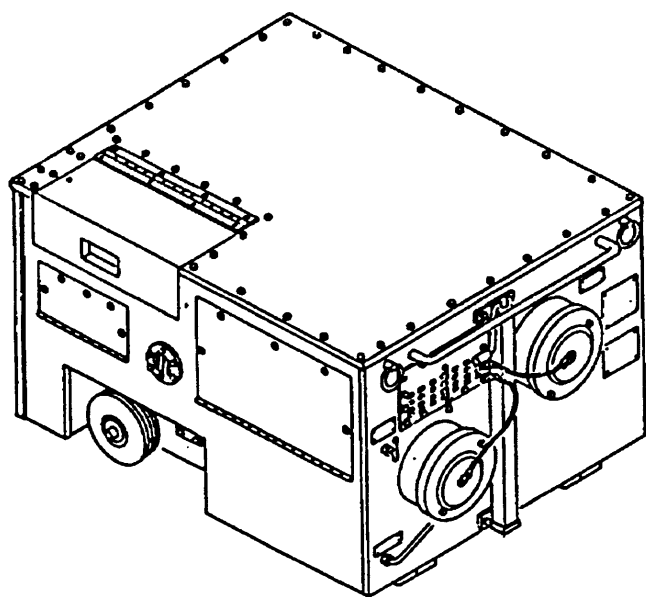


**TECHNICAL MANUAL  
OPERATOR'S, UNIT,  
DIRECT SUPPORT AND  
GENERAL SUPPORT  
MAINTENANCE MANUAL**



**ARMY SPACE HEATER (ASH)  
ELECTRIC POWERED, MULTI-FUEL**

120,000 BTU, MODEL H120, NSN 4520-01-367-2739

120,000 BTU, MODEL H120-1, NSN 4520-01-439-1682

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**Distribution Statement A: Approved for public release; distribution is unlimited.**



**WARNINGS**

DEATH or serious injury may result if personnel fail to observe safety precautions.

**FUEL FLAMMABLE/NO SMOKING**

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection is required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.

Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible, remove clothes and wash skin with warm soapy water before getting dressed.

Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop refueling immediately if fuel spill occurs.

**FROSTBITE**

Touching cold metal with exposed skin will cause skin to bond to metal. Gloves are required when touching cold metal objects. Do not touch cold metal parts with bare hands.

**SOLVENT HAZARD**

Drycleaning solvent, P-D-680, Type III, used to clean parts, is potentially dangerous to personnel and property. Combustible do not use near welding areas, near open flames or on hot surfaces. Use only with adequate ventilation. Avoid prolonged or repeated breathing of vapors. Do not smoke while using it. Use protective creams; wear apron and goggles (or face shield) to protect the skin. Store in approved metal safety containers.

**COMPRESSED AIR HAZARD**

When using compressed air for cooling, cleaning, or drying operation, do not exceed 30 psig at the nozzle. Eyes can be permanently damaged by contact with liquid and large particles or solvent vapor can damage lungs. When using air for cleaning at an air-exhausted workbench, wear approved goggles or face shield. When using air for cleaning at an unexhausted workbench, wear approved respirator and goggles.

FIRST AID instructions are given in FM 21-11, First Aid For Soldiers.

**WARNINGS (Continued)****ELECTRICAL HIGH VOLTAGE CAN KILL YOU**

Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:

- DO NOT perform any maintenance on electrical equipment unless all power is removed.
- BE CERTAIN that there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

**CARBON MONOXIDE (EXHAUST GAS) CAN KILL YOU**

Carbon monoxide is without color or smell, but can kill you. Breathing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, a sleepy feeling, and coma. Brain damage or death can result from heavy exposure. Carbon monoxide occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of no ventilation.

Precautions must be followed to ensure operator's safety when the ASH Unit is in operation.

- OPERATE the ASH Unit with the exhaust pipe attached in a well-ventilated area.
- DO NOT operate ASH Unit with a known exhaust (combustion air) leak.
- BE ALERT at all times during operating procedures for carbon monoxide poisoning. If exposure is present, IMMEDIATELY evacuate personnel to fresh air.
- BE AWARE the field protection mask used for nuclear-biological-chemical attack WILL NOT protect you from carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS GOOD VENTILATION.

**WARNINGS (Continued)****JEWELRY**

Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock. Remove rings, bracelets, wristwatches, and neck chains before working around or on the unit.

**HOT COMPONENTS**

Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.

**STEEL BANDING**

Steel banding, cut under tension, can snap free and cause injury. Leather gloves and face shield are required.

**FUEL SPILL**

Fuel is toxic and flammable and can cause injury to personnel and damage equipment. Improper positioning of external fuel source can cause the internal fuel tank to overflow. Properly position external fuel source.

**CLEANING AGENTS DO NOT**

use diesel fuel, gasoline, or benzene (benzol) for cleaning.

DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in wellventilated places. Flash point of solvent is 138°F (60°C).

USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

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Change

No. 2

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC, 1 August 2004

**Operator's, Unit, Direct Support and General Support Maintenance Manual**

**ARMY SPACE HEATER (ASH),  
ELECTRIC POWERED, MULTI-FUEL  
120,000 BTU, MODEL H120, NSN 4520-01-367-2739  
120,000 BTU, MODEL H120-1, NSN 4520-01-439-1682**

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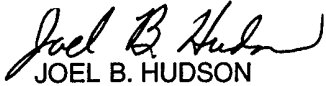
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DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 7 October 1996

**OPERATOR'S, UNIT, DIRECT SUPPORT AND  
GENERAL SUPPORT MAINTENANCE MANUAL**

**ARMY SPACE HEATER (ASH),  
ELECTRIC POWERED, MULTI-FUEL  
120,000 BTU, MODEL H120, NSN 4520-01-367-2739**

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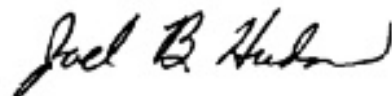
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OPERATOR'S, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

ARMY SPACE HEATER (ASH),  
ELECTRIC POWERED, MULTI-FUEL  
120,000 BTU, MODEL H 120, NSN 4520-01-367-2739  
120,000 BTU, MODEL H120-1, NSN 4520-01-439-1682

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5000. The fax number is 732-532-1413, DSN 992-1413. You may also e-mail your recommendations to AMSEL-LC-LEO-PUBS-CHG @cecom3.monmouth.army.mil

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## HOW TO USE THIS MANUAL

*Be sure to read all Warnings before using your equipment.*

This manual contains instructions for operation and maintenance of the Army Space Heater (ASH).

### MANUAL OVERVIEW

a. Index Tabs.

Notice the front cover index of this manual. It lists the most important areas of the manual and guides you to those sections. Follow the black mark on the cover index edge through the pages to the edge mark on the section you want. The subjects on the front cover index are also highlighted in the table of contents by boxes. A detailed alphabetical index is located at the back of this manual.

b. Contents.

The following gives you a summary of each chapter and appendix. Before beginning a maintenance task, you must familiarize yourself with the entire procedure.

- Chapter 1 -Introduces you to the equipment and gives you information such as weight, dimensions, abbreviations used and information on how the unit works.
- Chapter 2 -Provides information necessary to identify and use the equipment. Operating instructions in this chapter tell you how to use the equipment in both usual and unusual weather conditions.
- Chapter 3 -Provides operator troubleshooting procedures for identifying equipment malfunctions and maintenance procedures for performing operator maintenance tasks.
- Chapter 4 -Provides unit maintenance personnel with troubleshooting procedures for identifying equipment malfunctions and maintenance procedures for repairing defective equipment.
- Chapter 5 -Provides direct support maintenance personnel with maintenance instructions for performing repairs on equipment as authorized by the maintenance allocation chart.
- Chapter 6 -General support maintenance. There are no general support maintenance procedures required on this unit.
- Appendix A-Provides a list of frequently used forms and publications referenced or used in this manual.
- Appendix B -The Maintenance Allocation Chart identifies repairable components and the maintenance level authorized to perform the repairs.
- Appendix C -Lists components that are not mounted on the equipment, but are required to make the unit functional.
- Appendix D -Lists additional equipment authorized for your unit for use with the Army Space Heater.
- Appendix E -Provides you with information about expendable supplies such as sealants, lubricants, chemicals, etc., that are used when operating or maintaining equipment.
- Appendix F -Provides a list of items and instructions on how to make certain tools and devices required to perform some of the maintenance tasks contained in this manual.
- Appendix G -Provides you with general torque values for common hardware.
- Appendix H -Provides a list of parts that must be replaced during maintenance of the equipment.
- Glossary -Lists items and abbreviations used in this manual.
- Index -Lists subject matter contained in manual in alphabetical order.



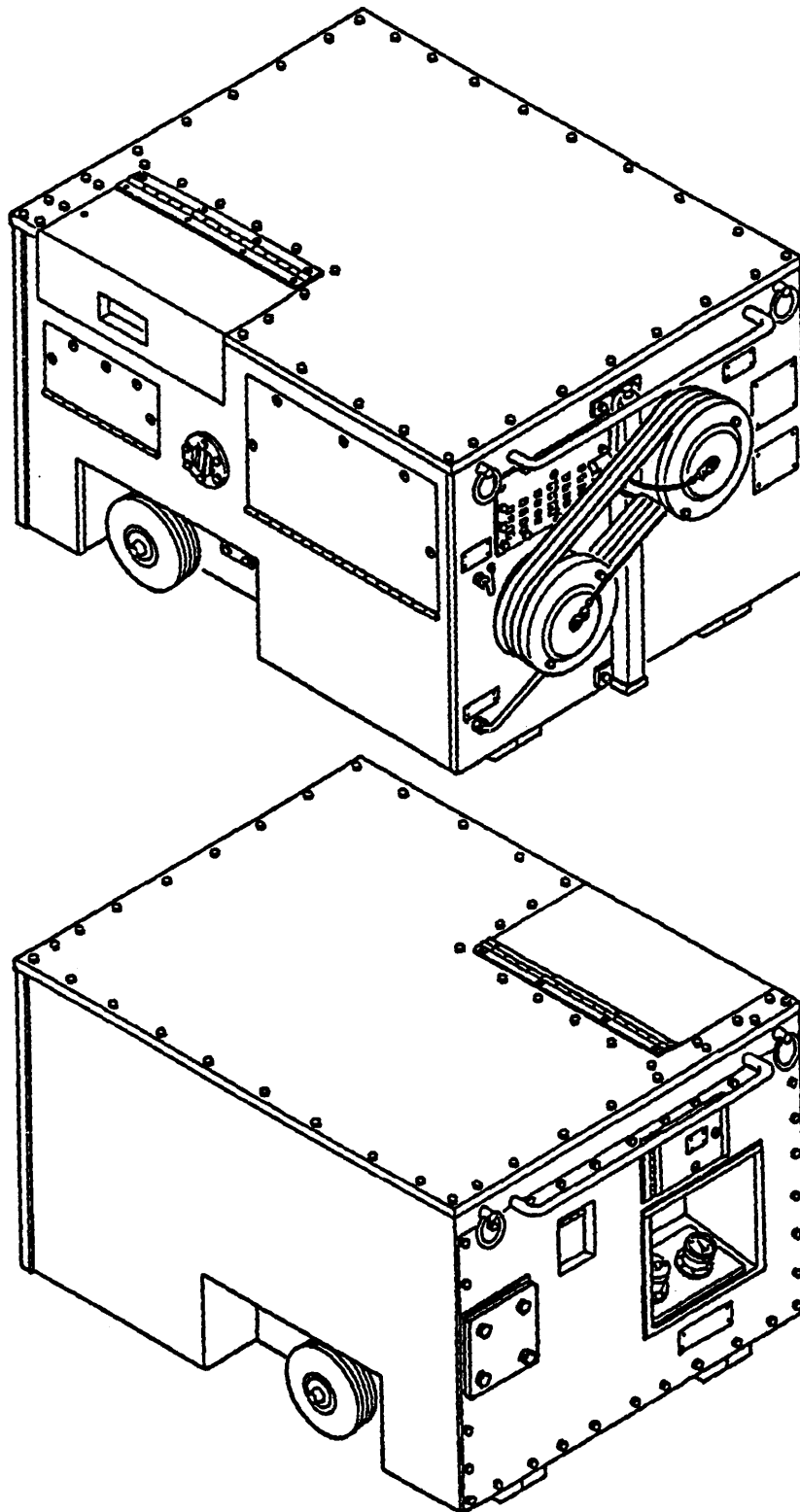


Figure 1-1. Army Space Heater, Model H120 and Model H120-1



## CHAPTER 1 INTRODUCTION

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### Section I. GENERAL INFORMATION

#### 1-1. SCOPE.

This manual is for use by personnel responsible for the operation and maintenance of the Army Space Heater.

- a. Type of Manual. This is an Operator's, Unit, Direct Support, and General Support Maintenance Manual.
- b. Equipment Name and Model Number. The official equipment name is Army Space Heater (ASH), Electric Powered, Multi-fuel, 120,000 BTU Model H120. Hereafter, it will be referred to as the ASH unit.
- c. Purpose of Equipment. Designed for heating and ventilating fixed and transportable shelters.

#### 1-2. MAINTENANCE FORMS, RECORDS AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, The Army Maintenance Management Systems (TAMMS).

**1-3. CORROSION PREVENTION AND CONTROL (CPC).**

- a. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements made to prevent the problem in future items.
- b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling or breaking of the materials may be a corrosion problem.
- c. If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Using key words such as "rust", "deterioration", or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750.

**1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.**

Instructions for destruction of the equipment to prevent enemy use are in TM 750-244-3.

**1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATION (EIR).**

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5000. The fax number is 732-532-1413, DSN 992-1413. You may also e-mail your recommendations to AMSEL-LC-LEO-PUBS-CHG@cecom3.monmouth.army.mil

**1-6. NOMENCLATURE CROSS REFERENCE LIST.**

Common Name	Official Nomenclature
ASH Unit	Army Space Heater

**1-7. LIST OF ABBREVIATIONS.** Refer to glossary.

## Section II. EQUIPMENT DESCRIPTION

---

### 1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES.

#### a. Characteristics

- (1) Portable.
- (2) Heats and ventilates shelters, vans and other enclosed areas.
- (3) Adjustable air damper.
- (4) Positive pressurized enclosure.
- (5) Quiet operation, less than 60 Db.
- (6) Remote thermostat control.
- (7) Retractable wheels.
- (8) Rated at 120,000 BTU per hour.
- (9) Requires 120 vac / 50-60 hz power source.

#### b. Capabilities

- (1) Can operate as either a heater or fresh air ventilator.
- (2) In the heat mode, unit can operate as either a recirculation or fresh air heater.
- (3) Can operate up to 14 hours, unattended on a 14 gallon internal fuel tank.
- (4) Operation can be extended beyond 14 hours when used in the external fuel supply mode.
- (5) Operates as a heater in an ambient temperature range of -40° to 65°F.
- (6) Operates as a ventilator up to 100°F.
- (7) Can be moved by one person when the wheels are extended.
- (8) Skids are provided for mobility on ice and snow.
- (9) The quiet operation allows use in areas where personnel work or sleep.
- (10) Unit is suitable for hardening for use in nuclear, biological and chemical environments.

**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.****a. Front and Right Side. (Refer to Figure 1-2)**

- (1) Supply Air Duct. The supply air duct (1) moves hot air from the ASH to the shelter.
- (2) Supply Air Outlet. The supply air outlet (2) provides support to attach the supply air duct.
- (3) Return Air Duct. The return air duct (3) brings return air back to the ASH for reheating.
- (4) Return Air Inlet. The return air inlet (4) provides support to attach the return air duct.
- (5) Fresh Air Damper. The fresh air damper (5), when open, allows fresh air to be drawn into the ASH. It can be used in the ventilating or heating mode.
- (6) Return And Supply Air Duct Covers. The return and supply air duct covers (6) prevent dust and debris from entering the ASH when not in operation or in storage.
- (7) Power Cable. The power cable (7) is to be connected to a power source to operate the ASH.
- (8) Remote Thermostat Receptacle. The remote thermostat receptacle (8) provides a receptacle for attaching the remote thermostat cable.
- (9) Remote Thermostat and Cable. The remote thermostat and cable (9) controls temperature from inside the heated area.
- (10) Lubrication Chart. The lubrication chart (10) provides information for proper lubrication of the ASH.
- (11) Jack Assembly. The jack assembly (11) is used to raise the ASH to allow the wheels to be extended or retracted and to level the ASH.
- (12) Front Side Access Door. The front side access door (12) provides access to the ASH interior for inspections/maintenance, the handbook compartment, the exhaust elbow, and fuel hose.
- (13) Rear Side Access Door. The rear side access door (13) provides access to the ASH interior for inspections/maintenance and the remote thermostat.
- (14) Combustion Air Inlet. The combustion air inlet (14) brings air into the combustor blower assembly.
- (15) Retractable Wheel Assembly (right side). The retractable wheel assembly (15) allows an individual to move and position the ASH when used in conjunction with the left side wheel assembly.
- (16) Control Panel Cover. The control panel cover (16) protects the control panel.
- (17) Control Panel. The control panel (17) contains the operator controls and indicators used during operation. The hinged panel provides a central location for troubleshooting the ASH electrical components/controls.



**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.****b. Rear and left Side. (Refer to Figure 1-3)**

- (1) Exhaust Pipe. The exhaust pipe (1) provides for removing the exhaust gases from the heater during operation.
- (2) Exhaust Pipe Stowage Compartment. The exhaust pipe is stored in the exhaust pipe stowage compartment (2) when the ASH is being shipped or not in use.
- (3) Exhaust Cover Plate. The exhaust cover plate (3) covers the ASH exhaust port when shipped or in stowage. The exhaust cover plate is stowed in the exhaust elbow stowage position when the elbow is attached to exhaust port.
- (4) Sight Glass. The sight glass (4) is used to look into the burner/heat exchanger compartment to ensure that ignition is on and the burner flame is functioning properly.
- (5) Retractable Wheel Assembly (left side). The retractable wheel assembly (5) allows an individual to move and position the ASH when used in conjunction with the right side wheel assembly.
- (6) Exhaust Elbow. The exhaust elbow (6) when attached to the exhaust port at the rear of the ASH directs exhaust fumes upward into the exhaust pipe.
- (7) External Fuel Connection. The external fuel connection (7) is a quick disconnect and is used to connect the external fuel hose to the ASH. It is protected by a removable cap.
- (8) Fuel Selector Valve. The fuel selector valve (8) allows the user to select either an external fuel source or the ASH's internal fuel tank.
- (9) Fuel Tank Cap. The fuel tank cap (9) prevents dirt and debris from entering the internal fuel tank. The cap is removable for filling the internal fuel tank.
- (10) Fuel Gage. The fuel gage (10) indicates the amount of fuel remaining in the internal fuel tank.
- (11) External Fuel Hose. The external fuel hose (11) connects to the unit external fuel connector and an external fuel source.

## 1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.

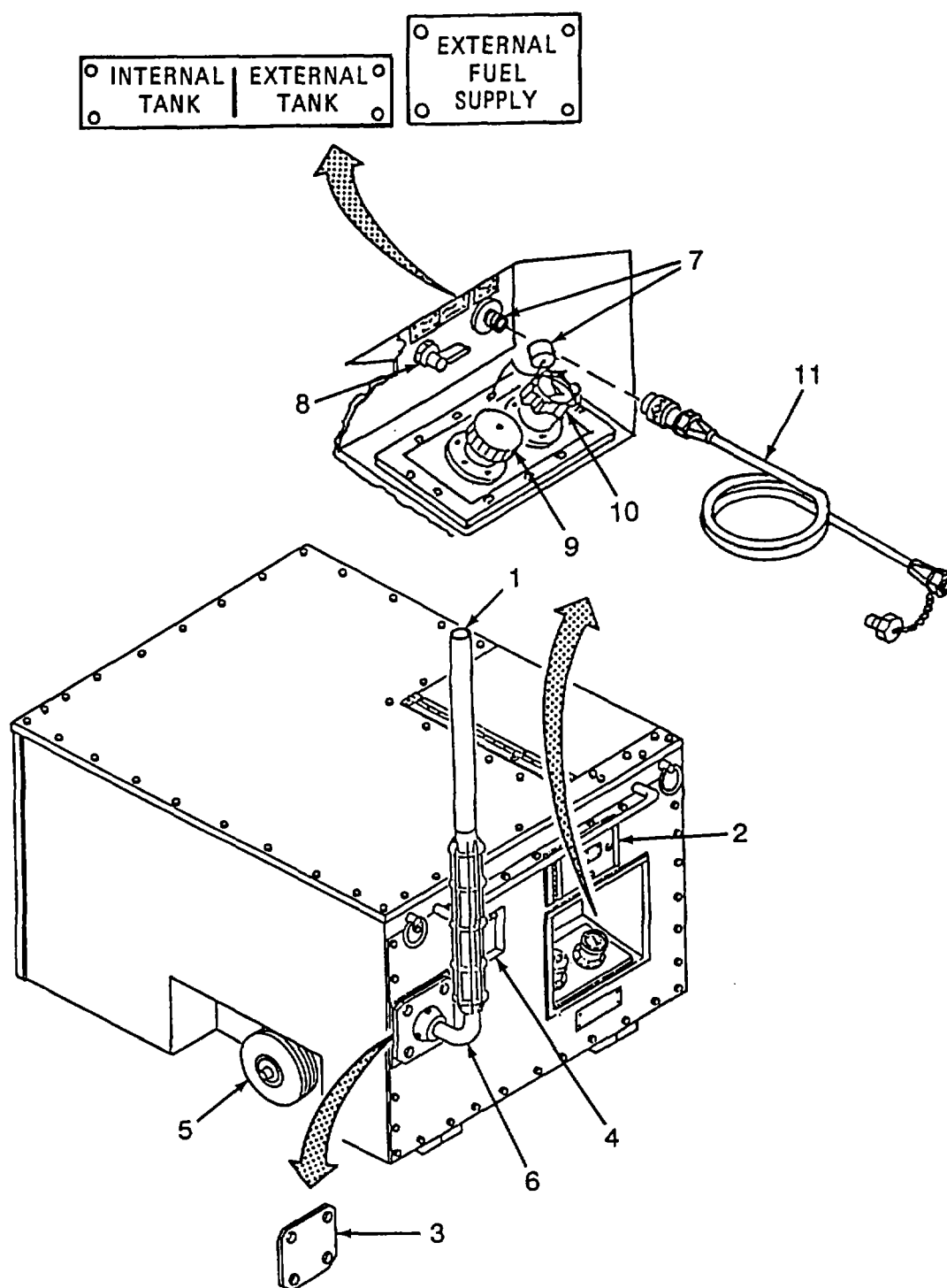


Figure 1-3. Rear and Left Side  
1-7

**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.****c. Heater Interior. (Refer to Figure 1-4)**

- (1) Circulating Fan Assembly. The circulating fan assembly (1) is a "squirrel cage" fan and provides motive force for the air supply.
- (2) Motor. The motor (2) drives the circulating fan assembly and fuel pump.
- (3) Fuel Pump. The fuel pump (3) pulls fuel from the internal fuel tank or external fuel source, pressurizes it, and supplies fuel to the burner assembly.
- (4) Fuel Filter, Low Pressure. The low pressure fuel filter (4) filters fuel to remove dirt and debris before it enters the pump.
- (5) Fuel Solenoid Valves. The fuel solenoid valves (5) control the flow of fuel during operation.

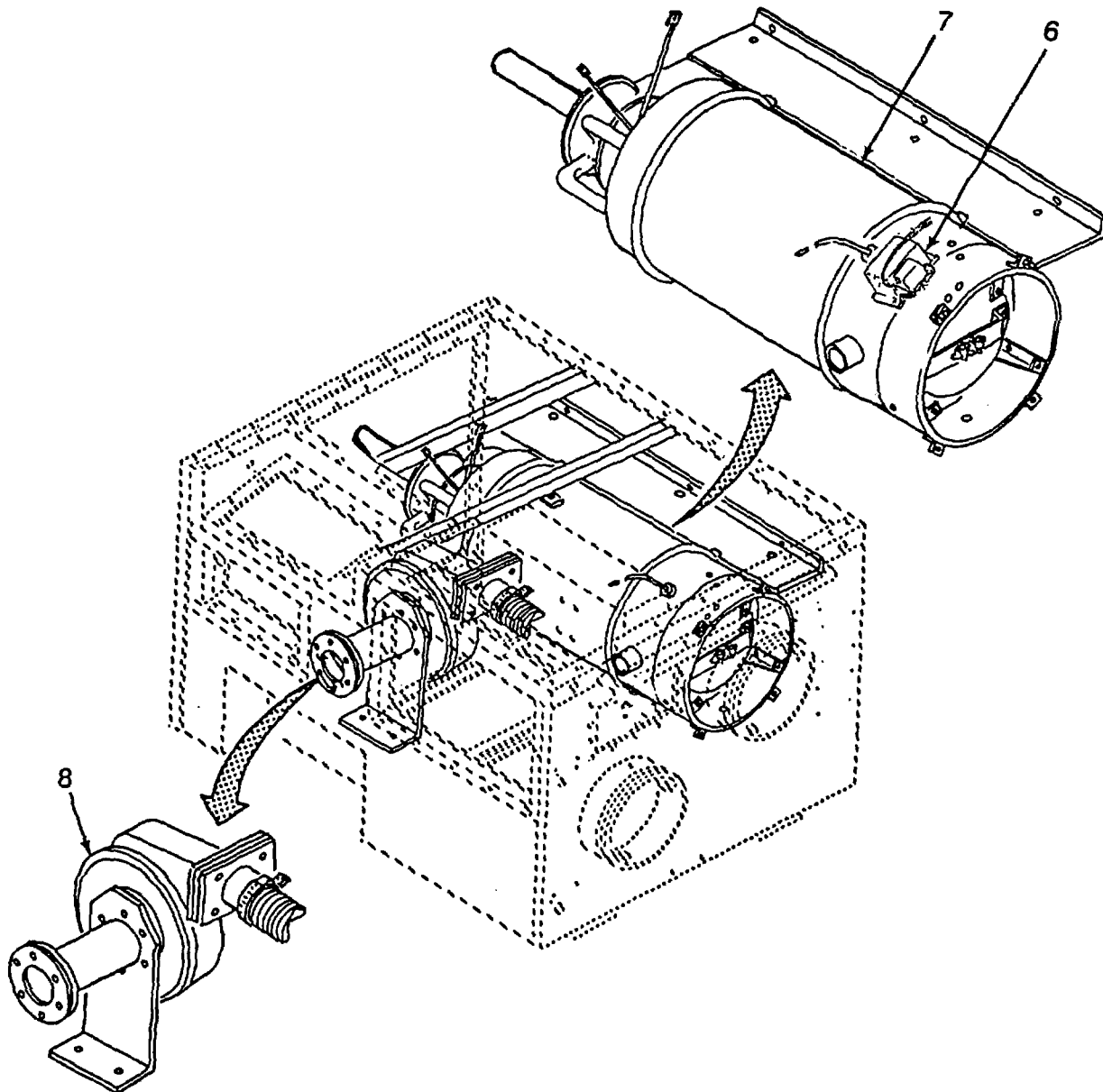
**Figure 1-4. Heater Interior(Sheet 1 of 3)**



**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.**

c. Heater Interior - continued. (Refer to Figure 1-4)

- (6) Transformer. The transformer (6) provides the voltage necessary through the ignition leads to the burner electrodes to ignite the fuel.
- (7) Heat Exchanger. The heat exchanger (7) consists of the primary and secondary exchangers and the burner assembly and provides the means for heating the supply air.
- (8) Combustor Fan Assembly. The combustor fan assembly (8) provides air to the burner assembly.



**Figure 1-4. Heater Interior (Sheet 2 of 3)**

**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - continued.**

c. Heater Interior - continued. (Refer to Figure 1-4)

(9) Fuel Tank. The fuel tank (9) holds 14 gallons of fuel.

(10) Combustor Control Relay Assembly. The combustor control relay assembly (10) provides for safe operation/control of the burner assembly.

(11) Air Pressure Switch. The air pressure switch (11) detects air flow to the heat exchangers. It allows power to the combustor control relay assembly.

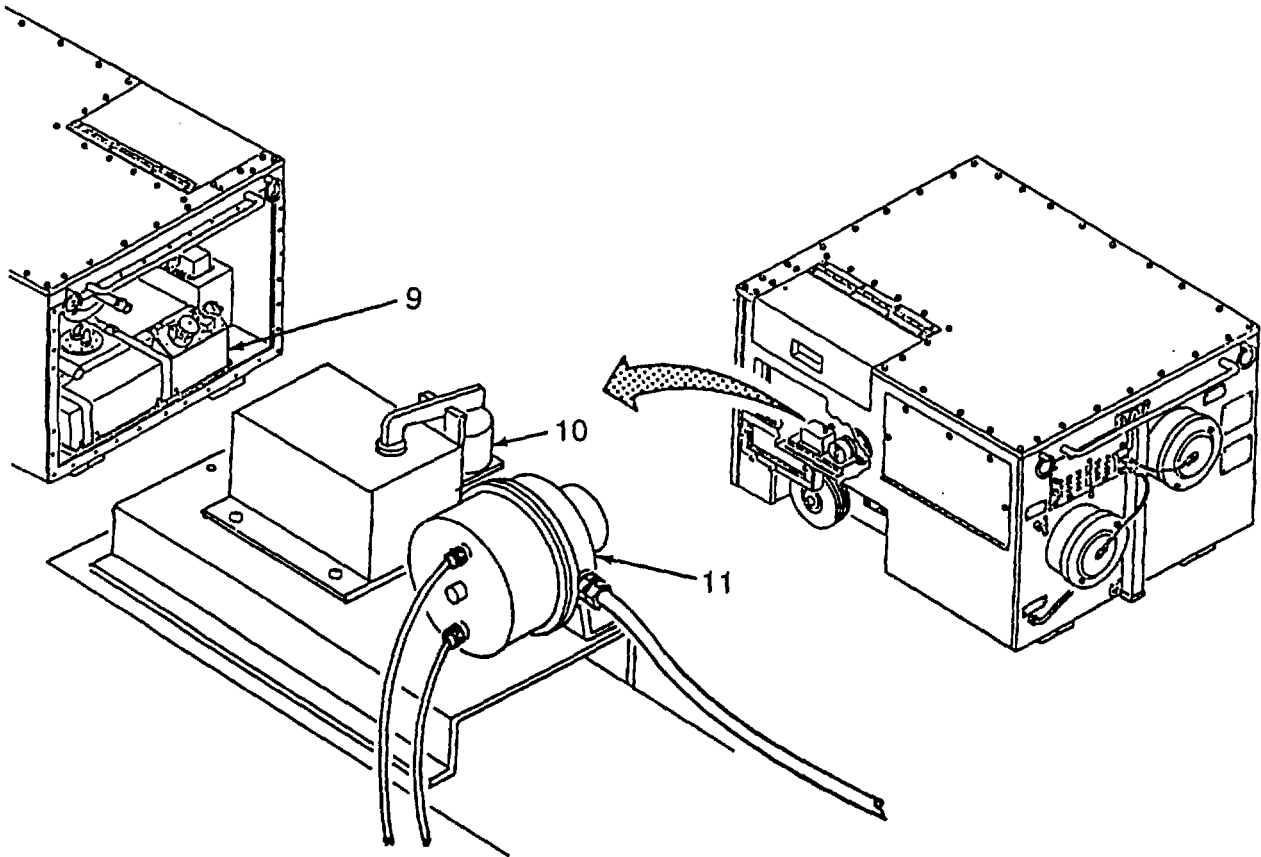


Figure 1-4. Heater Interior (Sheet 3 of 3)  
1-10

**1-10. EQUIPMENT DATA.**

- a. General Information.
- Model.....H120
- Part Number (PN).....60000-100
- National Stock Number (NSN) .....4520-01-367-2739
- Model.....H120-1
- Part Number (PN).....60200-100
- National Stock Number NSN .....4520-01-439-1682
- b. Dimensions.
- Length.....50.5 inches
- Width .....40 inches
- Height .....32 inches
- Diameter of Air Duct Connectors .....12 inches
- Remote Thermostat Cable .....25 ft
- Power Cable .....25 ft
- Fuel Hose .....25 ft
- Supply/Return Air Ducts .....12 inch diameter x 15 ft
- c. Weight: .....355 pounds
- d. Operating Temperature Range: .....-40° to 65°F
- e. Heating Capacity .....140,000 BTU/hr at sea level, 120,000 BTU/hr at 4,000 ft elevation.
- f. Electrical Input .....120 volts, 50/60 hertz, single-phase, grounded, 1200 watts (10 amps) in heat mode.
- g. Rated Air Flow .....1000 scfm at 0.5 iwg at sea level
- h. Fuel Capacity .....14 gallon self-contained internal tank. Port provided for single hose external fuel supply.
- i. Types of Fuel: See Table 1-1.

*Table 1-1. Types of Fuel*

<b>Ambient Temperature</b>	<b>Specification</b>	<b>Type of Fuel</b>
Above +20°F	A-A-52557	Low Sulfur No. 2-D DF-2
Above -25°F	A-A-52557	Low Sulfur No. -D/ DF-1
Above -50°F	A-A-52557	Icing inhibitor added
Above -50°F	MIL-T-83133	JP-8

**1-10. EQUIPMENT DATA - continued.**

- j. Fuel Pressure Settings for Variable Altitude and Frequency: See Table 1-2.

**NOTE**

Fuel pressures depend to a certain extent on the fuel being burned, ambient temperature and altitude. Most economical heater operation requires knowledge of application. Pressure settings in Table 1-2 allow the operator to become familiar with the heater and its operation.

*Table 1-2. Fuel Pressure Settings*

Elevation	Fuel Pressure Setting at 60 Hz		Fuel Pressure Setting at 50 Hz	
	Below -20°F	Above -20°F	Below -20°F	Above -20°F
Sea Level to 1,500 ft. (458m)	120 - 130	110 - 125	110 - 120	100 - 115
1,500 ft. (458.8m) - 3,000 ft. (915m)	110 - 125	105 - 120	105 - 120	95 - 110
3,000 ft. (915m) - 4,500 ft. (1372m)	105 - 120	100 - 115	100 - 110	90 - 105
4,500 ft. (1372m) - 6,000 ft. (1830m)	100 - 115	95 - 110	95 - 105	85-100

### Section III. PRINCIPLES OF OPERATION

---

#### 1-11. GENERAL.

This section provides the principles of operation and functional description of the components comprising the ASH Unit. Three systems comprise the heater: the electrical system, the fuel system, and the airflow system. These systems are described in the paragraphs that follow.

#### 1-12. ELECTRICAL SYSTEM.

The electrical system (refer to FO-1, ASH Electrical Schematic) provides for three modes of operation: the ventilation mode, the auto heating mode, and the manual heating mode. A functional description of these modes are described in the following paragraphs.

- a. Ventilation Mode. Initially, 120 vac, 50/60 Hz, single-phase power is applied through the main power plug (P1) and the POWER circuit breaker (CB1) to the contacts of the mode selector switch (S1).
  - (1) When the MODE SWITCH (S1) is placed in the VENT position, the POWER light (DS1) will illuminate. The ventilation fan motor (B1) and the ignition transformer (TR1) also begin operating. Once the ventilation fan motor (B1) is operating, a position pressure is built up inside the enclosure which closes the air pressure switch (S5). The air pressure switch (S5) must close to allow the combustor air fan motor (B2) to operate in the HEAT modes (B2 does not operate in the VENT mode).
  - (2) Power is also available at the PURGE SWITCH (S4). The air purge switch (S4) is used to purge air from the fuel system. The (S4) is spring loaded to the OFF position, holding it to the ON position operates the 3-way purge valve solenoid (L2).
- b. Heating Mode. The heating mode is initiated when MODE SWITCH (S1) is set to AUTO HEAT or MANUAL HEAT. Continued operation of the heating mode is dependent upon combustion control relay (K1), its associated controls, and the setting of the remote thermostat. In addition to the 120-vac 50/60 Hz power input (black lead) and the neutral (white lead), two input circuits and two output circuits are provided by relay combustion control (K1). One input, the flame sensor circuit, includes the safety devices. The other input, the thermostat circuit, includes the temperature control devices and the control relay contacts. Both the flame sensor and thermostat circuits must be completed to provide an output for the two-way fuel solenoid valve (L1). Functional descriptions of these circuits are contained in the paragraphs that follow:
  - (1) Flame Sensor. Components comprising the circuit are temperature limit switch (S2) and flame sensor (D1).
    - (a) After depressing FLAME RESET button (F7), the flame sensor circuit will be overridden for approximately 10 to 13 seconds. During this time, if the temperature controller thermostat circuits are closed, power will be applied to fuel solenoid valve (L1) through combustion control relay (K1). When ignition occurs, flame sensor (D1) will complete the flame detector circuit.
    - (b) Should the flame sensor circuit open due to an overheat condition in the heat exchanger, a flameout, or lack of fuel, power will be removed from solenoid valve (L1), and safety flameout (DS3) will illuminate.

**1-12. ELECTRICAL SYSTEM - continued.**

- (2) Temperature Controller Circuits. The components comprising the temperature control circuits are the discharge air thermostat (S3), the temperature limit switch (S2) and the remote temperature thermostat (S6).
- (a) When the MODE SWITCH (S1) is in the AUTO HEAT mode, the remote temperature thermostat (S6) controls the unit temperature output (from 35°F to 85°F). The burner will cycle to the temperature setting on the remote thermostat (S6) unless the output exceeds 160°F. When the temperature exceeds 160°F the discharge air thermostat (S3) cycles the burner to OFF until the outlet temperature is below 130°F.
  - (b) While still operating in the AUTO HEAT mode, the remote thermostat (S6) can be placed in HI by depressing both of the control buttons (arrows) at the same time. The display screen on the remote thermostat (S6) will indicate HI. The burner will now burn continuously unless the outlet temperature exceeds 160°F. When this happens, the discharge air thermostat (S3) will again turn the burner OFF until the outlet temperature is below 13°F.
  - (c) When in the MANUAL HEAT mode, the remote thermostat (S6) and the discharge air thermostat are bypassed and the burner is on continuously unless the outlet temperature exceeds 200°F. When outlet temperatures exceed 200°F, the temperature limit switch (S2) shuts down the burner but the circulating air fan and the combustion air fan continue to operate. The HIGH TEMP light (DS2) will illuminate. The flame sensor (D1) will sense no flame and the FLAME OUT light (DS3) will illuminate.

**1-13. FUEL SYSTEM.**

- a. General. The fuel system is illustrated schematically on Figure 1-5. The fuel system incorporates a 14-gallon internal fuel tank. A fuel transfer valve V1 enables operation of the heater from the internal fuel tank or from an external fuel source using a 25-foot fuel hose.
- b. Purge System. The purge system enables the operator to purge air from the fuel system upon initial startup of the heater. Purging is also required when operating from an external source and after the fuel system has been allowed to run dry.

**CAUTION**

**Do not operate unit without fuel. Operation without fuel will result in damage to fuel pump.**

**Never attempt to operate the ASH Unit with the fuel selector valve handle in a vertical position. Fuel will not flow with the handle in the vertical position. The fuel selector valve handle must be in a horizontal position.**

**Internal tank may be over serviced during purging if the external fuel source is used. Never purge the system on external tank when internal tank is full.**

**1-13. FUEL SYSTEM - continued.**

- (1) Priming the fuel system is accomplished by turning the MODE SWITCH (S1) to the VENT position and holding the PURGE SWITCH (S4) to the ON position until the fuel pressure gage indicates greater than zero. When S4 is released, the pressure must be greater than 10 psi.
- (2) If not, purging must be continued until the proper fuel pressure is obtained. Priming the fuel system at extremely low ambient temperatures with the correct fuels presents no problems, except it takes slightly longer due to the greater restriction of cold fuel circulating through the filter.
- (3) The purge system can also be used to transfer fuel from an external source to the internal fuel tank. The external fuel hose must be attached to the external fuel supply connection and the fuel transfer valve (V1) must be in the EXTERNAL TANK position. When the PURGE SWITCH (S4) is operated, the fuel passes through the pump to the 3-way solenoid purge valve (L2) to the purge line and into the internal fuel tank. Do not over fill the tank.

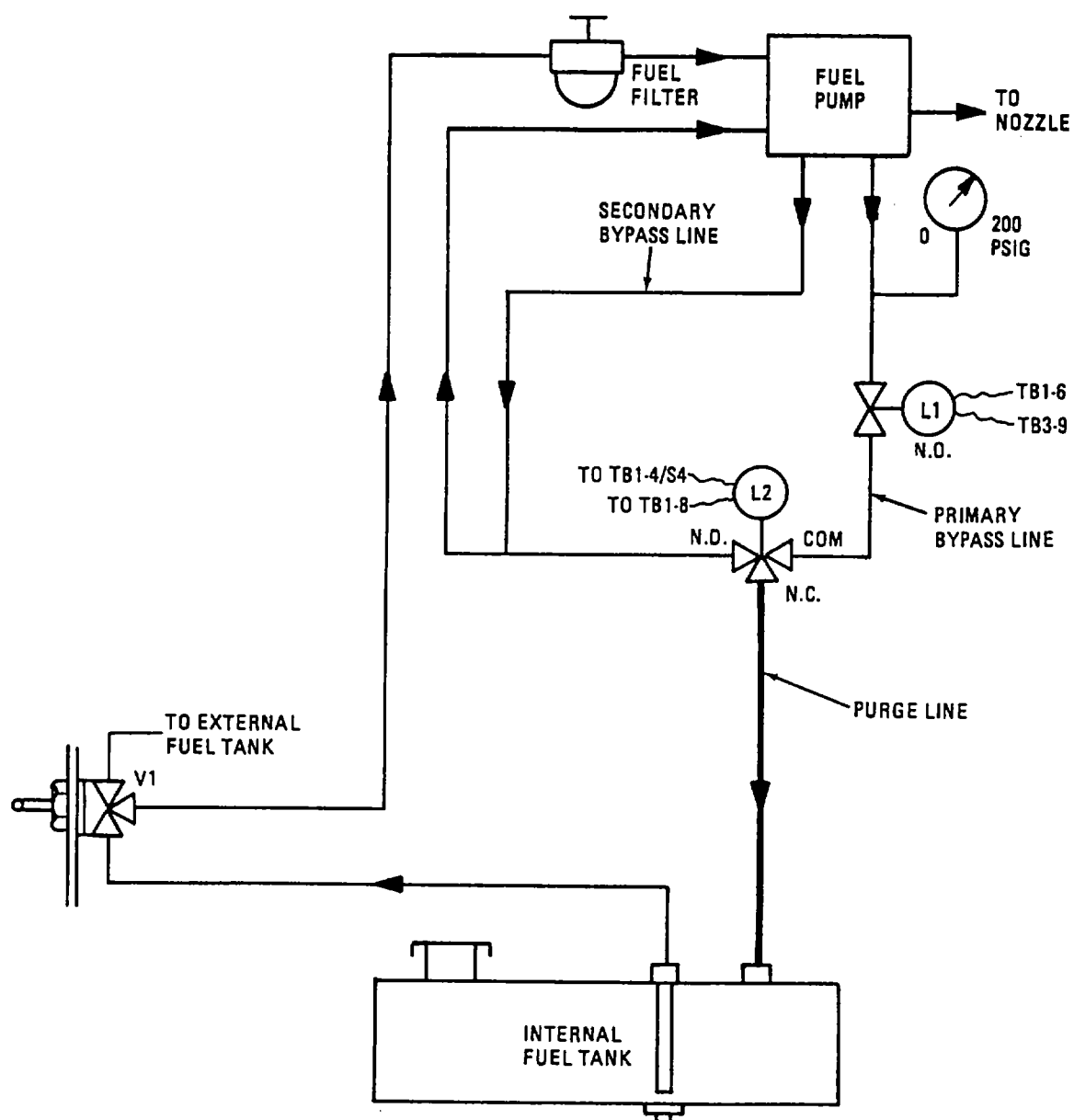
c. Ventilation Mode. In the VENT mode, fuel is drawn through the low pressure filter by the fuel pump. The fuel is then pumped through the two-way fuel solenoid valve (L1), to the 3-way solenoid purge valve (L2). Since L2 is not energized, the fuel passes through the normally open (N.O.) position of L2 and returns to the inlet side of the fuel pump. If L2 is energized, the unit will operate as described in the preceding paragraph, Purge System.

d. Heating Mode. In the heating mode, fuel flow is the same as during vent mode. Upon heat demand, fuel solenoid valve (LI) closes and fuel is supplied to the nozzle at the set pressure. Unused fuel is bypassed back to the pump through the secondary bypass line. When desired air temperature is reached or the temperature limit switch (S2) activates or the safety relay (K1) activates, LI opens. When LI is open all fuel will return to the pump through the primary bypass line.

e. Additional Components. Additional components of the fuel system are:

- (1) The fuel tank drain, provides a means to drain the tank when required.
- (2) The fuel tank gage, mechanically indicates the level of fuel in the internal fuel tank.
- (3) The fuel filler neck, provides a means to service the fuel tank with fuel. A fuel strainer is located inside the neck to trap foreign objects before they enter the tank. The screen can be removed and cleaned for reuse.
- (4) The fuel pressure gage, indicates purge, recirculate, and heat fuel pressures.

## 1-13. FUEL SYSTEM - continued.



## LEGEND

- L1 SOLENOID VALVE, N.O.
- L2 SOLENOID VALVE, 3 WAY
- V1 VALVE, 3 WAY, MANUAL

Figure 1-5. Fuel Schematic



# 1-14. AIRFLOW SYSTEM.

a. General. The airflow system is divided into two separate air flows and is illustrated schematically in Figure 1-6. Major items include the circulating air fan, primary and secondary heat exchanger, burner, combustion air fan.

b. Circulating Air Flow. In the circulating air flow, the air is either ventilation (ambient) or heated air.

(1) Ventilation Mode. Ventilation air is drawn through the return air duct and/or the fresh air damper by the circulating air fan. The ASH enclosure becomes pressurized, the air moves first around the secondary heat exchanger then through the primary heat exchanger. From the primary heat exchanger the air is discharged through the supply air duct.

(2) Heating Mode. The airflow in the heating mode is identical to that described for the ventilation mode, except the air passing over the heat exchanger is heated by the heat exchanger as required by either the remote thermostat (Auto Heat Mode) or the discharge air thermostat (Manual Heat Mode).

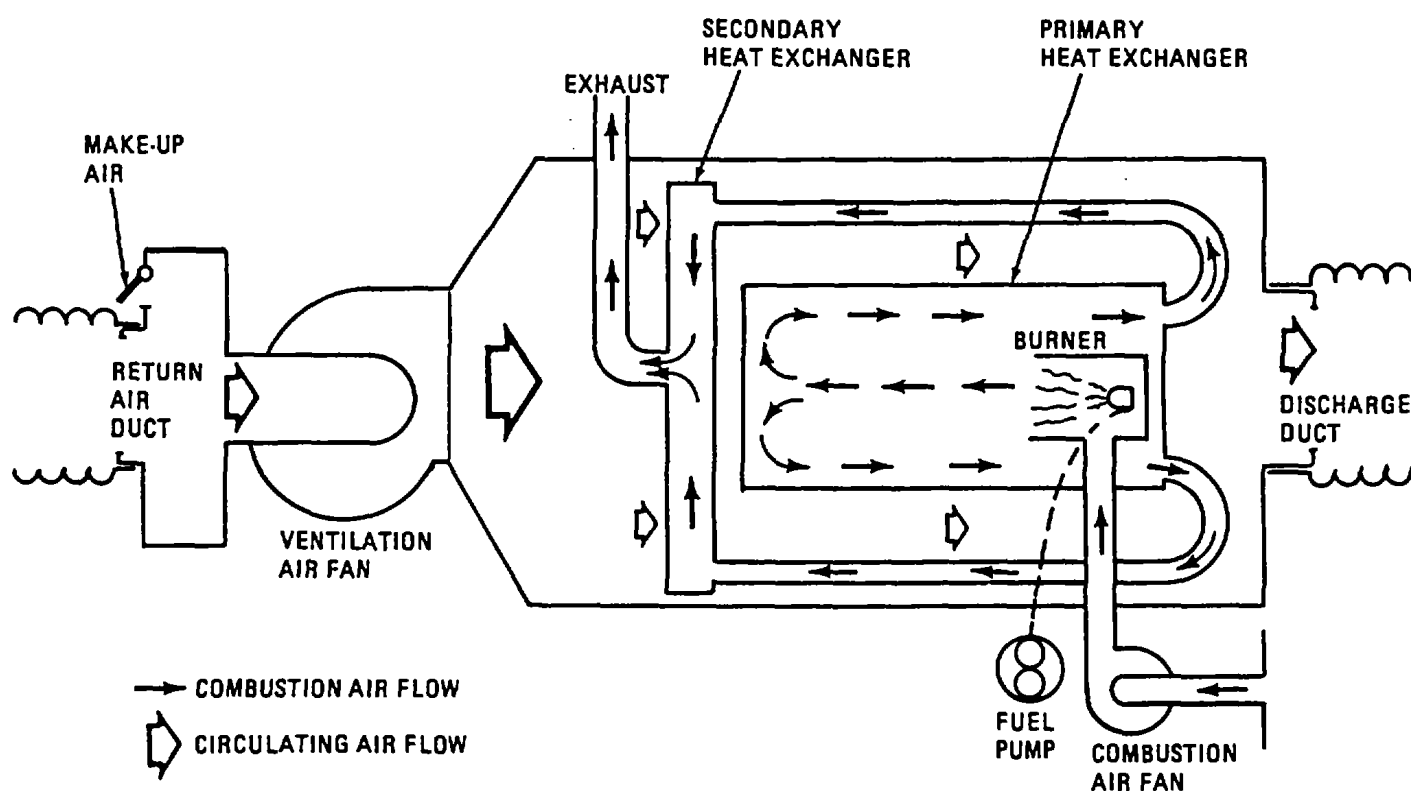


Figure 1-6. Air Flow Schematic

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## CHAPTER 2 OPERATING INSTRUCTIONS

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### Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

#### 2-1. INTRODUCTION.

This section describes the controls and indicators the operator will use most often. The following paragraphs are brief descriptions of each control and indicator.

## 2-2. LOCATION AND USE OF CONTROLS AND INDICATORS.

- a. **FRONT and RIGHT SIDE** controls and Indicators. (Refer to Figure 2-1)
- (1) **DAMPER** (1) allows fresh air to enter the unit's supply air system.
  - (2) **HOURLY METER** (2) indicates the total number of hours the burner has been operated.
  - (3) **MODE SWITCH** (3) is used to place the heater unit in the VENT, AUTO HEAT, MANUAL HEAT or OFF mode.
  - (4) **POWER LIGHT** (4) illuminates when power to the heater is available, the power circuit breaker is set and the mode switch is moved to the VENT, AUTO HEAT or MANUAL HEAT position.
  - (5) **HIGH TEMP** (5) light illuminates any time the heater discharge air exceeds the limit of the temperature limit switch setting.
  - (6) **FLAME OUT** (6) light illuminates any time there is a burner flame out during unit operating in the heating mode caused by a lack of combustion when the controls require heat.
  - (7) **FLAME RESET** (7) switch is pressed to reset the burner control relay (Ki).
  - (8) **PURGE SWITCH** (8) is used to purge air from the fuel system.
  - (9) **THERMOSTAT CIRCUIT BREAKER** (9) trips whenever an overcurrent condition exists with the remote thermostat circuit. Must be manually reset by pushing in.
  - (10) **POWER ON CIRCUIT BREAKER** (10) protects the electrical circuits whenever an overcurrent condition exists within the heater unit. Must be manually reset by pushing in.
  - (11) **FUEL PRESSURE GAGE** (11) provides a constant indication of the fuel system pressure (in psi and kilobars) of the fuel pump output.

## 2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.

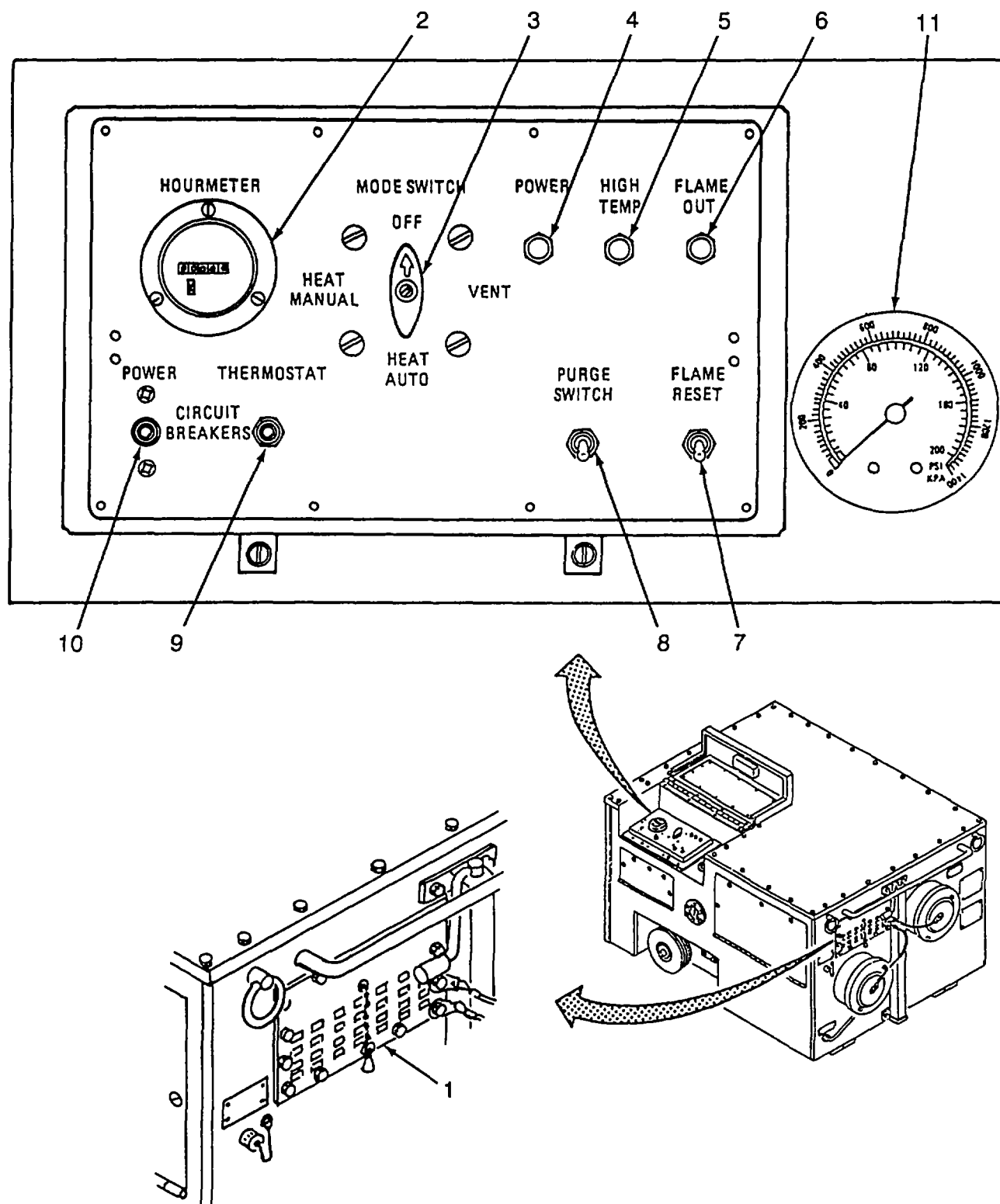
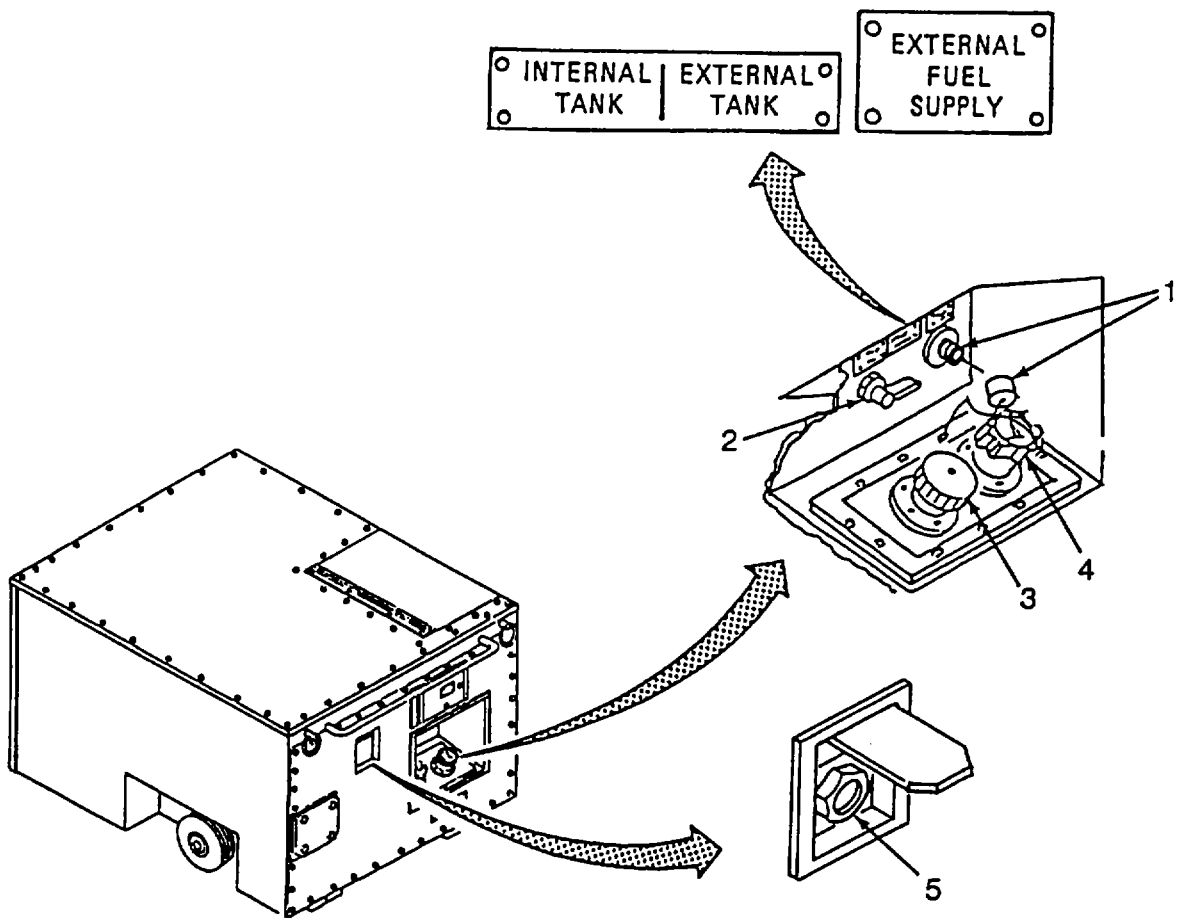


Figure 2-1. Front and Right Side Controls and Indicators

**2-2. LOCATION AND USE OF CONTROLS AND INDICATORS - continued.****b. REAR and LEFT SIDE controls and indicators. (Refer to Figure 2-2)**

- (1) EXTERNAL FUEL CONNECTION (1) used to connect the external fuel source to the ASH Unit.
- (2) INTERNAL TANK/EXTERNAL TANK (2) selector valve used to select either the internal fuel tank or the external fuel source (if connected).
- (3) FUEL FILLER NECK and CAP (3) allows the internal fuel tank to be serviced with fuel when the cap is removed.
- (4) FUEL GAGE (4) used to provide a continuous indication of the internal tank fuel level.
- (5) SIGHT GLASS (5) used to visually verify ignition or burner operation.

**Figure 2-2. Rear and Left Side Controls and Indicators**

## **Section II. OPERATOR'S PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)**

---

### **2-3. GENERAL.**

Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the equipment operator, your mission is to:

- a. Be sure to perform your PMCS each time you operate the equipment. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong.
- b. Do your BEFORE (B) PMCS just before you operate the equipment. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- c. Do your DURING (D) PMCS while you operate the equipment. During operation means to monitor the equipment and its related components while it is actually being operated. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- d. Do your AFTER (A) PMCS right after operating the equipment. Pay attention to WARNINGS, CAUTIONS, and NOTES.
- e. Do your WEEKLY (W) PMCS once a week.
- f. Do your MONTHLY (M) PMCS once a month.
- g. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.

### **2-4. PMCS PROCEDURES.**

- a. Your Preventive Maintenance Checks and Services, Table 2-1, lists inspections and care required to keep your equipment in good operating condition. It is set up so you can make your BEFORE (B) OPERATION checks as you walk around the equipment. The ITEM column of Table 2-1 is a numeric listing of the sequence in which the services and inspections are performed.
- b. The INTERVAL column of Table 2-1 tells you when to do a certain check or service.
- c. The PROCEDURE column of Table 2-1 tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify your supervisor.

**2-4. PMC PROCEDURES-continued.****NOTE**

**Terms ready/available and mission capable refer to same status: Equipment is on hand and ready to perform its combat missions. (See DA Pam 738-750).**

- d. The EQUIPMENT IS NOT READY/AVAILABLE IF: column in Table 2-1 tells you when your equipment is nonmission capable and why the equipment cannot be used.
- e. If the equipment does not perform as required, refer to Chapter 3, Section II, Troubleshooting.
- f. If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY, report it to your supervisor.
- g. When you do your PMCS, you will always need a rag or two. Following are checks that are common to all equipment:
  - (1) Keep It Clean. Dirt, grease, oil, and debris only get in the way and may cover up a serious problem. Clean as you work and as needed. Use dry cleaning solvent, P-D-680 ( App E, item 1) on all metal surfaces. Use soap and water when you clean rubber or plastic material.
  - (2) Rust and Corrosion. Check equipment for rust and corrosion. If any bare metal or corrosion exists, clean, and apply a thin coat of oil (App E, item 15). Report it to your supervisor.
  - (3) Bolts, Nuts, and Screws. Check for looseness, missing, bent, or broken condition. Look for chipped paint, bare metal, or rust around bolt heads. If you find a bolt, nut or screw you think is loose, report it to your supervisor.
  - (4) Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to your supervisor.
  - (5) Electric Wires and Connectors. Look for cracked, frayed, or broken insulation, bare wires, and loose or broken connectors. Report any damaged wires to your supervisor.
  - (6) Hoses and Fluid Lines. Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots show leaks, but a stain around a fitting or connector can also mean a leak. If a leak comes from a loose fitting or connector, report it to your supervisor. If something is broken or worn out, report it to your supervisor.
- h. Check operating condition.
  - (1) Listen for unusual noise, clinking, rubbing or squealing.
  - (2) Watch and feel for unusual shaking or vibration.

**2-5. CLEANING AGENTS.****WARNING**

**DO NOT use diesel fuel, gasoline, or benzene (benzol) for cleaning.**

**DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in well ventilated places. Flash point of solvent is 138°F (60°C).**

**USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.**

Cleaning Rust, Grease or Fuel. When cleaning grease or fuel buildup or rusty places, use a cleaning solvent. Then apply a thin coat of light oil to affected area.

**2-6. LEAKAGE DEFINITIONS FOR OPERATOR PMCS.**

It is necessary for you to know how fluid leakage affects the status of the equipment. Following are types/classes of leakage an operator needs to know to be able to determine the status of the equipment. Learn these leakage definitions and remember when in doubt, notify your supervisor.

**CAUTION**

**Equipment not mission capable if leaks are found.**

**Leaks should be reported immediately to your supervisor.**

- a. CLASS I Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- b. CLASS II Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
- c. CLASS III Leakage of fluid great enough to form drops that fall from item being checked/inspected.



Table 2-1. Operator Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
1	Before	EXTERNAL	Inspect for loose/missing hardware, broken hinges/latches/stays, dents or holes.	Door/panel missing, or holes.
		Access Doors/Panels		
2	Before	Control Panel	Inspect for broken/missing knobs, gages or switches. Inspect for loose/missing hardware. switches.	Broken or missing gages or
3	Before	Power Cable and Remote Thermostat Cable	Inspect for frayed/cracked insulation, cracked/bent/broken connectors. Inspect cable connector for cracks/wear/foreign objects.	Exposed wires, damaged connectors.

Table 2-1. Operator Preventive Maintenance Checks And Services.

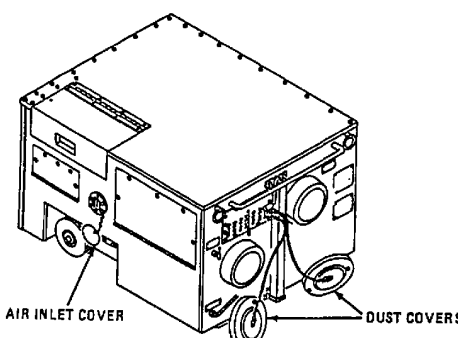
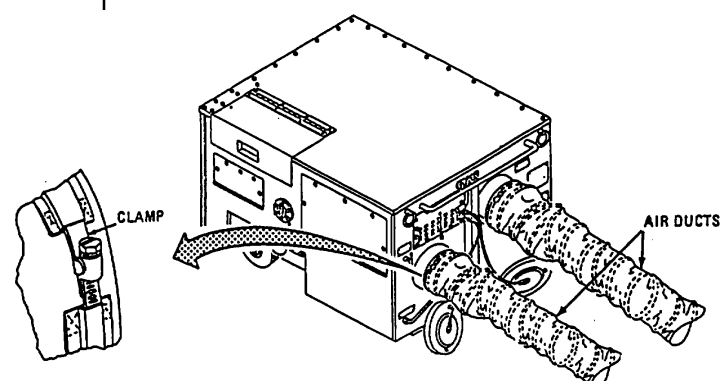
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
4	Before	EXTERNAL Supply and Return Air Port Dust Covers, Combustion Air	<p>Inspect for missing covers. Inspect for cracks/holes/bent covers. Inspect for security of chain. Ensure covers have been removed from all three locations.</p> 	
5	Before	Supply and Return Air Ducts	<p>Inspect for holes or tears in fabric. Inspect clamps for wear and sharp edges. Inspect for missing, broken or loose clamps. Tape minor holes or tears in fabric (Item 14, App E).</p> 	Holes or tears in fabric and missing, loose or broken clamp.

Table 2-1. Operator Preventive Maintenance Checks And Services.

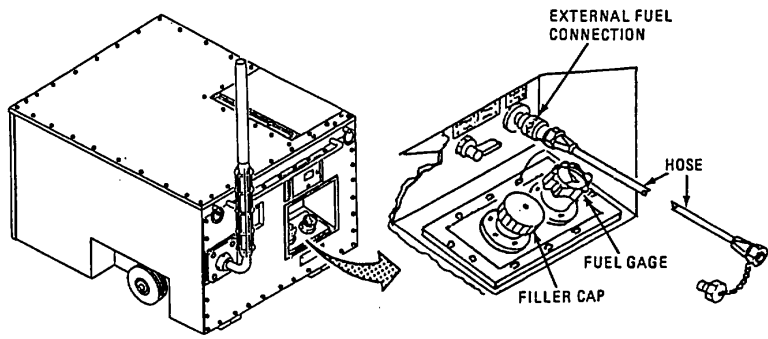
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
		<b>EXTERNAL</b>	<p><b>WARNING</b></p> <p>Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated / prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.</p> <p>Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible, remove clothes and wash skin with warm, soapy water before getting dressed.</p> <p>Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop refueling immediately if fuel spill occurs.</p>	
6	Before	External Fuel Connection and Hose	Inspection for missing dust cap. Inspect fitting for damage, corrosion or leaks. Inspect hose for wear or leaks.	Any leaks.
7	Before	Fuel Gage and Filler Neck	Inspect for broken glass, bent/broken pointer and corrosion. Inspect both for leaks. Remove filler cap and inspect screen for holes or foreign objects.	Any leaks.
				

Table 2-1. Operator Preventive Maintenance Checks And Services.

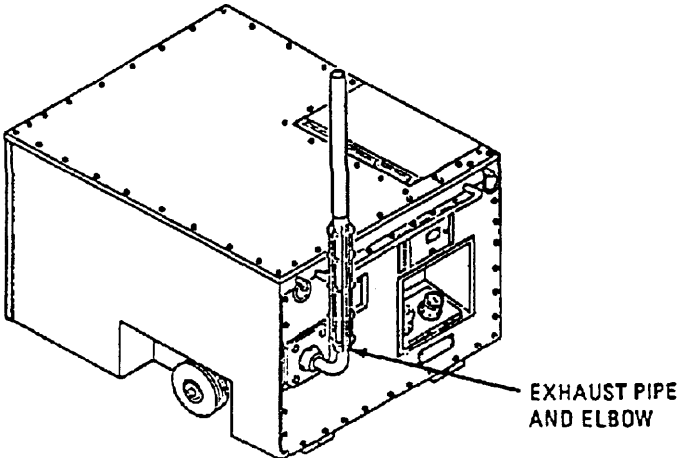
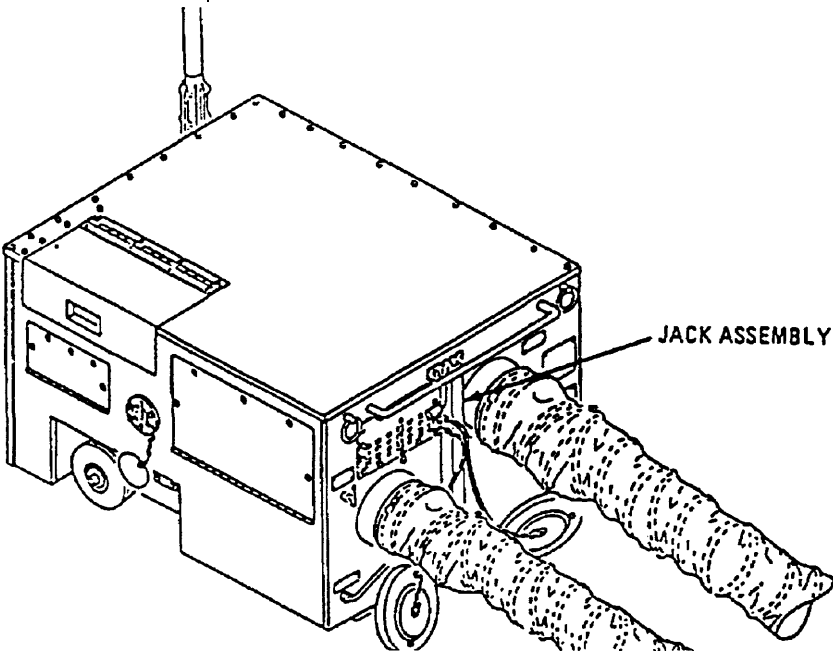
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
8	Before	<b>EXTERNAL</b>	<p>Inspect for cracks, holes, corrosion, or improper fit. Inspect for missing or damaged bolts. Inspect for loose/missing or damaged guard.</p> 	Improper fit. Cracks or holes, damaged or missing bolts.
		Exhaust Pipe and Elbow		
9	Before	Jack Assembly	<p>Check for missing or damaged hardware. Check jack operation for ease of movement and ability to lift front of unit.</p> 	

Table 2-1. Operator Preventive Maintenance Checks And Services.

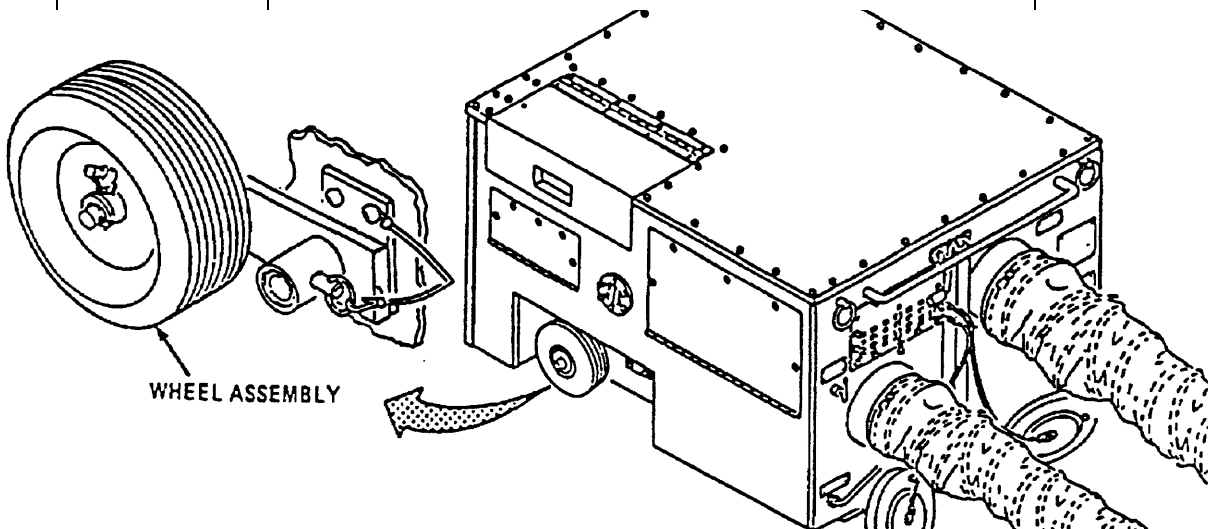
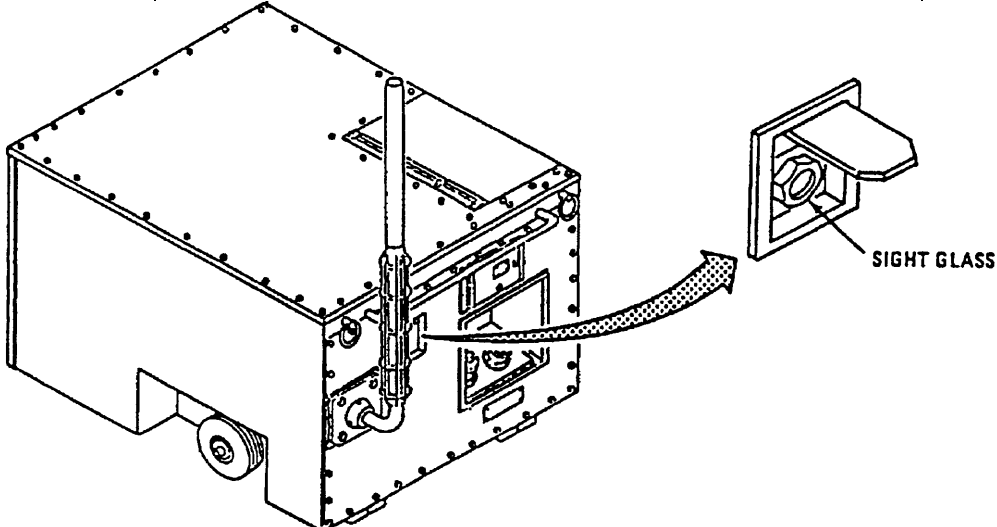
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
10	Before	EXTERNAL	<p>Inspect for cuts, exposed cords in tread, flat tire. Check tire pressure, 15 psi. Check for movement of wheel on axle and axle movement on pivot. Check for missing or damaged bolts/lock pins.</p> 	
		Wheel Assembly		
11	Before	Sight Glass	<p>Inspect for dirty, cracked, rusty or missing sight glass.</p> 	Cracked or missing

Table 2-1. Operator Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
12	During	EXTERNAL	<p><b>WARNING</b></p> <p>Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated / prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.</p> <p>Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible, remove clothes and wash skin with warm, soapy water before getting dressed.</p> <p>Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop refueling immediately if fuel spill occurs.</p>	Any leaks.
		External Fuel Connection and Hose	Inspect for leaks.	

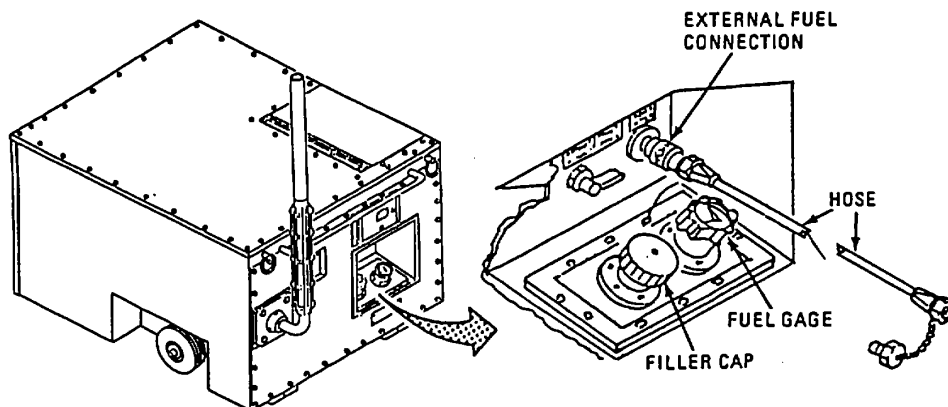


Table 2-1. Operator Preventive Maintenance Checks And Services.

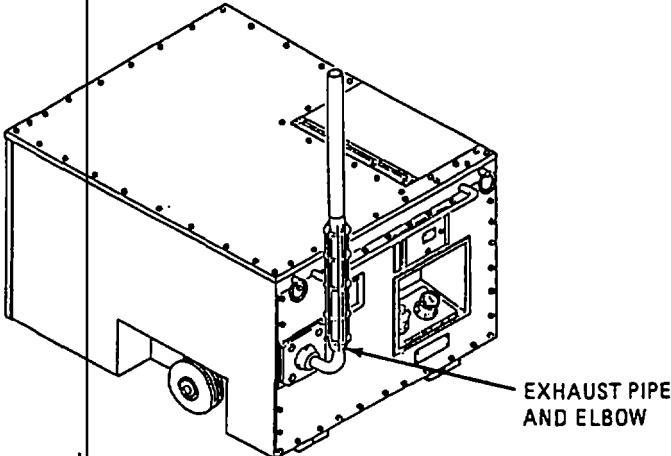
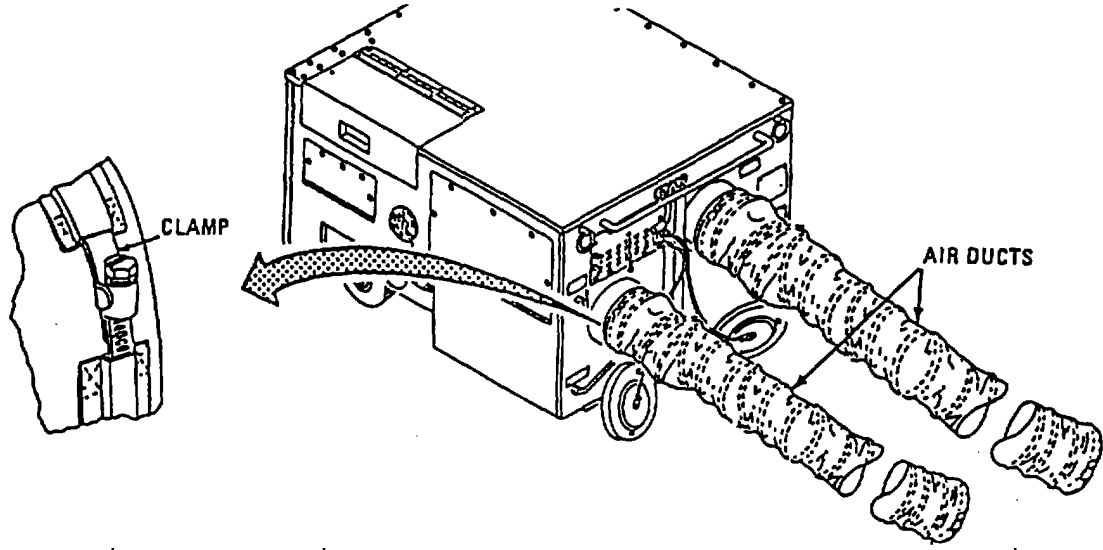
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
13	During	EXTERNAL Exhaust Pipe and Elbow bolts.	Inspect for cracks or holes, loose or missing guard. Inspect for loose or missing captive captive bolts.  	Cracks or holes, loose or missing
14	During	Supply and Return Air Ducts	Inspect for holes or tears in fabric. Inspect clamps for wear and sharp edges. Inspect for missing, broken or loose clamps. Tape minor holes or tears in fabric (Item 14, App E).  	Holes or tears in fabric and missing, loose or broken clamp.

Table 2-1. Operator Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
15	During	EXTERNAL	Check for accumulation of dirt/soot. Inspect glass for cracks. Check for missing glass.	Cracked or missing glass.
		Sight Glass		
16	During	ASH Unit	Check unit for any unusual noises or vibrations.	Any unusual noise or vibration.

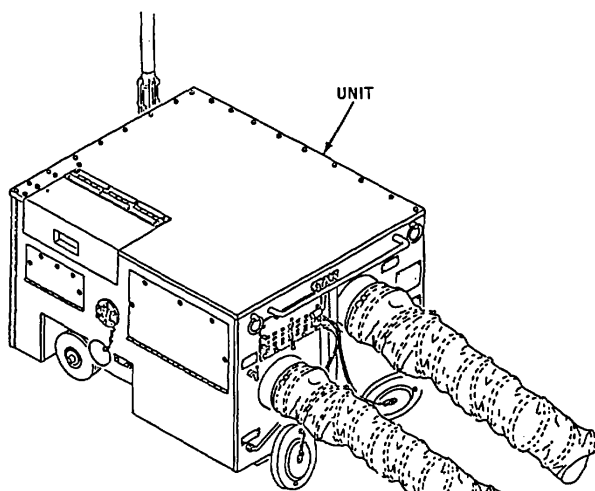
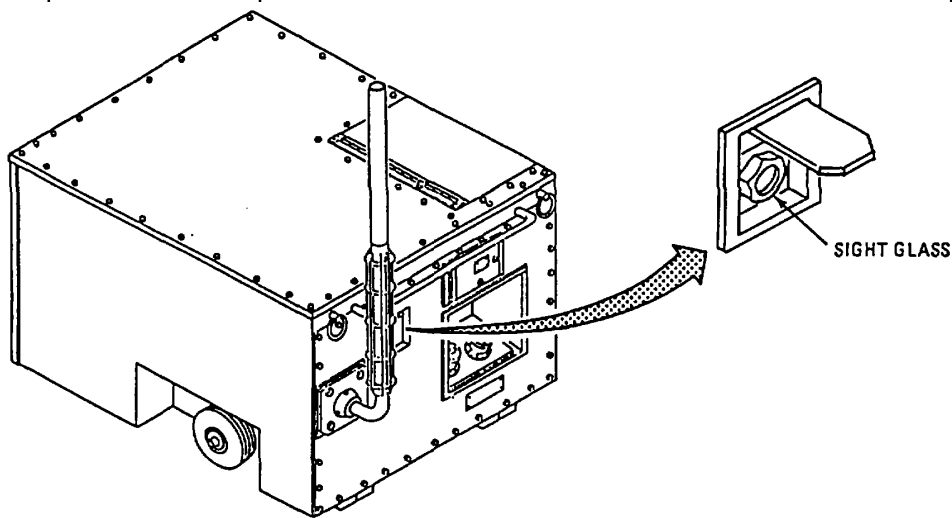




Table 2-1. Operator Preventive Maintenance Checks And Services.

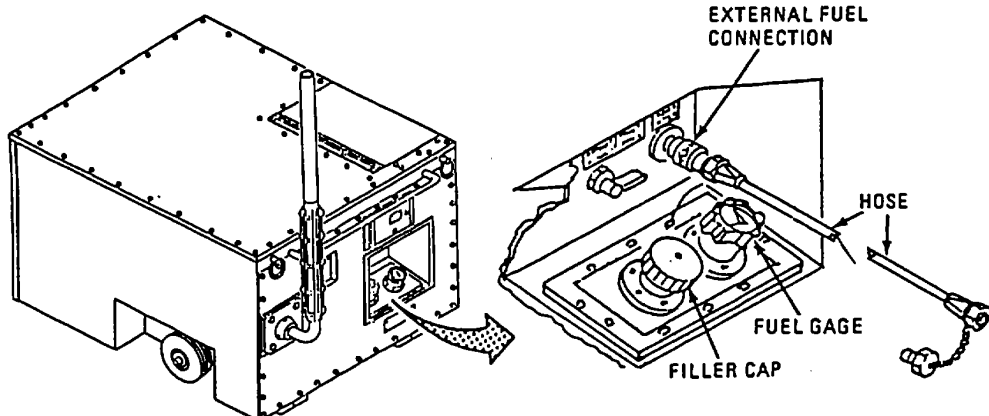
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
		EXTERNAL	<p><b>WARNING</b></p> <p>Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated / prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.</p> <p>Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible, remove clothes and wash skin with warm, soapy water before getting dressed.</p> <p>Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop refueling immediately if fuel spill occurs.</p>	
17	After	External Fuel Connection and Hose	Inspect for damaged threads or missing dust cap. Inspect for leaks. Inspect hose for wear or leaks.	Damaged threads. Any leaks. Any leaks.
18	After Filler Neck	Fuel Gage and and corrosion.	Inspect for broken glass, bent/broken pointer Inspect both for leaks. Remove filler cap and inspect screen for holes or foreign objects.	
				

Table 2-1. Operator Preventive Maintenance Checks And Services.

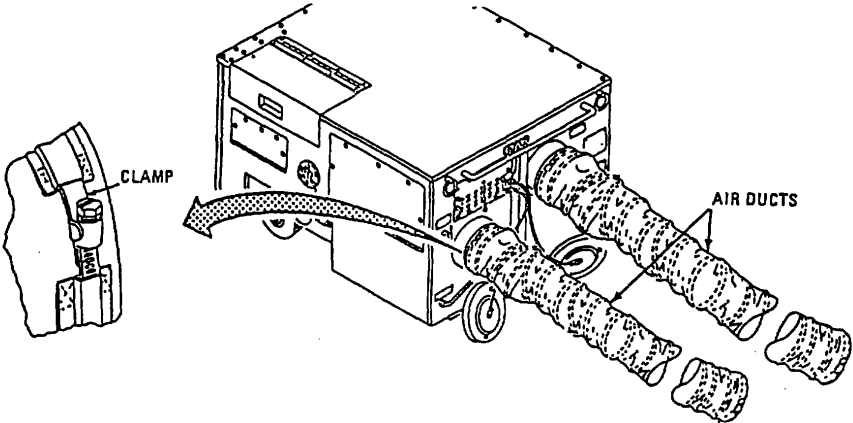
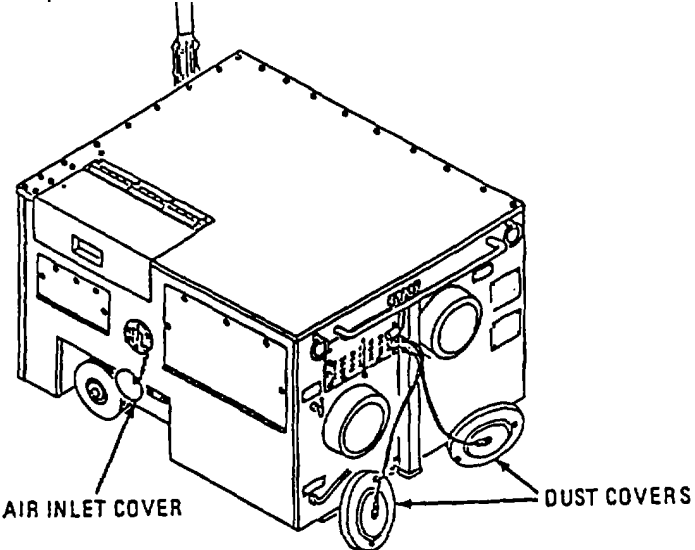
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
19	After	EXTERNAL Supply and Return Air Ducts	<p>Inspect for holes or tears in fabric. Inspect clamps for proper operation, wear and sharp edges. Tape minor holes or tears in fabric (Item</p> 	Holes or tears in fabric, and inoperative
20	After	Supply and Return Air Port Dust Covers and Air Inlet Cover chain for security.	<p>Inspect for missing covers. Inspect for proper fit over ports. Inspect for damaged covers. Inspect</p> 	Missing or damaged covers.

Table 2-1. Operator Preventive Maintenance Checks And Services.

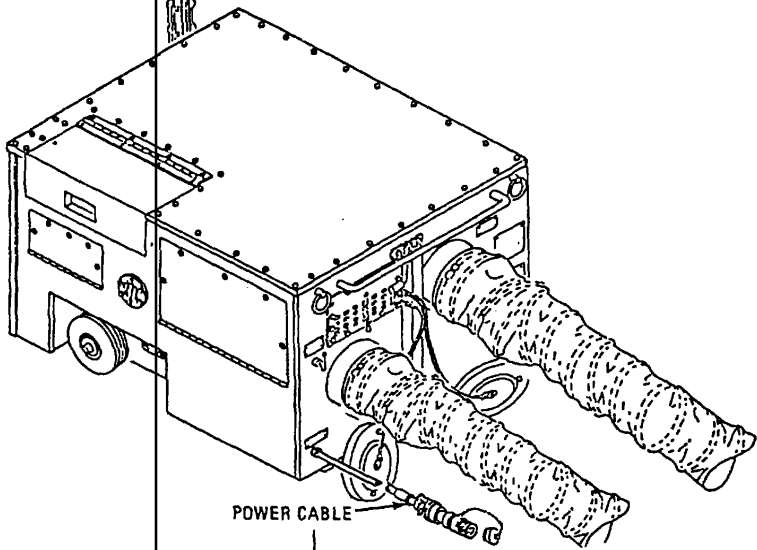
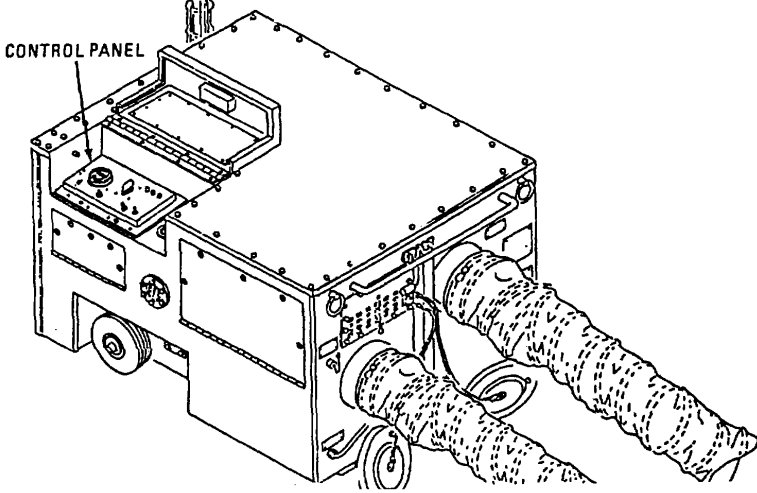
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
21	After	EXTERNAL Power Cable	<p>Inspect for frayed/cracked insulation, cracked/bent/broken/burnt connectors. Cable connector for cracks/wear/foreign objects. Exposed wires, damaged or burnt connectors.</p> 	
22	After	Control Panel	<p>Inspect for broken/missing knobs, gages or switches. Inspect for loose/missing hardware.</p> 	Broken or missing knobs, gages or switches.

Table 2-1. Operator Preventive Maintenance Checks And Services.

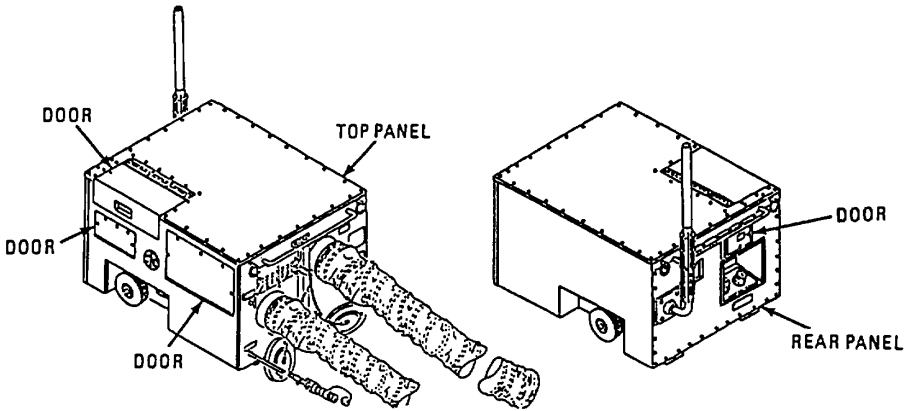
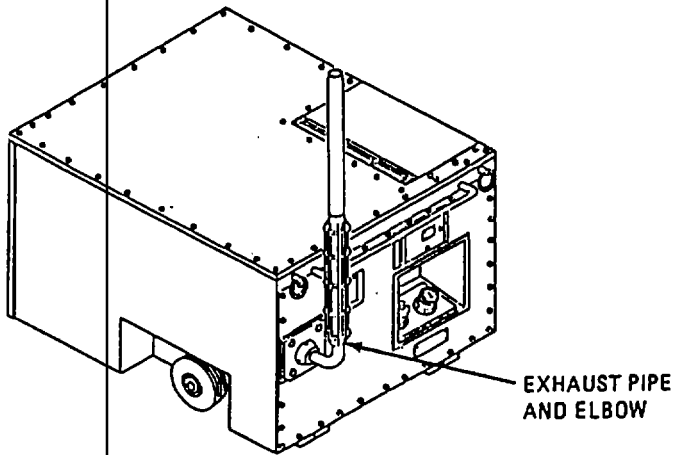
Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
23	After	Access Doors and Panels	<p>Inspect for loose or missing doors, panels or hardware. Inspect for loose, broken, bent or missing hinges, latches or stays.</p> 	Door or panel missing.
24	After	Exhaust Pipe and Elbow bolts.	<p>Inspect for cracks or holes, loose or missing heat shield. Inspect for loose or missing captive bolts.</p> 	Cracks or holes, loose or missing

Table 2-1. Operator Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
25	Monthly	EXTERNAL	Inspect for loose or missing plates. Inspect	
		Instruction/ Information Schematic Plates plates for legibility.		

The diagram is an exploded view of a rectangular metal enclosure. It shows the top, front, and side panels. Various plates are labeled with leader lines pointing to their locations on the enclosure. The labels are: SCHEMATIC INSTRUCTION PLATE, INFORMATION PLATE, INFORMATION PLATE, INFORMATION PLATE, INSTRUCTION INFORMATION PLATE, INFORMATION PLATE, INFORMATION PLATE, INFORMATION PLATE, INFORMATION PLATE, and INFORMATION PLATE.

### Section III. OPERATION UNDER USUAL CONDITIONS

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#### 2-7. ASSEMBLY AND PREPARATION FOR USE.

##### a. General Precautions

- (1) Do not operate the heater unit in fuel vapor areas or in areas lacking adequate ventilation to support heater fuel combustion.
- (2) Do not smoke or use open flame in the vicinity when filling fuel tank.
- (3) Always provide metal-to-metal contact between fuel container and fuel tank to prevent a spark from being generated.
- (4) Do not operate the heater unit inside a building unless the exhaust gases are properly vented to the outside.
- (5) Be sure the air duct covers and combustion air inlet cover are removed prior to operation.
- (6) A 50-lb (22.7 kg) capacity carbon dioxide fire extinguisher should be available on a standby basis in the area the heater unit is operated.
- (7) Do not restrict ventilating or combustion airflow. Equipment damage and/or improper operation will occur.
- (8) Perform Operator Before PMCS, notify unit maintenance if any discrepancies found.

##### b. Fuel Tank Selection (Refer to Figure 2-3)

- (1) Check fuel gage (1) and service internal fuel tank as required. (Refer to para 2-7c.)

#### CAUTION

**Never attempt to operate the ASH Unit with the fuel selector valve handle in a vertical position. Damage will occur. Fuel will not flow with the handle in the vertical position. The fuel selector valve handle must be in a horizontal position.**

- (2) Set the fuel selector valve (2) to the INTERNAL TANK position.
- (3) If external fuel line (3) is attached to the unit external fuel connection (4) and a fuel source, set fuel selector valve (2) to the EXTERNAL TANK position.

2-7. ASSEMBLY AND PREPARATION FOR USE - continued.

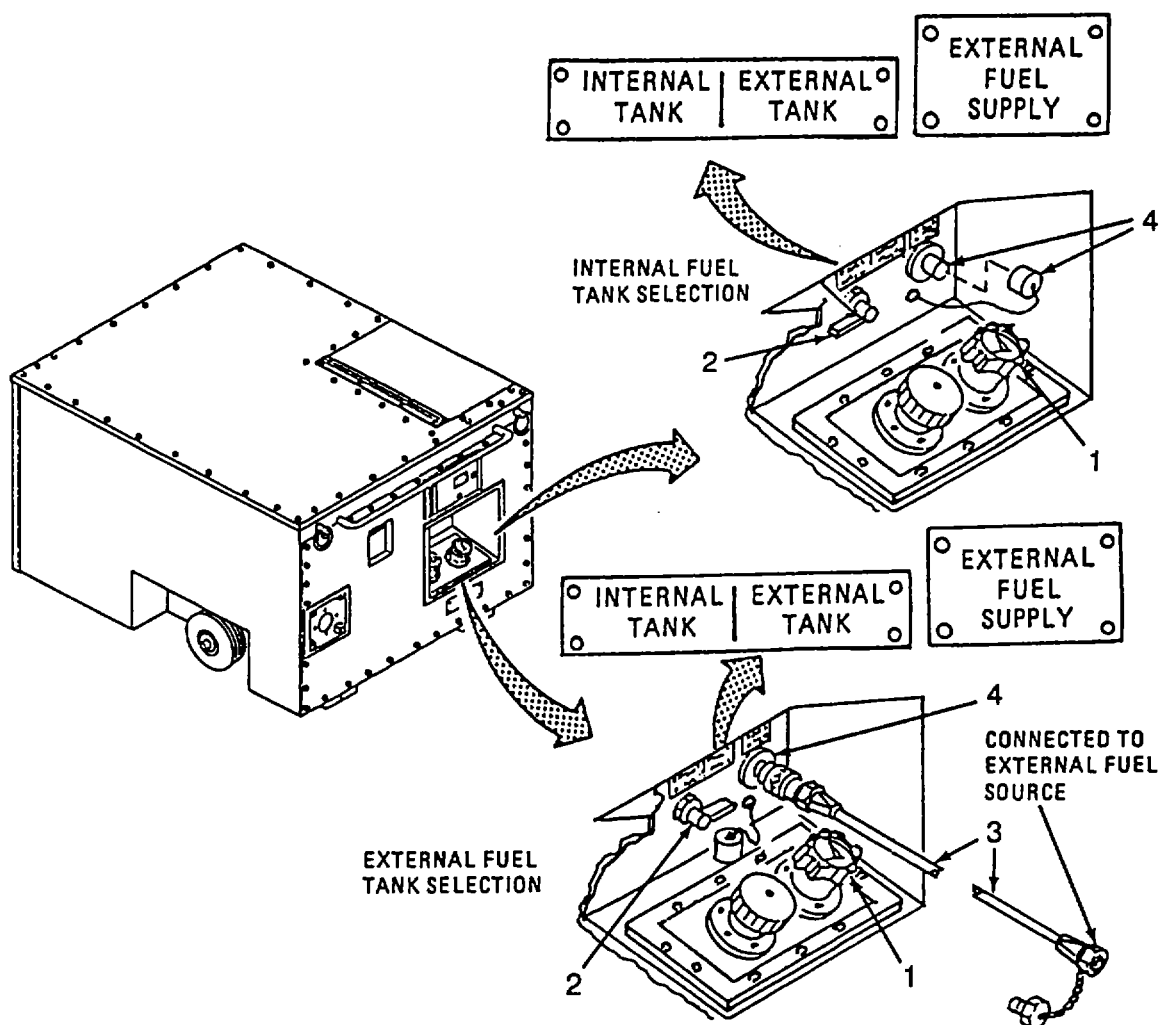


Figure 2-3. Fuel Tank Selection

**2-7. ASSEMBLY AND PREPARATION FOR USE - continued.**

- c. Fueling Unit. The following procedures contain instructions for refueling of the heater unit's internal fuel tank. (Refer to Figure 2-4)

**WARNING**

**Do not smoke or use an open flame in vicinity of the heater while servicing the fuel tank. Failure to comply may result in injury to personnel.**

- (1) Remove fuel cap (1).
- (2) Provide metal-to-metal contact between fuel tank (2) and dispenser (3) to avoid possibility of sparks. A grounding cable, bonding strap, or equivalent may be used.

**NOTE**

**If diesel fuel is not available, turbine fuel conforming to MIL-T-83133 maybe used as an alternate. However, greater heating efficiency will be obtained using one of the diesel fuels recommended in step (3).**

- (3) Fill fuel tank with 14 gallons of fuel conforming the Federal Specification V-F-800/MIL-T-83133 of the following class depending upon ambient temperature.

Temperature

Above +20°F

Above -25°F

Above -50°F

Above -50°F

Specification

A-A-52557

A-A-52557

A-A-52557

MIL-T-83133

Military Symbol

Low Sulfur No. 2-D/ DF-2

Low Sulfur No. 1-D/ DF-1

Icing inhibitor added / DF-A

JP-8

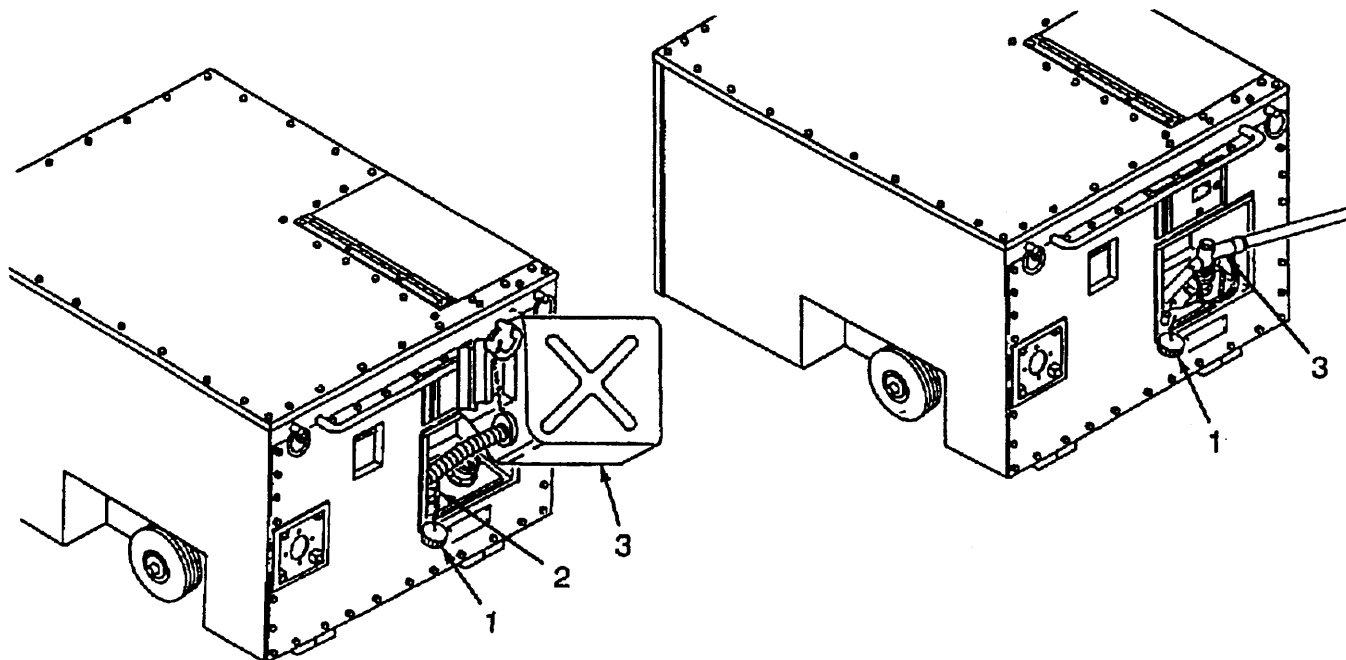


Figure 2-4. Fueling Unit



## 2-7. ASSEMBLY AND PREPARATION FOR USE - continued.

### d. Power Connection (Refer to Figure 2-5)

- (1) Be sure the MODE SWITCH (1) is in the OFF position.
- (2) Connect heater power cable (2) to power cable adapter (3).
- (3) Depress POWER circuit breaker (4) and THERMOSTAT circuit breaker (5) buttons.

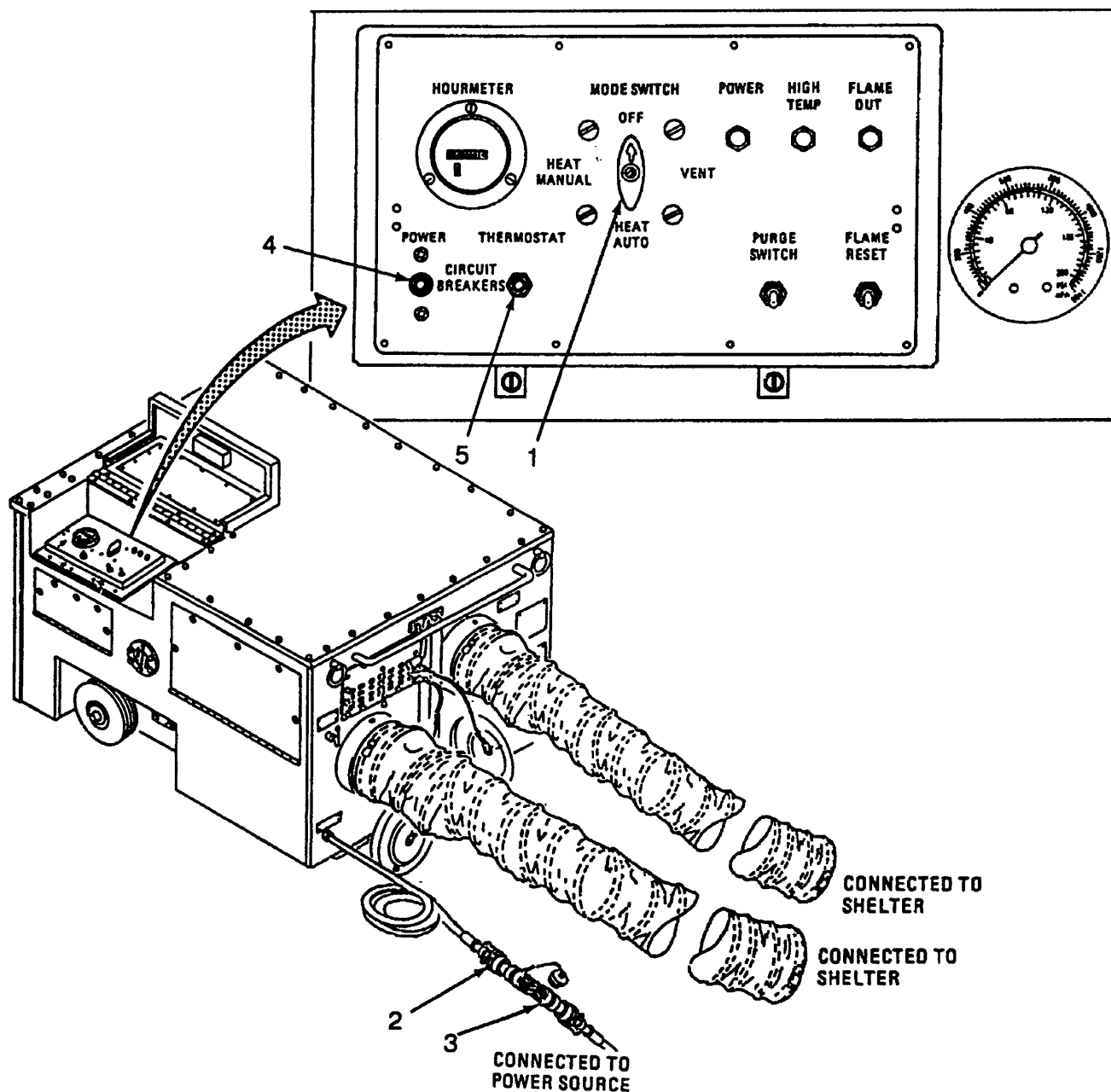


Figure 2-5. Power Connection

## 2-8. OPERATING PROCEDURES.

### a. Ventilation Mode Operation (Refer to Figure 2-6)

- (1) Perform assembly and preparation for use procedures in paragraph 2-7.
- (2) Operate 50/60 hertz, 120 vac power source in accordance with applicable Technical Manual.

### CAUTION

**Do not operate unit without fuel. Operation without fuel will result in damage to fuel pump.**

**Never attempt to operate the ASH Unit with the fuel selector valve handle in a vertical position. Fuel will not flow with the handle in the vertical position. The fuel selector valve handle must be in a horizontal position.**

- (a) Set the MODE SWITCH (1) in the VENT position. The ventilation motor/fan should begin operating immediately.
- (b) Push fuel PURGE SWITCH (2) upward to ON position for 10 seconds to purge fuel lines of air. Fuel pressure gage (3) indication will drop while switch (2) is in ON position and return to approximately 20 psig when released.
- (c) Adjust the fresh air damper (4) for the desired amount of fresh air by releasing the chain (5) and allowing it to feed into the damper assembly.

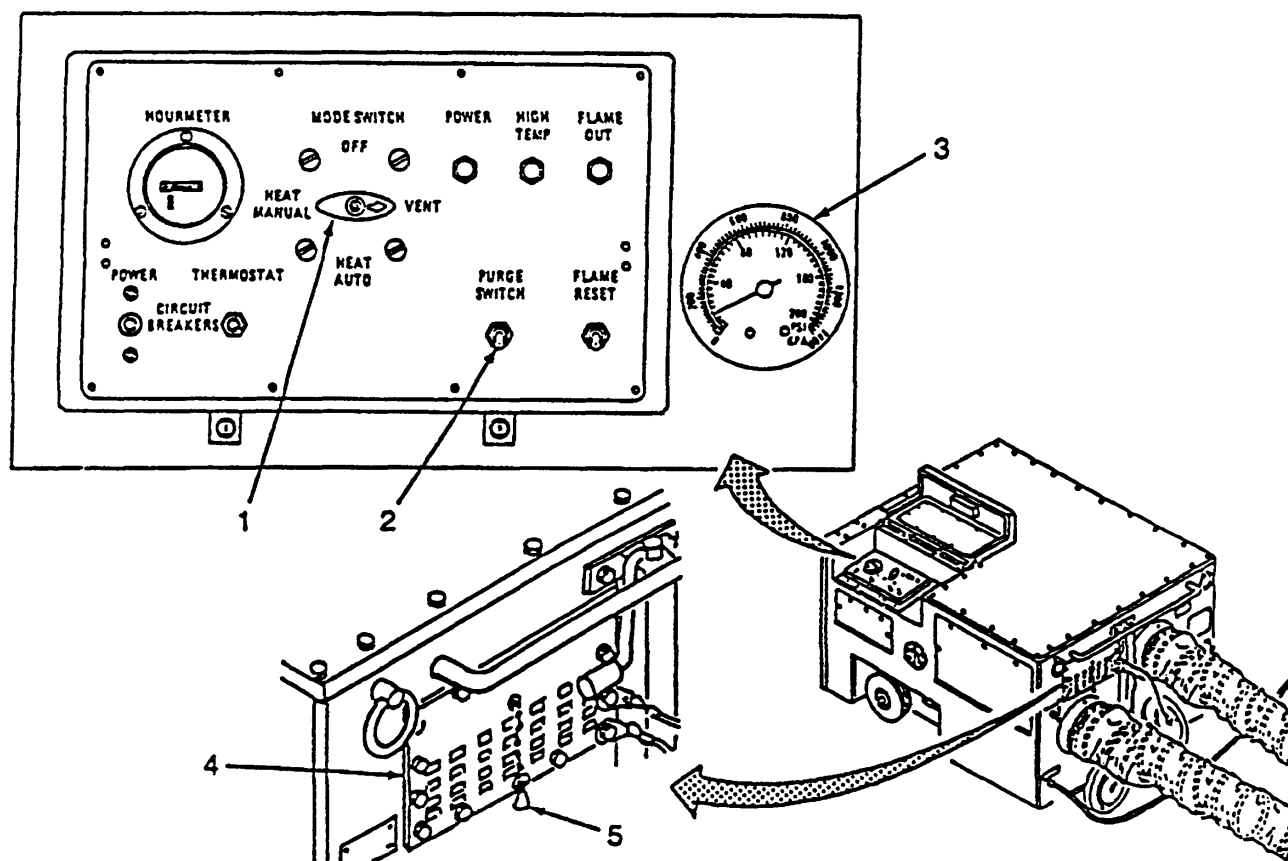


Figure 2-6. Operation, Ventilation Mode

**2-8. OPERATING PROCEDURES - continued.**

- b. Heat-Auto Mode (Refer to Figure 2-7)

**CAUTION**

**Do not attempt to operate the heater unit in the heating mode for more than 10 minutes when ambient temperature is above +100°F (+39°C). Failure to comply may result in damage to equipment. Operation in the VENT mode may be done at any temperature.**

- (1) Perform assembly and preparation for use procedures in paragraph 2-7.
- (2) Operate the unit in the VENT mode by following the instructions in paragraph 2-8a.

**CAUTION**

**Do Not attempt to operate the heater in the HEAT AUTO mode if ignition arc is not present. Damage to equipment may occur.**

- (3) Look through the sight glass (1) to check for ignition arc. If ignition arc is not seen, do not attempt to fire heater. The arc should be steady and bright blue in color.

**NOTE**

**If the ambient air temperature is below 0°F (-17.8°C), wait 30 to 45 seconds prior to performing step (4).**

**If the burner does not ignite within 15 seconds after mode switch is placed in the HEAT AUTO position or if burner goes out during heating mode, the FLAME OUT light will come on.**

- (4) Set the MODE SWITCH (5) to the HEAT AUTO position.
  - (a) If the FLAME OUT light (6) comes on wait 30 seconds and depress the FLAME RESET button (7).
  - (b) If FLAME OUT light comes on after three attempts to reset, notify unit maintenance.
- (5) Set remote thermostat (2) at least 3°F above ambient temperature. Depress the tip arrow (3) to increase setting or the down arrow (4) to decrease setting.
- (6) Check fuel pressure at the fuel pressure gage (8). Proper pressure for elevation/ambient temperature and voltage frequency (50 or 60 Hz) is listed in Table 1-2. If pressure is not correct, notify unit maintenance.

**2-8. OPERATING PROCEDURES- continued.**

## b. Heat-Auto Mode - continued (Refer to Figure 2-7)

- (7) After the burner lights up, observe the flame through the sight glass (1). If flame is not bright and steady, notify unit maintenance to adjust the fuel pressure.
- (8) Adjust the fresh air damper (9) for the desired amount of fresh air by releasing the chain (10) and allowing it to feed into the damper assembly.
- (9) Adjust the temperature of the area being heated by depressing one of the arrows on the

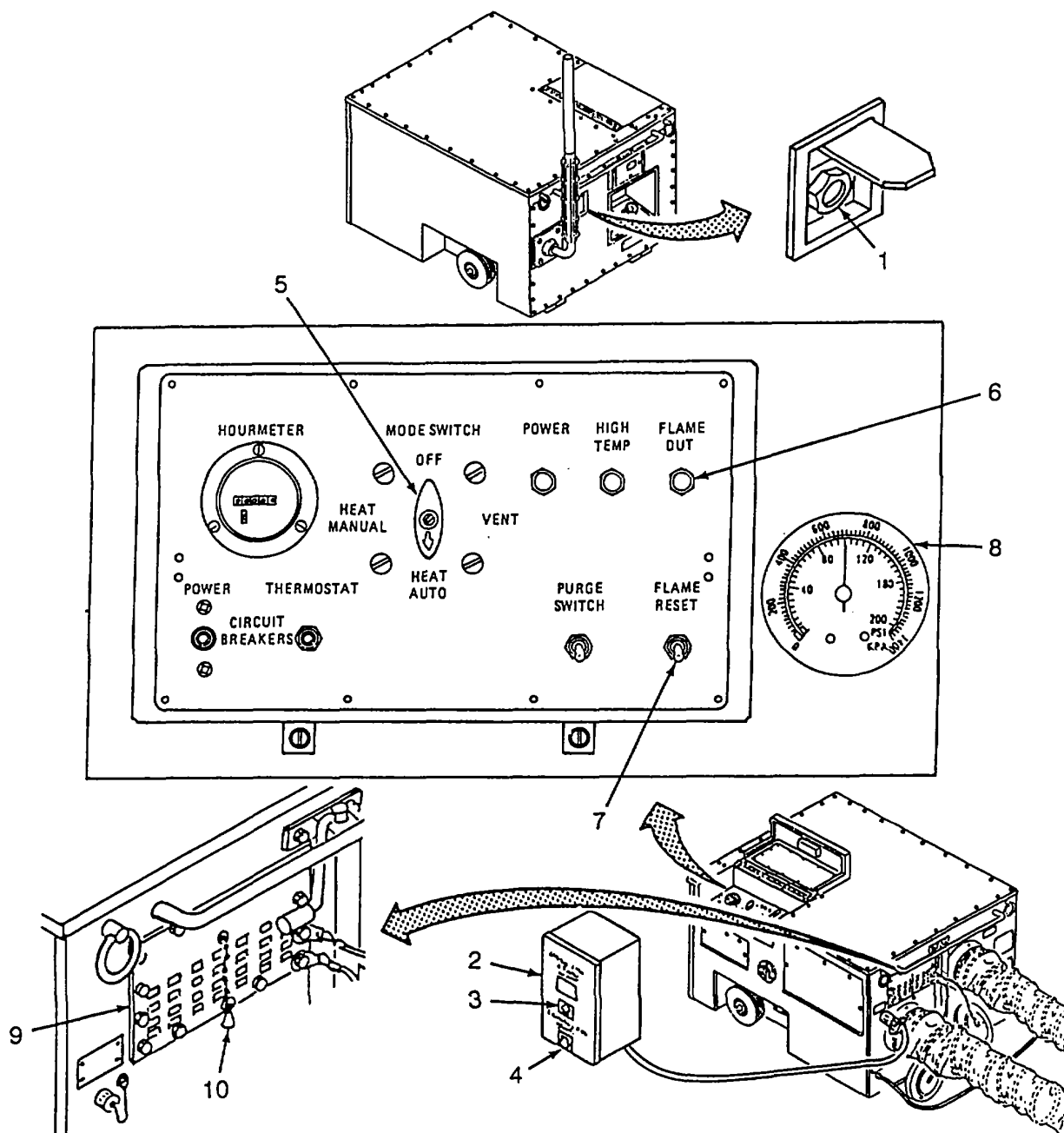


Figure 2-7. Operation, Heat Auto Mode (Sheet 1 of 2)

**2-8. OPERATING PROCEDURES - continued.**

## b. Heat-Auto Mode - continued (Refer to Figure 2-7)

(10) The unit may be placed in the HI temperature, mode and deliver heated air up to 150°F as follows.

(a) Follow the procedures in steps (1) through (8) for operating in the HEAT AUTO mode.

**NOTE**

**HI temperature mode can not be obtained in the HEAT MANUAL mode.**

- (b) Once the unit burner lights up and the fuel pressure is correct, the unit may be placed in the HI heat mode by depressing arrows (1) and (2) on the remote thermostat (3) at the same time.
- (c) The remote thermostat (3) will indicate HI. The ambient temperature will not affect the heater operation.
- (d) The unit may be returned to the AUTO HEAT mode by depressing arrows (1) and (2) together a second time.

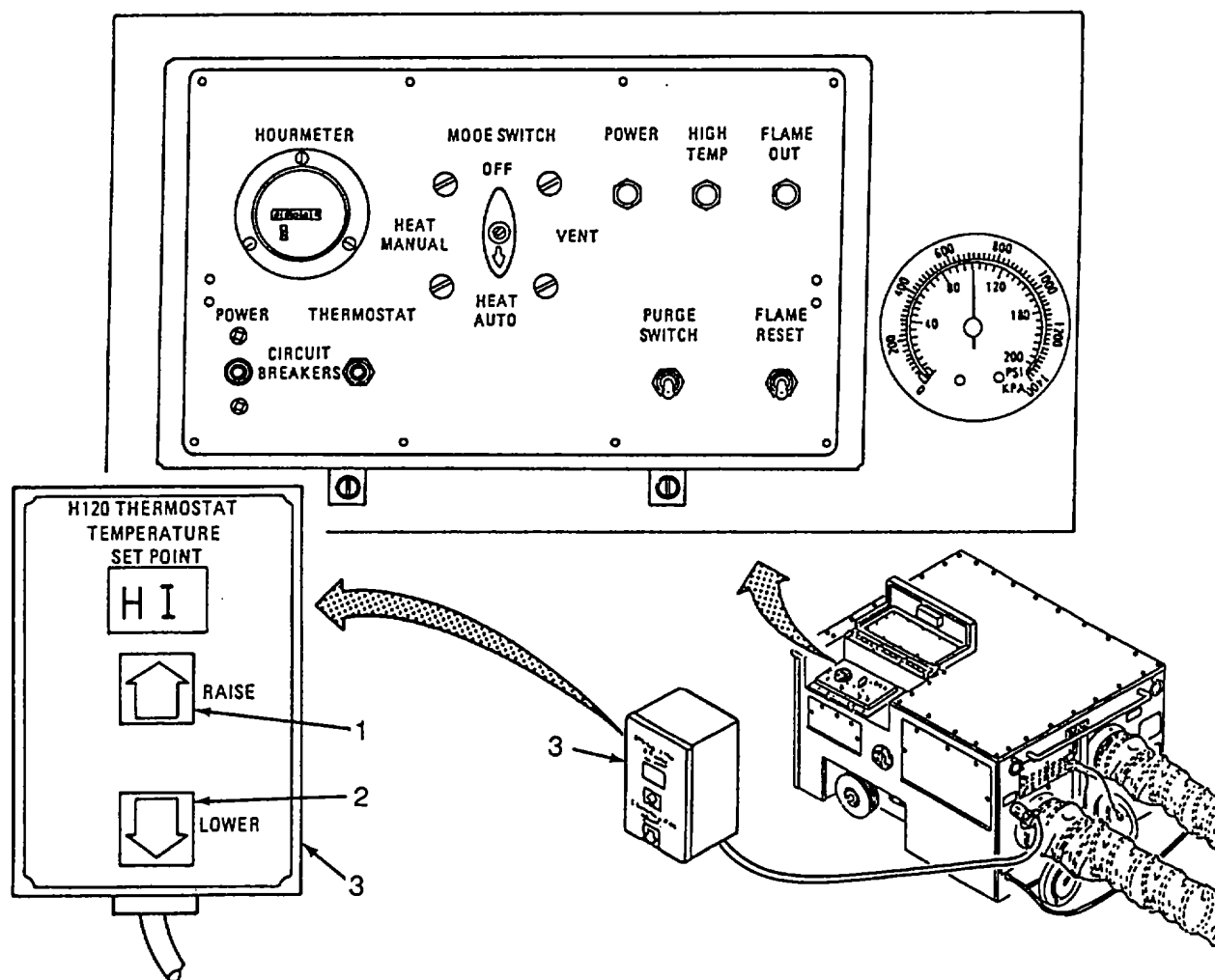


Figure 2-7. Operation, Heat Auto Mode (Sheet 2 of 2)

**2-8. OPERATING PROCEDURES - continued.**

- c. Heat Manual Mode. The ASH Unit may be placed in the HEAT MANUAL mode by using the MODE SWITCH. (Refer to Figure 2-8)

**CAUTION**

**Do not attempt to operate the heater unit in the heating mode for more than 10 minutes when ambient temperature is above + 100°F (+39°C). Failure to comply may result in damage to equipment. Operation in the VENT mode may be done at any temperature.**

**NOTE**

**If unit is presently operating in the HEAT AUTO mode, proceed to step (4).**

- (1) Perform setup procedures in paragraph 2-7.
- (2) Operate the unit in the VENT mode by following the instructions in paragraph 2-8b.

**CAUTION**

**Do Not attempt to operate the heater in the HEAT MANUAL mode if ignition arc is not present. Damage to equipment may occur.**

- (3) Look through the sight glass (2) to check for ignition arc. If ignition arc is not seen, do not attempt to fire heater.

**NOTE**

**If the ambient air temperature is below 0°F (-17°C), then wait 30-45 seconds prior to performing step (d).**

- (4) Set MODE SWITCH (1) in the HEAT MANUAL position.
- (5) Look through sight glass (2) and ensure flame is present. If flame is not bright and steady, notify unit maintenance.
- (6) Check fuel pressure at the fuel pressure gage (3). Proper pressure for elevation and voltage frequency (50 or 60 Hz) is listed in Table 1-2. If pressure is not correct, notify unit maintenance.

2-8. OPERATING PROCEDURES - continued.

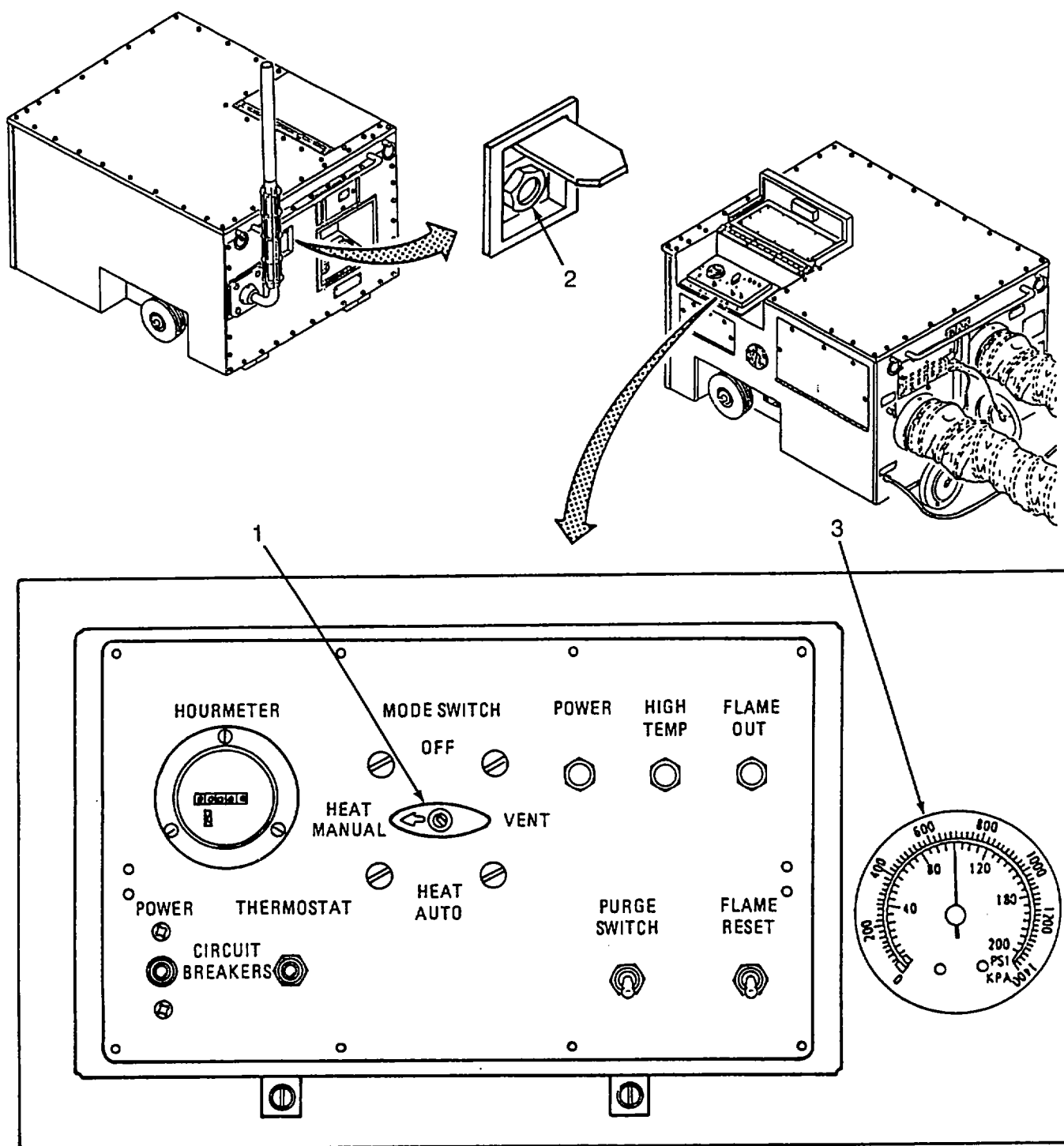


Figure 2-8. Operation, Heat Manual Mode

## 2-8. OPERATING PROCEDURES - continued.

## d. Shutdown (Refer to Figure 2-9)

**WARNING**

Hot shutdown may damage heater and under some conditions, a safety hazard may result. A hot shutdown occurs when the combustion and vent blower fans are turned off at the same time when in heat modes. Avoid turning off the combustion and vent blower fans at the same time. Always set the mode selector switch to VENT for at least 2 minutes when shutting down the heater unit from heat modes.

- (1) Set the MODE SWITCH (1) in the VENT position for at least two minutes.
- (2) Set the MODE SWITCH (1) to the OFF position to shutdown the unit.
- (3) Install combustor air inlet cover (2) on combustor air inlet (3), and the return air duct cover (4) if the return air duct (5) was not attached.
- (4) Disconnect heater power cable (6) from power source.

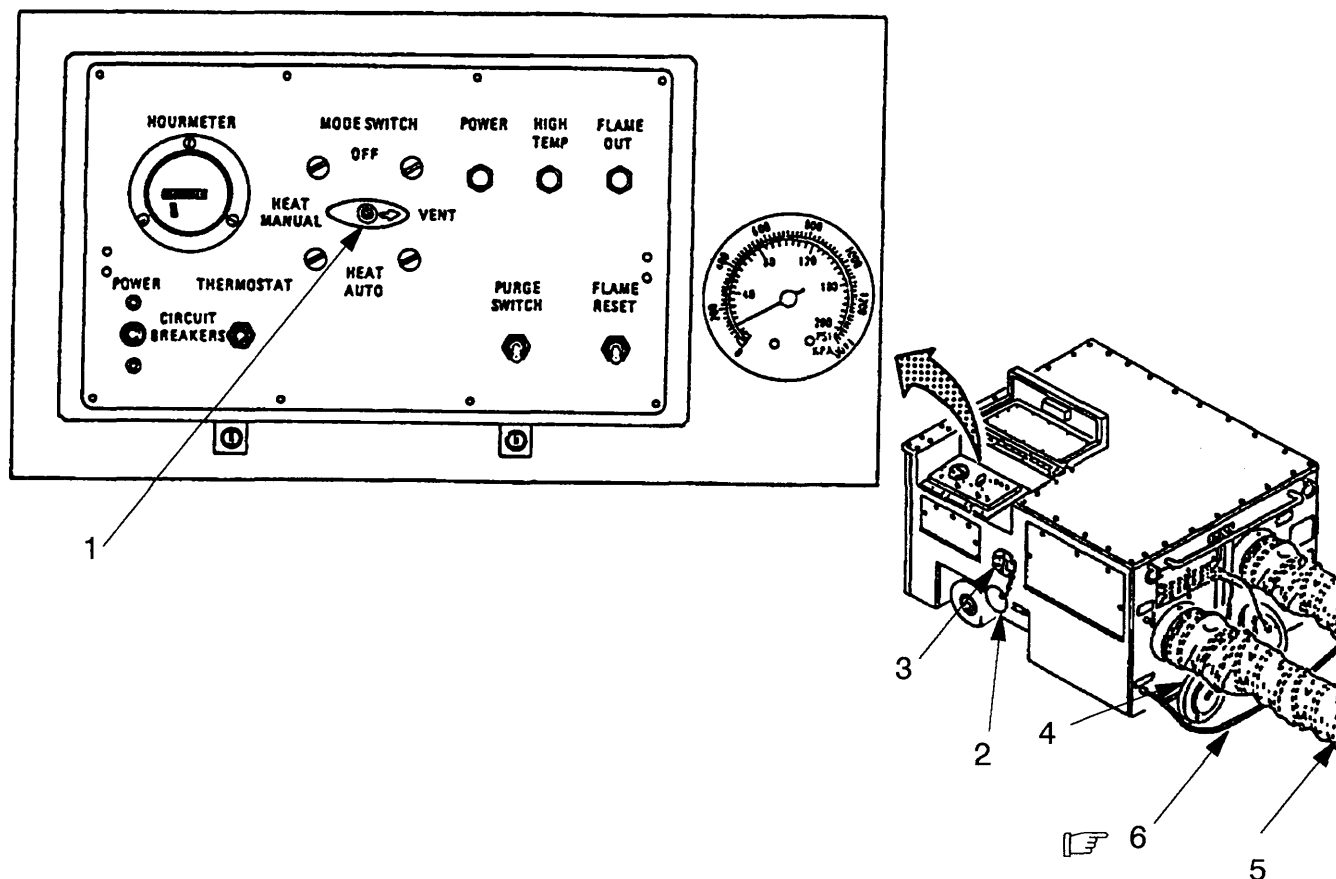
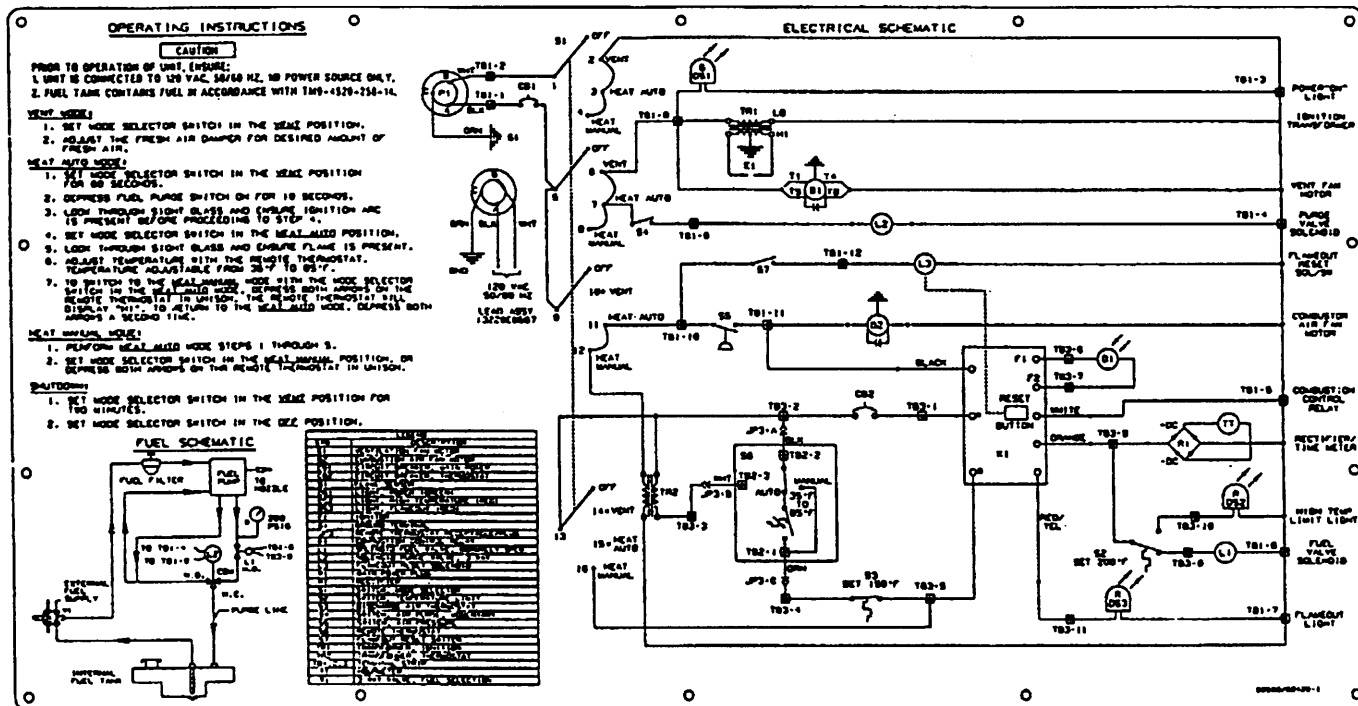


Figure 2-9. Shutdown

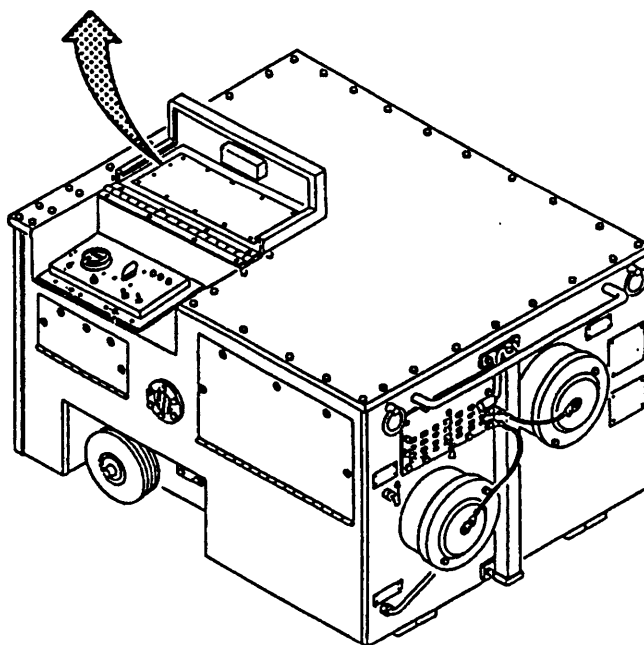


## 2-9. DECALS AND INSTRUCTION PLATES.

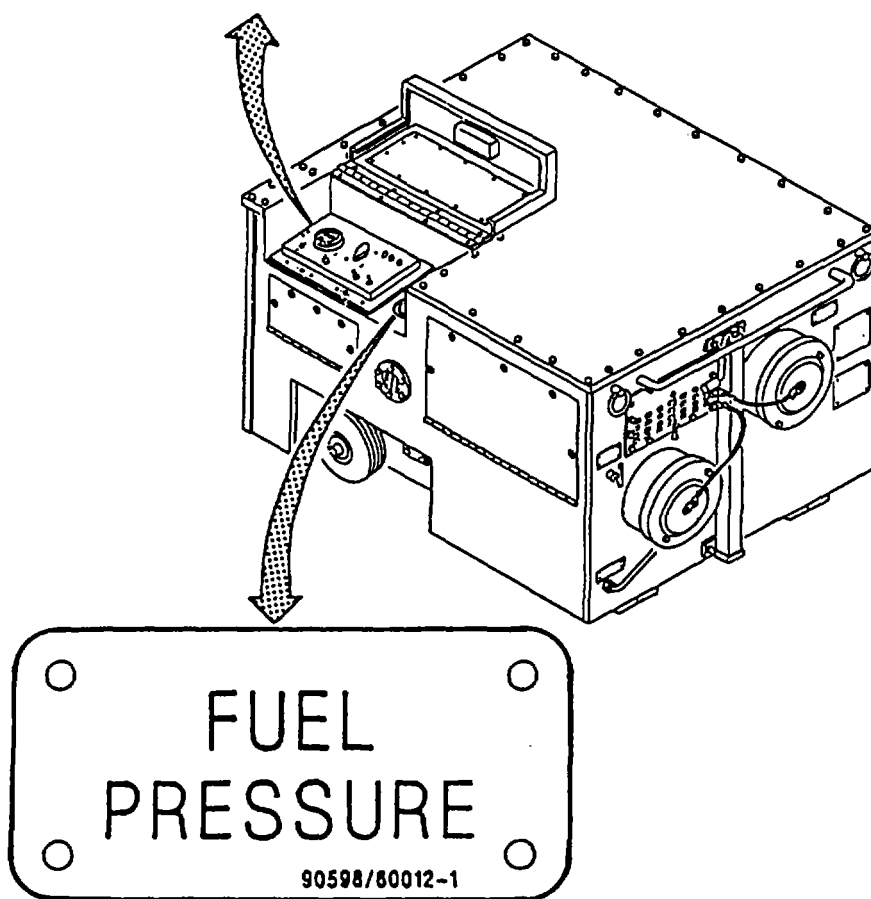
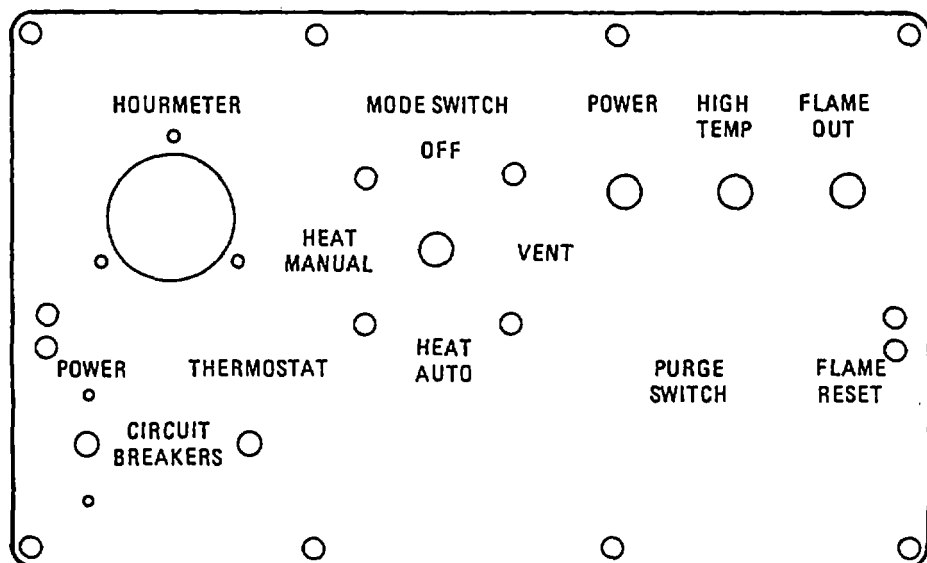
Decals and Instruction plates used on the ASH Unit are shown below.



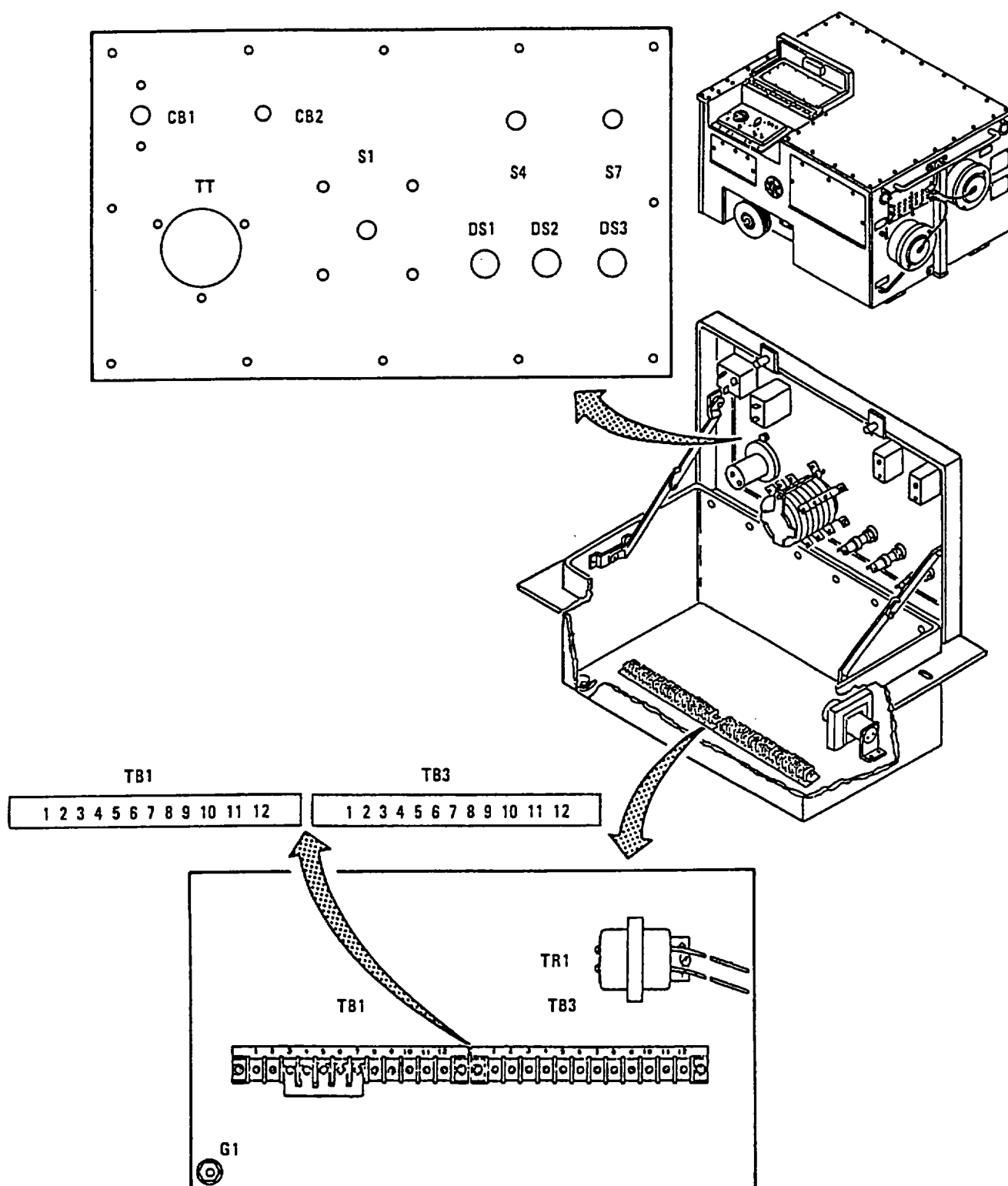
NOTE: See F0-2 for an enlarged  
clear view of instructions



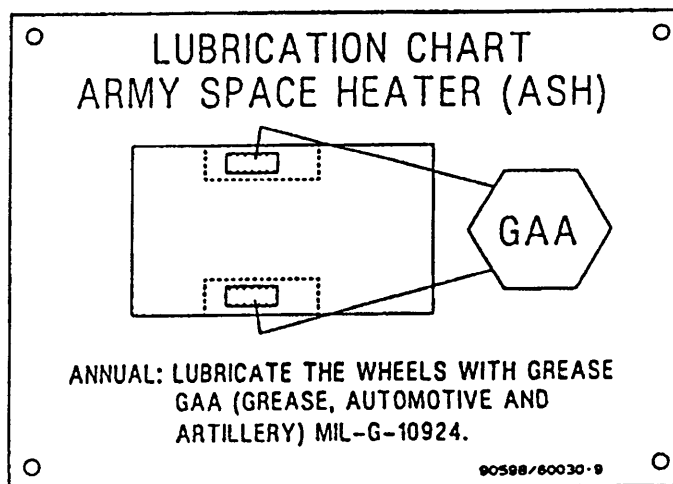
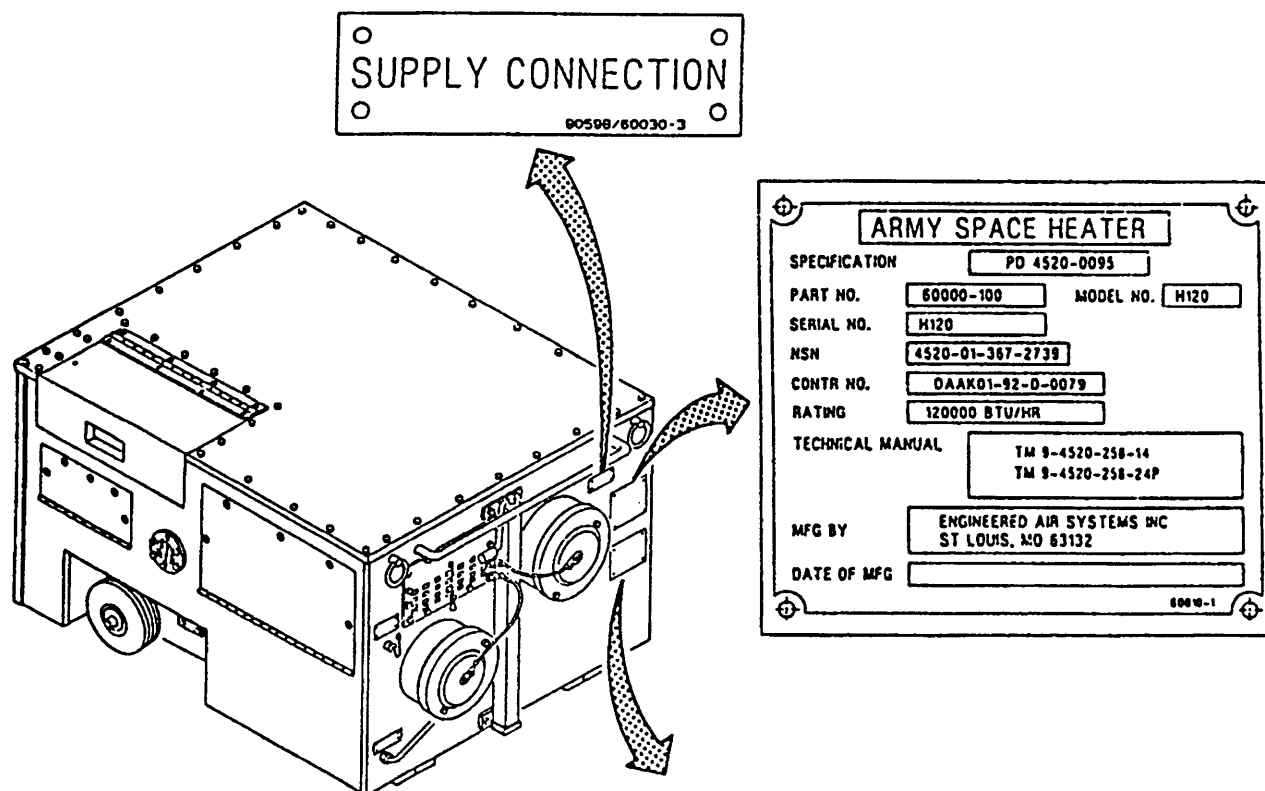
2-9. DECALS AND INSTRUCTION PLATES - continued.



