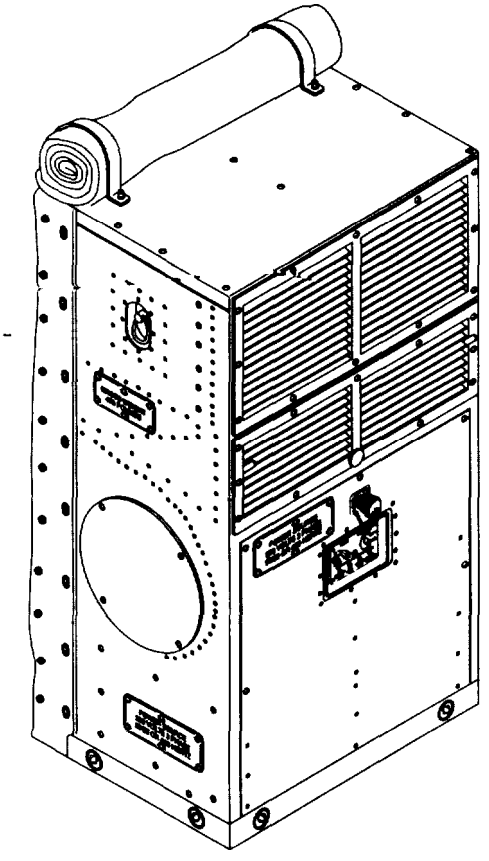
TM 9-4120-407-14

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



AIR CONDITIONER, 36,000 BTU, VERTICAL, MULTI-POWER INPUT, MODEL F36T-MPI NSN 4120-01-359-0083

HEADQUARTERS, DEPARTMENT OF THE ARMY
28 FEBRUARY 1995

WARNINGS

- High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death. Exercise extreme caution to avoid injury.
- Dangerous chemical refrigerant under pressure is used in the operation of this equipment. Use great care to avoid contact with liquid refrigerant.
- Never use a heating torch on any part that contains refrigerant. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. All refrigerant must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any brazing operation.
- Do not attempt any disassembly of refrigerant system components with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously.
- Sudden and irreversible tissue damage can result from freezing if skin is exposed to liquid refrigerant. Wear gloves and a face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.
- Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.
- Burns can result from contact with acid formed by burn out of oil and refrigerant. Avoid inhaling fumes and wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear gloves to protect hands.
- Never pressurize refrigerant lines with oxygen, mixture with oil could cause an explosion.
- Nitrogen is an inert gas that can cause suffocation and must be discharged in a well ventilated area.
- The pressure in a nitrogen cylinder can exceed 2000 psi. A nitrogen pressure regulator should be used at all times to avoid personal injury.
- Do not operate this unit with the panels/covers, screen/guard, and grilles removed or open unless the instructions tell you to. When this is necessary, do so with care to prevent personal injury.
- Acetone and methyl-ethyl ketone (MEK) are flammable and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well ventilated area, wear gloves, and keep away from sparks or flame.
- Solder, brazing alloys, and flux contain materials which are hazardous to health. Avoid breathing vapors or fumes from soldering or brazing operations. Perform operations only in well-ventilated areas. Wash hands with soap and water after handling solder, brazing alloys, or flux. Wear thermal gloves and protective goggles or face shield to protect against burns.
- The polyurethane foam used as insulation in this air conditioner will break down to form toxic gases if exposed to the flame of a torch or brazing temperature. Work in well ventilated area.

TECHNICAL MANUAL
No. 9-4120-407-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 28 February 1995

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

AIR CONDITIONER, 36,000 BTU, VERTICAL, MULTI-POWER INPUT

MODEL F36T-MPI

NSN 4120-01-359-0083

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 these procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, US Army Aviation and Troop Command, ATTN: AMSAT-I-MP, 4300 Goodfellow Blvd., St. Louis, MO 83120-1798 or E-mail to AMSATIMP@st-louis-emh7.army.mil. Fax to (314) 263-9033. A reply will be furnished directly to you.

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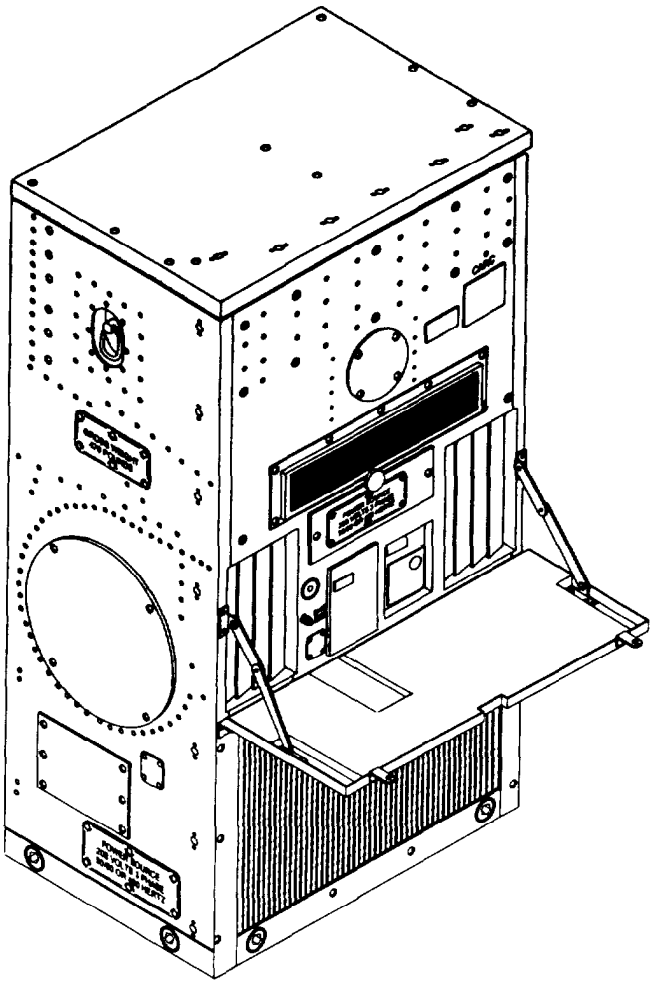
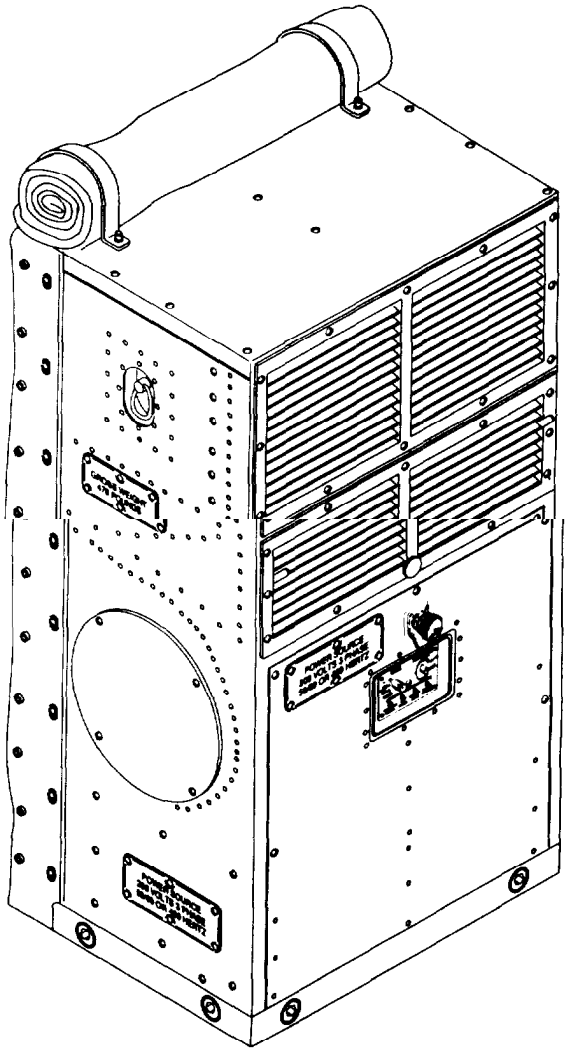


AIR CONDITIONER-REAR
AND RIGHT SIDE VIEW
(WITH FABRIC COVER REMOVED
AND CONDENSER DISCHARGE
AIR DEFLECTOR DOOR OPEN)



AIR CONDITIONER-FRONT
AND LEFT SIDE VIEW

Figure 1-0. Air Conditioner

CHAPTER 1

INTRODUCTION

Paragraph No.

Section I General Information

Section II Equipment Description

Section III Technical Principles of Operation

SECTION I GENERAL INFORMATION

1-1. SCOPE. This manual covers instructions required to operate, troubleshoot and maintain the 36,000 BTU/HR, air conditioner required by operators, unit, direct support, and general support personnel. The type, model and purpose for this equipment is as follow:

a. *Type of Manual.* Operator's, Unit, Direct Support, and General Support Maintenance Manual.

b. *Model Number and Equipment Name.* Keco Model F36T-MPI, Vertical, Compact, 36,000 BTU/HR, Multi-Power Input, 208 Volt, 3 Phase, 50/60/400 Hertz Air Conditioner.

c. *Purpose of Equipment.* The air conditioner covered by this manual is designed for cooling and heating air to a desired predetermined range and circulating the conditioned air to provide heating and cooling of equipment or personnel within the conditioned area.

1-2. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA Pam 738-750 (The Army Maintenance Management System (TAMMS) (Maintenance Management UPDATE).

1-3. DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE. For destruction of Army material to prevent enemy use see TM 750-244-3.

1-4. PREPARATION FOR STORAGE OR SHIPMENT. See Chapter 3, Section VII for administrative storage or shipment information.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS). If your air conditioner 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 us at:

Commander, U.S. Army Aviation and Troop Command
ATTN: AMSAT-I-MDO
4300 Goodfellow Blvd.
St. Louis, MO 63120-1798

We will send you a reply.

1-6. WARRANTY INFORMATION. See Warranty Technical Bulletin TB 9-4120-407-24.

1-7. NOMENCLATURE CROSS-REFERENCE LIST. This listing includes the nomenclature list, list of abbreviations, and explanation of terms (glossary) used in this manual.

a. *Nomenclature Cross-Reference List.*

Common Name	Official Nomenclature
Air Conditioner	36,000 BTU, Vertical Multi-Power Input, Air Conditioner

b. *List of Abbreviations/Acronyms.*

AC	Alternating Current
Assy	Assembly
AWG	American Wire Gauge
BTU	British Thermal Unit
C	Centigrade
CAGE	Commercia1 and Government Entity
cfm	Cubic Feet per Minute
cm	Centimeter
cm^2	Square Centimeter
CTA	Common Table of Allowances
cy	Cylinder
DC	Direct Current
DIA	Diameter
DMWR	Depot Maintenance Work Requirements
DS	Direct Support
EMI	Electromagnetic Interference
ESC	Equipment Serviceable Criteria
F	Fahrenheit
GS	Genera1 Support
ID	Inside Diameter
JTA	Joint Table of Allowances
kg	Kilogram
LED	Light Emitting Diode
m^3	Cubic Meter
m^3/m	Cubic Meter Per Minute
MTOE	Modified Table of Organization and Equipment
MWO's	Maintenance Work Orders
NBC	Nuclear, Biological, and Chemical
Nom	Nominal
NPT	National Pipe Taper (Thread)
psi	Pounds Per Square Inch

b. *List of Abbreviations/Acronwms.* (Cont)

psig	Pounds per Square Inch Gauge
RAD	Radius
SMR	Source, Maintenance and Recoverability
TDA	Table of Distribution and Allowances
TMDE	Test Measurement and Diagnostic Equipment
TOE	Tables of Organization and Equipment
UNC	Unified Coarse Thread
UNF	Unified Fine Thread
UUT	Unit Under Test
vdc	Volt Direct Current

c. *Glossary.* No unusual terms are used in this manual.

1-8. CORROSION PREVENTION AND CONTROL. Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items. The following information may be useful in identifying the problem.

a. *Keywords.* 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 a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of keywords such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem.

b. *Submit form.* The Standard Form 368, Product Quality Deficiency Report, should be submitted to the address specified in DA PAM 738-750.

SECTION II EQUIPMENT DESCRIPTION

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES. The following information describes the characteristics and capabilities of the Keco Model F36T-MPI Air Conditioner.

a. *Characteristics.* The air conditioner is self-contained in a single cabinet that is ideally suited for van or shelter type installations. The only external requirements are a source of 208 volt ac, 50/60 or 400 hertz input power, a suitable ground and an entry to a suitable drain. The drain must be lower than the base of the cabinet, in its operating location, for disposal of condensate waste water. It is designed to operate in almost any environmental condition from arctic to tropic and is fully portable for movement from one location to another.

b. *Capabilities.* The air conditioner has the capability of providing a maximum of 36,000 BTU/HR of cooling or 28,600 BTU/HR of heating. It is designed to automatically maintain the air in the room or enclosure at the desired temperature selected on the control panel.

c. *Features.* The air conditioner is designed to circulate, filter and cool or heat air in the room or enclosure in which it is installed.

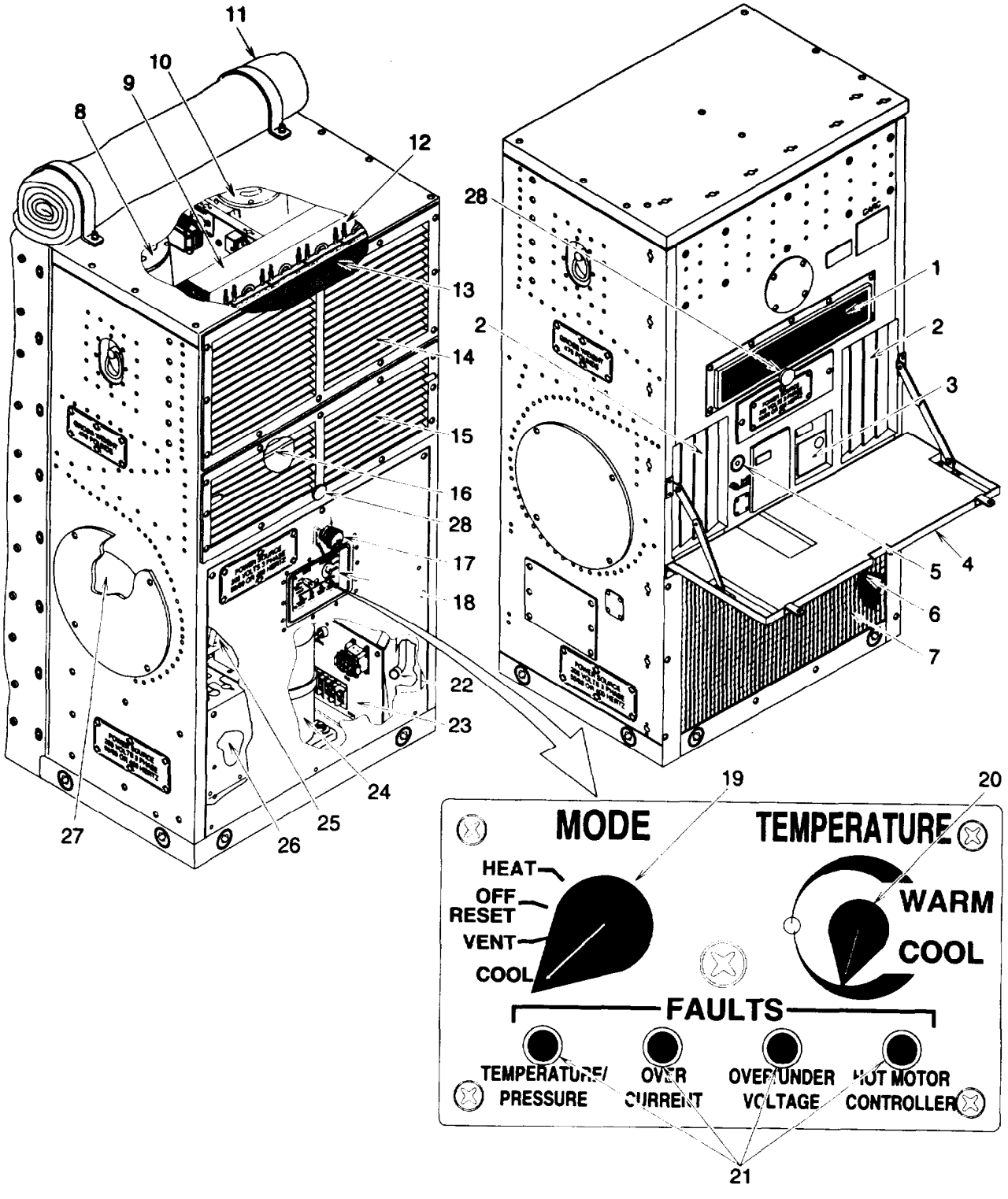


Figure 1-1. Location of Major Components

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. The information that follows references the location and description of major components found in Figure 1-1.

- Fresh Air Filter Element (1). Provides filtered outside air.

- Condenser Air Damper Vanes (2). Controls air flow across the condenser coil to maintain optimum refrigerant system discharge pressure.

- Safety Control Box Assembly (3). Contains HIGH and LOW PRESSURE CUTOUT switches (S5 and S6) and control circuit breakers (CB1).

- Condenser Discharge Air Deflector Door (4). Shown in open operational position. When closed, it protects the rear (exposed) surfaces of the air conditioner.

- Liquid Sight Indicator (5). Allows visual inspection and indicates condition of liquid refrigerant when the air conditioner is operating in the cool mode.

- Condenser Coil (6). Serves as a heat exchanger by transferring heat from the refrigerant passing through the tubing to the air passing over the tubing and fins.

- Condenser Coil Guard (7). Protects coil from damage.

- Left Evaporator Fan and Motor (8). Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the room or enclosure.

- Evaporator Coil (9). Serves as a heat exchanger by transferring heat from the air passing through the tubing and fins to the refrigerant passing through the tubing.

- Right Evaporator Fan and Motor (10). Draws air into the evaporator section and exhausts it through the evaporator (cooling) coil and heater elements into the room or enclosure.

- Fabric Cover (11). Shown in stowed (operational) position. When rolled down and snapped, it protects the rear (exposed) surface of the air conditioner.

- Heater Elements (12). The six heating elements warm the air to the conditioned space.

- Mist Eliminator (13). Prevents condensate (water) from being blown from the coil into the room or enclosure.

- Evaporator Air Discharge Grille (14). Adjustable louvers allow control of discharge air direction.

- Evaporator Air Return Grille (15). Adjustable louvers allow control of outside (fresh) and return (from room or enclosure) air.

- Conditioned Air Filter (16). Provides filtered return air.

- Input Power Receptacle (17). For connection of external power source cable.

- Control Panel Assembly (18). Contains switches, controls and indicators for operating the air conditioner. See items (19), (20), and (21) for a description of these switches, controls and indicators.

- Mode Selector Rotary Switch (19). Allows selection of air conditioner operating mode.

- Temperature Potentiometer Control (20). This control allows adjustment of the conditioned air temperature while operating in the cool or heat modes.

- Light Emitting Diodes (Fault Lights) (21). Helps to indicate problem areas if the air conditioner fails.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Cont)

• Condensate Water Drip Pan and Drain Trap (22). The drip pan is located below the evaporator coil and mist eliminator and is built into the casing. Its purpose is to collect condensate that drips off the evaporator coil and mist eliminator during cooling operations. Condensate water then follows through tubing to the drain trap located inside the lower right hand front corner of the cabinet. The drain trap is a check valve that prevents air flow between the condenser and evaporator sections through the drain tubing

• Electrical Components Panel (23). Houses the majority of the air conditioner's electrical control components.

• Compressor (24). Pumps refrigerant through the system during the cooling operations.

• Logic Box Assembly (25). Operates the motor controller and relays for selected operating mode. Receives status signals from high and low refrigerant pressure switches, motor thermal overloads, air heater thermostat, and coil frost switch to provide safety shut down of the motor controller if any of these faults occur.

• Motor Controller (26). Controls power to the air conditioner motors as directed by the logic box assembly. The motor controller uses a "soft start" method to operate the air conditioner motors. This feature starts the motors on a low voltage and frequency and brings them up to speed at full voltage and frequency within two seconds. The motor controller also provides power for logic box assembly operation and reacts to fault signals received by the logic box assembly to provide safety control for the air conditioner components.

• Condenser Air Fans and Motor Assembly (27). Draws air through the condenser coil and discharges the heated air back to the outside during cooling operations.

• Fresh Air Damper Control (28). Provides manual adjustment for fresh air mixture.

1-11. EQUIPMENT DATA.

OPERATING TEMPERATURES

Low	-50° F (-148° C)
High	120° F (158° C)

PERFORMANCE

Cooling Capacity	36,000 Btu/Hr
Heating Capacity	28,600 Btu/Hr

POWER REQUIREMENTS

Voltage	208
Phase	3
Hertz	50/60 or 400
Full Load Amperage	37 (average between three phases)
Number of Conductors	.5

DIMENSIONS

Width	30.80 in. (78.32 cm)
Depth	20.00 in. (50.80 cm)
Height	55.06 in. (139.85 cm)
Weight	470 lbs. (213 kg)

REFRIGERANT

Type	R-22
Charge	6.2 lbs (2.8 kg)

AIRFLOW (EVAPORATOR)

Rate	1250 cfm (35 m3/m) at 0 in (0 cm) water gauge

SECTION III TECHNICAL PRINCIPLES OF OPERATION

1-12. REFRIGERATION CYCLE. The following information describes the function of the components in this air conditioner, listed in the order that the refrigerant flows through the refrigeration systems. Reference find numbers to Figure 1-2 Refrigeration Schematic.

a. *The Compressor.* The Compressor (1) takes cold, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing passing through the Service Valve (2) and the High Pressure Cutout Switch (3) to the Condenser Coil (4) and Receiver (9).

b. *The Solenoid Valve.* The Solenoid Valve (5) prevents compressor overload and damage during start-up by remaining open when the compressor is not running to equalize the pressure. This valve closes at start of cooling cycle.

c. *The Condenser Fan.* The Condenser Fan (6) draws outside ambient air through the Condenser Coil (4). The high pressure, high temperature gas is cooled by the flow of air and is condensed to a high pressure liquid.

d. *The Pressure Relief Value.* The Pressure Relief Valve (7) provides protection for the compressor due to extreme pressures.

e. *The Linear Actuator.* The Linear Actuator (8) is activated by pressure in the cylinder and allows more air to flow to the condenser coil.

f. *The Dehydrator.* The Dehydrator (10) removes moisture (water vapor) or dirt that may be carried by the liquid refrigerant.

g. *The Liquid Sight Indicator.* The Liquid Sight Indicator (11) indicates the presence of moisture and quantity of refrigerant in the system.

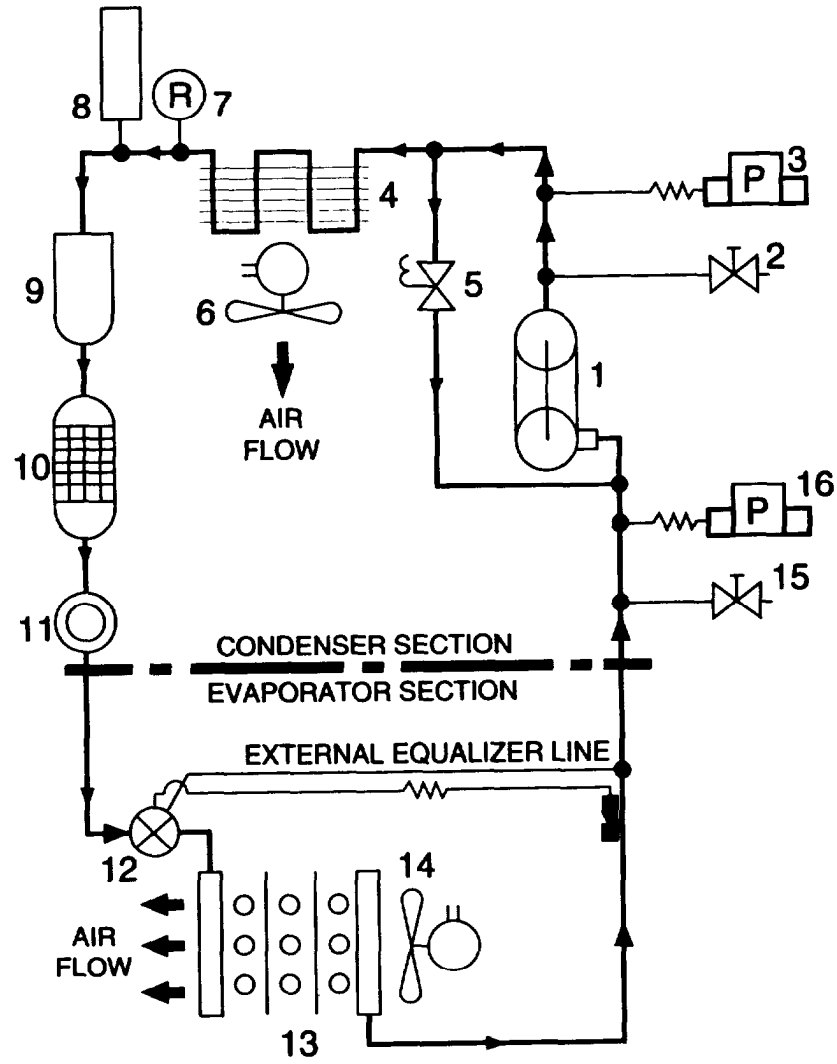
h. *The Expansion Valve.* The Expansion Valve (12) controls the amount and pressure of liquid refrigerant to the Evaporator Coil (13). This valve senses temperature and pressure of the refrigerant as it leaves the evaporator coil and adjusts the flow of liquid refrigerant to the evaporator coil depending on the heat load to the air conditioner. The liquid refrigerant leaves the Expansion Valve (12) at a reduced pressure and enters the Evaporator Coil (13). The reduction in pressure and the warmer air being forced across the tubes of the coil cause the refrigerant to evaporate.

i. *The Evaporator Fan.* The Evaporator Fan (14) draws the warm air from the conditioned space and blows it through the Evaporator Coil (13). The refrigerant absorbs heat when it changes from a liquid to a gas and the air passing over the coil is cooled.

j. *The Service Value.* The Service Valve (15) is provided for charging and general servicing of the high and low pressure sides of the refrigerant system.

k. *The Low Pressure Cutout Switch.* The Low Pressure Cutout Switch (16) protects the air conditioner from damage due to pressure extremes,

1-13. HEATING. When the MODE Selector Rotary Switch is set for HEAT, all heating elements located behind the evaporator coil are energized. These elements are controlled by the Temperature Control Potentiometer. They are protected from overheating by thermal cutout switch.



COMPONENT REFERENCE LIST		
FIND NO.	QTY	DESCRIPTION
1	1	COMPRESSOR
2	1	SERVICE VALVE
3	1	HIGH PRESSURE CUTOUT SWITCH
4	1	CONDENSER COIL
5	1	SOLENOID VALVE
6	2	CONDENSER FAN
7	1	PRESSURE RELIEF VALVE
8	1	LINEAR ACTUATOR
9	1	RECEIVER
10	1	DEHYDRATOR
11	1	LIQUID SIGHT INDICATOR
12	1	EXPANSION VALVE
13	1	EVAPORATOR COIL
14	2	EVAPORATOR FAN
15	1	SERVICE VALVE
16	1	LOW PRESSURE CUTOUT SWITCH

Figure 1-2. Refrigeration Schematic

CHAPTER 2

OPERATING INSTRUCTIONS

SECTION I DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. GENERAL. The Model F36T-MPI has been designed for a variety of installations and can operate under a wide range of climatic conditions. The air conditioner is designed for continuous or intermittent operation as a self-contained unit or may be connected to or used with external filtering equipment for operation under Nuclear, Biological, and Chemical (NBC) environmental conditions. Operators must be aware of any peculiarities or operational limitations for their specific installation. See the appropriate shelter or system manual for instructions peculiar to your specific installation.

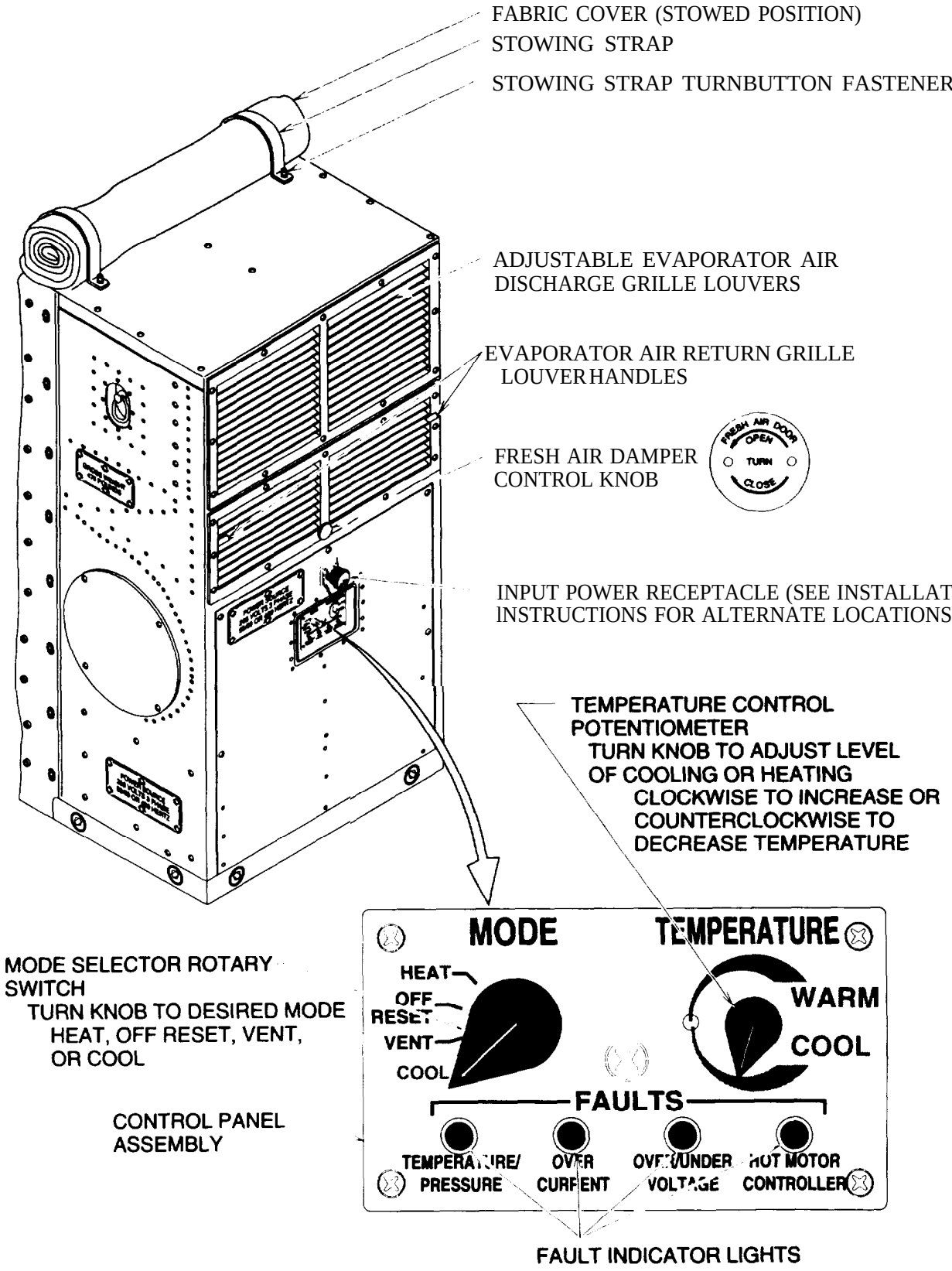


Figure 2-1. Operator's Controls (Front Panel)

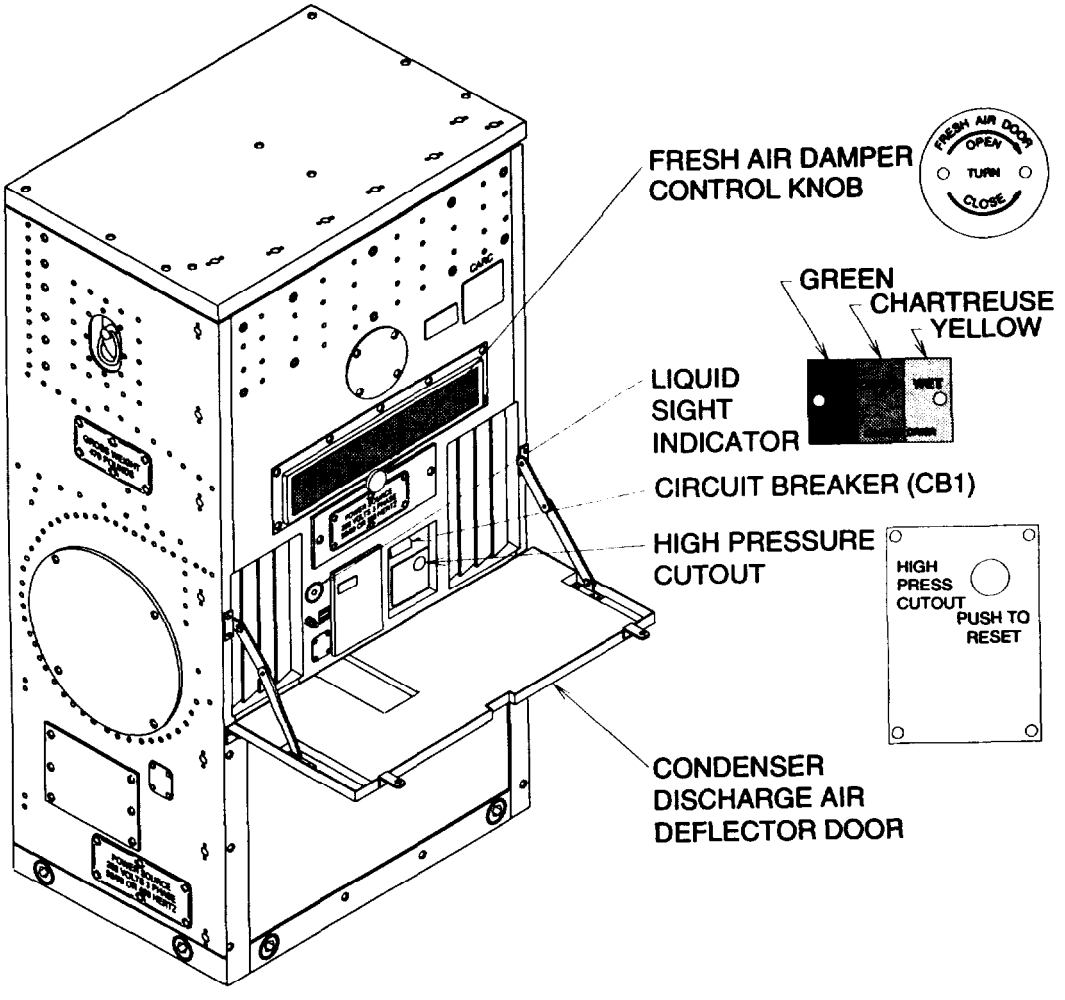


Figure 2-2. Operator's Controls (Rear Panel)

2-2. OPERATOR INDICATORS. See Figures 2-1 and 2-2 for location.

Control Panel Assembly Fault Indicator Lights.

(1) The TEMPERATURE/PRESSURE FAULT indicator will come on if either of the evaporator fan motors or condenser fan motor exceed safe operating temperature. The light will also come on if any of the following switches opens, thermostatic (heater cutout), coil frost, low pressure cutout, or high pressure cutout.

(2) The OVER CURRENT FAULT indicator light will come on if the motor controller draws excessively high amperage.

(3) The OVER/UNDER VOLTAGE FAULT indicator light will come on if the motor controller receives excessively high or low voltage.

(4) The HOT MOTOR CONTROLLER FAULT indicator light will come on if the motor controller is exposed to excessively high temperatures.

2-3. CONTROLS. See Figures 2-1 and 2-2 for location.

a. *Fresh Air Damper Control Knob.* The fresh air damper control knob is located on both the front and rear of the air conditioner and allows fresh air to be introduced into the system.

b. *The High Pressure Cutout.* The indicator is located in the rear of the air conditioner and has a manual reset button. The Temperature/Pressure indicator light on the control panel will come on if the refrigerant discharge pressure exceeds safe operating limits causing the switch to trip.

c. *The Liquid Sight Indicator.* The liquid sight indicator has a small chamber with a glass window through which the refrigerant flow can be observed. The liquid sight indicator is equipped with a center indicator that is moisture sensitive.

d. *The Condenser Discharge Air Deflector Door.* The condenser discharge air deflector door must be opened during cooling operation to allow discharge air to vent.

e. *Mode Selector Rotary Switch.* The MODE selector rotary switch is located on the control panel and allows the user to set the desired mode such as HEAT, VENT, COOL and OFF/RESET by turning the knob.

f. *Temperature Control Potentiometer.* The temperature control potentiometer is located on the control panel and is used to adjust the level of cooling or heating. This is accomplished by turning the knob clockwise to increase or counterclockwise to decrease temperature.

g. *Evaporator Air Discharge Grille Louvers.* The grille louvers allows the conditioned air to circulate and be directed throughout the room or enclosure.

h. *Evaporator Air Return Grille Louver Handles.* These control levers allow the user to adjust the air intake.

SECTION II OPERATOR PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-4. GENERAL. Preventive Maintenance Checks and Services (PMCS) are essential to the efficient operation of the air conditioner 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 which can be done from the outside of the cabinet. The Preventive Maintenance Checks and Services Table 2-1 lists the inspections and care of the air conditioner required to keep it in good operating condition.

a. *Warning and Cautions.* Always observe the WARNINGS and CAUTIONS appearing in your PMCS Table. Warnings and cautions appear before applicable procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or prevent your equipment from being damaged.

b. *Explanation of Table Entries.*

(1) *Item Number 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) *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. When a check and service procedure is required for both WEEKLY and BEFORE intervals, it is not necessary to do the procedure twice if the equipment is operating during the WEEKLY period.

(3) *Location, Check/Service Column.* This column provides the location and the item to be checked or serviced. The item location is underlined.

(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.

(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 make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

c. *Other Table Entries.* Be sure to observe all special information and notes that appear in your table.

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI

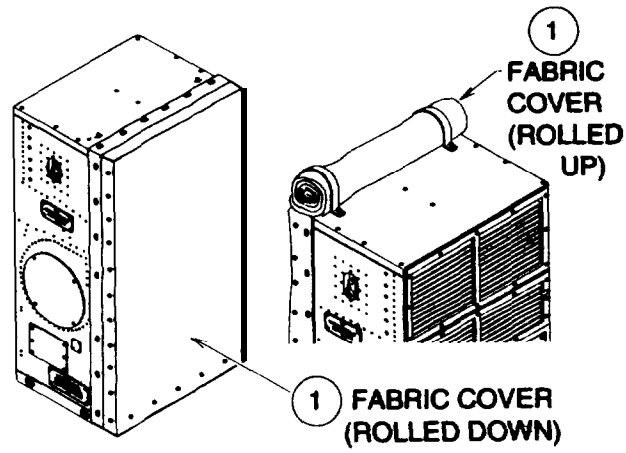
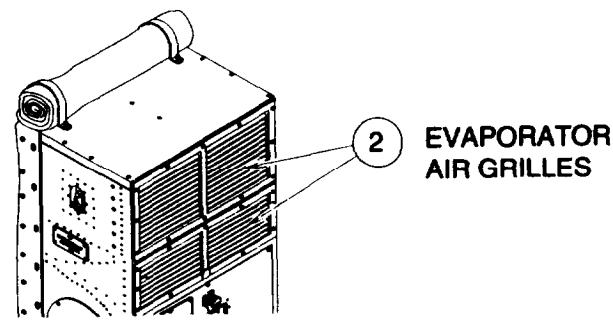
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
		EXTERIOR		
1	Before	FABRIC COVER	Check that fabric cover is rolled down and secured for heating or ventilating when no fresh air is required.	
				
	Before		Check that fabric cover is rolled up and secured for cooling or any time fresh air is required.	Fabric cover is rolled down.
	Before	GRILLES	Check that evaporator air grilles are in place and secure.	Grille is missing or loose.
				
	Before		Check that evaporator air grille louvers are adjusted for desired air flow direction. Adjust as needed.	Grille is closed when fresh air damper is closed.

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
2	Before	GRILLES - Cont	Check evaporator air grilles for obstruction. If dirty, clean per the following: a. Mix a small quantity of detergent (item 13, appendix E) with clean water to make a wash solution. b. Dampen a rag (item 12, appendix E) with wash solution and clean the grilles. Carefully use a scrub brush (item 2, appendix B) to remove any caked on dirt or deposits. c. Dampen a rag with clean water and rinse the grilles Rinse rag in clean water and continue until all detergent residue has been removed. d. Wipe the grilles with a clean dry rag until they are thoroughly dry.	Grille is obstructed.
3	Before	PANELS/COVER	Check that panels and cover are in place and secure.	Panel or cover missing or loose.

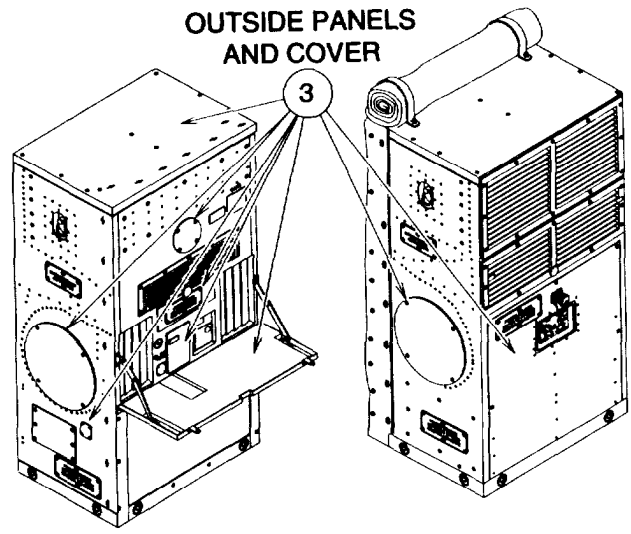


Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI-Cont

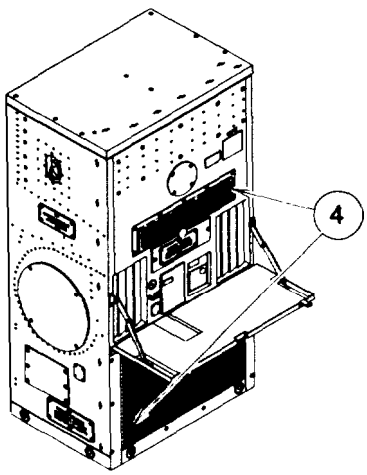
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
4	Before	SCREENS/ GUARDS	Check that screens and guards are in place and secure.	Screen or guard missing or loose.
		 PROTECTIVE SCREENS AND GUARDS,		
	Before		Check screens and guards for obstruction. If dirty, clean per the following: a. Mix a small quantity of detergent (item 13, appendix E) with clean water to make a wash solution. b. Dampen a rag (item 12, appendix E) with wash solution and clean the screens/guards. Carefully use a scrub brush (item 2, appendix B) to remove any caked on dirt or deposits. c. Dampen a rag with clean water and rinse the screens/guards. Rinse rag in clean water and continue until all detergent residue has been removed. d. Wipe the screens/guards with a clean dry rag until they are thoroughly dry.	Screen or guard obstructed.

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

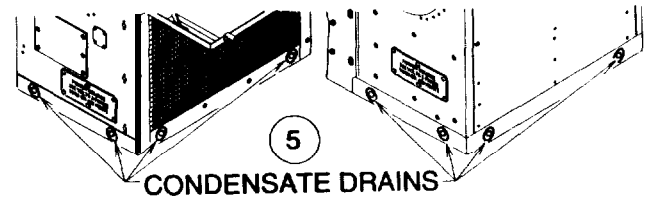
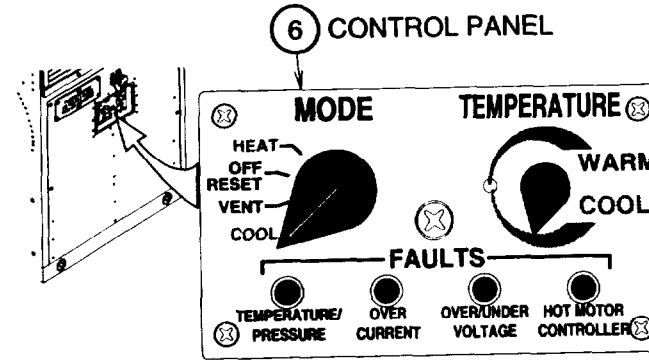
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
5	Before	CONDENSATE DRAINS	Check to see that the condensate drain plug(s) have been removed or an appropriate drain tube has been connected.	Drain plug is not removed.
				
6	Before	CONTROL PANEL ASSEMBLY	Check that control panel assembly is not loose or missing and for any damage such as dents or tears.	Control panel assembly loose, missing or damage would interfere with operation.
				
	Before		Check that control knobs rotate without binding or being excessively loose.	Control knobs bind or are excessively loose.

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
7	Before	LIQUID SIGHT INDICATOR	Check condition of liquid indicator. If dirty, clean per the following: a. Mix a small quantity of detergent (item 13, appendix E) with clean water to make a wash solution. b. Dampen a rag (item 12, appendix E) with wash solution and clean the liquid sight indicator. Carefully use a scrub brush (item 2, appendix B) to remove any caked on dirt or deposits. C. Dampen a rag with clean water and rinse the liquid indicator. Rinse rag in clean water and continue until all detergent residue has been removed d. Wipe the liquid sight indicator with a clean dry rag until it is thoroughly dry.	Liquid sight indicator is damaged or shows evidence of leaking.

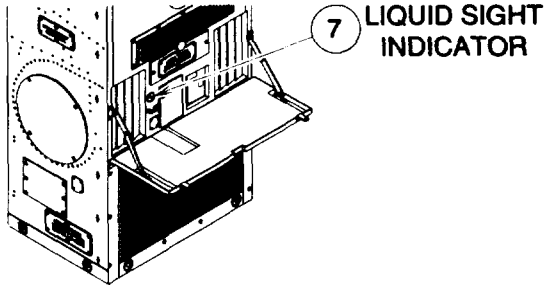


Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
7	During	LIQUID SIGHT INDICATOR - Cont	When the air conditioner is operating in cooling mode and the compressor and condenser fan motors have been running for at least five minutes, observe the liquid sight indicator. NOTE The compressor and condenser fan motor must be running while observing the liquid indicator. a. The chamber should be clear (no bubbles or foam) or it may have occasional flashes of bubbles or foam. **NOTE** The appearance of an occasional bubble in the sight glass can be expected, especially when operating in a high ambient temperature. A gradual increase in the number and frequency of bubbles is usually an indication that the refrigerant charge is being lost from the system through a small leak.	Constant flow of bubbles or Foam is observed.

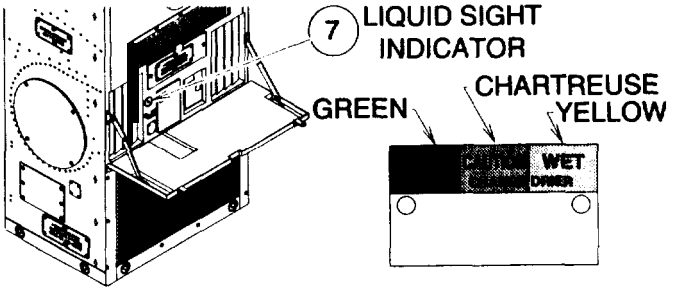


Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

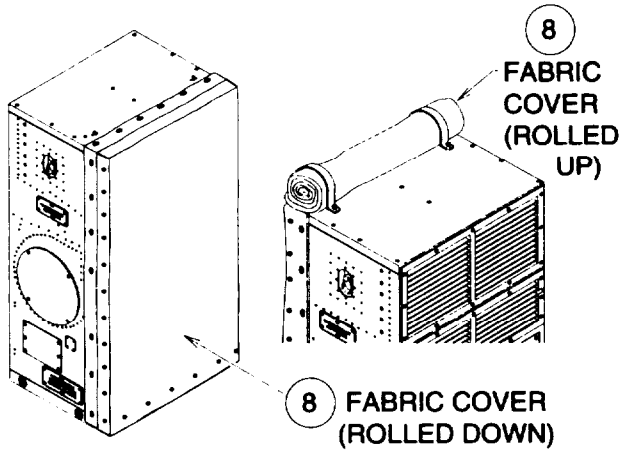
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
7	During	LIQUID SIGHT INDICATOR - Cont	b. The color indicator should be green or chartreuse. **NOTE** A green color indicates that the refrigerant is dry. If moisture content increases, the color will gradually change to chartreuse and finally to yellow.	Color indicator is yellow.
8	Weekly	FABRIC COVER	Check that fabric cover is in place and secured.	
				
	Weekly		Check that fabric cover is not damaged.	

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

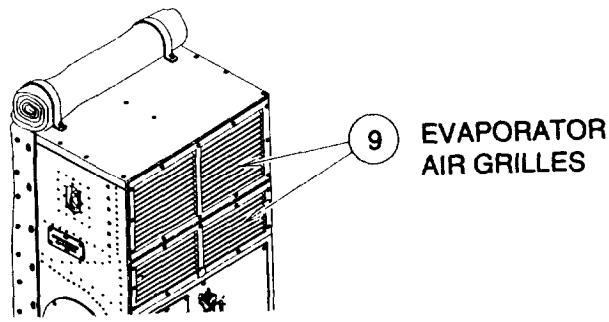
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
9	Weekly	GRILLES	Check that evaporator air grilles are not damaged.	Grille damage would interfere with safe operation.
				
	Weekly		Check evaporator air grille louvers for binding. If difficult to operate, lubricate per the following: a. Apply a small amount of lubricating oil (item 15, appendix E) to the louver pivot points and move louver to work it into the joint. b. Blot or wipe all excess lubricating oil from the grilles using a clean dry rag (item 12, appendix E).	

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

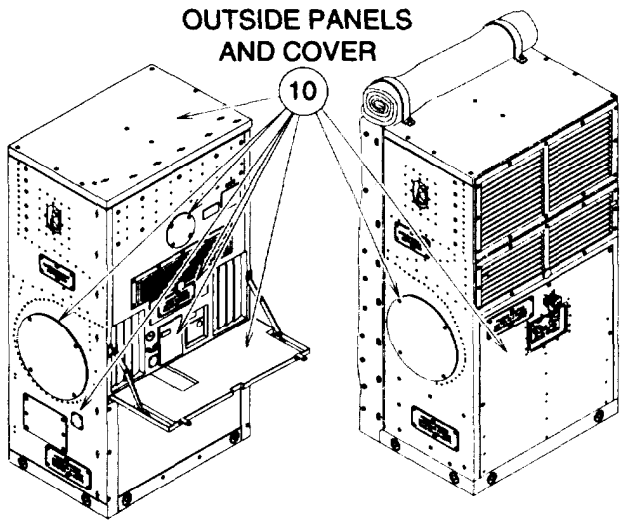
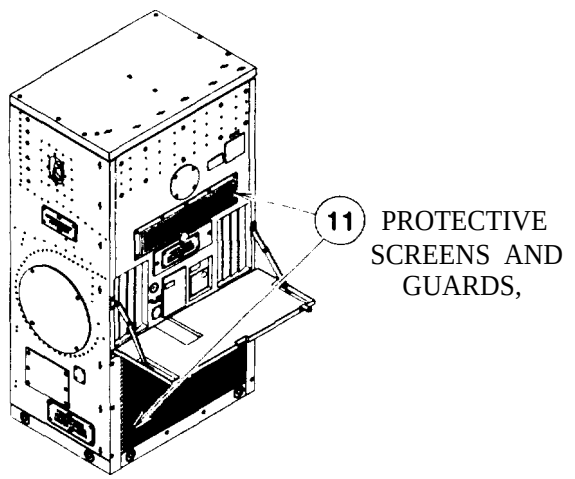
Itern No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
10	Weekly	PANELS/COVER	Check that panels and cover are not damaged.	Panels or cover damage would interfere with safe operation
				
11	Weekly	SCREENS/ WARDS	Check condition of screens and guards.	Screen or guard damage would interfere with safe operation.
				

Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
12	Weekly	INFORMATION PLATES	Check that information plates are in place and secure.	

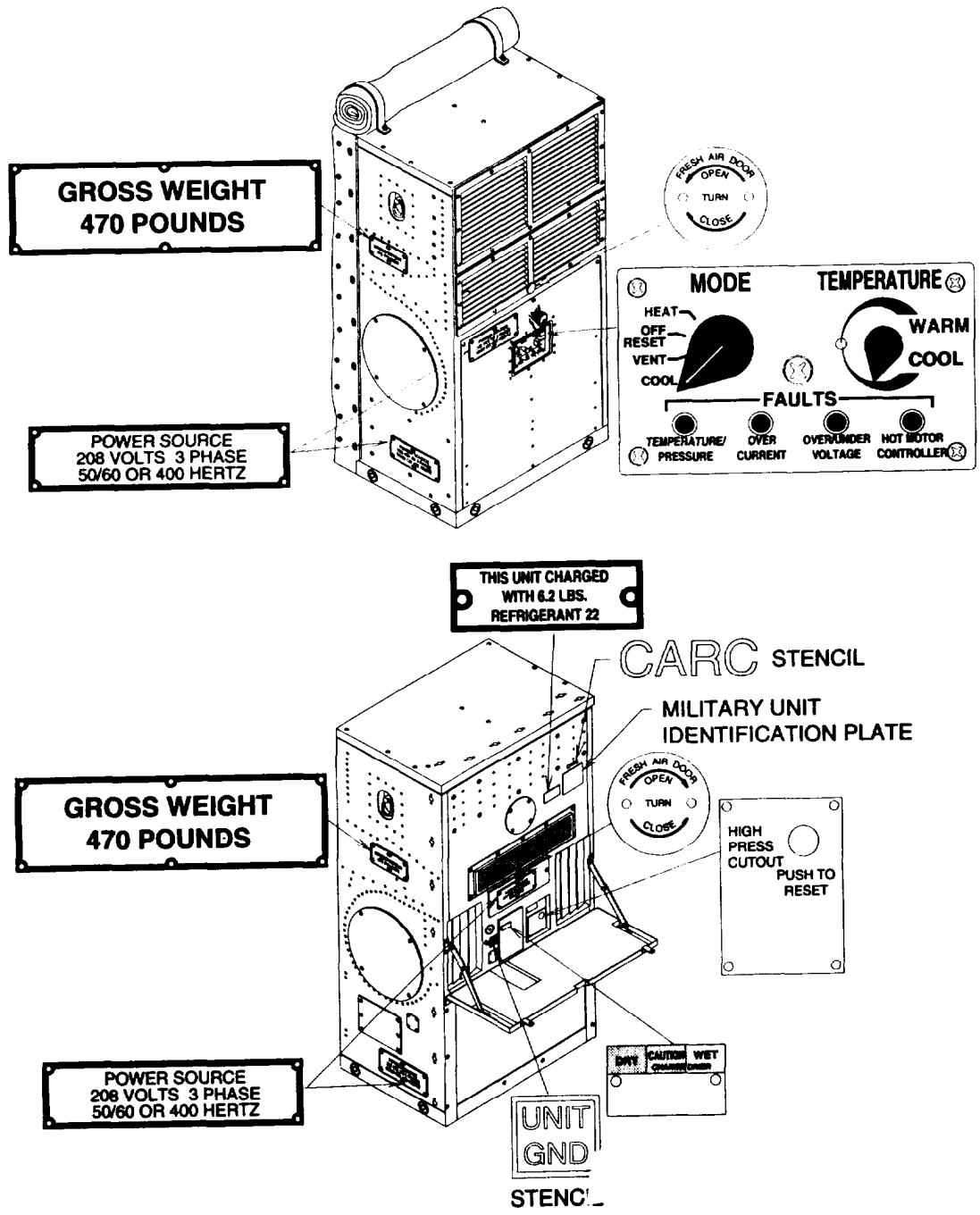


Table 2-1. Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
12	Weekly	INFORMATION PLATES - Cont	Check that information plates are readable. If dirty, clean per the following: a. Mix a small quantity of detergent (item 13, appendix E) with clean water to make a wash solution. b. Dampen a rag (item 12, appendix E) with wash solution and clean the information plates. Carefully use a scrub brush (item 2, appendix B) to remove any caked on dirt or deposits. c. Dampen a rag with clean water and rinse the information plates. Rinse rag in clean water and continue until all detergent residue has been removed. d. Wipe the information plates with a clean dry rag until they are thoroughly dry.	

SECTION III OPERATION UNDER USUAL CONDITIONS

2-5. ASSEMBLY AND PREPARATION FOR USE.

a. *Assembly.* The Model F36T-MPI Air Conditioner is a completely assembled, self-contained unit as recieved.

b. *Preparation for Use.* The services of Unit Maintenance personnel should be used for original unpacking and installation.

2-6. INITIAL ADJUSTMENTS AND CHECKS.

a. *Initial Adjustments.* The following steps cover adjustments and preparation for startup.

(1) Turn the MODE selector rotary switch to OFF/RESET position.

(2) Adjust the TEMPERATURE potentiometer midway between WARM and COOL.

CAUTION

The motor controller creates a momentary short circuit when power is applied to it, Damage to the connector and power cable pins can result if it is not isolated when the power cable is connected.

(3) Place the circuit breaker handle in the OFF (down) position to isolate the motor controller.

(4) Connect the power cable to the air conditioner input power connector.

(5) Check to see that the power cable is connected to a source of 208 volt, three phase, five wire, 50/60 or 400 hertz power.

(6) Check to see that the ground wire is connected to an adequate earth ground.

CAUTION

Liquid refrigerant can accumulate in the compressor when power is disconnected. Be sure power has been connected to the air conditioner for a period of at least 30 minutes prior to starting in cool mode to prevent equipment damage.

(7) Place the circuit breaker handle in the ON (up) position.

b. *Checks.* Perform any preventive maintenance checks and services listed in Table 2-1, under the "Before" column.

2-7. OPERATING PROCEDURES.

a. *General.*

(1) To open the fabric cover, unsnap all fasteners and roll fabric cover flap up neatly. Wrap with two straps provided and secure each with a turnbutton fastener mounted on top of the air conditioner.

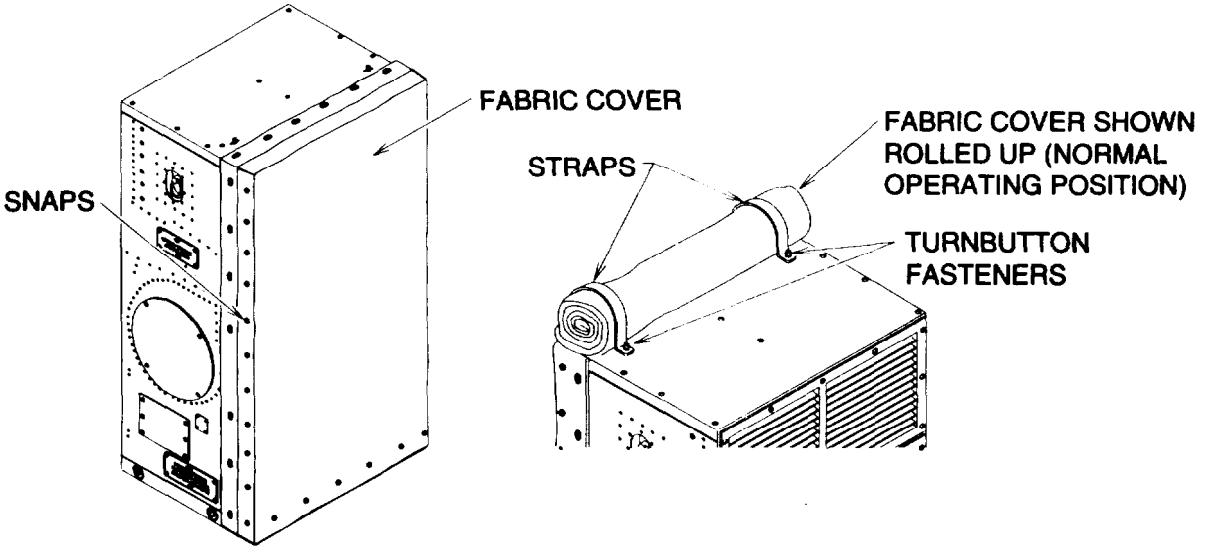


Figure 2-3. Fabric Cover

(2) To open the condenser air discharge deflector door, rotate the two turnbutton fasteners counterclockwise and lower the door.

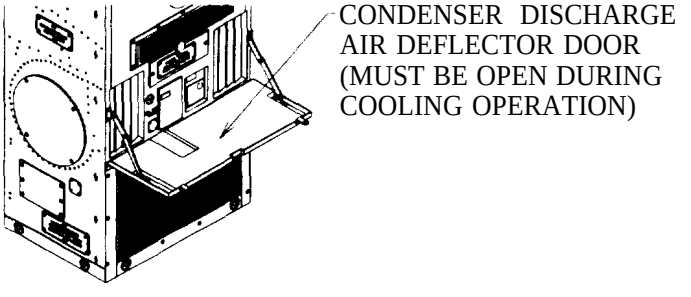


Figure 2-4. Condenser Air Discharge Deflector Door

(3) The evaporator air discharge grille can be adjusted by moving each louver individually. The louvers can be positioned to direct the airflow as desired.

(4) The evaporator air return grille can be adjusted by moving the louver handles.

(5) The fresh air damper can be adjusted by turning the FRESH AIR DOOR knob toward OPEN or CLOSE.

NOTE

The mixture of fresh air and recirculated air can be fully regulated by adjusting the fresh air damper and the evaporator air return grille together. With the fresh air damper fully closed and the evaporator return air grille fully open, 100% recirculated air is being used. With the fresh air damper fully open and the evaporator return air grille fully closed, 100% fresh air is being used. Any position between these two extremes will result in a mixture of recirculated and fresh air.

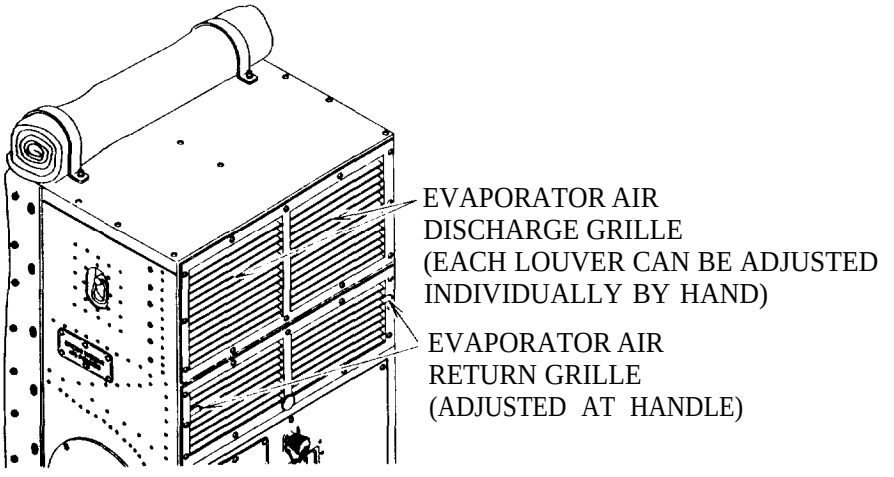


Figure 2-5. Grille Adjustment

b. *Faults and Corrective Actions.*

(1) If the amperage draw exceeds safe operating limits, the circuit breaker will trip off.

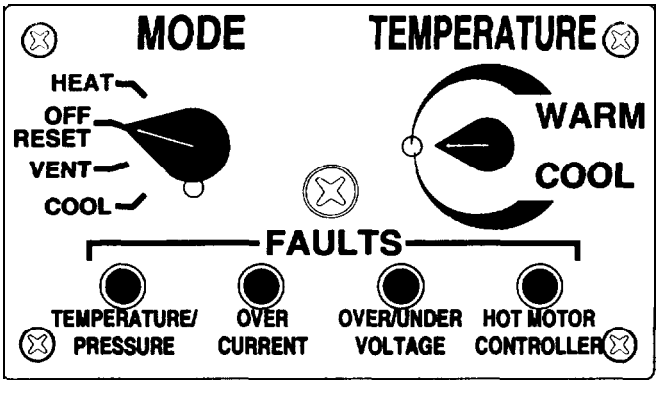


Figure 2-6. Temperature Control Panel Assembly

(a) Turn the MODE selector rotary switch to OFF/RESET position.

2-7. OPERATING PROCEDURES. (Cont)

(b) Wait one minute then set circuit breaker (CB1) to the ON position.

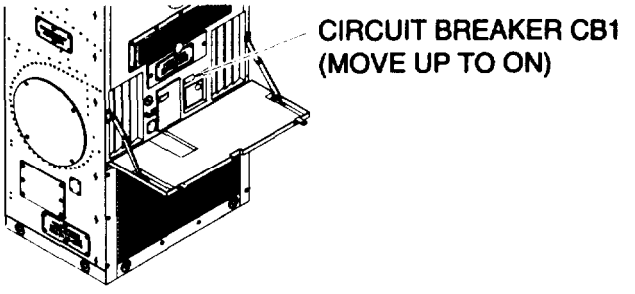


Figure 2-7. Circuit Breaker CB1

(c) Turn the MODE selector rotary switch to the desired operating position.

(d) If the circuit breaker continues to trip, immediately shutdown the air conditioner and disconnect power. Notify Unit Maintenance.

(2) If the motor controller draws excessively high amperage, the OVER CURRENT FAULT indicator light will come on and the air conditioner will shutdown.

(a) Turn the MODE selector rotary switch to OFF/RESET position.

(b) Turn the MODE selector rotary switch to the desired operating position.

(c) If the OVER CURRENT FAULT indicator light continues to come on, immediately shutdown the air conditioner and disconnect power. Notify supervisor.

(3) If the motor controller is supplied with excessively high or low voltage, the OVER/UNDER VOLTAGE FAULT indicator light will come on and the air conditioner will shutdown.

(a) Turn the MODE selector rotary switch to OFF/RESET position.

(b) Turn the MODE selector rotary switch to the desired operating position.

(c) If the OVER/UNDER VOLTAGE FAULT indicator light continues to come on, immediately shutdown the air conditioner and disconnect power. Notify supervisor.

(4) If the motor controller is exposed to excessively high temperatures, the HOT MOTOR CONTROLLER FAULT indicator light will come on and the air conditioner will shutdown.

(a) Turn the MODE selector rotary switch to OFF RESET position.

(b) Turn the MODE selector rotary switch to the desired operating position.

(c) If the HOT MOTOR CONTROLLER FAULT indicator light continues to come on, immediately shutdown the air conditioner and disconnect power. Notify supervisor.

c. *Operation in Vent Mode.*

(1) Adjust the evaporator air discharge and return grilles and the fresh air damper as desired.

NOTE

If the fresh air damper is to be opened, the fabric cover must be rolled up and secured.

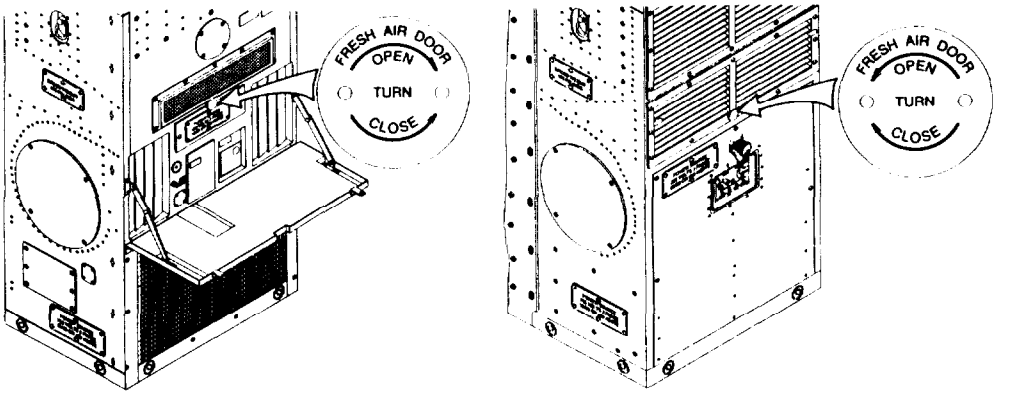


Figure 2-8. Fresh Air Damper Adjustment

(2) Turn the MODE selector rotary switch to VENT position.

NOTE

The motor controller will take approximately two seconds to bring the evaporator fan motor from start to full power.

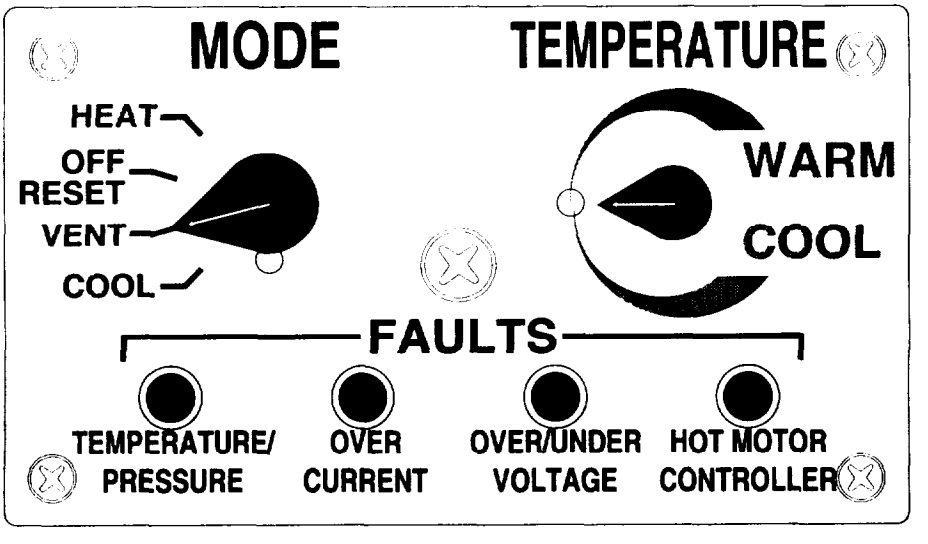


Figure 2-9. VENT Control Setting

2-7. OPERATING PROCEDURES. (Cont)

(3) If the TEMPERATURE/PRESSURE FAULTS indicator light comes on, immediately turn the mode selector rotary switch to OFF RESET position and disconnect power. Notify Unit Maintenance.

NOTE

The TEMPERATURE/PRESSURE FAULTS indicator light will come on if either of the evaporator fan motors exceed safe operating temperature limits and air conditioner will shutdown.

d. *Operation in Heat Mode.*

CAUTION

Obstructing the airflow across the heating elements will cause excessively high temperatures and could severely damage the equipment.

(1) Adjust the evaporator air discharge and return grilles and the fresh air damper as desired.

NOTE

If the fresh air damper is to be opened, the fabric cover must be rolled up and secured.

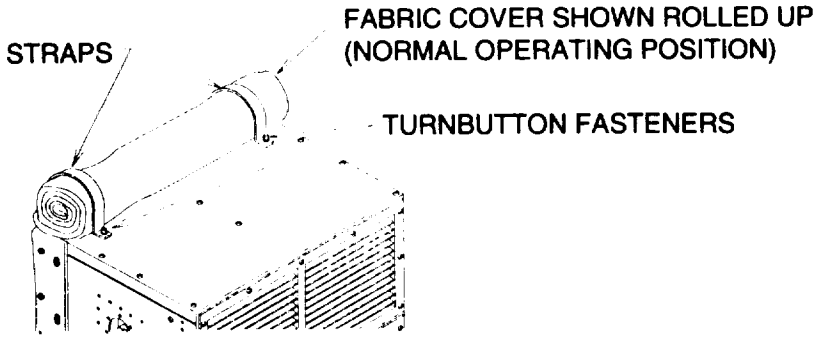


Figure 2-10. Fabric Cover

(2) Adjust the TEMPERATURE potentiometer midway between WARM and COOL.

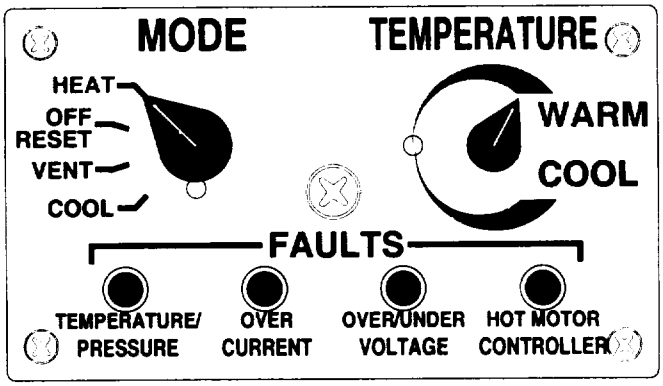


Figure 2-11. HEAT Control Setting

(3) Turn the MODE selector rotary switch to HEAT position.

NOTE

The motor controller will take approximately two seconds to bring the evaporator fan motor from start to full power.

(4) If the TEMPERATURE/PRESSURE FAULTS indicator light comes on, immediately turn the MODE selector rotary switch to COOL position for one minute, then to OFF RESET position and check the following.

NOTE

The TEMPERATURE/PRESSURE FAULTS indicator light will come on if the evaporator discharge air temperature exceeds safe operating limits.

(a) The evaporator air discharge grille is closed. Open if necessary.

(b) The evaporator air return grille and or the fresh air damper are closed. Open or adjust if necessary.

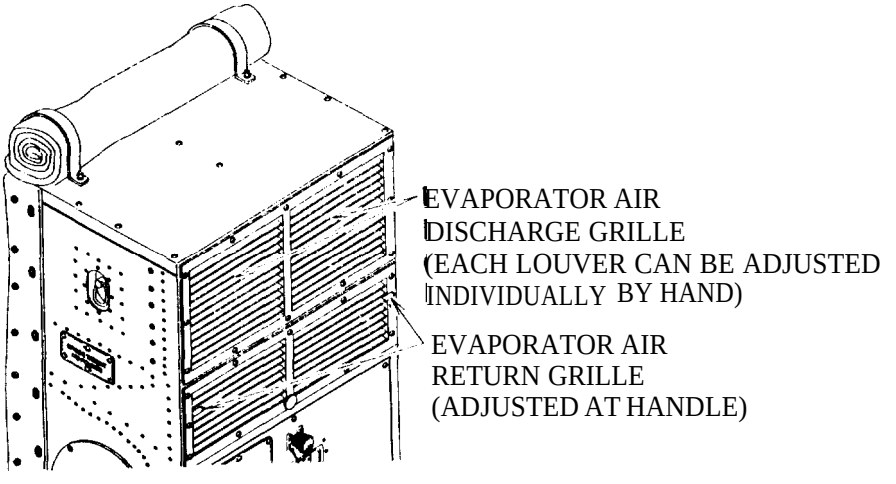


Figure 2-12. Grille Adjustment

(5) Turn the MODE selector rotary switch to HEAT position. If the TEMPERATURE/PRESSURE FAULTS indicator light continues to come on, notify Unit Maintenance.

NOTE

The evaporator fan motor will continue to operate when the heating elements cycle on and off.

(6) If the air conditioner was returned to the heating mode, the temperature should soon stabilize and the air conditioner will begin to cycle the heating elements on and off. If the desired temperature is not maintained, adjust the TEMPERATURE knob slightly toward WARM or COOL as necessary until it does.

(7) When discontinuing heating mode of operation, rotate MODE selector rotary switch to VENT position for one minute, then to OFF RESET position.

2-7. OPERATING PROCEDURES. (Cont)

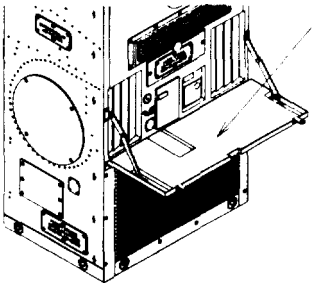
e. *Operation in Cool Mode.*

CAUTIONS

- Obstructing the airflow across the condenser coil will cause excessively high refrigerant discharge pressures and could severely damage the equipment.
- Liquid refrigerant can accumulate in the compressor when power is disconnected. Be sure power has been connected to the air conditioner for a period of at least 30 minutes prior to starting in cool mode to prevent equipment damage.

(1) Roll up and secure the fabric cover.

(2) Open the condenser air discharge deflector door.



CONDENSER DISCHARGE AIR DEFLECTOR DOOR (MUST BE OPEN DURING COOLING OPERATION)

Figure 2-13. Condenser Air Discharge Deflector Door

CAUTION

Obstructing the airflow across the evaporator coil will cause excessively low refrigerant suction pressures and could severely damage the equipment.

(3) Adjust the evaporator air discharge and return grilles and the fresh air damper as desired.

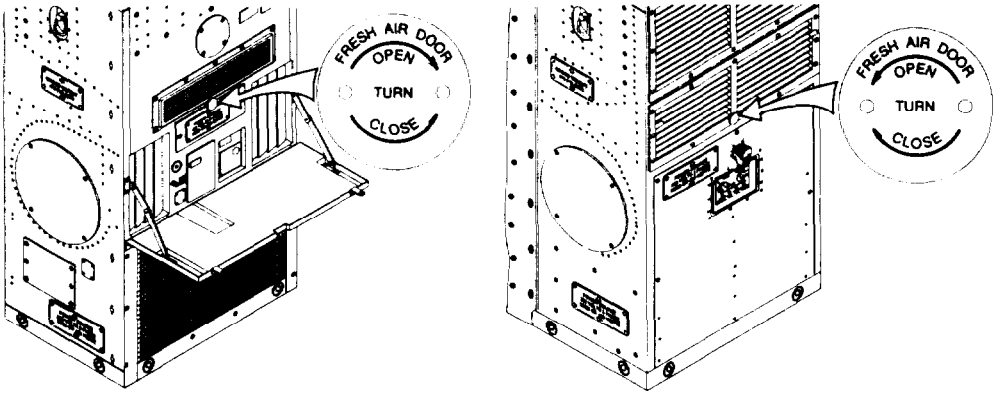


Figure 2-14. Fresh Air Damper (Door) Adjustment

(4) Adjust the TEMPERATURE knob midway between WARM and COOL.

(5) Turn the MODE selector rotary switch to COOL position.

NOTES

- The motor controller will delay equipment start up for approximately 30 seconds, then it will take approximately two seconds to bring the equipment from start to full power.
- If the temperature is below the TEMPERATURE potentiometer cut-out setting, the compressor and condenser fan motor will not start.

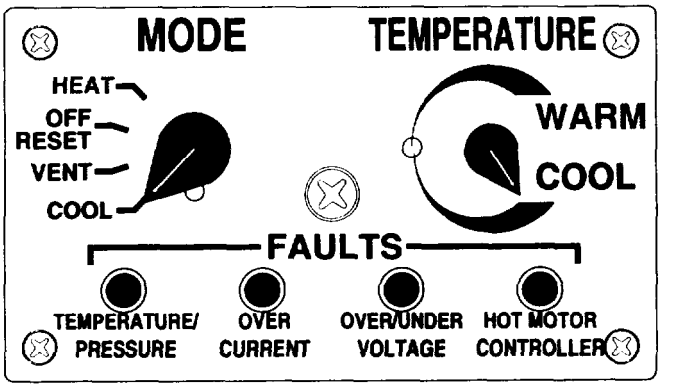


Figure 2-15. COOL Setting

(6) If the TEMPERATURE/PRESSURE FAULTS indicator light comes on, immediately rotate the MODE selector rotary switch to OFF RESET position and check the following.

NOTE

The TEMPERATURE/PRESSURE FAULTS indicator light will come on if:

- The condenser fan motor or either evaporator fan motors overheat.
- The refrigerant suction pressure drops below safe operating limits.
- The evaporator coil temperature drops below safe operating limits.
- The refrigerant discharge pressure exceeds safe operating limits which will also cause the HIGH PRESSure CUTOUT switch to trip.

(a) The fabric cover is closed. Roll up and secure if necessary.

(b) The condenser air discharge deflector door is closed. Open door.

(c) The evaporator air discharge grille is closed. Open louvers.

(d) The evaporator air return grille and or the fresh air damper are closed. Open grille louvers and fresh air damper then adjust for desired air mix.

(e) The HIGH PRESSure CUTOUT switch is tripped. Push to reset.

2-7. OPERATING PROCEDURES. (Cont)

(7) Turn the MODE selector rotary switch to COOL position. If the TEMPERATURE /PRESSURE FAULTS indicator light continues to come on, notify Unit Maintenance.

NOTES

- The evaporator fan motor will continue to operate when the TEMPERATURE potentiometer cut-out setting is reached.
- The evaporator fan motor will cycle off when the TEMPERATURE potentiometer cut-in setting is reached and start up again with the compressor and condenser fan motor.
- The motor controller will delay equipment re-start for approximately 30 seconds, then it will take approximately two seconds to bring the equipment from start to full power.

(8) If the air conditioner was returned to the cooling mode, the temperature should soon stabilize and the air conditioner will begin to cycle the equipment on and off. If the desired temperature is not maintained, adjust the TEMPERATURE knob slightly toward WARM or COOL as necessary until it does.

CAUTION

Do not operate the air conditioner in the COOL mode if the refrigerant condition color indicator has turned yellow or if numerous bubbles appear in the liquid sight indicator. Equipment damage can result.

(9) When the desired temperature has been reached and the air conditioner is cycling, observe the liquid sight indicator when the compressor and condenser fan motor are running.

NOTE

The liquid sight indicator shows the liquid refrigerant flowing from the condenser coil to the evaporator metering device.

(a) The liquid sight indicator should be full. No bubbles or an occasional flash of bubbles or foam should be observed. Rechecked after four hours of operation to insure that the condition has not become worse. If there is a constant flow of bubbles or foam, shutdown the air conditioner and disconnect power. Notify supervisor.

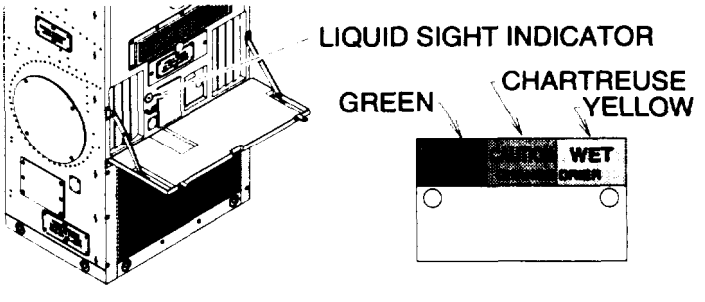


Figure 2-16. Liquid Sight Indicator

(b) The colored moisture indicator should be green. Operation may continue with the a chartreuse indicator color. Rechecked after four hours of operation to insure that the condition has not become worse. If the moisture indicator is yellow, shutdown the air conditioner and disconnect power. Notify supervisor.

f. *Shutdown (OFF RESET).*

(1) Turn the MODE selector rotary switch to OFF RESET position.

(2) Place the circuit breaker handle in the OFF position for extended shutdown periods.

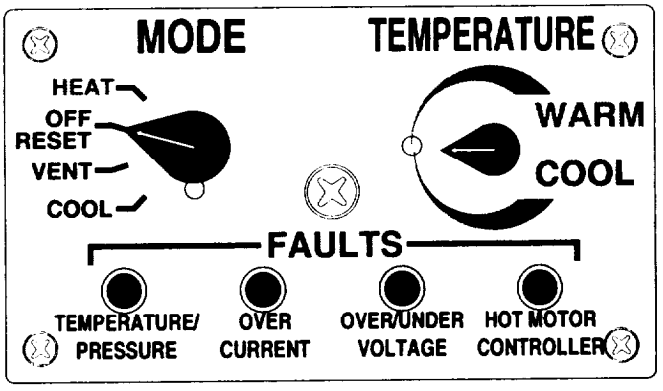


Figure 2-17. OFF RESET Control Setting

2-8. PREPARATION FOR MOVEMENT. When the air conditioner is to be moved, contact Unit Maintenance.

2-9. INFORMATION PLATES. Decals and information plates located on the equipment are illustrated on Figure 2-18.

2-9. INFORMATION PLATES. (Cont)

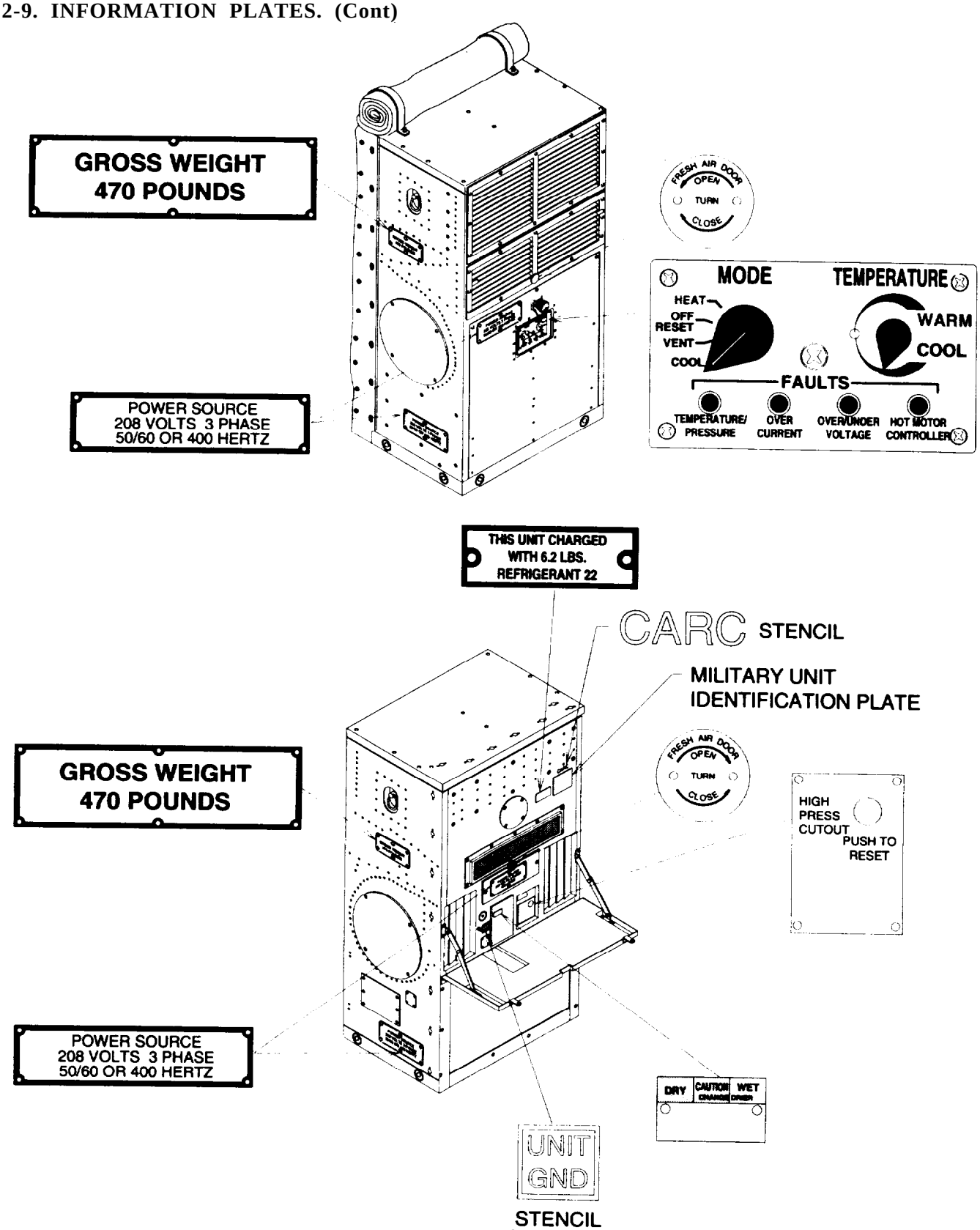


Figure 2-18. Information Plates

SECTION IV OPERATION UNDER UNUSUAL CONDITIONS

2-10. GENERAL. The Model F36T-MPI Air Conditioner is designed to operate normally within a wide range of climatic conditions. However, some extreme conditions require special operating and servicing procedures to prevent overloading and excessive wear on the equipment.

2-11. OPERATION IN INCLEMENT WEATHER.

a . *Operation In Extreme Heat.* The air conditioner is designed to operate in temperatures up to 120º F (49º C). Extra care should be taken to minimize the cooling load when operating in extremely high temperatures. Some of the steps that may be taken are:

(1) Check all openings in the enclosure, especially doors and windows, to be sure they are tightly closed. Limit in and out traffic, if possible.

(2) When appropriate, use shades or awnings to shut out direct rays of the sun.

(3) When possible, limit the use of electric lights and other heat producing equipment.

(4) Limit the amount of hot, outside air introduced through the fresh air damper to that essential for ventilation.

(5) Clean filter, mist eliminator, and coils more frequently.

CAUTION

Do not disturb electrical wiring that has been exposed to extremely low temperatures. Both the wire and insulation become brittle when cold and are easily broken.

b. *Operation In Extreme Cold*. The air conditioner is designed to operate in the HEAT mode at temperatures down to -50º F (-45º C) and in the COOL mode at outside temperatures down to 45º F (7º C). Extra care should be taken to minimize the heating load when operating in extremely low temperatures. Some of the steps that may be taken are:

(1) Check all openings in the enclosure, especially doors and windows, to be sure they are tightly closed. Limit in and out traffic, if possible.

