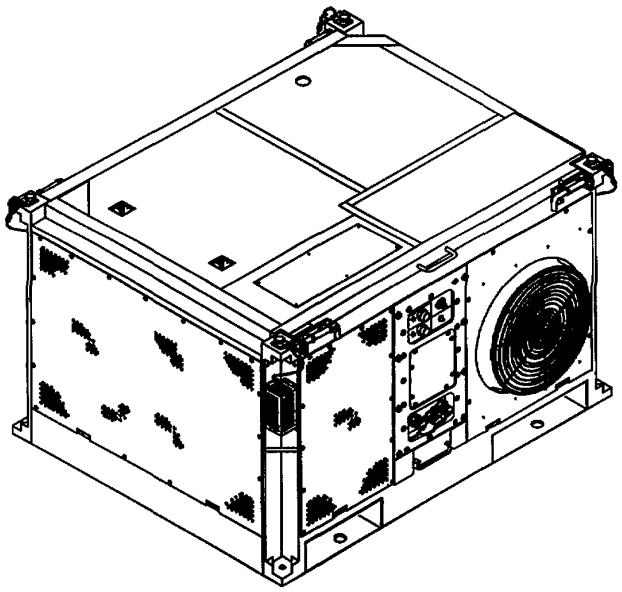
TECHNICAL MANUAL

OPERATOR, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT

MODELS FDECU-2, FDECU-3, AND FDECU-4 (NSN 4120-01-449-0459)



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DEPARTMENTS OF THE ARMY AND THE AIR FORCE
1 MAY 2000

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENTS OF THE ARMY AND THE AIR FORCE
WASHINGTON D.C., 15 September 2001

TECHNICAL MANUAL

OPERATOR, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT, MODELS FDECU-2, FDECU-3, AND FDECU-4 (NSN 4120-01-449-0459)

TM 9-4120-411-14/T.O. 35E9-314-1, 1 May 2000 is changed as follows:

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WARNING

LETHAL VOLTAGE

Dangerous and lethal voltage is used in the operation of the FDECU. Personal injury or death can result if power is not isolated from the unit during maintenance when panels and doors are open.

DANGEROUS CHEMICAL

Refrigerant (tetrafluoroethane, R-134a) under pressure is used in the operation of the FDECU. Do not attempt any disassembly of refrigeration system components with a refrigerant charge in the system. Sudden and irreversible tissue damage can result from contact with liquid refrigerant.

When refrigerant is exposed to high heat or flame, irritating, toxic, and corrosive gases may be released. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible. All refrigerant must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any brazing operation.

Compressor lubricating oil is caustic. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact is possible. If oil does contact skin, wash with soap and water.

Never pressurize refrigerant lines with oxygen, mixture with oil could cause an explosion. If necessary to pressurize lines, always use nitrogen.

Nitrogen is an inert gas that can cause suffocation and must be discharged in a well ventilated area.

HEAVY EQUIPMENT

The FDECU is heavy (800 lbs) and requires an appropriate lifting device to move. Personal injury can result if moved without the aid of a lifting device.

FIRST AID

For frozen tissue "frost-bite" or chemical burn, refer to FM 21-11.

TECHNICAL MANUAL
NO. 9-4120-411-14

TECHNICAL ORDER
NO. 35E9-314-1

HEADQUARTERS
DEPARTMENT OF THE ARMY AND THE AIR FORCE
WASHINGTON D.C., 1 MAY 2000

TECHNICAL MANUAL

OPERATOR, UNIT, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT, MODELS FDECU-2, MODEL FDECU-3, AND FDECU-4 (NSN 4120-01-449-0459)

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 07703-5006. The fax number is 732-532-1413, DSN 992-1413. You may also e-mail your recommendations to AMSEL-LC-LEO-PUBS-CHG@mail1.monmouth.army.mil

For Air Force, submit AFTO Form 22 (Technical Order System Publication Improvement Report and Reply) in accordance with paragraph 6-5, Section VI, TO 00-5-1. Forward direct to prime ALC/MST.

In either case a reply will be furnished directly to you.

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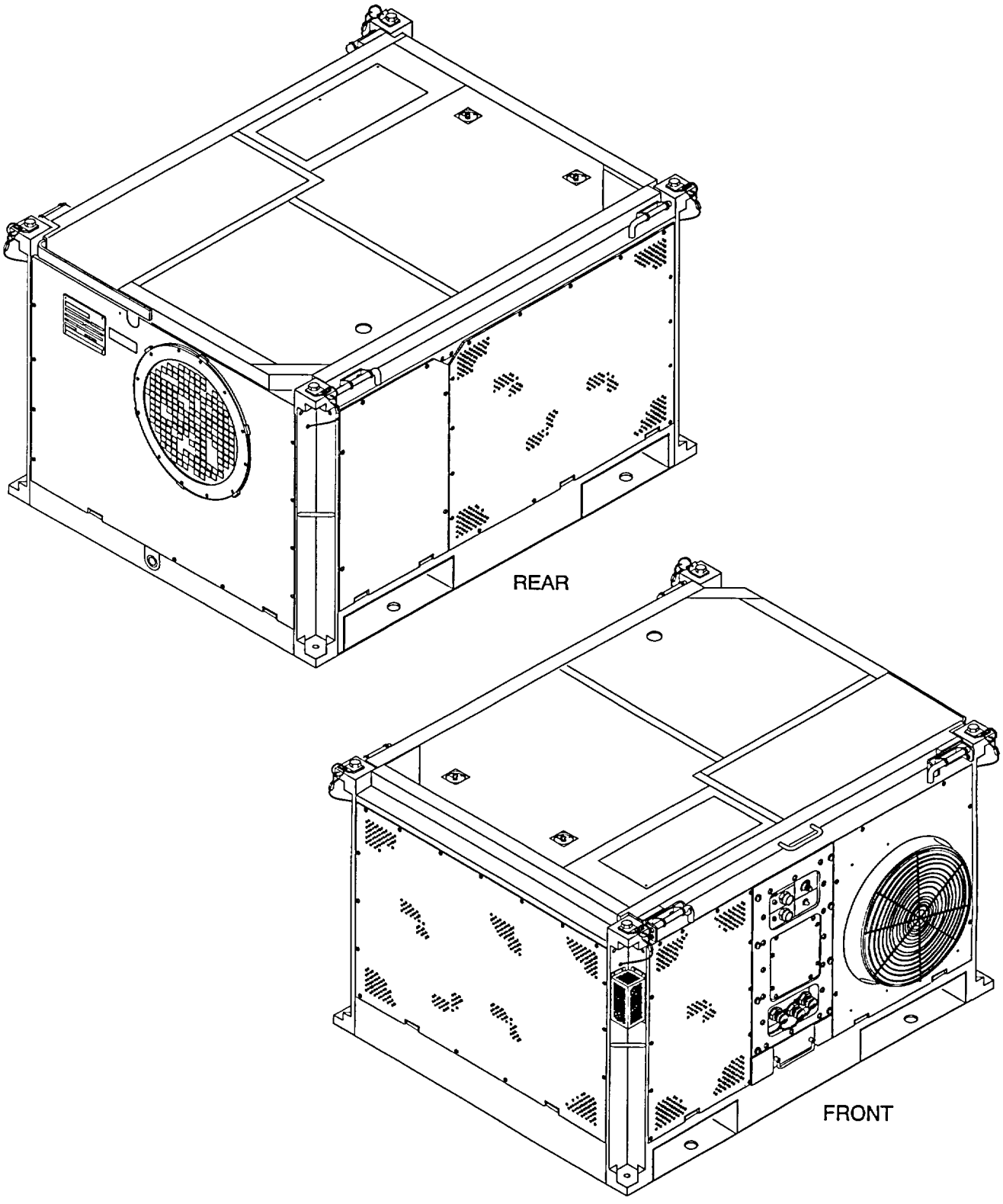


Figure 1-1. Field Deployable Environmental Control Unit (FDECU).

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1.1 **SCOPE.** This technical manual is arranged to provide necessary information to operator, unit, direct support and general support maintenance personnel for use when operating and maintaining the Keco Industries model FDECU-2, FDECU-3, and FDECU-4 Field Deployable Environmental Control Units (FDECU). The FDECU is intended to provide cooled and dehumidified air, or heated air, through flexible ducts into various types of portable shelters or vans in accordance with electronic and personnel requirements.

NOTE

The FDECU-2 uses two compressor crankcase heaters that are wrapped around the compressor and a compressor warm up indicator light on each of the control panels to indicate heater operation. Units after the FDECU-2 do not have compressor crankcase heaters or compressor warm up indicator lights.

1.2 **MAINTENANCE FORMS, RECORDS, AND REPORTS.**

1.2.1 **Reports of Maintenance and Unsatisfactory Equipment.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750, as contained in Maintenance Management Update. Air Force personnel will use AFR 66-1 for maintenance reporting and TO-00-35D54 for unsatisfactory equipment reporting.

1.2.2 **Reporting of Item and Packaging Discrepancies.** Fill out and forward SF 364 (Report of Discrepancy (ROD)) as prescribed in AR 735-11-2. Air Force personnel will use AFR 400-54.

1.2.3 **Transportation Discrepancy Report (TDR) (SF 361).** Fill out and forward Transportation Discrepancy Report (TDR) (SF 361) as prescribed in AR 55-38. Air Force personnel will use AFR 75-18.

1.3 **DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE.** Refer to TM 750-244-3 for necessary instructions for destruction of equipment to prevent enemy use. Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

1.4 **PREPARATION FOR STORAGE OR SHIPMENT.** Procedures for preparing the FDECU for storage or shipment, including packaging and administrative storage, are contained in Chapter 4, Section V of this manual.

1.5 **REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).**

1.5.1 **Army.** If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-LC-LEO-D-CS-CFO, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.

1.5.2 **Air Force.** Air Force personnel are encouraged to submit EIR's in accordance with AFR 900-4.

1.6 **WARRANTY INFORMATION.** The FDECU is warranted for a period of one (1) year from the date the unit was accepted, via signed DD Form 250, and allows for a maximum of sixty (60) days from the date a defect is discovered/reported. Report all defects to your supervisor, who will take appropriate action.

1.7 **CORROSION PREVENTION AND CONTROL (CPC).** It is important to report any corrosion problems with this item so the problem can be corrected and improvements made to prevent it in future items. 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 these materials may be a corrosion problem. If you find a corrosion problem, report it on an SF368 (Product Quality Deficiency Report). Using key words like corrosion, rust, deterioration, or cracking will help ensure identification as a CPC problem. Submit the form to the address specified in DA PAM 738-750.

1.8 **REPAIR PARTS, TOOLS, TEST, MEASUREMENT, DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT.** Repair parts are listed and illustrated in TM 9-4120-411-24P covering unit, DS, and GS maintenance for the FDECU. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, or CTA 8-100, as applicable to your unit. All common and special tools as well as TMDE and support equipment are listed in Appendix B and Appendix F of this manual as applicable.

Section II. EQUIPMENT DESCRIPTION AND DATA

1.9 **CHARACTERISTICS, CAPABILITIES, AND FEATURES.**

1.9.1 The FDECU is a horizontally configured electric motor driven heat pump. The unit uses integral supplemental resistance heaters during system defrost and low ambient temperature conditions.

1.9.2 The unit will circulate and filter the air as well as provide fresh make-up air as desired.

1.9.3 The unit is designed for use while directly exposed to the environment and will operate with filter blower overpressure systems developed for use in Nuclear/Biological/Chemical (NBC) environments.

1.10 **DIFFERENCES BETWEEN MODELS.** The FDECU-2 uses two compressor crankcase heaters that are wrapped around the compressor and a compressor warm up indicator light on each of the control panels to indicate heater operation. Units after the FDECU-2 do not have compressor crankcase heaters or compressor warm up indicator lights. The FDECU-4 and thereafter are lighter weight due to manufacturing process changes and the use of a lighter compressor. The new compressor is placed on resilient mounts and stabilized with a cushion clamp to reduce vibration and sound levels.

1.11 **IDENTIFICATION PLATES.** Refer to figure 1-2.

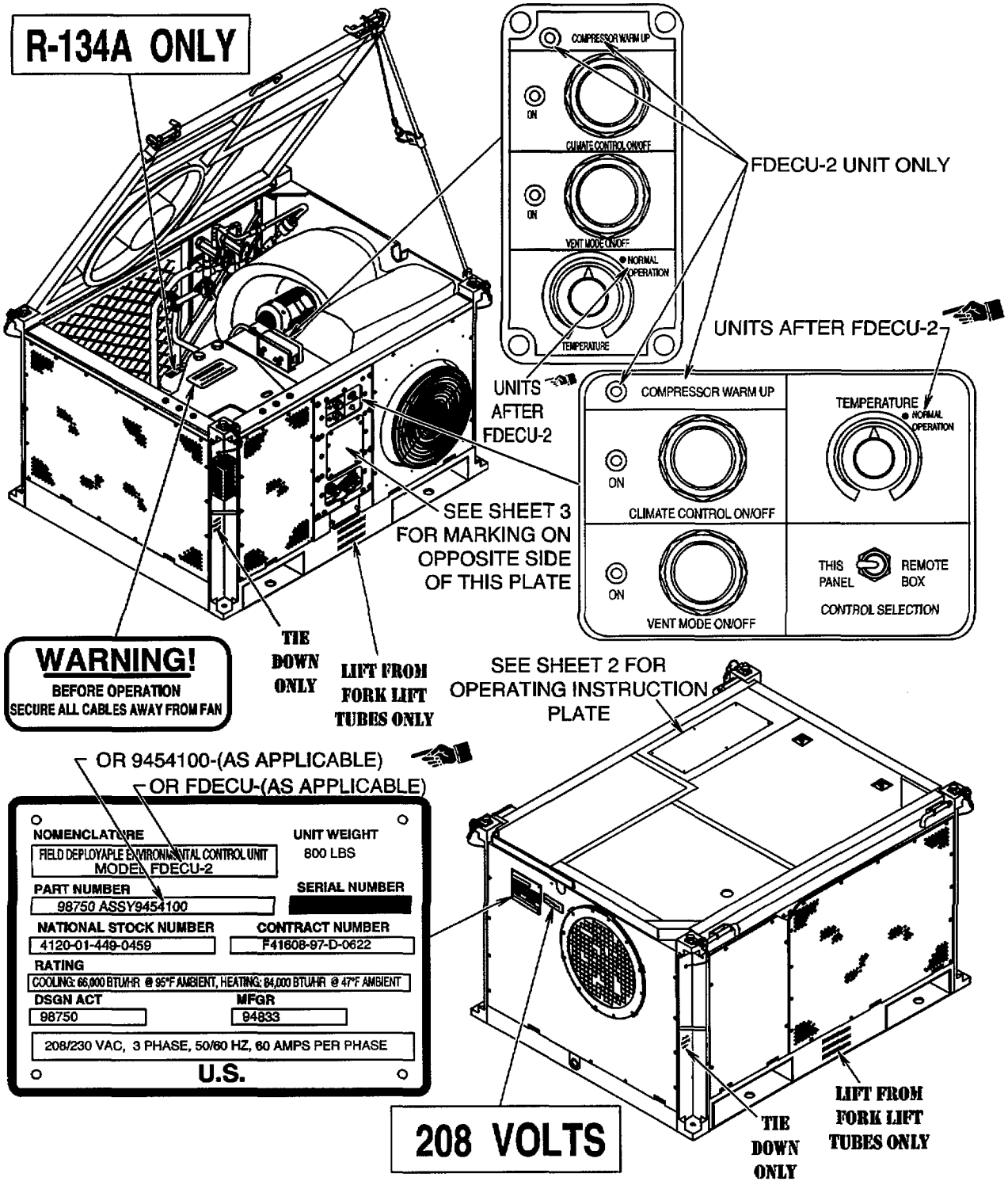


Figure 1-2. Identification Plates (Sheet 1 of 3).

Operating Instructions

I. Setup

1. Position FDECU on a level surface, at least (4) feet from any obstructions. Ensure that ducts can be attached between the FDECU and shelter without kinks or sharp bends.
2. Open top cover by removing pins, and secure in open position with rod provided. Insert safety pin through rod.
3. Remove insulated ducts and drain hose.
4. Unwind power cable and guide cable through opening on side panel.
5. If remote control box is used, unwind remote cable and guide remote control box and cable through opening on side panel. Locate remote control box inside shelter through appropriate hole in shelter and install at eye level, away from drafts or supply air opening.
6. Close top cover and secure with pins provided. Make sure cables cannot interfere with fan.
7. Remove return air duct by rotating the adapter counter–clockwise to unlock. Flip the adapter so that the perforated ring projects beyond the FDECU, and lock the adapter by rotating it clockwise. Connect the 7–foot duct to the adapter and to the shelter opening. Note airflow direction arrow on duct. The arrow must point toward the FDECU.
8. Remove the panel covering the supply duct. Uncoil Condensate drain hose then pass it through hole in frame located in front of drain fitting and route to appropriate drainage area. Remove the retaining pins that secure the heater assembly, and slide the assembly forward. Replace the panel and connect 9–foot–duct to the heater assembly and to the shelter opening. Note airflow direction arrow. The arrow must point toward the shelter.
9. Connect power cable to a three–phase, 208 Volt alternating current (VAC), 60 Amp power supply with ground.

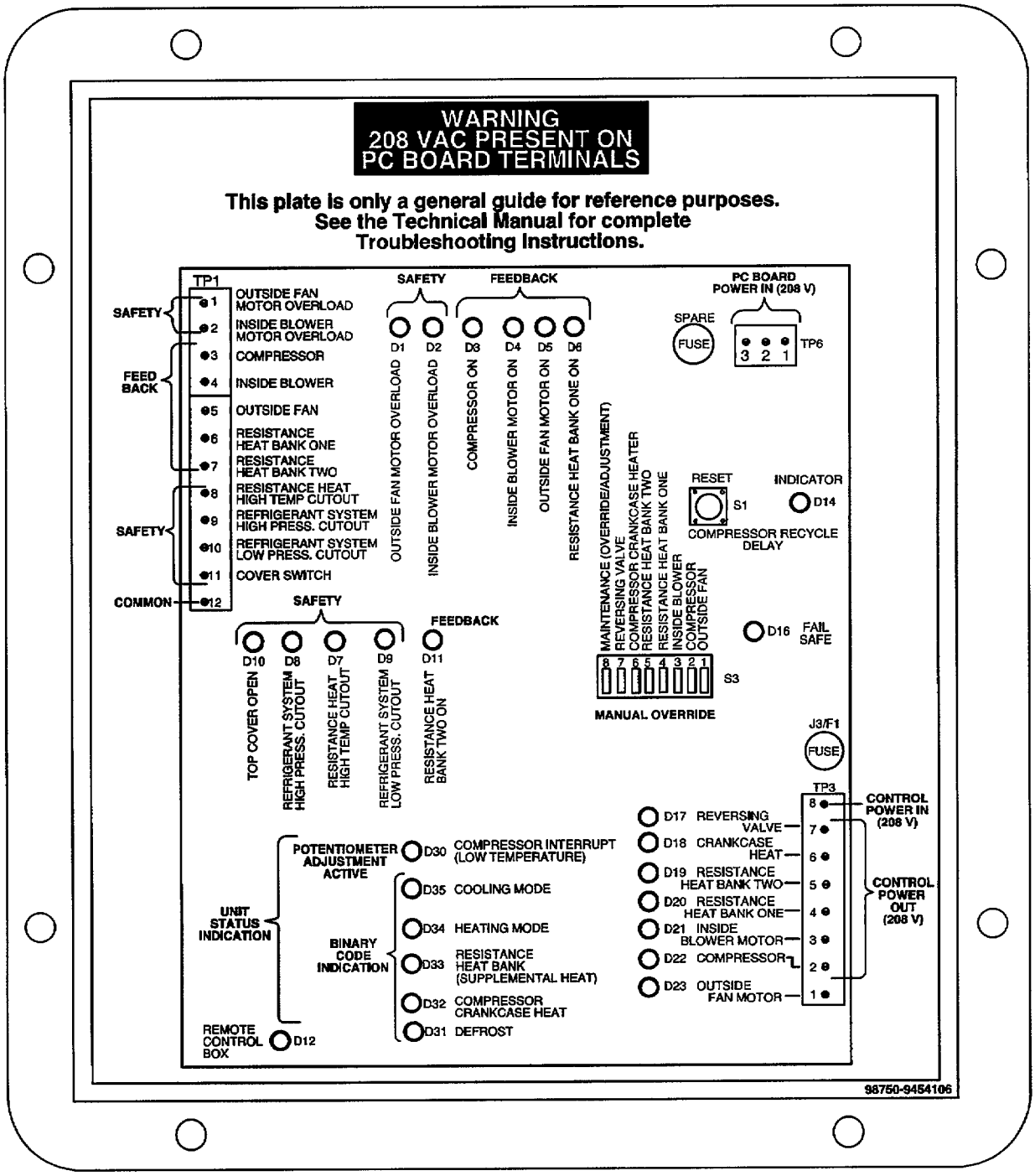
II. Operating Modes

1. Push the "VENT MODE ON/OFF" button for vent mode, and/or the "CLIMATE CONTROL ON/OFF" button for automatic climate control. The corresponding "ON" indicator light will illuminate.
2. Check for proper phasing of power supply. Fan must spin in direction of arrow.
3. Set the adjustable "TEMPERATURE" knob to the position desired. HOT or COLD. Turning the knob clockwise increases the temperature (WARMER), and counter–clockwise decreases the temperature (COOLER).

III. Shutdown

1. To turn unit off, push the VENT MODE ON/OFF and/or the CLIMATE CONTROL ON/OFF button(s).

Figure 1-2. Identification Plates (Sheet 2 of 3).



Note that LED D18 (CRANKCASE HEAT) was removed from circuit board used on FDECU-4 and there-after.

Figure 1-2. Identification Plates (Sheet 3 of 3).

1.12 **LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.** Refer to figure 1-3.

(1) Inside Coil Assembly (Volute). The inside coil assembly (1) carries either warm or cool refrigerant depending upon the mode of operation. The refrigerant either heats or cools the shelter air as necessary.

(2) Inside Blower. The inside blower (2) circulates the shelter air through the FDECU.

(3) Outside Coil Assembly. The outside coil assembly (3) carries either cool or warm refrigerant depending upon the mode of operation. The refrigerant is either heated or cooled by the outside (ambient) air as necessary.

(4) Outside Fan Assembly. The outside fan assembly (4) circulates outside (ambient) air through the FDECU.

(5) Compressor. The compressor (5) reduces pressure on the vapor at its' inlet, then compresses the vapor and discharges under high pressure at its' outlet.

(6) Electrical Resistance Heaters Assembly. The electrical resistance heaters assembly (6) contains two banks of electric resistance heaters that are used independently or together to supplement the refrigerant system heating capacity in low outside (ambient) temperature conditions.

(7) Air Filter. The air filter (7) removes dust and debris from the shelter air as it passes through the FDECU.

(8) Master Control Panel. The master control panel (8) is incorporated into the FDECU and provides all the operator controls needed to start, operate, and stop the system as well as maintain, desired shelter air temperature.

(9) Remote Control Panel and Cable. The remote control panel and cable (9) is mounted inside the shelter and provides all the operator controls needed to start, operate, and stop the system as well as maintain desired shelter air temperature.

(10) Insulated Flexible Ducts. The insulated flexible ducts (10) connect between the FDECU and the shelter to circulate shelter air through the system.

(11) Electrical Power Input Cable. The electrical power input cable (11) is used to connect the FDECU to a source of electrical power for operation.

(12) Condensate Drain Hose. The condensate drain hose (12) is used to carry condensate collected by the inside coil during cooling operation to a suitable drain or collection area.

(13) Sight Glass. The sight glass (13) allows for a visual inspection of the liquid refrigerant passing through the system and is used to aid in diagnosing possible refrigerant system problems. The sight glass also contains an indicator that changes color depending upon the amount of moisture contained in the refrigerant.

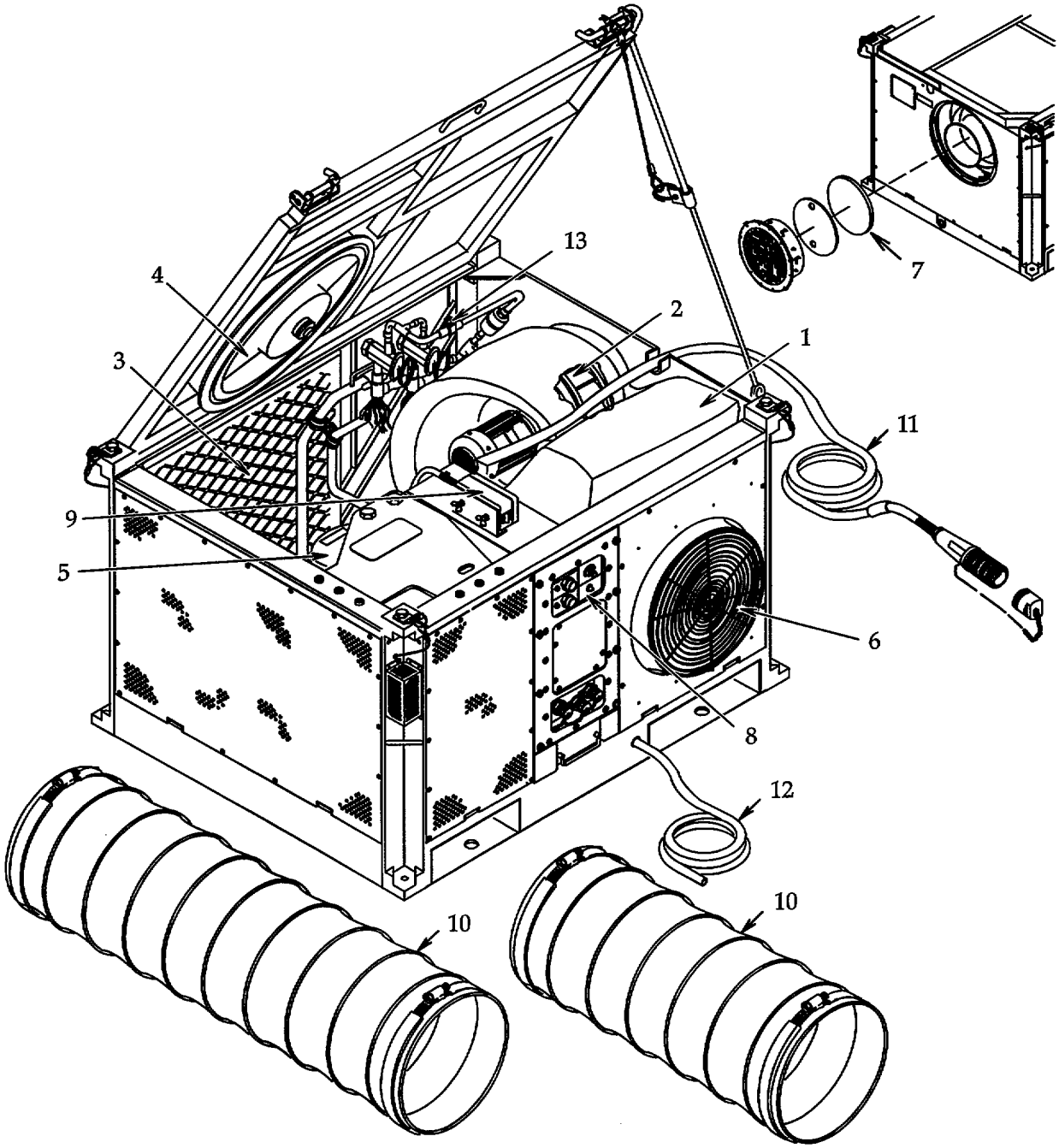


Figure 1-3. Major Components

1.13 **EQUIPMENT DATA.**

Dimensions:

- Width ..... 52.0 inches
- Height ..... 32.5 inches
  - Allow an additional 38.0 inches to permit opening of top cover
- Length ..... 42.0 inches

Refrigerant:

- Type ..... Tetrafluoroethane, R-134a
- Charge ..... 14 lb

Weight (Maximum) (FDECU-2 and FDECU-3 only) ..... 800 lb
Weight (Maximum) (FDECU-4 and thereafter) ..... 700 lb

Power Requirements:

- Voltage ..... 208 Vac (191 to 218)
- Frequency ..... 50/60 Hertz
- Phase 3
- Configuration ..... 4-wire (plus ground)
- Power Factor ..... 0.95 (+5%, -0%)
- Wattage (Maximum):
  - Ventilating Mode ..... 1.5 Kw
  - Cooling Mode ..... 14.0 Kw
  - Heating Mode ..... 13.5 Kw

Airflow:

- Total ..... 2200 SCFM
- Makeup Air ..... 0 to 500 SCFM (Adjustable)

Capacities:

- Cooling BTU/Hour ..... 55,000 (Minimum), 67,000 (Maximum)
- Heating BTU/Hour ..... 47,000 (Minimum), 84,000 (Maximum)

Tilted Operation (Any Direction) ..... 10°

Noise Level:

- Maximum ..... 75 Db at 1,000 Hertz

Environmental Limits:

- Non-Operational (Storage):
  - Temperature Range ..... -60° F to 160° F
  - Relative Humidity 100%
  - Altitude Pressure Range (in Hg) ..... 3.4 to 30
- Operational:
  - Temperature Range Cooling ..... 50° F to 125° F
  - Temperature Range Heating ..... -25° F to 75° F
  - Altitude Range (feet) 6,000

1.14 **EQUIPMENT CONFIGURATION.** The FDECU can be configured for use in either normal environmental conditions or NBC environmental conditions. Use in NBC environmental conditions requires using the NBC adapter kit and two M-28 NBC filter blower assemblies. Refer to figure 1-4.

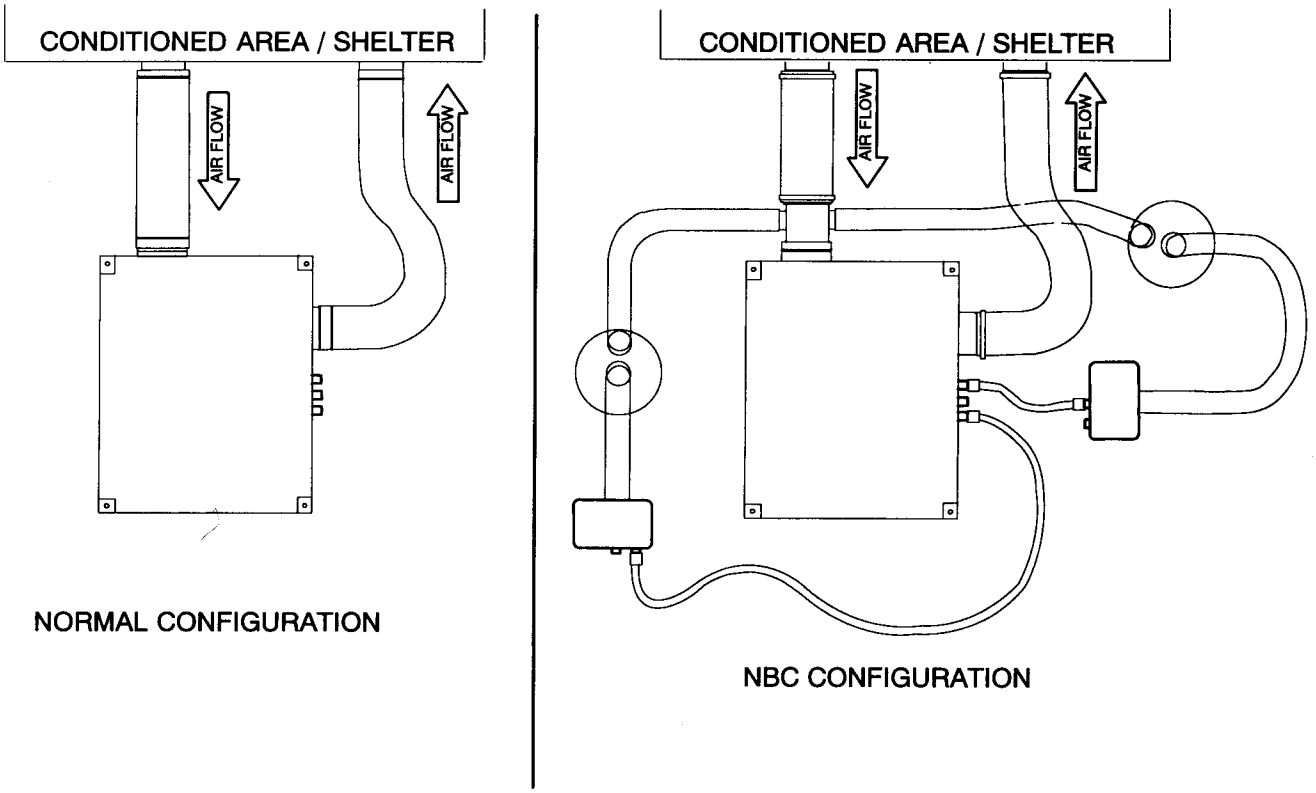


Figure 1-4. Equipment Configurations

Section III. PRINCIPLES OF OPERATION

1.15 The FDECU is a horizontally configured electric motor driven heat pump. It has a nominal cooling capacity of 60,000 btu/hr and contains integral resistance heaters. The heaters are used as a supplemental heat source during system defrost and low ambient temperature conditions. The unit will circulate, filter, provide fresh make-up air, cool and dehumidify, or heat the air in various types of portable shelters or vans. The unit is designed for use while directly exposed to the elements and is placed outside the shelter. The unit is connected to the shelter by flexible ducts.

1.16 **AIR CIRCULATION.** See figure 1-5.

1.16.1 Air from the shelter is drawn in through a flexible duct to the unit. The air then passes over a replaceable filter then into the inside blower. The air is pushed through the inside coil and the resistance heaters. The air is then pushed out of the unit through the flexible duct and back into the shelter.

1.16.2 Fresh make-up air is supplied by sliding the flexible duct back on the perforated inside blower inlet collar. This will expose the perforations and allow outside air to be drawn into the air circulation system.

1.16 **AIR CIRCULATION - CONTINUED.**

1.16.3 In Nuclear/Biological/Chemical (NBC) environments, the unit can be fitted with NBC filters that are attached to a special inside blower inlet collar and flexible ducts. This system draws contaminated outside air into the NBC filter using integral blowers. The blowers push clean filtered air through flexible ducts to the adapter collar to overpressurize the air circulation system to prevent the infiltration of NBC contaminants into the shelter.

1.16.4 The outside fan is automatically activated whenever outside ambient airflow is needed across the outside coil. Air is drawn in through the outside coil by the outside fan and blown out the unit top.

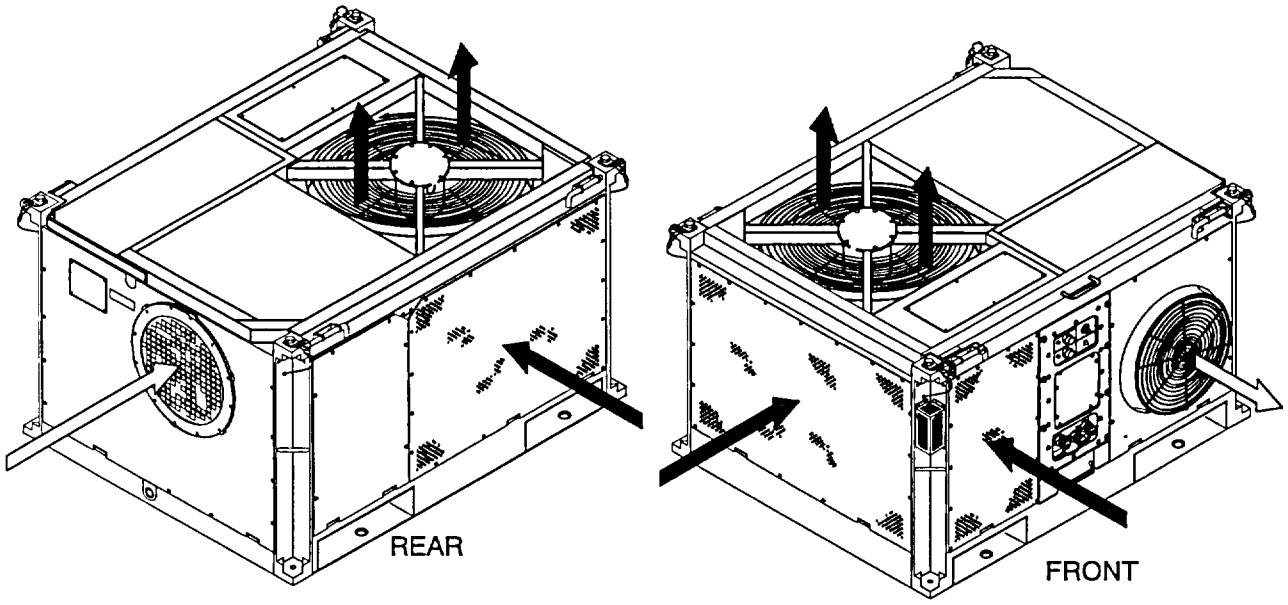


Figure 1-5. Air Circulation System

1.17 **COOLING AND DEHUMIDIFYING.** See figure 1-6.

1.17.1 Air is cooled and dehumidified by a reversing mechanical refrigeration system called a heat pump.

1.17.2 When in the cooling mode of operation, the compressor (1) moves the refrigerant through the refrigeration system by raising the pressure of the incoming gas from the inside coil (evaporator) (2) and discharging it as a high pressure gas.

1.17.3 The high pressure gas passes through the reversing valve (7) that controls the refrigerant flow depending on the operating mode. In this mode, the refrigerant is routed toward the outside coil (condenser) (3).

1.17.4 The high pressure gas enters the outside coil (3) where heat is released to the outside ambient air passing across the coil. This will cause the high pressure gas to condense to a high pressure liquid.

1.17.5 The high pressure liquid reaches the outside expansion valve (10) outlet that will not allow flow in this direction. It then passes through the outside check valve (13).

1.17.6 The inside check valve (13) will not allow flow in this mode of operation and the high pressure liquid is forced through the filter drier (12) where any moisture that may be in the refrigerant is absorbed and any debris is removed.

1.17.7 The high pressure liquid then passes through the liquid indicator (15) where the condition of the refrigerant can be visually inspected.

1.17.8 The outside expansion valve (10) inlet and outlet pressures are equal in this mode of operation preventing flow through it. The high pressure liquid will then pass through the inside expansion valve (10) which causes a pressure drop and automatically meters the amount of liquid passing through it. The rapid drop in pressure causes the liquid to cool.

1.17.9 The cool, low pressure liquid passes through the inside coil (evaporator) (2) where heat is absorbed from the shelter air passing across it causing the low pressure liquid to evaporate to a low pressure gas. The low pressure gas then returns to the compressor (1) to begin the cycle again.

1.17.10 When the shelter air passes across the inside coil (2) it will be dehumidified. This is a result of the rapid drop in temperature causing moisture to condense out of the air and collect on the coil.

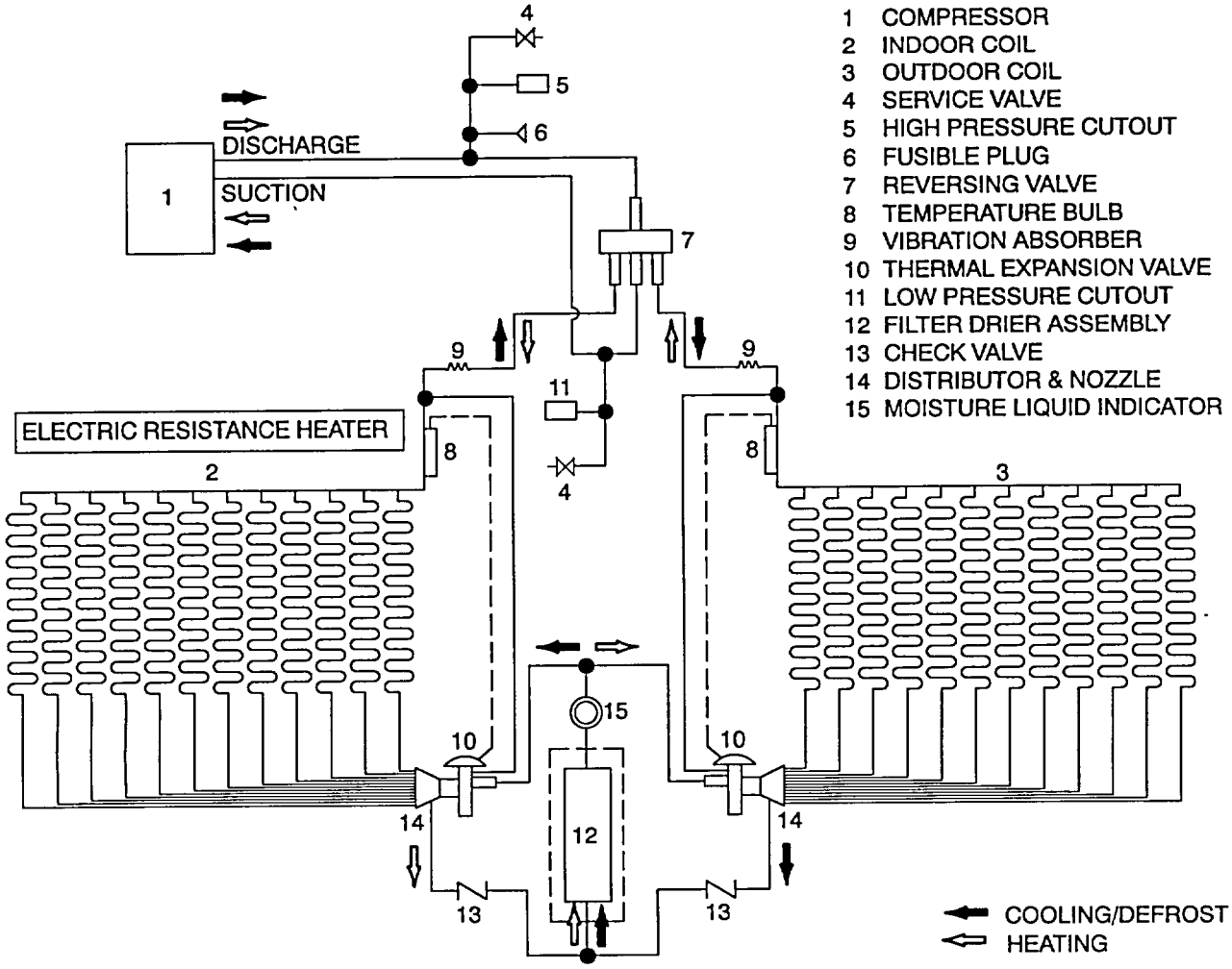


Figure 1-6. Cooling, Dehumidifying, and Heating System Schematic

1.18 **HEATING.** See figure 1-6.

1.18.1 Air is heated primarily by a reversing mechanical refrigeration system called a heat pump. Supplemental electric resistance heat is provided for use during system defrost mode and operation in low ambient temperature conditions.

1.18 **HEATING - CONTINUED.**

1.18.2 When in the heating mode of operation, the compressor (1) moves the refrigerant through the refrigeration system by raising the pressure of the incoming gas from the outside coil (evaporator) (3) and discharging it as a high pressure gas.

1.18.3 The high pressure gas passes through the reversing valve (7) that controls the refrigerant flow depending on the operating mode. In this mode, the refrigerant is routed toward the inside coil (condenser) (2).

1.18.4 The high pressure gas enters the inside coil (2) where heat is released to the shelter air passing across the coil. This will cause the high pressure gas to condense to a high pressure liquid.

1.18.5 The high pressure liquid reaches the inside expansion valve (10) outlet that will not allow flow in this direction. It then passes through the inside check valve (13).

1.18.6 The outside check valve (13) will not allow flow in this mode of operation and the high pressure liquid is forced through the filter drier (12) where any moisture that may be in the refrigerant is absorbed and any debris is removed.

1.18.7 The high pressure liquid then passes through the liquid indicator (15) where the condition of the refrigerant can be visually inspected.

1.18.8 The inside expansion valve (10) inlet and outlet pressures are equal in this mode of operation preventing flow through it. The high pressure liquid will then pass through the outside expansion valve (10) which causes a pressure drop and automatically meters the amount of liquid passing through it. The rapid drop in pressure causes the liquid to cool.

1.18.9 The cool, low pressure liquid passes through the outside coil (evaporator) (3) where heat is absorbed from the relatively warmer outside ambient air passing across it causing the low pressure liquid to evaporate to a low pressure gas. The low pressure gas then returns to the compressor (1) to begin the cycle again.

1.18.10 By lowering the temperature on the outside coil (evaporator) (3) to a point below freezing, any moisture that accumulates on the outside coil (3) will freeze and prevent proper air circulation through the coil. The defrost cycle is automatically controlled by an outside air temperature sensor and outside coil temperature sensor in the electrical system. When an iced coil condition is sensed, the outside blower stops and the outside coil (3) is defrosted as high pressure gas is sent from the compressor (1) into the coil (cooling mode). Supplemental electric resistance heat is energized to compensate for the cooling of shelter air when in this mode. The defrost cycle will continue until the temperature sensors terminate it.

1.18.11 If the outside ambient air temperature drops to 180 F -$\pm 2^{o}$ or below, the compressor (1) and outside blower will be disabled and the FDECU will rely solely on supplemental electric resistance heat until the outside ambient temperature rises above this point.

1.19 **CONTROL.** See figure 1-7.

1.19.1 The power box (1) is where the incoming power supply is connected and distributed to the various components in the FDECU. Power distribution is controlled by various relays and protective circuits.

1.19.2 The control box (2) contains the control circuit board as well as the unit mounted operator controls and indicators. The control circuit board monitors the various sensors and operator controls in the FDECU and controls the power distribution relays as necessary.

1.19.3 The remote box (3) duplicates the operator controls and indicators on the control box and can be remote mounted within the limits of the attached 35 foot interconnecting cable.

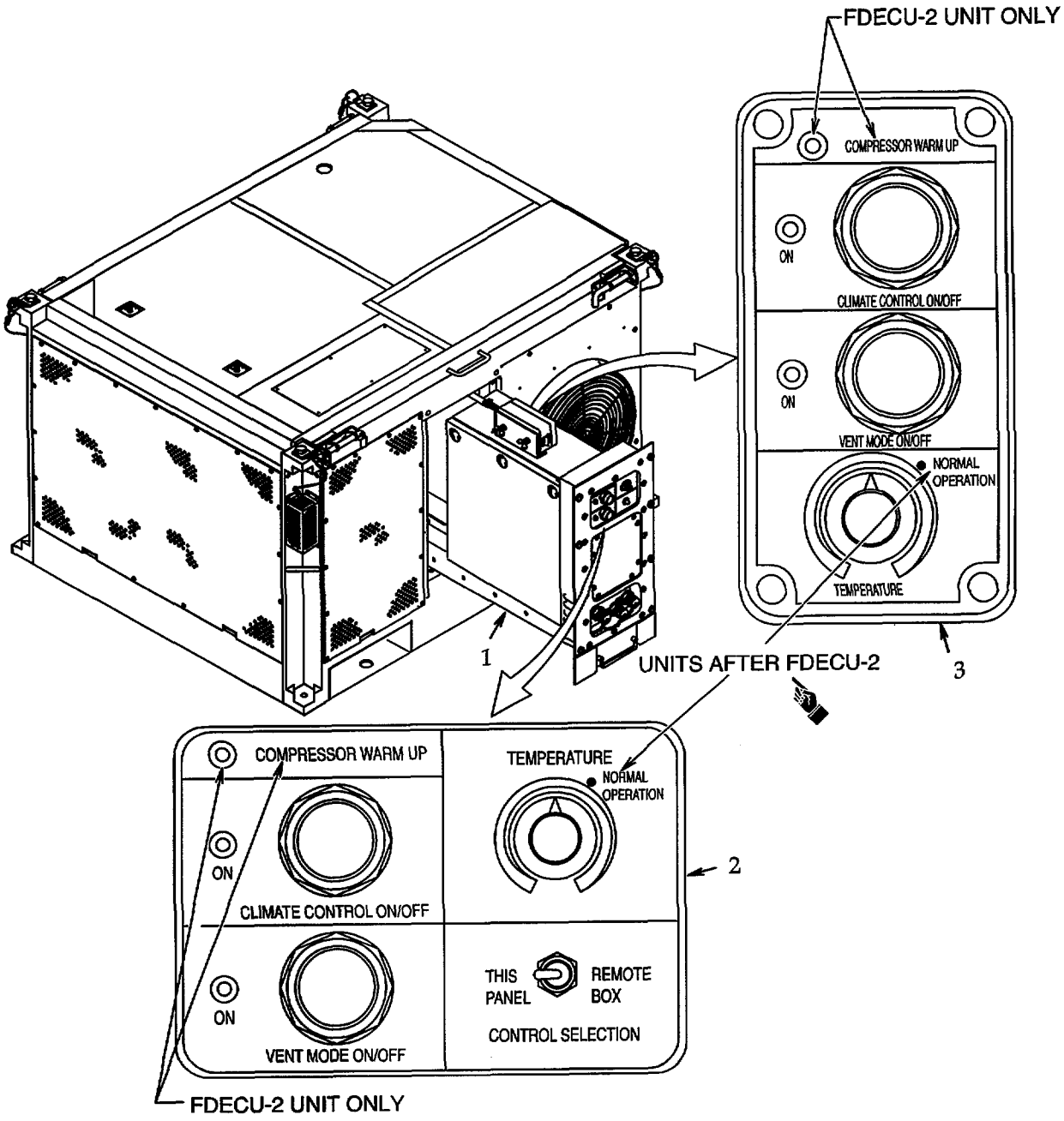


Figure 1-7. Control System

CHAPTER 2
OPERATING INSTRUCTIONS

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

2.1 **DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS.** See figure 2-1.

NOTE

The control box assembly and remote box assembly use similar controls and indicators. The following descriptions will apply to both assemblies with the exception of the CONTROL SELECTION switch that is only used on the control box assembly.

2.1.1 The CONTROL SELECTION toggle switch (1) is used to select between the control panel integrated into the electrical assembly on the unit by placing the switch towards the THIS PANEL position or the remote mounted control panel that can be placed inside the shelter by placing the switch towards the REMOTE BOX position.

2.1.2 The VENT MODE ON/OFF push button (2) is a momentary switch that, when pushed, will operate the inside blower to circulate air through the shelter. When pushed again, the unit will shut down. When the unit is operating in the ventilation mode, the ON indicator (3) will be illuminated.

2.1.3 The CLIMATE CONTROL ON/OFF push button (4) is a momentary switch that, when pushed, will operate the unit in either heating or cooling mode as necessary to maintain the desired shelter temperature. When pushed again, the unit will shut down. When the unit is operating in this mode, the ON indicator (5) will be illuminated. Note that a control logic time-out circuit may prevent the unit from operating immediately. If this occurs, do not turn the unit off, it should start automatically within 5 minutes.

2.1.4 The TEMPERATURE control knob (6) can be adjusted to select a relative temperature setting to be maintained inside the shelter. The knob can be adjusted within a range of 60^{o} F to 100^{o} F. When operating the FDECU, the knob should be set slightly right of the control range mid-point, or 1:00 position, this is approximately 75^{o} F. **(Units after FDECU-2)** This position is marked as NORMAL OPERATION.

2.1.5 **(FDECU-2 ONLY)** The COMPRESSOR WARM UP indicator (7) will be illuminated if the compressor crankcase heaters are energized. The compressor will not operate until the heaters have cycled off.

2.1.6 Compressors used in the FDECU may or may not contain an oil level indicator. The migration of liquid refrigerant in and out of the compressor during varying ambient temperatures will cause erratic oil levels to be observed. Do not use this indicator to determine compressor oil level.

2.1.7 The refrigerant liquid indicator (9) allows for a visual inspection of the liquid refrigerant passing through the system and is used to aid in diagnosing possible refrigerant system problems. The refrigerant liquid indicator also contains a colored dot indicator that changes color depending upon the amount of moisture contained in the refrigerant.

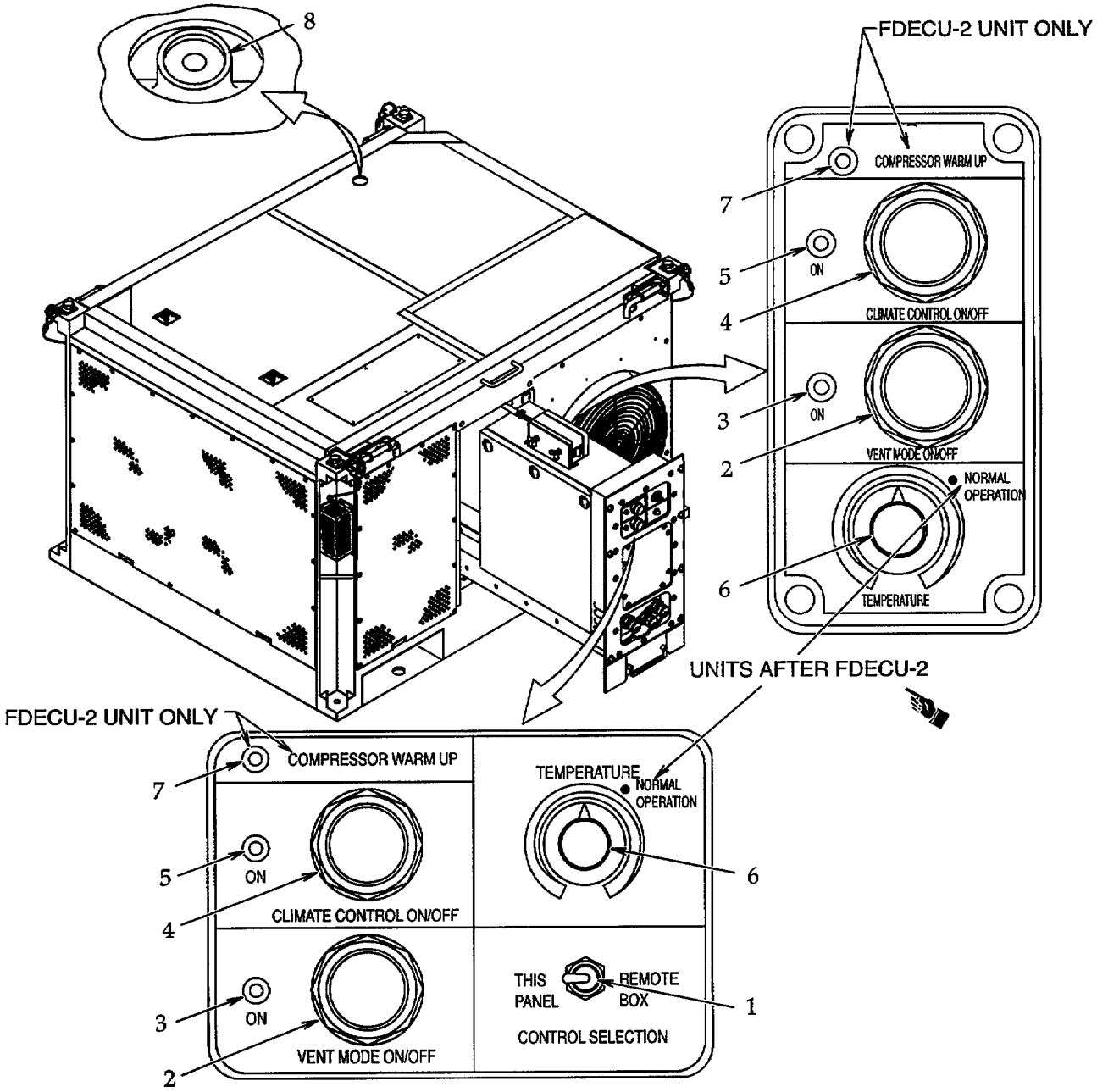


Figure 2-1. Operator Controls and Indicators.

Section II. OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2.2 **INTRODUCTION.**

2.2.1 **General.** Preventive Maintenance Checks and Services are essential to the efficient operation of the FDECU and to prevent possible damage that might occur through neglect or failure to observe warning symptoms in a timely manner. Checks and services performed by operators are limited to those functions listed in table 2-1. This table lists the inspections and care of the FDECU required to keep it in good operating condition. The procedures are intended to be done if the equipment is used periodically during the interval period and not if the equipment is in storage. If the equipment has been in storage and is to be used, perform the WEEKLY and MONTHLY procedures prior to putting it back into service.

2.2.2 **PMCS Procedures.** The following paragraphs identify and explain the columns used in the PMCS table.

2.2.2.1 **Item No. Column.** Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

2.2.2.2 **Interval Column.** This column tells you when you must do the procedure in the procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

2.2.2.3 **Item to be Checked or Serviced Column.** This column provides the location and the item to be checked or serviced. The item location is underlined.

2.2.2.4 **Procedure Column.** This column gives the procedure you must do to check or service the item listed in the Check/ Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

2.2.2.5 **"Not Fully Mission Capable If": Column.** Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you made a check and service procedure that shows faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

2.2.3 **Refrigerant Leaks.** Oil is carried with the refrigerant as it flows through the refrigeration system. If a leak develops in the system, the oil will seep out and soak the copper tubing around the leak or drip and soak or puddle on the frame or other component below the leak. If any oil or seepage is found, a refrigerant leak would be suspected.

Table 2-1. Operator Preventive Maintenance Checks and Services for FDECU.

NOTE

If the FDECU must be kept in operation during a scheduled PMCS interval, perform only those procedures that will not disturb operation then perform remaining procedures when the unit can be shut down.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If":
1	Before	Flexible Ducts	Inspect for worn or torn spots and for secure attachment to unit and shelter. If loose, notify unit maintenance to secure it.	Loose from unit or shelter. Torn to the point that it will not carry air to shelter.
2	Before	Outside Coil	Inspect for dirt or obstruction to coil. Remove obstruction or notify unit maintenance to clean as necessary.	Coil is obstructed or dirty to the point of causing obstruction.
3	Before	Outside Fan	Check that fan is securely attached to motor. If loose, notify unit maintenance to secure it. **NOTE** **Two different liquid indicators can be used and each has a unique center indicator color.**	Fan is loose on motor shaft.
4	Before	Liquid Indicator	Unclip quick release pin and raise fan cover door to inspect liquid indicator port for cracks and note center indicator color. If cracked or center indicator color is red or yellow, depending on liquid indicator being used, notify unit maintenance who will verify and notify direct support maintenance. Secure fan cover with quick release pin.	Liquid indicator port cracked or center indicator color is yellow or red, depending on liquid indicator being used.
5	Before	Control Panel	Check the control panel for damage to knob, switch, or push button. Notify unit maintenance if damaged.	Damage that would prevent safe operation of equipment.
6	During	Liquid Indicator	Unclip quick release pin and raise fan cover door to inspect liquid indicator port for constant bubbles, foam, or if center indicator color is red or yellow, depending on liquid indicator being used. If this condition occurs, notify unit maintenance who will verify and notify direct support maintenance. Secure fan cover with quick release pin.	Liquid indicator port shows constant bubbles foam, or center indicator color is yellow or red, depending on liquid indicator being used.

Table 2-1. Operator Preventive Maintenance Checks and Services for FDECU - Continued.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If":
7	During	Condensate Drain Hose	When in cooling mode, check that water is dripping from the hose end. If water is dripping from any other place, notify unit maintenance who will repair, if possible, or verify and notify direct support maintenance if necessary.	
8	Weekly	Power Cable	Inspect for frayed or damaged insulation over visible length of cord and particularly at entry point to unit. If frayed or damaged, notify unit maintenance.	Cord is frayed or damaged.
9	Weekly	Interconnecting Wiring	Inspect for frayed or damaged insulation over visible portion of wires. If frayed or damaged, notify unit maintenance.	Any wire is frayed or damaged.
10	Monthly	Cover, Screens, and Panels	Check for dirt or obstruction of screens. Remove obstruction or notify unit maintenance to clean as necessary. Check for loose or missing attaching hardware. Notify unit maintenance to replace or tighten as necessary.	Cover or screen is missing, loose, or damaged to the point of interfering with safe operation.
11	Monthly	Air Filter	a. Loosen clamp(s) and disconnect return air duct from flange assembly or NBC adapter, as applicable. b. Remove air filter then clean or replace it as necessary.	Return air filter is dirty enough to cause obstruction to airflow.
12	Monthly	Outside Surface of Unit	Inspect for cracks or dents in the frame or panels. Check for chipped or missing paint and any evidence of corrosion. Notify unit maintenance who will verify and notify direct support maintenance to repair or paint as necessary.	
13	Monthly	Identification Plates	Check that identification plates are securely attached to unit and can be easily read. Notify unit maintenance to attach if loose or replace if hard to read.	

Table 2-1. Operator Preventive Maintenance Checks and Services for FDECU - Continued.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable if":
7	During	Condensate Drain Hose	When in cooling mode, check that water is dripping from the hose end. If water is dripping from any other place, notify unit maintenance who will repair, if possible, or verify and notify direct support maintenance if necessary.	
8	Weekly	Power Cable	Inspect for frayed or damaged insulation over visible length of cord and particularly at entry point to unit. If frayed or damaged, notify unit maintenance.	Cord is frayed or damaged.
9	Weekly	Interconnecting Wiring	Inspect for frayed or damaged insulation over visible portion of wires. If frayed or damaged, notify unit maintenance.	Any wire is frayed or damaged.
10	Weekly	Compressor Oil Level-Indicator	Inspect compressor oil level. Oil level should be half way up indicator port. If oil level is either high or low, notify unit maintenance who will verify and notify direct support maintenance. See figure 2-1.	Compressor oil level is either high or low.
11	Monthly	Cover, Screens, and Panels	Check for dirt or obstruction of screens. Remove obstruction or notify unit maintenance to clean as necessary. Check for loose or missing attaching hardware. Notify unit maintenance to replace or tighten as necessary.	Cover or screen is missing, loose, or damaged to the point of interfering with safe operation.
12	Monthly	Air Filter	a. Loosen clamp(s) and disconnect return air duct from flange assembly or NBC adapter, as applicable. b. Remove air filter then clean or replace it as necessary.	Return air filter is dirty enough to cause obstruction to airflow.
13	Monthly	Outside Surface of Unit	Inspect for cracks or dents in the frame or panels. Check for chipped or missing paint and any evidence of corrosion. Notify unit maintenance who will verify and notify direct support maintenance to repair or paint as necessary.	
14	Monthly	Identification Plates	Check that identification plates are securely attached to unit and can be easily read. Notify unit maintenance to attach if loose or replace if hard to read.	

Section III. OPERATION UNDER USUAL CONDITIONS

2.3 **ASSEMBLY AND PREPARATION FOR USE.**

2.3.1 Notify unit maintenance personnel and refer them to service upon receipt instructions contained in Chapter 4, Section I.

2.3.2 Perform all of the PMCS procedures listed in table 2-1.

2.4 **OPERATING PROCEDURES.** See figure 2-2.

2.4.1 **General.**

2.4.1.1 Check that ducts (1) have been connected between the FDECU and shelter, also that they are secure and not kinked. Ducts should be fully extended with the least number of bends as possible. Sharp bends, kinks, or collapsed ducts will restrict airflow and lower unit performance.

WARNING

Rotating parts are used in operating the FDECU. Do not install or adjust return air duct when inside blower is operating. The flange assembly can disengage and come off resulting in personal injury.

NOTE

Fresh outside make-up air is recommended during normal operating conditions.

2.4.1.2 Check that the duct (1), connected to the FDECU return air flange assembly (2), was installed back on the flange assembly far enough to expose the perforated holes as necessary. To assure a continuous supply of fresh make-up air, at least four or five rows of perforated holes should be exposed.

2.4.1.3 Check that the drain hose (3) has been brought out of the FDECU and will drain in an appropriate area away from the unit.

2.4.1.4 If the remote control panel (4) is to be used, check that it has been mounted inside the shelter and that any openings made in the shelter to route it have been sealed.

2.4.1.5 Check that the FDECU cover (5) is down and secured by the latch hinges (6).

2.4.1.6 Release fasteners then open the fan cover door (7) and secure with quick release pin (8).

2.4.1.7 Check that the FDECU power cable (9) has been connected to a power source.

NOTE

(FDECU-2 ONLY) The compressor crankcase temperature lockout could prevent the compressor from operating immediately. If the compressor is to operate, power must be connected to the unit for approximately three hours. This is to raise the compressor temperature above the surrounding ambient air temperature.

(FDECU- 2 ONLY) (FOR AIR FORCE ONLY) On some FDECU- 2 units, the compressor crankcase sensor has been bypassed to eliminate the compressor warm up delay. This is accomplished by installing a jumper or splice in the harness that will connect the crankcase sensor (CCS) and common (COM) terminals of terminal block (TP4) on circuit board (A2A1).

2.4.1.8 Choose which control panel, integral to the unit or remote, will be used then position the CONTROL SELECTION switch (10) to either THIS PANEL or REMOTE BOX as applicable. If the remote control box is to be used, and was not installed, notify unit maintenance for installation.

WARNING

Rotating parts are used in operating the FDECU. Do not install or adjust return air duct when inside blower is operating. The flange assembly can disengage and come off resulting in personal injury.

NOTE

Fresh outside make-up air is recommended during normal operating conditions.

2.4.2 **Vent Mode.** Push the VENT MODE ON/OFF momentary push button switch (11) to activate the inside blower. The ON indicator light (12) will illuminate. This will only circulate the shelter air and will not control the temperature. Check that the duct (1), connected to the FDECU return air flange assembly (2), was installed back on the flange assembly far enough to expose the perforated holes as necessary. To assure a continuous supply of fresh make-up air, at least four or five rows of perforated holes should be exposed.

2.4.3 **Climate Control (Heating/Air Conditioning).** Set the TEMPERATURE knob (13) slightly right of the control range mid-point, or 1:00 position. This is approximately 75° F. Push the CLIMATE CONTROL ON/OFF momentary push button switch (14) to activate the automatic temperature control system. The ON indicator light (15) will illuminate. Note that a control logic time-out circuit may prevent the unit from operating immediately. If this occurs, do not turn the unit off, it should start automatically within 5 minutes. (FDECU-2 ONLY) Note that if the COMPRESSOR WARM UP indicator light (16) is illuminated, the compressor is still warming and will not operate, however, the unit will operate in vent or resistance heat mode. When the system is fully operating, the TEMPERATURE knob can be rotated to increase (clockwise) or decrease (counterclockwise) the shelter air temperature within a range of 60° F to 100° F and will maintain the temperature to within 5° F of the setting. If the unit is operating in the cooling mode, do not adjust the TEMPERATURE knob from the 1:00 position for several hours after starting the unit, this will give the shelter air temperature time to stabilize. The inside coil may begin to ice over in moderate ambient temperatures if the TEMPERATURE knob is adjusted to the lowest setting, fully counterclockwise. If the inside coil does begin to ice over, operate the unit in vent mode for between 5 and 10 minutes. This will de-ice the coil. If the inside coil becomes severely iced over, turn the TEMPERATURE knob clockwise to activate the heating mode for between 10 and 15 minutes. Observe the drain hose and note the condensate flow. As the coil de-ices, the flow of condensate should initially increase then decrease when the coil is clear of ice. When the coil has de-iced, adjust the TEMPERATURE knob back to the 1:00 position.

2.4.4 **Shutdown.**

2.4.4.1 If operating in climate control (heating/air conditioning), push the CLIMATE CONTROL ON/OFF momentary push button switch (14) to de-activate the automatic temperature control system. The ON indicator light (15) will go out. **(FDECU-2 ONLY)** To avoid compressor warm-up time delay, power must stay connected to the unit when shut down to maintain the compressor temperature above the surrounding ambient air temperature. On some FDECU-2 units, the compressor crankcase sensor has been bypassed to eliminate the compressor warm up delay.

2.4.4.2 If operating in vent mode, push the VENT MODE ON/OFF momentary push button switch (11) to de-activate the inside blower. The ON indicator light (12) will go out.

2.4.4.3 Unclip quick release pin (8) then close the fan cover door (7) and secure with fasteners.

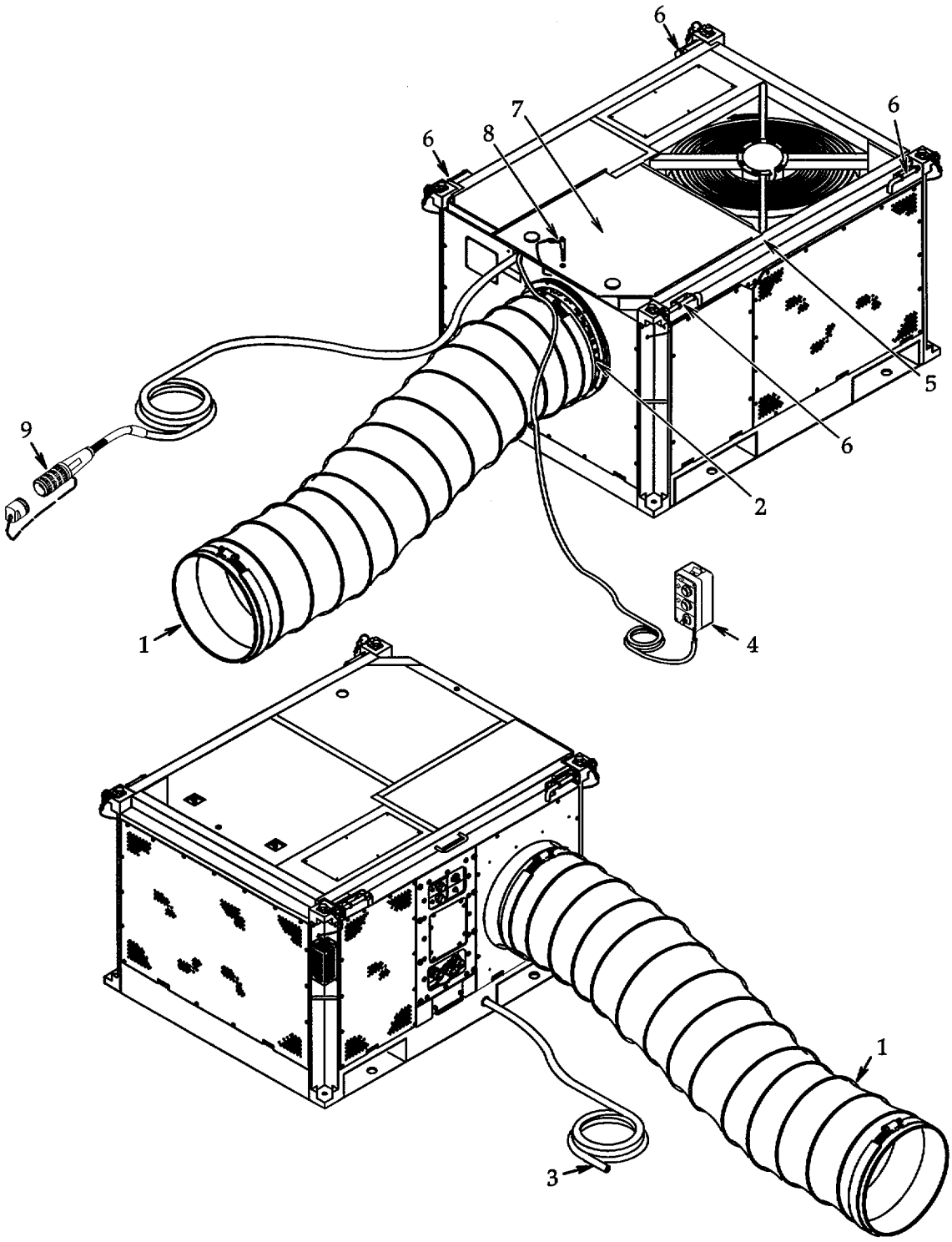


Figure 2-2. Operation (Sheet 1 of 2).

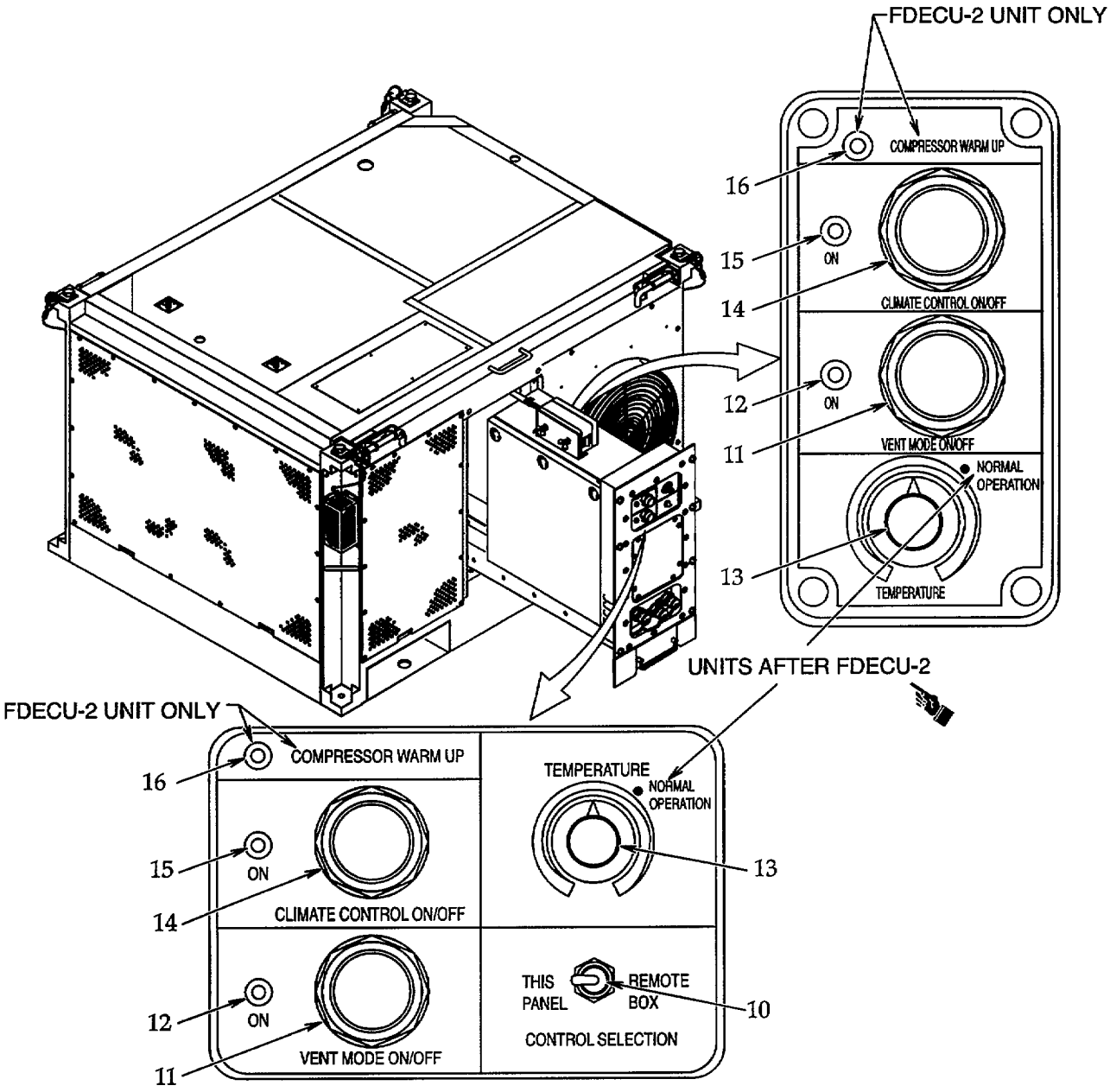


Figure 2-2. Operation (Sheet 2 of 2).

2.5 **DECALS AND INSTRUCTION PLATES.** See figure 1-2.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2.6 **GENERAL.** Follow instructions given in Section III, Operation Under Usual Conditions.

2.7 **UNUSUAL ENVIRONMENTS AND WEATHER.** Notify unit maintenance personnel for assistance if necessary to perform any of the following tasks.

2.7.1 **Extreme Heat.** Open and close the shelter as little as possible. If fresh outside make-up air is not required, slip return air duct over perforations on unit return air duct adapter. Seal any openings in shelter. Do not try to maintain a shelter temperature any lower than is necessary. Be sure there are no obstructions to airflow through FDECU. Provide shade over unit if possible but do not obstruct air flow.

CAUTION

Extreme cold can cause electrical wire leads and insulation to become brittle. Do not disturb electrical wiring that has been exposed to extremely low temperatures. Damage to electrical wire leads or insulation can result if disturbed under these conditions.

2.7.2 **Extreme Cold.** Open and close the shelter as little as possible. If fresh outside make-up air is not required, slip return air duct over perforations on unit return air duct adapter. Seal any openings in shelter. Do not try to maintain a shelter temperature any higher than is necessary. The unit will periodically defrost ice from the outside coil. When this happens, water will drain from the unit bottom and could cause ice build up if it collects there. It may be necessary to raise the unit to prevent the collection of water under the unit.

2.7.3 **Salt Air or Sea Spray.** The FDECU requires no special protection procedures against salt air or sea spray, however, it is advisable to clean the unit more frequently than under normal conditions. If fresh outside make-up air is not required, slip return air duct over perforations on unit return air duct adapter. Check and clean the return air filter more frequently.

2.7.4 **Dust Storm or Sand Storm.** The FDECU requires no special protection procedures against dust or sand storms, however, it is advisable to clean the unit more frequently than under normal conditions. If fresh outside make-up air is not required, slip return air duct over perforations on unit return air duct adapter. Check and clean the return air filter more frequently.

2.7.5 **Snow.** The FDECU requires no special protection procedures against snow, however, the snow should not be allowed to build up around the unit and obstruct airflow. The unit will periodically defrost ice from the outside coil. When this happens, water will drain from the unit bottom and could cause ice build up if it collects there. It may be necessary to raise the unit to prevent the collection of water under the unit.

2.8 **NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) CONDITIONS.**

2.8.1 Notify unit maintenance personnel and refer them to installation instructions contained in Chapter 4, Section I for instructions to setup the NBC kit for this condition.

2.8.2 Operate and maintain the NBC filter/blower assemblies per instructions supplied with them.

2.8.3 Seal any openings in the shelter. Open and close the shelter as little as possible. Follow decontamination procedures per paragraph 2.9 as necessary when entering and leaving the shelter.

2.9 **NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES.**

NOTE

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

2.9.1 **General.** The following emergency procedures can be performed until field NBC decon facilities are available.

2.9.2 **Emergency Procedures.** If NBC attack is known or suspected, mask at once and continue mission. If outside, follow decon procedures below to avoid taking contamination into controlled area. Do not unmask until told to do so.

2.9.2.1 **Nuclear Decontamination.** Brush fallout from skin, clothing, and equipment with available brushes, rags, and tree branches. Wash skin and have radiation check made as soon as tactical situation permits.

2.9.2.2 **Biological Decontamination.** Remain masked and continue mission until told to unmask.

2.9.2.3 **Chemical Detection and Decontamination.**

WARNING

Do not use decontamination spray on personnel. It could cause personal injury.

2.9.2.3.1 Use M8 paper from the M256 Chemical Agent Detection Kit or M9 paper to determine if liquid agent is present on the equipment.

2.9.2.3.2 If exposure to liquid agent is known or suspected, clean exposed skin, clothing, personal gear, and equipment, in that order, using M258A1 kit. Use the buddy system. Wash exposed skin and thoroughly decontaminate as soon as tactical situation permits.

2.9.2.3.3 If the M8 or M9 paper indicates that liquid chemical agent is present on the equipment, use the NBC-M11 decon apparatus for decon of equipment.

CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

Lubrication instructions are found in Appendix H of this TM. All lubrication instructions are mandatory.

Section II. OPERATOR TROUBLESHOOTING PROCEDURES

Table 3-1. Operator Troubleshooting.

FDECU DOES NOT START IN ANY MODE.