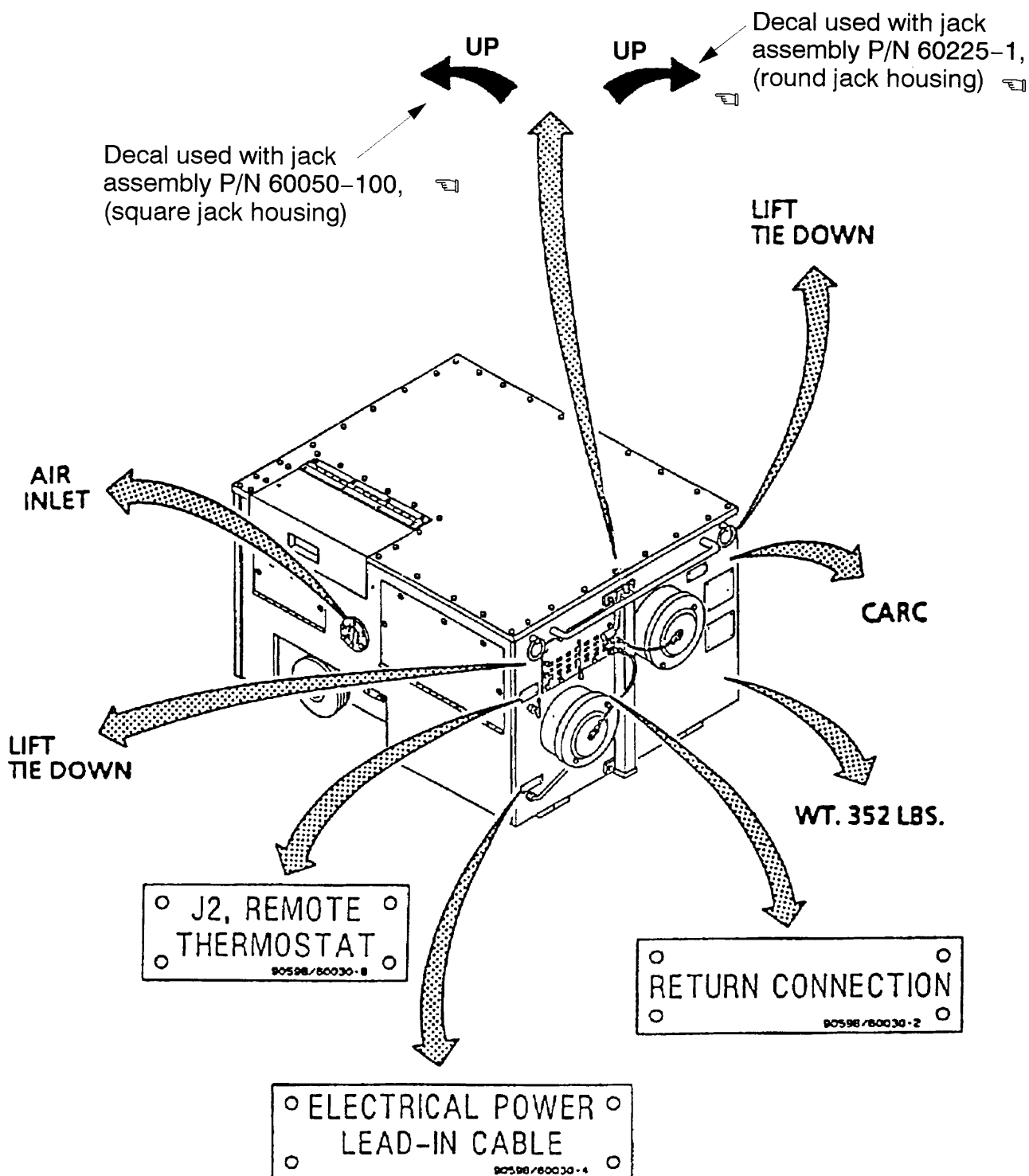
2-9. DECALS AND INSTRUCTION PLATES - continued.



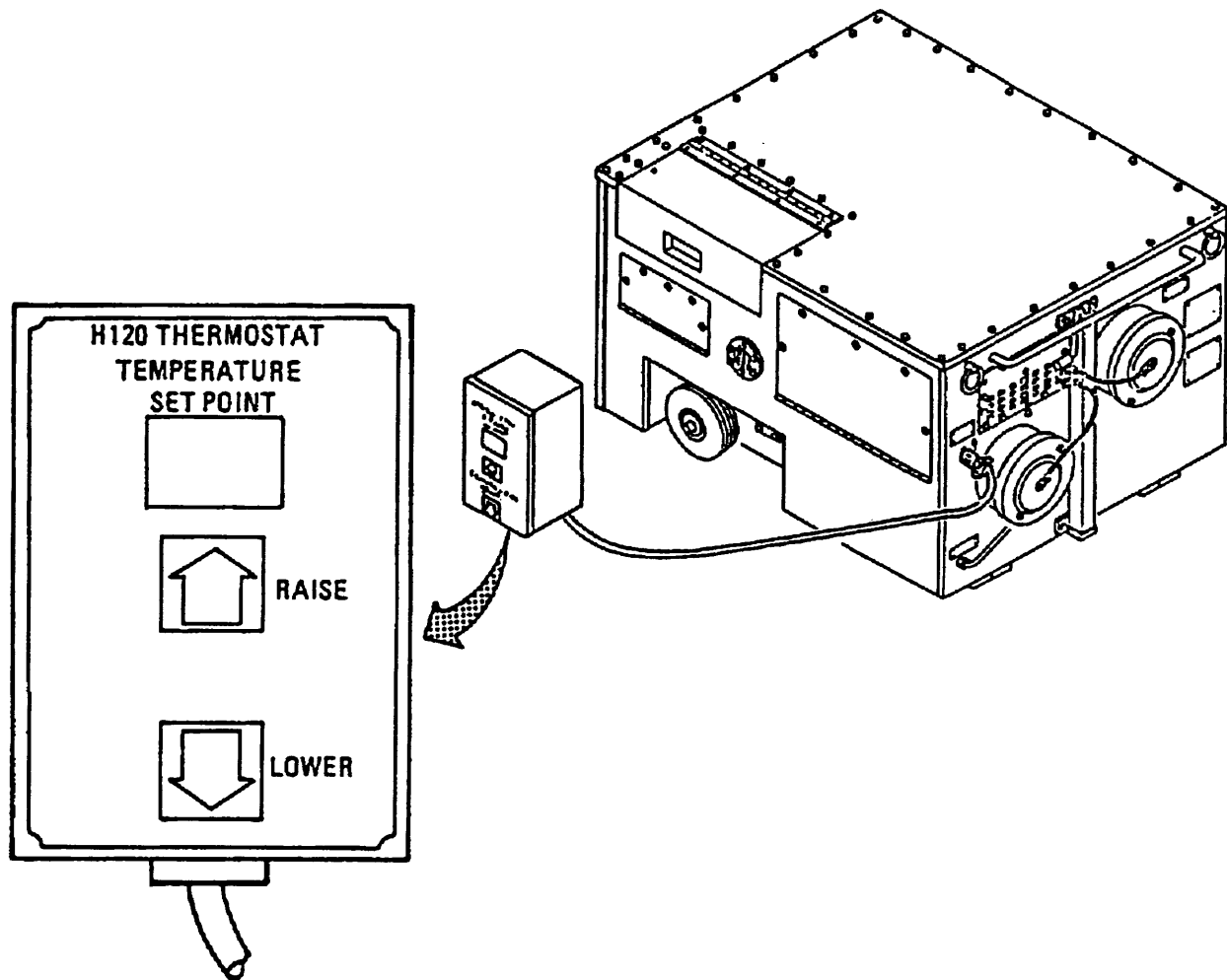
2-9. DECALS AND INSTRUCTION PLATES - continued.



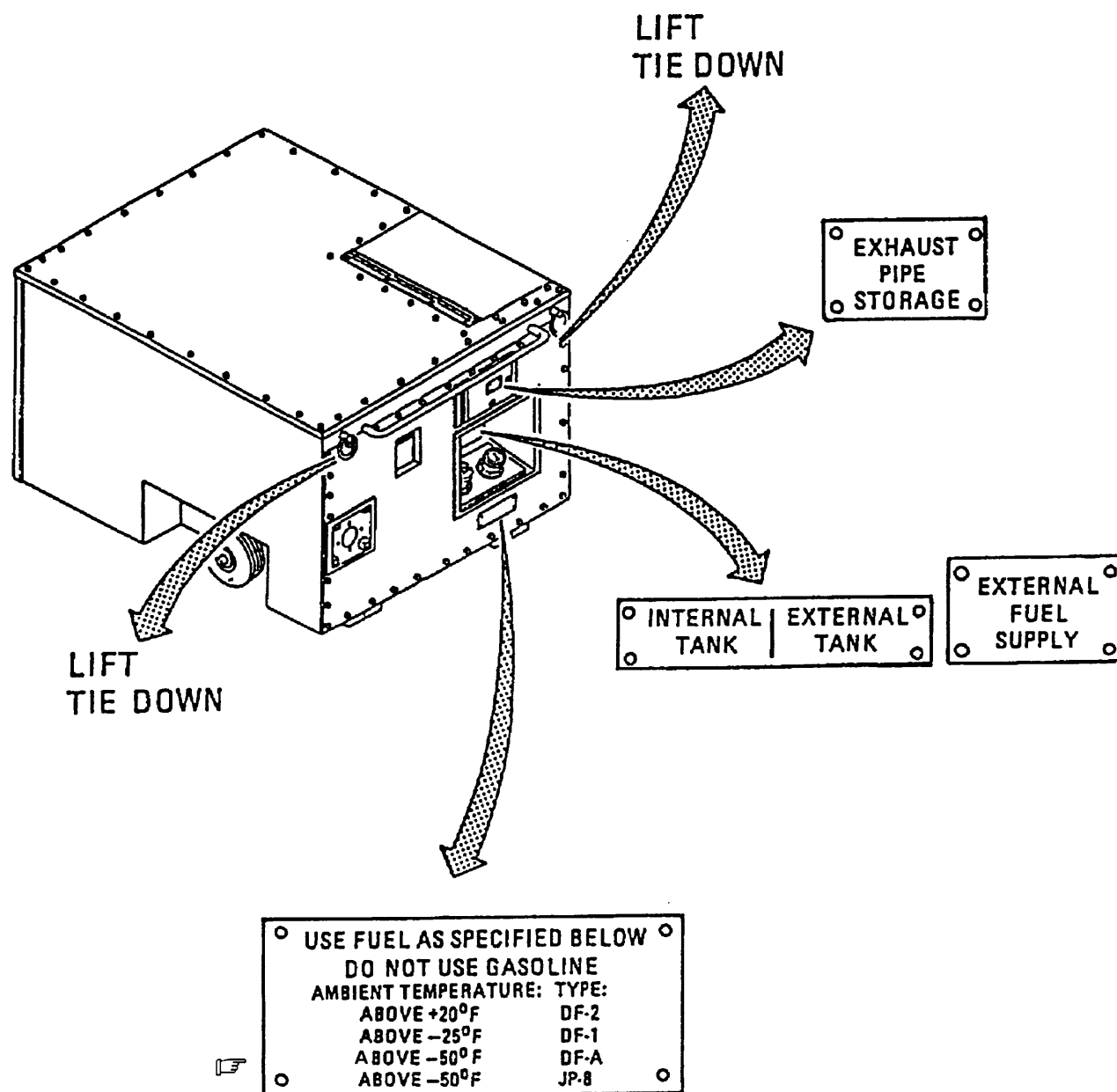
2-9. DECALS AND INSTRUCTION PLATES - continued.



2-9. DECALS AND INSTRUCTION PLATES - continued.



2-9. DECALS AND INSTRUCTION PLATES - continued.



## Section IV. OPERATION UNDER UNUSUAL CONDITIONS

---

### 2-10. UNUSUAL ENVIRONMENTAL / WEATHER.

- a. Operating the ASH Unit In Extreme Cold Conditions. Observe the following precautions when operating the ASH Unit in extreme cold conditions.

#### WARNING

**Do not touch cold metal parts with bare hands when operating under extreme cold conditions. Frostbite can cause permanent injury.**

- (1) Always wear arctic mittens when handling heater and other equipment.
  - (2) Be careful when handling the air duct assemblies to avoid cracking the ducts.
  - (3) Always keep protective covers on the ASH Unit when not in use.
  - (4) Perform operating procedure according to paragraph 2-8.
- b. Operating the ASH Unit in Strong Winds and Sandy or Dusty Conditions.
  - (1) Strong Winds.
    - (a) Should not affect the performance of the ASH Unit.
    - (b) Perform operating procedures according to paragraph 2-8.
  - (2) Sandy or Dusty Conditions.
    - (a) Remove any sand or dust from the air inlet openings before installing the ducts or operating the combustor motor.
    - (b) Keep the protective covers installed when not in use.
    - (c) Perform operating procedure according to paragraph 2-8.
- c. Operating the ASH Unit In Extreme Heat Conditions.
  - (1) This equipment should not be operated in the heating modes when the ambient temperature is above 100°F for more than 10 minutes.
  - (2) Perform operating procedure according to paragraph 2-8.



**2-11. EMERGENCY PROCEDURES.****WARNING**

**Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop refueling immediately if fuel spill occurs. Refer to FM 10-68, Petroleum Supply Point Equipment and Operations.**

**Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible remove clothes and wash skin with warm soapy water before getting dressed.**

- a. If spillage of fuel occurs:
  - (1) Unit operating in recirculating air setup, proceed as follows
    - (a) Close the damper if open.
    - (b) Turn selector switch to VENT and allow unit to cool down for 2 minutes.
    - (c) Turn selector switch to OFF.
    - (d) Notify your supervisor.
    - (e) Start clean up in accordance with FM 10-68.
  - (2) Unit operating in 100% fresh air setup, proceed as follows:
    - (a) Stop operation by setting the selection switch in the OFF position.
    - (b) Check shelter being serviced by the ASH Unit for any fuel odors. Evacuate area until the shelter is ventilated and free of any fuel odors.
    - (c) Notify your supervisor.
    - (d) Reference FM 10-68 for details on cleaning up fuel spills.
  - (3) On improved (hard) surfaces, call for a wash down truck to reduce the rate of vaporization.
  - (4) On unimproved (soft) surfaces, cover the areas with dry soil to reduce its rate of vaporization.

## 2-11. EMERGENCY PROCEDURES - continued.

- (5) Notify your supervisor.

### WARNING

**Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible remove clothes and wash skin with warm soapy water before getting dressed.**

- (6) Avoid getting fuel on the body or clothing. If clothing becomes saturated with fuel, remove the clothing and wash body with hot soapy water.

## 2-12. NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES.

### NOTE

**Detailed decontamination procedures can be found in FM 3-3, FM 3-4, and FM 3-5.**

- a. General. The following emergency procedures can be followed until field NBC Decontamination Facilities are available. Assigned operators will assist the supporting NBC unit.
- b. Emergency Procedure. If NBC attack is known or suspected, mask at once and perform the following:
  - (1) If unit is operating with either the dampener open or return air duct removed:
    - (a) Stop operation.
    - (b) Notify your supervisor and personnel in the shelter connected to the ASH Unit.
    - (c) Do not disconnect the unit.
    - (d) Close or cover all openings.
    - (e) Have decontamination done on the equipment.
    - (f) Operate unit in accordance with para 2-8 with both ducts attached and damper closed.
  - (2) If unit is operating with dampener closed and both air ducts attached:
    - (a) Unit operation may continue.
    - (b) Do not open any door or panels.
    - (c) Have decontamination done on unit.

## CHAPTER 3

### OPERATOR MAINTENANCE INSTRUCTIONS

		PAGE
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#### Section I. LUBRICATION INSTRUCTIONS

There are no lubrication requirements at the operator maintenance level.

#### Section II. OPERATOR TROUBLESHOOTING

##### 3-1. INTRODUCTION.

- a. This section contains troubleshooting information for locating and correcting most of the operating trouble which may develop in the ASH Unit and its components. You should perform the tests/inspections and corrective actions in the order listed.
  
- b. Malfunction Index, lists the common malfunctions which you may find during operation or maintenance of the ASH Unit and its components. Table 3-1, Troubleshooting Procedures lists the most common malfunctions and each malfunction is followed by a list of tests or inspections which will help you determine the probable causes and corrective actions.

**3-2. MALFUNCTION INDEX.**

Refer to Table 3-1. Any malfunction requiring repair beyond the scope of the operator should be referred to Unit Maintenance.

**MALFUNCTION INDEX**

<b>MALFUNCTION</b>	<b>PAGE</b>
1. Unit Will Not Start .....	3-3
2. Combustor Fan Does Not Operate.....	3-4
3. Fuel Pressure Stays at 25 PSI or Less in <b>HEAT AUTO</b> or <b>HEAT MANUAL</b> modes .....	3-5
4. Unit Flames Out Repeatedly (More than 3 times in a row) .....	3-6
5. No Combustion in <b>AUTO HEAT</b> Mode .....	3-7
6. Excessive Black Smoke in Exhaust .....	3-10
7. Fan Motor Slows Down or Indicator Lights Dim .....	3-11

**3-3. TROUBLESHOOTING INDEX.**

Troubleshooting procedures for malfunctions listed in the Malfunction Index are given in Table 3-1. Notify Unit Maintenance for other malfunctions observed.

Table 3-1. Operator Troubleshooting

## MALFUNCTION 1. UNIT WILL NOT START.

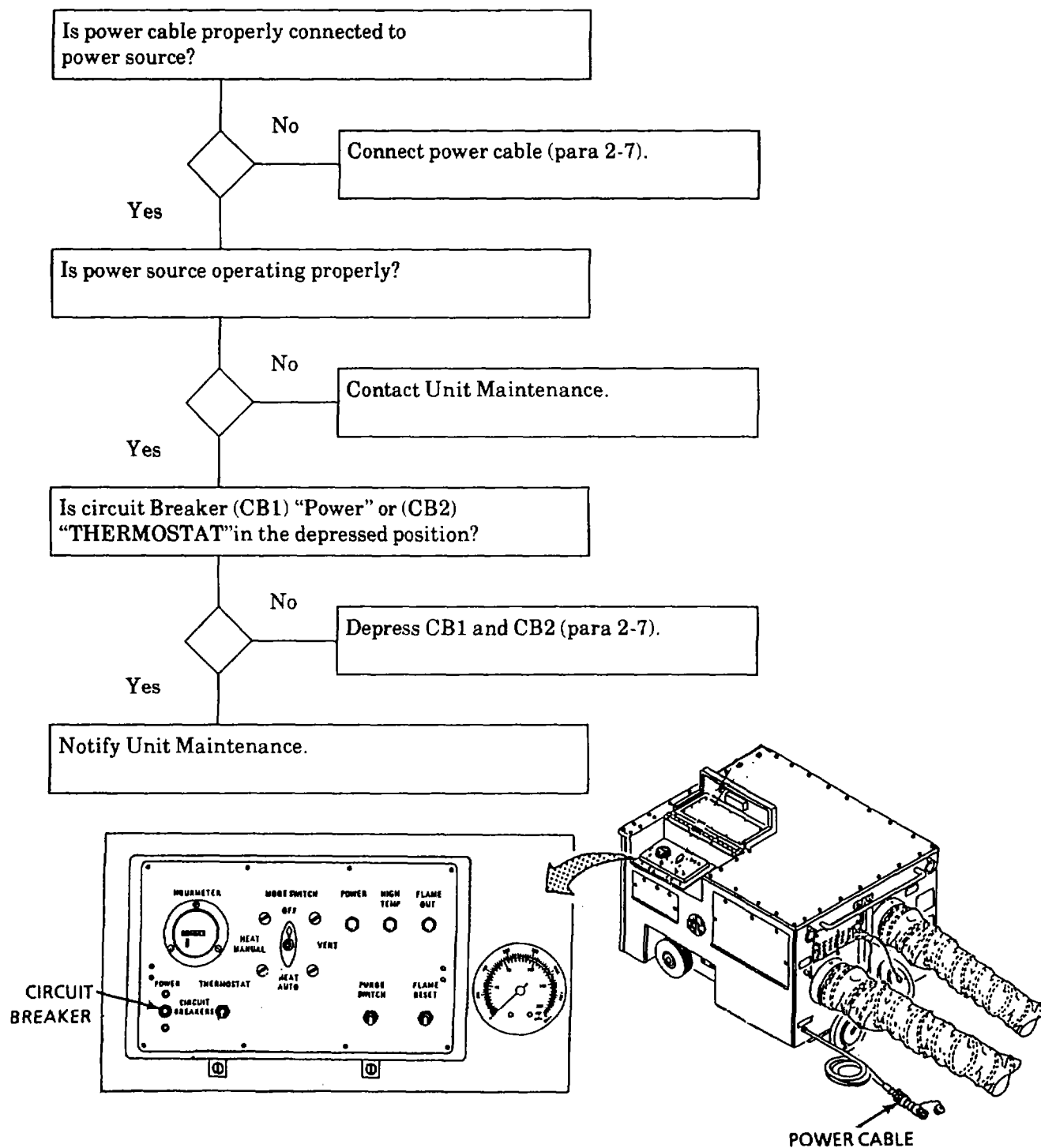


Table 3-1. Operator Troubleshooting - continued.

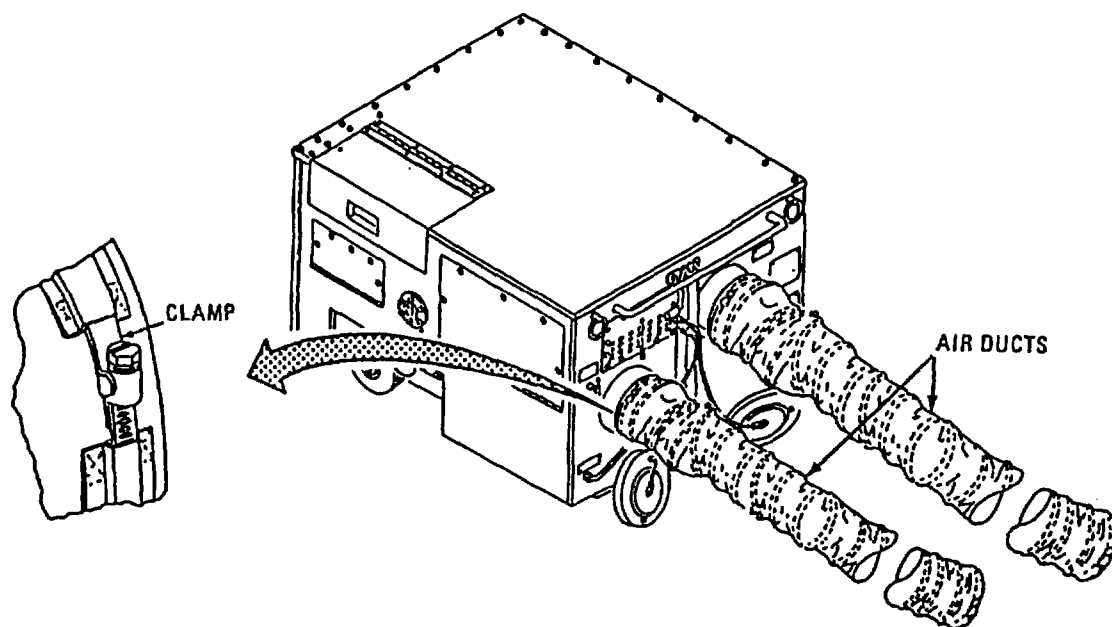
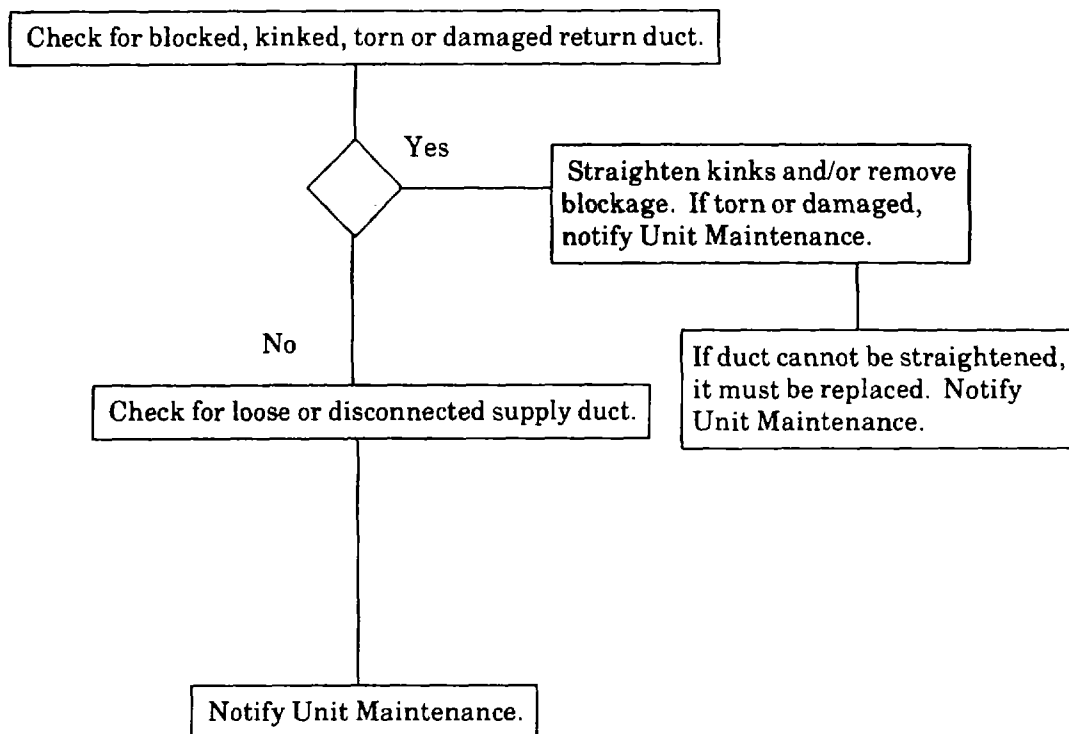
**MALFUNCTION 2. COMBUSTOR FAN DOES NOT OPERATE.**

Table 3-1. Operator Troubleshooting - continued.

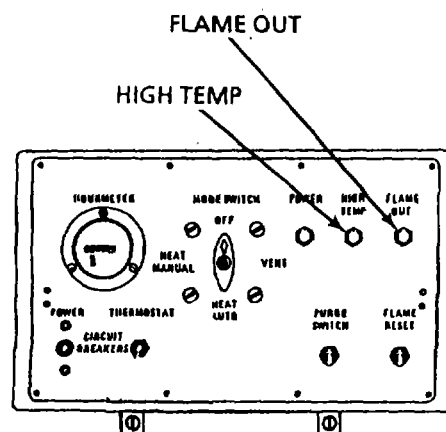
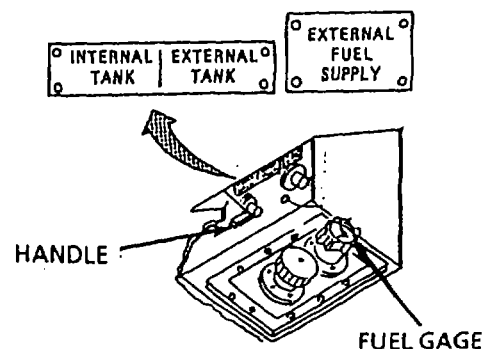
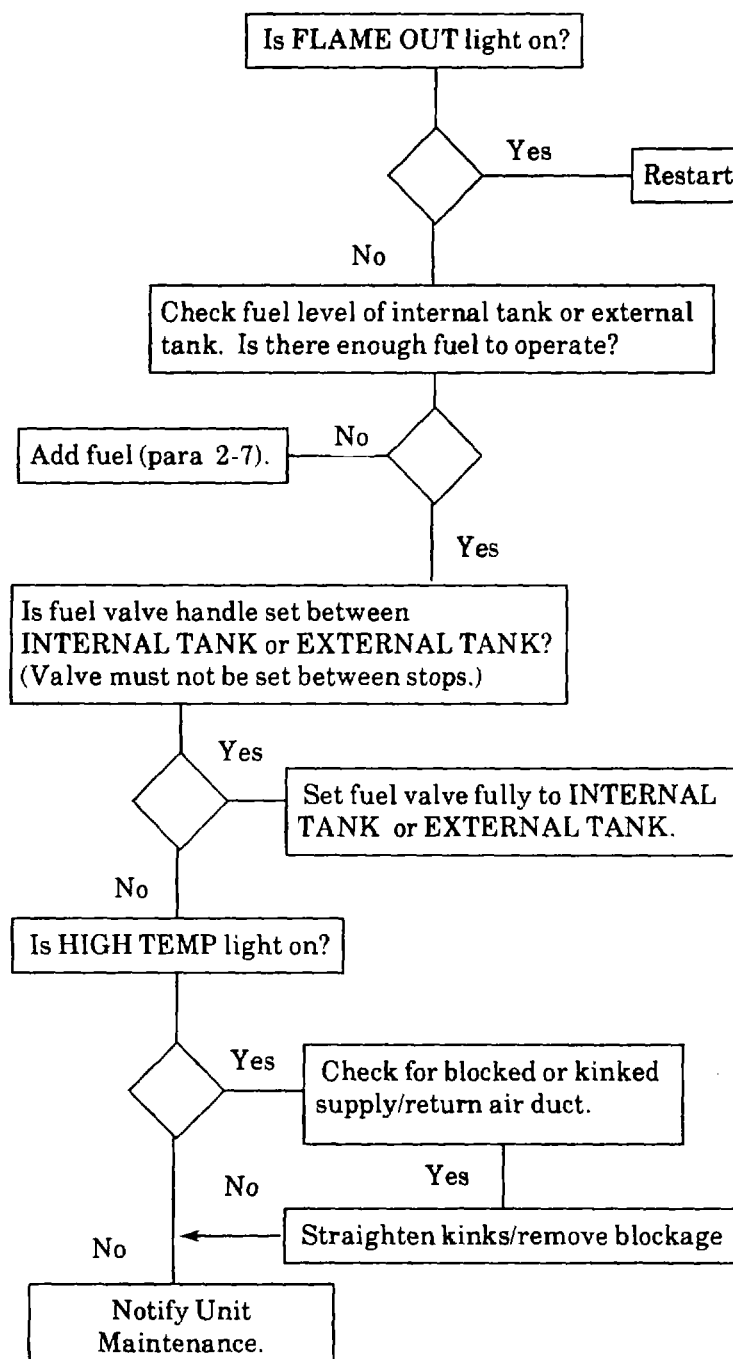
**MALFUNCTION 3. FUEL PRESSURE STAYS AT 25 PSI OR LESS IN HEAT AUTO OR HEAT MANUAL MODES.**

Table 3-1. Operator Troubleshooting - continued.

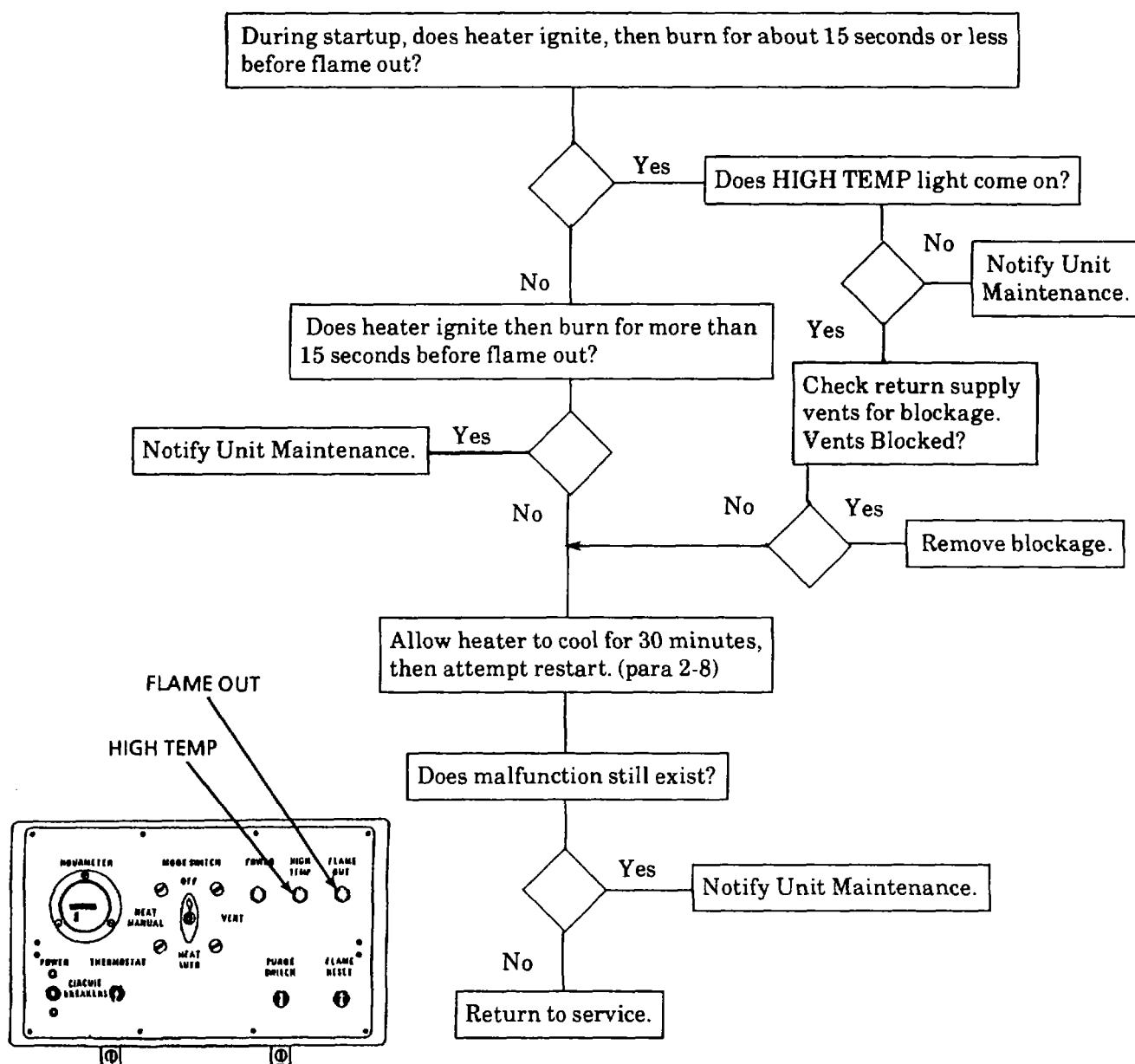
**MALFUNCTION 4. UNIT FLAMES OUT REPEATEDLY (MORE THAN 3 TIMES IN A ROW)**



Table 3-1. Operator Troubleshooting - continued.

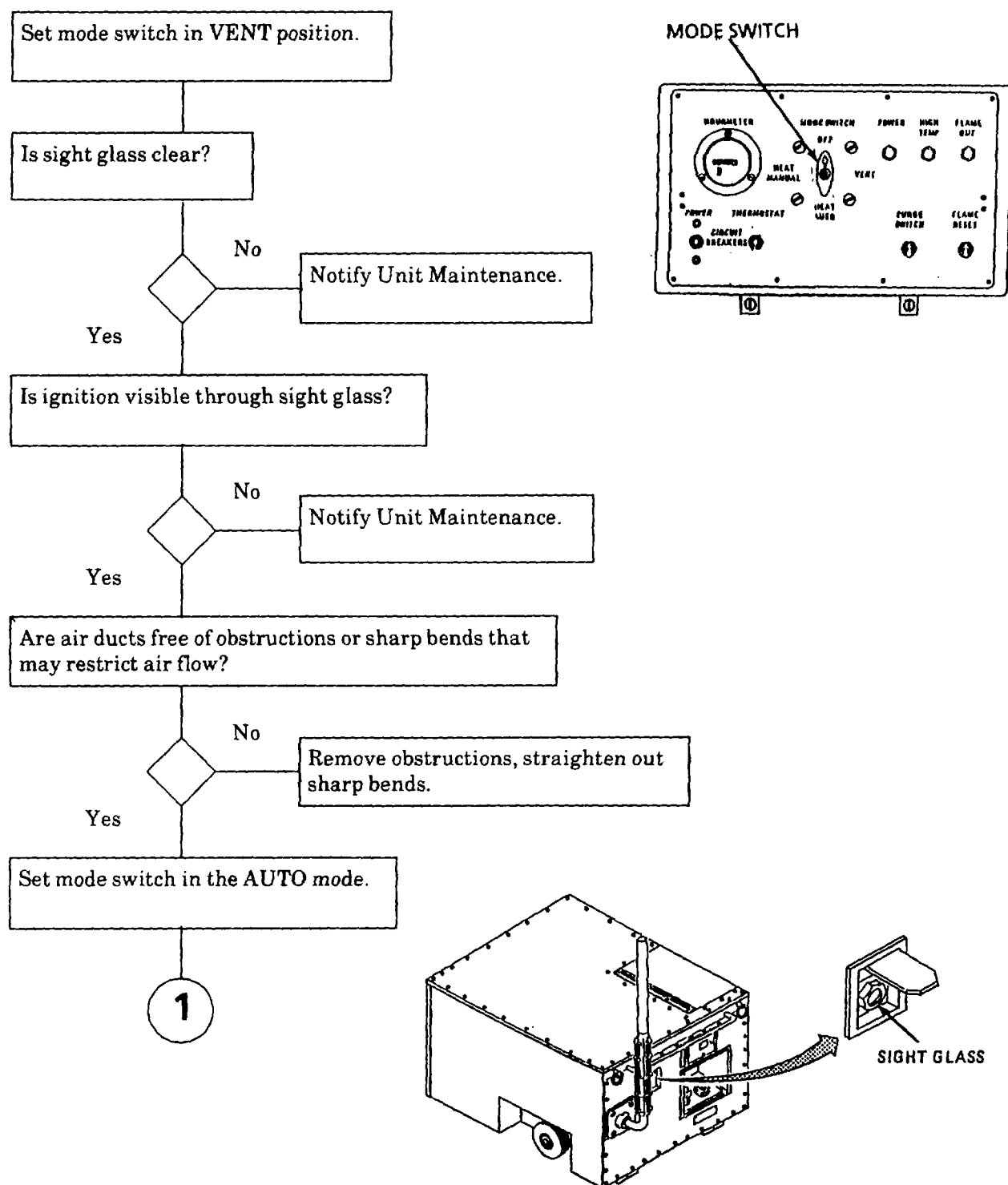
**MALFUNCTION 5. NO COMBUSTION IN AUTO HEAT MODE.**

Table 3-1. Operator Troubleshooting - continued.

## MALFUNCTION 5. NO COMBUSTION IN AUTO HEAT MODE - continued.

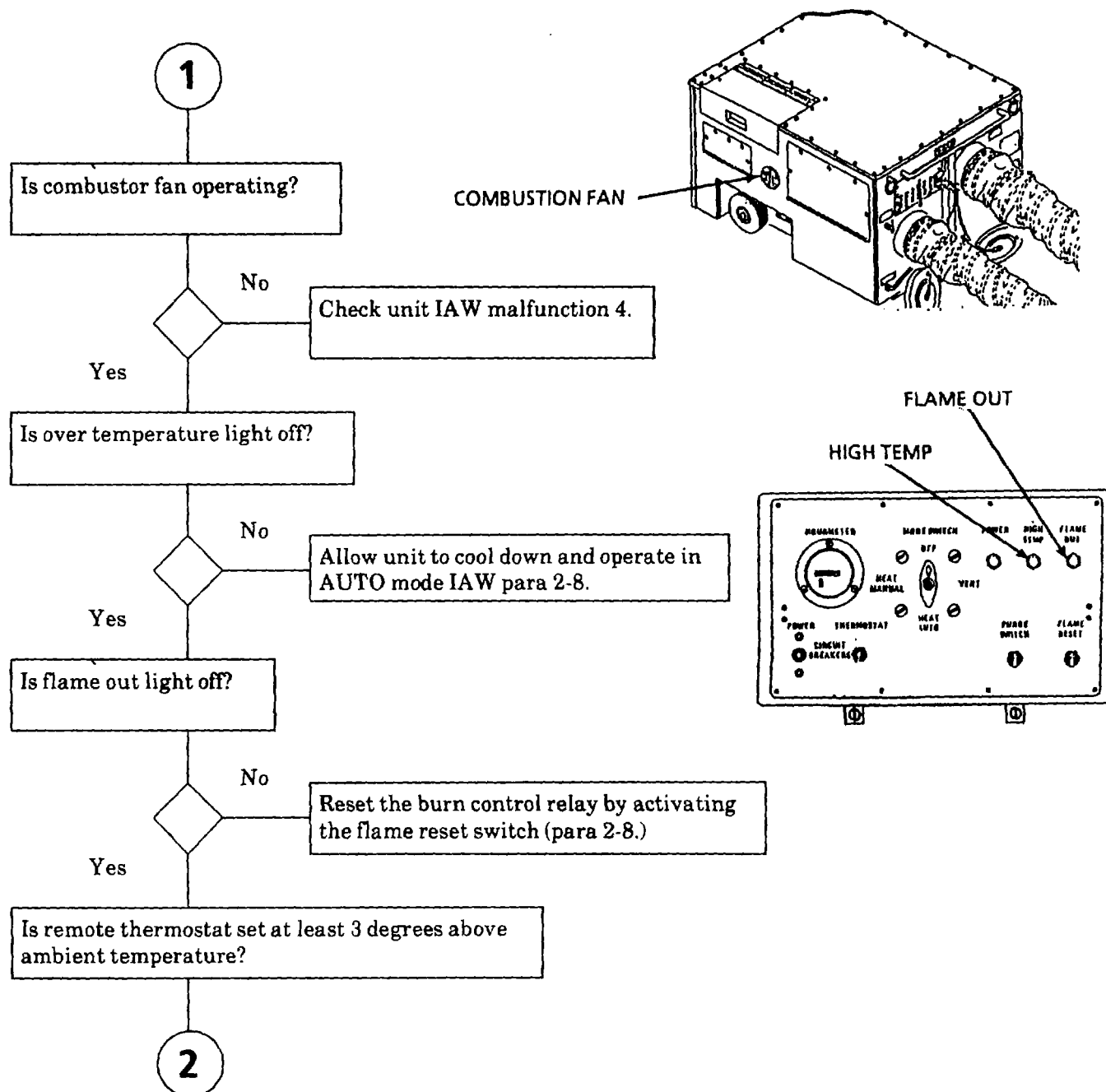


Table 3-1. Operator Troubleshooting - continued.

MALFUNCTION 5. NO COMBUSTION IN AUTO HEAT MODE - continued.

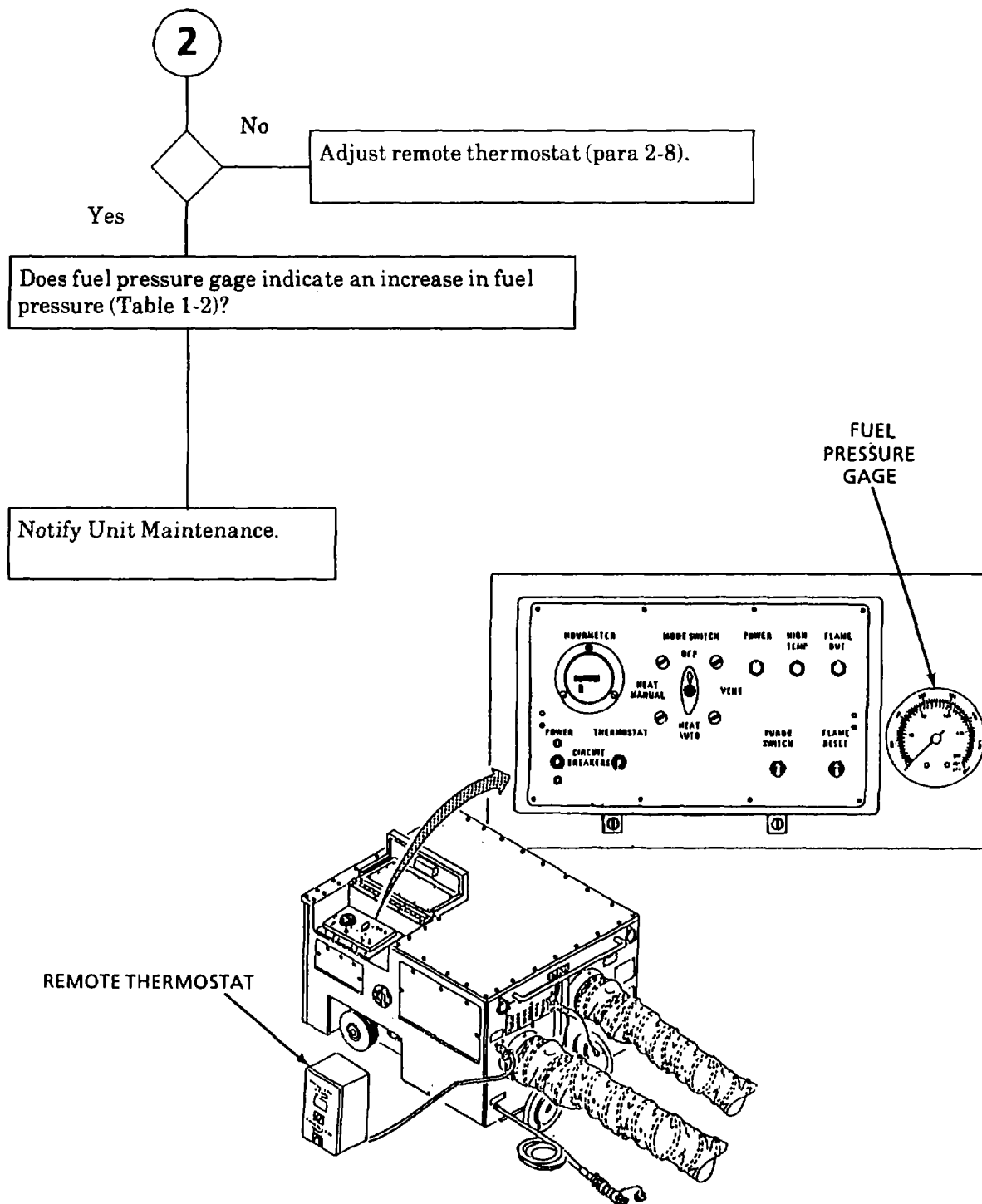


Table 3-1. Operator Troubleshooting - continued.

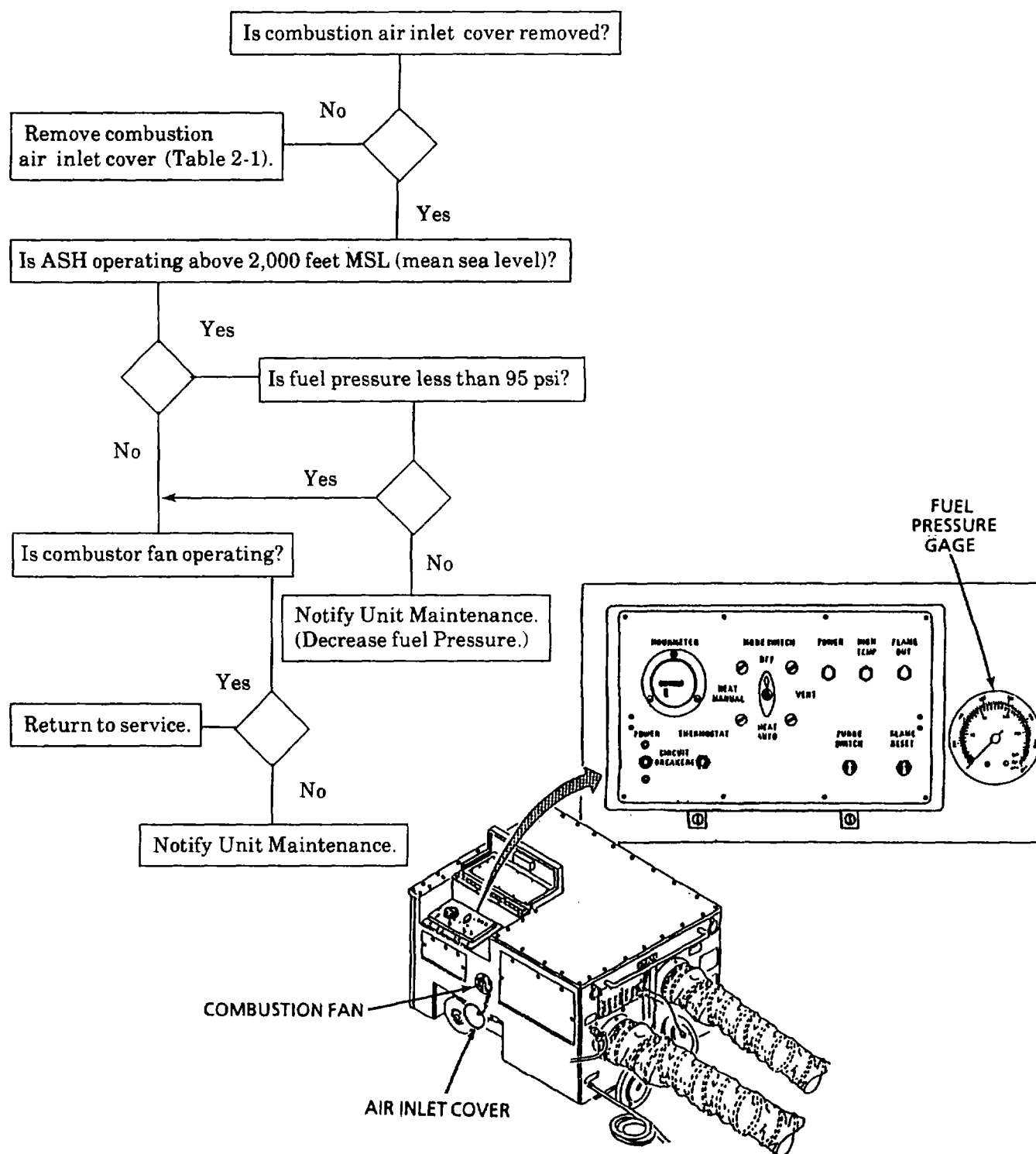
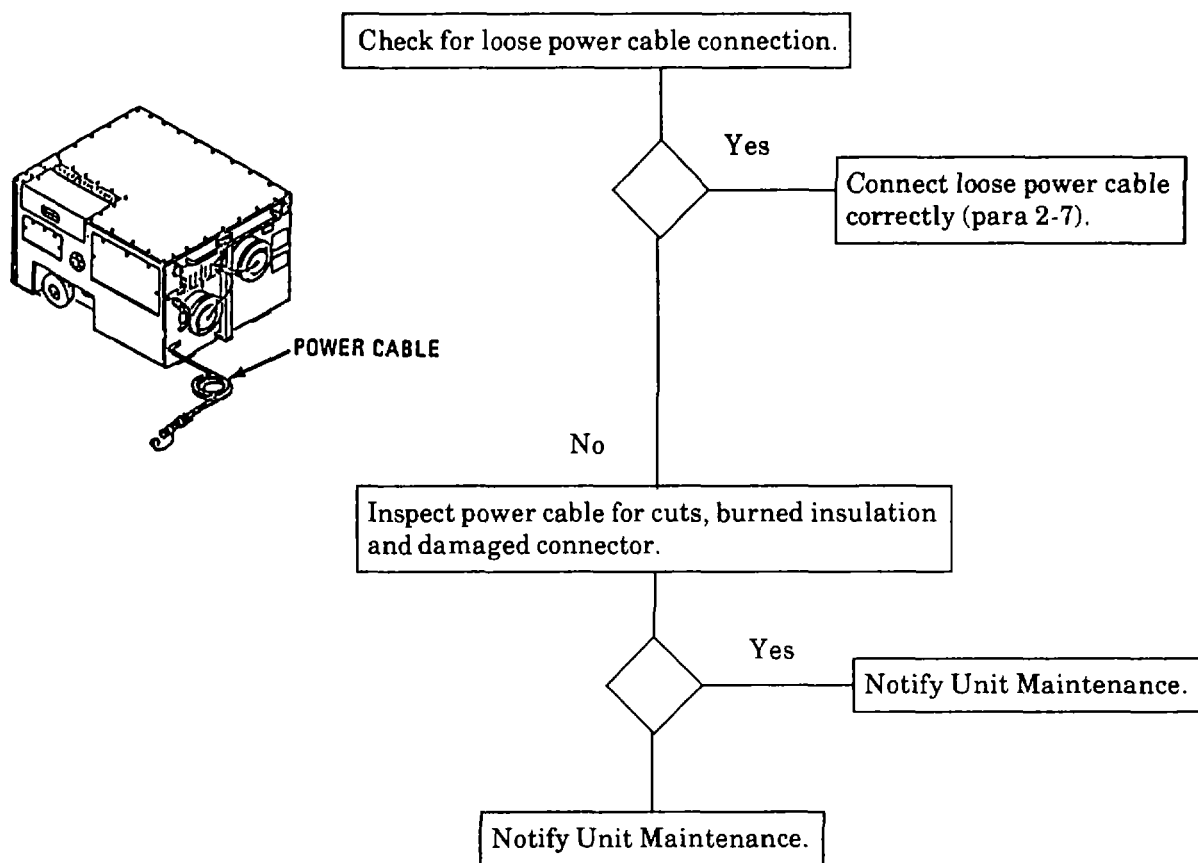
**MALFUNCTION 6. EXCESSIVE BLACK SMOKE IN EXHAUST.**

Table 3-1. Operator Troubleshooting - continued.

**MALFUNCTION 7. FAN MOTOR SLOWS DOWN OR INDICATOR LIGHTS DIM.**

### **Section III. OPERATOR MAINTENANCE PROCEDURES**

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Operator maintenance consists of inspection of components (see Table 2-1).

## CHAPTER 4

## UNIT MAINTENANCE INSTRUCTIONS

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**Section I. REPAIR PARTS AND SPECIAL TOOLS LIST****4-1. COMMON TOOLS AND EQUIPMENT.**

For authorized common tools and equipment refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**4-2. SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT.**

Refer to the Maintenance Allocation Chart contained in Appendix B for maintenance tasks authorized at unit level and for the TMDE and support equipment required to perform these tasks.

**4-3. REPAIR PARTS.**

Repair parts are listed and illustrated in the ASH unit Repair Parts and Special Tools List (RPSTL), TM 9-4520-258-24p covering unit maintenance for this equipment.

**Section II. LUBRICATION INSTRUCTIONS****4-4. LUBRICATION INSTRUCTIONS**

These lubrication instructions are for unit (o) maintenance. Lubrication intervals (on-condition or hard time) are based on normal operation. Lube more frequently during constant use, and less during inactive periods. The task-hour specified is the time you need to do all the services prescribed for a particular interval. Use correct grade of lubricant for seasonal temperature expected.



4-4. LUBRICATION INSTRUCTIONS- continued.

The lubrication interval and symbol is listed below:

S = Semiannually

Before you start your lubrications:

ALWAYS

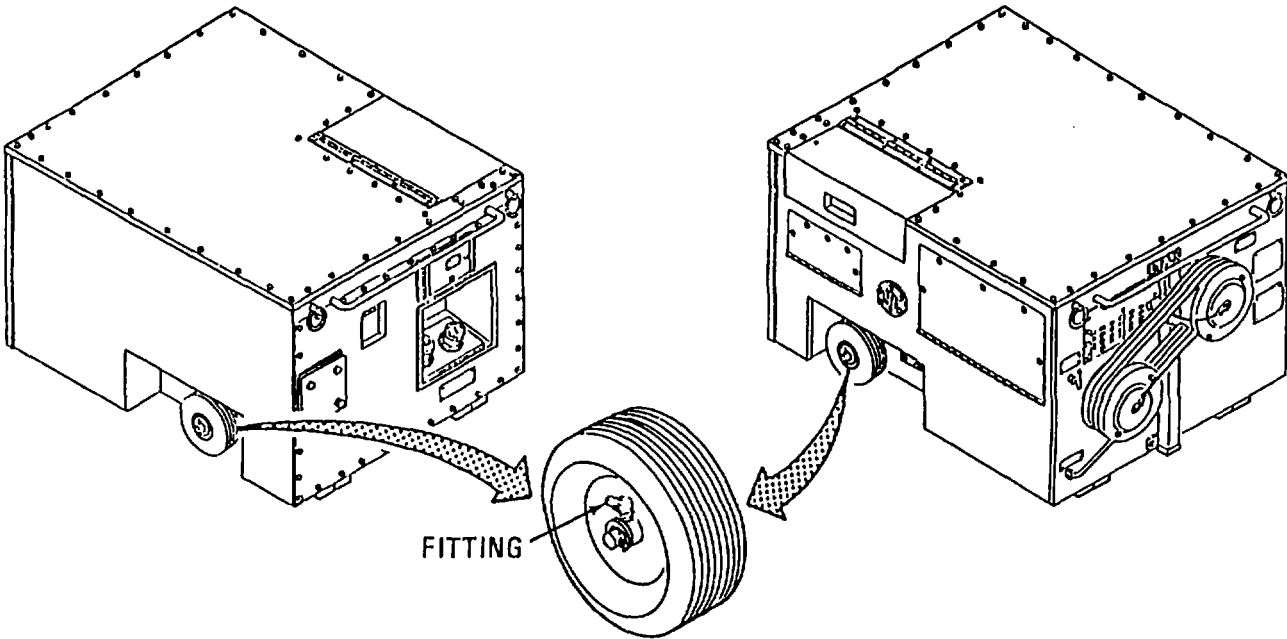
- a. Clean grease fitting before lubrication.
- b. Use lubrication Appendix as your guide.
- c. After lubrication, wipe off excessive grease from fittings to prevent build-up of dirt, grit, and contaminants.

NEVER

- a. Use wrong type/grade grease.
- b. Use too much lubricant.

Lubricant for Wheels

Nomenclature/ Temperature Range	Lubricant Mil Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Grease Fittings -65 to 356°F (-54 to 180°C) (grease fitting on wheel). See Note	GAA (G-403) MIL-G-10924	As Required	S	.5



NOTE: Apply grease to grease fittings.

### Section III. SERVICE UPON RECEIPT

---

#### 4-5. SITE REQUIREMENT.

- a. Location
  - (1) Locate the ASH unit approximately 7 feet from the shelter, about midway between the shelter air supply and return connections.
  - (2) The heater duct openings must be facing the shelter connections.
- b. The power source must be located within 25 feet of the ASH unit.
- c. The external fuel source must be located within 25 feet of the ASH unit.
- d. Terrain

#### CAUTION

**Do not set up the ASH unit on extremely unlevel (greater than 10 degrees from true horizontal position) terrain. Doing so may result in improper operation or damage to equipment.**

- (1) The wheel assemblies should be in the stowed position. Raise the front of the unit with the attached jack and remove the wheel pin and move the wheels up toward the rear of the unit. Lower the front end.
- (2) The terrain should be as level as possible. Level the ASH by adjusting the front of the unit with the attached jack so it does not exceed 10 degree incline.
- (3) The area in front of the ASH unit must be clear of objects that would interfere with proper positioning of the air ducts.
- (4) The area around and above (6 ft. from ground level) the exhaust pipe must be clear of obstacles.
- (5) The area of the right side of unit must allow access by the operator to operate the controls on the control panel and allow a clear path for air flow to the combustion fan air inlet.

#### WARNING

**Fuel is toxic and flammable, it can cause injury to personnel and damage to equipment. Improper positioning of the external fuel source can cause the internal fuel tank to overflow. Properly position external fuel source.**

- (6) The terrain for the external fuel source should be as level as possible. The external fuel source must be placed not lower than 12 inches below base of heater and not higher than 10 feet above the heater.

#### 4-6. SERVICE UPON RECEIPT OF MATERIAL.

- a. Unpacking Equipment, equipment may be crated in a wooden box or wrapped in stretch plastic, depending on packaging used, proceed as follows: (Refer to Figure 4-2)

*Wooden Crate:*

#### NOTE

**Two personnel are required to remove wooden cover.**

- (1) Remove two duct boxes (1) from top of wooden crate cover (2).
- (2) Remove eighteen lag bolts (3) and remove cover (2).

*Plastic Wrap:*

- (3) Remove plastic wrap (4) and two duct boxes (1) from heater unit (5).

*Wooden Crate and Plastic Wrap:*

#### WARNING

**Steel banding, cut under tension, can snap free and cause injury. Leather gloves and face shield are required.**

- (2) Cut metal bands (6) from heater unit (5).

#### NOTE

**Use forklift or four personnel to lift unit.**

- (3) Remove heater (5) from skid (7).
- (4) Carefully open two duct boxes (1) and remove ducts (8).
- (5) Container and skid may be saved for reuse.

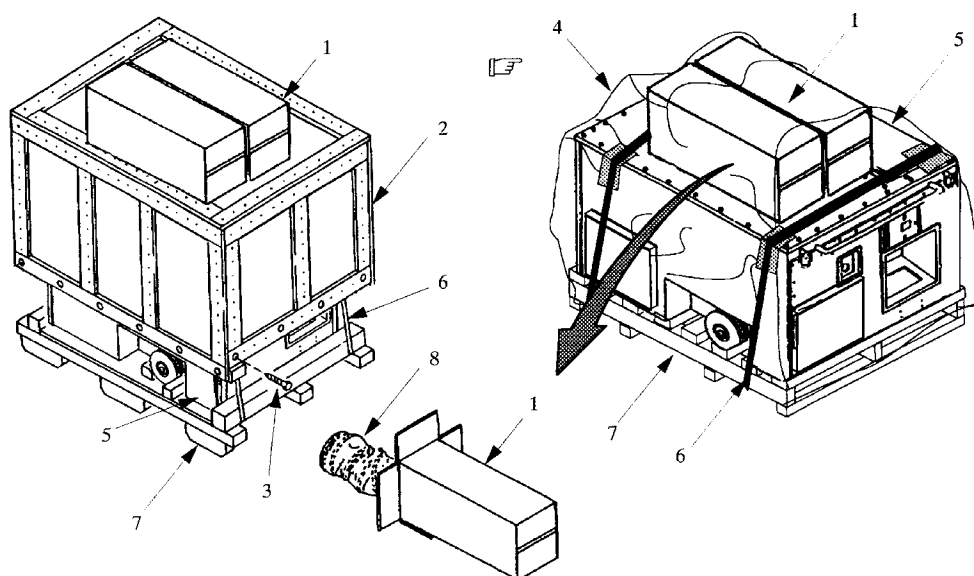


Figure 4-2. Heater Unit Packaging

**4-6. SERVICE UPON RECEIPT OF MATERIAL- continued.****b. Checking unpacked equipment.**

- (1) Inspect the equipment for damage incurred during shipment. If the shipment has been damaged, report the damage on SF 364, Report of Discrepancy.
- (2) Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions in DA Pam 738-750 or DA Pam 738-751 as applicable.

**4-7. INSTALLATION INSTRUCTIONS.****a. Assembly of Equipment (Refer to Figure 4-3)**

- (1) Open the rightside front door (1) and right side rear door (2).
- (2) Loosen two thumb screws (3) and remove the exhaust elbow (4) and external fuel hose (5). Close the right side front door (1).
- (3) Remove the remote thermostat assembly (6), Close the right side rear door (2).
- (4) Remove the dust cap (7) from remote thermostat assembly (6).
- (5) Remove the remote thermostat connection cap (8) and connect remote thermostat assembly (6) to connection (9).
- (6) Remove combustion air inlet cover (10).

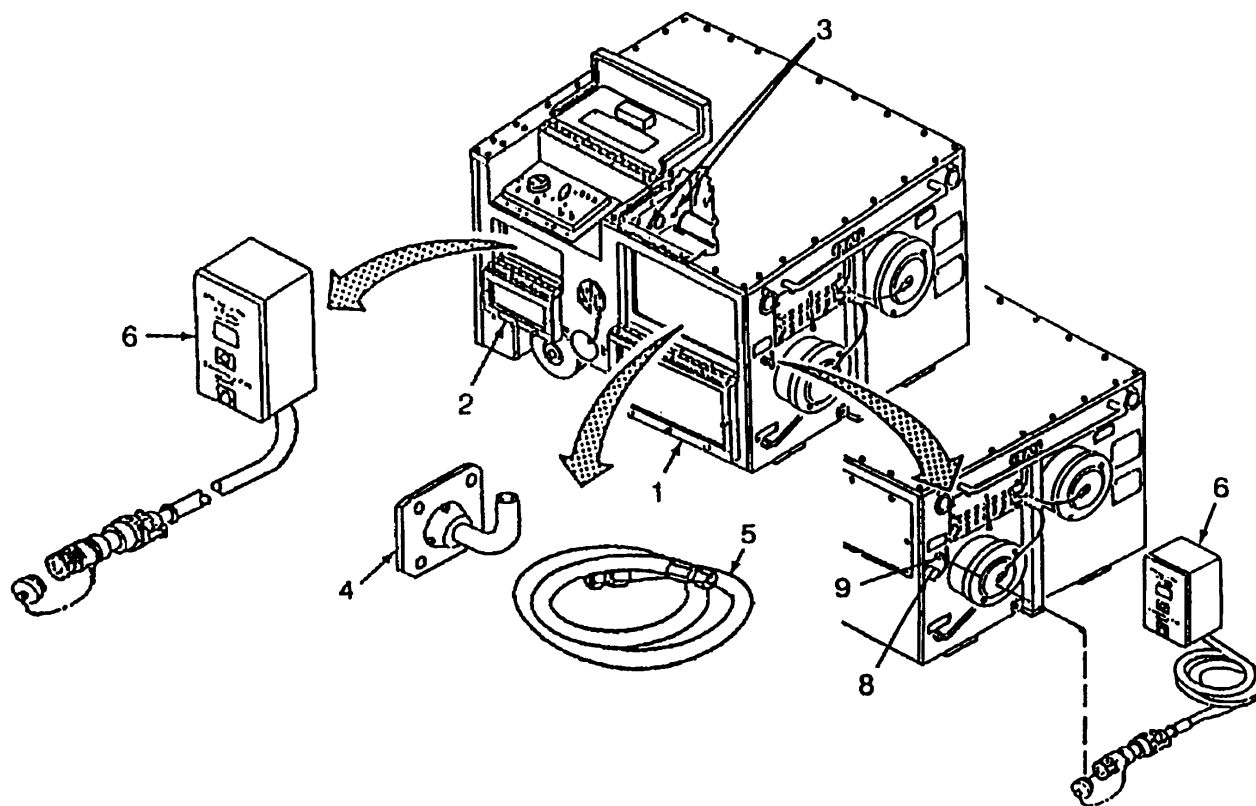


Figure 4-3. Assembly of Equipment (Sheet 1 of 2)

**4-7. INSTALLATION INSTRUCTIONS - continued.**

- a. Assembly of Equipment - continued. (Refer to Figure 4-3)
- (7) Open the exhaust pipe storage door (11) and remove the exhaust pipe (12). Close the exhaust pipe storage door (11).
  - (8) Remove four screws (13) and exhaust cover plate (14).
  - (9) Position the exhaust elbow (15) over the exhaust port (16).
  - (10) Install exhaust cover plate (14) and four screws (13).
  - (11) Install the exhaust pipe (12) on the exhaust elbow (15).

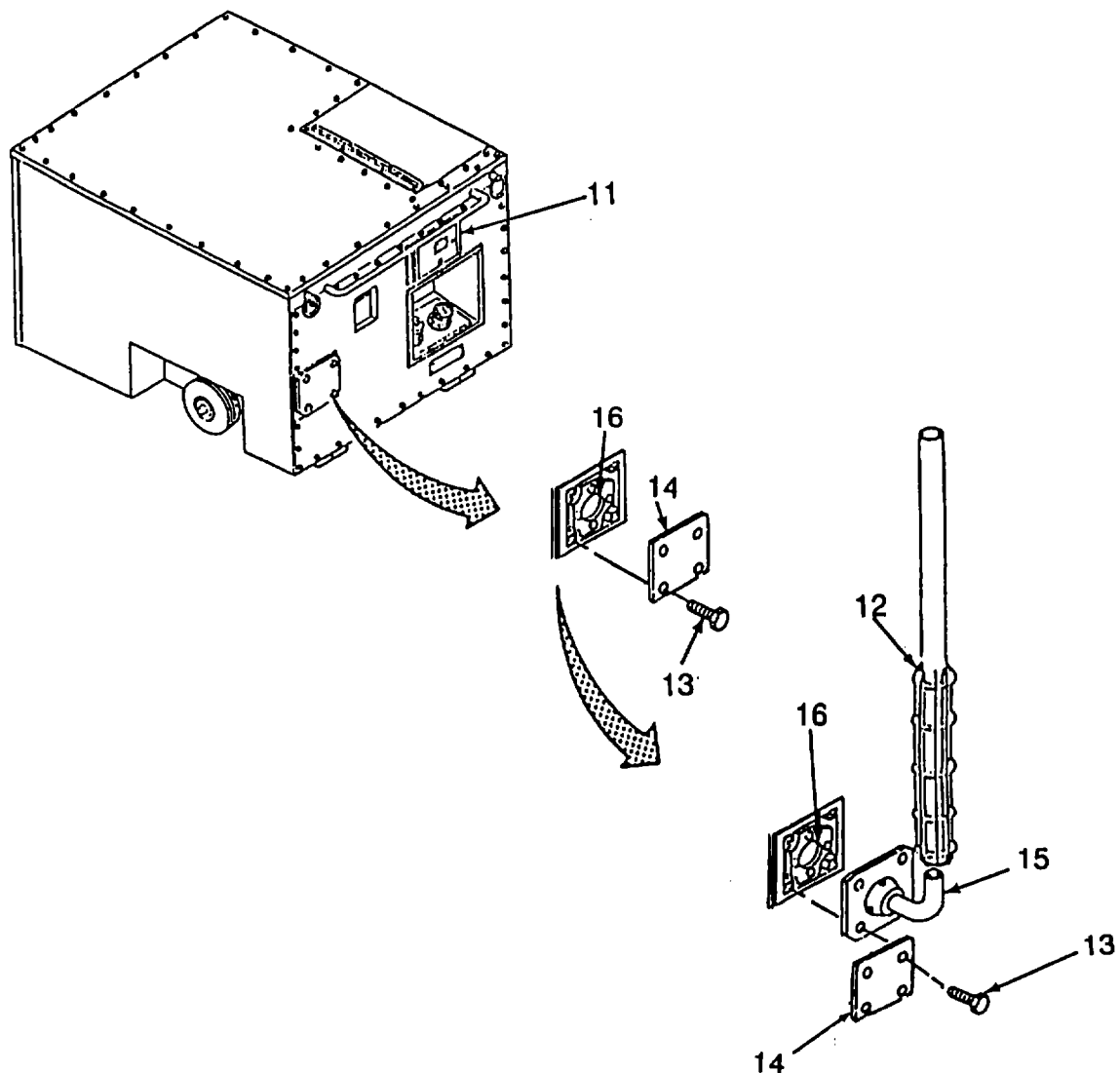


Figure 4-3. Assembly of Equipment (Sheet 2 of 2 )

**4-7. INSTALLATION INSTRUCTIONS - continued.**

## b. Installation Instructions (Refer to Figure 4-4)

- (1) Unwrap power cable (1) and lay aside.
- (2) Loosen four screws (2) and remove supply air duct cover (3) and return air duct cover (4).

**NOTE**

**The ASH unit may be operated either in a closed loop or 100% fresh air configuration. Check with the operator for intended use prior to connecting the return duct to the heater.**

- (3) For recirculating air setup, proceed as follows:

**CAUTION**

**The air ducts may have smooth bends when connected properly. Be careful to avoid sharp bends, which will restrict air flow. Restrictions will cause equipment damage or improper operation.**

**NOTE**

**Arrows on ducts indicate direction of air flow**

- (a) Connect the air supply duct (5) to heater (6) and to the shelter connection. Tighten two clamps (7) securely.
  - (b) Connect the return air duct (8) to heater (6) and to the shelter connection. Tighten two clamps (7) securely.
  - (c) Fresh air can be introduced into the heater unit by adjusting the damper assembly (9). This can be accomplished at initial setup or by the operator at a later time.
- (4) For 100% fresh air setup, proceed as follows:

**CAUTION**

**The air ducts may have smooth bends when connected properly. Be careful to avoid sharp bends, which will restrict air flow. Restrictions will cause equipment damage or improper operation.**

- (a) Connect the air supply duct (5) to heater (6) and to the shelter connection. Tighten two clamps (7) securely.
- (b) Do not connect the return air duct (8) to heater (6).

4-7. INSTALLATION INSTRUCTIONS - continued.

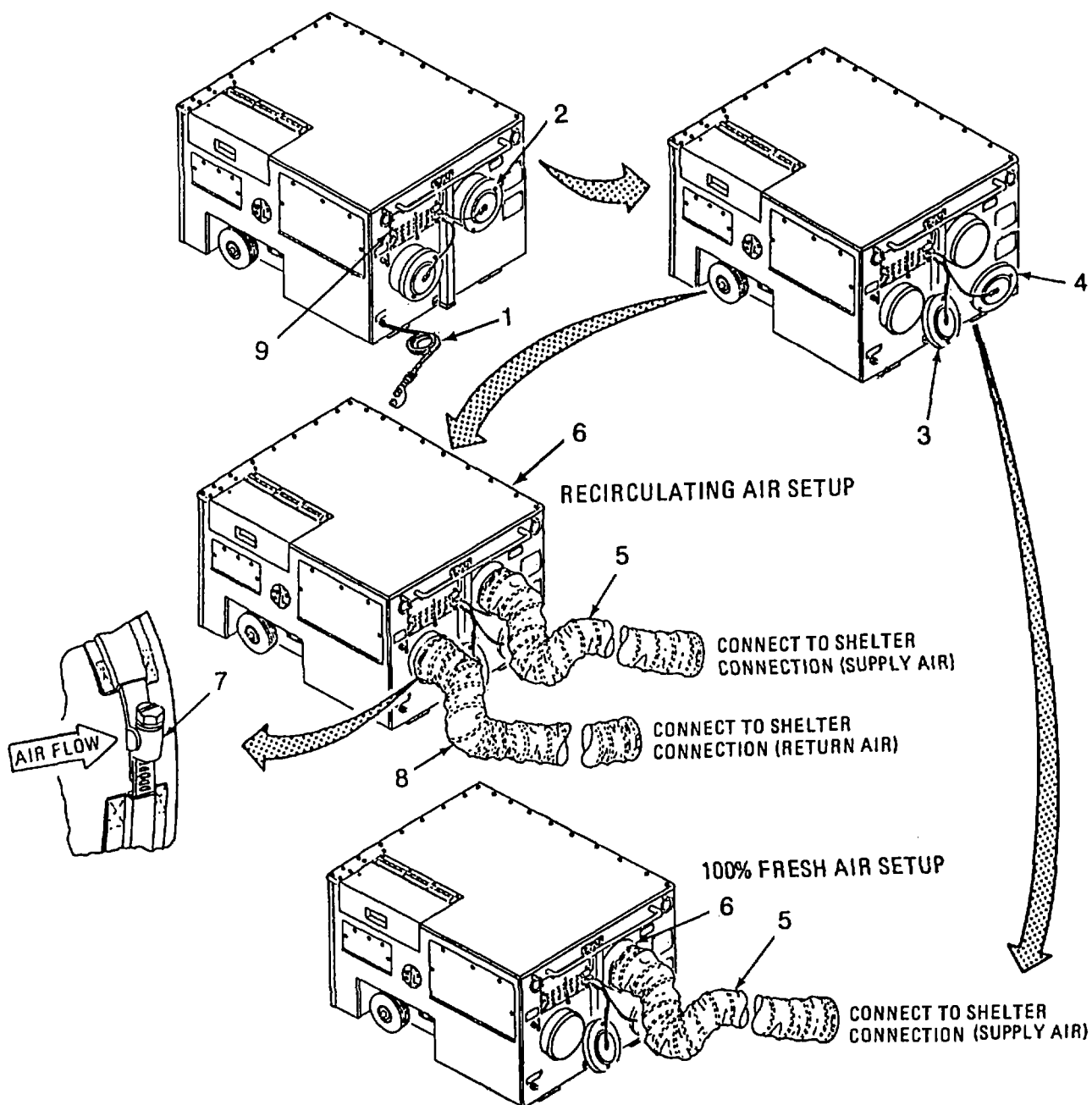


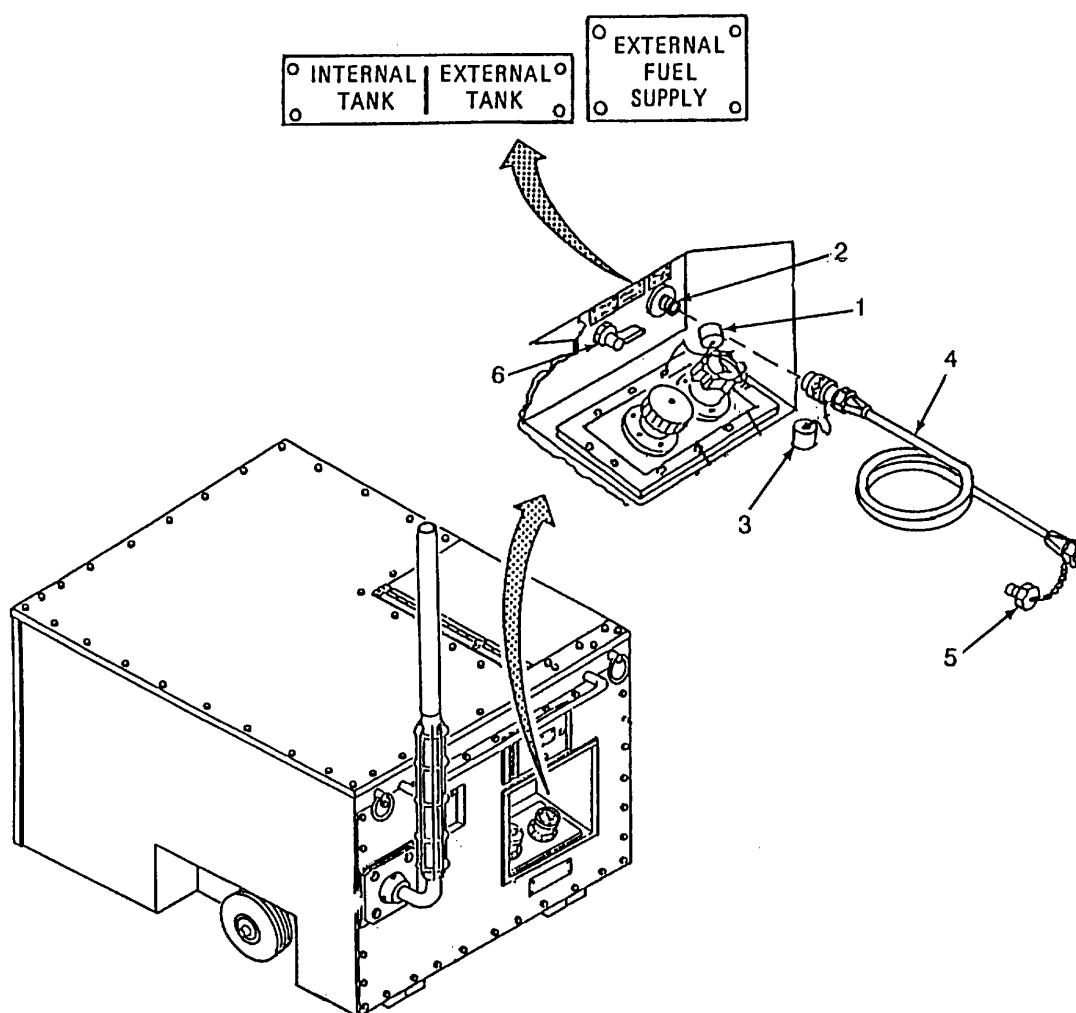
Figure 4-4. Supply Air Duct and Return Air Duct Connection

**4-7. INSTALLATION INSTRUCTIONS - continued.**

b. Installation Instructions - continued. (Refer to Figure 4-5)

(5) For external fuel connection proceed as follows:

- (a) Remove dust cap (1) from external fuel port (2).
- (b) Remove dust cap (3) from external fuel hose (4), quick disconnect and attach the hose to the unit external fuel port (2).
- (c) Remove the plug (5) from external fuel hose (4) and connect the hose to the external fuel source.
- (d) Set the fuel selector valve (6) to the EXTERNAL TANK position. The handle on the fuel selector valve (6) must be horizontal and pointing to the right.



**Figure 4-5. External Fuel Source Connection**



**4-7. INSTALLATION INSTRUCTIONS- continued.**

b. Installation Instructions - continued. (Refer to Figure 4-6)

(6) For connection of the power cable adapter cord (1) proceed as follows:

(a) Loosen three screws (2) on the power source distribution panel (3).

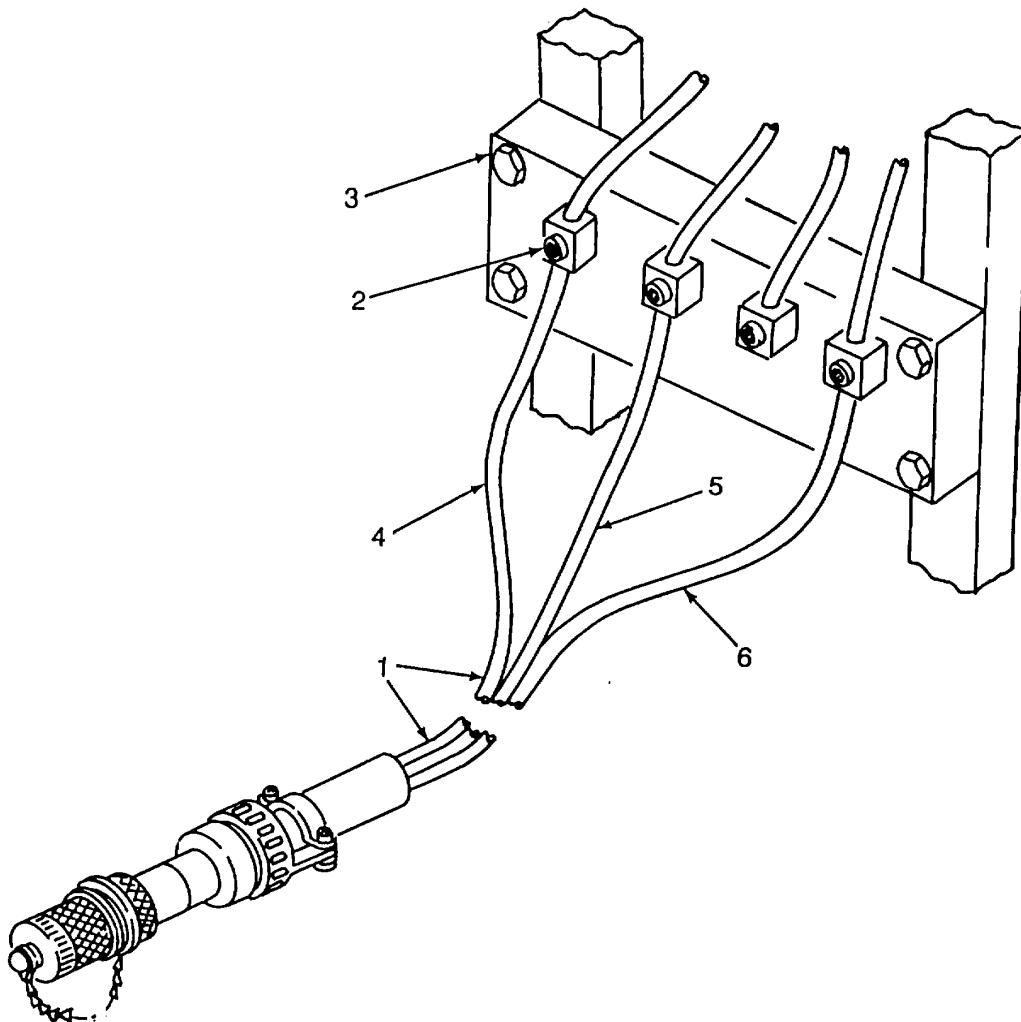
**NOTE**

**Adapter is designed to attach to a 120 volts, 50/60 hertz, single-phase grounded screw lug type power source.**

(b) Connect black wire (4) to power source connection and tighten screw (2).

(c) Connect white wire (5) to power source connection and tighten screw (2).

(d) Connect green wire (6) to power source ground connection and tighten screw (2).



**Figure 4-6. Power Cable Adapter Cord**

**Section IV. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

---

**4-8. GENERAL.**

To ensure that the ASH unit is ready for use at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or equipment failure. The necessary preventive maintenance services to be performed are listed and described in Table 4-1. Defects discovered during operation of the unit should be corrected as soon as possible. All deficiencies and shortcomings will be recorded, together with the corrective actions taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

**Table 4-1. Unit Preventive Maintenance Checks And Services.**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
1	Semi-annually	EXTERNAL/ INTERNAL		
		Frame Assembly	<p>Visually inspect all four sides, top and bottom of Unit for cracks, loose/missing hardware and corrosion.</p> <p>Open all access doors.</p> <p>Inspect inside for loose or missing hardware, cracks or other damage.</p> <p>Inspect inside bottom of unit for accumulation of water or fuel.</p>	<p>Cracks in frame. Loose/missing hardware</p> <p>Loose or missing hardware or damage. Fuel in bottom of unit.</p>

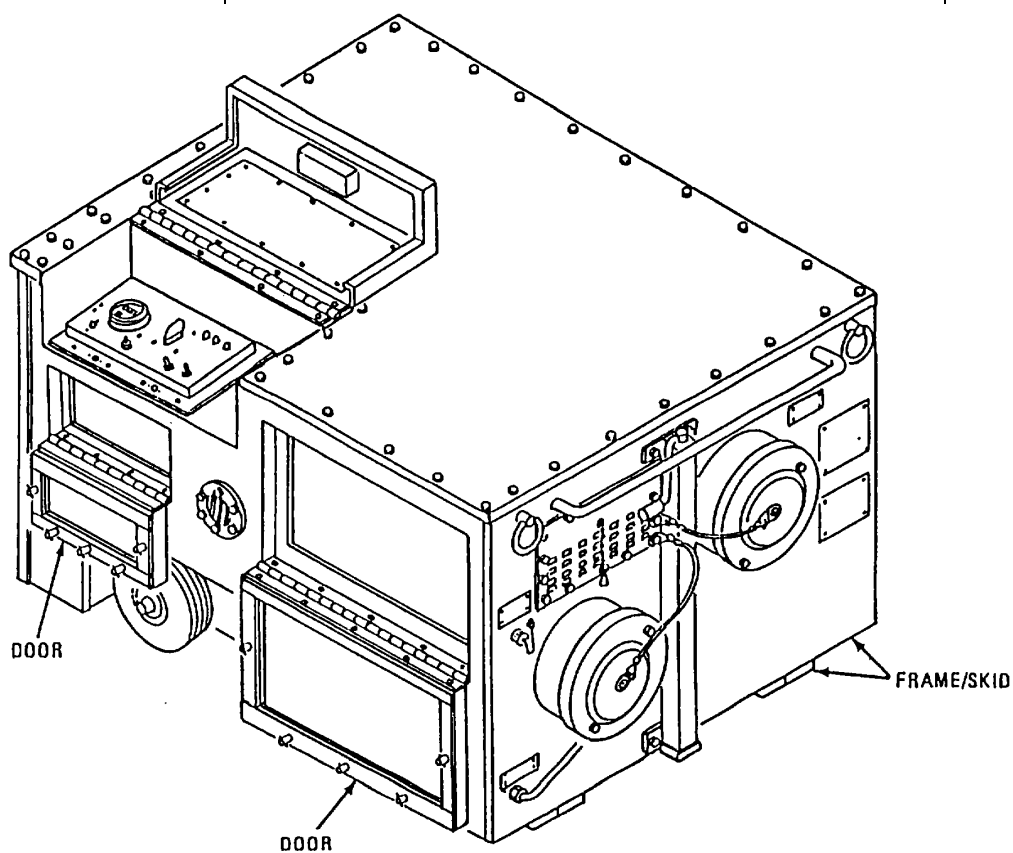


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
2	Semi-annually	EXTERNAL/ INTERNAL	<p><b>WARNING</b></p> <p>Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:</p> <p><b>DO NOT</b> perform any maintenance on electrical equipment unless all power is removed.</p> <p><b>ALWAYS</b> place <b>POWER OFF</b> warning tags on power supply switches so that no one will apply power while you are performing maintenance.</p> <p><b>FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.</b></p>	Loose or exposed wires.
		Control Box	<p>Open right side rear door. Open control box cover. Open control box lid. Inspect components for damaged/missing hardware or corrosion. Inspect for loose connections, chafing or exposed wires/ (Refer t para 4-24a.)</p>	

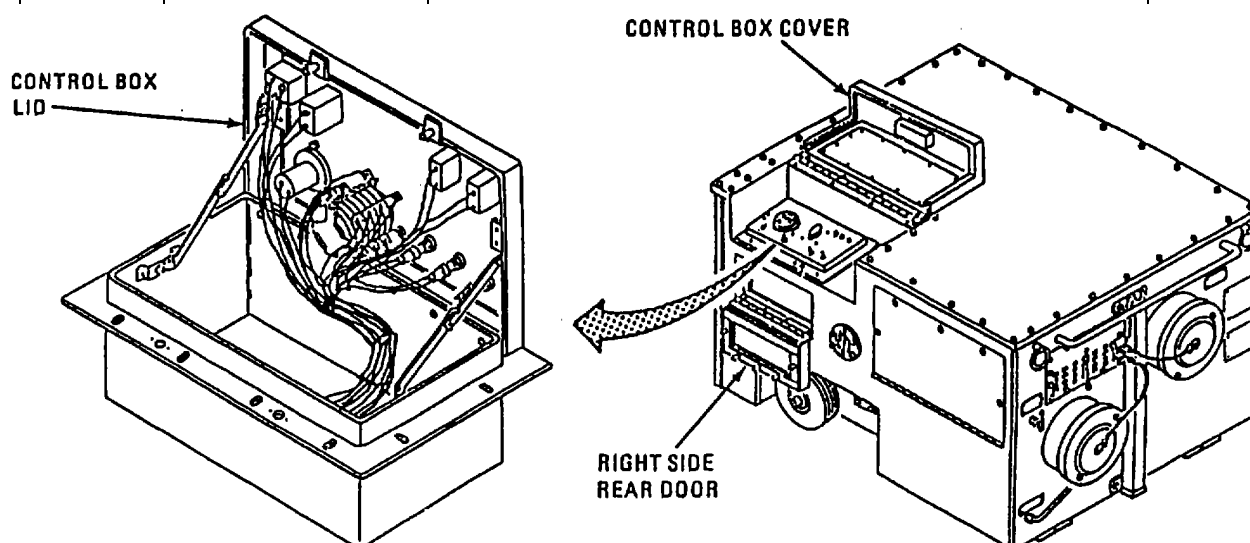


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
3	Semi-annually	<b>INTERNAL</b>	Inspect for loose or missing hardware, loose, chafing, or broken connections. Inspect for corrosion on terminals. Check reset arm for freedom of movement. (Refer to para 4-26)	Loose, chafing, or broken connections.
		Combustor Control Relay		
4	Semi-annually	Air Pressure Switch	Inspect for loose or missing hardware. Inspect for loose connections, chafing or exposed wires. Inspect air line for security, kinks or cracks. (Refer to para 4-27)	Loose, chafing, or broken wires. Kinked or cracked air line.

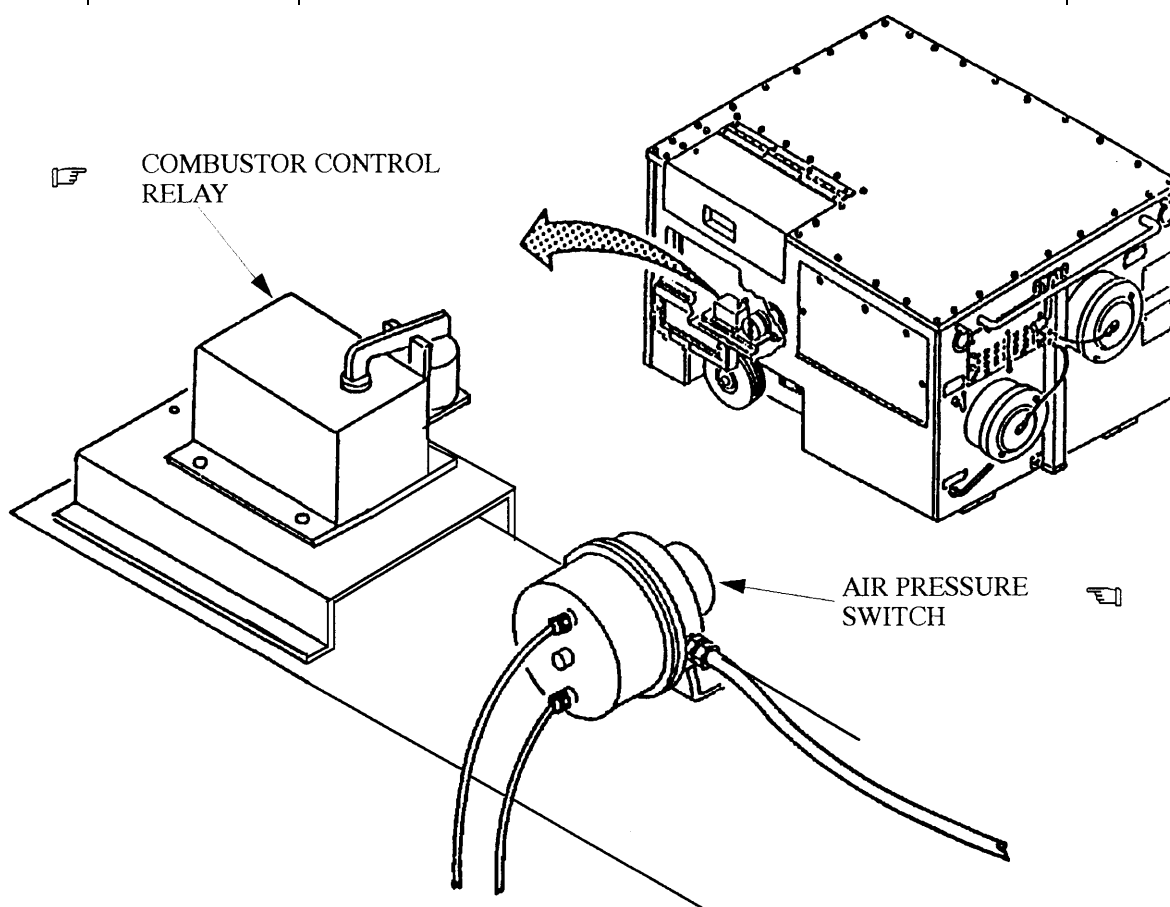


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
5	Semi-annually	<b>INTERNAL</b>		
		Thermostat Assembly		
		a. Discharge Air Thermostat	Inspect for secure mounting and corrosion. Inspect for loose connections, chafing or exposed wires.	Loose connections, chafing or exposed wires.
		b. Temperature Limit Switch	Inspect for secure mounting and corrosion Inspect for loose connections, chafing or exposed wires.	Loose connections, chafing or exposed wires.

Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
6	Semi-annually	<b>INTERNAL</b>		
		Circulating Air Fan/Pump/Motor Assembly		
		a. Air Fan	Inspect fan for damaged/missing blades, loose or missing hardware.	Loose, missing or damaged blades or hardware.
			Inspect scroll for holes, dents, loose or missing hardware.	Loose or damaged scroll.
		b. Pump	Inspect fuel pump for security and leaks (para 4-30). Check the coupling spring pin and cotter pin for security (para 4-30).	Any leaks exists.
		c. Motor	Inspect motor for loose or damaged hardware. Tighten or replace hardware. Inspect for loose connections, chafing or exposed wires (para 4-31).	Loose or damaged hardware. Loose, frayed or exposed wires.
		d. Base	Inspect for loose or missing hardware.	Loose base.

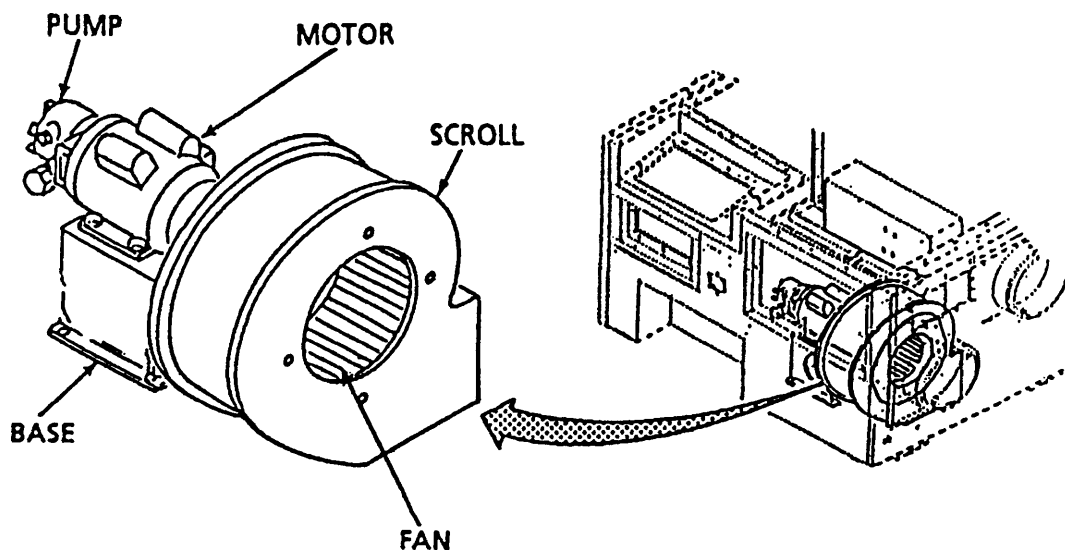


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
6	Semi-annually	<b>INTERNAL</b>		
		Circulating Air Fan/Pump/Motor Assembly (cont)		
		<p>e. Solenoid Valves</p> <p>f. Fuel Filter</p>	<p>Inspect for loose or missing hardware, loose or broken connections and leaks.</p> <p>Inspect for loose or missing hardware, leaks, corrosion or other damage. Service filter element as follows:</p> <ol style="list-style-type: none"> <li>(1) Unscrew captive nut (1).</li> <li>(2) Remove bowl (2), gasket (3), filter (4). Discard gasket</li> <li>(3) Clean filter with drycleaning solvent (Item 1, App E).</li> <li>(4) Install filter (4), gasket (3)(Item 45, App H), and bowl (2).</li> <li>(5) Position captive nut (1) under bowl (2) and tighten hand tight only.</li> </ol>	<p>Any leaks exists.</p> <p>Any leaks exists.</p>

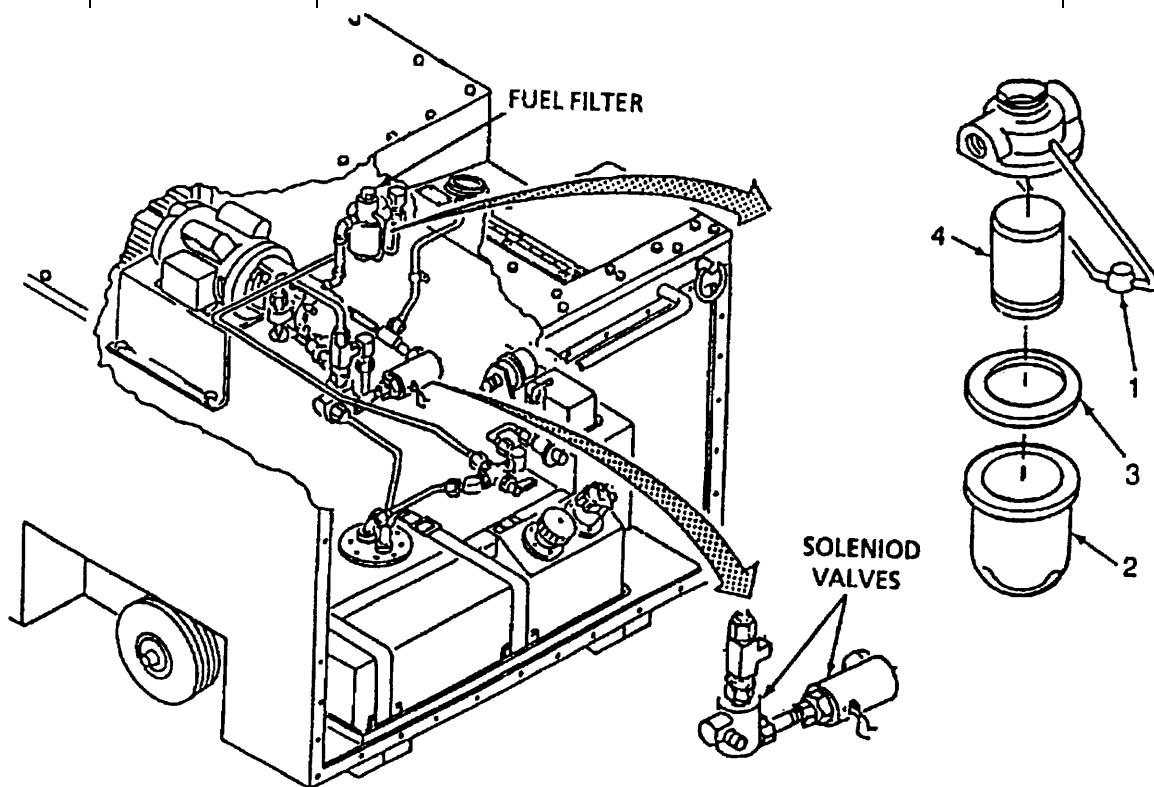




Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
7	Semi-annually	<b>INTERNAL</b>	<p>Inspect fan assembly for damaged/missing blades, loose or missing hardware or corrosion (para 4-29).</p> <p>Inspect duct for security, holes, cracks or corrosion (para 4-29).</p> <p>Inspect motor base for loose/missing hardware, cracks or corrosion (para 4-29).</p> <p>Inspect for loose connections, chafing or exposed wires(para 4-29).</p>	<p>Damaged/ missing blades. Loose or damaged hardware. Holes or cracks.</p> <p>Loose or missing hardware.</p> <p>Loose connections, chafing or exposed wires.</p>
		Combustor Fan Assembly		

**COMBUSTOR FAN ASSEMBLY**

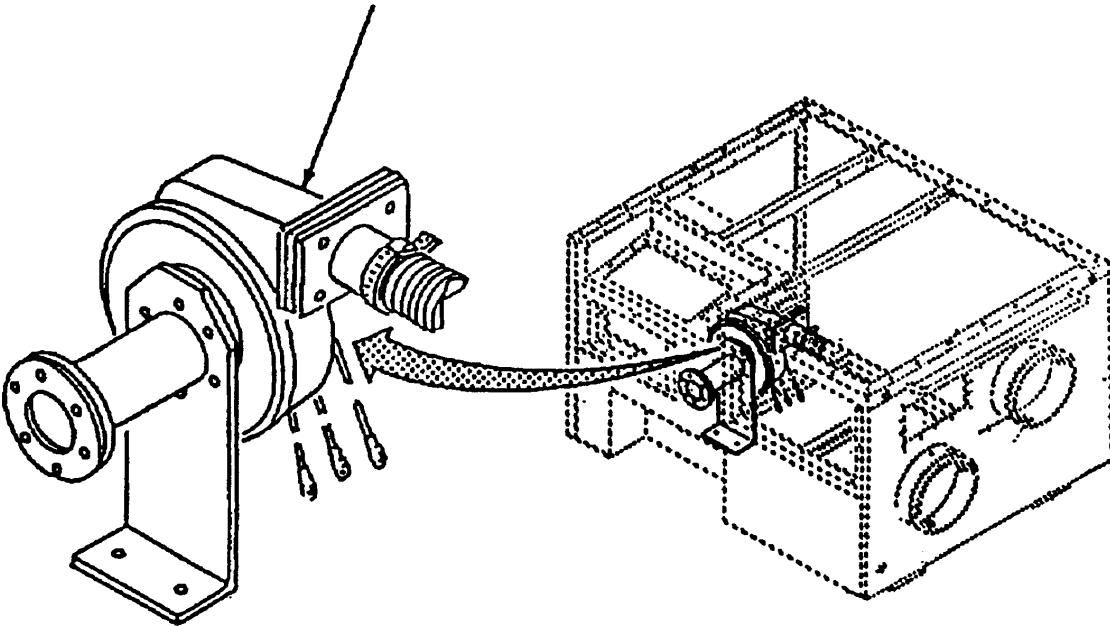


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
8	1000 hrs	<b>EXTERNAL</b>		
		Heat Exchanger Assembly		
		a. Primary and Secondary Exchangers	<p>Inspect for loose or missing hardware.</p> <p>Inspect for holes, cracks or other signs of burn through, or corrosion.</p> <p>Inspect exhaust pipe for security, holes, cracks, or other signs of exhaust leaks, and corrosion.</p> <p>Remove sight glass. Clean lens with a clean soft rag. Apply anti-seize compound (Item 3, App E) to sight glass and install on heat exchanger.</p>	<p>Holes, cracks or signs of burn through. Missing hardware.</p> <p>Leaks exists.</p> <p>Dirty.</p>
		b. Transformer	<p>Inspect for loose or missing hardware. Tighten loose hardware, replace missing hardware (para 4-32, 4-32A).</p> <p>Inspect for loose connections, chafing or exposed wire (para 4-32, 4-32A).</p>	<p>Loose or missing hardware.</p> <p>Loose connections, chafing or exposed wire.</p>

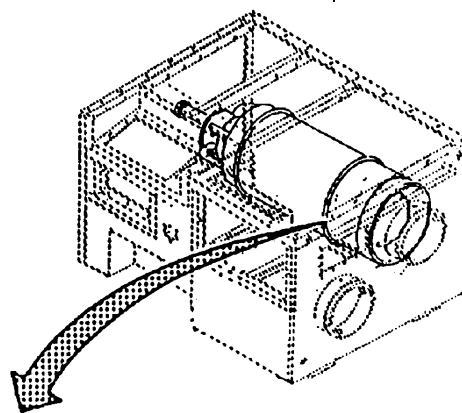
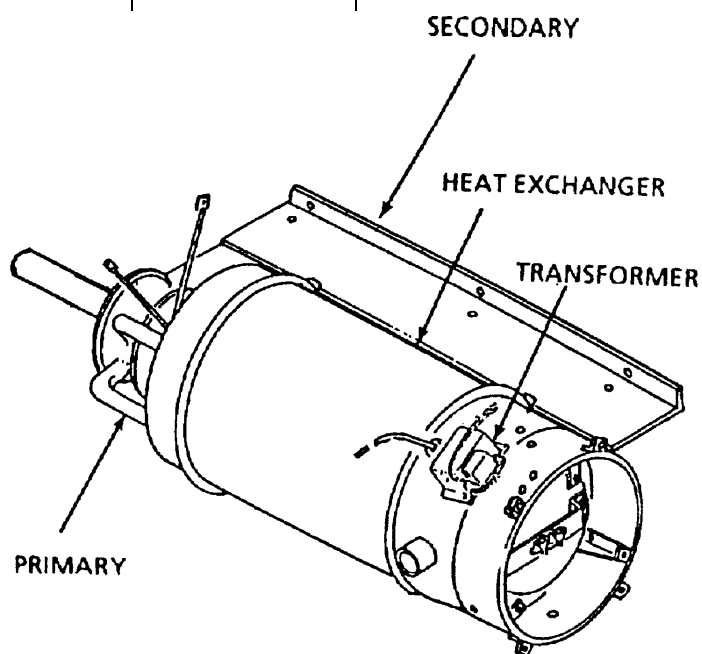
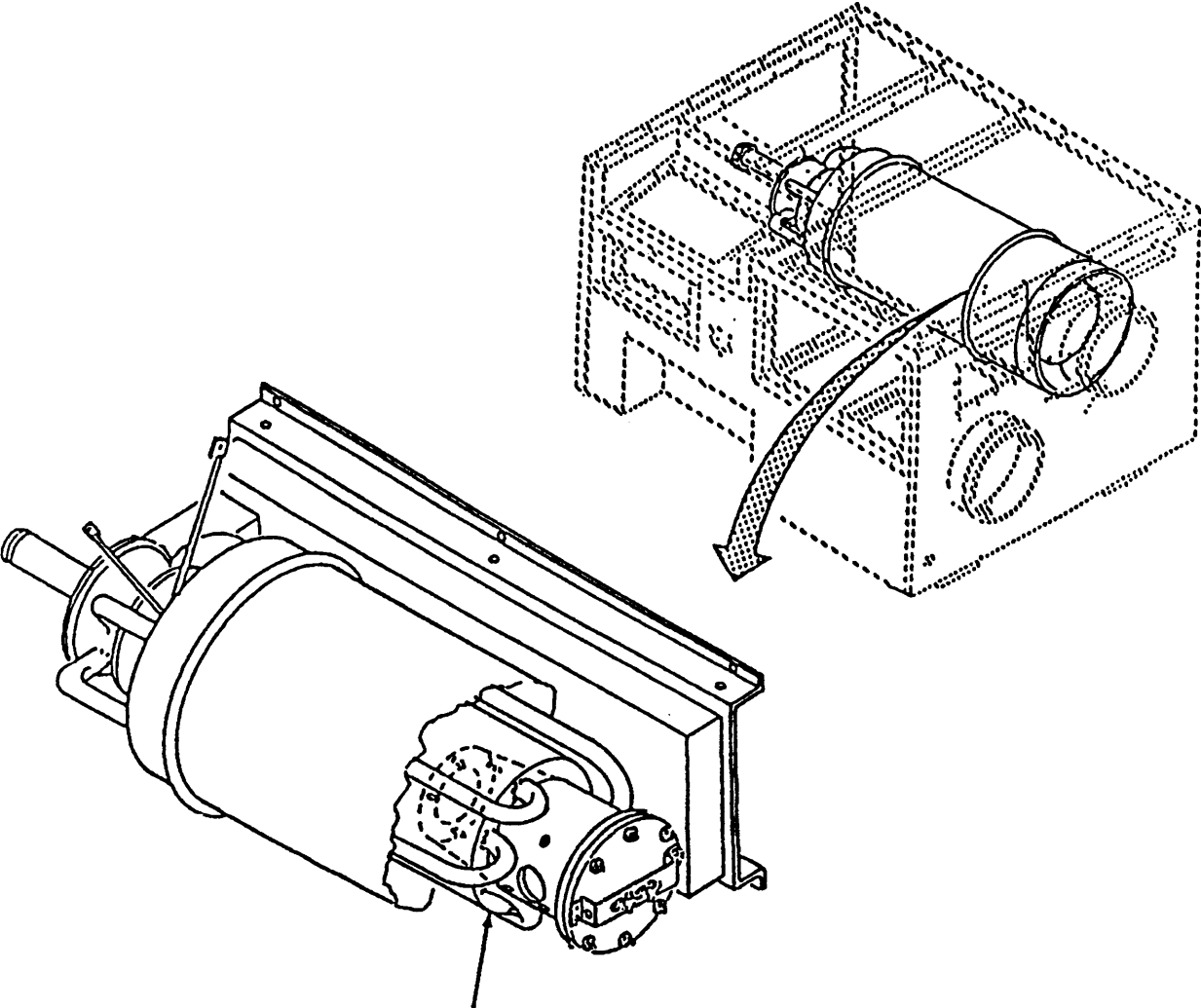


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
8	1000 hrs	<b>INTERNAL</b>	Inspect for loose or missing hardware on burner section. Inspect for holes, cracks or other signs of burn through, or corrosion on burner section.	Missing hardware. Holes, cracks or signs of burn through.
		Heat Exchanger Assembly (cont.)  c. Burner		



BURNER SECTION

Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
8	1000 hrs	<b>INTERNAL</b>		
		c. Burner - continued	Remove burner assembly from heat exchanger (refer to para 4-33). Remove three setscrews (1) and pull burner (2) from housing (3).	
		(1) Nozzle	Remove nozzle/filter from burner and discard. Install new nozzle/filter snugly on burner, do not overtighten.	Dirty filter.
		(2) Electrodes	Inspect for cleanliness and secure mounting. Check for signs of pitting, burning or cracks.	Cracks found in electrodes.
		(3) Fire Ring	Inspect for cleanliness and secure mounting. Inspect for burring or other signs of damage.	

Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
8	1000 hrs	<b>INTERNAL</b>	<p>Inspect for evidence of leaks and secure mounting.</p> <p>Inspect for secure mounting. Inspect for cracks or bends.</p> <p>Inspect for cracks, tears, or bends.</p> <p>Install burner (2) into housing (3) until it is flush with back of housing. Install three setscrews (1).</p>	<p>Any leaks exists.</p> <p>Cracked or bent tube.</p> <p>Cracks, tears or bends.</p>
		c. Burner - continued		
		(4) Fuel Supply Tube		
		(5) Flame Sensor Tube		

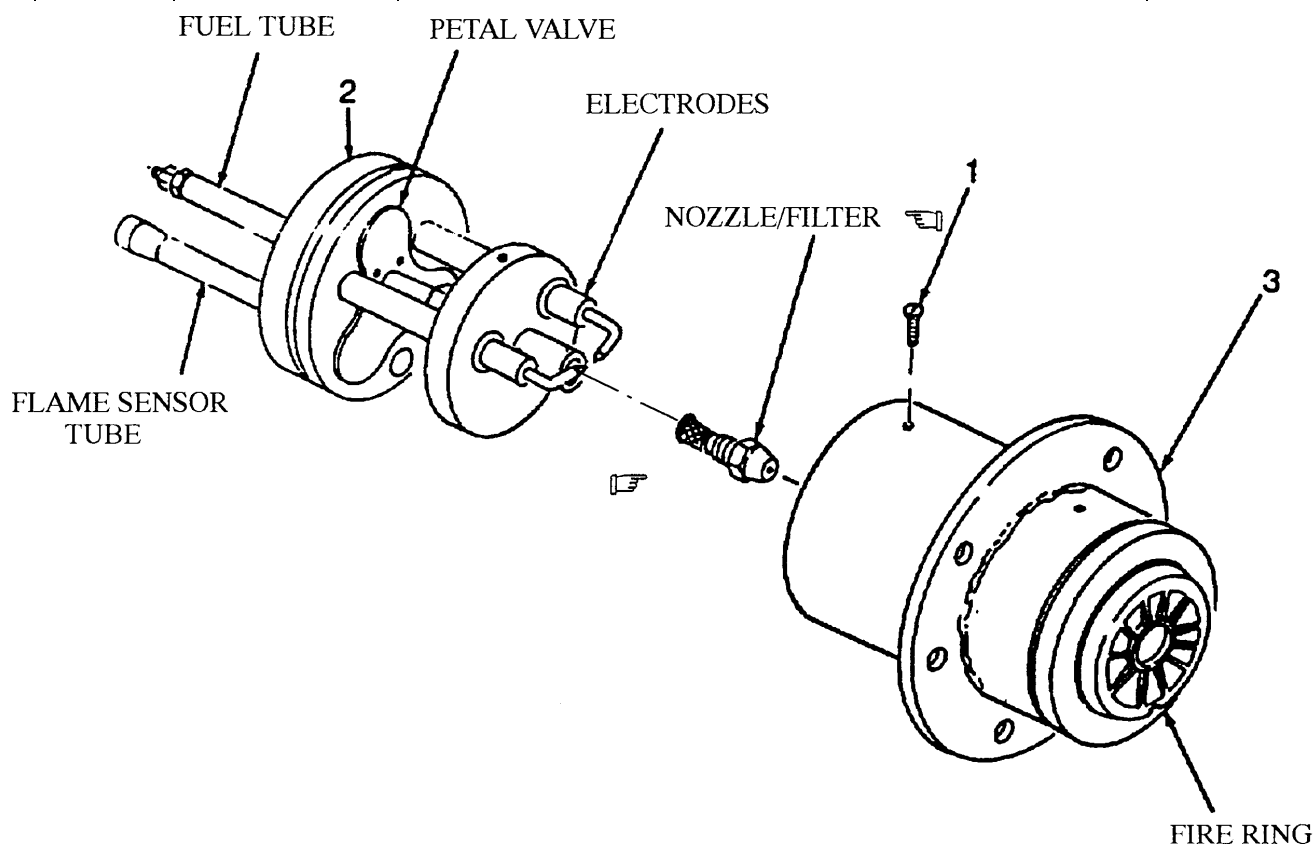


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
9	Semi-annually	<b>INTERNAL</b>	<p><b>WARNING</b></p> <p>Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.</p> <p>Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, as soon as possible remove clothes and wash skin with warm soapy water before getting dressed.</p> <p>Spilled fuel creates a flammable, vapor-air mixture and fire can take place. Stop immediately if fuel spill occurs.</p>	
		Fuel Tank Assembly		
		a. Tank		<p>Inspect for leaks, missing hardware or other damage (para 4-35).</p> <p>Inspect for loose or missing hardware, leak, corrosion or other damage.</p>

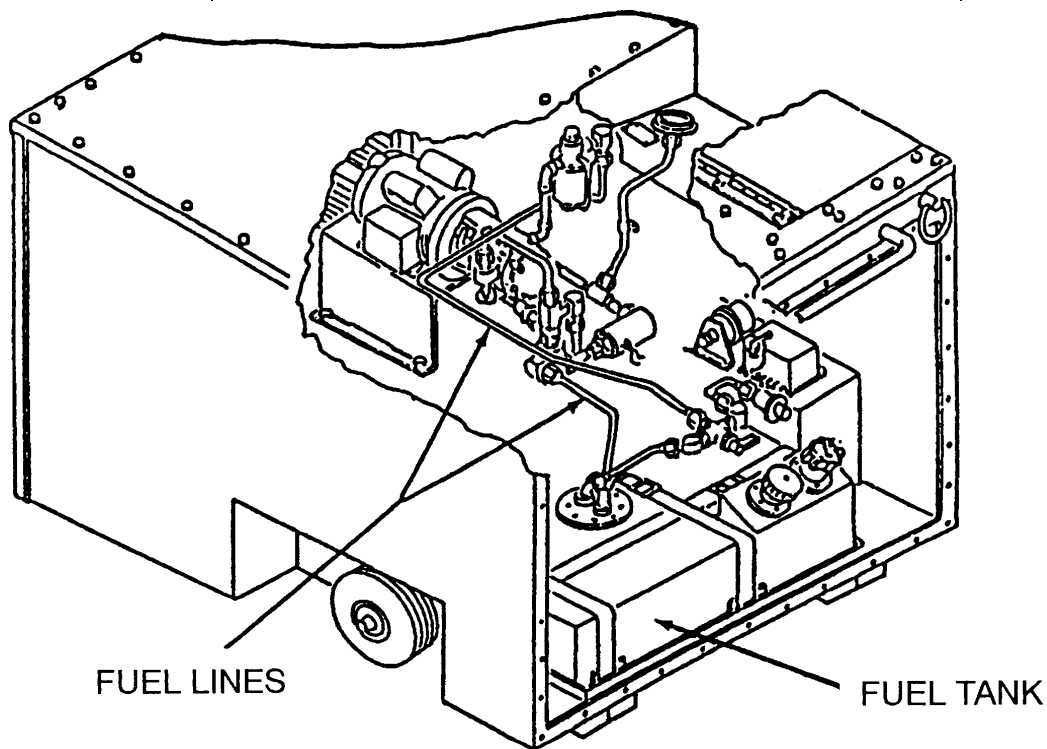
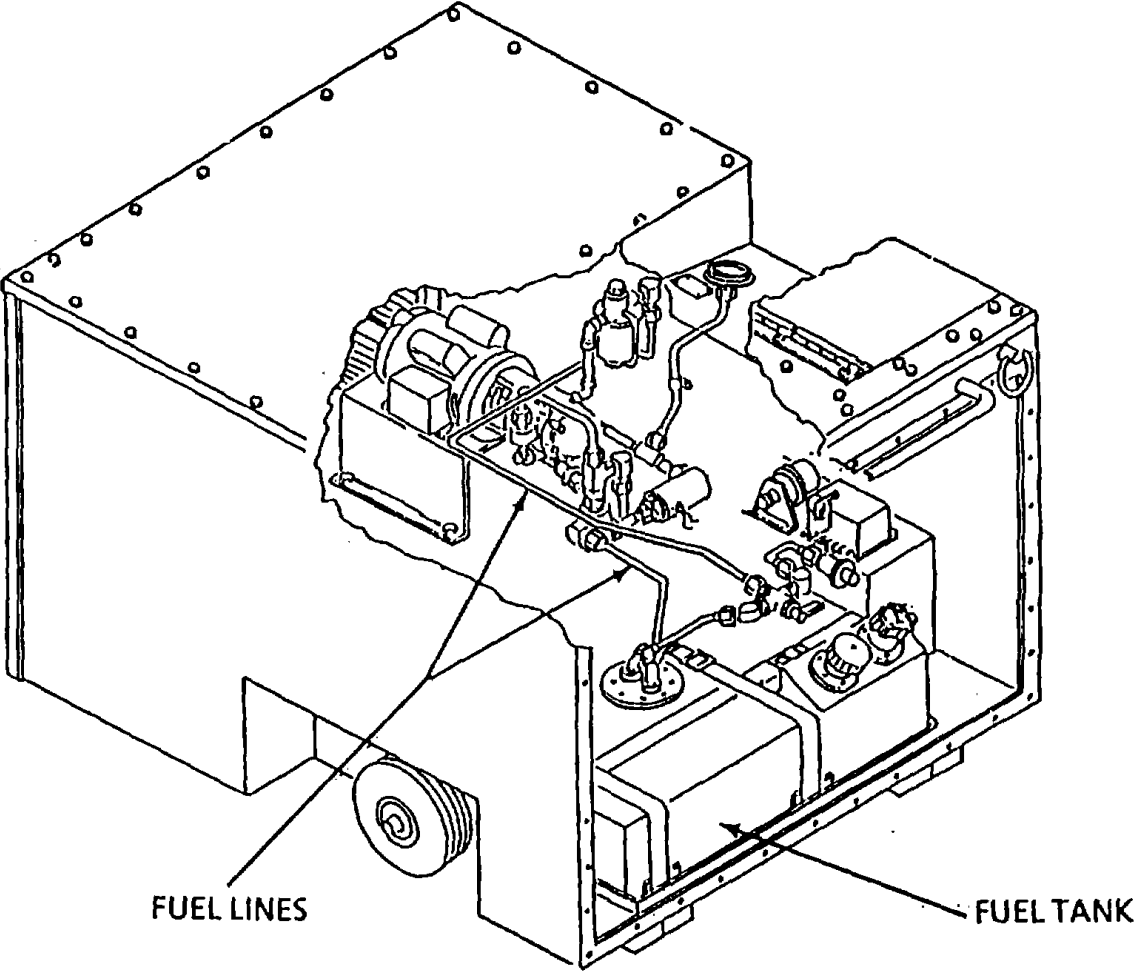


Table 4-1. Unit Preventive Maintenance Checks And Services.

Item No.	Interval	Location	Procedure	Not Fully Mission Capable If:
		Item to Check/Service		
9	Semi-annually	INTERNAL	Inspect for chafing, cracks, leaks, corrosion or other damage. Remove damaged fuel lines and replace (para 4-35).	Any leaks exist.
		Fuel Tank Assembly (cont)  b. Fuel Lines		



The diagram is an exploded view of a fuel tank assembly. It shows a rectangular metal tank with a hinged lid. Inside the tank, there is a complex network of fuel lines, valves, and a pump mechanism. Two labels with leader lines point to specific parts: 'FUEL LINES' points to a line running along the bottom of the tank, and 'FUEL TANK' points to the main body of the tank. The assembly is shown in a disassembled state to illustrate the internal components.

## Section V. UNIT TROUBLESHOOTING PROCEDURES

### 4-9. INTRODUCTION.

This section provides troubleshooting information for the ASH unit at the unit level of maintenance. It consists of the malfunction index, listing the most common malfunctions, and the troubleshooting table, Table 4-2. The troubleshooting table is presented as flow diagrams for each malfunction listed in the malfunction index. Each diagram provides the procedure and corrective actions to return the ASH unit to operational readiness. The ASH Electrical Schematic, FO-1, and Wiring Diagram, FO-3, are provided to assist during troubleshooting.

### 4-10. TROUBLESHOOTING.

The troubleshooting table lists the common malfunctions which can occur in operation of the ASH unit. The tests, inspections and corrective actions should be performed in the order given.

#### MALFUNCTION INDEX

MALFUNCTION	PAGE
1. Unit Will Not Start .....	4-28
2. Combustor Fan Does Not Operate.....	4-31
3. Fuel Pressure Stays at 25 PSI or Less in HEAT AUTO or HEAT MANUAL.....	4-33
4. Unit Flames Out Repeatedly (more than 3 times in a row) .....	4-34
5. No Fuel Pressure Indicated.....	4-35
6. Low Fuel Pressure Indicated.....	4-37
7. Excessive Black Smoke in Exhaust .....	4-38
8. Fan Motor Slows Down, Indicator Lights Dim.....	4-39
9. Improper/No Spark in Igniter.....	4-40
10. Unit Backfires or Rumbles in AUTO and/or MANUAL HEAT modes.....	4-43
11. Combustor Fan Does Not Operate (Black exhaust smoke and loud rumble) .....	4-44
12. No Combustion in HEAT AUTO Mode .....	4-46
13. No Combustion in HEAT MANUAL Mode.....	4-52



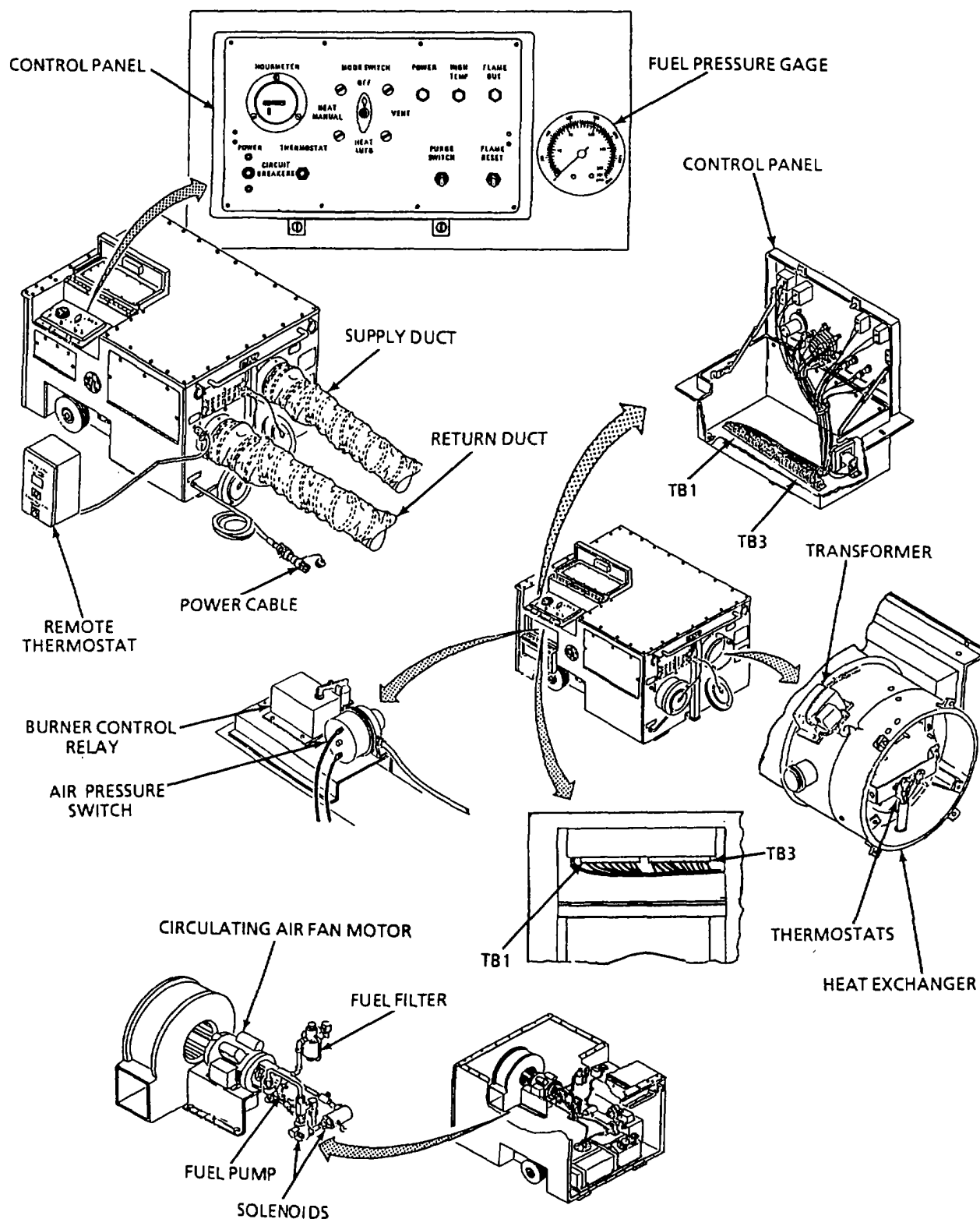


Figure 4-7. Troubleshooting Component Location Guide.

Table 4-2. UNIT TROUBLESHOOTING.

## MALFUNCTION 1. UNIT WILL NOT START.

**WARNING**

Electrical high voltage cannot be seen, but it can kill you. It is unlike other dangerous things you come in contact with because it gives no warning or symptoms to be wary of. Its effect is immediate. It can kill, render you unconscious, or severely burn you. To ensure your safety and other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

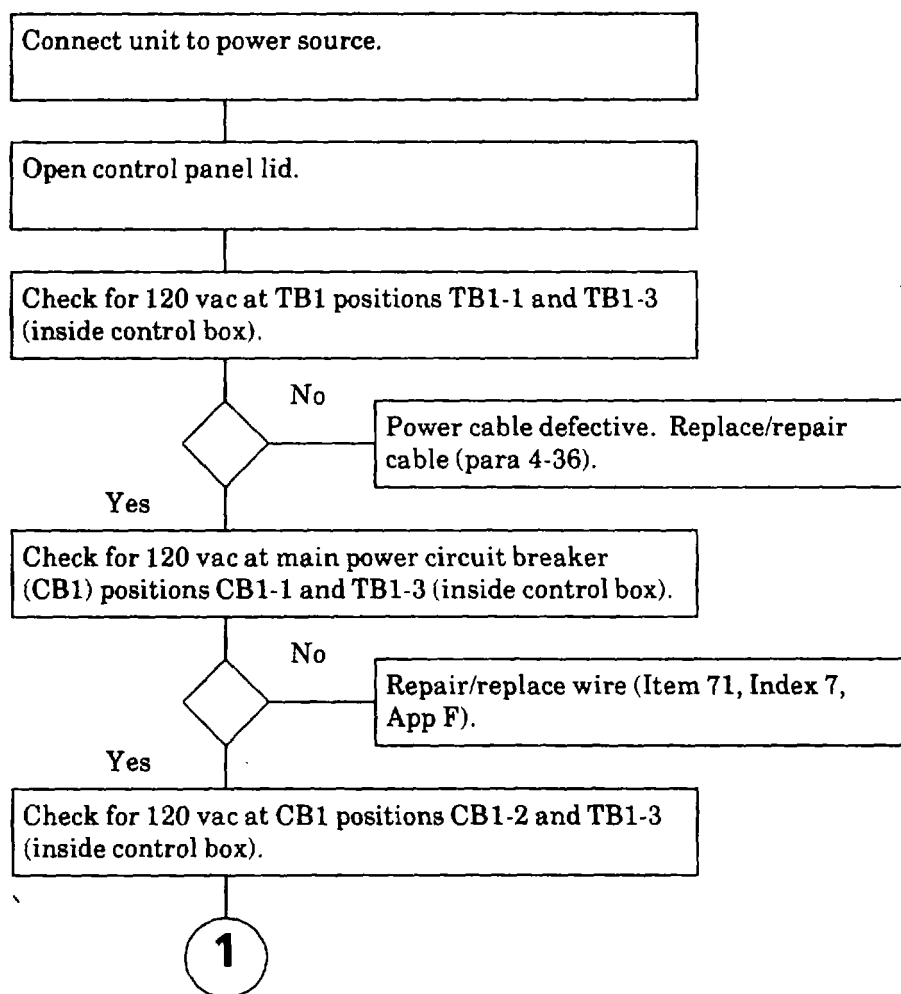


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 1. UNIT WILL NOT START - continued.

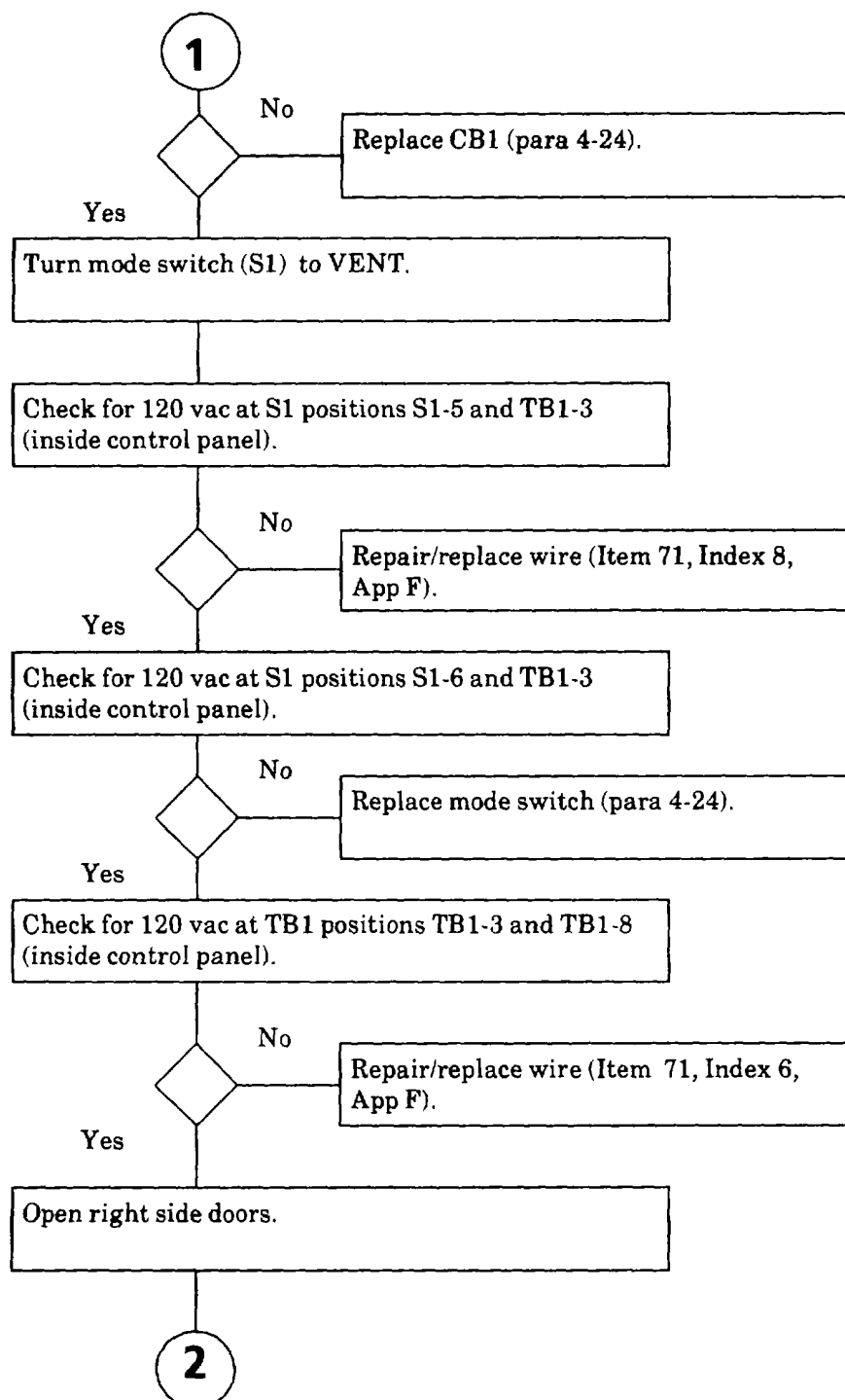


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 1. UNIT WILL NOT START - continued.

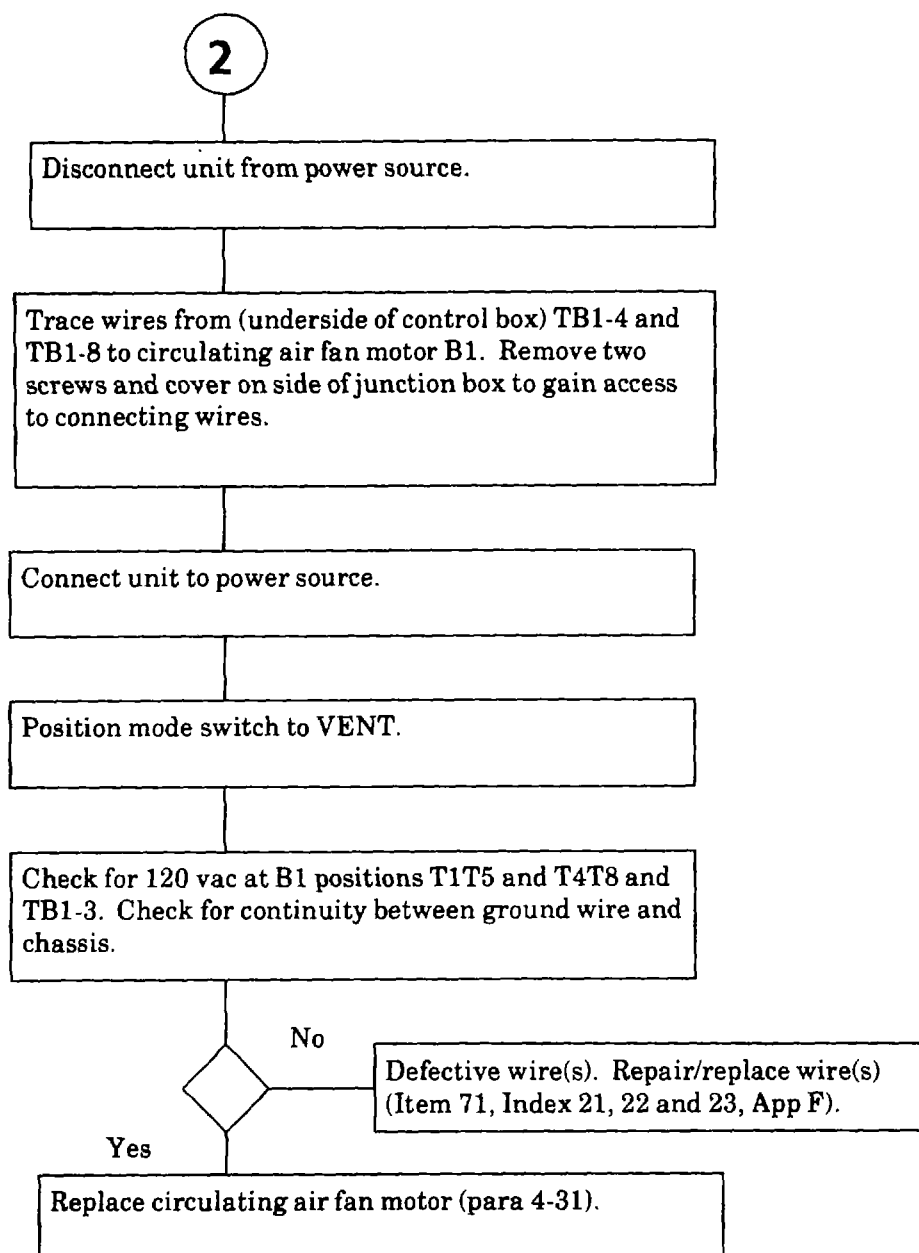


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 2.

## COMBUSTOR FAN DOES NOT OPERATE.

## WARNING

Electrical high voltage cannot be seen, but it can kill you. It is unlike other dangerous things you come in contact with because it gives no warning or symptoms to be wary of. Its effect is immediate. It can kill, render you unconscious, or severely burn you. To ensure your safety and other maintenance personnel, always observe the following precautions:

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- BE CERTAIN there is someone assisting you who can remove power immediately.
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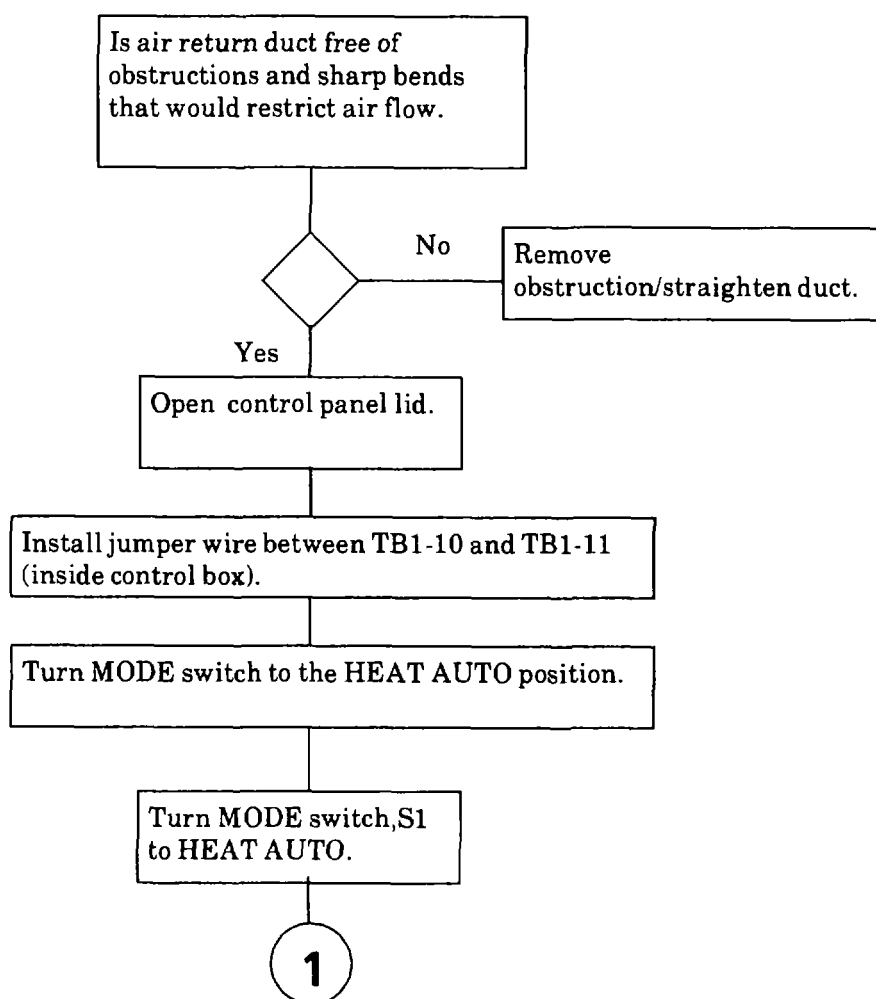


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 2.

## COMBUSTOR FAN DOES NOT OPERATE.

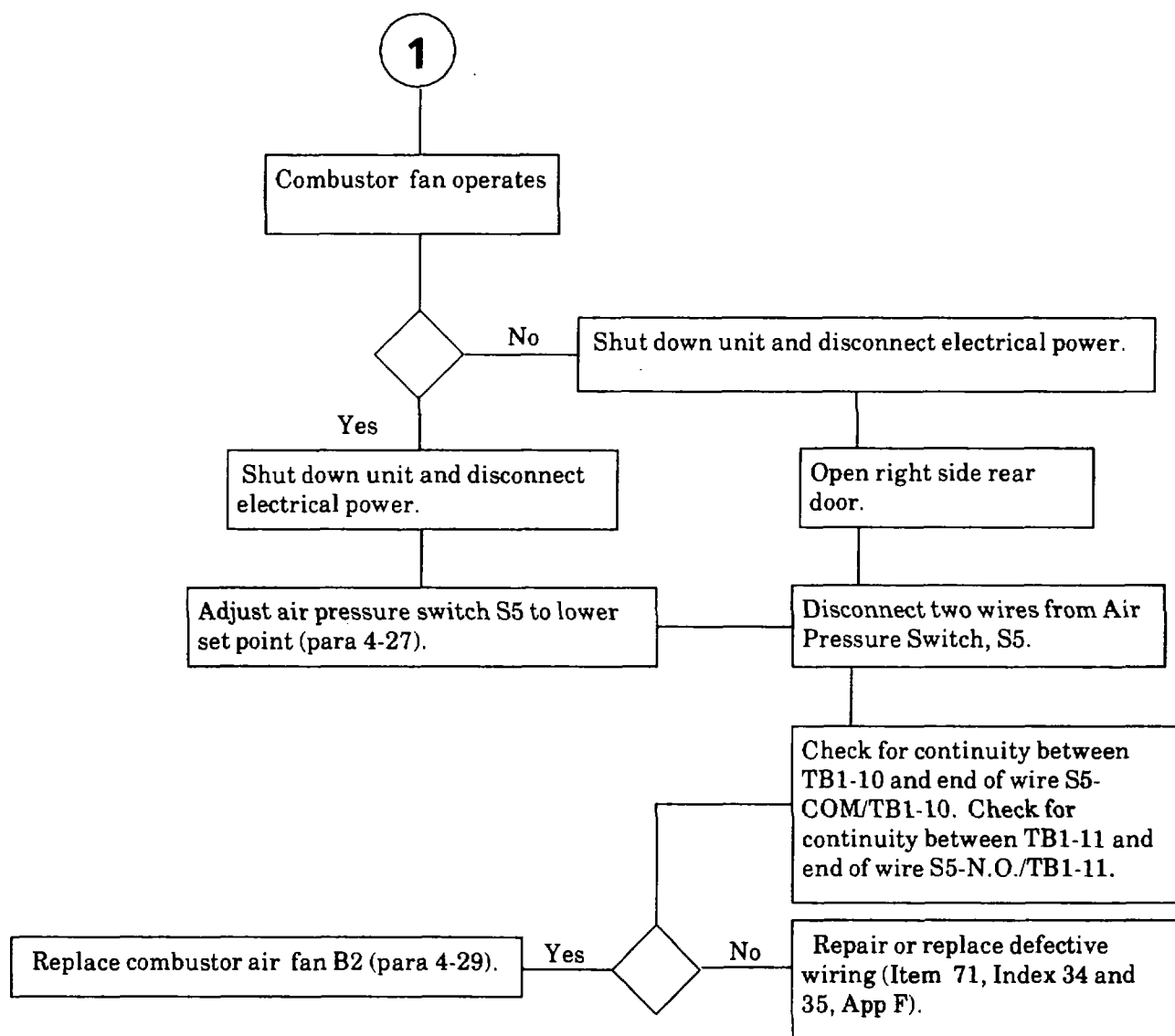


Table 4-2. UNIT TROUBLESHOOTING - continued.

**MALFUNCTION 3. FUEL PRESSURE STAYS AT 25 PSI OR LESS IN HEAT AUTO OR HEAT MANUAL.****WARNING**

Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:

- **DO NOT** perform maintenance on electrical equipment unless all power is removed.
- **BE CERTAIN** there is someone assisting you who can remove power immediately.
- **ALWAYS** place **POWER OFF** warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- **FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.**

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required.

Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post **FUEL FLAMMABLE/No SMOKING** signs. Suitable fire extinguisher must be present.

Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible and wet clothes with water before taking them off. In extreme cold conditions, clothes should not be wet; instead, ground yourself to a piece of grounded equipment by taking hold of it before taking off the clothes. Wash skin with warm soapy water.