(2) Open shades and awnings to permit entry of direct rays of the sun, if appropriate.

(3) Limit the amount of cold, outside air introduced through the fresh air damper to that essential for ventilation.

NOTE

Weather stripping, the installation of storm doors, and windows, if appropriate, and insulation of surfaces exposed to the outside is recommended when operation at extremely low temperatures for extended periods is anticipated.

(a) Before attempting to start the air conditioner in the COOL mode or when fresh air is being used during the HEAT mode, be sure that fabric cover is rolled up and all exposed air openings are clear of ice and snow. Be sure that fresh air damper (door) is operating freely.

(b) If air conditioner is not being used or is being used in the HEAT mode without fresh air, close (roll down) and secure the fabric cover.

2-11. OPERATION IN INCLEMENT WEATHER. (Cont)

c. *Operation In Dusty Or Sandy Conditions*. Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filter, mist eliminator, and coils. This will cause a restriction in the volume of air flow. Accumulation of dust or sand in the condenser coil and/or in the compressor compartment may cause overheating of the refrigeration system. Dust or sand may also clog the condensate trap and water drain lines. Some of the steps that may be taken are:

(1) Frequent cleaning of filters, mist eliminator, coils and all other areas of dust and sand accumulation. In extreme conditions, daily cleaning of filters may be necessary.

(2) Limit the amount of dusty or sandy outside air introduced through the fresh air damper to that essential for ventilation.

(3) Roll down and secure the fabric cover on the back of the cabinets during periods of shutdown.

d. *Operation In Unusually Wet Conditions*. The air conditioner is designed for normal exposure to the elements, so it is reasonably waterproof. Some of the steps that should be taken in an extremely wet climate are:

(1) More frequent inspection and cleaning of the mist eliminator, condensate trap, and drain lines to insure proper drainage and prevent accumulation of water inside the cabinet.

(2) Roll down and secure the fabric cover on the back of the cabinet during periods of wet, windy weather and when the air conditioner is not in use.

(3) Roll up and secure the fabric cover during dry weather when the air conditioner is not in operation so that the interior can dry out.

e. *Operation In Salt Air Or Sea Spray.* Salt air or sea spray may cause many of the same clogging problems as experienced when operating in a dusty or sandy environment. In addition, the nature of salt presents serious corrosion problems. Some of the steps that should be taken when operating in a salt air or sea spray environment are:

(1) All exposed surfaces should be thoroughly spray rinsed or sponged with fresh water to remove salt deposits.

(2) Roll down and secure the fabric cover on the back of the cabinet during all periods when the air conditioner is not in operation.

2-12. OPERATION UNDER EMERGENCY CONDITIONS. During periods when full electrical power is in critically short supply, if the air conditioner cannot be turned off completely, it should be operated in Ventilate mode when possible.

2-13. NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION.

NOTE

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

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

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

(1) For nuclear decontamination, brush fallout from skin, clothing, and equipment with available brushes, rags, and tree branches. Wash skin and have radiation check made so soon as tactical situation permits.

(2) For biological decontamination, remain masked and continue mission until told to unmask.

(3) For chemical detection and decontamination:

WARNING

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

(a) Use M8 paper from the M256 Chemical Agent Detector Kit or M9 paper to determine if liquid agent is present on the equipment.

(b) If exposure to liquid agent is known or suspected, clean exposed skin, clothing, personal gear, and equipment, in that order using M258Al kit. Use the buddy system. Wash exposed skin and thoroughly decontaminate as soon as tactical situation permits.

(c) 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.

c. *Operation During NBC (Nuclear, Biological, and Chemical) Hazard.* When operation is anticipated under potential NBC conditions, securely close the fresh air damper and seal the fresh air filter and connect an NBC filtering unit (not a part of this air conditioner) to the auxiliary fresh air intake. See specific instructions for your shelter or facility installation. If a NBC filtering unit is installed, adjust the return air louvers in conjunction with the NBC filter controls to provide a higher overpressure within the room or enclosure.

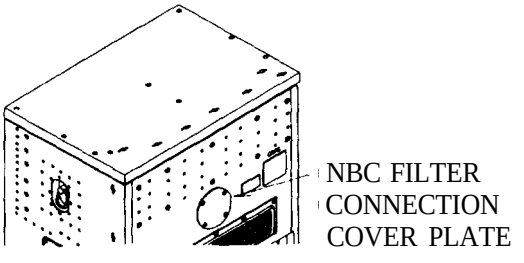


Figure 2-19. NBC Filter Connection Location

2-14. JAMMING AND ELECTRONIC COUNTERMEASURES (ECM). The air conditioner has been designed to meet all electromagnetic interference (EMI) requirements for electronic interference susceptibility, both radiated and conducted. See your shelter or facility manual for additional steps that can be taken.

CHAPTER 3

UNIT MAINTENANCE INSTRUCTIONS

SECTION I LUBRICATION INSTRUCTIONS

3-l. LUBRICATION.

a. *General.* The refrigerant compressor and its drive motor are hermetically sealed in a canister. The compressor is supplied with a complete charge of oil and requires no lubrication. The evaporator and condenser fan motors also have permanently lubricated, sealed bearings. No lubrication of these items is required.

b. *Mechanical Lubrication.* The only mechanical items which may require lubrication are the evaporator air discharge and return grille louvers, the condenser air damper vanes and control linkages and the devices which operate the fresh air damper door. These points should be checked and lubricated, as necessary, during preventive maintenance service. A few drops of light oil should be applied to pivot points, bearing surfaces, and linkages to prevent or eliminate stiffness or binding. Be sure to wipe off all excess oil with a cloth or paper towel. These items are in an area of high volume airflow and excess oil will tend to attract and accumulate dust particles from the passing air. Graphite may be used as an alternate lubricant during extreme cold weather operation.

SECTION II REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT

3-2. GENERAL.

a. *Common Tools and Equipment.* 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.

b. *Special Tools, TMDE, and Support Equipment.* The only special tool or equipment required is the logic box test fixture (94833) 111K8002-1. Refer to maintenance allocation chart Appendix B for authorized maintenance tasks at unit, Direct Support, and General Support Maintenance levels and the TMDE and support equipment required to perform the tasks.

c. *Repair Parts.* Repair parts are listed and illustrated in TM 9-4120-407-241, covering Unit, Direct Support, and General Support Maintenance for this equipment. Appendix G includes all mandatory replacement parts required to maintain the air conditioner in mission ready status.

SECTION III SERVICE UPON RECEIPT

3-3. SITE AND SHELTER REQUIREMENTS. The air conditioner is designed and adaptable to a variety of installation arrangements. Most typical installations are made by preparing an opening in an exterior wall of the room or enclosure to be conditioned and positioning the air conditioner so that the front of the cabinet is inside the room or enclosure and the back of the cabinet is outside. Alternate installations may be made with the entire cabinet either inside or outside the conditioned area. The following are minimum requirements for all installations:

a. *Floor Space Requirement.* A relatively level surface capable of bearing the weight of the air conditioner. To insure proper condensate drainage, the surface should be level within 5º from front to back and side to side.

b. *Airflow Requirements.* An unobstructed flow of air from:

(1) Outside the conditioned area to the intake and discharge of the condenser fan (back face of air conditioner).

(2) Inside the conditioned area to the conditioned air supply and discharge openings (front face of air conditioner).

(3) Outside the conditioned area to the fresh air intake (back of the air conditioner).

c. *Accessibility Access* to the front and back of the air conditioner for routine operation and servicing and for necessary maintenance actions. Sufficient headroom and access to allow removal of the front and rear panels for installation and servicing.

d. *Electrical Source.* A source of 208 volt, 3 phase, 50/60 hertz or 400 hertz input power rated at 37.0 amps located as near as possible to the installed location. The wiring must include a disconnect switch. Provisions should be made to insure that the power is not disconnected during normal operation. This disconnect should not be used to turn off the air conditioner for normal shutdown.

e. *Air Quality and Efficiency* Check that no source of dangerous or objectionable fumes is near the fresh air intake. If possible, make use of terrain features such as trees and buildings to provide a shaded location. This minimizes the cooling load on the refrigeration system. Avoid a location where the condenser and fresh air intakes will be laden with dust, dirt, soot, smoke or other debris.

3-4. SERVICE UPON RECEIPT OF MATERIAL.

a. *Unloading*. The air conditioner is packaged in a container designed for shipment and handling with the cabinet in an upright position. The base of the container is constructed as a shipping pallet with provisions for the insertion of the fork on material handling equipment.

(1) Remove all blocking and tiedowns that have been used to secure the container to the carrier.

WARNINGS

- DO NOT LIFT without holding unit in upright position. Otherwise, unit will fall over causing injury to personnel.
- Do not allow unit to swing while suspended from a lifting device. Failure to observe warning may result in injury to personnel and damage to equipment.

CAUTION

Use care in handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is borne by the base of the shipping container.

(2) Use a forklift truck or other suitable material handling equipment to remove the packaged unit from the carrier.

b. *Unpacking*. The packaged air conditioner should be moved into the immediate area in which it is to be installed before it is unpacked.

NOTE

The shipping container is of such a design that it may be retained for reuse for mobility purposes if frequent relocation of the air conditioner is anticipated.

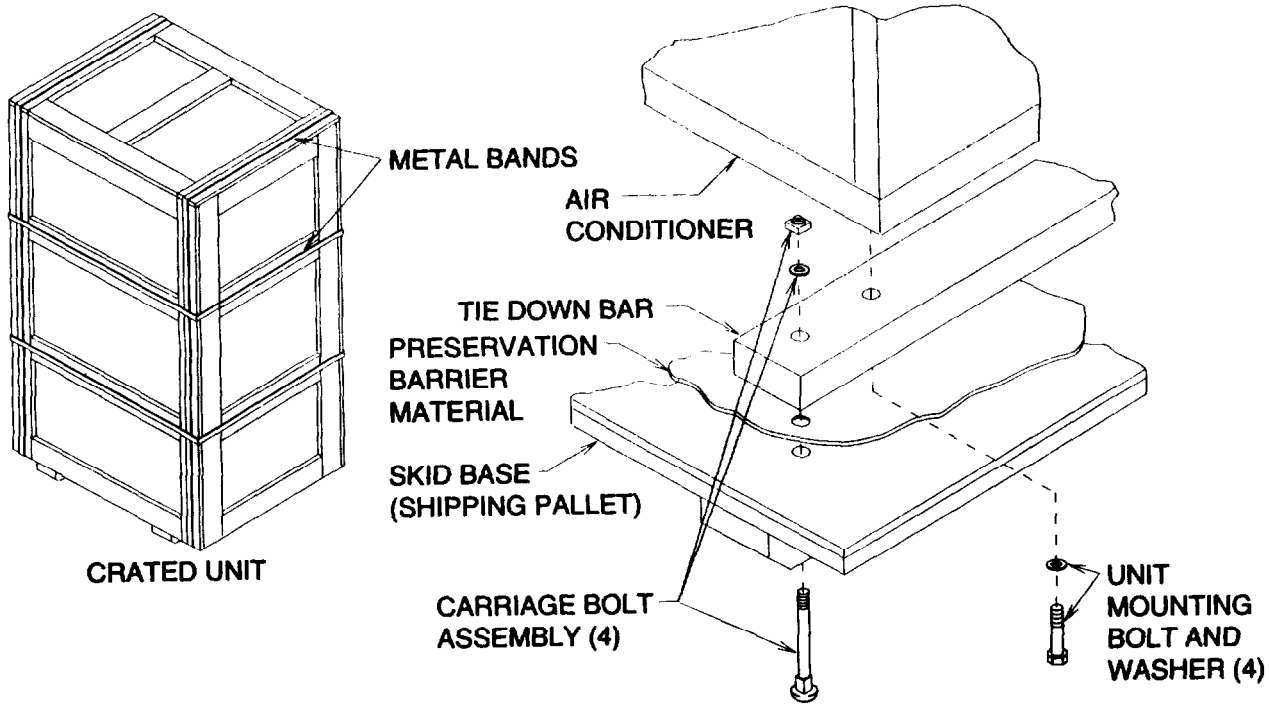


Figure 3-1. Unpacking

3-4. SERVICE UPON RECEIPT OF MATERIAL. (Cont)

(1) Remove the shipping container by cutting the metal bands that hold the top and sides of the container to the base. Lift the container vertically and remove it from the base and cabinet.

(2) Remove the cushioning around the top of the cabinet and retain, if reuse is anticipated. Remove the preservation barrier by tearing around the bottom of the cabinet. Remove the technical publications envelope and accessory sack that are taped to the cabinet and put them in a safe place.

WARNINGS

- DO NOT LIFT without holding unit in upright position. Otherwise, unit will fall over causing injury to personnel.
- Do not allow unit to swing while suspended from a lifting device. Failure to observe warning may result in injury to personnel and damage to equipment.

CAUTION

Use care in handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is borne by the base of the shipping container.

NOTE

The bolts used to anchor the cabinet base to the tiedown bars may be used to anchor it in place in the installed location if the installation method allows for anchoring from beneath.

(3) Attach an overhead hoist with an appropriate sling and spreader bar to the lifting rings provided at each side of the cabinet. Raise the cabinet and remove the four carriage bolt assemblies that hold the tiedown bars to the pallet from the underside of the pallet. Remove the four bolts that hold the two tiedown bars to the unit base. Remove and retain the pallet and carriage bolt assemblies and the tiedown bars and bolts, if reuse is anticipated. Be sure to remove all remaining barrier material from the underside of the cabinet base. Lower the cabinet to the floor in the desired position and remove the sling and hoist.

NOTE

It is recommended that the cabinet be left bolted to the shipping pallet until time to place it in the installation position. All receiving inspection actions can be conducted without removal from the pallet.

c. *Receiving Inspection*. Perform receiving inspection of the air conditioner in the following manner:

(1) Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy.

(2) Check the equipment against the packing slip to see if the shipment is compete. Report all discrepancies in accordance with the instructions of DA Pam 738-750 (The Army Maintenance Management System).

3-5. PREPARATION FOR INSTALLATION. No preparation is necessary if the air conditioner is to be installed through a typical exterior wall opening and operated as a self-contained unit. For installations that require remote mounting the control panel, alternate input power connection locations, or removal of the fabric cover, use the following procedures:

NOTE

Figure 3-5 (wiring diagram) and Figure 3-6 (electrical schematic) are provided for reference during installation.

a. *Remote Mounting the Control Panel.*

(1) Remove control panel per paragraph 3-20.

(2) Secure the control panel in the remote location using appropriate hardware and bracket.

(3) If the control cable will be routed through the return air opening, use the following procedures:

(a) Remove the lower front panel per paragraph 3-14.

(b) Disconnect the logic box input P1 connector (l), Figure 3-3 and connect it to the J13 connector (2).

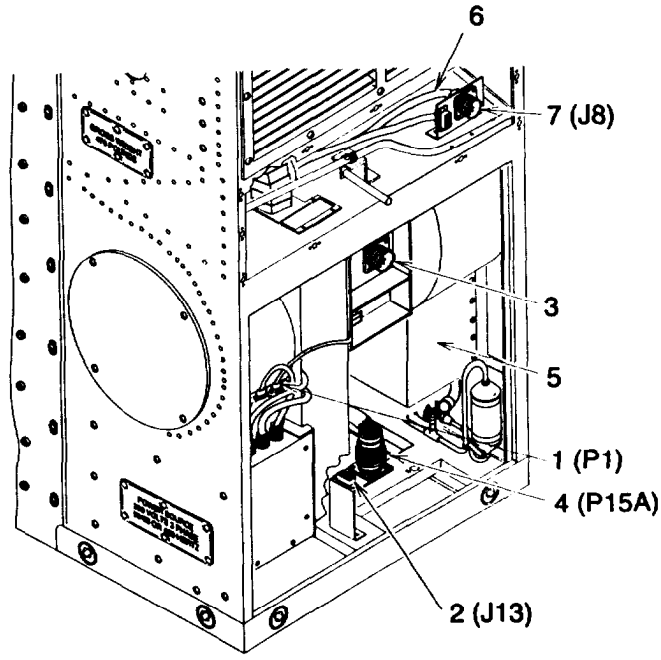


Figure 3-2. Power and Control Connections

(c) Install the lower front panel per paragraph 3-14.

b. *Alternate Input Power Cable Connector Locations.*

(1) Remove lower front panel per paragraph 3-14.

(2) Remove the input power connector/EMI filter assembly (3) per paragraph 3-28 and leave loose inside the unit.

(3) If power cable will be routed through the return air opening, disconnect P11A connector (4), and connect it to the power connector/EMI filter assembly (3) inside the unit.

3-5. PREPARATION FOR INSTALLATION. (Cont)

(4) If using alternate power input connector location, use the following procedures:

(a) If using side connection, remove the EMI filter (5) per paragraph 3-28.

(b) Remove input power connector block-off cover (l), Figure 3-4 per paragraph 3-14 and install it over input power connector/EMI filter assembly (2) opening.

(c) Remove the J8 to P11A harness (6), Figure 3-3 per paragraph 3-25 and cover/seal the hole left in the evaporator compartment bulkhead.

(d) Install the J8 connector (7) at the alternate input power connector location.

(e) Connect the P11A connector (4) to the input power connector/EMI filter assembly (3) inside the unit.

(f) If the EMI filter (5) was removed, install it per paragraph 3-28.

(5) Cover/seal input power connector/EMI filter assembly (3) opening if necessary.

(6) Install return air grille per paragraph 3-13 as necessary.

(7) Install lower front panel per paragraph 3-14.

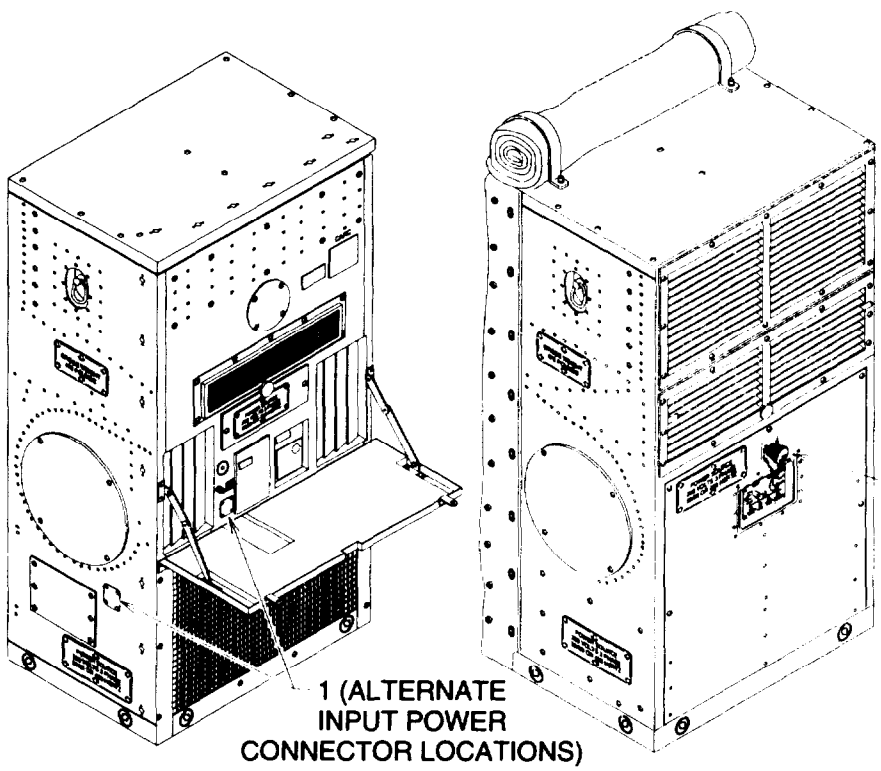


Figure 3-3. Input Power Connector Locations

c. *Removal of Fabric Cover.* If the fabric cover needs to be removed, see paragraph 3-12.

3-6. INSTALLATION INSTRUCTIONS. This paragraph covers only the actual installation of the air conditioner into a shelter or similar facility. All preparations and modifications to the unit and the shelter must be completed prior to installation.

NOTES

- For more information on air conditioner installations, refer to MIL-HDBK-116 Environmental Control of Small Shelters.
- A wiring diagram and electrical schematic are provided at the end of this paragraph if needed for reference.

a. *Mounting Air Conditioner Into Shelter Opening.* See Figure 3-4 for dimensional information,

WARNINGS

- DO NOT LIFT without holding unit in upright position. Otherwise, unit will fall over causing injury to personnel.
- Do not allow unit to swing while suspended from a lifting device. Failure to observe warning may result in injury to personnel and damage to equipment.

CAUTION

Use care in handling to avoid damage to the air conditioner. If an overhead lifting device must be used, use an appropriate sling so that the weight of the unit is borne by the base of the shipping container.

(1) Attach an overhead hoist through a sling and spreader bar to the lifting rings on each side of the cabinet.

(2) Move air conditioner into position and align mounting holes.

(3) Secure air conditioner with appropriate mounting hardware.

NOTE

The bolts used to anchor the cabinet base to the tiedown bars may be used to anchor it in place in the installed location if the installation method allows for anchoring from beneath.

Base	0.4375-14 UNC-2C (4 holes)
Rear	0.3125-24 UNF-3B (6 holes) 0.190-32 UNF-3B (10 holes)

(4) Seal openings between cutout in shelter and air conditioner. Use suitable material for an air and water tight seal.

3-6. INSTALLATION INSTRUCTIONS. (Cont)

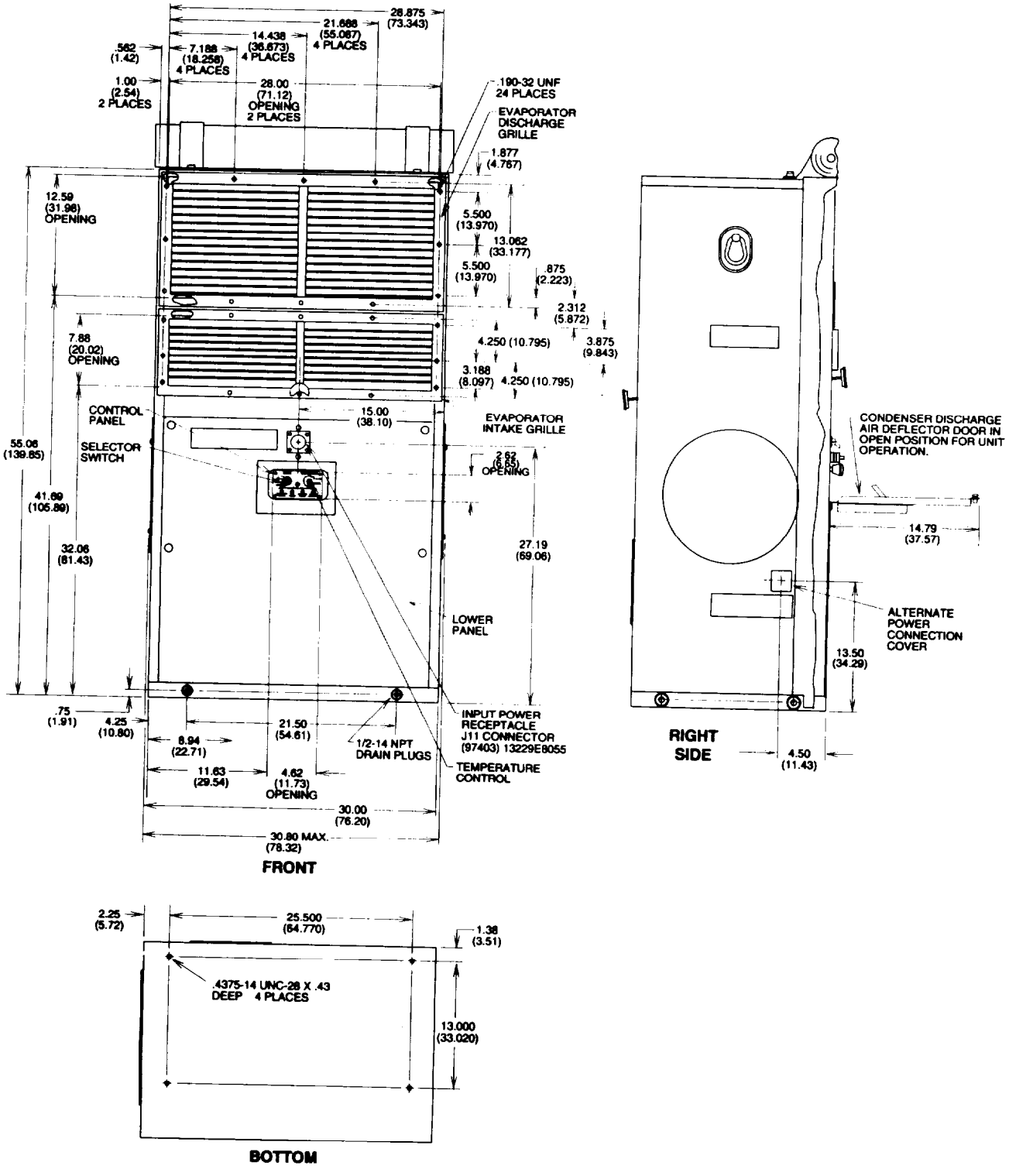


Figure 3-4. Installation Dimensions (Sheet 1 of 2)

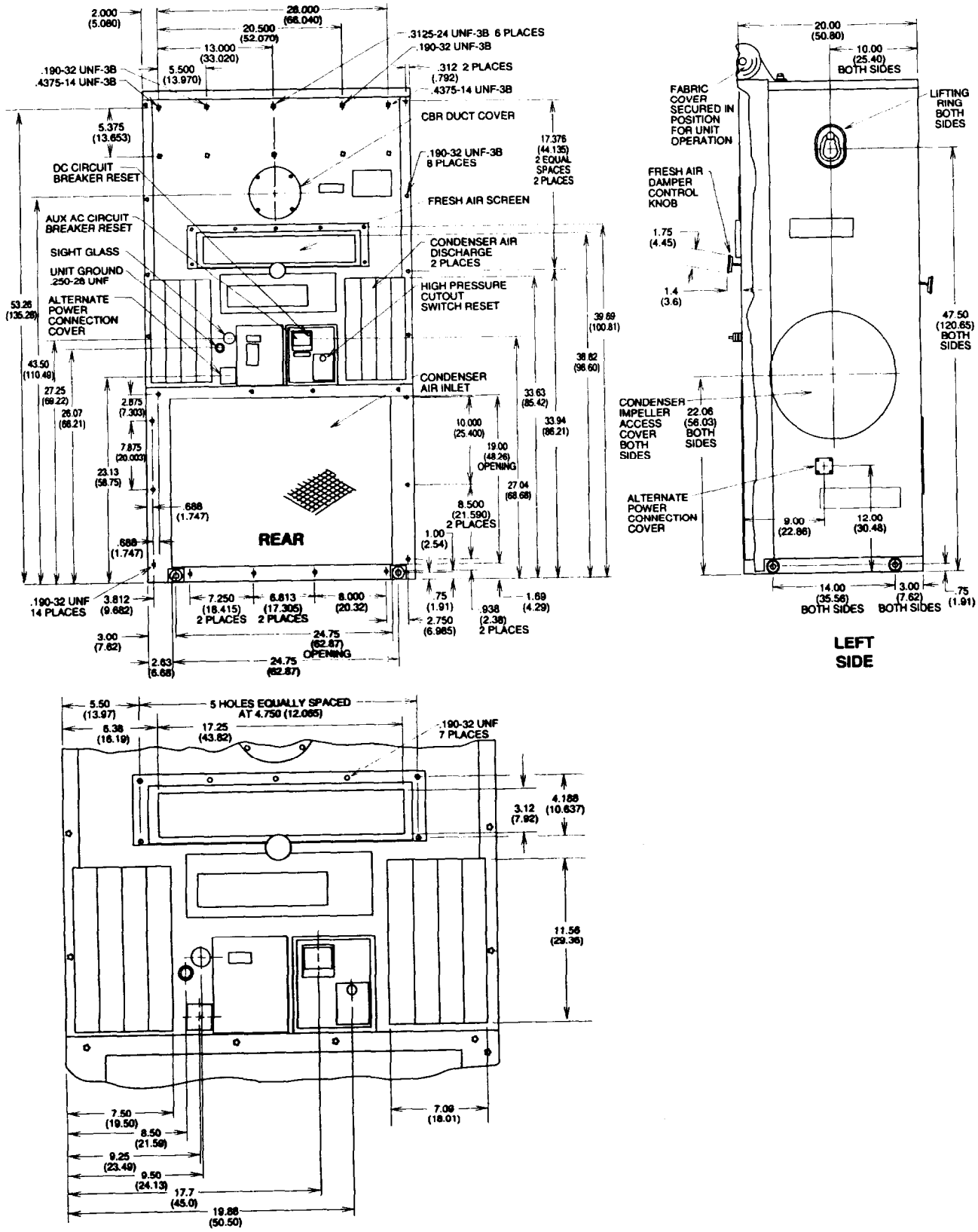


Figure 3-4. Installation Dimensions (Sheet 2 of 2)

3-6. INSTALLATION INSTRUCTIONS. (Cont)

b. *Connecting Ground and Power Cable.*

(1) Install a 10 AWG (minimum) ground wire between air conditioner cabinet and an adequate earth ground.

(2) Determine the length of power cable required and fabricate per Appendix F, Figure F-4.

WARNING

VOLTAGES USED IN THIS EQUIPMENT CAN KILL.

The following test is conducted with the power on. Exercise extreme caution to avoid injury.

CAUTION

If a miswired power cable is connected to the air conditioner, unit damage can result.

(3) Connect power cable to a source of 208 volt, 3 phase, 50/60/400 hertz power but do not connect power cable to air conditioner. Check voltage at power cable connector per the following:

(a) Using a multimeter, check for AC voltage between connector pin D and a good chassis ground. If any voltage is measured, disconnect power cable and check the power source for incorrect wiring. Correct any problem with power source, connect power cable, and re-check for voltage.

(b) Check voltage between remaining pins and compare readings to those listed in Table 3-1. If voltage measured is more than 10 volts above or below those listed, disconnect power and correct problem at power source.

Table 3-1. Power Cable Connector

Measure From Pin:	To Pin:			
	A	B	C	D
A	N/A	208	208	120
B	208	N/A	208	120
C	208	208	N/A	120
D	120	120	120	N/A

(4) Turn MODE selector rotary switch to OFF RESET position.

CAUTION

The air conditioner motor controller creates a momentary short circuit when power is applied to it. Damage to the connector and power cable pins can result if it is not isolated when the power cable is Connected.

(5) Place circuit breaker handle in OFF (down) position to isolate the motor controller.

(6) Route power cable to the air conditioner through the return air opening or outside panel as appropriate and connect.

(7) Place the circuit breaker handle in the ON (up) position.

c. *Connecting Control Cable.* This procedure is used only if the control panel has been remote mounted.

(1) Determine the length of control cable required and fabricate per Appendix F, Figure F-3.

(2) Connect the appropriate end of control cable to the control panel.

(3) Route control cable to the air conditioner through the return air opening or lower front panel as appropriate and connect.

d. *Preparing Drains.*

NOTES

- The air conditioner is provided with eight drain holes in the base.
- Any type of hose or tubing may be used as a drain line.

(1) Remove plugs from as many drains as possible.

(2) If a drain line is required, install standard l/2-14 NPT male pipe fittings into drains to connect hose or tubing. Route the drain line to an appropriate facility drain, storm sewer, dry sump, or an acceptable outside area while keeping the entire length at or below the air conditioner base height.

3-6. INSTALLATION INSTRUCTIONS. (Cont)

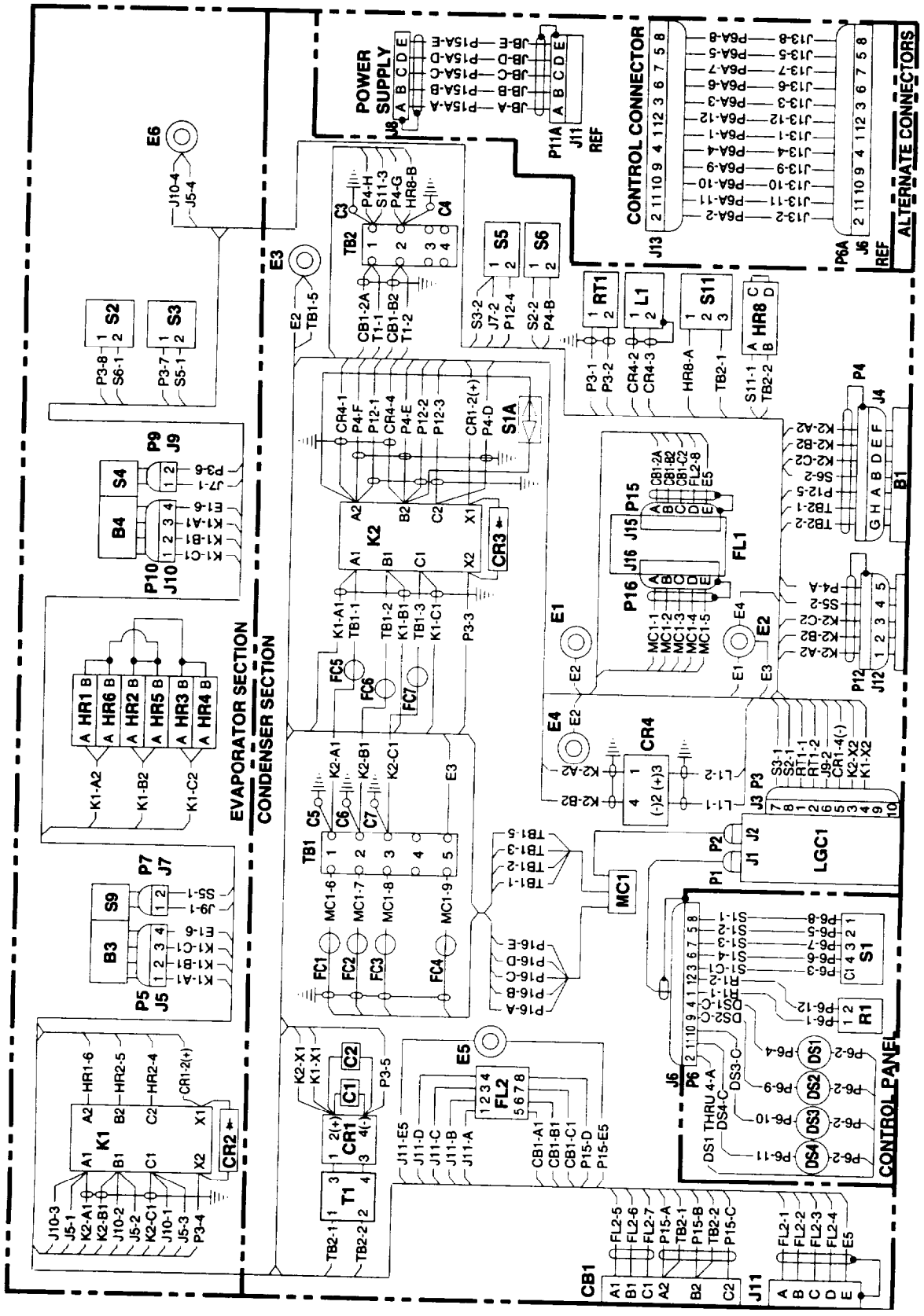


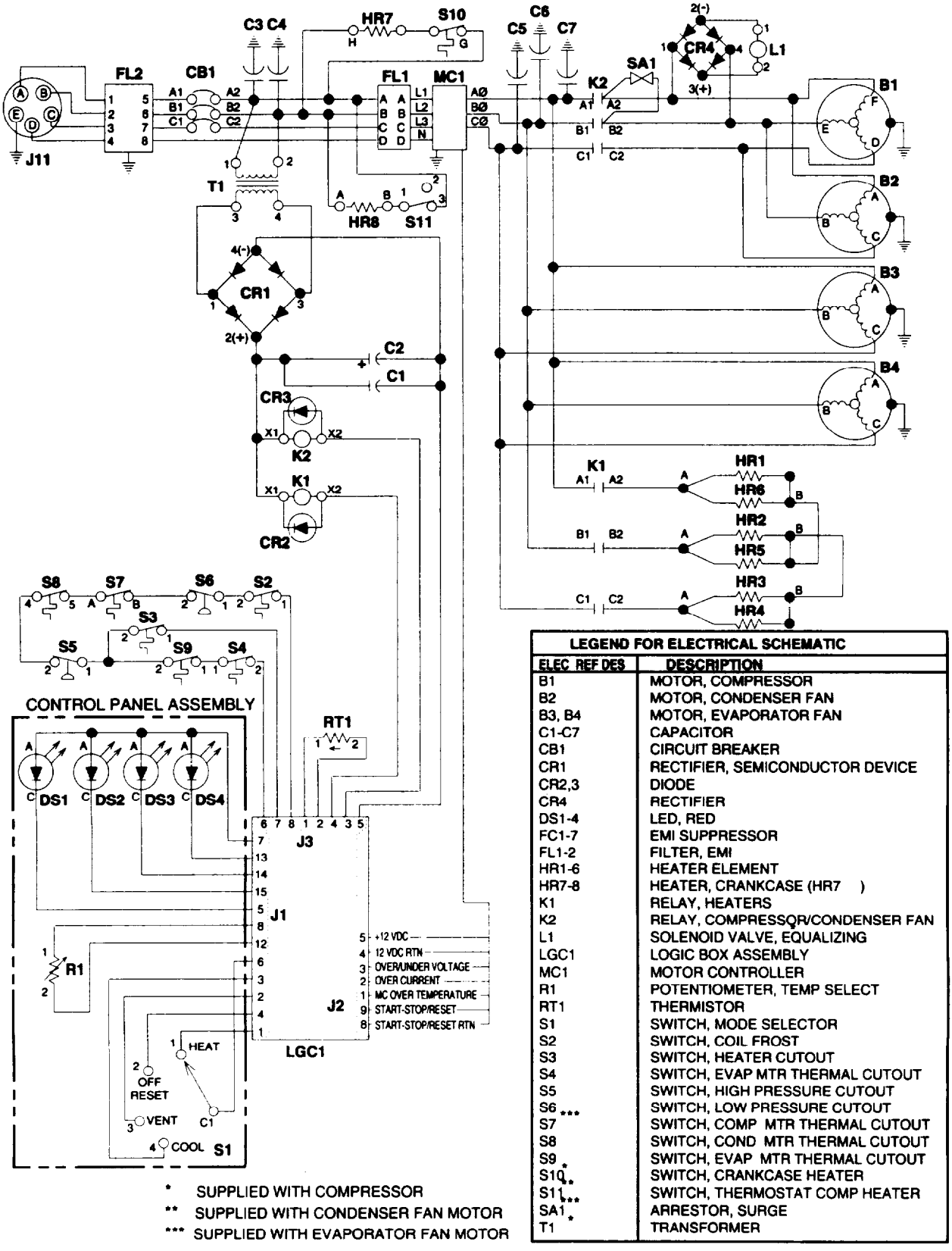
Figure 3-5. Wiring Diagram (Sheet 1 of 2)

LEGEND FOR WIRING DIAGRAM	
ELECTRICAL REFERENCE DESIGNATION	DESCRIPTION
B1	MOTOR, COMPRESSOR
B2	MOTOR, CONDENSER FAN
B3, B4	MOTOR, EVAPORATOR FAN
C1	CAPACITOR
C2	CAPACITOR
C3-C7	CAPACITOR
CB1	CIRCUIT BREAKER
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
CR2, CR3	DIODE
CR4	RECTIFIER
DS1-4	LED, RED
E1	TERMINAL, SCREW, CONDENSER GND
E2	TERMINAL. UNIT GND
E3	TERMINAL SCREW, FRAME GND
E4	TERMINAL SCREW, COMPRESSOR GND
FC1-FC7	EMI SUPPRESSOR
FL1	FILTER, EMI
FL2	FILTER, EMI
HR1-6	HEATING ELEMENT, ELECTRICAL
HR7	HEATER, CRANKCASE
HR8	HEATER, CRANKCASE
J1	CONNECTOR, LOGIC-CONTROL
J2	CONNECTOR, CONTROL
J3	CONNECTOR, A/C INTERFACE
J4	CONNECTOR, COMPRESSOR
J5	CONNECTOR, EVAPORATOR MOTOR-POWER
J6	CONNECTOR, CONTROL PANEL
J7	CONNECTOR, EVAPORATOR MOTOR-THERMAL SWITCH
J8	CONNECTOR, AUXILIARY, POWER INPUT
J9	CONNECTOR, EVAPORATOR MOTOR-THERMAL SWITCH
J10	CONNECTOR, EVAPORATOR MOTOR-POWER
J11	CONNECTOR, POWER INPUT
J12	CONNECTOR, CONDENSER MOTOR
J13	CONNECTOR, AUXILIARY, CONTROL PANEL
J15	CONNECTOR, EMI FILTER, INPUT
J15A	CONNECTOR, DUMMY STOWAGE
J16	CONNECTOR, EMI FILTER, OUTPUT
K1	RELAY, HEATERS
K2	RELAY, COMPRESSOR/CONDENSER FANS
L1	SOLENOID VALVE, EQUALIZING
LGC1	LOGIC BOX ASSEMBLY
MC1	MOTOR CONTROLLER
P1	CONNECTOR, LOGIC-CONTROL
P2	CONNECTOR, LOGIC-CONTROLLER
P3	CONNECTOR, LOGIC-RECT/PRESSURE SWITCH
P4	CONNECTOR, COMPRESSOR
P5	CONNECTOR, EVAPORATOR MOTOR-POWER
P6	CONNECTOR, CONTROL PANEL
P6A	CONNECTOR, AUXILIARY, CONTROL PANEL
P7	CONNECTOR, EVAPORATOR MOTOR-THERMAL SWITCH
P9	CONNECTOR, EVAPORATOR MOTOR-THERMAL SWITCH

LEGEND FOR WIRING DIAGRAM	
ELECTRICAL REFERENCE DESIGNATION	DESCRIPTION
P10	CONNECTOR, EVAPORATOR MOTOR-POWER
P12	CONNECTOR, CONDENSER MOTOR
P15	CONNECTOR, EMI FILTER INPUT
P15A	CONNECTOR, AUXILIARY, EMI FILTER INPUT
P16	CONNECTOR, EMI FILTER OUTPUT
R1	POTENTIOMETER, TEMPERATURE SELECT
RT1	THERMISTOR
S1	SWITCH, MODE SELECTOR
S2	SWITCH. COIL FROST
S3	SWITCH, HEATER CUTOUT
S4	SWITCH, EVAPORATOR MOTOR-THERMAL CUTOUT
S5	SWITCH, HIGH PRESSURE CUTOUT
S6	SWITCH, LOW PRESSURE CUTOUT
S7	SWITCH, COMPRESSOR MOTOR-THERMAL CUTOUT
S8	SWITCH, CONDENSER MOTOR-THERMAL CUTOUT
S9	SWITCH, EVAPORATOR MOTOR-THERMAL CUTOUT
S10	SWITCH, CRANKCASE HEATER
S11	THERMOSTAT, COMPRESSOR HEATER
SA1	ARRESTOR, SURGE
T1	TRANSFORMER
TB1	TERMINAL BOARD
TB2	TERMINAL BOARD

Figure 3-5. Wiring Diagram (Sheet 2 of 2)

3-6. INSTALLATION INSTRUCTIONS. (Cont)



LEGEND FOR ELECTRICAL SCHEMATIC

ELEC REF DES	DESCRIPTION
B1	MOTOR, COMPRESSOR
B2	MOTOR, CONDENSER FAN
B3, B4	MOTOR, EVAPORATOR FAN
C1-C7	CAPACITOR
CB1	CIRCUIT BREAKER
CR1	RECTIFIER, SEMICONDUCTOR DEVICE
CR2,3	DIODE
CR4	RECTIFIER
DS1-4	LED, RED
FC1-7	EMI SUPPRESSOR
FL1-2	FILTER, EMI
HR1-6	HEATER ELEMENT
HR7-8	HEATER, CRANKCASE (HR7)
K1	RELAY, HEATERS
K2	RELAY, COMPRESSOR/CONDENSER FAN
L1	SOLENOID VALVE, EQUALIZING
LGC1	LOGIC BOX ASSEMBLY
MC1	MOTOR CONTROLLER
R1	POTENTIOMETER, TEMP SELECT
RT1	THERMISTOR
S1	SWITCH, MODE SELECTOR
S2	SWITCH, COIL FROST
S3	SWITCH, HEATER CUTOUT
S4	SWITCH, EVAP MTR THERMAL CUTOUT
S5	SWITCH, HIGH PRESSURE CUTOUT
S6 ***	SWITCH, LOW PRESSURE CUTOUT
S7	SWITCH, COMP MTR THERMAL CUTOUT
S8	SWITCH, COND MTR THERMAL CUTOUT
S9 *	SWITCH, EVAP MTR THERMAL CUTOUT
S10 **	SWITCH, CRANKCASE HEATER
S11 ***	SWITCH, THERMOSTAT COMP HEATER
SA1 *	ARRESTOR, SURGE
T1	TRANSFORMER

Figure 3-6. Electrical Schematic

3-7. PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT.

a. *Check Installation.*

(1) Check that air conditioner is securely mounted.

(2) Check that any gap around air conditioner and shelter wall is sealed against air and water leakage.

(3) Check that the drains are open and if necessary, connected to drain lines.

b. *Check the Control Settings.*

(1) Check that the control panel MODE selector rotary switch is in the OFF RESET position.

(2) Check that the potentiometer TEMPERATURE control is midway between the WARM and COOL positions.

(3) Check that the circuit breaker has been placed in the ON (up) position.

c. *Check Electrical Connections.*

(1) Check that a grounding wire has been connected to the air conditioner casing and an appropriate ground.

(2) Check that the power cable is connected to the air conditioner and a source of 208 volt, three phase, 50/60 or 400 hertz electrical power.

(3) If the control panel has been remote mounted, check that the control cable is secure.

SECTION IV UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-8. GENERAL. Systematic, periodic, preventive maintenance checks and services (PMCS) are essential to insure that the air conditioner is ready for operation in any mode at all times. The purpose of a preventive maintenance program is to discover and correct defects and deficiencies before they can cause serious damage or complete failure of the equipment. Any effective preventive maintenance program must begin with the training of operators to report all unusual conditions noted during daily checks or actual operation, to Unit Maintenance. All defects and deficiencies discovered during maintenance inspections must be recorded, together with corrective action taken, on DA Form 2404, Equipment Inspection and Maintenance Worksheet).

3-9. INSPECTION AND SERVICE.

a. *Schedule*. A schedule for unit preventive maintenance inspection and service should be established immediately after installation of the air conditioner. A quarterly interval, equal to three calendar months or 250 hours of operation, whichever occurs first, is recommended for usual operating conditions. When operating under unusual conditions, such as a very dusty or sandy environment, it may be necessary to reduce the interval to monthly or even less if conditions are extreme.

b. *PMCS Instructions.* Table 3-2 lists unit preventive maintenance checks and services that should be performed at quarterly (or otherwise established) intervals. The PMCS items in the table have been arranged and numbered in a logical sequence to provide greater personnel efficiency with the least amount of required maintenance down time.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
		EXTERIOR		
1	Quarterly	Screen/Guard	Check screen/guard (1) for any damage such as dents, tears or cracks. If damaged, replace it per paragraph 3-15.	Damaged to prevent safe operation.
			If screen/guard (1) is dirty, clean it per the following: (1) Remove the screen/guard per paragraph 3-15. (2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (3) Dampen a rag (Item 12, Appendix E) with wash solution and clean the screen/guard. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (4) Dampen a rag with clean water and rinse the screen/guard. Rinse rag in clean water and continue until all detergent residue has been removed. (5) Wipe the screen/guard with a clean dry rag until it is thoroughly dry. (6) Install the screen/guard per paragraph 3-15.	Screen/guard obstructed.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

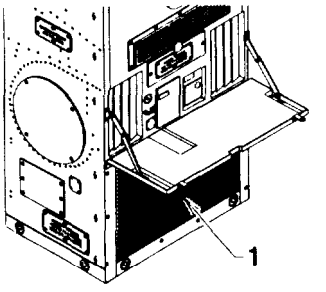
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
1	Quarterly	Screen/Guard - Cont	Check condition of paint on screen/guard (1). If necessary, paint it per the following: (1) Remove the screen/guard per paragraph 3-15. (2) Paint in accordance with TM 43-0139. (3) Install the screen/guard. See paragraph 3-15.	
			Check that screen/guard (1) is securely attached. If loose, secure it.	Screen/guard loose or missing.
		INTERIOR		
			NOTE To prevent repeated removal and installation of items, the following procedures must be performed to gain access to the interior components.	
			Remove the air filters per paragraph 3-16, mist eliminator per paragraph 3-17, front panel assembly per paragraph 3-14, and evaporator air discharge grille per paragraph 3-13.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

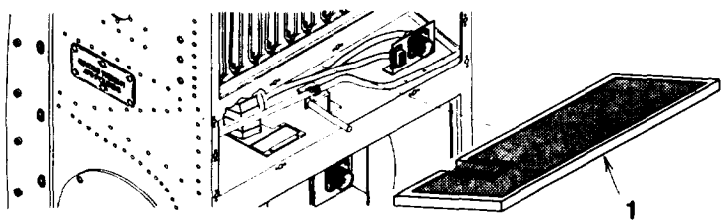
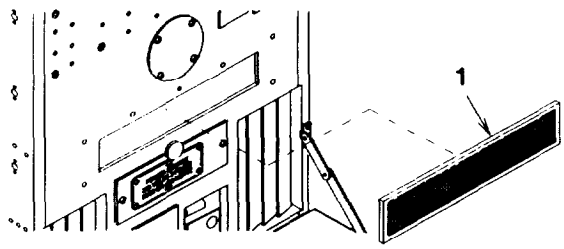
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
2	Quarterly	Air Filters	If air filters (1) are dirty, clean them per the following: (1) Mix a small quantity of detergent (Item 13, Appendix E) with clean water in a container or sink large enough to lay the filter flat. Be sure the wash solution is deep enough to completely cover the filters.	Air filters are obstructed.
			  	
			(2) Immerse the filters in the wash solution and agitate by moving them up and down. If necessary, carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (3) Empty the container or sink and fill with enough clean water to completely cover the filters. Immerse the filters in the water and agitate by moving them up and down. Repeat as necessary until all detergent residue has been removed. (4) Shake excess water from filters and let stand until they are thoroughly dry. Check each air filter (1) for any damage such as crushed filter media or bent frame. If damaged, replace it.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
3	Quarterly	Mist Eliminator	If mist eliminator (1) is dirty, clean it per the following: (1) Mix a small quantity of detergent (Item 13, Appendix E) with clean water in a container or sink large enough to lay the mist eliminator flat. Be sure the wash solution is deep enough to completely cover the mist eliminator.	Mist eliminator is obstructed.

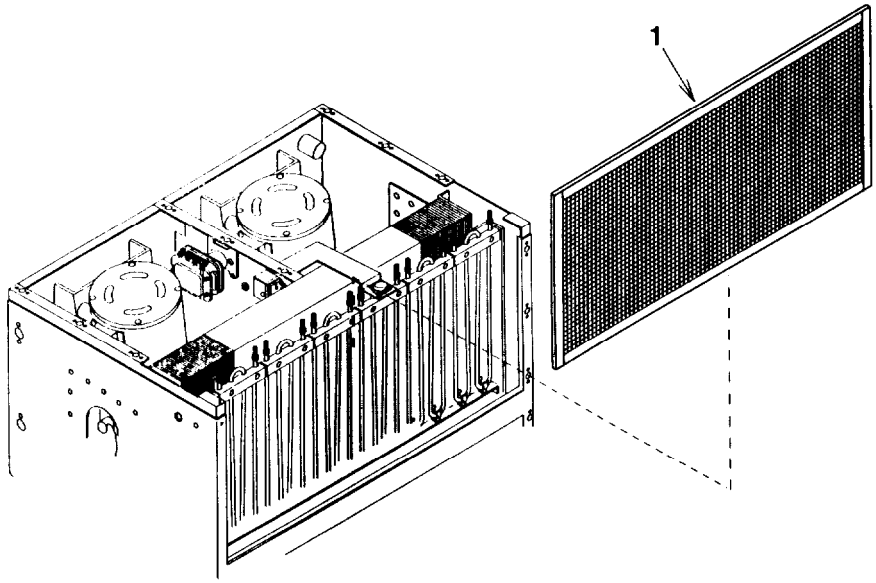


Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
3	Quarterly	Mist Eliminator - Cont	(2) Immerse the mist eliminator in the wash solution and agitate by moving it up and down. If necessary, carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (3) Empty the container or sink and fill with enough clean water to completely cover the mist eliminator. Immerse the mist eliminator in the water and agitate by moving it up and down. Repeat as necessary until all detergent residue has been removed. (4) Shake excess water from mist eliminator and let stand until it is thoroughly dry.	
4	Quarterly	Condensate Traps	Check condensate trap (1) and tubes (2) for any visible damage such as cut or split plastic tubing, crushed or cracked metal drain tube, damaged or missing condensate trap spring or ball, and cracked or broken barbed tee fitting. If any components are damaged or missing, replace them per paragraph 3-40.	Condensate trap damaged, or parts missing.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

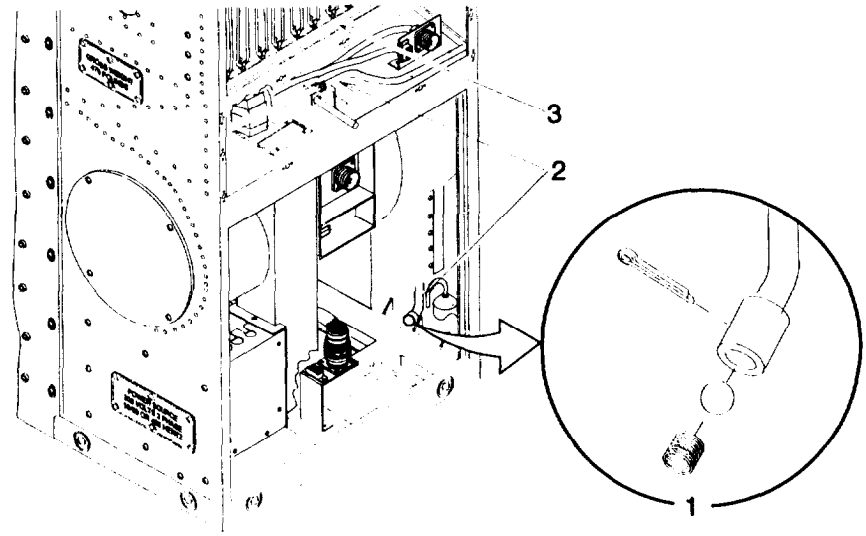
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
4	Quarterly	Condensate Traps - Cont	If condensate trap (1) or tubing (2) is clogged or dirty, clean per the following: (l) Disassemble the tubing and trap as necessary to locate the obstruction. See paragraph 3-42. (2) Flush tubing or trap with water to remove obstruction. If needed, carefully insert a rod or wire as appropriate to work obstruction out. 3) Assemble the trap and tubing and install. See paragraph 3-40. Check that tubing (2) and fitting connections are securely clamped. If loose, tighten them. Pour approximately one cup clean water into the evaporator coil drip pan (3) and check that it flows freely out condensate trap (1). If the water does not flow through condensate drain tubes (2) and trap, clean them and re-check.	Condensate trap obstructed.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

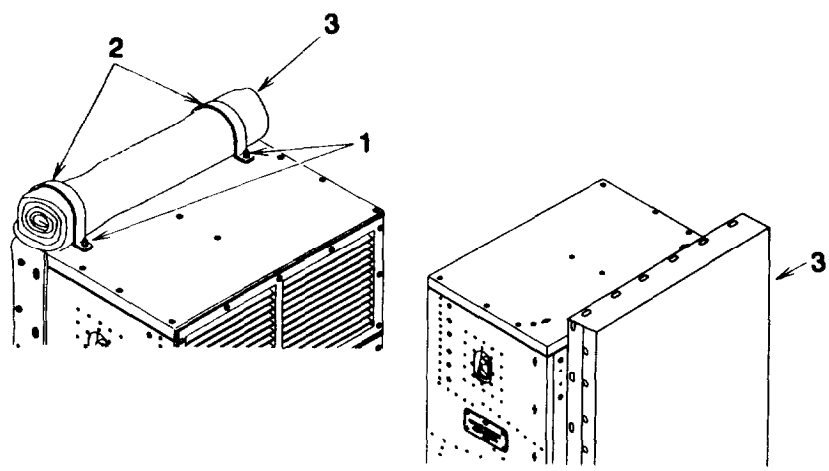
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
			NOTE The following procedure is required after completing the interior checks and services.	
4	Quarterly	Condensate Traps - Cont	Install the air filter, evaporator air return grille assembly, and fresh air damper knob per paragraphs 3-16 and 3-13, mist eliminator and top panel assembly per paragraphs 3-17 and 3-14, front panel assembly per paragraph 3-14, and evaporator air discharge grille per paragraph 3-13.	
		EXTERIOR		
5	Annually	Fabric Cover	Rotate turnbutton fasteners (1) to release straps (2). Roll down fabric cover (3). Check fabric cover for any damage such as tears or cracks. If damaged, replace it per paragraph 3-12.	
				
			Check that fabric cover (3) is securely attached. If loose, secure it.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
5	Annually	Fabric Cover - Cont	If fabric cover (3) is dirty, clean it per the following: (1) Remove the fabric cover per paragraph 3-12. (2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (3) Dampen a rag (Item 12, Appendix E) with wash solution and clean the fabric cover. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (4) Dampen a rag with clean water and rinse the fabric cover. Rinse rag in clean water and continue until all detergent residue has been removed. (5) Wipe the fabric cover with a clean dry rag until it is thoroughly dry. (6) Install the fabric cover per paragraph 3-12. If turnbutton fasteners (1) bind when turned, lubricate them per the following: (1) Apply a small amount of lubricating oil (Item 15, Appendix E) to the pivot points and move the turnbutton fasteners to work it into the joint. (2) Blot or wipe all excess lubricating oil from the turnbutton fasteners using a clean dry rag (Item 12, Appendix E).	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
6	Annually	Grilles	Check grilles (1) for any damage such as bent or missing louvers and cracked or bent frame. If damaged beyond repair, replace them per paragraph 3-13.	
			If grilles (1) are dirty, clean them per the following:	Grilles are obstructed.
			(1) Remove the grilles per paragraph 3-13.	
			(2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution.	
			(3) Dampen a rag (Item 12, Appendix E) with wash solution and clean the grilles. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits.	
			(4) Dampen a rag with clean water and rinse the grilles. Rinse rag in clean water and continue until all detergent residue has been removed.	
			(5) Wipe the grilles with a clean dry rag until they are thoroughly dry.	
			(6) Install the grilles per paragraph 3-13.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

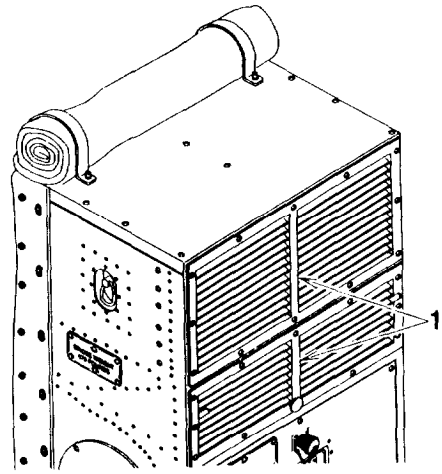
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
6	Annually	Grilles - Cont	If grille (1) louvers bind when moved, lubricate them per the following: (1) Remove the grilles per paragraph 3-13. (2) Apply a small amount of lubricating oil (Item 15, Appendix E) to the pivot points and move the louvers to work it into the joint. (3) Blot or wipe all excess lubricating oil from the louvers using a clean dry rag (Item 12, Appendix E). (4) Install the grilles per paragraph 3-13.	Grille louvers can not be opened.

Table 3-2. *Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont*

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
6	Annually	Grilles - Cont	If gasket material is suspected to be damaged, check it per the following: (1) Remove grilles per paragraph 3-13. (2) Check if gasket material is tom or missing. (3) If no repairs were necessary, install the grilles per paragraph 3-13. Check condition of paint on grilles (1). If necessary, paint them per the following: (1) Remove the grilles per paragraph 3-13. (2) Paint in accordance with TM 43-0139. (3) Install the grilles per paragraph 3-13. Check that grilles (1) are securely attached. If loose, secure them.	
7	Annually	Panels/Covers	Check panels/covers for any damage such as dents, tears or cracks. If damaged beyond repair, replace them per paragraph 3-14.	Damaged to prevent proper sealing of unit or safe operation.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

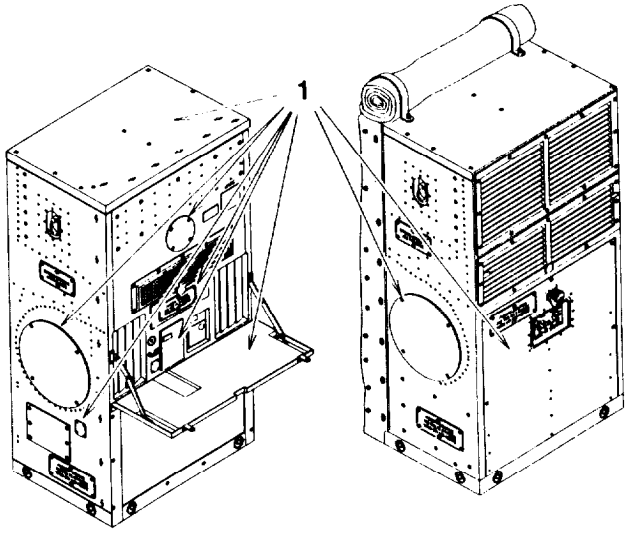
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
7	Annually	Panels/Covers - Cont	f panels/covers are dirty, clean them per the following: (1) Remove the panels/covers per paragraph 3-14. (2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (3) Dampen a rag (Item 12, Appendix E) with wash solution and clean the panels/covers. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (4) Dampen a rag with clean water and rinse the panels/covers. Rinse rag in clean water and continue until all detergent residue has been removed.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
7	Annually	Panels/Covers - Cont	(5) Wipe the panels/covers with a clean dry rag until it is thoroughly dry. (6) Install the panels/covers per paragraph 3-14. If gasket material is suspected to be damaged, check it per the following: (1) Remove panels/covers per paragraph 3-14. (2) Check if gasket material is tom or missing. (3) If no repair was necessary, install the panels/covers per paragraph 3-14.	
			Check that panels/covers are securely attached. If loose, secure them.	Panels/covers loose or missing.
		INTERIOR		
			NOTE To prevent repeated removal and installation of items, the following procedures must be performed to gain access to the interior components.	
			Remove the air filters per paragraph 3-16, mist eliminator per paragraph 3-17, front panel assembly per paragraph 3-14, and evaporator air discharge grille per paragraph 3-13.	
8	Annually	Fresh Air Damper	Turn fresh air damper knob (1) to open and close damper door. If damper door assembly is damaged, repair or replace it per paragraph 3-18.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

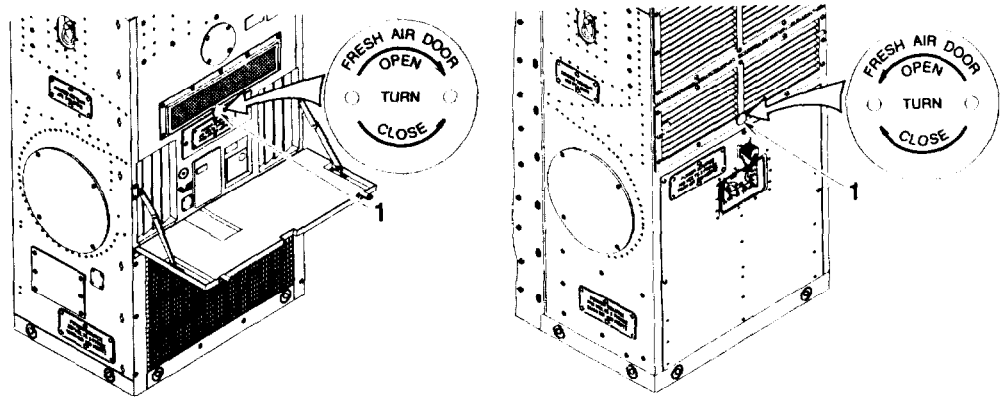
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
8	Annually	Fresh Air Damper - Cont	If damper door binds when adjusted, lubricate it per the following: 1) Apply a small amount of lubricating oil (Item 15, Appendix E) to the hinge pivot points, linkage pivot points, and gears. Turn the knob to open and close the damper and work lubricant into the joints. 2) Blot or wipe all excess lubricating oil from the damper door assembly using a clean dry rag (Item 12, Appendix E). Check that fresh air damper knobs (1) are securely attached. If loose, tighten them.	
9	Annually	Control Panel Assembly	Remove control panel assembly and disassemble only to extent necessary to check components. See paragraph 3-20.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
9	Annually	Control Panel Assembly - Cont	Check control panel and components for visible damage such as dents, cracks broken cases, loose connections, burns, and cut, broken, or frayed wire leads. If any item is damaged, test, repair or replace it as necessary per paragraphs 3-21 through 3-24. Check condition of paint on control panel. If it requires painting, remove it per paragraph 3-20 and paint in accordance with TM 43-0139. Check rotary switch and potentiometer operation for smoothness and binding. If excessively loose or binding, replace per paragraphs 3-22 and 3-24. Check that components are securely mounted. If loose, secure them. Assemble and install the control panel assembly per paragraph 3-20. Check that knobs are securely mounted to shafts. If loose, tighten them.	Control panel or components damaged or missing.
10	Annually	Wiring Harnesses [unit]	Check wiring harnesses for any visible damage such as loose connections or cut, broken, or frayed wire leads. Test, repair, or replace harnesses as necessary per paragraph 3-25.	If any wire leads are damaged.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

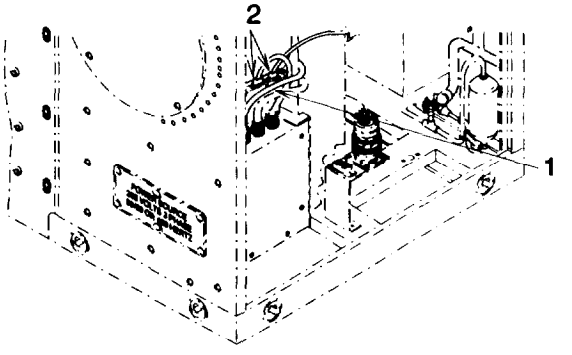
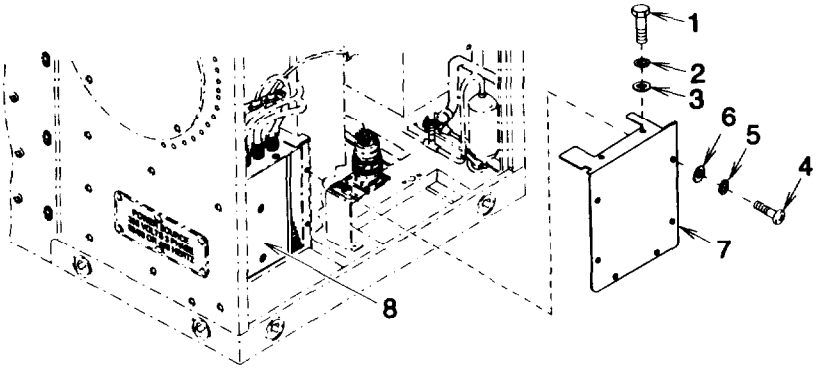
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
11	Annually	Logic box Assembly	Check logic box assembly (1) for any visible signs of overheating such as burnt or discolored case.	If logic box assembly has been overheated.
				
			Check logic box assembly (1) case for any visible damage such as dents or tears. Disconnect two connectors (2) and check for any damage such as broken or damaged pins. Connect two connectors (2) If logic box assembly (1) is damaged in any way or is suspected to be defective, notify Direct Support Maintenance.	If logic box assembly is damaged.
12	Annually	Motor Controller Assembly	Remove two screws (l), lock washers (2), and flat washers (3). Discard lock washers.	
				

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPl - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
12	Annually	Motor Controller Assembly - Cont	Remove six screws (4), lock washers (5), flat washers (6), and cover (7). Discard lock washers.	
			Check motor controller assembly (8) for any visible signs of overheating such as burnt or discolored case.	If motor controller assembly has been overheated.
			Check motor controller assembly (8) case for any visible damage such as dents or tears.	If motor controller assembly is damaged.
			Check motor controller assembly (8) electrical leads for any damage such as frayed or damaged insulation or shielding.	If electrical leads are damaged.
			Install cover (7), six screws (4), new lock washers (5) (Item 8, Appendix G) and flat washers (6).	
			Install two screws (l), new lock washers (2) (Item 10, Appendix G) and flat washers (3).	
			If motor controller assembly (8) is damaged in any way or is suspected to be defective, notify Direct Support Maintenance.	
13	Annually	EMI Filters	Check EMI filters (1) for any visible damage such as dents, swelling, or burns. Test or replace as necessary per paragraph 3-26.	EMI filter is damaged or missing.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

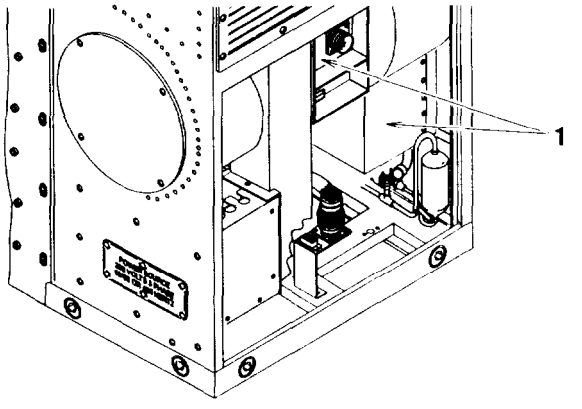
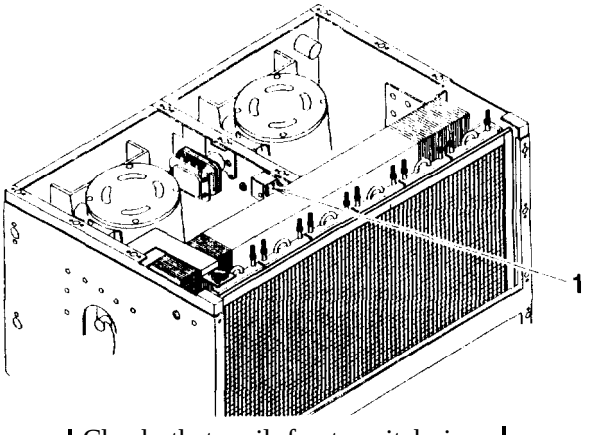
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
13	Annually	EMI Filters - Cont	Check that EMI filters are securely mounted. If loose, secure them.	
14	Annually	Coil Frost Switch	Check coil frost switch (1) for any visible damage such as broken terminals or cracked case. Test or replace as necessary per paragraph 3-27.	Coil frost switch is damaged or missing.
				
			Check that coil frost switch is securely mounted. If loose, secure it.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

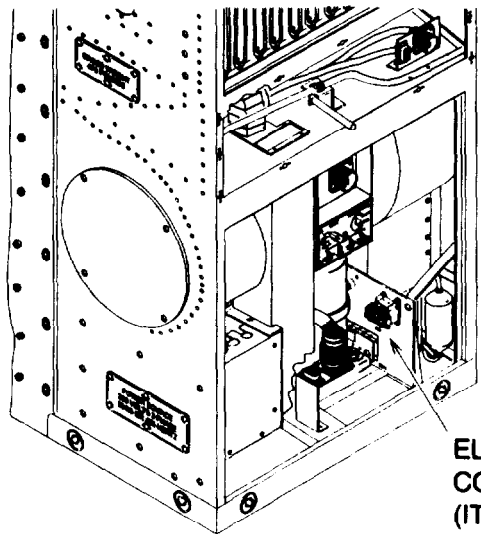
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
15	Annually	Capacitors	Check capacitors for any visible damage such as broken leads, swelling, or burns. Test or replace as necessary per paragraphs 3-29.	Capacitor is damaged or missing.
			 ELECTRICAL COMPONENTS (ITEMS 13 THROUGH 18)	
			Check that capacitor leads are securely connected to terminals. If loose, tighten them.	
16	Annually	Rectifiers	Check rectifiers for any visible damage such as broken terminals, swelling, or burns. Test or replace as necessary per paragraph 3-30. Check that rectifiers are securely mounted. If loose, secure them.	Rectifier is damaged or missing.
17	Annually	Transformer	Check transformer for any visible damage such as broken terminals, swelling, or burns. Test or replace as necessary per paragraph 3-31. Check that transformer is securely mounted. If loose, secure it.	Transformer is damaged or missing.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
18	Annually	Relays	Check relays for any visible damage such as cracked case, broken terminals, or burns. Test or replace as necessary per paragraph 3-32.	Relay is damaged or missing.
			Check that relays are securely mounted. If loose, secure them.	
19	Annually	Diodes	Check diodes for any visible damage such as broken terminal leads, swelling, or bums. Test or replace as necessary per paragraph 3-32.	Diode is damaged or missing.
			Check that diode leads are securely connected to terminals. If loose, tighten them.	
20	Annually	Terminal Boards	Check terminal boards for any visible damage such as broken terminals, stripped screws, and cracked or broken board. If damaged, replace them per paragraph 3-33.	Terminal board is damaged or missing.
			Check that terminal boards are securely mounted. If loose, secure them.	
21	Annually	Evaporator Fans	Check evaporator fans (1) for any visible damage such as cracks and bent, loose, or missing blades. If visibly damaged, replace them per paragraph 3-34.	Evaporator fans are damaged.
			Check that evaporator fans (1) are securely attached to motor shafts. If loose, tighten them.	Evaporator fans are loose.
			Check that evaporator fans (1) are properly aligned to inlet bell. If misaligned, see paragraph 3-34.	Evaporator fans are misaligned.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI- Cont

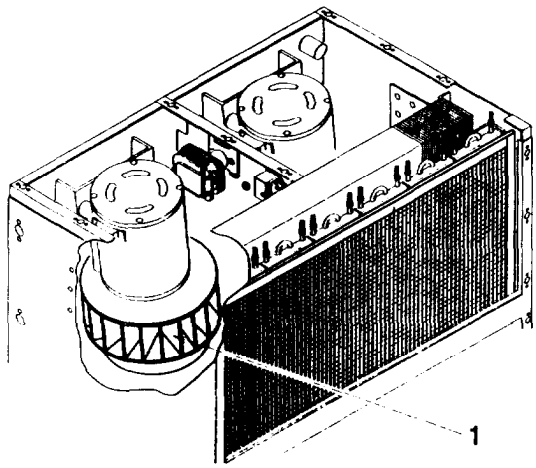
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
21	Annually	Evaporator Fans - Cont	If evaporator fans (1) are dirty, clean them per the following: (1) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (2) Dampen a rag (Item 12, Appendix E) with wash solution and clean the evaporator fans. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (3) Dampen a rag with clean water and rinse the evaporator fans. Rinse rag in clean water and continue until all detergent residue has been removed. (4) Wipe the evaporator fans with a clean dry rag.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI- Cont

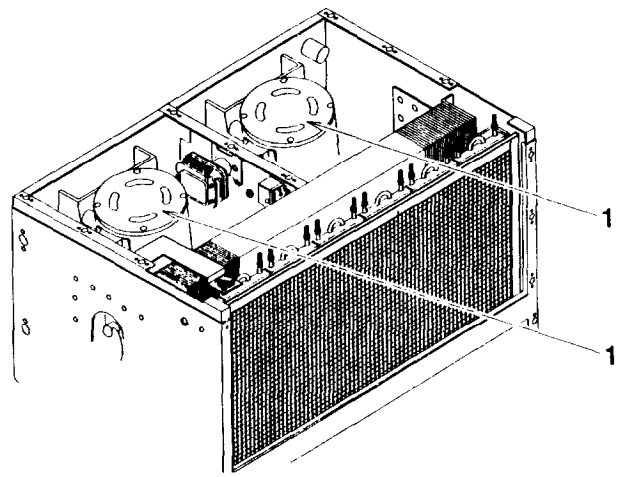
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
22	Annually	Evaporator Fan motors	Check evaporator fan motors (1) for any visible damage such as dented or cracked housing and burns or other evidence of overheating. Check that shafts turn smoothly with no binding or looseness. Check wire leads for any visible damage such as broken wires, loose connections, and cut or frayed ends. Test or replace them per paragraph 3-34.	Evaporator fan motor is damaged.
				
			If evaporator fan motors (1) are dirty, clean them per the following: (1) Wipe the evaporator fan motors with a clean dry rag.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

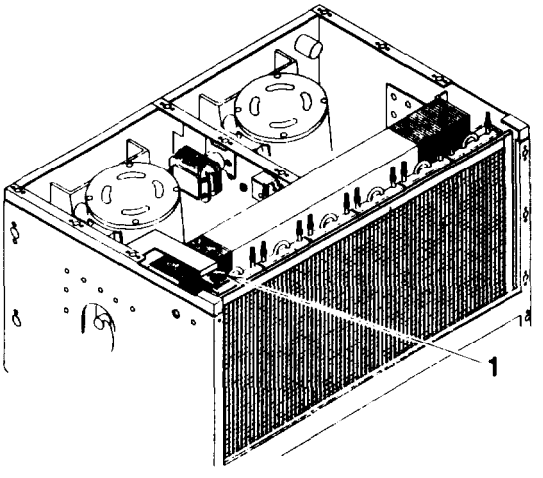
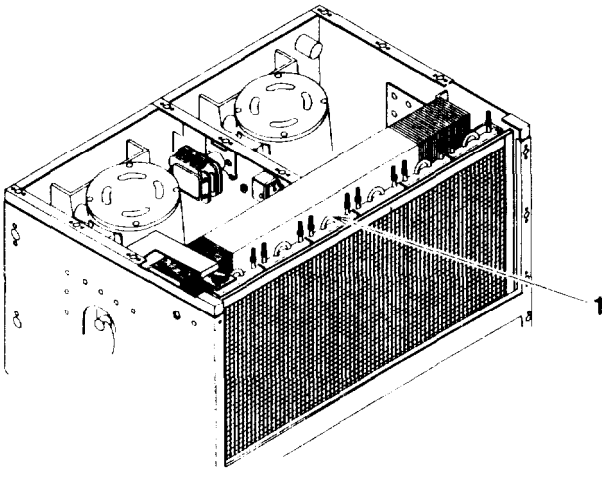
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
23	Annually	Heater Thermostat	Check heater thermostat (1) for any visible damage such as broken terminals or cracked case. Test or replace as necessary per paragraph 3-35.	Heater thermostat is damaged.
				
			Check that heater thermostat (1) is securely mounted. If loose, secure it.	
24	Annually	Heater Elements	Check heater elements (1) for any visible damage such as broken terminals, stripped screw posts, and split or burned sheath. Test or replace as necessary per paragraph 3-35.	Heater element is damaged
				

Table 3-2. Unit Preventive Maintenance Check-s and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
24	Annually	Heater Elements - Cont	Check that heater elements (1) are securely mounted. If loose, secure them.	
25	Annually	Condenser Fans	Remove the condenser fan cover assemblies per paragraph 3-14.	
			Check condenser fans (1) for any visible damage such as cracks and bent, loose, or missing blades. If visibly damaged, replace them per paragraph 3-37.	Condenser fans are damaged.
			Check that condenser fans (1) are securely attached to motor shafts. If loose, tighten them.	Condenser fans are loose.
			Check that condenser fans (1) are properly aligned to inlet bell. If misaligned, see paragraph 3-37.	Condenser fans are misaligned.

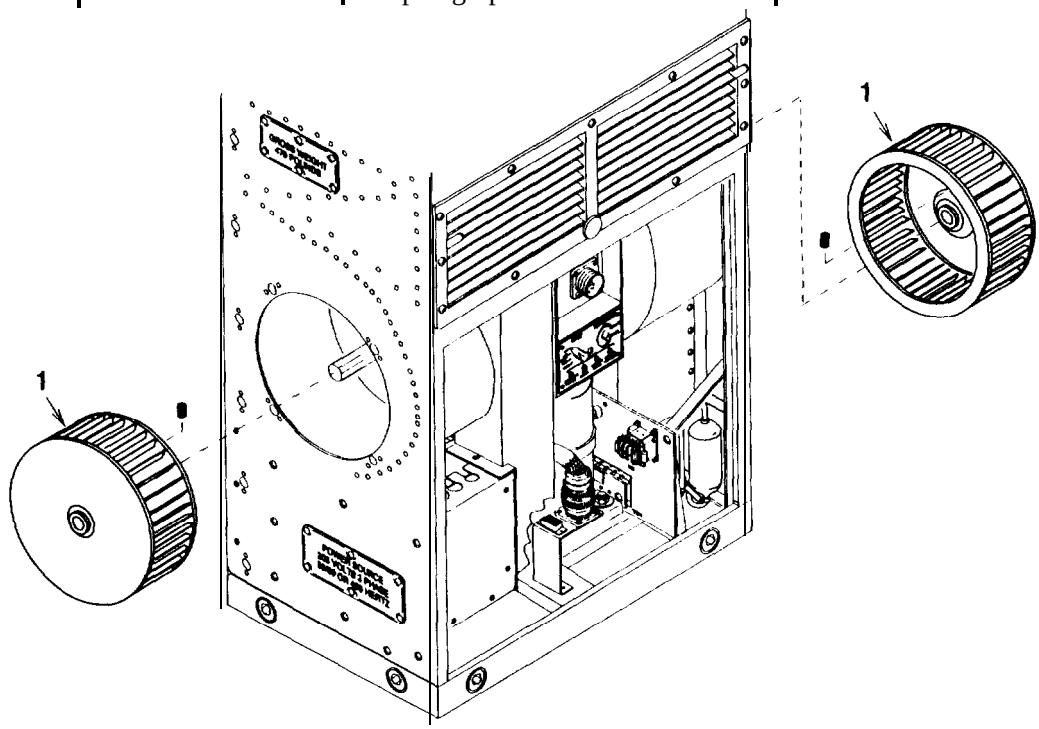


Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
25	Annually	Condenser Fans - Cont	If condenser fans (1) are removed for any reason and are dirty, clean them per the following: (1) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (2) Dampen a rag (Item 12, Appendix E) with wash solution and clean the condenser fans. Carefully use a scrub brush (Item 2, Appendix B) to remove any caked on dirt or deposits. (3) Dampen a rag with clean water and rinse the condenser fans. Rinse rag in clean water and continue until all detergent residue has been removed. (4) Wipe the condenser fans with a clean dry rag. Install the condenser fan cover assemblies per paragraph 3-14.	
26	Annually	Condenser Fan Motor	Check condenser fan motor (1) for any visible damage such as dented or cracked housing and burns or other evidence of overheating. Check that shaft turns smoothly with no binding or looseness. Check wire leads for any visible damage such as broken wires, loose connection, and cut or frayed end. Test or replace per paragraph 3-37.	Condenser fan motor is damaged.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

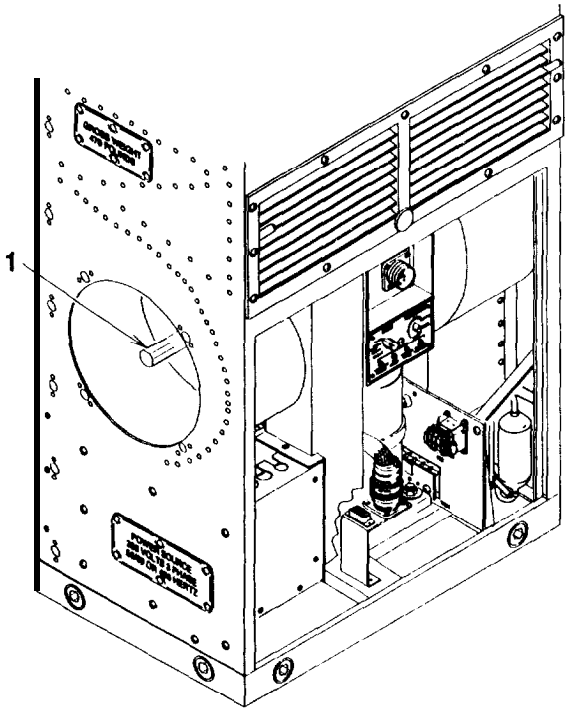
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
26	Annually	Condenser Fan Motor - Cont	If condenser fan motor (1) is dirty, clean it per the following: Wipe the condenser fan motor with a clean dry rag.	
27	Annually	Safety Control Box Circuit Breaker	Remove safety control box assembly and disassemble only to extent necessary to check circuit breaker (1). See paragraph 3-38. Check condition of paint on safety control box. If necessary, paint it per the following: (1) Remove the safety control box per paragraph 3-38. (2) Paint in accordance with TM 43-0139. (3) Install the safety control box per paragraph 3-38.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

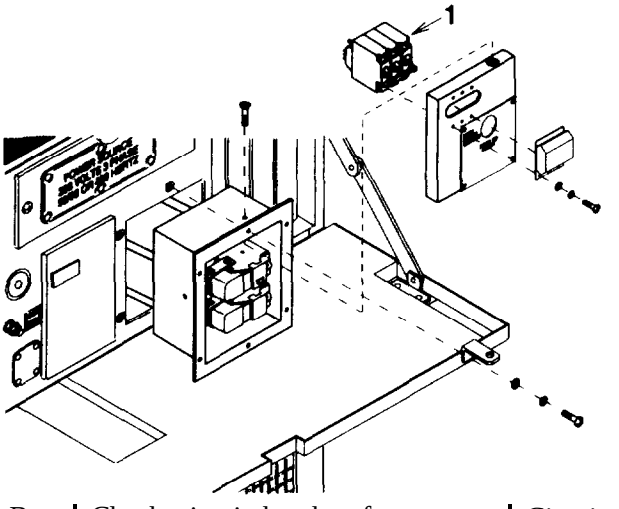
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
27	Annually	Safety Control Box Circuit Breaker - Cont	Check circuit breaker for any visible damage such as broken or stripped terminal screw posts, cracked or broken case, or burns. Test or replace as necessary per paragraph 3-38. Check that circuit breaker is securely mounted. If loose, secure it. Assemble and install safety control box assembly. See paragraph 3-38.	Circuit breaker is damaged.
28	Annually	Condenser Coil	Check condenser coil (1) for any visible damage such as kinked, crushed, or punctured tubes, crushed or missing fins, and any evidence of leaking. If tubes are damaged or there is any evidence of leaking, notify Direct Support Maintenance. If fins are crushed but repairable, carefully straighten them using a fin comb (Item 11, Appendix B).	Condenser coil is damaged.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

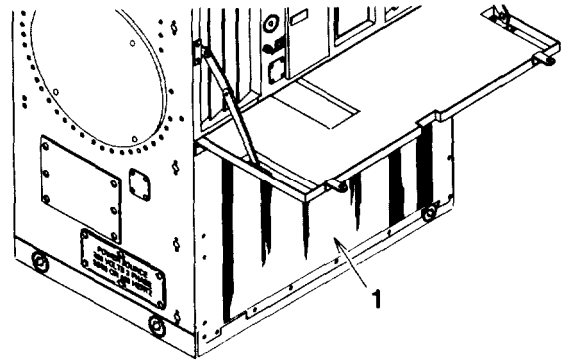
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
28	Annually	Condenser Coil - Cont	Check that condenser coil (1) is securely mounted. If loose, notify Direct Support Maintenance. If condenser coil (1) is dirty, clean it per the following: (1) Remove condenser coil guard assembly per paragraph 3-15. (2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (3) Dip a scrub brush (Item 2, Appendix B) into the wash solution and clean the condenser coil by carefully brushing the fins up and down to remove any caked on dirt or deposits. (4) Rinse the scrub brush with clean water and carefully brush the fins up to rinse the condenser coil. Rinse the brush in clean water and continue until all detergent residue has been removed. (5) Install condenser coil guard assembly per paragraph 3-15.	Condenser coil is obstructed.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

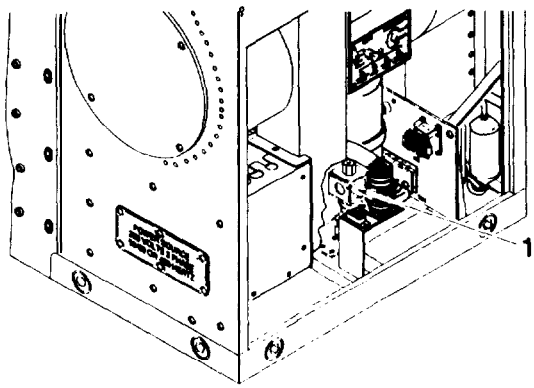
Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
29	Annually	Solenoid Valve Coil	Check solenoid valve coil (1) for any visible damage such as frayed or broken wire leads and bum marks. Test or replace as necessary per paragraph 3-39.	Solenoid valve coil is damaged.
				