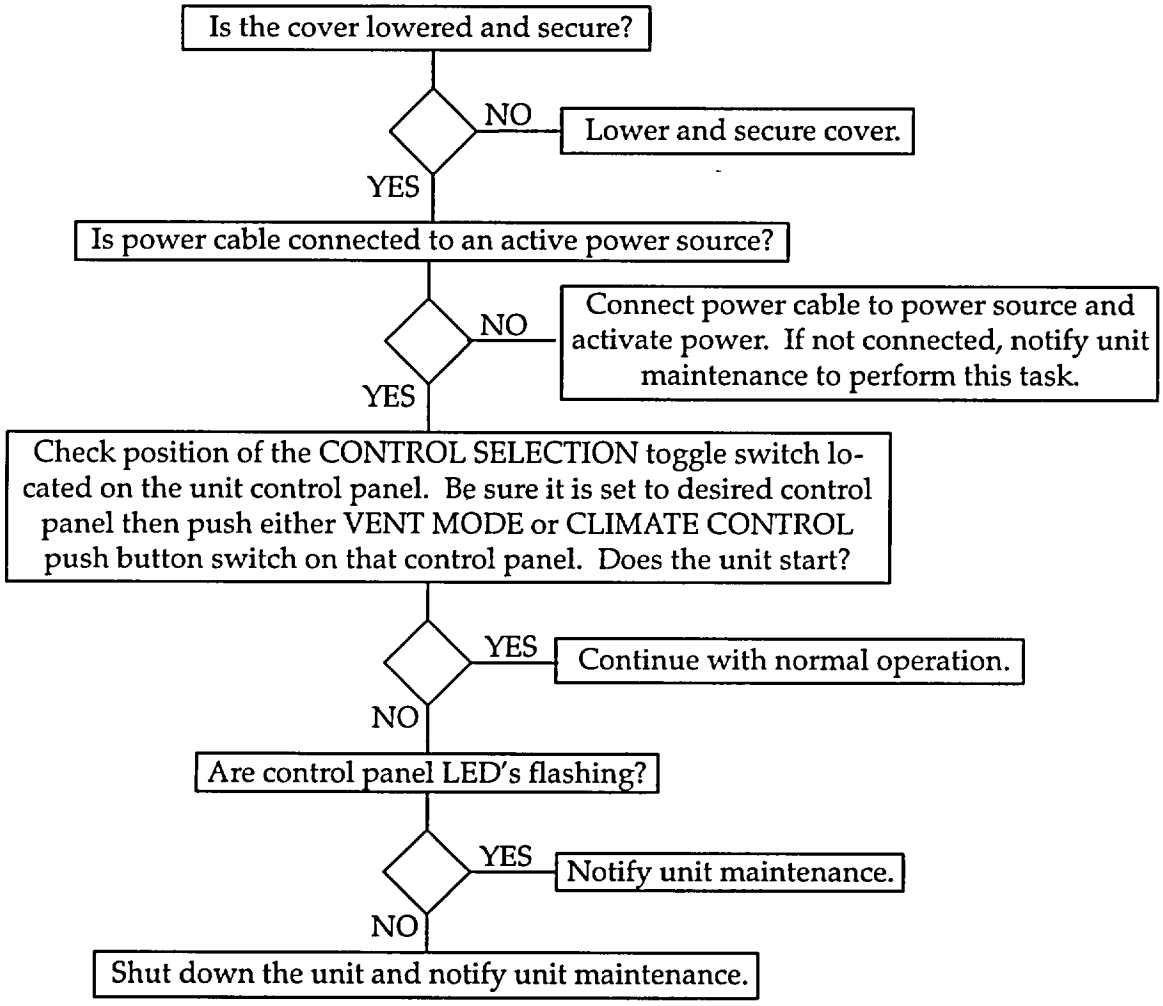
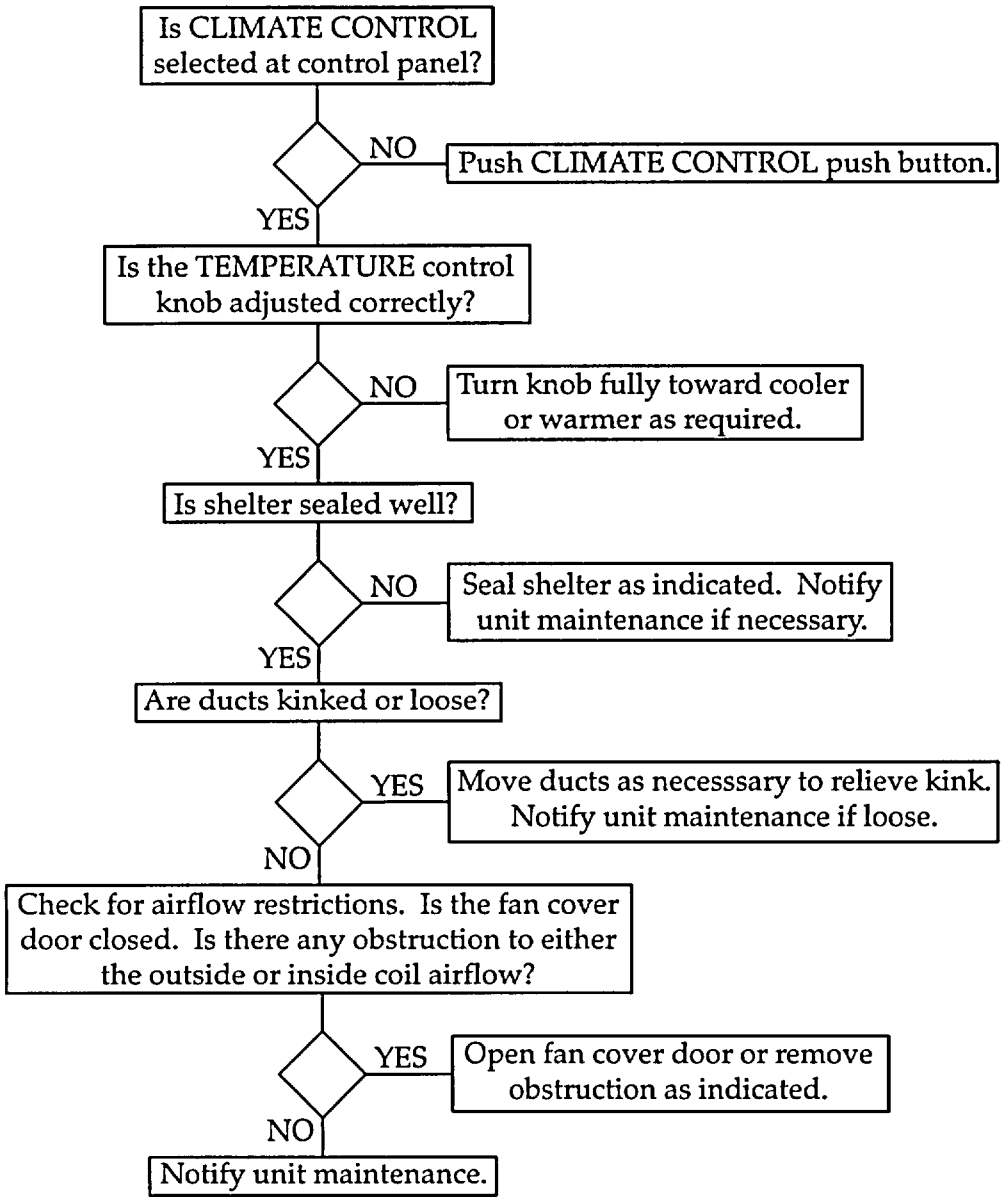


Table 3-1. Operator Troubleshooting - Continued.

FDECU RUNS BUT WILL NOT COOL OR HEAT THE SHELTER AS NEEDED.



Section III. OPERATOR MAINTENANCE PROCEDURES

NOTE

The following maintenance procedure is the only one authorized to the operator with the exception of any service and inspection procedures noted in Operator Preventive Maintenance Checks And Service, Section II, Chapter 2.

3.1 **CLEANING.**

THIS TASK COVERS: Cleaning

Initial Setup:

Materials/Parts
Detergent
Item 13, Section II, Appendix E
Wiping Rag
Item 12, Section II, Appendix E

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

a. Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

b. Raise and secure cover if necessary to access inside of unit for cleaning.

c. Mix a small quantity of detergent with clean water to make a wash solution.

d. Dampen a rag with wash solution and clean the equipment.

e. Dampen a rag with clean water and rinse the equipment. Rinse rag in clean water and continue until all detergent residue has been removed.

f. Wipe the equipment with a clean dry rag until thoroughly dry.

g. Lower and secure cover if raised for cleaning.

h. Connect FDECU to power source and operate per paragraph 2.4.

CHAPTER 4
UNIT MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT

4.1 SITE REQUIREMENTS.

4.1.1 **Siting.** Figure 4-1 illustrates the various requirements and limitations for determining proper placement of the FDECU. In addition to those requirements, the unit must be placed so that the sides and top are a minimum of four feet from any obstruction. The unit must be placed to allow for water draining from the bottom in the winter during outside coil defrost cycle. When orienting the unit to the shelter, be sure that the ducts can be connected with smooth bends and will not get kinked. The unit must be placed on a relatively level surface, within 5° in any direction.

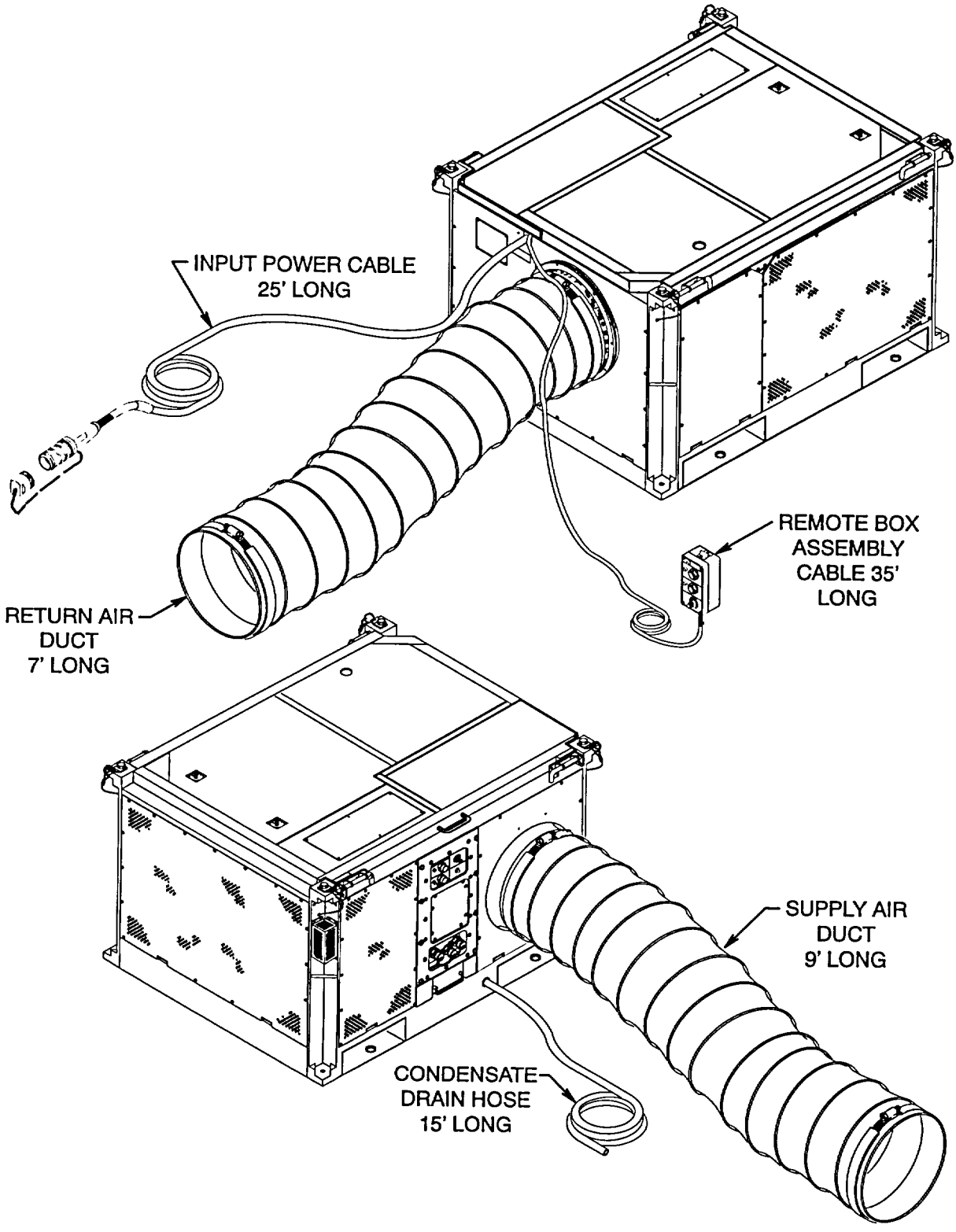


Figure 4-1. Siting.

4.2 **RAISING AND LOWERING COVER.**

THIS TASK COVERS:	a. **Raising**	b. **Lowering**

a. **Raising.** See figure 4-2.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Release two latch hinges (1) and raise cover (2). Insert cover retaining rod (3) into latch hinge doubler (4) and secure using hair pin cotter (5). Be sure to install hair pin cotter from top as shown so it cannot be accidentally pulled out if lanyard cable gets snagged.

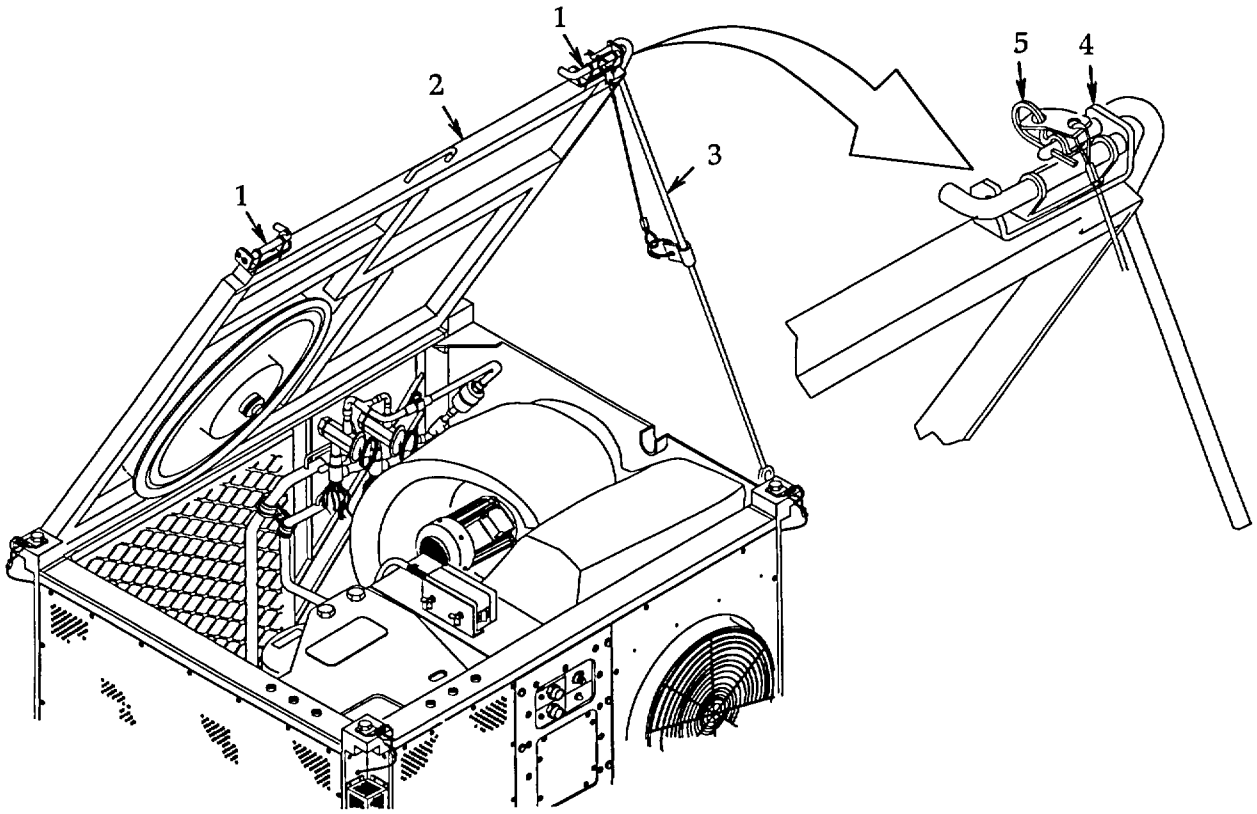


Figure 4-2. Cover.

b. **Lowering.** See figure 4-2.

(1) Support cover (2) then remove hair pin cotter (5). Remove cover retaining rod (3) from latch hinge doubler (4) then lower cover retaining rod to storage position being sure end is in compressor brace slot. Carefully lower cover and secure with two latch hinges (1).

4.3 **SERVICE UPON RECEIPT OF MATERIEL.**

4.3.1 **Checking Equipment.**

4.3.1.1 Inspect the equipment for damage done in shipment. Report any damage on SF 364 (Report of Discrepancy).

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

4.3.1.2 Check equipment against the packing slip to make sure the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750 or DA PAM 738-751 as applicable. Raise and secure cover to check packed components inside unit. Lower and secure cover after checking. Raise and lower cover per paragraph 4.2.

4.4 **INSTALLATION INSTRUCTIONS.**

4.4.1 **Tools, Test Equipment, and Materials Required for Installation.** Only basic hand tools found in general mechanics tool kit, Item 1, Section III, Appendix B are required to install the FDECU.

4.4.2 Place unit in operating position at shelter in accordance with site requirements paragraph 4.1.

4.4.3 **Remove Packed Components.** See figure 4-3.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

4.4.3.1 Raise and secure cover per paragraph 4.2 to access packed components inside unit.

4.4.3.2 Carefully uncoil input power cable assembly (1). Lay cable outside unit and rest in end panel notch (2).

4.4.3.3 Remove two ducts (3).

4.4.3.4 Lower and secure cover per paragraph 4.2.

4.4 **INSTALLATION INSTRUCTIONS - CONTINUED.**

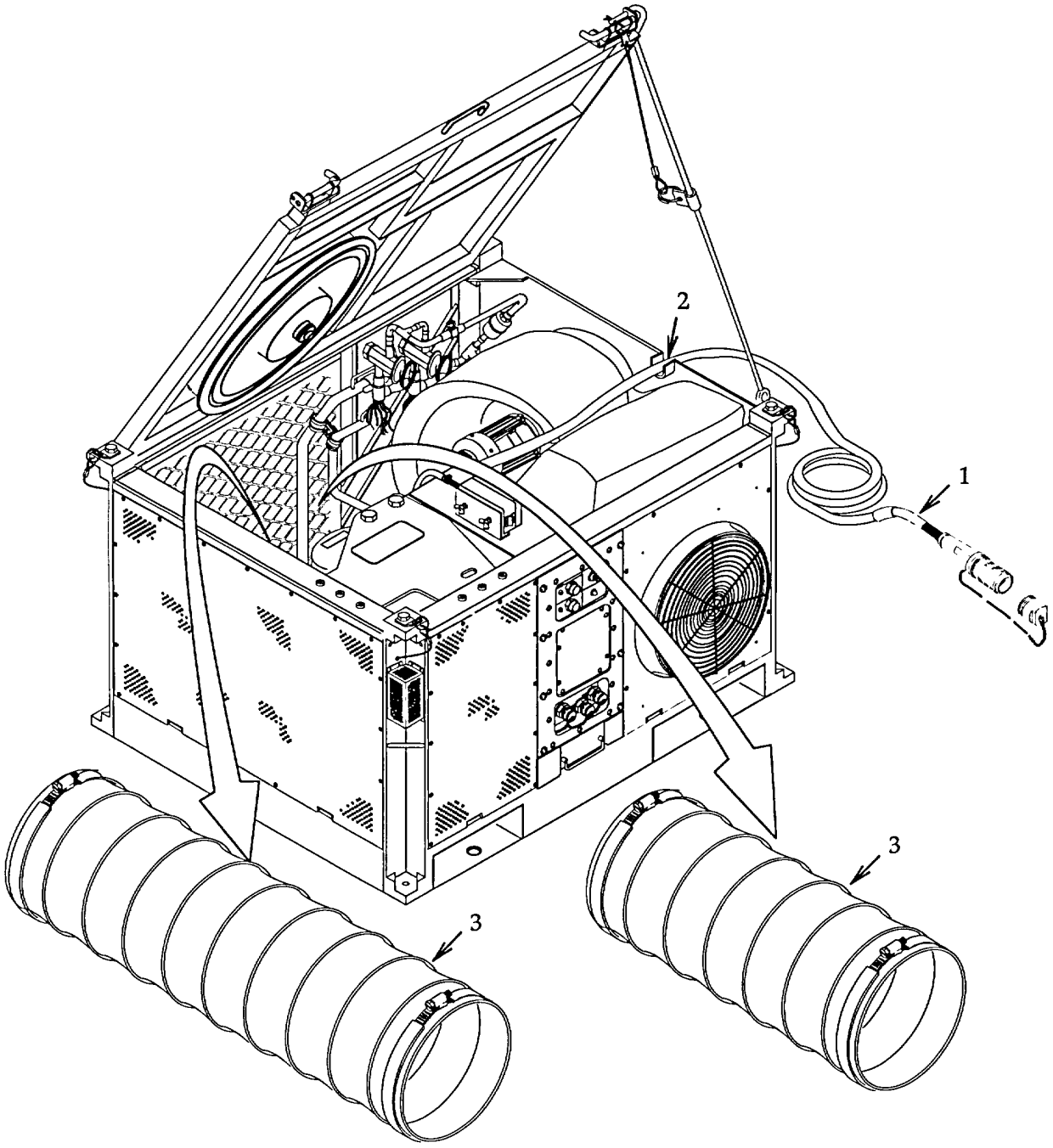


Figure 4-3. Unpacking Components.

4.4.4 **Remove Shipping Covers and Condensate Drain Hose.** See figure 4-4.

4.4.4.1 Raise and secure cover per paragraph 4.2.

4.4.4.2 Unclip quick release pin (1). Turn flange assembly (2) counterclockwise to unlock then pull it from volute assembly (3). Install quick release pin back into volute to seal hole.

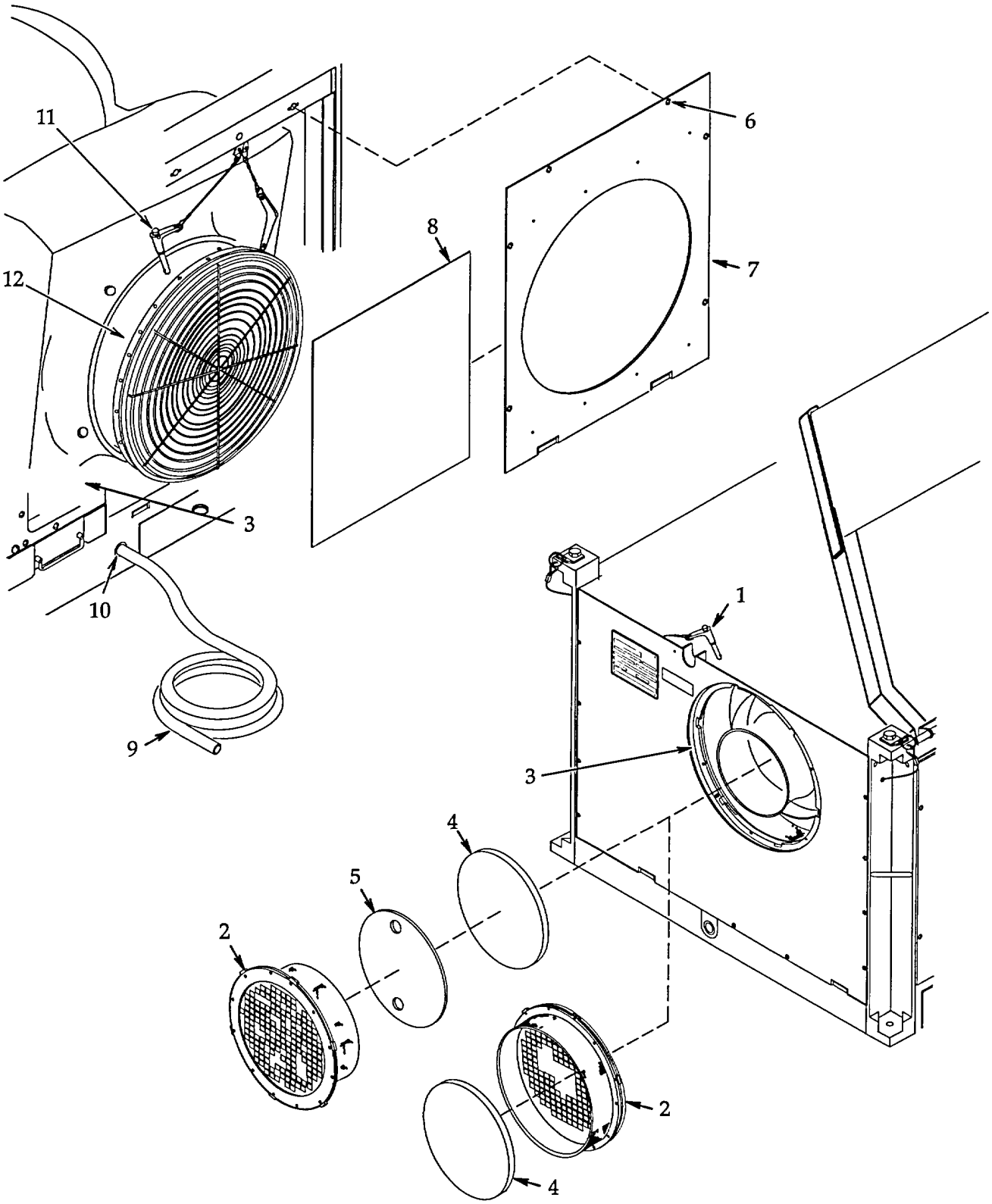


Figure 4-4. Shipping Covers and Condensate Drain Hose.

4.4 **INSTALLATION INSTRUCTIONS - CONTINUED.**

4.4.4.3 Remove filter (4) and return cover (5). Place filter back into flange assembly (2) and store the return cover for re-use.

4.4.4.4 Install the flange assembly (2) into volute assembly (3) with the perforated duct collar facing out (opposite the way it was removed). Align slots and turn clockwise to lock in place.

4.4.4.5 Loosen six captive screws (6) and remove supply panel (7) from lower retaining clips. Slide supply cover (8) out of supply panel. Store the supply cover for re-use.

4.4.4.6 Uncoil condensate drain hose (9) then pass it through hole (10) in frame. Pull the entire length of hose from the unit, leaving it attached to the volute assembly (3).

4.4.4.7 Unclip four quick release pins (11) then carefully pull heater barrel (12) out to stops (approximately 4 inches).

4.4.4.8 Install supply panel (7) into lower retaining clips then slip over heater barrel (12) and align mounting holes. Secure with six captive screws (6).

4.4.4.9 Lower and secure cover per paragraph 4.2.

4.4.5 **Remote Control Box Installation.** See figure 4-5.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

4.4.5.1 Raise and secure cover per paragraph 4.2 to access remote control box mounted inside unit.

4.4.5.2 Release two wing nut fasteners (1) to remove remote control box (2).

4.4.5.3 Release any fastener straps securing cable (3) then lay cable with remote control box outside unit and rest cable in end panel notch (4).

4.4.5.4 Route remote control box (2) inside shelter then mount at eye level away from drafts or supply air opening. Seal any opening made in shelter. If a mounting bracket is not provided inside the shelter for the remote control box, the bracket (5), used in the FDECU for storage, can be removed and secured inside the shelter using standard hardware or clamps.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

4.4.5.4.1 Loosen eight captive screws (6) and carefully pull the electrical assembly (7) out.

4.4.5.4.2 Turn to release three latches (8) and open power box assembly cover (9).

4.4.5.4.3 Remove two nuts (10), lock washers (11), flat washers (12), screws (13), flat washers (14), and bracket (5). Install hardware back onto power box assembly (15) to seal holes. Install bracket into shelter as appropriate and mount the remote control box (2).

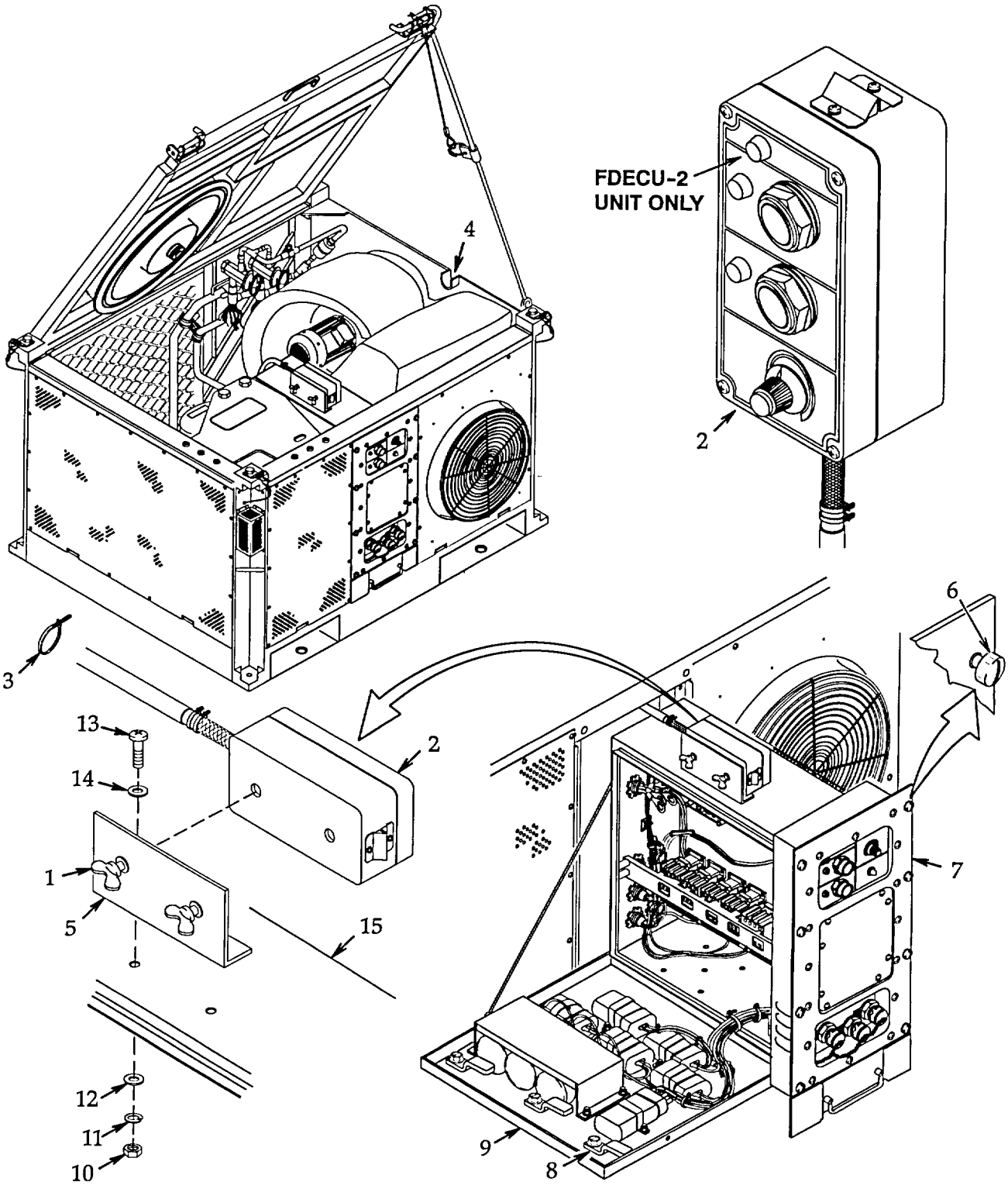


Figure 4-5. Remote Control Box.

4.4 **INSTALLATION INSTRUCTIONS - CONTINUED.**

4.4.5.4.4 Close power box assembly cover (9) and turn three latches (8) to secure.

4.4.5.4.5 Carefully slide electrical assembly (7) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (6).

4.4.5.5 Lower and secure cover per paragraph 4.2.

4.4.6 **Connect Ducts and Input Power.** See figure 4-6.

CAUTION

Ice could form on the inside coil if airflow is restricted. Ducts must be installed as straight as possible with a minimum number of bends. Unit performance will be affected and damage to equipment can occur.

4.4.6.1 Install nine foot long supply air duct (1) between heater barrel (2) and shelter supply duct connector. Note airflow direction marked on duct and be sure duct is installed with arrow toward shelter. Tighten two clamps (3) to secure.

WARNING

Rotating parts are used in operating the FDECU. Do not install or adjust return air duct when inside blower is operating. The flange assembly can disengage and come off resulting in personal injury.

NOTE

Fresh outside make-up air is recommended during normal operating conditions.

4.4.6.2 Install seven foot long return air duct (4) between flange assembly (5) and shelter return duct connector. Note airflow direction marked on duct and be sure duct is installed with arrow toward FDECU. The perforated holes in the flange assembly are intended to provide from 0 to 500 SCFM of fresh outside air to the shelter depending on how many, or if any, holes are exposed. Position the duct on the flange assembly as necessary then tighten two clamps (6) to secure. To assure a continuous supply of fresh makeup air, at least four or five rows of perforated holes should be exposed. Duct should be fully extended with the least number of bends as possible. Sharp bends, kinks, or collapsed duct will restrict airflow, lower unit performance, and could cause ice to form on the inside coil.

4.4.6.3 Connect input power cable assembly (7) to a source of 208 Volts AC, 50/60 Hertz, 3-phase, 4-wire plus ground, 16 kilowatt (60 amp). **(FDECU-2 ONLY)** A compressor crankcase temperature lockout will prevent the compressor from operating immediately. If the compressor is to operate, power must be connected to the unit for approximately three hours. This is to raise the compressor temperature above the surrounding ambient air temperature. **(FDECU-2 ONLY) (FOR AIR FORCE ONLY)** On some FDECU-2 units, the compressor crankcase sensor has been bypassed to eliminate the compressor warm up delay. This is accomplished by installing a jumper or splice in the harness that will connect the crankcase sensor (CCS) and common (COM) terminals of terminal block (TP4) on circuit board (A2A1).

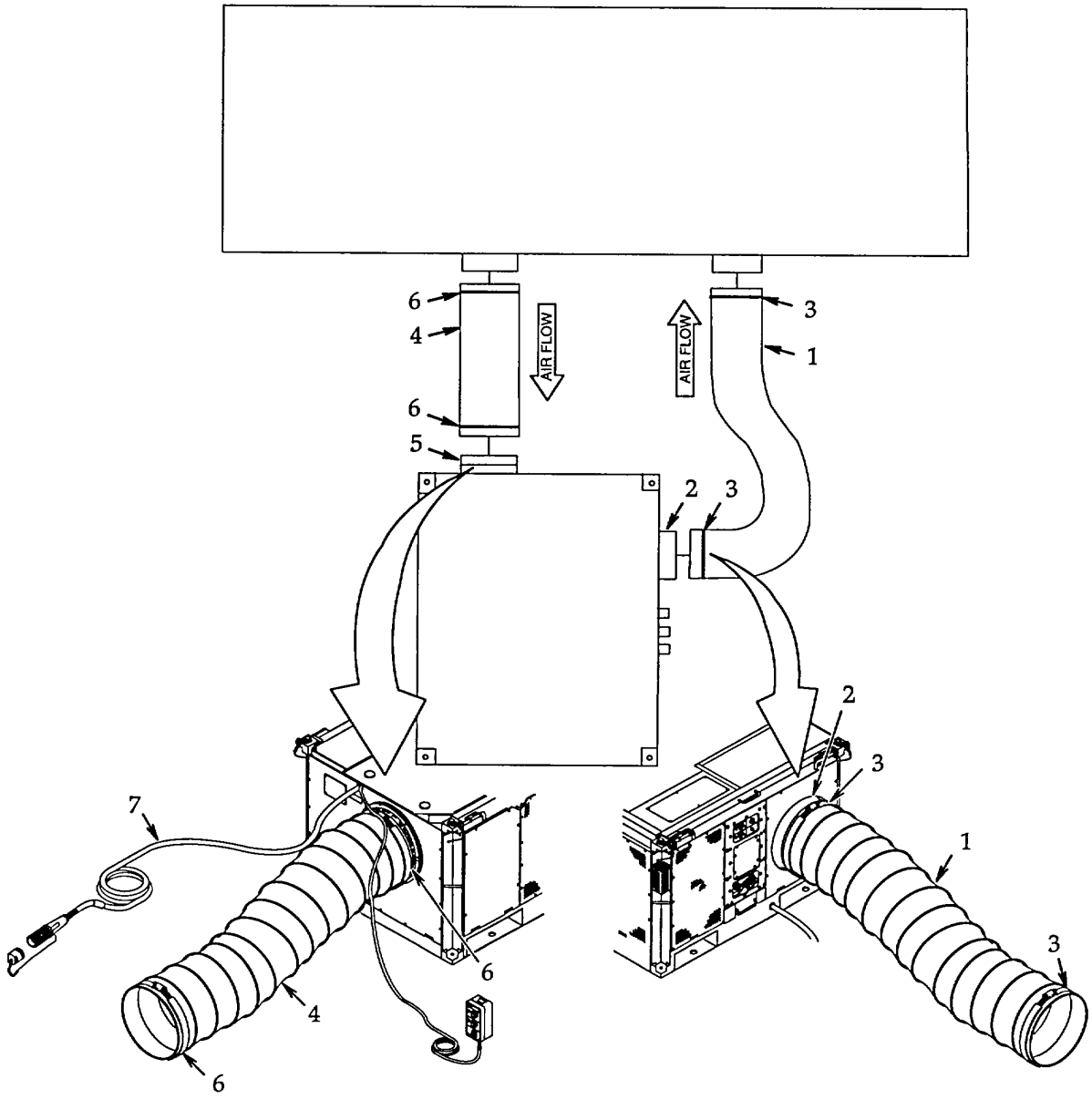


Figure 4-6. Ducts and Input Power Connection.

4.4.7 **NBC Hardening.** See figure 4-7.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

4.4.7.1 Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

4.4.7.2 Loosen four clamps (1) then remove two ducts (2). Store the ducts and clamps for re-use.

4.4 **INSTALLATION INSTRUCTIONS - CONTINUED.**

4.4.7.3 Remove filter (3) from flange assembly (4) and install it into NBC adapter (5).

4.4.7.4 Turn flange assembly (4) counterclockwise to unlock then pull it from volute assembly (6).

4.4.7.5 Install the NBC adapter (5) into volute assembly (6). Align slots and turn clockwise to lock in place.

4.4.7.6 Install NBC supply air duct (7) between heater barrel (8) and shelter supply duct connector. Note airflow direction marked on duct and be sure duct is installed with arrow toward shelter. Tighten two clamps (9) to secure.

NOTE

The NBC return air duct is designed with one duct inside another, sewn together at one end. This will create an air chamber between the ducts that when pressurized, will prevent contaminants from entering the shelter.

4.4.7.7 Install NBC return air duct (10) between NBC adapter (5) and shelter return duct connector. Note airflow direction marked on duct and be sure duct is installed with arrow toward FDECU. Install the inner duct then tighten clamp (11) to secure. Install the outer duct then tighten two clamps (12) to secure.

4.4.7.8 Place two NBC filter canisters (13) as illustrated. Be sure they are within three feet of the NBC adapter (5).

4.4.7.9 Place two NBC motor blowers (14) as illustrated. Be sure they are within three feet of their NBC filter canister (13).

4.4.7.10 Connect and secure one NBC air duct (15) between each NBC motor blower (14) and NBC filter canister (13) center hole.

4.4.7.11 Connect and secure one NBC air duct (16) between each NBC filter canister (13) outside hole and NBC adapter (5). Use duct tape to secure hose connections at NBC adapter.

4.4.7.12 Connect one power cord (17) between each NBC motor blower (14) and any two of the three NBC motor blower power connectors (18) located on the FDECU control box assembly. If several units are being used on the same power source, be sure not to use the same two connectors on all units as this will unbalance the power supply phases. Try to use the three connectors equally.

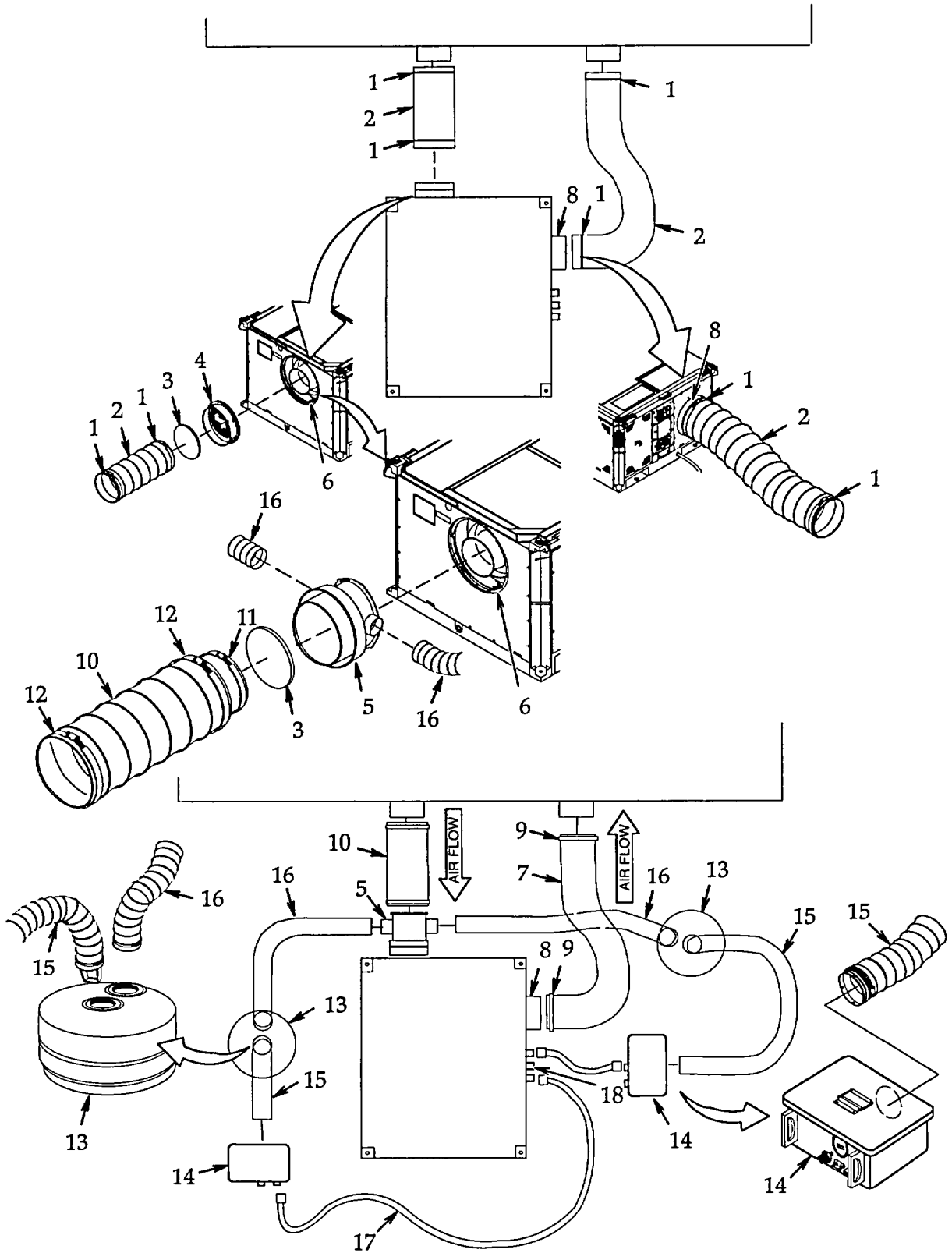


Figure 4-7. NBC Hardening.

4.5 **PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.**

4.5.1 Check that all ducts are tight and secure. Seal or secure as necessary.

4.5.2 Perform all of the PMCS procedures listed in table 4-1.

4.5.3 Connect FDECU to power source and operate per paragraph 2.4. If operating with the unit hardened for NBC environments, be sure to operate and maintain both of the NBC blower assemblies according to instructions supplied with them and be sure they are functioning properly. Check that the unit operates in all modes and that the outside fan is turning in the correct direction. If the fan is turning backwards, this indicates that the power was connected to the wrong phase and that two of the power wire leads need to be reversed at the source.

4.5.4 Operate the FDECU using desired control panel to check for proper operation of the controls. Change the CONTROL SELECTION switch on the unit control panel as necessary.

Section II. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4.6 **INTRODUCTION.**

4.6.1 **General.** Preventive Maintenance Checks and Services are essential to the efficient operation of the FDECU and to prevent possible damage that might occur through neglect or failure to observe warning symptoms in a timely manner. Checks and services performed by unit maintenance personnel are in table 4-1. This table lists the inspections and care of the FDECU required to keep it in good operating condition. The procedures are intended to be done if the equipment is used periodically during the interval period and not if the equipment is in storage. If the equipment has been in storage and is to be used, perform all of the procedures prior to putting it back into service.

4.6.2 **PMCS Procedures.** The following paragraphs identify and explain the columns used in the PMCS table.

4.6.2.1 **Item No. Column.** Numbers in this column are for reference. When completing DA Form 2404 (Equipment Inspection and Maintenance Worksheet), include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

4.6.2.2 **Interval Column.** This column tells you when you must do the procedure in the procedure column.

4.6.2.3 **Item to be Checked or Serviced Column.** This column provides the location and the item to be checked or serviced. The item location is underlined.

4.6.2.4 **Procedure Column.** This column gives the procedure you must do to check or service the item listed in the Check/ Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

4.6.2.5 **"Not Fully Mission Capable If": Column.** Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you made a check and service procedure that shows faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

4.6.3 **Refrigerant Leaks.** Oil is carried with the refrigerant as it flows through the refrigeration system. If a leak develops in the system, the oil will seep out and soak the copper tubing around the leak or drip and soak or puddle on the frame or other component below the leak. If any oil or seepage is found, a refrigerant leak would be suspected.

4.6.4 **Corrosion Prevention Control.** If a corrosion problem is identified, it can be reported using Standard Form 368, Production Quality Deficiency Report. The form should be submitted to the address specified in DA Pam 738-750. This will result in more definitive actions being taken to prevent future occurrences.

Table 4-1. Unit Preventive Maintenance Checks and Services for FDECU.

NOTE

If the FDECU must be kept in operation during a scheduled PMCS interval, perform only those procedures that will not disturb operation then perform remaining procedures when the unit can be shut down.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable If":
1	Quarterly	Inside Blower	Examine inside blower then clean as necessary and inspect for any cracks or other damage. Replace if damaged.	Inside blower damaged or dirty enough to cause reduced air flow.
2	Quarterly	Outside Fan	Clean outside fan as necessary and inspect for any cracks or other damage. Replace if damaged.	Outside fan is damaged or dirty enough to cause reduced air flow.
3	Quarterly	Condensate Drain Hose	a. Remove supply panel per paragraph 4.25. b. Examine condensate drain hose for any obstruction. Clean as indicated.	Condensate drain hose obstructed.
4	Semi-annually	Wires, Cables, Harnesses, and Electrical Connections	a. Open cover and panels as necessary to access component connections. b. Check wires, cables, and harnesses for breaks, cuts, or frayed insulation. c. Check that all electrical connections are secure. Tighten if necessary. If terminals are missing or damaged, repair or replace per paragraph 4.16.	Any wire, cable, or harness is damaged. Any electrical connection is loose, missing, or damaged.
5	Semi-annually	Electrical System Components	a. Open cover and panels as necessary to access components. b. Check components for damage or evidence of overheating. Replace any damaged components per appropriate procedure.	Electrical system component damaged or overheated.

Table 4-1. Unit Preventive Maintenance Checks and Services for FDECU - Continued.

Item No.	Interval	Item to be Checked or Serviced	Procedure	"Not Fully Mission Capable if":
6	Semi-annually	Heater Assembly	a. Loosen clamp and disconnect supply air duct from heater barrel. b. Check heater assembly for any visible damage or evidence of overheating. If damaged, replace per paragraph 4.46. c. Clean any accumulated dirt from heater assembly. If necessary remove to clean.	Heater assembly shows evidence of overheating or other damage. Heater assembly dirty enough to obstruct air flow.
7	Semi-annually	Refrigeration System Components, Tubing and Fittings	a. Open cover and panels as necessary to access components. b. Check components for damage or evidence of refrigerant leak. Notify direct support maintenance if damaged or leak is suspected. c. Check tubing and fittings for damage such as kinks or pinched as well as evidence of leaking. Notify direct support maintenance if damaged or leak is suspected.	Refrigeration system component damaged or leaking. Tubing or fittings are damaged or leaking.
8	Semi-annually	Outside Coil	a. Check outside coil for any visible damage or evidence of leaking. Notify direct support maintenance if leaking or damaged. b. Clean any accumulated dirt from coil.	Outside coil leaking or damaged. Outside coil dirty enough to obstruct air flow.

Section III. UNIT TROUBLESHOOTING PROCEDURES

4.7 **INTRODUCTION.** The FDECU uses a printed circuit board (pc board) to automatically operate and control unit components under various conditions. This pc board has a comprehensive monitoring, testing, and diagnostic capability that can be used to perform much of the troubleshooting for the unit. The following procedures will provide information and procedures to access the control components for diagnosing troubles, and a detailed explanation of the pc board logic sequence with a layout of pertinent components on the board. Temperature potentiometers on the pc board are used to establish temperature set points for various control functions and will affect troubleshooting if not adjusted correctly. A procedure is provided to set these potentiometers if the settings are suspect. Thermistor temperature sensors provide the pc board with temperature input signals. To properly troubleshoot the unit, a testing procedure is provided to check these thermistors. General troubleshooting procedures are provided to address non-specific troubleshooting items such as wire lead and harness testing, contactor and overload testing, motor winding testing, etc. A table of branching logic tree symptoms and corrective actions is provided to troubleshoot specific fault symptoms. Procedures are then given to secure the unit and return it to service. The following procedures cannot address all possible faults that could occur with the unit but they do cover the most common symptoms and should give enough general information to help logically diagnose other symptoms effectively. When performing any troubleshooting functions or checks refer to the necessary equipment setup procedures found in Section I of this Chapter then operate per paragraph 2.4.

4.8 **ACCESS FOR TROUBLESHOOTING.** See figure 4-8.

WARNING

Lethal voltage levels are used in operating the FDECU. Disconnecting power will reset the fault indicators. Therefore it may be necessary to access the pc board and power box assembly components when power is connected to effectively diagnose the trouble while the unit is still in the fault mode. Be sure to observe extreme caution when accessing electrical assembly if power is connected.

The pc board contains high voltage on control circuits as do the contactor coils. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

a. If necessary, raise and secure cover per paragraph 4.2.

b. Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

c. Turn to release three latches (3) and open power box assembly cover (4).

d. Loosen eight captive screws (5) and carefully remove panel (6).

4.8 **ACCESS FOR TROUBLESHOOTING - CONTINUED.**

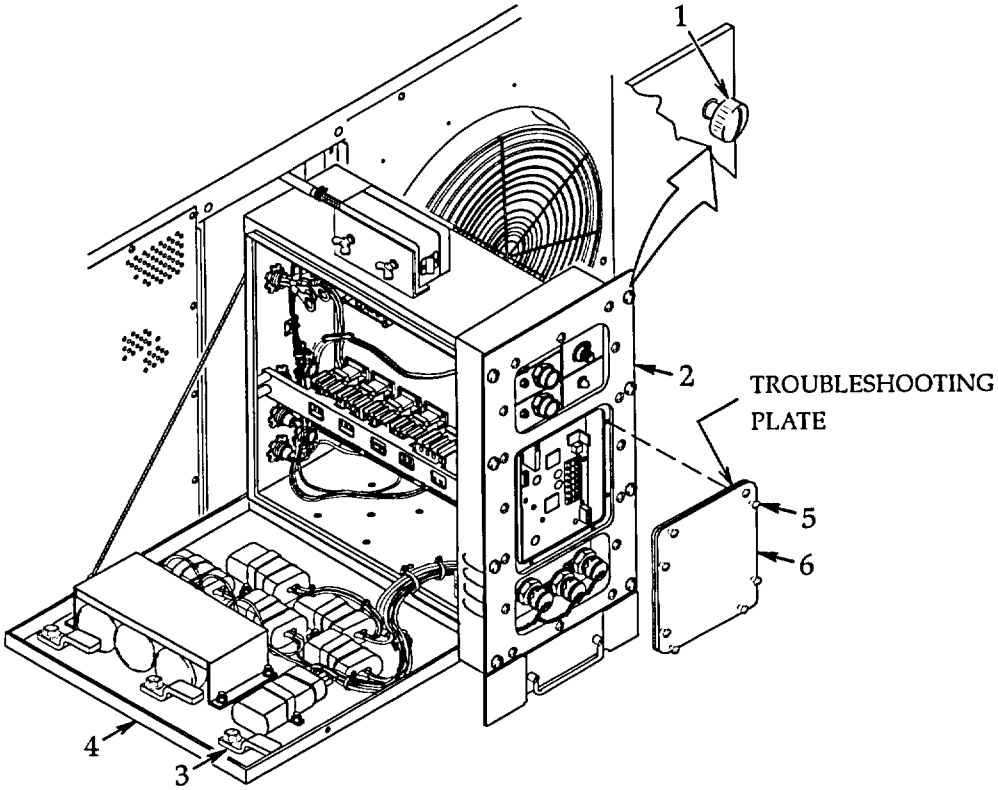


Figure 4- 8. Access for Troubleshooting.

4.9 LOGIC CONTROL DETAILS. The following paragraphs describe the layout of the pc board as well as the general function of components and overall unit control logic including system monitoring for diagnostic purposes.

WARNING

Lethal voltage levels are used in operating the FDECU. Disconnecting power will reset the fault indicators. Therefore it may be necessary to access the pc board and power box assembly components when power is connected to effectively diagnose the trouble while the unit is still in the fault mode. Be sure to observe extreme caution when accessing electrical assembly if power is connected.

The pc board contains high voltage on control circuits as do the contactor coils. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

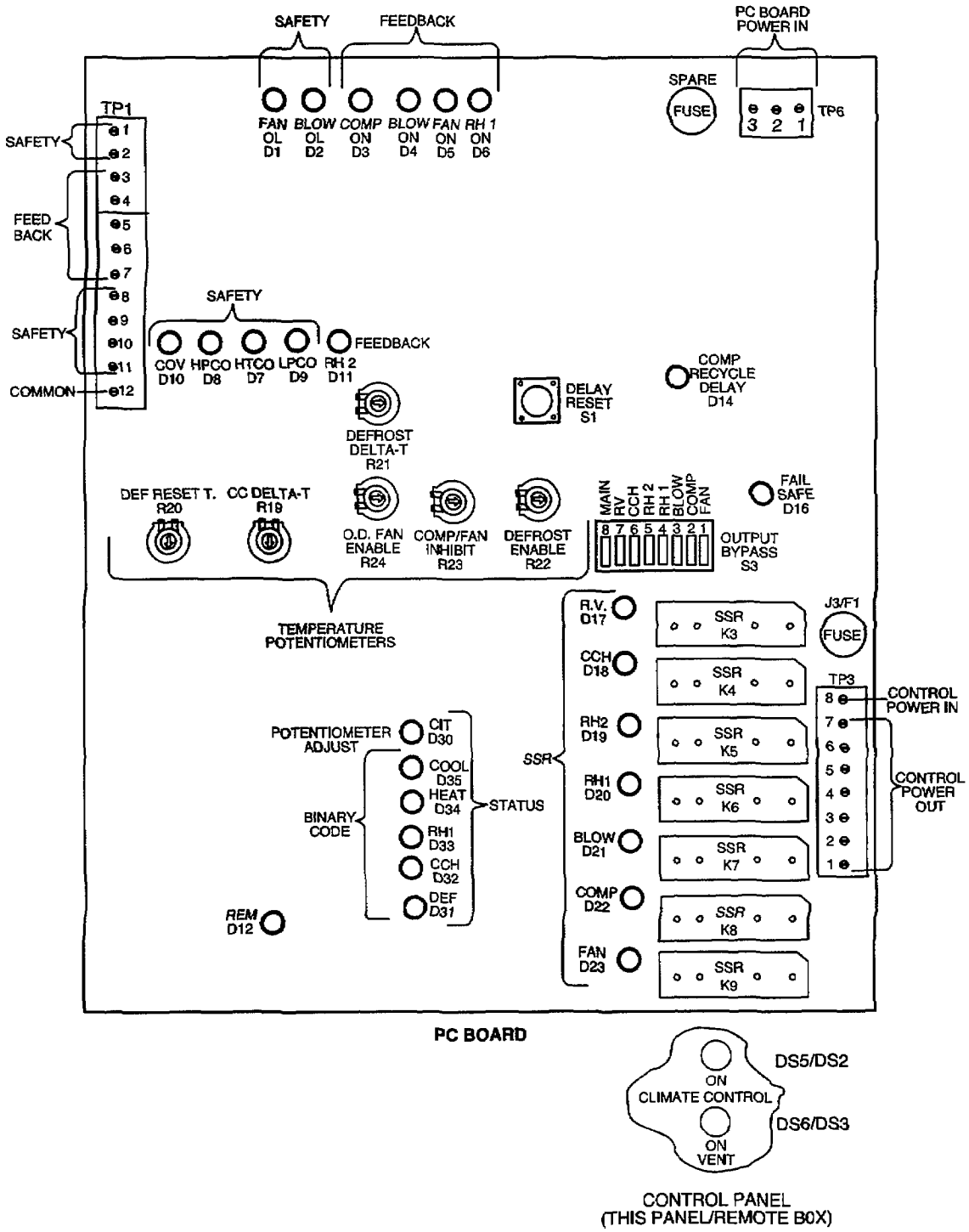
NOTE

The pc board cannot be tested outside the FDECU.

4.9.1 **PC Board Layout and Component Functions.** See figure 4-9. The pc board logic circuits receive power at TP6 (upper right corner) directly from the unit power supply. The status light emitting diodes (LED's) D30 through D35 (lower center) indicate the operating condition the pc board "thinks" it's in. Unit power, used by the pc board to control system components, is completely separate from the logic circuits and enters at TP3 (lower right). The control power then passes through fuse J3/F1 before going to the output switch side of the solid state relays (SSR's) K3 through K9. The SSR's will switch the control power at TP3 to energize the various system component contactors. The LED's D17 through D23 adjacent to the SSR's provide a visual indication of when the SSR's are energized. When a system component contactor is energized, it will send a signal back to the pc board at TP1 (upper left). Feedback LED's D3 through D6 and D11 provide a visual indication of what component contactor is energized. Safety cutout switches used in the unit will send a signal to the pc board at TP1. Safety LED's D1, D2, and D7 through D10 provide a visual indication of what cutout switch has indicated a fault. The pc board receives temperature signals from the volute or remote control box for shelter air, outside coil, and outside air. The temperature potentiometers R19 through R24 (center left) can be adjusted to set the point at which the temperature signals will cause system components to cycle. When the remote control box is being used, LED D12 will be illuminated. The compressor is protected from short cycling by a timer circuit on the pc board that, when activated, is indicated by LED D14. The compressor recycle time delay can be terminated for maintenance troubleshooting purposes by pressing momentary push button switch S1. The dual inline parallel (DIP) switches S3 are used for maintenance troubleshooting purposes to override the automatic logic in the pc board and operate the control circuits manually. Binary codes for adjustment and diagnosis of failures in the system are indicated by LED's D16 and D30 through D35.

4.9.2 **(FDECU-2 ONLY) Compressor Crankcase Heater Function.** The compressor crankcase heaters are used to keep the compressor temperature above the surrounding ambient air temperature to prevent liquid refrigerant from migrating into the compressor when it is not operating. When the FDECU is put into the climate control mode, and the compressor needs to operate, the compressor warm up LED (DS1 or DS4) on the control panel will come on if the compressor temperature is not 23° F above the surrounding ambient air temperature. If this LED is on, the compressor will not operate until this temperature difference is met. Once the compressor starts, the crankcase heaters may cycle on and off to maintain the temperature difference. When the compressor is running, the heater cycling will not affect operation, however, if the compressor attempts to start during a warmup cycle, the temperature difference must be met before the compressor actually starts. **(FDECU-2 ONLY) (FOR AIR FORCE ONLY)** On some FDECU-2 units, the compressor crankcase sensor has been bypassed to eliminate the compressor warm up delay. This is accomplished by installing a jumper or splice in the harness that will connect the crankcase sensor (CCS) and common (COM) terminals of terminal block (TP4) on circuit board (A2A1).

4.9 **LOGIC CONTROL DETAILS - CONTINUED.**



Note that LED D18 (CCH) and solid state relay K4 were removed from printed circuit (PC) board used on FDECU-4 and thereafter.

Figure 4-9. PC Board Layout.

4.9.3 **Overall Control Logic.**

4.9.3.1 **Normal Operation.** When the FDECU is put into a mode of operation at the control panel, the pc board logic circuits will control the operation of all system components necessary for the desired mode. Various time delays are programmed into the logic circuits to cause simple make-before-break contactor functions and inrush current limiting. The length of time for these delays ranges from between one and three seconds to three minutes for the compressor recycle time delay. When observing the operation of the pc board light emitting diodes (LED's), keep the time delays in mind and wait before assuming a fault has occurred. Note that a control logic time-out circuit may prevent the unit from operating immediately. If this occurs, do not turn the unit off, it should start automatically within 5 minutes. Table 4-2 lists the two modes of operation, vent and climate control. The table breaks down the logical control of these modes and shows the LED's that indicate the control functions. The status LED's give an indication of the logic process the pc board is using to control the system components for any given mode. The logic sequence is based on the selected mode and input signals from the thermistor temperature sensors used in the system. In general, the vent mode can be used under any condition. When using the control panel integral to the unit (THIS PANEL) the inside blower will remain on anytime the unit is in the climate control mode. This is necessary for the temperature sensor, integral to the volute assembly, to sense the shelter air. When using the remote control box (REMOTE BOX) the inside blower will cycle with the cooling or heating demand because the temperature sensor, integral to the remote control panel, is inside the shelter and can sense the air at any time. The climate control mode follows certain temperature setting points as follows; cooling will activate when the shelter temperature is 3° F above the thermostat set point. If the outside temperature drops to a point that causes the outside coil temperature to go below 80° F, the outside fan will stop. This is necessary to maintain proper refrigerant system pressures under low ambient conditions. At outside ambient temperatures above 17° F, the mechanical refrigeration system provides primary (first stage) heating and electric resistance heaters provide supplemental (second stage) heating. First stage heating activates when the shelter temperature is 2° F below the thermostat set point and second stage heat will activate if the shelter temperature drops to 5°F below the thermostat set point. Ice will form on the outside coil whenever the mechanical refrigeration system is used for heat. The system must melt the ice that forms on the coil using the defrost mode of operation. Defrost mode will activate whenever the outside air temperature is below 51° F, and the outside coil temperature is 10° F below the outside air temperature. Defrost mode is essentially cooling mode without the outside fan. Supplemental electric resistance heat is used when in defrost mode to offset the cooling effect of the mechanical refrigeration system. If the outside ambient temperature drops below 17° F, the mechanical refrigeration system will be disabled and electric resistance heat will provide both primary (first stage) and supplemental (second stage) heating. When the control logic energizes the reversing valve, for cooling or defrosting, it will remain energized even after the unit cycles off. It will remain energized until there is a change in the operating mode that requires it to be deenergized. The defrost status LED may blink slowly during normal operation when the unit is put into climate control mode and is cooling the shelter air. This is an indication that the logic circuit is monitoring the outside coil and air temperatures to determine if there is a need to defrost the inside coil. This LED may continue to blink indefinitely or stop blinking 20 minutes after it starts depending on the temperature conditions. The following cross reference list is provided to explain the abbreviations used on the pc board:

OL	Overload	HTCO	High Temperature Cutout
BLOW	Blower	LPCO	Low Pressure Cutout
COMP	Compressor	CIT	Compressor Interrupt, Temperature
RH	Resistance Heat	DEF	Defrost
COV	Cover	REM	Remote
HPCO	High Pressure Cutout	R.V.	Reversing Valve

4.9 **LOGIC CONTROL DETAILS - CONTINUED.**

Table 4-2. LED Condition For Normal Operating Modes.

LED	VENT	CLIMATE CONTROL						
		COOL		HEAT			LOW AMB	
		NORMAL	LOW AMB	1st STAGE	2nd STAGE	DEFROST	1st STAGE	2nd STAGE
STATUS								
CI T (D30)							•	•
COOL (D35)		•	•					
HEAT (D34)				•	•	•	•	•
RH 1 (D33)					•			•
DEF (D31)						•		
SSR								
RV (D17)		•	•			•		
RH 2 (D19)							•	•
RH 1 (D20)					•	•		•
BLOW (D21)	•	•	•	•	•	•	•	•
COMP (D22)		•	•	•	•	•		
FAN (D23)		•		•	•			
FEEDBACK								
COMP ON (D3)		•	•	•	•	•		
BLOW ON (D4)	•	•	•	•	•	•	•	•
FAN ON (D5)		•		•	•			
RH 1 ON (D6)					•	•		•
RH 2 (ON) (D11)							•	•
CONTROL PANEL								
(VENT) ON	•							
(CLIMATE) ON		•	•	•	•	•	•	•

Note: A dot "·" on the table indicates the LED is ON.

Several components operate under a time delay of between one second to three minutes depending on the component or operating condition. If an LED is not on, but should be, wait until all time delays have reset. Note that a control logic time-out circuit may prevent the unit from operating immediately. If this occurs, do not turn the unit off, it should start automatically within 5 minutes.

The REM (D12) LED will be on if using the remote panel for control and additional LED's are used to indicate faults in the system.

Status LED's serve two additional functions; they indicate, in binary code, the settings of on board temperature potentiometers and TP 1 terminal point if a major or minor failure occurs.

In CLIMATE CONTROL mode, the blower will operate continuously if using THIS BOX (local) control panel but will cycle with heating or cooling demand if using REMOTE PANEL for control.

4.9.3.2 **System Monitoring and Fault Isolation.** When the pc board logic circuits make a "request" of the system components to satisfy the desired operating control mode, the logic circuits compare the signal going to the appropriate solid state relays (SSR's) and the signal coming back from the associated system component contactor. This control circuit loop will determine if an SSR or system component contactor is defective. If the logic circuits determine that a signal is going out to an SSR but is not returning from the associated contactor, the pc board will go into a minor failure mode. A minor failure will cause the control panel LED's to flash to indicate a fault but will allow the unit to continue operating in a limited capacity depending upon the mode of operation at the time of the failure. If the unit power is not interrupted, causing the pc board to reset the failure mode, the status LED's will operate in their alternate mode of flashing the binary code for the terminal point number on TP1 where the failure was detected to help isolate a control loop or component failure. See table 4-3 to convert the binary code to a numeric value. The defrost status LED may blink slowly during normal operation. This is an indication that the logic circuit is monitoring the outside coil and air temperatures to determine if there is a need to defrost the inside coil. This is not a fault indication. A fault will override this monitoring indicator and display the fault if necessary. If the logic circuits determine that a signal is coming from a contactor but there is no signal going to the associated SSR, the pc board will go into a major failure mode. A major failure will cause the system to completely shut down and the fail safe light emitting diode (LED) (D16) will come on. If the unit power is not interrupted, causing the pc board to reset the failure mode, the status LED's will operate in their alternate mode of flashing the binary code for the terminal point number on TP1 where the failure was detected to help isolate a component failure. The pc board also monitors the signals being sent from various safety overload or cutout switches in the unit. A safety related failure can cause the unit to shut down or allow for limited operation depending on the failure. Refer to abbreviations listed in paragraph 4.9.3.1 for definition of LED's. If a component or the pc board is determined to have failed, replace it per the appropriate procedures. Note that the pc board components cannot be replaced individually and the entire board must be replaced if any one component on it fails. The only exception to this is the output control power fuse J3/F1, located above TP3, that can be replaced by the spare fuse mounted at the top of the pc board.

Table 4-3. LED Condition For Binary Code.

	DIGITAL NUMBER EQUIVALENT																					
LED	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
COOL (D35)																	•	•	•	•	•	•
HEAT (D34)									•	•	•	•	•	•	•	•						
RH 1 (D33)					•	•	•	•					•	•	•	•						
CCH (D32)			•	•			•	•			•	•			•	•			•	•		
DEF (D31)		•		•		•		•		•		•		•		•		•		•		•

Note: A dot "•" on the table indicates the LED is ON.

Additional LED's or combinations not listed represent higher numbers that are not relevant to this equipment.

In maintenance mode, LED (D30) comes on to indicate that the PC board is in potentiometer adjustment mode and is not part of the binary code indicators.

4.9 **LOGIC CONTROL DETAILS - CONTINUED.**

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure to observe extreme caution when accessing pc board with power connected. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

CAUTION

Operating the system components in the manual mode will override the safety features of the pc board and could cause equipment damage if components are operated improperly. Use great care when operating in manual mode to consider which components must be activated to simulate various operational modes to prevent equipment damage.

4.9.4 **Manual Override of Logic Control.** See figure 4-9. For troubleshooting purposes it may be helpful to override the automatic control of the pc board logic circuits and operate the system components manually to observe the function of the light emitting diodes (LED's) and check for operation of the individual system components. With power applied to the FDECU and no operating mode selected, put the pc board into the maintenance mode by placing switch number 8, on the dual inline parallel (DIP) switch S3, down (ON). Use a non- conducting probe such as a plastic or wooden toothpick to move the DIP switches. When in the maintenance mode, the other DIP switches can be positioned down (ON) to activate various system components as follows; RV (7) reversing valve, RH 2 (5) electric resistance heat bank 2, RH 1 (4) electric resistance heat bank 1, BLOW (3) inside blower, COMP (2) compressor, and FAN (1) outside fan. LED's D31 through D35 will indicate in binary code the terminal point number on TP1 where the feedback signal is being indicated for each of the component contactors being activated. See table 4-3 to convert the binary code to a numeric value. After operating in the manual mode, be sure to place all DIP switches back to the up (off) mode. Failure to put the DIP switches in the off mode will prevent the safety circuits from protecting the components and could cause equipment damage.

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure to observe extreme caution when accessing pc board with power connected. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

4.10 **TEMPERATURE POTENTIOMETER SETTINGS.** See figure 4-9. The temperature potentiometers R19 through R24 affect the operation of the defrost cycle as well as outside fan and/or compressor cycling. If you suspect the potentiometers have been tampered with or simply want to confirm their setting, adjust them as follows.

a. With power applied to the FDECU and no operating mode selected, put the pc board into the maintenance mode by placing switch number 8, on the dual inline parallel (DIP) switch S3, down (ON). Use a non- conducting probe such as a plastic or wooden toothpick to move the DIP switch. At this point no light emitting diodes (LED's) should be on.

b. Turn each potentiometer fully counterclockwise. When the first potentiometer is turned, LED D30 will come on, and will stay on indicating that the pc board is in the potentiometer adjustment mode. LED's D31 through D35 will flash as you turn each potentiometer indicating, in binary code, the set point. The LED's will automatically switch to whichever potentiometer is being adjusted.

NOTE

Each potentiometer adjustment is directly related to the temperature set point for the item being controlled. Each potentiometer however has a different start point temperature (fully counter clockwise) and temperature adjustment range. When adjusting the potentiometers, it is important to note that the numeric value indicated on the LED's is actually a change, or increase, of the start point temperature and must be added to that start point temperature to find the actual set point temperature. The following is each potentiometer start point temperature/temperature adjustment range; R19 start point 10 range 0-26, R20 start point 70 range 0-21, R21 start point 10 range 0-10, R22 start point 30 range 0-21, R23 start point 12 range 0-12, R24 start point 70 range 0-20.

c. By turning each potentiometer clockwise you can observe the binary display on LED's D31 through D35 as they light to indicate the set point. See table 4-3 to convert the binary code to a numeric value. The set point will start at zero and go up as you adjust clockwise. Adjust each potentiometer set point as follows; R19 to 13, R20 to 21 (fully clockwise), R21 to 0 (fully counterclockwise), R22 to 21 (fully clockwise), R23 to 6, and R24 to 10.

d. Place DIP switch S3 switch number 8 back to the up (off) position. Be sure that all DIP switches are in the up (off) position. Failure to put the DIP switches in the off mode will prevent the safety circuits from protecting the components and could cause equipment damage.

4.11 **THERMISTOR TEMPERATURE SENSORS TESTING.** See figure 4-10. The thermistor temperature sensors provide the primary input signals for the pc board. If any one of the sensors is defective or is not getting a signal to the pc board, it will cause erratic and unpredictable operation of the FDECU. To ensure accurate diagnostic troubleshooting of the pc board and system, it will be necessary to confirm that the thermistors are functioning properly. The following procedures will test the thermistors at the pc board. This will test the interconnecting wiring as well as the thermistor itself. If an open circuit failure is indicated however, it will be necessary to disconnect the thermistor from the wiring and test it directly to determine if the thermistor or the wiring is defective.

4.11 **THERMISTOR TEMPERATURE SENSORS TESTING - CONTINUED.**

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure power has been disconnected prior to servicing the unit. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

a. **Disconnect Leads.**

(1) Tag and disconnect outside air sensor wire lead (1) from TP4 terminal OAS.

(2) Tag and disconnect outside coil sensor wire lead (2) from TP4 terminal OCS.

(3) Disconnect remote control box connector P2 (3) from pc board.

(4) Disconnect inside air sensor (volute) connector P1 (4).

b. **Testing.**

(1) Using a multimeter set to measure resistance, connect test leads to the various contact points as follows to test each thermistor. Note resistance reading for each one tested.

(a) Inside air sensor (volute) at P1 (4) pins 1 and 2.
(b) Inside air sensor (remote) at P2 (3) pins 5 and 12.
(c) Outside coil sensor wire lead (2) and TP4 terminal COM (5).
(d) Outside air sensor wire lead (1) and TP4 terminal COM (5).

(2) A thermistors' resistance will change in response to various temperatures. Compare the resistance readings measured with the following list of temperatures and associated resistance. Use this list to estimate the resistance based on the current ambient condition. For more accurate results, you may remove the thermistor being tested and immerse it in a bath of water and crushed ice to establish a reasonably accurate 32° F reference. A thermistor should be considered defective if it tests more than 10% above or below the estimated resistance or 5% above or below the ice water (32° F) reference.

32° F --------- 32,654Ω
55° F ---------- 17,439Ω
77° F ---------- 10,000Ω
100° F ---------- 5,827Ω

(3) Replace any defective thermistor. Note that if a thermistor shows a short or open condition the interconnecting wiring or connectors could be damaged and not the thermistor. The volute thermistor(s) are epoxied in place and cannot be removed. If the volute thermistor tests defective, be sure to check the one not in use and connect to it if not defective. If both volute thermistors are defective, the entire volute assembly must be replaced.

c. **Connect Leads.**

(1) Connect inside air sensor (volute) connector P1 (4).
(2) Connect remote control box connector P2 (3) onto pc board.
(3) Connect outside coil sensor wire lead (2) to TP4 terminal OCS per tag and wiring diagram figure 4-14. Remove tag.

(4) Connect outside air sensor wire lead (1) to TP4 terminal OAS per tag and wiring diagram figure 4-14. Remove tag.

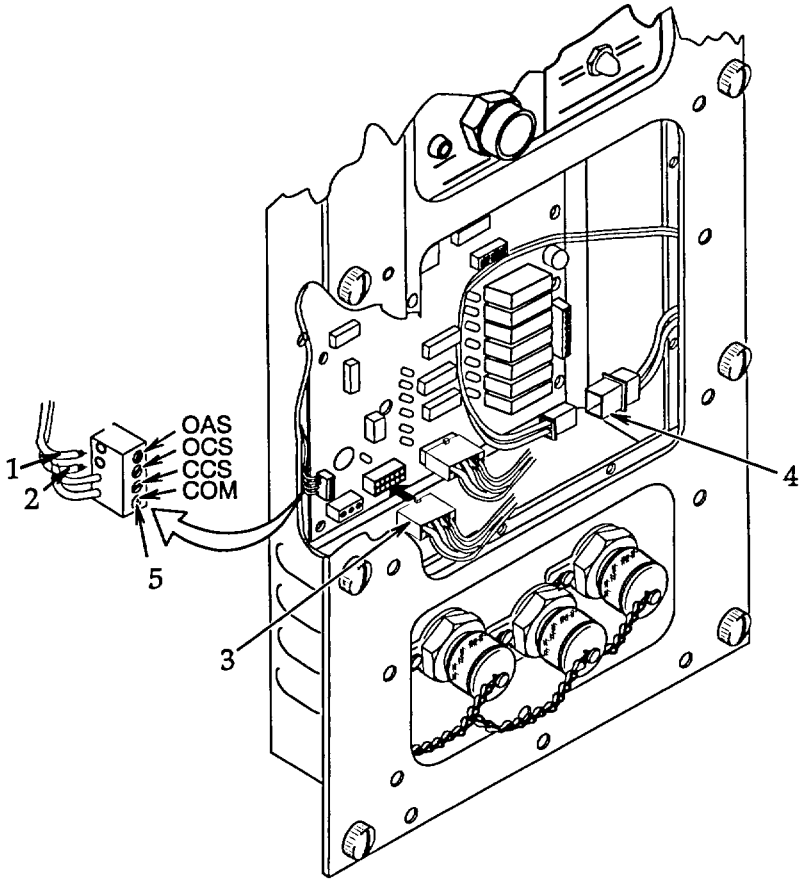


Figure 4-10. Thermistor Temperature Sensor Test Points.

4.12 **GENERAL TROUBLESHOOTING PROCEDURES.** Electrical wiring and connections can be tested per electrical system general repair paragraph 4.16. The following paragraphs describe the procedures necessary to make general overall tests on specific components in the FDECU.

a. PC Board. See figure 4-9. To test if the logic circuits and output controls have power and are functioning properly, the pc board will be checked with power connected. Use extreme caution when testing the pc board.

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure to observe extreme caution when accessing pc board with power connected. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

(1) To make a visual check that the logic circuits have power, check to see if any light emitting diodes (LED's) are on. If no LED's are on, place the CONTROL SELECTION switch to the REMOTE BOX position and check that the remote indicator (LED) (D12) is on. If it does not come on, check voltage per the following procedures.

4.12 **GENERAL TROUBLESHOOTING PROCEDURES - CONTINUED.**

(2) To check for voltage to the logic circuits, use a multimeter set to measure ac voltage and carefully touch probes to terminals 1 and 3 on TP6. Line voltage should be indicated (nominally 208 vac). If no power is indicated, check the interconnecting wiring per paragraph 4.16.

(3) To check for voltage to the solid state relays (SSR's) output control switches, use a multimeter set to measure ac voltage and carefully touch probes to terminal 3 on TP6 and terminal 8 on TP3. Line voltage should be indicated (nominally 208 vac). Note that this only confirms that power is being supplied to the output control fuse (J3/Fl). If no power is indicated, check the interconnecting wiring per paragraph 4.16.

(4) To check the output control fuse (J3/F1), disconnect power from the FDECU and carefully remove the fuse. Using a multimeter set to measure continuity, check continuity between fuse terminals. Continuity should be indicated. If no continuity is indicated, discard the fuse and replace it with the spare fuse located at the top of the pc board. Replace the spare fuse as soon as possible.

(5) To check the SSR's, connect power to the FDECU then carefully place the dual inline parallel (DIP) switch (S3) into the maintenance mode by pushing switch 8 to the ON position (down). Each of the remaining DIP switches correspond with one of the SSR's. Place each DIP switch 1 through 7 to the ON position (down) and observe the LED adjacent to the associated SSR. The LED should come on and the component controlled by that SSR should also operate confirming voltage at the SSR output. If the component does not come on or cannot be detected, check voltage across the associated SSR as follows: Using a multimeter set to measure ac voltage, carefully touch probes to terminal 8 on TP3 and the associated terminal 1 through 7 on TP3. Minimal voltage should be indicated (less than 5 vac) if the fuse J3/F1 is good and the SSR is closed. Line voltage (nominally 208 vac) would indicate a blown fuse or open SSR. If this occurs, test the fuse J3/F1 and replace if necessary. If line voltage is indicated after replacing the fuse, the SSR is defective and the pc board must be replaced. If a feedback signal is being received from a component contactor (component operating) without a control signal going to that contactor, the pc board will enter a major failure mode (completely shut down) and the binary indicators will display the terminal number on TP1 associated with the failure. To determine whether the associated SSR or component contactor has fused closed, check the output voltage of that SSR to see if it is sending a signal. If it is, carefully pull fuse J3/F1, using insulated tool, to open the circuit. If the contactor opens (component shuts off), this will confirm that the SSR has fused closed and the pc board must be replaced. If the component continues to operate, then the contactor has fused closed and must be replaced.

(6) If pc board failure is suspected, notify direct support maintenance to verify and replace as necessary.

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure power has been disconnected prior to servicing the unit. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

b. **Contactors K1 through K5.** Be sure power has been disconnected prior to testing the contactor.

(1) Tag and disconnect leads from contactor coil terminals A1 and A2. Using a multimeter set to measure continuity, check continuity between coil terminals. Continuity should be indicated. Connect wire leads per tags. Remove tags.

(2) Tag and disconnect leads from contactor line terminals 1L1, 3L2, 5L3, and 13NO. Using a multimeter set to measure continuity, check continuity between each set of contactor contacts 1L1 to 2T1, 3L2 to 4T2, 5L3 to 6T3, and 13NO to 14NO. No continuity should be indicated. Connect wire leads per tags. Remove tags.

WARNING

Lethal voltage levels are used in operating the FDECU. Be sure power has been disconnected prior to servicing the unit. Injury or death can occur if personnel contact any electrical terminal while the unit is connected to power source.

c. **Overload Relays.** See figure 4-11. Be sure power has been disconnected prior to testing the overload relays.

(1) **K6.** (**FDECU-2 & -3 ONLY)** Tag and disconnect leads from overload switch terminals 95 and 96 (1). Push reset button (2). Using a multimeter set to measure continuity, check continuity between overload switch terminals. Continuity should be indicated. Raise TRIP lever (3) to trip overload manually then check continuity between overload switch terminals. No continuity should be indicated. Push reset button. Connect wire leads per tags. Remove tags.

(2) **K7 and K8.** Tag and disconnect leads from overload switch terminals 97NO and 98NO (4) and from terminals 95NC and 96NC (5). Push RESET button (6). Using a multimeter set to measure continuity, check continuity between terminals (4). No continuity should be indicated. Check continuity between terminals (5). Continuity should be indicated. Push test button (7) to trip overload manually then check continuity between terminals (4). Continuity should be indicated. Check continuity between terminals (5). No continuity should be indicated. Push reset button. Connect wire leads per tags. Remove tags.

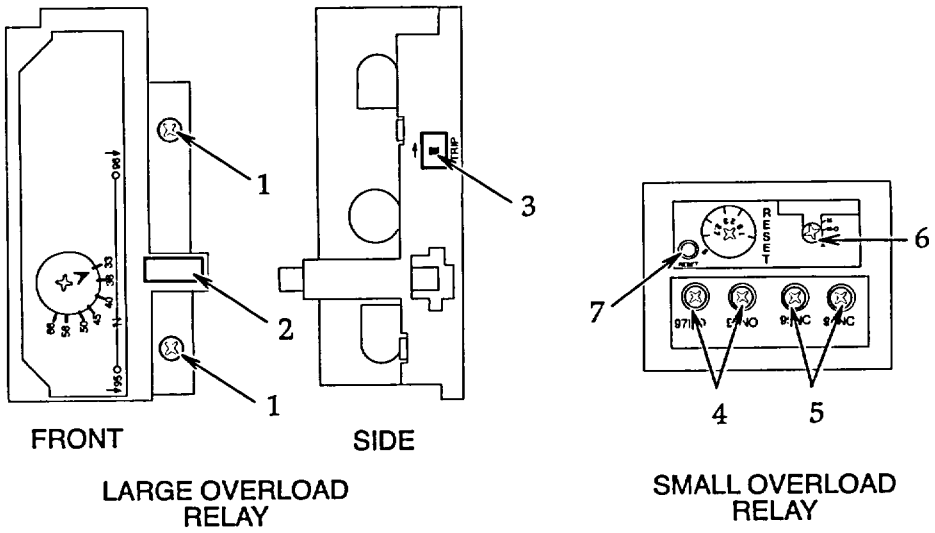


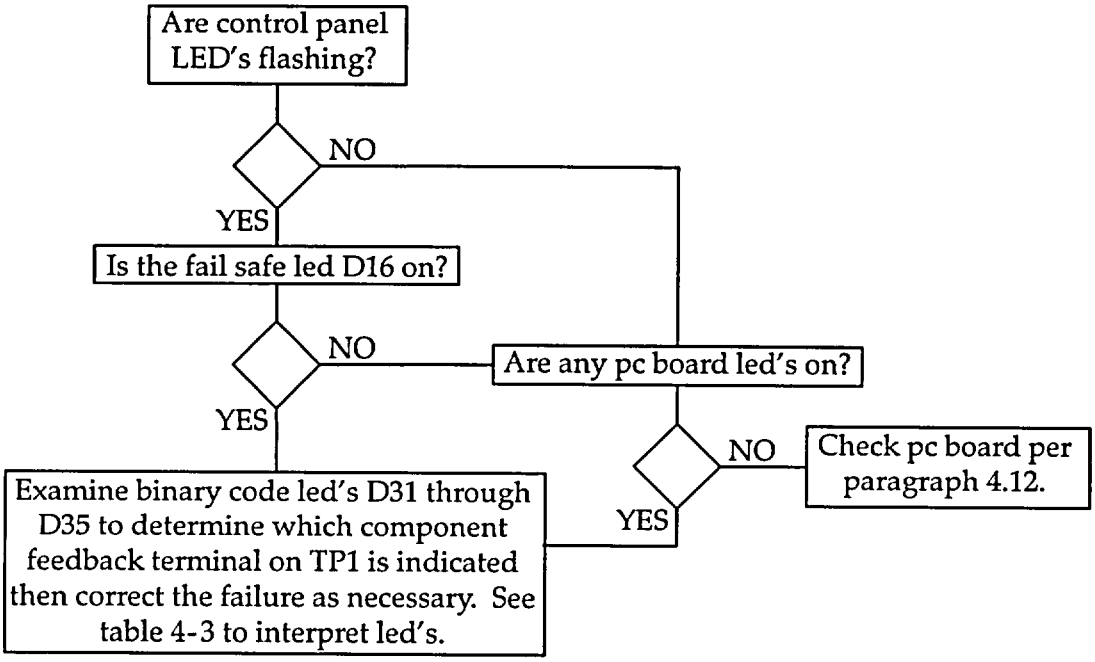
Figure 4-11. Overload Relays.