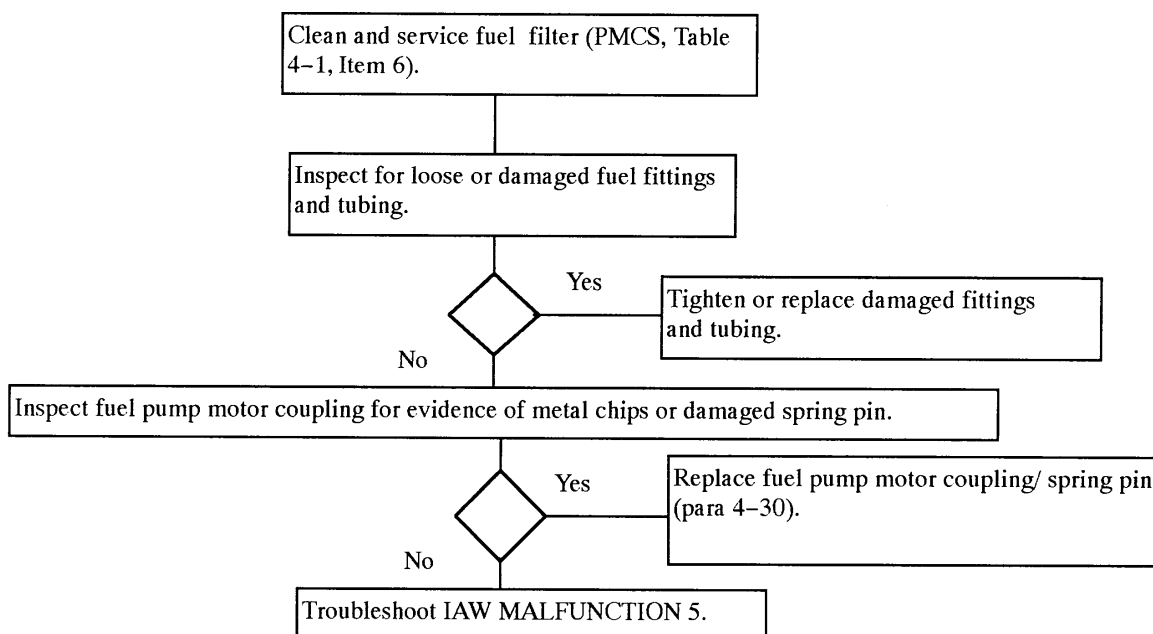
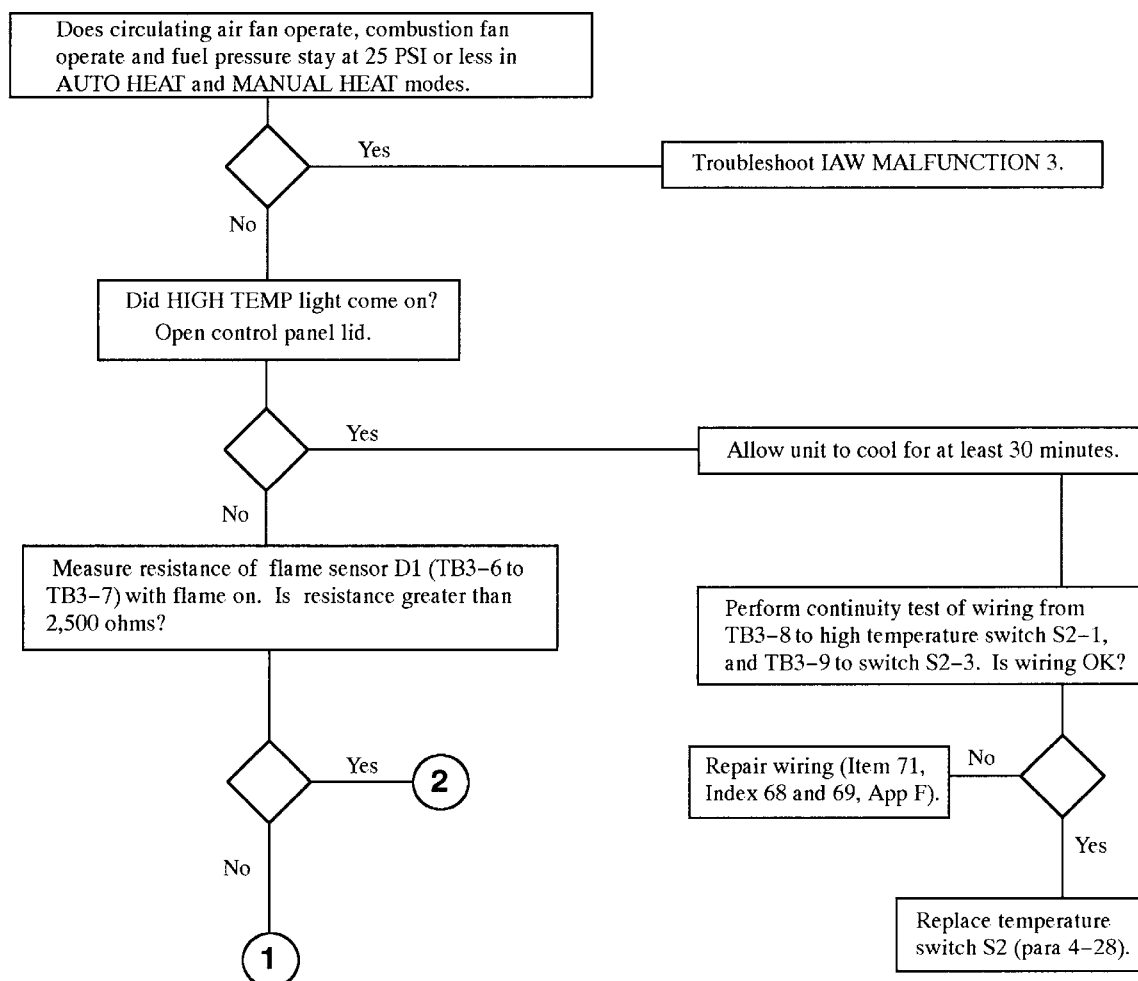


Table 4-2. UNIT TROUBLESHOOTING - continued.

**MALFUNCTION 4. UNIT FLAMES OUT REPEATEDLY (MORE THAN 3 TIMES IN A ROW)****WARNING**

Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:

- **DO NOT** perform maintenance on electrical equipment unless all power is removed.
- **BE CERTAIN** there is someone assisting you who can remove power immediately.
- **ALWAYS** place **POWER OFF** warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- **FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.**





**MALFUNCTION 4. UNIT FLAMES OUT REPEATEDLY (MORE THAN 3 TIMES IN A ROW)**

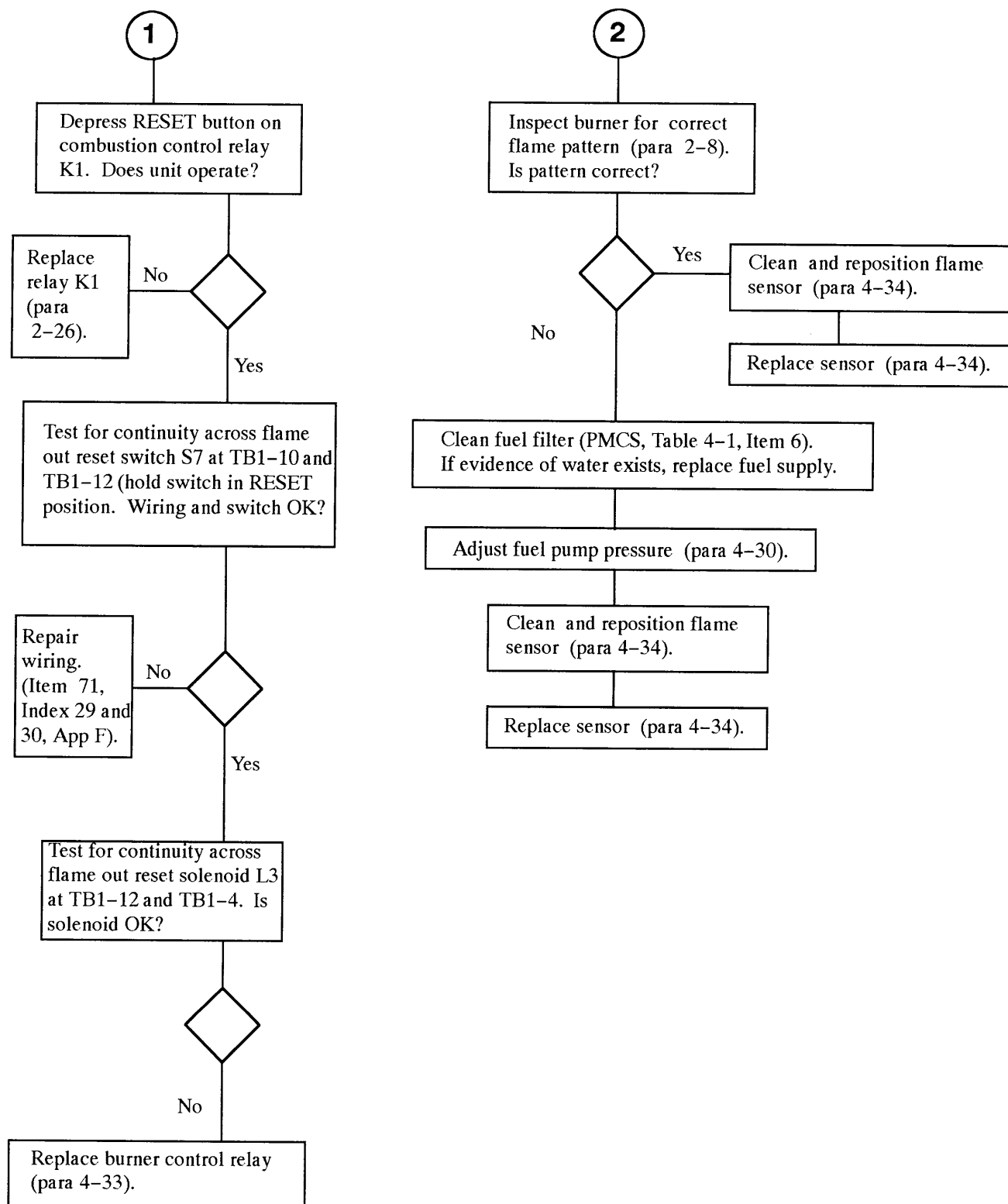




Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 5.

## NO FUEL PRESSURE INDICATED.

## WARNING

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/No SMOKING signs. Suitable fire extinguisher must be present.

Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible and wet clothes with water before taking them off. In extreme cold conditions, clothes should not be wet; instead, ground yourself to a piece of grounded equipment by taking hold of it before taking off the clothes. Wash skin with warm soapy water.

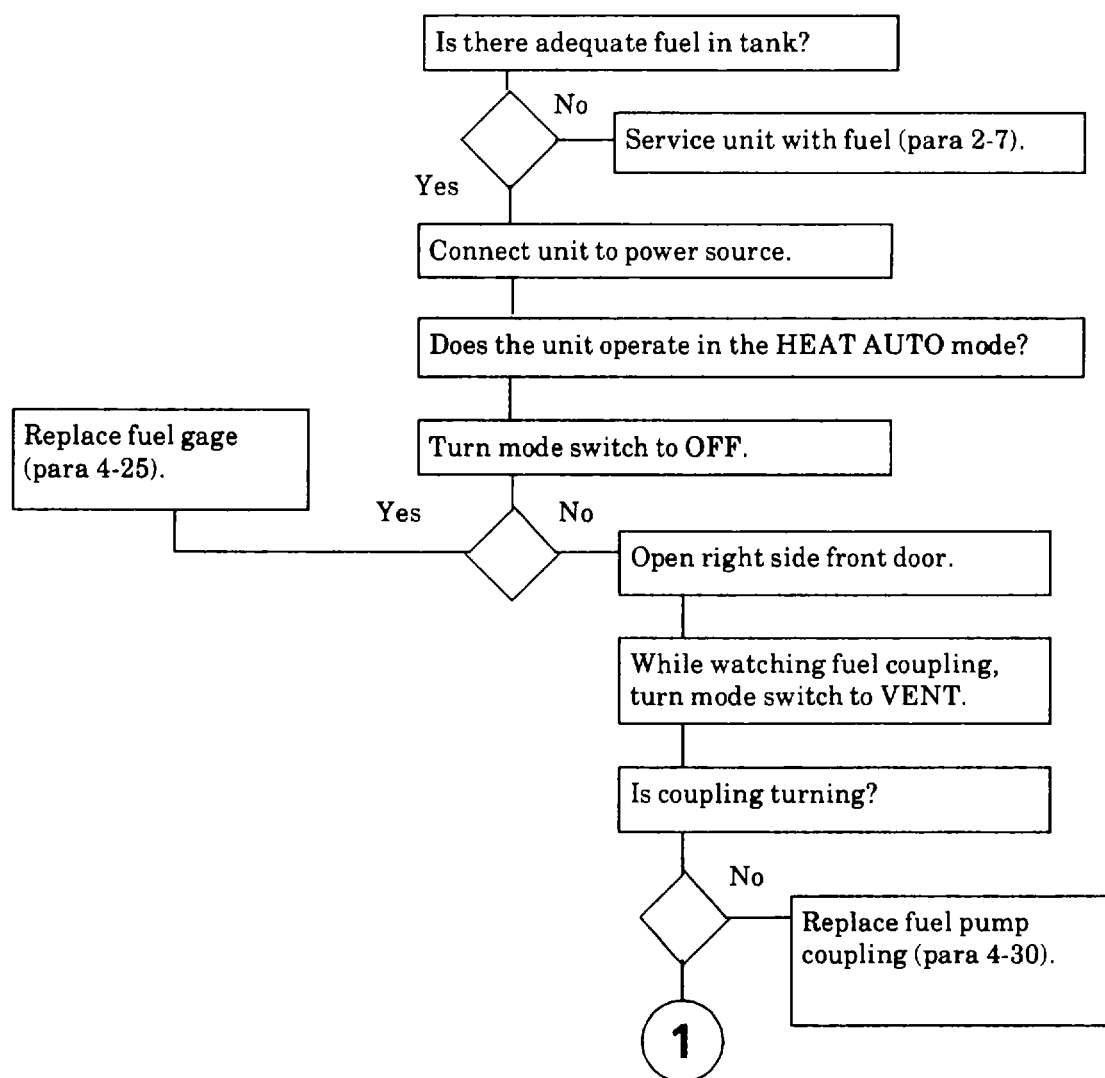


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 5.

## NO FUEL PRESSURE INDICATED - continued.

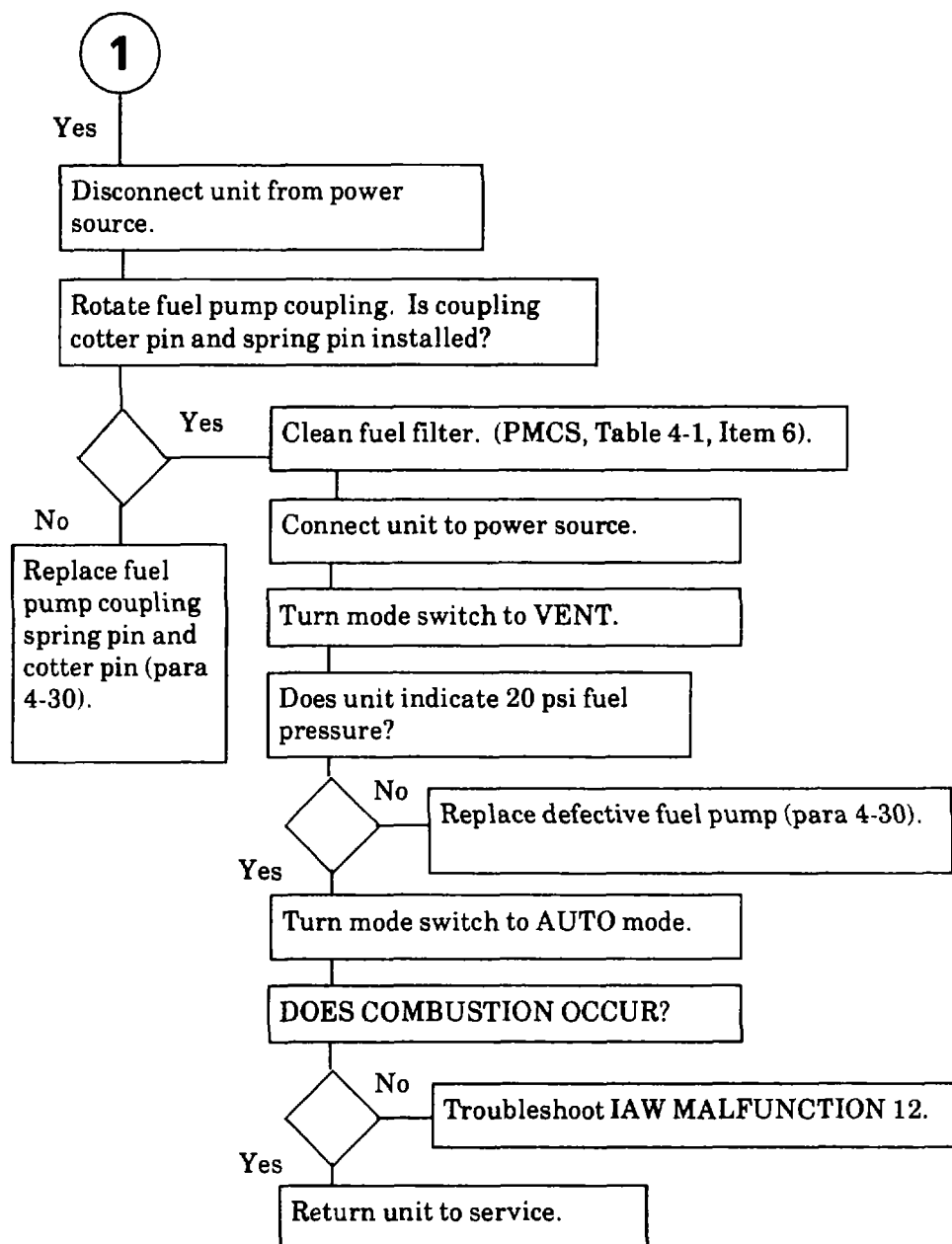


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 6.

## LOW FUEL PRESSURE INDICATED.

## WARNING

Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/No SMOKING signs. Suitable fire extinguisher must be present.

Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible and wet clothes with water before taking them off. In extreme cold conditions, clothes should not be wet; instead, ground yourself to a piece of grounded equipment by taking hold of it before taking off the clothes. Wash skin with warm soapy water.

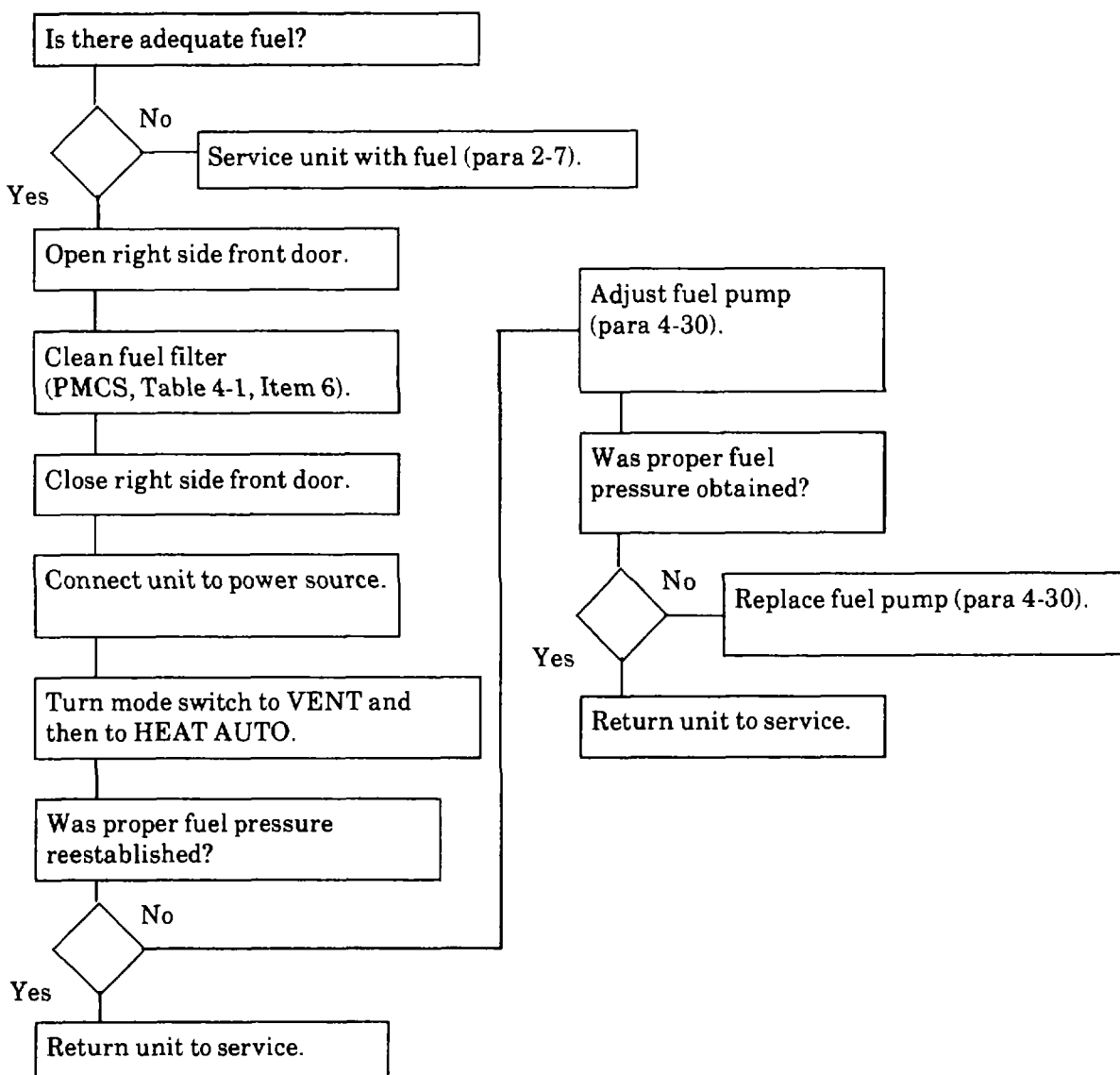


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 7.

## EXCESSIVE BLACK SMOKE IN EXHAUST.

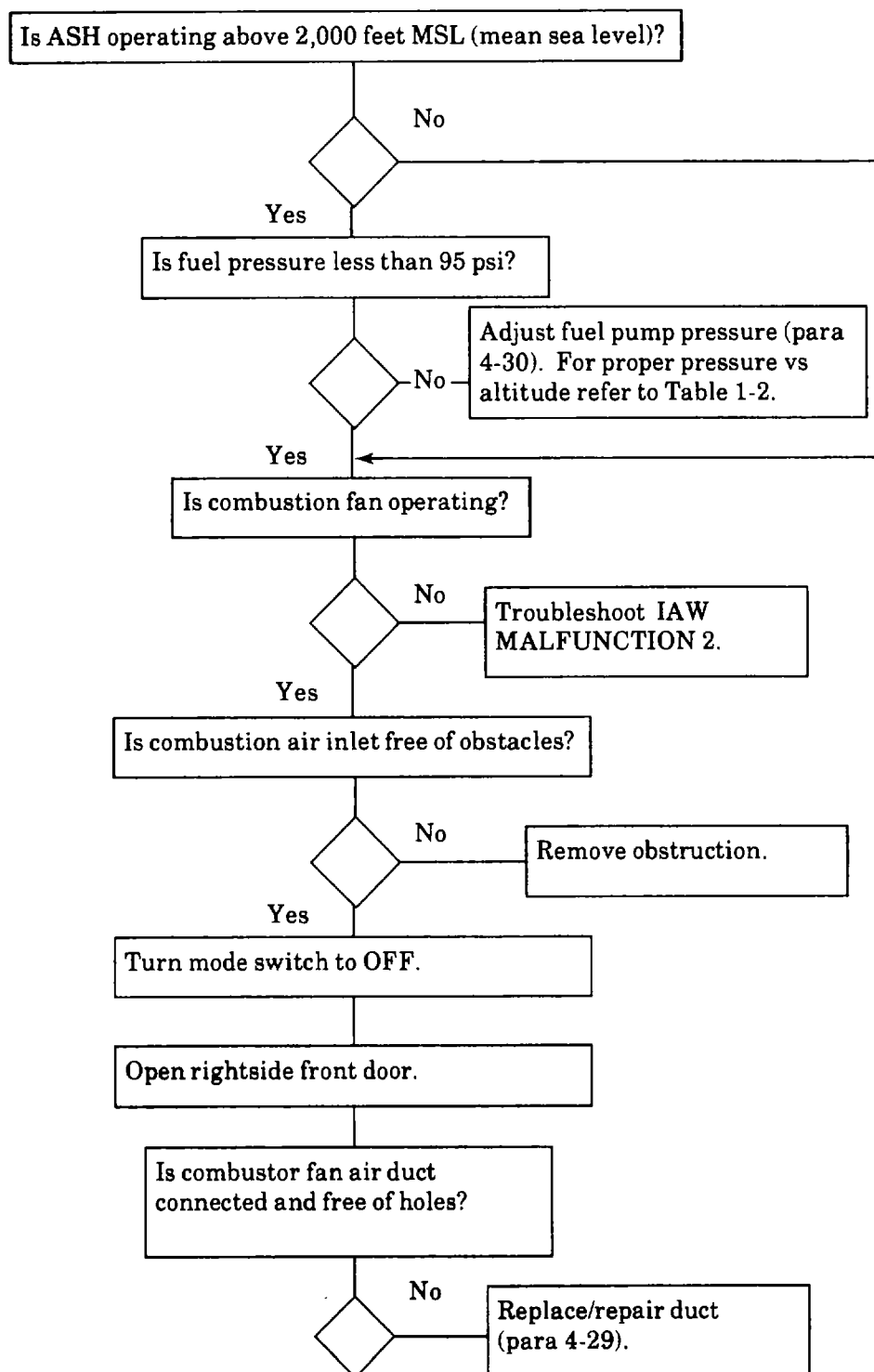


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 8.

## FAN MOTOR SLOWS DOWN, INDICATOR LIGHTS DIM.

## WARNING

Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

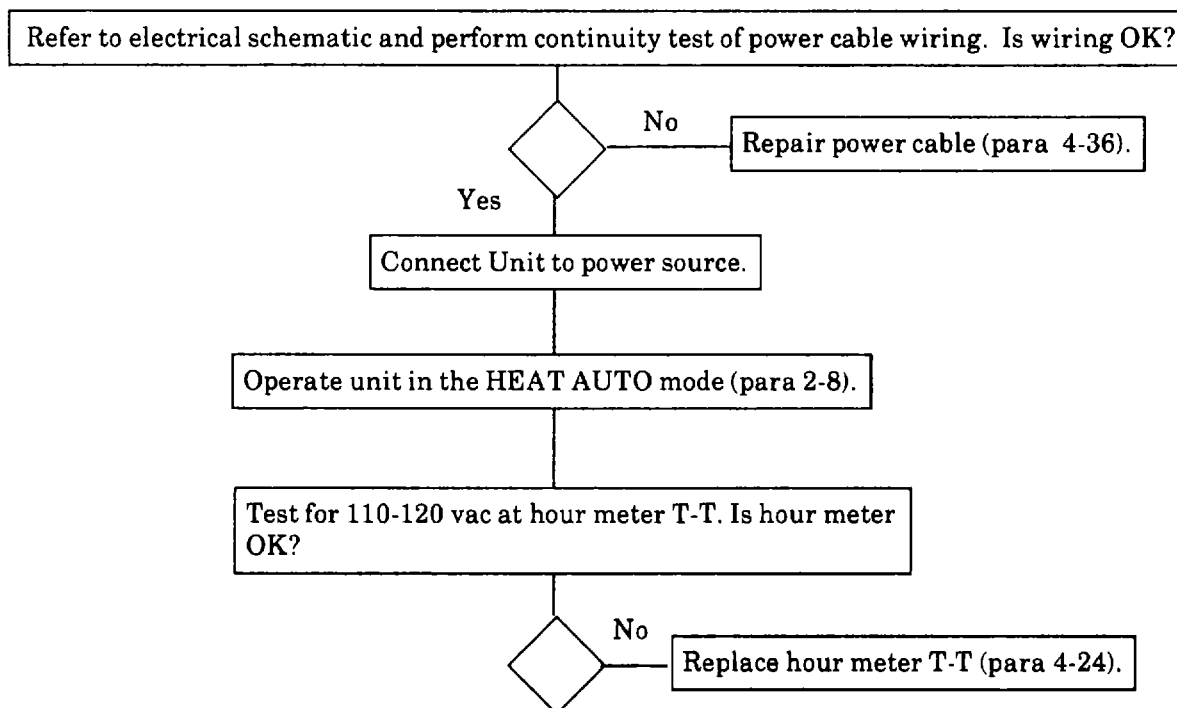


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 9.

## IMPROPER/NO SPARK IN IGNITER.

## NOTE

A straight blue spark inside the burner must be present in all modes (VENT, AUTO, MANUAL) of heater operation to have combustion. Troubleshoot ignition system if spark is not visible or appears weak.

## WARNING

Electrical high voltage cannot be seen, but it can kill you. It is unlike other dangerous things you come in contact with because it gives no warning or symptoms to be wary of. Its effect is immediate. It can kill, render you unconscious, or severely burn you. To ensure your safety and other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.
- 

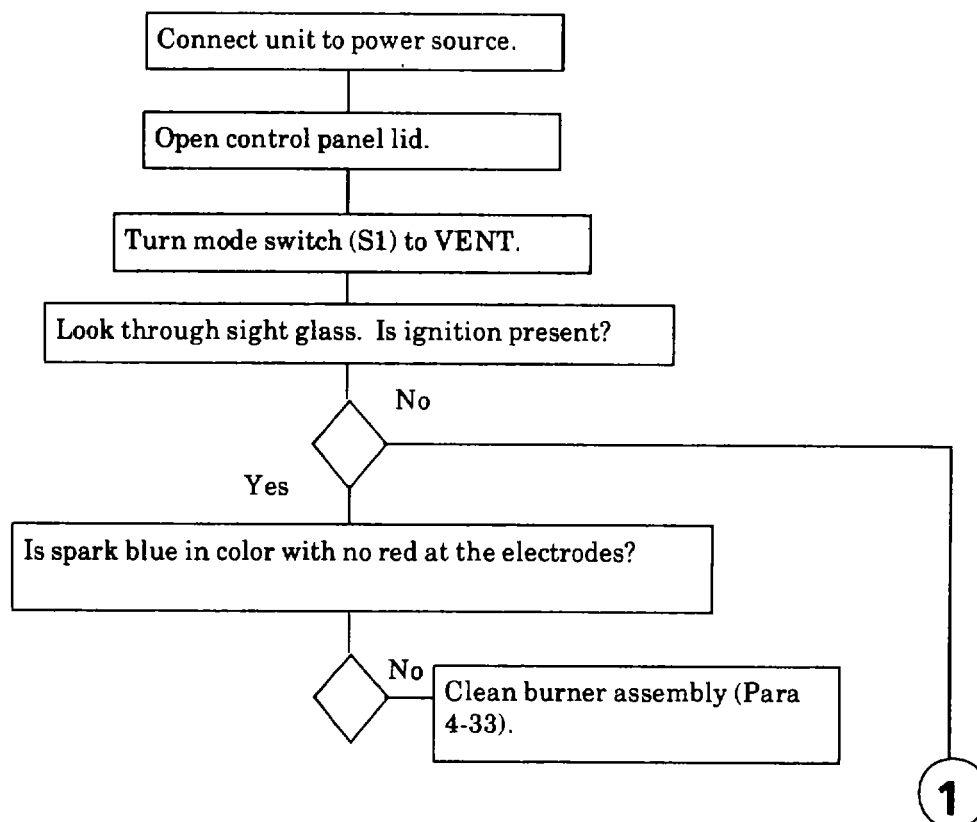




Table 4-2. UNIT TROUBLESHOOTING - continued.

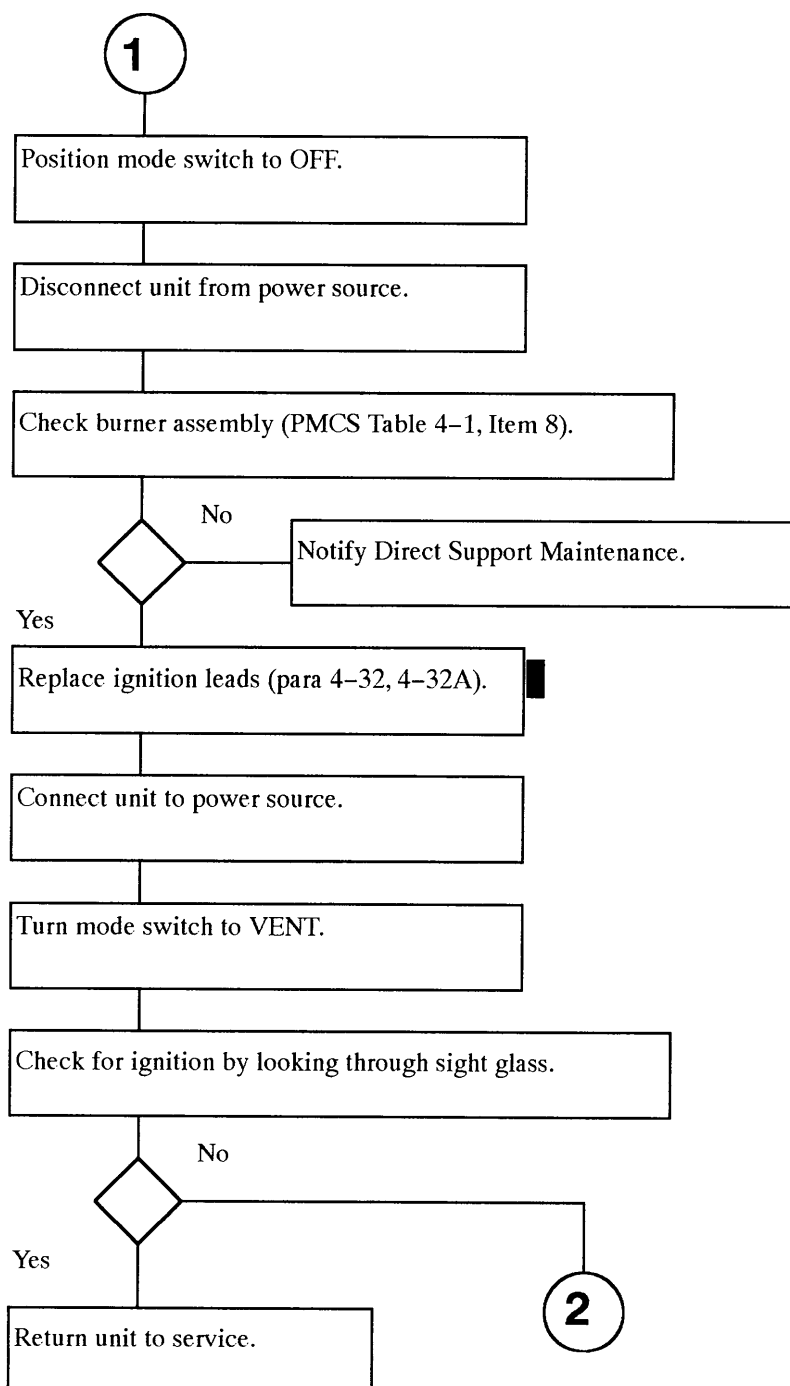
**MALFUNCTION 9. IMPROPER/NO SPARK IN IGNITER - continued.**

Table 4-2. UNIT TROUBLESHOOTING - continued.

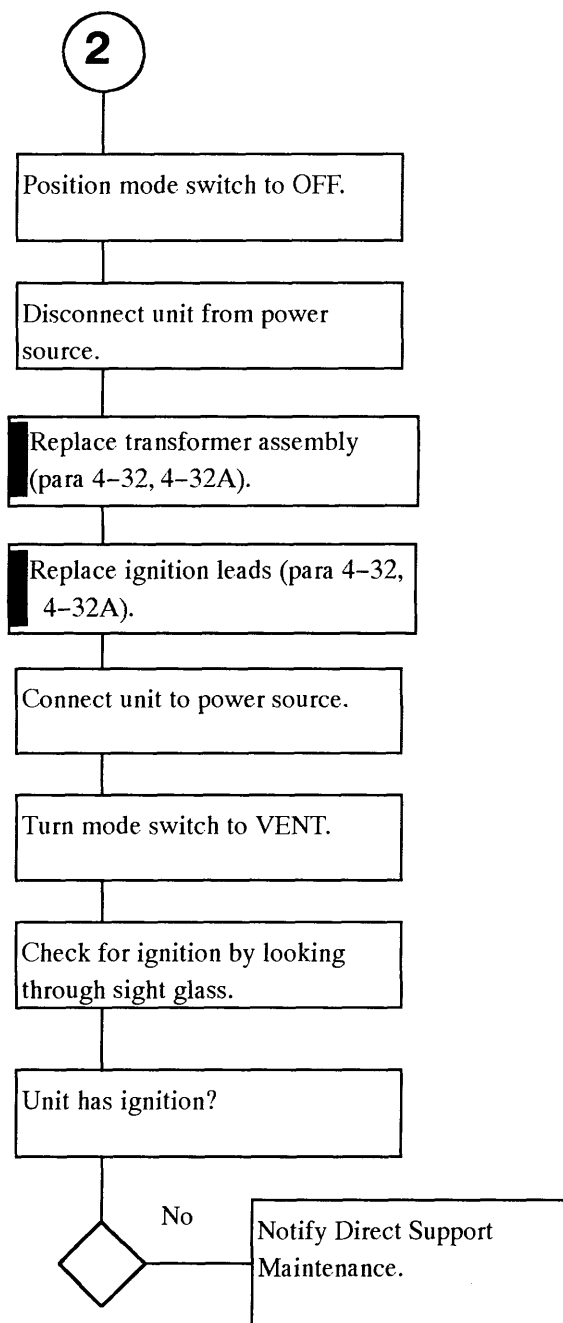
**MALFUNCTION 9. IMPROPER/NO SPARK IN IGNITER - continued.**

Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 10.

## UNIT BACKFIRES OR RUMBLES IN AUTO AND/OR MANUAL HEAT MODES

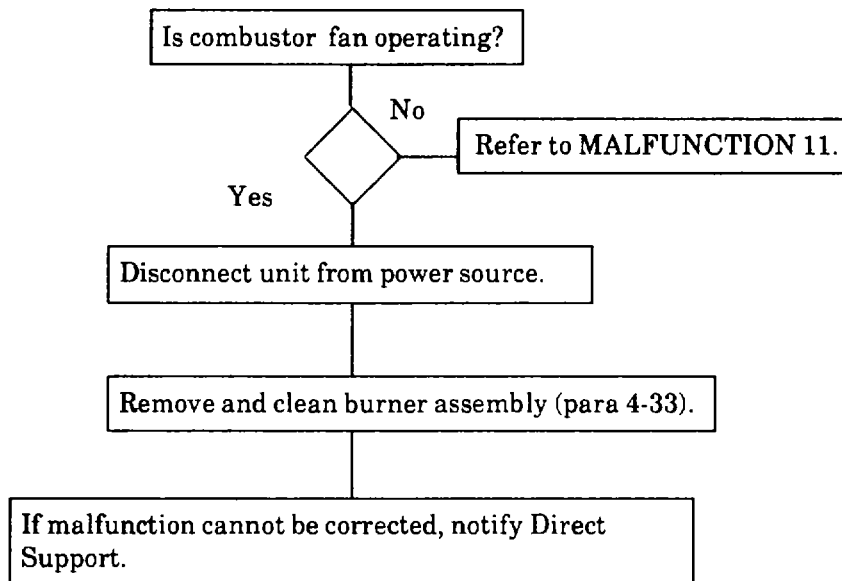


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 11.

COMBUSTOR FAN DOES NOT OPERATE (BLACK EXHAUST SMOKE AND LOUD RUMBLE).

## WARNING

Electrical high voltage cannot be seen, but it can kill you. It is unlike other dangerous things you come in contact with because it gives no warning or symptoms to be wary of. Its effect is immediate. It can kill, render you unconscious, or severely burn you. To ensure your safety and other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

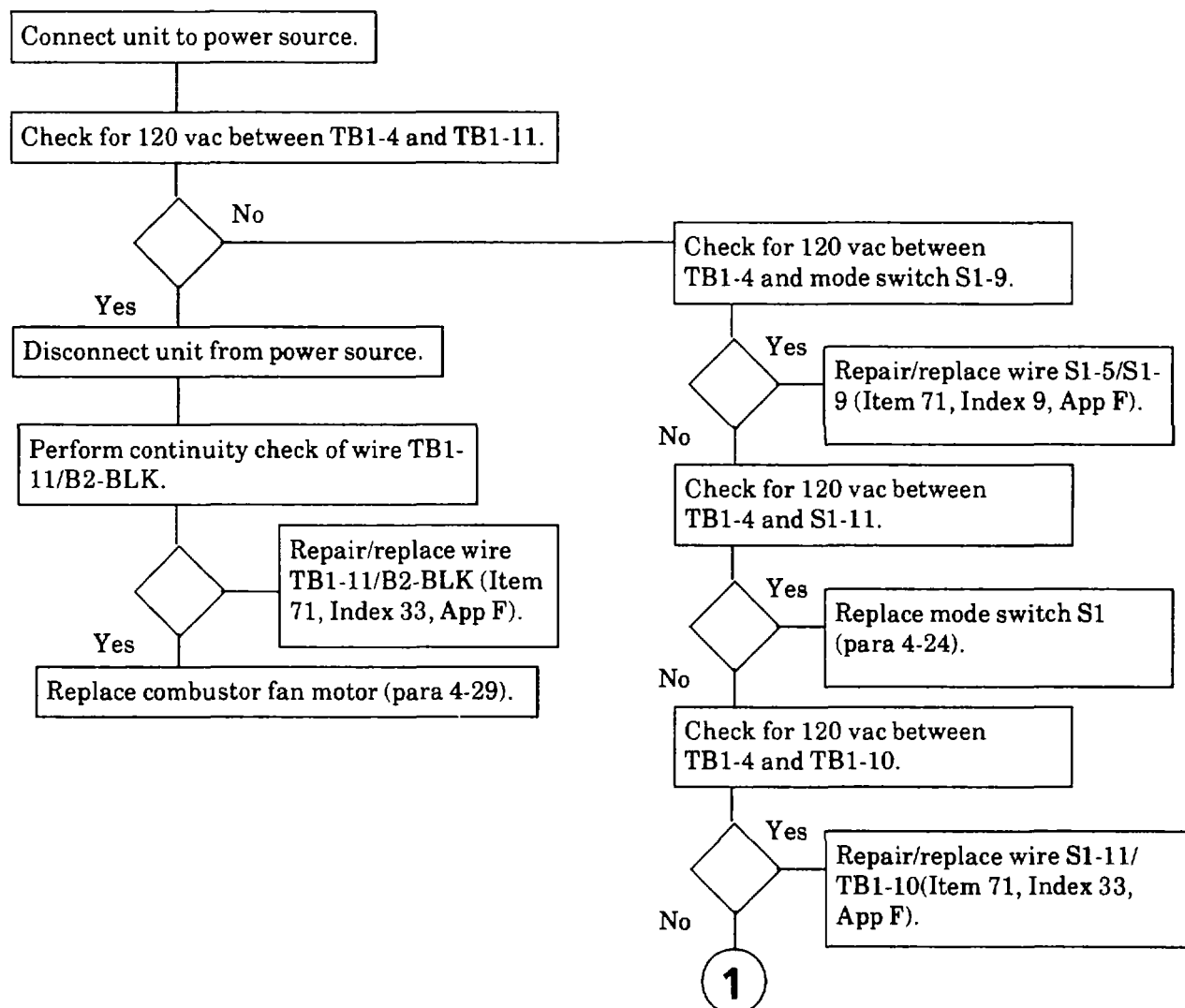


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 11.

## COMBUSTOR FAN DOES NOT OPERATE (BLACK EXHAUST SMOKE AND LOUD RUMBLE)-continued.

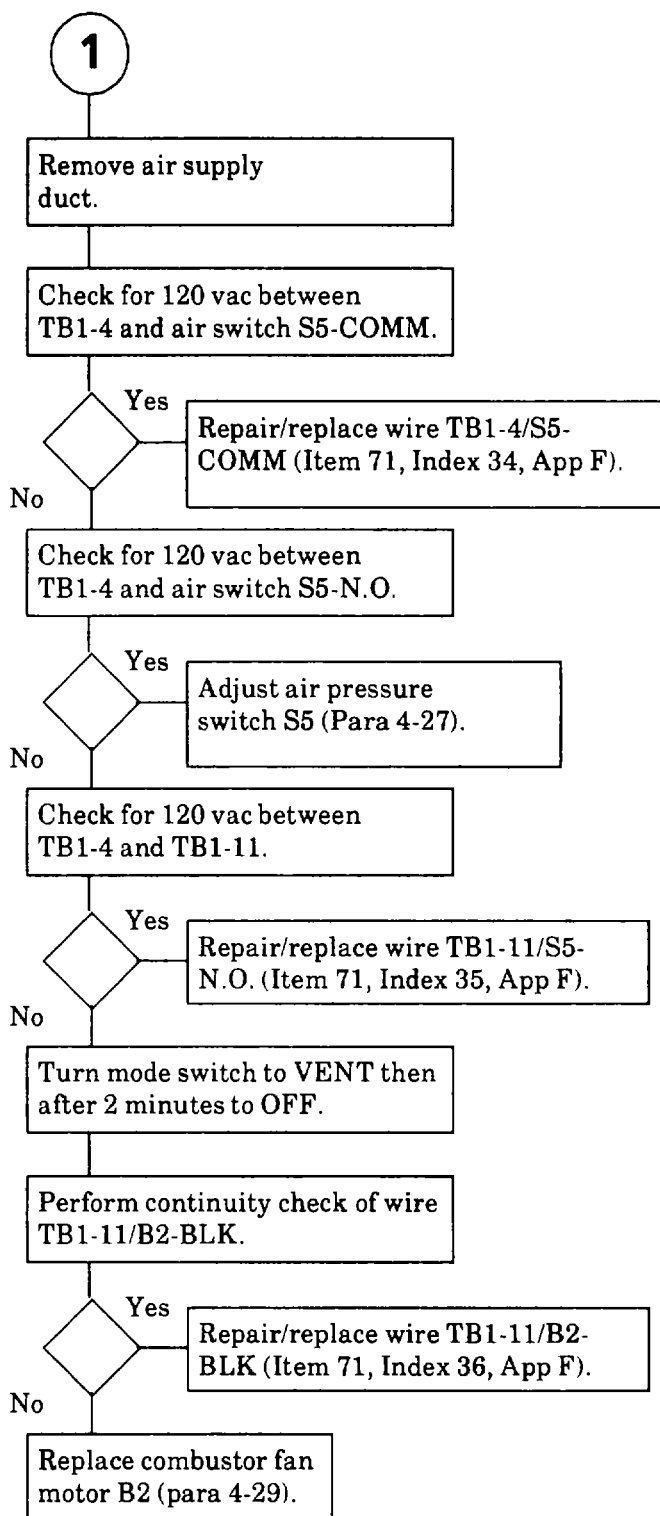
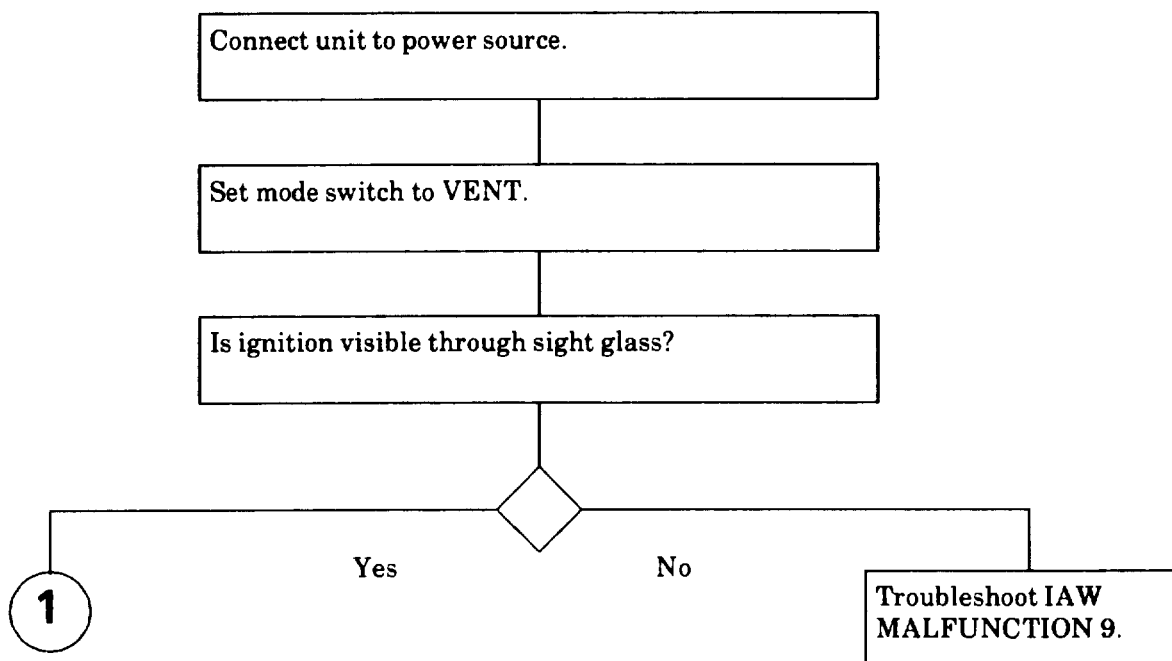


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE.

**WARNING**

Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE - continued.

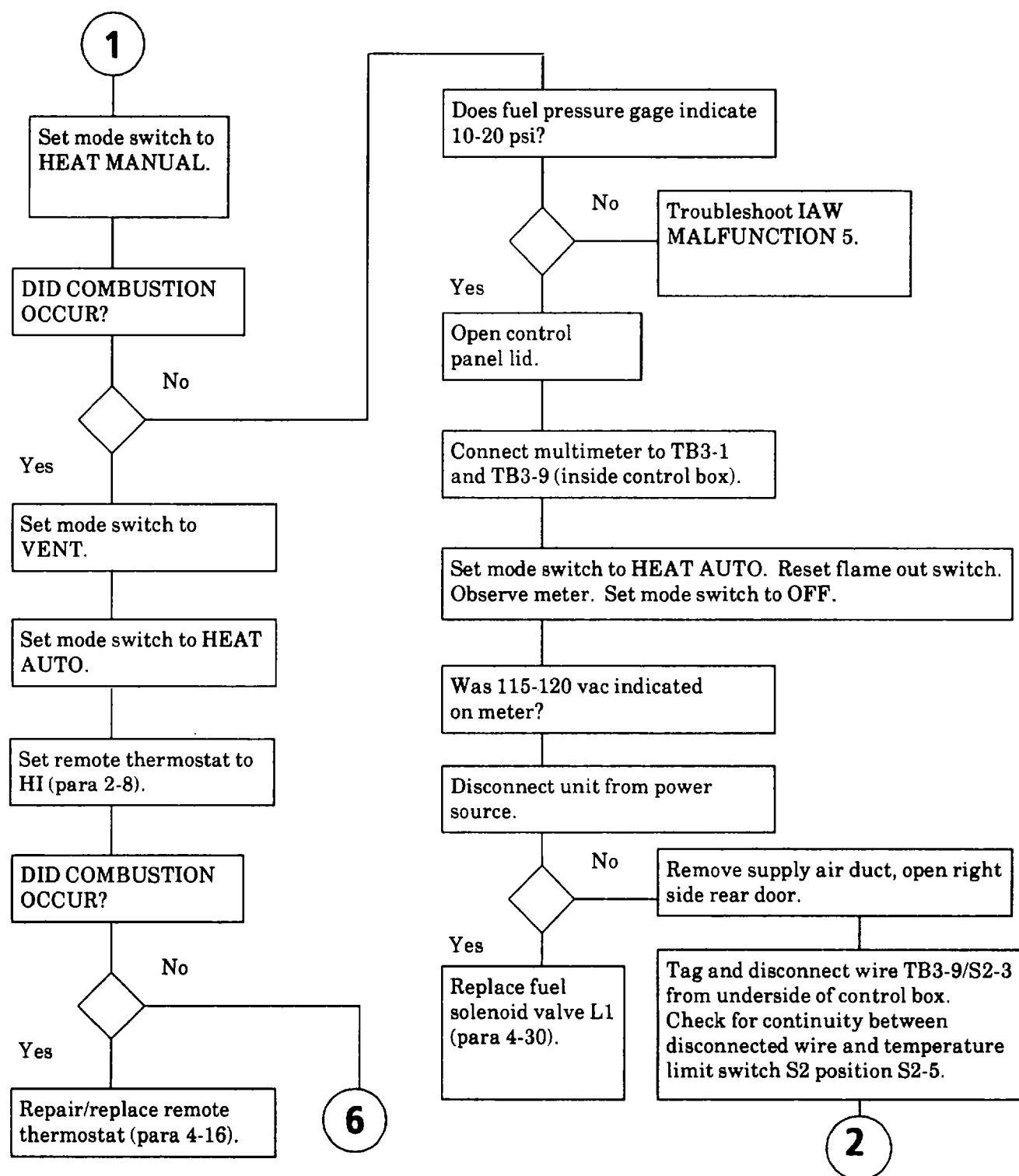


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE - continued.

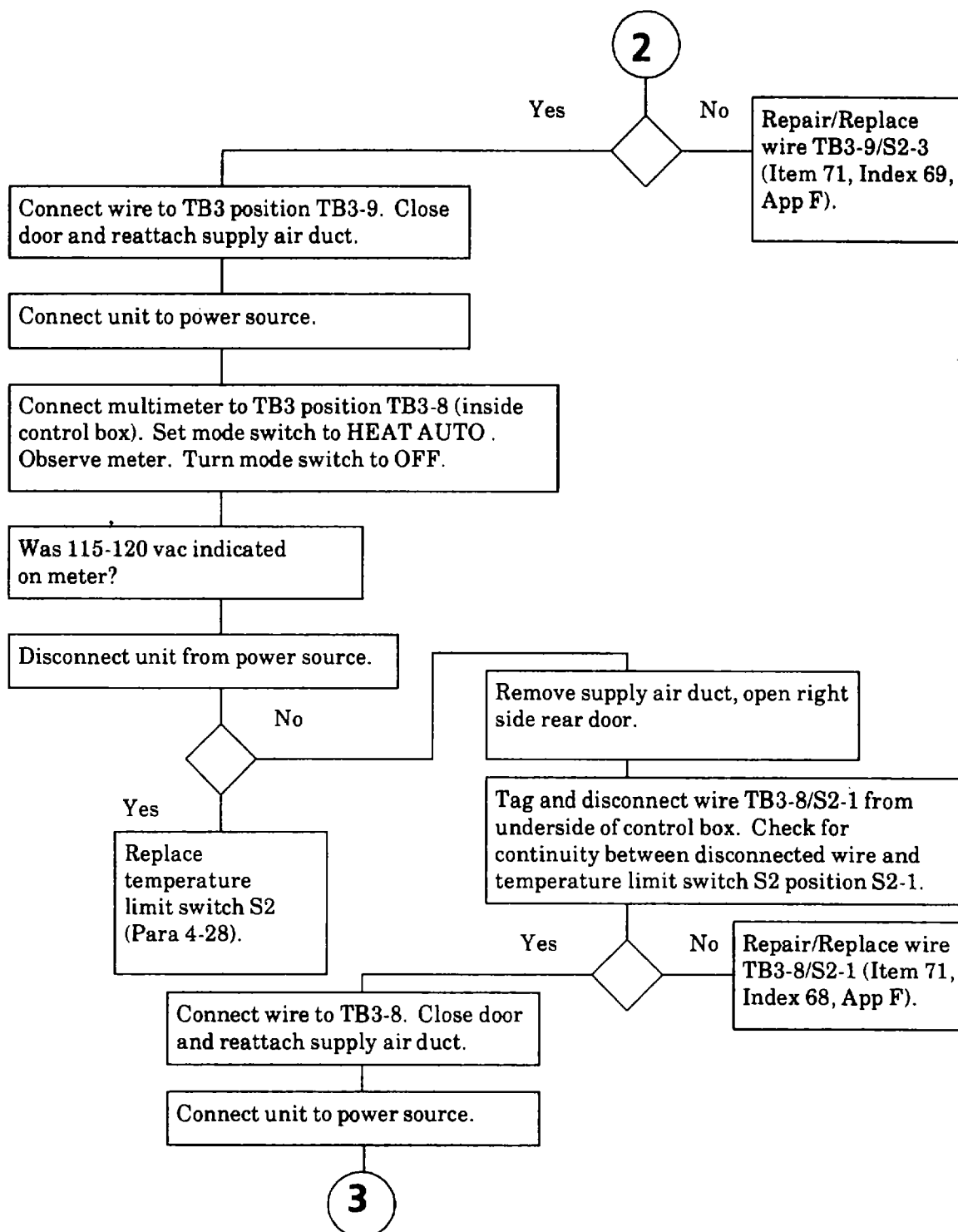




Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE - continued.

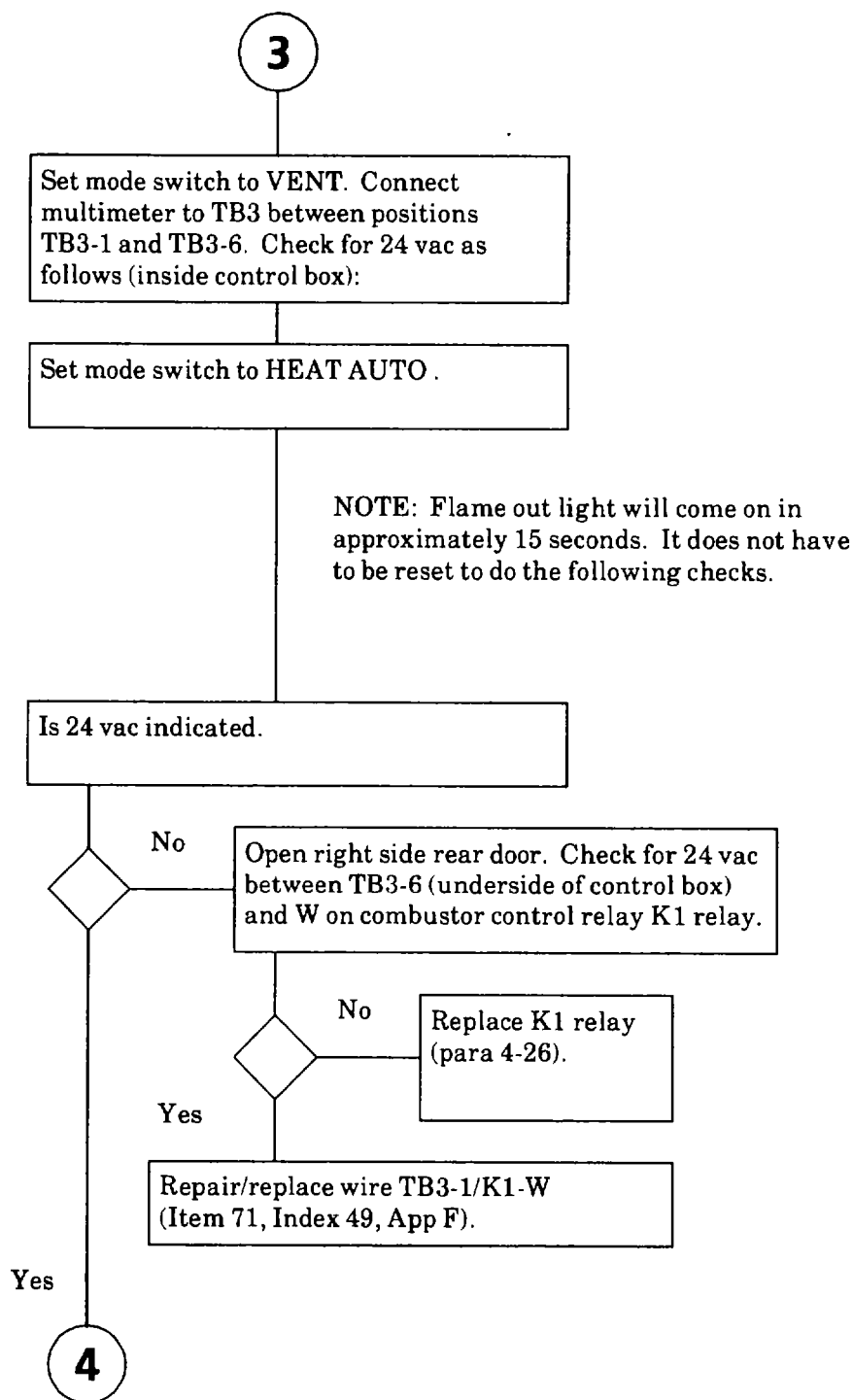


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE - continued.

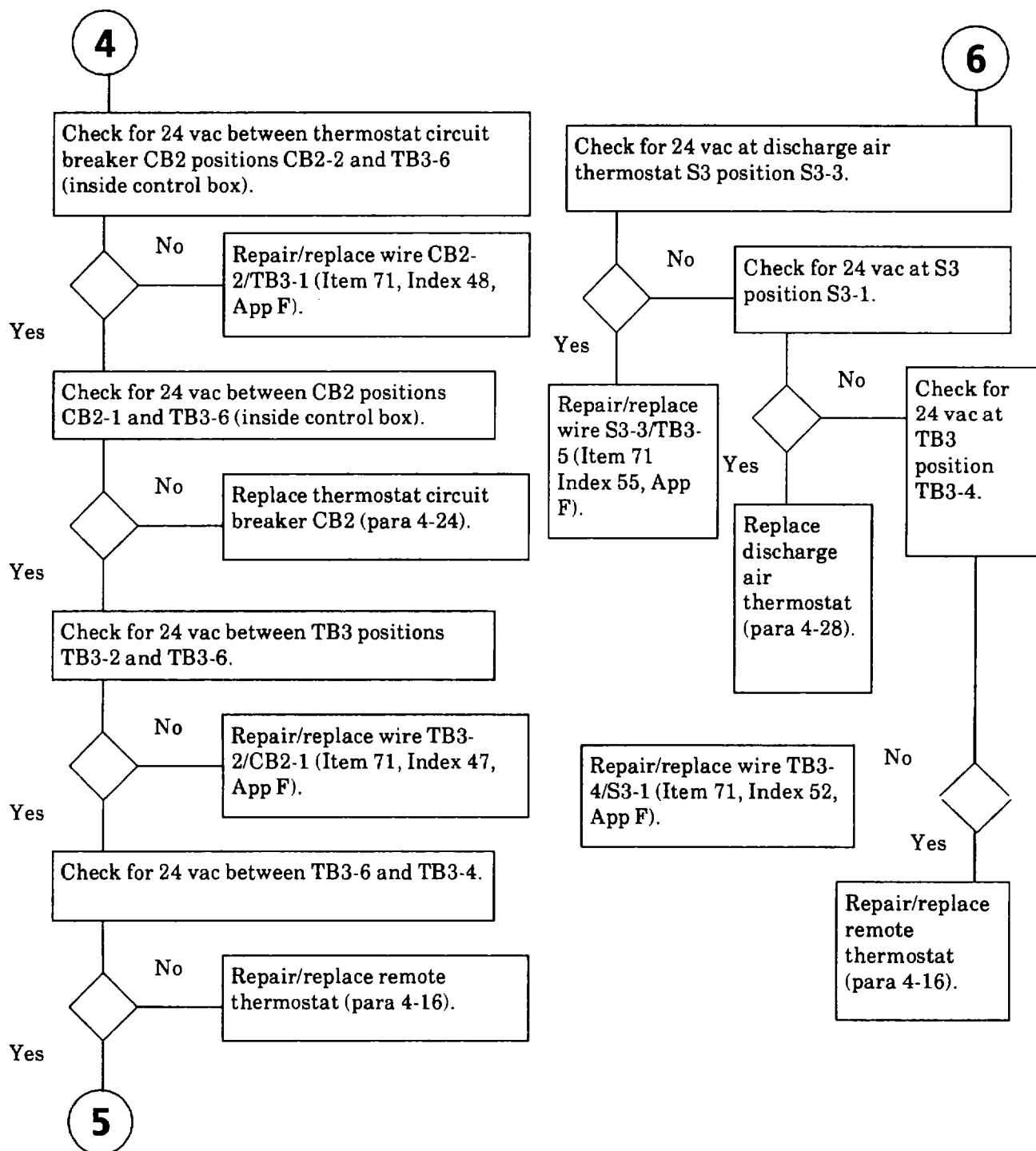


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 12.

## NO COMBUSTION IN HEAT AUTO MODE - continued.

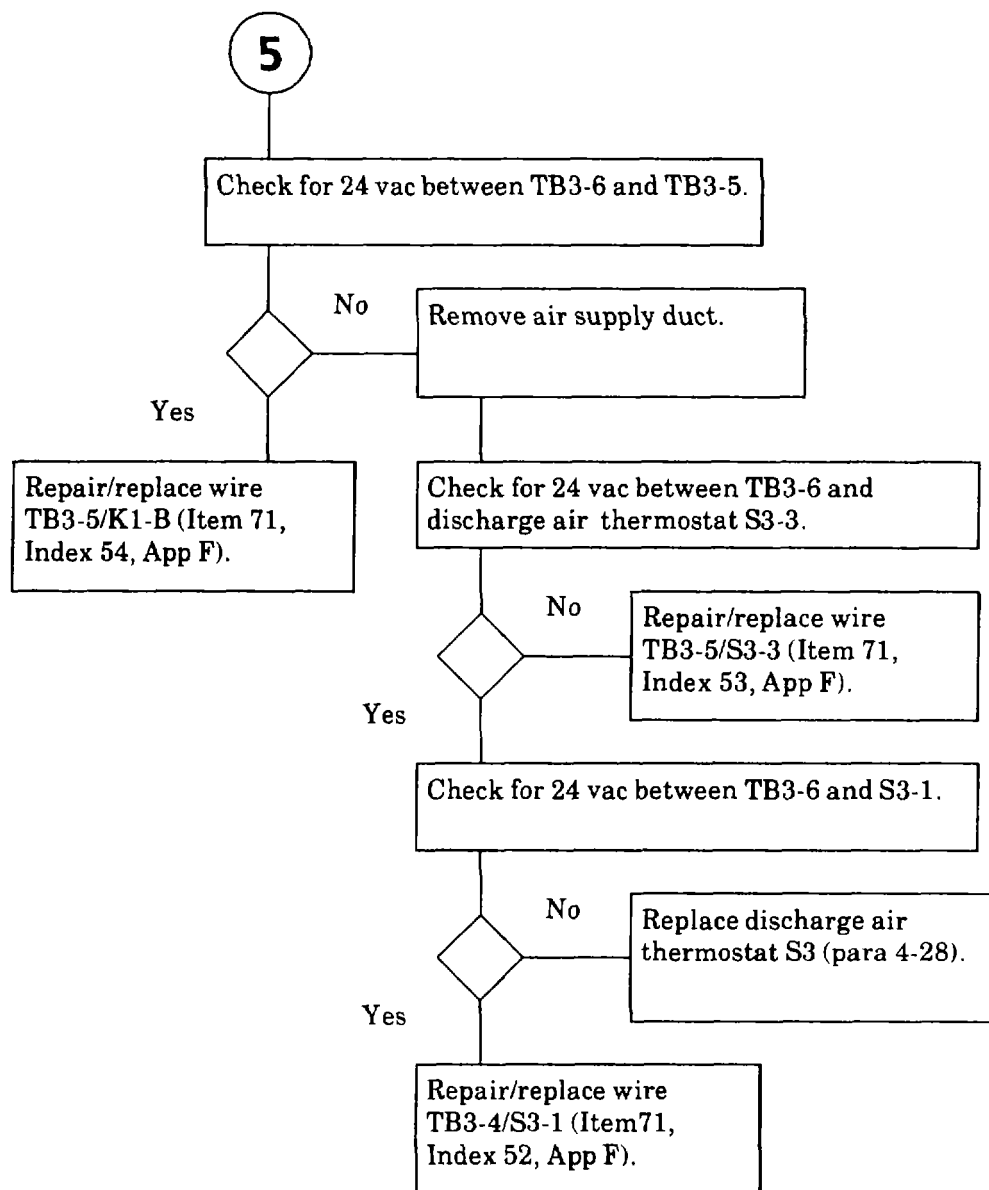


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 13.

## NO COMBUSTION IN HEAT MANUAL MODE.

## WARNING

Electrical high voltage cannot be seen, but it can kill you. It is unlike other dangerous things you come in contact with because it gives no warning or symptoms to be wary of. Its effect is immediate. It can kill, render you unconscious, or severely burn you. To ensure your safety and other maintenance personnel, always observe the following precautions:

- DO NOT perform maintenance on electrical equipment unless all power is removed.
- BE CERTAIN there is someone assisting you who can remove power immediately.
- ALWAYS place POWER OFF warning tags on power supply switches so that no one will apply power while you are performing maintenance.
- FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.

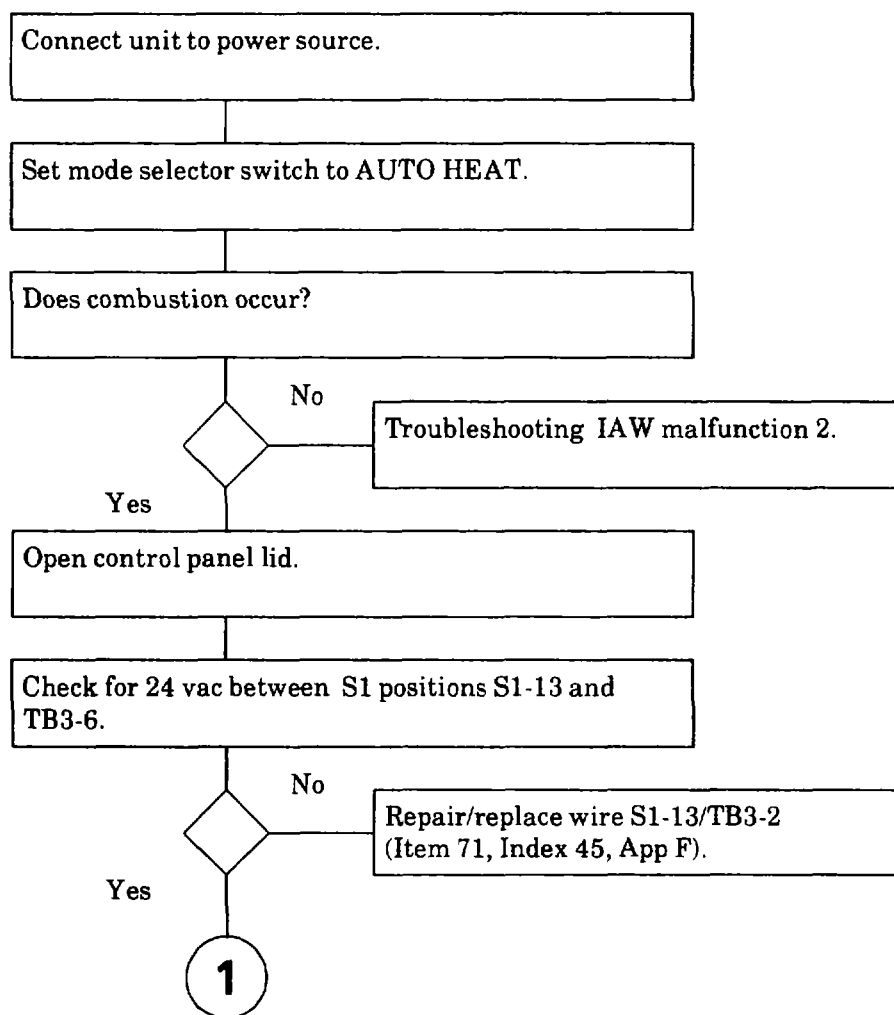
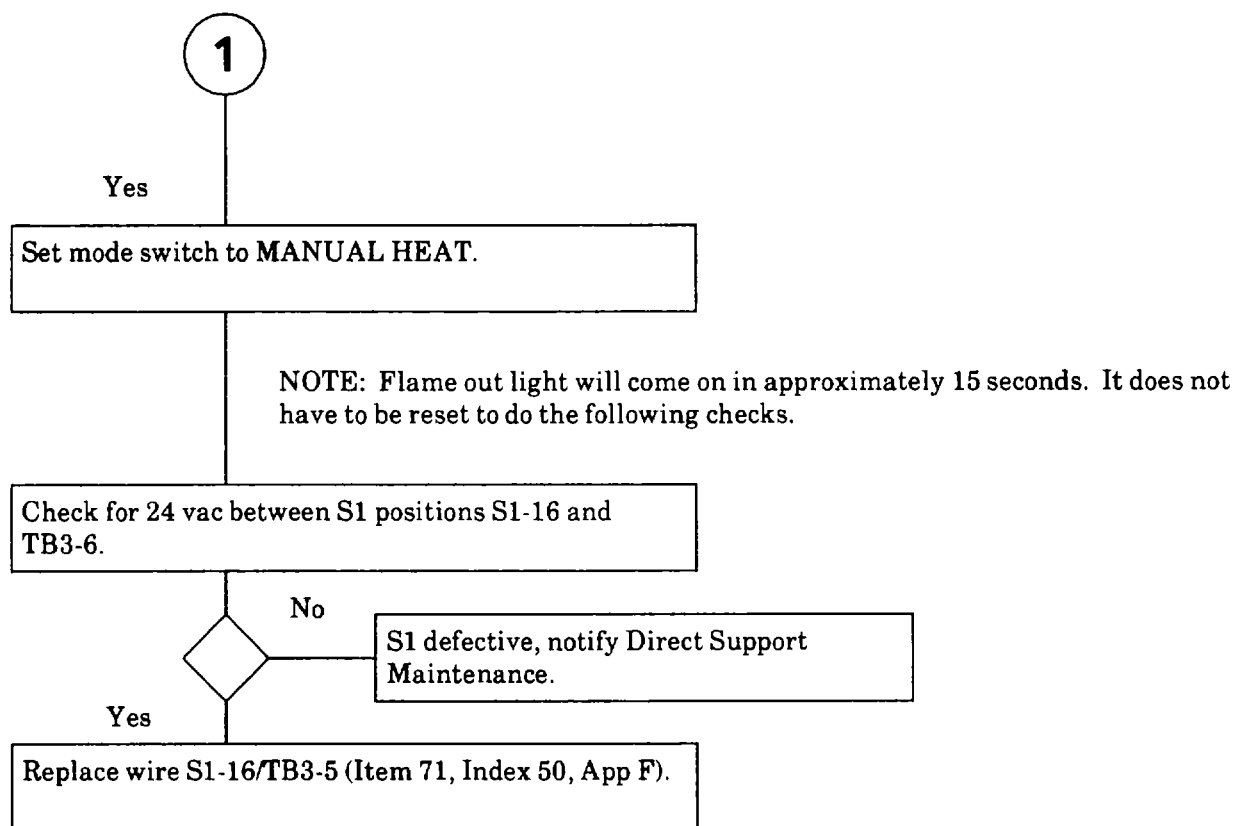


Table 4-2. UNIT TROUBLESHOOTING - continued.

## MALFUNCTION 13.

## NO COMBUSTION IN HEAT MANUAL MODE.



## Section VI. UNIT MAINTENANCE PROCEDURES

---

### 4-11. GENERAL.

This section contains instructions for performing unit level maintenance on the ASH unit.

### 4-12. PERSONNEL SAFETY.

Personnel must remove all items of jewelry (rings, bracelets, watches, necklaces, etc.) and loose clothing before working on equipment. Jewelry and loose fitting clothing can get caught in moving equipment and result in injury to personnel.

When performing maintenance of the ASH unit, keep in mind the purpose of the equipment is to provide heated or vent air circulation for personnel shelters. Cleaning fluids, lubricants, preservatives, paint or other chemicals must not be allowed to contaminate the interior of the unit.

Operate the equipment after performing maintenance to ensure repairs have been performed correctly and equipment can be returned to service.

### 4-13. PROPER EQUIPMENT.

Obtain proper equipment before starting maintenance. This includes hand tools and/or special tools, receptacles for storing small parts and expendable materials required by the maintenance task.

---

**4-14. EXHAUST PIPE.**

---

This task consists of: a. Removal b. Cleaning c. Inspection d. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
Brush, Medium Bristle (Item 2, App B)

**Equipment Conditions:**

Unit disconnected from power source (para 2-8)

**General Safety Requirements:****WARNING**

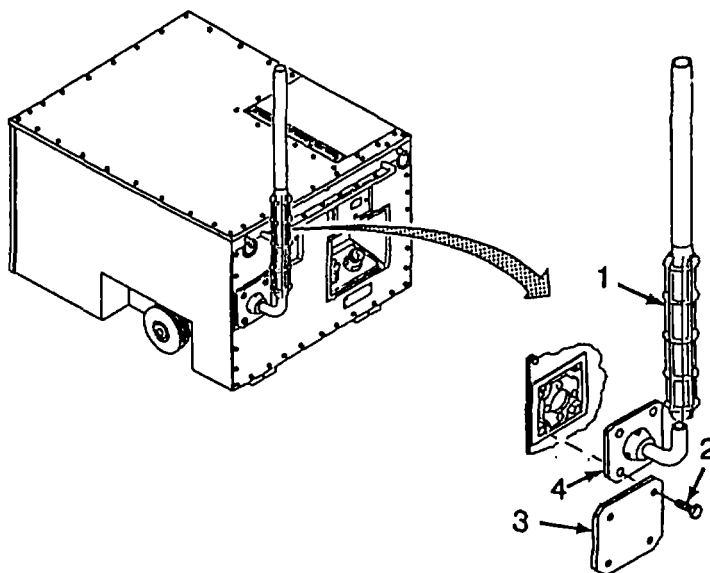
Allow unit to cool down before attempting service/inspection/maintenance activity.

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

a. Removal (Refer to Figure 4-8)

- (1) Remove pipe and guard assembly (1).
- (2) Remove four screws (2), exhaust cover plate (3) and exhaust elbow (4).



**Figure 4-8. Exhaust Pipe (Sheet 1 of 2)**

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**4-14. EXHAUST PIPE - continued.**

---

**b. Cleaning**

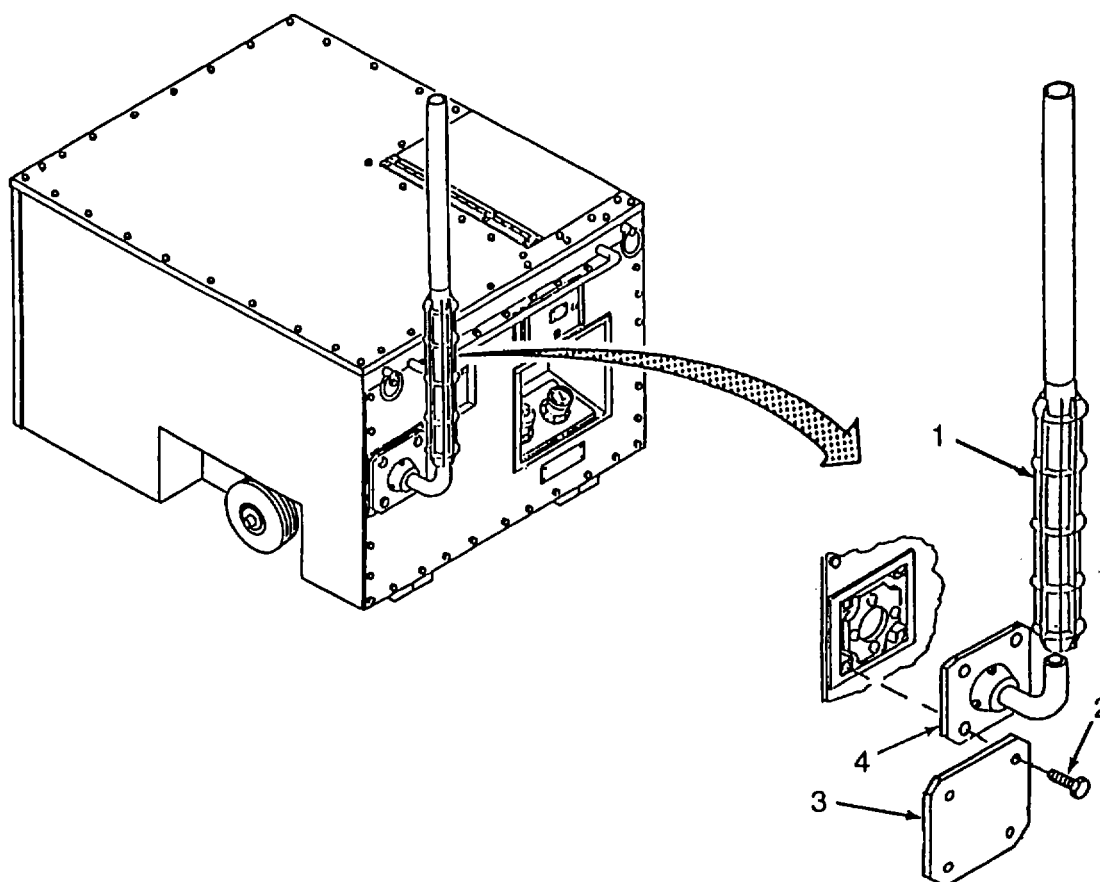
Clean exhaust pipe section interiors and exteriors with a medium bristle brush (Item 2, App B) to remove dirt and soot.

**c. Inspection**

- (1) Inspect screws (2) for stripped or damaged threads.
- (2) Inspect exhaust elbow (4) for cracked welds, cracked or damaged mounting plate.
- (3) Inspect pipe and guard assembly (1) for dents, holes, cracks, broken welds, corrosion and secure mounting.

**d. Installation**

- (1) Install exhaust elbow (4). Install exhaust cover plate (3) on bottom mount and install four screws (2).
- (2) Install pipe and guard assembly (1) onto exhaust elbow (4).



**Figure 4-8. Exhaust Pipe (Sheet 2 of 2)**



---

#### 4-15. DUCT ASSEMBLY.

---

This task consists of:    a. Removal        b. Inspection        c. Cleaning  
                                      d. Repair            e. Installation

---

#### INITIAL SETUP:

##### **Tools:**

Tool Kit, General Mechanics (Item 1, App B)

##### **General Safety Requirements:**

##### **WARNING**

##### **Equipment Condition:**

Unit disconnected from power source (para 2-8)

**Allow unit to cool down before attempting service/inspection/maintenance activity.**

##### **Material/Parts:**

Mild Soap (Item 10, App E)

Pressure Sensitive Tape (Item 14, App E)

Rags (Item 2, App E)

##### **WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

##### **NOTE**

**Removal and installation is typical for both ducts.**

- a. Removal (Refer to Figure 4-9)

Loosen clamps (1) on both ends of duct (2) and remove from unit (3) and shelter connector.

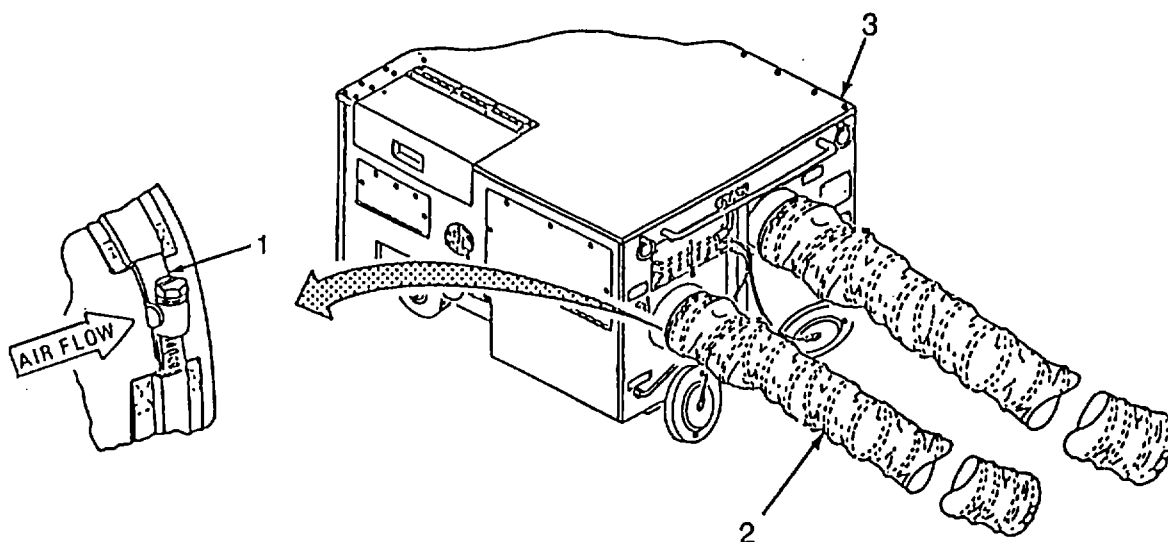


Figure 4-9. Duct Assembly (Sheet 1 of 2)

**4-15. DUCT ASSEMBLY - continued.****b. Inspection**

- (1) Inspect clamps (1) for damaged screw head, deformed slots on strap, corrosion or broken strap.
- (2) Inspect duct (2) for rips, tears and deterioration.
- (3) Inspect duct (2) stiffener for bends and breaks.

**c. Cleaning**

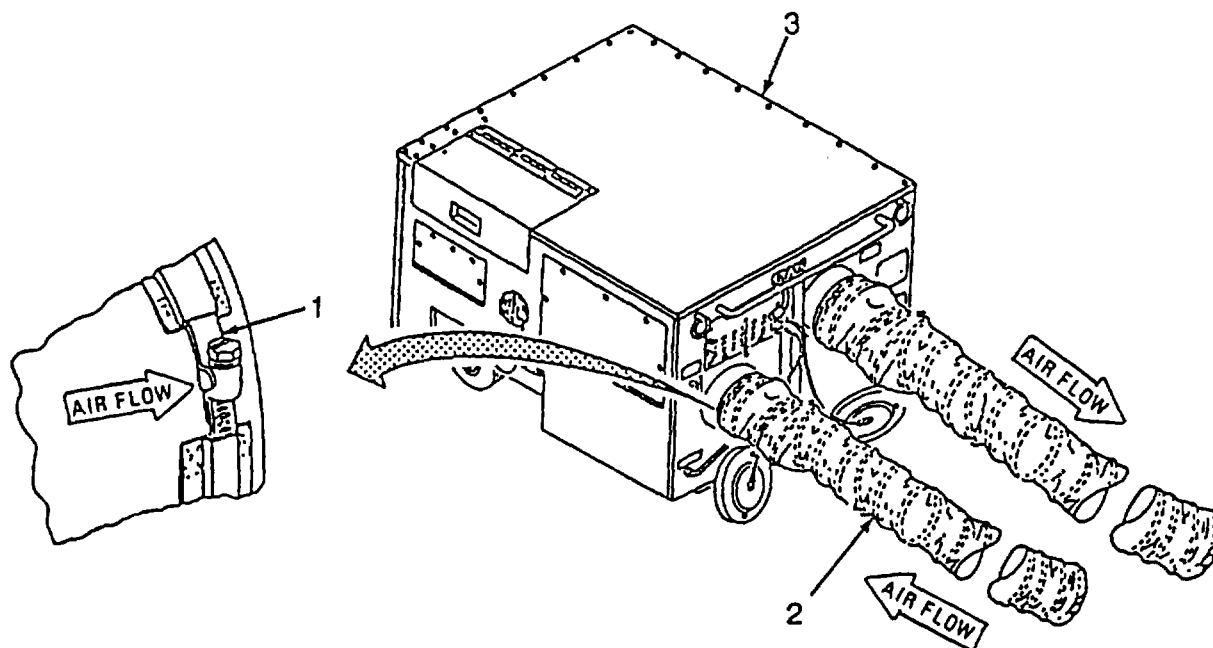
- (1) Clean the duct (2) using a mild solution of soap (Item 10, App E) and water.
- (2) Rinse thoroughly with clean water.
- (3) Allow to dry completely.

**d. Repair**

- (1) Small tears and holes may be repaired by patching with pressure sensitive tape (Item 14, App E).
- (2) Replace ducts (2) if clamps (1) are damaged or large tears or holes are present in fabric.

**e. Installation (Refer to Figure 4-9)**

- (1) Install duct (2) on unit (3) with arrow facing direction of air flow.
- (2) Install other end of duct (2) to shelter connector.
- (3) Tighten clamps (1) on both ends of duct (2) securely.

**Figure 4-9. Duct Assembly (Sheet 2 of 2)**

---

**4-16. REMOTE CONTROL THERMOSTAT.**

---

This task consists of:   a. Disassembly                   b. Inspection  
                              c. Repair                       d. Assembly

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

Soldering Iron (Item 2, App B)

Tool Kit, Electrical Connector Repair (Item 2, App B)

a. Disassembly (Refer to Figure 4-10)

- (1) Remove remote control thermostat (1) from unit (2).
- (2) Remove four screws (3) and cover (4) from rear of remote thermostat box (5).
- (3) Remove three screws (6), tag and remove three wires (7) from TB2 (8).
- (4) Loosen nut (9) and remove cable (10) from remote thermostat box (5).
- (5) Remove nut (11) and connector (12).

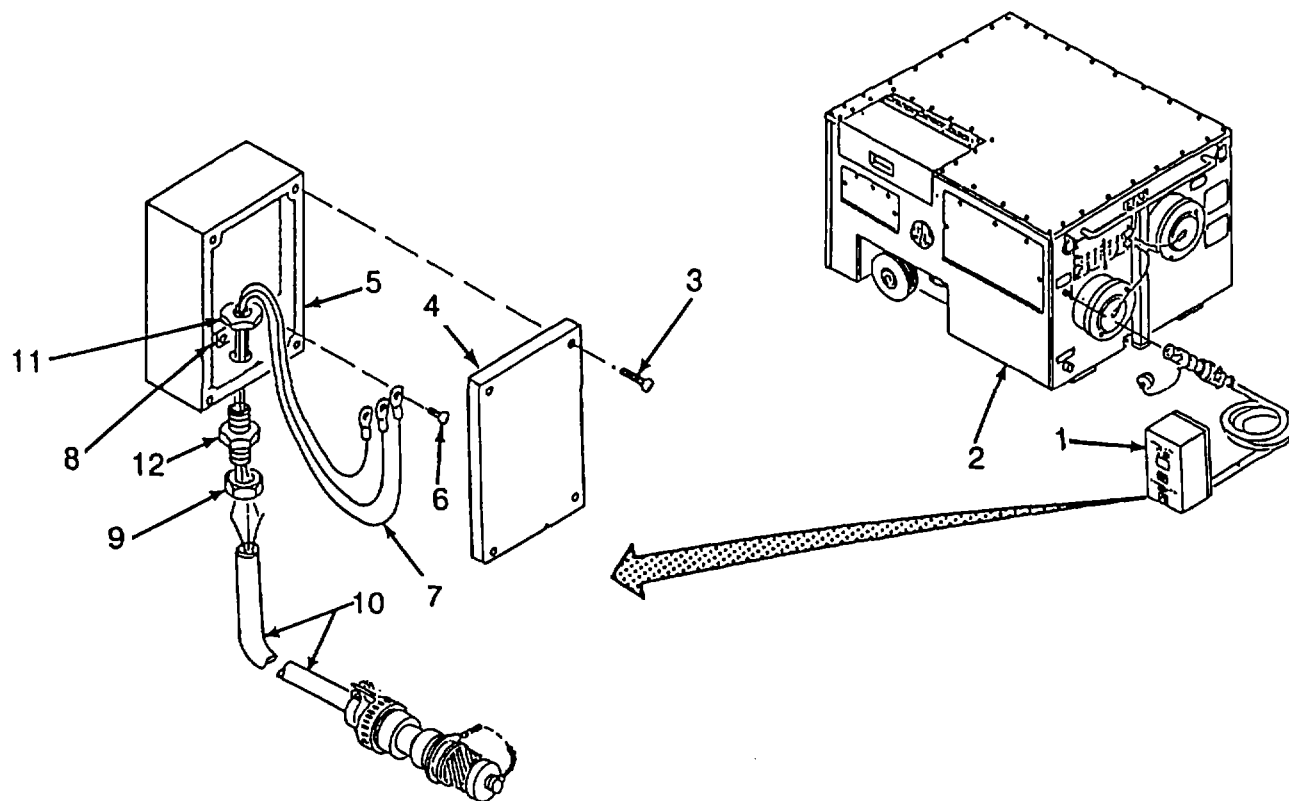


Figure 4-10. Remote Control Thermostat Disassembly

---

**4-16. REMOTE CONTROL THERMOSTAT - continued.**

---

**b. Inspection**

- (1) Inspect connection for secure mounting, burnt, broken or bent terminals and corrosion.
- (2) Inspect cable for cracked, burnt, or deteriorated insulation and exposed conductor.
- (3) Inspect lug terminal for secure mounting and signs of burning and corrosion.

**c. Repair (Refer to Figure 4-11)**

- (1) Repair of remote thermostat box is limited to replacement if damaged.
- (2) Repair of cable assembly consists of replacing damaged parts with new parts. If cable (1) is damaged the complete assembly must be replaced.
  - (a) Cut strap (2) from connector plug (3) and remove cover assembly (4).
  - (b) Remove two screws (5), two nuts (6) and two saddles (7).
  - (c) Unscrew clamp (8) and slide clamp, grommet follower (9), grommet (10), and rubber bushing (11) down on cable (1).
  - (d) Unscrew sleeve (12) from connector plug (3) and down on cable (1).
  - (e) Tag three wires (13), (14) and (15).
  - (f) Cut connector plug (3) from cable (1).
  - (g) Slide sleeve (12), bushing (11), grommet (10), grommet follower (9), and clamp (8) from cable (1).

## 4-16. REMOTE CONTROL THERMOSTAT - continued.

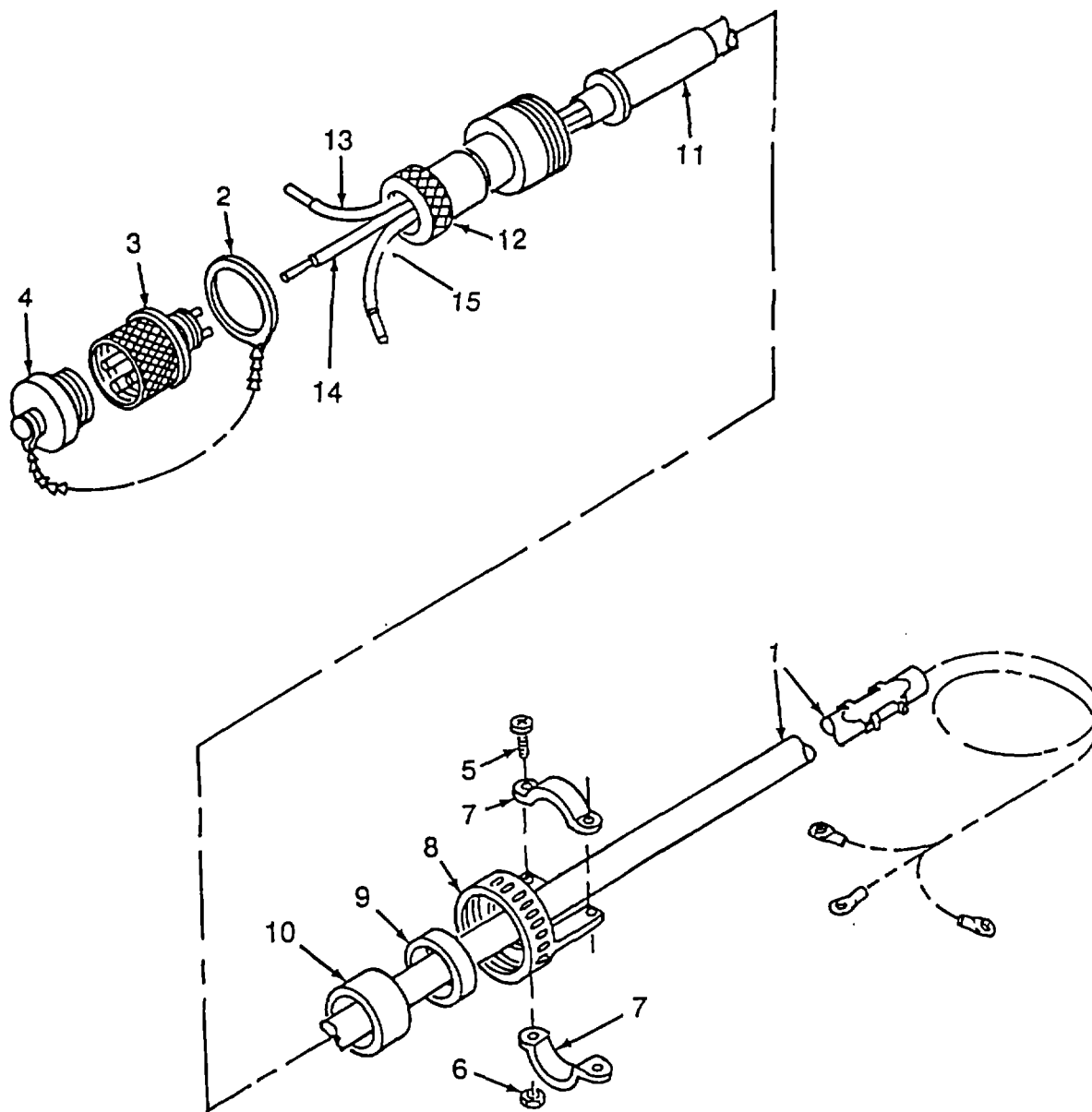


Figure 4-11. Remote Control Thermostat Repair(Sheet 1 of 3)

**4-16. REMOTE CONTROL THERMOSTAT - continued.**

c. Repair - continued (Refer to Figure 4-11)

- (h) Slide cable clamp (8), grommet follower (9), grommet (10), rubber bushing (11), and sleeve assembly (12) on cable (1).
- (i) Strip .75 inch of insulation from cable (1) to expose insulated conductor wires (13), (14) and (15).
- (j) Strip .25 inch of insulation from insulation conductor wires (13), (14) and (15) Solder wires into connector plug (3) pins as follows:
  - 1 Black wire (15), P3-A/TB2-2 to pin A.
  - 2 White wire (14), P3-B/TB2-3 to pin B.
  - 3 Green wire (13), P3-C/TB2-1 to pin C.

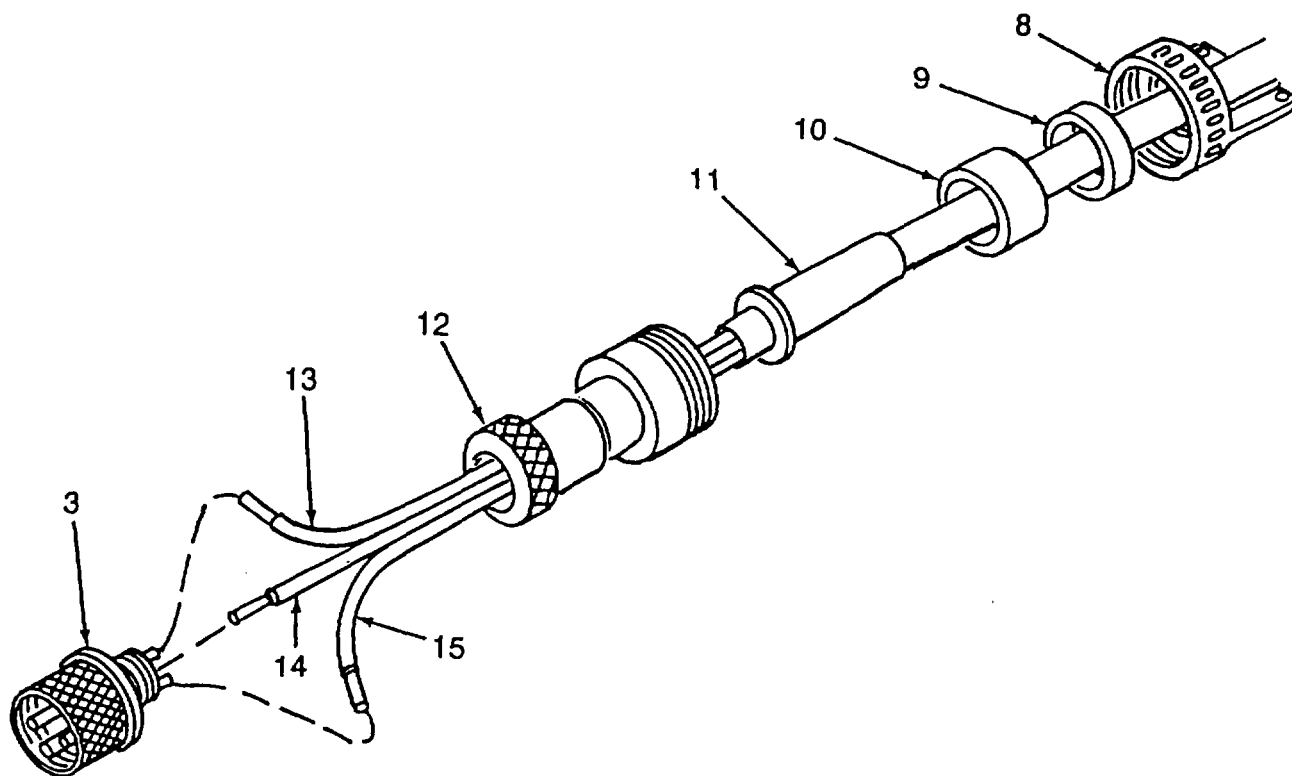


Figure 4-11. Remote Control Thermostat Repair (Sheet 2 of 3)

**4-16. REMOTE CONTROL THERMOSTAT - continued.**

c. Repair - continued (Refer to Figure 4-11)

**NOTE**

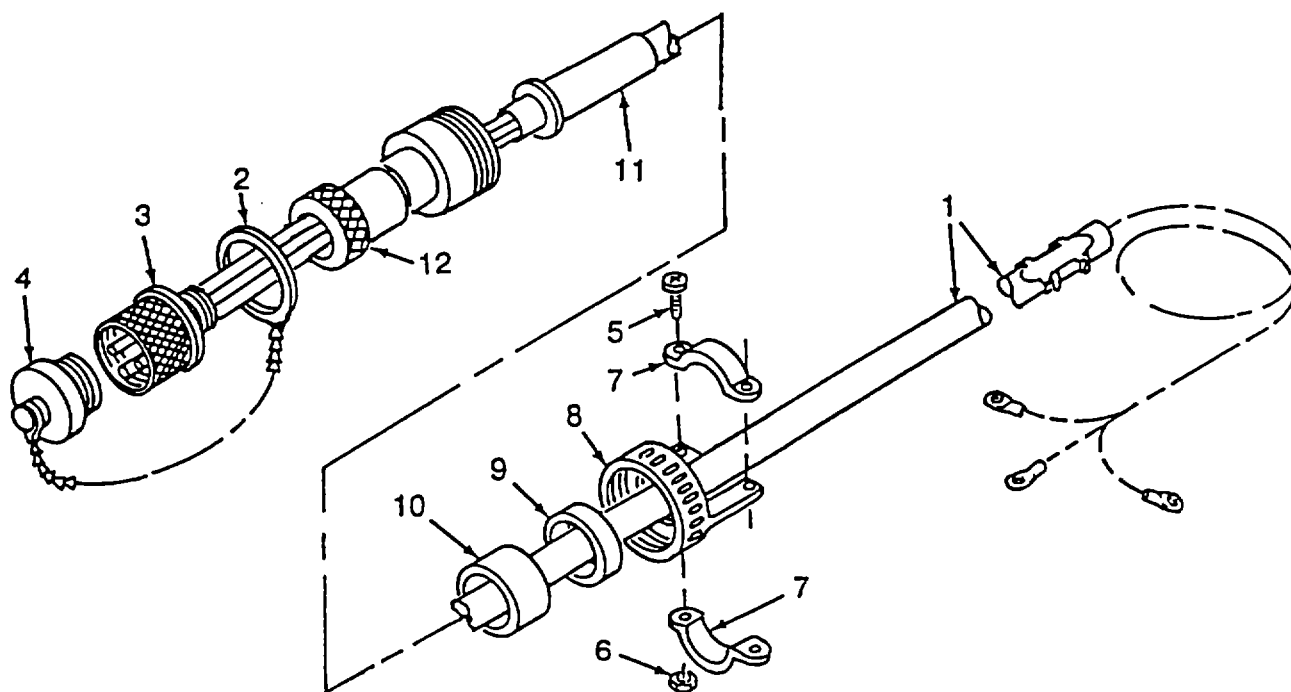
**Hold connector plug while turning sleeve assembly to prevent twisting of conductor wires.**

- (k) Hold connector plug (3) tight and slide sleeve (12) up cable (1) and screw sleeve (12) into connector plug (3).
- (l) Slide rubber bushing (11), grommet (10), grommet follower (9), and clamp (8) up cable (1) and screw clamp (8) onto sleeve (12).

**NOTE**

**The rubber bushing should bulge slightly when saddles are tight.**

- (m) Position two saddles (7) on clamp (8), secure with two screws (5) and two nuts (6).
- (n) Insert strap (2) through end of chain on cover (4) and secure onto connector plug (3).
- (o) Screw cover (4) into connector plug (3).

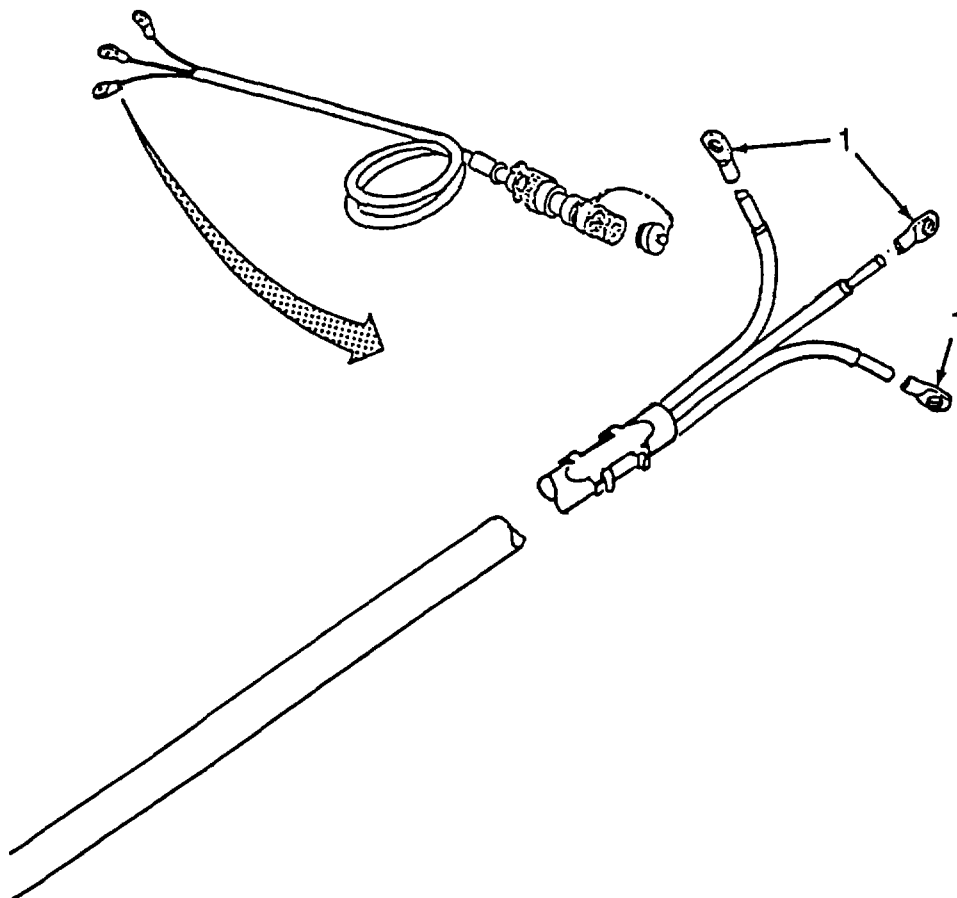


**Figure 4-11. Remote Control Thermostat Repair (Sheet 3 of 3)**

**4-16. REMOTE CONTROL THERMOSTAT - continued.**

c. Repair - continued (Refer to Figure 4-12)

(p) Repair to this end of cable limited to replacement of terminal lugs (1).



**Figure 4-12. Remote Control Thermostat Repair**



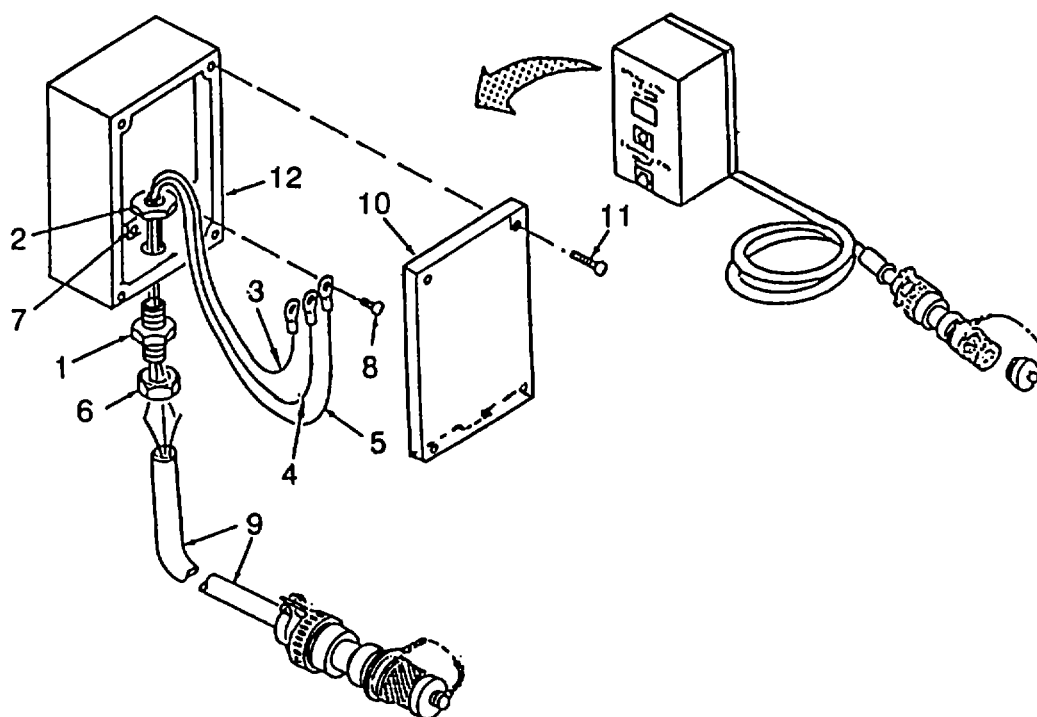
**4-16. REMOTE CONTROL THERMOSTAT - continued.**

- d. Assembly (Refer to Figure 4-13)
- (1) Install connector (1) and nut (2).
  - (2) Install wires (3), (4) and (5) through nut (6) and connector (1).
  - (3) Connect wires (3), (4) and (5) to TB2 (7) with three screws (8) as follows:
    - (a) Connect green wire (3) P3-C/TB2-1 to TB2-1.
    - (b) Connect white wire (4) P3-A/TB2-2 to TB2-2.
    - (c) Connect black wire (5) P3-B/TB2-3 to TB2-3.

**NOTE**

**Flat edges of connector hex and nut must be parallel with the back edge of remote thermostat box or cover will not seal properly.**

- (4) Position cable (9) in connector (1) until the cable (9) insulation is flush with inside of connector (1) and tighten nut (6).
- (5) Install cover (10), with notch at bottom, and four screws (11) on remote thermostat box (12).



**Figure 4-13. Remote Control Thermostat Assembly**

---

**4-17. POWER CABLE ADAPTER CORD.**

---

This task consists of:                      Repair

---

**INITIAL SETUP:**

---

**Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
Soldering Iron (Item 2, App B)  
Tool Kit, Electrical Connector Repair (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-28)

**Material/Parts:**

Wire tags (Item 9, App E)

---

Repair (Refer to Figure 4-14)

- (1) Remove adapter cord (1) from power cable (2).
- (2) Repair of cord consists of replacing damaged parts with new parts. If cord (1) is damaged, the complete assembly must be replaced.
- (3) Cut strap (3) from connector plug (4) and remove cover assembly (5).
- (4) Remove two screws (6), two nuts (7) and two saddles (8).
- (5) Unscrew clamp (9) and slide clamp, grommet follower (10), grommet (11), and rubber bushing (12) down on cord (1).
- (6) Unscrew sleeve (13) from connector plug (4) and down on cord (1).
- (7) Tag three wires (14), (15) and (16).
- (8) Cut connector plug (4) from cord (1).
- (9) Slide sleeve (13), bushing (12), grommet (11), grommet follower (10), and clamp (9) from cord (1).
- (10) Slide cable clamp (9), grommet follower (10), grommet (11), rubber bushing (12), and sleeve assembly (13) on cord (1).

## 4-17. POWER CABLE ADAPTER CORD - continued.

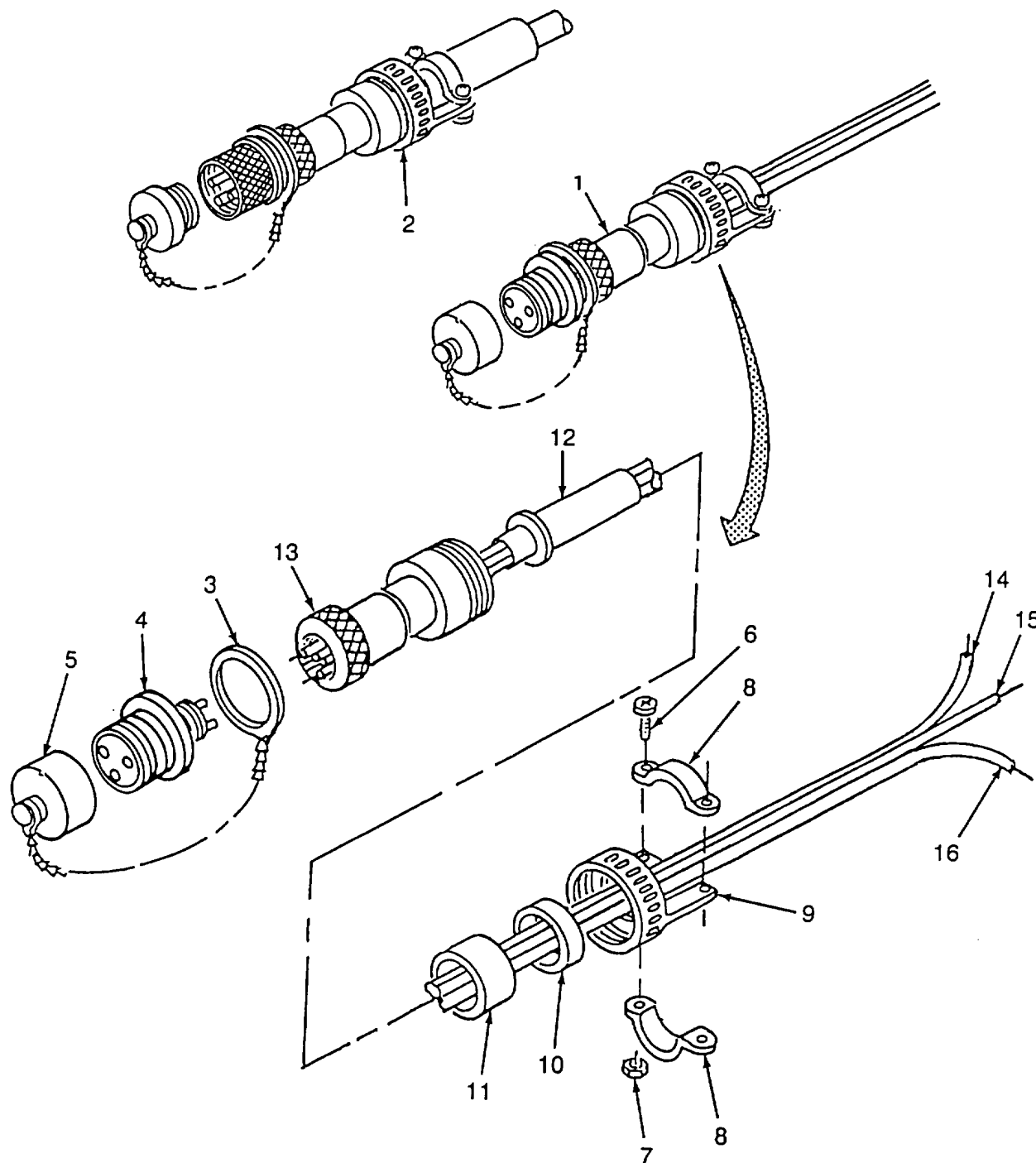


Figure 4-14. Power Cable Adapter Cord Repair (Sheet 1 of 3)

**4-17. POWER CABLE ADAPTER CORD - continued.**

Repair - continued (Refer to Figure 4-14)

(11) Strip .25 inch of insulation from insulation conductor wires (14), (15) and (16) Solder wires to connector plug (4) pins as follows:

- (a) Black wire (14) to pin A.
- (b) White wire (15) to pin B.
- (c) Green wire (16) to pin C.

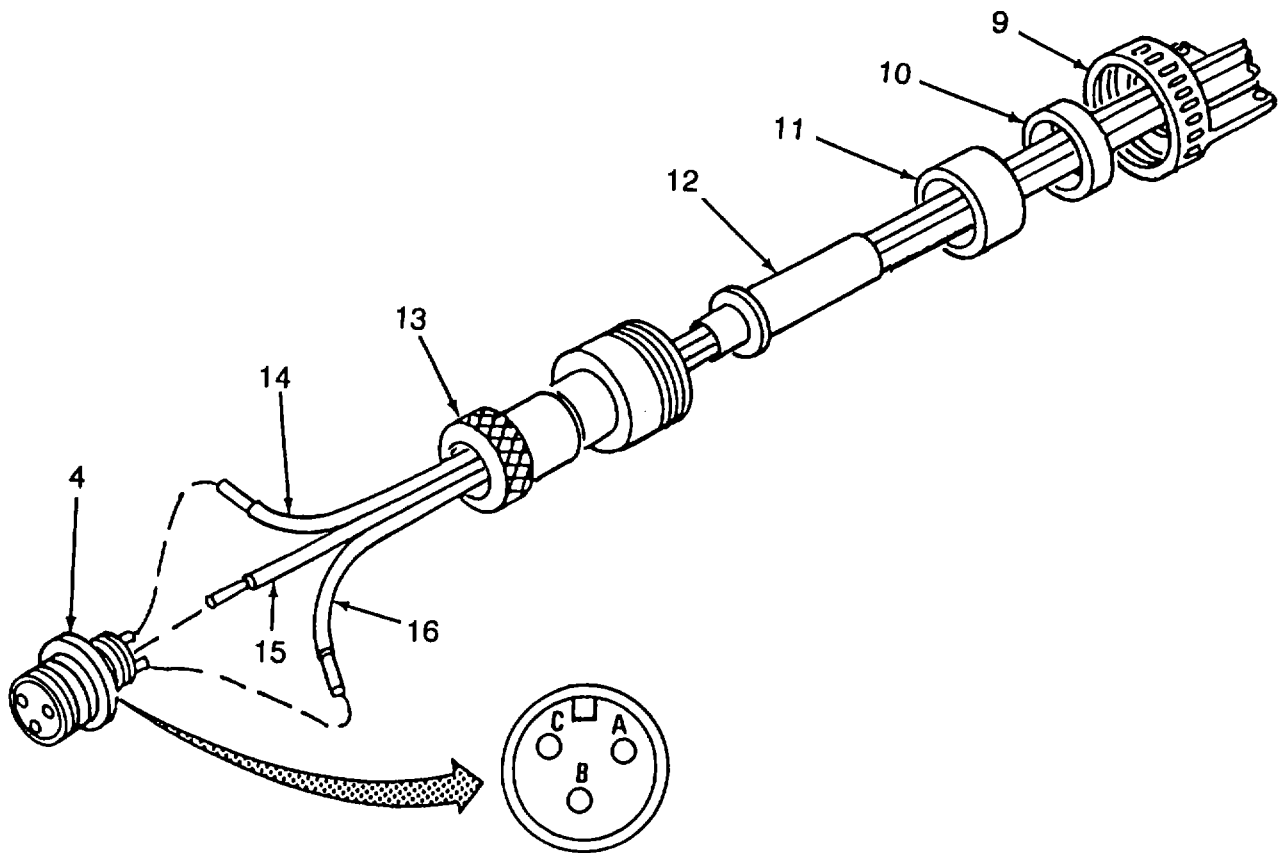


Figure 4-14. Power Cable Adapter Cord Repair (Sheet 2 of 3)

**4-17. POWER CABLE ADAPTER CORD -continued.**

Repair -continued (Refer to Figure 4-14)

**NOTE**

**Hold connector plug while turning sleeve assembly to prevent twisting of conductor wires.**

- (12) Hold connector plug (4) tight and slide sleeve (13) up cord (1) and screw sleeve (13) onto connector plug (4).
- (13) Slide rubber bushing (12), grommet (11), grommet follower (10), and clamp (9) up cord (1) and screw clamp (9) onto sleeve (13).

**NOTE**

**The rubber bushing should bulge slightly when saddles are tight.**

- (14) Position two saddles (8) on clamp (9), secure with two screws (6) and two nuts (7).
- (15) Insert strap (3) through end of chain on cover (5) and secure onto connector plug (4).
- (16) Screw cover (5) into connector plug (4).
- (17) Repair to other end of cable is limited to stripping of insulation to expose .25 inch of wire and tinning each end.

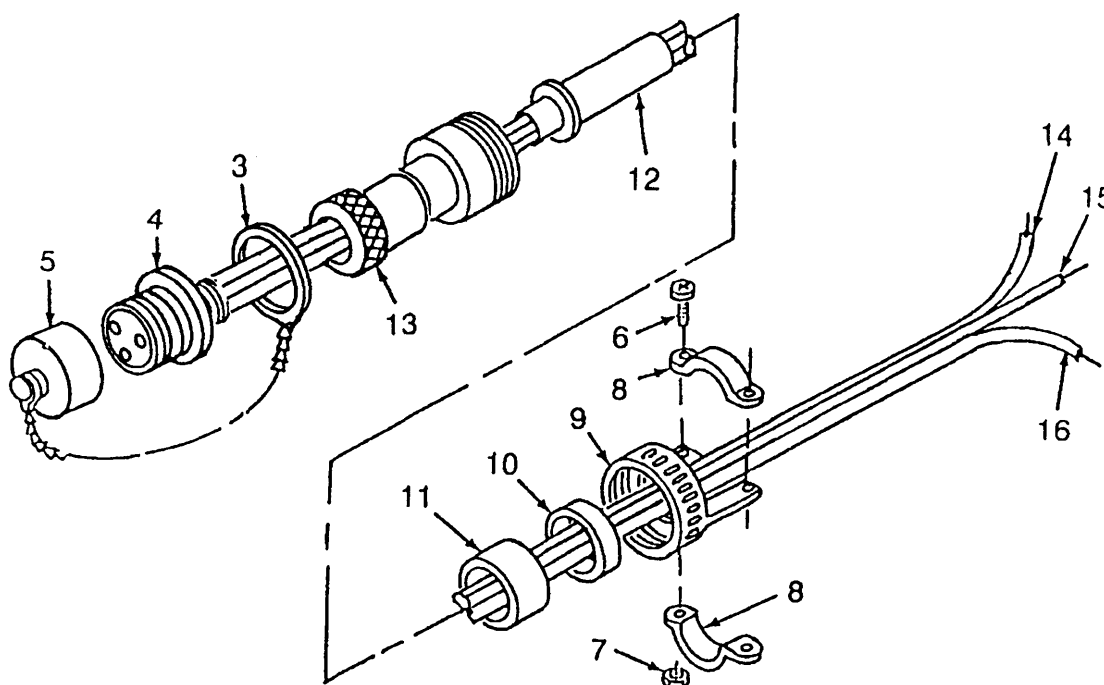


Figure 4-14. Power Cable Adapter Cord Repair (Sheet 3 of 3)

**4-18. CONTROL BOX COVER ASSEMBLY.**

This task consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Drill (Item 2, App B)  
 Bit Set (Item 2, App B)  
 Blind Riveter (Item 5, App B)

**Material/Parts:**

Rivets (Item 18, App H)  
 Rivets (Item 19, App H)  
 Rivets (Item 21, App H)  
 Anti-seize Compound (Item 3, App E)

**NOTE**

**Disassemble only to the level required to make repairs.**

- a. Removal (Refer to Figure 4-15)
  - (1) Remove four screws (1) from unit (2).
  - (2) Pull cover (3) up to unlatch clip (4) from bar (5) and remove cover.
- b. Disassembly
  - (1) Drill out rivet (6), remove clip (4) and spacer (7).
  - (2) Drill out four rivets (8) and remove hinge (9).

**NOTE**

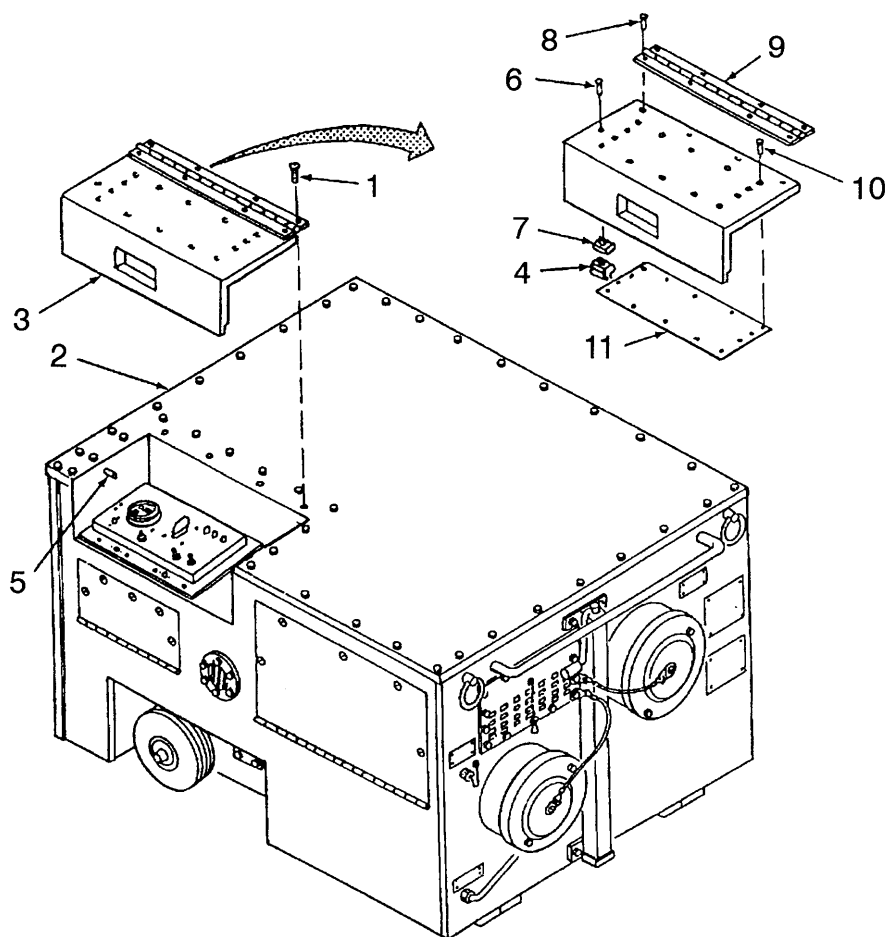
**Instruction plate is attached to cover using six or fourteen rivets.  
 Remove the quantity of rivets configuration requires.**

- (3) Drill out fourteen rivets (10) and remove instruction plate (11).
- c. Repair
  - Replace defective parts.
- d. Assembly
  - (1) Position hinge (9) on cover (3) and secure with four rivets (8).

**4-18. CONTROL BOX COVER ASSEMBLY - continued.****NOTE**

**Instruction plate is attached to cover using six or fourteen rivets.  
Install the quantity of rivets configuration requires.**

- (3) Install fourteen rivets (10).
- (4) Position spacer (7) and clip (4) on inside of cover (3) and secure with rivet (6).
- e. Installation (Refer to Figure 4-15)
  - (1) Place cover (3) over unit (2) so clip (4) aligns with bar (5) and push down on cover.
  - (2) Align the four holes in hinge (9) and unit(2).
  - (3) Apply anti-seizing compound (Item 3, App E) to four screws (1) and install in hinge (9).



*Figure 4-15. Control Box Cover Assembly*





**4-19. TOP PANEL ASSEMBLY - continued.**

## d. Assembly (Refer to Figure 4-16)

(1) Using bulk stock, cut new insulation (9)(Item 53, App F), (8)(Item 54, App F) and (7)(Item 55, App F).

(2) Install gasket (6)(Item 1, 2, 3, 4 and 5, App F).

## e. Installation (Refer to Figure 4-9)

(1) Position top panel (4) on top of frame (5).

**NOTE**

**Top panel is attached using twenty-eight or thirty-eight sets of hardware. Install the quantity of hardware configuration requires. Panels are interchangeable with all units.**

(2) Apply anti-seizing compound (Item 3, App E) to screws (1). Install thirty-eight flat washers (3), lockwashers (2) and screws (1).

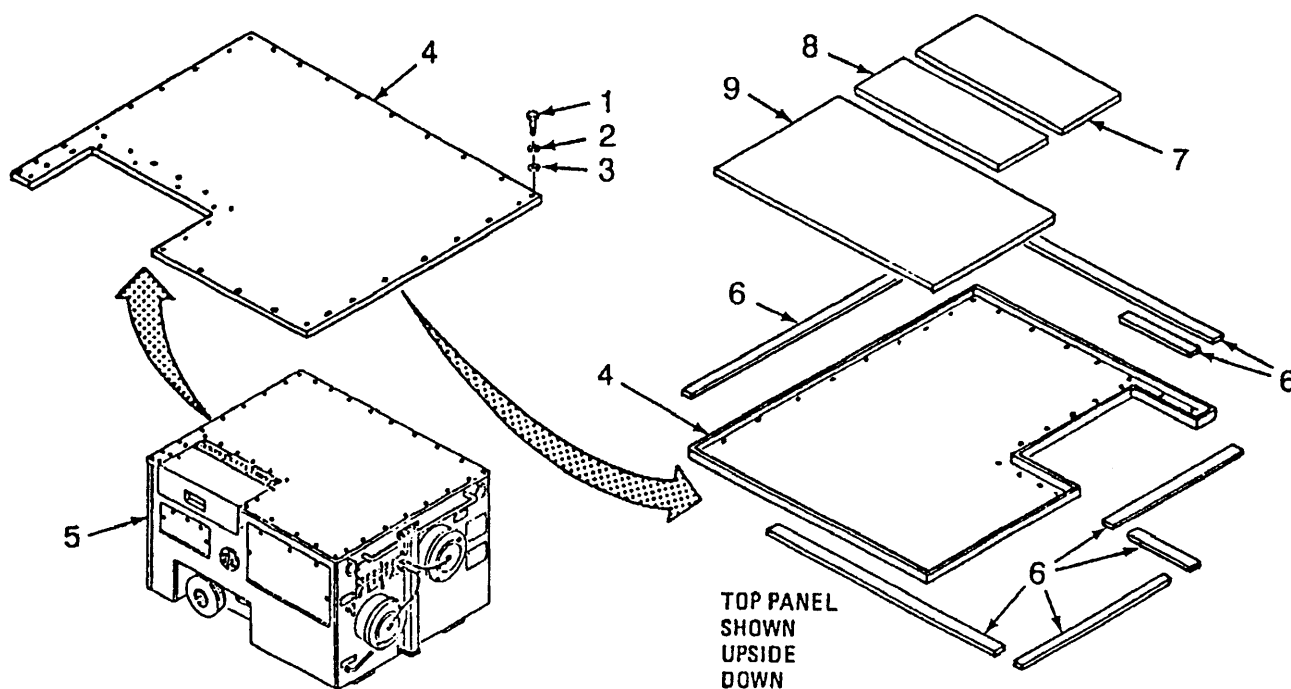


Figure 4-16. Top Panel Assembly

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**4-20. REAR PANEL ASSEMBLY.**

---

This task consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Blind Riveter (Item 5, App B)  
 Vice (Item 2, App B)  
 Drill (Item 2, App B)  
 Bit Set (Item 2, App B)

**Material/Parts:**

Unit disconnected from power source (para 2-8)  
 Exhaust pipe removed (para 4-14)

**General Safety Requirements:****WARNING****Fuels Flammable / No Smoking.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/ inspection/ maintenance activity.**

**Material/Parts:**

Lockwasher (Item 1, App H)  
 Rivets (Item 31, App H)  
 Rivets (Item 22, App H)  
 Rivets (Item 18, App H)  
 Gasket (Item 10, App F)  
 Gasket (Item 11, App F)  
 Gasket (Item 17, App F)  
 Anti-seizing Compound (Item 3, App E)  
 Insulation (Item 38, App F)  
 Insulation (Item 52, App F)  
 Insulation (Item 51, App F)  
 Lockwashers (Item 4, App H)  
 Gasket (Item 60, App F)  
 Gasket (Item 61, App F)  
 Sealing Compound (Item 4, App E)

---

**NOTE**

**Disassemble only to the level required to make repairs.**

## a. Removal (Refer to Figure 4-17)

- (1) Remove four screws (1) and remove exhaust protective cover (2).
- (2) Remove four screws (3), four lockwashers (4), four flat washers (5), and seal plate (6). Remove sealant (7). Discard lockwashers.
- (3) Remove ten screws (8), ten lockwashers (9), ten flat washers (10) and isolator frame (11). Discard lockwashers.

**4-20. REAR PANEL ASSEMBLY - continued.**

a. Removal -continued (Refer to Figure 4-17)

(4) Open right rear door (12).

**WARNING**

**Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. Post FUEL FLAMMABLE/NO SMOKING signs around the area. Suitable fire extinguisher must be present.**

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.**

(5) Disconnect tubing (13) from elbow (14) and tubing (15) from straight connector (16). Cover tubing (13) and (15) to prevent any foreign matter from entering tubing. Remove dust cap (16a).

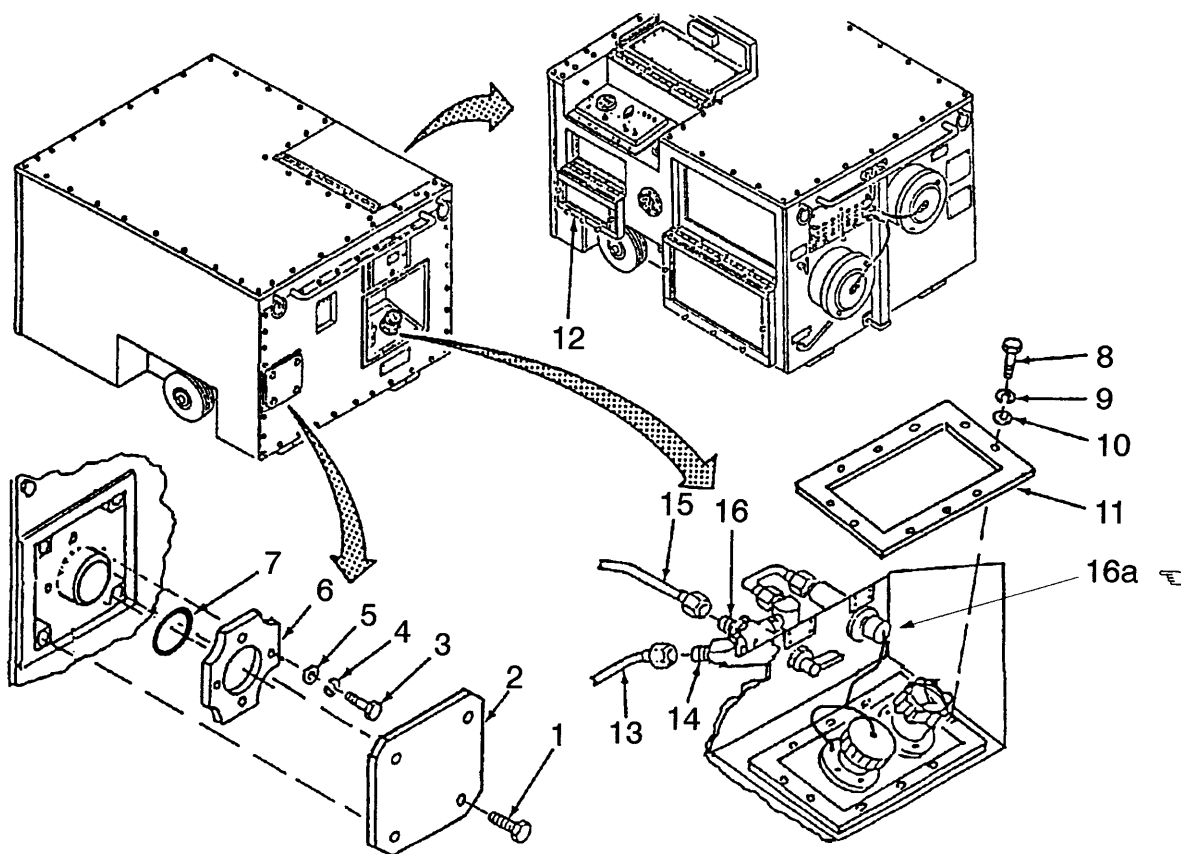


Figure 4-17. Rear Panel Assembly Removal (Sheet 1 of 2)

**4-20. REAR PANEL ASSEMBLY - continued.**

a. Removal -continued (Refer to Figure 4-17)

- (6) Remove sealant (16) from sight tube pipe (17).
- (7) Remove thirty-three screws (18), thirty-three lockwashers (19), and thirty-three flat washers (20). Discard lockwashers.
- (8) Remove rear panel (21) from frame (22) by gently pulling the panel over the insulator (23).
- (9) Loosen and remove ring (24).

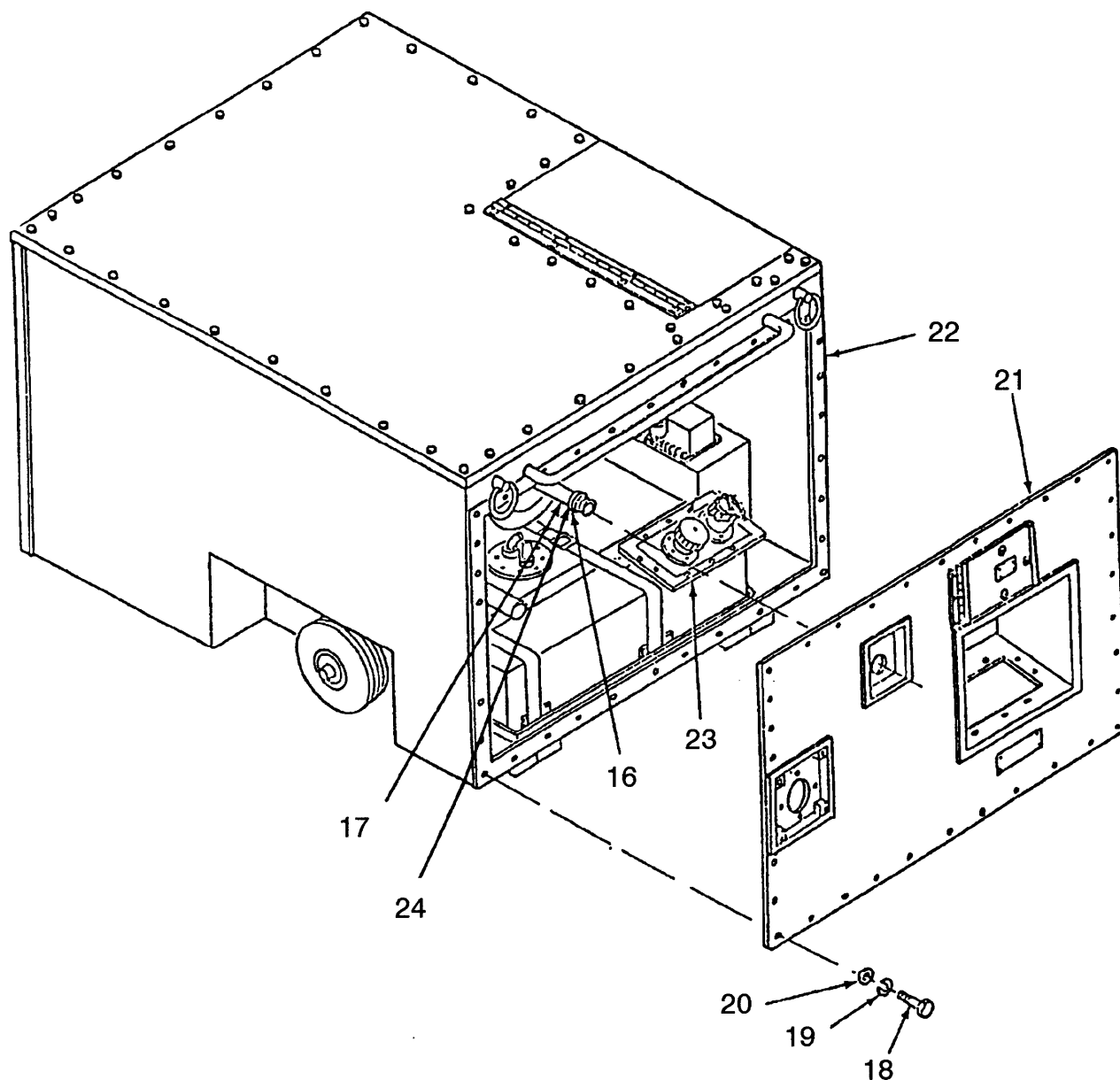


Figure 4-17. Rear Panel Assembly Removal (Sheet 2 of 2)

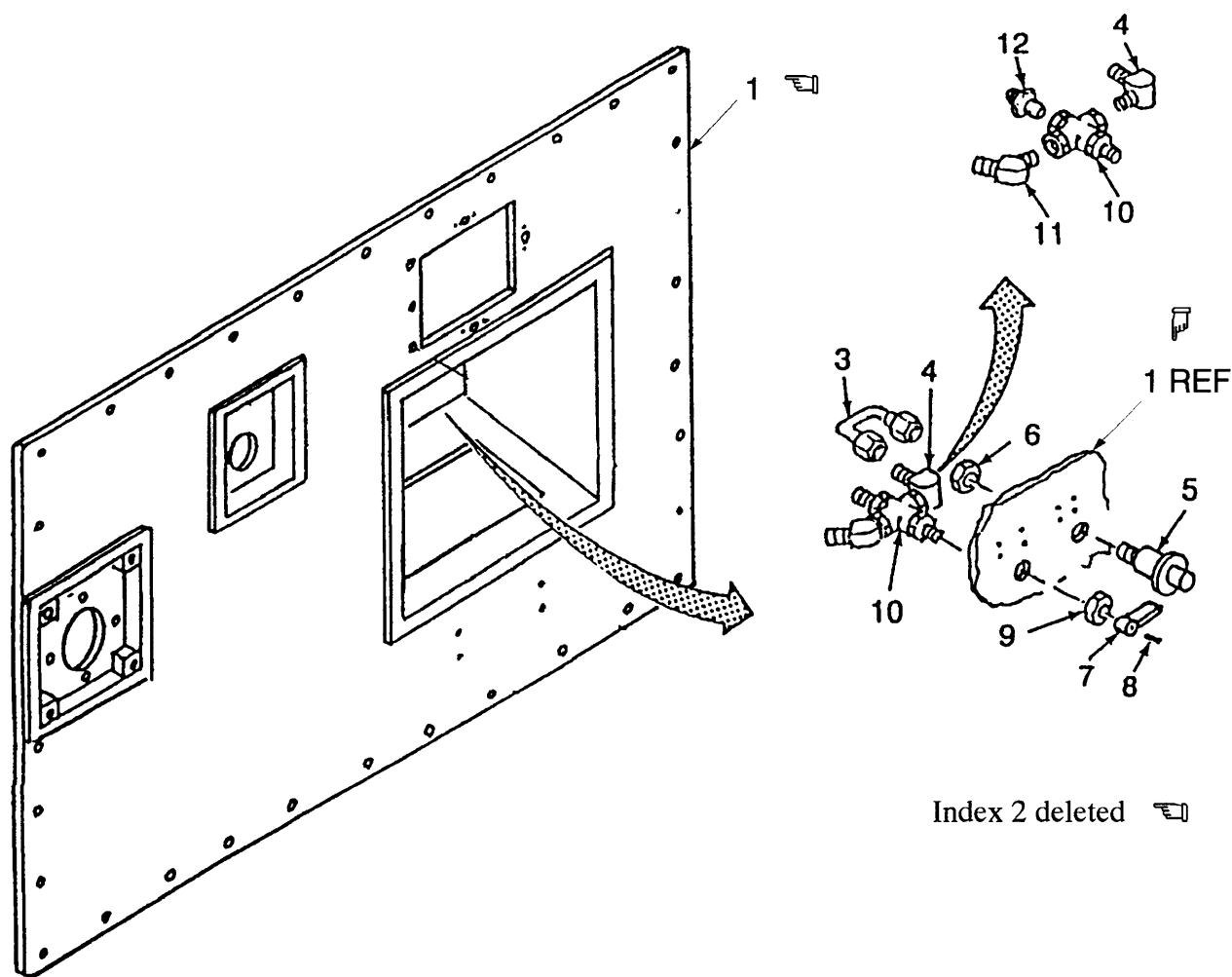
**4-20. REAR PANEL ASSEMBLY - continued.**

- b. Disassembly (Refer to Figure 4-18)

**NOTE**

**Disassemble only to the level required to make repairs.**

- (1) Paragraph deleted.
- (2) On rear panel (1), remove tubing (3) from elbow (4) and quick disconnect coupling (5).
- (3) Remove nut (6) and quick disconnect coupling (5).
- (4) Position selector handle (7) in external position and remove screw (8) and handle (7).
- (5) Remove nut (9) and selector valve (10).
- (6) Place selector valve (10) in a soft faced vise and remove elbow (4), elbow (11) and straight connector (12). Remove selector valve from vise.



Index 2 deleted

Figure 4-18. Rear Panel Disassembly (Sheet 1 of 3)

**4-20. REAR PANEL ASSEMBLY - continued.**

b. Disassembly (Refer to Figure 4-18)

- (7) Drill out two rivets (13) and remove site glass cover (14).

**NOTE**

**Information plates are attached using two or four rivets each.  
Remove the quantity of rivets configuration requires.**

- (8) Drill out three rivets (15) and remove exhaust storage door (16). Drill out four rivets (17) and remove information plate (18).

- (9) Remove gaskets (19), (20), (21) and (22).

- (10) Remove three stud retaining rings (23) and three studs (24).

- (11) Remove three retaining rings (25) and three grommets (26).

- (12) Drill out six rivets (27) and remove three receptacles (28).

**NOTE**

**Information plates are attached using two or four rivets each.  
Remove the quantity of rivets configuration requires.**

- (13) Drill out four rivets (29) from each information plates (30), (31) and (32) and remove plates.

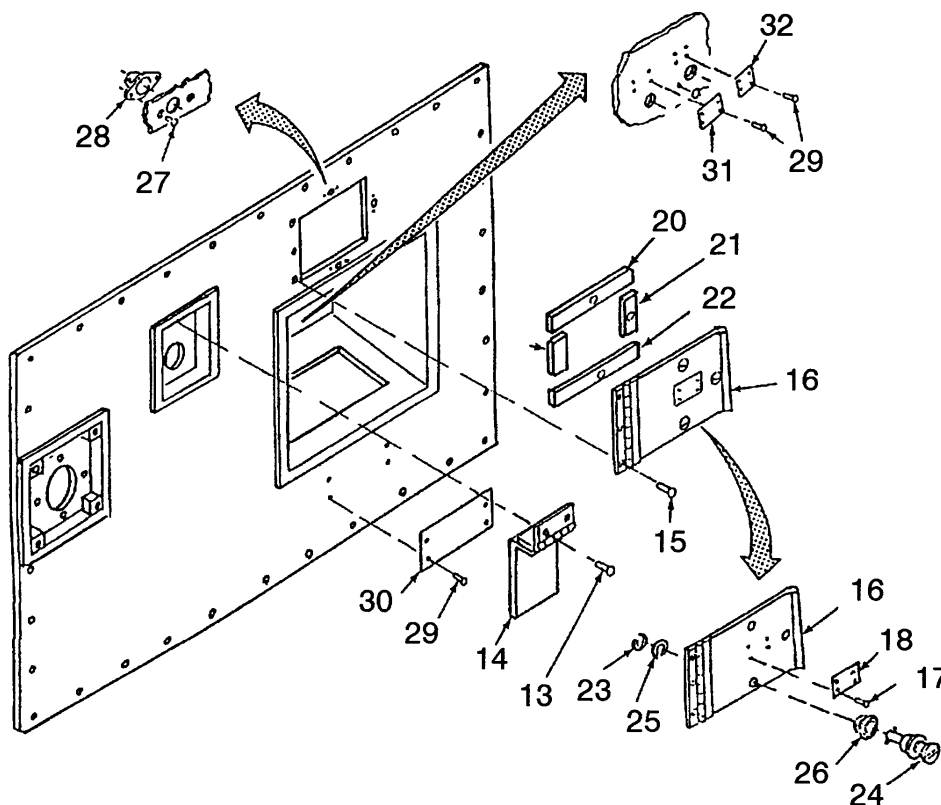
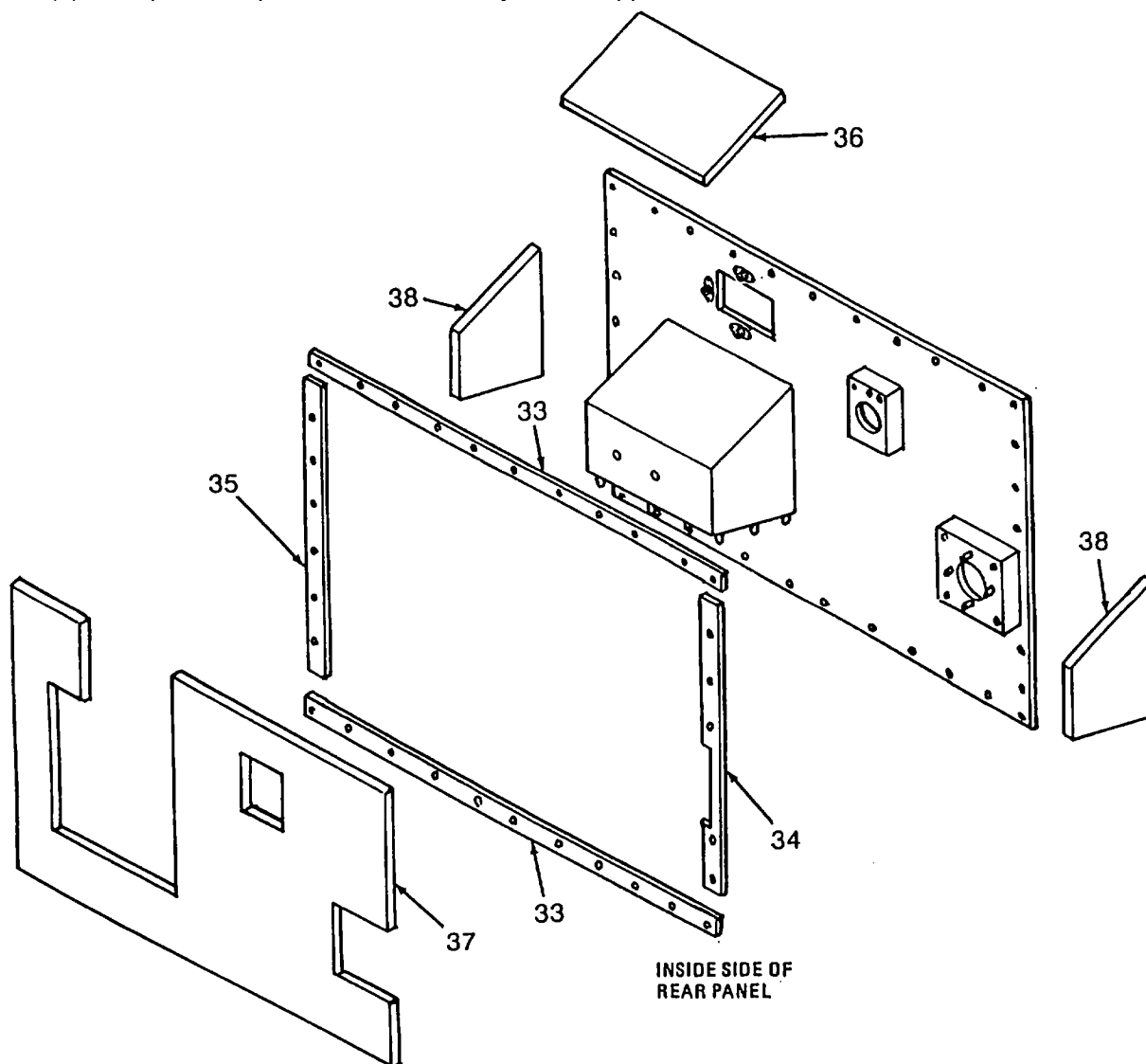


Figure 4-18. Rear Panel Disassembly (Sheet 2 of 3)

**4-20. REAR PANEL ASSEMBLY - continued.**

- b. Disassembly - continued (Refer to Figure 4-18)
  - (14) Remove two gaskets (33), gasket (34) and gasket (35). Discard gaskets.
  - (15) Remove insulation (36) and (37) and two insulations (38) as required.
- c. Repair
  - (1) Repair limited to replacement of damaged parts at unit level.
  - (2) Inspect rear panel for cracks, notify direct support to have cracks welded.