			Check that solenoid valve coil (1) is securely mounted to solenoid valve stem. If loose, secure it.	
30	Annually	Evaporator Coil	Check evaporator coil (1) for any visible damage such as kinked, crushed, or punctured tubes, crushed or missing fins, and any evidence of leaking. If tubes are damaged or there is any evidence of leaking, notify Direct Support Maintenance. If fins are crushed but repairable, carefully straighten them using a fin comb (Item 11, Appendix B).	Evaporator coil is damaged.
			Check that evaporator coil (1) is securely mounted. If loose, notify Direct Support Maintenance.	

Table 3-2. Unit *Preventive Maintenance Checks and Services for Model F36T-MPI - Cont*

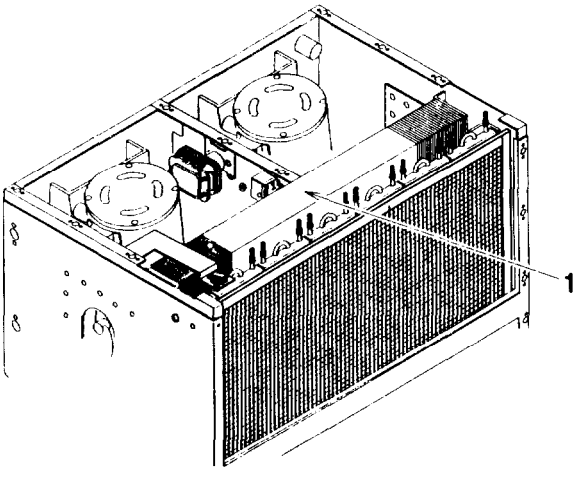
Item No	Interval	Location Item To Check/Service	Procedures	Not Fully Mission Capable if:
				
30	Annually	Evaporator Coil Cont	If evaporator coil (1) is dirty, clean it per the following: (1) If necessary, loosen and move the heater elements to access the coil. See paragraph 3-36. (2) Mix a small quantity of detergent (Item 13, Appendix E) with clean water to make a wash solution. (3) Dip a scrub brush (Item 2, Appendix B) into the wash solution and clean the evaporator coil by carefully brushing up and down the fins on both sides to remove any caked on dirt or deposits. (4) Rinse the scrub brush with clean water and carefully brush up and down the fins on both sides to rinse the evaporator coil. Rinse the brush in clean water and continue until all detergent residue has been removed. (5) If the heater elements were loosened and moved, secure them per paragraph 3-36.	Evaporator coil is obstructed.

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
	NOTE The following procedure is required after completing the interior checks and services.			
30	Annually	Evaporator Coil - Cont	Install the air filter, evaporator air return grille assembly, and fresh air damper knob per paragraphs 3-16 and 3-13, mist eliminator and top panel assembly per paragraphs 3-17 and 3-14, front panel assembly per paragraph 3-14, evaporator air discharge grille per paragraph 3-13).	
31	Annually	Operation Checks	a. Be sure the MODE selector rotary switch is in the OFF RESET position and reconnect input power.	
	CAUTION Do not check operation in COOL mode until after input power has been reconnected for 30 minutes to eliminate any danger of liquid refrigerant accumulation in the compressor.			
			b. Check that the fabric cover is rolled up and secured. C. Adjust conditioned air intake and outlet louvers to the full open position. d. Adjust fresh air damper to full closed position. e. Turn MODE selector rotary switch to VENT. After a short delay (approximately five seconds) the fan should start.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPI - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
31	Annually	Operation Checks - Cont	f. Use a paper streamer or smoke and note amount of air being discharged from conditioned air outlet grille. g. Open fresh air damper fully. h. Close conditioned air intake grille louvers fully. i. Again check air flow as in step f. above. Air flow should be approximately the same. j. Fully open louvers in conditioned air intake grille and fully close fresh air damper.	
			NOTE The potentiometer temperature control has an effective functional range between 60º F and 90° F (16” C and 32° C). In extreme conditions when ambient air temperature is outside this range, operation in either HEAT or COOL mode will vary from that described.	
			k. Turn potentiometer TEMPERATURE control knob to fully WARM (clockwise) position and then turn mode selector switch to HEAT. After a short delay (approximately five seconds) the fan should start. Place you had in air flow from the conditioned air outlet grille and feel for a temperature rise. Next, turn potentiometer TEMPERATURE control knob to fully COOL (counterclockwise) position. Feel that discharge air temperature drops to ambient level.	

Table 3-2. Unit Preventive Maintenance Checks and Services for Model F36T-MPl - Cont

Item No	Interval	Location: Item To Check/Service	Procedures	Not Fully Mission Capable if:
31	Annually	Operation Checks - Cont	1. Turn potentiometer TEMPERATURE control knob to fully WARM (clockwise) position, then turn MODE selector rotary switch to COOL. After a short delay (approximately five seconds) the fan should start. Hold your hand in air flow from conditioned air outlet grille; there should be no change in temperature. Now turn potentiometer TEMPERATURE control knob to fully COOL (counterclockwise) position. The fan will stop, after a short delay (approximately five seconds) the fan and compressor should start. Feel outlet air temperature begin to drop. Leave controls in present position and perform next check. m. After 15 minutes of operation check the sight glass and compare refrigerant condition with the color coded information plate provided. n Turn MODE selector rotary switch to OFF RESET and observe that all air conditioner functions cease. 0. Set-up the air conditioner for the desired operational mode. p. Record performance of PMCS, including corrective actions taken.	

SECTION V UNIT TROUBLESHOOTING

3-10. USE OF TROUBLESHOOTING TABLE. This table contains troubleshooting information useful to Unit Maintenance technicians in diagnosing and correcting malfunctions or unsatisfactory operation of the air conditioner.

a. The Troubleshooting Table lists the common malfunction symptoms and unsatisfactory performance characteristics technicians are most likely to encounter. Included are test and inspection steps to be followed to determine the cause and the corrective action(s) that should be performed for each possible cause listed.

b. The technicians should first find the malfunction symptom or unsatisfactory performance characteristic in the table which most closely describes the immediate situation. Perform the test and inspections, and corrective action steps in the order in which they are listed.

C. This manual cannot list all possible situations which may be encountered, nor can it list all test and inspection, and corrective action steps which may be taken. If a condition is encountered which cannot be resolved within the capabilities and experience of Unit Maintenance personnel, assistance should be requested from Direct Support Maintenance.

SYMPTOM INDEX

Table 3-3. Unit Troubleshooting Table

MALPUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE.

CAUTION

Liquid refrigerant will collect in the compressor during cold weather. Compressor damage can result if operated before it has warmed enough to boil the liquid out.

Step 1. Check that input power cable is connected to air conditioner and a source of 208 volt, 50/60 or 400 hertz, three phase power.

WARNING

VOLTAGES USED IN THIS EQUIPMENT CAN KILL.

The following test is conducted with the power on. Exercise extreme caution to avoid injury.

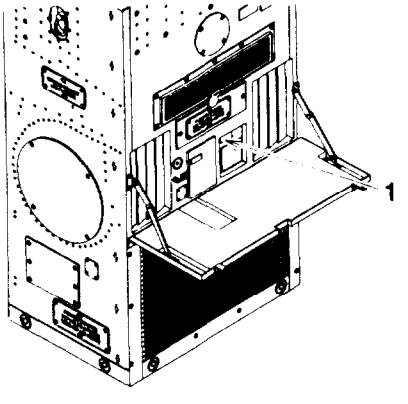
Connect input power cable to air conditioner and power source per paragraph 3-6. During cold weather, wait at least 30 minutes before operating in cooling mode.

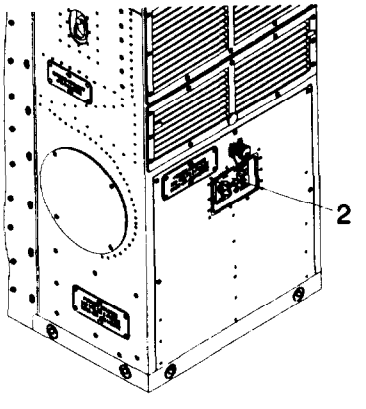
CAUTION

The circuit breaker will trip off if the unit draws excessive amperage. Equipment damage can result if the circuit breaker is repeatedly reset without correcting the cause of the excessive amp draw.

Step 2. Check to see if circuit breaker handle (1) has tripped to OFF position.

Move circuit breaker handle to ON position.





Step 3. Check to see if the control panel assembly (2) is loose.

Tighten the control panel assembly mounting screw.

Table *3-3. Unit Troubleshooting Table* - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

1. AIR CONDITIONER DOES NOT START IN ANY MODE. - Cont

Step 4. Test circuit breaker per paragraph 3-38.

If circuit breaker is defective, replace it per paragraph 3-38.

Step 5. Test EMI filters per paragraph 3-26.

If EMI filters are defective, replace them per paragraph 3-26.

Step 6. Test transformer per paragraph 3-31.

If transformer is defective, replace it per paragraph 3-31.

Step 7. Test rectifiers per paragraph 3-30.

If rectifiers are defective, replace them per paragraph 3-30.

Step 8. Inspect motor controller per paragraph 3-9.

If motor controller appears to be damaged, notify Direct Support Maintenance.

Step 9. Inspect logic box assembly per paragraph 3-9.

If logic box assembly appears to be damaged, notify Direct Support Maintenance.

Step 10. Test motor controller by observing if fault lights come on.

If the motor controller fails, no fault lights will be on, notify Direct Support Maintenance.

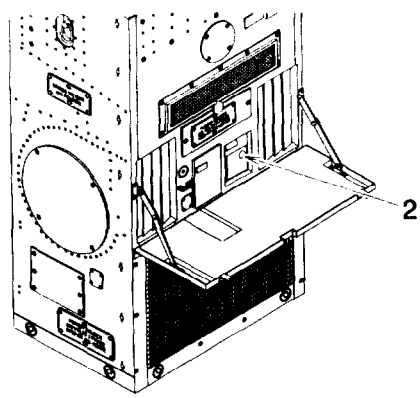
Step 11. Test logic box assembly by observing if fault lights come on.

If the logic box assembly fails, no fault lights will be on, notify Direct Support Maintenance.

2. COMPRESSOR DOES NOT START IN COOL MODE.

Step 1. Check that the potentiometer TEMPERATURE control (1) is in the COOL position.

Adjust the potentiometer TEMPERATURE control toward the COOL position.



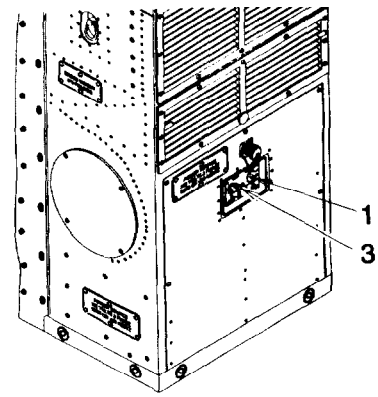


Table 3-3. Unit Troubleshooting Table - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

2. COMPRESSOR DOES NOT START IN COOL MODE. - Cont

CAUTION

If the high pressure cutout switch trips, it is an indication that the refrigerant system is operating with excessively high discharge pressure. Equipment damage can result if the cause of the excessive pressure is not corrected.

Step 2. Check to see if the HIGH PRESSure CUTOUT switch (2) has tripped.

Push and release to reset.

Step 3. Check if motor controller needs to be reset.

Turn MODE selector rotary switch (3) to OFF RESET, then back to COOL.

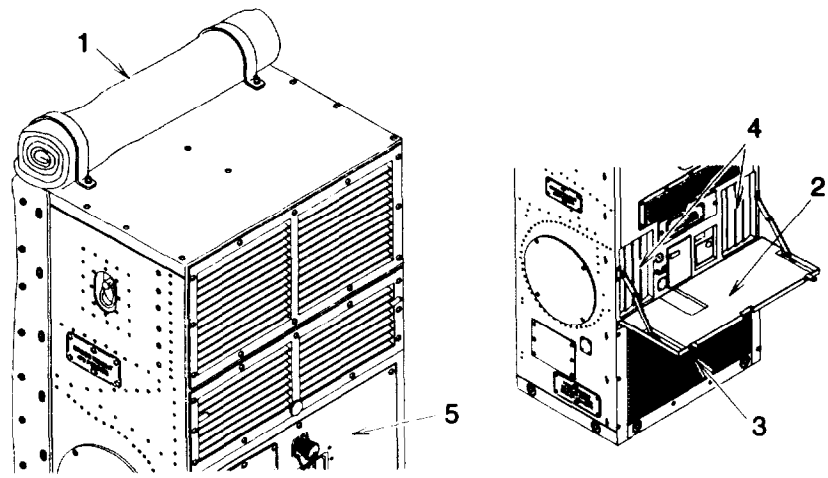
Step 4. Test the coil frost switch per paragraph 3-27.

If the coil frost switch is defective, ‘ replace it per paragraph 3-27.

3. COMPRESSOR STARTS NORMALLY, BUT HIGH PRESSURE CUTOUT SWITCH SOON TRIPS.

Step 1. Check to be sure the fabric cover (1) is rolled up and secured.

Roll up and secure the fabric cover per paragraph 2-7.



Step 2. Check to be sure the condenser discharge air deflector door (2) is open.

Open the condenser discharge air deflector door per paragraph 2-7.

Step 3. Check to be sure the condenser air inlet (3) and outlets (4) are not obstructed.

Remove obstructions.

Table 3-3. Unit Troubleshooting Table - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

3. COMPRESSOR STARTS NORMALLY, BUT HIGH PRESSURE CUTOUT SWITCH SOON TRIPS. - Cont

Step 4. Check to be sure the lower front panel (5) is not loose or missing.

Secure the lower front panel.

Step 5. Check to be sure condenser fan motor is operating when compressor starts (air should be coming out the condenser air outlet).

Test, and if necessary replace, the condenser fan motor per paragraph 3-37.

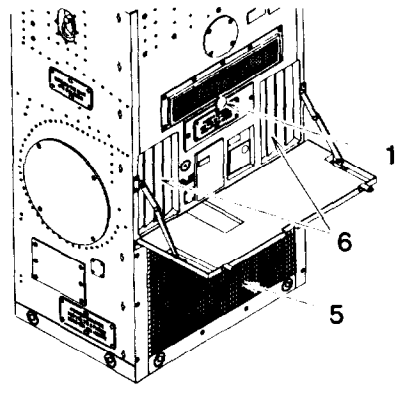
4. COOLING CAPACITY REDUCED.

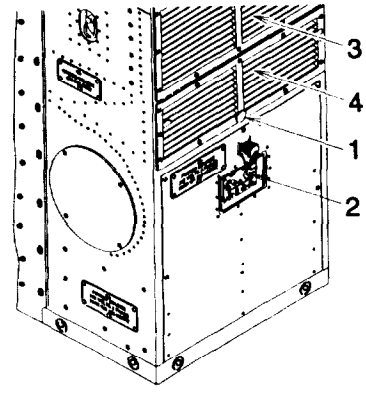
Step 2. Check that all doors, windows, and other openings in room or enclosure are tightly closed.

Tightly close all openings.

Step 2. Check that fresh air damper is not open.

Fully close fresh air damper by turning the control knob (1) to CLOSE. When condition improves, adjust as necessary.





Step 3. Check adjustment of the potentiometer TEMPERATURE control (2).

Adjust the potentiometer TEMPERATURE control fully toward the COOL position. When condition improves, adjust as necessary.

Step 4. Check that the evaporator air discharge (3) and return (4) grille louvers are fully open.

Fully open louvers.

Step 5. Check that the condenser air intake (5) and discharge (6) are not obstructed.

Remove obstruction.

Step 6. Test the equalizing solenoid valve coil per paragraph 3-39.

If the coil is defective, replace it per paragraph 3-39.

Table 3-3. Unit Troubleshooting Table - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

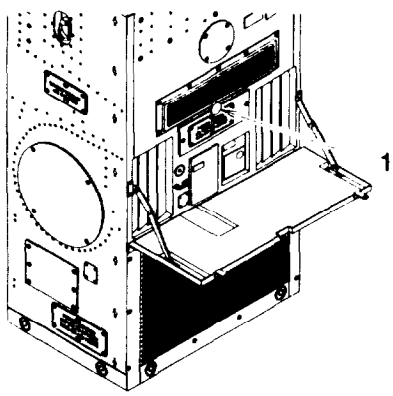
5. HEATING CAPACITY REDUCED.

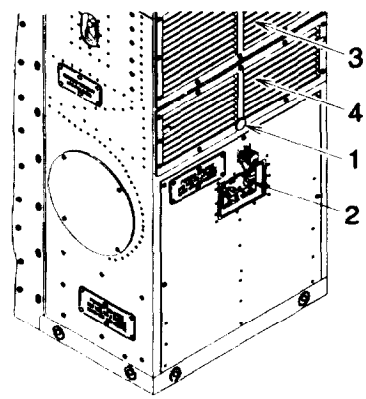
Step 1. Check that all doors, windows, and other openings in room or enclosure are tightly closed.

Tightly close all openings.

Step 2. Check that fresh air damper is not open.

Fully close fresh air damper by turning the control knob (1) to CLOSE. When condition improves, adjust as necessary.





Step 3. Check adjustment of the potentiometer TEMPERATURE control (2).

Adjust the potentiometer TEMPERATURE control fully toward the WARM position. When condition improves, adjust as necessary.

Step 4. Check that the evaporator air discharge (3) and return (4) grille louvers are fully open.

Fully open louvers.

Step 5. Test the heater elements per paragraph 3-36.

If any heater elements are defective, replace them per paragraph 3-36.

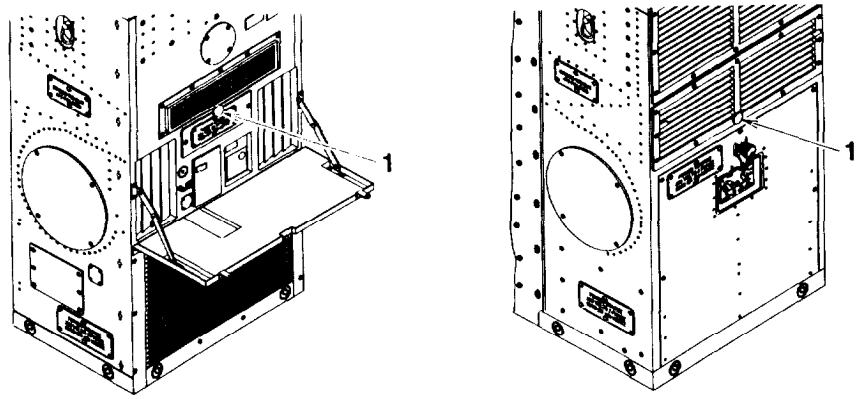
Table 3-3. Unit Troubleshooting Table - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

6. FRESH AIR DAMPER WILL NOT OPERATE.

Step 2. Check that control knob (1) is not loose.

Tighten the control knob.



Step 2. Check that the damper door hinges and control linkage are not damaged.

Repair or replace any damaged components per paragraph 3-18.

7. EVAPORATOR FAN MOTOR SHAFT DOES NOT TURN.

Step 1. Check to see if the shaft is bent.

If the shaft is bent, replace motor per paragraph 3-34.

Step 2. Check to see if the motor housing is cracked or damaged.

If the housing is damaged, replace motor per paragraph 3-34.

8. CONDENSER FAN MOTOR SHAFT DOES NOT TURN.

Step 1. Check to see if the shaft is bent.

If the shaft is bent, replace motor per paragraph 3-37.

Step 2. Check to see if the motor housing is cracked or damaged.

If the housing is damaged, replace motor per paragraph 3-37.

SECTION VI UNIT MAINTENANCE PROCEDURES

3-11. GENERAL. The procedures in this section have been arranged in the order in which the items appear in the unit (0) maintenance level column on the Maintenance Allocation Chart (MAC) which is provided in Appendix 8. Step-by-step procedures have been provided for all action authorized to be performed by Unit Maintenance in the order in which they appear on the MAC.

WARNING

Do not operate this unit with the panels/covers, screen/guard, and grilles removed or open unless the instructions tell you to. When this is necessary, do so with care to prevent personal injury.

3-12. FABRIC COVER REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Service Refrigeration Unit Tool Kit
(Item 1, Appendix 8)

a. *Removal*.

(1) If fabric cover (1) is rolled up, rotate two turnbutton fasteners (2), lift two straps (3), and roll cover down

(2) Remove 26 screws (4), flat washers (5), and fabric cover (1).

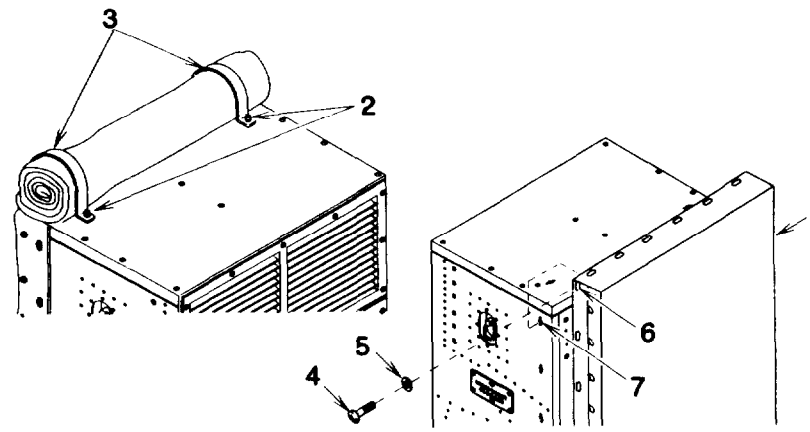


Figure 3-7. Fabric Cover

b. *Installation*

(1) Install fabric cover (1) and align the eyelets (6) with the mounting holes (7).

(2) Install 26 screws (4) and flat washers (5).

3-13. GRILLES REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Self Locking Nuts, Qty 2 (Item 15, Appendix G)

a. Removal.

(1) *Evaporator Air Discharge* Grille. Remove 12 screws (1) Figure 3-8, flat washers (2), and grille (3).

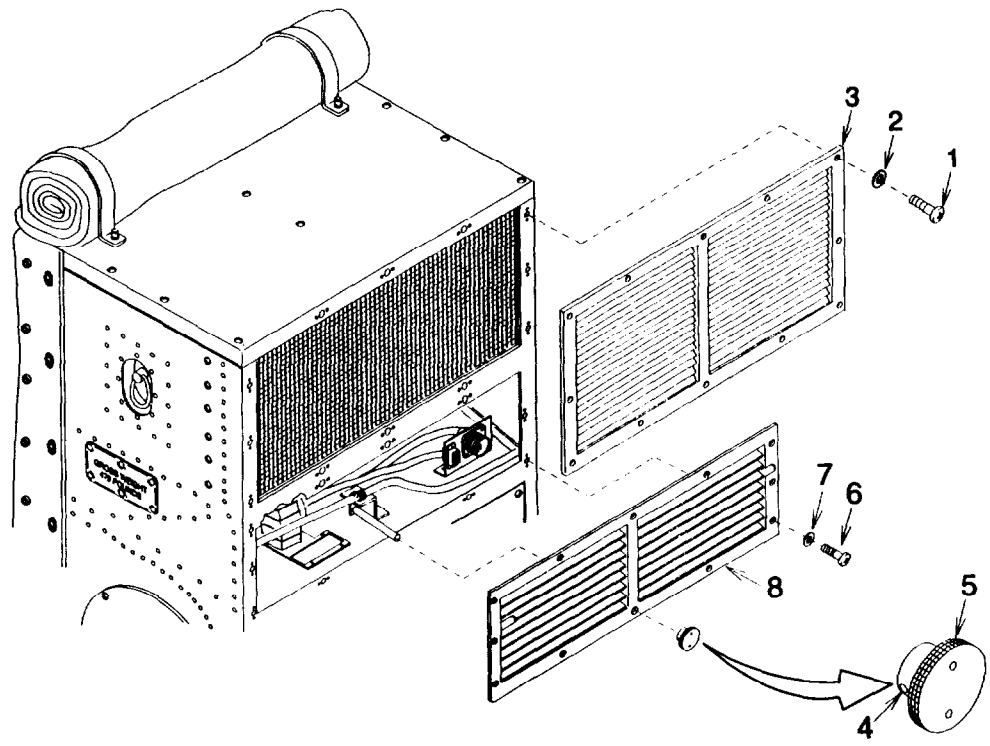


Figure 3-8. *Evaporator Air Return and Discharge Grilles*

(2) Evaporator Air Return Grille.

(a) Loosen setscrew (4) and remove knob (5).

(b) Remove 12 screws (6), flat washers (7), and grille (8).

3-13. GRILLES REPLACEMENT. (Cont)

(3) *Condenser Air Damper Vanes.*

(a) Remove actuating cylinder cover assembly. See paragraph 3-14.

(b) Remove four self locking nuts (1) Figure 3-9, and two screws (2). Discard self locking nuts.

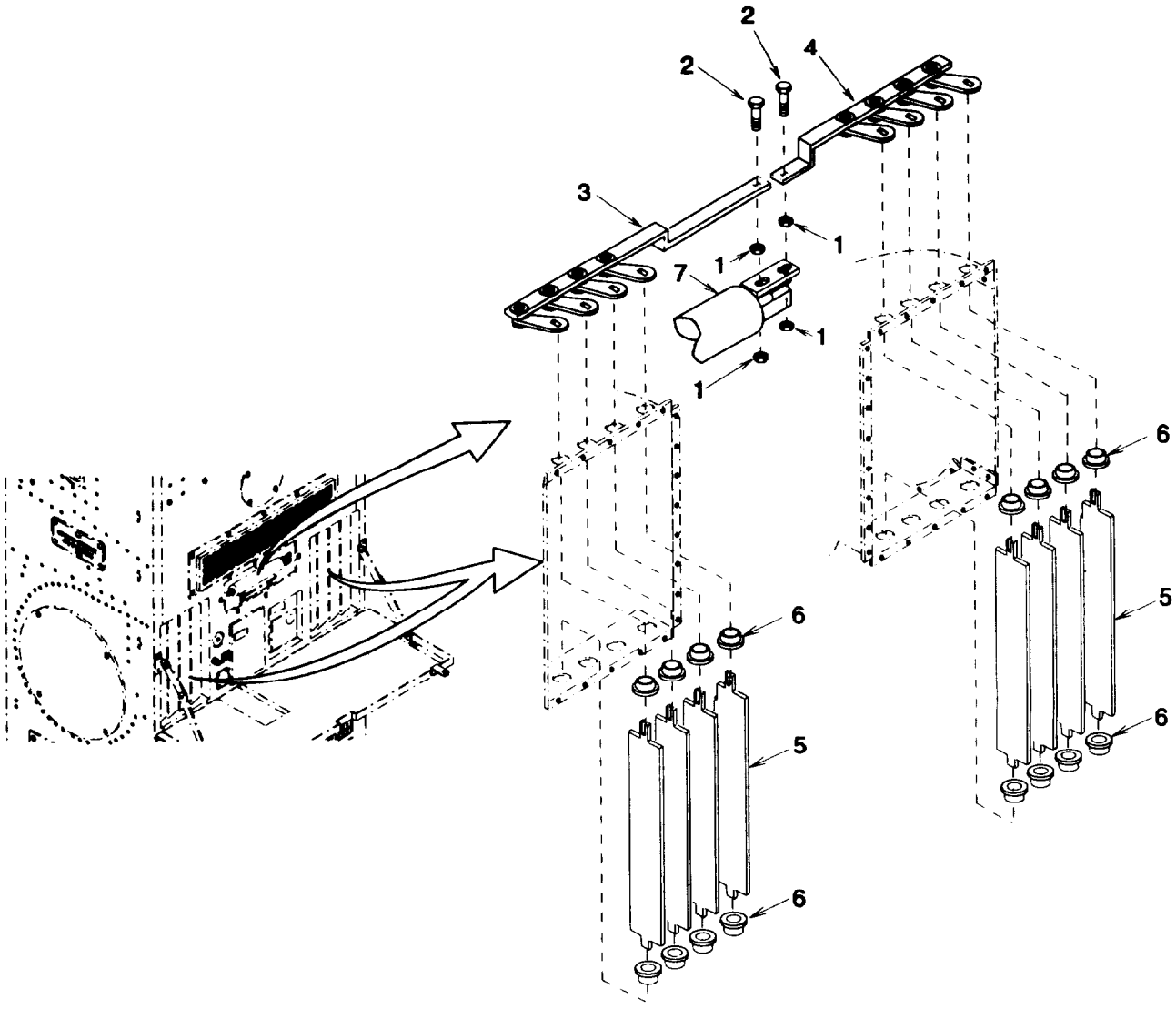


Figure 3-9. *Condenser Air Damper*

(c) Lift damper crank bells (3) and (4) to release shaft end of damper vanes (5).

(d) Carefully flex damper vane (5) enough to free it from the bottom bearing (6) and remove damper vane. Repeat for each damper vane.

(e) Remove 16 bearings (6).

b. *Installation.*

(1) *Evaporator Air Discharge Grille.* Install grille (3) Figure 3-8, 12 screws (1), and flat washers (2).

(2) *Evaporator Air Return Grille.*

(a) Install grille (8), 12 screws (6), and flat washers (7).

(b) Install knob (5) and tighten setscrew (4).

(3) *Condenser Air Damper Vanes.*

(a) Install 16 bearings (6) Figure 3-9.

(b) Insert the longer shaft end of damper vane (5) through the top bearing (6). Carefully flex damper vane enough to insert the short shaft end into the bottom bearing. Repeat for each damper vane.

(c) Install the damper crank bells (3) and (4). Press onto the damper vane (5) shafts.

(d) Move damper crank bells (3) and (4) to check for smooth movement of the damper vanes (5).

(e) Install two screws (2) and four new self locking nuts (1). Do not tighten self locking nuts.

NOTE

Damper crank bells must pivot freely on actuating cylinder to prevent binding when the damper vanes open and close.

(f) Check that damper vanes (5) are in the closed position. Tighten four self locking nuts (1) against actuating cylinder (7). Be sure damper crank bells (3) and (4) pivot freely on screws (2).

(g) Install actuating cylinder cover assembly. See paragraph 3-14.

3-14. PANELS/COVERS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 18 (Item 9, Appendix G)
Lock Washer (Item 6, Appendix G)
Lock Washer (Item 7, Appendix G)
Self Locking Nuts, Qty 8 (Item 21, Appendix G)

Equipment Conditions:

Unit in shutdown mode. gee para 2-7.
Power cable disconnected from input power connector. See para 3-6.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

a. Removal

(1) NBC Duct Cover.

(a) Roll up and secure fabric cover. See paragraph 2-7.

(b) Remove four screws (1) Figure 3-10, flat washers (2), and cover (3).

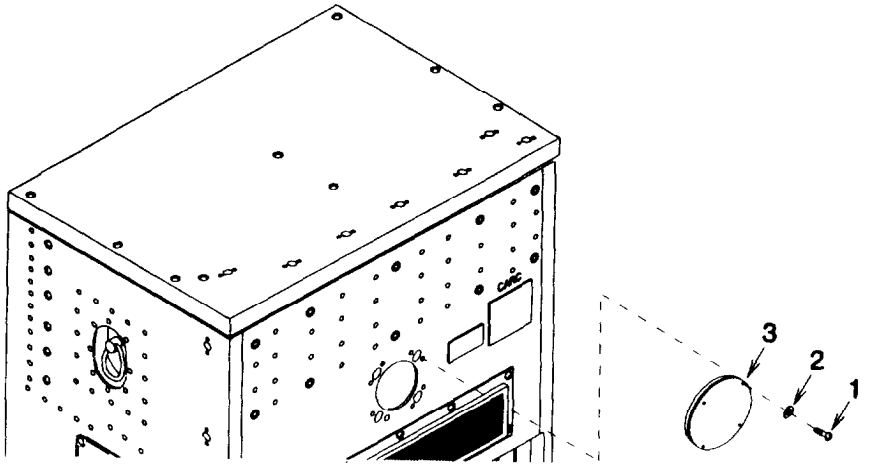


Figure 3-10. NBC Duct Cover

(2) Actuating Cylinder Cover Assembly.

(a) Roll up and secure fabric cover. See paragraph 2-7.

(b) Loosen two turnlock fasteners (1) Figure 3-11 and open condenser discharge air deflector door (2).

(c) Remove eight screws (3), lock washers (4), flat washers (5), and cover (6). Discard lock washers.

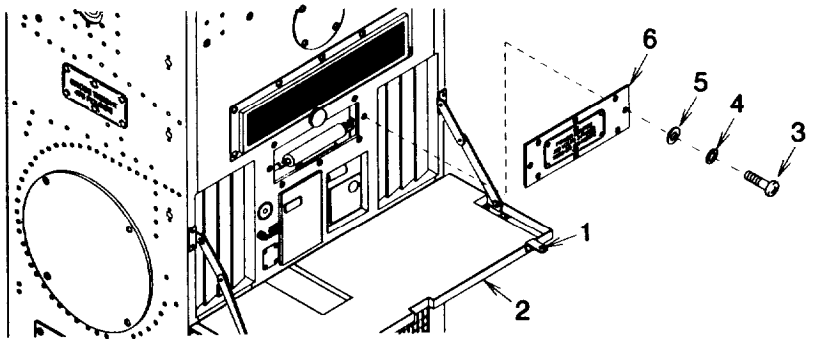


Figure 3-11. Actuating Cylinder Cover Assembly

(3) Service Valve Cover.

(a) Roll up and secure fabric cover. See paragraph 2-7.

(b) Loosen two turnlock fasteners (1) Figure 3-12 and open condenser discharge air deflector door (2).

(c) Remove six screws (3), lock washers (4), flat washers (5), and cover (6). Discard lock washers.

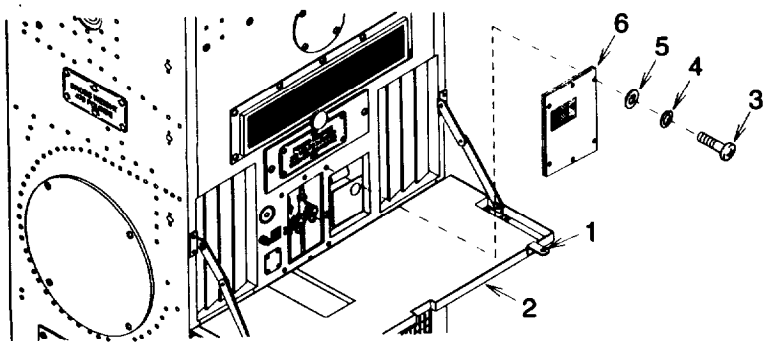


Figure 3-12. Service Valve Cover

3-14. PANELS/COVERS REPLACEMENT. (Cont)

(4) Connector Cover Plates.

(a) Remove lower front panel per step a., (7).

NOTE

The unit can have as many as three connector cover plates, the following procedure applies to each one individually.

Remove four self locking nuts (1) Figure 3-13, screws (2), and cover (3). Discard self locking nuts.

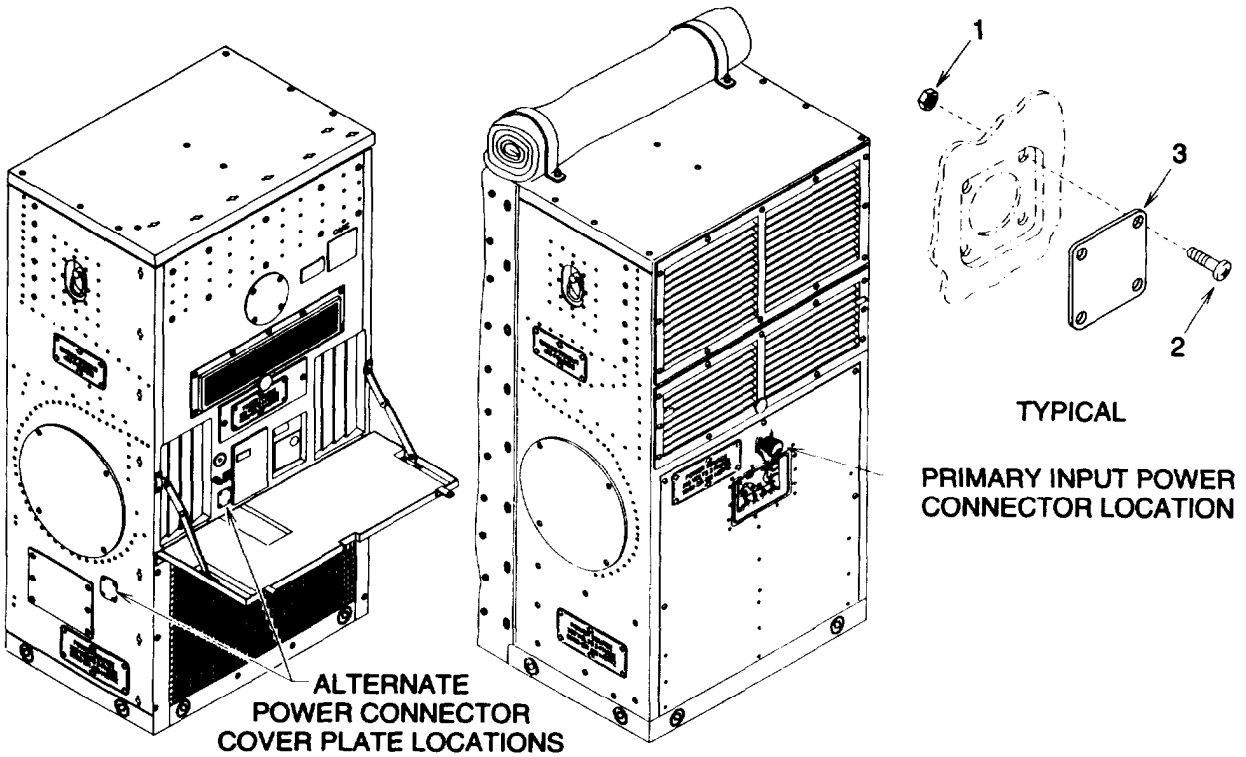


Figure 3-13. Connector Cover Plates

(5) *Condenser Fun Covers.* Remove four screws (1) Figure 3-14, flat washers (2), and cover (3). Repeat for second cover.

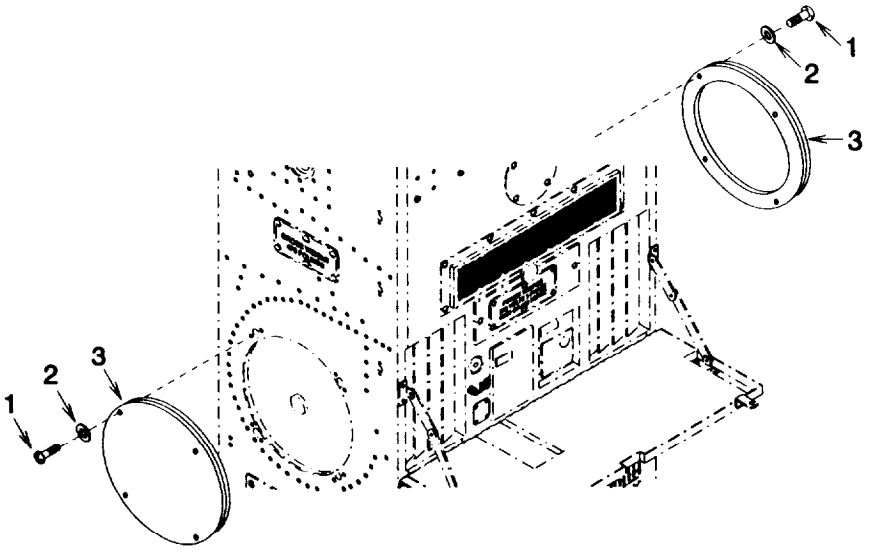


Figure 3-14. *Condenser Fan Covers*

3-14. PANELS/COVERS REPLACEMENT. (Cont)

(6) Top Panel.

(a) Remove fabric cover. See paragraph 3-12.

(b) Remove evaporator air discharge grille. See paragraph 3-13.

(c) Remove 11 screws (1) Figure 3-15 and flat washers (2).

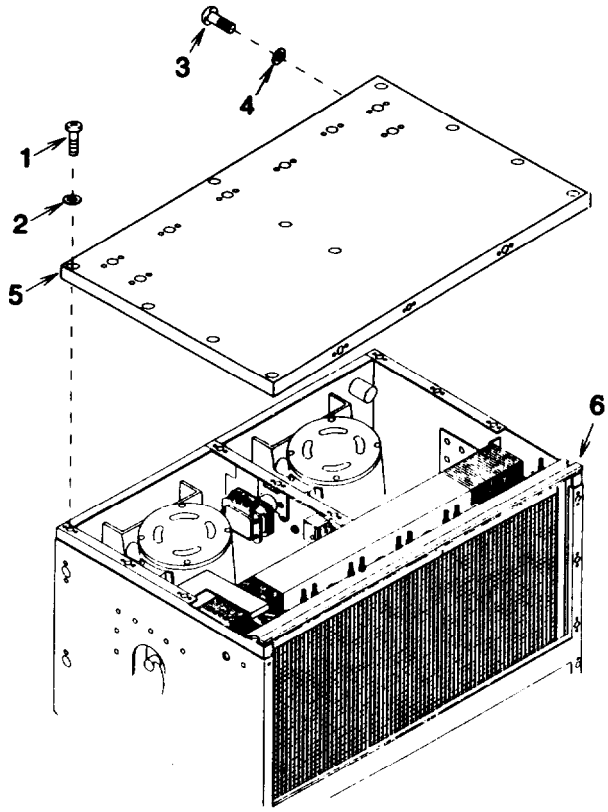


Figure 3-15. Top Panel

(d) Remove seven screws (3), flat washers (4), and cover (5).

(7) Lower Front Panel.

(a) Remove screw (1) Figure 3-16, lock washer (2), and flat washer (3). Discard lock washer.

(b) Remove screw (4), lock washer (5), and flat washer (6). Discard lock washer.

(c) Loosen seven captive screws (7) and remove cover (8).

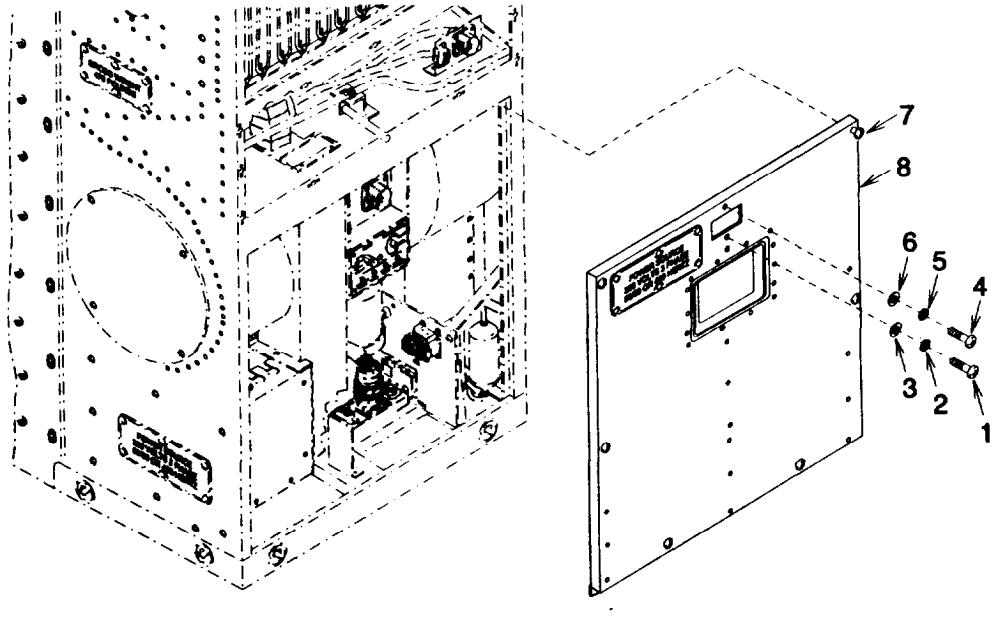


Figure 3-16. Lower Front Panel

3-14. PANELS/COVERS REPLACEMENT. (Cont)

(8) *Condenser Discharge Air Deflector Door.*

(a) Roll up and secure fabric cover. See paragraph 2-7.

(b) Loosen turnlock fasteners (1) Figure 3-17 and open door (2).

(c) Remove four screws (3), lock washers (4), flat washers (5), and spacer plate (6). Discard lock washers.

(d) Remove four screws (7) and door (2).

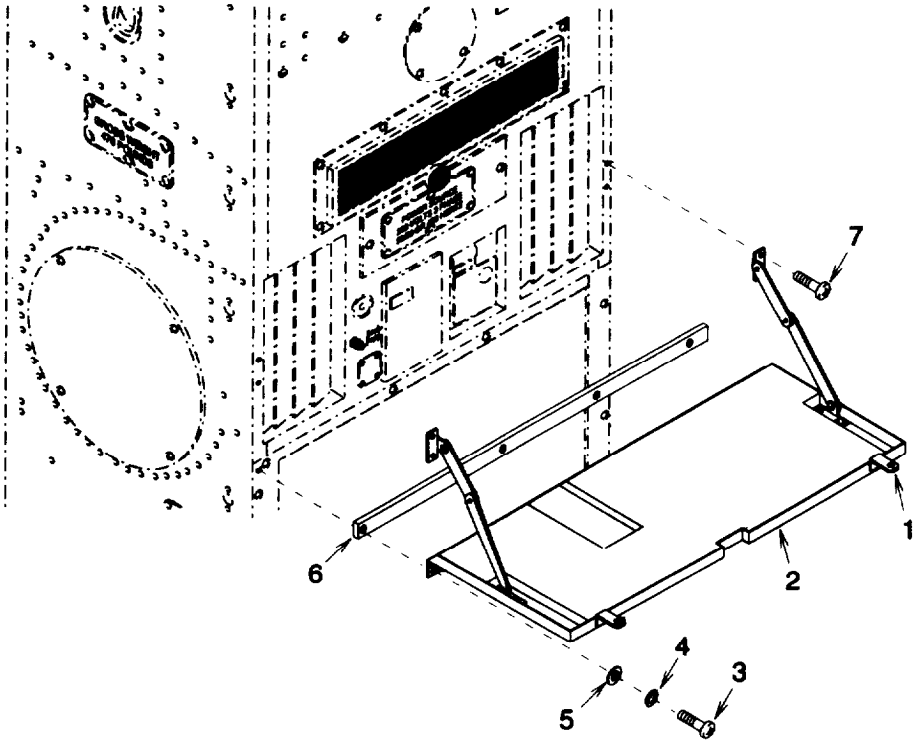


Figure 3-17. Condenser *Discharge Air Deflector Door*

b. Installation

(1) NBC Duct Cover.

(a) Install cover (3) Figure 3-10, four screws (1), and flat washers (2).

(b) Roll up and secure fabric cover. See paragraph 2-7.

(2) *Actuating Cylinder Cover Assembly.*

(a) Install cover (6) Figure 3-11, eight screws (3), new lock washers (4), and flat washers (5).

(b) Close condenser discharge air deflector door (2) and tighten two turnlock fasteners (1).

(c) Roll down and secure fabric cover. See paragraph 2-7.

(3) Service Valve Cover

(a) Install cover (6) Figure 3-12, six screws (3), new lock washers (4), and flat washers (5).

(b) Close condenser discharge air deflector door (2) and tighten two turnlock fasteners (1).

(c) Roll down and secure fabric cover. See paragraph 2-7.

(4) *Connector Cover Plates.*

NOTE

The unit can have as many as three connector cover plates, the following procedure applies to each one individually.

(a) Install cover (3) Figure 3-13, four screws (2), and new self locking nuts (1).

(b) Install lower front panel per step b., (7).

(5) *Condenser Fan Covers.* Install cover (3) Figure 3-14, four screws (1), and flat washers (2). Repeat for second cover.

(6) Top Panel.

(a) Be sure mist eliminator bracket (6) Figure 3-15 end notches are aligned over mounting holes and carefully install cover (5).

(b) Install seven screws (3) and flat washers (4).

(c) Install 11 screws (1) and flat washers (2).

(d) Install evaporator air discharge grille. See paragraph 3-13.

(e) Install fabric cover. See paragraph 3-12.

(7) Lower Front Panel.

(a) Install cover (8) Figure 3-16 and tighten seven captive screws (7).

(b) Install screw (4), new lock washer (5), and flat washer (6).

(c) Install screw (1), new lock washer (2), and flat washer (3).

3-14. PANELS/COVERS REPLACEMENT. (Cont)

(8) Condenser Discharge Air Deflector Door.

(a) Install door (2) Figure 3-17 and four screws (7).

(b) Install spacer plate (6), four screws (3), new lock washers (4), and flat washers (5).

(c) Roll down and secure fabric cover. See paragraph 2-7.

CAUTION

The air conditioner motor controller creates a momentary short circuit when power is applied to it. Damage to the connector and power cable pins can result if it is not isolated when the power cable is Connected.

NOTE

FOLLOW-ON MAINTENANCE:
Connect power cable to input power connector. See para 3-6.
Return unit to desired operating mode. See para 2-7.

3-15. SCREEN/GUARD REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 9 (Item 9, Appendix G)

Equipment Conditions:

Condenser discharge air deflector door removed from unit. See para 3-14.
Fabric cover removed from air conditioner. See para 3-12.

a. Removal. Remove five screws (1), lock washers (2), flat washers (3), and condenser coil guard (4). Discard lock washers.

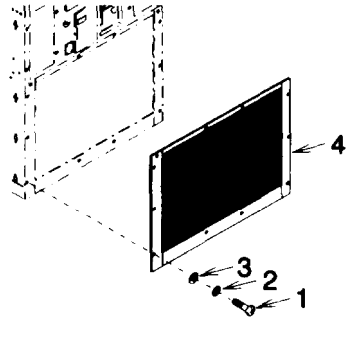


Figure 3-18. Screen/Guard

b. *Installation* Install condenser coil guard (4), five screws (1), new lock washers (2), and flat washers (3).

NOTE

FOLLOW-ON MAINTENANCE:
Install condenser discharge air deflector door. See para 3-14.
Install fabric cover. See para 3-12.

3-16. AIR FILTERS REPLACEMENT.

This task *covers:* a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 7 (Item 9, Appendix G)
Lock Washers, Qty 5 (Item 8, Appendix G)

Equipment Conditions:

Unit in shutdown mode. See para 2-7.
Power cable disconnected from input power connector. See para 2-7.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

a. *Removal.*

(1) *Fresh Air Filter.*

(a) Roll up and secure fabric cover. See paragraph 3-12.

(b) Remove five screws (1) Figure 3-19, lock washers (2), and flat washers (3). Discard lock washers.

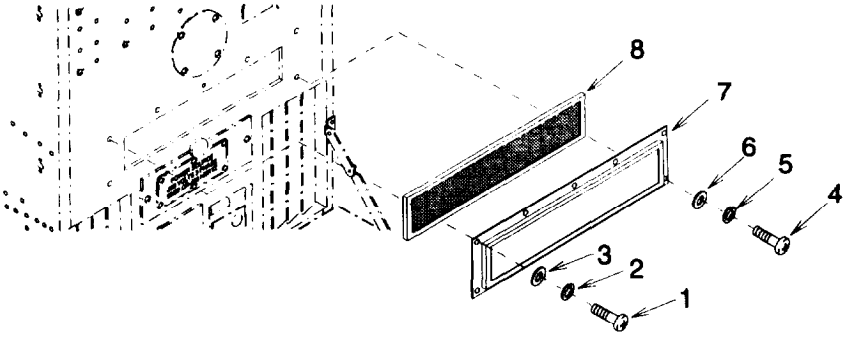


Figure 3-19. Fresh Air Filter

3-16. AIR FILTERS REPLACEMENT. (Cont)

(c) Remove two screws (4), lock washers (5), flat washers (6), filter frame (7), and air filter element (8). Discard lock washers.

(2) Conditioned Air Filter.

(a) Remove evaporator air return grille. See paragraph 3-13.

(b) Remove five screws (1) Figure 3-20, lock washers (2), flat washers (3), upper filter support (4), and conditioned air filter (5). Discard lock washers.

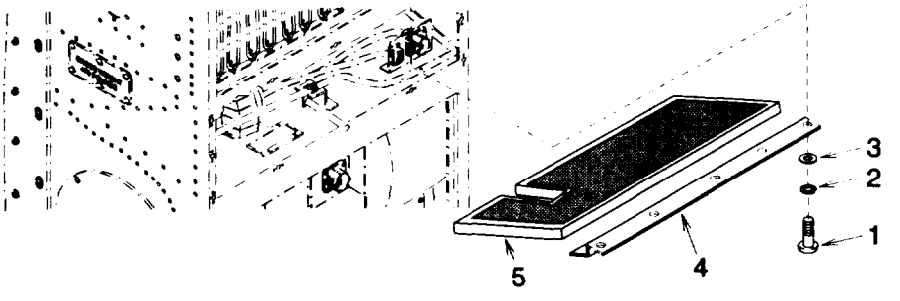


Figure 3-20. Conditioned Air Filter

b. Installation

(1) *Fresh Air Filter*

(a) Install air filter element (8) Figure 3-19, filter frame (7), two screws (4), new lock washers (5), and flat washers (6).

(b) Install five screws (1), new lock washers (2), and flat washers (3).

(c) Roll down and secure fabric cover. See paragraph 3-12.

(2) Conditioned Air Filter.

(a) Install conditioned air filter (5) Figure 3-20, upper filter support (4), five screws (l), new lock washers (2), and flat washers (3).

(b) Install evaporator air return grille. See paragraph 3-13.

CAUTION

The air conditioner motor controller creates a momentary short circuit when power is applied to it. Damage to the connector and power cable pins can result if it is not isolated when the power cable is Connected.

NOTE

FOLLOW-ON MAINTENANCE:
Connect power cable to input power connector. See para 3-6.
Return unit to desired operating mode. See para 2-7.

3-17. MIST ELIMINATOR REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Equipment Conditions:

Top panel removed from unit. See para 3-14.

a. Removal. Remove bracket (1) and mist eliminator (2).

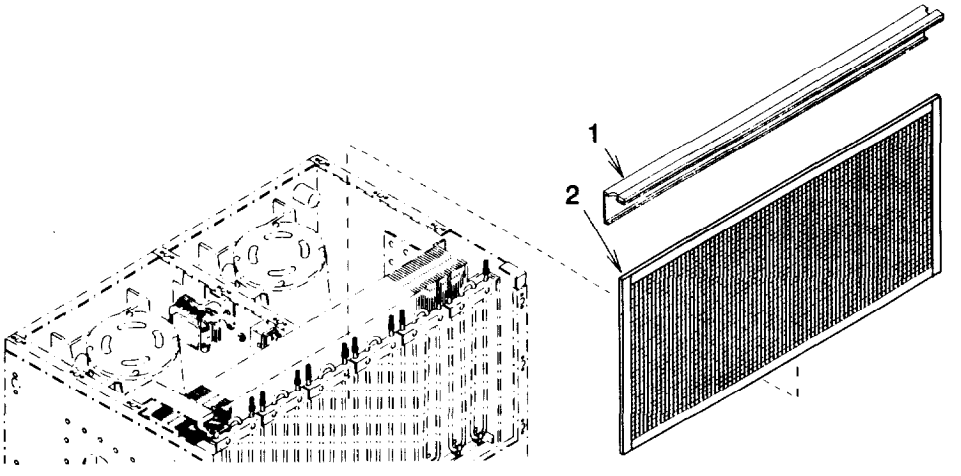


Figure 3-21. Mist Eliminator

b. *Installation.* Install mist eliminator (2) and bracket (1).

NOTE

FOLLOW-ON MAINTENANCE:
Install top panel. See para 3-14.

3-18. FRESH AIR DAMPER REPAIR AND REPLACEMENT.

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

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B),
Drive Pin Punch Set (Item 2, Appendix B)

Equipment Conditions

Air filters removed from unit. See para 3-16.

Materials/Parts

Self Locking Nuts, Qty 3 (Item 25, Appendix G),
Self Locking Nuts, Qty 6 (Item 15, Appendix G),
Spring Washers, Qty 4 (Item 22, Appendix G),
Spring Pin (Item 23, Appendix G),
Drive Screws, Qty 2 (Item 24, Appendix G)

a. *Removal*

(1) *Panel/Cover.*

(a) Be sure fresh air damper is closed. Rotate knob (1) Figure 3-22 in CLOSE direction if necessary.

(b) Remove 20 screws (2) and two covers (3).

(c) Remove eight screws (4).

(d) Remove self locking nut (5), flat washer (6), screw (7), bushing (8), and panel (9). Discard self locking nut.

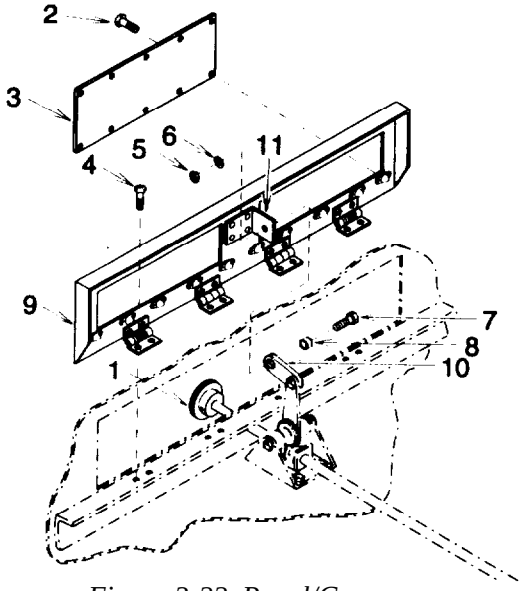


Figure 3-22. Panel/Cover

(2) Rod. Arm. and Worm Gear.

(a) *Remove Actuator Mounting Bracket Panel.*

1 Remove actuating cylinder cover. See paragraph 3-14.

2 Remove and discard two self locking nuts (1) Figure 3-23.

CAUTION

Be careful when moving refrigerant tubing, a kink or any other damage can result in a leak or reduced refrigerant flow. Loosening refrigerant tubing will result in loss of charge.

3 Remove two nuts (2) and carefully pull the actuating linear cylinder (3) out of the air conditioner as far as the refrigerant tubing will allow. Do not disconnect refrigerant tubing.

4 Remove eight screws (4) and panel (5).

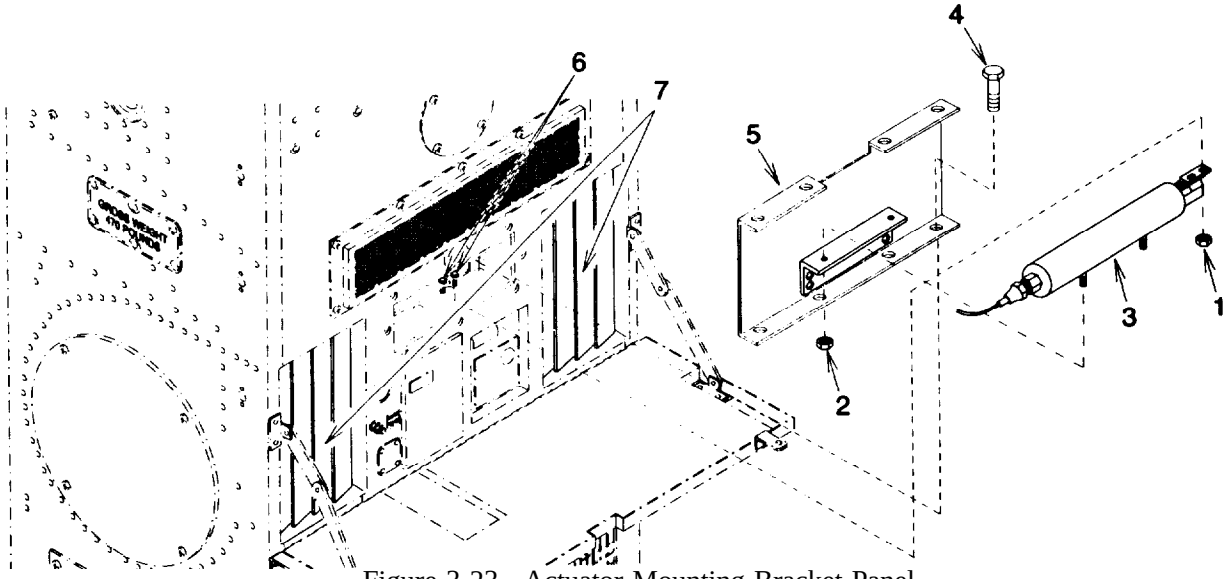


Figure 3-23. Actuator Mounting Bracket Panel

3-18. FRESH AIR DAMPER REPAIR AND REPLACEMENT. (Cont)

(b) Remove Rod. Arm. and Worm Gear.

1 Loosen setscrew (1) Figure 3-24 and remove extension rod (2).

2 Loosen setscrew (3) and remove knob (4).

3 Remove four self locking nuts (5), screws (6), and flat washers (7). Discard self locking nuts.

4 Working through the fresh air damper panel opening, push the rod, arm and worm gear assembly (8) into the air conditioner, then raise and pull it out of bracket (9) and through the fresh air damper panel opening.

5 Remove grommet (10).

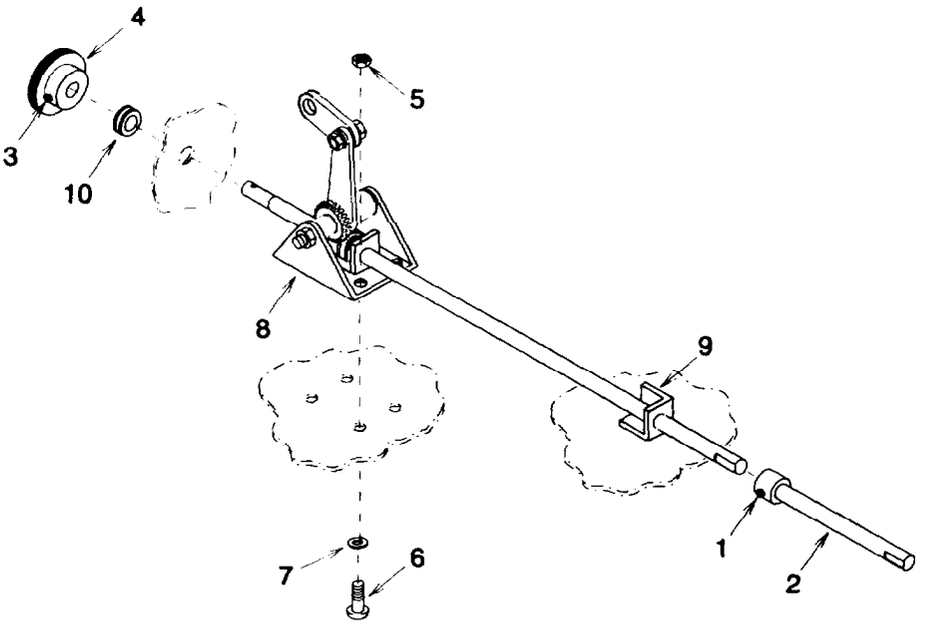


Figure 3-24 Rod, Arm, and Worm Gear

b. Disassembly.

(1) Rod, Arm, and Worm Gear Assembly.

(a) Remove self locking nut (1) Figure 3-25, flat washer (2), screw (3), bushing (4), and arm (5). Discard self locking nut.

(b) Remove self locking nut (6), flat washer (7), screw (8), two spacers (9), two spring washers (10), and arm (11) assembly. Discard self locking nut and spring washers.

(c) Remove screw (12), worm wheel gear (13), and lock washer (14). Discard lock washer.

(d) Remove setscrew (15) from extension rod (16).

e) Remove spring pin (17), rod (18), two spring washers (19), two flat washers (20), and worm gear (21). Discard spring pin and spring washers.

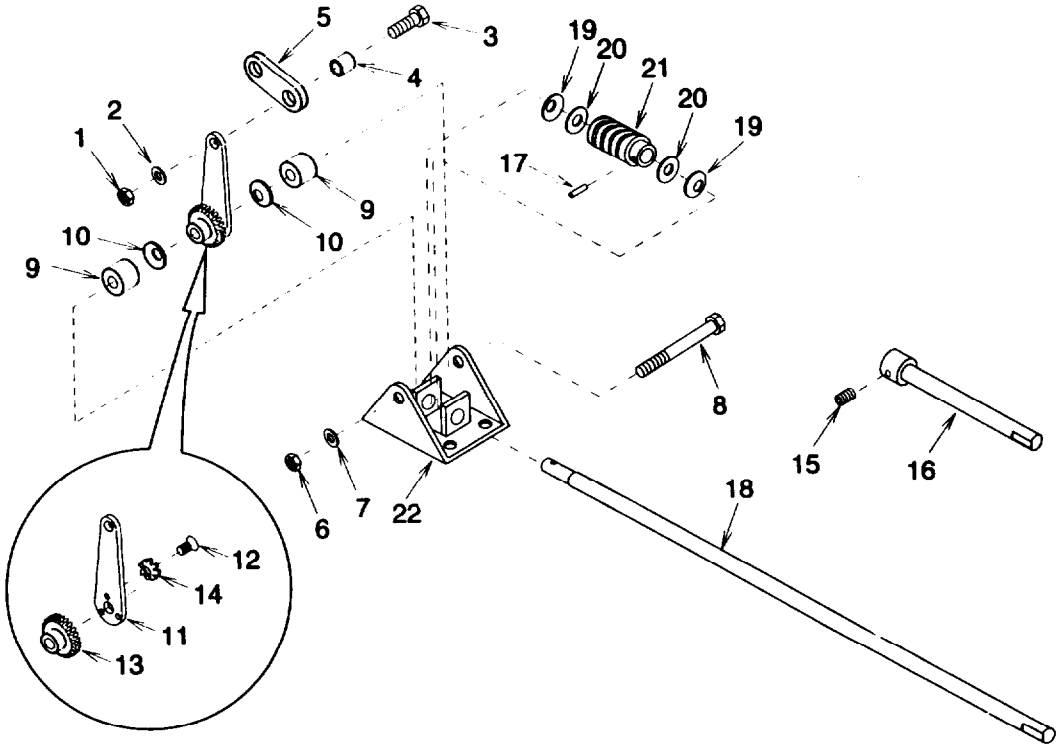


Figure 3-25. Rod, Arm, and Worm Gear Assembly

3-18. FRESH AIR DAMPER REPAIR AND REPLACEMENT. (Cont)

(2) Knob Assembly

NOTE

The following procedures are typical for both knob assemblies.

(a) Remove setscrew (1) Figure 3-26.

(b) Remove two drive screws (2) and information plate (3). Discard drive screws.

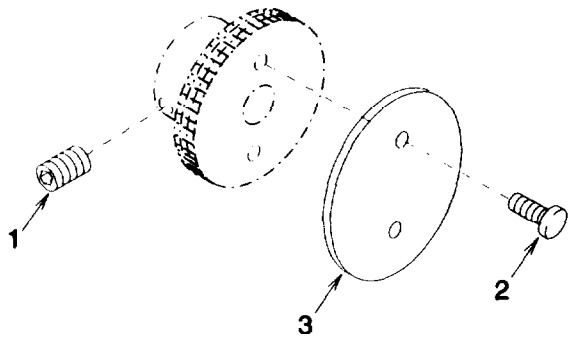


Figure 3-26. Knob Assembly

c. *Repair.* Repair is by replacement of damaged or missing components only.

d. *Assembly.*

(1) *Rod. Arm. and Worm Gear Assembly.*

(a) Insert rod (18) Figure 3-25 into first support on bracket (22).

NOTE

Install the following components onto the rod in the order given.

(b) Install new spring washer (19), flat washer (20), worm gear (21), a second flat washer, and a second new spring washer. Push rod (18) through bracket (22) supports as needed while installing the components.

(c) Align the holes in worm gear (21) with the hole in rod (18) and install a new spring pin (17).

(d) Install setscrew (15) into extension rod (16).

(e) Install worm wheel gear (13), new lock washer (14), and screw (12) onto arm (11).

(f) Insert screw (8) into hole in one side of bracket (22).

CAUTION

Over tightening the retaining hardware can cause binding of the assembly and affect operation of the equipment.

NOTE

Install the following components onto the screw in the order given.

(g) Install spacer (9), new spring washer (10), arm (11) assembly, a second spring washer, a second spacer, flat washer (7), and new self locking nut (6). Push screw (8) through bracket (22) holes as needed while installing the components. Tighten only as needed to begin compressing the spring washers.

CAUTION

Over tightening the retaining hardware can cause binding of the assembly and affect operation of the equipment.

(h) Install screw (3), bushing (4), arm (5), flat washer (2), and new self locking nut (1). Tighten only as needed to secure the components and still allow free movement of the arm.

(2) *Knob Assembly.*

NOTE

The following procedures are typical for both knob assemblies.

(a) Install information plate (3) Figure 3-26 and two new drive screws (2).

(b) Install setscrew (1).

e. Installation

(1) Rod, Arm, and Worm Gear.

(a) *Install Rod. Arm.* and Worm Gear.

1 Install grommet (10) Figure 3-24.

2 Install the rod, arm, and worm gear assembly (8) through the fresh air damper panel opening and insert the rod into the bracket (9) hole. Lower the rod, arm, and worm gear assembly and insert the rod through the grommet (10).

3 Align rod, arm, and worm gear assembly (8) mounting holes and install four screws (6), flat washers (7), and new self locking nuts (5).

4 Install knob (4) and tighten setscrew (3).

5 Install extension rod (2) and tighten setscrew (1).

3-18. FRESH AIR DAMPER REPAIR AND REPLACEMENT. (Cont)

(b) *Install Actuator Mounting Bracket Panel.*

1 Install panel (5) Figure 3-23 and eight screws (4).

CAUTION

Be careful when moving refrigerant tubing, a kink or any other damage can result in a leak or reduced refrigerant flow.

2 Carefully insert the actuating linear cylinder (3) and place on panel (5). Install two nuts (2).

3 Place damper arms (6) onto actuating linear cylinder (3) and install two new self locking nuts (1). Do not tighten self locking nuts.

4 Check that damper vanes (7) are in the closed position. Tighten two self locking nuts (1).

5 Install actuating cylinder cover. See paragraph 3-14.

(2) Panel/Cover.

(a) Be sure fresh air damper is in open position. Rotate knob (1) Figure 3-22 in OPEN direction if necessary.

(b) Install panel (9) and eight screws (4).

CAUTION

Over tightening the retaining hardware can cause binding of the assembly and affect operation of the equipment.

(c) Adjust the fresh air damper knob (1) in CLOSE direction to align holes in arm (10) and bracket (11). Install screw (7), bushing (8), flat washer (6), and new self locking nut (5). Tighten only as needed to secure the components and still allow free movement of the arm and bracket.

(d) Install two covers (3) and 20 screws (2).

NOTE

FOLLOW-ON MAINTENANCE:
Install air filters. See para 3-16.

3-19. ELECTRICAL WIRING REPAIR - GENERAL.

This task covers: Repair

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Heat Gun (Item 4, Appendix B)
Electrical Repair (Item 9, Appendix B)

Materials/Parts

Wire (As Required)
Insulation Sleeving (Heat Shrink Tubing) (Figure F-6, Appendix F)
Solder (Item 6, Appendix E)
Flux (Item 5, Appendix E)

Equipment Conditions.

Power disconnected at source.

Repair.

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 burns.

(1) 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 to the point at which the solder will melt completely and flow into all parts of the joint. Excessive build-up of solder "gobs" on the joint should be avoided or removed.

(2) Insulating Joints. The preferred method of insulating electrical joints is by the use of heat-shrink tubing. To apply, cut a piece of heat-shrink tubing of suitable diameter to a length of 1 inch (2.5 cm) for covering joints at terminals or connectors, or to a length about 1/2 inch (1.3 cm) longer than the joint to be insulated. Slide the tubing over the wire before making the joint. After the joint is made, slide the tubing so that it covers the joint, and shrink in place with moderate heat.

(3) Splicing Wires. To repair broken or cut wires that are otherwise sound, the mating ends can be stripped and spliced. Solder and apply insulation as described above.

(4) Crimping Terminals. To install a terminal on the end of a wire, strip 1/4 -1/2 inch (0.6-1.3 cm) of insulation from the end of the wire and apply a one-inch (2.5 cm) piece of heat-shrink tubing (if the terminals are of the uninsulated type). Insert wire-end into the shank of the terminal. Crimp the shank and install heat-shrink tubing, if necessary.

NOTE

Preferred repair methods consist of replacing wires, terminals, connectors, etc., rather than splicing wires, bending ends to form terminals, and other make-shift procedures, although the latter may be appropriate for emergency field repairs.

(5) Determine the proper size and length of wire, or the terminal, or connector to be used for replacement by referring to Table 3-4, wire list, and to the wiring diagram Figure 3-5.

3-19. ELECTRICAL WIRING REPAIR - GENERAL. (Cont)

Table 3-4. Wire List

Termination		Termination		AWG Wire	Length	
From	Terminal Type	To	Terminal Type	Size	IN.	CM
		Wiring Harness, Control Panel				
P6-1	M24308/4-303	R1-3		22	8.0	20.3
P6-2	M24308/4-303	DS1-4A		22	4.2	10.7
P6-3	M24308/4-303	S1-C1		22	6.0	15.5
P6-4	M24308/4-303	DS1-C		22	4.9	12.5
P6-5	M24308/4-303	S1-2		22	6.0	15.3
P6-6	M24308/4-303	S1-4		22	6.0	15.3
P6-7	M24308/4-303	S1-3		22	6.0	15.3
P68	M24308/4-303	S1-1		22	6.0	15.3
P6-9	M24308/4-303	DS2-C		22	5.2	13.2
P6-10	M24308/4-303	DS3-C		22	4.2	10.7
P6-11	M24308/4-303	DS4-C		22	6.2	15.8
P6-12	M24308/4-303	R1-2		22	8.0	20.3
		Lead Electrical				
E3	MS25036-112	TB2-5	MS25036-112	10	10.0	25.4
L1-1	13216E6191-2	CR-2	13216E6191-2	16	24.0	61.0
L1-2	13216E6191-2	CR4-3	13216E6191-2	16	24.0	61.0
S2-2	13216E6191-2	56-1	MS25036-153	16	44.0	111.8
E1	MS25036-114	E2	MS25036-157	10	14.0	35.6
T1-3		CR1-1		16	8.0	20.3
T1-4		CR1-3		16	7.5	19.1
T1-1		TB2-1	MS25036-154	16	10.0	25.4
T1-2		TB2-2	MS25036-154	16	10.5	26.7
CR1-2 (+)		K1-X1	MS25036-153	16	70.0	177.8
CR1-2 (+)		K2-X1	MS25036-153	16	3.5	8.9
K1-A2	MS25036-108	HR1-A	MS25036-108	14	58.5	148.6
Kl-A2	MS25036-108	HR6-A	MS25036-108	14	30.5	77.5
K1-B2	MS25036-108	HR2-A	MS25036-108	14	52.8	134.1
K1-B2	MS25036-108	HR5-A	MS25036-108	14	36.3	92.2
K1-C2	MS25036-108	HR3-A	MS25036-108	14	47.0	119.4
K1-C2	MS25036-108	HR4-A	MS25036-108	14	42.0	106.7
TB2-2	MS25036-108	HR8-B	MS25036-108	16	40.0	101.6
HR1-B	MS25036-108	HR6-B	MS25036-108	14	27.0	68.6
HR2-B	MS25036-108	HR5-B	MS25036-108	14	17.0	43.2
HR3-B	MS25036-108	HR4-B	MS25036-108	14	6.0	15.5
E2	MS25036-157	E3	MS25036-112	10	32.0	81.3
E2	MS25036-157	E4	MS25036-112	10	24.0	61.0
S5-1	MS25036-153	S3-2	13230E5288-2	14	75.0	190.5
HR8-C	MS25036-108	HR8-D	MS25036-108	16	3.0	7.6
HR6-B	MS25036-108	HR5-B	MS25036-108	14	6.0	15.5
HR2-B	MS25036-108	HR3-B	MS25036-108	14	6.0	15.5
K2-A2	MS25036-108	CR4-1	13216E6191-2	16	11.5	29.2
K2-B2	MS25036-108	CR4-4	13216E6191-2	16	12.5	31.8

Table 3-4. Wire List - Cont

Termination		Termination		AWG Wire	Length	
From	Terminal Type	To	Terminal Type	Size	IN.	CM
		Wiring Harness, P6A-J13				
*Make From Shielded Multiconductor Cable (97403) 13229E4286						
P6A-1	M24308/4-436	J13-1	M24308/2-2	*	52.0	132.1
P6A-2	M24308/4-436	J13-2	M24308/2-2	*	52.0	132.1
P6A-3	M24308/4-436	J13-3	M24308/2-2	*	52.0	132.1
P6A-4	M24308/4-436	J13-4	M24308/2-2	*	52.0	132.1
P6A-5	M24308/4-436	J13-5	M24308/2-2	*	52.0	132.1
P6A-6	M24308/4-436	J13-6	M24308/2-2	*	52.0	132.1
P6A-7	M24308/4-436	J13-7	M24308/2-2	*	52.0	132.1
P6A-8	M24308/4-436	J13-8	M24308/2-2	*	52.0	132.1
P6A-9	M24308/4-436	J13-9	M24308/2-2	*	52.0	132.1
P6A-10	M24308/4-436	J13-10	M24308/2-2	*	52.0	132.1
P6A-11	M24308/4-436	J13-11	M24308/2-2	*	52.0	132.1
P6A-12	M24308/4-436	J13-12	M24308/2-2	*	52.0	132.1
SHIELD		GND	MS25036-148	20	4.0	10.2
		Wiring Harness, J8 To P11A				
J8-A	13229E6716-1	P11A-A	13229E6718-2	8	18.0	45.7
J8-B	13229E6716-1	P11A-B	13229E6718-2	8	18.0	45.7
J8-C	13229E6716-1	P11A-C	13229E6718-2	8	18.0	45.7
J8-D	1322986716-1	P11A-D	13229E6718-2	8	18.0	45.7
J8-E	13229E6716-1	P11A-E	13229E6718-2	8	18.0	45.7
		Wiring Harness, J10 To K1				
J10-1	*	K1-C1	MS25036-108	16	77.8	195.6
J10-2	*	K1-B1	MS25036-108	16	78.4	199.1
J10-3	*	K1-A1	MS25036-108	16	79.1	200.9
J10-4	**	E6	MS25036-108	16	79.8	202.7

*Use	(97403)	13229E4181-2	Connector, Pin Housing
	(97403)	13229E4273	Socket, Connector
**Use	(97403)	13229E4181-2	Connector, Pin Housing
	(97403)	13229E4272	Pin, Connector

3-19. ELECTRICAL WIRING REPAIR - GENERAL. (Cont)

Table 3-4 . Wire List - Cont

Termination		Termination		AWG Wire	Length	
From	Terminal Type	To	Terminal Type	Size	IN.	CM
		Wiring Harness, J5 To K1				
J5-1	*	K1-A1	MS25036-108	16	66.8	169.7
J52	*	K1-B1	MS25036-108	16	67.4	171.2
J5-3	*	K1-C1	MS25036-108	16	68.0	172.7
J5-4	**	E6	MS25036-108	16	68.7	174.5
*Use	(97403) 13229E4181-2	Connector, Pin Housing				
	(97403) 13229E4273	Socket, Connector				
**Use	(97403) 1322984181-2	Connector, Pin Housing				
	(97403) 13229E4272	Pin, Connector				
		Wiring Harness, P3				
J7-2	*	S5-1	MS25036-149	18	111.0	281.4
P3-1	13229E6683-1	RT1-1	M23053/5-103-9	18	78.0	198.1
P3-2	1322986683-l	RT1-2	M23053/5-103-9	18	80.0	203.2
P3-3	13229E66831	K2-X2	MS25036-149	18	82.0	208.3
P3-4	13229E6683-1	K1-X2	MS25036-149	18	82.5	209.6
P3-5	13229E6683-1	CR1-4 (-)	*	18	85.0	215.9
P3-6	13229E6683-1	J9-2		18	82.0	208.3
P3-7	13229E6683-1	S3-1	13230E5288-1	18	107.0	271.8
P3-8	13229E6683-1	S2-1	13216E6191-1	18	78.0	198.1
J7-1	**	J9-1		18	56.0	142.2
E7	MS25036-149	SHIELD	QQB575R36T0250	20	6.0	15.2
E8	MS25036-149	SHIELD	QQB575R36T0250	20	6.0	15.2
*Use	(97403) 13229E4181-1	Connector, Pi Housing				
	(97403) 1322984273	Socket, Connector				
**Use	(97403) 13229E4181-1	Connector, Pin Housing				
	(97403) 13229E4272	Pin, Connector				
		Wiring Harness, Compressor				
P4-A	MS3106R24-11S	P12-E	MS3106R-11S	14	31.0	78.7
P4-B	MS3106R24-11S	S6-2	MS25036-153	14	37.0	94.0
P4-D	MS3106R24-11S	KC-C2	MS25036-112	10	35.1	89.2
P4-E	MS3106R24-11S	K2-B2	MS25036-112	10	34.4	87.4
P4-F	MS3106R24-11S	K2-A2	MS25036-112	10	33.8	85.9
P4-G	MS3106R24-11S	TB2-2	MS25036-154	14	30.8	78.2
P4-H	MS3106R24-11S	TB2-1	MS25036-154	14	31.6	80.3
P12-A	MS3106R18-11S	K2-A2	MS25036-108	14	51.8	131.6
P12-B	MS3106R18-11S	K2-B2	MS25036-108	14	52.4	133.1
P12-C	MS3106R18-11S	K2-C2	MS25036-108	14	53.1	134.9
P12-D	MS3106R18-11S	S5-2	MS25036-153	14	48.0	121.9
P4	MS3106R24-11S	E3	MS25036-149	20	36.0	91.4
P12	MS3106R18-11S	E3	MS25036-149	20	60.0	152.4

Table 3-4. Wire *List - Cont*

Termination		Termination		AWG Wire	Length	
From	Terminal Type	To	Terminal Type	Size	IN.	CM
		Wiring Harness, K2 To TB1				
TB1-1	MS25036-112	K2-A1	MS25036-112	10	10.0	25.4
TB1-2	MS25036-112	K2-B1	MS25036-112	10	11.4	29.0
TB1-3	MS25036-112	K2-C1	MS25036-112	10	12.7	32.3
		Wiring Harness, K1 To K2				
K2-A1	MS25036-112	K1-A1	MS25036-112	10	74.5	189.2
K2-B1	MS25036-112	K1-B1	MS25036-112	10	75.8	192.5
K2-C1	MS25036-112	K1-Cl	MS25036-112	10	77.1	195.8
E3	MS25036-149	SHIELD	QQB575R30T0875	20	8.0	20.3
E3	MS25036-149	SHIELD	QQB575R30T0875	20	8.0	20.3
		Wiring Harness, J6 To P1				
J6-1	M24308/2-2	P1-8	M24308/2-2	22	20.0	50.8
J6-2	M24308/2-2	P1-7	M24308/2-2	22	20.0	50.8
J6-3	M24308/2-2	P1-6	M24308/2-2	22	20.0	50.8
J6-4	M24308/2-2	P1-5	M24308/2-2	22	20.0	50.8
J6-5	M24308/2-2	P1-4	M24308/2-2	22	20.0	50.8
J6-6	M24308/2-2	P1-3	M24308/2-2	22	20.0	50.8
J6-7	M24308/2-2	P1-2	M24308/2-2	22	20.0	50.8
J6-8	M24308/2-2	P1-1	M24308/2-2	22	20.0	50.8
J6-9	M24308/2-2	P1-15	M24308/2-2	22	20.0	50.8
J6-10	M24308/2-2	P1-14	M24308/2-2	22	20.0	50.8
J6-11	M24308/2-2	P1-13	M24308/2-2	22	20.0	50.8
J6-12	M24308/2-2	P1-12	M24308/2-2	22	20.0	50.8
SHIELD	M24308/2-2	GND	MS25036-148	20	4.0	10.2
		Wiring Harness, FL2 To CB1 To P15				
P15-A	13229E6718-2	CB1-A2	MS25036-115	8	47.8	121.4
P15-B	1322986718-2	CB1-B2	MS25036-115	8	48.5	123.2
P15-C	13229E6718-2	CB1-C2	MS25036-115	8	49.3	125.2
P15-D	13229E6718-2	FL2-8	MS25036-116	8	41.0	104.1
P15E	13229E6718-2	E5	MS25036-116	8	41.0	104.1
FL2-5	MS25036-116	CB1-A1	MS25036-115	8	44.8	113.8
FL2-6	MS25036-116	CB1-B1	MS25036-115	8	45.5	115.6
FL2-7	MS25036-116	CB1-C1	MS25036-115	8	46.3	117.6
		Wiring Harness, CB1 To TB2				
TB2-1	MS25036-108	CB1-A2	MS25036-108	16	44.5	113.0
TB2-2	MS25036-108	CB1-B2	MS25036-108	16	46.1	117.1
E3	MS25036-154	SHIELD	QQ575R36T0250	16	5.6	14.2

3-19. ELECTRICAL WIRING REPAIR - GENERAL. (Cont)

Table *3-4 . Wire List - Cont*

Termination		Termination		AWG Wire	Length	
From	Terminal Type	To	Terminal Type	Size	IN.	CM
		Wiring Harness, J11 To FL2				
J11-A	13229E6716-1	FL2-1	MS25036-157	10	3.5	8.9
J11-B	13229E6716-1	FL2-2	MS25036-157	10	3.5	8.9
J11-C	13229E6716-1	FL2-3	MS25036-157	10	3.5	8.9
J11-D	13229E6716-1	FL2-4	MS25036-157	10	3.5	8.9
J11-E	13229E6716-1	E9	MS25036-157	10	3.5	8.9
Lead Electrical , S5-1 To S6-2						
S5-1	MS25036-153	S 6 - 2	MS25036-153	16	3.0	7.6
		Wiring Harness, Compressor Cable -1				
J-A	MS3102R24-11P	J-B	MS3102R24-11P	12	3.0	7.6
J-D	MS3102R24-11P	B1-L2	MS23053/5-106-9	12	3.0	7.6
J-E	MS3102R24-11P	B1-L1	MS23053/5-106-9	12	3.0	7.6
J-F	MS3102R24-11P	B1-L3	MS23053/5-106-9	12	3.0	7.6
J-G	MS3102R24-11P	HR7-A	MS23053/5-104-9	*	*	*
J-H	MS3102R24-11P	HR7-B	MS23053/5-104-9	*	*	*

* Lead Wire Supplied On The HR7 Compressor Heater

3-20. CONTROL PANEL ASSEMBLY REPAIR AND REPLACEMENT.

This task covers: a. Removal b. Repair c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Clinch Nut Installation Tool (Item 12, Appendix B)

Materials/Parts

Lock Washers, Qty 4 (Item 6, Appendix G)
Self Locking Nut, Qty 4 (Item 16, Appendix G)

a. Removal. Loosen screw (1) Figure 3-27 and carefully remove control panel (2).

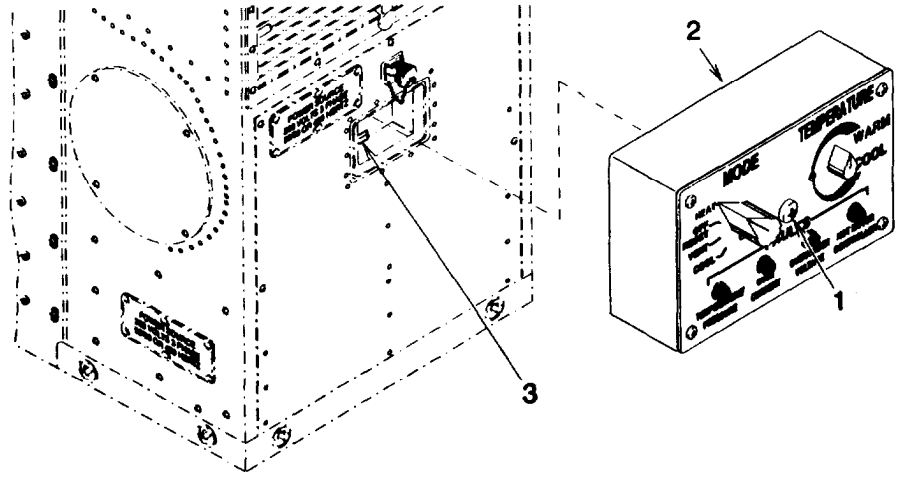


Figure 3-27. Control Panel

3-20. CONTROL PANEL ASSEMBLY REPAIR AND REPLACEMENT. (Cont)

b. Disassembly

NOTE

Disassemble only to extent necessary for repair.

(1) Remove four screws (1) Figure 3-28, lock washers (2), and flat washers (3). Discard lock washers.