4.12 **GENERAL TROUBLESHOOTING PROCEDURES - CONTINUED.**

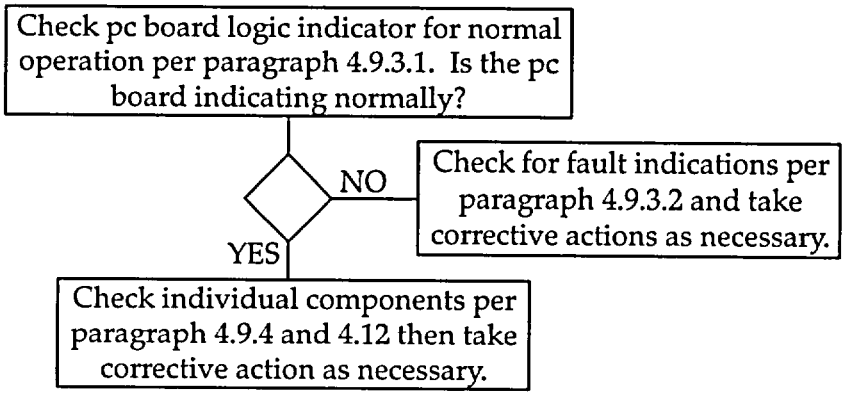
d. **Motor Windings (Compressor, Blower, or Fan).** Using a multimeter set to measure continuity, check continuity between the associated contactor output terminals T1, T2, and T3. Continuity should be indicated by a nominal resistance reading between any combination of these terminals. Check continuity between each of these terminals and the FDECU frame (ground). No continuity should be indicated. Note that if a motor winding shows a dead short (no resistance) or open condition the interconnecting wiring or connectors could be damaged and not the motor.

Table 4-4. Unit Troubleshooting.

FDECU DOES NOT START IN ANY MODE.



FDECU RUNS BUT WILL NOT COOL OR HEAT THE SHELTER AS NEEDED.



4.13 **SECURE ELECTRICAL ASSEMBLY.** See figure 4-8.

a. Install panel (6) and secure with eight captive screws (5).

b. Close power box assembly cover (4) and turn three latches (3) to secure.

c. Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

d. If cover is raised, lower and secure per paragraph 4.2.

Section IV. UNIT MAINTENANCE PROCEDURES

4.14 **FRAME COVER ASSEMBLY REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools
General Mechanics Tool Kit
Item 1, Section III, Appendix B

Materials/Parts
Lock Washer
Item 12, Appendix G
Tiedown Straps (qty 2)
Item 2, Section II, Appendix E

Personnel Required
2

a. **Removal.** See figure 4-12.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Cut and discard two tiedown straps (1) securing outside blower motor cable.

(4) Disconnect cap (2) and plug (3).

(5) Remove nut (4), lock washer (5), flat washer (6), ground lead (7), and flat washer (8). Discard lock washer.

(6) Lower cover per paragraph 4.2 but do not secure front latch hinges.

(7) Release rear latch hinges (9) then using two personnel carefully lift cover (10) from unit.

4.14 **FRAME COVER ASSEMBLY REPLACEMENT - CONTINUED.**

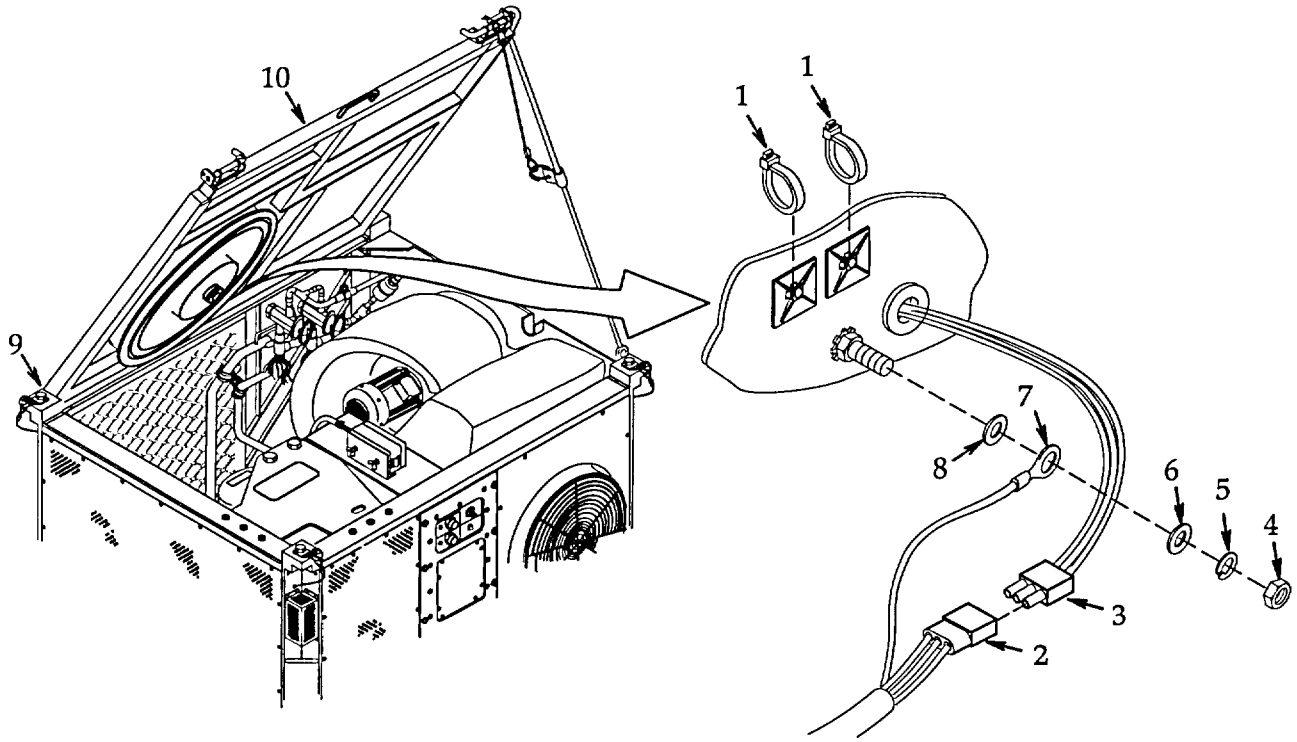


Figure 4-12. Frame Cover Assembly.

b. **Installation.** See figure 4-12.

(1) Release latch hinges (9) then using two personnel carefully install cover (10) and secure with two rear latch hinges (9).

(2) Be sure two rear latch hinges (9) are secure then raise and secure cover per paragraph 4.2.

(3) Install flat washer (8), ground lead (7), flat washer (6), new lock washer (5), and nut (4).

(4) Connect cap (2) and plug (3).

(5) Secure outside blower motor cable with two tiedown straps (1). Cut to remove excess tiedown strap material.

(6) Lower and secure cover per paragraph 4.2.

(7) Connect FDECU to power source and operate per paragraph 2.4.

4.15 **OUTSIDE FAN REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

a. **Removal.** See figure 4-13.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Loosen two setscrews (1) then remove outside fan (2).

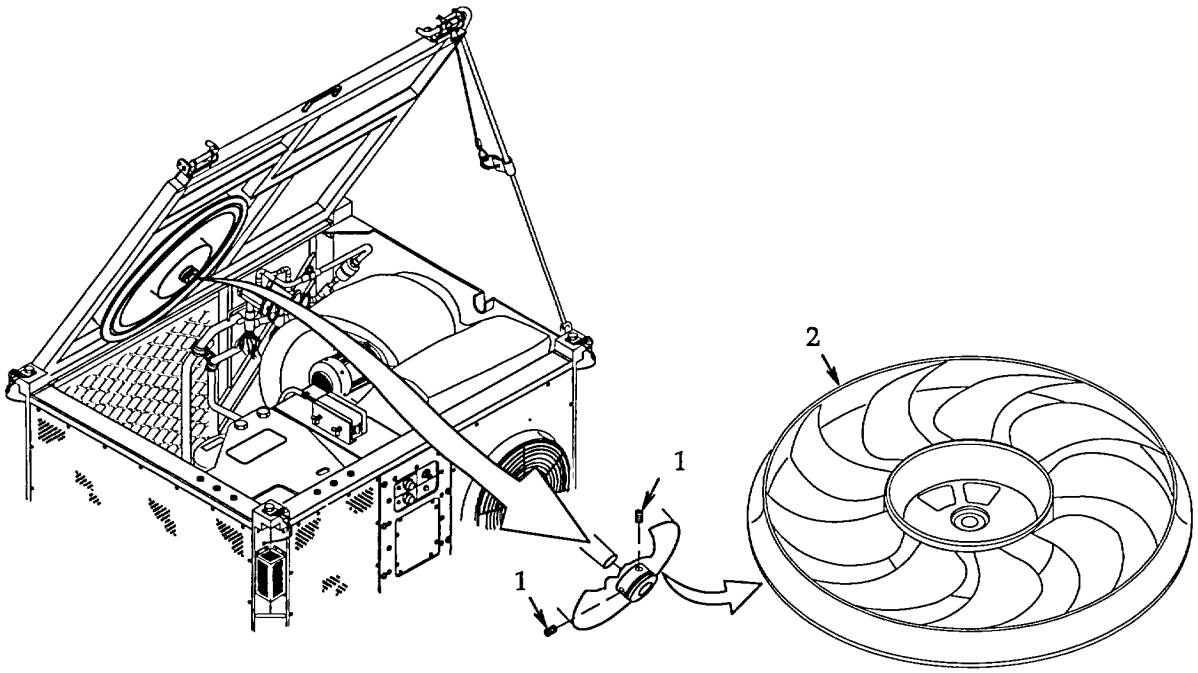


Figure 4-13. Outside Fan.

4.15 **OUTSIDE FAN REPLACEMENT.**

b. **Installation.** See figure 4-13.

(1) Install outside fan (2). Align one setscrew (1) over flat on outside fan motor shaft (3) then tighten two setscrews.
(2) Lower and secure cover per paragraph 4.2.
(3) Connect FDECU to power source and operate per paragraph 2.4.

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR.**

THIS TASK COVERS **a. Repair**

Initial Setup:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

Heat Gun
Item 6, Section III, Appendix B

Materials/Parts

Marker Tags (As Required)
Item 3, Section II, Appendix E

Crimp Nuts (As Required)
Item 4, Section II, Appendix E

Splices (As Required)
Item 5, Section II, Appendix E

Tiedown Straps (As Required)
Item 1, Section II, Appendix E

Tiedown Straps (As Required)
Item 2, Section II, Appendix E

Insulation Sleeving (As Required)
Figure F-2, Section III, Appendix F

Wire ,Cable, or Harness (As Required)
Figures F-3, F-4, F-18, F-19, Section III, Appendix F

Lead-Tin Solder (As Required)
Item 10, Section II, Appendix E

Rosin Base Liquid Solder Flux (As Required)
Item 11, Section II, Appendix E

a. **Repair.** Preferred repair methods consist of replacing wire leads, cables, harnesses, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other make shift procedures. Make shift repair procedures may be appropriate for emergency field repairs but should be properly repaired as soon as possible.

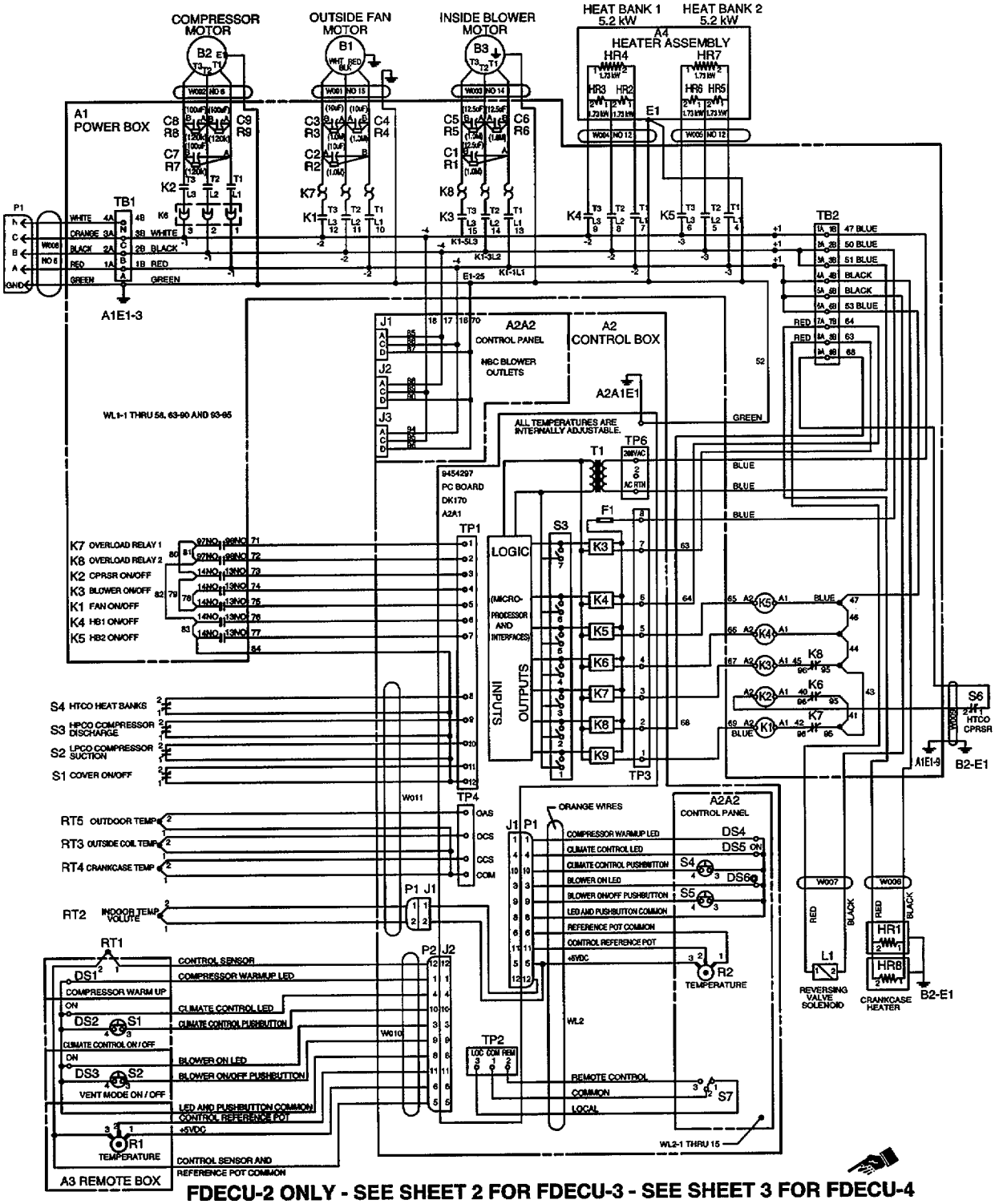


Figure 4-14. Wiring Diagram (Sheet 1 of 5).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

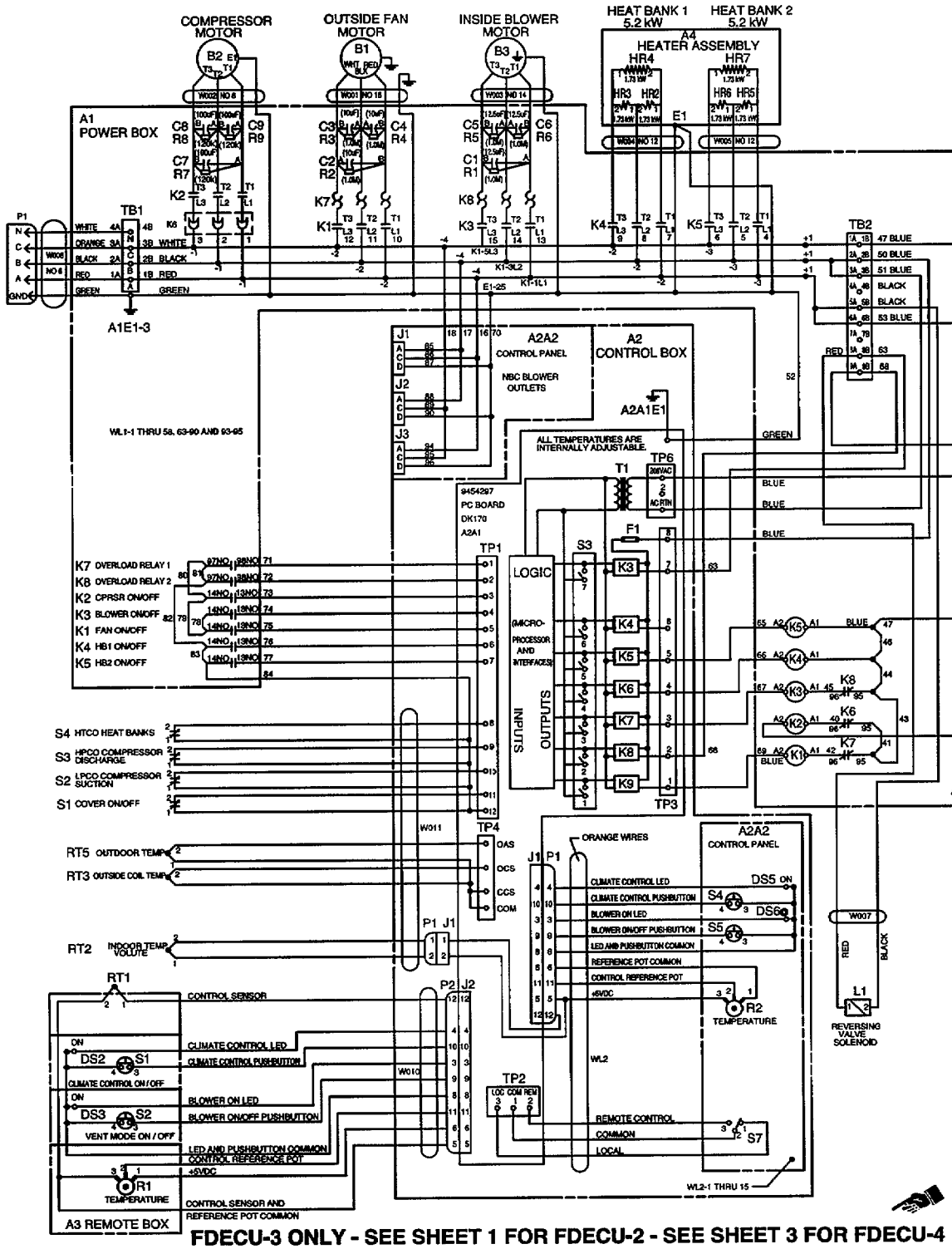


Figure 4-14. Wiring Diagram (Sheet 2 of 5).

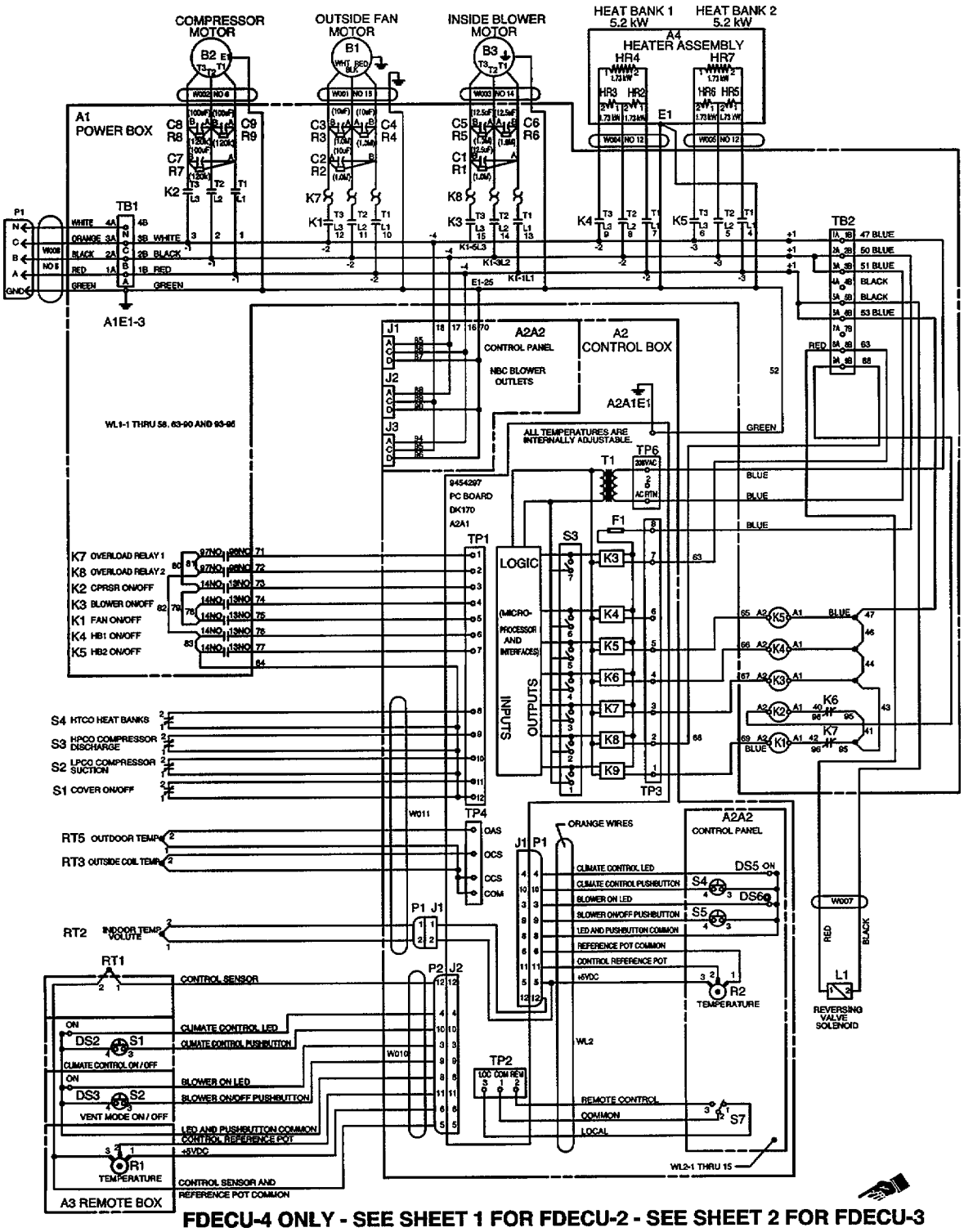


Figure 4-14 Wiring Diagram (Sheet 3 of 5).

LEGEND	
UNIT	
B1	OUTSIDE FAN MOTOR
B2	COMPRESSOR MOTOR
B3	INSIDE BLOWER MOTOR
HR1, HR8	**(FDECU-2 ONLY)** COMPRESSOR CRANKCASE HEATER
L1	REVERSING VALVE SOLENOID
RT2	INSIDE AIR TEMPERATURE SENSOR (VOLUTE)
RT3	OUTSIDE COIL TEMPERATURE SENSOR
RT4	**(FDECU-2 ONLY)** COMPRESSOR CRANKCASE TEMPERATURE SENSOR
RT5	OUTSIDE AIR TEMPERATURE SENSOR
S1	COVER
S2	LOW PRESSURE CUTOUT (COMPRESSOR SUCTION)
S3	HIGH PRESSURE CUTOUT (COMPRESSOR DISCHARGE)
S4	HIGH TEMPERATURE CUTOUT (HEATER)
S6	**(FDECU-2 & -3 ONLY)** HIGH TEMPERATURE CUTOUT (COMPRESSOR)
A1 POWER BOX	
K1	OUTSIDE FAN MOTOR CONTACTOR
K2	COMPRESSOR MOTOR CONTACTOR
K3	INSIDE BLOWER MOTOR CONTACTOR
K4	HEATER (BANK 1) CONTACTOR
K5	HEATER (BANK 2) CONTACTOR
K6	**(FDECU-2 & -3 ONLY)** COMPRESSOR MOTOR OVERLOAD
K7	OUTSIDE FAN MOTOR OVERLOAD
K8	INSIDE BLOWER MOTOR OVERLOAD
C2, C3, C4	POWER FACTOR CORRECTION CAPACITORS (OUTSIDE FAN MOTOR)
C1, C5, C6	POWER FACTOR CORRECTION CAPACITORS (INSIDE BLOWER MOTOR)
C7, C8, C9	POWER FACTOR CORRECTION CAPACITORS (COMPRESSOR MOTOR)
R2, R3, R4	BLEED DOWN RESISTORS (OUTSIDE FAN MOTOR POWER FACTOR CORRECTION
	CAPACITORS)
R1, R5, R6	BLEED DOWN RESISTORS (INSIDE BLOWER MOTOR POWER FACTOR CORRECTION
	CAPACITORS)
R7, R8, R9	BLEED DOWN RESISTORS (COMPRESSOR MOTOR POWER FACTOR CORRECTION
	CAPACITORS)

Figure 4-14. Wiring Diagram (Sheet 4 of 5).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

LEGEND CONTINUED

A2 CONTROL BOX

A2A1 PC BOARD		A2A2 CONTROL PANEL	
F1	OUTPUT POWER FUSE	DS4	**(FDECU-2 ONLY)** LED (COMPRESSOR WARMUP)
K3	SOLID STATE RELAY (REVERSING VALVE SOLENOID)	DS5	LED (CLIMATE CONTROL)
K4	SOLID STATE RELAY (COMPRESSOR CRANKCASE HEATERS)	DS6	LED (VENT)
K5	SOLID STATE RELAY (BANK 2 HEATERS CONTACTOR)	R2	POTENTIOMETER (TEMPERATURE CONTROL)
K6	SOLID STATE RELAY (BANK 1 HEATERS CONTACTOR)	S1	PUSHBUTTON SWITCH (CLIMATE CONTROL)
K7	SOLID STATE RELAY (INSIDE BLOWER MOTOR CONTACTOR)	S2	PUSHBUTTON SWITCH (VENT)
K8	SOLID STATE RELAY (COMPRESSOR MOTOR CONTACTOR)	S7	SWITCH (REMOTE BOX/THIS PANEL)
K9	SOLID STATE RELAY (OUTSIDE FAN MOTOR CONTACTOR)		
S3	DUAL INLINE PARALLEL SWITCH (MANUAL OVERIDE)		
T1	STEP DOWN TRANSFORMER		

A3 REMOTE BOX

DS1	(FDECU-2 ONLY) LED (COMPRESSOR WARMUP)
DS2	LED (CLIMATE CONTROL)
DS3	LED (VENT)
R1	POTENTIOMETER (TEMPERATURE CONTROL)
RT1	INSIDE AIR TEMPERATURE SENSOR
S1	PUSHBUTTON SWITCH (CLIMATE CONTROL)
S2	PUSHBUTTON SWITCH (VENT)

A4 HEATER ASSEMBLY

HR2, HR3, HR4	HEATERS (BANK 1)
HR5, HR6, HR7	HEATERS (BANK 2)

Figure 4-14. Wiring Diagram (Sheet 5 of 5).

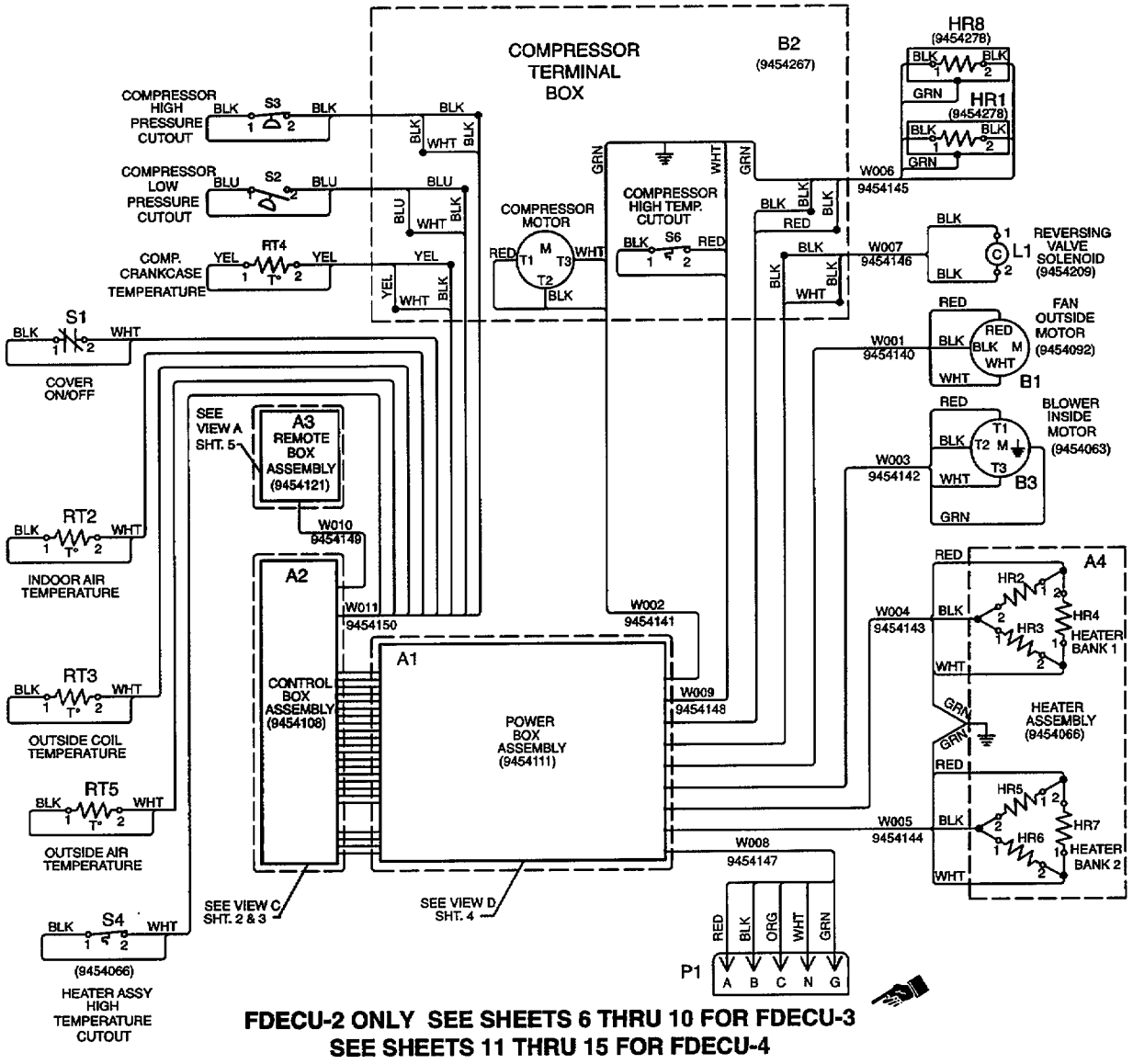
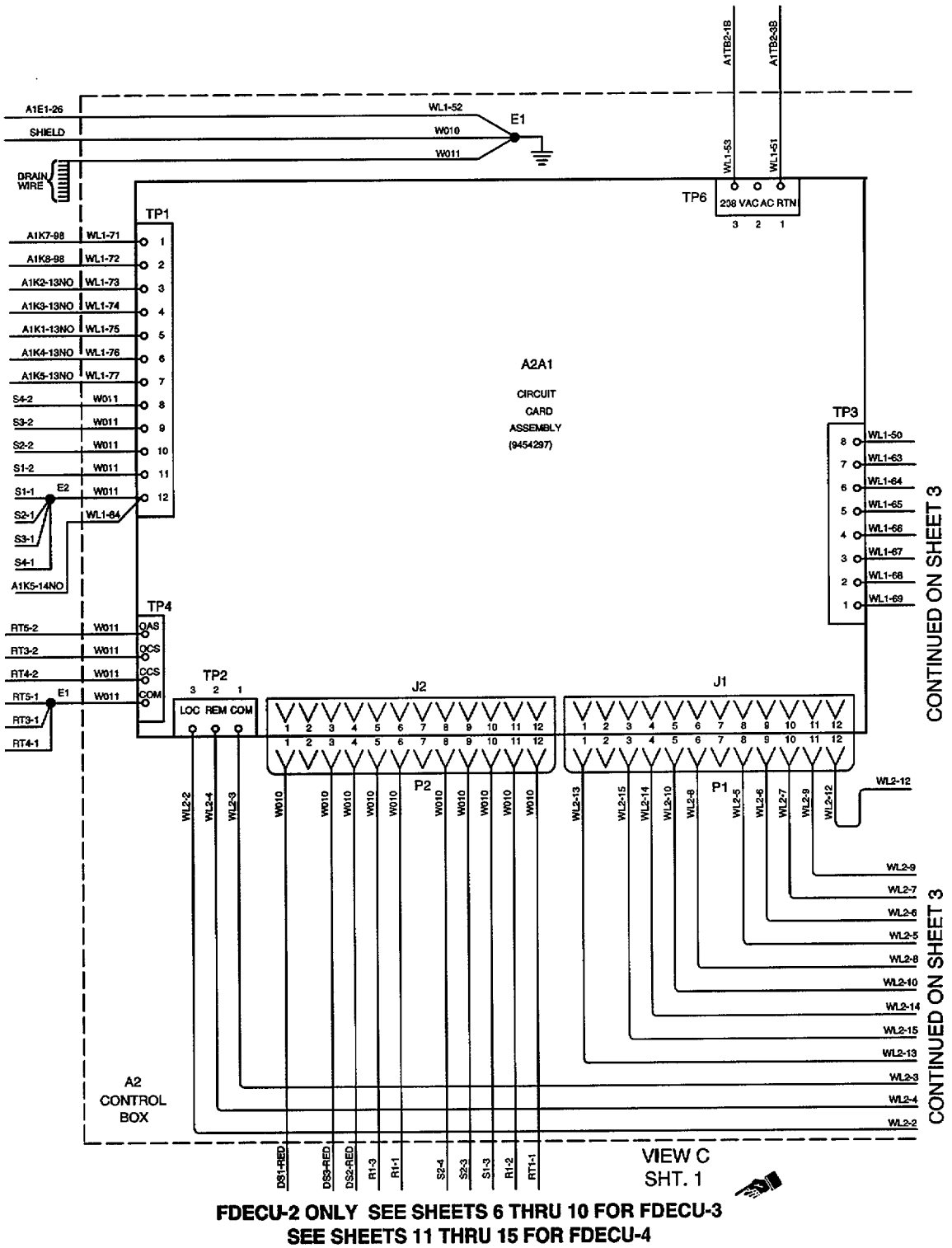


Figure 4-15. Electrical Schematic (Sheet 1 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**



FDECU-2 ONLY SEE SHEETS 6 THRU 10 FOR FDECU-3
SEE SHEETS 11 THRU 15 FOR FDECU-4

Figure 4-15. Electrical Schematic (Sheet 2 of 15).

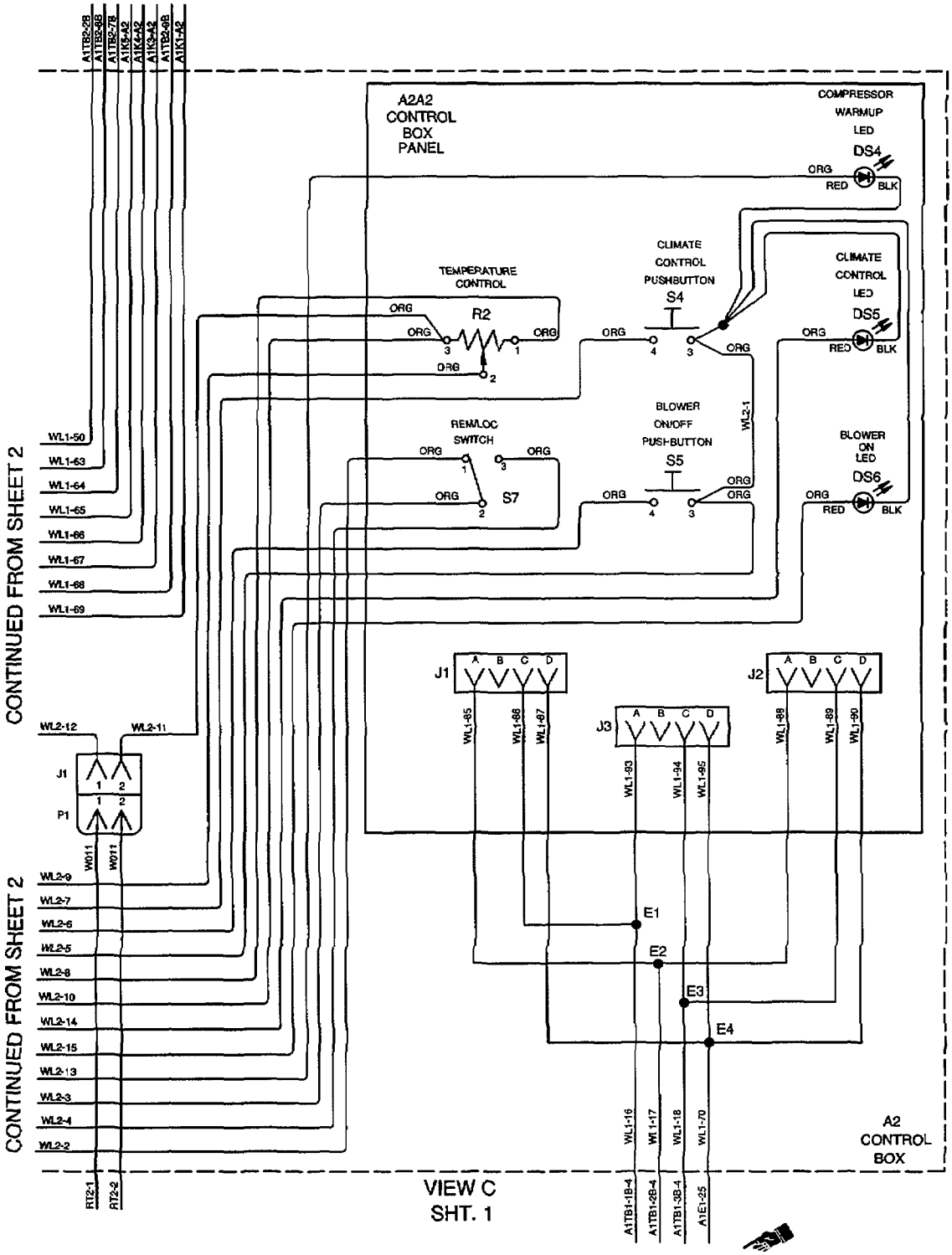


Figure 4-15. Electrical Schematic (Sheet 3 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

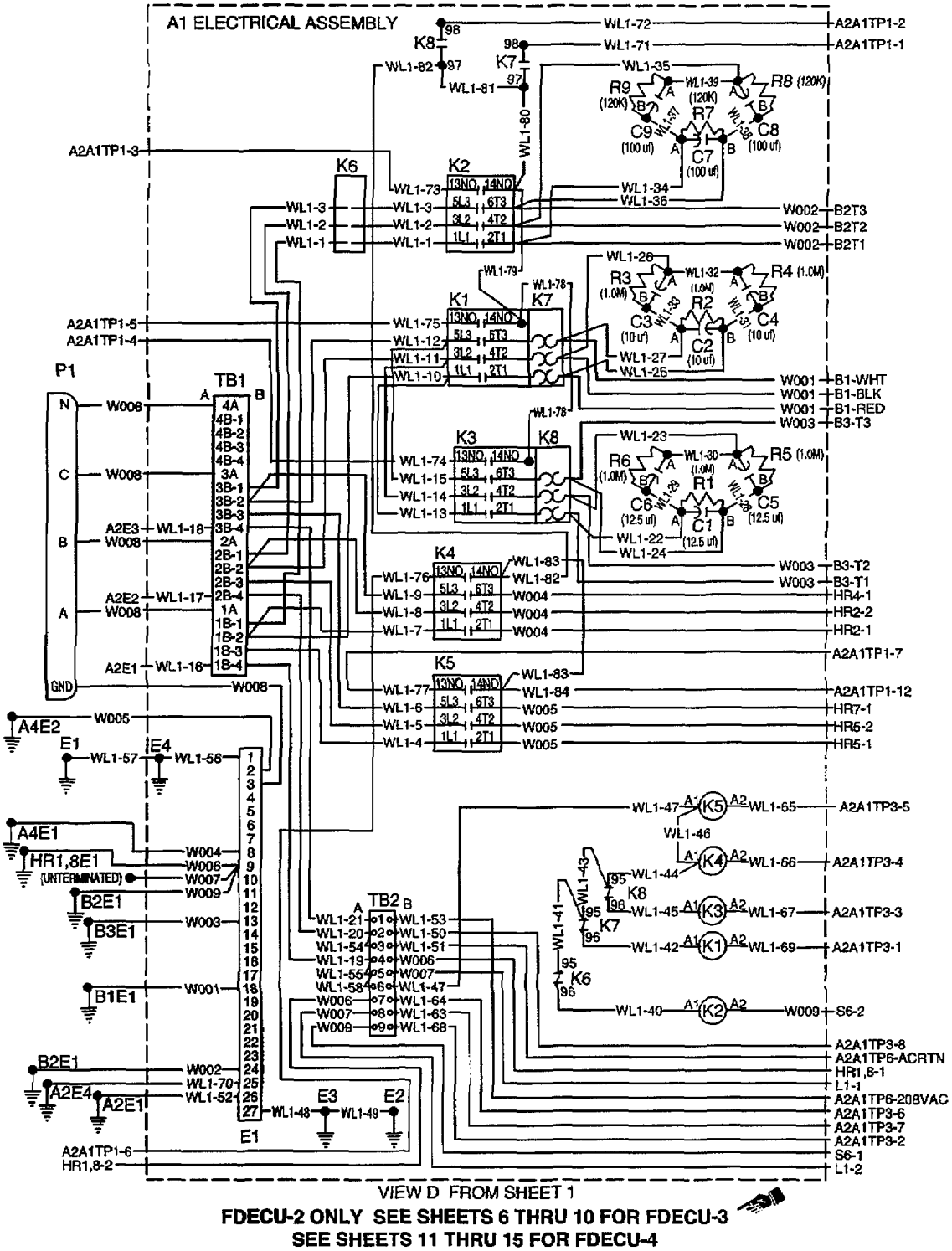
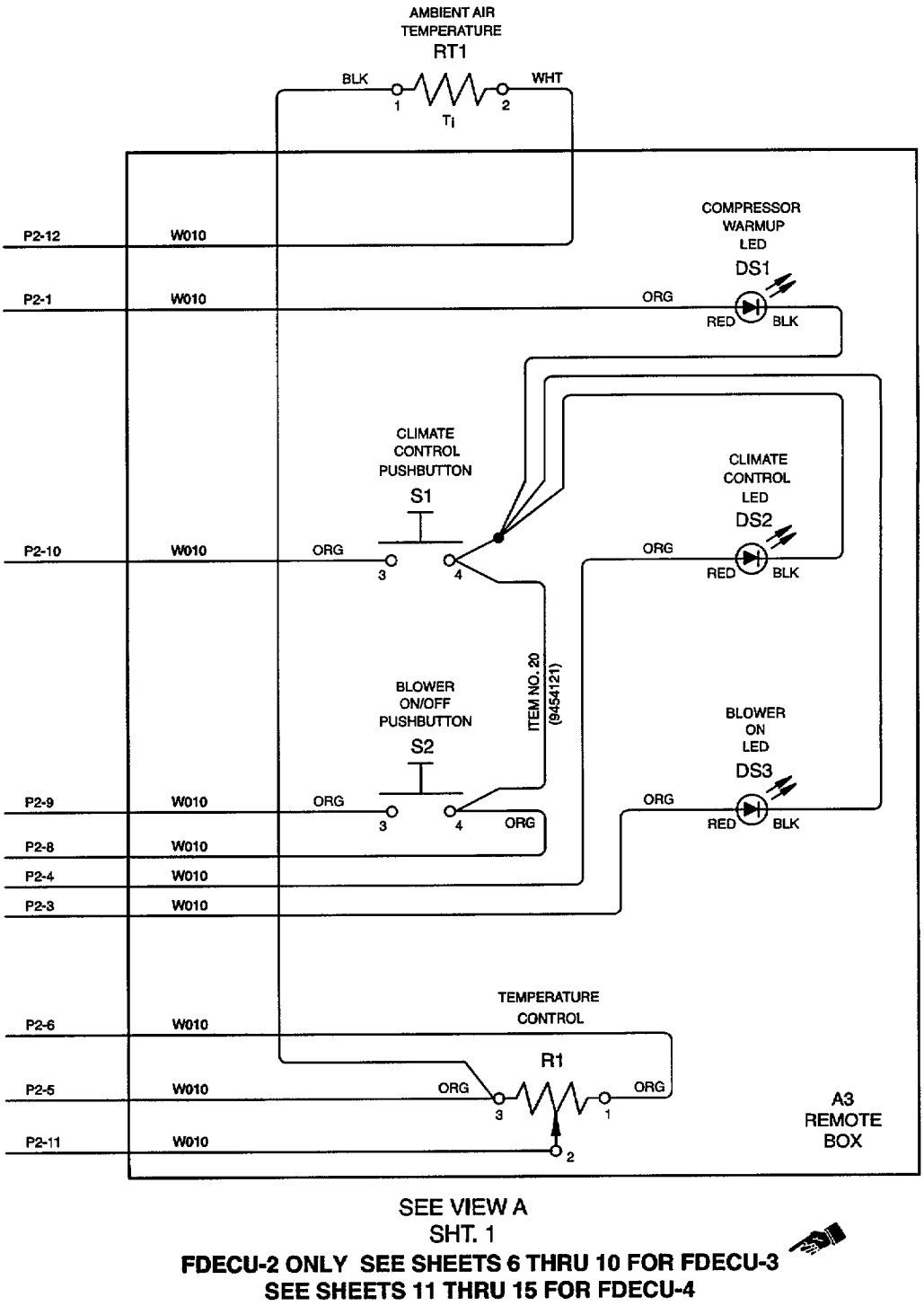


Figure 4-15. Electrical Schematic (Sheet 4 of 15).



SEE VIEW A
SHT. 1

FDECU-2 ONLY SEE SHEETS 6 THRU 10 FOR FDECU-3
SEE SHEETS 11 THRU 15 FOR FDECU-4

Figure 4-15. Electrical Schematic (Sheet 5 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

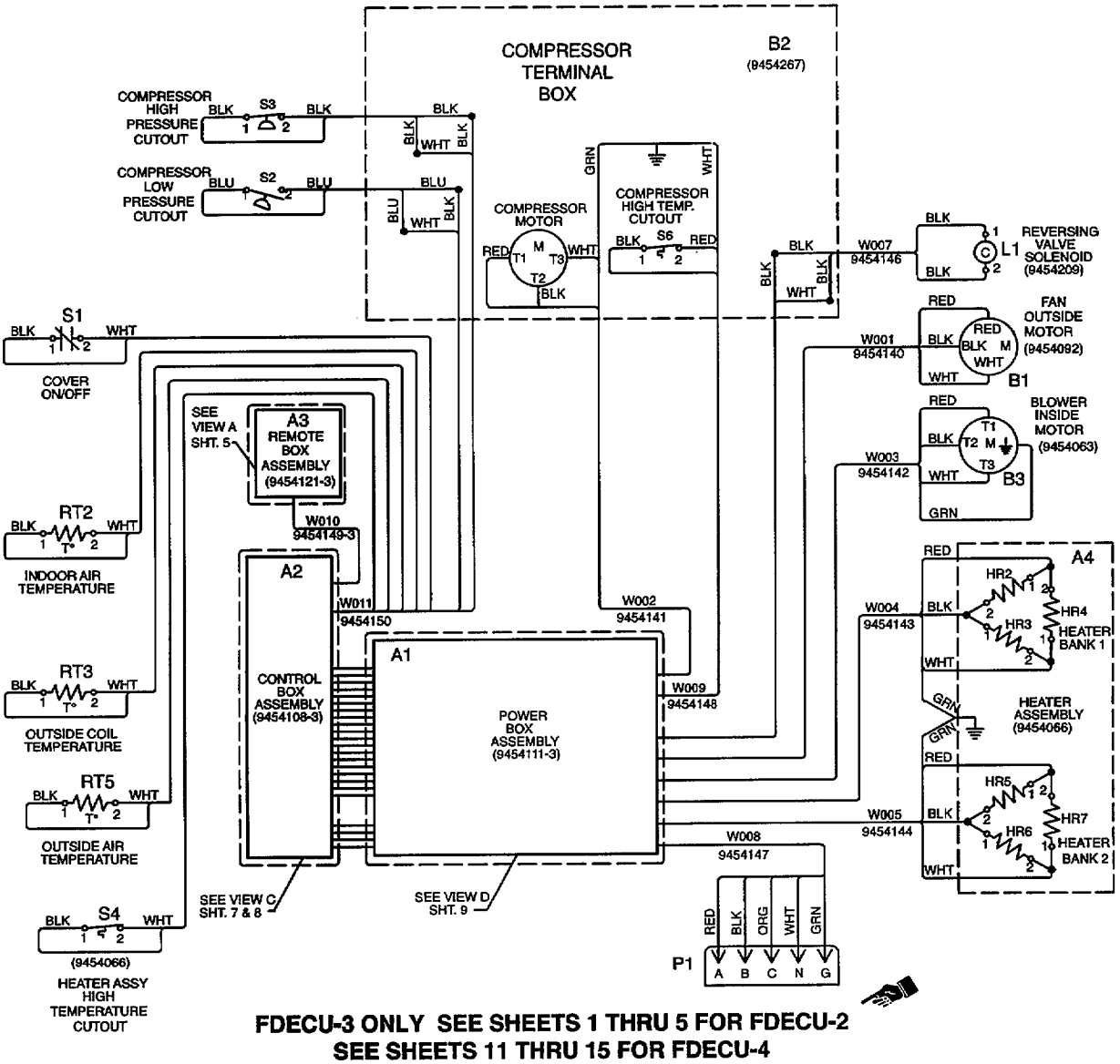


Figure 4-15. Electrical Schematic (Sheet 6 of 15).

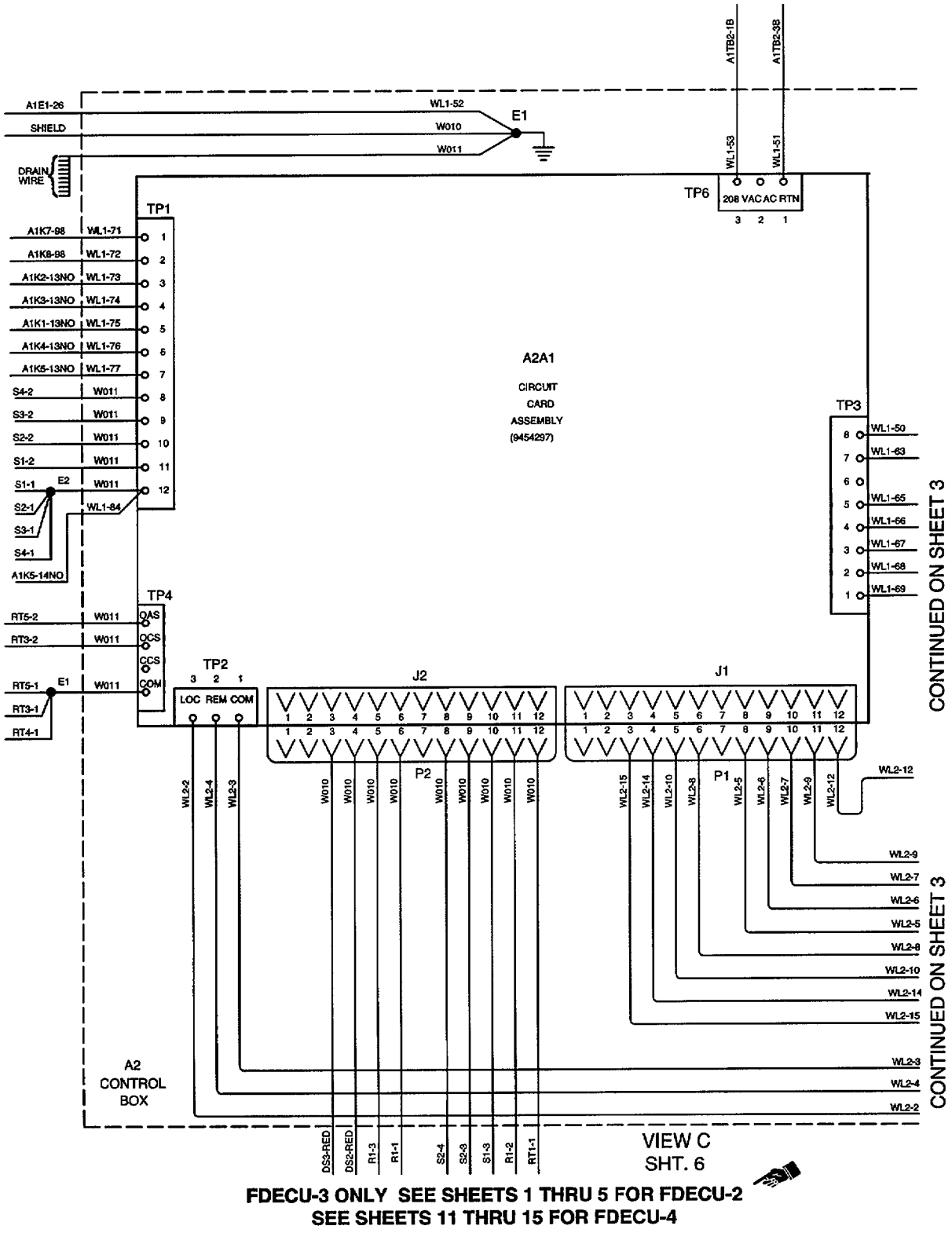


Figure 4-15. Electrical Schematic (Sheet 7 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

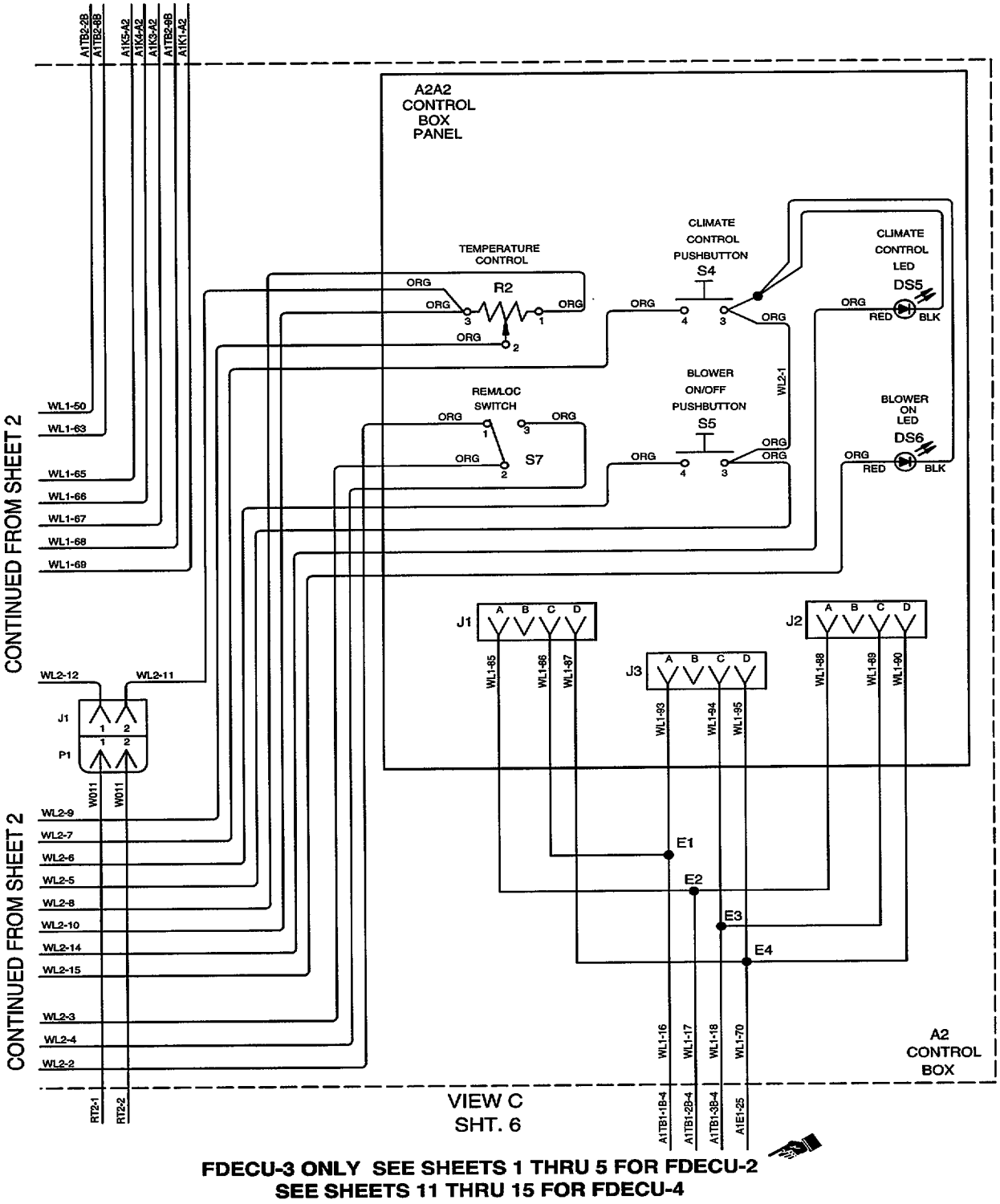


Figure 4-15. Electrical Schematic (Sheet 8 of 15).

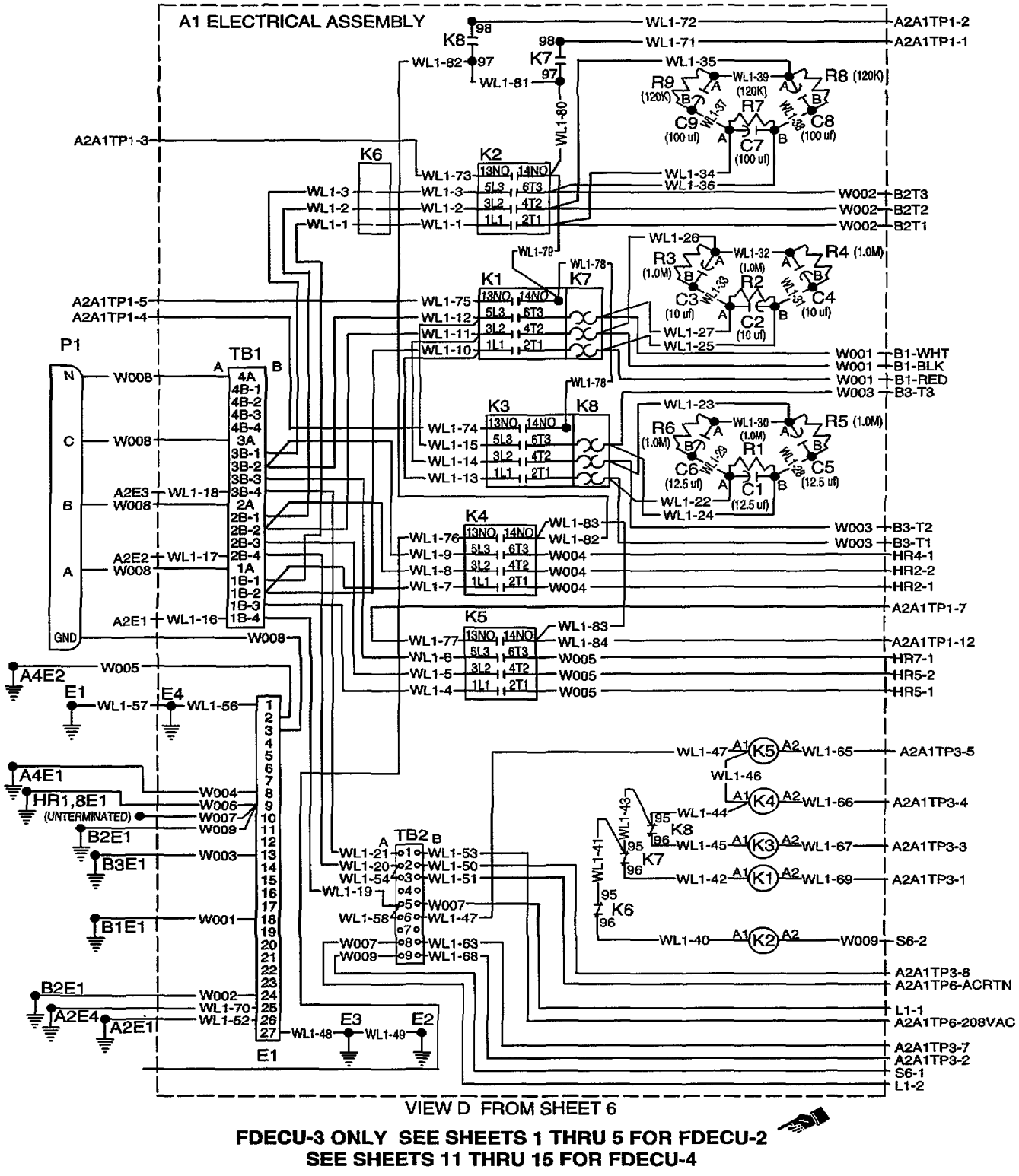


Figure 4-15. Electrical Schematic (Sheet 9 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

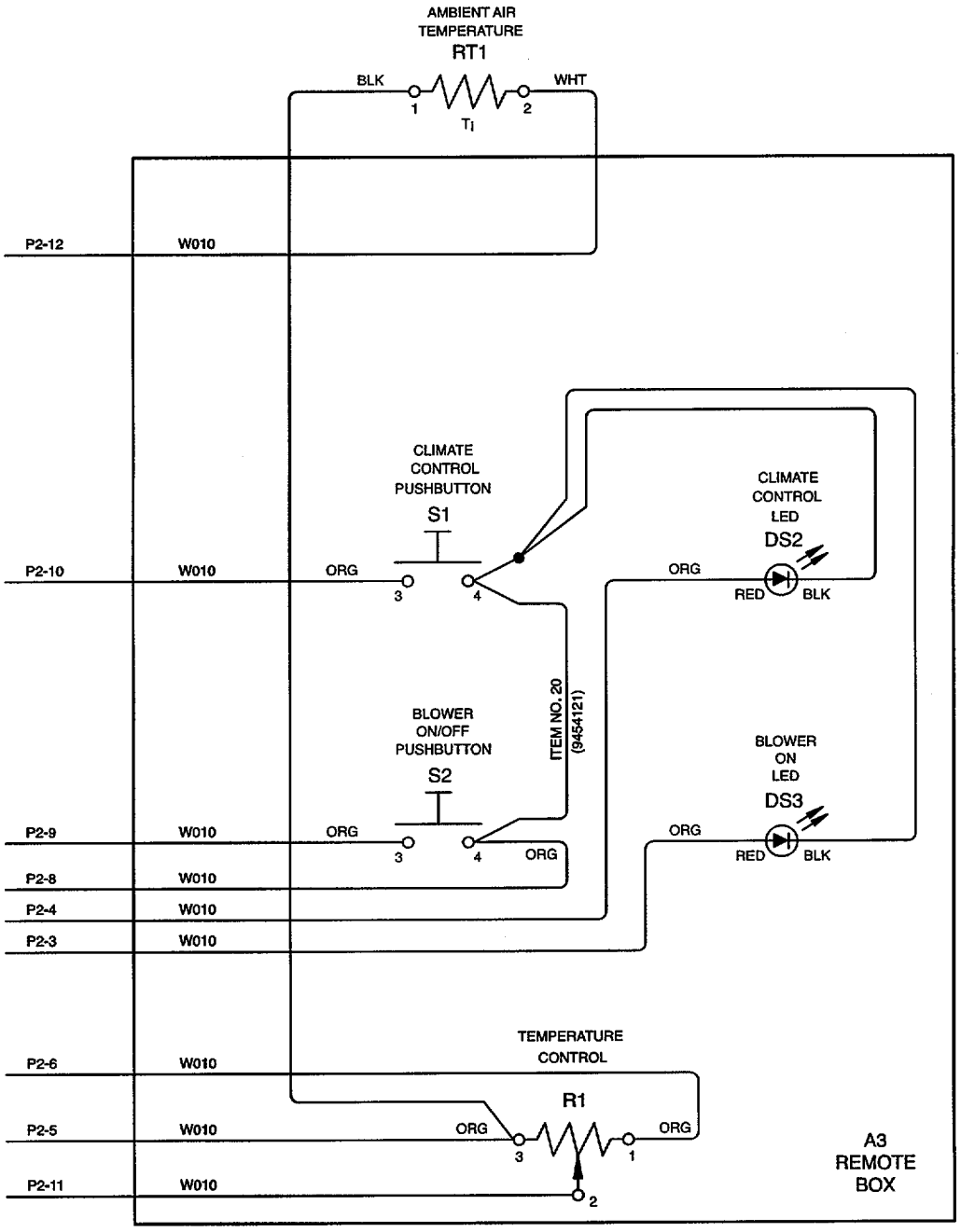


Figure 4-15. Electrical Schematic (Sheet 10 of 15).

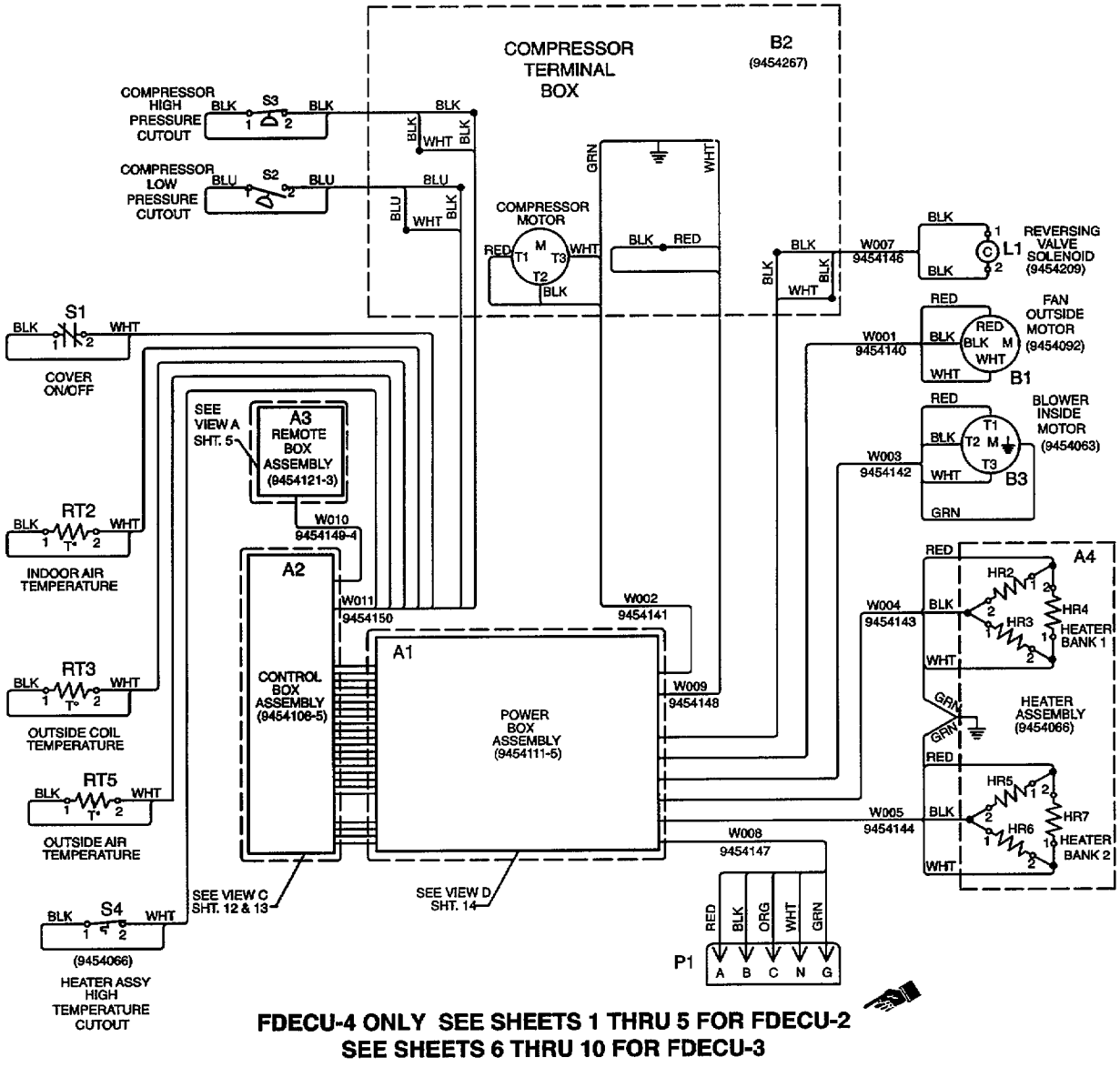


Figure 4-15. Electrical Schematic (Sheet 11 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.**

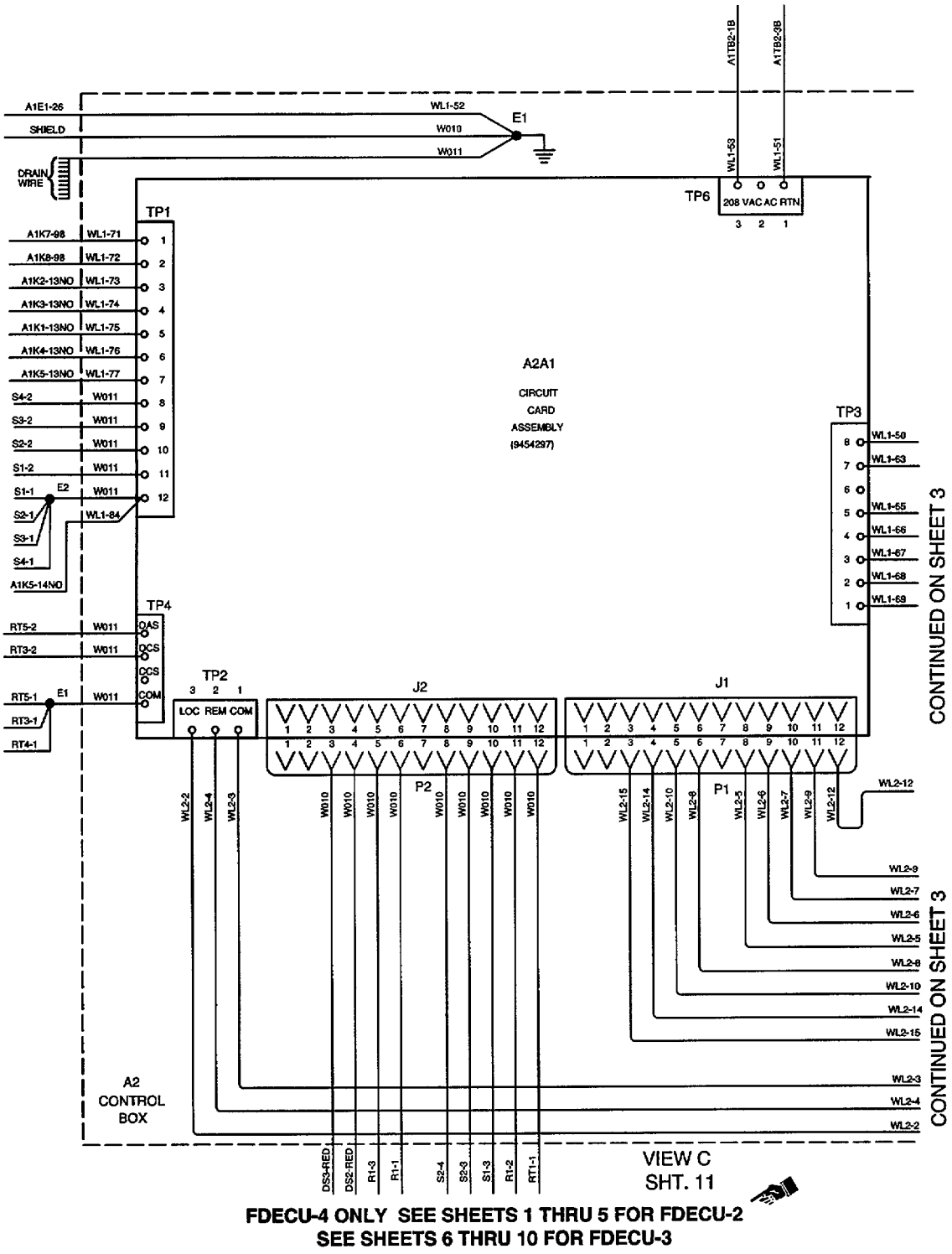
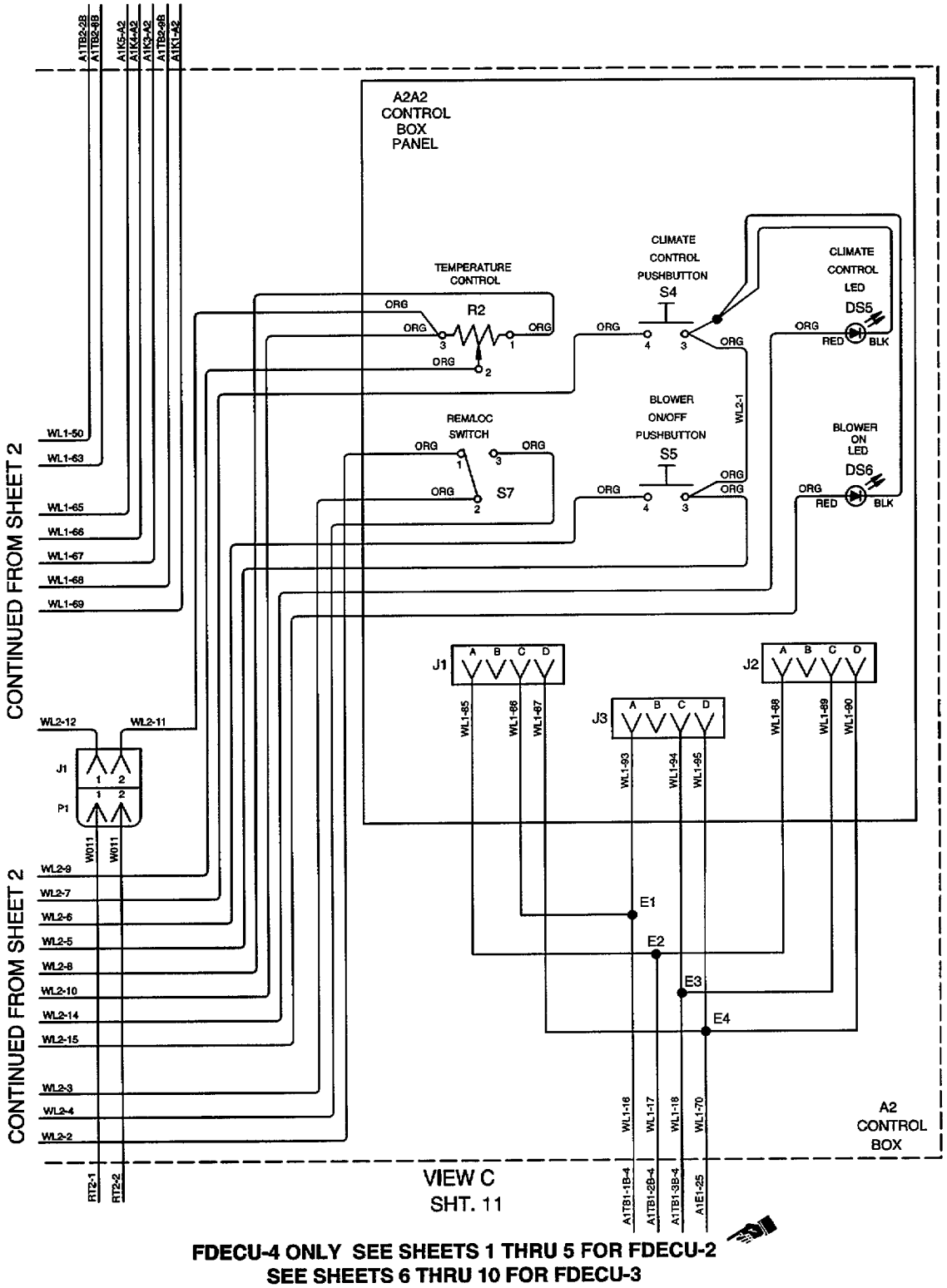


Figure 4-15. Electrical Schematic (Sheet 12 of 15).



FDECU-4 ONLY SEE SHEETS 1 THRU 5 FOR FDECU-2
SEE SHEETS 6 THRU 10 FOR FDECU-3

Figure 4-15. Electrical Schematic (Sheet 13 of 15).

4.16 **ELECTRICAL SYSTEM GENERAL REPAIR- CONTINUED.**

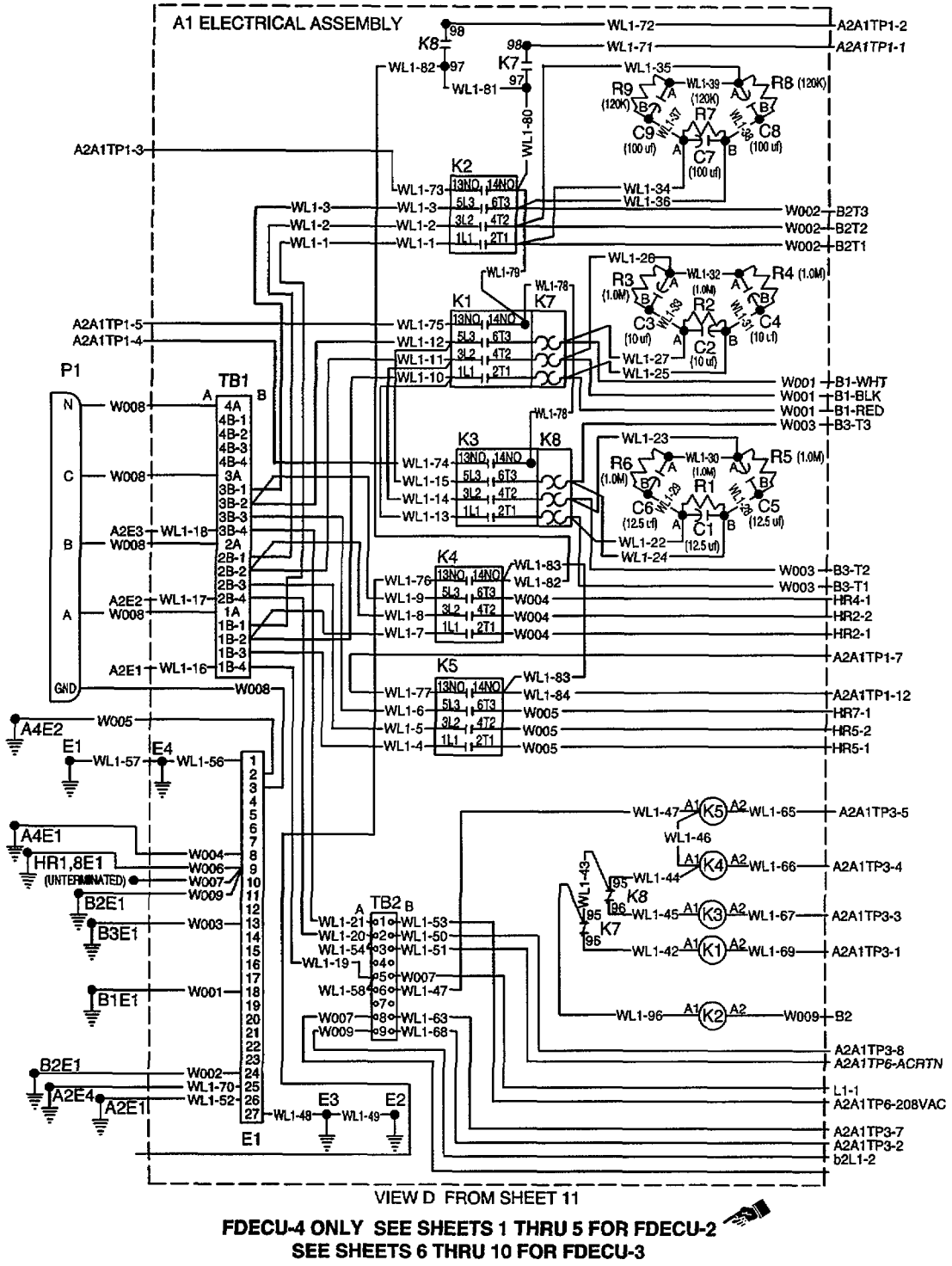


Figure 4-15. Electrical Schematic (Sheet 14 of 15).