**Figure 4-18. Rear Panel Disassembly (Sheet 3 of 3)**

**4-20. REAR PANEL ASSEMBLY - continued.**

d. Assembly (Refer to Figure 4-19)

- (1) Install insulation (1) (Item 51, App F) and (2) (Item 38, App F) and two insulations (3) (Item 52, App F).
- (2) Install two gaskets (4) (Item 10, App F), gasket (5) (Item 17, App F) and gasket (6) (Item 11, App F).

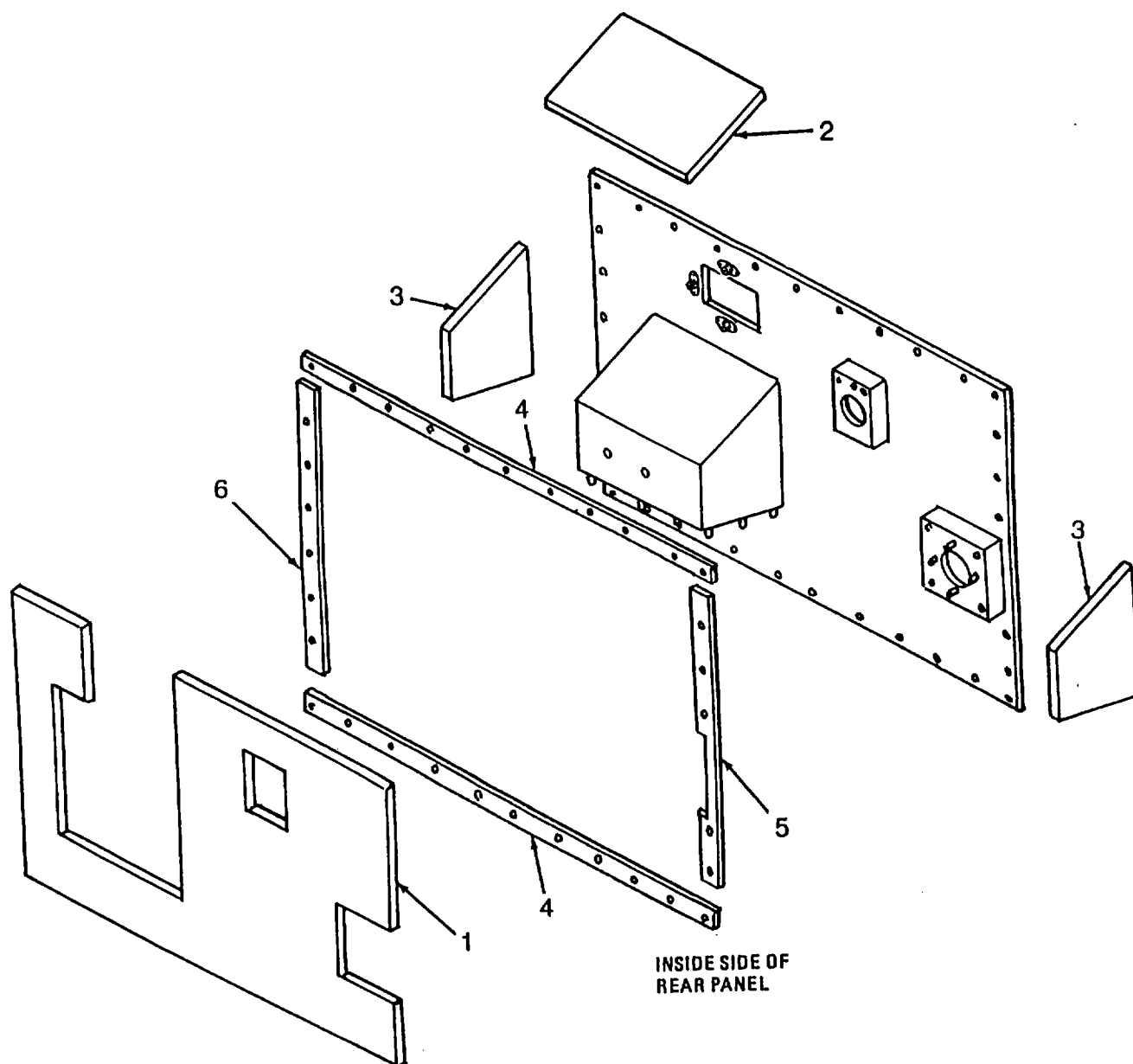


Figure 4-19. Rear Panel Assembly (Sheet 1 of 3)



**4-20. REAR PANEL ASSEMBLY - continued.**

d. Assembly - continued (Refer to Figure 4-19)

**NOTE**

**Information plates are attached using two or four rivets each.  
Install the quantity of rivets configuration requires.**

- (3) Install information plates (7), (8), and (9) and secure each with four rivets (10).
- (4) Install three receptacles (11) and secure with six rivets (12).
- (5) Install two gaskets (13)(Item 60, App F) and two gaskets (14)(Item 62, App F).
- (6) Install three grommets (15) and three retaining rings (16).
- (7) Install three studs (17) and three stud retaining rings (18).

**NOTE**

**Information plates are attached using two or four rivets each.  
Install the quantity of rivets configuration requires.**

- (8) Install information plate (19), and secure with four rivets (20).
- (9) Install exhaust storage door (21) and secure with three rivets (22).
- (10) Install site glass cover (23) and secure with two rivets (24).
- (11) Paragraph deleted.

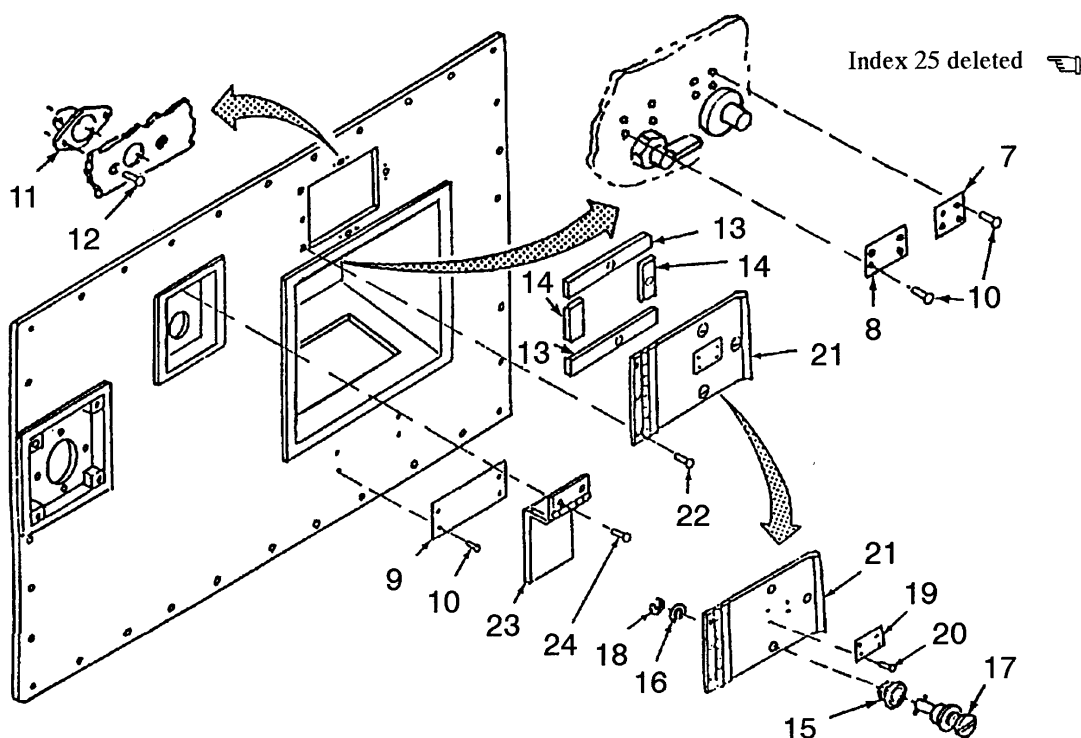


Figure 4-19. Rear Panel Assembly (Sheet 2 of 3)

**4-20. REAR PANEL ASSEMBLY - continued.**

d. Assembly -continued (Refer to Figure 4-19)

- (12) Hold selector valve (27) in left hand with the half moon shaped handle stop on top.
  - (a) Look in right side opening to ensure valve is open to that side.
  - (b) If it is not, use handle to turn valve stem 180°.
- (13) Place selector valve (27) in soft faced vise and install elbows (28) and (29) and straight connector (30). Remove selector valve (27) from vise.
- (14) Install selector valve (27) with half moon shaped handle stop on top and nut (31).
- (15) Install handle (32) and secure with screw (33).
- (16) Install quick-disconnect coupling (34) and nut (35).
- (17) Install tubing (36)(Item 77, App F) on elbow (29) and quick-disconnect coupling (34).

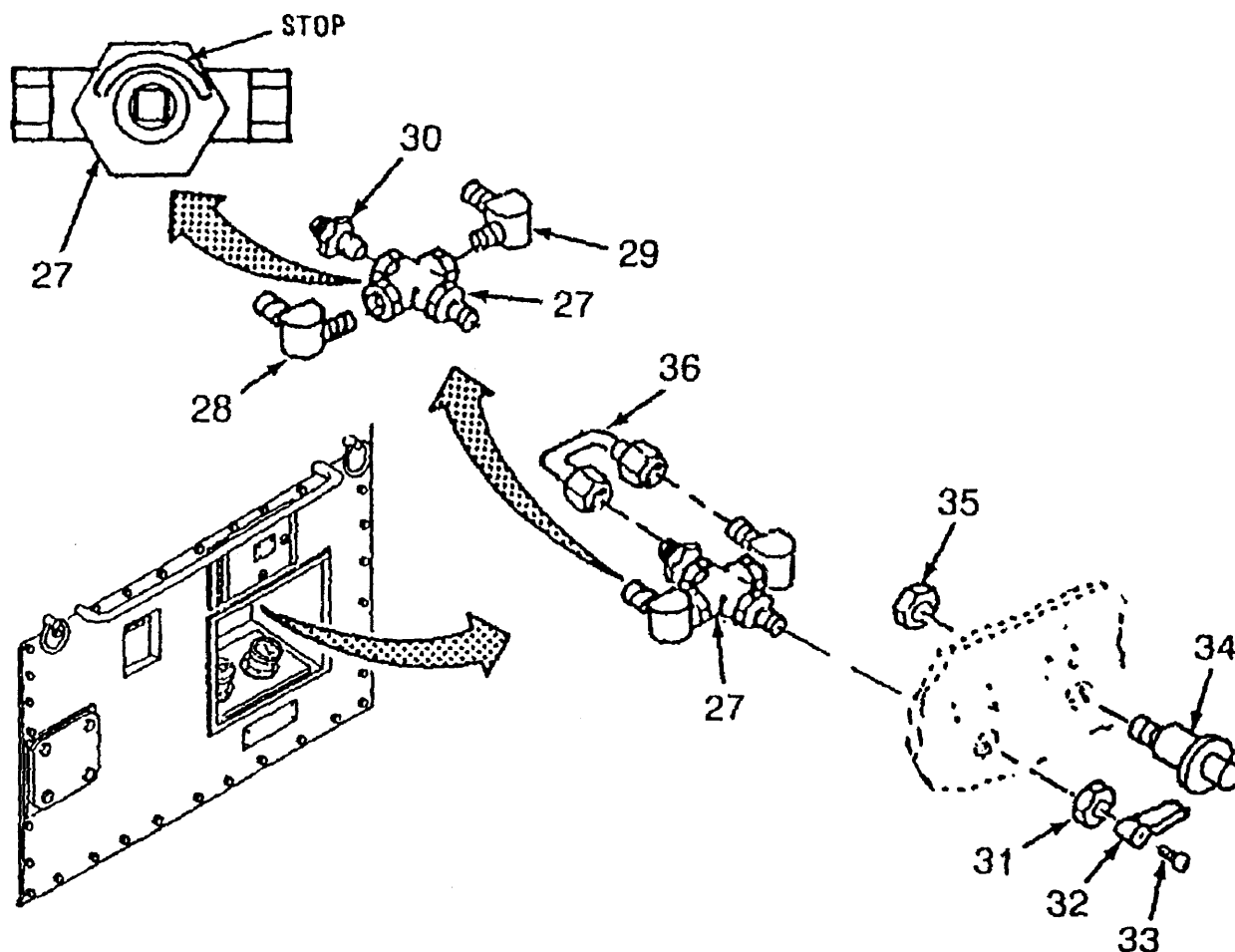
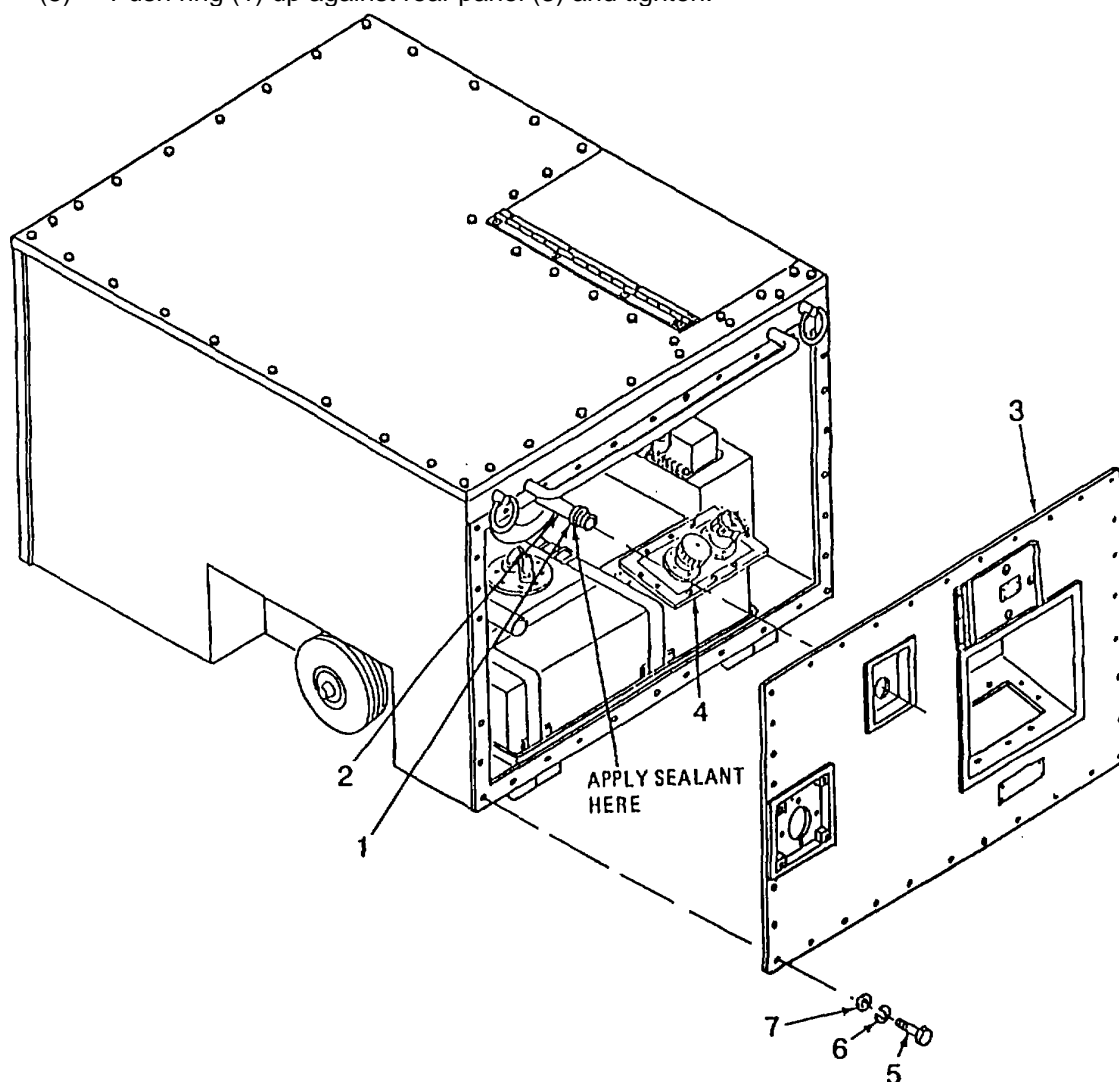


Figure 4-19. Rear Panel Assembly (Sheet 3 of 3)

**4-20. REAR PANEL ASSEMBLY - continued.**

e. Installation (Refer to Figure 4-20)

- (1) Install ring (1) on sight glass tube (2), do not tighten.
- (2) Install rear panel (3) over insulator (4), gently pull insulator through rear panel so it rests on the outside of rear panel.
- (3) Apply anti-seizing compound (Item 3, App E) to screws (5). Install thirty-three flat washers (6), thirty-three lockwashers (7), thirty-three screws (5).
- (4) Apply a heavy bead of sealant (Item 4, App E) around sight glass tube (2) so it goes through the gap and provides a tight seal.
- (5) Push ring (1) up against rear panel (3) and tighten.



**Figure 4-20. Rear Panel Installation (Sheet 1 of 2)**

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**4-20. REAR PANEL ASSEMBLY - continued.**

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- e. Installation (Refer to Figure 4-20)
  - (6) Remove any covers from tubing (7) and (8). Connect tubing (7) (Item 81, App F) to elbow (9) and tubing (8) (Item 80, App F) to straight connector (10).
  - (7) Install dust cap (11) onto quick disconnect coupling (12).
  - (8) Install isolator frame (13), ten flat washers (14), ten lockwashers (15) and ten screws (16).
  - (9) Apply sealant (Item 4, App E) around exhaust pipe (17).
  - (10) Install seal plate (18), four flat washers (19), four lockwashers (20), and four screws (21).
  - (11) Install cover (22) and secure with four screws (23).

4-20. REAR PANEL ASSEMBLY - continued.

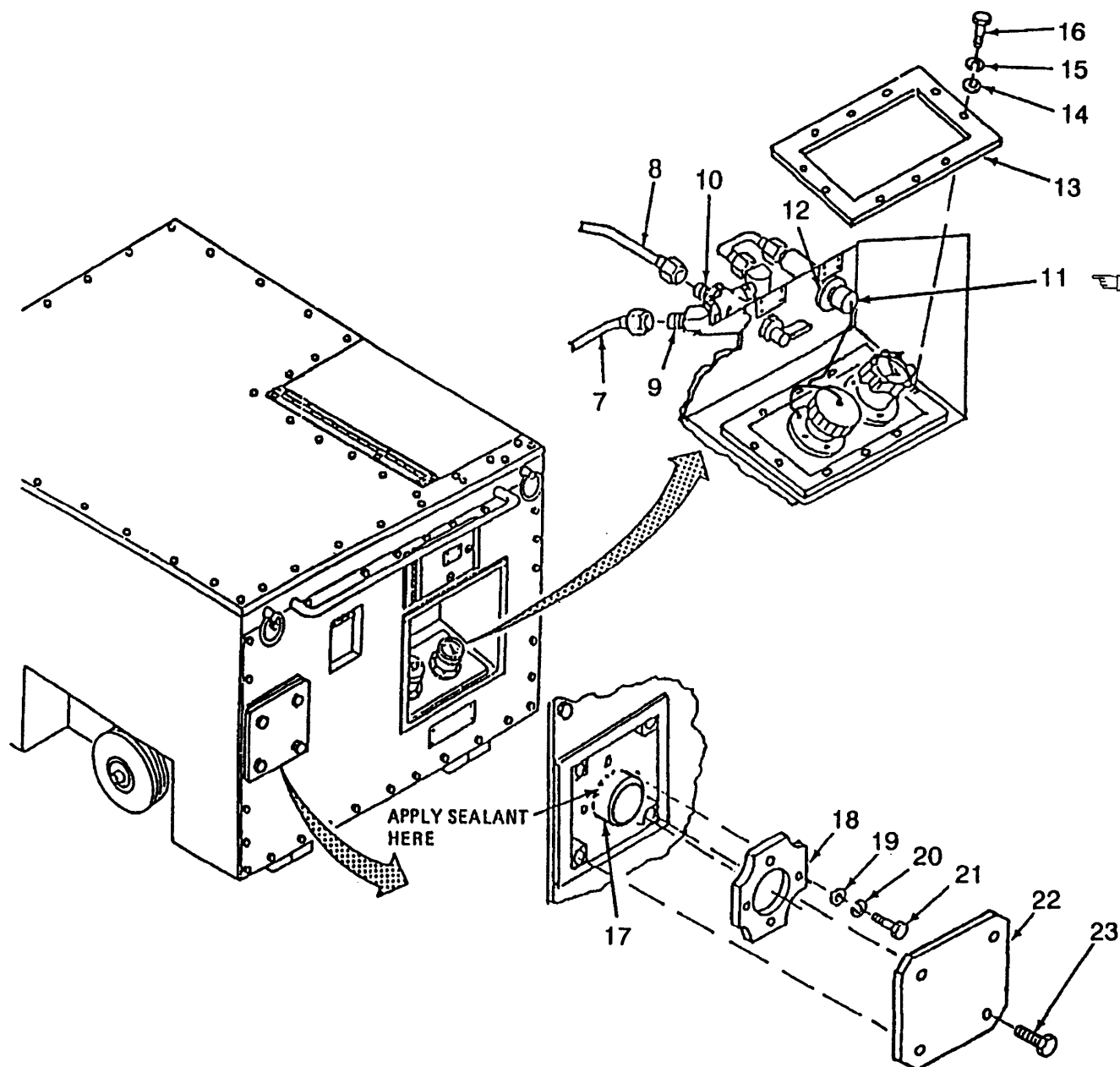


Figure 4-20. Rear Panel Installation (Sheet 2 of 2)

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**4-21. DOOR ASSEMBLIES SIDE REAR AND SIDE FRONT.**

---

This task consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Drill (Item 2, App B)  
 Bit Set (Item 2, App B)  
 Shears (Item 2, Appendix B)  
 Gasket Punch (Item 2, Appendix B)  
 Blind Riveter (Item 5, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Gasket (Item 13, App F)

**Material/Parts:**

Gasket (Item 6, App F)  
 Gasket (Item 8, App F)  
 Insulation (Item 56, App F)  
 Gasket (Item 7, App F)  
 Gasket (Item 9, App F)  
 Insulation (Item 57, App F)  
 Rivet (Item 36, App H)  
 Rivet (Item 37, App H)  
 Gasket (Item 12, App F)

---

**NOTE**

**Disassemble only to the level required to make repairs.**

- a. Removal. (Refer to Figure 4-21)

**NOTE**

**Both door assemblies are similar in construction. The differences are in size and the number of rivets used to secure the hinges. The rear panel is smaller and uses four rivets while the front door is larger and uses five rivets.**

- (1) Open door (1).
- (2) Remove insulation (2).
- (3) Remove nut (3), lockwasher (4), screw (5) and ground wire (6).
- (4) Drill out rivets (7) from hinge (8) and frame (9).

## 4-21. DOOR ASSEMBLIES SIDE REAR AND SIDE FRONT - continued.

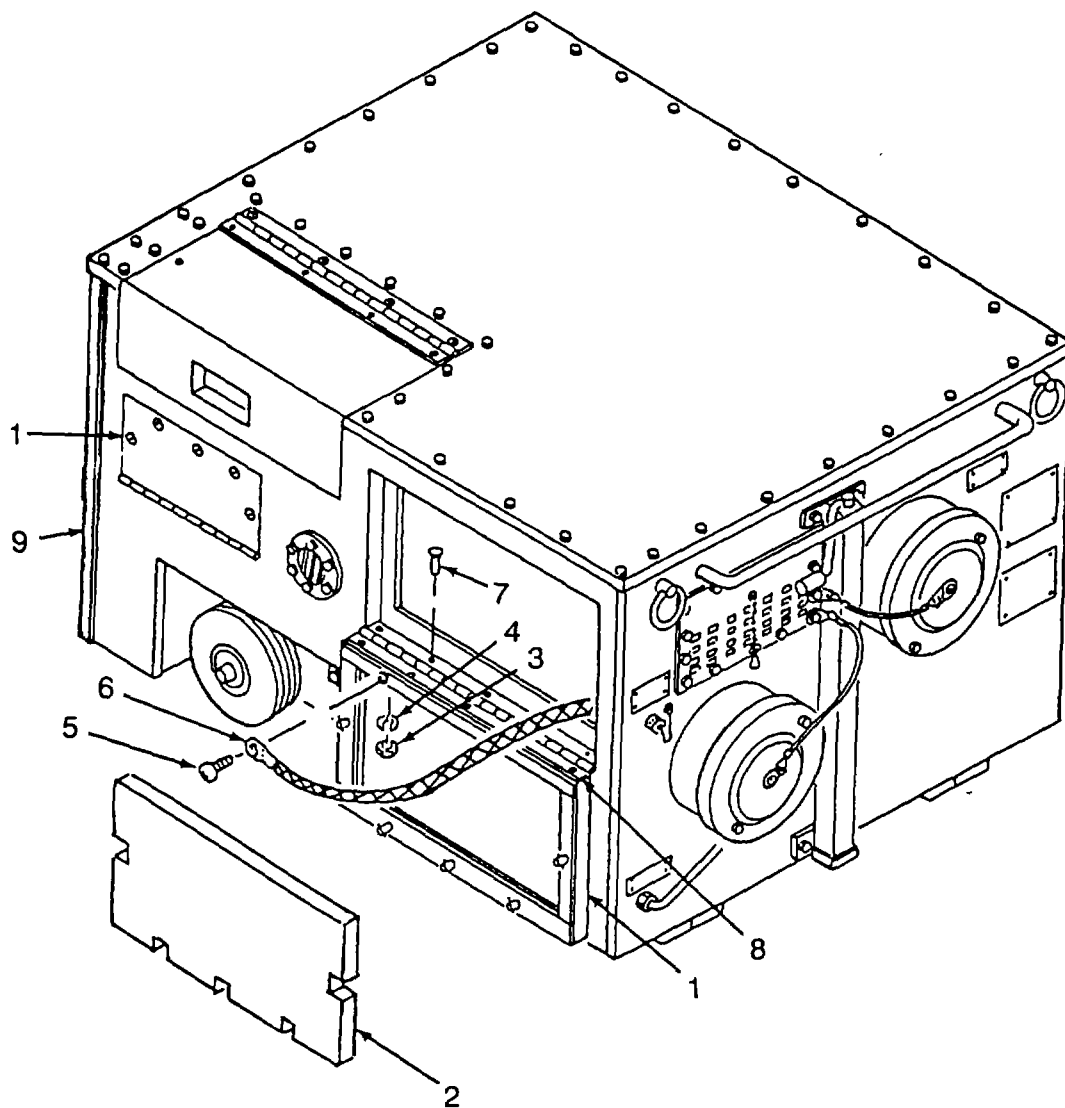


Figure 4-21. Door Removal

**4-21. DOOR ASSEMBLIES SIDE REAR AND SIDE FRONT- continued.**

## b. Disassembly (Refer to Figure 4-22)

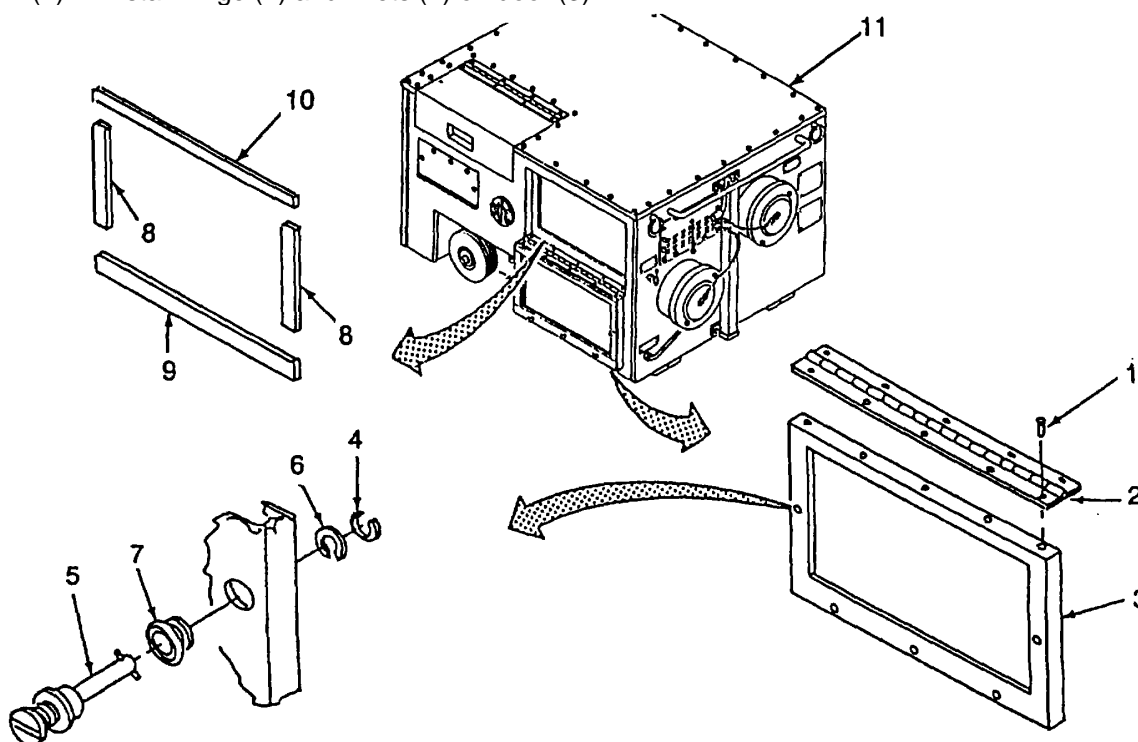
- (1) Drill out rivets (1) and remove hinge (2) from door (3).
- (2) Remove five stud retaining rings (4) and five studs (5).
- (3) Remove five retainer rings (6) and five grommets (7).
- (4) Remove two gaskets (8), gaskets (9) and gasket (10) from unit (11).

## c. Repair

Repair limited to replacement of defective parts.

## d. Assembly (Refer to Figure 4-22)

- (1) Install gasket (9) (Item 6 or 8, App F), two gaskets (8) (Item 7 or 9, App F), and gasket (10) (Item 12 or 13, App F) on unit (11).
- (2) Install five grommets (7) and five retainer rings (6).
- (3) Install five studs (5) and five stud retainer rings (4).
- (4) Install hinge (2) and rivets (1) on door (3).



**Figure 4-22. Door Disassembly/Assembly**



**4-21. DOOR ASSEMBLIES SIDE REAR AND SIDE FRONT - continued.**

- e. Installation (Refer to Figure 4-23)
- (1) Install hinge (1) and rivets (2) on frame (3).
  - (2) Install ground wire (4), screw (5), lockwasher (6) and nut (7).
  - (3) Install insulation (8)(Item 56, App F).
  - (4) Close door (9).

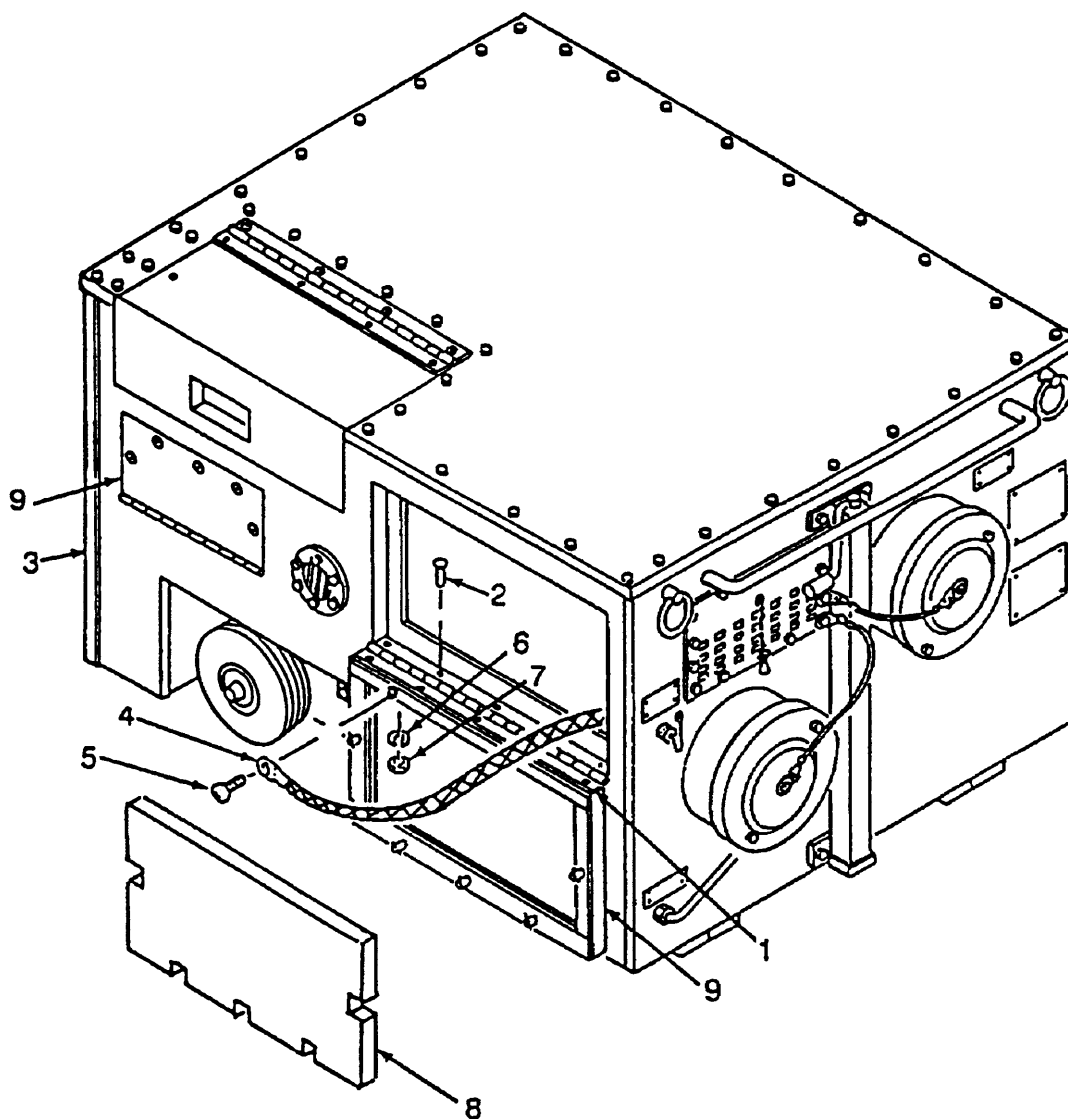


Figure 4-23. Door Installation

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**4-22. DUCT COVER ASSEMBLY.**

---

This task consists of:                      a. Removal      b. Inspection      c. Repair                      d. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**Material/Parts:**

Anti-seizing Compound (Item 3, App E)

Lockwasher (Item 8, App H)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

---

- a. Removal (Refer to Figure 4-24)

**NOTE**

**Both covers are the same.**

- (1) Loosen two screws (1) and remove duct cover (2).

- (2) Remove screw (3), lockwasher (4), flat washer (5), and cable (6). Discard lockwasher.

- b. Inspection

- (1) Inspect cover for cracks, or holes.

- (2) Inspect cable assembly for fraying cable or missing hardware.

- c. Repair

- (1) Repair of duct cover assembly is limited to replacement of damaged parts.

- (2) If cable assembly (6) is damaged, fabricate new cable assembly (Item 58, App F).

- (3) Remove locknut (7), flat washer (8), screw (9), and cable assembly (6) from cover (2).

- (4) Attach cable assembly (6) on cover (2) using screw (9), flat washer (8) and locknut (7).

- d. Installation (Refer to Figure 4-24)

- (1) Apply anti-seizing compound (Item 3, App E) to screw (3). Install cable (6), screw (3), flat washer (4), and lockwasher (5).

- (2) Align duct cover (2) so two screws (1) protrude through cover.

- (3) Install duct cover (2) and tighten two screws (1).

## 4-22. DUCT COVER ASSEMBLY - continued.

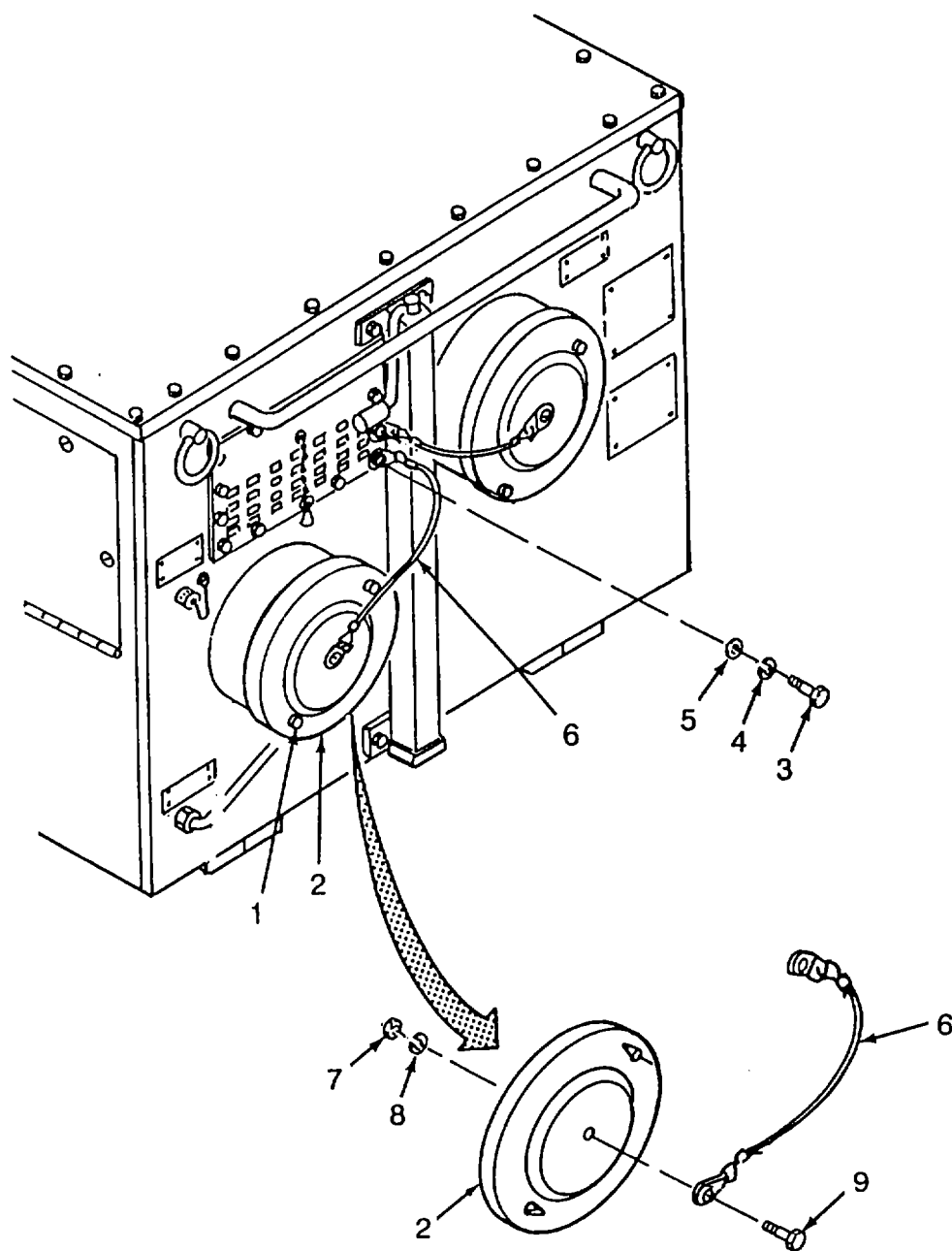


Figure 4-24. Duct Cover Assembly

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**4-23. RETURN/SUPPLY SCREEN.**

---

This task consists of:                      a.      Removal                                      b.      Inspection                                      c.      Installation

---

**INITIAL SETUP:****Tools:**

Tool Box, General Mechanics (Item 1, App B)

**Material Parts:**

Lockwashers (Item 8, App H)

Rags (Item 2, App E)

**Equipment Condition:**

Supply and return air duct covers removed  
(para 4-22)

Unit disconnected from power source (para 2-8).

---

- a.            Removal (Refer to Figure 4-25)
  - (1)    Remove four nuts (1), four lockwashers (2), four screws (3), and eight flat washers (4).
  - (2)    Remove supply screen (5).
  - (3)    Repeat step (1) and (2) to remove second screen (5).
- b.            Inspection
  - (1)    Inspect screens for dirt, grease, and soot. Clean with rags (Item 2, App E).
  - (2)    Inspect screens for broken wire mesh and/or cracked welds.
- c.            Installation (Refer to Figure 4-25)
  - (1)    Install screen (5).
  - (2)    Install eight flat washers (4), four screws (3), four lockwashers (2) and four nuts (1).
  - (3)    Repeat steps (1) and (2) to install second screen (5).

4-23. RETURN/SUPPLY SCREEN.

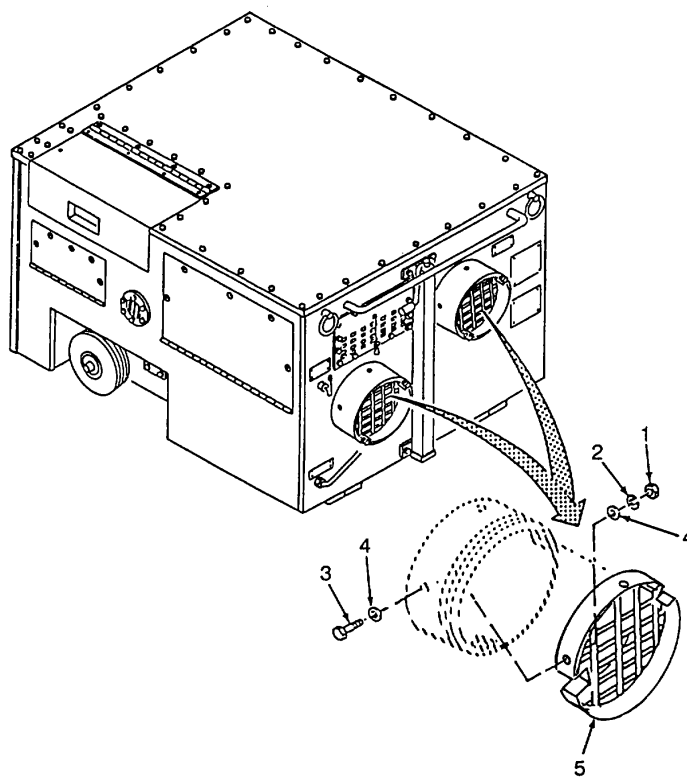


Figure 4-25. Return/Supply Screen

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**4-24. CONTROL BOX ASSEMBLY.**

---

This task consists of:                      a.     Disassembly                                      b.     Repair    c.     Installation

**INITIAL SETUP:****Tools:**

Tool Box, General Mechanics (Item 1, App B)  
 Shears (Item 2, App B)  
 Gasket Punch (Item 2, App B)  
 Drill (Item 2, App B)  
 Drill Bits (Item 2, App B)  
 Blind Riveter (Item 5, App B)

**Material/Parts:**

Gasket (Item 17, App H)  
 Lockwashers (Item 10, App H)  
 Preformed Packing (Item 11, App H)  
 Lockwashers (Item 12, App H)  
 Lockwasher (Item 15, App H)  
 Lockwasher (Item 16, App H)  
 Terminal Splicer (Item 26, App H)  
 Wire Tags (Item 11, App E)  
 Preformed Packing (Item 38, App H)  
 Preformed Packing (Item 39, App H)  
 Preformed Packing (item 40, App H)

**Equipment Condition:**

Unit disconnected from power source (pare 2-8)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

- a.     Disassembly (Refer to Figure 4-26)

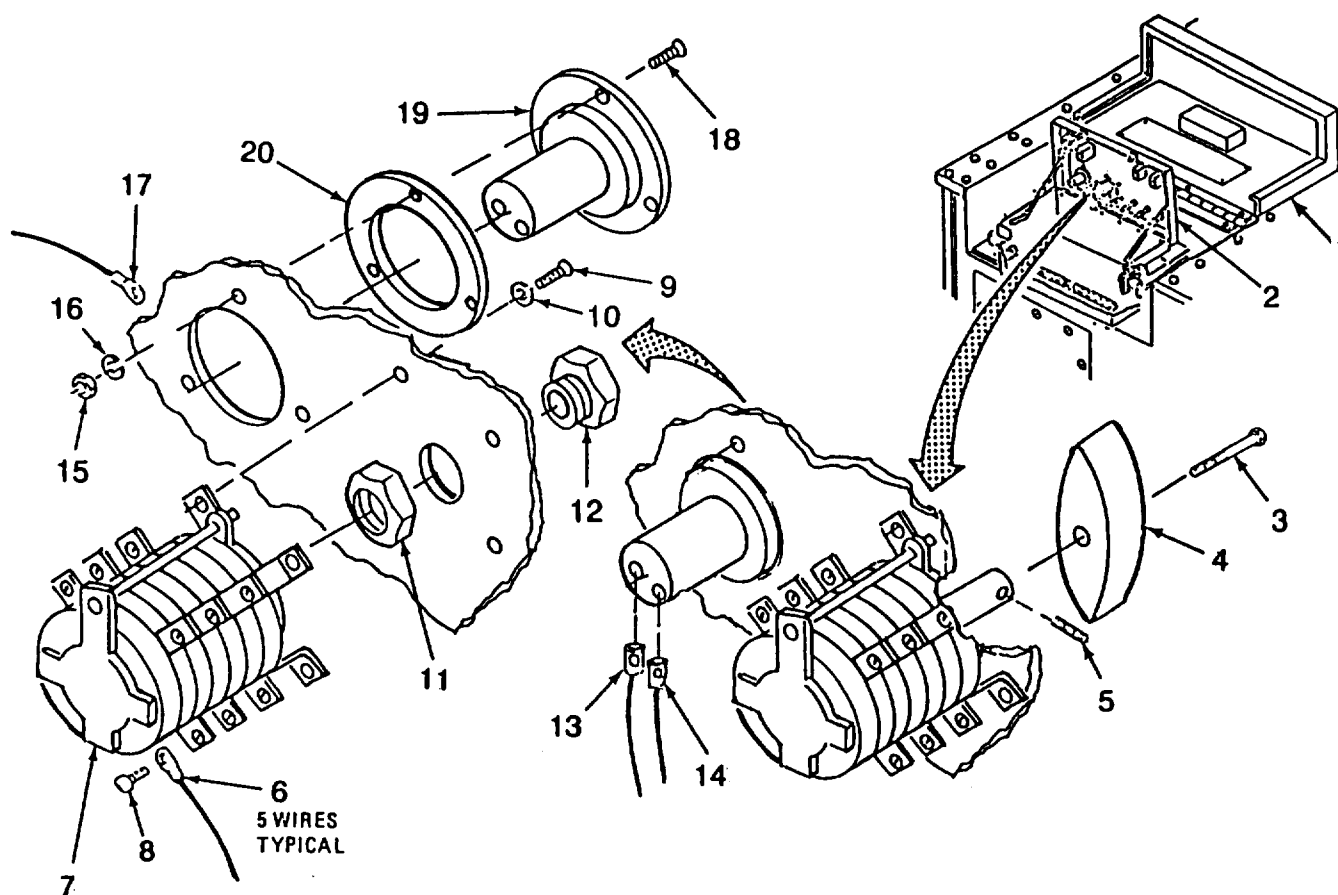
*Mode Switch and Hour Meter*

- (1)    Open control box cover ( 1) and control panel lid (2).
- (2)    Remove screw (3), knob (4) and pin (5).

**4-24. CONTROL BOX ASSEMBLY - continued.**

a. Disassembly - continued (Refer to Figure 4-26)

- (3) Tag and disconnect sixteen wires (6) from MODE switch (7) by removing thirteen screws (8).
- (4) Remove four screws (9), four preformed packings (10) and MODE switch (7).
- (5) Remove nut (11) and sleeve (12).
- (6) Tag and disconnect wires (13) and (14).
- (7) Remove three self-locking nuts (15), three flat washers (16), ground wire (17), three screws (18), hour meter (19) and gasket (20). Discard gasket.

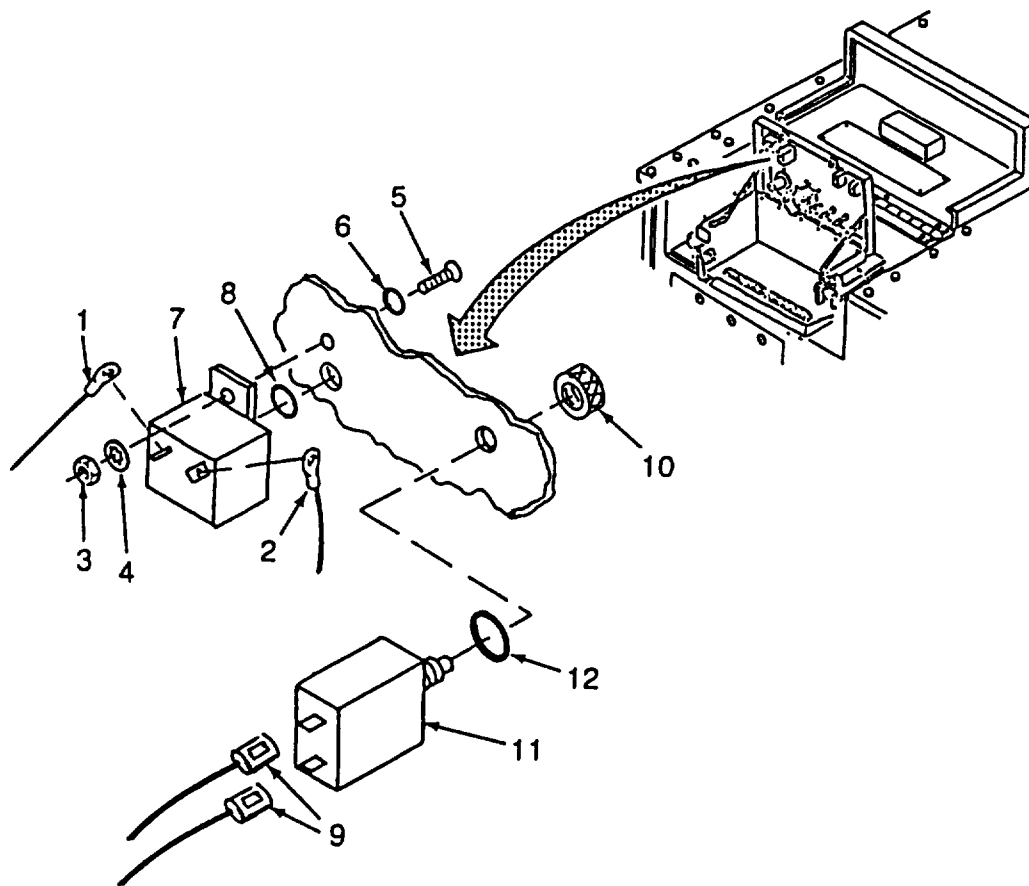


**4-24. CONTROL BOX ASSEMBLY - continued.**

- a. Disassembly - continued (Refer to Figure 4-27)

*Power and Thermostat Circuit Breakers*

- (8) Tag and disconnect wires (1) and (2).
- (9) Remove two nuts (3), two lockwashers (4), two screws (5), two preformed packings (6) POWER circuit breaker (7) and preformed packing (8). Discard preformed packing and lockwashers.
- (10) Tag and disconnect two wires (9).
- (11) Remove nut (10), THERMOSTAT circuit breaker (11) and preformed packing (12). Discard preformed packing.





**4-24. CONTROL BOX ASSEMBLY - continued.**

- a. Disassembly - continued (Refer to Figure 4-28)

*Purge and Flame Reset Switches*

**NOTE**

**Both switches are the same.**

- (12) Remove extension (1).
- (13) Tag and disconnect two wires (2).
- (14) Remove nut (3), lockwasher (4), preformed packing (5), switch (6), keyed washer (7) and nut (8). Discard preformed packing.

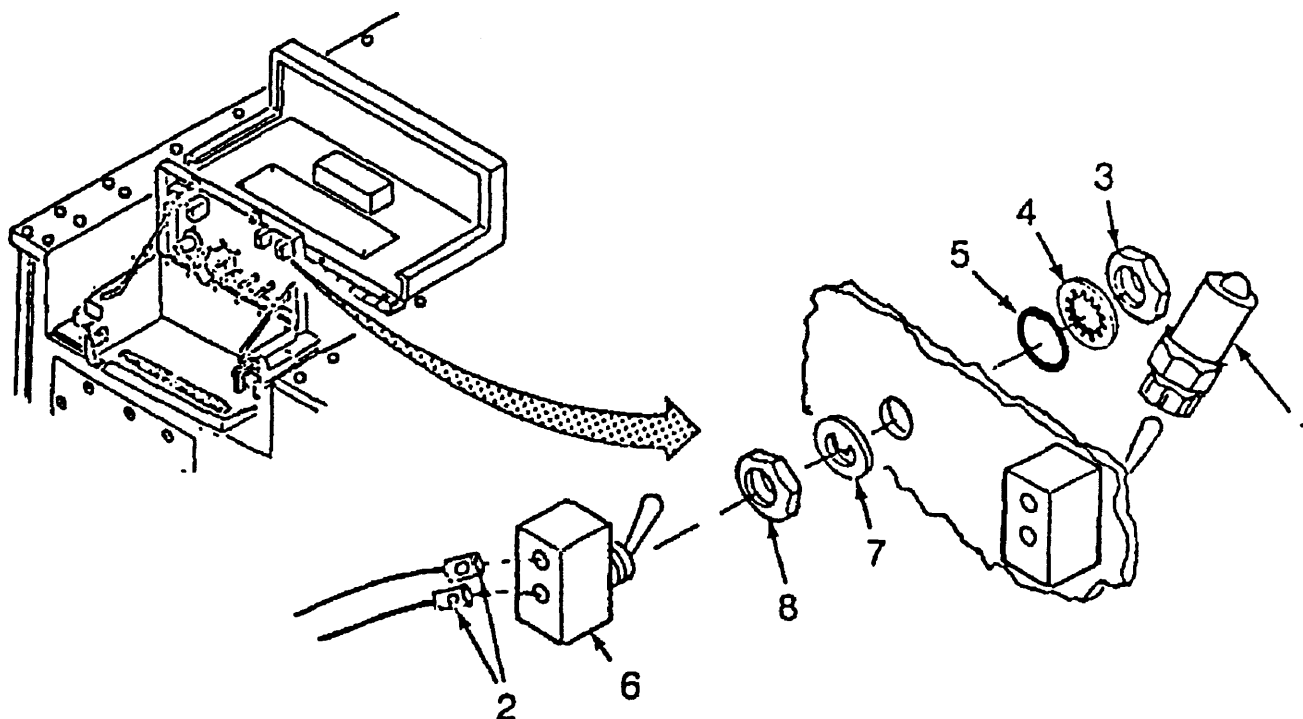


Figure 4-28. Control Box Disassembly Purge and Flame Reset Switches

**4-24. CONTROL BOX ASSEMBLY - continued.**

- a. Disassembly - continued (Refer to Figure 4-29)

*Flameout, High Temp and Power Lights*

**NOTE**

**All three lights are the same. Only the cap colors differ. Power light is green, others are red.**

- (15) Tag and disconnect two wires (1).
- (16) Remove nut (2), lockwasher (3), gasket (4) and light (5).
- (17) Remove cap (6) and bulb (7).

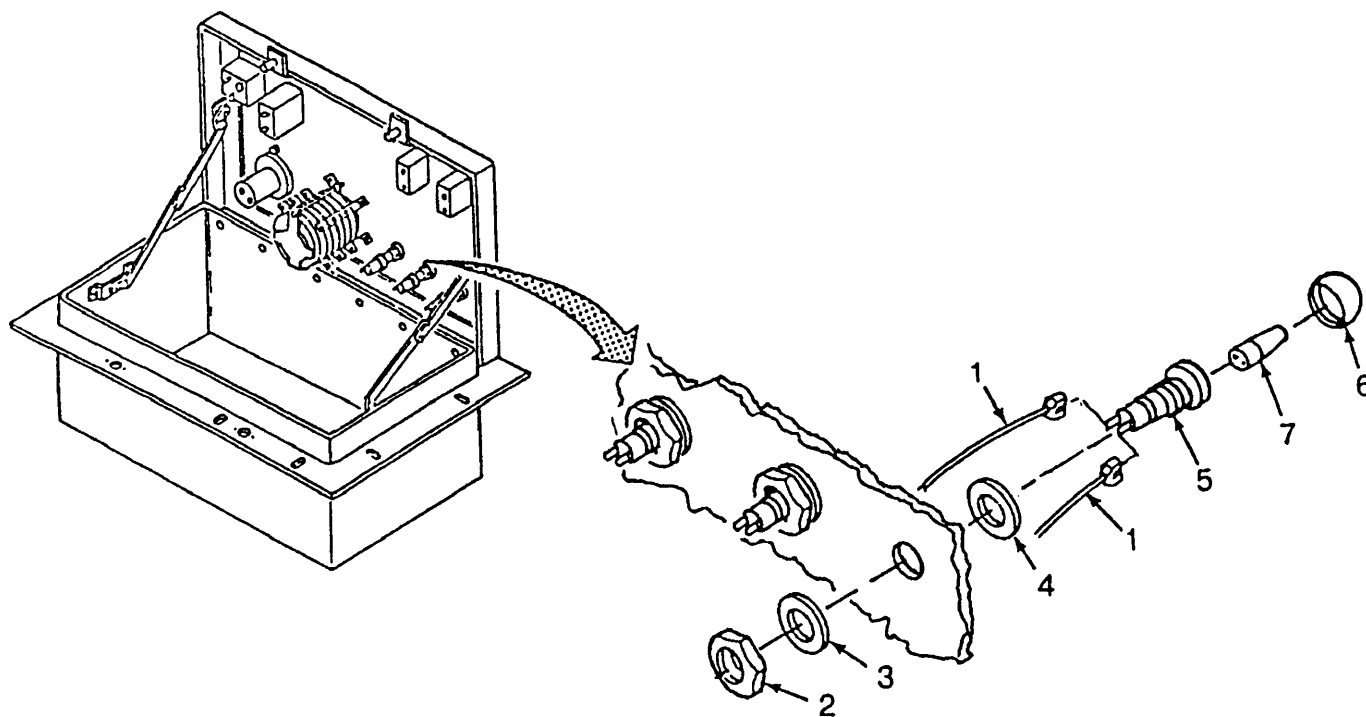


Figure 4-29. Control Box Disassembly Flameout, High Temp and Power Lights

**4-24. CONTROL BOX ASSEMBLY - continued.**

## a. Disassembly - continued (Refer to Figure 4-30)

*Transformer/Terminal Boards*

- (18) Tag and disconnect two wires (1).
- (19) Tag and separate black wire (2) and white wire (3) at splices (4). Discard splices.
- (20) Remove two nuts (5), two lockwashers (6), two screws (7) and transformer (8). Discard lockwashers.
- (21) Open right side rear door (9), tag and disconnect wires on top and bottom of TB1 (10) and TB3 (11) and remove jumper (12) and two terminals (13).
- (22) Remove four nuts (14), four lockwashers (15), four screws (16), TB1 (10), TB3 (11) and two terminal marking strips (17). Discard lockwashers.
- (23) Remove nut (18), lockwasher (19), tag and disconnect seven wires (20). Discard lockwasher.
- (24) Remove nut (21), two lockwashers (22), screw (23) and ground wire (24). Tag wire. Discard lockwashers.

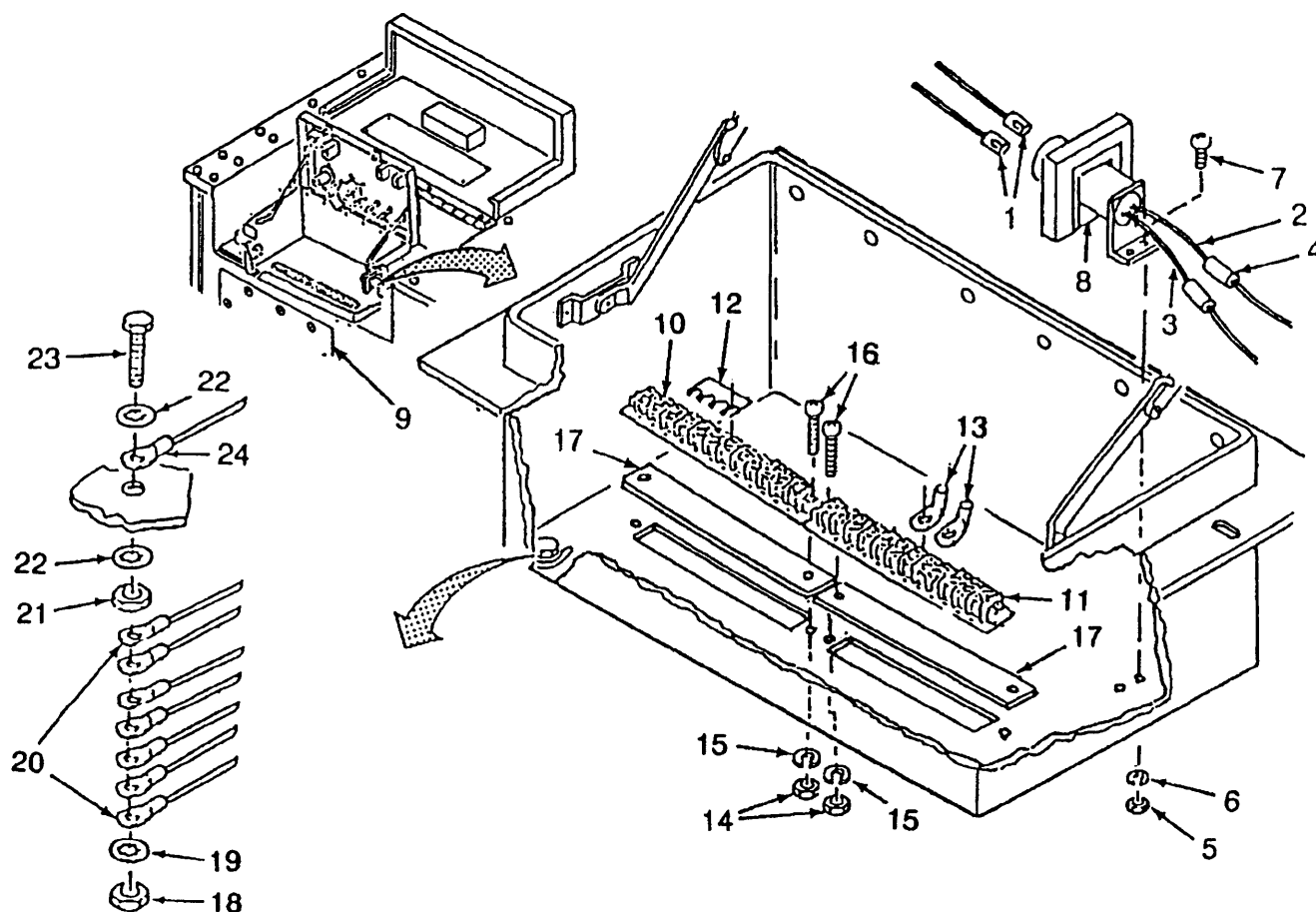


Figure 4-30. Control Box Disassembly, Transformer/Terminal Boards

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**4-24. CONTROL BOX ASSEMBLY - continued.**

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**b. Repair**

- (1) Inspect all parts for wear, cracks, corrosion, bent or broken terminals, broken/cracked glass. Inspect all hardware for stripped or damaged threads.
- (2) Repair limited to replacement of damaged parts.

**c. Assembly (Refer to Figure 4-31)***Terminal Boards/Transformer*

- (1) Install ground wire (1), two lockwashers (2), screw (3) and nut (4).
- (2) Install seven wires (5), lockwashers (6) and nut (7).
- (3) Install two terminal marking strips (8), terminal boards TB3 (9) and TB1 (10), four screws (11), four lockwashers (12) and four nuts (13).
- (4) Connect wires to top of TB3 (9) as follows.
  - (a) Connect wire CB2-2 to TB3-1
  - (b) Connect wire CB2-1 to TB3-2
  - (c) Connect wire S1-13 to TB3-2
  - (d) Connect wire TR2-R to TB3-3
  - (e) Connect wire S1-16 to TB3-5
  - (f) Install two terminals (14) and TB3-6 and TB3-7.
  - (g) Connect wire TT-POS to TB3-8
  - (h) Connect wire DS2-POS to TB3-10
  - (i) Connect wire DS3-POS to TB3-11
- (5) Connect wires to top of TB1 (10) as follows.
  - (a) Connect wire CB1-1 to TB1-1
  - (b) Connect wire S1-1 to TB1-2
  - (c) Position jumper bar (15) between terminals TB1-3 through TB1-7
  - (d) Connect wires S1-2 and DS1-NEG to TB1-3
  - (e) Connect wire TT-NEG to TB1-5

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**4-24. CONTROL BOX ASSEMBLY - continued.**

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## c. Assembly - continued (Refer to Figure 4-31)

## (6) Connect wires to bottom of TB3 (9) as follows.

- (a) Connect wire K1-W to TB3-1.
- (b) Connect wire J3-A to TB3-2.
- (c) Connect wire J3-B to TB3-3.
- (d) Connect wires J3-C and S3-1 to TB3-4.
- (e) Connect wires S3-3 and K1-B to TB3-5.
- (f) Connect wires K1-F1 and D1-YEL to TB3-6.
- (g) Connect wires D1-YEL and K1-F2 to TB3-7.
- (h) Connect wires K1-ORG and S2-1 to TB3-8.
- (i) Connect wires S2-3 and L1-BLK to TB3-9.
- (j) Connect wire S2-2 to TB3-10.
- (k) Connect wire K1-RED/YEL to TB3-11.

## (7) Connect wires to bottom of TB1 (10) as follows.

- (a) Connect wire P1-A to TB1-1.
- (b) Connect wire P1-B to TB1-2.
- (c) Connect wires F1-BLK and B1-T4, T8 to TB1-3.
- (d) Connect wires L2-BLK and L3-NEG to TB1-4.
- (e) Connect wires B2-WHT and K1-WHT to TB1-5.
- (f) Connect wire CR1-AC to TB1-6.
- (g) Connect wire L1-BLK to TB1-7.
- (h) Connect wires FI-WHT and B1-T1, T5 to TB1-8.

**4-24. CONTROL BOX ASSEMBLY - continued.**

- c. Assembly - continued (Refer to Figure 4-31)
- (i) Connect wire L2-BLK to TB1-9.
  - (j) Connect wire S5-COMM to TB1-10.
  - (k) Connect wires S5-N.O. and B2-BLK and K1-BLK to TB1-11.
  - (l) Connect wire L3-POS to TB1-12.

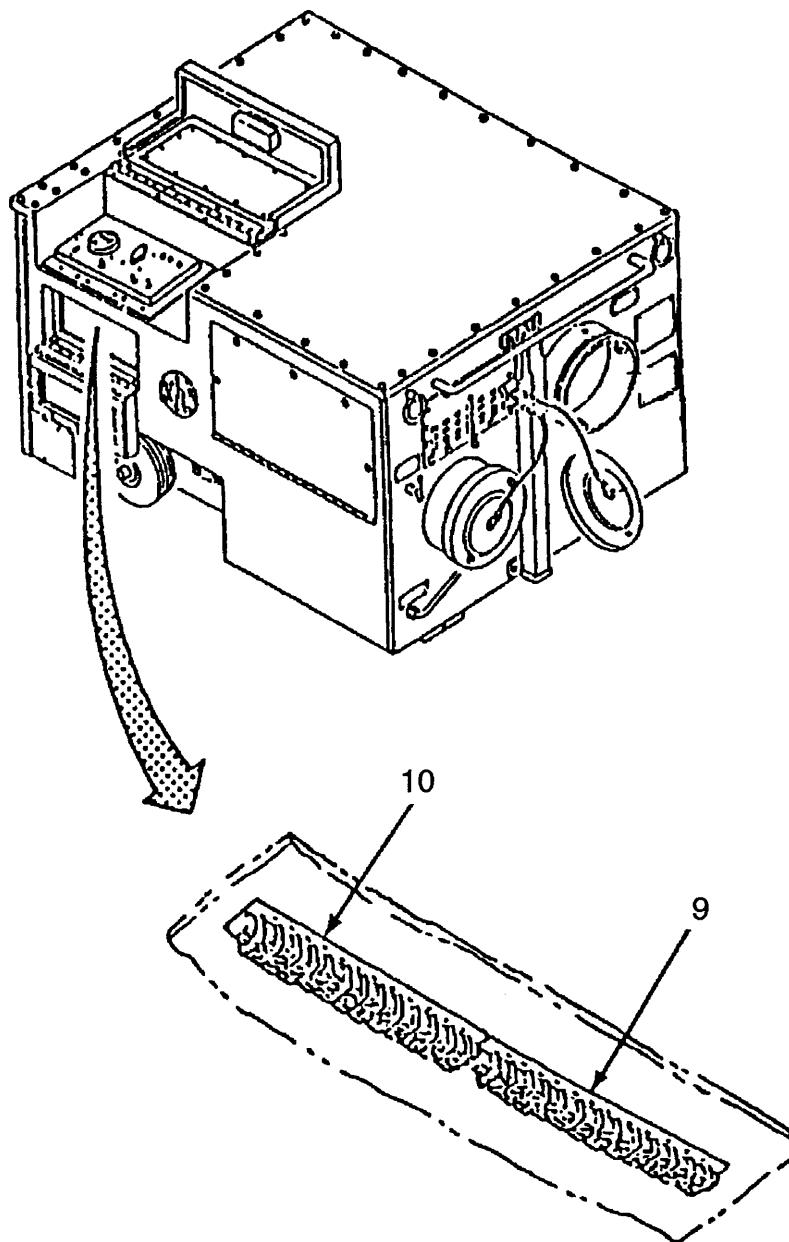


Figure 4-31. Control Box Assembly Terminal Boards/Transformer (Sheet 2 of 3)

4-24. CONTROL BOX ASSEMBLY - continued.

c. Assembly - continued (Refer to Figure 4-31)

- (8) Install transformer (16), two screws (17), two lockwashers (18) and two nuts (19).
- (9) Connect wire TR2-R/TB3-3 (20) and TR2-C/S1-13 (21).
- (10) Connect the black wire (22) to wire S1-12 (23) and the white wire (24) to wire TB1-7 (25) with two terminal splices (26).
- (11) Close rightside rear door (27).

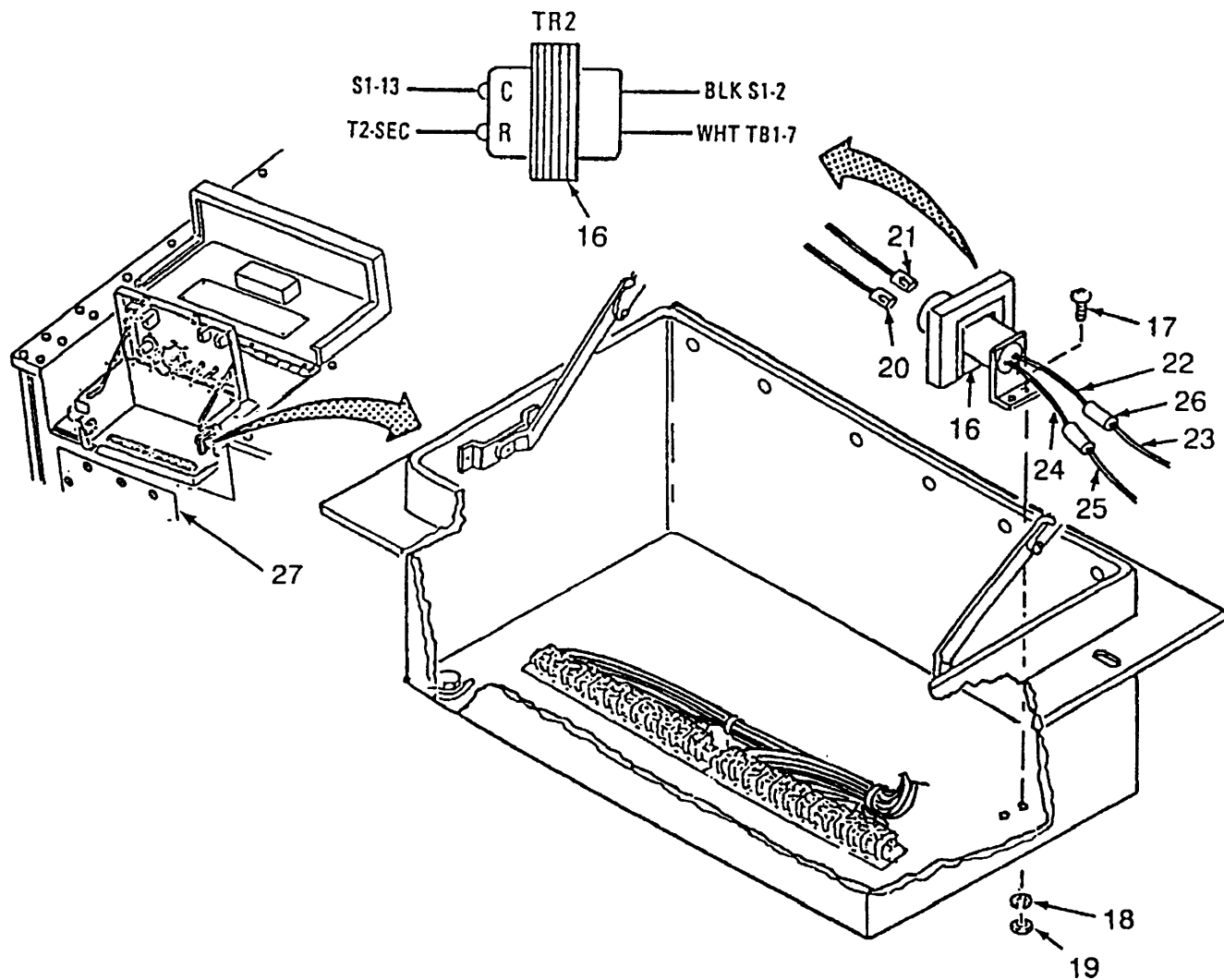


Figure 4-31. Control Box Assembly Terminal Boards/Transformer (Sheet 3 of 3)



**4-24. CONTROL BOX ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 4-32)

*Flameout, High Temp and Power Lights*

**NOTE**

**All three lights are the same. Only the cap colors differ. Power light is green, others are red.**

- (12) Install gasket (1), light (2), lockwasher (3) and nut (4).
- (13) Install bulb (5) and cap (6).
- (14) Connect wires for each light as follows:
  - (a) Power Light (7) - connect wire DS1-POS (8) and wire DS1-NEG (9).
  - (b) High Temp Light (10) - connect wire DS2-POS (11) and wire DS2-NEG (12).
  - (c) Flameout Light (2) - connect wire DS3-POS (13) and wire DS3-NEG (14).

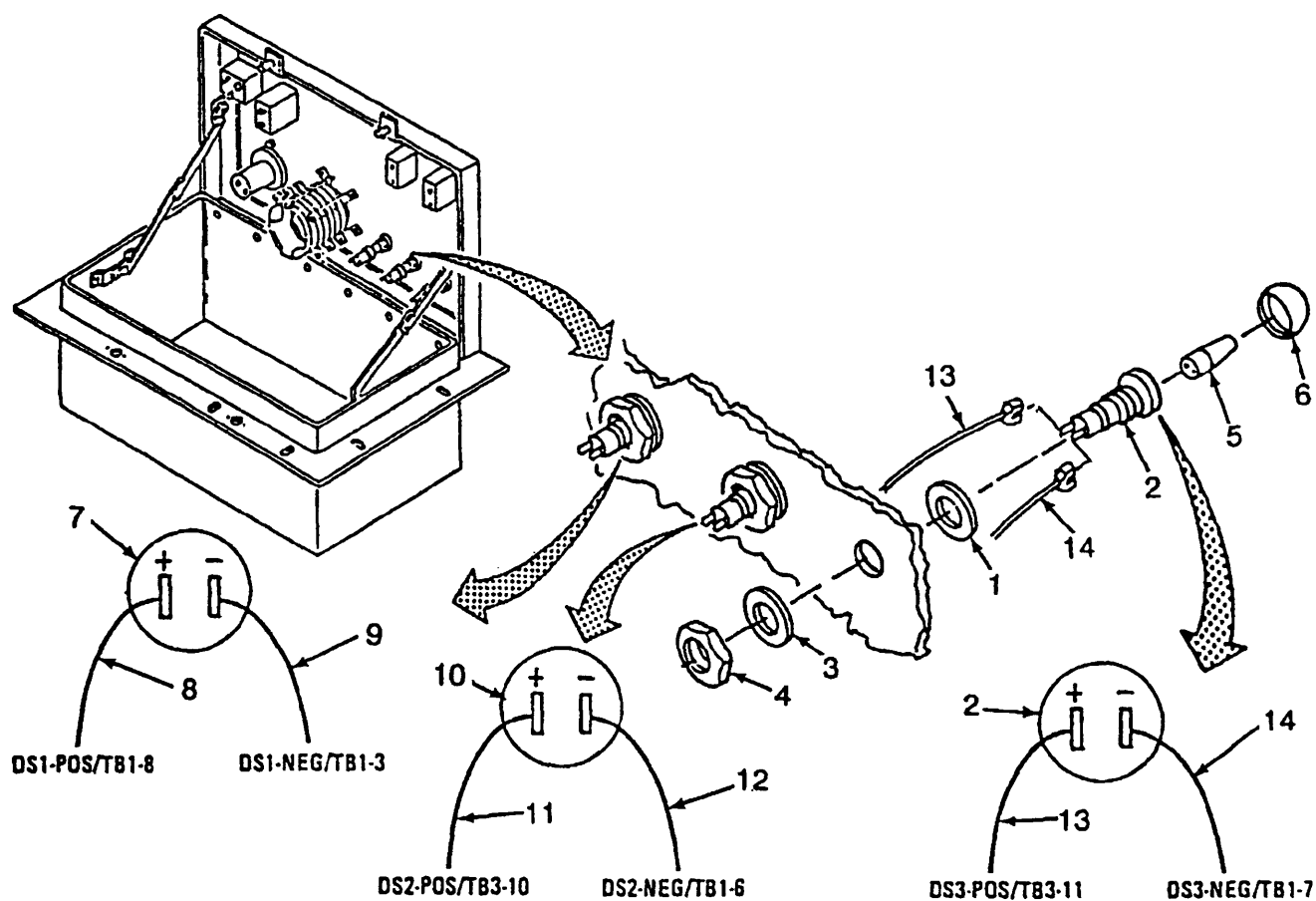


Figure 4-32. Control Box Assembly Power, High Temp and Flameout Lights

**4-24. CONTROL BOX ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 4-33)

*Purge and Flame Reset Switches*

**NOTE**

**Both switches are the same.**

(15) Install nut (1), locking ring (2), switch (3), preformed packing (4)(Item 39, App H), lockwasher (5) and nut (6).

(16) Install extension (7).

(17) Connect wire S4-1/TB1-9(8) and wire S4-2/S1-7(9) to Purge Switch (3).

(18) Connect wire S7-1 (11) and wire S7-2 (12) to Flame Reset Switch (10).

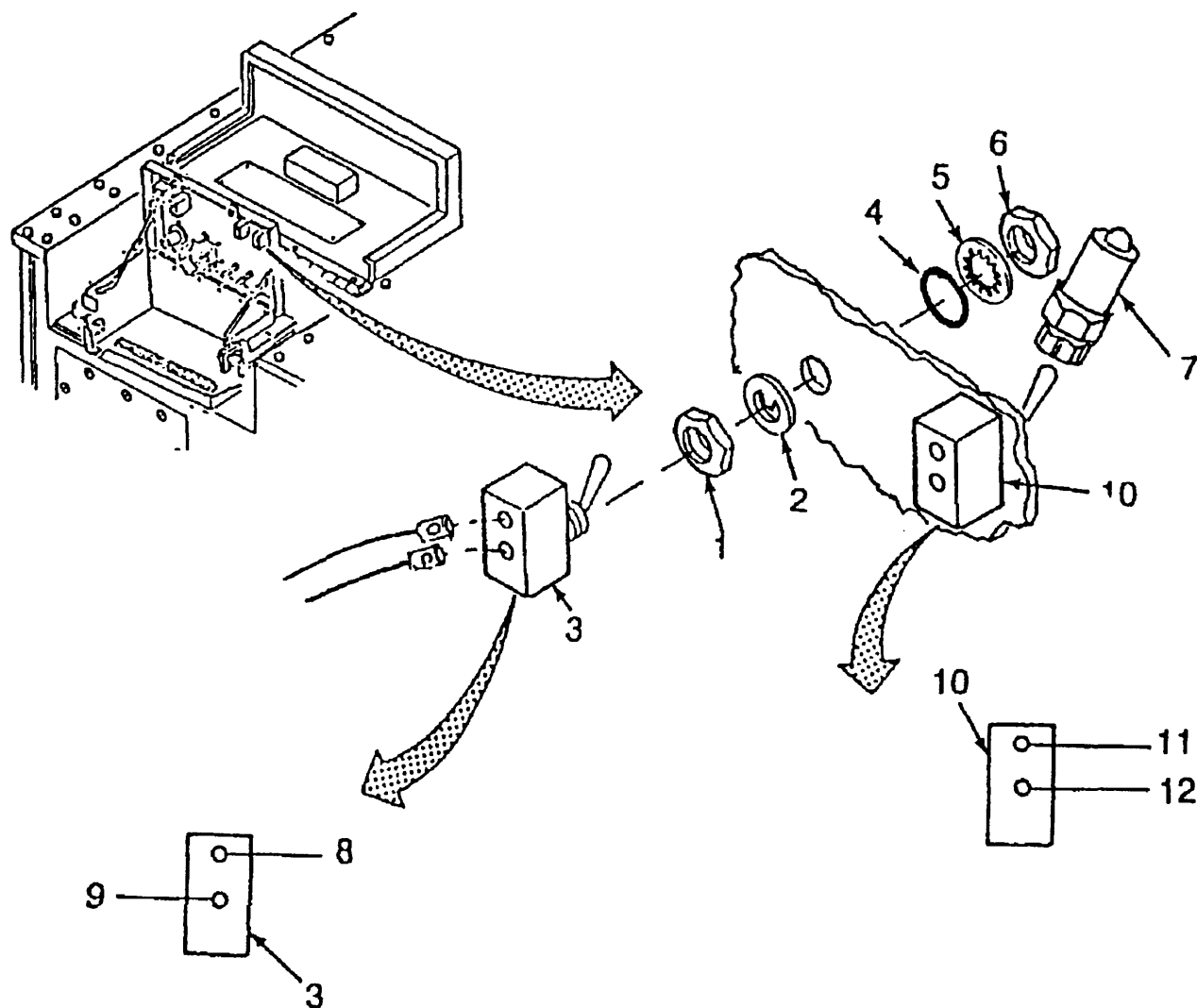


Figure 4-33. Control Box Assembly, Purge and Flame Reset Switches

**4-24. CONTROL BOX ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 4-34)

*Thermostat and Power Circuit Breakers*

- (19) Install preformed packing (1)(Item 40, App H), THERMOSTAT circuit breaker (2), and nut (3).
- (20) Connect wire CB2-1/TB3-2(4) and wire CB2-2/TB3-1(5).
- (21) Install preformed packing (6)(Item 39, App H), POWER circuit breaker (7), two preformed packings (8)(Item 38, App H), two screws (9), two lockwashers (10) and two nuts (11).
- (22) Connect wire CB1-1/TB1-1(12) and wire CB1-2/S1-5(13).

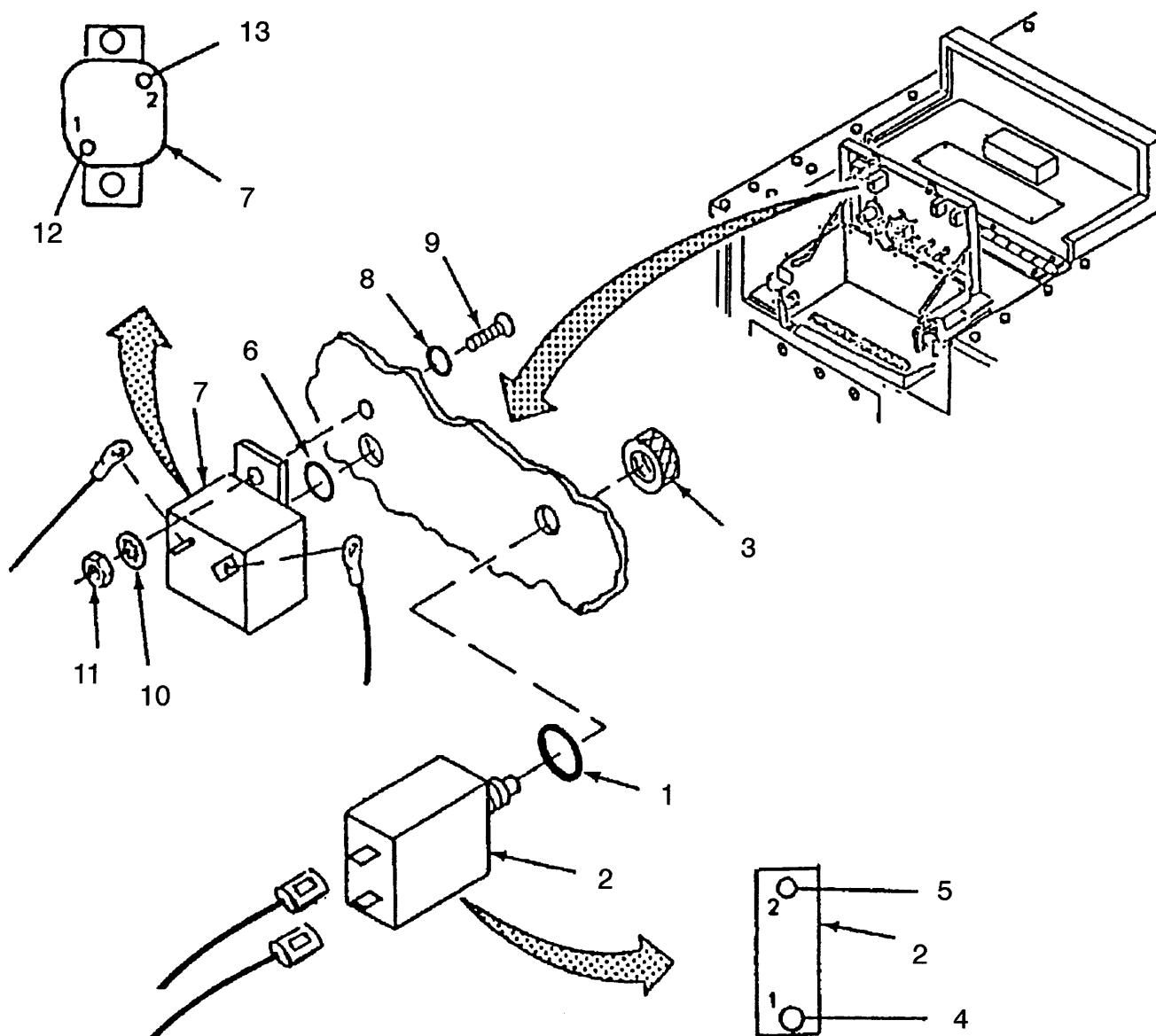


Figure 4-34. Control Box Assembly, Thermostat and Power Circuit Breakers

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**4-24. CONTROL BOX ASSEMBLY - continued.**

---

## c. Assembly - continued (Refer to Figure 4-35)

*Hourmeter and Mode Switch*

- (23) Install gasket (1)(Item 17, App H), HOURMETER (2), three screws (3), ground wire (4), three flat washers (5) and three self-locking nuts (6).
- (24) Connect two wires TT-NEG (7) and TT-POS (8).
- (25) Install sleeve (9) and nut (10).
- (26) Install MODE SWITCH (11), four preformed packings (12) and four screws (13).
- (27) Install pin (14), knob (15) and screw (16).
- (28) Connect wires on MODE switch (11) as follows.
  - (a) Connect wire S1-1/TB1-2 to position S1-1.
  - (b) Connect wires S1-2/TB1-3 and S1-2/S1-3 to position S1-2.
  - (c) Connect wires S1-2/S1-3 and S1-3/S1-4 to position S1-3.
  - (d) Connect wire S1-3/S1-4 to position S1-4.
  - (e) Connect wires S1-5/CB1-2 and S1-5/S1-9 to position S1-5.
  - (f) Connect wires S1-6/TB1-8 and S1-6/S1-7 to position S1-6.
  - (g) Connect wires S1-6/S1-7, S1-7/S4-2, and S1-7/S1-8 to position S1-7.
  - (h) Connect wire S1-7/S1-8 to position S1-8.
  - (i) Connect wire S1-5/S1-9 to position S1-9.
  - (j) Connect wires S1-11/TB1-10 and S1-11/S1-12 to position S1-11.
  - (k) Connect wires S1-11/S1-12 and S1-12 /TR2-BLK to position S1-12.
  - (l) Connect wires S1-13/TR2-C and S1-13/TB3-2 to position S1-13.
  - (m) Connect wire S1-16/TB3-5 to position S1-16.
- (29) Close control box lid (17) and control panel cover (18).

## 4-24. CONTROL BOX ASSEMBLY - continued.

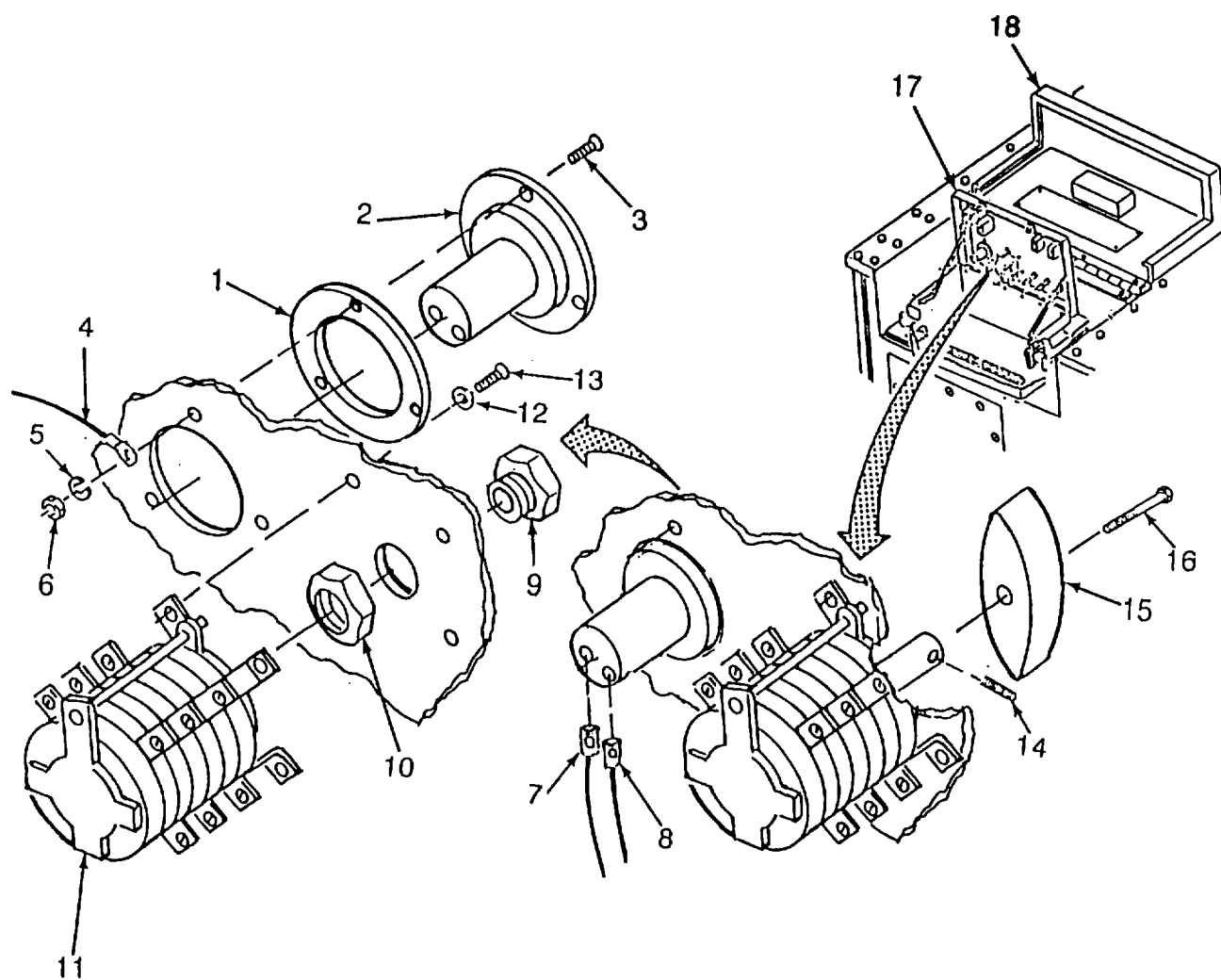


Figure 4-35. Control Box Assembly Hourmeter and MODE Switch

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**4-25. FUEL PRESSURE GAGE.**

---

This task consists of:                      a.      Removal                                      b.      Installation

---

**INITIAL SETUP**

Tools:  
Tool Box, General Mechanics (Item 1, App B)  
Equipment Condition:  
Unit disconnected from power source (para 2-8)

General Safety Requirements:  
**WARNING**  
Contact with hot components can cause burns.  
Allow unit to cool down before attempting  
service/inspection/maintenance activity.  
  
Fuels Flammable / No Smoking.

---

- a.                      Removal (Refer to Figure 4-36.)

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

- (1)      Open control panel cover (1).
- (2)      Open side, front door (2).

**WARNING**

**Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. No SMOKING around the area. Suitable fire extinguisher must be present.**

**Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible and wet clothes with water before taking them off. In extreme cold conditions, clothes should not be wet; instead, ground yourself to a piece of grounded equipment by taking hold of it before taking off the clothes. Wash skin with warm soapy water.**

- (3)      Disconnect tubing (3).
- (4)      Remove two nuts (4), two lockwashers (5), bracket (6), and gage (7).

**4-25. FUEL PRESSURE GAGE - continued.**

- b. Installation (Refer to Figure 4-36)

**NOTE**

**Be sure gage face is readable when standing in front of control box.**

- (1) Install fuel gage (7), bracket (6), two lockwashers (5), and two nuts (4).
- (2) Install tubing (3)(Item 78, App F).
- (3) Close side front door (2).
- (4) Close control panel cover (1).

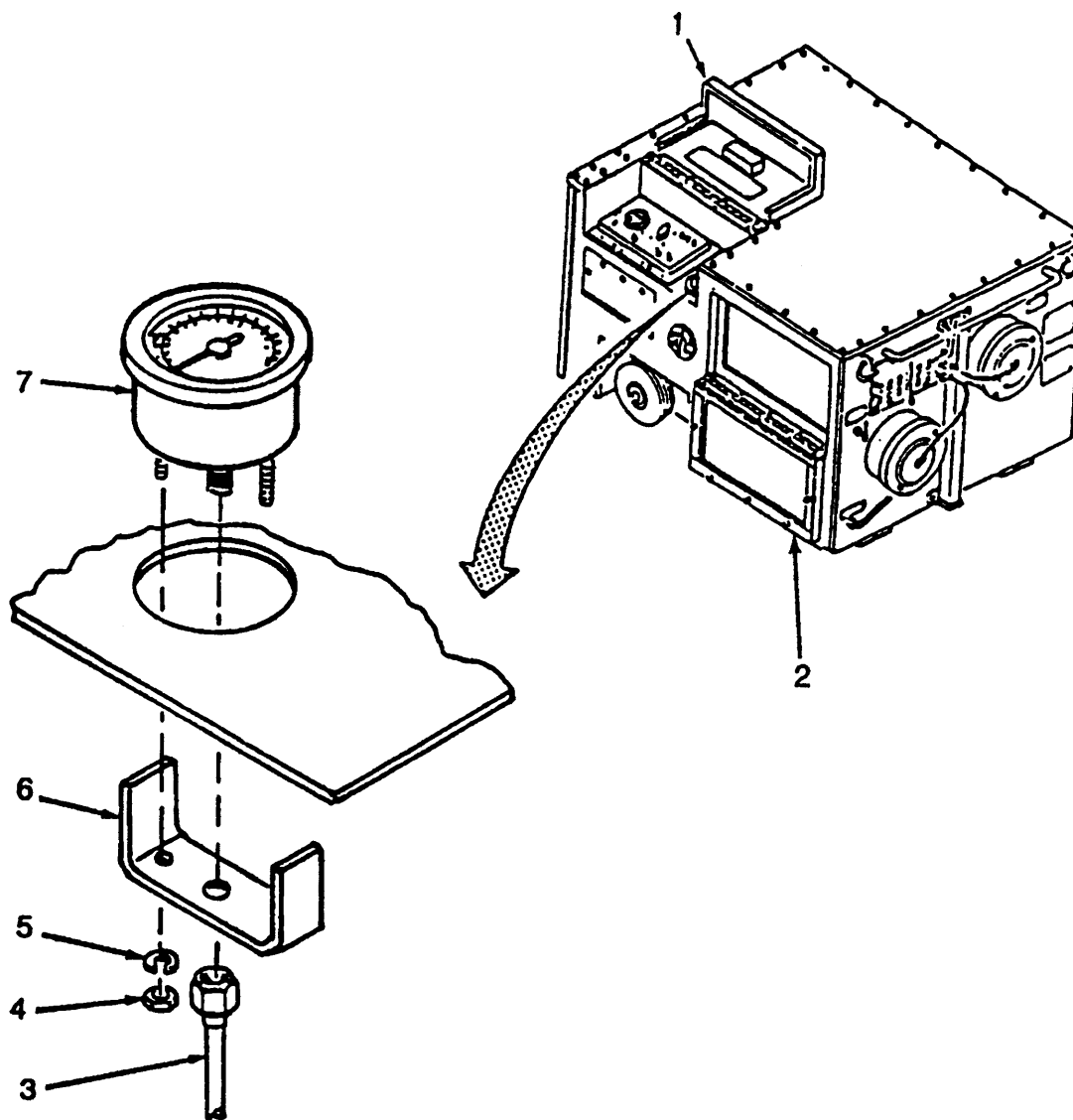


Figure 4-36. Fuel Pressure Gage

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**4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY.**

---

This task consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

---

**INITIAL SETUP:****Tools:**

Tool Box, General Mechanics (Item 1, App B)  
 Offset Phillips Screwdriver (Item 2, App B)  
 Repair Kit Electrical Connector (Item 2, App B)

**Material/Parts:**

Lockwasher (Item 15, App H)  
 Terminal Splice (Item 26, App H)  
 Wire Tags (Item 9, App E)  
 Rags (Item 2, App E)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

---

**NOTE**

**Disassemble only to the level required to make repairs.**

## a. Removal (Refer to Figure 4-37)

(1) Open side, rear door (1).

(2) Tag and separate four wires (2) at terminal splice (3). Discard splices. Remove screw (4), flat washer (4.1), nut (4.2), lock washer (4.3) and clamp (5).

(3) Tag and disconnect wires (6) and (7) from combustor relay (8).



## 4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY - continued.

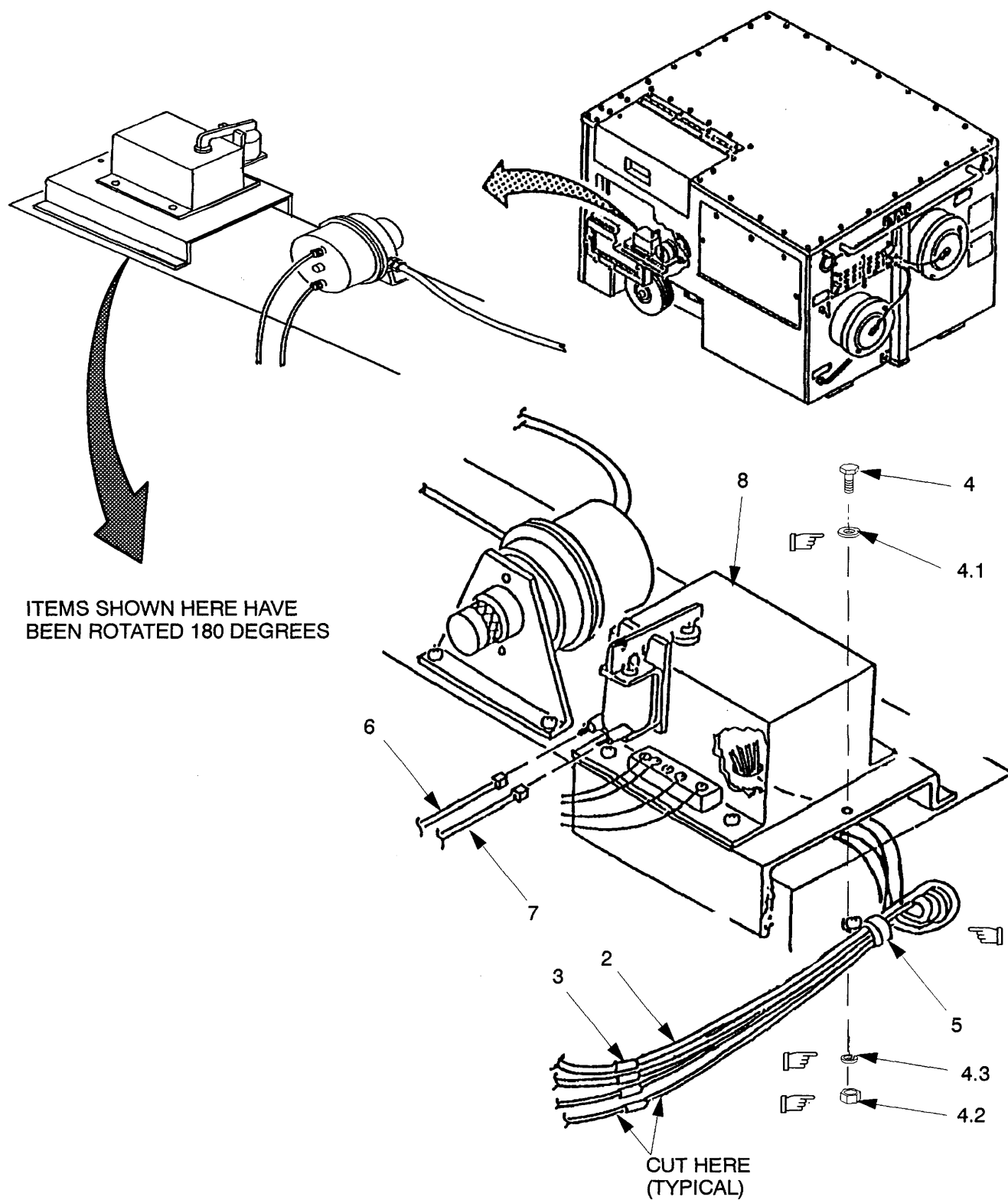


Figure 4-37. Combustor Control Relay (Sheet 1 of 2)

**4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY - continued.**

- a. Removal - continued (Refer to Figure 4-37)
- (4) Loosen screw (9) and remove cover (10).
  - (5) Tag and disconnect four wires (11) by removing four screws (12).
  - (6) Remove four screws (13), four lockwashers (14) and combustor relay base (15). Discard lockwashers.

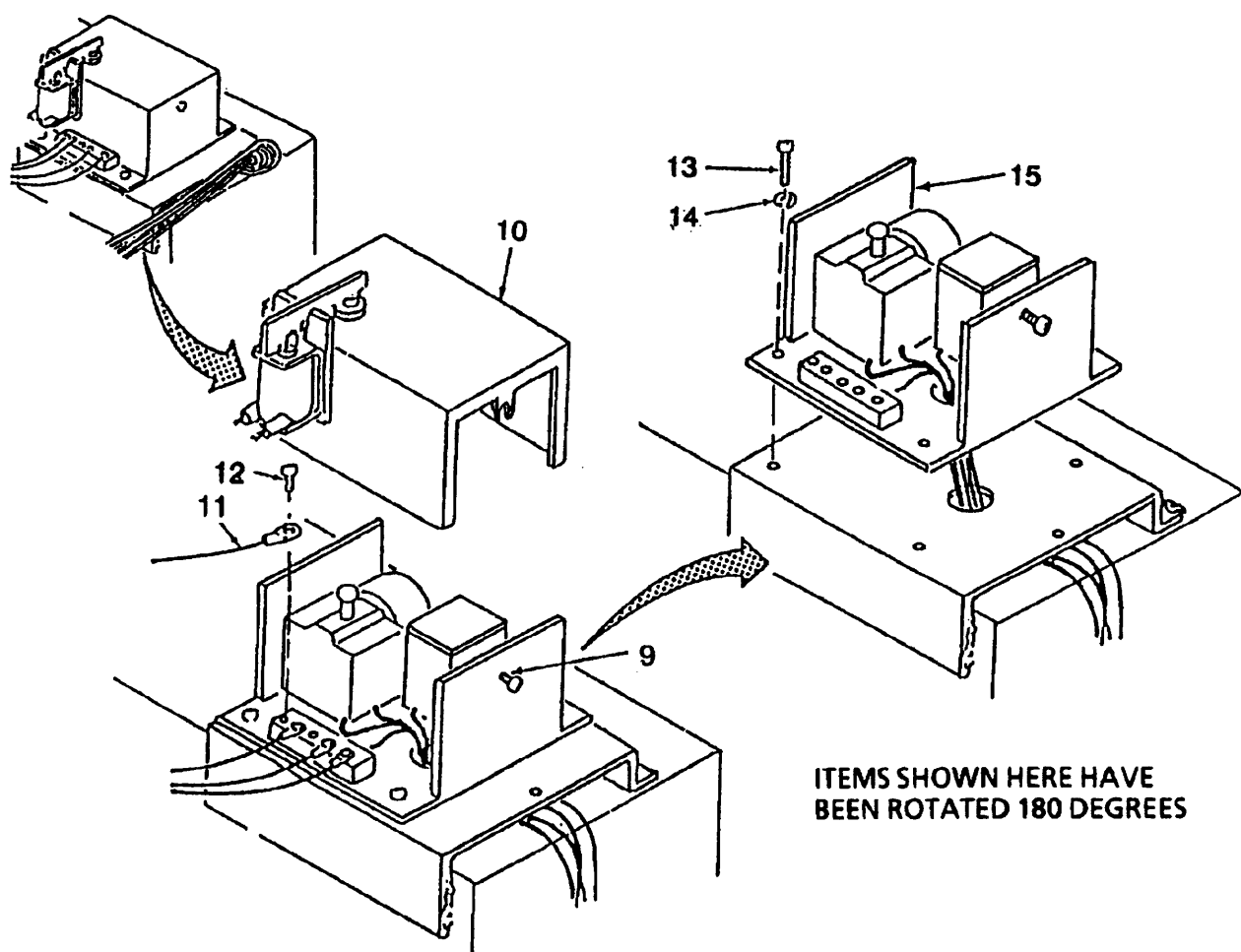


Figure 4-37. Combustor Control Relay (Sheet 2 of 2)

**4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY - continued.**

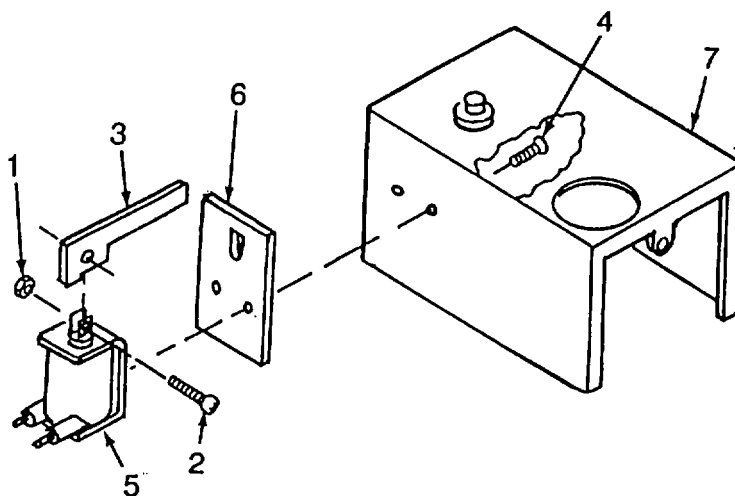
- b. Disassembly (Refer to Figure 4-38)
  - (1) Remove nut (1) and screw (2) and lever arm (3).
  - (2) Remove two screws (4), solenoid (5) and retainer plate (6) from combustor control relay cover (7).
- c. Repair

Repair limited to replacement of defective parts.
- d. Assembly (Refer to Figure 4-38)
  - (1) Install retainer plate (6) and solenoid (5) on combustor control relay (7) and secure with two screws (4).
  - (2) Place lever arm (3) through hole in retainer plate (6) and in slot on top of solenoid (5).

**NOTE**

**Lever arm must move freely. Do not overtighten nut.**

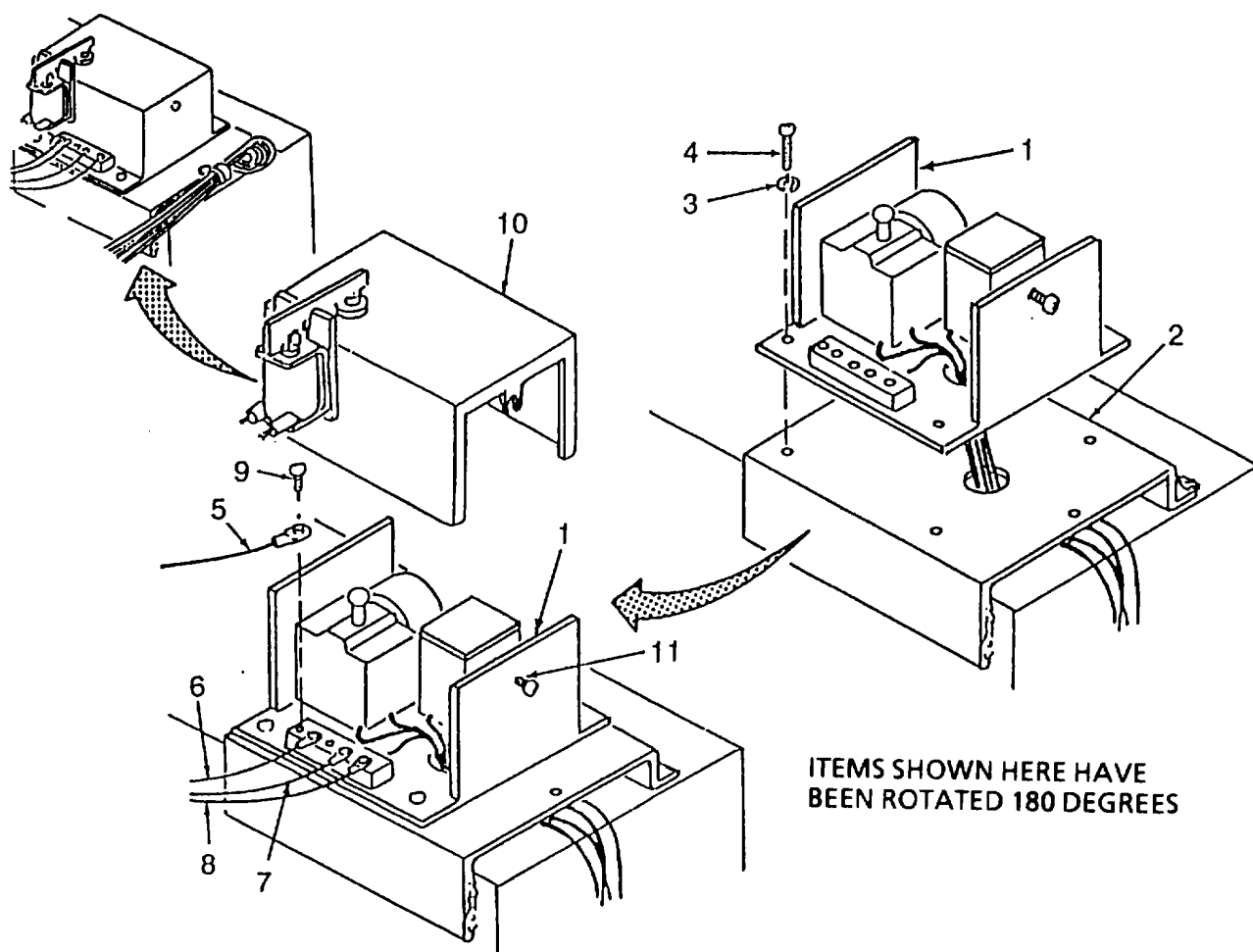
- (3) Insert screw (2) and nut (1) to secure lever arm (3).



**Figure 4-38. Combustor Control Relay Assembly/Disassembly**

**4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY - continued.**

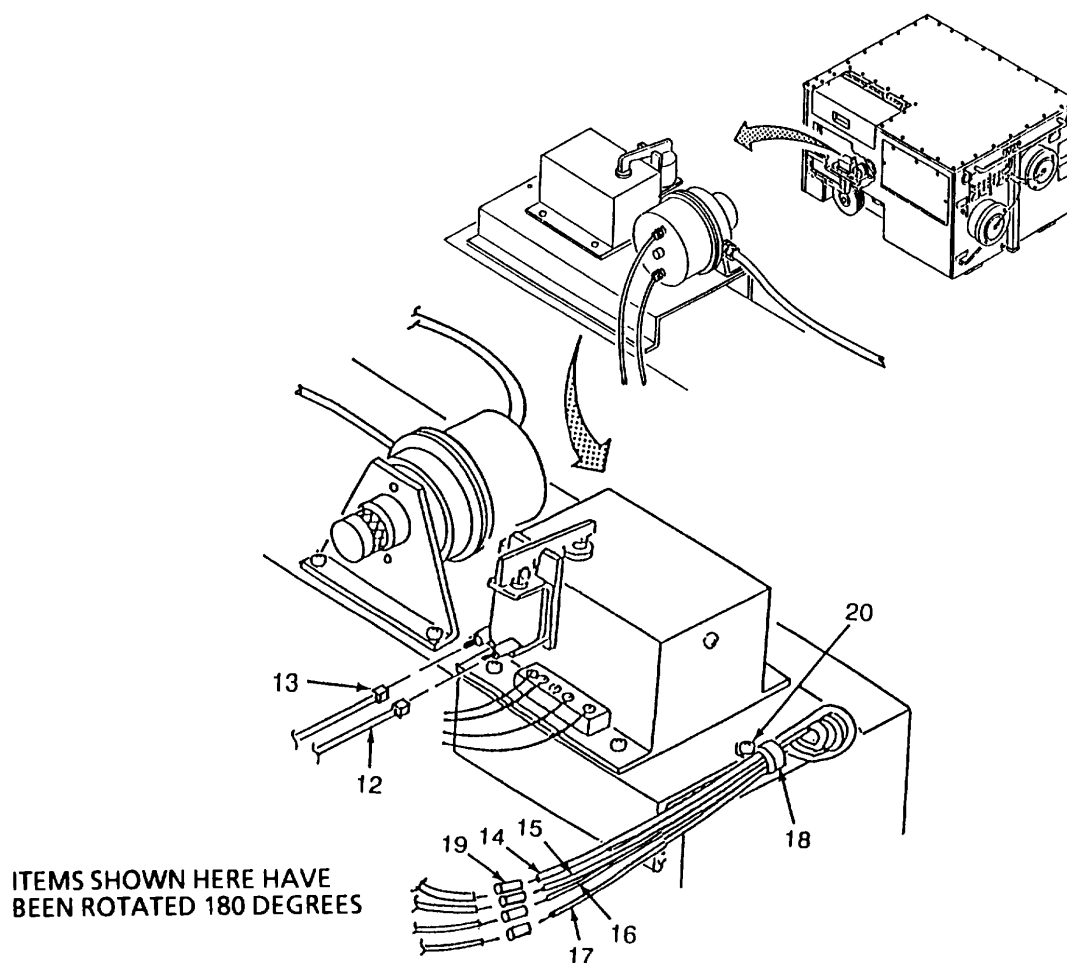
- e. Installation (Refer to Figure 4-39)
- (1) Install combustor control relay (1) while guiding the four colored wires through the hole in the unit mounting bracket (2) with the wires extending out toward the rear of the unit.
  - (2) Install four lockwashers (3) and four screws (4).
  - (3) Install wires (5), (6), (7), and (8) with four screws (9) as follows:
    - (a) Wire (5) K1-W:TB3-1 connects to position W.
    - (b) Wire (6) K1-B:TB3-5 connects to position B.
    - (c) Wire (7) K1-F1:TB3-6 connects to position F1.
    - (d) Wire (8) K1-F2:TB3-7 connects to position F2.
  - (4) Install cover (10) on combustor control relay (1) and tighten screw (11).

**Figure 4-39. Combustor Control Relay Installation (Sheet 1 of 2)**

**4-26. COMBUSTOR CONTROL RELAY (K1) ASSEMBLY - continued.**

e. Installation - continued (Refer to Figure 4-39)

- (5) Install wires (12) and (13).
- (6) Insert the four colored wires (14), (15), (16), and (17) through clamp (18) and connect the wires using four crimp splices (19) as follows:
  - (a) Black wire (14) connects to wire coming from TB1-11.
  - (b) White wire (15) connects to wire coming from TB1-5.
  - (c) Orange wire (16) connects to wire coming from TB3-8.
  - (d) Red/Yellow wire (17) connects to wire coming from TB3-11.
- (7) Install wire clamp (18) and screw (20).
- (8) Close door (21).



**Figure 4-39. Combustor Control Relay Installation (Sheet 2 of 2)**

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**4-27. AIR PRESSURE SWITCH.**

---

This task consists of:	a.	Testing	b.	Removal	c.	Repair
	d.	Installation	e.	Adjustment		

---

INITIAL SETUP: I

**Tools:**

Tool Box, General Mechanics (Item 1, App B)  
Multimeter (Item 2, App B)

**General Safety Requirements:****WARNING**

Contact with hot components can cause burns.  
Allow unit to cool down before attempting  
service/inspection/maintenance activity.

**Material/Parts:**

Lockwashers (Item 15, App H)  
Tags, Wire (Item 9, App E)

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

- a. Testing (Refer to Figure 4-40)
  - (1) Open control panel cover (1) and control panel lid (2).

**WARNING**

**Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions: BE CERTAIN that there is someone assisting you who can remove power immediately.**

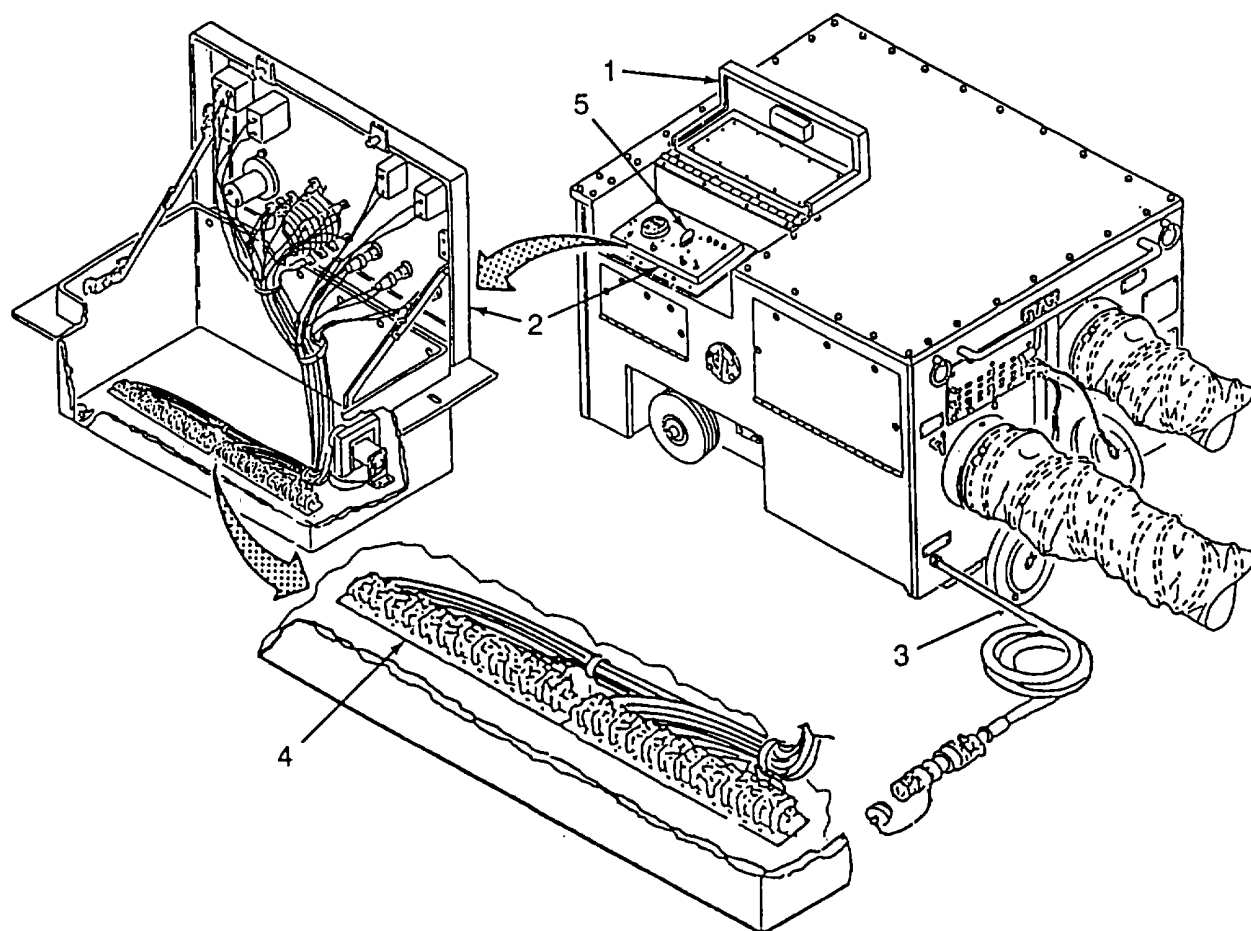
**FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.**

- (2) Connect power cable (3) to power source.
- (3) Connect a multimeter to TB1 (4), terminals TB1-10 and TB1-11. If meter indicated continuity, switch is closed; leave multimeter connected and proceed to paragraph e, Adjustment.

**4-27. AIR PRESSURE SWITCH - continued.**

a. Testing - continued (Refer to Figure 4-40)

- (4) Ensure all access doors are closed.
- (5) Turn MODE SWITCH (5) to the VENT position and observe meter indication.
  - (a) If the air switch closes the meter will indicate continuity, proceed to step (6).
  - (b) If the air switch does not close the meter will indicate infinity, switch is open; leave multimeter attached and proceed to paragraph e. Adjustment.
- (6) Turn MODE SWITCH (5) to the OFF position.
- (7) Disconnect multimeter, close control panel lid (2) and control panel cover (1).
- (8) Disconnect power cable (3) from power source.



**Figure 4-40. Air Pressure Switch, Testing**

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**4-27. AIR PRESSURE SWITCH - continued.**

---

- b. Removal (Refer to Figure 4-41)
  - (1) Open side, rear door (1) and side, front door (2).
  - (2) Tag and disconnect wires (3) and (4) from air switch (5).
  - (3) Remove air line (6) fittings (7) and (8).
  - (4) Remove two screws (9), two lockwashers (10) and air switch (5). Discard lockwashers.
- c. Repair. Repair is limited to replacement of defective components.
- d. Installation (Refer to Figure 4-41)
  - (1) Install air switch (5), two lockwashers (10) and two screws (9).
  - (2) Install fittings (8) and (7) and air line (6).
  - (3) Connect wires (4) and (3) as follows:
    - (a) Connect wire S5-NO/TB1-11 to the top (normally open) post.
    - (b) Connect wire S5-COM/TB1-10 to the bottom (common) post.
  - (4) Close doors (2) and (1).



## 4-27. AIR PRESSURE SWITCH - continued.

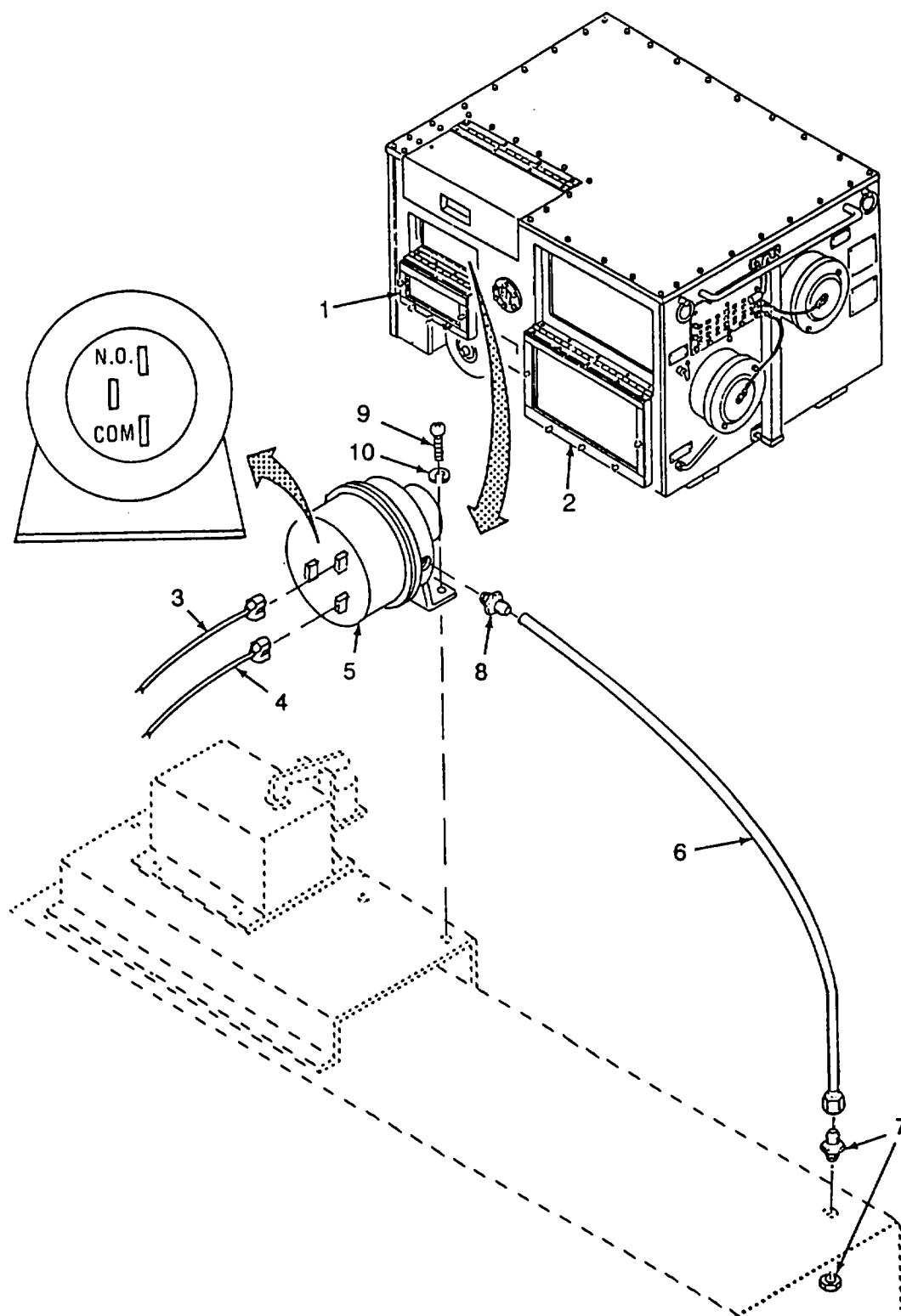


Figure 4-41. Air Pressure Switch

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**4-27. AIR PRESSURE SWITCH - continued.**

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- e. Adjustment (Refer to Figure 4-42)
- (1) Disconnect power cable (1) from power source.
  - (2) Remove air return duct (2) from the unit.
  - (3) Open rear side door (3).
  - (4) If testing indicated air switch was closed, proceed as follows:
    - (a) Remove cover (4) from air switch (5), loosen locknut (6).
    - (b) Turn adjustment screw (7) clockwise/in until meter indicates infinity. Turn adjustment screws (7) one quarter turn more.
    - (c) Tighten locknut (6), install cover (4), and proceed to step (12).
  - (5) If testing indicated air switch was open, proceed to step (6).
  - (6) Remove cover (4) from air switch (5), loosen locknut (6) and turn adjustment screw (7) one half turn counter clockwise/out.
  - (7) Close rear side door (3).

**WARNING**

**Electrical high voltage cannot be seen, but it can kill you. Electricity is unlike most other dangerous things you can come in contact with because it gives no warning and no symptoms to be wary of. Its effect is immediate. It can kill you, render you unconscious, or severely burn you. To ensure your safety and that of other maintenance personnel, always observe the following precautions: BE CERTAIN that there is someone assisting you who can remove power immediately.**

**FOR ARTIFICIAL RESPIRATION, REFER TO FM 21-11.**

- (8) Connect power cable (1) to power source.
- (9) Turn MODE SWITCH (8) to the VENT position and observe meter indication.
  - (a) If the air switch (5) closes the meter will indicate continuity, turn MODE SWITCH (8) to OFF and proceed to step (10).
  - (b) If the air switch (5) does not close the meter will indicate infinity. Repeat steps (1), (2), (3), (6), (7), (8) and (9).
  - (c) If the air switch (5) does not close after turning the adjustment screw (7) completely clockwise/in replace the air switch.

**4-27. AIR PRESSURE SWITCH - continued.**

e. Adjustment - continued (Refer to Figure 4-42)

- (10) Disconnect multimeter, close control panel lid (9) and control panel cover (10).
- (11) Open rear side door (3).
- (12) Tighten locknut (6) and install cover (4).
- (13) Close rear side door (3).
- (14) Connect air return duct (2) to unit.

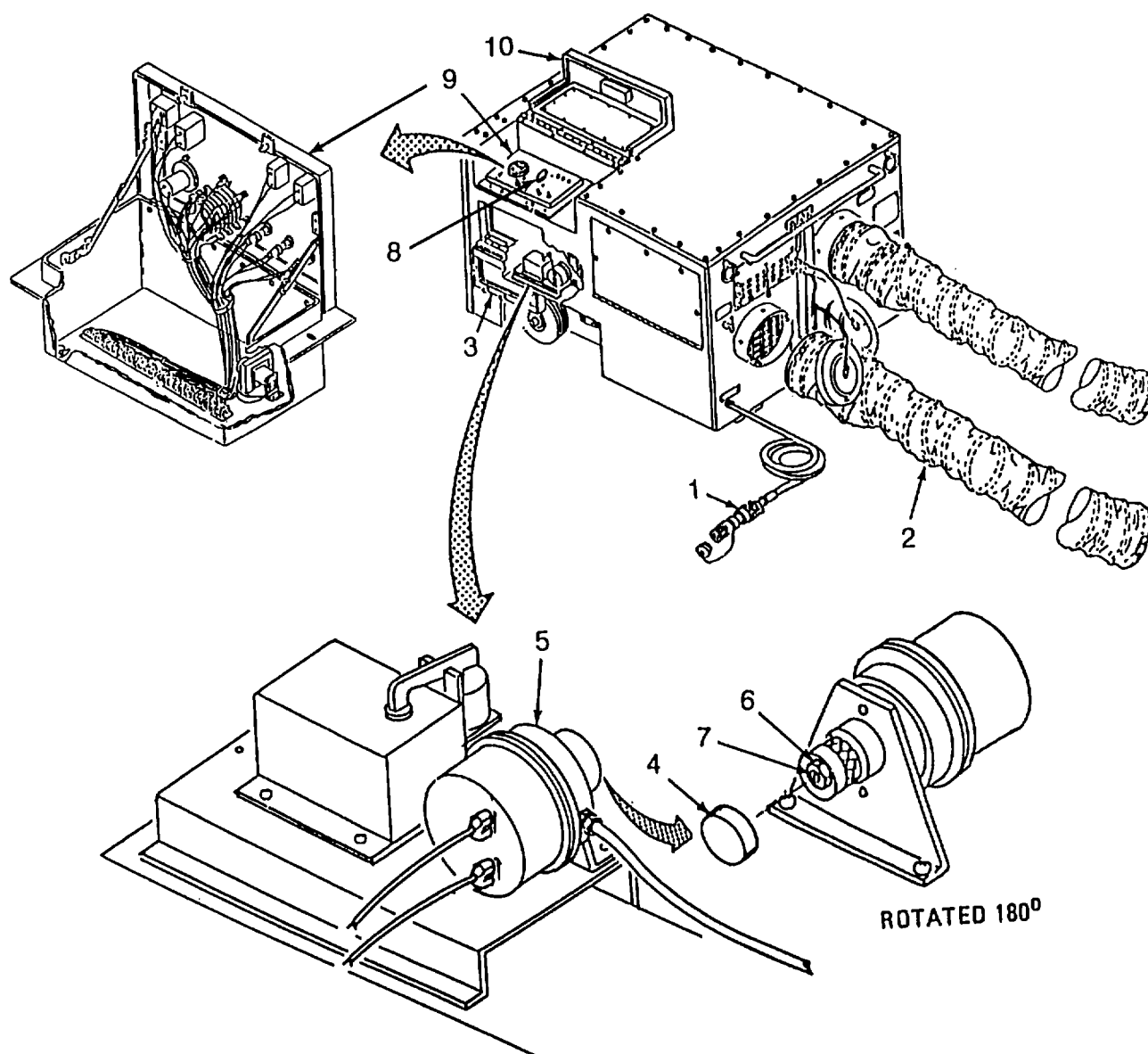


Figure 4-42. Air Pressure Switch, Adjustment

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**4-28. THERMOSTAT ASSEMBLY.**

---

This task consists of:	a. Removal	b. Disassembly	c. Repair
	d. Assembly	e. Installation	

---

**INITIAL SETUP:****Tools:**

Tool Box, General Mechanics (Item 1, App B)  
 Tool Kit, Electrical Connector Repair (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Supply duct removed (para 4-15)  
 Supply outlet screen removed (para 4-23)

**Material/Parts:**

Lockwasher (Item 12, App H)  
 Lockwasher (Item 14, App H)  
 Wire Tags (Item 9, App E)  
 Wire Ties (Item 11, App E)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

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**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/ maintenance activity.**

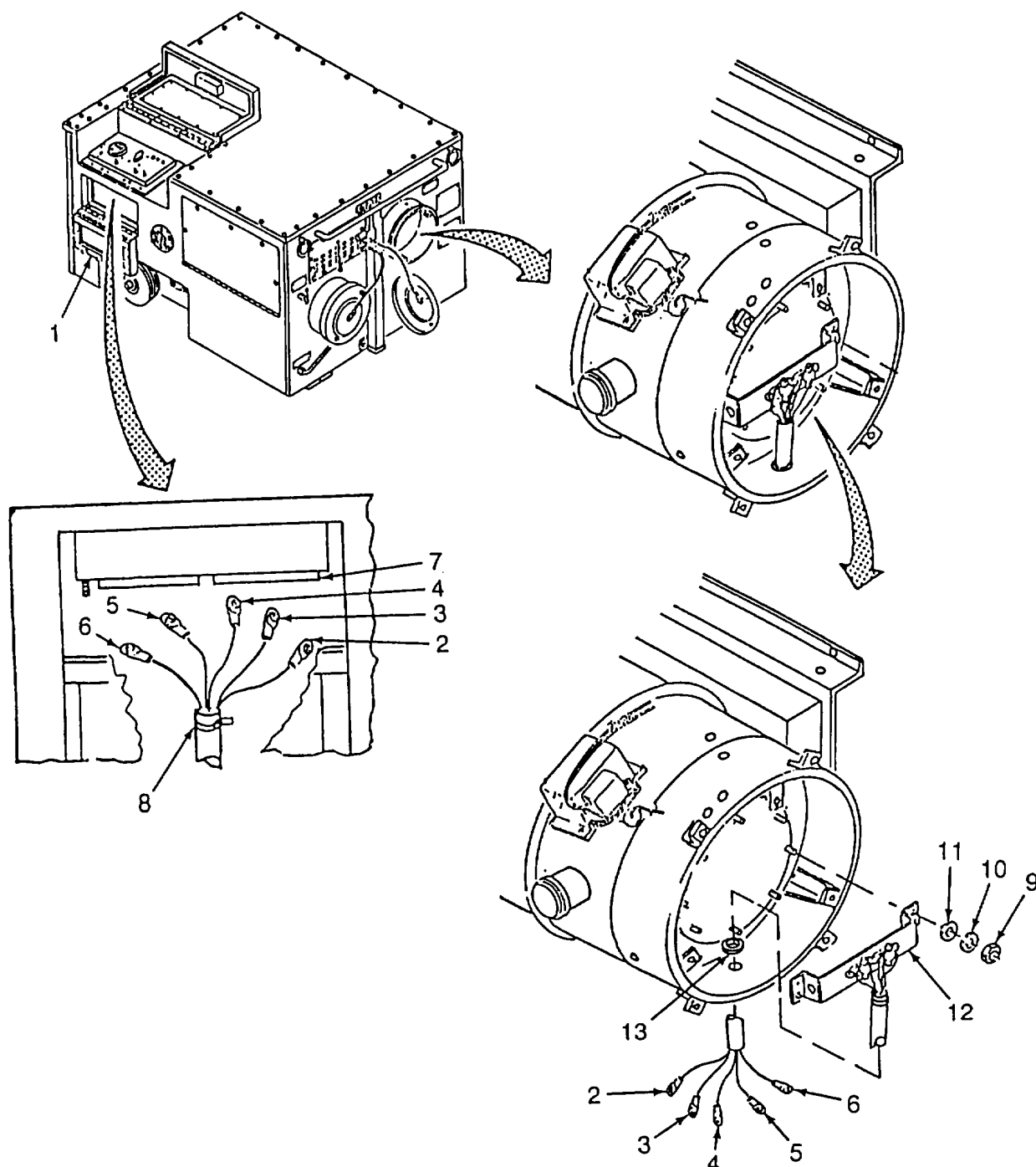
**NOTE**

**Disassemble only to level required to make repairs.**

- a. Removal (Refer to Figure 4-43)
  - (1) Open right rear side door (1).
  - (2) Tag and disconnect wires (2), (3), (4), (5) and (6) from terminal board TB3 (7) as follows:
    - (a) Disconnect wire (2), S2-3 from TB3-9.
    - (b) Disconnect wire (3), S2-2 from TB3-10.
    - (c) Disconnect wire (4), S2-1 from TB3-8.
    - (d) Disconnect wire (5), S3-1 from TB3-4.
    - (e) Disconnect wire (6), S3-3 from TB3-5.
  - (3) Reconnect all other wires.
  - (4) Remove wire ties (8) as required.

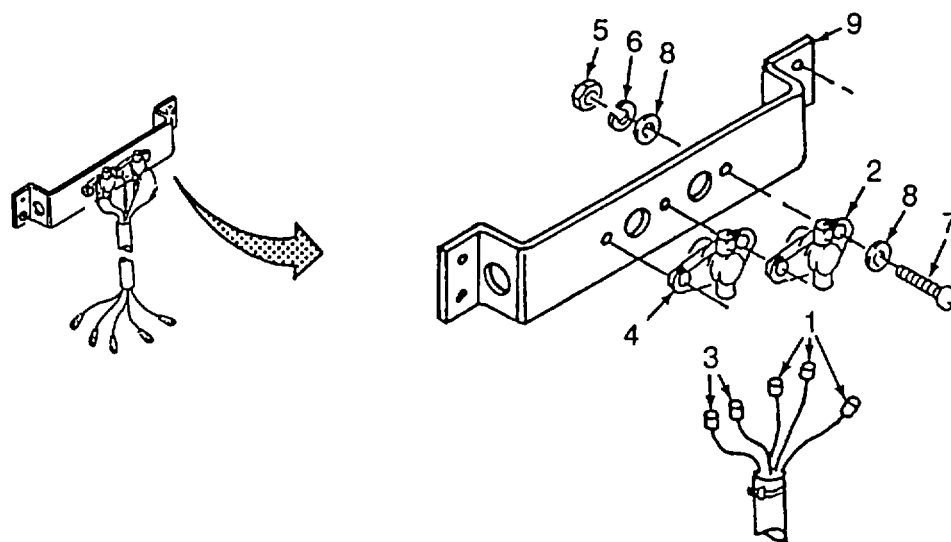
**4-28. THERMOSTAT ASSEMBLY - continued.****a. Removal (Refer to Figure 4-43)**

- (5) Remove two nuts (9), two lockwashers (10) two flat washers (11) and thermostat bracket (12). Discard lockwashers.
- (6) Remove grommet (13) and wires (2), (3), (4), (5), and (6).

**Figure 4-43. Thermostat Assembly Removal**

**4-28. THERMOSTAT ASSEMBLY - continued.****b. Disassembly (Refer to Figure 4-44)**

- (1) Tag and disconnect three wires (1) from temperature limit switch (2).
- (2) Tag and disconnect two wires (3) from discharge air thermostat (4).
- (3) Remove three nuts (5), three lockwashers (6), three screws (7) six flat washers (8), temperature limit switch (2), and discharge air thermostat (4) from bracket (9). Discard lockwashers.

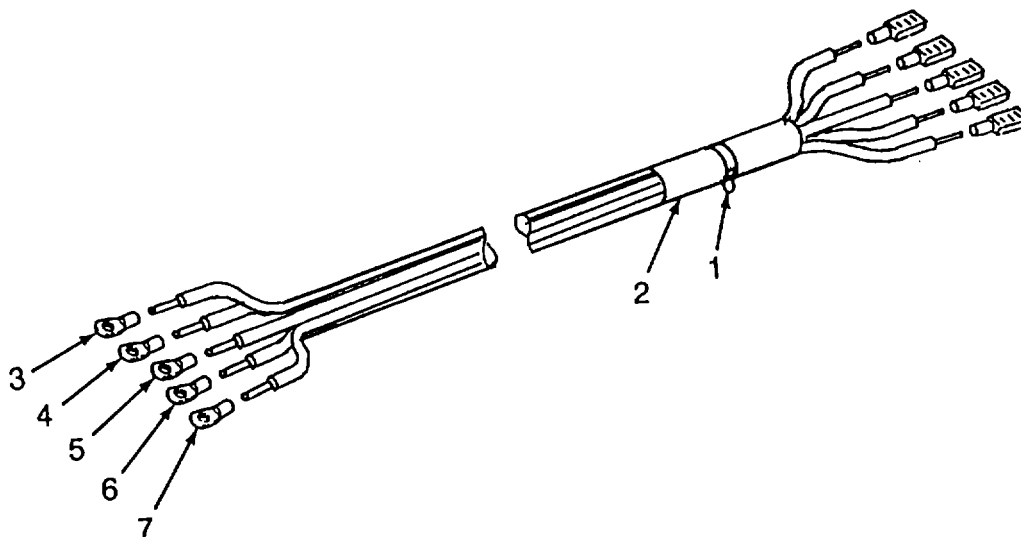
**Figure 4-44. Thermostat Assembly Disassembly**

**4-28. THERMOSTAT ASSEMBLY - continued.**

- c. Repair (Refer to Figure 4-45) (1) Repair of temperature limit switch and discharge air thermostat limited to replacement.

**NOTE****Repair typical for all wires.**

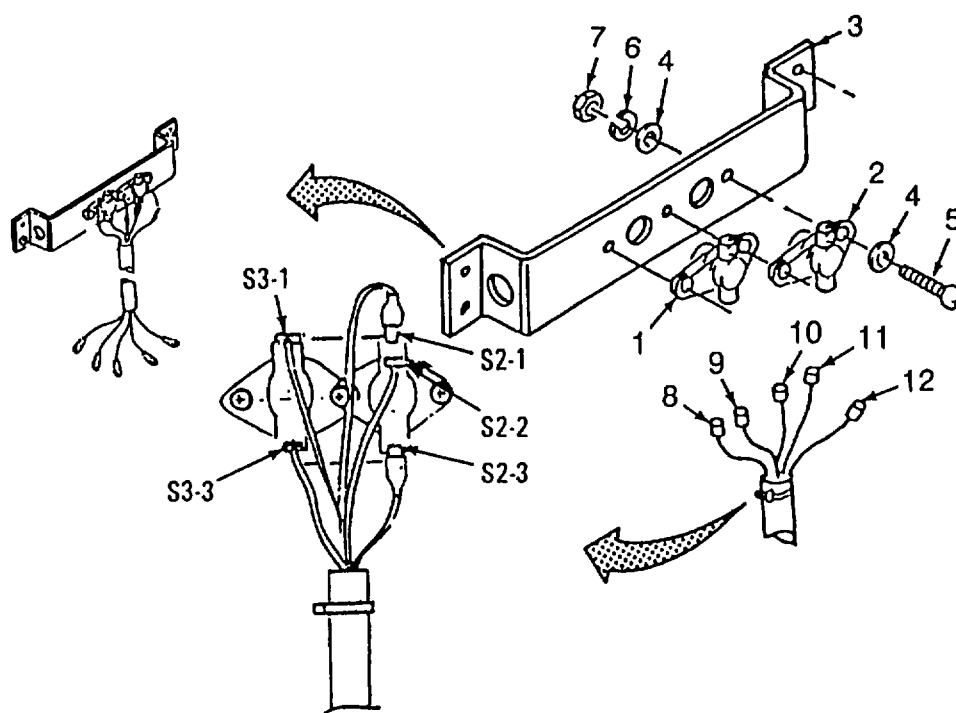
- (2) If wires are damaged, repair/replace wiring as follows:
- (a) Remove wire tie (1) and insulation sleeve (2).
  - (b) Repair/replace wire S3-3/TB3-5 (3) (Item 71, App F, Index 53).
  - (c) Repair/replace wire S3-1/TB3-4 (4) (Item 71, App F, Index 52).
  - (d) Repair/replace wire S2-1/TB3-8 (5) (Item 71, App F, Index 68).
  - (e) Repair/replace wire S2-2/TB3-10 (6) (Item 71, App F, Index 72).
  - (f) Repair/replace wire S32-3/TB3-9 (7) (Item 71, App F, Index 69).
  - (g) Install insulation sleeve (2) (Item 72, App F) and secure with wire tie (2).



**Figure 4-45. Thermostat Assembly Repair**

**4-28. THERMOSTAT ASSEMBLY - continued.****d. Assembly (Refer to Figure 4-46)**

- (1) Install temperature limit switch (1) with terminal S3-1 and discharge air thermostat (2), with terminal S2-1 toward the top of the bracket (3), secure with six flat washers (4), three screws (5), three lockwashers (6) and three nuts (7).
- (2) Connect wires (8), (9), (10), (11), and (12) as follows:
  - (a) Connect quick disconnect end wired S3-3/TB3-5 (8) to S3-3.
  - (b) Connect quick disconnect end wired S3-1/TB3-4 (9) to S3-1.
  - (c) Connect quick disconnect end wired S2-1/TB3-8 (10) to S2-1.
  - (d) Connect quick disconnect end wired S2-2/TB3-10 (11) to S2-2.
  - (e) Connect quick disconnect end wired S2-3/TB3-9 (12) to S2-3.