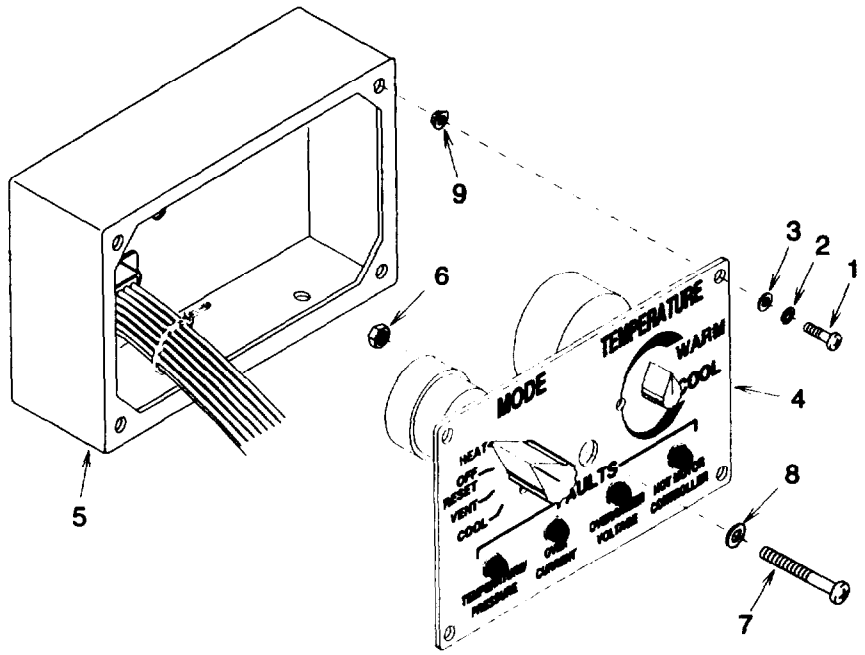


Figure 3-28. Control Panel Assembly

(2) Carefully pull control panel (4) away from control box (5) as far as wiring harness will allow.

(3) Remove self locking nut (6), screw (7), and flat washer (8). Discard self locking nut.

(4) Remove wiring harness and individual components per paragraphs 3-21 through 3-24.

c. Repair

NOTE

Paragraphs 3-21 through 3-24 contain replacement procedures for individual control panel assembly components.

(1) Replace any damaged or missing components or hardware.

(2) Replace clinch nuts (9) if stripped or missing.

(a) Remove damaged clinch nuts (9).

(b) Install new clinch nuts (9) using clinch nut installation tool.

(3) Touch-up or re-paint the control box (5) in accordance with TM 43-0139.

d. *Assembly*

(1) Install individual components and wiring harness per paragraphs 3-21 through 3-24.

(2) Install screw (7), flat washer (8), and new self locking nut (6). Screw must turn freely, do not tighten self locking nut.

(3) Carefully assemble control panel (4) *onto* control box (5), being careful not to damage or pinch wiring harness leads, and align mounting holes.

(4) Install four screws (1), new lock washers (2), and flat washers (3).

e. *Installation*. Carefully align the control panel (2) Figure 3-27 connector with the air conditioner connector (3) and tighten screw (1).

3-21. WIRING HARNESS (CONTROL PANEL) TESTING, REPAIR, AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Repair d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 2 (Item 5, Appendix G)
Tiedown Straps, Qty 3 (Item 20, Appendix G)
Sleeving Insulation (Item 17, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Control panel removed and disassembled as necessary to access wiring harness. See para 3-20.

a. *Testing.* Using multimeter set to measure resistance, check for continuity between each connector terminal and the wire lead/terminal attached to it. If no continuity is indicated, repair or replace the wiring harness as necessary. See Figure 3-29.

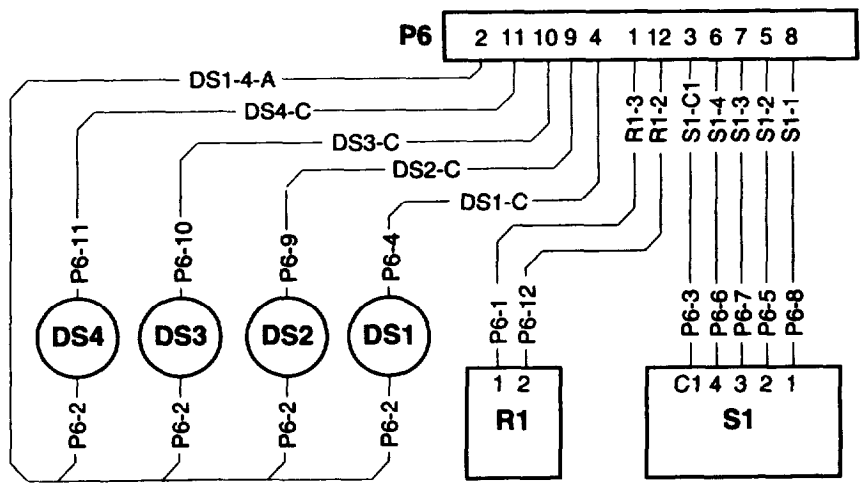


Figure 3-29. Control Panel Wiring Diagram

3-21. WIRING HARNESS (CONTROL PANEL) TESTING, REPAIR, AND REPLACEMENT. (Cont)

b. *Removal.*

NOTE

The wiring harness can be repaired while installed. Remove wiring harness only if replacement is necessary.

(1) Tag and disconnect wire leads (1) Figure 3-30 from the control panel (2) components. See paragraph 3-19 for soldering procedures.

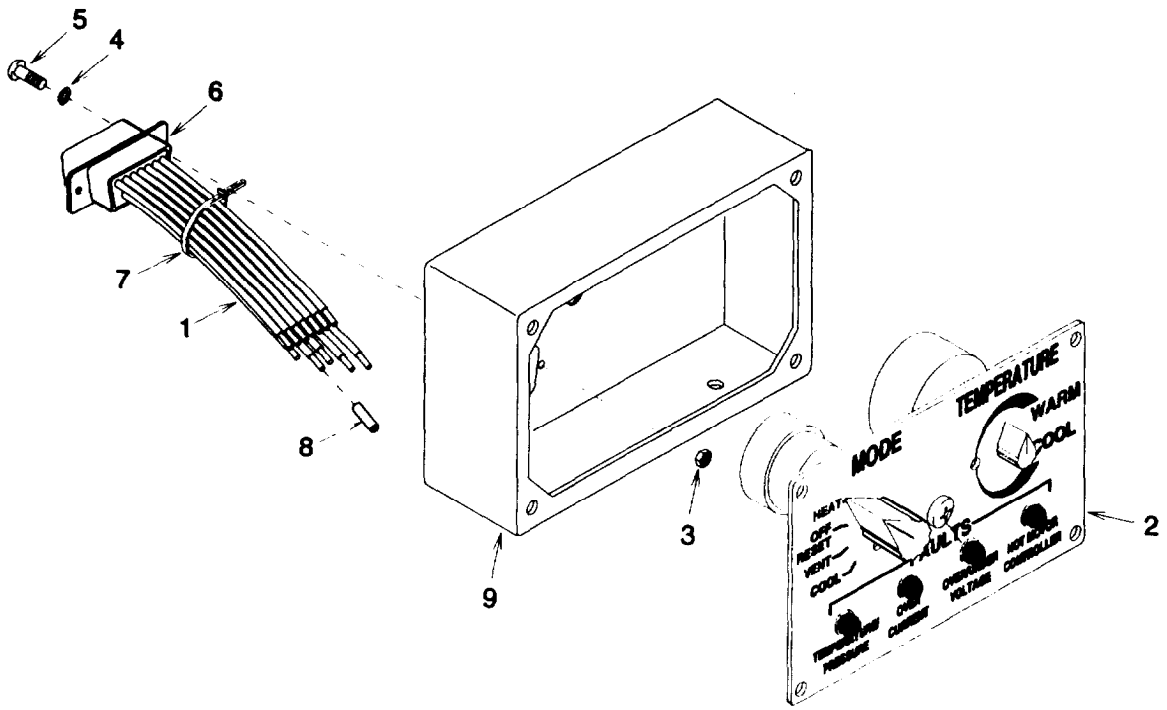


Figure 3-30. Control PaneI Wiring Harness

(2) Remove two nuts (3), lock washers (4), screws (5), and wiring harness connector (6). Discard lock washers.

c. Repair.

NOTE

Repairs to the wiring harness are limited to replacement of damaged wire leads or connector only.

(1) Remove tiedown straps (7).

(2) Disconnect damaged wire lead(s) (1) from connector (6) and control panel (2) component(s). See paragraph 3-19 for soldering procedures.

(3) Refer to Table 3-4 for wire size, length, and terminal information for new wire lead (1).

(4) Remove any remaining sleeving insulation (8).

(5) Connect new wire lead(s) (1) to connector (6) and control panel (2) component(s) using control panel wiring diagram Figure 3-30. Use new sleeving insulation (8) as necessary. See paragraph 3-19 for soldering procedures.

(6) Secure wire leads with tiedown straps (7) as necessary.

d. *Installation.*

(1) Carefully pass the wire leads (1) through control panel (9) opening.

(2) Remove any remaining sleeving insulation (8).

(3) Secure wiring harness connector (6), using two screws (5), new lock washers (4), and nuts (3).

(4) Connect wire leads (1) to control panel (2) components using tags and control panel wiring diagram Figure 3-29. Use new sleeving insulation (8) Figure 3-30 as necessary. See paragraph 3-19 for soldering procedures. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the control panel. See para 3-20.

3-22. POTENTIOMETER TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Sleeving Insulation (Item 17, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Control panel removed and disassembled as necessary to access potentiometer. See para 3-20.

a.. Testing.

(1) Using multimeter set to measure resistance, check resistance between potentiometer (1) Figure 3-31 terminals 2 and 3.

NOTE

Figure 3-32 shows potentiometer schematic diagram for reference.

(a) Turn knob (2) fully clockwise (WARM). Multimeter should indicate a resistance of between 0 and 60 ohms.

(b) Turn knob (2) fully counterclockwise (COOL). Multimeter should indicate a resistance of between 4500 and 5500 ohms.

(2) Replace the potentiometer (1) if the resistance indicated is not within the values specified.

3-22. POTENTIOMETER TESTING AND REPLACEMENT. (Cont)

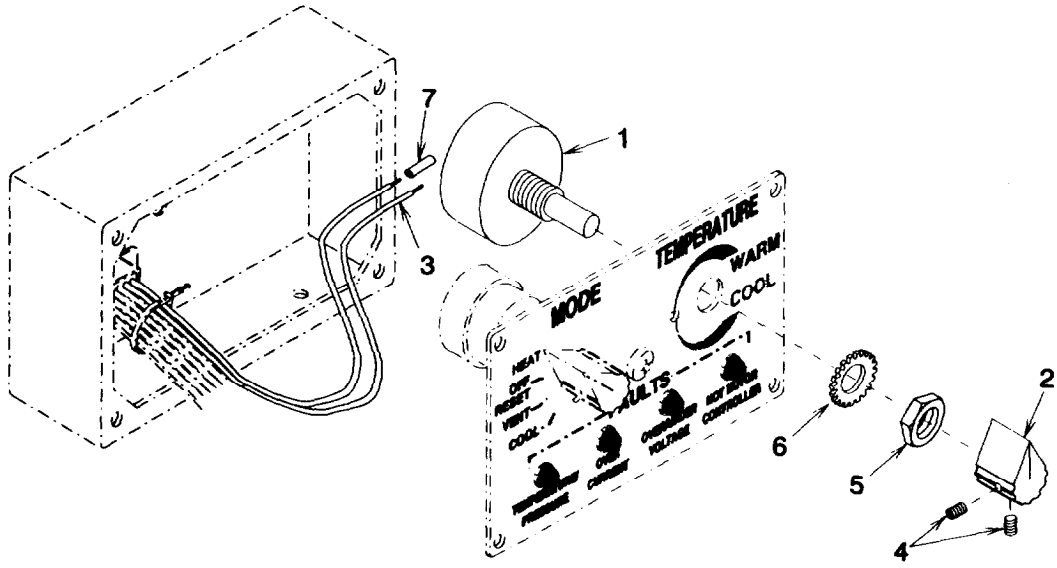


Figure 3-31. Potentiometer (TEMPERATURE Control) (R1)

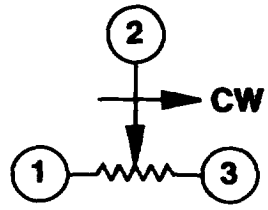


Figure 3-32. Potentiometer Schematic Diagram

b. **Removal**

(1) Tag and disconnect wire leads (3) from potentiometer (1). See paragraph 3-19 for soldering procedures.

(2) Loosen two setscrews (4) and remove knob (2).

(3) Remove nut (5), lock washer (6), and potentiometer (1).

*c. **Installation.***

(1) Install potentiometer (1), lock washer (6), and nut (5).

(2) Rotate potentiometer (1) shaft to midway position and install knob (2) pointing midscale between WARM and COOL. Tighten two setscrews (4).

(3) Connect wire leads (3) to potentiometer (1) using tags and control panel wiring diagram Figure 3-5. Use new sleeving insulation (7) Figure 3-31 as necessary. See paragraph 3-19 for soldering procedures. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the control panel. See para 3-20.

3-23. FAULT INDICATORS (LED' S) TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Crimping Tool Kit (Item 2, Appendix B)

Materials/Parts

Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Control panel removed and disassembled as necessary to access light emitting diodes. See para 3-20.

a. *Testing*.

(1) Using multimeter set to test diodes, connect red lead to connector (1) pin number 2 and black lead in turn to pin numbers 4,9,10, and 11 (DS1, DS2, DS3, and DS4). Multimeter should indicate between 1 and 2 volt drop at each pin.

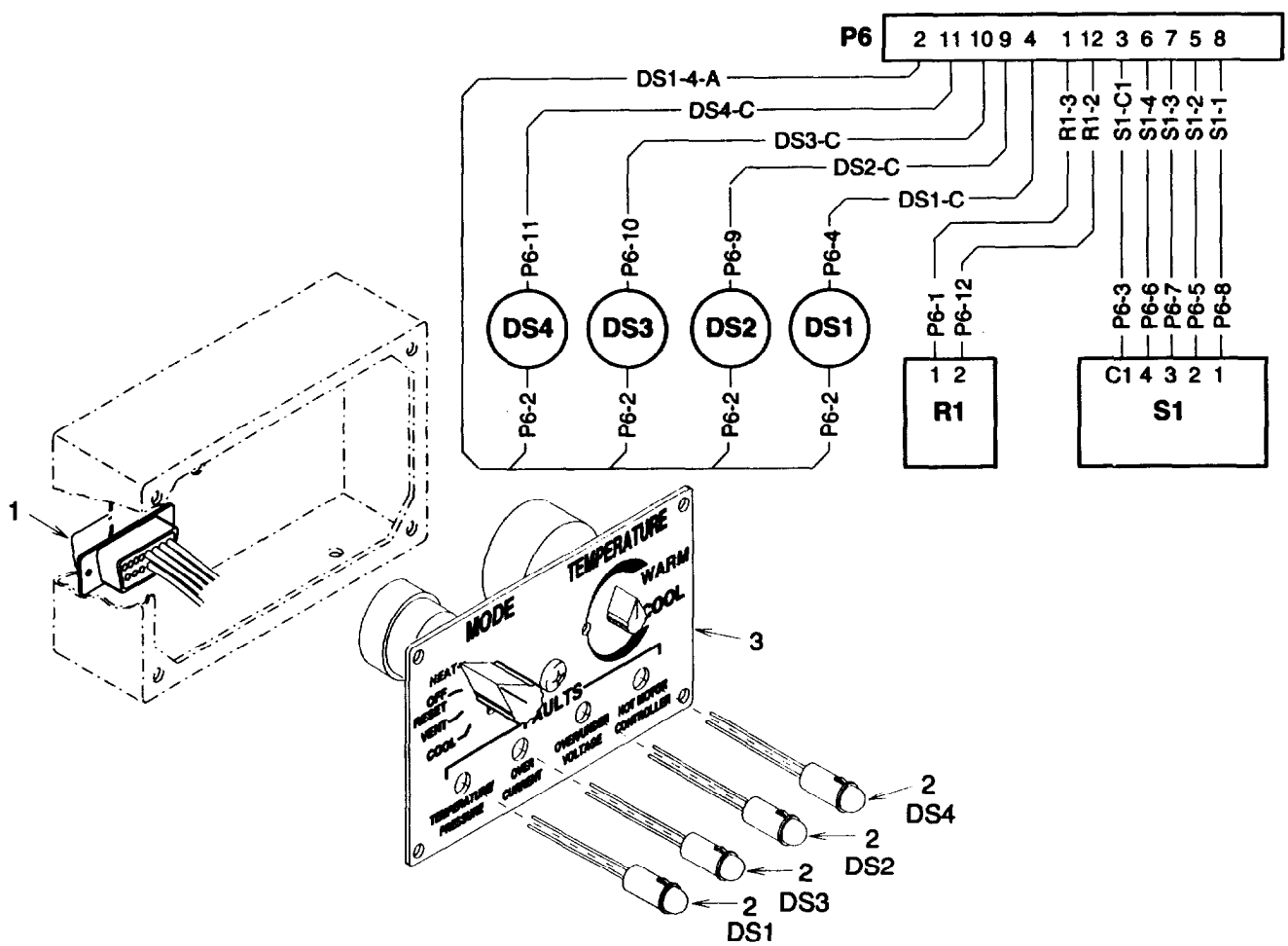


Figure 3-33. Light Emitting Diodes (DS1, DS2, DS3, and DS4)

3-23. FAULT INDICATORS (LED' S) TESTING AND REPLACEMENT. (Cont)

(2) Reverse leads from above and m-test. The multimeter should give no indication of voltage drop.

(3) Replace any light emitting diode (2) if the voltage drop indicated is not within the values specified.

b. Removal

(1) Tag and disconnect light emitting diode (2) black wire lead from connector (1).

(2) Remove cap splice from light emitting diode (2) red wire lead bundle.

(3) Push light emitting diode (2) out of control panel (3).

c. Installation.

(1) Carefully pass light emitting diode (2) wire leads through hole in control panel (3) and press light emitting diode into control panel.

(2) Connect light emitting diodes (2) red leads together in a bundle and crimp on an appropriate cap splice. See paragraph 3-19 for general repair information.

(3) Connect light emitting diode (2) black lead to connector (1) using tags and control panel wiring diagram. See paragraph 3-19 for general repair information. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the control panel. See para 3-20.

3-24. ROTARY SWITCH (S1) TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Sleeving Insulation (Item 17, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Control panel removed and disassembled as necessary to access rotary switch. See para 3-20.

a. Testing.

(1) Using multimeter set to measure resistance, check continuity between rotary switch (1) terminals as follows:

(a) With knob (2) in OFF RESET position, continuity should be indicated between connector (P6) (3), pin 3 and pin 5. See wiring diagram Figure 3-5 and schematic Figure 3-6.

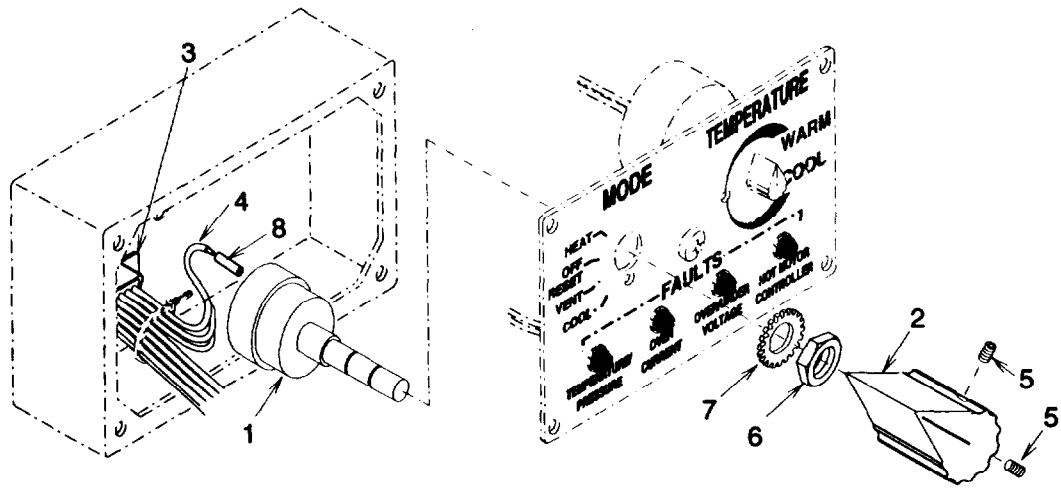


Figure 3-34. MODE selector rotary switch (S1)

(b) With knob (2) in VENT position, continuity should be indicated between connector (P6) (3), pm 3 and pin 7. gee wiring diagram Figure 3-5 and schematic Figure 3-6.

(c) With knob (2) in COOL position, continuity should be indicated between connector (P6) (3), pin 3 and pin 6. See wiring diagram Figure 3-5 and schematic Figure 3-6.

(d) With knob (2) in HEAT position, continuity should be indicated between connector (P6) (3), pin 3 and pin 8. See wiring diagram Figure 3-5 and schematic Figure 3-6.

(2) Replace the rotary switch (1) if the continuity indicated is not as specified.

b. Removal.

(1) Tag and disconnect wire leads (4) from rotary switch (1). See paragraph 3-19 for soldering

(2) Loosen two setscrews (5) and remove knob (2)

(3) Remove nut (6), lock washer (7), and rotary switch (1).

c. Installation.

(1) Install rotary switch (1), lock washer (7), and nut (6).

(2) Rotate rotary switch (1) shaft to fully clockwise position and install knob (2) pointing at HEAT. Tighten two setscrews (5).

(3) Connect wire leads (4) to rotary switch (1) using tags and control panel wiring diagram Figure 3-30. Use new sleeving insulation (8) as necessary. See paragraph 3-19 for soldering procedures. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the control panel. See para 3-20.

3-25. WIRING HARNESSES (AIR CONDITIONER) TESTING, REPAIR AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Repair d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Self Locking Nuts, Qty 2 (Item 14, Appendix G)
Self Locking Nut, Qty 2 (Item 15, Appendix G)
Lock Washers, Qty 4 (Item 9, Appendix G)
Self Locking Nuts, Qty 4 (Item 12, Appendix G)
Lock Washers, Qty 6 (Item 5, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Control panel assembly removed. See para 3-20.
Evaporator return air grille removed. See para 3-13.
Top panel removed. See para 3-14.
Electrical component bracket loose and pulled out to access components. See para 3-28.

a. *Testing.*

(1) *Disconnect Wiring Harnesses.*

(a) Disconnect all wiring harness connectors.

(b) Tag and disconnect all wiring harness lead terminals from the components they attach to.

(2) Using multimeter set to measure resistance, check continuity of wire leads in harness by measuring between connector pins or terminals as appropriate. See wiring diagram Figure 3-5 for pin and terminal information.

(3) Replace or repair any wiring harness if a wire lead indicates no continuity when checked.

b. *Removal.*

(1) *General Removal Procedures.*

(a) Tag and disconnect wiring harness connectors.

(b) Tag and disconnect wiring harness lead terminals from the components they attach to.

(c) Carefully remove the wiring harness. Remove grommets (1) as necessary.

(2) Specific Removal Procedures.

(a) Wiring *Harness (2) Removal.*

1 Remove two self locking nuts (3), screws (4), and clamps (5). Discard self locking nuts.

2 Remove self locking nut (6) and screw (7). Discard self locking nut.

3 Tag and disconnect wiring harness (2) connectors.

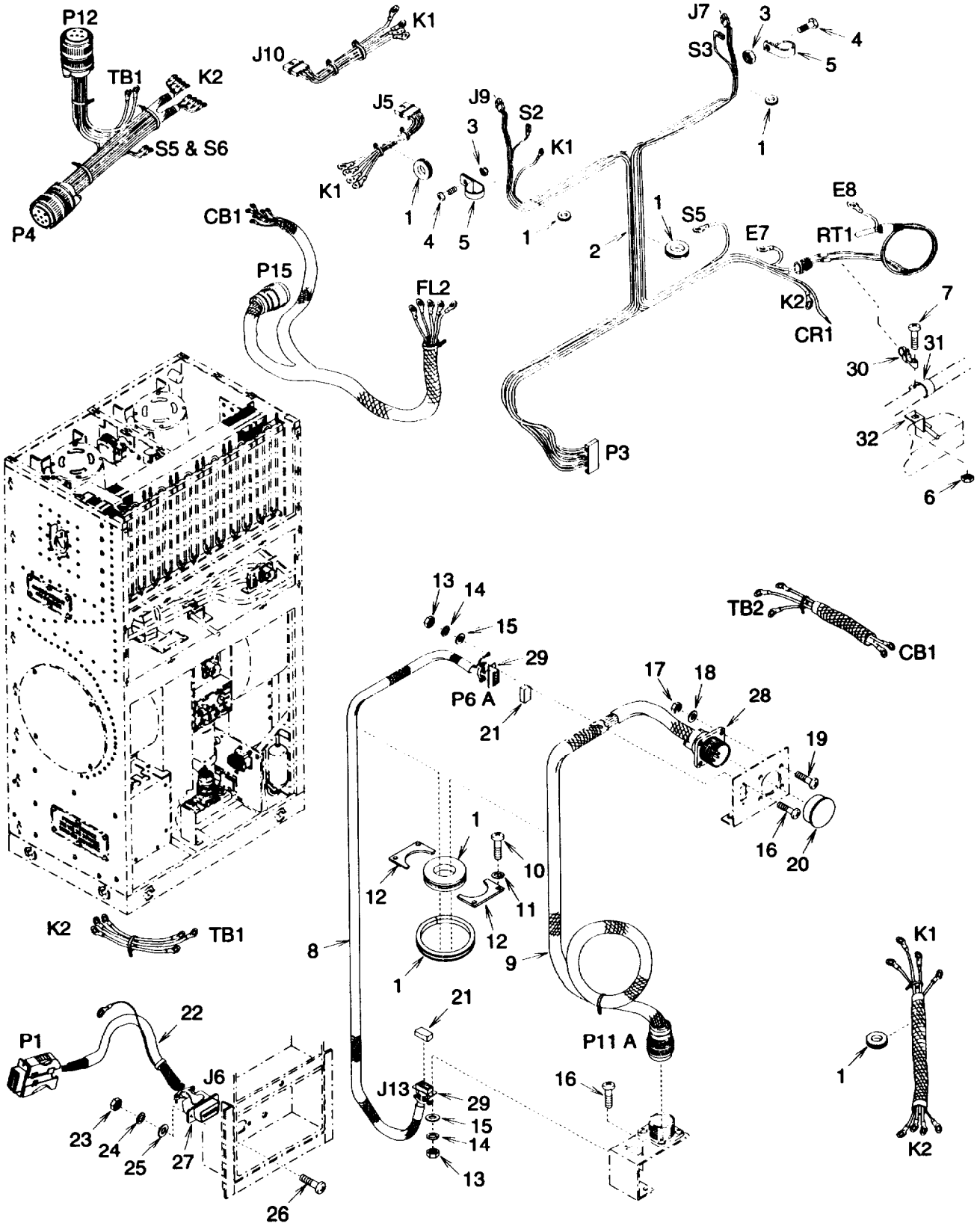


Figure 3-35. Wiring Harnesses

3-25. WIRING HARNESSES (AIR CONDITIONER) TESTING, REPAIR AND REPLACEMENT. (Cont)

4 Tag and disconnect wiring harness (2) lead terminals from the components they attach to.

5 Carefully remove the wiring harness (2). Remove grommets (1) as necessary.

(b) *Wiring Harnesses (8) and (9) Removal.*

1 Remove four screws (10), lock washers (11), and two block off plates (12). Discard lock washers.

2 Remove four nuts (13), lock washers (14), flat washers (15), and screws (16). Discard lock washers.

3 Remove four self locking nuts (17), flat washers (18), and screws (19). Discard self locking nuts.

4 Remove dust cap (20) and two dust caps (21).

5 Tag and disconnect wiring harness (9) connector.

6 Carefully remove the wiring harnesses (8) and (9). Remove grommets (1) as necessary.

(c) Wiring Harness (22) Removal.

1 Remove two nuts (23), lock washers (24), flat washers (25), and screws (26). Discard lock washers.

2 Tag and disconnect wiring harness (22) connector.

3 Carefully remove the wiring harness (22).

c. Repair. See paragraph 3-19 for repair information and procedures.

d. *Installation.*

Specific Installation Procedures.

(a) *Wiring Harness (22) Installation.*

1 Carefully install the wiring harness (22).

2 Connect wiring harness (22) connector using tags and wiring diagram Figure 3-5. Remove tags.

3 Install connector (27), two screws (26), flat washers (25), new lock washers (24), and nuts (23).

(b) *Wiring Harnesses (8) and (9) Installation.*

1 Carefully install the wiring harnesses (8) and (9). Install grommets (1) as necessary.

2 Connect wiring harness (9) connector using tags and wiring diagram Figure 3-5. Remove tags.

3 Install connector (28), four screws (19), flat washers (18), and new self locking nuts (17).

4 Install two connectors (29) and secure each with two screws (16), flat washers (15), new lock washers (14), and nuts (13).

5 Install two block off plates (12), four screws (10) and new lock washers (11).

6 Install dust cap (20) and two dust caps (21).

(c) *Wiring Harness (2) Installation.*

1 Carefully install the wiring harness (2). Install grommets (1) as necessary.

2 Connect wiring harness (2) lead terminals to the components they attach to using tags and wiring diagram Figure 3-5. Remove tags.

3 Connect wiring harness (2) connectors using tags and wiring diagram Figure 3-5. Remove tags.

4 Install cable strap (30) between clamp (31) and bracket (32) and secure with screw (7) and new self locking nut (6).

5 Install two clamps (5), screws (4), and new self locking nuts (3).

NOTE

FOLLOW-ON MAINTENANCE:
Install electrical component bracket. See para 3-28.
Install top panel. See para 3-14.
Install evaporator return air grille. See para 3-13.
Install control panel assembly. See para 3-20.

3-26. EMI FILTERS AND SUPPRESSORS TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Equipment Conditions:

Lower front panel removed. See para 3-14.

Materials/Parts

Lock Washers, Qty 14 (Item 10, Appendix G)
Lock Washers, Qty 10 (Item 6, Appendix G)
Lock Washers, Qty 4 (Item 9, Appendix G)
Tape, Qty 14 (Item 19, Appendix G)
Tiedown Straps, Qty 7 (Item 20, Appendix G)
Marker Tag (Item 2, Appendix E)

a. *Testing.*

(1) *EMI Filter (FL1) Testing.*

(a) Tag and disconnect wiring harness connectors from EM1 filter (FLl) (1) Figure 3-36.

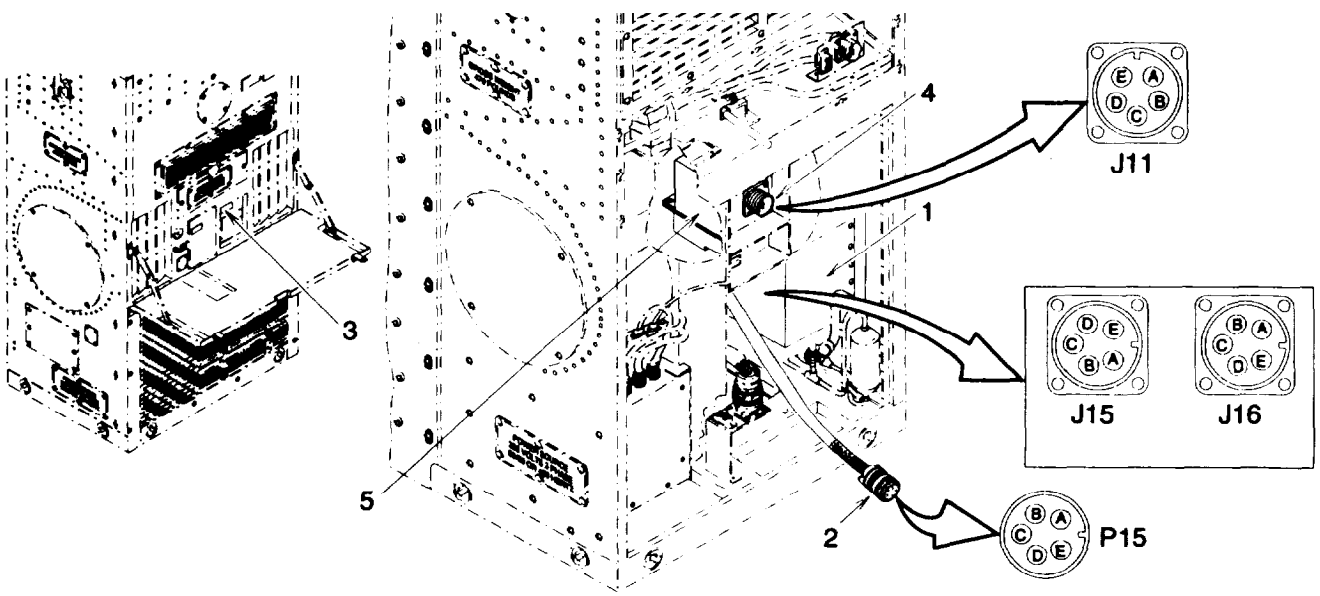


Figure 3-36. EMI Filters

(b) Using multimeter set to measure resistance, perform the following checks on EMI filter (FL1) (1).

1 Check for continuity between connector J15 pin E to J16 pin E. Continuity should be indicated.

2 Check for continuity between connector J15 or J16 pm E to EMI filter case. Continuity should be indicated.

3 Check for continuity between connector J15 pins A, B, C, and D in sequence to matching pins A, B, C, and D on connector J16. Continuity should be indicated.

NOTE

Checking resistance between any two connector pins A, B, C, or D is not necessary. If it is checked for any reason, the resistance should be 1120 ± 224 k ohms.

4 Check the resistance between connector J16 pins A, B, C, and D in sequence to EMI filter (FLl) (1) case. A resistance of 560 ± 56 k-ohms should be indicated.

(c) Replace the EM1 filter (1) if it fails any of the continuity/resistance tests.

(2) *EMI Filter (FL2) Testing.*

(a) Disconnect input power cable from air conditioner.

NOTE

Removing output power cable connector J16 will make input power cable connector J15 more accessible.

(b) Disconnect input power cable connector (2) from EMI filter (FL1) (1) Figure 3-36.

(c) Put the circuit breaker (3) in the ON (up) position.

(d) Using multimeter set to measure resistance, perform the following checks between connectors (2) and (4).

1 Check for continuity between connector P15 pin E to J11 pin E. Continuity should be indicated.

2 Check for continuity between connector P15 or J11 pin E to EMI filter (FL2) (5) case. Continuity should be indicated.

3. Check for continuity between connector P15 pins A, B, C, and D in sequence to matching pins A, B, C, and D on connector J11. Continuity should be indicated.

4 Check the resistance between connector J11 pins A, B, C, and D in sequence to EMI filter (FL2) (5) case. No continuity should be indicated.

(e) Replace the EMI filter (FL2) (5) if it fails any of the continuity/resistance tests.

3-26. EMI FILTERS AND SUPPRESSORS TESTING AND REPLACEMENT. (Cont)

b. *Removal.*

(1) *EMI Filter (FL1) Removal.*

(a) Tag and disconnect wiring harness connectors from EMI filter (1) Figure 3-37.

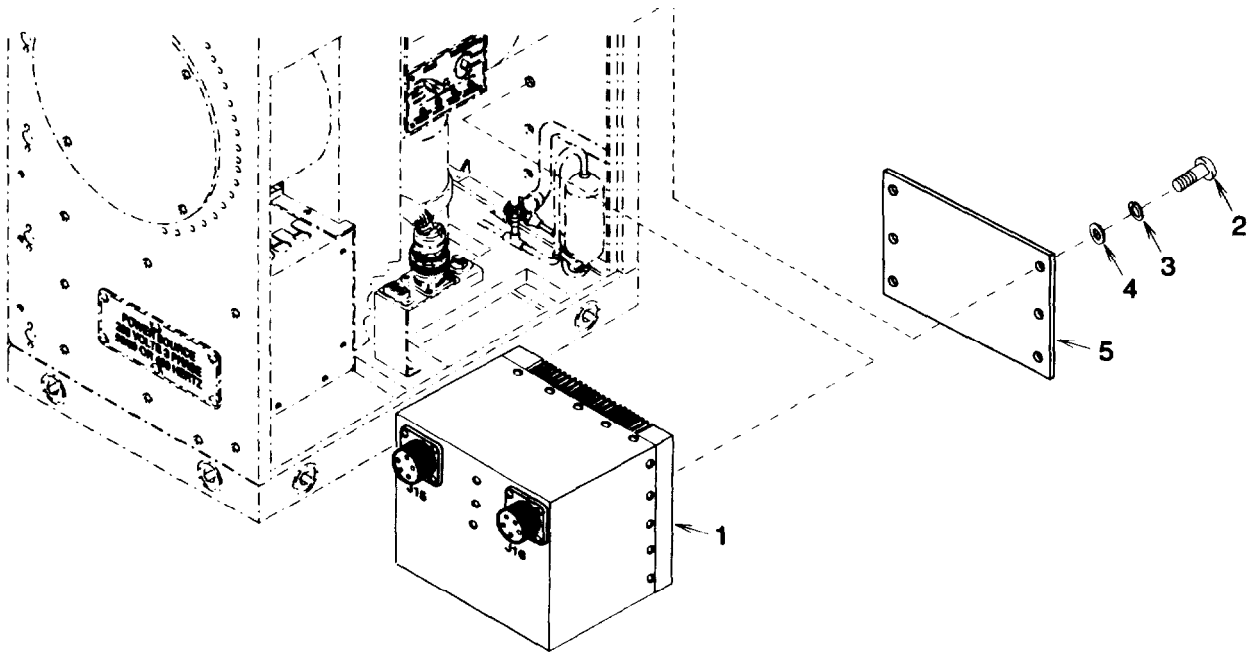


Figure 3-37. EMI Filter (FL1)

(b) Remove electrical components bracket. See paragraph 3-30.

(c) Remove six screws (2), lock washers (3), flat washers (4), doubler plate (5), and EMI filter (FL1) (1). Discard lock washers.

(2) *EMI Filter (FL2) Removal.*

(a) Remove control panel support.

1 Loosen screw (1) Figure 3-38 and remove control panel assembly (2).

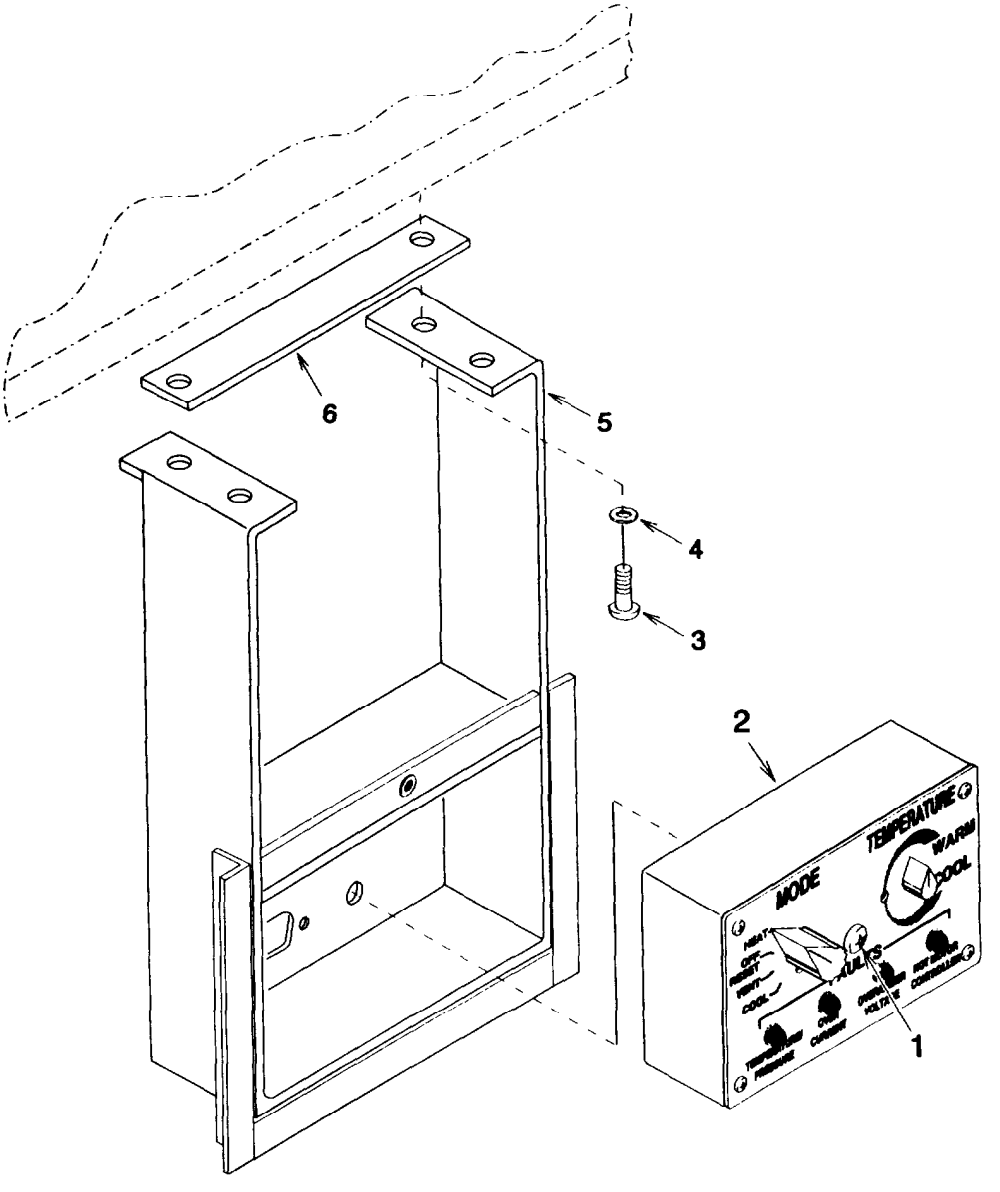


Figure 3-38. Control Panel Support

2 Remove four screws (3), flat washers (4), control panel support (5), and shim (6).

(b) Remove four screws (1) Figure 3-39, lock washers (2), and flat washers (3). Discard lock washers.

(c) Carefully pull the box (4) away from air conditioner frame as far as wire leads (5) will allow.

(d) Remove four self locking nuts (6), screws (7), connector (8), and gasket (9). Discard self locking nuts.

3-26. EMI FILTERS AND SUPPRESSORS TESTING AND REPLACEMENT. (Cont)

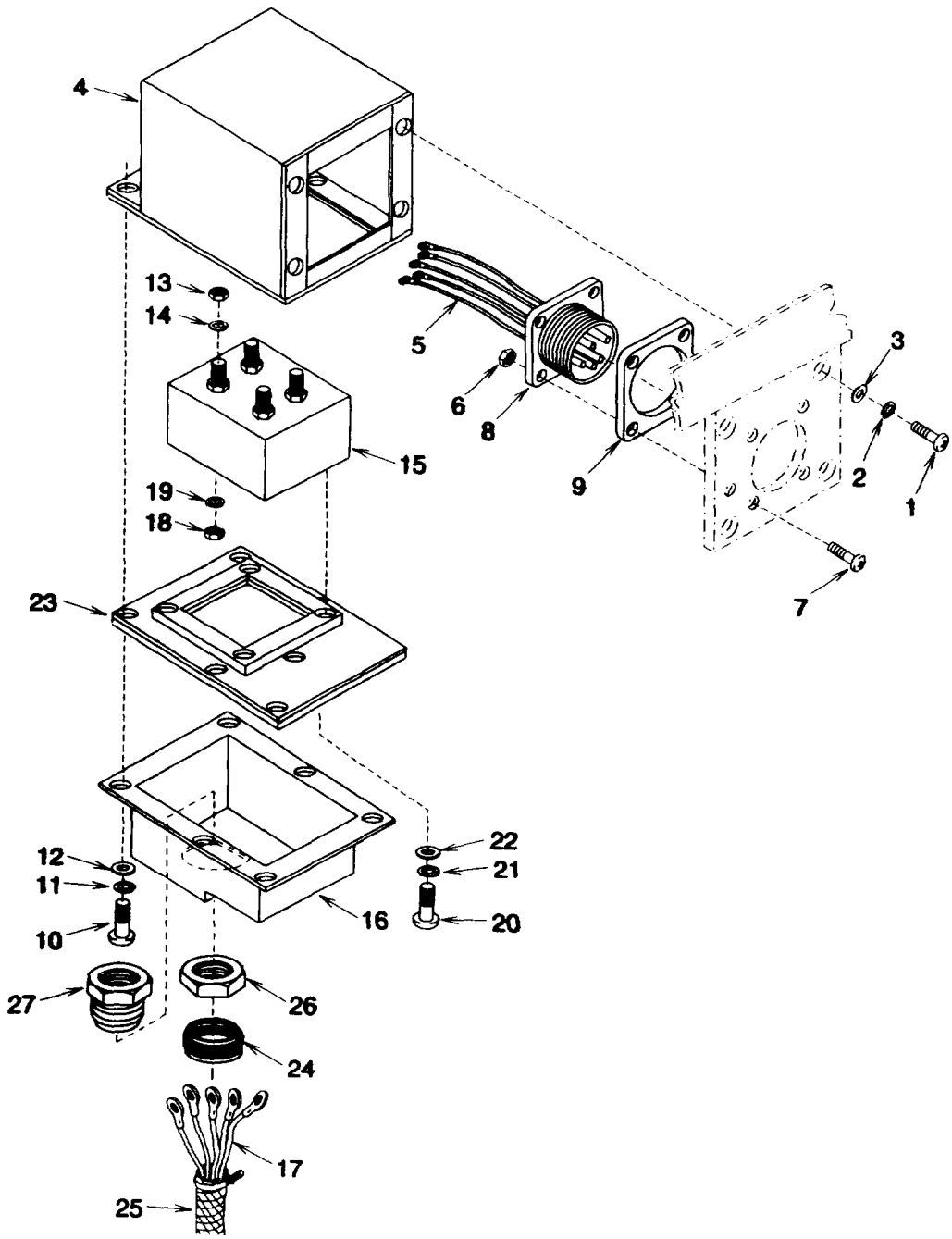


Figure 3-39. EMI Filter (FL2)

(e) Remove six screws (10), lock washers (11), flat washers (12), and box (4). Discard lock washers.

(f) Tag wire leads (5).

(g) Remove four nuts (13), lock washers (14), and wire leads (5). Discard lock washers.

(h) Carefully pull the EM1 filter (15) from bottom box (16) as far as wire leads (17) will allow.

(i) Tag wire leads (17).

(j) Remove four nuts (18), lock washers (19), and wire leads (17). Discard lock washers.

(k) Remove four screws (20), lock washers (21), flat washers (22), and plate (23). Discard lock washers.

NOTE

Steps (1) and (m) only apply to removal of the bottom box, fitting, and wiring harness. Do not perform these steps if only the EMI filter is being removed.

(l) Remove harness nut (24) and wiring harness (25).

(m) Remove fitting nut (26) and fitting (27).

(3) *EMI Suppressors (FC1through FC7) Removal.*

NOTE

Removal of EMI suppressors is required only if they are damaged and need replacement.

(a) Tag wire lead, then cut and remove tiedown strap (1) Figure 3-40.

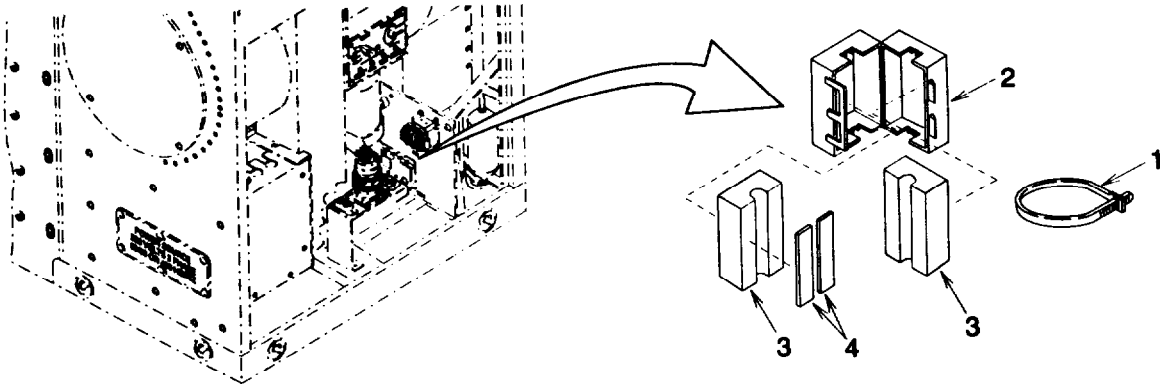


Figure 3-40. EMI Suppressors (FC1 through FC7)

(b) Open case (2).

(c) Remove two core halves (3).

(d) Remove two tape strips (4). Discard tape strips.

c. *Installation.*

(1) *EMI Suppressors (FC1 through FC7) Installation*

(a) Attach two new tape strips (4) to one core half (3).

(b) Place two core halves (3) around wire lead per tag and wiring diagram Figure 3-5. Remove tags.

(c) Secure case (2) around core halves (3) with new tiedown strap (1).

3-26. EMI FILTERS AND SUPPRESSORS TESTING AND REPLACEMENT. (Cont)

(2) *EMI Filter (FL2) Installation.*

NOTE

Steps (a) through (c) only apply to installation of the bottom box, fitting, and wiring harness. Do not perform these steps if only the EMI filter has been removed.

(a) Install fitting (27) Figure 3-39 and fitting nut (26).

(b) Slip harness nut (24) over wiring harness (25).

(c) Insert wiring harness (25) leads into fitting (27) and secure using harness nut (24).

(d) Install plate (23), four screws (20), new lock washers (21), and flat washers (22).

(e) Install wire leads (17) using tags and wiring diagram Figure 3-5, four new lock washers (19), and nuts (18). Remove tags.

(f) Install wire leads (5) using tags and wiring diagram Figure 3-5, four new lock washers (14), and nuts (13). Remove tags.

(g) Feed connector (8) through box (4) and install six screws (10), new lock washers (11), and flat washers (12).

(h) Install gasket (9), connector (8), four screws (7), and new self locking nuts (6).

(i) Install box (4), four screws (1), new lock washers (2), and flat washers (3).

(j) Install control panel support.

1 Install shim (6) Figure 3-38, control panel support (5), four screws (3), and flat washers (4).

2 Install control panel assembly (2) and tighten screw (1).

(3) *EMI Filter (FL1) Installation.*

(a) Install EMI filter (1) Figure 3-37, doubler plate (5), six screws (2), new lock washers (3), and flat washers (4).

(b) Install electrical components bracket. See paragraph 3-28.

(c) Connect wiring harness connectors to EMI filter (1) using tags and wiring diagram Figure 3-5. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.

3-27. COIL FROST SWITCH TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock washers, Qty 2 (Item 9, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Remove top panel. See para 3-14.

a. *Testing.*

(1) Tag and disconnect wire leads from coil frost switch (1).

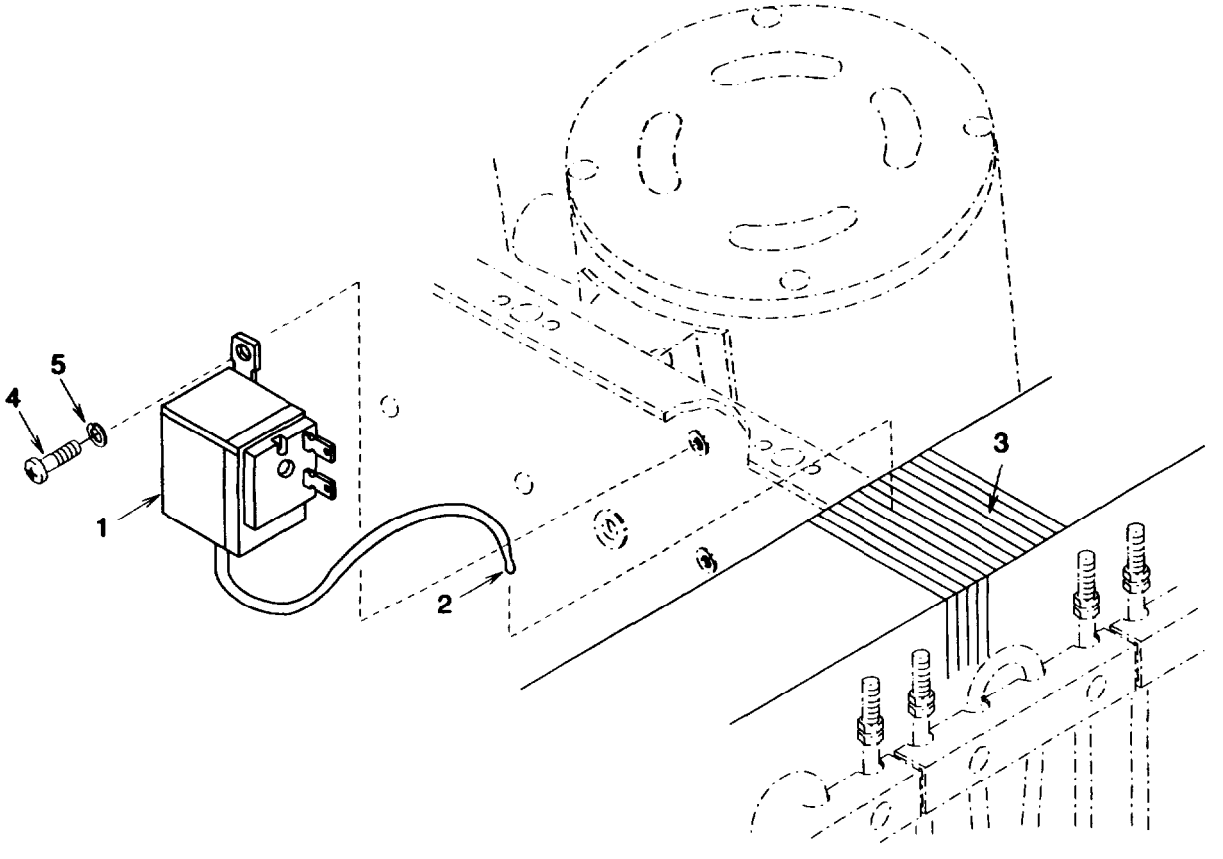


Figure 3-41. Coil Frost Switch (S2)

3-27. COIL FROST SWITCH TESTING AND REPLACEMENT. (Cont)

CAUTION

Be careful not to kink capillary line temperature sensor as this can damage the coil frost switch.

(2) Carefully pull capillary line temperature sensor (2) from evaporator coil (3).

(3) Remove two screws (4), lock washers (5), and coil frost switch (1). Discard lock washers.

(4) Place the capillary line temperature sensor in a temperature controlled bath, 47° to 52° F (8" to 11° C) and set multimeter to measure continuity. Place multimeter leads on terminals 1 and 2 of the coil frost switch. A closed circuit (continuity) should be indicated.

(5) Replace coil frost switch (1) if continuity check fails.

b. *Removal.*

(1) Tag and disconnect wire leads from coil frost switch (1).

CAUTION

Be careful not to kink capillary line temperature sensor as this can damage the coil frost.

(2) Carefully pull capillary line temperature sensor (2) from evaporator coil (3).

(3) Remove screws (4), lock washers (5), and coil frost switch (1).

c. *Installation.*

CAUTION

Be careful not to kink capillary line temperature sensor as this can damage the coil frost switch.

(1) Carefully shape the capillary line temperature sensor (2) as necessary.

(2) Install coil frost switch (1), two screws (4), and new lock washers (5).

(3) Carefully insert capillary line temperature sensor (2) into evaporator coil (3).

(4) Connect wire leads to coil frost switch (1) using tags and wiring diagram Figure 3-5. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install top panel. See para 3-14.

3-28. ELECTRICAL COMPONENTS BRACKET REMOVAL.

This task covers: a. Removal b. Disassembly c. Assembly d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Material/Parts

Lock Washers, Qty 3 (Item 7, Appendix G)
Lock Washers, Qty 2 (Item 8, Appendix G)

Equipment Conditions:

Lower front panel removed. See para 3-14.

a. *Removal.*

(1) Remove screw (1), lock washer (2), and flat washer (3). Discard lock washer.

(2) Remove two screws (4) and flat washers (5).

(3) Carefully pull the electrical components bracket (6) out of the air conditioner as far as the wire leads will allow.

b. *Disassembly.*

NOTE

Disassemble only to the extent necessary for maintenance task being performed.

(1) Remove three screws (7), lock washers (8), flat washers (9), and sheet (10). Discard lock washers.

(2) Remove screw (11), lock washer (12), flat washer (13) and strap (14). Discard lock washer.

(3) If complete disassembly/removal of the electrical components bracket (6) is necessary, remove the individual components per the appropriate procedural paragraphs.

c. *Assembly.*

(1) If any components were removed from the electrical components bracket (6), install them per the appropriate procedural paragraphs.

(2) Install strap (14), screw (11), new lock washer (12), and flat washer (13).

(3) Install sheet (10), three screws (7), new lock washers (8), and flat washers (9).

d. *Installation.*

(1) Carefully install the electrical components bracket (6) into the air conditioner.

(2) Install two screws (4) and flat washers (5).

(3) Install screw (1), new lock washer (2), and flat washer (3).

3-28. ELECTRICAL COMPONENTS BRACKET REMOVAL. (Cont)

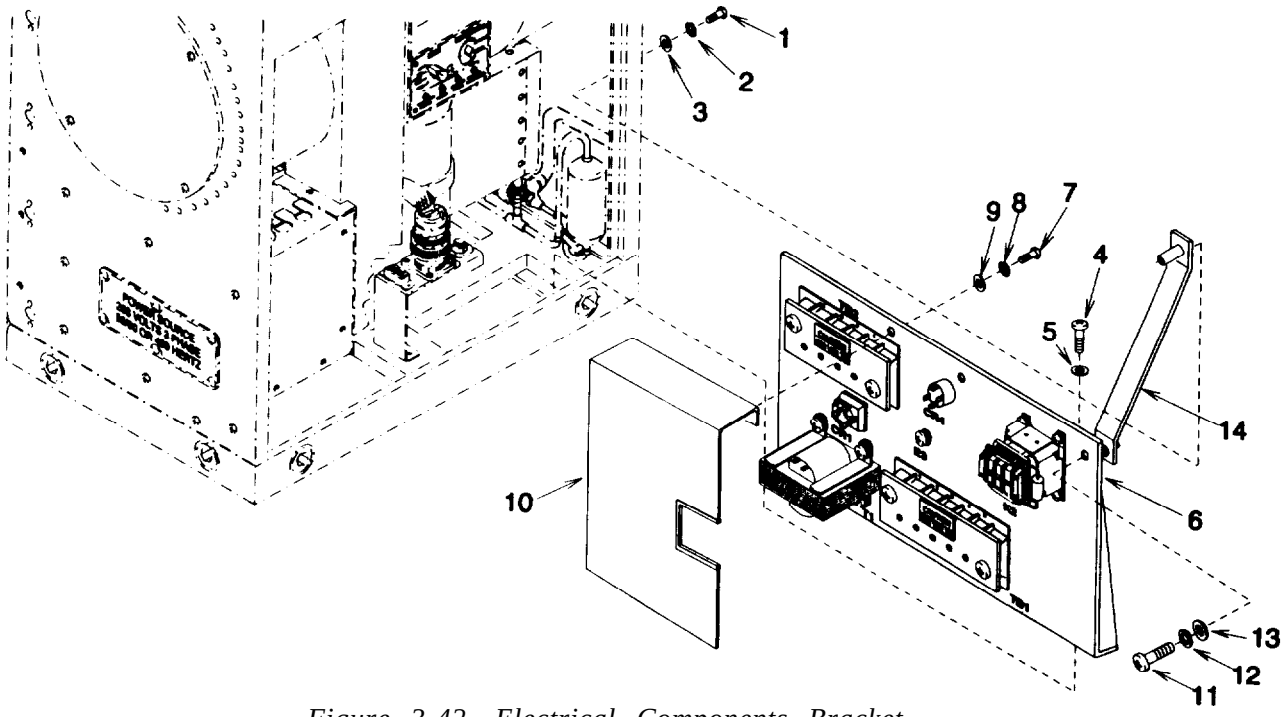


Figure 3-42. Electrical Components Bracket

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.

3-29. CAPACITORS (C3, C4, C5, C6, AND C7) TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Capacitance Meter (Item 10, Appendix B)

Materials/Parts

Lock Washers, Qty 6 (Item 8, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Electrical components bracket removed and disassembled as necessary to access terminal boards TB1 and TB2. See para 3-28.

a. *Removal.*

(1) *Capacitors C3 and C4 Removal.*

(a) Remove two screws (1) Figure 3-43, lock washers (2), flat washers (3), cover (4), and two posts (5). Discard lock washers.

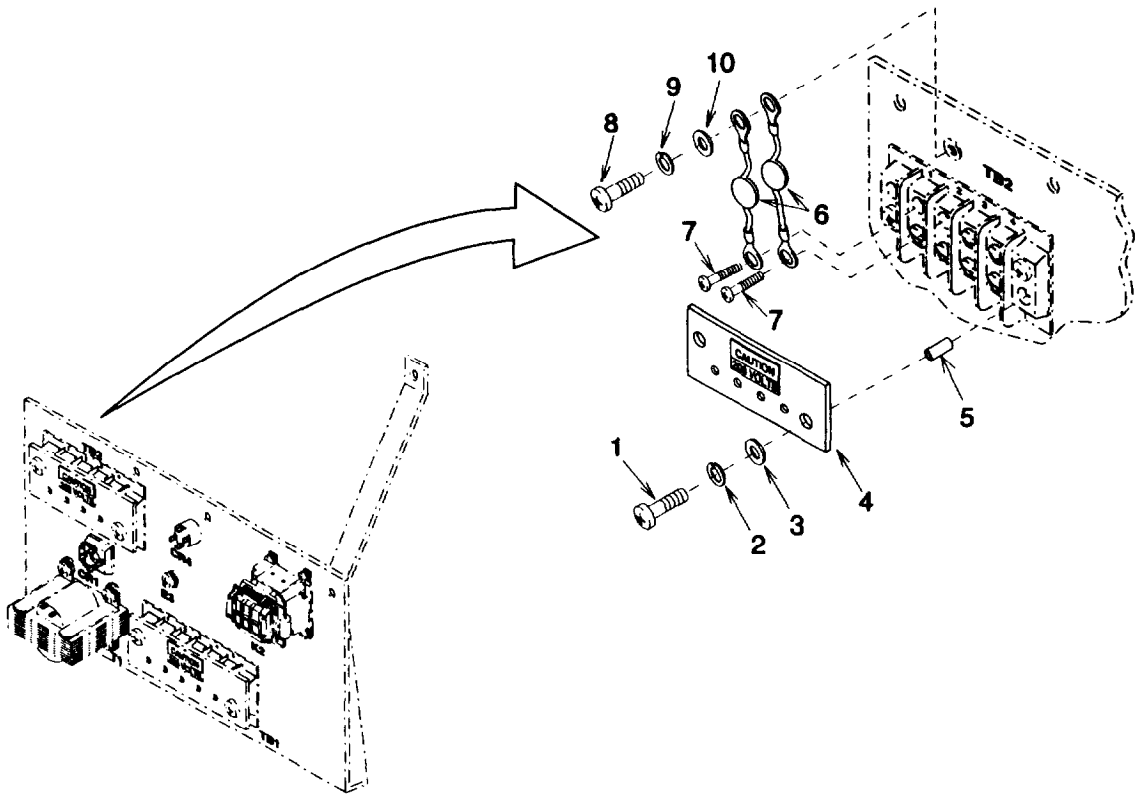


Figure 3-43. Capacitors (C3 and C4)

(b) Tag wire leads connected with capacitors (6) leads.

3-29. CAPACITORS (C3, C4, C5, C6, AND C7) TESTING AND REPLACEMENT. (Cont)

(c) Remove two screws (7).

(d) Remove screw (8), lock washer (9), flat washer (10), and two capacitors (6). Discard lock washer.

(2) *Capacitors C5, C6, and C7 Removal.*

(a) Remove two screws (1) Figure 3-44, lock washers (2), flat washers (3), cover (4), and two posts (5). Discard lock washers.

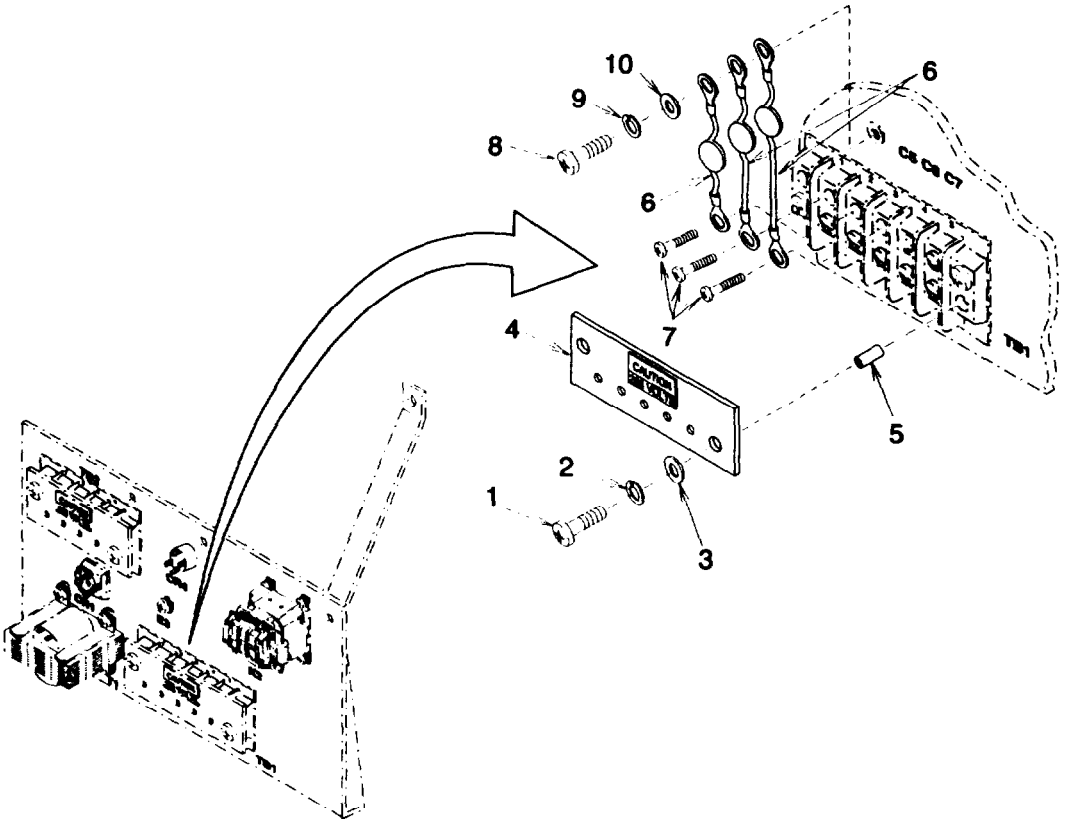


Figure 3-44. Capacitors (C5, C6, and C7)

(b) Tag wire leads connected with capacitors (6) leads.

(c) Remove three screws (7).

(d) Remove screw (8), lock washer (9), flat washer (10), and three capacitors (6). Discard lock washer.

b. *Testing.* Using a capacitance meter set to measure capacitance in micro Farads, measure between terminal leads of individual capacitors. A capacitance of between 0.00376 and 0.00564 µF should be indicated. Replace any defective capacitors.

c. *Installation.*

(1) *Capacitors C3 and C4 Installation.*

(a) Install two capacitors (6) Figure 3-43, screw (8), flat washer (10), and new lock washer (9).

(b) Install capacitor (6) leads and any wire leads as necessary per tags and wiring diagram Figure 3-5. Secure each using screw (7). Remove tags.

(c) Install two screws (1), new lock washers (2), flat washers (3), cover (4), and two posts (5).

(2) *Capacitors C5, C6. and C7 Installation.*

(a) Install three capacitors (6) Figure 3-44, screw (8), flat washer (10), and new lock washer (9).

(b) Install capacitor (6) leads and any wire leads as necessary per tags and wiring diagram Figure 3-5. Secure each using screw (7). Remove tags.

(c) Install two screws (1), new lock washers (2), flat washers (3), cover (4), and two posts (5).

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the electrical components bracket. See para 3-28.

3-30. RECTIFIERS (CR1 AND CR4) WITH CAPACITORS (C1 AND C2) TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix 8)
Capacitance Meter (Item 10, Appendix B)

Materials/Parts

Marker Tag (Item 2, Appendix E)

Equipment Conditions.

Electrical components bracket removed and disassembled as necessary to access rectifiers (CR1 and CR4). See para 3-28.

a. *Removal.*

(1) *Rectifier (CR1) and Capacitors (C1 and C2) Removal.*

(a) Tag and disconnect wire leads from rectifier (1) Figure 3-45 terminals. See paragraph 3-19.

(b) Tag and disconnect capacitors (2) and (3) from rectifier (1) terminals. See paragraph 3-19.

(c) Remove screw (4), flat washer (5), and rectifier (1).

3-30. RECTIFIERS (CR1 AND CR4) WITH CAPACITORS (C1 AND C2) TESTING AND REPLACEMENT. (Cont)

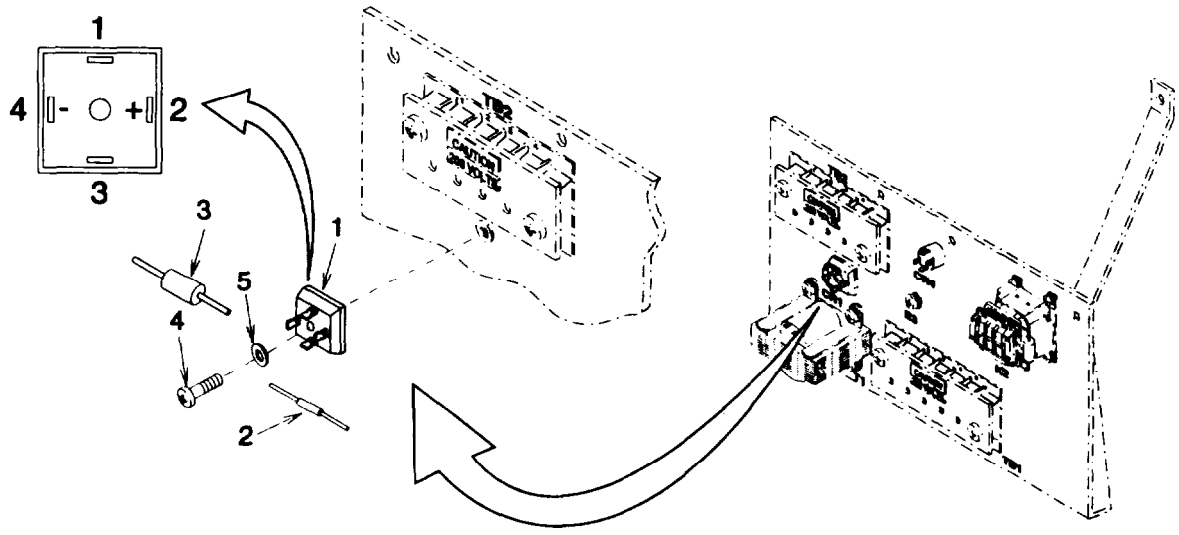


Figure 3-45. Rectifier (CR1) and Capacitors (C1 and C2)

(2) *Rectifier (CR4) Removal.*

(a) Tag and disconnect wire leads from rectifier (1) Figure 3-46 terminals. See paragraph 3-19.

(b) Remove nut (2), lock washer (3), and rectifier (1).

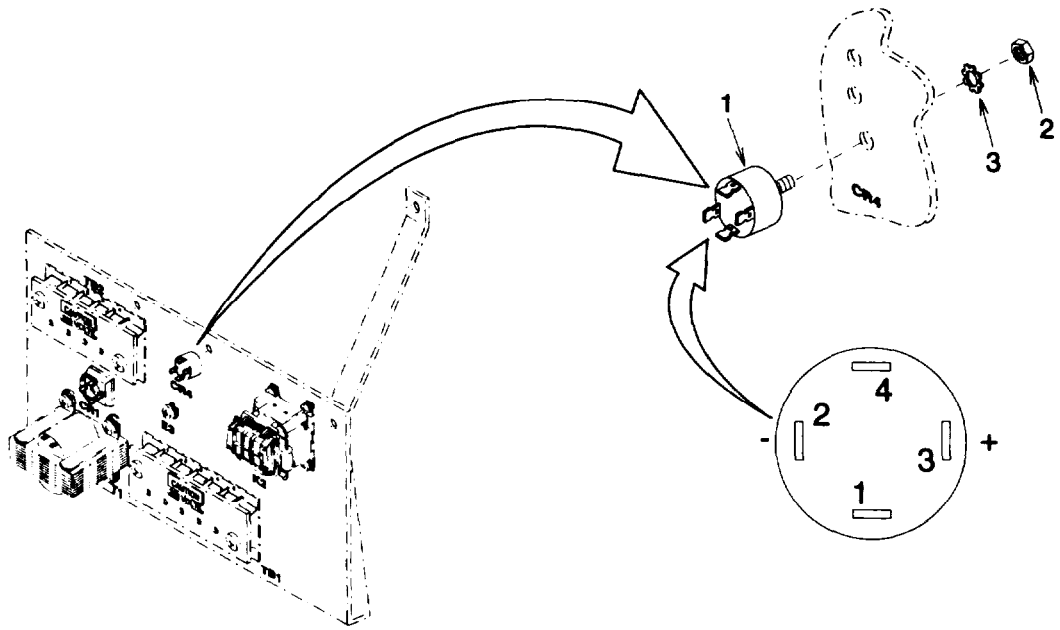


Figure 3-46. Rectifier (CR4)

b. *Testing.*

(1) *Rectifier (CR1) Testing.*

(a) Using a multimeter set to measure resistance, perform the following checks on rectifier (1) Figure 3-45.

1 Connect black (negative) lead to terminal 4 and red (positive) lead in turn to terminals 1 and 2. A low resistance reading should be indicated.

2 Connect red (positive) lead to terminal 4 and black (negative) lead in turn to terminals 1 and 2. An open circuit should be indicated.

3 Connect red (positive) lead to terminal 3 and black (negative) lead in turn to terminals 1 and 2. A short circuit should be indicated.

4 Connect black (negative) lead to terminal 3 and red (positive) lead in turn to terminals 1 and 2. An open circuit should be indicated.

(b) Replace rectifier (1) if defective.

(2) *Rectifier (CR4) Testing.*

(a) Using a multimeter set to measure resistance, perform the following checks on rectifier (1) Figure 3-46.

1 Connect black (negative) lead to terminal 2 and red (positive) lead in turn to terminals 1 and 3. A low resistance reading should be indicated.

2 Connect red (positive) lead to terminal 2 and black (negative) lead in turn to terminals 1 and 3. An open circuit should be indicated.

3 Connect red (positive) lead to terminal 4 and black (negative) lead in turn to terminals 1 and 3. A short circuit should be indicated.

4 Connect black (negative) lead to terminal 4 and red (positive) lead in turn to terminals 1 and 3. An open circuit should be indicated.

NOTE

Rectifier (CR4) will fail if surge arrestor (SA1) is defective. It is advisable to replace the surge arrestor as a precautionary measure any time the rectifier is found to be defective.

(b) Replace rectifier (1) if defective.

(3) *Capacitor (C1) Testing.* Using a capacitance meter set to measure capacitance in pico Farads, measure between capacitor (2) Figure 3-45 terminal leads. A capacitance of between 9,000 and 11,000 pF should be indicated. Replace capacitor if defective.

(4) *Capacitor (C2) Testing.* Using a capacitance meter set to measure capacitance in micro Farads, measure between capacitor (3) Figure 3-45 terminal leads. A capacitance of between 110 and 130 µF should be indicated. Replace capacitor if defective.

3-30. RECTIFIERS (CR1 AND CR4) WITH CAPACITORS (C1 AND C2) TESTING AND REPLACEMENT. (Cont)

c. *Installation.*

(1) *Rectifier (CR1) and Capacitors (C1 and C7) Installation.*

(a) Install rectifier (1) Figure 3-45, screw (4), and flat washer (5).

(b) Connect wire leads and capacitors (2) and (3) to rectifier (1) terminals per tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

(2) *Rectifier (CR4) Installation.*

(a) Install rectifier (1) Figure 3-46, lock washer (3), and nut (2).

(b) Connect wire leads to rectifier (1) terminals per tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the electrical components bracket. See para 3-30.

3-31. TRANSFORMER TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 4 (Item 8, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Electrical components bracket removed and disassembled as necessary to access transformer. See para 3-28.

a. *Removal.*

(1) Tag and disconnect wire leads from transformer (1) terminals. See paragraph 3-19.

(2) Remove four screws (2), lock washers (3), flat washers (4), and transformer (1). Discard lock washers.

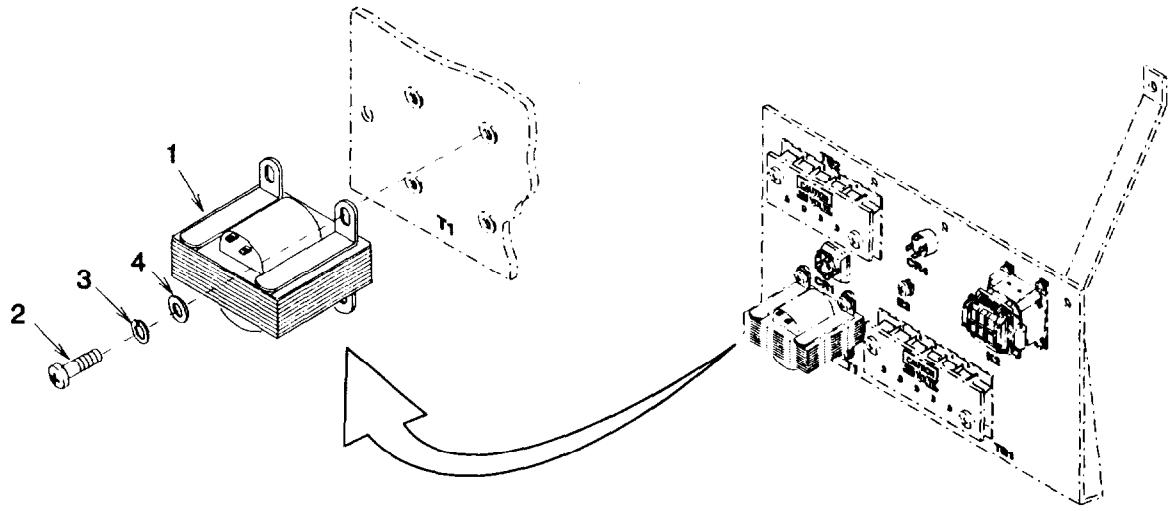


Figure 3-47. Transformer

b. *Testing.*

(1) Using multimeter set to measure resistance, perform the following checks on transformer (1).

(a) Check continuity between terminals 1 and 2. Continuity should be indicated.

(b) Check continuity between terminals 3 and 4. Continuity should be indicated.

(c) Check continuity between terminals 1 and 3. Continuity should not be indicated.

(2) Replace transformer (1) if it is defective.

c. *Installation.*

(1) Install transformer (1), four screws (2), new lock washers (3), and flat washers (4).

(2) Connect wire leads to transformer (1) terminals per tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the electrical components bracket. See para 3-28.

3-32. RELAYS K1 AND K2 WITH DIODES CR2, CR3, AND SURGE ARRESTOR SA1 TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Power Supply (Item 5, Appendix B)

Materials/Parts

Lock Washers, Qty 8 (Item 8, Appendix G)
Marker Tag (Item 2, Appendix E)

a. *Removal.*

(1) *Relay (K1) and Diode (CR2) Removal.*

(a) Remove top panel. See paragraph 3-14.

(b) Remove four screws (1) Figure 3-48, flat washers (2), and two terminal covers (3).

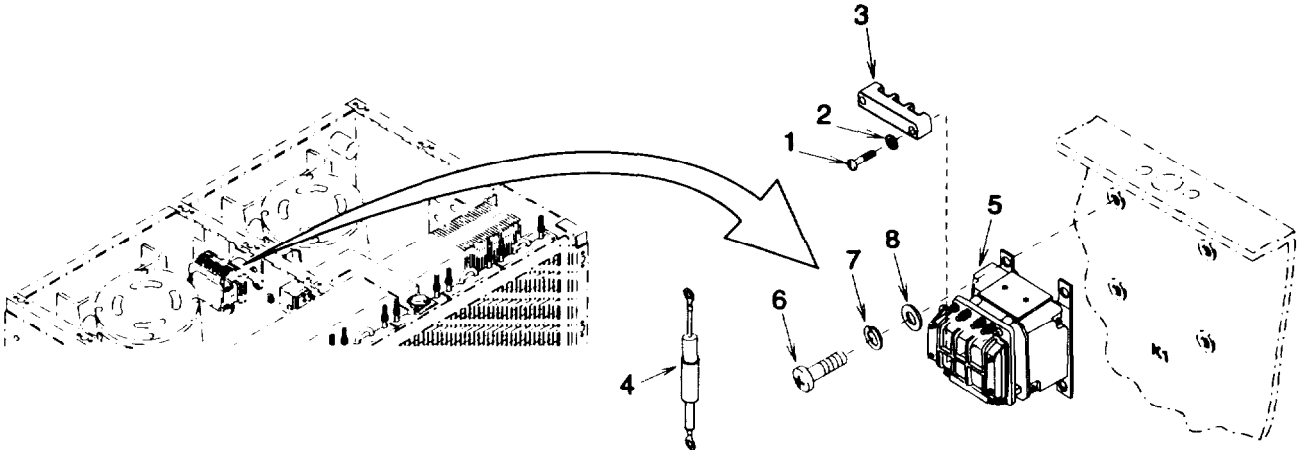


Figure 3-48. Relay (K1) and Diode (CR2)

(c) Tag and disconnect wire leads and diode (4) from relay (5) terminals.

(d) Remove four screws (6), lock washers (7), flat washers (8), and relay (5). Discard lock washers.

(2) *Relay (K2). Diode (CR3). and Surge Arrestor (SA1) Removal.*

(a) Remove electrical components bracket and disassemble as necessary to access relay (1) Figure 3-49. See paragraph 3-28.

(b) Remove four screws (2), flat washers (3), and two terminal covers (4).

(c) Tag and disconnect wire leads, diode (5), and surge arrestor (6) from relay (1) terminals.

(d) Remove four screws (7), lock washers (8), flat washers (9), and relay (1). Discard lock washers.

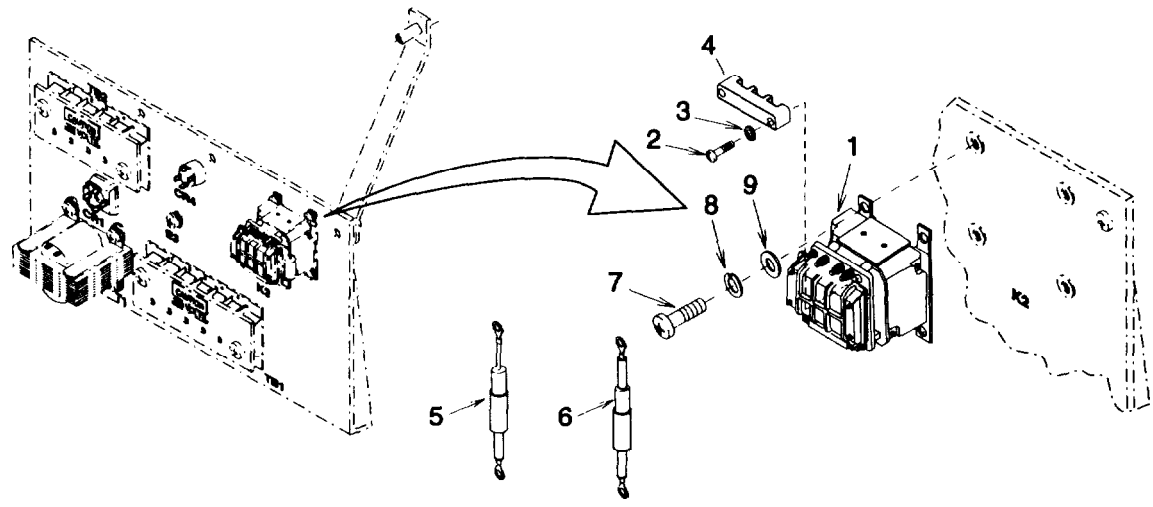


Figure 3-49. Relay (K2), Diode (CR3), and Surge Arrestor (SA1)

b. *Testing.*

(1) *Relays (K1) and (K2) Testing.* The following procedures apply to both relays and should be performed on each one separately.

(a) Using power supply, apply 28 volts dc to relay coil terminals X1 and X2.

(b) Using multimeter set to measure resistance, check continuity in turn between relay contacts Al to A2, B1 to B2, and C1 to C2. Continuity should be indicated.

(c) Disconnect power supply from relay coil terminals X1 and X2.

(d) Using multimeter set to measure resistance, check continuity in turn between relay contacts Al to A2, B1 to B2, and C1 to C2. No continuity should be indicated.

(e) Replace relay if it is defective.

NOTE

Surge arrestor (SA1) protects rectifier (CR4). If the surge arrestor is defective, it is advisable to test the rectifier.

(2) *Diodes (CR2) and (CR3) Testing.* The following procedures apply to both diodes and should be performed on each one separately.

(a) Using multimeter set to measure resistance, check resistance across the diode per the following procedures.

1 Connect black lead (negative) to terminal nearest the band on diode body and the red lead (positive) to the opposite terminal. Slight resistance should be indicated.

2 Connect red lead (positive) to terminal nearest the band on diode body and the black lead (negative) to the opposite terminal. No resistance should be indicated.

(b) Replace the diode if it is defective.

(3) *Surge Arrestor (SA1) Testing.* No conclusive test can be performed on the surge arrestor (6) Figure 3-49. If it is visibly damaged or suspected to be defective, replace it.

3-32. RELAYS K1 AND K2 WITH DIODES CR2, CR3, AND SURGE ARRESTOR SA1 TESTING AND REPLACEMENT. (Cont)

c. *Installation.*

(1) *Relay (K1) Installation.*

(a) Install relay (5) Figure 3-48, four screws (6), new lock washers (7), and flat washers (8).

(b) Connect wire leads and diode (4) to relay (5) terminals per tags and wiring diagram Figure 3-5. Terminal lead nearest band on diode body must be connected to relay terminal Xl. Remove tags.

(c) Install two terminal covers (3), four screws (1), and flat washers (2).

(d) Install top panel. See paragraph 3-14.

(2) *Relay (K2) and Surge Arrestor (SA1) Installation.*

(a) Install relay (1) Figure 3-49, four screws (7), new lock washers (8), and flat washers (9).

(b) Connect wire leads, diode (5), and surge arrestor (6) to relay (1) terminals per tags and wiring diagram Figure 3-5. Terminal lead nearest band on diode body must be connected to relay terminal X1. Remove tags.

(c) Install two terminal covers (4), four screws (2), and flat washers (3).

(d) Assemble and install electrical components bracket. See paragraph 3-28.

(e) Install lower front panel. See paragraph 3-14.

3-33. TERMINAL BOARDS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 8 (Item 8, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Electrical components bracket removed and disassembled as necessary to access terminal boards. See para 3-28.

a. *Removal.* The following procedures apply to both terminal boards and should be performed on each one separately.

(1) Remove two screws (1), lock washers (2), flat washers (3), cover (4), and two posts (5). Discard lock washers.

(2) Tag and disconnect capacitors (6) leads and wire leads from terminal board (7) terminals.

(3) Remove two screws (8), lock washers (9), flat washers (10), terminal board (7), and marker strip (11). Discard lock washers.

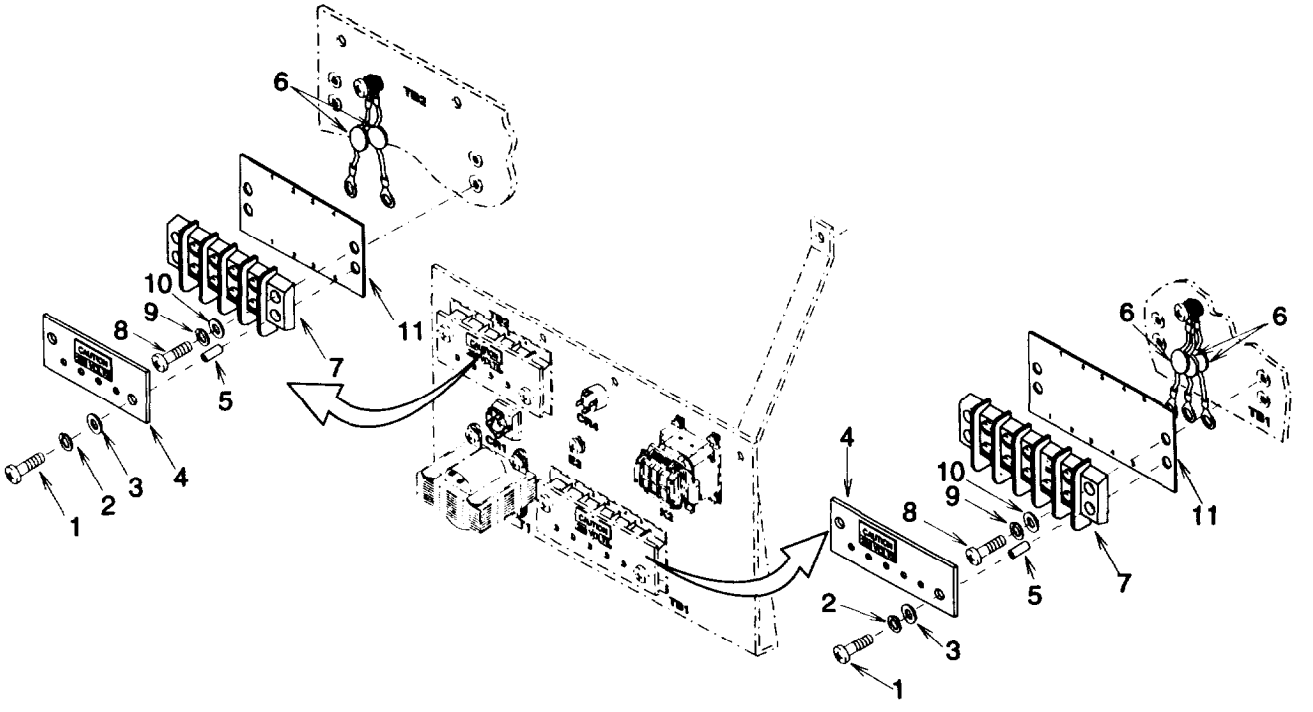


Figure 3-50. Terminal Boards (TB1) and (TB2)

b. *Installation.* The following procedures apply to both terminal boards and should be performed on each one separately.

