. DEATH or severe burns, may result if personnel fail to observe safety precautions.

(6) Open drain valve (7, fig. 2-32) and drain fuel from tank. Use an approved receptacle to hold gasoline.

**(7)** Disconnect plug connector (35, fig. 2-32.1).

(8) Remove rail section (39) by pulling upward.

(9) Remove screw (37), and cap (34), with chain 33).

(10) Remove three screws (38) and shield (36) with attached components.

(11) Loosen clamp (28) and remove hose (27) from air cleaner (29). Lay end of hose away from fuel tank.

(12) Unfasten two clamps (30) and lift air cleaner head (21) up to expose screw (26). Remove screw (26), lockwasher (25), clamp (24), and washer (23).

(13) Loosen screw (32) and remove cable clamping collar (31) from throttle cable (22). Pull throttle cable from cable clamping collar (31) and lay aside.

(14) Disconnect plug connector (10) from RFI filter (13) and plug connector (14) from receptacle connector (16).

(15) Remove locknuts (15), screws (11), washers 12), and clamp (6). Move RFI filter (13) away from working area.

(16) Remove locknut (5), screw (9), washer (8). cave clamp (7) on electrical cable.

(17) Remove four screws (33, fig. 2-32.2), washers (32), locknuts (31) and duct support (34).

(18) Loosen clamps (1 and 4, fig. 2-32.1) and disconnect hoses (2) and (3).

(19) Remove gas and particulate filters as follows:

(a) Release two fasteners (12, fig. 2-28) and two fasteners (18).

(b) Swing enclosure (3) upward.

(c) Remove gas filter (6) and particulate filter (7). (19. 1) Unlock catch (40, fig. 2-32.1) and remove safety shield (41).

(20) Loosen clamp (15, fig. 2-28) and remove hose (14) from lower enclosure (16).

(21) Remove 12 screws (8), washers (9), and lower enclosure (16) assembled.

(22) Remove screw (3, fig. 2-3 1) and lockwasher (4) securing clamp (2) to fuel tank (9).

(23) Remove nut (6), lockwasher (6.1), and wire lead (7) from stud (7.1).

(24) Remove fuel pump (para 2-80.a, steps (2) through (7)).

(25) Disconnect fuel lines and remove fuel filter (fig. 2–30). Identify fuel lines for reinstallation.

(26) Cut electrical tiedown straps securing electrical cables to fuel lines.

(27) Remove clamps securing all fuel lines, and vent line.

(28) Disconnect and remove fuel lines and identify for reinstallation. Disconnect engine fuel line from flexible metal hose.

(29) Remove four screws and shield.

(30) Unscrew two coupling nuts (1. 1, fig. 2-32] and remove copper tubing line (2).

(31) Loosen clamps (19 & 21, fig. 2-43) and remove hose (20).

(32) Disconnect clamp (4, fig. 2-32.2).

(33) Remove four screws (l), washers (2), and locknuts (28).

(34) Remove four screws (20), washers (19), and support (5).

(35) Remove four locknuts (27), screws (30), and washers (29).

(36) Remove four screws (17), and washers (16).

(37) Remove four locknuts (23), screws (26), washers (25), and supports (22) and (24).

(38) Remove four screws (16, fig. 2-43), washers (15), and air duct (18) assembled.

(39) Remove four locknuts (15, fig. 2-32.2), screws (7), and washers (6).

(40) Remove four locknuts (14), screws (9), and washers (10).

(41) Remove one locknut (18), screw (12), washer (11), and support (8).

(42) Remove screw (10, fig. 2-32), washer (9), securing ground wire (8).

(43) Remove drain valve (7).

(44) Remove eight bolts (12) and washers (13).

(45) Release four latches (2, fig. 2-34) and remove heater access cover (3) from heater cabinet.

WARNING

Be careful to avoid spilling gasoline when disconnecting fuel tubing. Keep open flame away from working area. DEATH, or severe burns may result if personnel fail to observe these safety precautions.

(46) Disconnect connector (4) and tubing (5) from heater (1).

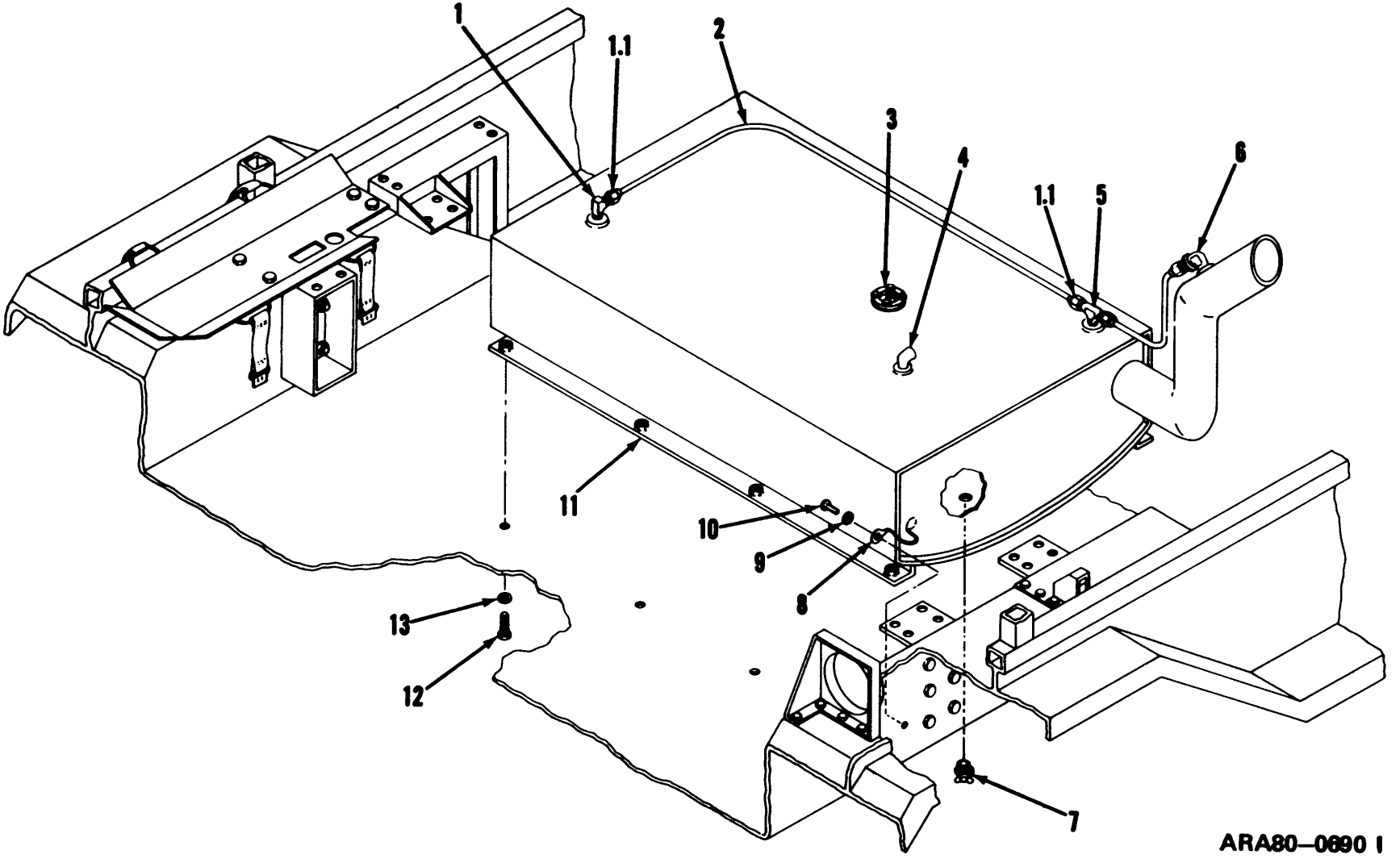
(47) Remove heater fuel line and grommet from heater cabinet (fig. 2-30).

**CAUTION**

Be sure electrical cables and throttle cable do not catch on protruding fittings when removing fuel tank to avoid damage to cables.

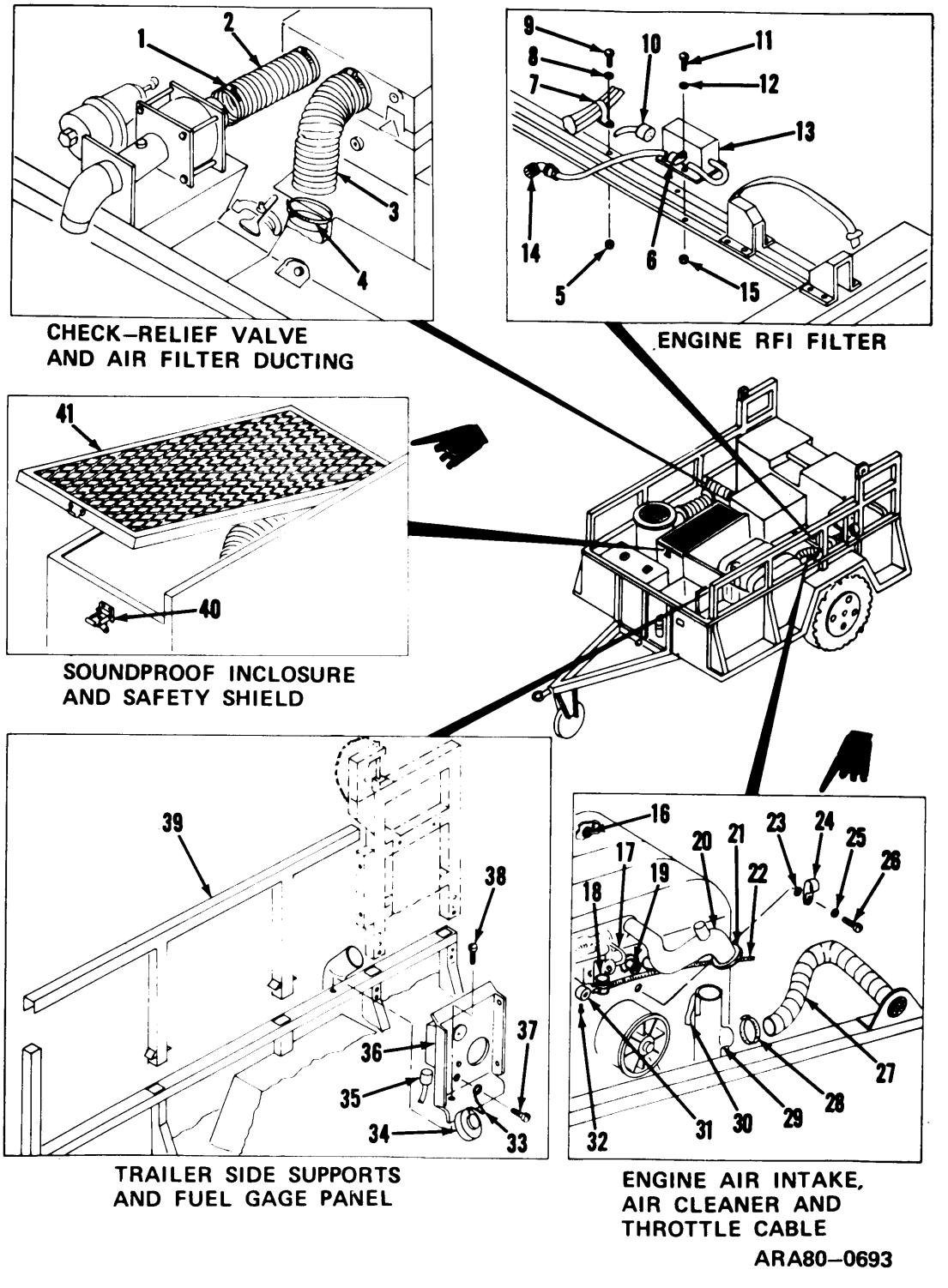
(48) With three people, slide fuel tank (11, fig. 2-32) to clear supports (13 and 21, fig. 2-32.2). Lift fuel tank up by filler neck to clear trailer side. Remove fuel tank from trailer.

(49) Remove elbow (4, fig. 2-32) from fuel tank.



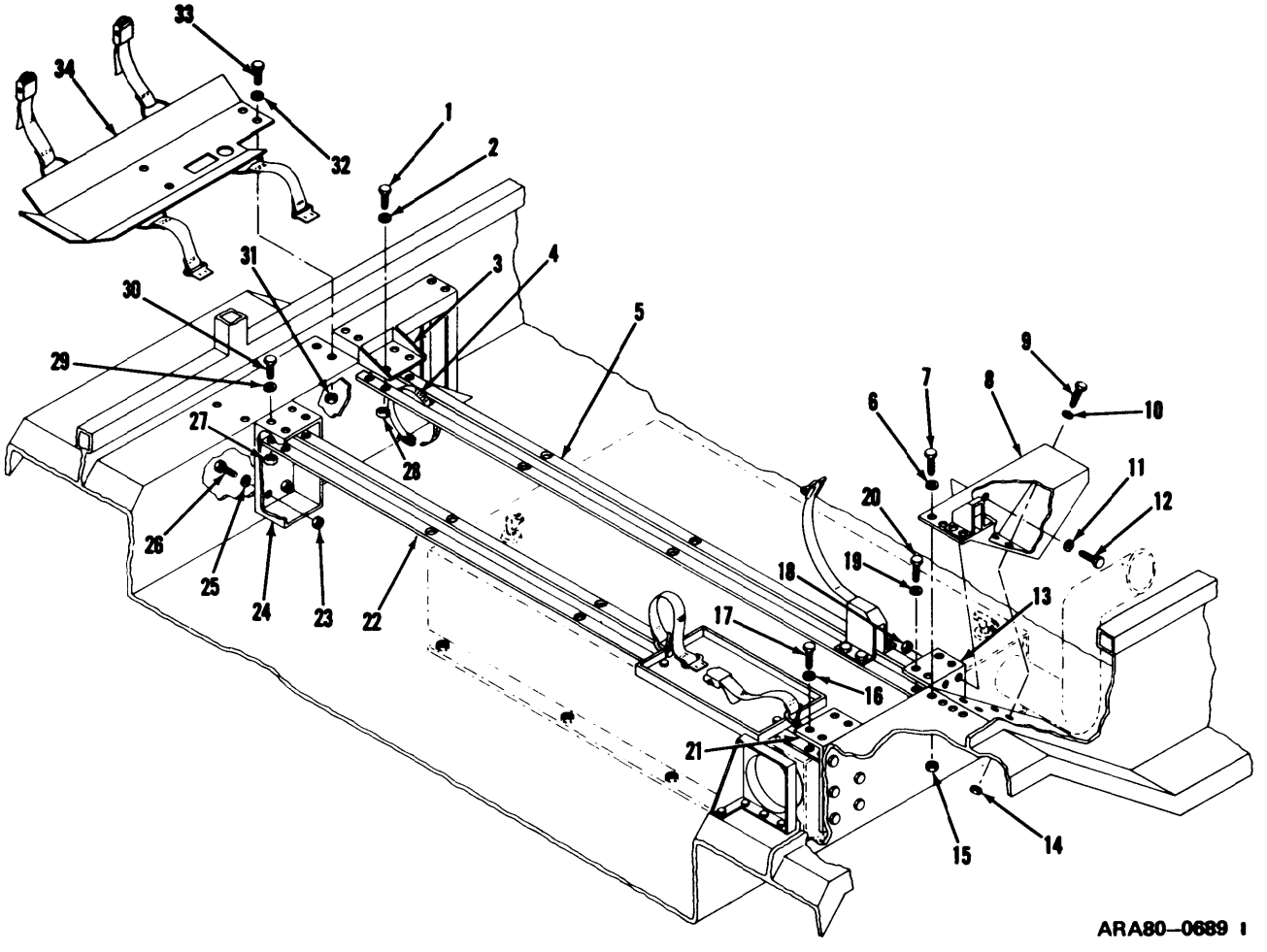

| | | | |
|---|---|---|---|
| 1 | Elbow | 7 | Drain valve |
| 1.1 | Coupling nut | 8 | Ground wire |
| 2 | Copper tube | 9 | Lockwasher |
| 3 | Fuel quantity transmitter | 10 | Screw |
| 4 | Elbow | 11 | Fuel tank |
| 5 | Tee | 12 | Bolt |
| 6 | Elbow | 13 | Washer |

*Figure 2-32. Fuel tank removal and installation, exploded view.*




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Clamp | 12 | Washer | 22 | Throttle cable | 32 | Screw |
| 2 | Hose | 13 | RFI filter | 23 | Washer | 33 | Chain |
| 3 | Hose | 14 | Plug connector | 24 | Clamp | 34 | Fuel tank cap |
| 4 | Clamp | 15 | Locknut | 25 | Lockwasher | 35 | Plug connector |
| 5 | Locknut | 16 | Receptacle connector | 26 | Screw | 36 | Shield |
| 6 | Clamp | 17 | Fuel line | 27 | Hose | 37 | Screw |
| 7 | Clamp | 18 | Stud | 28 | Clamp | 38 | Screw |
| 8 | Washer | 19 | Crankcase vent | 29 | Air cleaner | 39 | Rail section |
| 9 | Screw | 20 | Air cleaner elbow | 30 | Clamp | 40 | Catch |
| 10 | Plug connector | 21 | Air cleaner head | 31 | Cable clamping collar | 41 | Safety shield |
| 11 | Screw | | | | | | |

*Figure 2-32.1. Fuel tank removal and installation, exploded view.*




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | Screw | 10 | Washer | 19 | Washer | 27 | Locknut |
| 2 | Washer | 11 | Washer | 20 | Screw | 28 | Locknut |
| 3 | Support | 12 | Screw | 21 | Support | 29 | Washer |
| 4 | Clamp | 13 | Support | 22 | Support | 30 | Screw |
| 5 | Support | 14 | Locknut | 23 | Locknut | 31 | Locknut |
| 6 | Washer | 15 | Locknut | 24 | Support | 32 | Washer |
| 7 | Screw | 16 | Washer | 25 | Washer | 33 | Screw |
| 8 | Support | 17 | Screw | 26 | Screw | 34 | Duct support |
| 9 | Screw | 18 | Locknut | | | | |

*Figure 2-32.2. Fuel tank removal and installation, exploded view.*

*b. Cleaning & Inspection.*

**WARNING**

Do not permit gas-particulate filters to become wet as filters will become inoperable.

(1) Wipe outer surface of serviceable removed parts with a slightly damp rag (12, table 2-1).

(2) Inspect all rubber components for deterioration, rips, and tears. Replace unserviceable parts.

(3) Inspect clamps and fasteners for bends, breaks, or inoperability. Replace unserviceable parts.

(4) Inspect all metal parts for cracks or warping. Replace unserviceable parts.

(5) Inspect threads for stripping. Replace if unserviceable.

**(6)** Inspect copper tubing for kinks, dents, and cracks. Replace if unserviceable.

(7) Inspect grommet on heater fuel line for cracks. Replace if unserviceable.

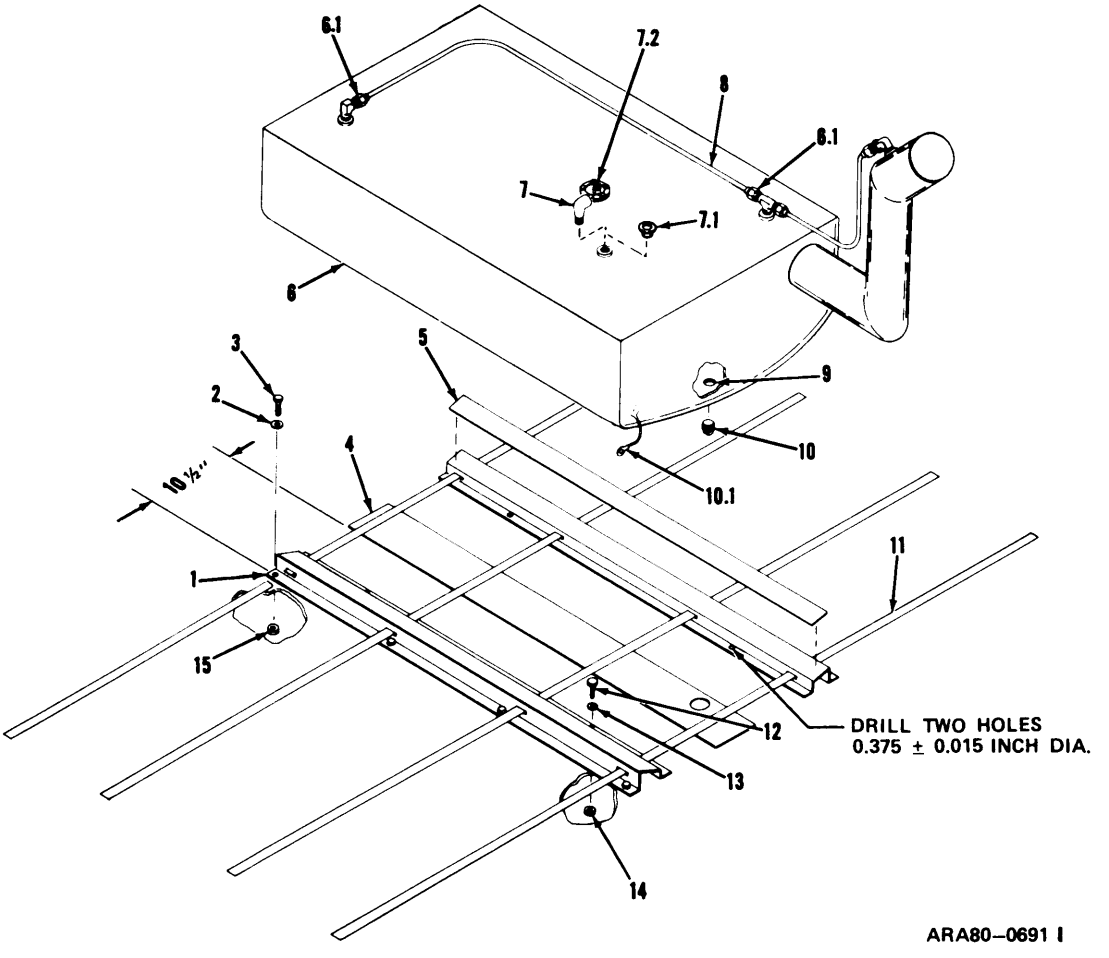
*c. Installation of Steel Fuel Tank.*

**WARNING**

When using adhesive or cleaning solvent, keep open flame away from working area. Have working area well ventilated, DEATH, or severe burns may result if personnel fail to observe safety precautions.

(1) Remove all dirt and foreign matter from trailer bed.

(2) Using existing holes in trailer bed, aline two fuel tank supports (1, fig. 2-32.3) and secure with eight bolts (3), washers (2), and locknuts (15). Wrench tighten.




| | | | |
|---|---|---|---|
| 1 | Support | 8 | Copper tube |
| 2 | Washer | 9 | Drain valve hole |
| 3 | Bolt | 10 | Plug |
| 4 | Runner pad | 10.1 | Ground wire |
| 5 | Rubber strip | 11 | Straps |
| 6 | Fuel tank | 12 | Bolt |
| 6.1 | Coupling nut | 13 | Washers |
| 7 | Elbow | 14 | Locknuts |
| 7.1 | Plug | 15 | Locknuts |
| 7.2 | Fuel quantity transmitter | | |

*Figure 2-32.3. Fuel tank removal and installation, exploded view.*

(3) Center punch and drill four holes (0.375 ± 0.015 inch dia) in trailer body to match holes in supports (1).

(4) Install four bolts (12), washers (13), and locknuts (14) in holes drilled in step (3) above. Wrench tighten.

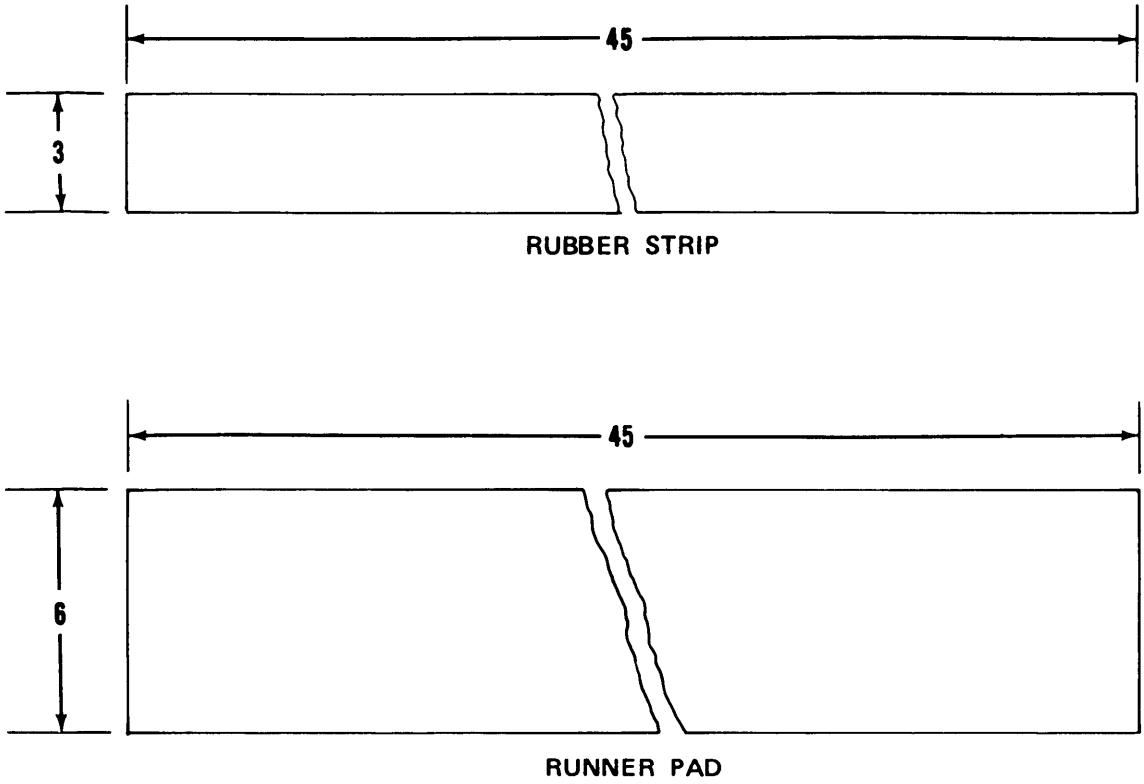



Figure 2-33. Fabrication of Runner Pad and Rubber Strips.

(5) Fabricate runner pad tank supports (fig. 2-33).

(6) Locate runner pad (4, fig. 2-32.3) and cut a hole in pad to match drain valve hole in the trailer body.

(7) Clean trailer body for runner pad with cleaning compound solvent (4, table 2-1 ). Let cleaning compound dry.

(8) Apply adhesive (2, table 2-1) to bottom of runner pad (4).

(9) Place runner pad in position and press down firmly. Permit adhesive to dry for approximately 15 minutes.

(10) Remove plugs (7.1 and 10, fig. 2-32.3) from new fuel tank. Discard plugs.

(11) Unscrew two coupling nuts (6.1). Remove copper tube line (8).

(12) Wrap pipe threads of elbow (7) with antiseize tape (7, table 2-1). Install elbow in fuel tank (6) Tighten until open end of elbow faces toward fuel quantity transmitter (7.2).

(13) Cut four steel straps (11) in seven foot lengths.

(14) Insert four steel straps (11) through slots in fuel tank supports (l). Midpoint of the strap should be located approximately at the center of runner pad (4).

**NOTE**

Be sure electrical cables and throttle cable are not caught under the replacement tank.

(15) With three people, place new fuel tank (6) on tank supports (1).

**NOTE**

Be sure ground wire (10.1) is not caught between fuel tank (6) and supports (l).

(16) Aline fuel tank by centering drain valve hole 9) with hole in bottom of trailer.

(17) Remove fuel tank cap (34, fig. 2-32.1) from new fuel tank.

(18) Install shield (36) and secure with three screws ***(38).*** Tighten screws.

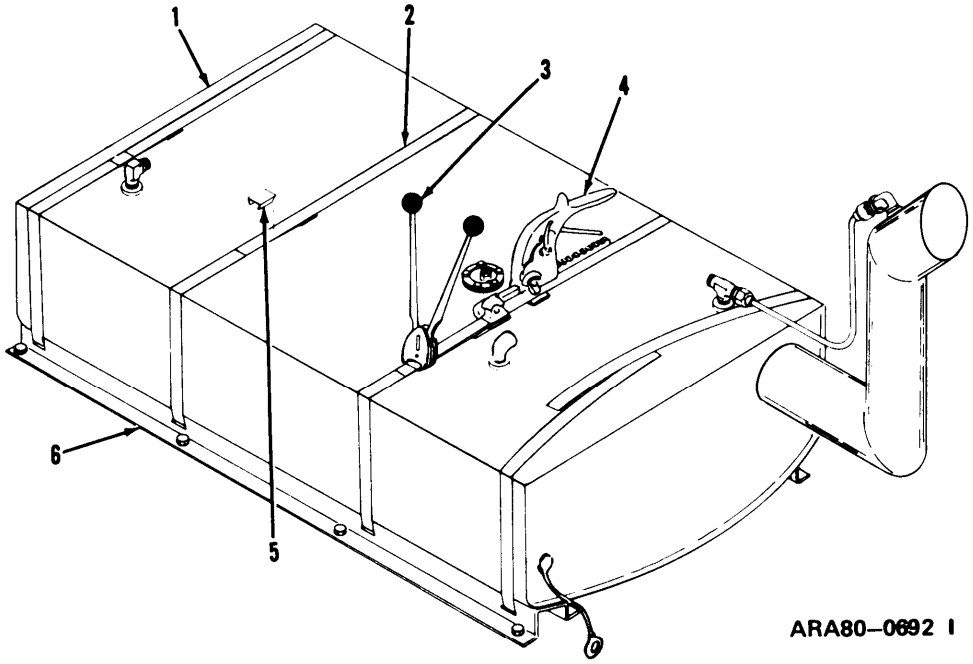
(19) Aline fuel tank neck in opening of shield. Re check position of fuel tank drain valve hole.

(20) Install fuel tank cap (34) on fuel tank neck, Attach cap chain (33) to shield (36) with screw (37) Tighten screw.

CAUTION

Be sure electrical cables are free of banding straps.

(21) Bend four straps (2, fig. 2-33. 1) across the top of the fuel tank (l).




| | | | |
|---|---|---|---|
| 1 | Fuel tank | 4 | Stretcher |
| 2 | Straps | 5 | Strap seals |
| 3 | Sealer | 6 | Supports |

***Figure 2-33.1. Fuel tank removal and installation, exploded view.***

**CAUTION**

The four straps should be tightened to a point where tank cannot move on the supports. Do not tighten to a point where tank will be crushed.

(22) Using instructions furnished with strapping and sealing kit, tighten each steel strap with stretcher 4). Install strap seal (5) with sealer (3).

(23) Break off top end of strap (2) at edge of seal 5) by bending.

(24) Secure ground wire (8, fig. 2-32) with screw 10) and washer (9).

(25) Position support (8, fig. 2-32.2). Install crew (12), washer (11), and locknut (18). Do not tighten.

(26) Install four screws (7), washers (6), locknuts 15), screws (9), washers (10), and locknuts (14). Wrench tighten.

(27) Wrench tighten screw (12).

(28) Install shield (fig. 2-30) with four screws.

(29) Install air duct (18, fig. 2-43). Secure with four screws (16) and washers (15). Tighten screws.

**NOTE**

Be sure throttle cable is under supports, and that electrical cables are not above supports.

(30) Slide end of support (22, fig. 2-32.2) under Support (21). Slide support (24) on other end of support (22) and position into trailer.

**CAUTION**

Be sure heads of securing hardware are installed on wheel side. Protruding threads of securing hardware, holding support to wheel well, damages tires while in transit.

(31) Secure support (24) with four screws (26), washers (25), and locknuts (23). Wrench tighten.

(32) Secure support (22), to support (24) with four

screws (30), washers (29), and locknuts (27). Wrench tighten.

(33) Secure other end of support (22) to support 21) with four screws (17) and washers (16). Wrench tighten.

(34) Slide end support (5) under support (13).

(35) Place other end of support (5) under support 3).

(36) Secure support (5) to support (13) with four crews (20) and washers (19). Wrench tighten.

(37) Secure other end of support (5) to support (3) with four screws (l), washers (2), and locknuts (28). Wrench tighten.

(38) Place clamp (4) around air duct (18, fig. 2-43). Tighten clamp.

(39) Connect plug connector (35, fig. 2-32. 1).

(40) Remove screw (3, fig. 2-3 1) and lockwasher 4). Secure throttle cable clamp (2) to transmitter (5) with screw (3) and lockwasher (4). Tighten screw.

(41) Remove nut (6) and lockwasher (6.1). Place wire lead (7) on stud (7.1) and secure with lockwasher 6.1) and nut (6). Tighten nut.

(42) Place RFI filter (13, fig. 2-32.1) in position and secure with four screws (11), washers (12), locknuts 15), and clamp (6).

(43) Connect plug connector (14) to receptacle connector (16).

(44) Install copper tube (2, fig. 2-32) to elbow (1) and tee (5). Tighten two coupling nuts (1.1).

(45) Place copper tube clamp (fig. 2-30) in posiion. If hole in clamp and support are not alined, drill new hole 0.193 ± .015 inch dia in support.

(46) Secure air vent line to support with clamp, crew, washer and locknut. Tighten screw.

(47) Install fuel pump (16, fig. 2-29) with one crew (4), washer (3), locknut (l), screw (14), and washer (15). Tighten screws.

(48) Install clamp (7) on RFI filter (6).

(49) Place washer (8), ground wire (7.1) on screw 9). Secure clamp (7) to heater cabinet wall with screw 9), tighten screw.

(50) Install heater fuel line and grommet (fig. 2-30).

(51 ) Install fuel filter and remaining fuel lines and clamp in position. During installation of fuel line (Tank of pump), aline elbow (4, fig. 2–32) to match fuel line. tighten all connections.

(52) Connect plug connector (10, fig. 2-32. 1) to RFI filter (13).

(53) Secure clamp (7) with screw (9), washer (8), and locknut (5).

(54) Secure electrical cables to fuel lines with electrical tie down straps (20, table 2-1).

(55) Install hose (20, fig. 2-43) and secure by tightening clamps (19) and (21).

**CAUTION**

When positioning lower enclosure be sure electrical cables and wires are clear of area.

(56) Position lower enclosure (16, fig. 2-28) assembled on supports (5 and 22, fig. 2-32.2).

(57) Swing enclosure (3, fig. 2-28) upward.

(58) Aline holes in lower enclosure (16) with matching holes in supports. Secure with 12 screws (8) and washers (9). Tighten screws.

(59) Install particulate filter (7) with gasket (19.1) facing toward lower enclosure (16).

(60) Install gas filter (6) on top of particulate filter (7) with arrow pointing upward.

(61) Lower upper enclosure (3) and secure with two fasteners (12) and two fasteners (18).

(62) Install hose (2, fig. 2-32.1) and secure by tightening clamp (1).

(63) Install hose (3) and secure by tightening clamp (4).

(64) Install hose (14, fig. 2-28) and secure by tightening clamp (15).

(65) Install safety shield (41, fig. 2-32.1) and secure with catch (40).

(66) Wrap threads of drain valve (7, fig. 2-32) with antiseize tape (7, table 2-1) and install in fuel tank (11). Close drain valve by turning clockwise.

(67) Install duct support (34, fig. 2-32.2) and secure with four screws (33), washers (32), and locknuts (31). Tighten screws.

(68) Place throttle cable wire through hole in stud (18, fig. 2-32.1). Slide cable clamping collar (31) on throttle wire up to stud (18) and tighten screw (32).

(69) Install clamp (24) in throttle cable (22).

(70) Lift air cleaner head (21) to expose threaded hole. Secure clamp (24) to engine with washer (23), lockwasher (25), and screw (26).

(71) Install air cleaner elbow (20) on crankcase vent (19).

(72) Position air cleaner head (21) and secure with two clamps (30).

(73) Install hose (27) on air cleaner (29). Tighten clamp (28).

(74) Position rail section (39) and press down.

(75) Connect negative battery cable (5, fig 2-31.1).

(76) Position battery cover (2) and secure with two fasteners (4). Close baffle (l).

(77) Apply sealant (5, table 2-1) around fuel tank filler neck on back of shield (36, fig. 2-32.1).

(78) Be sure drain valve is closed.

**WARNING**

**HIGHLY FLAMMABLE MATERIAL**

When filling fuel tank, keep open flame away from working area, DEATH, or severe burns may result if personnel fail to observe proper safety precautions.

(79) Remove fuel tank cap (34). Add approximately two gallons of gasoline (18 or 19, table 2-1) and replace cap.

**WARNING**

When operating the gasoline engine indoors,

insure that proper ventilation is provided.

Carbon monoxide can cause DEATH.

(80) Start up engine (para. 2-83.3a). Inspect for fuel leaks. If leaks are found, tighten fittings or replace as required.

(81) Shut down engine (para. 2-83 .3 b).

(82) Replace heater access cover (3, fig. 2-34) on heater cabinet and lock down with four latches (2).

(83) Disconnect ground wire and place in trailer.

(84) Coat underside of trailer and wheel wells where undercoating was removed, with bituminous solvent coating compound (8, table 2– 1).

(85) Touch-up paint as required (para 2-174).

(86) Raise trailer rear mounted support leg, and release brakes (TM 9-2330-213-14).

### 2-83.1. Steel Fuel Tank

*a. Removal.*

(1) Perform steps 2-83a (1 through 43) and (45 through 47).

(2) Cut and remove four steel straps (2, fig. 2-33.1).

**NOTE**

Be sure electrical cables and throttle cable do not catch on protruding fittings when removing fuel tank.

(3) With three people, slide fuel tank to clear supports (13 and 21, fig. 2-32.2). Lift fuel tank up by filler neck to clear trailer side. Remove fuel tank from trailer.

(4) Remove elbow (4, fig. 2-32) from fuel tank 11).

*b. Cleaning and Inspection.*

(1) Refer to para 2-83.b for cleaning and inspecion of removed items.

(2) Inspect rubber pads (4 and 5, fig. 2-32.3) for deterioration. Replace unserviceable parts (para 2-83.2.b(1)(b)).

(3) Inspect supports for cracks and looseness. Replace cracked supports (para 2-83.2.a(1)(b)). Tighten loose securing hardware.

*c. Installation.* For installation of steel tank refer to (para. 2-83c) steps (10 through 86).

### 2-83.2. Fuel Tank Supports and Pads.

*a. Fuel Tank Supports.*

(1) Removal.

(a) Remove fuel tank (para 2-83.1a) steps (1 through 3).

(b) Remove four locknuts (15, fig. 2-32.3), bolts (3), and washers (2).

(c) Remove two locknuts (14), bolts (12), and washers (13). Remove supports (1).

(2) Installation.

(a) Position new support (1).

(b) Secure with four bolts (3), washers (2), locknuts (15), two bolts (12), washers (13), and locknuts (14).

(c) Cut four steel straps (11) into seven foot lengths.

(d) Insert four steel straps (11) through slots in fuel tank supports (1). Midpoint of the straps should be located approximately at center of the runner pad (4).

**NOTE**

Be sure electrical cables and throttle cable are not caught under the replacement tank.

(e) With three people, place the fuel tank (6) in its place on the tank supports (1).

**NOTE**

Be sure ground wire is not caught between fuel tank and support.

(f) Aline the fuel tank by centering the drain valve hole (9) with hole in bottom of the trailer.

(g) perform steps (18 through 86) para 2-83c.

b. Rubber Strips and Runner Pad.

(1) Removal.

(a) Remove fuel tank (para 2-83.1a), steps (1 through 3).

(b) Remove unserviceable rubber strips and runner pad (5).

(c) Remove dried adhesive from metal surface using cleaning compound solvent (4, table 2-1).

(2) Manufacture. Fabricated new rubber strip(s) or runner pad (fig. 2-33).

(3) Installation.

(a) Apply adhesive (2, table 2-1) to metal surface where pad or strip will be positioned.

(b) Position pad or strip and press down firmly. Permit adhesive to dry for approximately 15 minutes before installing fuel tank.

(c) Cut hole in runner pad to match drain valve hole in trailer body.

(d) Cut four steel straps (11, fig. 2-32.3) into seven foot lengths.

(e) Insert four steel straps (11) through slots in fuel tank supports (l). Midpoint of the strap should be located approximately at center of the runner pad (4).

**NOTE**

Be sure electrical cable and throttle cable are not caught under the replacement tank.

(f) With three people, place fuel tank (6) or tank supports (1).

**NOTE**

Be sure ground wire (10.1) is not caught between fuel tank (6) and support (l).

(g) Aline fuel tank by centering drain valve hole (9) with hole in bottom of the trailer.

(h) Perform steps (18 through 86) para 2-83c.

### 2-83.3. Engine Startup and Shutdown Pro cedure

a. Engine Startup.

**WARNING**

Be sure that trailer grounding wire is attached to a suitable ground or anchor prior to starting gasoline engine.

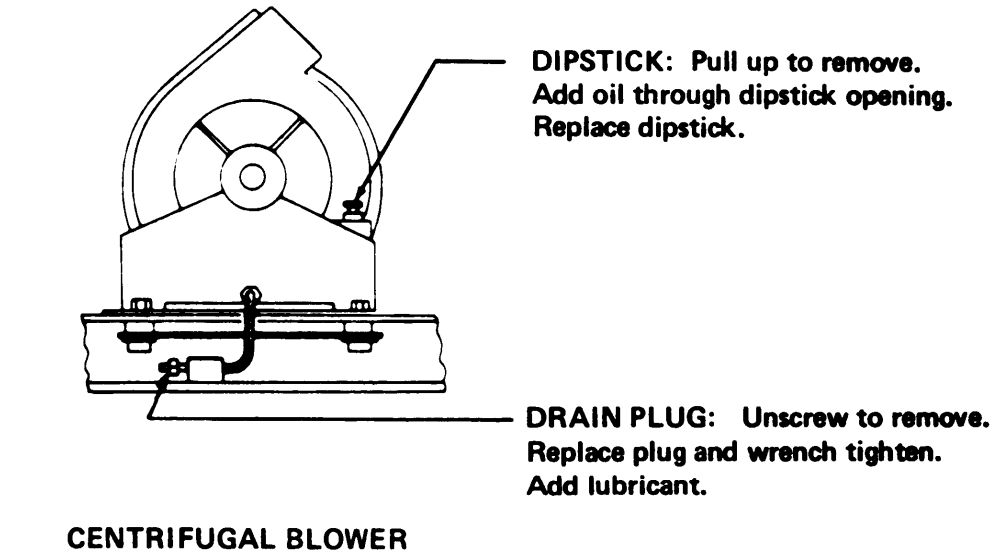
**CAUTION**

Insure that blower and generator drive belts are not obstructed and can operate freely.

(1) Release catch (40, fig. 2-32.1) and remove safety shield (41 ).

(2) Remove any debris or foreign object that may hinder operation of belts.

(3) Remove centrifugal blower dip stick (fig. 2-33.2) and check oil level. Maintain oil level at full mark. If necessary, add hydraulic lubrication oil (item 16, table 2-l).



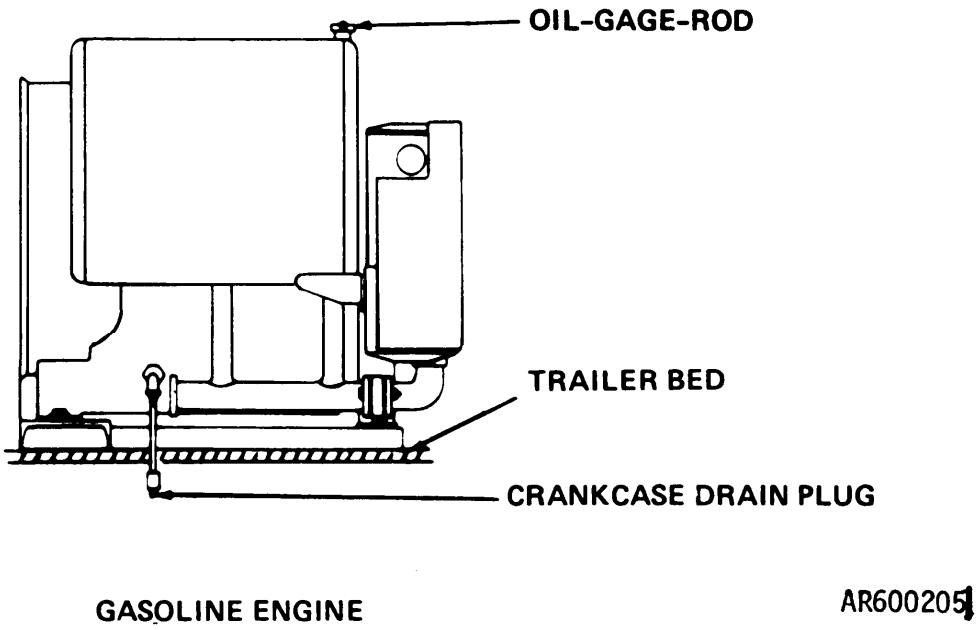




*Figure 2-33.2. Centrifugal blower and gasoline engine lubrication.*

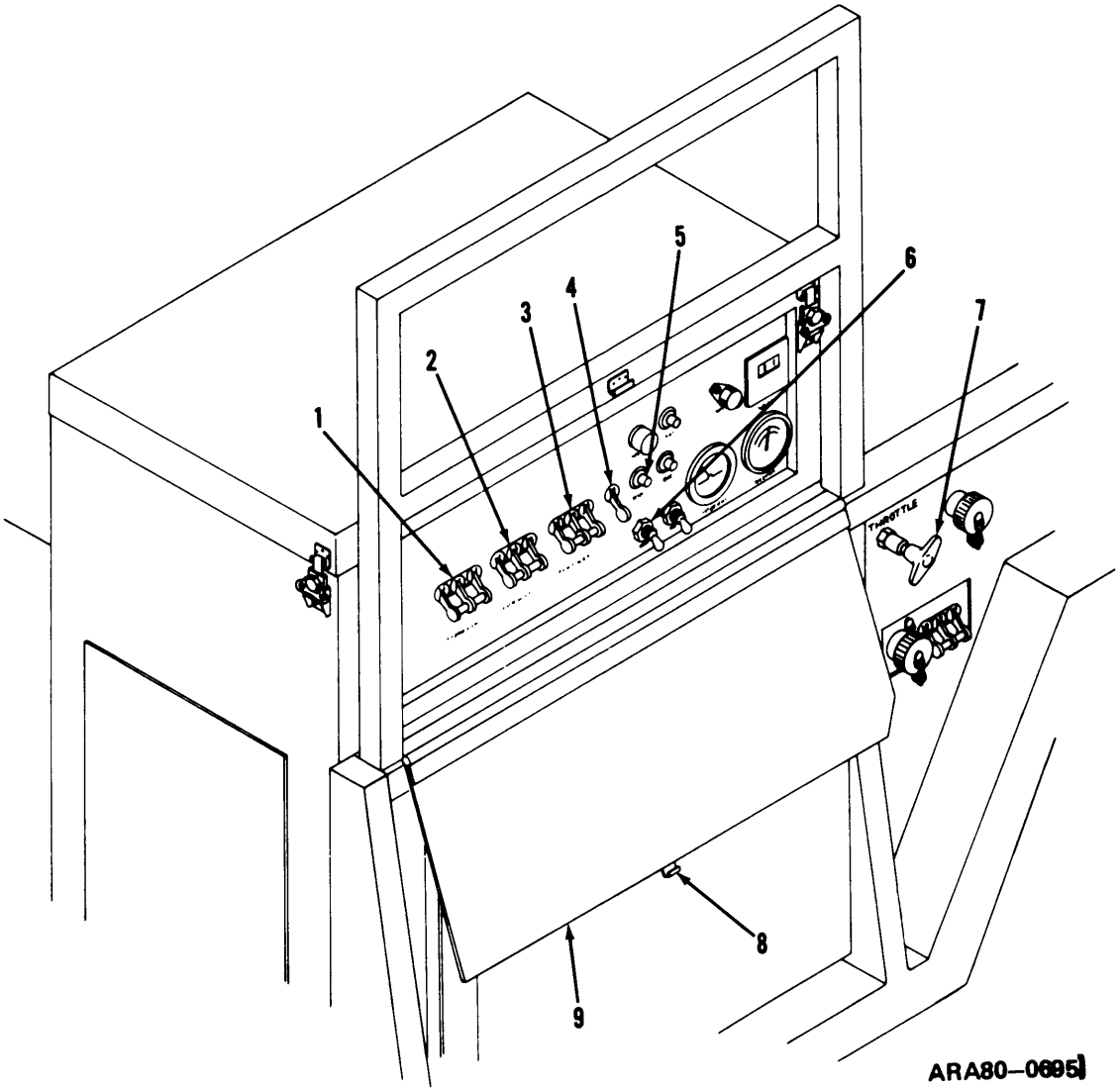
(4) Insure that immediate area around gasoline engine is clear of debris, especially area near fly wheel, manifold, and muffler.

(5) Remove engine-crankcase-oil-gage-rod and check oil level. Maintain oil level at full mark.

(6) Add oil as required (LO5-2805-259-12).

(7) Install safety shield (41, fig. 2-32.1) and secure with catch (40).

(8) Release catch (8, fig. 2-33.3) and open access door (9).




