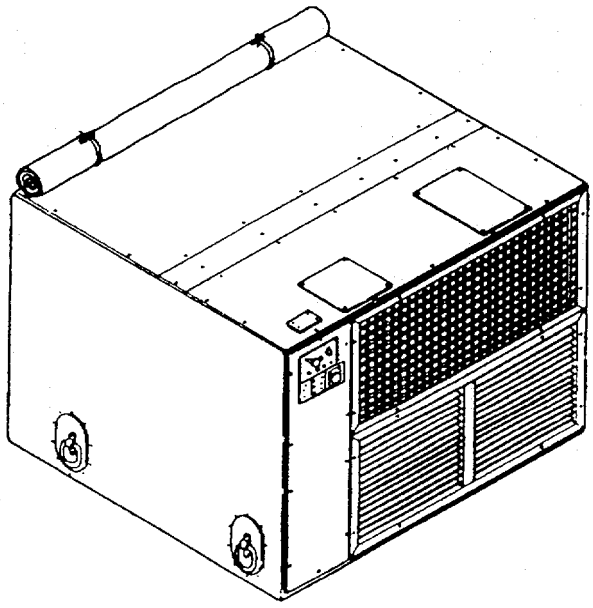
TECHNICAL MANUAL

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

AIR CONDITIONER, HORIZONTAL, COMPACT, 36,000 BTU/HR, MULTI-POWER INPUT 208V, 3 PHASE, 50/60/400 HZ MODEL MH-40-MP NSN 4120-01-330-6543



HEADQUARTERS, DEPARTMENT OF THE ARMY
31 AUGUST 1994

Change

No. 1

HEADQUARTERS,
DEPARTMENTS OF THE ARMY
Washington, DC, 1 July 2000

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

For

AIR CONDITIONER, HORIZONTAL,
COMPACT, 36,000 BTU/HR,
MULTI-POWER INPUT
208v, 3 PHASE, 50160/400 HZ,
MODEL MH-40-MP
NSN 4120-01-330-6543

TM 9-4120-404-14, 31 AUGUST 1994, is changed as follows:

1. Remove old pages and insert new pages as indicated below. New or changed material is indicated by a vertical bar in the margin of the page. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration caption.

Remove Pages	*Insert Pages*
None	A/B(blank)
i/ii(blank)	i/ii(blank)
2-9 through 2-12	2-9 through 2-12
2-19 and 2-20	2-19 and 2-20
B-7 and B-8	B-7 and B-8
B-11 and B-12	B-11 and B-12

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

By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
0017103

DISTRIBUTION:
To be distributed in accordance with the initial distribution number (IDN) 255220 requirements for TM 9-4120-404-14.

WARNING
HIGH VOLTAGE
is used in operation of this equipment-

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

WARNING
Voltages used can kill. Do not be misled by term "low voltage." Potentials as low as 50 volts may cause death under adverse conditions. Always disconnect power cord to air conditioner before performing any internal maintenance. Shutting unit off at its control panel does not disconnect unit power.

WARNING
Moving and rotating parts can snag Clothing, jewelry, or fingers which can severely injure operating personnel. Panels, covers, screens, and guards installed on unit are there for a purpose. Do not operate unit with them off or open unless instructions tell you to. When necessary, do so with care.

WARNING
DANGEROUS CHEMICAL

(R22)
is used in this equipment.

DEATH
or severe injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant gas being discharged under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

WARNING

Burned oil from defective compressors can burn skin injuring operating personnel. Avoid inhaling fumes from acid formed by burnout of oil and refrigerant. Acid in sludge can cause bums. Wear a gas mask if area is not thoroughly ventilated. Wear protective goggles or glasses to protect eyes. Wear rubber gloves to protect hands.

WARNING

Heating of refrigerant can release extremely dangerous toxic fumes which can kill and injure personnel. All refrigerant-22 must be recovered and recycled from system and entire system must be purged with dry nitrogen before beginning any debrazing operation.

WARNING

Fumes from heated polyurethane foam can cause damage to lungs. Polyurethane foam used as insulation in air conditioner will break down to form toxic gases if exposed to flame of a torch at brazing temperature.

WARNING

Serious injury could occur if heavy equipment is moved/lifted without sufficient personnel to do the job. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves and other suitable protective Clothing.

WARNING

While handling coils, wear gloves to avoid cuts and reduce fin damage on coil.

WARNING

Serious injury can result in breathing fumes of dry cleaning solvent P-D-680, Type III. Serious injury or death can result from explosion of fumes from solvent. When using this solvent:

- **Clean parts in a well ventilated area.**
- **Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.**
- **Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).**
- **Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm ^{2})**

WARNING

Repeated or prolonged skin contact or inhalation of vapors can be toxic. Acetone is flammable and vapors can be explosive. Use in a well-ventilated area, and keep away from sparks or flame. Use goggles, gloves, and apron when appropriate to reduce skin contact.

WARNING

Death or serious injury could occur if compressed air is directed against the skin. Do not use compressed air for cleaning or drying unless the pressure is/has been reduced to 30 psi (2.11 kg/cm ^{2}) or less. When working with compressed, air always use chip guards and wear eye protection and other protective equipment.

WARNING

In the event that first aid is required for injured operating or maintenance personnel, refer to FM 21-11 for proper first aid procedures.

WARNING

Soldering and brazing operations can result in serious injury if personnel fail to observe proper precautions. Avoid burns and possible eye damage from splattering by wearing thermal gloves and protective goggles or face shield. Do not solder or braze in the presence of flammable materials. Remove nearby combustible materials or shield them from the heat source. 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 properly ventilated work areas. Wash hands with soap and water after handling solder, brazing alloys, and flux.

LIST OF EFFECTIVE PAGES INSERT LATEST CHANGED PAGES, DESTROY SUPERSEDED PAGES

NOTE: The portion of the text affected by the changes is indicated by a vertical line in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original .....0 .....31 August 1994
Change.....1.....1 July 2000

Total number of pages in this manual is 312, consisting of the following:

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Cover	0				
a thru d(blank)	0				
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TECHNICAL MANUAL
NO. 9-4120-404-14

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON D. C., 31 August 1994

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

For

AIR CONDITIONER, HORIZONTAL,
COMPACT, 36,000 BTU/HR,
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208V, 3 PHASE, 50/60/400 HZ,
MODEL MH-40-MP
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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended changes to publications and Blank Forms) or DA Form 2028-2 located in the back of this manual direct to: Commander, U.S. Army Communications-Electronics Command & Fort Monmouth, ATTN: AMSEL-LC- LEO-D-CS-CFO, Fort Monmouth, NJ 07703-5006. Reply will be furnished to you.

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HOW TO USE THIS MANUAL

GENERAL. This technical manual provides you with the information needed to operate and to maintain the 36000 Btu/hr air conditioner. By properly using this manual, you will be able to identify any problem you may have in operating the air conditioner and then locate the proper procedure needed to correct any problem found.

MANUAL ORGANIZATION. This manual has been organized in a manner that groups together the information that an operator or a maintenance technician will need to perform their duties. The following list indicates how this information has been organized.

Chapter 1 This chapter contains a complete description of the air conditioner and includes such information as general equipment data, location/descriptions of major air conditioner components, and general theory of operations for the air conditioner.

Chapter 2 The information needed to set up and to operate the air conditioner are included in this chapter. It includes assembly information, operator PMCS, and special instructions for unusual or emergency conditions.

Chapter 3 In the event that unit level maintenance is required for the air conditioner, the required maintenance instructions can be found in this chapter.

Chapter 4 The required maintenance instructions authorized for direct support level maintenance can be found in this chapter.

Chapter 5 This chapter contains the maintenance procedures for general support maintenance personnel.

Appendix A Some of the procedures in this manual have references to other military technical manuals and forms. A complete list of all of these Reference Documents is included in this appendix.

Appendix B This appendix contains the Maintenance Allocation Chart for the air conditioner. This chart defines which of the items on the air conditioner will likely require maintenance and what military maintenance level is authorized to perform these maintenance procedures.

Appendix C The Components of End Item List containing a complete listing of all of the items required for a complete air conditioner and the Basic Issue Items List showing the essential items needed to operate the air conditioner are contained in (his appendix.

Appendix D If any additional items are authorized for support of the air conditioner, they will be shown on the Additional, Authorization List contained in this appendix.

Appendix E As you operate and maintain the air conditioner you will be required to use some special expendable items. The Expendable/Durable Supplies and Materials List in this appendix is a complete list of these items which appear elsewhere in the operating and maintenance procedures in this manual.

Appendix F Some components of the air conditioner must be manufactured from bulk or stock material before they can be replaced on the unit. A complete set of instructions required to manufacture these items from bulk stock is included in this Illustrated List of Manufactured Parts.

AIDS TO FINDING INFORMATION. The following aids have been placed within this technical manual to help you quickly locate the information you may need.

Front Cover Index To provide you with a quick reference to the most used portions of this manual, an index has been placed on the cover of this manual.

Bleeder Edges On Pages On the right edge of the front cover index of this manual you will see a black box area that goes to the edge of the front cover page. If you hold this manual with your left hand and bend back the outer right edges of the pages with your right hand, you will find that there are pages inside the technical manual that also have black boxes on the right edges of the page and that these boxes line up with the boxes on the front cover index. By turning to the page in the technical manual that lines up with the box on the front cover, you will be able to quickly turn to the topic shown in the front cover index.

Table Of Contents and Boxed Titles In the event that the front cover has been removed from this manual, the items that appear in the front cover index have also been placed in a **box** where they appear in the Table of Contents of this manual.

Index To assist you in locating any other information not found in the front cover index or the Table of Contents, an alphabetical index has been placed in the back of this manual to help you find any information you may need.

GENERAL MAINTENANCE METHOD. Although your local standard operating and maintenance procedure may vary, a simple method of using this technical manual to operate and maintain the air conditioner is shown in the following steps.

WARNINGS And CAUTIONS
Always Read, Understand, and Perform ALL WARNINGS and CAUTIONS
Found In This Technical Manual BEFORE Performing
The Step Immediately Following The
WARNING or CAUTION.

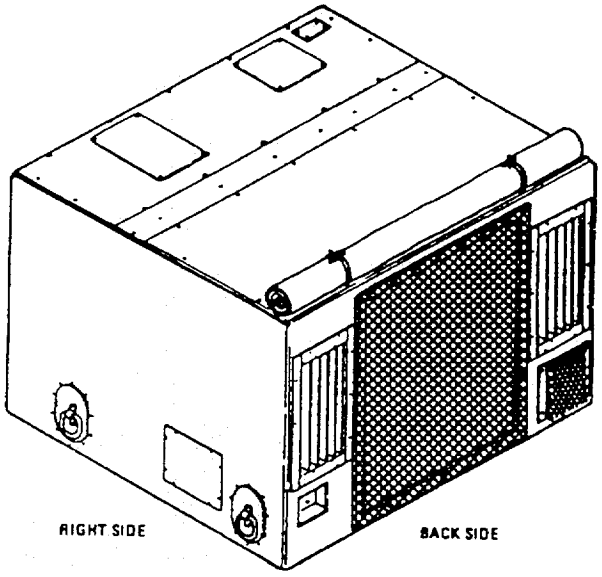
Throughout this technical manual there are certain procedures and operations that are hazardous to you or to the air conditioner. If you see a **WARNING**, pay special attention to the information stated in it because **all WARNINGS provide you with data that will prevent serious injury to you or others around You.** When you see a **CAUTION** read it carefully because the information given in it will keep you from damaging the air conditioner and making the air conditioner unable to fulfill its mission.

Equipment Set Up And Operation. Unpack and set up the air conditioner in accordance with the procedures shown in Chapter 2.

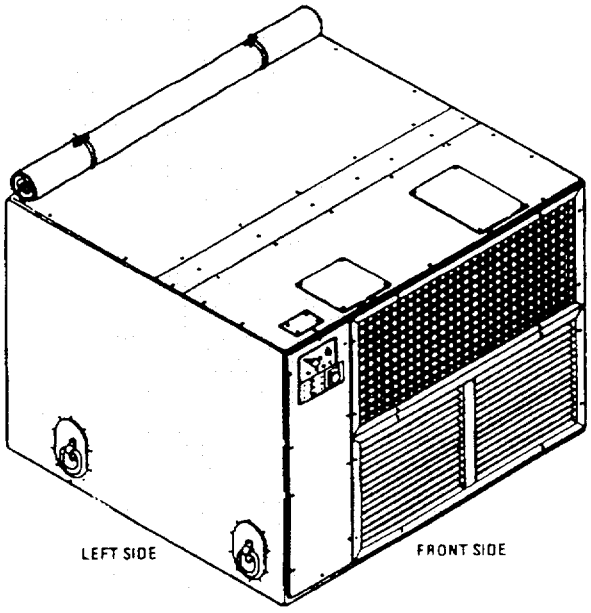
Preventive Maintenance Checks And Services (PMCS). Perform the operator PMCS procedures shown in Chapter 2.

Troubleshooting Procedures. If the air conditioner should not operate properly, refer to either the unit troubleshooting procedures in Chapter 3 or the direct support troubleshooting procedures in Chapter 4. The most likely air conditioner malfunctions have been placed within these troubleshooting procedures and a test and/or repair procedure paragraph has been indicated to correct the malfunction found. If a repair is required, refer to the maintenance paragraph shown in the troubleshooting procedure.

Maintenance Procedures. The complete repair procedures needed to correct a problem with the air conditioner have been included in Chapters 3, 4, and 5.



REAR THREE QUARTER VIEW
(With Fabric Cover Removed)



FRONT THREE QUARTER VIEW

Figure 1-1. Air Conditioner.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

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

b. Model Number and Equipment Name. AIRTACS Corporation Model MH-40-MP, Horizontal, Compact, Multiple Power Input (208 VAC, 3 Phase, 50/60/400 Hz), 36,000 Btu/hr Cooling, 31,200 Btu/hr Heating, Air Conditioner.

c. Purpose of Equipment, Cools, heats, and ventilates enclosed spaces. The unit covered by this manual is designed for cooling of equipment or personnel within the conditioned area.

1-2. **MAINTENANCE FORMS AND PROCEDURES.** 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. **WARRANTY information.** Refer to TB 9-4120-404-24.

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S). 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 a SF 368 (Product Quality Deficiency Report). Mail it to us at; Commander, U.S. Army Aviation and Troop Support Command, Attention: AMSAT-I-MDO, 4300 Goodfellow Blvd., St. Louis, Missouri 63120-1798. We will send you a reply.

1-5. CORROSION PREVENTION AND CONTROL (CPC). Corrosion Prevention and Control of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with the rusting of metals, it can also include deterioration of other materials such as rubber and plastic Unusual cracking, softening, swelling, or breaking of the materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using Standard Form 368, Product Quality Deficiency Report. Use of key words such as "rust", "deterioration", "corrosion", or "cracking" will insure that the information is identified as a CPC problem. The form should be submitted to the address specified in the DA PAM 738-750.

1-6. NOMENCLATURE CROSS-REFERENCE LIST. To simplify the use of certain terms used in this technical manual, some common names have been used to replace longer or more complex terms. The following list shows the common name used in this technical manual and the official nomenclature of the terms these common names replace.

Common Name	Official Nomenclature
Air Conditioner	Air Conditioner, Horizontal, Compact, 36,000 Btu/hr, Multi-Power Input, Model MH-40-MP

1-7. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE. Refer to TM 750-244-3, Procedures for Destruction of Equipment to Prevent Enemy Use.

1-8. PREPARATION FOR STORAGE OR SHIPMENT. Contact unit maintenance for air conditioning unit preparation for storage or shipment. Refer to Section VII, Chapter 3.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. Equipment Characteristics. This air conditioner is designed to ventilate, cool or heat, and to filter air in rooms or enclosures.

b. Capabilities and features.

(1) Provides a maximum of 36,000 Btu/hr of cooling or 31,200 Btu/hr of heating.

(2) This air conditioner unit is capable of accepting an external power source of 208 volts AC, 3 phase in frequencies of 50/60/400 Hz.

(3) Other external requirements are a suitable ground and an entry to a suitable condensation drain.

(4) Equipped with an electronic logic box assembly which accepts signals from the air conditioner control module, sends signals to the motor controller, and identifies electrical faults by means of integral fault lights.

(5) Equipped with a motor controller which provides "soft starts" to the air conditioner motors and automatic shutdown in the event of over/under input power voltage, output overcurrent, and over temperature of the motor controller.

(6) Provides source of filtered outside (fresh) ventilation air.

(7) Is self contained in a single cabinet that is ideally suited for van, shelter, or room installations.

(8) Operates in environmental conditions from tropic to arctic.

(9) Is fully portable.

(10) Designed for low-noise level operation.

c. Special features.

The control panel may be removed from the unit and remote mounted.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS. (Refer to Figure 1-2.)

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

(2) Condenser Air Outlet Guard -- Protects personnel from injury and fans from damage.

(3) High Pressure Cutout Switch -- This switch is factory set to shut off the compressor if the refrigerant discharge line pressure rises to 480 $\pm$ 10 psig (33.75 $\pm$ .7 kg/cm 2) (4) Low Pressure Cutout Switch -- This switch is factory set to shut off the compressor if the refrigerant suction line pressure drops to 15 $\pm$ 3 psig (1.05 $\pm$ .2 kg/cm 2).

(5) Refrigerant Sight Glass (liquid sight indicator) -- Allows visual inspection and indicates condition of liquid refrigerant when the unit is operating in the cool mode. A moisture indicator in sight glass indicates possible moisture contamination of refrigerant.

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

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

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

(9) Fabric Cover -- Shown in stowed (operational) position. When rolled down and snapped it protects the rear (exposed) surface of the unit.

(10) Heater Elements -- Consists of six 1470 watt heating elements.

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

(11) Conditioned Air Louver -- Adjustable louvers allow directional control of conditioned air.

(12) Intake Air Louver -- Adjustable louvers allow control of outside (fresh) and return (from room or enclosure) air.

(13) Input Power Receptacle (Primary) -- For standard primary connection of external power source cable.

(14) Input Power Receptacle (Alternate) -- This alternate input power receptacle is provided to allow power connections to the air conditioner when unit installation makes use of the primary input power receptacle inconvenient.

(15) Control Panel Assembly -- Contains a four position mode selector switch and a temperature control thermostat.

(16) Compressor -- Cycles refrigerant through the system during cooling operations.

(17) Condenser Fan Assembly -- Draws ambient air through the condenser coil and discharges the heated air back to the outside during cooling operations.

(18) Condenser Air Louvers -- Adjustable louvers control amount of air available to cool condenser coil.

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

(20) Mist Eliminator -- Eliminates mist from conditioned air.

(21) Circuit Breaker -- Located in the main electric power supply line just after the EMI filter. The circuit breaker provides electrical circuit protection for the air conditioner.

(22) Service Valves (High and Low Pressure) -- These valves provide a connection point for charging and checking the refrigerant lines.

(23) Expansion Valve -- Meters refrigerant flow to the evaporator during cooling cycles when the unit is in the COOL mode.

(24) Coil Frost Switch -- This thermostatic switch opens compressor circuit if the evaporator coil begins to ice.

(25) Solenoid Valve, Pressure Equalizing -- This valve is normally open when the compressor is NOT running to equalize the pressure at the suction and discharge sides of the compressor. It closes when the compressor starts.

(26) **Dehydrator** -- Removes moisture and contaminants from the refrigerant.

(27) **Electromagnetic Interference Filter** -- Reduces the radiated and conducted electromagnetic interference created by the air conditioner electrical components to an acceptable level.

(28) **Compressor Relay** -- Controls power to the compressor and is activated by the logic box assembly.

(29) **Relief Valve** --This safety valve opens when the refrigerant discharge line pressure rises above 540 psig (37.97 kg/cm ^{2}).

(30) **Actuating Cylinder** -- This hydraulic cylinder operates the discharge louver assembly. It will start to open the louver assembly at 150 to 180 psig (10.55 to 12.66 kg/cm ^{2}) and fully open the louver assembly at 220 to 260 psig (15.74 to 18.28 kg/cm ^{2}) compressor discharge pressure to allow unit operation when outside temperature is low.

(31) **Heater Relay** -- Controls power to the heating elements and is activated by the logic box assembly.

(32) **Mode Selector Switch** -- Provides selection of unit operating modes.

(33) **Temperature Control Potentiometer** -- This control allows adjustment of the conditioned air temperature while operating in either the COOL or HEAT modes.

(34) **Light Emitting Diodes (Fault Lights)** -- These lights provide operating and maintenance personnel with an indication of unit operating problems.

(35) **Logic Box Assembly** -- Electronic device that monitors unit sensors and control settings to operate the unit control the fault lights.

(36) **Motor Controller Assembly** -- Electronic device that conditions and regulates motor and heater supply power according to signals sent from the logic box assembly.

(37) **Transformer** -- Reduces the main line input voltage to the required control circuit voltage level.

(38) **Rectifier** -- Converts the relay load side ac voltage to dc for use by solenoid valve.

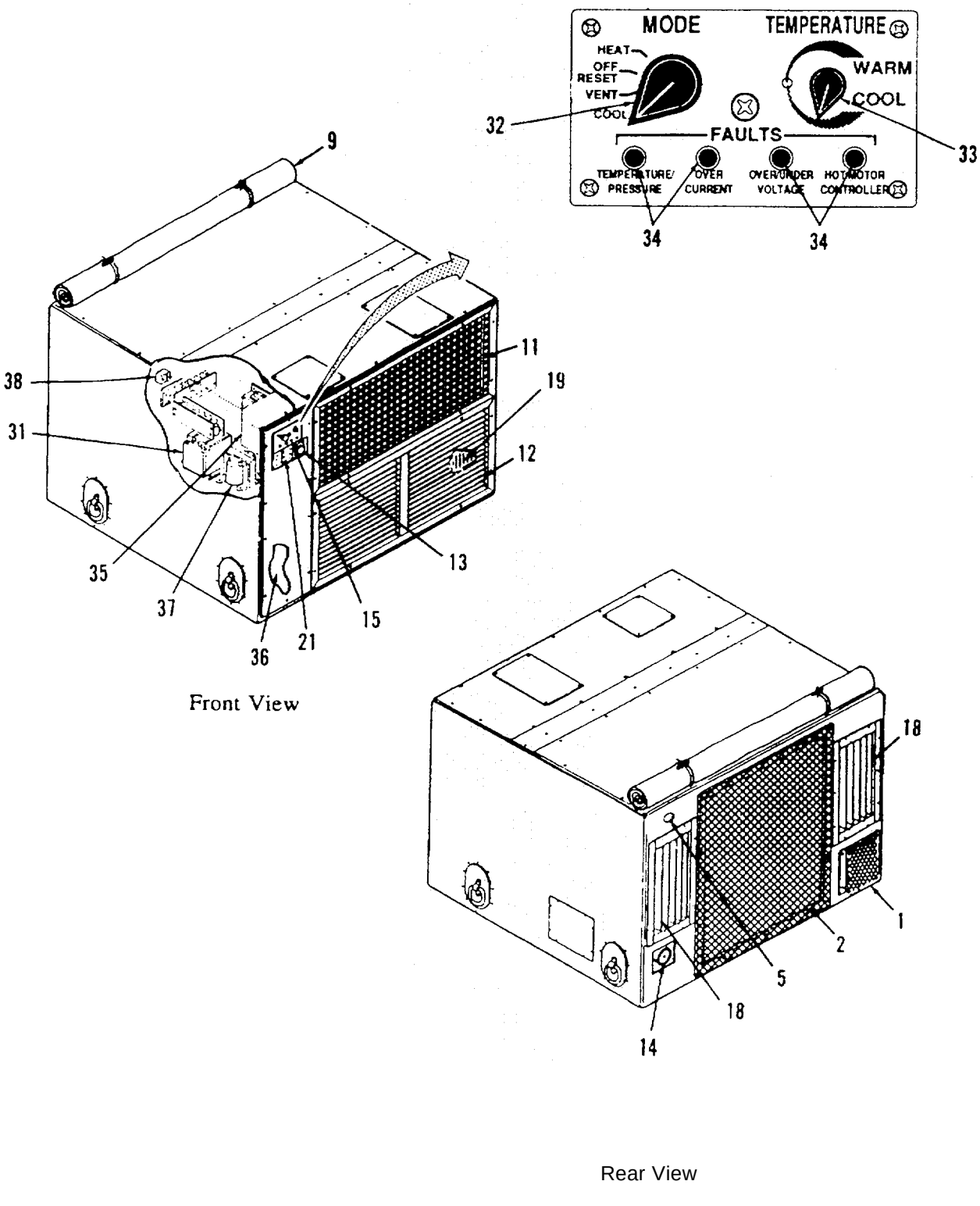
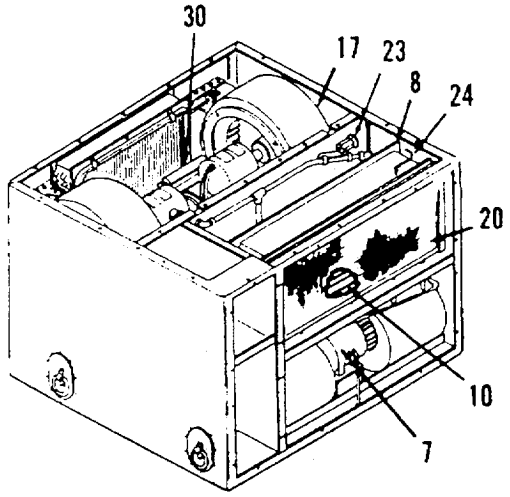
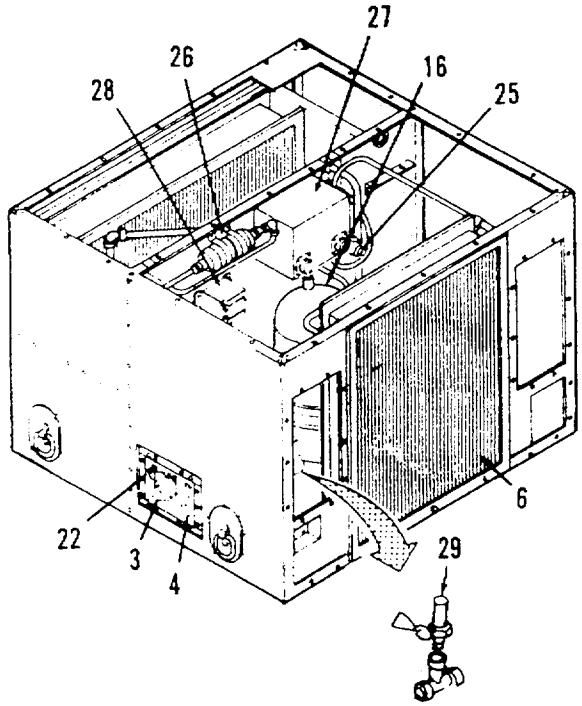


Figure 1-2. Location of Major Components. (Sheet 1 of 2).



Front View With
Panels and Louvers Removed



Rear View With
Panels and Louvers Removed

Figure 1-2. Location of Major Components. (Sheet 2 of 2).

1-11. EQUIPMENT DATA. Refer to Table 1-1. for the performance data for this air conditioner.

Table 1-1. Equipment Data.

OPERATING TEMPERATURES

LOW ..... -50° F(-45° C)
HIGH ..... +120° F (+49° C)

PERFORMANCE

COOLING CAPACITY ..... 36,000 Btu/hr
HEATING CAPACITY ..... 31,200 Btu/hr

POWER REQUIRED

VOLTAGE ..... 208 VAC
PHASE 3
HERTZ ..... 50, 60, or 400
FULL LOAD AMPERAGE (Amperage reading is the average of the three phases)
50 Hz, 60 Hz, or 400 Hz ..... 45 amps maximum

DIMENSIONS

WIDTH ..... 38.0 in. (78.1 cm)
DEPTH ..... 35.0 in. (54.6 cm)
HEIGHT ..... 27.0 in. (140.6 cm)
WEIGHT ..... 420 pounds (190.9 kg)

REFRIGERANT

TYPE R-22
CHARGE ..... 11 pounds (4.9 kg)

COMPRESSOR OIL CAPACITY

OIL TYPE BB-L-825
INITIAL ..... 55 oz.
RECHARGE ..... 52 oz.

AIRFLOW

AIR FILTER ..... Permanent - Re-usable
RATE (At 0.25 water gauge) ..... 1,340 cfm

Section III. PRINCIPLES OF OPERATION

1-12. REFRIGERATION CYCLE. (Refer to Figure 1-3.) When the control panel assembly mode selector switch is set on COOL and the temperature control thermostat set to COOL, the cooling cycle of the air conditioner is activated and the air conditioner refrigeration cycle functions in the following manner.

a. Compressor (2) starts and takes low temperature, low pressure refrigerant gas and compresses it to a high temperature, high pressure gas. This gas flows through the metal tubing to the condenser coil (4A) and receiver (5).

b. The condenser fans draw outside ambient air over and through the condenser coil (4A). The high temperature, high pressure gas from the compressor (2) is cooled by the flow of air and is condensed into a high pressure liquid.

c. The cooler, high pressure liquid refrigerant flows through the refrigerant desiccant dehydrator (filter/dryer) (8) and removes any moisture (water vapor) or dirt that may be carried by the liquid refrigerant and to the liquid indicator (sight glass) (7) which indicates the presence of moisture and quantity of refrigerant in the system.

d. The equalizer solenoid valve (13) is controlled by the temperature control thermostat on the control panel assembly. This valve closes to separate the high and low sides of the refrigerant system when compressor is running and opens to equalize the high and low pressure sides of the refrigerant system when the compressor is not running.

e. The expansion valve (9) controls the amount and pressure of liquid refrigerant to the restrictor (10) and the evaporator coil (11). The expansion valve senses the temperature and pressure of the refrigerant as it leaves the evaporator coil. By use of a sensing bulb and "external equalizer linc" the valve constantly adjusts the flow of liquid refrigerant to the evaporator coil.

f. As the liquid refrigerant leaves the expansion valve (9) it passes through the restrictor (10) and enters the evaporator coil (11). As the liquid enters the coil at a reduced pressure, the reduction in pressure and the warmer air being forced across the tubes of the coil cause the refrigerant to boil and change to a gas (vapor). The evaporator fans circulate the warm air from the conditioned space over and through the evaporator coil Refrigerant absorbs heat when it changes from a liquid to a gas. As the air from the conditioned spaces comes in contact with the evaporator coil, the air is cooled.

g. The low pressure refrigerant gas is then drawn back through the accumulator (16) to the compressor (2) and the cycle is repeated.

h. The linear actuating cylinder (12) automatically controls the condenser air discharge louver assemblies to maintain an adequate discharge pressure.

1-12. REFRIGERATION CYCLE. - Continued.

i. The service valves (14) are provided for charging, and general servicing of the high and low pressure sides of the refrigerant system.

j. The low pressure switch (1 7), the high pressure switch (15), and the pressure relief valve (6) are provided to protect the unit from damage due to pressure extremes.

FIND NO	PART NO.	QTY	DESCRIPTION
1	13216E6167-13	1	HOSE ASSEMBLY, METAL
2	13216E6309	1	COMPRESSOR
3	13216E6167-1	1	HOSE ASSEMBLY, METAL
4A	13225E9503	1	COIL, CONDENSER
4B	PART OF FIND NO 4A	1	SUBCOOLER
5	13216E6355	1	RECEIVER, LIQUID REFRIGERANT
6	13211E8369	1	VALVE, PRESSURE RELIEF
7	13216E6155-2	1	INDICATOR, SIGHT, LIQUID
8	13214E4209	1	DEHYDRATOR, DESICCANT, REFRIGERANT
9	13216E6160-3	1	VALVE , EXPANSION
10	PART OF FIND NO. 11	1	RESTRICTOR, FLUID FLOW
11	13216E6283	1	COIL, EVAPORATOR
12	13216E6330	1	CYLINDER ASSY, ACTUATOR, LINEAR
13	13229E4215	1	VALVE SOLENOID
14	13219E9499	2	VALVE, SERVICE WITH CAP
15	13216E6215.3	1	SWITCH, PRESSURE, (HIGH)
16	13218E7546	1	ACCUMULATOR
17	13216E6215-1	1	SWITCH, PRESSURE (LOW)

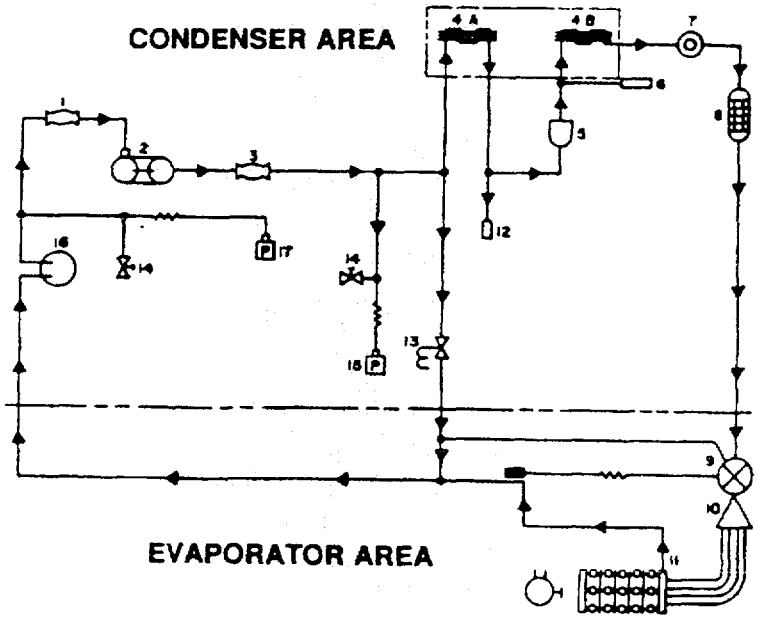


Figure 1-3. Refrigeration Flow Schematic.