(1) Install marker strip (11), terminal board (7), two screws (8), new lock washers (9), and flat washers (10).

(2) Connect capacitors (6) leads and wire leads to terminal board (7) terminals per tags and wiring diagram Figure 3-5. Remove tags.

(3) Install two screws (1), new lock washers (2), flat washers (3), cover (4), and two posts (5).

NOTE

FOLLOW-ON MAINTENANCE:
Assemble and install the electrical components bracket. See para 3-28.

3-34. EVAPORATOR FANS AND MOTORS TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock washers, Qty 8 (Item 10, Appendix G)
Lock washers, Qty 8 (Item 26, Appendix G)
Tiedown Straps, Qty 2 (Item 20, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Remove top panel. See para 3-14.

a. *Removal*

NOTE

Removal is typical of both fans and motors.

(1) Tag and disconnect fan motor cable connectors (1) Figure 3-51.

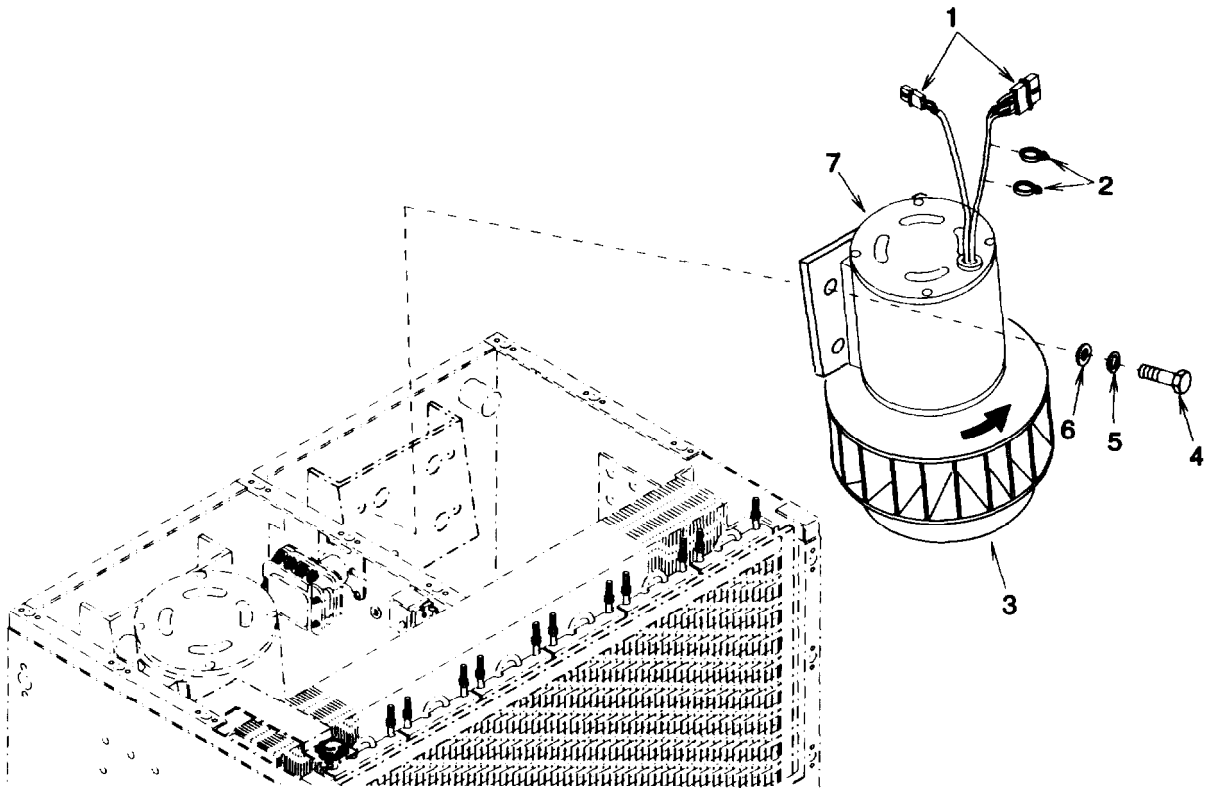


Figure 3-51. Evaporator Fan and Motor

(2) Cut tiedown straps (2) as necessary.

Motor must be supported as hardware is removed or damage to the fan will occur.

(3) Note rotation of fan (3) and remove four screws (4), lock washers (5), flat washers (6), and motor fan assembly (7). Discard lock washers.

(4) Remove four screws (1) Figure 3-52, lock washers (2), flat washers (3), shims (4), and motor plate (5). Discard lock washers.

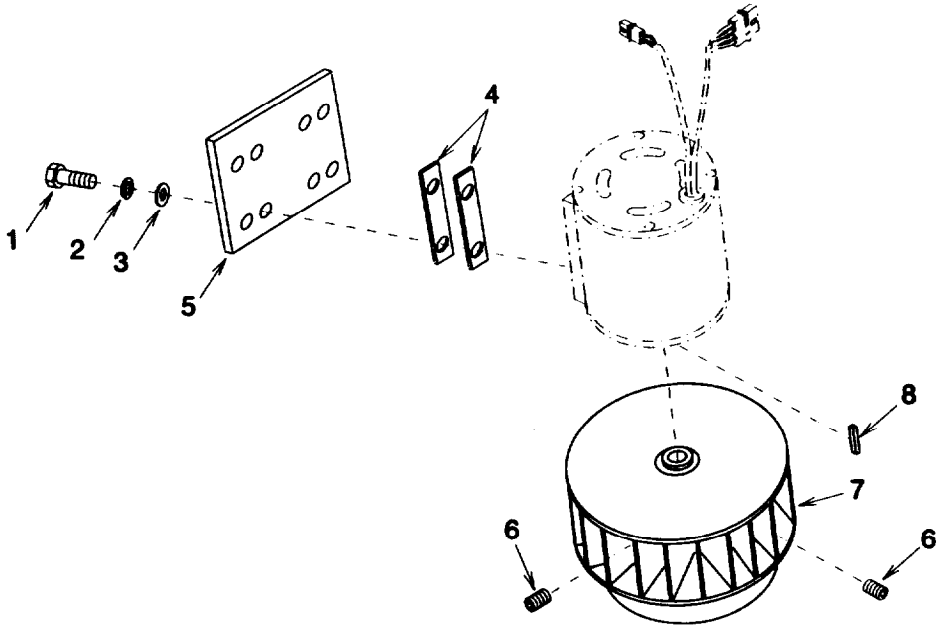


Figure 3-52. Evaporator Fan and Motor Assembly.

(5) Loosen two setscrews (6), remove fan (7), and key (8).

3-34. EVAPORATOR FANS AND MOTORS TESTING AND REPLACEMENT. (Cont)

(6) Note mounting location of collar assembly (1) Figure 3-53 and remove four screws (2), flat washers (3), collar assembly (1), and inlet bell (4).

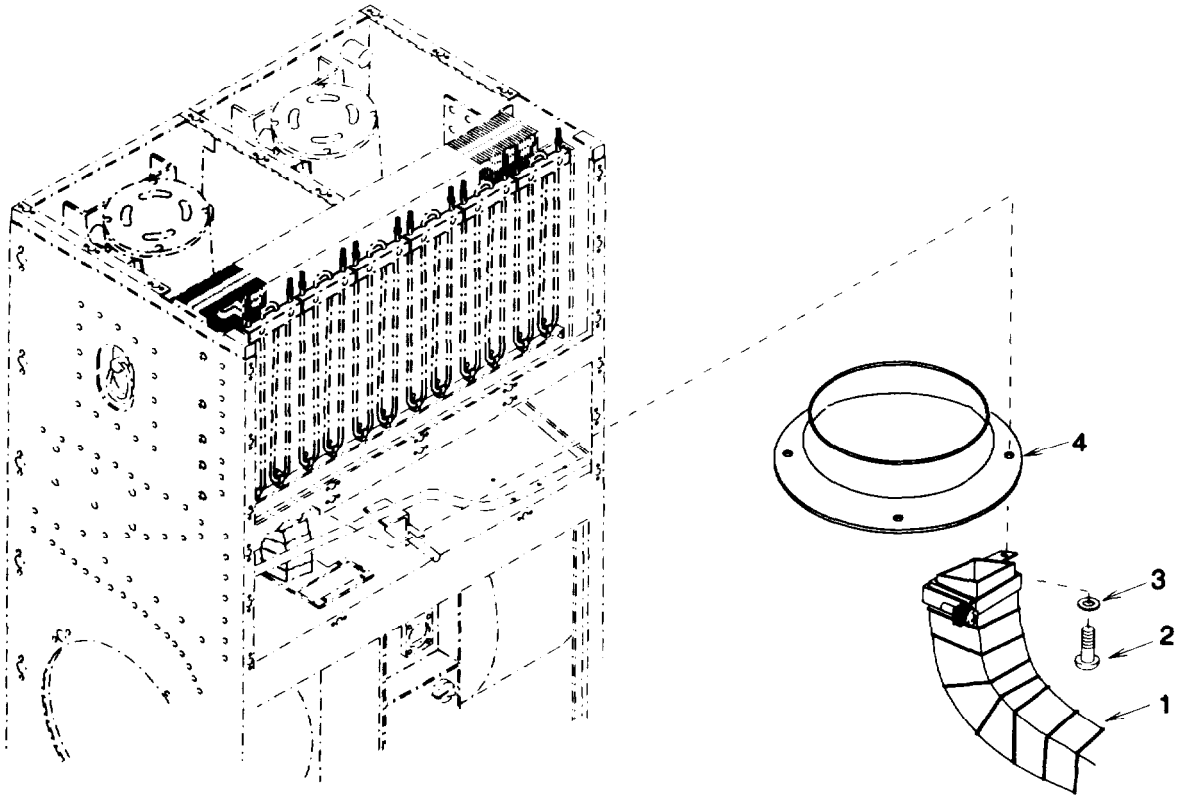


Figure 3-53. Inlet Bell

b. *Testing.*

NOTE

Testing is typical of both motors.

(1) Use a multimeter set on lowest OHMS scale to check continuity between pins A and B, A and C and B and C in connector. If there is no continuity between any pair of pins, the motor winding is open. Replace motor.

(2) Use a multimeter set on lowest OHMS scale to check for continuity between each pin in connector (A, B, and C) and the motor housing. If there is continuity between any pin and motor housing, the motor winding is shorted. Replace motor.

(3) Replace motor if defective.

c. Installation.

NOTE

Installation is typical of both fans and motors.

(1) Install inlet bell (4) Figure 3-53, on collar assembly (1) located as noted during removal, four screws (2), and flat washers (3).

(2) Install key (8) Figure 3-52, fan (7), and tighten two set screws (6).

(3) Install four shims (4), motor plate (5), four screws (1), new lock washers (2), and flat washers (3).

NOTE

The fans are not identical. They must rotate in opposite directions. Take care that they are installed on correct side.

(4) Observe fan (3) Figure 3-51 rotation noted during removal and install motor fan assembly (7), four screws (4), new lock washers (5) and flat washers (6).

(5) Check that fan (3) is centered on inlet bell (4) Figure 3-53. If it is not, loosen mounting hardware and adjust as necessary. Retighten mounting hardware. If front to rear adjustment is required, loosen mounting hardware and add or remove shims (4) Figure 3-52 as necessary.

(6) Loosen two setscrews (6), and slip fan (7) down so that there is 0.06 to 0.08 in. (0.15 to 0.20 cm) clearance between fan and inlet bell (4) Figure 3-53. Tighten setscrews.

(7) Connect motor connectors (1) Figure 3-51 using tags and wiring diagram Figure 3-5. Remove tags.

(8) Secure wires with new tiedown straps (2) as necessary.

NOTE

FOLLOW-ON MAINTENANCE:
Install top panel. See para 3-14.

3-35. HEATER THERMOSTAT TESTING AND REPLACEMENT.

This task covers: a. Removal b. Testing c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Self locking nuts, Qty 2 (Item 21, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Remove top panel. See para 3-14.

a. *Removal.*

(1) Tag and disconnect leads.

(2) Remove two self locking nuts (1), screws (2), flat washers (3), and thermostatic switch (4). Discard self locking nuts.

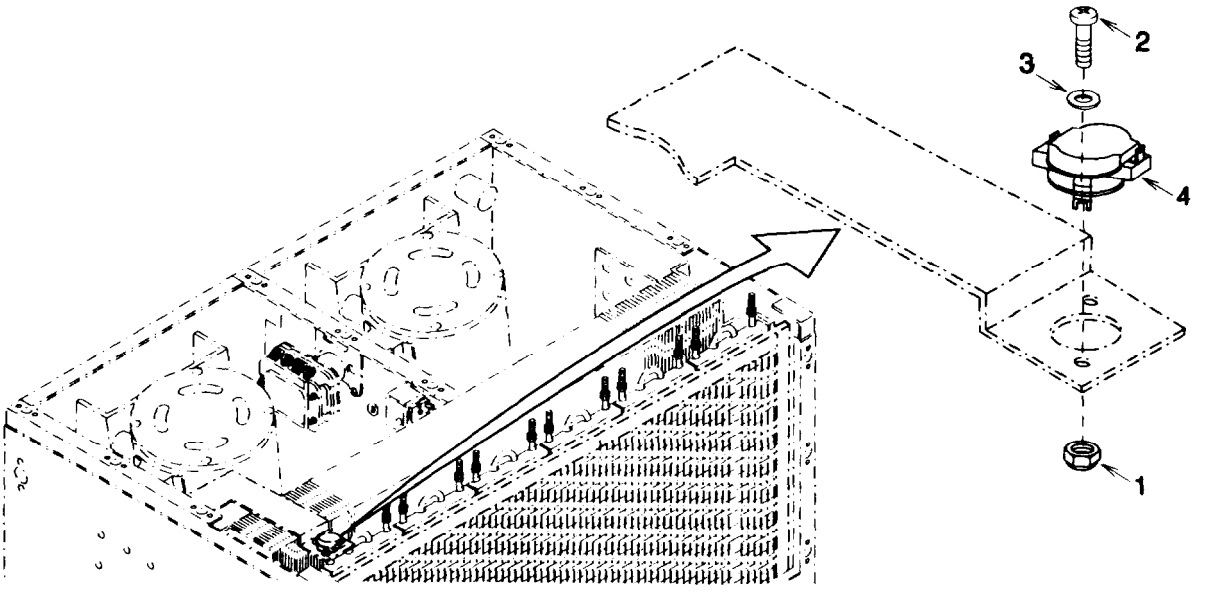


Figure 3-54. Thermostatic (Heater Cutout) Switch

b. *Testing.*

(1) With thermostat at room temperature, use multimeter set on the lowest OHMS scale to check for continuity between terminals 1 and 2. If continuity is not indicated between terminals, replace the thermostat.

(2) For full operational test of thermostat use an external heat source. Thermostat should open (no continuity across terminals) at temperature increase of 194° F ± 9° (90° C ± 5°) and close at temperature decrease of 142° F ± 16° (61° C ± 9°). If defective, replace thermostatic switch.

c. Installation.

(1) Install thermostatic switch (4), two screws (2), flat washers (3), and new self locking nuts (1).

(2) Connect wire leads using wiring diagram Figure 3-5 and tags. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install top panel. See para 3-14.

3-36. HEATER ELEMENT TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials /Parts

Marker Tag (Item 2, Appendix E)

Equipment Conditions.

Remove front grill. See para 3-13.
Remove mist eliminator. See para 3-17.

a. *Testing.*

(1) Tag and disconnect wire leads from the heater element (1) that is being removed.

(2) Use a multimeter set on lowest OHMS scale, check for continuity between the two heater terminal studs (2). Replace if no continuity is indicated.

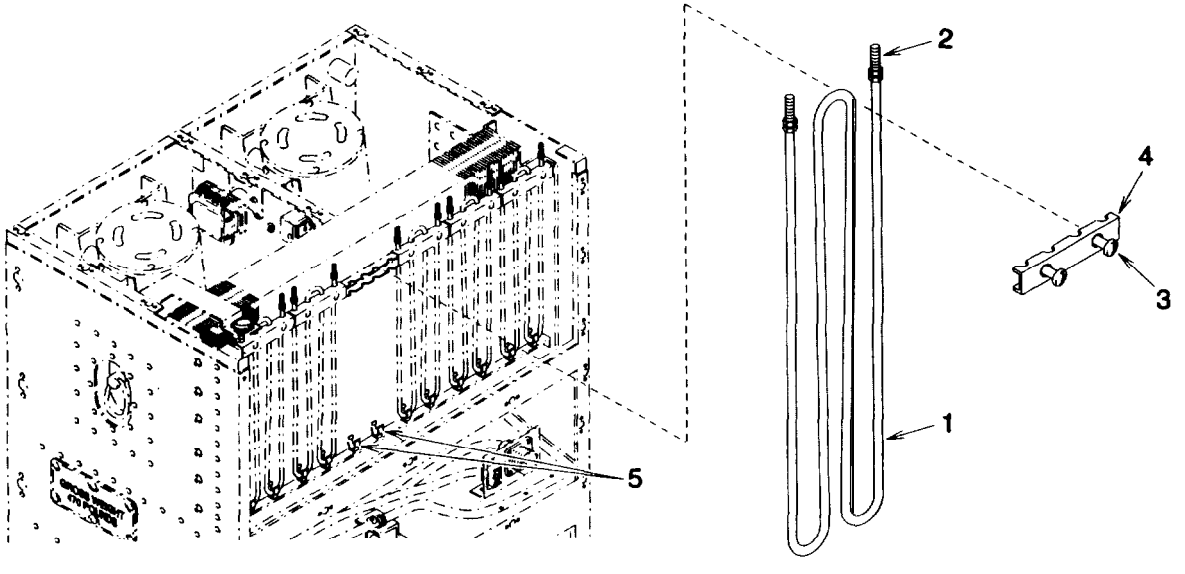


Figure 3-55. Heating Elements (HR1 through HR6)

3-36. HEATER ELEMENT TESTING AND REPLACEMENT. (Cont)

(3) Use a multimeter set on lowest OHMS scale, check for continuity between the two heater terminal studs (2) and heater (1) sheath. Replace if continuity is indicated.

(4) If heater element (1) tests good, connect wire leads using wiring diagram Figure 3-5 and tags. Remove tags.

b. *Removal.*

(1) Tag and disconnect wire leads from the heater element (1) that is being removed.

(2) Loosen two screws (3) and remove channel (4).

(3) Carefully pull heater element (1) from lower mounting clips (5).

c. *Installations.*

(1) Insert heater element (1) into lower mounting clips (5).

(2) Install channel (4) and tighten two screws (3).

(3) Connect wire leads using wiring diagram Figure 3-5 and tags. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install mist eliminator. See para 3-17.
Install top panel. See para 3-14.
Install front grilles. See para 3-13.

3-37. CONDENSER FANS AND MOTOR TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials /Parts

Lock washer, Qty 4 (Item 4, Appendix G)
Self locking nut, Qty 4 (Item 13, Appendix G)

Equipment Conditions:

Remove lower front panel. See para 3-14.
Remove condenser fan covers. See para 3-14.

Personnel Required:

Two

a. *Testing.*

(1) Disconnect harness connector (1) Figure 3-56 from motor connector (2).

(2) Use a multimeter set on lowest OHMS scale to check continuity between A and B, A and C, and B and C in motor connector (2). If there is no continuity between any pairs of pins, the motor winding is open. Replace motor.

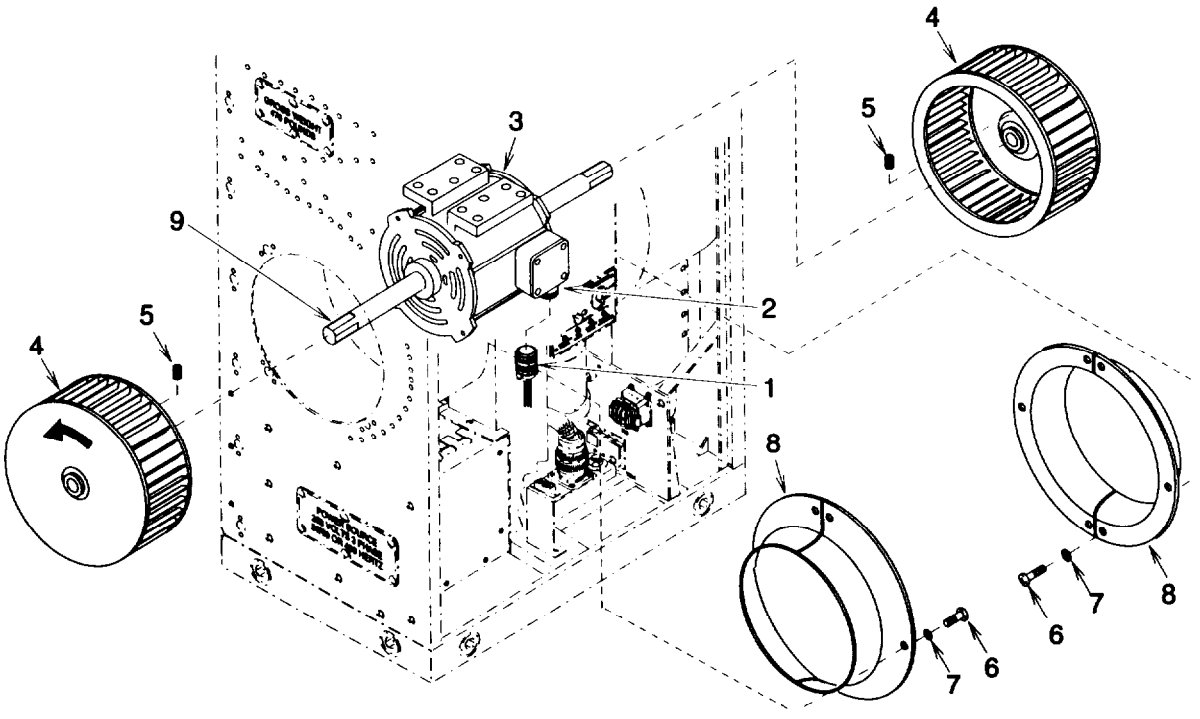


Figure 3-56. Condenser Fans

(3) Use a multimeter set on lowest OHMS scale to check for continuity between each pin A, B, and C in motor connector (2) and the motor (3) housing. If there is continuity between any pin and motor housing, the motor winding is shorted. Replace motor.

(4) Use a multimeter set on high OHMS scale to test stator insulation by checking between each pin A, B, and C in motor connector (2) and motor (3) housing. A reading of less than 500,000 ohms indicates insulation failure. Replace motor.

(5) Check continuity between pins D and E in motor connector (2). If there is no continuity, this indicates an open thermostat. Replace motor.

(6) If motor (3) tests good, connect harness connector (1) to motor connector (2).

b. *Removal.*

NOTE

Removal is typical for both fans.

(1) Disconnect harness connector (1) Figure 3-56 from motor connector (2).

(2) Note rotation of fan (4) and loosen two sets screws (5). Remove fan (4).

(3) Remove six screws (6), flat washers (7), and inlet bell (8).

3-37. CONDENSER FANS AND MOTOR TESTING AND REPLACEMENT. (Cont)

NOTE

Support or hold motor in place. Note number and location of shims as mounting hardware is removed.

(4) Remove one self locking nut (1) Figure 3-57, flat washer (2), screw (3), flat washer (4), wire lead (5), flat washer (6), and lock washer (7). Discard self locking nut and lock washer.

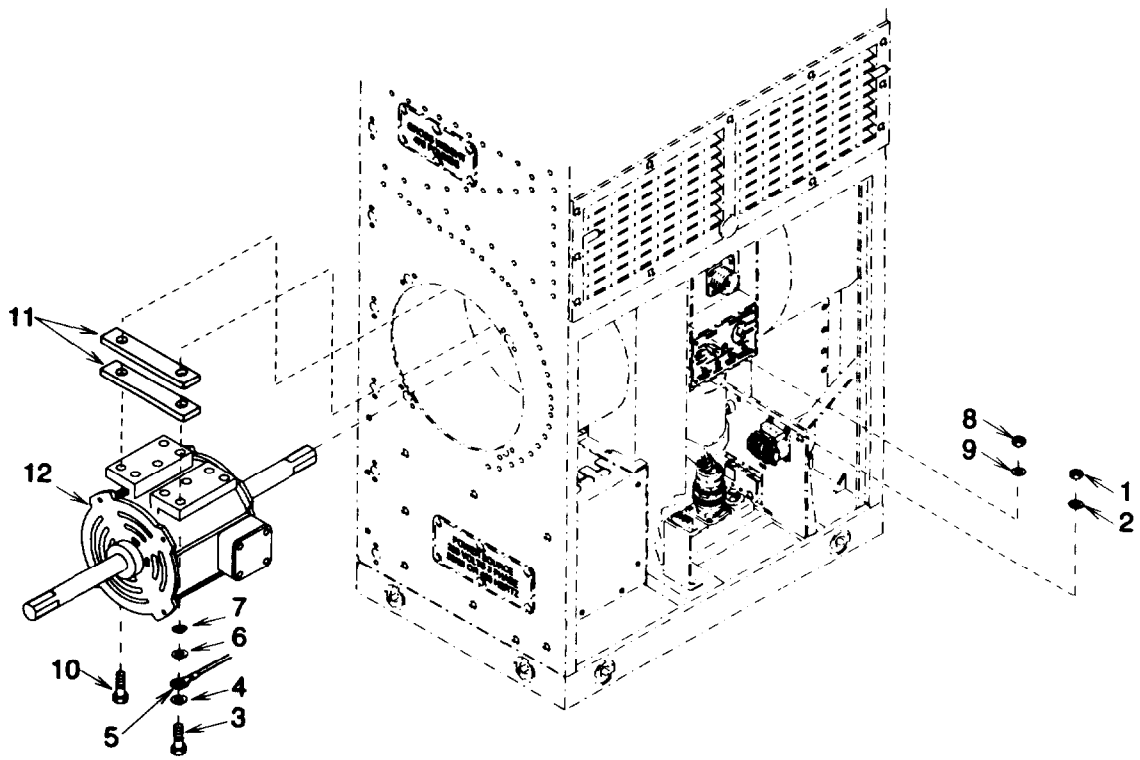


Figure 3-57. Condenser Fan Motor

CAUTION

Motor must be supported as hardware is removed or damage to the motor will occur.

(5) Remove three self locking nuts (8), flat washers (9), screws (10) and four shuns (11). Carefully remove motor (12) from left side of air conditioner.

c. *Installation.*

(1) Lift motor (12) Figure 3-57, into position and install four shims (11), three screws (10), flat washers (9), and new self locking nuts (8).

(2) Install screw (3), flat washer (4), wire lead (5), flat washer (6), new lock washer (7), flat washer (2) and new self locking nut (1).

(3) Install inlet bell (8) Figure 3-56, six screws (6), and flat washers (7).

NOTE

The fans are not identical parts. Take care that fans are installed on correct side.

(4) Observe fan (4) rotation noted during removal and install fan onto shaft (9) and tighten two setscrews (5).

(5) Spin fans (4) and check for any rotational interference. Adjust fans as follows; in or out on shaft (9), front to rear on mounting hardware, or up and down by changing quantity of shims (11) Figure 3-57.

(6) Connect harness connector (1) Figure 3-56 to motor connector (2).

NOTE

FOLLOW-ON MAINTENANCE:
Install condenser fan covers. See para 3-14.
Install lower front panel. See para 3-14.

3-38. CIRCUIT BREAKER TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock washers Qty 6 (Item 7, Appendix G)
Lock washers Qty 6 (Item 9, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Unit in shutdown mode. See para 2-7.
Power cable disconnected from input power connector. See para 2-7.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

a. *Testing.*

(1) Loosen two turnlock fasteners (1) and open condenser discharge air deflector door (2).

CAUTION

Be careful when moving refrigerant tubing, a kink or any other damage can result in a leak or reduced refrigerant flow.

(2) Remove six screws (3), lock washers (4), and flat washers (5). Pull safety control box (6) out far enough to gain access to panel mounting screws (7).

3-38. CIRCUIT BREAKER TESTING AND REPLACEMENT. (Cont)

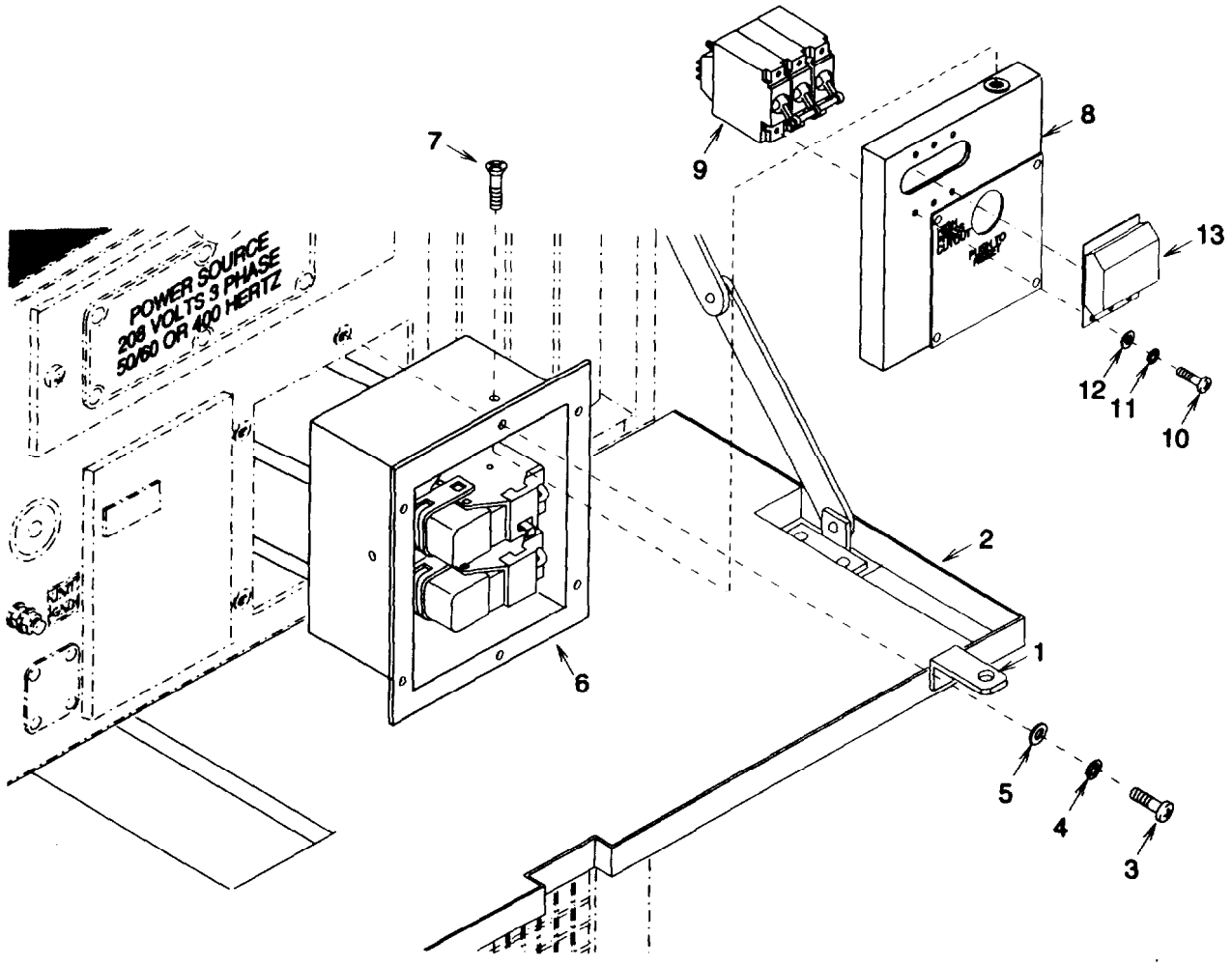


Figure 3-58. Circuit Breaker

(3) Remove four screws (7).

(4) Carefully pull panel (8) from safety control box (6) far enough to gain access to circuit breaker (9) terminal connections.

(5) Check that wires leads are properly connected. See wiring diagram Figure 3-5.

(6) Place circuit breaker (9) reset bar in the OFF position.

(7) Use multimeter set on lowest OHMS scale to check continuity between terminals A1 to A2, B1 to B2, and C1 to C2 on circuit breaker (9). All contacts should be open. If there is continuity on any check, replace circuit breaker.

(8) Place circuit breaker (9) reset bar in the ON position.

(9) Use a multimeter set on the lowest OHMS scale and repeat continuity checks between terminals Al to A2, B1 to B2, and C1 to C2 on circuit breaker (9). All contacts should be closed. If there is no continuity on any check, replace circuit breaker.

b. *Removal.*

(1) Tag and disconnect wire leads.

(2) Remove six screws (10), lock washers (11), flat washers (12) and the circuit breaker cover (13). Discard lock washers.

(3) Remove circuit breaker (9).

c. *Installation.*

(1) Secure circuit breaker (9) and circuit breaker cover (13) to panel (8) with six screws (10), new lock washers (11), and flat washers (12).

(2) See tags and wiring diagram Figure 3-5 and connect wire leads. Remove tags.

(3) Slip panel (8) back into safety control box (6) and aline mounting holes.

(4) Install four screws (7).

CAUTION

Be careful when moving refrigerant tubing, a kink or any other damage can result in a leak or reduced refrigerant flow.

(5) Carefully push safety control box (6) back into unit and secure with six screws (3), new lock washers (4), and flat washers (5).

(6) Close condenser discharge air deflector door (2) and tighten two tumlock fasteners (1).

NOTE

FOLLOW-ON MAINTENANCE:
Check that circuit breakers are reset to ON position.

3-39. SOLENOID VALVE TESTING AND COIL REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Power Supply (Item 5, Appendix B)

Equipment Conditions:

Lower front panel removed. See para 3-14.

Materials/Parts

Marker Tag (Item 2, Appendix E)

a. *Testing.*

(1) Tag and disconnect wire leads from the solenoid valve coil (1).

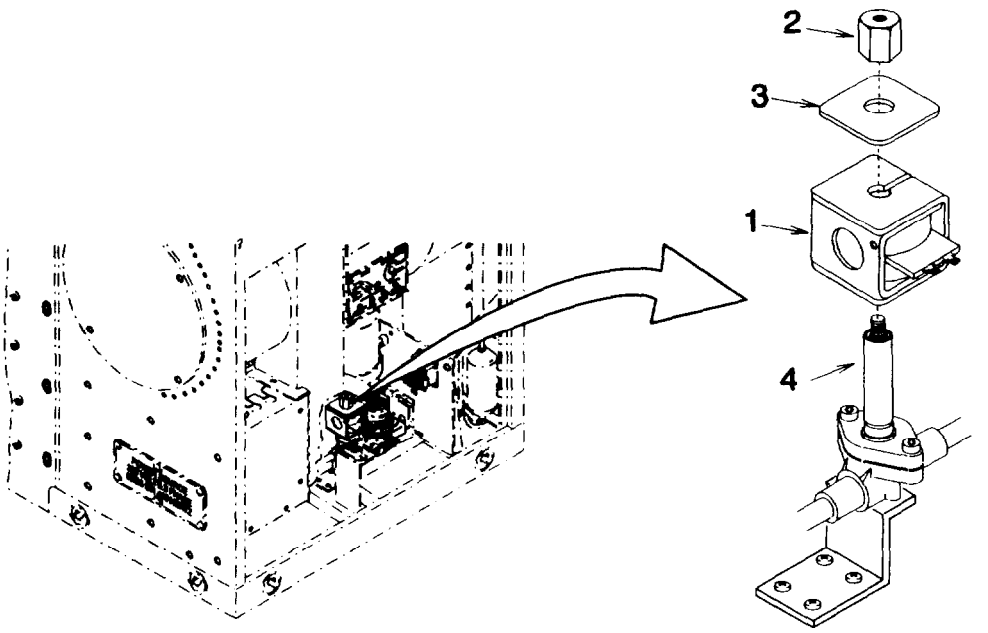


Figure 3-59. Solenoid Valve Coil

(2) Using a multimeter set to measure resistance, check for continuity between solenoid valve coil (1) terminals 1 and 2. If continuity is not found, the coil is open and must be replaced.

(3) Check for continuity between solenoid valve coil (1) terminal 1 and 2 and coil casing. If continuity is found the coil is shorted and must be replaced.

(4) If continuity checks are satisfactory, apply 28 volts dc across solenoid valve coil (1) terminals 1 and 2. Listen for a sharp click when the valve changes position. If a click is not heard, internal valve problems are indicated and the entire valve should be replaced. Notify supervisor.

(5) If all checks are satisfactory, connect wire leads to solenoid valve coil (1) using tags and wiring diagram Figure 3-5. Remove tags.

WARNING

Do not attempt any disassembly of the solenoid valve other than coil removal with a refrigerant charge in the system. Refrigerant will be sprayed out dangerously if the screws that attach the tube and plunger assembly to the valve body are loosened.

NOTE

The only authorized repair to the solenoid valve is coil replacement. The coil can be replaced without opening the refrigeration pressure system.

b. *Removal.*

(1) Tag and disconnect wire leads from solenoid valve coil (1).

(2) Remove nut (2).

(3) Pull data plate (3) and coil (1) off valve body stem (4). Replace coil.

c. *Installation.*

(1) Slide coil (1) and data plate (3) onto valve body stem (4). Secure with nut (2).

(2) Connect wire leads to solenoid coil (1) using tags and wiring diagram Figure 3-5. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.

3-40. CONDENSATE TRAPS REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Cotter pins (Item 27, Appendix G)

Equipment Conditions:

Lower front panel removed. See para 3-14.

a. *Removal.*

(1) Loosen clamps (1), (2) and spring tension clip (3). Remove hose (4).

(2) Loosen clamp (5) and spring tension clip (6). Remove hose (7).

(3) Loosen spring tension clip (8). Remove tee (9).

(4) Loosen spring tension clip (10). Remove hose (11).

(5) Remove drain tube (12).

(6) Remove cotter pin (13), spring (14), and ball (15). Discard cotter pin.

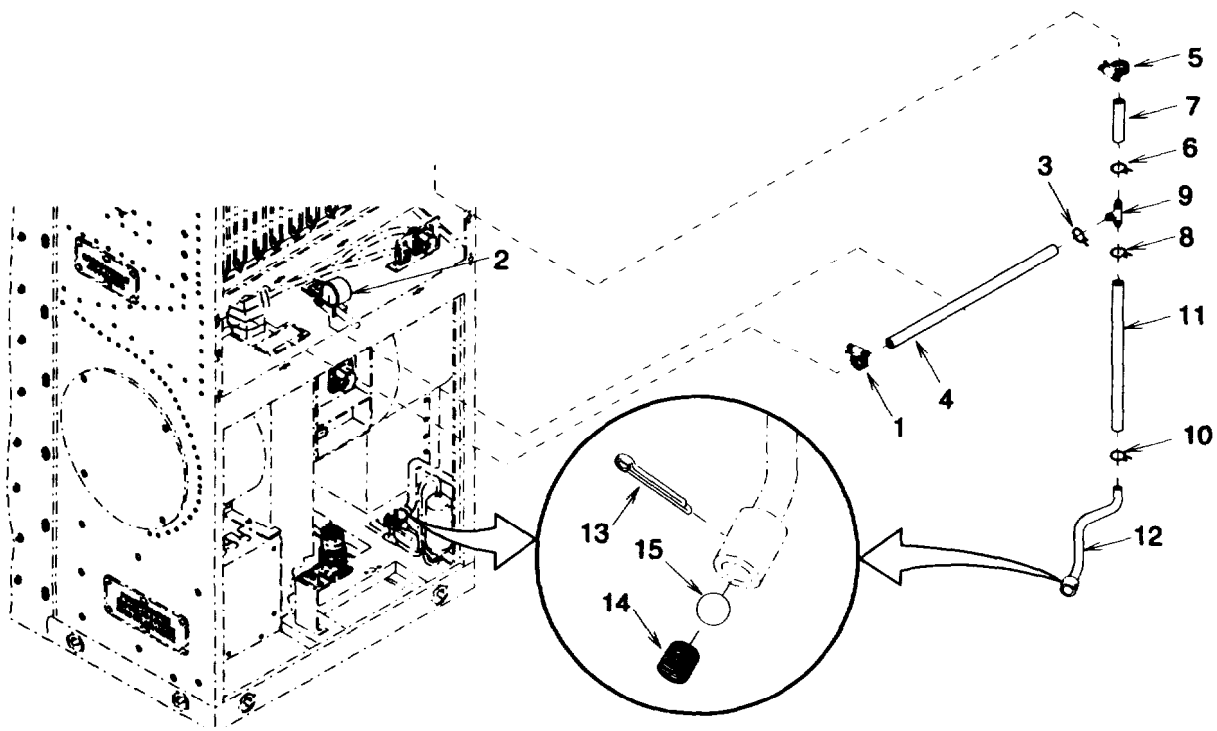


Figure 3-60. Condensate Drain Trap

b. *Installation.*

(1) Install ball (15), spring (14), and new cotter pm (13).

(2) Install drain tube (12).

(3) Install hose (11) and spring tension clip (10).

(4) Install tee (9) and spring tension clip (8).

(5) Install hose (7), springs tension clip (6) and clamp (5).

(6) Install hose (4), clamp (1), and spring tension clip (3).

(7) Tighten clamp (2).

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.

SECTION VII PREPARATION FOR STORAGE OR SHIPMENT

3-41. PREPARATION FOR STORAGE.

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current Preventive Maintenance Checks and Services (PMCS) evaluations should be compiled, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWO's) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

CHAPTER 4

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I DIRECT SUPPORT TROUBLESHOOTING

4-1. USE OF TROUBLESHOOTING TABLE.

a. The troubleshooting table, Table 4-1, lists the most common malfunctions that you may find during the operation or maintenance of the air conditioner. You should perform the tests or inspections and corrective actions in the order listed.

b. For specific malfunction, perform the troubleshooting procedures listed in Table 3-3 before performing the procedures listed in Table 4-1.

c. This manual cannot list all malfunctions that may occur. However, listed are the most common tests or inspections and corrective actions.

d. Notify your supervisor if a malfunction or corrective action is not addressed or incorrect.

SYMPTOM INDEX

Table 4-1. Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. COMPRESSOR WILL NOT OPERATE.

Test compressor per paragraph 4-31.

If compressor is defective, replace it per paragraph 4-31.

2. NOT COOLING WHEN OPERATED IN COOL MODE.

Test the equalizing solenoid per paragraph 4-27.

If the solenoid is defective, replace it per paragraph 4-27.

4-1. USE OF TROUBLESHOOTING TABLE. (Cont)

Table 4-1. Troubleshooting - Cont

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. REDUCED COOLING CAPACITY.
Step 1. Check for leaks in refrigerant system per paragraph 4-16.
Replace any leaking components per appropriate procedures. Replace or repair any leaks in tubing or fittings per paragraph 4-32.
Step 2. Check to see if dehydrator is obstructed.
Replace dehydrator per paragraph 4-20.
Step 3. Check to see if any tubing or fittings are kinked or crushed.
Replace any damaged tubing or fittings per paragraph 4-32.
Step 4. Test the expansion valve per paragraph 4-29.
If the expansion valve is defective, replace it per paragraph 4-29.
Step 5. Test equalizing solenoid per paragraph 4-27.
If solenoid is not closing completely, replace it per paragraph 4-27.

SECTION II MAINTENANCE PROCEDURES

4-2. GENERAL. The procedures in this section are arranged in the order in which the items appear in the direct (F) maintenance level columns on the Maintenance Allocation Chart (MAC) which is provided in Appendix B. Step-by-step procedures have been provided for all action authorized to be performed by direct maintenance in the order in which they appear on the MAC.

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

b. When testing the logic box assembly installed in this air conditioner, a special test fixture is required. (See paragraph 4-7 for use of this test fixture.)

Description	Part Number
Logic Box Test Fixture.....	(94833) 111K8002-1
Test Fixture Adapter Cable	(94833) 111K8016-1

4-3. FABRIC COVER REPAIR.

This task covers: Repair

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Equipment Conditions:

Fabric cover removed. See para 3-12.

Repair. Minor rips, cuts, tears, or punctures may be repaired by applying a patch to the inside surface.

NOTE

FOLLOW-ON MAINTENANCE:
Return repaired fabric cover to Unit Maintenance for installation.

4-4. GRILLES REPAIR.

This task covers: Repair

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Brush (Item 2, Appendix B)
Gloves (Item 2, Appendix B)

Materials/Parts

Adhesive (Item 1, Appendix E)

Equipment Conditions:

Grilles removed from air conditioner. See para 3-13.

NOTE

The only authorized repairs are replacement of gaskets and straightening of louvers.

Repair

(1) Remove as much old gasket material as possible by pulling or scraping it away from the surface.

4-4. GRILLES REPAIR. (Cont)

WARNING

Repeated or prolonged skin contact or inhalation or vapors can be toxic. Use in a well ventilated area and wear gloves.

(2) Soften and remove old adhesive and gasket residue, using a stiff brush.

(3) See Appendix F to identify and fabricate gasket to be replaced using material specified.

(4) Coat mating surfaces and gasket with adhesive. Let both surfaces air dry until adhesive is tacky but will not stick to fingers.

(5) Starting with an end, carefully attach gasket to surface. Press firmly insure contact all over.

(6) Straighten slightly bent grille louvers by hand.

(7) Should touch up or refinishing be necessary, see TM 43-0139.

NOTE

FOLLOW-ON MAINTENANCE:
Install grilles. See para 3-13.

4-5. OUTSIDE COVERS AND PANELS REPAIR.

This task covers: Repair

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Brush (Item 2, Appendix B)

Materials/Parts

Adhesive (Item 1, Appendix E)

Equipment Conditions

Outside covers and panels removed from air conditioner. See para 3-14.

NOTE

The only authorized repairs are replacement of gaskets and insulation.

Repair.

(1) Use only gaskets and insulation identified in TM 9-4120-407-24P.

(2) Remove as much old gasket or insulation material as possible by pulling or scraping it away from the surfaces.

WARNING

Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well ventilated area and wear gloves.

(3) Soften and remove old adhesive and gasket residue, using a stiff brush.

(4) See Appendix F to identify and fabricate gasket or insulation to be replaced using material specified.

(5) Coat mating surfaces and gasket with adhesive. Let both surfaces air dry until adhesive is tacky but will not stick to fingers.

(6) Starting with an end, carefully attach gasket to the surfaces. Press firmly to insure complete contact.

(7) Should touch up or refinishing be necessary, see TM 43-0139.

NOTE

FOLLOW-ON MAINTENANCE:
Install covers and panels. See para 3-14.

4-6. INFORMATION PLATES REPLACEMENT.

This task covers: Replacement

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix 8)
Rivet Gun (Item 8, Appendix B)
Drill Motor (Item 2, Appendix B)
Drill Bit Set (Item 2, Appendix B)

Materials/Parts

Blind Rivets (as needed) (Item 1, Appendix G)

Equipment Conditions:

Power disconnected. See para 3-6.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

Replacement.

CAUTION

Drilling through the air conditioner cabinet can cause damage to internal components if drill is allowed to penetrate too far.

(1) Remove old plate by drilling blind rivets out. Use a drill stop or similar tool to avoid damage to internal parts.

(2) Install new plate with proper size blind rivets.

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Logic Box Test Fixture (Item 14, Appendix B)
Test Fixture Adapter Cable (Item 15, Appendix B)

Equipment Conditions:

Power disconnected. See para 3-6.
Lower front panel removed. See para 3-14.

Materials/Parts

Lock Washers, Qty 2 (Item 8, Appendix G)
Marker Tag (Item 2, Appendix E)

a. *Testing.*

(1) Connect a multimeter set to measure dc voltage to the test fixture TEST POINT (positive lead to TP1 and negative lead to TP2). Connect P1, P2, and P3 to J1, J2 and J3 respectively on the logic box assembly being tested.

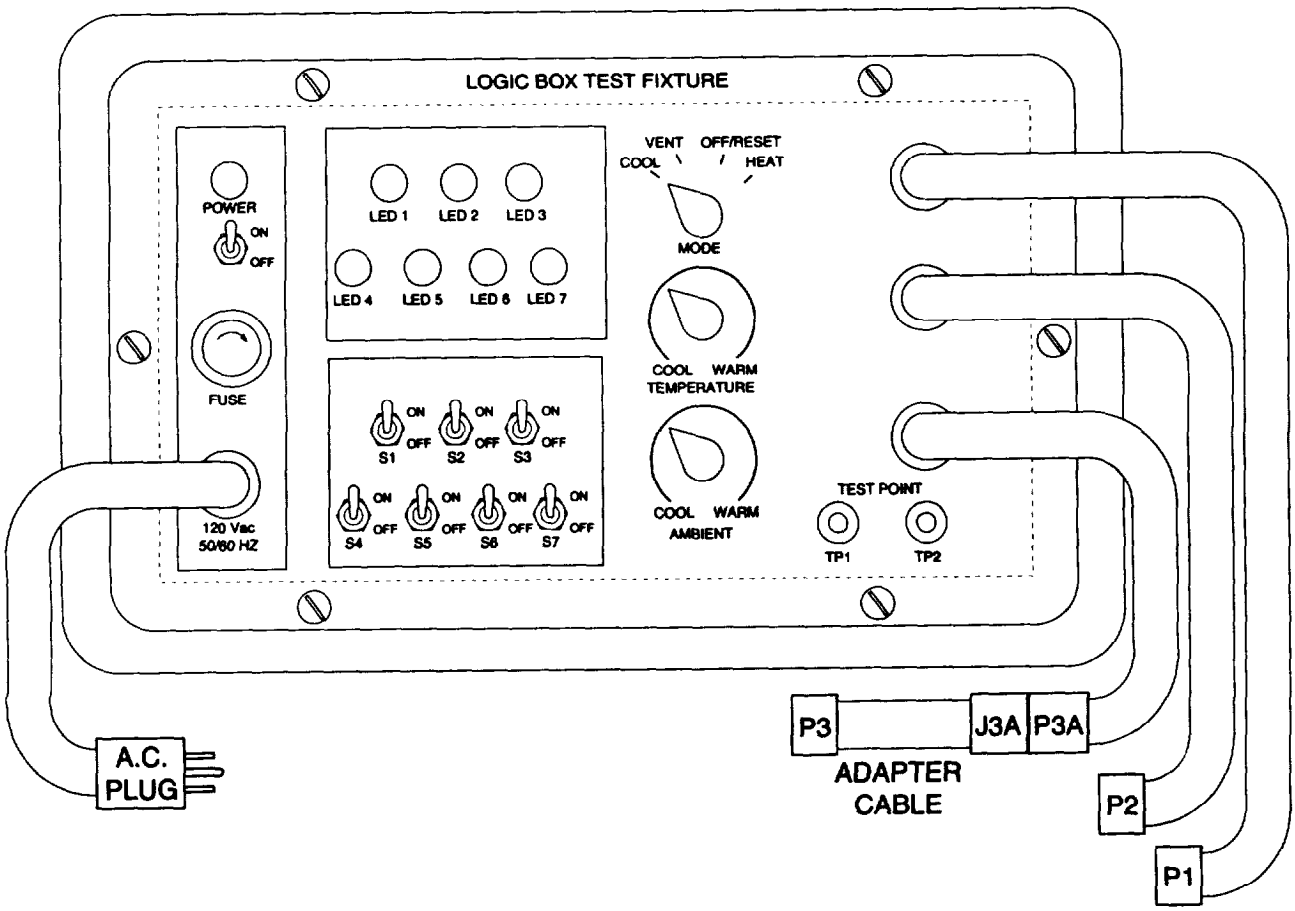


Figure 4-1. Logic Box Test Fixture Assembly

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT. (Cont)

NOTE

If the logic box assembly fails any of the following tests, the entire assembly must be replaced. Do not continue testing beyond a failure point.

(2) *Heat Mode Test.*

(a) Set TEMPERATURE control to WARM position and AMBIENT control to COOL position, MODE switch to HEAT and switches S1 thru S6 to OFF position (contacts closed) and switch S7 to ON position (contact open), then turn test fixture power on. After a 2 second delay, LED's 1 and 7 shall illuminate and multimeter shall read 6.3 vdc or higher.

(b) Set TEMPERATURE control to COOL position. LED 1 shall turn off. LED 7 shall remain illuminated.

(c) Rotate TEMPERATURE control slowly towards WARM position until LED 1 illuminates. Slowly rotate AMBIENT control toward WARM position until LED 1 turns off. LED 7 shall remain illuminated.

(d) Rotate TEMPERATURE control towards WARM until LED 1 illuminates again. Place S3 in the ON position (contacts open). This step should have no effect on operation. LED's 1 and 7 shall remain illuminated.

(e) Rotate AMBIENT control to COOL position and place S3 in the OFF position. Place S1 in the ON position. LED's 1 and 7 shall turn off and in 10 seconds. LED's 3 shall illuminate.

(f) Reset logic by turning rotary MODE switch to OFF RESET position. Place S1 in the OFF position. Move TEMPERATURE control to WARM position. Set MODE switch to HEAT. LED's 1 and 7 shall illuminate following a 2 second delay.

(g) Place S1 in the ON position for 2 seconds then place S1 in the OFF position. LED's 1 and 7 shall turn off for 10 seconds then illuminate.

(h) Place S2 in the ON position for 2 seconds then turn S2 OFF again. LED 1 shall turn off. After 10 seconds, LED 7 shall turn off for 2 seconds. Then both LED's turn on again.

(i) Place S2 in ON position. LED 1 shall turn off and LED 7 shall remain illuminated. LED 3 shall illuminate after 10 seconds.

(j) Reset by turning rotary MODE switch to OFF RESET position. Place S2 in the OFF position. Maintain TEMPERATURE control in WARM position. Set MODE switch to HEAT. LED's 1 and 7 shall illuminate after a 2 second delay.

(k) Place S4 in the ON position. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 4 and 7 turn off.

4 For the next 2 seconds: LED 4 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 4 illuminates and LED 7 remains illuminated. End of routine.

(l) Place S4 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position and then back to HEAT position again. Still maintaining TEMPERATURE control to WARM position wait 10 seconds and place S5 in the ON position. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 5 and 7 turn off.

4 For the next 2 seconds: LED 5 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 repeat twice. Then LED 5 illuminates and LED 7 remains illuminated. End of routine.

(m) Place S5 in the OFF position. Reset fault by placing MODE switch in the OFF RESET position and then back to the HEAT position. Leave TEMPERATURE control set for WARM. Wait 10 seconds then place S6 in the ON position. The following routine shall occur.

1 LED 1 shall turn OFF, LED 7 shall remain illuminated.

2 For 8 seconds: LED 6 illuminates and LED 7 remains illuminated.

3 For 2 seconds: LED's 6 and 7 turn OFF.

4 For 2 seconds: LED 7 illuminates.

5 Steps 2 thru 4 repeat twice. Then LED 6 illuminates and LED 7 remains ON.

(n) Place S6 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position and then back to HEAT position. Place S4 in the ON position for 2 seconds and then turn S4 OFF. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 4 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED's 1 and 7 shall illuminate. End of routine.

(o) Place S5 in the ON position for 2 seconds then place S5 in the OFF position. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 5 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED's 1 and 7 shall illuminate. End of routine.

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT. (Cont)

(p) Place S6 in the ON position for 2 seconds then place S6 in the OFF position. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 6 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 6 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED's 1 and 7 shall illuminate. End of routine.

(q) Place S2 and S4 in the ON position making certain that S2 is turned on before S4. LED 1 turns off and LED 7 remains illuminated. In 10 seconds, LED's 3 and 4 shall illuminate and LED 7 remains illuminated.

(r) Reset by placing S2 and S4 in the OFF position and turning the MODE switch to OFF RESET and back to HEAT. Place S2 and then S5 in the ON position making certain S2 is turned on before S5. LED 1 turns off and LED 7 remains illuminated. In 10 seconds, LED's 3 and 5 shall illuminate and LED 7 remains illuminated.

(s) Reset by placing S2 and S5 in the OFF position and turning the MODE switch to OFF RESET and back to HEAT. Place S2 and then S6 in the ON position immediately. LED 1 turns off and LED 7 remains illuminated. In 10 seconds, LED's 3 and 6 shall illuminate and LED 7 remains illuminated.

(t) Reset by placing S2 and S6 in the OFF position and turning the MODE switch to OFF RESET and back to HEAT. Place S7 in the OFF position, then place S4, S5, and S6 in the ON position. Next, place S1 in the ON position, followed immediately by S7. LED's 1 and 7 shall turn off. In 10 seconds, LED 3 illuminates and LED 7 stays off. S4, S5, and S6 should have no effect.

(u) Reset by placing switches S1 thru S7 in the OFF position and setting MODE switch to OFF RESET and back to HEAT. Place S4, S5, and S6 in the ON position, followed by S7. The following routine shall occur:

1 LED 1 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED's 4, 5, and 6 shall illuminate. LED 7 remains illuminated.

3 For the next 2 seconds: LED's 4,5,6, and 7 turn off.

4 For the next 2 seconds: LED's 4, 5, and 6 shall continue to be off. LED 7 shall illuminate.

5 Step 2 thru 4 shall repeat twice. Then, LED's 4, 5, and 6 illuminate and LED 7 remains illuminated.

(v) Reset by placing switches S1 thru S7 in the OFF position and setting MODE switch to OFF RESET and back to HEAT. Place S4, S5, and S6 in the ON position followed immediately by S7, then S2. LED 7 shall illuminate. If LED's 4, 5, and 6 are illuminated, they shall turn off and in 10 seconds, LED's 3, 4, 5, and 6 illuminate and LED 7 remains illuminated.

(w) Reset by turning MODE switch to OFF RESET however, keep S2, S4, S5, S6 and S7 in the ON position. Then turn MODE switch to HEAT. LED 1 shall not illuminate. LED 7 shall illuminate. In 10 seconds, LED's 3, 4, 5, and 6 illuminate and LED 7 remains illuminated.

(3) Vent mode test.

(a) Reset by turning MODE switch to OFF RESET and placing switches S1 thru S6 in the OFF position. Then turn MODE switch to VENT position. In 2 seconds, LED 7 shall illuminate.

(b) Rotate TEMPERATURE control from WARM to COOL position and back to WARM. LED 7 remains illuminated. Temperature setting should have no effect.

(c) Turn test fixture power off and then back on again. In 2 seconds, LED 7 shall illuminate.

(d) Place S4 in the ON position. The following routine shall occur.

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 4 and 7 turn off.

4 For the next 2 seconds: LED 4 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 4 illuminates and LED 7 remains illuminated. End of routine.

(e) Place S4 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position and then back to VENT position again. Still maintaining TEMPERATURE control, set to WARM position, wait 10 seconds and then place S5 in the ON position. The following routine shall occur:

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 5 and 7 turn off.

4 For the next 2 seconds: LED 5 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 5 illuminates and LED 7 remains illuminated. End of routine.

(f) Place S5 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position and then back to VENT position again. Still maintaining TEMPERATURE control set to WARM position, wait 10 seconds and then place S6 in the ON position. The following routine will occur:

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 6 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 6 and 7 turn off.

4 For the next 2 seconds: LED 6 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then, LED 6 illuminates and LED 7 remains illuminated. End of routine.

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT. (Cont)

(g) Place S6 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position and then back to VENT position. Place S4 in the ON position for 2 seconds and then place S4 in the OFF position. The following routine shall occur:

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 4 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED 7 shall illuminate. End of routine.

(h) Place S5 in the ON position for 2 seconds and then place S5 in the OFF position. The following routine shall occur.

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 5 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED 7 shall illuminate. End of routine.

(i) Place S6 in the ON position for 2 seconds and then place S6 in the OFF position. The following routine shall occur.

1 LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 6 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 6 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED 7 shall illuminate. End of routine.

(j) Place S1 in the ON position for 2 seconds and then place S1 in the OFF position. LED 7 shall turn off for 10 seconds and then illuminate.

(k) Place S1 in ON position. LED 7 shall turn off and in 10 seconds, LED 3 shall illuminate.

(l) Place S1 in the OFF position and reset MODE switch by turning to OFF RESET. Turn MODE switch back to VENT position. In 2 seconds, LED 7 illuminates.

(m) Place S7 in the OFF position; place S4, S5, and S6 in the ON position. Place S1 in the ON position and in 2 seconds, place S7 in the ON position. LED 7 shall turn off and in 10 seconds, LED 3 shall illuminate. S4, S5, and S6 have no effect.

(n) Place switches S1 thru S6 in the OFF position. Reset by turning MODE switch to OFF RESET and then back to VENT. Place S7 in the OFF position; place S4, S5, and S6 in the ON position. Place S7 in the ON position. In 1 second, place S1 in the ON position. LED' s, 4,5, and 6 turn off. After 10 seconds, LED 3 illuminates and LED 7 is off.

(o) Reset by turning MODE switch to OFF RESET position and then back to VENT. However, do not change any other switch positions. No LED' s are illuminated but in 10 seconds, LED 3 shall illuminate.

(4) Cool mode test.

(a) Place switches S1 thru S6 in the OFF position and AMBIENT control to mid range. Reset by turning MODE switch to OFF RESET position and then to COOL position. Rotate TEMPERATURE control to COOL position. After a 2 second delay, LED' s 2 and 7 shall illuminate.

(b) Slowly rotate TEMPERATURE control to the WARM position until LED 2 just turns off. LED 7 shall remain illuminated.

(c) Slowly rotate AMBIENT control toward the WARM position. LED 7 shall turn off. After 2 seconds, LED' s 2 and 7 shall illuminate.

(4) Rotate AMBIENT control to WARM position. Rotate TEMPERATURE control to COOL position. Place S4 in the ON position. The following routine shall occur:

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 4 and 7 turn off.

4 For the next 2 seconds: LED 4 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 4 illuminates and LED 7 remains illuminated. End of routine.

(e) Place S4 in the OFF position. Reset by turning the MODE switch to OFF RESET position and then back to COOL position. Still maintaining TEMPERATURE control set to COOL position, wait 10 seconds and then place S5 in the ON position. The following routine shall occur.

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 5 and 7 turn off.

4 For the next 2 seconds: LED 5 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 5 illuminates and LED 7 remains illuminated. End of routine.

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT. (Cont)

(f) Place S5 in the OFF position. Reset previous fault condition by turning the MODE switch to OFF RESET position then back to COOL position. Still maintaining TEMPERATURE control set to COOL position, wait 10 seconds and then place S6 in the ON position. The following routine shall occur:

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 6 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 6 and 7 turn off.

4 For the next 2 seconds: LED 6 shall continue to be off. LED 7 shall illuminate.

5 Steps 2 thru 4 shall repeat twice. Then LED 6 illuminates and LED 7 remains illuminated. End of routine.

(g) Place S6 in the OFF position. Reset by turning the MODE switch to OFF RESET position and then back to COOL position. Place S4 in the ON position for 2 seconds then place S4 in the OFF position. The following routine shall occur:

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 4 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 4 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED' s 2 and 7 shall illuminate. End of routine.

(h) Place S5 in the ON position for 2 seconds and then place S5 in the OFF position. The following routine shall occur:

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 5 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 5 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED' s 2 and 7 shall illuminate. End of routine.

(i) Place S6 in the ON position for 2 seconds and then place S6 in the OFF position. The following routine shall occur:

1 LED 2 shall turn off and LED 7 shall remain illuminated.

2 For the next 8 seconds: LED 6 illuminates. LED 7 remains illuminated.

3 For the next 2 seconds: LED' s 6 and 7 turn off.

4 LED 7 illuminates for 2 seconds and then turns off for 2 seconds.

5 LED' s 2 and 7 shall illuminate. End of routine.

(j) Place S1 in the ON position for 2 seconds and then place S1 in the OFF position. LED' s 2 and 7 shall turn off for 10 seconds then LED' s 2 and 7 shall illuminate.

(k) Place S1 in the on position. LED' s 2 and 7 shall turn off. In 10 seconds, LED 3 shall illuminate.

(l) Place S1 in the OFF position and reset MODE switch by turning to OFF RESET. Turn MODE switch back to COOL position. In 2 seconds, LED' s 2 and 7 shall illuminate.

(m) Place S1 in the ON position. LED' s 2 and 7 shall turn off. In 10 seconds, LED 3 shall illuminate.

(n) Reset by placing S1 thru S7 in the OFF position and setting MODE switch to OFF RESET then back to COOL. Place S4, S5, and S6 in the ON position followed by S7. LED' s 4, 5, and 6 shall illuminate. After 1 second place S1 in the ON position, LED' s 4, 5, and 6 shall turn off. After 10 seconds, LED 3 shall illuminate.

(o) Reset MODE switch by turning to OFF RESET position. Do not change any other switch positions. Turn MODE switch to COOL position. No LED' s shall illuminate. In 10 seconds, LED 3 shall illuminate.

(p) Reset MODE switch by turning to OFF RESET position. Do not change any other switch positions. Turn MODE switch to COOL position. Then immediately place S4, S5, S6, S7 and S1 in the OFF position. In 10 seconds, LED' s 2 and 7 shall illuminate.

(q) Place S2 in the ON position. LED' s 2 and 7 remain illuminated. S2 has no effect.

(r) Place S2 in the OFF position and place S3 in the ON position. Turn MODE switch to HEAT position with TEMPERATURE control set at the WARM position and ambient control to COOL position. After 2 second delay, LED' s 1 and 7 illuminate. S3 has no effect.

(s) Place S1 thru S7 in the OFF position, and reset by placing the MODE switch in the OFF RESET position then in the VENT position. LED 7 shall illuminate after 2 seconds. Place S2 and S3 in the ON position. LED 7 shall turn OFF. After a 10 second delay, LED 3 shall illuminate. Turn MODE switch to the COOL position. LED 3 shall remain illuminated.

(t) Place S2 and S3 in the OFF position and reset MODE switch by turning to OFF RESET position. Place S1 in the ON position and turn MODE switch to VENT position. No LED' s shall illuminate. After a 10 second delay, LED 3 shall illuminate.

(5) Turn test fixture power off and disconnect test equipment from logic box assembly.

4-7. LOGIC BOX ASSEMBLY TESTING AND REPLACEMENT. (Cont)

b. Removal.

(1) Tag and disconnect cable connector (1)

(2) Remove two screws (2), lock washers (3), flat washers (4), and logic box assembly (5). Discard lock washers.

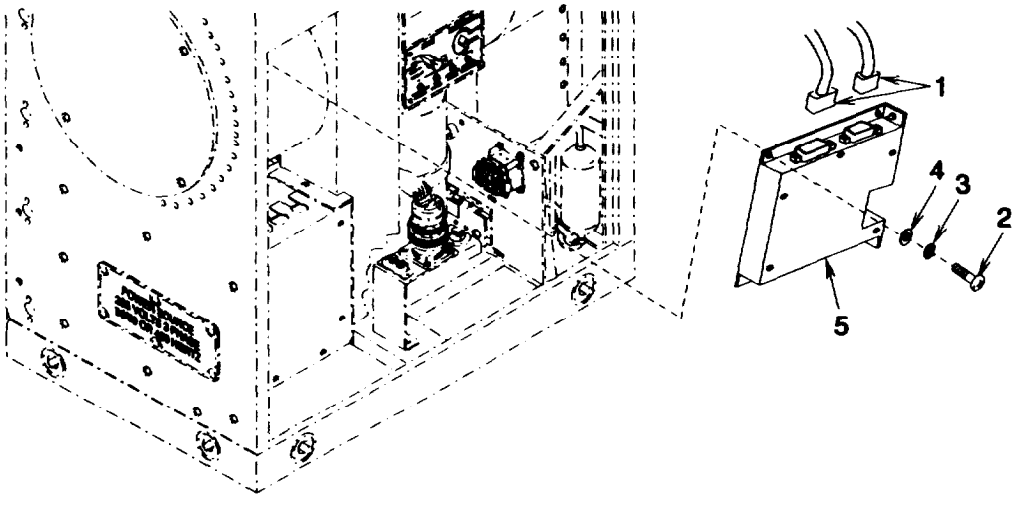


Figure 4-2. Logic Box Assembly

c. Installation:

(1) Install logic box assembly (5), two screws (2), new lock washers (3) and flat washers (4).

(2) Connect cable connectors (1) per tags and wiring diagram Figure 3-5. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front cover panel. See para 3-14.

4-8. MOTOR CONTROLLER ASSEMBLY REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 24 (Item 8, Appendix G)
Lock Washers, Qty 4 (Item 10, Appendix G)
Lock Washers, Qty 4 (Item 7, Appendix G)
Lock Washers, Qty 7 (Item 9, Appendix G)
Tiedown Straps, Qty 6 (Item 20, Appendix G)
Tape, Qty 8 (Item 19, Appendix G)
Marker Tag (Item 2, Appendix E)

Equipment Condition

Lower front panel removed. See para 3-14.
Front grille removed. See para 3-13.
Logic box assembly removed. See para 4-7.
Electrical components bracket and rain shield sheet removed as necessary to access terminal board TB1. See para 3-28.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

NOTE

Remove only items necessary for replacement.

a. *Removal.*

(1) *Motor Controller Removal.*

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

(b) Remove two screws (5), lock washers (6), and flat washers (7). Discard lock washers.

(c) Remove six screws (8), lock washers (9), flat washers (10), and cover (11). Discard lock washers.

(d) Remove two tiedown straps (12). Discard tiedown straps.

(e) Remove two screws (13), lock washers (14), flat washers (15), one cover (16), and two posts (17). Discard lock washers.

(f) Tag and disconnect wire leads (18) from terminal board (19).

(g) Tag and disconnect connectors (20) and (21).

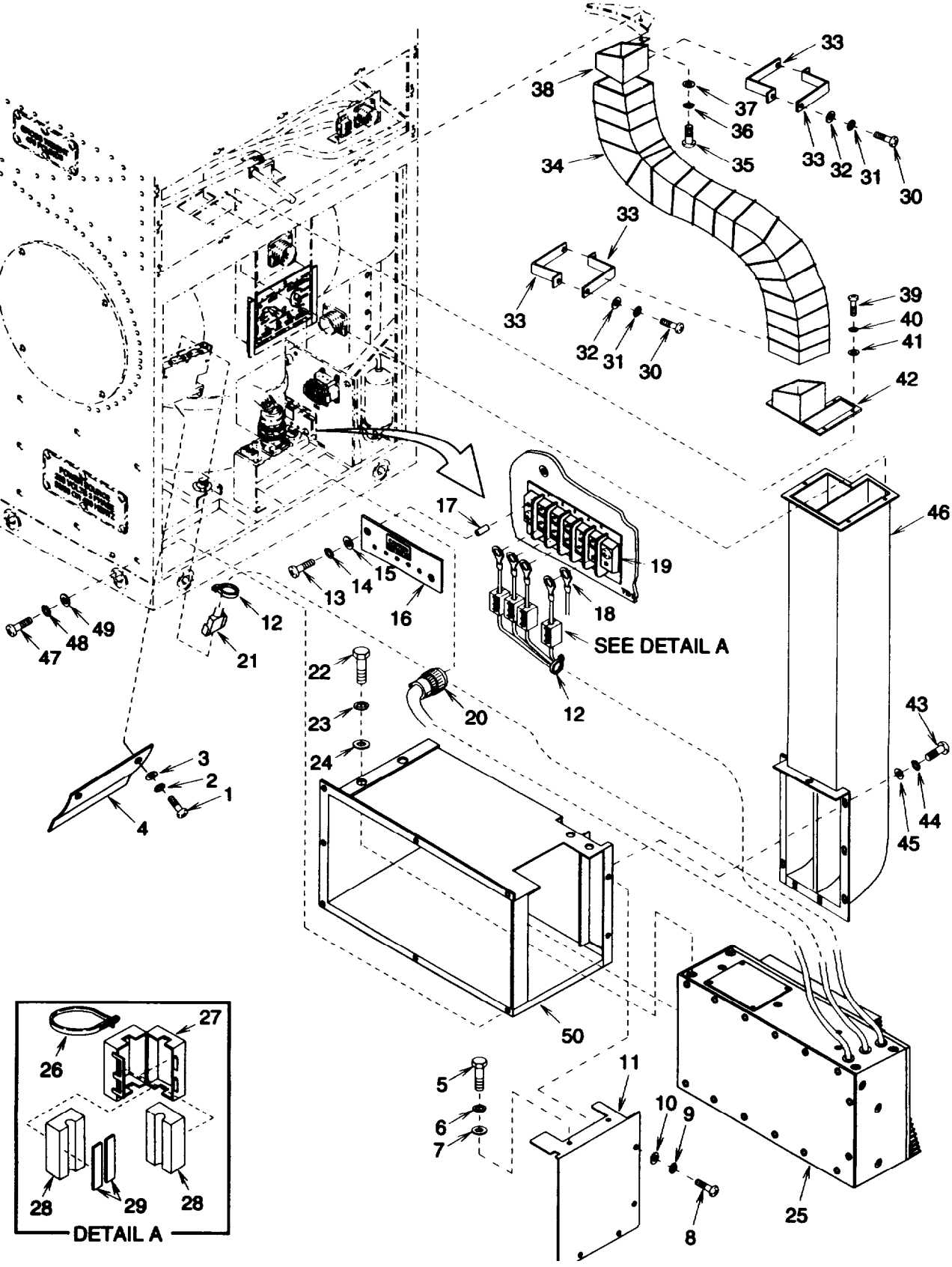


Figure 4-3. Motor Controller

4-8. MOTOR CONTROLLER ASSEMBLY REPLACEMENT. (Cont)

(h) Remove two screws (22), lock washers (23), and flat washers (24). Discard lock washers.

(i) Remove motor controller (25).

(2) EMI Suppressors (FC1 through FC4) Removal.

(a) Remove tiedown strap (26). Discard tiedown strap.

(b) Open case (27) and remove two core halves (28).

(c) Remove two tape strips (29). Discard tape strips.

(3) Air Duct Hose Removal.

NOTE

Two clamps secure air duct hose in place. Removal instruction are typical for each clamp.

(a) Remove two screws (30), lock washers (31), flat washers (32), and clamps (33). Discard lock washers.

(b) Remove air duct hose (34).

(c) Remove screw (35), lock washer (36), flat washer (37), and collar (38). Discard lock washers.

(d) Remove four screws (39), lock washers (40), flat washers (41), and duct (42). Discard lock washers.

(4) Duct Removal.

(a) Remove four screws (39), lock washers (40), and flat washers (41). Discard lock washers.

(b) Remove eight screws (43), lock washers (44), flat washers (45), and duct (46). Discard lock washers.

(5) Enclosure Removal.

(a) Remove motor controller per step (1) above and duct per step (4) above.

(b) Remove seven screws (47), lock washers (48), flat washers (49), and enclosure (50). Discard lock washers.

b. Installation.

(1) Enclosure Installation. Install enclosure (50), seven screws (47), new lock washers (48) and flat washer: (49).

(2) Duct Installation.

(a) Install enclosure per step (1) above.

(b) Install duct (46), eight screws (43), new lock washers (44), and flat washers (45).

(c) Install four screws (39), new lock washers (40), and flat washers (41).

(3) Air Duct Hose Installation.

NOTE

Two clamps secure air duct hose in place. Installation instruction are typical for each clamp.

(a) Install duct (42), four screws (39), new lock washers (40), and flat washers (41).

(b) Install collar (38), screw (35), new lock washer (36), and flat washer (37).

(c) Install air duct hose (34).

(d) Install two clamps (33), screws (30), new lock washers (31), and flat washers (32)

(4) EMI Suppressors (FCZ through FC4) Installation..

(a) Attach two new tape strips (29).

(b) Install two core halves (28) and close case (27).

(c) Secure case (27) with new tiedown strap (26).

(5) Motor Controller Installation.

(a) Install enclosure per step (1) above.

(b) Install motor controller (25).

(c) Install two screws (22), new lock washers (23), and flat washers (24).

(d) Connect connectors (20) and (21) per tags and wiring diagram Figure 3-5. Remove tags.

(e) Connect wire leads (18) onto terminal board (19) per tags and wiring diagram Figure 3-5. Remove tags.

(f) Install two posts (17), one cover (16), two screws (13), new lock washers (14), and flat washers (15).

(g) Install two new tiedown straps (12).

(h) Install cover (11), six screws (8), new lock washers (9), and flat washers (10).

(i) Install two screws (5), new lock washers (6), and flat washers (7).

(j) Remove shield (4), two screws (1), new lock washers (2), and flat washers (3).

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.
Install front grille. See para 3-13.
Install logic box assembly. gee para 4-7.
Install electrical components bracket and rain shield sheet. See para 3-28.

4-9. EVAPORATOR FAN MOTORS REPAIR.

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Electrical Repair (Item 9, Appendix B)

Materials/Parts

Lock Washers, Qty 8 (Item 2, Appendix G)
Marker Tag (Item 2, Appendix E)
Spring Tension Washer, Qty 2 (Item 33, Appendix G)

Equipment Conditions:

Evaporator fan motor removed. See para 3-34.

a. Disassembly.

NOTE

Disassemble only to extent necessary for repair.

(1) Match mark the frame (1) to end shields (2) and (3).

(2) Remove four nuts (4), lock washers (5), and studs (6). Discard lock washers.

(3) Carefully separate end shield (2) from frame (1). Gently tap around end shield to break it loose.

(4) Carefully remove rotor (7).

(5) Carefully separate end shield (3) from frame (1) as far as cords (8) will allow. Gently tap around end shield to break it loose.

(6) Remove cord bushing (9).

(7) Tag and carefully remove contacts (10) from connector bodies (11).

(8) Carefully pull cords (8) through end shield (3).

(9) Remove ball bearing (12) from end shield (2).

(10) Remove ball bearing (13) and two spring tension washers (14) from end shield (3). Discard spring tension washers.

(11) Note location of thermostat (15) and carefully pull from winding (16).

NOTE

Rotor and shaft are supplied as one component and must be replaced as an assembly if either component is damaged.

(12) Check rotor (7) for any evidence of overheating such as discoloration or bum marks. Check shaft (17) for any gouges, burrs or scored marks around bearing surfaces. Replace if damaged.

4-9. EVAPORATOR FAN MOTORS REPAIR. (Cont)

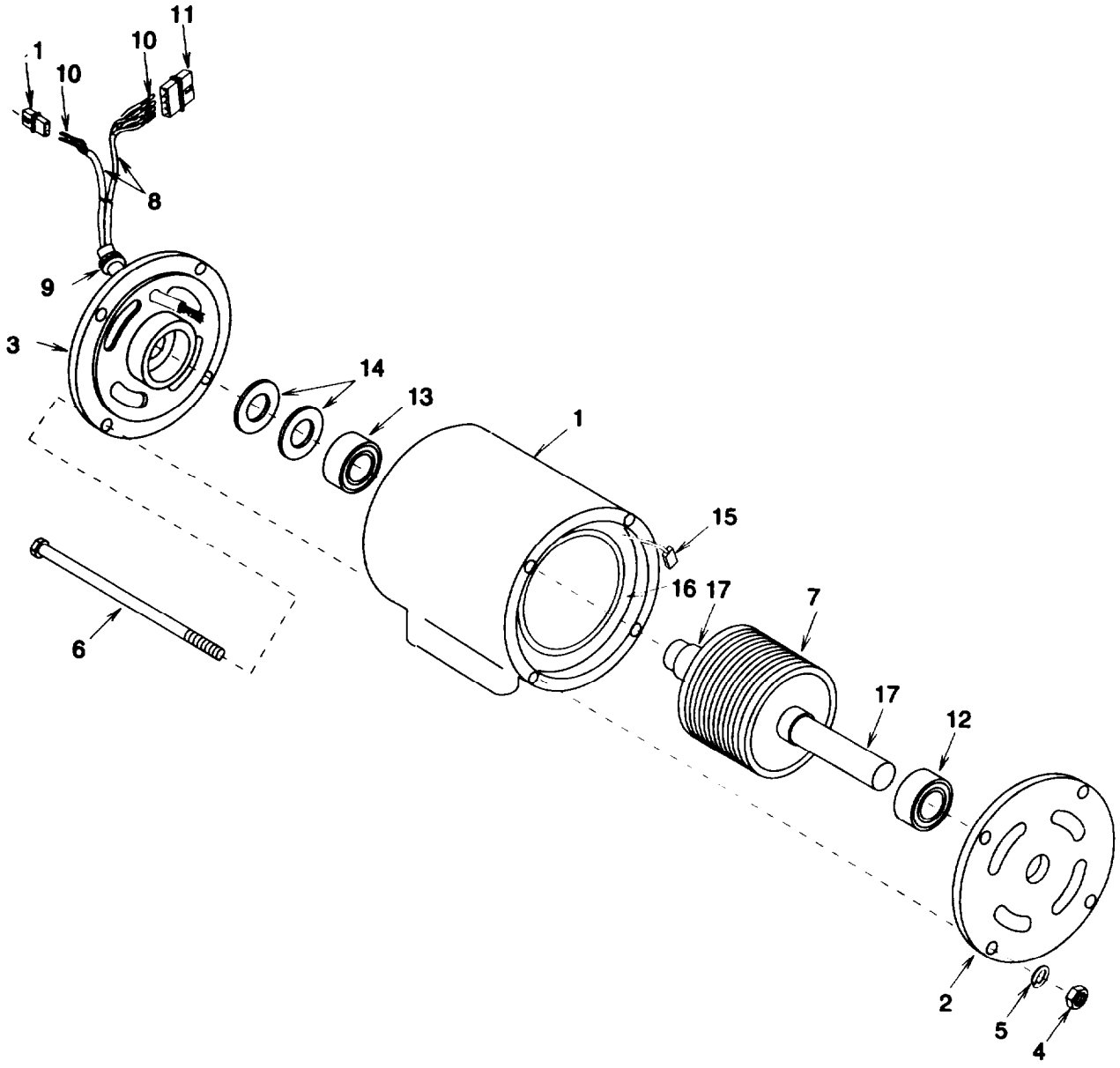


Figure 4-4. Evaporator Fan Motors (B3 & B4)

NOTE

Frame, winding, and thermostat are supplied as one component and must be replaced as an assembly if any one component is damaged.

(13) Check cords (8) for cut or frayed wire leads, broken terminals, or loose connections. Check winding (16) for any broken wires, damaged insulation, or evidence of overheating such as discolored or burned insulation. Check thermostat (15) for any visible damage and broken wire leads. Replace if damaged.

(14) Check ball bearings (12) and (13) for any damage such as binding or looseness and any evidence of overheating such as discoloration. Replace if damaged.

b. Repair. Repair is limited to replacement of defective or damaged parts.

c. Assembly.

(1) Carefully install thermostat (15) into winding (16) in location noted during disassembly.

(2) Install two new spring tension washers (14) and ball bearing (13) into end shield (3).

(3) Install ball bearing (12) into end shield (2).

(4) Carefully push cords (8) through end shield (3).

(5) Carefully install contacts (10) into connector bodies (11) per tags and wiring diagram Figure 3-5. Remove tags.

(6) Install cord bushing (9).

(7) Align match mark made during disassembly and carefully assemble end shield (3) onto frame (1). Gently tap end shield into place.

(8) Carefully install rotor (7).

(9) Align match mark made during disassembly and carefully assemble end shield (2) onto frame (1). Gently tap end shield into place.

(10) Install four studs (6), new lock washers (5) and nuts (4).

NOTE

FOLLOW-ON MAINTENANCE:
Install evaporator fan motor. See para 3-34.

4-10. CONDENSER FAN MOTOR REPAIR.

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Electrical Repair (Item 9, Appendix B)

Materials/Parts

Lock Washers, Qty 4 (Item 32, Appendix G)
Lock Washers, Qty 4 (Item 3, Appendix G)
Marker Tag (Item 2, Appendix E)
Load Spring (Item 31, Appendix G)

Equipment Conditions:

Condenser fan motor removed. See para 3-37.

a. Disassembly.

NOTE

Disassemble only to extent necessary for repair.

(1) Match mark the frame (1) to end shields (2) and (3).

(2) Remove four nuts (4), lock washers (5), and studs (6). Discard lock washers.

(3) Carefully separate end shield (2) from frame (1). Gently tap around end shield to break it loose.

(4) Carefully remove rotor (7).

(5) Carefully separate end shield (3) from frame (1). Gently tap around end shield to break it loose.

(6) Remove two screws (8) and cover (9).

(7) Remove four nuts (10), lock washers (11), flat washers (12), and screws (13). Discard lock washers.

(8) Carefully pull connector (14) out as far as wire leads (15) will allow.

(9) Tag and disconnect wire leads (15) from connector (14). See paragraph 3-19.

(10) Remove two screws (16) and box (17).

(11) Note location of thermostat (18) and carefully remove it.

(12) Tag and disconnect wire leads (19) from thermostat (18). See paragraph 3-19.

(13) Remove ball bearing (20) from end shield (2).

(14) Remove ball bearing (21) and load spring (22) from end shield (3). Discard load spring.

NOTE

Rotor and shaft are supplied as one component and must be replaced as an assembly if either component is damaged.

(15) Check rotor (7) for any evidence of overheating such as discoloration or bum marks. Check shaft (23) for any gouges, burrs or scored marks around bearing surfaces. Replace if damaged.

NOTE

Frame and winding are supplied as one component and must be replaced as an assembly if either component is damaged.

(16) Check wire leads (15) and (19) for cut or frayed wires. Check winding (24) for any broken wires, damaged insulation, or evidence of overheating such as discolored or burned insulation. Replace if damaged.

(17) Check thermostat (18) for any visible damage. Replace if damaged.

(18) Check ball bearings (20) and (21) for any damage such as binding or looseness and any evidence of overheating such as discoloration. Replace if damaged.

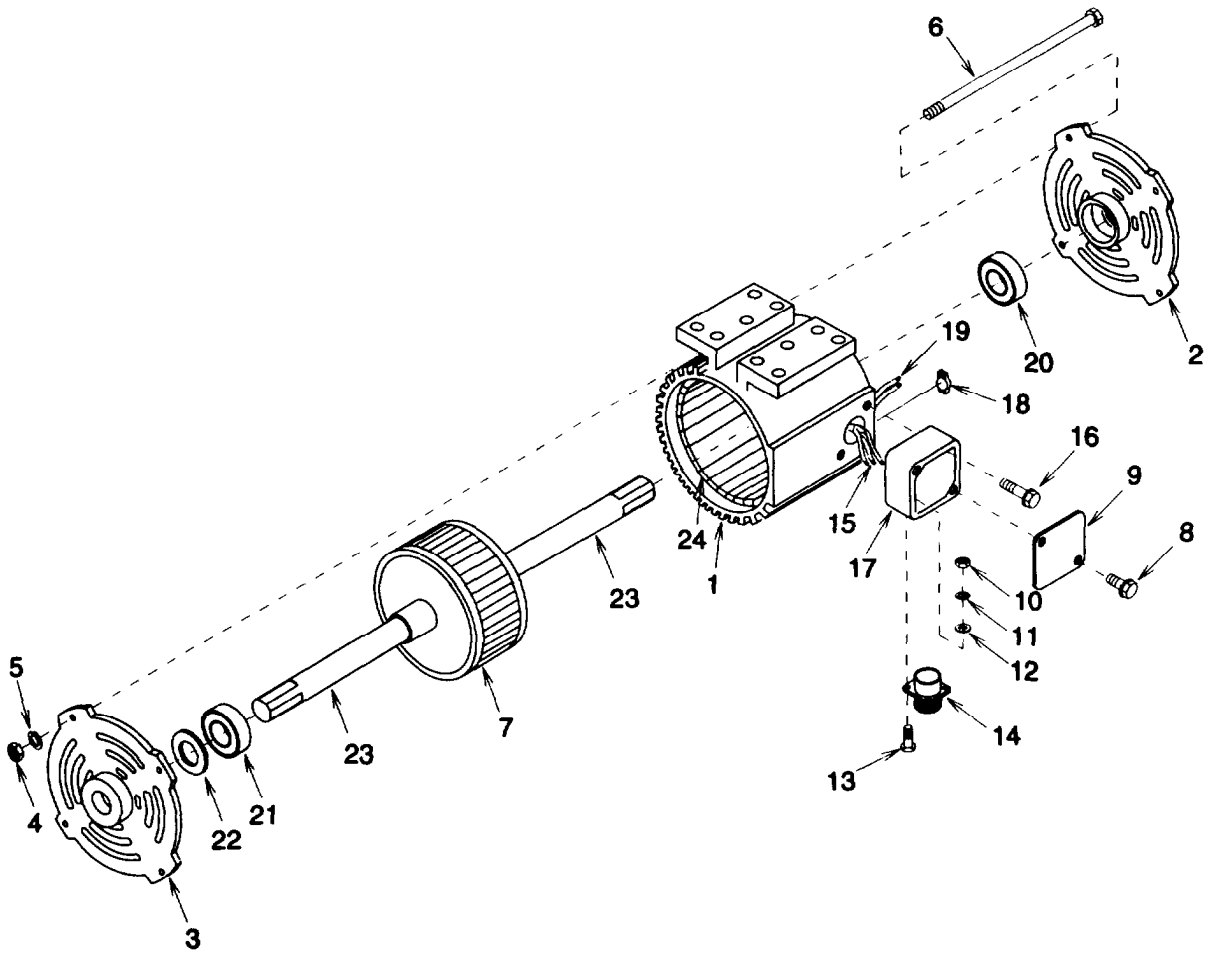


Figure 4-5. Condenser Fan Motor (B2)

b. Repair. Repair is limited to replacement of defective or damaged parts.