1 DC power supply circuit breaker
2 Condenser fan circuit breaker
3 Recirculation and entrance fan circuit breaker
4 Auxiliary 120 VAC circuit breaker
5 Engine start switch
6 Engine control switch
7 Engine throttle
8 Catch
9 Access door

*Figure 2-33.3. Main control panel.*

(9) Be sure that circuit breakers (1, 2, 3, 4) are in OFF position.

(10) Position engine control switch (6) to ON.

(11) Be sure engine throttle (7) is fully in before starting engine.

**CAUTION**

Do not depress ENGINE START switch for more than 15 seconds. If engine fails to start after two 15-second attempts, allow starter to cool off for 5 minutes before next attempt. Failure to comply may result in damage to starter or loss of battery charge.

(12) Depress ENGINE START switch (5).

(13) If engine fails to start after two attempts, use engine choke (TM 5-2805-259-14). If necessary, apply engine primer fuel (17, table 2–1) to engine carburetor.

(14) After engine starts, pull out engine throttle (7) until idle speed is obtained. Turn clockwise (CW) to lock in idle position.

b. Engine Shutdown.

(1) Turn engine throttle (7, fig. 2-33.3) counterclockwise (CCW) and push in.

(2) Set ENGINE CONTROL switch (6), to OFF.

(3) If engine fails to stop, pull out choke (TM 5-2805-259-14).

(4) Close door (9) and lock with catch (8).

## Section XIV. SPACE HEATER

### 2-84. Space Heater

Direct support maintenance personnel are authorized to troubleshoot, disassemble, clean, inspect, repair, reassemble and test the space heater and its attaching hardware.

### 2-85. Troubleshooting

*a.* This paragraph contains troubleshooting or malfunction information and tests for locating and correcting most of the troubles which may develop in the space heater. Each malfunction or trouble symptom for an individual component unit is followed by a list of probable causes and suggested corrective actions for you to remedy the malfunction.

*b.* This manual cannot list all possible malfunctions that may occur or all corrective actions. If a malfunction is not listed (except when malfunction and cause are obvious), or is not corrected by listed corrective actions, you should notify higher echelon maintenance.

c. Table 2-6 lists the common malfunctions that you may find during the operation or maintenance of the space heater or its components. You should perform the tests and corrective actions in the order listed.

**NOTE**

Before troubleshooting or testing, always check the voltage supply to the heater and make sure fuel is available at the rated pressure.

*Table 2-6. Space Heater, Troubleshooting.*

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
|---|
| 1. HEATER WILL NOT START, BLOWER DOES NOT RUN |
| *Step 1.* Test for defective wiring or relay (10, fig. 2-26), (para 2-65*a*).<br>Repair wiring or replace relay (para 2-65*c*), if defective. |
| *Step 2.* Test for defective blower (33, fig. 2-35), (para 2-92*d*).<br>Replace blower (para 2-88*i*), if defective. |
| *Step 3.* **Deleted.** |
| *Step 4.* Test and inspect heating thermostat (3, fig. 2-35), (para 2-95).<br>Adjust or replace thermostat (para 2-96, 2-97). |
| 2. BLOWER RUNS WHEN SWITCH IS IN HI OR LOW POSITION BUT HEATER WILL NOT IGNITE |
| *Step 1.* Inspect for proper fuel flow (para 2-93). Test fuel control valve (para 2-92*e*).<br>Replace valve (para 2-88*f*), if defective. |
| *Step 2.* **Deleted.** |
| *Step 3.* Test for defective overheat switch (20, fig. 2-35) (para 2-92*b*).<br>Replace switch (para 2-88*h*), if defective. |
| *Step 4.* Test for defective control module (22, fig. 2-35), (para 2-92*f*).<br>Replace control module (para 2-88*g*), if defective. |
| *Step 5.* Test for defective preheat resistor (45, fig. 2-35), (para 2-88*e*).<br>Replace resistor (para 2-88*e*), if defective. |
| *Step 6.* Test for defective fuel control valve (14, fig. 2-35), (para 2-92*e*).<br>Replace valve (para 2-88*f*), if defective. |
| 3. BLOWER RUNS WHEN SWITCH IS IN HI OR LOW POSITION AND HEATER IGNITES BUT GOES OUT AFTER SHORT INTERVAL |
| *Step 1.* **Deleted.** |
| *Step 2.* Inspect for restriction in blower vent airflow.<br>Remove restriction, if any. |
| *Step 3.* Test for defective overheat switch (20, fig. 2-35), (para 2-92*b*).<br>Replace switch (para 2-88*h*), if defective. |
| *Step 4.* Inspect for defective time delay relay (fig. 2-24), (para 2-60).<br>Replace relay (para 2-60, if defective. |
| 4. HEATER OVERHEATS AND STOPS BURNING |
| *Step 1.* Inspect for restriction in blower air vent.<br>Remove restriction, if any. |
| *Step 2.* Test for defective fuel control valve (14, fig. 2-35), (para 2-92*e*).<br>Replace valve (para 2-88*f*), if defective. |

*Table 2-6. Space Heater, Troubleshooting – Continued*

| MALFUNCTION<br>TEST OR INSPECTION<br>CORRECTIVE ACTION |
|---|
| 5. HEATER OVERHEATS AND STOPS BURNING<br>See MALFUNCTION 2, step 3. |
| 6. HEAT OUTPUT TOO LOW<br>*Step 1.* Inspect for low fuel pressure.<br>Clean fuel system.<br>*Step 2.* Inspect auxiliary control indicator for proper heat setting.<br>If switch is on LO, switch to HI.<br>*Step 3.* See MALFUNCTION 4, step 2. |
| 7. HEATER SMOKES EXCESSIVELY OR "BANGS" UPON STARTING<br>*Step 1.* Inspect for fuel control valve leaks.<br>Replace valve (para 2-92*e*), if leaking.<br>**NOTE**<br>If ignition is delayed, the exhaust may be smoky immediately after ignition but should clear up within a few minutes of operation. |
| 8. ODOR OF GASOLINE IN VENTILATING AIR STREAM<br>*Step 1.* Inspect for leaking fuel connections at fuel tubes (46, 47, fig. 2-35), (para 2-88*j*) or connections at fuel control valve (14, fig. 2-35).<br>Tighten fuel connections. |

## 2-86. Shutdown Procedures

For shutdown procedures refer to TM 3-4240-264-12. The following WARNINGS should be strictly observed.

**WARNINGS**

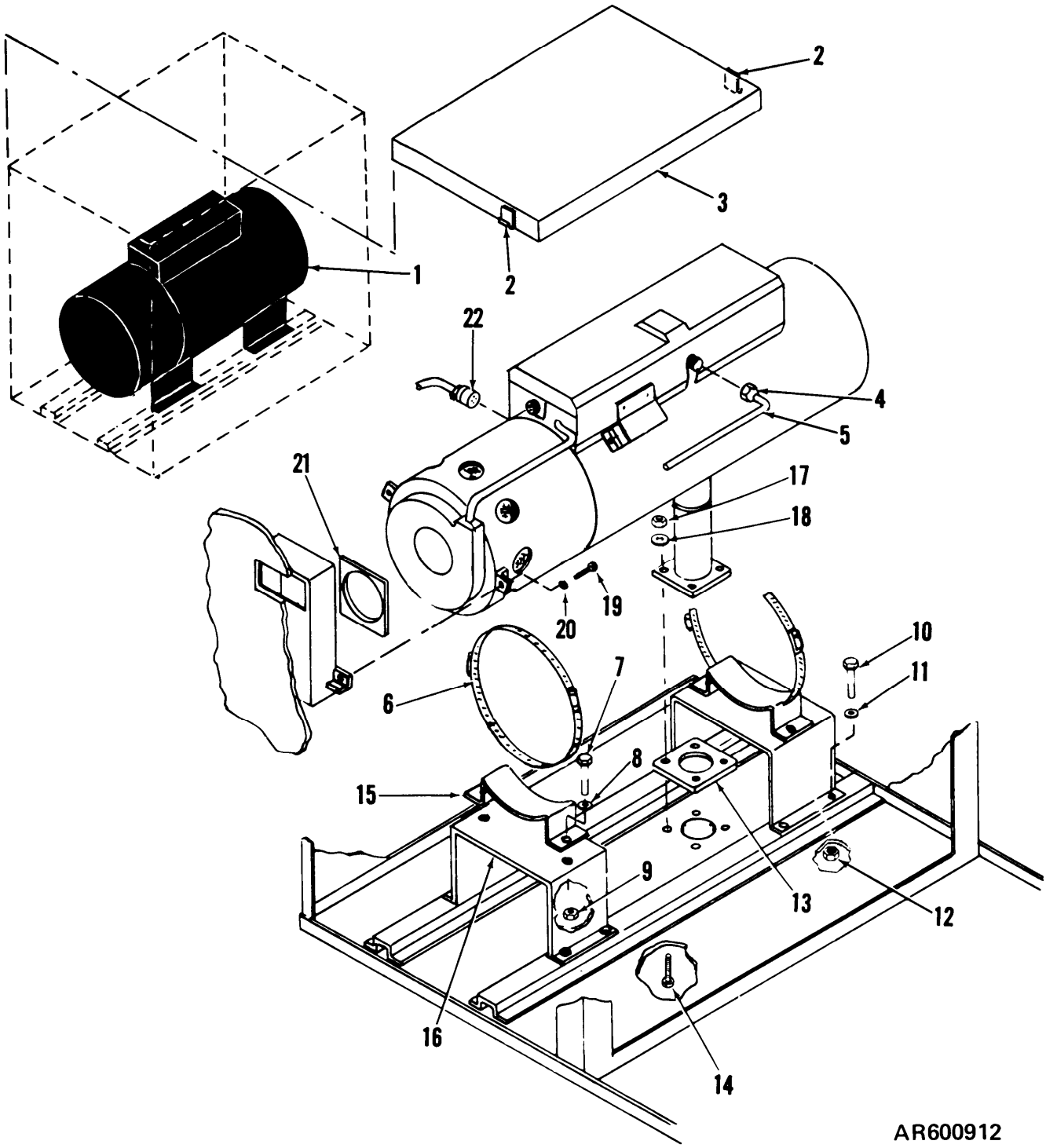
To prevent injury to personnel, if system has been operating in heating mode, do not proceed with servicing operations until heater blower shuts down and heater is cool enough to handle.

To prevent explosion or flashfire, be sure system is inoperative and heater has not been operating for approximately 10 minutes before attempting to remove heater or replace any component.

To prevent explosion or flashfire, the gas and particulate filters must be replaced if gasoline leakage has occurred during heater system operation.

## 2-87. Removal

Remove space heater (1, fig. 2-34) as follows:




| | | | |
|---|---|---|---|
| 1 Heater | 7 Screw | 12 Nut | 17 Nut |
| 2 Latch | 8 Washer | 13 Gasket | 18 Washer |
| 3 Access cover | 9 Nut | 14 Screw | 19 Screw |
| 4 Connector | 10 Screw | 15 Saddle | 20 Washer |
| 5 Tubing | 11 Washer | 16 Bracket | 21 Gasket |
| 6 Clamp | | | 22 Receptacle connector |

*Figure* 2-34. *Heater removal.*

*a.* Release latches (2) and remove access cover (3).

*b.* Disconnect electrical connector (22 ).

c. Disconnect connector and fuel tube (4, 5).

**WARNING**

Be careful to avoid spilling gasoline when disconnecting fuel tube. Keep open flame away from working area. DEATH or severe burns may result if personnel fail to observe these safety precautions.

*d.* Remove four screws (14), nuts (17), and washers (18) securing heater exhaust to trailer floor.

*e.* Remove two screws (19), and washers (20) securing heater to heater cabinet.

*f.* Loosen screw of hose clamp (6) until it can be disengaged from threads, pull clamp out of the slots in saddle (15).

*g.* Remove heater (1).

**NOTE**

When removing heater, be careful not to damage cabinet insulation or evaporator coil.

*h.* Remove gaskets (13 and 21, fig. 2-34). Gaskets may stick to trailer floor or cabinet. Replace gasket, if necessary.

*i.* Heater mounting brackets may be removed as follows:

(1) Saddle bracket ( 15) is secured with two screws (7), washers (8), and nuts (9).

(2) Bracket ( 16) is secured with four screws (10), washers (11), and nuts (12).

*j.* Installation is the reverse of removal.

## 2-88. Disassembly

*a.* Remove guard assembly (2, fig. 2-35) by loosening screw (1).

Legend for fig. 2-35:

1 Screw
2 Guard assembly
3 Screw
4 "U" nut
5 Bracket
6 Wiring harness
7 Screw
8 Switch, flame detector
9 Fitting
10 Tube
11 Screw
12 Screw
13 Connector
14 Valve, fuel control
15 Terminal
16 Screw
17 Screw
18 Electrical lead
19 Washer
20 Switch, overheat
21 Screw
22 Control module
23 Screw
24 Plate, name
25 Screw
27 Screw
28 Bracket
29 Heat exchanger
30 Elbow
31 Gasket
32 Adapter, front half
33 Blower
34 Electrical lead
35 Elbow
36 Screw
37 Tube and bracket assembly
38 Screw
39 Screw
40 Ground terminal
41 Sleeve, compression
42 Bushing, compression
43 Igniter
44 Nut
45 Resistor
46 Tube
47 Tube
48 Tube
49 Tube
50 Elbow
51 Bracket

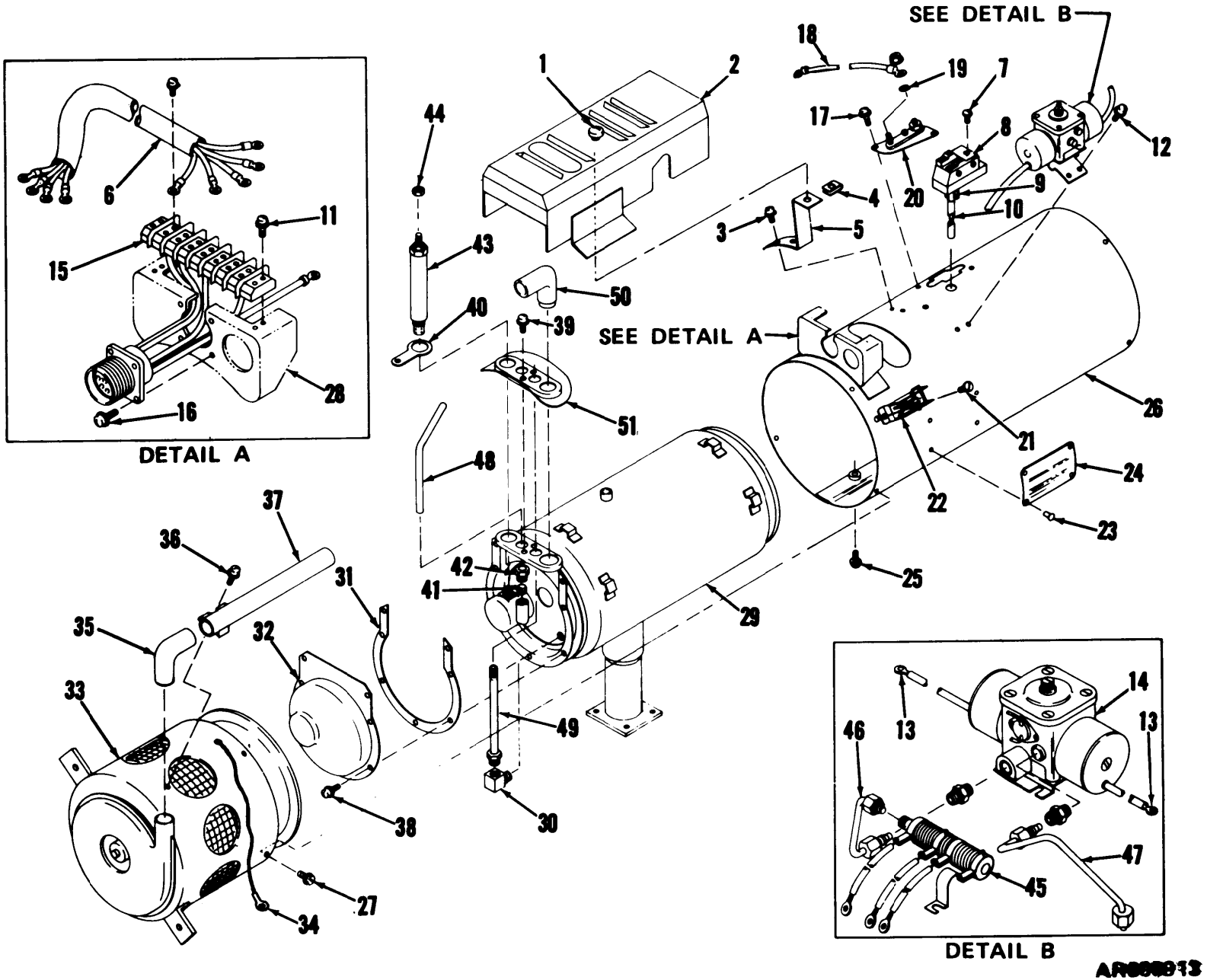



*Figure 2-35. Heater components.*

b. Remove "U" nut (4), screw (3), and guard assembly bracket (5).

*Figure 2-36. Deleted.*

*c.* This procedure deleted.

*d.* This procedure deleted.

*e.* Remove preheat resistor as follows:

(1) Disconnect primary fuel tube (47) from outlet of fuel control valve (14) and inlet of primary fuel tube (48).

(2) Tag and disconnect resistor leads (45, fig. 2-35) from terminals 4,7, and 8 of the terminal strip (15).

(3) Slide resistor (45) off fuel tube (47).

(4) Replacement is the reverse of removal.

*f.* Remove fuel control valve as follows:

(1) Discomect and remove secondary fuel tube (46, fig. 2-35) that connects the fuel control valve (14) to the secondary tube (49).

(2) Disconnect two fuel valve solenoid leads (13) from terminal No. 5 of terminal strip (15) and terminal No. 30 of the overheat switch (20).

(3) Remove the three mounting screws (12) which attach the control valve (14) to heater housing (26) and lift off valve.

(4) If valve is defective, replace entire assembly. (See para 2-92e).

**CAUTION**

Fuel flow of the valve is adjusted at the factory; therefore, do not attempt to readjust the adjusting screw.

*g.* Remove control module as follows:

(1) Disconnect power supply to heater (22, fig. 2-34).

(2) Remove guard assembly (2, fig. 2-35).

(3) Tag and disconnect six wires leading to module (22).

(4) Remove two screws (21) attaching module to heater shell.

(5) Remove module.

(6) Replacement is the reverse of removal.

*h.* Remove overheat switch as follows: Identify, tag, and disconnect three leads from terminals of overheat switch (20, fig. 2-35) and remove two screws (17), and washers (19) from heater housing, lift off switch (20). Installation is the reverse of removal.

**CAUTION**

Overheat switch is equipped with adjusting screw which is sealed at factory. Screw should not be disturbed from its original setting since special equipment is required for calibration. Protect blade of switch after removal to prevent loss of calibration.

*i.* Remove blower as follows:

(1) Remove screw (36, fig. 2-35).

(2) Remove tube and bracket assembly (37), and elbow (35) from blower (33).

(3) Disconnect electrical lead (34) from terminal No. 6 of terminal strip (15).

(4) Remove clamp (6, fig. 2-34).

(5) Remove four screws (27, fig. 2-35) from blower housing.

(6) Pull entire blower assembly (33) off heater.

(7) Installation is the reverse of removal.

*j.* Remove fuel tubes as follows:

(1) Remove seven screws (38, fig. 2-35) from front half adapter (32).

(2) Remove front half adapter (32) and gasket (31).

(3) Remove primary fuel tube (48), compression bushing (42), and compression sleeve from heat exchanger (29). When threads are clear, lift tube out through opening in bracket (51).

(4) Remove secondary fuel tube (49) from elbow (30) in heat exchanger (29). When turning secondary fuel tube out of elbow, elbow must be held secure with 9/16" open end wrench to ensure elbow is not broken off heat exchanger. When threads are clear, lift fuel tube out through opening in bracket (51).

*k.* Remove heat exchanger as follows:

(1) Remove elbow (50) from heat exchanger.

(2) Remove heat exchanger (29) from housing (26) by removing four screws (25) from seam. Spread housing apart to permit heat exchanger to drop out.

**CAUTION**

To avoid permanent distortion of housing (26), do not spread seam any more than necessary to remove the heat exchanger (29).

(3) Installation is the reverse of removal.

*l.* Remove terminal board and electrical connector as follows:

(1) Identify, tag, and remove all electrical leads to terminal (15, fig. 2-35). Remove four screws (11). Remove terminal (15) from heater housing bracket (28).

(2) Remove four screws (16) from connector and remove connector from heater housing bracket (28).

(3) Installation is the reverse of removal.

## 2-89. Cleaning, Inspection, Repair, Assembly, and Adjustment

*a. Heat exchanger.*

(1) Inspect heat exchanger for possible damage or leaks. If heat exchanger is burned through, or shows evidence of cracks, it must be replaced.

(2) Scrape as much carbon out of igniter pocket as possible, using a sharp tool and blow out with compressed air.

*b. This procedure deleted.*

*c. Overheat switch.* Inspect switch for damage and clean contact by sliding a clean strip of bond paper between the points. Do not attempt to bend blade or contact armor change setting of adjusting screw. Replace switch if defective.

*d. Wiring.*

(1) Inspect all wiring insulation and tightness of connectors.

(2) Inspect terminal strip for cracks and condition of threaded inserts.

*e. Heater case.* Clean case inside and out and inspect for dents and roundness. Inspect condition of weld nut threads.

### 2-90. Reassembly

Reassembly of heater is reverse of disassembly with precautions and exceptions noted throughout disassembly procedures.

**2-91. Test equipment**

The following equipment is required to test the heater:

*a.* A source of 24 volts dc. The source of current must be capable of continuous operation without excessive change in voltage with variations in load. An ammeter and voltmeter must be provided to indicate the total current draw and applied voltage during the test.

*b.* A rack or cradle to support the heater and a means for disposing of exhaust gases. The rack or cradle should be a permanent fixture, if possible, so the heater can be removed and replaced with a minimum of effort. The exhaust fitting should be a part of the mounting fixture and the total length of the exhaust tubing should not be more than 10 feet.

*c.* A fuel tank and electric fuel pump to supply fuel under pressure. A gravity fuel system with a static head of at least six feet.

*d.* A flowmeter should be installed in the fuel line between the fuel pump and the heater assembly to measure the fuel flow while the heater is burning. A fuel shutoff valve should be placed near the outlet end of the fuel line. A flexible section will ease making connection to the heater. If a flowmeter is not available, it is possible to remove the fuel control valve from the heater and test fuel flow by means of a glass graduate, but this method is not as convenient as a flowmeter.

*e.* A strobe light or tachometer is required to determine speed of the blower motor.

*f.* A voltage meter is required for continuity tests.

**2-92. Component Tests**

*a. Burn test.*

(1) Install heater on test bench. Connect jumper wire across two terminals of the thermostat receptacle.

(2) Make fuel, electric and exhaust connections to heater.

(3) If the power source is adjustable, preset the voltage control by trial and error so that there will be 24 volts with the full starting load of the heater. If nonadjustable power source is used, make sure the voltage is at least 24 volts under starting conditions or the test will not be valid. Ignition time is affected by voltage.

(4) Turn the heater control switch on. Start timing heater operation the instant the switch is turned on.

(a) The current must not exceed 17 amperes at 22 volts or 18.5 amperes at 24 volts.

(b) The heater must ignite within 20 seconds from the time the switch is turned on. The igniter can be tested by checking continuity with a voltage meter or by removing it from the heater and watching the coil turn red when grounded to the heater. Replace the igniter if there is no ignition in 20 seconds, providing you have a good electrical lead to the igniter.

(c) The flame detector switch must transfer in more than 10 seconds, but less than 30 seconds from the time the heater ignites.

(d) After the flame detector switch transfers, turn the control switch to HI (if heater was started on LO) and observe the rate of fuel flow on the flowmeter. The rate must be more than 0.078 but less than 0.082 lb/rein.

(e) Turn the heater control switch to LO and observe the flowmeter reading. Flow must be more than 0.044 lb/rein. If flow is not within limits, turn the adjusting screw of the fuel control valve clockwise to increase fuel flow, or counterclockwise to reduce flow. If after adjustment, the LO heat is not within limits, it is an indication that one of the metering orifices is clogged and the valve must be replaced, Both HI and LO heat fuel flow must be within limits for satisfactory heater operation.

*b. Overheat test.*

(1) The overheat test should be made from a cold start. A heater which has been burning and is still hot may not test within limits.

(2) Install the heater on the test stand, as for the burn test. Turn heater on. Start timing operation from the moment of ignition.

(3) As soon as the flame detector switch transfers, snap the control switch to HI heat and completely shut off all ventilating air flow by holding a piece of cardboard or sheet metal over the blower inlet. Note the time for the overheat switch to shut off fuel flow (heater will stop burning). The time must be more than 80 seconds but less than 150 seconds from time of ignition. Replace switch and retest, if not within limits.

*c. Purge test.* Start heater. After the heater begins to burn normally, switch to HI heat and let the heater burn for about one minute. Shut the heater off and time blower operation from the moment the switch was turned off. The blower must continue to run for one minute, but less than three minutes and then must automatically stop. If the purge time is not within limits, reset the flame detector switch and retest.

*d. Blower test.* To time the blower, remove the blower assembly and mark the fan with chalk. Start the heater and time the fan with a strobe light or tachometer. Blower speed on HI heat must be within the limits of 6,000 to 6,800 RPM with no restriction on the heater outlet and an

applied 24 volts. Replace the blower if not within limits.

e. *Fuel control valve test.*

(1) The valve must be tested in its normal upright position.

(2) If a flowmeter is not available to test fuel flow, the valve can be removed from the heater and tested separately by measuring the amount of fuel that passes through the valve in a specified time.

(3) Fabricate two short lengths of 3/16-inch tubing and install in the fuel outlets of the valve (fig. 2-37). Two 3/16-inch pipe and 3/16-inch tube compression couplings, nuts and ferrules will be used to attach the tubes to the valve.

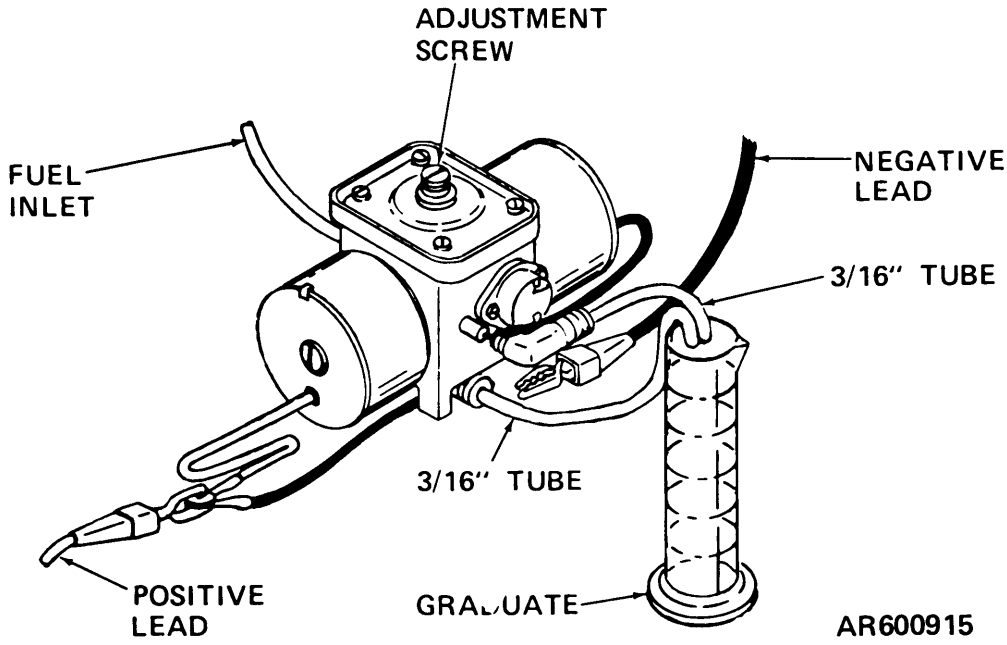



*Figure 2-37. Fuel control valve test.*

(4) A 50 or 100 CC glass graduate (fig. 2-37) with accurate calibrations will be required. A fixture to hold the valve will be required. Two test leads with alligator clips (fig. 2-37) and a panel switch must be provided to energize the solenoids.

(5) Mount the valve in the holding fixture and connect the fuel inlet (fig. 2-37) and the test leads. The shutoff solenoid lead only should be energized. Place a container under the valve and apply fuel pressure.

(6) Turn on the switch to energize the shutoff solenoid and permit fuel to flow for a few seconds until conditions are stabilized. Place the graduate under the outlet tubes and start timing flow. One minute can be used as a timing interval if the graduate has sufficient capacity.

(7) Snap the solenoid switch off at the end of the timing interval and place the graduate on a flat surface to read the contents. The amount of fuel must be within 48.5 to 52.2 cc/min on HI heat. If the fuel flow is not within limits, turn the adjustment screw (fig. 2-37) in to increase flow and out to reduce flow. Recheck flow after adjusting.

(8) After HI heat flow has been brought within limits, connect the lead to the restriction solenoid and repeat test to measure LO heat flow, as in (5), (6), and (7) above. The amount of fuel must be within 25.5 to 27.5 cc/min on LO heat. If fuel flow cannot be brought within required limits, replace valve.

*f. Control module test.*

(1) With 24 volts applied through fuze F2, place air conditioning switch S4 in heat position. Check voltage at heater terminal (3, fig. 2-38). This should be 24 volts. All voltages are checked to ground.

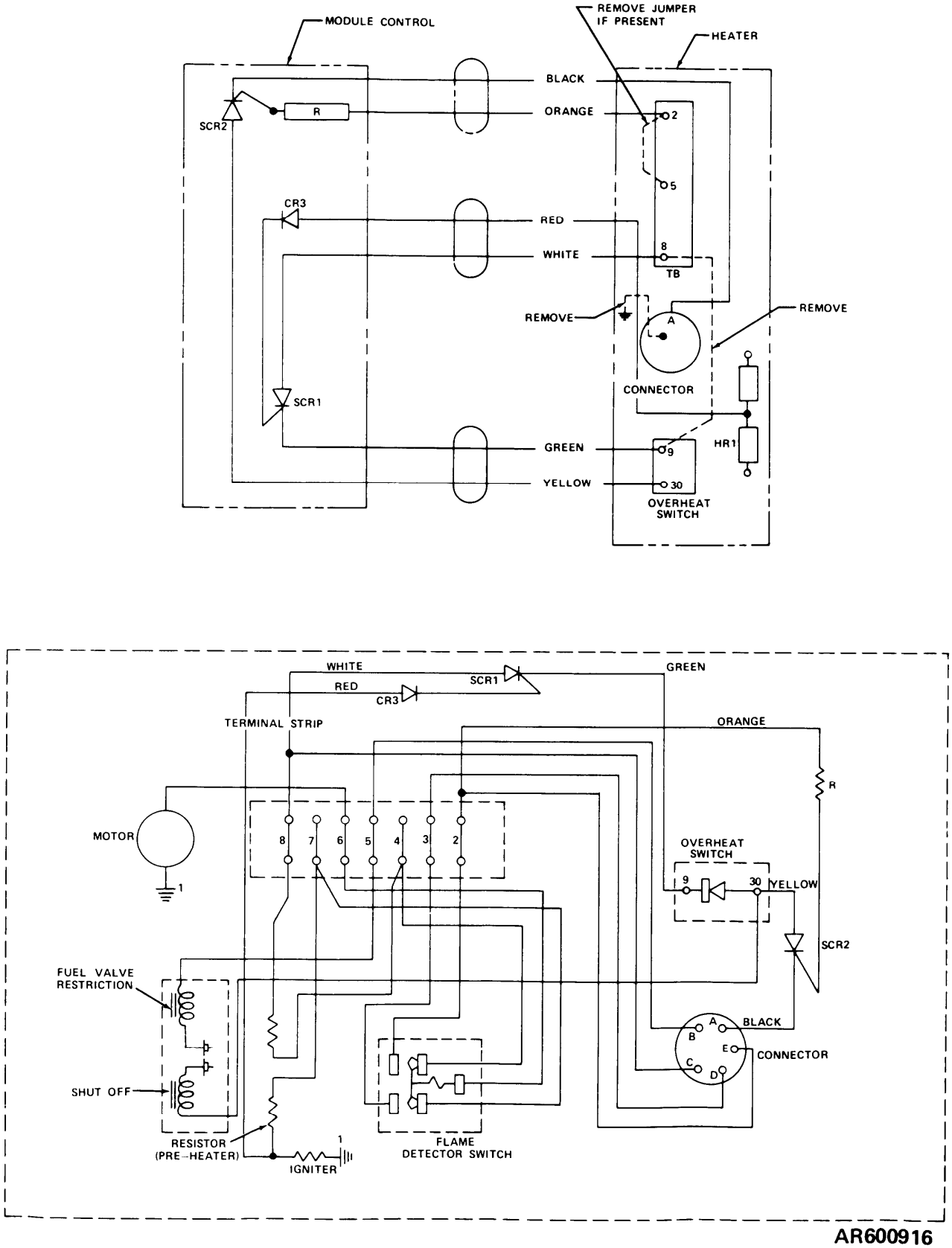



*Figure 2-38. Module control and heater wiring diagram.*

(2) Check for 24 volts at heater terminal 8.

(3) Check for 24 volts at input side of heater (overheat switch). A 24 volt reading indicates module is working and fault lies elsewhere in the heater system.

(4) Check for voltage at heater terminal 7. If this registers 3 volts or more, and no voltage at overheat switch when 24 volts is applied at heater terminal 8, module is defective and should be replaced.

(5) If no voltage at heater terminal 7, and at overheat switch, with 24 volts at heater terminal 8, module is operative. Check and adjust flame detector switch to obtain correct voltage at terminal 7.

(6) Should green heater light fail to indicate heat, check "A" terminal at heater connector. This should show approximately 24 volts. With no voltage at terminal "A" and voltage at overheat switch and terminal 2, module is defective and should be replaced. Should terminal 2 and terminal "A" show no voltage with voltage at overheat switch, module is operative. Check for defective flame detector switch.

**2-93. Fuel Flow Rates**

*a.* Flow rates for use with a flowmeter are in pounds per minute and rates for separate testing of a detached valve are in cubic centimeters per minute.

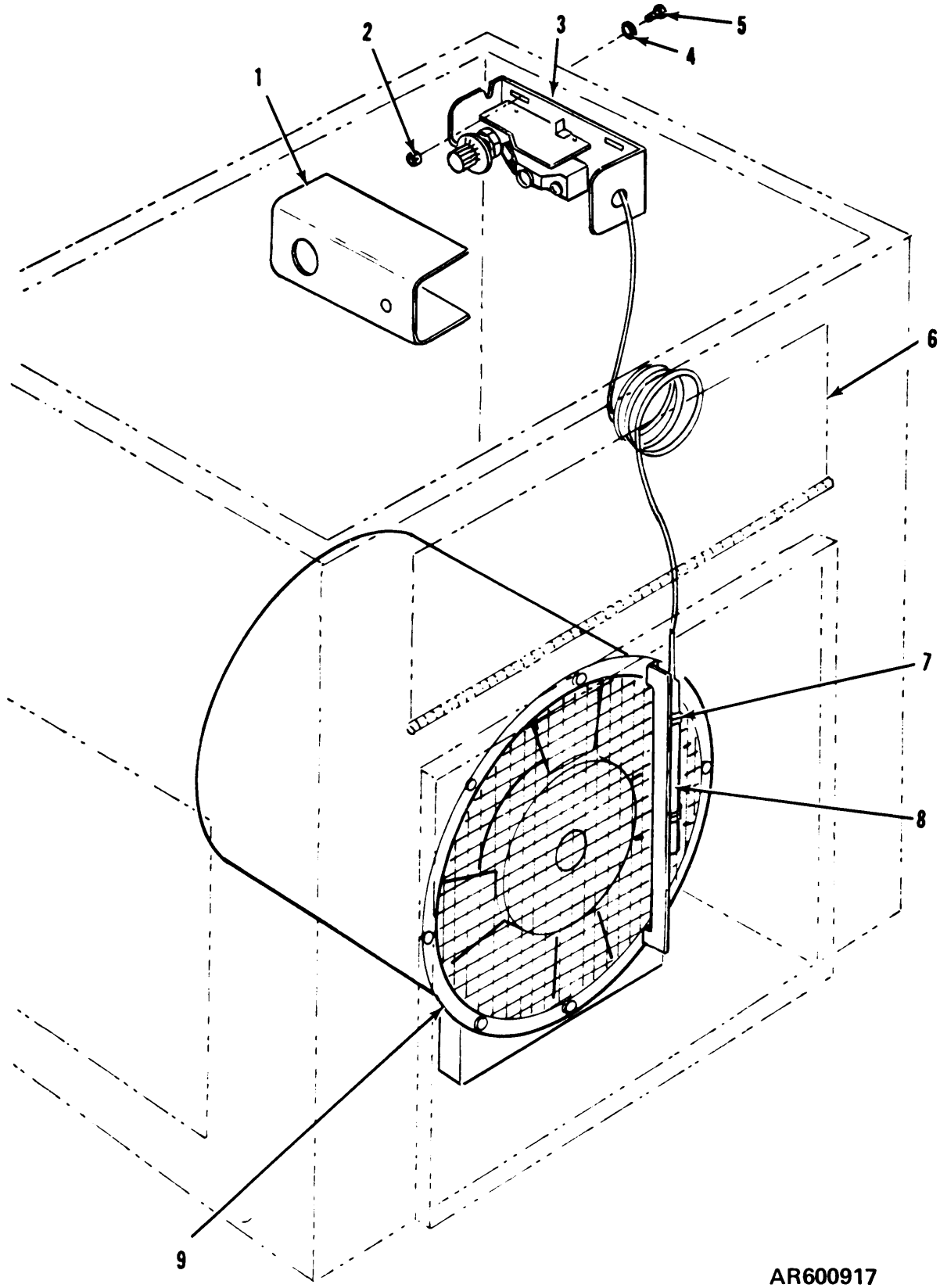
*b.* All fuel rates are specified for fuel at room temperature or within the range of 65 to 85 degrees F. Fuel valves should not be adjusted at extremely low or high temperatures.

*c.* The high heat fuel rate is set at the factory for approximately 0.080 lb/min or 50.3 cc/min. This is the proper fuel rate which will produce the designed heat output. If a heater set for normal operation, exhaust pointed straight down, is mounted in any other position, the fuel rate will be less than this amount as a result of back pressure caused by the weight of fuel in the primary or secondary tubing. This is the reason the actual mounting position must be taken into consideration when adjusting the fuel rate.

## Section XV. HEATING THERMOSTAT

**2-94. Heating Thermostat**

The heating thermostat (3, fig. 2-39) installed in the recirculation fan cabinet, is provided to control shelter temperature while the environmental control system is operating in the heating mode. The thermostat is set to maintain shelter interior temperature from 67 degress F to 73 degrees F. Direct support maintenance personnel are authorized to test, adjust and replace this thermostat.

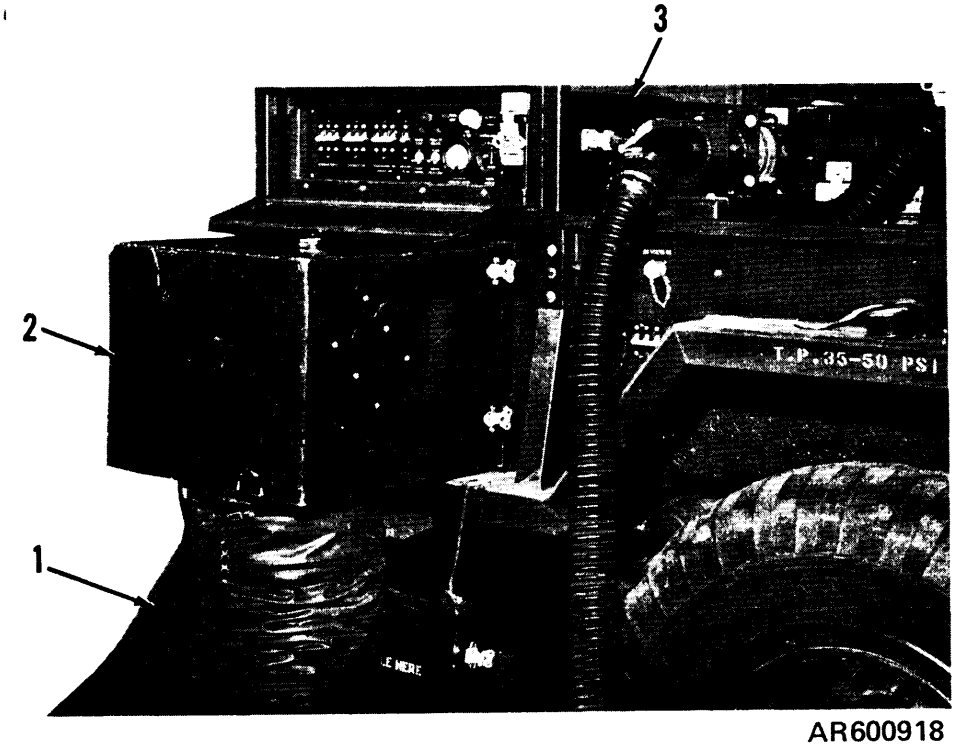



1 Thermostat cover
2 Nuts
3 Heating thermostat
4 Washers
5 Screws
6 Cover, main control indicator
7 Clips
8 Sensing bulb
9 Recirculation fan

*Figure 2-39. Heating thermostat.*

**2-95. Test**

*a.* Remove return air duct (1, fig. 2-40) and plenum (20); remove access panel *(3).*




1 Return air duct 2 Return air plenum 3 Access panel

*Figure 2-40. Detachable plenum and duct.*

*b.* Place an accurate thermometer near thermostat sensing bulb (8, fig. 2-39).

*c.* When thermometer stabilizes, check position of temperature dial on thermostat (3). Readings should agree with ± 2 degrees F.

*d.* Remove cover (1) and compare thermometer indication with temperature dial setting and check continuity between terminals 1 and 2. If thermometer indication is lower than thermostat dial setting, continuity should exist between terminals 1 and 2.

*e.* Adjust thermostat (para 2-96 below).

*f.* Install plenum (2, fig. 2-40), duct (1) and access panel (3).

**2-96. Adjust**

*a.* Remove access panel (3, fig. 2-40) from recirculation fan cabinet.

*b.* Rotate temperature dial on heating thermostat (3, fig. 2-39) to 70 degrees F.

*c.* Set differential pointer to 2 degrees F.

*d.* Install access panel on recirculation fan cabinet.

**2-97. Replacement**

*a.* Remove air return duct (fig. 2-40) and plenum (2); remove access panel (3).

*b.* Remove cover (1, fig. 2-39).

c. Tag and disconnect electrical leads from heating thermostat (3).

*d.* Remove four nuts (2), screws (5), and washers (4) securing thermostat to side of recirculation fan cabinet.

*e.* Carefully remove sensing bulb (8) from clips (7).

*f.* Remove thermostat, tubing and sensing bulb from cabinet.

*g.* Installation is the reverse of removal.

## Section XVI. MAKE UP AND INFLATION AIR VALVING AND DUCTS

### 2-98. Air Duct Coupling, Check Valve, and Relief Valve

Direct support maintenance personnel are authorized to replace the air duct coupling (3, fig. 2-41), check valve (9), relief valve (7), and attaching hardware.

Legend for fig. 2-41:

1 Washers
2 Screws
3 Air duct coupling
4 Quick-disconnect coupling
5 Locknuts
6 Washers
7 Relief Valve
8 Gasket
9 Check valve
10 Gasket
11 Bracket
12 Washers
13 Screws
14 Screws
15 Washers
16 Clamp
17 Hose
18 Support
19 Washers
20 Locknuts
21 Locknuts
22 Washers
23 Locknuts
24 Washers
25 Wheel well support
26 Washers
27 Screws
28 Inflation system support
29 Locknuts
30 Washers
31 Washers
32 Locknuts
33 Screws
34 Washers
35 Washers
36 Screws

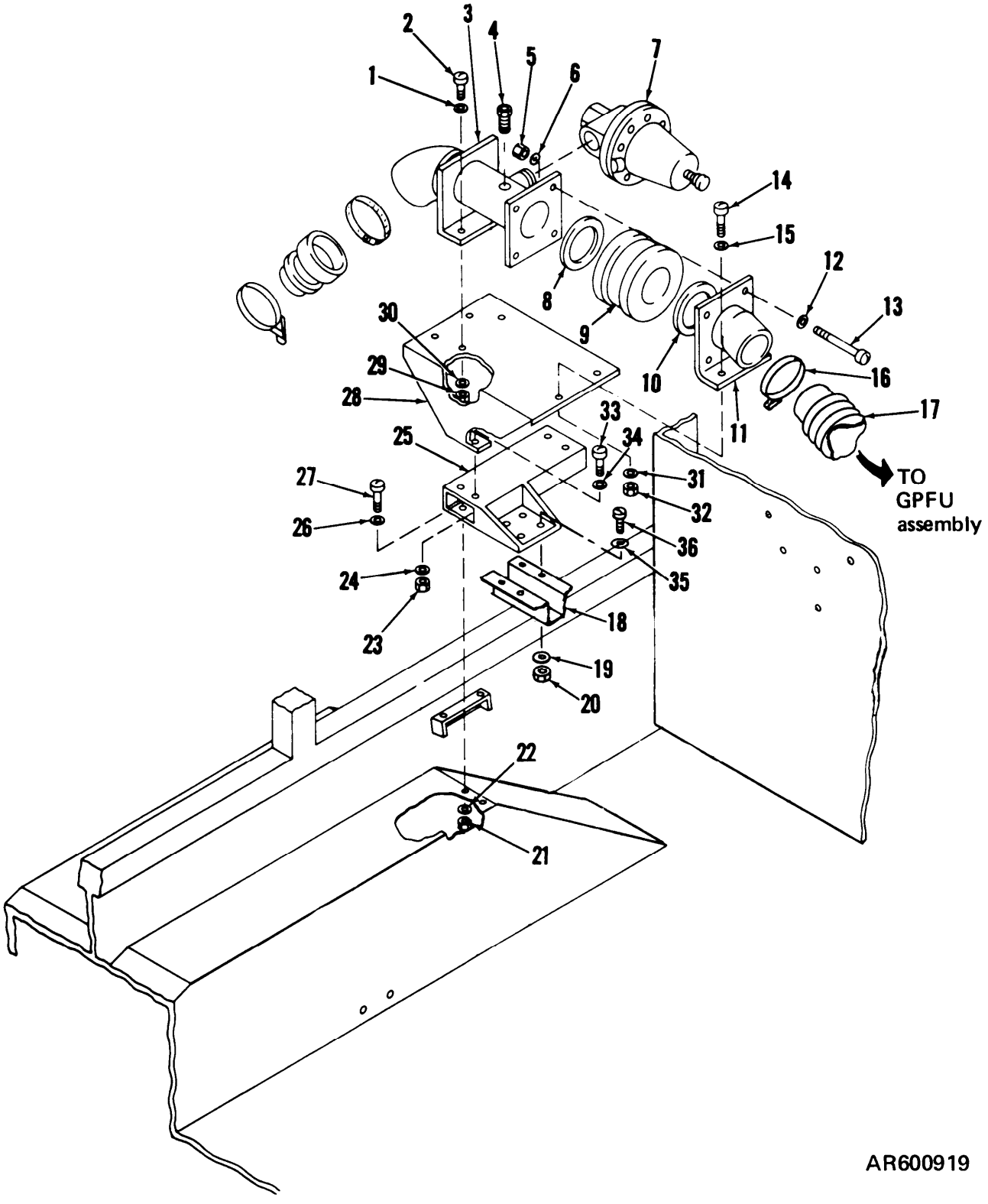



*Figure 2-41. Air inflation valving and related components, exploded view.*

*a. Removal and disassembly.*

(1) Remove two locknuts (29, fig. 2-41 ), washers (30), screws (2), and washers (1).

(2) Remove four locknuts (5), washers (6), screws (13), and washers (12).

(3) Remove air duct coupling (3) with assembled components, check valve (9), and gaskets (8) and (10).