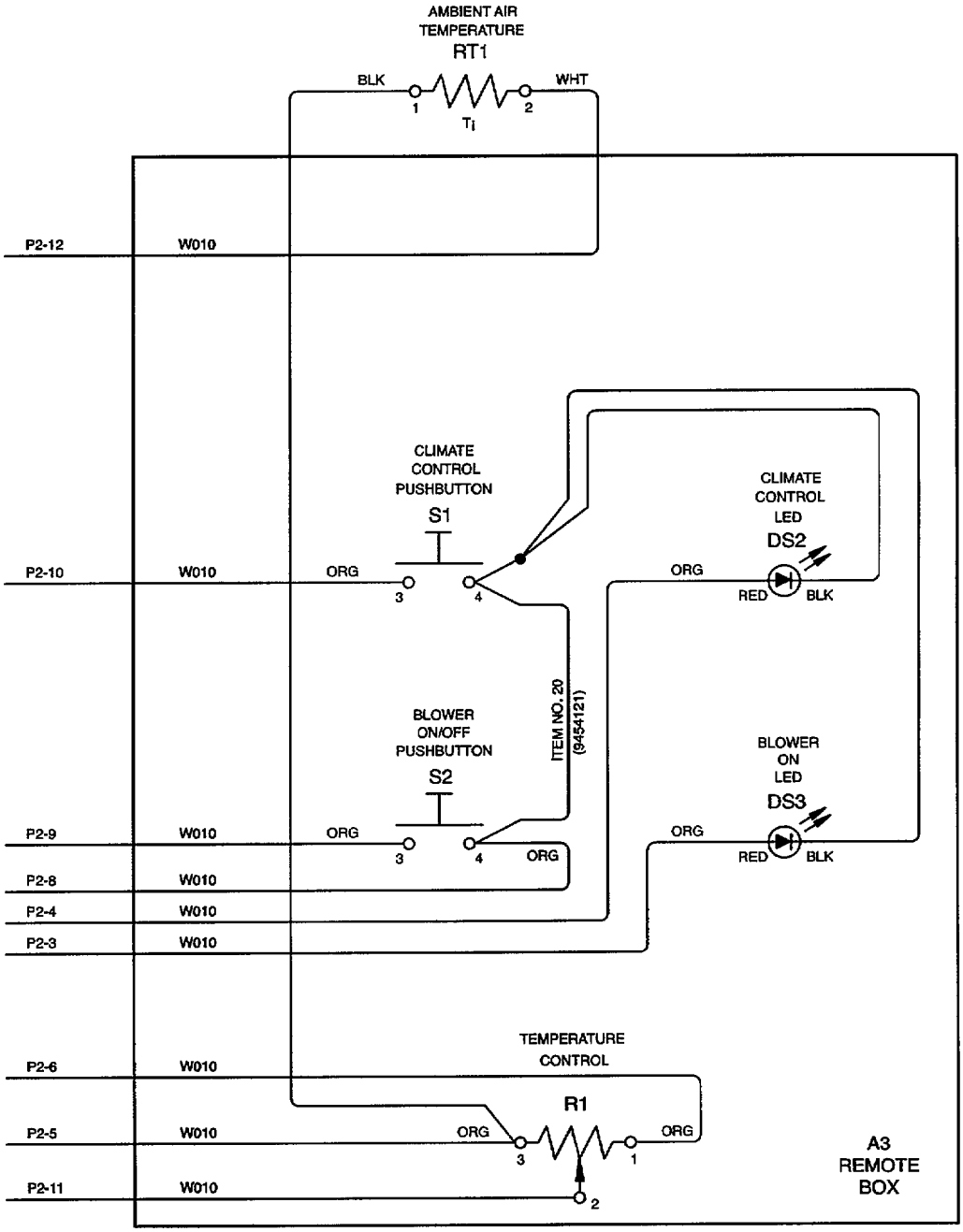


Figure 4-15. Electrical Schematic (Sheet 15 of 15).

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Open or remove covers and panels as necessary to access repair area.

CAUTION

Extreme cold can cause electrical wire leads and insulation to become brittle. Do not disturb electrical wiring that has been exposed to extremely low temperatures. Damage to electrical wire leads or insulation can result if disturbed under these conditions.

(3) If access to a repair requires removal of a component, refer to the replacement procedure for that component for removal instructions.

(4) Cut and discard tiedown straps as necessary to make the repair.

(5) Tag the wire lead, cable, or harness ends as necessary.

(6) Disconnect wire lead, cable, or harness ends.

(a) Cut off and discard splices or crimp nuts.

(b) Disconnect connectors and cut off pins with housing as necessary.

(c) Cut leads at solder connections then remove and discard insulation sleeving pieces from wire lead ends and component.

(d) Disconnect wire leads from component.

(7) Loosen strain relief fittings as necessary then note routing and remove wire lead, cable, or harness.

(8) **Insulating Joints.** The preferred method of insulating bare electrical joints is by using insulation sleeving. To apply, slide a piece of insulation sleeving over the wire lead before making the joint. Make the joint then slide the insulation sleeving over the joint and shrink in place with heat gun.

(9) **Crimping Terminals.** If the terminal is not insulated, refer to (8) above. To install the terminal, strip 1/4-1/2 inch (0.6-1.3 cm) of insulation from the end of the wire lead. Insert bare wire lead end into the shank of the terminal. Crimp the shank securely onto the wire lead.

4.16 ELECTRICAL SYSTEM GENERAL REPAIR - CONTINUED.

WARNING

Solder and flux contain materials which are hazardous to health. Avoid breathing vapors or fumes from soldering operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling solder and flux. Wear thermal gloves and protective goggles or face shield to protect against bums.

(10) Soldering Connections. Wire connections must be made mechanically sound before they are soldered; solder alone does not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. Flux should be brushed onto the joint before soldering. Wires should always be heated with a soldering iron to the point at which the solder will melt completely when touched to joint and flow into all parts of the joint. Excessive build up of solder on the joint should be avoided or removed.

(11) Splicing Wire. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced by using a crimped splice installed per (9) above or by wrapping the stripped wire lead ends onto themselves then soldering and insulating per (8) and (10) above.

(12) Select appropriate wire lead, cable, or harness then route as noted during removal being sure to pass it through any grommets or strain relief fittings as necessary.

(13) Tighten any strain relief fittings that were loosened for removal.

(14) Connect wire lead, cable, or harness ends per tags and wiring diagram figure 4-14. Remove tags.

(a) Connect wire leads to components.

(b) Solder and insulate leads to components per (8) and (10) above.

(c) Install connector pins per (9) above and tab housings then connect cable or harness.

(d) Install splice or crimp as appropriate per (9) above.

(15) Secure wires, cables, or harnesses with tiedown straps as necessary. Cut to remove excess tiedown strap material.

(16) Install any components that were removed for access.

(17) Install any covers and panels that were removed for access.

(18) Connect FDECU to power source and operate per paragraph 2.4.

4.17 OUTSIDE FAN MOTOR REPLACEMENT.

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Tiedown Straps (qty 2) Item 2, Section II, Appendix E

a. **Removal.** See figure 4-16.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING;

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Cut and discard two tiedown straps (1) securing cap (2) and plug (3).

(4) Disconnect cap (2) and plug (3).

(5) Tag wire leads then cut plug (3) with contacts (4) off outside fan motor cable leads and discard.

(6) Cut and discard two tiedown straps (5) securing outside blower motor cable then pull cable through grommet (6).

(7) Loosen two setscrews (7) then remove outside fan (8).

(8) Remove seven screws (9) and retaining plate (10).

(9) Remove outside fan motor (11).

4.17 OUTSIDE FAN MOTOR REPLACEMENT - CONTINUED.

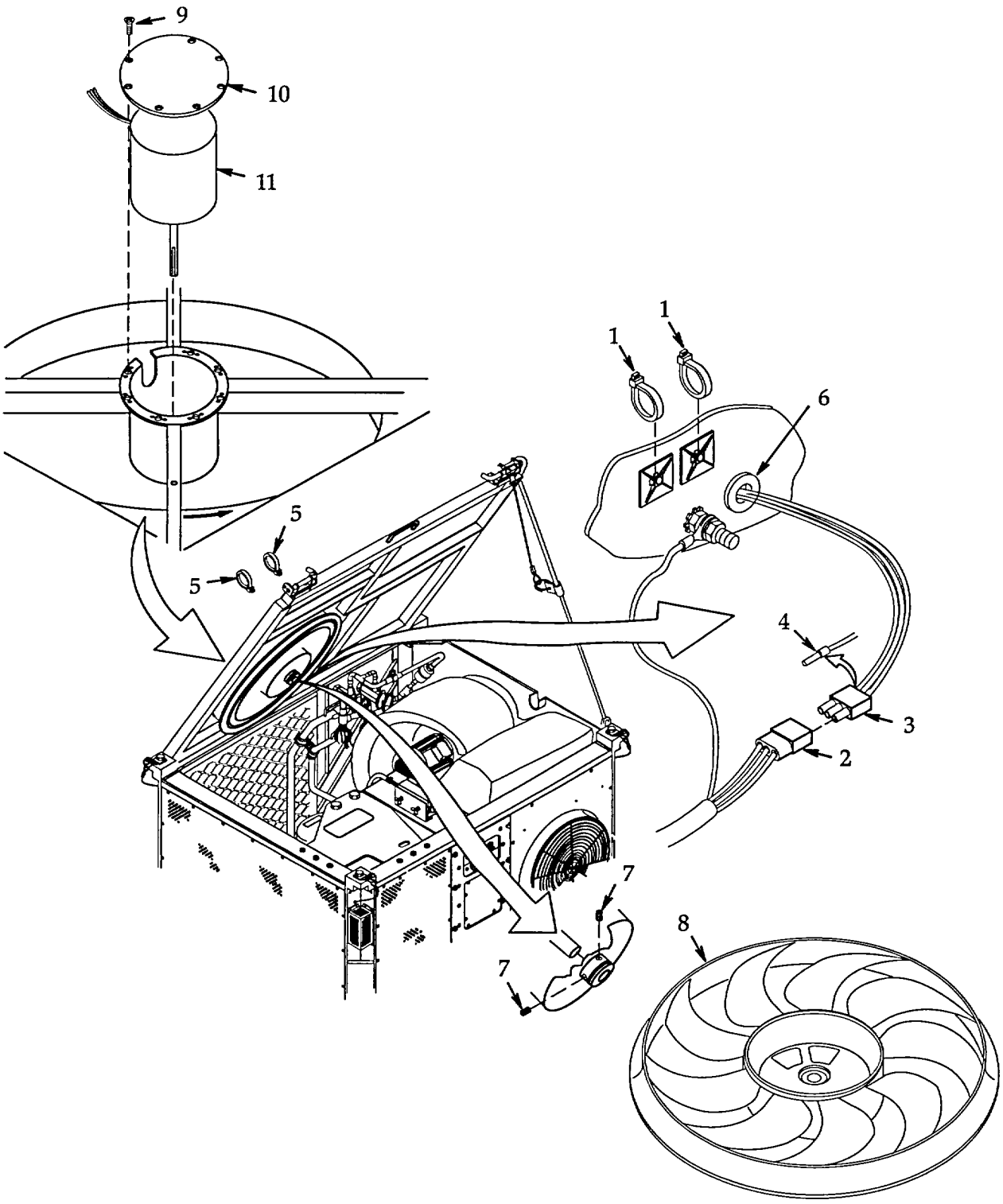


Figure 4-16. Outside Fan Motor.

b. **Installation.** See figure 4-16.

(1) Install outside fan motor (11). Be sure to align cable connector with notch in cover.

(2) Install retaining plate (10) and align mounting holes. Secure with seven screws (9).

(3) Install outside fan (8). Align one setscrew (7) over flat on outside fan motor (11) shaft then tighten two setscrews.

(4) Insert outside blower motor cable through grommet (6) then secure cable with two tiedown straps (5). Cut to remove excess tiedown strap material.

(5) Install three new contacts (4) per paragraph 4.16 then using tags and wiring diagram figure 4-14 install new plug (3). Remove tags.

(6) Connect cap (2) and plug (3).

(7) Secure cap (2) and plug (3) with two tiedown straps (1). Cut to remove excess tiedown strap material.

(8) Lower and secure cover per paragraph 4.2.

(9) Connect FDECU to power source and operate per paragraph 2.4.

4.18 **HANDLE REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 2) Item 11, Appendix G

a. **Removal.** See figure 4-17.

(1) Shutdown the FDECU per paragraph 2.4.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Remove two screws (1), lock washers (2), flat washers (3), and handle (4). Discard lock washers.

4.18 **HANDLE REPLACEMENT - CONTINUED.**

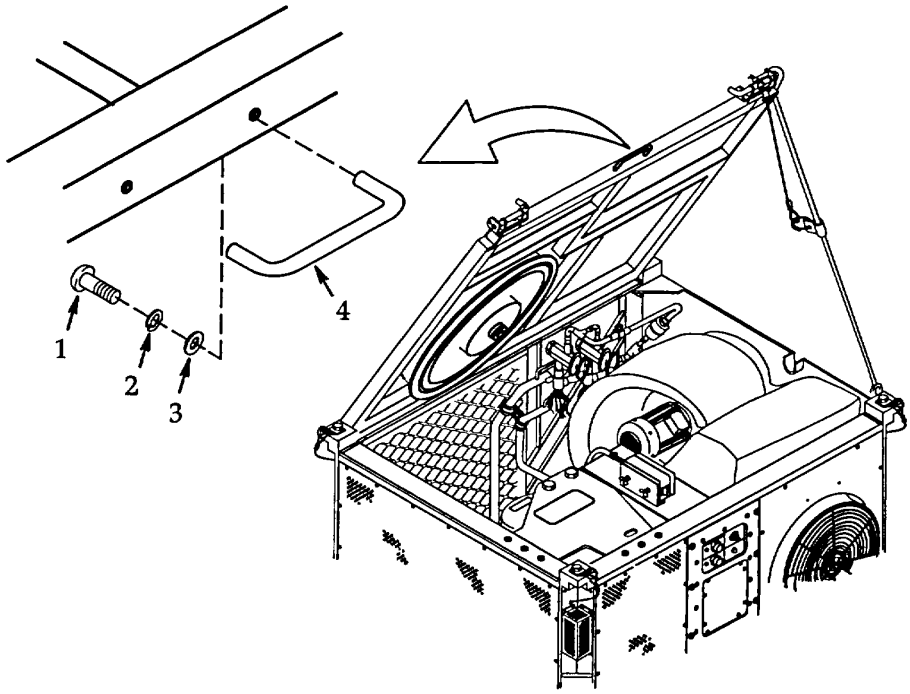


Figure 4-17. Handle.

b. **Installation.** See figure 4-17.

(1) Install handle (4) and align mounting holes. Secure with two flat washers (3), new lock washers (2) and screws (1).

(2) Lower and secure cover per paragraph 4.2.

(3) Connect FDECU to power source and operate per paragraph 2.4.

4.19 **LATCH HINGE AND LATCH HINGE DOUBLER REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 2) Item 11, Appendix G

a. **Removal.** See figure 4-18.

(1) Shutdown the FDECU per paragraph 2.4.

NOTE

The latch hinges and latch hinge doublers are different for the left and right side of the cover. Be sure to note which set is being replaced. The following procedures apply to any of the four latch hinges and latch hinge doublers. The quantities given are for each set.

(2) Be sure latch hinge (1) is released then remove two screws (2), lock washers (3), latch hinge, and latch hinge doubler (4) (front set only). Discard lock washers.

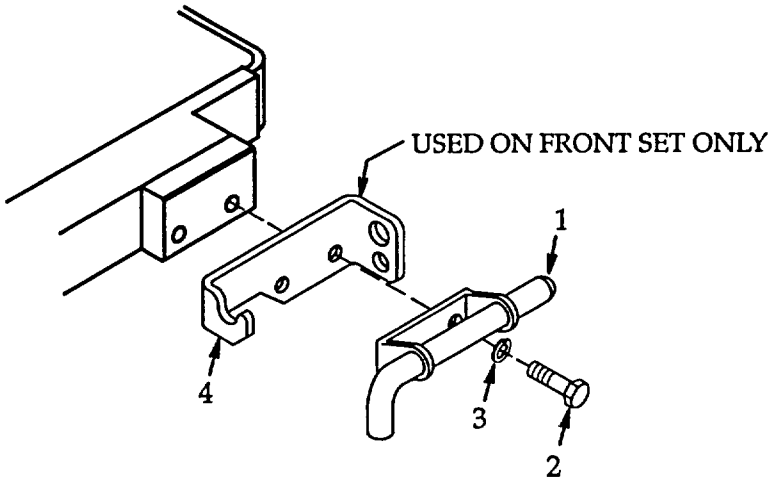


Figure 4-18. Latch Hinge and Latch Hinge Doubler.

b. **Installation.** See figure 4-18.

(1) Install latch hinge doubler (4) (front set only) and latch hinge (1). Align mounting holes and secure with two new lock washers (3) and screws (2).

(2) Connect FDECU to power source and operate per paragraph 2.4.

4.20 **END PANEL REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 10) Item 4, Appendix G

a. **Removal.** See figure 4-19.

(1) Shutdown the FDECU per paragraph 2.4.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Pull quick release pin (1) if installed.

(4) If duct is attached, remove per paragraph 4.57.

(5) Remove 10 screws (2), lock washers (3), flat washers (4), and end panel (5). Discard lock washers.

4.20 END PANEL REPLACEMENT - CONTINUED.

(6) Remove I.D. plate (6) and label (7) from old end panel (5) and install on new end panel. If label cannot be removed and re-used, replace it with new one.

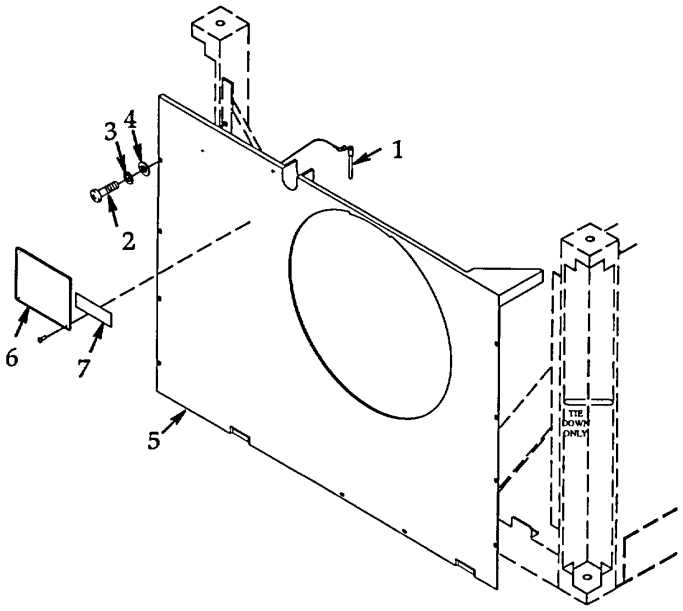


Figure 4-19. End Panel.

b. **Installation.** See figure 4-19.

(1) Be sure I.D. plate (6) and label (7) were installed onto new end panel (5). Install end panel and align mounting holes. Secure with 10 flat washers (4), new lock washers (3), and screws (2).

(2) Install duct if necessary per paragraph 4.4.6.

(3) Insert quick release pin (1) if necessary.

(4) Lower and secure cover per paragraph 4.2.

(5) Connect FDECU to power source and operate per paragraph 2.4.

4.21 ACCESS PANEL REPLACEMENT.

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

a. **Removal.** See figure 4-20.

(1) Shutdown the FDECU per paragraph 2.4.

(2) Turn to release six captive hardware fasteners (1) and remove access panel (2).

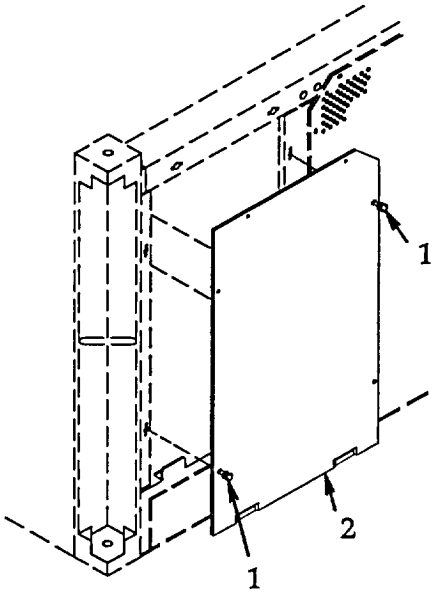


Figure 4-20. Access Panel.

b. **Installation.** See figure 4-20.

(1) Install access panel (2) and engage six captive hardware fasteners (1) to secure.

(2) Connect FDECU to power source and operate per paragraph 2.4.

4.22 **REAR SCREEN REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 15) Item 4, Appendix G

a. **Removal.** See figure 4-21.

(1) Shutdown the FDECU per paragraph 2.4.

(2) Remove 15 screws (1), lock washers (2), flat washers (3), and rear screen (4). Discard lock washers.

b. **Installation.** See figure 4-21.

(1) Install rear screen (4) and align mounting holes. Secure with 15 flat washers (3), new lock washers (2), and screws (1).

(2) Connect FDECU to power source and operate per paragraph 2.4.

4.22 REAR SCREEN REPLACEMENT - CONTINUED.

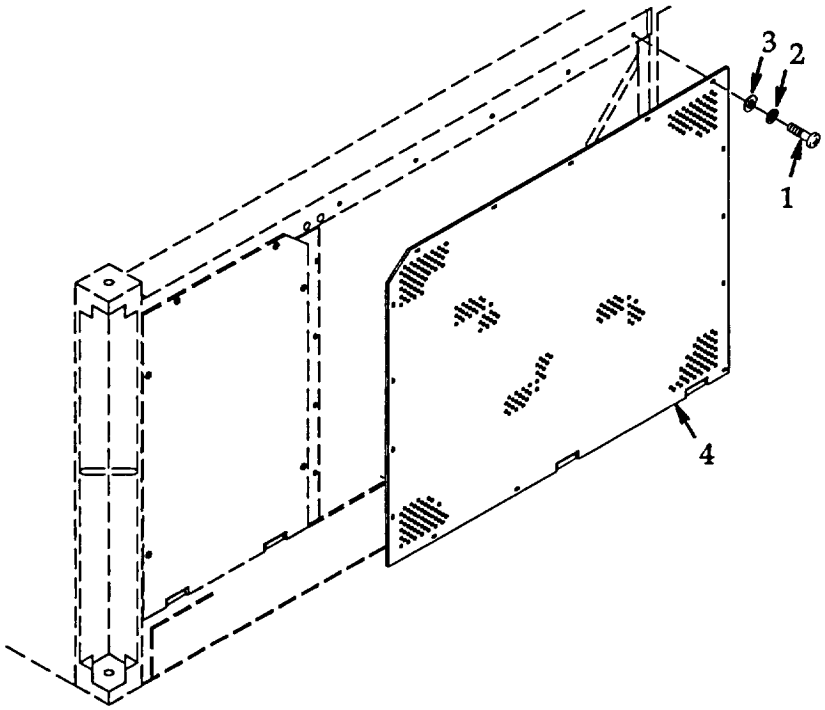


Figure 4-21. Rear Screen.

4.23 **END SCREEN REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 17) Item 4, Appendix G

a. **Removal.** See figure 4-22.

(1) Shutdown the FDECU per paragraph 2.4.

(2) Remove 17 screws (1), lock washers (2), flat washers (3), and end screen (4). Discard lock washers.

b. **Installation.** See figure 4-22.

(1) Install end screen (4) and align mounting holes. Secure with 17 flat washers (3), new lock washers (2), and screws (1).

(2) Connect FDECU to power source and operate per paragraph 2.4.

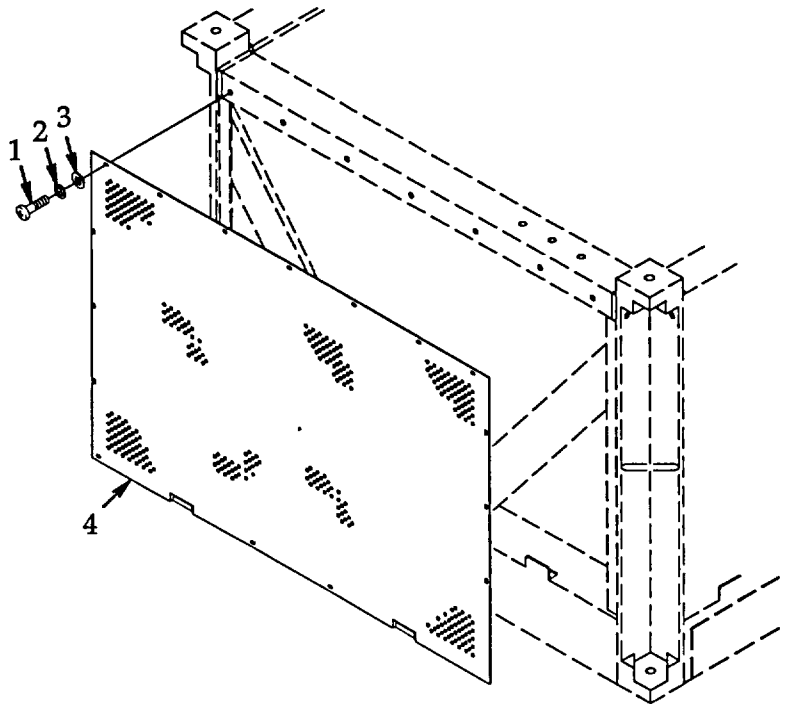


Figure 4-22. End Screen.

4.24 FRONT SCREEN REPLACEMENT.

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 12) Item 4, Appendix G

a. **Removal.** See figure 4-23.

(1) Shutdown the FDECU per paragraph 2.4.

(2) Remove 12 screws (1), lock washers (2), flat washers (3), and front screen (4). Discard lock washers.

b. **Installation.** See figure 4-23.

(1) Install front screen (4) and align mounting holes. Secure with 12 flat washers (3), new lock washers (2), and screws (1).

(2) Connect FDECU to power source and operate per paragraph 2.4.

4.24 FRONT SCREEN REPLACEMENT - CONTINUED.

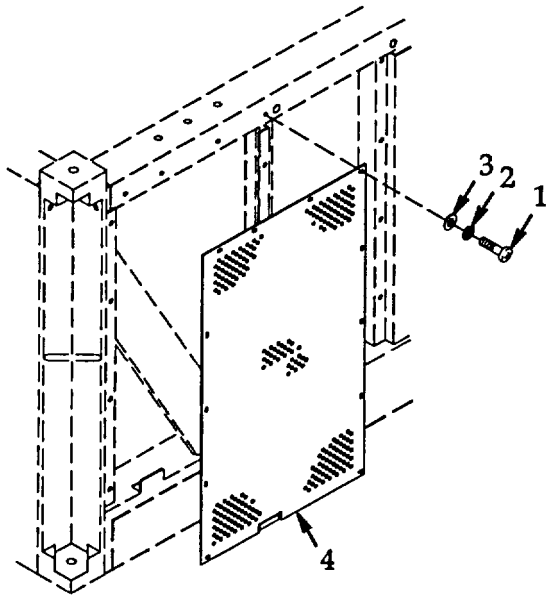


Figure 4-23. Front Screen.

4.25 SUPPLY PANEL REPLACEMENT.

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

a. **Removal.** See figure 4-24.

(1) Shutdown the FDECU per paragraph 2.4.

(2) If duct is attached, remove per paragraph 4.57. Push heater barrel (1) into volute assembly (2).

(3) Turn to release six captive hardware fasteners (3) and remove supply panel (4).

b. **Installation.** See figure 4-24.

(1) Install supply panel (4) and engage six captive hardware fasteners (3) to secure.

(2) Pull heater barrel (1) out of volute assembly (2) to stops (approximately 4 inches). Install duct if necessary per paragraph 4.4.6.

(3) Connect FDECU to power source and operate per paragraph 2.4.

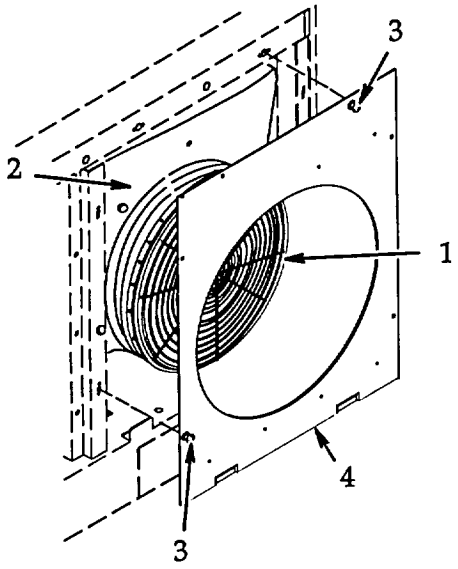


Figure 4-24. Supply Panel.

4.26 **ELECTRICAL ASSEMBLY REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 3) Item 2, Appendix G Lock Washers (qty 2) Item 3, Appendix G Lock Washers (qty 13) Item 12, Appendix G Marker Tags (qty 76) Item 3, Section II, Appendix E Crimp Nuts (qty 14) Item 4, Section II, Appendix E Splices (qty 8) Item 5, Section II, Appendix E Tiedown Straps (qty 5) Item 1, Section II, Appendix E Tiedown Straps (qty 23) Item 2, Section II, Appendix E

a. **Removal.** See figure 4-25.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

4.26 **ELECTRICAL ASSEMBLY REPLACEMENT - CONTINUED.**

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(4) Remove two screws (3) and compressor cover (4).

(5) Remove four screws (5) and flat washers (6). Carefully pull inside blower motor cover (7) out as far as wire leads will allow.

(6) Remove heater assembly per paragraph 4.46.

(7) Cut two each tabs (8) with tab housings (9) off cable leads and discard.

(8) Remove locking nut (10) then pull cable (11) with strain relief fitting (12) out. Install locking nut to retain sealing washer (13).

(9) Loosen compression nut (14) then slide strain relief fitting (12) off cable (11). Pull cable through lanyard (15) then slide strain relief fitting onto cable far enough to leave one inch of the cable extending from the strain relief fitting and tighten compression nut.

(10) Tag wire leads then cut two each caps (16) with contacts (17) off heater cable leads and discard.

(11) Remove locking nuts (18) then pull cables (19) with strain relief fittings (20) out. Install locking nuts to retain sealing washers (21).

(12) Loosen compression nuts (22) then slide strain relief fittings (20) off cables (19). Pull cables through lanyard (15) then slide strain relief fittings onto cables far enough to leave one inch of the cables extending from the strain relief fittings and tighten compression nuts.

(13) Cut and discard three tiedown straps (23) securing outside blower motor cable.

(14) Tag and disconnect cap (24) with contacts (25).

(15) Remove nut (26), lock washer (27), flat washer (28), ground lead (29), and flat washer (30). Discard lock washer.

(16) Tag four wire leads at inside blower motor connection points then cut off and discard three crimp nuts (31) to disconnect three power leads. Remove screw (32), lock washer (33), and flat washer (34) to disconnect the fourth, ground, lead. Retain lock washer for use during installation.

(17) Remove locking nut (35) then pull cable (36) with strain relief fitting (37) out of inside blower motor cover (7). Install locking nut to retain sealing washer (38).

(18) Tag wire leads attached to compressor ground stud then remove nut (39), lock washer (40), and flat washer (41) to disconnect them. Discard lock washer.

(19) Tag the two wire leads attached to compressor high temperature cutout (42) (S6) and disconnect from compressor.

(20) Tag three wire leads connected to compressor input power terminals then remove three screws (43), lock washers (44), and flat washers (45) to disconnect them.

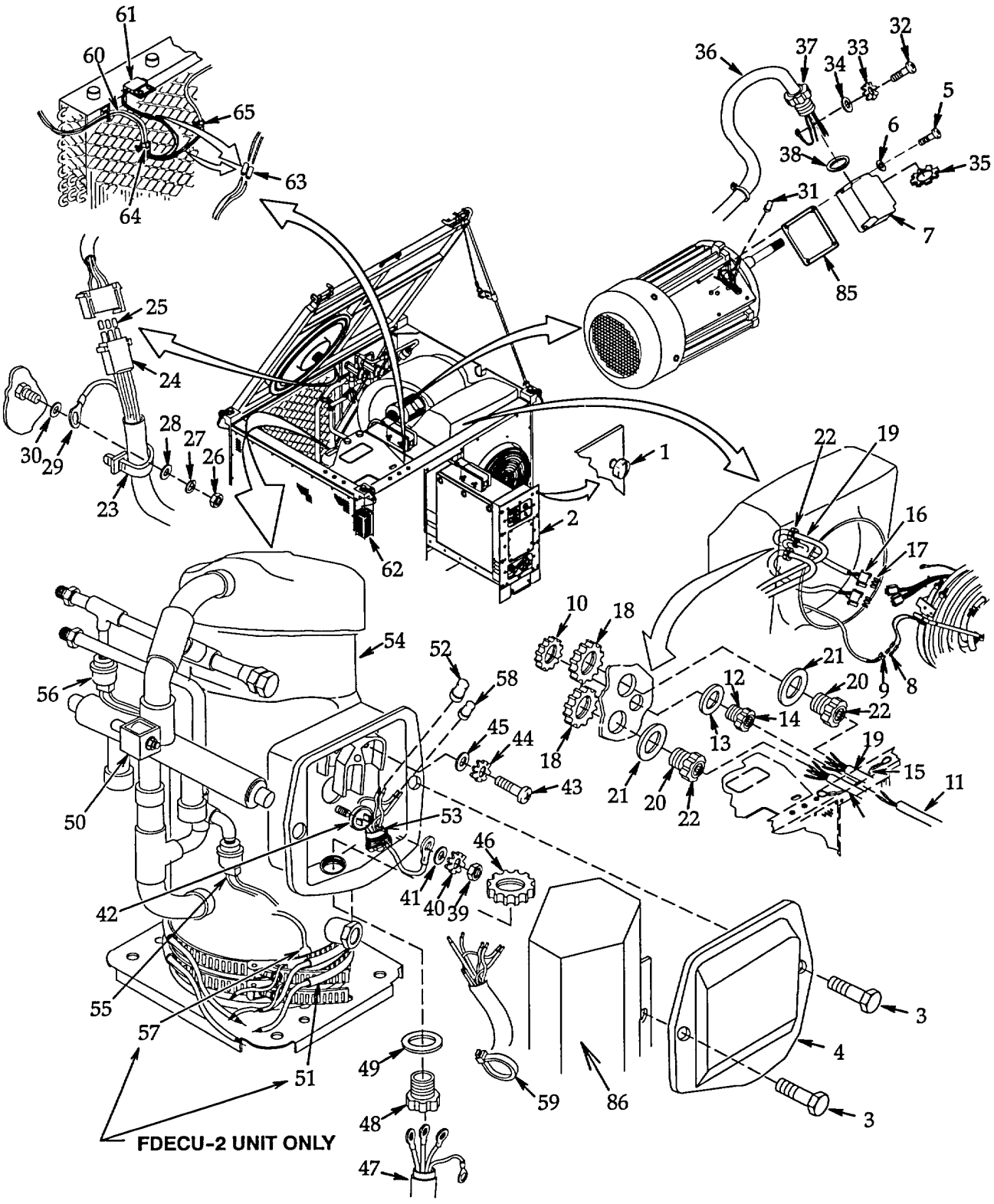


Figure 4-25. Electrical Assembly (Sheet 1 of 2).

4.26 **ELECTRICAL ASSEMBLY REPLACEMENT - CONTINUED.**

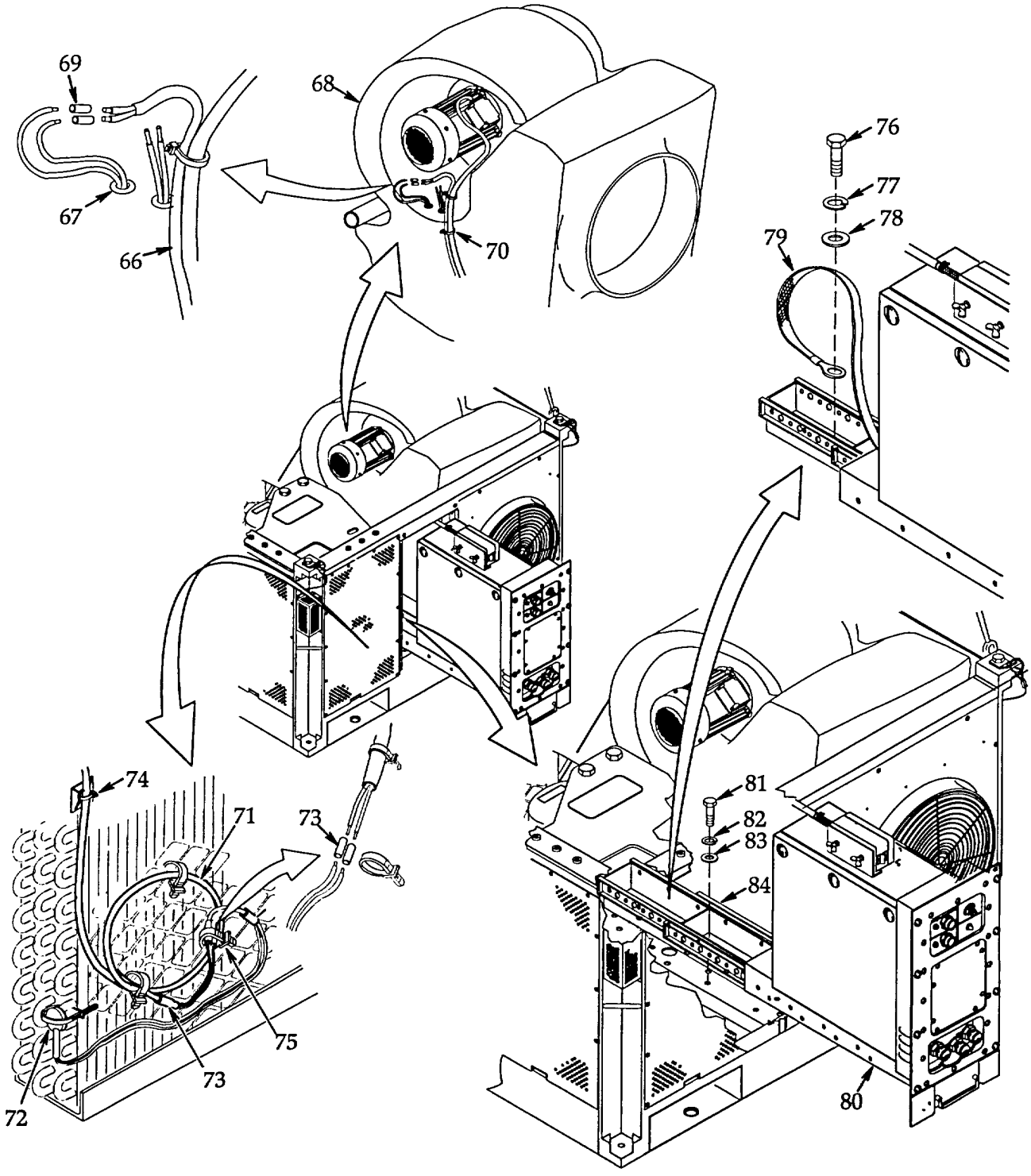


Figure 4-25. Electrical Assembly (Sheet 2 of 2).

(21) Remove locking nut (46) then pull cable (47) with strain relief fitting (48) out of compressor. Install locking nut to retain sealing washer (49).

(22) Locate the two cables inside the compressor that go to reversing valve (50) (L1) and **(FDECU-2 ONLY)** crankcase heater (51) (HR1). Tag the leads at these connection points then cut off and discard five crimp nuts (52) to disconnect leads. Locate the cable that went to the compressor high temperature cutout (42) (S6) then pull these three cables out of the compressor.

(23) Locate the three cables (53) inside compressor (54) that go to low pressure cutout switch (55) (S2), high pressure cutout switch (56) (S3), and **(FDECU-2 ONLY)** crankcase temperature sensor (57) (RT4). Tag the leads at these connection points then cut off and discard six crimp nuts (58) to disconnect leads. Pull all three cables out of compressor. Cut and discard 10 large tiedown straps (59) securing cables.

(24) Locate the two cables (60) that go to cover switch (61) (S1) and outdoor temperature sensor (62) (RT5). Tag the leads at these connection points then cut off and discard four splices (63) to disconnect leads. Cut and discard two large tiedown straps (64) and two small tiedown straps (65) securing cables.

(25) Locate the cable (66) that goes to indoor temperature sensor (67) (RT2) located on volute assembly (68). Tag the leads at this connection point then cut off and discard two splices (69) to disconnect leads. Cut and discard six large tiedown straps (70) securing cable.

(26) Locate the cable (71) that goes to outside coil temperature sensor (72) (RT3). Tag the leads at this connection point then cut off and discard two splices (73) to disconnect leads. Cut and discard two large tiedown straps (74) and three small tiedown straps (75) securing cable.

(27) Remove screw (76), lock washer (77), and flat washer (78) to disconnect power box assembly ground strap (79) from frame. Discard lock washer.

(28) Support electrical assembly (80) then remove 11 screws (81), lock washers (82), flat washers (83), and electrical assembly. Discard lock washers.

b. **Installation.** See figure 4-25.

(1) Pull bracket (84) out from electrical assembly (80) then carefully place electrical assembly bracket in unit and align mounting holes. Support electrical assembly then install 11 flat washers (83), new lock washers (82), and screws (81) to secure.

(2) Connect power box assembly ground strap (79) to frame with flat washer (78), new lock washer (77), and screw (76).

(3) Locate the cable (71) that goes to outside coil temperature sensor (72) (RT3). Connect wire leads with two splices (73) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cable using two large tiedown straps (74) and three small tiedown straps (75). Cut to remove excess tiedown strap material.

(4) Locate the cable (66) that goes to indoor temperature sensor (67) (RT2) located on volute assembly (68). Connect wire leads with two splices (69) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cable using six large tiedown straps (70). Cut to remove excess tiedown strap material.

(5) Locate the two cables (60) that go to cover switch (61) (S1) and outdoor temperature sensor (62) (RT5). Connect wire leads with four splices (63) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cables using two large tiedown straps (64) and two small tiedown straps (65). Cut to remove excess tiedown strap material.

4.26 **ELECTRICAL ASSEMBLY REPLACEMENT - CONTINUED.**

(6) Insert the three cables (53) that go to low pressure cutout switch (55) (S2), high pressure cutout switch (56) (S3), and **(FDECU-2 ONLY)** crankcase temperature switch (57) (RT4) into compressor (54). Connect wire leads with six crimp nuts (58) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cables using 10 large tiedown straps (59). Cut to re i move excess tiedown strap material.

(7) Insert the three cables that go to reversing valve (50) (L1), **(FDECU-2 ONLY)** crankcase heater (51) (HR1), and compressor high temperature cutout (42) (S6). Connect wire leads from cables going to reversing valve (L1) and **(FDECU-2 ONLY)** crankcase heater (HR1) with five crimp nuts (52) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(8) Remove locking nut (46). With sealing washer (49) in place, install cable (47) with strain relief fitting (48) into compressor and secure with locking nut.

(9) Install three wire leads onto compressor input power terminals using tags and wiring diagram figure 4-14. Secure using three flat washers (45), new lock washers (44) and screws (43). Remove tags.

(10) Install two wire leads onto compressor high temperature cutout (42) (S6) using tags and wiring diagram figure 4-14. Remove tags.

(11) Place wire leads onto compressor ground stud using tags and wiring diagram figure 4-14. Secure using flat washer (41), new lock washer (40) and nut (39). Remove tags.

(12) Remove locking nut (35). With sealing washer (38) in place, install cable (36) with strain relief fitting (37) into inside blower motor cover (7) and secure with locking nut. Be sure gasket (85) is in place on cover.

(13) Connect the ground wire lead at the inside blower motor connections point using flat washer (34), lock washer (33), and screw (32). Connect the remaining wire leads with three crimp nuts (31) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(14) Install new cap (24) onto outside blower motor cable lead contacts (25) using wiring diagram figure 4-14.

(15) Install flat washer (30), ground lead (29), flat washer (28), new lock washer (27), and nut (26).

(16) Connect cap (24) with contacts (25) using tags and wiring diagram figure 4-14. Remove tag.

(17) Secure outside blower motor cable with three tiedown straps (23). Cut to remove excess tiedown strap material.

(18) Loosen compression nuts (22) then slide strain relief fittings (20) off cables (19). Feed cables through lanyard (15) then slide strain relief fittings onto cables far enough to leave one inch of the cables extending from the strain relief fittings and tighten compression nuts.

(19) Remove locking nuts (18). With sealing washers (21) in place, install cables (19) with strain relief fittings (20) into volute assembly (68) and secure with locking nut.

(20) Install two new caps (16) onto heater cable lead contacts (17) using tags and wiring diagram figure 4-14. Remove tags.

(21) Loosen compression nut (14) then slide strain relief fitting (12) off cable (11). Feed cable through lanyard (15) then slide strain relief fitting onto cable far enough to leave one inch of the cable extending from the strain relief fitting and tighten compression nut.

(22) Remove locking nut (10). With sealing washer (13) in place, install cable (11) with strain relief fitting (12) into volute assembly (68) and secure with locking nut.

(23) Install two new tab housings (9) onto cable wire lead tabs (8).

(24) Install heater assembly per paragraph 4.46.

(25) Install inside blower motor cover (7) then align mounting holes and secure with four flat washers (6) and screws (5).

(26) Install compressor cover (4) under reversing valve guard (86) then align mounting holes and secure with two screws (3).

(27) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(28) Lower and secure cover per paragraph 4.2.

(29) Connect FDECU to power source and operate per paragraph 2.4.

4.27 **POWER BOX ASSEMBLY REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 3) Item 2, Appendix G Lock Washers (qty 2) Item 3, Appendix G Lock Washers (qty 10) Item 12, Appendix G Marker Tags (qty 33) Item 3, Section II, Appendix E Crimp Nuts (qty 8) Item 4, Section II, Appendix E Tiedown Straps (qty 3) Item 2, Section II, Appendix E

a. **Removal.** See figure 4-26.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

4.27 **POWER BOX ASSEMBLY REPLACEMENT - CONTINUED.**

(3) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(4) Turn to release three latches (3) and open power box assembly cover (4).

(5) Remove two screws (5) and compressor cover (6).

(6) Remove four screws (7) and flat washers (8). Carefully pull inside blower motor cover (9) out as far as wire leads will allow.

(7) Remove heater assembly per paragraph 4.46.

(8) Remove remote box assembly per paragraph 4.36.

(9) Remove control box assembly per paragraph 4.41.

(10) Tag wire leads then cut two each caps (10) with contacts (11) off heater cable leads and discard.

(11) Remove locking nuts (12) then pull cables (13) with strain relief fittings (14) out. Install locking nuts to retain sealing washers (15).

(12) Loosen compression nuts (16) then slide strain relief fittings (14) off cables (13). Pull cables through lanyard (17) then slide strain relief fittings onto cables far enough to leave one inch of the cables extending from the strain relief fittings and tighten compression nuts.

(13) Cut and discard three tiedown straps (18) securing outside blower motor cable.

(14) Tag and disconnect cap (19) with contacts (20).

(15) Remove nut (21), lock washer (22), flat washer (23), ground lead (24), and flat washer (25). Discard lock washer.

(16) Tag four wire leads at inside blower motor connection points then cut off and discard three crimp nuts (26) to disconnect three leads. Remove screw (27), lock washer (28), and flat washer (29) to disconnect the fourth, ground, lead. Retain lock washer for use during installation.

(17) Remove locking nut '(30) then pull cable (31) with strain relief fitting (32) out of inside blower motor. Install locking nut to retain sealing washer (33).

(18) Tag wire leads attached to compressor ground stud then remove nut (34), lock washer (35), and flat washer (36) to disconnect them. Discard lock washer.

(19) Tag the two wire leads attached to compressor high temperature cutout (36) and disconnect from compressor.

(20) Tag three wire leads connected to compressor input power terminals then remove three screws (37), lock washers (38), and flat washers (39) to disconnect them.

(21) Remove locking nut (40) then pull cable (41) with strain relief fitting (42) out of compressor. Install locking nut to retain sealing washer (43).

(22) Locate the two cables inside the compressor that go to reversing valve (44) (L1) and **(FDECU-2 ONLY)** crankcase heater (45) (HR1). Tag the leads at these connection points then cut off and discard five crimp nuts (46) to disconnect leads. Locate the cable that went to the compressor high temperature cutout (47) (S6) then pull these three cables out of the compressor.

(23) Remove screw (48), lock washer (49), and flat washer (50) to disconnect power box assembly ground strap (51) from frame. Discard lock washer.

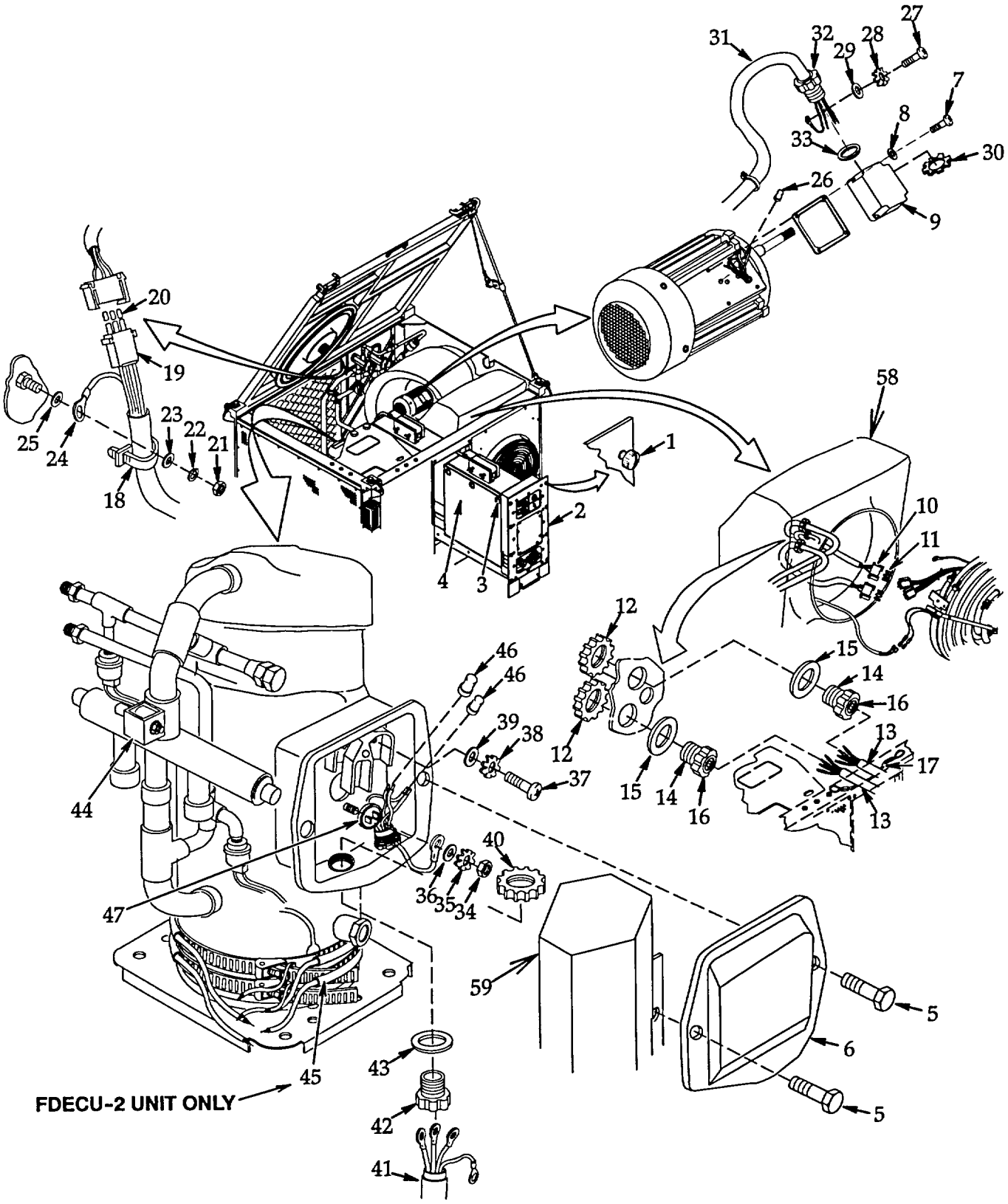


Figure 4-26. Power Box Assembly (Sheet 1 of 2).

4.27 **POWER BOX ASSEMBLY REPLACEMENT - CONTINUED.**

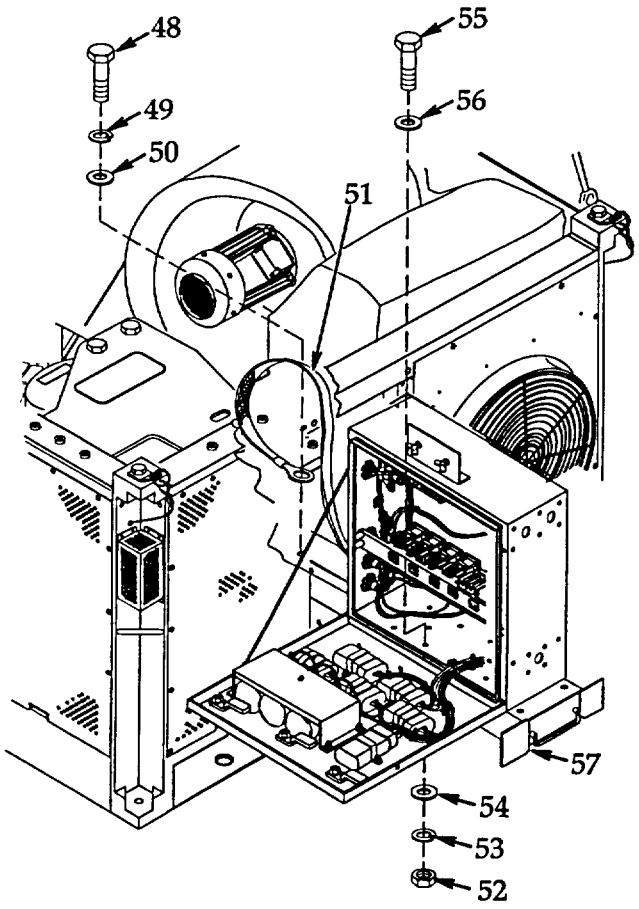


Figure 4-26. Power Box Assembly (Sheet 2 of 2).

(24) Support power box assembly then remove eight nuts (52), lock washers (53), flat washers (54), screws (55), flat washers (56), and power box assembly. Discard lock washers. Close power box assembly cover (4) and turn three latches (3) to secure.

b. **Installation.** See figure 4-26.

(1) Turn to release three latches (3) and open power box assembly cover (4). Pull bracket (57) out from unit then carefully place power box assembly on bracket and align mounting holes. Support power box assembly then install eight flat washers (56), screws (55), flat washers (54), lock washers (53), and nuts (52) to secure.

(2) Connect power box assembly ground strap (51) to frame with flat washer (50), new lock washer (49), and screw (48).

(3) Insert the three cables that go to reversing valve (44) (L1), **(FDECU-2 ONLY)** crankcase heater (45) (HR1), and compressor high temperature cutout (47) (S6). Connect wire leads from cables going to reversing valve (L1) and crankcase heater (HR1) with five crimp nuts (46) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(4) Remove locking nut (40). With sealing washer (43) in place, install cable (41) with strain relief fitting (42) into compressor and secure with locking nut.

(5) Install three wire leads onto compressor input power terminals using tags and wiring diagram figure 4-14. Secure using three flat washers (39), new lock washers (38) and screws (37). Remove tags.

(6) Install two wire leads onto compressor high temperature cutout (S6) using tags and wiring diagram figure 4-14. Remove tags.

(7) Place wire leads onto compressor ground stud using tags and wiring diagram figure 4-14. Secure using flat washer (36), new lock washer (35) and nut (34). Remove tags.

(8) Remove locking nut (30). With sealing washer (33) in place, install cable (31) with strain relief fitting (32) into inside blower motor and secure with locking nut.

(9) Connect the ground wire lead at the inside blower motor connections point using flat washer (29), lock washer (28), and screw (27). Connect the remaining wire leads with three crimp nuts (26) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(10) Install new cap (19) onto outside blower motor cable lead contacts (20) using wiring diagram figure 4-14.

(11) Install flat washer (25), ground lead (24), flat washer (23), new lock washer (22), and nut (21).

(12) Connect cap (19) with contacts (20) using tags and wiring diagram figure 4-14. Remove tag.

(13) Secure outside blower motor cable with three tiedown straps (18). Cut to remove excess tiedown strap material.

(14) Loosen compression nuts (16) then slide strain relief fittings (14) off cables (13). Feed cables through lanyard (17) then slide strain relief fittings onto cables far enough to leave one inch of the cables extending from the strain relief fittings and tighten compression nuts.

(15) Remove locking nuts (12). With sealing washers (15) in place, install cables (13) with strain relief fittings (14) into volute assembly (58) and secure with locking nut.

(16) Install two new caps (10) onto heater cable lead contacts (11) using tags and wiring diagram figure 4-14. Remove tags.

4.27 **POWER BOX ASSEMBLY REPLACEMENT - CONTINUED.**

(17) Install control box assembly per paragraph 4.41.

(18) Install remote box assembly per paragraph 4.36.

(19) Install heater assembly per paragraph 4.46.

(20) Install inside blower motor cover (9) then align mounting holes and secure with four flat washers (8) and screws (7).

(21) Install compressor cover (6) under reversing valve guard (59) then align mounting holes and secure with two screws (5).

(22) Close power box assembly cover (4) and turn three latches (3) to secure.

(23) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(24) Lower and secure cover per paragraph 4.2.

(25) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.28 **CAPACITORS (C7 THRU C9) REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B Marker Tags (qty 2) Item 3, Section II, Appendix E	Lock Washers (qty 4) Item 9, Appendix G

a. **Removal.** See figure 4-27.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Turn to release three latches (3) and open power box assembly cover (4).

NOTE

All three capacitors are mounted under a common bracket that must be removed to access any individual capacitor.

(4) Remove four nuts (5), lock washers (6), flat washers (7), and bracket (8). Discard lock washers.

WARNING

Capacitors can store electrical power for extended periods of time after being disconnected from power supply. A bleed resistor is connected across the capacitor terminals to discharge this power more quickly. Do not touch capacitor terminals for the first five minutes after the power has been disconnected.

(5) Carefully pull cap (9) back to expose capacitor (10) terminals then tag and disconnect wire leads and remove capacitor.

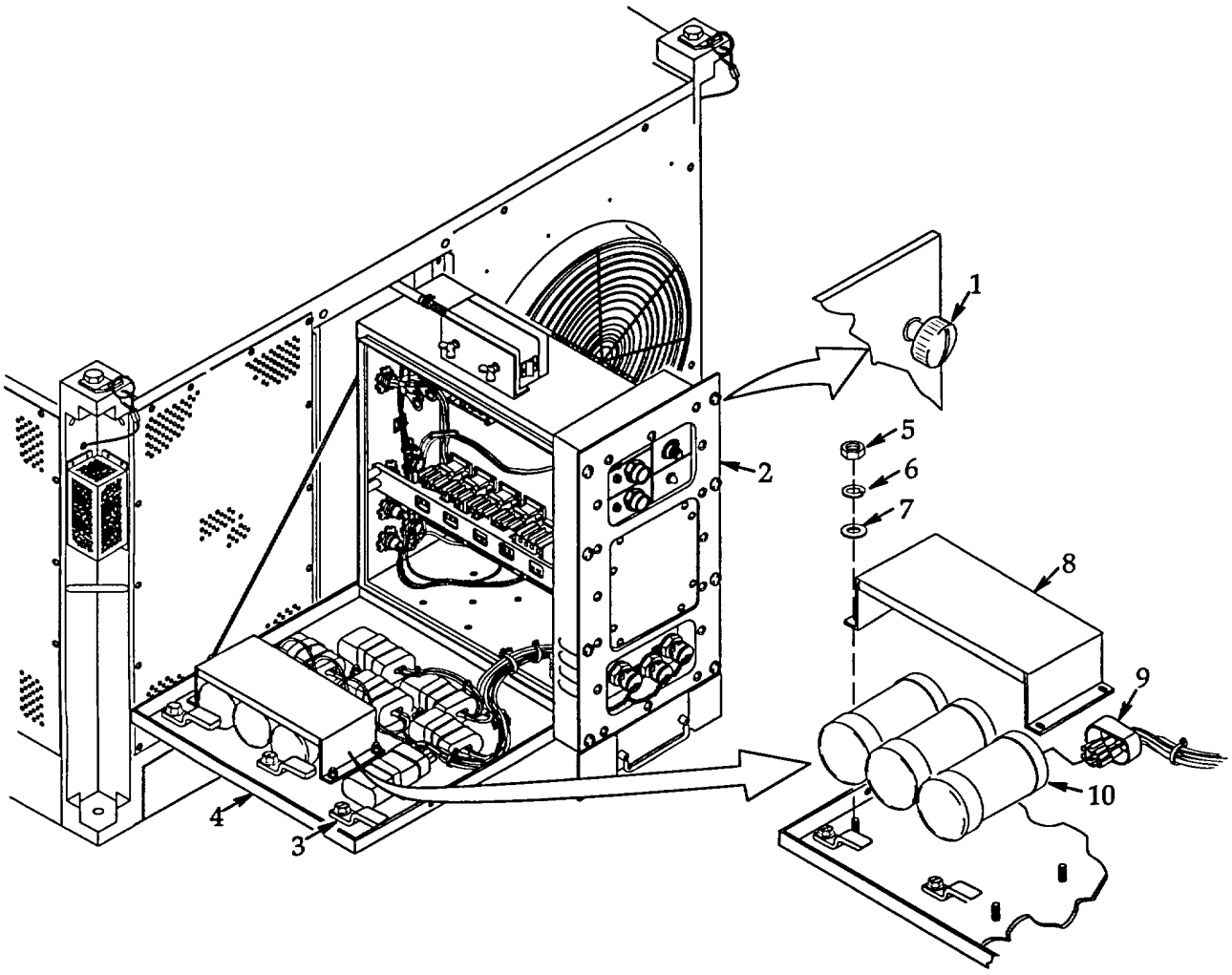


Figure 4-27. Capacitors (C7 thru C9).

b. **Installation.** See figure 4-27.

(1) Connect wire leads to capacitor (10) per tags and wiring diagram figure 4-14. Remove tags then carefully place cap (9) over terminals.

(2) Place capacitor (10) in position with bracket (8) over it on mounting studs. Secure bracket with four flat washers (7), new lock washers (6), and nuts (5).

(3) Close power box assembly cover (4) and turn three latches (3) to secure.

4.28 **CAPACITORS (C7 THRU C9) REPLACEMENT - CONTINUED.**

(4) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(5) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.29 **CAPACITORS (C1 THRU C6) REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B Marker Tags (qty 2) Item 3, Section II, Appendix E	Lock Washers (qty 2) Item 9, Appendix G

a. **Removal.** See figure 4-28.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Turn to release three latches (3) and open power box assembly cover (4).

NOTE

Each capacitor is mounted in the same manner and the following procedures can be used for any of them. The quantities given are for one capacitor only.

(4) Remove two nuts (5), lock washers (6), flat washers (7), and bracket (8). Discard lock washers.

WARNING

Capacitors can store electrical power for extended periods of time after being disconnected from power supply. A bleed resistor is connected across the capacitor terminals to discharge this power more quickly. Do not touch capacitor terminals for the first five minutes after the power has been disconnected.

(5) Carefully pull cap (9) back to expose capacitor (10) terminals then tag and disconnect wire leads and remove capacitor.

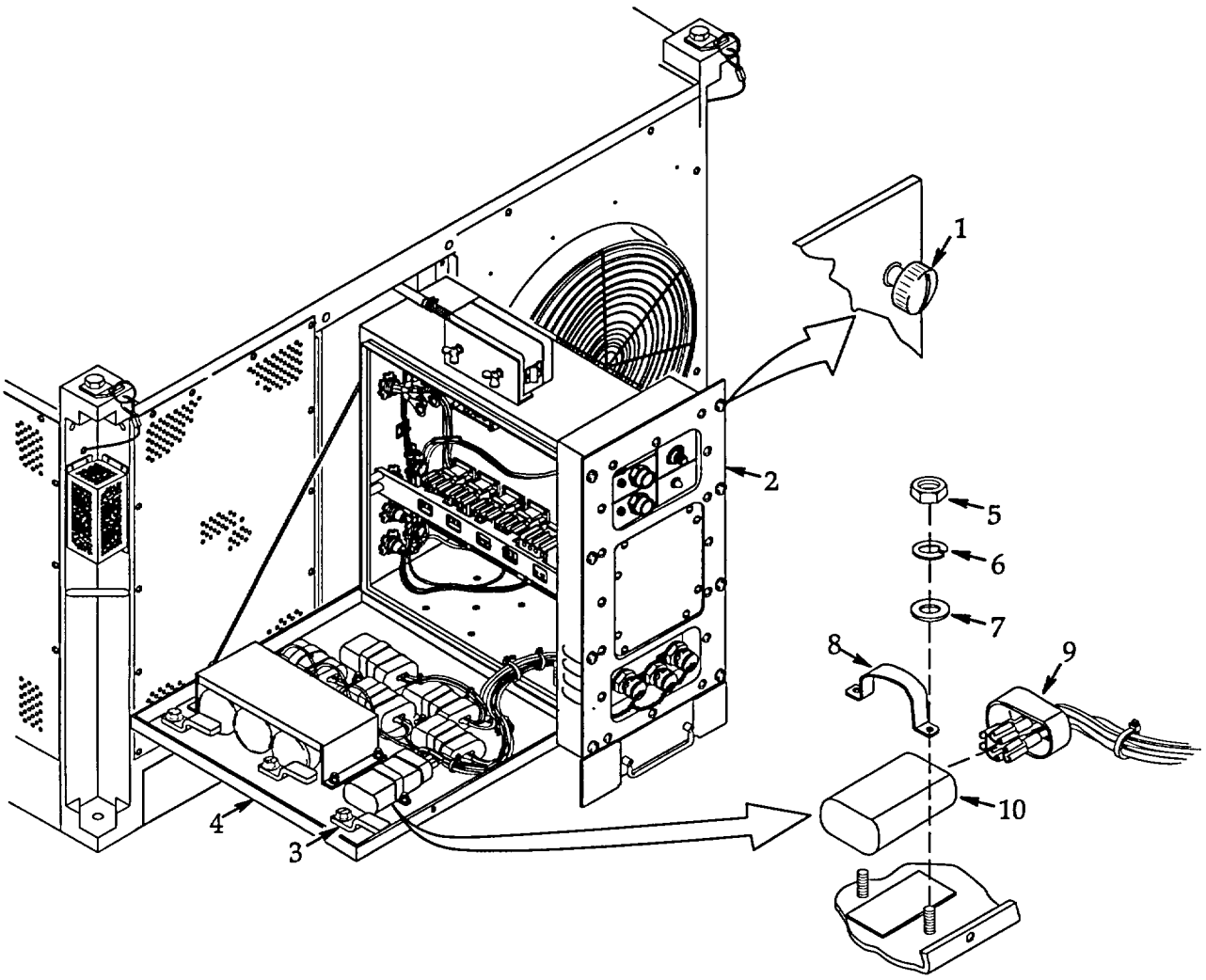


Figure 4-28. Capacitors (C1 thru C6).

b. **Installation.** See figure 4-28.

(1) Connect wire leads to capacitor (10) per tags and wiring diagram figure 4-14. Remove tags then carefully place cap (9) over terminals.

(2) Place capacitor (10) in position with bracket (8) over it on mounting studs. Secure bracket with two flat washers (7), new lock washers (6), and nuts (5).

(3) Close power box assembly cover (4) and turn three latches (3) to secure.

(4) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(5) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.30 **RELAYS (K1 THRU K5) REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B
Marker Tags (qty 10)
Item 3, Section II, Appendix E

Materials/Parts

Lock Washers (qty 4)
Item 10, Appendix G

a. **Removal.** See figure 4-29.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Turn to release three latches (3) and open power box assembly cover (4).

NOTE

All five relays are mounted under a common bracket that must be removed to access any individual relay.

(4) Remove four screws (5), lock washers (6), flat washers (7), spacers (8), and bracket (9). Discard bck washers.

NOTE

All five relays are mounted the same way and the following procedures apply to any one of them.

(5) If necessary, remove overload relay per paragraph 4.31.

(6) Tag and disconnect wire leads (10) as necessary.

(7) Push and hold latch (11) down to release then pull bottom of relay (12) out and up off rail (13) to remove.

b. **Installation.** See figure 4-29.

(1) Hook top of relay (12) on rail (13) then push bottom in until latch (11) engages.

(2) Connect wire leads to relay (10) per tags and wiring diagram figure 4-14. Remove tags.

(3) If removed, install overload relay per paragraph 4.31.

(4) Install bracket (9) onto relays (12) then install four spacers (8), flat washers (7), new lock washers (6), and screws (5).

(5) Close power box assembly cover (4) and turn three latches (3) to secure.

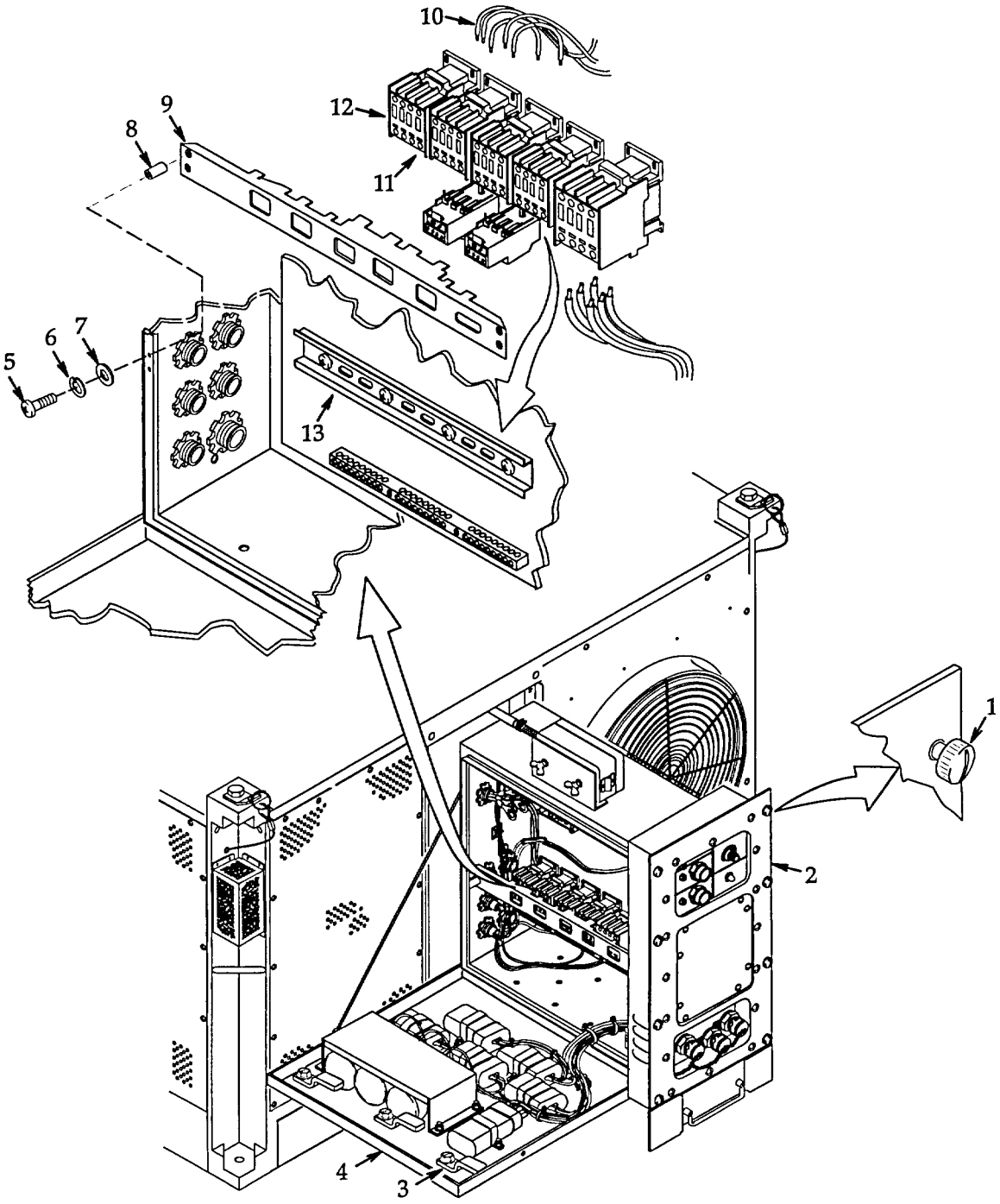


Figure 4-29. Relays (K1 thru K5).

(6) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(7) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.31 **OVERLOAD RELAYS (K7 & K8) REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 7) Item 3, Section II, Appendix E

a. **Removal.** See figure 4-30.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Turn to release three latches (3) and open power box assembly cover (4).

NOTE

Both overload relays are installed the same. The following procedures apply to either overload relay. The quantities given are for one only.

(4) Tag and disconnect seven wire leads (5) from overload relay (6).

(5) Loosen three terminal screws (7) then pivot overload relay (6) down to release contacts and remove.

b. **Installation.** See figure 4-30.

(1) Install overload relay (6) by engaging bottom clip at an angle and pivoting into position. Secure by tightening three terminal screws (7).

(2) Place the reset control (8) to the M position.

(3) If replacing overload relay (K7), place the amperage dial (9) to 1.8. If replacing overload relay (K8), place the amperage dial to 8.

(4) Connect seven wire leads (5) to overload relay (6) per tags and wiring diagram figure 4-14. Remove tags.

(5) Close power box assembly cover (4) and turn three latches (3) to secure.

(6) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(7) Connect FDECU main power cable to power source and operate per paragraph 2.4.

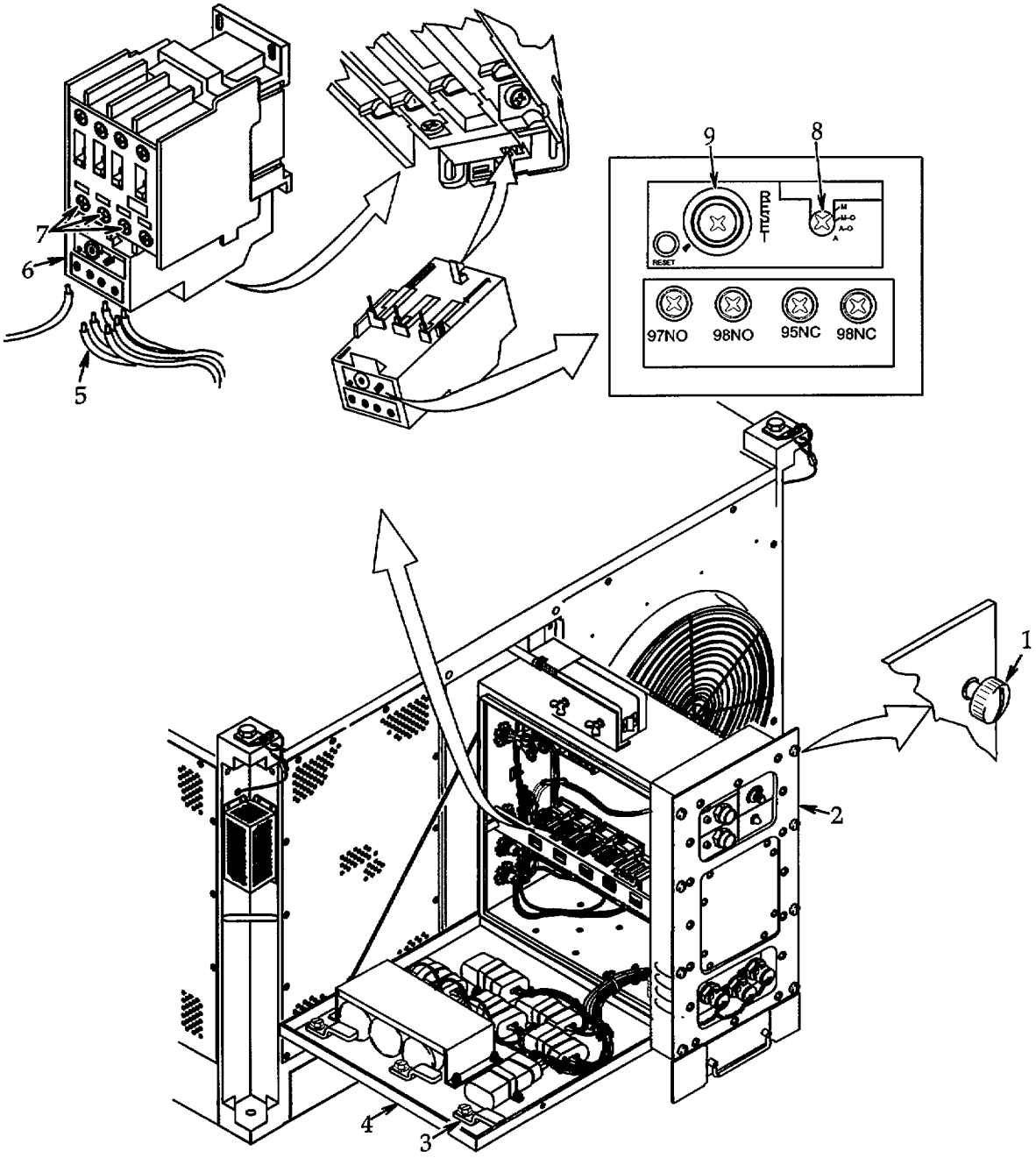


Figure 4-30. Overload Relays (K7 & K8).

4.32 LARGE OVERLOAD RELAY (K6) REPLACEMENT (FDECU-2 AND FDECU-3 ONLY).

THIS TASK COVERS: a. **Removal** b. **Installation**

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 4) Item 10, Appendix G Marker Tags (qty 5) Item 3, Section II, Appendix E

a. **Removal.** See figure 4-31.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Turn to release three latches (3) and open power box assembly cover (4).

(4) Tag and disconnect three wire leads (5) from power distribution block (6) and pull them out of large overload relay (7).

(5) Tag and disconnect two wire leads (8) from large overload relay (7).

(6) Remove four screws (9), lock washers (10), flat washers (11), and large overload relay (7). Discard lock washers.

b. **Installation.** See figure 4-31.

(1) Install large overload relay (7) and align mounting holes. Secure with four flat washers (11), new lock washers (10), and screws (9). Place the amperage dial (12) to 44 and push reset button (13).

(2) Connect two wire leads (8) to large overload relay (7) per tags and wiring diagram figure 4-14. Remove tags.

(3) Pass three wire leads (5) through large overload relay (7) and connect to power distribution block (6) per tags and wiring diagram figure 4-14. Remove tags.

(4) Close power box assembly cover (4) and turn three latches (3) to secure.

(5) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(6) Connect FDECU main power cable to power source and operate per paragraph 2.4.

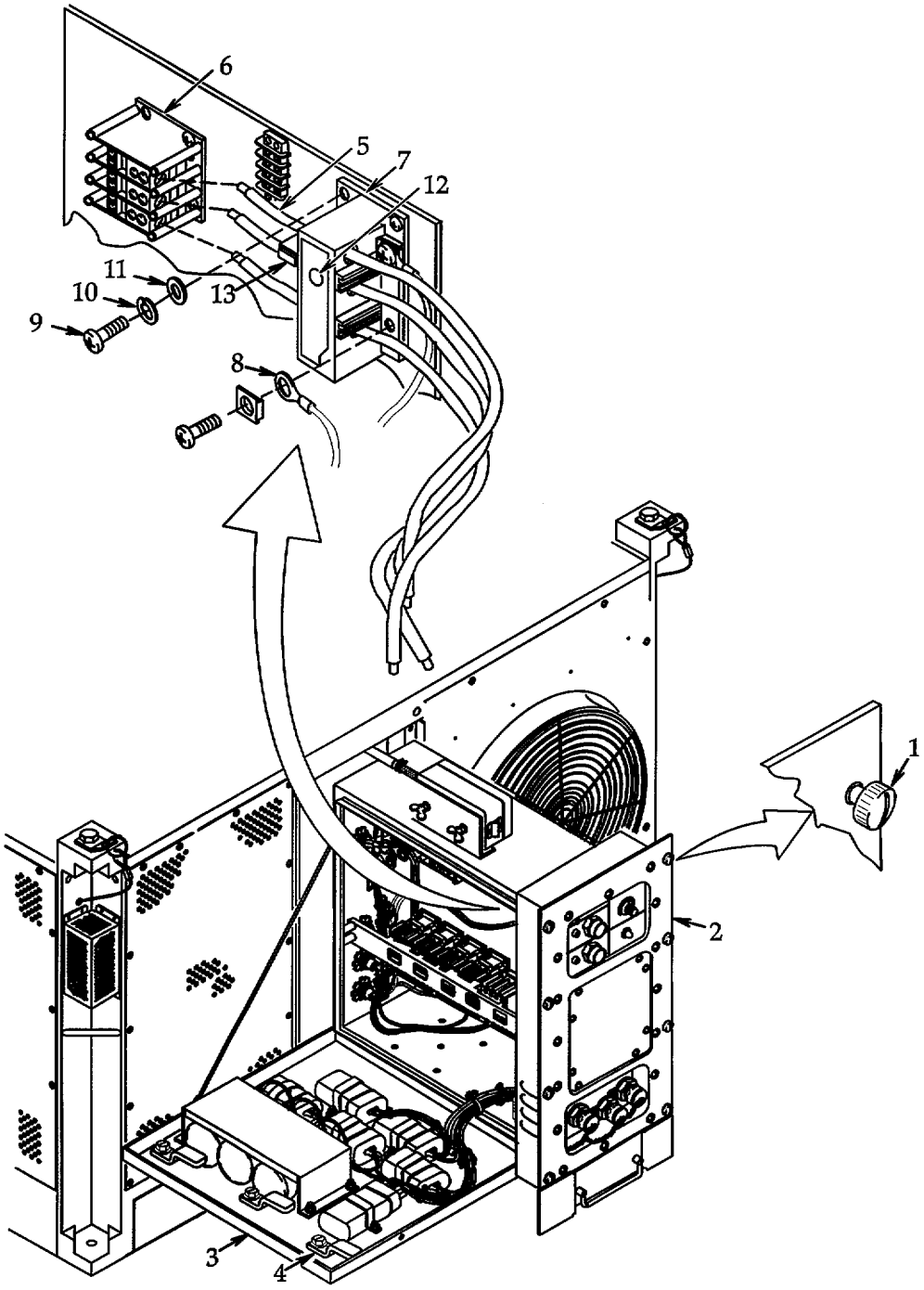


Figure 4-31. Overload Relay (K6) (FDECU-2 and FDECU-3 only).

4.33 ELECTRICAL ASSEMBLY MOUNTING BRACKET AND SLIDE REPAIR OR REPLACEMENT.

THIS TASK COVERS:	a. Removal	b. Disassembly	c. Assembly	d. Installation

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 20) Item 12, Appendix G

a. **Removal.** See figure 4-32.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(4) Turn to release three latches (3) and open power box assembly cover (4).

(5) Remove nut (5), lock washer (6), and flat washer (7) to disconnect power box assembly ground strap (8) from frame. Discard lock washer.