4-10. CONDENSER FAN MOTOR REPAIR. (Cont)

c. Assembly.

(1) Install new load spring (22) and ball bearing (21) into end shield (3).

(2) Install ball bearing (20) into end shield (2).

(3) Connect wire leads (19) onto thermostat (18) per tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

(4) Carefully install thermostat (18) in location noted during disassembly.

(5) Install box (17) and two screws (16).

(6) Connect wire leads (15) onto connector (14) per tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

(7) Install four screws (13), flat washers (12), new lock washers (11), and nuts (10).

(8) Install cover (9) and two screws (8).

(9) Align match mark made during disassembly and carefully assemble end shield (3) onto frame (1). Gently tap end shield into place.

(10) Carefully install rotor (7).

(11) Align match mark made during disassembly and carefully assemble end shield (2) onto frame (1). Gently tap end shield into place.

(12) Install four studs (6), new lock washers (5) and nuts (4).

NOTE

FOLLOW-ON MAINTENANCE:
Install condenser fan motor. See para 3-37.

4-11. SERVICE MANIFOLD INSTALLATION.

This task covers: **a.** Installation b. Removal

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Items 1, Appendix B)
Gloves (Item 2, Appendix B)

Materials/Parts

Lock Washers, Qty 6 (Item 9, Appendix G)

a. Installation

(1) Remove six screws (1), lock washers (2), flat washers (3), and one access (service valves) cover (4).

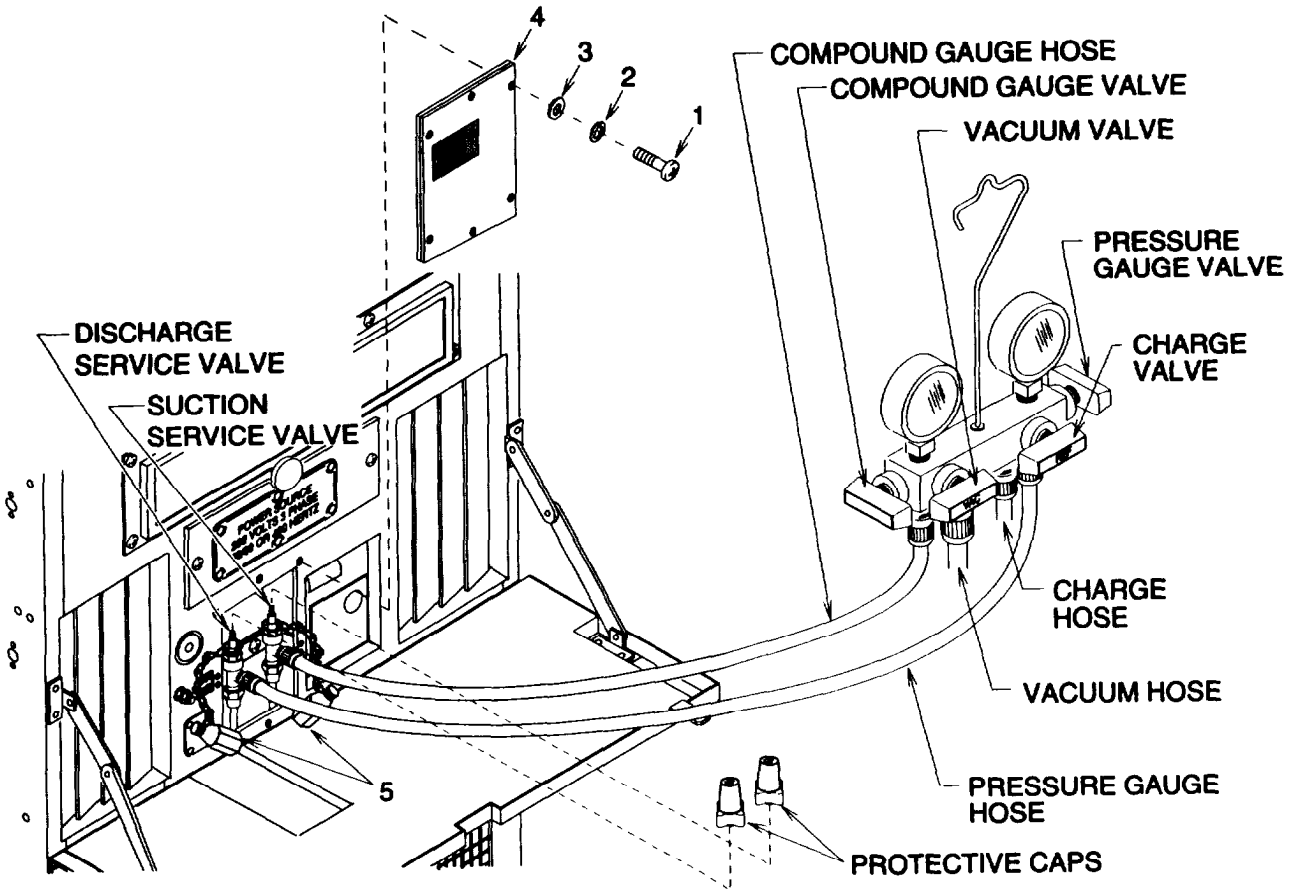


Figure 4-6. Service Manifold Installation

(2) Check that discharge and suction service valves are closed.

(3) Unscrew hose connection protective caps (5).

WARNINGS

- 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 face protector or safety glasses in any situation where skin or eye contact with refrigerant is possible.
- Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. Prevent contact of refrigerant with flame or hot surfaces.

(4) Connect the pressure gauge hose to discharge service valve and the blue (compound gauge) hose to suction service valve.

(5) Check that all four service manifold valves are closed.

(6) Open discharge and suction valves.

4-11. SERVICE MANIFOLD INSTALLATION. (Cont)

(7) Loosen the pressure gauge hose at service manifold and allow refrigerant to purge for 3-5 seconds. Tighten hose.

(8) Loosen the compound gauge hose at service manifold and allow refrigerant to purge for 3-5 seconds. Tighten hose.

b. Removal.

(1) Check that discharge and suction service valves are closed.

(2) Open all four service manifold valves to bleed off pressure.

(3) Remove hoses from discharge and suction service valves.

(4) Close service manifold valves.

(5) Install protective caps (5) onto discharge and suction service valves.

(6) Install access (service valves) cover (4) with six screws (1), lock washers (2) and flat washers (3).

4-12. DISCHARGING THE REFRIGERANT SYSTEM.

This task covers: Discharge

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Refrigerant Recovery and Recycle Unit (Item 7, Appendix B)

Equipment Conditions:

Service manifold installed. See para 4-11.

Materials/Parts

Oil (Item 14, Appendix E)

Discharge.

WARNINGS

- 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 causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. Prevent contact of refrigerant with flame or hot surfaces.

Note

Venting chlorofluorocarbon refrigerants into the atmosphere rather than recovering them is a violation of public law and subject to severe penalties.

(1) Connect the charge hose to an approved container or refrigerant recovery unit.

CAUTION

Follow instructions for specific container or refrigerant recovery unit being used to avoid compressor oil loss. Loss of oil could result in compressor damage.

(2) Open pressure gauge and compound gauge valves.

4-12. DISCHARGING THE REFRIGERANT SYSTEM. (Cont)

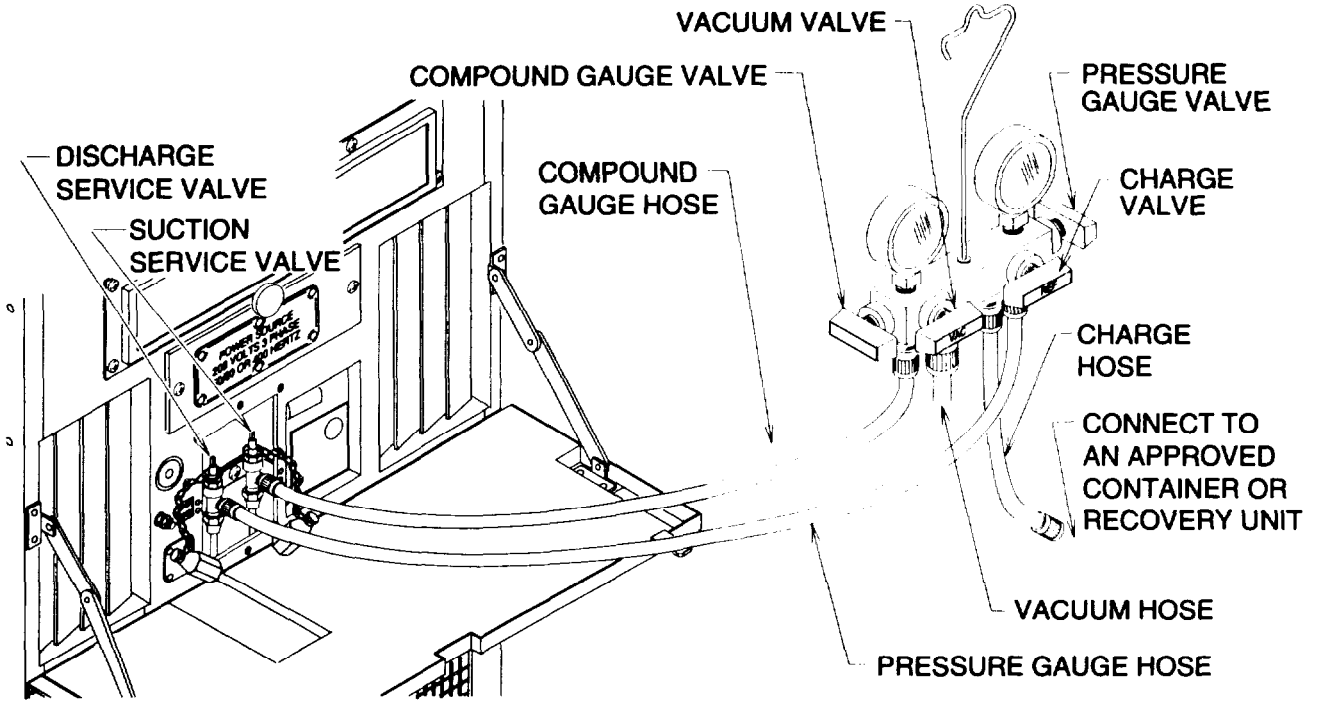


Figure 4-7. Discharging Refrigerant

(3) Discharge refrigerant.

NOTE

Some oil may be drawn from the system when discharging refrigerant.

(4) Install fresh oil as necessary.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-13. PURGING THE REFRIGERANT SYSTEM.

This task covers: Purge

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Nitrogen Regulator (Item 6, Appendix B)

Materials/Parts

Nitrogen (Item 7, Appendix E)

Equipment Conditions:

Refrigerant system discharged. See para 4-12.

Purge.

WARNINGS

- 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) Connect the charge hose to a nitrogen regulator and dry nitrogen cylinder.

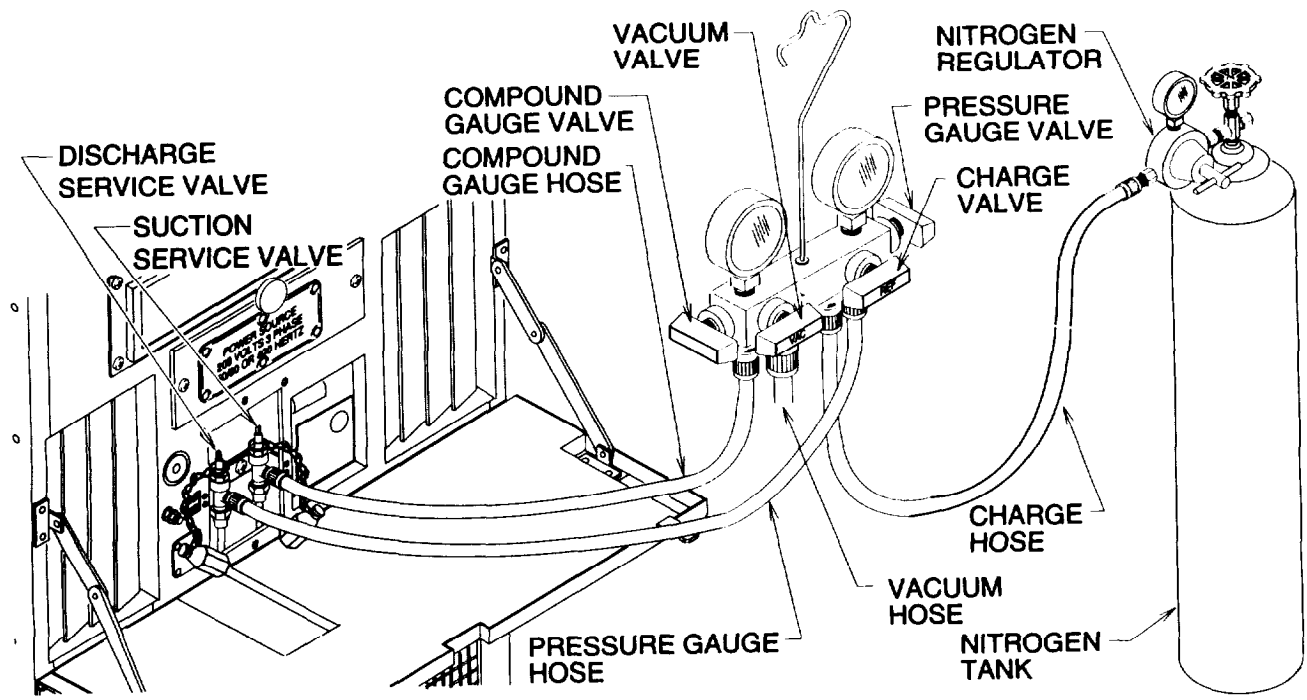


Figure 4-8. Nitrogen Tank Connection

4-13. PURGING THE REFRIGERANT SYSTEM. (Cont)

(2) Disconnect the compound gauge hose from the service manifold.

(3) Be sure the service manifold compound gauge and vacuum valves are closed.

(4) Be sure that discharge and suction service valves are open.

(5) Open the service manifold pressure gauge and charge valves.

(6) Open the nitrogen cylinder valve and adjust the regulator so that approximately 1-2 cfm (0.028 - 0.057 m^3/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) When purging is completed, close nitrogen cylinder valve.

(9) Disconnect the charge hose from nitrogen regulator.

(10) Connect the compound gauge hose to service manifold.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-14. BRAZING/DEBRAZE PROCEDURES.

This task covers: a. Debraze b. Clean c. Braze

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Brush (item 2, Appendix B)
Nitrogen Regulator (Item 6, Appendix B)

Materials/Parts

Nitrogen (Item 7, Appendix E)
Brazing Alloy (Items 8 and 9, Appendix E)
Brazing Flux (Item 10, Appendix E)
Abrasive Cloth (Item 11, Appendix E)
Rags (Item 12, Appendix E)

Equipment Conditions:

Refrigerant system discharged. See para 4-12.

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 thermal gloves and protective goggles or face shield to protect against bums.

a. *Debraze.*

WARNINGS

- 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) Purge with dry nitrogen. See paragraph 4-13.

4-14. BRAZING/DEBRAZE PROCEDURES. (Cont)

WARNING

The polyurethane foam used as insulation in the air conditioner will break down to form toxic gases if exposed to the flame of a torch or brazing temperature. Work in well ventilated area.

(2) Protect insulation, wiring harnesses, and other components with appropriate heat shields.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. All refrigerant must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any brazing operation.

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 a wet cloth to act as a heat sink.

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) 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.

c. *Braze*.

WARNINGS

- 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) Purge with dry nitrogen. See paragraph 4-13.

WARNING

The polyurethane foam used as insulation in the air conditioner will break down to form toxic gases if exposed to the flame of a torch or brazing temperature. Work in well ventilated area.

(2) Protect insulation, wiring harnesses, and other components with appropriate heat shields.

WARNING

Never use a heating torch on any part that contains refrigerant. Heat causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. All refrigerant must be discharged from the system and the entire system must be purged with dry nitrogen before beginning any debrazing operation.

NOTES

- 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 and Type B flux, as specified in MIL-B-7883, must be used for all copper to brass joints. Grade III brazing alloy may be substituted for Grade IV or VI for copper to copper joints; flux is not required for copper to copper joints.

(3) If brazing a joint on a valve, disassemble the valve to the extent possible and wrap all but the joint with a wet cloth to act as a heat sink.

NOTE

If interconnecting tubing was removed with a component, braze tubing to the new components before reinstallation.

(4) Position component or assembly into place.

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.

(5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. Remove heat as soon as brazing is completed.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 411.

4-15. FLUSHING THE REFRIGERANT SYSTEM.

This task covers: a. Flush b. Purge

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Diaphragm Pump (Item 13, Appendix B)
Nitrogen Regulator (Item 6, Appendix B)

Materials/Parts

Refrigerant R-114 (Item 4, Appendix E)
Nitrogen (Item 7, Appendix E)

Equipment Conditions:

Compressor removed. See para 4-31.

a. Flush. Flush the refrigerant system with refrigerant R-114. Procedures for flushing the system are as follows:

(1) Connect the two filter-drier fittings with a jumper, locally manufactured from refrigerant tubing and fittings.

(2) Connect a line from the discharge line in the Air Conditioner to the discharge side of pump.

(3) Connect a line containing a filter to the suction line in the Air Conditioner. The other end of the line should discharge into a small drum or suitable reservoir.

(4) Connect a line to draw from the bottom of the reservoir to the inlet of the pump.

WARNING

Burns can result from contact with acid formed by bum out of oil and refrigerant. Avoid inhaling fumes and wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear gloves to protect hands.

(5) Fill reservoir with refrigerant R-114 and start pump. Keep reservoir full until refrigerant begins to pour out of the return line. Continue flushing for at least 15 minutes.

(6) Reverse the Air Conditioner discharge and suction line connections, replace the filter with a new filtering medium, and flush the system for at least 15 minutes.

b. Purge. Purge the system with nitrogen at approximately 30 psig (2.1 1 kg/cm^2) as follows:

WARNINGS

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 the pump, reservoir, filter, and refrigerant desiccant dehydrator jumper. Place an empty container below the compressor connections, and connect the cylinder of dry nitrogen to each filter-drier connection in turn. Blow down each leg of the system for at least 30 seconds after moisture stops being discharged.

(2) Disconnect the dry nitrogen cylinder. Cap or plug open connections if compressor and filter-drier are not to be installed immediately.

NOTE

FOLLOW-ON MAINTENANCE:
Install compressor. See para 4-31.

4-16. LEAK TESTING THE REFRIGERANT SYSTEM.

This task covers: Testing

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Nitrogen Regulator (Item 6, Appendix B)

Materials/Parts

Nitrogen (Item 7, Appendix E)
Refrigerant R-22 (Item 3, Appendix E)

Equipment Conditions:

Service manifold installed. See para 411.

WARNINGS

- 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.

NOTES

- Either a refrigerant gas leak detector or a strong solution of liquid detergent in water can be used to test for leaks.
- If an electronic refrigerant gas leak detector is available, it should be used in accordance with the procedures contained in TM 9-4940-435-14, "Leak Detector, Refrigerant Gas".
- To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas.

Testing.

(1) *To pressurize a system that has some refrigerant charge:*

(a) Connect the charge hose to a Refrigerant R-22 cylinder.

(b) Open the service manifold compound gauge, pressure gauge, and charge valves.

(c) Check that service manifold vacuum valve is closed.

(d) Open refrigerant cylinder valve and pressurize system to 100 psi (7.1 kg/cm^2).

(e) Test for leaks at all points of possible leakage using an electronic refrigerant gas leak detector.

(f) If a leak is found, discharge and purge system, and repair leak. Retest for leaks. See paragraphs 4-12 thru 4-14 as appropriate.

(g) If a leak is found, check air conditioner charge. See paragraph 4-18.

(2) To pressurize a system that has been dischawed and purged:

(a) Connect the charge hose to a cylinder of Refrigerant R-22 set to deliver gas only.

(b) Open the service manifold compound gauge, pressure gauge, and charge valves.

(c) Check that service manifold vacuum valve is closed.

(d) Open refrigerant cylinder valve and pressurize system to 40-50 psi (2.8-3.5 kg/cm^2).

(e) Close service manifold valves and refrigerant cylinder valve.

(f) Disconnect charge hose from the refrigerant cylinder.

(g) Connect the charge hose to a nitrogen regulator and dry nitrogen cylinder.

(h) Open the service manifold compound gauge, pressure gauge, and charge valves.

(i) Open nitrogen cylinder valve and pressurize system to 350 psi (24.7 kg/cm^2).

(j) Close service manifold valves and nitrogen cylinder valve.

(k) Test for leaks at all points of possible leakage using an electronic refrigerant gas leak detector.

(l) If a leak is found, discharge and purge system, and repair leak. See paragraphs 4-12 thru 4-14.

(m) After performing leak test, discharge and purge system before performing maintenance, or evacuating and charging system, as appropriate. See paragraphs 4-12 and 4-13.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-17. EVACUATING THE REFRIGERANT SYSTEM.

This task covers: Evacuate

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Vacuum Pump (Item 3, Appendix B)

Equipment Conditions:

Service manifold installed. See para 4-11.
Refrigerant system discharged. See para 4-12.

Evacuate.

(1) Check that new refrigerant desiccant dehydrator was installed. If not, install one. See paragraph 4-20.

(2) Check that service manifold charge valve is closed.

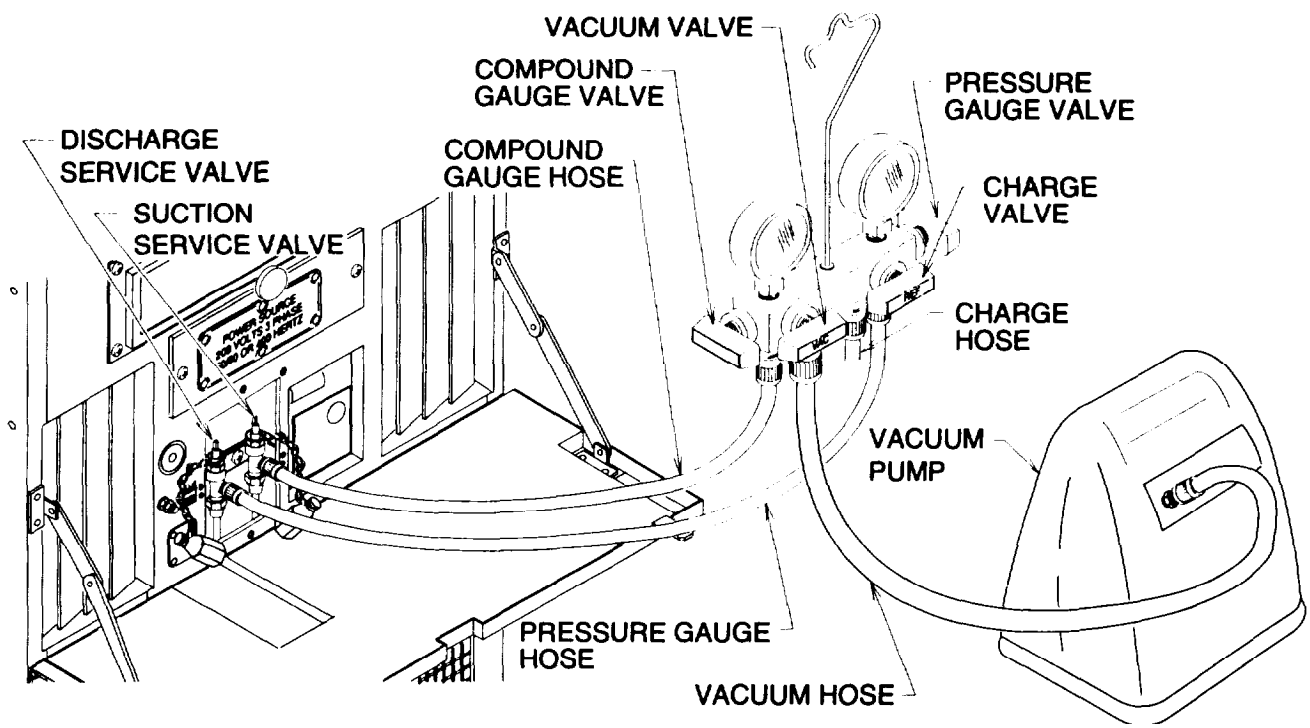


Figure 4-9. Evacuation of Refrigerant System

(3) Check that Air Conditioner discharge and suction service valves are open.

(4) Connect the vacuum hose to vacuum pump.

(5) Start vacuum pump.

(6) Open service manifold high pressure gauge, compound gauge, and vacuum valves.

(7) Run vacuum pump until at least 29 inches of mercury is measured on compound gauge.

NOTE

Inability to reach and hold 29 inches of mercury may indicate either a leak or a problem with the vacuum pump.

(8) Continue running vacuum pump for one more hour, while observing the gauge. If gauge needle moves back and forth, you have a leak which must be located and corrected. See paragraph 4-16.

(9) Close Air Conditioner discharge and suction service valves.

(10) Close service manifold high pressure gauge, compound gauge, and vacuum valves.

(11) Stop vacuum pump.

(12) Disconnect the vacuum hose from vacuum pump.

(13) Charge the refrigerant system. See paragraph 4-18.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-18. CHARGING THE REFRIGERANT SYSTEM.

This task covers: a. Full Charge b. Partial Charge

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)

Materials/Parts

Refrigerant R-22 (Item 3, Appendix E)

Equipment Conditions:

Refrigerant system evacuated. See para 4-17.

a. Full Charge

WARNINGS

- 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 causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. Prevent contact of refrigerant with flame or hot surfaces.

CAUTION

The system must be evacuated before charging. Moisture in the system will prevent the Air Conditioner from operating properly.

NOTE

The charging operation should be done with all panels in place except for refrigerant charging valve access cover.

(1) Connect the charge hose to a cylinder of Refrigerant R-22 set to deliver gas.

(2) Loosen hose connections on the discharge and suction service valves slightly.

(3) Check that vacuum and charge valves are closed.

(4) Open pressure gauge and compound gauge valves.

(5) Open refrigerant cylinder valve.

(6) Open charge valve slightly to allow a small amount of refrigerant to purge air from hoses. (Tighten hose connections on the discharge and suction service valves). Close charge valve.

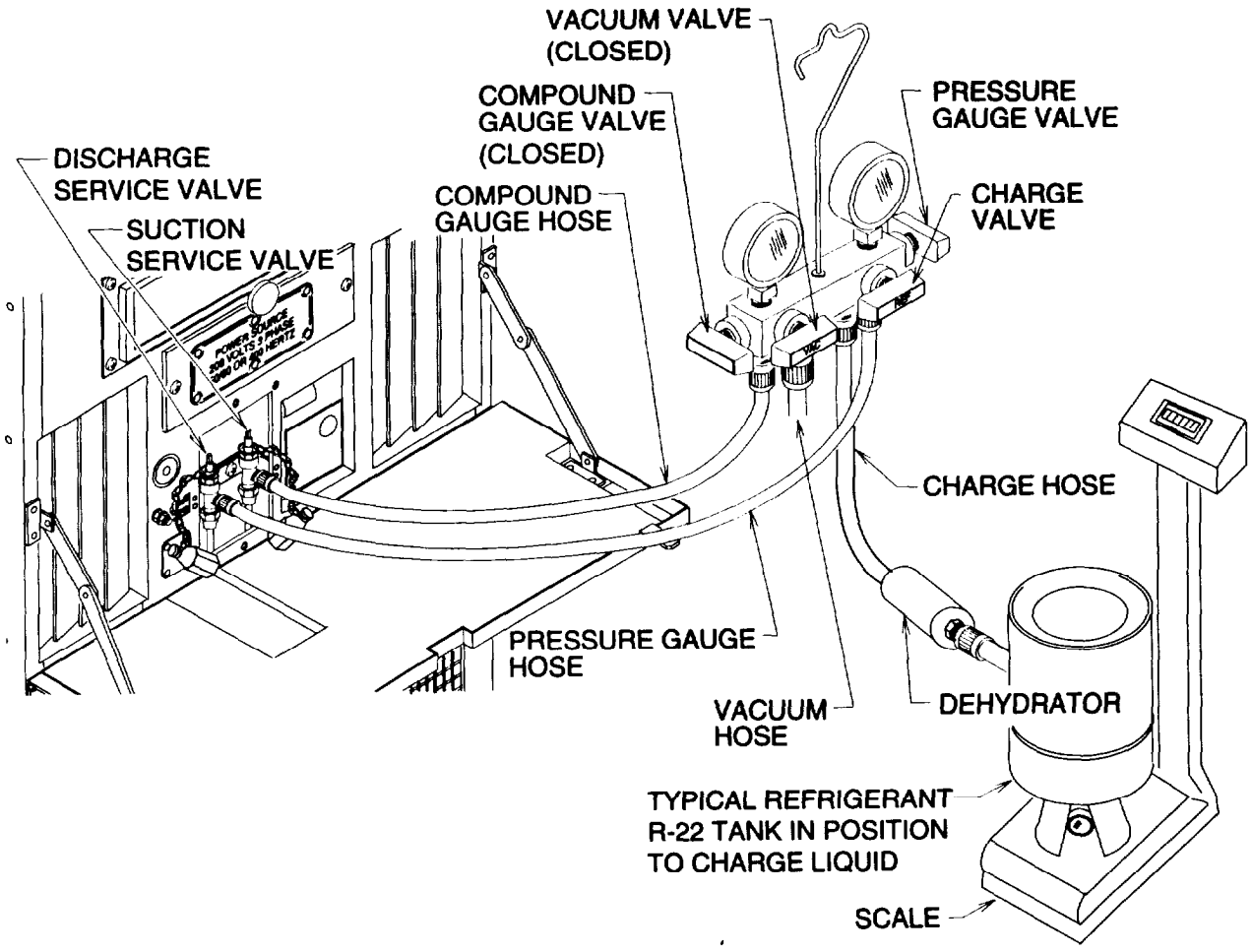


Figure 4-10. Refrigerant Charging (Total System)

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) charging valve. This can cause damage to the compressor.

(7) Close compound gauge valve.

(8) Set refrigerant cylinder to deliver liquid only.

(9) Place refrigerant cylinder on an accurate scale to measure and record weight.

(10) Open discharge and suction valves.

(11) Open charge valve. Allow liquid refrigerant to enter system until drum weight has decreased by 6.2 pounds (2.8 kg) or until system pressure has equalized.

4-18. CHARGING THE REFRIGERANT SYSTEM. (Cont)

(12) Close charge and pressure gauge valves.

NOTE

If 6.2 pounds (2.8 kg) full charge was obtained, skip steps (13) through (23).

(13) Connect power at power source.

(14) Turn air conditioner on and operate in COOL mode with potentiometer TEMPERATURE control set at maximum COOL position.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) charging valve. This can cause damage to the compressor.

(15) Set refrigerant cylinder to deliver gas only.

WARNING

Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.

(16) Check that pressure gauge valve is closed.

(17) Open compound gauge valve.

(18) Open charge valve.

(19) Monitor weight of the refrigerant drum as air conditioner compressor pulls additional refrigerant gas into system until fully 6.2 pounds (2.8 kg) charge is obtained. When system is fully charged, immediately close refrigerant drum valve and air conditioner suction service valve.

(20) Run air conditioner in COOL mode (with potentiometer TEMPERATURE control in full COOL position) for 15 minutes.

(21) With the Air Conditioner running, observe sight glass on back of condenser section. Be sure that the compressor is running.

(a) Green center means refrigerant moisture content is acceptable.

(b) Yellow center means there is too much moisture in system. It must be discharged, evacuated and charged again.

(22) Close compound gauge, charge, and refrigerant cylinder valves.

(23) Turn rotary MODE selector switch to OFF RESET.

b. *Partial Charge.*

WARNINGS

- 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 causes the refrigerant to break down and form carbonyl chloride (phosgene), a highly toxic and corrosive gas. Prevent contact of refrigerant with flame or hot surfaces.

CAUTION

The system must be evacuated before charging. Moisture in the system will prevent the Air Conditioner from operating properly.

NOTE

The charging operation should be done with all panels in place except for refrigerant charging valve access cover.

(1) Connect the charge hose to a cylinder of Refrigerant R-22 set to deliver gas only.

(2) Loosen hose connections on the high and low pressure charging valves slightly.

(3) Check that vacuum and charge valves are closed.

(4) Open pressure gauge and compound gauge valves.

(5) Open refrigerant cylinder valve.

(6) Open charge valve slightly to allow a small amount of refrigerant to purge air from hoses. Tighten hose connections on the discharge and suction service valves. Close charge valve.

CAUTION

Never introduce liquid refrigerant into the low pressure (suction) charging valve. This can cause damage to the compressor.

(7) Close compound gauge valve.

(8) Connect power at power source.

(9) Turn air conditioner on and operate in COOL mode with potentiometer TEMPERATURE control set at maximum COOL position.

4-18. CHARGING THE REFRIGERANT SYSTEM. (Cont)

(10) With the Air Conditioner running, observe sight glass on back of condenser section. Be sure that the compressor is running.

(a) Green center means refrigerant moisture content is acceptable.

(b) Yellow center means there is too much moisture in system. It must be discharged, evacuated, and charged again.

(c) Milky white or bubbly liquid means system has low charge.

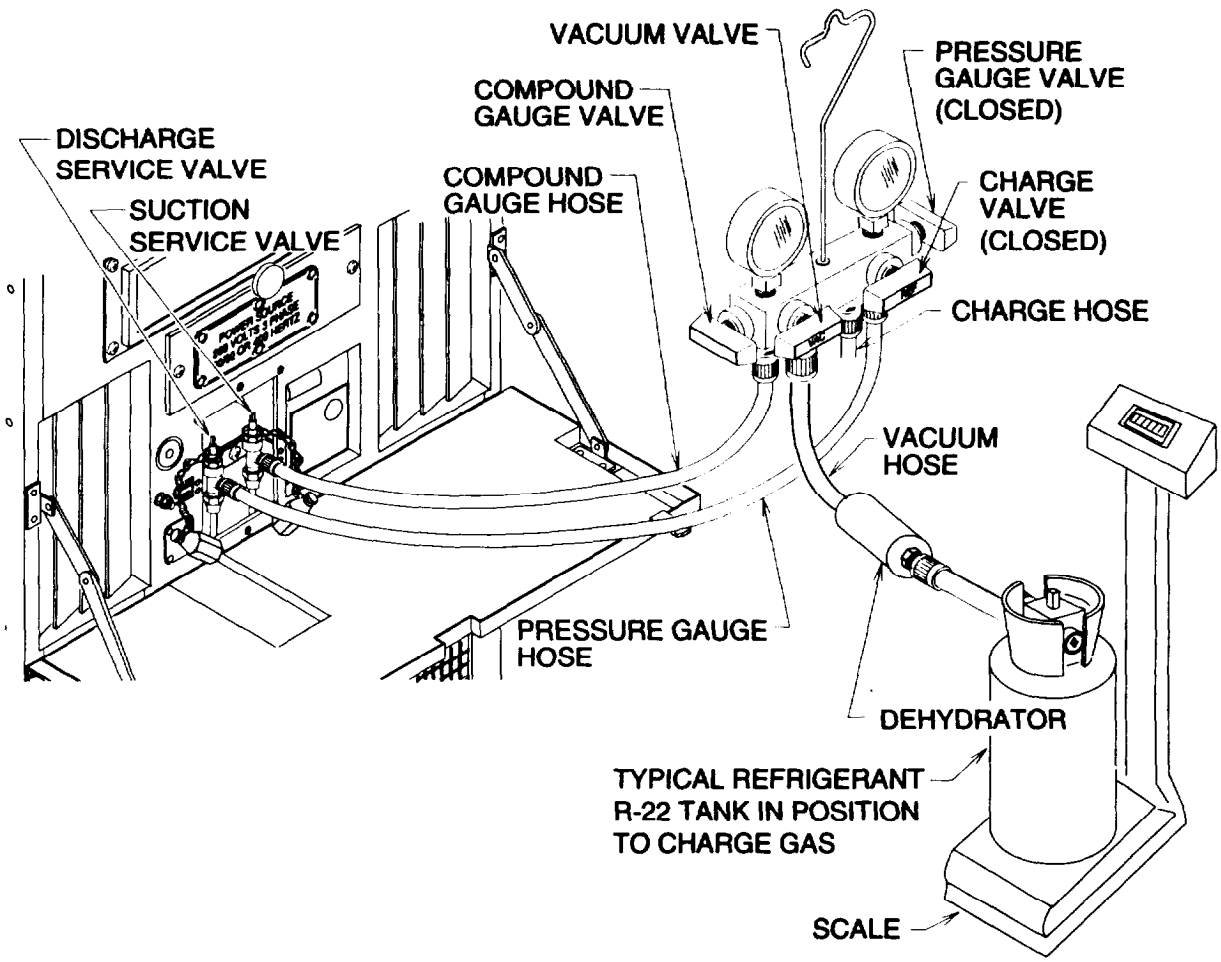


Figure 4-11. Refrigerant Charging (Partial Systems/Small Quantify Charge)

(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.

(11) If charge is low, carefully add refrigerant.

(12) Set refrigerant cylinder to deliver gas only.

WARNING

Never introduce high discharge pressure into a refrigerant cylinder. This can cause the cylinder to rupture and injure personnel.

(13) Check that pressure gauge valve is closed.

(14) Open compound gauge and charge valves.

(15) Continue to charge until sight glass remains clear and bubble-free for 15 minutes.

(16) Close compound gauge, charge, and refrigerant cylinder valves.

(17) Turn rotary MODE selector switch to OFF RESET.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-19. REFRIGERANT SYSTEM PRESSURE CHECK.

This task covers: Testing

INITIAL SETUP

Tools

Refrigeration Unit Service Tool Kit (Item 1, Appendix B)
Goggles (Item 1, Appendix B)
Gloves (Item 2, Appendix B)

Equipment Conditions:

Service manifold installed. See para 411.

Testing

(1) Check that all four service manifold valves are closed and Air Conditioner discharge and suction service valves are open.

(2) Both gauges should read the same. Check the reading with the appropriate column in Table 4-2. 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. See paragraph 4-16 for leak testing.

(3) Turn air conditioner on and operate in COOL mode with potentiometer TEMPERATURE control set at maximum COOL position for five minutes.

4-19. REFRIGERANT SYSTEM PRESSURE CHECK. (Cont)

Table 4-2. Pressure Temperature Relationship of Saturated Refrigerant R-22

Temperature		Pressure		Temperature		Pressure	
Deg F	Deg C	Psig	kg/cm^2	Deg F	Deg C	Psig	kg/cm^2
10	-12.3	32.93	2.315	66	18.9	114.2	8.029
12	-11.1	34.68	2.439	68	20.0	118.3	8.318
14	-10.0	36.89	2.593				
16	-8.9	38.96	2.739	70	21.1	122.5	8.612
18	-7.8	41.09	2.889	72	22.2	126.8	8.915
				74	23.3	131.2	9.225
20	-6.6	43.28	3.043	76	24.4	135.7	9.541
22	-5.5	45.23	3.180	78	25.6	140.3	9.864
24	-4.3	47.85	3.364				
26	-3.4	50.24	3.532	80	26.7	145.0	10.195
28	-2.2	52.70	3.705	82	27.8	149.8	10.522
				84	28.9	154.7	10.877
30	-1.1	55.23	3.883	86	30.0	159.8	11.236
32	0	57.83	4.066	88	31.1	164.9	11.594
34	1.1	60.51	4.254				
36	2.2	63.27	4.448	90	32.2	170.1	11.960
38	3.3	66.11	4.648	92	33.3	175.4	12.332
				94	34.5	180.9	12.719
40	4.4	69.02	4.853	96	35.6	186.5	13.113
42	5.5	71.99	5.062	98	36.7	192.1	13.506
44	6.6	75.04	5.276				
46	7.7	78.18	5.497	100	37.8	197.9	13.914
48	8.8	81.40	5.723	102	38.9	203.8	14.329
				104	40.0	209.9	14.758
50	10.0	84.70	5.955	106	41.1	216.0	15.187
52	11.1	88.10	6.257	108	42.2	222.3	15.630
54	12.2	91.5	6.433				
56	13.3	95.1	6.686	110	43.3	228.7	16.080
58	14.5	98.8	6.947	112	44.4	235.2	16.537
				114	45.6	241.9	17.008
60	15.6	102.5	7.206	116	46.7	248.7	17.486
62	16.7	106.3	7.474	118	47.8	255.6	17.971
64	17.8	110.2	7.748				

Table 4-3. Normal Operating Pressures (In Full Cooling Decrease Mode)

Temperatures	Pressure Range (Psig)			
Outdoor ambient	50° F (10 C)	75° F (24 C)	100° F (38 C)	120° F (49 C)
90°F (32 C) Return Air to Air Conditioner (Dry Bulb)	55-65 Suction 125-160 Discharge	59-70 Suction 175-210 Discharge	60-75 Suction 275-350 Discharge	75-98 Suction 370-430 Discharge
80° F (27 C) Return Air to Air Conditioner (Dry Bulb)	58-65 Suction 120-155 Discharge	58-70 Suction 170-205 Discharge	60-75 Suction 275-325 Discharge	65-90 Suction 370-410 Discharge

(4) With the Air Conditioner operating, allow gauges to stabilize. Take readings of the two gauges and compare to Table 4-3.

(a) If discharge and suction pressures are at, or near, the same value, a pressure equalizer solenoid valve (L1) or compressor 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 or maladjustment of the expansion valve is indicated.

(d) If ice forms on evaporator coil or evaporator coil does not cool during operation, failure or malfunction of evaporator expansion valve is indicated.

(e) If discharge pressure is high and suction pressure in normal, refrigerant overcharge is indicated.

(5) When pressure tests are completed, turn Air Conditioner off and proceed with any maintenance action indicated.

(6) Turn rotary MODE selector switch to OFF RESET.

NOTE

FOLLOW-ON MAINTENANCE:
Remove service manifold. See para 4-11.

4-20. REFRIGERANT DESICCANT DEHYDRATOR (FILTER-DRIER) INSPECTION AND REPLACEMENT.

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Self Locking Nuts, Qty 2 (Item 15, Appendix G)

a. *Inspection.* Inspect refrigerant desiccant dehydrator (1) for visible signs of damage. Replace if damaged.

b *Removal.*

(1) Discharge refrigerant system. See paragraph 4-12.

(2) Remove lower front panel. See paragraph 3-14.

(3) Loosen and move electrical component bracket. See paragraph 3-28.

(4) Loosen and disconnect two flare nuts (2).

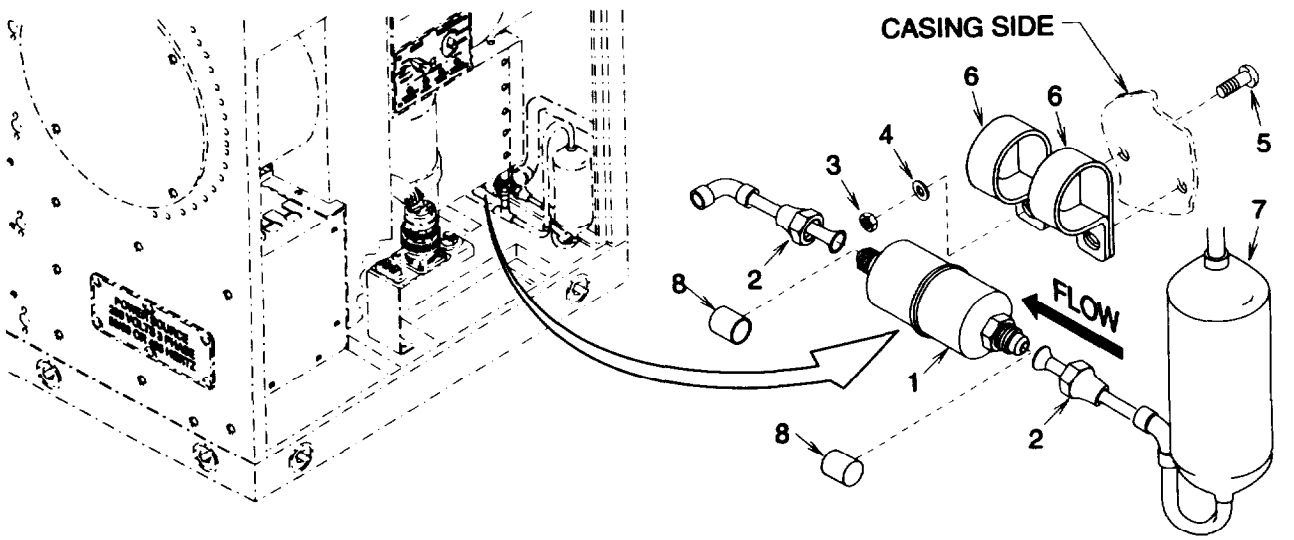


Figure 4-12. Refrigerant Desiccant Dehydrator (Filter-Drier)

(5) Remove two self locking nuts (3), flat washers (4) and screws (5). Slip refrigerant desiccant dehydrator (1) and two brackets (6) from air conditioner. Discard self locking nuts.

(6) Remove refrigerant desiccant dehydrator (1) from two brackets (6).

c. Installation.

(1) Slip refrigerant desiccant dehydrator (1) and two brackets (6) into place in the Air Conditioner. Refrigerant flow is away from receiver (7), be sure refrigerant desiccant dehydrator is installed correctly per flow direction indicator. Secure brackets in place with two screws (5), flat washers (4) and new self locking nuts (3).

CAUTIONS

- New refrigerant desiccant dehydrators are packaged with sealing caps on the flare fittings to prevent moisture contamination of the desiccant filtering media.
- Installing a new refrigerant desiccant dehydrator from which caps have been removed for an extended or unknown period of time can cause contamination of refrigeration system.

(2) Remove two caps (8) from new refrigerant desiccant dehydrator (1) and tighten two flare nuts (2)

(3) Leak test refrigerant system. See paragraph 4-16.

(4) Evacuate refrigerant system. See paragraph 4-17.

(5) Charge refrigerant system. See paragraph 4-18.

(6) Remove service manifold. See paragraph 4-11.

(7) Install service valve cover. See paragraph 3-14.

(8) Install electrical components bracket. See paragraph 3-28.

(9) Install lower front panel. See paragraph 3-14.

4-21. ACTUATING CYLINDER INSPECTION, ADJUSTMENT, AND REPLACEMENT.

This task covers: a. Inspection b. Adjustment c. Removal d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Self Locking Nuts, Qty 2 (Item 15, Appendix G)

Equipment Conditions:

Actuating cylinder cover removed. See para 3-14.

a. Inspection.

(1) Check for evidence of leaking. Leak check per paragraph 4-16. Replace actuating cylinder (1) if leaking.

(2) Check for dents on actuating cylinder (1). Replace if dented.

(3) Check that vanes (2) are in the closed position and the cylinder shaft (3) is completely retracted. Adjust if required.

4-21. ACTUATING CYLINDER INSPECTION, ADJUSTMENT, AND REPLACEMENT. (Cont)

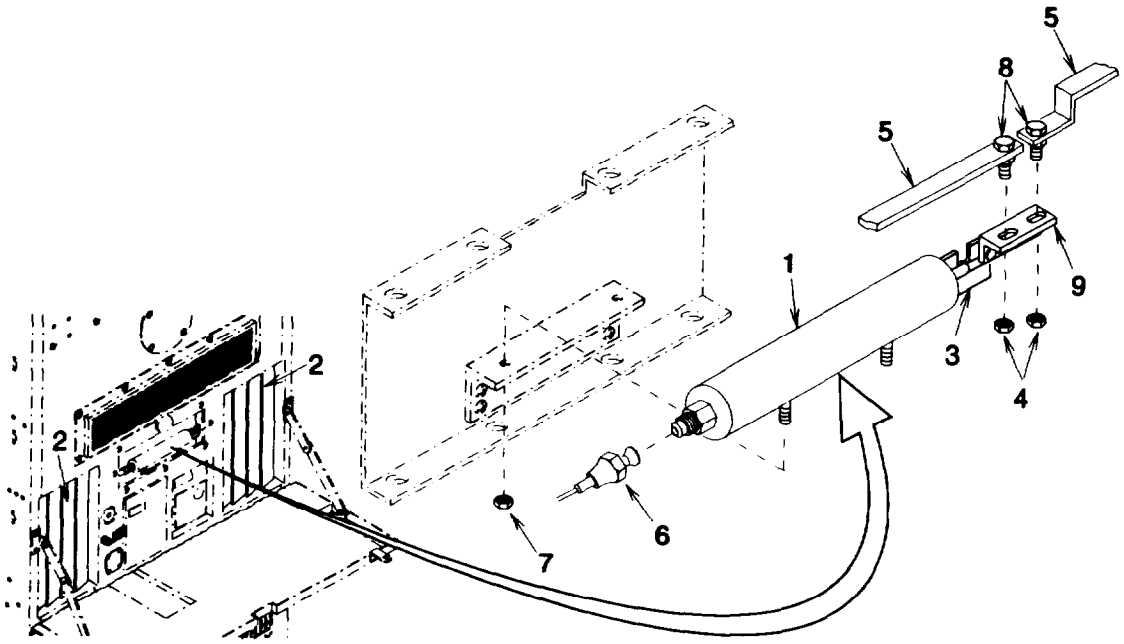


Figure 4-13. Actuating Cylinder

b. Adjustment.

(1) Loosen two self locking nuts (4).

(2) Adjust links (5) until the vanes (2) are closed.

(3) Tighten two self locking nuts (4).

c. Removal.

(1) Remove the refrigerant desiccant dehydrator. See paragraph 4-20.

(2) Remove two self locking nuts (4). Discard self locking nuts.

(3) Remove coupling nut (6).

(4) Remove two nuts (7).

(5) Lift links (5) to remove two screws (8) from bracket (9).

(6) Remove actuating cylinder (1).

d. *Installation.*

(1) Install actuating cylinder (1). Lift links (5) to insert two screws (8) into bracket (9).

(2) Install two nuts (7).

(3) Install two new self locking nuts (4).

(4) Connect coupling nut (6).

(5) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:
Install actuating cylinder cover. See para 3-14.

4-22. SAFETY CONTROL BOX (PRESSURE SWITCHES) TESTING AND REPLACEMENT.

This task covers: a. Testing b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 6 (Item 7, Appendix G)
Insulation Tape (Item 16, Appendix E)
Marker Tag (Item 2, Appendix E)

Equipment Conditions:

Power cable disconnected from input power connector. See para 3-6.
Service manifold gauges installed. See para 4-11.

WARNING

High voltage is used in this equipment. Be sure power cable is disconnected prior to performing any maintenance to prevent personal injury or death.

a. Testing.

(1) *High Pressure Switch.*

(a) Manifold gauges should read below 470 psig (3243 kPa). If readings are higher than 470 psig, check refrigerant charge per paragraph 4-18.

(b) Remove six screws (1), lock washers (2), and flat washers (3). Discard lock washers.

(c) Carefully pull safety control box (4) out far enough to access screws (5).

(d) Remove four screws (5) and carefully pull panel (6) out to access high pressure switch (7).

(e) Remove two screws (8).

(f) Carefully pull high pressure switch (7) out far enough to gain access to cover (9).

4-42. SAFETY CONTROL BOX (PRESSURE SWITCHES) TESTING AND REPLACEMENT. (Cont)

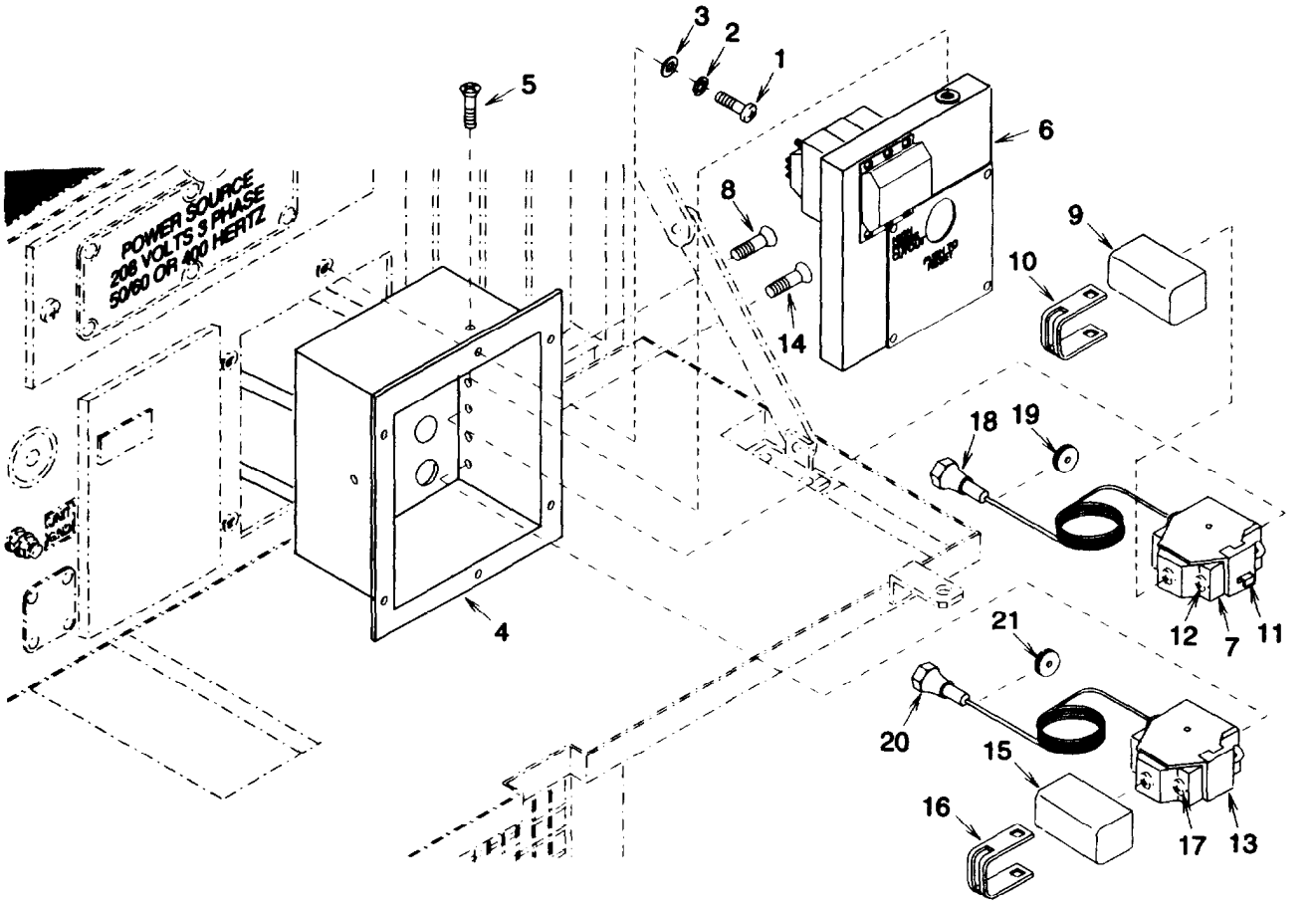


Figure 4-14. Pressure Cutout Switches (S5) and (S6)

(g) Remove clip (10) and cover (9).

(h) Press and release the reset button (11).

(i) Using a multimeter set to measure resistance, check for continuity between two terminals (12). If no continuity is indicated, high pressure switch (7) must be replaced.

(2) Low Pressure Switch.

(a) Manifold gauge should read above 12 psig (83 kPa). If readings are below 12 psig (83 kpa), check refrigerant charge per paragraph 4-18.

(b) Remove six screws (1), lock washers (2), and flat washers (3). Discard lock washers.

(c) Carefully pull safety control box (4) out far enough to access screws (5).

(d) Remove four screws (5) and carefully pull panel (6) out to access low pressure switch (13).

(e) Remove two screws (14).

(f) Carefully pull low pressure switch (13) out far enough to gain access to cover (15).

(g) Remove clip (16) and cover (15).

(h) Using a multimeter set to measure resistance, check for continuity between two terminals (17). If no continuity is indicated, low pressure switch (13) must be replaced.

b. *Removal.*

(1) *High Pressure* Switch.

(a) Remove six screws (1), lock washers (2), and flat washers (3). Discard lock washers.

(b) Carefully pull safety control box (4) out far enough to access screws (5).

(c) Remove four screws (5) and carefully pull panel (6) out to access high pressure switch (7).

(d) Remove two screws (8).

(e) Carefully pull high pressure switch (7) out far enough to gain access to cover (9).

(f) Remove clip (10) and cover (9).

(g) Tag and disconnect wire leads from two terminals (12).

(h) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(i) Disconnect coupling nut (18).

(j) Remove grommet (19) and carefully remove high pressure switch (7).

(2) *Low Pressure Switch.*

(a) Remove six screws (1), lock washers (2), and flat washers (3). Discard lock washers.

(b) Carefully pull safety control box (4) out far enough to access screws (5).

(c) Remove four screws (5) and carefully pull panel (6) out to access low pressure switch (13).

(d) Remove two screws (14).

(e) Carefully pull low pressure switch (13) out far enough to gain access to cover (15).

(f) Remove clip (16) and cover (15).

(g) Tag and disconnect wire leads from two terminals (17).

(h) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(i) Disconnect coupling nut (20).

(j) Remove grommet (21) and carefully remove low pressure switch (13).

4-22. SAFETY CONTROL BOX (PRESSURE SWITCHES) TESTING AND REPLACEMENT. (Cont)

c. Installation.

(1) Low Pressure Switch.

(a) Wrap insulation tape around low pressure switch (13) tube.

(b) Carefully install low pressure switch (13) and grommet (21).

(c) Connect coupling nut (20).

(d) Connect wire leads onto two terminals (17) using tags and wiring diagram Figure 3-5. Remove tags.

(e) Install cover (15) and clip (16).

(f) Carefully push low pressure switch (13) in and install two screws (14).

(g) Carefully push panel (6) in and install four screws (5).

(h) Install six screws (1), new lock washers (2), and flat washers (3).

(i) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

(2) High Pressure Switch.

(a) Wrap insulation tape around high pressure switch (7) tube.

(b) Carefully install high pressure switch (7) and grommet (19).

(c) Connect coupling nut (18).

(d) Connect wire leads onto two terminals (12) using tags and wiring diagram Figure 3-5. Remove tags.

(e) Install cover (9) and clip (10).

(f) Carefully push high pressure switch (7) in and install two screws (8).

(g) Carefully push panel (6) in and install four screws (5).

(h) Install six screws (1), new lock washers (2), and flat washers (3).

(i) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:
Connect power cable to input power connector. See para 3-6.

4-23. PRESSURE RELIEF VALVE INSPECTION AND REPLACEMENT.

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Antisieze Tape (Item 17, Appendix E)

Equipment Conditions:

Electrical components bracket removed. See para 3-28.

a. *Inspection.* Check relief valve (1) for any visible damage or evidence of leakage. Leak test per paragraph 4-16. Replace if damaged or leaking.

b. *Removal.*

(1) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(2) Secure straight adapter (2) so it does not twist and remove pressure relief valve (1).

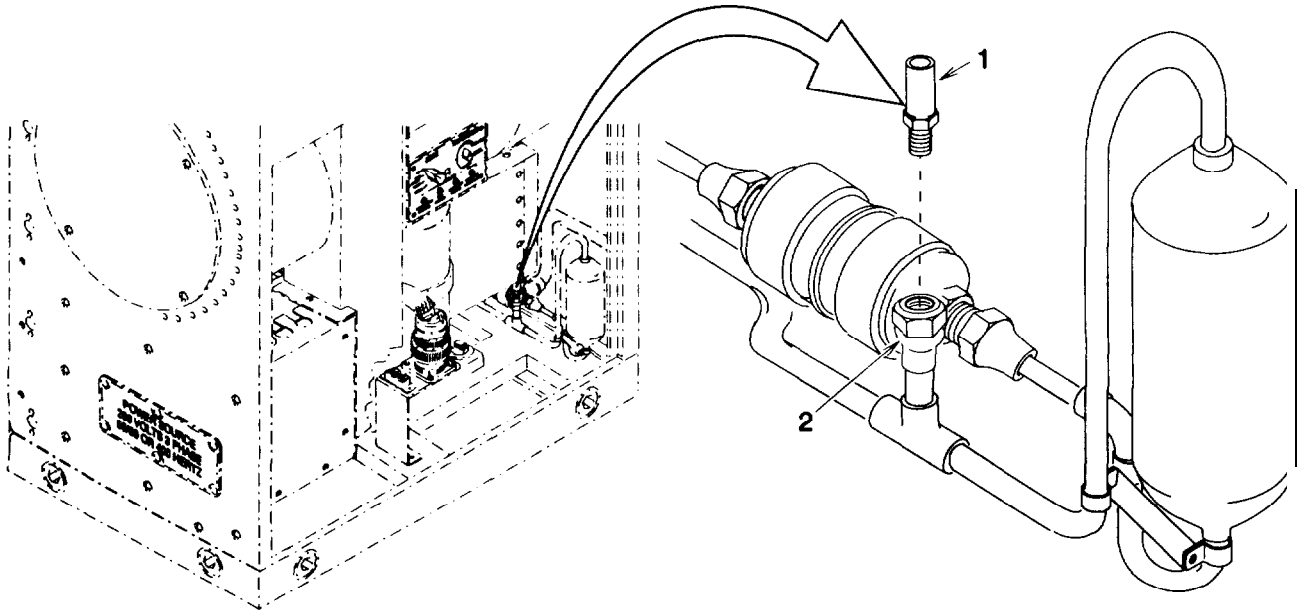


Figure 4-15. Pressure Relief Valve

4-23. PRESSURE RELIEF VALVE INSPECTION AND REPLACEMENT. (Cont)

c. Installation.

(1) Wrap antisieze tape around pressure relief valve (1) threads.

(2) Secure straight adapter (2) so it does not twist and install pressure relief valve (1).

(3) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:

Install electrical components bracket. See para 3-28.
Install lower front panel. See para 3-14.

4-24. CONDENSER COIL REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Gloves (Item 2, Appendix B)

Equipment Conditions:

Refrigerant desiccant dehydrator removed. See para 4-20.
Condenser discharge air deflector door removed. See para 3-14.
Condenser coil guard removed. See para 3-15.

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage to the coil.

a. *Removal.*

(1) Remove 13 screws (2) from condenser coil (1).

(2) Carefully pull condenser coil (1) and attached tubing from the air conditioner.

(3) Debraze tube joints (3) and (4). See paragraph 4-14.

b. *Installation.*

(1) Braze tube joints (3) and (4) to condenser coil (1). See paragraph 4-14.

(2) Being careful not to damage tubing, place condenser coil (1) into the air conditioner.

(3) Position condenser coil (1) in place and install 13 screws (2).

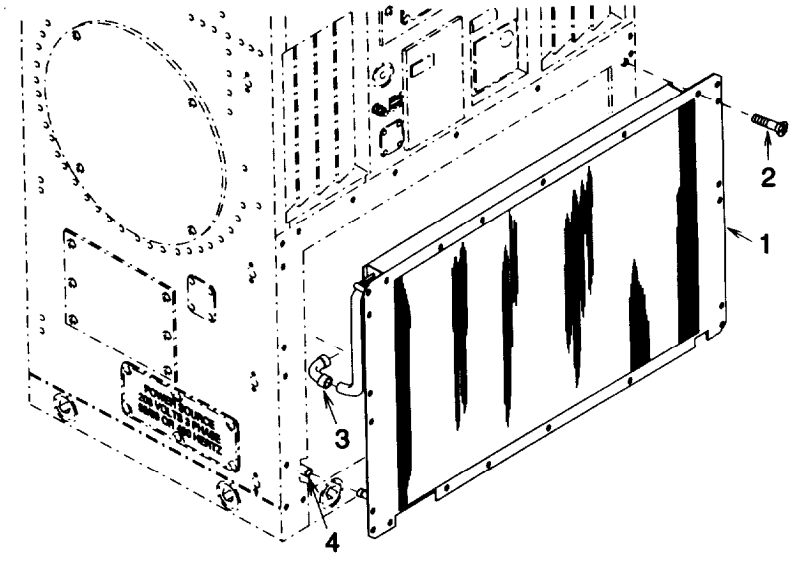


Figure 4-16. Condenser Coil

NOTE

FOLLOW-ON MAINTENANCE:
Install new refrigerant desiccant dehydrator. See para 4-20.
Install condenser coil guard. See para 3-15.
Install condenser discharge air deflector door. See para 3-14.

4-25. RECEIVER INSPECTION AND REPLACEMENT.

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit
(Item 1, Appendix B)

Materials/Parts

Lock Washer, Qty 1 (Item 9, Appendix G)
Self Locking Nuts, Qty 2 (Item 15, Appendix G)

Equipment Conditions:

Lower front panel removed. See para 3-14.

a. Inspection. Check receiver (1) for any visible damage or evidence of leakage. Leak test per paragraph 4-16. Replace if damaged or leaking.

4-25. RECEIVER INSPECTION AND REPLACEMENT. (Cont)

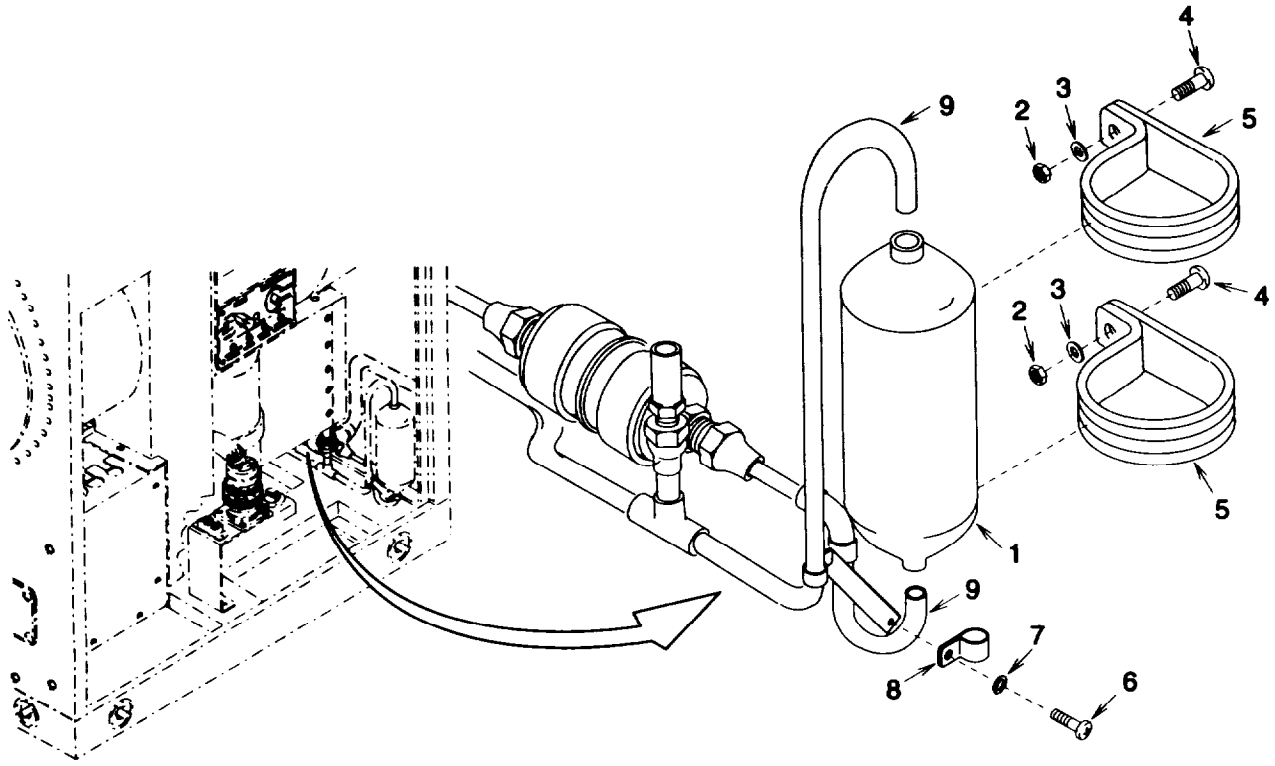


Figure 4-17. Receiver

b. Removal.

(1) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(2) Remove two self locking nuts (2), flat washers (3), screws (4), and clamps (5). Discard self locking nuts.

(3) Remove screw (6), lock washer (7), and clamp (8). Discard lock washer.

(4) Debraze tubing (9) and remove receiver (1). See paragraph 4-14.

c. Installation.

(1) Place receiver (1) onto tubing (9) and braze. See paragraph 4-14.

(2) Install two clamps (5), screws (4), flat washers (3), and new self locking nuts (2).

(3) Install clamp (8), screw (6), and new lock washer (7).

(4) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:
Install lower front panel. See para 3-14.

4-26. SERVICE VALVES INSPECTION AND REPLACEMENT.

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Equipment Conditions:

Service valve cover removed. See para 3-14.

a. *Inspection.*

(1) Remove two covers (1) and caps (2).

(2) Check service valves (3) for any visible damage or evidence of leakage. Leak test per paragraph 4-16. Replace if damaged or leaking.

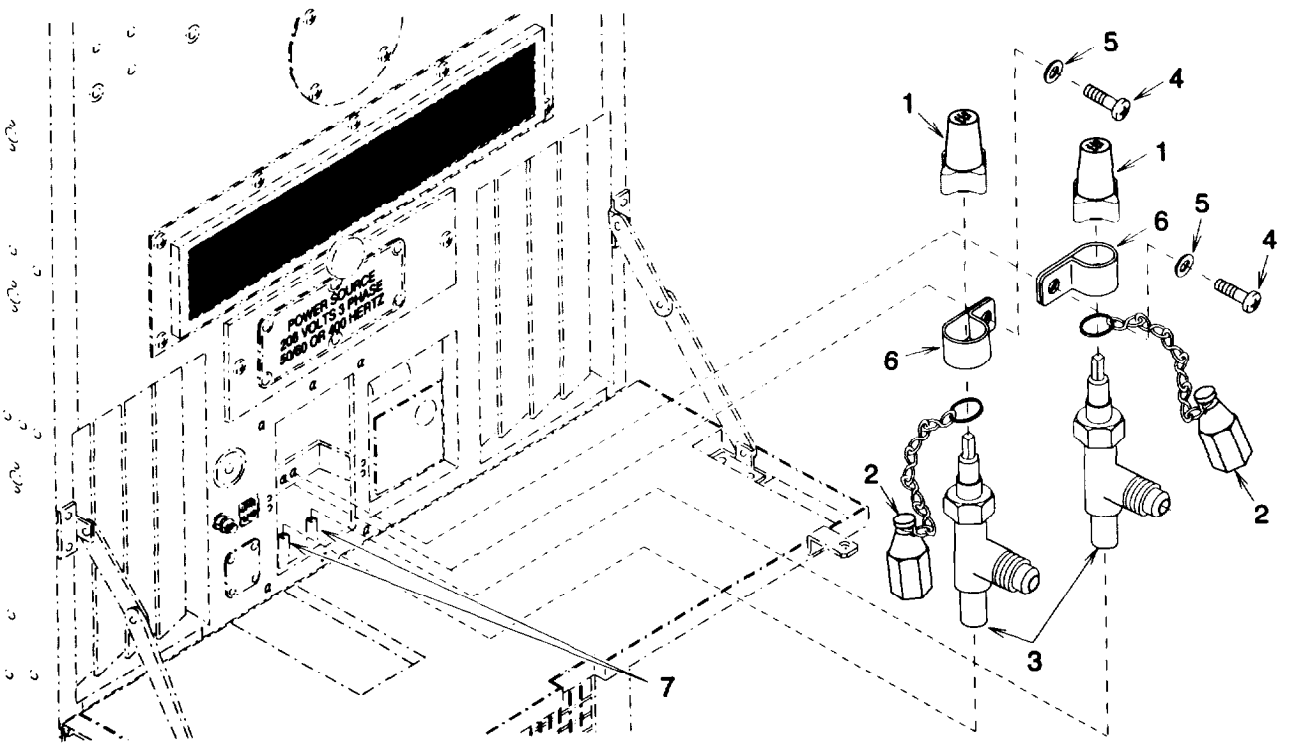


Figure 4-18. Service Valves

4-26. SERVICE VALVES INSPECTION AND REPLACEMENT. (Cont)

b. *Removal.*

NOTE

The following procedures apply to both service valves.

(1) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(2) Remove screw (4), flat washer (5), and clamp (6).

(3) Remove cover (1) and cap (2).

(4) Debraze tubing (7) and remove service valve (3). See paragraph 4-14.

c. *Installation*

NOTE

The following procedures apply to both service valves.

(1) Position service valve (3) on tubing (7) with threaded connection end facing out.

(2) Braze service valve (3). See paragraph 4-14.

(3) Install clamp (6), screw (4), and flat washer (5).

(4) Install cover (1) and cap (2).

(5) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:
Install service valve cover. See para 3-14.

4-27. SOLENOID VALVE REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Lock Washers, Qty 2 (Item 8, Appendix G)

Equipment Conditions:

Lower front panel removed. See para 3-14.
Refrigerant desiccant dehydrator removed. See para 4-20.

a. *Removal*.

(1) Remove nut (1). Pull data plate (2) and coil (3) off valve body stem (4).

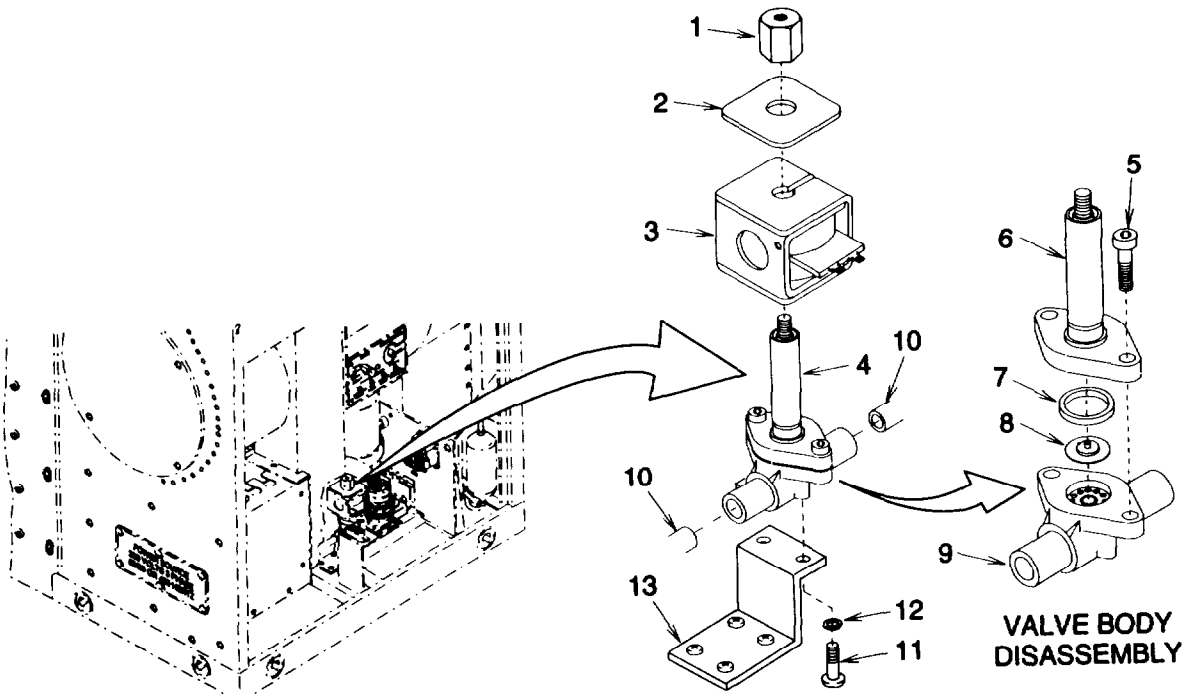


Figure 4-19. Solenoid Valve

(2) Remove two screws (5). Remove tube and plunger assembly (6), gasket (7), and diaphragm (8).

(3) Check valve body (9) for visible damage. Normally valve body replacement is unnecessary. If valve body is in good condition, skip steps (5) through (7).

(4) Purge refrigerant system. See paragraph 4-13.

(5) Debraze tube connections (10). See paragraph 4-14.

(6) Remove two screws (11) and lock washers (12). Remove valve body (9).

4-27. SOLENOID VALVE REPLACEMENT. (Cont)

b. *Installation*.

(1) Secure valve body to bracket (13) with two screws (11) and lock washers (12).

(2) Braze tube connections (10). See paragraph 4-14.

(3) Install diaphragm (8) into valve body (9) and gasket (7) into tube and plunger assembly (6).

(4) Secure tube and plunger assembly (6) to valve body (9) with two screws (5).

(5) Slide coil (3) and data plate (2) onto valve body stem (4). Secure with nut (1).

NOTE

FOLLOW-ON MAINTENANCE:
Install new refrigerant desiccant dehydrator. See para 4-20.
Install lower front panel. See para 3-14.

4-28. LIQUID SIGHT INDICATOR REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Equipment Conditions:

Refrigerant desiccant dehydrator removed. See para 4-20.

a. *Removal*.

(1) Remove two screws (1), flat washers (2), and bracket (3) being careful not to drop bracket into the air conditioner.

(2) Carefully remove gasket (4) and spacer (5).

(3) Debraze liquid sight indicator (6) connections from tubing (7) to remove. See paragraph 4-14.

b. *Installation*.

(1) Position liquid sight indicator (6) on tubing (7) and braze. See paragraph 4-14.

(2) Install spacer (5) and gasket (4) on liquid sight indicator.

(3) Position bracket (3) in place and install two screws (1) and flat washers (2).

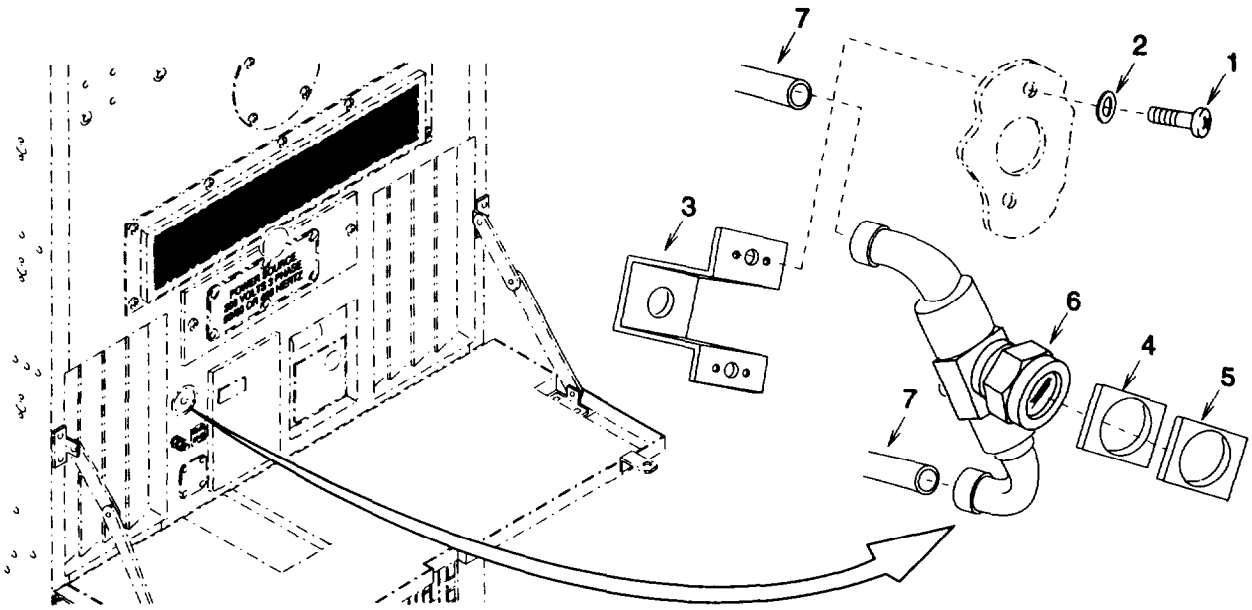


Figure 4-20. Liquid Sight Indicator

NOTE

FOLLOW-ON MAINTENANCE:
Install new refrigerant desiccant dehydrator. See para 4-20.

4-29. EXPANSION VALVE TESTING AND REPLACEMENT.

This task covers:	a. Testing	b. Removal	c. Installation	d. Adjustment

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Materials/Parts

Insulation Tape (Item 16, Appendix E)

Equipment Conditions:

Conditioned air filter removed. See para 3-16.

a. *Testing.*

(1) Remove insulation (1) from tubing (2).

(2) Note position of sensing bulb (3) and loosen two screws (4).

(3) Carefully pull sensing bulb (3) out of clamps (5).

(4) Place sensing bulb (3) in a container of ice water.

4-29. EXPANSION VALVE TESTING AND REPLACEMENT. (Cont)

WARNING

The following tests must be conducted with power on and evaporator fans operating. Exercise extreme caution to avoid personal injury.

(5) Operate the air conditioner in the COOL mode with the TEMPERATURE control set fully to COOL position. See paragraph 2-7.

(6) Place one hand on the tubing (2). If a drop in temperature is felt on the tubing, the expansion valve (6) is not closing fully and should be replaced.

CAUTION

The following test can cause the compressor to flood with liquid refrigerant. If the air conditioner operates under the test conditions more than a few seconds, excessive flooding of liquid refrigerant may damage or destroy the compressor.

(7) With one hand on the tubing (2), remove the sensing bulb (3) from the container of ice water and warm it in the other hand. If a temperature drop is not felt in the tubing by the time the sensing bulb warms, the expansion valve (6) is not opening and should be replaced. If a drop in temperature is felt in the tubing, immediately turn the air conditioner MODE switch to OFF RESET.

(8) Shut down the air conditioner. See paragraph 2-7.

NOTE

If the expansion valve fails any of the above tests, it is not necessary to perform the next two procedures.

(9) Slip the sensing bulb (3) into clamps (5). Be sure the bulb is in original position and making metal-to-metal-contact with the tubing (2). Tighten two screws (4).

(10) Install insulation (1) and wrap with insulation tape.

b. *Removal*.

(1) Remove insulation (1) and (7) from tubing (2) and (8).

(2) Note position of sensing bulb (3) and loosen two screws (4).

(3) Carefully pull sensing bulb (3) out of clamps (5).

(4) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(5) Remove fresh air damper panel/cover assembly. See paragraph 3-18.

(6) Debraze tubing (8) and (9). See paragraph 4-14.

(7) Remove tube coupling (10).

(8) Remove two screws (11), spacers (12), body (13), gasket (14), cage assembly (15), gasket (16), seat (17), and base (18).

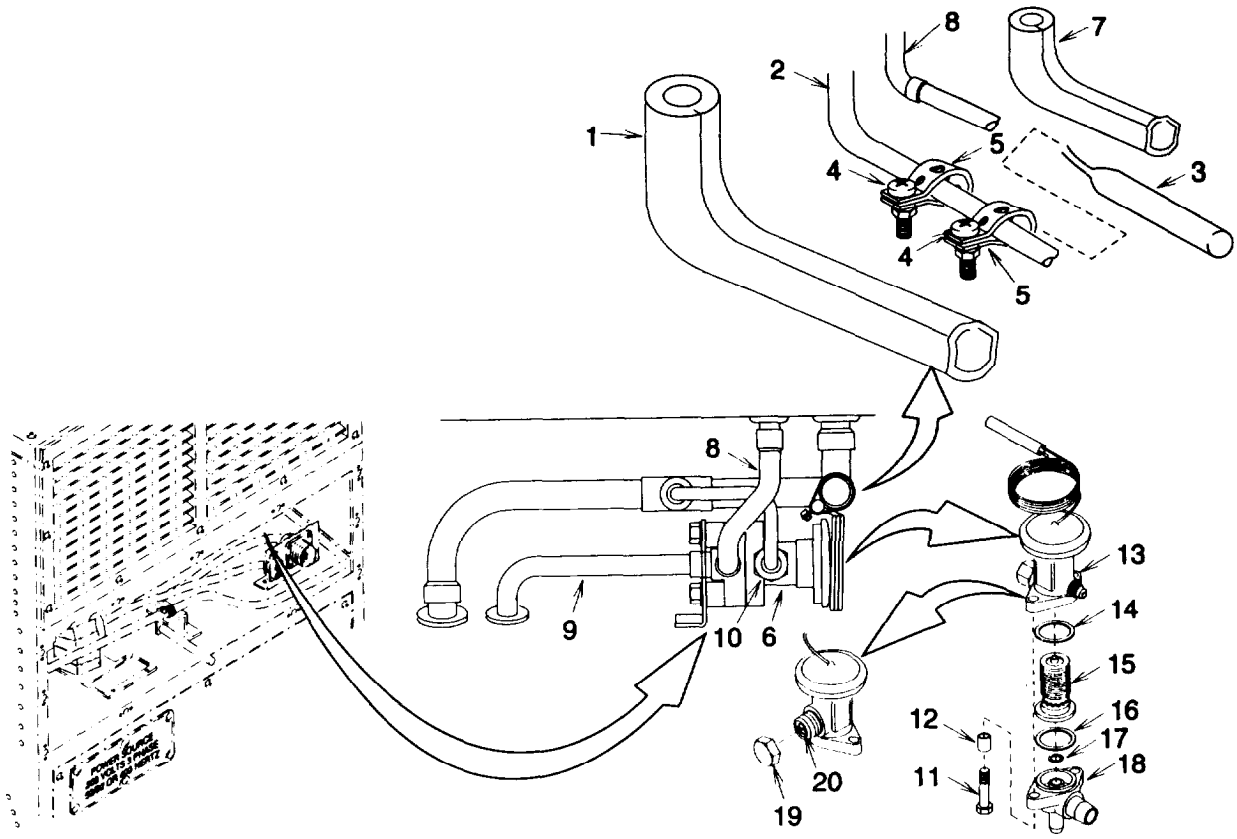


Figure 4-21. Expansion Valve

c. *Installation*.

(1) Disassemble new expansion valve (6) prior to brazing by remove two screws (11), spacers (12), body (13), gasket (14), cage assembly (15), gasket (16), seat (17), and base (18).

(2) Install base onto tubing (8) and (9) then braze tubing. See paragraph 4-14.

(3) Assemble expansion valve (6) by installing seat (17), gasket (16), cage assembly (15), gasket (14), body (13), spacers (12), and two screws (11), onto base (18).

(4) Connect tube coupling (10).

(5) Install fresh air damper panel/cover assembly. See paragraph 3-18.

(6) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

(7) Carefully push sensing bulb (3) into clamps (5) in position noted during removal and tighten two screws (4).

(8) Wrap insulation (1) and (7) onto tubing (2) and (8) and secure with insulation tape to seal it.

4-29. EXPANSION VALVE TESTING AND REPLACEMENT. (Cont)

d. *Adjustment*.

(1) Remove fresh air damper panel/cover assembly. See paragraph 3-18.

(2) Open a portion of insulation (1) and attach an accurate thermometer to tubing (2) near the sensing bulb (3). Close the insulation and wrap with insulation tape.

(3) Install service manifold. See paragraph 4-11.

(4) Operate the air conditioner in the COOL mode with the TEMPERATURE control set fully to COOL position per paragraph 2-7. Allow the air conditioner to run until the thermometer and suction pressure readings remain unchanged for at least 2 minutes.

(5) Note the pressure on the suction gauge. Find the saturation temperature for the suction pressure per Table 4-1 and compare this temperature to the thermometer temperature. The thermometer temperature should be 10 $\pm$ 1° F (5.55 $\pm$ 0.55° C) higher than the saturation temperature. This is the superheat temperature for the air conditioner.

(6) If the superheat temperature is not within tolerance, adjust the expansion valve (6) as follows:

(a) Remove cap (19).

(b) Turning the adjusting stem (20) two complete turns will change the superheat setting 1° F (0.55° C). Turn the stem clockwise to increase the superheat and counterclockwise to decrease it. Turn only two full turns, then wait for the thermometer temperature and suction pressure to stabilize. Check superheat before making another adjustment.

(c) If the superheat cannot be adjusted to within tolerance, the expansion valve (6) must be replaced.

(d) Install cap (19).

(7) Shutdown the air conditioner. See paragraph 2-7.

(8) Remove the thermometer and wrap insulation (1) with insulation tape as necessary to seal it.

(9) Remove service manifold. See paragraph 4-11.

(10) Install fresh air damper panel/cover assembly. See paragraph 3-18.

NOTE

FOLLOW-ON MAINTENANCE:
Install conditioned air filter. See para 3-16.