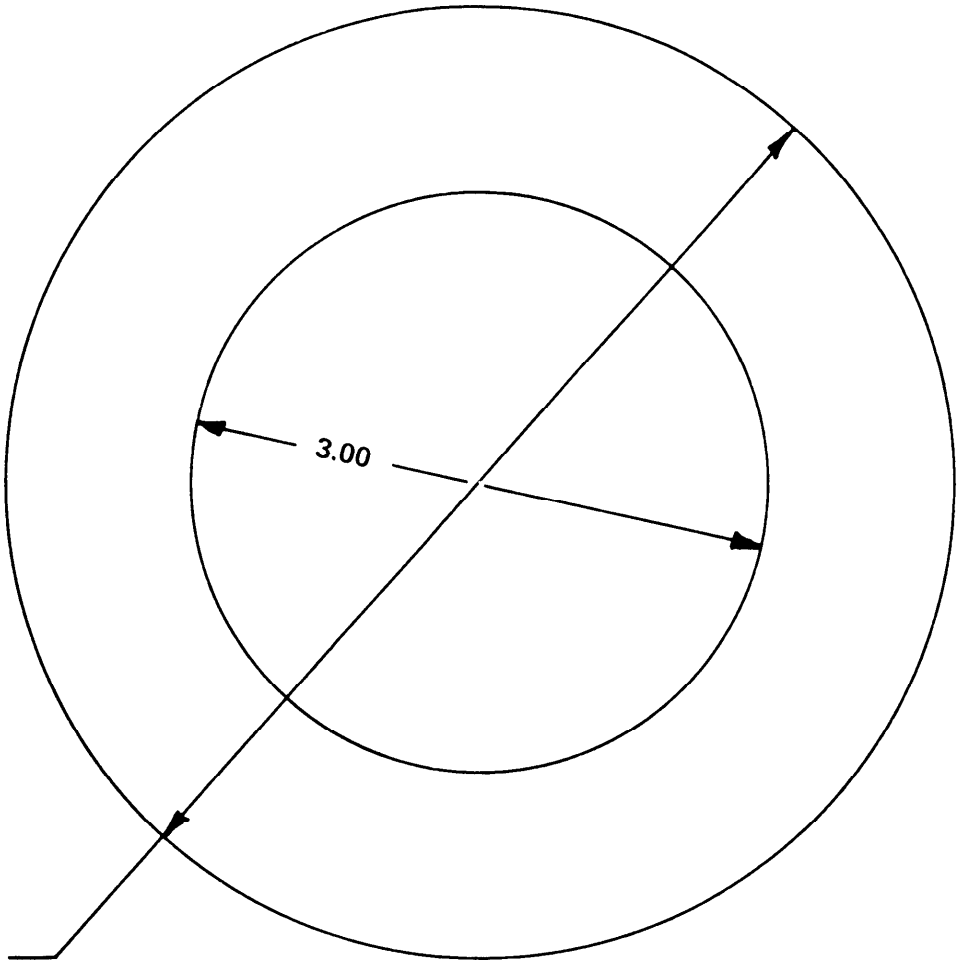
(4) Remove quick disconnect coupling (4) and relief valve (7) from air duct coupling.

*b. Reassembly and Installation.* Reassembly and installation is the reverse of removal and disassembly (a above).

**2-99. Check Valve Gaskets**

Direct support maintenance personnel are authorized to manufacture and replace the check valve gaskets (8 and 10, fig. 2-41).

*a. Manufacture.* Fabricate check valve gasket (fig. 2-42).




NOTE:

1. MATERIAL. SILICONE SPONGE RUBBER, 0.187 THICK.
2. DIMENSIONS IN INCHES.

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*Figure 2-42. Check valve gasket fabrication.*

*b. Removal.* Remove check valve (para 2-98a, steps (1) through (3) ).

*c. Installation.* Installation is the reverse of removal (para 2-98a.).

**2-100. Check Valve Bracket**

Direct support maintenance personnel are authorized to replace the check valve bracket (11, fig. 2-41) and attaching hardware.

*a. Removal.*

(1) Loosen clamp (16, fig. 2-41) and remove hose (17).

(2) Remove two locknuts (32), washers (31), screws (14), and washers (15).

(3) Remove four locknuts (5), washers (6), screws (13), and washers (12).

(4) Remove bracket (11), check valve (9), and gaskets (8) and (10).

*b. Installation.* Installation is the reverse of

removal (a above). If necessary, manufacture new check valve gaskets (fig. 2-42).

**2-101. Inflation System and Wheel Well Supports**

Direct support maintenance personnel are authorized to replace the inflation system and wheel well supports, and attaching hardware.

*a. Removal.*

(1) Remove check valve bracket (para 2-100a).

(2) Remove two locknuts (29, fig. 2-41), washers (30), screws (2), and washers (l). Remove air duct coupling (3) with assembled components.

(3) Remove four locknuts (23), washers (24), screws (33), and washers (34). Remove support (28).

(4) Remove four locknuts (21), washers (22), screws (27), and washers (26).

(5) Remove four locknuts (20), washers (19), screws (36), and washers (35) securing support (25) to support (18).

*b. Installation.* Installation is the reverse of removal (a above).

**2-102. Solenoid Valve**

Direct support maintenance personnel are authorized to replace the solenoid valve and attaching hardware.

*a. Removal and disassembly.*

*(1)* Disconnect plug connector (4, fig. 2-43).

(2) Loosen clamp (19) and remove hose (20) from elbow (32).

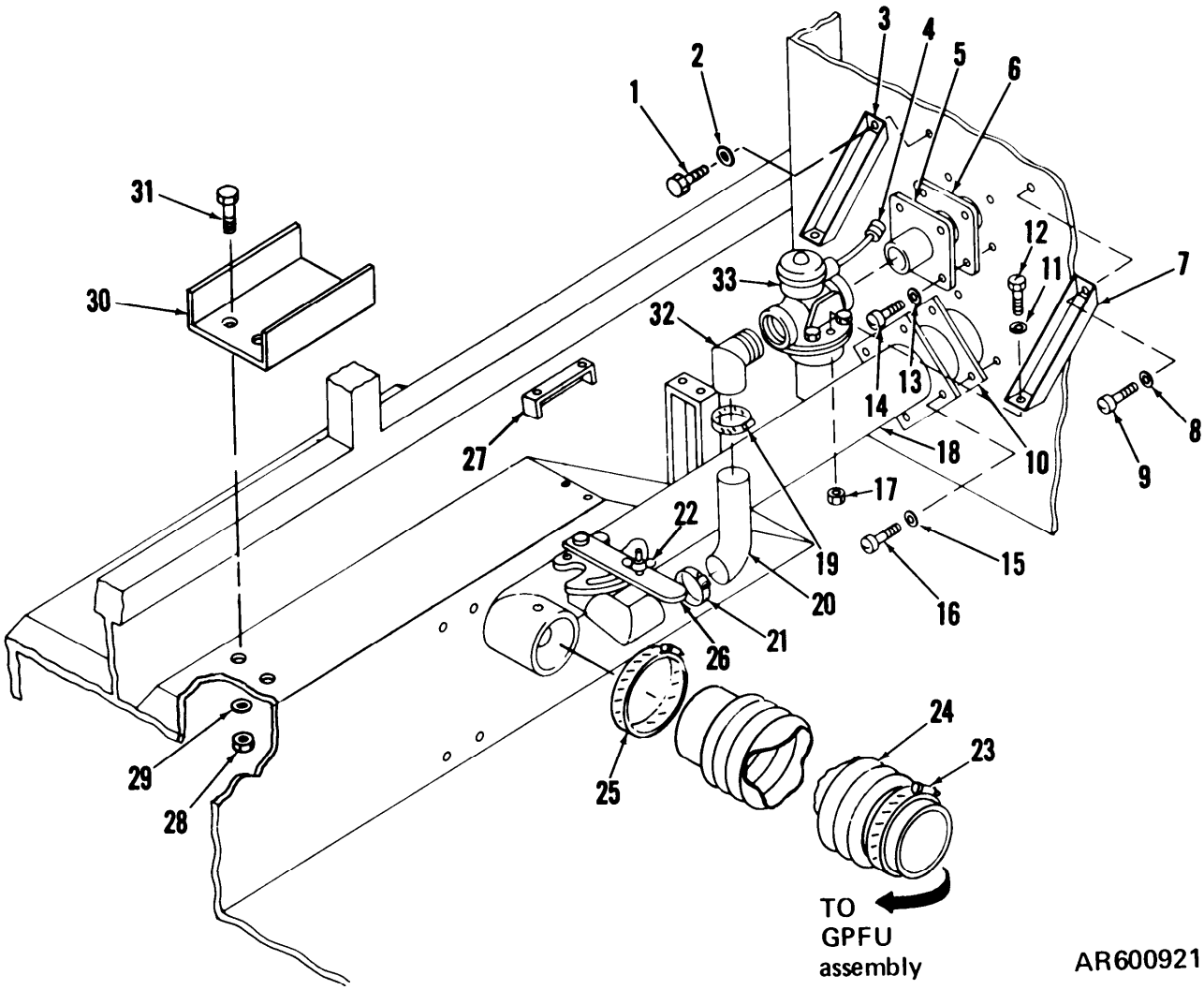
(3) Loosen clamp (16, fig. 2-41) and remove hose (17) from bracket (11).

(4) Remove four screws (14, fig. 2-43) and washers (13).

(5) Remove two nuts (17), screws (12) and washers (11). Remove solenoid valve (33) with assembled components, and gasket (6).

(6) Remove struts (3) and (7) by removing screw (1), washer (2), screw (9) and washer (8).

(7) Disassemble elbow (32), solenoid valve (33), and flange (5).




| | | |
|---|---|---|
| 1 Screw | 12 Screw | 23 Clamp |
| 2 Washer | 13 Washers | 24 Hose |
| 3 Strut | 14 Screws | 25 Clamp |
| 4 Plug connector | 15 Washers | 26 Lever |
| 5 Flange | 16 Screws | 27 Bracket |
| 6 Gasket | 17 Nuts | 28 Locknuts |
| 7 Strut | 18 Air duct | 29 Washers |
| 8 Washer | 19 Clamp | 30 Support |
| 9 Screw | 20 Hose | 31 Screws |
| 10 Gasket | 21 Clamp | 32 Elbow |
| 11 Washer | 22 Wing nut | 33 Solenoid valve |

*Figure 2-43. Make up air duct, valving, and related components, exploded (view.*

*b. Reassembly and Installation.* Reassembly and installation is the reverse of removal and disassembly ( *a* above), except be sure the valve boss marked "IN" is toward the front of trailer when installed.

**2-103. Plug Connector**

Direct support maintenance personnel are authorized to replace the solenoid valve plug connector.

*a. Removal.*

(1) Perform shutdown procedures (TM 3-4240-264-12).

(2) Disconnect plug connector (4, fig. 2-43).

(3) Disassemble plug connector, tag and disconnect electrical leads.

*b. Installation.* Installation is the reverse of removal (a above).

**2-104. Make Up Air Duct**

Direct support maintenance personnel are

authorized to replace the make up air duct and attaching hardware.

*a. Removal.*

(1) Loosen clamps (23, fig. 2-43) and (25). Remove hose (24).

(2) Loosen clamps (19) and (21). Remove hose (20).

(3) Remove clamp (3, fig. 2-32).

(4) Remove four screws (16, fig. 2-43) and washers (15).

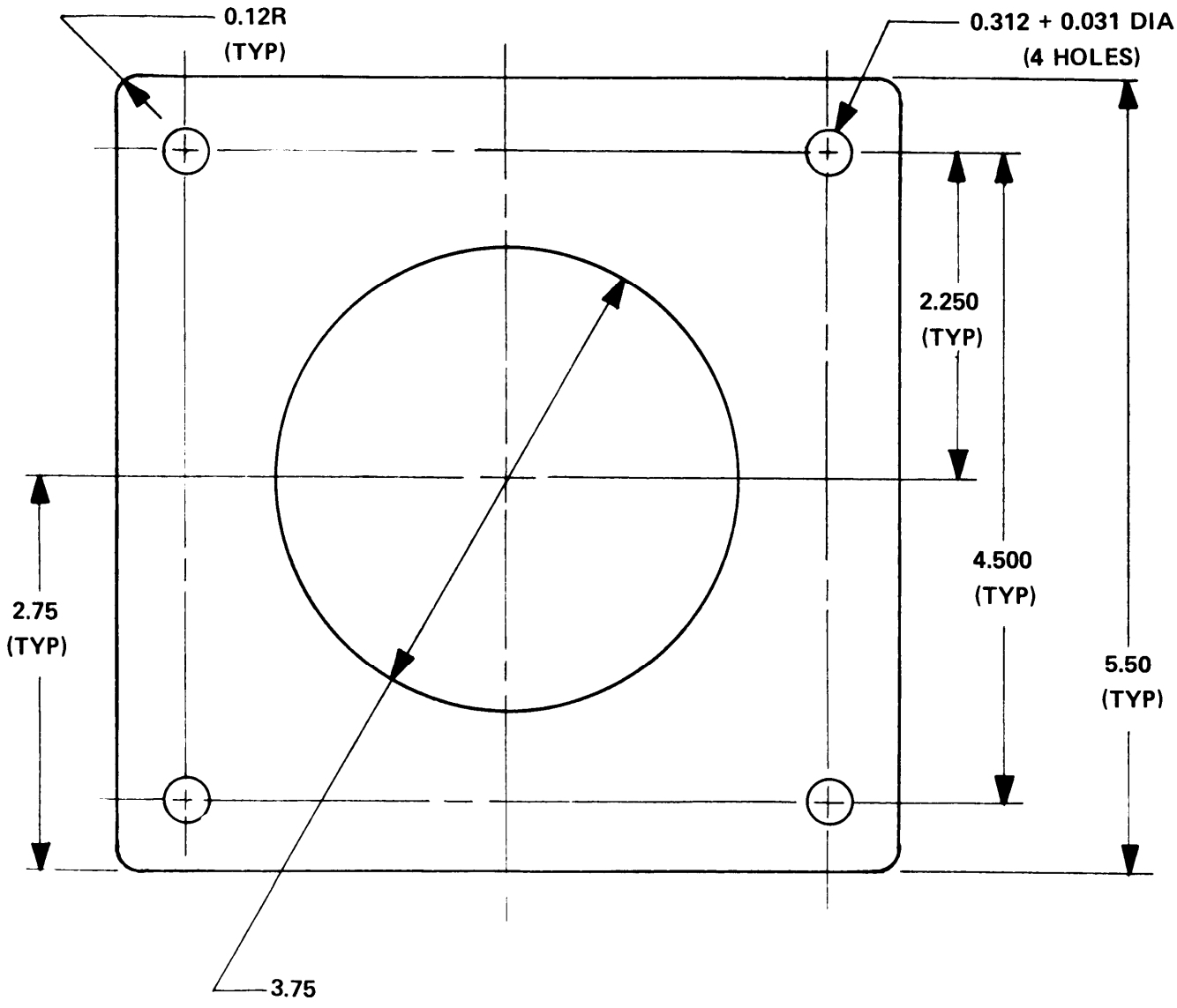
(5) Remove make up air duct (18), and gasket (10).

*b. Installation.* Installation is the reverse of removal ( *a* above).

**2-105. Make Up Air Duct Gasket**

Direct support maintenance personnel are authorized to manufacture and replace the make up air duct gasket.

*a. Manufacture.* Fabricate gasket (fig. 2-44).




NOTE:

1. MATERIAL. SILICONE SPONGE RUBBER, 0.187 THICK.
2. DIMENSIONS IN INCHES.

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*Figure 2-44. Make up air duct gasket fabrication.*

*b. Removal.*

(1) Remove make up air duct (para 2-104a).

(2) Remove gasket (10, fig. 2-43) from air duct (18). Clean gasket and adhesive residue from duct with decreasing solvent (item 4, table 2-1).

*c. Installation.*

(1) Secure gasket (10) to duct (18) with adhesive sealant (item 3, table 2-1).

(2) Install make up air duct (para 2-104 *b).*

## Section XVII. AIR CONDITIONING SYSTEM

### 2-106. Air Conditioning System

Direct support maintenance personnel are authorized to repair, replace, and test major components of the air conditioning system and the attaching hardware.

### 2-107. Maintaining Chemical Stability in the Refrigeration System

*a.* The efficient operation of the air conditioning refrigeration system is dependent upon the pressure-temperature relationship of pure refrigerant. As long as the system contains pure refrigerant it is considered to be chemically stable.

*b.* When foreign materials such as dirt, air or moisture are allowed to get in the system they will change the pressure-temperature relationship of the refrigerant. Thus, the system will no longer operate at the proper pressures and temperatures and the efficiency will decrease.

*c.* The following general practices should be observed to insure chemical stability in the system:

(1) Whenever it becomes necessary to disconnect a refrigerant connection, wipe away any dirt, moisture, or oil, at and near the connection to eliminate the possibility of dirt, moisture or oil, entering the system. Both sides of the connection should be immediately taped or plugged to prevent the entrance of dirt, oil, foreign material and moisture. It must be remembered that all air contains moisture. Air that enters any part of the system will carry moisture with it and the exposed surfaces will collect the moisture quickly.

(2) Keep tools clean and dry. This includes the gage set and replacement parts.

(3) When it is necessary to open a system, have everything needed ready and handy so that as little time as possible will be required to perform the operation. Do not leave the system open any longer than necessary.

(4) Any time the system has been opened and sealed again, the system must be properly evacuated and charged (paras 2-128 and 2-129).

### 2-108. Refrigerant Tubing

Copper tubing is used to carry the refrigerant through the vapor cycle system with the exception of flexible metal hose in the suction and discharge service lines adjacent to the compressor and the condenser and evaporator coils. See figure 2-44 for tubing layout in trailer. Brazed fittings (sweated joints) are used at tubing junctions (elbows, couplings, and tees) to assure against refrigerant leakage.

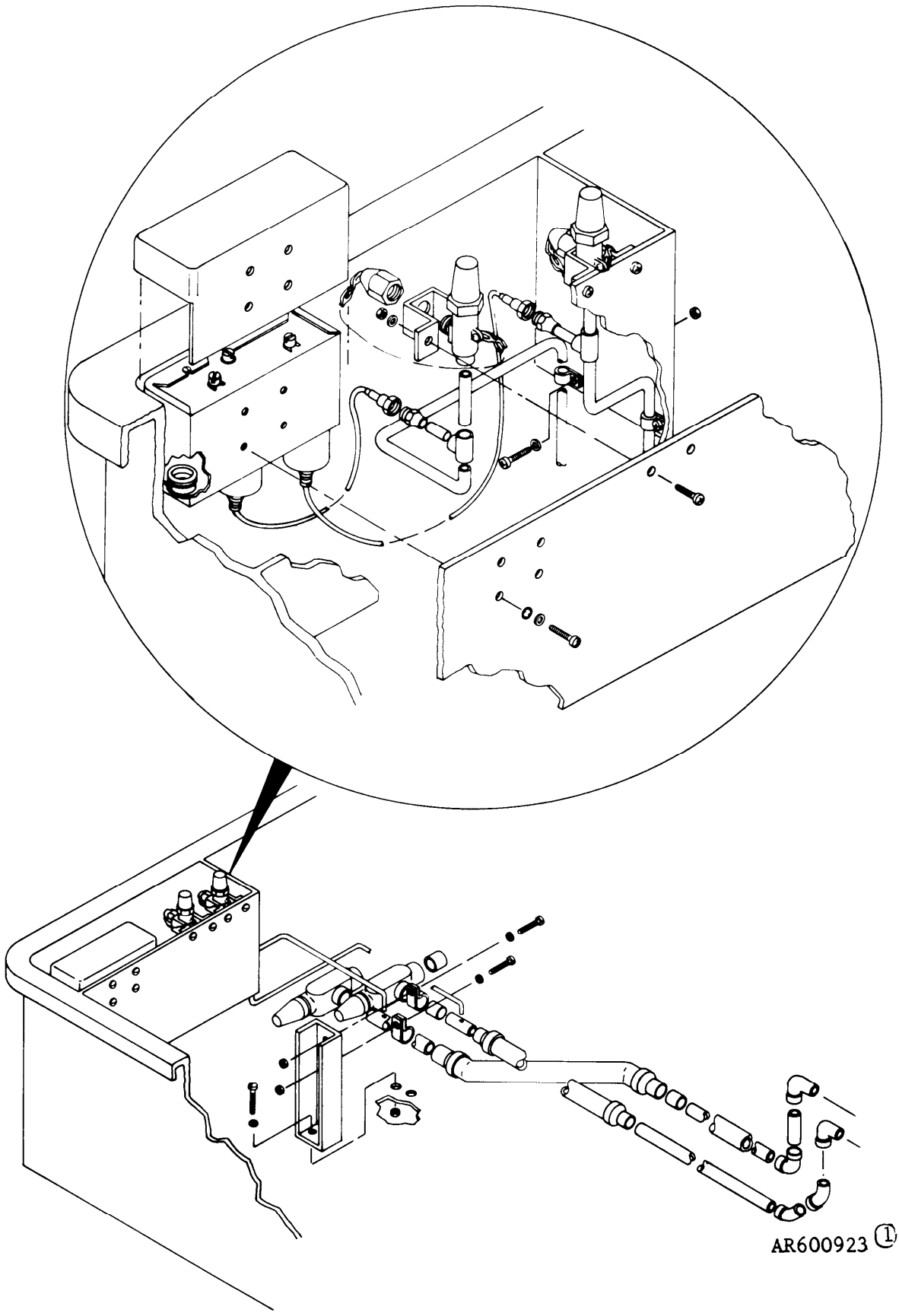


*Figure* 2-45 ①. *Refrigerant tubing, connections, and insulation (sheet 1 of 3).*

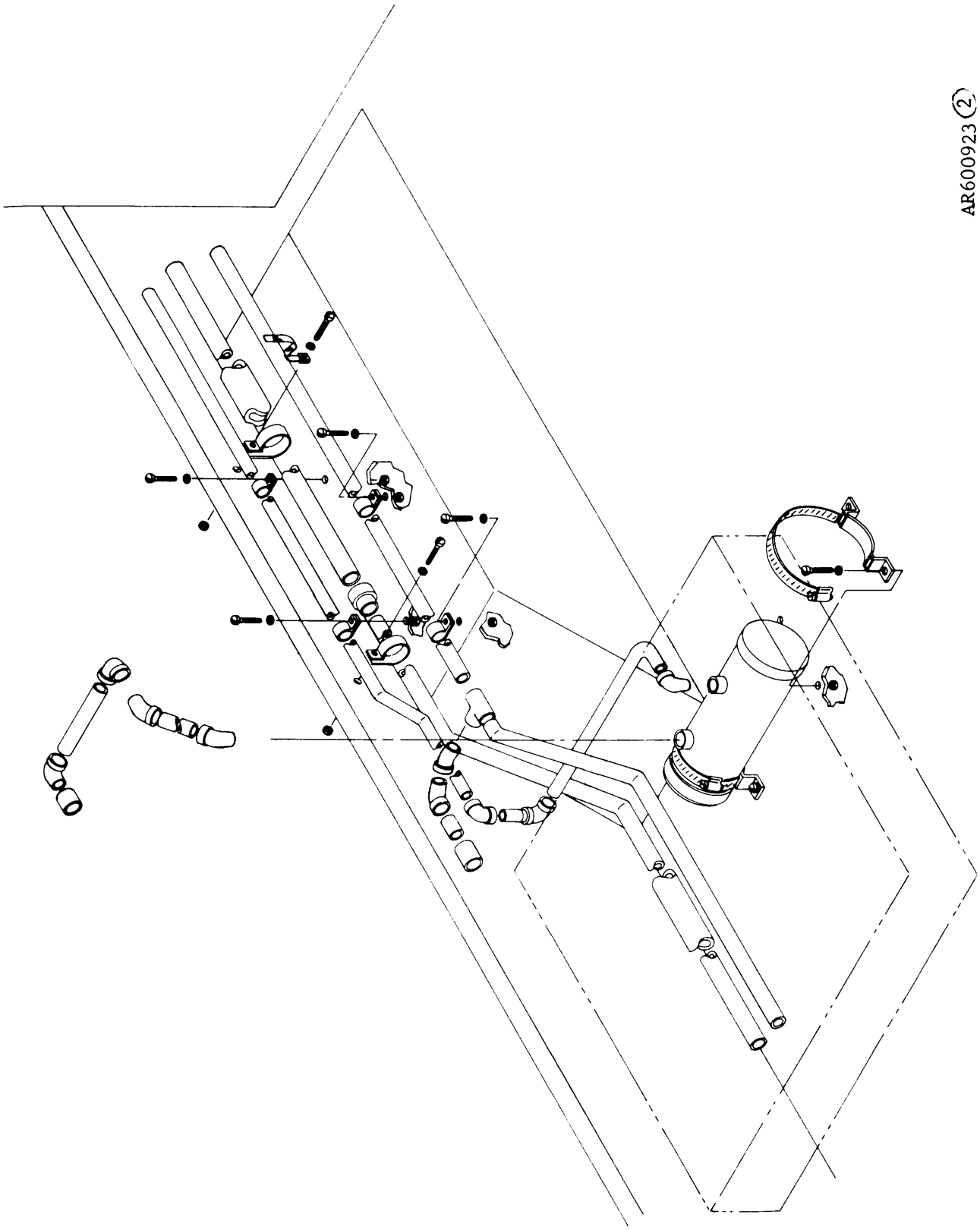

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*Figure 2-45 (2). Refrigerant tubing, connections, and insulation (sheet 2 of 3).*

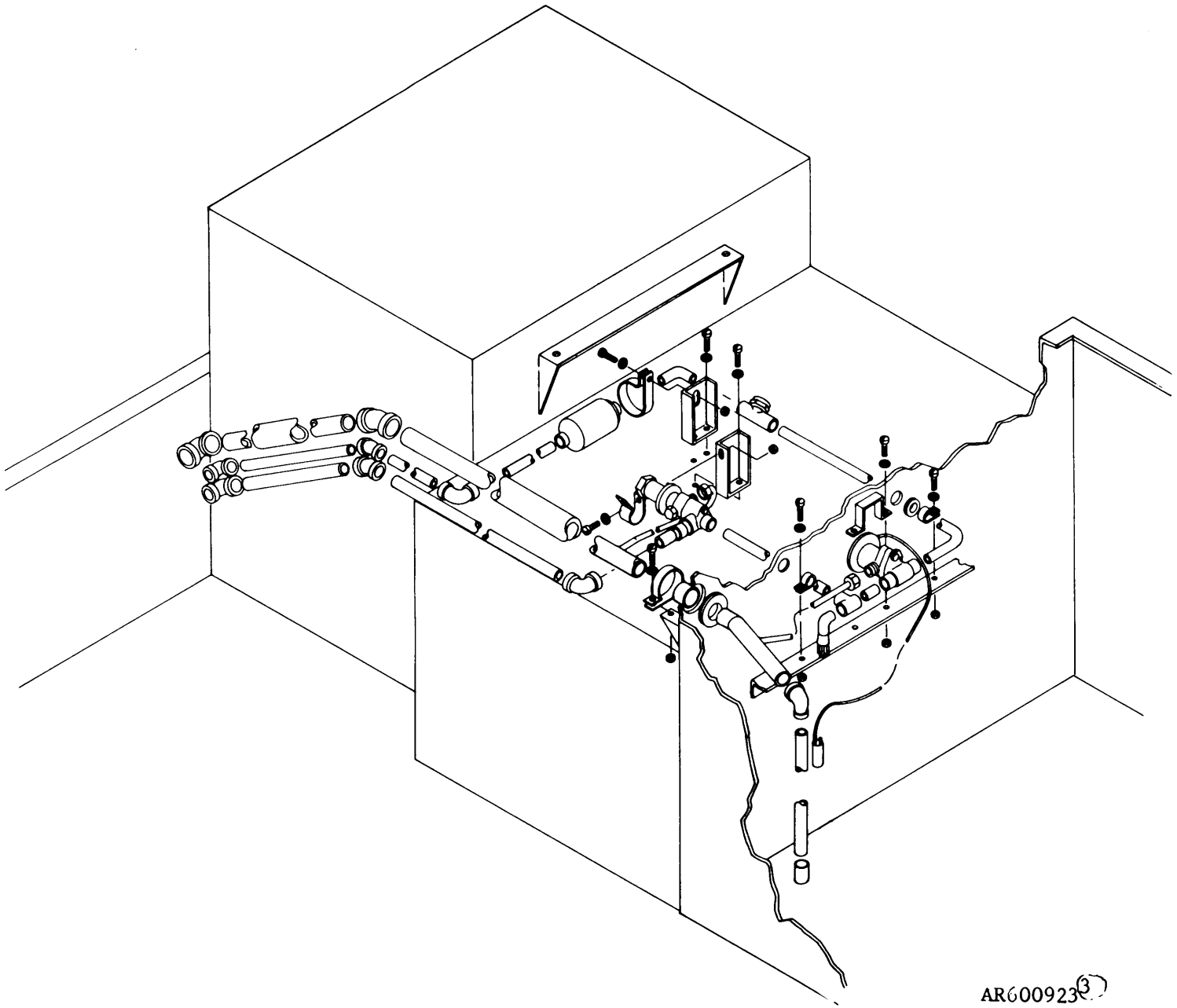



*Figure 2-45 ③. Refrigerant tubing, connections, and insulation (sheet 3 of 3).*

### 2-109. Work Area

The maintenance area should be equipped with such standard items of equipment as suitable air and electrical outlets and work benches. It is important that the maintenance area be clean and dust-free. Keep hardware and small parts together in trays to prevent them from being mislaid. Cover parts which are to stand for any period of time with clean paper or suitable coverings.

### 2-110. Cleaning Tubing

Whenever refrigerant tubing is being repaired, replaced or otherwise altered, the following procedures are recommended:

*a.* A clean, lintless cloth should be drawn through the tubing by the means of wire. This will remove all coarse particles of dirt and dust.

*b.* A clean, lintless cloth saturated with toluene (item 1, table 2-1) should be pulled through the tubing. This procedure is continued until the saturated cloth is not discolored by dirt.

*c.* A clean cloth saturated with compressor oil, squeezed dry, is drawn through the tubing again. This is to remove any lint. If possible, visual inspection should be made to see that tubing is perfectly clean.

*d.* The cleaning job is completed by pulling through a clean dry lintless cloth. The cloth must be lintless as an accumulation of lint will cause almost as much trouble as scale.

### 2-111. Maintenance

*a. Inspect.* Inspect refrigerant tubing as follows:

(1) Inspect tubing for kinks, cracks, holes, and other damage.

(2) Inspect tubing clamps for tightness.

(3) Check sight glass (4, fig. 2-53) for low charge indication moisture content, para 2-123. System must be operating for five minutes before checking sight glass.

*b. Test.* Leak checks can be made by the following methods:

(1) Electronic halogen leak detector (para 2-126a).

(2) Torch-type halogen leak detector (para 2-126 *b).*

(3) Soap solution (para 2-126c).

c. *Tubing repair or replacement.* When opening a brazed (sweated) joint, perform the following steps:

(1) Discharge and evacuate the refrigerant from the system (para 2-127 and 2-128). Purge the area around the joint with nitrogen to assure that any refrigerant due to leakage has been expelled from the area.

(2) Remove insulation, where necessary.

(3) Using an oxy-acetylene torch, heat the joint beyond the melting point of the filler material.

(4) Using well-insulated gloves, or other appropriate hand tools, separate the joined tubing before the filler material temperature drops below the melting points.

**CAUTION**

Use masking tape or plugs, immediately seal any tubing opened to the atmosphere, This prevents moisture or dirt from entering the system.

*d. Joining Brazed Fittings.*

(1) Braze fittings in accordance with Military Specification MIL-B-7883.

(2) Use Class 4 or 6A silver solder filler material as designated in QQ-S-561d.

*e. Insulation.* Replace insulation, where necessary, using adhesive (item 9, table 2-1) to seal joint.

*f. Thermo couple.* When replacing thermo couple, attach to refrigerant tubing using tape (item 10, table 2-1).

g. *Dehydrator.* Install new dehydrator 2-112 below.

*h. Evacuate and charge.* Evacuate and charge system (para 2-128 and 2-129).

### 2-112. Dehydrator

The dehydrator (3, fig. 2-53) contains a solid desicant which prevents the accumulation of moisture within the refrigerant lines.

*a. Inspection.* If dehydrator is defective, there will be a noticeable difference in temperature on either side of it when the system is operating.

*b. Removal.* Remove the dehydrator (3, fig. 2-53) as follows:

(1) Open suction service valve (2, fig. 2-54) and then the discharge service valve ( 1 ) to relieve pressure in the system.

(2) Unbraze the dehydrator from the refrigerant tubing, 2-111 above.

(3) If the new dehydrator cannot be installed immediately, the tubing must be taped or plugged to prevent contamination,

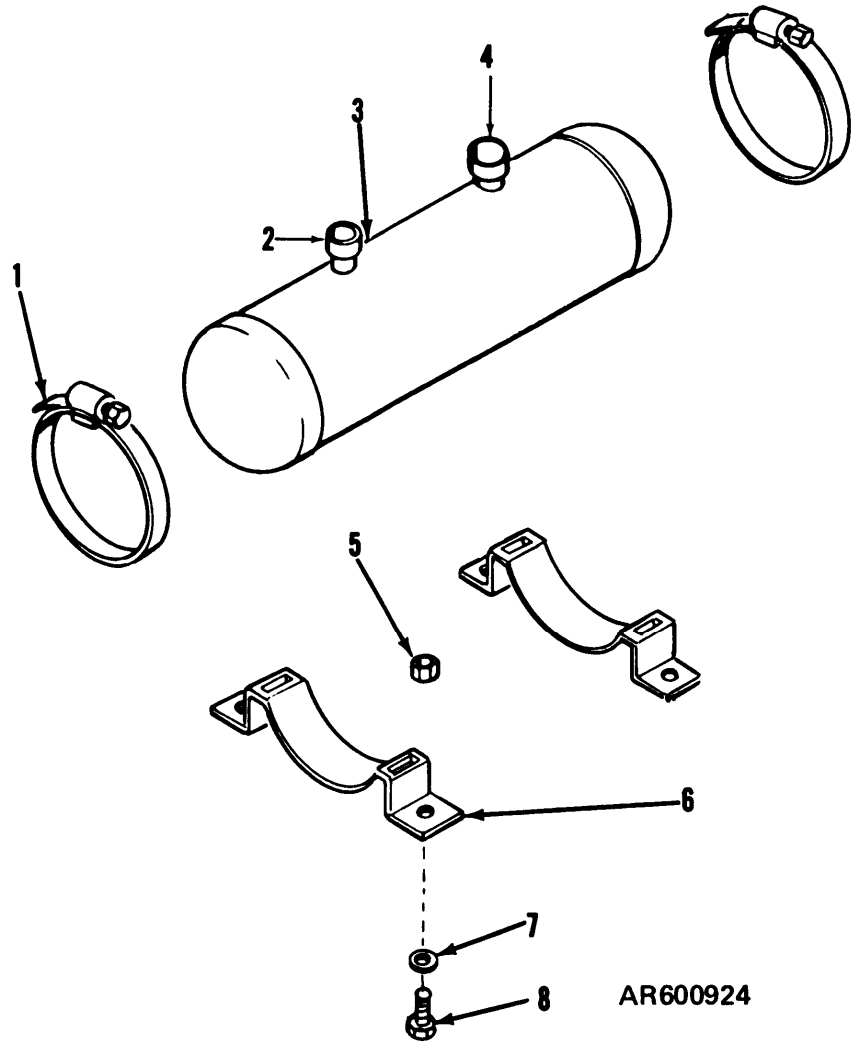
*c. Installation.* Install the dehydrator as follows:

(1) Braze the dehydrator to the refrigerant tubing, 2-111 above.

(2) Evacuate and charge system (para 2-128 and para 2-129).

### 2-113. Receiver

The receiver (fig. 2-46) is a cylindrical tank that serves as a reservoir for refrigerant. The receiver is installed on the trailer floor near the condenser coil.




1 Clamp
2 Refrigerant connection
3 Receiver
4 Refrigerant connection
5 Nut
6 Bracket
7 Washer
8 Screw

*Figure 2-46. Receiver.*

*a. Inspect.* Inspect the receiver (3) for leaks, using the halide leak detector (para 2-126).

*b. Removal.* Remove the receiver as follows:

**CAUTION**

Evacuate refrigerant from system.

(1) Unsolder the two refrigerant lines from the connectors (2 and 4) on the receiver.

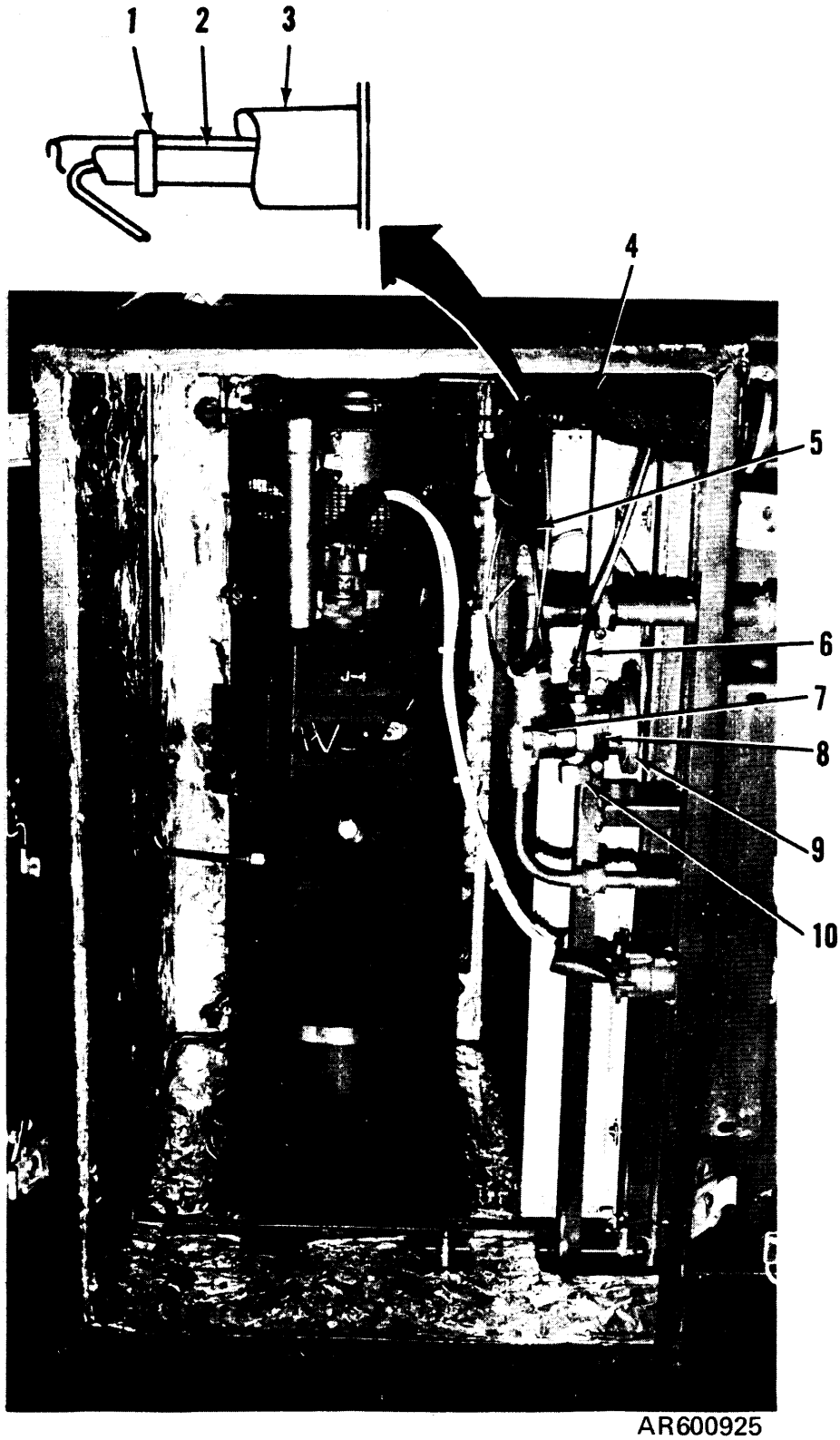
(2) Loosen two clamps (1) and remove receiver (3).

(3) Remove screw (8), washer (7), nut (5), and mounting bracket (6).

*c. Installation.* Installation is the reverse of removal. Install new dehydrator (para 2-112). Evacuate and charge the refrigerant system (para 2-128 and 2-129). Special precautions should be taken before soldering refrigerant tubing (para 2-110 and 2-111).

### 2-114. Thermostatic Expansion Valve

The function of the thermostatic expansion valve (9, fig. 2-47) is to regulate the flow of liquid refrigerant to the evaporator.




1 Clamp
2 Temperature bulb
3 Insulation
4 Evaporator outlet line
5 Evaporator inlet line
6 Refrigerant sensing line
7 Bolt (2)
8 Mounting bracket
9 Thermostatic expansion valve
10 Bolt (2)

*Figure 2-47. Thermostatic expansion valve.*

*a. Test.* Test the thermostatic expansion valve as follows:

(1) Remove heater access cover (5, fig. 2-49).

(2) Check evaporator coil (1, fig. 2-48) for a superheat of eight to twelve degrees F. If superheat is not correct, adjust superheat. If adjustment will not correct, replace expansion valve.

*b. Removal.* Remove the thermostatic expansion valve as follows:

(1) Relieve refrigerant pressure by removing caps from suction and discharge service valves (1 and 2, fig. 2-54) and opening valves.

(2) Remove heater access cover (5, fig. 2-49).

(3) Disconnect refrigerant sensing line (6, fig. 2-47) from thermostatic expansion valve (9).

(4) Remove insulation (3) and two clamps (1) holding temperature bulb (2) to refrigerant line.

(5) Remove two bolts (10) securing mounting bracket (8).

**CAUTION**

Be careful when separating valve at flange to prevent internal parts of valve from dropping out.

(6) Remove two bolts (7) and separate valve at flange.

*c. Installation.*

(1) Position valve body in place, and insure that internal part of valve is properly seated. Install two bolts (7, fig. 2-47).

**NOTE**

Insure new preformed packing is installed in valve connection flange.

(3) Install mounting bracket (8) with two bolts (10).

(4) Connect refrigerant line (6) to thermostatic expansion valve (9).

(5) Clamp temperature bulb (2) to refrigerant line (6) with two clamps (1).

(6) Install insulation (3) and hold in place with tape.

(7) Install new dehydrator (para 2-1 12).

(8) Evacuate and charge system (para 2-128 and para 2-129).

(9) Install heater access cover (5, fig. 2-49).

### 2-115. Hot Gas Bypass Valve

The hot gas bypass valve (8, fig. 2-53) controls the capacity of the air conditioning system by putting an artificial load on the evaporator coil.

*a. Test.* If the air conditioning system discharge air is below 50 degrees F, test the hot gas bypass valve (8, fig. 2-53) as follows:

(1) Connect gage manifold (fig. 2-55) to suction and discharge service valves (fig. 2-55) and (1 and 2, fig. 2-54).

(2) Close manifold valves (fig. 2-55).

(3) If gage connected to suction valve reads below 40 psig with system operating, and there are no bubbles in the sight glass, the hot gas bypass valve is not opening because of improper adjustment or failure.

*b. Adjust.* Adjust the hot gas bypass valve as follows:

(1) Connect gage manifold (fig. 2-55) to suction and discharge service valves (1 and 2, fig. 2-54).

(2) Open the suction and discharge service valves.

(3) Position AIR CONDITIONING switch to COOL.

(4) Remove cap on suction valve and rotate adjustment stem to obtain reading of 40 psig on gage.

**NOTE**

Rotating adjustment stem clockwise will increase pressure. One complete turn will result in 4 psig pressure change. Make adjustment slowly to allow system pressure to equalize.

c. *Removal.* Remove hot gas bypass valve as follows:

**WARNING**

Refrigerant is at high pressure; open suction service valve slowly.

(1) Relieve refrigerant pressure by removing cap from suction valve and opening valve.

(2) Remove panel (5, fig. 2-49) over hot gas bypass valve by removing four bolts.

(3) Disconnect refrigerant line (7, fig. 2-53) from hot gas bypass valve (8).

(4) Remove two bolts (5) securing valve to mounting bracket.

(5) Remove two bolts (6) and separate valve at flange.

*d. Installation.* Install hot gas bypass valve as follows:

**CAUTION**

Be careful when separating valve at flange to prevent internal parts of valve from dropping out.

(1) position valve body in place and insure that internal part of valve is properly seated. Install two bolts (6, fig. 2-53).

**NOTE**

Insure new preformed packing is installed in valve connection flange.

(2) Install mounting bracket with two bolts (5).

(3) Connect line (7) to valve (8).

(4) Install new dehydrator (para 2-112).

(5) Evacuate and charge system (para 2-128 and 2-129).

**2-116. Sight Glass**

The refrigerant sight glass (4, fig. 2-53) provides a visual indication of refrigerant flow and moisture content. Under normal operating conditions, with a full refrigerant charge, the sight glass will be free of bubbles. A normal "blue" color means no moisture content. A change to "pink" means moisture content.

*a. Removal.* Remove sight glass as follows:

(1) Evacuate refrigerant (para 2-128).

(2) Heat and disconnect sight glass connections.

*b. Installation.*

(1) Install in accordance with paragraph 2-111.

(2) Evacuate and recharge system in accordance with paragraphs 2-128 and 2-129.

**2-117. Hi-Low Pressure Switch**

The high-low pressure switch (3, fig. 2-54) is a protective device that will disengage the refrigerant compressor clutch to protect the system from excessively high or low pressure.

*a. Test.* With the air conditioning system operating, test the high-low pressure switch (3, fig. 2-54) as follows:

(1) Remove cover (8) to gain access to the high-low pressure cutout adjustment knobs (4 and 5, fig. 2-54).

(2) Remove knob (4) from top of high-low pressure switch.

(3) Remove locking plate (7).

(4) Connect manifold gage (fig. 2-55) to the discharge and suction service valves (1 and 2, fig. 2-54).

(5) Test the high-pressure switch as follows:

(a) Slowly raise the discharge pressure by carefully blocking airflow through the condenser fan housing.

(b) When the discharge pressure reaches 200 psig, if necessary, install control knob on the high pressure switch adjustment screw (4, fig. 2-54) adjust knob until the cutout stops the compressor (at 300 psig).

(c) Restart the compressor and again carefully raise the discharge pressure by blocking the airflow through the condenser fan housing. If the high-pressure switch does not stop the compressor at 300 (± 10) psig, replace the control.

(6) Test the low-pressure switch as follows:

(a) Check the cut-in setting, with the compressor running, by slowly closing the suction line valve until the low-pressure switch stops the compressor.

(b) Slowly crack open the suction line valve and raise the suction pressure to 45 psig, adjust the range adjustment screw to start the compressor.

**NOTE**

If the compressor starts before the suction line pressure reaches 45 psig, reset the switch setting, and repeat steps (a) and (b) above.

(c) Check the switch setting, with the compressor running, by slowly closing the suction valve until 20 psig is reached. If necessary, adjust the differential adjustment screw (6, fig. 2-54) until the compressor stops (at 20 psig).

(d) Recheck the cut-in and cut-out settings of the switch. Replace the switch if it does not start the compressor at 45 (± 5) psig or stop the compressor at 20 (± 5) psig.

*b. Removal.* Remove the high-low pressure switch as follows:

**WARNING**

Refrigerant is at high pressure; open suction valve slowly.

**NOTE**

When evacuating system, first open suction valve, then discharge service valve (1 and 2, fig. 2-54), and watch exhaust gas carefully. If gas contains oil, close down valves until oil no longer appears.

(1) Relieve refrigerant pressure by removing caps from valves and opening valves.

(2) Remove cover (8, fig. 2-54) from high-low pressure switch (3).

(3) Remove electrical wires of cable (9).

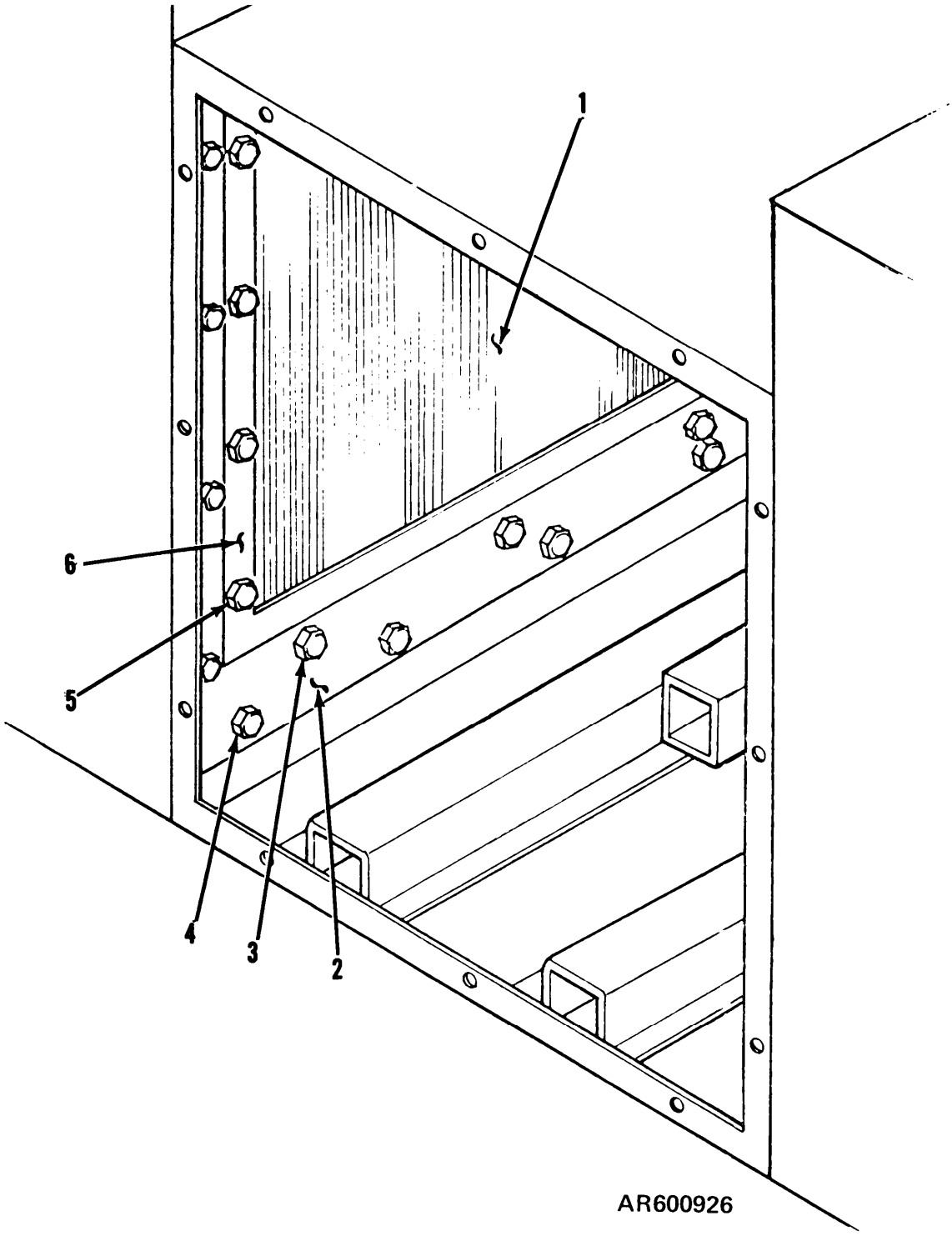
(4) Unsolder and disconnect high pressure line and low pressure line.