(6) Support electrical assembly (2) then remove eight nuts (9), lock washers (10), flat washers (11), screws (12), and flat washers (13). Discard lock washers. Close power box assembly cover (4) and turn three latches (3) to secure. Support electrical assembly as necessary then slide bracket (14) back into unit.

(7) Remove 11 screws (15), lock washers (16), flat washers (17), and mounting bracket (18) assembly. Discard lock washers.

NOTE

Repair is limited to replacement of missing or damaged components. The following disassembly and assembly procedures provide for complete repair. Disassemble only to extent necessary.

b. **Disassembly.** See figure 4-32.

NOTE

If the following components are to be reused, the attaching hardware must be retained for use during assembly.

(1) Remove two nuts (19), lock washers (20), flat washers (21), and handle (22).

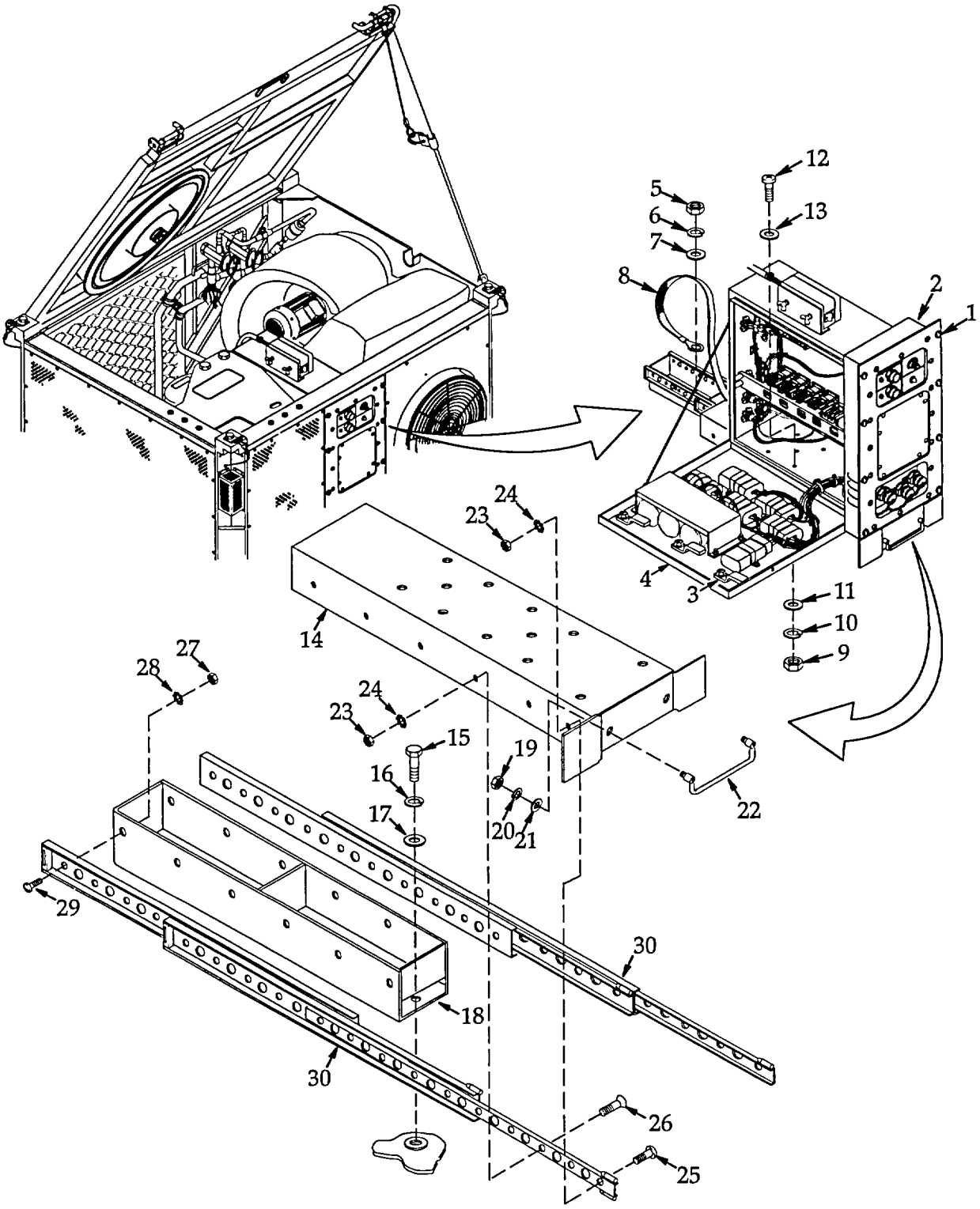


Figure 4-32. Electrical Assembly Mounting Bracket and Slide.

4.33 **ELECTRICAL ASSEMBLY MOUNTING BRACKET AND SLIDE REPAIR OR REPLACEMENT - CONTINUED.**

NOTE

The slides are mounted to the bracket using a mixture of pan head and countersunk screws. Note the location of these different screw types for proper assembly.

(2) Remove 10 nuts (23), lock washers (24), three pan head screws (25), two countersunk screws (26), and bracket (14).

(3) Remove 12 nuts (27), lock washers (28), screws (29), and two slides (30) from mounting bracket (18).

c. **Assembly.** See figure 4-32.

(1) Install two slides (30) onto mounting bracket (18) and align mounting holes. Secure with 12 screws (29), lock washers (28), and nuts (27).

(2) Install bracket (14) and align mounting holes. Locate mounting hardware as noted during disassembly then secure with three pan head screws (25), two countersunk screws (26), 10 lock washers (24), and nuts (23).

(3) Install handle (22), and secure using two flat washers (21), lock washers (20), and nuts (19).

d. **Installation.** See figure 4-32.

(1) Install mounting bracket (18) assembly and align mounting holes. Secure using 11 flat washers (17), new lock washers (16), and screws (15).

(2) Support electrical assembly (2) then turn to release three latches (3) and open power box assembly cover (4). Pull bracket (14) out from unit then carefully place electrical assembly on bracket and align mounting holes. Install eight flat washers (13), screws (12), flat washers (11), new lock washers (10), and nuts (9) to secure electrical assembly to bracket.

(3) Connect power box assembly ground strap (8) to frame with flat washer (7), new lock washer (6), and nut (5).

(4) Close power box assembly cover (4) and turn three latches (3) to secure.

(5) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(6) Lower and secure cover per paragraph 4.2.

(7) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.34 MAGNETIC PROXIMITY SWITCH (S1) REPLACEMENT.

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 2) Item 3, Section II, Appendix E Lock Washers (qty 2) Item 8, Appendix G Tiedown Straps (qty 3) Item 2, Section II, Appendix E Splices (qty 2) Item 5, Section II, Appendix E

a. **Removal.** See figure 4-33.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Cut and remove three tiedown straps (1) securing magnetic proximity switch (2) leads. Discard tiedown straps.

(4) Tag the magnetic proximity switch (2) leads at connection points then cut off and discard two splices (3) to disconnect leads.

(5) Remove two nuts (4), lock washers (5), flat washers (6), screws (7), flat washers (8), and magnetic proximity switch (2). Discard lock washers.

b. **Installation.** See figure 4-33.

(1) Install magnetic proximity switch (2) and align mounting holes. Secure with two flat washers (8), screws (7), flat washers (6), new lock washers (5), and nuts (4).

(2) Connect wire leads with two splices (3) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(3) Secure magnetic proximity switch (2) leads with three tiedown straps (1). Cut to remove excess tiedown strap material.

(4) Lower and secure cover per paragraph 4.2.

(5) Connect FDECU to power source and operate per paragraph 4.4.

4.34 **MAGNETIC PROXIMITY SWITCH (S1) REPLACEMENT - CONTINUED.**

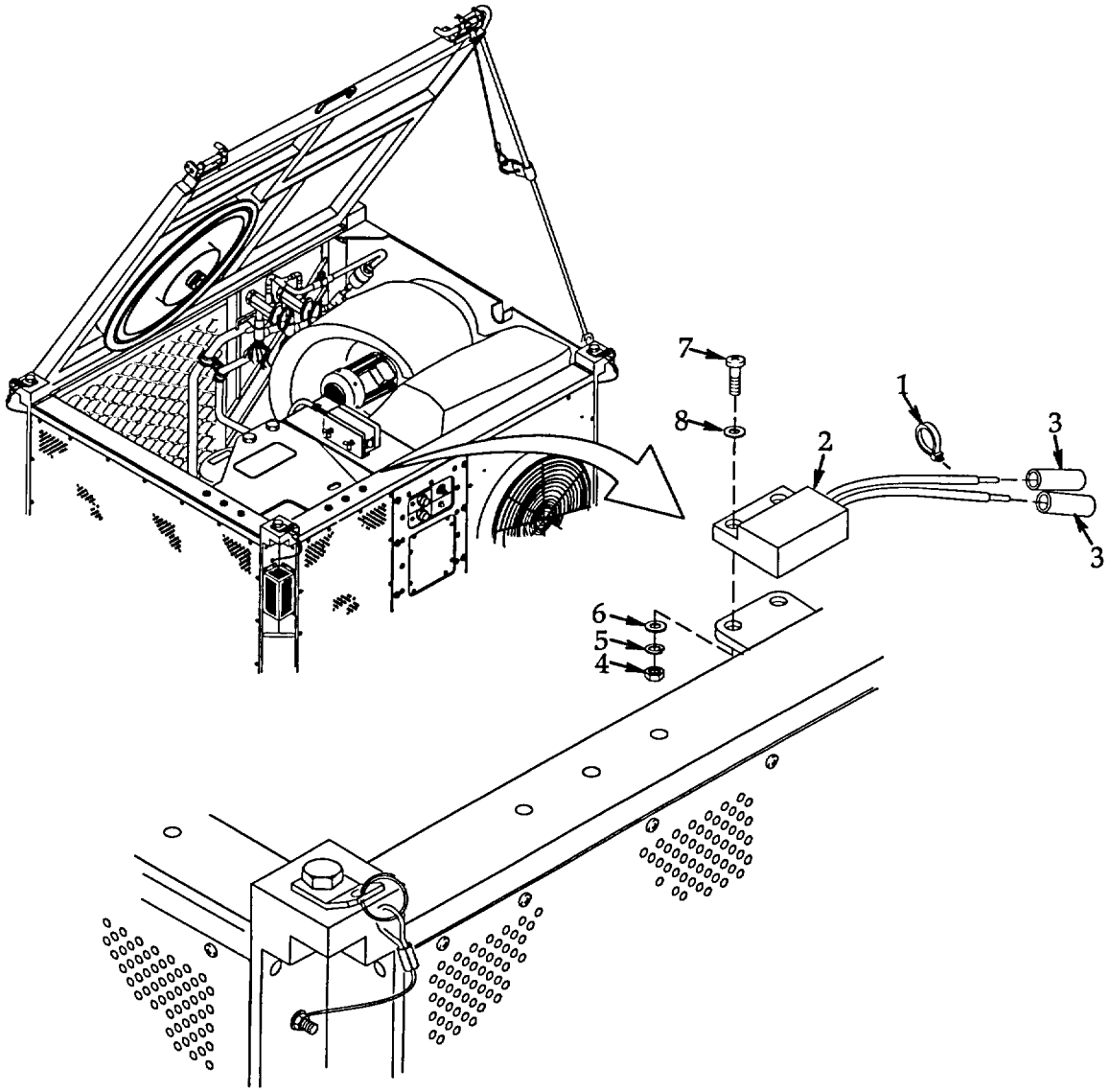


Figure 4-33. Magnetic Proximity Switch (S1).

4.35 TEMPERATURE SENSOR (RT5) REPLACEMENT.

THIS TASK COVERS **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B
Rivet Gun
Item 7, Section III, Appendix B

Materials/Parts

Marker Tags (qty 2)
Item 3, Section II, Appendix E
Blind Rivets (qty 8)
Item 6, Section II, Appendix E
Tiedown Straps (qty 2)
Item 2, Section II, Appendix E
Splices (qty 2)
Item 5, Section II, Appendix E

a. **Removal.** See figure 4-34.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Cut and remove tiedown strap (1) securing temperature sensor (2) leads. Discard tiedown strap.

(4) Tag the temperature sensor (2) leads at connection points then cut off and discard two splices (3) to disconnect leads.

(5) Drill out eight blind rivets (4) using drill with drill bit slightly smaller than rivet diameter. Remove sensor cover (5) and any remaining rivet material.

(6) Cut and remove tiedown strap (6) securing temperature sensor (2) then pull leads through hole in frame to remove. Discard tiedown strap.

b. **Installation.** See figure 4-34.

(1) Carefully push temperature sensor (2) leads through hole in frame.

(2) Secure temperature sensor (2) in place with tiedown strap (6). Cut to remove excess tiedown strap material.

4.35 **TEMPERATURE SENSOR (RT5) REPLACEMENT - CONTINUED.**

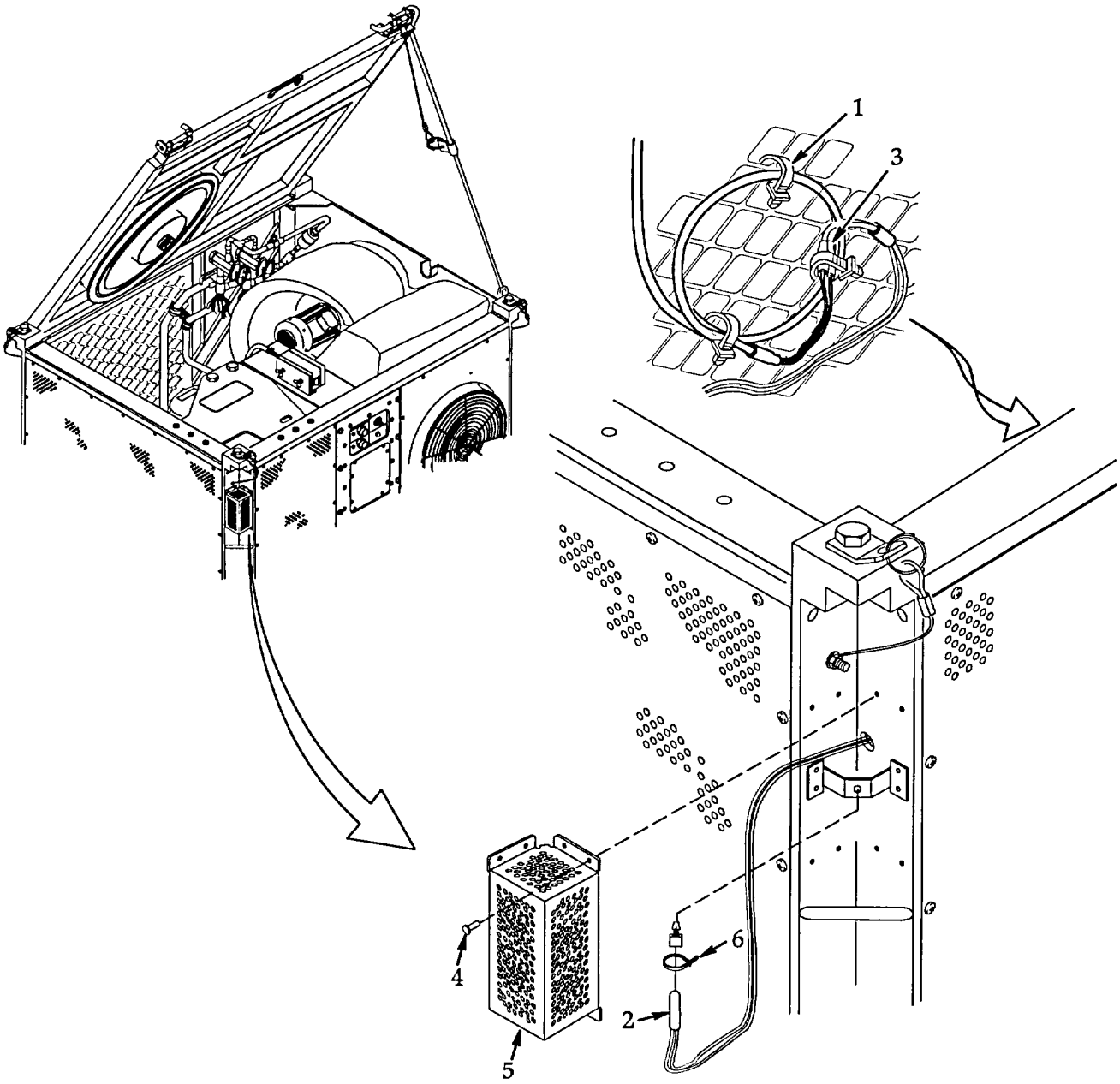


Figure 4-34. Temperature Sensor (RT5).

(3) Connect temperature sensor (2) leads with two splices (3) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cable using tiedown strap (1). Cut to remove excess tiedown strap material.

(4) Install sensor cover (5) and secure with eight blind rivets (4).

(5) Lower and secure cover per paragraph 4.2.

(6) Connect FDECU to power source and operate per paragraph 2.4.

4.36 **REMOTE BOX ASSEMBLY REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools
General Mechanics Tool Kit
Item 1, Section III, Appendix B

Materials/Parts
Lock Washers (qty 16)
Item 10, Appendix G
Lock Washer
Item 9, Appendix G
Lock Washers (qty 2)
Item 1, Appendix G
Tiedown Straps (qty 4)
Item 2, Section II, Appendix E

a. **Removal.** See figure 4-35.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(4) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(5) Turn to release three latches (7) and open power box assembly cover (8).

(6) Cut and remove four tiedown straps (9) securing cable assembly (10). Discard tiedown straps.

(7) Release connector (11) lock and disconnect from circuit board (12).

(8) Remove nut (13), lock washer (14), flat washer (15), terminal (16), lock washer (17), screw (18), and lock washer (19). Discard lock washers.

(9) Loosen and remove locking nut (20) by sliding off end of cable assembly (10). Bend connector (11) wire leads over to remove locking nut.

(10) Carefully pull cable assembly (10) out through control box chassis (21) hole. Bend connector (11) wire leads over so connector can pass through control box chassis hole.

(11) Install sealing washer (22) and locking nut (20) onto strain relief fitting (23).

4.36 **REMOTE BOX ASSEMBLY REPLACEMENT - CONTINUED.**

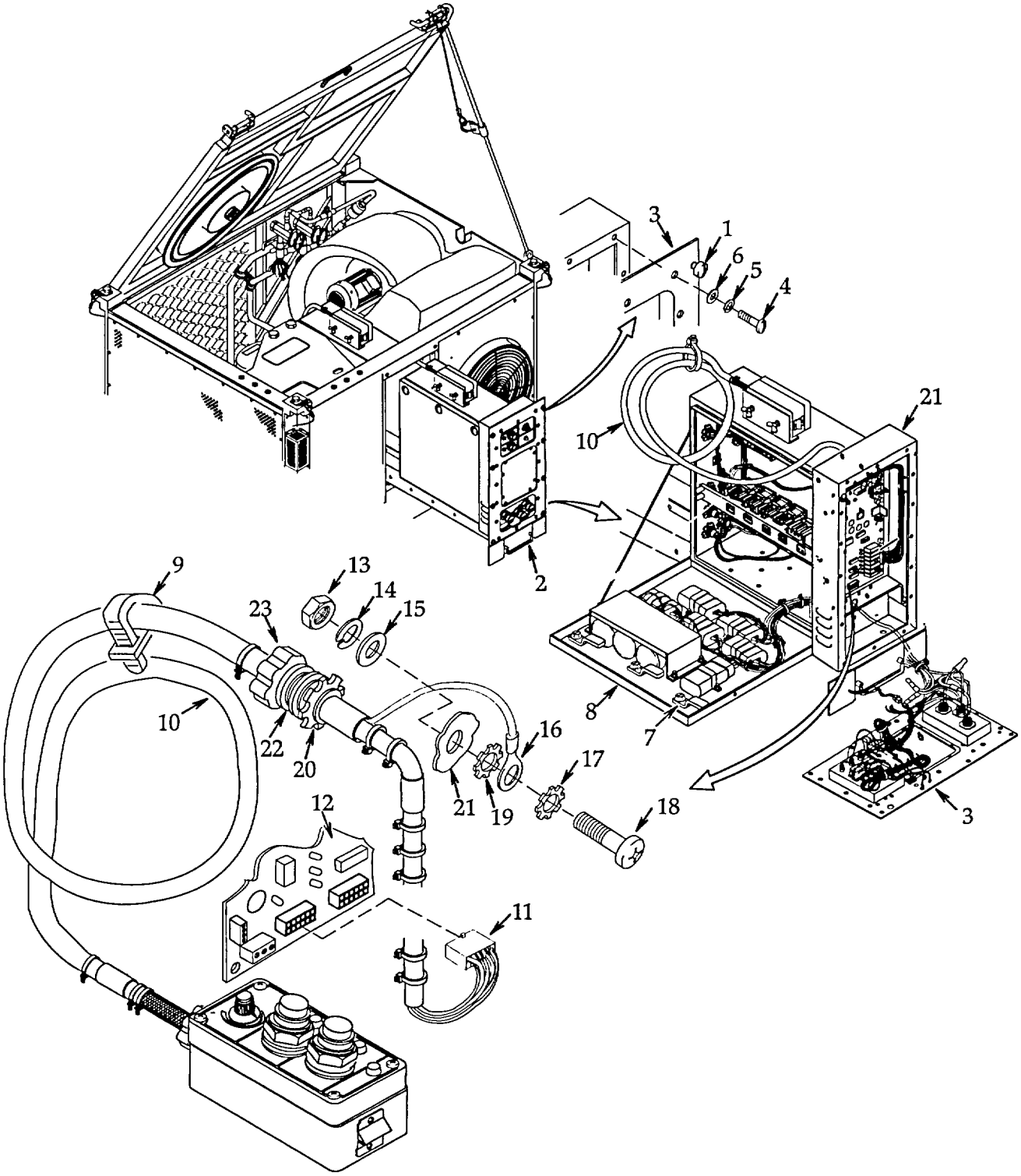


Figure 4-35. Remote Box Assembly.

b. **Installation.** See figure 4-35.

(1) Install and secure locking nut (20) onto strain relief fitting (23).

(2) Be sure sealing washer (22) is on strain relief fitting (23) then carefully push cable assembly (10) through control box chassis (21) hole. Carefully bend connector (11) wire leads over so connector can pass through control box chassis hole.

(3) Loosen and remove locking nut (20) by sliding off end of cable assembly (10). Carefully bend connector (11) wire leads over to remove locking nut.

(4) Install new lock washer (19), screw (18), new lock washer (17), terminal (16), flat washer (15), new lock washer (14), and secure with nut (13).

(5) Align connector (11) to mating circuit board (12) connector and push in place until lock engages.

(6) Secure cable assembly (10) with four tiedown straps (9). Cut to remove excess tiedown strap material.

(7) Close power box assembly cover (8) and turn three latches (7) to secure.

(8) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(9) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(10) Lower and secure cover per paragraph 4.2.

(11) Connect FDECU to power source and operate per paragraph 2.4.

4.37 **TEMPERATURE SENSOR (RT1) REPLACEMENT.**

THIS TASK COVERS	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools
General Mechanics Tool Kit
Item 1, Section III, Appendix B
Heat Gun
Item 6, Section III, Appendix B

Materials/Parts
Marker Tags (qty 2)
Item 3, Section II, Appendix E
Lock Washers (qty 2)
Item 8, Appendix G
Tiedown Strap
Item 2, Section II, Appendix E
Insulation Sleeving (qty 2)
Item 23, Figure F-2, Section III, Appendix F
Insulation Sleeving
Item 21, Figure F-2, Section III, Appendix F

a. **Removal.** See figure 4-36.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

4.37 **TEMPERATURE SENSOR (RT1) REPLACEMENT - CONTINUED.**

(2) Loosen four captive screws (1) then separate remote box (2) halves and lay it open being careful not to damage wire leads.

(3) Cut and remove tiedown strap (3) securing temperature sensor (4) leads. Discard tiedown straps.

(4) Tag and cut temperature sensor (4) leads at solder connections. Remove and discard insulation sleeving (5) pieces from wire lead ends.

(5) Remove two screws (6), lock washers (7), flat washers (8), and cover (9). Discard lock washers.

(6) Pull temperature sensor (4) leads through hole in remote box (2) to remove.

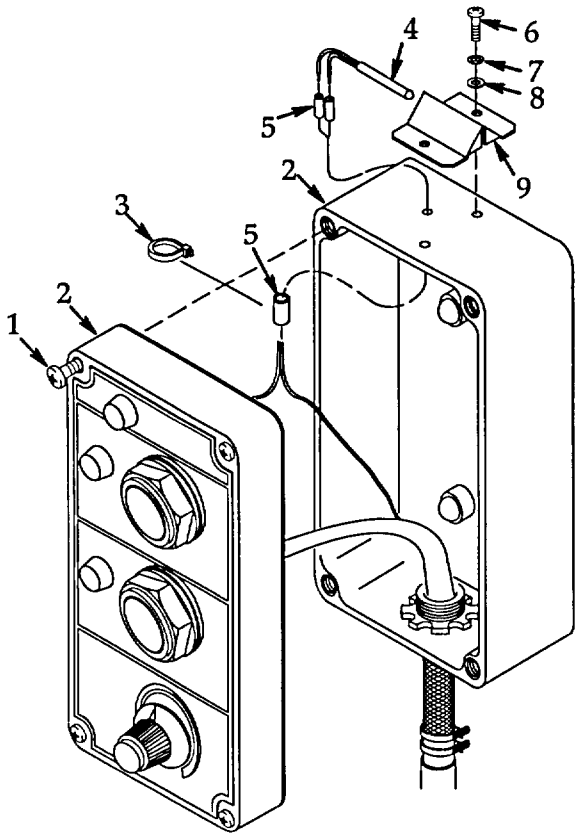


Figure 4-36. Temperature Sensor (RT1).

b. **Installation.** See figure 4-36.

(1) Carefully push temperature sensor (4) leads through hole in remote box (2).

(2) Slide one piece of insulation sleeving (5) over each temperature sensor (4) lead. Connect leads using tags and wiring diagram figure 4-14. Solder connections per paragraph 4.16 then slide insulation sleeving over each connection and heat to shrink in place using heat gun. Remove tags.

(3) Lay temperature sensor (4) over and place cover (9) over it. Align cover mounting holes and secure using two flat washers (8), new lock washers (7) and screws (6).

(4) Secure temperature sensor (4) leads with tiedown strap (3). Cut to remove excess tiedown strap material.

(5) Assemble remote box (2) halves being sure that no wire leads are pinched. Secure with four captive screws (1).

(6) Connect FDECU to power source and operate per paragraph 2.4.

4.38 **LIGHT EMITTING DIODES (FDECU-2 DS1 THRU DS3) (UNITS AFTER FDECU-2 DS2 AND DS3) REPLACEMENT.**

THIS TASK COVERS: a. **Removal** b. **Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B
Heat Gun
Item 6, Section III, Appendix B

Materials/Parts

Marker Tags (qty 2)
Item 3, Section II, Appendix E
Insulation Sleeving (qty 2)
Item 21, Figure F-2, Section III, Appendix F
Tiedown Straps (qty 2)
Item 2, Section II, Appendix E

a. **Removal.** See figure 4-37.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen four captive screws (1) then separate remote box (2) halves and lay it open being careful not to damage wire leads.

(3) Cut and remove two tiedown straps (3) securing light emitting diode (4) leads. Discard tiedown straps.

(4) Tag and cut light emitting diode (4) leads at solder connections. Remove and discard insulation sleeving (5) pieces from wire lead ends.

(5) Remove nut (6), lock washer (7), light emitting diode (4) and sealing washer (8).

b. **Installation.** See figure 4-37.

(1) Be sure sealing washer (8) is on light emitting diode (4) then install light emitting diode and secure using lock washer (7) and nut (6).

(2) Slide one piece of insulation sleeving (5) over each light emitting diode (4) lead. Connect leads using tags and wiring diagram figure 4-14. Solder connections per paragraph 4.16 then slide insulation sleeving over each connection and heat to shrink in place using heat gun. Remove tags.

(3) Secure light emitting diode (4) leads with two tiedown straps (3). Cut to remove excess tiedown strap material.

4.38 **LIGHT EMITTING DIODES (FDECU-2 DS1 THRU DS3) (UNITS AFTER FDECU-2 DS2 AND DS3) REPLACEMENT - CONTINUED.**

(4) Assemble remote box (2) halves being sure that no wire leads are pinched. Secure with four captive screws (1).

(5) Connect FDECU to power source and operate per paragraph 2.4.

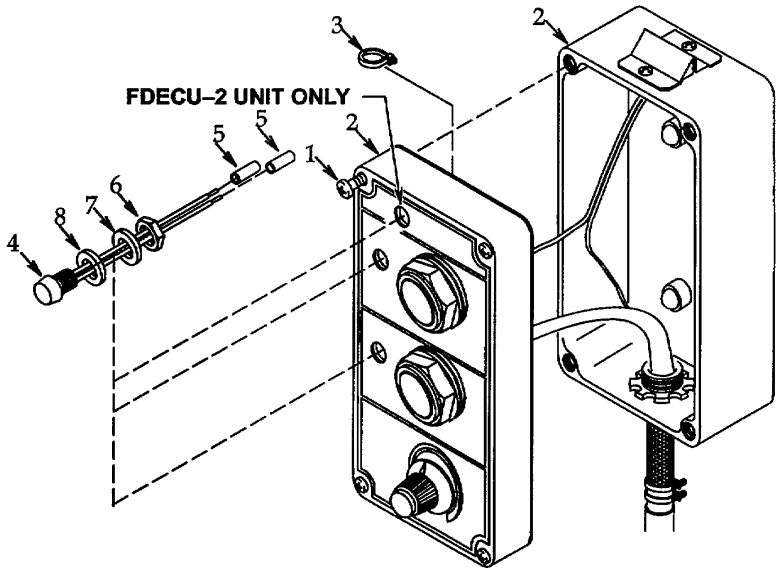


Figure 4-37. Light Emitting Diodes (FDECU-2 DS1 thru DS3) (Units After FDECU-2 DS2 ad DS3).

4.39 **PUSH BUTTON SWITCHES (S1 & S2) REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 3) Item 3, Section II, Appendix E

a. **Removal.** See figure 4-38.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen four captive screws (1) then separate remote box (2) halves and lay it open being careful not to damage wire leads.

(3) Tag wire leads (3). Loosen two screws (4) then remove three terminals (5).

(4) Remove nut (6), push button switch (7), and sealing washer (8).

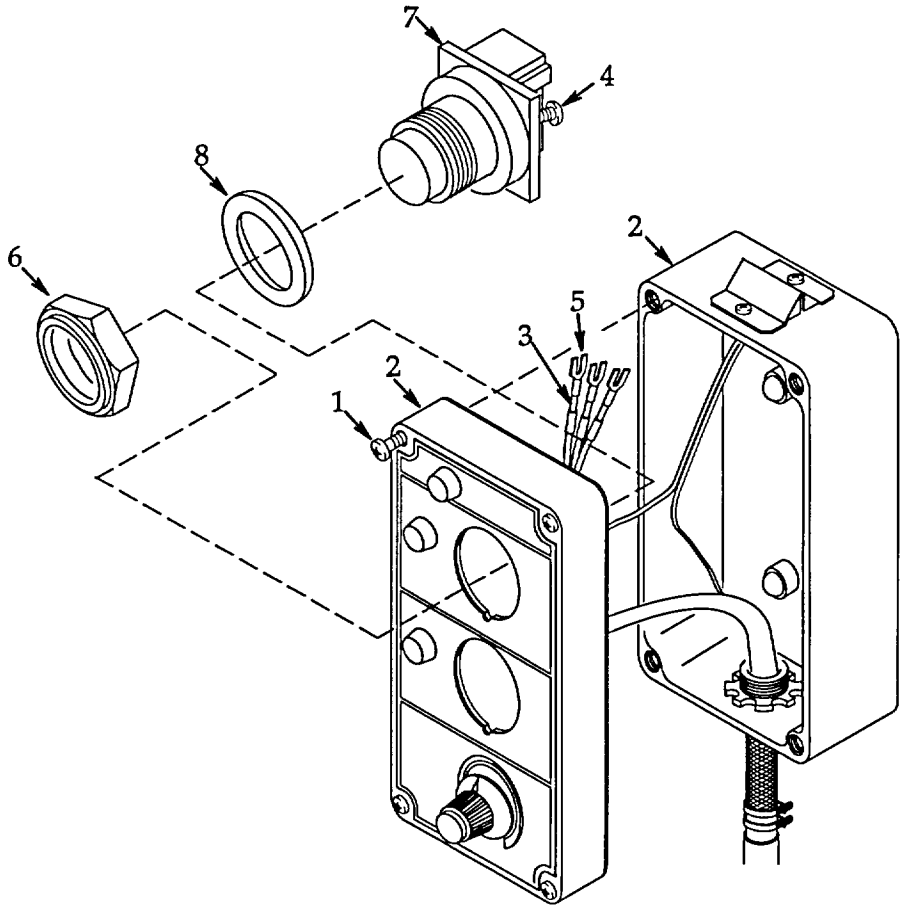


Figure 4-38. Push Button Switches (S1 & S2).

b. **Installation.** See figure 4-38.

(1) Be sure sealing washer (8) is on push button switch (7) then install push button switch. Align anti-rotation key with notch in sealing washer and panel then secure using nut (6).

(2) Loosen two screws (4) then install three terminals (5) using tags and wiring diagram figure 4-14. Secure by tightening screws. Remove tags.

(3) Assemble remote box (2) halves being sure that no wire leads are pinched. Secure with four captive screws (1).

(4) Connect FDECU to power source and operate per paragraph 2.4.

4.40 **POTENTIOMETER (R1) REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B Heat Gun Item 6, Section III, Appendix B	Marker Tags (qty 3) Item 3, Section II, Appendix E Insulation Sleeving (qty 3) Item 25, Figure F-2, Section III, Appendix F

a. **Removal.** See figure 4-39.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen four captive screws (1) then separate remote box (2) halves and lay it open being careful not to damage wire leads.

(3) Remove and discard three pieces of insulation sleeving (3). Tag and unsolder three leads (4) per paragraph 4.16.

(4) Loosen two set screws (5) and remove knob (6).

(5) Remove nut (7), lock washer (8), flat washer (9), and potentiometer (10).

b. **Installation.** See figure 4-39.

(1) Install potentiometer (10) and align anti-rotation pin. Secure using flat washer (9), lock washer (8), and nut (7).

(2) Rotate potentiometer (10) shaft to position it at mid-point then install knob (6) with pointer at mid-point and secure by tightening two set screws (5).

(3) Slide one piece of insulation sleeving (3) over each lead (4). Connect leads using tags and wiring diagram figure 4-14. Solder connections per paragraph 4.16 then slide insulation sleeving over each connection and heat to shrink in place using heat gun. Remove tags.

(4) Assemble remote box (2) halves being sure that no wire leads are pinched. Secure with four captive screws (1).

(5) Connect FDECU to power source and operate per paragraph 2.4.

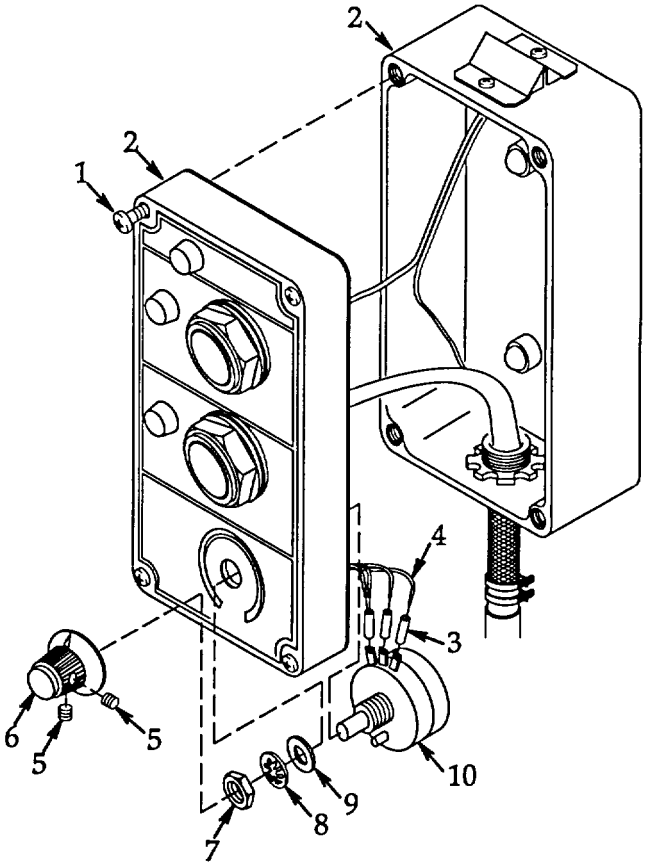


Figure 4-39. Potentiometer (R1).

4.41 **CONTROL BOX ASSEMBLY REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 16) Item 10, Appendix G Lock Washers (qty 11) Item 9, Appendix G Marker Tags (qty 70) Item 3, Section II, Appendix E Crimp Nuts (qty 6) Item 4, Section II, Appendix E Splices (qty 8) Item 5, Section II, Appendix E Tiedown Straps (qty 6) Item 1, Section II, Appendix E Tiedown Straps (qty 23) Item 2, Section II, Appendix E

a. **Removal.** See figure 4-40.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(4) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow.

(5) Turn to release three latches (7) and open power box assembly cover (8).

(6) Remove two screws (9) and compressor cover (10).

(7) Remove remote box assembly per paragraph 4.36.

(8) Remove heater assembly per paragraph 4.46.

(9) Tag and disconnect high temperature cutouts (S4 and S5) leads (11) inside volute assembly (12).

(10) Cut two each tabs (13) with tab housings (14) off cable leads and discard.

(11) Remove locking nut (15) then pull cable (16) with strain relief fitting (17) out. Install locking nut to retain sealing washer (18).

(12) Loosen compression nut (19) then slide strain relief fitting (17) off cable (16). Pull cable through lanyard (20) then slide strain relief fitting onto cable far enough to leave one inch of the cable extending from the strain relief fitting and tighten compression nut.

(13) Locate the three cables (21) inside compressor (22) that go to low pressure cutout switch (23) (S2), high pressure cutout switch (24) (S3), and (FDECU-2 ONLY) crankcase temperature sensor (25) (RT4). Tag the leads at these connection points then cut off and discard six crimp nuts (26) to disconnect leads. Pull all three cables out of compressor. Cut and discard 10 large tiedown straps (27) securing cables.

(14) Locate the two cables (28) that go to cover switch (29) (S1) and outdoor temperature sensor (30) (RT5). Tag the leads at these connection points then cut off and discard four splices (31) to disconnect leads. Cut and discard two large tiedown straps (32) and two small tiedown straps (33) securing cables.

(15) Locate the cable (34) that goes to indoor temperature sensor (35) (RT2) located on volute assembly (12). Tag the leads at this connection point then cut off and discard two splices (36) to disconnect leads. Cut and discard six large tiedown straps (37) securing cable.

(16) Locate the cable (38) that goes to outside coil temperature sensor (39) (RT3). Tag the leads at this connection point then cut off and discard two splices (40) to disconnect leads. Cut and discard two large tiedown straps (41) and three small tiedown straps (42) securing cable.

(17) Locate the four wire leads (43) that go to NBC blower outlets (44) 01, J2, and J3) then cut and discard the three large tiedown straps (45) securing them inside power box assembly (46). Tag the wire leads then disconnect and pull them from power box assembly. Pull terminal grommets (47) back onto wire leads of the three NBC blower outlets to expose solder connections. Tag wire leads and unsolder per paragraph 4.16. Remove terminal grommets from wire leads and install back onto NBC blower outlets. Retain wire leads for use during installation.

(18) Cut and discard small tiedown strap (48) securing 10 blue wire leads (49) to control box assembly (50). Tag each of these wire leads inside the power box assembly (46). Disconnect each of these wire leads from the circuit board (51) then pull them into the power box assembly.

(19) Tag eight orange wire leads (52) inside the power box assembly (46). Disconnect each of these wire leads from the circuit board (51) then pull them into the power box assembly.

(20) Remove three grommets (53).

(21) Support control box assembly (50) them remove 11 nuts (54), lock washers (55), flat washers (56), screws (57), lock washers (58), flat washers (59), and control box assembly. Discard lock washers.

4.41 **CONTROL BOX ASSEMBLY REPLACEMENT - CONTINUED.**

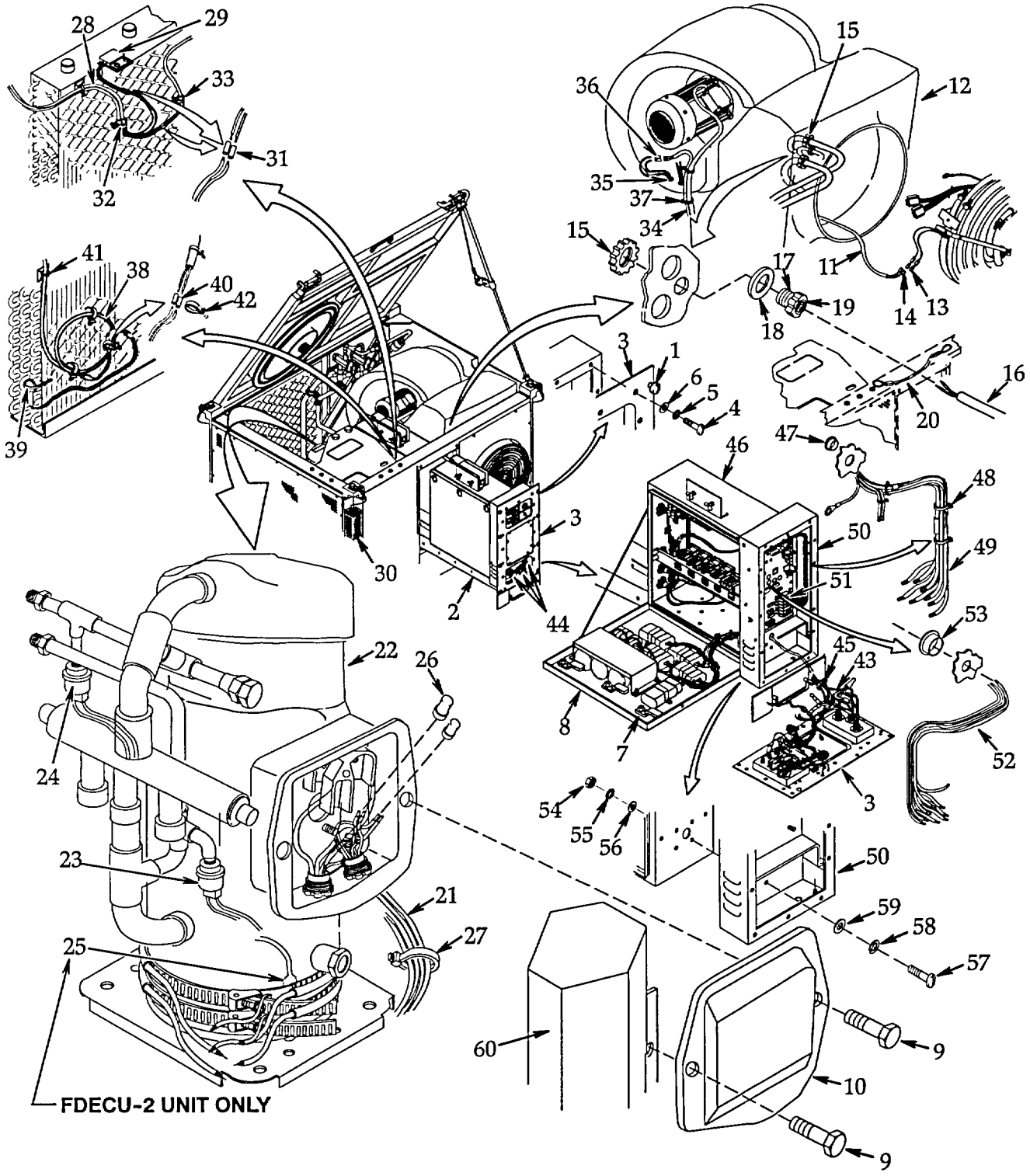


Figure 4-40. Control Box Assembly.

b. **Installation.** See figure 4-40.

(1) Support control box panel (3) then remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(2) Support control box assembly (50) in place then align mounting holes and secure with 11 flat washers (59), lock washers (58), screws (57), flat washers (56), new lock washers (55), and nuts (54).

(3) Install three grommets (53).

(4) Push eight orange wire leads (52) into control box assembly (50). Connect each of the wire leads to circuit board (51) using tags and wiring diagram figure 4-14. Remove tags.

(5) Push the 10 blue wire leads (49) into control box assembly (50). Connect each of the wire leads to circuit board (51) using tags and wiring diagram figure 4-14. Remove tags. Secure the wire leads to control box assembly using small tiedown strap (48). Cut to remove excess tiedown strap material.

(6) Remove terminal grommets (47) from the three NBC blower outlets (44) (J, J2, and J3) and install onto wire leads (43) using tags and wiring diagram figure 4-14. Solder wire leads onto three NBC blower outlets per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Slide terminal grommets onto the three NBC blower outlets. Insert the four remaining wire lead ends into power box assembly (46) then connect them using tags and wiring diagram figure 4-14. Remove tags. Secure wire leads in power box assembly using three large tiedown straps (45). Cut to remove excess tiedown strap material.

(7) Locate the cable (38) that goes to outside coil temperature sensor (39) (RT3). Connect wire leads with two splices (40) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cable using two large tiedown straps (41) and three small tiedown straps (42). Cut to remove excess tiedown strap material.

(8) Locate the cable (34) that goes to indoor temperature sensor (35) (RT2) located on volute assembly (12). Connect wire leads with two splices (36) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cable using six large tiedown straps (37). Cut to remove excess tiedown strap material.

(9) Locate the two cables (28) that go to cover switch (29) (S1) and outdoor temperature sensor (30) (RT5). Connect wire leads with four splices (31) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cables using two large tiedown straps (32) and two small tiedown straps (33). Cut to remove excess tiedown strap material.

(10) Insert the three cables (21) that go to low pressure cutout switch (23) (S2), high pressure cutout switch (24) (S3), and (FDECU-2 ONLY) crankcase temperature switch (25) (RT4) into compressor (22). Connect wire leads with six crimp nuts (26) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure cables using 10 large tiedown straps (27). Cut to remove excess tiedown strap material.

(11) Loosen compression nut (19) then slide strain relief fitting (17) off cable (16). Feed cable through lanyard (20) then slide strain relief fitting onto cable far enough to leave one inch of the cable extending from the strain relief fitting and tighten compression nut.

(12) Remove locking nut (15). With sealing washer (18) in place, install cable (16) with strain relief fitting (17) into volute assembly (12) and secure with locking nut.

(13) Install two new tab housings (14) onto cable wire lead tabs (13).

4.41 **CONTROL BOX ASSEMBLY REPLACEMENT - CONTINUED.**

(14) Using tags and wiring diagram figure 4-14, connect high temperature cutout leads (11). Remove tags.

(15) Install heater assembly per paragraph 4.46.

(16) Install remote box assembly per paragraph 4.36.

(17) Install compressor cover (10) under reversing valve guard (60) then align mounting holes and secure with two screws (9).

(18) Close power box assembly cover (8) and turn three latches (7) to secure.

(19) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(20) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(21) Lower and secure cover per paragraph 4.2.

(22) Connect FDECU to power source and operate per paragraph 2.4.

4.42 **POTENTIOMETER (R2) REPLACEMENT.**

THIS TASK COVERS	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B Heat Gun Item 6, Section III, Appendix B	Marker Tags (qty 3) Item 3, Section II, Appendix E Insulation Sleeving (qty 3) Item 25, Figure F-2, Section III, Appendix F Lock Washers (qty 16) Item 10, Appendix G

a. **Removal.** See figure 4-41.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(4) Remove and discard three pieces of insulation sleeving (7). Tag and unsolder three leads (8) per paragraph 4.16.

(5) Loosen two set screws (9) and remove knob (10).

(6) Remove nut (11), lock washer (12), flat washer (13), and potentiometer (14).

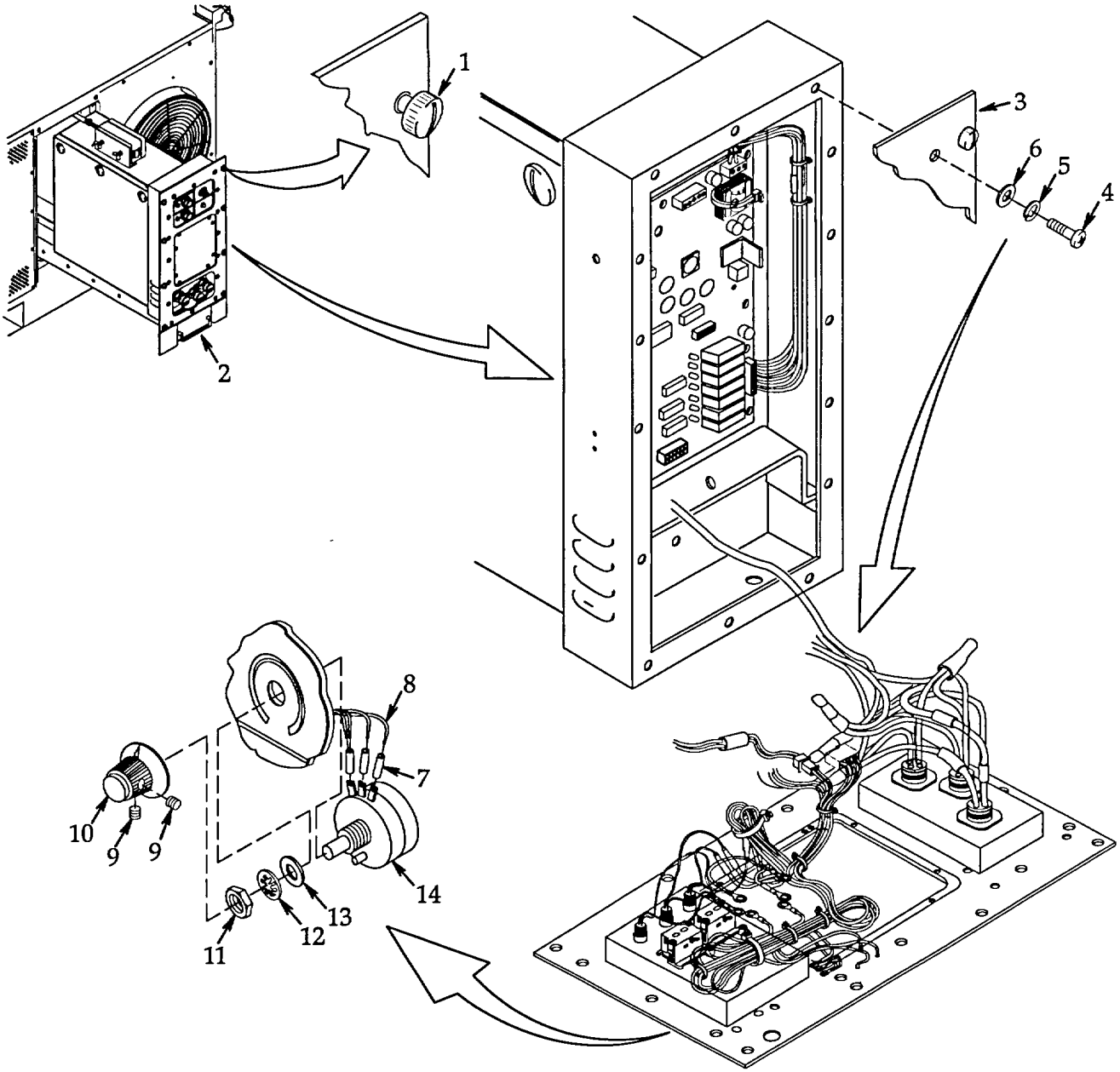


Figure 4-41. Potentiometer (R2).

b. **Installation.** See figure 4-41.

(1) Install potentiometer (14) and align anti-rotation pin. Secure using flat washer (13), lock washer (12), and nut (11).

(2) Rotate potentiometer (14) shaft to position it at mid-point then install knob (10) with pointer at mid-point and secure by tightening two set screws (9).

(3) Slide one piece of insulation sleeving (7) over each lead (8). Connect leads using tags and wiring diagram figure 4-14. Solder connections per paragraph 4.16 then slide insulation sleeving over each connection and heat to shrink in place using heat gun. Remove tags.

4.42 **POTENTIOMETER (R2) REPLACEMENT - CONTINUED.**

(4) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(5) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(6) Connect FDECU to power source and operate per paragraph 2.4.

4.43 **PUSH BUTTON SWITCHES (S4 & S5) REPLACEMENT.**

THIS TASK COVERS	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 3) Item 3, Section II, Appendix E Lock Washers (qty 16) Item 10, Appendix G

a. **Removal.** See figure 4-42.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(4) Tag wire leads (7). Loosen two screws (8) then remove wire leads.

(5) Remove nut (9), push button switch (10), and sealing washer (11).

b. **Installation.** See figure 4-42.

(1) Be sure sealing washer (11) is on push button switch (10) then install push button switch. Align anti-rotation key with notch in sealing washer and panel then secure using nut (9).

(2) Loosen two screws (8) then install three wire leads (7) using tags and wiring diagram figure 4-14. Secure by tightening screws. Remove tags.

(3) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(4) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(5) Connect FDECU to power source and operate per paragraph 2.4.

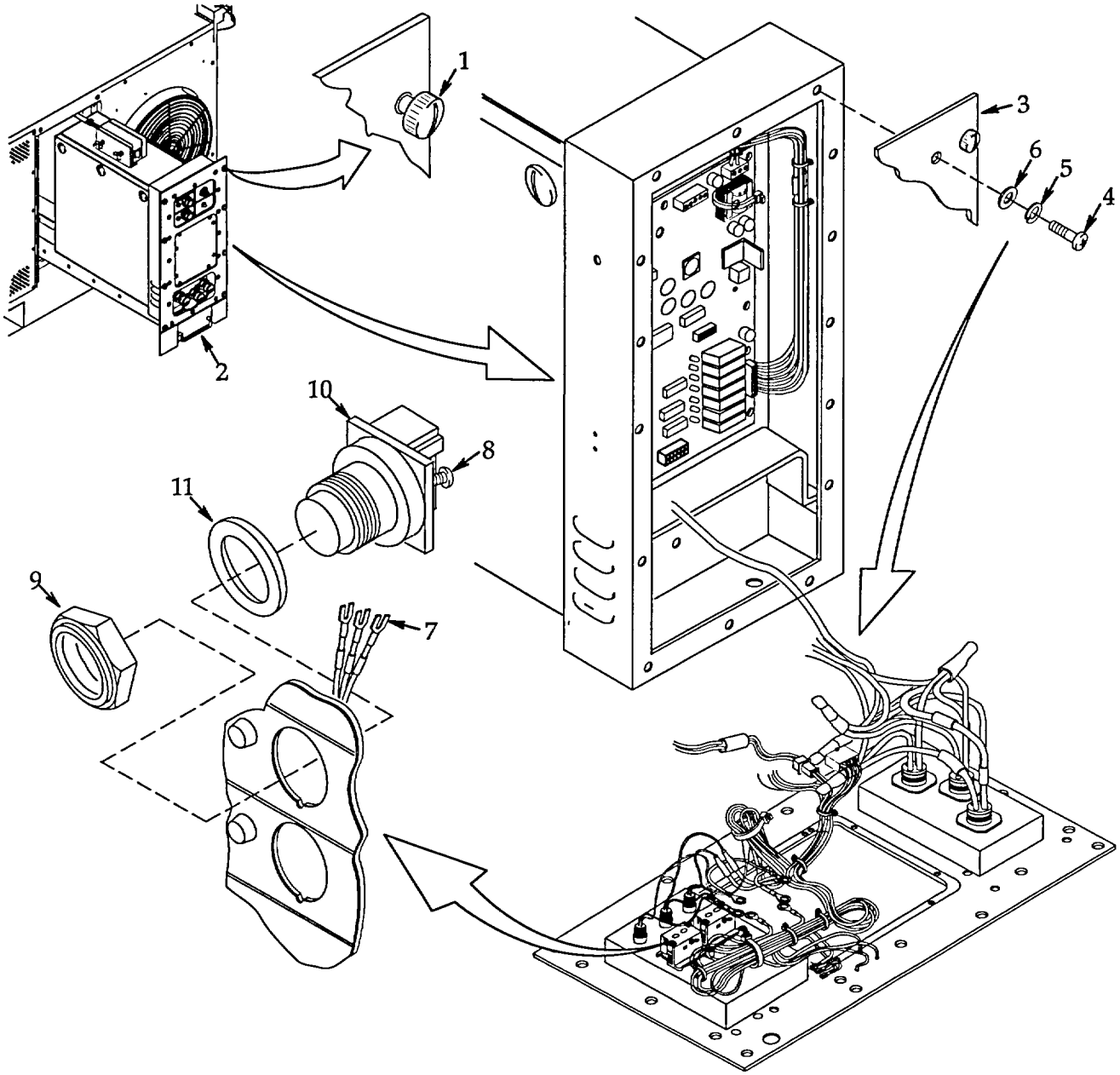


Figure 4-42. Push Button Switches (S4 & S5).

4.44 **TOGGLE SWITCH (S7) REPLACEMENT.**

THIS TASK COVERS	a. Removal	b. Installation

INITIAL SETUP:

Tools
General Mechanics Tool Kit
Item 1, Section III, Appendix B

Materials/Parts
Lock Washers (qty 16)
Item 10, Appendix G

Marker Tags (qty 3)
Item 3, Section II, Appendix E

a. **Removal.** See figure 4-43.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(4) Tag three wire leads (7). Loosen three screws (8) and remove wire leads.

(5) Remove toggle switch cover (9), nut (10), toggle switch (11), and anti-rotation ring (12).

b. **Installation.** See figure 4-43.

(1) Be sure anti-rotation ring (12) is on toggle switch (11) then install toggle switch. Align anti-rotation ring key with panel and secure using nut (10) and toggle switch cover (9).

(2) Loosen three screws (8) and install wire leads (7) using tags and wiring diagram figure 4-14. Secure by tightening screws. Remove tags.

(3) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(4) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(5) Connect FDECU to power source and operate per paragraph 2.4.

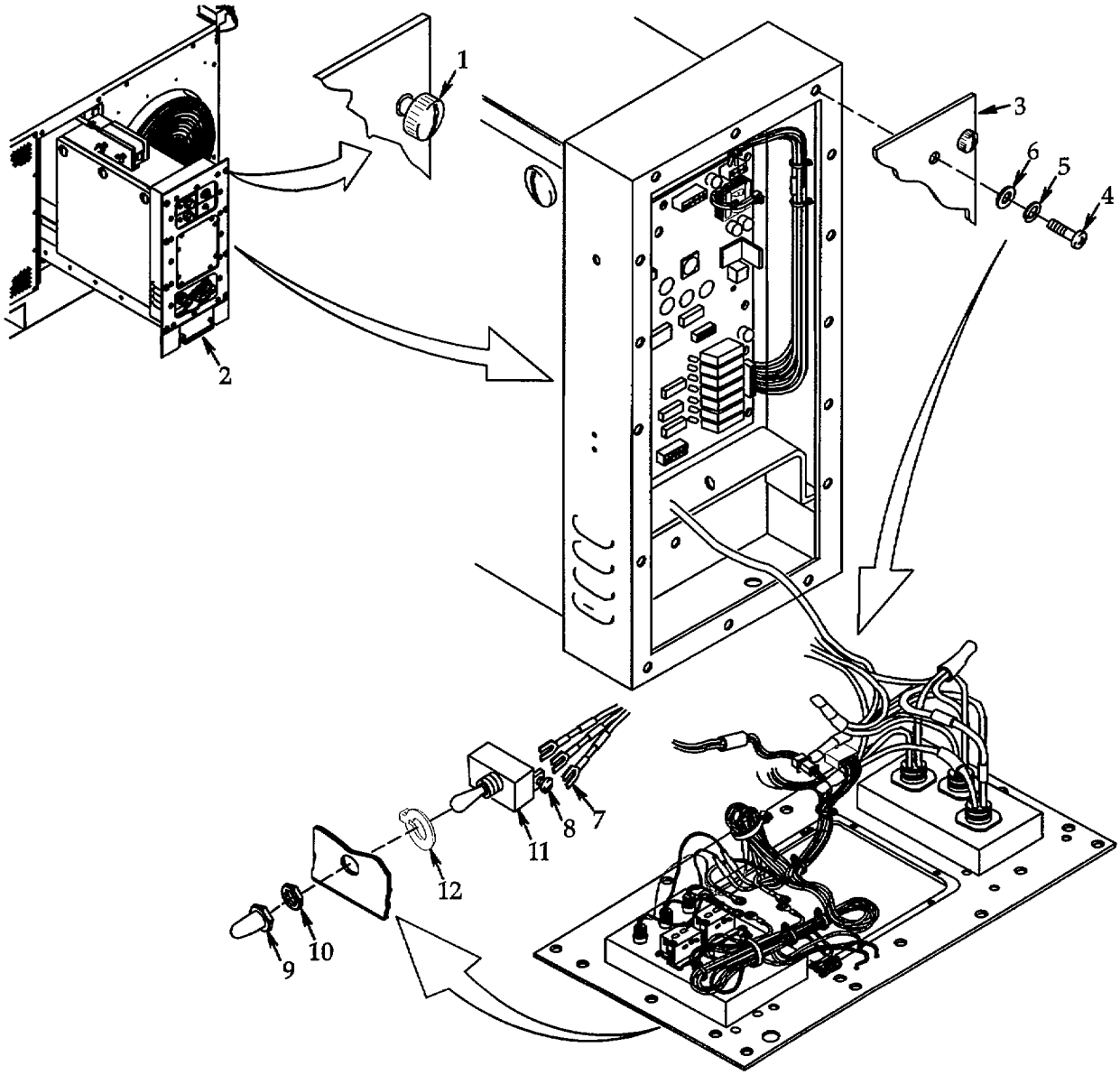


Figure 4-43. Toggle Switch (S7).

4.45 LIGHT EMITTING DIODES (FDECU-2 DS4 THRU DS6) (UNITS AFTER FDECU-2 DS5 AND DS6) REPLACEMENT.

THIS TASK COVERS: a. **Removal** b. **Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B
Heat Gun
Item 6, Section III, Appendix B

Materials/Parts

Marker Tags (qty 2)
Item 3, Section II, Appendix E
Insulation Sleeving (qty 2)
Item 26, Figure F-2, Section III, Appendix F
Tiedown Straps (qty 2)
Item 2, Section II, Appendix E
Lock Washers (qty 16)
Item 10, Appendix G

a. **Removal.** See figure 4-44.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.

(3) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.

(4) Cut and remove two tiedown straps (7) securing light emitting diode (8) leads. Discard tiedown straps.

(5) Tag and cut light emitting diode (8) leads at solder connections. Remove and discard insulation sleeving (9) pieces from wire lead ends.

(6) Remove nut (10) and light emitting diode (8) with sealing washer (11).

b. **Installation.** See figure 4-44.

(1) Be sure sealing washer (11) is on light emitting diode (8) then install light emitting diode and secure using nut (10).

(2) Slide one piece of insulation sleeving (9) over each light emitting diode (8) lead. Connect leads using tags and wiring diagram figure 4-14. Solder connections per paragraph 4.16 then slide insulation sleeving over each connection and heat to shrink in place using heat gun. Remove tags.

(3) Secure light emitting diode (8) leads with two tiedown straps (7). Cut to remove excess tiedown strap material.

(4) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).

(5) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).

(6) Connect FDECU to power source and operate per paragraph 2.4.

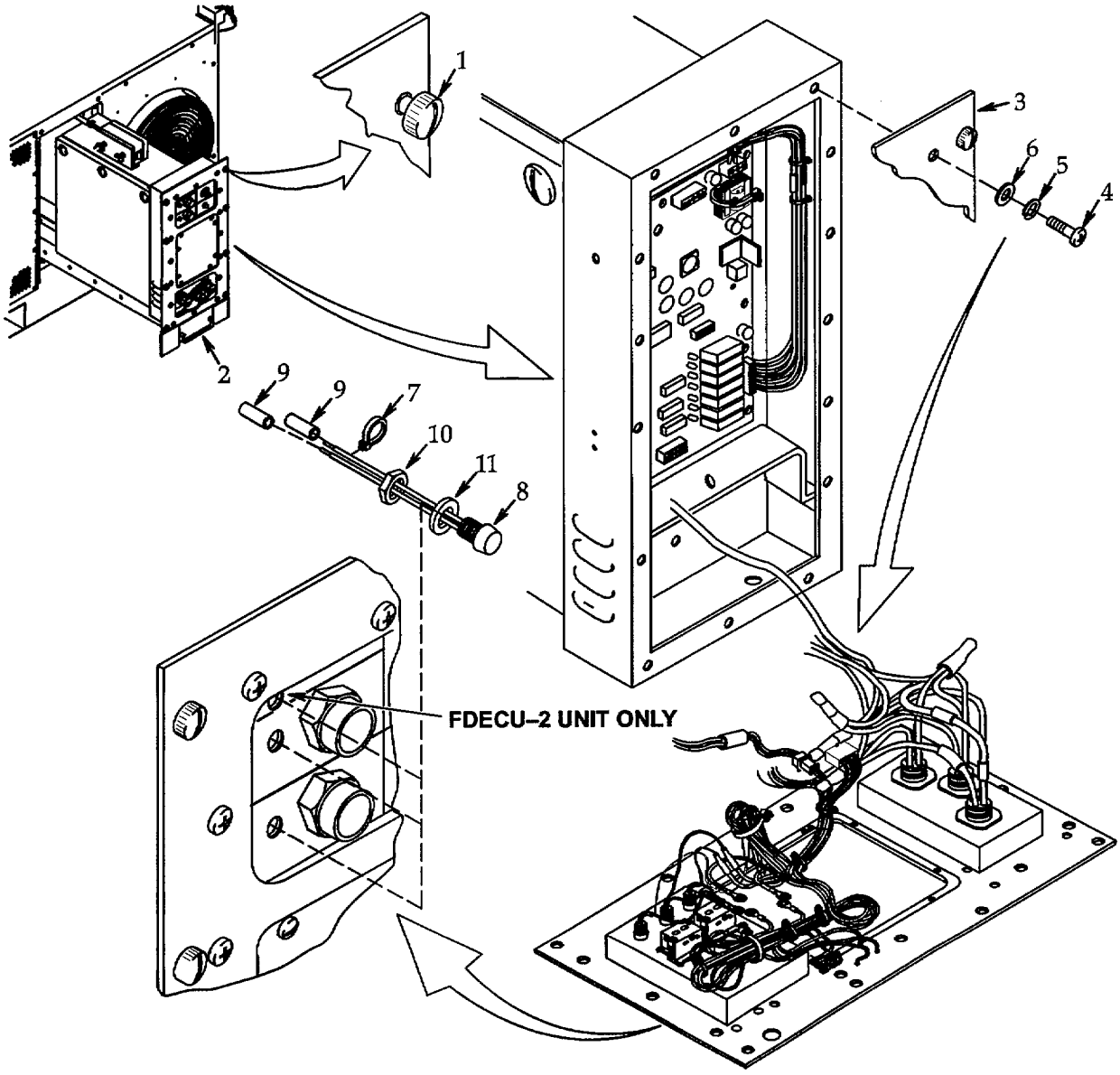


Figure 4-44. Light Emitting Diodes (FDECU-2 DS4 thru DS6) (Units After FDECU-2 DS5 and DS6).

4.46 **HEATER ASSEMBLY REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 8) Item 3, Section II, Appendix E Lock Washer Item 3, Appendix G Lock Washer Item 12, Appendix G Lock Washers (qty 8) Item 9, Appendix G

a. **Removal.** See figure 4-45.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) If duct is attached, remove per paragraph 4.57.

(3) Remove supply panel per paragraph 4.25.

(4) Pull quick release pin (1) if installed.

(5) If heater barrel (2) is pushed in, pull it out to operating position.

(6) Remove eight screws (3), lock washers (4), and flat washers (5). Remove finger guard (6). Discard lock washers.

(7) Remove three screws (7). Carefully pull heater assembly (8) out as far as wire leads will allow and support as necessary.

(8) Tag and disconnect high temperature cutout leads (9).

(9) Tag and disconnect heat bank leads (10).

(10) Remove nut (11), lock washer (12), flat washer (13), lock washer (14), and ground terminal (15). Discard lock washers. Heater assembly (8) may now be removed.

b. **Installation.** See figure 4-45.

(1) Support heater assembly (8) near heater barrel (2) as necessary to connect wire leads. Install ground terminal (15), new lock washer (14), flat washer (13), new lock washer (12), and nut (11).

(2) Using tags and wiring diagram figure 4-14, connect heat bank leads (10). Remove tags.

(3) Using tags and wiring diagram figure 4-14, connect high temperature cutout leads (9). Remove tags.

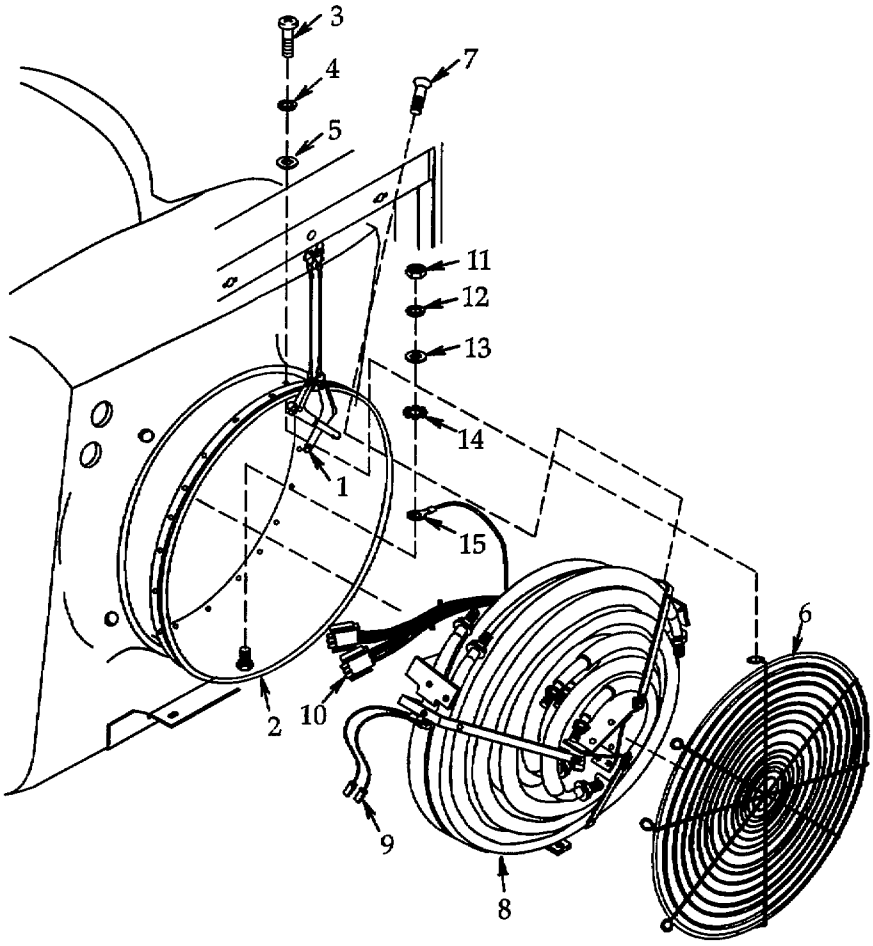


Figure 4-45. Heater Assembly.

CAUTION

Wire leads can become chaffed or burnt if they contact the heater assembly.

(4) Secure wire leads as necessary and position them so they will not touch the heater assembly (8) when heater barrel (2) is moved in or out. Install heater assembly inside heater barrel and align mounting holes so high temperature cutout is at the top. Secure with three screws (7).

(5) Install finger guard (6) inside heater barrel (2) and align mounting holes. Secure with eight flat washers (5), new lock washers (4), and screws (3).

(6) Position heater barrel (2) in or out as necessary. Insert quick release pin (1) if heater barrel is pushed in.

(7) Install supply panel per paragraph 4.25.

(8) Install duct if necessary per paragraph 4.4.6.

(9) Connect FDECU to power source and operate per paragraph 2.4.

4.47 **INSIDE BLOWER REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washer Item 14, Appendix G

a. **Removal.** See figure 4-46.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

(2) If duct is attached, remove per paragraph 4.57.

(3) Turn flange assembly (1) to unlock then remove it. Be sure filter (2) and, if applicable, return cover (3) are kept in flange assembly.

(4) Remove inlet bell (4).

(5) Remove jam nut (5), lock washer (6), flat washer (7), inside blower (8), and key (9). Discard lock washer.

b. **Installation.** See figure 4-46.

(1) Install key (9), and inside blower (8). Secure with flat washer (7), new lock washer (6), and jam nut (5). Torque jam nut to 40 ft lb.

(2) Install inlet bell (4). Spin inside blower (8) by hand and check that it spins freely and does not rub on inlet bell.

CAUTION

Return cover will obstruct air flow if installed in flange assembly during operation. Equipment damage can result if operated with return cover installed in flange assembly.

(3) Install flange assembly (1) in either direction as necessary, with filter (2), and if applicable, return cover (3) in place. Turn flange assembly to lock in place.

(4) Install supply panel per paragraph 4.25.

(5) Install duct if necessary per paragraph 4.4.6.

(6) Connect FDECU to power source and operate per paragraph 2.4.

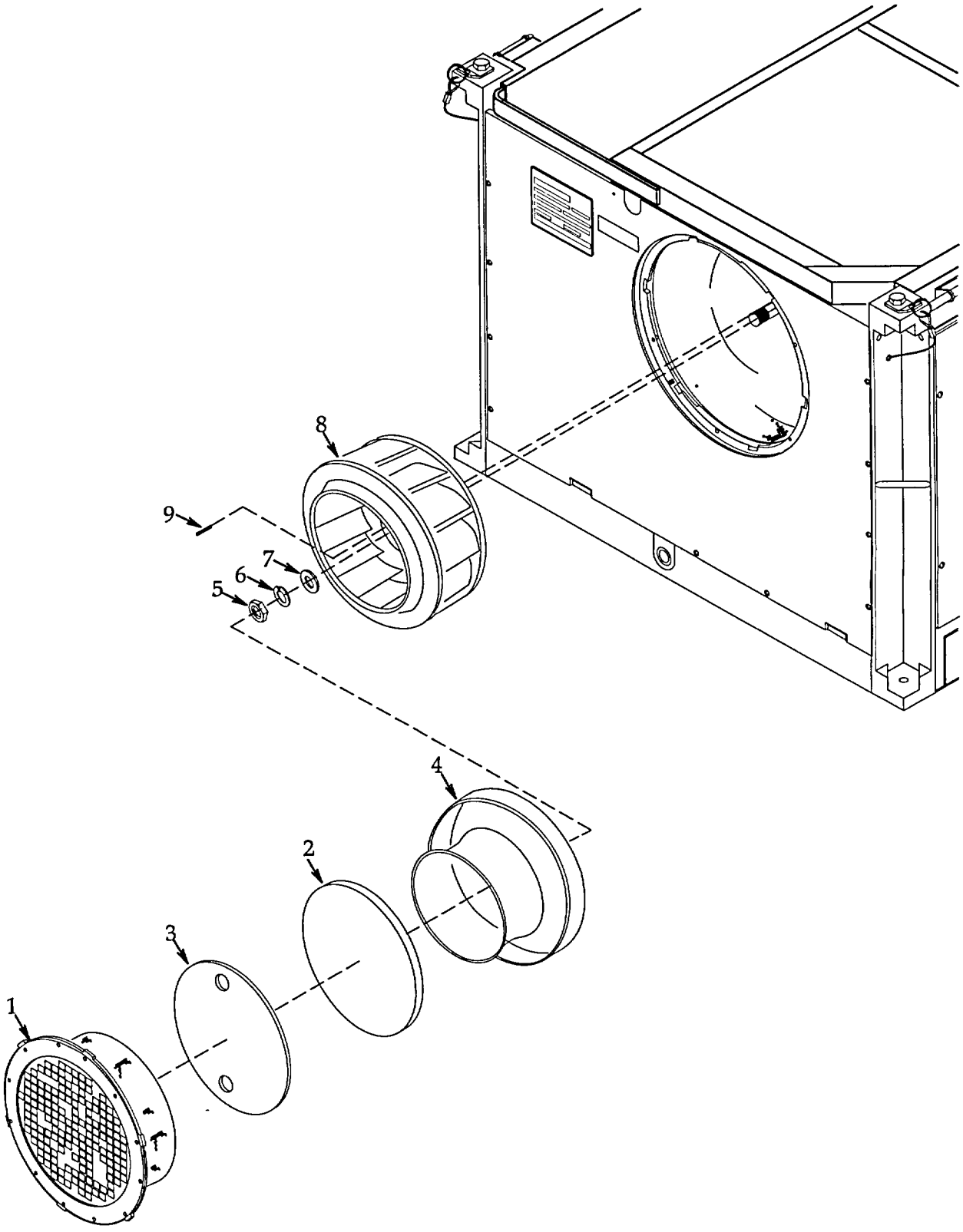


Figure 4-46. Inside Blower Assembly.

4.48 **INSIDE BLOWER MOTOR REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

Materials/Parts

Marker Tags (qty 7)
Item 3, Section II, Appendix E

Crimp Nuts (qty 5)
Item 4, Section II, Appendix E

a. **Removal.** See figure 4-47.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect main power cable from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.
(3) Remove four screws (1) and flat washers (2). Carefully pull inside blower motor cover (3) out as far as wire leads will allow.
(4) Tag four wire leads at inside blower motor connection points then cut off and discard three crimp nuts (4) to disconnect three power leads. Remove screw (5), lock washer (6), and flat washer (7) to disconnect the fourth, ground, lead.
(5) Remove locking nut (8) then pull cable (9) with strain relief fitting (10) out of inside blower motor cover (3). Install locking nut to retain sealing washer (11).
(6) Remove blower assembly per paragraph 4.47.
(7) Remove four screws (12), flat washers (13), and inside blower motor (14).

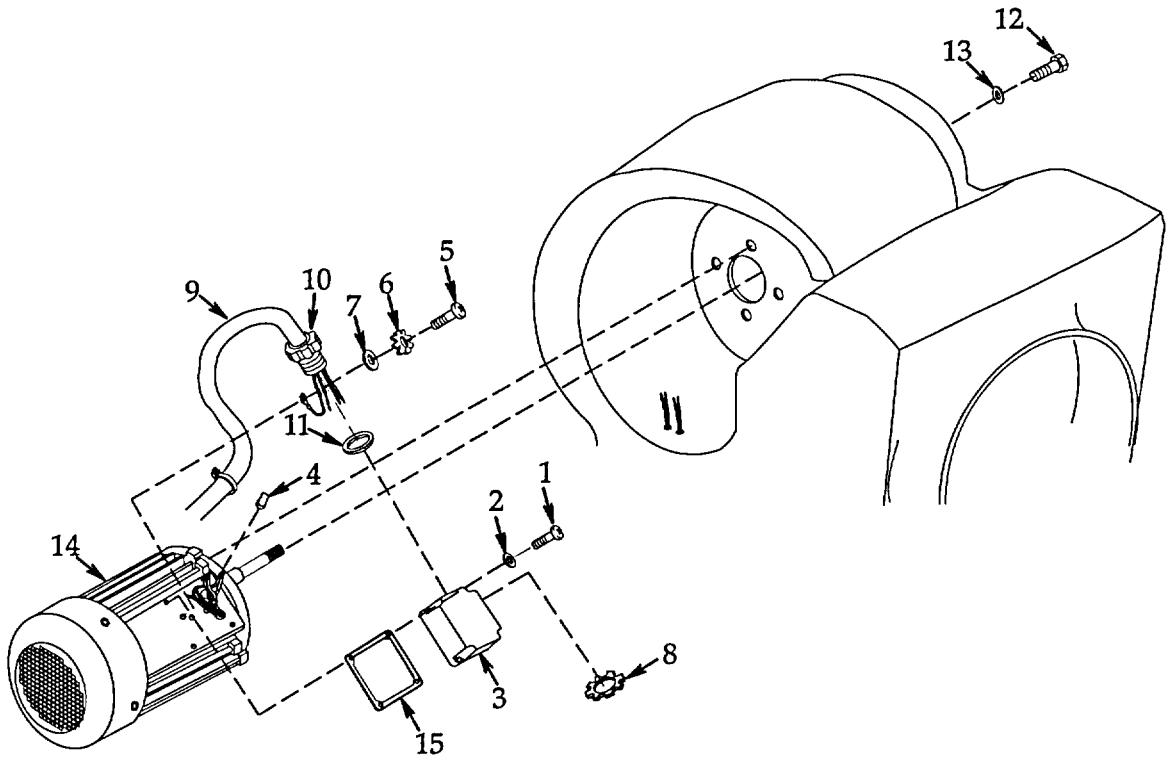


Figure 4-47. Inside Blower Motor.

b. **Installation.** See figure 4-47.

(1) Install inside blower motor (14) and orient as illustrated. Secure with four flat washers (13) and screws (12).
(2) Install blower assembly per paragraph 4.47.
(3) Remove four screws (1), flat washers (2), and inside blower motor cover (3).
(4) Remove locking nut (8). With sealing washer (11) in place, install cable (9) with strain relief fitting (10) into inside blower motor cover (3) and secure with locking nut. Be sure gasket (15) is in place on cover.
(5) Connect the ground wire lead at the inside blower motor connections point using flat washer (7), lock washer (6), and screw (5). Connect the remaining three power leads with three crimp nuts (4) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Connect the two remaining thermal overload leads together with crimp nut per paragraph 4.16.
(6) Install inside blower motor cover (3) then align mounting holes and secure with four flat washers (2), and screws (1).
(7) Lower and secure cover per paragraph 4.2.
(8) Connect FDECU main power cable to power source and operate per paragraph 2.4.

4.49 **CRANKCASE HEATERS (HR1 & HR8) REPLACEMENT (FDECU-2 ONLY).**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 2) Item 3, Section II, Appendix E Crimp Nuts (qty 2) Item 4, Section II, Appendix E

a. **Removal.** See figure 4-48.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.
(3) Remove two screws (1) and compressor cover (2).

NOTE

Both crankcase heaters are mounted the same way and the following procedures apply to either of them.

(4) Locate the two leads (3) inside compressor (4) that go to crankcase heater (5). Tag the leads then cut off and discard two crimp nuts (6) to disconnect leads. Pull leads out of compressor.
(5) Note crankcase temperature sensor (7) location then fully loosen clamp screw (8) and remove crankcase heater (5).