1-13. HEATING CYCLE. The air conditioner is equipped with a heating operation mode. When the mode selector switch is set for HEAT the six heating elements, located in front of the evaporator coil, are energized. These elements are protected from overheating by a thermal cutout switch.

1-14. LOGIC BOX ASSEMBLY AND MOTOR CONTROLLER ASSEMBLY. The electrical operations of the air conditioner are controlled through the operation of an electronic logic box assembly and a motor controller assembly. The primary functions of each of these components is as follows. Refer to Figure 1-4, Logic Box Assembly/Motor Controller Assembly Interface Schematic for detailed description of current and signal flows for air conditioner operation.

a. Logic Box Assembly. The Logic Box Assembly provides the following functions.

(1) Accepts signals from the control panel assembly mode selector switch and temperature selection control to control the operation of the air conditioner.

(2) Provides start/run and stop/reset signals to the motor controller.

(3) Accepts fault signals from the motor controller and illuminates the appropriate fault indicator light on the control panel assembly.

(4) Accepts control circuit fault signals, including low and high pressure cutout signals, motor thermal overload signals, heater over temperature signals, and evaporator coil frost cutout switch signals and will illuminate the applicable fault light.

b. Motor Controller Assembly. The motor controller assembly provides the following functions.

(1) Accepts nominal input power of 208 VAC, 3 phase, 50/60/400 Hz and provides outputs of 208 volts ac, 3 phase 60 hz and 12 volts dc power.

(2) Provides a "soft start" output to the air conditioner motors under all operating conditions.

(3) Provides power to the logic box assembly.

(4) Interfaces with the logic box assembly by:

(a) Accepting start/run and stop/reset signals from the logic box assembly.
(b) Providing separate signals to the logic box assembly for the following faults:
- Over and under voltage in the input power source.
- Over current in output power.
- Over temperature of the motor controller assembly.

(5) Automatically shuts down in the event of over/under input power voltage, output over current, or over temperature of the motor controller assembly.

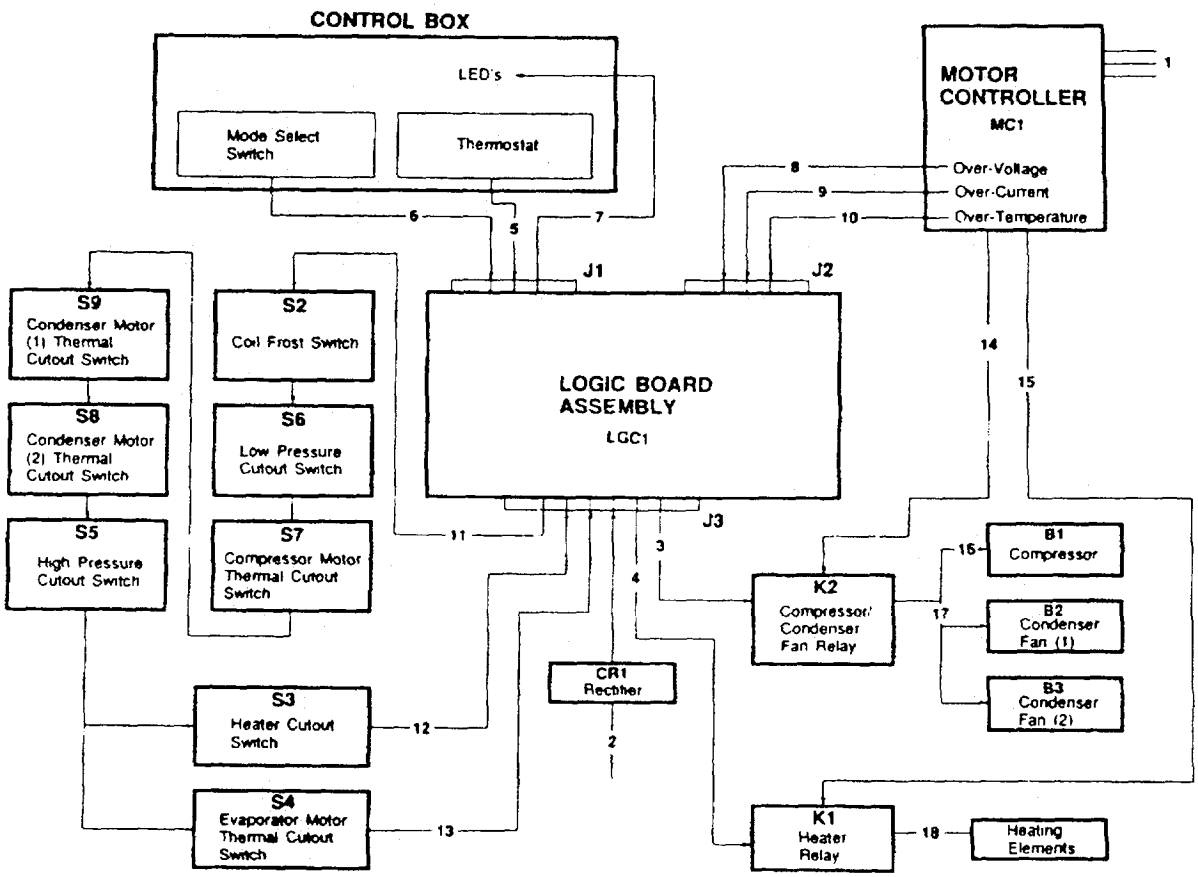
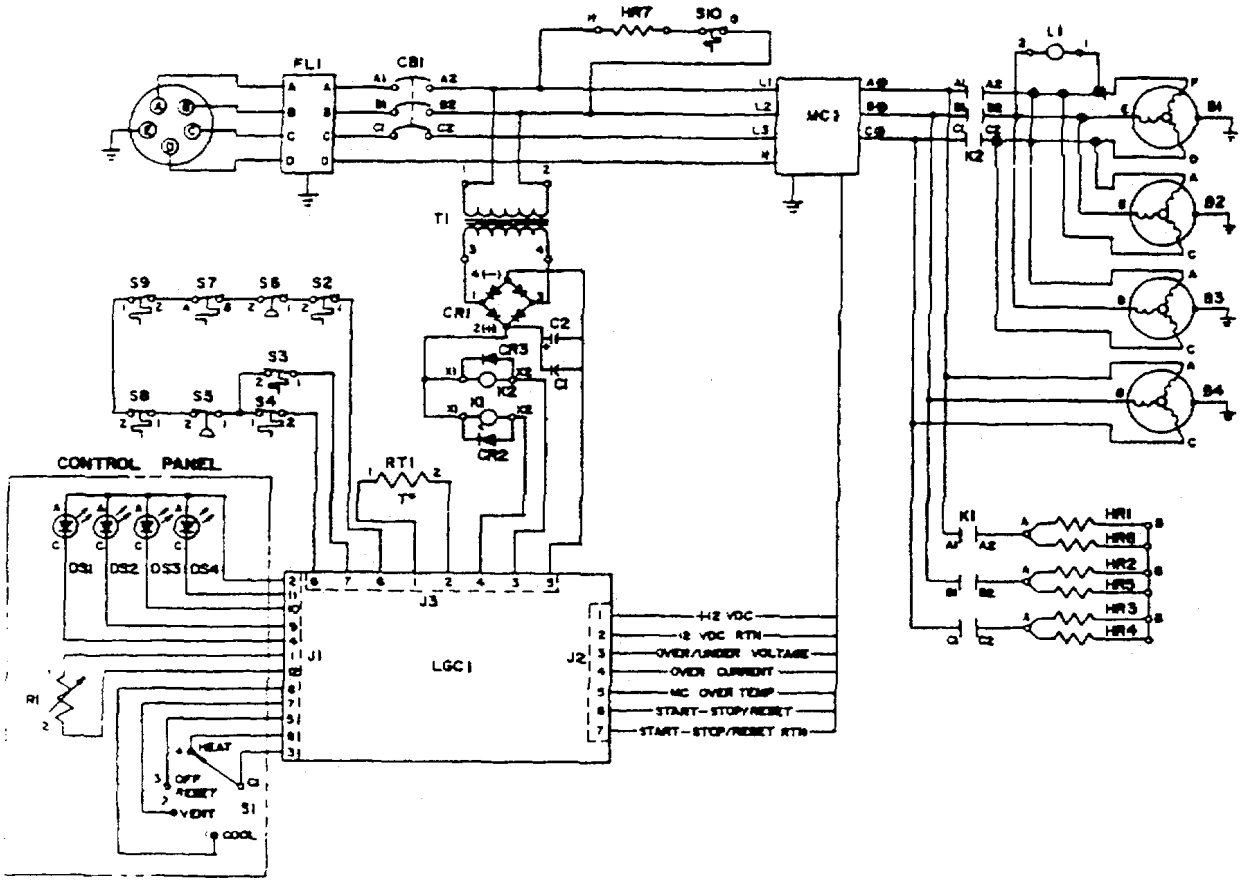


Figure 1-4. Logic Box Assembly/Motor Controller Assembly Interface Schematic.

1-15. GENERAL ELECTRICAL. For general electrical connections, refer to Figure 1-5, Electrical Schematic and Figure 1-6, Electrical Wiring Diagram.



ELEC REF DES	PART NUMBER	DESCRIPTION
B2 B3	13216E6309-1	COMPRESSOR
B2 B3	13229E4276	MOTOR CONDENSER FAN
B4	13229E6671	MOTOR. EVAPORATOR FAN
C1	M39014/06-2661	CAPACITOR (MIL-C-39014/5
C2	13229E4264	CAPACITOR
CB1	M55629/5-425	CIRCUIT BREAKER (MIL-556295)
CR	1327E&321 DEVICE	RECTIFIER. SEMICONDUCTOR
CR2-CR3	13219E0897	DIODE
DS1 4	13229E4166	LED RED
FL1	13229E6669	FILTER, EMI
HR1-HR6	13228E4258-5	HEATER, ELEMENT
HR-7	PART OF B1	HEATER CRANKCASE
K1	MS24192-D1	RELAY HEATERS
K2	MS24193-D1	RELAY COMPRESSOR/CONDENSER FAN
L1	13229E4215	SOLENOID, EQUALIZING
LGC1	13229E6660	LOGIC BOX ASSEMBLY
MC1	13229E6570	MOTOR CONTROLLER

ELEC REF DES	PART NUMBER	DESCRIPTION
RI	13229E4185	POTENTIOMETER TEMP SELECT
RT1	13229E4176	THERMISTOR
S	13229E4187	SWITCH MODE SELECTOR
S1	13229E4213	SWITCH, COIL FROST
S3	13216E6224	SWITCH. HEATER CUTOUT
S4	PART OF B4	SWITCH EVAPORATOR MOTOR-THERMAL CUTOUT
S5	13216E6215-3	SWITCH. HIGH PRESSURE CUTOUT
S6	13216E6215-1	SWITCH. LOW PRESSURE CUTOUT
S7	PART OF B1	SWITCH. COMPRESSOR MOTOR-THERMAL CUTOUT
S8	PART OF B2	SWITCH. CONDENSER MOTOR-THERMAL CUTOUT
S9	PART OF B3	SWITCH CONDENSER MOTOR-THERMAL CUTOUT
S10	PART OF B1	SWITCH. CRANKCASE HEATER
T1	13229E4214	TRANSFORMER

Figure 1-5. Electrical Schematic.

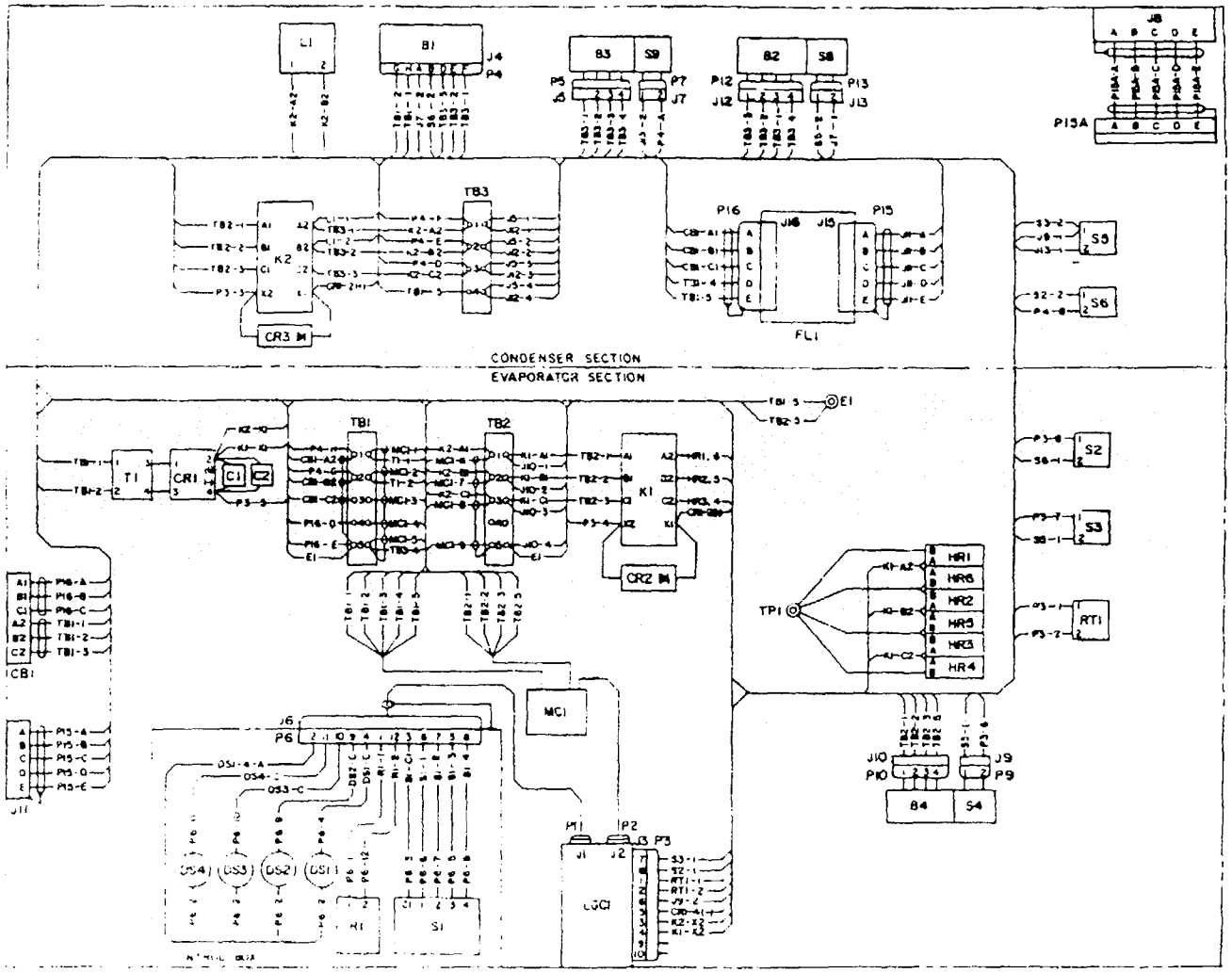


Figure 1-6. Electrical Wiring Diagram.

CHAPTER 2

OPERATING INSTRUCTIONS

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

2-1. GENERAL. The air conditioner is designed for a variety of installations and for operation under a wide range of climatic conditions. It is also designed for continuous or intermittent operation as a self-contained unit. 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.

2-2. OPERATOR'S CONTROLS. See Figure 2-1 for a general description of the controls that an operator will normally be concerned with. For specific operating instructions, see Sections III and IV of this chapter.

2-3. INDICATORS. The following indicators are used on the air conditioner.

(1) Refrigerant Sight Glass. The refrigerant sight glass is a port or window through which the refrigerant condition can be seen. Liquid refrigerant actually flows though the sight glass chamber only during cooling cycles when the air conditioner is in operation in the COOL mode. The unit must be operated approximately 15 minutes at maximum cooling prior to checking condition of refrigerant at sight glass. The sight glass is equipped with a center indicator that is moisture sensitive. Dry refrigerant is indicated by green, it turns to chartreuse when the moisture content becomes undesirable, and to yellow when the level becomes unacceptable. Excessive moisture in the refrigerant may damage or possibly destroy the compressor. If the liquid refrigerant observed in the sight glass has an opaque, milky appearance, or frequent bubbles appear, the volume of refrigerant may be low and the system should be charged Either moisture or low charge indications should be reported to your supervisor.

(2) Fault Indicator Lights. Fault indicator lights are located on the control panel assembly to indicate the following conditions.

a. The TEMPERATURE/PRESSURE fault indicator light (Figure 2-1) comes on if the high pressure cut out, low pressure cut out, coil frost switch, or heater cut out switch opens. The switches are associated with the units cooling and heating operation and can be an indication of obstructed air flow across the evaporator or condenser coil or improper refrigerant charge.

b. The OVER CURRENT fault indicator light (Figure 2-1) comes on if the motor controller is operating with an amp draw that is too high. This can be an indication of a component failure or wiring problem.

c. The OVER/UNDER VOLTAGE Fault indicator light (Figure 2-1) comes on if the motor controller is operating outside its voltage range. This could indicate controller failure or a problem with input power.

d. The HOT MOTOR CONTROLLER fault indicator light (Figure 2-1) comes on if the motor controller overheats.

CAUTION

Do not operate the air conditioner in the COOL mode if the refrigerant color looks yellow in the refrigerant sight glass or if numerous bubbles appear in the sight glass. Equipment damage can result. COOL mode operation may be continued if the refrigerant color is chartreuse or with only an occasional bubble appearing in the window, but the sight glass should be rechecked every four hours of operation to insure that the condition does not become worse.

e. The refrigerant sight glass (Figure 2-1) has a small chamber with a glass window through which the refrigerant condition can be observed. It is installed in the liquid refrigerant line downstream from the condenser coil. Liquid refrigerant actually flows through the sight glass chamber only during cooling cycles when the air conditioner is in operation in the COOL mode. The unit must be operated approximately 15 minutes at a maximum cooling prior to checking the condition of the refrigerant in the sight glass. The sight glass is equipped with a center indicator that is moisture sensitive. Dry refrigerant is indicated by green, it turns to chartreuse when the moisture content becomes undesirable, and to yellow when the moisture level becomes unacceptable. Excessive moisture in the refrigerant may damage or possibly destroy the compressor. If the liquid refrigerant observed in the sight glass has a milky appearance, or frequent bubbles appear, the volume of refrigerant is low and the system should charged. Either moisture or low charge indications should be reported to direct support maintenance for appropriate refrigerant system action.

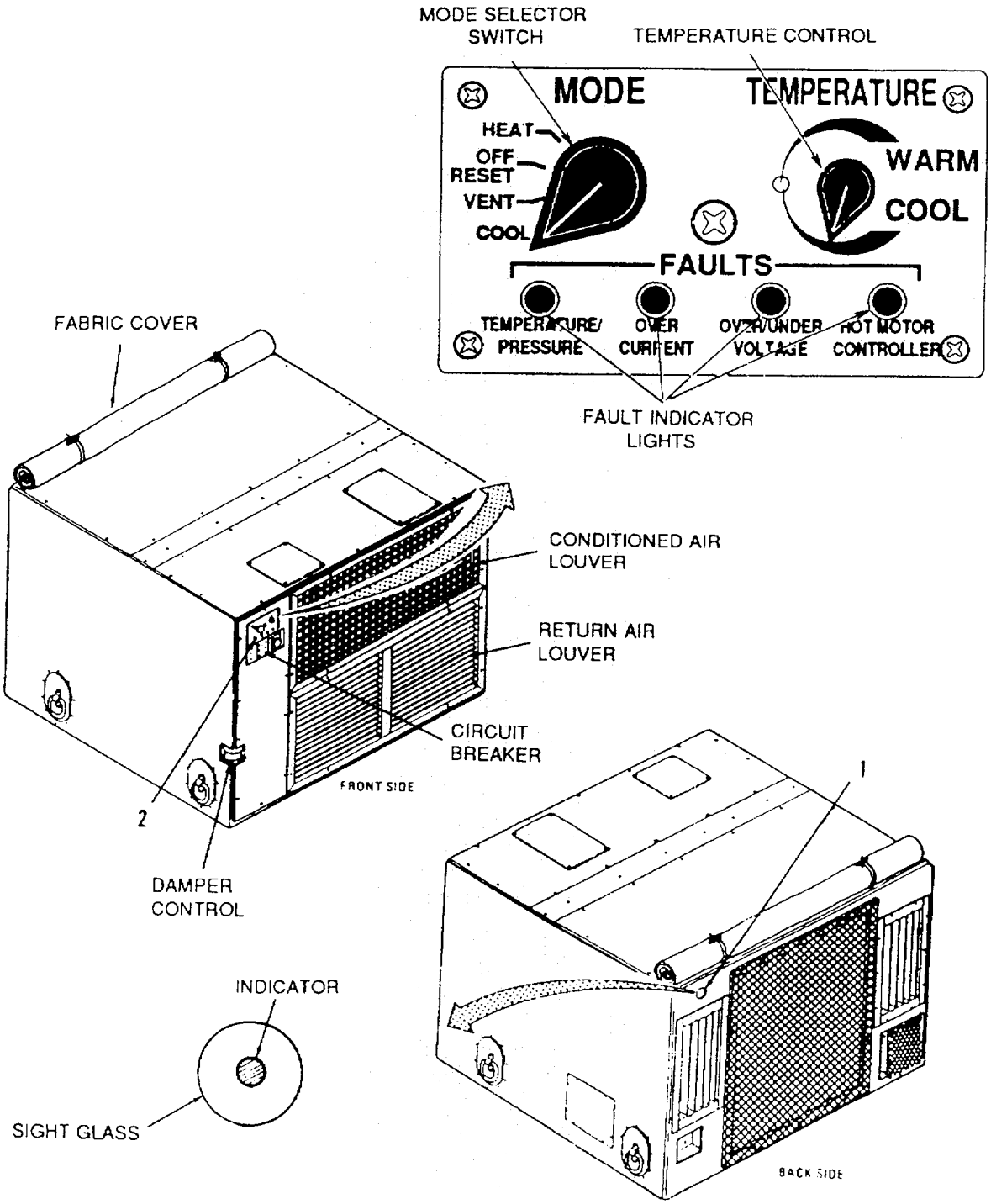


Figure 2-1. Operator's Controls and Indicators.

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

2-4. INTRODUCTION. The following information should be read and understood before performing the procedures within the PMCS table.

a. General. Table 2-1 (PMCS Table) has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

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

c. 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.

(3) Location, Item To 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.

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

NOTE

If the equipment must be kept in continuous operation, check and service only those items that can be checked and serviced without disturbing operation. Make the complete checks and services when the equipment can be shut down.

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

Item No.	Interval	Location: Item To Check/Service.	Procedure	Not Fully Mission Capable If:
1	Before	Fabric Cover	Check that cover is rolled up for normal operation.	Cover is rolled down.
2	Before	Access Panels	Check that all panels are in place.	Panels are missing.
3	Before	Conditioned Air Louver, Return Air Louver, and Condenser Exhaust Louver	Check that louvers are in place.	
4	Before	Ventilation Guard	Check that guard is in place.	
5	Before	Ventilation Air Filter	Check that filter is in place.	
6	Before	Filter, Air Conditioning	Check that filter is in place.	
7	Before	Condenser Coil Guard	Inspect for missing or damaged guard.	
8	Before	Information Plates	Inspect for damaged or missing information plates.	

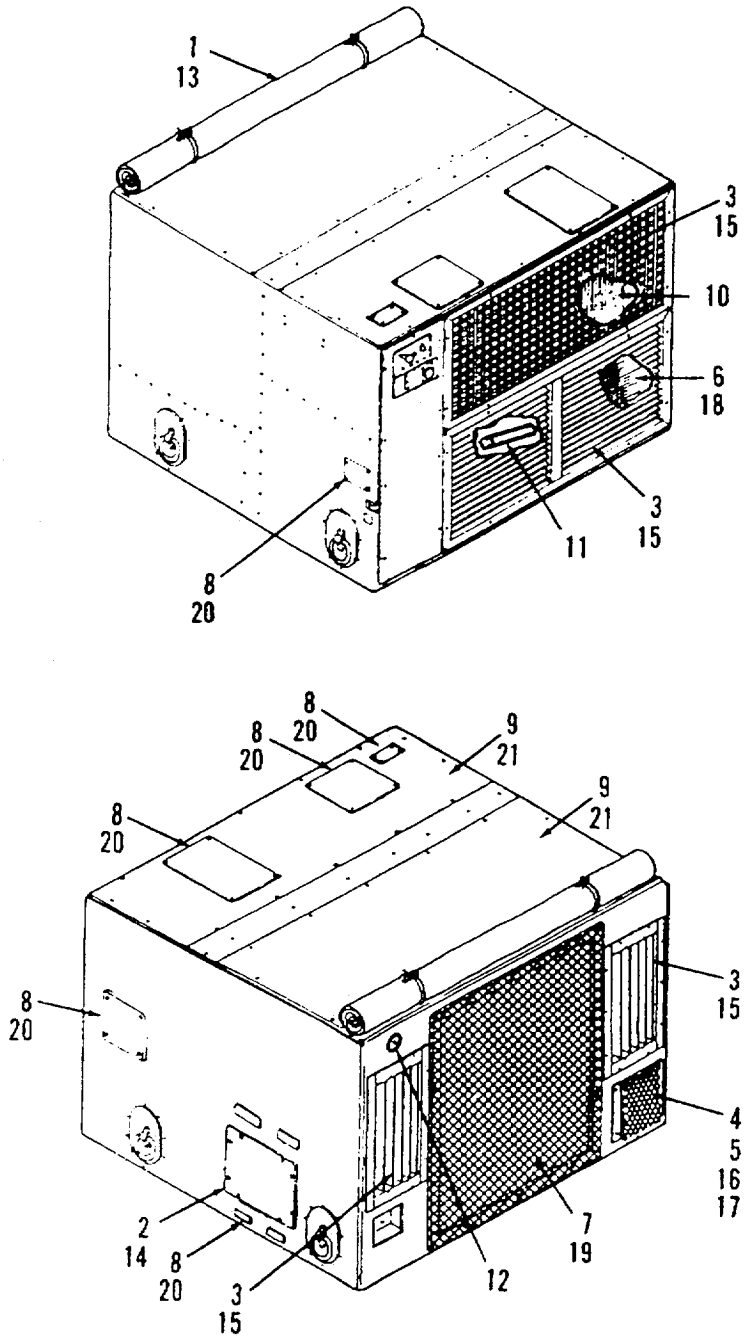


Figure 2-2. Routing Diagram for Operator PMCS.

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

Item No.	Interval	Location Item To Check/Service.	Procedure	Not Fully Mission Capable If:
9	Before	Metal Covers	Inspect for missing or damaged covers	Covers are missing.
10	Before	Mist Eliminator	Check that eliminator is in place.	
11	During	Condensate Drain Assembly	Check for clogged tubes or drain holes. **NOTE** **Air conditioner must be operating for at least 15 minutes before checking liquid sight indicator.**	Drain tubes or drain holes are clogged.
12	Weekly	Liquid Sight Indicator	Examine sight indicator glass.	Bubbles, milky, or yellow color is observed in sight indicator.
13	Weekly	Fabric Cover	Roll cover down and check condition of snaps, tom or worn edges, and mildew.	
14	Weekly	Access Panels	Inspect all covers and panels for dents or **missing** hardware.	
15	Weekly	Conditioned Air Louver, Return Air Louver, and Condenser Exhaust Louver	Check that louvers are not obstructed, damaged, or loose. Check for missing hardware. Clean debris from louvers	

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

Item No.	Interval	Location Item To Check/Service.	Procedure	Not Fully Mission Capable If:
16	Weekly	Ventilation Guard	Check that guard is not obstructed, damaged or loose. Check for missing hardware. Clean debris from guard.	
17	Weekly	Ventilation Air Filter	Check that filter is not clogged or dirty.	
18	Weekly	Filter, Air Conditioning	Inspect for clogged or dirty filter.	Filter is clogged.
19	Weekly	Condenser Coil Guard	Check for loose or missing mounting hardware.	
20	Weekly	Information Plates	Check for missing mounting hardware.	
21	Weekly	Metal Covers	Check for loose or missing mounting hardware.	

Section III. OPERATION UNDER USUAL CONDITIONS

2-5. ASSEMBLY AND PREPARATION FOR USE. Services of unit maintenance should be employed for original unpacking, assembly installation, and preparation for use. See paragraph 3-6 through 3-13.

a. Inspect all covers, panels, and screens for loose mounting, obstructions, or shipping damage. Report any deficiencies to unit maintenance.

b. Perform the preventive maintenance checks and services listed in Table 2-1.

2-6. GENERAL OPERATING PROCEDURES. The following general operation procedures and explanations should be used and understood to be sure that the air conditioner unit will operate in the best possible manner. Refer to Figure 2-1 for location of operator's controls and indicators. The Air Conditioner should be checked for operation in all modes after installation is completed and when it is placed back in operation after an extended shut down period.

a. **Before operation**.

(1) Check that fabric cover has been unsnapped and rolled up, and secured with both straps.

(2) Check that mode selector switch on control panel is in the OFF/RESET position.

(3) Check that air conditioner has been properly connected to a 208 volt AC, 50/60/400 HZ power source.

(4) Check that circuit breaker is in the ON position.

CAUTION

Do not operate the unit until input power has been supplied for at least 20 minutes. The motor controller voltage threshold circuit will drift during cold start operation and may indicate an over/under voltage fault.

(5) Check that all air inlet and outlet openings are clear and fully open. Adjust fresh air damper as desired.

NOTE

Condenser air louvers on back of unit are operated automatically by the air conditioner.

(6) Check that condensate drain at lower left rear of the air conditioner is either opened or properly connected to drain water from unit.

CAUTION

Do not perform the operational check in COOL mode until input power has been supplied to the unit in accordance with the following:

Ambient (Outside) Temperature	Minimum Input Power Time
60 Degrees F	20 Minutes
40 Degrees F	One (1) Hour
20 Degrees F	Two (2) Hours
Below 20 Degrees F	Four (4) Hours

Liquid refrigerant tends to migrate into the compressor and mix with the lubricating oil. Since the refrigerant is heavier than the oil, it displaces the lubricating oil from the bottom of the compressor well. The above sliding timetable for power input to Air Conditioner is required to boil the liquid refrigerant out of the lubricating oil at the bottom of the compressor well. This action is needed to prevent "slugging" of the compressor when the Air Conditioner is started in cool mode and to prevent premature failure of the compressor.

Before starting the air conditioner in COOL mode, make sure that the fabric condenser cover on the back of the condenser section is rolled up and secured and that all screens and guards are in place and unobstructed. This action is needed to avoid damage to the equipment.

NOTE

Do not adjust controls unnecessarily.

b. **General Operation of Controls** When the controls are properly set (See paragraphs 2-8 through 2-10.), the unit will automatically control the temperature. The temperature control thermostat on the control panel operates like a conventional room thermostat except that the temperature scale is not marked on the control panel. The thermostat has a control range of 60°F to 90°F (16°C to 32°C). The centered position of the control knob would be approximately 75°F (24°C). The full WARM would be 90°F (32°C). The full COOL would be 40°F (5°C). When the control panel is mounted in the unit or remotely mounted, the control temperature is always sensed at the conditioned air inlet.

(1) **During Cold Weather**:

(a) Adjust shades, blinds, etc. (when applicable) to admit sunlight during day. Close them at night.

(b) Adjust the conditioned air outlet louvers slightly downward.

(2) **During Hot Weather**:

(a) Adjust shades, blinds, etc. (when applicable) to block out sunlight during day.

(b) Adjust the conditioned air outlet louvers slightly upward.

2-8. OPERATION IN VENT MODE. (No Heating or Cooling Needed).

NOTE

The fabric cover must be rolled up and secured if fresh air damper (door) is to be opened. When using fresh air for ventilation, a window, door, or vent should be opened. If the room or enclosure is tightly closed, an over pressure will build up and decrease the volume of fresh air drawn in.

a. Turn mode selector switch to VENT.

b. Adjust fresh air damper to desired setting. The unit can be operated in the VENT mode with the fresh air damper (door) closed, open, or partially open.

c. Adjust louvers to suit.

NOTE

To pull in maximum of fresh (outside) air, close conditioned air inlet louvers.

2-9. OPERATION IN HEAT MODE. In the HEAT mode six thermostatically controlled heaters are activated. To operate the unit in HEAT mode perform the following steps.

a. Turn mode selector switch to HEAT.

b. Turn temperature control thermostat knob as far as it will go in the WARM position.

c. When room or enclosure temperature reaches the desired level, slowly turn the temperature control thermostat knob toward COOL. Heating will stop when you reach the approximate room temperature. Further adjustment can be made by turning the temperature control thermostat knob slightly toward WARM or COOL until desired temperature is controlled automatically.

NOTE

An overheat thermostat located near the heating elements will turn them off if the temperature in the heater compartment reaches an excessive level.

NOTE

Fresh (outside) air cannot be introduced with fabric cover down. Close damper.

d. Adjust fresh air damper (door) to desired setting. It is normally better to keep the fresh air damper slightly open. Damper should be closed during very cold weather and during fast warmup periods.

e. Adjust louvers to suit. Since warm air tends to rise, it is normally better to adjust the conditioned air outlet louvers slightly downward. The conditioned air inlet louvers should be fully open.

f. During periods of very cold weather the fabric cover should be rolled down and snapped.