(5) Remove four bolts and remove high-low pressure switch.

c. *Installation.* Installation is the reverse of removal. After installation, evacuate and charge the system (para 2-128 and 2-129).

**2-118. Evaporator Coil**

The evaporator coil (1, fig. 2-48) is an aluminum-tube, fin type; its function is to cool the air entering the shelter when air conditioning is required.




1 Evaporator coil
2 Support panel
3 Bolts
4 Bolts
5 Bolts
6 Coil frame

*Figure 2-48. Evaporator coil.*

*a. Service.* Service evaporator coil as follows:

(1) Check evaporator coil for leaks, using a halide leak detector (para 2-126).

(2) Inspect for bent fins. Straighten bent fins by using a fin comb.

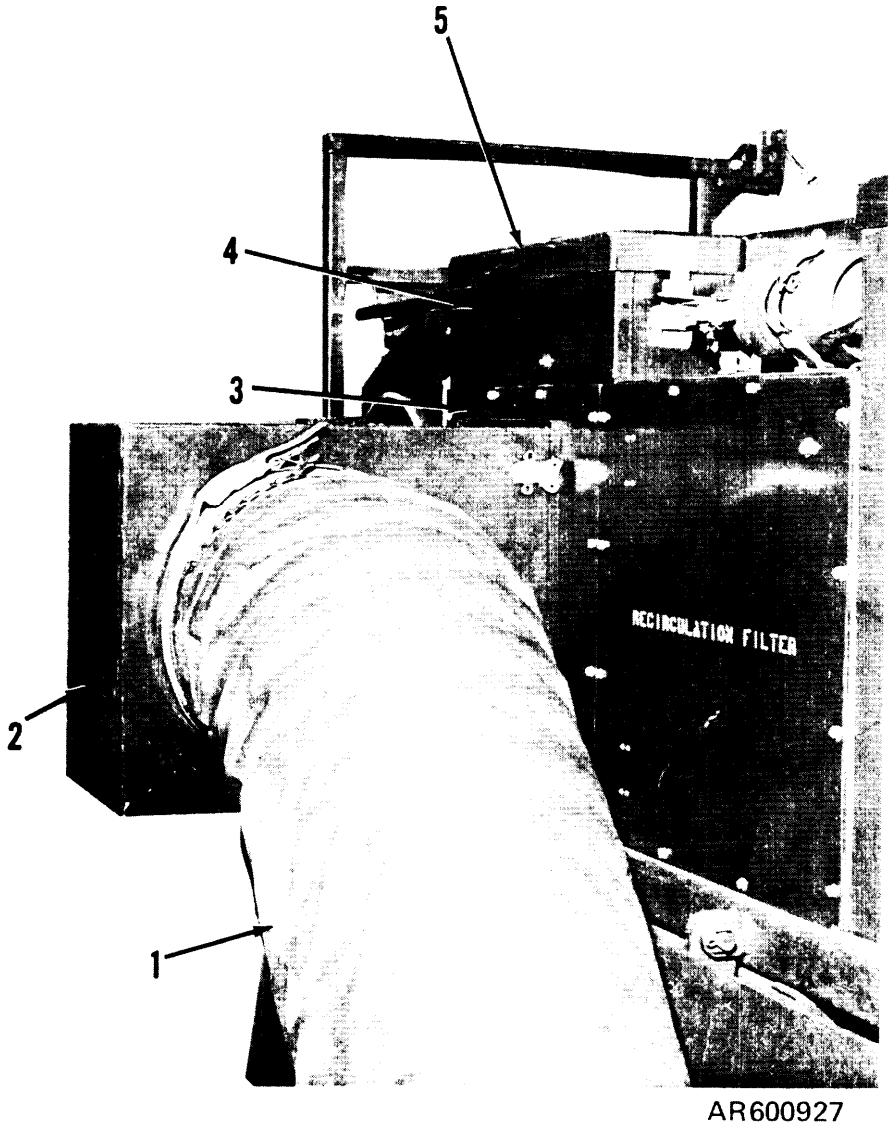
*b. Removal.* Remove the evaporator coil as follows:

**WARNING**

Refrigerant is at high pressure; open suction service valve slowly.

(1) Relieve refrigerant pressure by opening suction service valve (2, fig. 2-54) and discharge service valve (1).

(2) Remove heater access cover (5, fig. 2-49),




1 Supply airduct
2 Supply plenum
3 End panel
4 Heater and evaporator cabinet
5 Cover

*Figure 2-49. Detachable plenum and duct*

(3) Remove supply air duct (1, fig. 2-49) and plenum (2). Remove end panel (3) from cabinet (4).

(4) Remove recirculation filter. Refer to TM 3-4240-264-12 for removal instructions.

(5) Disconnect refrigerant lines (4 and 5, fig. 2-47) from coil.

(6) Remove 24 bolts (4, fig. 2-48) and remove evaporator coil assembly.

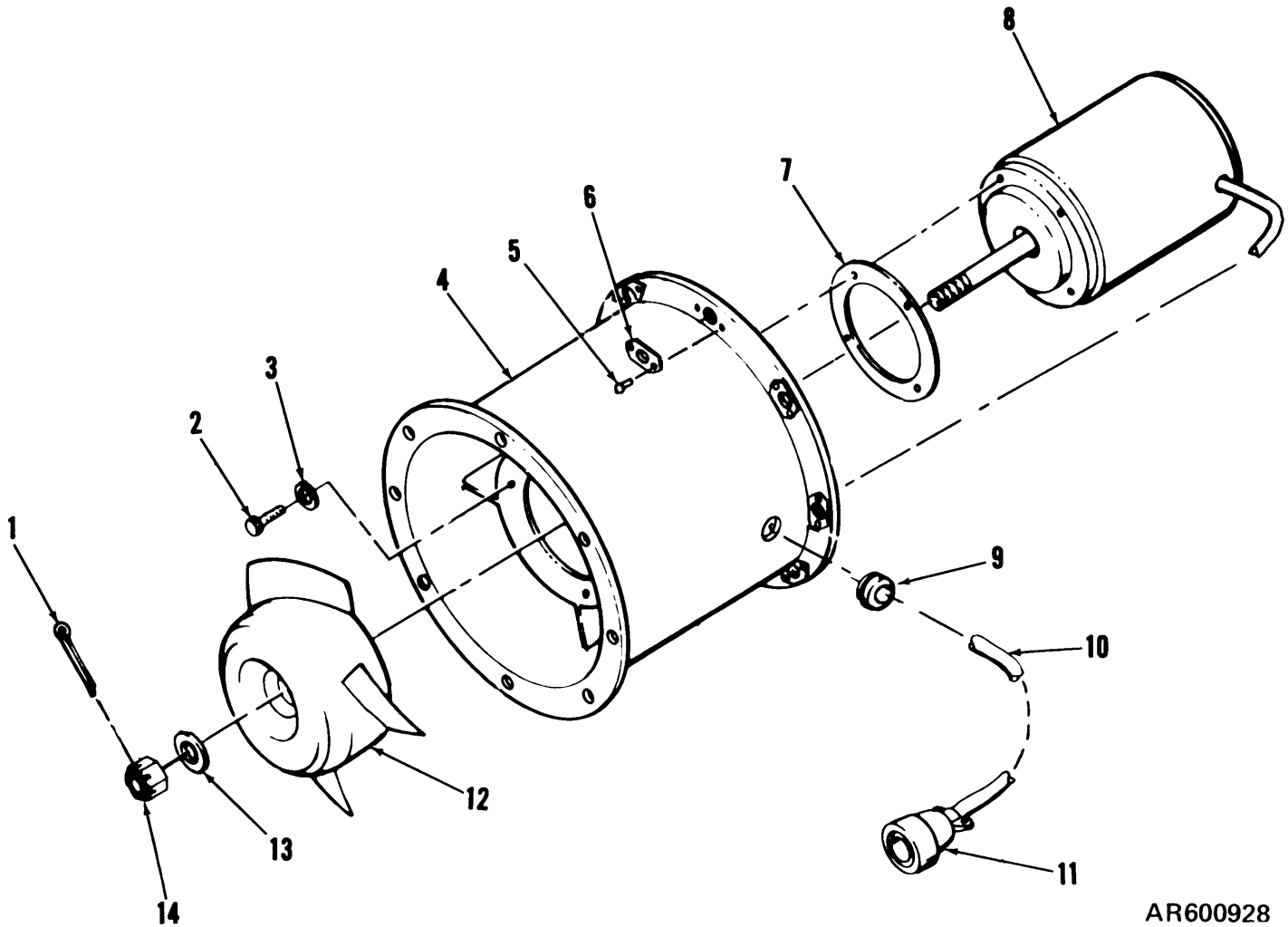
(7) Remove eight bolts (5) and remove coil frame (6) from evaporator coil (1).

c. *Installation.* Installation is the reverse of removal. Install new dehydrator (para 2-1 12).

Evacuate and charge the refrigerant system (para 2-128 and 2-129).

**2-119. Recirculation Fan**

The recirculation fan (fig. 2-50) is a vaneaxial type; it has an output of 1,200 cfm at 3.1 inches w.g. Its function is to recirculate shelter air through the evaporator coil to remove contaminants.




1 Cotter pin
2 Screw
3 Lockwasher
4 Housing
5 Rivet
6 Nut
7 Gasket
8 Motor
9 Grommet
10 Cable
11 Connector
12 Impeller
13 Washer
14 Nut

*Figure 2-50. Recirculation fan.*

*a. Test.* Test the recirculation fan as follows:

(1) Remove main control indicator TM 3-4240-264-12.

(2) Disconnect the electrical connector (11, fig. 2-50).

(3) Check for continuity between pins A and B, A and C, and B and C of connector P12A. Continuity should exist.

(4) Check for continuity between pin D and motor housing (4) and pin E and motor housing.

(5) There should be no continuity between pins D and E and the motor housing.

(6) Remove plenum.

(7) Rotate impeller (12) by hand to check for defective bearings.

*b. Motor removal.* Remove motor as follows:

(1) Remove recirculation fan (TM 3-4240 - 264-12).

(2) Remove cotter pin (1, fig. 2-50).

(3) Remove nut (14) and washer (13).

(4) Remove impeller (12).

(5) Remove four bolts (2) and lockwashers (3).

(6) Remove plug connector (11) from cable (10) and tag wires.

(7) Pull cable (10) through rubber grommet (9) and slide motor (8) and gasket (7) out of housing (4).

*c. Motor installation.* Installation is the reverse of removal except for the following:

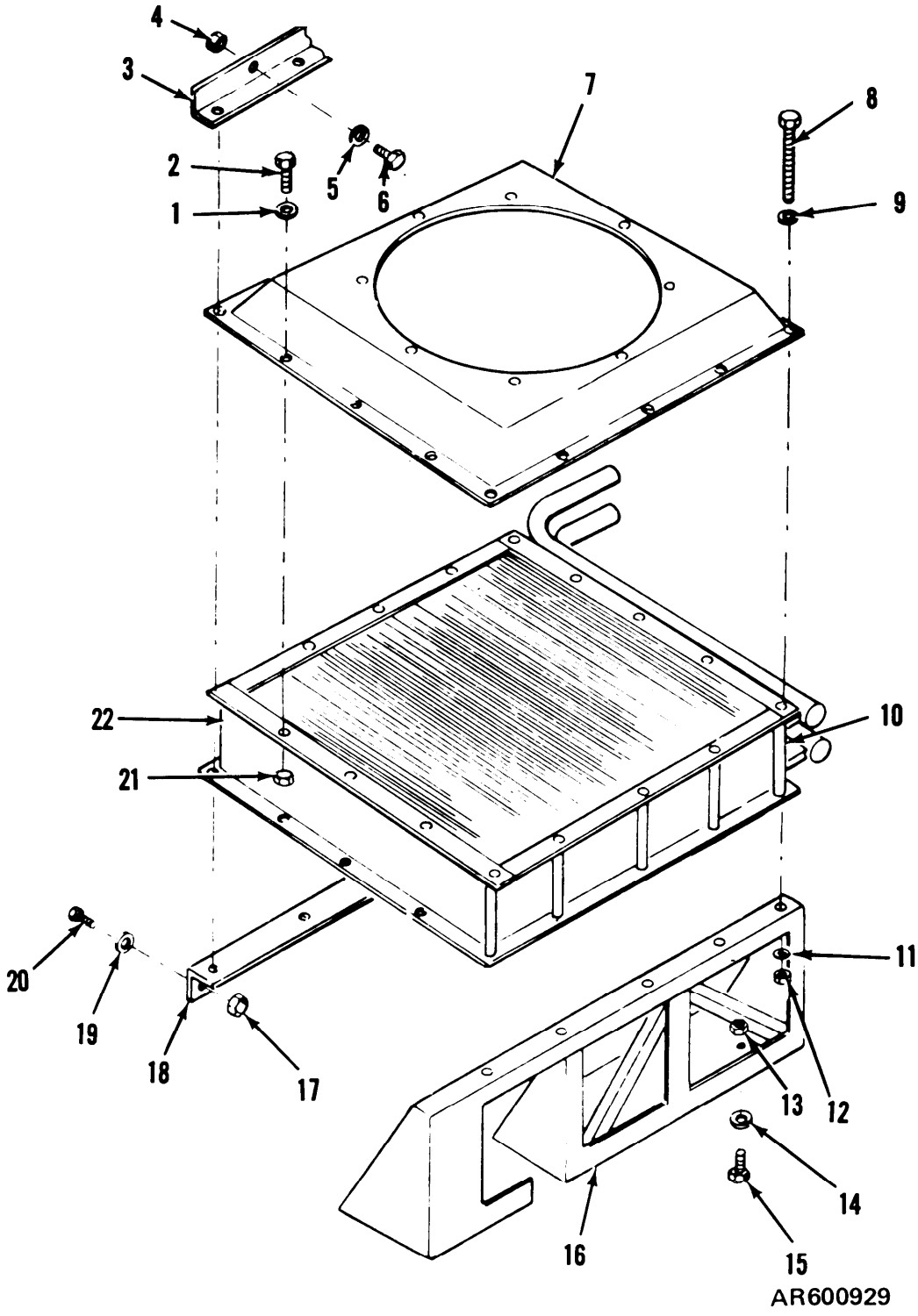
(1) Clean adhesive residue from housing (4, fig. 2-50) with decreasing solvent (item 4, table 2-1).

(2) If rubber grommet (9) has deteriorated, replace.

(3) If self-locking plate nuts (6) are damaged, remove rivets (5) and nuts and replace.

**2-120. Condenser Coil**

The condenser coil (22, fig. 2-51) is a copper tube, fin type. Its function is to remove the heat and condense the refrigerant gas used in the shelter air conditioning system.




| | | |
|---|---|---|
| 1 Washer | 9 Washer | 16 Support bracket |
| 2 Screw | 10 Spacer | 17 Nut |
| 3 Wall angle | 11 Lockwasher | 18 Wall angle |
| 4 Nut | 12 Nut | 19 Washer |
| 5 Washer | 13 Nut | 20 Screw |
| 6 Screw | 14 Washer | 21 Nut |
| 7 Plenum | 15 Screw | 22 Condenser |
| 8 Screw | | |

*Figure 2-51. Condenser coil.*

*a. Service.* Service the condenser coil as follows:

(1) Inspect bottom of condenser coil and the area under the coil by reaching under the coil and feeling for debris under the coil or stuck to the bottom of the coil.

(2) Inspect the condenser tubing, fins, supports, and plenum for tightness.

(3) Carefully straighten any bent fins with a fin comb.

(4) Inspect bolts and nuts attaching fan, supports, and plenum for tightness.

(5) Check condenser coil for leaks with a halide leak detector (para 2-126).

**NOTE**

When checking the high side of the system, raise the high side pressure as near as possible to the high pressure cutout (275 psig). This may be accomplished by operating the system and blocking the airflow across the condenser to bring head pressure up for leak testing, if required.

*b. Removal.* Remove the condenser coil (22, fig. 2-51) as follows:

**WARNING**

Refrigerant is at high pressure; to prevent injury, open suction valve slowly.

(1) Remove condenser fan assembly. Refer to TM 3-4240-264-12.

(2) Relieve refrigerant pressure by opening suction valve; then, opening discharge valve.

(3) Disconnect refrigerant lines.

(4) Remove five screws (15, fig. 2-51), washers (14), and nuts (13).

(5) Remove four screws (20), washers (19), and nuts (17).

(6) Remove four screws (6), washers (5), and nuts (4).

(7) Lift out condenser coil assembly (22).

(8) Remove ten screws (8), washers (9), lockwashers (11), and nuts (12) that attach wall angles (3) and (18), and support bracket (16) to condenser coil (22).

(9) Remove 10 screws (2), washers (1), and nuts (21) that attach transition plenum (7) to condenser coil (22).

c. *Installation.* Installation is the reverse of removal. Install new spacers [aluminum tube (10) ], if damaged. Install new dehydrator (para 2-112). Evacuate and charge the refrigerant system (para 2-128 and 2-129).

## Section XVIII. AIR CONDITIONING SYSTEM REFRIGERANT SERVICE

### 2-121. Precautions When Handling Refrigerant

The air conditioning system (fig. 2-52) on the shelter system is charged with refrigerant-12 (R12). Although R12 is one of the safest refrigerants to handle, it is important that personnel observe the following precautions in handling the refrigerant.

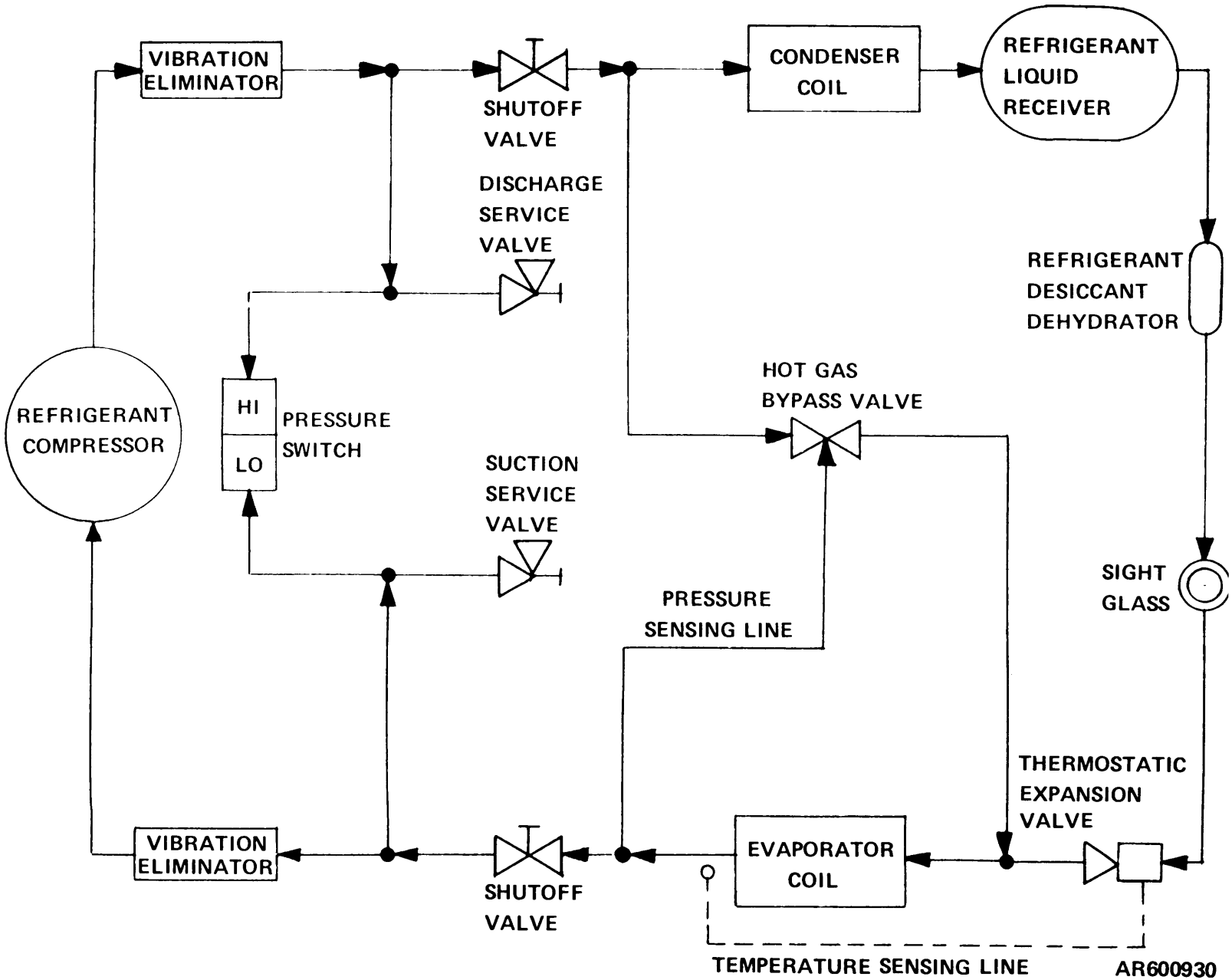



*Figure 2-52. Air conditioning system refrigerant flow diagram.*

*a.* Do not discharge R12 into areas having exposed flames. A heavy concentration of refrigerant in contact with a live flame produces a gas which is toxic and attacks bright metal surfaces.

*b.* Do not expose the eyes to the refrigerant. If R12 comes in contact with eyes, observe the following instructions.

(1) Do not rub the eye(s).

(2) Arrange at once to take the affected person to an eye specialist.

(3) Put drops of sterile mineral oil into the eyes to remove the excess refrigerant.

(4) Wash the eyes with either a weak solution of boric acid or a sterile salt solution (not to exceed 2 percent sodium chloride).

*c.* Do not expose the skin to the liquid refrigerant. If the liquid comes in contact with the skin treat the injury the same as though the skin has been frostbitten or frozen. If a person is overcome in an area which lacks oxygen because of the presence of a high concentration of R12, treat the person by applying artificial respiration.

### 2-122. Refrigerant Service Cylinder Handling Procedures

The following precautions must be observed when handling refrigerant service cylinders.

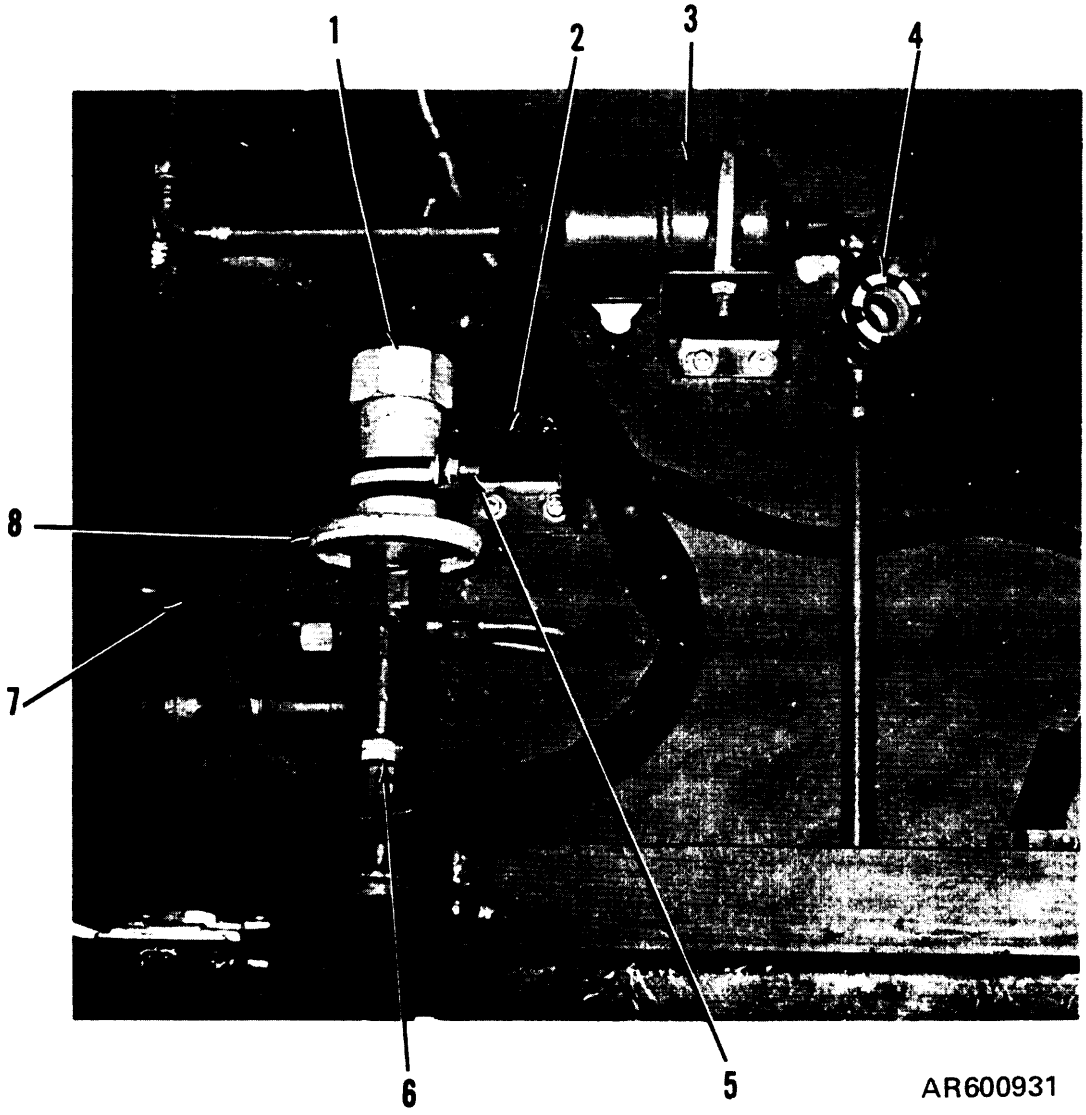
*a.* Do not leave the refrigerant cylinder uncapped. All refrigerant cylinders are shipped with a metal screw cap to protect the valve and safety plug from damage. Replace the cap after each use of the refrigerant cylinder.

*b.* Do not carry or otherwise transport a refrigerant cylinder in the passenger compartment of a vehicle. Do not expose refrigerant cylinder to radiant heat from the sun because the resulting increase in pressure can cause the safety plug to release or the cylinder to burst.

*c.* Never subject the refrigerant cylinder to high temperature when adding refrigerant to the air conditioning system.

### 2-123. Checking Refrigerant Charge Level and Moisture Content

*a.* Operate air conditioning system for five or more minutes and check refrigerant sight glass (4, fig. 2-53) for bubbles in the passing refrigerant fluid. If bubbles in the refrigerant fluid are evident, add refrigerant to system (para 2-125).




1 Cap
2 Bracket
3 Dehydrator
4 Sight glass
5 Bolts
6 Bolts
7 Refrigerant line
8 Hot gas bypass valve

*Figure 2-53. Hot gas bypass valve, dehydrator, and sight glass.*

b. Moisture content in the refrigerant fluid can be determined by checking for color change of the chemically -treated sight indicator, A normal "blue" color means no moisture content. A change to "pink" means moisture content. If sight indicator shows pink, evacuate (para 2-128) and charge (para 2-129) the air conditioning system.

**2-124. Insufficient Cooling Check**

*a.* Connect the gage manifold, or equivalent, to the suction and discharge service valves (fig. 2-54).

I.egend for fig. 2-54:
1 Discharge service valve
2 Suction service valve
3 Hi-low pressure switch
4 Hi-pressure adjustment knob
5 Low pressure adjustment knob
6 Differential adjustment screw
7 Locking plate
8 Cover
9 Electrical cable

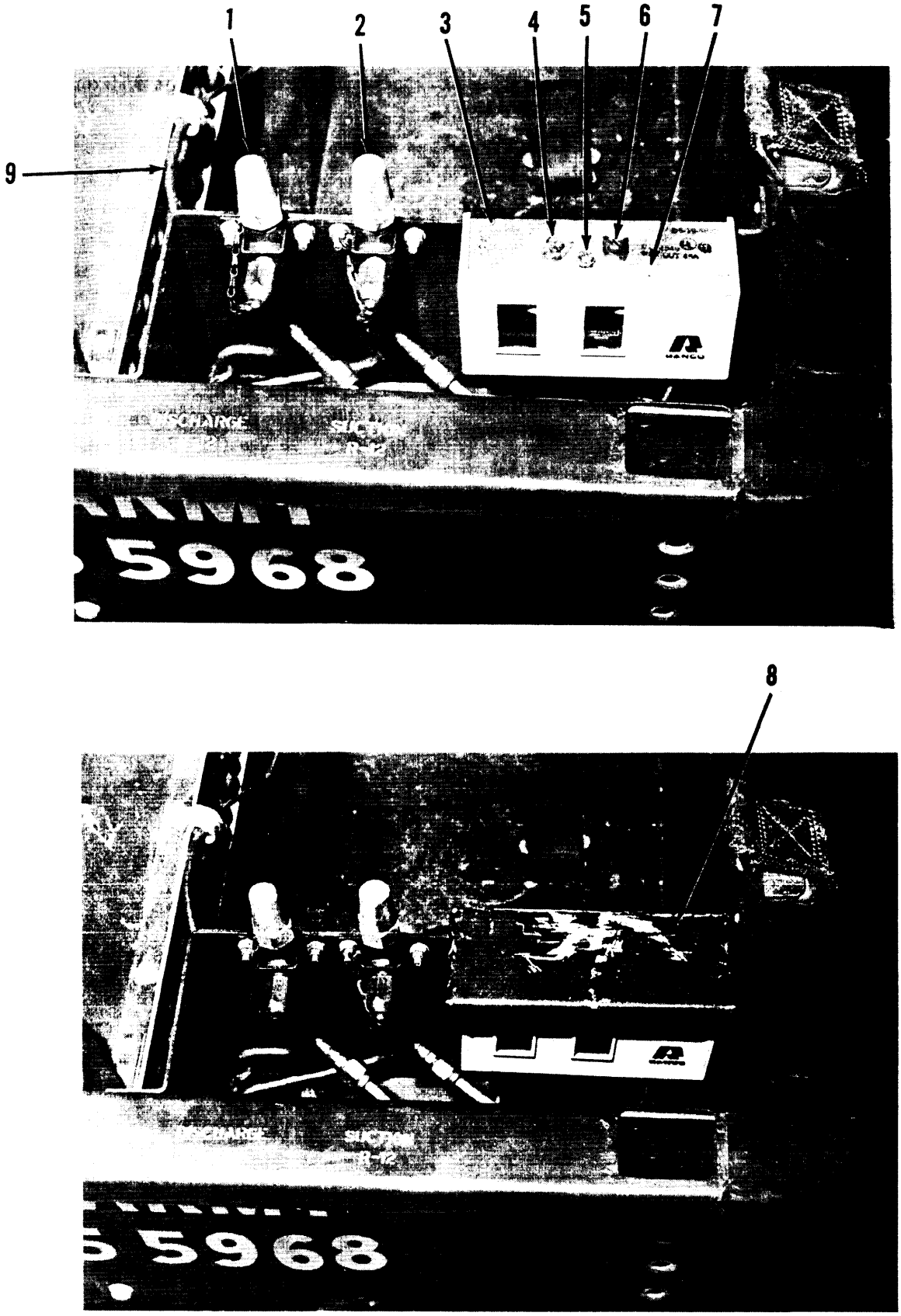



*Figure 2-54. HI-low pressure switch and suction and discharge service valves.*

**NOTE**

Make sure the gage manifold is clean and in operational condition.

*b.* While air conditioning system is operating, check for pressure differential. Pressure differential should be 100 to 200 pounds per square inch gage (psig) depending upon the ambient temperature. The warmer the ambient temperature, the greater the differential (table 2-7).

*Table 2-7. Ambient Temperature and Refrigerant Pressure,*

| *Ambient Temperature* | *Suction Pressure* | *Discharge Pressure* |
|---|---|---|
| 80 F (27 C) | 30 to 35 psig | 170 to 190 psig |
| 90 F (32 C) | 30 to 35 psig | 180 to 200 psig |
| 100 F (38 C) | 30 to 35 psig | 190 to 210 psig |
| 110 to 125 F (43 to 52 C) | 30 to 35 psig | 200 to 275 psig |

*c.* If there is a small pressure differential, check for the following causes:

(1) Ambient temperature too low (table 2-7).

(2) Compressor V-belts improperly adjusted and slipping. Properly adjust or if necessary replace V-belts (TM 3-4240-264-12).

(3) Malfunctioning compressor. Replace compressor (para 2-130 through 2-135).

(4) Refrigerant fluid low. Add R12 to system (para 2-125), and check for leaks (para 2-126).

**2-125. Adding Refrigerant**

*a.* Unscrew protective caps from suction and discharge valves (fig. 2-55).

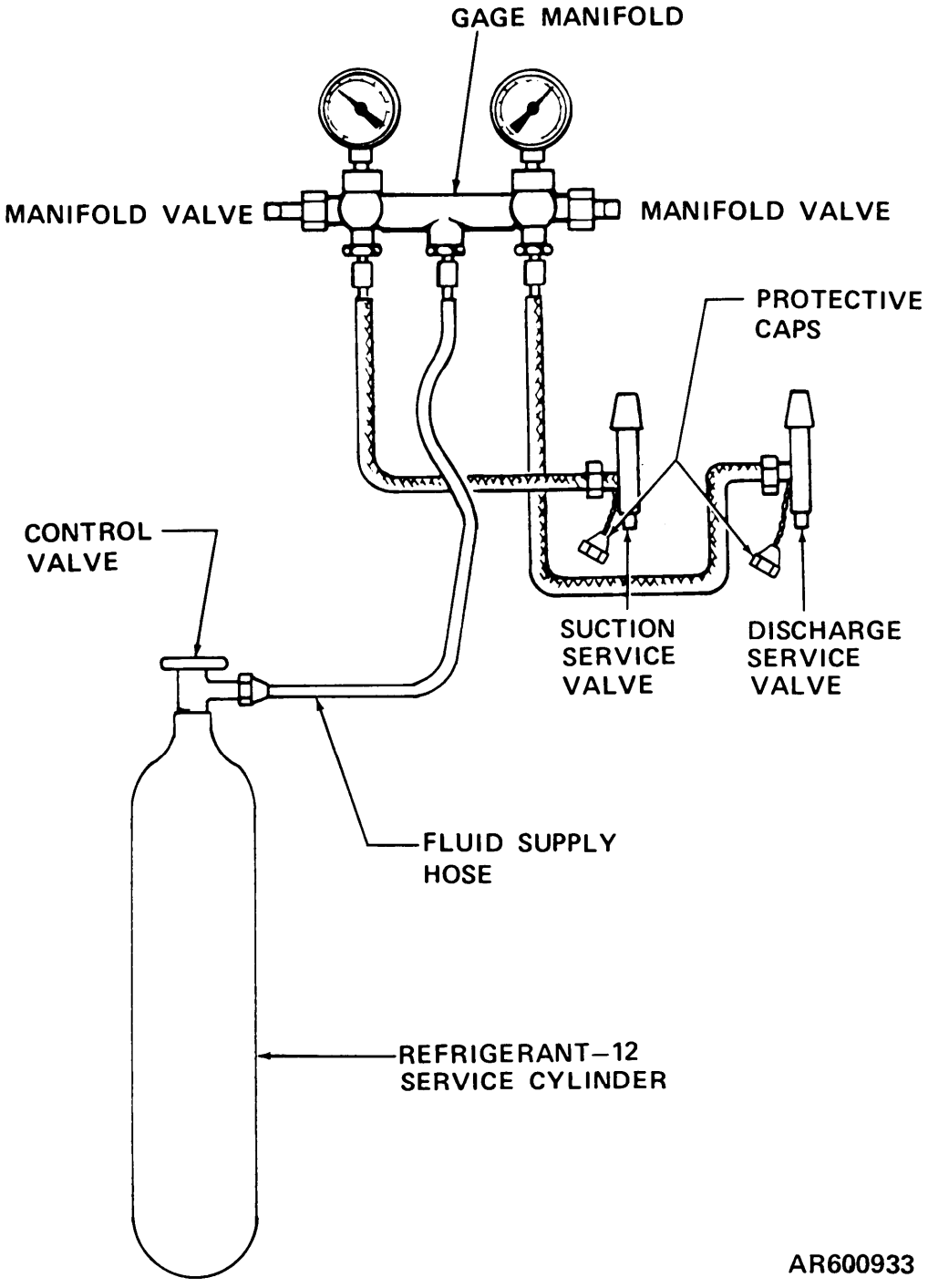



*Figure 2-55. Adding refrigerant to air conditioning system.*

*b.* Connect the gage manifold hoses to the suction and discharge valves. Do not tighten the manifold hose couplings at the suction and discharge valve connections.

**NOTE**

Make sure the gage manifold is clean and in operational condition.

**WARNING**

To avoid eye injury wear goggles when handling service cylinders.

*c.* Attach the fluid supply hose to the R12 service cylinder and tighten.

*d.* Be sure manifold valves are open.

e. Bleed air out of lines.

*f.* Open the service cylinder control valve to permit R12 to escape from the hoses attached to the suction and discharge valves. When the R12 has displaced the air trapped in the gage manifold and hoses, tighten the loose couplings, and close the service cylinder control valve.

g. Operate air conditioning system for five minutes or more.

*h.* Open suction and discharge service valves.

*i.* While observing the liquid sight glass, admit small quantities of R12, using the service cylinder control valve to meter the flow. When the bubbles in the liquid sight glass have been eliminated, close the service cylinder control valve. Observe the liquid sight glass for three or four minutes after flow clears to ascertain that sufficient R12 has been added to the system.

**CAUTION**

To prevent damage to the compressor, do not overcharge the refrigerant system. After each small quantity of R12 has been added, allow three to four minutes for the refrigerant to circulate before adding more refrigerant.

*j.* Monitor gage for maximum reading according to Table 2-7.

*k.* Close suction and discharge service valves.

*l.* Close the manifold valves.

**NOTE**

Be sure the refrigerant service cylinder control valve is closed before disconnecting any hoses.

**CAUTION**

High pressure refrigerant is trapped in the manifold hoses and fluid supply hose. To prevent loss of compressor oil, caution should be used in releasing this pressure.

*m.* Disconnect the manifold hoses from the discharge and suction valves. Reinstall the protective caps.

*n.* Inspect air conditioning system for leaks (para 2-126).

### 2-126. Inspect Refrigerant System for Leaks

*a.* An electronic type halogen leak detector is used to detect refrigerant system leaks. The leak detector is a very sensitive device, and to some extent dangerous to use. It incorporates a sensing element that operates at approximately 14720 F. This device is best used to detect small leaks because a large area contaminated with leakage makes it difficult to pinpoint a leak.

**WARNING**

The halogen leak detector uses an open flame and should not be used in the presence of explosive or flammable gases.

**CAUTION**

Do not expose the leak detector probe to large leaks that can be detected without the use of the leak detector. This will prevent damage to the leak detector probe.

(1) Pass the leak detector probe over all refrigerant lines, fittings, couplings, brazed joints and valves.

**NOTE**

To obtain good leak detection, avoid using the leak detector in a draft, also, avoid exposing the leak detector probe to refrigerant leakage for a long period of time.

(2) Pass the leak detector probe over all accessible sweated joints on components such as the condenser and evaporator assemblies. Check the compressor housing and the refrigerant liquid sight indicator.

(3) Mark all leaks and repair them upon completion of leak test (para 2-111).

*b.* A halide torch leak detector can be used in much the same manner at the electronic type halogen leak detector. The same precautions concerning the use of the electronic type halogen leak detector in the presence of explosive or flammable gases is equally applicable to the use of the halide torch.

(1) The halide torch, when ignited gives off a greenish flame in the presence of a small refrigerant leak. It will give off a dense blue flame with a reddish tip or it may be extinguished in the presence of a large leak.

(2) The halide torch is extremely sensitive. The presence of R12 in the air due to changing refrigerant cylinders or making repairs may interfere with a test by coloring the flame regardless of the position of the searching tube. In this case, it will be necessary to ventilate the compartment thoroughly.

(3) The exploring tube of this detector should be run over all sweat fittings, all mechanical couplings, and all valves. All portions of the system under refrigerant pressure should be methodically checked with this device.

*c.* A solution of soap can be used to detect leaks. In order to detect small leaks, system pressure must be raised above 100 psig. This can be accomplished by installing a refrigerant service cylinder (fig. 2-55).

(1) Brush all refrigerant fittings, couplings, and valves with soap solution, and check for bubbles.

(2) Wipe solution from joints; mark all spots

where leaks are detected and replace the damaged sections (para 2-111).

**2-127. Discharging Air Conditioning System**

*a.* Unscrew the discharge service valve protective cap (fig. 2-55).

*b.* Attach a bleed hose to the discharge service valve outlet and bleed slowly to eliminate loss of oil in the system.

**WARNING**

To avoid eye injury wear protective goggles when discharging air conditioning system.

*c.* Discharge system by opening the discharge service valve.

**NOTE**

Bleed the refrigerant slowly to prevent blowing oil out of the compressor.

*d.* Remove hose from the discharge valve when the refrigerant discharge ceases. Record the amount of oil collected in a 500 ml graduated cylinder. It may be necessary to replace the escaped oil in the refrigerant compressor.

**2-128. Evacuating Refrigerant System**

*a.* Discharge system (para 2-127).

*b.* Unscrew the suction service valve protective cap (fig. 2-55).

c. Connect the gage manifold to the suction and discharge valves.

*d.* Connect the vacuum pump, valve, and vacuum indicator to the center port of the gage manifold (fig. 2-56).

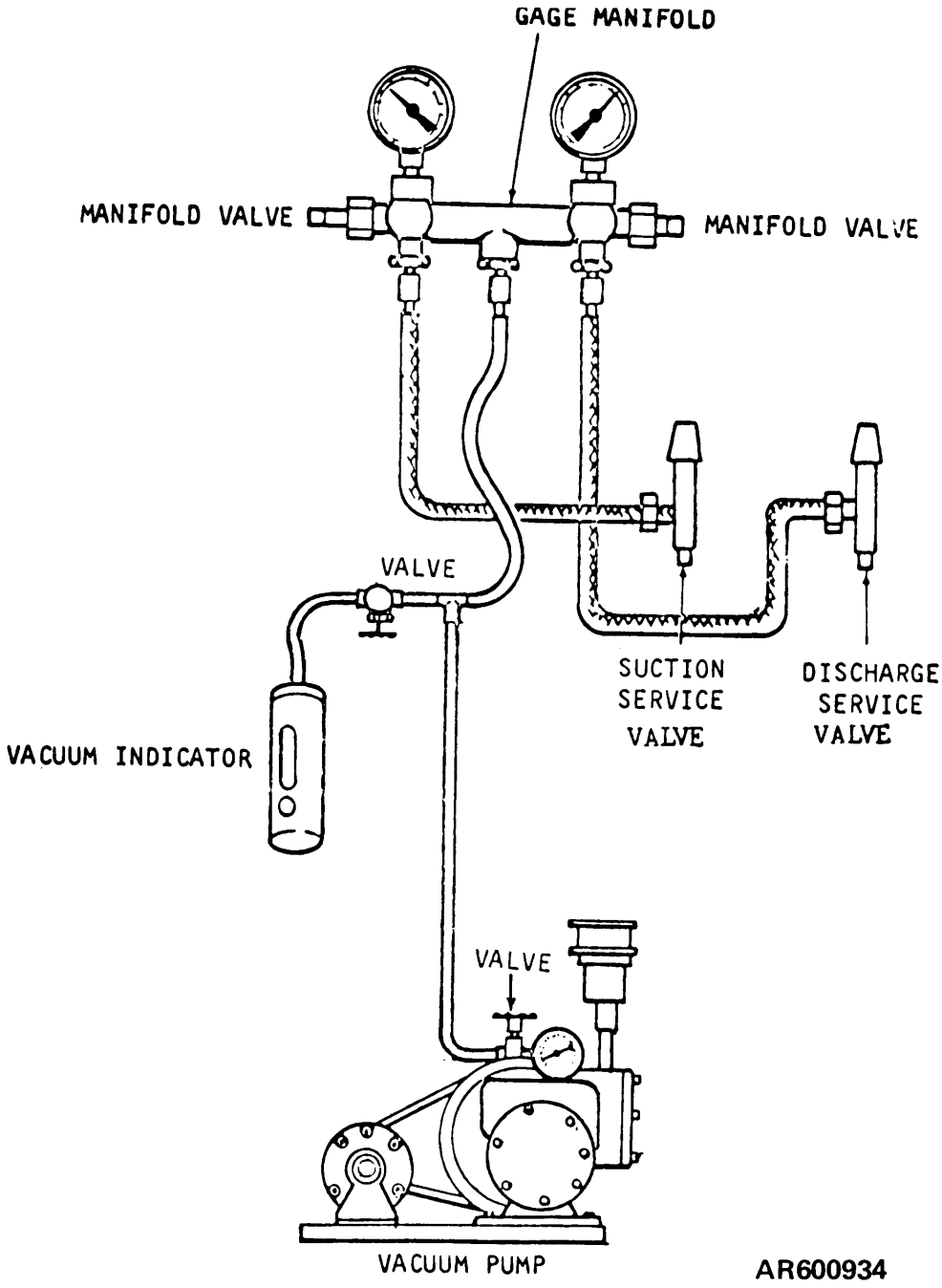



*Figure 2-56. System evacuation and gage manifold—hookup.*

**NOTE**

When manifold valves are in closed position, center tap of manifold is closed.

*e.* Open all valves.

*f.* Start vacuum pump and operate until system is evacuated to 500 microns [0.5 mm mercury (hg) ] or 30 psig on suction gage. System should be evacuated for a minimum period of four hours.

g. Close manifold valves and stop vacuum pump. Observe for a period of two hours to insure gage holds at 25 to 30 psig.

*h.* Disconnect vacuum pump from center port.

*i.* Attach a bleed hose to the center port of the gage manifold; place the other end of the hose into a 500 ml graduated cylinder.

**WARNING**

To avoid eye injury wear protective goggles when discharging air conditioning system.

*j.* Discharge system by opening the manifold gage valves.

**NOTE**

Bleed the refrigerant slowly to prevent blowing oil out of the compressor.

*k.* Close gage manifold valves.

*l.* Disconnect the bleed hose from the gage manifold center port. Record the amount of oil collected in the 500 ml graduated cylinder. It may be necessary to replace the escaped oil in the refrigerant compressor.

*m.* Connect R12 service cylinder to center port of gage manifold. Do not tighten fluid supply hose connection at manifold.

*n.* Open valve on service cylinder, allow fluid supply hose to purge at manifold, and tighten connection.

*o.* Open manifold valves and allow system to fill with refrigerant.

*p.* When pressure in service cylinder and system has equalized, close suction and discharge service valves.

*q.* Close manifold valves.

*r.* Close valve on service cylinder, and disconnect cylinder from manifold.

*s.* Connect vacuum pump to center port on manifold.

*t.* Open all valves.

*u.* Start vacuum pump and operate until system is evacuated to 500 microns (0.5 mm hg).

*v.* Close vacuum pump suction valve, and hold vacuum in system for 15 minutes.

*w.* Monitor vacuum indicator. If no noticeable rise in pressure has taken place after 15 minutes, the system may be charged. If there is a pressure rise, the leak must be located and repaired, and the system must be reevaluated.

*x.* Close manifold valves, and disconnect vacuum pump from manifold.

*y.* Charge air conditioning system.

**2-129. Charging Refrigerant System**

*a.* If not already accomplished, discharge and evacuate the air conditioning system according to paragraphs 2-127 and 2-128.

*b.* Connect R12 service cylinder to center port of gage manifold. Do not tighten fluid supply hose connection at manifold.

*c.* Open valve service cylinder, allow fluid supply hose to purge, and tighten connection.

*d.* Open manifold suction valve to allow refrigerant to go into system. Manifold discharge valve must remain closed.

*e.* Check V-belts for proper tension. (Refer to TM 3-4240-264-12.)

*f.* Set refrigerant service cylinder in an upright position.

g. Start up system and then the refrigerant compressor by positioning environmental control switch located on the auxiliary control indicator to COOL.

**CAUTION**

During the following steps, monitor gage connector to discharge valve. Gage reading shall not exceed 275 psig at ambient temperature of 110 degrees to 125 degrees F. If gage reading reaches 275 psig, close valve on refrigerant cylinder.

*h.* Open manifold suction valve.

*i.* When sufficient refrigerant has been drawn into the air conditioning system, close manifold suction valve and check suction gage pressure. System should read between 30 and 35 psig.