**Figure 4-46. Thermostat Assembly Assembly**



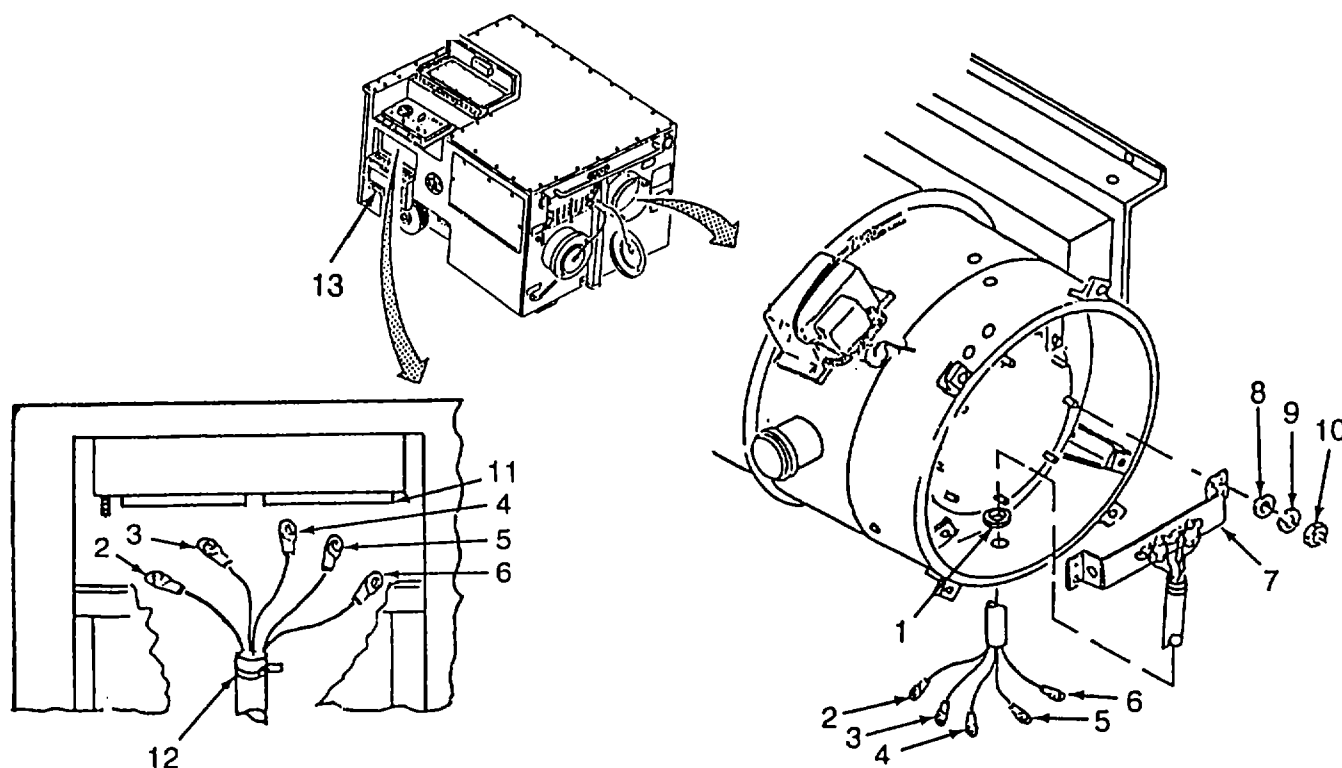
**4-28. THERMOSTAT ASSEMBLY - continued.**

- e. Installation (Refer to Figure 4-47) (1) Install grommet (1).
- (2) Insert wires (2), (3), (4), (5) and (6) through grommet (1).

**NOTE**

**Use appropriate holes to allow the bracket to be parallel to the base of the ASH unit.**

- (3) Install bracket (7), two flat washers (8), two lockwashers (9), and two nuts (10).
- (4) Connect wires (2), (3), (4), (5) and (6) to TB3 (11) as follows:
- Connect wire (2), S3-3 to TB3-5.
  - Connect wire (3), S3-1 to TB3-4.
  - Connect wire (4), S2-1 to TB3-8.
  - Connect wire (5), S2-2 to TB3-10.
  - Connect wire (6), S2-3 to TB3-9.
- (5) Install wire ties (12) as required.
- (6) Close door (13).



**Figure 4-47. Thermostat Assembly Installation**

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**4-29. COMBUSTOR FAN ASSEMBLY.**

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This task consists of:	a. Removal	b. Disassembly	c. Inspection
	d. Repair	e. Assembly	f. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Gasket Punch (Item 2, App B)  
 Shears (Item 2, App B)

**Material/Parts:**

Lockwasher (Item 1, App H)  
 Wire Ties (Item 11, App E)  
 Wire Tags (Item 9, App E)  
 Gasket (Item 63, App F)  
 Gasket (Item 62, App F)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Top panel removed (para 4-19)

**General Safety Requirements:****WARNING**

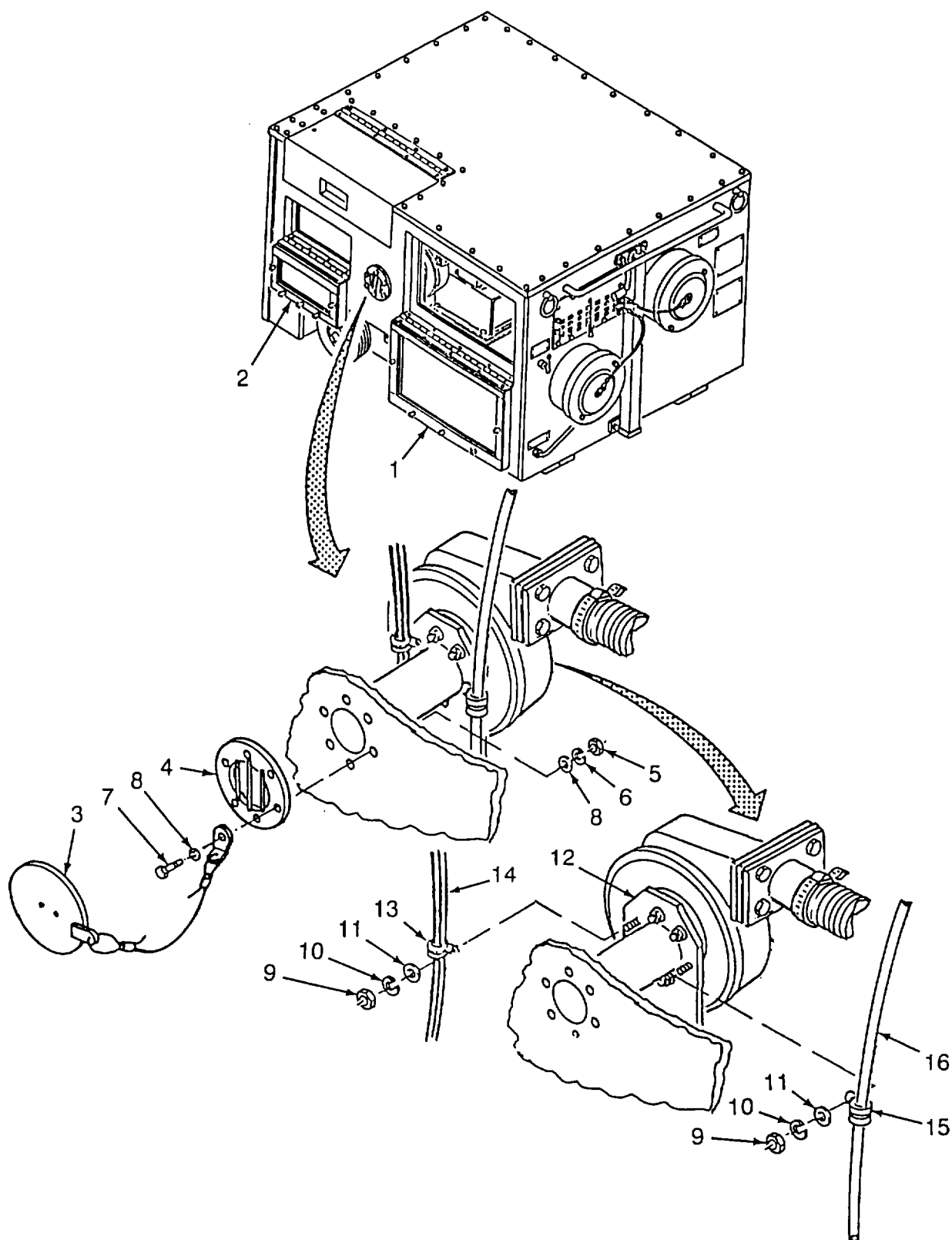
**Contact with hot components can cause burns.  
 Allow unit to cool down before attempting  
 service/inspection/maintenance activity.**

---

## a. Removal (Refer to Figure 4-48)

- (1) Open right side front door (1) and rear door (2).
- (2) Pull air inlet cover (3) off the front of fan inlet guard (4).
- (3) Remove six nuts (5), six lockwashers (6), six screws (7), twelve flat washers (8), air inlet cover (3) and fan guard (4). Discard lockwashers.
- (4) Remove two nuts (9), two lockwashers (10) and two flat washers (11) from the 3 and 9 o'clock positions on the fan mount bracket (12). Discard lockwashers.
- (5) Remove clamp (13) wire bundle (14), clamp (15) and fuel line (16).

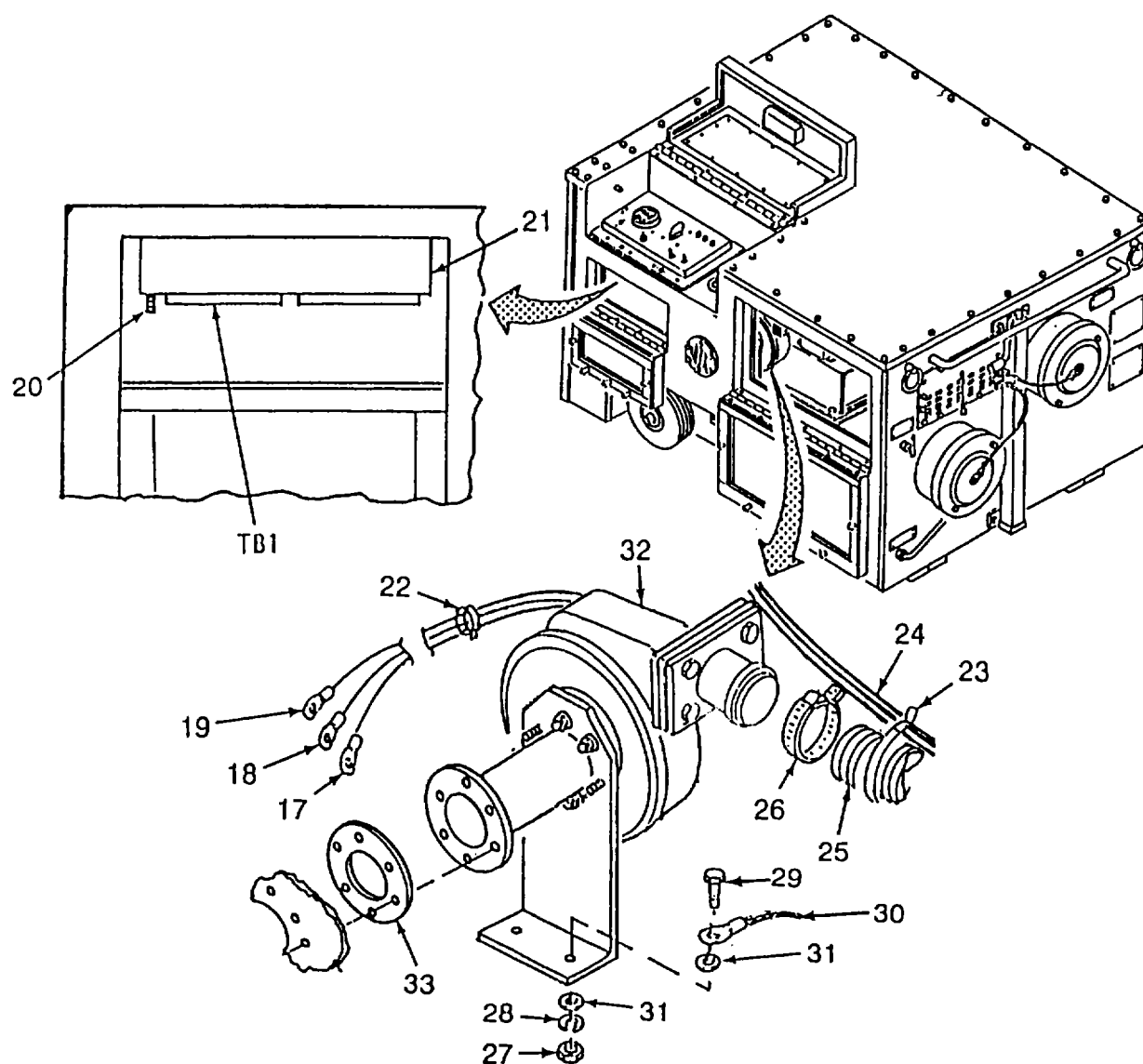
#### 4-29. COMBUSTOR FAN ASSEMBLY - continued.



**Figure 4-48. Combustor Fan Removal (Sheet 1 of 2)**

**4-29. COMBUSTOR FAN ASSEMBLY - continued.**

- (6) Tag and disconnect black wire (17) from TM1-11, white wire (18) from TB1-5 and green wire (19) from ground stud (20) on bottom of control box (21). Reconnect remaining wires. Cut wire ties (22) as required.
- (7) Remove wire ties (23) and wire bundle (24) from duct (25).
- (8) Loosen two clamps (26) and remove duct (25) and clamps (26).
- (9) Remove two nuts (27), two lockwashers (28), two screws (29) ground wire (30) and four flat washers (31). Discard lockwashers.
- (10) Remove fan assembly (32).
- (11) Remove gasket (33). Discard gasket.

**Figure 4-48. Combustor Fan Removal (Sheet 2 of 2)**

**4-29. COMBUSTOR FAN ASSEMBLY - continued.**

## b. Disassembly (Refer to Figure 4-49)

- (1) Remove four nuts (1), four lockwashers (2), four screws (3), eight flat washers (4), adapter (5) and gasket (6). Discard gasket and lockwashers.
- (2) Remove the remaining four nuts (7), four lockwashers (8), four flat washers (9), fan mount bracket (10) and gasket (11) from fan assembly (12). Discard gasket and lockwashers.

## c. Inspection Inspect parts for wear, cracks or other damage.

## d. Repair Limited to replacement of damaged parts.

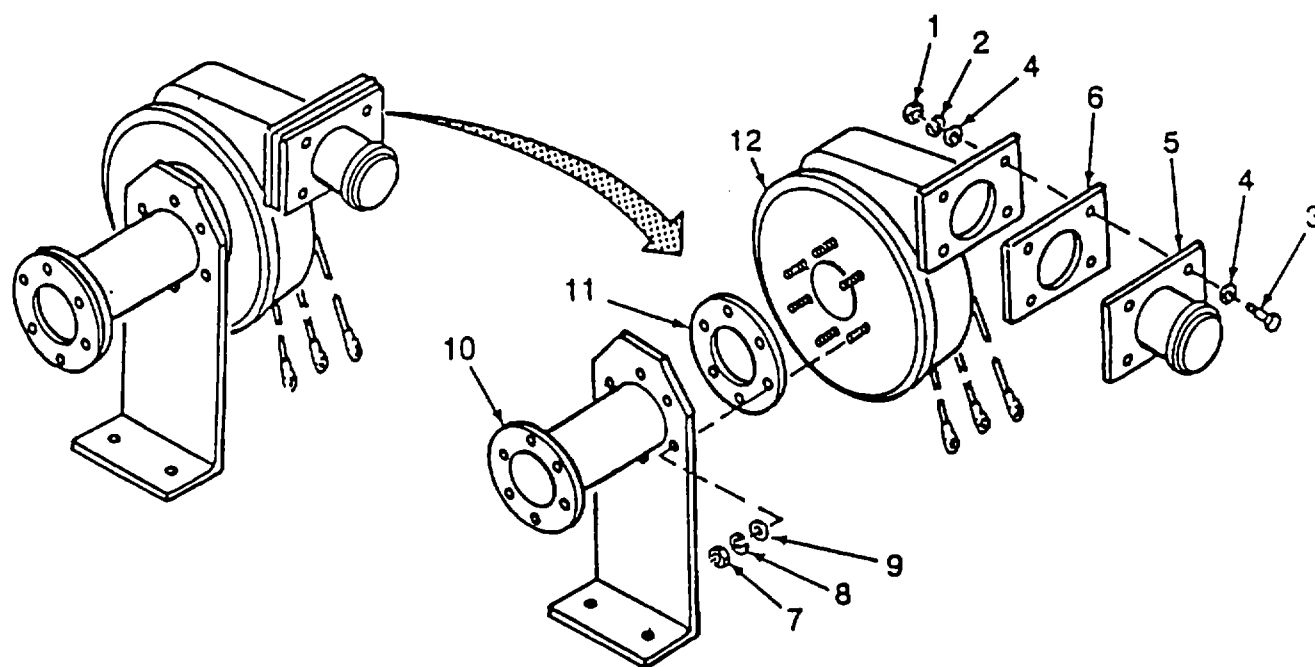
## e. Assembly (Refer to Figure 4-49)

- (1) Install gasket (11) (Item 62, App F) on fan assembly (12).
- (2) Position fan assembly (12) on fan mount bracket (10).

**NOTE**

**Leave the 3 o'clock and 9 o'clock positions empty.**

- (3) Install four flat washers (9), four lockwashers (8), and four nuts (7), to secure the fan assembly (12) to the mount bracket (10).
- (4) Position gasket (6) (Item 63, App F) and adapter outlet (5) on fan assembly (12) and secure with eight flat washers (4), four screws (3), four lockwashers (2), and four nuts (1).



**Figure 4-49. Combustor Fan Disassembly/Assembly**

**4-29. COMBUSTOR FAN ASSEMBLY - continued.**

## f. Installation (Refer to Figure 4-50)

- (1) Install gasket (1) (Item 62, App F) on frame (2).
- (2) Insert fan assembly (3) and position on frame (2).
- (3) Install four flat washers (4), ground wire (5), two screws (6), two lockwashers (7) and two nuts (8). Hand tighten only.
- (4) Press the inlet of fan assembly (3) against gasket (1).
- (5) Position fan inlet guard (9) on the outside of frame (2) and loosely install ten flat washers (10), five screws (11), five lockwashers (12) and five nuts (13) on all but the 4 o'clock position. Hand tighten only.
- (6) Position the air inlet cover connector plate (14) on the fan inlet guard (9) and secure with one screw (10), two flat washers (11), one lockwasher (12) and one nut (13).
- (7) First tighten the hardware installed in step (5), then the hardware installed in step (3).

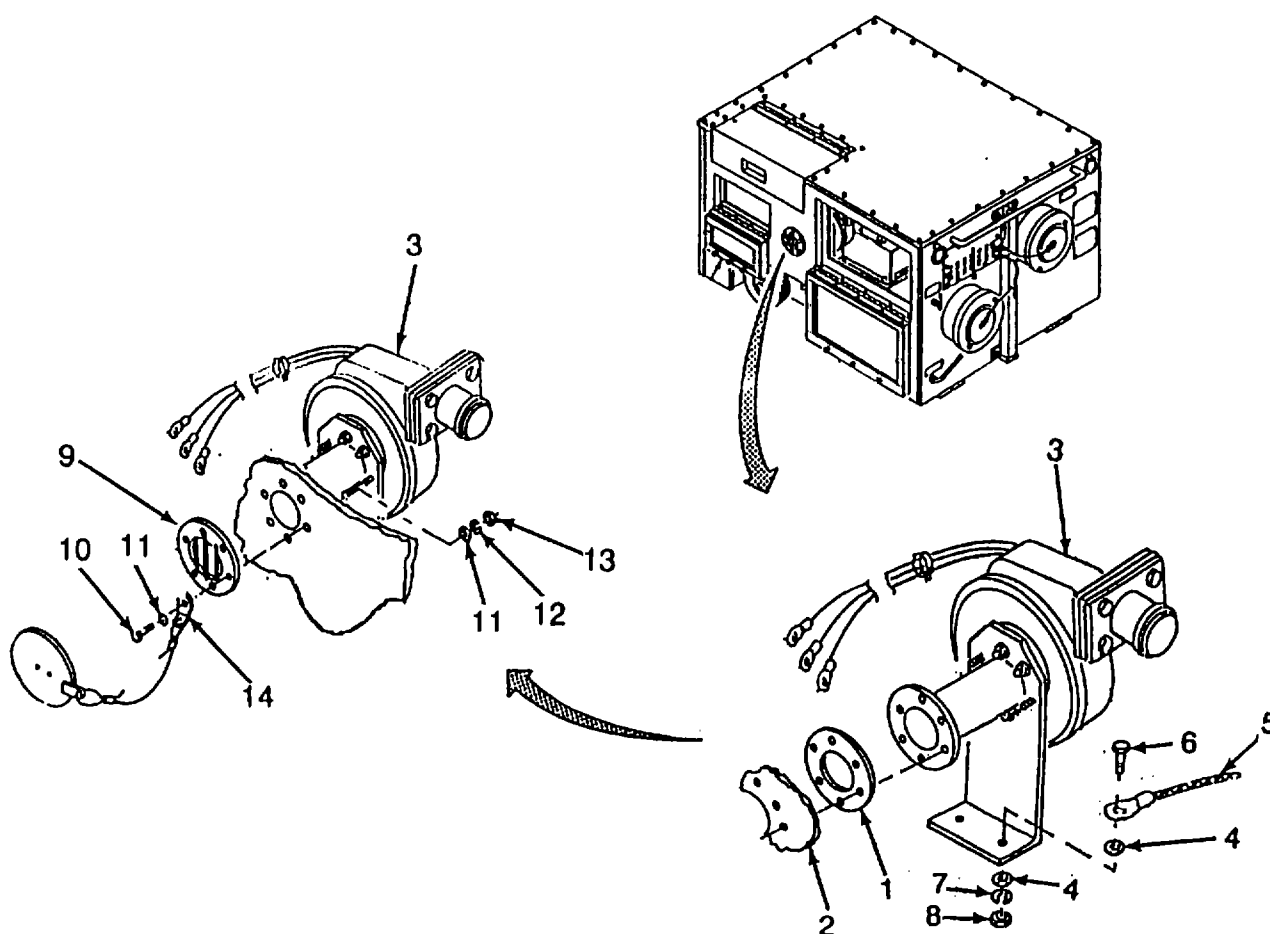
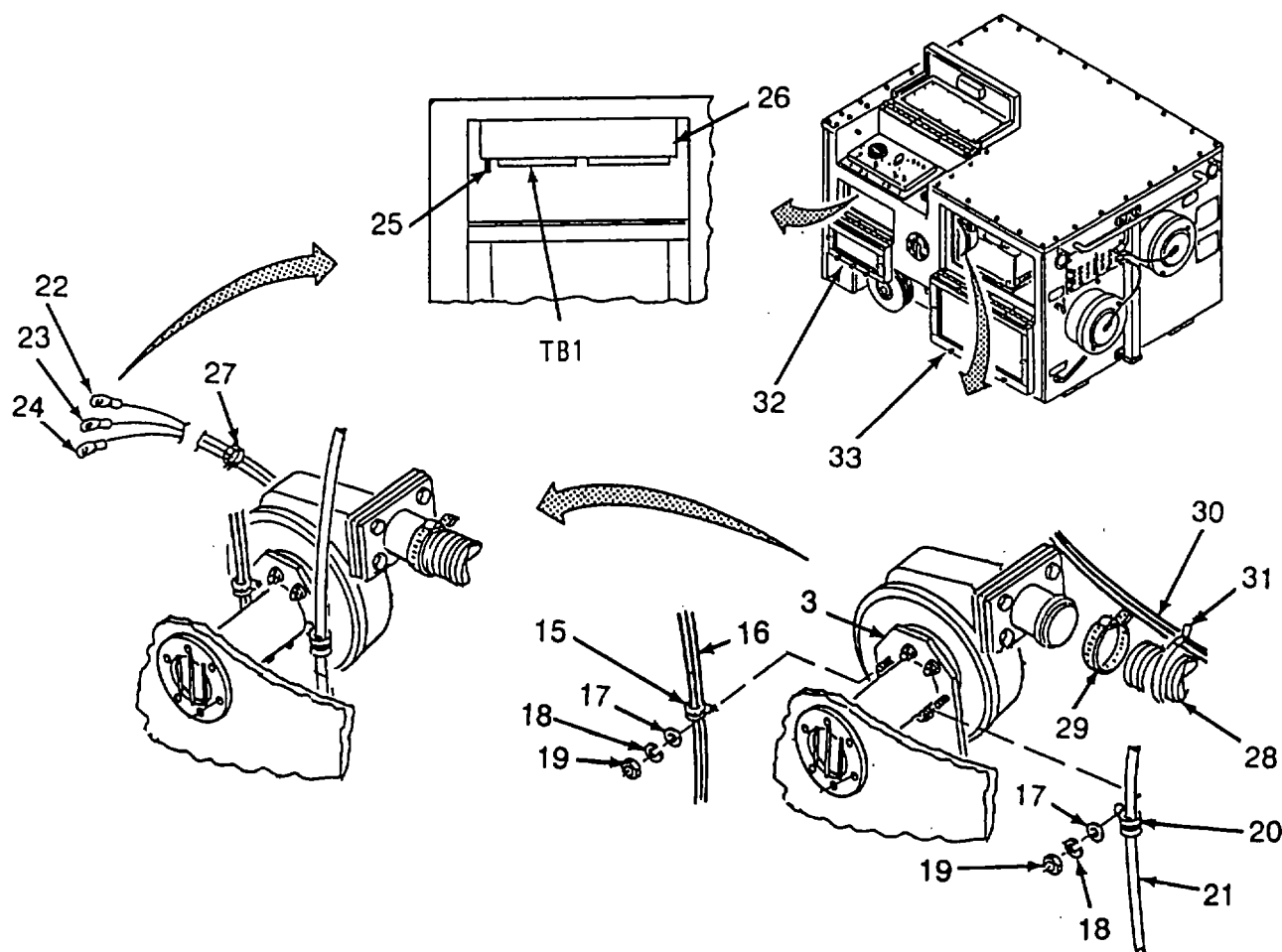


Figure 4-50. Combustor Fan Assembly Installation (Sheet 1 of 2)

**4-29. COMBUSTOR FAN ASSEMBLY - continued.**

f. Installation continued (Refer to Figure 4-50)

- (8) Install clamp (15) and wire bundle (16) on fan assembly (3) at the 9 o'clock position, secure with a flat washer (17), lockwasher (18), and nut (19).
- (9) Install clamp (20) and fuel line (21) on fan assembly at the 3 o'clock position, secure with a flat washer (17), lockwasher (18) and nut (19).
- (10) Connect the white wire (22) on TB1-5, the black wire (23) on TB -11 and the green wire (24) to the ground stud (25) on the bottom of the control box (26).
- (11) Route three wires from fan assembly (3) along wire bundle and secure with two wire ties (27).
- (12) Install duct (28) on outlet of fan assembly (3) and secure with clamp (29).
- (13) Route wire bundle (30) along duct (28) and secure with wire ties (31) as required.
- (14) Close and secure doors (32) and (33).



**Figure 4-50. Combustor Fan Assembly Installation (Sheet 2 of 2)**

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**4-30. FUEL PUMP AND SOLENOID VALVE.**


---

This task consists of:	a. Removal	b. Disassembly	c. Repair
	d. Assembly	e. Installation	f. Adjustment

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Top Panel removed (para 4-19)

**Material/Parts:**

Lockwasher (Item 13, App H)  
 Wire Ties (Item 11, App E)  
 Wire Tags (Item 9, App E)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns.  
 Allow unit to cool down before attempting  
 service/inspection/maintenance activity.**

---

- a. Removal (Refer to Figure 4-51) (1)      Open right rear door (1) and right side front door (2).
  - (2) Disconnect tube assemblies (3), (4), (5) and (6).
  - (3) Tag and disconnect wire (7) TB3-9/L1-BLK from TB3 (8) terminal 9. Reinstall remaining wires.
  - (4) Tag and disconnect the following wires from TB1 (9). Reinstall remaining wires:
    - (a) Wire (10), I1-BLK/TB1-7 from terminal 7.
    - (b) Wire (11) TB1-9/L2-BLK from terminal 9.
    - (c) Wire (12) L2-BLK/TB1-4 from terminal 4.
  - (5) Remove wire ties (13) as required.



## 4-30. FUEL PUMP AND SOLENOID VALVE - continued.

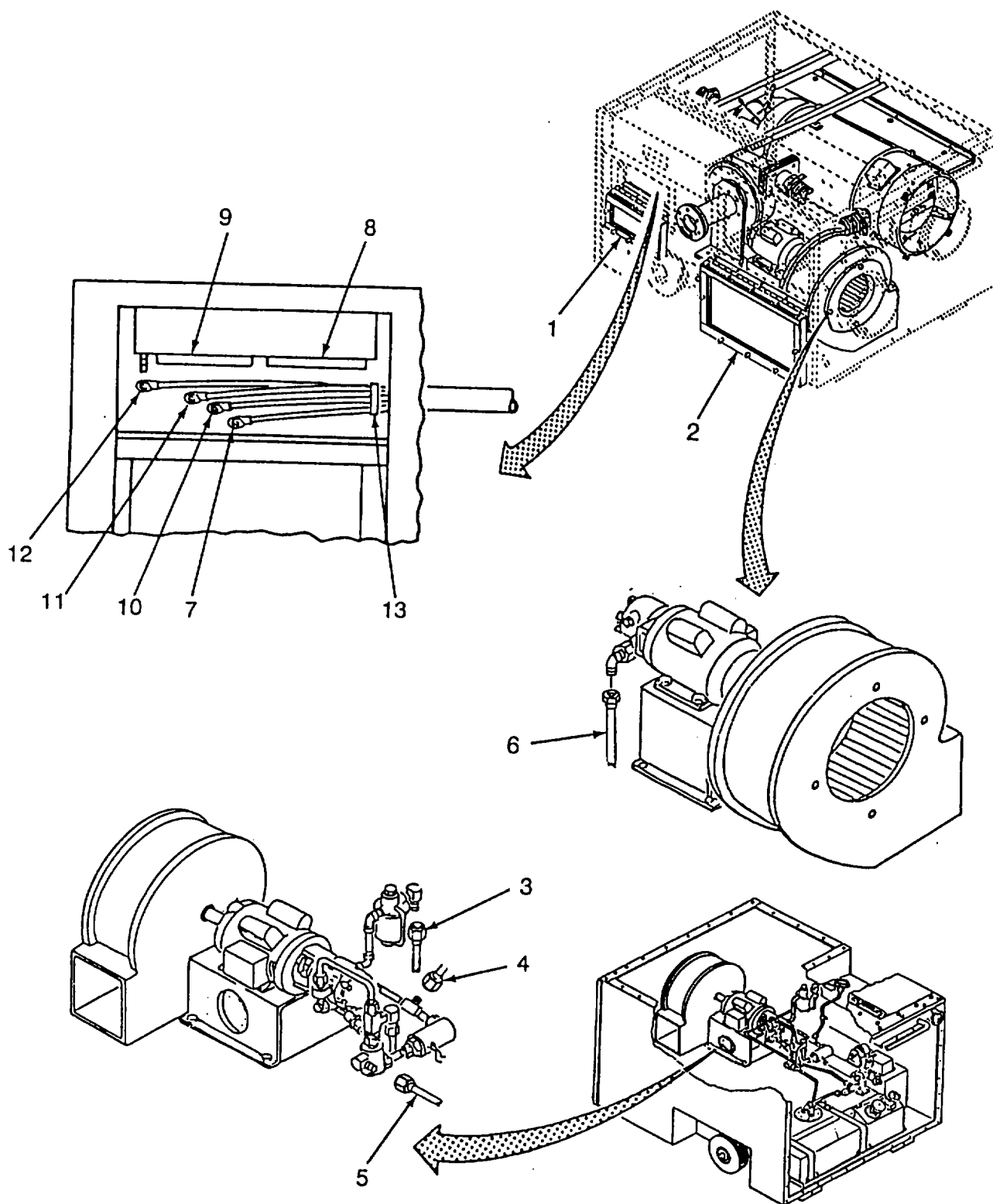


Figure 4-51. Fuel Pump and Solenoid Valve Removal (Sheet 1 of 2 )

**4-30. FUEL PUMP AND SOLENOID VALVE - continued.**

a. Removal continued (Refer to Figure 4-51)

(6) Slide wires (7), (10), (11) and (12) through clamp (14).

(7) Remove two screws (15), two lockwashers (16) and pump assembly (17). Discard lockwasher.

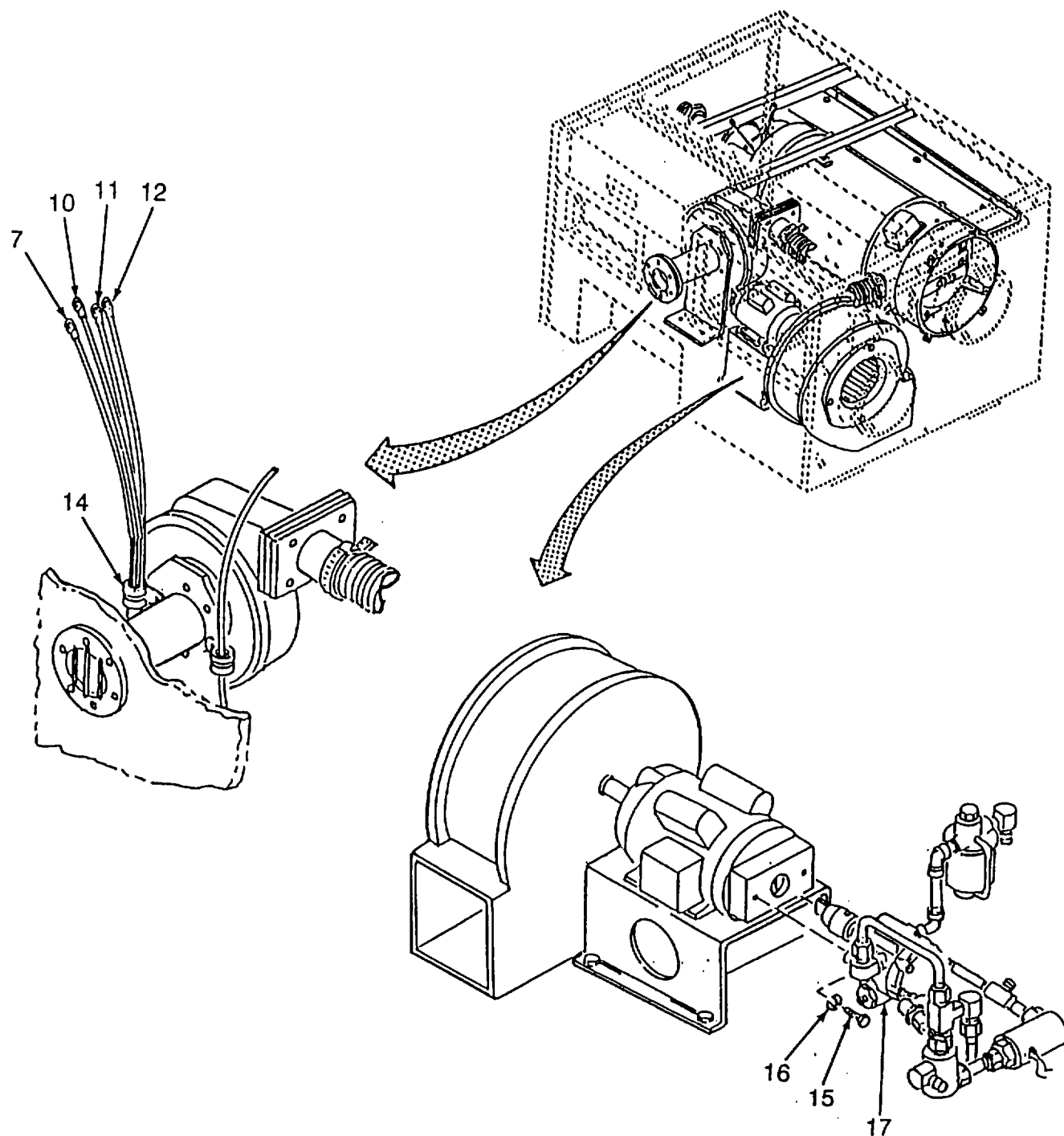


Figure 4-51. Fuel Pump and Solenoid Valve Removal (Sheet 2 of 2)

**4-30. FUEL PUMP AND SOLENOID VALVE - continued.****b. Disassembly (Refer to Figure 4-52)**

- (1) Remove cotter pin (1), spring pin (2) and fuel coupling (3).
- (2) Place pump (4) into a soft faced vise.
- (3) Remove tubing (5), straight connector (6) and elbow (7).
- (4) Remove tubing (8), straight connectors (9), (10) and elbows (11) and (12).
- (5) Remove tee (13), straight connector (14) and elbow (15).
- (6) Loosen adapter port (16) on outlet side of solenoid valve (17).
- (7) Remove 3-way solenoid valve (18), nipple (19), adapter port (16) and preformed packing (20). Discard packing.
- (8) Remove adapter port (16) and nipple (19) from 3-way solenoid valve (18). Install adapter port (16) on solenoid valve (17), hand tighten only.
- (9) Remove solenoid valve (17), bushing (21), tee (22) and nipple (23).
- (10) Loosen retainer nut (24) to remove fuel filter bowl (25), gasket (26) and filter (27).
- (11) Remove elbow (28), filter housing (29), elbow (30), nipple (31) and elbow (32).
- (12) Remove pump (4) from vise.

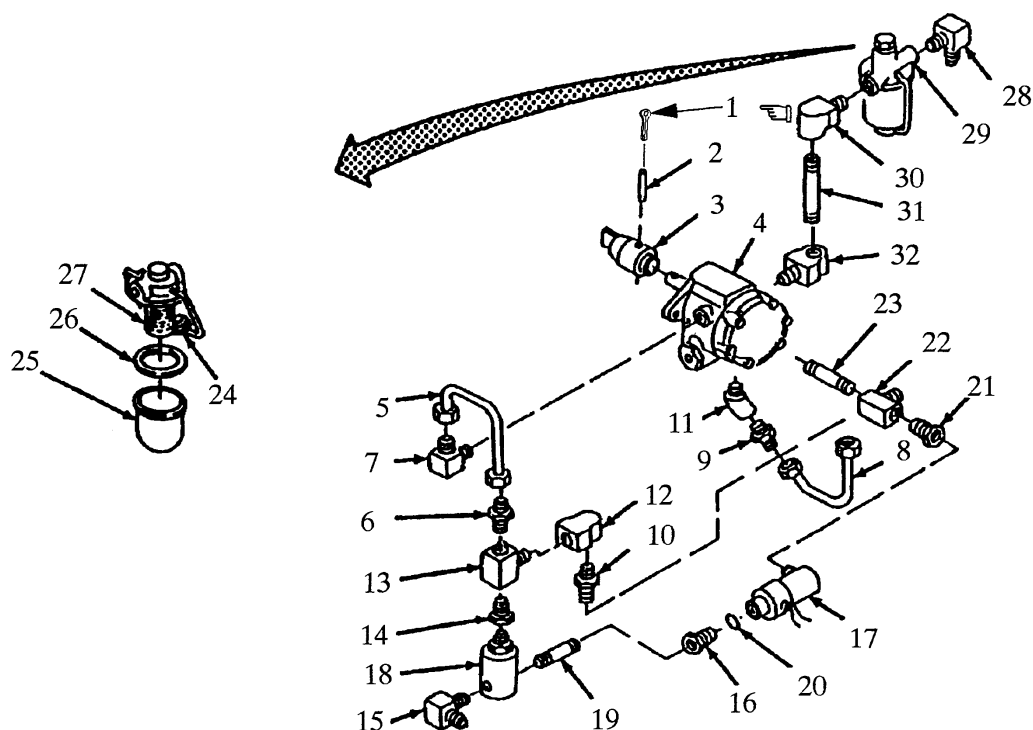
**c. Repair. Repair limited to replacement of defective parts.**

Figure 4-52. Fuel Pump and Solenoid Valve Assembly/Disassembly (Sheet 1 of 2)

**4-30. FUEL PUMP AND SOLENOID VALVE - continued.**

## d. Assembly (Refer to Figure 4-52)

- (1) Place pump (1) in soft faced vise.
- (2) Install elbow (2), nipple (3), elbow (4), filter housing (5) and elbow (6).
- (3) Install filter (7), filter gasket (8), filter bowl (9) and tighten retainer nut (10).
- (4) Install nipple (11), tee (12), bushing (13) and solenoid valve (14).
- (5) Remove adapter port (15) from solenoid valve (14).
- (6) Install nipple (16) and adapter port (15) on solenoid valve (17).
- (7) Install preformed packing (18) and adapter port (15) on solenoid valve (14).
- (8) Install elbow (19), straight connector (20) and tee (21).
- (9) Install elbows (22), (23) and straight connectors (24) and (25).
- (10) Install tubing (26)(Item 76, App F) on straight connectors (24) and (25).
- (11) Install straight connector (27) and elbow (28).
- (12) Install tubing (29)(Item 75, App F) on straight connector (27) and elbow (28), remove pump (1) from vise.
- (13) Install fuel coupling (30), spring pin (31) and cotter pin (32)(Item 42, App H).

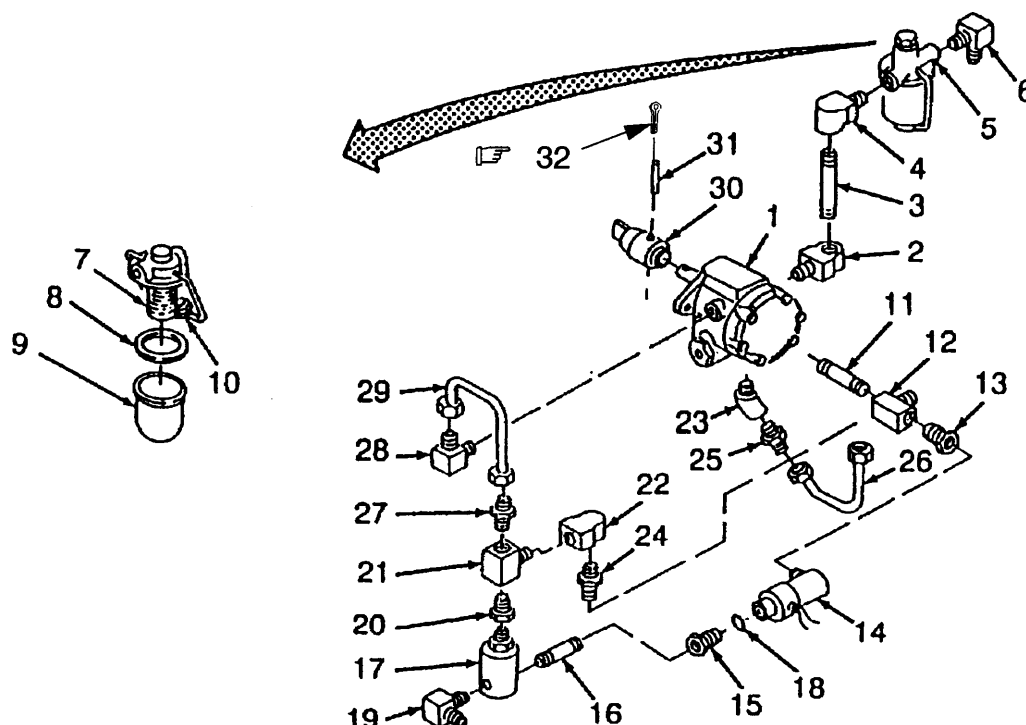
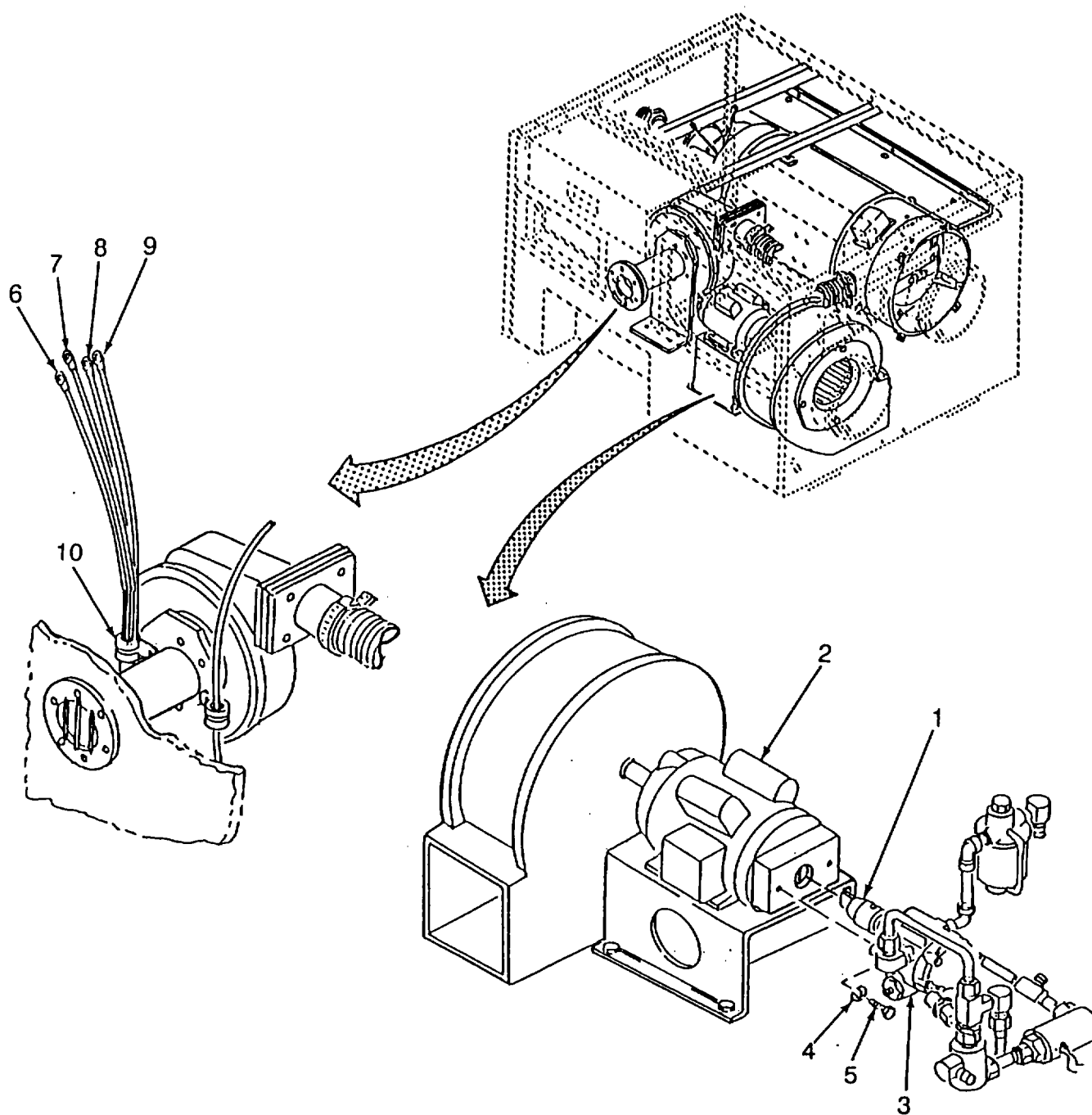


Figure 4-52. Fuel Pump and Solenoid Valve Assembly/disassembly (Sheet 2 of 2)

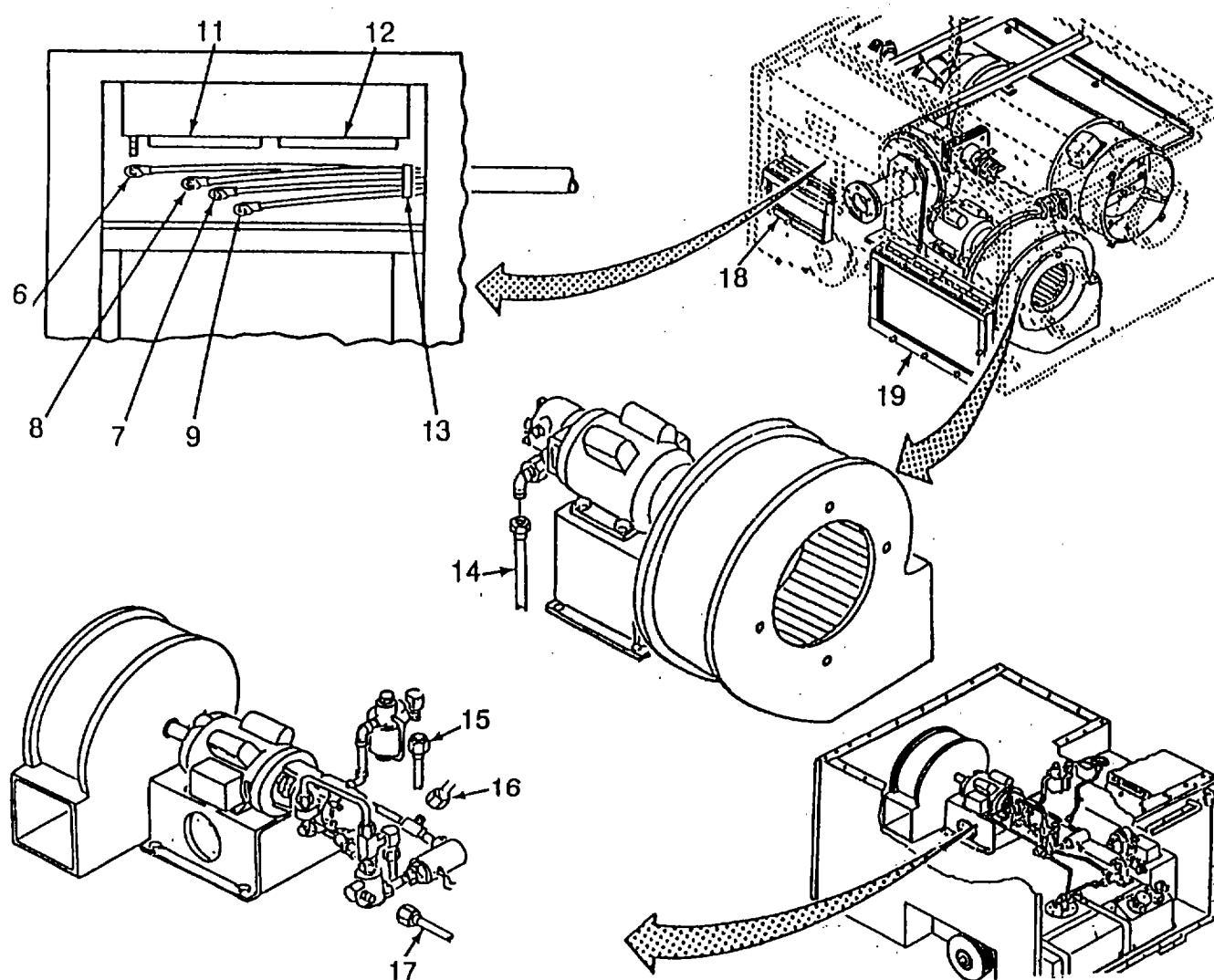
**4-30. FUEL PUMP AND SOLENOID VALVE - continued.****d. Installation (Refer to Figure 4-53)**

- (1) Align fuel coupling (1) with slot in motor (2) and install pump (3), two lockwashers (4) and two screws (5).
- (2) Route wires (6), (7), (8), and (9) through clamp (10).

**Figure 4-53. Fuel Pump and Solenoid Valve Installation (Sheet 1 of 2)**

**4-30. FUEL PUMP AND SOLENOID VALVE - continued.**

- e. Installation continued (Refer to Figure 4-53)
- (3) Connect the following wires to TB 1 (11).
  - (a) Wire (6), L2-BLK/TB 1-4 to terminal 4.
  - (b) Wire (7) TB1-9/L2-BLK to terminal 9.
  - (c) Wire (8) L1-BLK/TB1-7 to terminal 7.
- (4) Connect wire (9) TB3-9/L1-BLK to terminal 9 on TB3 (12).
- (5) Install wire ties (13) as required.
- (6) Connect tube assemblies (14), (15) (Item 80, App F), (16) (Item 78, App F) and (17) (Item 79, App F).
- (7) Close right side rear door (18) and right side front door (19).

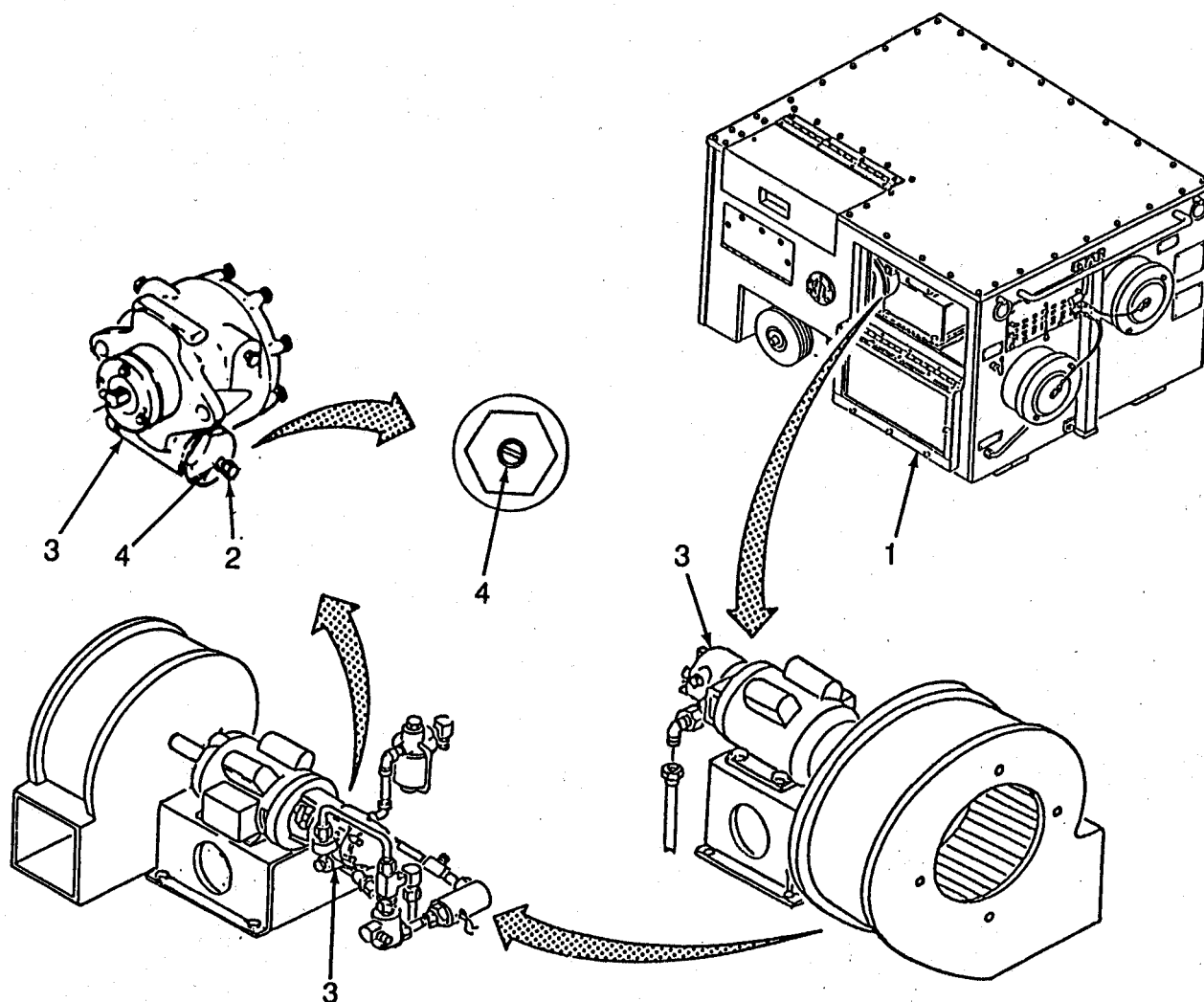


**Figure 4-53. Fuel Pump and Solenoid Valve Installation (Sheet 2 of 2)**

**4-30. FUEL PUMP AND SOLENOID VALVE - continued.**

## f. Adjustment (Refer to figure 4-54)

- (1) Open right side front door (1).
- (2) Remove the small hex nut (2) from the far side of pump (3).
- (3) Turn the adjustment screw (4) inward to increase pump pressure and outward to decrease pump pressure.
- (4) Install hex nut (2) and close door (1).
- (5) Operate the unit IAW para 2-8, check the fuel pressure against Table 1-2.
- (6) If additional adjustment is necessary repeat steps (1) through (5).

**Figure 4-54. Fuel Pump Adjustment**

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**4-31. CIRCULATING MOTOR AND FAN**

---

This task consists of:                      a. Removal                                      b. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

Fuel pump and solenoids removed (para 4-30)

Inlet screen removed (para 4-23)

Inlet screen removed (para 4-23)

**Personnel Required:**

Two

**Material/Parts:**

Lockwasher (Item 1, App H)

Wire tags (Item 9, App E)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns.  
Allow unit to cool down before attempting  
service/inspection/maintenance activity.**

---

a. Removal (Refer to Figure 4-55)

- (1) Open right side rear door (1) and right side front door (2).
- (2) Remove four lock nuts (3), four screws (4) and eight flat washers (5).
- (3) Loosen two setscrews (6) and remove key (7).

**NOTE**

**Two persons required to remove motor from fan.**

- (4) Slide motor (8) off fan (9).
- (5) Lay motor (8) on its side with junction box facing up.
- (6) Remove two screws (10) and cover (11). Gently pull wires (12) outside of junction box.
- (7) Tag and disconnect wires (12) and remove two connectors (13).
- (8) Remove the two white wires (12) through hole in junction box on motor (8).
- (9) remove screw (14), lockwasher (15), and ground wire (16).
- (10) Remove motor (8).

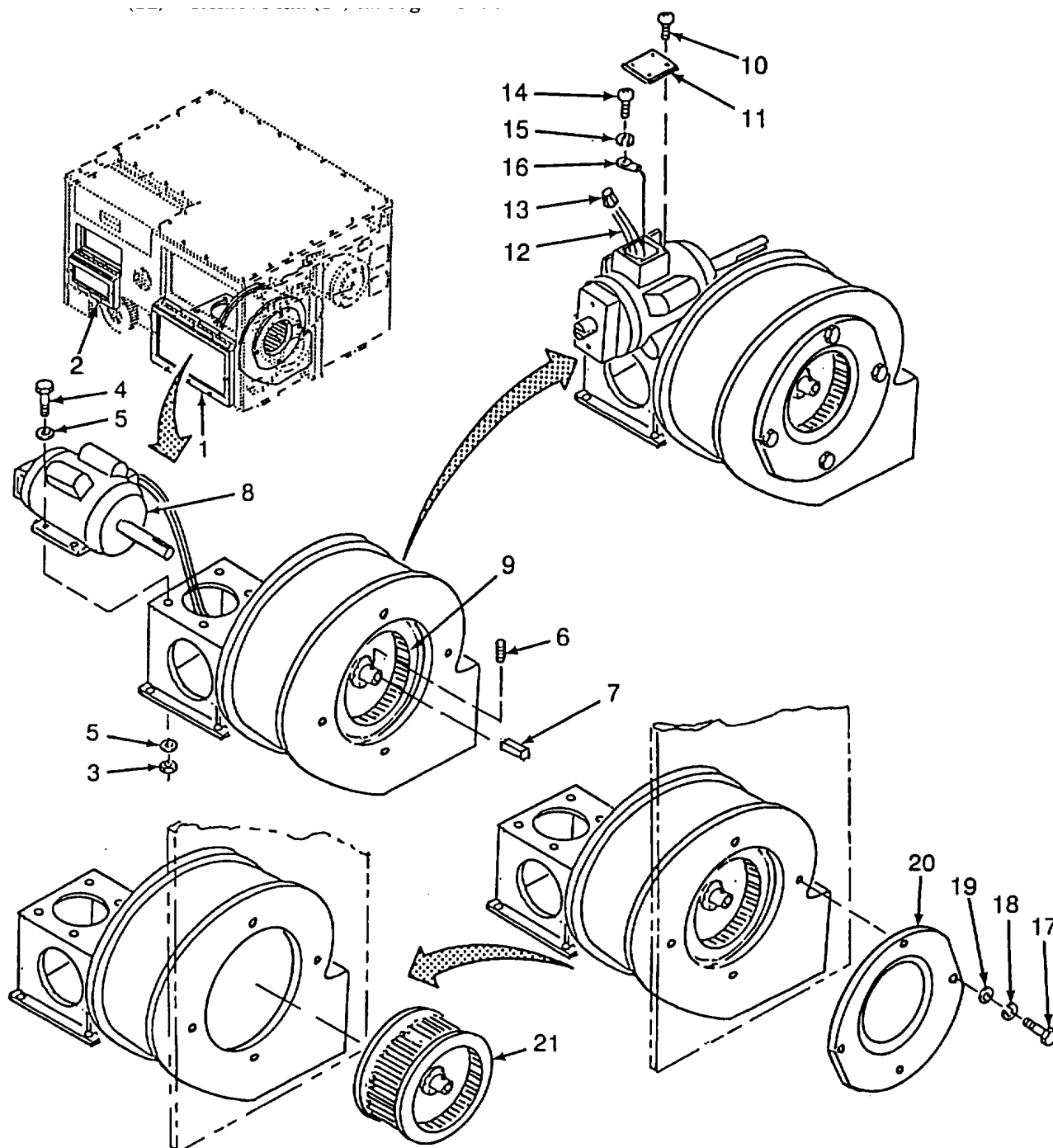


**4-31. CIRCULATING MOTOR AND FAN - continued.**

a. Removal continued (Refer to Figure 4-55)

(11) Remove four screws (17), four lockwashers (18), four flat washers (19) and inlet cone (20). Discard lockwashers.

(12) Remove fan (21) through front of unit.



**Figure 4-55. Circulating Motor and Fan Removal**

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**4-31. CIRCULATING MOTOR AND FAN - continued.**

---

**b. Installation (Refer to Figure 4-56)**

- (1) Install fan (1) through front of unit.
- (2) Install inlet cone (2), four flat washers (3), four lockwashers (4) and four screws (5).
- (3) Place motor (6) on its side with junction box facing up on base (7).
- (4) Feed wires (8) B1-TL, T5/TB1-8, (9) B1-T4, T8/TB1-3 and (10) B1-GRD/G1 through hole in bottom of junction box on side of motor (6).
- (5) Remove one wire nut (11) connecting wires T1 and T5. Twist wire (8) with T1 and T5 and install wire nut (11).
- (6) Remove the other wire nut (11) connecting wires T4 and T8. Twist wire (9) with T4 and T8 and install wire nut (11).
- (7) Install ground wire (10), lockwasher (12) and screw (13).
- (8) Gently push all wiring into junction box on motor (6).
- (9) Install cover (14) and two screws (15).
- (10) Turn motor (6) onto its base and slide onto fan (1).
- (11) Install key (16) and two setscrews (17) do not tighten.
- (12) Make sure fan (1) is pushed back on motor until it stops and tighten two setscrews (17).
- (13) Install eight flat washers (18), four screws (19) and four locknuts (20), hand tight.
- (14) Turn fan (1) by hand. If fan turns freely without rubbing, tighten hardware installed in step (13). If fan rubs, realign motor (6) until fan turns freely and tighten hardware installed in step (13).
- (15) Close rightside front door (21) and rightside rear door (22).

## 4-31. CIRCULATING MOTOR AND FAN - continued.

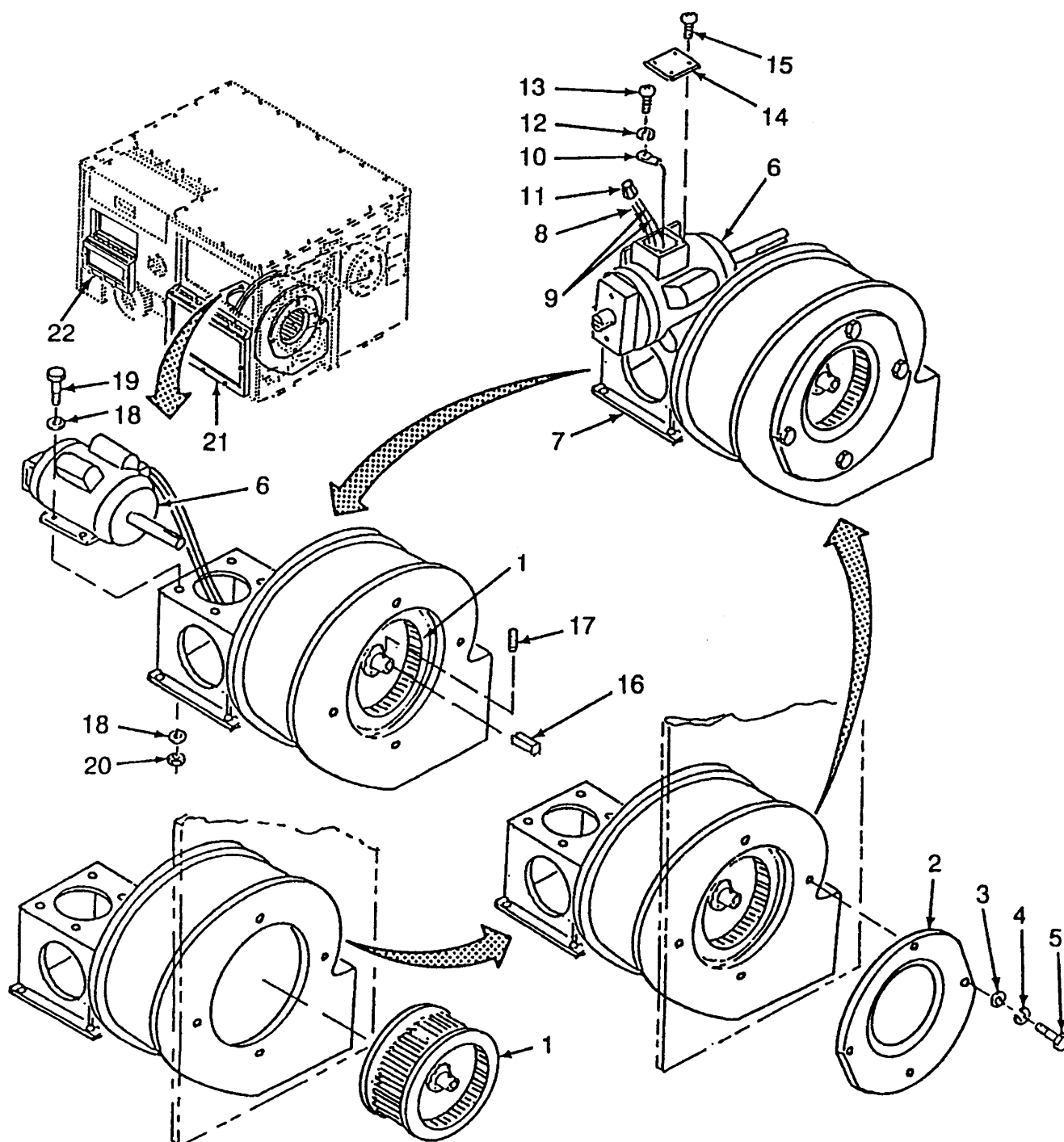


Figure 4-56. Circulating Motor and Fan Installation

**4-32. TRANSFORMER ASSEMBLY, (Model H120).**

This task consists of:                      a. Removal                      b. Repair                      c. Installation

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Tool Kit, Electrical Connector Repair (Item 2, App B)  
 Heat Gun (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Top panel removed (para 4-19)  
 Duct cover removed (para 4-22)  
 Supply outlet screen removed (para 4-23)

**Material/Parts:**

Shielded gasket (Item 73, App F)  
 Shielded gasket (Item 74, App F)  
 Shielded gasket (Item 75, App F)  
 Gasket (Item 59, App F)  
 Lockwasher (Item 12, App H)  
 Wire tags (Item 9, App E)  
 Heat shrink (Item 43, App H)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**The transformer assembly used on model H120, has the filter attached to side of transformer assembly cover. (Refer to Figure 4-57)**

## a. Removal (Refer to Figure 4-57)

- (1) Tag and disconnect wire (1) TB1-8/F1-BLK and wire (2) F1-WHT/TB1-3 from TB1 (3).
- (2) Remove two nuts (4), two lockwashers (5), two screws (6), ground wire (7) and two flat washers (8). Discard lockwashers.
- (3) Lift transformer assembly (9) away from base plate (10), remove two heat shrink tubes (11) and disconnect two high-tension leads (12). Discard heat shrink.
- (4) Remove eight nuts (13), eight lockwashers (14), eight flat washers (15), thermostat bracket (16) and cover plate (17). Discard lockwashers.
- (5) Remove gasket (18) from cover plate (17). Discard gasket.
- (6) Disconnect the other end of two high-tension leads (12) and remove the leads through transformer base plate (10). Remove two grommets (19).
- (7) Remove transformer base plate (10).
- (8) Remove two shielded gaskets (20) and two shielded gaskets (21) as required.

## b. Repair is limited to the replacement of defective components.

## 4-32. TRANSFORMER ASSEMBLY, (Model H120). - continued.

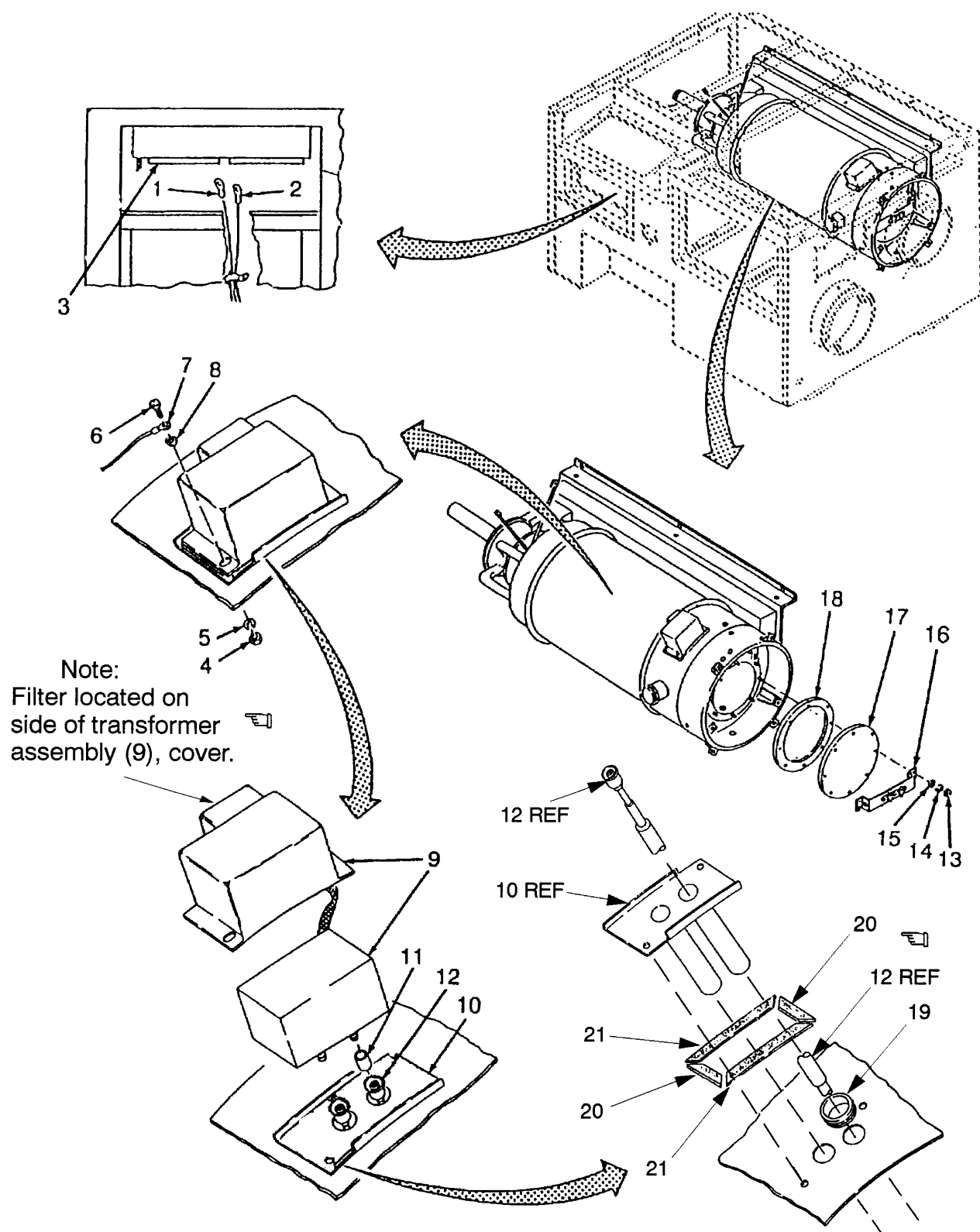


Figure 4-57. Transformer, (Model H120) Removal

**4-32. TRANSFORMER ASSEMBLY, (Model H120). - continued.**

## c. Installation (Refer to Figure 4-58)

- (1) Install two shielded gaskets (1)(Item 74, App F) and two shielded gaskets (2)(Item 73, App F), and transformer base plate (3).
- (2) Install two high-tension leads (4) through base plate (3) and attach high-tension leads to electrodes (5).
- (3) Slide heat shrinks (6) over high-tension leads (4) and install the two high tension leads on transformer assembly (7).
- (4) Position and secure the heat shrink (6) over high tension leads (4) and transformer assembly (7).
- (5) Position transformer assembly (7) on transformer base plate (3).
- (6) Secure transformer assembly (7) with two flat washers (8), ground wire (9), two screws (10), two lockwashers (11) and two nuts (12).
- (7) Connect wire (13) F1-BLK/TB1-8 and wire (14) F1-WHT/TB1-3 to TB1 (15). Remove tags.
- (8) Install two grommets (16) over two high-tension leads (4) and insert the grommets approximately 1/4 inch into transformer base plate (3). New grommets will have to be cut so they can be installed over high-tension leads.
- (9) Install gasket (17)(Item 59, App F) on cover plate (18) and install cover.
- (10) Install thermostat bracket (19) horizontal to bottom of unit and eight flat washers (20), eight lockwashers (21) and eight nuts (22).

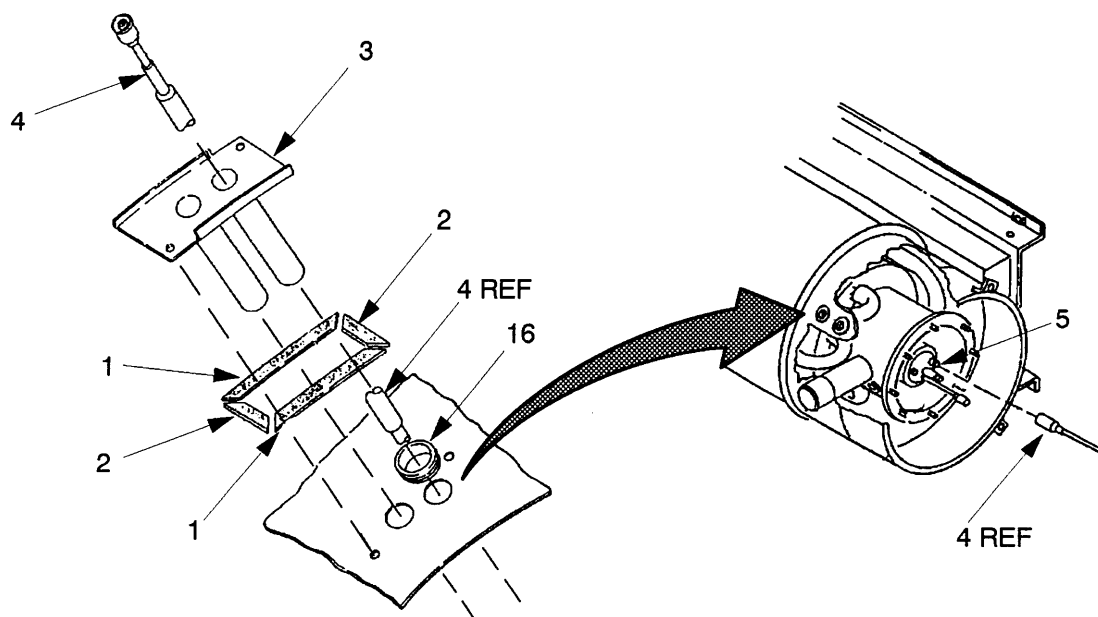


Figure 4-58. Transformer, (Model 11120) Installation (Sheet 1 of 2)

## 4-32. TRANSFORMER ASSEMBLY, (Model H120). - continued.

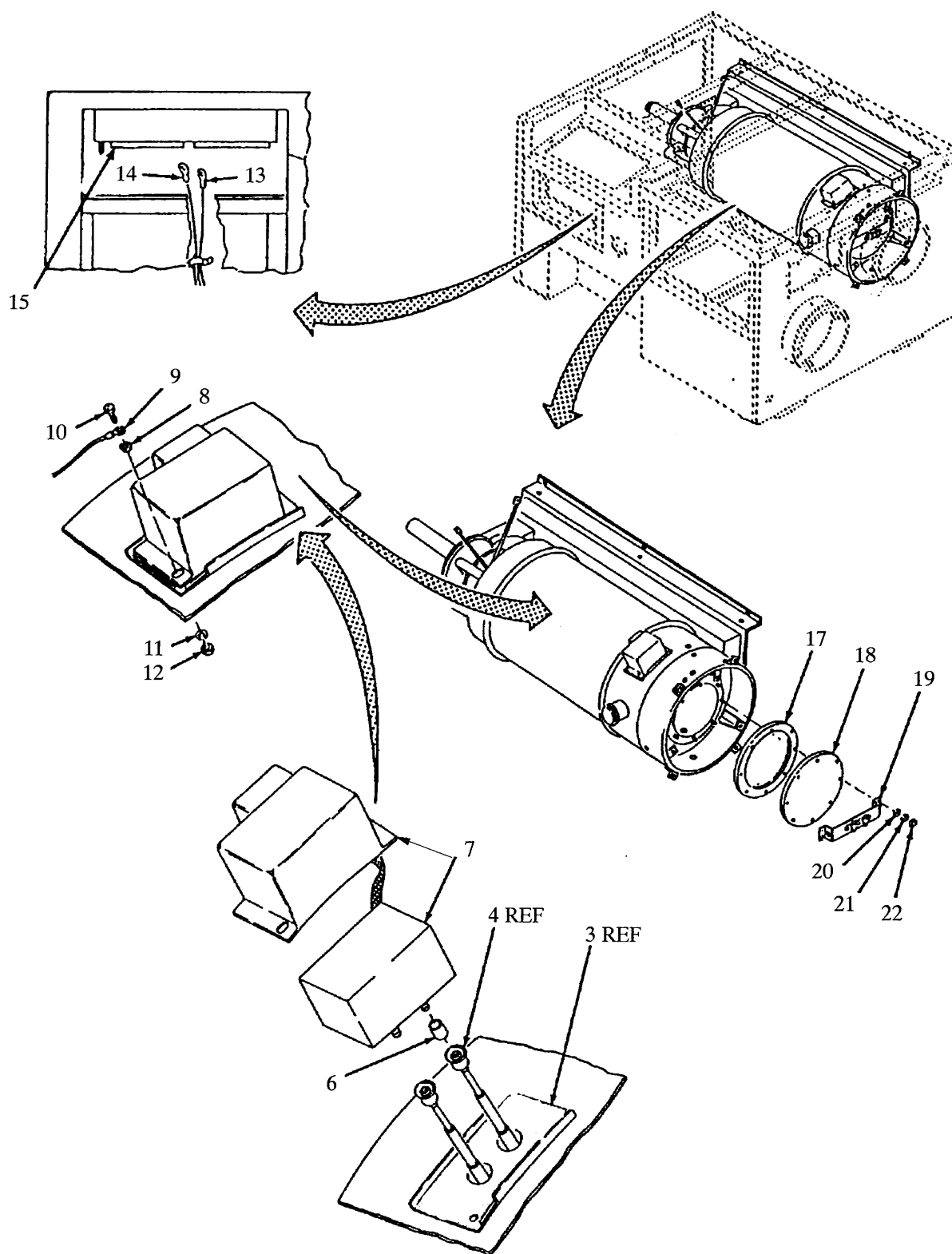


Figure 4-58. Transformer, (Model H120) Installation (Sheet 2 of 2)

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**4-32A. TRANSFORMER ASSEMBLY, (Model H120-1).**

---

This task consists of:                      a. Removal      b. Repair      c. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Tool Kit, Electrical Connector Repair (Item 2, App B)  
 Heat Gun (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Top panel removed (para 4-19)  
 Duct cover removed (para 4-22)  
 Supply outlet screen removed (para 4-23)

**Material/Parts:**

Shielded gasket (Item 73, App F)  
 Shielded gasket (Item 74, App F)  
 Shielded gasket (Item 75, App F)  
 Gasket (Item 59, App F)  
 Lockwasher (Item 12, App H)  
 Wire tags (Item 9, App E)  
 Heat shrink (Item 43, App H)  
 Terminal Splice (Item 26, App H)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

---

**NOTE**

**The transformer used on model H120-1, does not have a filter attached to the side of the transformer cover, (Ref to Fig 4-57).**

- a. Removal (Refer to Figure 4-58A)
  - (1) Tag and separate wire (1) TB1-8/TR1-BLU and wire (2) TR1-WHT/TB1-3 from two terminal splices (3). Discard terminal splices.
  - (2) Remove two nuts (4), two lockwashers (5), two screws (6), ground wire (7), two flat washers (8) and transformer cover (9). Discard lockwashers.
  - (3) Lift transformer assembly (10) away from base plate (11), remove two heat shrink tubes (12) and disconnect two high-tension leads (13). Discard heat shrink.
  - (4) Tag braided wires (14) and (15). Remove eight nuts (16), eight lockwashers (17), eight flat washers (18), thermostat bracket (19), braided wires and cover plate (20). Discard lockwashers.
  - (5) Remove gasket (21) from cover plate (20). Discard gasket.
  - (6) Disconnect the other end of two high-tension leads (13) and remove the leads through transformer base plate (11). Remove two grommets (22).
  - (7) Remove transformer base plate (11).
  - (8) Remove two shielded gaskets (23) and two shielded gaskets (24) as required.
- b. Repair is limited to the replacement of defective components.



4-32A. TRANSFORMER ASSEMBLY, (Model H120-1) - continued.

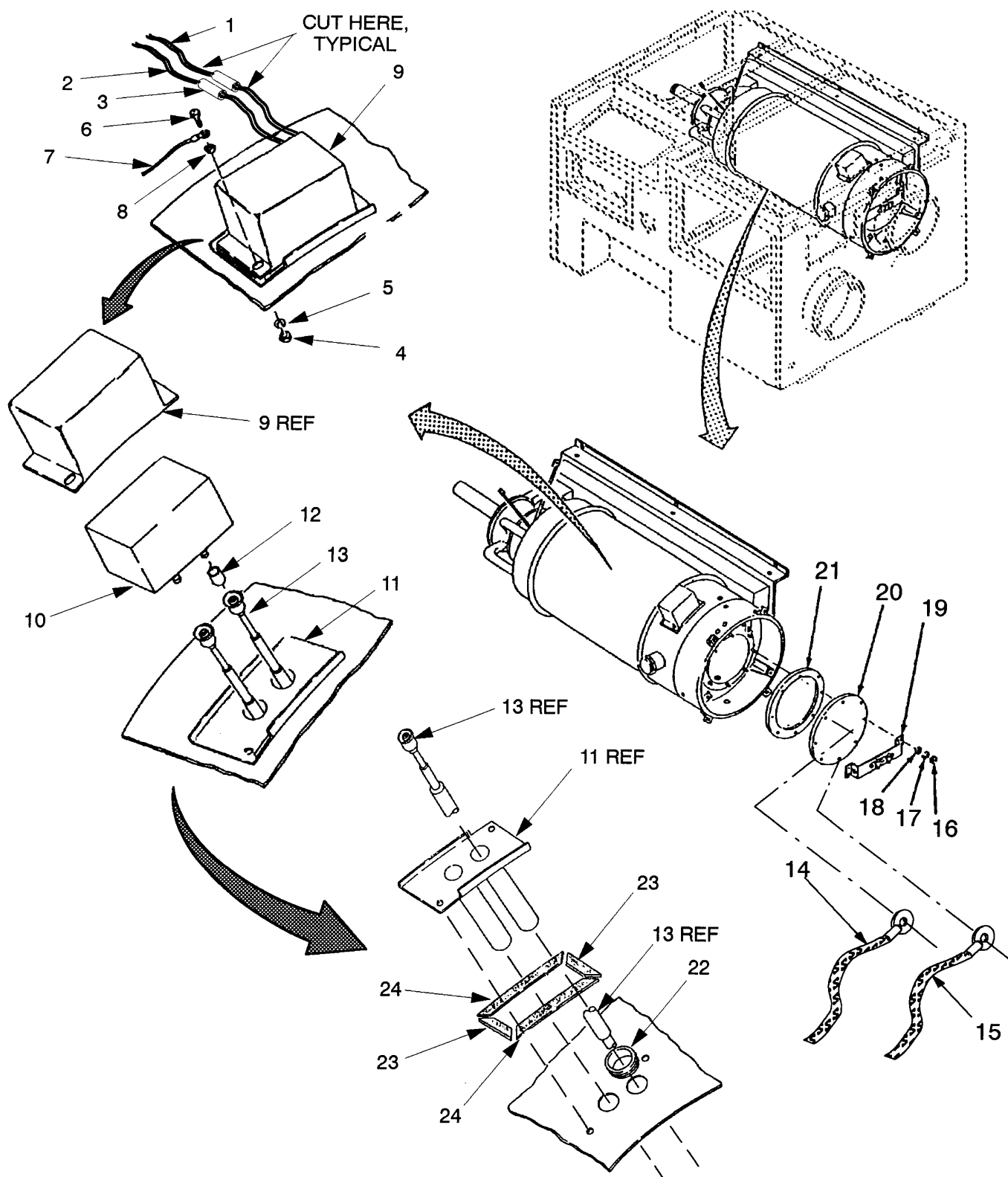


Figure 4-58A. Transformer, (Model H120-1) Removal

**4-32A. TRANSFORMER ASSEMBLY, (Model H120-1) - continued.**

## c. Installation (Refer to Figure 4-58B)

- (1) Install two shielded gaskets (1)(Item 74, App F) and two shielded gaskets (2)(Item 73, App F), and transformer base plate (3).
- (2) Install two high-tension leads (4) through base plate (3) and attach high-tension leads to electrodes (5).
- (3) Slide heat shrinks (6) over high-tension leads (4) and install the two high tension leads on transformer (7).
- (4) Position and secure the heat shrink (6) over high tension leads (4) and transformer (7).
- (5) Position transformer (7) on transformer base plate (3).
- (6) Install cover (8), two flat washers (9), ground wire (10), two screws (11), two lockwashers (12) and two nuts (13).
- (7) Connect wire (14) TR1-BLU/TB1-8 and wire (15) TR1-WHT/TB1-3 to terminal splices (16). Remove tags.
- (8) Install two grommets (17) over two high-tension leads (4) and insert the grommets approximately 1/4 inch into transformer base plate (3). New grommets will have to be cut so they can be installed over high-tension leads.
- (9) Install gasket (18)(Item 59, App F) on cover plate (19) and install cover.
- (10) Connect braided wire (20) on stud at the 6 o'clock position and braided wire (21) on stud at the 10 o'clock position and secure with two flat washers (22), two lockwashers (23) and two nuts (24). Remove tags.
- (11) Install thermostat bracket (25) horizontal to bottom of unit and the remaining six flat washers (22), six lockwashers (23) and six nuts (24).

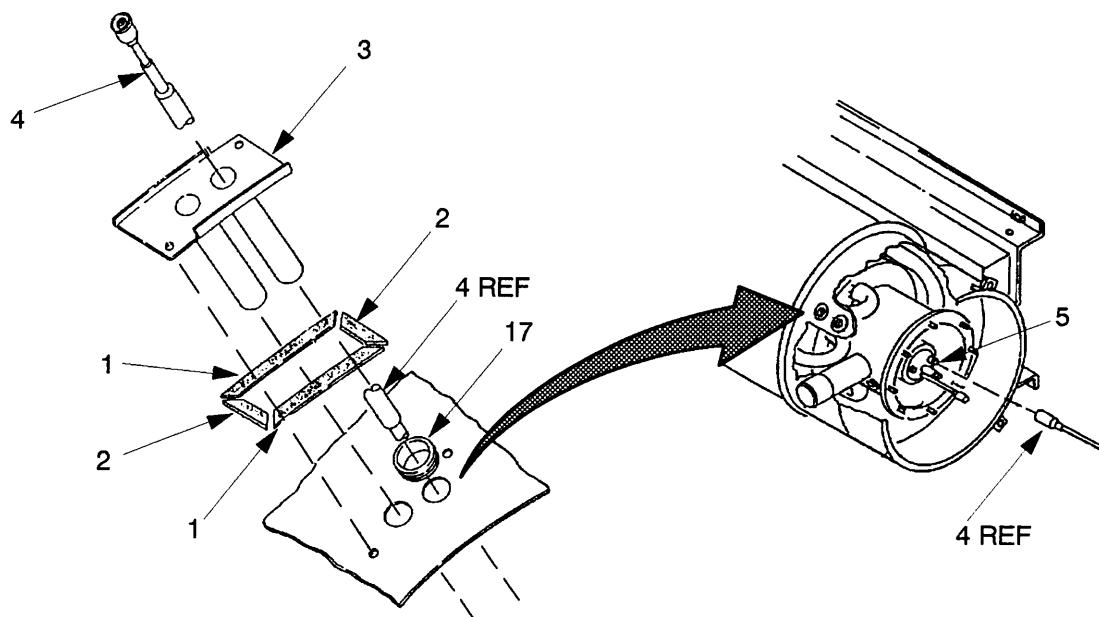


Figure 4-58B. Transformer, (Model H120-1) Installation (Sheet 1 of 2)

## 4-32A. TRANSFORMER ASSEMBLY, (Model H120-1) - continued.

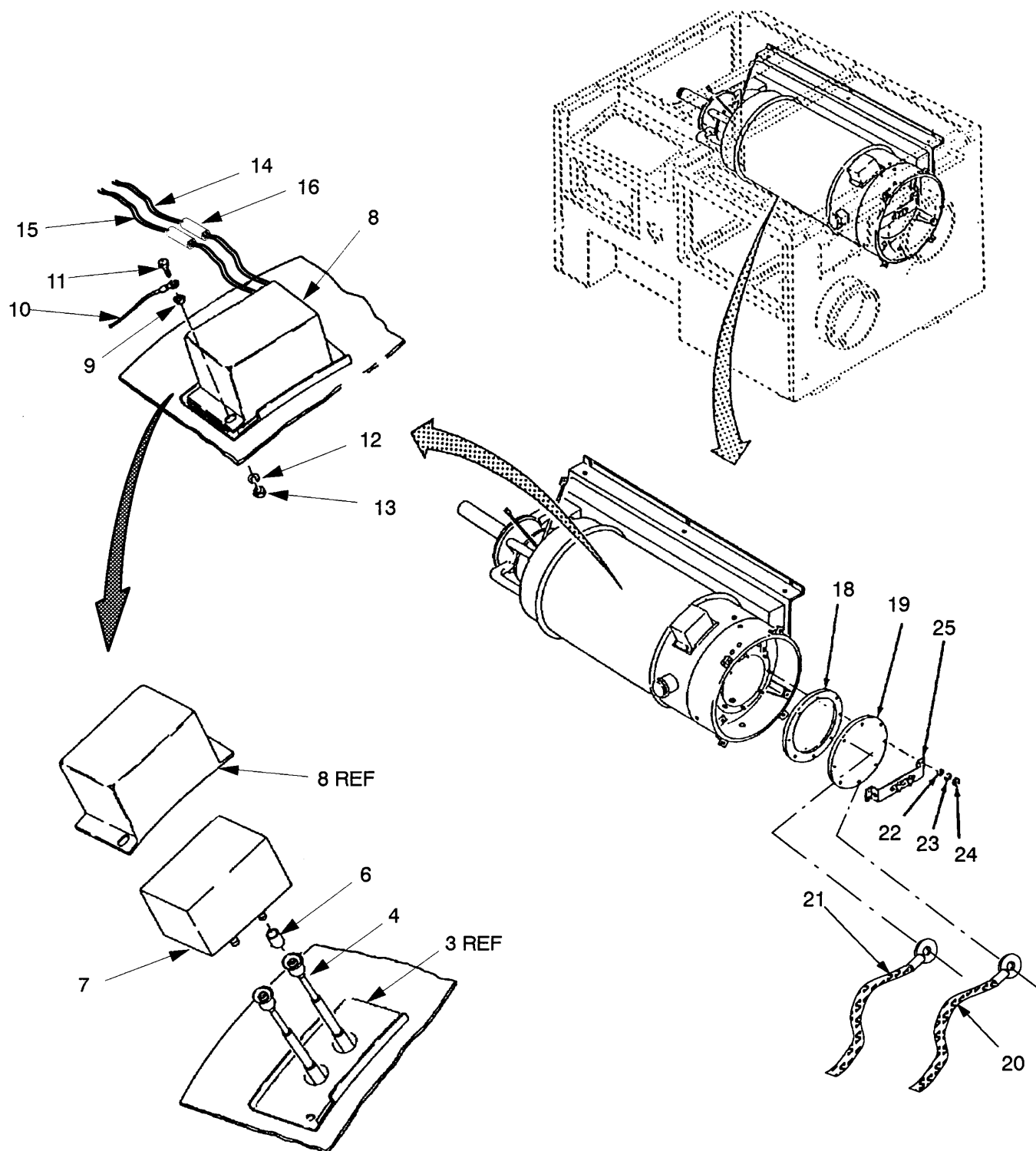


Figure 4-58B. Transformer, (Model H120-1) Installation (Sheet 2 of 2)

**4-33. BURNER ASSEMBLY.**

This task consists of:                      a. Removal      b. Inspection      c. Repair              d. Installation

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
Gasket Punch (Item 2, App B)  
Shears (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
Supply duct cover removed (para 4-22)  
Supply outlet screen removed (para 4-23)

**Material/Parts:**

Gasket (Item 59, App F)  
Cleaning Solvent (Item 1, App E)  
Lockwashers (Item 12, App H)  
Rags (Item 2, App E)

**General Safety Requirements:****WARNING**

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.**

**Fuels Flammable/No Smoking.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

## a. Removal (Refer to Figure 4-59)

- (1) Remove eight nuts (1), eight lockwashers (2), eight flat washers, (3) and thermostat bracket (4). Discard lockwashers.

**NOTE**

**Cover plate (5) may have two braided wires attached on some models.**

- (1a) Tag and disconnect braided wires (4.1) and (4.2), if attached to cover plate (5).
- (1b) Remove cover plate (5)
- (2) Remove gasket (6) from cover plate (5). Discard gasket.
- (3) Disconnect two high tension leads (7) from two electrodes on burner assembly (8).

**WARNING**

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.**

**Fuels Flammable/No Smoking.**

- (4) Disconnect fuel line (9).
- (5) Flame sensor (11) without braided wire; loosen clamp (10) and remove flame sensor.
- (5a) Flame sensor (11) with braided wire; loosen clamp (10) and (11.1), slide braided wire (11.2) off tube (11.3) and remove flame sensor.

**4-33. BURNER ASSEMBLY - continued.**

## a. Removal -continued (Refer to Figure 4-59)

- (6) Remove six nuts (12), six lockwashers (13), and six flat washers (14). Discard lockwashers.
- (7) Remove burner assembly (8) and gasket (15).
- (8) Remove three set screws (16) and baffle (17).
- (9) Remove filter/nozzle (18).

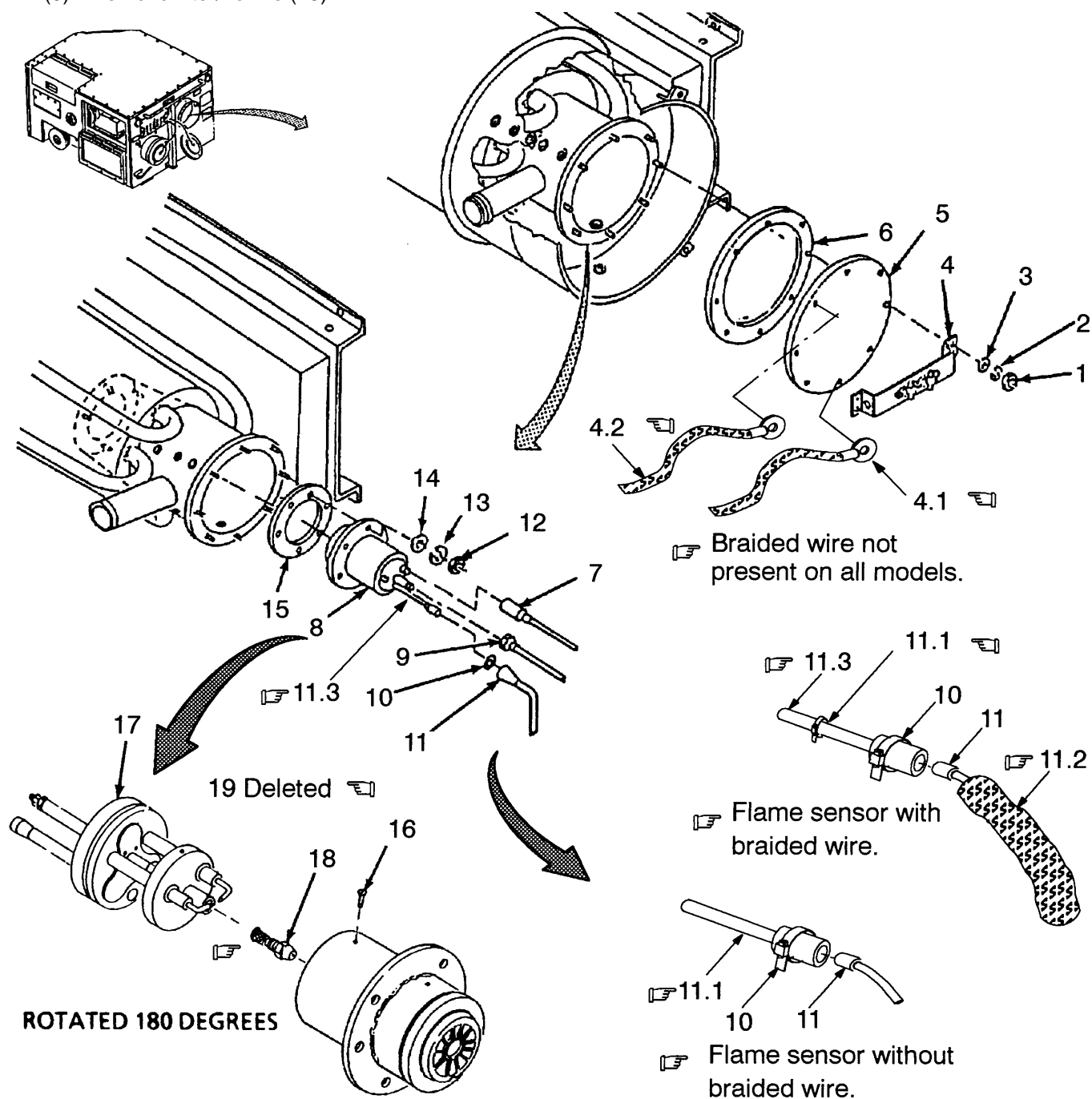


Figure 4-59. Burner Assembly Removal

**4-33. BURNER ASSEMBLY - continued.**

## b. Inspection

- (1) Inspect burner assembly for cracks, wear and damage to parts.
- (2) Inspect for carbon /soot build up, clean as required.

## c. Repair

**WARNING**

**Drycleaning solvent, P-D-680, Type III, used to clean parts, is potentially dangerous to personnel and property. Combustible — do not use near welding areas, near open flames or on hot surfaces. use only with adequate ventilation. Avoid prolonged or repeated breathing of vapors. do not smoke while using it. Use protective creams; wear apron and goggles (or face shield) to protect the skin. Store in approved metal safety containers.**

- (1) Clean burner assembly with drycleaning solvent (Item 1, App E) and let dry.
- (2) Repair is limited to replacement of nozzle, filter and burner assembly.
- (3) Refer any additional damage to direct support maintenance.

## d. Installation (Refer to Figure 4-60)

- (1) Install filter/nozzle (1).

**NOTE**

**Burner must be installed with flame detector tube on the bottom.**

- (2) Install baffle (3) and three set screws (4).
- (3) Install gasket (5), burner assembly (6), six flat washers (7), six lockwashers (8), and six nuts (9).
- (4) Flame sensor (11) without braided wire; slide clamp (10) on tube (11.1) and install flame sensor into tube, secure with clamp.
- (4a) Flame sensor (11) with braided wire; slide clamps (10) and (11.2) on tube (11.1), install flame sensor into tube, slide braided wire (11.3) over tube and secure with clamp (11.2). Position clamp (10) over sensor (11) and braided wire (11.3) and secure.
- (5) Connect fuel line (12) and two high tension leads (13).
- (6) Install gasket (14)(Item 59, App F) on cover (15).

**NOTE**

**Use appropriate holes to allow the bracket to be parallel to base of the ASH Unit.**

**Cover plate (15) may have two braided wires attached on some models.**

- (6a) Install cover (15). If equipped with two braided wires, attach wire (15.1) on stud at the 6 o'clock position and braided wire (15.2) on stud at the 10 o'clock position. Remove tags.
- (7) Install thermostat bracket (16) and eight flat washers (17), eight lockwashers (18) and eight nuts (19).

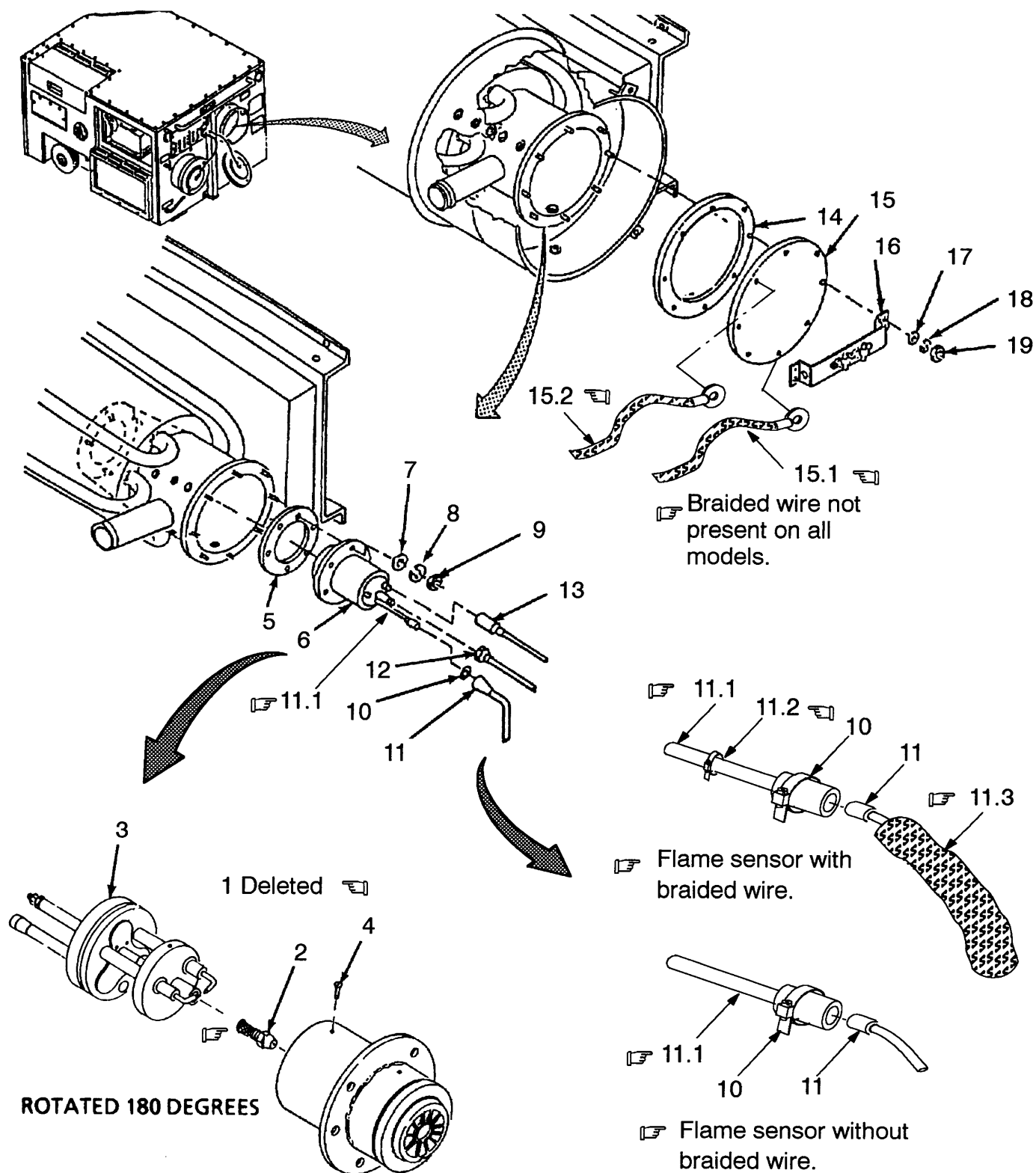


Figure 4-60. Burner Assembly Installation

**4-34. HEAT EXCHANGER ASSEMBLY.**

This task consists of:                      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**General Safety Requirements:****WARNING****Equipment Condition:**

Unit disconnected from power source (para 2-8)

Supply duct cover removed (para 4-22)

Supply air screen removed (para 4-23)

■ Transformer assy removed (para 4-32, 4-32A)

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.**

**Fuels Flammable / No Smoking.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/ inspection/maintenance activity.**

**Material/Parts:**

Lockwasher (Item 1, App H)

Gasket (Item 59, App F)

Anti-seize Compound (Item 3, App E)

Wire Ties (Item 11, App E)

Wire Tags (Item 9, App E)

**NOTE**

**Disassemble only to the level required to make repairs.**

a. Disassembly (Refer to Figure 4-61)

- (1) Remove eight nuts (1), eight lockwashers (2), eight flat washers, (3) and thermostat bracket (4). Discard lockwashers.

**NOTE**

**Cover plate (5) may have two braided wires attached on some models.**

- (1a) Tag and disconnect braided wires (4.1) and (4.2), if attached to cover plate (5).

- (1b) Remove cover plate (5)

- (2) Remove cover (5) and gasket (6). Discard gasket.

- (3) Open right side rear door (7) and right side front door (8).



## 4-34. HEAT EXCHANGER ASSEMBLY - continued

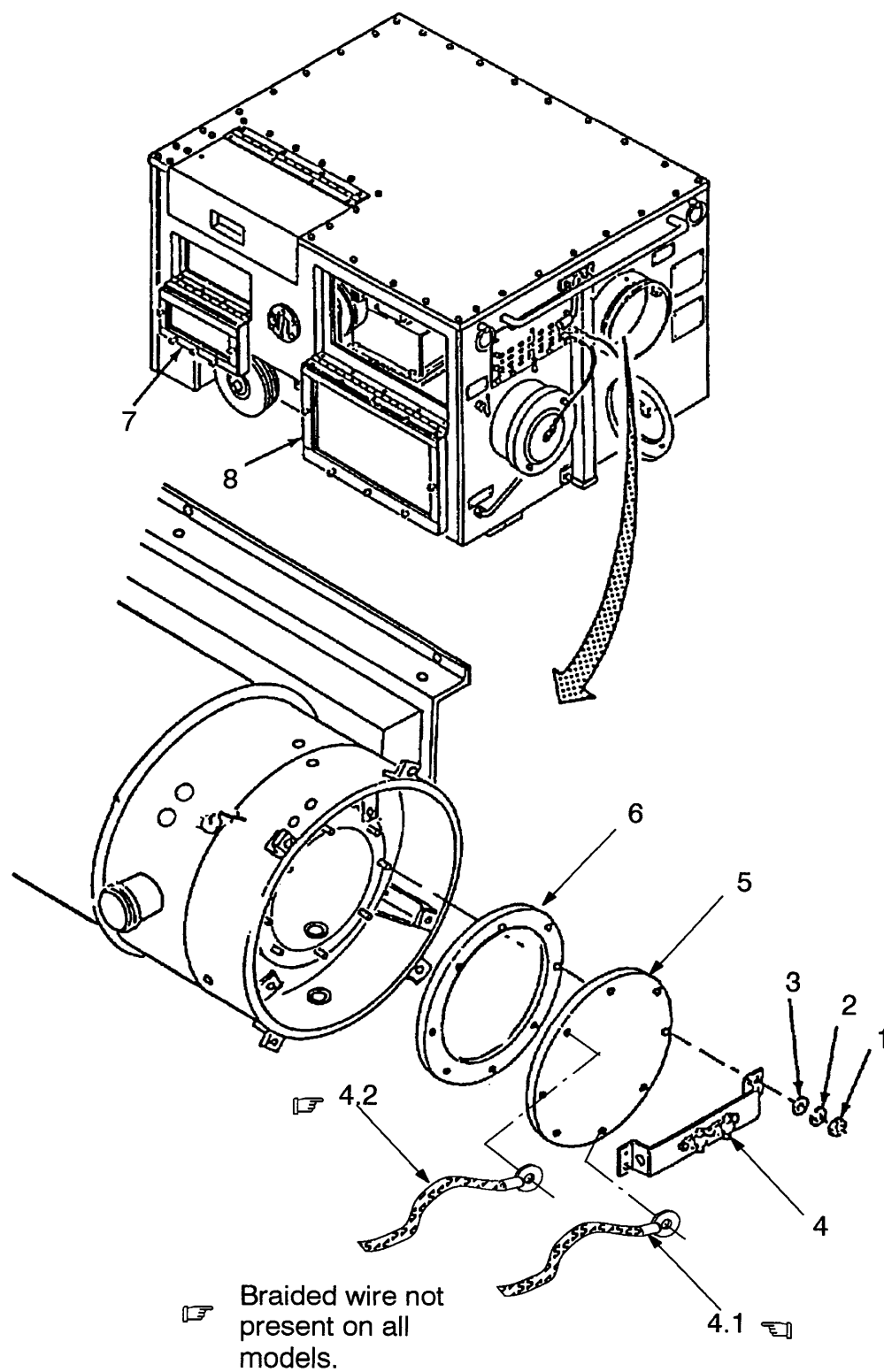


Figure 4-61. Heat Exchanger Removal

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**4-34. HEAT EXCHANGER ASSEMBLY - continued.**

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## a. Removal - continued

*Flame Sensor* (Refer to Figure 4-62)

**NOTE**

**Grommets on flame sensor do not come off the assembly.**

**Flame sensor may have a braided wire with terminal lug attached on some models.  
Braided wire is located between the two grommets.**

- (4) Tag and disconnect wire (1) TB3-6/D1-YEL and wire (2) TB3-7/D1-YEL from TB3 (3). Remove wire ties (4) as required.
- (5) Flame sensor (6) without braided wire; loosen clamp (5) and remove flame sensor.
- (5a) Flame sensor (6) with braided wire; loosen clamp (5) and (6.1), slide braided wire (6.2) off tube (6.3) and remove flame sensor.
- (6) Push grommet (7) out of heat exchanger (8) toward heat exchanger shell (9).
- (7) Push grommet (10) out of heat exchanger shell (9) toward heat exchanger (8).
- (8) Remove the flame sensor (6) and braided wire (6.2), if attached, from between the heat exchanger (8) and heat exchanger shell (9).

## 4-34. HEAT EXCHANGER ASSEMBLY - continued.

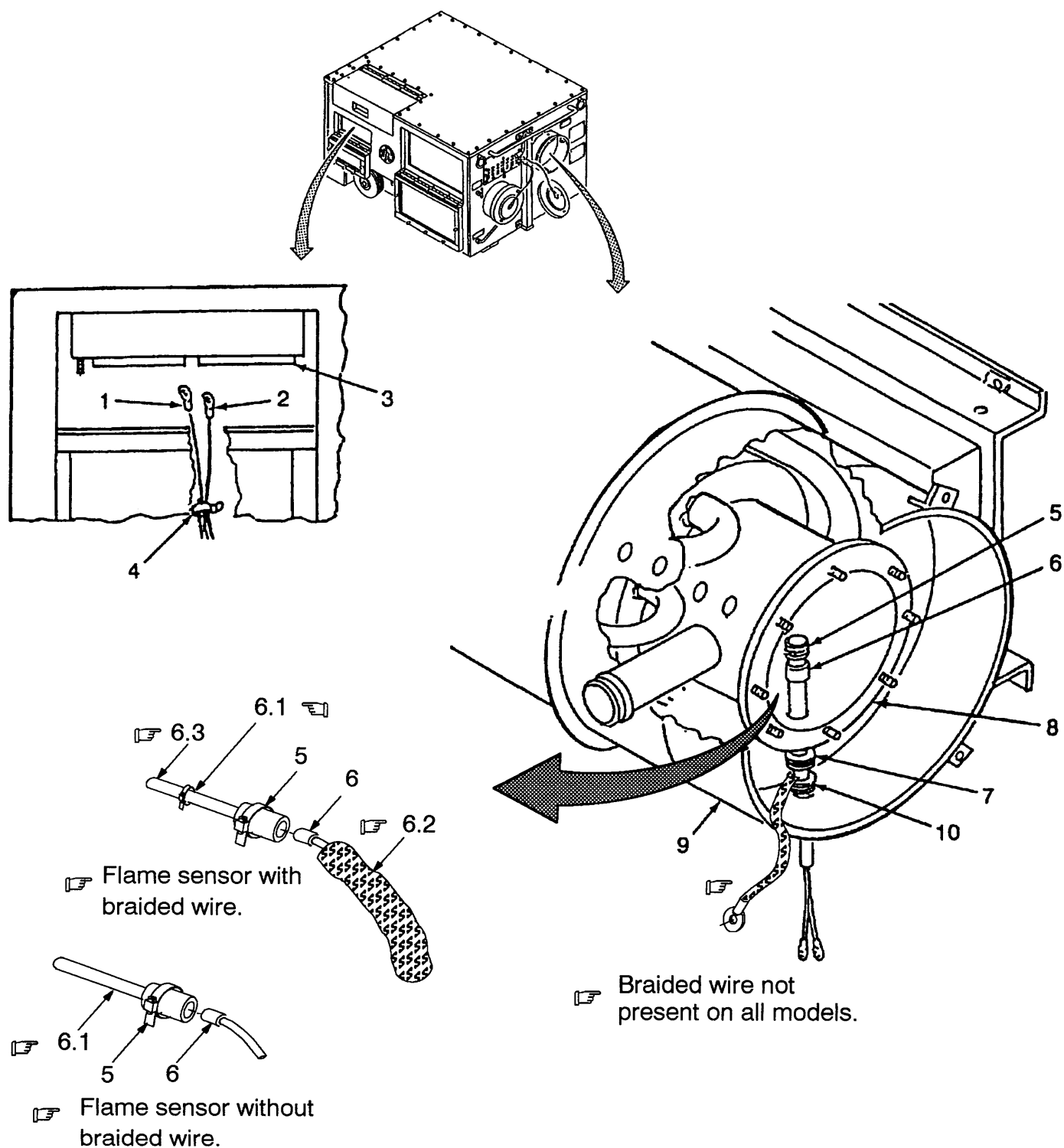


Figure 4-62. Flame Sensor Removal

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**4-34. HEAT EXCHANGER ASSEMBLY - continued.**

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**a. Removal - continued**

*Fuel Line and Sight Glass* (Refer to Figure 4-63)

**WARNING**

**Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. No SMOKING. Suitable fire extinguisher must be present.**

**Fuel on clothing can be fatal if ignited by a static discharge. If fuel gets on your clothes, leave the refueling area as soon as possible and wet clothes with water before taking them off. In extreme cold conditions, clothes should not be wet; instead, ground yourself to a piece of grounded equipment by taking hold of it before taking off the clothes. Wash skin with warm soapy water.**

**NOTE**

**Fuel line may have a braided wire with terminal lug attached on some models. Braided wire is located between the two grommets.**

- (9) Disconnect fuel line (1) from fuel pump (2) and burner (3).
- (10) Push grommet (4) out of heat exchanger (5) toward heat exchanger shell (6).
- (11) Push grommet (7) out of heat exchanger shell (6) toward heat exchanger (5).
- (12) Remove fuel line (1) from between heat exchanger (5) and heat exchanger shell (6).
- (13) Remove sight glass (8).

## 4-34. HEAT EXCHANGER ASSEMBLY - continued.

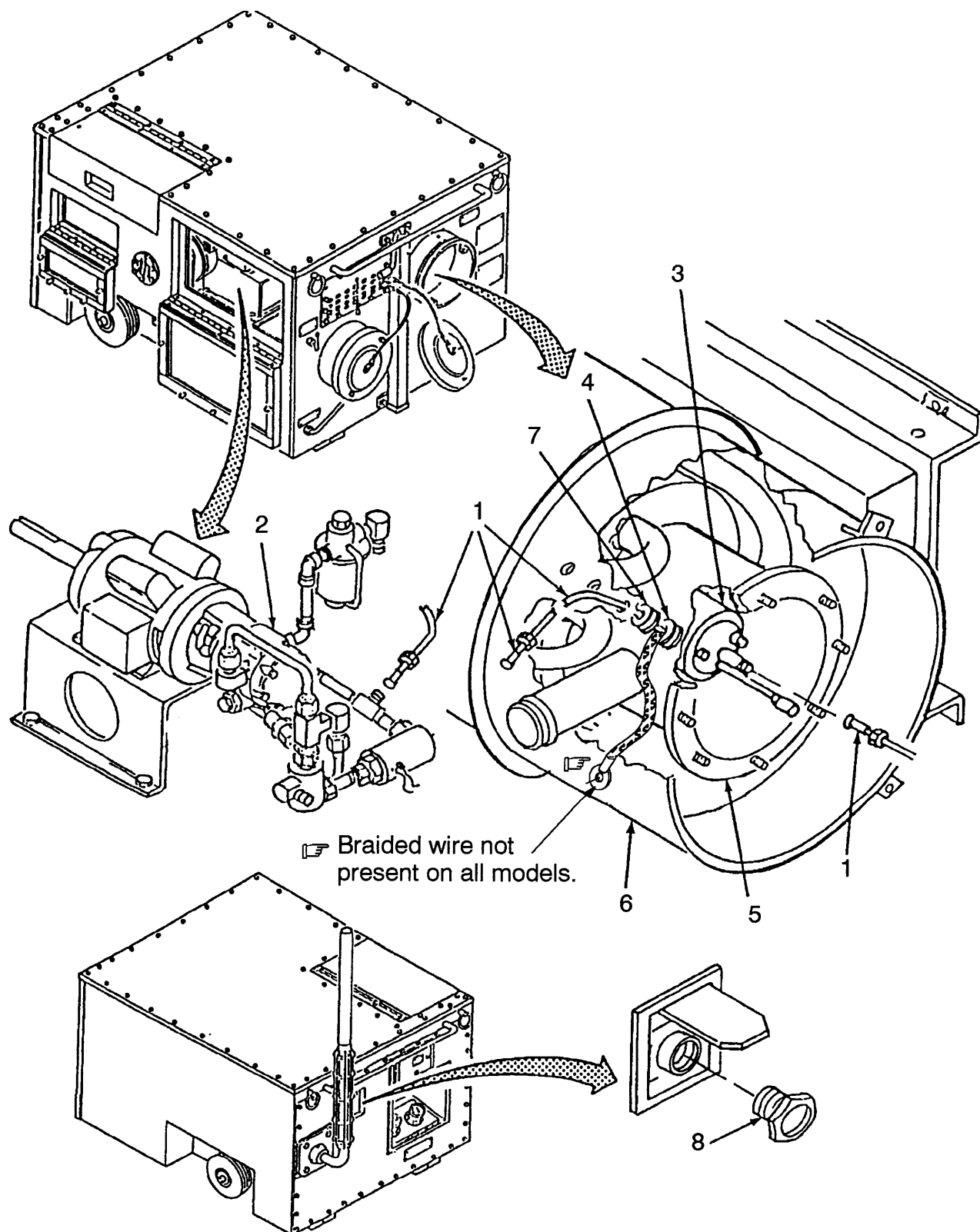


Figure 4-63. Fuel Line and Sight Glass Removal

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**4-34. HEAT EXCHANGER ASSEMBLY - continued.**

---

## b. Repair

Repair is limited to replacement of defective parts.

## c. Installation

*Fuel line and Sight Glass* (Refer to Figure 4-64)

- (1) Apply anti-seize compound (Item 3, App E) to sight glass (1) and install sight glass.

**NOTE**

**Fuel line may have a braided wire with terminal lug attached on some models.  
Braided wire is located between the two grommets.**

- (2) Insert one end of fuel line (2) through hole near top of heat exchanger shell (3) from the inside.
- (3) Insert the other end of fuel line (2) through hole near top of heat exchanger (4).
- (4) Install grommet (5) on heat exchanger shell (3) and grommet (6) on heat exchanger (4).
- (5) Connect fuel line (2) to fuel pump (7) and burner (8).

## 4-34. HEAT EXCHANGER ASSEMBLY - continued.

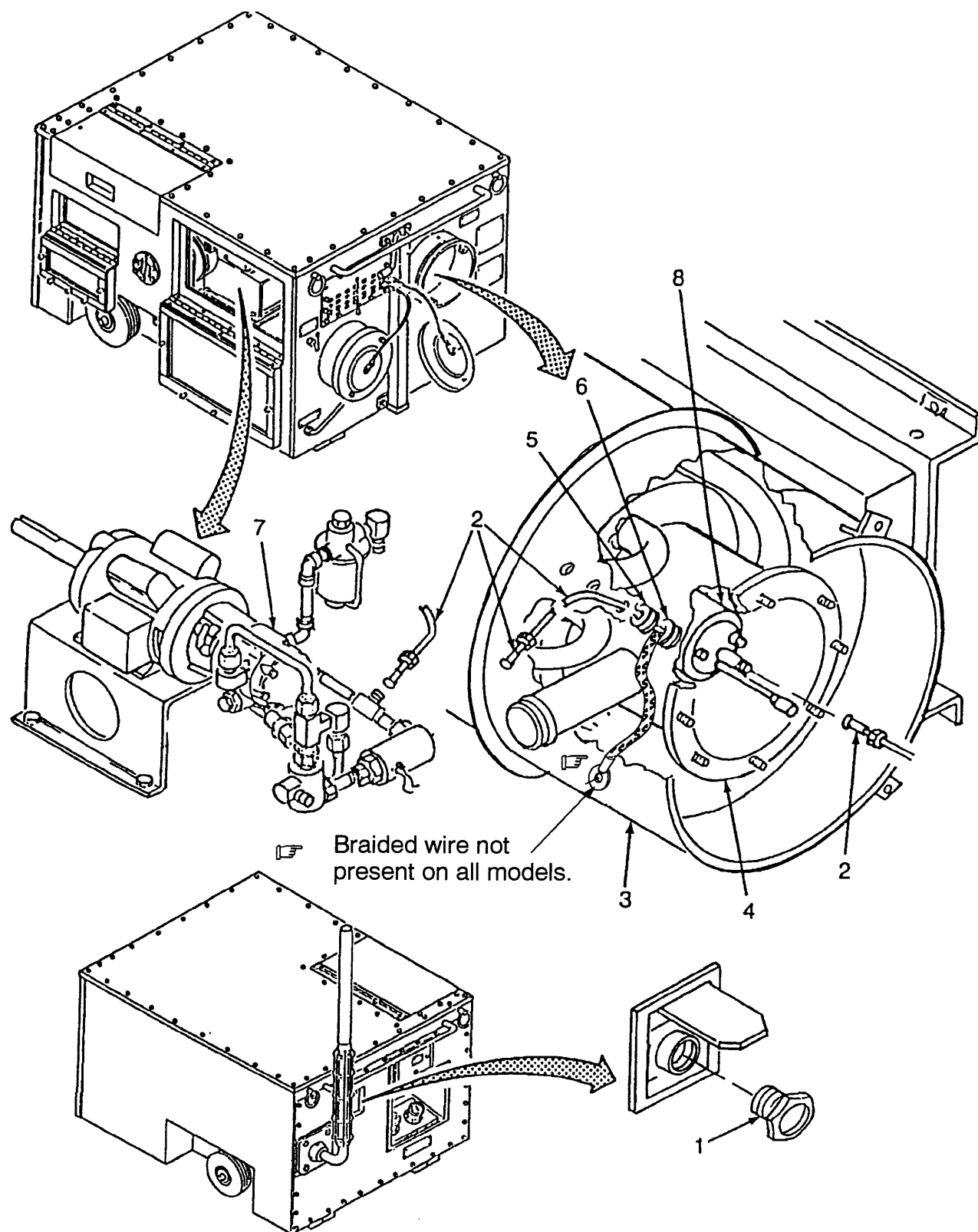


Figure 4-64. Fuel Line and Sight Glass Installation

**4-34. HEAT EXCHANGER ASSEMBLY - continued.**

## c. Installation -continued

*Flame Sensor* (Refer to Figure 4-65)

- (6) Insert wire end of flame sensor (1) through the bottom hole of heat exchanger shell (2) from the inside.
- (7) Insert eye end of the flame sensor (1) and braided wire (1.1), if attached, through the bottom hole of heat exchanger (3) from the outside.
- (8) Install grommet (4) in heat exchanger shell (2) and grommet (5) in heat exchanger (3).
- (9) Flame sensor (1) without braided wire; slide clamp (7) on tube (7.1) and install flame sensor into tube, secure with clamp.
- (9a) Flame sensor (1) with braider wire; slide clamps (7) and (7.2) on tube (7.1), install flame sensor into tube, slide braided wire (1.1) over tube and secure with clamp (7.2). Position clamp (7) over sensor (11) and braided wire (1.1) and secure.
- (10) Connect wires (8) and (9) as follows to TB3 (10). Install wire ties (11) as required.
  - (a) Connect wire (8), TB3-6/D1-YEL to position TB3-6.
  - (b) Connect wire (9), D1-YEL/TB3-7 to position TB3-7.

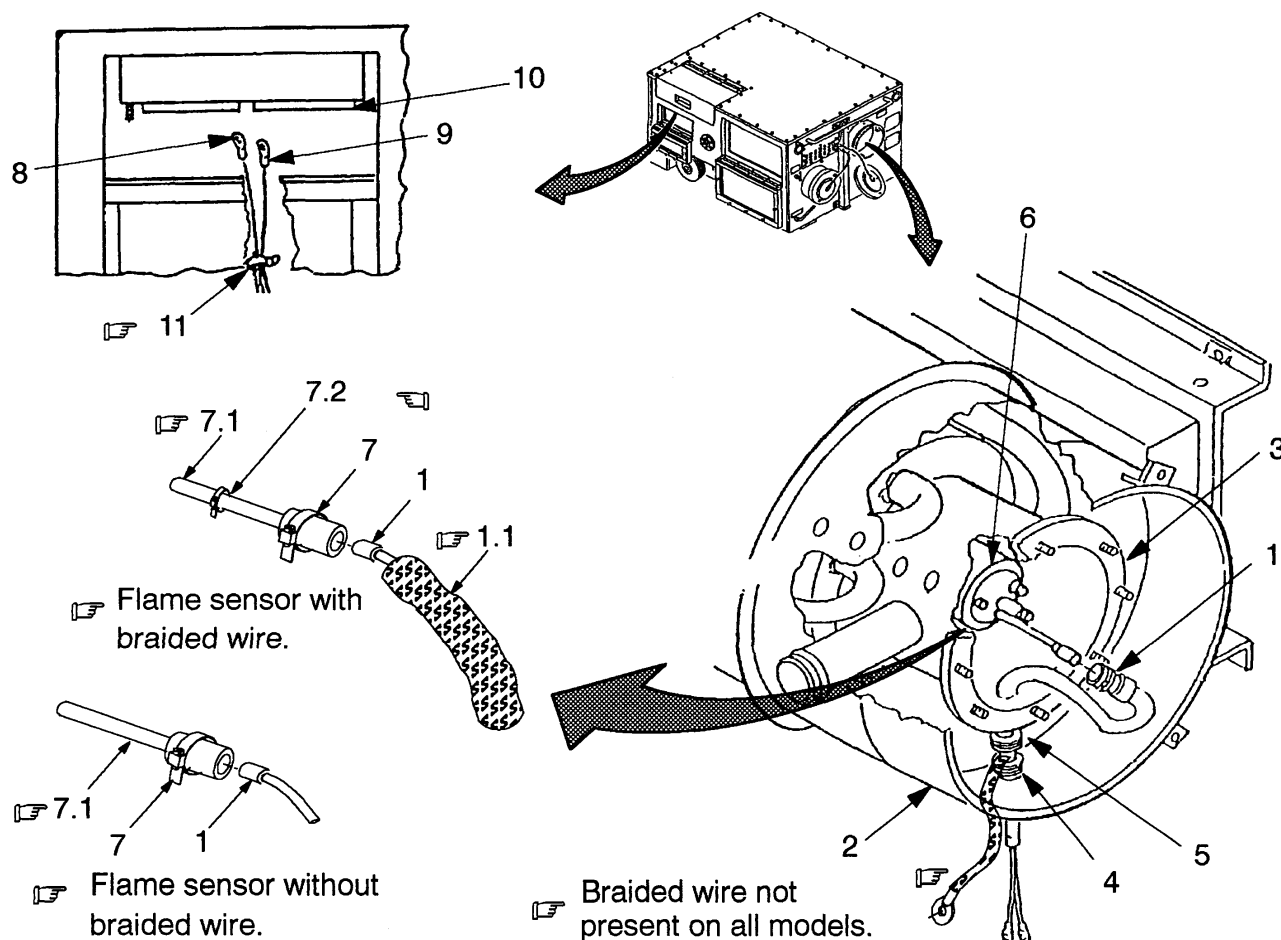


Figure 4-65. Flame Sensor Installation



**4-34. HEAT EXCHANGER ASSEMBLY - continued.**

c. Installation -continued (Refer to Figure 4-66)

(11) Install gasket (1)(Item 59, App F) and cover (2).

**NOTE**

**Cover plate may have two braided wires attached on so models.**

(11a) Install cover (2). If equipped with two braided wires, attach wire (2a) on stud at the 6 o'clock position and braided wire (2.2) on stud at the 10 o'clock position. Remove tags.

(12) Install thermostat bracket (3) so it is horizontal to bottom of unit.

(13) Install eight flat washers (4), eight lockwashers (5), and eight nuts (6).

(14) Close right side rear door (7) and right side front door (8).

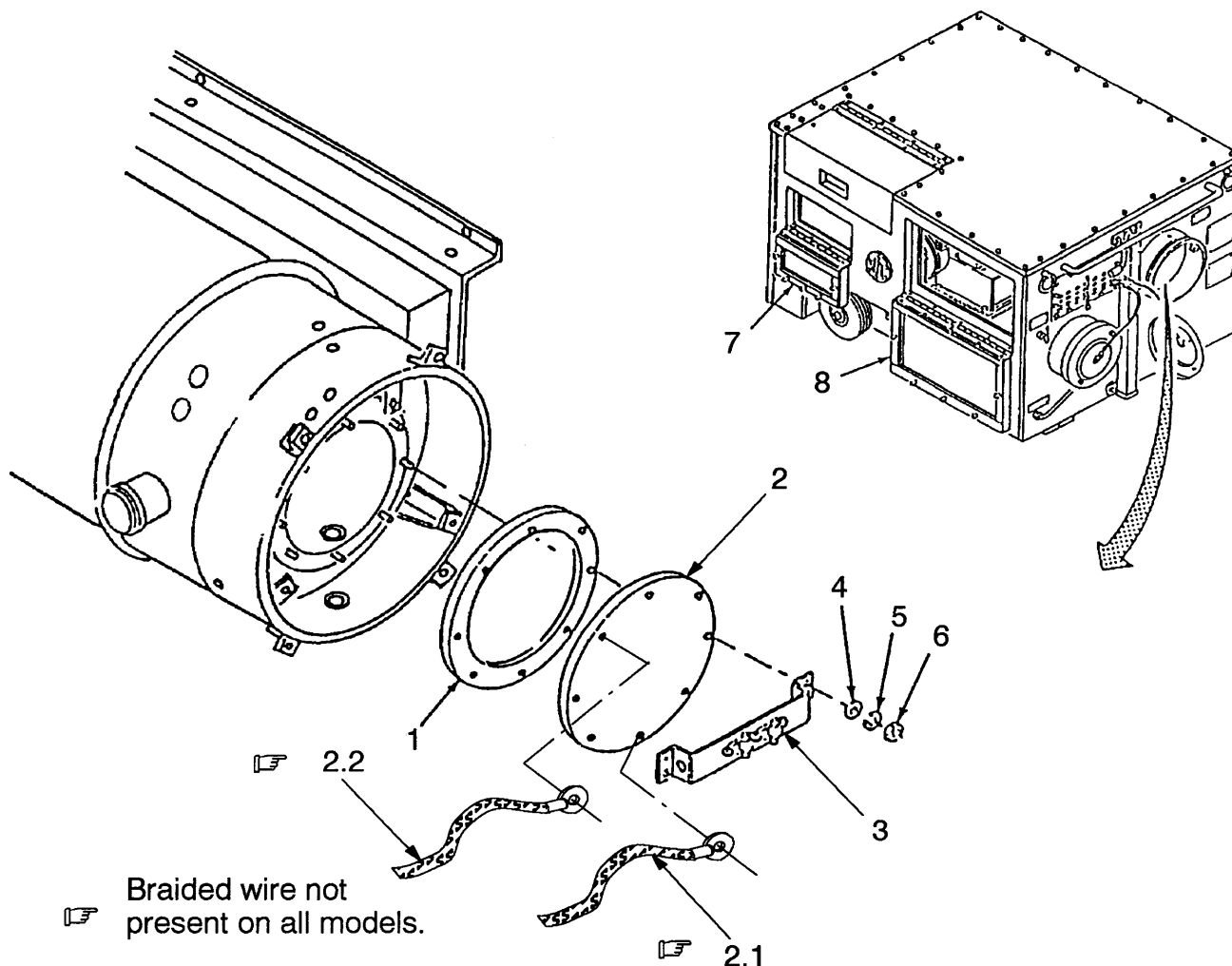


Figure 4-66. Heat Exchanger Installation

**4-35. FUEL TANK ASSEMBLY.**

This task consists of:

a. Removal	b. Disassemble	c. Repair
d. Assembly	e. Installation	

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Drain Pan (Item 2, App B)

**Material/Parts:**

Lockwasher (Item 1, App H) well ventilated.  
 Lockwasher (Item 8, App H)  
 Lockwasher (Item 10, App H)  
 Sealant (Item 6, App E)  
 Preformed Packing (Item 28, App H)  
 ■ Primer, Sealant, (Item 16, App E)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
 Rear panel removed (para 4-20)

**General Safety Requirements:****WARNING**

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be**

**Fuels Flammable / No Smoking.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

a. Removal (Refer to Figure 4-67)

**WARNING**

**Fuel is flammable and toxic to eyes, skin, and respiratory tract. Skin/eye protection required. Avoid repeated/prolonged contact. Use only in well ventilated areas. Keep away from open flames or other sources of ignition. No SMOKING around the area. Suitable fire extinguisher must be present.**

**Fuels are toxic and flammable. Do not get on person or clothing. Do not use near open flame. Area should be well ventilated.**

- (1) Extend jack assembly (1), remove pin (2) and place wheel assembly (3) in the down position. Insert pin (2).
- (2) Retract jack assembly (1) until front of Unit (4) is resting on the ground.
- (3) Remove four screws (5) four lockwashers (6), four flat washers (7), fuel drain cover (8), and gasket (9). Discard lockwashers and gasket.

## 4-35. FUEL TANK ASSEMBLY - continued.

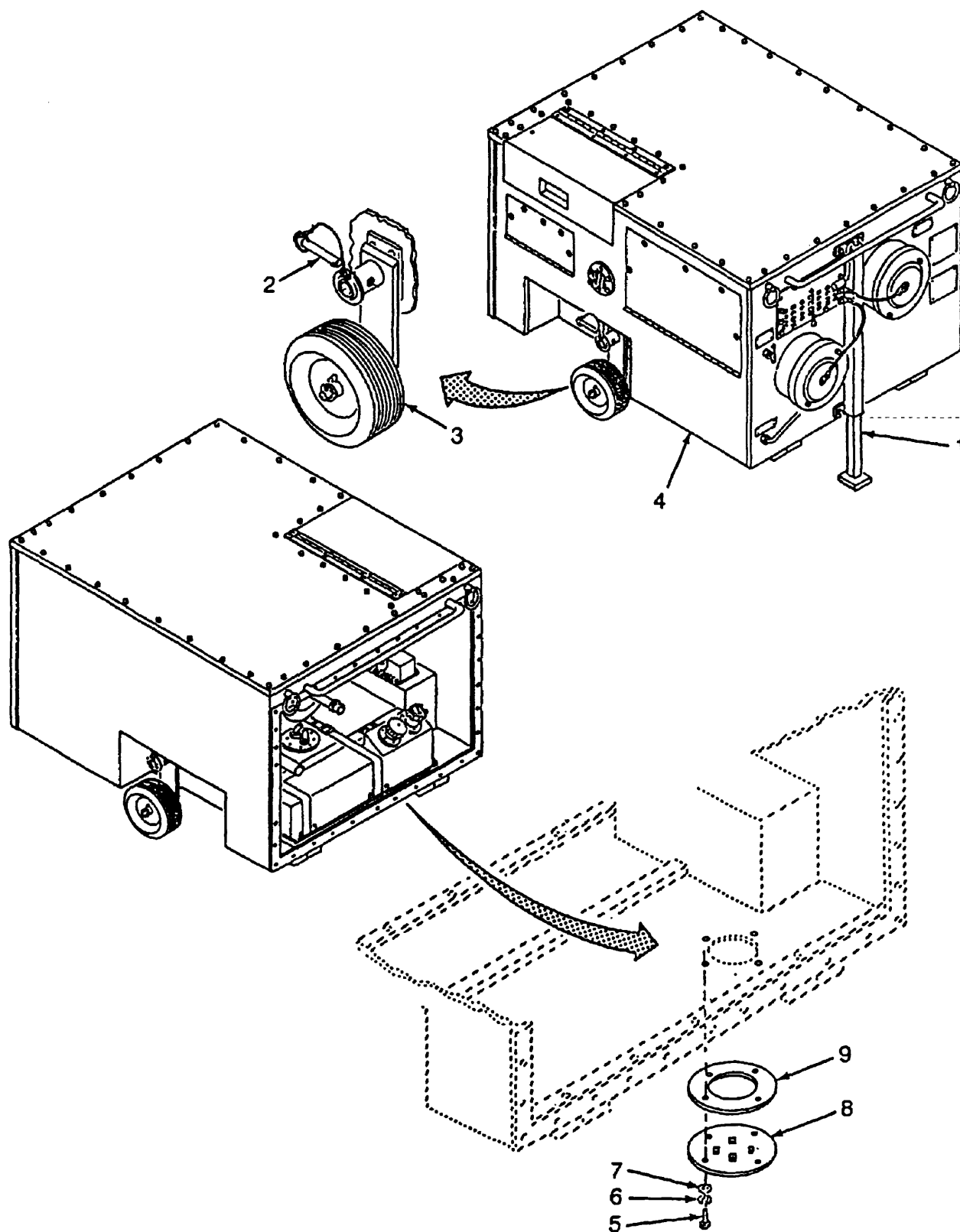


Figure 4-67. Fuel Tank Removal

**4-35. FUEL TANK ASSEMBLY - continued.**

- a. Removal - continued (Refer to Figure 4-68)

**NOTE**

**Fuel tank holds 14 gallons. Drain pan may need to be drained repeatedly.**

- (4) Position drain pan under fuel tank (1).
- (5) Remove drain plug (2).
- (6) Extend jack assembly (3) while emptying tank (1) until unit is level.
- (7) When tank (1) is empty, install drain plug (2).
- (8) Remove tubing (4) and tubing (5) from fuel tank assembly (1).
- (9) Unfasten four straps (6).
- (10) Lift fuel tank assembly (1) from tray (7).
- (11) Remove eight screws (8), eight lockwashers (9), eight flat washers (10), and tray (7). Discard lockwashers.

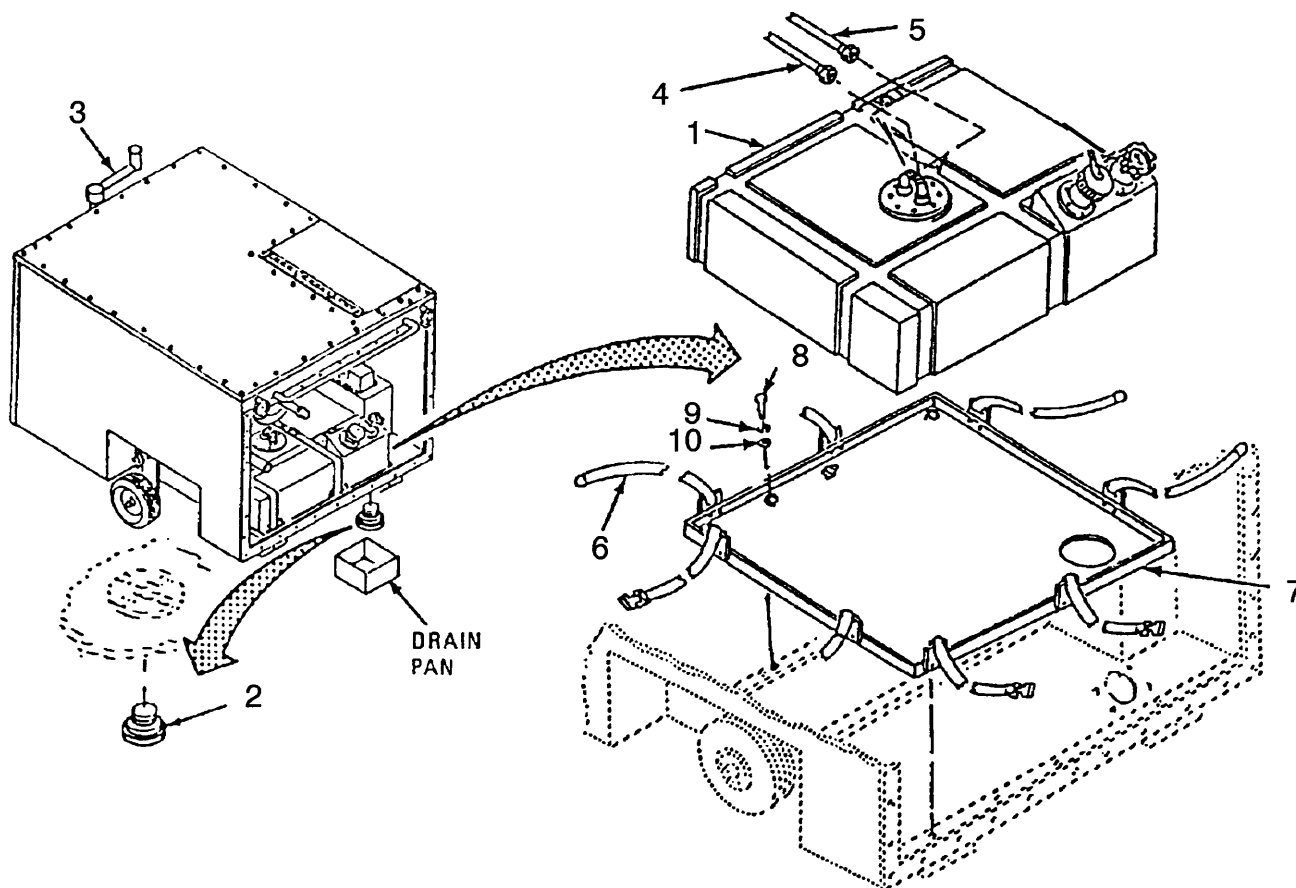
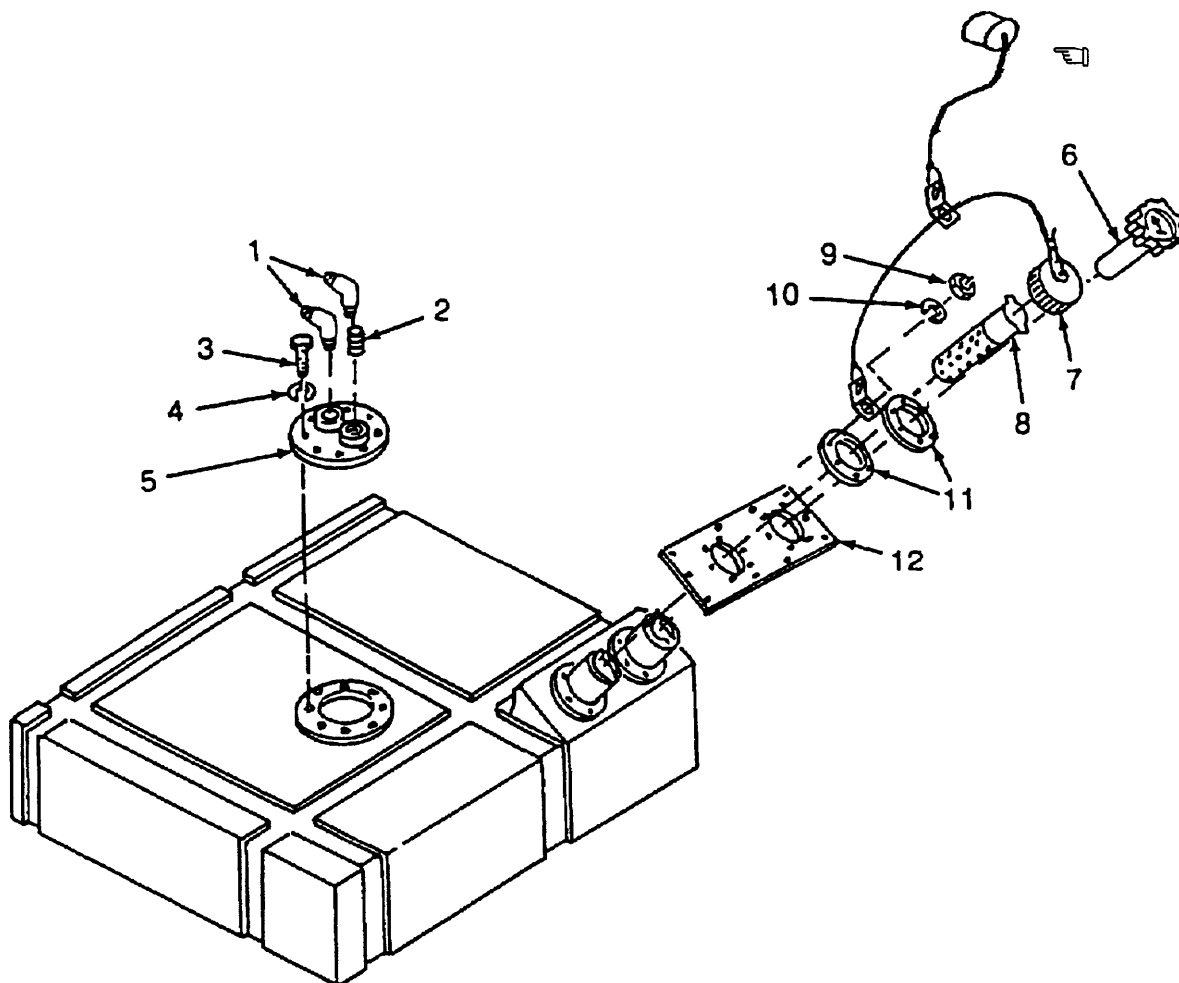


Figure 4-68. Fuel Tank Assembly Removal

**4-35. FUEL TANK ASSEMBLY - continued.****b. Disassembly (Refer to Figure 4-69)**

- (1) Remove two fittings (1) and bushing (2).
- (2) Remove eight screws (3), eight lockwashers (4), and mount plate (5). Discard lockwashers.
- (3) Remove fuel gage (6), filler cap (7), and fuel screen (8).
- (4) Remove twelve nuts (9), twelve lockwashers (10), filler cap (7), two filler neck rings (11), and isolator (12). Discard lockwashers.

*Figure 4-69. Fuel Tank Disassembly*

**4-35. FUEL TANK ASSEMBLY - continued.**

- b. Disassembly - continued (Refer to Figure 4-70)
- (5) Remove twelve space adapters (1), filler neck (2) and fuel gage neck (3).
  - (6) Remove drain plug (4).
  - (7) Remove four lock nuts (5), four flat washers (6) and washer ring (7).
  - (8) Remove drain port (8) and preformed packing (9). Discard preformed packing.
- c. Repair. Repair is limited to replacement of defective parts.