CAUTION

Interior components may be damaged by heating elements and cause unit to fail. After operation in HEAT mode, always run unit in VENT mode for one minute before turning unit off.

2-10. OPERATION IN COOL MODE. To operate the unit in the COOL mode, perform the following steps.

CAUTION

Fabric cover must be rolled up and secured. If fabric cover is not rolled up, a high temperature/high pressure condition will occur within the unit which may damage the compressor or cause the unit to stop functioning.

a. Turn mode selector switch to COOL.

b. Turn temperature control thermostat knob as far as it will go in the COOL position.

c. For faster cool down at initial start-up, fresh air damper (door) should be closed. After desired cooling temperature is reached, it is normally better to keep the fresh air damper (door) slightly open. During periods of very hot outside temperatures, it should be closed to improve efficiency and conserve energy.

d. When room or enclosure temperature reaches the desired level, slowly turn the temperature control thermostat knob toward WARM. Cooling will stop when you reach the approximate room temperature. Further adjustment can be made by turning the temperature control thermostat knob slightly toward COOL or WARM until desired temperature is controlled automatically.

e. Adjust louvers to suit. Since cold air tends to flow downward, it is normally better to adjust the conditioned air outlet louvers slightly upward. The conditioned air inlet louvers should be fully open.

2-11. RESETTING AIR CONDITIONER. If either the logic box assembly or the motor controller detects a problem with the input power or overheating of the motor controller, the air conditioner shuts off automatically and a fault indicator light is illuminated on the control panel. If the fault light indicates an input power problem, check input power for proper voltage and frequency and correct for proper input power. After problem has been corrected, turn mode selector switch to the RESET position for one minute and then attempt to restart unit. If unit shuts off again automatically or if fault light indicates an over temperature problem, notify unit level maintenance.

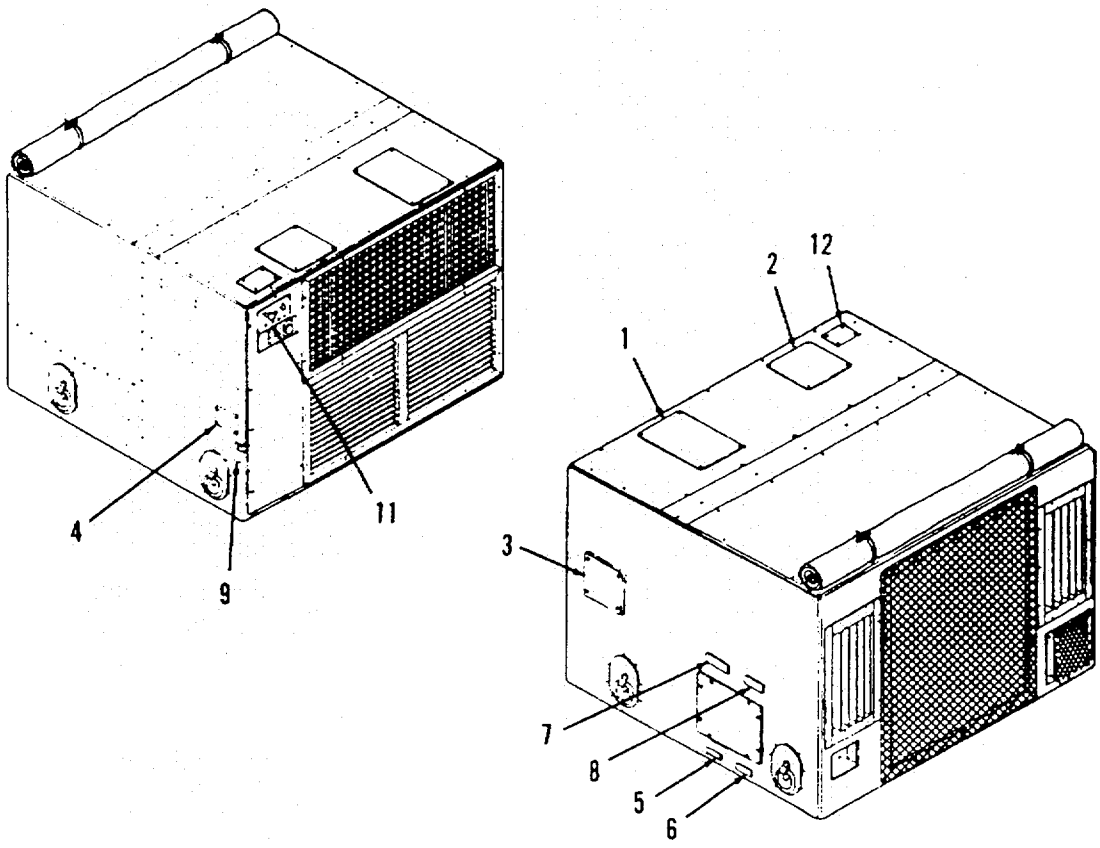
2-12. SHUTDOWN. Turn the mode selector switch to OFF.

CAUTION

DO NOT disconnect power or turn off circuit breaker to the air conditioner during periods of normal shutdown. If power is disconnected or turned off, the compressor may be damaged during restart.

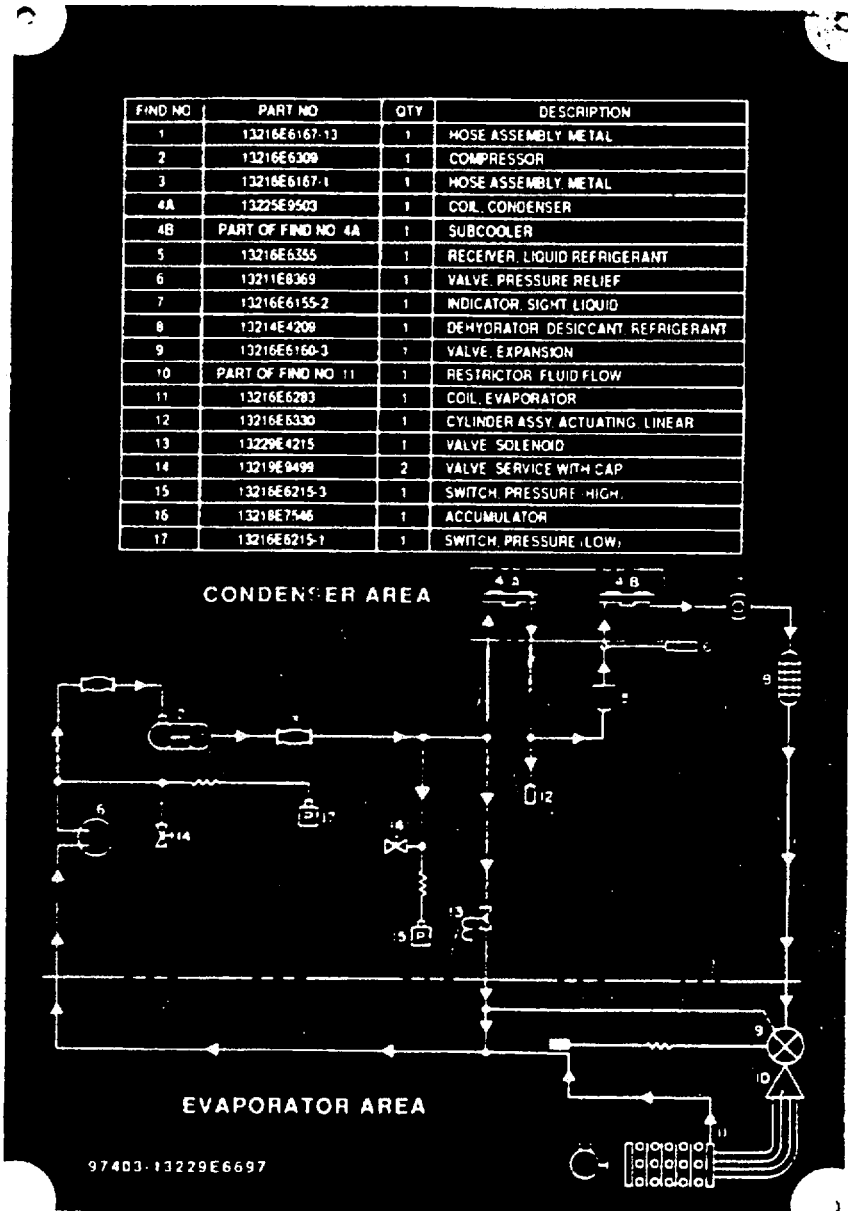
2-13. **PREPARATION FOR MOVEMENT**. When the unit is to be moved, the services of unit maintenance shall be employed for the necessary preparations. See Chapter 3, Section VII.

2-14. **DECALS AND INSTRUCTION PLATES**. Refer to Figures 2-3 and 2-4 for the locations and text of the identification and information plates on the air conditioner.



Information plates 10 are located inside unit on terminal board covers.

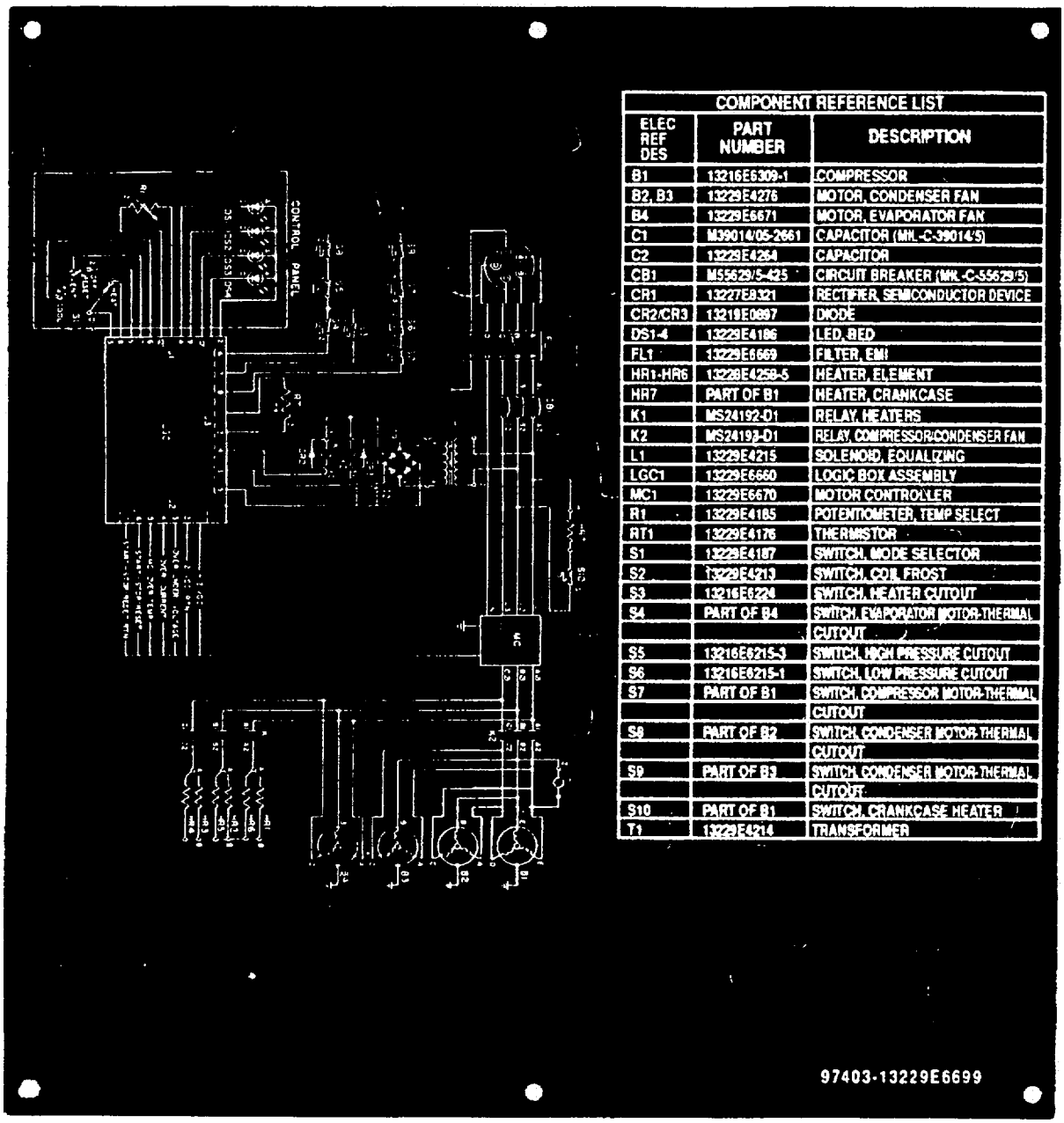
Figure 2-3. Location of Information Plates.



FIND NO	PART NO	QTY	DESCRIPTION
1	13216E6167-13	1	HOSE ASSEMBLY METAL
2	13216E6309	1	COMPRESSOR
3	13216E6167-1	1	HOSE ASSEMBLY METAL
4A	13225E9503	1	COIL, CONDENSER
4B	PART OF FIND NO 4A	1	SUBCOOLER
5	13216E6355	1	RECEIVER, LIQUID REFRIGERANT
6	13211E8369	1	VALVE, PRESSURE RELIEF
7	13216E6155-2	1	INDICATOR, SIGHT LIQUID
8	13214E4209	1	DEHYDRATOR, DESICCANT, REFRIGERANT
9	13216E6160-3	1	VALVE, EXPANSION
10	PART OF FIND NO 11	1	RESTRICTOR, FLUID FLOW
11	13216E6283	1	COIL, EVAPORATOR
12	13216E6330	1	CYLINDER ASSY, ACTUATING, LINEAR
13	13229E4215	1	VALVE, SOLENOID
14	13219E9499	2	VALVE, SERVICE WITH CAP
15	13216E6215-3	1	SWITCH, PRESSURE (HIGH)
16	13218E7546	1	ACCUMULATOR
17	13216E6215-1	1	SWITCH, PRESSURE (LOW)

Information Plate (1).

Figure 2-4. Identification of Information Plates. (Sheet 1 of 4).

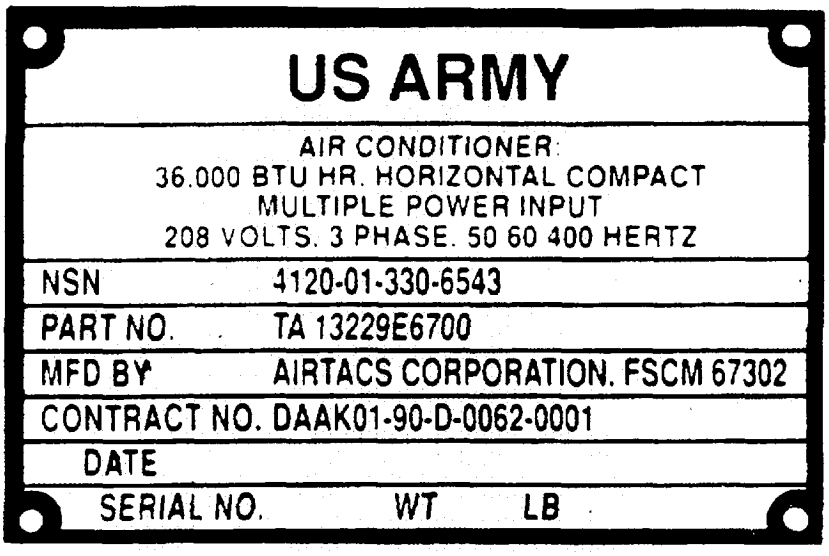


COMPONENT REFERENCE LIST

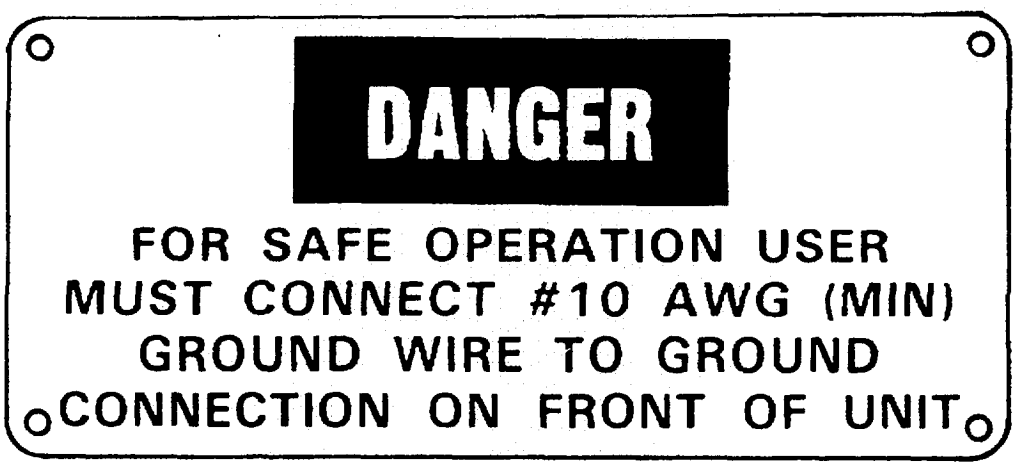
ELEC REF DES	PART NUMBER	DESCRIPTION
B1	13216E6309-1	COMPRESSOR
B2, B3	13229E4276	MOTOR, CONDENSER FAN
B4	13229E6671	MOTOR, EVAPORATOR FAN
C1	M39014/05-2661	CAPACITOR (MIL-C-39014/5)
C2	13229E4264	CAPACITOR
CB1	M55629/5-425	CIRCUIT BREAKER (MIL-C-55629/5)
CR1	13227E9321	RECTIFIER, SEMICONDUCTOR DEVICE
CR2/CR3	13219E0897	DIODE
DS1-4	13229E4186	LED, RED
FL1	13229E6669	FILTER, EMI
HR1-HR6	13228E4258-5	HEATER, ELEMENT
HR7	PART OF B1	HEATER, CRANKCASE
K1	MS24192-D1	RELAY, HEATERS
K2	MS24192-D1	RELAY, COMPRESSOR/CONDENSER FAN
L1	13229E4215	SOLENOID, EQUALIZING
LGC1	13229E6660	LOGIC BOX ASSEMBLY
MC1	13229E6670	MOTOR CONTROLLER
R1	13229E4185	POTENTIOMETER, TEMP SELECT
RT1	13229E4176	THERMISTOR
S1	13229E4187	SWITCH, MODE SELECTOR
S2	13229E4213	SWITCH, COIL FROST
S3	13216E6224	SWITCH, HEATER CUTOUT
S4	PART OF B4	SWITCH, EVAPORATOR MOTOR-THERMAL CUTOUT
S5	13216E6215-3	SWITCH, HIGH PRESSURE CUTOUT
S6	13216E6215-1	SWITCH, LOW PRESSURE CUTOUT
S7	PART OF B1	SWITCH, COMPRESSOR MOTOR-THERMAL CUTOUT
S8	PART OF B2	SWITCH, CONDENSER MOTOR-THERMAL CUTOUT
S9	PART OF B3	SWITCH, CONDENSER MOTOR-THERMAL CUTOUT
S10	PART OF B1	SWITCH, CRANKCASE HEATER
T1	13229E4214	TRANSFORMER

Information Plate (2).

Figure 2-4. Identification of Information Plates. (Sheet 2 of 4).



Information Plate (3).



Information Plate (4).

Figure 2-4. Identification of Information Plates. (Sheet 3 of 4).

Information Plate (5).

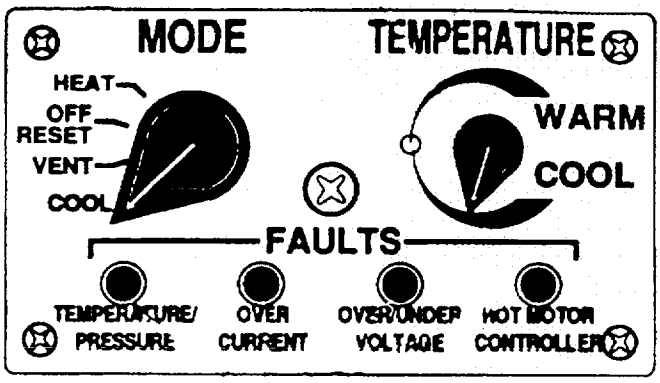
Information Plate (6).

Information Plate (7).

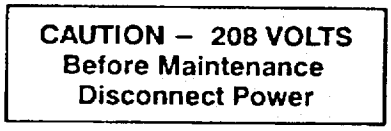
Information Plate (8).

Information Plate (9).

Information Plate (10).



Information Plate (11).



Information Plate (12).

Figure 2-4. Identification of Information Plates. (Sheet 4 of 4).

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-15. GENERAL. The 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 undue loading and excessive wear on the equipment. These unusual conditions and the special steps to be performed are listed in the following paragraphs.

2-16. OPERATION in EXTREME HEAT. When operating the air conditioner in temperatures of 120°F (49°C) or higher, extra care should be taken to minimize the cooling load. Some of the precautions that may be taken are:

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

b. When possible, use shades or awning to shut out direct rays of the sun.

c. Limit the use of electric lights and other heat producing equipment.

NOTE

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

d. Limit the amount of hot, outside air introduced through the fresh air damper to that needed for ventilation.

e. If the shelter has been closed for an extended period in 90°F (84°C) or higher temperatures and/or when direct sun has been hitting the shelter and the air conditioner has been off, these additional steps may be taken:

(1) Open the shelter's door and leave it open if the outside environmental conditions do not adversely affect the equipment in the shelter, or the mission requirement.

(2) Operate the air conditioner in the vent mode for approximately 5 minutes to remove high temperature air from the shelter. Then switch the air conditioner to the cool mode. Close the shelter door, if it was left open during the vent mode.

2-17. OPERATION in EXTREME COLD. When operating the air conditioner in temperatures down to -50°F (-45°C), extra care should be taken to minimize the heating load. Some of the steps that may be taken are:

CAUTION

Do not disturb electrical wiring that has been exposed to extremely low temperatures. When exposed to cold, both the wire and insulation become brittle and can easily be broken.

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

2-17. OPERATION in EXTREME COLD. Continued.

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

c. Limit the amount of cold, outside air introduced through the fresh air damper to that needed for ventilation.

CAUTION

Do not perform the operational check in COOL mode until input power has been supplied to the unit in accordance with the following:

Ambient (Outside) Temperature	Minimum Input Power Time
60 Degrees F	20 Minutes
40 Degrees F	One (1) Hour
20 Degrees F	Two (2) Hours
Below 20 Degrees F	Four (4) Hours

Liquid refrigerant tends to migrate into the compressor and mix with the lubricating oil. Since the refrigerant is heavier than the oil, it displaces the lubricating oil from the bottom of the compressor well. The above sliding timetable for power input to Air Conditioner is required to boil the liquid refrigerant out of the lubricating oil at the bottom of the compressor well. This action is needed to prevent "slugging" of the compressor when the Air Conditioner is started in cool mode and to prevent premature failure of the compressor.

Before starting the air conditioner in COOL mode, make sure that the fabric condenser cover on the back of the condenser section is rolled up and secured and that all screens and guards are in place and unobstructed. This action is needed to avoid damage to the equipment.

2-18. OPERATION in DUSTY OR SANDY CONDITIONS. Dusty and sandy conditions can seriously reduce the efficiency of the air conditioner by clogging the air filters which will restrict the volume of airflow. 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. When operating the air conditioner in these dusty and sandy conditions, perform the following steps:

a. Frequent cleaning of filters and all other areas of dust and sand accumulation. in extreme conditions, daily cleaning of filters may be necessary.

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

c. Roll down and secure the fabric cover on the back of the cabinet during periods of shutdown.

2-19. OPERATION in UNUSUALLY WET CONDITIONS. When operating the air conditioner in unusually wet conditions, perform the following steps:

WARNING
HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

WARNING

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

CAUTION

Do not allow excessive amounts of water to enter unit. Water can collect in electrical component areas and cause electrical shorts.

a. More frequent inspection and cleaning of the condensate trap and drain lines to insure proper drainage and prevent accumulation of water inside the cabinet.

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

c. Roll up and secure the fabric cover during dry spells when the air conditioner is not in operation so that the interior can dry out and condensation will not accumulate.

2-20. OPERATION in SALT AIR OR SEA SPRAY. Salt air or sea spray may cause many of the same clogging problems as encountered when operating in a dusty or sandy environment. in addition, the nature of salt presents serious corrosion problems. Frequent cleaning is necessary during which all exposed surfaces should be thoroughly sprayed, rinsed, or sponged with fresh water to remove salt. The fabric cover on the back of the cabinet should be rolled down and secured during all periods when the air conditioner is not in operation.

2-21. OPERATION UNDER EMERGENCY CONDITIONS.

a. NBC (Nuclear, Biological, Chemical). This unit has no provisions for direct connection to an external NBC filtering source. Should it be necessary to operate in conditions requiring use of NBC filtration equipment, see specific instructions for your shelter or facility installation. For additional general NBC information, refer to MIL-HDBK-116, Environmental Control of Small Shelters. The following are general suggestions for operation in NBC hazards and do not apply if they conflict with instructions for your shelter or facility installation.

(1) The fresh air damper should be closed, the opening should be covered with duct tape (Item 3, Appendix E) and sealed air tight.

(2) The conditioned air inlet louvers should be adjusted (partially or completely) closed in conjunction with the NBC filter intake volume. This will cause a more positive pressure on inside of shelter or enclosure and keep air from being drawn.

b. Power Conservation. During periods when full input power is in critically short supply, the air conditioner should not be turned off completely, but should be operated in VENT mode only.

2-22. INTERIM NBC DECONTAMINATION PROCEDURES. in the event that the air conditioner has been subjected to NBC contamination, follow the NBC procedures in FM 3-3, FM 3-4, and FM 3-5.

CHAPTER 3

UNIT MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. 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.

3-2. MECHANICAL LUBRICATION. The only mechanical items which may require lubrication are the conditioned air supply and return louvers, the condenser air discharge louver 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 air flow 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

3-3. COMMON TOOLS AND EQUIPMENT. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

3-4. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. No special tools are required for maintenance of the equipment. Test, Measurement, and Diagnostic Equipment (TMDE) and Support Equipment include standard equipment found in any maintenance shop.

3-5. REPAIR PARTS. Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 9-4120-404-24P, covering unit, direct support and general support maintenance for this equipment.

Section III. SERVICE UPON RECEIPT

3-6. SERVICE UPON RECEIPT. The following paragraphs contain the procedures for unloading, unpacking, and general checking of the unpacked air conditioner.

a. **Unloading**. The air conditioner is packaged in a container designed for shipment and handling with the unit in an upright position. The base of the container is constructed as a shipping pallet with provisions for the insertion of the tongs of a fork-lift. The unit may be lifted by fork-lift, crane, or sling. To unload the air conditioner, perform the following steps.

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

3-6. SERVICE UPON RECEIPT.-Continued.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

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

b. Unpacking.

CAUTION

To protect the air conditioner and prevent damage, the air conditioner should be left packaged until it is moved to the location where it is to be installed.

NOTE

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

(1) Remove shipping container.

(2) Cut the metal bands that hold the top of the container to the base.

(3) Remove staples that secure fiber board container to pallet.

(4) Remove the cushioning around the top of the cabinet and retain, if re-use is anticipated.

(5) Remove the preservation barrier by tearing around the bottom of the cabinet.

(6) Remove the technical publications envelope and accessory sack that are taped to the cabinet and put them in a safe place.

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.

(7) Remove pallet.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

(8) Attach an overhead hoist with an appropriate sling and spreader bar to the lifting fittings provided at each side of the cabinet then raise the cabinet and remove the four bolts that hold the air conditioner to the pallet.

(9) Remove and retain the pallet and bolts if re-use is anticipated. Be sure to remove all remaining barrier material from the underside of the cabinet base.

(10) Lower the cabinet to the floor in the desired position and remove the sling and hoist.

NOTE

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

c. **Checking Unpacked Equipment**. To check the unpacked air conditioner, perform the following steps.

(1) Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report damage on DD Form 6, Packaging Improvement Report.

(2) Check the equipment against the packing slip to see if the shipment is complete.
Report all discrepancies in accordance with the instructions as defined within DA PAM 738-750. See that all components of end item and basic issue items are with the equipment.

(3) Check to see whether the equipment has been modified.

3-7. INSTALLATION SITE PREPARATION.

a. General. The air conditioner is designed so that it is 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 outside. Alternate installations may be made with the entire cabinet either inside or outside the conditioned area. Refer to MIL-HDBK-116, Environmental Control of Small Shelters, for additional general information. The following are minimum requirements for all installations:

(1) A relatively level surface, capable of bearing the weight of the air conditioner, on which to set the base. To insure proper condensate drainage, the surface should be level within 5° from front to back and side to side.

(2) An unobstructed flow of air from outside the conditioned area to the inlet and two outlets of the condenser fans.

(3) An unobstructed flow of air from inside the conditioned area to the conditioned air intake and discharge.

(4) An unobstructed flow of air from outside the conditioned area to the fresh air damper intake.

(5) Access to the front and back of the cabinet for routine operation and servicing and for necessary maintenance actions.

(6) Access to the top of the cabinet for removal of the top panel and sufficient headroom to allow maintenance actions and internal component removal and installation through the top panel opening if possible.

(7) A source of 208 VAC, 3 phase, 50/60/400 Hz input power rated at 45 amps. The power source outlet should be located as near as possible to the installed location of the air conditioner. The power source wiring must include a disconnect switch. However, provisions should be made to insure that power is not disconnected during normal operation and that the disconnect is not used to turn off the air conditioner for normal shut-down.

(8) An earth ground (10 AWG minimum) capable of handling 45 amps.

(9) Check that no source of dangerous or objectionable fumes is located near the fresh air intake.

(10) If possible make use of terrain features such as trees and buildings to provide a shaded location. This will minimize the cooling load on the air conditioner.

(11) If possible, avoid locations where the condenser and fresh air intakes will be laden with dust, dirt, soot, smoke, or other debris.

b. Through the Wall Installation. Prepare an opening in the wall large enough to slide the air conditioner through. Consideration should be given to service of internal components. All openings around air conditioner must be sealed air tight. Refer to Figure 3-1 for Installation Dimensions.

c. Inside Installation Manufacture an arrangement of ducts for the condenser intake and discharge air openings and the fresh air damper intake. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the condenser inlet and outlet guards, and the fresh air filter frame or some other arrangement may be made. Prepare appropriate openings in an exterior wall for the ducts. Ducts may be designed to use the condenser inlet and outlet guards and fresh air filter and frame supplied with the air conditioner and relocated and installed on new duct work. Adequate replacements or some other arrangement of these items may be provided.

CAUTION

Easy access to air filters must be provided. Filters may be left in unit or relocated in duct work. Some installations (filters relocated in duct work) may require different size filters.

d. Outside Installation. Manufacture an arrangement of ducts for the conditioned air intake and discharge air. Ducts may be made for attachment to the air conditioner cabinet using the mounting holes for the conditioned air intake and discharge guards or some other arrangement may be made. Ducts may also be made for installation of the conditioned air intake and discharge guards on the inside ends or replacements for these items may be used. Prepare appropriate openings in the appropriate wall for the ducts.

NOTE

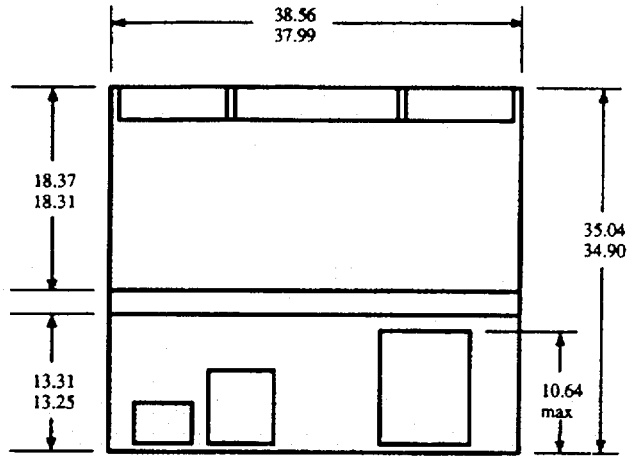
Retain all items removed from air conditioner. Store them in a safe place. These parts must be reinstalled prior to returning air conditioner to supply. For a list of required items, see Appendix C.

3-8. AIR CONDITIONER PREPARATION FOR INSTALLATION. Determine which input power is to be used and select the proper input power connector. The air conditioner is shipped from the manufacturer with the primary input power connector J11 as the source of input power. Refer to MIL-HDBK-116, Environmental Control of Small Shelters, for additional general information. For alternate installation methods, some preparation is necessary. The unit is designed to provide for several basic types of installation. See the following paragraphs for instructions only if they are applicable to your requirements.

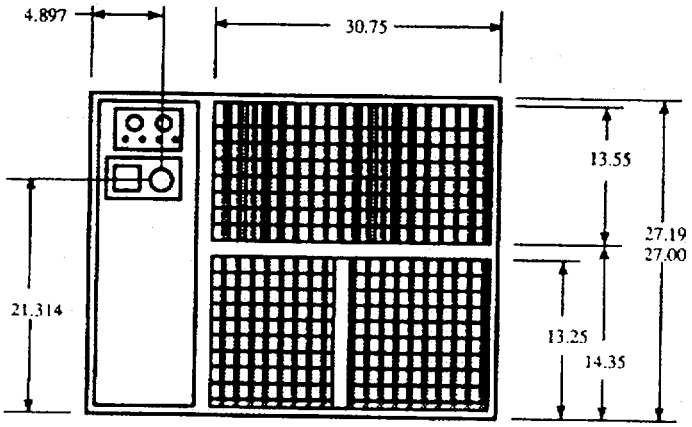
(1) Remote mounting of control panel. (See para. 3-9).

(2) Installations that require removal of the fabric cover. (See para. 3-10.)