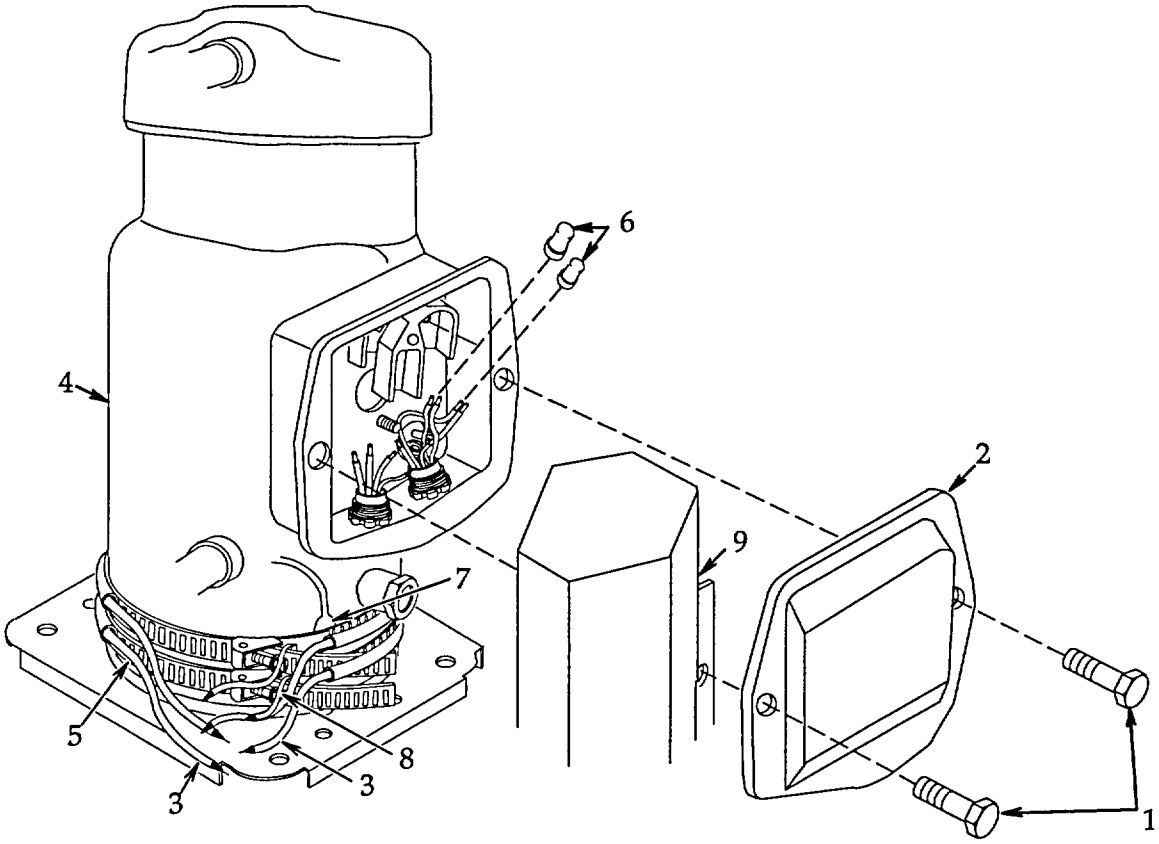


Figure 4-48. Crankcase Heaters (HR1 & HR8) (FDECU-2 ONLY).

b. **Installation.** See figure 4-48.

CAUTION

Crankcase heaters can be damaged if crankcase temperature sensor is not located properly. Be sure temperature sensor is located under heater clamp area and not under heater element area. If located under heater element area, the element will kink and can short internally.

(1) Place crankcase heater (5) around compressor (4). Be sure crankcase temperature sensor (7) is under clamp, as noted during removal, and not under heater element. Assemble crankcase heater clamp and tighten clamp screw (8) to secure.

(2) Insert the two leads (3) that go to crankcase heater (HR1 or HR8) (5) into compressor (4). Connect wire leads with four crimp nuts (6) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(3) Install compressor cover (2) under reversing valve guard (9) then align mounting holes and secure with two screws (1).

(4) Lower and secure cover per paragraph 4.2.

(5) Connect FDECU to power source and operate per paragraph 2.4.

4.50 CRANKCASE TEMPERATURE SENSOR (RT4) REPLACEMENT (FDECU-2 ONLY).

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 2) Item 3, Section II, Appendix E Crimp Nuts (qty 2) Item 4, Section II, Appendix E

a. **Removal.** See figure 4-49.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.
(3) Remove two screws (1) and compressor cover (2).
(4) Locate the two leads (3) inside compressor (4) that go to crankcase temperature sensor (5). Tag the leads then cut off and discard two crimp nuts (6) to disconnect leads. Pull leads out of compressor.
(5) Note crankcase heaters (7) and crankcase temperature sensor (5) location then loosen two clamp screws (8) enough to remove temperature sensor.

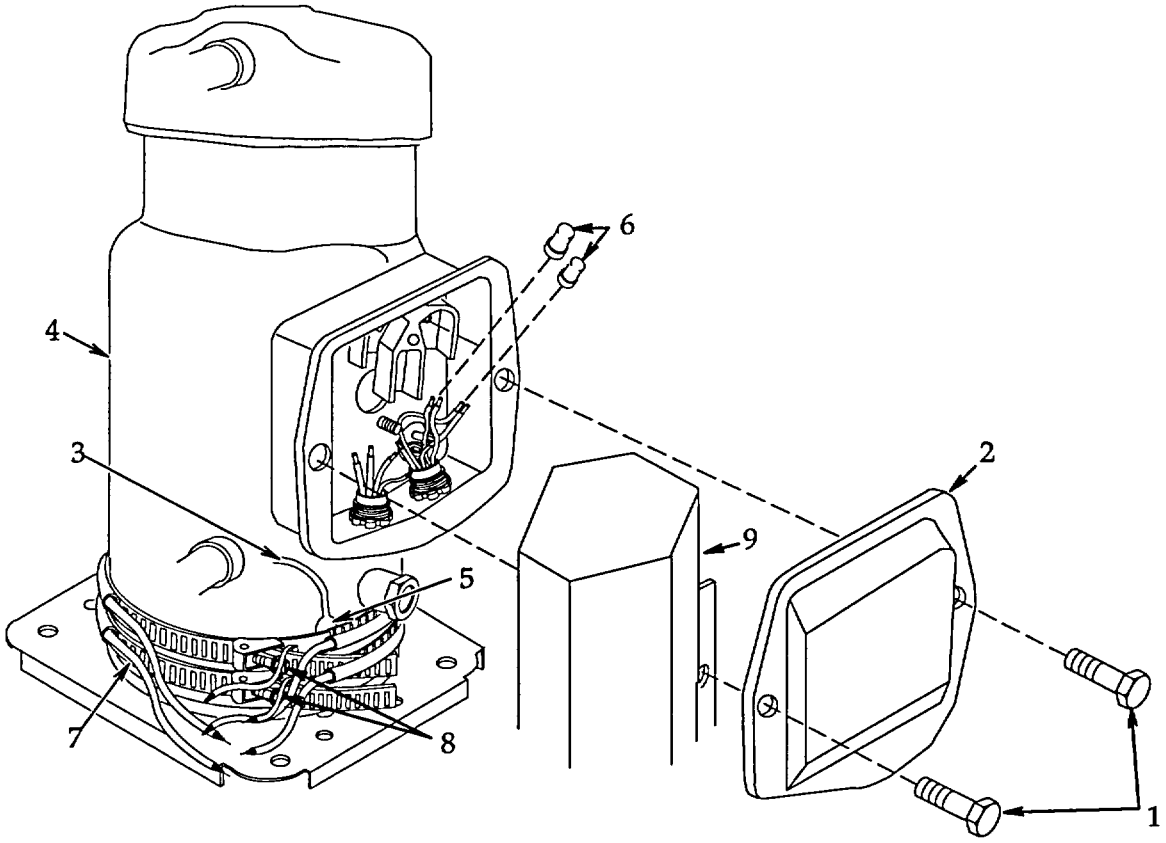


Figure 4-49. Crankcase Temperature Sensor (RT4) (FDECU-2 ONLY).

b. **Installation.** See figure 4-49.

CAUTION

Crankcase heaters can be damaged if crankcase temperature sensor is not located properly. Be sure temperature sensor is located under heater clamp area and not under heater element area. If located under heater element area, the element will kink and can short internally.

(1) Hold crankcase heaters (7) in position, as noted during removal, then place crankcase temperature sensor (5) under clamp, as noted during removal, and not under heater element. Tighten two clamp screws (8) to secure.

(2) Insert the two leads (3) that go to crankcase temperature sensor (5) into compressor (4). Connect wire leads with two crimp nuts (6) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.

(3) Install compressor cover (2) under reversing valve guard (9) then align mounting holes and secure with two screws (1).

(4) Lower and secure cover per paragraph 4.2.

(5) Connect FDECU to power source and operate per paragraph 2.4.

4.51 **OUTSIDE COIL TEMPERATURE SENSOR (RT3) REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Marker Tags (qty 4) Item 3, Section II, Appendix E Splices (qty 2) Item 5, Section II, Appendix E Tiedown Strap Item 1, Section II, Appendix E Tiedown Straps (qty 2) Item 2, Section II, Appendix E

a. **Removal.** See figure 4-50.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.

(3) Cut and discard two large tiedown straps (1) securing outside coil temperature sensor leads (2). Tag the temperature sensor leads at the connection points then cut off and discard two splices (3) to disconnect leads.

(4) Cut and discard small tiedown strap (4) securing outside coil temperature sensor (5) to coil then remove.

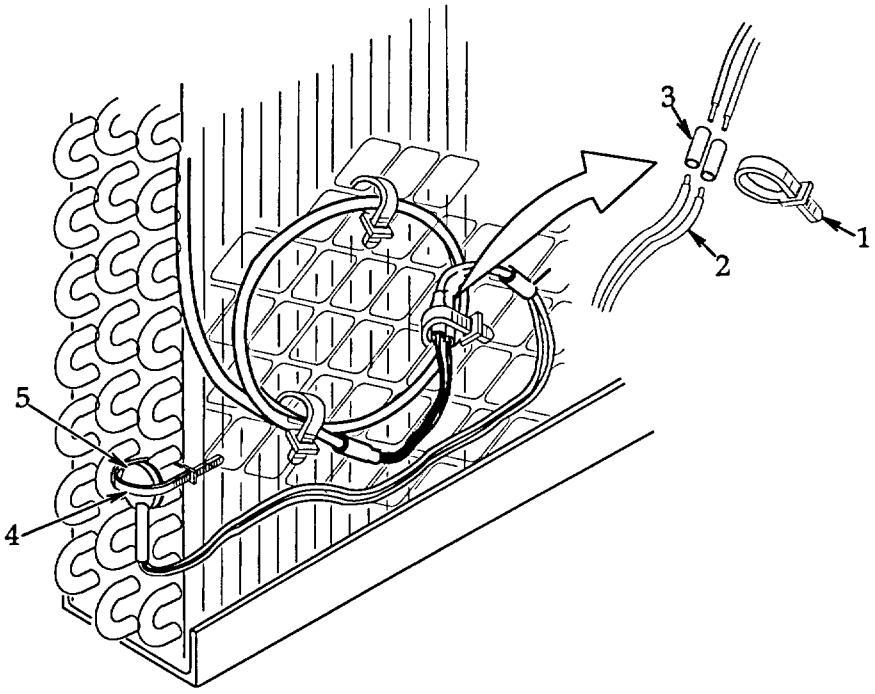


Figure 4-50. Outside Coil Temperature Sensor (RT3).

b. **Installation.** See figure 4-50.

(1) Secure outside coil temperature sensor (5) to coil using small tiedown strap (4). Cut to remove excess tiedown strap material.
(2) Connect outside coil temperature sensor leads (2) with two splices (3) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags. Secure leads with two large tiedown straps (1). Cut to remove excess tiedown strap material.
(3) Lower and secure cover per paragraph 4.2.
(4) Connect FDECU to power source and operate per paragraph 2.4.

4.52 **COVER RETAINING ROD REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 2) Item 13, Appendix G

a. **Removal.** See figure 4-51.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

4.52 **COVER RETAINING ROD REPLACEMENT - CONTINUED.**

(2) Remove frame cover assembly per paragraph 4.14.
(3) Remove nut (1), lock washer (2), flat washer (3), cover retaining rod (4), flat washer (5), lock washer (6), and nut (7). Discard lock washers.

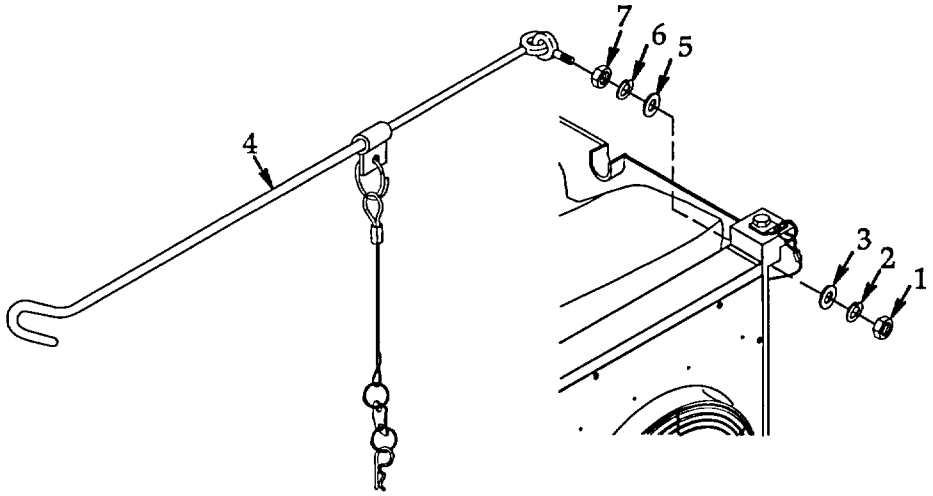


Figure 4-51. Cover Retaining Rod.

b. **Installation.** See figure 4-51.

(1) Install nut (7), new lock washer (6), and flat washer (5) onto cover retaining rod (4). Install cover retaining rod and secure with flat washer (3), new lock washer (2), and nut (1). Place cover retaining rod in storage position and be sure end is in compressor brace slot.
(2) Install frame cover assembly per paragraph 4.14.
(3) Connect FDECU to power source and operate per paragraph 2.4.

4.53 **END RAIL REPLACEMENT.**

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
General Mechanics Tool Kit Item 1, Section III, Appendix B	Lock Washers (qty 3) Item 12, Appendix G

a. **Removal.** See figure 4-52.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.
(3) Remove end screen per paragraph 4.23.
(4) Remove three screws (1) and lock washers (2). Discard lock washers.
(5) Remove four screws (3) and end rail (4).

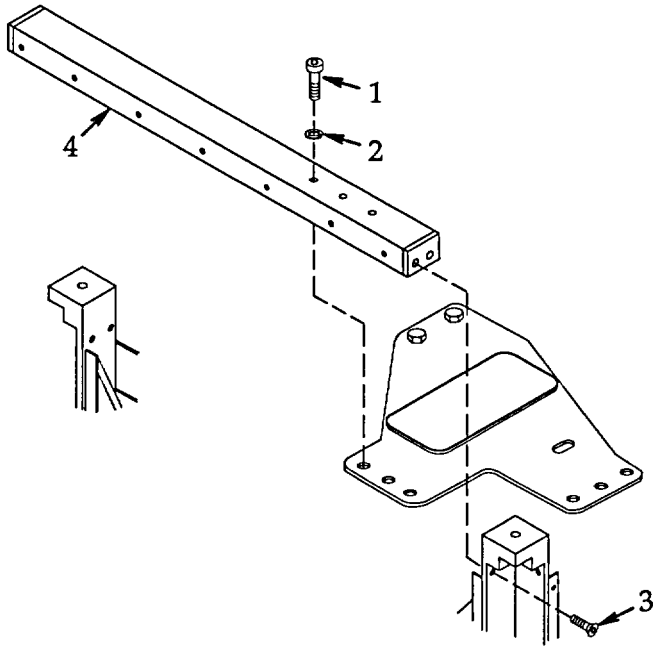


Figure 4-52. End Rail.

b. **Installation.** See figure 4-52.

(1) Install end rail (4) and align mounting holes. Secure with four screws (3).
(2) Install three new lock washers (2) and screws (1).
(3) Install end screen per paragraph 4.23.
(4) Lower and secure cover per paragraph 4.2.
(5) Connect FDECU to power source and operate per paragraph 2.4.

4.54 **REAR RAIL REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

a. **Removal.** See figure 4-53.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.
(2) Remove access panel per paragraph 4.21.
(3) Remove rear screen per paragraph 4.22.
(4) Remove two screws (1).
(5) Remove four screws (2) and rear rail (3).

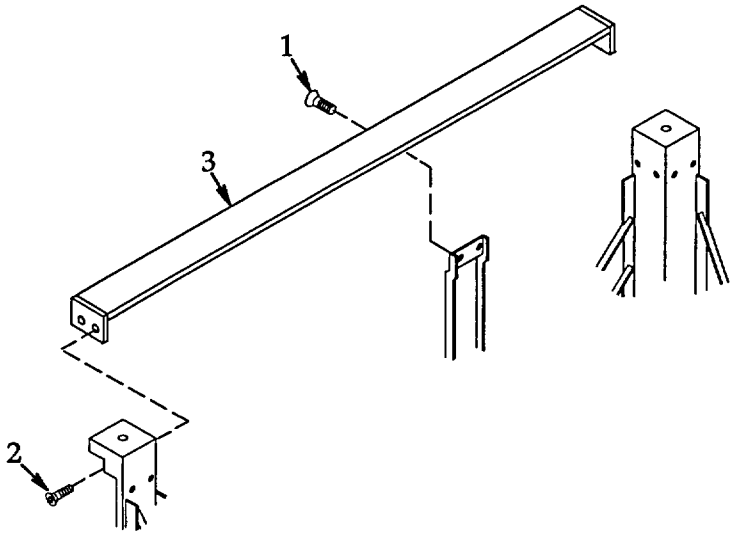


Figure 4-53. Rear Rail.

b. **Installation.** See figure 4-53.

(1) Remove two screws (1).
(2) Install rear rail (3) and align mounting holes. Secure with four screws (2).
(3) Install rear screen per paragraph 4.22.
(4) Install access panel per paragraph 4.21.
(5) Connect FDECU to power source and operate per paragraph 2.4.

4.55 FRONT RAIL REPLACEMENT.

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools	Materials/Parts
General Mechanics Tool Kit Item 1, Section III, Appendix B Rivet Gun Item 7, Section III, Appendix B	Lock Washers (qty 3) Item 12, Appendix G Rivet Item 8, Section II, Appendix E

a. **Removal.** See figure 4-54.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover per paragraph 4.2.
(3) Remove front screen per paragraph 4.24.
(4) Remove supply panel per paragraph 4.25.
(5) Remove two screws (1).
(6) Remove three screws (2) and lock washers (3). Discard lock washers.
(7) Drill out rivet (4) using drill with drill bit slightly smaller than rivet diameter. Remove flat washer (5) and any remaining rivet material. Pull lanyard (6) away from cables (7).
(8) Remove four screws (8) and front rail (9).

4.55 **FRONT RAIL REPLACEMENT - CONTINUED.**

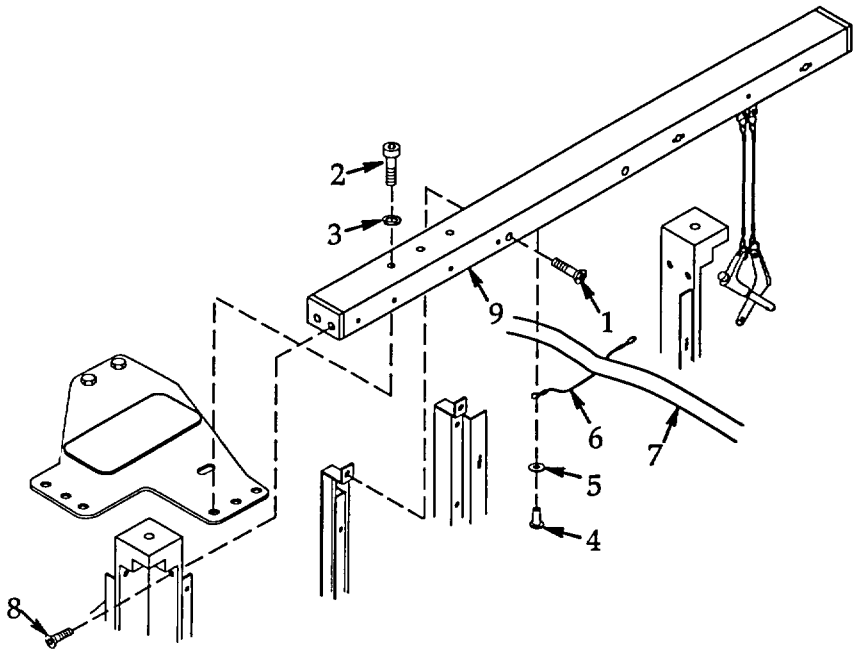


Figure 4-54. Front Rail.

b. **Installation.** See figure 4-54.

(1) Install front rail (9) and align mounting holes. Secure with four screws (8).
(2) Place lanyard (6) around cables (7) and secure with flat washer (5) and rivet (4).
(3) Install three new lock washers (3) and screws (2).
(4) Install two screws (1).
(5) Install supply panel per paragraph 4.25.
(6) Install front screen per paragraph 4.24.
(7) Lower and secure cover per paragraph 4.2.
(8) Connect FDECU to power source and operate per paragraph 2.4.

Section V. PREPARATION FOR STORAGE OR SHIPMENT

4.56 **DISCONNECT AND SECURE NBC KIT IF USED.** See figure 4-55.

4.56.1 Operate the FDECU in vent mode per paragraph 2.4 for approximately one hour to ensure that any condensate is drained from the unit and to dry out the inside coil and ducts.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

4.56.2 Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

4.56.3 Disconnect power cord (1) from each NBC motor blower (2) and NBC motor blower power connectors (3) located on the FDECU control box assembly. Store power cord in NBC support kit.

4.56.4 Disconnect NBC air duct (4) from each NBC motor blower (2) and NBC filter canister (5) center hole. Store one NBC air duct and one NBC motor blower in each NBC support kit.

4.56.5 Remove duct tape securing NBC air duct (6) to NBC adapter (7) then disconnect NBC air duct from each NBC filter canister (5) outside hole and NBC adapter. Store one NBC air duct in each NBC support kit. Store NBC filter canister for re-use.

4.56.6 Loosen two clamps (8) then remove supply air duct (9). Be sure duct is dry then store the duct and clamps for re-use.

NOTE

The NBC return air duct is designed with one duct inside another, sewn together at one end. This will create an air chamber between the ducts that when pressurized, will prevent contaminants from entering the shelter.

4.56.7 Loosen two clamps (10) then pull outer return air duct (11) back. Loosen clamp (12) then remove return air duct. Be sure duct is dry then store the duct and clamps for re-use.

4.56.8 Remove filter (13) from NBC adapter (7) and install it into flange assembly (14).

4.56.9 Turn NBC adapter (7) counterclockwise to unlock then pull it from volute assembly (15). Store the NBC adapter for re-use.

4.56 **DISCONNECT AND SECURE NBC KIT IF USED - CONTINUED.**

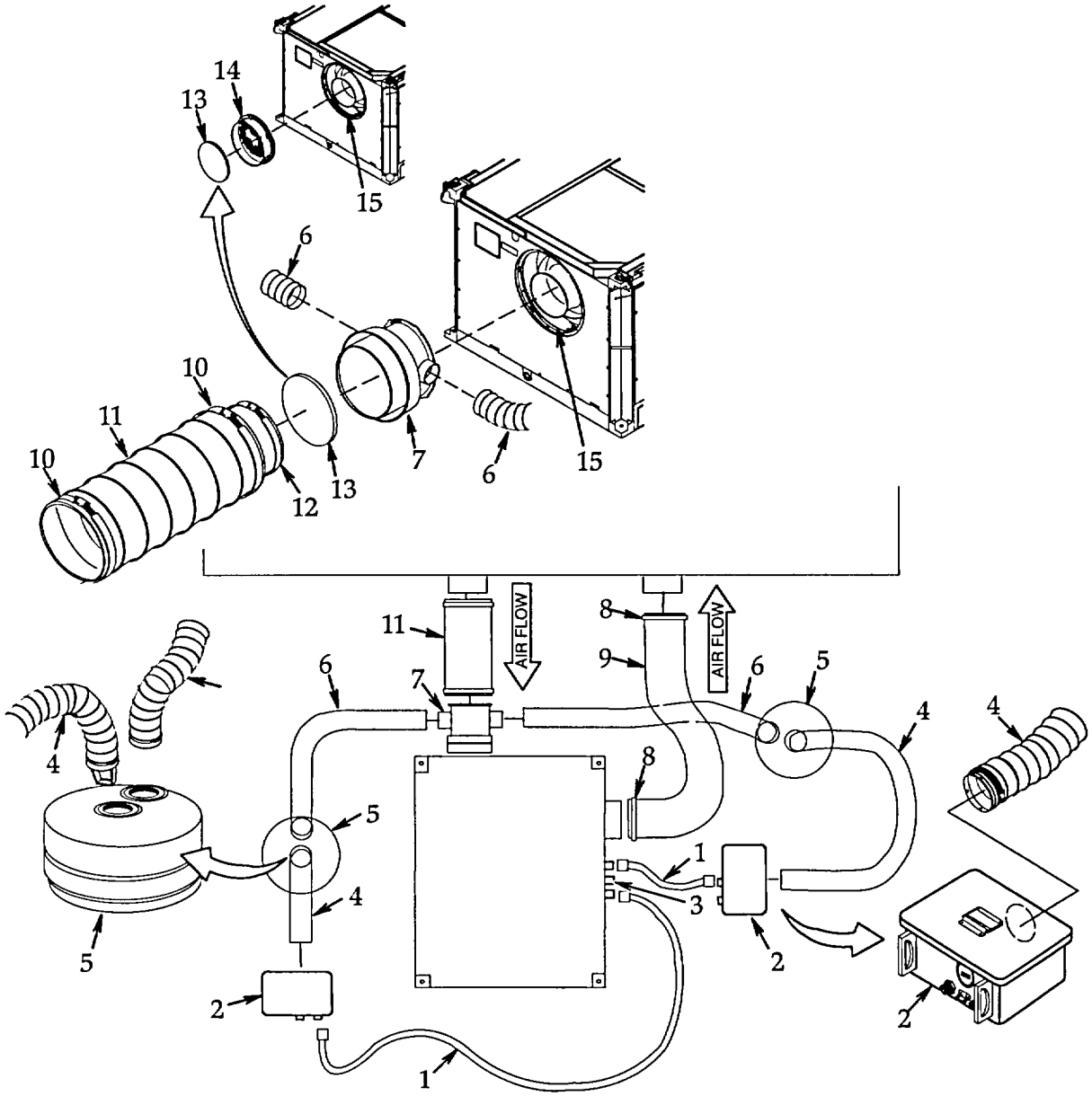


Figure 4-55. NBC Hardened.

4.57 **DISCONNECT INPUT POWER AND DUCTS.** See figure 4-56.

4.57.1 Operate the FDECU in vent mode per paragraph 2.4 for approximately one hour to ensure that any condensate is drained from the unit and to dry out the inside coil and ducts.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

4.57.2 Shutdown the FDECU per paragraph 2.4 then disconnect input power cable assembly (1) from power source.

4.57.3 Loosen four clamps (2) then remove two air ducts (3). Be sure ducts are dry then set ducts and clamps aside for storage inside the FDECU.

4.57 **DISCONNECT INPUT POWER AND DUCTS - CONTINUED.**

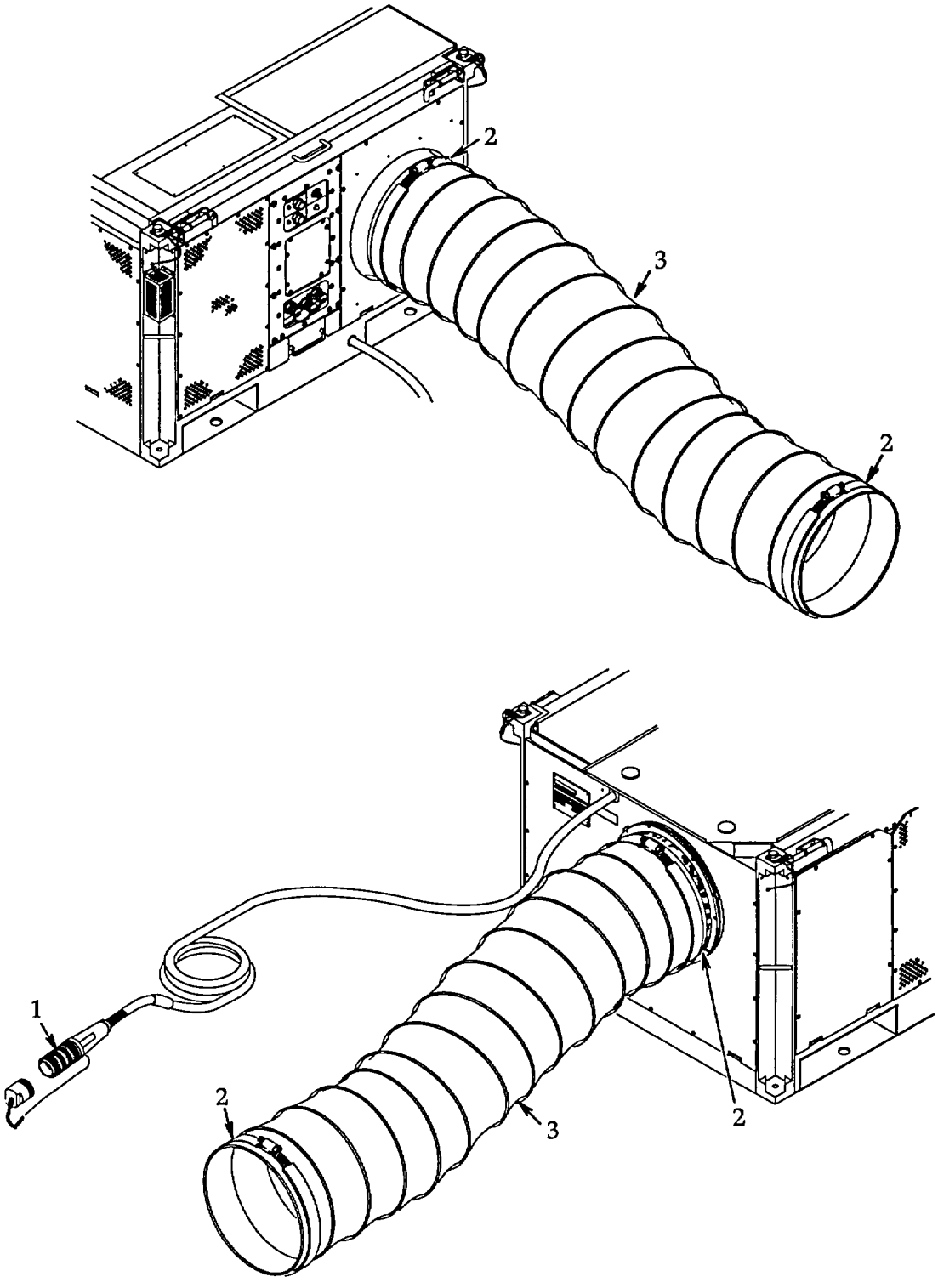


Figure 4-56. Ducts and Input Power Connection.

4.58 **SECURE REMOTE CONTROL BOX IF USED.** See figure 4-57.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

4.58.1 Raise and secure cover per paragraph 4.2.

4.58.2 Remove remote control box (1) from inside shelter and route back to FDECU. Seal any opening made in shelter. If the bracket (2), used in the unit for storage, was used to mount the remote control box inside the shelter, remove it and install back into the unit.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

4.58.2.1 Loosen eight captive screws (3) and carefully pull the electrical assembly (4) out.

4.58.2.2 Turn to release three latches (5) and open power box assembly cover (6).

4.58.2.3 Remove two nuts (7), lock washers (8), flat washers (9), screws (10), and flat washers (11). Install bracket (2) and align mounting holes. Secure with hardware just removed.

4.58.2.4 Close power box assembly cover (6) and turn three latches (5) to secure.

4.58.2.5 Carefully slide electrical assembly (4) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (3).

4.58.3 Place remote control box (1) in storage position on bracket (2) then secure with two wing nut fasteners (12).

4.58.4 Coil cable (13) and secure with fastener straps (14).

4.58.5 Lower and secure cover per paragraph 4.2.

4.58 **SECURE REMOTE CONTROL BOX IF USED - CONTINUED.**

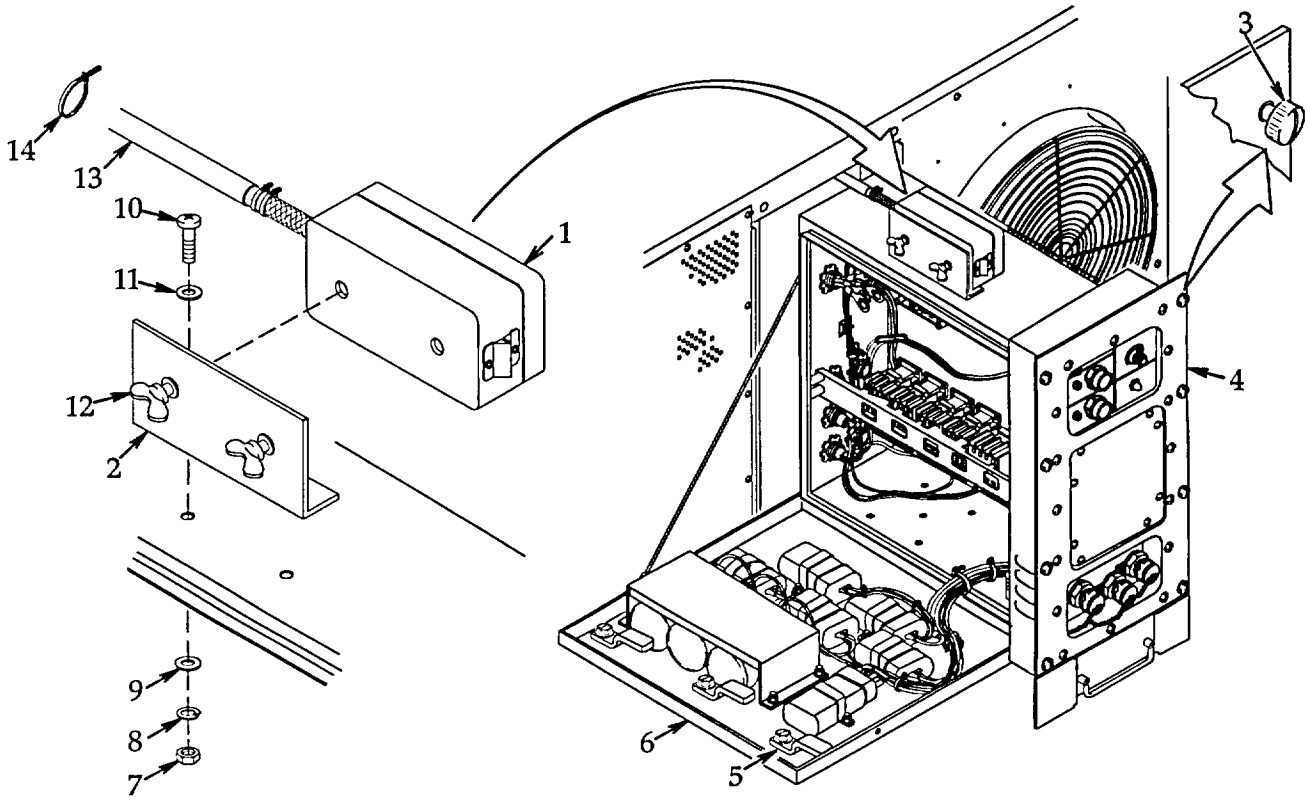


Figure 4-57. Remote Control Box.

4.59 **SECURE CONDENSATE DRAIN HOSE AND INSTALL SHIPPING COVERS.** See figure 4-58.

4.59.1 Raise and secure cover per paragraph 4.2.

4.59.2 Loosen six captive screws (1) and supply panel (2).

4.59.3 Push heater barrel (3) into volute assembly (4) to stops (approximately 4 inches). Align retaining holes then secure with four quick release pins (5).

4.59.4 Be sure there is no water in the condensate drain hose (6) then pull the entire length of hose back into the unit, leaving it attached to the volute assembly (4). Coil the hose around the heater barrel (3) for storage.

4.59.5 Slide supply cover (7) into supply panel (2). Install supply panel over heater barrel (3) and align mounting holes. Secure with six screws (1).

4.59.6 Turn flange assembly (8) counterclockwise to unlock then pull it from volute assembly (4). Remove filter (9) then install return cover (10) and filter. Unclip quick release pin (11) then check for alignment of retaining holes and install the flange assembly into volute assembly with the perforated duct collar facing in (opposite the way it was removed). Align slots and turn clockwise to lock in place. Secure flange assembly with quick release pin.

4.59.7 Lower and secure cover per paragraph 4.2.

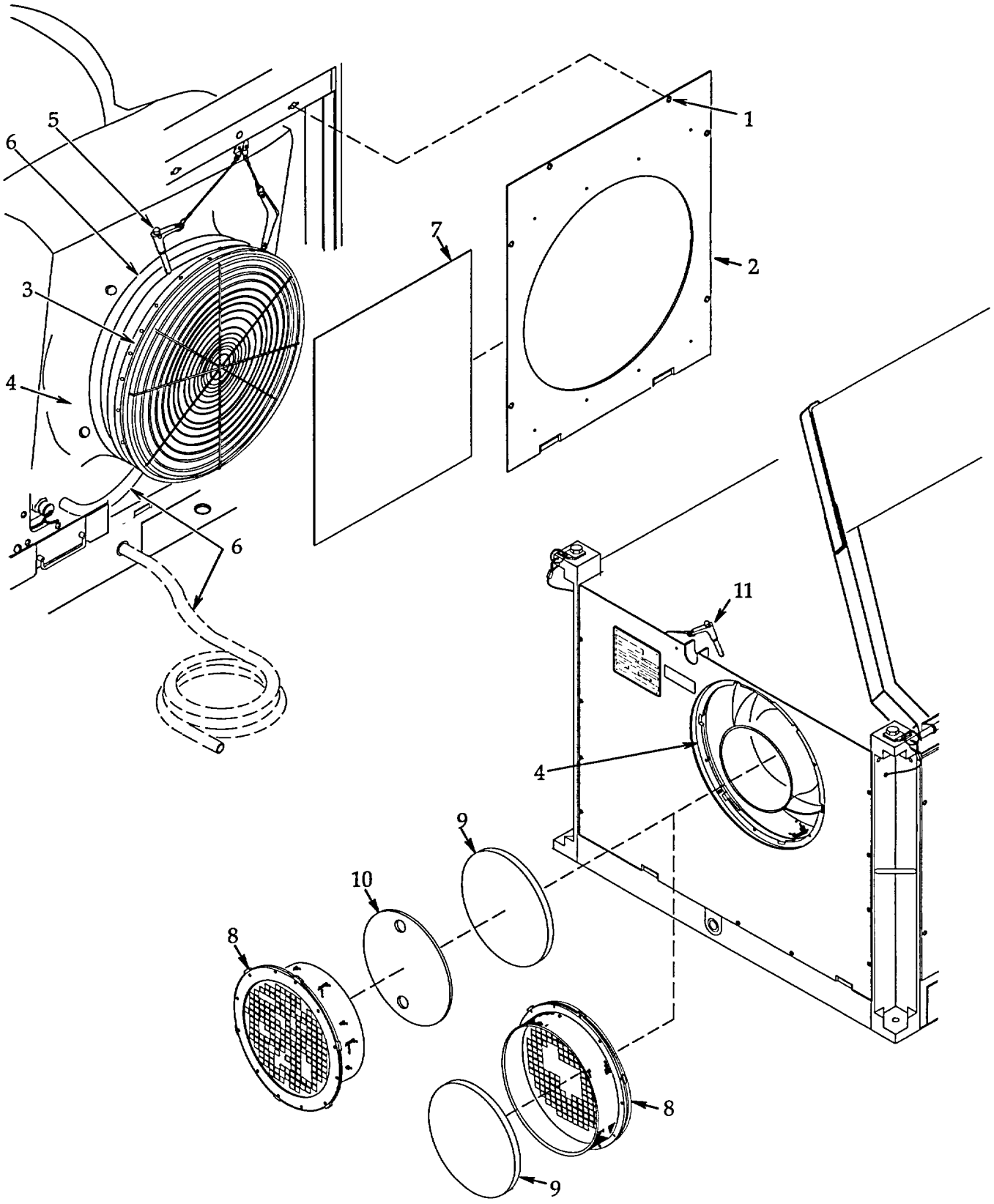


Figure 4-58. Shipping Covers and Condensate Drain Hose.

4.60 **PACK COMPONENTS INSIDE FDECU.** See figure 4-59.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

4.60.1 Raise and secure cover per paragraph 4.2.

4.60.2 Install two ducts (1) and push them down into the FDECU.

4.60.3 Carefully coil input power cable assembly (2) around ducts (1) then drape connector down into ducts to help hold them down.

4.60.4 Lower and secure cover per paragraph 4.2.

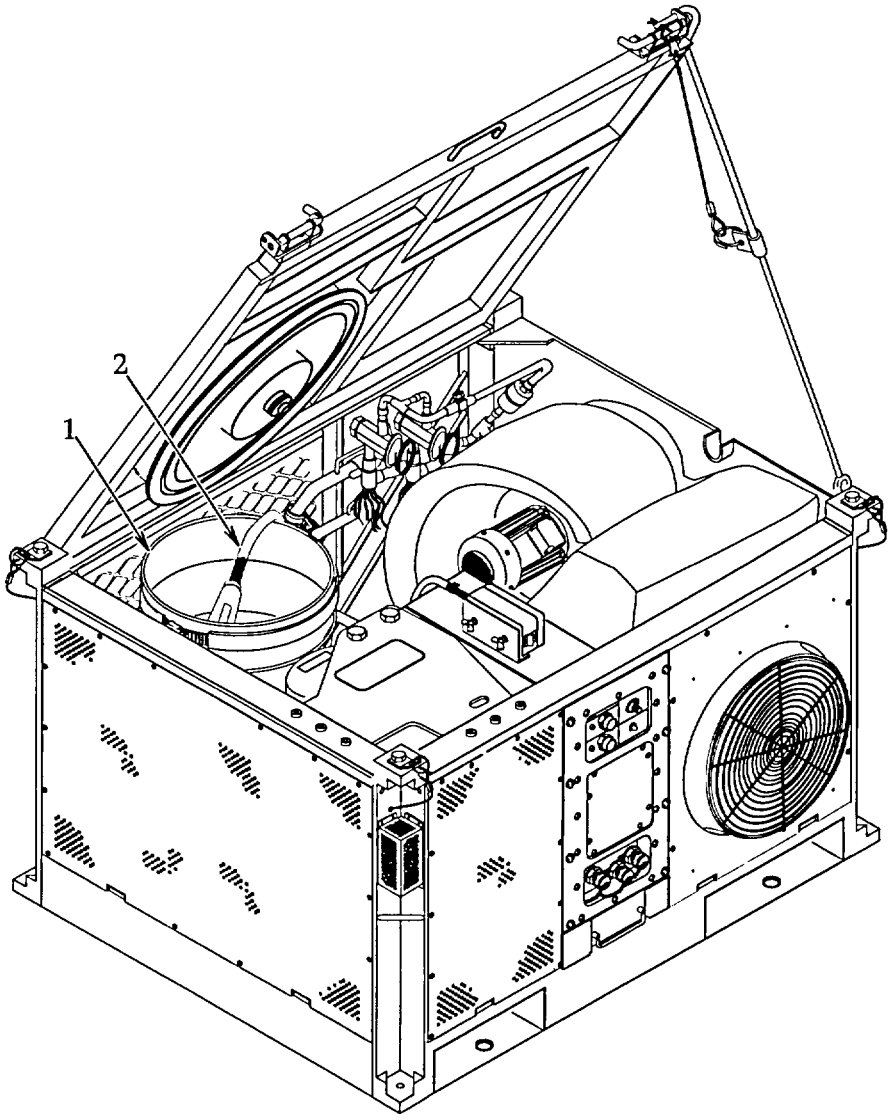


Figure 4-59. Packed Components.

CHAPTER 5
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

5.1 CIRCUIT BOARD TESTING AND REPLACEMENT.

THIS TASK COVERS: **a. Testing** **b. Removal** **c. Installation**

INITIAL SETUP:

Tools

General Mechanics Tool Kit
Item 1, Section III, Appendix B

Materials/Parts

Marker Tags (qty 31)
Item 3, Section II, Appendix E

Lock Washers (qty 7)
Item 8, Appendix G

Lock Washers (qty 16)
Item 10, Appendix G

a. **Testing.** Test the circuit board per troubleshooting procedures found in Chapter 4, Section III.

b. **Removal.** See figure 5-1.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.
(2) Loosen eight captive screws (1) and carefully pull the electrical assembly (2) out.
(3) Support control box panel (3) and remove 16 screws (4), lock washers (5), and flat washers (6). Carefully pull control box panel away as far as wire leads will allow. Discard lock washers.
(4) Tag two connectors (7) then release locking clip and disconnect from circuit board (8).
(5) Tag and disconnect 29 wire leads (9) from circuit board (8).

NOTE

The center circuit board mounting screw uses two plastic washers to insulate it from a circuit track on the board.

(6) Remove six screws (10), lock washers (11), and flat washers (12). Discard lock washers.
(7) Remove screw (13), lock washer (14), flat washer (15), plastic flat washer (16), circuit board (8), and plastic flat washer (17). Discard lock washer.

5.1 **CIRCUIT BOARD TESTING AND REPLACEMENT - CONTINUED.**

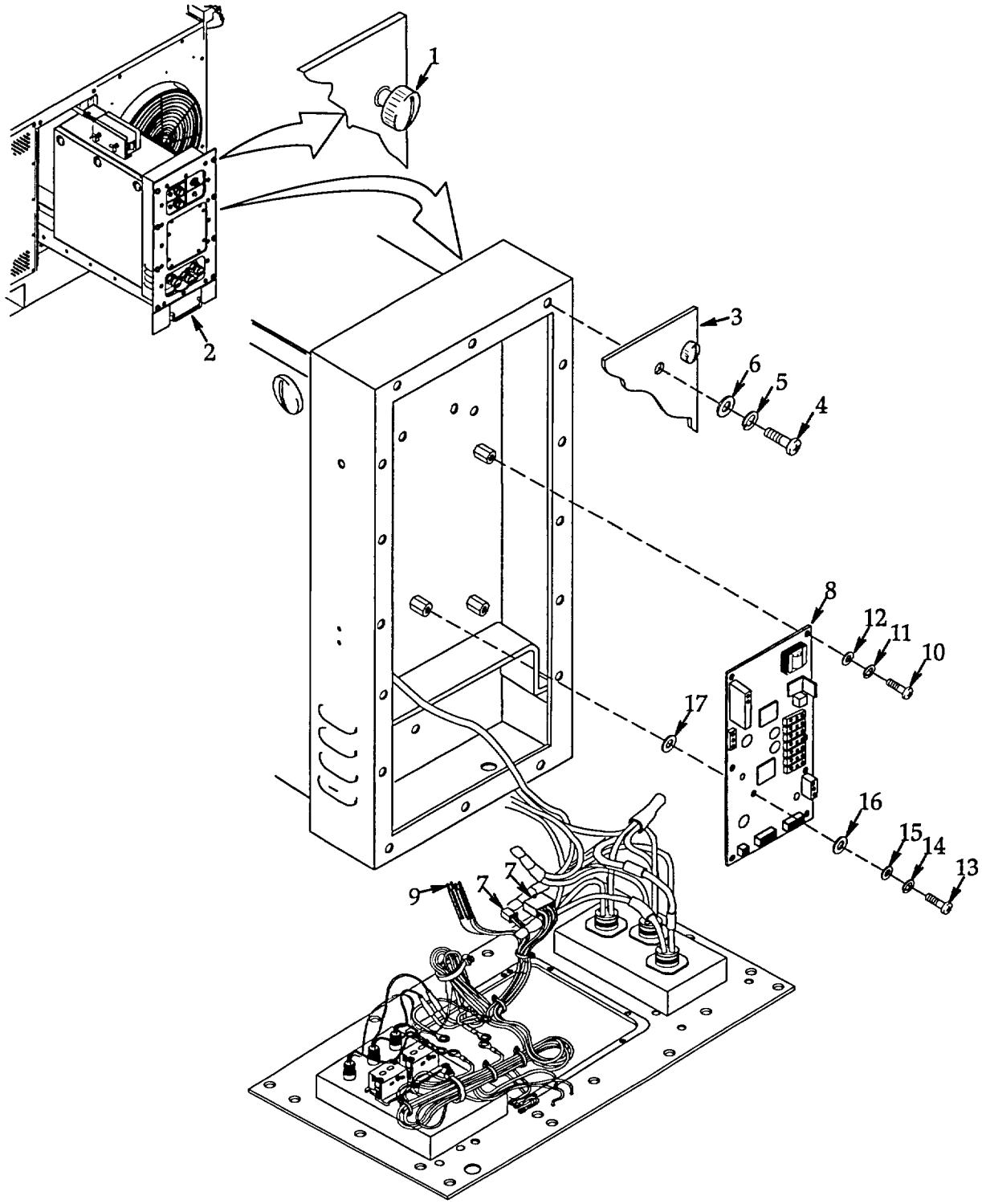


Figure 5-1. Circuit Board.

c. **Installation.** See figure 5-1.

CAUTION

The center circuit board mounting screw contacts a circuit track on the board. Two plastic flat washers are used against the circuit board to insulate the mounting screw. The circuit board will short out if the plastic flat washers are not used.

(1) Install plastic flat washer (17) in place then carefully install circuit board (8) and secure using plastic flat washer (16), flat washer (15), new lock washer (14), and screw (13).
(2) Install six flat washers (12), new lock washers (11), and screws (10).
(3) Connect 29 wire leads (9) to circuit board (8) using tags and wiring diagram figure 4-14. Remove tags.
(4) Install two connectors (7) onto circuit board (8) using tags and wiring diagram figure 4-14. Be sure locking clips engage. Remove tags.
(5) Carefully position control box panel (3) in place and align mounting holes. Be sure no wires are pinched. Secure with 16 flat washers (6), new lock washers (5), and screws (4).
(6) Carefully slide electrical assembly (2) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (1).
(7) Connect FDECU to power source and operate per paragraph 2.4.

5.2 REFRIGERATION SYSTEM REPAIRS.

NOTE

Refrigeration system repairs must be performed by a technician certified to perform such duties in accordance with EPA restrictions. Performing repairs without proper certification may be a violation of public law and subject to severe penalties.

The system refrigerant must be totally removed and recovered per paragraph 5.4 before any maintenance is performed on system components. Leak testing per paragraph 5.7 and filter-drier replacement per paragraph 5.16 are required after any system component has been removed and replaced. After repair, the system must be properly evacuated per paragraph 5.8 and charged per paragraph 5.9 to function correctly.

5.3 **SERVICE MANIFOLD INSTALLATION.**

THIS TASK COVERS: **a. Installation** **b. Removal**

INITIAL SETUP:

Tools

Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B
Refrigerant Recovery and Recycle Unit
Item 5, Section III, Appendix B

a. **Installation.** See figure 5-2.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access service valves inside unit.

WARNING

Sudden and irreversible tissue damage can result from freezing. Wear gloves and face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.

Compressor lubricating oil used in this equipment is caustic. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact is possible. If oil does contact skin, wash with soap and water.

Dangerous chemical refrigerant under pressure is used in this equipment. Use great care to avoid contact with liquid refrigerant. Work in a well ventilated area.

Heat may cause the refrigerant to decompose and release irritating, toxic, and corrosive gases. Prevent contact of refrigerant with flame or hot surfaces.

(3) Remove two protective caps.
(4) Check that all four service manifold valves are closed.
(5) Connect service manifold pressure gage hose to discharge service valve and compound gage hose to suction service valve. Lay service manifold outside unit then rest hoses in end panel notch so cover can be closed if necessary.
(6) Connect service manifold charge hose to recovery unit.
(7) Open service manifold pressure gage valve and charge valve. Operate recovery unit and allow refrigerant to purge for 3-5 seconds. Close pressure gage and charge valves then shut down recovery unit.

(8) Open service manifold compound gage valve and charge valve. Operate recovery unit and allow refrigerant to purge for 3-5 seconds. Close compound gage and charge valves then shut down recovery unit.

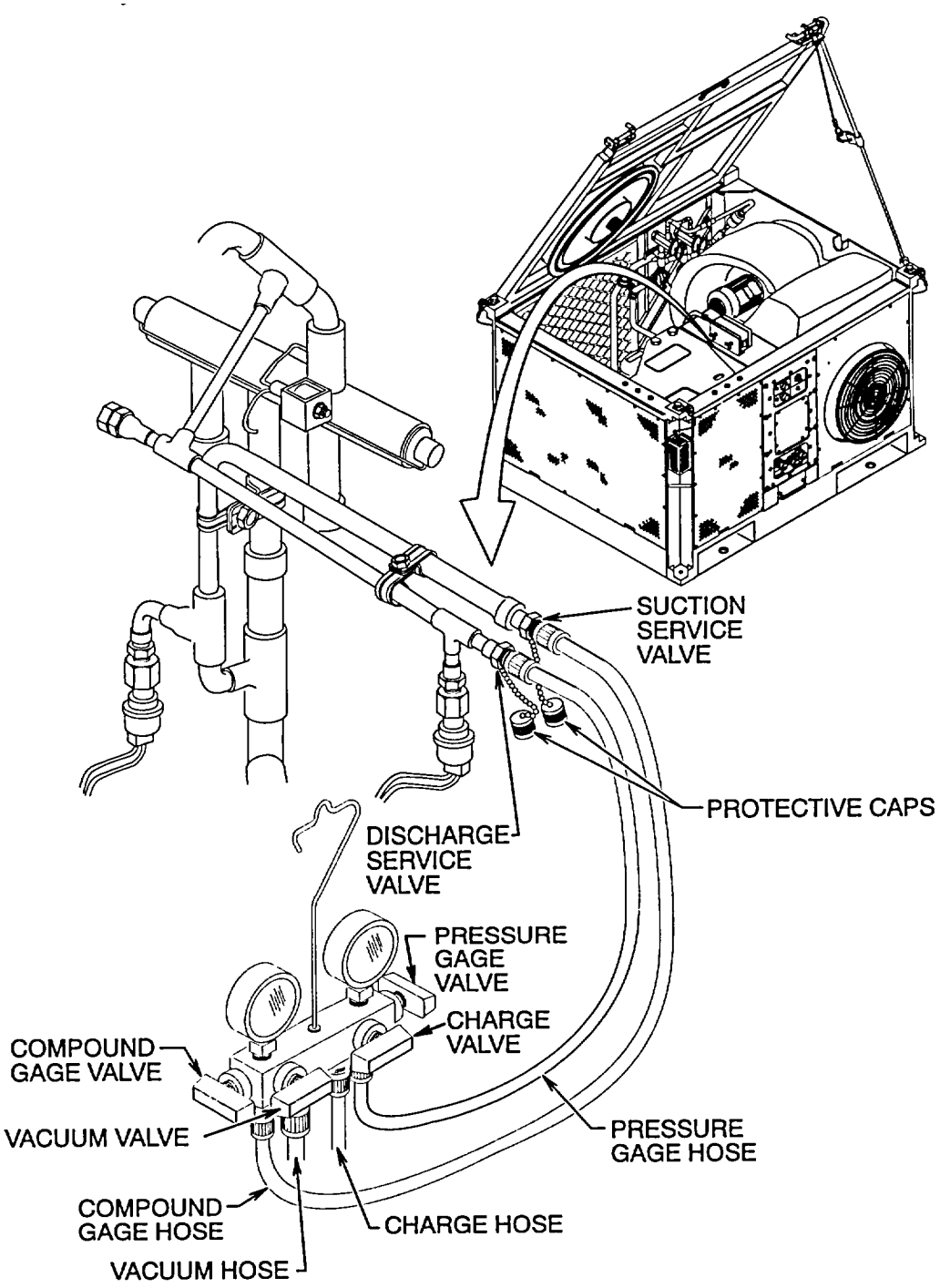


Figure 5-2. Service Manifold Installation

5.3 **SERVICE MANIFOLD INSTALLATION - CONTINUED.**

b. **Removal**. See figure 5-2.

(1) Check that all four service manifold valves are closed.
(2) Disconnect service manifold pressure gage hose from discharge service valve and compound gage hose from suction service valve.
(3) Open service manifold charge valve. Operate recovery unit and allow refrigerant to purge from hoses.
(4) Close service manifold valves.
(5) Shut down recovery unit.
(6) Disconnect service manifold charge hose from recovery unit.
(7) Install two protective caps.
(8) Close and secure cover.

5.4 **REMOVAL AND RECOVERY OF THE SYSTEM REFRIGERANT.**

THIS TASK COVERS: a. Removal/Recovery

a. **Removal/Recovery**. See figure 5-3.

(1) Install service manifold per paragraph 5.3.

CAUTION

Follow instructions for specific refrigerant recovery unit being used to avoid compressor oil loss. Loss of oil could result in compressor damage.

NOTE

Venting tetrafluoroethane refrigerant (R- 134a) into the atmosphere rather than recovering it is subject to EPA restrictions. Venting the refrigerant maybe a violation of public law and subject to severe penalties.

(2) Open service manifold pressure and compound gage valves.
(3) Open service manifold charge valve. Operate recovery unit until all refrigerant has been removed from system.
(4) Close service manifold valves.
(5) Shut-down refrigerant recovery unit.

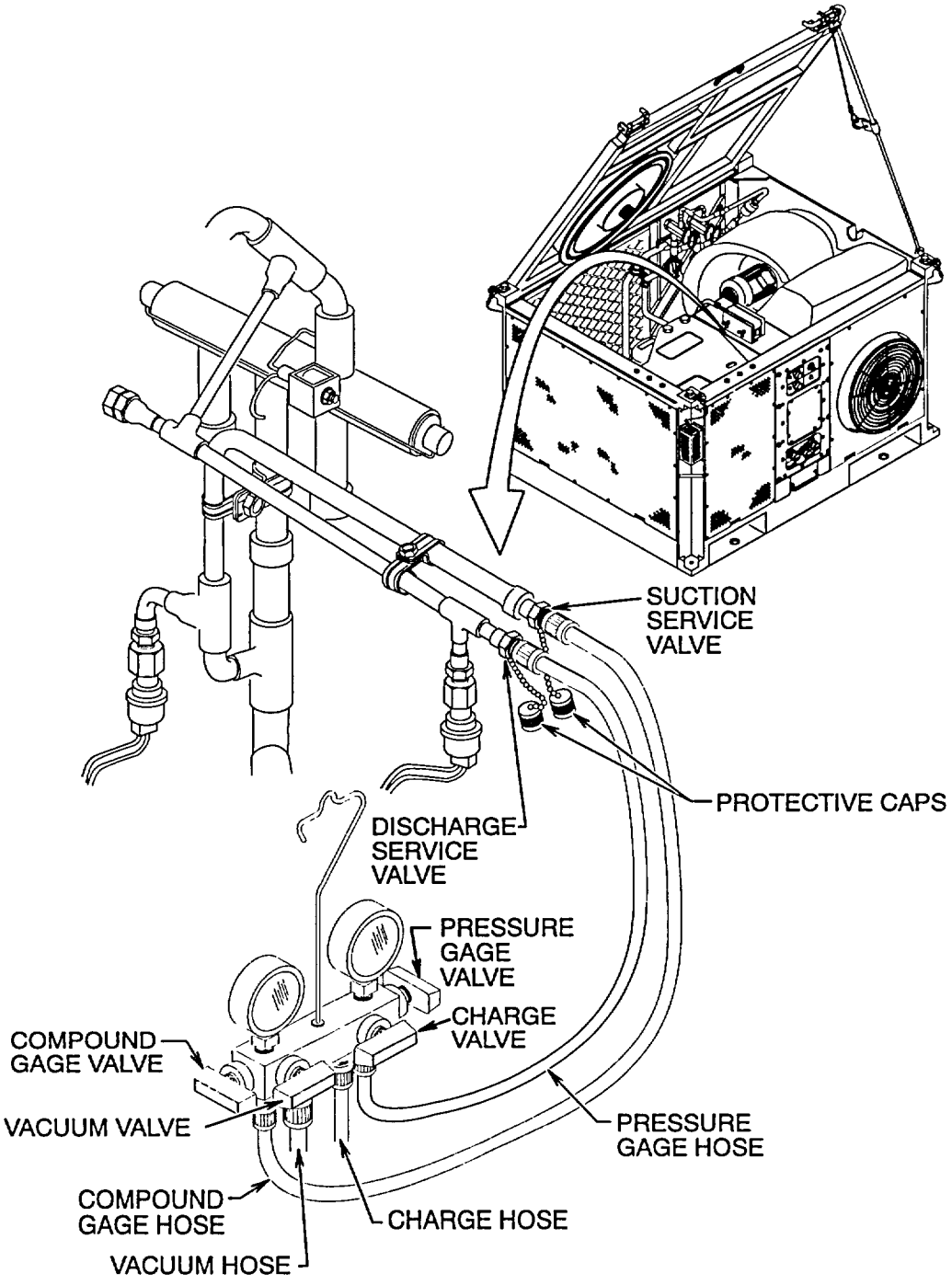


Figure 5-3. Removal And Recovery Of Refrigerant

5.5 PURGING THE REFRIGERANT SYSTEM.

THIS TASK COVERS	a. Purge

Initial Setup:

Tools	Materials/Parts
Nitrogen Regulator Item 4, Section III, Appendix B	Nitrogen Item 14, Section II, Appendix E

a. **Purge**. The refrigeration system must be purged with dry nitrogen before brazing is performed on any component. A flow of dry nitrogen should be continued during all brazing operations to minimize internal oxidation and scaling.

WARNING

Never pressurize refrigerant lines with oxygen, mixture with oil could cause an explosion.

The pressure in a nitrogen cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times to avoid personal injury.

Nitrogen is an inert gas that can cause suffocation and must be discharged in a well ventilated area.

(1) Remove and recover system refrigerant per paragraph 5.4.

(2) Disconnect charge hose from recovery unit and connect to nitrogen regulator and nitrogen tank.

(3) Disconnect the compound gage hose from the service manifold and place end in a suitable container to catch any oil that may come out.

(4) Be sure the service manifold compound gage and vacuum valves are closed.

(5) Open the service manifold pressure gage and charge valves.

(6) Open the nitrogen tank valve and adjust the regulator so that approximately 1-2 cfm (0.028-0.057 m /minute) of nitrogen flows through the system.

(7) Check discharge from the hose attached to the suction service valve to be sure that no oil is being forced out of the system.

(8) Perform any brazing/ debrazing operations necessary per paragraph 5.6.

(9) When purging is completed, close nitrogen tank valve.

(10) Disconnect the charge hose from nitrogen regulator.

(11) Connect the compound gage hose to service manifold.

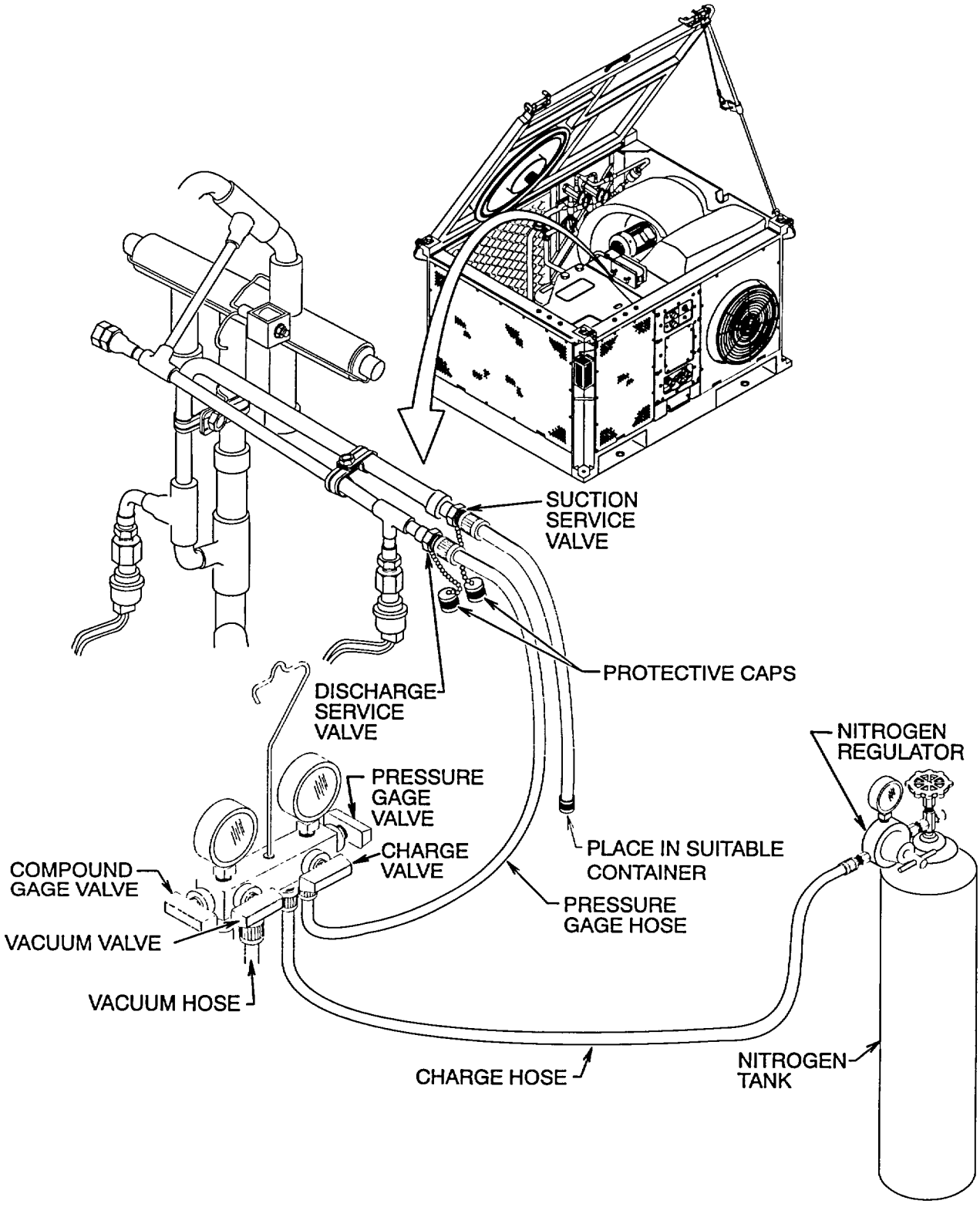


Figure 5-4. Nitrogen Tank Connection

5.6 **BRAZING/DEBRAZE PROCEDURE.**

THIS TASK COVERS	**a. Debraze**	**b. Clean**	**c. Braze**

Initial Setup:

Materials/Parts

Brazing Alloy
Item 17 or Item 18, Section II, Appendix E

Brazing Flux
Item 16, Section II, Appendix E

Rags
Item 12, Section II, Appendix E

Abrasive Cloth
Item 15, Section II, Appendix E

WARNING

Brazing alloys and flux contain materials which are hazardous to health. Avoid breathing vapors or fumes from brazing operations. Perform operations only in well ventilated areas. Wash hands with soap and water after handling brazing alloys and flux. Wear gloves and protective goggles or face shield to protect against burns.

a. **Debraze**.

(1) Remove and recover system refrigerant per paragraph 5.4 and purge per paragraph 5.5.

(2) Protect wiring harnesses and other components with appropriate heat shields.

NOTE

It may be easier to access a component by cutting or debrazing the copper lines in accessible areas and removing part of the interconnecting tubing with the component.

(3) If debrazing a joint on a valve, disassemble the valve to the extent possible and wrap all but the joint with wet rag to act as a heat sink.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat may cause the refrigerant to decompose and release irritating, toxic, and corrosive gases. All refrigerant must be removed and recovered from the system and the entire system must be purged with dry nitrogen before beginning any brazing operation.

CAUTION

If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted.

(4) Check that the system is being purged per paragraph 5.5 and apply sufficient heat uniformly around the joint to quickly melt the filler alloy. Remove heat as soon as the joint is separated.

b. **Clean**. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler is melted and then wipe it away with a wire brush. Be sure no filler alloy or other debris is left inside any tubing, fitting, or component. Use abrasive cloth as necessary to clean joints.

c. **Braze**.

(1) Protect wiring harnesses and other components with appropriate heat shields.

NOTE

All joints, except those provided with flare fittings, are made by brazing in accordance with MIL-B-7883, except that radiographic examination is not required.

Grade IV or VI brazing alloy (50% silver) and Type-B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III (15% silver) brazing alloy may be substituted for Grade IV or VI for copper to copper joints, flux is not required for copper to copper joints.

(2) If brazing a joint on a valve, disassemble the valve to the extent possible and wrap all but the joint with a wet rag to act as a heat sink.

NOTE

If interconnecting tubing was removed with a component, braze tubing to the new components before installation.

(3) Position component or assembly into place.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat may cause the refrigerant to decompose and release irritating, toxic, and corrosive gases. All refrigerant must be removed and recovered from the system and the entire system must be purged with dry nitrogen before beginning any brazing operation.

CAUTION

If heat is applied slowly, or only on one side, the entire component or length of tubing will be heated and filler alloy in adjacent joints may also be melted.

Brazing a joint without nitrogen flowing through the tubing, will cause deposits to form on the inside of the tube and may cause obstructions in the refrigeration system or equipment damage.

(4) Check that the system is being purged per paragraph 5.5 and apply sufficient heat uniformly around the joint to quickly melt the filler alloy. Remove heat and stop purging as soon as brazing is completed.

5.6.A **REFILLING COMPRESSOR LUBRICATING OIL.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

INITIAL SETUP:

Tools	**Materials/Parts**
Refrigeration Unit Service Tool Kit Item 2, Section III, Appendix B	Refrigerant Oil, R-134a Item 21, Section II, Appendix E

WARNING

The synthetic refrigerant oil used in the compressor is mildly caustic. Protect any exposed skin from possible contact with refrigerant oil. If refrigerant oil contacts skin, itching or rash-like irritation can result.

CAUTION

New compressors are not supplied with lubricant. Compressor must be filled with proper amount of refrigerant oil. Operation without lubricant will destroy the compressor.

a. **Draining.**

NOTE

It is important to take careful measurements of the amount of refrigerant oil contained in the old compressor in order to refill the new compressor with the proper amount.

(1) When compressor has been removed from unit.

(a) Carefully tip the compressor and drain refrigerant oil from it into a container suitable to hold up to 7 pints of fluid.

(b) Measure and note the amount of refrigerant oil that was removed.

(c) Discard used refrigerant oil in accordance with established guidelines.

(2) When there has been excessive oil loss from the unit due to a line rupture or component failure and the compressor will not be replaced.

(a) Drain refrigerant oil per either of the following procedures as applicable.

(b) Do not measure amount of oil removed, since oil loss cannot be accurately measured, and proceed directly to filling.

(c) Discard used refrigerant oil in accordance with established guidelines.

NOTE

The FDECU can be supplied with one of two different compressor casing styles. Since the compressors are interchangeable, either compressor type can be found on any given model FDECU. Generally, the FDECU-2 and FDECU-3 use a compressor that has an oil level indicator and angle drain valve located on the lower portion of the compressor case and FDECU-4 and thereafter use a compressor that has no oil level indicator or angle drain valve on the case.

(3) When compressor is installed in unit and has an oil level indicator and angle drain valve.

(a) Remove protective caps from angle drain valve.

NOTE

It may be necessary to slightly pressurize the system using dry nitrogen to remove oil from the compressor.

(b) Place a suitable container under the angle drain valve then slowly open the valve to remove oil.

(c) Measure and note the amount of refrigerant oil that was removed.

(d) Discard used refrigerant oil in accordance with established guidelines.

(4) When compressor is installed in unit and does not have an oil level indicator or angle drain valve.

(a) Remove low pressure cutout switch located below the reversing valve per paragraph 5.18.

(b) Remove and recover system refrigerant per paragraph 5.4.

(c) Remove self-sealing valve core from low pressure cutout switch fitting.

NOTE

It may be necessary to slightly pressurize the system using dry nitrogen to remove oil from the compressor.

(d) Place a suitable container under the low pressure cutout switch fitting to collect the oil.

(e) Using a suitable lifting device or overhead hoist, lift the unit from the frame cornerpost nearest the compressor until all oil has been removed.

(f) Measure and note the amount of refrigerant oil that was removed.

(g) Discard used refrigerant oil in accordance with established guidelines.

b. **Filling.**

(1) Carefully measure the appropriate amount of refrigerant oil as noted during draining and place into a suitable container. If the amount of oil could not be determined, measure in six pints.

NOTE

Refrigerant oil must be drawn into tie unit using a vacuum pump. This process can be performed more efficiently if the hose restrictions, such as self-sealing valve cores and hose depression pins, are removed.

(2) Remove the self-sealing valve cores from the discharge and suction service valves located on the compressor and reversing valve assembly piping and move the depressions from the ends of any hoses being used.

(3) Connect one hose to either the suction or discharge service valve and a vacuum pump. Connect a second hose to the remaining service valve and place into the pre-measured container of refrigerant oil.

(4) Start the vacuum pump and draw the required amount of refrigerant oil into the unit. When completed, remove hoses ad install self-sealing valve cores and depression pins as necessary.

5.7 LEAK TESTING THE REFRIGERANT SYSTEM.

THIS TASK COVERS: a. **Testing**

Initial Setup:

Tools	Materials/Parts
Refrigeration Unit Service Tool Kit Item 2, Section III, Appendix B Nitrogen Regulator Item 4, Section III, Appendix B	Refrigerant R- 134a Item 19, Section II, Appendix E Nitrogen Item 14, Section II, Appendix E

a. **Testing**.

WARNING

Never pressurize refrigerant lines with oxygen, mixture with oil could cause an explosion.

The pressure in a nitrogen cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times to avoid personal injury.

Nitrogen is an inert gas that can cause suffocation and must be discharged in a well ventilated area.

NOTE

To perform leak test, it is necessary that the system be pressurized with a proportion of refrigerant gas.

The electronic gas tester is highly sensitive to the presence of a minute quantity of gas in the air, and is quite effective in the detection of small leaks. However, due to rapid dispersion of refrigerant gas into surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well ventilated area but draft free area. Use procedures contained in TM 9-4940-435-14&P, "Leak Detector, Refrigerant Gas".

(1) Install service manifold per paragraph 5.3.

(2) To pressurize a system that has some refrigerant charge.

(a) Connect the charge hose to a refrigerant cylinder containing refrigerant R-134a set to deliver gas only.

(b) Check that service manifold vacuum valve is closed.

(c) Open the service manifold compound gage, pressure gage, and charge valves.

(d) Open refrigerant cylinder valve and pressurize system to 100 psi (7.1 kg/cm^2).

(3) To pressurize a system that has had the refrigerant removed and recovered then purged.

(a) Connect the charge hose to a refrigerant cylinder containing refrigerant R-134a set to deliver gas only.

(b) Check that service manifold vacuum valve is closed.

(c) Open the service manifold compound gage, pressure gage, and charge valves.

(d) Open refrigerant cylinder valve and pressurize system to 40-50 psi (2.8-3.5 kg/cm2).

(e) Close service manifold valves and refrigerant cylinder valve.

(f) Disconnect charge hose from the refrigerant cylinder and connect it to a nitrogen regulator and nitrogen cylinder.

(g) Open the service manifold compound gage, pressure gage, and charge valves.

(h) Open nitrogen cylinder valve and pressurize system to 350 psi (24.7 kg/cm2).

(4) Test for leaks at all points of possible leakage using a refrigerant gas leak detector. If a leak is found, take necessary steps to replace damaged components or repair leak.

(5) If no leak was found and refrigerant only was used to pressurize the system, check refrigeration unit charge per paragraph 5.10.

(6) If no leak was found and nitrogen was used to pressurize the system, remove and recover system refrigerant per paragraph 5.4, evacuate per paragraph 5.8, and charge the refrigeration unit per paragraph 5.9.

5.8 EVACUATING THE REFRIGERANT SYSTEM.

THIS TASK COVERS **a. Evacuate**

Initial Setup:

Tools
Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

a. **Evacuate**. See figure 5-5. The refrigeration system must be evacuated to remove all moisture and non-condensables before it is charged.

(1) Remove and recover system refrigerant per paragraph 5.4.

(2) Check that new filter- drier was installed. If not, install one per paragraph 5.16.

(3) Check that service manifold charge valve is closed.

(4) Connect the vacuum hose to vacuum pump and start pump.

(5) Open service manifold high pressure gage, compound gage, and vacuum valves.

(6) Run vacuum pump until at least 29 inches of mercury is measured on compound gage. Continue running vacuum pump for one more hour, while observing the compound gage. If gage needle moves back and forth, you have a leak which must be located and corrected per paragraph 5.7.

5.8 **EVACUATING THE REFRIGERANT SYSTEM - CONTINUED.**

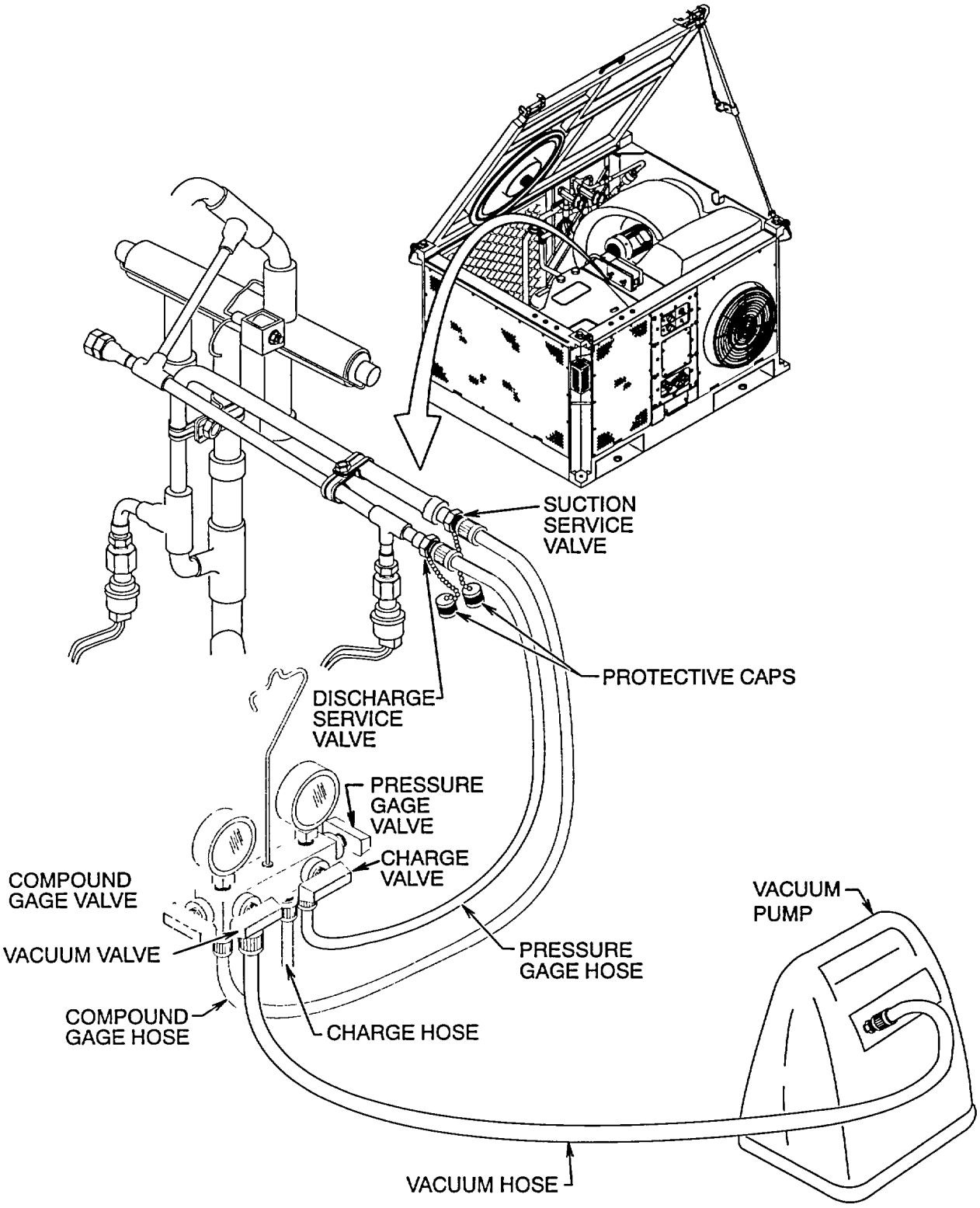


Figure 5-5. Evacuation of Refrigerant System

NOTE

Inability to reach and hold 29 inches of mercury may indicate either a leak or a problem with the vacuum pump.

(7) Close service manifold vacuum valve and stop vacuum pump. Note reading on compound gage and observe for 10 minutes. If pressure rises, moisture may still be in the system or a leak exists. If pressure rose, repeat evacuation and re- check. If the pressure rise occurs again at the same speed, a leak is in the system and must be found per paragraph 5.7. If the pressure rise was slower the second time, moisture remains in the system and the evacuation process must be repeated until there is no rise.

(8) Close service manifold high pressure gage and compound gage valves.

(9) Disconnect the vacuum hose from vacuum pump.

(10) Charge the refrigeration system per paragraph 5.9.

5.9 **CHARGING THE REFRIGERANT SYSTEM.**

THIS TASK COVERS **a. Full Charge** **b. Partial Charge**

Initial Setup:

Materials/Parts
Refrigerant R-134a
Item 19, Section II, Appendix E

a. **Full Charge**. See figure 5-6.

WARNING

Dangerous chemical refrigerant under pressure is used in the operation of this equipment. Use great care to avoid contact with liquid refrigerant.

Sudden and irreversible tissue damage can result from freezing. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.

Heat may cause the refrigerant to decompose and release irritating, toxic, and corrosive gases. Prevent contact of refrigerant with flame or hot surfaces.

Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.

CAUTION

The system must be evacuated before charging. Moisture in the system will prevent the refrigeration unit from operating properly.

(1) Install service manifold per paragraph 5.3.