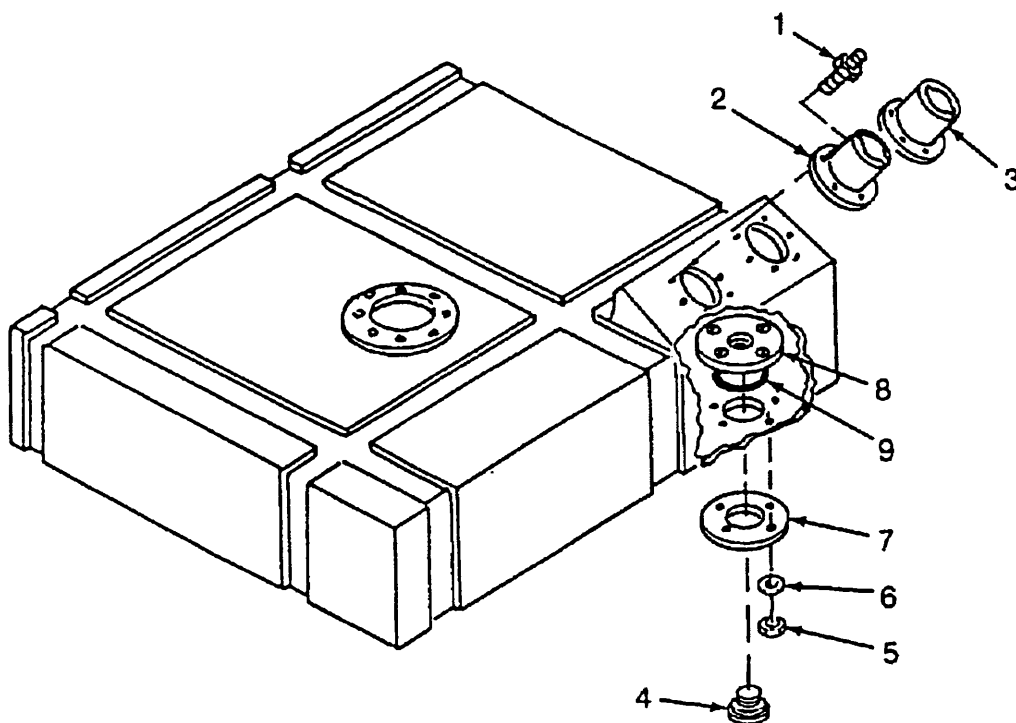


Figure 4-70. Fuel Tank Disassembly

**4-35. FUEL TANK ASSEMBLY - continued.****d. Assembly (Refer to Figure 4-71)**

- (1) Install preformed packing (1)(Item 28, App H) and drain port (2).
- (2) Apply a thin coat of sealant primer (Item 16, App E) to washer ring (3) and mounting surface on bottom of fuel tank (4).
- (3) Apply Sealant (Item 6, App E) to washer ring (3) and bottom mounting surface of fuel tank (4).
- (4) Install washer ring (3), four flat washers (5) and four lock nuts (6).
- (5) Install drain plug (7).
- (6) Apply a thin coat of sealant primer (Item 16, App E) to bottom flange on fuel gage necks (8) and filler neck (9).
- (7) Apply sealant (Item 6, App E) to bottom flange on fuel gage neck (8) and filler neck (9).
- (8) Install fuel gage neck (8), filler neck (9) and twelve space adapters (10).

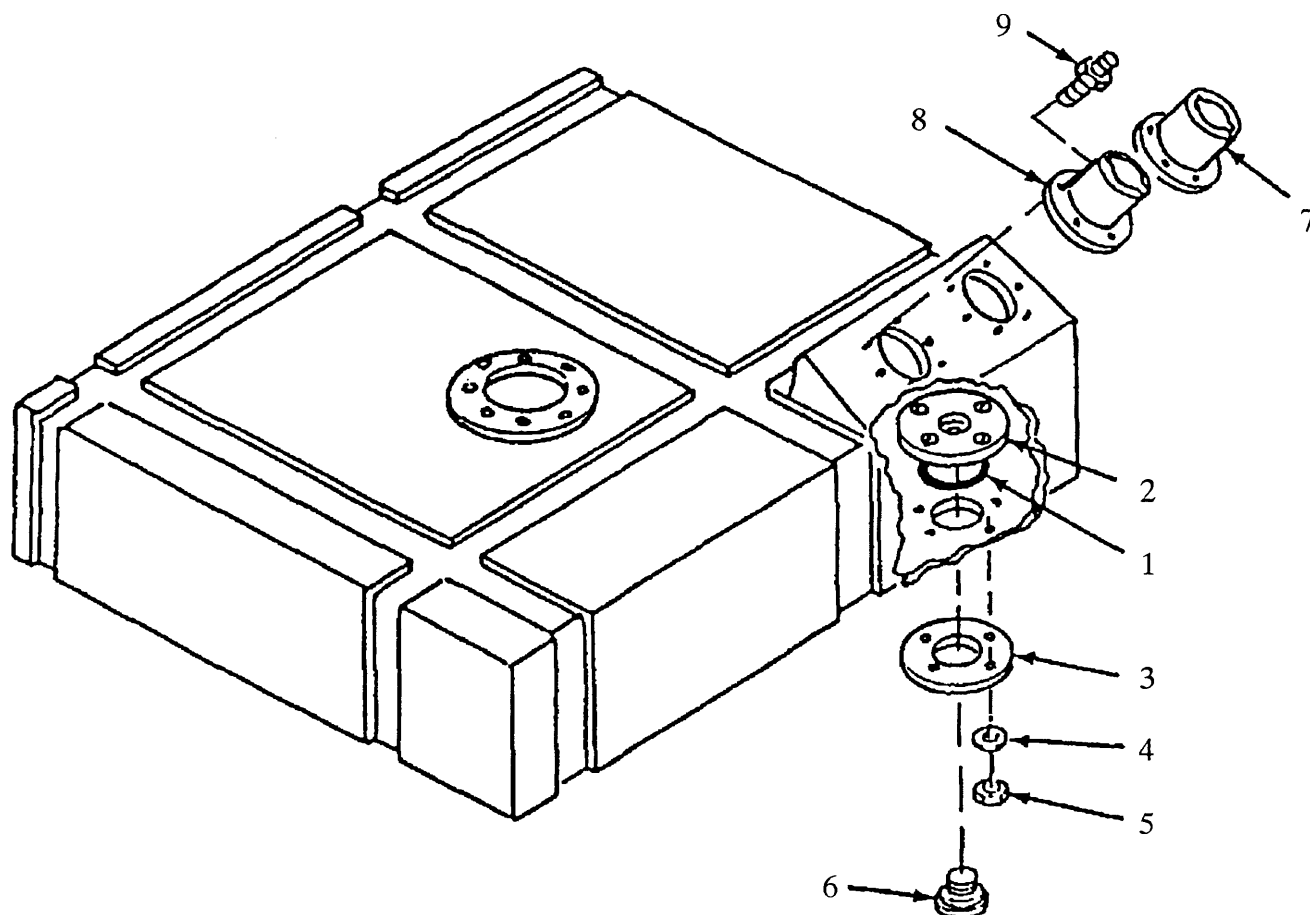


Figure 4-71. Fuel Tank Assembly

**4-35. FUEL TANK ASSEMBLY - continued.****d. Assembly - continued (Refer to Figure 4-72)**

- (9) Install isolator (1) and two fill neck rings (2).
- (10) Install the loose end of the fuel cap cable (3), twelve lockwashers (4) and twelve nuts (5).
- (11) Ensure dust cap (7a), lanyard is attached to the fuel cap (3), lanyard. Install fuel screen (6), fuel cap (3) and fuel gage (7).
- (12) Apply a thin coat of sealant primer (Item 16, App E) to bottom outer edge of mouth plate (8).
- (13) Apply sealant (Item 6, App E) to bottom outer edge of mount plate (8).
- (14) Install mount plate (8), eight lockwashers (9) and eight screws (10).
- (15) Install bushing (11) and two fittings (12).

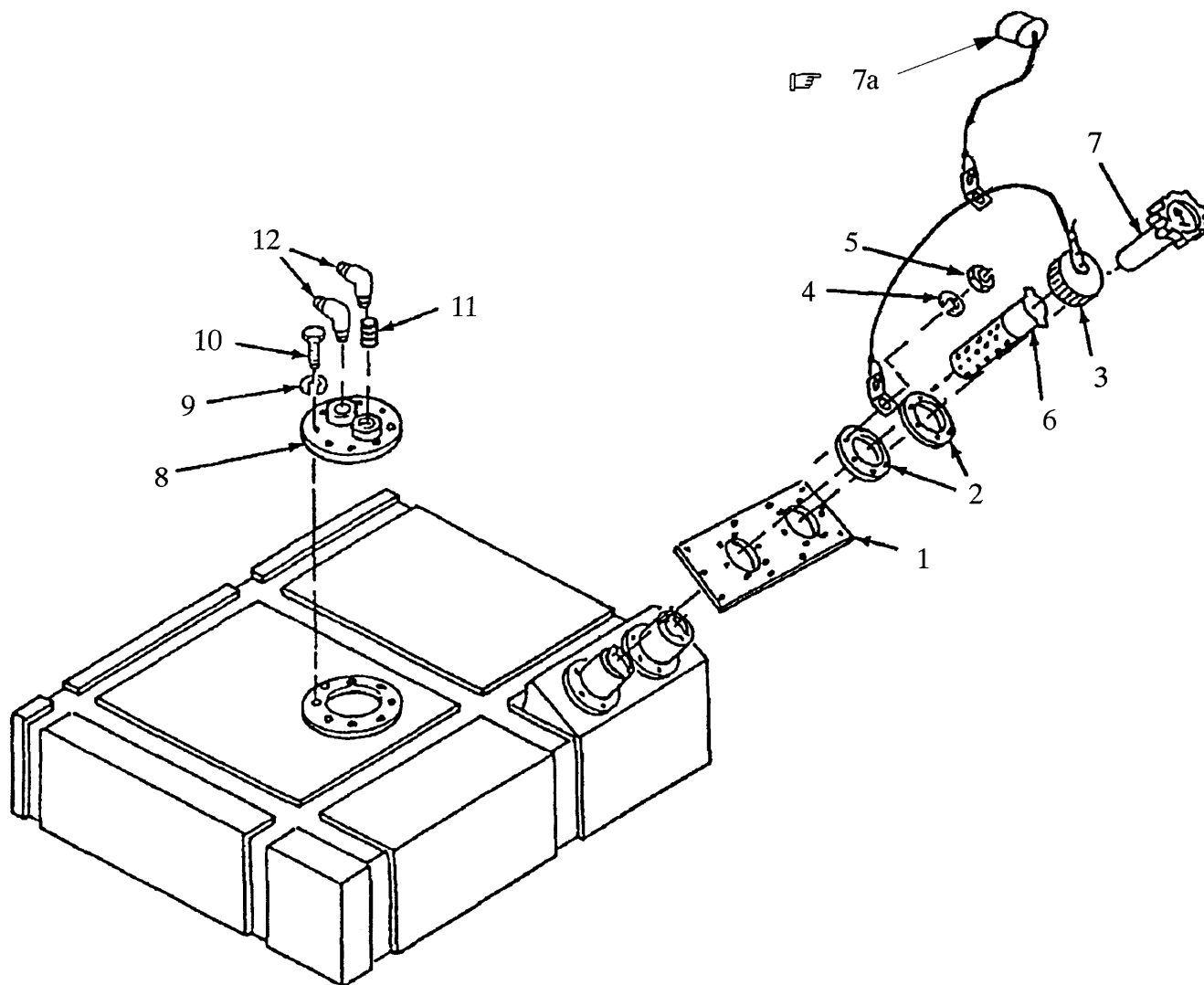
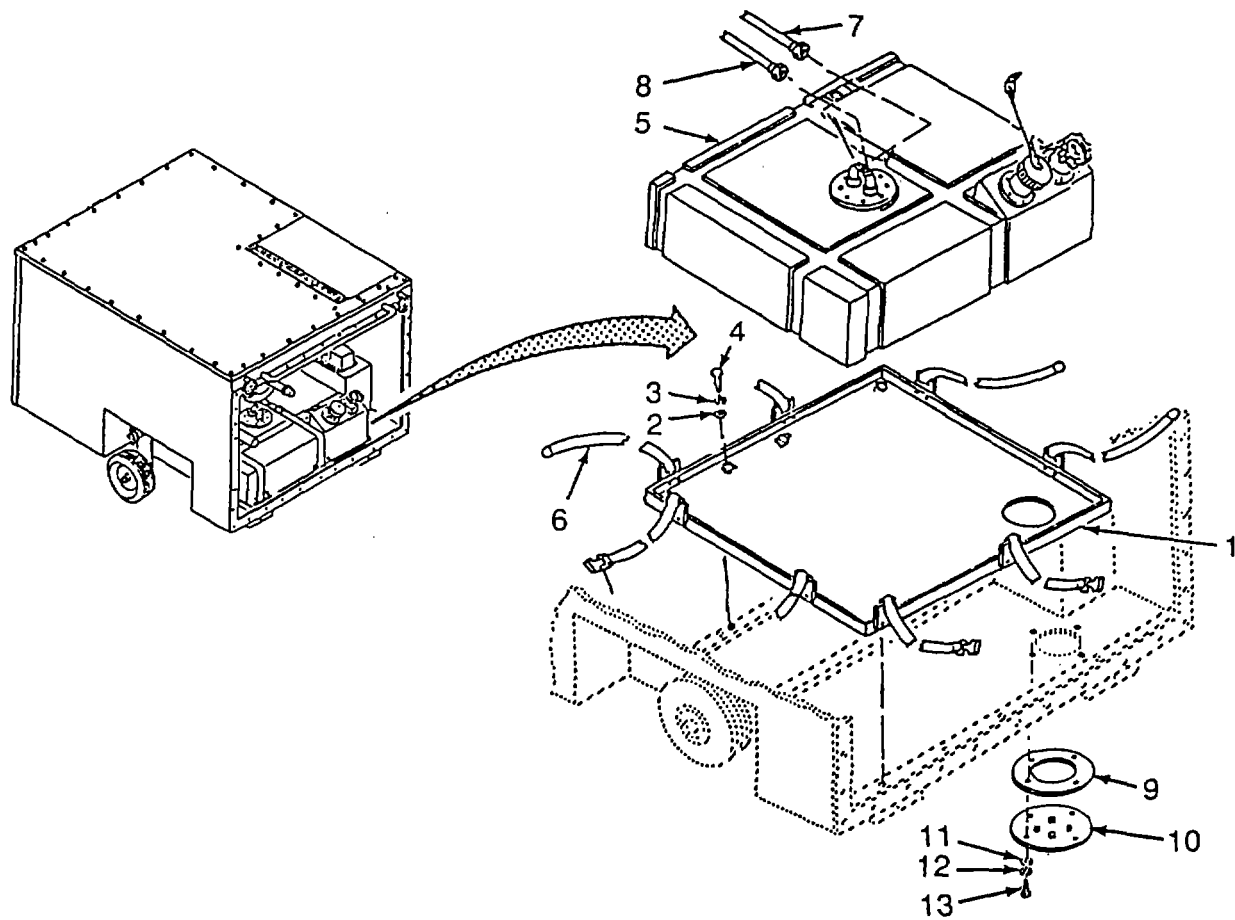


Figure 4-72. Fuel Tank Assembly



**4-35. FUEL TANK ASSEMBLY - continued.**

- e. Installation (Refer to Figure 4-73)
- (1) Install tray (1) eight flat washers (2), eight lockwashers (3) and eight screws (4).
  - (2) Install fuel tank (5) on tray (1) and fasten four straps (6).
  - (3) Connect tubing (7) (Item 81, App F) and tubing (8) (Item 79, App F) to fuel tank (5).
  - (4) Install gasket (9) (Item 82, App F), fuel drain cover (10), four flat washers (11), four lockwashers (12) and four screws (13).

**Figure 4-73. Fuel Tank Installation**

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**4-36. POWER CABLE ASSEMBLY.**

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This task consists of:	a. Removal	b. Inspection
	c. Repair	d. Installation

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**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Soldering Iron (Item 2, App B)  
 Tool Kit, Electrical Connector Repair (Item 2, App B)

**Material/Parts:**

Lockwasher (Item 9, App H)  
 Wire ties (Item 11, App E)  
 Wire tags (Item 9, App E)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

General Safety Requirements:

**WARNING**

Contact with hot components can cause burns.  
 Allow unit to cool down before attempting service/inspection/maintenance activity.

---

**WARNING**

Contact with hot components can cause burns.  
 Allow unit to cool down before attempting service/inspection/maintenance activity.

**NOTE**

Disassemble only to the level required to make repairs.

- a. Removal (Refer to Figure 4-74)
  - (1) Open doors (1) and (2) on right side of unit (3).
  - (2) Tag and disconnect wires (4), (5) and (6) from TB1 (7) as follows:
    - (a) Remove black wire (4) P1-A from position TB1-1. Reconnect remaining wires.
    - (b) Remove white wire (5) P1-B from position TB 1-2. Reconnect remaining wires.
    - (c) Remove nut (8), lockwasher (9), flat washer (10), and green wire (6) P1-C from ground post (11). Discard lockwasher. Reconnect remaining wires.
  - (3) Remove wire ties (12) as required.
  - (4) Loosen nut (13) on clamp (14) and feed cable (15) through clamp.
  - (5) Loosen nut (16) and gently pull power cable (15) through fitting (17) from outside the unit.

## 4-36. POWER CABLE ASSEMBLY - continued.

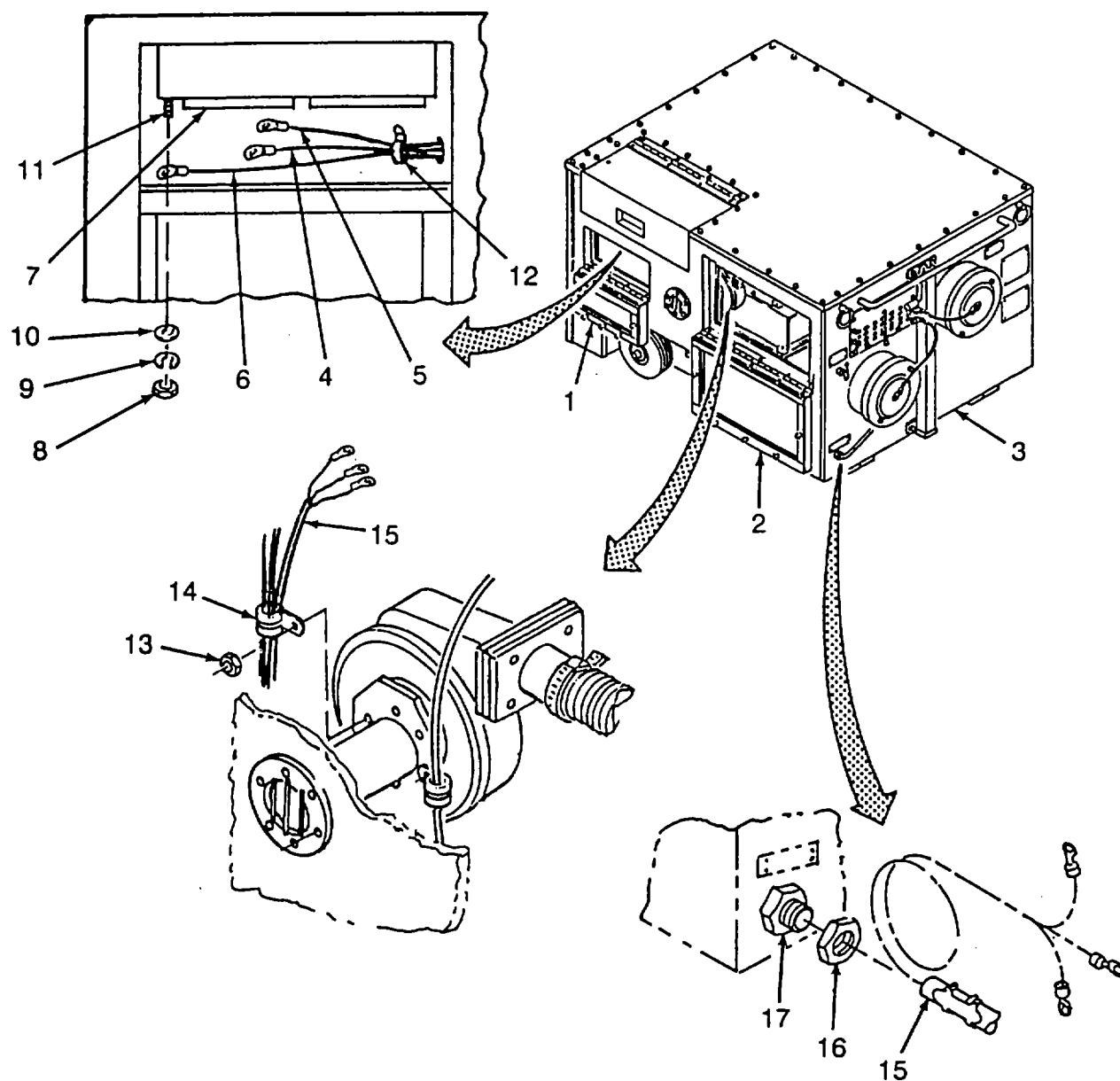


Figure 4-74. Power Cable Removal

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**4-36. POWER CABLE ASSEMBLY - continued.**

---

**b. Inspection**

- (1) Inspect connection for secure mounting, burnt, broken, or bent terminals, and corrosion.
- (2) Inspect cable for cracked, burned, or deteriorated insulation and exposed conductor.
- (3) Inspect lug terminals for secure mounting and signs of burning, and corrosion.
- (4) Inspect fitting on unit for damage. If damaged, notify Direct Support.

**c. Repair (Refer to Figure 4-75)**

- (1) Repair of cable assembly consists of replacing damaged parts with new parts. If cable (1) is damaged the complete assembly must be replaced.
- (2) Cut strap (2) from connector plug (3) and remove cover assembly (4).
- (3) Remove two screws (5), two nuts (6) and two saddles (7).
- (4) Unscrew clamp (8) and slide clamp, grommet follower (9), grommet (10), and rubber bushing (11) down on cable (1).
- (5) Unscrew sleeve (12) from connector plug (3) and down on cable (1).
- (6) Tag three wires (13, (14) and (15).
- (7) Cut connector plug (3) from cable (1).
- (8) Slide sleeve (12), bushing (11), grommet (10), grommet follower (9), and clamp (8) from cable (1).

## 4-36. POWER CABLE ASSEMBLY - continued.

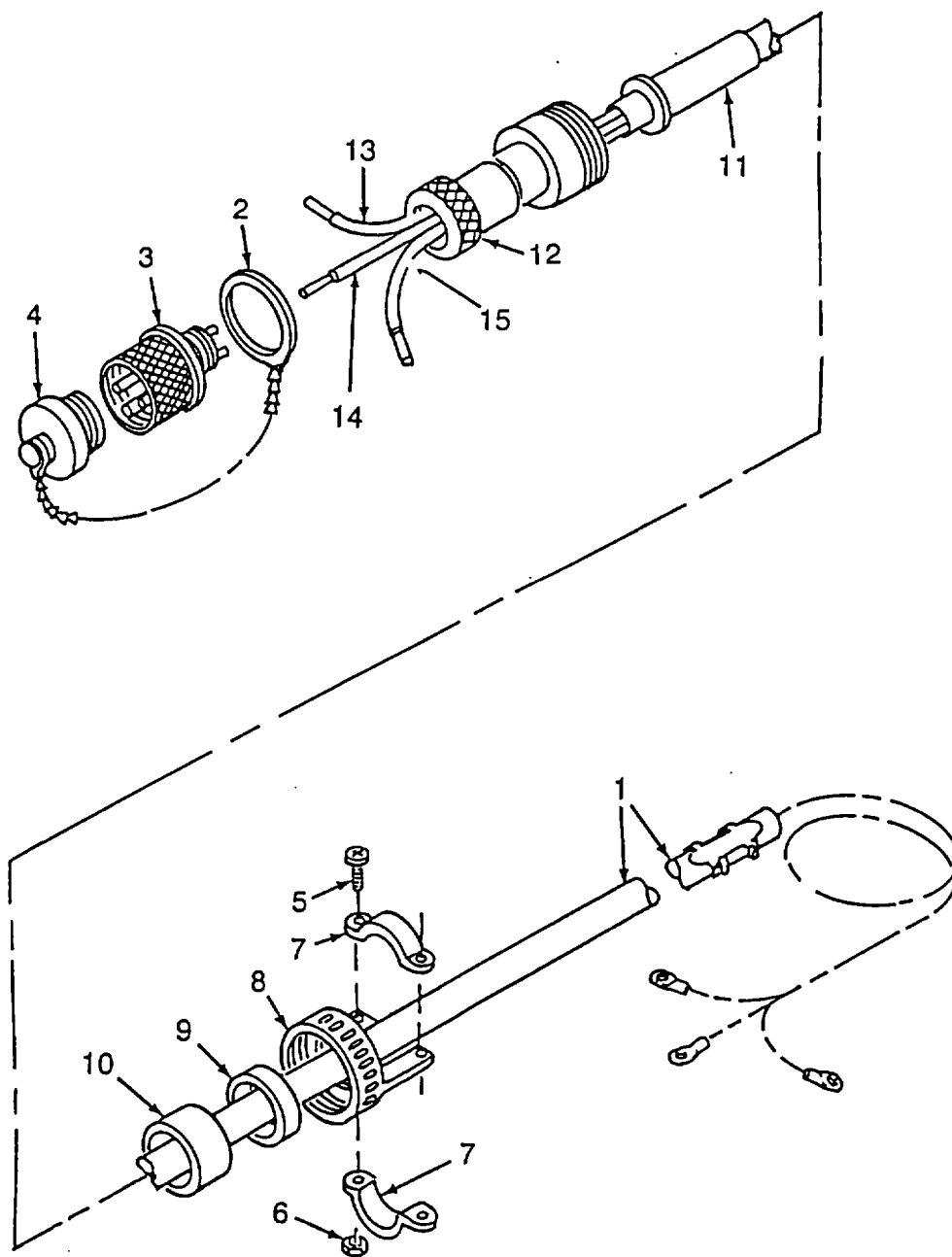
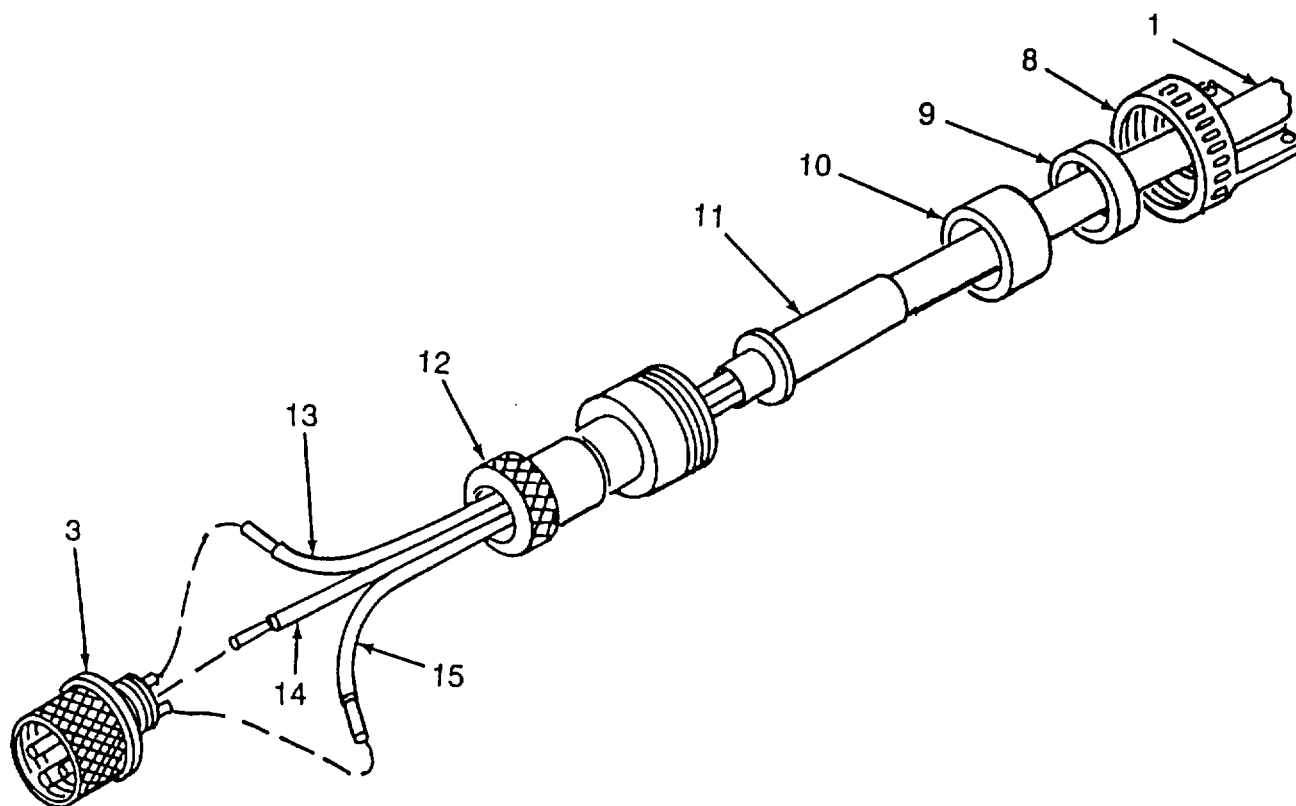


Figure 4-75. Power Cable Repair (Sheet 1 of 3)

**4-36. POWER CABLE ASSEMBLY - continued.**

- d. Repair - continued (Refer to Figure 4-75)
- (9) Slide cable clamp (8), grommet follower (9), grommet (10), rubber bushing (11), and sleeve assembly (12) on cable (1).
  - (10) Strip .75 inch of insulation from cable (1) to expose insulated conductor wires (13), (14) and (15).
  - (11) Strip .25 inch of insulation from insulated conductor wires (13), (14) and (15) Solder wires into connector plug (3) pins as follows:
    - (a) Black wire (13), P1-A/TB1-1 to pin A.
    - (b) White wire (14), P1-B/TB1-2 to pin B.
    - (c) Green wire (15), P1-C/G1 to pin C.

**Figure 4-75. Power Cable Repair (Sheet 2 of 3)**

**4-36. POWER CABLE ASSEMBLY - continued.**

- d. Repair - continued (Refer to Figure 4-75)

**NOTE**

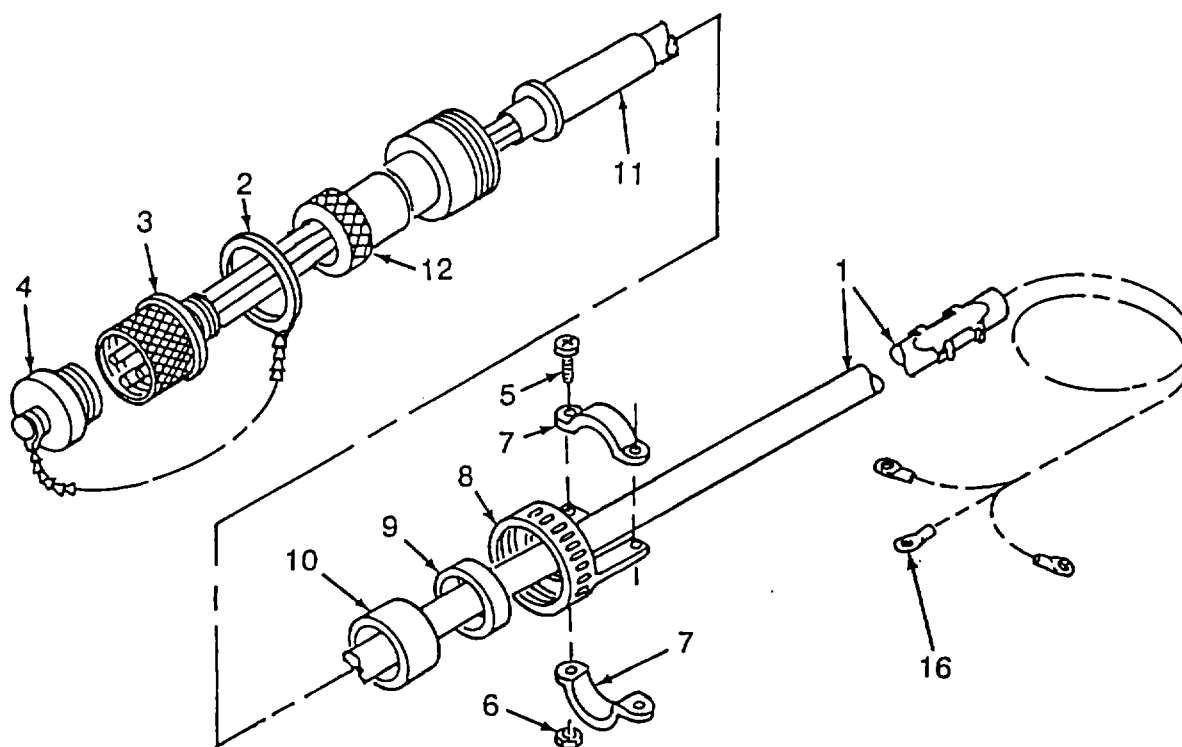
**Hold connector plug while turning sleeve assembly to prevent twisting of conductor wires.**

- (12) Hold connector plug (3) tight and slide sleeve (12) up cable (1) and screw sleeve (12) onto connector plug (3).
- (13) Slide rubber bushing (11), grommet (10), grommet follower (9), and clamp (8) up cable (1) and screw clamp (8) onto sleeve (12).

**NOTE**

**The rubber bushing should bulge slightly when saddles are tight.**

- (14) Position two saddles (7) on clamp (8), secure with two screws (5) and two nuts (6).
- (15) Insert strap (2) through end of chain on cover (4) and secure onto connector plug (3).
- (16) Screw cover (4) into connector plug (3).
- (17) Repair of other end of cable limited to replacement of terminal lugs (16).



**Figure 4-75. Power Cable Repair (Sheet 3 of 3)**

---

**4-36. POWER CABLE ASSEMBLY - continued.**

---

- e. Installation (Refer to Figure 4-76)
  - (1) Insert power cable (1) through fitting (2).
  - (2) Route power cable (1) along the bottom of unit, under combustor fan assembly (3).
  - (4) Bring power cable (1) up along side the combustor fan assembly (3) and feed cable (1) through clamp (4). Allow enough slack to attach the three wires to TB 1 (5) and G1 (6).
  - (5) Connect wires (7), (8) and (9) as follows:
    - (a) Connect green wire (7) P1-C, to the G1 (6), secure with flat washer (10), lockwasher (11) and nut (12).
    - (b) Connect white wire (8), P1-B to TB1 (5) position TB1-2.
    - (c) Connect black wire (9), P1-A to TB1 (5) position TB1 1.
  - (6) Tie power cable (1) to the wire bundle (13) using wire ties (14) as required.
  - (7) Tighten nut (15) to secure clamp (4).
  - (8) Tighten nut (16).
  - (9) Close doors (17) and (18).



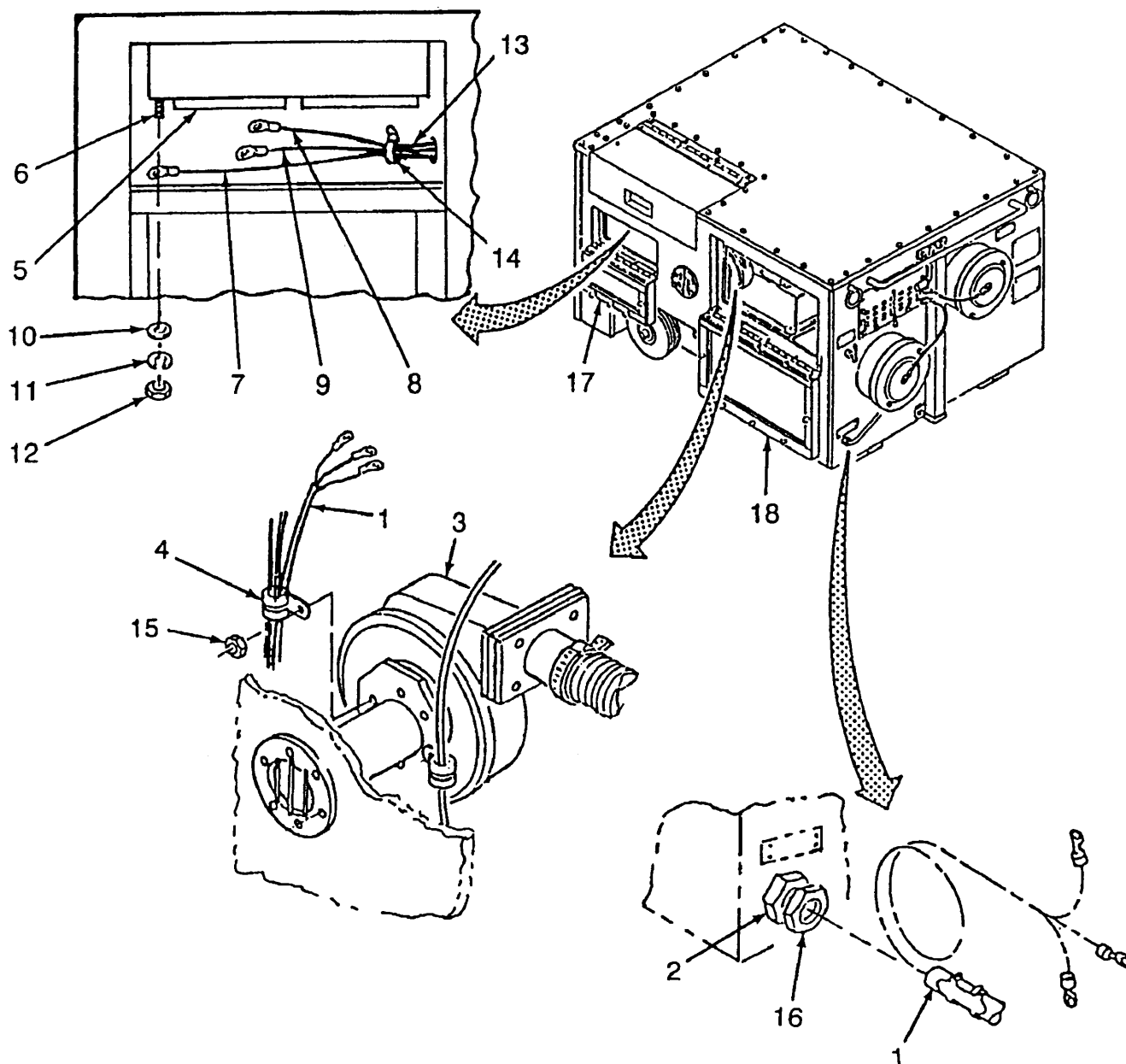


Figure 4-76. Power Cable Installation

---

**4-37. JACK ASSEMBLY.**

---

- This task consists of:                      a. Removal                      b. Installation
- 

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**Material/Parts:**

Lockwasher (Item 1, Appendix H)

**Equipment Conditions:**

Wheels in stowed position (para 4-5)

---

a. Removal (Refer to Figure 4-77)

- (1) Remove four screws (1), four lockwashers (2), four flat washers (3) from front of jack (4). Discard lockwashers.
- (2) Remove screw (1), lockwasher (2), flat washer (3) from bottom of jack (4) and remove jack from frame (5). Discard lockwashers.

b. Installation (Refer to Figure 4-57)

- (1) Position jack assembly (4) on frame (5), install four flat washers (3), four lockwashers (2), and four screws (1), on front of jack, hand tight only.
- (2) On bottom of jack (4) install flat washer (3), lockwasher (2), and screw (1). Tighten all screws (1) in steps (1) Changed (2).

## 4-37. JACK ASSEMBLY - continued.

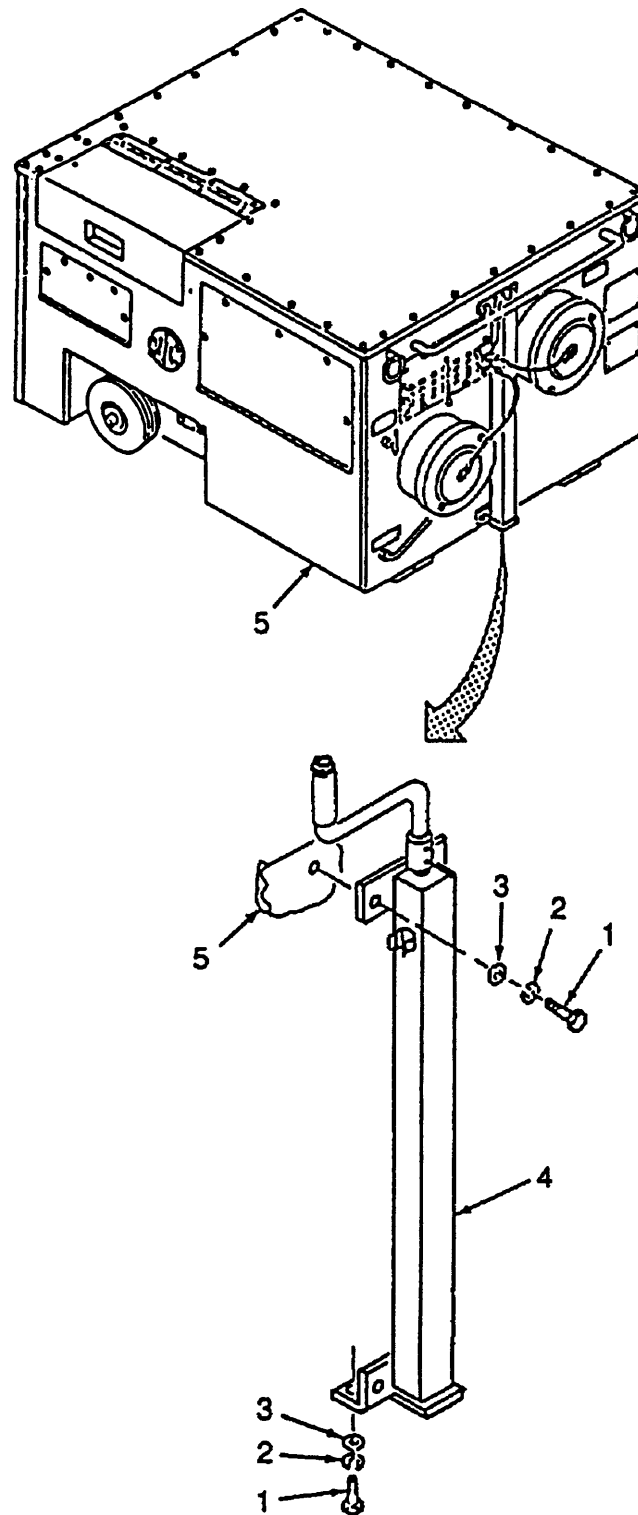


Figure 4-77. Jack Assembly

**4-38. WHEEL ASSEMBLY.**

This task consists of:                      a. Removal                      b. Repair                      c. Installation

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)

**Material/Parts:**

Cotter Pin (Item 32, App H)

Cotter Pin (Item 41, App H)

Grease (Item 12, App E)

**Equipment Condition:**

Wheel in stowed position (Para 4-5)

- a. Removal (Refer to Figure 4-78)
  - (1) Remove cotter pin (1) and flat washer (2). Discard cotter pin.
  - (2) Remove pin (3) and wheel assembly (4) from pivot (5).
  - (3) Remove cotter pin (6), flat washer (7), wheel (8) and flat washer (9) from arm (10). Discard cotter pin.
  - (4) Remove pin (3) from cable (11) only if replacement is necessary.
- b. Repair. Repair limited to replacement of damaged parts.
- c. Installation (Refer to Figure 4-78)
  - (1) Install pin (3) and cotter pin (1)(Item 41, App H) on cable (11)(Item 65, App F).
  - (2) Install flat washer (9), wheel (8), flat washer (7) and cotter pin (6)(Item 32, App H) on arm (10).
  - (3) Install wheel assembly (4) on pivot (5) and install pin (3).
  - (4) Install flat washer (2) and cotter pin (1). Service grease fitting (12) with grease (Item 12, App E).
  - (5) Check/service tire pressure, (15 psi).

## 4-38. WHEEL ASSEMBLY - continued.

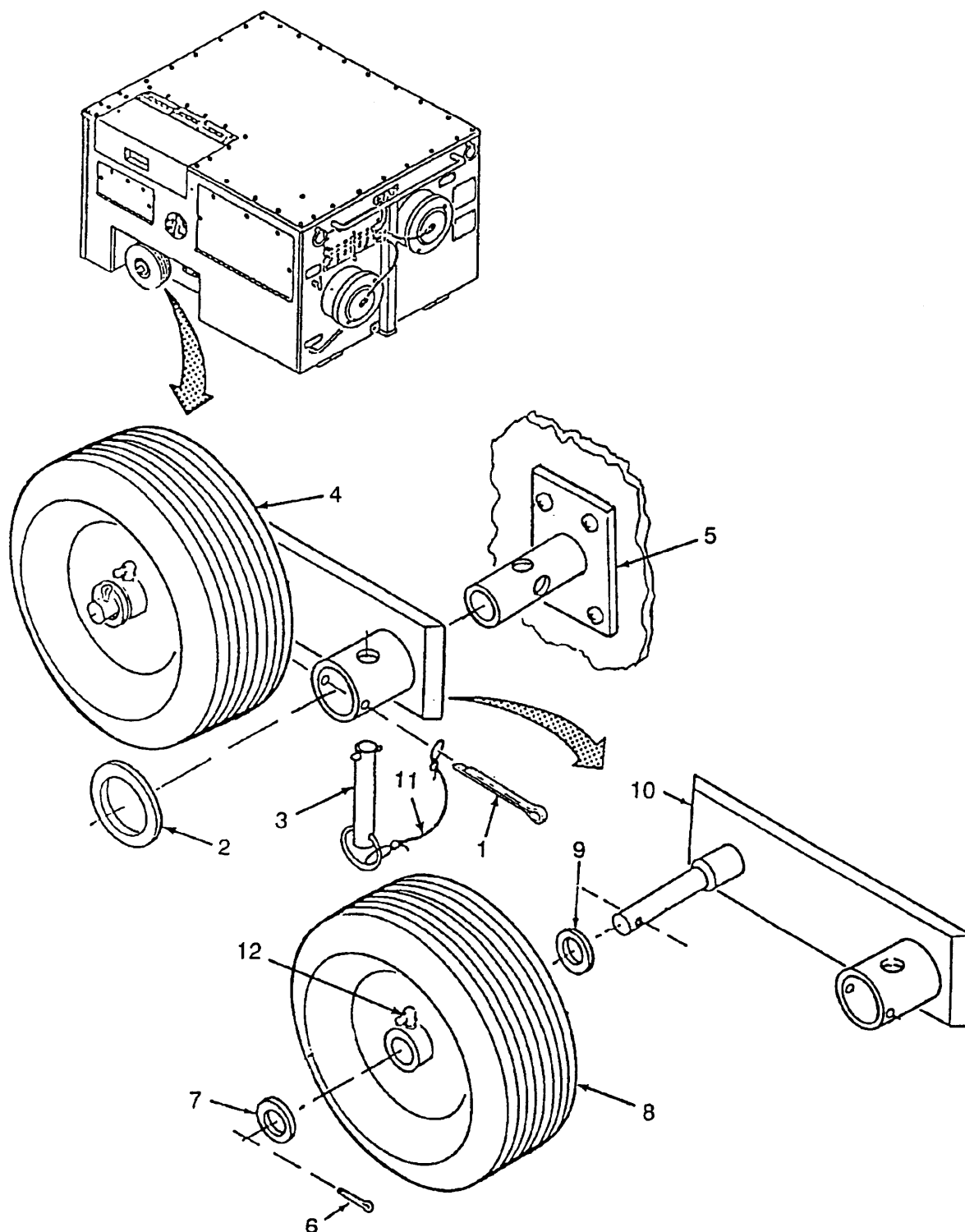


Figure 4-78. Wheel Assembly

**4-39. DAMPER ASSEMBLY.**

This task consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Blind Riveter (Item 5, App B)  
 Drill (Item 2, App B)  
 Drill Bits (Item 2, App B)  
 Gasket Punch (Item 2, App B)  
 Shears (Item 2, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

**Material/Parts:**

Gasket (Item 66, App F)  
 Gasket (Item 65, App F)  
 Rivet (Item 7, App H)  
 ■ Rivet (Item 21, App H)  
 Lockwasher (Item 8, App H)  
 Gasket (Item 68, App F)  
 Gasket (Item 67, App F)  
 Chain (Item 69, App F)  
 ■ Backup Plate (Item 33, App H)

**NOTE**

**Disassemble only to the level required to make repairs.**

## a. Removal (Refer to Figure 4-79)

- (1) Remove clip (1) and pendant (2) from chain (3).

**NOTE**

**Grill is attached using eight or sixteen sets of hardware. Remove the quantity of hardware configuration requires. Grills are interchangeable with all units.**

- (2) Remove sixteen screws (4), lockwashers (5), flat washers (6) and two duct cover stays (7) from grill (8). Discard lockwashers.
- (3) Feed chain (3) through grill (8) while removing grill from frame (9).
- (4) Remove damper assembly (10) .

## b. Disassembly (Refer to Figure 4-79)

- (1) Remove six lock nuts (11) and six flat washers (12) from mounting plate (13). Remove mounting plate (13) and door (14).
- (2) Drill out rivet (15) and remove chain (3).
- (3) Remove clip (16) from chain (3).
- (4) Remove two gaskets (17) and two gaskets (18). Discard gaskets.
- (5) Remove two gaskets (19) and two gaskets (20). Discard gaskets.
- (6) Drill out six rivets (21), remove six backup plates (22) and three hinges (23). Discard backup plates.

## 4-39. DAMPER ASSEMBLY - continued.

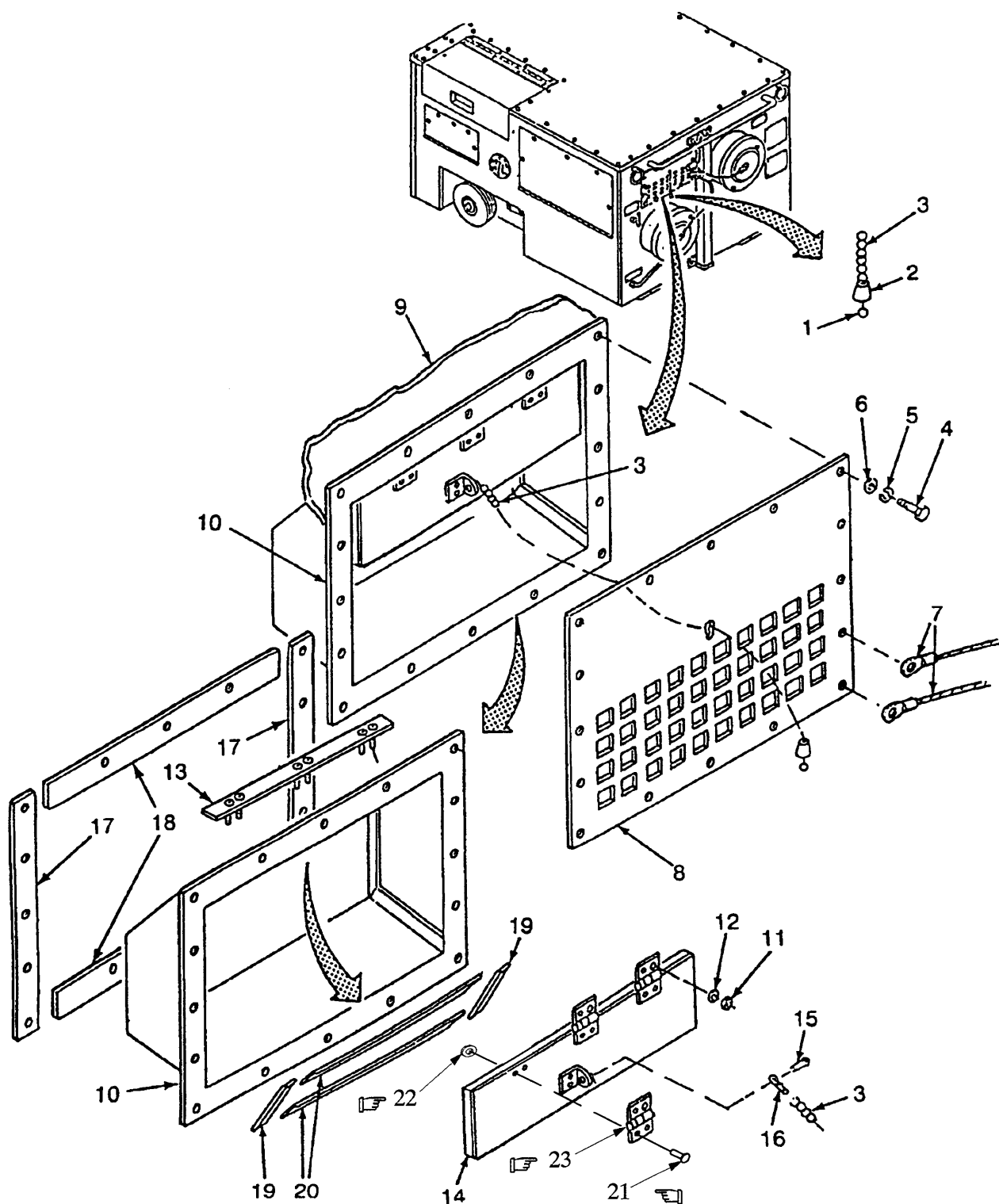


Figure 4-79. Damper Assembly Removal/Disassembly

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**4-39. DAMPER ASSEMBLY - continued.**

---

- c. Repair. Repair limited to replacement of damaged parts.
- d. Assembly (Refer to Figure 4-80)
  - (1) Install two gaskets (1)(Item 65, App F) and two gaskets (2)(Item 66, App F).
  - (2) Install two gaskets (3)(Item 68, App F) and two gaskets (4)(Item 67, App F).
  - (3) Attach clip (5) on chain (6)(Item 69, App F).
  - (4) Install clip (5) and rivet (7).
  - (5) Position hinges (7.1) and secure with two backup plates (7.2)(Item 33, App H) and two rivets (7.3)(Item 1, App H).
  - (6) Position mounting plate (8) on damper (9). Position door (10) on damper (9) and mounting plates (8) and secure with six flat washers (11) and six locknuts (12).
- e. Installation (Refer to Figure 4-80)
  - (1) Insert damper assembly (9) into frame (13).
  - (2) Feed chain (6) through slot in grill (14) and install pendant (15) and clip (16).

**NOTE**

**Do not install hardware in the right hand bottom two positions on grill.**

**Grill is attached using eight or sixteen sets of hardware. Install the quantity of hardware configuration requires. Grills are interchangeable with all units.**

- (3) Install fourteen flat washers (17), fourteen lockwashers (18) and fourteen screws (19).
- (4) Position two dust cover stays (20) on grill (14) one at a time and secure each with a flat washer (17), lockwasher (18) and screw (19).



## 4-39. DAMPER ASSEMBLY - continued.

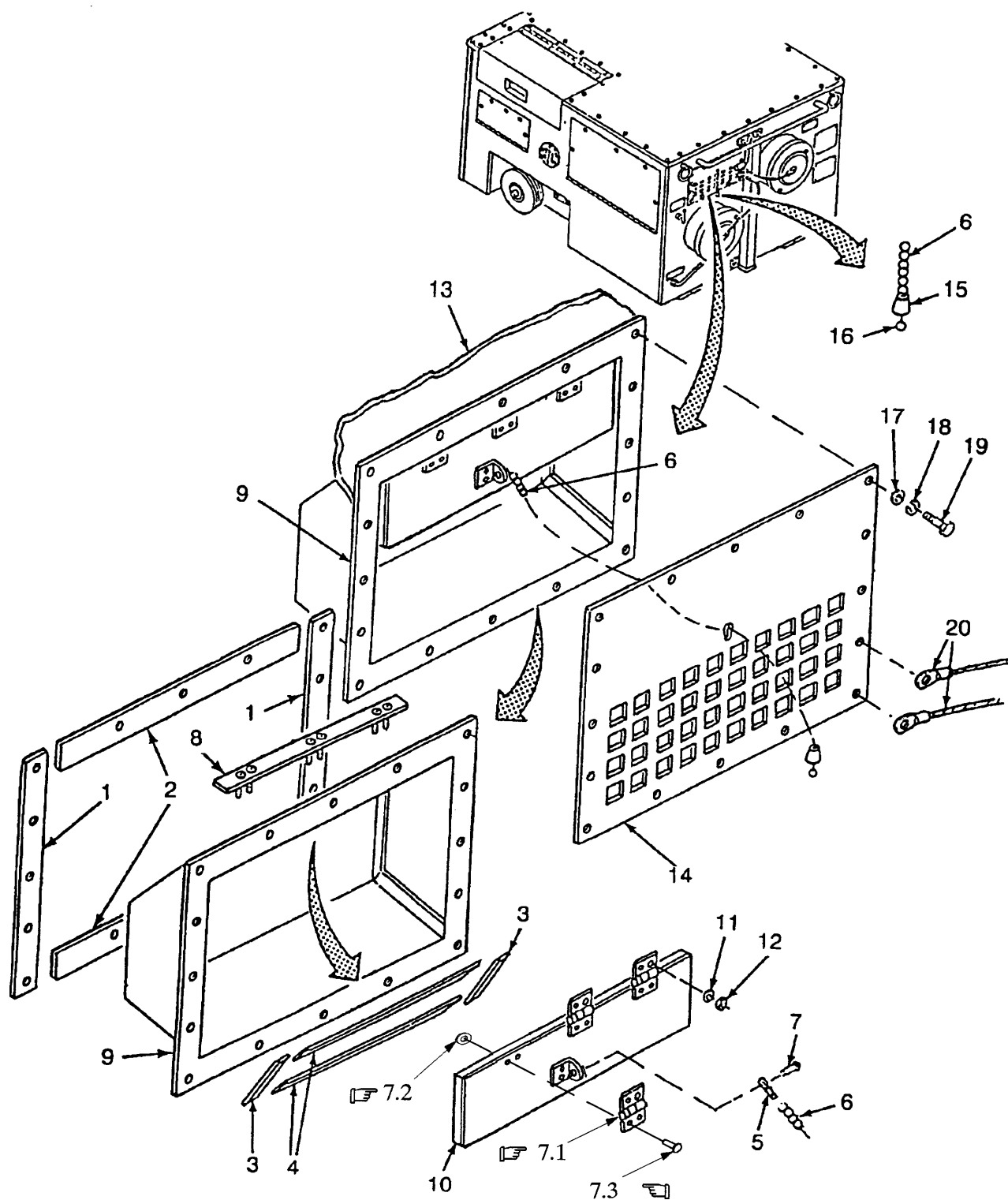


Figure 4-80. Damper Assembly Assembly/Installation

**4-40. FRAME ASSEMBLY.**

This task consists of:                      a. Disassembly                      b. Repair                      c. Assembly

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 1, App B)  
 Blind Riveter (Item 5, App B)  
 Drill (Item 2, App B)  
 Drill Bits (Item 2, App B)

**Material/Parts:**

Rivets (Item 18, App H)  
 Rivets (Item 5, App H)  
 Wire Ties (Item 9, App E)  
 ■ Cotter Pin (Item 41, App H)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

a. Disassembly (Refer to Figure 4-81)

- (1) Drill out four rivets (1) and remove handbook compartment (2).

**NOTE**

**Information plates are attached using two or four rivets each. Remove the quantity of rivets configuration requires.**

- (2) Drill out four rivets (3) for each of the following plates:

- (a) Plate (4), J2, REMOTE THERMOSTAT.
- (b) Plate (5), ELECTRICAL POWER LEAD-IN CABLE.
- (c) Plate (6), RETURN CONNECTION.
- (d) Plate (7), LUBRICATION CHART.
- (e) Plate (8), ARMY SPACE HEATER.
- (f) Plate (9), SUPPLY CONNECTION.

- (3) The four tiedown rings (10) are attached to the frame in one of two methods. They are screwed directly into the frame or attached using a flat washer, slotted nut and cotter pin. Remove four tiedown rings (10) as follows.

- (a) Tiedown rings that are screwed into the frame (11), remove by unscrewing the tiedown ring.
- (b) Tiedown rings (10) that are attached with a slotted nut remove as follows:

- 1 Remove cotter pin (12) and discard.

## 4-40. FRAME ASSEMBLY - continued.

- 2 Remove slotted nut (13) and flat washer (14).
- 3 Remove Tiedown ring (10) from frame(11).

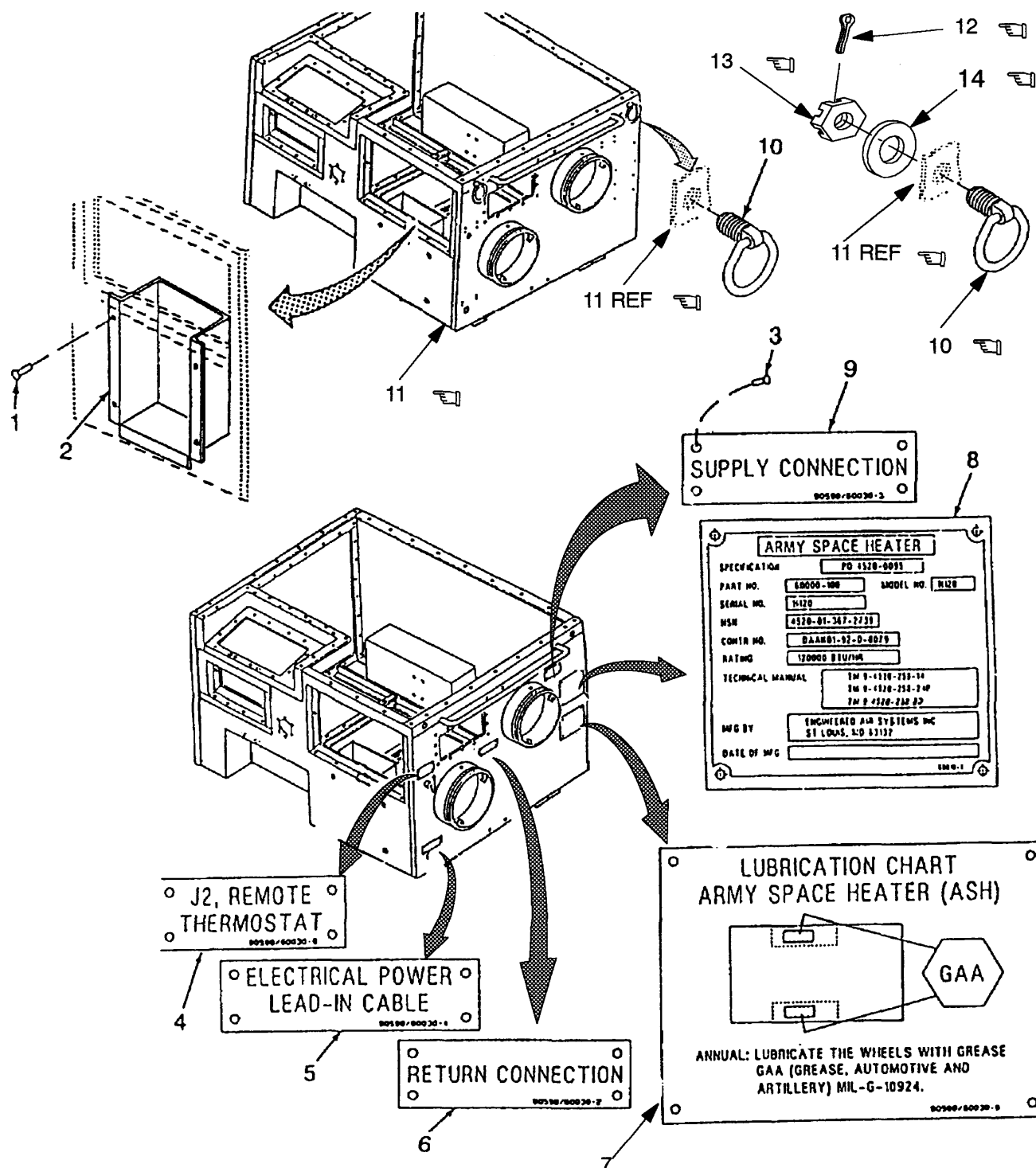


Figure 4-81. Frame Assembly Disassembly (Sheet 1 of 2)

**4-40. FRAME ASSEMBLY - continued.**

## a. Disassembly - continued (Refer to Figure 4-81)

- (4) Tag and disconnect wires (11) J3-C/TB3-4, (12) J3-B/TB3-3 and (13) J3-A/TB3-2 from TB3 (14), and braided wire (15) from terminal (16).
- (5) Remove wire ties (17) as required.
- (6) Slide wires (11), (12), (13) and (16) through clamp (18).
- (7) Drill out rivet (19) and remove cover (20).
- (8) Remove nut (21) and connector (22).

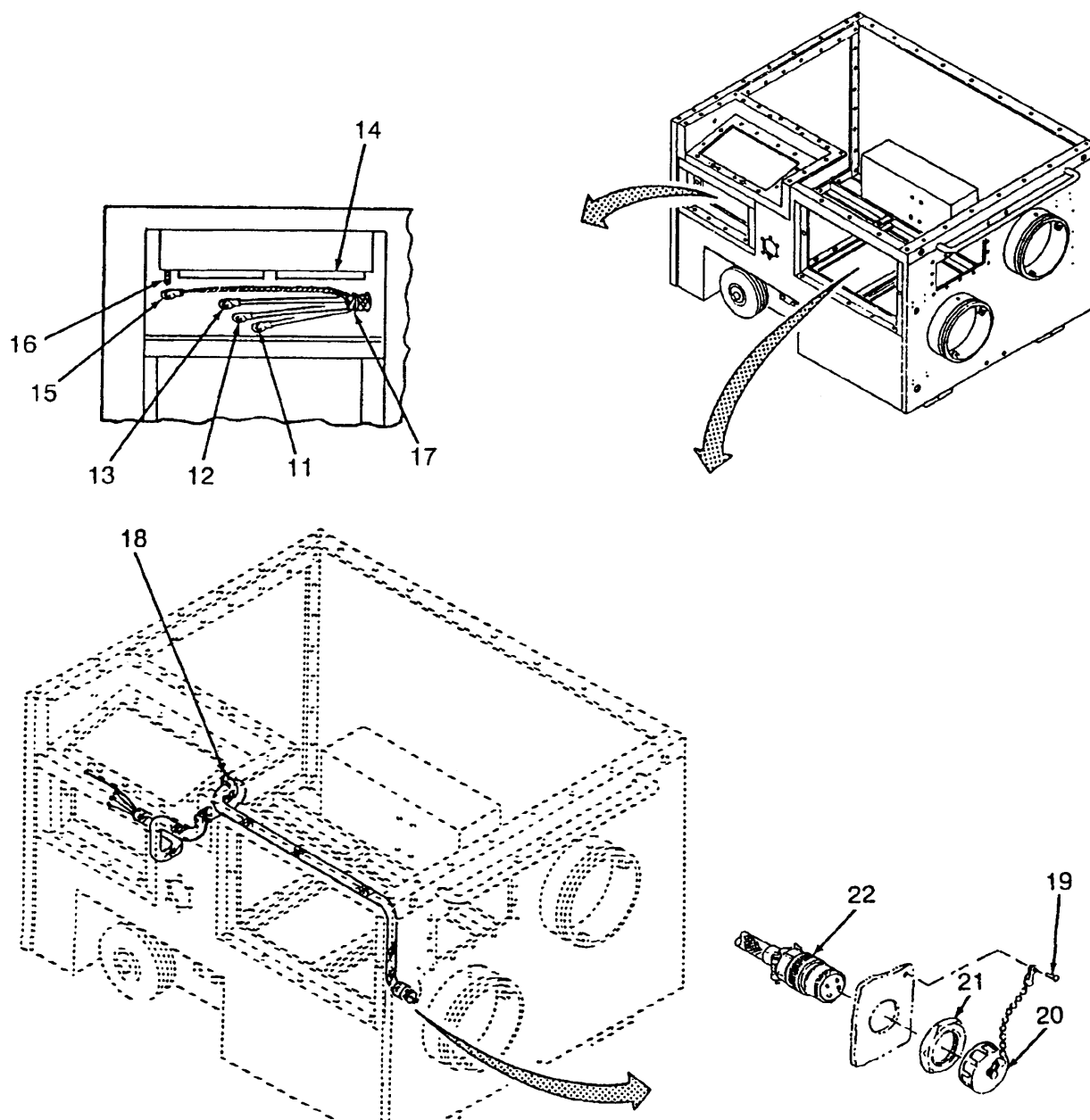


Figure 4-81. Frame Assembly Disassembly (Sheet 2 of 2)

**4-40. FRAME ASSEMBLY - continued.**

## b. Repair.

Repair is limited to replacement of defective parts.

## c. Assembly (Refer to Figure 4-82)

- (1) Install connector (1) and nut (2).
- (2) Install cover (3) and rivet (4).
- (3) Slide wires (5), (6), (7) and (8) through clamp (9).
- (4) Connect wires (5), (6) and (7) to TB3 (10) as follows:
  - (a) Wire (5) J3-A/TB3-2.
  - (b) Wire (6) J3-B/TB3-3.
  - (c) Wire (7) J3-C/TB3-4.
- (5) Install braided wire (8) to terminal (11).
- (6) Install wire ties (12) as required.

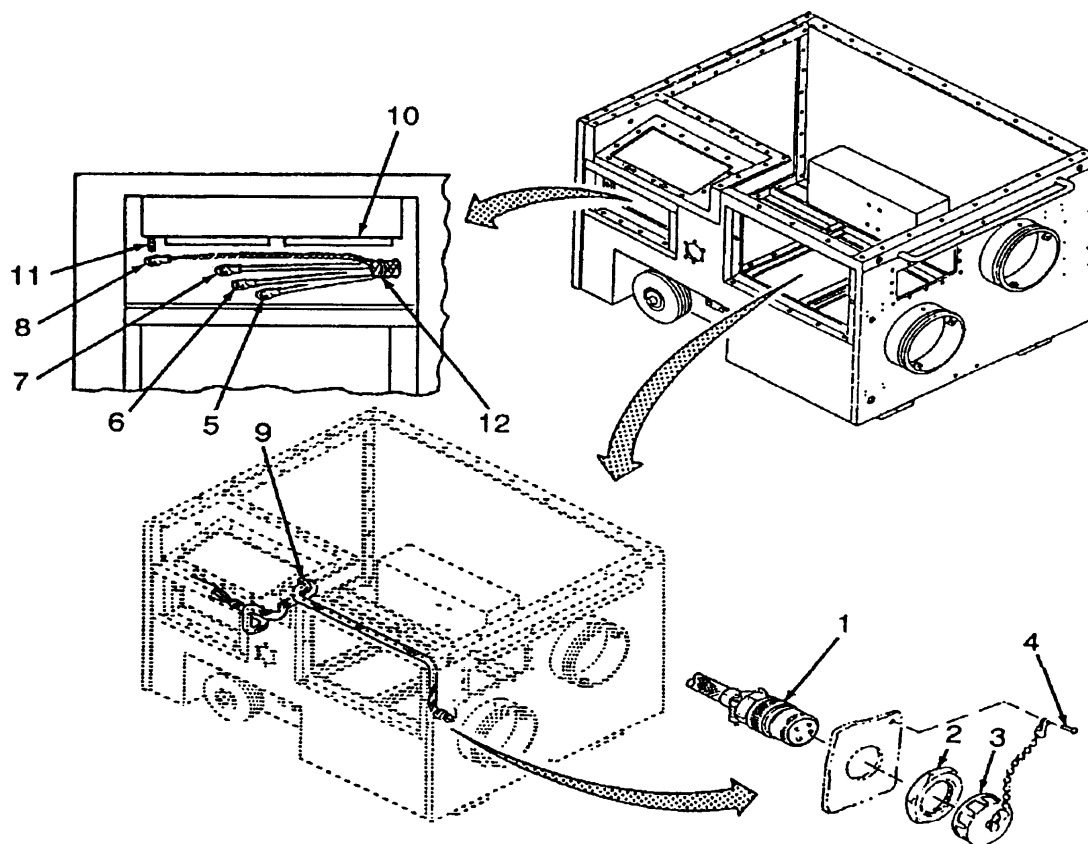


Figure 4-82. Frame Assembly Assembly (Sheet 1 of 2)

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**4-40. FRAME ASSEMBLY - continued.**

---

## c. Assembly - continued (Refer to Figure 4-82)

## (7) Install four tiedown rings (14) as follows:

- (a) Install four tiedown rings (14) that screw directly into frame (24) hand tight and then back them off until ring hangs down.
- (b) Install the four tiedown rings (14) that attach to frame (24) with a slotted nut as follows:
  - 1 Install tiedown ring (14) through frame (24).
  - 2 Secure tiedown ring (14) with flat washer (25) and slotted nut (26) hand tight and then back them off until ring hangs down.
  - 3 Install cotter pin (27)(Item 41, App H) through slot in nut (26) and Hole in tiedown ring (14). Slotted nut may be loosened only enough to align the nearest slot with the hole in the tiedown ring.

**NOTE**

**Information plates are attached using two or four rivets each. Install the quantity of rivets configuration requires.**

## (8) Install the following information plates using four rivets (15) for each:

- (a) Plate (16), J2, REMOTE THERMOSTAT.
- (b) Plate (17), ELECTRICAL POWER LEAD-IN CABLE.
- (c) Plate (18), RETURN CONNECTION.
- (d) Plate (19), LUBRICATION CHART.
- (e) Plate (20), ARMY SPACE HEATER.
- (f) Plate (21), SUPPLY CONNECTION.

## (9) Install handbook compartment (22) and four rivets (23).

## 4-40. FRAME ASSEMBLY - continued.

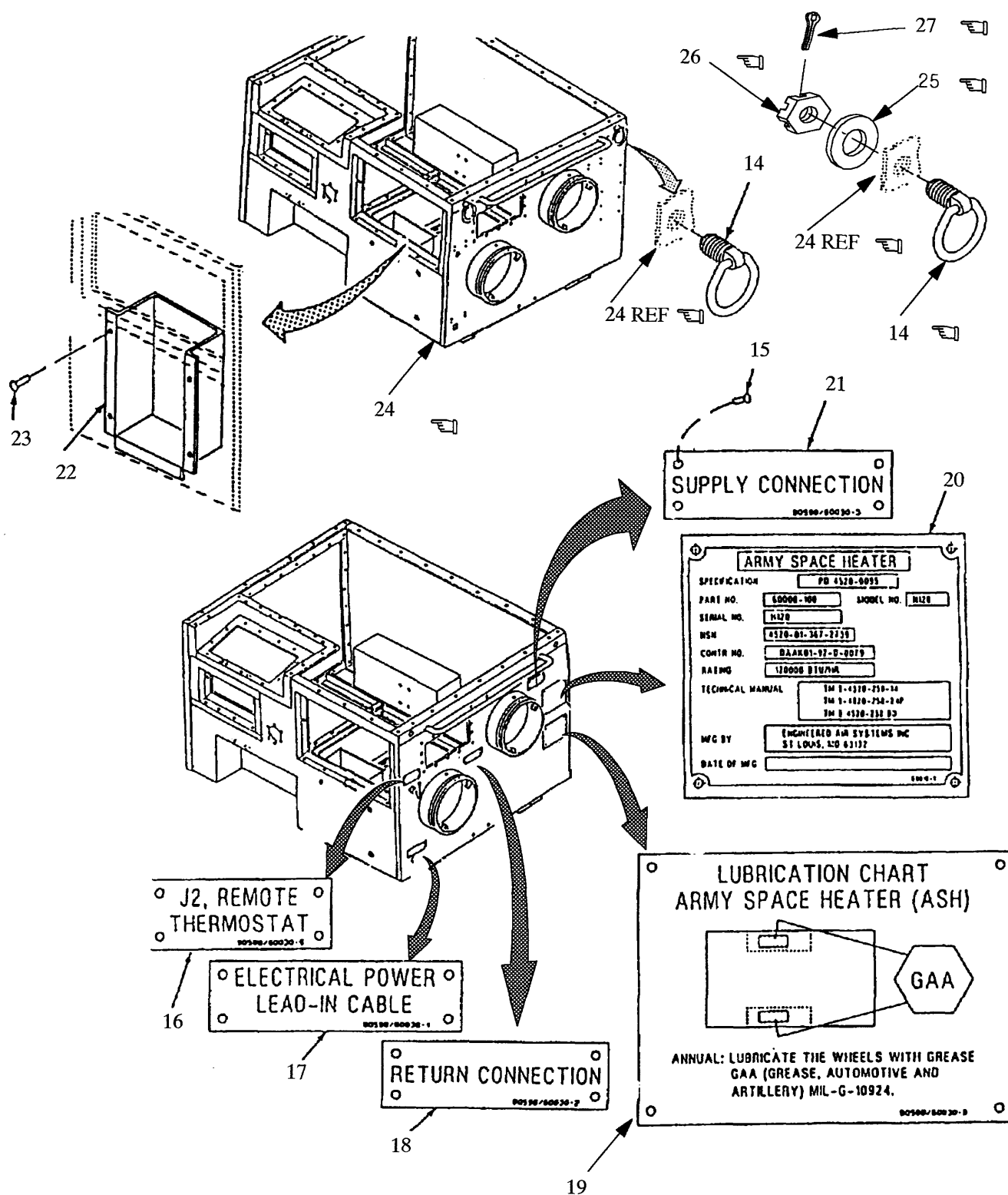


Figure 4-82. Frame Assembly Assembly (Sheet 2 of 2)

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**Section VII. PREPARATION FOR STORAGE OR SHIPMENT****4-41. SECURITY PROCEDURES.**

Refer to AR 190-11 or AR 190-13.

**4-42. PREPARATION FOR MOVEMENT.**

- (a) Disconnect and stow ducts. Install dust covers.
- (b) Disconnect and stow electric power cable adapter cord. Wrap electric power cable around outlet duct openings.
- (c) Disconnect and stow remote thermostat control.
- (d) Remove and stow exhaust stack. Install exhaust port cover.
- (e) Dispose of contaminated fuel, refer to FM 10-20, Organizational Maintenance of Military Petroleum Pipelines, Tanks and Related Equipment.
- (f) If used, disconnect and drain residual fuel from hose. Install plug and cap on hose. Stow external fuel hose. Install dust cap on external fuel port on heater.

**4-43. ADMINISTRATIVE STORAGE.**

Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

Before placing equipment in administrative storage, current preventative maintenance checks and services should be completed, shortcomings and deficiencies should be corrected and all Modification Work Orders (MWO's) should be applied.

Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.



CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

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Section I. TROUBLESHOOTING

Troubleshooting is not required on the ASH Unit at the Direct Support level of maintenance.

Section II. MAINTENANCE INSTRUCTIONS

5-1. INTRODUCTION.

This section contains procedures for Direct Support level maintenance on the ASH Unit.

Maintenance consists of repair by replacement of defective components, then testing to ensure correction of malfunction.

The ASH has two configurations. The differences between the two configurations are minor and noted throughout the section. Where the difference is quantity of mounting hardware, the difference is explained with a "Note": ie. "Note: Panel is attached using twenty-eight or thirty-eight sets of hardware. Panels are interchangeable with all units." If the difference is more complex, additional instructions and illustrations are provided.

---

**5-2. REAR PANEL.**

---

This task consists of:                      Repair

---

**INITIAL SETUP:****Tools:**

Welding Shop (Item 6, App B)  
Tool Box, General Mechanics (Item 3, App B)  
Drill (Item 4, App B)  
Drill Bit (Item 4, App B)  
Rivnut Tool (Item 7, App B)  
Rivnut Tool (Item 10, App B)

**Equipment Condition:**

Rear panel removed (4-20)

**References:**

TM 9-237 Welding Theory and Application  
TM 43-0139 Painting Instructions for Army Material

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Repair (Refer to Figure 5-1)

- (1) Inspect rear panel (1) for cracks, weld in accordance with TM 9-237.
- (2) Replace damaged/missing rivnuts (2) and (3) as required.
  - (a) Drill out four rivnuts (2).
  - (b) Drill out ten rivnuts (3).
- (3) Paint rear panel in accordance with TM 40-0139.

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5-2. REAR PANEL - continued.

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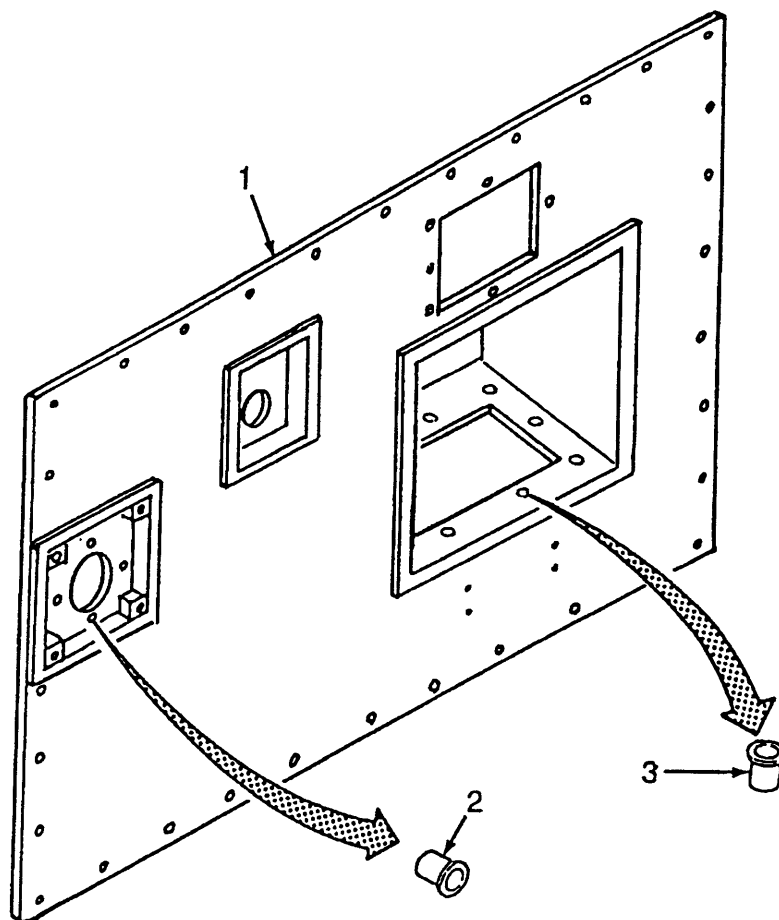


Figure 5-1. Rear Panel Repair

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**5-3. CONTROL BOX ASSEMBLY.**

---

This tasks consists of:

a. Removal	b. Disassembly	c. Repair
d. Assembly	e. Installation	

---

**INITIAL SETUP:****Tools:**

Tool Box, General Mechanics (Item 3, App B)  
 Shears (Item 4, App B)  
 Gasket Punch (Item 4, App B)  
 Drill (Item 4, App B)  
 Drill Bits (Item 4, App B)

**Material/Parts:**

Lockwasher (Item 9, App H)  
 Lockwasher (Item 1, App H)  
 Gasket (Item 14, App F)  
 Gasket (Item 15, App F)  
 Gasket (Item 16, App F)

**Equipment Condition:**

Unit disconnected from power source (para. 2-8)  
 Control Box Components removed. (para 4- 24)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

---

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

a. Removal (Refer to Figure 5-2)

- (1) Open control panel cover (1) and right side rear door (2).
- (2) Loosen two clamps (3) and remove hose (4) and clamps (3).
- (3) Remove screw (5), lockwasher (6), flat washer (7) and bar (8). Discard lockwasher.
- (4) Remove twelve screws (9), twelve lockwashers (10) and twelve flat washers (11). Discard lockwashers.
- (5) Lift control box (12), two gaskets (13) and two gaskets (14). Discard gaskets.

## 5-3. CONTROL BOX ASSEMBLY - continued.

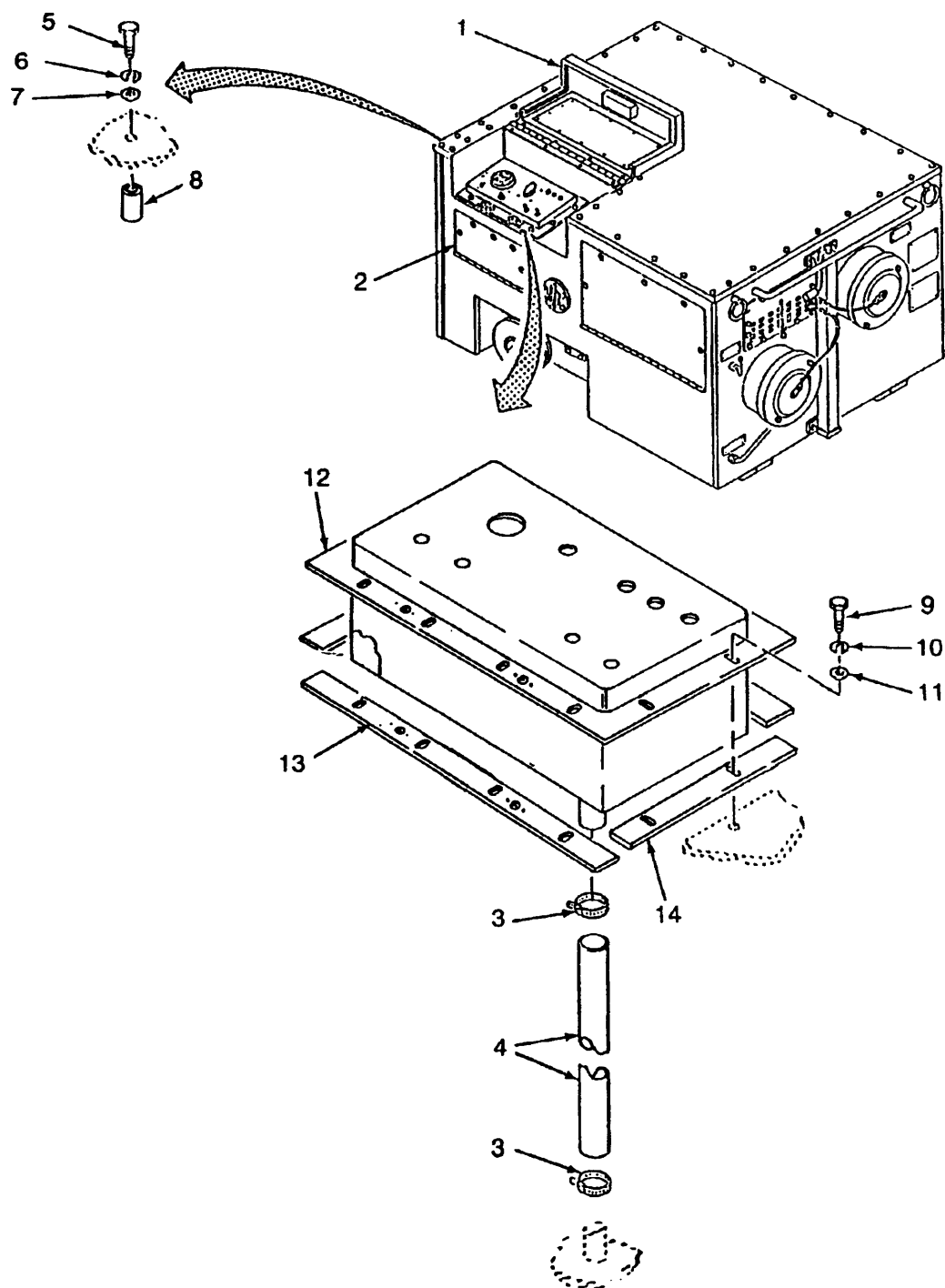


Figure 5-2. Control Box Removal

**5-3. CONTROL BOX ASSEMBLY - continued.****b. Disassembly (Refer to Figure 5-3)**

- (1) Open control box cover (1).
- (2) Remove two self-locking nuts (2), two flat washers (3), two screws (4) and the top end of right support (5).
- (3) Drill out two rivets (6) and remove the bottom end of right support (5).
- (4) Repeat steps (2) and (3) to remove the left support (7).
- (5) Drill out six rivets (8) and remove cover (1).

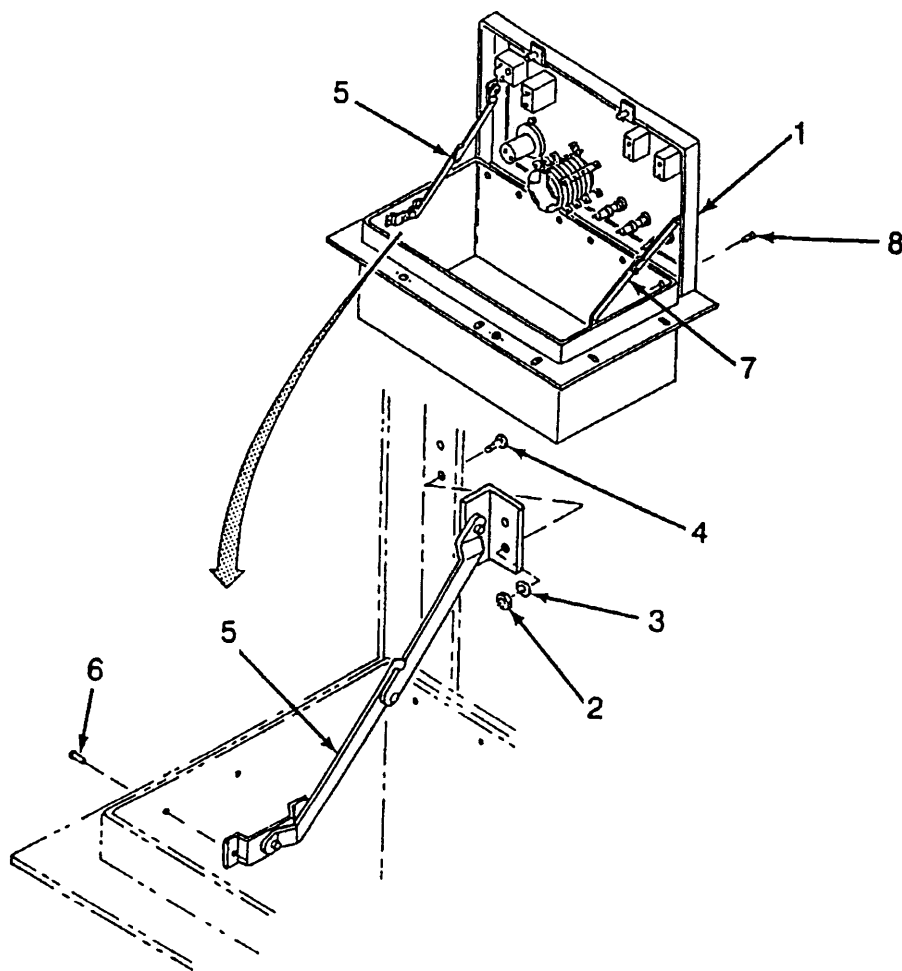


Figure 5-3. Control Box Disassembly (Sheet 1 of 2)

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**5-3. CONTROL BOX ASSEMBLY - continued.**

---

- b. Disassembly (Refer to Figure 5-3)
- (1) Open control box cover (1).
  - (2) Remove two self-locking nuts (2), two flatwashers (3), two screws (4) and the top end of right support (5).
  - (3) Drill out two rivets (6) and remove the bottom end of right support (5).
  - (4) Repeat steps (2) and (3) to remove the left support (7).
  - (5) Drill out six rivets (8) and remove cover (1).

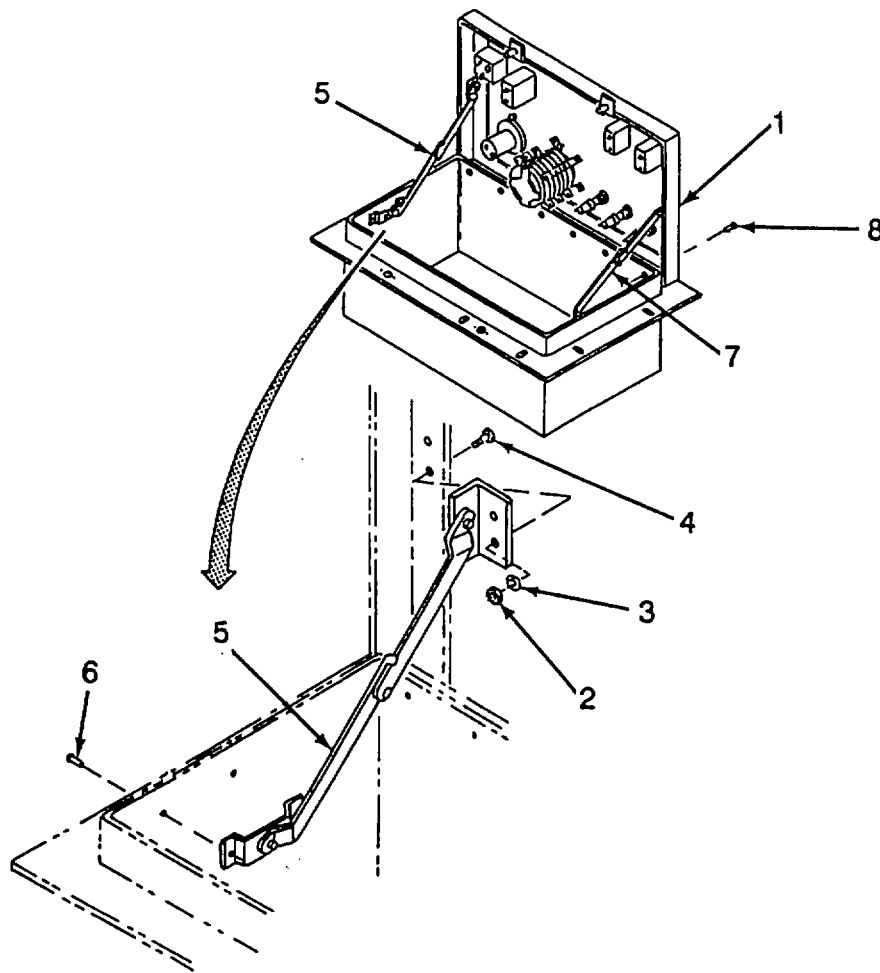


Figure 5-3. Control Box Disassembly (Sheet 1 of 2)

**5-3. CONTROL BOX ASSEMBLY - continued.**

- b. Disassembly - continued. (Refer to Figure 5-3)
- (6) Drill out six rivets (9) and remove hinge (10).
  - (7) Drill out eight rivets (11) and remove control panel plate (12).
  - (8) Remove two stud retaining rings (13), two studs (14), two retaining rings (15) and two grommets (16).
  - (9) Remove two gaskets (17) and two gaskets (18).

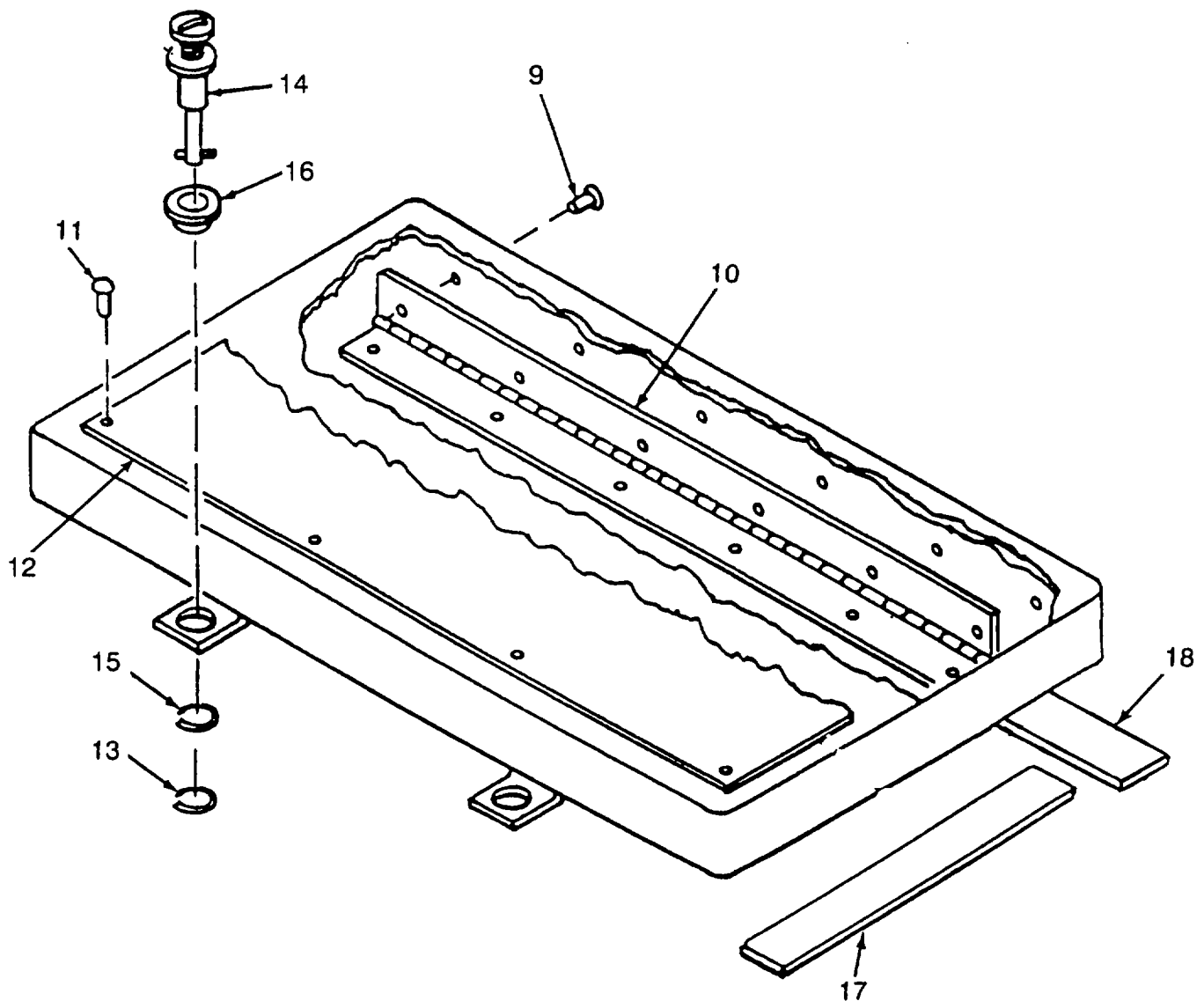


Figure 5-3. Control Box Disassembly (Sheet 2 of 2)



### 5-3. CONTROL BOX ASSEMBLY - continued.

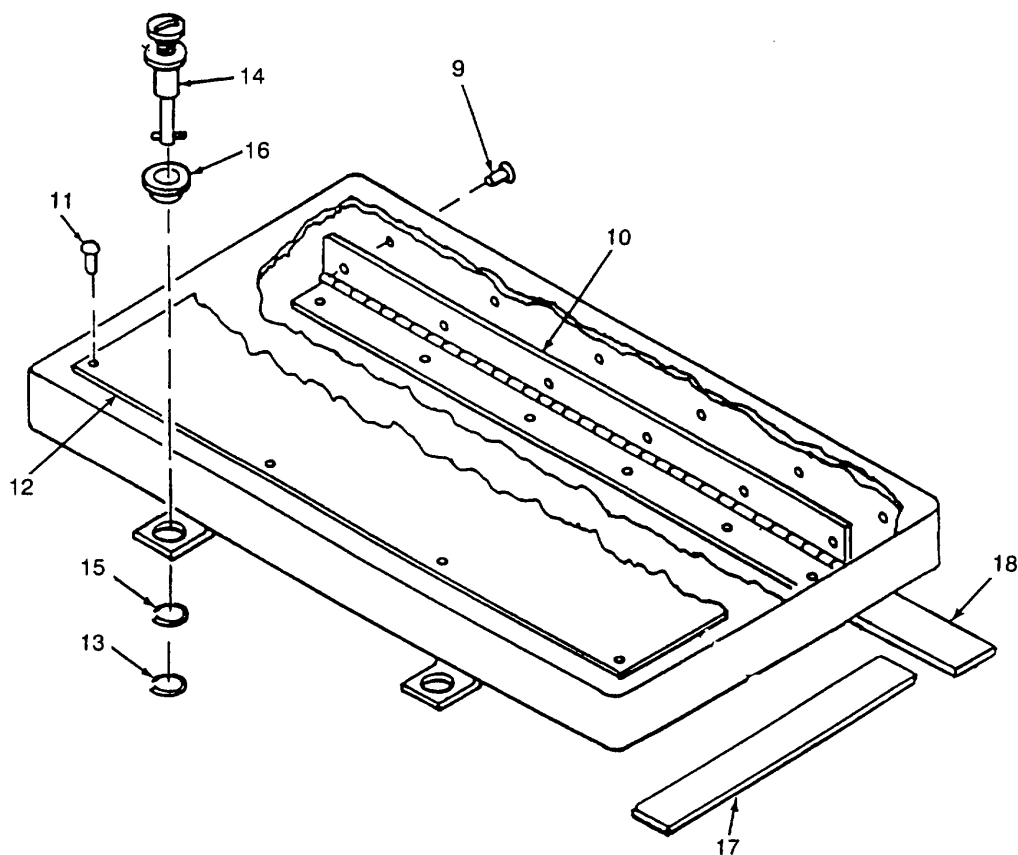
c. Repair

- (1) Inspect all parts for wear, cracks, corrosion, bent or broken terminals, broken/cracked glass. Inspect all hardware for stripped or damaged threads.

- (2) Repair limited to replacement of damaged parts.

d. Assembly (Refer to Figure 5-4)

- (1) Install two gaskets (1) and two gaskets (2).
- (2) Install two grommets (3) and two retaining rings (4).
- (3) Install two studs (5) and two stud retaining rings (6).
- (4) Install control panel plate (7) and eight rivets (8).
- (5) Position hinge (9) on inside rear edge of cover (10) and install six rivets (11).



**Figure 5-4. Control Box Assembly (Sheet 1 of 2)**

---

**5-3. CONTROL BOX ASSEMBLY - continued.**

---

- d. Assembly - continued (Refer to Figure 5-4)
- (6) Position cover (12) on control box (13) and secure with six rivets (14).
  - (7) Position bottom end of left handed support (15) and secure with two rivets (16).
  - (8) Install top end of left hand support (15), two screws (17), two flat washers (18) and two locknuts (19).
  - (9) Repeat steps (7) and (8) for right hand support (20).

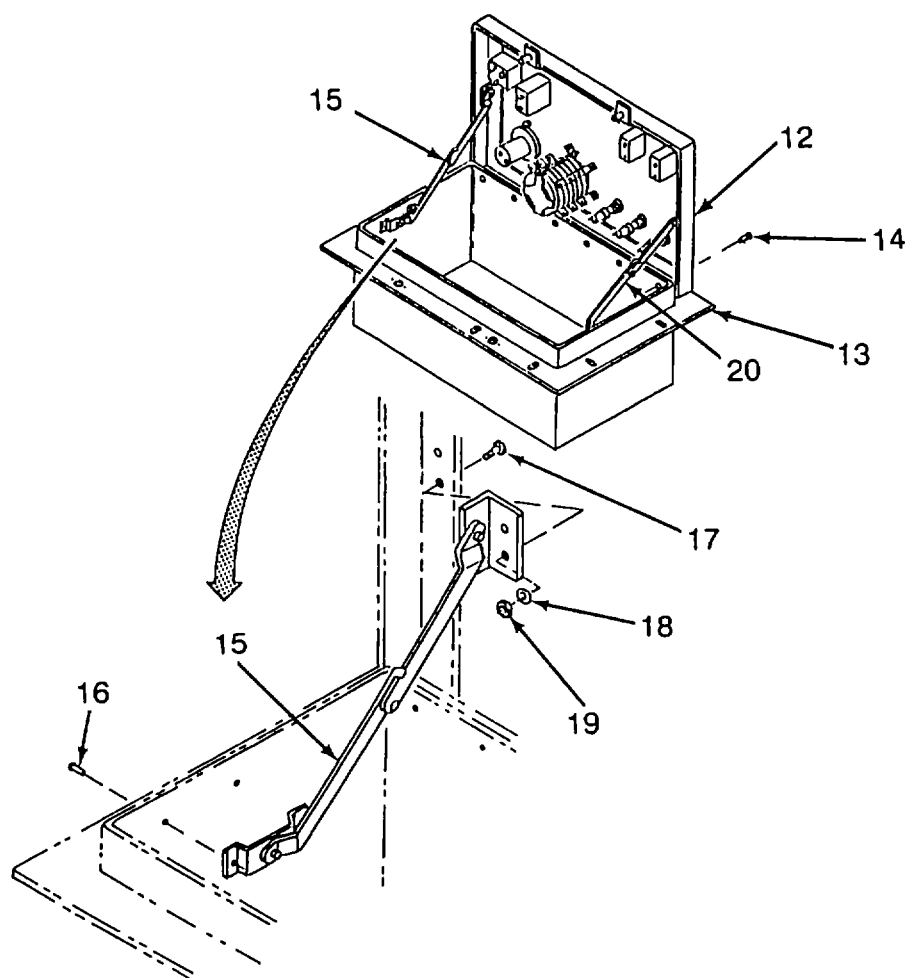


Figure 5-4. Control Box Assembly (Sheet 2 of 2)

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**5-3. CONTROL BOX ASSEMBLY - continued.**

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- e. Installation (Refer to Figure 5-5)
  - (1) Install gasket (1) (Item 14, App F), gasket (2) (Item 16, App F) and two gaskets (3) (Item 15, App F).
  - (2) Insert control box assembly (4).
  - (3) Install twelve flat washers (5), twelve lockwashers (6) and twelve screws (7).
  - (4) Install flat washer (8), lockwasher (9), screw (10) and bar (11).

**NOTE**

**Drain tube must be routed under the air inlet of the combustor fan assembly.**

- (5) Install drain tube (12) and secure with two clamps (13).
- (6) Close control box lid (14), control panel cover (15) and door (16).

## 5-3. CONTROL BOX ASSEMBLY - continued.

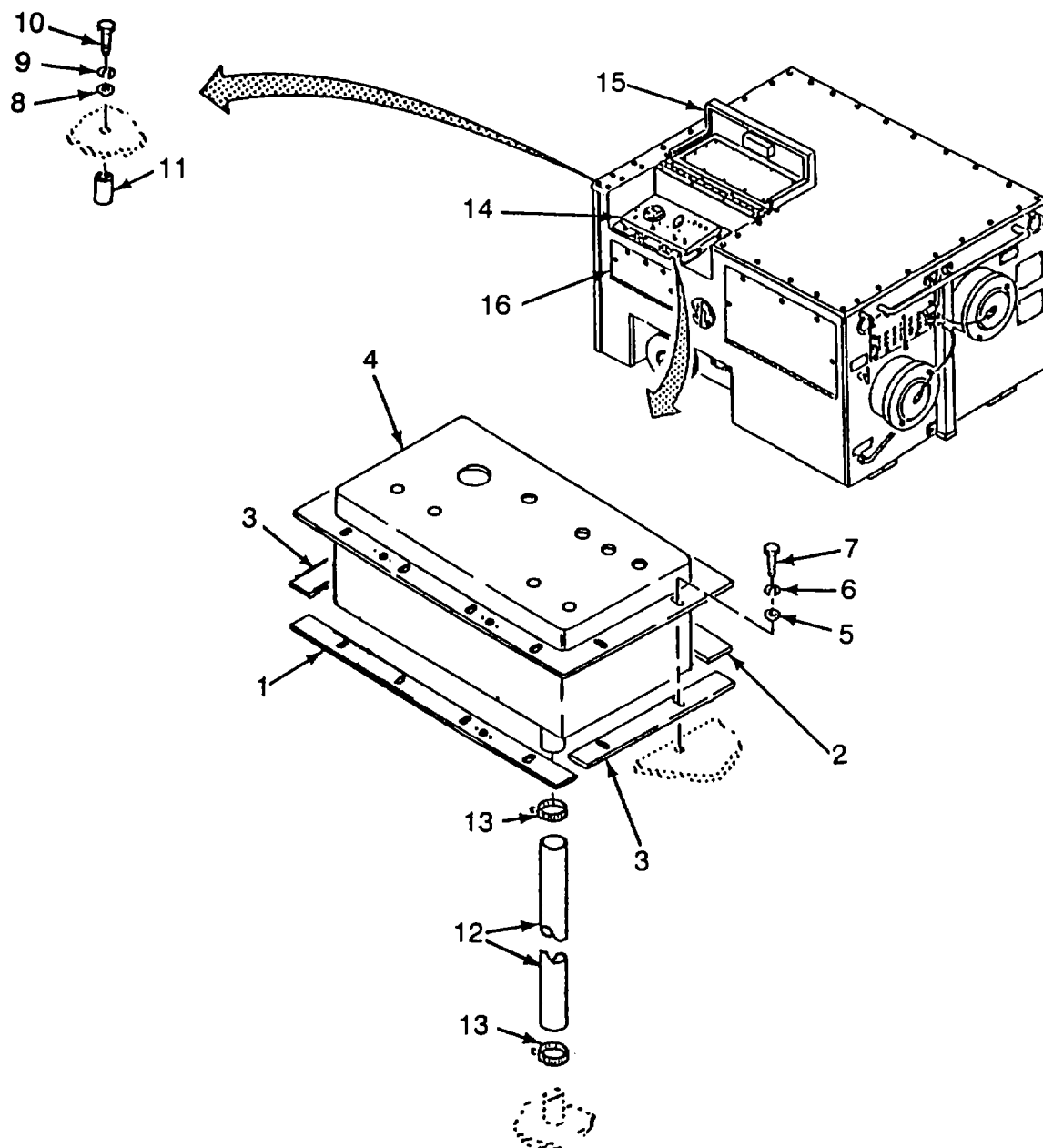


Figure 5-5. Control Box Installation

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**5-4. CIRCULATING AIR FAN/PUMP/MOTOR ASSEMBLY.**


---

This task consists of:      a. Removal      b. Inspection      c. Repair      d. Installation

---

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 3, App B)  
Lockwashers (Item 2, App H)

**Equipment Condition:**

Unit disconnected from power source (pare 2-8)  
Top panel removed (pare 4-19)  
Fuel pump and solenoids removed (pare 4-30)  
Circulating air fan and motor removed (pare 4-31)

**Material/Parts:**

Lockwashers (Item 1, App H)

**General Safety Requirements:****WARNING**

Contact with hot components can cause burns.  
Allow unit to cool down before attempting service/  
inspection/maintenance activity.

---

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/ inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

- a. Removal (Refer to Figure 5- 6)
  - (1) Open right side front door (1).
  - (2) Remove four nuts (2), four lockwashers (3), eight flat washers (4) and four screws (5). Discard lockwashers.
  - (3) Remove four screws (61, four lockwashers (7) and four flat washers (8). Discard lockwashers.
  - (4) Remove motor base (9) and scroll (10).

5-4. CIRCULATING AIR FAN/PUMP/MOTOR ASSEMBLY - continued.

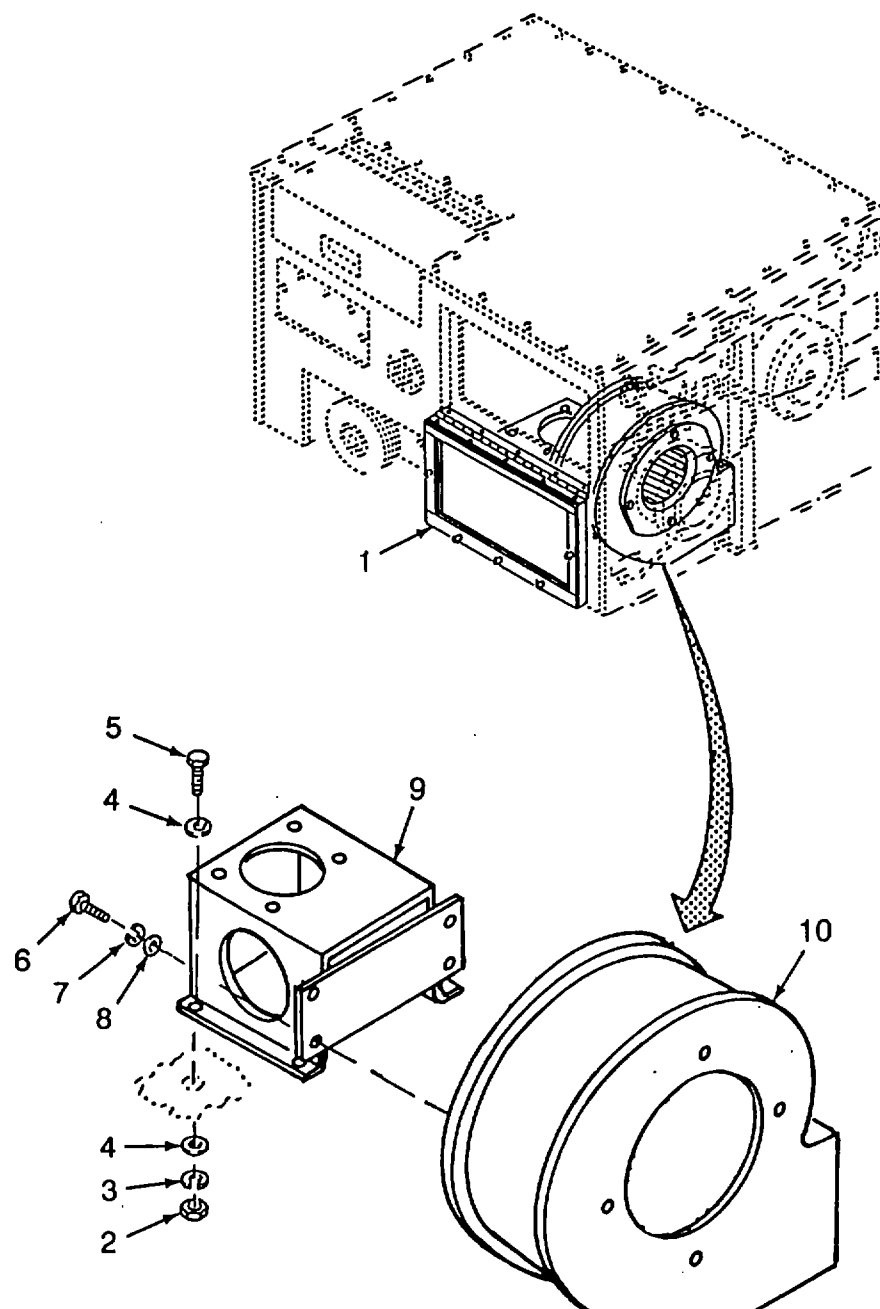


Figure 5-6. Circulating Air Fan/Pump/Motor Assembly Removal

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**5-4. CIRCULATING AIR FAN/PUMP/MOTOR ASSEMBLY - continued.**

---

**b. Inspection**

- (1) Inspect all parts for wear and cracks.
- (2) Inspect all hardware for stripped or damaged threads.

**c. Repair**

Repair limited to replacement of damaged parts.

**d. Installation (Refer to Figure 5-7)**

- (1) Place motor base (1) in bottom of frame (2), align scroll (3) with motor base (1) and secure with four flat washers (4), four lockwashers (5) and four screws (6).
- (2) Align the motor base (1) with the mounting holes in bottom of frame (2).
- (3) Install eight flat washers (7), four screws (8), four lockwashers (9) and four nuts (10) in motor base (1) and frame (2). Hand tight only.
- (4) Install circulating air fan and motor IAW paragraph 4-31.
- (5) Tighten hardware installed in step (3).
- (6) Close right side front door (11).

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5-4. CIRCULATING AIR FAN/PUMP/MOTOR ASSEMBLY - continued.

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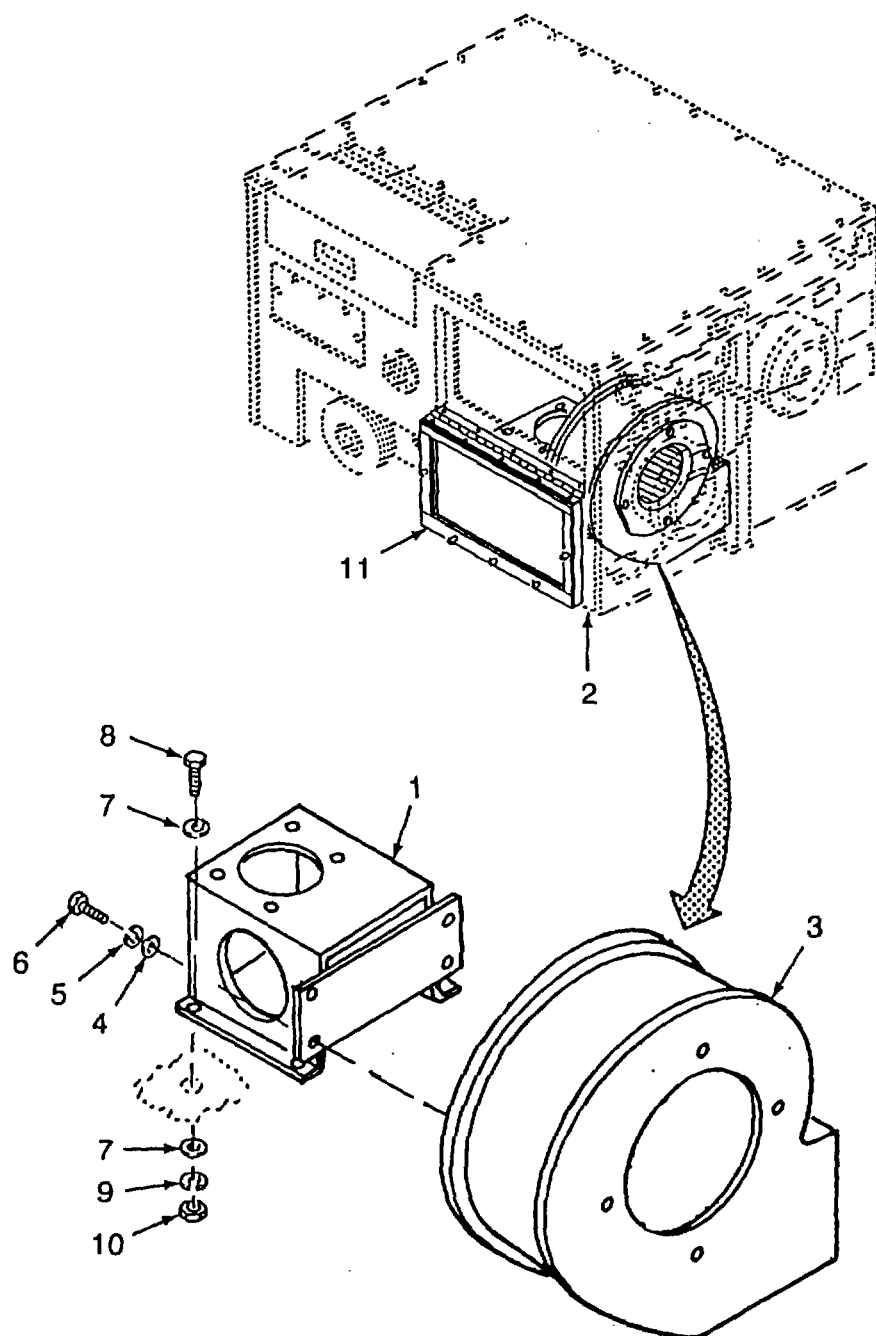


Figure 5-7. Circulating Air Fan/Pump Motor Assembly Installation



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## 5-5. BURNER ASSEMBLY.

---

This task consists of:    a.    Disassembly            b.    Repair                    c.    Assembly

---

### **INITIAL SETUP:**

#### **Tools:**

Tool Kit, General Mechanics (Item 3, App B)  
Wrench Set Hex Key (Item 4, App B)

#### **General Safety Requirements:**

##### **WARNING**

Drycleaning solvent, P-D-680, Type III, used to clean parts, is potentially dangerous to personnel and property. Combustible - do not use near welding areas, near open flames or on hot surfaces. use only with adequate ventilation. Avoid prolonged or repeated breathing of vapors. do not smoke while using it. Use protective creams; wear apron and goggles (or face shield) to protect the skin. Store in approved metal safety containers.

#### **Material/Parts:**

Preformed Packing (Item 11, App H)  
Preformed Packing (Item 30, App H)  
Drycleaning Solvent (Item 1, App E)  
Rags (Item 2, App E)  
Prime, Sealing Compound (Item 7, App E)  
Loctite (Item 13, App E)

#### **Equipment Condition:**

Burner assembly removed (para 4-33)

---

- a.    Disassembly (Refer to Figure 5-8)
  - (1)    Remove three setscrews (1).

### **CAUTION**

**Petal valve can be damaged by rough handling. Be careful when disassembling the burner assembly so petal valve is not damaged.**

### **NOTE**

**When removing the block assembly, the fuel tube, electrodes and tube assembly will also come out. If the block assembly is difficult to remove, light pressure may be applied to the nozzle. Resistance is caused by packing around the block assembly.**

- (2)    Remove block (2) from flange (3). Remove preformed packing (4). Discard packing.
- (3)    Remove screw (5) and fire ring (6).
- (4)    Remove two set screws (7), two electrodes (8), two preformed packings (9) and two sleeves (10). Discard packing.
- (5)    Remove tube assembly (11).
- (6)    Remove set screw (12) from baffle (13).
- (7)    Remove set screw (14) and fuel tube (15).

**5-5. BURNER ASSEMBLY - continued.**

a. Disassembly - continued (Refer to Figure 5-8)

(8) Remove nozzle (16) and screen (17).

(9) Remove three screws (18), three lockwashers (19), three flat washers (20) and petal valve (21). Discard lockwashers.

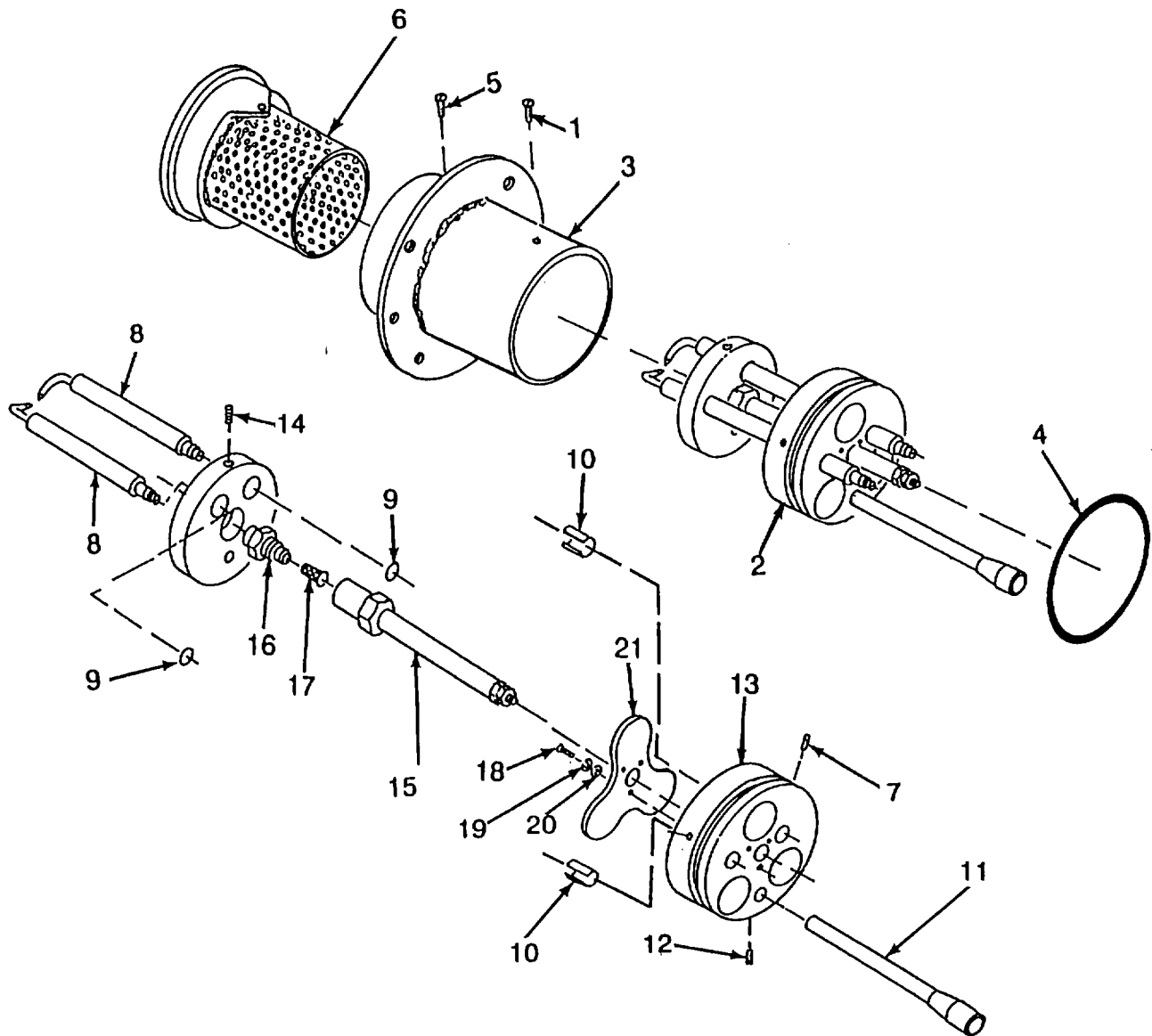


Figure 5-8. Burner Assembly

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**5-5. BURNER ASSEMBLY - continued.**

---

## b. Repair

Repair limited to replacement of defective parts.

## c. Assembly (Refer to Figure 5-9)

**CAUTION**

**Petal valve can be damaged by rough handling. Be careful when assembling the burner assembly so petal valve is not damaged.**

**NOTE**

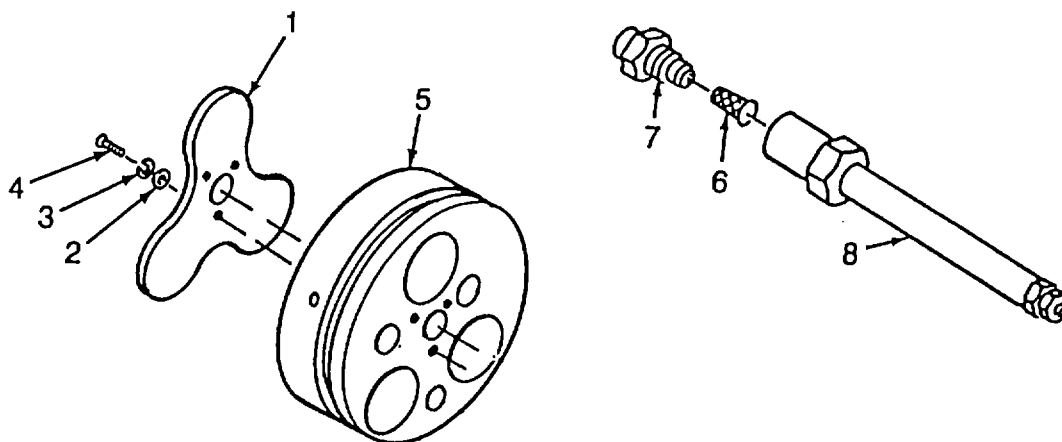
**The front of the block assembly is the flat face furthest from the packing groove. Packing groove is toward the back face of the block.**

- (1) Install petal valve (1), three flat washers (2), three lockwashers (3) and three screws (4) on the front of block (5).
- (2) Install screen (6) on nozzle (7).

**CAUTION**

**Damage to fuel tube may result if nozzle is over tightened.**

- (3) Install nozzle (7) on fuel tube (8) snugly, do not over tighten.



**Figure 5-9. Burner Assembly (Sheet 1 of 5)**

**5-5. BURNER ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 5-9)

- (4) Install fuel tube (8) into baffle (9) until baffle contacts hex nut on fuel tube. Secure fuel tube (8) and baffle (9) with setscrew (10).
- (5) To help keep baffle and block aligned, insert the two electrodes (11) and preformed packing (12). Remove after completing next steps.
- (6) Install fuel tube (8) through the center hole in the front of block (5). The distance between the front of block (5) and the back of baffle (9) is 1-1/4 in. Secure fuel tube in block by tightening setscrew (13).

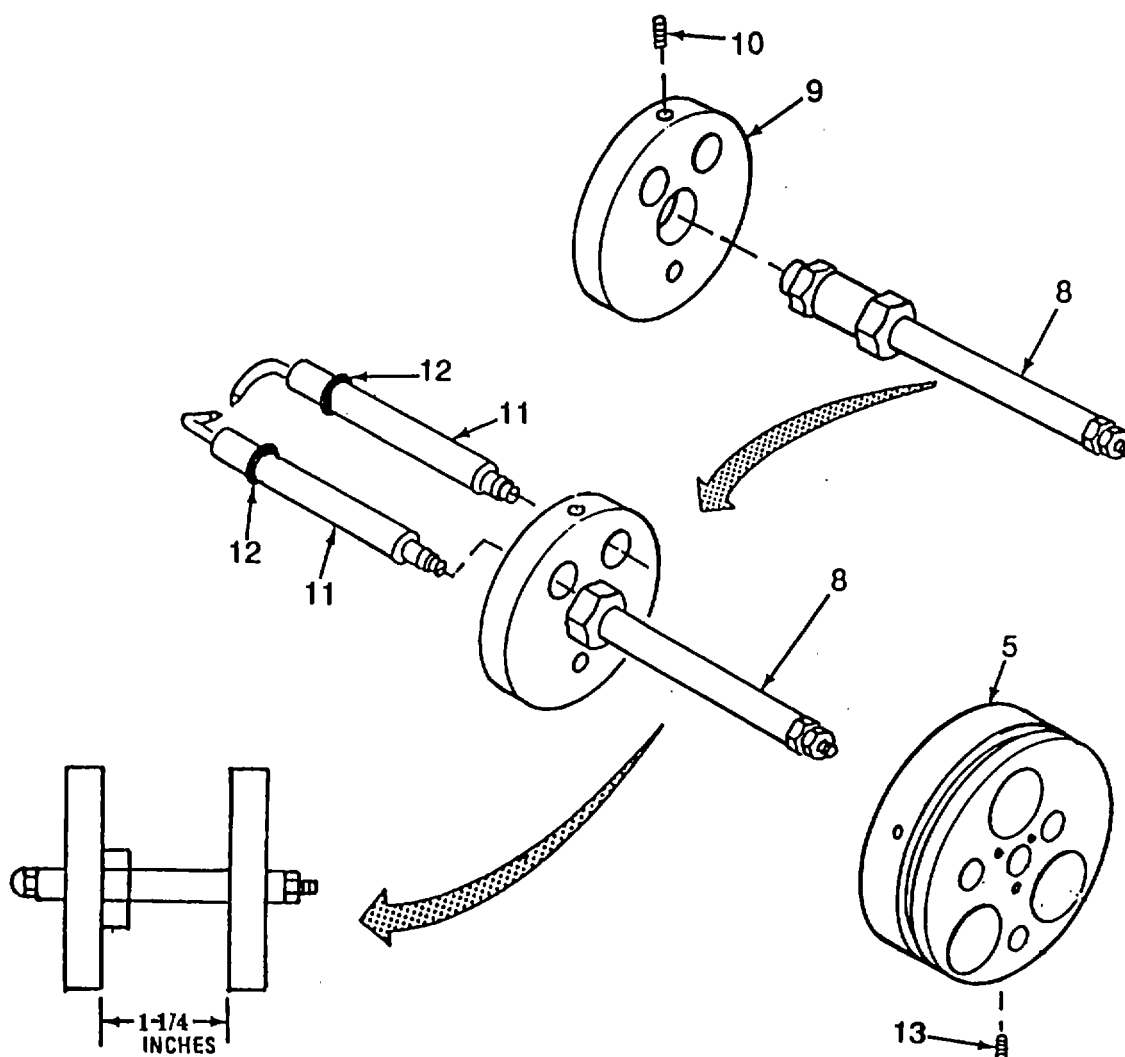


Figure 5-9. Burner Assembly (Sheet 2 of 5)

**5-5. BURNER ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 5-9)

- (7) Install two sleeves (14) into block (5). Ensure the slots are 180° away from setscrews (15).
- (8) Install two preformed packings (12) (Item 11, App H) on electrodes (11) toward the tip.

**WARNING**

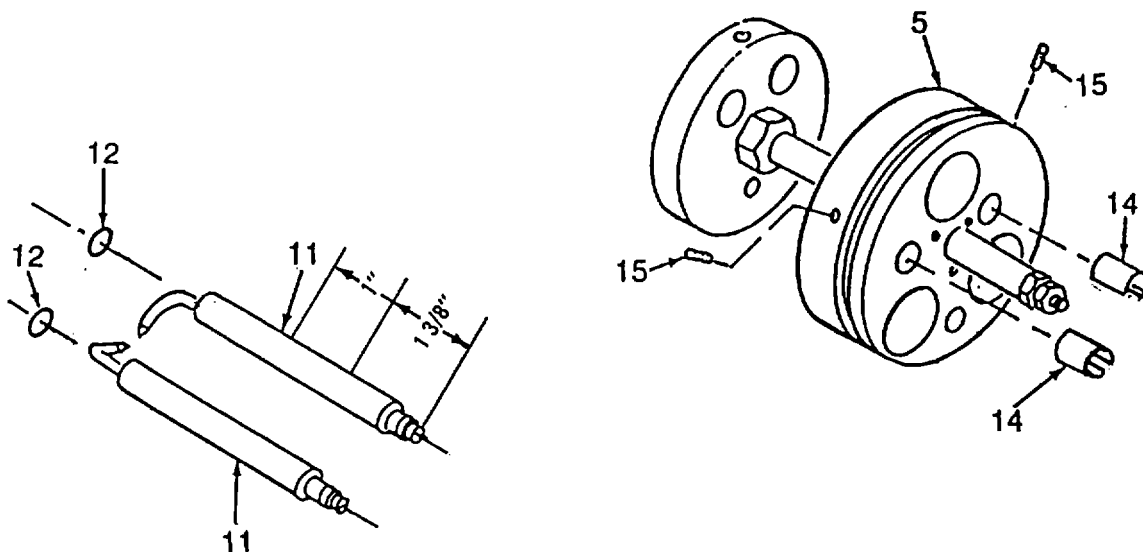
**Drycleaning solvent, P-D-680, Type III, used to clean parts, is potentially dangerous to personnel and property. Combustible - do not use near welding areas, near open flames or on hot surfaces. use only with adequate ventilation. Avoid prolonged or repeated breathing of vapors. do not smoke while using it. Use protective creams; wear apron and goggles (or face shield) to protect the skin. Store in approved metal safety containers.**

- (9) Clean white porcelain on electrodes (11) with dry cleaning solvent (Item 1, App E). Wipe dry.
- (10) Measure approximately 1-3/8 inch from connector end of both electrodes (11) and treat the next 1 inch of porcelain with sealing primer (Item 7, App E).

**NOTE**

**Only areas treated with primer should have loctite applied.**

- (11) Apply two drops of loctite (Item 13, App E) on each electrode (11) and spread over treated area.



**Figure 5-9. Burner Assembly (Sheet 3 of 5)**

**5-5. BURNER ASSEMBLY- continued.**

c. Assembly - continued (Refer to Figure 5-9)

- (12) Insert the two electrodes (11) into baffle (9) and block (5), making sure preformed packing (12) is inserted into baffle.
- (13) Install two setscrews (15) but do not tighten at this time.
- (14) Position the electrode (11) tips  $\frac{3}{8}$  inch in front of nozzle (7) and  $\frac{3}{8}$  inch above the nozzle discharge port (View A).

**CAUTION**

**Electrodes may be damaged during bending of electrode. Care must be taken when bending the electrode tips.**

- (15) Tighten two setscrews (15) snugly, do not over tighten.
- (16) Carefully bend the gap between the two electrodes (11) to  $\frac{1}{8}$  inch (View B).
- (17) Recheck electrodes position. Repeat steps 13 thru 15 if necessary.
- (18) Check position of two preformed packings (12). They should be approximately centered in the baffle (9).

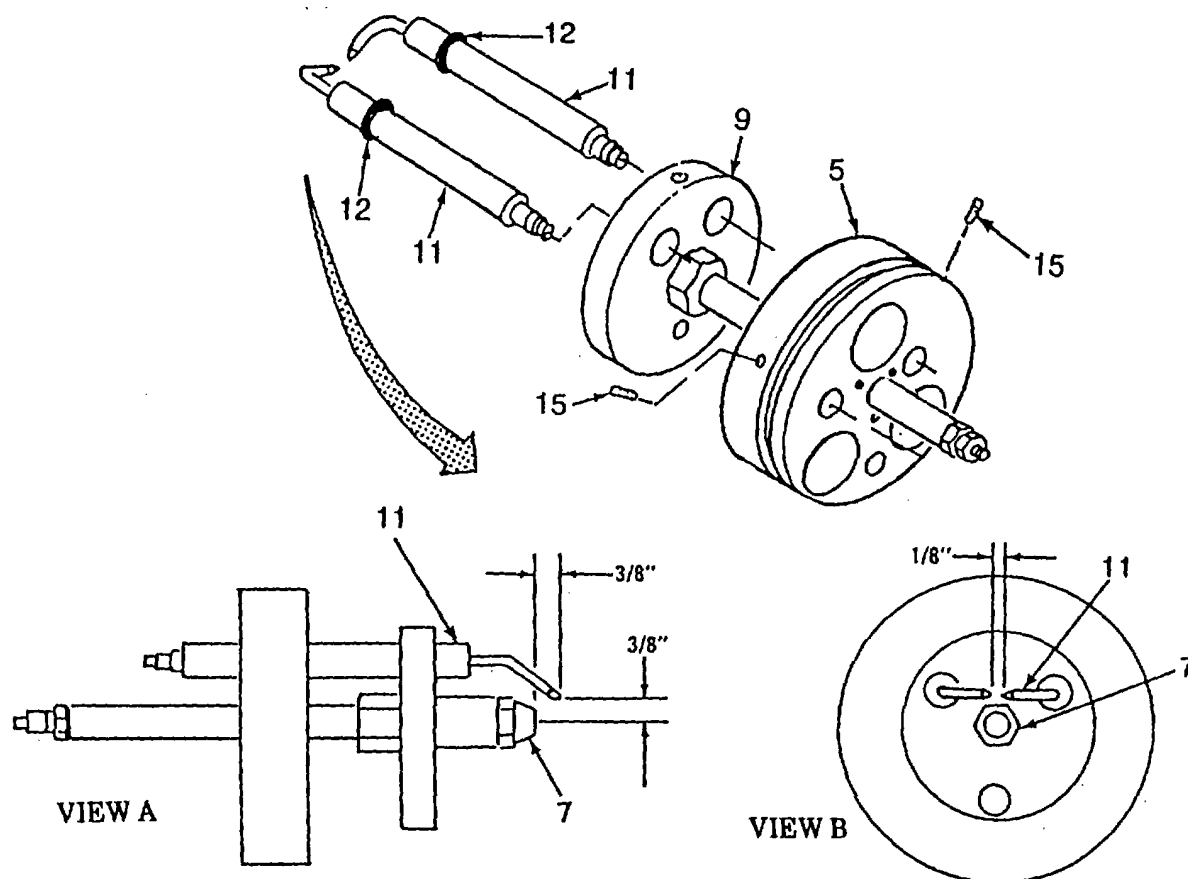


Figure 5-9. Burner Assembly (Sheet 4 of 5)

**5-5. BURNER ASSEMBLY - continued.**

c. Assembly - continued (Refer to Figure 5-9)

(19) Install tube (16) into block assembly (5).

(20) Install preformed packing (17) (Item 30, App H) on block assembly (5).

(21) Install fire ring (18) into flange assembly (19) and install screw (20).

(22) Install block (5) flush with flange assembly (19) aligning the tube (16) with the notch in fire ring (18) and install three setscrews (21).

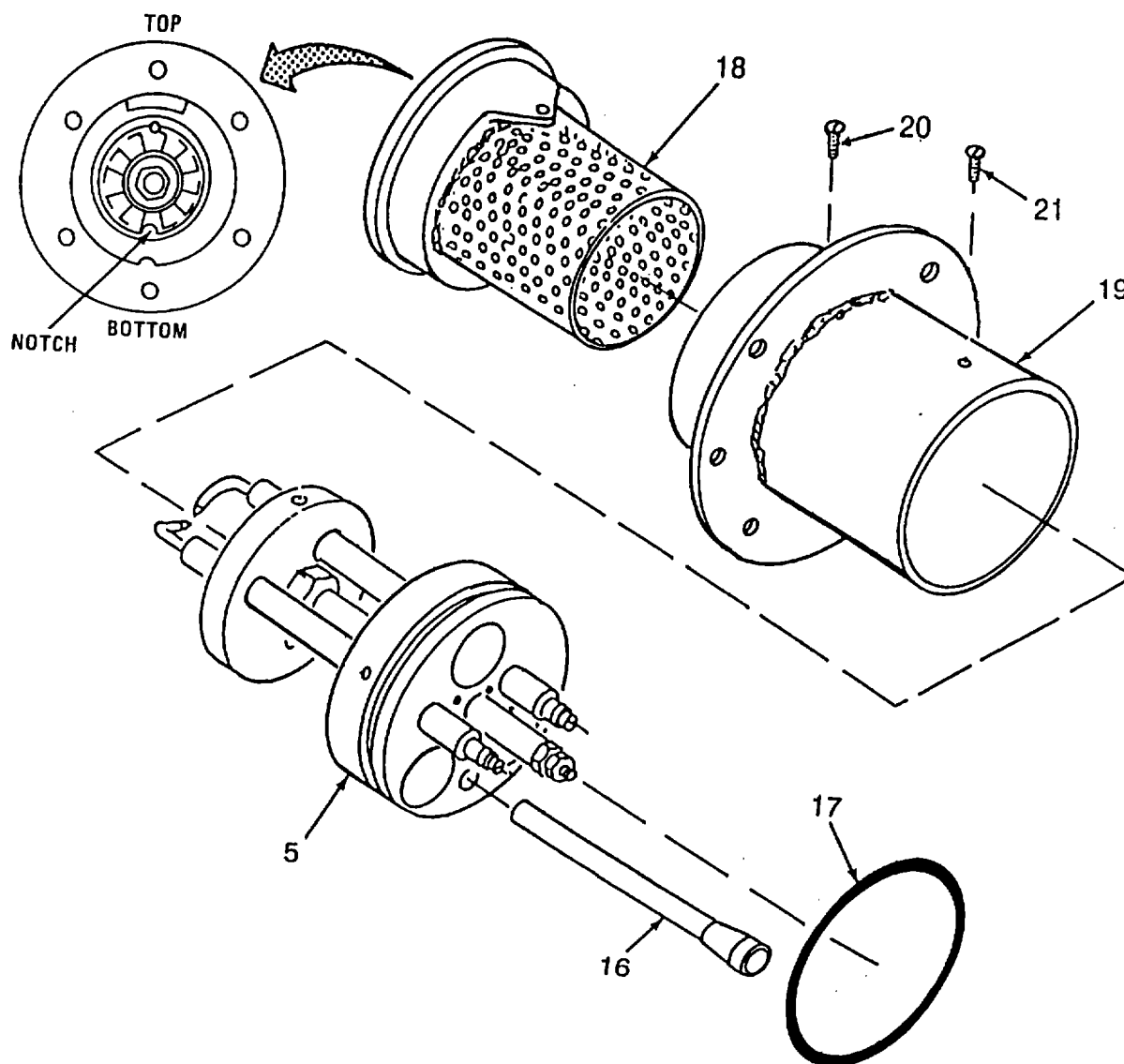


Figure 5-9. Burner Assembly (Sheet 5 of 5)

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120).**

This task consists of:	a. Removal	Disassembly	c. Inspection
	d. Repair	e. Assembly	f. Installation

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 3, App B)  
Gloves (Item 5, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
Control box cover removed (para 4-18)  
Top panel removed (para 4-19)  
Rear panel removed (para 4-20)  
Jack assembly removed (para 4-37)  
Supply duct cover removed (para 4-22)  
Supply duct cover removed (para 4-22)  
Supply air screen removed (para 4-23)  
Burner assembly removed (para 4-33)  
Transformer assembly removed (para 4-32)

**Personnel:**

Two persons.

**Material/Parts:**

Lockwasher (Item 1, App H)  
Wire Ties (Item 9, App E)  
Anti-seize Compound (Item 3, App E)  
Lockwasher (Item 12, App E)

**General Safety Requirements:****WARNING**

**Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

**Insulation should only be removed when necessary to gain access to another part/component or replacement is necessary.**

a. Removal (Refer to Figure 5- 10)

- (1) Loosen clamp (1) and remove hose (2).
- (2) Remove six screws (3), six lockwashers (4), six flat washers (5) and shield (6). Discard lockwashers.
- (3) Remove seven nuts (7), seven lockwashers (8), fourteen flat washers (9) and seven screws (10). Discard lockwashers.



**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

a. Removal - continued (Refer to Figure 5-10)

(4) Remove six screws (11), six lockwashers (12) and six flat washers (13). Discard lockwashers.

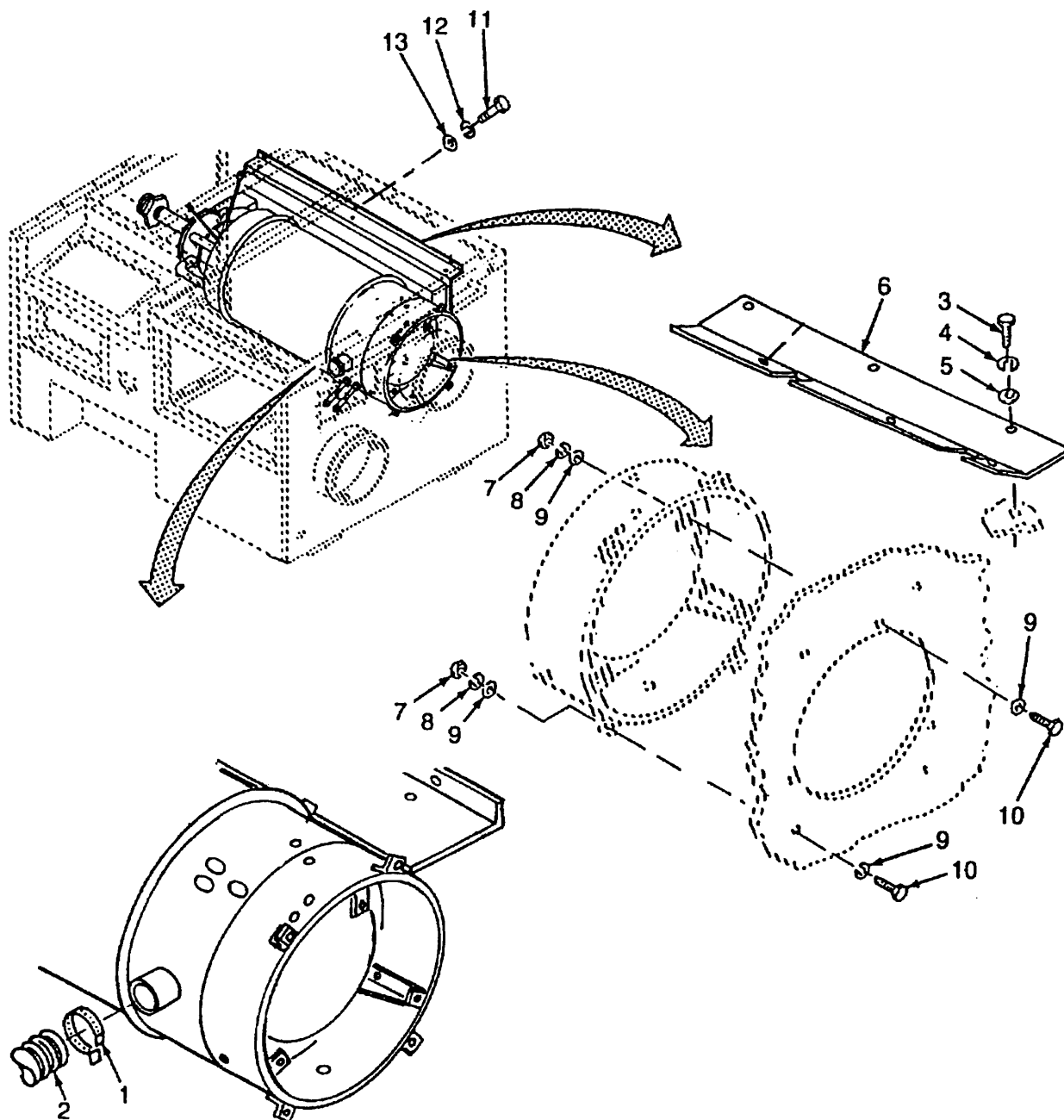


Figure 5-10. Heat Exchanger, (Model H120) Removal

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.****a. Removal - continued (Refer to Figure 5-11)**

- (5) Remove two nuts (1), two lockwashers (2), four flat washers (3) and two screws (4). Discard lockwashers.
- (6) Remove one nut (5), one lockwasher (6), two flat washers (7) and one screw (8) from left side of brace (9). Discard lockwashers.
- (7) Remove second nut (5), second lockwasher (6), two flat washers (7), ground wire (10), star lockwasher (11), second screw (8) and brace (9).