(3) Alternate input power cable connections to connector J8. (See para. 3-11.)

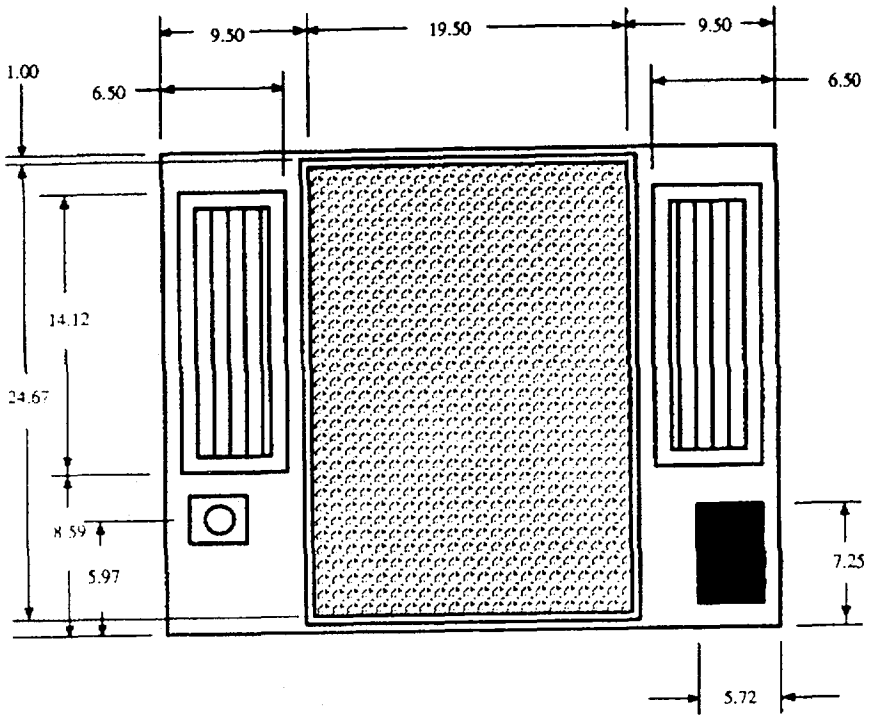


Top View



Front View

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



Rear View

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

3-9. REMOTE MOUNTING OF CONTROL PANEL. This paragraph is applicable only when the control panel is to be remote mounted. If the control panel is to be removed from the unit and installed in a remote location, follow instructions of this paragraph. For interconnecting cable circuit designations and required power input information, refer to Electrical Schematic Figure 1-5. (Refer to Figure 3-2).

WARNING
HIGH VOLTAGE
is used in operation of this equipment
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.
Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

WARNING
Be sure input power is disconnected before doing any work inside the air conditioner cabinet.

a. Remove fourteen screws (1) and front cover (2) from top of unit.

b. Remove eleven screws (3) and eleven washers (4) and pull access panel (5) away from front of unit (6).

c. Remove two nuts (7), two flat washers (8), wire (9), and two lock washers (10), and then disconnect wiring harness connector J6 from connector P6 on the back of the control panel assembly (11).

d. Loosen screw (12) from center of control panel assembly and remove control panel assembly from air conditioner.

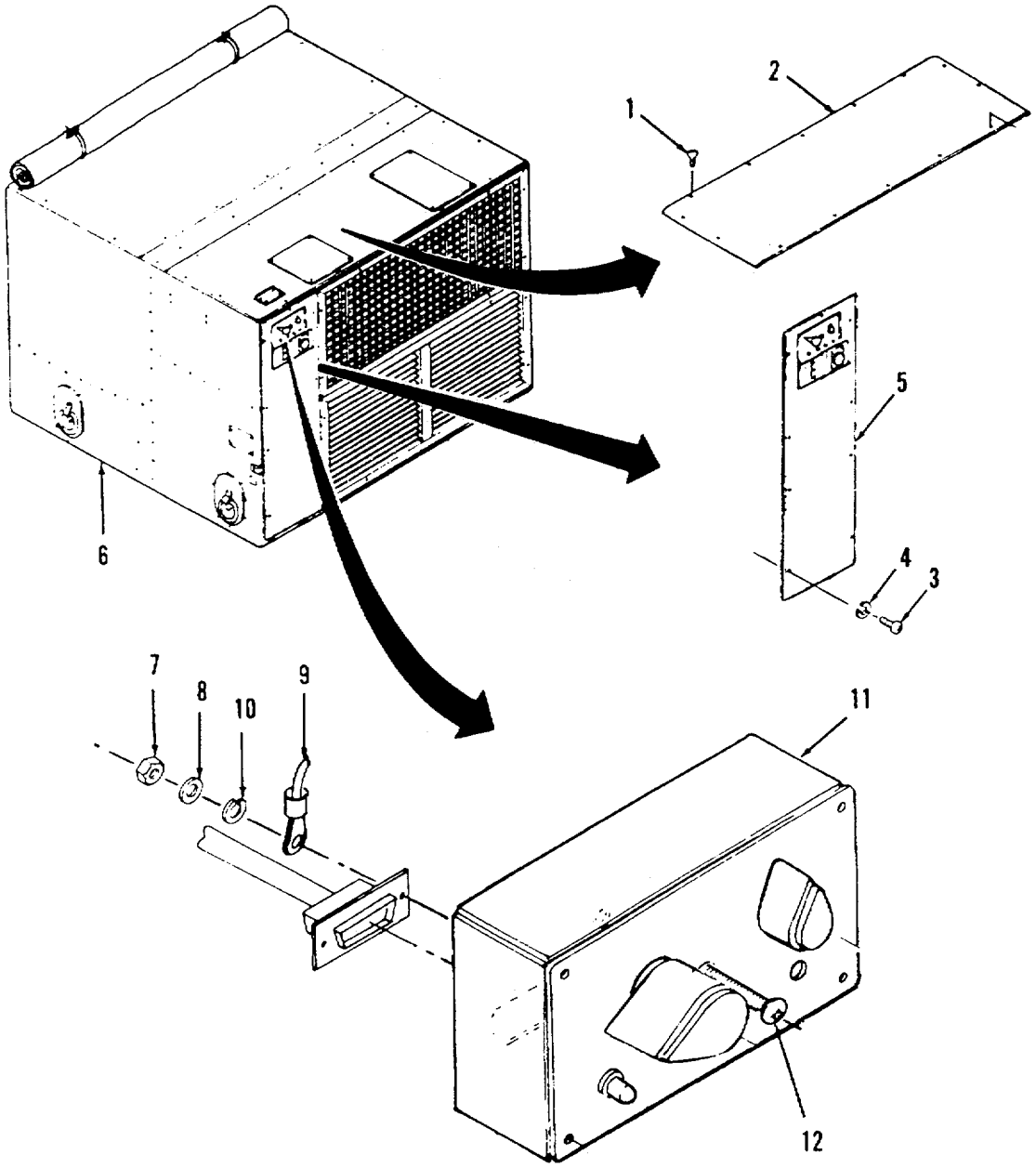


Figure 3-2. Remote Mounting of Control Panel.

3-9. REMOTE MOUNTING OF CONTROL PANEL. -Continued.

e. Mount the control panel assembly (11) in the desired location by tightening screw (12) through the center of the control panel assembly and into a 1/4-20 tapped mounting hole prepared at the new remote mounting location. Care should be taken to locate the control panel assembly and sensing bulb where there will be an accurate temperature indication.

f. Fabricate an interconnecting cable/harness of the required length to connect J6 to P6 with two lock washers (10), wire (9), two flat washers (8), and two nuts (7) on the back of the control panel assembly (11) and install this new cable assembly in accordance with local installation policies. (Refer to Appendix F for interconnecting harness fabrication instructions.)

g. Install access panel (5), eleven washers (4), and eleven screws (3).

h. Install front cover (2) and fourteen screws (1).

3-10. INSTALLATIONS THAT REQUIRE REMOVAL OF FABRIC COVER. Some installations require removal of the condenser side fabric cover. This generally applies only when air conditioner is positioned inside with condenser and fresh air openings ducted to the outside. (Refer to Figure 3-3).

NOTE

If air conditioner is to be installed with condenser side (rear) exposed, the fabric cover should be left in place if possible.

a. Remove three screws (1), three flat washers (2), and three lock washers (3).

b. Carefully remove the fabric cover (4) from unit (5). Store the cover in a safe place for future use.

c. Reinstall three lock washers (3), three flat washers (2), and three screws (1) into unit (5).

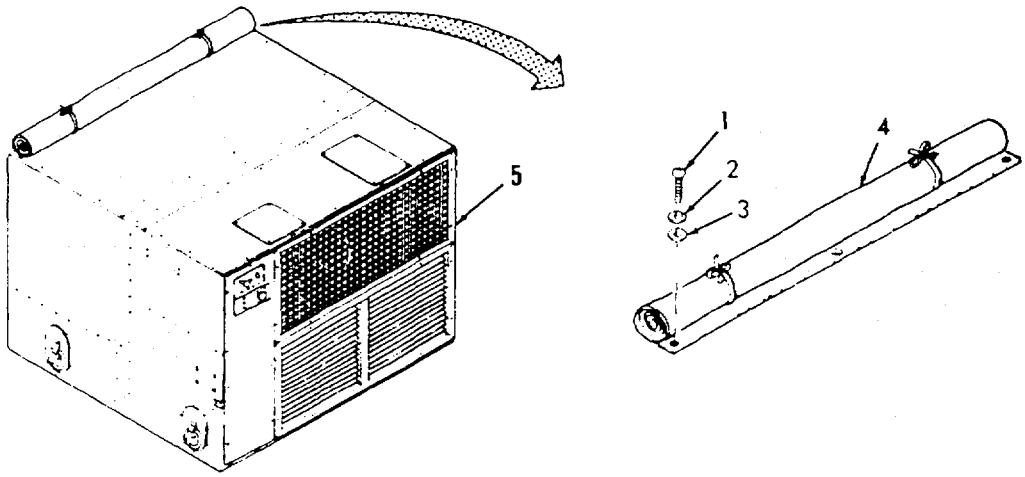


Figure 3-3. Fabric Cover Removal.

3-11. ALTERNATE INPUT POWER CABLE CONNECTOR (J8) LOCATIONS. If input power cable connection is to be relocated to the alternate location at the rear of the unit, perform the following steps. (Refer to Figure 3-4).

WARNING

Voltages used can kill. Always disconnect power cord to air conditioner before performing any internal maintenance. Shutting unit off at its control panel does not disconnect unit power.

a. Remove fourteen screws (1) and rear panel (2).

b. Remove plug P15 from connector J15 located on EMI filter assembly FL1 (3).

c. Remove plug P15A from dummy plug.

d. Install plug P15A into connector J15 on EM filter assembly FL1 (3).

e. Install plug P15 onto dummy plug.

f. Remove cap assembly from input power connection J8 on rear of unit and connect unit to 208 VAC, 3 phase, 50/60/400 Hz power.

g. Install rear panel (2) and fourteen screws (1).

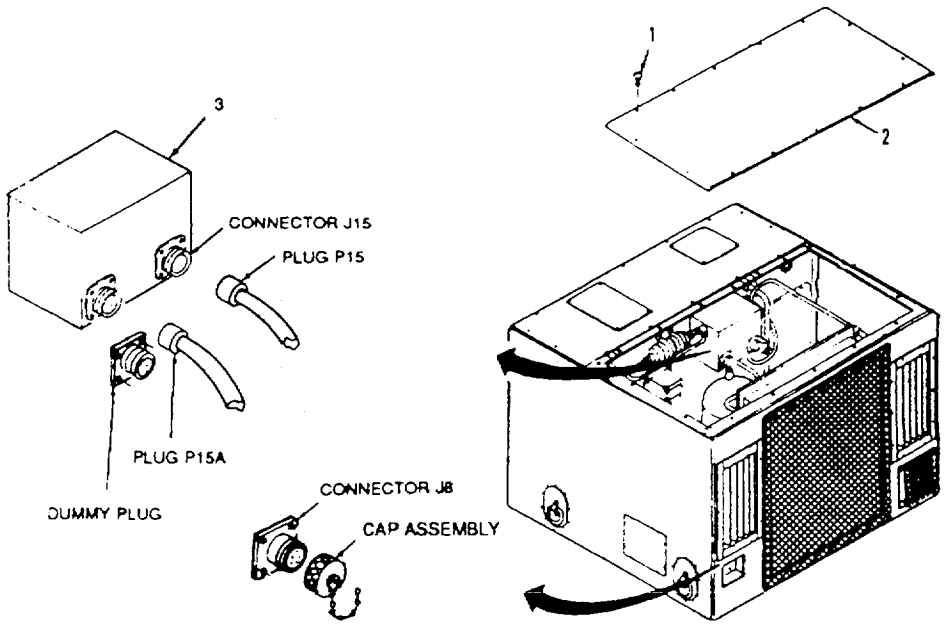


Figure 3-4. Alternate Input Cable Connector (J8) Locations.

3-12. INSTALLATION INSTRUCTIONS. All alterations to the shelter or facility where the air conditioner is to be installed should be complete before installation of air conditioner.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

a. Attach an overhead hoist, sling, and spreader bar to lifting fittings on each side of cabinet.

b. Move air conditioner into position and align mounting holes.

c. Secure unit with appropriate mounting hardware.

d. Seal all openings around cutouts for air conditioned air and water tight. Use gasket, caulking, or other suitable material (Item 19, Appendix E).

e. The air conditioner is provided with a drain hole in the lower left rear corner of the housing. If plug has not been removed from this drain opening, remove this plug now to allow for drainage of condensate water. If water from this drain will be objectionable or create a hazard, external overboard drains can be connected. Install pipe to tube fitting (Item 1, Appendix D) to connect base drains. Any type of hose or tubing may be used as a drain line. The drain line should lead to an appropriate facility drain, storm sewer, dry sump, or an acceptable outside area. Be sure the entire length of the drain line is lower than the base to ensure gravity drainage.

f. (Refer to Figure 3-5). Attach a ground cable to ground screw (1) on front of unit.

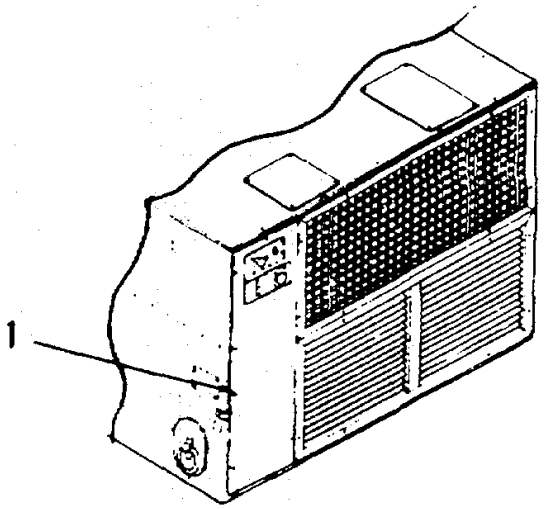


Figure 3-5. Ground Cable Connection.

g. Fabricate a power cable in accordance with Appendix F.

WARNING
HIGH VOLTAGE
is used in operation of this equipment.
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.
Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

WARNING
Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

h. Connect power cable to 208 VAC, 3 phase, 50/60/400 Hz power source. Check input power as follows:

(1) Apply power to power cable.

(2) Use a multimeter set to AC voltage range of at least 250 volts for following tests.

(3) Measure voltage between pin D of connector and pin E (chassis ground). Voltage must be zero (0). If more than zero voltage is observed, disconnect cable and check power source. Correct problem at power source or at cable connection as indicated.

(4) With zero voltage on pin D of connector, check voltages between remaining pins as shown on Table 3-1 for 208 VAC, 3 phase, 50/60/400 Hz power input. Voltages should be approximately as shown. If voltages are not within ten volts of those indicated in Table 3-1 as applicable, disconnect power. Locate and correct problem.

CAUTION
Insure mode selector switch is set to OFF and circuit breaker is in OFF position. Connecting power source with unit in operating position may damage electrical components.

(5) After proper voltages are indicated on all pins of connector, connect it to connector J11 on air conditioner.

(6) Place circuit breaker into ON position.

CAUTION

DO NOT perform the operational check in COOL mode until power has been supplied to the unit for at least four hours. Liquid refrigerant tends to migrate into the compressor crankcase and cylinders during periods when the compressor heater is not operating. Under moderate climatic conditions, the compressor heater will normally "boil" all liquid refrigerant out within a four hour period. If the air conditioner has been exposed to below freezing temperatures without power input, an eight hour warm up period is recommended.

Before starting the air conditioner in COOL mode, make sure that the fabric condenser cover on the back of the unit is rolled up and secured and that all screens and guards are in place and unobstructed to avoid damage to equipment.

Table 3-1. Power Voltages for 208 VAC, 3 Phase.

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

(7) Turn mode selector switch to COOL and immediately back to OFF.

(8) Observe the condenser fans to determine the direction of rotation.

(9) If fan rotation is from top to bottom, unit power cable is not wired properly. Exchange wires connected to pins A and B at power source connection and repeat steps (6) and (7) above.

(10) Check unit operation in accordance with paragraphs 2-7 through 2-12.

i. See air conditioner Electrical Schematic Figure 1-5, for additional wiring information.

3-13. OPERATIONAL CHECK. To perform an operational check of the air conditioning unit, do the following steps.

a. Be sure the mode selector switch is in the OFF position and air conditioner is connected to power source.

CAUTION

DO NOT perform the operational check in COOL mode until power has been supplied to the unit for at least four hours. Liquid refrigerant tends to migrate into the compressor crankcase and cylinders during periods when the compressor heater is not operating. Under moderate climatic conditions, the compressor heater will normally "boil" all liquid refrigerant out within a four hour period. If the air conditioner has been exposed to below freezing temperatures without power input, an eight hour warm up period is recommended.

Before starting the air conditioner in COOL mode, make sure that the fabric condenser cover on the back of the unit is rolled up and secured and that all screens and guards are in place and unobstructed to avoid damage to equipment.

b. Check that the fabric cover is rolled up and secured.

c. Adjust conditioned air intake and outlet louvers to the fully open position.

d. Adjust fresh air damper to fully closed position.

e. Turn mode selector switch to VENT. Fan should start.

f. Use a paper streamer or smoke and note amount of air being discharged from conditioned air louver.

g. Open fresh air damper fully.

h. Close conditioned air intake guard 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 louver and fully close fresh air damper.

k. Turn temperature control thermostat knob to fully WARM (clockwise) position and then turn mode selector switch to HEAT. Place your hand in air flow from the conditioned air outlet grille and feel for a temperature rise. When discharge air temperature has reached a relatively stable level, turn temperature control thermostat knob to fully COOL (counterclockwise) position. Feel that discharge air temperature drops to ambient level.

3-13. OPERATIONAL CHECK. - Continued.

l. The temperature control thermostat has an effective functional range between 60° and 90°F (15° and 32°C). In extreme conditions when ambient air temperature is below 60°F (15°C) or above 90°F (32°C), operation in HEAT mode will vary from that described above.

m. Turn temperature control thermostat knob to fully WARM (clockwise) position, then turn mode selector switch to COOL. Hold your hand in air flow from conditioned air louver; there should be no change in temperature. Now turn temperature control thermostat knob to fully COOL (counterclockwise) position and feel outlet air temperature begin to drop almost immediately. Leave controls in present position and perform next check.

n. After 15 minutes of operation, examine sight glass and check refrigerant condition.

o. Turn mode selector switch to OFF/RESET and observe that all air conditioner functions cease.

p. Set-up the air conditioner for the desired operational mode.

Section IV. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

3-14. INTRODUCTION, INSPECTION, AND SERVICE.

a. Systematic, periodic, Preventive Maintenance Checks and Services (PMCS) are essential to ensure that the air conditioner is ready for operation 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 indoctrination 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).

b. 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 very dusty or sandy environment, it may be necessary to reduce the interval to monthly or even less if conditions are extreme.

c. Table 3-2 lists the 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 for minimum amount of required maintenance downtime.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

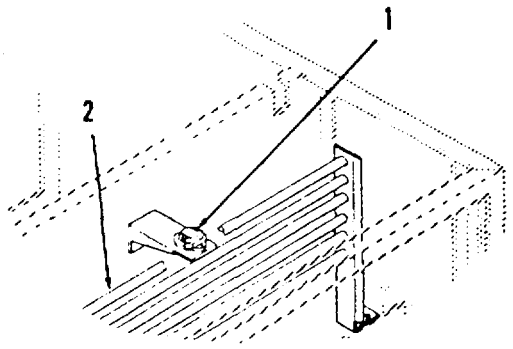
Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
					WARNING **Disconnect input power before disassembly of the air conditioner for PMCS to prevent dangerous, possibly fatal, electrical shock.**
1	•			Conditioned Air Louver and Return Air Louver	• Remove any debris from louvers. • Lubricate moving parts with small amount of oil (Item 11, Appendix E).
2	•			Ventilation Air Filter	• Remove and clean filter per para. 3-23.
3	•			Filter, Air Conditioning	• Remove filter per para. 3-24 and clean thoroughly.
4	•			Condenser Coil Guard	• Check condenser guard for loose or missing hardware.
	•				• Check for clogged or dirty condenser guard. Clean condenser guard if dirty.
5	•			Mist Eliminator	• Remove mist eliminator per para. 3-28 and clean thoroughly.
6		•		Heating Elements and Heater Cutout Switch	• Remove conditioned air louver per para. 3-20. • Check that heater cutout switch (1) is in place and that mounting hardware is not loose or missing. (See para. 3-30.) • Test heater cutout switch per para. 3-30. 

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
6			•	Heating Elements and Heater Cutout Switch - Continued.	• Test each heating element (2) per para. 3-29 • Inspect wire leads for heater elements (2) and heater cutout switch for cracked or burned insulation and for loose connections. (See para. 3-29.) • Check heating elements (2) for cracked or damaged surfaces.
7			•	Heater Relay	• Inspect heater relay for cracked, burned, or loose wire leads.
8	•			Condensate Drain Assembly	• Remove conditioned air louver per para. 3-20. and return air louver per para. 3-21. • Check that all drain holes in drain pan are clear and not clogged. Clean any clogged drain holes and remove any debris from drain pan. • Inspect all drain tubing for cuts and cracks. • Check for loose or missing tube clamps. • Check for broken or leaking elbows and tees.
9			•	Evaporator Fan Assembly	• Remove return air louver per para. 3-21. • Inspect for loose or missing hardware.
10			•	Evaporator Fan Scrolls	• Remove return air louver per para. 3-21. • Inspect scrolls for dents, cracks, or bent metal. • Check for loose or missing mounting hardware.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
11			•	Evaporator Impeller Fans	• Remove return air louver per para, 3-21. • Inspect evaporator fans for bent or loose blades. • Check that fans are not rubbing against scrolls. • Clean impeller fan blades. • Check for loose or missing mounting hardware.
12			•	Evaporator Motor, Motor Bracket, and Chassis	• Remove return air louver per para. 3-21. • Check motor for loose, broken, or cut wire leads and wire connections. • Check that motor rotates smoothly and quietly. • Check for loose or missing mounting hardware. • Inspect motor for bent shafts. • Check that chassis is not bent or warped.
13			•	Condenser Fan Motors	• Remove rear cover para. 3-27. • Check motor for loose, broken, or cut wire leads and wire connections. • Check that motor rotates smoothly and quietly. • Check for loose or missing mounting hardware. • Inspect motor for bent shafts.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
14			•	Condenser Impeller Fans	• Remove rear cover per para. 3-27. • Inspect condenser fans for bent or loose blades. • Check that fans are not rubbing against scrolls. • Clean impeller fan blades. • Check for loose or missing mounting hardware.
15			•	Condenser Fan Scrolls	• Remove rear cover per para. 3-27. • Inspect scrolls for dents, cracks, or bent metal. • Check for loose or missing mounting hardware.
16			•	Condenser Fan Braces and Support	• Remove rear cover per para. 3-27. • Check for loose or missing mounting hardware. • Inspect braces and support for cracked or bent metal.
17			•	Louver Actuator Cables	• Remove rear cover per para. 3-27 • Check that both cables operate smoothly and without binding. • Lubricate moving parts with small amount of oil (Item 11, Appendix E). • Check for loose or missing mounting hardware.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Interval Q	Interval A	Item To Be Inspected	Procedure
18		•		Damper Actuator	Remove ventilation guard and filter per para. 3-23.
					Check that actuator is not leaking.
					Lubricate moving parts with small amount of oil (Item 11, Appendix E).
					Check for loose or missing mounting hardware.
19		•		Ventilation Damper	Remove ventilation guard and filter per para. 3-23.
					Check that damper operates without binding.
					Check that damper control cable operates without binding.
20		•		Circuit Breaker	Check that circuit breaker remains in place when in the on position and no electrical fault is present.
					Check for loose or missing mounting hardware.
21			•	Logic Box Assembly	Remove front cover per para. 3-27.
					Check for loose or disconnected cables.
					Inspect logic box for any damage.
					Check for loose or missing mounting hardware.
22			•	Motor Controller	Remove front access cover per para. 3-27.
					Check for loose or disconnected cables.
					Inspect motor controller for any damage or signs of overheating.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
					Check for loose or missing mounting hardware.
23			•	Transformer	Remove front cover per para. 3-27.
					Check wire leads for cracks, breaks, or loose connections.
					Check transformer for signs of burn out.
					Check for loose or missing mounting hardware.
24			•	Rectifier	Remove front cover per para. 3-27.
					Check wire leads for cracks, breaks, or loose connections.
					Check rectifier for signs of bum out.
					Check for loose or missing mounting hardware.
25		•		Control Panel Assembly	Check for loose or missing mounting hardware.
					Inspect control knobs for damage.
26			•	EMI Filter	Remove rear cover per para. 3-27.
					Check wire leads for cracks, breaks, or loose connections.
					Check for loose or missing mounting hardware.
27			•	Compressor/Condenser Fan Relay	Remove front cover per para. 3-27.
					Inspect relays for cracked, burned, or loose wire leads.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
					Check for loose or missing mounting hardware.
28			•	Coil Frost Switch	Remove front cover per para. 3-27.
					Check for any damage to sensor bulb.
					Inspect switch for cracked, burned, or loose wire leads.
					Check for loose or missing mounting hardware.
29			•	Terminal Boards	Check for loose or missing mounting hardware.
					Check that terminal board or plastic cover is not cracked or broken.
30		•		Wiring Harnesses	Remove front and rear covers per para. 3-27.
					Check wiring on all harness for cracks, breaks, or burns.
					Check for missing or damaged receptacle caps.
					Inspect all connectors for damage or looseness
					Inspect all wires for loose connections.
					Check that all cable clamps are in place with mounting hardware.
31			•	Coil (Solenoid)	Remove rear cover per para. 3-27.
					Check wire leads for cracks, breaks, or burns.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Interval Q	Interval A	Item To Be Inspected	Procedure
32		•		Pressure Switches	• Check wire leads for cracks, breaks, or burns. • Remove access panel per para. 3-19. • Inspect switches for damage and for loose or missing hardware. • Install access panel per para. 3-19.
33			•	Evaporator Coil	• Remove front cover per para. 3-27. • Remove conditioned air louver per para. 3-20. • Remove mist eliminator per para. 3-28. • Check for loose or missing mounting hardware. • Inspect evaporator coil for evidence of leaks. • Remove debris from fins of evaporator coil. • Straighten fins with fin straightener (Item 7, Appendix B).
34			•	Condenser Coil	• Remove condenser coil guard per para. 3-25. • Check for loose or missing mounting hardware. • Inspect condenser coil for evidence of leaks. • Remove debris from fins of condenser coil.

Table 3-2. Unit Preventive Maintenance Checks and Services (PMCS)

Item No.	Interval M	Q	A	Item To Be Inspected	Procedure
					• Straighten fins with fin straightener (Item 7, Appendix B).
35			•	Service Box	• Inspect service box for any damage. • Check for loose or missing mounting hardware.
36			•	Lifting Rings and Clips	• Check for loose or missing mounting hardware. • Check rings for deformation and cracks.
37			•	Block Off Plates	• Remove front and rear covers per para. 3-27. • Check for loose or missing mounting hardware. • Check for missing block off plates.

Section V. UNIT TROUBLESHOOTING PROCEDURES.

3-15. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the air conditioner. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective actions, notify your supervisor.

c. Table 3-3 lists the common malfunctions which you may find during the operation or maintenance of the air conditioner or its components. You should perform the tests/inspections and corrective actions in the order listed.

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

3-16. UNIT TROUBLESHOOTING TABLE. Refer to Table 3-3 for Unit Troubleshooting. The following malfunction index is provided to assist you in locating malfunctions within this table.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. AIR CONDITIONER FAILS TO OPERATE IN ANY MODE.
Step 1. Check to see if main power cord is plugged in. Connect power cable to a source supplying 208 VAC, three phase, 50/60/430 Hz input power.
Step 2. Check to see if circuit breaker is in the ON position. Place circuit breaker in the ON position. If the air conditioner will not operate, check for a defective circuit breaker. Replace defective circuit breaker per para. 3-36.
Step 3. Check to see if mode selector switch is in the VENT position. Place mode selector switch in the VENT position. If the air conditioner will not operate and no fault lights on the control panel are on, check for a defective switch. Replace defective mode selector switch per para. 3-41.
Step 4. Check control panel fault light indications. If a fault light is on, follow the related procedure as follows: TEMP/PRESSURE light - Refer to malfunction 8, evaporator fan motor failure OVER CURRENT light - Check input power voltage. If input power voltage is correct, refer to malfunction 8, evaporator fan motor failure. OVER/UNDER VOLTAGE light - Check input power voltage. Correct as required. HOT MOTOR CONTROLLER light - Refer to malfunction 8, evaporator fan motor failure. If evaporator fan motor has not failed, proceed to next step.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 5. Check for defective EMI filter. Test EMI filter per para. 3-42. Replace defective EMI filter.
Step 6. Check for defective transformer. Test transformer per para. 3-39. Replace transformer if it is defective.
Step 7. Check for defective rectifier. Test rectifier per para. 3-40. Replace defective rectifier.
Step 8. Check for defective logic box assembly. Perform operational test per para. 3-37. Replace logic box assembly if defective.
Step 9. Check for loose electrical connections. Tighten electrical connections.
Step 10. See Electrical Wiring Diagram, Figure 1-6 and check for defective wiring. Repair wires as required. If unit still malfunctions, notify Direct Support maintenance.
Step 11. Check for defective motor controller. If logic box assembly passes functional operation test in step 10, replace motor controller assembly per para. 3-38.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
2. IN COOL MODE, EVAPORATOR FAN RUNS, BUT CONDENSER FANS AND COMPRESSOR DO NOT RUN.
Step 1. Check TEMP/PRESSURE fault light on control panel assembly. If light is on, proceed to step 2. If light is not on, proceed to step 11.
Step 2. Check for defective thermistor. Using a multimeter set at maximum ohm reading, check for continuity between the two thermistor leads. Check that resistance between leads is between 2.4 and 33.2 kilo ohms. If thermistor fails this test, replace it. If thermistor is not defective, proceed to next step.
Step 3. Check for defective mode selector switch on control panel assembly. Test mode selector switch per para. 3-41. Replace mode selector switch if defective. If mode selector switch is not defective, proceed to next step.
Step 4. Check for defective control panel temperature control on control panel assembly. Test temperature control per para. 3-41. Replace temperature control if defective. If temperature control is not defective, proceed to next step.
Step 5. Check for defective compressor/condenser fan relay. Test compressor/condenser fan relay per para. 3-43. Replace compressor/condenser fan relay if defective. If relay is not defective, proceed to next step.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 6. Check for defective coil frost switch. Test coil frost switch per para. 3-44. If coil frost switch is defective, replace it. If coil frost switch is not defective, proceed to next step. Step 7. Check to see if high pressure cut-out switch has tripped. Push reset button. If compressor fails to start, proceed to next step. Step 8. Check to see if low pressure cut-out switch has tripped. Push reset button. If compressor fails to start, proceed to next step. Step 9. Check for tripped condenser fan motor thermal cut out switch. Inspect condenser fan motor thermal cut out switch per para. 3-34. If condenser fan motor thermal cut out switch is defective, replace condenser fan motor. If condenser fan motor thermal cut out switch is not defective, proceed to next step. Step 10. Check for proper operation of logic box assembly. Test logic board assembly in accordance with paragraph 3-37. If logic box is defective, replace logic box assembly. If logic box assembly is not defective, proceed to next step. Step 11. Check for defective light on control panel assembly. Test each of the control panel lights per para. 3-41. If control panel lights are not defective, notify your supervisor.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
3. COMPRESSOR STARTS NORMALLY, BUT COMPRESSOR SOON TRIPS.
Step 1. Check to be sure fabric cover is rolled up.
Roll up and secure fabric cover.
Step 2. Check to be sure there is no restriction to air flow through condenser section.
Clean all obstructions from condenser inlet, outlet, and condenser coil.
Step 3. Check to be sure that condenser fan is operating.
Inspect fan motors. Replace if defective per para. 3-34.
Step 4. Check to be sure that condenser outlet louvers are operating properly.
If condenser outlet louvers are not functioning, repair them per paragraph 3-22.
If condenser outlet louvers are not jammed or defective, notify your supervisor.
4. REDUCED COOLING CAPACITY.
Step 1. Check air flow out of conditioned air louver. If air volume is low:
Adjust return air inlet louvers.
Clean or replace conditioned air filter.
Clean evaporator coil.
Step 2. Check operation of temperature control potentiometer.
Test potentiometer per para. 3-41.
Replace potentiometer if defective per para. 3-41.
If unit cooling capacity is still reduced, notify your supervisor.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
5. REDUCED HEATING CAPACITY. Step 1. Check air flow out of conditioned air outlet louver. If air flow volume is low: Adjust intake air louvers. Clean and service or replace conditioned air filter element. Clean evaporator coil. Step 2. Check operation of temperature control potentiometer. Set control to fully WARM then, if condition improves, adjust properly. If condition does not improve, test temperature control potentiometer per para. 3-41. Replace potentiometer if defective. Step 3. Check operation of heater cutout switch (S3). Test and replace defective heater cutout switch per para. 3-30. Step 4. Check individual heating elements (HR1 through HR6). Replace defective heating element per para. 3-29. **WARNING** **Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.** Step 5. Check for loose or damaged wires and terminals. Tighten loose or damaged terminals. Repair or replace damaged wires.