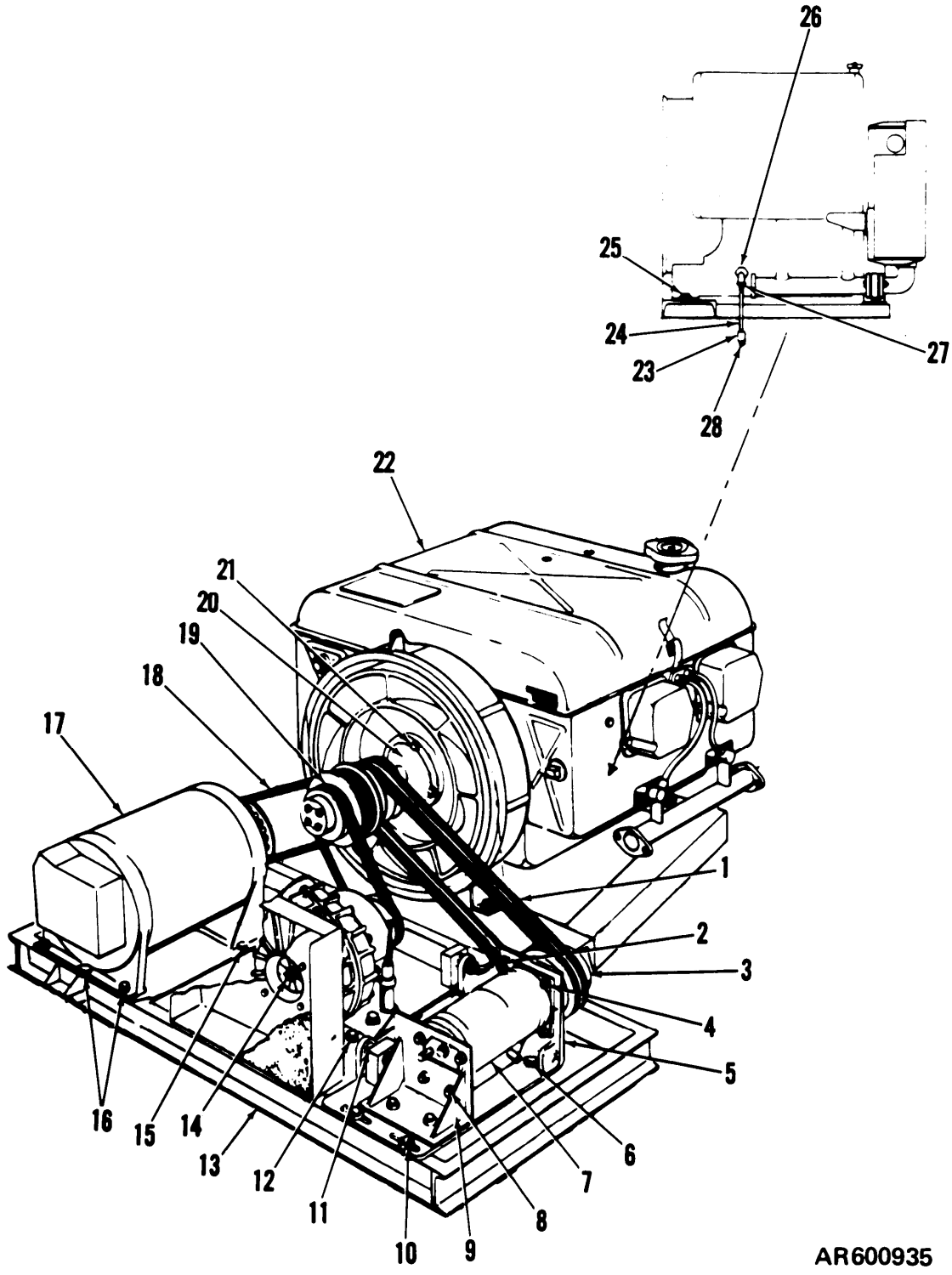
## Section XIX. REFRIGERANT COMPRESSOR

**2-130. Refrigerant compressor**

Direct support maintenance personnel are authorized to remove, repair and replace the refrigerant compressor and its attaching hardware.

**2-131. Removal**

Remove compressor (7, fig. 2-57) as follows:



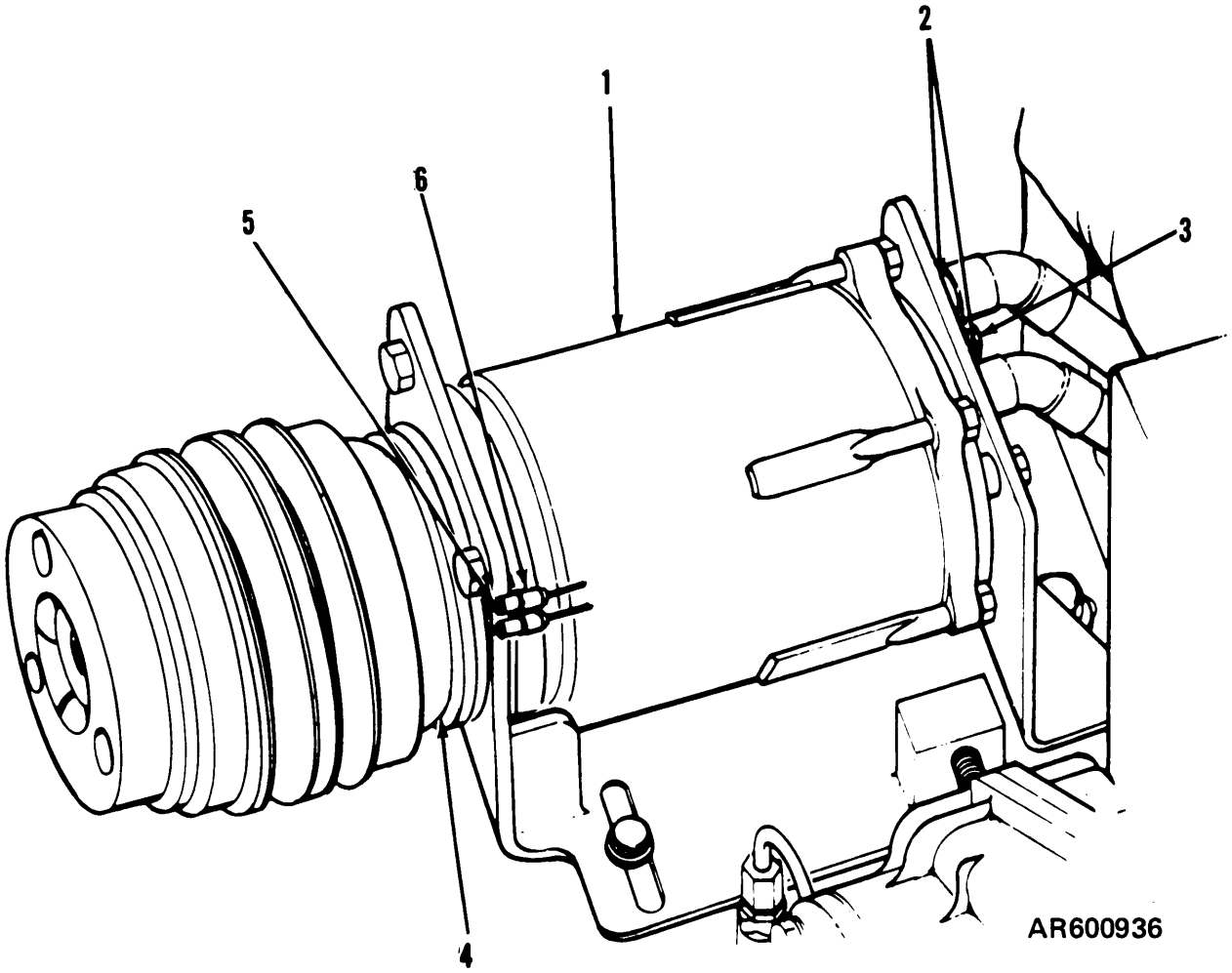

| | | | |
|---|---|---|---|
| 1 Drive belts | 8 Bolt | 15 Adjustment bolt | 22 Engine |
| 2 Adjustment bolt | 9 Bracket | 16 Bolt | 23 Coupling |
| 3 Pulley | 10 Bolt | 17 Generator | 24 Nipple |
| 4 Bolt | 11 Adjustment bolt | 18 Drive belt | 25 Bolt, washer |
| 5 Mounting plate | 12 Bolt | 19 Drive belt | 26 Adapter |
| 6 Bolt | 13 Pallet | 20 Driveshaft extension | 27 Elbow |
| 7 Compressor | 14 Blower | 21 Bolt, lockwasher | 28 Plug |

*Figure 2-57. Refrigerant compressor and gasoline engine.*

*a.* Stop engine and place all switches in OFF position.

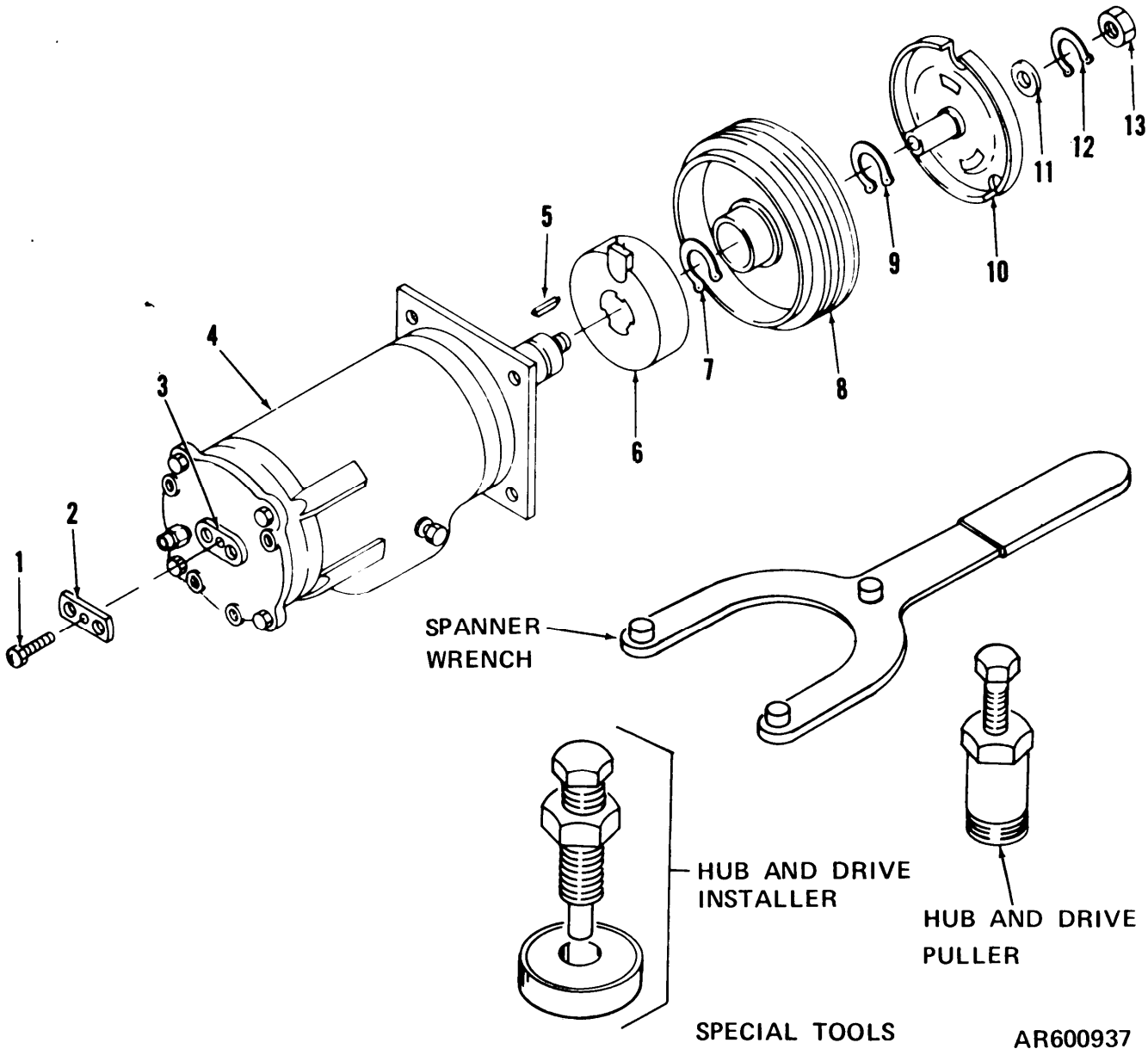
*b.* Relieve refrigerant pressure by removing cap from discharge service valve (1, fig. 2-54) and suction service valve (2) and opening valves.

*c.* After the system is depressurized, very slowly loosen bolt (1, fig. 2-59) which retains the adapter (2) and refrigerant fitting assembly and refrigerant tubes (2, fig. 2-58) to the compressor. As bolt is being loosened, work adapter and tubing assembly back and forth and carefully bleed off any remaining pressure.




1 Refrigerant compressor
2 Refrigerant tubes
3 Flange bolt
4 Clutch
5 Electrical connections
6 Plugs

*Figure 2-58. Refrigerant compressor, removal.*




1 Screw
2 Adapter
3 Packing
4 Compressor
5 Key
6 Coil
7 Retainer
8 Pulley
9 Retainer
10 Clutch
11 Spacer
12 Retainer
13 Nut

*Figure 2-59. Refrigerant compressor, exploded view, and special tools.*

**CAUTION**

High pressure may still exist at the discharge fitting. If this pressure is released too rapidly, there will be a considerable discharge of refrigerant and oil.

*d.* When all pressure has been relieved, remove bolt, (1, fig. 2-59) adapter (2), and packing (3).

e. Immediately cover all openings in compressor and system. A simple way to cover compressor openings is with a plate similar to that used on a new compressor. It can be attached with bolt (1, fig. 2-59) and packing (3) to form a seal.

f. Disconnect electrical connections (5 and 6, fig. 2-58) from compressor clutch (4).

**NOTE**

Position of electrical connections and plugs should be scribed on compressor body before removal.

g. Loosen adjustment bolt (11, fig. 2-57).

*h.* Remove bolts (6 and 10).

*i.* Rotate adjustment bolt (11) to loosen belts.

j. Remove belts (1) from compressor pulley (3).

*k.* Remove compressor (7) from mounting plate (5) and bracket (9) by removing bolts (4) and (8).

**2-132. Component removal**

Compressor components are removed as follows:

*a.* Using the clutch spanner wrench (fig. 2-59) (NSN 5120-00-174-2383) hold clutch drive assembly (10, fig. 2-59). Remove locknut (13) from shaft using special thin wall 9/16-inch socket (NSN 5120-00-881-0001).

*b.* Remove retainer ring (12) with pliers. Remove spacer (11).

*c.* Screw the hub and drive puller (fig. 2-59) (NSN 5120-00-174-2386) into the clutch hub. Holding body of tool with wrench, tighten center screw to remove clutch drive assembly (10). Remove puller.

*d.* Remove key (5) from shaft.

*e.* Remove pulley retainer rings (7) and (9).

*f.* Place puller over compressor shaft and remove pulley assembly (8).

g. Remove coil (6).

**2-133. Replacement of Compressor Components**

*a.* Position clutch coil (6, fig. 2-59) on front head casting so electrical connections are in their proper location as previously scribed on compressor body, 2-131 *f* above.

**NOTE**

If the existing pulley (8, fig. 2-59) and clutch driver (10) are reused, clean the drive faces on each part with decreasing solvent (item 4, table 2-1). If parts show evidence of warpage due to overheating, they should be replaced.

*b.* Press or tap pulley (8) on the shaft of the compressor.

*c.* The pulley should rotate freely.

*d.* Install pulley retainers (7) and (9).

*e.* Insert drive key (5) into shaft so that it projects about 3/16" out of end of keyway. Wedge into keyway with blunt tool.

**CAUTION**

To avoid internal damage to the compressor DO NOT drive or pound on clutch drive assembly or on end of shaft. If proper tools to remove and replace clutch parts are not used, it is possible to disturb the position of the swash plate (keyed to main shaft) resulting in compressor damage.

*f.* Lineup keyway in clutch drive assembly with keyway in shaft.

g. Position clutch drive assembly (10) into compressor front end casting.

*h.* Place the spacer (11) on clutch drive assembly (10) and screw the hub and drive installer (NSN 5120-00-279-2218) on the threaded end of compressor shaft about three full turns (to prevent tool from forcing key out of keyway). Make certain key remains in place when pressing clutch drive on shaft.

*i.* Using wrench on end of tool body and another wrench on tool hex, tighten nut to press driver assembly onto shaft about ¼".

*j.* Remove hub and drive installer and look into coil hub to make certain key remains in place.

*k.* Reinstall hub and drive installer and press until there is about .031" - .062" (1/32" - 1/16") space between the frictional faces on pulley and drive plate.

*l.* Remove hub and drive installer.

*m.* Install spacer (11).

*n.* Install retainer ring (12) with flat side of retainer facing spacer.

o. Install new nut (13) with special thin wall socket. Tighten to 15 ft lb torque. The air gap between the friction faces of the pulley and driver should now be between .031" - .062" (1/32" 1/16") clearance.

**2-134. Installation of Compressor**

*a.* Installation is the reverse of removal as outlined in 2-131 above.

*b.* Evacuate, charge and leak test the system as outlined in paragraph 126, 127, 128, and 129.

*c.* Operate engine and refrigeration system with suction pressure of at least 30 psi and discharge pressure of at least 150 psi. Cycle clutch (by turning air conditioning off and on) at least 20 times at about one second intervals to "seat" or "run-in" mating parts of clutch.

**2-135. Compressor Replacement**

If a compressor is inoperative it is replaced as follows:

*a.* Remove compressor as outlined in 2-131 above.

CAUTION

Before installing a new compressor, rotate compressor shaft four or five times. This permits proper lubrication of compressor seal over all of its surface. Before compressor clutch is mounted to new compressor, wipe the front face of the compressor thoroughly with a clean dry cloth and, if necessary, clean front of compressor with degreasing solvent (item, 4, table 2-1) to remove any excess oil. Cleaning compressor in this manner

will prevent any oil being thrown onto the clutch surfaces which could cause slippage and eventual clutch failure.

*b.* Stamp refrigeration charge of system on new compressor in space on plate provided for this information.

*c.* Install new compressor, leaving compressor fitting cover plate on compressor.

*d.* Remove cover plate from compressor openings very slowly to bleed off pressure.

**CAUTION**

New compressors are charged with a mixture of nitrogen, refrigerant and eleven fluid ounces of 525 viscosity refrigeration oil. If the cover is removed too rapidly, the oil may be blown out violently due to the sudden release of pressure.

e. Install coil, pulley, and clutch parts if not already installed.

*f.* Evacuate, charge and leak test the system.

## Section XX. GASOLINE ENGINE

### 2-136. Gasoline Engine

The gasoline engine (22, fig. 2-57) is a 20 horsepower military standard engine, model 4A084-3. Its function is to supply power to operate the refrigerant compressor (7, fig. 2-57), centrifugal blower (14), and generator (17). Refer to TM 5-2805-259-14 for technical and maintenance data.

### 2-137. Maintenance

*a. Test.* Refer to TM 5-2805-259-14.

*b. Adjust.*

(1) *Governor.* Refer to TM 5-2805-259-14.

(2) *Throttle.* Refer to TM 3-4240-264-12.

*c. Removal.* Remove gasoline engine as follows:

(1) Remove top engine shroud.

(2) Disconnect battery cables (2, fig. 2-60) and (3, fig. 2-61) from battery and flywheel housing.

Legend for fig. 2-60:
1 Evacuation fan leads
2 Battery cables
3 Arrowhead anchors
4 Battery
5 Quick-release
6 Access panel (hinged baffle)

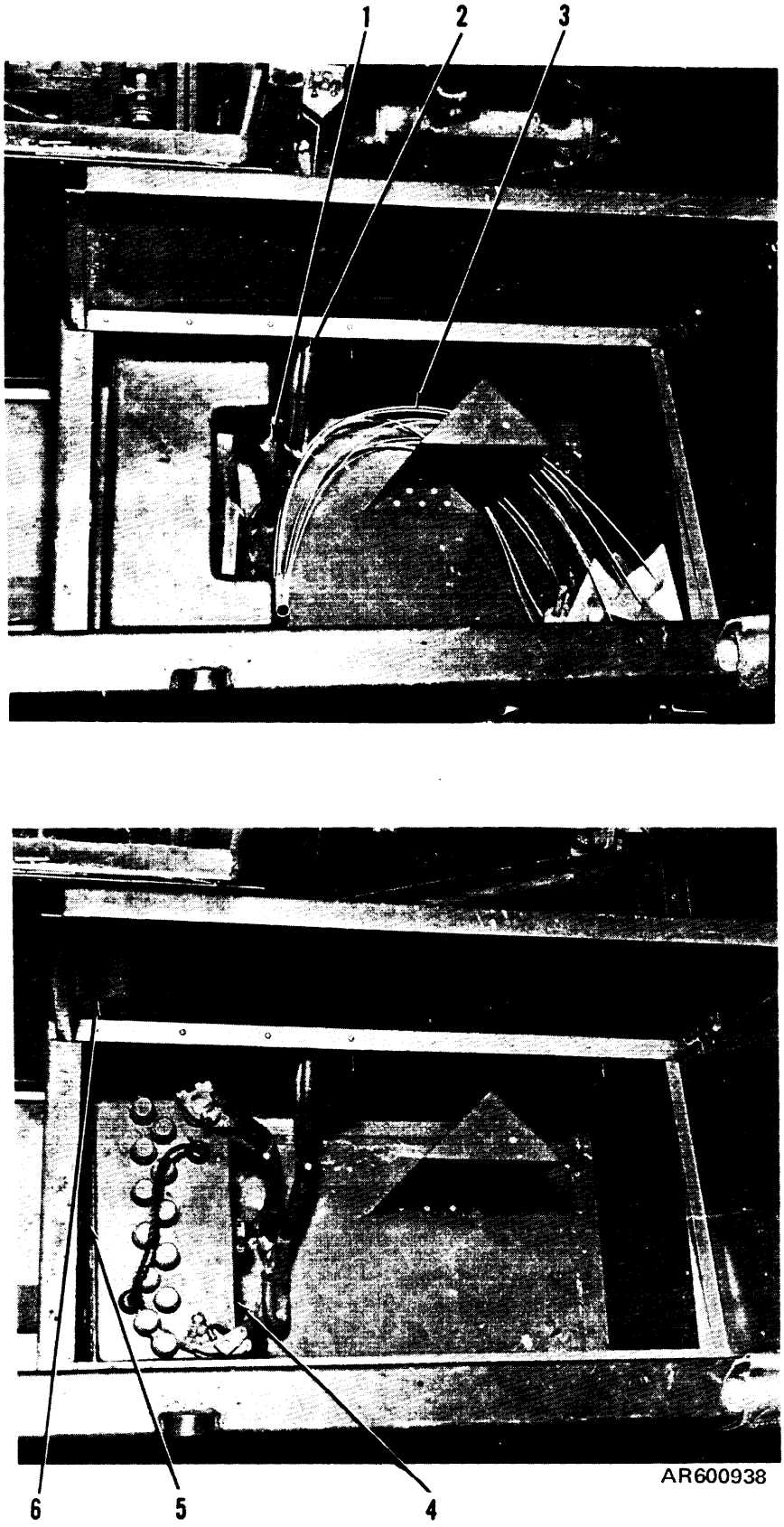



*Figure 2-60. Battery and anchor storage.*

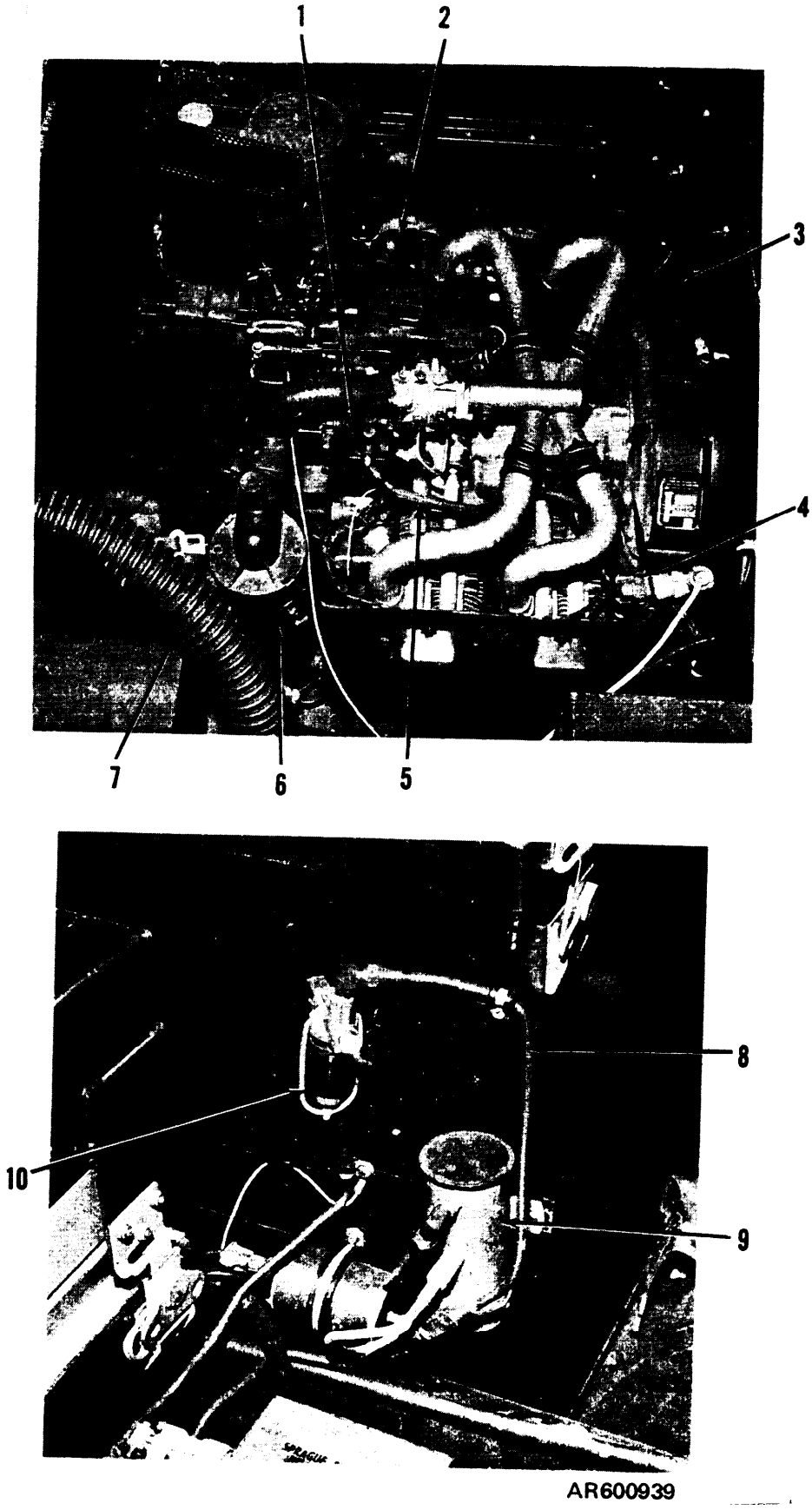


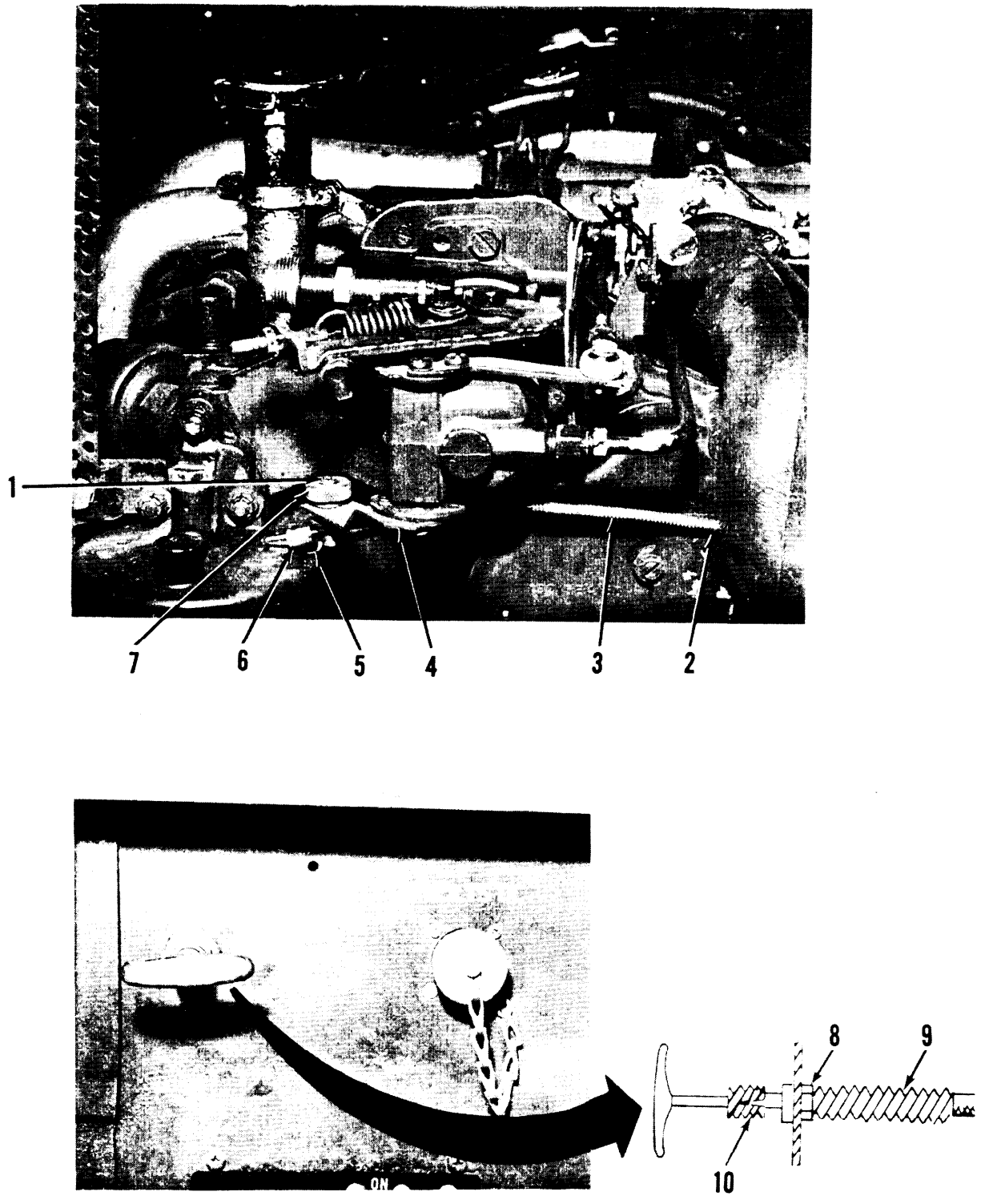

*Figure 2-61. Engine fuel lines.*

Legend for fig. 2-61:
1 Fuel pump
2 Oil pressure switch
3 Battery cable
4 Electrical connector
5 Fuel line
6 Air cleaner
7 Flexible duct
8 Fuel line
9 Fuel pump
10 Fuel filter

(3) Disconnect battery cable to starter solenoid.

(4) Disconnect battery cable to automatic choke.

(5) Loosen screw (5, fig. 2-62) and remove throttle stop (6).




1 Bolt
2 Clamp
3 Cable casing
4 Bracket
5 Screw
6 Throttle stop
7 Lock nut
8 Nut
9 Cable casing
10 Throttle lock

*Figure 2-62. Throttle cable installation.*

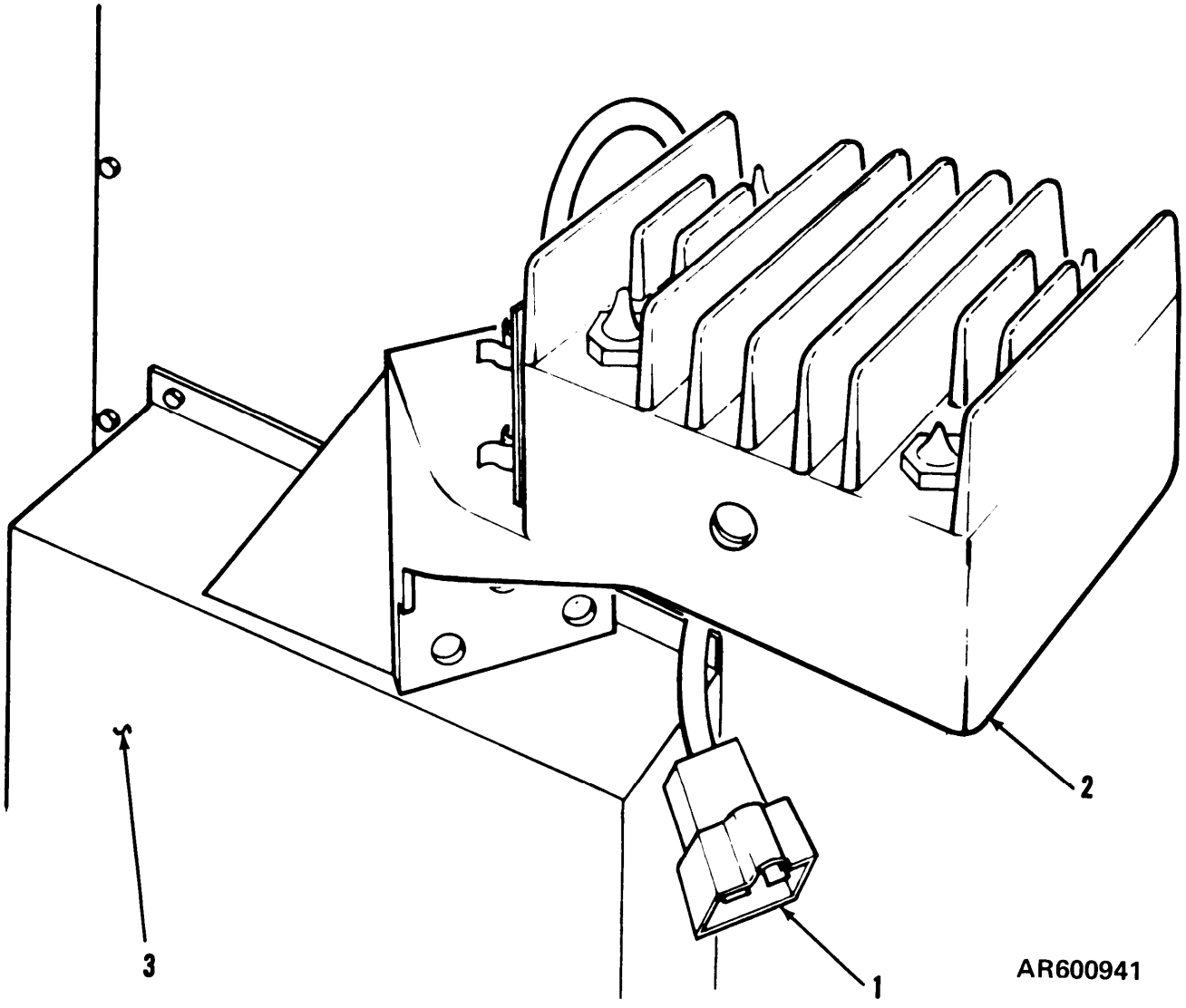
(6) Loosen clamp (2) and pull throttle cable casing (3) out of clamp.

(7) Disconnect electrical connector (4, fig. 2-61).

(8) Disconnect fuel line (5) from fuel pump (1).

(9) Disconnect fuel line (8) from fuel tank.

(10) Unplug voltage regulator-rectifier connector (1, fig. 2-63).




1 Voltage regulator connector
2 Engine voltage regulator-rectifier
3 Soundproof enclosure

*Figure 2-63. Voltage regulator-rectifier.*

(11) Disconnect flexible duct (7, fig. 2-61) from air cleaner (6).

(12) Loosen bolts (12, fig. 2-57).

(13) Rotate adjustment bolt (2) to loosen centrifugal blower drive belt (19) and remove belt.

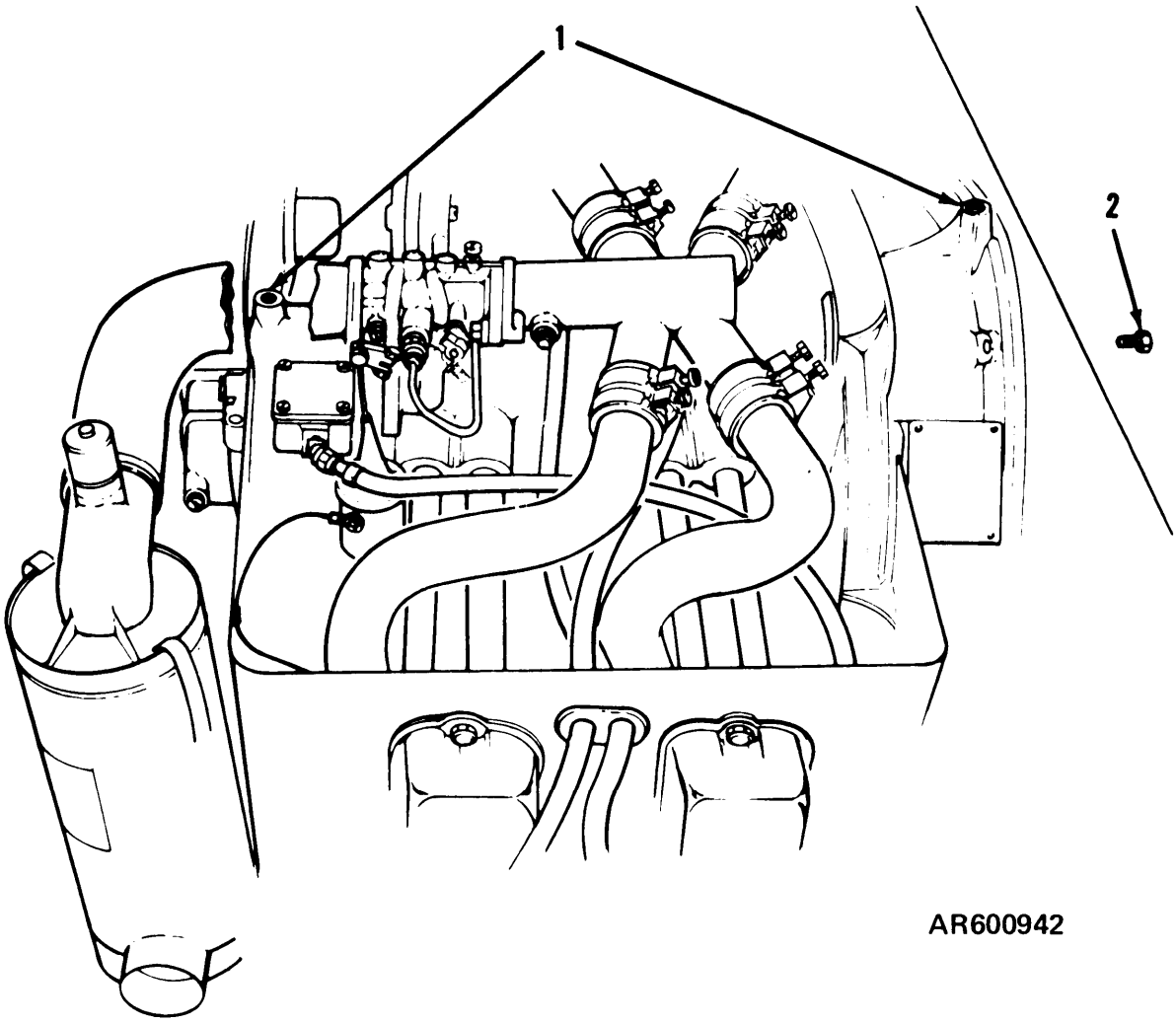
(14) Rotate adjustment bolt (15) to loosen generator drive belt (18) and remove belt.

(15) Loosen bolts (6) and (10).

(16) Rotate adjustment bolt (11) to loosen refrigerant compressor drive belts ( 1 ) and remove belts.

(17) Remove four bolts and lockwashers (21) attaching driveshaft extension (20) to engine flywheel; remove driveshaft extension.

(18) Remove eight bolts (2, fig. 2-64) that attach sound-proof enclosure to engine.

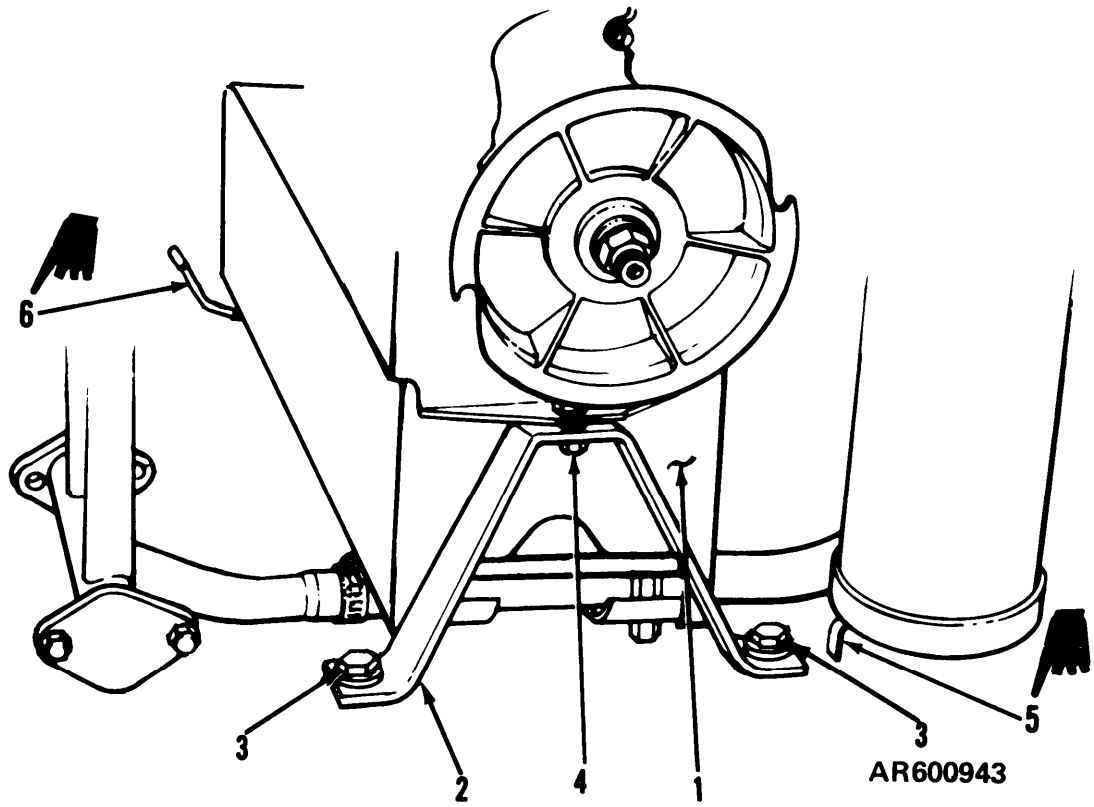



1 Lifting holes
2 Bolt

*Figure 2-64. Hoisting provisions.*

(19) Remove four bolts (25, fig. 2-57) (rear engine attaching).

(20) Remove two engine mount attaching bolts (3, fig. 2-65) securing engine mounts (2) to pallet (13, fig. 2-57).




1 Engine
2 Engine mount
3 Engine mount attaching bolt
4 Engine bolt
5 Air cleaner intake shutter
6 Oil pan baffle air control handle

*Figure 2-65. Engine mount and air control handles.*

(21) Screw hoisting eye bolts into threaded holes (1, fig. 2-64) in engine.

**CAUTION**

Be careful when raising engine to prevent it from swinging and damaging other trailer mounted components.

(22) Connect hoist with minimum capacity of 225 pounds to eye bolts and raise engine from trailer.

(23) Remove bolt (4, fig. 2-65) and engine mount (2) from engine.

(24) Drain engine crankcase. (Refer to TM 3-4240 -264-12.)

*d*. Preparing replacement engine for installation. The following procedures are to be perform whenever an engine is received from supply:

(1) Remove voltage regulator-rectifier from new engine (TM 5-2805-259-14).

(2) Remove old engine voltage regulator-rectifier (2, fig. 2-63) from soundproof enclosure (3); install new voltage regulator-rectifier, removed from engine in step (1) above, onto soundproof enclosure.

(3) Install voltage regulator-rectifier removed in step (2) above onto the engine being returned to supply (TM 5-2805-214).

(4) Remove knob (1, fig. 2-66) spring (2), washer (3), and bolt (4) from bracket (5).

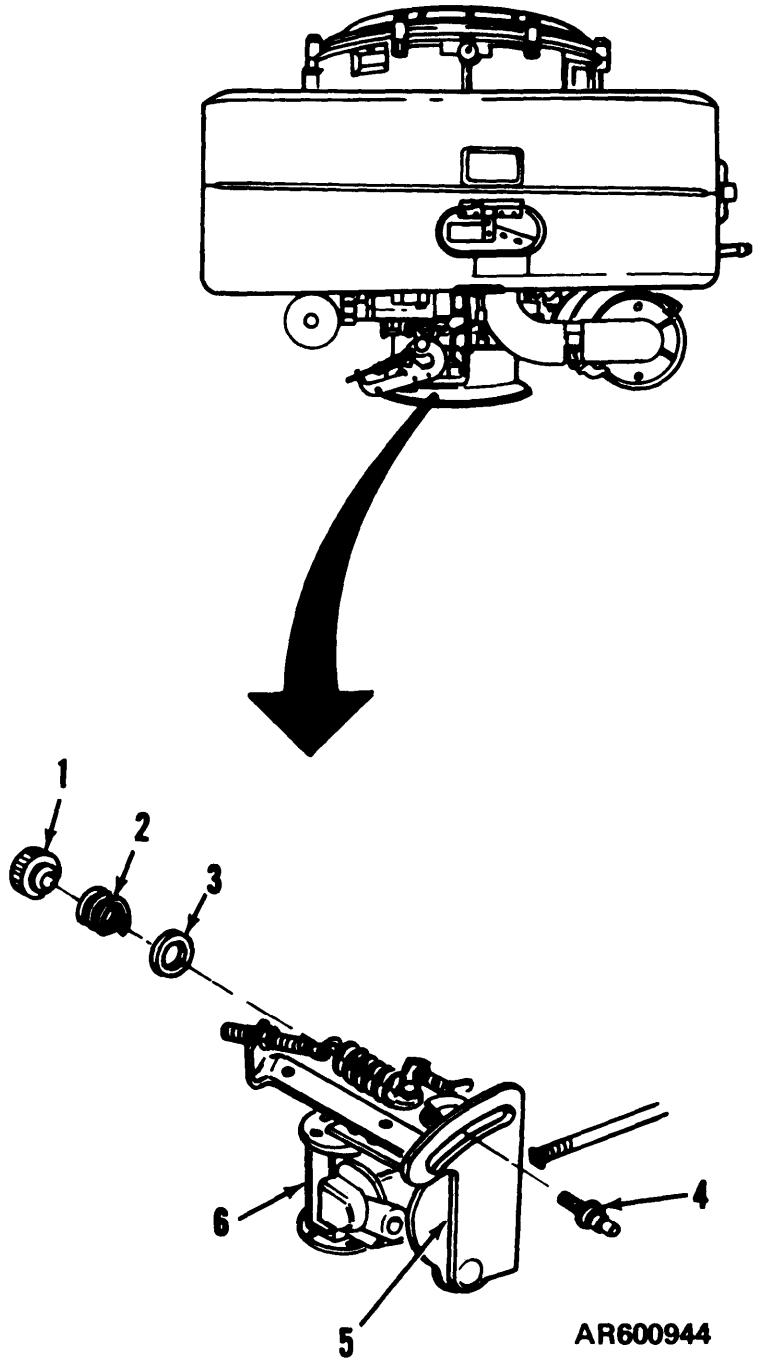



*Figure 2-66. Governor modification.*

(5) Remove locknut (7, fig. 2-62), spring, washer, and bolt (1) from engine removed in c above.

(6) Install knob (1, fig. 2-66), spring (2), washer (3), and bolt (4), removed in step (4) above, onto bracket (5).

(7) Remove bracket (4, fig. 2-62) and throttle stop (6) from engine removed in c above and install on new engine prior to installation.

(8) Return new fuel filter to supply along with engine removed in c above.

(9) Disconnect wire from upper terminal on oil pressure switch (2, fig. 2-61) from upper

terminal marked NO (normally open) and connect to lower terminal marked NC (normally closed).

(10) Remove magnetic drain plug (TM 5-2805-259-14) and drain preservative oil from replacement engine.

(11 ) Install magnetic plug in removed engine.

e. *Repair.* Refer to TM 5-2805-259-14 for instructions on repair of the gasoline engine.

*f. Installation of a New Engine.* Install gasoline engine (22, fig. 2-57) as follows:

(1) Install two engine hoisting bolts in lifting holes (1, fig. 2-64).

(2) Hoist engine and lower into position. Disconnect hoist and remove bolts.

(3) Install adapter (26, fig. 2-57) in engine block.

(4) Install elbow (27) in adapter (26).

(5) Install nipple (24) and coupling (23) onto elbow (27).

(6) Install oil drain plug (28); add oil to engine crankcase as directed in LO 5-2805-259-12 and LO 3-4240-264-12.

(7) Proceed to g (3) below.

g. *Installation of Repaired Engine.* Install gasoline engine (22, fig. 2-57) as follows:

(1) Install engine mount (2, fig. 2-65).

(2) Install two engine hoisting eye bolts in lifting holes (1, fig. 2-64) and lower into position. Disconnect hoist and remove eye bolts.