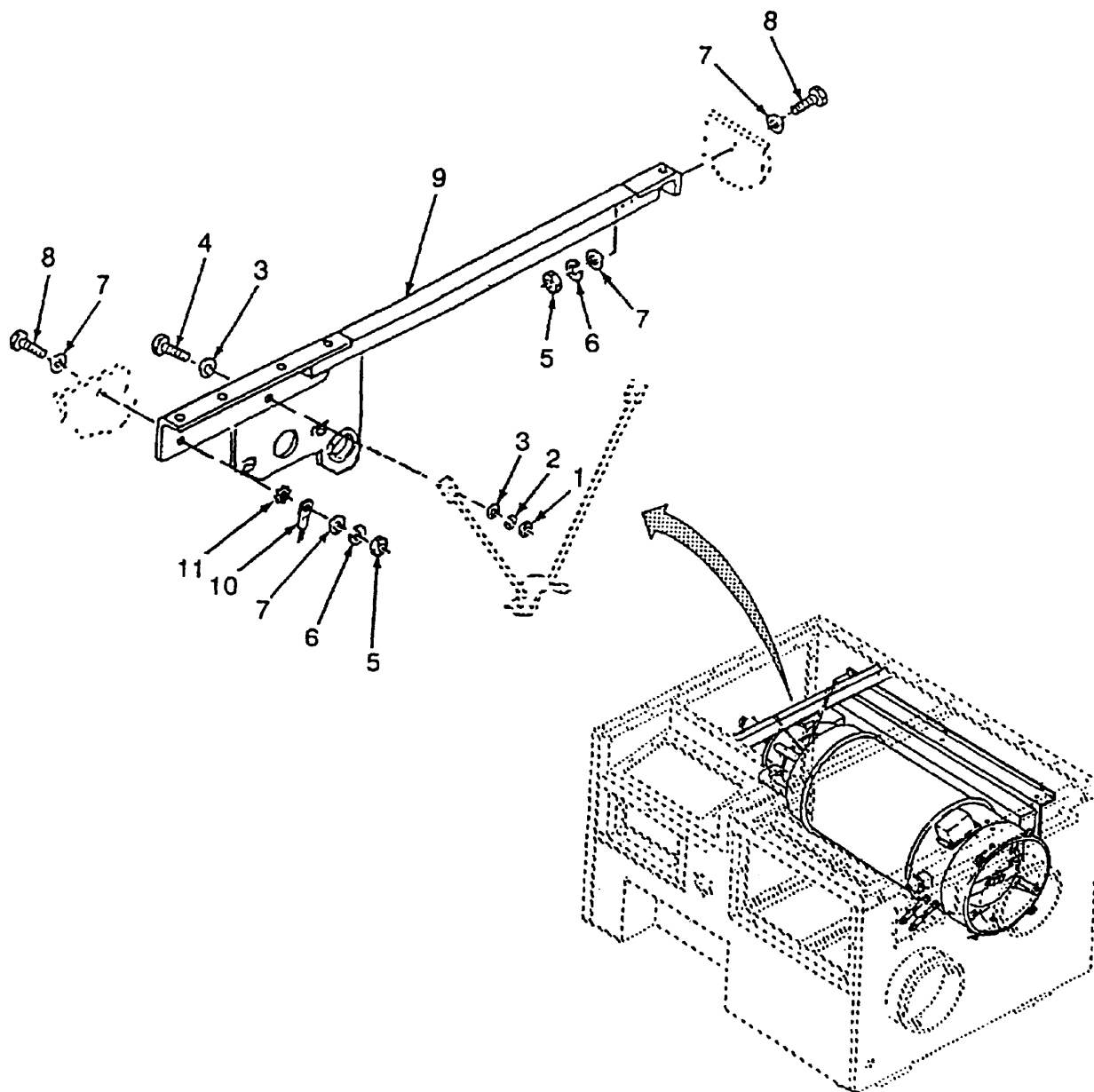


Figure 5-11. Heat Exchanger, (Model H120) Removal

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

- a. Removal - continued (Refer to Figure 5-12)

**WARNING**

Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.

**CAUTION**

Damage to heat exchanger will result if the last support screw removed without supporting the assembly. Support the front and rear of the heat exchanger prior to final removal of attaching hardware.

**NOTE**

Two individuals are required to remove the heat exchanger assembly.

- (8) One person supports the front end of the heat exchanger (1), the second person supports the rear end of the heat exchanger and removes screw (2), lockwasher (3) and flat washer (4) from top of frame (5). Discard lockwasher.
- (9) Remove heat exchanger (1) through rear of unit.

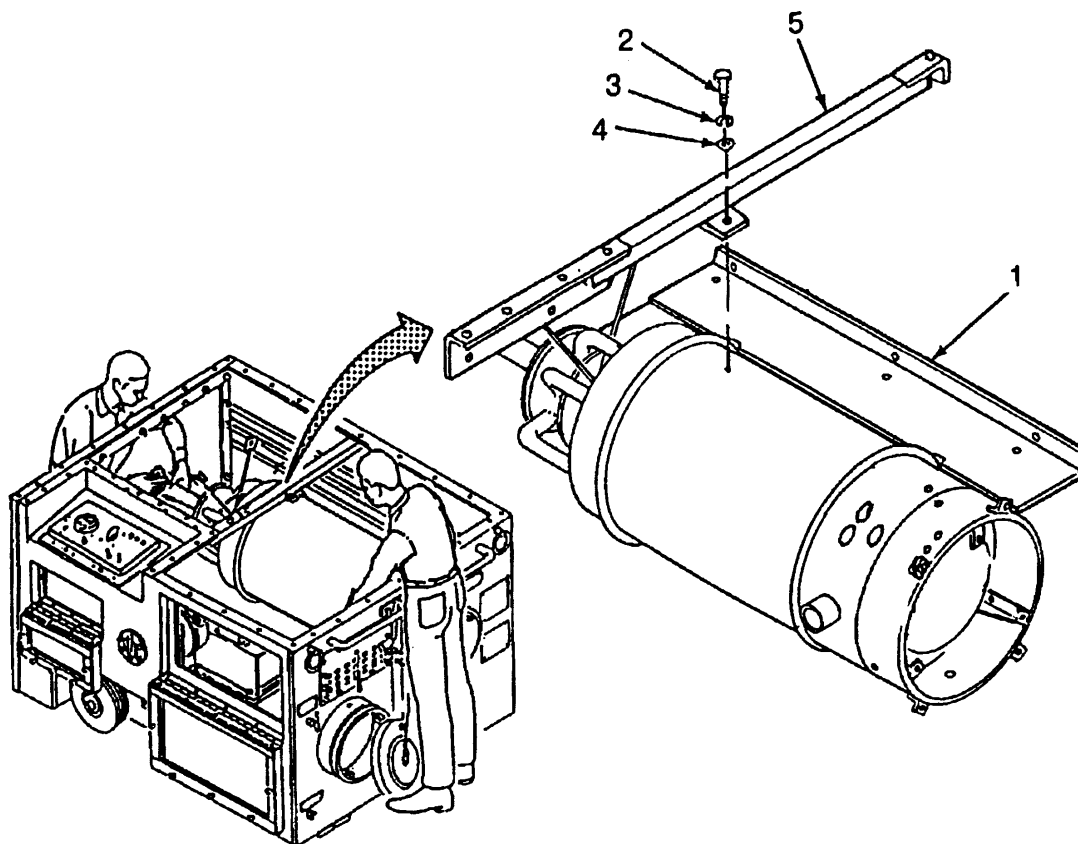


Figure 5-12. Heat Exchanger, (Model H120) Removal

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.****b. Disassembly (Refer to Figure 5- 13)**

- (1) Remove six nuts (1), six lockwashers (2), six screws (3) and twelve flat washers (4) from three brackets (5). Remove three brackets (5) and mounting ring (6). Discard lockwashers.

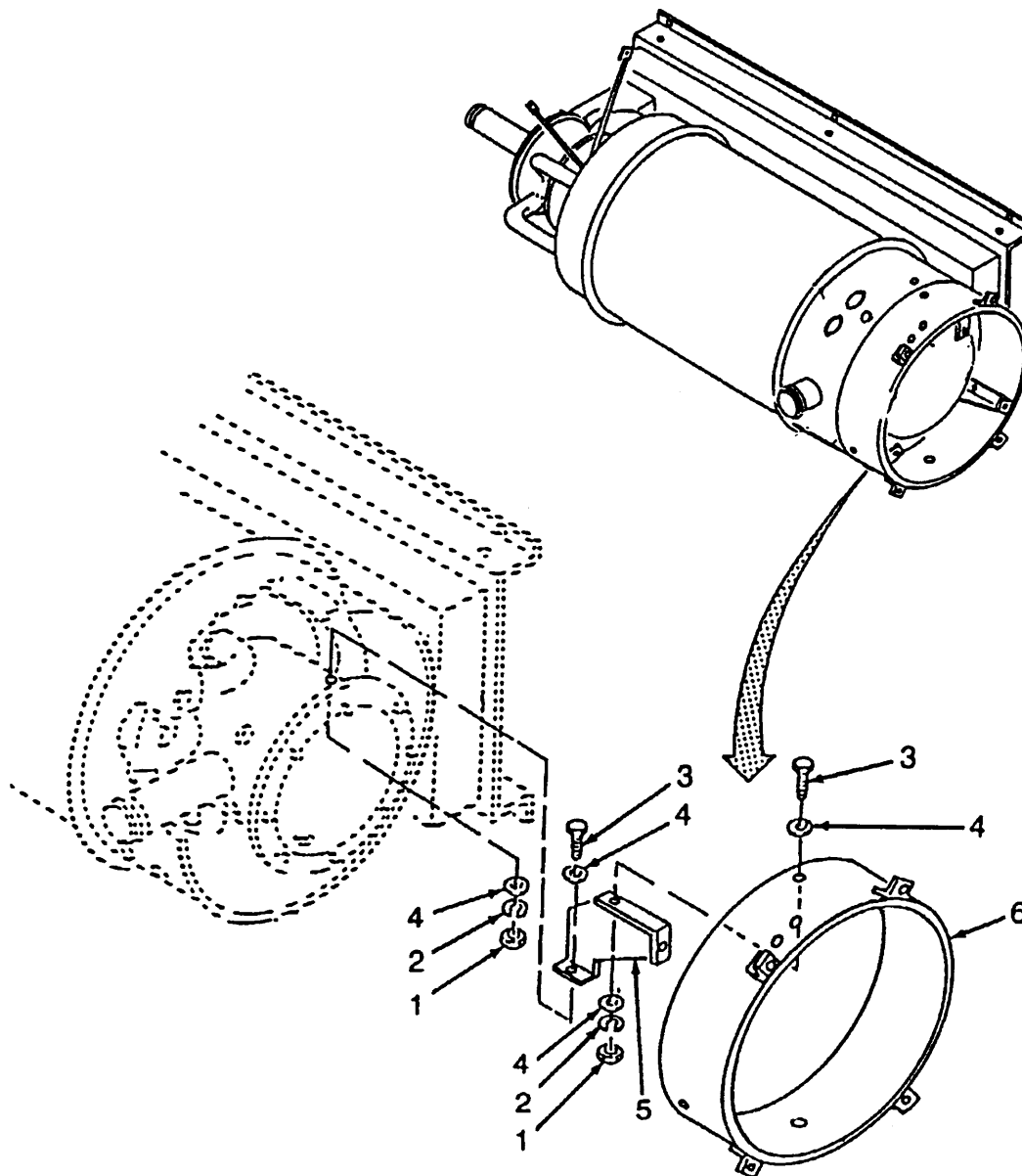


Figure 5-13. Heat Exchanger, (Model H120) Disassembly

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

b. Disassembly - continued (Refer to Figure 5-14)

- (2) Remove six nuts (1), six lockwashers (2), six screws (3) and twelve flat washers (4) from two clamps (5). Discard lockwashers.

**NOTE**

**Shell must be tilted to allow clearance for the heat exchanger air inlet pipe.**

- (3) Remove heat exchanger shell (6) from the heat exchanger (7).
- (4) Remove two nuts (8), two lockwashers (9), two screws (10) and four flat washers (11) and clamp (12). Discard lockwashers.
- (5) Remove captive nuts (13) only if damaged and replacement is required.

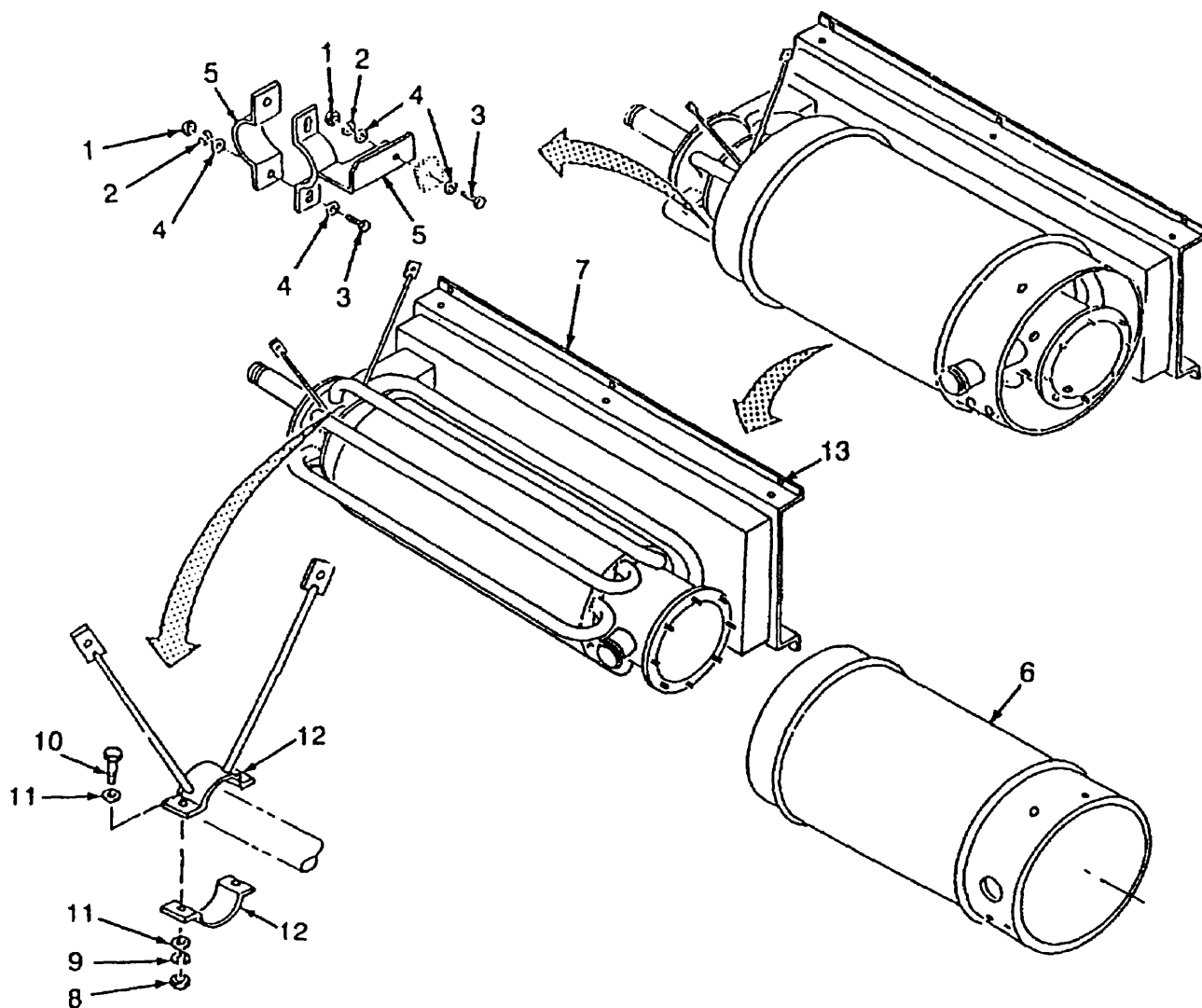


Figure 5-14. Heat Exchanger, (Model H120) Disassembly

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

## c. Inspection

- (1) Inspect all parts for wear, cracks, corrosion, bent or broken terminals.
- (2) Inspect all hardware for stripped or damaged threads.

## d. Repair

Repair limited to replacement of damaged parts.

## e. Assembly (Refer to Figure 5-15)

**WARNING**

**Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.**

**NOTE**

**The top tube of heat exchanger is between the top ends of clamp when properly positioned.**

- (1) Install clamp (1), four flat washers (2), two screws (3), two lockwashers (4) and two nuts (5) hand tight only. Hardware will be tightened during installation of assembly.

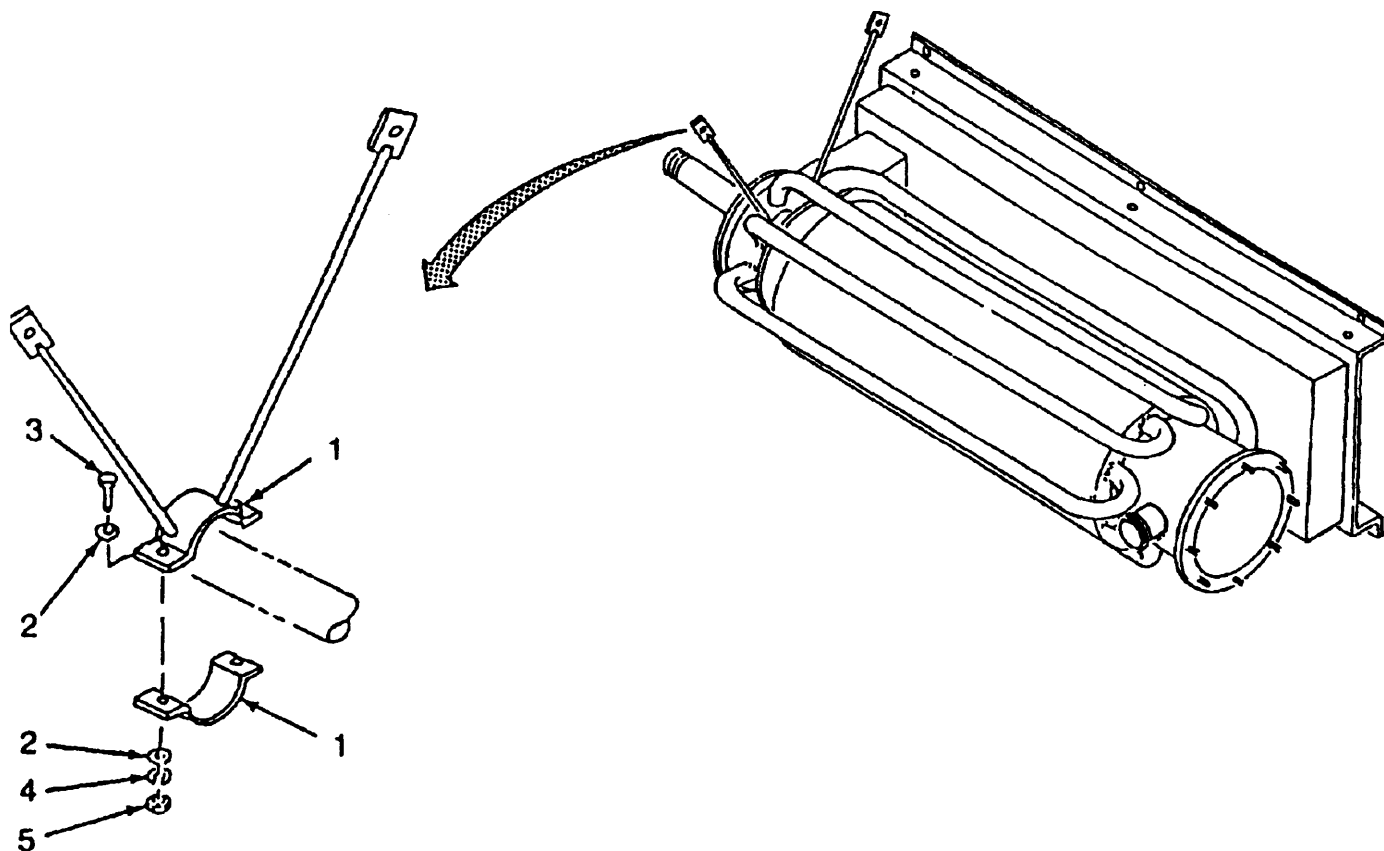


Figure 5-15. Heat Exchanger, (Model H120) Assembly

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

e. Assembly - continued (Refer to Figure 5-16)

- (2) Install any captive nuts (1) removed during disassembly.
- (3) Slide heat exchanger shell (2) onto heat exchanger (3) with air inlet pipe (4) aligned with large opening in side of shell.
- (4) Install two clamps (5) on heat exchanger (3), one on tube 5 and one on tube 7. Secure with eight flat washers (6), four screws (7), four lockwashers (8) and four nuts (9). Tighten hardware hand tight only, hardware will be tightened during installation of assembly.

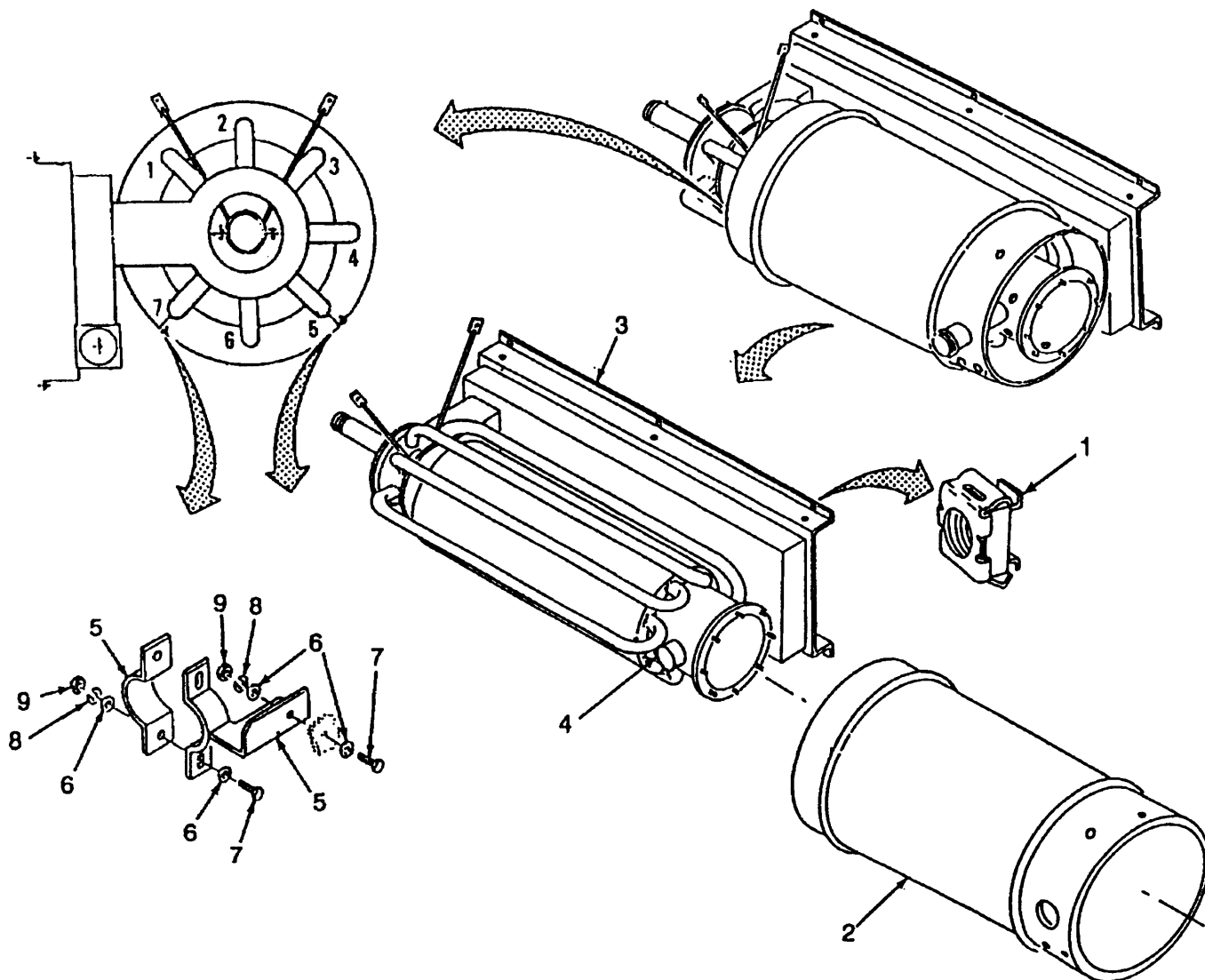


Figure 5-16. Heat Exchanger, (Model H120) Assembly

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

e. Assembly - continued (Refer to Figure 5-17)

- (5) Slide mounting ring (1) in end of heat exchanger shell (2), position the large hole in the ring towards the bottom of the shell.
- (6) Install three brackets (3) between heat exchanger (4), heat exchanger shell (2) and mounting ring (1), and secure each with four flat washers (5), two screws (6), two lockwashers (7) and two nuts (8).

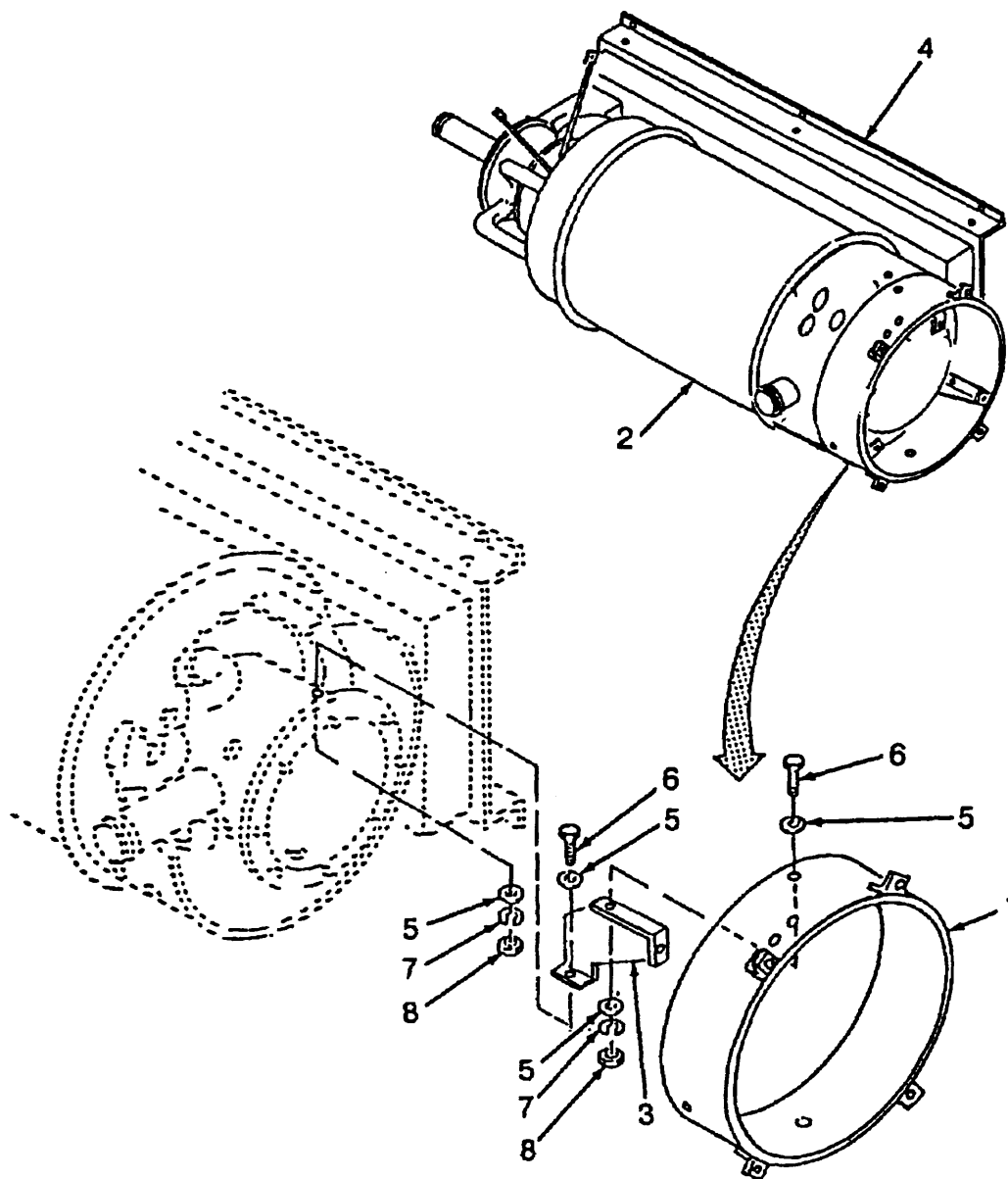


Figure 5-17. Heat Exchanger, (Model H120) Assembly



**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

f. Installation (Refer to Figure 5-18)

**WARNING**

Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.

**NOTE**

Two individuals are required to install the heat exchanger assembly.

- (1) Lift the heat exchanger assembly (1) into the unit through the rear.
- (2) Apply anti-seize compound (Item 3, App E) to screw (2). Align the top of heat exchanger (1) with the tab on brace (3), install flat washer (4), lockwasher (5) and screw (2). Hand tighten only.

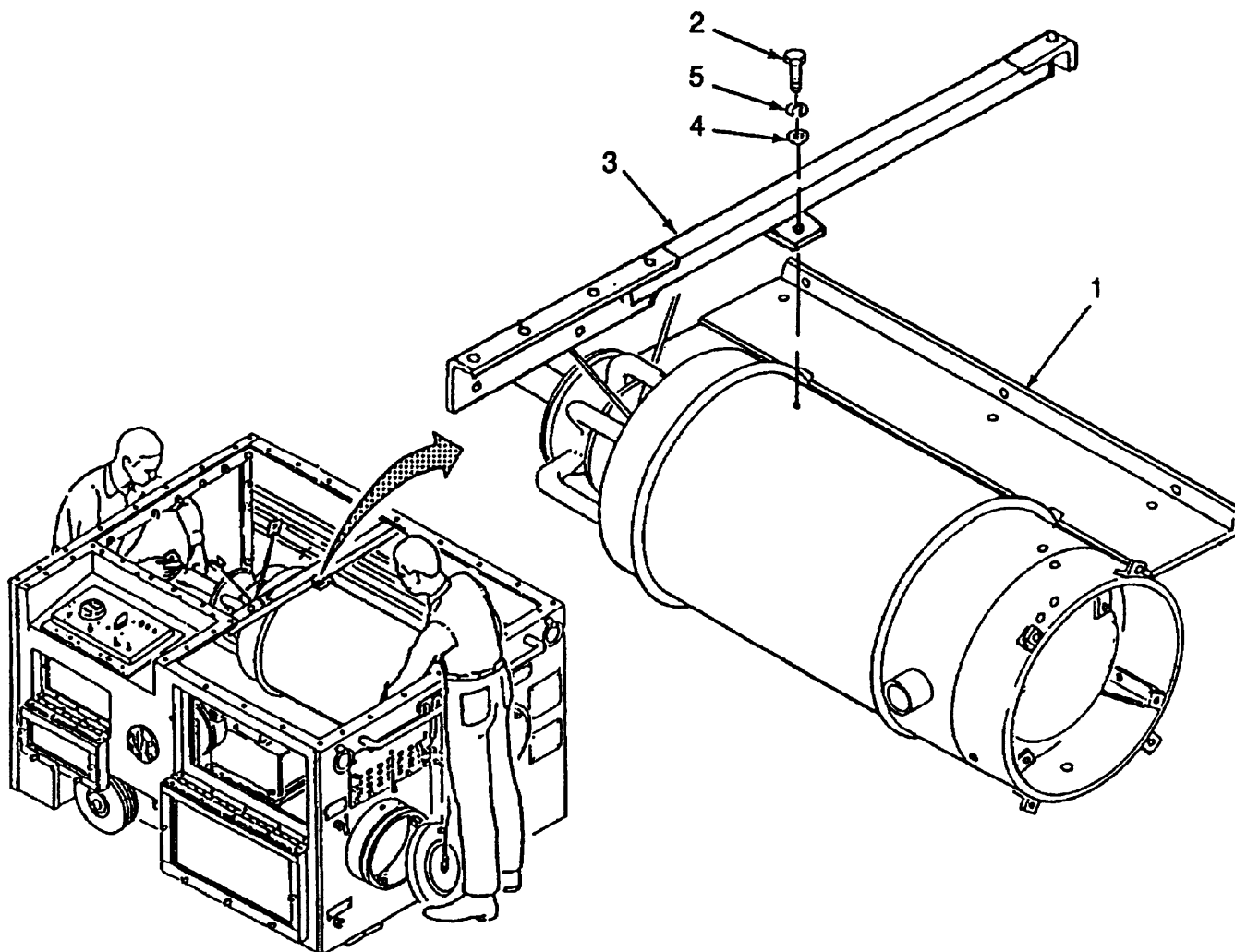


Figure 5-18. Heat Exchanger, (Model H120) Installation

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

f. Installation - continued (Refer to Figure 5-19)

(3) Install brace (1) as follows:

(a) Secure left end of brace (1) with two flat washers (2), screw (3), lockwasher (4) and nut (5).

(b) Secure the right end of brace (1) with two flat washer (6), screw (7), star lockwasher (8), ground lead (9), lockwasher (10), and nut (11).

(4) Secure clamp (12) to brace (1) with four flat washers (13), two screws (14), two lockwashers (15) and two nuts (16).

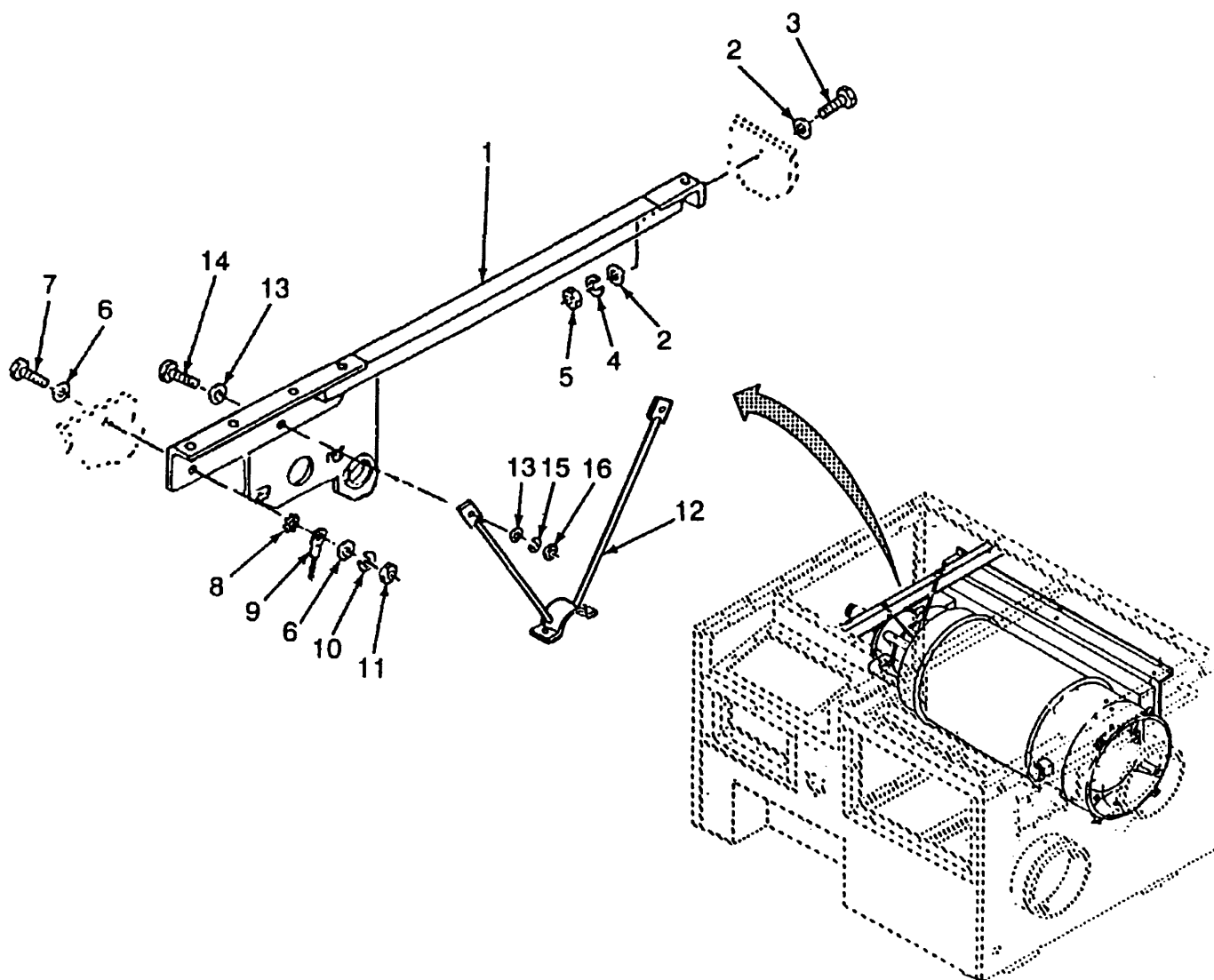


Figure 5-19. Heat Exchanger, (Model H120) Installation

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

f. Installation - continued (Refer to Figure 5-20)

- (5) Apply anti-seize compound (Item 3, App E) to six screws (1). Install six flat washers (2), six lockwashers (3), and six screws (1). Hand tighten only.
- (6) Align the front mounting tabs on heat exchanger (4) with the front of unit.
- (7) Install fourteen flat washers (5), seven screws (6), seven lockwashers (7), and seven nuts (8).
- (8) Tighten all the hardware. installed in steps (2) and (5).
- (9) Apply anti-seize compound (Item 3, App E) to six screws (9). Install heat exchange shield (10), six flat washers (11), six lockwashers (12) and six screws (9).

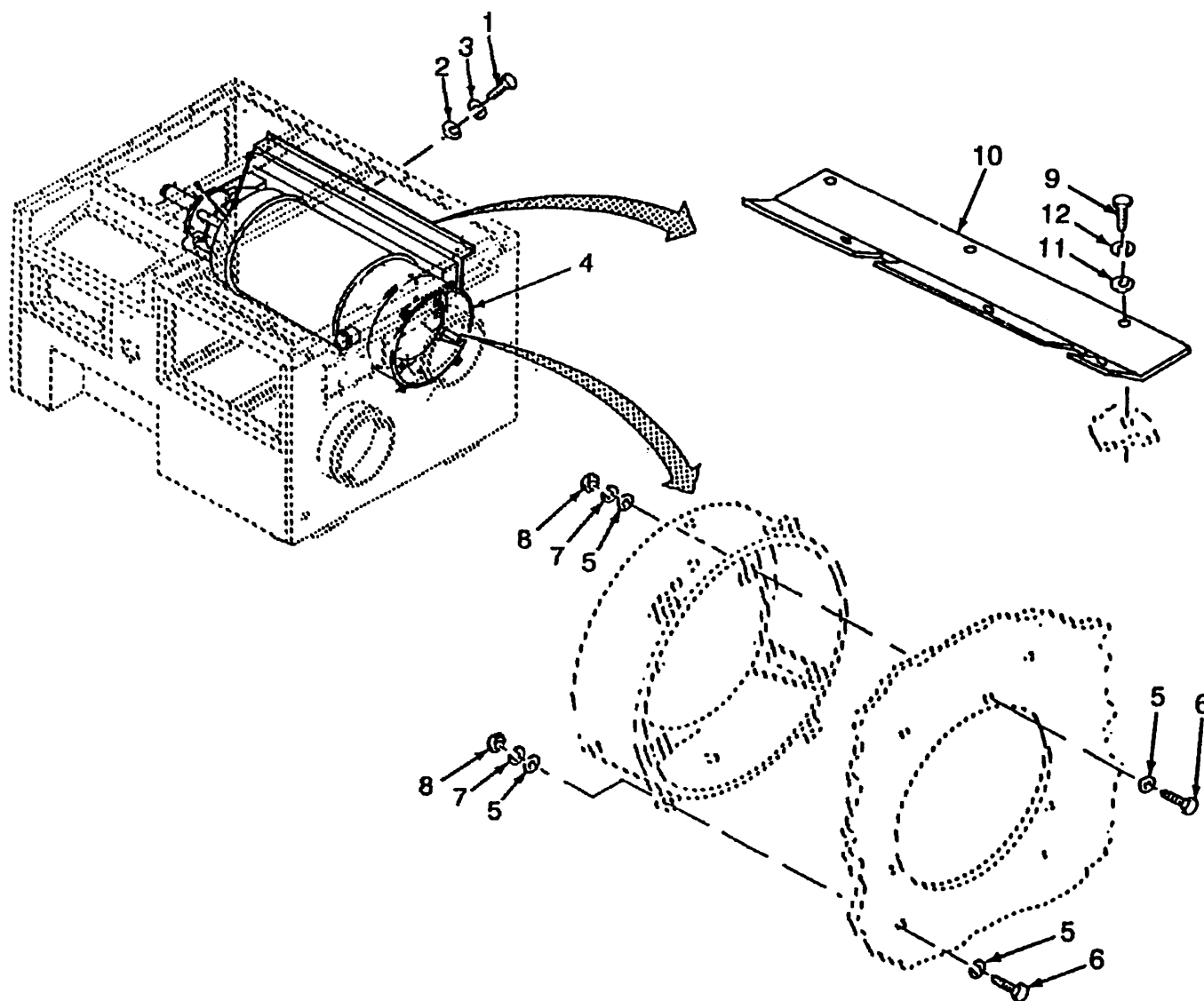


Figure 5-20. Heat Exchanger, (Model H120). Installation

**5-6. HEAT EXCHANGER ASSEMBLY, (Model H120) - continued.**

- f. Installation - continued (Refer to Figure 5-21)
- (10) Tighten four screws (1) and four nuts (2) on two clamps (3).
  - (11) Tighten two screws (4) and two nuts (5) on clamp (6).
  - (12) Connect hose (7) and tighten clamp (8).

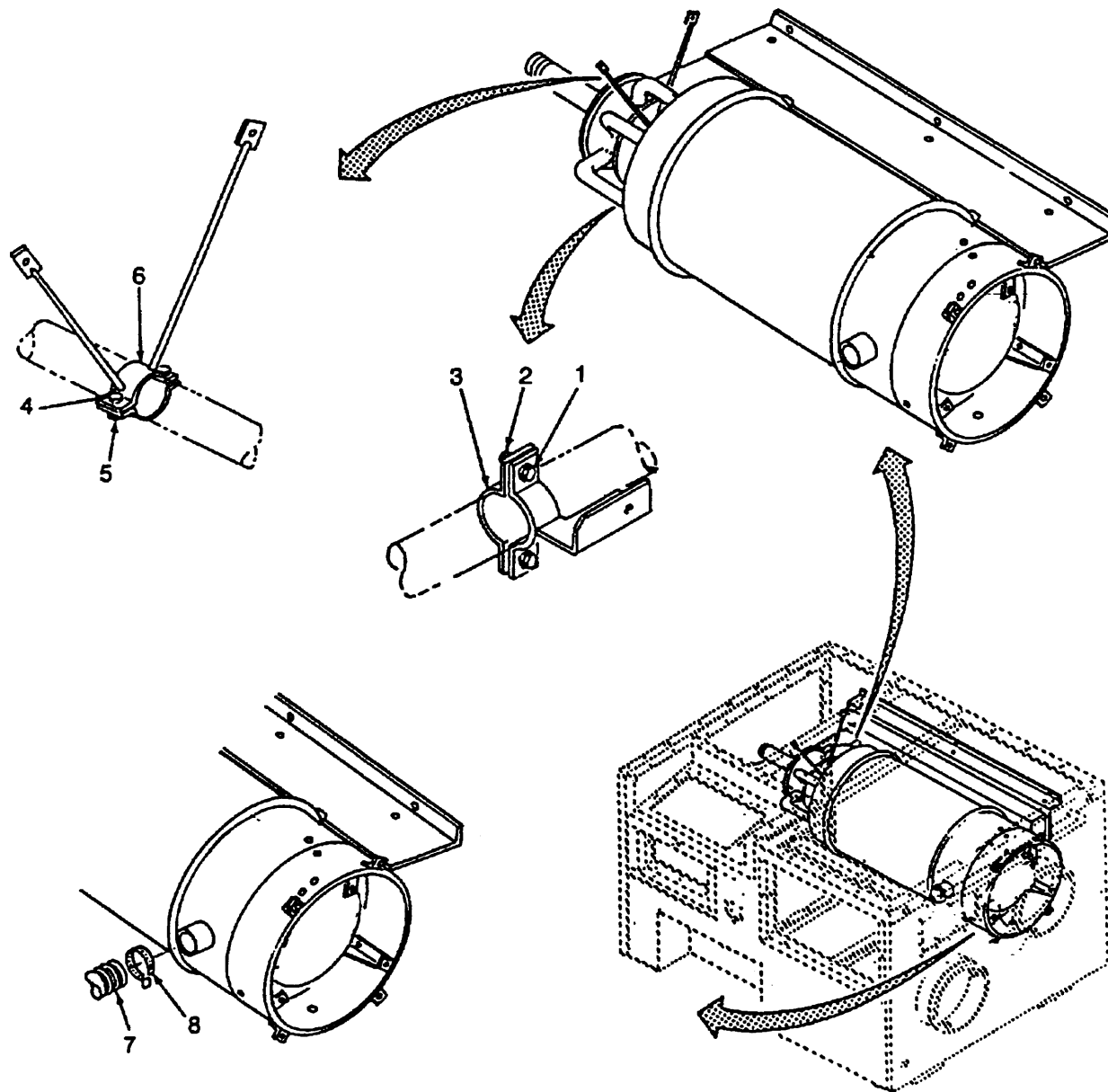


Figure 5-21. Heat Exchanger, (Model H120) Installation

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1).**

This task consists of:	a. Removal	b. Disassembly	c. Inspection
	d. Repair	e. Assembly	f. Installation

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 3, App B)  
Gloves (Item 5, App B)

**Equipment Condition:**

Unit disconnected from power source (para 2-8)  
Control box cover removed (para 4-18)  
Top panel removed (para 4-19)  
Rear panel removed (para 4-20)  
Jack assembly removed (para 4-37)  
Supply duct cover removed (para 4-22)  
Supply duct cover removed (para 4-22)  
Supply air screen removed (para 4-23)  
Burner assembly removed (para 4-33)  
Transformer assembly removed (para 4-32, 4-32A)

**Personnel:**

Two persons.

**Material/Parts:**

Lockwasher (Item 1, App H)  
Wire Ties (Item 9, App E)  
Anti-seize Compound (Item 3, App E)  
Lockwasher (Item 12, App E)

**General Safety Requirements:****WARNING**

**Edges of sheet metal can be sharp and cause injury.  
Gloves should be worn when handling the heat exchanger.**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**NOTE**

**Disassemble only to the level required to make repairs.**

**Insulation should only be removed when necessary to gain access to another part/component or replacement is necessary.**

- a. Removal (Refer to Figure 5- 21A)
  - (1) Loosen clamp (1) and remove hose (2).
  - (2) Remove six screws (3), six lockwashers (4), six flat washers (5) and shield (6). Discard lockwashers.
  - (3) Remove seven nuts (7), seven lockwashers (8), fourteen flat washers (9) and seven screws (10). Discard lockwashers.

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

- a. Removal - continued (Refer to Figure 5- 10)
  - (4) Remove six screws (11), six lockwashers (12) and six flat washers (13). Discard lockwashers.

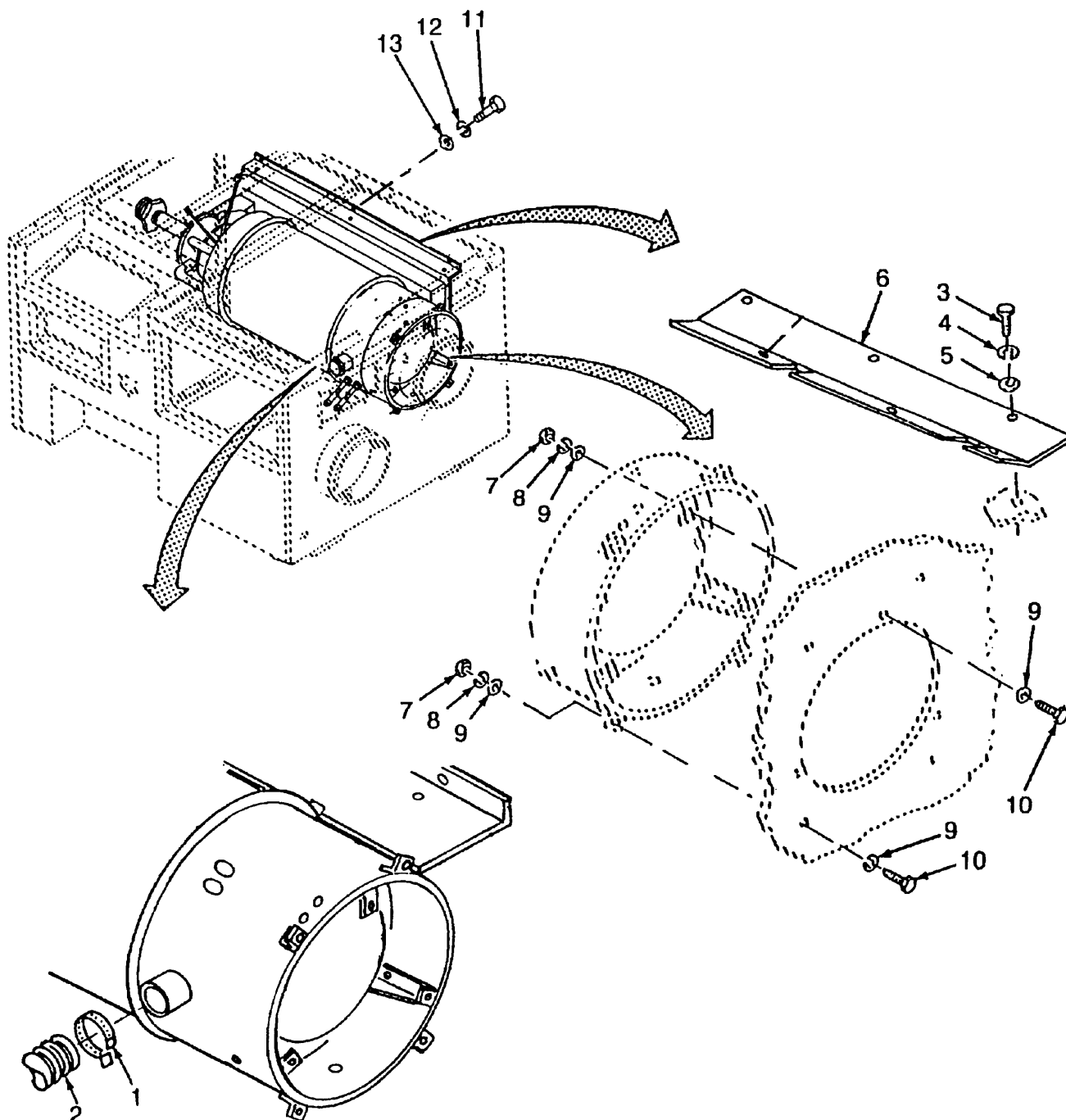


Figure 5-10. Heat Exchanger, (Model H120-1) Removal

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

## a. Removal - continued (Refer to Figure 5-11.1)

- (5) Remove two nuts (1), two lockwashers (2), four flat washers (3) and two screws (4). Discard lockwashers.
- (6) Remove one nut (5), one lockwasher (6), two flat washers (7) and one screw (8) from left side of brace (9). Discard lockwashers.
- (7) Remove second nut (5), second lockwasher (6), two flat washers (7), ground wire (10), star lockwasher (11), second screw (8) and brace (9).

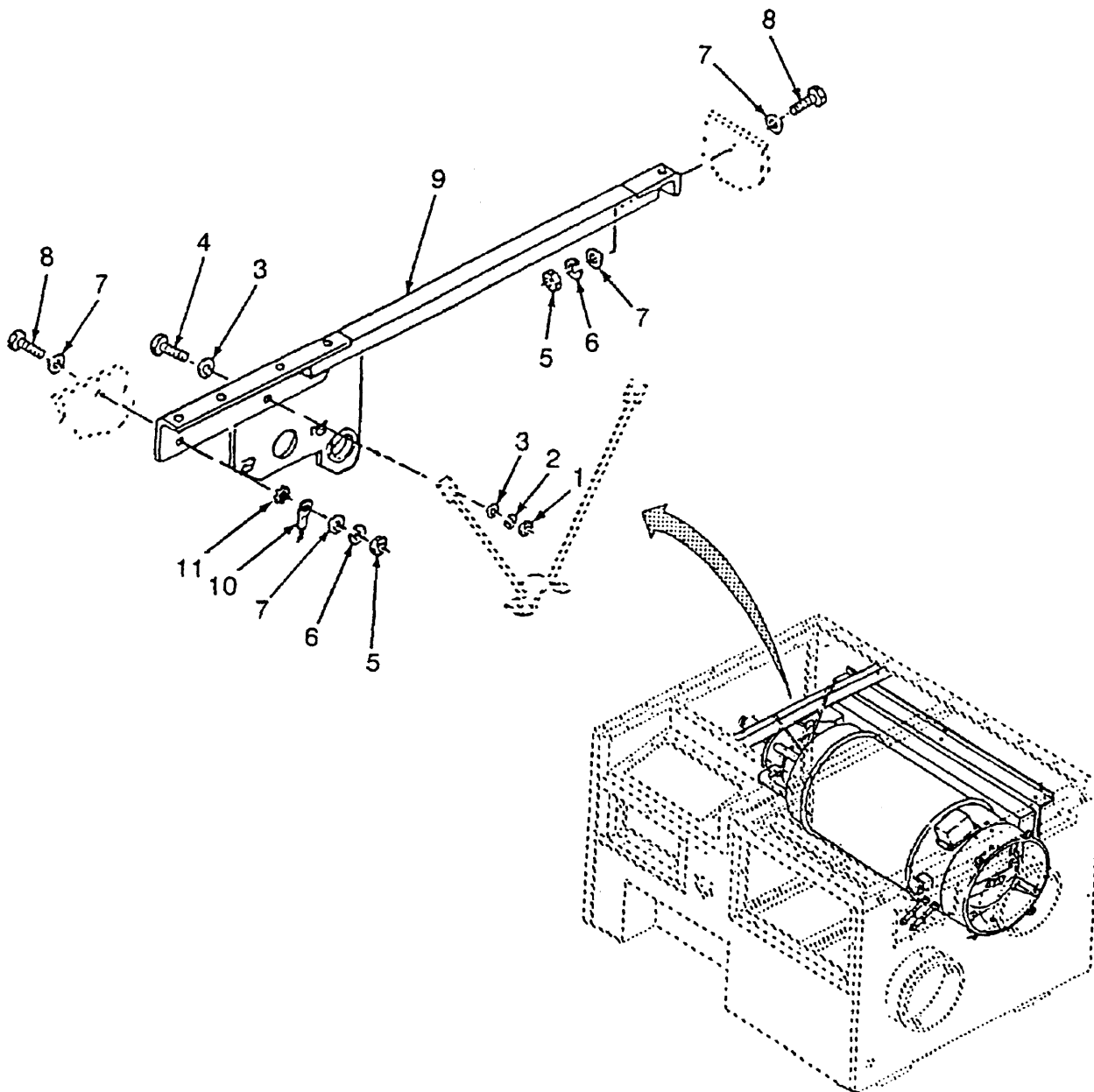


Figure 5-11.1. Heat Exchanger, (Model H120-1) Removal

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

- a. Removal - continued (Refer to Figure 5-12.1)

**WARNING**

Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.

**CAUTION**

Damage to heat exchanger will result if the last support screw removed without supporting the assembly. Support the front and rear of the heat exchanger prior to final removal of attaching hardware.

**NOTE**

Two individuals are required to remove the heat exchanger assembly.

- (8) One person supports the front end of the heat exchanger (1), the second person supports the rear end of the heat exchanger and removes screw (2), lockwasher (3) and flat washer (4) from top of frame (5). Discard lockwasher.
- (9) Remove heat exchanger (1) through rear of unit.

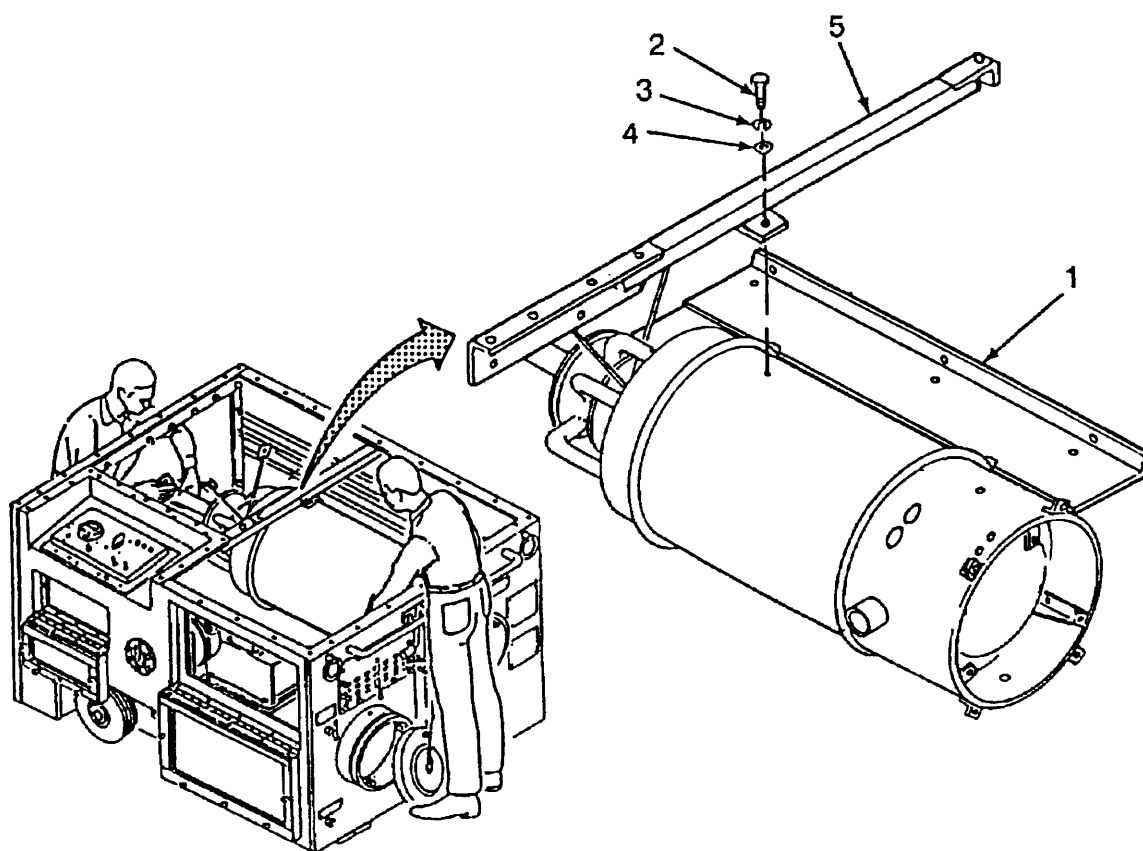


Figure 5-12.1. Heat Exchanger, (Model H120-1) Removal



**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

## b. Disassembly (Refer to Figure 5- 13.1)

- (1) Remove six nuts (1), six lockwashers (2), six screws (3) and twelve flat washers (4) from three brackets (5). Remove three brackets (5). Discard lockwashers.

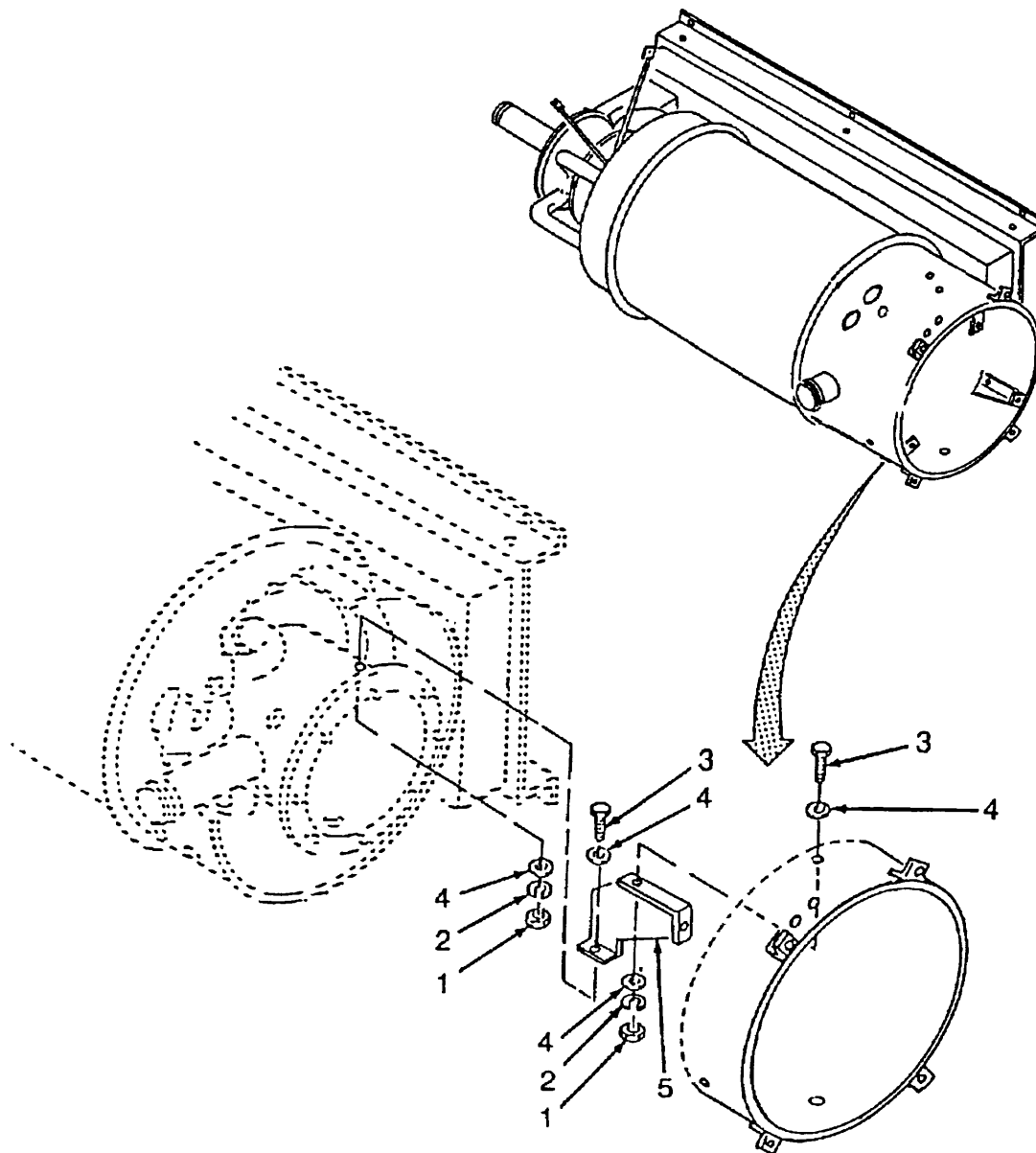


Figure 5-13.1. Heat Exchanger, (Model H120-1) Disassembly

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

## b. Disassembly - continued (Refer to Figure 5-14.1)

- (2) Remove six nuts (1), six lockwashers (2), six screws (3) and twelve flat washers (4) from two clamps (5). Discard lockwashers.

**NOTE**

**Shell must be tilted to allow clearance for the heat exchanger air inlet pipe.**

- (3) Remove heat exchanger shell (6) from the heat exchanger (7).
- (4) Remove two nuts (8), two lockwashers (9), two screws (10) and four flat washers (11) and clamp (12). Discard lockwashers.
- (5) Remove captive nuts (13) only if damaged and replacement is required.

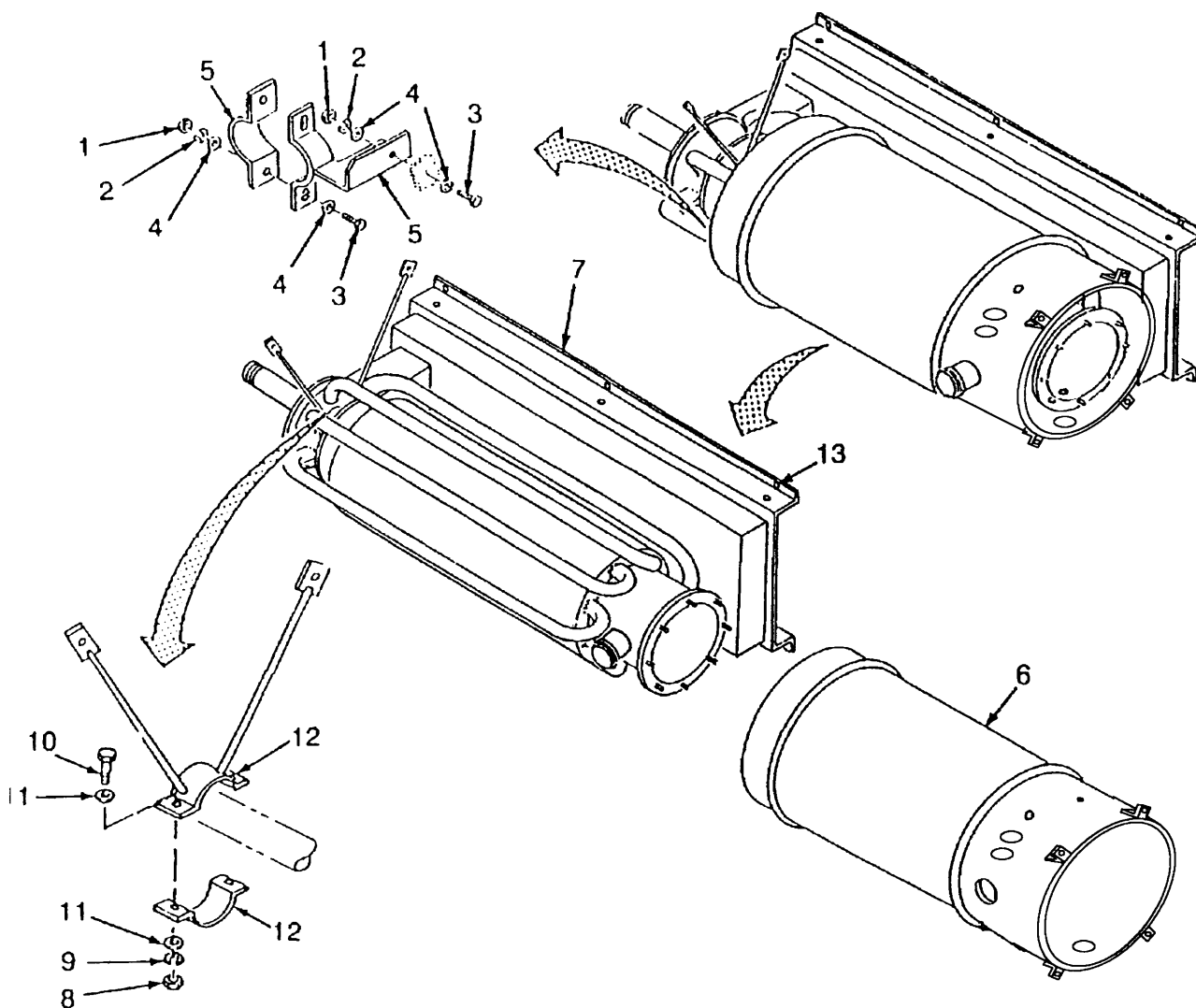


Figure 5-14.1. Heat Exchanger, (Model H120-1) Disassembly

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

## c. Inspection

- (1) Inspect all parts for wear, cracks, corrosion, bent or broken terminals.
- (2) Inspect all hardware for stripped or damaged threads.

## d. Repair

Repair limited to replacement of damaged parts.

## e. Assembly (Refer to Figure 5-15.1)

**WARNING**

**Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.**

**NOTE**

**The top tube of heat exchanger is between the top ends of clamp when properly positioned.**

- (1) Install clamp (1), four flat washers (2), two screws (3), two lockwashers (4) and two nuts (5) hand tight only. Hardware will be tightened during installation of assembly.

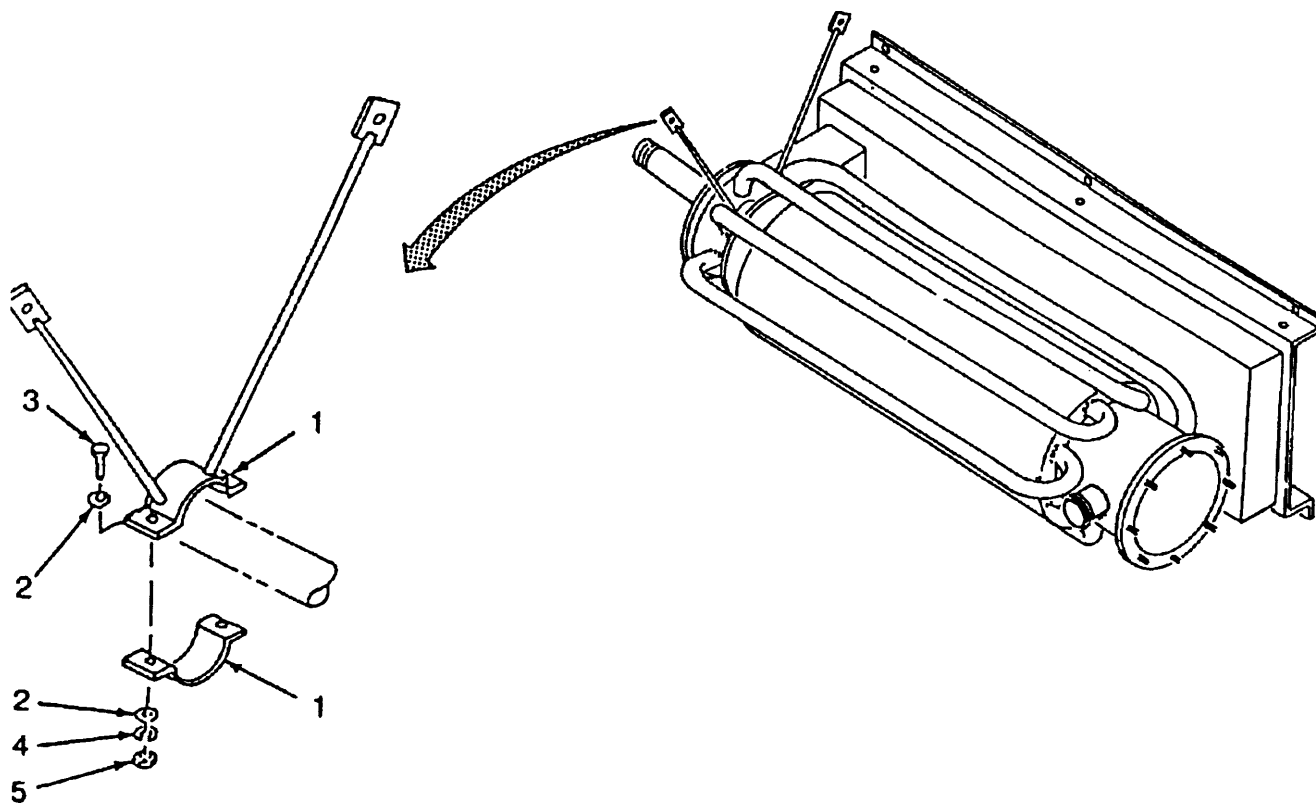


Figure 5-15.1. Heat Exchanger, (Model H120-1) Assembly

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

e. Assembly - continued (Refer to Figure 5-16.1)

- (2) Install any captive nuts (1) removed during disassembly.
- (3) Slide heat exchanger shell (2) onto heat exchanger (3) with air inlet pipe (4) aligned with large opening in side of shell.
- (4) Install two clamps (5) on heat exchanger (3), one on tube 5 and one on tube 7. Secure with eight flat washers (6), four screws (7), four lockwashers (8) and four nuts (9). Tighten hardware hand tight only, hardware will be tightened during installation of assembly.

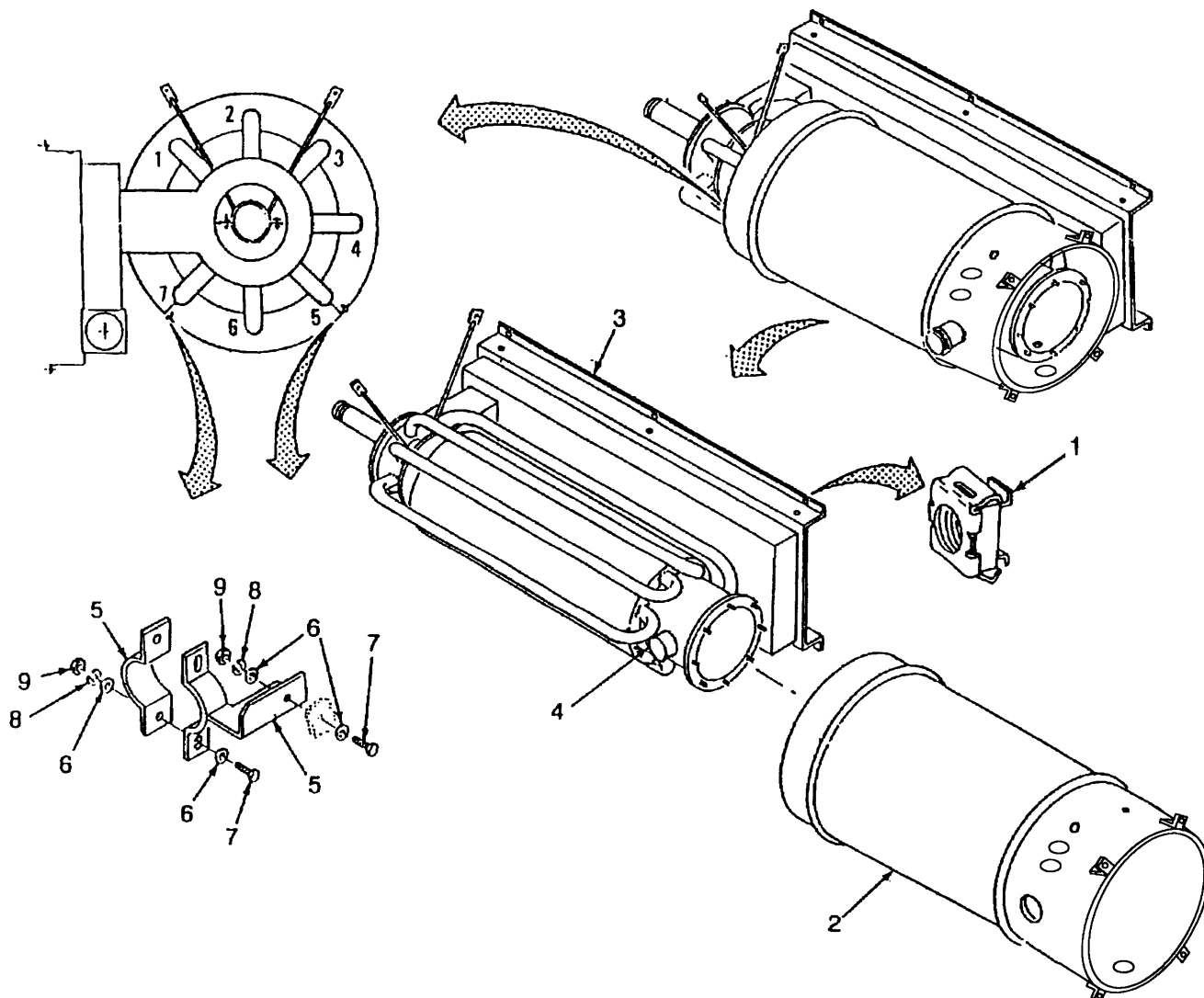


Figure 5-16.1. Heat Exchanger, (Model H120-1) Assembly

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

e. Assembly - continued (Refer to Figure 5-17.1)

- (5) Install three brackets (1) between heat exchanger (2), heat exchanger shell (3) and secure each with four flat washers (4), two screws (5), two lockwashers (6) and two nuts (7).

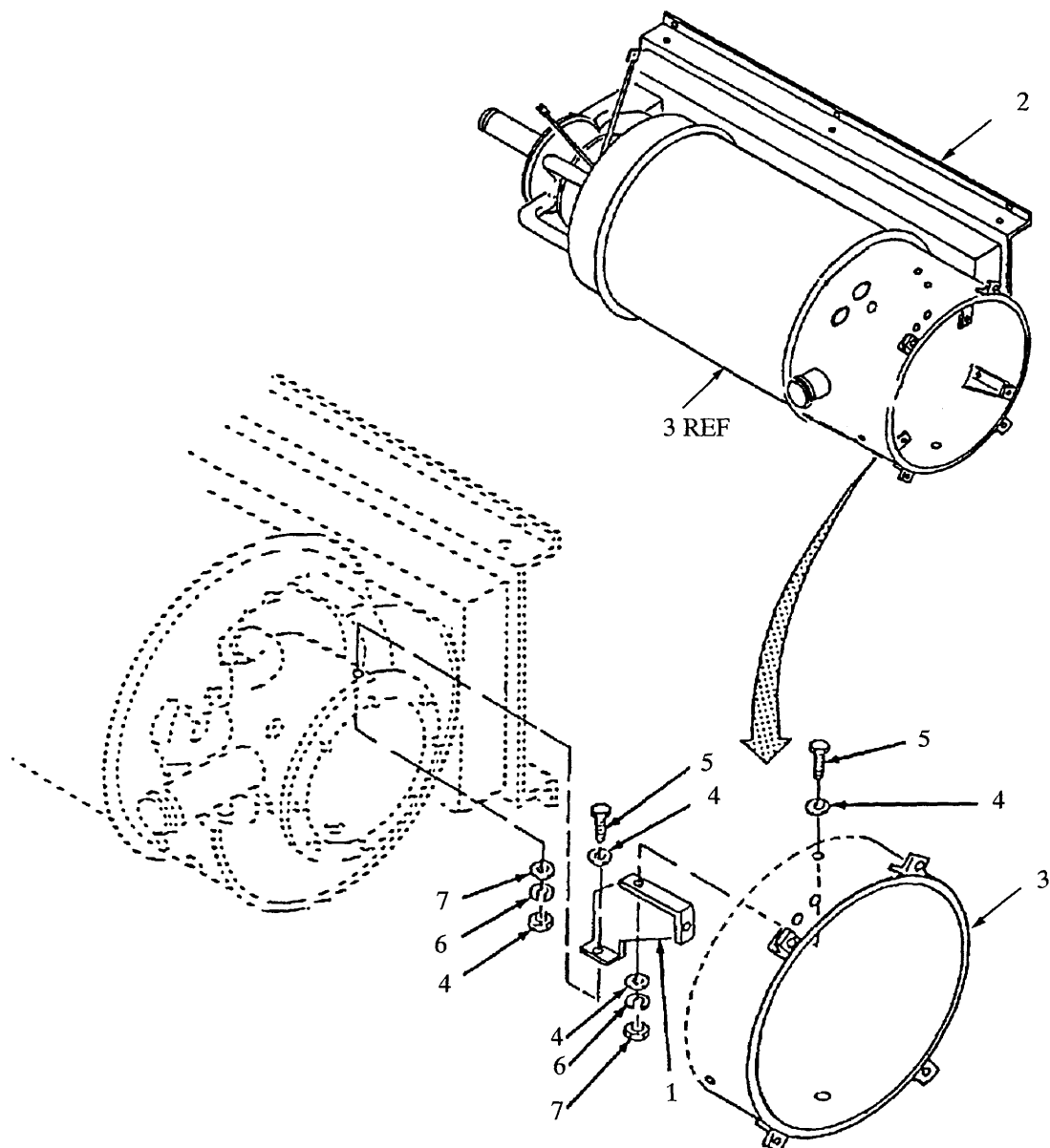


Figure 5-17.1. Heat Exchanger, (Model H120-1) Assembly

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

f. Installation (Refer to Figure 5-18.1)

**WARNING**

**Edges of sheet metal can be sharp and cause injury. Gloves should be worn when handling the heat exchanger.**

**NOTE**

**Two individuals are required to install the heat exchanger assembly.**

- (1) Lift the heat exchanger assembly (1) into the unit through the rear.
- (2) Apply anti-seize compound (Item 3, App E) to screw (2). Align the top of heat exchanger (1) with the tab on brace (3), install flat washer (4), lockwasher (5) and screw (2). Hand tighten only.
- (3) Install brace (3), secure left end of brace with two flat washers (6), screw (7), lockwasher (8) and nut (9). Secure the right end of brace with two flat washers (10), screw (11), star lockwasher (12), ground lead (13), lockwasher (14), and nut (15).
- (4) Secure clamp (16) to brace (3) with four flat washers (17), two screws (18), two lockwashers (19) and two nuts (20).

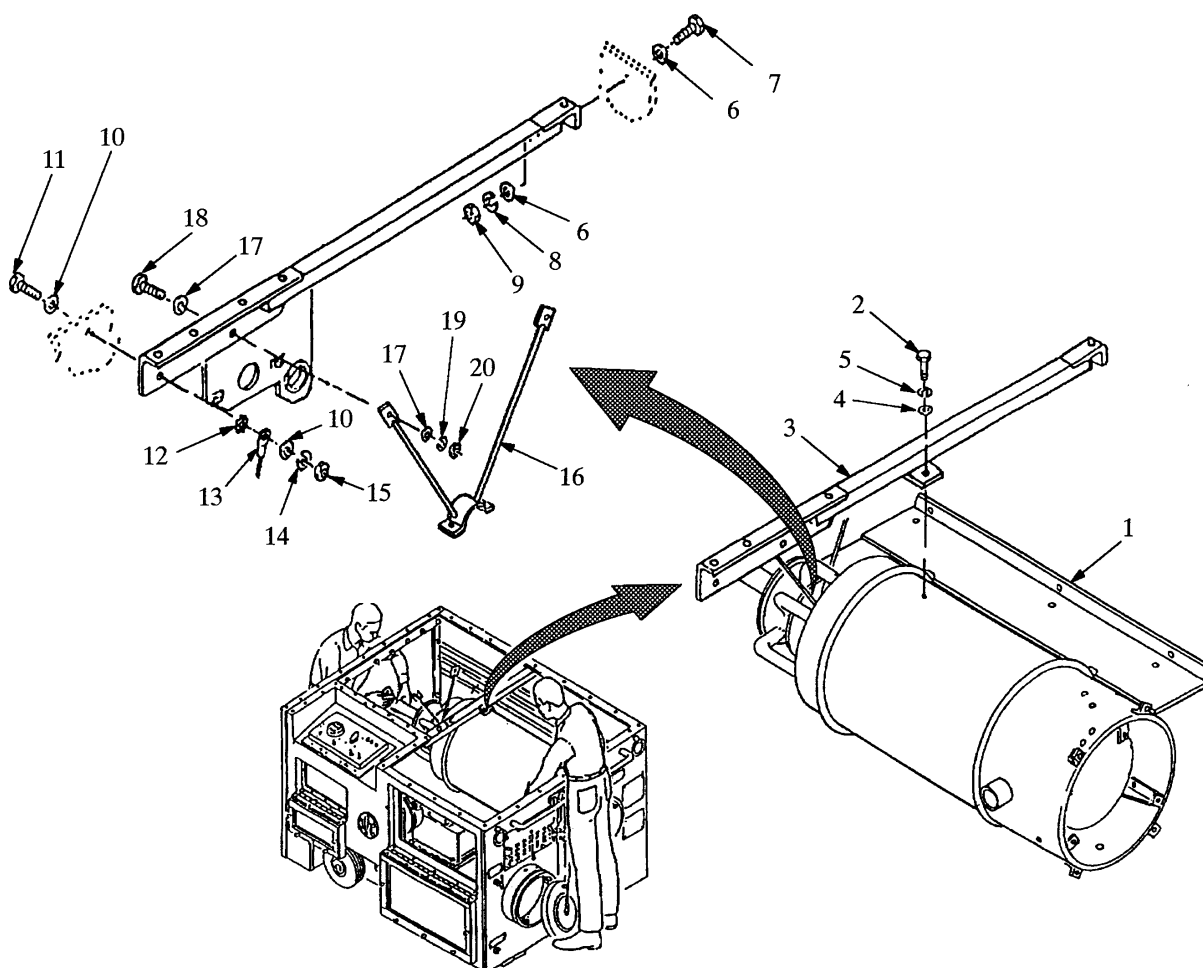


Figure 5-18.1. Heat Exchanger, (Model H120-1) Installation

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

f. Installation - continued (Refer to Figure 5-19.1)

- (5) Apply anti-seize compound (Item 3, App E) to six screws (1). Install six flat washers (2), six lockwashers (3), and six screws (1). Hand tighten only.
- (6) Align the front mounting tabs on heat exchanger (4) with the front of unit.
- (7) Install fourteen flat washers (5), seven screws (6), seven lockwashers (7), and seven nuts (8).
- (8) Tighten all the hardware installed in steps (2) and (5).
- (9) Apply anti-seize compound (Item 3, App E) to six screws (9). Install heat exchange shield (10), six flat washers (11), six lockwashers (12) and six screws (9).

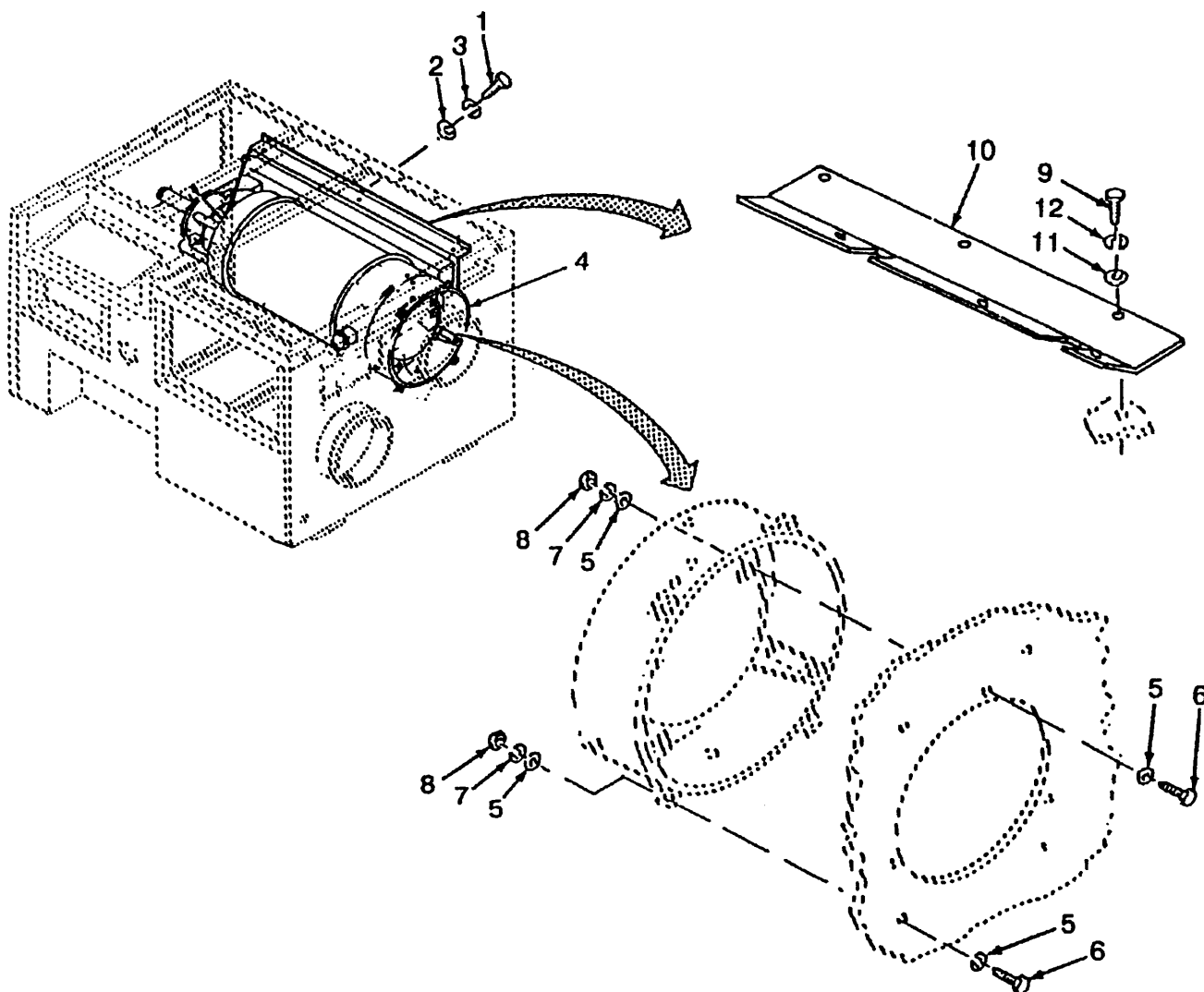


Figure 5-19.1. Heat Exchanger, (Model H120-1) Installation

**5-6A. HEAT EXCHANGER ASSEMBLY, (Model H120-1) - continued.**

- f. Installation - continued (Refer to Figure 5-20.1)
- (10) Tighten four screws (1) and four nuts (2) on two clamps (3).
  - (11) Tighten two screws (4) and two nuts (5) on clamp (6).
  - (12) Connect hose (7) and tighten clamp (8).

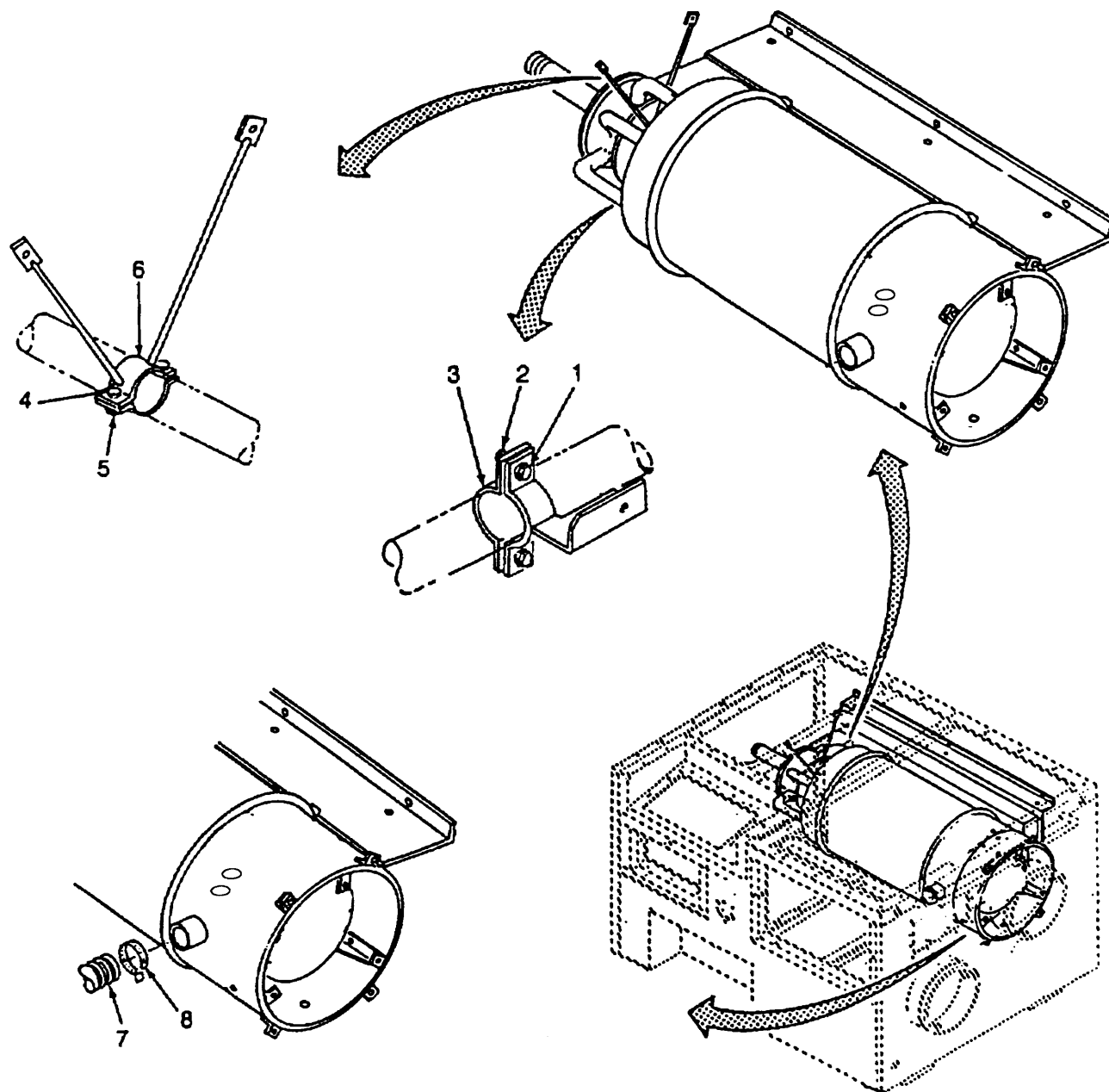


Figure 5-20.1. Heat Exchanger, (Model H120-1) Installation



**5-7. FRAME ASSEMBLY.**

This task consists of:                      a. Disassembly                      b. Inspection                      c. Repair                      d. Assembly

**INITIAL SETUP:****Tools:**

Tool Kit, General Mechanics (Item 3, App B)  
 Shop Set Automotive, Vehicle (Item 4, App B)  
 Riveter Blind (Item 5, App B)  
 Welding Shop (Item 6, App B)  
 Rivnut Tool (Item 7, App B)  
 Rivnut Tool (Item 9, App B)

**Personnel:**

Two persons.

**Material/Parts:**

Gasket (Item 33, App H)  
 Lockwashers (Item 1, App H)  
 Rivet (Item 31, App H)  
 Rivet (Item 18, App H)  
 Packing, Preformed (Item 34, App H)  
 Backup plate (Item 60, App F)

**General Safety Requirements:****WARNING**

**Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.**

**Equipment Condition:**

Exhaust pipe removed (para 4-14)  
 Duct assembly removed (para 4-15)  
 Remote control thermostat removed (para 4-16)  
 Control box cover removed (para 4-18)  
 ■ Top panel removed (para 4-19)  
 Rear panel removed (para 4-20)  
 Door assemblies removed (para 4-21)  
 Duct covers removed (para 4-22)  
 Supply and return air screens removed (para 4-23)  
 Fuel pressure gage removed (para 4-25)  
 Combust control relay removed (para 4-26)  
 Air pressure switch removed (para 4-27)  
 Thermostat assembly removed (para 4-28)  
 Combust fan assembly removed (para 4-29)  
 Fuel pump and solenoids removed (para 4-30)  
 Circulating air fan and motor removed (para 4-31, 5-4)  
 ■ Transformer removed (para 4-32, 4-32A)  
 Burner assembly removed (para 4-33)  
 ■ Heat exchanger removed (para 4-34,5-6, 5-6A)  
 Fuel tank assembly removed (para 4-35)  
 Power cable assembly removed (para 4-36)  
 Jack assembly removed (para 4-37)  
 Wheel assembly removed (para 4-38)  
 Damper assembly removed (para 4-39)  
 Frame assembly (para 4-40)  
 Control box assembly removed (para 5-3)

## 5-7. FRAME ASSEMBLY- continued.

**WARNING**

Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.

**NOTE**

Disassemble only to the level required to make repairs. Insulation should only be removed when necessary to gain access to another part/component or replacement is necessary.

## a. Disassembly (Refer to 5-22)

- (1) Remove four screws (1), four lockwashers (2), four flat washers (3) and fuel drain cover (4).
- (2) Remove gasket (5) from fuel drain cover (4).
- (3) Remove eight rivets (6), eight flat washers (7) and fuel drain ring (8).
- (4) Remove locknut (9), preformed packing (10) and fitting (11). Discard packing.

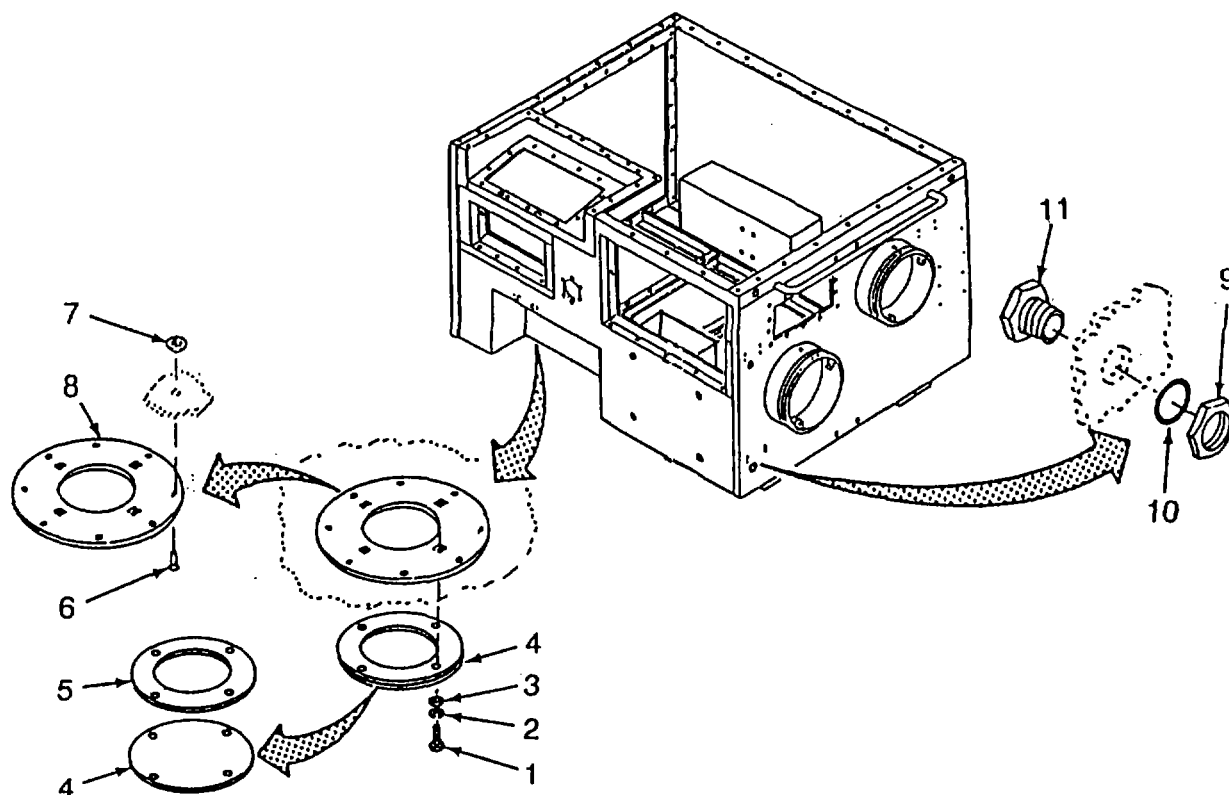


Figure 5-22. Frame Assembly

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**5-7. FRAME ASSEMBLY - continued.**

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- a. Disassembly - continued (Refer to 5-23)
- (5) Remove two nuts (1), two lockwashers (2), two screws (3), four flat washers (4) and heat exchanger support brace (5).
  - (6) Remove grommet (6).
  - (7) Remove rivnuts (7) as required.
  - (8) Remove receptacles (8) as required by drilling out two rivets (9).
  - (9) Remove four nuts (10), four lockwashers (11), flatwashers (12), four screws (13) and wheel pivot (14).

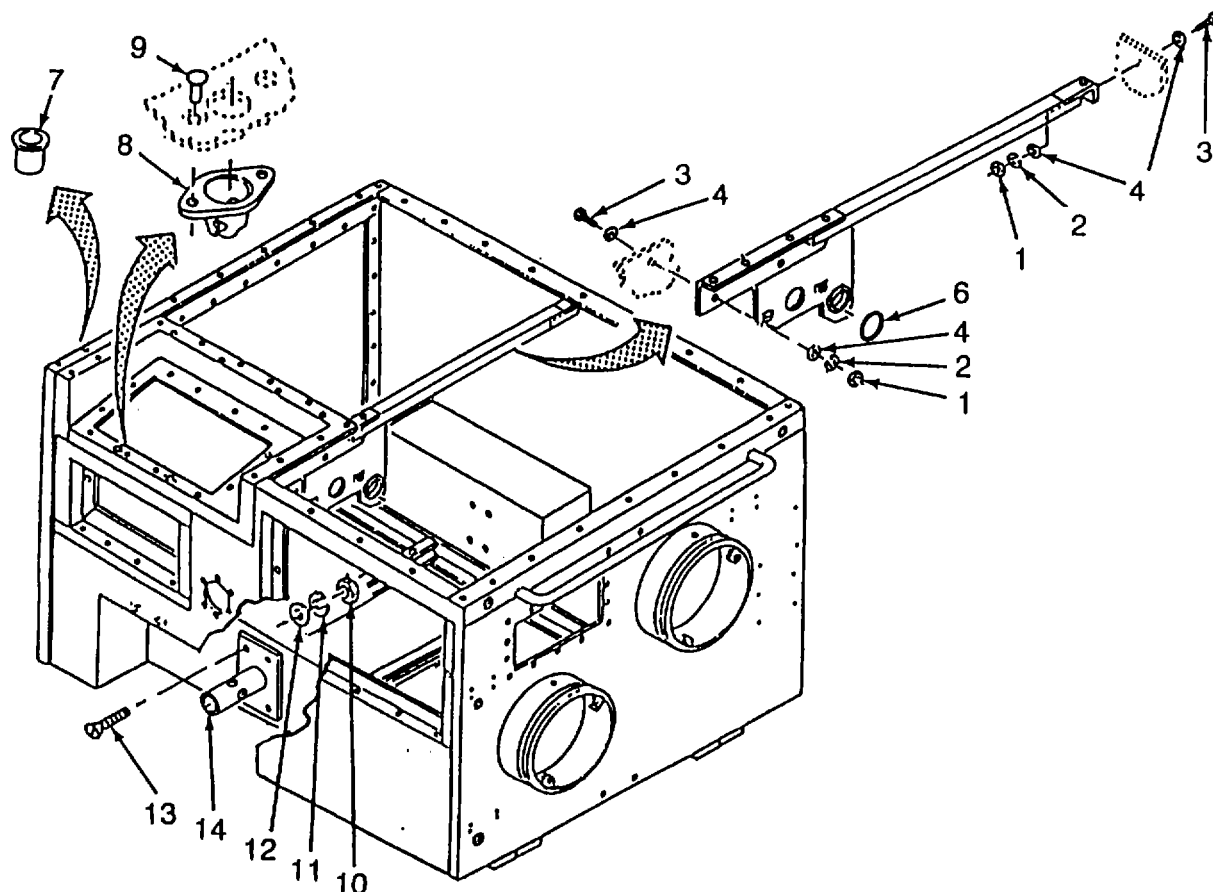


Figure 5-23. Frame Assembly

**5-7. FRAME ASSEMBLY - continued.**

a. Disassembly - continued (Refer to figure 5-24) (Index numbers refer to App F)

(10) Remove insulation as required.

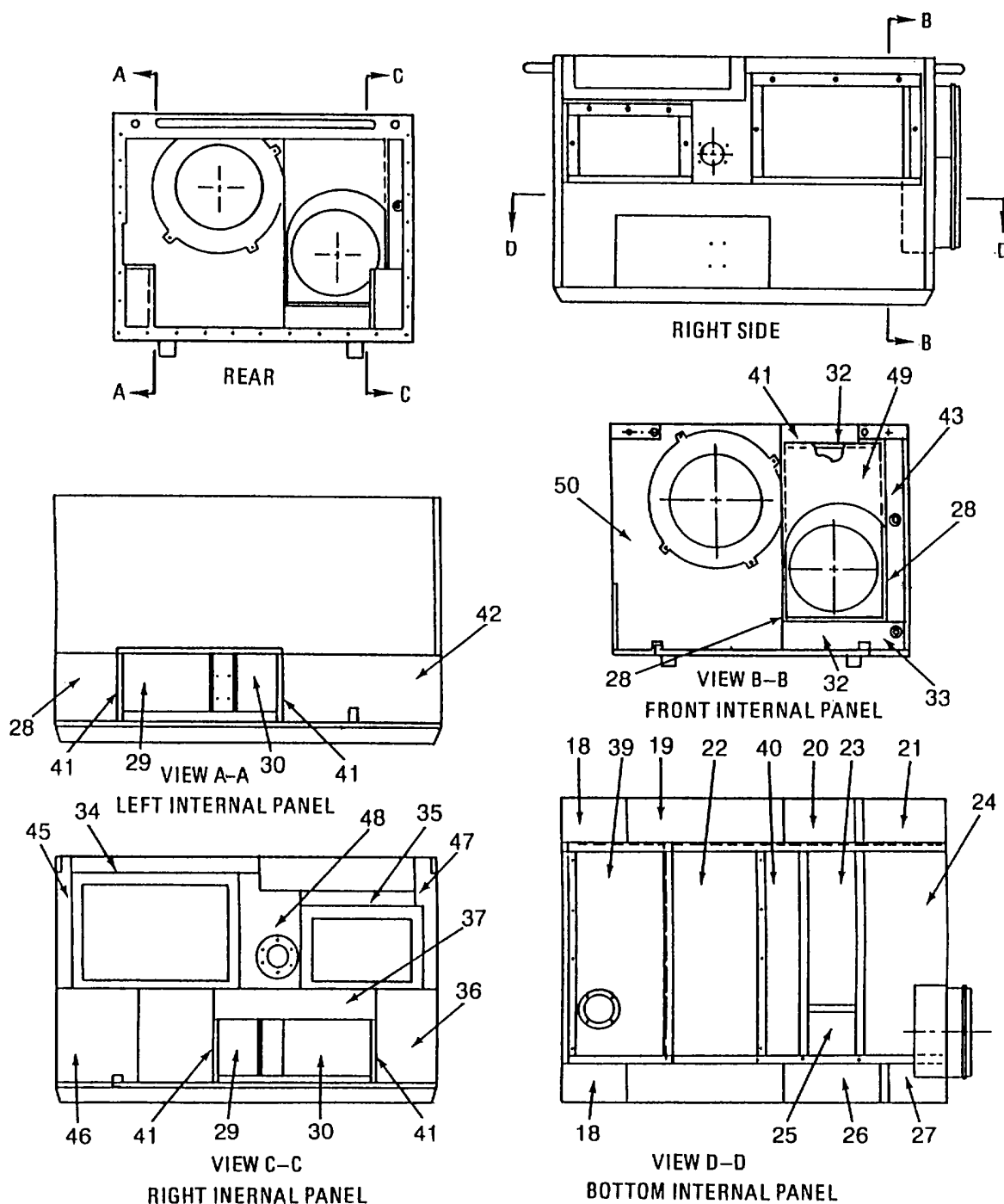


Figure 5-24. Frame Assembly

**5-7. FRAME ASSEMBLY - continued.**

## b. Inspection

Inspect for cracks, broken locks, rivets and broken frame parts.

## c. Repair

(a) Weld frame as required in accordance with TM 9-237.

(b) Paint frame in accordance with TM 40-0139.

## d. Assembly (Refer to Figure 5-25)

(1) Install receptacles (1) as required by installing two rivets (2).

(2) Install rivnuts (3) as required.

(3) Install heat exchanger brace (4) and secure with four flat washers (5), two screws (6), two lockwashers (7), two nuts (8) and grommet (9).

(4) Install wheel pivot (10), four screws (11), four flatwashers (12), four lockwashers (13) and four nuts (14).

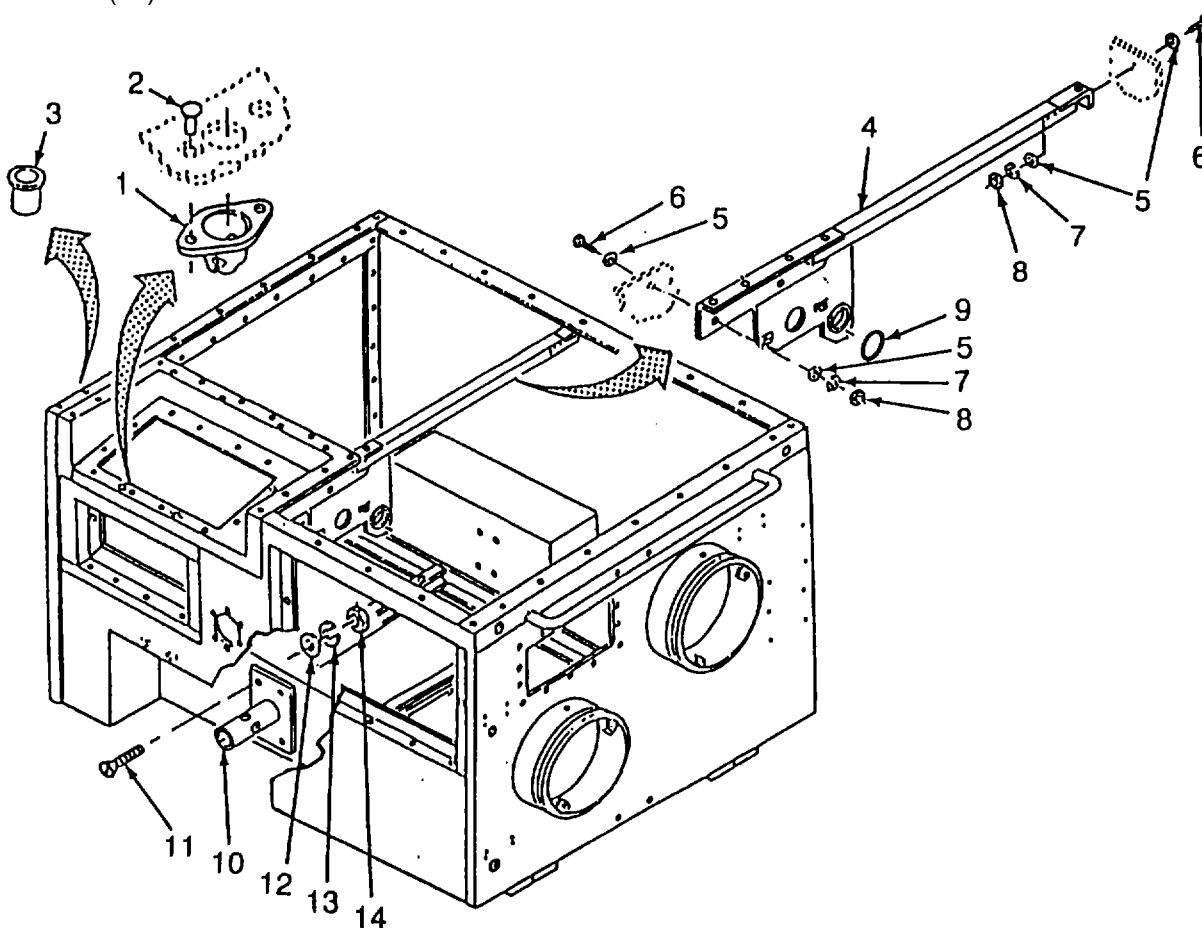
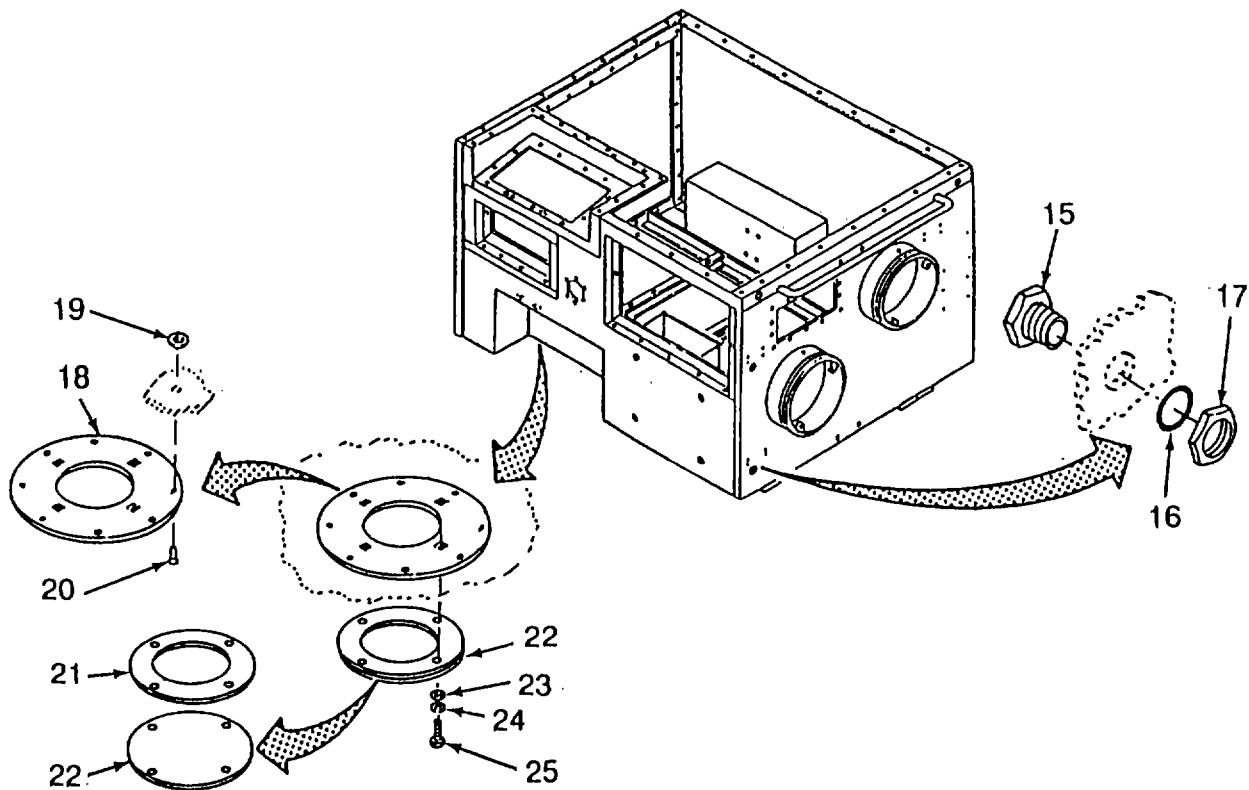


Figure 5-25. Frame Assembly (Sheet 1 of 2)

**5-7. FRAME ASSEMBLY - continued.**

- d. Assembly - continued. (Refer to Figure 5-25)
- (5) Install nylon liquid tight fitting (15), preformed packing (16) and steel locknut (17).
  - (6) Install fuel drain ring (18) and secure with eight backup washers (19) and eight rivets (20).
  - (7) Install gasket (21) on drain cover (22).
  - (8) Install drain cover (22), four flat washers (23), four lockwashers (24) and four screws (25).

**Figure 5-25. Frame Assembly (Sheet 2 of 2)**

**5-7. FRAME ASSEMBLY - continued.**

d. Assembly - continued (Refer to Figure 5-26) (Index numbers refer to App F)

(9) Install insulation, if removed.

(a) Insulation in bottom of unit is placed in without adhesive.

(b) Insulation on all other areas of frame are attached using adhesive (Item 8, App E).

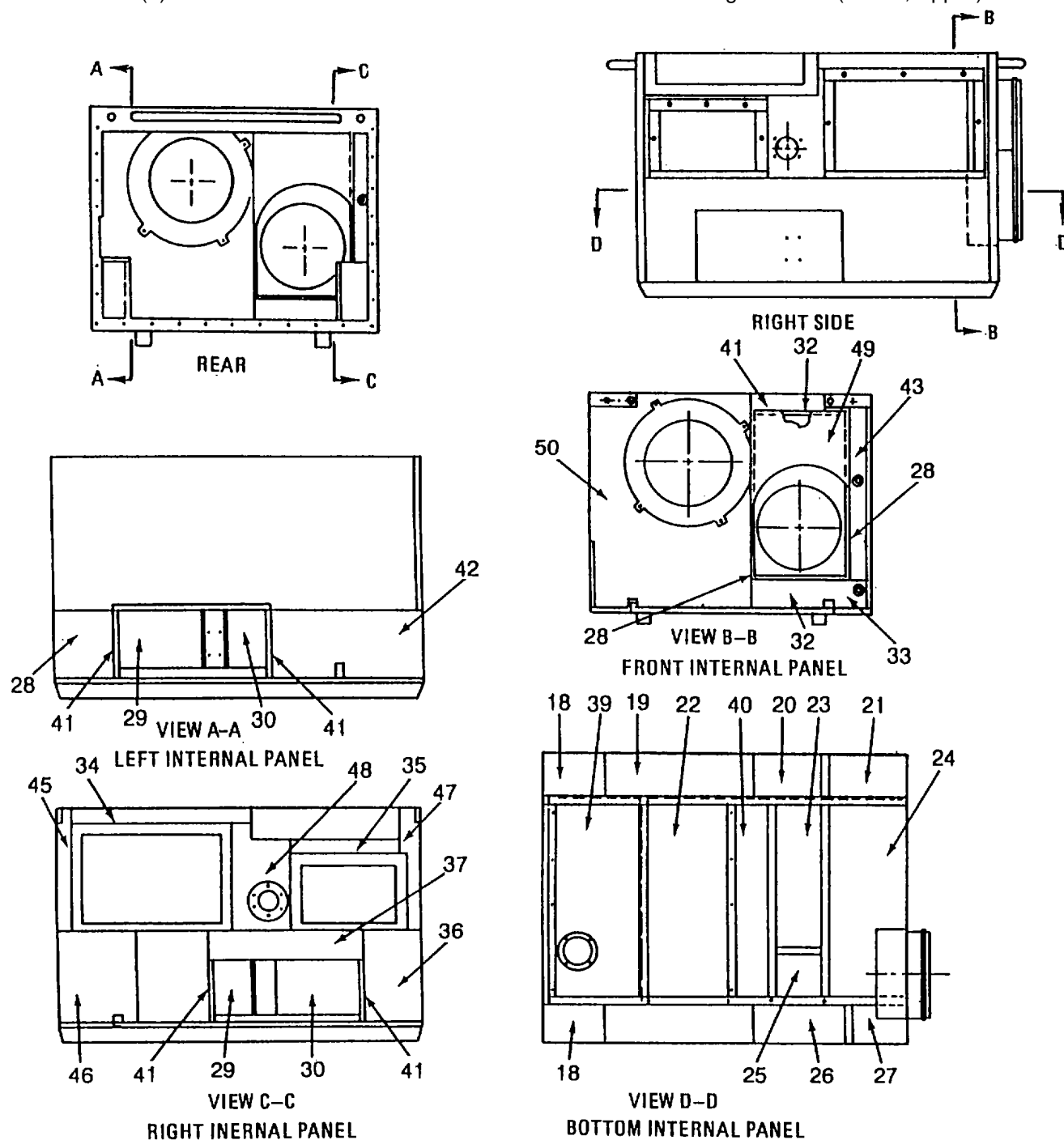


Figure 5-26. Frame Assembly

**CHAPTER 6**  
**GENERAL SUPPORT MAINTENANCE**

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No General Support Maintenance is required on the ASH Unit.



## APPENDIX A

## REFERENCES

**A-1. SCOPE**

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual. Also listed are publications that should be consulted for additional information.

**A-2. FORMS**

Recommended Changes to Publications and Blank Forms .....	DA Form 2028
Recommended Changes to Publications .....	DA Form 2028-2
Equipment Inspection and Maintenance Worksheet .....	DA Form 2404
Maintenance Request .....	DA Form 2407
Equipment Log Assembly (Records) .....	DA Form 2408-9
Product Quality Deficiency Report .....	SF Form 368

**A-3. FIELD MANUALS**

NBC Contamination Avoidance .....	FM 3-3
NBC Protection .....	FM 3-4
NBC Decontamination .....	FM 3-5
Petroleum Supply Point Equipment and Operation .....	FM 10-68
Rigging, Loading and Dropping Procedures .....	FM 10-564
First Aid for Soldiers .....	FM 21-11
Basic Cold Weather Manual .....	FM 31-70
Northern Operations .....	FM 31-71

**A-4. TECHNICAL MANUALS**

Welding Theory and Application .....	TM 9-237
RPSTL for Army Space Heater (ASH) .....	TM 9-4520-258-24P
Painting Instructions for Army Material .....	TM 43-0139
Destruction of Army Material to Prevent Enemy Use .....	TM 750-244-3

**A-5. MISCELLANEOUS**

Security Procedures .....	AR 190-11, AR 190-13
Packing of Army Material for Shipment and Storage .....	AR 746-1
The Army Maintenance Management System .....	DA PAM 738-750
Functional Users Manual for the Army Maintenance Management Systems -- Aviation (TAMMS-A) .....	DA PAM 738-751

## APPENDIX B

## MAINTENANCE ALLOCATION CHART

## Section I. INTRODUCTION

**B-1. GENERAL.**

- a. This section provides a general explanation of all maintenance and repair function authorized at various maintenance levels under the standard Army Maintenance System concept.
- b. The Maintenance Allocation Chart (MAC) in Section II designates overall authority and responsibility for performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels, which are shown on the MAC in column (4) as:

Unit includes two subcolumns, c (operator/crew) and o (unit) maintenance.

Direct Support includes an F subcolumn.

General Support includes an H subcolumn.

Depot includes a D subcolumn.

- c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.
- d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

**B-2. MAINTENANCE FUNCTIONS.**

Maintenance functions will be limited to and are defined as follows:

- a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).
- b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.
- c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.
- d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.
- e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

**B-2. MAINTENANCE FUNCTIONS - continued.**

- f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.
- i. Repair. The application of maintenance services, including fault location/troubleshooting,<sup>2</sup> removal/installation, and disassembly/assembly<sup>3</sup> procedures, and maintenance actions<sup>4</sup> to identify troubles, and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly) end item, or system.
- j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.
- k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army

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<sup>1</sup>Services Inspect, test, service, adjust, align, calibrate, and/or replace.

<sup>2</sup>Fault location/troubleshooting The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UTT).

<sup>3</sup>Disassembly/assembly The step-by-step breakdown (taking apart) of a spare/functional group coded item to the level of its least component, that is assigned an SMR code for the level of maintenance under consideration (i.e., identified as maintenance significant).

<sup>4</sup>Actions Welding, grinding, riveting, straightening, facing, machining, and/or resurfacing.

**B-3. EXPLANATION OF COLUMNS IN THE MAC - SECTION II.'**

- a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group numbers are "00".
- b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.
- c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For a detailed explanation of these functions, see paragraph B-2).
- d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a work time figure (expressed as man-hours shown as whole hours or decimals) in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in Column (3). This figure represents the active time required to perform that maintenance function at the indicated level of maintenance. If the number or the complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation item including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform

the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The system designations for the various maintenance levels are shown on the following page.

C ..... Operator or crew  
 O ..... Unit Maintenance  
 F ..... Direct Support Maintenance  
 L ..... Specialized Repair Activity (SRA)<sup>5</sup>  
 H ..... General Support Maintenance  
 D ..... Depot Maintenance

- e. Column 5, Tools and Equipment. Column 5 specifies, by code, those common tool sets (not individual tools) common TMDE, and special tools, special TMDE, and support equipment required to perform the designated function. Codes are keyed to tools and test equipment in section III.
- f. Column 6, Remarks. This column, when applicable, contains a letter code, in alphabetic order, which is keyed to the remarks contained in Section IV.

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<sup>5</sup>This maintenance level is not included in Section II, column (4) of the Maintenance Allocation Chart. Functions to this level of maintenance are identified by a work-time figure in the "H" column of Section II, column (4), and an associated reference code is used in the Remarks column (6). This code is keyed to Section IV, Remarks, and the SRA complete repair application is explained there.

**B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.**

- a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.
- b. Column 2, Maintenance Level. The lowest category of maintenance authorized to use the tool or test equipment.
- c. Column 3, Nomenclature. Name or identification of the tool or test equipment.
- d. Column 4, National Stock Number. The national stock number of the tool or test equipment.
- e. Column 5, Tool Number. The manufacturer's part number.

**B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.**

- a. Column 1, Reference Code. The code recorded in column 6, Section II.
- b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

**Section II. MAINTENANCE ALLOCATION CHART  
FOR  
ARMY SPACE HEATER**

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	Army Space Heater, 120,000 BTU/HR	Inspect Repair Replace Service	2.0	2.2 25.0 26.5 .5	1.3 13.0 14.0			1,2,3,4,5,6, 7,8,9,10	A,B,C,D,E
01	Exhaust Pipe, Hose, Covers, Doors and Panels Installation	Inspect Repair Replace	.7	3.5 7.0				1,2,3,4,5 1,2	A
0101	Cover Assembly, Control	Inspect Repair Replace	.1	5 1.0				1,2 1,2	
0102	Panel Top Assembly	Inspect Repair Replace	.1	.5 1.0				1,2 1,2	
0103	Panel Assembly, Rear	Inspect Repair Replace	.1	.5 1.0				1,2,5 1,2	
010301	Door, Access	Inspect Repair Replace	.1	.5 1.0				1,2 1,2	
0104	Door Assembly, Front Side	Inspect Repair Replace	.1	.5 1.0				1,2 1,2	
0105	Door Assembly, Side	Inspect Repair Replace	.1	.5 1.0				1,2 1,2	
0106	Cover, Duct Assembly	Inspect Repair Replace	.1	.5 1.0				1,2,3,4 1,2	

## Section II. MAINTENANCE ALLOCATION CHART - continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
02	Control and Combustion Assemblies	Inspect Repair Replace Installation	.4	2.5 2.0	2.5 3.0			1,2,3,4 1,2,3,4	A
0201	Control Assembly	Inspect Repair Replace	.2		2.5 3.0			3,4 3,4	
020101	Control Box	Inspect Repair Replace	.1		1.0 2.0			1 3,4 3,4	
02010101	Panel Assembly	Inspect Repair Replace	.1		1.5 1.0			3,4 3,4	
0202	Tube Assembly	Inspect Repair Replace	.1	1.0 1.0				1,2 1,2	
0203	Combustion Assembly	Inspect Repair Replace	.1	1.5 1.0				1,2 1,2	
03	Hose, Tube and Tank Assemblies Installation	Inspect Repair Replace	.4	.2 4.5 3.0				1,2, 1,2	A
0301	Hose Assembly, External Fuel	Inspect Repair Replace	.1	1.0 .5				1,2 1,2	
0302	Tube Assembly	Inspect Repair Replace	.1	.1 1.0 .5				1,2 1,2	B
0303	Tube Assembly	Inspect Repair Replace	.1	.1 1.0 .5				1,2 1,2	B

## Section II. MAINTENANCE ALLOCATION CHART - continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0304	Tube Assembly	Inspect Repair Replace	.1	.1 1.0 .5				1,2 1,2	B
0305	Tank, Fuel Assembly	Inspect Repair Replace	.1	.1 1.5 1.5				1,2 1,2	
030501	Tank, Fuel, Engine	Inspect Repair Replace	.1	.1 1.5 1.5				1,2 1,2	
0306	Cover, Fuel Drain	Inspect Repair Replace	.1	1.0 .5				1,2 1,2	
04	Circulating Air Fan/Pump/Motor Assembly	Inspect Repair Replace	.1	2.0 2.0				3,4 1,2	
0401	Fan, Pump, and Motor Assembly	Inspect Repair Replace	.1	2.0 2.0				3,4, 1,2	
05	Hose, Fan and Mount Installation	Inspect Repair Replace	.1	2.0 2.0				1,2 1,2	
0501	Fan and Mount, Combustion Air	Inspect Repair Replace	.1	2.0 2.0				1,2 1,2	
06	Heat Exchanger Assembly	Inspect Repair Replace	.1	.3 2.5 3.0	1.0 4.0 4.0			1,2,3,4,8 1,2,3,4,8	
0601	Plate, Cover	Inspect Repair Replace	.1	.1 .5 1.0				1,2 1,2	



## Section II. MAINTENANCE ALLOCATION CHART - continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0602	Thermostat Assembly	Inspect Repair Replace		.1 1.0 1.0				1,2 1,2	
060201	Wiring Harness	Inspect Repair Replace		.1 1.0 1.0				1,2,8 1,2,8	
0603	Heat Exchanger	Inspect Repair Replace			.5 2.0 2.0			3,4 3,4	
0604	Burner Assembly	Inspect Repair Replace			.5 2.0 2.0			3,4 3,4	
07	Remote Thermostat Assembly Installation	Inspect Repair Replace		.4 2.0 1.5				1,2,8 1,2,8	A
0701	Remote Thermostat Assembly	Inspect Repair Replace		.2 1.0 1.0				1,2,8 1,2,8	
0702	Thermostat Cable Assembly	Inspect Repair Replace		.2 1.0 .5				1,2,8 1,2,8	
08	Power Cable Assembly(P1)	Inspect Repair Replace		.2 1.0 .5				1,2,8 1,2,8	
09	External Electrical Lead Assembly	Inspect Repair Replace		.2 1.0 .5				1,2,8 1,2,8	
10	Internal Power Thermostat Cable (J3)	Inspect Repair Replace		.2 1.0 1.0				1,2,8 1,2,8	

## Section II. MAINTENANCE ALLOCATION CHART - continued.

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS & EQUIP.	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
11	Jack and Wheel Installation	Inspect Repair Replace Service		.2 1.0 1.0 .5				1,2 1,2	A
1101	Wheel Assembly	Inspect Repair Replace Service		.2 1.0 1.0 .5				1,2 1,2	
12	Grille and Damper Installation	Inspect Repair Replace		.1 1.0	.1 2.0 1.0			3,4 1,2,3,4	A
1201	Damper Assembly	Inspect Repair Replace		.1 1.0	.1 2.0 1.0			3,4 1,2	
120101	Door Assembly	Inspect Repair Replace		.1 1.0	1.0			3,4 1,2,3,4	
120102	Frame-Damper Assembly	Inspect Repair Replace			.1 1.0 1.0			3,4 3,4	
13	Eyebolt, Tiedown and Frame Installation	Inspect Repair Replace		.1 1.0 1.0	.2 2.5 4.0			1,2,5,6,7,9,10 1,2,3,4	A
1301	Support. Control Box	Inspect Repair Replace		.1 1.0 1.0				1,2,5 1,2	
1302	Frame Assembly	Inspect Repair Replace			.2 2.5 4.0			6,7,9,10 3,4	E

## Section III. TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) REFERENCE CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER (NSN)	(5) TOOL NUMBER
1	O	Tool Kit, General Mechanics	5180-00-177-7033	SC 5180-90-CL-N26
2	O	Shop Set Automotive, Vehicle	4910-00-754-0654	SC-4910-95-CL-A74
3	F	Tool Kit, General Mechanics	5180-00-699-5273	SC-5180-90-CL-N05
4	F	Shop Set, Electrical Repair Kit	4940-00-294-9517	SC-4940-95-CL-B05
5	O	Riveter, Blind, Hand	5120-00-017-2849	200 OR EQUIVALENT (CAGE 10054)
6	F	Shop Equipment, Welding Field Maintenance	4940-00-357-7268	SC-4910-95-CL-B-19 -HR
7	F	Rivnut Tool		C-845/10-32 (03481)
8	O	Multimeter	5180-00-596-1474	AN/PSM-45
9	F	Rivnut Tool		C-845 / 1/4"-20 (03481)
10	F	Rivnut Tool		C-772 / 5/16-18 (03481)

## Section IV. REMARKS

REFERENCE CODE	REMARKS
A	This functional group number is for installation purposes only. Several replacement components and significant components are combined under this function group to ensue no maintenance functions were deleted.
B	This functional group covers the maintenance functions of several tube assemblies.
C	Power Transformers are not interchangeable between models.
D	Replace jack assembly on model H-120 with P/N 60225-1.
E	Welding procedures refer to TM 9-237(Welding Theory and Application).

## APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST

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## Section I. INTRODUCTION

**C-1. SCOPE.**

This appendix lists components of end item and basic issue items for the Army Space Heater (ASH), Model H120 to help you inventory items required for safe and efficient operation.

**C-2. GENERAL.**

The Components of End Item and Basic Issue Items List are divided into the following sections:

- a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.
- b. Section III. Basic Issue Items. These are the minimum essential items required to place the Army Space Heater in operation. Although shipped separately packaged, BII must be with the Army Space Heater during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

**C-3. EXPLANATION OF COLUMNS.**

The following provides an explanation of columns found in the tabular listing:

- a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.
- b. Column (2) - National Stock Number. Indicates the national stock number assigned to the item and will be used for requisitioning purposes.
- c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC), in parentheses followed by the part number.
- d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).
- e. Column (5) - Quantity required (Qty rqd). Indicates the quantity of the item authorized to be used with/on the equipment.

## Section II. COMPONENTS OF END ITEM

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC and Part Number	(4) U/M	(5) QTY. RQD
1	4720-01-389-9929	Duct, Return/Supply Air (16632) M38386B2D015	EA	2
2	4520-01-398-8361	Exhaust Elbow (90598) 60557-100	EA	1
3	4520-01-399-0872	Exhaust Pipe and Guard Assembly (90598) 60561-100	EA	1
4		External Fuel Hose (90598) 60490-100 (Model H120) (90598) 60210-100 (Model H120-1)	EA	1
5		Remote Thermostat Assembly (90598) 60410-100	EA	1
6	6150-01-335-3449	Power Cable Adapter, (Lead Assembly, Electrical) (97403) 13229E8567	EA	1

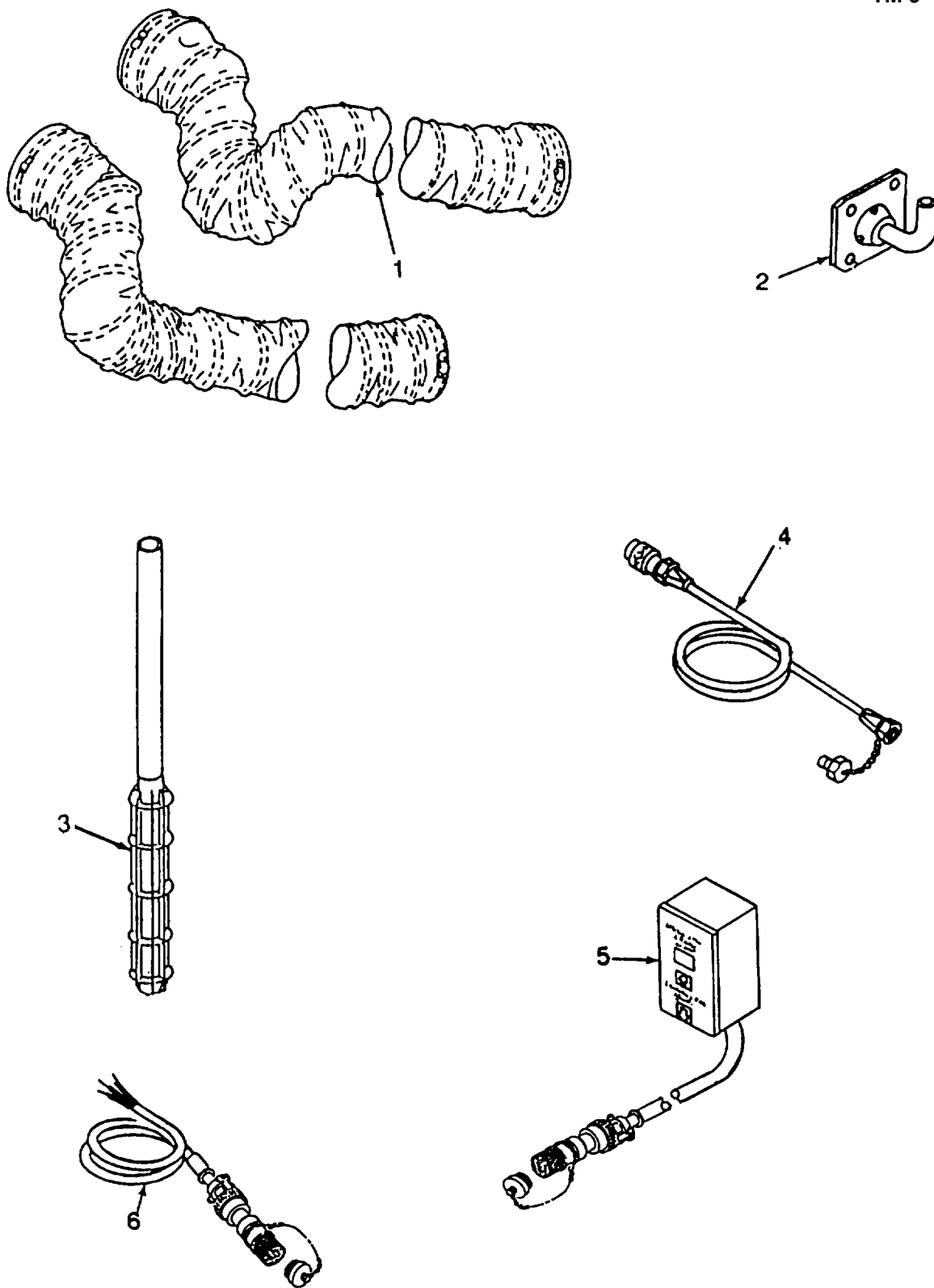


Figure C-1. Components of End Items.

## Section III. BASIC ISSUE ITEMS

(1) ILLUS NUMBER	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC and Part Number	(4) U/M NSN	(5) QTY. RQD.
1		Technical Manual, Operator's, Unit Direct Support, and General Support Maintenance TM 9-4520-258-14	EA	1

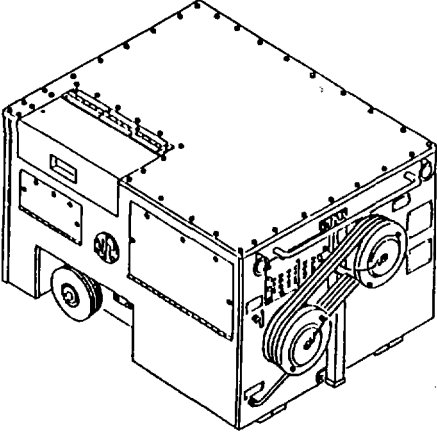
TM 9-4520-258-14																													
<p><b>TECHNICAL MANUAL OPERATOR'S, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL</b></p>  <p><b>ARMY SPACE HEATER (ASH), ELECTRIC POWERED, MULTI-FUEL, 120,000 BTU, MODEL H120 NSN 4520-01-367-2739</b></p>	<table border="1"> <tr> <td>OPERATING INSTRUCTIONS</td> <td>2-1</td> </tr> <tr> <td>OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)</td> <td>2-5</td> </tr> <tr> <td>OPERATOR TROUBLESHOOTING</td> <td>3-1</td> </tr> <tr> <td>UNIT MAINTENANCE</td> <td>4-1</td> </tr> <tr> <td>UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)</td> <td>4-12</td> </tr> <tr> <td>UNIT TROUBLESHOOTING</td> <td>4-27</td> </tr> <tr> <td>DIRECT SUPPORT MAINTENANCE</td> <td>5-1</td> </tr> <tr> <td>DIRECT SUPPORT TROUBLESHOOTING</td> <td>5-1</td> </tr> <tr> <td>GENERAL SUPPORT MAINTENANCE</td> <td>6-1</td> </tr> <tr> <td>APPENDIX A - REFERENCES</td> <td>A-1</td> </tr> <tr> <td>APPENDIX B - MAINTENANCE ALLOCATION CHART</td> <td>B-1</td> </tr> <tr> <td>APPENDIX C - COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST</td> <td>C-1</td> </tr> <tr> <td>APPENDIX D - ADDITIONAL AUTHORIZATION LIST</td> <td>D-1</td> </tr> <tr> <td>APPENDIX E - EXPENDABLE/ DURABLE SUPPLIES AND MATERIALS LIST</td> <td>E-1</td> </tr> </table>	OPERATING INSTRUCTIONS	2-1	OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)	2-5	OPERATOR TROUBLESHOOTING	3-1	UNIT MAINTENANCE	4-1	UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)	4-12	UNIT TROUBLESHOOTING	4-27	DIRECT SUPPORT MAINTENANCE	5-1	DIRECT SUPPORT TROUBLESHOOTING	5-1	GENERAL SUPPORT MAINTENANCE	6-1	APPENDIX A - REFERENCES	A-1	APPENDIX B - MAINTENANCE ALLOCATION CHART	B-1	APPENDIX C - COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LIST	C-1	APPENDIX D - ADDITIONAL AUTHORIZATION LIST	D-1	APPENDIX E - EXPENDABLE/ DURABLE SUPPLIES AND MATERIALS LIST	E-1
	OPERATING INSTRUCTIONS	2-1																											
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	UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)	4-12																											
	UNIT TROUBLESHOOTING	4-27																											
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<p>Distribution Statement A: Approved for public release; distribution is unlimited.</p> <p><b>HEADQUARTERS, DEPARTMENT OF THE ARMY</b></p>																													

Figure C-2. Basic Issue Item.

## APPENDIX D ADDITIONAL AUTHORIZATION LIST

### Section I. Introduction.

#### D-1. SCOPE.

This appendix lists additional items you are authorized for the support of the ASH.

#### D-2. GENERAL.

This list identifies items that do not have to accompany the ASH and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

#### D-3. EXPLANATION OF LISTING.

National stock number, descriptions and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name. If the item you require differs between serial numbers of the same model, effective serial numbers are shown in the last line of the description. If item required differs for different models of this equipment, the model is shown under the "Used on Code" heading in the description column.

### Section II. Additional Authorization Items List

(1) National Stock Number	(2) Description	(3) U/M	(4) Qty Auth
	CAGEC & Part Number                      Used On Code		
5120-00-237-6985	Screwdriver, Flat Tip: 3/8 in. w/tip; 8 in. lg Blade; Plastic Handle                      ALL	ea	1

D-1/(D-2 blank)



## APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

---

## Section I. INTRODUCTION

**E-1. SCOPE.**

This appendix lists expendable/durable supplies and materials you will need to operate and maintain the Army Space Heater, Model H120. This listing is for informational purpose only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

**E-2. EXPLANATION OF COLUMNS.**

- a. Column 1 - Item Number. This number is assigned to the entry in the listing and is referenced in maintenance procedures to identify the material.
- b. Column 2 - Category. This column identifies the lowest category of maintenance that requires the listed item:  
  
C - Operator/Crew  
  
O - Unit Maintenance  
  
F - Direct Support Maintenance  
  
G - General Support Maintenance
- c. Column 3 - National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the items.
- d. Column 4 - Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Commercial And Government Entity Code (CAGE) for Manufacturer in parentheses, if applicable.
- e. Column 5 - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two character alphabetical abbreviation (for example, ea, in, pr). If the unit of measure differs from the rest of the issue, requisition the lowest unit of issue that will satisfy your requirements.

Item Number	Category	National Stock Number	Description	U/M
1	O	6850-00-281-1985	Cleaning Solvent, Federal Specification PD 680, 1 gl	GL
2	O	7920-00-205-1711	Rags, Wiping, 50 lb, (64076) A-A-531	BE
3	O	8030-00-059-2761	Anti - Seize Compound, 3 oz tube, (81349) MIL-A-907E	TU
4	O		Sealing, Compound, 3 oz tube, SIKAFLEX-221 (OPMNO)	TU
5	O	8415-01-129-6535	Gloves, Heat Protective, 1 pair, (1S655)	PR
6	F	8030-01-051-3373	Sealant, Gasket, 3 oz tube, (05972) Loctite 510	TU
7	F	8030-00-043-1682	Primer, Sealing Compound, 1 gl, (81349) MIL-S-22473D	GL
8	O	8040-00-550-8835	Adhesive R-373, 1 gl, (81349) MIL-A-24179A	GL
9	O	9905-00-537-8954	Wire Tags, 50 each (81349)	BD
10	O	7930-00-068-1669	Soap, Mild, 5 gl	CO
11	O	5975-01-273-8133	Wire Ties, 50 each, MS3367	FY
12	O	9150-00-935-4017	Grease, Automotive & Artillery, Cartridge, MIL-G-23827	CA
13	F		Loctite 609, 3 oz tube, (05972)	TU
14	O	7150-00-778-6383	Tape, Pressure Sensitive, 3 in. wide, 36 yard, green, PPP-T-66	RO
15	O	9150-00185-0629	Oil, General purpose, Preservative, VV-L-800 (81349)	CN
16	F	8030-01-388-5606	Primer, Sealant, Loctite Primer 7649, (05972)	CN

## APPENDIX F

### ILLUSTRATED LIST OF MANUFACTURED ITEMS

#### F-1. INTRODUCTION.

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers the fabrication criteria. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list of the illustrations.

#### F-2. MANUFACTURED ITEMS PART NUMBER INDEX.

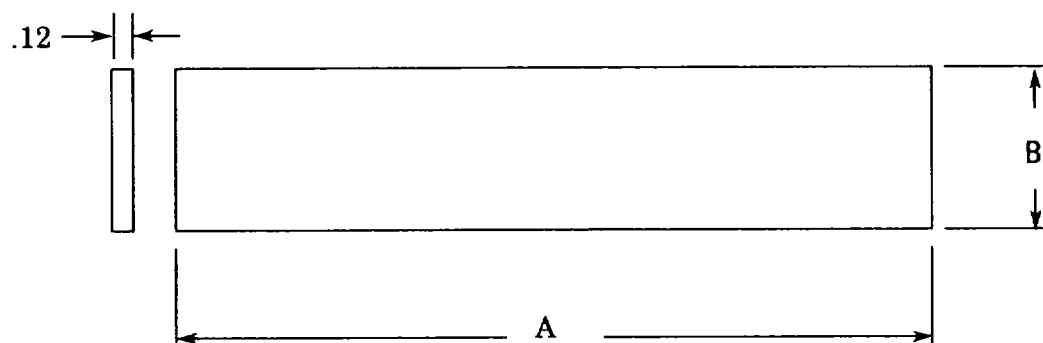
ITEM NUMBER	PART NUMBER	FIGURE NUMBER	INDEX NUMBER
1	60032-2	F-1	1
2	60032-3	F-1	2
3	60032-4	F-1	3
4	60032-5	F-1	4
5	60032-6	F-1	5
6	60397-39	F-1	6
7	60397-38	F-1	7
8	60397-42	F-1	9
9	60397-41	F-1	10
10	60638-22	F-1	12
11	60638-23	F-1	13
12	60397-40	F-1	11
13	60397-37	F-1	8
14	60397-34	F-1	14
15	60397-35	F-1	15
16	60397-36	F-1	16
17	60638-24	F-2	N/A
18	60140-1	F-3	1
19	60140-2	F-3	2
20	60140-3	F-3	3
21	60140-4	F-3	4
22	60140-5	F-3	5
23	60140-6	F-3	6

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.**

ITEM NUMBER	PART NUMBER	FIGURE NUMBER	INDEX NUMBER
24	60140-7	F-3	7
25	60140-8	F-3	8
26	60140-9	F-3	9
27	60140-10	F-3	10
28	60140-11	F-3	11
29	60140-12	F-3	12
30	60140-13	F-3	13
31	60140-14	F-3	14
32	60140-15	F-3	15
33	60140-16	F-3	16
34	60140-17	F-3	17
35	60140-18	F-3	18
36	60140-19	F-3	19
37	60140-20	F-3	20
38	60140-21	F-3	21
39	60180-1	F-4	N/A
40	60181-1	F-5	N/A
41	60182-1	F-6	N/A
42	60183-1	F-7	N/A
43	60184-1	F-8	N/A
44	60185-1	F-9	N/A
45	60186-1	F-10	N/A
46	60187-1	F-11	N/A
47	60170-1	F-12	N/A
48	60171-1	F-13	N/A
49	60172-1	F-14	N/A
50	60173-1	F-15	N/A
51	60169-1	F-16	N/A
52	60179-1	F-17	N/A
53	60188-1	F-18	N/A
54	60188-2	F-19	N/A

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

ITEM NUMBER	PART NUMBER	FIGURE NUMBER	INDEX NUMBER
55	60188-3	F-20	N/A
56	60174-1	F-21	N/A
57	60175-1	F-22	N/A
58	CABLE	F-23	N/A
59	60518-1	F-24	N/A
60	60628-4	F-25	1
61	60628-3	F-25	2
62	60584-1	F-26	N/A
63	60588-1	F-27	N/A
64	CABLE	F-28	N/A
65	60106-9	F-29	1
66	60106-8	F-29	2
67	60105-5	F-30	1
68	60105-6	F-30	2
69	60115-1	F-31	N/A
70	M23053/5-109-0	F-32	N/A
71	60401	F-33	On Figure
72	60182-2	F-34	N/A
73	60444-5	F-35	N/A
74	60444-5	F-36	N/A
75	60486	F-37	N/A
76	60492	F-38	N/A
77	60489	F-39	N/A
78	60488	F-40	N/A
79	60487	F-41	N/A
80	60485	F-42	N/A
81	60484	F-43	N/A
82	60499	F-44	N/A
83	60815-5	F-45	1
84	60815-6	F-45	2

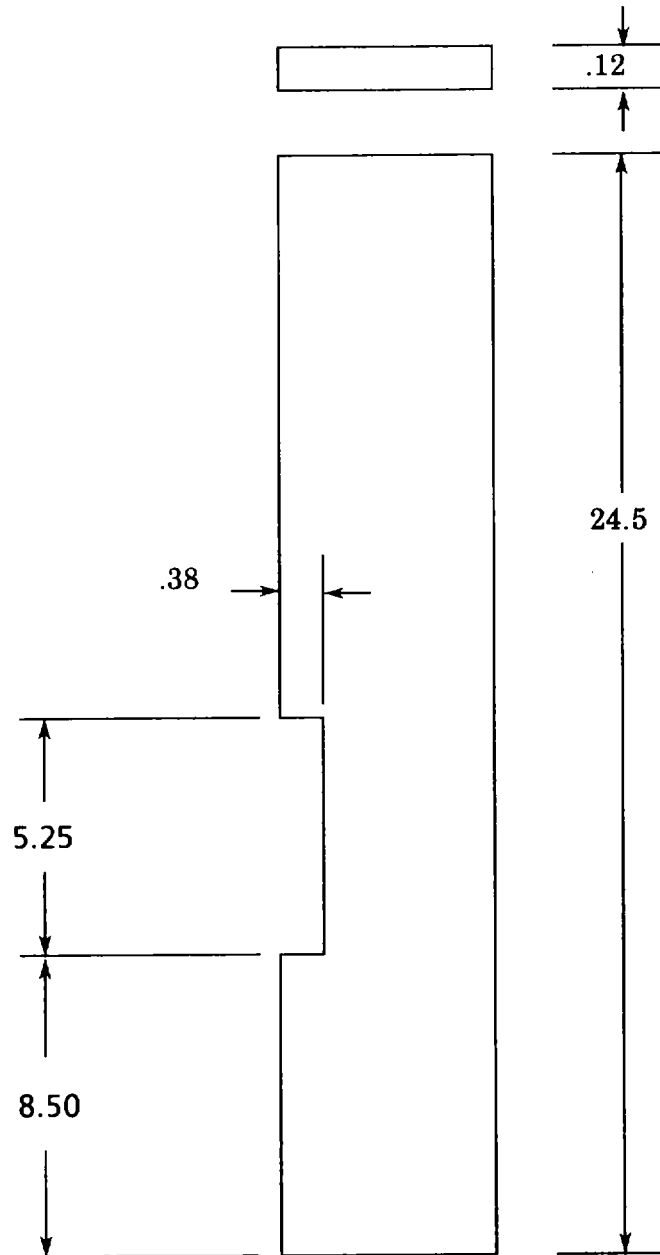
**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.**

INDEX	A (Inches)	B (Inches)	QUANTITY
1	39.50	1.44	2
2	47.62	1.44	1
3	13.00	1.44	2
4	20.50	1.44	1
5	24.12	1.44	1
6	16.12	1.00	1
7	7.62	1.50	2
8	22.12	1.50	1
9	11.75	1.50	2
10	39.00	1.50	2
11	24.50	1.50	1
12	16.12	1.00	1
13	22.12	1.00	1
14	17.25	1.00	1
15	9.00	1.00	2
16	17.25	1.00	1

**NOTES:**

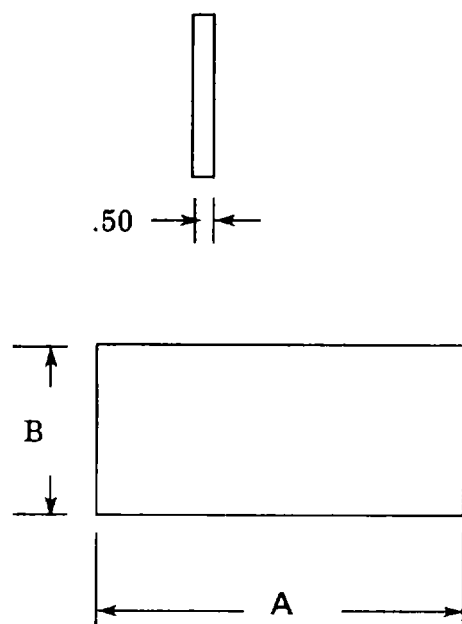
1. Made from Rubber, Neoprene, Sponge, Adhesive back, Shore 00, Durometer 25-45. P/N 411N PSA.
2. Cut each gasket to length and width. Place on location and mark hole location, remove and punch holes.
3. Peel plastic strip off back of gasket and install on unit.