Table 3-3. Unit Troubleshooting. - Continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
6. EVAPORATOR FAN RUNS, BUT NO HEAT IN HEAT MODE.
Step 1. Check TEMP/PRESSURE light on control panel assembly. If TEMP/PRESSURE light is not on, proceed to step 2. If TEMP/PRESSURE light is on, proceed to step 7.
Step 2. Check for defective heater relay. Test heater relay per para. 3-31. If heater relay is defective, replace it. If heater relay is not defective, proceed to next step.
Step 3. Check for defective mode selector switch. Test mode selector switch per para. 3-41. If mode selector switch is defective, replace it. If mode selector switch is not defective, proceed to next step.
Step 4. Check for defective temperature control potentiometer. Test temperature control potentiometer per para. 3-41. If temperature control potentiometer is defective, replace it. If temperature control potentiometer is not defective, proceed to next step.
Step 5. Check for defective thermistor. Test thermistor per para. 3-41. If thermistor is defective, replace it. If thermistor is not defective, proceed to next step.

Table 3-3. Unit Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 6. Check for defective logic box assembly. Test logic board assembly in accordance with paragraph 3-37. If logic box is defective, replace logic box assembly. If logic box assembly is not defective, proceed to next step. Step 7. Check for defective heater cut out switch. Check heater cut out switch per para. 3-30. If heater cut out switch defective, replace it. If heater cut out switch is not defective, proceed to next step. Step 8. Check for defective light on control panel assembly. Test each of the control panel lights per para. 3-41. If control panel lights are not defective, notify your supervisor.
7. ONE CONDENSER FAN MOTOR DOES NOT OPERATE. **WARNING** **Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.** Step 1. Check for loose or damaged connectors or wires. Tighten or replace loose or damaged connectors, or repair damaged wires. Step 2. Using Electrical Wiring Diagram Figure 1-6, check electrical connectors and individual wires for tightness and continuity. Tighten, repair, or replace as indicated per para. 3-17. Step 3. Check operation of condenser fan motor. Test condenser fan motor. Repair or replace as needed per para. 3-34.

Table 3-3. Unit Troubleshooting. - Continued.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
8. EVAPORATOR FAN MOTOR DOES NOT OPERATE. **WARNING** **Disconnect input power before performing internal electrical troubleshooting. Voltages used can be deadly.** Step 1. Check for loose or damaged wires. Tighten or replace loose or damaged connectors, or repair damaged wires per para. 3-17. Step 2. Using Electrical Wiring Diagram Figure 1-6, check individual wires for tightness and continuity. Tighten, repair, or replace as indicated. Step 3. Perform procedures indicated in malfunction 1. **9. EXCESSIVELY NOISY OPERATION.** **CAUTION** **If a knocking or hammering sound is heard when compressor starts, turn mode selector switch to OFF, immediately. Such noise is usually caused by liquid refrigerant in compressor which can seriously damage or destroy compressor.** Step 1. Check fans for looseness or damage, and for rotational clearance. Tighten loose fans, adjust rotational clearance, or replace fans per para. 3-34. Step 2. Check all internal components for looseness, vibration, and security. Tighten, adjust and secure as necessary. If unit is still noisy, notify your supervisor.

Section VI. UNIT MAINTENANCE PROCEDURES.

3-17. ELECTRICAL WIRING REPAIR GENERAL. This section contains the maintenance procedures authorized for the Unit maintenance as defined in the Maintenance Allocation Chart located in Appendix B. Before performing any procedure in this section, use the Unit Troubleshooting procedures to identify and locate the parts on the air conditioner unit requiring maintenance. 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. Determine the proper size and length of wire, or the terminal or connect or to be used for replacement by referring to Table 3-4, Wire List, and to the Electrical Wiring Diagram Figure 1-6.

WARNING

Solderingandbrazingoperationscanresultinseriousinjuryifpersonnelfailto observe proper precautions. Avoid burns and possible eye damage from splattering by wearing thermal gloves and protective goggles or face shield. Do not solder or braze in the presence of flammable materials. Remove nearby combustible materials to shield them from heat source. 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 properly ventilated areas. Wash hands with soap and water after handling solder, brazing alloys, and flux.

a. Soldering Connections. Wire connections must be made mechanically sound before they are soldered; solder alone dots not provide sufficient strength to prevent breakage. Joining surfaces of connections to be soldered must be clean and bright. If a separate flux is used, it should conform to soldering flux (Item 6, Appendix E) and should be brushed onto the joint before soldering. If an uncored solder is used, it should be a lead-tin solder, (Item 1, Appendix E). 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 solder "gobs" on the joint should be avoided or removed.

b. Insulation Joints. The preferredmethodofinsulatingelectricaljointsisbytheuseofheat-shrink tubing, To apply, cut a piece of heat-shrink tubing (Item 17, Appendix E) of suitable diameter to a one-inch length 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, and 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.

c. Splicing Wires. To repair broken or cut wires that arc otherwise sound, the mating ends can be stripped and spliced. A commercial butt splice can be crimped onto the end to join them, or a: Western Union wire splice can be made. The latter is made by stripping 1/4 to 1/2 inch (0.6 to 1.3 cm) of insulation from the wire ends, holdingtheendsparallelandfacingoppositedirectionsthentwistingeachendaround the other wire at least three turns. Solder and apply insulation as described above.

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

Table 3-4. Wire List.

FROM	TERMINAL TYPE	TO	TERMINAL TYPE	AWG WIRE SIZE	LENGTH IN.	LENGTH CM
		Wiring Harness, J11 to P15 - 13229E6706				
J11-A	13229E6716-1	P15-A	13229E6718-2	8	45.0	114.3
J11-B	13229E6716-1	P15-B	13229E6718-2	8	45.0	114.3
J11-C	13229E6716-1	P15-C	13229E6718-2	8	45.0	114.3
J11-D	13229E6716-1	P15-D	13229E6718-2	8	45.0	114.3
J11-E	13229E6716-1	P15-E	13229E6718-2	8	45.0	114.3
		Wiring Harness, J8 to P15A - 13229E6707				
J8-A	13229E6716-1	P15A-A	13229E6718-2	8	67.0	170.8
J8-B	13229E6716-1	P15A-B	13229E6718-2	8	67.0	170.8
J8-C	13229E6716-1	P15A-C	13229E6718-2	8	67.0	170.8
J8-D	13229E6716-1	P15A-D	13229E6718-2	8	67.0	170.8
J8-E	13229E6716-1	P15A-E	13229E6718-2	8	67.0	170.8
		Wiring Harness, P1 to J6 - 13229E4207-2				
J6-1	M24308/2-2	P1-1	M24308/2-2	20	8.0	20.3
J6-2	M24308/2-2	P1-2	M24308/2-2	20	8.0	20.3
J6-3	M24308/2-2	P1-3	M24308/2-2	20	8.0	20.3
J6-4	M24308/2-2	P1-4	M24308/2-2	20	8.0	20.3
J6-5	M24308/2-2	P1-5	M24308/2-2	20	8.0	20.3
J6-6	M24308/2-2	P1-6	M24308/2-2	20	8.0	20.3
J6-7	M24308/2-2	P1-7	M24308/2-2	20	8.0	20.3
J6-8	M24308/2-2	P1-8	M24308/2-2	20	8.0	20.3
J6-9	M24308/2-2	P1-9	M24308/2-2	20	8.0	20.3
J6-10	M24308/2-2	P1-10	M24308/2-2	20	8.0	20.3
J6-11	M24308/2-2	P1-11	M24308/2-2	20	8.0	20.3
J6-12	M24308/2-2	P1-12	M24308/2-2	20	8.0	20.3
Shield	13229E4286	GRN	MS25036-148	20	As required	
		Wiring Harness, J10 to TB2 - 13229E6676				
J10-1	13229E4181-2, 13229E4273	TB2-1	MS25036-108	16	23.8	60.1
J10-2	13229E4181-2, 13229E4273	TB2-2	MS25036-108	16	23.1	58.7
J10-3	13229E4181-2, 13229E4273	TB2-3	MS25036-108	16	22.4	56.9
J10-4	13229E4181-2, 13229E4272	TB2-5	MS25036-108	16	21.8	55.4

Table 3-4. Wire List.

FROM	TERMINAL TYPE	TO	TERMINAL TYPE	AWG WIRE SIZE	LENGTH IN.	LENGTH CM
		Wiring Harness, P3- 13229E6673				
J9-1	13229E4181-1	S5-1	13216E6191-3	18	96.0	243.8
S3-2	MS25036-108	S5-1	13216E6191-3	16	51.0	129.5
P3-1	13229E6683	RT1-1	13229E4176	18	42.0	106.7
P3-2	13229E6683	RT1-2	13229E4176	18	42.0	106.7
P3-3	13229E6683	K2-X2	MS25036-149	18	46.0	116.8
P3-4	13229E6683	K1-X2	MS25036-149	18	19.0	48.3
P3-5	13229E6683	CR1-4(-)	None	18	14.0.	35.6
P3-6	13229E6683	J9-2	13229E4181-1, 13229E4273	18	51.0	129.5
P3-7	13229E6683	S3-1	MS25036-103	18	36.0	91.4
P3-8	13229E6683	S2-1	13216E6191-1	18	48.0	121.9
		Wiring Harness, J12 to TB3 - 13229E6678				
J12-1	13229E4181-2, 13229E4272	TB3-1	MS25036-108	16	22.8	57.9
J12-2	13229E4181-2, 13229E4272	TB3-2	MS25036-108	16	22.1	56.1
J12-3	13229E4181-2, 13229E4272	TB3-3	MS25036-108	16	21.4	54.5
J12-4	13229E4181-2, 13229E4272	TB3-4	MS25036-108	16	20.8	52.8
		Wiring Harness, CB1 to TB1 - 13229E6703				
CB1-A2	MS25036-115	TB1-1	MS25036-116	8	31.4	79.8
CB1-B2	MS25036-115	TB1-2	MS25036-116	8	29.8	75.7
CB1-C2	MS25036-115	TB1-3	MS25036-116	8	28.1	71.5
		Wiring Harness, J5 to TB3 - 13229E6677				
J5-1	13229E4181-2, 13229E4272	TB3-1	MS25036-108	16	11.8	30.0
J5-2	13229E4181-2, 13229E4272	TB3-2	MS25036-108	16	11.1	28.2
J5-3	13229E4181-2, 13229E4272	TB3-3	MS25036-108	16	10.4	26.4
J5-4	13229E4181-2, 13229E4272	TB3-4	MS25036-108	16	9.8	24.9

Table 3-4. Wire List. Continued

FROM	TERMINAL TYPE	TO	TERMINAL TYPE	AWG WIRE SIZE	LENGTH IN.	LENGTH CM
		Wiring Harness, K1 to TB2 - 13229E6674				
K1-A1	MS25036-108	TB2-1	MS25036-108	16	11.3	28.8
K1-B1	MS25036-108	TB2-2	MS25036-108	16	11.3	28.8
K1-C1	MS25036-108	TB2-3	MS25036-108	16	11.3	28.8
		Wiring Harness, K2 to TB2 - 13229E6672				
K2-A1	MS25036-112	TB2-1	MS25036-112	10	39.5	100.3
K2-B1	MS25036-112	TB2-2	MS25036-112	10	39.5	100.3
K2-C1	MS25036-112	TB2-3	MS25036-112	10	39.5	100.3
		Wiring Harness, P16 to CB1 - 13229E6704				
P16-A	13229E6718-1	CB1-A1	MS25036-115	8	52.5	133.4
P16-B	13229E6718-1	CB1-B1	MS25036-115	8	53.3	135.4
P16-C	13229E6718-1	CB1-C1	MS25036-115	8	54.0	137.2
P16-D	13229E6718-1	TB1-4	MS25036-116	8	35.0	88.9
P16-E	13229E6718-1	TB1-5	MS25036-116	8	35.0	88.9
		Wiring Harness, Compressor- 13229E6675				
P4-A	MS3106R24-11S	J7-2	13229E4181-1	16	26.8	68.1
P4-B	MS3106R24-11S	S6-2	13216E6191-2	16	39.0	99.1
P4-D	MS3106R24-11S	TB3-3	MS25036-112	10	63.4	161.0
P4-E	MS3106R24-11S	TB3-2	MS25036-112	10	64.1	162.8
P4-F	MS3106R24-11S	TB3-1	MS25036-112	10	64.8	164.6
P4-G	MS3106R24-11S	TB1-2	MS25036-154	16	64.6	164.1
P4-H	MS3106R24-11S	TB1-1	MS25036-154	16	65.5	166.4
J7-1	13229E4181-1	J13-2	13229E4181-1	16	46.0	116.8
J13-1	13229E4181-1	S5-2	13216E6191-2	16	39.0	99.1

Table 3-4. Wire List.

FROM	TERMINAL TYPE	TO	TERMINAL TYPE	AWG WIRE SIZE	LENGTH IN.	LENGTH CM
		Wiring Harness, Control Panel - 13229E4274				
P6-1	M24308/4-303	R1-1	NONE	20	8.0	20.3
P6-2	M24308/4-303	DS1-4-A	NONE	20	4.0	10.2
P6-3	M24308/4-303	S1-C1	NONE	20	6.0	15.2
P6-4	M24308/4-303	DS1-C	NONE	20	4.0	10.2
P6-5	M24308/4-303	S1-2	NONE	20	6.0	15.2
P6-6	M24308/4-303	S1-4	NONE	20	6.0	15.2
P6-7	M24308/4-303	S1-3	NONE	20	6.0	15.2
P6-8	M24308/4-303	S1-1	NONE	20	6.0	15.2
P6-9	M24308/4-303	DS2-C	NONE	20	4.0	10.2
P6-10	M24308/4-303	DS3-C	NONE	20	4.0	10.2
P6-11	M24308/4-303	DS4-C	NONE	20	4.0	10.2
P6-12	M24308/4-303	R1-2	NONE	20	8.0	20.3
		Miscellaneous Wire Leads				
E1	13216E6191-2	TB2-5	MS23056-108	16	5.5	14.0
L1-1	13216E6191-2	K2-A2	MS23056-108	16	7.0	17.8
L1-2	13216E6191-2	K2-B2	MS23056-108	16	7.0	17.8
S2-2	13216E6191-2	S6-1	13216E6191-2	16	50.0	37.0
TB3-4	M525036-108	TB1-5	MS25036-154	16	29.0	73.7
E1	13216E6191-2	TB1-5	MS25036-154	16	3.0	7.6
T1-3	NONE	CR1-1	NONE	16	10.0	25.4
T1-4	NONE	CR1-3	NONE	16	10.0	25.4
T1-1	NONE	TB1-1	MS25036-154	16	7.0	17.8
T1-2	NONE	TB1-2	MS25036-154	16	7.0	17.8
CR1-2(+)	NONE	K1-X1	MS25036-153	16	14.0	35.6
CR1-2(+)	NONE	K2-X1	MS25036-153	16	28.0	71.1
TB3-1	MS25036-112	K2-A2	MS25036-112	10	3.8	9.7
TB3-2	MS25036-112	K2-B2	MS25036-112	10	3.8	9.7
TB3-3	MS25036-112	K2-C2	MS25036-112	10	3.8	9.7

3-18. FABRIC COVER.

This Task Covers:

a. Removal b. Repair c. Installation

Initial Setup:

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

Material/Parts Required
Tape, Duct (Item 3, Appendix E)

Equipment Condition
Air conditioner shut down and cool.

a. Removal. (Refer to Figure 3-6).

(1) Untie two straps (1) and roll down fabric cover (2).

(2) Remove three screws (3), three lock washers (4), and three flat washers (5) attaching cover (2) to top of unit (6).

(3) Remove fabric cover (2) from unit (6).

b. Repair.

(1) Repair minor fabric rips, cuts, tears or punctures by applying a patch of duct tape to inside surface.

(2) If damage to fabric cover is extensive, replace fabric cover.

c. Installation.

(1) Place fabric cover onto top of unit (6) and install three flat washers (5), three lock washers (4), and three screws (3).

(2) Roll up fabric cover (2), tie two straps (1) to keep cover in place.

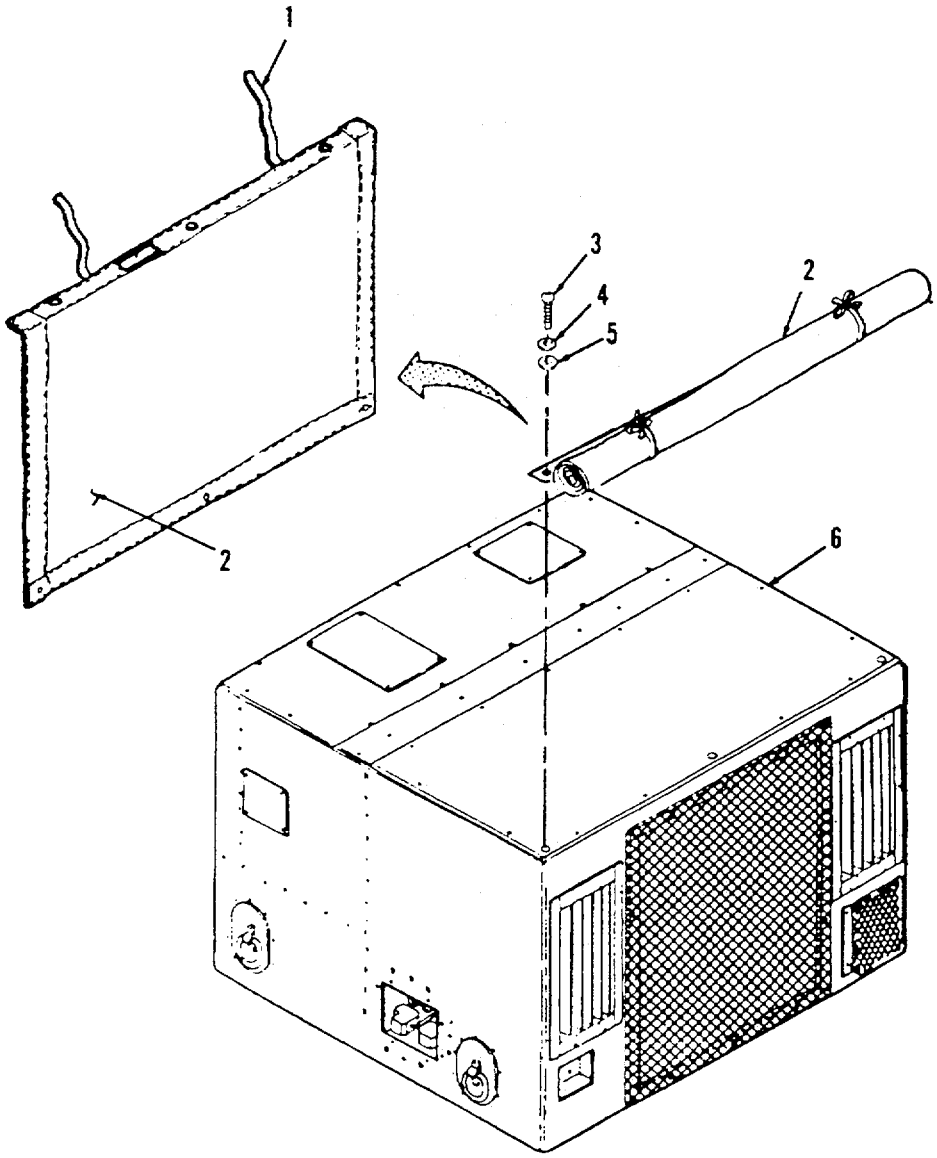


Figure 3-6. Fabric Cover.

3-19. ACCESS PANEL.

This Task Covers:

a. Removal b. Cleaning c. Repair d. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Cloth, Lint-Free (Item 12, Appendix E)
Brush, Medium Bristle (Item 13, Appendix E)
Solvent, Dry Cleaning (Item 9, Appendix E)
Adhesive (Item 15, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

WARNING
HIGH VOLTAGE
is used in operation of this equipment.
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.
Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

a. Removal. (Refer to Figure 3-7).

(1) Remove eight screws (1) and access panel (2) from air conditioner (3).

(2) If gasket material is being replaced, remove gasket (4) from access panel (2).

b. Cleaning

WARNING

Serious injury can result in breathing fumes of dry cleaning solvent P-D-680, Type III. Serious injury or death can result from explosion of fumes from solvent. When using this solvent:

- **Clean parts in a well ventilated area.**
- **Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.**
- **Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).**
- **Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm ^{2}).**

(1) Clean all metallic parts with a clean soft cloth or a medium bristle brush, and cleaning solvent. Be sure that all gasket adhesive residue is removed if gasket material is being replaced.

(2) Allow parts to dry.

c. Repair.

(1) Repair access panel by straightening any bent metal.

(2) If access panel damage is extensive, replace panel.

(3) If gasket material was removed, replace gasket material. Cut bulk lengths of new gasket material to match the lengths of the old gasket material.

d. Installation.

(1) Put new gasket (4) onto access panel (2) if gasket was removed.

(2) Install access panel (2) and eight screws (1) onto air conditioner (3).

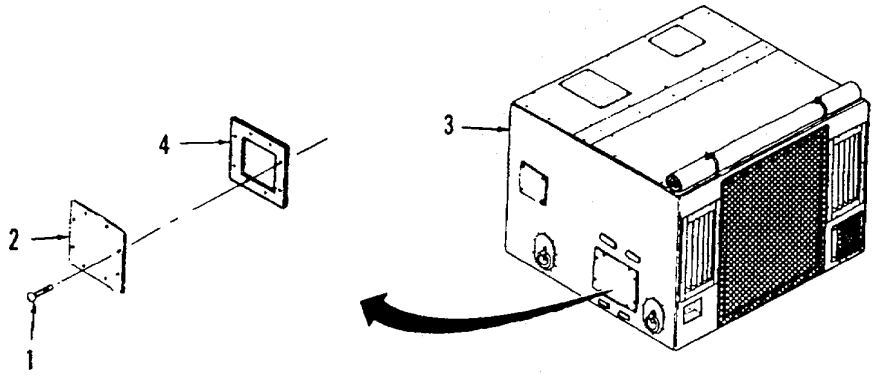


Figure 3-7. Access Panel.

3-20. CONDITIONED AIR LOUVER.

This Task Covers:

a. Removal b. Repair c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool

a. Removal (Refer to Figure 3-8)

(1) Remove eight screws (1) and eight lock washers (2).

(2) Remove conditioned air louver (3) from unit (4).

b. Repair.

(1) Repair louver by straightening any louver blades which may be bent.

(2) If louver is badly damaged, replace with a new louver.

c. Installation.

(1) Place conditioned air louver (3) into position on unit (4).

(2) Install eight lock washers (2) and eight screws (1).

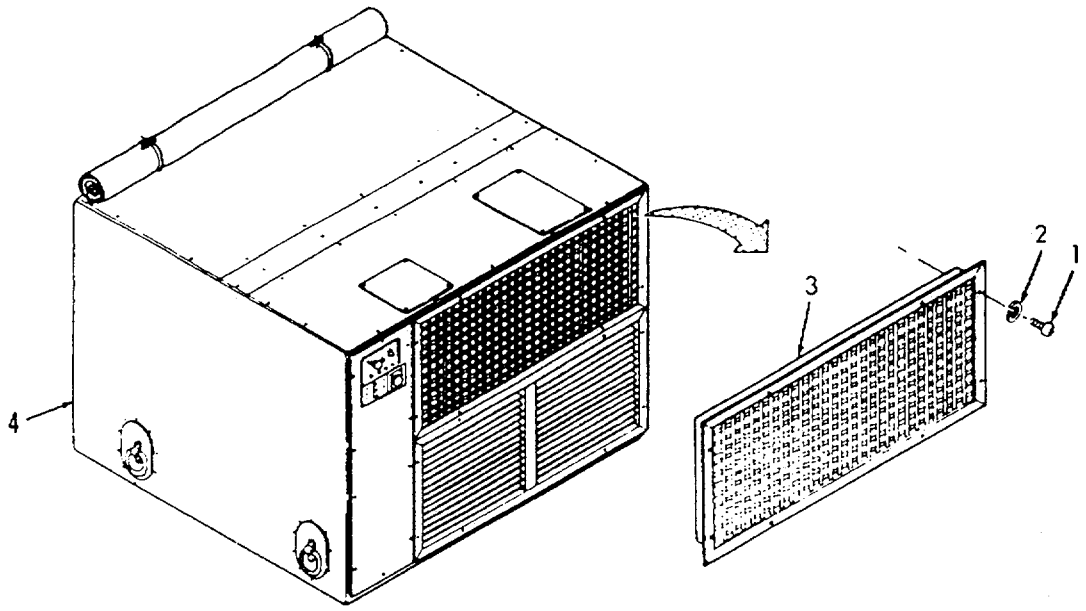


Figure 3-8. Conditioned Air Louver.

3-21. RETURN AIR LOUVER.

This Task Covers:

a. Removal b. Repair c. Installation

Initial Setup:

Tools Required

Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)
Drill, Electric, Portable (Item 2, Appendix B)
Drill Set, Twist (Item 2, Appendix B)
Riveter, Blind, Hand (Item 2, Appendix B)

Material/Parts Required

Rivets (Refer to TM 9-4120-404-24P)

Equipment Condition

Air conditioner shut down and cool.

a. Removal. (Refer to Figure 3-9).

(1) Remove eight screws (1) and eight lock washers (2).

(2) Remove return air louver (3) from unit (4).

(3) Remove air conditioning filter (5) from return air louver (3).

b. Repair.

(1) Remove eight new rivets (6), four angles (7), and four clips (8) from louver (9).

(2) Straighten bent louver blades on louver (9).

(3) Replace four angles (7) and four clips (8) if damaged.

(4) Install four clips (8), four angles (7), and eight new rivets (6) onto louver (9).

c. Installation.

NOTE

Be sure arrow indicating air flow direction on air conditioning filter is pointing toward unit.

(1) Install air conditioning filter (5) into return air louver (3).

(2) Place return air louver (3) into place on unit (4).

(3) Install eight lock washers (2) and eight screws (1).

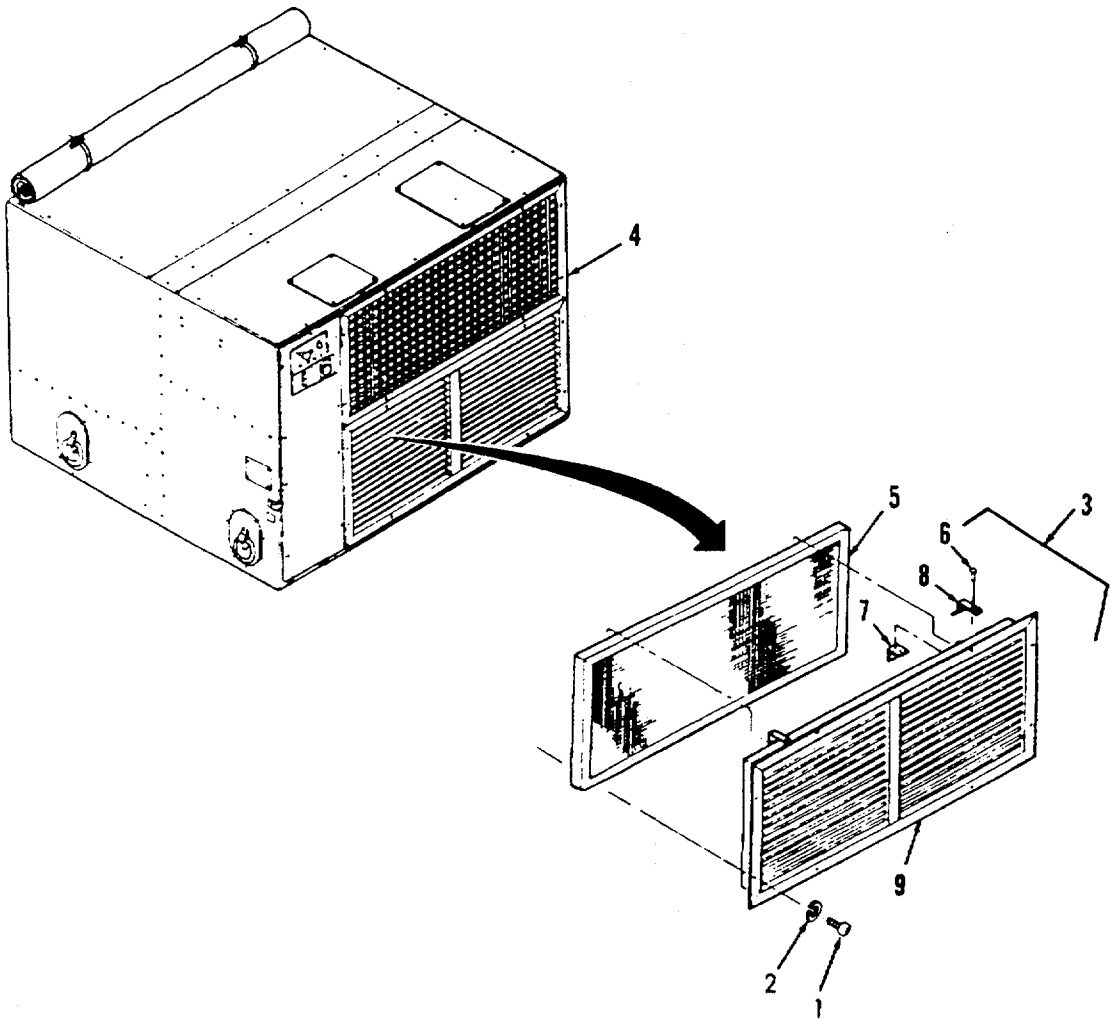


Figure 3-9. Return Air Louver.

3-22. CONDENSER EXHAUST LOUVERS.

This Task Covers:

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

Initial Setup:

Took Rewired
Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)

Material/Parts Required
None

Equipment Condition
Air conditioner shut down and cool.
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-10).

(1) Remove two screws (1) and two nuts (2) to disconnect cables (3) from exhaust louvers (6 and 7).

(2) Remove ten screws (4), ten lock washers (5), and right condenser exhaust louver (6).

(3) Remove ten screws (4), ten lock washers (5), and left condenser exhaust louver (7).

b. Disassembly. (Refer to Figure 3-11).

(1) Remove twelve screws (1) and louver frame (2).

(2) Remove lower bearing plate (3) and five bearings (4).

(3) Disassemble five pins (5), five washers (6), connecting link (7), upper bearing plate (8), five bearings (9), and five louver blades (10).

(4) Remove five rivets (11) and then disassemble five flat washers (12), five spacers (13), link (14), and five louver blade arms (15).

c. Assembly. (Refer to Figure 3-11).

(1) Assemble five louver blade arms (15), link (14), five spacers (13), and five flat washers (12) and then install five rivets (11).

(2) Install five louver blades (10), five bearings (9), connecting link (7), five washers (6), and five pins (5) onto upper bearing plate (8).

(3) Install five bearings (4) and lower bearing plate (3).

(4) Install louver frame (2) and twelve screws (1).

d. Installation. (Refer to Figure 3-10).

(1) Install left condenser exhaust louver (7), ten lock washers (5), and ten screws (4).

(2) Install right condenser exhaust louver (6), ten lock washers (5), and ten screws (4).

(3) Place loops from cable (3) into louvers (6 and 7) and install two screws (1) and two nuts (2).

(4) Install rear cover (see para. 3-27).

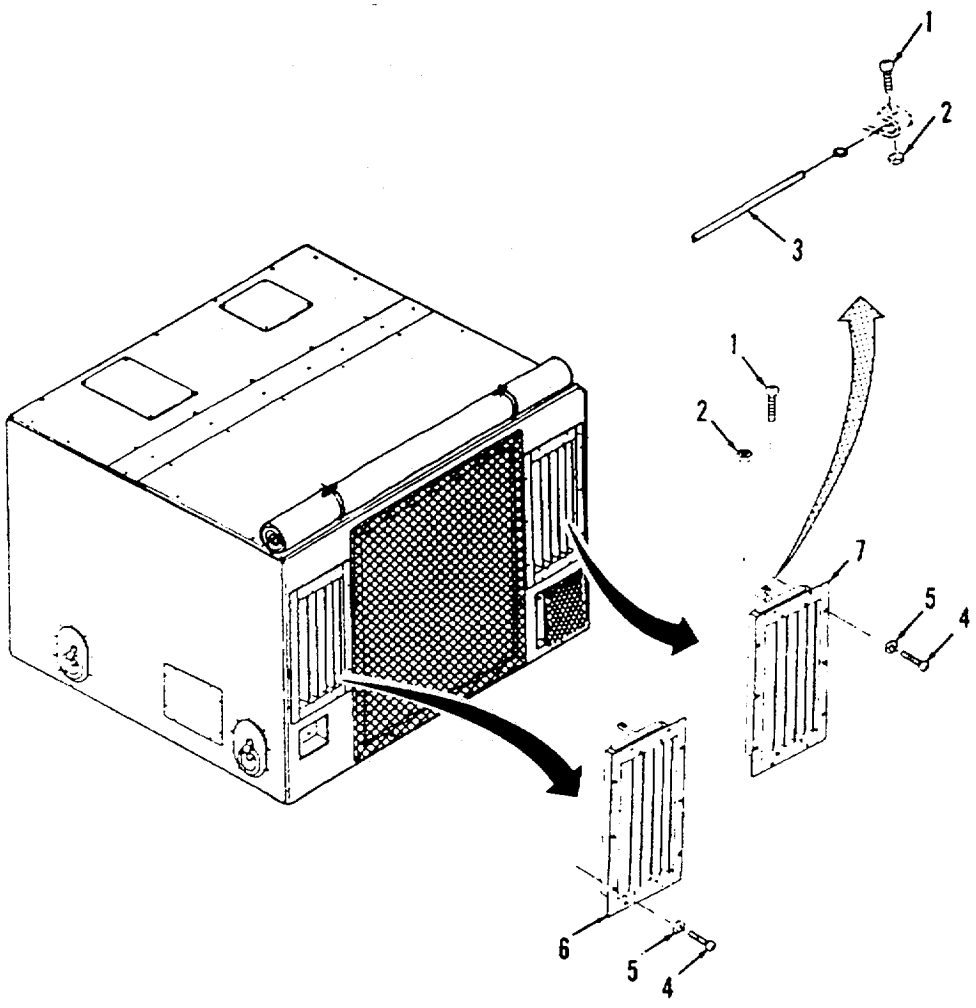


Figure 3-10. Condenser Exhaust Louvers.