(2) Evacuate the refrigerant system per paragraph 5.8.

(3) Connect the charge hose to a tank containing refrigerant R-134a set to deliver gas and the vacuum hose to reclaim unit.

5.9 **CHARGING THE REFRIGERANT SYSTEM - CONTINUED.**

(4) Check that compound gage and pressure gage valves are closed.

(5) Open vacuum and charge valves.

(6) Open refrigerant tank valve. Operate reclaim unit for 3 to 5 seconds to purge hoses.

(7) Close refrigerant tank, vacuum, and charge valves then stop reclaim unit.

(8) Set refrigerant tank to deliver liquid only.

(9) Place refrigerant tank on an accurate scale to measure and record weight.

CAUTION

Never introduce liquid refrigerant into the suction shut off valve. This can cause damage to the compressor.

(10) With system shutdown, open refrigerant tank, pressure gage, and charge valves. Allow liquid refrigerant to enter system until tank weight has decreased by 14 pounds (6.4 kg) or until system pressure has equalized, whichever occurs first.

(11) Close refrigerant tank, charge, and pressure gage valves.

NOTE
If 14 pounds (6.4 kg) full charge was obtained, skip steps (12) through (16).

(12) Connect FDECU to power source and operate per paragraph 2.4.

(13) Set refrigerant tank to deliver gas only.

(14) Check that all service manifold valves are closed.

WARNING
Never introduce high discharge pressure into a refrigerant tank. This can cause the tank to rupture and injure personnel.

CAUTION
Never introduce liquid refrigerant into the suction shut off valve. This can cause damage to the compressor.

(15) Open refrigerant tank, compound gage, and charge valves.

(16) Monitor weight of the refrigerant tank until total 14 pounds (6.4 kg) charge is obtained. When system is fully charged, immediately close refrigerant tank, compound gage, and charge valves.

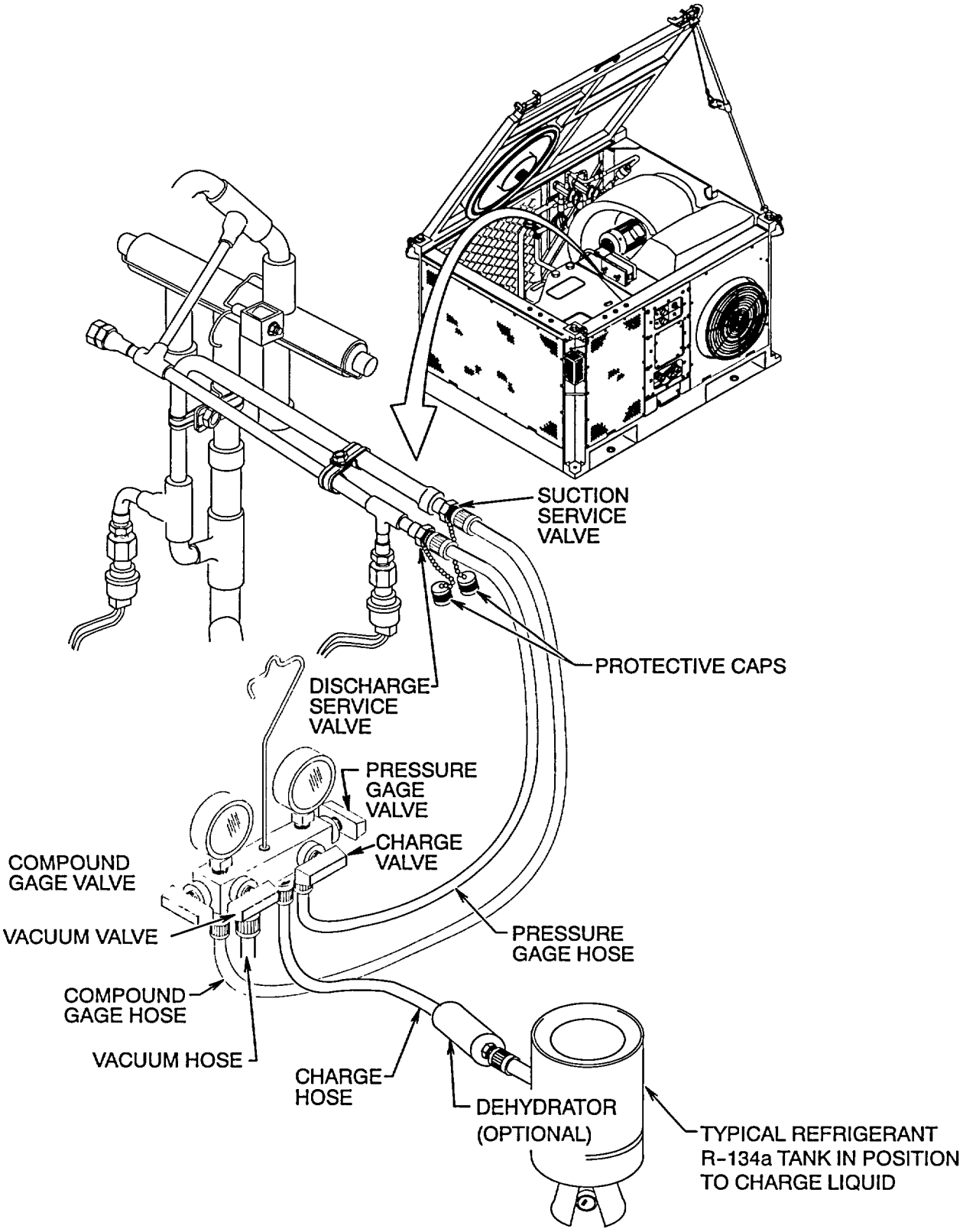


Figure 5-6. Refrigerant Charging (Total System)

5.9 CHARGING THE REFRIGERANT SYSTEM - CONTINUED.

(17) Run FDECU for 15 minutes and observe sight glass through cover.

NOTE

Two different liquid indicators can be used and each has a unique center indicator color.

(a) Green to chartreuse or blue to violet to pink center, depending on liquid indicator being used, means refrigerant moisture content is acceptable.

(b) Yellow or red center, depending on liquid indicator being used, means there is too much moisture in system. Remove and recover system refrigerant per paragraph 5.4, replace filter- drier per paragraph 5.16, leak check per paragraph 5.7, evacuate per paragraph 5.8, and charge again.

(18) Be sure all service manifold valves are closed.

(19) Shutdown the FDECU per paragraph 2.4.

b. Partial Charge. See figure 5-7.

(1) Install service manifold per paragraph 5.3.

(2) Evacuate the refrigerant system per paragraph 5.8.

(3) Connect the charge hose to a tank containing refrigerant R- 134a set to deliver gas and the vacuum hose to reclaim unit.

(4) Check that compound gage and pressure gage valves are closed.

(5) Open vacuum and charge valves.

(6) Open refrigerant tank valve. Operate reclaim unit for 3 to 5 seconds to purge hoses.

(7) Close refrigerant tank, vacuum, and charge valves then stop reclaim unit.

(8) Connect FDECU to power source and operate per paragraph 2.4.

(9) Set refrigerant tank to deliver gas only.

(10) Check that all service manifold valves are closed.

WARNING

Never introduce high discharge pressure into a refrigerant tank. This can cause the tank to rupture and injure personnel.

CAUTION

Never introduce liquid refrigerant into the suction shut off valve. This can cause damage to the compressor.

(11) Open refrigerant tank, compound gage, and charge valves.

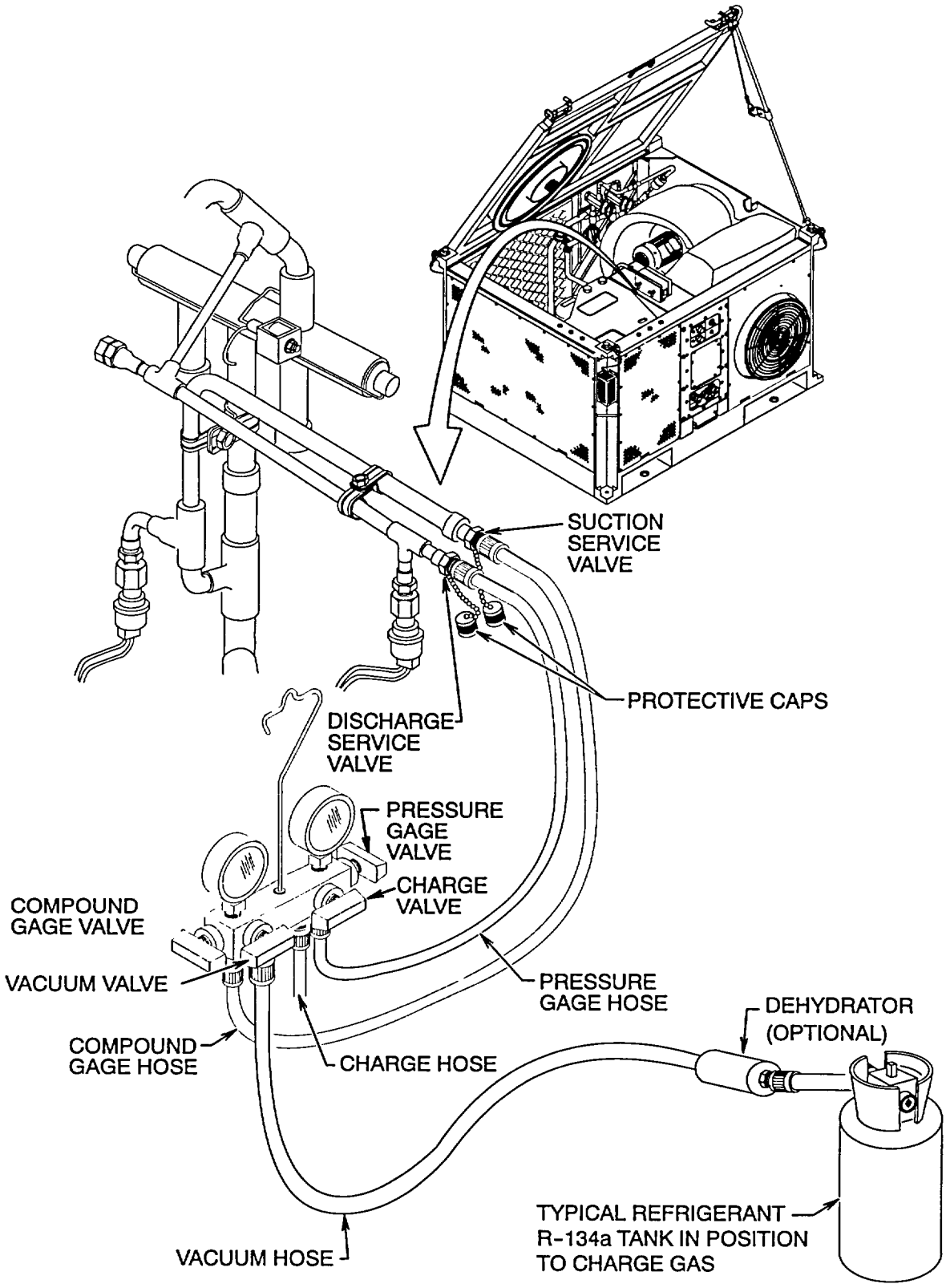


Figure 5-7. Refrigerant Charging (Partial System /Small Quantity Charge)

5.9 **CHARGING THE REFRIGERANT SYSTEM - CONTINUED.**

(12) Run FDECU for 15 minutes and observe sight glass through cover.

NOTE

Two different liquid indicators can be used and each has a unique center indicator color.

(a) Green to chartreuse or blue to violet to pink center, depending on liquid indicator being used, means refrigerant moisture content is acceptable.

(b) Yellow or red center, depending on liquid indicator being used, means there is too much moisture in system. Remove and recover system refrigerant per paragraph 5.4, replace filter drier per paragraph 5.16, leak check per paragraph 5.7, evacuate per paragraph 5.8, and charge again.

(c) Milky white or bubbly liquid means system has low charge.

(d) Clean bubble free liquid around center means the system is fully charged.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) charging valve. This can cause damage to the compressor.

(13) If charge is low, set refrigerant tank to deliver gas only.

WARNING

Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.

(14) Check that pressure gage valve is closed.

(15) Open refrigerant tank, compound gage, and charge valves.

(16) Charge until sight glass remains clear and bubble free for 15 minutes.

(17) When system is fully charged, immediately close refrigerant tank, compound gage, and charge, valves.

(18) Shutdown the FDECU per paragraph 2.4.

(19) Remove service manifold per paragraph 5.3.

5.10 REFRIGERANT SYSTEM PRESSURE CHECK.

THIS TASK COVERS: a. Testing

a. **Testing.**

(1) Install service manifold per paragraph 5.3.

(2) Check that all four service manifold valves are closed.

(3) Service manifold compound and pressure gages should indicate the same pressure. Check the reading with the appropriate column in Table 5-1. If the system is even partially charged, the pressure should be approximately equal to that shown in the table for the appropriate ambient temperature. If the pressure is considerably less than shown in the table, the system does not contain enough refrigerant to continue the pressure check. Leak check the FDECU per paragraph 5.7.

(4) Connect FDECU to power source and operate per paragraph 2.4.

(5) With the FDECU operating, allow service manifold gages to stabilize. Compare readings with those listed in Table 5-2.

(a) If discharge and suction pressure are at, or near, the same value, reversing valve (L1) or compressor (B2) failure is indicated.

(b) If discharge pressure is low and suction pressure is normal, a low refrigerant charge is indicated.

(c) If discharge pressure is normal and suction pressure is either high, or low, failure of the expansion valve is indicated.

(d) If discharge pressure is high and suction pressure is normal, refrigerant overcharge is indicated.

(6) When pressure tests are completed, shutdown the FDECU per paragraph 2.4.

(7) Remove service manifold per paragraph 5.3.

Table 5-1. Pressure Temperature Relationship of Saturated Refrigerant R-134a.

Temperature		Pressure	
Deg F	Deg C	psia	kg/cm^2
-20	-28.88	12.95	5.87
-18	-27.77	13.63	6.18
-16	-26.66	14.35	6.50
-14	-25.55	15.09	6.84
-12	-24.44	15.87	7.19
-10	-23.33	16.67	7.56
-8	-22.22	17.51	7.94
-6	-21.11	18.38	8.33
-4	-20.00	19.29	8.74
-2	-18.88	20.23	9.17
0	-17.77	21.20	9.61
2	-16.66	22.22	10.07

5.10 **REFRIGERANT SYSTEM PRESSURE CHECK - CONTINUED.**

Table 5-1. Pressure Temperature Relationship of Saturated Refrigerant R-134a - Continued.

Temperature		Pressure	
Deg F	Deg C	psia	kg/cm^2
4	-15.55	23.27	10.55
6	-14.44	24.35	11.04
8	-13.33	25.48	11.55
10	-12.22	26.65	12.08
12	-11.11	27.86	12.63
14	-10.00	29.11	13.20
16	-8.88	30.41	13.79
18	-7.77	31.75	14.40
20	-6.66	33.14	15.03
22	-5.55	34.57	15.68
24	-4.44	36.05	16.35
26	-3.33	37.58	16.78
28	-2.22	39.16	17.76
30	-1.11	40.79	18.50
32	0.00	42.47	19.26
34	1.11	44.21	20.05
36	2.22	45.99	20.86
38	3.33	47.84	21.69
40	4.44	49.74	22.56
42	5.55	51.70	23.45
44	6.66	53.71	24.36
46	7.77	55.79	25.30
48	8.88	57.93	26.27
50	10.00	60.13	27.27
52	11.11	62.39	28.29
54	12.22	64.71	29.35
56	13.33	67.11	30.44
58	14.44	69.57	31.55
60	15.55	72.09	32.69
62	16.66	74.69	33.87
64	17.77	77.36	35.08
66	18.88	80.09	36.32
68	20.00	82.90	37.60
70	21.11	85.79	38.91
72	22.22	88.75	40.25
74	23.33	91.79	41.63
76	24.44	94.90	43.04
78	25.55	98.09	44.49

Table 5-1. Pressure Temperature Relationship of Saturated Refrigerant R-134a - Continued.

Temperature		Pressure	
Deg F	Deg C	psia	kg/cm^2
80	26.66	101.37	45.98
82	27.77	104.73	47.50
84	28.88	108.16	49.06
86	30.00	111.69	50.66
88	31.11	115.30	52.16
90	32.22	118.99	53.97
92	33.33	122.78	55.69
94	34.44	126.65	57.44
96	35.55	130.62	59.24
98	36.66	134.68	61.08
100	37.77	138.83	62.59
102	38.88	143.07	64.86
104	40.00	147.42	66.86
106	41.11	151.86	68.88
108	42.22	158.40	71.84
110	43.33	161.04	73.04
112	44.44	165.79	75.20
114	45.55	170.64	77.40
116	46.66	175.59	79.64
118	47.77	180.65	82.58
120	48.88	185.82	84.28
122	50.00	191.11	86.68
124	51.11	196.50	89.13
126	52.22	202.00	91.62
128	53.33	207.62	94.17
130	54.44	213.36	96.77
132	55.55	219.22	99.43
134	56.66	225.19	102.14
136	57.77	231.29	104.91
138	58.88	237.51	107.73
140	60.00	243.86	110.06
142	61.11	250.33	113.54
144	62.22	256.94	116.54
146	63.33	263.67	119.59
148	64.44	270.54	122.71
150	65.55	277.54	125.89
152	66.66	284.67	129.12
154	67.77	291.95	132.42
156	68.88	299.37	135.79
158	70.00	306.64	139.08
160	71.11	314.64	142.71

5.10 **REFRIGERANT SYSTEM PRESSURE CHECK - CONTINUED.**

Table 5-2. Nominal Operating Pressure At Suction And Discharge Service Valves

COOLING MODE			
Coil Entering Air Temperature		Pressure At Service Valve	
Inside	Outside	Suction	Discharge
80° F (27°C)	85° F (29° C)	35 psi (242 kPa)	200 psi (1380 kPa)
	125° F (52° C)	42 psi (290 kPa)	345 psi (2381 kPa)
HEATING MODE			
Coil Entering Air Temperature		Pressure At Service Valve	
Inside	Outside	Suction	Discharge
70° F (21°C)	17° F (-8° C)	7 psi (48 kPa)	150 psi (1035 kPa)
	47° F (8° C)	20 psi (138 kPa)	170 psi (1173 kPa)

5.11 **TUBING AND FITTINGS TESTING, REPAIR AND REPLACEMENT.**

THIS TASK COVERS: **a. Testing** **b. Removal** **c. Installation**

INITIAL SETUP:

Tools

Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

Materials/Parts

Insulation Tape
Item 20, Section II, Appendix E

a. **Testing.** See figure 5-8.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access tubing and fittings inside unit.

(3) Remove panels as necessary to access tubing and fittings.

(4) Remove insulation as necessary.

(5) Leak test the tubing and fittings per paragraph 5.7. If a leak is found, skip steps (6) thru (8) and repair or replace the tubing or fitting as necessary.

(6) Install insulation if removed and secure with insulation tape as necessary.

(7) Install any panels removed to access tubing and fittings.

(8) Close and secure cover.

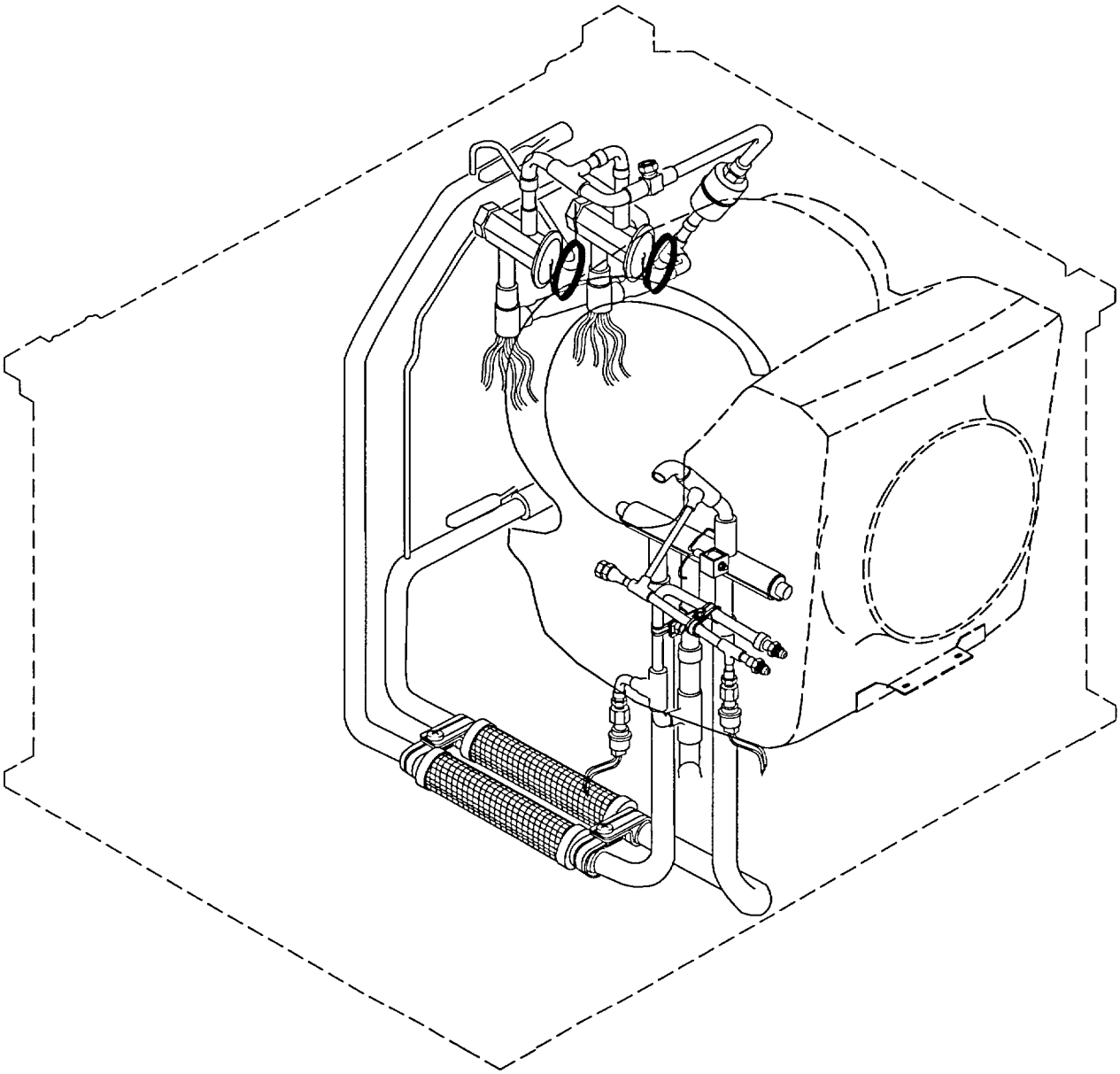


Figure 5-8. Tubing And Fittings

NOTE
Repair consists of replacing damaged or leaking tubing and/or fittings.

b. **Removal.** See figure 5-8.

(1) Remove and recover system refrigerant per paragraph 5.4.

(2) Remove insulation as necessary.

(3) Purge, per paragraph 5.5, the refrigerant system and de-braze, per paragraph 5.6, any fitting or tubing that was leaking.

5.11 **TUBING AND FITTINGS TESTING, REPAIR AND REPLACEMENT - CONTINUED.**

c. **Installation.** See figure 5-8.

(1) Install tubing or fittings as necessary then purge the refrigerant system per paragraph 5.5 and braze in place per paragraph 5.6.

(2) Replace filter- drier per paragraph 5.16.

(3) Leak check the refrigerant system per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.

(4) Install insulation if removed and secure with insulation tape as necessary.

(5) Install any panels removed to access tubing and fittings.

(6) Close and secure cover.

5.12 AIR HANDLING ASSEMBLY REPLACEMENT.

THIS TASK COVERS:	**a. Removal**	**b. Installation**

INITIAL SETUP:

Materials/Parts	**Materials/Parts**
Lock Washers (qty 2) Item 5, Appendix G Lock Washers (qty 10) Item 6, Appendix G Lock Washers (qty 2) Item 11, Appendix G	Insulation Tape Item 20, Section II, Appendix E Crimp Nuts (qty 3) Item 4, Section II, Appendix E

a. **Removal.** See figure 5-9.

(1) Remove heater assembly per paragraph 4.46.

(2) Remove cover per paragraph 4.14.

(3) Disconnect duct from flange assembly (1) if attached then turn flange assembly counterclockwise to unlock and remove. Install the flange assembly with the perforated duct collar facing in (opposite the way it was removed). Align slots and turn clockwise to lock in place.

(4) Remove end panel per paragraph 4.20.

(5) Remove access panel per paragraph 4.21.

(6) Remove four screws (2), lock washers (3), and flat washers (4)(two front and two rear). Discard lock washers.

(7) Remove insulation from tubing as necessary.

(8) Loosen connection and remove drain hose (5).

(9) Remove four screws (6) and flat washers (7). Carefully pull inside blower motor cover (8) out as far as wire leads will allow.

(10) Tag and disconnect wire leads from inside air temperature sensor (9) and inside blower motor (10).

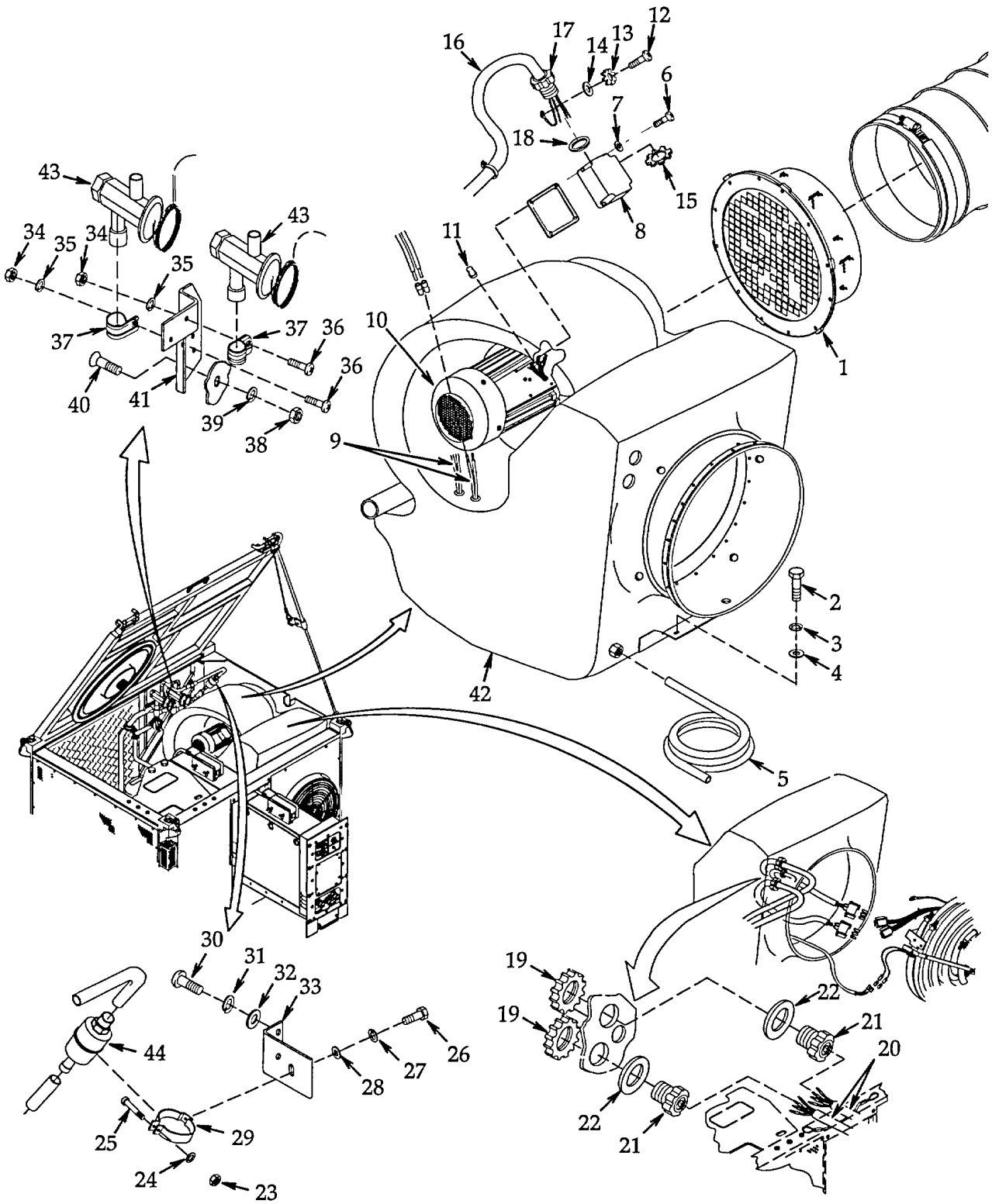


Figure 5-9. Air Handling Assembly

5.12 **AIR HANDLING ASSEMBLY REPLACEMENT - CONTINUED.**

(11) Tag four wire leads at inside blower motor connection points then cut off and discard three crimp nuts (11) to disconnect three leads. Remove screw (12), lock washer (13), and flat washer (14) to disconnect the fourth, ground, lead. Retain lock washer for use during installation.
(12) Remove locking nut (15) then pull cable (16) with strain relief fitting (17) out of inside blower motor. Install locking nut to retain sealing washer (18).
(13) Remove two locking nuts (19) then pull cables (20) with strain relief fittings (21) out. Install locking nuts to retain sealing washers (22).
(14) Remove cover retaining rod per paragraph 4.52.
(15) Remove nut (23), lock washer (24), and bolt (25). Discard lock washer.
(16) Remove bolt (26), lock washer (27), flat washer (28), and clamp (29). Discard lock washer.
(17) Remove two screws (30), lock washers (31), flat washers (32), and bracket (33). Discard lock washers.
(18) Remove two nuts (34), lock washers (35), screws (36), and clamps (37). Discard lock washers.
(19) Remove four nuts (38), lock washers (39), screws (40), and bracket (41). Discard lock washers.

CAUTION
Check valves can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when de-brazing.

(20) Remove and recover system refrigerant per paragraph 5.4.
(21) Purge the refrigerant system per paragraph 5.5 then de-braze the air handling assembly (42) connections per paragraph 5.6.
(22) Carefully lift the air handling assembly (42) out of the FDECU using an appropriate lifting device and sling.

b. **Installation**. See figure 5-9.

(1) Carefully lower the air handling assembly (42) into the FDECU using an appropriate lifting device and sling.

CAUTION
Check valves can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when brazing.

(2) Assemble air handling assembly (42) fittings onto tubing ends. Purge the refrigerant system per paragraph 5.5 and braze connections per paragraph 5.6.
(3) Replace filter-drier per paragraph 5.16.
(4) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.
(5) Install bracket (41) and secure with four screws (40), new lock washers (39), and four nuts (38).

(6) Install two clamps (37) around expansion valves (43) and secure with two screws (36), new lock washers (35), and nuts (34).
(7) Install bracket (33) and secure with two flat washers (32), new lock washers (31), and screws (30).
(8) Install clamp (29) and secure with flat washer (28), new lock washer (27), and bolt (26).
(9) Secure clamp (29) to filter- drier (44) with bolt (25), new lock washer (24), and nut (23).
(10) Install cover retaining rod per paragraph 4.52.
(11) Remove two locking nuts (19). Be sure sealing washers (22) are in place then install cables (20) with strain relief fittings (21). Install locking nuts to secure.
(12) Remove locking nut (15). With sealing washer (18) in place, install cable (16) with strain relief fitting (17) into inside blower motor and secure with locking nut.
(13) Connect the ground wire lead at the inside blower motor connections point using flat washer (14), lock washer (13), and screw (12). Connect the remaining wire leads with three crimp nuts (11) per paragraph 4.16 using tags and wiring diagram figure 4-14. Remove tags.
(14) Connect wire leads from inside air temperature sensor (9) and inside blower motor (10) using tags and wiring diagram figure 4-14. Remove tags.
(15) Install inside blower motor cover (8) then align mounting holes and secure with four flat washers (7) and screws (6).
(16) Install drain hose (5) and tighten connection to secure.
(17) Install insulation and secure with insulation tape as necessary.
(18) Install four flat washers (4), new lock washers (3), and screws (2).
(19) Install access panel per paragraph 4.21.
(20) Install end panel per paragraph 4.20.
(21) Turn flange assembly (1) counterclockwise to unlock and remove it. Be sure the air filter is in place then install the flange assembly with the perforated duct collar facing out (opposite the way it was removed). Align slots and turn clockwise to lock in place. If duct was disconnected for air handling assembly removal, connect to flange assembly.
(22) Install heater assembly per paragraph 4.46.
(23) Install cover per paragraph 4.14.

5.13 **VOLUTE ASSEMBLY REPLACEMENT.**

THIS TASK COVERS: a. Removal b. Installation

a. **Removal**.

(1) Remove air handling assembly per paragraph 5.12.
(2) Remove inside blower motor per paragraph 4.48.

b. **Installation**.

(1) Install inside blower motor per paragraph 4.48.
(2) Install air handling assembly per paragraph 5.12.

5.14 **EXPANSION VALVE REPLACEMENT.**

THIS TASK COVERS: a. Removal b. Installation

INITIAL SETUP:

Tools
Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

Materials/Parts
Lock Washer
Item 11, Appendix G
Insulation Tape
Item 20, Section II, Appendix E

NOTE
Two expansion valves are used in the FDECU. The following procedures apply to either expansion valve.

a. **Removal**. See figure 5-10.

WARNING
Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING
The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access expansion valve (1).
(3) Remove access panel per paragraph 4.21.
(4) Remove insulation from tubing as necessary.
(5) Remove nut (2), lock washer (3), screw (4), and clamp (5). Discard lock washer.
(6) Loosen clamp (6) then slide sensing bulb (7) out.
(7) Remove and recover system refrigerant per paragraph 5.4.

(8) Purge the refrigerant system per paragraph 5.5 then de-braze the expansion valve (1) connections per paragraph 5.6 to remove it.

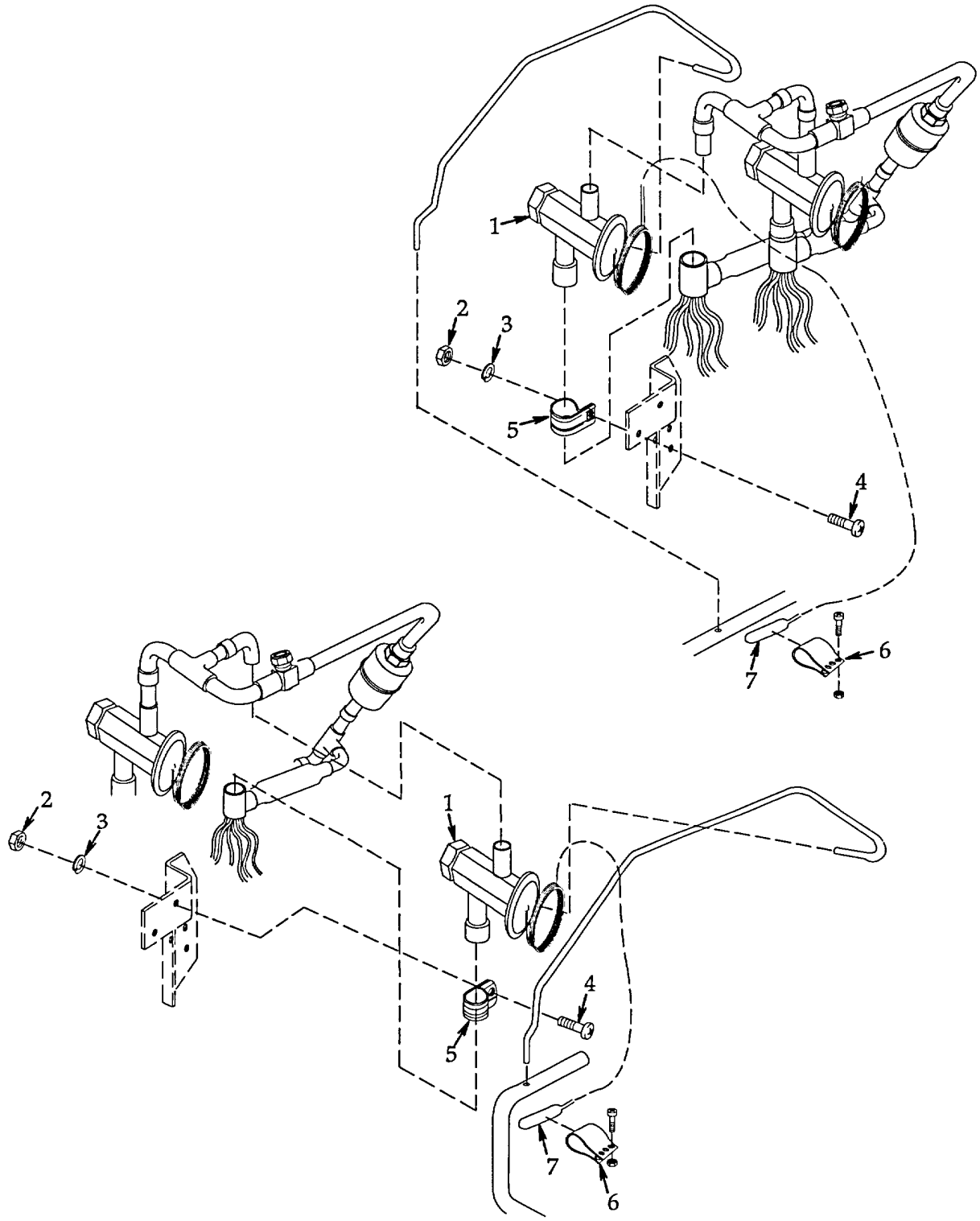


Figure 5-10. Expansion Valve

5.14 **EXPANSION VALVE REPLACEMENT - CONTINUED.**

b. **Installation**. See figure 5-10.

CAUTION

Expansion valve can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when brazing.

NOTE

Both expansion valves are identical but must be adjusted differently after installation for use with the inside or outside coil. A used expansion valve can have an unknown adjustment setting and should never be reused. Always install a new expansion valve.

(1) Install expansion valve (1) onto tubing ends. Purge the refrigerant system per paragraph 5.5 and braze connections per paragraph 5.6.
(2) Remove expansion valve (1) end cap and adjust the valve stem for use with the coil it serves as follows. Inside coil expansion valve to be adjusted 2-1/2 turns clockwise. Outside coil expansion valve to be adjusted 1-1/2 turns counterclockwise. Install end cap after making adjustment.
(3) Replace filter-drier per paragraph 5.16.
(4) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.
(5) Install clamp (5), and secure with screw (4), new lock washer (3), and nut (2).
(6) Slide sensing bulb (7) into clamp (6) then tighten clamp to secure.
(7) Install insulation and secure with insulation tape as necessary.
(8) Install access panel per paragraph 4.21.
(9) Close and secure cover.

5.15 **LIQUID INDICATOR REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools

Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

a. **Removal**. See figure 5-11.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access liquid indicator (1).
(3) Remove clamps as necessary to de-braze connections.
(4) Remove and recover system refrigerant per paragraph 5.4.
(5) Purge the refrigerant system per paragraph 5.5 then de-braze the liquid indicator (1) connections per paragraph 5.6 to remove it.

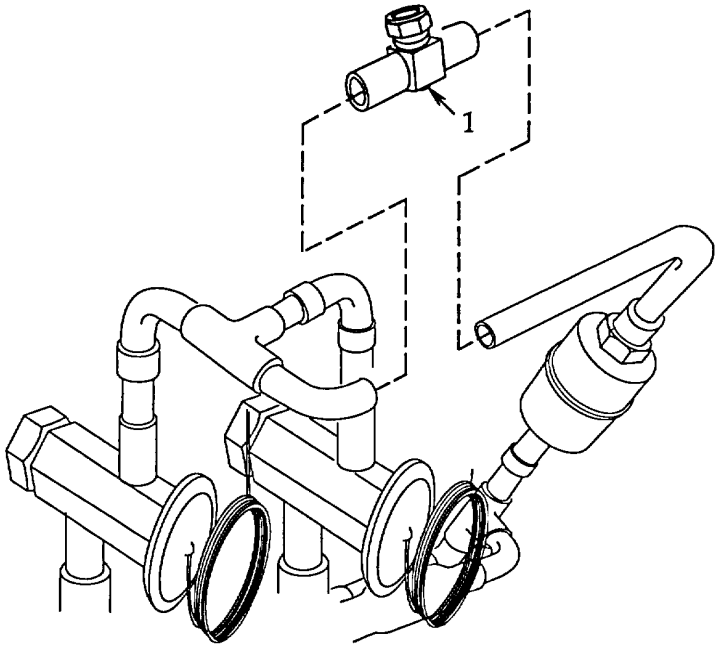


Figure 5-11. Liquid Indicator

5.15 **LIQUID INDICATOR REPLACEMENT - CONTINUED.**

b. **Installation**. See figure 5-11.

CAUTION

The liquid indicator can be damaged by high heat. Be sure to wrap the indicator body with wet rags as instructed to avoid damage when brazing.

NOTE

New liquid indicator fittings are protected with caps. Do not remove these caps until ready to install.

(1) Remove protective caps and install liquid indicator (1) onto tubing ends. Purge the refrigerant system per paragraph 5.5 and braze connections per paragraph 5.6.
(2) Replace filter- drier per paragraph 5.16.
(3) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.
(4) Install any clamps removed to braze connections.
(5) Close and secure cover.

5.16 **FILTER-DRIER REPLACEMENT.**

THIS TASK COVERS: **a. Removal** **b. Installation**

INITIAL SETUP:

Tools
Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

Materials/Parts
Lock Washer
Item 6, Appendix G

a. **Removal**. See figure 5-12.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access filter-drier (1).
(3) Remove end panel per paragraph 4.20.
(4) Remove nut (2), lock washer (3), and bolt (4). Discard lock washer.
(5) Remove and recover system refrigerant per paragraph 5.4.

(6) Purge the refrigerant system per paragraph 5.5 then de-braze the filter- drier (1) connections per paragraph 5.6 to remove it.

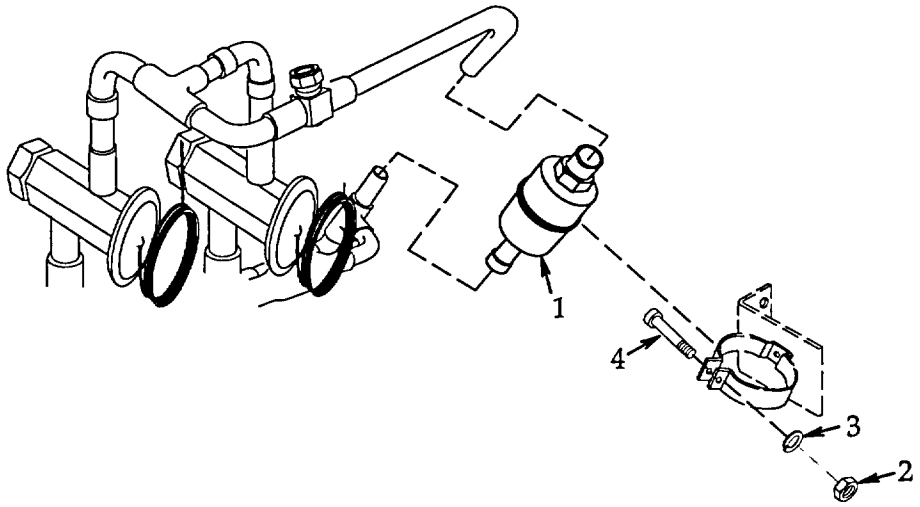


Figure 5-12. Filter-Drier

b. **Installation**. See figure 5-12.

CAUTION

The filter-drier is direction sensitive and must be installed correctly to prevent damage to unit or improper operation.

NOTE

New filter-drier fittings are protected with caps. Do not remove these caps until ready to install.

(1) Remove protective caps and install filter-drier (1) onto tubing ends. Be sure the direction arrow is pointing toward the liquid indicator. Purge the refrigerant system per paragraph 5.5 and braze connections per paragraph 5.6.

(2) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.

(3) Install bolt (4), new lock washer (3), and nut (2) to secure filter-drier (1).

(4) Install end panel per paragraph 4.20.

(5) Close and secure cover.

5.17 **COMPRESSOR AND REVERSING VALVE ASSEMBLY REPLACEMENT.**

THIS TASK COVERS: a. **Removal** b. **Installation**

Initial Setup:

Tools

Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

Materials/Parts
Lock Washer
Item 7, Appendix G
Lock Washers (qty 2)
Item 11, Appendix G
Lock Washers (qty 2)
Item 6, Appendix G

Materials/Parts

Lock Washers (qty 8)
Item 12, Appendix G
Lock Washers (qty 6)
Item 14, Appendix G
Insulation Tape
Item 20, Section II, Appendix E

Personnel Required
2

a. Removal. See figure 5-13.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access compressor and reversing valve assembly (1).
(3) Loosen eight captive screws (2) and carefully pull the electrical assembly (3) out.
(4) **(FDECU-2 ONLY)** Remove compressor crankcase heaters per paragraph 4.49.
(5) Remove two nuts (4), lock washers (5), flat washers (6), and screws (7). Discard lock washers.
(6) Remove screw (8) and reversing valve guard (9).
(7) Tag and disconnect wire leads connected to compressor and reversing valve assembly (1).
(8) Remove six screws (10) and lock washers (11). Discard lock washers.
(9) **(FDECU-2 AND FDECU-3 ONLY)** Remove two screws (12), lock washers (13), flat washers (14), and compressor brace (15). Discard lock washers.
(10) **(FDECU-2 AND FDECU-3 ONLY)** Remove two nuts (16), lock washers (17), and screws (18). Discard lock washers.
(11) **(FDECU-2 AND FDECU-3 ONLY)** Remove screw (19), lock washer (20), flat washer (21), and compressor bracket (22). Discard lock washer.
(12) **(FDECU-4 AND THEREAFTER)** Remove two nuts (12A), lock washers (13A), flat washers (14A), screws (15A), flat washers (16A), clamp (17A) and compressor brace (18A). Discard lock washers.

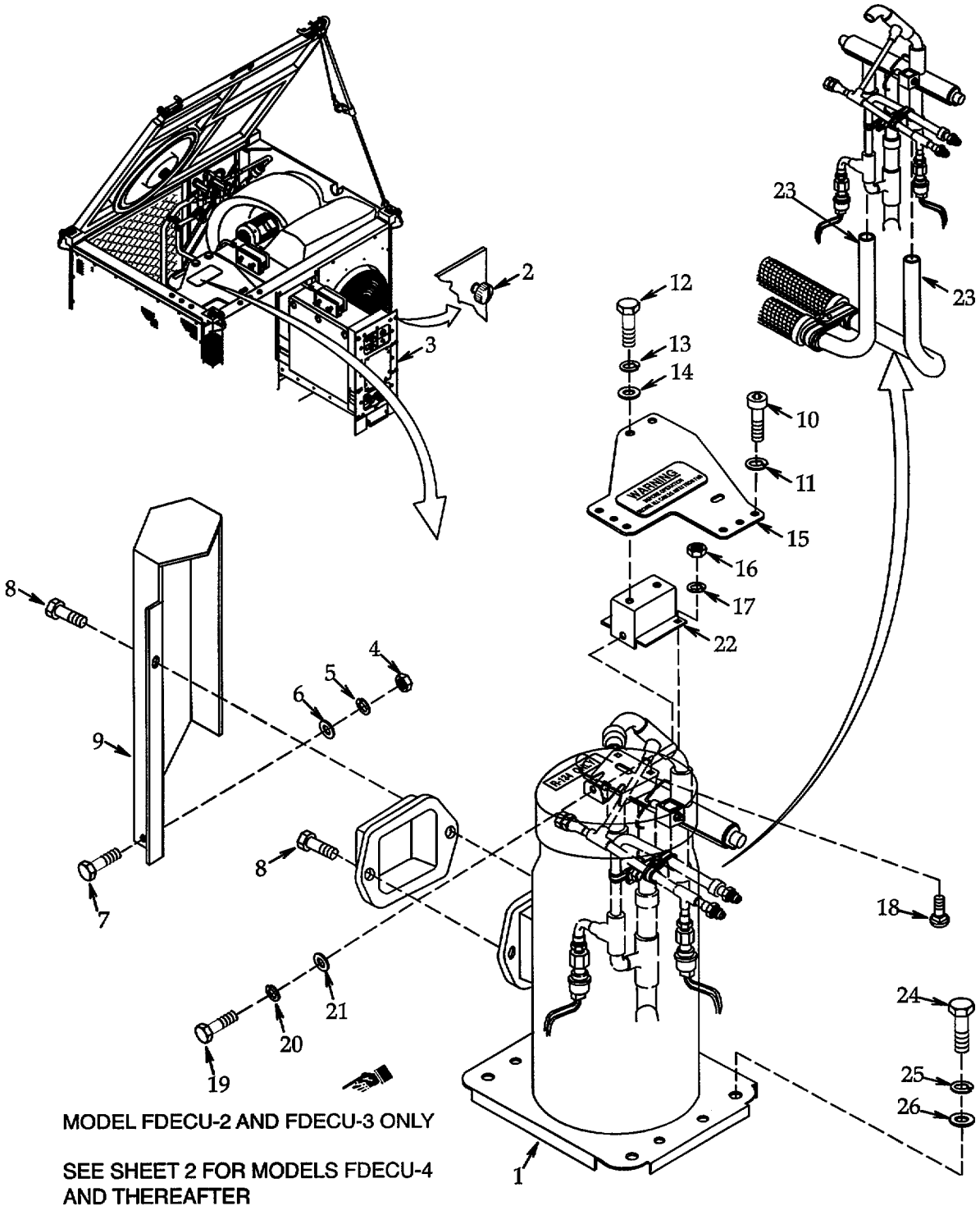


Figure 5-13. Compressor and Reversing Valve Assembly (Sheet 1 of 2).

5.17 **COMPRESSOR AND REVERSING VALVE ASSEMBLY REPLACEMENT - CONTINUED.**

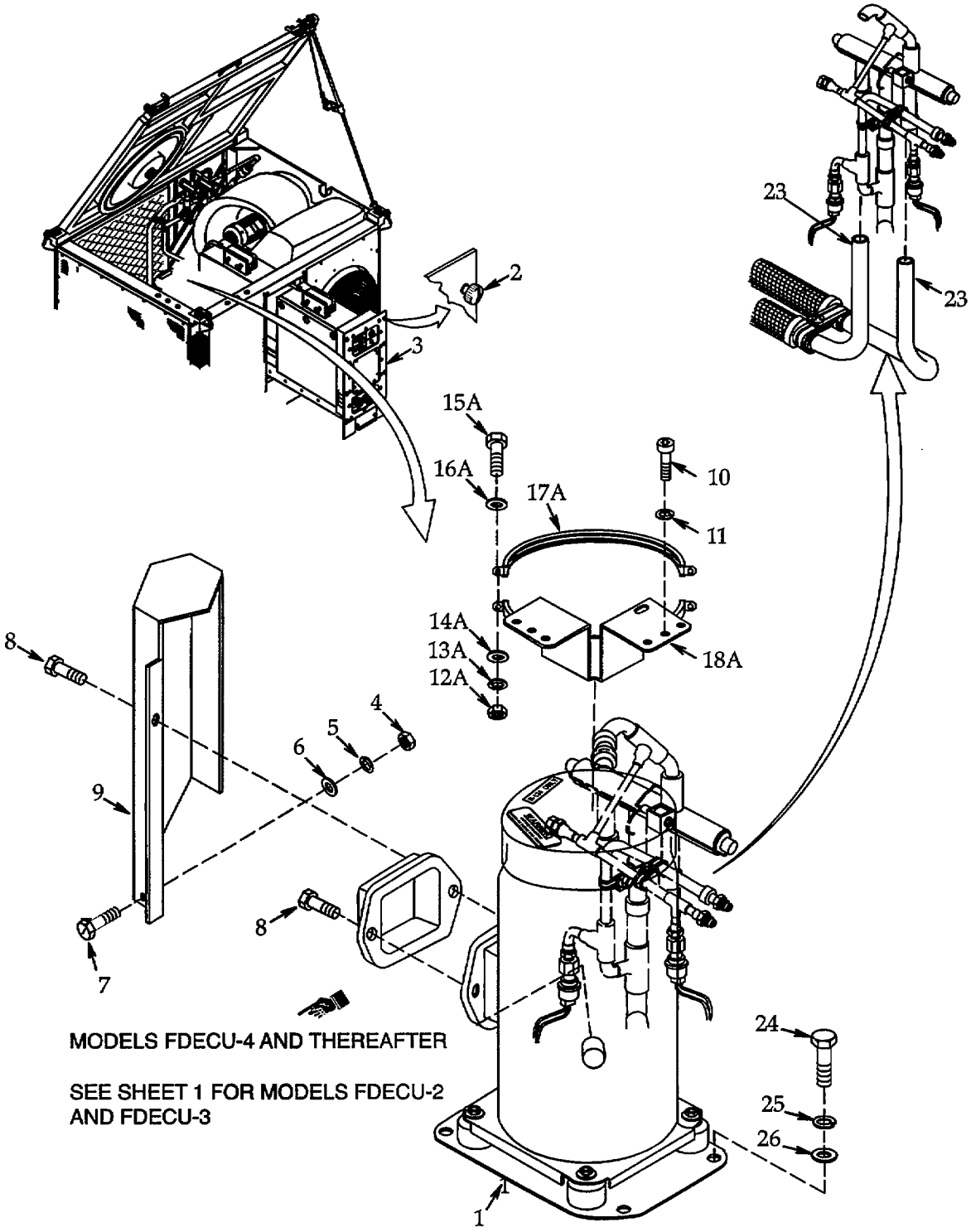


Figure 5-13. Compressor and Reversing Valve Assembly (Sheet 2 of 2).

(13) Remove insulation from tubing as necessary.

(14) Remove and recover system refrigerant per paragraph 5.4.

(15) Purge the refrigerant system per paragraph 5.5 then de-braze two connections (23) per paragraph 5.6 to remove compressor and reversing valve assembly (1).

(16) Remove four screws (24), lock washers (25), and flat washers (26). Discard lock washers.

WARNING

The synthetic refrigerant oil used in the compressor is mildly caustic. Protect any exposed skin from possible contact with refrigerant oil. If refrigerant oil contacts skin, itching or rash-like irritation can result.

(17) Using two people, carefully lift e compressor and reversing valve assembly (1) out of the unit. If available, a hoist or forklift and appropriate sling should be used to remove the assembly. A jibpole assembly (custom compressor lifting hoist) can be secured to the unit frame and used to aid in removal of the compressor and reversing valve assembly. This jibpole assembly is identified in Appendix D, Section I, Additional Authorized Items List.

(18) Drain refrigerant oil from compressor per paragraph 5.6.A.

b. **Installation.** See figure 5-13.

WARNING

The synthetic refrigerant oil used in the compressor is mildly caustic. Protect any exposed skin from possible contact with refrigerant oil. If refrigerant oil contacts skin, itching or rash-like irritation can result.

(1) Using two people, carefully place the compressor and reversing valve assembly (1) into the unit. A jibpole assembly (custom compressor lifting hoist) can be secured to the unit frame and used to aid in installation of the compressor and reversing valve assembly This jibpole assembly is identified in Appendix D, Section II, Additional Authorized Items List.

(2) Align mounting holes then secure with four flat washers (26), new lock washers (25), and screws (24).

NOTE

New compressor and reversing valve assembly fittings are protected with caps. Do not remove these caps until ready to install.

(3) Remove protective caps and install compressor and reversing valve assembly (1) onto tubing ends. Purge the refrigerant system per paragraph 5.5 and braze connections (23) per paragraph 5.6.

(4) Replace filter-drier per paragraph 5.16.

CAUTION

New compressors as well as compressor and reversing valve assemblies are not supplied with lubricants. Compressor must be filled with proper amount of refrigerant oil prior to use. Operation without lubricant will destroy the compressor.

(5) Fill compressor with proper amount of refrigerant oil per paragraph 5.6.A.

(6) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, ad charge per paragraph 5.9.

(7) Install insulation and secure with insulation tape as necessary.

(7) **(FDECU-2 AND FDECU-3 ONLY)** Install compressor bracket (22) and align mounting hole. Secure with flat washer (21), new lock washer (20), and screw (19).

(8) **(FDECU-2 AND FDECU-3 ONLY)** Align mounting holes then install two screws (18), new lock washers (17), and nuts (16).

(9) **(FDECU-2 AND FDECU-3 ONLY)** Install compressor brace (15) and align mounting holes. Secure with two flat washers (14), new lock washers (13), and screws (12).

(10) **(FDECU-4 AND THEREAFTER)** Install compressor brace (18A) and clamp (17A). Secure with two flat washers (16A), screws (15A), flat washers (14A), new lock washers (13A) and nuts (12A). Be sure compressor brace mounting holes are aligned prior to tightening clamp.

(11) Align mounting holes then install six new lock washes (11) and screws (10).

(12) Connect wire leads to compressor and reversing valve assembly (1) using tags and wiring diagram figure 4-14. Remove tags.

(13) Be sure compressor cover is in place then install reversing valve guard (9) and secure with screw (8).

(14) Install two screws (7), flat washers (6), new lock washers (5), and nuts (4).

(15) **(FDECU-2 ONLY)** Install compressor crankcase heaters per paragraph 4.49.

(16) Carefully slide electrical assembly (3) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (2).

(17) Close and secure cover.

5.18 HIGH OR LOW PRESSURE CUTOUT SWITCH (S2 OR S3) REPLACEMENT

THIS TASK COVERS: a. **Removal** b. **Installation**

Tools	**Materials/Parts**
Refrigeration Unit Service Tool Kit Item 2 Section III, Appendix B	Lock Washers (qty 2) Item 11, Appendix G

a. **Removal.** See figure 5-14.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access pressure cutout switch (1).

(3) Loosen eight captive screws (2) and carefully pull the electrical assembly (3) out.

(4) Remove two nuts (4), lock washers (5), flat washers (6), and screws (7). Discard lock washers.

5.18 **HIGH OR LOW PRESSURE CUTOUT SWITCH (S2 OR S3) REPLACEMENT - CONTINUED.**

(5) Remove screw (8) and reversing valve guard (9).

(6) Tag and disconnect pressure cutout switch (1) wire leads.

NOTE

The pressure cutout switch is connected to a self-sealing fitting. No refrigerant will escape when disconnected from this type fitting.

(7) Remove pressure cutout switch (1).

b. **Installation.** See figure 5-14.

(1) Install pressure cutout switch (1).

(2) Connect wire leads from pressure cutout switch (1) using tags and wiring diagram figure 4-14. Remove tags.

(3) Install reversing valve guard (9) and secure with sew (8).

(4) Install two screws (7), flat washers (6), new lock washers (5), and nuts (4).

(5) Carefully slide electrical assembly (3) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (2).

(6) Close and secure cover.

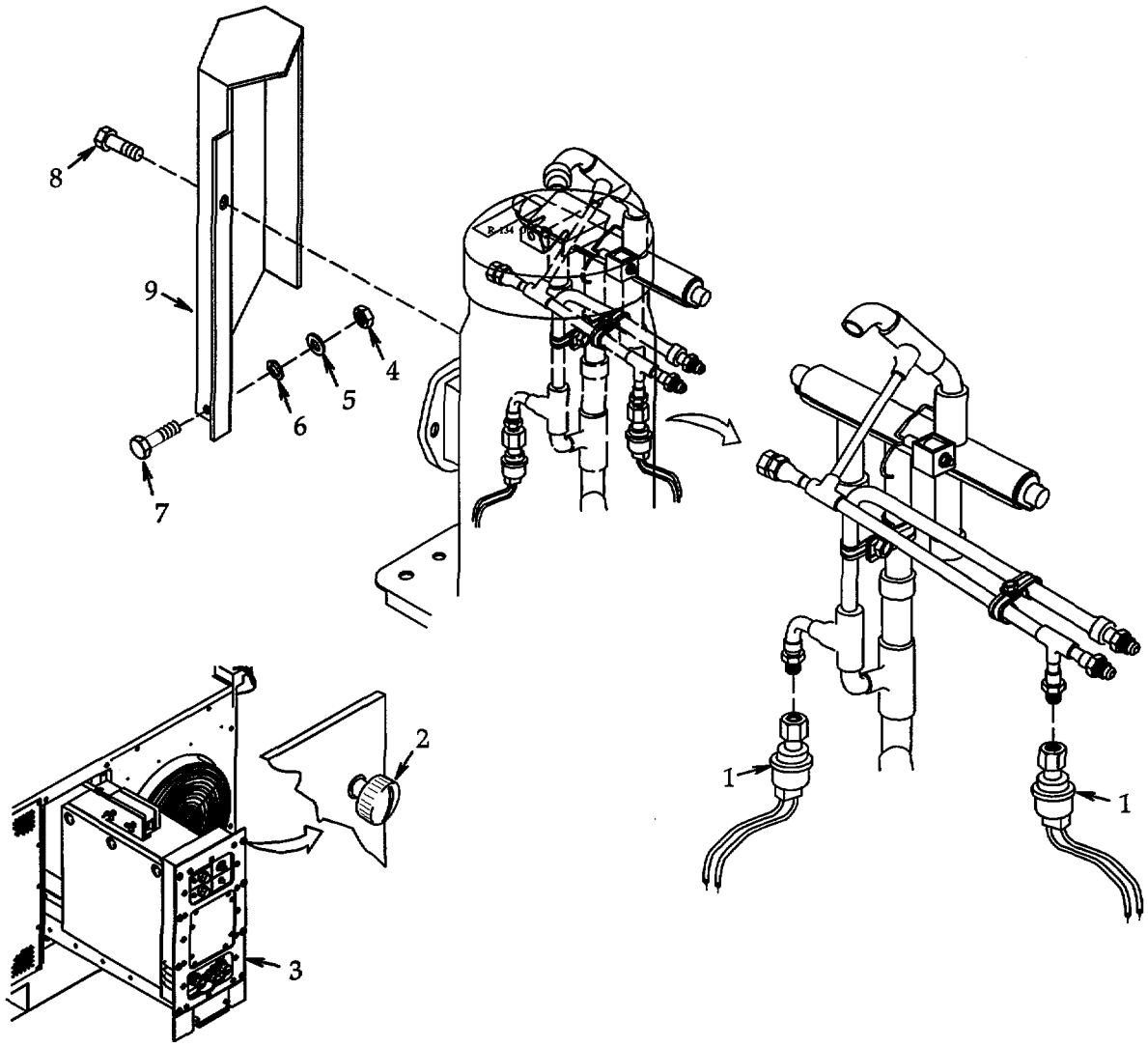


Figure 5-14. High or Low Pressure Cutout Switch (S2 or S3).

5.19 REVERSING VALVE REPLACEMENT.

THIS TASK COVERS	a. Removal	b. Installation

Initial Setup:

Tools
Refrigeration Unit Service Tool Kit
Item 2, Section III, Appendix B

Materials/Parts
Insulation Tape
Item 20, Section II, Appendix E
Lock Washers (qty 2)
Item 11, Appendix G

a. Removal. See figure 5-15.

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.

WARNING

The FDECU cover is heavy. Be sure the cover retaining rod is in place and properly secured with hair pin cotter. Injury can occur if cover drops.

(2) Raise and secure cover to access reversing valve (1).
(3) Remove insulation from tubing as necessary.
(4) Tag and disconnect reversing valve (1) wire leads.
(5) Remove and recover system refrigerant per paragraph 5.4.
(6) Purge the refrigerant system per paragraph 5.5 then de-braze the reversing valve (1) connections per paragraph 5.6 to remove it.
(7) Loosen eight captive screws (2) and carefully pull the electrical assembly (3) out.
(8) Remove two nuts (4), lock washers (5), flat washers (6), and screws (7). Discard lock washers.
(9) Remove screw (8) and reversing valve guard (9).

b. Installation. See figure 5-15.

CAUTION

The reversing valve can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when brazing.

(1) Install reversing valve (1) onto tubing ends. Purge the refrigerant system per paragraph 5.5 and braze connections per paragraph 5.6.
(2) Replace filter- drier per paragraph 5.16.

5.19 **REVERSING VALVE REPLACEMENT - CONTINUED.**

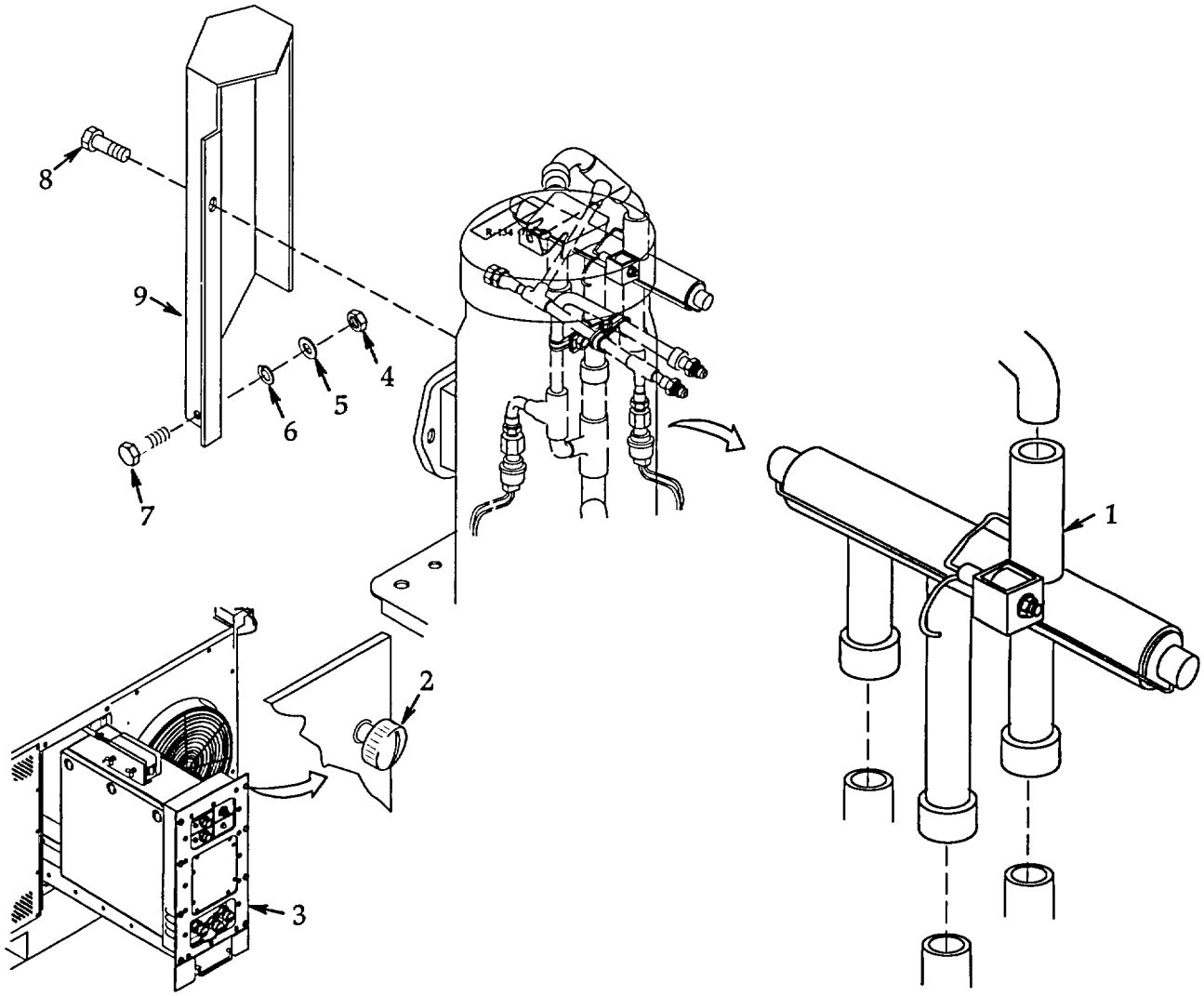


Figure 5-15. Reversing Valve

(3) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.
(4) Connect wire leads from reversing valve (1) using tags and wiring diagram figure 4-14. Remove tags.
(5) Install insulation and secure with insulation tape as necessary.
(6) Install reversing valve guard (9) and secure with screw (8).
(7) Install two screws (7), flat washers (6), new lock washers (5), and nuts (4).
(8) Carefully slide electrical assembly (3) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (2).
(9) Close and secure cover.

5.20 **COMPRESSOR REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

Initial Setup:

Materials/Parts

Insulation Tape
Item 20, Section II, Appendix E

a. **Removal**. See figure 5-16.

(1) Remove compressor and reversing valve assembly per paragraph 5.17.

(2) Remove insulation from tubing as necessary.

(3) Purge the tubing per paragraph 5.5 then de-braze two connections (1) per paragraph 5.6 to disconnect compressor (2) from reversing valve assembly. Lower connection contains a bushing (3), be sure bushing does not remain in compressor if it is to be reused.

(4) Drain refrigerant oil from compressor per paragraph 5.6.A.

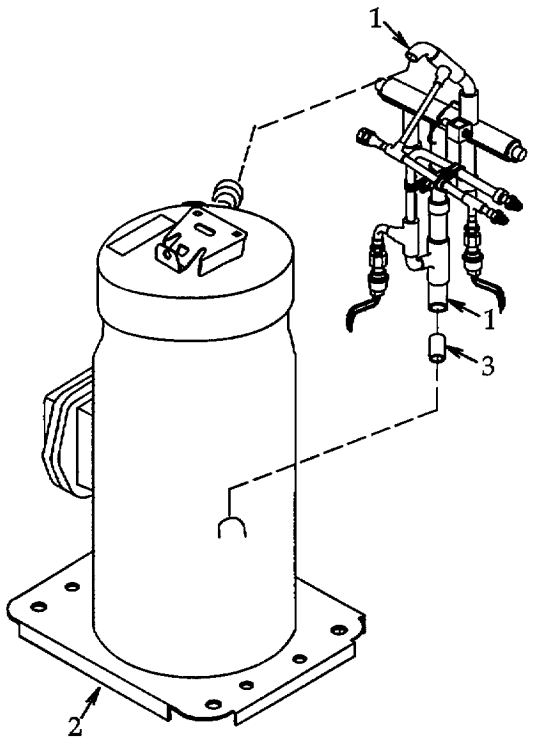


Figure 5-16. Compressor.

5.20 **COMPRESSOR REPLACEMENT - CONTINUED.**

b. **Installation**. See figure 5-16.

NOTE

New compressor fittings are protected with caps. Do not remove these caps until ready to install.

(1) Remove protective caps and install reversing valve assembly onto compressor (2) tubing ends. Be sure to install bushing (3) into lower compressor tubing end. Purge the tubing per paragraph 5.5 and braze connections (1) per paragraph 5.6.

(2) Install insulation and secure with insulation tape as necessary.

(3) Install compressor and reversing valve assembly per paragraph 5.17.

(4) Fill compressor with proper amount of refrigerant oil per paragraph 5.6.A

5.21 **OUTSIDE COIL REPLACEMENT.**

THIS TASK COVERS:	a. **Removal**	b. **Installation**

Initial Setup:

Materials/Parts	**Personnel Required**
Lock Washers (qty 2) Item 14, Appendix G Lock Washers (qty 6) Item 12, Appendix G Lock Washers (qty 2) Item 8, Appendix G	2

a. **Removal**. See figure 5-17.

(1) Remove cover per paragraph 4.14.
(2) Remove end rail per paragraph 4.53.
(3) Remove rear rail per paragraph 4.54.
(4) Remove front rail per paragraph 4.55.
(5) Remove two screws (1), lock washers (2), flat washers (3), and compressor brace (4). Discard lock washers.
(6) **(FDECU-4 AND THEREAFTER)** Remove two nuts (1A), lock washers (2A), flat washers (3A), screws (4A), flat washers (4B), clamp (4C), and compressor brace (4D). Discard lock washers.
(7) Remove two nuts (5), lock washers (6), flat washers (7), screws (8), and flat washers (9). Discard lockwashers.
(8) Loosen eight captive screws (10) and carefully pull the electrical assembly (11) out.
(9) Tag and disconnect wire leads from outside air temperature sensor (12), outside coil temperature sensor (13), and magnetic proximity switch (14).
(10) Remove and recover system refrigerant per paragraph 5.4.

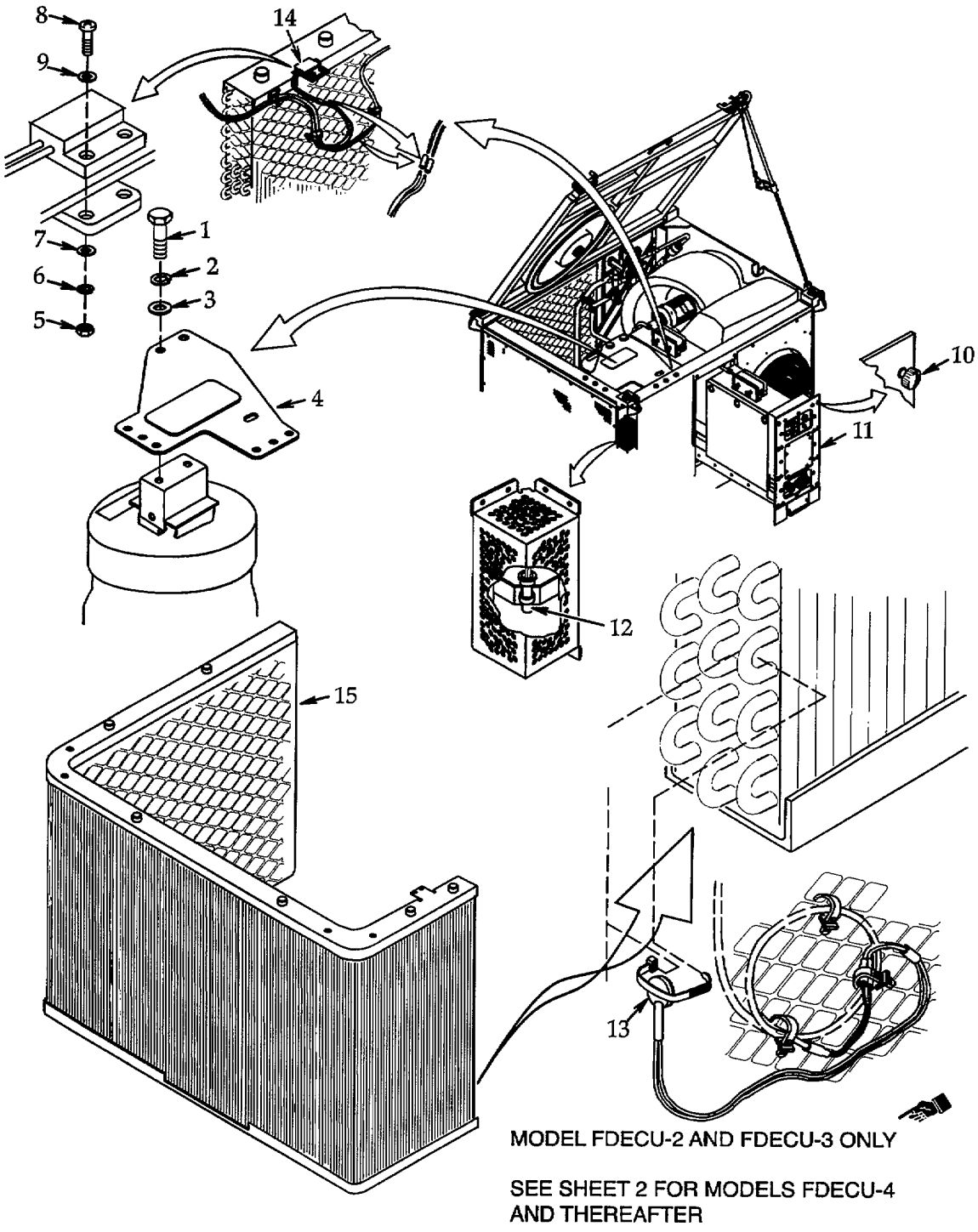


Figure 5-17. Outside Coil (Sheet 1 of 2).

5.21 **OUTSIDE COIL REPLACEMENT - CONTINUED.**

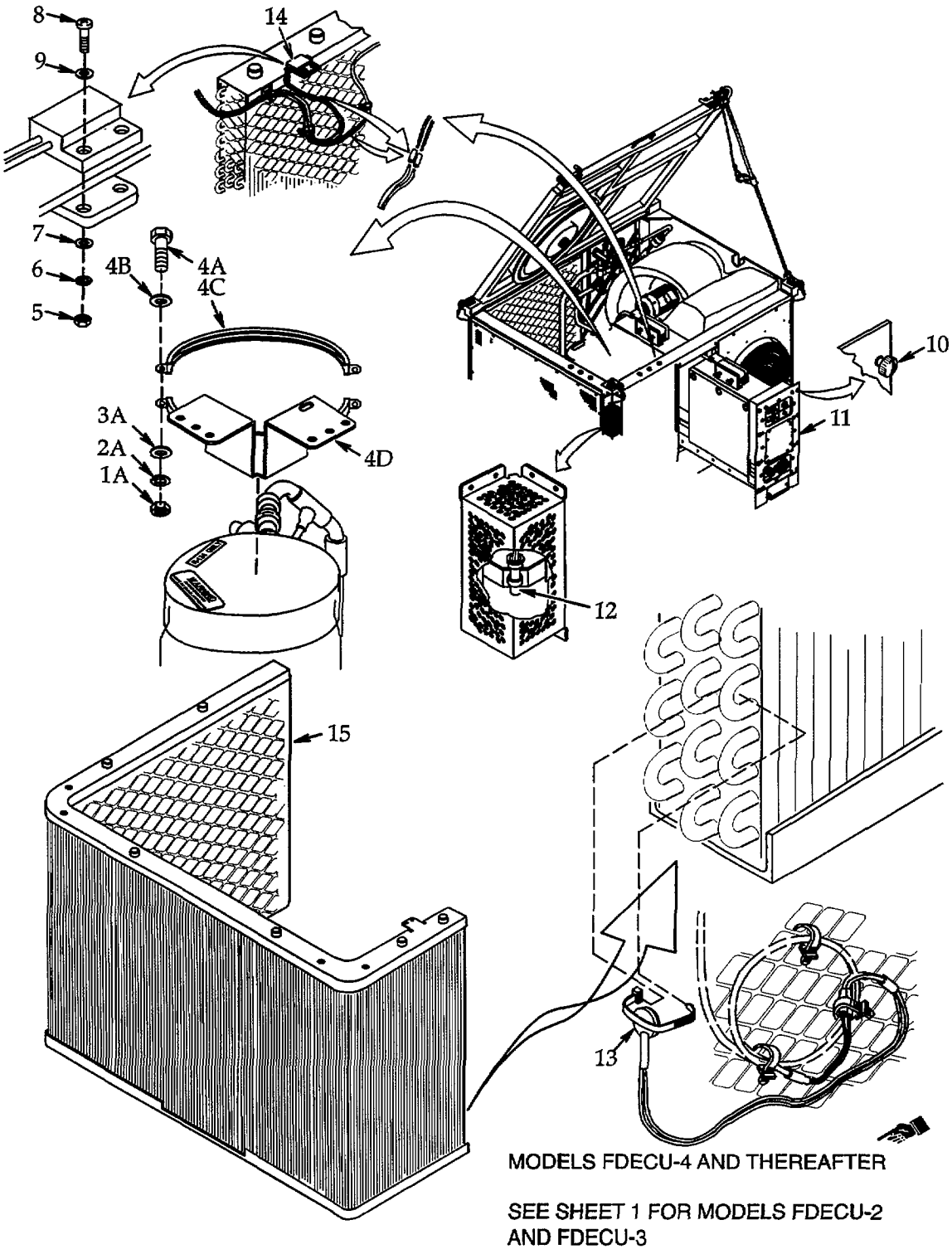


Figure 5-17. Outside Coil (Sheet 2 of 2).

CAUTION

Check valves can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when de-brazing.

(11) Purge the refrigerant system per paragraph 5.5 then de-braze the outside coil (15) connections per paragraph 5.6.

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

(12) Using two people, carefully lift the outside coil (15) out of the unit.

b. **Installation.** See figure 5-17.

WARNING

Coil fins are sharp. Wear gloves any time you need to handle a coil. Severe cuts can occur if hands are not protected.

(1) Using two people, carefully lower the outside coil (15) into the unit.

CAUTION

Check valves can be damaged by high heat. Be sure to wrap the valve body with wet rags as instructed to avoid damage to internal components when brazing.

(2) Assemble outside coil (15) fittings onto tubing ends. Purge the refrigerant system per paragraph 5 and braze connections per paragraph 5.6.

(3) Replace filter-drier per paragraph 5.16.

(4) Leak check the connections per paragraph 5.7, then evacuate per paragraph 5.8, and charge per paragraph 5.9.

(5) Install front rail per paragraph 4.55.

(6) Install rear rail per paragraph 4.54.

(7) Install end rail per paragraph 4.53.

(8) Check that outside coil temperature sensor (13) is installed on coil ad properly secured.

(9) Connect wire leads from outside air temperature sensor (12), outside coil temperature sensor (13) and magnetic proximity switch (14) using tags and wiring diagram figure 4-14. Remove tags.

(10) Carefully slide electrical assembly (11) into frame. Be sure no cables or wires are pinched. Secure with eight captive screws (10).

(11) Place magnetic proximity switch (14) in place and align mounting holes. Secure with two flat washers (9), screws (8), flat washers (7), new lock washers (6), and nuts (5).

(12) Install compressor brace (4) and align mounting holes. Secure with two flat washers (3), new lock washers (2), and screws (1).

(13) **(FDECU-4 AND THEREAFTER)** Install compressor brace (4D) and damp (4C). Secure with two flat washers (4B), screws (4A), flat washes (3A), new lock washers (2A) ad nuts (1A). Be sure compressor brace mounting holes aligned prior to tightening damp.

(14) Install cover per paragraph 4.14.

CHAPTER 6
GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

6.1 **GENERAL**. The only item authorized by the Maintenance Allocation Chart (MAC) to the general support maintenance level is welding or straightening repair to the FDECU frame. However, general support maintenance may be called upon to perform any or all of the MAC items listed for unit and direct support maintenance for rehabilitation or overhaul of the FDECU.

6.2 **FRAME ASSEMBLY REPAIR.**

THIS TASK COVERS **a. Removal**

a. **Repair.**

WARNING

Rotating parts and lethal voltage levels are used in operating the FDECU. Be sure power source is disconnected. Injury or death can occur if connected to power source.