**NOTE**

Be sure that engine is level with pallet.
Shim under rear mount as necessary.

(3) Fasten engine to pallet (13, fig. 2-57) with four engine attaching bolts and washers (25). Tighten bolts finger tight.

(4) Install eight bolts (2, fig. 2-64) that attach soundproof enclosure to engine. Aline engine as necessary and securely tighten engine attaching bolts (25, fig. 2-57).

(5) Install bolts (21, fig. 2-57) attaching driveshaft extension (20) to engine flywheel.

(6) Position refrigerant compressor drive belts, (1, fig. 2-57) on engine pulleys.

(7) Adjust refrigerant compressor drive beltw (TM 3-4240-264-12).

(8) Tighten bolts (6 and 10, fig. 2-57).

**CAUTION.**

Be sure that belt teeth are engaged with pulley teeth.

(9) Position generator drive belt (18) on pulleys.

(10) Adjust generator drive belt (TM 3-4240-264-12).

(11) Tighten bolts (16).

(12 ) Position centrifugal blower drive belt (19) on pulleys.

(13) Adjust centrifugal blower drive belt (TN 3-4240-264-12).

(14) Tighten bolts (12).

(15) Plug voltage regulator-rectifier connecter (1, fig. 2-63) into engine.

(16) Connect electrical connector (4, fig. 2-61).

(17) Install and adjust throttle cable (TM 3-4240-264-12).

(18) Connect flexible duct (7, fig. 2-61) to air cleaner (6).

(19) Feed fuel line (5) through grommet lined hole and connect to fuel pump (1).

(20) Connect fuel line (8) to fuel tank.

(21) Check to insure that oil filter cartridge has been installed.

(22) Insure that oil drain plug (28, fig. 2-57) is installed.

(23) Lubricate engine (LO 5-2805-259-12).

(24) Connect battery cable (3, fig. 2-61) to engine and battery cables (2, fig. 2-60) to battery.

(25) Connect battery cable to starter solenoid.

(26) Connect battery cable to automatic choke.

(27) Adjust governor to operate engine in accordance with procedures set forth in TM 3-4240-264-12.

(28) Check to insure that all attachments and connections are secure, and that adequate fuel is in the tank.

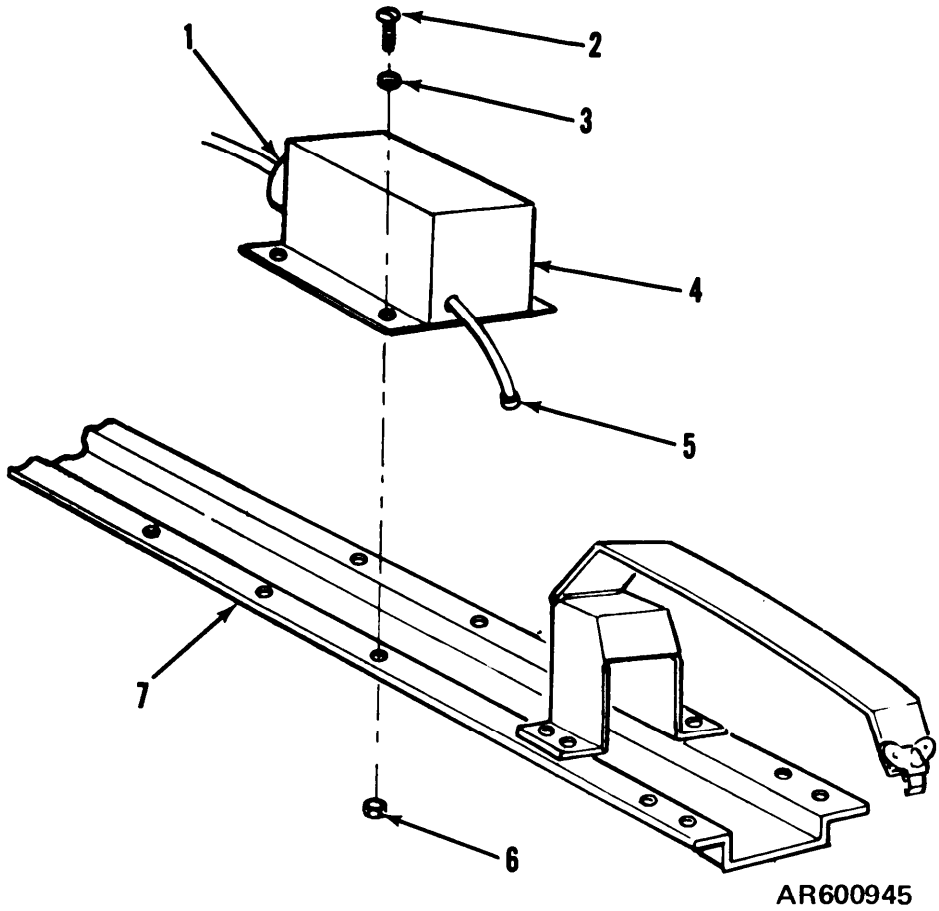
(29) Install engine top shroud.

(30) Start engine (TM 3-4240-264-12).

## Section XXI. ENGINE RFI FILTER

**2-138.** Engine RFI Filter

The engine RFI filter (4, fig. 2-67), located on top of gas tank. is provided to eliminate electrical disturbances in the radio frequency range which may be generated by the engine.




1 Connector
2 Screw
3 Washer
4 Filter
5 Cable
6 Nut
7 Support

*Figure 2-67. Engine RFI filter.*

### 2-139. Maintenance

*a. Inspect.*

(1) Inspect the filter for damage.

(2) Inspect for loose or missing hardware or damaged electrical leads.

*b. Removal.*

(1) Disconnect electrical connection (1, fig. 2-67) to engine.

(2) Disconnect electrical cable (5).

*(3)* Remove four screws (2), washers (3), and nuts (6).

(4) Remove filter from support (7).

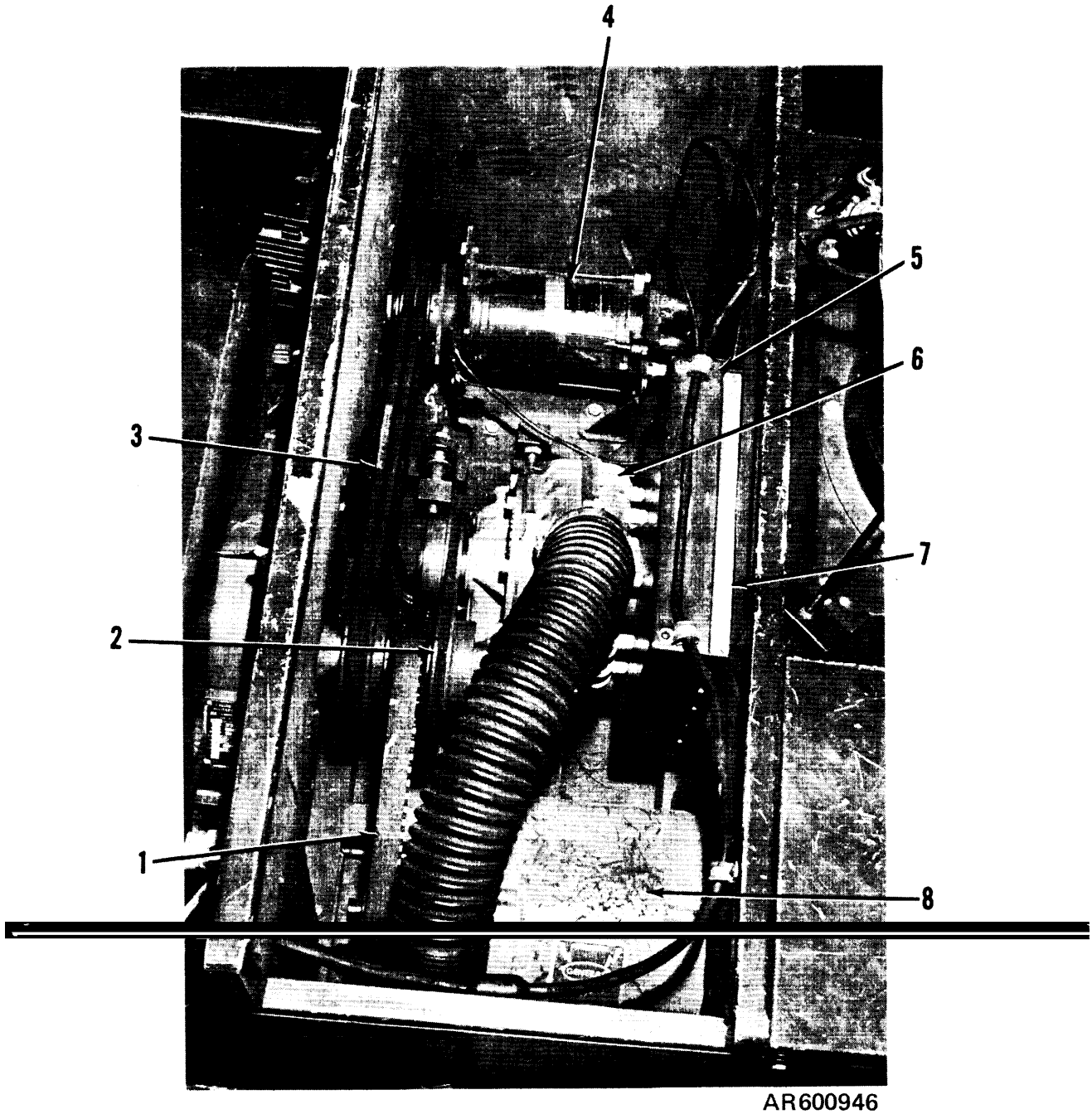
c. *Installation.* Installation is the reverse of removal.

## Section XXII. GENERATOR

### 2-140. Generator

The generator (8, fig. 2-68) is a 208 volt, three phase, 60 hertz power unit. Its function is to supply electrical power for the system. Direct support maintenance personnel are authorized to test, and replace the generator and its attached hardware.

### 2-141. Test




1 Generator drivebelt
2 Blower drivebelt
3 Compressor drivebelts
4 Refrigerant compressor
5 Plenum
6 Centrifugal blower
7 Prefilter
8 Generator

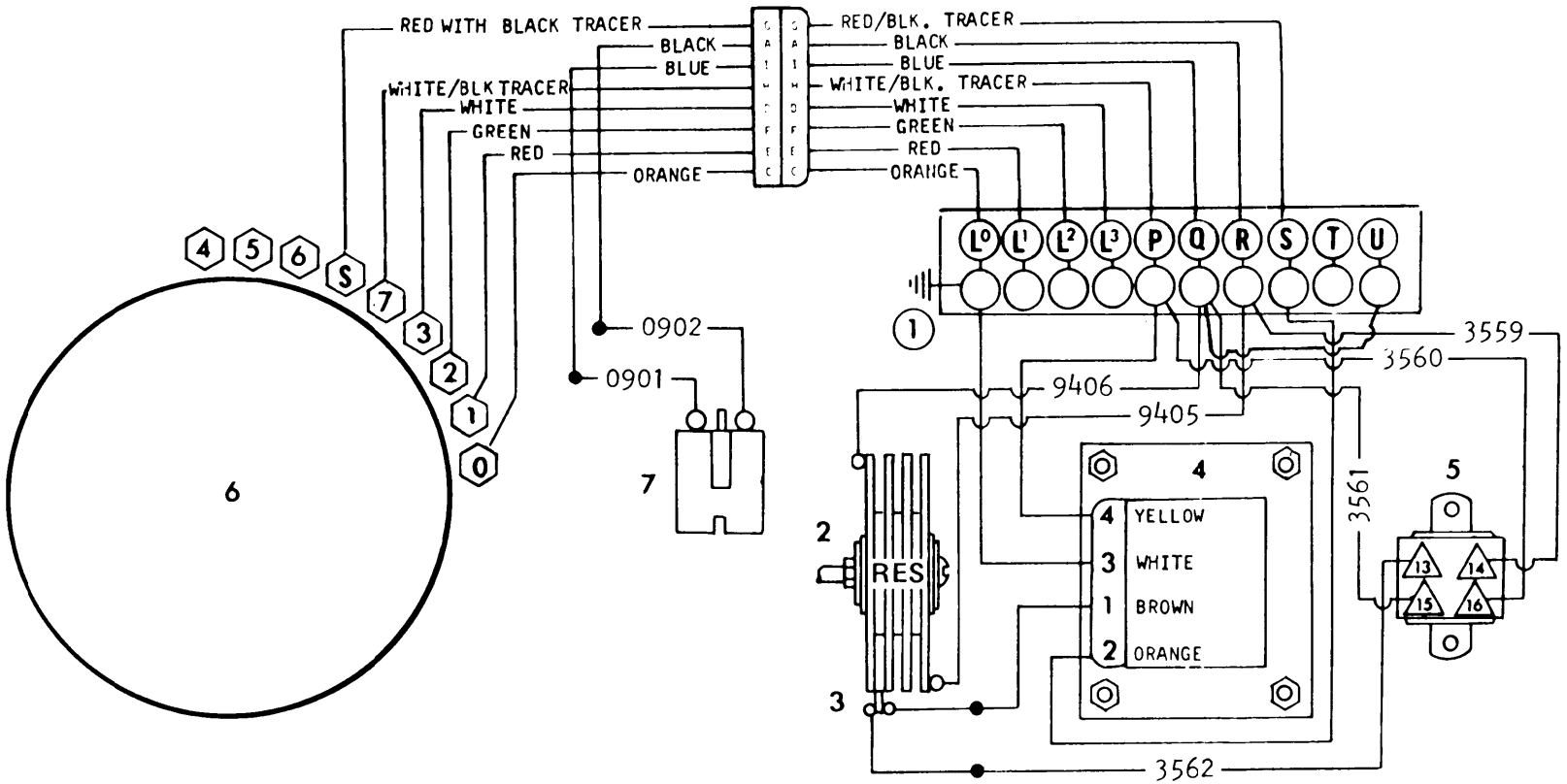
*Figure 2-68. Soundproof inclosure.*

**WARNING**

Be careful to avoid contact with high voltage and with moving belts and pulleys when testing generator. Contact with high voltage could cause DEATH.

*a.* Remove screws (1, fig. 2-73), access panel (2), from soundproof inclosure (3).
*b.* Remove screws (15) and access panel (14).
*c.* Remove screws (6) and cover (5).
*d.* With generator (8, fig. 2-68) operating,

check for 15 to 30 vdc between terminals Q and R on terminal block (1, fig. 2-69). If 15 to 30 vdc is not present, polarize the generator by applying 12 vdc or 24 vdc to terminals Q and R with Q positive and R negative.




1 Terminal block
2 Resistor assembly
3 Resistor protector
4 Reactor assembly
5 Rectifier receptacle
6 Stator assembly
7 Brush holder assembly

*Figure 2-69. Generator and voltage regulator wiring diagram.*

**NOTE**

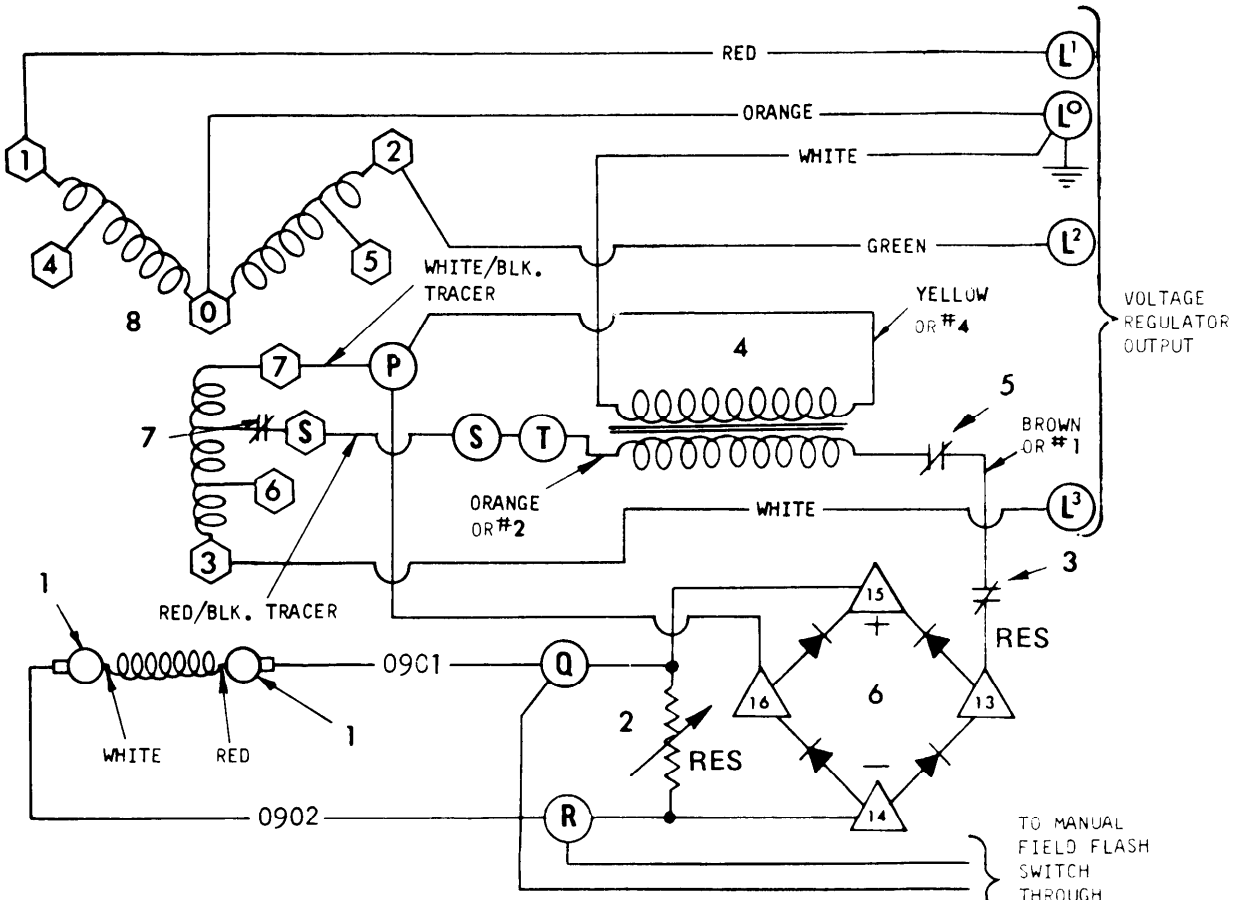
With generator installed and engine operating, the generator can be polarized by setting the MANUAL FIELD FLASH switch, located on the main control indicator, to FLASH.

e. Check for 208 (± 10) vac between terminals L1 and L2, L1 and L3, and L2 and L3 on terminal block (1, fig. 2-69).

**NOTE**

Steps f and g cannot be accomplished with generator operating.

*f.* Check for continuity (figs. 2-69 and 2-70). Unplug rectifier (3, fig. 2-74) when checking for continuity.




1 Brush holder assembly
2 Resistor assembly
3 Resistor protector
4 Reactor assembly
5 Reactor protector-internal
6 Rectifier assembly
7 Stator protector-internal
8 Stator assembly

*Figure 2-70. Generator and voltage regulator schematic.*

g. Test rotor circuit by disconnecting wires connected to terminals Q and R on voltage regulator and checking for continuity between the two wires.

*h.* If no continuity. check generator brushes (30, fig. 2-72) for wear.

*i.* If no continuity, check slip ring (35, fig. 2-72) for wear.

j. If no continuity, check for broken wires.

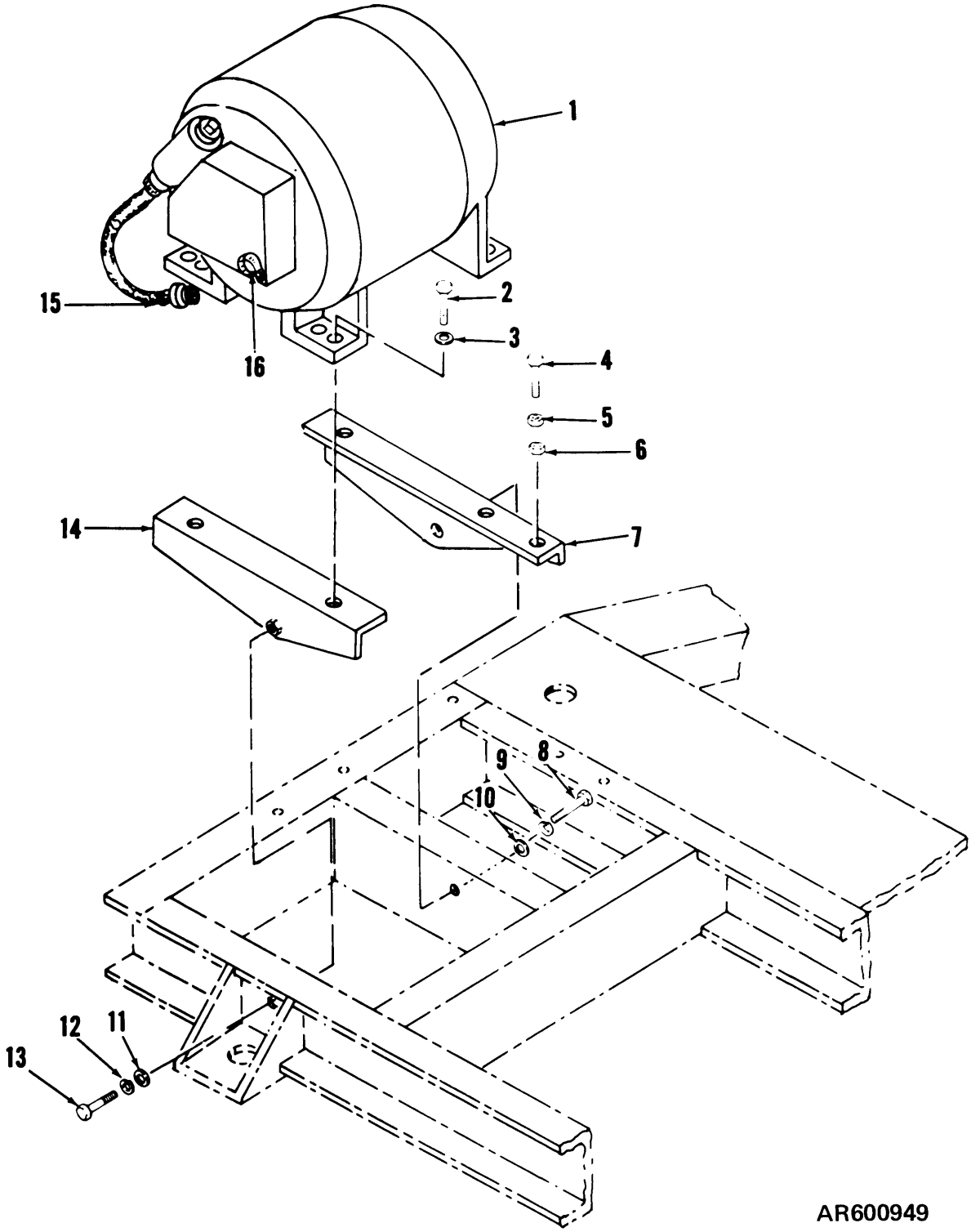
*k.* If no continuity, check rotor (31, fig. 2-72) for wear.

### 2-142. Removal

Remove generator as follows:

*a.* Loosen nut (5, fig. 2-71) and screw (4) to loosen generator drive belt (18, fig. 2-57). Remove belt.

*b.* Remove screw (8, fig. 2-71), lockwasher (9), and washer (10).




| | | | |
|---|---|---|---|
| 1 Generator | 5 Nut | 9 Lockwasher | 13 Screw |
| 2 Screw | 6 Lockwasher | 10 Washer | 14 Bracket |
| 3 Lockwasher | 7 Bracket | 11 Washer | 15 Plug connector |
| 4 Screw | 8 Screw | 12 Lockwasher | 16 Cable clamp |

*Figure 2-71. Generator removal.*

c. Remove screw (13), lockwasher (12), and washer (11).

*d.* Remove cable clamp (16) and disconnect plug connector (15).

*e.* Remove brackets (7) and (14), and generator (1).

*f.* If necessary, remove four screws (2) and washers (3) to remove brackets (7) and (14) from generator (1).

### 2-143. Disassembly

Using Figure 2-72 as a guide, disassemble generator starting with item 1.

**CAUTION**

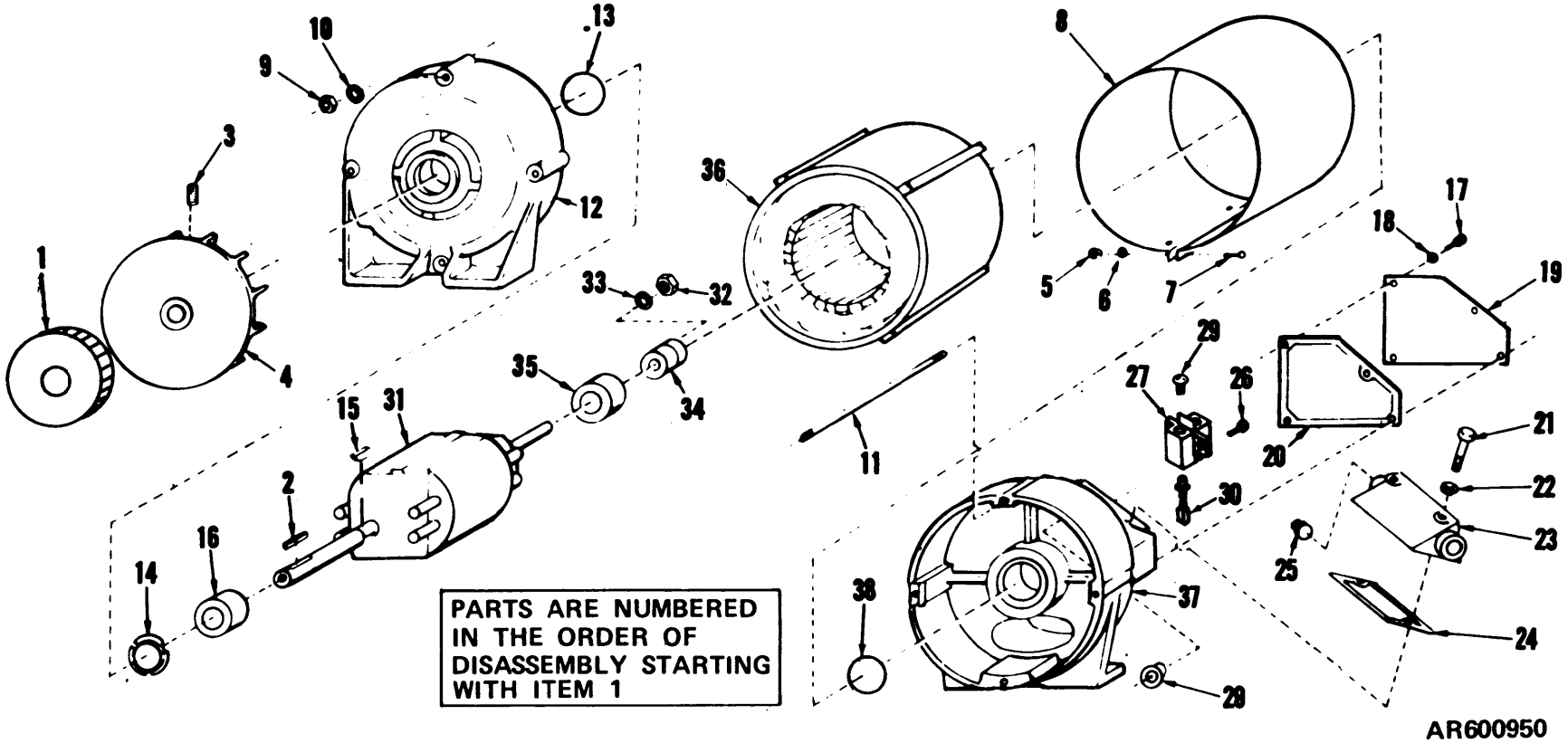
Spread brushes (30) in brush holder (27) before removal of rotor (31).

### 2-144. Inspection and Repair

*a.* Inspect all sheetmetal parts for dents. Straighten minor dents; replace part if damage is beyond repair.

*b.* Inspect all parts for damage, deterioration, or excessive wear. Replace all defective parts.

*c.* Replace preformed packings (13 and 39, fig. 2-72).




| | | | |
|---|---|---|---|
| 1 Pulley | 11 Stud | 21 Screw | 31 Rotor |
| 2 Key | 12 Front end bell | 22 Lockwasher | 32 Bearing |
| 3 Setscrew | 13 Packing, preformed | 23 Connecting box cover | 33 Brass nut |
| 4 Fan | 14 Loading spring | 24 Gasket | 34 Lockwasher |
| 5 Nut | 15 Key | 25 Plug | 35 Slip ring |
| 6 Lockwasher | 16 Deleted | 26 Screw | 36 Bearing |
| 7 Screw | 17 Screw | 27 Brush holder | 37 Stator |
| 8 Strap | 18 Lockwasher | 28 Snap bushing | 38 Rear end bell |
| 9 Nut | 19 Cover, brush box | 29 Screw | 39 Packing, preformed |
| 10 Lockwasher | 20 Gasket | 30 Brush | |

*Figure 2-72. Generator, exploded view.*

*d.* Check bearings (32 and 36) for freedom of movement and looseness of balls in race. Replace if defective.

*e.* Check slip ring (35) for wear. If defective replace.

**2-145. Assembly**

Assembly is the reverse of disassembly (para 2-143). When installing rotor (31) and slip ring (35) spread brushes (30) in brush holder (27) to prevent damage to brushes.

**2-146. Installation**

Installation of the generator is the reverse of removal (para 2-142).

## Section XXIII. VOLTAGE REGULATOR

**2-147. Voltage Regulator**

The function of the voltage regulator (4, fig. 2-73) is to maintain generator output at the proper level within the full range of no load to full load conditions. Direct support maintenance personnel are authorized to test, remove, disassemble, assemble, and install the voltage regulator.

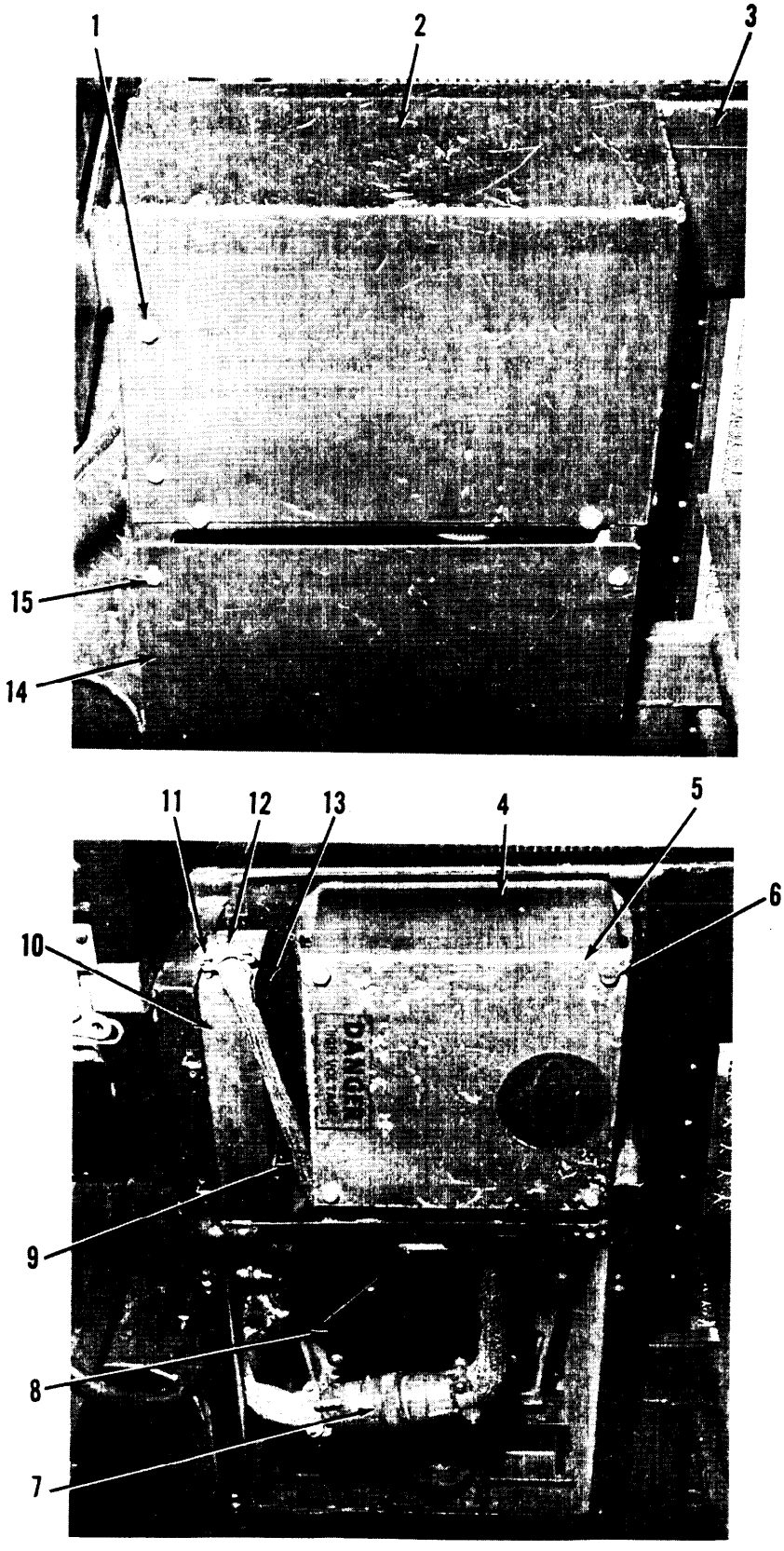
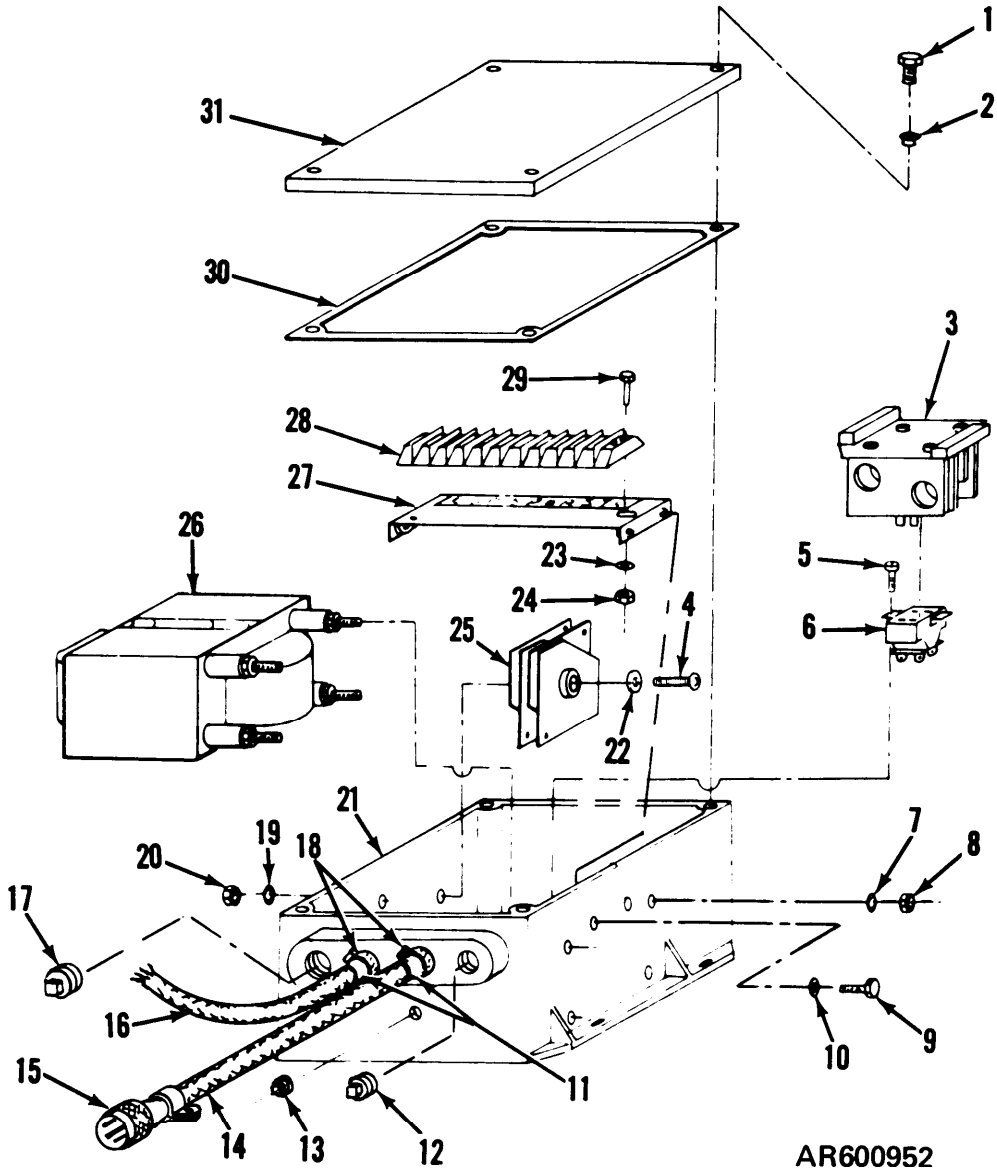



*Figure 2-73. Voltage regulator, generator brush box, and system RFI filter.*

Legend for fig. 2-73:
1 Screw
2 Access panel
3 Soundproof inclosure
4 Voltage regulator
5 Cover
6 Screw
7 Connector
8 Brush box cover
9 Cable
10 RFI filter
11 Screw
12 Connector
13 Cover
14 Access panel
15 Screw

**2-148. Test**

*a.* Remove screws (1, fig. 2-73), access panel (2), from soundproof inclosure (3).
*b.* Remove screws (15) and access panel (14).
c. Remove screws (6) and cover (5).
*d.* Unplug rectifier (3, fig. 2-74).




1 Screw
2 Washer
3 Rectifier
4 Screw
5 Screw
6 Receptacle
7 Washer
8 Nut
9 Screw
10 Washer
11 Connector
12 Plug
13 Plug
14 Cable
15 Connector
16 Cable
17 Plug
18 Clamp
19 Washer
20 Nut
21 Box
22 Washer
23 Washer
24 Nut
25 Resistor
26 Reactor
27 Support
28 Terminal
29 Screw
30 Gasket
31 Cover

*Figure 2-74. Voltage regulator, exploded view.*

*e.* Connect multimeter leads to terminals indicated in table 2-8.

*f.* If correct readings are not obtainable in any of the checks in table 2-8, replace the rectifier.

g. Tag and disconnect electrical leads to terminal block (28).

*h.* Check reactor (26, fig. 2-74) for continuity between leads 1 and 2 and 3 and 4 (4, fig. 2-69). Disconnect leads before testing.

*i.* While checking for continuity, flex leads and move them in and out slightly to check for loose wires and intermittent shorts.

*j.* Install access panels (2 and 14, fig. 2-73).

### 2-149. Removal

*a.* Remove screws (1 and 15, fig. 2-73) and panels (2) and (14).

*b.* Disconnect connector (7).

*c.* Remove two screws (11) and cover (13).

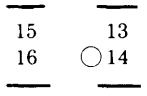
*d.* Loosen clamps (18, fig. 2-74).

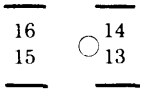
*e.* Tag and disconnect six electrical leads (16).

*f.* Remove four screws attaching regulator (4, fig. 2-73) to soundproof enclosure (3).

*g.* Remove regulator (4).

*Table 2-8. Voltage Regulator Test.*




| *Positive Lead* | *Negative Lead* | *Multimeter Reading* | *Remarks* |
|---|---|---|---|
| 16 | 15 | 1-3 ohms | If infinity, rectifier open |
| 15 | 16 | Infinity | If zero, rectifier shorted |
| 13 | 15 | 1-3ohms | If infinity, rectifier open |
| 15 | 13 | Infinity | If zero, rectifier shorted |
| 14 | 16 | 1-3 ohms | If infinity, rectifier open |
| 16 | 14 | Infinity | If zero, rectifier shorted |
| 14 | 13 | 1-3 ohms | If infinity, rectifier open |
| 13 | 14 | Infinity | If zero, rectifier shorted |
| 15 | 14 | Infinity | If zero, rectifier shorted |
| 14 | 15 | 3-7 ohms | If infinity, rectifier open |

### 2-150. Disassembly

*a.* Remove screw (1, fig. 2-74) and washer (2).

*b.* Remove cover (31) and gasket (30).

*c.* Unplug rectifier (3).

*d.* Remove screws (5) and rectifier receptacle (6).

*e.* Tag and disconnect electrical leads from receptacle (table 2-8).

*f.* Remove screw (4), washer (22), nut (20), washer (19), and resistor (25).

*g.* Tag and disconnect electrical leads from resistor (25).

*h.* Tag and disconnect electrical leads from terminal block (28).

*i.* Remove screws (9), washers (10), terminal block support (27), and terminal block (28).

*j.* Remove screws (29), washers (23), nuts (24), and remove terminal block (28) from support (27).

*k.* Remove nuts (8), washers (7), and reactor (26).

*l.* Tag and disconnect four electrical leads from reactor (26).

*m.* Loosen cable clamps (18) and pull back clamp and cable shield from ferruled portion of box connectors (11).

*n.* Remove box connectors (11 ) and pull cables (14) and (16) from box (21).

### 2-151. Assembly

Assembly is the reverse of disassembly, with the following exceptions:

*a.* Replace rectifier (3, fig. 2-74), rectifier receptacle (6), and screws (5), if readings cannot be obtained as stated in table 2-8.

*b.* Connect electrical leads to rectifier receptacle (6), using fig. 2-69 as a guide.

*c.* Replace resistor (25, fig. 2-74), if damaged.

*d.* Connect electrical leads to resistor, using fig. 2-69 as a guide.

*e.* Replace reactor (26, fig. 2;74), if continuity test cannot be made (para 2-148h).

*f.* Connect electrical leads to reactor, using fig. 2-69 as a guide.

*g.* Replace terminal block (28, fig. 2-74), if damaged.

*h.* Connect electrical leads to terminal block, using fig. 2-69 as a guide.

*i.* Replace clamps (18, fig. 2-74), if damaged.

*j.* Replace plug connector (15, fig. 2-74), if damaged.

**k.** Replace gasket (30, fig. 2-74) if damaged or deteriorated, as follows:

(1) Remove gasket from cover (31 ).

(2) Clean adhesive and gasket residue from cover with decreasing solvent (item 4, table 2-1).

(3) Fabricate gasket (fig. 2-75).

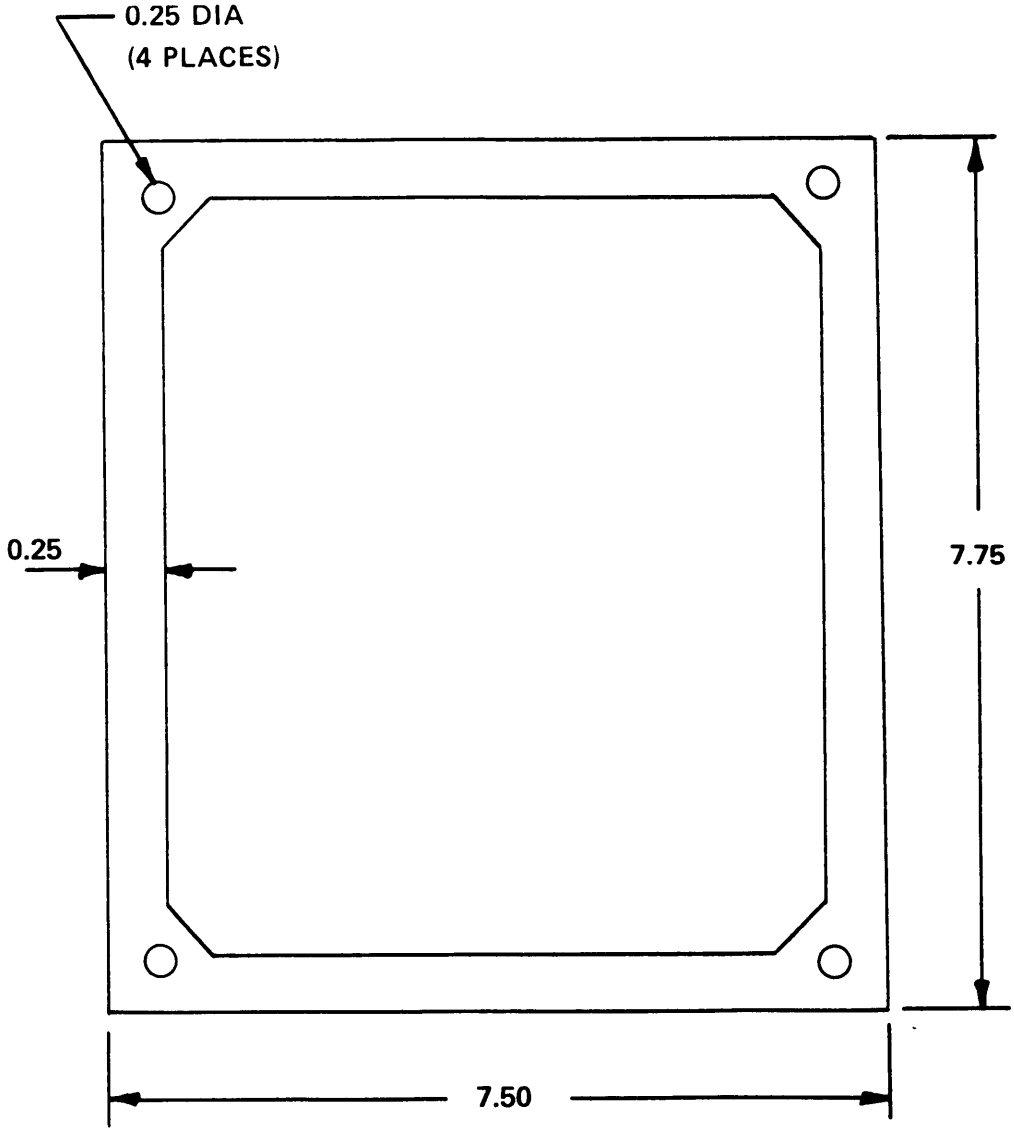



*Figure 2-75. Voltage regulator cover gasket fabrication.*

(4) Install gasket, using adhesive sealant (item 5, table 2-1) to secure gasket to cover.

**2-152. Installation**

Installation is the reverse of removal (para 2-149 above).

## Section XXIV. SYSTEM RFI FILTER

### 2-153. System RFI Filter

The system RFI filter (10, fig. 2-73) is provided to eliminate electrical disturbances in the radio frequency range which may be generated by the shelter electrical system. The filter is located inside the soundproof inclosure (3). Direct support maintenance personnel are authorized to inspect, test, remove, and install the filter.

### 2-154. Maintenance

*a. Inspect.*

(1) Remove screws (1, fig. 2-73) access panel (2), from soundproof inclosure (3).

(2) Inspect filter for damage.

(3) Inspect for loose or missing hardware or damaged electrical cable and connectors.

*b. Test.*

(1) Remove two screws (11) and cover (13).

(2) Use voltammeter to check electrical connections for continuity.

*c. Removal.*

(1) Remove four screws, washers, and nuts attaching filter (10) to soundproof inclosure.

(2) Loosen box connector clamp (12).

(3) Tag and disconnect six electrical leads (16, fig. 2-74).

*d. Installation.* Installation is the reverse of removal. Make electrical connections, using figure 2-76 as a guide.

| WIRE NO. | FROM REGULATOR | TO FILTER |
|---|---|---|
| K1A16V | VRI-Q | FL1-D |
| K2A16N | VRI-R | FL1-F |
| X3A12N | VRI-LO | FL1-GRD |
| X6A12A | VRI-L1 | FL1-A |
| X5A12B | VRI-L2 | FL1-C |
| X4A12C | VRI-L3 | FL1-E |

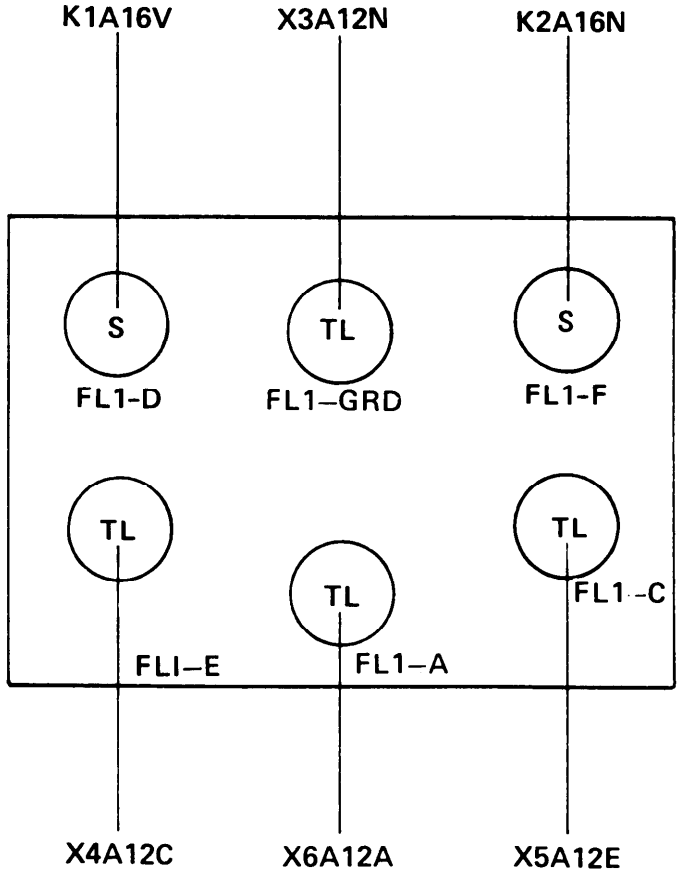



*Figure 2-76. Systcm RFI filter wiring diagram.*

## Section XXV. CABINETS AND INCLOSURES

**2-155. General**

The cabinets and enclosures serve as mounts for fans, heater, coils, and other system components, and as enclosures for filters. Direct support maintenance personnel are authorized to inspect, repair, and replace missing hardware.