3-22. CONDENSER EXHAUST LOUVERS. - Continued

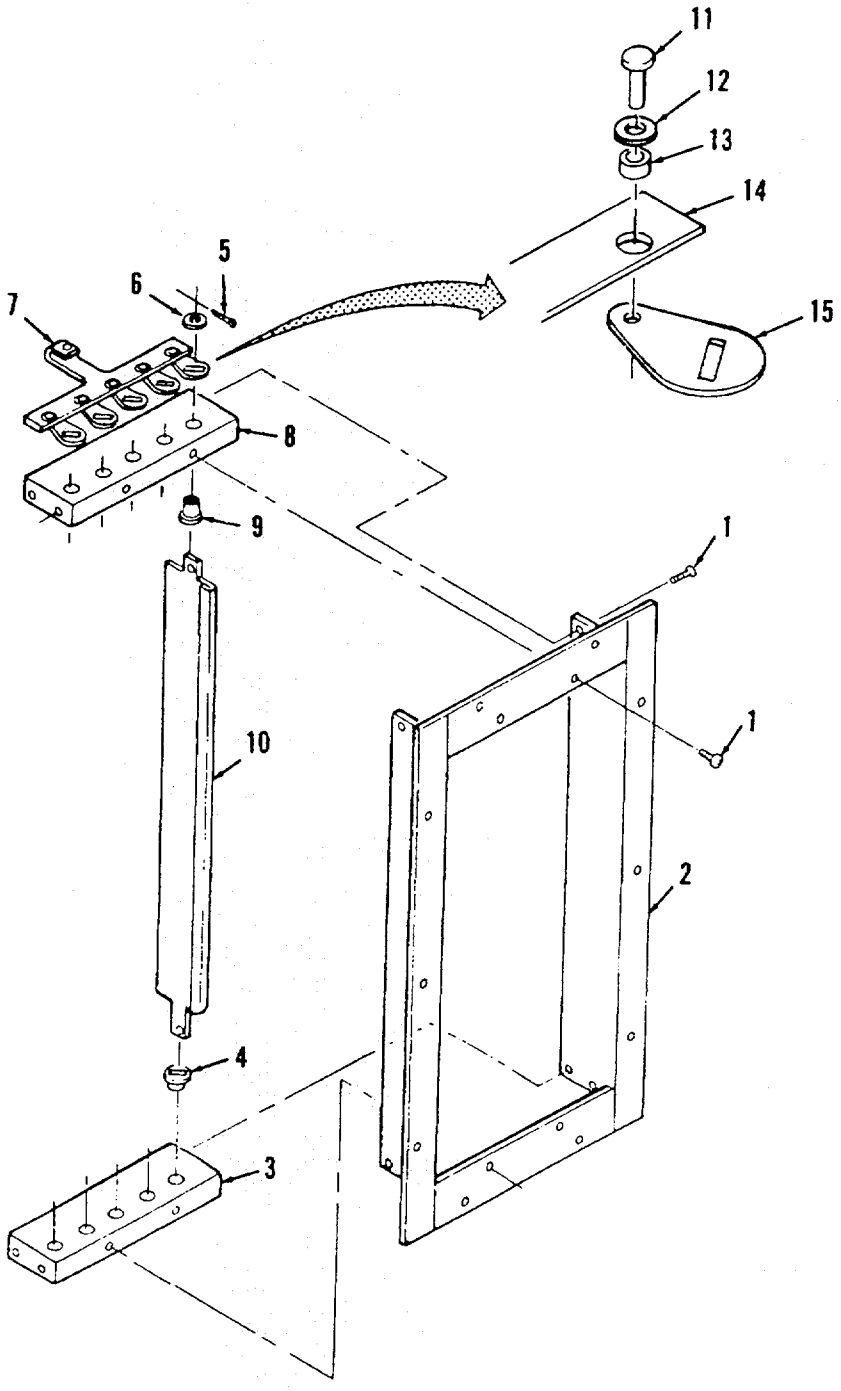


Figure 3-11. Condenser Exhaust Louvers Disassembly.

3-23. VENTILATION GUARD AND VENTILATION AIR FILTER.

This Task Covers:

a. Removal b. Inspection c. Servicing d. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Soap (Item 14, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

a. Removal. (Refer to Figure 3-12).

(1) Remove four screws (1), four lock washers (2), and ventilation guard (3).

(2) Remove ventilation filter (4) from unit (5).

b. **Inspection**.

Inspect ventilation filter for dirt or debris that cannot be removed without damaging filter. If filter is unable to be cleaned, replace it with a new filter.

c. Servicing.

(1) Wash filter thoroughly with mild soap and water solution.

(2) Drain excess water from filter and allow to dry.

d. Installation.

(1) Install ventilation air filter (4) into unit (5).

(2) Install ventilation guard (3), four lock washers (2), and four screws (1).

3-23. VENTILATION GUARD AND VENTILATION AIR FILTER.- Continued

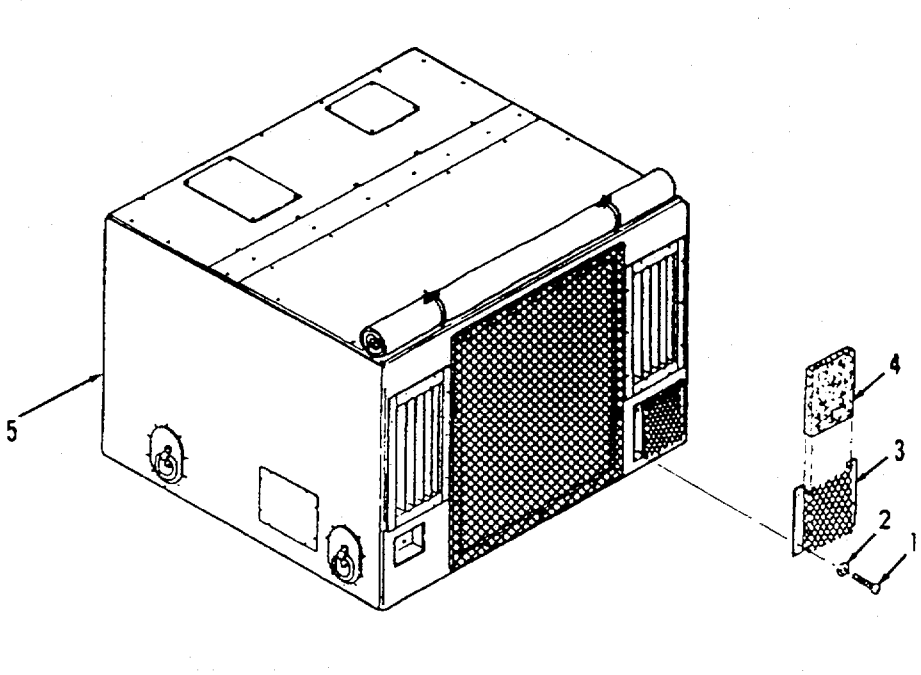


Figure 3-12. Ventilation Guard and Ventilation Air Filter.

3-24. FILTER, AIR CONDITIONING.

This Task Covers:

a. Removal b. Servicing c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Soap (Item 14, Appendix E)
Coater, Air Filter (Item 20, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

a. Removal. (Refer to Figure 3-13).

(1) Remove eight screws (1), eight lock washers (2), and return air louver (3) from unit (4).

(2) Remove air conditioning filter (5) from return air louver (3).

b. Servicing.

(1) Clean filter thoroughly with mild soap and water solution.

(2) Drain excess water and allow filter to dry.

(3) Sparingly apply air filter coater to filter.

c. Installation.

NOTE
Be sure arrow indicating air flow direction on filter points toward unit.

(1) Install air conditioning filter (5) into return air louver (3).

(2) Install return air louver (3) into unit (4).

(3) Install eight lock washers (2) and eight screws (1).

3-24. FILTER, AIR CONDITIONING.- Continued

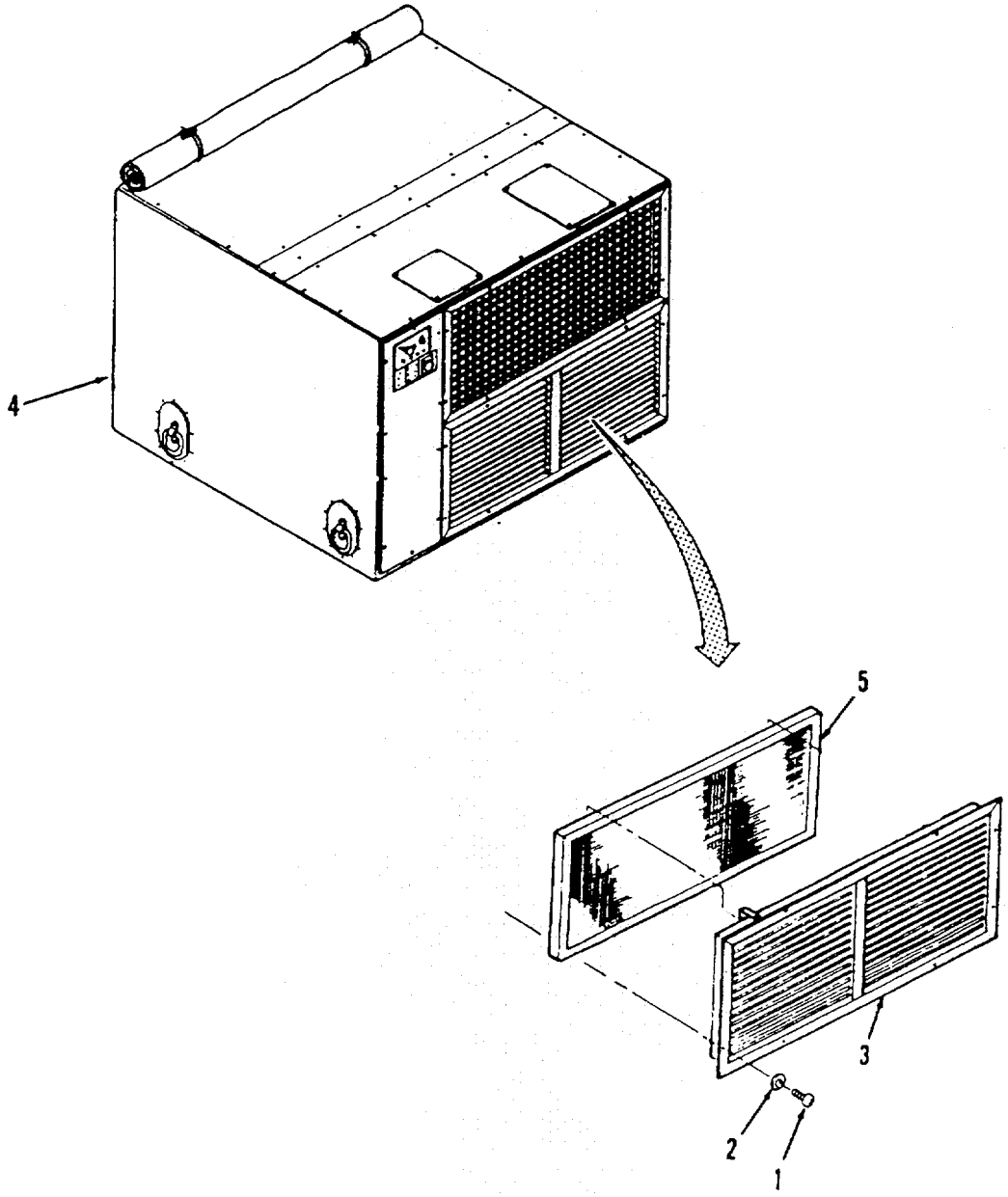


Figure 3-13. Filter, Air Conditioning.

3-25. CONDENSER COIL GUARD.

This Task Covers:

a. Removal b. Installation

Initial Setup:

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

Material/Parts Required
None

Equipment Condition
Air conditioner shut down and cool.

a. Removal (Refer to Figure 3-14).

Remove eight screws (1), eight lock washers (2), fastener (3), and condenser coil guard (4) from unit (5).

b. Installation.

Install condenser coil guard (4), fastener (3), eight lock washers (2), and eight screws (1) onto unit (5).

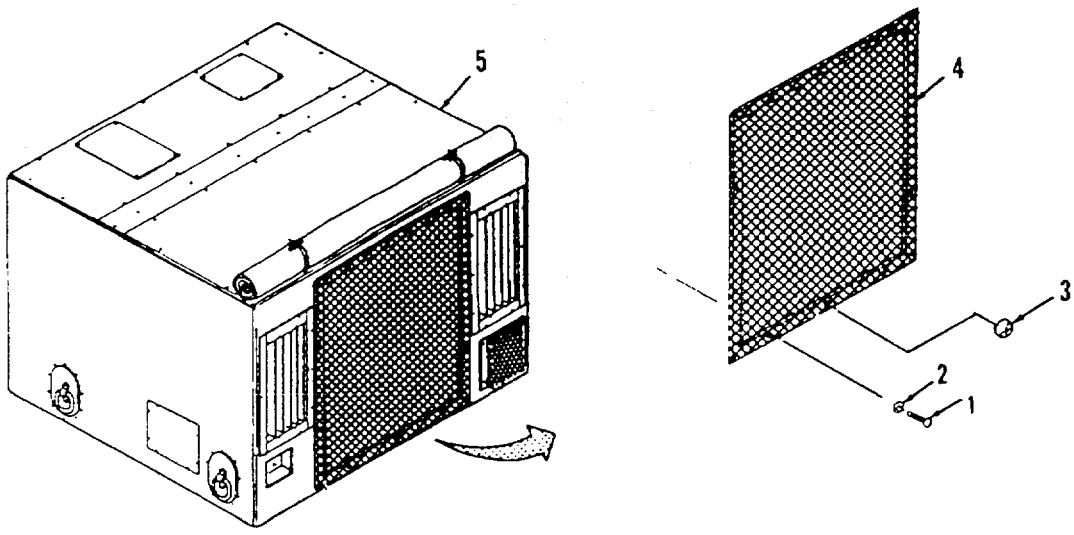


Figure 3-14. Condenser Coil Guard .

3-26. INFORMATION PLATES.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Riveter, Blind, Hand (Item 2, Appendix B)
Drill, Electric, Portable (Item 2, Appendix B)
Drill Set, Twist (Item 2, Appendix B)

Material/Parts Required

Rivets (Refer to TM 9-4120-404-24P)
Soap (Item 14, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

a. Removal (Refer to Figure 3-15).

(1) Drill out four rivets (1) and information plate (2) from side of unit (3).

(2) Drill out eighteen rivets (4) and information plates (5), (6), (7), and (8).

(3) Remove identification plates (9), (10), (11), and (12) from side of unit (3).

b. Installation.

(1) Clean area on side of unit (3) with soap and water where identification plates (12), (11), (10), and (9) will be installed.

(2) Install information plates (12), (11), (10), and (9) onto side of unit (3).

(3) Position information plates (8), (7), (6), and (5) onto top unit and install eighteen new rivets (4).

(4) Position identification plate (2) into position on side of unit (3) and install four new rivets (1).

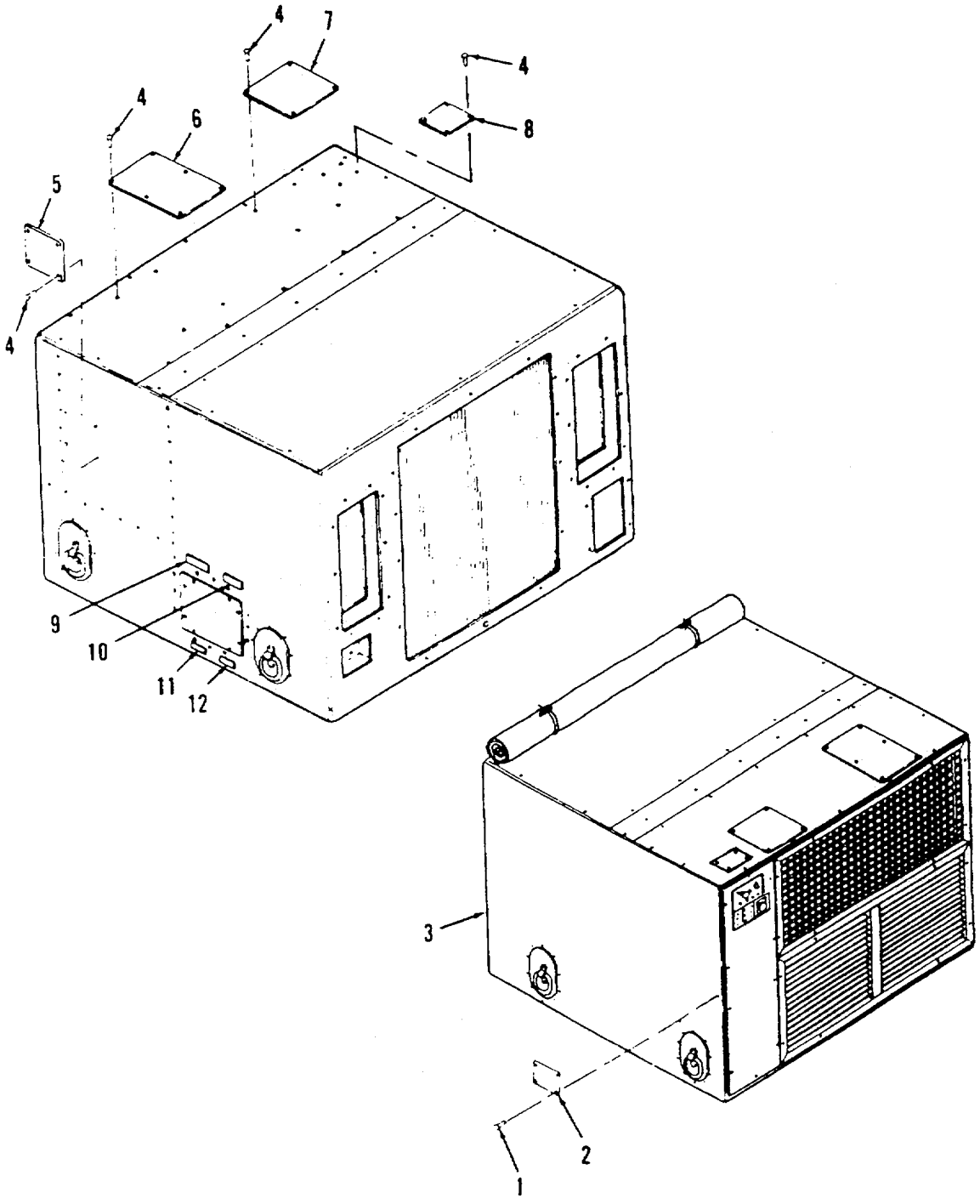


Figure 3-15. Information Plates.

3-27. METAL COVERS.

This Task Covers:

a. Removal b. Cleaning c. Repair d. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Gaskets (Refer to TM 9-4120-404-24P) (If gaskets are being replaced.)
Cloth, Lint-Free (Item 12, Appendix E)
Brush, Medium Bristle (Item 13, Appendix E)
Solvent, Dry Cleaning (Item 9, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

a. Removal. (Refer to Figure 3-16).

(1) Remove nine screws (1), five screws (2) and front cover (3).

(2) Remove nine screws (4), five screws (5), and rear cover (6).

(3) Remove eight screws (7) and center cover (8).

(4) Remove gasket material (9) if damaged.

b. Cleaning.

WARNING

Serious injury can result in breathing fumes of dry cleaning solvent P-D680, Type III. Serious injury or death can result from explosion of fumes from solvent. When using this solvent:

- **Clean parts in a well ventilated area.**
- **Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly.**
- **Do not use near open flame or excessive heat. Flash point of solvent is 100° F to 138° F (38° C to 59° C).**
- **Wear eye protection when blowing solvent from parts. Air pressure should not exceed 30 psig (2.1 kg/cm 2).**

(1) Clean all metallic parts with a clean soft cloth or a medium bristle brush, and cleaning solvent. Be sure that all gasket adhesive residue is removed if gasket material is being replaced.

(2) Allow parts to dry.

c. Repair. Repair of metal covers is limited to replacing damaged gaskets and to straightening any bent metal surfaces.

d. Installation.

(1) Install new gasket material (9) onto front cover (3), rear cover (6), and center cover (8) using adhesive. Refer to Appendix F for gasket manufacturing instructions.

(2) Install center cover (8) and eight screws (7).

(3) Install rear cover (6), five screws (5), and nine screws (4).

(4) Install front cover (3), five screws (2), and nine screws (1).

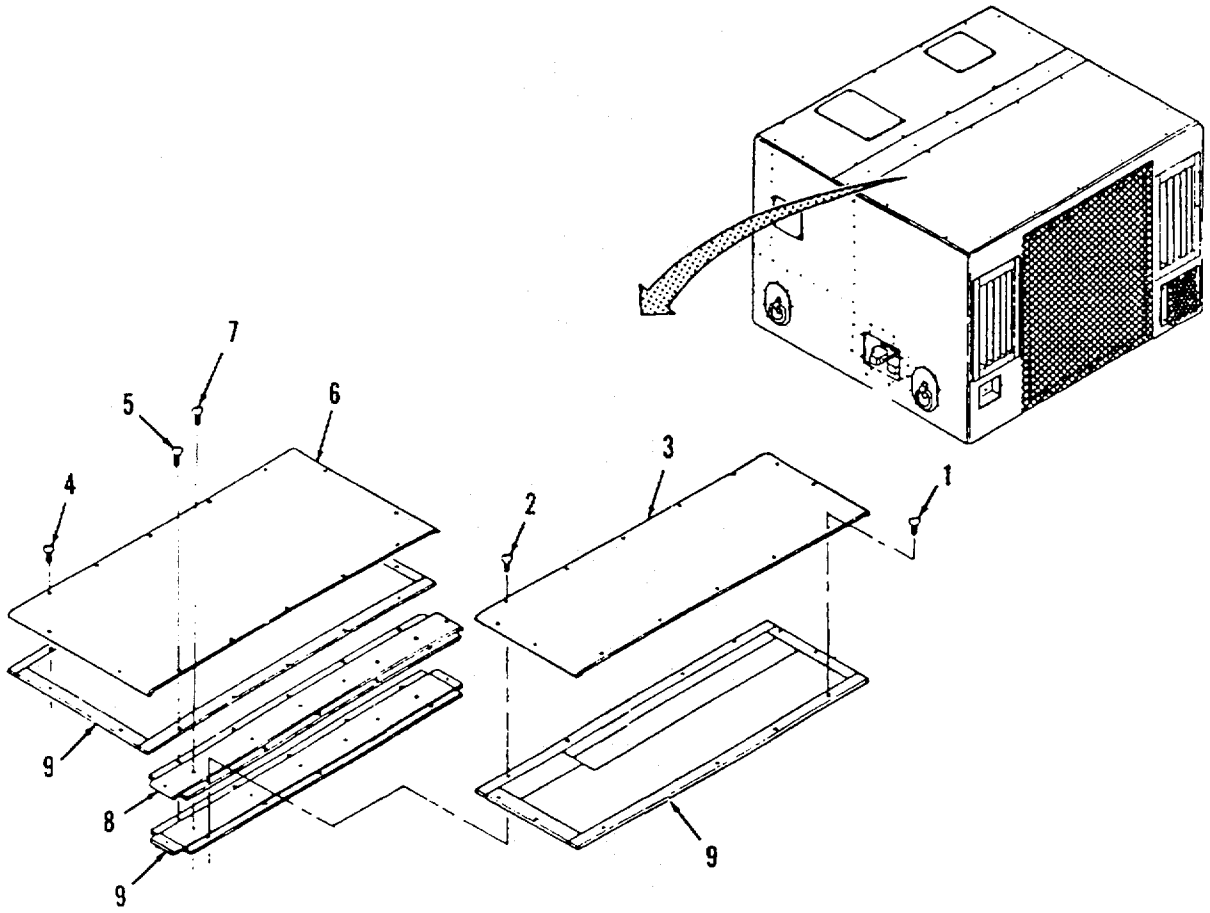


Figure 3-16. Metal Covers.

3-28. MIST ELIMINATOR.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required
Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)

Material/Parts Required
None

Equipment Condition
Air conditioner shut down and COOL
Front cover removed (See para. 3-27).

a. Removal. (Refer to Figure 3-17).

Remove mist eliminator (1) from unit.

b. Installation.

(1) Place mist eliminator bracket (1) into unit.
(2) Install front cover (see para. 3-27).

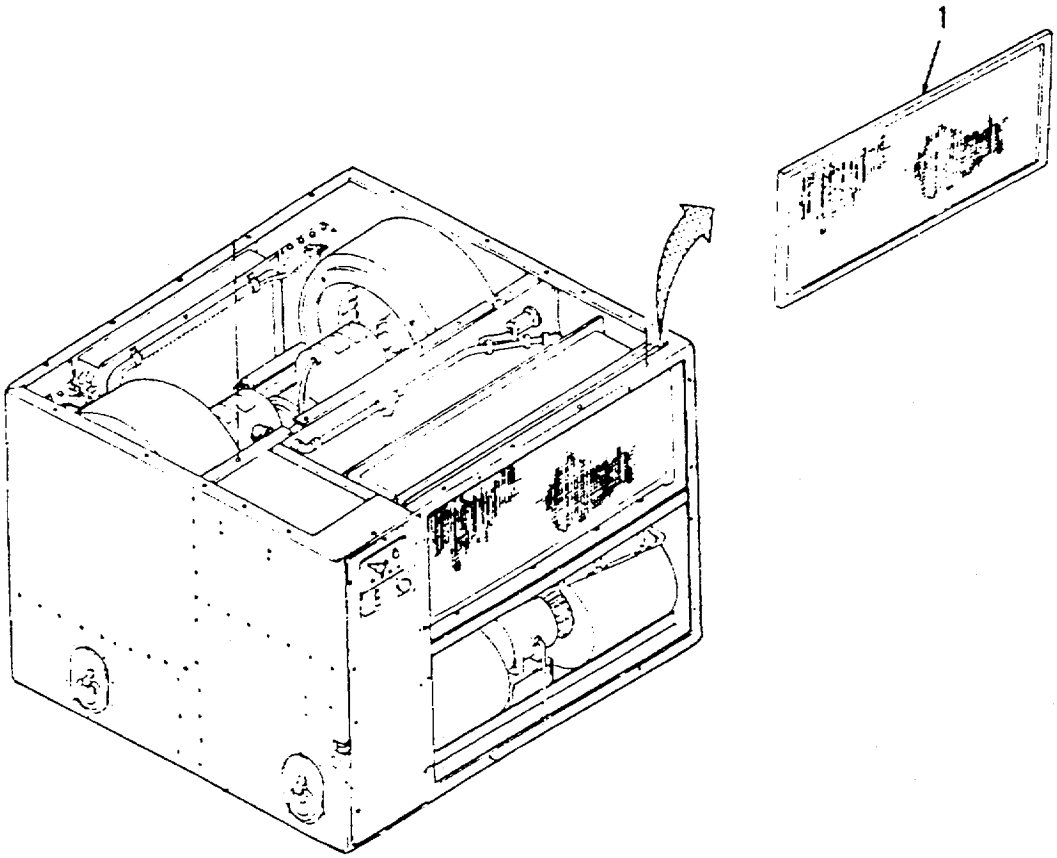


Figure 3-17. Mist Eliminator.

3-29. HEATING ELEMENTS (HR1 through HR6).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Took Required

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

Material/Parts Rewired

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-18).

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Remove cable ties as needed.

(2) Tag and disconnect all heating element wires from heater relay (K1) and terminal post.

WARNING

Evaporator fins are very sharp and can injure personnel. Use extreme care when removing heating elements.

CAUTION

Bending evaporator fins will reduce unit's operating efficiency. Use care when removing heating elements to not bend evaporator coil fins.

NOTE

Remove top heating element first. Element removal sequence is HR6, HR5, HR4, HR3, HR2, and then HR1.

(3) Remove nut (1), lock washer (2), flat washer (3), insulating washer (4), and carefully maneuver heating element (5) from unit.

(4) Repeat step (3) for each heating element.

b. Test.

(1) Set multimeter on R x 1000 scale and test each heating element for resistance. Each element should indicate a resistance of 10 ohms ± 30%.

(2) If any element does not read correct resistance, the element must be replaced.

c. Installation.

WARNING

Evaporator fins are very sharp and can injure personnel. Use extreme care when removing heating elements.

CAUTION

Bending evaporator fins will reduce unit's operating efficiency. Use care when removing heating elements to not bend evaporator coil fins.

(1) Install heating element (5), insulating washer (4), flat washer (3), lock washer (2), and nut (1) into unit.

(2) Repeat step (1) for other heating elements.

(3) Install heating element wires as tagged during removal and then remove tags.

3-29. HEATING ELEMENTS (HR1 through HR6). - Continued

(4) Install any cable ties as needed.

(5) Install front cover (see para. 3-27).

(6) Reconnect air conditioner to power source.

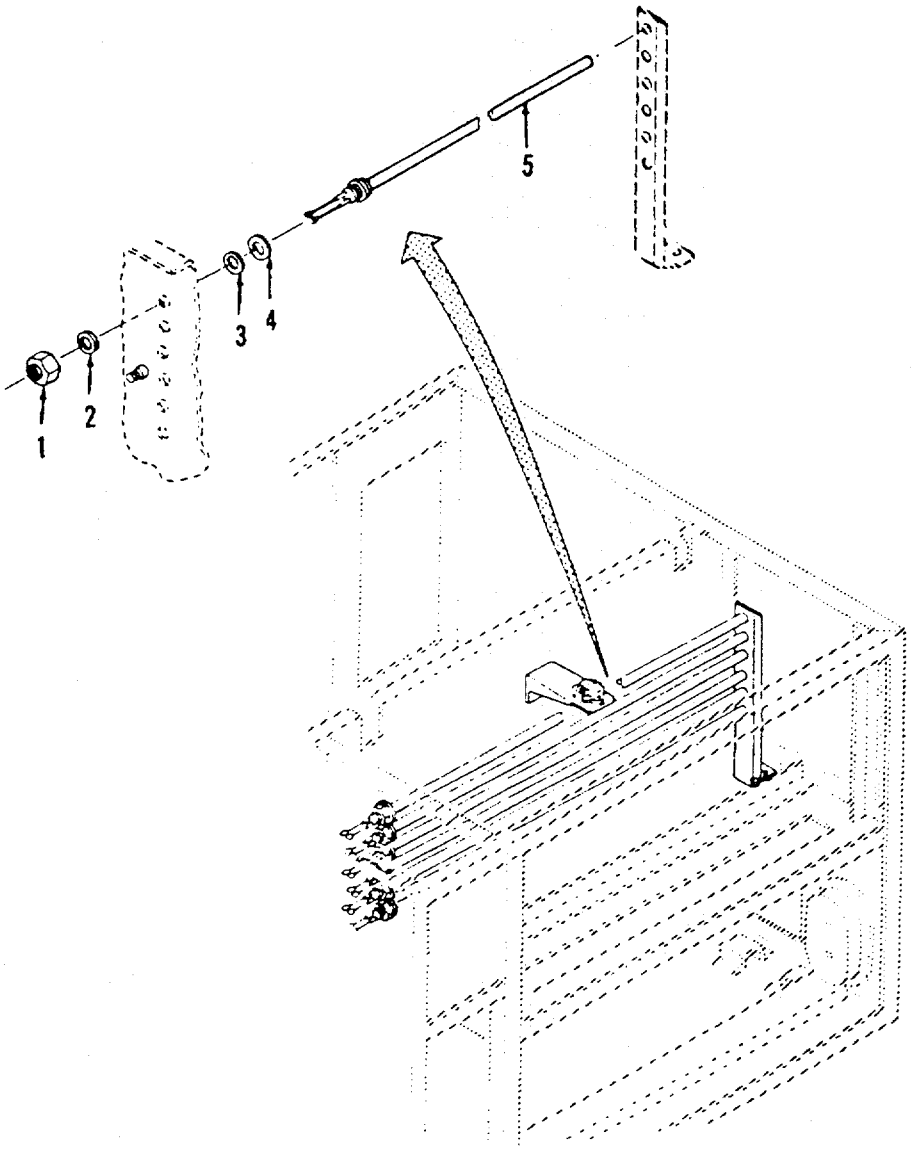


Figure 3-18. Heating Elements.