(1) Shutdown the FDECU per paragraph 2.4 and disconnect it from power source.
(2) Disassemble the FDECU as necessary to access repair area then make repair as indicated.
(3) Repair any minor sheet metal dents and bent edges by straightening using common sheet metal repair procedures.
(4) Weld any cracks or breaks in frame members or welds per MIL-B-7883.
(5) Touch-up any painted surfaces per TM 43-0139.
(6) Assemble the FDECU after making necessary repairs.

APPENDIX A
REFERENCES

A.1 **SCOPE.**

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A.2 **TECHNICAL MANUALS.**

Destruction of Army Materiel to Prevent Enemy Use ..... TM 750-244-3
Destruction of Army Electronics Materiel to Prevent Enemy Use ..... TM 750-244-2
Unit, Direct Support, and General Support Maintenance
Repair Parts and Special Tools List ..... TM 9-4120-411-24P
Painting Instructions for Army Materiel ..... TM 43-0139
Leak Detector, Refrigerant Gas ..... TM 9-4940-435-14&P

A.3 **FIELD MANUALS.**

NBC Contamination Avoidance ..... FM 3-3
NBC Protection ..... FM 3-4
NBC Decontamination ..... FM 3-5
First Aid of Soldiers ..... FM 21-11

A.4 **FORMS.**

Production Quality Deficiency Report ..... SF 368
Transportation Discrepancy Report ..... SF 361
Equipment Inspection and Maintenance Worksheet ..... DA Form 2404
Report of Discrepancy ..... SF 364
Technical Order System Publications Improvement Report and Reply ..... AFTO Form 22
Recommended Changes to Publications ..... DA Form 2028
Recommended Changes to Equipment Technical Manuals ..... DA Form 2028-2
Log Book ..... DA Form 2408-9

A.5 **MISCELLANEOUS PUBLICATIONS.**

Unsatisfactory Equipment Reporting TO-00-35D54
Production Quality Deficiency Report .....AFR 900-4
Reporting of Item and Packaging Discrepancies .....AR 735-11-2
Reporting of Transportation Discrepancies in Shipments .....AR 55-38
Reporting of Transportation Discrepancies in Shipments .....AFR 75-18
Reporting of Item and Packaging Discrepancies .....AFR 400-54
Maintenance Reporting .....AFR 66-1
Expendable Items
(Except Medical Class V, Repair Parts and Heraldic Items) .....CTA 50-970
Army Maintenance Management System (TAMMS) .....DA PAM 738-750
Functional Users Manual for the Army Maintenance
Management System-Aviation (TAMMS-A) ..... DA Pam 738-751
Brazing of Steels, Copper, Copper Alloys, Nickel Alloys, Aluminum
and Aluminum Alloys MIL-B-7883

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B.1 **GENERAL.**

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II designates overall responsibility for the 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 categories.

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 and 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 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 (decontaminate), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. **Adjust.** To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. **Aline**. To adjust specified variable elements of an item to bring about optimum or desired performance.

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 a 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, removal/ installation, and disassembly/assembly procedures, and maintenance actions 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.

B.1 **GENERAL - CONTINUED.**

j. **Overhaul.** That maintenance effort (service/actions) prescribed to restore an item to a completely serviceable/operational condition as prescribed 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 equipment/ components.

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 to identify maintenance significant, components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "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 Functions. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed, explanation of these functions, see paragraph B-2.)

d. **Column 4.** Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance functions vary at different maintenance categories, appropriate work time figures will be shown for each category. 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 time (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 symbol designations for the various maintenance categories are as follows:

C .....Operator or Crew
O .....Unit
F.....Direct Support Maintenance
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) and special tools, TMDE, and support equipment required to perform the designated function.

f. **Column 6. Remarks**. Column 6 contains a note number which shall correspond to the notes contained in Section IV.

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 Category**. 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 FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT, 66,000 BTU/HR

(1) Group No.	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equip.	(6) Remarks
			Unit		DS	GS	Depot		
			C	O	F	H	D		
00	FIELD DEPLOYABLE ENVIRONMENTAL	INSPECT	0.1						A
ENVIRONMENT 1 SERVICE			0.3	1.0				1	B
	CONTROL UNIT, 66,000								
	BTU/HR	TEST	0.5	0.5	0.5			1,2	
	MODEL FDECU-2	REPLACE		3.0				1	
		REPAIR		2.0				1,6,7	C
		REPAIR			6.0			1,2,3,4,5	D,E
		REPAIR				2.0		8	F
01	FRAME COVER ASSEMBLY	INSPECT	0.1	0.1					
		SERVICE		0.3				1	
		REPLACE		1.0				1	
		REPAIR		2.0				1	C
02	ELECTRICAL ASSEMBLY	INSPECT		1.0				1	
		TEST		0.5	0.5			1	
		REPLACE		2.0	1.0			1	G
		REPAIR		1.0				1,6	C
0201	POWER BOX ASSEMBLY	INSPECT		0.2					
		TEST		0.5				1,2	
		REPLACE		1.5				1	
		REPAIR		1.0				1	C

(1) Group No.	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equip.	(6) Remarks
			Unit		DS	GS	Depot		
			C	O	F	H	D		
020101	CABLE ASSEMBLIES	INSPECT		0.1				1	H,
		TEST		0.5				1,2	H
		REPLACE		1.0				1	H
		REPAIR		1.0				1,6	C,H
0202	REMOTE BOX ASSEMBLY	INSPECT		0.2				1	
		TEST		0.5				1,2	
		REPLACE		1.5				1	
		REPAIR		1.0				1,6	C
020201	CABLE ASSEMBLY	INSPECT		0.1				1	
		TEST		0.5				1,2	
		REPLACE		1.0				1	
		REPAIR		1.0				1,6	C
0203	CONTROL BOX ASSEMBLY	INSPECT		0.2				1	
		TEST		0.5				1,2	
		REPLACE		1.5				1	
		REPAIR		1.0				1	C
020301	CABLE ASSEMBLY	INSPECT		0.1				1	
		TEST		0.5				1,2	
		REPLACE		1.0				1	
		REPAIR		1.0				1,6	C
0204	WIRE LIST 1, ELECTRICAL ASSEMBLY	INSPECT		0.1				1	
		TEST		0.5				1,2	
		REPLACE		2.0				1	
		REPAIR		1.0				1,6	C

(1) Group No.	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Category					(5) Tools & Equip.	(6) Remarks
			Unit		DS	GS	Depot		
			C	O	F	H	D		
03	HEATER ASSEMBLY	INSPECT		0.1				1	
		TEST		0.5				1,2	
		REPLACE		1.0				1	
		REPAIR		2.0				1	C
04	AIR HANDLING ASSEMBLY	INSPECT		0.1				1	
		TEST		0.5				1,2	
		SERVICE		0.3				1	
		REPLACE			7.0			1,2,3,4,5	
		REPAIR		1.0	8.0			1,2,3,4,5	I
05	REFRIGERA TION SYSTEM ASSEMBLY	INSPECT			0.1				
		TEST			0.5	2			
		REPAIR			6.0			1,2,3,4,5	D
06	COMPRESSOR/ REVERSING VALVE ASSEMBLY	INSPECT			0.1				
		TEST			0.5			2	
		REPLACE			7.0			1,2,3,4,5	
		REPAIR			7.0			1,2,3,4,5	D
07	OUTSIDE COIL ASSEMBLY ASSEMBLY	INSPECT			0.1				
		TEST			0.5			2	
		REPLACE			7.0			1,2,3,4,5	
		REPAIR			7.0			1,2,3,4,5	D
08	FRAME ASSEMBLY	INSPECT				0.5	1		
		REPAIR		1.0				1	E
		REPAIR				2.0		8	F

Section III. TOOL AND TEST EQUIPMENT FOR FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT, 66,000 BTU/HR

Tool or Test Equipment Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
		NOTE		
		Standard tools and test equipment in the following kits are adequate to accomplish the maintenance functions listed in Section II:		
1	O	Tool Kit, General Mechanics	5180-00-699-5273	SC 5180-90-CL-N05
2	O	Tool Kit, Service, Refrigeration Unit	5180-00-596-1474	SC 5180-90-CL-N18
3	F	Pump, Vacuum	4310-00-289-5967	
4	F	Nitrogen Regulator	6680-00-503-1327	
5	F	Recovery and Recycle Unit, Refrigerant	4130-01-338-2707	
6	O	Heat Gun	4940-01-042-4855	
7	O	Rivet Gun	5120-00-508-1588	
8	H	Welding Shop, Trailer Mounted	3431-01-090-1231	SC-3431-95-CL-A04

Section IV. REMARKS FOR FIELD DEPLOYABLE ENVIRONMENTAL CONTROL UNIT, 66,000 BTU/HR

Reference Code	Remarks
A	External at C and O maintenance levels. Internal at O maintenance level and above.
B	Preventive Maintenance Checks and Services (PMCS)
C	Limited to component part replacement at O level maintenance and above.
D	Limited to component part replacement at F level maintenance and above.
E	Replace 1/4 turn receptacles, threaded rivet nuts, lanyards and quick release pins only.
F	Minor weld repairs and straighten at H level maintenance
G	Replace circuit board at F level maintenance and above. All other electrical assembly components can be replaced at O level maintenance and above.
H	Applies to 9 Cable Assemblies part numbers 9454140, 9454141, 9454142, 9454143, 9454144, 9454145, 9454146, 9454147, and 9454148,
I	Replace coil at F level maintenance or above. All other components can be replaced at O level maintenance and above.
	Other than those items listed above there are no supplemental instructions or explanatory remarks required for the maintenance functions listed in Section II. All functions are sufficiently defined in Section I. Active time listed for maintenance task functions are with the air conditioner shutdown.

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS
Section I. INTRODUCTION

C.1 **SCOPE.**

This appendix lists components of end item and basic issue items for the Field Deployable Environmental Control Unit (FDECU) to help you inventory the items required for safe and efficient operation of the equipment.

C.2 **GENERAL.**

The Components Of End Item (COEI) and Basic Issue Items (BII) lists are divided into the following section.

a. **Section II.** Components Of End Item. This listing is for information purposes only, and is not authority to requisition replacements. These items are part of the FDECU. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

b**. Section III**. Basic Issue Items. These essential items are required to place the FDECU in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the FDECU during operation and when it is transferred between property accounts. This list is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the items.

C.3 **EXPLANATION OF COLUMNS.**

The following provides an explanation of columns found in the tabular listings.

a. **Column (1), Illus Number**. Gives you the number of the item illustrated.

b. **Column (2), National Stock Number**. Identifies the stock number of the item to be used for requisitioning purposes.

c. **Column (3), Description and Usable On Code**. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the Commercial And Government Entity Code (CAGEC) (in parentheses) and the part number.

d. **Column (4), U/M (Unit of Measure).** Indicates how the item is issued for the National Stock Number shown in column two.

e. **Column (5), Qty Reqd**. Indicates the quantity required.

Section II. COMPONENTS OF END ITEM

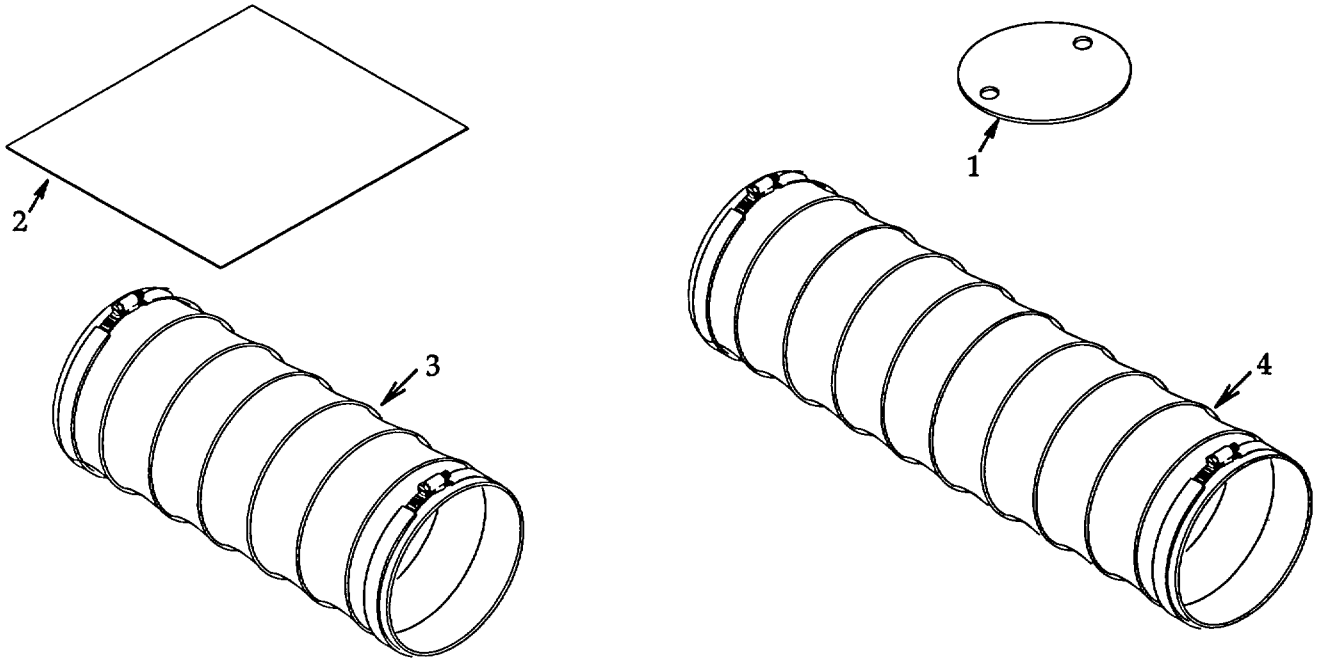
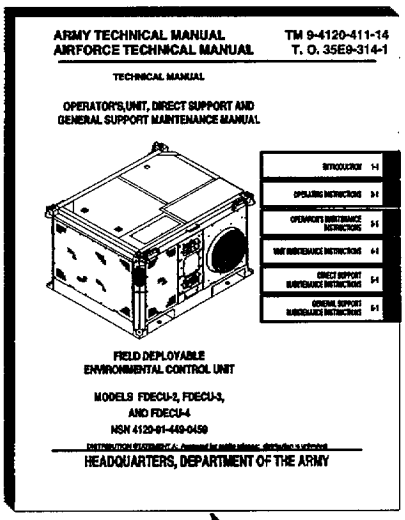


Figure C-1. Components Of End Item.

(1) Illus. No.	(2) National Stock Number	(3) Description (CAGEC) and Part Number	Usable on code	(4) U/M	(5) QTY Reqd
1		COVER, RETURN (98750) 9454402		ea	1
2		COVER, SUPPLY (98750) 9454401		ea	1
3	4720-00-255-9034	DUCT, FLEXIBLE (90598) 12006-100 (AFF)		ea	1
4	4720-00-255-9032	DUCT, FLEXIBLE (90598) 12006-101 (AFF)		ea	1

Section III. BASIC ISSUE ITEMS



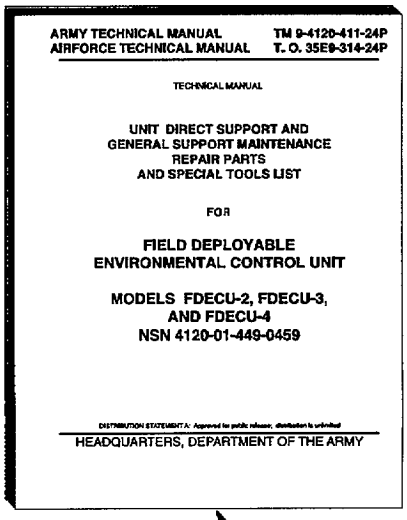


Figure C-2. Basic Issue Items.

(1) Illus. No.	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable on code	(4) U/M	(5) QTY Reqd
1		ARMY/AIR FORCE TECHNICAL MANUAL (Operator's, Unit, Direct Support and General Support Maintenance Manual for Field Deployable Environmental Control Unit, Model FDECU-2, FDECU-3 and FDECU-4) TM 9-4120-411-14 T.O. 35E9-314-1		ea	1
2		ARMY/AIR FORCE TECHNICAL MANUAL (Unit, Direct Support and General Support Maintenance Repair Parts and Special Tools List for Field Deployable Environmental Control Unit, Model FDECU-2, FDECU-3 and FDECU-4) TM 9-4120-411-24P T.O. 35E9-314-4		ea	1

APPENDIX D
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D.1 **SCOPE.**

This appendix lists additional items you are authorized for the support of the Field Deployable Environmental Control Unit (FDECU).

D.2 **GENERAL.**

This list identifies items that do not have to accompany the FDECU and that do not have to be turned in with it.

D.3 **EXPLANATION OF LISTING.**

National stock numbers, 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.

Section II. ADDITIONAL AUTHORIZED ITEMS LIST

(2) National Stock Number	(3) Description CAGEC and Part Number	Usable on code	(4) U/M	(5) Qty Recm
	NOTE The following items are required for NBC configuration.			
4240-01-178-9936	Filter Canister		ea	2
	NBC Adapter (98750) 9454308		ea	1
4720-01-434-2327	Return Air Duct		ea	1
4720-01-434-2331	Supply Air Duct		ea	1
4240-01-200-4330	Support Kit		ea	2
	Jibpole Assembly (98750) 9454160		ea	1

APPENDIX E
EXPENDABLE AND DURABLE ITEMS LIST

Section I. INTRODUCTION

E.1 **SCOPE.**

This appendix lists expendable and durable supplies you will need to operate and maintain the FDECU. These items are authorized to you by CTA 50-970, Expendable 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 the initial setup to identify the material (e.g., "Cleaning Compound, Item 5, Appendix E").

b. **Column (2) - Level.** This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - 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 item.

d. **Column (4) - Description.** Indicates the item name and, if required, a description to identify the item. The last line for each item indicates the Commercial And Government Entity Code (CAGEC) in parentheses followed by the part number.

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 (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirement.

Section II. EXPENDABLE AND DURABLE ITEMS LIST

1 ITEM NUMBER	2 LEVEL	3 NATIONAL STOCK NUMBER	4 DESCRIPTION	5 U/M
1	O	5975-00-727-5153	Tiedown Strap (96906) MS3367-4-9	hd
2	O	5975-00-111-3208	Tiedown Strap (96906) MS3367-5-9	hd
3	O	9905-00-537-8954	Marker Tag (81349) MIL-T-12755	box
4	O	5940-00-617-2711	Crimp Nut (98750) 9454363-1	ea
5	O		Splice (98750) 9454296-2	ea
6	O	5320-00-957-2497	Blind Rivet (96906) MS20604B4W7	ea
7	O		Rivet (94833) 9842401-10-1	ea
8	O		Rivet (94833) 9842401-19-1	ea
9	O		Rivet (94833) 9842401-21-1	ea
10	O	5935-00-725-4153	Solder, Lead-Tin (81348) QQ- S-571/SN60WRP2	roll
11	O	3439-01-045-7940	Flux, Solder, Liquid, Rosin Base MIL- F- 14256	qt
12	C	7920-00-205-1711	Wiping Rag	bl
13	C	7930-00-985-6911	Detergent (81349) MIL-D-76791	gl
14	F	6830-00-292-0732	Nitrogen	cy
15	F	5350-00-192-5047	Abrasive Cloth	pg
16	F	3439-00-640-3713	Flux, Brazing 0-F-499, type B	oz
17	F		Brazing Alloy, Silver QQ-B-564, grade 0, I, or II	oz
18	F		Brazing Alloy, Silver QQ-B-564, grade III	oz
19	F	6830-01-380-4960	Refrigerant, R134a	lb
20	F	5640-00-580-6276	Insulation Tape	roll
21	F		Refrigerant Oil, R134a (1LLR3) EMKARATE-RL32HB	gl

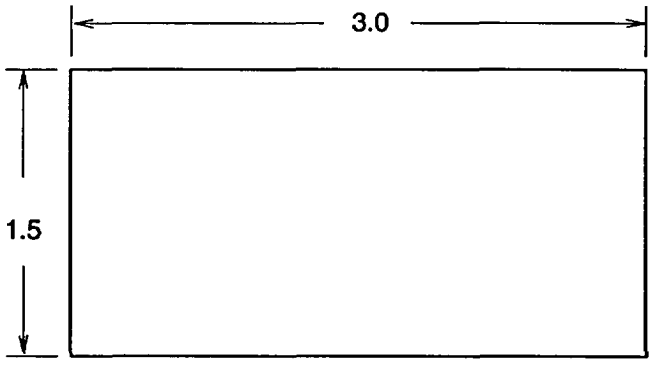
APPENDIX F
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. INTRODUCTION

This appendix includes complete instructions for items authorized to be manufactured or fabricated. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be fabricated to the figure covering fabrication criteria. All bulk materials needed for manufacturing an item are listed by part number or specification number in a tabular list on the illustration.

Section II. MANUFACTURED ITEMS PART NUMBER INDEX

Section III. MANUFACTURED ITEMS ILLUSTRATIONS



NOTE

1. FABRICATE FROM (76381) 4726 VINYL FOAM SHEET

Figure F-1. Vinyl Foam, Part Number 9454111 ITEM 44.

ITEM	PART NUMBER	DIM "A"	FABRICATE FROM
1	9454140 ITEM 3	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
2	9454140 ITEM 2	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
3	9454141 ITEM 4	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
4	9454141 ITEM 3	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
5	9454142 ITEM 3	1.0	(81349) M23053/5-105-0 HEAT SHRINK INSULATION SLEEVING
6	9454142 ITEM 2	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
7	9454143 ITEM 4	1.0	(81349) M23053/5-106-0 HEAT SHRINK INSULATION SLEEVING
8	9454143 ITEM 3	2.0	(81349) M23053/5-109-0 HEAT SHRINK INSULATION SLEEVING
9	9454144 ITEM 4	1.0	(81349) M23053/5-106-0 HEAT SHRINK INSULATION SLEEVING
10	9454144 ITEM 3	2 0	(81349) M23053/5-109-0 HEAT SHRINK INSULATION SLEEVING
11	9454144 ITEM 4	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
12	9454144 ITEM 3	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
13	9454146 ITEM 4	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
14	9454146 ITEM 3	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
15	9454147 ITEM 3	1.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
16	9454147 ITEM 2	2.0	(81349) M23053/5-111-0 HEAT SHRINK INSULATION SLEEVING
17	9454148 ITEM 5	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
18	9454148 ITEM 4	2.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
19	9454149 ITEM 5	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
20	9454149 ITEM 4	1.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
21	9454121 ITEM 17	1.25	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
22	9454121 ITEM 19	1.5	(81349) M23053/5-104-0 HEAT SHRINK INSULATION SLEEVING
23	9454202 ITEM 2	1.0	(81349) M23053/5-103-0 HEAT SHRINK INSULATION SLEEVING
24	9454130 ITEM 5	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
25	9454108 ITEM 39	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
26	9454108 ITEM 35	1.0	(81349) M23053/5-104-0 HEAT SHRINK INSULATION SLEEVING
27	9454150 ITEM 6	1.0	(81349) M23053/5-107-0 HEAT SHRINK INSULATION SLEEVING
28	9454150 ITEM 7	1.0	(81349) M23053/5-102-0 HEAT SHRINK INSULATION SLEEVING
29	9454150 ITEM 5	2.0	(81349) M23053/5-109-0 HEAT SHRINK INSULATION SLEEVING
30	9454202-3 ITEM 2	1.0	(81349) M23053/5-103-0 HEAT SHRINK INSULATION SLEEVING

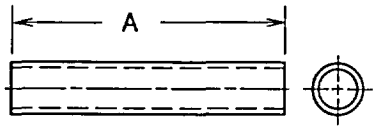


Figure F-2. Insulation Sleeving.

ITEM	PART NUMBER	DIM "A"	FABRICATE FROM
1	9454140-1	70.0	(81774) 02766 FLEXIBLE SO CABLE, 4 CONDUCTOR, 16 AWG
2	9454141-1	62.0	(81774) 01824 FLEXIBLE SO CABLE, 4 CONDUCTOR, 6 AWG
3	9454142-1	57.0	(81774) 02768 FLEXIBLE SO CABLE, 4 CONDUCTOR, 14 AWG
4	9454143-1	102.0	(81774) 0272 6 FLEXIBLE SO CABLE, 4 CONDUCTOR, 12 AWG
5	9454144-1	102.0	(81774) 02726 FLEXIBLE SO CABLE, 4 CONDUCTOR, 12 AWG
6	9454145-1	65.0	(92194) 6653 OUTDOOR CABLE, 3 CONDUCTOR, 18 AWG
7	9454146-1	60.0	(92194) 6653 OUTDOOR CABLE, 3 CONDUCTOR, 18 AWG
8	9454147-1	324.0	(81774) 98270 FLEXIBLE SO CABLE, 5 CONDUCTOR, 6 AWG
9	9454148-1	60.0	(92194) 2576 OUTDOOR CABLE, 3 CONDUCTOR, 18 AWG
10	9454149-1	445.0	(70903) 9946 10 CONDUCTOR CABLE
11	9454150-1	646.0	(92194) 5610B2001E MULTI CONDUCTOR CABLE,
			2 CONDUCTOR SHIELDED

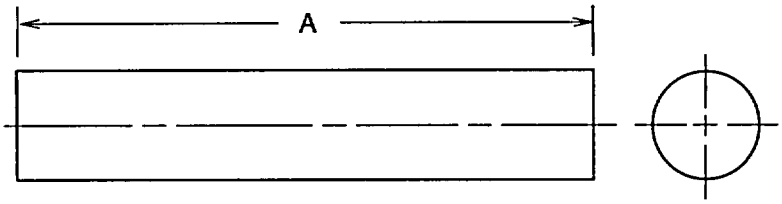


Figure F-3. Cable.

ITEM	PART NUMBER	DIM "A"	FABRICATE FROM
1	9454149-3	8.0	THHN STRANDED UL LISTED, 600 VAC, 90 DEG C, 14 AWG
			CONDUCTOR COLOR-GREEN ELECTRICAL WIRE
2	9454202 ITEM 20	6.0	UL RECOGNIZED, STYLE 1015, 600 VAC, 105 DEG C, 22 AWG
			CONDUCTOR COLOR-RED ELECTRICAL WIRE
3	9454130-1	28.0	UL RECOGNIZED, STYLE 1015, 600 VAC, 105 DEG C, 20 AWG
			CONDUCTOR COLOR-ORANGE ELECTRICAL WIRE
4	9454150-3	12.0	UL RECOGNIZED, STYLE 1015, 600 VAC, 105 DEG C, 20 AWG
			CONDUCTOR COLOR-BLACK ELECTRICAL WIRE

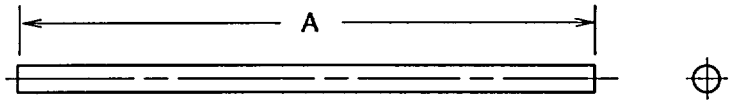


Figure F-4. Wire.

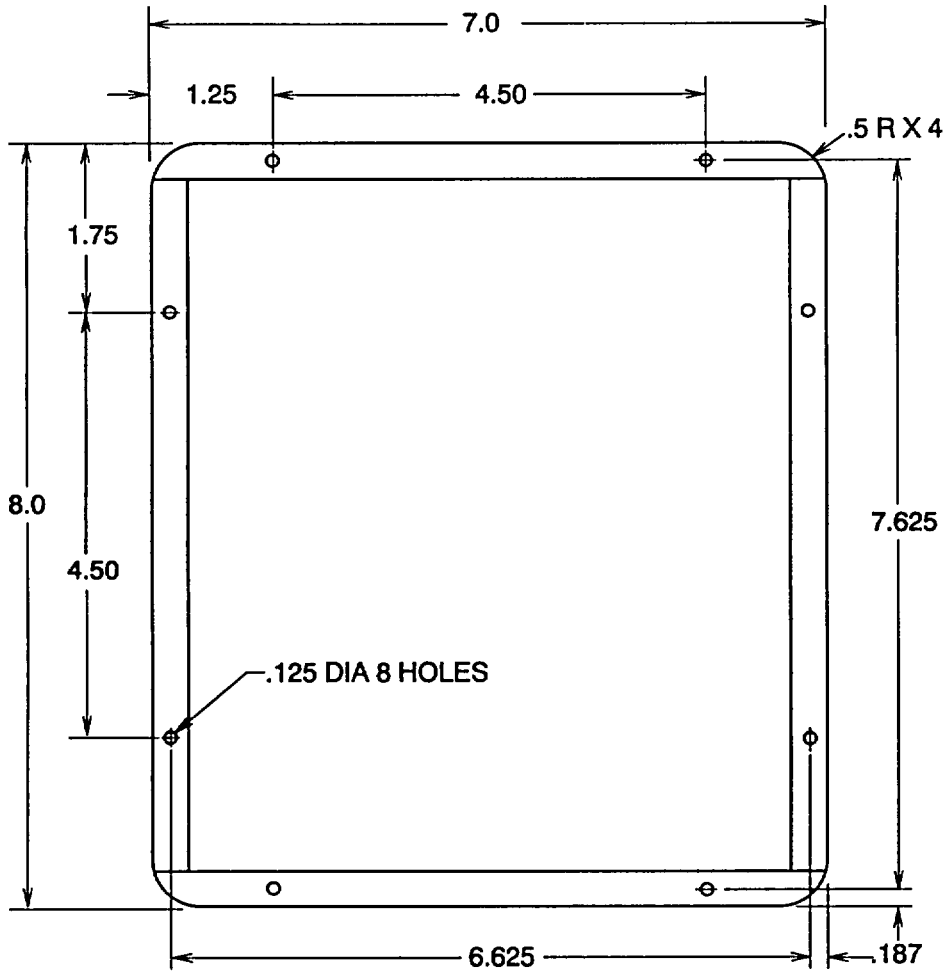
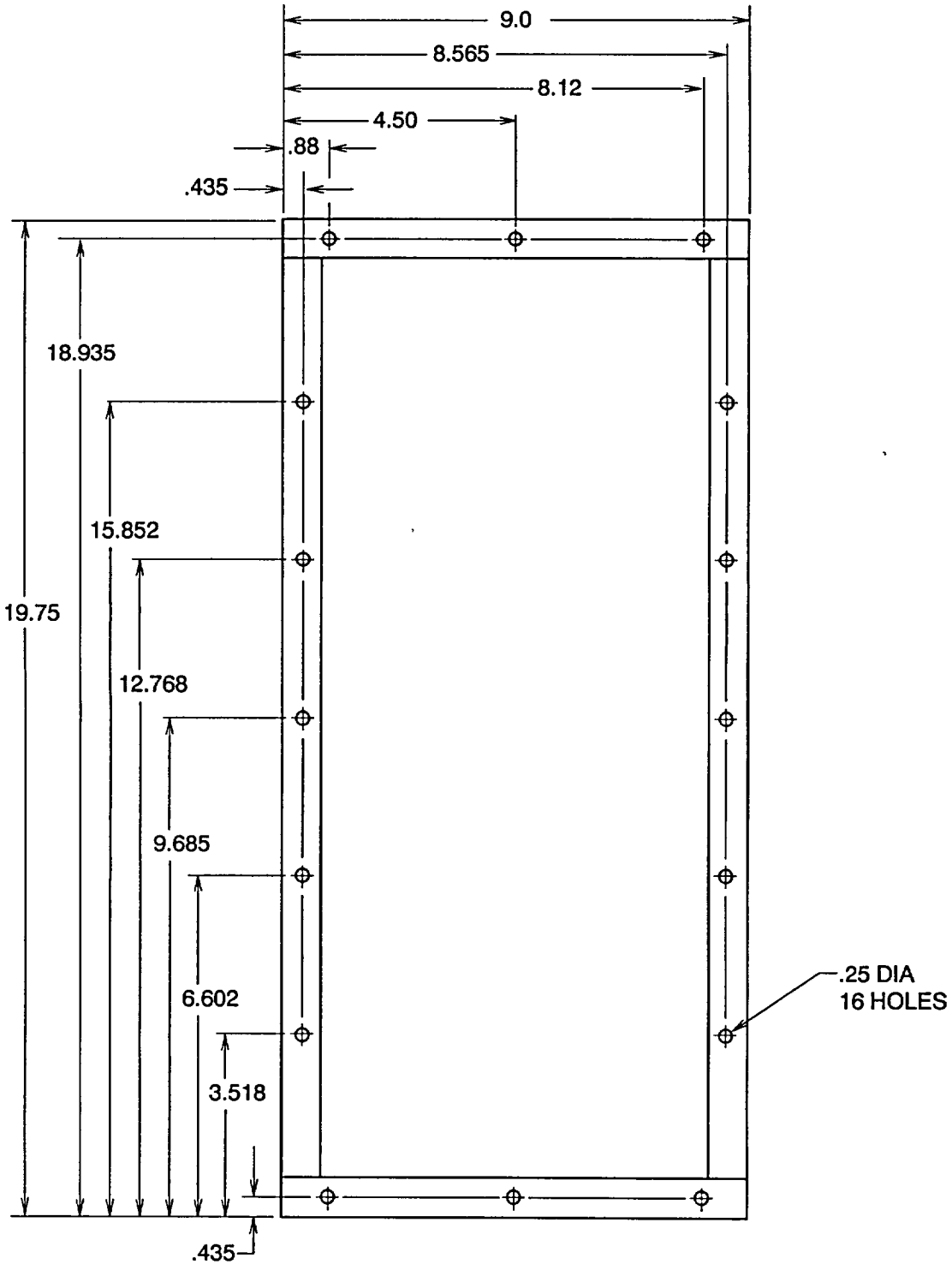
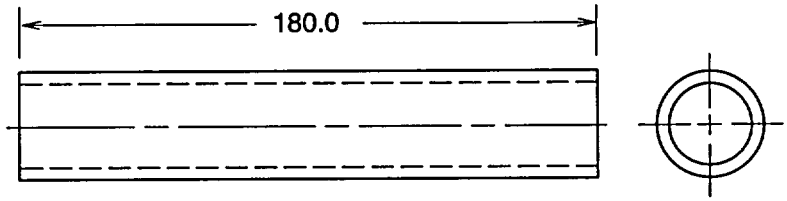


Figure F-5. Vinyl Foam, Part Number 9454108 ITEM 27.



NOTE
1. FABRICATE FROM (76381) 4726 X .75 WIDE VINYL FOAM STRIP

Figure F-6. Vinyl Foam, Part Number 9454108 ITEM 26.



NOTE
1. FABRICATE FROM (98750) 9454304-3 PPVC TUBING

Figure F-7. Hose, Part Number 9454078 ITEM 18.

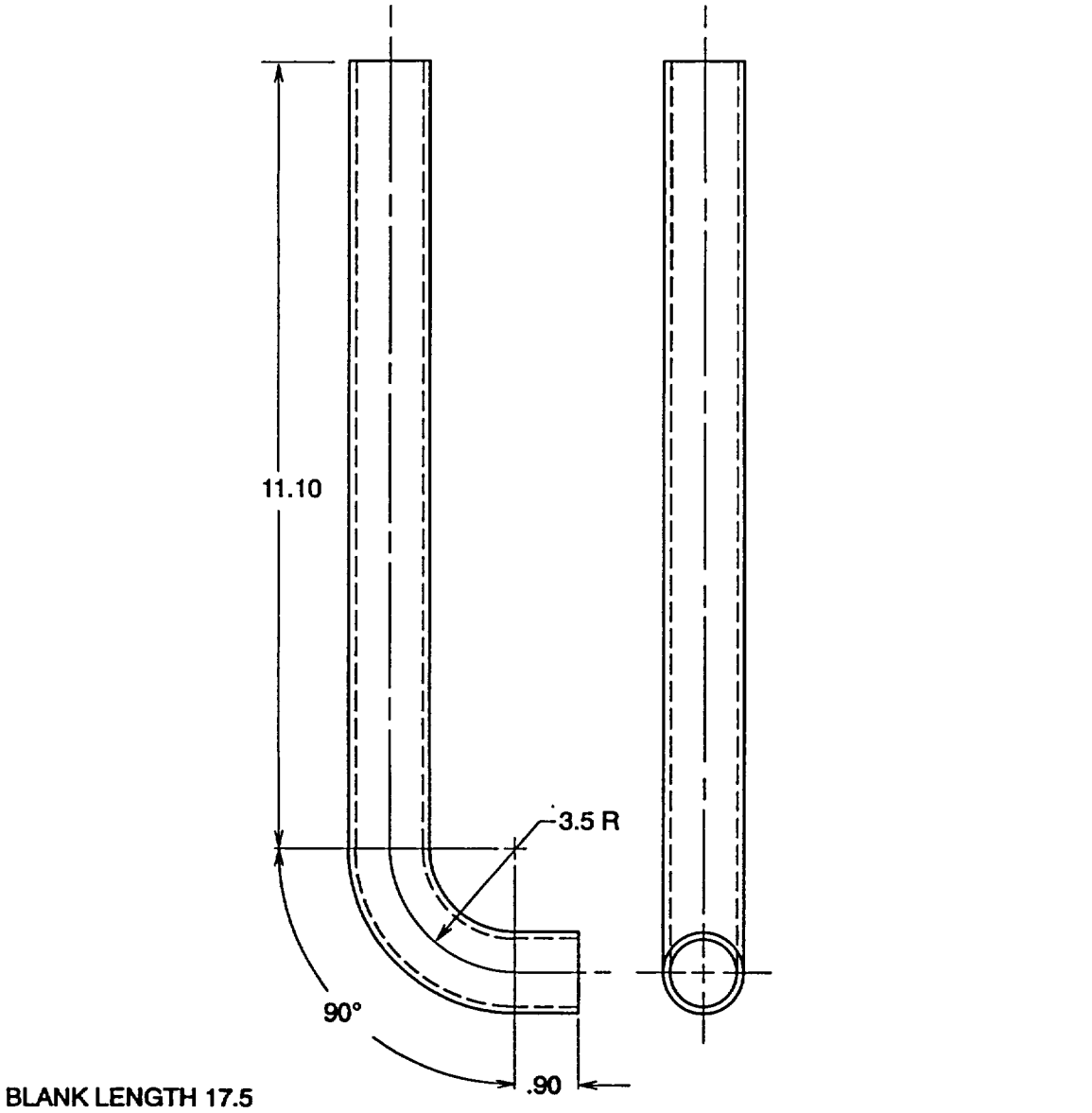
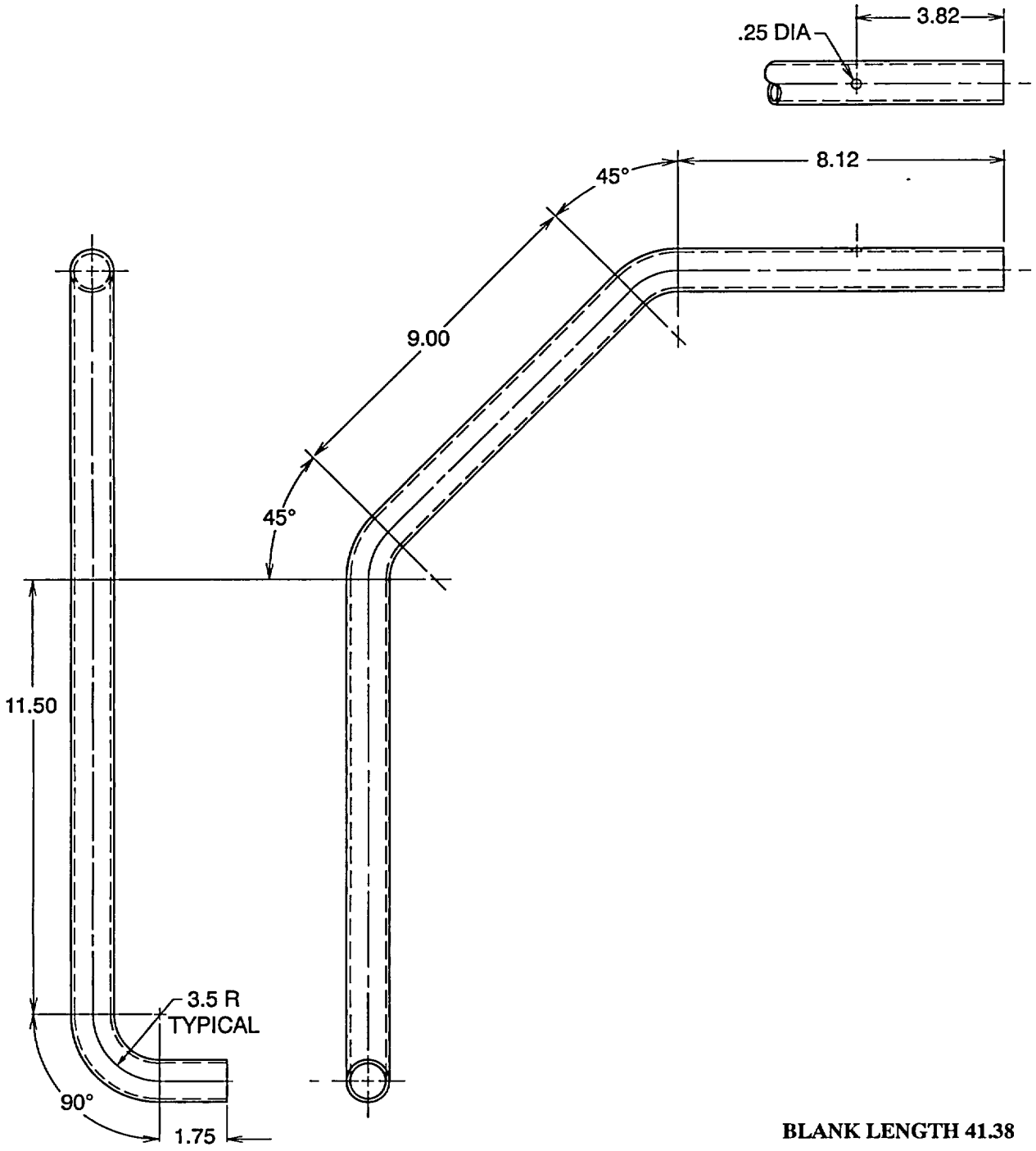


Figure F-8. Tube, Part Number 9454135-8-17.50.



NOTE
1. FABRICATE FROM ASTM B88,1.125 OD X 0.50 WALL COPPER TUBING

Figure F-9. Tube, Part Number 9454135-8-41.38.

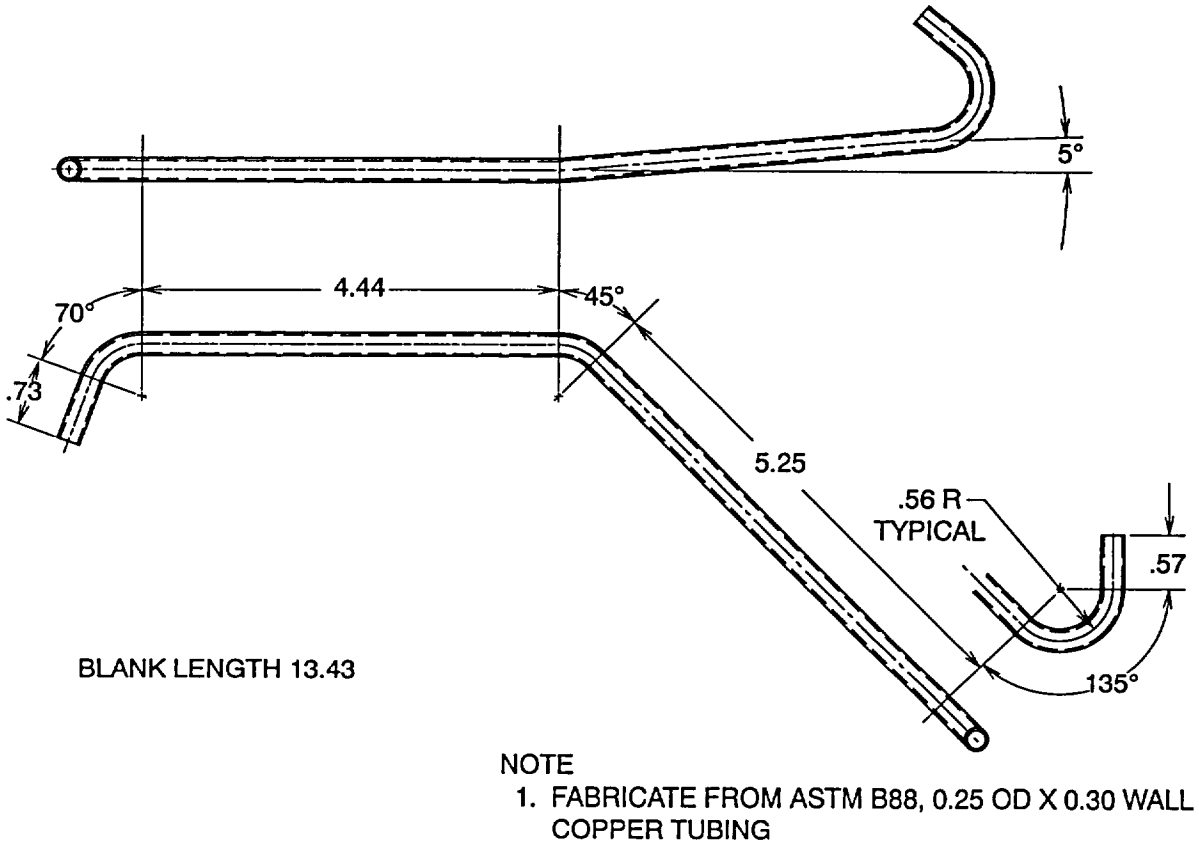
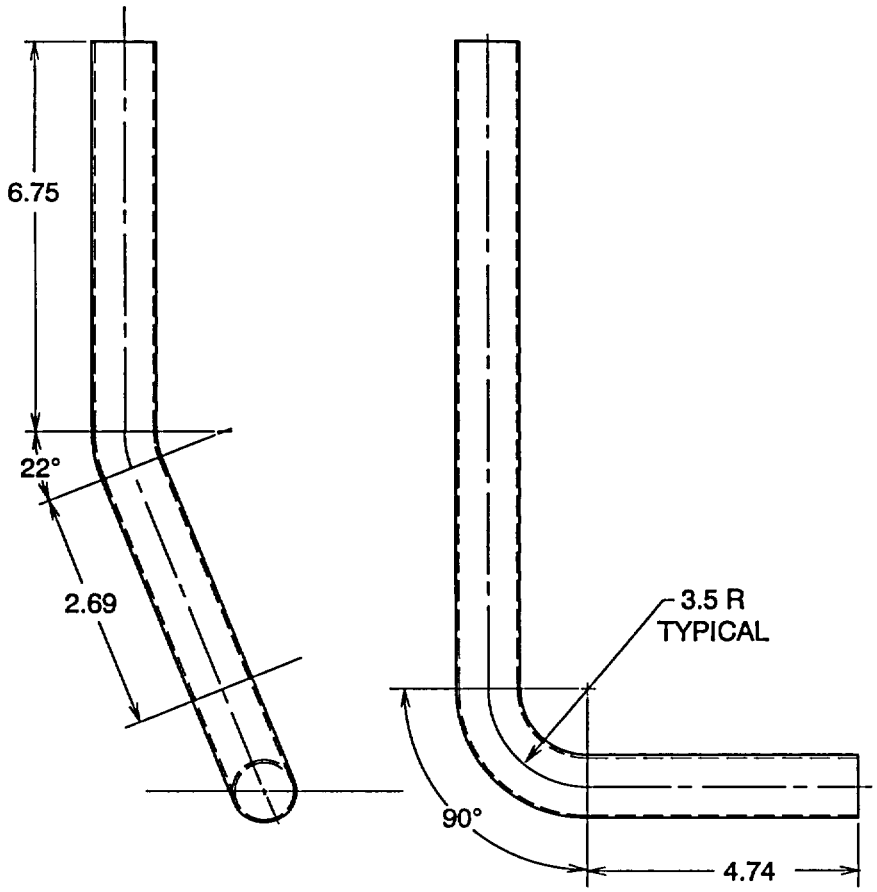


Figure F-10. Tube, Part Number 9454135-11-13.43.



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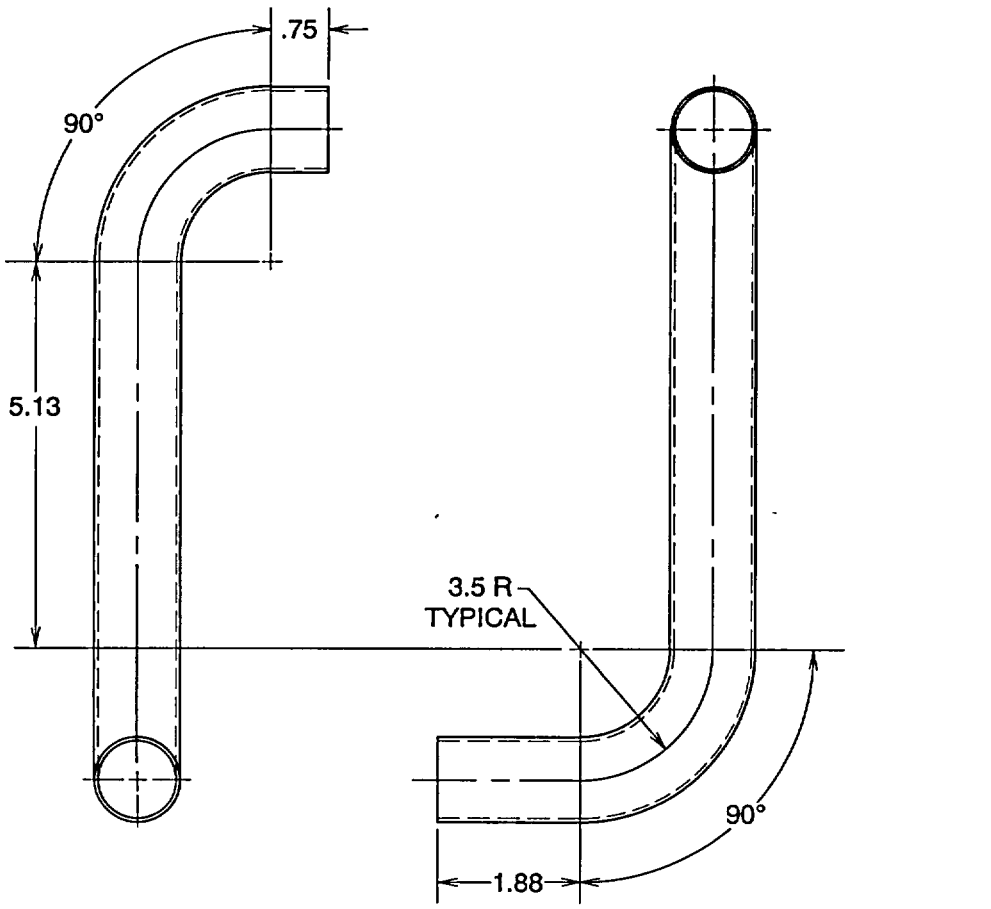
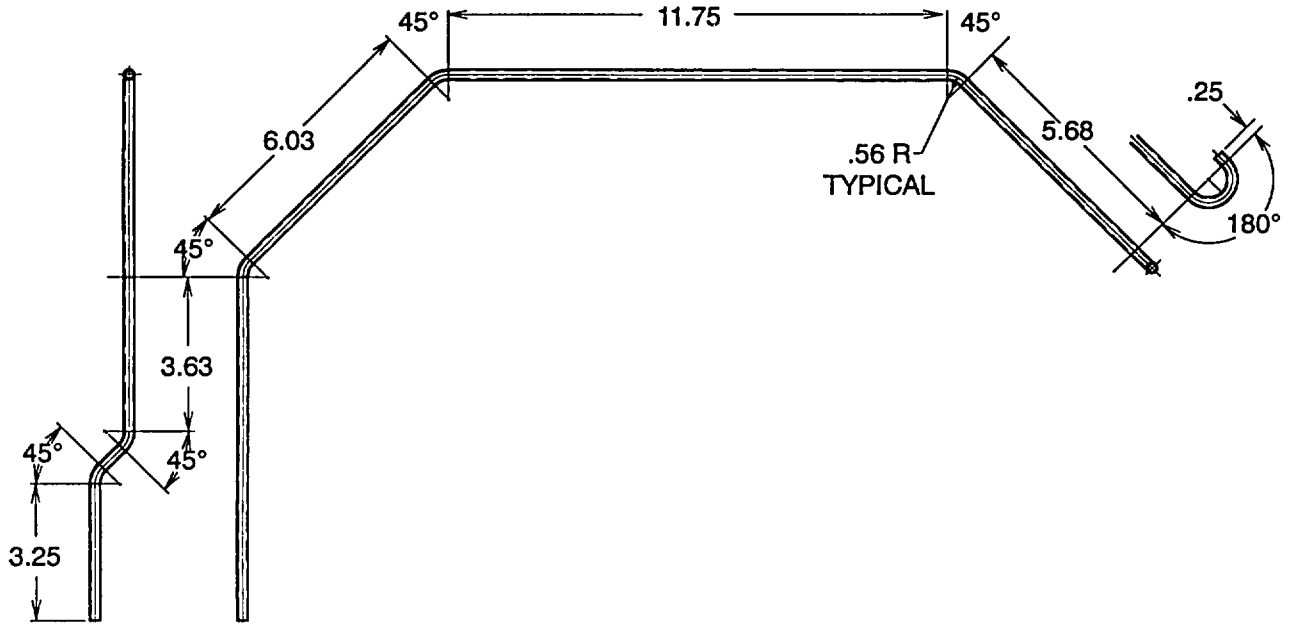
NOTE
1. FABRICATE FROM ASTM B88,1.125 OD X 0.50 WALL COPPER TUBING

Figure F-11. Tube, Part Number 9454135-8-21.02.



NOTE
1. FABRICATE FROM ASTM B88,1.125 OD X 0.50 WALL COPPER TUBING

Figure F-12. Tube, Part Number 9454135-8-18.76.



NOTE
1. FABRICATE FROM ASTM B88, 0.25 OD X 0.30 WALL COPPER TUBING

Figure F-13. Tube, Part Number 9454135-11-35.15.

ITEM	PART NUMBER	DIM "A"	FABRICATE FROM
1	9454135-9-1.56	1.56	(81346) ASTM B88, 0.625 OD X 0.040 WALL COPPER TUBING
2	9454135-9-1.19	1.19	(81346) ASTM B88, 0.625 OD X 0.040 WALL COPPER TUBING
3	9454135-9-1.52	1.52	(81346) ASTM B88, 0.625 OD X 0.040 WALL COPPER TUBING
4	9454135-9-2.57	2.57	(81346) ASTM B88, 0.625 OD X 0.040 WALL COPPER TUBING
5	9454317 ITEM 13-1.00	1.00	(81346) ASTM B88, 0.375 OD X 0.032 WALL COPPER TUBING
6	9454317 ITEM 13-3.94	3.94	(81346) ASTM B88, 0.375 OD X 0.032 WALL COPPER TUBING
7	9454317 ITEM 10	2.50	(81346) ASTM B88, 1.125 OD X 0.050 WALL COPPER TUBING

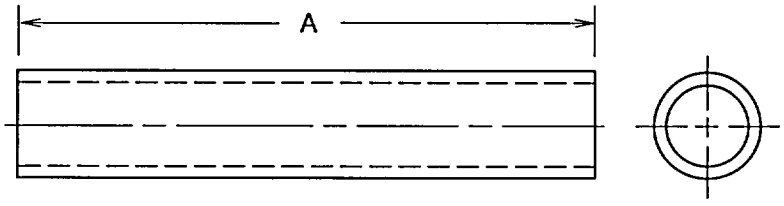
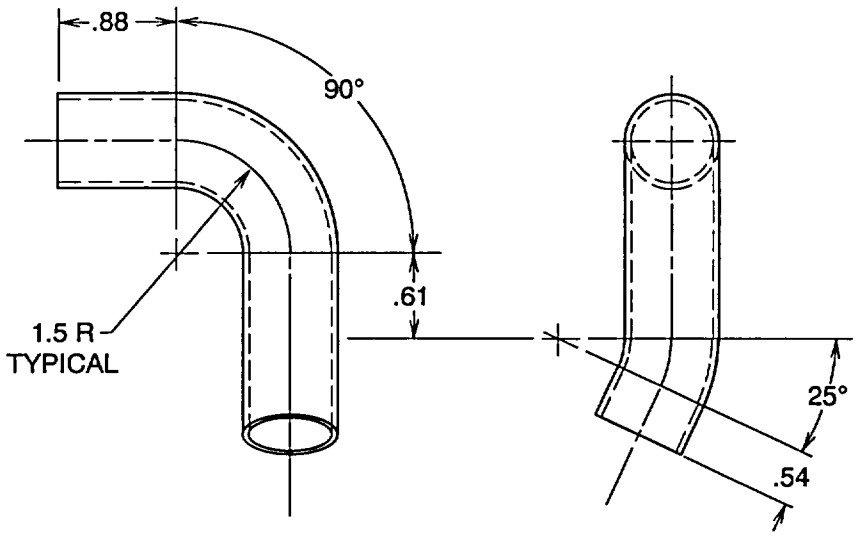


Figure F-14. Tube, Copper.



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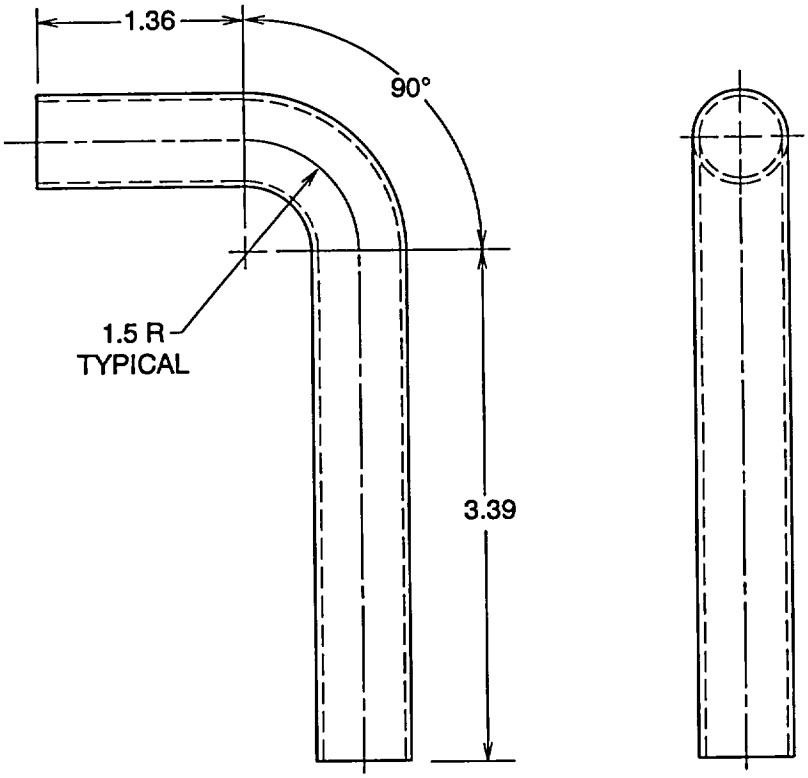
NOTE
1. FABRICATE FROM ASTM B88,.625 OD X 0.40 WALL COPPER TUBING

Figure F-15. Tube, Part Number 9454135-9-5.05.



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NOTE
1. FABRICATE FROM ASTM B88,.625 OD X 0.40 WALL COPPER TUBING

Figure F-16. Tube, Part Number 9454135-9-7.11.

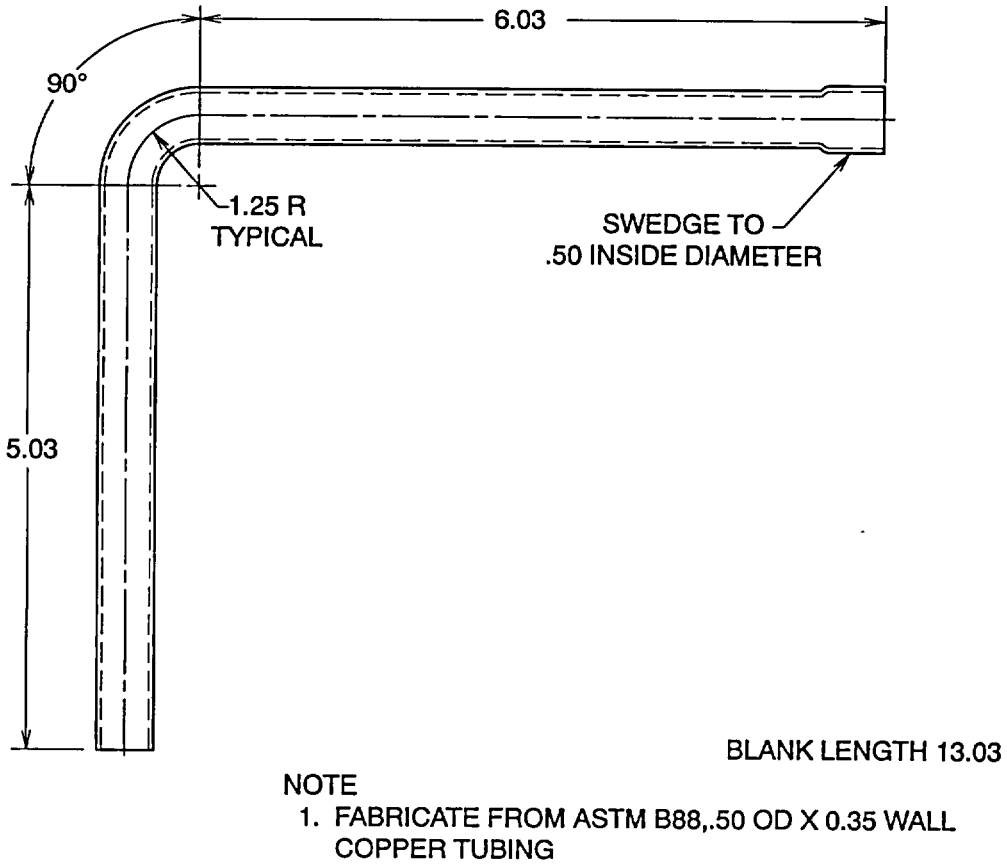
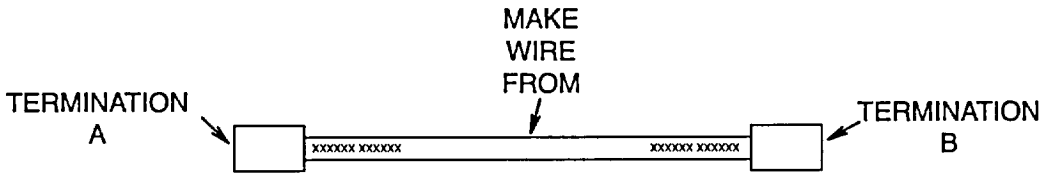


Figure F-17. Tube, Part Number 9454317 ITEM 12.

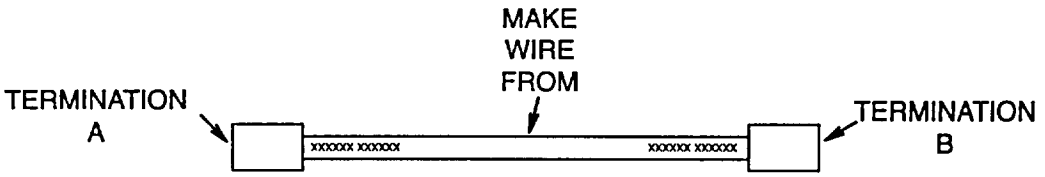


ITEM	FROM	TERMINATION A ITEM NO.	TO	TERMINATION B	MAKE WIRE FROM (SEE NOTE)	WIRE LENGTH IN INCHES
1	A2A2S4-3	SEE NOTE 2	A2A2S5-3	SEE NOTE 2	1	4
2	A2A2S7-1	SEE NOTE 2	A2A1TP2-3	SEE NOTE 3	1	22
3	A2A2S7-2	SEE NOTE 2	A2A1TP2-1	SEE NOTE 3	1	22
4	A2A2S7-3	SEE NOTE 2	A2A1TP2-2	SEE NOTE 3	1	22
5	A2A2S5-3	SEE NOTE 2	A2P1-8	SEE NOTE 4	1	24
6	A2A2S5-4	SEE NOTE 2	A2P1-9	SEE NOTE 4	1	24
7	A2A2S4-4	SEE NOTE 2	A2P1-10	SEE NOTE 4	1	24
8	A2A2S2-1	SEE NOTE 3	A2P1-6	SEE NOTE 4	1	24
9	A2A2S2-2	SEE NOTE 3	A2P1-11	SEE NOTE 4	1	24
10	A2A2S2-3	SEE NOTE 3	A2P1-5	SEE NOTE 4	1	24
11	A2A2S2-3	SEE NOTE 3	A2J1-2	SEE NOTE 5	1	24
12	A2P1-12	SEE NOTE 4	A2J1-1	SEE NOTE 5	1	24
13	A2A2DS4-RED	SEE NOTE 3	A2P1-1	SEE NOTE 4	1	24
14	A2A2DS5-RED	SEE NOTE 3	A2P1-4	SEE NOTE 4	1	24
15	A2A2DS6-RED	SEE NOTE 3	A2P1-3	SEE NOTE 4	1	24

NOTE

1. **FABRICATE FROM ELECTRIC WIRE, UL RECOGNIZED STYLE 1015, 20 AWG, CONDUCTOR COLOR - ORANGE**
2. **STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (98750) 9454243-1.**
3. **STRIP WIRE END .25 INCH.**
4. **STRIP WIRE END .25 INCH AND INSTALL CONTACT PIN (98750) 9454244-2.**
5. **STRIP WIRE END .25 INCH AND INSTALL CONTACT PIN (98750) 9454277-4.**

Figure F-18. Control Box Wiring List 2, Part Number 9454130.



ITEM	FROM	TERMINATION A ITEM NO.	TO	TERMINATION B ITEM NO.	MAKE WIRE FROM			WIRE LENGTH IN INCHES
					WIRE AWG	COLOR	WIRE TYPE	
1	A1TB1-1B-1	SEE NOTE 5	A1K2-1L1	SEE NOTE 4	6	RED	SEE NOTE 1	15
2	A1TB1-2B-1	SEE NOTE 5	A1K2-3L2	SEE NOTE 4	6	BLK	SEE NOTE 1	15
3	A1TB1-3B-1	SEE NOTE 5	A1K2-5L3	SEE NOTE 4	6	WHT	SEE NOTE 1	15
4	A1TB1-1B-3	SEE NOTE 5	A1K5-1L1	SEE NOTE 4	10	RED	SEE NOTE 2	12
5	A1TB1-2B-3	SEE NOTE 5	A1K5-3L2	SEE NOTE 4	10	BLK	SEE NOTE 2	12
6	A1TB1-3B-3	SEE NOTE 5	A1K5-5L3	SEE NOTE 4	10	WHT	SEE NOTE 2	12
7	A1TB1-1B-2	SEE NOTE 4	A1K4-1L1	SEE NOTE 4	10	RED	SEE NOTE 2	9
8	A1TB1-2B-2	SEE NOTE 4	A1K4-3L2	SEE NOTE 4	10	BLK	SEE NOTE 2	9
9	A1TB1-3B-2	SEE NOTE 4	A1K4-5L3	SEE NOTE 4	10	WHT	SEE NOTE 2	9
10	A1TB1-1B-2	SEE NOTE 4	A1K1-1L1	SEE NOTE 4	16	RED	SEE NOTE 2	10
11	A1TB1-2B-2	SEE NOTE 4	A1K1-3L2	SEE NOTE 4	16	BLK	SEE NOTE 2	10
12	A1TB1-3B-2	SEE NOTE 4	A1K1-5L3	SEE NOTE 4	16	WHT	SEE NOTE 2	10
13	A1K1-1L1	SEE NOTE 4	A1K3-1L1	SEE NOTE 4	16	RED	SEE NOTE 2	4
14	A1K1-3L2	SEE NOTE 4	A1K3-3L2	SEE NOTE 4	16	BLK	SEE NOTE 2	4
15	A1K1-5L3	SEE NOTE 4	A1K3-5L3	SEE NOTE 4	16	WHT	SEE NOTE 2	4
16	A1TB1-1B-4	SEE NOTE 4	A2-E1	SEE NOTE 11	8	RED	SEE NOTE 3	28
17	A1TB1-2B-4	SEE NOTE 4	A2-E2	SEE NOTE 11	8	BLK	SEE NOTE 3	28
18	A1TB1-3B-4	SEE NOTE 4	A2-E3	SEE NOTE 11	8	WHT	SEE NOTE 3	28
19	A1TB1-1B-4	SEE NOTE 4	A1TB2-4A	SEE NOTE 6	16	RED	SEE NOTE 2	5
20	A1TB1-2B-4	SEE NOTE 4	A1TB2-2A	SEE NOTE 6	16	BLK	SEE NOTE 2	5
21	A1TB1-3B-4	SEE NOTE 4	A1TB2-1A	SEE NOTE 6	16	WHT	SEE NOTE 2	5
22	A1K8-2T1	SEE NOTE 4	A1C1-A	SEE NOTE 7	16	RED	SEE NOTE 2	25
23	A1K8-4T2	SEE NOTE 4	A1C5-A	SEE NOTE 7	16	BLK	SEE NOTE 2	18
24	A1K8-6T3	SEE NOTE 4	A1C1-B	SEE NOTE 7	16	WHT	SEE NOTE 2	25
25	A1K7-2T1	SEE NOTE 4	A1C2-B	SEE NOTE 7	16	RED	SEE NOTE 2	18

NOTE

1. FABRICATE FROM ELECTRIC WIRE, UL RECOGNIZED STYLE 1283.
2. FABRICATE FROM ELECTRIC WIRE, UL RECOGNIZED STYLE 1015.
3. FABRICATE FROM ELECTRIC WIRE, UL RECOGNIZED STYLE 1028.
4. STRIP WIRE END .25 INCH.
5. STRIP WIRE END .40 INCH.
6. STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (98750) 9454243-1.
7. STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (98750) 9454243-4.
8. STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (98750) 9454243-3.
9. STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (96906) MS25036-120.
10. STRIP WIRE END .25 INCH AND INSTALL WIRE LUG (96906) MS25036-108.
11. STRIP WIRE END .25 INCH AND INSTALL CRIMP NUT (98750) 9454363-3
12. MARK WITH APPROPRIATE WIRE NUMBER WHICH SHALL CONSIST OF THE "FROM" TERMINATION AND THE "TO" TERMINATION. MARKING TO BE IN ACCORDANCE WITH MIL-STD-130.

Figure F-19. Electrical Assembly Wiring List 1, Part Number 9454109 (Sheet 1 of 3).

ITEM	FROM	TERMINATION A ITEM NO.	TO	TERMINATION B ITEM NO.	MAKE WIRE FROM WIRE AWG	COLOR	WIRE TYPE	WIRE LENGTH IN INCHES
26	A1K7-4T2	SEE NOTE	4 A1C3-A	SEE NOTE 7	16	BLK	SEE NOTE 2	24
27	A1K7-6T3	SEE NOTE	4 A1C2-A	SEE NOTE 7	16	WHT	SEE NOTE 2	18
28	A1C1-B	SEE NOTE	7 A1C5-B	SEE NOTE 7	16	RED	SEE NOTE 2	13
29	A1C1-A	SEE NOTE	7 A1C6-B	SEE NOTE 7	16	RED	SEE NOTE 2	16
30	A1C6-A	SEE NOTE	7 A1C5-A	SEE NOTE 7	16	RED	SEE NOTE 2	10
31	A1C4-B	SEE NOTE	7 A1C2-B	SEE NOTE 7	16	BLK	SEE NOTE 2	14
32	A1C4-A	SEE NOTE	7 A1C3-A	SEE NOTE 7	16	BLK	SEE NOTE 2	7
33	A1C3-B	SEE NOTE	7 A1C2-A	SEE NOTE 7	16	BLK	SEE NOTE 2	13
34	A1K2-2T1	SEE NOTE	4 A1C7-A	SEE NOTE 8	10	RED	SEE NOTE 2	22
35	A1K2-4T2	SEE NOTE	4 A1C8-A	SEE NOTE 8	10	BLK	SEE NOTE 2	25
36	A1K2-6T3	SEE NOTE	4 A1C7-B	SEE NOTE 8	10	WHT	SEE NOTE 2	23
37	A1C9-A	SEE NOTE	8 A1C7-A	SEE NOTE 8	10	BLK	SEE NOTE 2	7
38	A1C7-B	SEE NOTE	8 A1C8-B	SEE NOTE 8	10	BLK	SEE NOTE 2	5
39	A1C8-A	SEE NOTE	8 A1C9-B	SEE NOTE 8	10	BLK	SEE NOTE 2	5
40	A1K6-96	SEE NOTE	6 A1K2-A1	SEE NOTE 4	18	BLU	SEE NOTE 2	9
41	A1K7-95	SEE NOTE	4 A1K6-95	SEE NOTE 6	18	BLU	SEE NOTE 2	29
42	A1K7-96	SEE NOTE	4 A1K1-A1	SEE NOTE 4	18	BLU	SEE NOTE 2	23
43	A1K7-95	SEE NOTE	4 A1K8-95	SEE NOTE 4	18	BLU	SEE NOTE 2	3
44	A1K4-A1	SEE NOTE	4 A1K8-95	SEE NOTE 4	18	BLU	SEE NOTE 2	17
45	A1K3-A1	SEE NOTE	4 A1K8-96	SEE NOTE 4	18	BLU	SEE NOTE 2	20
46	A1K4-A1	SEE NOTE	4 A1K5-A1	SEE NOTE 4	18	BLU	SEE NOTE 2	5
47	A1TB2-6B	SEE NOTE	6 A1K5-A1	SEE NOTE 4	18	BLU	SEE NOTE 2	13
48	A1E3	SEE NOTE	9 A1E1-27	SEE NOTE 4	6	GRN	SEE NOTE 1	8
49	A1E3	SEE NOTE	9 A1E2	SEE NOTE 9	6	GRN	SEE NOTE 1	15
50	A1TB2-2B	SEE NOTE	6 A2A1TP3-8	SEE NOTE 4	18	BLU	SEE NOTE 2	20
51	A1TB2-3B	SEE NOTE	6 A2A1TP6-AC RTN	SEE NOTE 4	18	BLU	SEE NOTE 2	13
52	A1E1-26	SEE NOTE	4 A2E1	SEE NOTE 10	16	GRN	SEE NOTE 2	20
53	A1TB2-1B	SEE NOTE	6 A2A1TP6-208VAC	SEE NOTE 4	18	BLU	SEE NOTE 2	16
54	A1TB2-2A	TERMINALJMPR	A1TB2-3A	TERMINALJMPR	N/A	N/A	N/A	
55	A1TB2-4A	TERMINALJMPR	A1TB2-5A	TERMINALJMPR	N/A	N/A	N/A	
56	A1E1-1	SEE NOTE	4 A1E4	SEE NOTE 9	6	GRN	SEE NOTE 1	6
57	A1E4	SEE NOTE	9 E1	SEE NOTE 9	BRAID	N/A	BRAIDED WIRE	21
58	A1TB2-5A	TERMINALJMPR	A1TB2-6A	TERMINALJMPR	N/A	N/A	N/A	
63	A1TB2-8B	SEE NOTE	6 A2A1TP3-7	SEE NOTE 4	18	BLU	SEE NOTE 2	18
64	A1TB2-7B	SEE NOTE	6 A2A1TP3-6	SEE NOTE 4	18	BLU	SEE NOTE 2	21
65	A1K5-A2	SEE NOTE	4 A2A1TP3-5	SEE NOTE 4	18	BLU	SEE NOTE 2	30
66	A1K4-A2	SEE NOTE	4 A2A1TP3-4	SEE NOTE 4	18	BLU	SEE NOTE 2	29
67	A1K3-A2	SEE NOTE	4 A2A1TP3-3	SEE NOTE 4	18	BLU	SEE NOTE 2	26
68	A1TB2-9B	SEE NOTE	6 A2A1TP3-2	SEE NOTE 4	18	BLU	SEE NOTE 2	20
69	A1K1-A2	SEE NOTE	4 A2A1TP3-1	SEE NOTE 4	18	BLU	SEE NOTE 2	28
70	A1E1-25	SEE NOTE	4 A2-E4	SEE NOTE 11	8	GRN	SEE NOTE 3	14

Figure F- 19. Electrical Assembly Wiring List 1, Part Number 9454109 (Sheet 2 of 3).

ITEM	FROM	TERMINATION A ITEM NO.	TO	TERMINATION B ITEM NO.	MAKE WIRE FROM			WIRE LENGTH IN INCHES
					WIRE AWG	COLOR	WIRE TYPE	
71	A1K7-98	SEE NOTE 4	A2A1TP1-1	SEE NOTE 4	18	ORG	SEE NOTE 2	27
72	A1K8-98	SEE NOTE 4	A2A1TP1-2	SEE NOTE 4	18	ORG	SEE NOTE 2	30
73	A1K2-13NO	SEE NOTE 4	A2A1TP1-3	SEE NOTE 4	18	ORG	SEE NOTE 2	21
74	A1K3-13NO	SEE NOTE 4	A2A1TP1-4	SEE NOTE 4	18	ORG	SEE NOTE 2	25
75	A1K1-13NO	SEE NOTE 4	A2A1TP1-5	SEE NOTE 4	18	ORG	SEE NOTE 2	24
76	A1K4-13NO	SEE NOTE 4	A2A1TP1-6	SEE NOTE 4	18	ORG	SEE NOTE 2	27
77	A1K5-13NO	SEE NOTE 4	A2A1TP1-7	SEE NOTE 4	18	ORG	SEE NOTE 2	29
78	A1K3-14NO	SEE NOTE 4	A1K1-14NO	SEE NOTE 4	18	ORG	SEE NOTE 2	4
79	A1K3-14NO	SEE NOTE 4	A1K2-14NO	SEE NOTE 4	18	ORG	SEE NOTE 2	5
80	A1K2-14NO	SEE NOTE 4	A1K7-97	SEE NOTE 4	18	ORG	SEE NOTE 2	7
81	A1K7-97	SEE NOTE 4	A1K8-97	SEE NOTE 4	18	ORG	SEE NOTE 2	3
82	A1K8-97	SEE NOTE 4	A1K4-14NO	SEE NOTE 4	18	ORG	SEE NOTE 2	4
83	A1K4-14NO	SEE NOTE 4	A1K5-14NO	SEE NOTE 4	18	ORG	SEE NOTE 2	6
84	A1K5-14NO	SEE NOTE 4	A2A1TP1-12	SEE NOTE 4	18	ORG	SEE NOTE 2	34
85	A2-E2	SEE NOTE 11	A2A2J1-A	SEE NOTE 4	12	BLK	SEE NOTE 2	9
86	A2-E1	SEE NOTE 11	A2A2J1-C	SEE NOTE 4	12	RED	SEE NOTE 2	9
87	A2-E4	SEE NOTE 11	A2A2J1-D	SEE NOTE 4	12	GRN	SEE NOTE 2	9
88	A2-E2	SEE NOTE 11	A2A2J2-A	SEE NOTE 4	12	BLK	SEE NOTE 2	9
89	A2-E3	SEE NOTE 11	A2A2J2-C	SEE NOTE 4	12	WHT	SEE NOTE 2	9
90	A2-E4	SEE NOTE 11	A2A2J2-D	SEE NOTE 4	12	GRN	SEE NOTE 2	9
93	A2-E1	SEE NOTE 11	A2A2J3-A	SEE NOTE 4	12	RED	SEE NOTE 2	9
94	A2-E3	SEE NOTE 11	A2A2J3-C	SEE NOTE 4	12	WHT	SEE NOTE 2	9
95	A2-E4	SEE NOTE 11	A2A2J3-D	SEE NOTE 4	12	GRN	SEE NOTE 2	9

Figure F- 19. Electrical Assembly Wiring List 1, Part Number 9454109 (Sheet 3 of 3).

APPENDIX G
MANDATORY REPLACEMENT PARTS

ITEM NO.	PART NUMBER	NSN	NOMENCLATURE	QTY
1	MS35335-58	5310-00-209-1366	Lock Washer	2
2	MS35335-60	5310-00-209-1239	Lock Washer	3
3	MS35335-61	5310-00-527-3634	Lock Washer	2
4	MS35338-42	5310-00-045-3299	Lock Washer	54
5	MS35338-43	5310-00-045-3296	Lock Washer	2
6	MS35338-44	5310-00-582-5965	Lock Washer	3
7	MS35338-48	5310-01-335-4901	Lock Washer	1
8	MS35338-135	5310-00-933-8118	Lock Washer	2
9	MS35338-136	5310-00-929-6395	Lock Washer	3
10	MS35338-137	5310-01-389-6984	Lock Washer	20
11	MS35338-138	5310-01-420-7626	Lock Washer	4
12	MS35338-139	5310-01-422-3905	Lock Washer	10
13	MS35338-140	5310-00-974-6623	Lock Washer	2
14	MS35338-143	5310-01-180-7157	Lock Washer	1

APPENDIX H
LUBRICATION APPENDIX

There are no special lubrication requirements for the FDECU.

APPENDIX I
TORQUE LIMITS

No special torque requirements are necessary to maintain or repair the FDECU.

ALPHABETICAL INDEX

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V

W

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BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 20 IFF antenna lag rather than 10. REASON: Experience has shown that with only a 10 lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing stress to the drive train. Hunting is minimized by adjusting the lag to 20 without degradation of operation.
3-10	3-3		3-1	Item 5, Functional Description. Change "2 dB" to "3 dB". REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 dB (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e above." REASON: To replace the cover plate.
		FO-3		Zone C 3. On J1-2, change "+24 VDC" to "+5 VDC". REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

SAMPLE

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER	SIGN HERE
SSG I. M. DeSpiritof 999-1776	I. M. DeSpiritof

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

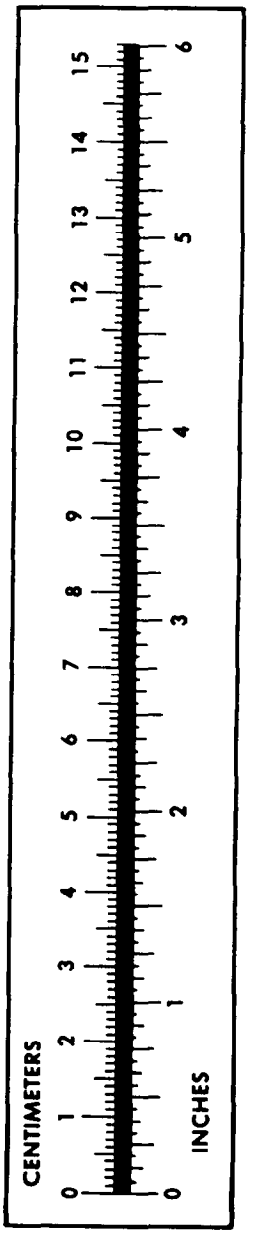
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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