**2-156. Repair**

Repair as required, by welding, replacing missing hardware, patching with adhesive sealant (item 5, table 2-1) to reduce leakage, straightening minor dents, and touching up scratched painted surfaces (TM 9-213). The recirculation fan cabinet, the filter inclosure, and the environmental cabinet must be airtight.

## Section XXVI. WIRING HARNESS

**2-157. General**

Electrical cables (fig. 2-77 ) containing the shelter system wiring (fig. 2-78) are provided for power distribution within the shelter system. Direct support maintenance personnel are authorized to inspect and replace the wiring harness and its attaching hardware.

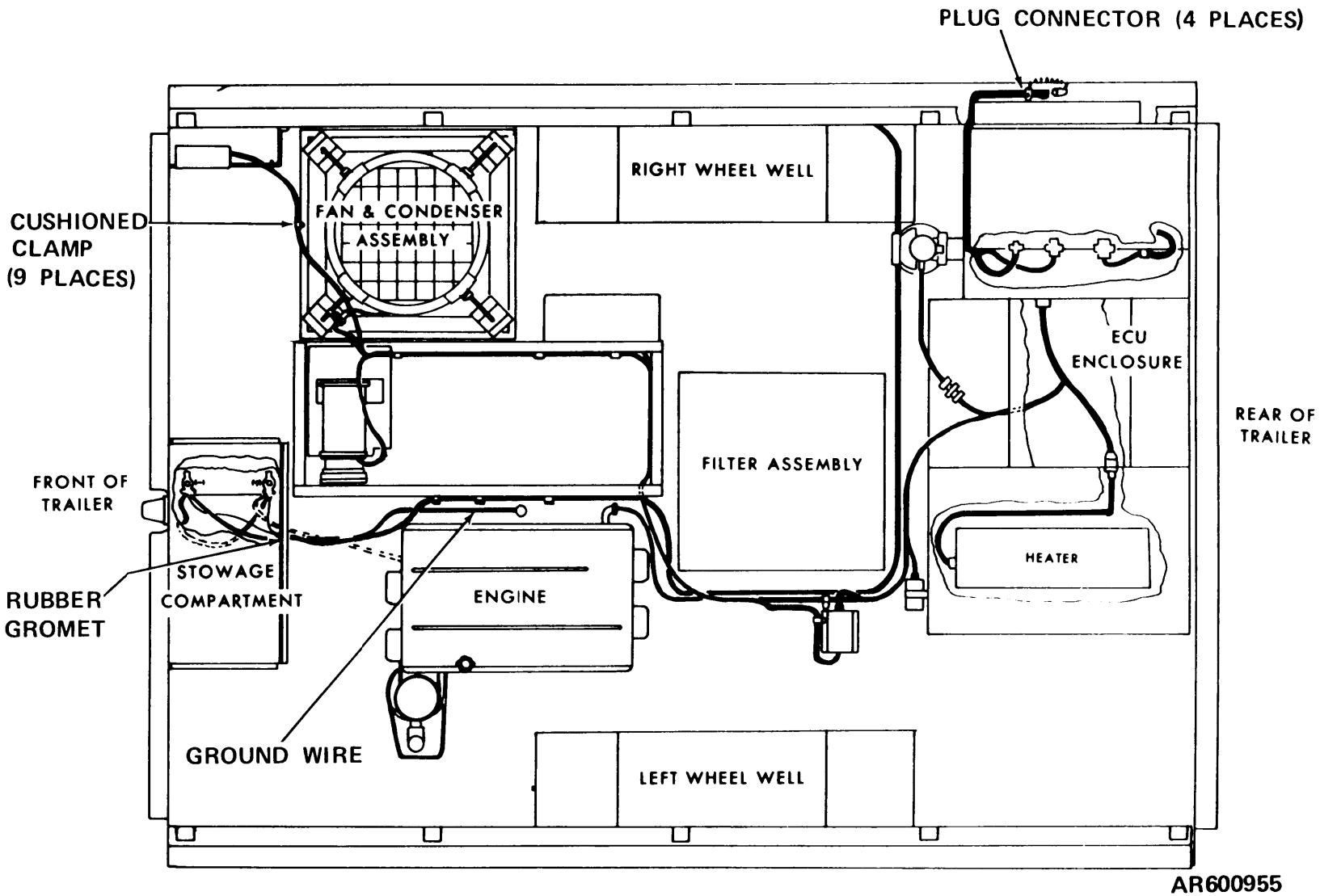



*Figure 2-77. Wiring harness.*

Figure 2-78. Shelter system **cable** diagram. **(Located in back of manual. )**

**2-158. Inspect**

*a.* Inspect cables for frayed insulation, burns, breaks or other forms of damage.

*b.* Inspect terminal contacts for deterioration or other damage. Inspect solder connections between cables and terminal contacts. Connections should be solid, rigid and free of corrosion.

**2-159. Replacement**

*a.* Disconnect applicable plug connectors.

*b.* Tag and disconnect electrical leads.

*c.* Remove loop clamps securing cable to trailer, where applicable; retain loop clamps for reinstallation. Replace clamps if damaged or rubber is deteriorated.

*d.* Raise refrigeration lines to remove cable from back of main indicator panel.

*e.* Replace rubber grommets if deteriorated, cracked, or loose.

*f.* If necessary, replace ground wire. Manufacture from wire, electric, 4AWG, MIL-C-13486.

## Section XXVI 1$_0$ FUEL GAGE WIRING

**2-160. General**

Direct support maintenance personnel are authorized to test, manufacture, and replace the fuel gage wiring and its attaching hardware.

**2-161. Test**

Test by making continuity check.

**2-162. Replace**

*a.* Remove cushioned loop clamp (7, fig. 2-79).

Legend for fig. 2-79:

1 Terminal lug
2 Wire
3 Connector
4 Tubing
5 Wire
6 Screw
7 Loop clamp
8 Terminal lug

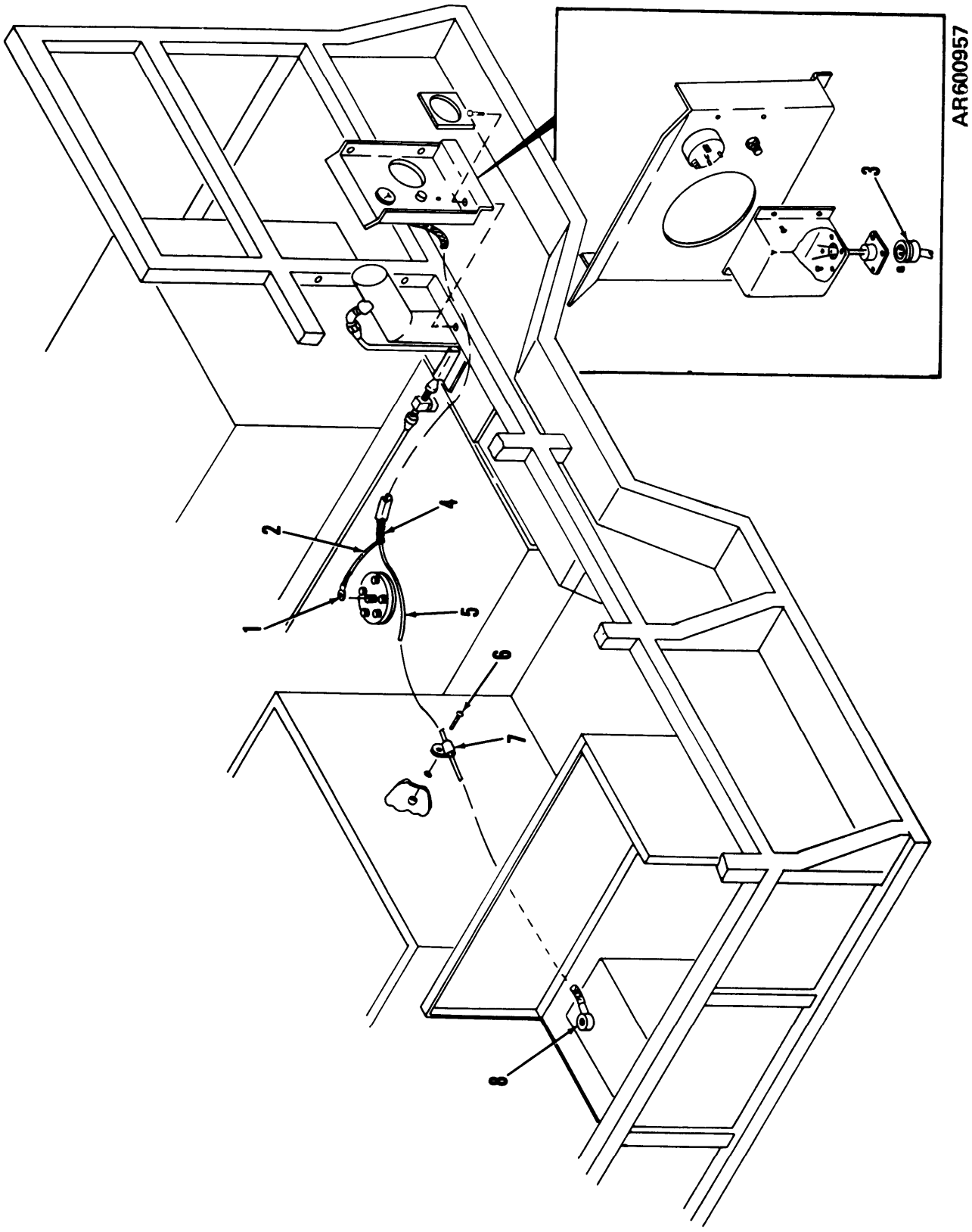



*Figure 2-79. Fuel gage wiring.*

*b.* Disconnect and remove wiring (2) and (5).

*c.* Check for faulty terminal lugs (1) and (8). Replace if damaged.

*d.* Fabricate wire (2) with 600-volt white electric wire, MIL-W-5086/1.

e. Fabricate wire (5) with 600-volt black electric wire, MIL-W-5086/1.

*f.* Fabricate tubing (4) from .375 ID black tubing, MIL-R-46846.

*g.* Install connector (3). Replace if damaged.

*h.* Make continuity check of new wiring.

*i.* Replace loop clamps.

# Section XXVIII. FILTER AND UTILITIES UNIT M68

## 2-163. General

Direct support maintenance personnel are authorized to maintain the Filter and Utilities Unit M68 (fig. 2-80 ① and ② ) Hereinafter this equipment will be referred to as the maintenance float trailer. Authorized maintenance and specific tests in this section are required to be performed as soon as the maintenance float trailer is received at Direct Support Maintenance. Maintenance float trailers are required for field emergency use as replacement for the shelter trailer M51. Serviceable maintenance float trailers will be retained at Direct Support for use when required.

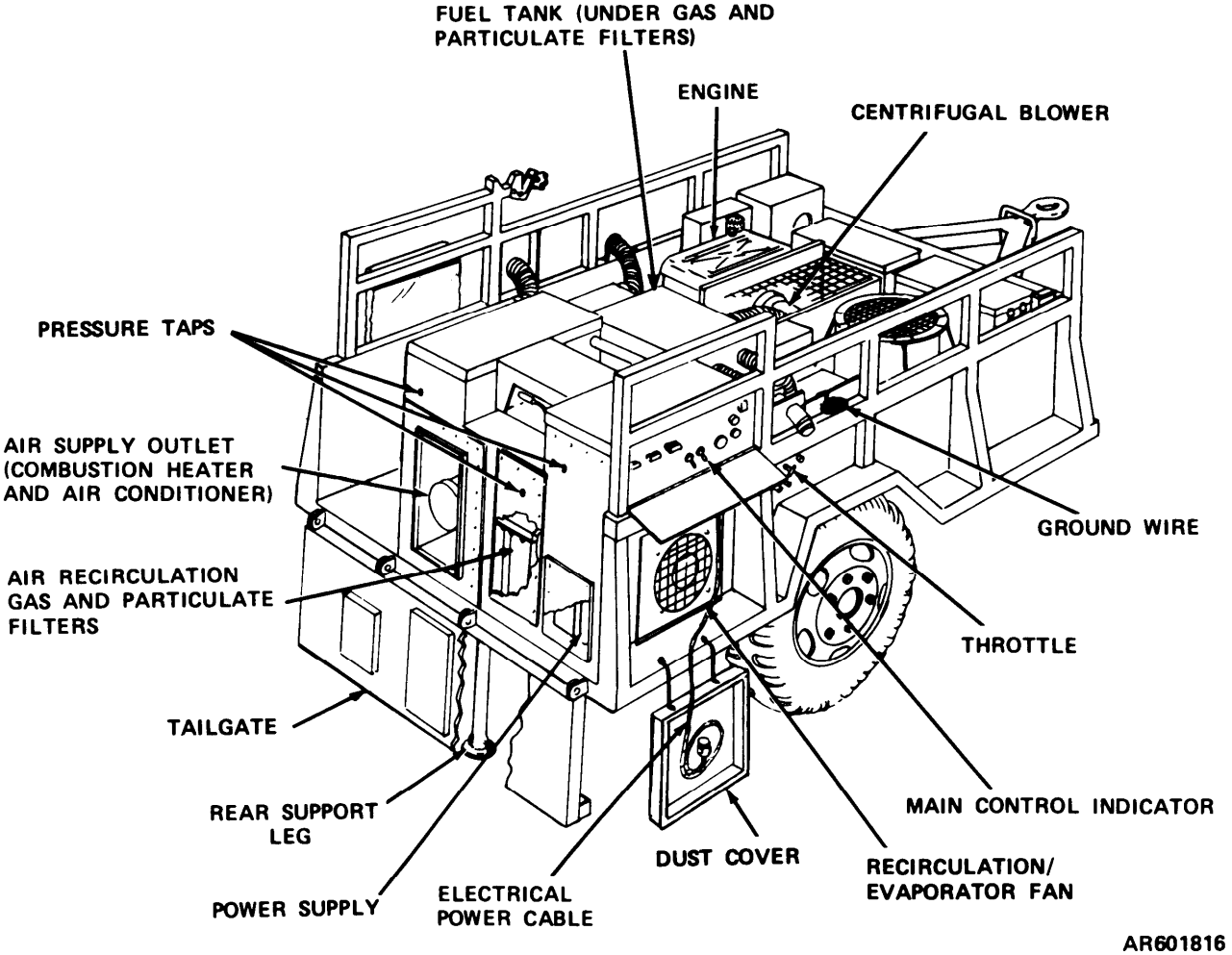



*Figure 2-80 ① . Filter and utilities unit M68 (maintenance float trailer), rear and side view.*

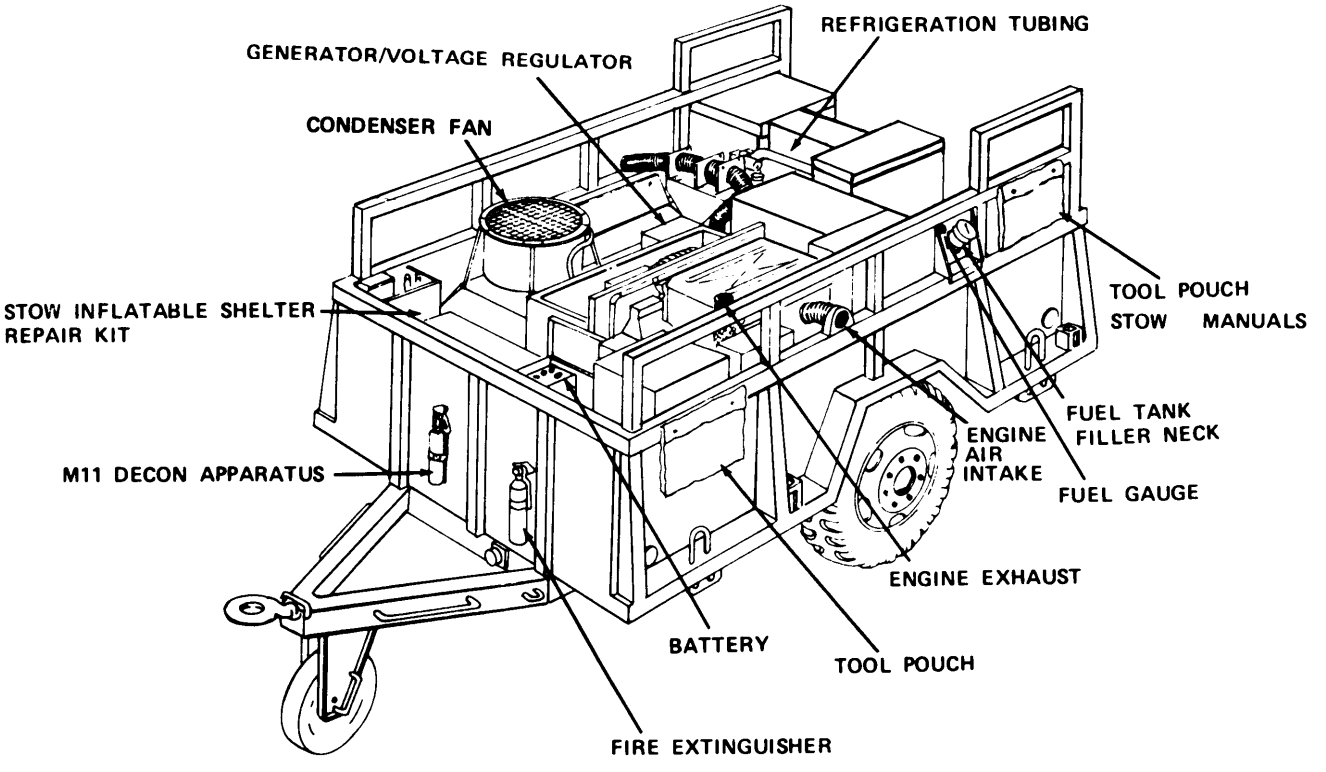



*Figure 2-80 ②. Filter and utilities unit M68 (maintenance float trailer), front and side view.*

## 2-164. Unpacking

*a.* Remove shipping straps (fig. 2-81).
*b.* Remove protective plywood cap.

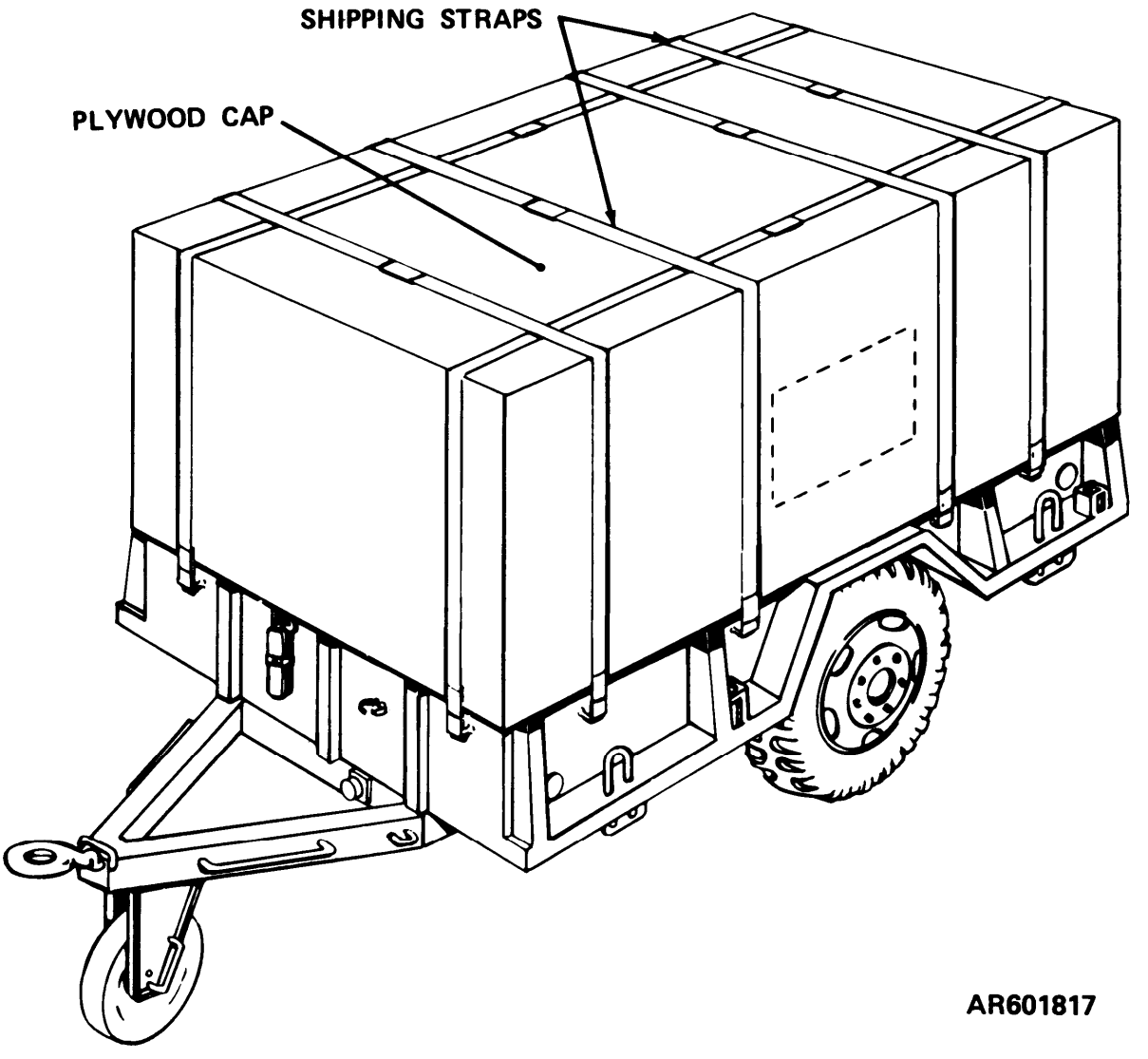



*Figure 2-81. Filter and utilities unit M68 (maintenance float trailer), shipping configuration.*

**WARNING**

The trailer rear support leg should be lowered and secured. This will prevent trailer overturning, injury to personnel, and damage to equipment.

*c.* Lower and adjust the rear support leg of the trailer (fig. 2-80 ①).

*d.* Lower the trailer tailgate.

*e.* Remove and inventory the items in table 2-9.

*Table 2-9. Separately Packaged Items*

| *Quantity* | *Nomenclature* | *TM/NSN* |
|---|---|---|
| 1 | Operator's and Organizational Maintenance Manual Shelter System, Collective Protection, Chemical-Biological: Inflatable, Trailer-Transported, M51. | TM 3-420-264-12 |
| 1 | Operator, Organizational, Direct support and General Support Maintenance Manual Engine, Gasoline, 20HP, Military Standard Models (Model 4A084-2) (Model 4A084-3) | TM 5-2805-259-14 |
| 1 | Operator, Organizational, Direct and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists) Chassis Trailer: 1½ Ton, 2-Wheel, M103A1, M103A2, M103A3, M103A3C, M103A4, M103A4C Trailer, Cargo: 1½ Ton, 2-Wheel, M104, M104A1, M105A1, M105A2, M105A2C Trailer, Tank, Water: 1½ Ton, 2-Wheel, 400 Gallon, M107A1, M107A2, M107A2C Trailer, Van, Shop: Folding Sides, 1½ Ton, 2-Wheel, M448. | TM 9-2330-213-14 |
| 1 | Fire extinguisher, Dry Chemical, 2½ -pound. | |
| *2 | Particulate Filters, M24, 150 cfm | NSN 4240-00-802-5169 |
| *2 | Gas Filters, M23, 150 cfm | NSN 4240-00-802-5170 |
| 1 | Gas Filter | NSN 4240-00-152-1545 |
| 1 | Particulate Filter | NSN 4240-00-152-1543 |
| 1 | Inflatable shelter, repair kit, containing: | NSN 4240-00-008-1674 |
| | Adhesive tape, 3 in. (1 roll) | |
| | Adhesive 5 oz. (1 tube) | |
| | Window material 6 in. by 30 in. (1) | |
| | Black floor material 8 in. dia. patch (6) | |
| | Black floor material 5 in. dia. patch (6) | |
| | Cloth repair kit, bag (1) | |
| | Patch, white 10 in. by 36 in. (3) | |
| | Patch, olive drab 10 in. by 36 in. (3) | |
| | Patch, white 8 in. dia (6) | |
| | Patch, white 6 in. dia (6) | |
| | Patch, white 5 in. dia. (6) | |
| | Patch, olive drab 8 in. dia (6) | |
| | Patch, olive drab 6 in. dia. (6) | |
| | Patch, olive drab 5 in. dia. (6) | |
| | Zipper lubricant, stick (1) | |
| | Shop towels (10) | |
| | Brush jack, stiff bristle (1) | |
| | Brush, acid swabbing, 3/8 in. bristle (20) | |
| | Needles (1 package) | |
| | Shears bent trimmer, 8 in. (1) | |
| | Thread No. 5 polyester, shade S-1, 50 ft. (1 spool) | |
| | Toluene technical pt. cans (4) | |
| | Drawing, repair kit contents (1) | |
| | Fabric cement (1 Qt. Can). Item not furnished. Requisition as required. | 8040-00-165-8614 |

## 2-165. Stowing and Installing Loose Equipment

a. *Stowing.*

(1) Stow the inflatable shelter repair kit (fig. 2-80 ②). use hold down straps to secure the repair it.

(2) Stow the package containing manuals in the tool pouch on the side of the trailer (fig. 2-80 ②).

*b. Installing.*

(1) Install gas and particulate filters TM 3-4240-264-12 para 4-5 steps e. and f.

(2) Install fire extinguisher in clamps fig. 2-80 ②).

## 2-166. Servicing

a. Remove protective tape from the following:

(1) Engine air intake.

(2) Engine exhaust.

(3) Engine oil filter cap.

(4) Top of condenser fan.

(5) Three air pressure taps fig 2-80 ①.

(6) Three air pressure taps fig 2-83.

(7) Heater exhaust on rear underside of trailer.

(8) Battery cable connectors.

*a.* Requisition a belt tension bar (NSN 4240-00-489-5134) and tensiometer (NSN 6635-00-921-6255) from stock.

*c.* Perform preventive maintenance checks and services operations, TM 3-4240-264-12, table 3-1 items 4, 5,6,9, and 16.

*d.* Activate the battery. Requisition and use electrolyte acid (battery acid), NSN 6810-00-249-9354

**NOTE**

For additional information, if required, refer to TM 9-6140-200-12.

*e.* Connect cables to battery.

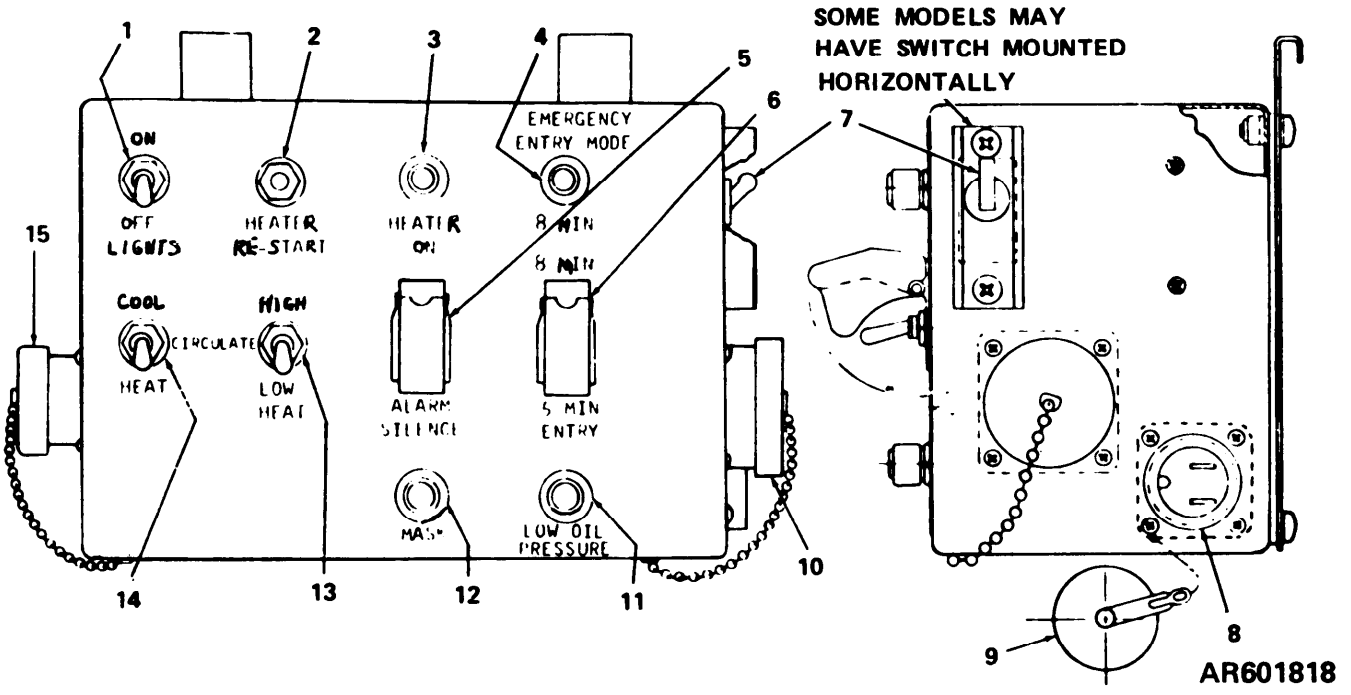
*f.* Drain preservative oil from engine crankcase. Fill with proper grade of oil, LO 5-2805-259-12.

*g.* Check level of lubricating oil in the centrifugal blower (fig. 2-80 .) Add hydraulic lubricating oil NSN 9150-00-009-0217) if required.

*h.* Fill fuel tank with approximately 50 gallons of gasoline (grade 91A NSN 9130-00-160-1817, or grade 91C (for temperatures consistently below 32°F), NSN 9130-00-160-8131).

### 2-167. Starting Operations

*a.* Requisition an auxiliary control indicator (fig, 2-82) from stock (NSN 4240-00-028-9579). Place in a convenient location.




1 ON, OFF LIGHTS switch
2 HEATER RE-START switch
3 HEATER ON light
4 EMERGENCY ENTRY MODE lights
5 ALARM SILENCE switch
6 8 MIN, 5 MIN ENTRY switch
7 Auxiliary circuit breaker
8 Receptacle connector
9 Cover
10 Cover
11 LOW-OIL-PRESSURE switch
12 MASK light
13 HIGH-LOW HEAT switch
14 COOL, CIRCULATE, HEAT switch
15 Cover

*Figure* 2-82. *Auxiliary control indicator.*

*b.* Requisition a differential dial indicating gage (fig. 2-83) from stock (NSN 4240-00-477-6733).

*c.* Requisition two plastic tubing assemblies (fig. 2-83) from stock (NSN 4240-00-877-9874).

*d.* Attach ground wire (fig. 2-80 ① ) to suitable ground.

*e.* Open the cover on the main control indicator (fig. 2-80 ① ).

*f.* Open the dust cover (fig. 2-80 ① ).

*g.* Place the COOL, CIRCULATE, HEAT switch (14, fig. 2-82) on the auxiliary control indicator in the CIRCULATE position.

*h.* Remove electrical power cable from the dust cover (fig. 2-80 ① ).

*i.* Remove the cover from the electrical power cable connector.

*j.* Remove cover (10, fig. 2-82) from receptacle.

*k* Plug electrical power cable into receptacle.

**NOTE**

Alarm will sound and MASK indicator light will light.

*l.* Silence the alarm by lifting red guard on ALARM SILENCE switch (5) and push toggle switch up (toward the guard).

*m.* Pull throttle (fig. 2-80 ① ) all the way out and turn it clockwise to lock in position.

*n.* Place the engine air cleaner intake shutter (5, fig. 2-65) to SUMMER position.

**NOTE**

In temperatures below 25° F place shutter in WINTER position.

*o.* Place the oil pan baffle air control handle (6) in ABOVE 0° F position.

*p.* Place ENGINE CONTROL switch on main control indicator (fig. 2-80 ① ) in the ON position.

**WARNING**

When operating the gasoline engine indoors ensure that proper ventilation is provided. Carbon monoxide gas can cause DEATH.

**CAUTION**

Do not press ENGINE START switch for more than 15 seconds. If engine does not start after two 15–second periods, allow starter to cool 5 minutes before next attempt to start.

*q.* Press ENGINE START switch on the main control indicator and start the engine. Allow engine to operate at idle speed for 2 minutes before increasing speed.

*r.* Place the AUXILIARY 120 VAC circuit breaker on the main control indicator in the ON position.

*s.* Unlock throttle by turning counterclockwise and slowly push in until the frequency meter on main control indicator shows 60 to 62 cycles per second. Lock throttle by turning clockwise.

*t.* Place the following circuit breakers on the main control indicator in the ON position; DC POWER SUPPLY, CONDENSER FAN, and RECIRCULATION AND ENTRANCE FAN.

**2-168. Combustion Heater Test**

**WARNING**

Avoid contact with main control panel electrical connections. High voltage can cause DEATH or severe injury when cover is removed.

**NOTE**

Operating time of this test is part of the 25-hour checkout test (para 2-171).

*a.* Remove cover (27, fig. 2-18).

**NOTE**

If the surrounding air temperature is above 80° F, when testing the combustion heater, remove sensing bulb (8, fig. 2-39) and immerse in cold water.

*b.* Turn thermostat (3, fig. 2-39) knob to +80° F.

*c.* Install cover removed in step *a* above.

*d.* Place HIGH LOW HEAT switch (13, fig. 2-82) on the auxiliary control indicator in the LOW HEAT position.

*e.* Place the COOL, CIRCULATE, HEAT switch 14, fig. 2-82) on the auxiliary control indicator in the HEAT position. The HEATER ON light should light in approximately 2 minutes, indicating that combustion of fuel is taking place in the heater.

**NOTE**

If HEATER ON light does not light in 5 minutes push HEATER RE-START switch (2) on the auxiliary control indicator to start the heater.

*f.* Run the combustion heater at low heat for approximately 5 minutes.

*g.* Physically check for heat output at air supply outlet (fig. 2-80 ).

*h.* Place the HIGH LOW HEAT switch (13, fig. 2-82) on the auxiliary control indicator in the HIGH position.

*i.* Physically check for an increase in the heat output.

*j.* Place the COOL, CIRCULATE, HEAT switch (14, fig. 2-82) on the auxiliary control indicator in the CIRCULATE position. This will automatically stop the combustion heater from operating. Do not proceed until heater blower shuts down.

*k.* HEATER ON light should go off.

**2-169. Air Conditioning Test**

**WARNING**

Avoid contact with main control panel electrical connections. High voltage can cause DEATH or severe injury when cover is removed.

**NOTE**

Operating time of this test is part of the 25-hour checkout test (para 2-171).

*a.* Remove cover (27, fig. 2-18).

*b.* Turn thermostat (3, fig. 2-39) knob to + 20° F.

*c.* Install cover removed in step *a* above.

*d.* Place the COOL, CIRCULATE, HEAT switch (14, fig. 2-82) on the auxiliary control indicator in the COOL position.

*e.* Check that the condenser fan (fig. 2-80 ② ) is operating.

*f.* Physically check for cool air being expelled from the air supply outlet (fig. 2-80 ② ). It will take approximately 5 minutes for cool air to be expelled.

*g.* Place the COOL, CIRCULATE, HEAT switch (14, fig. 2-82) on the auxiliary control indicator in the CIRCULATE position.

*h.* Place the AUXILIARY 120 VAC circuit breaker on the main control indicator in the OFF position.

*i.* Disconnect the power cable from the auxiliary control indicator (fig. 2-82). Install cap on power cable and auxiliary control indicator. Retain auxiliary control indicator for future tests.

*j.* Place the power cable in the dust cover (fig 2-80 ① ). Place connector in clip.

**2-170. Gas and Particulate Filter Air Pressure Test**

*a.* Place the AUXILIARY 120 VAC circuit breaker on the main control indicator in the ON position.

*b.* Check the reading on the frequency meter on he main control indicator. Indicator should show 60 to 62 cycles per second.

**WARNING**

Avoid contact with main control panel electrical connections. High voltage can cause DEATH or severe injury when cover is removed.

*c.* Remove cover (27, fig. 2-18).

*d.* Turn thermostat (3, fig. 2-39) knob to + 72° F.

*e.* Replace cover removed in step c above.

**NOTE**

Operating time of this test is part of the 25-hour checkout test (para 2-171).

*f.* Adjust the indicator needle to 0 on the lower gage, if required (fig. 2-83).

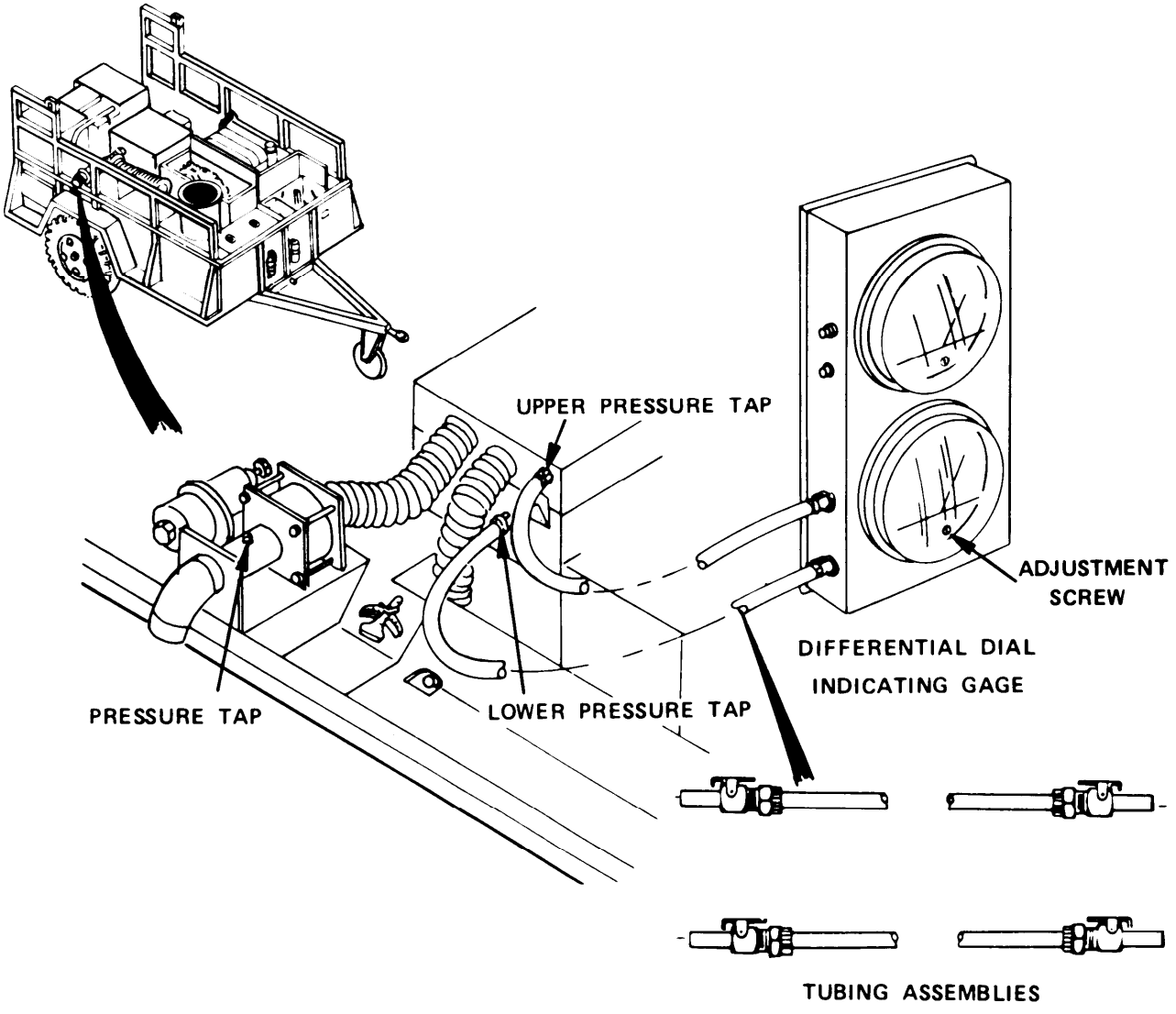



*Figure 2-83. Gas and particulate filter pressure check.*

**NOTE**

The upper gage is not used in this test.

g. Insert one end of tubing assembly into LOW tap of lower gage.

*h.* Insert one end of second tubing assembly into HI tap of lower gage.

*i.* Insert free end of tubing assembly from HI tap

into lower pressure tap on left side of filter and utilities unit.

*j.* Insert free end of tubing assembly from LOW tap into upper pressure tap on left side of filter and utilities unit.

**NOTE**

To avoid incorrect readings, hold dial indicating gage vertically when taking reading.

*k.* If pressure reading is above 4.8 INCHES OF WATER replace particulate filter (para 2-78).

1. Remove tubing assemblies and dial indicating gage. Retain dial indicating gage and tubing assemblies for future tests.

**2-171. Twenty-Five Hour Checkout** Test

**CAUTION**

After every 5 hours running time the engine should be shut down to check oil level in the engine and centrifugal blower. Shutdown is also required to check the tension of the drivebelts.

*a.* Place the following circuit breakers on the main control indicator in the OFF position; DC POWER SUPPLY, CONDENSER FAN, RECIRCULATION AND ENTRANCE FAN, and AUXILIARY 120 VAC.

*b.* Pull out throttle (fig. 2-80 ) until idle speed is obtained. Turn clockwise to lock in idle position. Idle engine 3 minutes.

*c.* Place ENGINE CONTROL switch on the main control indicator in the OFF position. After engine stops, push the throttle in and lock in position.

*d.* Check drivebelts for deterioration, cuts, and possible damage.

*e.* Check drivebelt tension, TM 3-4240-264-12 (para 3-26).

*f.* Check oil in the gasoline engine. See TM 3-4240-264-12 (fig. 3-2) for oil gage rod location.

g. Check oil level in the centrifugal blower. See TM 3-4240-264-12 (fig. 3-2) for dip stick location.

*h.* Start the engine to complete the 25-hour test para 2-167 *m* through t).

*i.* The engine should be shut down after completion of the 25-hour checkout test.

**2-172. Servicing Operations After Completion of 25-Hour Checkout Test.**

**NOTE**

Operations in this paragraph are performed after engine has been shut down.

*a.* Close dust cover and secure four catches (fig. 2-80 ①).

*b.* Close storage box cover over battery (fig. 2-80 ②).

*c.* Drain the oil from the gasoline engine crankcase (TM 3-4240-264-12, fig. 3-2).

*d.* Change engine oil filter (TM 5-2805-259-14 para 3-4).

*e.* Refill with new oil (LO 5-2805-259-12).

*f.* Fill fuel tank with gasoline (para 2-166h) to eliminate condensation during storage.

g. Close the cover on the main control indicator.

*h.* Check fuel strainer bowl (TM 3-4240-264-12 fig. 3-11) for dirt; remove and clean if required.

*i.* Inspect fuel lines and fittings for leaks.

*j.* Raise tailgate to closed position and secure with safety chains.

*k.* Raise and lock trailer rear support leg (fig 2-80 ①).

*l.* Disconnect ground wire from ground and stow on the trailer (fig. 2-80 ①).

**2-173. One Hour Operational Checkout Test**

Maintenance float trailers in direct support stool require a 1 hour operational checkout test every 30 days. Operational check includes the combustion heater and air conditioning units.

**WARNING**

The trailer rear support leg should be lowered and secured. This will prevent trailer overturning, injury to personnel, and damage to equipment.

a. Lower and adjust the rear support leg of the trailer (fig. 2-80 ①).

*b.* Lower the trailer tailgate.

*c.* Check level of gasoline in fuel tank. Add if required. Use grade 91A NSN 9130-00-160-1817 or grade 91C (for temperatures consistently below 32°F) NSN 9130-00-160-8131.

*d.* Check oil level in the gasoline engine. See TM 3-4240-264-12 (fig. 3-2) for oil gage rod location.

*e.* Check oil level in the centrifugal blower. See TM 3-4240-264-12 (fig. 3-2) for dip stick location.

*f.* Check battery for level of electrolyte acid (bat tery acid). Add if required.

g. Perform starting operations per paragraph 2-167 *a* and d through t.

*h.* Perform a one-half hour combustion heater test per paragraph 2-168.

**NOTE**

One-half hour running time to be equally divided between low heat and high heat. Transition from combustion heater test to air conditioning test is accomplished without shutdown.

*i.* Perform a one-half hour air conditioning test per paragraph 2-169.

*j.* Shut down the engine per paragraph 2-171 *a* through g.

*k. Close* dust cover and secure four catches (fig. 2-80 ① ).

*l.* Close the cover on the main control indicator.

*m.* Fill fuel tank with gasoline (para 2-166h) to eliminate condensation during storage.

*n.* Raise tailgate to closed position and secure with safety chains.

o. Raise and lock trailer rear support leg (fig. 2-80 ).

*p.* Disconnect ground wire from ground and stow on the trailer (fig. 2-80 ① ).

## Section XXXIX. PAINTING

### 2-174. General

Direct support maintenance personnel are authorized to paint and touch-up all painted exterior metal surfaces of he shelter system. Never paint fabric surface or identification and instruction plates. If stencil is made rereadable during repainting or touch–up, restencil nomenclature as necessary.

*a.* If required, painting will be accomplished as follows:

(1) Prepare area to be painted in accordance with standard shop practice.

(2) Prime all worn, scratched, bare metal surfaces with two coats of anti fouling paint (13, table 2-1).

(3) Repaint or touch-up all painted exterior metal surfaces with olive drab enamel (14, table 2-1).

*b.* If required, stenciling will be accomplished as follows:

(1) Clean area to be painted with clean wiping rag (12, table 2-1) dampened with cleaning compound solvent (4).

(2) Restencil with yellow enamel (15, table 2-1). Use fig. 3-12 of TM 3-4240-264-12 to identify location and size of lettering.

### 2-175. Painting Instructions

Refer to TM 43-0139 for painting instructions for field use.

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# CHAPTER 3

# GENERAL SUPPORT MAINTENANCE

## Section I. INTRODUCTION

### 3-1. General

This chapter contains information for use of personnel performing general support maintenance on the shelter system. A functional description of M51 shelter system is contained in TM 3-4240-264-12.

## Section II. CENTRIFUGAL BLOWER

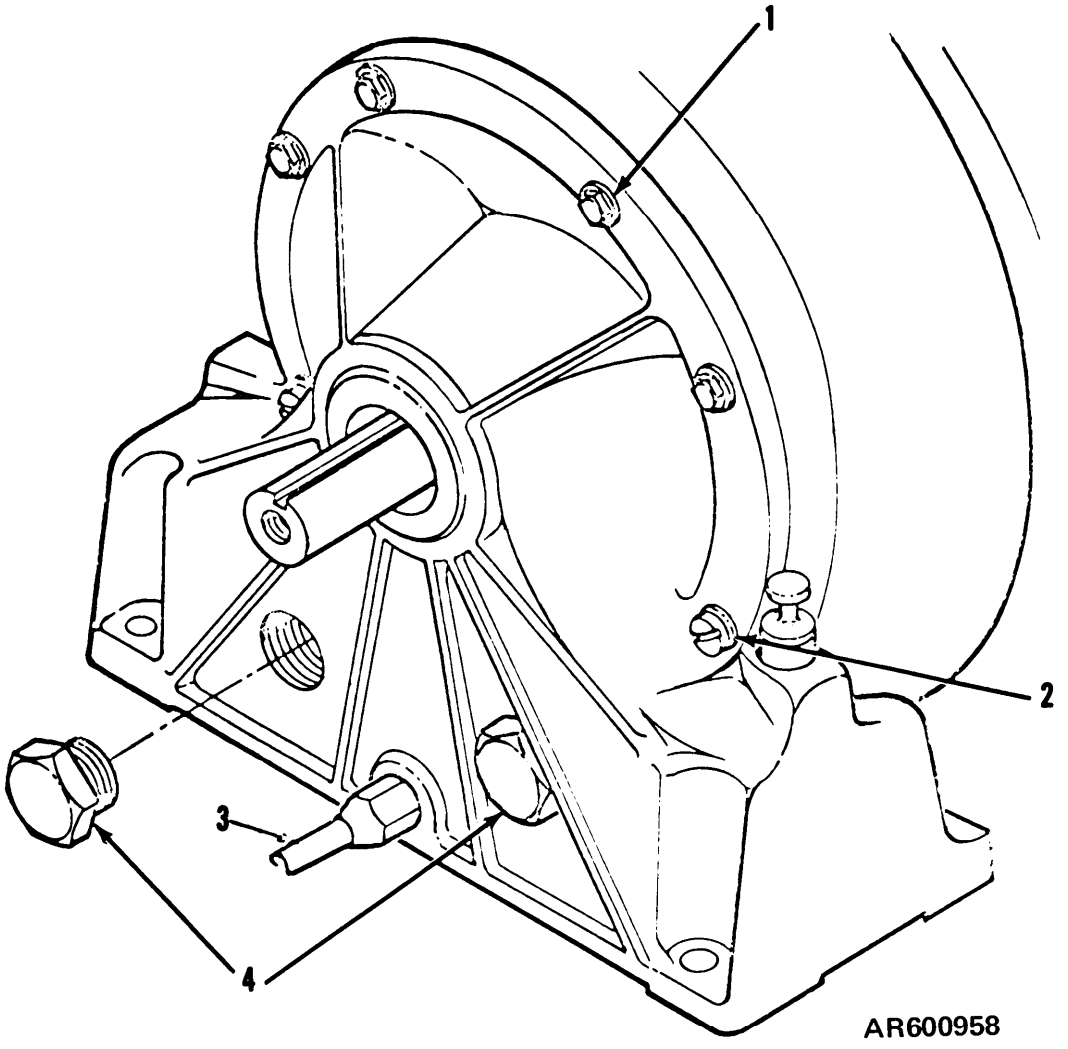
### 3-2. General

The function of the centrifugal blower is to supply air for inflation of the shelter wails and makeup air for the shelter interior.