3-30. HEATER CUTOUT SWITCH (S3).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-19).

WARNING

HIGH VOLTAGE

is used in operation of this equipment-

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag and disconnect heater cutout switch wires from terminals.

3-30. HEATER CUTOUT SWITCH (S3). - Continued

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

(3) Remove heater cutout switch (4) from thermostat switch bracket (5).

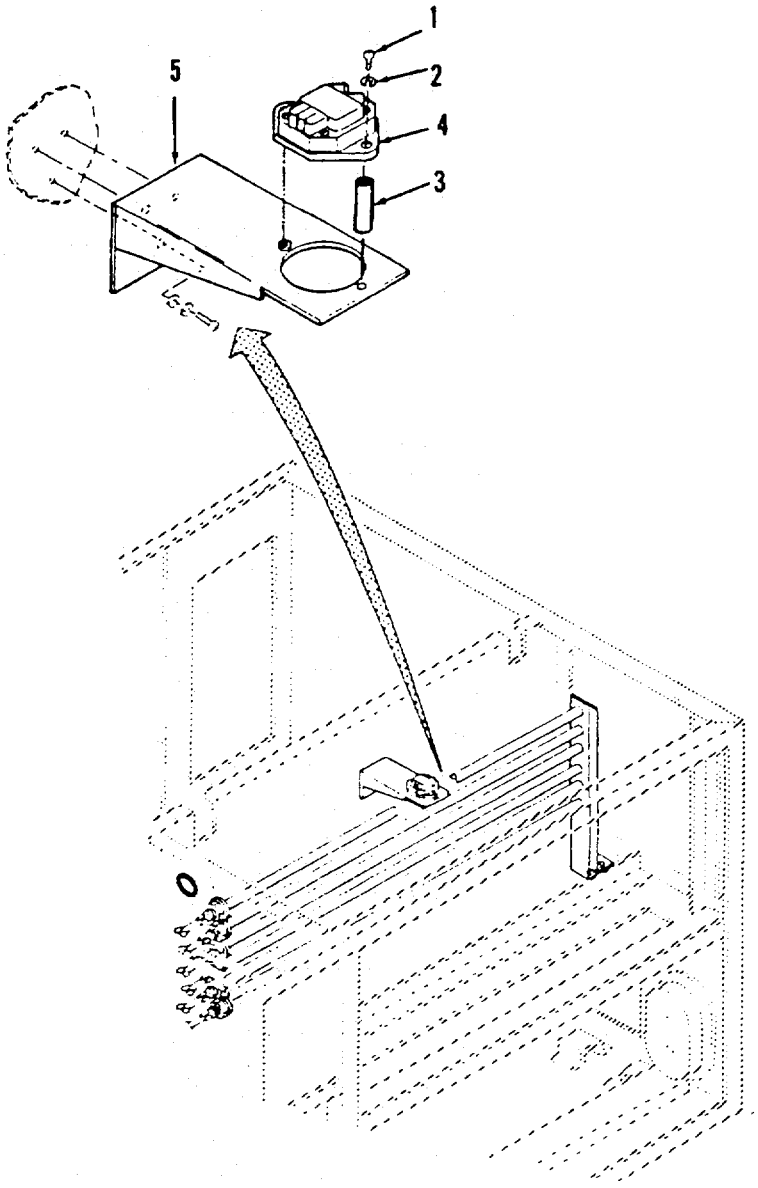


Figure 3-19. Heater Cutout Switch.

b. Test

(1) Using a multimeter check that circuits are closed across terminals 1 & 2 and 3 & 4.

(2) Infinity reading across any terminals indicates a defective thermostat and it must be replaced.

c. Installation.

(1) Position heater cutout switch (4) on thermostat switch bracket (5).

(2) Install two spacers (3), two lock washers (2) and two screws (1) onto heater cutout switch (4).

(3) Connect wires per tags installed during removal and then remove tags.

(4) Install front cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

3-31. HEATER RELAY (K1).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Front cover removed (see para. 3-27),

a. Removal. (Refer to Figure 3-20).

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag and disconnect all wires attached to heater relay.

(2) Remove four screws (1), four lock washers (2), and four flat washers (3).

(3) Remove heater relay (4) from unit.

b. Test.

(1) Using an ohmmeter set on lowest OHMS reading, check relay for continuity across terminals A1 and A2, B1 and B2, and C1 and C2.

(2) Each set of terminals should indicate an open circuit. If any set of terminals indicate a closed circuit, replace relay.

(3) Using ohmmeter set on lowest OHMS reading, check relay for continuity across terminals X2 and X1. Test should indicate a closed circuit. If test indicates an open circuit, replace relay.

(4) Use an ohmmeter to test that diode (5) has an infinite resistance when tested. Reverse ohmmeter test leads and check that diode now has continuity.

c. Installation.

(1) Place heater relay (4) into unit.

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

(3) Refer to wire tags and reconnect wires to heater relay.

NOTE

When reconnecting diode to heater relay terminals X1 and X2, be sure to connect "+" end of diode to terminal X1.

(4) Install front cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

3-31. HEATER RELAY (K1). Continued.

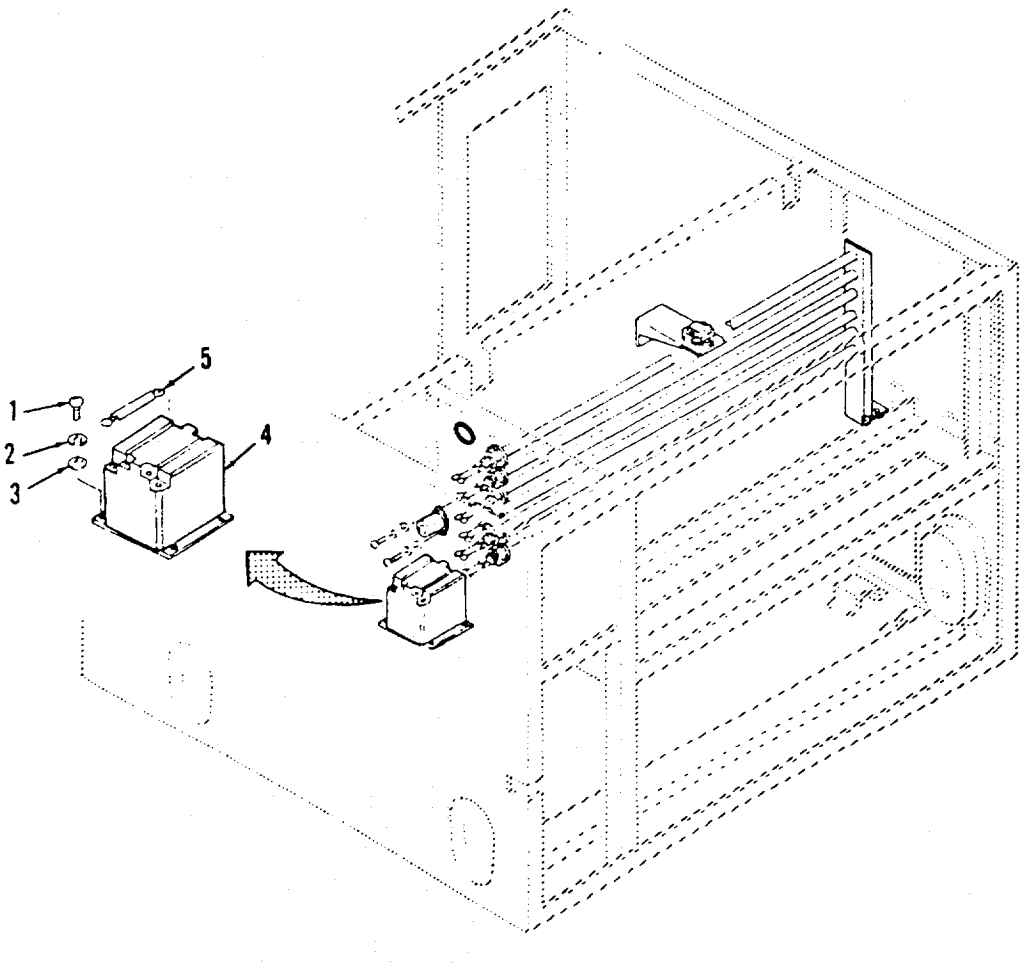


Figure 3-20. Heater Relay.

3-32. CONDENSATE DRAIN ASSEMBLY.

This Task Covers:

a. Removal b. Repair c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Return air louver removed (see para. 3-21).

a. Removal. (Refer to Figure 3-21).

(1) Loosen four clamps (1), (2), (3), and (4).

(2) Remove tubing (5), (6), (7), (8), (9), and (10) from bottom of evaporator drain pan.

(3) Remove tee (11) and tee (12).

(4) Remove elbow and tee assembly (13).

b. Repair.

Repair is limited to replacement of defective components.

c. Installation.

(1) Install elbow and tee assembly (13).

(2) Install tee (12) and (11) to tubing (10), (9), (8), (7), (6), and (5).

(3) Tighten clamps (4), (3), (2), and (1).

(4) Install return air louver (see para. 3-21).

3-32. CONDENSATE DRAIN ASSEMBLY. - Continued

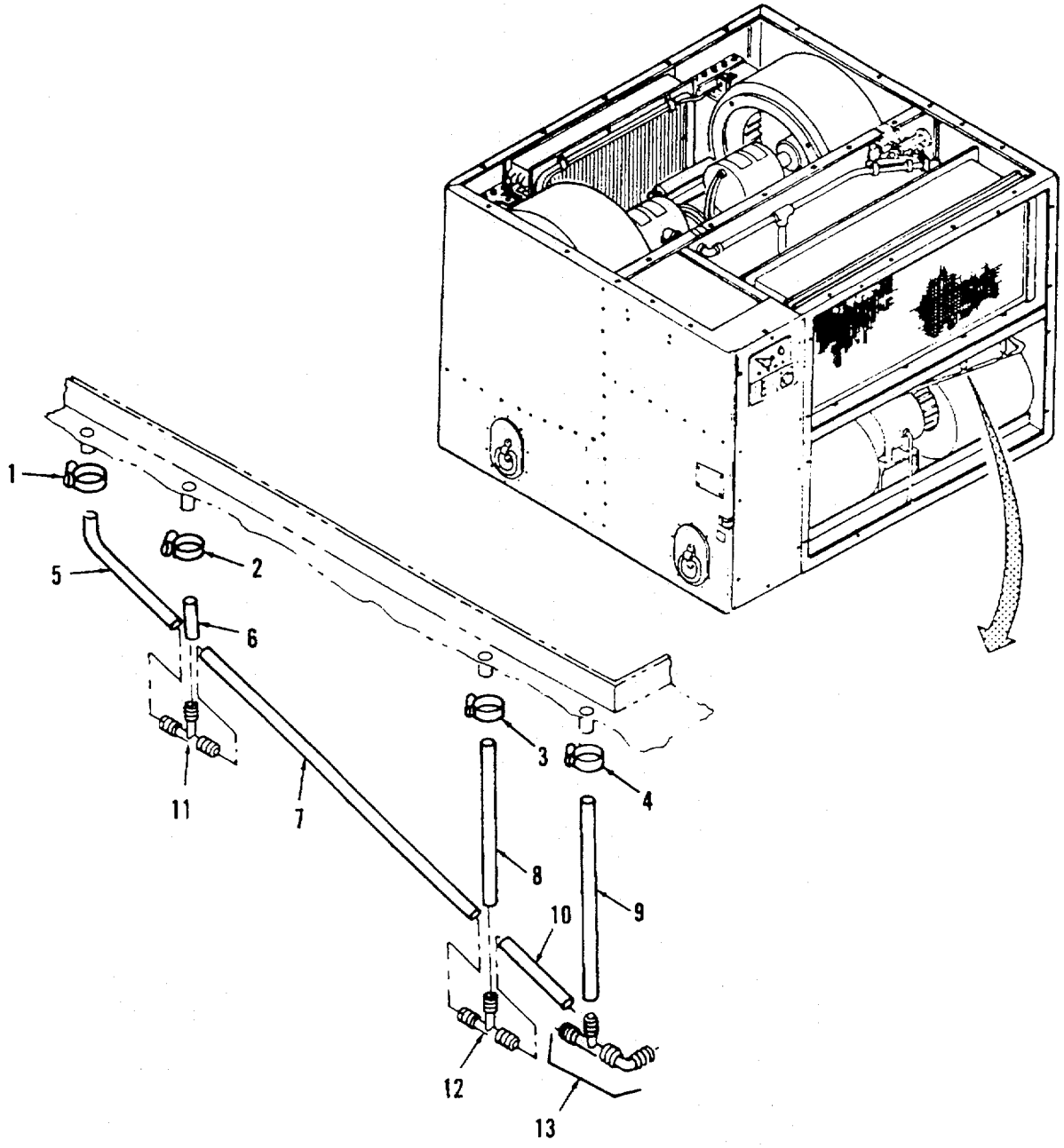


Figure 3-21. Condensate Drain Assembly.

3-33. EVAPORATOR FAN MOTOR.

This Task Covers:

a. Test

Initial Setup:

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

Material/Parts Required
None

Equipment Condition
Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Return air louver removed (see para. 3-21).

a. Test.

NOTE

This test must be conducted when motor is cool.

(1) Using an ohmmeter set on lowest ohms scale, check continuity between leads 1 (blue) & 2 (red), 1 (blue) & 3 (white), and 2 (red) & 3 (white) on connector P10. Continuity should be indicated between these leads.

(2) Test continuity between leads 1 (blue) & 4 (black), 2 (red) & 4 (black), and 3 (white) & 4 (black) on connector P10. Continuity should NOT be indicated between these leads.

(3) Test for continuity between leads 1 (yellow) & 2 (violet) on connector P9. Continuity should be indicated.

(4) Rotate motor shaft very slowly and check for smooth and quiet operation of shaft.

Shaft should rotate smoothly and should not make grinding or binding noises.

(5) If evaporator motor fads any of the above tests, motor must be replaced.

3-34. CONDENSER FAN MOTORS.

This Task Covers:

a. Test b. Removal c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Rear cover removed (see para. 3-27).

a. Test.

WARNING

HIGH VOLTAGE

is used in operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

NOTE

Motor must be cool when tested.

(1) Using an ohmmeter set on lowest ohms scale, check continuity between leads 1 (blue) & 2 (red), 1 (blue) & 3 (white), and 2 (red) & 3 (white) on connector P5 or P12, depending on which motor you are testing. Continuity should be indicated between these leads.

(2) Test continuity between leads 1 (blue) & 4 (black), 2 (red) & 4 (black), and 3 (white) & 4 (black) on connector P5 or P 12, depending on which motor you are testing. Continuity should NOT be indicated between these leads.

(3) Test for continuity between leads 1 (yellow) & 2 (violet) on connector P7 or P13 depending on which motor you are testing. Continuity should be indicated.

(4) Rotate motor shaft on each motor and check for smooth and quiet operation of shaft. Shaft should rotate smoothly and should not make grinding or binding noises.

(5) If either condenser fan motor fails any of the above tests, that motor must be replaced.

b. Removal. (Refer to Figure 3-22).

(1) Tag and disconnect all wires from condenser fan motor. Disconnect plug from receptacle J15 on EMI filter.

(2) Remove four screws (1), four flat washers (2), four grommets (3), four bushings (4), and twelve flat washers (5).

(3) Loosen two set screws (6) on shaft extension (7) and remove shaft extension from motor (9).

(4) Loosen set screw (11) on condenser impeller fan (8) holding shaft extension (7) into impeller fan and remove shaft extension from impeller fan.

(5) Remove condenser fan motor (9) from motor support (10).

(6) Repeat for other condenser fan motor.

c. Installation.

(1) Install shaft extension (7) onto condenser fan motor (9) and loosely tighten set screws (6).

3-34. CONDENSER FAN MOTORS. - (Continued).

(2) Place condenser fan motor (9) on motor support (10) while inserting shaft extension (7) into condenser impeller fan (8) and loosely tighten impeller fan set screw (11).

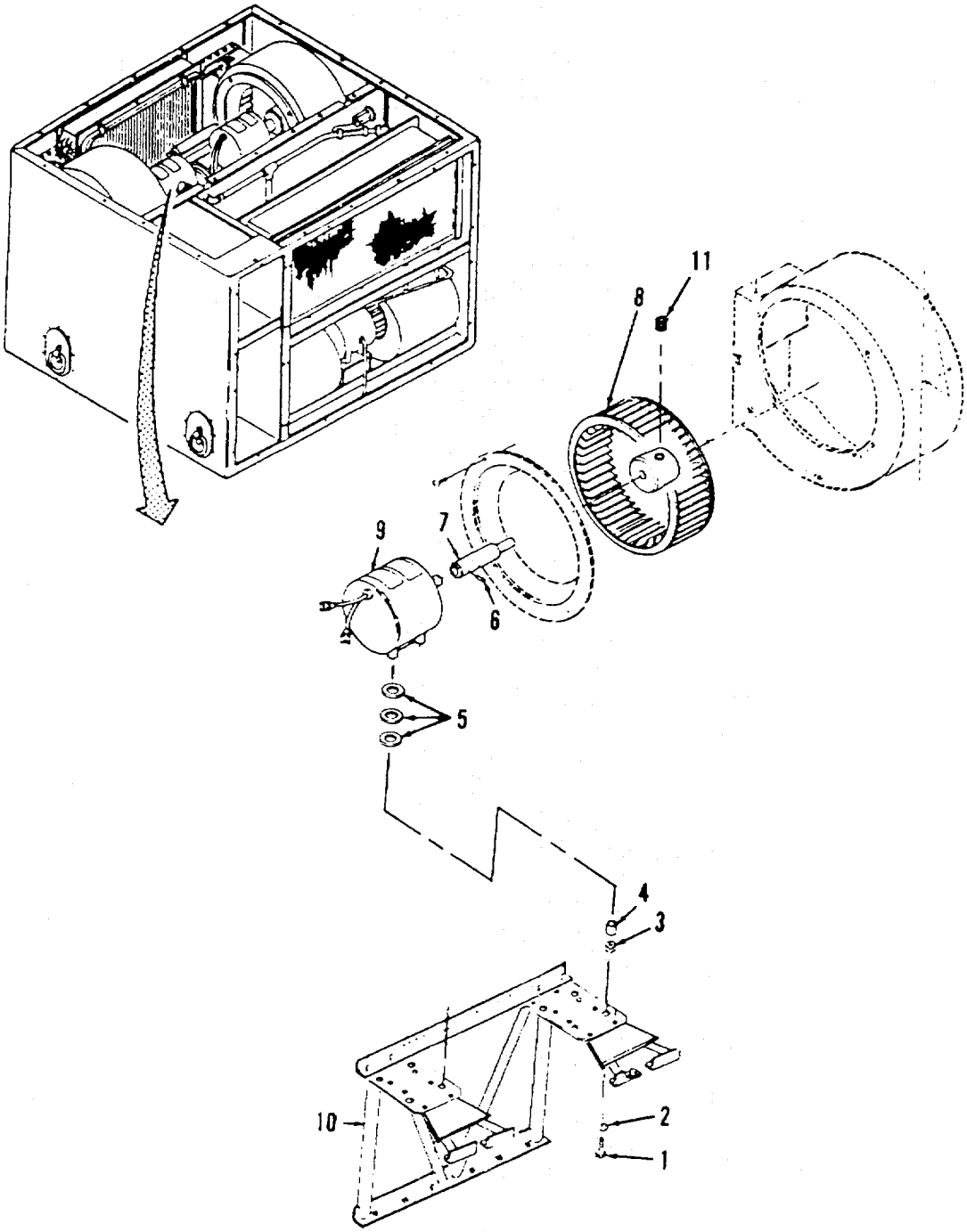


Figure 3-22. Condenser Fan Motors.

(3) Loosely install twelve flat washers (5), four bushings (4), four grommets (3), four flat washers (2), and four screws (1).

(4) Refer to tags installed during removal and connect all motor wires to connectors as required, and then remove temporary tags.

(5) Center all components to eliminate contact between all rotating components and then tighten all hardware.

(6) Repeat for other motor.

(7) Install rear cover (see para. 3-27).

(8) Reconnect air conditioner to power source.

3-35. LOUVER ACTUATOR CABLES.

This Task Covers:

a. Removal b. Repair c. Installation d. Adjustment

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-23).

(1) Remove cable ties from louver cables.

(2) Remove screw (1) and cable clip (2).

(3) Remove two mechanical posts (3) from ends of louver actuator cables (4) and (5).

(4) Remove two screws (6) and two nuts (7) attaching louver actuator cables (4) and (5) to louver assemblies.

(5) Compress clamps (8) on louver actuator cables (4) and (5) and pull cables through control bracket (9).

(6) Compress clamps (10) on louver actuator cables (4) and (5) and pull cables through angle (11) on condenser fan scrolls (12) and (13).

(7) Remove all cable ties (14) used to hold louver actuator cables (4) and (5) in place and remove both cables.

(8) Remove four screws (15), four lock washers (16), bracket (17), and control bracket (9).

b. Repair.

Repair of louver actuator cables is limited to replacement of defective or damaged components.

c. Installation.

(1) Install control bracket (9), bracket (17), four lock washers (16), and four screws (15).

(2) Compress and remove two clamps (10) on louver actuator cable (4) and (5) and insert ending of cables having screw eyelets through angles (11) on condenser fan scrolls (12) and (13).

(3) Compress and replace two clamps (8) onto louver actuator cables (4) and (5).

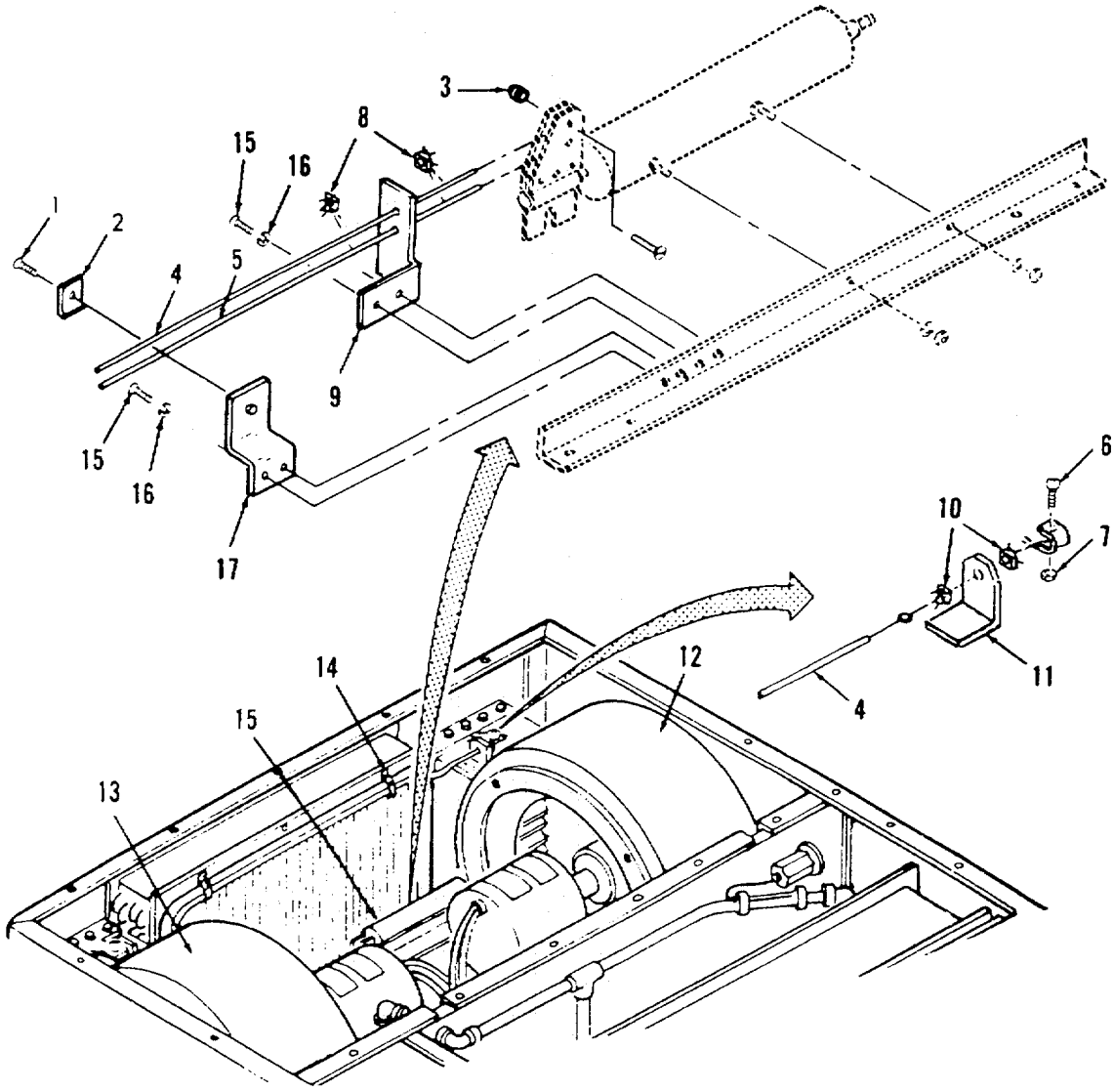


Figure 3-23. Louver Actuator Cables.

3-35. LOUVER ACTUATOR CABLES. - Continual

(4) Place eyelet end of cables into position in louver assemblies and install two screws (6) and two nuts (7).

(5) Compress and remove two clamps (8) on louver actuator cables (4) and (5) and insert plain cable end through control bracket (9) and into bracket on louver actuator, (6) Loosely install two mechanical posts (3) onto ends of louver actuator cables (4) and (5).

(7) Loosely install cable clip (2) and screw (1) to hold louver actuator cables (4) and (5).

(8) Loosely install cable ties (14) to hold louver actuator cables (4) and (5) in place within unit housing as needed.

(9) Install rear cover (see para. 3-27).

d. Adjustment

CAUTION

The louver actuator cables must be adjusted when air conditioner is shut down and cool If cables are adjusted while unit is not completely cool, cables may be damage to unit and improper operation of air conditioner may occur.

(1) Position the blades of both louver assemblies to a fully closed position.

(2) Compress and position clamps (10) together until both clamps are hard against the angle (11) on the condenser fan scrolls (12) and (13).

(3) Loosen clamps (8) at control bracket (9) to allow louver actuator cables (4) and (5) to be easily moved into the bracket on the louver actuator cylinder (15).

(4) Slide the mechanical posts (3) on each louver actuator cable down each cable until the post is hard against the bracket on the louver actuator cylinder (15).

(5) Tighten both mechanical posts (3) on both louver actuator cables (4) and (5).

(6) Compress and slide four clamps (8) on louver actuator cables (4) and (5) until each clamp is hard against control bracket (9).

(7) Tighten screw (1) to secure louver actuator cable (4) and (5) against the cable mounting bracket (17).

(8) Tighten all cable ties (14) as required.

3-36. CIRCUIT BREAKER (CB1).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.

a. Removal. (Refer to Figure 3-24).

WARNING

HIGH VOLTAGE

is used in operation of this equipment

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Remove eleven screws (1), eleven lock washers (2), eleven flat washers (3), and cover (4).

3-36. CIRCUIT BREAKER (CB1). - Continued

(2) Remove six screws (5), six lock washers (6), six flat washers (7), and pull circuit breaker (8) from front of unit.

(3) Tag and disconnect all wires attached to each circuit breaker (8).

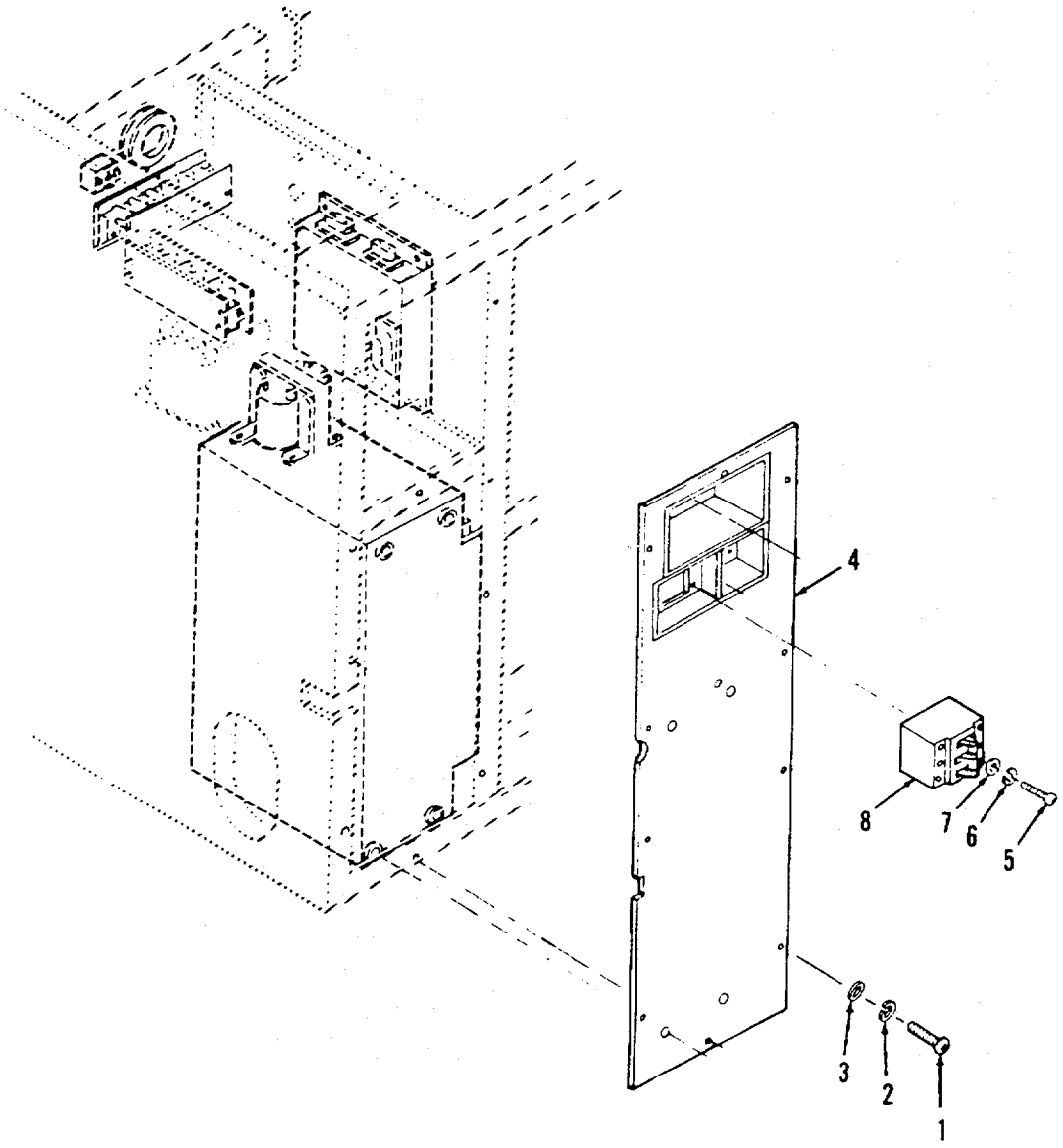


Figure 3-24. Circuit Breaker (CB1).

b. Test.

(1) With breaker in ON position, check for continuity across terminals A1 & A2, B1 & B2, and C1 & C2.

(2) With circuit breaker in OFF position, check for infinity reading between A1 & A2, A2, B1 & B2, and C1 & C2.

(3) If circuit breaker fails either test in steps (a) or (b), replace breaker.

c. Installation.

(1) Install circuit breaker (8) into unit.

(2) Refer to wiring tags installed during removal and reconnect all wires to circuit breakers (8) and remove tags.

(3) Install six flat washers (7), six lock washers (6), and six screws (5).

(4) Install cover (4), eleven flat washers (3), eleven lock washers (2), and eleven screws (1).

(5) Reconnect air conditioner to power source.

3-37. LOGIC BOX ASSEMBLY (LGC).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Test Fixture (Refer to Appendix F for fabrication instructions)
Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Heater relay mounting hardware removed, but wiring still connected to relay (see para. 3-31).
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-25).

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering frost aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Disconnect all wires connected to logic box assembly (1).

(2) Remove four screws (2), four lock washers (3), and four flat washers (4), and remove logic box assembly (1) from unit.