**Figure F-1. Gasket**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Make from Rubber, Neoprene, Sponge, Adhesive back, Shore 00, Durometer 25-45. P/N 411N PSA.
2. Cut gasket to size. Place along rear panel and mark hole location, remove and punch holes.
3. Peel plastic strip off back of gasket and install on rear panel.

**Figure F-2. Seal, Rear Panel**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.**

INDEX	A	B
60140-1	8.68	5.38
60140-2	21.38	5.88
60140-3	10.38	5.38
60140-4	10.88	5.38
60140-5	28.25	12.12
60140-6	20.25	7.38
60140-7	28.25	10.88
60140-8	7.88	7.38
60140-9	13.50	5.38
60140-10	7.50	5.35
60140-11	9.00	8.12
60140-12	11.62	7.88
60140-13	7.88	5.38
60140-14	10.25	2.12
60140-15	13.00	4.00
60140-16	23.12	4.00
60140-17	24.75	1.75
60140-18	15.38	1.75
60140-19	13.00	8.12
60140-20	21.38	4.00
60140-21	13.50	8.75

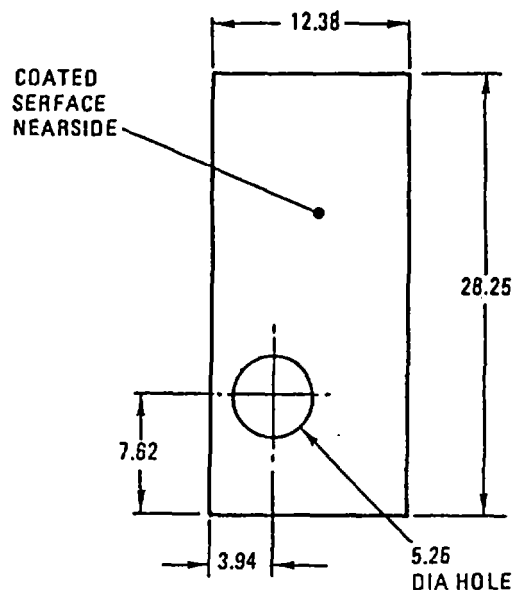
**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-3. Insulation**



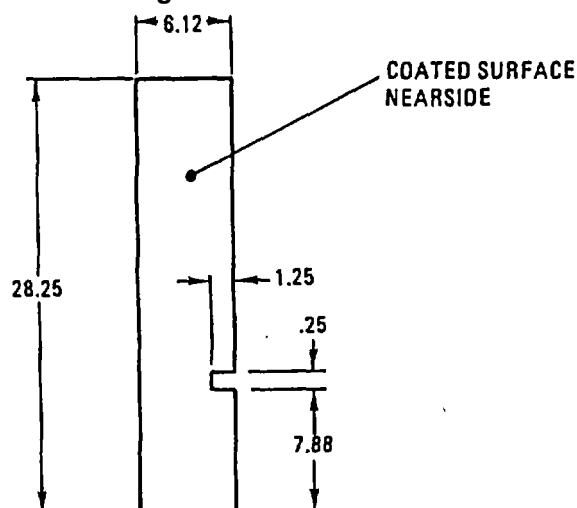
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

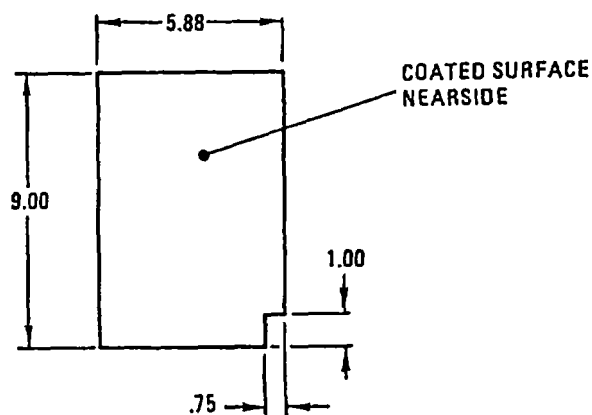
Figure F-4. Insulation



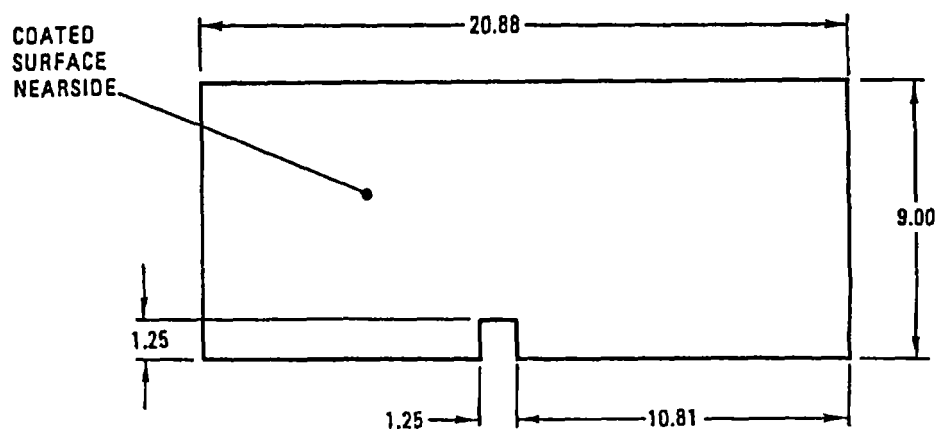
## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

Figure F-5. Insulation

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-6. Insulation****NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-7. Insulation**

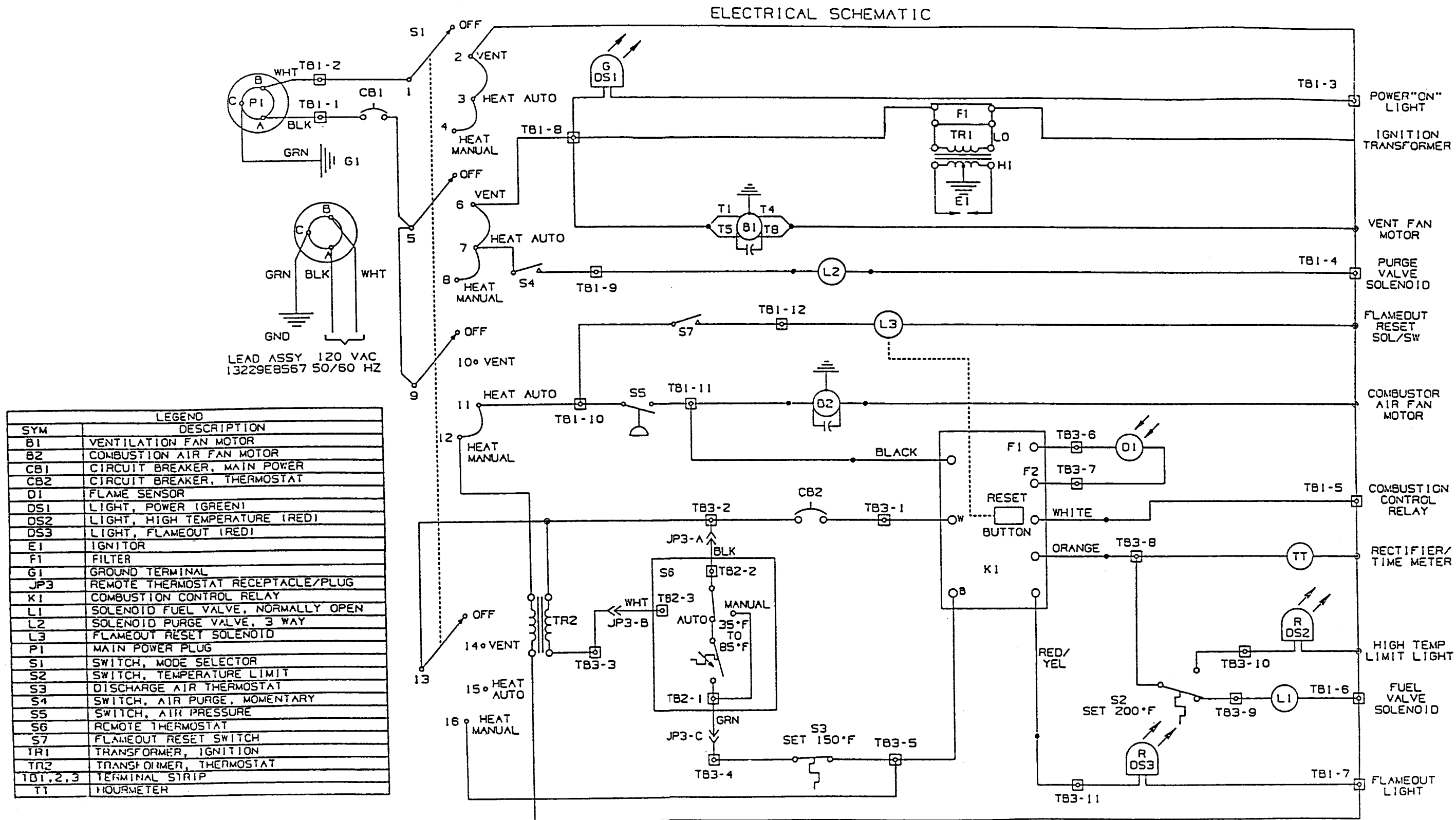
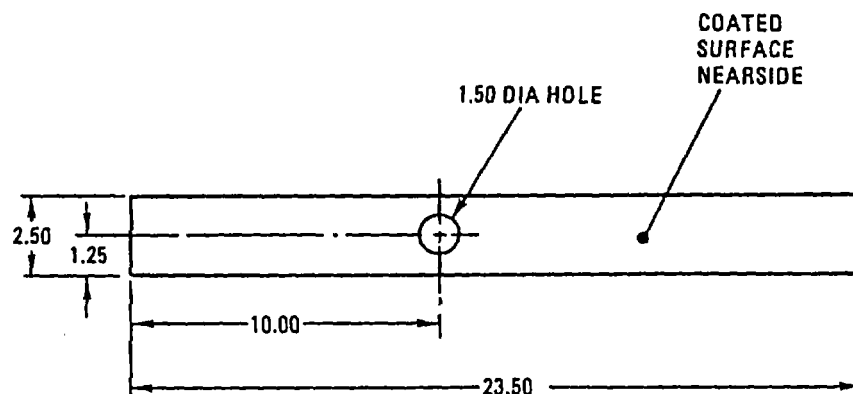


Figure FO-1. ASH Electrical Schematic  
FP-1/(FP-2 blank)

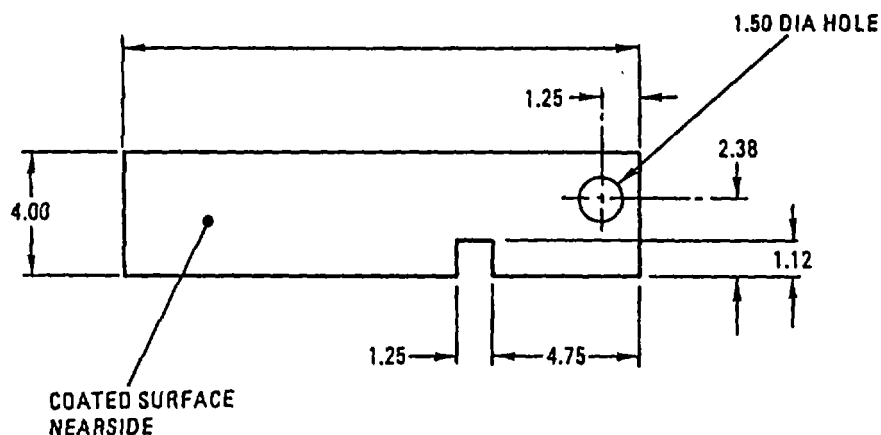
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

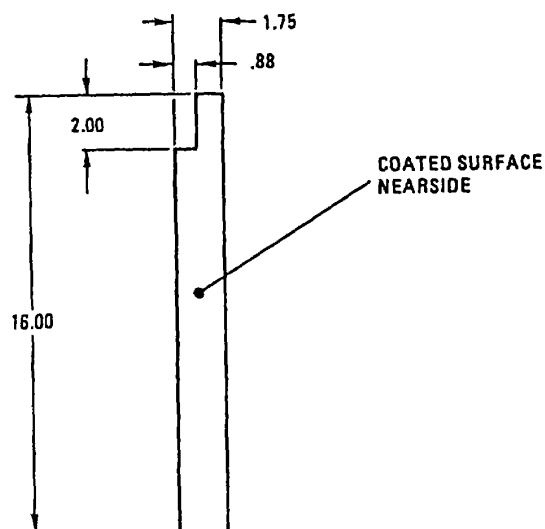
Figure F-8. Insulation



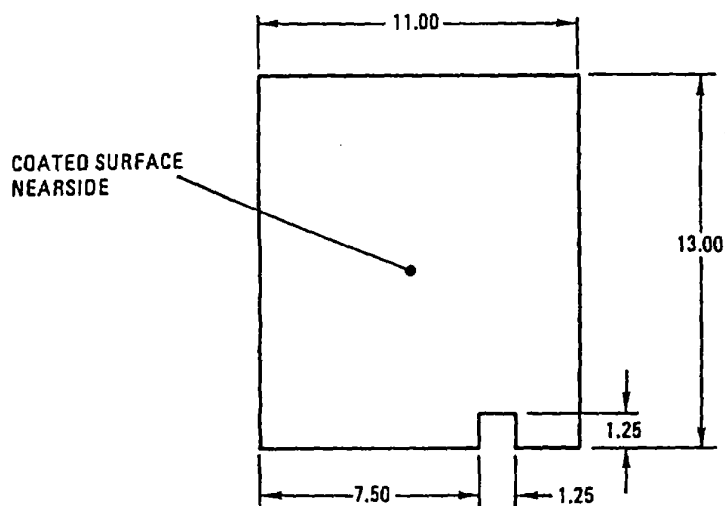
## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

Figure F-9. Insulation

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

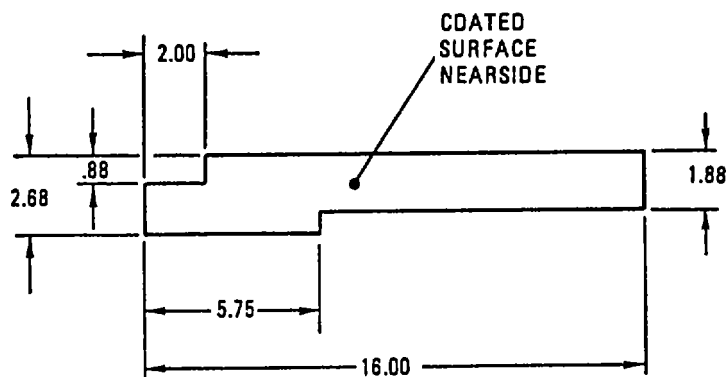
1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-10. Insulation****NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-11. Insulation****F-10**

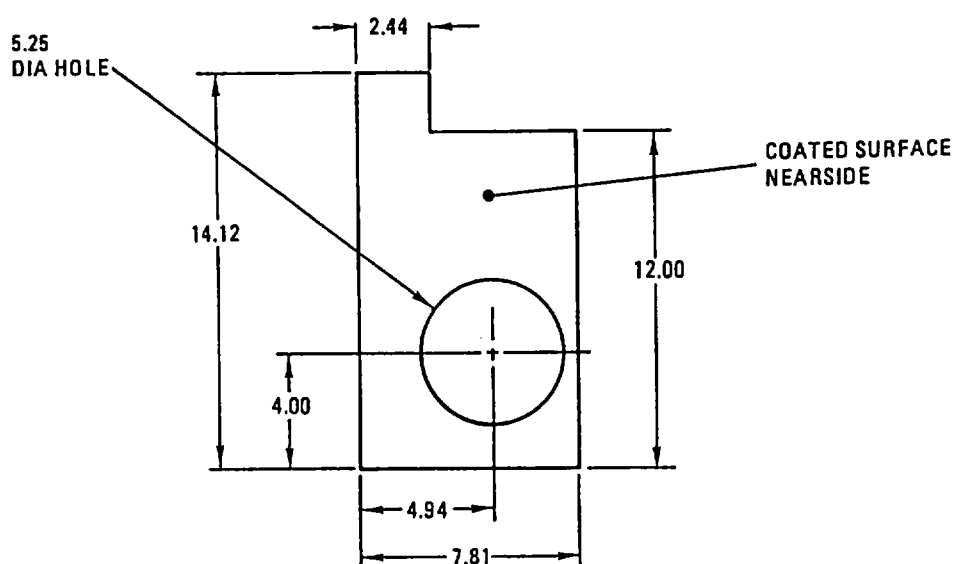
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

Figure F-12. Insulation

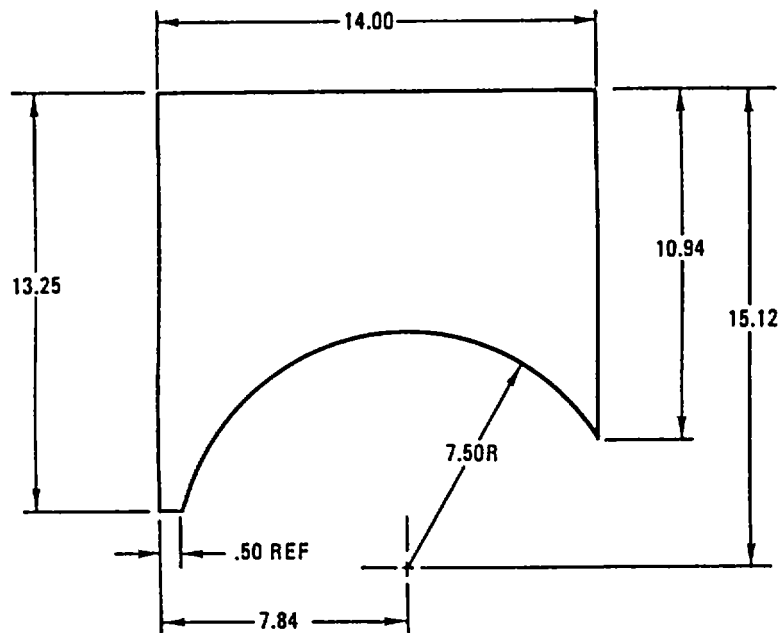


## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

Figure F-13. Insulation

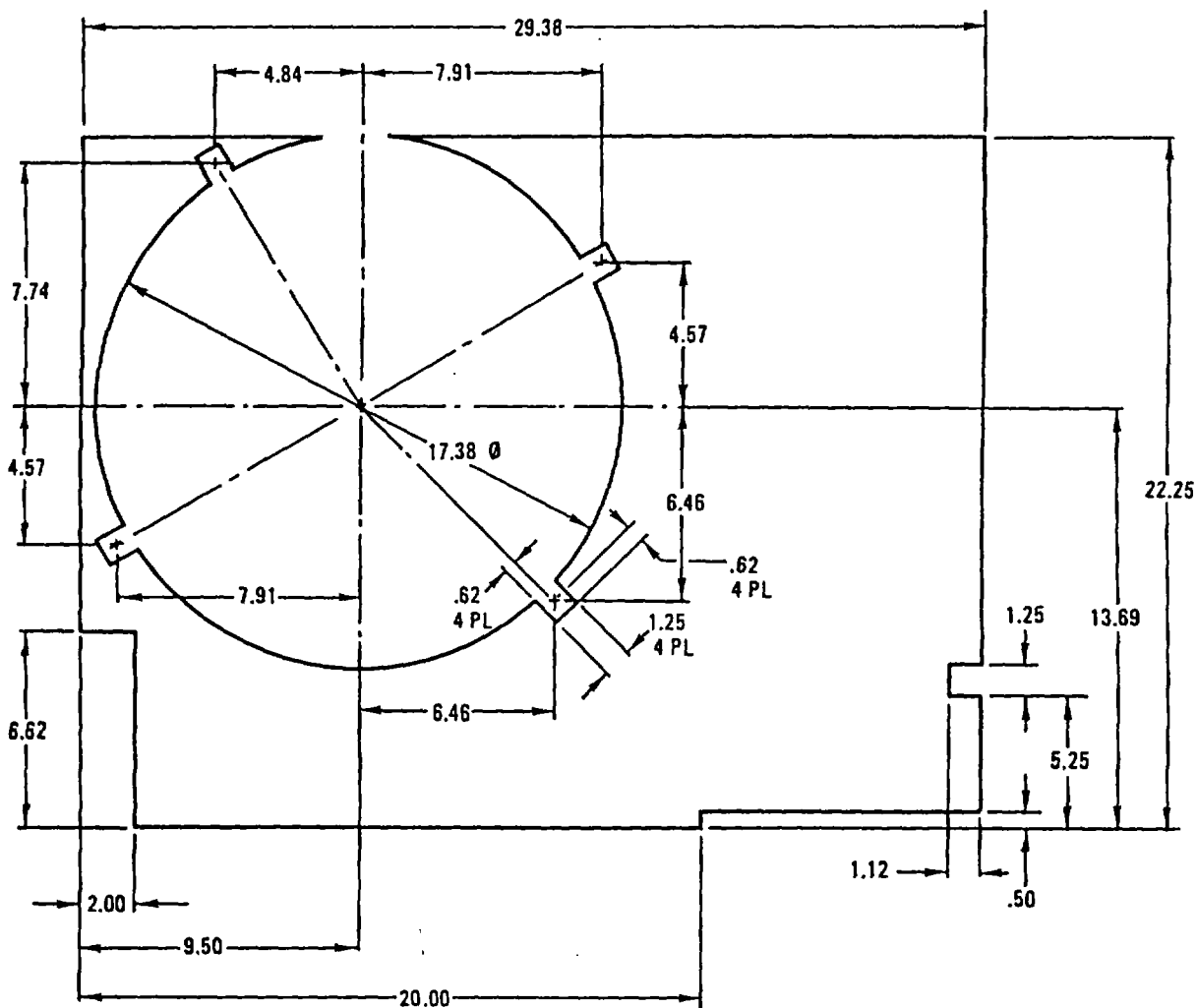
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, PIN R373 (5G015). Apply to insulation and mating surface.

**Figure F-14. Insulation**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

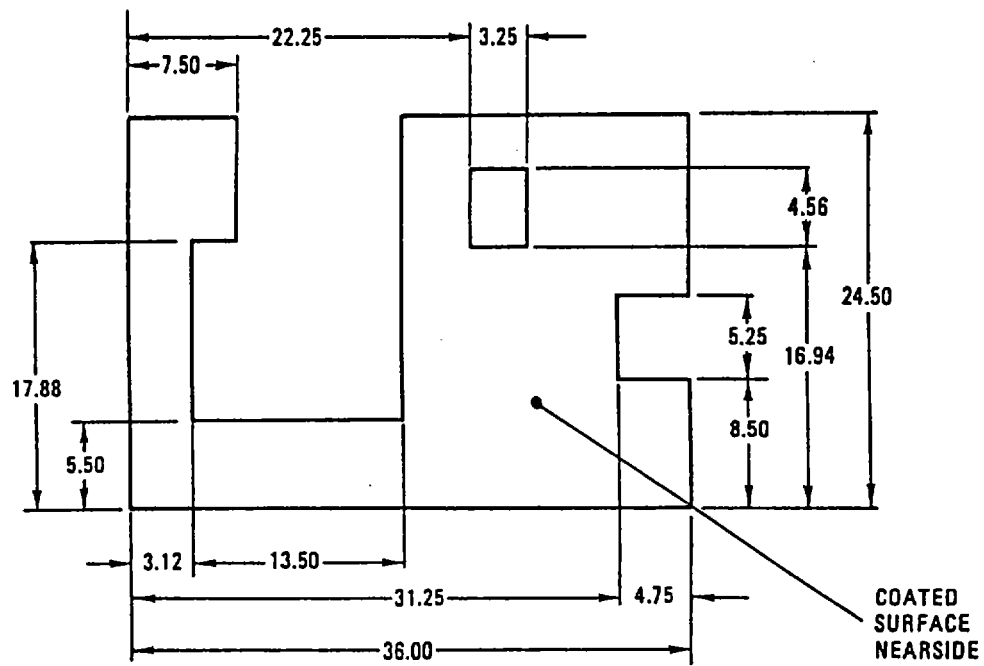
**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-15. Insulation**



## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

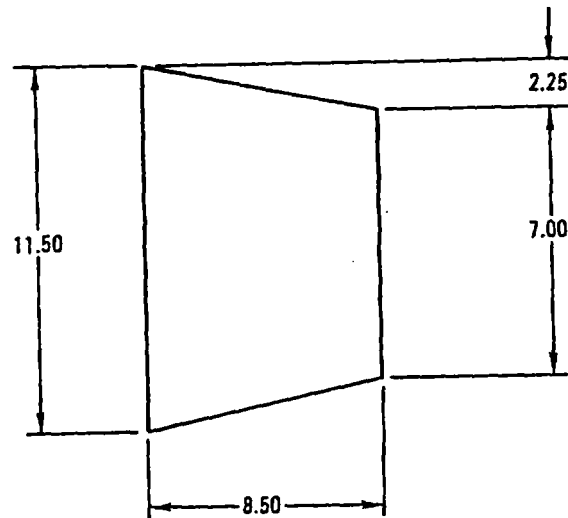
**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-16. Insulation**

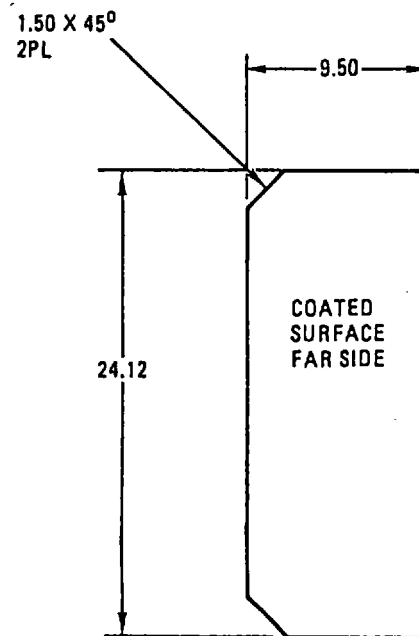
F-14

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

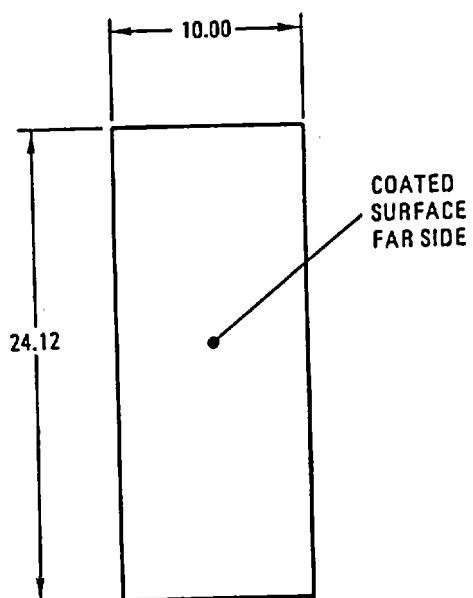
1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-17. Insulation****F-15**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

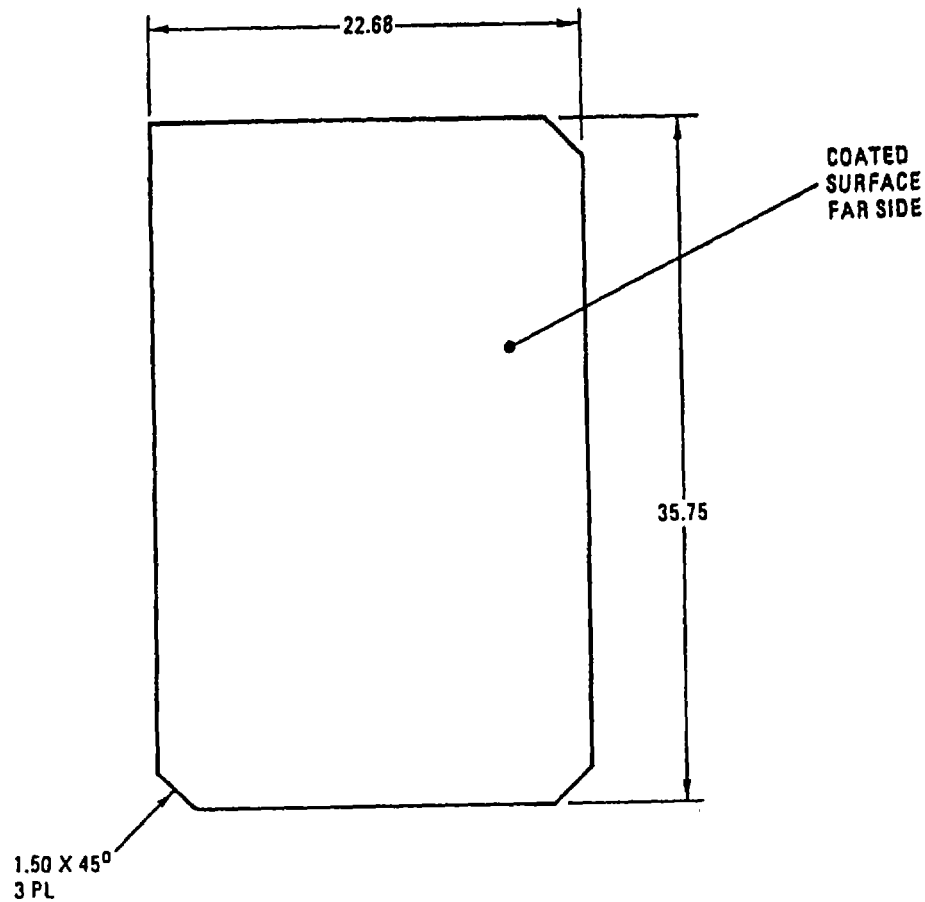
**Figure F-18. Insulation**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-19. Insulation****F-17**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

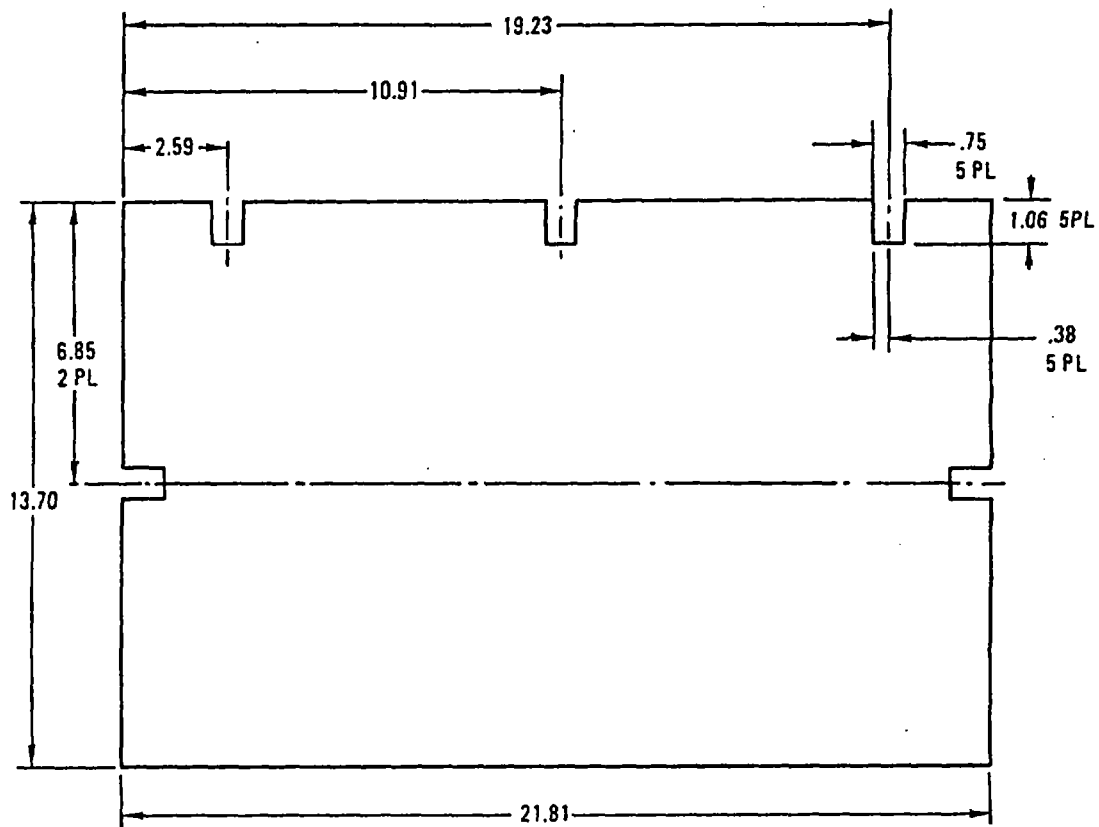


## NOTES:

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

Figure F-20. Insulation

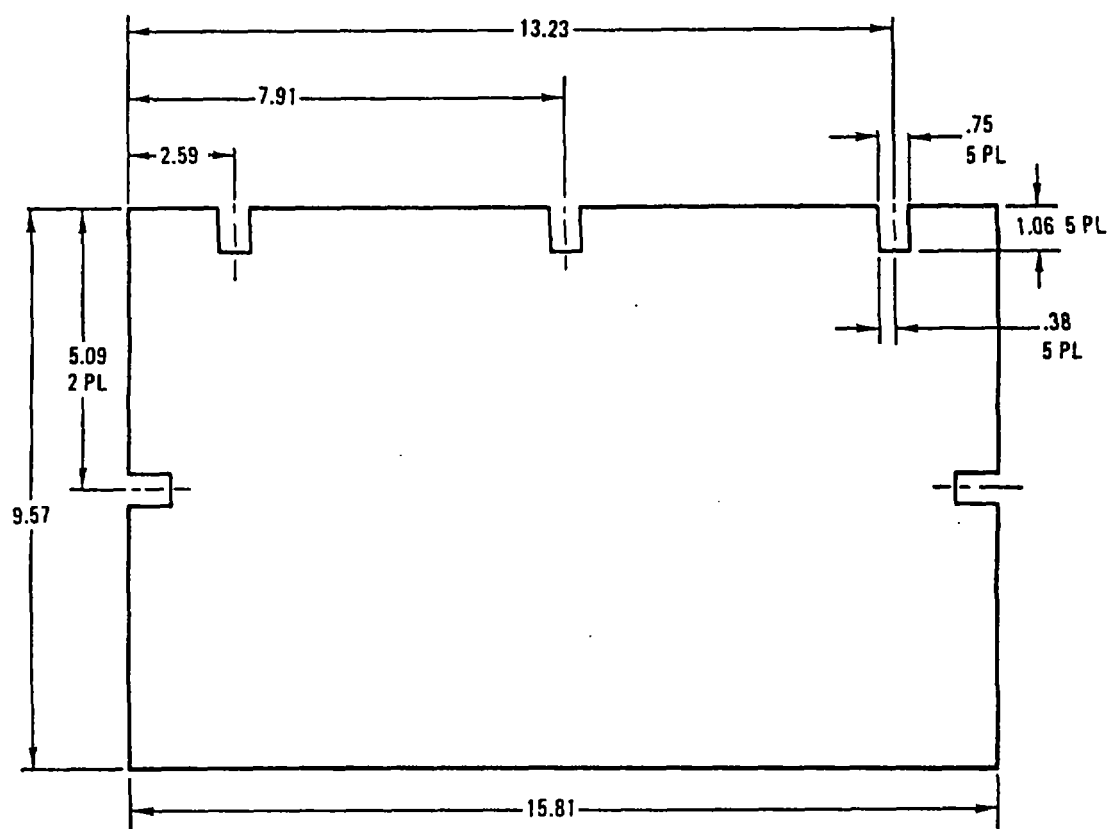
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-21. Insulation**

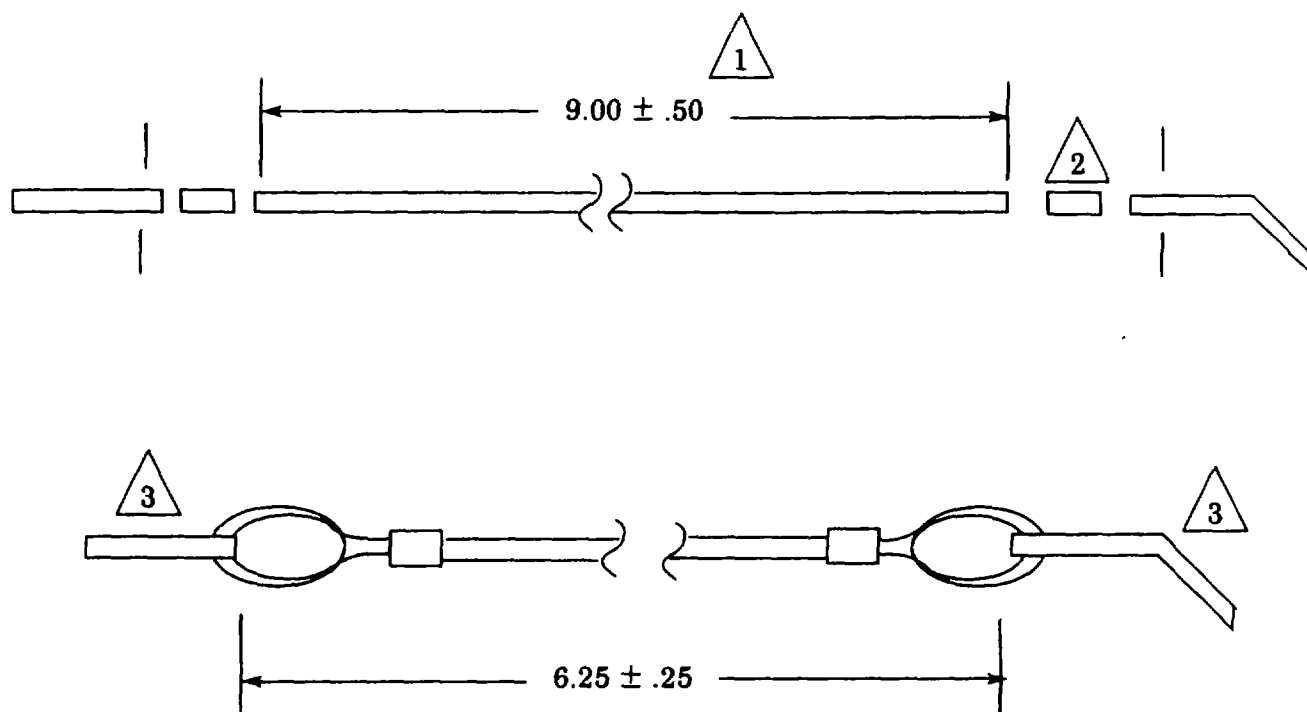
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. All measurements in inches.
2. Make from Rubber Insulation, Sheet, .05 inch thick. Ensolite, type MLC, color black.
3. Source: Ensolite, Inc. (OW711)
4. Adhesive, P/N R373 (5G015). Apply to insulation and mating surface.

**Figure F-22. Insulation**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

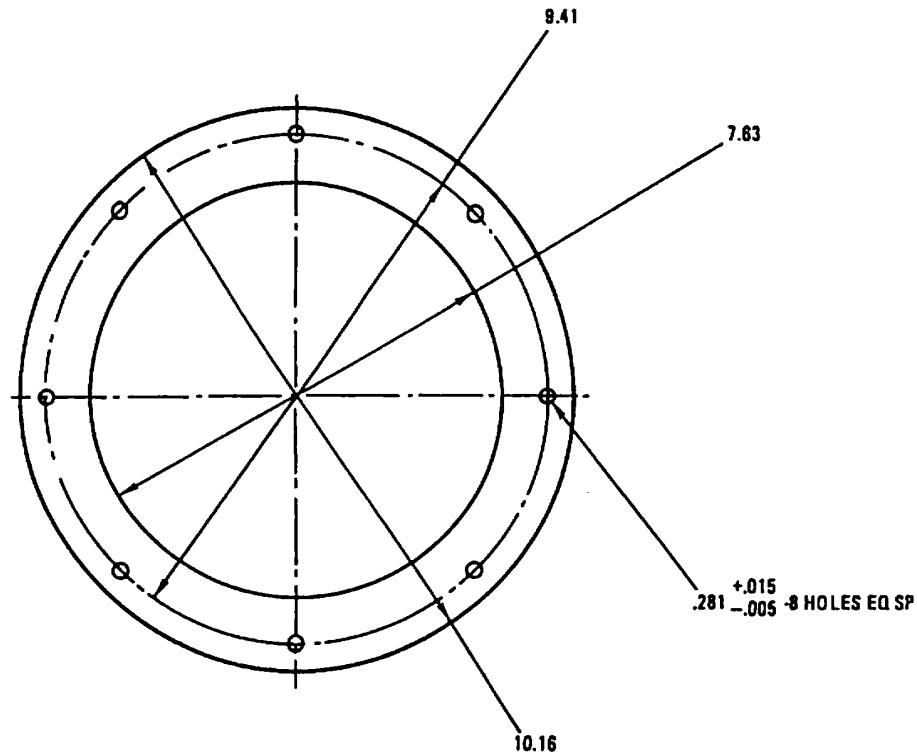
**NOTES:**

1. Make from Cable P/N 8930533 (39428).
2. Use Sleeve, Splicing P/N MS51844-62.
3. Reuse tab and connector.

Figure F-23. Cable, Dust Cover



## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



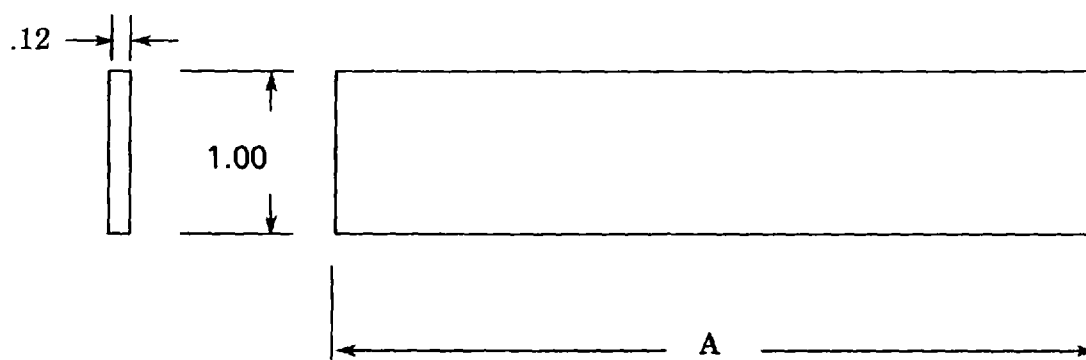
## NOTES:

1. Make from Rubber Sheet, Cellular, Type 2, Grade A, Condition Soft, P/N MIL-R-6130.
2. Cut gasket to size. Place along rear panel and mark hole location, remove and punch holes.
3. Peel plastic strip off back of gasket and install.

Figure F-24. Seal

Change 1 F-22

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



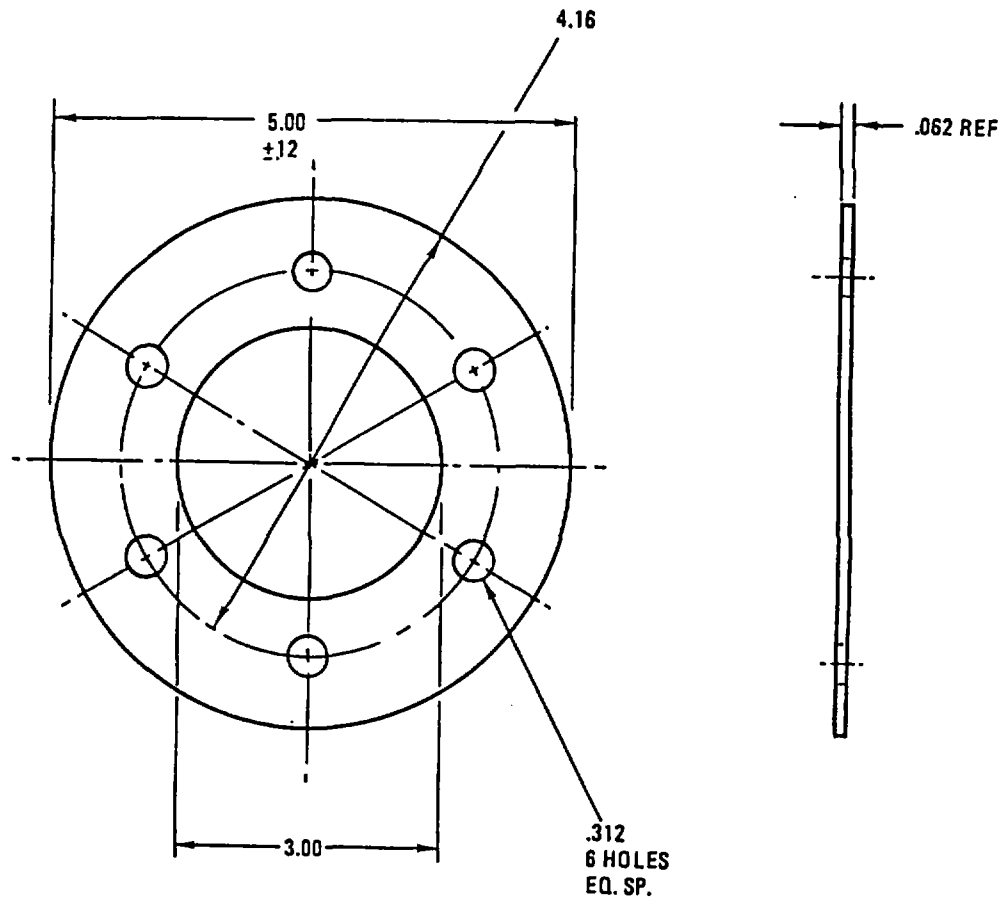
INDEX	A (Inches)	QUANTITY
1	8.42	2
2	4.84	2

**NOTES:**

1. Make from Rubber, Neoprene, Sponge, Adhesive back, Shore 00, Durometer 25-45. P/N R411N PSA.
2. Cut each gasket to length. Place on location and make hole locations, remove and punch holes.
3. Peel plastic strip off back of gasket and install on unit.

**Figure F-25. Gasket, Exhaust Door**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

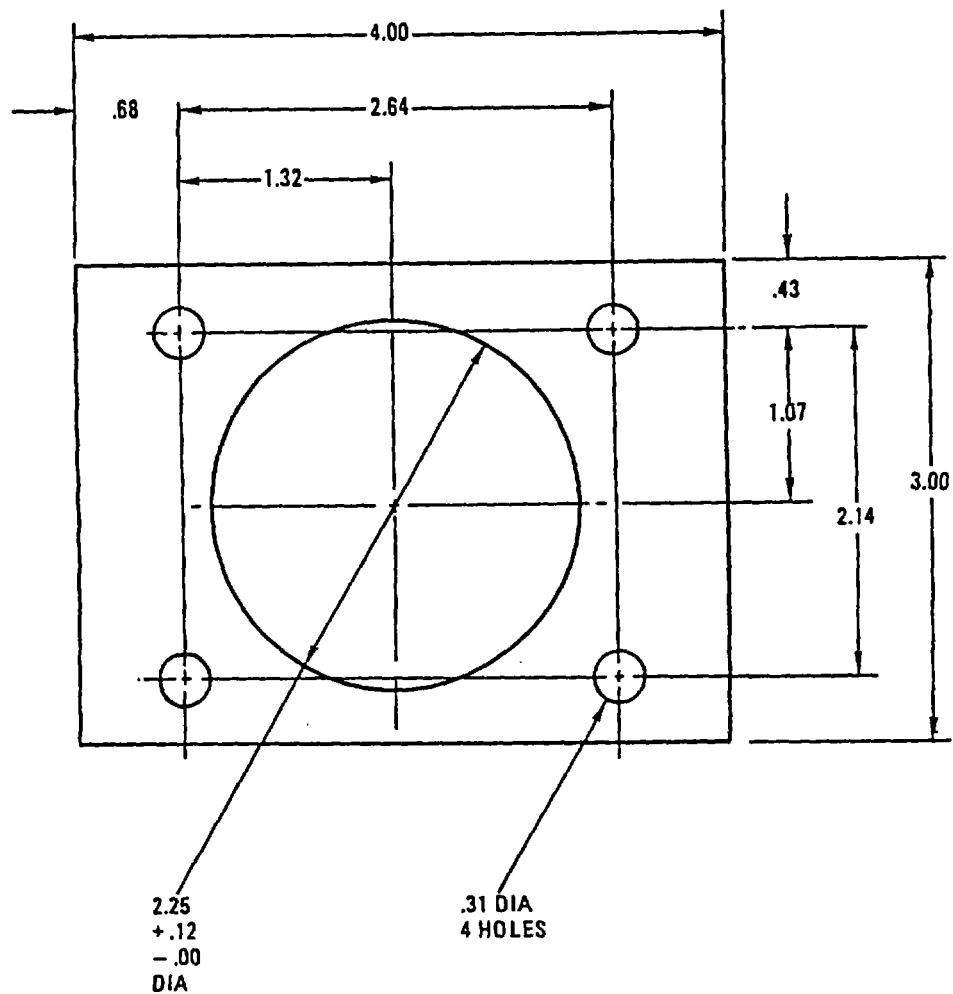


## NOTES:

1. Make from BUNA-N-Rubber sheeting, 1/16 thick per ASTM D-2000-86E, Type BG, Color Black, Hardness 45-55. P/N 8635K542.
2. Cut gasket to size.

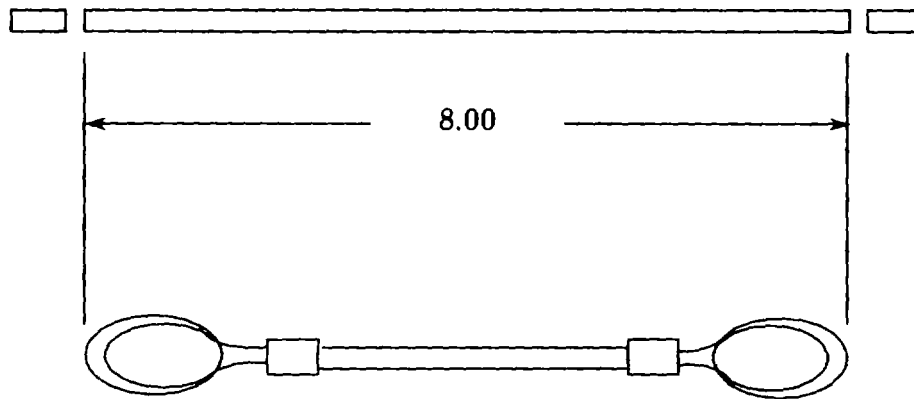
Figure F-26. Gasket, Combustor Fan Mount

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. Make from BUNA-N-Rubber sheeting,  $\frac{1}{16}$  thick per ASTM D-2000-86E, Type BG, Color Black, Hardness 45-55. P/N 8635K542.
2. Cut gasket to size.

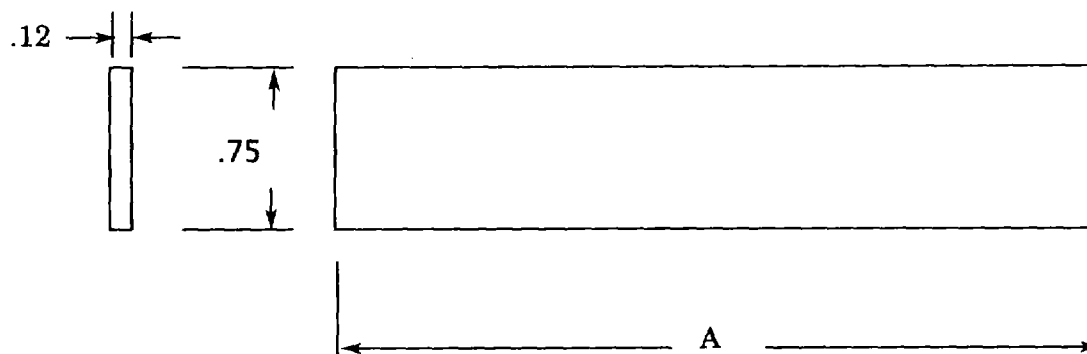
Figure F-27. Gasket, Combustor Fan Air Outlet

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Make from cable P/N 8930T33 (39428).
2. Use sleeve splicing P/N 3623T13 (39428).
3. Cut to length, make a loop on each end and install sleeves.

**Figure F-28. Cable, Wheel Assembly**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



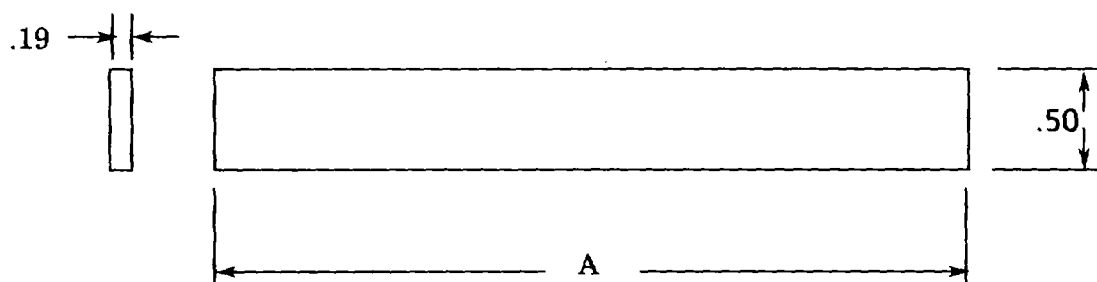
INDEX	A (Inches)	QUANTITY
1	7.88	2
2	10.75	2

**NOTES:**

1. Make from Rubber, Cellular, Chemically Blown per MIL-R-6130, Type II, Grade A, Condition Soft, .75 wide x .12 thick, adhesive backed.
2. Cut each gasket to length.
3. Place on location and mark hole locations, remove and punch holes.
4. Peel plastic strip off back of gasket and install on unit.

Figure F-29. Gasket, Damper

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

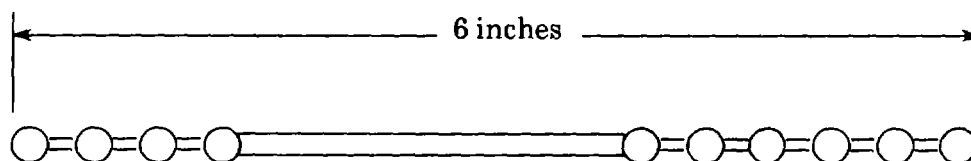


INDEX	A (Inches)	QUANTITY
1	8.50	2
2	2.88	2

**NOTES:**

1. Make from Rubber, CELLULAR, Chemically Blown per MIL-R-6130, Type II, Grade A, Condition Soft, .50 wide x .19 thick, adhesive backed.
2. Cut each gasket to length.
3. Peel plastic strip off back of gasket and install on unit.
4. Seal mating edges of gasket with sealant (Item 17, App E).

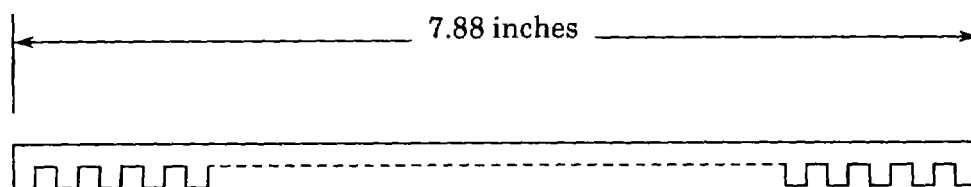
Figure F-30. Gasket, Damper

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Make from Bead Chain, Weldless, Type II, CL5, Size 10, FEDERAL Specification RR-C-271.
2. Cut chain to length.

**Figure F-31. Chain, Damper****F-29**

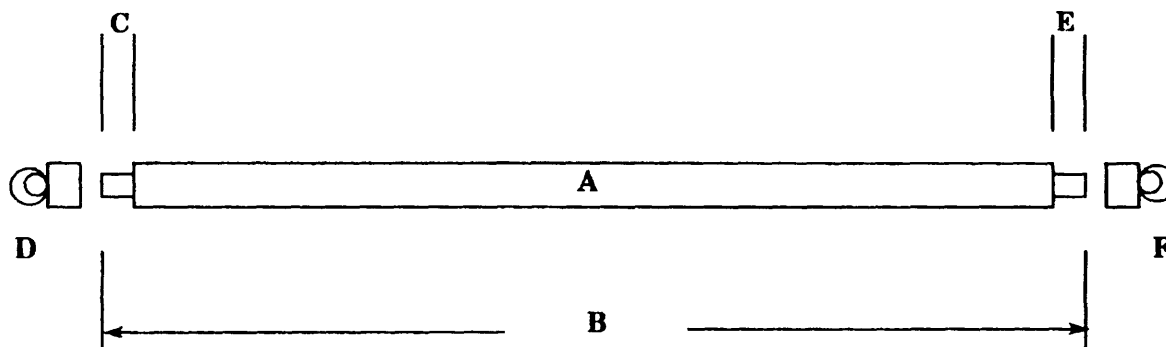


**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Make from MS21266-2.
2. Cut to length.
3. Sealant, SIKAFLEX 221, SIKA Corp. Apply to edge of hole on unit.

**Figure F-32. Grommet****F-30**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. Make from Parts Lists. Cut to length. Cut strip length.
2. Attach terminals.
3. Each wire shall be marked with terminal identification as shown below using Index 13:

"From" ↔ "To"  
 Example: TB1-1 ↔ CB1-1

Figure F-33. Wire List (Sheet 1 of 5)

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

WIRE ASSY INDEX #	WIRE INDEX # A	WIRE LNGTH INCHES B	STRIP LNGTH C	TERMINAL INDEX # D	FROM	TO	STRIP LNGTH E	TERMINAL INDEX # F
1	—	—	—	—	120 vac	J1-A	—	—
2	—	—	—	—	Neutral	J1-B	—	—
3	—	—	—	—	Ground	J1-C	—	—
4	—	—	—	—	P1-A	TB1-1	—	5
5	—	—	—	—	P1-B	TB1-2	—	5
6	—	—	—	—	P1-C	G-1	—	9
7	1	14.0	.38	5	TB1-1	CB1-1	.38	8
8	1	13.0	.38	8	CB1-2	S1-5	.38	6
9	1	4.0	.38	6	S1-5	S1-9	.38	6
10	1	12.0	.38	5	TB1-2	S1-1	.38	6
11	1	16.0	.38	6	S1-2	TB1-3	.38	5
12	1	3.5	.38	6	S1-2	S1-3	.38	6
13	1	3.5	.38	6	S1-3	S1-4	.38	6
14	1	3.5	.38	6	S1-8	S1-7	.38	6
15	1	3.5	.38	6	S1-7	S1-6	.38	6
16	1	15.0	.38	6	S1-6	TB1-8	.38	5
17	2	17.5	.25	3	TB1-8	DS1-POS	.25	12
18	2	16.0	.25	12	DS1-NEG	TB1-3	.25	3
*19	—	—	.25	3	TB1-8	F1-BLK	—	—
**19	2	44.0	.25	3	TB1-8	TR1-BLU	.25	10
*20	—	—	—	—	F1-BLK	TB1-3	.25	3
**20	2	44.0	.25	10	TR1-WHT	TB1-3	.25	3
21	1	39.0	.38	5	TB1-8	B-T1,T5	.38	11
22	1	40.0	.38	11	B1-T4,T8	TB1-3	.25	5
23	1	49.0	.38	6	B1-GRD	G1	.38	9
24	2	3.5	.25	4	S1-7	S4-2	.25	3
25	2	20.0	.25	3	S4-1	TB1-9	.25	3
26	—	—	.25	3	TB1-9	L2-BLK	—	—
27	—	—	—	—	L2-BLK	TB1-4	.25	3
28	2	3.5	.25	4	S1-12	S1-11	.25	4
29	2	20.0	.25	3	TB1-10	S7-2	.25	3

Figure F33. Wire List (Sheet 2 of 5)

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

WIRE ASSY INDEX #	WIRE INDEX # A	WIRE LNGTH INCHES B	STRIP LNGTH C	TERMINAL INDEX # D	FROM	TO	STRIP LNGTH E	TERMINAL INDEX # F
30	2	19.0	.25	3	S7-1	TB1-12	.25	3
31	2	20.0	.25	3	TB1-12	L3-POS	.25	12
32	2	20.0	.25	12	L3-NEG	TB1-4	.25	3
33	2	15.0	.25	4	S1-11	TB1-10	.25	3
34	2	23.0	.25	3	TB1-10	S5-COM	.25	12
35	2	22.0	.25	12	S5-N.O.	TB1-11	.25	3
36	—	11.0	.25	3	TB1-11	B2-BLK	—	—
37	—	12.0	—	—	B2-WHT	TB1-5	.25	3
38	—	13.0	—	—	B2-GRN/YEL	G1	.25	7
39	2	16.0	.25	3	TB1-11	K1-BLK	.25	10
40	2	10.0	.25	4	S1-12	TR2-BLK	.25	10
41	2	4.0	.25	10	TR2-WHT	TB1-7	.25	3
42	2	12.0	.25	4	S1-13	TR2-C	.25	3
43	2	5.0	.25	3	TR2-R	TB3-3	.25	3
44	2	—	.25	—	TB3-3	J3-B	.25	—
45	2	11.0	.25	4	S1-13	TB3-2	.25	3
46	2	—	.25	—	TB3-2	J3-A	.25	—
47	2	19.0	.25	3	TB3-2	CB2-1	.25	12
48	2	19.0	.25	12	CB2-2	TB3-1	.25	3
49	2	21.0	.25	3	TB3-1	K1-W	.25	3
50	2	12.0	.25	4	S1-16	TB3-5	.25	3
51	2	—	.25	—	TB3-4	J3-C	.25	—
52	2	62.00	.25	3	TB3-4	S3-1	.25	12
53	2	60.00	.25	12	S3-3	TB3-5	.25	3
54	2	21.0	.25	3	TB3-5	K1-B	.25	3
55	2	—	.25	—	P3-A	TB2-2	.25	—
56	2	—	.25	—	P3-B	TB2-3	.25	—
57	2	—	.2	—	5P3-C	TB2-1	.25	—
58	2	21.0	.25	3	K1-F1	TB3-6	.25	3
59	2	11.0	.25	3	TB3-6	D1-YEL	.25	10
60	2	11.0	.25	10	D1-YEL	TB3-7	.25	3

Figure F33. Wire List (Sheet 3 of 5)

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

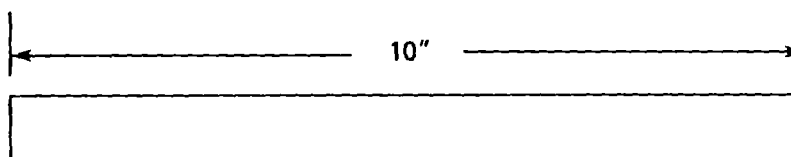
WIRE ASSY INDEX #	WIRE INDEX # A	WIRE LNGTH INCHES B	STRIP LNGTH C	TERMINAL INDEX # D	FROM	TO	STRIP LNGTH E	TERMINAL INDEX # F
61	2	21.0	25	3	TB3-7	K1-F2	25	3
62	2	15.0	25	10	K1-WHT	TB1-6	25	3
63	2	19.0	25	10	K1-ORG	TB3-8	25	3
64	2	18.0	25	3	TB3-8	TT	25	3
65	2	12.0	25	3	TT	TB1-6	25	3
66	14	17.0	—	9	G1	REAR DOOR	—	6
67	14	15.0	—	9	B2 FRAME	FRONT DOOR	—	6
68	2	61.00	25	3	TB3-8	S2-1	25	12
69	2	61.0	25	12	S2-3	TB3-9	25	3
70	—	24.0	25	3	TB3-9	L1-BLK	—	—
71	—	24.0	—	—	L1-BLK	TB1-7	25	3
72	2	61.0	25	12	S2-2	TB3-10	25	3
73	2	13.0	25	3	TB3-10	DS2-POS	25	12
74	2	17.0	25	12	DS2-NEG	TB1-6	25	3
75	2	19.0	25	10	K1-RED/YEL	TB3-11	25	3
76	2	15.0	25	3	TB3-11	DS3-POS	25	12
77	2	17.0	25	12	DS3-NEG	TB1-7	25	3
78	1	17.0	38	9	G1	C.P.-LID	38	5
79	1	31.0	38	9	G1	FRAME	38	9
80					Deleted			
*81	2	44.0	25	7	F1-G	G1	25	10
*82	2	6.0	25	4	F1-G	GNDT	25	7
**82	2	6.0	25	4	TR1-G	GNDT	25	7

## Note:

\* Item used on ASH model H120

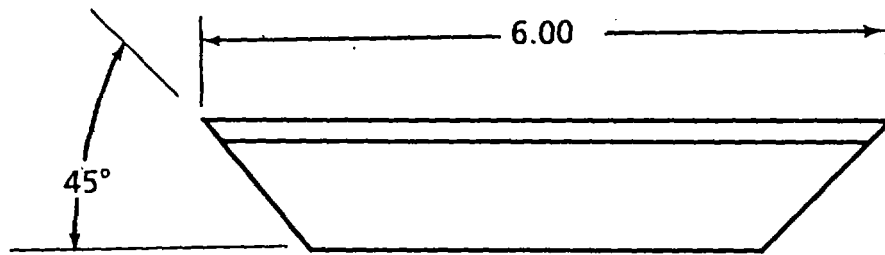
\*\* Item used on ASH model H120-1

Figure F33. Wire List (Sheet 4 of 5)

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Make from MS23053/5-109-0, Insulation Sleeving.
2. Cut to length.

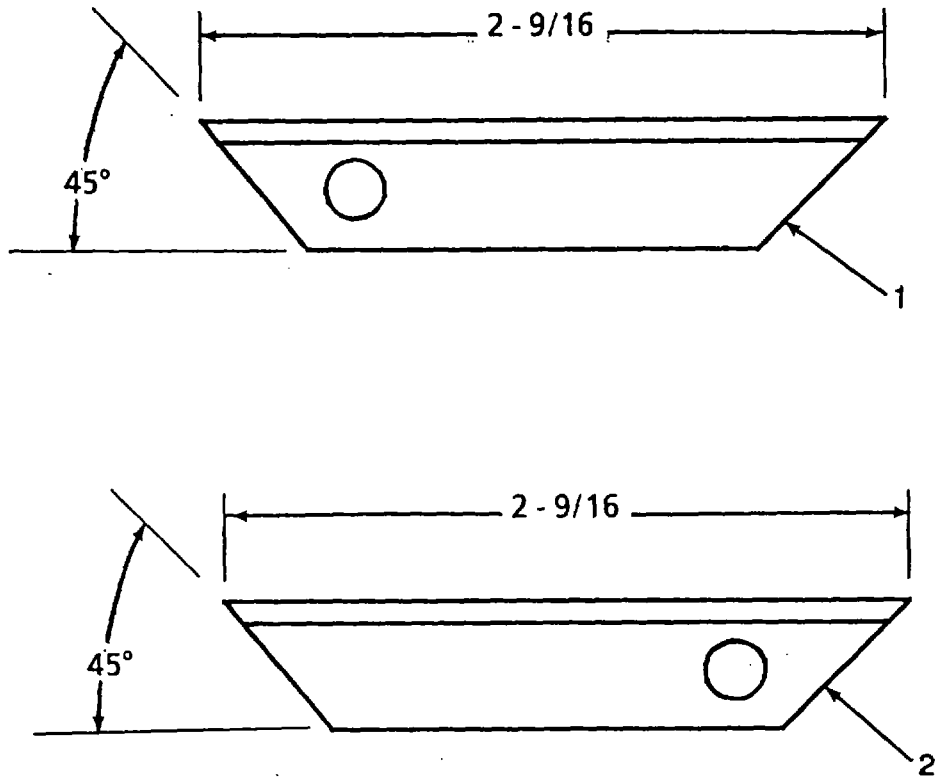
**Figure F-34. Insulation Sleeve, Thermostat Assembly****F-36**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Made from Rubber and wire mesh, Adhesive back, P/N 01-064-1756 (57003).
2. Cut each gasket to length cut two 45 degree angles as shown.
3. Peel plastic strip off back of gasket and install so wire mesh is to the outside perimeter on unit.

**Figure F-35. Gasket, Transformer****F-37**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

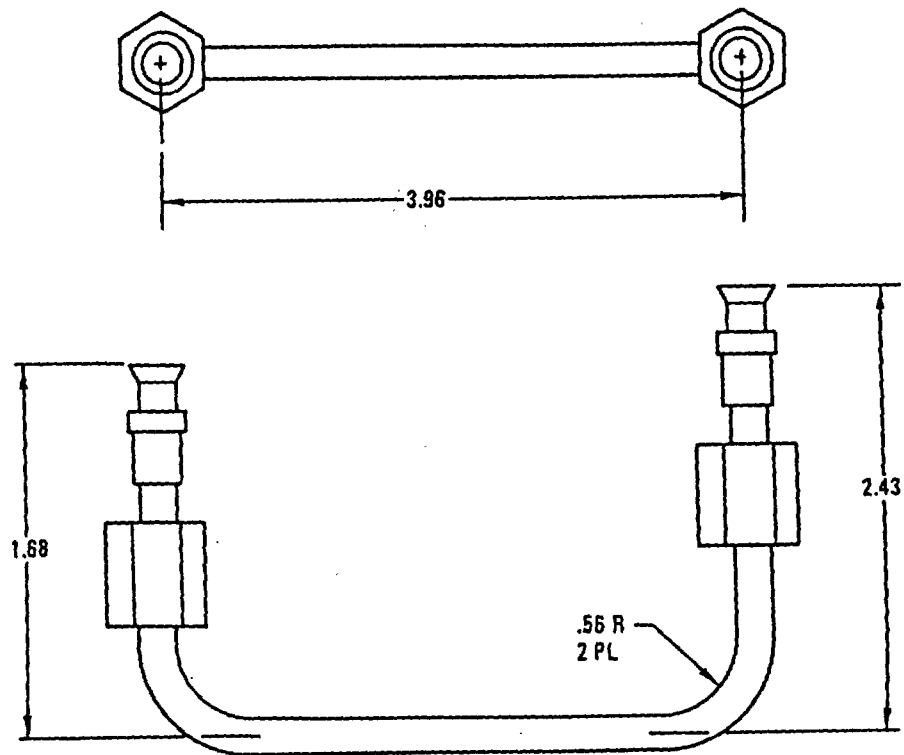
**NOTES:**

1. Made from Rubber and wire mesh, Adhesive back, P/N 01-064-1756 (57003).
2. Cut each gasket to length cut two 45 degree angles as shown.
3. Place on location so wire mesh is to the outside perimeter and mark hole location, remove and punch holes.
4. Peel plastic strip off back of gasket and install so wire mesh is to the outside perimeter on unit

**Figure F-36. Gasket, Transformer**



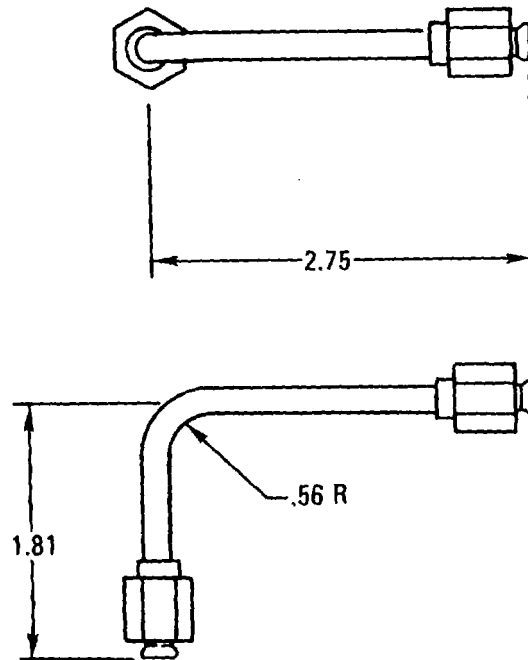
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



## NOTES:

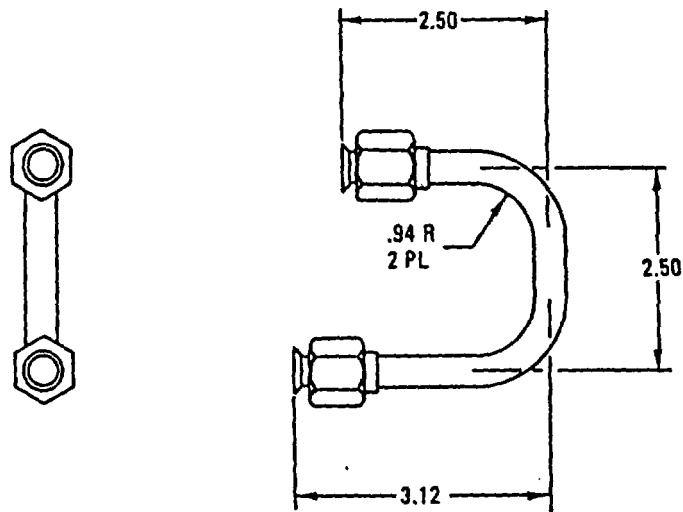
1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size and bend per figure.
4. Install two sleeves (1), MS51533B4Z and two nuts (2), MS51531B4Z.
5. Flare per MS33583 (37° Double flare).

Figure F-37. Tube Assembly, Fuel Pump

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size and bend per figure.
4. Install two sleeves (1), MS51533B4Z and two nuts (2), MS51531B4Z.
5. Flare per MS33583 (37° Double flare).

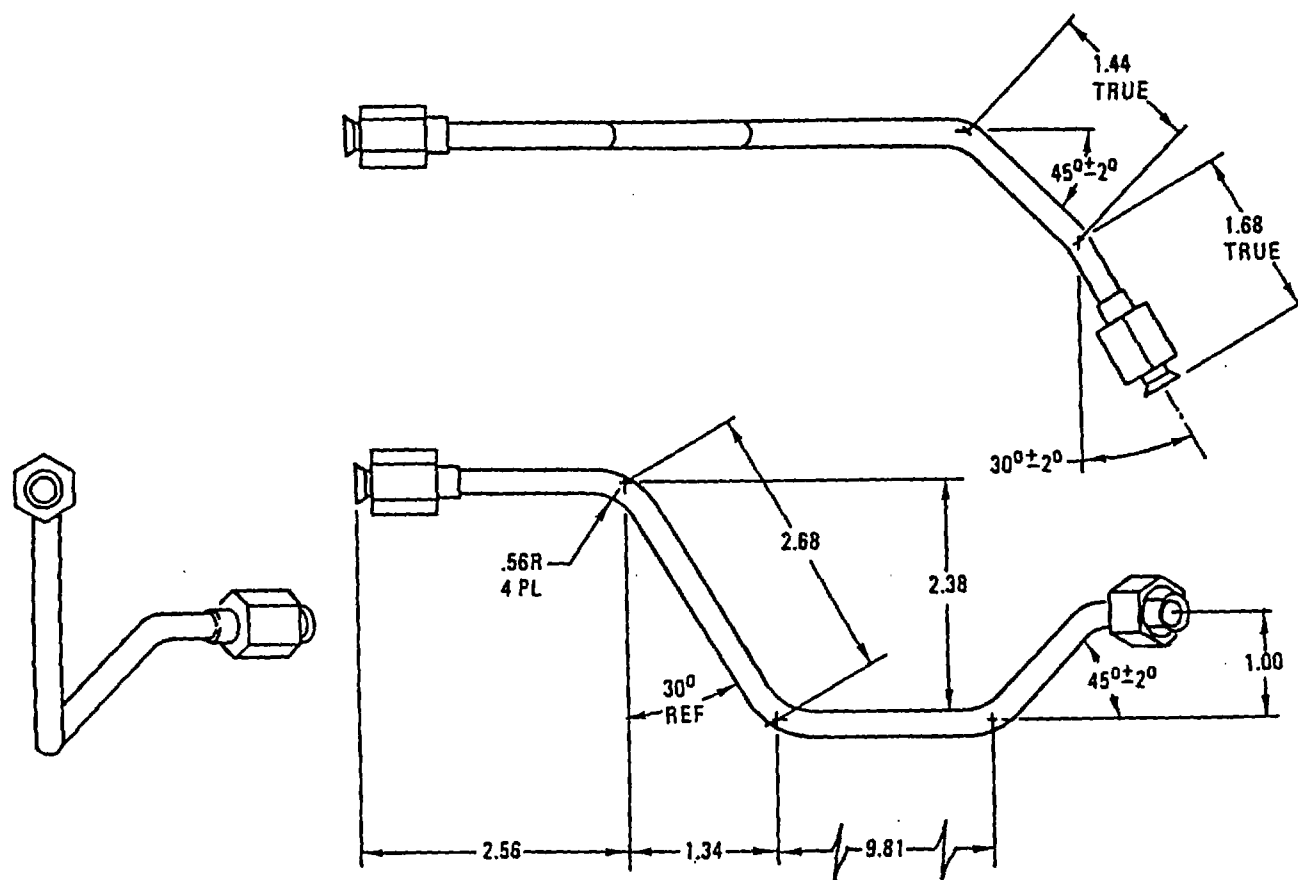
**Figure F-38. Tube Assembly, Fuel Pump**

**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .032 wall, per ASTM B280-83.
3. Cut to size and bend per figure.
4. Install two sleeves (1), MS51533B6Z and two nuts (2), MS51531B6Z.
5. Flare per MS33583 (37° Double flare).

**Figure F-39. Tube Assembly, Rear Panel****F-41'**

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

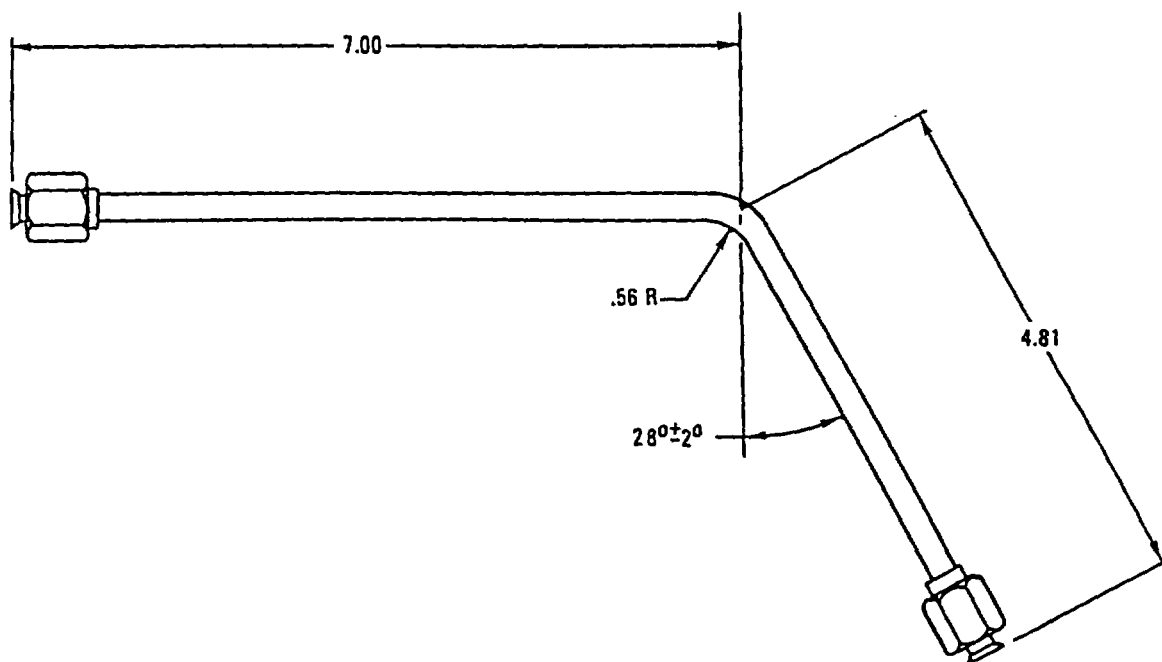


## NOTES:

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size (18.50 in) and bend per figure.
4. Install two sleeves (1), MS51533B4Z and two nuts (2), MS51531B4Z.
5. Flare per MS33583 (37° Double flare).

Figure F-40. Tube Assembly, Gage

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

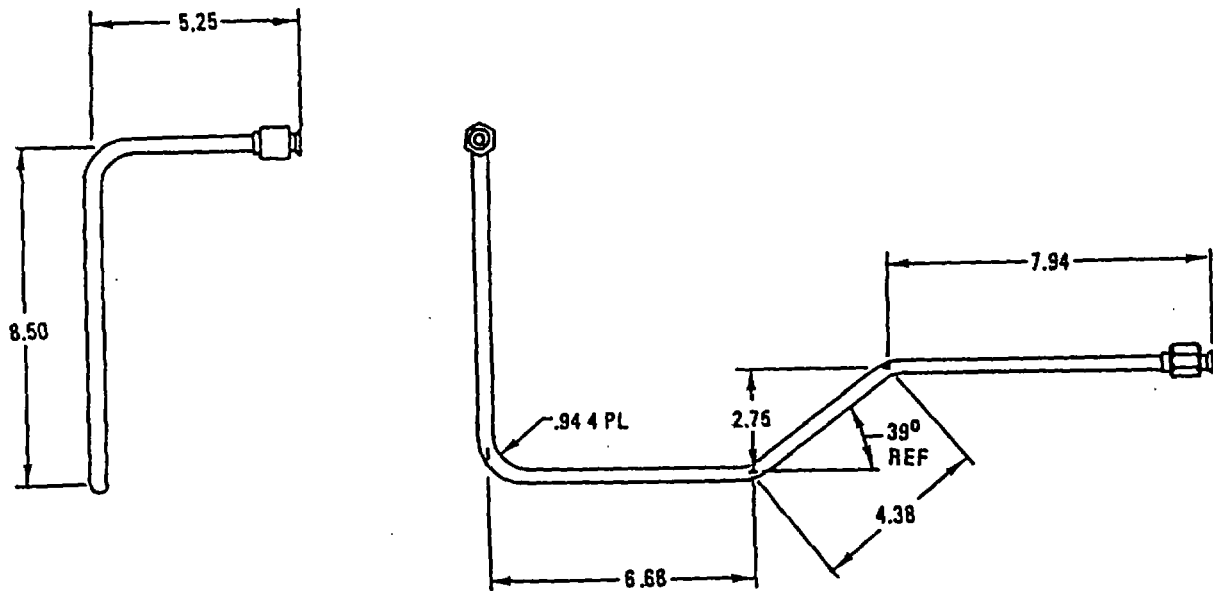


## NOTES:

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size (11.75 in) and bend per figure.
4. Install two sleeves (1), MS51533B4Z and two nuts (2), MS51531B4Z.
5. Flare per MS33583 (37° Double flare).

Figure F-41. Tube Assembly, Solenoid / Fuel Tank

## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.



## NOTES:

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size (31.75 in) and bend per figure.
4. Install two sleeves (1), MS51533B6Z and two nuts (2), MS51531B6Z.
5. Flare per MS33583 (37° Double flare).

Figure F-42. Tube Assembly, Rear Panel I Fuel Filter

**WARNINGS (Continued)****JEWELRY**

Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock. Remove rings, bracelets, wristwatches, and neck chains before working around or on the unit.

**HOT COMPONENTS**

Contact with hot components can cause burns. Allow unit to cool down before attempting service/inspection/maintenance activity.

**STEEL BANDING**

Steel banding, cut under tension, can snap free and cause injury. Leather gloves and face shield are required.

**FUEL SPILL**

Fuel is toxic and flammable and can cause injury to personnel and damage equipment. Improper positioning of external fuel source can cause the internal fuel tank to overflow. Properly position external fuel source.

**CLEANING AGENTS DO NOT**

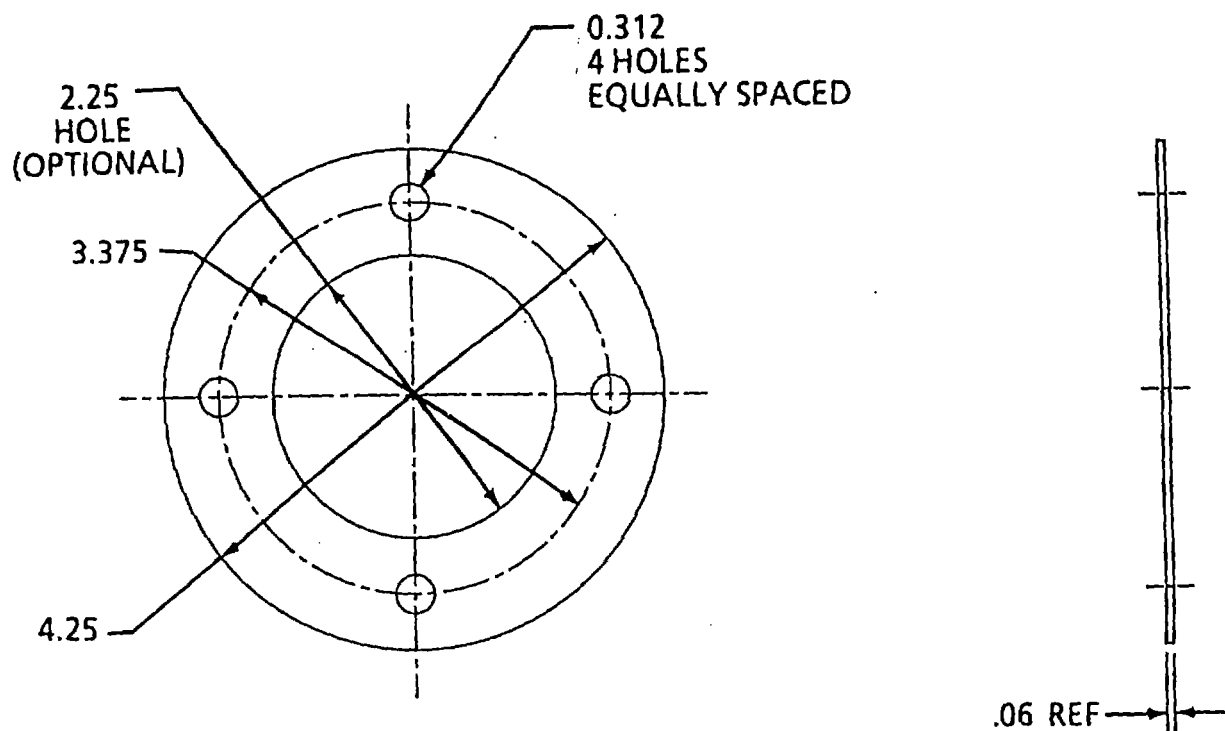
use diesel fuel, gasoline, or benzene (benzol) for cleaning.

DO NOT SMOKE when using cleaning solvent. NEVER USE IT NEAR AN OPEN FLAME. Be sure there is a fire extinguisher nearby and use cleaning solvent only in wellventilated places. Flash point of solvent is 138°F (60°C).

USE CAUTION when using cleaning solvents. Cleaning solvents evaporate quickly and can irritate exposed skin if solvents contact skin. In cold weather, contact of exposed skin with cleaning solvents can cause frostbite.

**c/ (d blank**

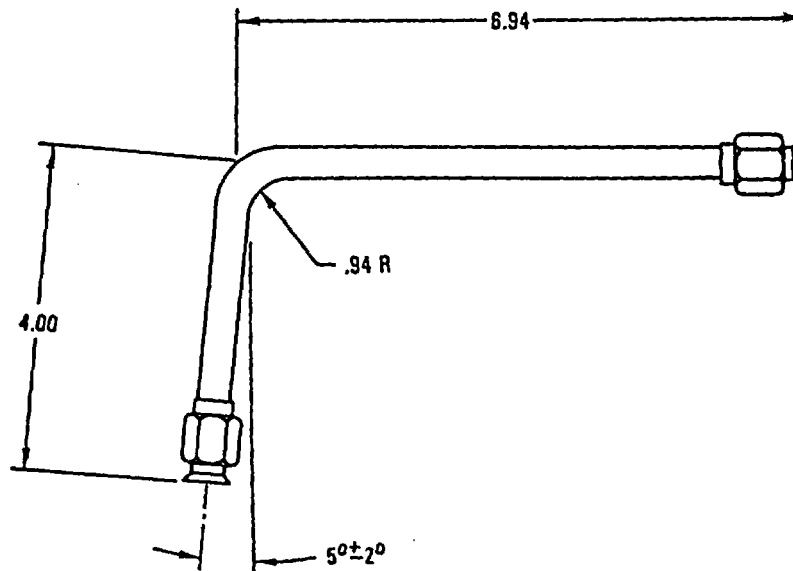
## F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.

**NOTES:**

1. Make from BUNA-N-Rubber sheeting, 1/16 thick per ASTM D-2000-86E, Type BG, Color Black, Hardness 45-55. P/N 8635K542.
2. Cut gasket to size.

Figure F-44. Gasket, Fuel Drain Cover



**F-2. MANUFACTURED ITEMS PART NUMBER INDEX - continued.****NOTES:**

1. Additional tools required, tube bending set, (Item 2, App B) and flaring tool, (Item 2, App B).
2. Make from copper tube, seamless .25 X .030 wall, per ASTM B280-83.
3. Cut to size (11.00 in) and bend per figure.
4. Install two sleeves (1), MS51533B6Z and two nuts (2), MS51531B6Z.
5. Flare per MS33583 (37° Double flare).

**Figure F-43. Tube Assembly, Fuel Tank / Rear Panel**

## APPENDIX G

### TORQUE LIMITS

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#### I-1. SCOPE.

This appendix provides torque limits for general use type fasteners. The torque values given in this appendix shall be used when specific torque values are not identified in the maintenance instructions.

#### I-2. TORQUE LIMITS.

Torque limits for fine threaded fasteners as compared to coarse threaded fasteners of the same diameter are slightly higher, but are not significant to general use. The following table identifies the torque limits for various sizes and types of fasteners.

## APPENDIX G

## TORQUE LIMITS - cont.

TYPE	MINIMUM TENSILE STRENGTH	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER												
			#2	#3	#4	#5	#6	#8	#10	¼	1/10	1/8	1/16	½	5/16
		LOW													
SAE	74,000	CARBON								6	12	20	32	47	69
0-1-2	PSI	STEEL								(8)	(16)	(27)	(44)	(64)	(94)
		MEDIUM													
SAE 3	100,000	CARBON								9	17	30	47	69	103
	PSI	STEEL								(12)	(23)	(41)	(64)	(94)	(140)
		MEDIUM													
SAE 5	120,000	CARBON								10	19	33	54	78	114
	PSI	HEAT TREAT								(14)	(26)	(45)	(73)	(106)	(155)
		STEEL													
		MEDIUM													
SAE 6	133,000	CARBON								12	24	43	69	106	150
	PSI	STEEL								(16)	(33)	(58)	(94)	(144)	(203)
		QUENCHED													
		TEMPERED													
		MEDIUM													
SAE 7	133,000	CARBON								13	25	44	71	110	154
	PSI	ALLOY								(18)	(34)	(60)	(96)	(141)	(209)
		STEEL													
		MEDIUM													
SAE 8	150,000	CARBON								14	29	47	78	119	169
	PSI	ALLOY								(19)	(39)	(64)	(106)	(161)	(229)
		STEEL													
		HIGH													
SOCKET		CARBON													
HEAD	160,000	CASE								16	33	54	84	125	180
CAP	PSI	HARDENED								(22)	(45)	(73)	(114)	(170)	(244)
SCREW		STEEL													
		HIGH													
SOCKET		CARBON													
SET	212,000	CASE					9	16	30	70	140	18	29	43	63
SCREW	PSI	HARDENED					(1-0)	(1.8)	(3.4)	(7.9)	(15.8)	(2.0)	(3.3)	(4.9)	(7.1)
		STEEL													

## APPENDIX G

## TORQUE LIMITS - cont.

TYPE	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER															
	3/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4	3
SAE 0-1-2	96 (130)	155 (210)	206 (279)	310 (420)	480 (651)	675 (915)	900 (1220)	1100 (1492)	1470 (1993)	1900 (2576)	2360 (3200)	2750 (3729)	3450 (4678)	4400 (5966)	7350 (9967)	9500 (12882)
SAE 3 (197)	145 (317)	234 (504)	372 (747)	551 (1182)	872 (1642)	1211 (2202)	1624 (2635)	1943 (3607)	2660 (4696)	3463 (6366)	4695 (7359)	5427 (9798)	7226 (10914)	8049 (18238)	13450 (23795)	17548
SAE5	154 (209)	257 (349)	382 (518)	587 (796)	794 (1077)	1105 (1498)	1500 (2034)	1775 (2407)	2425 (3288)	3150 (4271)	4200 (5695)	4550 (6170)	6550 (8882)	7175 (9729)	13000 (17628)	16000 (21696)
SAE6	209 (283)	350 (475)	550 (746)	825 (1119)	1304 (1768)	1815 (2461)	2434 (3301)	2913 (3950)	3985 (5404)	5189 (7036)	6980 (9465)	7491 (10158)	10825 (14679)	14983 (20317)	20151 (27325)	26286 (35644)
SAE7	215 (292)	360 (488)	570 (773)	840 (1139)	1325 (1797)	1825 (2475)	2500 (3390)	3000 (4068)	4000 (5424)	5300 (7187)	7000 (9492)	7500 (10170)	11000 (14916)	15500 (21018)	21000 (28476)	27000 (36612)
SAE8	230 (312)	380 (515)	600 (814)	900 (1220)	1430 (1940)	1975 (2678)	2650 (3593)	3200 (4339)	4400 (5966)	5650 (7661)	7600 (10306)	8200 (11119)	12000 (16272)	17000 (23052)	23000 (31188)	29000 (39324)
SOCKET HEAD CAP SCREW	250 (339)	400 (542)	640 (868)	970 (1315)	1520 (2061)	2130 (2888)	2850 (3865)	3450 (4678)	4700 (6373)	6100 (8272)	8200 (11119)	8800 (11933)	13000 (17628)	18000 (24408)	24000 (32544)	31000 (42036)
SOCKET SET SCREW	100 (136)	146 (198)														

## APPENDIX G

## TORQUE LIMITS - cont.

TYPE	MINIMUM TENSILE STRENGTH	MATERIAL	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER													
			#2	#3	#4	#5	#6	#8	#10	¼	1/10	1/8	1/16	½	5/16	
MACHINE SCREW YELLOW BRASS	60,000 PSI	COPPER (CU) 63% ZINC (ZN) 37%	2 (.2)	3.3 (.3)	4.4 (.5)	6.4 (.7)	8 (.9)	16 (1.8)	20 (2.3)	65 (7.3)	110 (12.4)	17 (23)	27 (37)	37 (50)	49 (66)	
SILOPHONE BRONZE TYPE "B"	70,000 PSI	COPPER (CU) 96% ZINC (ZN) 2% SILICON (SI) 2%	2.3 (.2)	3.7 (.3)	4.9 (.5)	7.2 (.8)	10 (1.1)	19 (2.1)	22 (2.5)	70 (7.9)	125 (14.1)	20 (27)	30 (41)	41 (56)	53 (72)	

TYPE	BODY SIZE OR OUTSIDE DIAMETER OF FASTENER															
	3/8	¾	7/8	1	1 1/8	1 1/4	1 3/8	1 ½	1 5/8	1 ¾	1 7/8	2	2 ¼	2 1/2	2 ¾	3
MACHINE SCREW YELLOW BRASS	78 (106)	104 (141)	160 (217)	215 (292)	325 (441)	400 (542)		595 (807)								
SILOPHONE BRONZE TYPE "B"	88 (119)	117 (159)	180 (244)	250 (339)	365 (495)	450 (610)		655 (888)								

**LEGEND**

1. TORQUE VALUES: All numbers are in foot-pounds except those that are underlined, which are inch-pounds.
2. Numbers in parentheses are Newton-Meters.

## APPENDIX H

## MANDATORY REPLACEMENT PARTS

ITEM NO.	NOMENCLATURE	PART NUMBER
1	Lockwasher	MS35338-44
2	Lockwasher	MS35338-25
3	Lockwasher	MS35333-42
4	Lockwasher	MS35338-45
5	Rivet	AD43AH
6	Rivet	AD62B5
7	Rivet	M24243 / IF402
8	Lockwasher	MS35338-43
9	Lockwasher	MS35333-40
10	Lockwasher	MS35333-39
11	Preformed Packing	0-1290
12	Lockwasher	MS35338-138
13	Lockwasher	MS35338-46
14	Lockwasher	MS35338-42
15	Lockwasher	MS35333-38
16	Lockwasher	MS35333-37
17	Gasket, Hourmeter	60824-1
18	Rivet	AD42AH
19	Rivet	AD66ABS
20	Rivet	SD43BS
21	Rivet	AD43H
22	Rivet	AD64H
23	Rivnut	A25KB151
24	Rivnut	A31KB125

## APPENDIX H

## MANDATORY REPLACEMENT PARTS - continued

ITEM NO.	NOMENCLATURE	PART NUMBER
25	Rivet	M24243 / 602F
26	Terminal Splice, Crimp Style	M7928 / 6-4
27	Rivet	AD64BS
28	Packing, Preformed	AS568-035
29	Gasket	60717-1
30	Packing, Preformed	239
31	Rivet	AK43H
32	Cotter Pin	MS24665-389
33	Backup Plate	ABUP4
34	Packing, Preformed	MS9955-023
35	Gasket, Fuel Drain Cover	60499-1
36	Rivet	AD64AH
37	Rivet	AD62H
38	Packing, Preformed	MS9955-107
39	Packing, Preformed	MS29513-014
40	Packing, Preformed	MS29513-012
41	Cotter Pin	MS24665-372
42	Cotter Pin	MS24665-42
43	Heat Shrink	WCSM-19/6-1200-S
44	Rivnut	A10KB116
45	Gasket, Fuel Filter	1752036

## GLOSSARY

---

### Section I. ABBREVIATIONS

amps.....	amperes
App .....	Appendix
BTU.....	British Thermal Unit
cfm .....	cubic feet per minute
CA .....	Cartridge
CN.....	Can
CO .....	Container
ea .....	each
F.....	Degrees Fahrenheit
FY .....	Fifty of an item
ft .....	.feet
GL .....	gallon
gph .....	gallons per hour
Hz .....	Hertz
IAW .....	In Accordance With
in .....	inch or inches
in-lb .....	inch-pounds
iwg .....	inches of water, gage
lb .....	pounds
N.C.....	Normally Closed
N.O.....	Normally Open
para.....	paragraph
PL .....	Pound
PN .....	Part Number
PR .....	Pair
psi .....	pounds per square inch
RL.....	Roll
TU.....	Tube
vac .....	volts, alternating current

---

### Section II. DEFINITIONS OF UNUSUAL TERMS

Preformed Packing:    O-Ring seals.



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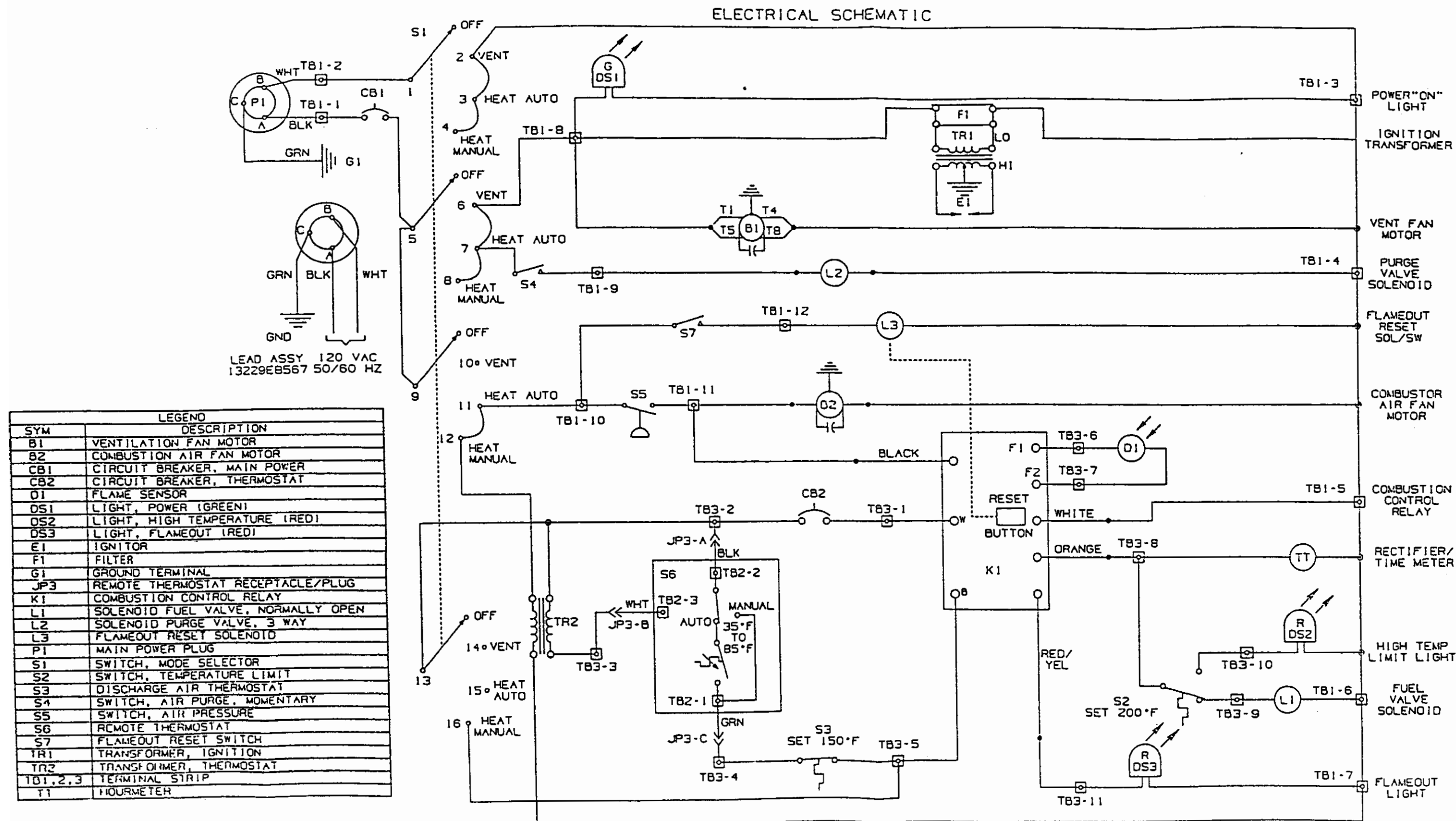


Figure FO-1 ASH Electrical Schematic

OPERATING INSTRUCTIONS

CAUTION

- PRIOR TO OPERATION OF UNIT, ENSURE:
- 1. UNIT IS CONNECTED TO 120 VAC, 50/60 HZ, 1Ø POWER SOURCE ONLY.
  - 2. FUEL TANK CONTAINS FUEL IN ACCORDANCE WITH TM9-4520-258-14.

VENT MODE:

- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION.
- 2. ADJUST THE FRESH AIR DAMPER FOR DESIRED AMOUNT OF FRESH AIR.

HEAT AUTO MODE:

- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION FOR 60 SECONDS.
- 2. DEPRESS FUEL PURGE SWITCH ON FOR 10 SECONDS.
- 3. LOOK THROUGH SIGHT GLASS AND ENSURE IGNITION ARC IS PRESENT BEFORE PROCEEDING TO STEP 4.
- 4. SET MODE SELECTOR SWITCH IN THE HEAT AUTO POSITION.
- 5. LOOK THROUGH SIGHT GLASS AND ENSURE FLAME IS PRESENT.
- 6. ADJUST TEMPERATURE WITH THE REMOTE THERMOSTAT. TEMPERATURE ADJUSTABLE FROM 35°F TO 85°F.
- 7. TO SWITCH TO THE HEAT MANUAL MODE WITH THE MODE SELECTOR SWITCH IN THE HEAT AUTO MODE, DEPRESS BOTH ARROWS ON THE REMOTE THERMOSTAT IN UNISON. THE REMOTE THERMOSTAT WILL DISPLAY "HI". TO RETURN TO THE HEAT AUTO MODE, DEPRESS BOTH ARROWS A SECOND TIME.

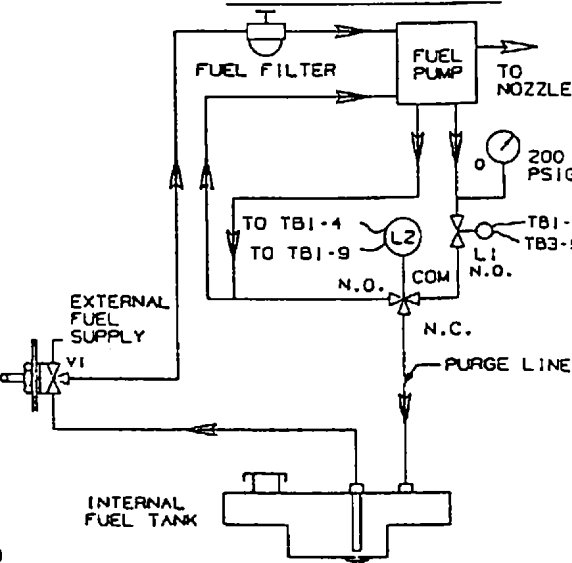
HEAT MANUAL MODE:

- 1. PERFORM HEAT AUTO MODE STEPS 1 THROUGH 5.
- 2. SET MODE SELECTOR SWITCH IN THE HEAT MANUAL POSITION, OR DEPRESS BOTH ARROWS ON THE REMOTE THERMOSTAT IN UNISON.

SHUTDOWN:

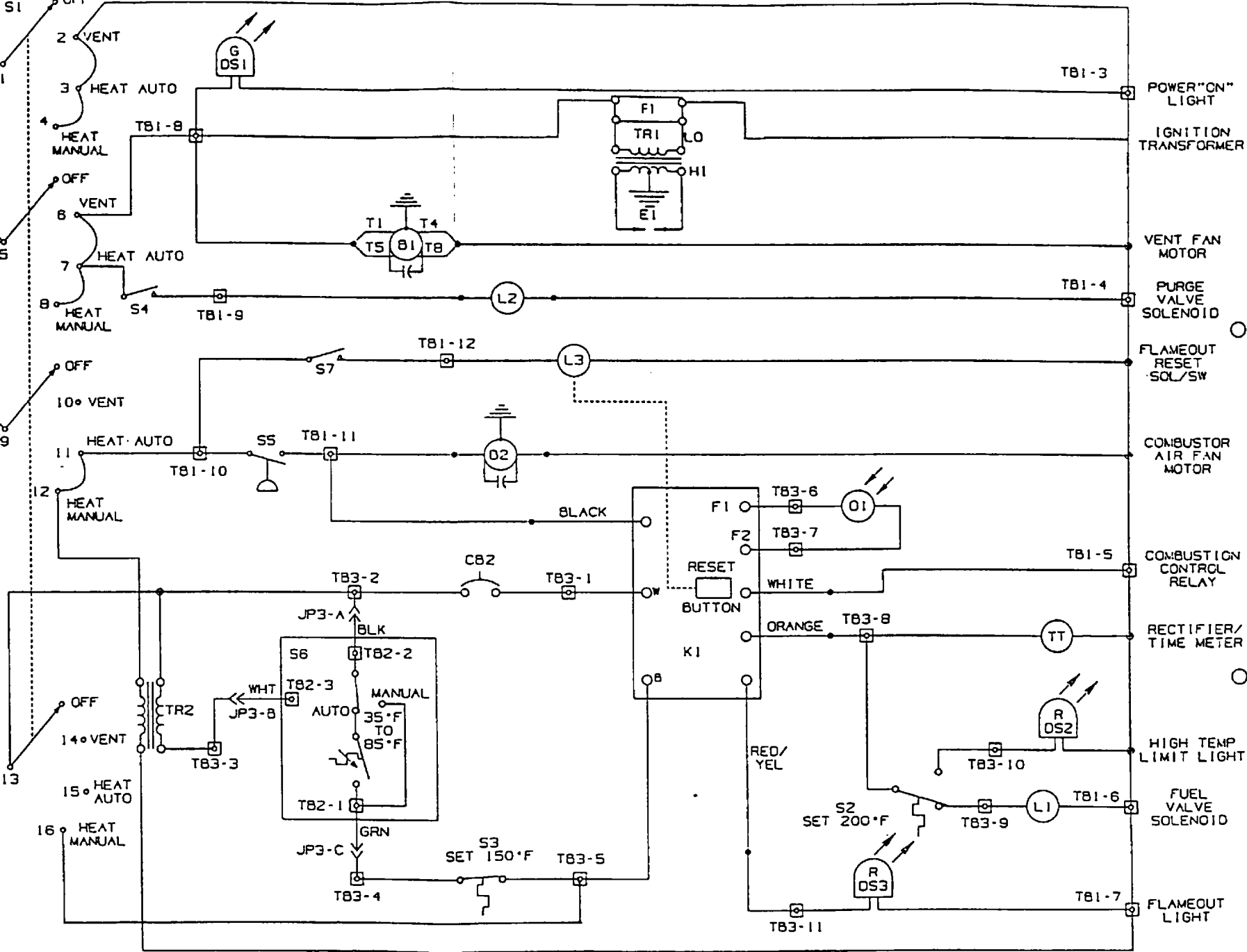
- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION FOR TWO MINUTES.
- 2. SET MODE SELECTOR SWITCH IN THE OFF POSITION.

FUEL SCHEMATIC

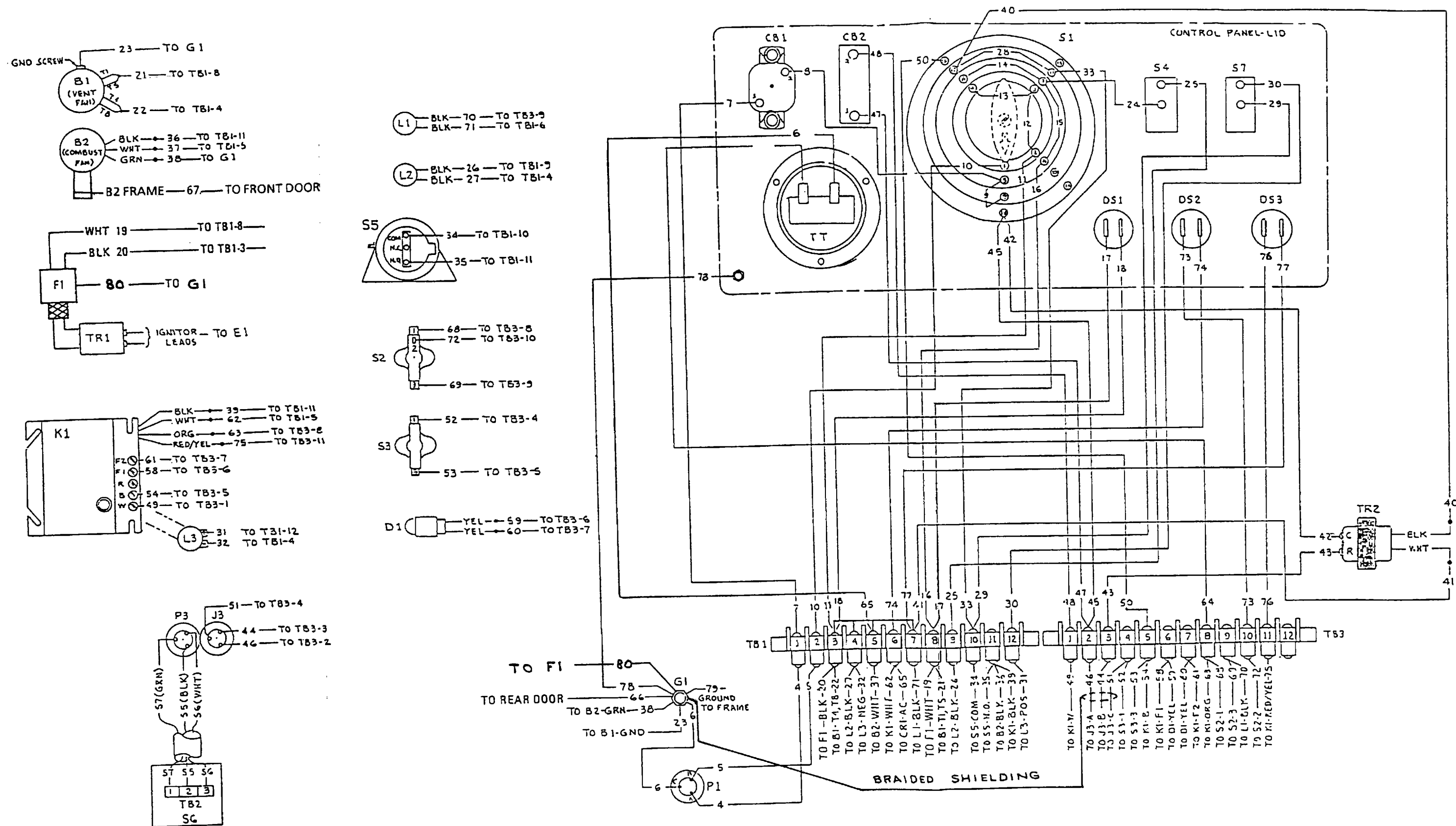


LEGEND	
SYM	DESCRIPTION
B1	VENTILATION FAN MOTOR
B2	COMBUSTION AIR FAN MOTOR
CB1	CIRCUIT BREAKER, MAIN POWER
CB2	CIRCUIT BREAKER, THERMOSTAT
DI	FLAME SENSOR
DS1	LIGHT, POWER (GREEN)
DS2	LIGHT, HIGH TEMPERATURE (RED)
DS3	LIGHT, FLAMEOUT (RED)
E1	IGNITOR
F1	FILTER
G1	GROUND TERMINAL
JP3	REMOTE THERMOSTAT RECEPTACLE/PLUG
K1	COMBUSTION CONTROL RELAY
L1	SOLENOID FUEL VALVE, NORMALLY OPEN
L2	SOLENOID PURGE VALVE, 3 WAY
L3	FLAMEOUT RESET SOLENOID
P1	MAIN POWER PLUG
S1	SWITCH, MODE SELECTOR
S2	SWITCH, TEMPERATURE LIMIT
S3	DISCHARGE AIR THERMOSTAT
S4	SWITCH, AIR PURGE, MOMENTARY
S5	SWITCH, AIR PRESSURE
S6	REMOTE THERMOSTAT
S7	FLAMEOUT RESET SWITCH
TR1	TRANSFORMER, IGNITION
TR2	TRANSFORMER, THERMOSTAT
TR1,2,3	TERMINAL STRIP
T1	THERMISTOR
V1	3 WAY VALVE, FUEL SELECTION

ELECTRICAL SCHEMATIC



FO-2- OPERATING INSTRUCTIONS AND ELECTRICAL SCHEMATIC PLATE  
FP-3/(FP-4 blank)



LEGEND	
SYM	DESCRIPTION
B1	VENTILATION FAN MOTOR
B2	COMBUSTION AIR FAN MOTOR
CB1	CIRCUIT BREAKER, MAIN POWER
CB2	CIRCUIT BREAKER, THERMOSTAT
D1	FLAME SENSOR
DS1	LIGHT, POWER (GREEN)
DS2	LIGHT, HIGH TEMPERATURE (RED)
DS3	LIGHT, FLAMEOUT (RED)
E1	IGNITER
F1	FILTER
G1	GROUND TERMINAL
JP3	REMOTE THERMOSTAT RECEPTACLE/PLUG
K1	COMBUSTION CONTROL RELAY
L1	SOLENOID FUEL VALVE, NORMALLY OPEN
L2	SOLENOID PURGE VALVE, 3 WAY
L3	FLAMEOUT RESET SOLENOID
P1	MAIN POWER PLUG
S1	SWITCH, MODE SELECTOR
S2	SWITCH, TEMPERATURE LIMIT
S3	DISCHARGE AIR THERMOSTAT
S4	SWITCH, AIR PURGE, MOMENTARY
S5	SWITCH, AIR PRESSURE
S6	REMOTE THERMOSTAT
S7	FLAMEOUT RESET SWITCH
TR1	TRANSFORMER, IGNITION
TR2	TRANSFORMER, THERMOSTAT
TB1,2,3	TERMINAL STRIP
TT	HOURLY METER

WIRE ASSY INDEX #	FROM	TO	WIRE ASSY INDEX #	FROM	TO	WIRE ASSY INDEX #	FROM	TO
1	120 vac	J1-A	29	TB1-10	S7-2	57	P3-C	TB2-1
2	Neutral	J1-B	30	S7-1	TB1-12	58	K1-F1	TB3-6
3	Ground	J1-C	31	TB1-12	L3-POS	59	TB3-6	D1-YEL
4	P1-A	TB1-1	32	L3-NEG	TB1-4	60	D1-YEL	TB3-7
5	P1-B	TB1-2	33	S1-11	TB1-10	61	TB3-7	K1-F2
6	P1-C	G-1	34	TB1-10	S5-COM	62	K1-WHT	TB1-6
7	TB1-1	CB1-1	35	S5-N.O.	TB1-11	63	K1-ORG	TB3-8
8	CB1-2	S1-5	36	TB1-11	B2-BLK	64	TB3-8	TT
9	S1-5	S1-9	37	B2-WHT	TB1-5	65	TT	TB1-6
10	TB1-2	S1-1	38	B2-GRN/YEL	G1	66	G-1	Door, Rear
11	S1-2	TB1-3	39	TB1-11	K1-BLK	67	B-2, Frame	Door, Front
12	S1-2	S1-3	40	S1-12	TR2-BLK	68	TB3-8	S2-1
13	S1-3	S1-4	41	TR2-WHT	TB1-7	69	S2-3	TB3-9
14	S1-8	S1-7	42	S1-13	TR2-C	70	TB3-9	L1-BLK
15	S1-7	S1-6	43	TR2-R	TB3-3	71	L1-BLK	TB1-7
16	S1-6	TB1-8	44	TB3-3	J3-B	72	S2-2	TB3-10
17	TB1-8	DS1-POS	45	S1-13	TB3-2	73	TB3-10	DS2-POS
18	DS1-NEG	TB1-3	46	TB3-2	J3-A	74	DS2-NEG	TB1-6
19	TB1-8	F1-BLK	47	TB3-2	CB2-1	75	K1-RED/YEL	TB3-11
20	F1-WHT	TB1-3	48	CB2-2	TB3-1	76	TB3-11	DS3-POS
21	TB1-8	B-T1,T5	49	TB3-1	K1-W	77	DS3-NEG	TB1-7
22	B1-T4,T8	TB1-3	50	S1-16	TB3-5	78	G1	C.P.-LID
23	B1-GRD	G1	51	TB3-4	J3-C	79	G1	FRAME
24	S1-7	S4-2	52	TB3-4	S3-1	80	F1	G1
25	S4-1	TB1-9	53	S3-3	TB3-5			
26	TB1-9	L2-BLK	54	TB3-5	K1-B			
27	L2-BLK	TB1-4	55	P3-A	TB2-2			
28	S1-12	S1-11	56	P3-B	TB2-3			

FO-3. Wiring Diagram  
(Sheet 2 of 2)  
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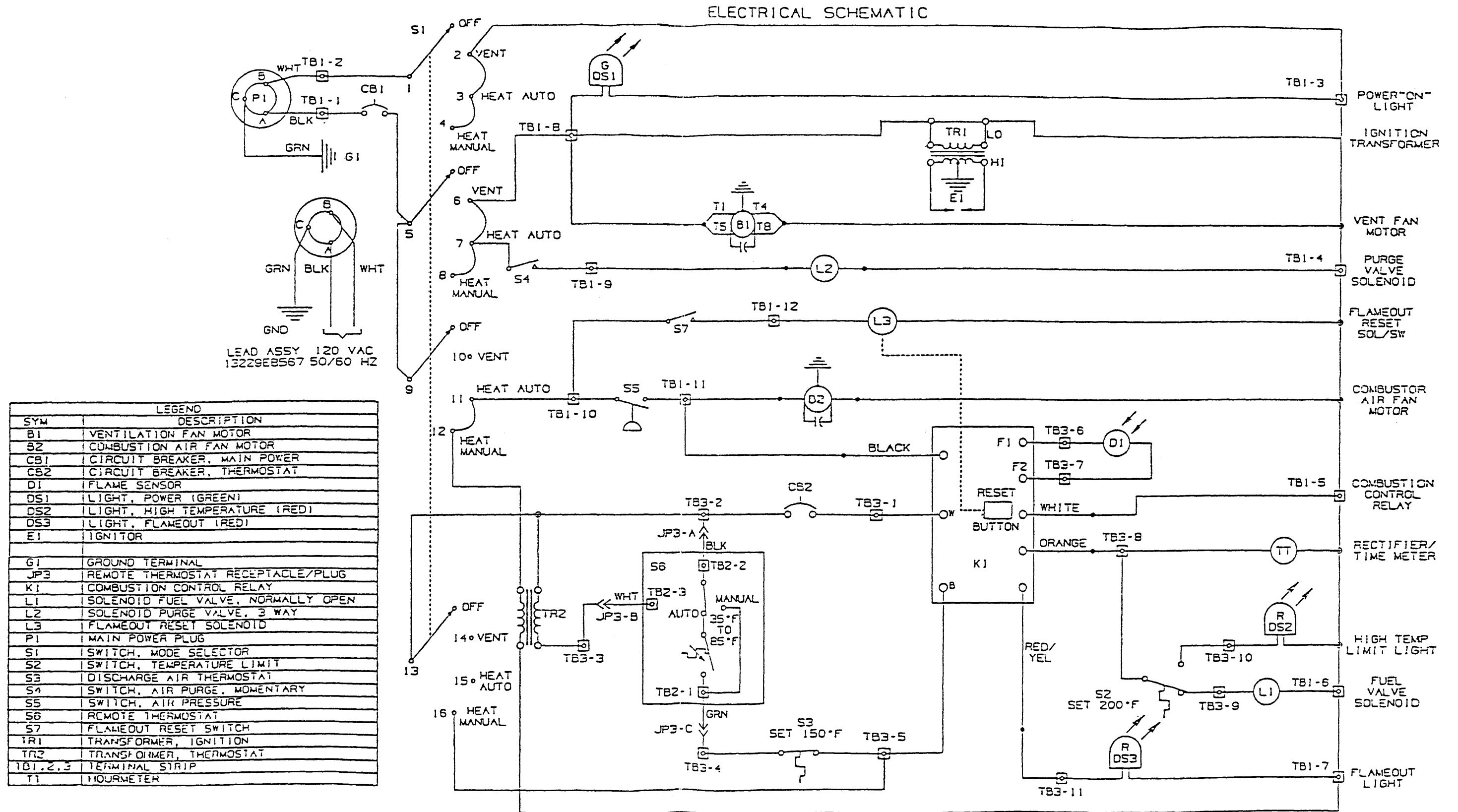


Figure FO-4. ASH Electrical Schematic (without Filter, F1)

OPERATING INSTRUCTIONS

CAUTION

PRIOR TO OPERATION OF UNIT, ENSURE:  
1. UNIT IS CONNECTED TO 120 VAC, 50/60 HZ, 1Ø POWER SOURCE ONLY.  
2. FUEL TANK CONTAINS FUEL IN ACCORDANCE WITH TM9-4520-258-14.

VENT MODE:

- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION.
- 2. ADJUST THE FRESH AIR DAMPER FOR DESIRED AMOUNT OF FRESH AIR.

HEAT AUTO MODE:

- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION FOR 60 SECONDS.
- 2. DEPRESS FUEL PURGE SWITCH ON FOR 10 SECONDS.
- 3. LOOK THROUGH SIGHT GLASS AND ENSURE IGNITION ARC IS PRESENT BEFORE PROCEEDING TO STEP 4.
- 4. SET MODE SELECTOR SWITCH IN THE HEAT AUTO POSITION.
- 5. LOOK THROUGH SIGHT GLASS AND ENSURE FLAME IS PRESENT.
- 6. ADJUST TEMPERATURE WITH THE REMOTE THERMOSTAT. TEMPERATURE ADJUSTABLE FROM 35°F TO 85°F.
- 7. TO SWITCH TO THE HEAT MANUAL MODE WITH THE MODE SELECTOR SWITCH IN THE HEAT AUTO MODE, DEPRESS BOTH ARROWS ON THE REMOTE THERMOSTAT IN UNISON. THE REMOTE THERMOSTAT WILL DISPLAY "HI". TO RETURN TO THE HEAT AUTO MODE, DEPRESS BOTH ARROWS A SECOND TIME.

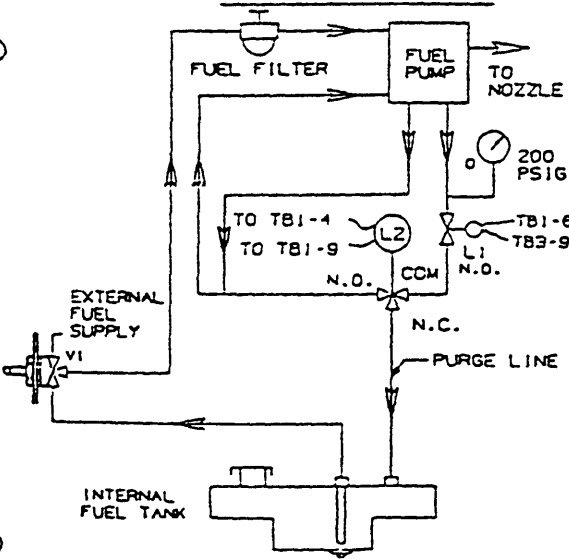
HEAT MANUAL MODE:

- 1. PERFORM HEAT AUTO MODE STEPS 1 THROUGH 5.
- 2. SET MODE SELECTOR SWITCH IN THE HEAT MANUAL POSITION, OR DEPRESS BOTH ARROWS ON THE REMOTE THERMOSTAT IN UNISON.

SHUTDOWN:

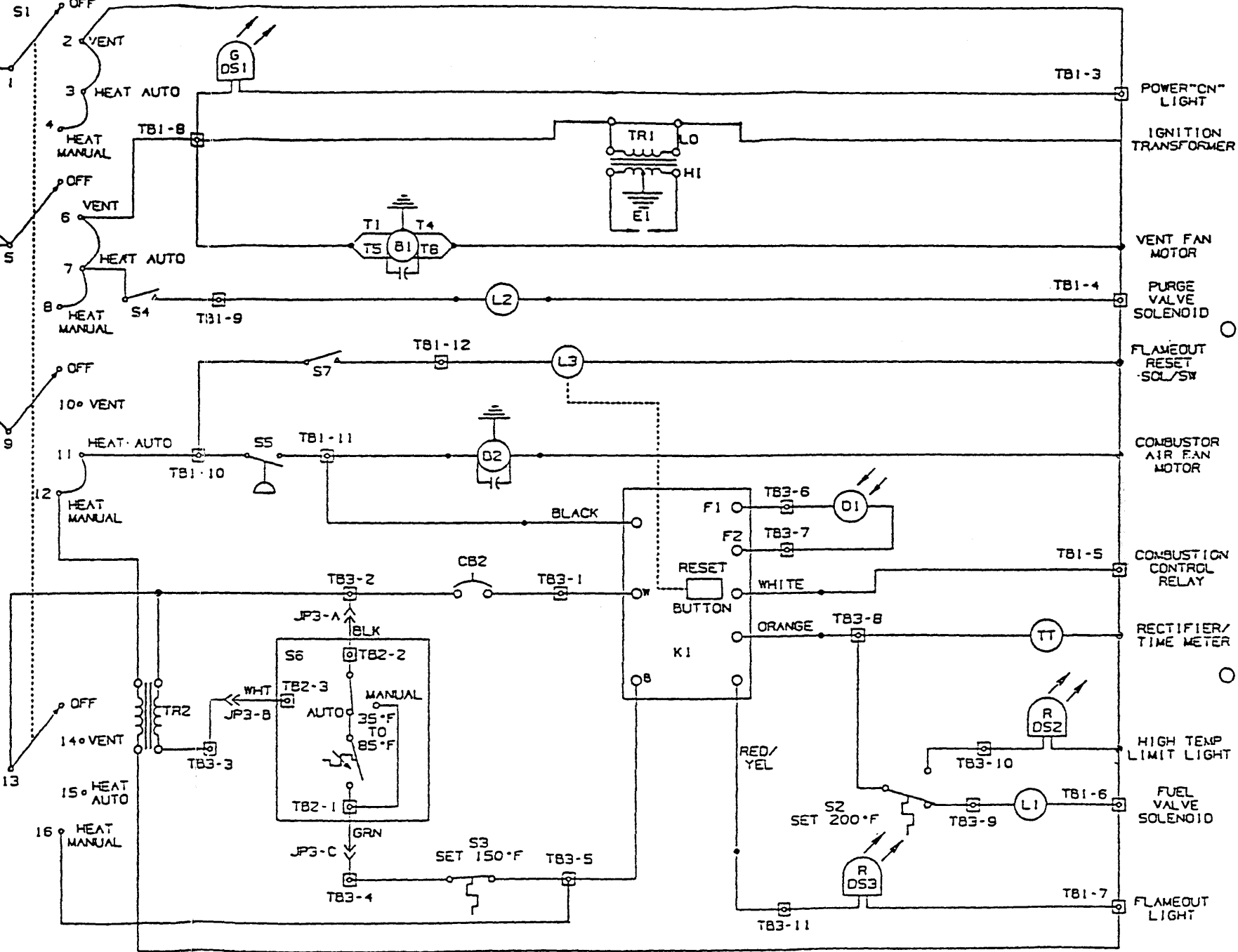
- 1. SET MODE SELECTOR SWITCH IN THE VENT POSITION FOR TWO MINUTES.
- 2. SET MODE SELECTOR SWITCH IN THE OFF POSITION.

FUEL SCHEMATIC



LEGEND	
SYM	DESCRIPTION
B1	VENTILATION FAN MOTOR
B2	COMBUSTION AIR FAN MOTOR
CB1	CIRCUIT BREAKER, MAIN POWER
CB2	CIRCUIT BREAKER, THERMOSTAT
D1	FLAME SENSOR
DS1	LIGHT, POWER (GREEN)
DS2	LIGHT, HIGH TEMPERATURE (RED)
DS3	LIGHT, FLAMEOUT (RED)
E1	IGNITOR
G1	GROUND TERMINAL
JP3	REMOTE THERMOSTAT RECEPTACLE/PLUG
K1	COMBUSTION CONTROL RELAY
L1	SOLENOID FUEL VALVE, NORMALLY OPEN
L2	SOLENOID PURGE VALVE, 3 WAY
L3	FLAMEOUT RESET SOLENOID
P1	MAIN POWER PLUG
S1	SWITCH, MODE SELECTOR
S2	SWITCH, TEMPERATURE LIMIT
S3	DISCHARGE AIR THERMOSTAT
S4	SWITCH, AIR PURGE, MOMENTARY
S5	SWITCH, AIR PRESSURE
S6	REMOTE THERMOSTAT
S7	FLAMEOUT RESET SWITCH
TR1	TRANSFORMER, IGNITION
TR2	TRANSFORMER, THERMOSTAT
TD1,2,3	TERMINAL STRIP
T1	THERMISTOR
V1	3 WAY VALVE, FUEL SELECTION

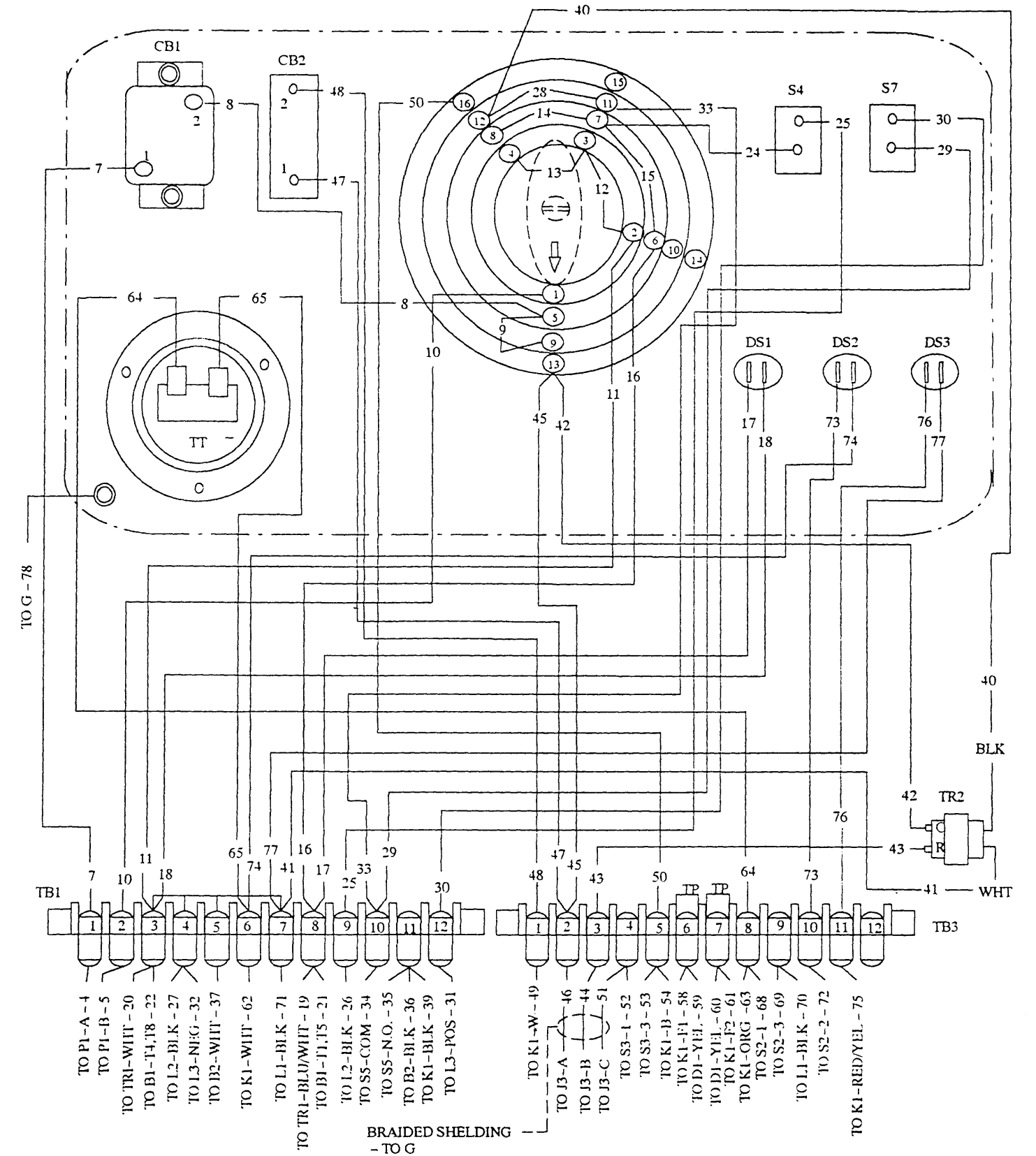
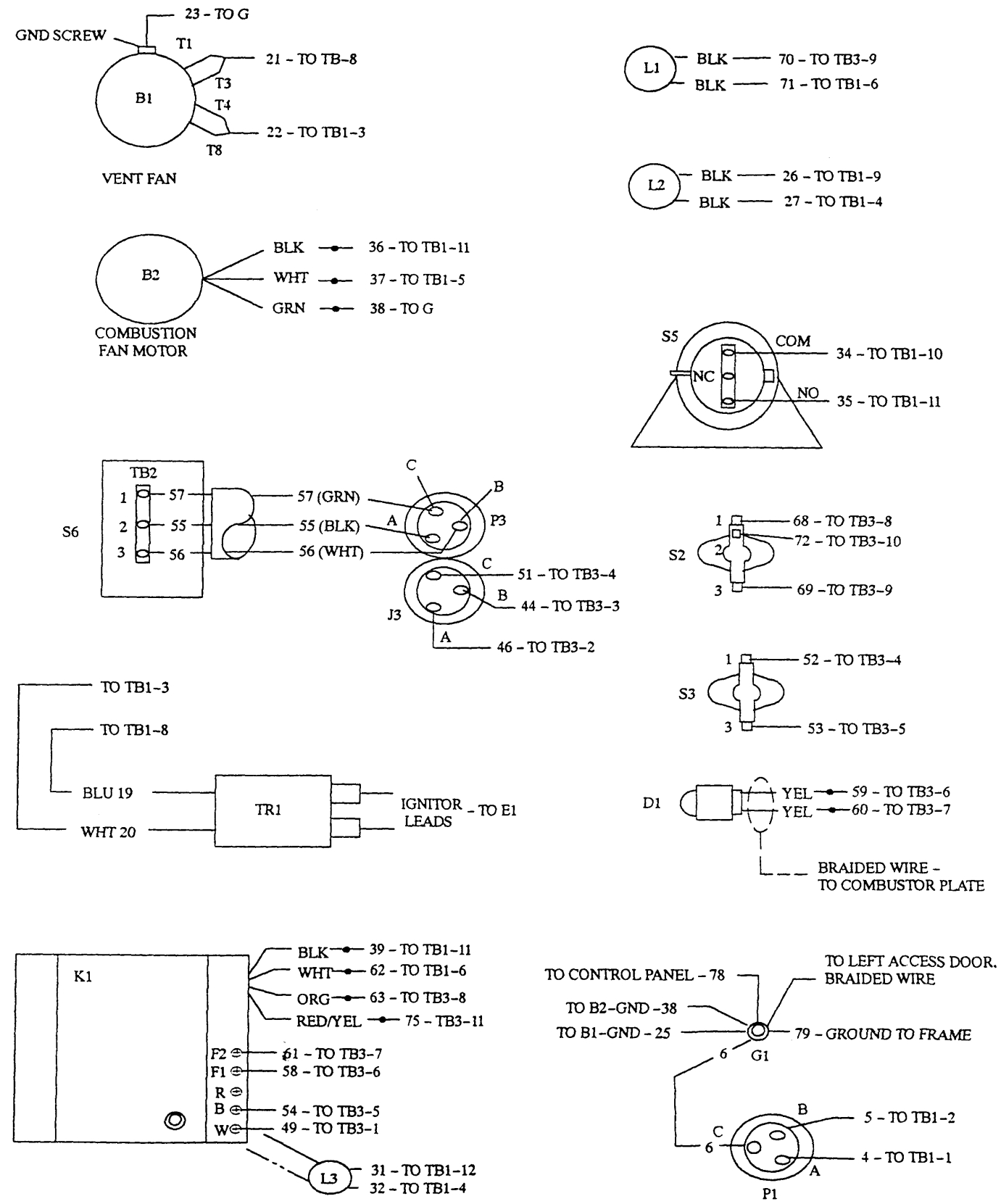
ELECTRICAL SCHEMATIC



90598/60-29-1

Figure FO-5. Operating Instructions and Electrical Schematic Plate (without Filter F1)





LEGEND	
SYM	DESCRIPTION
B1	VENTILATION FAN MOTOR
B2	COMBUSTION AIR FAN MOTOR
CB1	CIRCUIT BREAKER, MAIN POWER
CB2	CIRCUIT BREAKER, THERMOSTAT
D1	FLAME SENSOR
DS1	LIGHT, POWER (GREEN)
DS2	LIGHT, HIGH TEMPERATURE (RED)
DS3	LIGHT, FLAMEOUT (RED)
E1	IGNITER
G	GROUND TERMINAL
JP3	REMOTE THERMOSTAT RECEPTACLE/PLUG
K1	COMBUSTION CONTROL RELAY
L1	SOLENOID FUEL VALVE, NORMALLY OPEN
L2	SOLENOID PURGE VALVE, 3 WAY
L3	FLAMEOUT RESET SOLENOID
P1	MAIN POWER PLUG
S1	SWITCH, MODE SELECTOR
S2	SWITCH, TEMPERATURE LIMIT
S3	DISCHARGE AIR THERMOSTAT
S4	SWITCH, AIR PURGE, MOMENTARY
S5	SWITCH, AIR PRESSURE
S6	REMOTE THERMOSTAT
S7	FLAMEOUT RESET SWITCH
TR1	TRANSFORMER, IGNITION
TR2	TRANSFORMER, THERMOSTAT
TB1,2,3	TERMINAL STRIP
TT	HOURLY METER

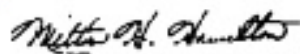
WIRE ASSY INDEX #	FROM	TO	WIRE ASSY INDEX #	FROM	TO	WIRE ASSY INDEX #	FROM	TO
1	120 vac	J1-A	29	TB1-10	S7-2	57	P3-C	TB2-1
2	Neutral	J1-B	30	S7-1	TB1-12	58	K1-F1	TB3-6
3	Ground	J1-C	31	TB1-12	L3-POS	59	TB3-6	D1-YEL
4	P1-A	TB1-1	32	L3-NEG	TB1-4	60	D1-YEL	TB3-7
5	P1-B	TB1-2	33	S1-11	TB1-10	61	TB3-7	K1-F2
6	P1-C	G	34	TB1-10	S5-COM	62	K1-WHT	TB1-6
7	TB1-1	CB1-1	35	S5-N.O.	TB1-11	63	K1-ORG	TB3-8
8	CB1-2	S1-5	36	TB1-11	B2-BLK	64	TB3-8	TT
9	S1-5	S1-9	37	B2-WHT	TB1-5	65	TT	TB1-6
10	TB1-2	S1-1	38	B2-GRN	G	66		
11	S1-2	TB1-3	39	TB1-11	K1-BLK	67		
12	S1-2	S1-3	40	S1-12	TR2-BLK	68	TB3-8	S2-1
13	S1-3	S1-4	41	TR2-WHT	TB1-7	69	S2-3	TB3-9
14	S1-8	S1-7	42	S1-13	TR2-C	70	TB3-9	L1-BLK
15	S1-7	S1-6	43	TR2-R	TB3-3	71	L1-BLK	TB1-7
16	S1-6	TB1-8	44	TB3-3	J3-B	72	S2-2	TB3-10
17	TB1-8	DS1-POS	45	S1-13	TB3-2	73	TB3-10	DS2-POS
18	DS1-NEG	TB1-3	46	TB3-2	J3-A	74	DS2-NEG	TB1-6
19	TB1-8	TR1-BLU	47	TB3-2	CB2-1	75	K1-RED/YEL	TB3-11
20	TR1-WHT	TB1-3	48	CB2-2	TB3-1	76	TB3-11	DS3-POS
21	TB1-8	B-T1,T5	49	TB3-1	K1-W	77	DS3-NEG	TB1-7
22	B1-T4,T8	TB1-3	50	S1-16	TB3-5	78	G	C.P.-LID
23	B1-GRD	G	51	TB3-4	J3-C	79	G	FRAME
24	S1-7	S4-2	52	TB3-4	S3-1	80		
25	S4-1	TB1-9	53	S3-3	TB3-5	81		
26	TB1-9	L2-BLK	54	TB3-5	K1-B	82	TR1-G	GND-T
27	L2-BLK	TB1-4	55	P3-A	TB2-2			
28	S1-12	S1-11	56	P3-B	TB2-3			

Figure FO-6. Wiring Diagram (without filter, F1) (Sheet 2 of 2)

TM 9-4520-258-14

By Order of the Secretary of the Army:

Official:



**MILNH. H. HAMILTON**

*Administrative Assistant to the  
Secretary of the Army*

07384

**GORDON R. SULLIVAN**

*General, United States Army  
Chief of Staff*

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From: "Whoever" <whoever@avma27.army.mil>  
To: mpmt%avma28(-st-louis-emh7.army.mil

**Subject:** DA Form 2028

1. **From:** Joe Smith
2. Unit: home
3. **Address:** 4300 Park
4. **City:** Hometown
5. **St:** MO
6. **Zip:** 77777
7. **Date Sent:** 19-OCT-93
8. **Pub no:** 55-2840-229-23
9. **Pub Title:** TM
10. **Publication Date:** 04-JUL-85
11. Change Number: 7
12. Submitter Rank: MSG
13. **Submitter FName:** Joe
14. Submitter MName: T
15. **Submitter LName:** Smith
16. **Submitter Phone:** 123-123-1234
17. **Problem:** 1
18. Page: 2
19. Paragraph: 3
20. Line: 4
21. NSN: 5
22. Reference: 6
23. Figure: 7
24. Table: 8
25. Item: 9
26. Total: 123
27. **Text:**

This is the text for the problem below line 27.

# RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

 <div style="border: 1px solid black; border-radius: 15px; padding: 5px; display: inline-block; margin-top: 10px;"> <p style="margin: 0;">THEN...JOT DOWN THE DOPE ABOUT IT ON THIS FORM. CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.</p> </div>		SOMETHING WRONG WITH PUBLICATION									
		FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)									
PUBLICATION NUMBER		PUBLICATION DATE									
PUBLICATION TITLE		DATE SENT									
<div style="display: flex;"> <div style="flex: 1; border-right: 1px solid black; padding-right: 5px;"> <p style="margin: 0; font-weight: bold;">BE EXACT    PIN-POINT WHERE IT IS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="padding: 5px;">PAGE NO.</th> <th style="padding: 5px;">PARA- GRAPH</th> <th style="padding: 5px;">FIGURE NO.</th> <th style="padding: 5px;">TABLE NO.</th> </tr> <tr><td style="height: 500px;"></td><td></td><td></td><td></td></tr> </table> </div> <div style="flex: 3; padding-left: 5px;"> <p style="margin: 0; font-weight: bold;">IN THIS SPACE, TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT.</p> <div style="border: 1px solid black; height: 500px; margin-top: 10px;"></div> </div> </div>				PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.				
PAGE NO.	PARA- GRAPH	FIGURE NO.	TABLE NO.								
PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER		SIGN HERE									

## The Metric System and Equivalents

### *Linear Measure*

1 centimeter = 10 millimeters = .39 inch  
 1 decimeter = 10 centimeters = 3.94 inches  
 1 meter = 10 decimeters = 39.37 inches  
 1 dekameter = 10 meters = 32.8 feet  
 1 hectometer = 10 dekameters = 328.08 feet  
 1 kilometer = 10 hectometers = 3,280.8 feet

### *Weights*

1 centigram = 10 milligrams = .15 grain  
 1 decigram = 10 centigrams = 1.54 grains  
 1 gram = 10 decigrams = .035 ounce  
 1 decagram = 10 grams = .35 ounce  
 1 hectogram = 10 decagrams = 3.52 ounces  
 1 kilogram = 10 hectograms = 2.2 pounds  
 1 quintal = 100 kilograms = 220.46 pounds  
 1 metric ton = 10 quintals = 1.1 short tons

### *Liquid Measure*

1 centiliter = 10 milliliters = .34 fl. ounce  
 1 deciliter = 10 centiliters = 3.38 fl. ounces  
 1 liter = 10 deciliters = 33.81 fl. ounces  
 1 dekaliter = 10 liters = 2.64 gallons  
 1 hectoliter = 10 dekaliters = 26.42 gallons  
 1 kiloliter = 10 hectoliters = 264.18 gallons

### *Square Measure*

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch  
 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches  
 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet  
 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet  
 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres  
 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

### *Cubic Measure*

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch  
 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches  
 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

## Approximate Conversion Factors

<i>To change</i>	<i>To</i>	<i>Multiply by</i>	<i>To change</i>	<i>To</i>	<i>Multiply by</i>
inches	centimeters	2.540	ounce-inches	Newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	Newton-meters	1.356	metric tons	short tons	1.102
pound-inches	Newton-meters	.11296			

## Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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