### 3-3. Rebuild

*a. Disassembly.* Disassemble as follows:

(1) Remove drain line (3, fig. 3-1) on front of bearing housing (46, fig. 3-2), and drain oil.




1 Screw, washer
2 Screw, washer
3 Drain line
4 Assembly plug

*Figure 3-1. Assembly plugs.*

*(2)* Hold blower pulley with a strap wrench, and remove pulley retaining screw (15, fig. 3-2). Do not use pliers or pipe wrench to hold pulley.

Legend for fig. 3-2:
1 Screw
2 Key
3 Bearing
4 Pump body
5 Retainer
6 Springs
7 Bearing
8 Spacer
9 Seal
10 Dip stick
11 Sleeve
28 Screw
29 Lockwasher
30 Scroll cover
31 Screw
32 Lockwasher
33 Flatwasher
34 Impeller
35 Shim
36 Scroll
37 Shim
38 Spring
39 Race
12 Washer
13 Screw
14 Retainer
15 Screw
16 Plug
17 Packing
18 Plug
19 Screw
20 Washer
21 Driver
22 Nut
23 Lockwasher
24 scoop
25 Diffuser plate
26 Screw
27 Plug
40 Pin
41 Ring
42 Shaft
43 Ball
44 Race
45 Pin
46 Housing
47 Gasket
48 Plunger
49 Spring
50 Gasket
51 Pump
52 Screen
53 Retainer
54 Screw
55 Shaft

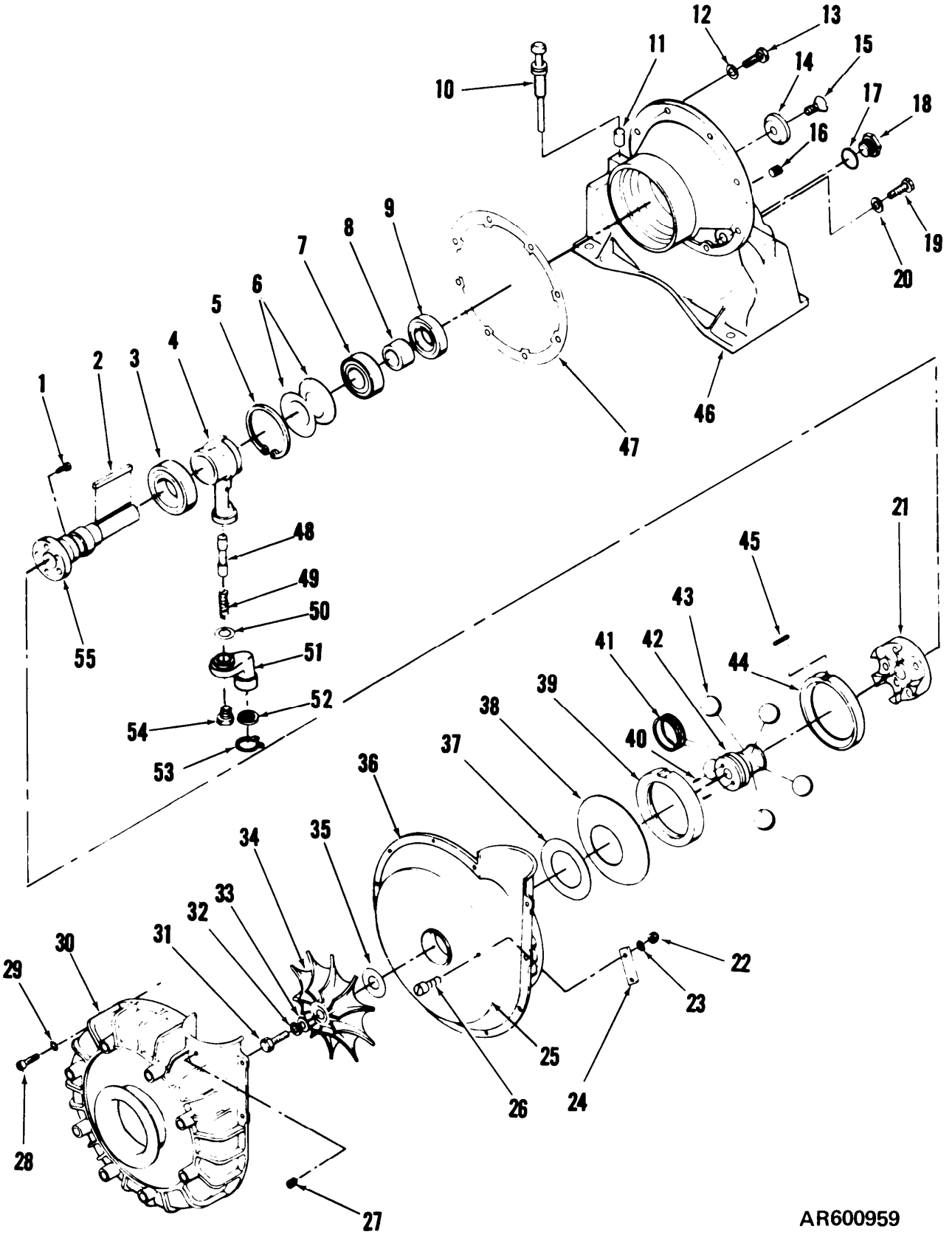



*Figure 3-2. Centrifugal blower.*

(3) Remove pulley retainer (14) and slide pulley from shaft. If pulley cannot be removed by hand, use a puller. Place ¼-inch flat washer on end of shaft to prevent damage to shaft threads. Engage puller jaws on rear flange of pulley.

(4) Remove nine screws (28, fig. 3-2) and lockwashers (29).

(5) Tap scroll cover (30) lightly with a mallet to remove it. Do not pry off because damage to mating surfaces will result.

**CAUTION**

Impeller is precision balanced; therefore, to avoid damage and imbalancing do not use any tool to hold impeller while removing impeller screw.

(6) Hold impeller (34) firmly by hand, and remove impeller screw (31 ) and washers (32 and 33).

(7) Use impeller puller (2, fig. 3-8) to remove impeller (34, fig. 3-2) from shaft; remove impeller shims (35).

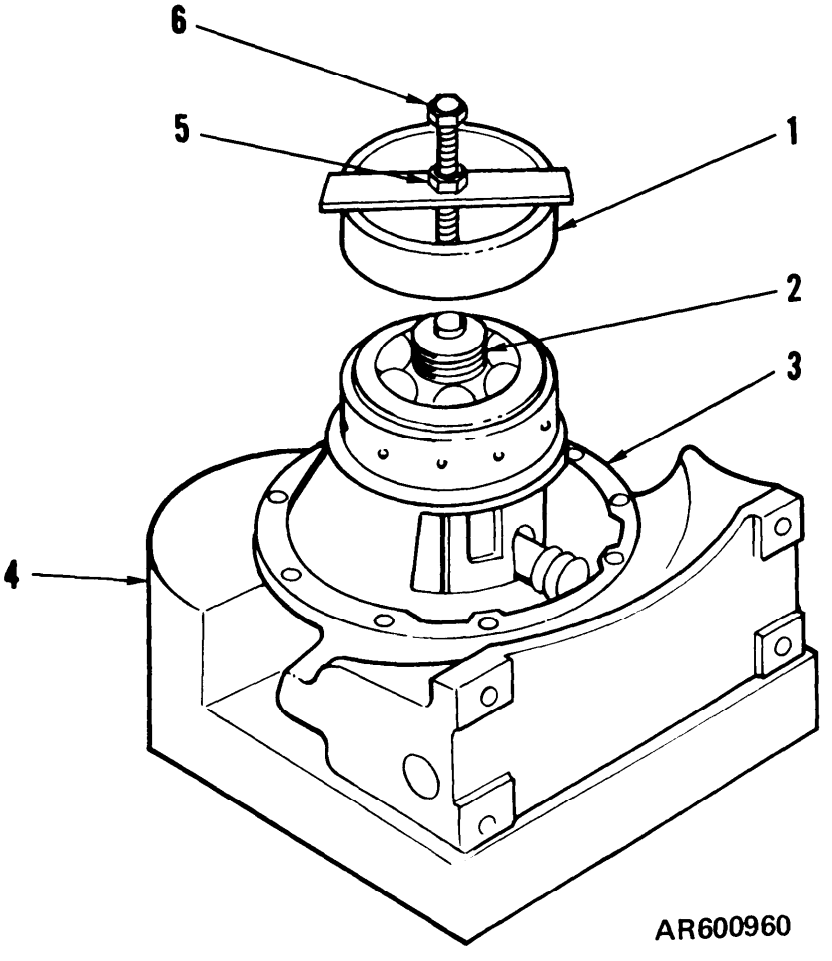
(8) Remove assembly plugs (4, fig. 3-1) also (18, fig. 3-2) and preformed packings (17, fig. 3-2).

(9) Loosen six screws (19, fig. 3-2), and aluminum washers (20), two screws (13) and aluminum washers (12) evenly until tension is released. Two of the six screws are located behind plugs (4, fig. 3-1); be careful not to drop screws or washers in oil sump.

(10) When tension is released, remove screws (19, fig. 3-2), screws (13), and washers (12 and 20), and remove scroll (36) from bearing housing (46).

(11 ) Remove belleville load spring (38) and shim (37).

(12) Position bearing housing (3, fig. 3-3) on blower block (4) also (1, fig. 3-8).




1 Race puller
2 Output shaft
3 Bearing housing
4 Blower block
5 Nut
6 Bolt

*Figure 3-3. Drive element removal.*

**CAUTION**

To keep them free of grit or corrosive sweat, do not handle races, drive balls, ball driver, or output shaft with bare hands; use clean, cloth gloves or clean oiled cloths.

(13) Lift rear outer race (39, fig. 3-2) from bearing housing.

(14) If race cannot be removed by hand, use race puller (1, fig. 3-3) also (3, fig. 3-8) as follows:

(a) Place ring on bearing (3, fig. 3-2).

(b) Screw bolt (6 fig. 3-3) into output shaft (2).

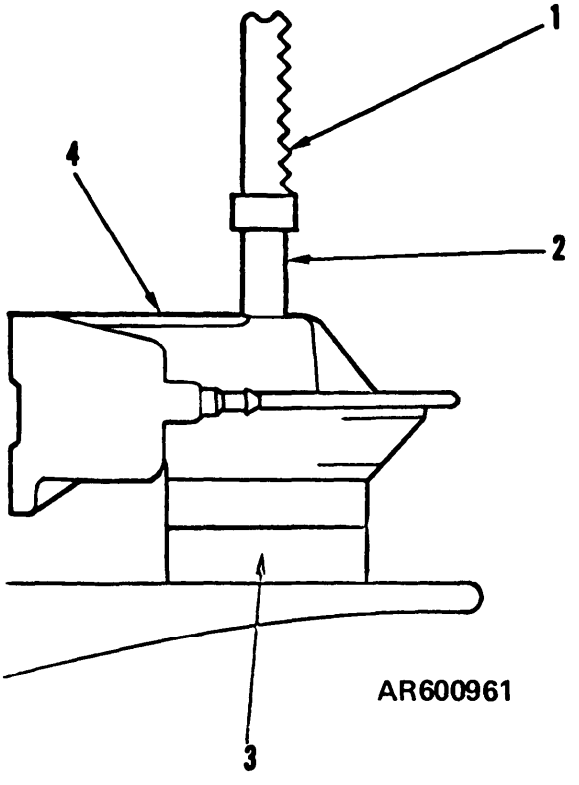
(c) While holding bolt (6) tighten nut (5) until outer race is free of bearing housing.

(15) Carefully remove output shaft (42, fig. 3-2) and drive balls (43); remove dowl pins (40) and labyrinth rings (41) from output shaft.

(16) Remove race lock pin (45) and front outer race (44).

(17) Allow oil pump plunger to fall until it is protruding from oil pump body (5, fig. 3-7).

(18) Position bearing housing (4, fig. 3-4) and ring part of race puller (3) in arbor press (1).




1 Arbor press
2 Input shaft
3 Race puller ring
4 Bearing housing

*Figure 3-4. Input shaft removal.*

**CAUTION**

Do not allow shaft to fall; damage to ball driver will result.

(19) Press input shaft (55, fig. 3-2) slowly out of bearing housing; remove shaft key (2).

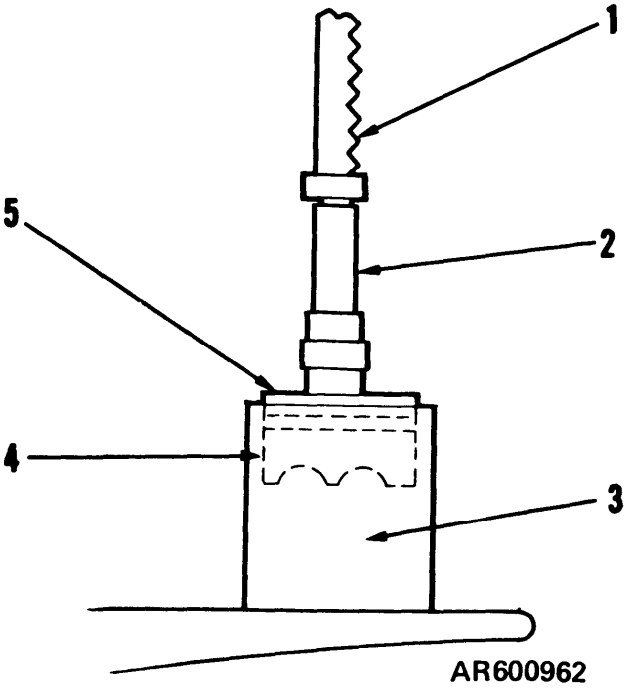
(20) Remove oil pump extension (51) and gasket (50) from oil pump body (4).

(21 ) Rotate oil pump body 180 degrees and lift up and out through rear of bearing housing (46); remove screen retainer (53) and oil pump screen (52).

**NOTE**

It is not necessary to disassemble the following items unless inspection shows that replacement is necessary.

(22) Position input shaft (55, fig. 3-2) also (2, fig. 3-5) and support (3, fig. 3-5) also (10, fig. 3-8) in an arbor press (1, fig. 3-5) and press off inner bearing (5) also (3, fig. 3-2).




1 Arbor press
2 Input shaft
3 Support
4 Ball driver
5 Inner bearing

*Figure 3-5. Inner bearing removal.*

(23) Remove retainer ring (5, fig. 3-2) and two belleville load springs (6).

(24) Remove seal spacer (8).

(25) Push seal and bearing remover (7, fig. 3-8) through input shaft seal until shoulder bottoms on inside of outer bearing, and press out bearing. Continued pressing will remove input shaft seal (9, fig. 3-2).

(26) Position ball driver (21, fig. 3-2) (shaft end up) in ball driver holder (6, fig. 3-8) and clamp ball driver holder in a soft jaw vice.

(27) Remove five screws (1, fig. 3-2) that secure ball driver to input shaft (55).

(28) Remove dipstick (10) and dipstick sleeve (11).

(29) Remove screw (26), locking nut (22), lockwasher (23), and airscoop (24).

(30) Remove plug (27).

*b. Clean and Inspect.* Clean and inspect parts as follows:

(1) Clean all parts with decreasing solvent (item 4, table 2-1) and dry thoroughly.

(2) Inspect inner bearing (3, fig. 3-2) and outer bearing (7) for pitted, nicked, or corroded balls or races.

(3) Inspect drive balls (43) and race path or output shaft and outer race (44) for scratches, pits, and corrosion.

(4) Inspect driving path of ball driver for scratches, pits, and corrosion. Driving path shall not be more than 1/8-inch wide.

(5) Inspect oil pump plunger (48) and body for scratches and scoring.

(6) Inspect impeller (34) for nicks, gouges, or chips.

c. *Parts Replacement.* Replace parts as follows :

(1) Replace all parts which fail to pass inspection.

(2) The drive element, consisting of output shaft (42), drive balls (43), and outer race (44) is a matched set; if one part is defective, replace the entire set.

(3) Replace gasket (47) and preformed packing (17).

*d. Assembly.* Assemble the blower as follows:

**NOTE**

Coat all parts with tractive fluid (NSN 9150-00-009-0217) when assembling.

(1) Press input shaft seal (9, fig. 3-2) into place using an arbor press and the seal and bearing installer (4, fig. 3-8). Be sure printing on face of seal is facing down (toward pulley side of housing) and that seal end of installer is used.

(2) Heat four inch diameter end of bearing housing (46) approximately 200 degrees F.

(3) Install outer race (44) in heated bearing housing (46), and insert race lock pin (45). Do not force or hammer pin.

(4) Press outer bearing (7) into heated bearing housing (46), using seal and bearing installer (4, fig. 3-8) and arbor press. Be sure bearing is seated on bottom of bore.

(5) Install a belleville load spring (6) with large diameter of spring against bearing. Install another belleville load spring, with small diameter of spring against spring previously installed.

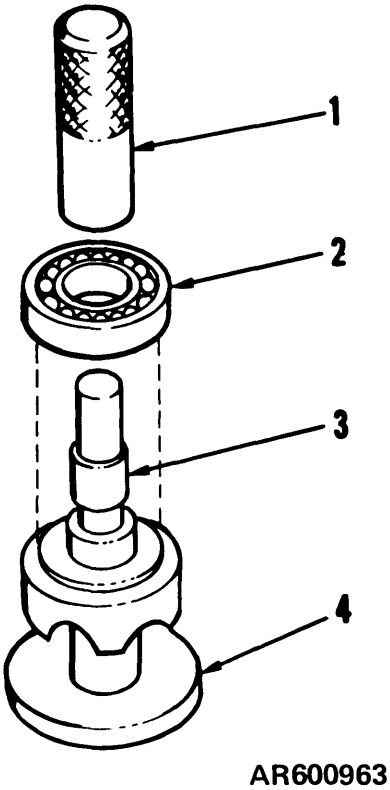
(6) Install retaining ring (5) with ring gap toward bottom bearing housing.

(7) Install airscoop (24) on scroll (36) and secure with screw (26), lockwasher (23), and locknut (22).

(8) Install ball driver (21) in ball driver holder (6, fig. 3-8) and clamp in a soft jaw vise.

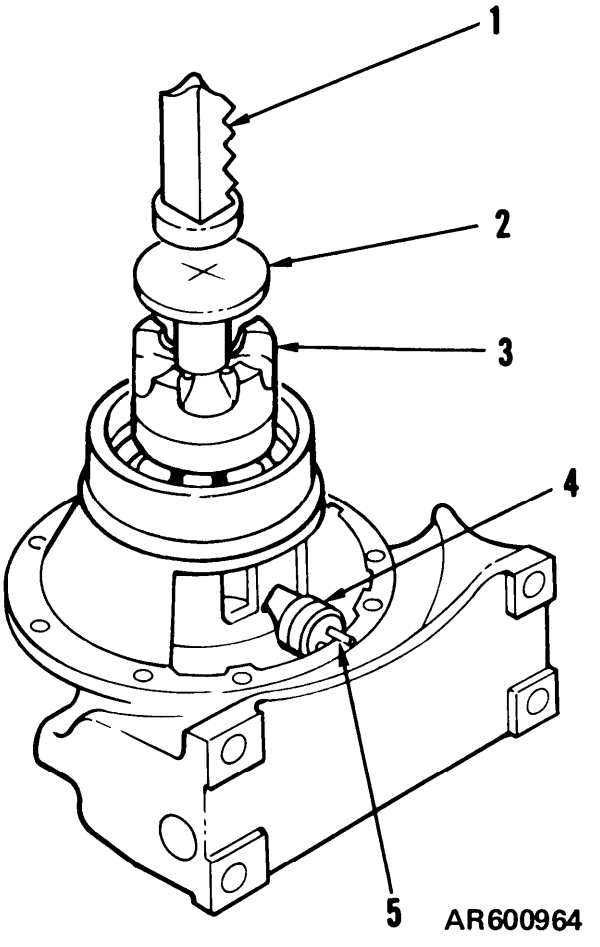
(9) Position input shaft (55) on ball driver (21), and secure with five input shaft screws (1). Tighten screws to a torque of 69 (+3/-2) inch-pounds.

(10) Install inner bearing (3) on input shaft (55), using bearing seat tool (1, fig. 3-6) also (8, fig. 3-8), input shaft tool (2, fig. 3-7) also (9, fig. 3-8), and arbor press (1, fig. 3-7).




1 Bearing seat tool
2 Inner ball bearing
3 Input shaft
4 Input shaft tool

*Figure* 3-6. *Bearing installation.*




1 Arbor press
2 Input shaft tool
3 Ball driver
4 Oil pump and extension
5 Oil pump plunger

*Figure 3-7. Input shaft installation.*

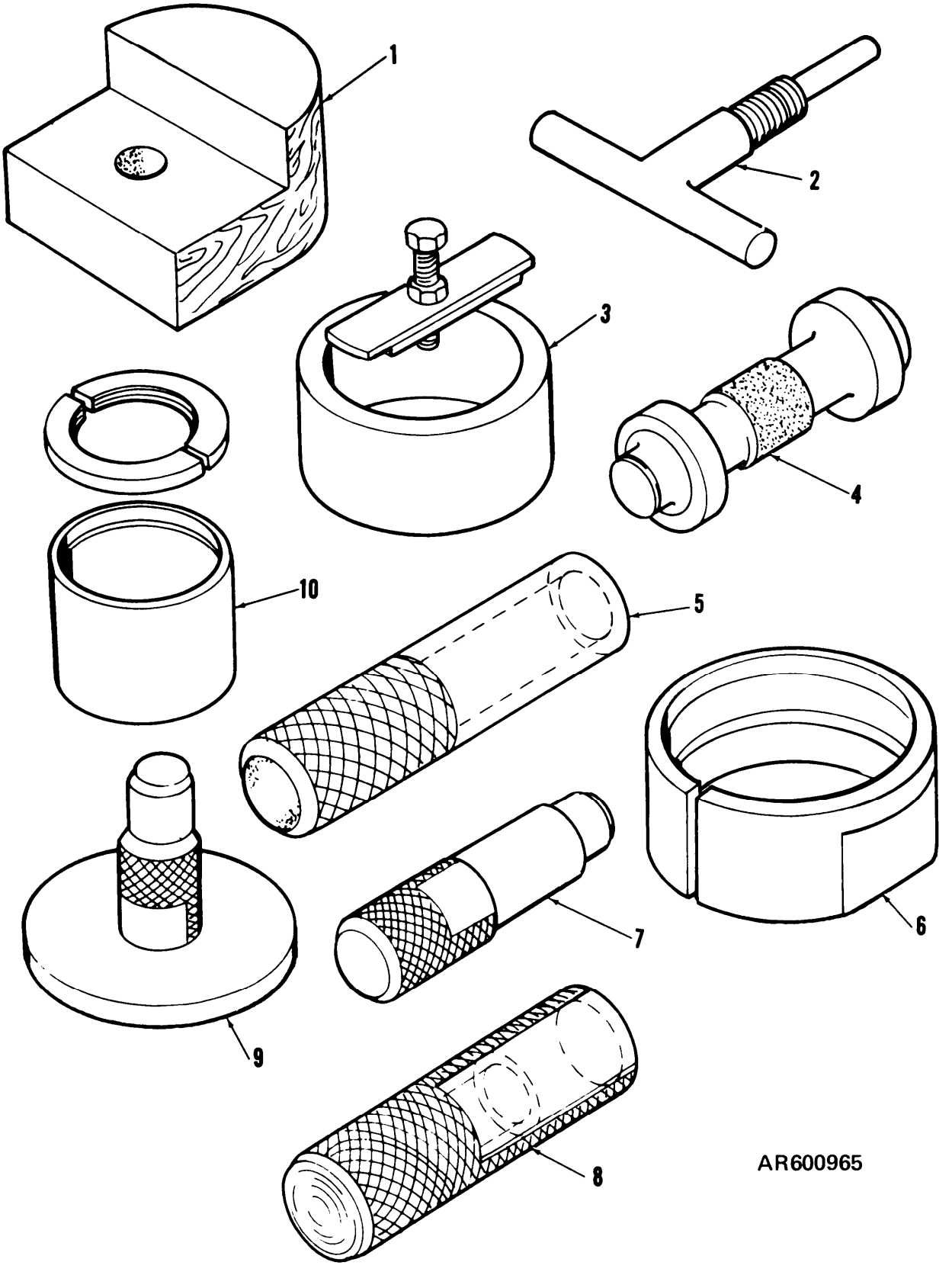



*Figure 3-8. Special tools.*

Legend for fig. 3-8:
1 Blower block
2 Impeller puller
3 Race puller
4 Seal and bearing installer
5 Bearing seat tool
6 Ball driver holder
7 Seal and bearing remover
8 Bearing seat tool
9 Input shaft tool
10 Support

(11) Insert oil pump body (4, fig. 3-2), bottom end first, through the bearing bore into the bearing housing (46). To pass the pump body (4) through the rectangular opening, the pump will be backward and must be rotated 180 degrees. When in correct position, the chamfered side of the pump is toward the pulley end of the blower.

(12) Position gasket (50) on bottom of oil pump body (4). Aline oil pump extension (51) with oil pump body, and insert oil pump plunger (48), with hollow end out, through oil pump extension (51) into oil pump body.

(13) Leave end of oil pump plunger (48) protruding from oil, pump extension (51 ), and let pump assembly hang on bearing housing while installing input shaft (55) as shown in figure 3-7.

(14) Assemble oil pump screen (52, fig 3-2) and screen retainer (53) to oil pump extension (51).

(15) Place oil pump extension in position in oil sump.

(16) Coat input shaft with tractive fluid (NSN 9150-00-009-0217) and insert through oil pump body (4), outer bearing (7), and seal (9) as far as it will go by hand.

**CAUTION**

Be sure oil pump body is properly alined with input shaft to prevent binding and subsequent damage to oil pump body, prior to pressing input shaft into bearing.

(17) Using input shaft tool (2, fig. 3-7), (9, fig. 3-8), and arbor press (1, fig. 3-7), press input shaft into bearing housing until inner bearing is seated in its bore. Be sure oil pump (4) is free to move on shaft.

(18) Rotate input shaft until keyway is down. Insert plunger spring (49, fig. 3-2) into oil pump plunger (48), and install extension screw (54). Be sure that gasket (50) is seated properly and extension (51) is not touching bearing housing.

(19) Position bearing housing (46) in arbor press with large end up and ball driver (21) resting on input shaft tool (2, fig. 3-7). Slip bearing seat tool (1, fig. 3-6), also (8, fig. 3-8) over input shaft (55) to bear against outer bearing (7, fig. 3-2), and press bearing back against shaft shoulder.

(20) Push seal spacer (8, fig. 3-2) over input shaft (55) and through seal (9).

(21) Set output shaft (42) in place in center of ball driver (21).

(22) Set five drive balls (43) in pockets of ball drive.

(23) Install outer race (39). Race should slip into bore; do not force.

(24) Insert labyrinth rings (41) into bore of scroll (36) to check ring gap. Gap should be 0.002 to 0.005 inch. If rings have insufficient gap, file ends of rings.

(25) Install labyrinth rings (41) on output shaft (42).

(26) Position gasket (47) on bearing housing flange.

(27) Position belleville load spring (38) on outer race (39) with large diameter of spring against race.

**CAUTION**

Be careful when inserting output shaft into scroll to insure that labyrinth rings are properly alined with hole in scroll.

(28) Place belleville load spring shim (37) on scroll (36); it may be retained on scroll with grease; position scroll on bearing housing (46).

(29) Install six screws (19) and aluminum washers (20) two screws (13) and aluminum washers (12). Tighten evenly until snug. Tighten bolts and screws to a torque of 145 inch-pounds.

(30) Check input shaft torque as follows:

(a) Install ¾-inch long, 5/16-24 hex head cap screw in pulley end of shaft.

(b) Rotate shaft with a torque wrench, and note torque required to maintain rotation.

(c) Torque reading should be 20 to 25 inch-pounds.

**NOTE**

A 0.001-inch thick shim will make approximately a two inch-pound change.

(d) If torque reading is below 20 inch-pounds, a thicker belleville load spring shim (37, fig. 3-2) must be added between belleville load spring (38) and scroll (36). If torque reading is above 25 inch-pounds, a thinner shim must be installed.

(31 ) Install two dowel pins (40) in output shaft.

(32) Position impeller (34) with estimated number of impeller shims (35) required on output shaft. Be sure index marks on impeller and shaft are alined.

(33) Install impeller screw (31), flat washer (33), and lockwasher (32).

(34) Hold impeller by hand, and tighten impeller screw (31) to a torque of 200 inch-pounds.

(35) Check clearance between back of impeller (34) and diffuser plate (25). Clearance should be 0.009 to 0.016 inches. If clearance is not correct, remove impeller and install correct thickness of shims.

(36) Position scroll cover (3) on scroll, and secure with nine screws (28) and lockwashers (29).

(37) Install preformed packing (17) and assembly plugs (4, fig. 3-1) also (18, fig. 3-2).

(38) Insert shaft key (2) in input shaft (55), and install pulley.

(39) Install drain line (3, fig. 3-1).

(40) Fill oil sump with 21 fluid ounces of (NSN 9150-00-009-0217) tractive fluid; install dipstick (10) and sleeve (11).

(41) Prime oil pump by turning pulley clockwise 15 to 20 revolutions when facing pulley end of shaft.

*e. Test.* Test blower as follows:

(1) Rotate blower by hand to feel freedom of movement.

(2) Operate blower at 45,000 rpm for one hour.

(3) Check for oil leaks.

(4) Rotate blower by hand; blower must rotate as freely as it did in step (1).

# APPENDIX A

# REFERENCES

**A-1. CBR Defense**

| | |
|---|---|
| FM 21-40 | Chemical, Biological, Radiological, and Nuclear Defense |
| FM 3-4 | NBC Protection |
| FM 3-5 | NBC Decontamination |
| TM 10-277 | Chemical, Toxicological and Missile Fuel Handlers Protective Clothing |

**A-2. Expendable Items**

| | |
|---|---|
| CTA 50-970 | Expendable Items (Except: Medical, Class V, .Repair Parts and Heraldic Items) |

**A-3. Lubrication**

| | |
|---|---|
| LO 5-2805-259-12 | Engine, Gasoline, 20hp, Military Standard Models (Model 4A084-2 and 4A084-3) |

**A-4. Maintenance**

| | |
|---|---|
| TM 43-0139 | Painting Instructions for Field Use |
| TM 3-4230-204-12&P | Operator's and Organizational Maintenance Manual (Including Repair Parts and Special Tools Lists): Decontaminating Apparatus, Portable, DS2, 1½ - quart, ABC-M11 (NSN 4230-00-720-1618). |
| TM 3-4240-264-12 | Operator's and Organizational Maintenance Manual: Shelter System, Collective Protection, Chemical-Biological: Inflatable, Trailer Transported, M51, (NSN 4240-00-854-4144) |
| TM 3-4240-264-20P | Organizational Maintenance Repair Parts and Special Tools Lists, Shelter System, Collective Protection, Chemical-Biological: Inflatable, Trailer-Transported, (M51, NSN 4240-00-854-4144). |
| TM 3-4240-264-34P | Direct Support and General Support Maintenance Repair Parts and Special Tools Lists, for Shelter System, Collective Protection, Chemical-Biological: Inflatable, Trailer-Transported, M51, (NSN 4240-00-854-4144) . |
| TM 5-2805-259-14 | Operator, Organizational, Direct Support and General Support Maintenance Manual: Engine, Gasoline, 20hp, Military Standard Models (Model 4A084-2) (NSN 2805-00-952-3926), (Model 4A084-3) (NSN 2805-00-872-5972). |
| TM 5-2805-259-24P | Organizational, Direct and General Support Maintenance Repair Parts and Special Tools Lists: Engine, gasoline, 20hp, Military Standard Models (Model 4A084-2) (NSN 2805-00-952-3926), (Model 4A084-3) (NSN 2805-00-872-5972). |
| TM 9-2330-213-14 | Operator's, Organizational, Direct and General Support Maintenance Manual (Including Repair Parts and Special Tools Lists): Chassis Trailer: 1½ - Ton, 2 - Wheel, M103A1 (2330-835-8629), M103A2 (2330-049-8050), M103A3 (2330-141-8052), M103A3C (2330-542-2181), M103A4 (2330-141-8051), M103A4C (2330-542-2182); Trailer, Cargo: 1½-Ton, 2-Wheel, M104 (2330-754-0509), M104A1 (2330-835-8630), M105A1 (2330-835-8631), M105A2 (2330-141-8050), M105A2C (2330-542-5689): Trailer, Tank, Water: 1½ -Ton, 2-Wheel, 400 Gallon, M107A1 (2330-835-8633), M107A2 (2330-141-8049), M 107A2C(2330-542-5688); Trailer, Van: Shop: Folding Sides, 1½ - Ton, 2-Wheel, M448 (2330-631-5692). |
| TM 9-6140-200-12 | Operator, and Organizational Maintenance Manual Lead-Acid Storage Batteries. |
| TM 38-750 | The Army Maintenance Management System (TAMMS). |

A-5. Storage

| | |
|---|---|
| TM 740-90-1 | Administrative Storage of Equipment. |



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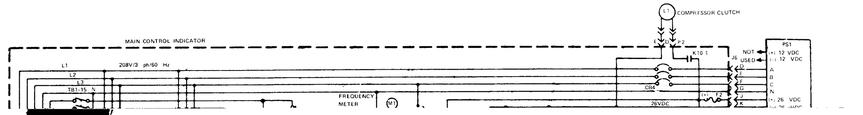


BT1—BATTERY, 24-VOLT
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B2—ENTRANCE FAN/MOTOR
B3—CONDENSER FAN/MOTOR
B4—HEATER FAN/MOTOR
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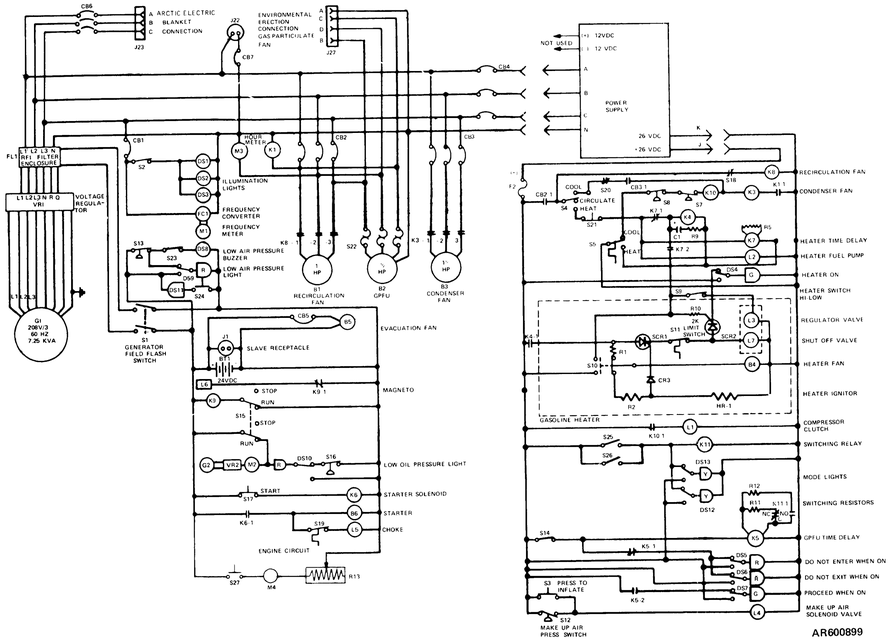
P11—CONNECTOR, PLUG, ELECTRICAL
P12—CONNECTOR, PLUG, ELECTRICAL

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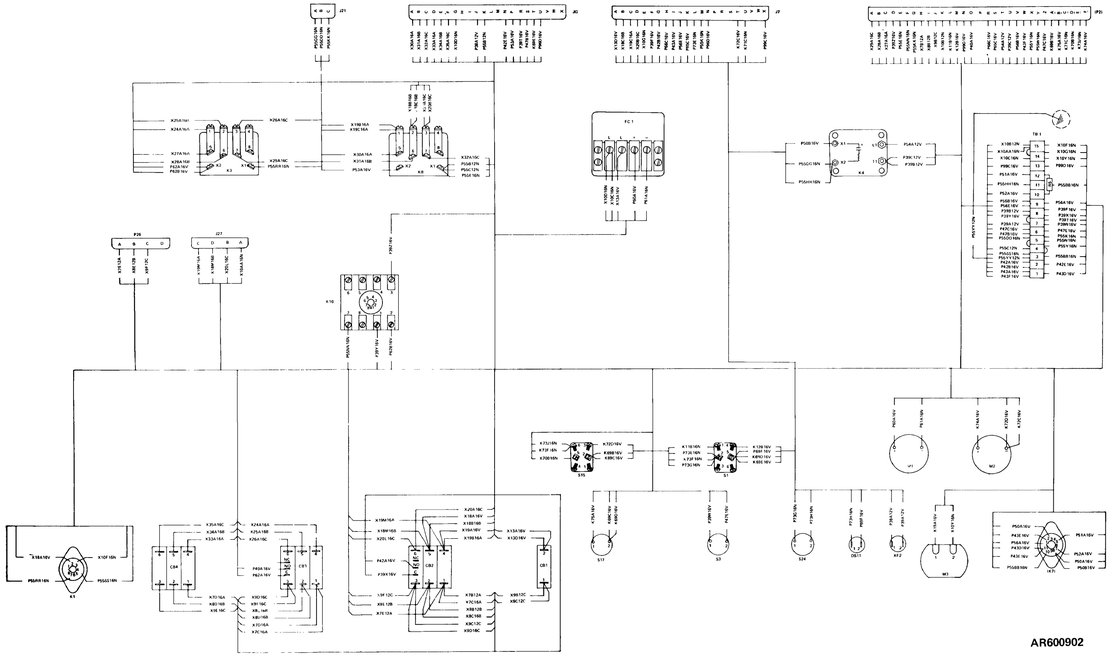
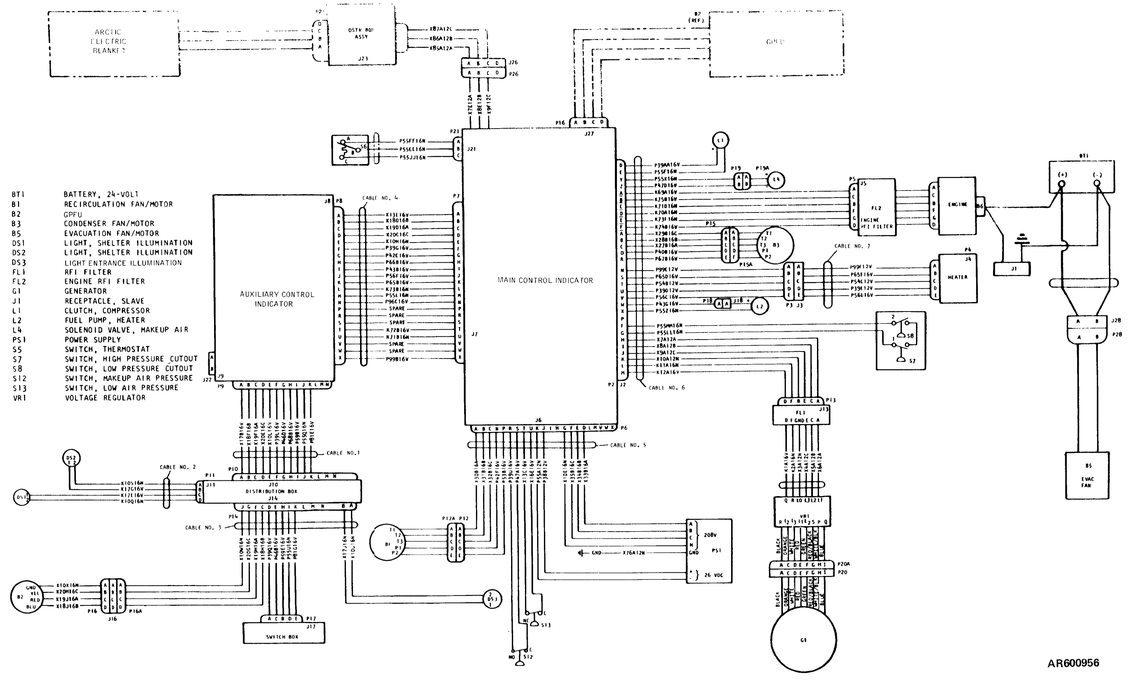
DS10—INDICATOR LIGHT, LOW OIL PRESSURE—ENGINE
DS11—PANEL LIGHT
DS12—INDICATOR LIGHT, PURGE MODE—SWITCH BOX
DS13—INDICATOR LIGHT, PURGE MODE—AUXILIARY CONTROL INDICATOR
FC1—FREQUENCY CONVERTOR
FL1—RFI FILTER
F2—FUSE
G1—GENERATOR—SYSTEM
G2—GENERATOR—ENGINE
J1—CONNECTOR, RECEPTACLE, ELECTRICAL
J22—CONNECTOR, RECEPTACLE, ELECTRICAL
J23—CONNECTOR, RECEPTACLE, ELECTRICAL
J25—CONNECTOR, RECEPTACLE, ELECTRICAL
J27—CONNECTOR, RECEPTACLE, ELECTRICAL
K1—RELAY, TIME DELAY
K3—RELAY, CONDENSER FAN
K4—RELAY, HEATER
K5—RELAY, TIME DELAY—ENTRANCE
K6—RELAY, ENGINE START
K7—RELAY, TIME DELAY—HEATER
K8—RELAY, RECIRCULATION FAN
K9—ENGINE MAGNETO RELAY AND RFI FILTER
K10—RELAY, TIME DELAY—CLUTCH
K11—RELAY, SWITCHING
L1—CLUTCH, COMPRESSOR
L2—FUEL PUMP, HEATER
L3—REGULATOR VALVE, HEATER
L4—SOLENOID VALVE, MAKEUP AIR
L5—CHOKE, ENGINE
L6—MAGNETO, ENGINE
L7—VALVE, HEATER SHUTOFF
M1—GENERATOR FREQUENCY METER
M2—ENGINE AMMETER
M3—SYSTEM HOURMETER
M4—FUEL LEVEL GAGE
PS1—POWER SUPPLY
R2—RESISTOR, HEATER FAN
R5—RESISTOR, TIME DELAY RELAY
R8—RESISTOR, 1000 OHM
R9—RESISTOR, 10 OHM 1 WATT
R10—RESISTOR, 2000 OHM
R11—RESISTOR, TIME DELAY
R12—RESISTOR, TIME DELAY
R13—FUEL QUANTITY TRANSMITTER
SCR1—RECTIFIER, 2N3528
SCR2—RECTIFIER, 2N3528
S1—SWITCH, MANUAL FIELD FLASH
S2—SWITCH, SHELTER LIGHTS
S3—SWITCH, PRESS-TO-INFLATE
S4—SWITCH, AIR-CONDITIONING, HEAT-COOL-CIRCULATE
S5—SWITCH, THERMOSTAT
S7—SWITCH, HIGH PRESSURE CUTOUT
S8—SWITCH, LOW PRESSURE CUTOUT
S9—SWITCH, HEATER OUTPUT, HI-LOW
S10—SWITCH, FLAME—HEATER
S11—SWITCH, LIMIT—HEATER
S12—SWITCH, MAKE-UP AIR PRESSURE
S13—SWITCH, LOW AIR PRESSURE
S14—SWITCH, ENTRANCE TIME DELAY
S15—SWITCH, ENGINE CONTROL
S16—SWITCH, LOW OIL PRESSURE—ENGINE
S17—SWITCH, ENGINE START
S18—OVERLOAD SWITCH, RECIRCULATION FAN MOTOR
S19—THERMOSTAT, EXHAUST MANIFOLD
S20—OVERLOAD SWITCH, CONDENSER FAN MOTOR
S21—SWITCH, HEATER RE-START
S22—OVERLOAD SWITCH, ENTRANCE FAN MOTOR
S23—SWITCH, BUZZER SILENCER
S24—SWITCH, PANEL LIGHT
S25—SWITCH, TIME DELAY MODE—AUXILIARY CONTROL INDICATOR
S26—SWITCH, TIME DELAY MODE—SWITCH BOX
S27—SWITCH, FUEL GAGE
VR1—VOLTAGE REGULATOR—SYSTEM
VR2—VOLTAGE REGULATOR—ENGINE

*Figure 2-21. Electrical schematic.*




CB1—CIRCUIT BREAKER, AUXILIARY 120 VAC
CB2—CIRCUIT BREAKER, RECIRCULATION AND ENTRANCE FAN
CB3—CIRCUIT BREAKER, CONDENSER FAN
CB4—CIRCUIT BREAKER, DC POWER SUPPLY
DS11—PANEL LIGHT
FC1—FREQUENCY CONVERTER
F2—FUZE 26 VDC
J6—RECEPTACLE CONNECTOR
J7—RECEPTACLE CONNECTOR
J21—RECEPTACLE CONNECTOR
J27—RECEPTACLE CONNECTOR
K1—TIME DELAY RELAY, ECU
K3—CONDENSER FAN RELAY
K4—HEATER RELAY
K7—TIME DELAY RELAY, HEATER
K8—RECIRCULATION FAN RELAY
K10—TIME DELAY RELAY, CLUTCH
P2—PLUG CONNECTOR
P26—PLUG CONNECTOR
M1—GENERATOR FREQUENCY METER
M2—ENGINE AMMETER
M3—SYSTEM HOURMETER
R5—RESISTOR, TIME DELAY RELAY
R9—CAPACITOR, TIME DELAY RELAY
S1—SWITCH, MANUAL FIELD FLASH
S3—SWITCH, PRESS TO INFLATE
S15—SWITCH, ENGINE CONTROL
S17—SWITCH, ENGINE START
S24—SWITCH, PANEL LIGHT
TB1—TERMINAL BOARD

*Figure 2-24. Main control indicator wiring diagram.*




| | |
|---|---|
| BT1 | BATTERY, 24-VOLT |
| B1 | RECIRCULATION FAN/MOTOR |
| B2 | GPFU |
| B3 | CONDENSER FAN/MOTOR |
| B5 | EVACUATION FAN/MOTOR |
| DS1 | LIGHT, SHELTER ILLUMINATION |
| DS2 | LIGHT, SHELTER ILLUMINATION |
| DS3 | LIGHT ENTRANCE ILLUMINATION |
| FL1 | RFI FILTER |
| FL2 | ENGINE RFI FILTER |
| G1 | GENERATOR |
| J1 | RECEPTACLE, SLAVE |
| L1 | CLUTCH, COMPRESSOR |
| L2 | FUEL PUMP, HEATER |
| L4 | SOLENOID VALVE, MAKEUP AIR |
| PS1 | POWER SUPPLY |
| S5 | SWITCH, THERMOSTAT |
| S7 | SWITCH, HIGH PRESSURE CUTOUT |
| S8 | SWITCH, LOW PRESSURE CUTOUT |
| S12 | SWITCH, MAKEUP AIR PRESSURE |
| S13 | SWITCH, LOW AIR PRESSURE |
| VR1 | VOLTAGE REGULATOR |

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BT1—BATTERY, 24-VOLT
B1—RECIRCULATION FAN/MOTOR
B2—GPFU
B3—CONDENSER FAN/MOTOR
B5—EVACUATION FAN/MOTOR
H6—ENGINE STARTER MOTOR
DS1 LIGHT, SHELTER ILLUMINATION
DS2—LIGHT, SHELTER ILLUMINATION
DS3—LIGHT, ENTRANCE ILLUMINATION
FL1—RFI FILTER
FL2—ENGINE RFI FILTER
G1—GENERATOR—SYSTEM
J1—RECEPTACLE, SLAVE
L1—CLUTCH, COMPRESSOR
L2—FUEL PUMP, HEATER
L3—REGULATOR VALVE, HEATER
L4—SOLENOID VALVE, MAKEUP AIR
M4—FUEL GAGE
PS1—POWER SUPPLY
S5—SWITCH, THERMOSTAT
S6—CONTROL, TEMPERATURE INDICATING
S7—SWITCH, HIGH PRESSURE CUTOUT
S8—SWITCH, LOW PRESSURE CUTOUT
S12—SWITCH, MAKEUP AIR PRESSURE
S13—SWITCH, LOW AIR PRESSURE
S27—FUEL GAGE SWITCH
VR1—VOLTAGE REGULATOR—SYSTEM

*Figure 2-78. Shelter system cable diagram.*