4-30. EVAPORATOR COIL REPLACEMENT.

This task covers: a. Removal b. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Rivet Gun (Item 8, Appendix B)

Equipment Conditions:

Mist eliminator removed. See para 3-17.
Coil. frost switch removed. See para 3-27.
Refrigerant desiccant dehydrator removed. See para 4-20.
Evaporator fan and motor nearest refrigerant tubing removed. See para 3-34.

Materials/Parts

Insulation Tape (Item 16, Appendix E)
Rivets, Qty 2 (Item 11, Appendix G)
Rags (Item 12, Appendix E)

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage to the coil.

a. *Removal*.

(1) Remove two rivets (1) and carefully move bracket (2) clear of evaporator coil (3). Discard any remaining rivet material.

(2) Remove insulation (4) from tubing (5).

(3) Note position of sensing bulb (7) and loosen two screws (6). Carefully pull sensing bulb from clamps (8).

CAUTION

Protect expansion valve during brazing operations. High heat can damage valve.

(4) Wrap expansion valve (9) with wet rags to prevent damage from high heat. Debraze tubing (5). See paragraph 4-14.

WARNING

When handling coils, wear gloves to avoid cuts and reduce fin damage to the coil.

(5) Remove twelve screws (10) and carefully remove evaporator coil (3).

(6) Remove two grommets (11).

4-30. EVAPORATOR COIL REPLACEMENT. (Cont)

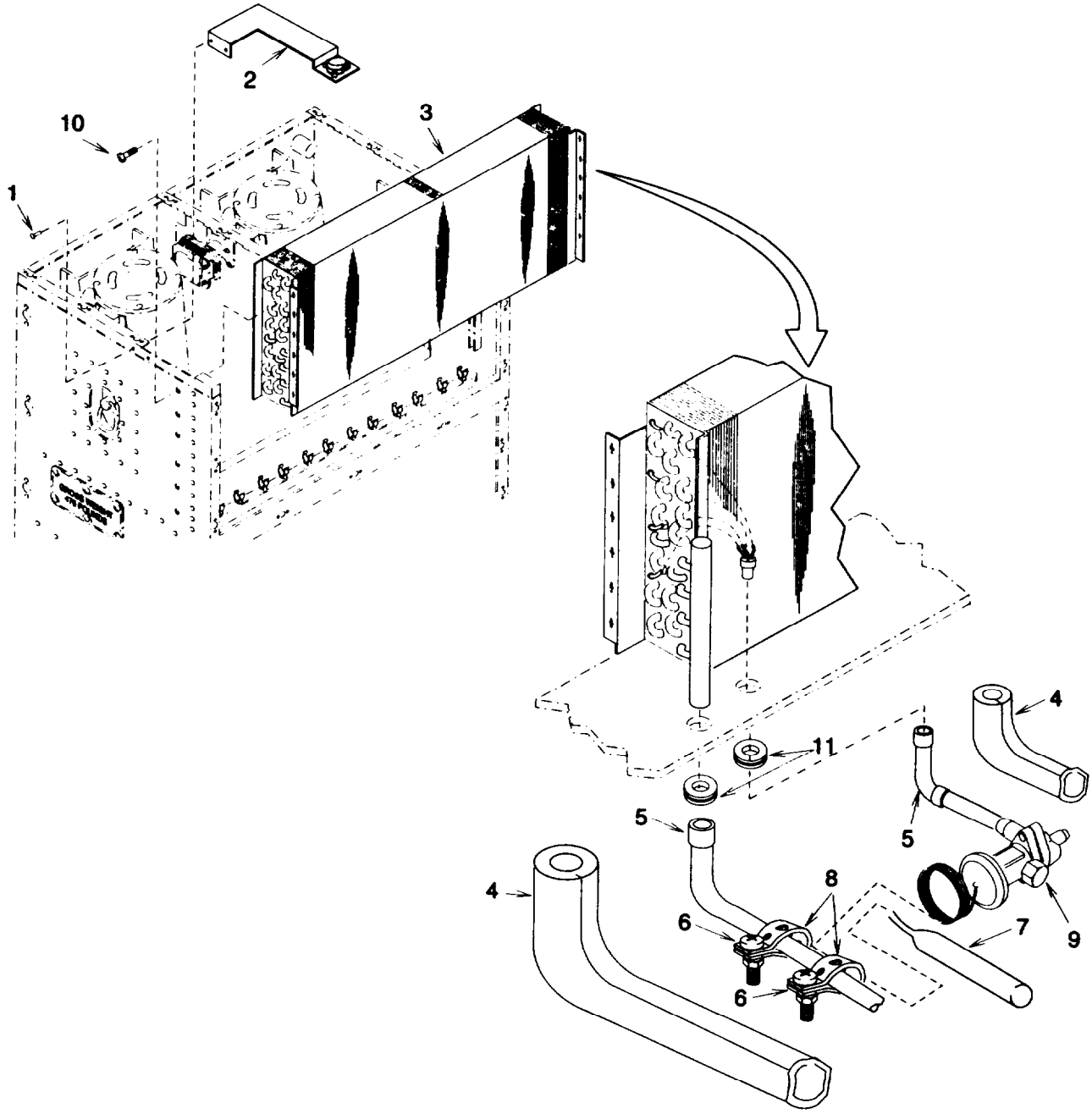


Figure 4-22. Evaporator Coil

b. *Installation*.

(1) Install two grommets (11).

(2) Carefully install evaporator coil (3) and 12 screws (10).

(3) Wrap expansion valve (9) with wet rags to prevent damage from high heat. Braze tubing (5). See paragraph 4-14.

(4) Carefully push sensing bulb (7) into clamps (8) in position noted during removal. Tighten two screws (6).

(5) Attach insulation (4) onto tubing (5). Wrap with insulation tape as necessary to seal.

(6) Carefully position bracket (2) in place and align mounting holes. Install two new rivets (1).

NOTE

FOLLOW-ON MAINTENANCE:
Install evaporator fan and motor. See para 3-34.
Install coil frost switch. See para 3-27.
Install mist eliminator. See para 3-17.
Install top panel. See para 3-14.
Install new refrigerant desiccant dehydrator. See para 4-20.

4-31. COMPRESSOR TESTING, REPAIR AND REPLACEMENT.

This task covers: a. Testing b. Repair c. Removal d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Jack (Item 2, Appendix B)
Jack Stands, Qty 4 (Item 2, Appendix B)

Equipment Conditions:

Duct removed. See para 4-8.

Materials/Parts

Tiedown Straps, Qty 4 (Item 20, Appendix G)
Self Locking Nuts, Qty 2 (Item 15, Appendix G)
Lock Washers, Qty 4 (Item 7, Appendix G)
Splices, Qty 2 (Item 18, Appendix G)
Marker Tag (Item 2, Appendix E)

Personnel Required:

Two

a. *Testing*.

(1) Thermostatic Switch.

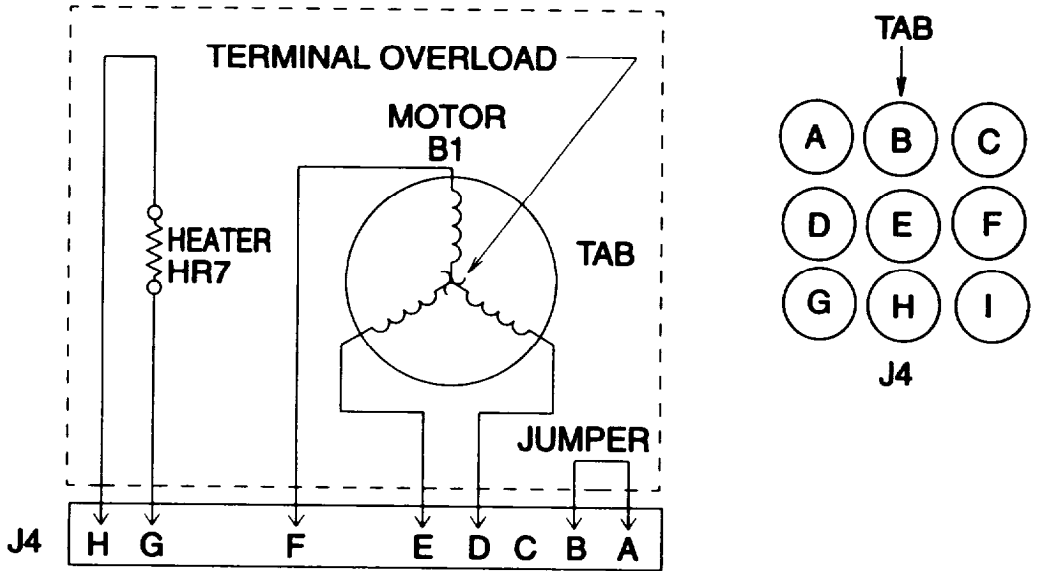
(a) Tag and disconnect wire leads (1) Figure 4-23.

NOTE

The thermostatic switch actuates (opens) at 70 ± 8° F (21 ± 5° C) and resets (closes) at 50 ± 5° F (10 ± 3° C).

(b) Maintain the temperature at the thermostatic switch (2) to any point above 78° F (26° C). Using a multimeter set to measure resistance, check continuity across lead (1) terminals (3). No continuity should be indicated.

4-31. COMPRESSOR TESTING, REPAIR AND REPLACEMENT. (Cont)



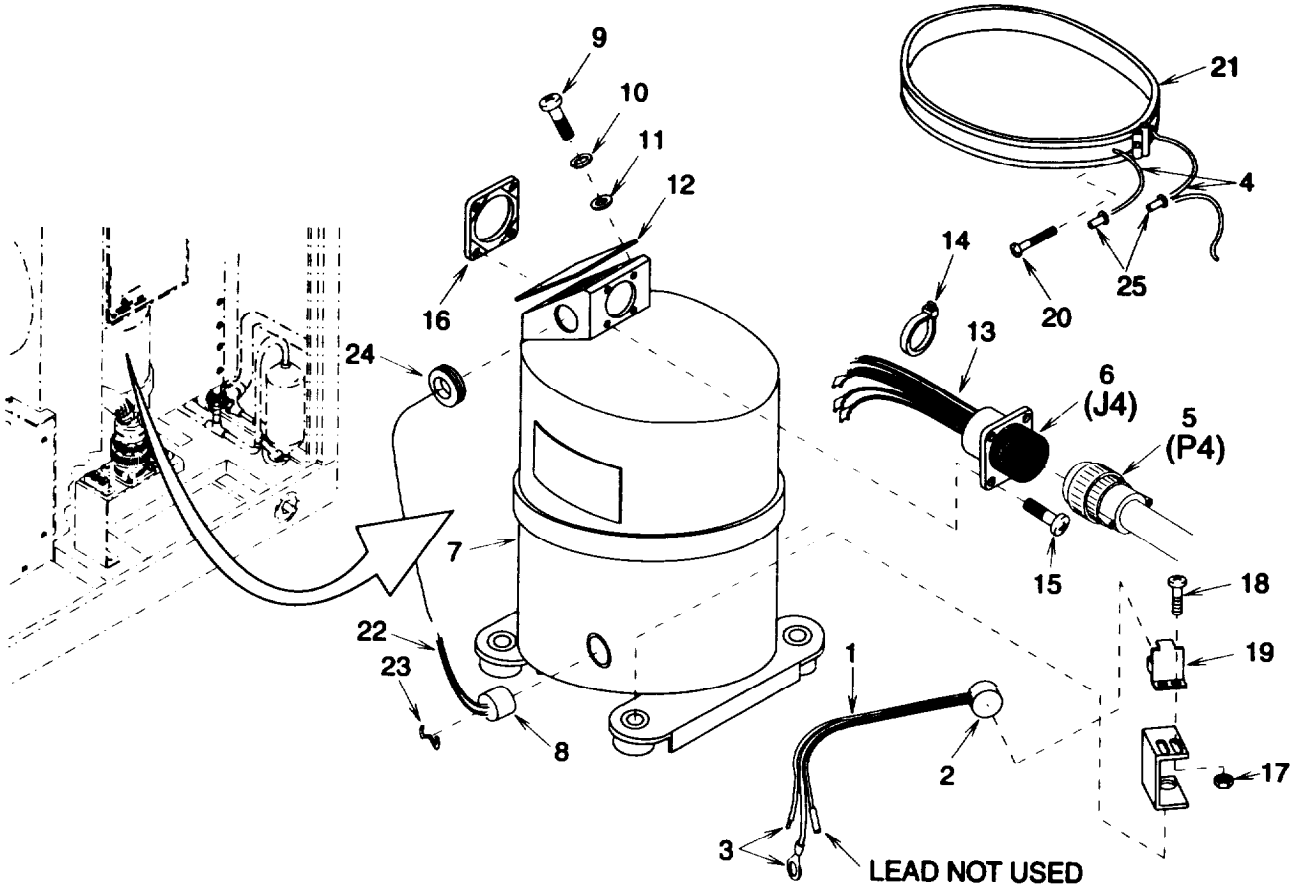


Figure 4-23. Compressor Replaceable Items

(c) Maintain the temperature at the thermostatic switch (2) to any point below 45° F (7° C). Using a multimeter set to measure resistance, check continuity across lead (1) terminals (3). Continuity should be indicated.

(2) *Compressor Heater.*

(a) Tag and disconnect two wire leads (4) Figure 4-23.

(b) Using multimeter set to measure resistance, check resistance across two lead (4) ends. A resistance of between 36 and 44 ohms should be indicated.

(3) *Compressor Assembly and Crankcase Heater.*

(a) Tag and disconnect wiring harness connector P4 (5) Figure 4-23 from connector J4 (6).

(b) Using multimeter set to measure resistance, make the following checks to test the compressor (7) motor windings.

NOTE

The compressor motor windings use an integral thermal overload to protect them. This overload will open if the compressor overheats and will reset once it has cooled. Tests will not be conclusive if conducted on a compressor that feels hot.

1 Check continuity between connector J4 (6) pins D to E, D to F, and E to F. Continuity should be indicated.

2 Check continuity between any bare metal point on compressor (7) case and each connector J4 (6) pin D, E, and F in turn. No continuity should be indicated.

3 Replace compressor (7) if windings fail above tests.

(c) Using a multimeter set to measure resistance, make the following checks to test the crankcase heater (8).

1 Check resistance between connector J4 (6) pins G and H. A resistance of between 950 and 1,450 ohms should be indicated.

2 Check continuity between any bare metal point on compressor (7) case and each connector J4 (6) pin G and H in turn. No continuity should be indicated.

(4) Replace component(s) that fail any of the above tests.

b. *Repair.* The only repairs that can be performed on the compressor are replacement of external damaged or missing components.

c. *Removal.*

NOTE

Remove components only as necessary for repair/replacement, or for transfer to a replacement compressor.

(1) *Connector (J4) and Wiring Harness.*

(a) Tag and disconnect wiring harness connector P4 (5) Figure 4-23 from connector J4 (6).

(b) Remove four screws (9), lock washers (10), flat washers (11), and cover (12). Discard lock washers.

4-31. COMPRESSOR TESTING, REPAIR AND REPLACEMENT. (Cont)

(c) Tag and disconnect wire leads (13) from component(s) or connector J4 (6) as necessary. See paragraph 3-19. Remove and discard tiedown straps (14) as necessary.

(d) Remove four screws (15), retaining plate (16), and connector J4 (6).

(2) *Thermostatic Switch.*

(a) Tag and disconnect wire leads (1) Figure 4-23.

(b) Remove two self locking nuts (17), screws (18), support (19), and thermostatic switch (2). Discard self locking nuts.

(3) *Compressor Heater.*

(a) Tag and disconnect wire leads (4) Figure 4-23.

(b) Remove screw (20) and compressor heater (21).

(4) *Crankcase Heater.*

(a) Remove four screws (9) Figure 4-23, lock washers (10), flat washers (11), and cover (12). Discard lock washers.

(b) Tag and disconnect two wire leads (22) from connector J4 (6).

(c) Remove clip (23) and pull crankcase heater (8) out.

(d) Remove grommet (24) if damaged.

(5) *Compressor Assembly.*

WARNING

The air conditioner is heavy and can cause personal injury if it falls or is dropped.

(a) Attach an appropriate sling and spreader bar to the air conditioner lifting rings and using an overhead hoist or forklift, carefully place the air conditioner onto four jack stands. Air conditioner must be placed leaving access to compressor mounting hardware.

(b) Tag and disconnect two wire leads (4) Figure 4-23.

(c) Tag and disconnect wiring harness connector P4 (1) Figure 4-24 from connector J4 (2).

(d) Remove and discard desiccant dehydrator. See paragraph 4-20.

(e) Debraze the compressor fittings (3). See paragraph 4-14.

(f) Remove four nuts (4), bracket (5), thermostatic switch (6), four screws (7), flat washers (8), and shouldered washers (9).

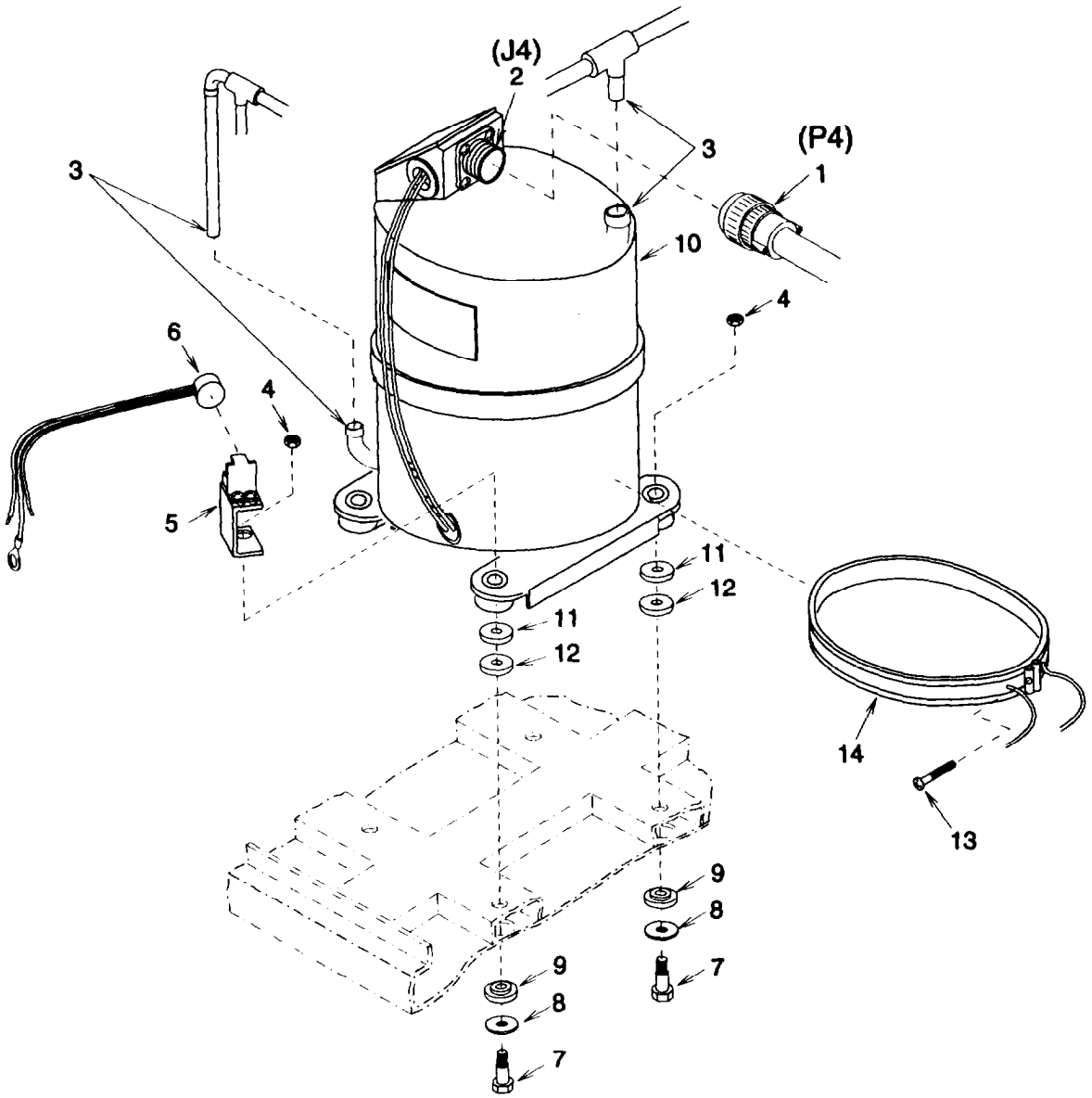


Figure 4-24. Compressor Assembly

WARNING

Compressor is heavy and difficult to remove from the air conditioner. Injury can result if one person attempts to remove it alone.

(g) Using two personnel, carefully remove the compressor (10).

(h) Remove four flat washers (11) and shouldered washers (12).

(i) Remove screw (13) and compressor heater (14).

4-31. COMPRESSOR TESTING, REPAIR AND REPLACEMENT. (Cont)

d. *Installation*.

(1) *Compressor Assembly*.

(a) Transfer any refrigerant tubing remaining on the old compressor (10) Figure 4-24 that is not on the new one.

(b) Install compressor heater (14) and screw (13).

(c) Install four shouldered washers (12) and flat washers (11).

WARNING

Compressor is heavy and difficult to install in the air conditioner. Injury can result if one person attempts to install it alone.

(d) Using two personnel, carefully install the compressor (10).

(e) Install four screws (7), flat washers (8), shouldered washers (9), one thermostatic switch (6), bracket (5), and four nuts (4).

(f) Braze the compressor fittings (3). See paragraph 4-14.

(g) Install new desiccant dehydrator. See paragraph 4-20.

(h) Install wiring harness connector P4 (1) onto connector J4 (2) per tags and wiring diagram Figure 3-5. Remove tags.

(i) Connect wire leads (4) Figure 4-23 per tags and wiring diagram Figure 3-5. Remove tags.

(2) *Crankcase Heater.*

(a) Install grommet (24) Figure 4-23 if necessary.

(b) Push crankcase heater (8) in and install clip (23).

(c) Push wire leads (22) through grommet (24) and connect to connector J4 (6) using tags and wiring diagram Figure 3-5. See paragraph 3-19. Remove tags.

(3) *Compressor Heater.*

(a) Install compressor heater (21) Figure 4-23 and screw (20).

(b) Connect wire leads (4) per tags and wiring diagram Figure 3-5. Use two new splices (25). Remove tags.

(4) *Thermostatic Switch.*

(a) Install thermostatic switch (2) Figure 4-23, support (19), two screws (18), and new self locking nuts (17).

(b) Connect wire leads (1) per tags and wiring diagram Figure 3-5. Remove tags.

(5) *Connector (J4) and Wiring Harness.*

(a) Install connector J4 (6) Figure 4-23, retaining plate (16), and four screws (15).

(b) Connect wire leads (13) to component(s) or connector J4 (6) as necessary. Install new tiedown straps (14) as necessary.

(c) Install cover (12), four screws (9), new lock washers (10), and flat washers (11).

(d) Install wiring harness connector P4 (5) onto connector J4 (6) per tags and wiring diagram Figure 3-5. Remove tags.

NOTE

FOLLOW-ON MAINTENANCE:
Install duct. See para 4-8.
Install lower front panel. See para 3-14.

4-32. TUBING AND FITTINGS TESTING AND REPLACEMENT.

This task covers: a. Inspection b. Testing c. Removal d. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)

Equipment Conditions:

Remove covers and panels as necessary to gain access to repair area. See para 3-14.

a. *Inspection.* Inspect tubing and fittings for visible signs of damage such as kink, crack, or split. Replace if damaged.

b. *Testing.* Test tubing and fittings for leaks. See paragraph 4-16. Replace tubing or fitting as needed.

c. *Removal.*

(1) Remove refrigerant desiccant dehydrator. See paragraph 4-20.

(2) Debraze the tube/fitting connections and remove from the air conditioner. See paragraph 4-14.

d. *Installation.*

(1) Place the new tube/fitting into the air conditioner. Braze the connections. See paragraph 4-14.

(2) Install new refrigerant desiccant dehydrator. See paragraph 4-20.

NOTE

FOLLOW-ON MAINTENANCE:
Install any panels or covers removed for access. See para 3-14.

4-33. INSULATION INSPECTION AND REPLACEMENT.

This task covers: a. Inspection b. Removal c. Installation

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Brush (Item 2, Appendix B)

Materials/Parts

Acetone (Item 18, Appendix E)
Methyl-Ethyl Ketone (Item 19, Appendix E)
Adhesive (Item 1, Appendix E)

Equipment Conditions:

Remove panels as necessary. See para 3-14.

a. *Inspection.* Check if insulation is loose, missing, burnt, or otherwise damaged. Replace if missing or damaged. If loose, apply adhesive to secure.

b. *Removal.*

(1) Remove as much old insulation as possible by pulling or scraping it away from the metal surface.

WARNING

Acetone and methyl-ethyl ketone (MEK) are flammable and their vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use in a well ventilated area, wear gloves, and keep away from sparks or flame.

(2) Soften and remove old adhesive and insulation residue, using acetone or methyl-ethyl ketone (MEK) and a stiff brush.

c. *Installation.*

(1) Fabricate new insulation. See appendix F.

(2) Be sure that the metal surface where the insulation is to be applied is clean and free of paint and old adhesive material.

(3) *Adhesive Backed Insulation.*

(a) Peel paper backing off insulation.

(b) Starting with an end, carefully attach insulation to the metal surface. Press firmly overall to ensure complete contact.

(4) *Bare Insulation.*

(a) Coat the mating surfaces of the metal and insulation with adhesive. Let both surfaces air dry until adhesive is tacky, but will not stick to fingers.

(b) Starting with an end, carefully attach insulation to the metal surface. Press firmly overall to ensure complete contact.

NOTE

FOLLOW-ON MAINTENANCE:
Install any removed panels. See para 3-14.

CHAPTER 5

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

SECTION I GENERAL SUPPORT TROUBLESHOOTING

5-1. GENERAL. Repair parts are listed and illustrated in TM 9-4120-407-24P. No special tools are required for general support maintenance of the air conditioner. Test, maintenance, and diagnostic equipment (TMDE), and support equipment, include standard electrical test equipment, and standard pressure and vacuum gages, vacuum pumps and servicing manifolds found in any general support maintenance refrigeration shop.

SECTION II GENERAL SUPPORT MAINTENANCE PROCEDURES

5-2. GENERAL. The only items restricted to general support maintenance level by the Maintenance Allocation Chart (MAC) are the repair of replacement insulation or lifting fittings on the housing, and replacement of the cabinet base. However, general support maintenance may be called upon, at times, to perform any or all of the MAC items listed for unit and direct support maintenance for rehabilitation or overhaul of an air conditioner.

5-3. BOTTOM PANEL INSPECTION AND REPAIR.

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

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Rivet Gun (Item 8, Appendix B)
Drill Motor (Item 2, Appendix B)
Drill Bit Set (Item 2, Appendix B)

Materials/Parts

Rivets, Qty 24 (Item 11, Appendix G)
Nut Plates, Qty 12 (Item 28, Appendix G)
Blind Rivet Nuts, Qty 12 (Item 29, Appendix G)

Equipment Conditions:

Panels and components removed per appropriate procedures to access bottom panel.

a. *Inspection.* Check nut plates and blind rivet nuts for visible signs of damage such as stripped threads or loose rivets. Replace if threads are damaged and repair nut plates if rivets are loose.

b. *Repair.*

(1) Drill through rivet using drill bit slightly smaller than rivet diameter.

(2) Remove any remaining rivet material.

(3) Install new rivet(s).

5-3. BOTTOM PANEL INSPECTION AND REPAIR. (Cont)

c. *Removal.*

(1) *Nut Plate*

(a) Drill through two rivets using drill bit slightly smaller than rivet diameter.

(b) Remove any remaining rivet material and nut plate.

(2) *Blind Nut.*

(a) Drill through blind nut using drill bit slightly smaller than blind nut diameter.

(b) Remove any remaining blind nut material.

d. *Installation.*

(1) *Nut Plate.* Hold new nut plate in position and secure using two new rivets.

(2) *Blind Nut.* Install new blind nut.

NOTE

FOLLOW-ON MAINTENANCE:
Install components and panels removed for access per appropriate procedures.

5-4. CASING INSPECTION AND REPAIR.

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

INITIAL SETUP

Tools

Service Refrigeration Unit Tool Kit (Item 1, Appendix B)
Rivet Gun (Item 8, Appendix B)
Drill Motor (Item 2, Appendix B)
Drill Bit Set (Item 2, Appendix B)

Materials/Parts

Blind Rivets (Item 30, Appendix G)

Equipment Conditions:

Panels and components removed per appropriate procedures to access repair area.

a. *Inspection.*

(1) *Nut Plates and Blind Rivets.* Check nut plates and blind rivets for visible signs of damage such as stripped threads or loose rivets. Replace if threads are damaged and repair nut plates if rivets are loose.

(2) *Lifting Rings.*

(a) Check for loose or missing rivets (1). Replace rivets as necessary.

(b) Check for broken or bent lifting ring (2). Replace if damaged.

b. *Repair.*

NOTE

Repair is limited to replacement of loose or missing rivets.

(1) Drill through rivet using drill bit slightly smaller than rivet diameter.

(2) Remove any remaining rivet material.

(3) Install new rivet(s).

c. *Removal.*

(1) *Nut Plate.*

(a) Drill through two rivets using drill bit slightly smaller than rivet diameter.

(b) Remove any remaining rivet material and nut plate.

(2) *Blind Nut.*

(a) Drill through blind nut using drill bit slightly smaller than blind nut diameter.

(b) Remove any remaining blind nut material.

(3) *Lifting Ring.* Drill through eight rivets (1) using drill bit slightly smaller than rivet diameter. Remove lifting ring (2).

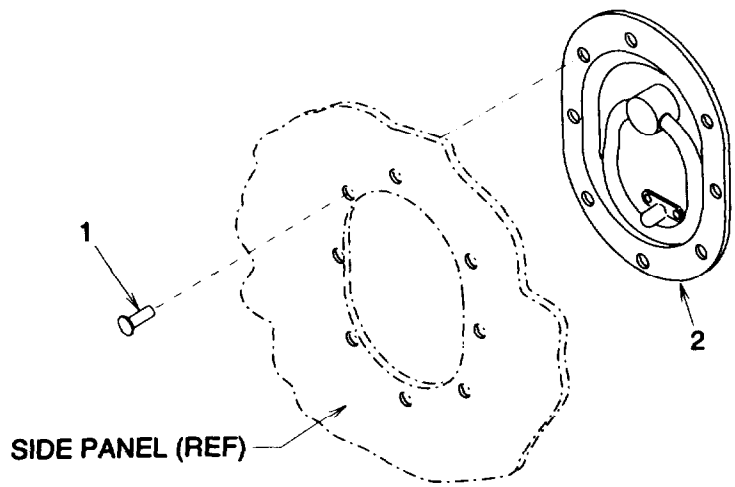


Figure 5-1. Lifting Ring

5-4. CASING INSPECTION AND REPAIR. (Cont)

d. *Installation.*

(1) *Nut Plate.* Hold new nut plate in position and secure using two new rivets.

(2) *Blind Nut.* Install new blind nut.

(3) *Lifting Ring.* Hold new lifting ring (2) in position and secure using eight new rivets (1).

NOTE

FOLLOW-ON MAINTENANCE:
Install components and panels removed for access per appropriate procedures.

APPENDIX A

REFERENCES

A-1. SCOPE. This appendix lists all forms, field manuals, technical manuals referenced in this manual.

A-2. FORMS.

- Recommended Changes to Publications and Blank Forms — DA 2028
- Equipment Inspection and Maintenance Worksheet — DA 2404
- Report of Discrepancy — SF 364
- Product Quality Deficiency Report — SF 368

A-3. TECHNICAL MANUALS.

- Painting Instructions for Army Materiel — TM 43-0139
- Unit, Direct Support, and General Support Maintenance — TM 9-4120-407-24P
- Leak Detector, Refrigerant Gas — TM 9-4940-435-14
- Procedures for Destruction of Equipment to Prevent Enemy Use — TM 750-244-3

A-4. FIELD MANUALS.

- NBC Contamination Avoidance — FM 3-3
- NBC Protection — FM 3-4
- NBC Decontamination — FM 3-5

A-5. HANDBOOKS.

- Environmental Control of Small Shelters — MIL-HDBK-116

A-6. MISCELLANEOUS PUBLICATIONS.

- The Army Maintenance Management System (TAMMS) — DA Pamphlet 738-750
- Warranty Program for Air Conditioners, Vertical, Compact, 36,000 BTU/HR — TB 9-4120-407-24
- Expendable Items (Except Medical Class V, Repair Parts and Heraldic Items) — CTA 50-970
- Army Medical Department Expendable/Durable Items — CTA 8-100

APPENDIX B

MAINTENANCE ALLOCATION CHART

SECTION I INTRODUCTION

B-l. 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[1], including fault location/troubleshooting[2], removal/installation, and disassembly/assembly[3] procedures, and maintenance actions[4] 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-2. MAINTENANCE FUNCTIONS. (Cont)

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(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.

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[1]Services-inspect, test, service, adjust, aline, calibrate, and/or replace.

[2]Fault locate/troubleshoot-The process of investigating and detecting the cause of the equipment malfunctioning; the act of isolating fault within a system or unit under test (UUT).

[3]Disassemble/assemble-encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

[4]Actions-welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

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

Maintenance Allocation Chart

(1) Group No.	(2) Component/Assembly	(3) Maintenance Functions	(4) Maintenance Category					(5) Tools & Equip.	(6) Remarks
			Unit		DS	GS	Depot		
			C	O	F	H	D		
01	COVERS, PANELS, GRILLES, SCREENS AND INFORMATION PLATES								
	Cover, Fabric	Inspect	0.1	0.1				1	
		Service		0.5				1, 2	
		Repair			2.0			1	
		Replace		0.5				1	
	Grilles	Inspect	0.1	0.1				1	
		Adjust	0.1	0.3				1	
		Service	0.2	0.2				1, 2	
		Repair			2.0			1, 2	Note B
		Replace		0.5				1	
	Panels/Covers	Inspect	0.1	0.1				1	
		Service		0.5				1, 2	
		Repair			2.0			1, 2	Note A
		Replace		0.5				1	
	Screens/Guards	Inspect	0.1	0.1				1	
		Service	0.2	0.1				1, 2	
		Replace		0.5				1	
	Information Plates	Inspect	0.1						
		Service	0.1						
		Replace			0.3			1, 2, 8	
02	FILTERS, MIST ELIMINATOR, AND DAMPER								
	Air Filters	Inspect		0.5				1	
		Service		1.0				1, 2	
		Replace		0.5				1	

Maintenance Allocation Chart - Cont

(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		
	Mist Eliminator	Inspect		0.7				1	
		Service		1.0				1, 2	
		Replace		0.7				1	
	Fresh Air Damper	Adjust	0.1						
		Service		0.5				1	
		Repair		1.0				1, 2	
		Replace		2.0				1, 2	
	Condensate Traps	Inspect		0.5				1	
		Service		0.8				1	
		Replace		0.7				1	
03	ELECTRICAL								
	Control Panel Assembly	Inspect	0.1	0.1				1	
		Adjust	0.1						
		Repair		2.0				1, 12	
		Replace		1.0				1	
	Wiring Harness (Control Panel)	Inspect		1.0				1	
		Test		1.0				1	
		Repair		2.0				1, 4, 9	
		Replace		4.0				1	
	Potentiometer	Inspect		0.1				1	
		Adjust	0.1						
		Test		0.5				1	
		Replace		1.0				1, 4, 9	
	Fault Indicator (LED)	Inspect		0.1				1	
		Test		0.1				1	
		Replace		0.1				1, 2, 4, 9	

Maintenance Allocation Chart - Cont

(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		
	Switch, Rotary	Inspect		0.1				1	
		Adjust	0.1						
		Test		0.5				1	
		Replace		1.0				1, 4, 9	
	Wiring Harnesses (Air Conditioner)	Inspect		1.0				1	
		Test		1.0				1	
		Repair		2.0				1, 4, 9	
		Replace		4.0				1	
	Logic Box Assembly	Inspect		0.2				1	
		Test			0.5			1, 14, 15	
		Replace			0.5			1	
	Motor Controller Assembly	Inspect		0.2				1	
		Replace			1.0			1	
	EMI Filter	Inspect		0.5				1	
		Test		0.5				1	
		Replace		1.5				1	
	Coil Frost Switch	Inspect		0.1				1	
		Test		0.5				1	
		Replace		0.5				1	
	Capacitors	Inspect		0.1				1	
		Test		0.5				1, 10	
		Replace		0.5				1	
	Rectifier	Inspect		0.1				1	
		Test		0.5				1	
		Replace		1.0				1, 4, 9, 10	
	Transformer	Inspect		0.1				1	
		Test		0.5				1	
		Replace		1.0				1, 4, 9	

Maintenance Allocution Chart - Cont

(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		
	Relays	Inspect		0.2				1	
		Test		1.0				1, 5	
		Replace		1.5				1	
	Diodes	Inspect		0.2				1	
		Test		0.5				1	
		Replace		0.5				1	
	Terminal Boards	Inspect		0.1				1	
		Replace		0.5				1	
04	EVAPORATOR FANS, MOTORS, AND HEATERS								
	Fans	Inspect		1.0				1	
		Service		0.1				1, 2	
		Replace		1.0				1	
	Motors	Inspect		1.0				1	
		Service		0.1				1	
		Test		0.2				1	
		Repair			2.0			1, 9	
		Replace		1.0				1	
	Heater Thermostat	Inspect		1.0				1	
		Test		0.3				1	
		Replace		0.5				1	
	Heater Element	Inspect		1.0				1	
		Test		0.3				1	
		Replace		1.0				1	

Maintenance Allocation Chart - Cont

(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		
05	CONDENSER FANS AND MOTOR								
	Fans	Inspect		1.0				1	
		Service		0.2				1, 2	
		Replace		1.0				1	
	Motor	Inspect		1.0				1	
		Service		0.1				1	
		Test		0.2				1	
		Repair			2.0			1, 9	
		Replace		1.0				1	
06	REFRIGERATION SYSTEM								
	Dehydrator	Inspect			1.0			1	
		Replace			6.0			1, 3, 6, 7	
	Actuating Cylinder	Inspect			0.5			1	
		Adjust			1.0			1	
		Replace			6.0			1, 3, 6, 7	
	Safety Control Box								
	Pressure Switches	Test			1.0			1	
		Replace			6.0			1, 3, 6, 7	
	Circuit Breaker	Inspect		0.1				1	
		Test		0.3				1	
		Replace		0.3				1	
	Pressure Relief Valve	Inspect			0.3			1	
		Replace			6.0			1, 3, 6, 7	

Maintenance Allocation Chart - Cont

(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		
	Condenser Coil	Inspect		1.0				1	
		Service		1.0				1, 2, 11	
		Replace			7.0			1, 2, 3, 6, 7	
	Receiver	Inspect			0.3			1	
		Replace			6.0			1, 3, 6, 7	
	Service Valves	Inspect			1.0			1	
		Replace			6.0			1, 3, 6, 7	
	Solenoid Valve	Test		1.0				1, 5	
		Repair		1.0				1	Note D
		Replace			6.0			1, 3, 6, 7	
	Valve Coil	Inspect		0.2				1	
		Replace		0.6				1, 5	Note D
	Liquid Sight Indicator	Inspect	0.1						
		Service	0.1						
		Replace			6.0			1, 3, 6, 7	
	Expansion Valve	Test			1.0			1	
		Replace			6.0			1, 3, 6, 7	
	Evaporator Coil	Inspect		1.0				1	
		Service		2.0				1, 2, 11	
		Replace			7.0			1, 2, 3, 6, 7, 8	

Maintenance Allocation Chart - Cont

(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		
	Compressor	Test			3.0			1	
		Repair			2.0			1, 9	Note C
		Replace			8.0			1, 2, 3, 6, 7, 9	
	Tubing and Fittings	Inspect			1.0			1	
		Test			2.0			1	
		Replace			6.0			1, 3, 6, 7	
07	CASING AND BOTTOM PANEL								
	Bottom Panel	Inspect				0.2		1	
		Repair				2.0		1, 2, 8	Note E
	Casing	Inspect				0.5		1	
		Repair				2.0		1, 2, 8	Note E
	Insulation	Inspect			1.0			1	
		Replace			1.0			1, 2	

SECTION III TOOL AND TEST EQUIPMENT REQUIREMENTS

MAINTENANCE ALLOCATION CHART

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	D-F-H	Tool Kit, Service, Refrigeration Unit (SC 5180-90-CL-N18)	5180-00-597-1474	
2	O-F-H	Shop Equipment, Auto Organizational #l Common	4910-00-754-0654	
3	F-H	Pump, Vacuum	4310-00-289-5967	
4	O-F-H	Heat Gun	4940-01-042-4855	
5	O-F-H	Power Supply, 28 Volt dc	6130-01-143-5947	
6	F-H	Nitrogen Regulator	6680-00-503-1327	
7	F-H	Recovery and Recycle Unit, Refrigerant	4130-01-338-2707	
8	O-F-H	Rivet Gun	5120-00-508-1588	
9	O-F-H	Electrical Repair	4940-00-294-9517	SC 4940-94-CL-B05
10	O-F-H	Capacitance Meter	6625-01-125-9392	
11	O-F-H	Comb, Fin	5120-00-157-2180	
12	O-F-H	Clinch Nut Tool		
13	O-F-H	Pump, Diaphragm	4320-00-588-3590	
		Special Tools		
14	F-H	Logic Box Test Fixture		(94833) 111K8002-1
15	F-H	Test Fixture Adapter Cable		(94833) 111K8016-1

SECTION IV REMARKS

MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
Note A	Replace gasket and insulation only.
Note B	Replace gasket and straighten bent blades only.
Note C	Replace external components only.
Note D	Replace coil only.
Note E	Replace blind nuts, plate nuts, and lifting handles only.
	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 (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

SECTION I INTRODUCTION

C-1. SCOPE. This appendix lists components of end item and basic items for the Air Conditioner to help you inventory items required for safe and efficient operation.

C-2. GENERAL. The Components of End Item and Basic Issue Items lists are divided into the following sections.

a. *Section II. Components of End Item.* This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. *Section III. Basic Issue Items.* These are minimum essential items required to place the Air Conditioner in operation, to operate it and to perform emergency repairs. Although shipped separately packed, BII must be with the air conditioner during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-t-identify items. This manual is your authority to request/requisition replacement BII based on Table(s) of Organization and Equipment (TOE) Modification Table of Organization and Equipment (MTOE) authorization of the end item.

C-3. EXPLANATION OF COLUMNS. The following provides an explanation of columns found in the tabular listings:

a. *Column (1) - Illustration Number (Illus Number).* This column indicates the number of the illustration in which the item is shown.

b. *Column (2) - National Stock Number.* Indicates the National Stock number assigned to the item which will be used for requisitioning.

c. *Column (3) - Description.* Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGE (in parentheses) followed by the part number. I

d. *Column (4) - Unit of Measure (U/M).* Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION IN II COMPONENTS OF END ITEM

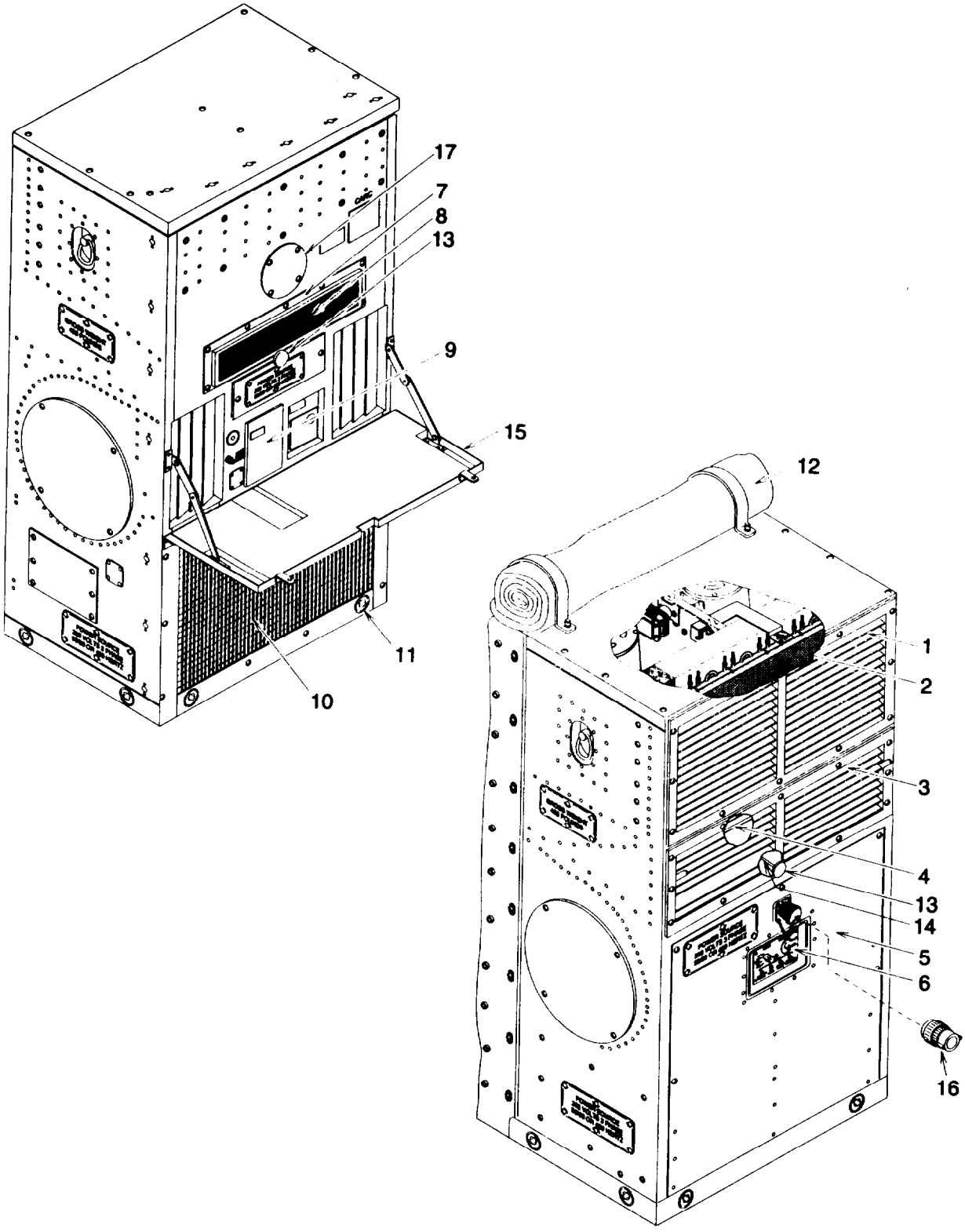

Figure C-1. Components of End Item

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On Code	(4) U/I	(5) Qty rqr
1		GRILLE, METAL (97403) 13214E3931		EA	1
2		MIST ELIMINATOR (97403) 13225E8119		EA	1
3		GRILLE, METAL (97403) 13214E3937		EA	1
4		FILTER (97403) 13229E8083		EA	1
5		PANEL, LOWER (97403) 13229E8105		EA	1
6		CONTROL PANEL ASSEMBLY (97403) 13229E4190		EA	1
7		FRAME, FILTER (97403) 13225E8106		EA	1
8		FILTER, FRESH AIR (97403) 13214E3972-1		EA	1
9		COVER, SERVICE VALVE (97403) 13225E8133		EA	1
10		GUARD, CONDENSER COIL (97403) 13228E1249		EA	1
11		PLUG, PIPE (97403) 13211E8178		EA	8
12		COVER, AIR CONDITIONER (97403) 13225E8159		EA	1
13		KNOB (97403) 13214E3889		EA	2
14		EXTENSION ROD (97403) 13225E8108		EA	1
15		DEFLECTOR, CONDENSER AIR DISCHARGE DOOR (97403) 13228E1254		EA	1
16		CONNECTOR, PLUG ELECTRICAL (97403) 13229E6718-2		EA	1
17		COVER, ASSEMBLY (97403) 13214E3864-1		EA	1

SECTION III BASIC ISSUE ITEMS

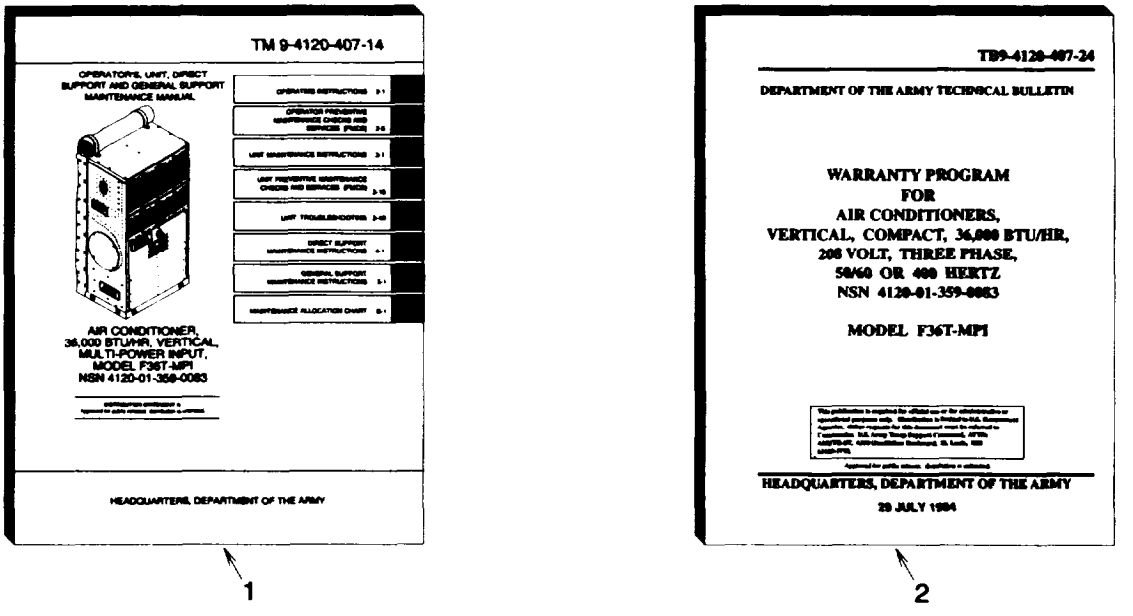

Figure C-2. Basic Issue Items

(1) Illus Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On Code	(4) U/I	(5) Qty rqr
1		DEPARTMENT OF THE ARMY TECHNICAL MANUAL; OPERATOR' S UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL TM 9-4120-407-14		EA	1
2		WARRANTY PROGRAM FOR AIR CONDITIONER, VERTICAL, COMPACT, 36,000 BTU/HR TB 9-4120-407-24		EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST (AAL) ITEMS

SECTION I INTRODUCTION

D-1. SCOPE. This appendix lists additional items you are authorized for the support of the air conditioner.

D-2. GENERAL. This list identifies items that do not have to accompany the air conditioner and that do not have to be tuned in with it. These items are authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING. National stock number, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. ‘ USABLE ON” codes are identified as follows: (Not applicable).

Section II ADDITIONAL AUTHORIZATION LIST

None Authorized.

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST (EDSML)

SECTION I INTRODUCTION

E-1. SCOPE. This appendix lists expendable supplies and materials you will need to operate and maintain the Air Conditioner. These items are authorized to you by CTA 50-970, Expendable items (except Medical, Class V, Repair Parts and Heraldic 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 narrative instructions to identify the material (e.g. "Use coaster air filter, Item 1, 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 Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Commercial and Government Entity (CAGE) in parentheses, if applicable.

e. Column 5, Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two character alphabetical abbreviation (e.i., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	F	3040-00-664-0439	Adhesive, General Purpose, 1 pint container	ea
2	O	9905-00-537-8954	Marker Tag MIL-T-12755	box
3	F	6850-00-837-9927	Monochlorodifluoromethane, Technical: w/cylinder 22 lb (Refrigerant-22) BB-F-1421, type 22 (81348)	cy
4	F	6830-00-782-6512	Dichlorotetrafluroethane Technical: w/cylinder (Refrigerant-114) BB-F-1421, Type 114 (81348)	cy
5	O	3439-01-045-7940	Flux, Solder, Liquid, Rosin Base MIL-F-14256	qt
6	O	5935-00-725-4153	Solder, Lead-Tin, QQ-S-571 Type SN60WRP2	
7	F	6830-00-292-0732	Nitrogen	cy
8	F		Brazing Alloy, Silver QQ-B-564, grade O, I, or II	oz
9	F		Brazing Alloy, Silver QQ-B-564, grade III	oz
10	F	3439-00-640-3713	Flux, Brazing O-F-499, type B	oz
11	F	5350-00-192-5047	Abrasive Cloth	pg
12	F	7920-00-205-1711	Rags	pg
13	O	7930-00-764-5066	Detergent, Dishwasher	oz
14	F		Oil W-L-825	gl
15	F	9150-00-189-6727	Oil, MIL-L-2104, Grade 10 (81349)	qt
16	F	5640-00-580-6276	Insulation Tape	roll
17	O		Tape, Antisieze, Polytetrafluroethylene, MIL-T-27730, Size 1	roll
18	F		Acetone	gl
19	F		Methyl-Ethyl Ketone	gl

APPENDIX F

ILLUSTRATED LIST OF MANUFACTURED ITEMS

SECTION I INTRODUCTION

F-1 SCOPE. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit, direct support, and general support maintenance.

a. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

b. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

c. All dimensions are given in inches with centimeters shown in parenthesis.

d. For fabrication information of electrical wires including lengths and markings, see Table 3-4.

Manufactured Items Part Number Index

Part Number	Figure Number	Part Number	Figure Number
Input Power Cable	F-4	13229E4207-1/9	F-7
Interconnecting Remote Control Cable	F-3	13229E4207/1-5	F-6
120K0623-1/6	F-6	13229E8056/3	F-7
120K0623-1/7	F-6	13229E8057/2	F-7
120K1374-1/2	F-l	13229E8057/7	F-6
120K1444-1/3	F-l	13229E8058/4	F-7
120K1443-1/4	F-10	13229E8058/7	F-6
120K1443-1/5	F-l	13229E8061/3	F-6
120K1443-1/6	F-9	13229E8064/11	F-7
120K1443-1/7	F-l	13229E8064/14	F-6
120K1444-1/2	F-11	13229E8065/4	F-6
120K1444-1/4	F-l	13229E8065/14	F-7
120K1446-1/3	F-6	13229E8065/16	F-6
120K1447-1/2	F-l	13229E8067K2/3	F-6
120K1448-1/3	F-l	13229E8067K2/5	F-6
13214E3864-1/2	F-12	13229E8068/6	F-1
13214E3931/2	F-13	13229E8068/7	F-29
13214E3931/3	F-15	13229E8068/8	F-28
13214E3931/4	F-14	13229E8068/13	F-l
13214E3937/2	F-16	13229E8068/14	F-l
13214F3937/3	F-17	13229E8068/15	F-l
13225E8090/3	F-18	13229E8069/2	F-30
13225E8090/4	F-21	13229E8069/3	F-31
13225E8090/5	F-20	13229E8069/4	F-32
13225E8090/6	F-19	13229E8069/5	F-33
13225E8091/2	F-22	13229E8076/4	F-34
13225E8133/2	F-24	13229E8076/5	F-35
13225E8133/4	F-23	13229E8076/6	F-36
13225E8171/2	F-25	13229E8076/14	F-37
13225E8171/3	F-26	13229E8076/15	F-38
13225E8558-3	F-41	13229E8076/16	F-39
13228E1254/6	F-27	13229E8078/7	F-6
13229E4190/16	F-6	13229E8082/2	F-40

Part Number	Figure Number
13229E8086/3	F-7
13229E8100/103	F-41
13229E8100/104	F-41
13229E8100/122	F-5
13229E8100/123	F-42
13229E8100/125	F-43
13229E8100/126	F-44
13229E8100/127	F-44
13229E8100/128	F-43
13229E8100/129	F-45
13229E8100/130	F-46
13229E8100/131	F-47
13229E8100/132	F-5
13229E8100/133	F-47
13229E8100/134	F-5
13229E8100/135	F-48
13229E8100/136	F-l
13229E8100/137	F-l
13229E8100/138	F-49
13229E8100/139	F-48
13229E8100/140	F-l
13229E8100/141	F-l
13229E8100/143	F-50
13229E8100/144	F-51
13229E8100/145	F-52
13229E8100/146	F-53
13229E8100/147	F-2
13229E8100/149	F-2
13229E8100/151	F-2
13229E8100/154	F-2
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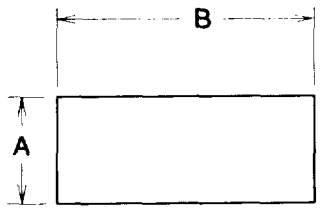
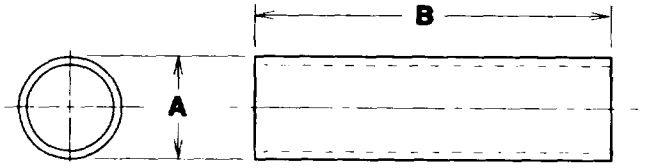
13229E8100/217	F-2
13229E8100/299	F-54
13229E8100/341	F-8
13229E8100/342	F-8
13229E8100/343	F-8
13229E8100/382	F-1
13229E8100/396	F-56
13229E8100/397	F-56
13229E8100/398	F-55
13229E8100/399	F-55
13229E8100/400	F-5
13229E8100/401	F-5
13229E8100/411	F-57
13229E8100/412	F-58
13229E8101/41	F-59
13229E8101/42	F-5
13229E8101/44	F-5
13229E8101/45	F-60
13229E8101/46	F-5
13229E8105/6	F-1
13229E8105/9	F-61
13229E8105/17	F-62
13229E8105/18	F-1
13229E8105/19	F-1
13229E8105/20	F-1

SECTION II MANUFACTURED ITEMS ILLUSTRATIONS



PART NUMBER	A DIM	B DIM	FABRICATE FROM
120K1374-1/2	.75 (1.91)	5.38 (13.67)	MIL-R-6130, TYPE II, GRADE A 0.125 (0.318) THICK RUBBER GASKET
120K1443-1/5	.38 (.97)	2.12 (5.38)	(97403) 13227E6913-1 EMI GASKET
120K1443-1/7	.56 (1.42)	2.75 (6.99)	(97403) 13227E6913-9 EMI GASKET
120K1444-1/3	.38 (.97)	2.75 (6.99)	(97403) 1322E6913-1 EMI GASKET
120K1444-1/4	.38 (.97)	2.50 (6.35)	(97403) 13227E6913-1 EMI GASKET
120Kl447-1/2	.38 (.97)	29.38 (74.63)	(97403) 13227E6913-21 EMI GASKET
120Kl448-1/3	.22 (.56)	1.21 (3.07)	(3x706)7270 KAPTON TAPE (0.002 THICK)
13229E8068/6	.12 (.30)	9.34 (23.72)	MIL-R-6130, TYPE II, GRADE A 0.063 (0.160) THICK RUBBER GASKET
13229E8068/13	.50 (1.27)	2.70 (6.86)	MIL-R-6130, TYPE II, GRADE A 0.125 (0.318) THICK RUBBER GASKET
13229E8068/14	.50 (1.27)	4.25 (10.80)	MIL-R-6130, TYPE II, GRADE A 0.125 (0.318) THICK RUBBER GASKET
13229E8068/15	.50 (1.27)	2.70 (6.86)	MIL-R-6130, TYPE II, GRADE A 0.125 (0.318) THICK RUBBER GASKET
13229E8100/136	.50 (1.27)	3.12 (7.92)	ASTM D1056 RE45ClF2 RUBBER SHEET 0.125 (.318) THICK
13229E8100/137	.50 (1.27)	17.88 (45.42)	ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK
13229E8100/140	.38 (.97)	27.03 (68.66)	ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK
13229E8100/141	.38 (.97)	28.00 (71.12)	ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK
13229E8100/382	.50 (1.27)	27.00 (68.58)	(97403) 13227E6913-10 EMI GASKET
13229E8105/6	.38 (.97)	3.12 (7.92)	(97403) 13227E6913-21 EMI GASKET
13229E8105/18	.38 (.97)	2.00 (5.08)	(97403) 13227E6913-21 EMI GASKET
13229E8105/19	.38 (.97)	3.00 (7.62)	(97403) 13227E6913-21 EMI GASKET
13229E8105/20	.38 (.97)	5.88 (14.94)	(97403) 13227E6913-21 EMI GASKET

Figure F-1. Gasket



PART NUMBER	FABRICATE FROM MATERIAL A	B LENGTH
13229E8100/147	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/149	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/151	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	15.00 (38.10)
13229E8100/154	0.375 (0.953) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	6.00 (15.24)
13229E8100/155	0.625 (1.588) O.D. X 0.035 (0.089) WALL ASTM B280 COPPER TUBING	2.00 (5.08)
13229E8100/158	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/160	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	15.00 (38.10)
13229E8100/162	0.625 (1.588) O.D. X 0.035 (0.089) WALL ASTM B280 COPPER TUBING	18.00 (45.72)
13229E8100/163	0.625 (1.568) O.D. X 0.035 (0.089) WALL ASTM B280 COPPER TUBING	5.00 (12.70)
13229E8100/164	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	24.00 (60.96)
13229E8100/168	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	2.00 (5.08)
13229E8100/170	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/171	0.375 (0.953) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	8.00 (20.32)
13229E8100/177	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/178	0.625 (1.586) O.D. X 0.035 (0.089) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/179	0.250 (0.635) O.D. X 0.030 (0.076) WALL ASTM B280 COPPER TUBING	6.00 (15.24)
13229E8100/181	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	10.00 (25.40)
13229E8100/182	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	10.00 (25.40)
13229E8100/186	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	12.00 (30.48)
13229E8100/187	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	20.00 (50.80)
13229E8100/194	0.375 (0.953) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	20.00 (50.80)
13229E8100/198	0.375 (0.953) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/201	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/203	0.625 (1.588) O.D. X 0.035 (0.089) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/204	0.875 (2.222) O.D. X 0.045 (0.114) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/210	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	5.00 (12.70)
13229E8100/213	0.375 (0.953) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	1.00 (2.54)
13229E8100/214	0.250 (0.635) O.D. X 0.030 (0.076) WALL ASTM B280 COPPER TUBING	3.00 (7.62)
13229E8100/215	0.125 (0.318) O.D. X 0.030 (0.076) WALL ASTM B280 COPPER TUBING	2.00 (5.08)
13229E8100/216	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	6.00 (15.24)
13229E8100/217	0.500 (1.270) O.D. X 0.032 (0.081) WALL ASTM B280 COPPER TUBING	6.00 (15.24)

Figure F-2. Copper Tubing

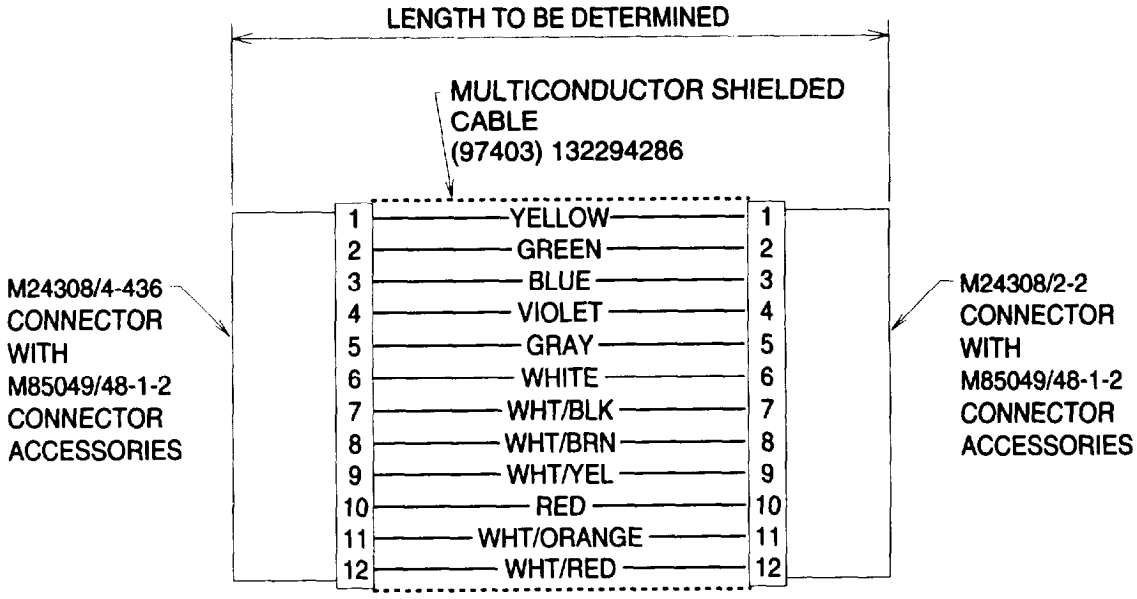


Figure F-3. Interconnecting Remote Control Cable Diagram

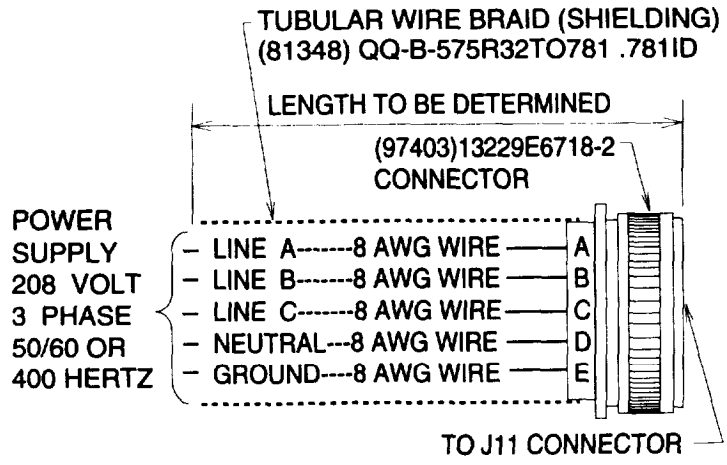
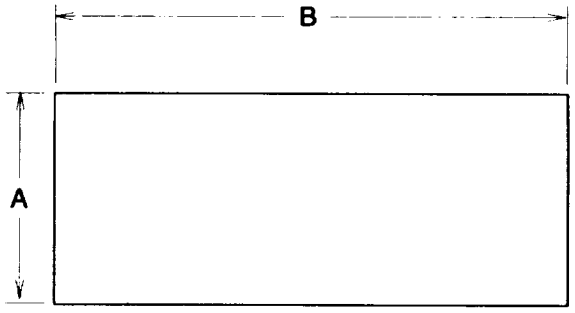
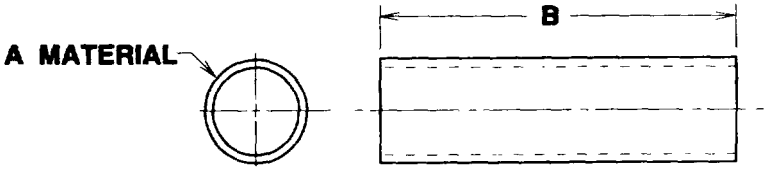


Figure F-4. Input Power Cable Diagram



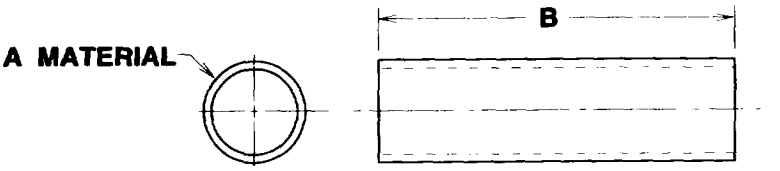
PART NUMBER	A DIM	B DIM	FABRICATE FROM
13229E8100/122	1.18 (3.00)	13.00 (33.02)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK
13229E8100/132	.62 (1.57)	14.69 (37.31)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK
13229E8100/134	7.13 (18.11)	11.19 (28.42)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK
13229E8100/400	7.13 (18.11)	11.19 (28.42)	AMS3570.250 THICK POLYURETHANE FLEXIBLE OPEN CELL 2.5 LB/FT ^{3} FOAM
13229E8100/401	7.13 (18.11)	11.19 (28.42)	AMS3570.250 THICK POLYURETHANE FLEXIBLE OPEN CELL 2.5 LB/FT ^{3} FOAM
13229E8101/42	.25 (.63)	6.78 (17.22)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK
13229E8101/44	1.25 (3.18)	29.64 (75.29)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK
13229E8101/46	.25 (.63)	5.62 (14.27)	MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-5. Insulation



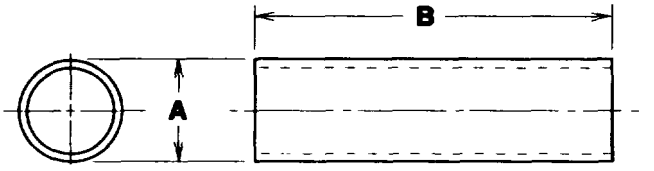
PART NUMBER	FABRICATE FROM MATERIAL A	B LENGTH
120K0623-1/6	M23053/5-104-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
120K0623-1/7	M23053/5-106-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
120K1446-l/3	M23053/5-102-0 INSULATION, SLEEVING, HEAT SHRINKABLE	1.50 (3.81)
13229E4190/16	M2305/5-104-9 INSULATION, SLEEVING, HEAT SHRINKABLE	0.75 (1.91)
13229E4207/1-5	M23053/5-107-0 INSULATION, SLEEVING, HEAT SHRINKABLE	20.00 (50.80)
13229E8057/7	M23053/5-109-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
13229E8058/7	M23053/5-110-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
13229E8061/3	M230453/5-107-9 INSULATION, SLEEVING, HEAT SHRINKABLE	0.75 (1.91)
13229E8064/14	M23053/5-110-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
13229E8065/4	M23053/5-103-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00(2.54)
13229E805/16	M23053/5-107-9 INSULATION, SLEEVING, HEAT SHRINKABLE	1.00 (2.54)
13229E8067K2/3	M23053/5-107-0 INSULATION, SLEEVING, HEAT SHRINKABLE	12.00 (30.48)
13229E8067K2/5	M23053/5-104-0 INSULATION, SLEEVING, HEAT SHRINKABLE	12.00 (30.48)
13229E8078/7	M23053/5-108-9 INSULATION, SLEEVING, HEAT SHRINKABLE	0.75 (1.91)

Figure F-6. Insulation Sleeving



PART NUMBER	FABRICATE FROM MATERIAL A	B LENGTH
13229E4207-l/9	QQB575R36T250 TUBULAR WIRE BRAID	20.00 (50.80)
13229E8056/3	QQB575R36T781 TUBULAR WIRE BRAID	40.00 (101.60)
13229E8057/2	QQB575R30T562 TUBULAR WIRE BRAID	41.00 (104.14)
13229E8058/4	QQB575R30T875 TUBULAR WIRE BRAID	71.00 (180.34)
13229E8064/11	QQB575R36T781 TUBULAR WIRE BRAID	60.00 (152.40)
13229E8065/14	QQB575R36T250 TUBULAR WIRE BRAID	16.00 (40.64)
13229E8086/3	QQB575R32T781 TUBULAR WIRE BRAID	18.00 (45.75)

Figure F-7. Tubular Wire Braid



PART NUMBER	FABRICATE FROM MATERIAL A	B LENGTH
13229E8100/341	0.625 (1.588 I.D. X 0.125 (0.318) WALL ASTM D922 CLEAR TRANSPARENT VINYL CHLORIDE TUBING	8.00 (20.32)
13229E8100/342	0.625 (1.588 I.D. X 0.125 (0.318) WALL ASTM D922 CLEAR TRANSPARENT VINYL CHLORIDE TUBING	3.00 (7.62)
13229E8100/343	0.625 1.566 I.D. X 0.125 (0.318) WALL ASTM D922 CLEAR TRANSPARENT VINYL CHLORIDE TUBING	36.00 (91.44)

Figure F-8. Transparent Vinyl Tubing

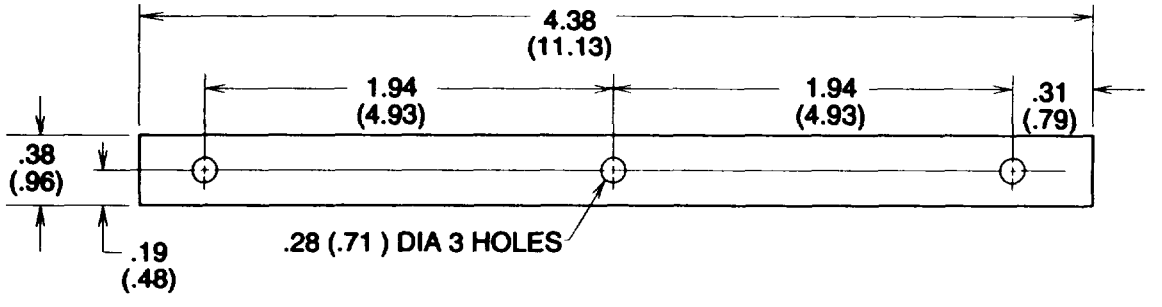


Figure *F-9. Gasket, Part Number 120K1443-1/6*

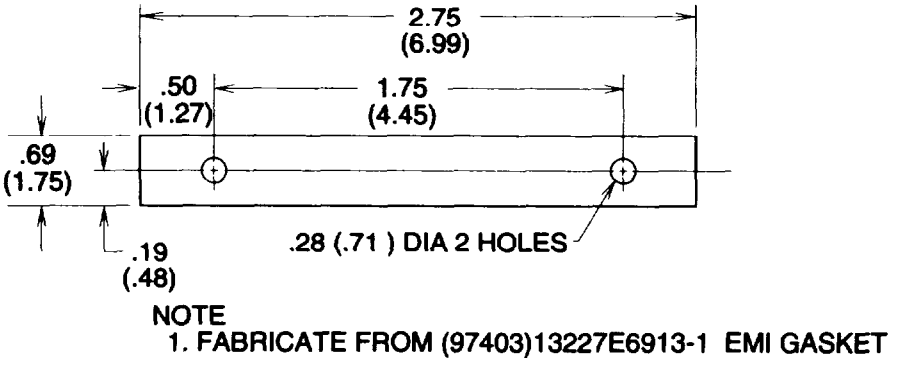
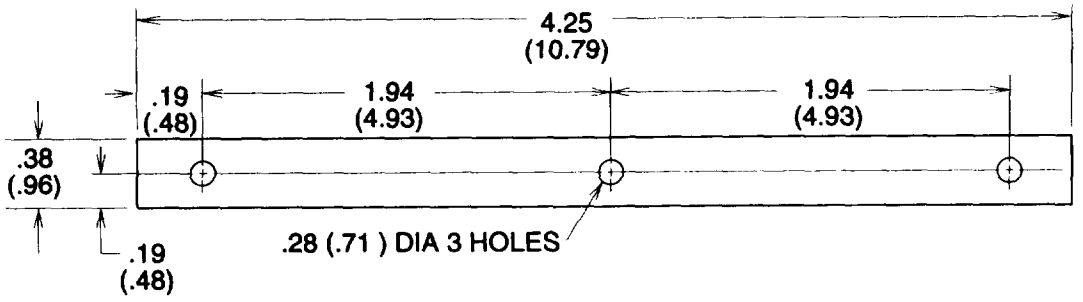
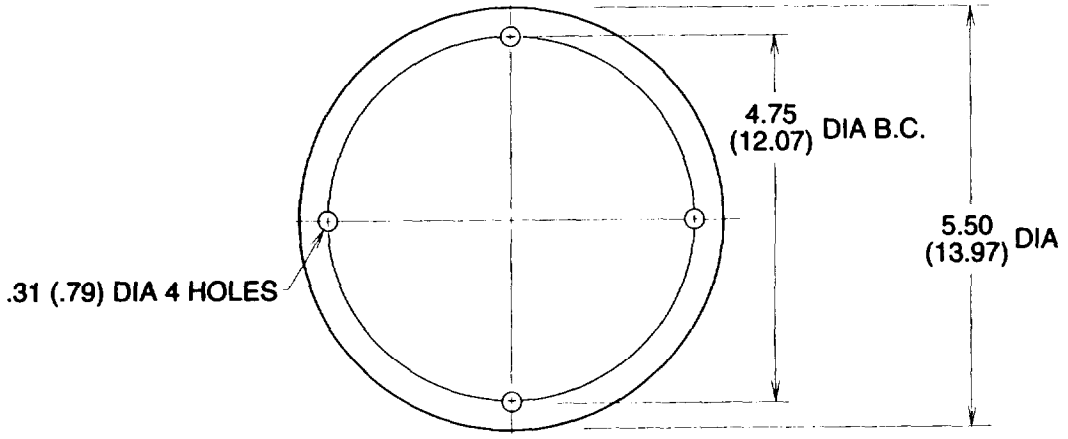


Figure F-10. Gasket, Part Number 120K1443-l/4



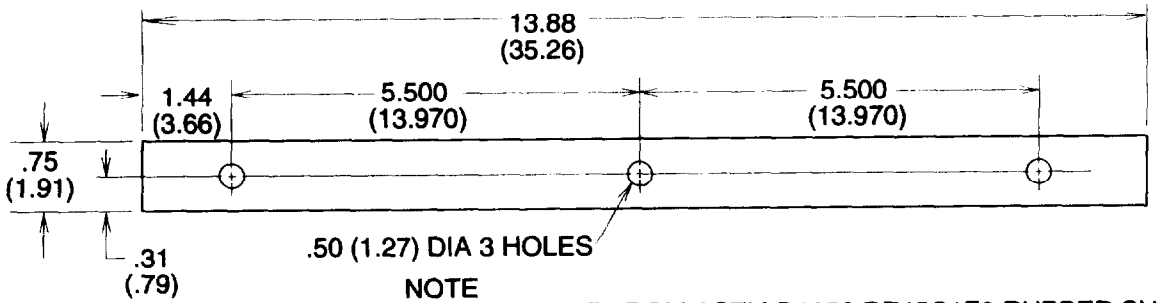
NOTE
1. FABRICATE FROM (97403)13227E6913-1 EMI GASKET

Figure F-l1. Gasket, Part Number 120K1444-1/2



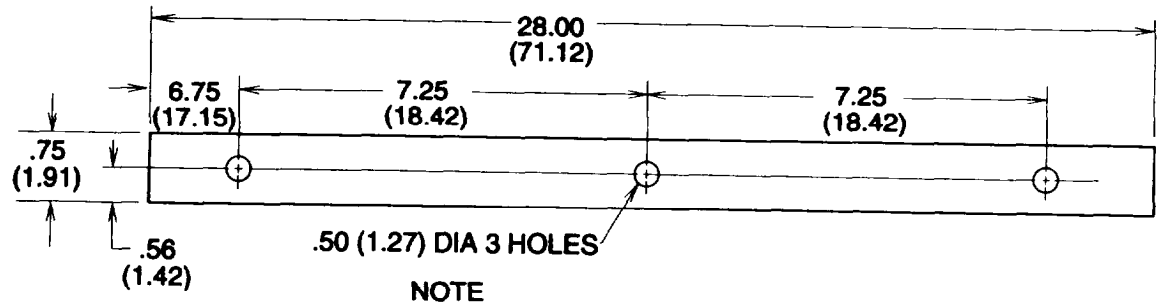
NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-12. Insulation, Part Number 13214E3864-l/2



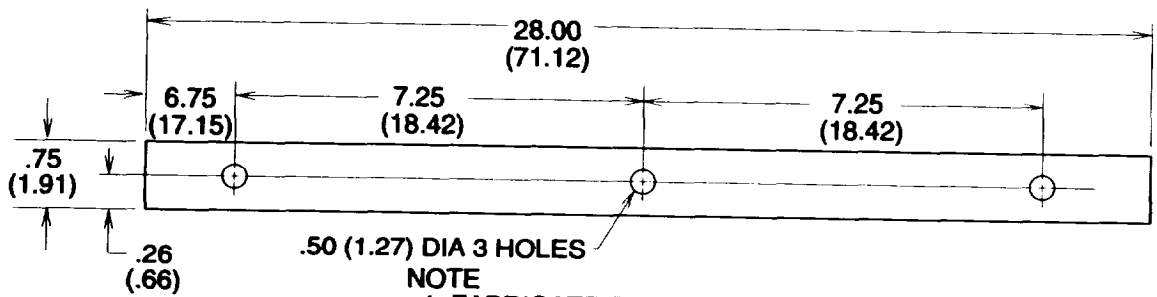
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-13. Gasket, Part Number 13214E3931/2



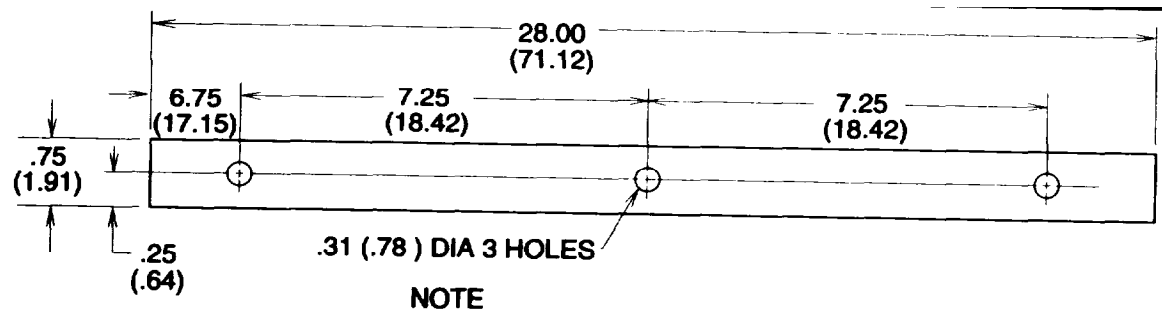
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-14. Gasket, Part Number 13214E3931/4



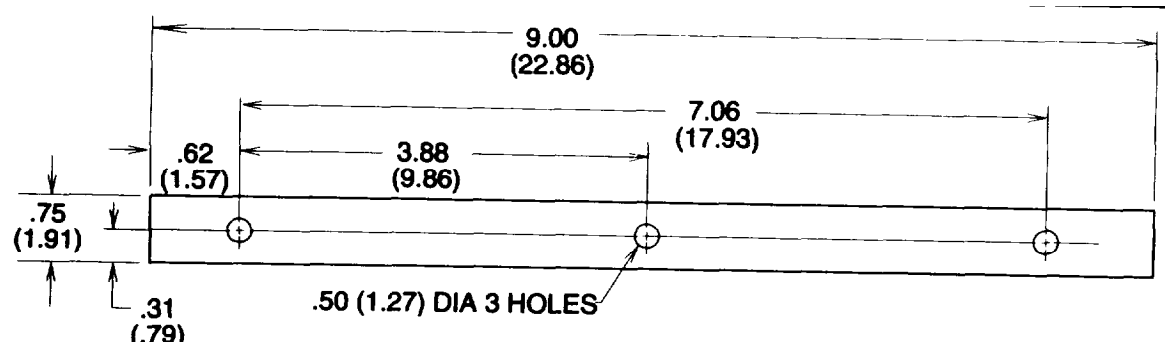
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-15. Gasket, Part Number 13214E3931/3



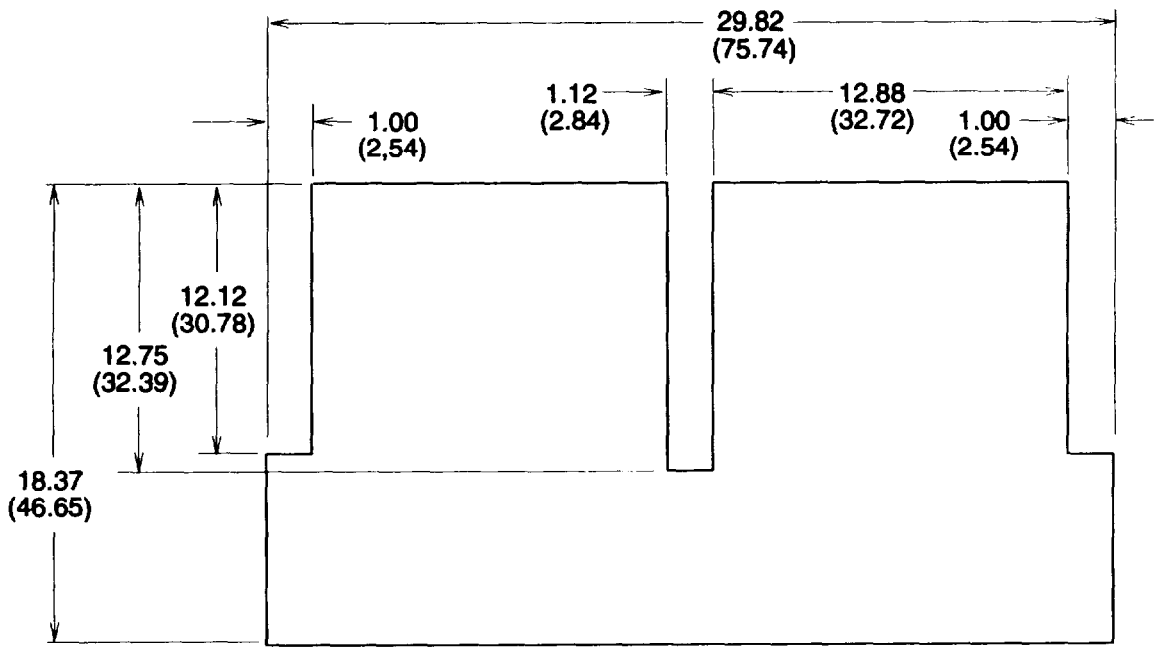
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-16. Gasket, Part Number 13214E3937/2



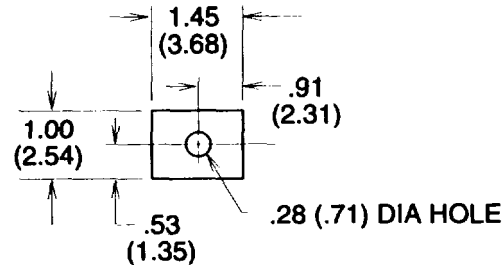
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-17. Gasket, Part Number 13214E3937/3



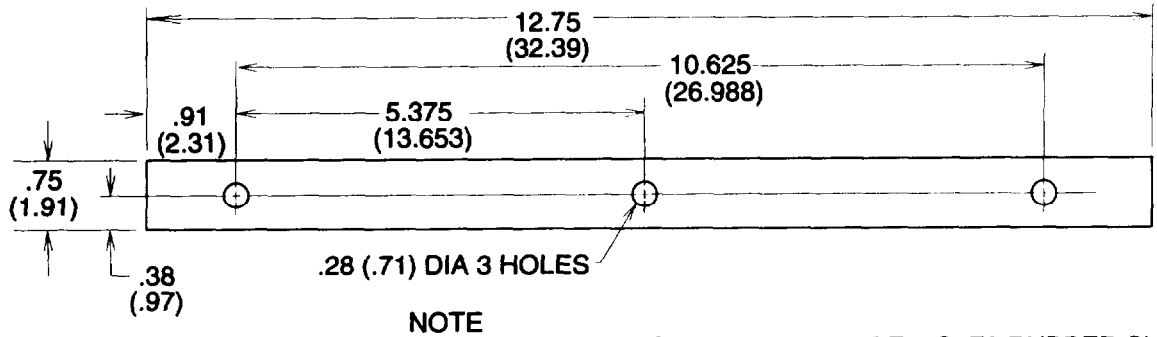
NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-18. Insulation, Part Number 13225E8090/3



NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 I 0.250 (.635) THICK

Figure F-19. Gasket, Part Number 13225E8090/6



NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.063 (.160) THICK

Figure F-20. Gasket, Part Number 13225E8090/5

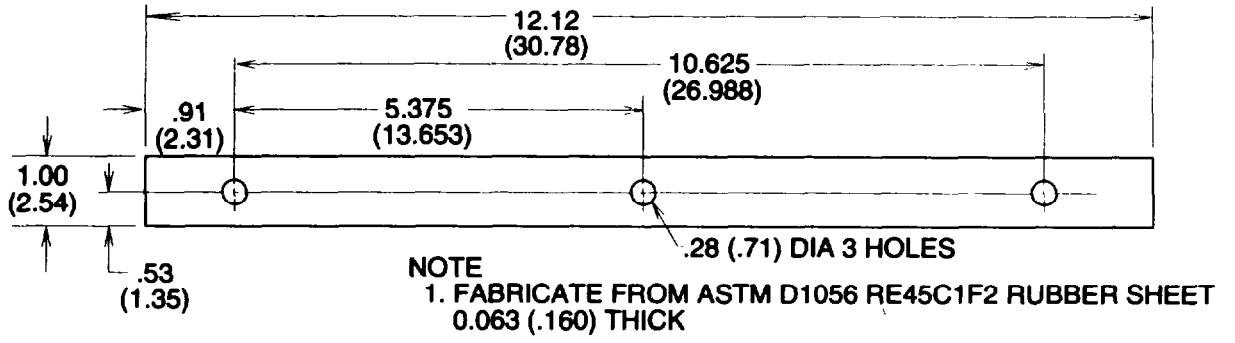


Figure F-21. Gasket, Part Number 23225E8090/4

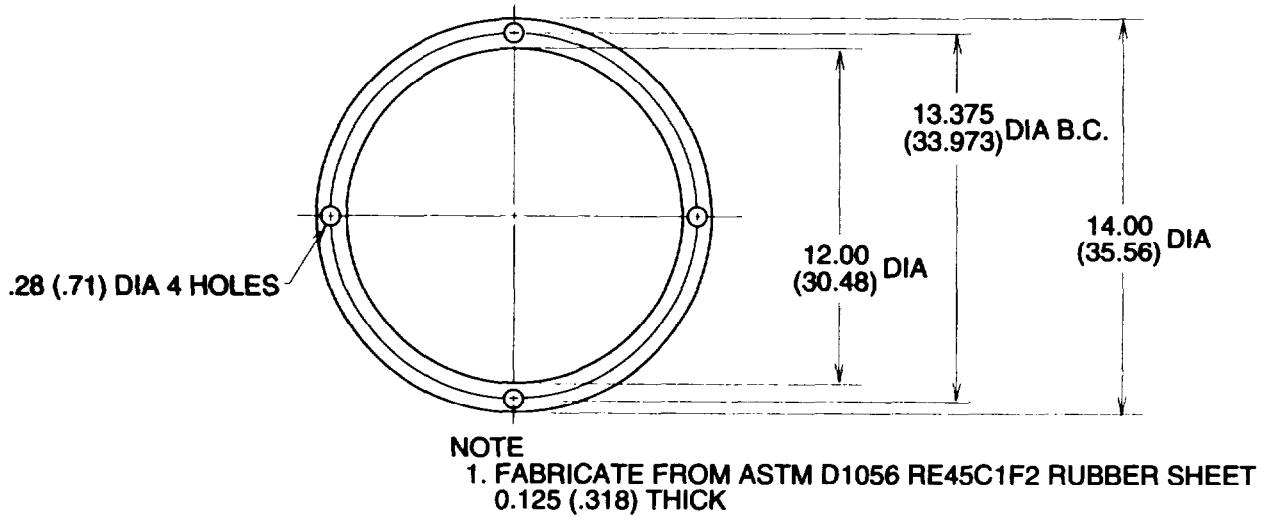


Figure F-22. Insulation, Part Number 13225E8091/2

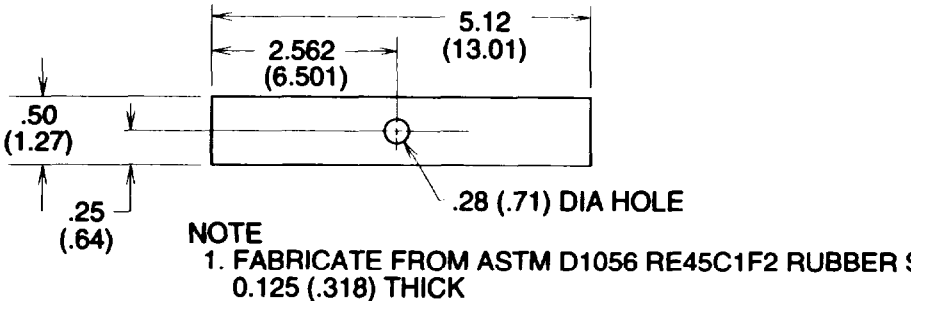


Figure F-23. Gasket, Part Number 13225E8133/4

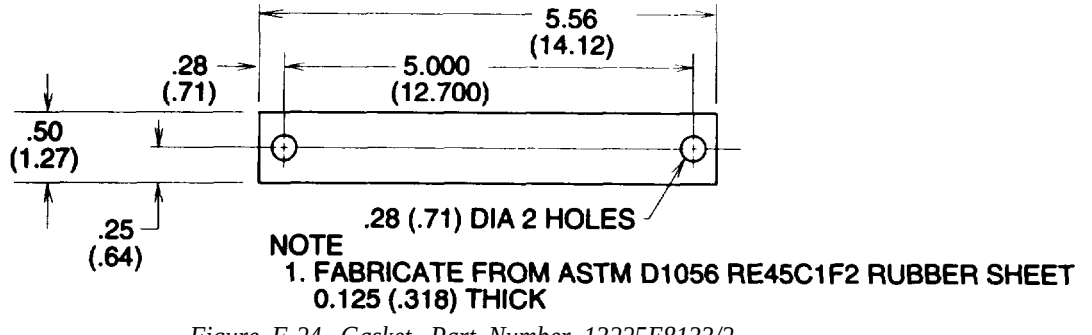
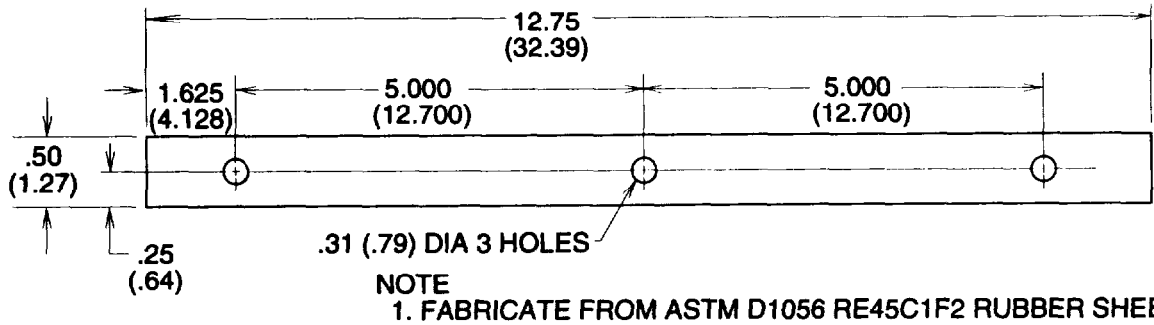
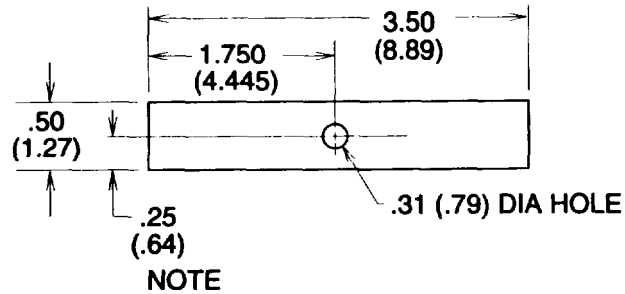


Figure F-24. Gasket, Part Number 13225E8133/2



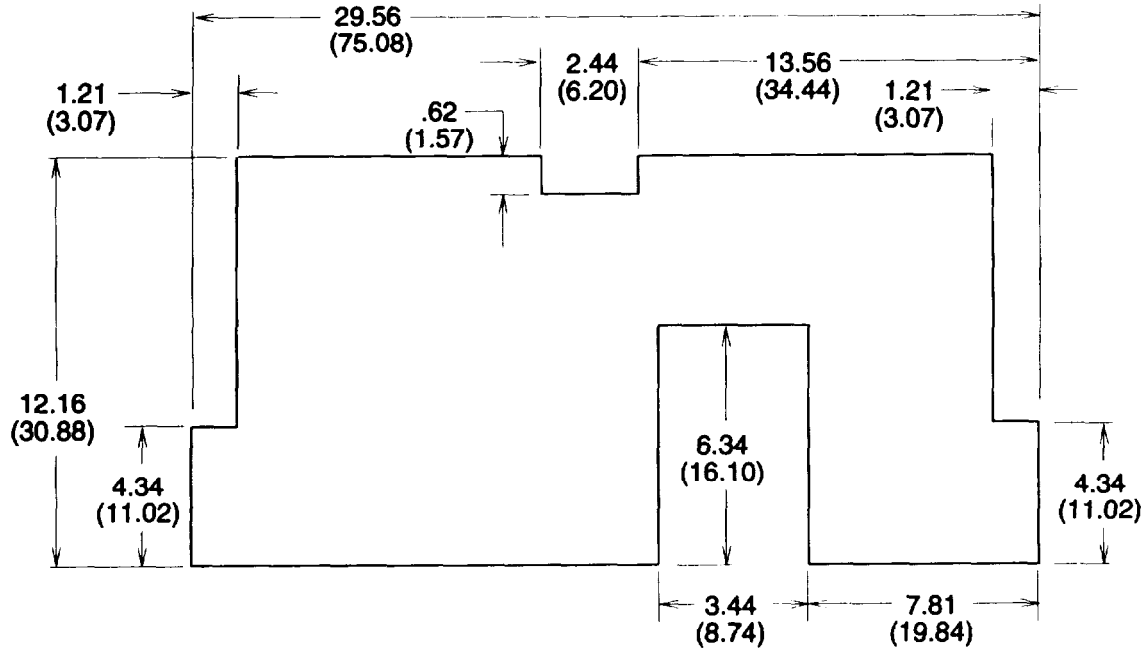
NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-25. Gasket, Part Number 13225E8171/2



NOTE
1. FABRICATE FROM ASTM D1056 RE45C1F2 RUBBER SHEET 0.125 (.318) THICK

Figure F-26. Gasket, Part Number 13225E8171/3



NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-27. Insulation, Part Number 13228E1254/6

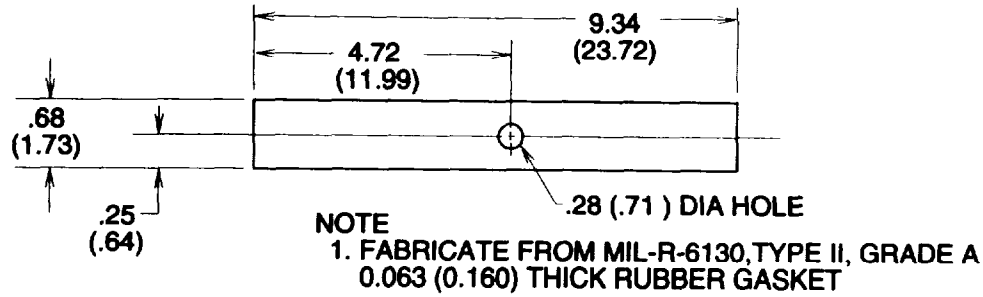


Figure F-28. Gasket, Part Number 13229E8068/8

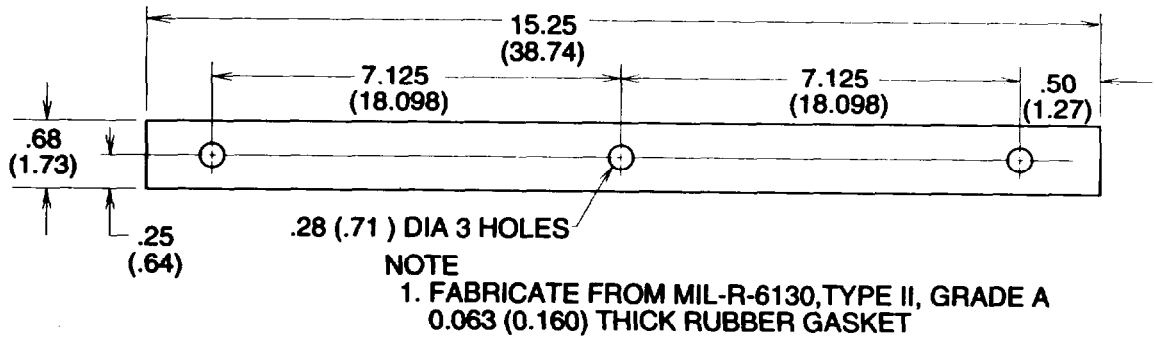


Figure F-29. Gasket, Part Number 13229E8068/7

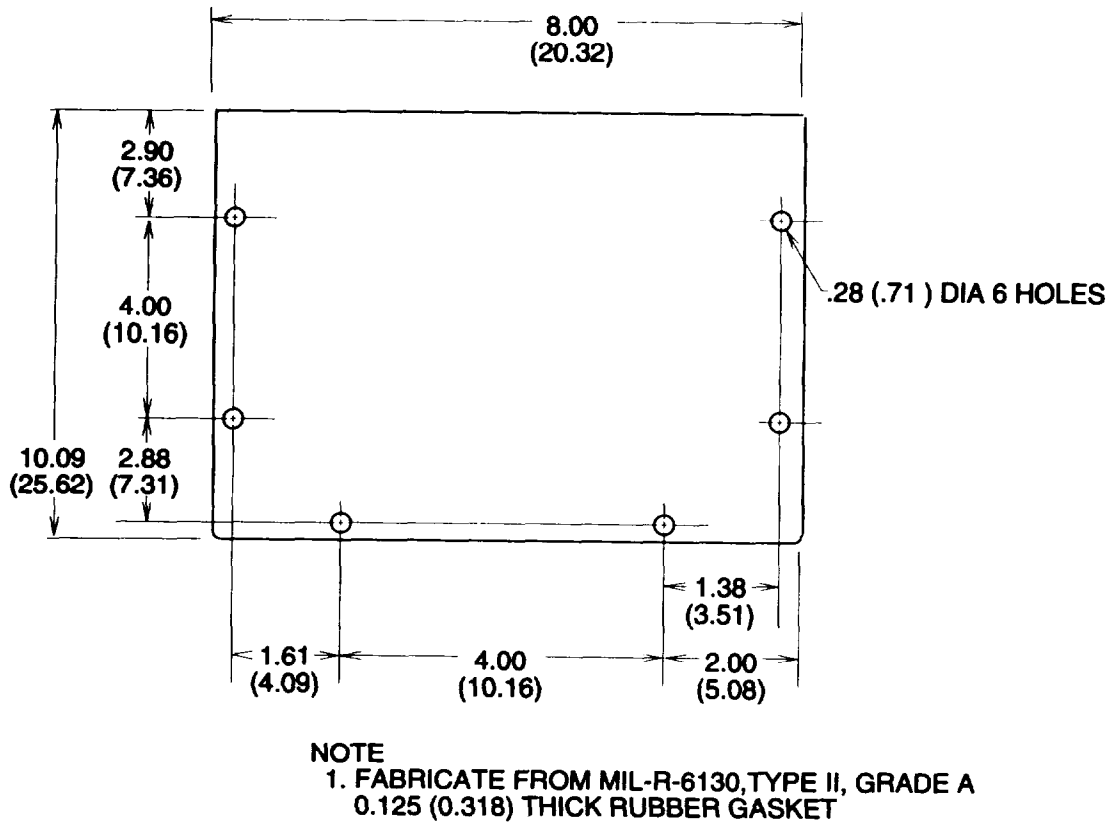


Figure F-30. Gasket, Part Number 13229E8069/2

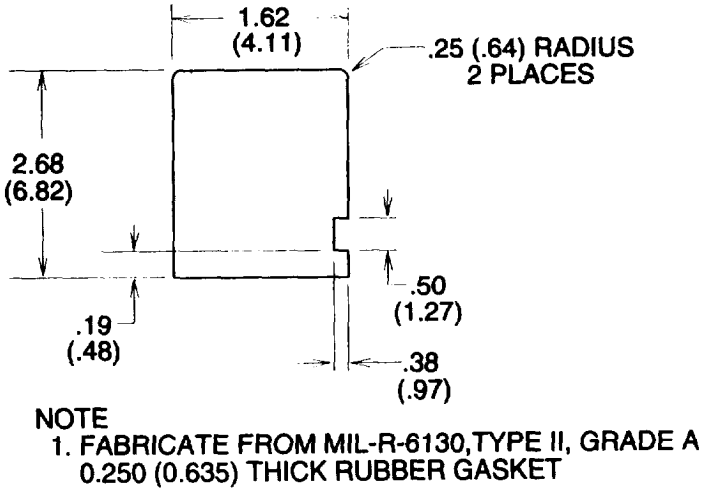


Figure F-31. Gasket, Part Number 13229E8069/3

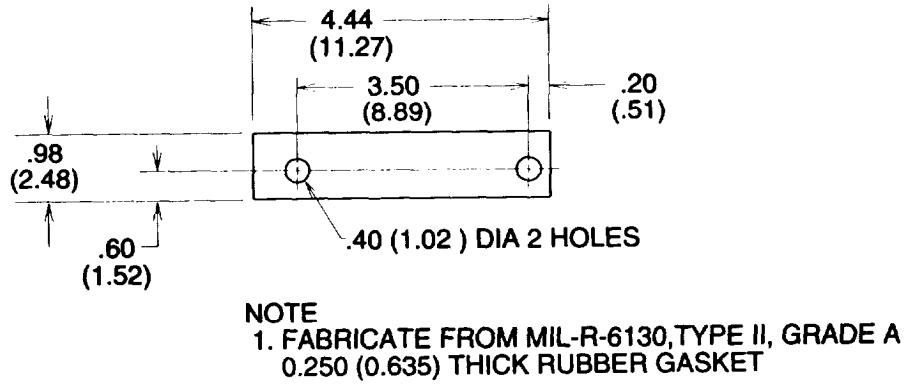


Figure F-32. Gasket, Part Number 13229E8069/4

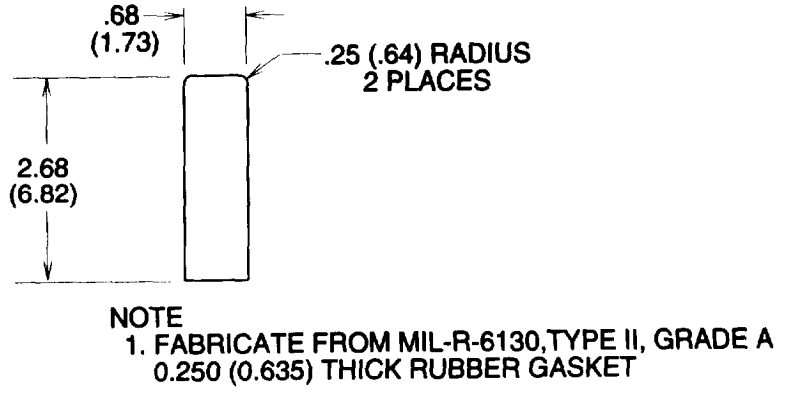


Figure F-33. Gasket, Part Number 13229E8069/5

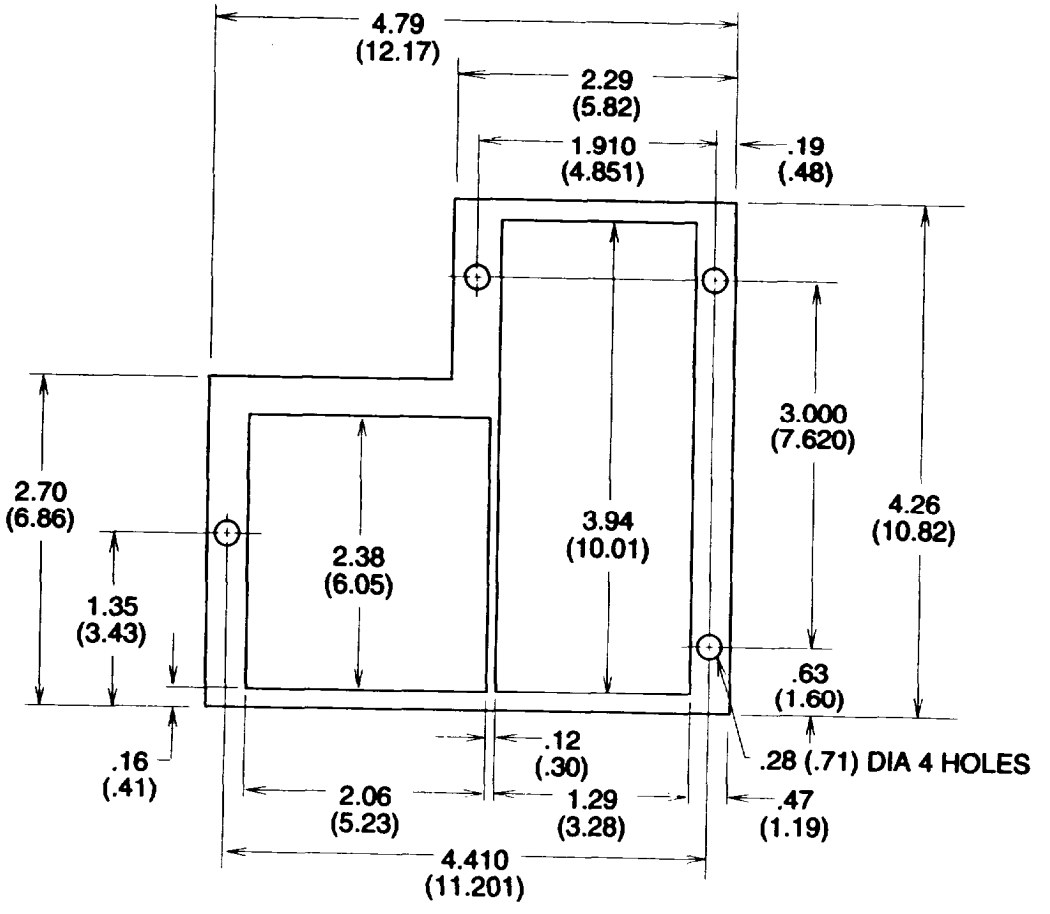


Figure F-34. Gasket, Part Number 13229E8076/4

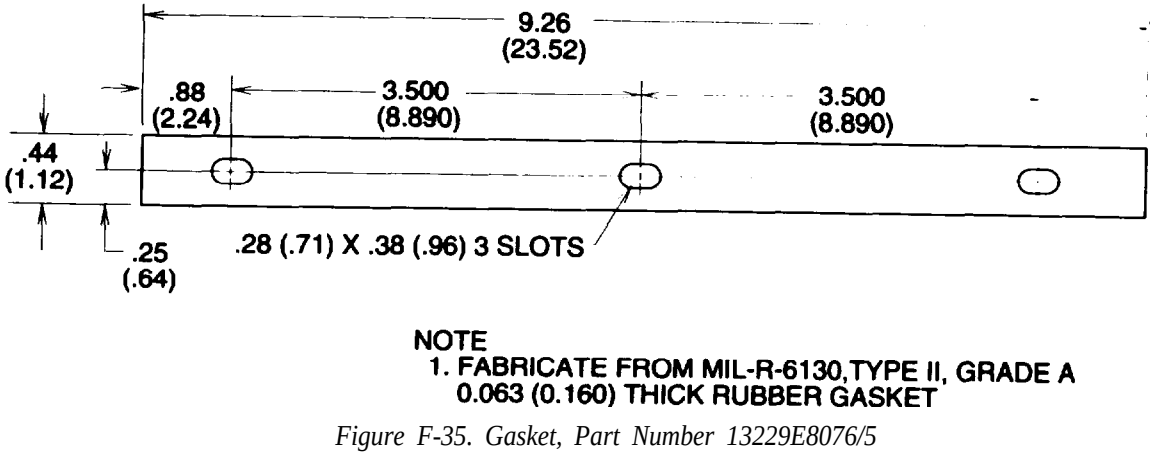


Figure F-35. Gasket, Part Number 13229E8076/5

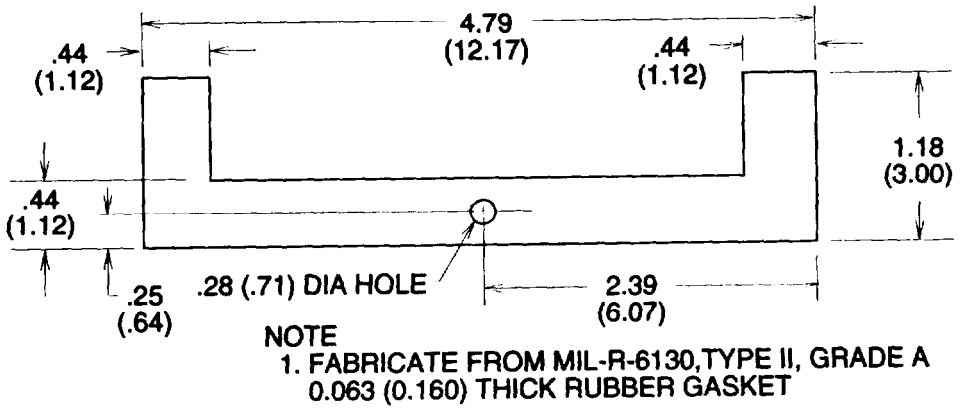


Figure F-36. Gasket, Part Number 13229E8076/6

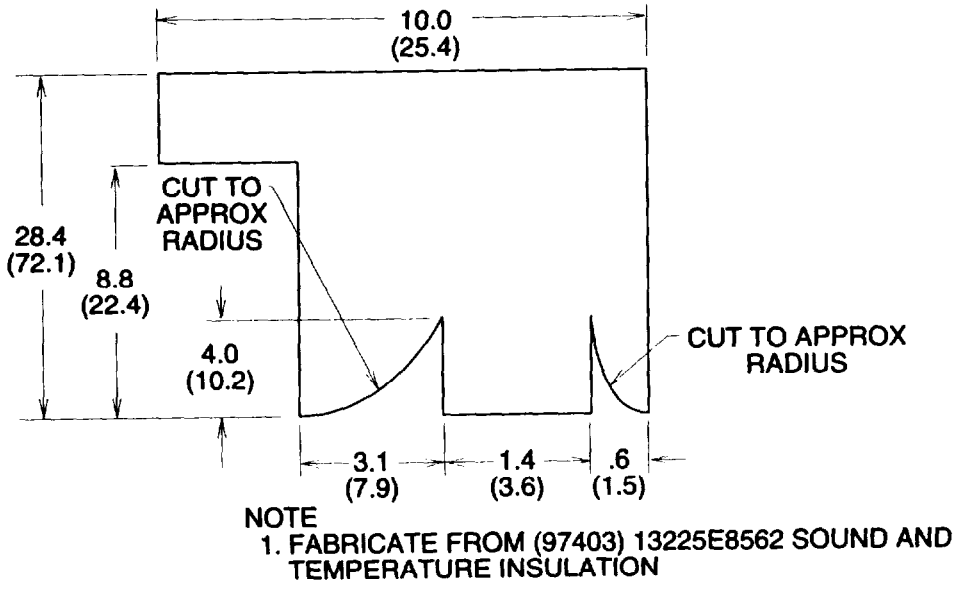


Figure F-37. Insulation, Part Number 13229E8076/14

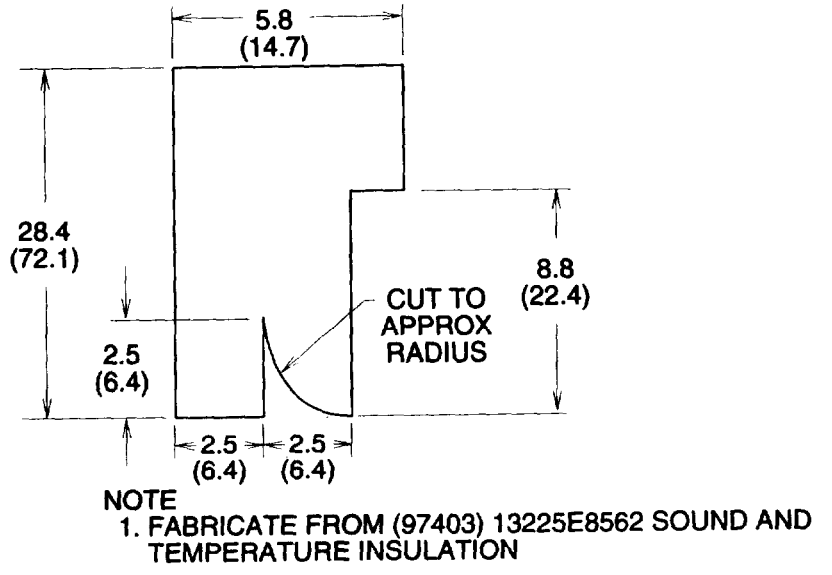


Figure F-38. Insulation, Part Number 13229E8076/15

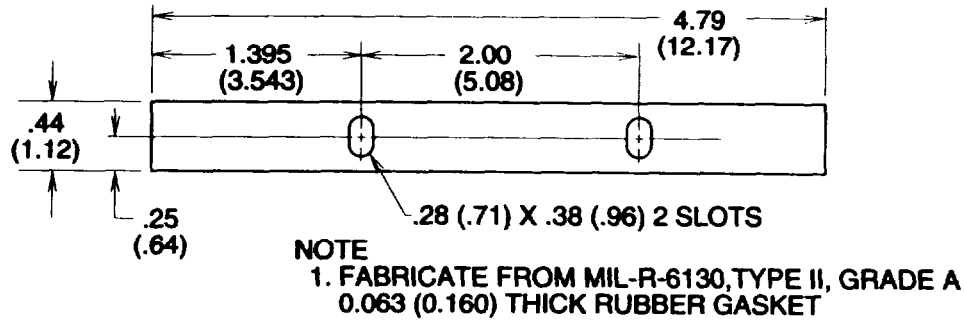


Figure F-39. Gasket, Part Number 13229E8076/16

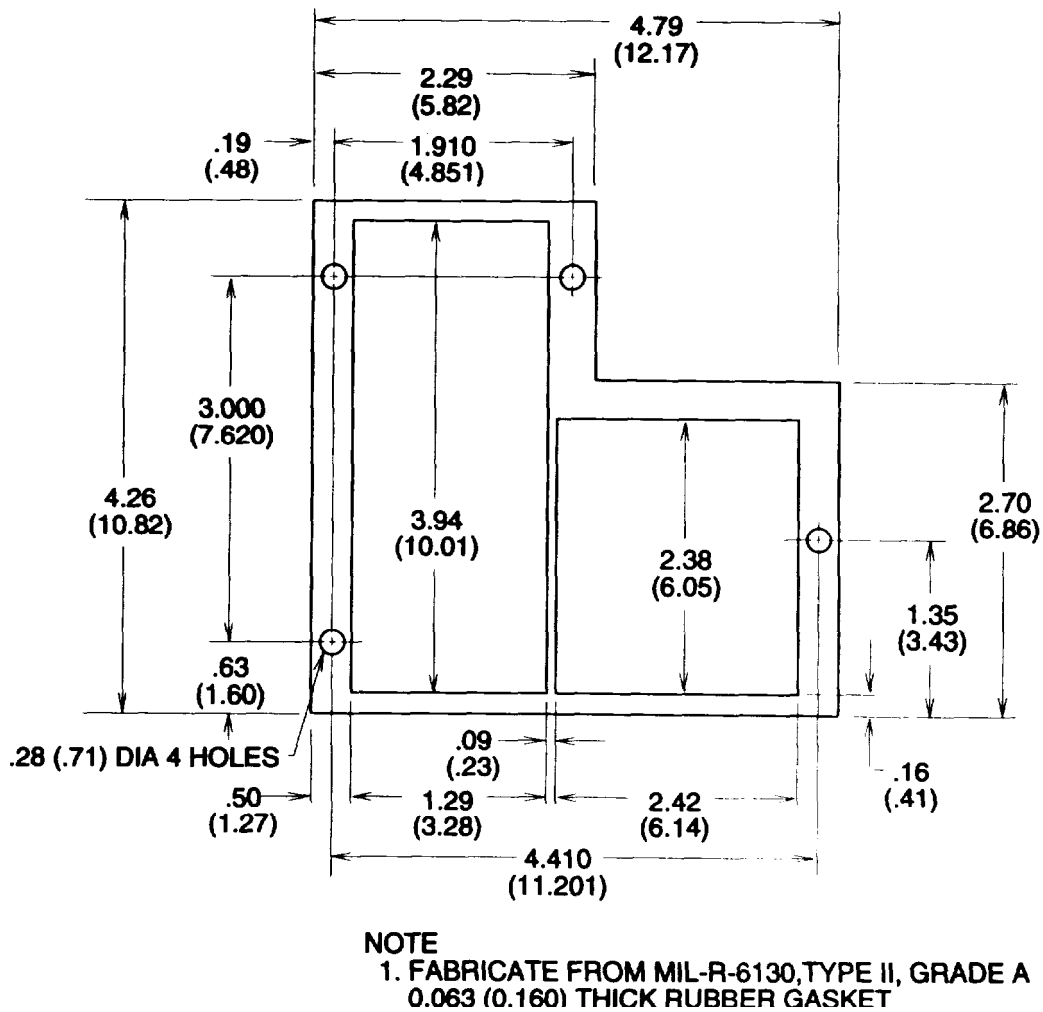
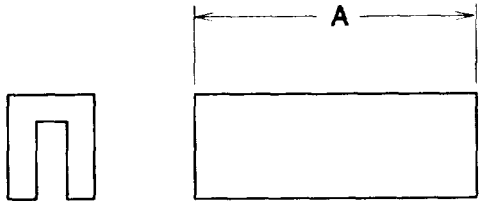


Figure F-40. Gasket, Part Number 13229E8082/2



PART NUMBER	A DIM	FABRICATE FROM
13225E8558-3	6.25 (15.88)	NORTHLAND PLASTICS INC. DIE-568 GRAY VINYL PLASTIC CHANNEL
13229E8100/103	1.00 (2.54)	(97403)13225E8114 RUBBER CHANNEL
13229E8100/104	3.00 (7.62)	(97403)13225E8114 RUBBER CHANNEL

Figure F-41. Rubber Channel

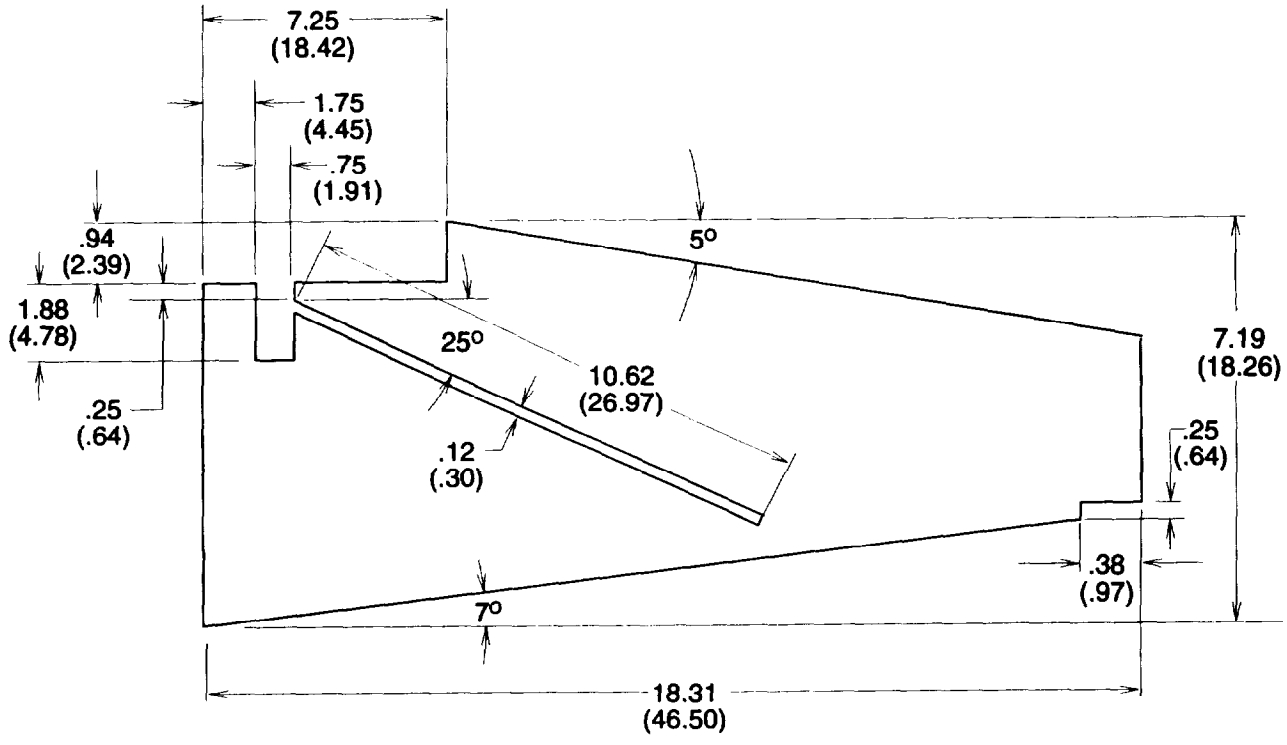


Figure F-42. Insulation, Part Number 13229E8100/123

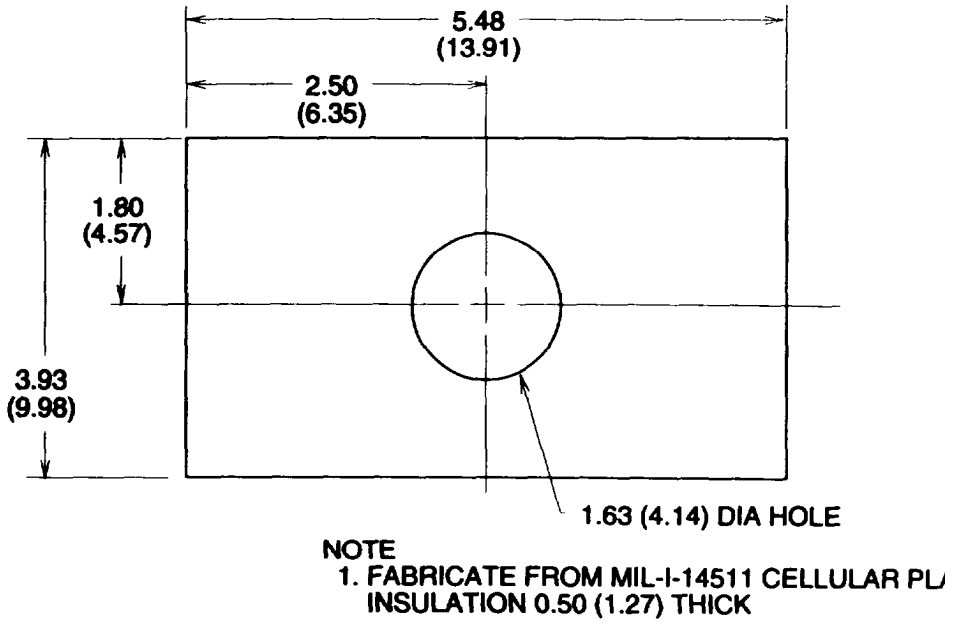


Figure F-43. insulation, Part Number 13229E8100/l25 and 13229E8100/128

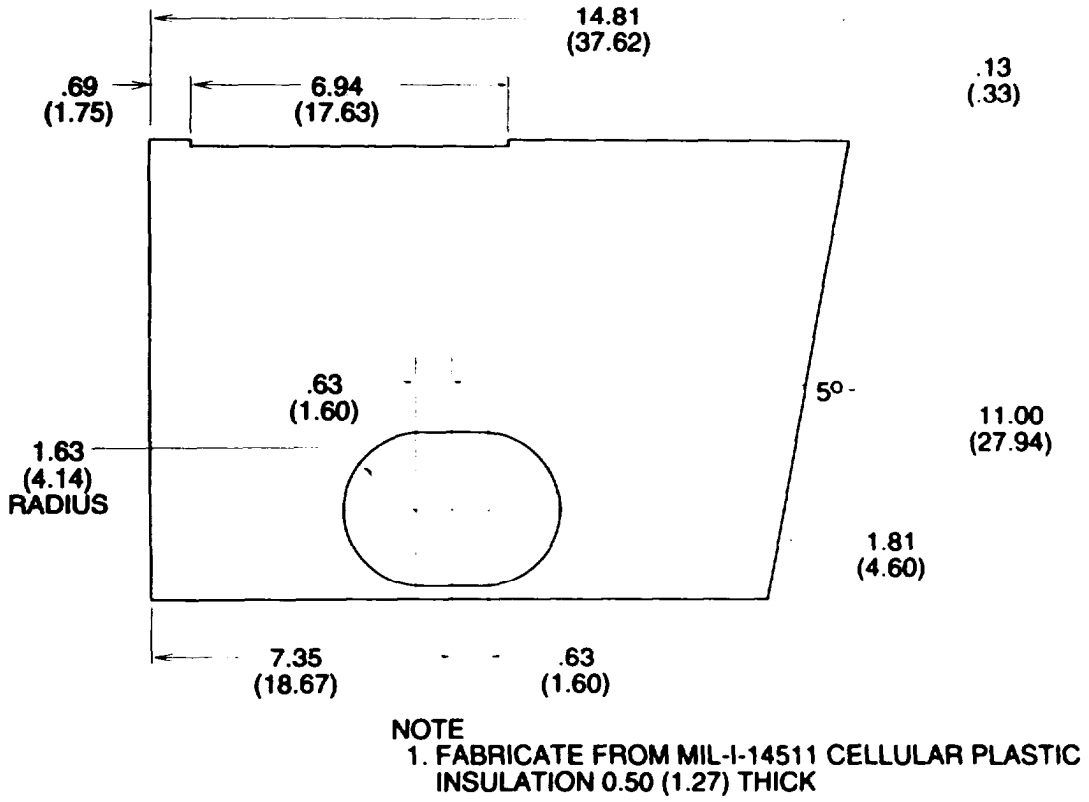
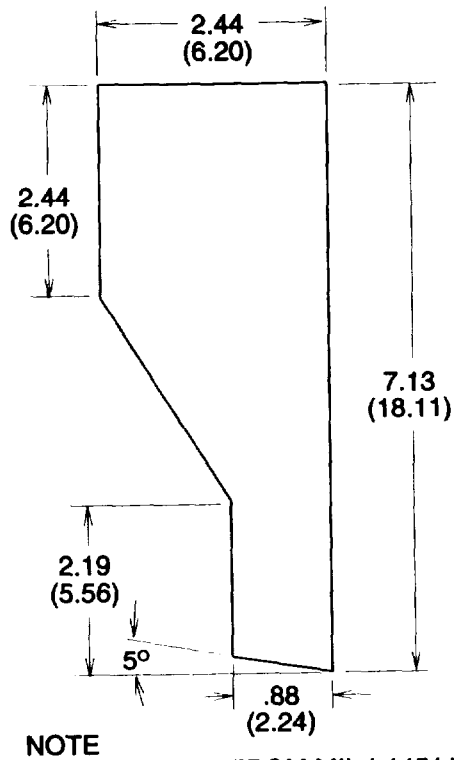
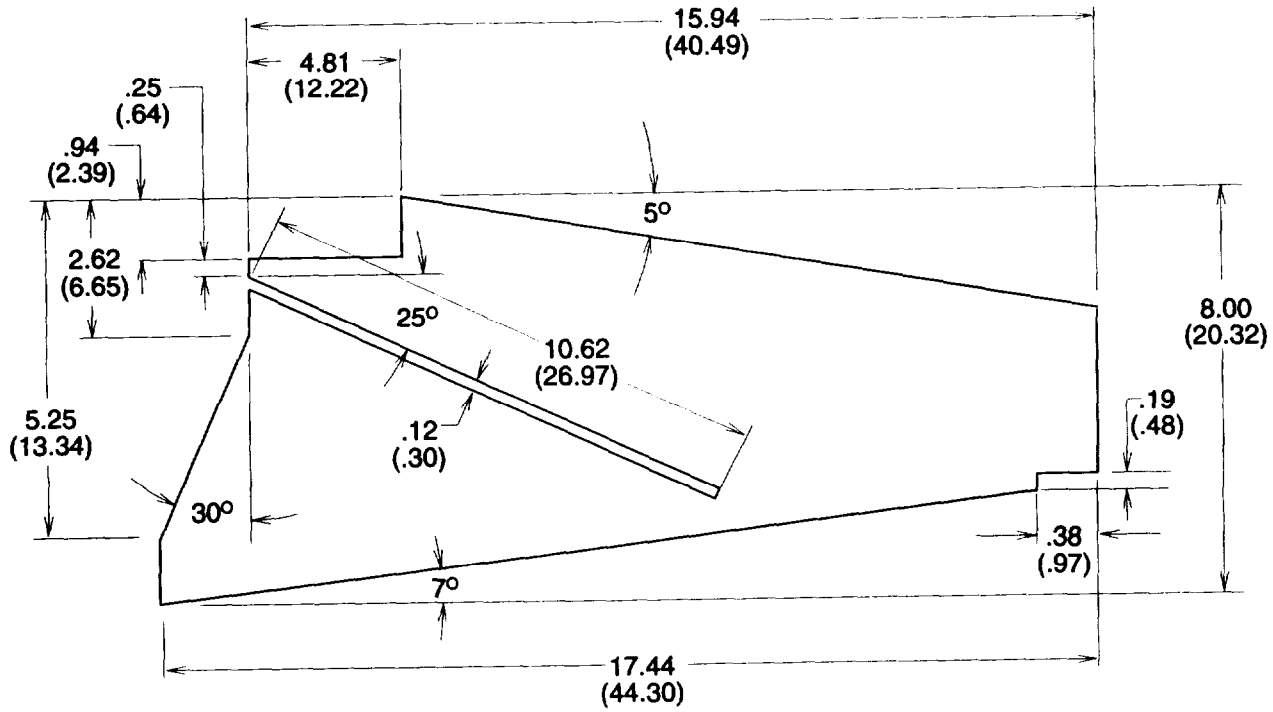


Figure F-44. Insulation, Part Number 33229E8100/126 & 13229E8100/127



NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-45. Insulation, Part Number 13229E8100/129



NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-46. Insulation, Part Number 13229E8100/130

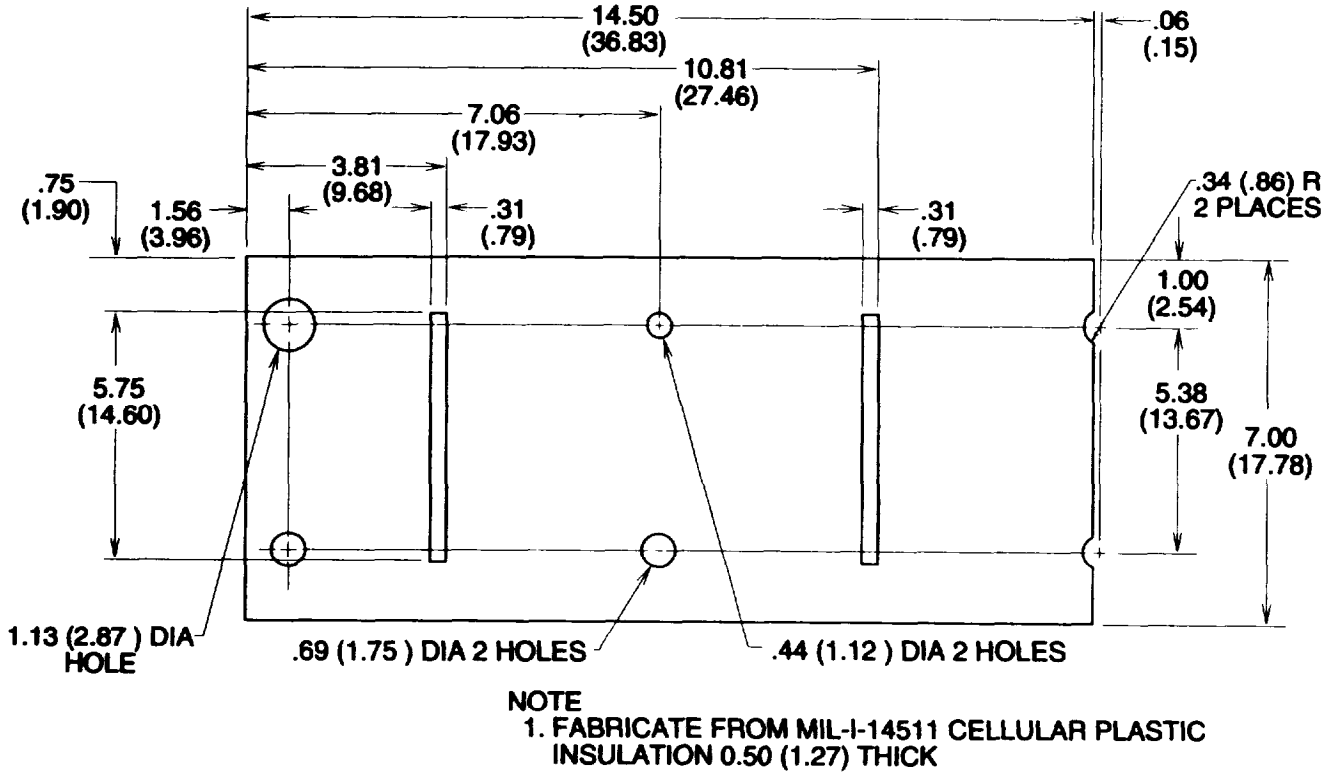


Figure F-47. Insulation, Part Number 13229E8100/131 & 13229E8100/133

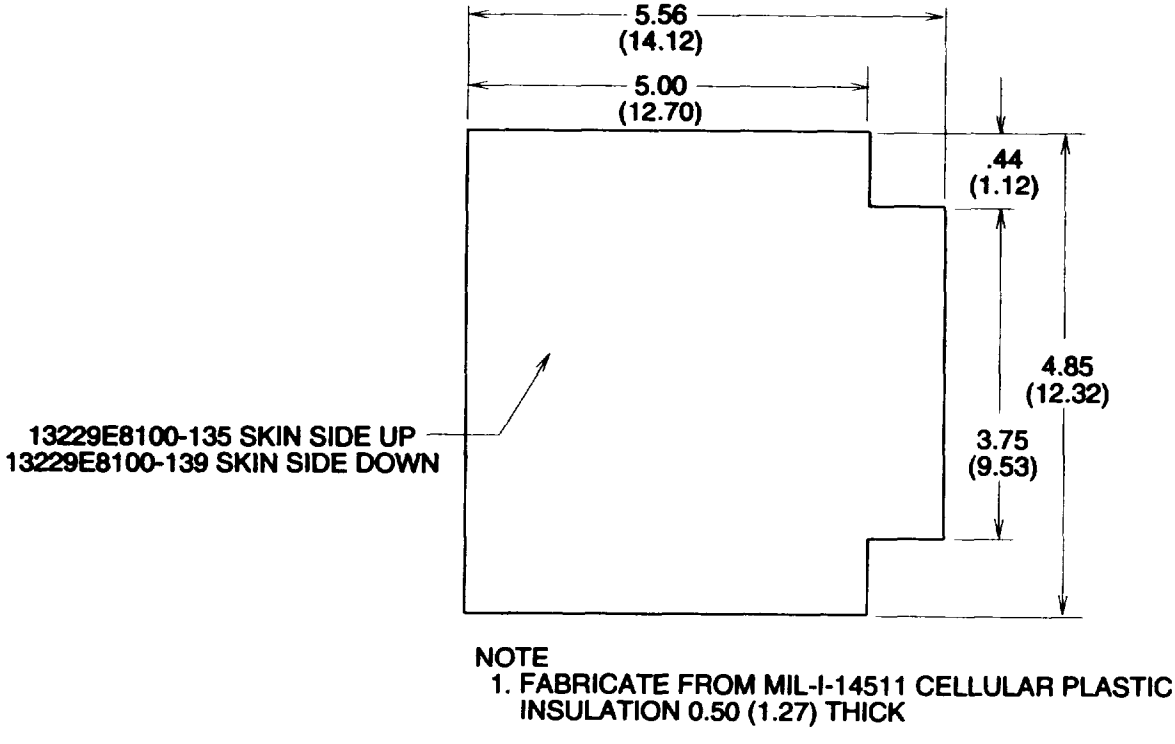


Figure F-48. Insulation, Part Number 13229E8100/135 & 13229E8100/139

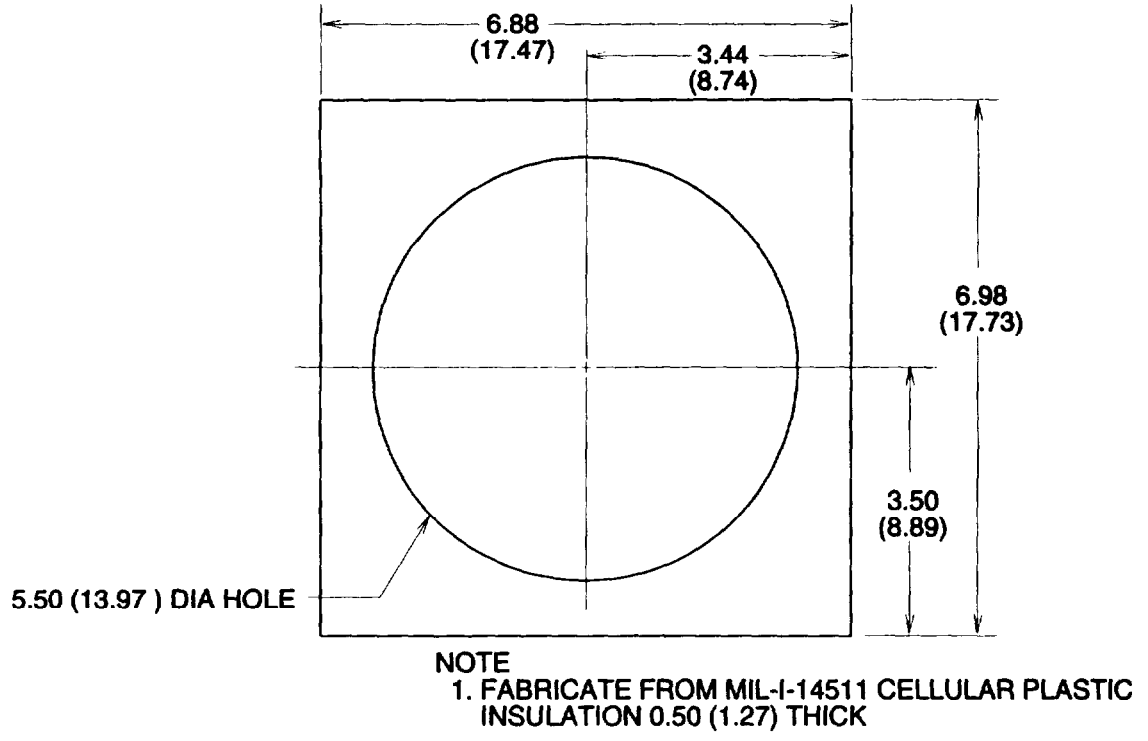


Figure F-49. Insulation, Part Number 13229E8100/138

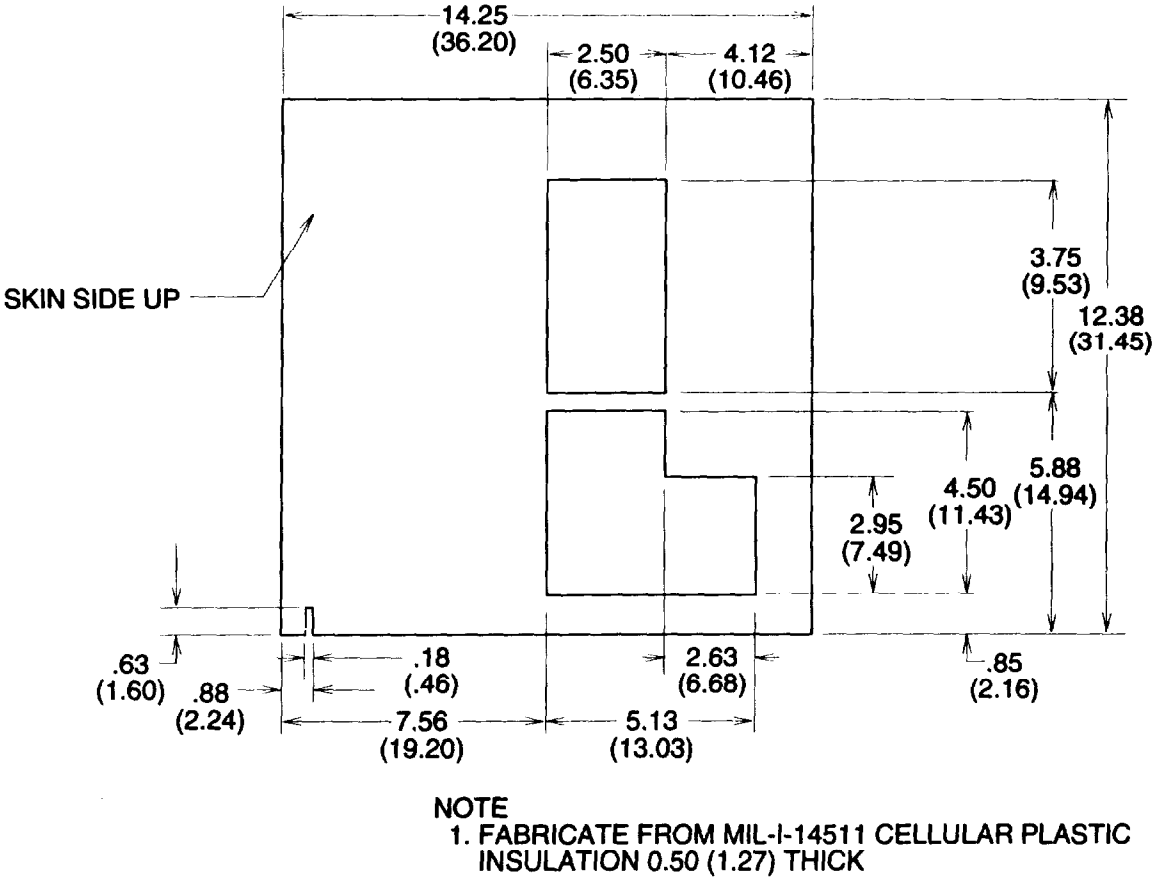


Figure F-50. Insulation, Part Number 13229E8100/143

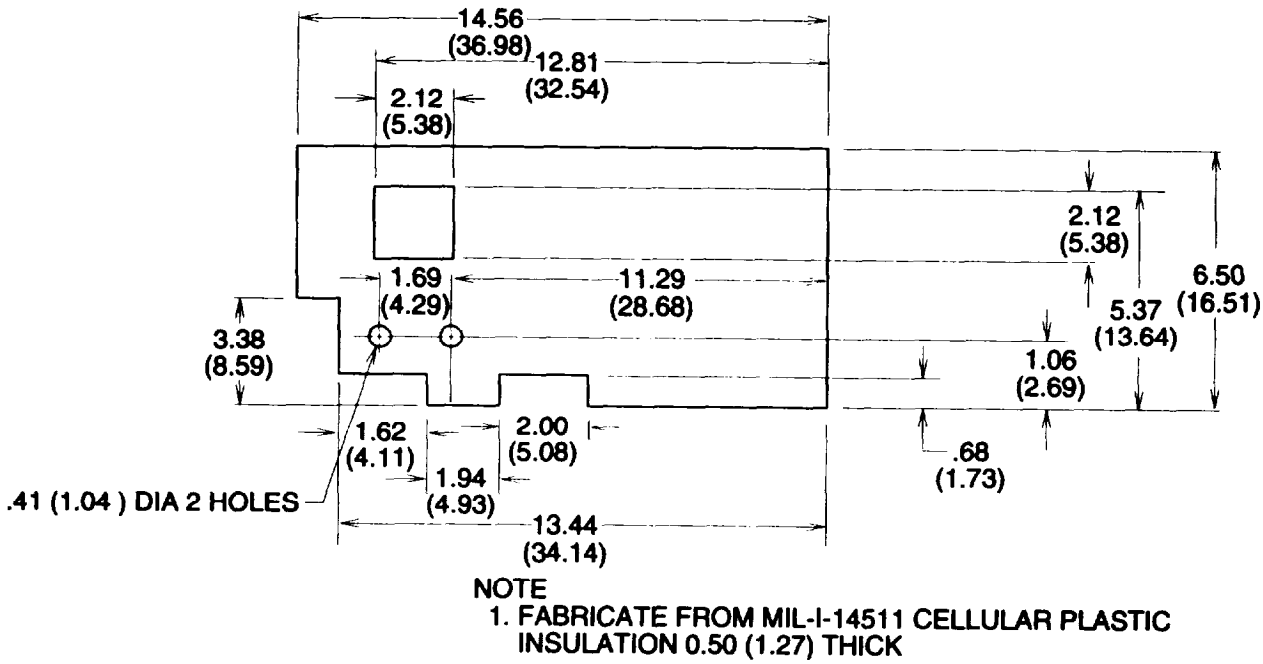


Figure F-51. Insulation, Part Number 13229E8100/144

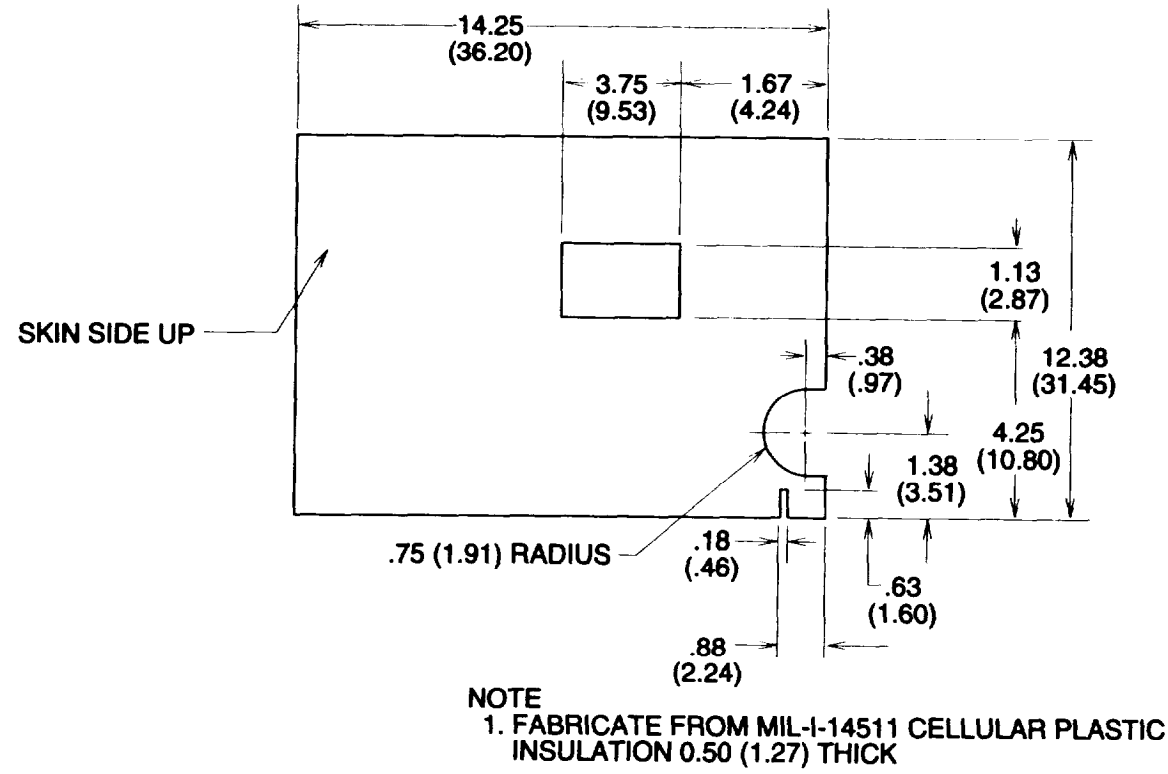
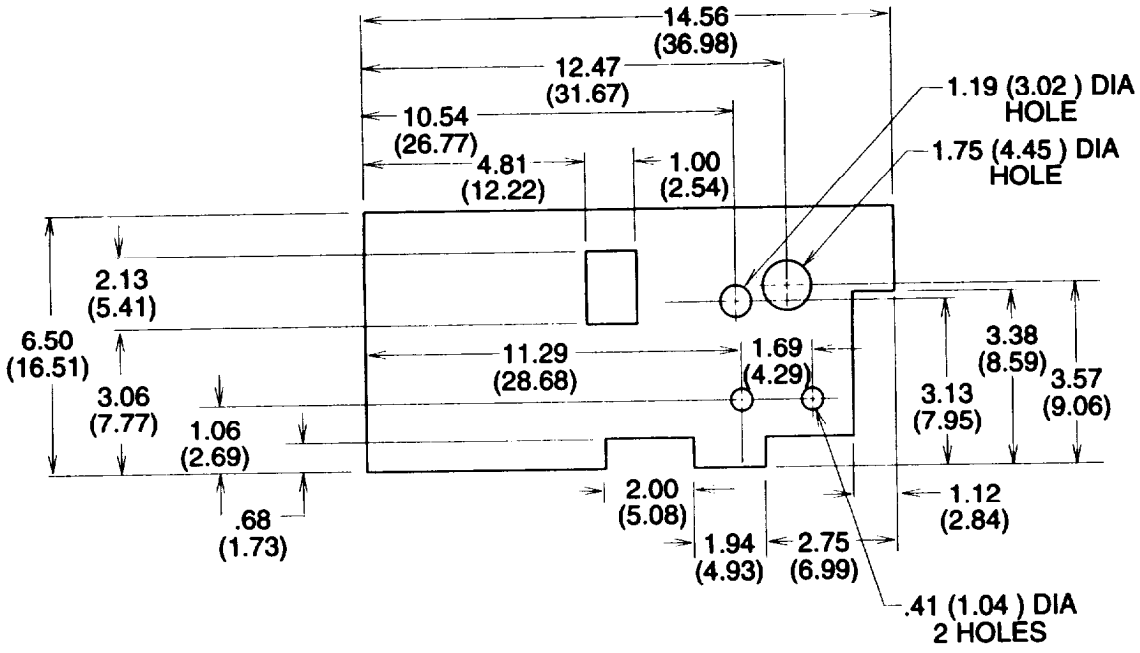
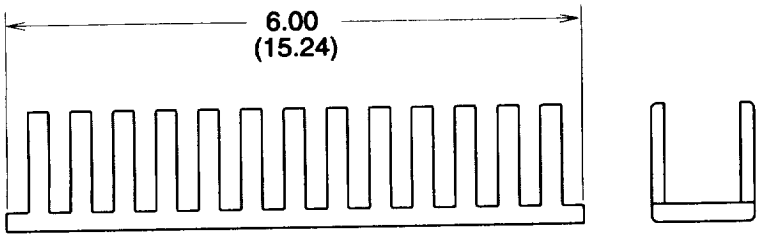


Figure F-52. Insulation, Part Number 13229E8100/145



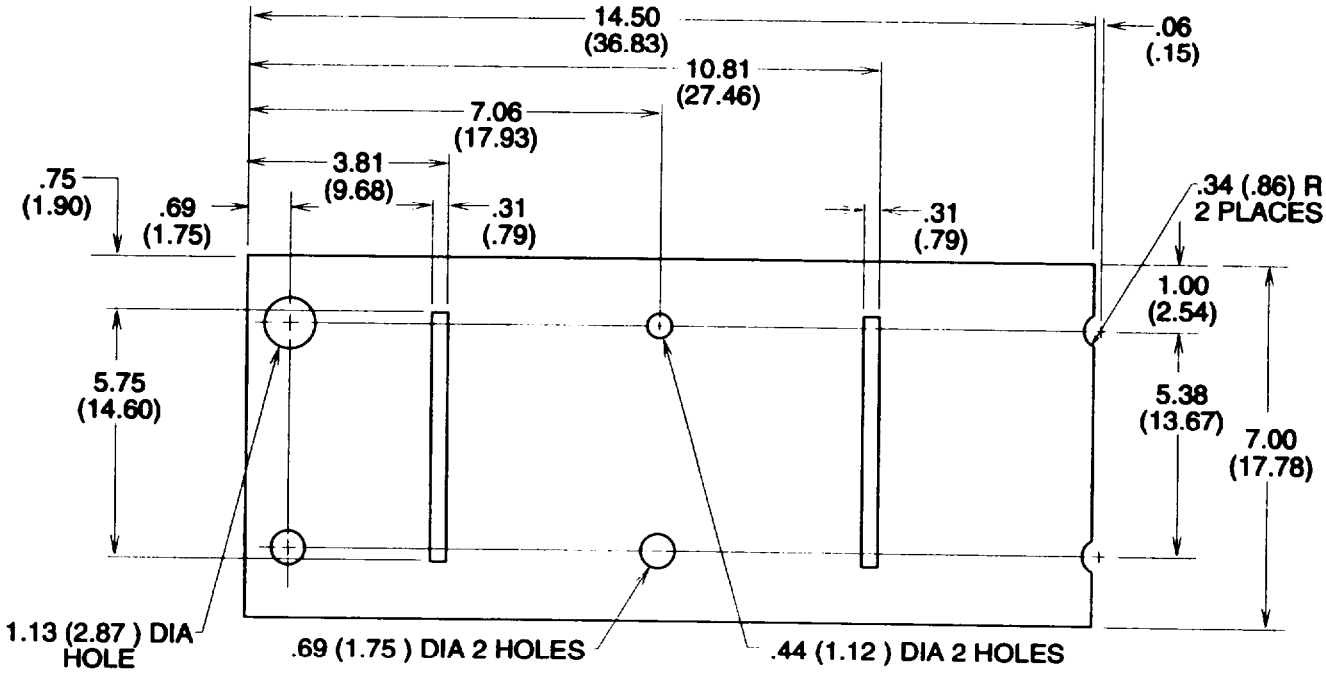
NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-53. Insulation, Part Number 13229E8100/146



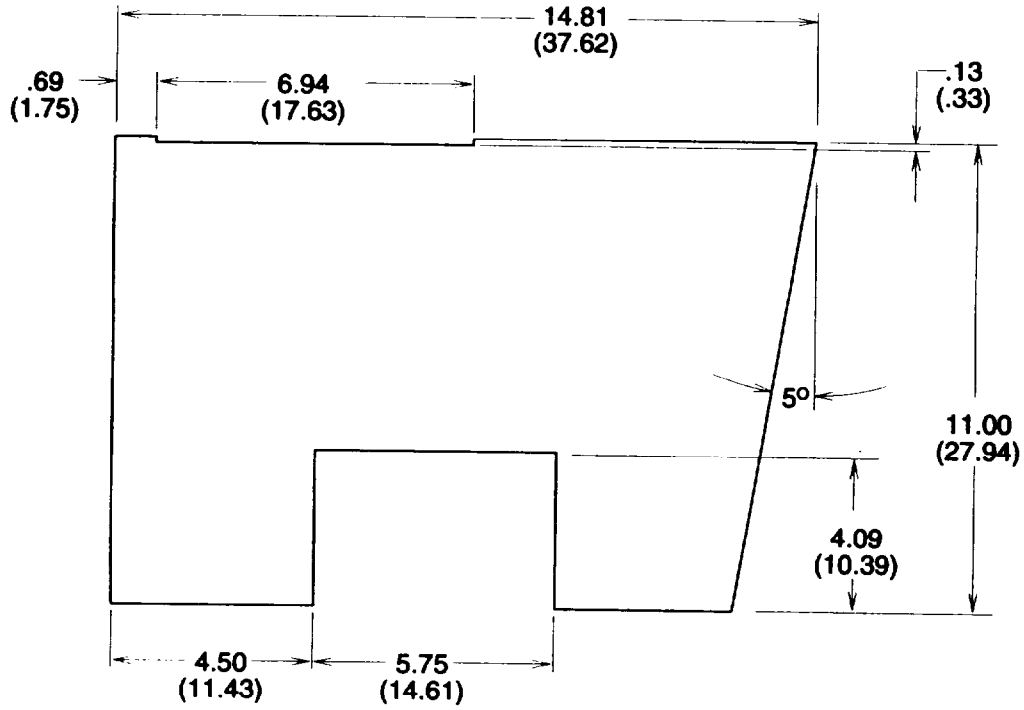
NOTE
1. FABRICATE FROM MS21266-5T GROMMET PLASTIC EDGING

Figure F-54. Grommet Edging, Part Number 13229E8100/299



NOTE
1. FABRICATE FROM AMS3570 .250 THICK POLYURETHANE FLEXIBLE OPEN CELL 2.5 LB/FT^3 FOAM

Figure F-55. Insulation, Part Number 13229E8100/398 & 13229E8100/399



NOTE
1. FABRICATE FROM AMS3570 .250 THICK POLYURETHANE FLEXIBLE OPEN CELL 2.5 LB/FT^3 FOAM

Figure F-56. Insulation, Part Number 13229E8100/396 & 13229E8100/397

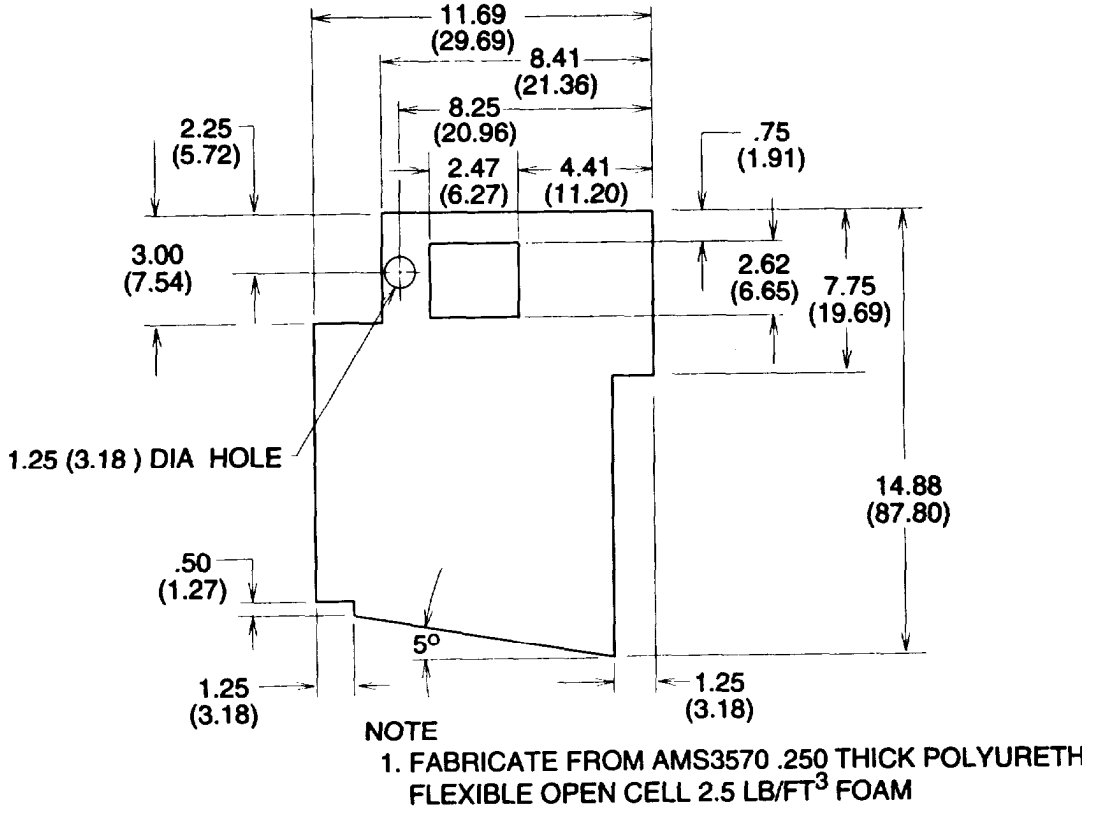


Figure F-57. Insulation, Part Number 13229E8100/411

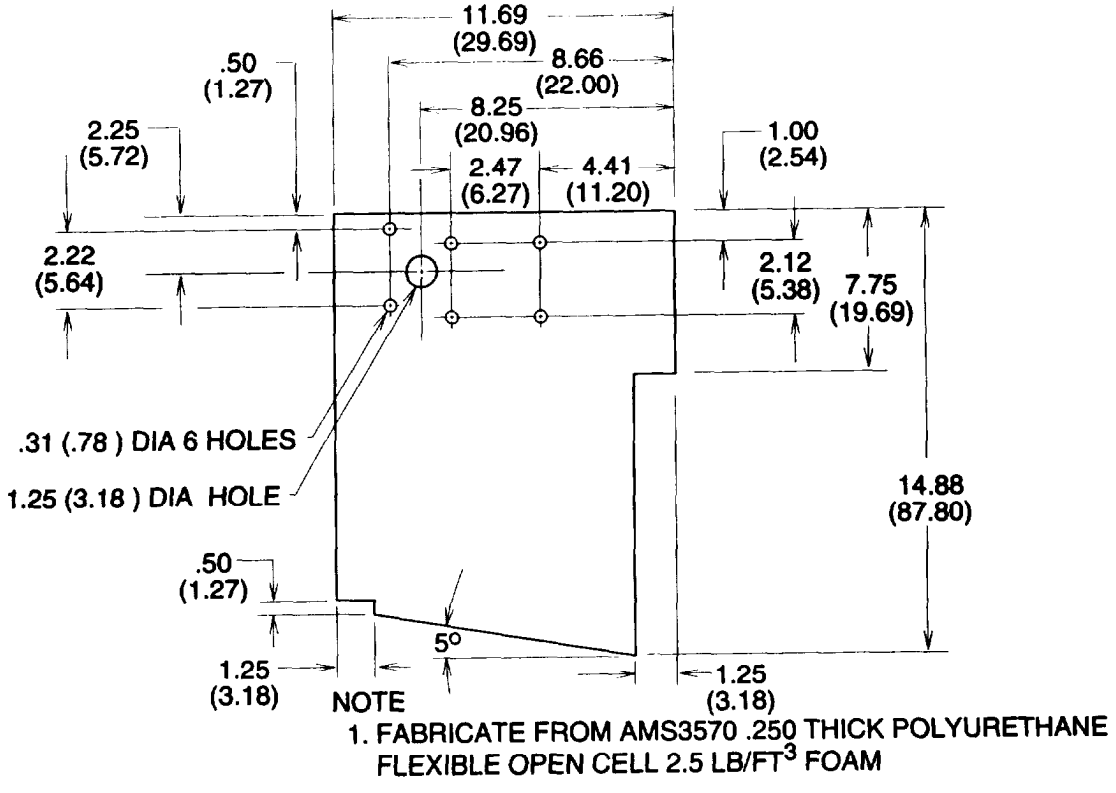
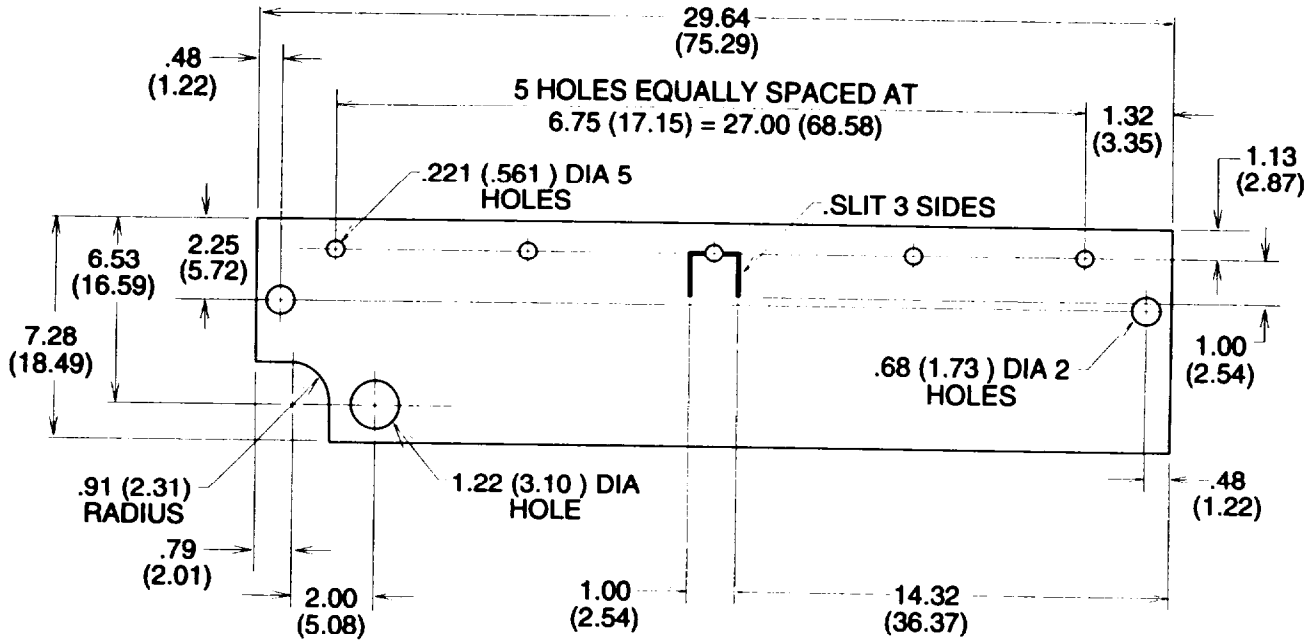
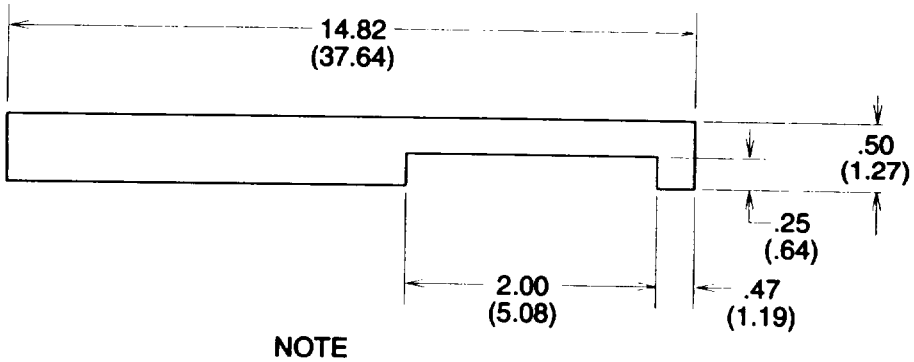


Figure F-58. Insulation, Part Number 13229E8100/412



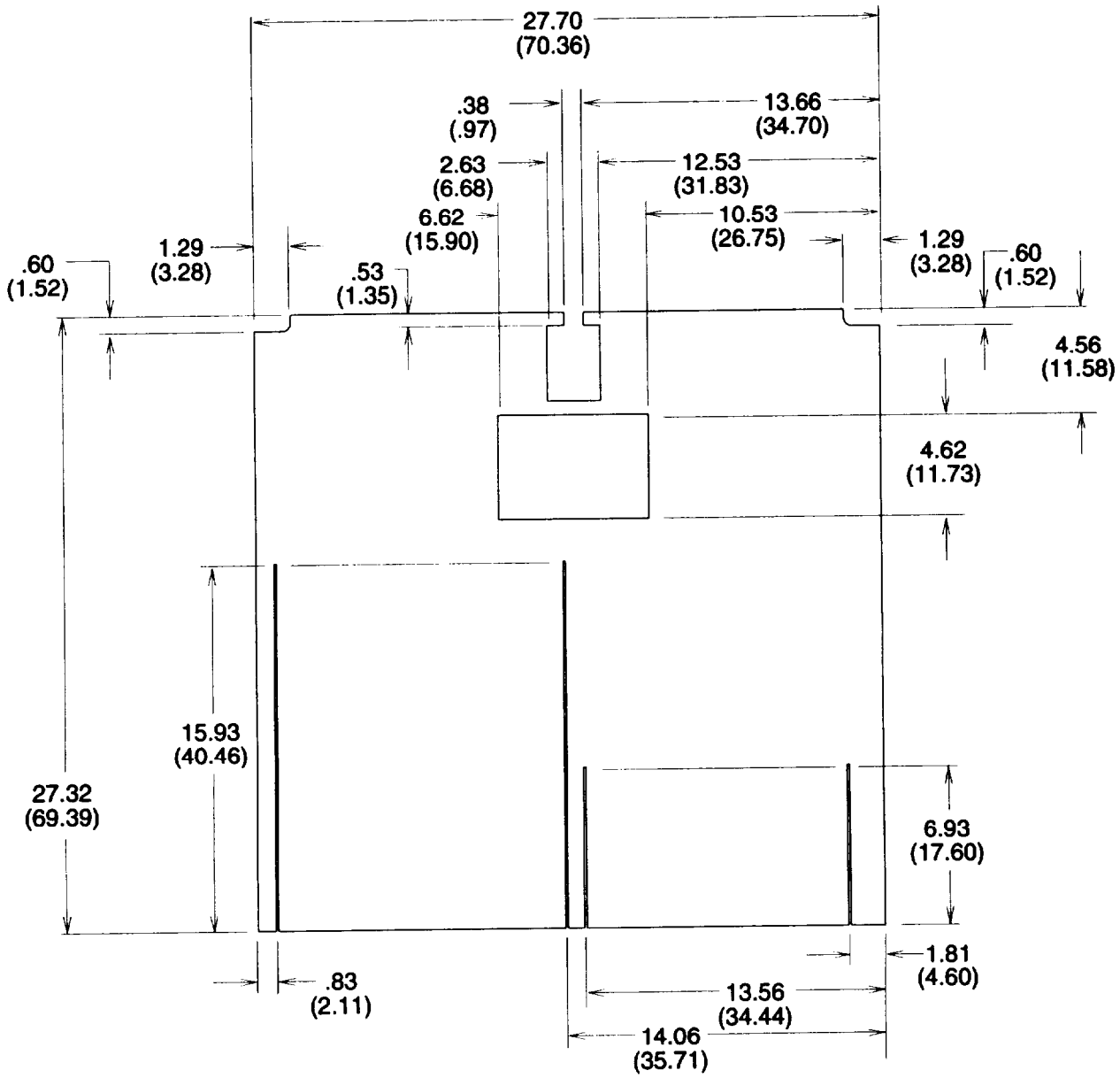
NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-59. Insulation, Part Number 13229E8101/41



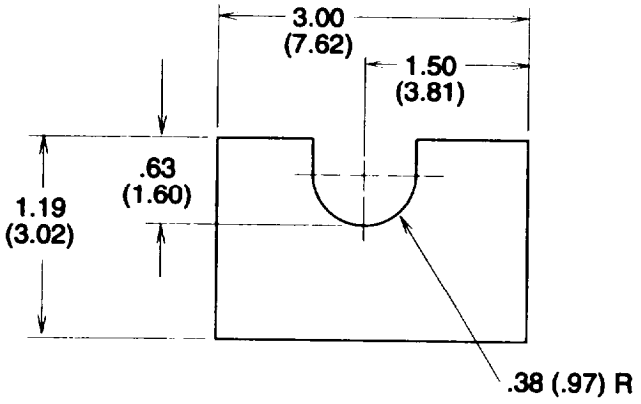
NOTE
1. FABRICATE FROM MIL-I-14511 CELLULAR PLASTIC INSULATION 0.50 (1.27) THICK

Figure F-60. Insulation, Part Number 13229E8101/45



NOTE
1. FABRICATE FROM (97403) 13225E8562 INSULATION 0.50 (1.27) THICK

Figure F-61. Insulation, Part Number 13229E8105/9



NOTE
1. FABRICATE FROM (97403)13227E6913-21 EMI GASKET

Figure F-62. Gasket, Part Number 13229E8105/17

APPENDIX G

MANDATORY REPLACEMENT PARTS

Item Number	Nomenclature	Part Number
1	Blind Rivets	13214E3789-2
2	Lock Washer	34017-008AC
3	Lock Washer	34017-009AB
4	Lock Washer	MS35335-35
5	Lock Washer	MS3533839
6	Lock Washer	MS35338-40
7	Lock Washer	MS3533841
8	Lock Washer	MS3533842
9	Lock Washer	MS3533843
10	Lock Washer	MS3533844
11	Rivet	MS20426AD3-5
12	Self Locking Nut	MS21044N04
13	Self Locking Nut	MS21044N6
14	Self Locking Nut	MS21045-08
15	Self Locking Nut	MS21045-3
16	Self Locking Nut	MS51922-1
17	Sleeving Insulation	13229E4190/16
18	Splices	12712947
19	Tape	120K1448-3
20	Tiedown Strap	MS3367-5-9
21	Self Locking Nut	MS2104506
22	Spring Washer	1316E4505
23	Spring Pin	MS17499
24	Drive Screw	MS21318-14
25	Self Locking Nut	MS210454

26	Lock Washer	M535338-45
27	Cotter Pin	MS24665-155
28	Self Locking Nut Plate	NAS1031A4
29	Blind Rivet Nut	13214E3791-2
30	Blind Rivet	13214E3789-11
31	Load Spring	173P003
32	Lock Washer	MS35338-40
33	Spring Tension Washer	173P00l

INDEX

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PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	

IN THIS SPACE, TELL WHAT IS WONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders.

Callout 16 on figure 4-3 is pointed at a bolt. In key to figure 4-3, item 16 is calle a shim. Please correct one or the other

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The Metric System and Equivalents

Linear Measure

1 **centimeter = 10 millimeters = 39 inch**
1 **decimeter = 10 centimeters = 3.94 inches**
1 **meter = 10 decimeters = 39.37 inches**
1 **dekameter - 10 meters = 32.8 feet**
1 **hectometer = 10 dskametars = 328.08 feet**
1 **kilometer = 10 hectometers = 3.280.8 feet**

Weights

1 **centigram = 10 milligrams = .15 grain**
1 **decigram = 10 centigrams = 1.64 grains**
1 **gram = 10 decigram = .035 ounce**
1 **dekagram = 10 grams = .35 ounce**
1 **hectogram = 10 dekagramr = 3.52 ounces**
1 **kilogram = 10 hectograms = 2.2 pounds**
1 **quintal = 100 kilograms - 220.46 pounds**
1 **metric ton = 10 quintals = 1.1 short tons**

Liquid Measure

1 centiliter = 10 millihrs = 34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 rq. centimeter = 100 sq. millimeters = .lSS sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters - 10.76 sq. feet
1 sq. dekametar (are) = 100 sq. meters = 1.076.4 sq. feet
1 sq. hectometer (hectate) I: 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 106 sq. hectometers = .386 sq. mile

Cubic Measure

l cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1006 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*to*	*Multiply by*	*To change*	*to*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometera	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

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