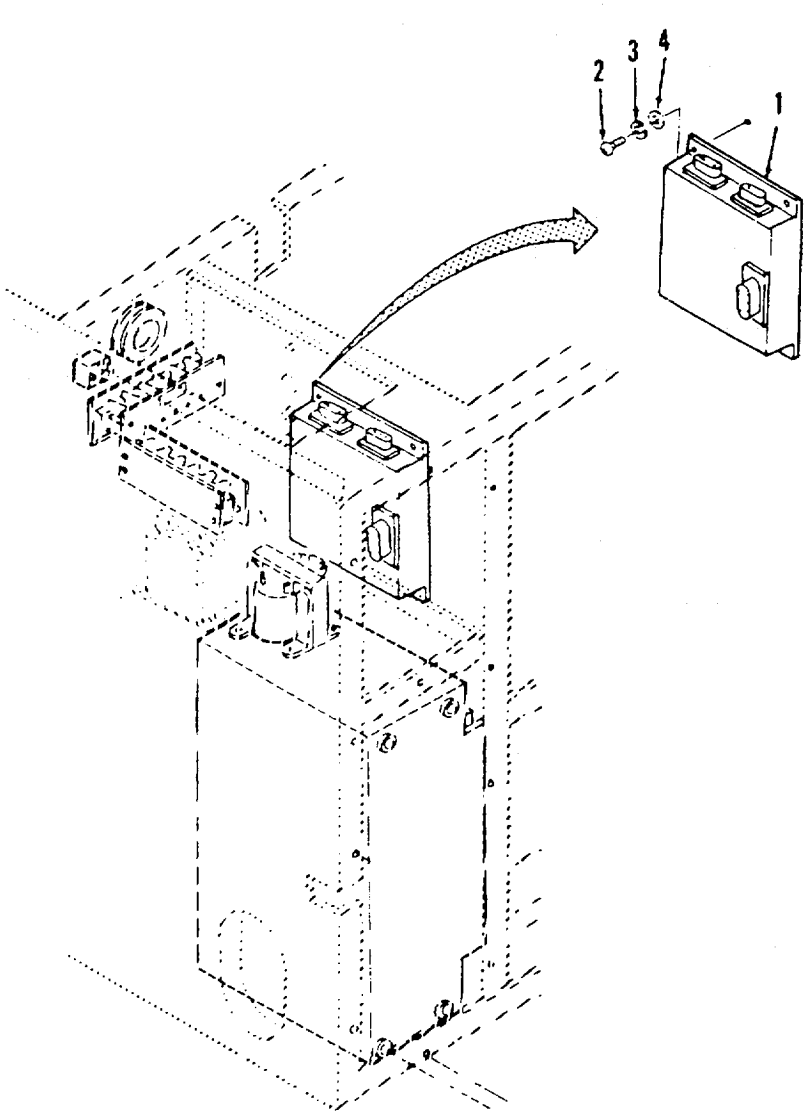


Figure 3-25. Logic Box Assembly.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. Test. To test the logic board assembly a test fixture must first be prepared. After fabrication of the test fixture assembly the logic board assembly can be tested using the following procedure.

(1) Test Equipment. The following test equipment is required to test the logic box assembly. The physical configuration of the test fixture indicated is left to maintenance personnel as long as the circuit used conforms to Figure F-3 in Appendix F.

- Multimeter.
- 12 VDC regulated power supply.
- Test fixture

(2) Set Up. Set up the above test equipment in accordance with the following steps.

(a) Adjust the DC power supply to + 12 ± 0.5 volts DC.

(b) Turn it off and connect it to the test fixture where indicated.

(c) Connect the multimeter, positive lead, to TP1 and set it on a scale to read at least 12 volts DC.

(d) Connect P1, P2, and P3 to J1, J2, and J3, respectively, of the unit under test.

(3) Test Requirements. Failure of the logic circuit card assembly to meet any step in the following test procedure constitutes failure of the entire assembly. Because no repair is authorized for a defective logic board assembly, any logic board assembly that fails any portion of this test must be discarded and replaced with a new logic board assembly.

(4) Test Procedures.

(a) Heat Mode Test.

1. Set temperature potentiometer, R6, to warmest position, mode switch, S7, to "H", and all fault switches S1-S6, to "OFF" position (contacts closed), then apply power to power supply. After a 2-second delay, LED's 1 and 7 shall illuminate, and multimeter shall read + 12 ±.5 VDC on test point, TP1, with respect to power supply common/board ground.

2. Set temperature potentiometer, R6, to coldest position. LED 1 shall turn off. LED 7 shall remain illuminated.

3. Rotate R6 slowly towards warmest position until LED 1 illuminates. Squeeze thermistor, RT1, between fingers for 20 seconds. LED 1 shall turn off. LED 7 shall remain illuminated.

4. Rotate R6 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.

5. 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 3 shall illuminate.

6. Reset logic by turning rotary mode switch, S7, to "OFF/RESET" position. Place S1 in the "OFF" position. Move R6 to warmest position. Set mode switch, S7, to "H". LED's 1 and 7 shall illuminate following a 2-second delay.

7. Place S1 in the "ON" position for 2 seconds, then place S 1 in the "OFF" position. LED's 1 and 7 shall turn off for 10 seconds then shall illuminate.

8. 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 shall illuminate again.

9. Place S2 in the "ON" position. LED 1 shall turn off, LED 7 shall remain illuminated. LED 3 shall illuminate after 10 seconds.

10. Reset logic by turning rotary mode switch, S7, to "OFF/RESET" position. Place S2 in the "OFF" position. Maintain R6 in warmest position. Set mode switch, S7, to "H". LED's 1 and 7 shall illuminate after a 2-second delay.

11. Place S4 in the "ON" position. The following routine shall occur:

    a. LED 1 shall turn off LED 7 shall remain illuminated.

    b. For the next 8 seconds:
    - LED 4 illuminates.
    - LED 7 remains illuminated.

    c. For the next 2 seconds:
    - LED's 4 and 7 turn off.

    d. For the next 2 seconds:
    - LED 4 shall continue to be off.
    - LED 7 shall illuminate.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. Test. - Continued

e. Steps b-d shall repeat twice. Then, LED 4 illuminates and LED 7 remains illuminated. End of routine.

12. Place S4 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET' position, and then back to "H" position again. Still maintaining R6 set to warmest position, wait 10 seconds and place S5 in the "ON" position. The following routine shall occur:

a. LED 1 shall turn off LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 5 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 5 and 7 turn off.
- For the next 2 seconds LED 5 shall continue to be off and LED 7 shall illuminate.

d. Steps b-d shall repeat twice. Then, LED 5 illuminates and LED 7 remains illuminated. End of routine.

13. Place S5 in the "OFF" position, reset previous fault condition by turning mode switch, S7, to "OFF/RESET" position and then back to "H" position. still maintaining R6 set to warmest position, wait 10 seconds and then place S6 in the "ON" position. The following routine shall occur:

a. LED 1 shall turn off LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 6 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 6 and 7 turn off.
- For the next 2 seconds LED 6 shall continue to be off and LED 7 shall illuminate.

d. Steps b-d shall repeat twice. Then, LED 6 illuminates and LED 7 remains on. End of routine.

14. Place S6 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, and then back to "H" position. Place S4 in the "ON" position for 2 seconds, and then turn S4 off. The following routine shall occur:

    a. LED 1 shall turn off LED 7 shall remain illuminated.

    b. For the next 8 seconds:
    - LED 4 illuminates.
    - LED 7 remains illuminated.

    c. For the next 2 seconds:
    - LED's 4 and 7 turn off.

    d. For the next 2 seconds:
    - LED 4 shall continue to be off.
    - LED's 1 and 7 shall illuminate. End of routine.

15. Place S5 in the "ON" position for 2 seconds, then place S5 in the "OFF" position. The following routine shall occur:

    a. LED 1 shall turn off LED 7 shall remain illuminated.

    b. For the next 8 seconds:
    - LED 5 illuminates.
    - LED 7 remains illuminated.

    c. For the next 2 seconds:
    - LED's 5 and 7 turn off.

    d. For the next 2 seconds:
    - LED 5 shall continue to be off.
    - LED's 1 and 7 shall illuminate. End of routine.

16. Place S6 in the "ON" position for 2 seconds, then place S6 in the "OFF" position. The following routine shall occur:

    a. LED 1 shall turn off LED 7 shall remain illuminated.

    b. For the next 8 seconds:
    - LED 6 illuminates.
    - LED 7 remains illuminated.

    c. For the next 2 seconds:
    - LED's 6 and 7 turn off.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. Test. - Continued

d. For the next 2 seconds:
- LED 6 shall continue to be off.
- LED's 1 and 7 shall illuminate. End of routine.

17. Place S2 and S4 in the "ON" position making certain that S2 is completed 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.

18. Reset, by placing S2 and S4 in the "OFF" position and turning the mode switch, S7, to "OFF/RESET", and back to "H". Place S2 and then S5 in the "ON" position making certain S2 is completed 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.

19. Reset, by placing S2 and S5 in the "OFF" position and turning the mode switch, S7, to "OFF/RESET", and back to "H". Place S2 and then S6 in the "ON"' position immediately after. LED 1 turns off and LED 7 remains illuminated. In 10 seconds LED's 3 and 6 shall illuminate and LED 7 remains illuminated.

20. Reset, by placing S2 and S6 in the "OFF" position and turning the mode switch, S7, to "OFF/RESET", and back to "H". Place S1 first, then S4, S5, and S6 in the "ON" position immediately after. 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.

21. Reset, by placing all fault switches in the "OFF" position and setting mode switch, S7, to "OFF/RESET", and back to "H". Simultaneously place S4, S5, and S6 in the "ON" position. The following routine shall occur:

a. LED 1 shall turn off LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED's 4, 5, and 6 illuminate.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 4, 5, 6, and 7 turn off.

d. For the next 2 seconds:
- LED's 4, 5, and 6 shall continue to be off.
- LED 7 shall illuminate.

e. Steps b-d shall repeat twice. Then, LED's 4, 5, and 6 illuminate and LED 7 remains illuminated. End of routine.

22. Reset, by placing all switches in the "OFF" position and setting mode switch, S7, to "OFF/RESET", and back to "H". Simultaneously place S4, S5, and S6 in the "ON" position, followed immediately by S2. 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.

23. Reset, by turning mode switch, S7, to "OFF/RESET", however, keep S2, S4, S5, and S6 in the "ON" position. Then turn mode switch to "H", LED 1 shall not illuminate. LED 7 shall remain illuminate, in 10 seconds LED's 3, 4, 5, and 6 illuminate and LED 7 remains illuminated.

(b) Vent Mode Test.

1. Reset, by turning mode switch, S7, to "OFF/RESET" and placing all switches in the "OFF" position. Then turn mode switch to "V" position. In 2 seconds LED 7 shall illuminate.

2. Rotate R6 from warmest to coldest position and back to warmest; LED 7 remains illuminated. Temperature setting should have no effect.

3. Turn power supply switch off, and then back on again. In 2 seconds LED 7 shall illuminate.

4. Place S4 in the "ON" position. The following routine shall occur:

   a. LED 7 shall remain illuminated.

   b. For the next 8 seconds:
      - LED 4 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 4 and 7 turn off.

   d. For the next 2 seconds:
      - LED 4 shall continue to be off.
      - LED 7 shall illuminate.

   e. Steps b-d shall repeat twice. Then, LED 4 illuminates and LED 7 remains illuminated. End of routine.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. ***Test*****.** - Continued

5. Place S4 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "V" position again. Still maintaining R6 set to warmest position, wait 10 seconds and then place S5 in the "ON" position. The following routine shall occur.

   a. LED 7 shall illuminate.

   b. For the next 8 seconds:
      - LED 5 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 5 and 7 turn off.

   d. For the next 2 seconds:
      - LED 5 shall continue to be off.
      - LED 7 shall illuminate.

   e. Steps b-d shall repeat twice. Then, LED 5 illuminates and LED 7 remains illuminated. End of routine.

6. Place S5 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "V" position again. Still maintaining R6 set to warmest position, wait 10 seconds and then place S6 in the "ON" position. The following routine shall occur:

   a. LED 7 shall illuminate.

   b. For the next 8 seconds:
      - LED 6 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 6 and 7 turn off.

   d. For the next 2 seconds:
      - LED 6 shall continue to be off.
      - LED 7 shall illuminate.

   e. Steps b-d shall repeat twice. Then, LED 6 illuminates and LED 7 remains illuminated. End of routine.

7. Place S6 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "V" position. Place S4 in the "ON" position for 2 seconds, and then place S4 in the "OFF" position. The following routine shall occur:

   a. LED 1 shall turn off LED 7 shall remain illuminated.

   b. For the next 8 seconds:
      - LED 4 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 4 and 7 turn off.

   d. For the next 2 seconds:
      - LED 4 shall continue to be off.
      - LED 7 shall illuminate. End of routine.

8. Place S5 in the "ON" position for 2 seconds, and then place S5 in the "OFF" position. The following routine shall occur:

   a. LED 1 shall turn off LED 7 shall remain illuminated.

   b. For the next 8 seconds:
      - LED 5 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 5 and 7 turn off.

   d. For the next 2 seconds:
      - LED 5 shall continue to be off.
      - LED 7 shall illuminate. End of routine.

9. Place S6 in the "ON" position for 2 seconds, and then place S6 in the "OFF" position. The following routine shall occur:

   a. LED 1 shall turn off, LED 7 shall remain illuminated.

   b. For the next 8 seconds:
      - LED 6 illuminates.
      - LED 7 remains illuminated.

   c. For the next 2 seconds:
      - LED's 6 and 7 turn off.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. Test. - Continued

d. For the next 2 seconds:
- LED 6 shall continue to be off.
- LED 7 shall illuminate. End of routine.

10. 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.

11. Place S1 in the "ON" position. LED 7 shall turn off and in 10 seconds LED 3 shall illuminate.

12. Place S1 in the "OFF" position and reset mode switch, S7. Then turn mode switch back to "V" position. In 2 seconds LED 7 illuminates.

13. Place S1 in the "ON" position, and in 2 seconds place S4, S5, and S6 in the "ON" position. LED 7 shall turn off and in 10 seconds LED 3 shall illuminate. S4, S5, and S6 have no effect.

14. Place all fault switches in the "OFF" position. Reset, by turning mode switch, S7, to "OFF/RESET", and then back to "V". Simultaneously place S4, S5, and S6 in the "ON" position, LED's 4, 5, and 6 illuminate. In 1 second place S 1 in the "ON" position, LED's 4, 5, and 6 turn off. After 10 seconds LED 3 illuminates.

15. Reset, by turning mode switch, S7, to "OFF/RESET" position; however, do not place fault switches in "OFF" position. Turn mode switch back to "V" position. No LED's are illuminated, but in 10 seconds LED 3 shall illuminate.

(c) Cool Mode Test.

1. Place all fault switches in the "OFF" position. Reset, by turning mode switch, S7, to "OFF/RESET" position, and then to "C" position. Rotate R6 to coldest position. After a 2-second delay, LED's 2 and 7 shall illuminate.

2. Rotate R6 to the warmest position. LED 2 shall turn off and LED 7 shall remain illuminated.

3. Rotate R6 slowly toward cold without causing LED 7 to turn off. Squeeze thermistor, RT1, between fingers for 10 seconds. LED 7 shall turn off. After 2 seconds LED's 2 and 7 shall illuminate.

4. Rotate R6 to coldest position. Place S4 in the "ON" position. The following routine shall occur:

a. LED 2 shall turn off; LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 4 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
1 LED's 4 and 7 turn off.

d. For the next 2 seconds:
- LED 4 shall continue to be off.
- LED 7 shall illuminate.

e. Steps b-d shall repeat twice. Then, LED 4 illuminates and LED 7 remains illuminated. End of routine.

5. Place S4 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "C" position. Still maintaining R6 set to coolest position, wait 10 seconds and then place S5 in the "ON" position. The following routine shall occur:

a. LED 2 shall turn off; LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 5 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 5 and 7 turn off.

d. For the next 2 seconds:
- LED 5 shall continue to be off.
- LED 7 shall illuminate.

e. Steps b-d shall repeat twice. Then, LED 5 illuminates and LED 7 remains illuminated. End of routine.

6. Place S5 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "C" position. Still maintaining R6 set to coolest position, wait 10 seconds and then place S6 in the "ON" position. The following routine shall occur:

a. LED 2 shall turn off; LED 7 shall remain illuminated.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued

b. Test. - Continued

b. For the next 8 seconds:
- LED 6 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 6 and 7 turn off.

d. For the next 2 seconds:
- LED 6 shall continue to be off.
- LED 7 shall illuminate.

e. Steps b-d shall repeat twice. Then, LED 6 illuminates and LED 7 remains illuminated. End of routine.

7. Place S6 in the "OFF" position. Reset previous fault condition by turning the mode switch, S7, to "OFF/RESET" position, then back to "C" position. Place S4 in the "ON" position for 2 seconds, then place S4 in the "OFF" position. The following routine shall occur:

a. LED 2 shall turn off; LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 4 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 4 and 7 turn off.

d. For the next 2 seconds:
- LED 4 shall continue to be off.
- LED's 2 and 7 shall illuminate. End of routine.

8. Place S5 in the "ON" position for 2 seconds, and then place S5 in the "OFF" position. The following routine shall occur:

a. LED 2 shall turn off LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 5 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 5 and 7 turn off.

d. For the next 2 seconds:
- LED 5 shall continue to be off.
- LED's 2 and 7 shall illuminate. End of routine.

9. Place S6 in the "ON" position for 2 seconds, and then place S6 in the "OFF" position. The following routine shall occur:

a. LED 2 shall turn off; LED 7 shall remain illuminated.

b. For the next 8 seconds:
- LED 6 illuminates.
- LED 7 remains illuminated.

c. For the next 2 seconds:
- LED's 6 and 7 turn off.

d. For the next 2 seconds:
- LED 6 shall continue to be off.
- LED's 2 and 7 shall illuminate. End of routine,

10. 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.

11. Place S1 in the "ON" position. LED's 2 and 7 shall turn off. In 10 seconds, LED 3 shall illuminate.

12. Place S1 in the "OFF" position and reset mode switch, S7. Then turn mode switch back to "C" position. In 2 seconds, LED's 2 and 7 illuminate.

13. Place S1 in the "ON" position and in 2 seconds simultaneously place S4, S5, and S6 in the "ON" position. LED's 2 and 7 shall turn off. In 10 seconds, LED 3 shall illuminate. Switches S4, S5, and S6 have no effect.

14. Place all fault switches in the "OFF" position. Reset mode switch, S7, and turn back to "C" position. Simultaneously place switches S4, S5, and S6 in the "ON" position. LED's 4, 5, and 6 shall illuminate. After 1 second, place S1 in the "ON" position, LED's 4, 5, 6, and 7 shall turn off. After 10 seconds, LED 3 shall illuminate.

3-37. LOGIC BOX ASSEMBLY (LGC). - Continued.

b. Test. - Continued

15. Reset mode switch S7. Do not place fault switches in the "OFF" position. Turn mode switch to "C" position. No LED's shall illuminate. In 10 seconds, LED 3 shall illuminate.

16. Reset mode switch S7. Do not place fault switches in the "OFF" position. Turn mode switch to "C" position. Then immediately place S1, S4, S5, and S6 in the "OFF" position. In 10 seconds, LED's 2 and 7 shall illuminate.

17. Place S2 in the "ON" position. LED's 2 and 7 remain illuminated. S2 has no effect.

18. Place S2 in the "OFF" position, and place S3 in the "ON" position. Then turn mode switch, S7, to "H" position, with R6 set at the warmest position. After a 2-second delay, LED's 1 and 7 illuminate. S3 has no effect.

19. Place all fault switches in the "OFF" position, and reset mode switch, S7. Turn mode switch to "V" position. Then place S2 and S3 in the "ON" position. If LED 7 illuminated, it shall turn off. After a 10-second delay, LED 3 shall illuminate. Turn mode switch, S7, to “C" position with R6 set to the coolest position. LED 2 shall not illuminate, LED 7 shall illuminate. After a 10-second delay LED 3 shall illuminate.

20. Place S2 and S3 in the "OFF" position, and reset mode switch, S7. Place S1 in the "ON" position, and turn mode switch to "V" position. No LED's shall illuminate. After a 10-second delay, LED 3 shall illuminate.

c. Installation.

(1) Install logic box assembly (1) into unit and install four flat washers (4), four lock washers (3), and four screws (2).

(2) Reconnect all wires and cables to logic box assembly (1). Remove tags.

(3) Install heater relay mounting hardware (see par. 3-31).

(4) Install front cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

3-38. MOTOR CONTROLLER (MC).

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power source disconnected from air conditioner.
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-26).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections of 208 volts ac input when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

3-38. MOTOR CONTROLLER (MC). - Continued

a. Removal. - Continued

CAUTION

Damage to cables will cause unit to fail. Where cables go through grommets, always remove grommets from metal panels before pulling cables through holes in panels.

(1) Tag and disconnect all wires connected to motor controller (1).

(2) Remove eleven screws (2) and eleven lock washers (3).

(3) Pull electrical access cover (4) away from unit.

(4) Remove four screws (5), four lock washers (6), four flat washers (7), and remove motor controller (1) from electrical access cover (4).

b. Installation.

(1) Place motor controller (1) against back electrical access cover (4) and install four flat washers (7), four lock washers (6), and four screws (5).

(2) Place electrical access cover (4) against front of unit and install eleven lock washers (3) and eleven screws (2).

(3) Refer to wiring tags installed during removal and reconnect wires and cables to motor controller (1). Remove tags.

(4) Install front cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

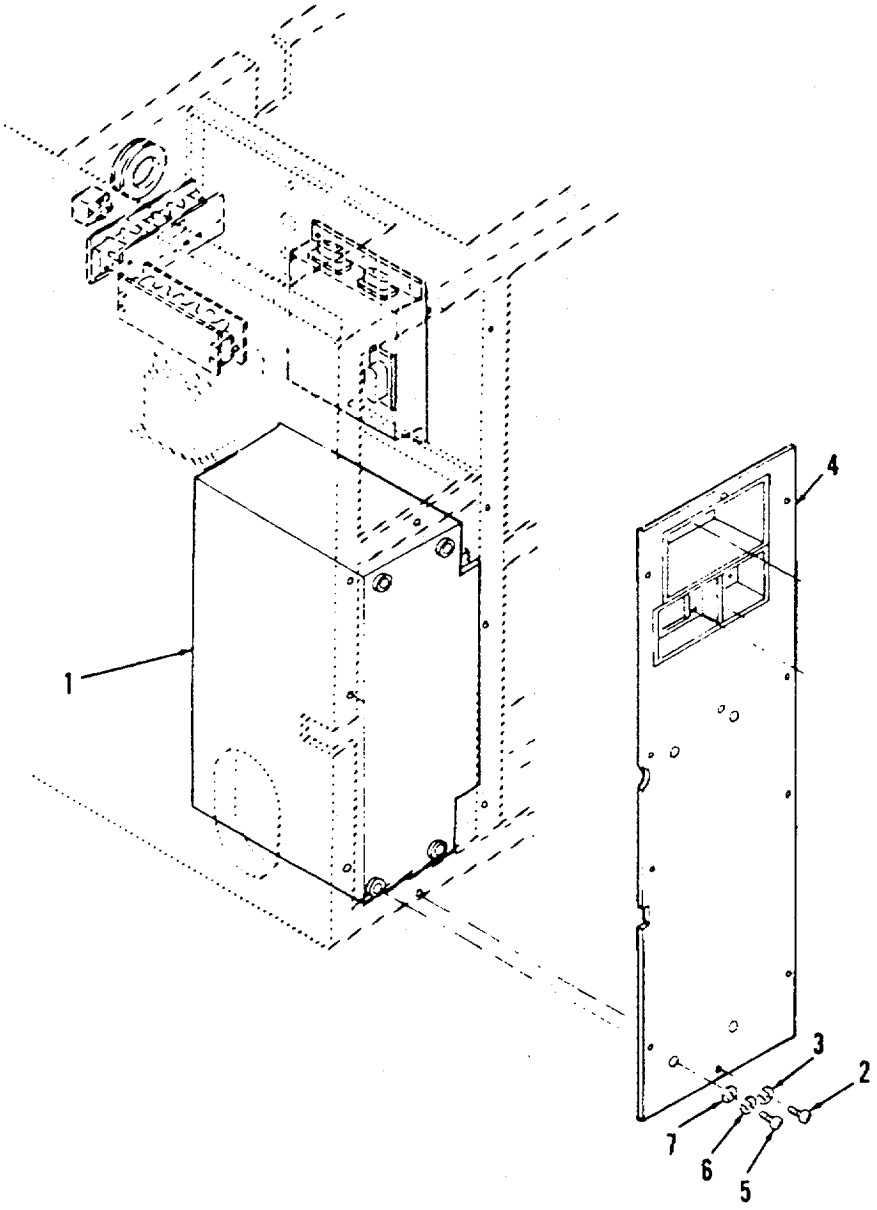


Figure 3-26. Motor Controller.

3-39. TRANSFORMER (T1).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)
Solder (Item 1, Appendix E)
Heat shrink tubing (Item 17, Appendix E)
Flux (Item 6, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from air conditioner.
Front cover removed (see para. 3-27).

a. ***Removal.*** (Refer to Figure 3-27).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag and disconnect all wires connected to transformer (1).

(2) Remove four screws (2), four lock washers (3), and four flat washers (4).

(3) Remove transformer (1) from unit.

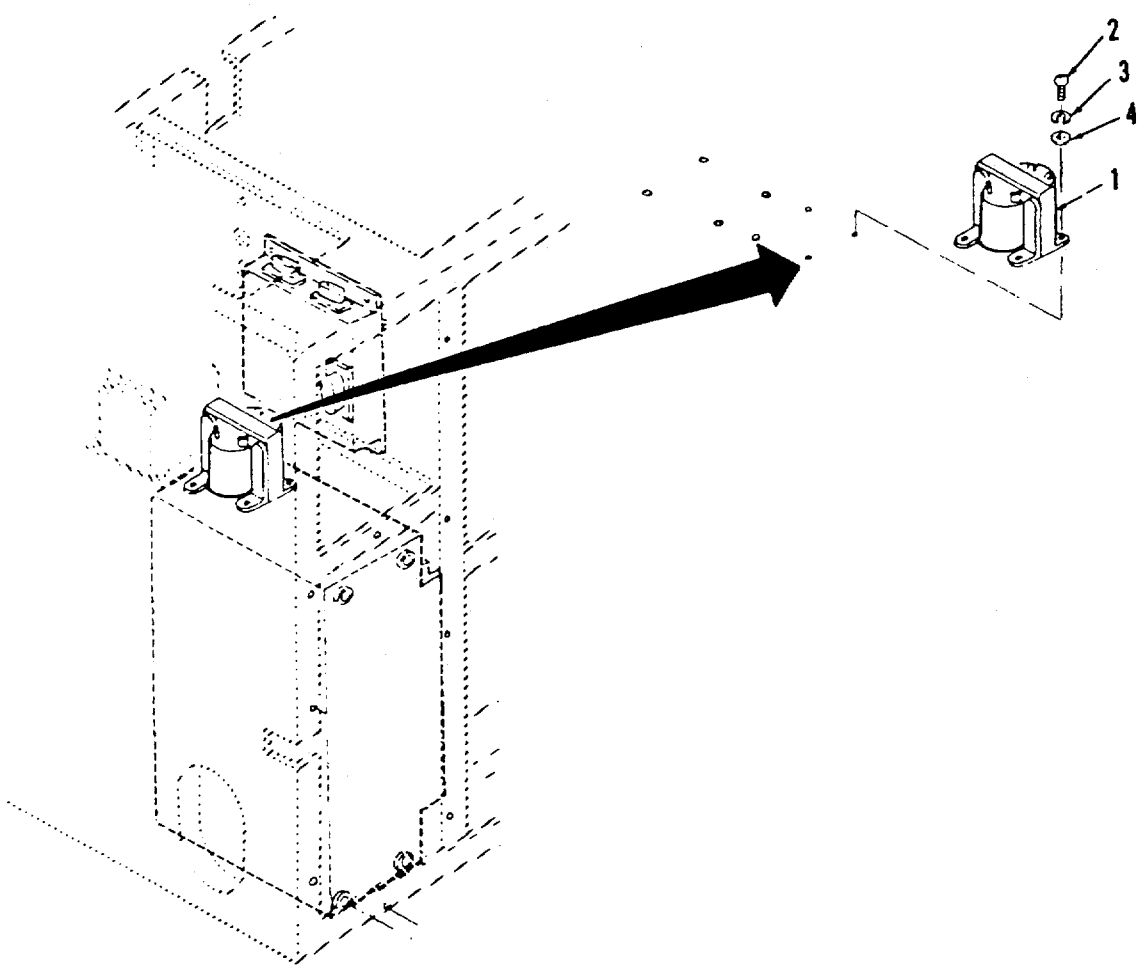


Figure 3-27. Transformer.

3-39. TRANSFORMER (T1). - Continued

b. Test.

(1) Tag and remove transformer leads.

(2) (Refer to Figure 3-28). Using a multimeter set on lowest OHMS scale probe transformer terminals 1 & 2, and 3 & 4. Multimeter should show a very low resistance.

(3) Probe transformer terminals 1 & 3. Multimeter should read infinite resistance.

(4) If transformer fails steps (2) or (3), transformer is defective. Replace transformer.

c. Installation.

(1) Install transformer (1) into unit.

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

(3) Place heat shrink onto wires and resolder all wires to transformer (1) and remove tags.

(4) Apply heat to heat shrink tubing to tighten it around installed wiring.

(5) Install front cover (see para. 3-27).

(6) Reconnect air conditioner to power source.

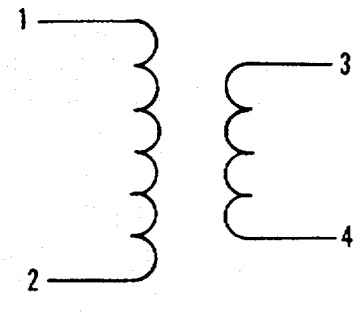


Figure 3-28. Transformer Schematic.

3-40. RECTIFIER (CR1).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from air conditioner.
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-29).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

3-40. RECTIFIER (CR1). - Continued

a. Removal. - Continued

(1) Tag and disconnect all wires attached to rectifier (1).

(2) Remove screw (2), lock washer (3), and rectifier (1) from unit.

(3) Remove capacitors (4) and (5) from rectifier (1).

b. Test

(1) Using an ohmmeter on lowest OHM setting, check for continuity across terminals 1 & 2,1 & 3, 1 & 4, 2 & 3, 2& 4, and 3 &4.

(2) If rectifier fails any test in step (1), replace rectifier.

c. Installation.

(1) Install capacitors (4) and (5) on rectifier (1).

(2) Install rectifier (1), lock washer (3), and screw (2).

(3) Connect all wires to rectifier (1) and remove tags.

(4) Install front cover (see para. 3-27).

(5) Reconnect power source to air conditioner.

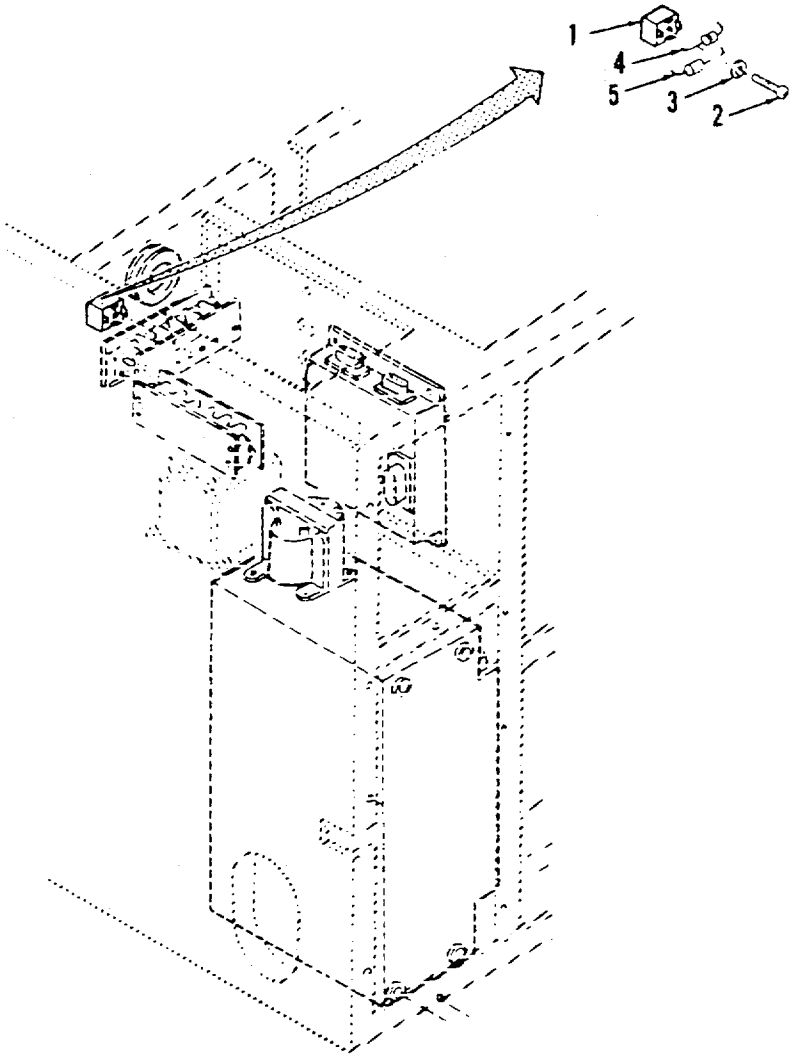


Figure 3-29. Rectifier.

3-41. CONTROL PANEL ASSEMBLY.

This Task Covers:

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

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)
Solder (Item 1, Appendix E)
Flux (Item 6, Appendix E)
Heat shrink (Item 17, Appendix E)
Battery (Item 23, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from unit.
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-30).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Disconnect connector J6 from P6 from rear of control panel assembly (1).

(2) Loosen screw (2) and remove control panel assembly (1) from unit.

b. Disassembly.

(1) Remove two set screws and knob (3) from mode selector switch (4).

(2) Remove two set screws and knob (5) from potentiometer (6).

(3) Remove four screws (7), four flat washers (8), and four lock washers (9), and remove control panel (10) from control panel assembly (1).

(4) Remove nut (11), star washer (12), and screw (2) from control panel (10).

(5) Remove mode selector switch (4) and potentiometer (6) from control panel (10).

(6) Tag and disconnect all wires from mode selector switch (4) and potentiometer (6)

(7) Remove four light emitting diodes (13) from splice.

(8) Remove four light emitting diodes (13) from control panel (10).

(9) Remove two nuts (14), two flat washers (15), and two screws (16), and P6 connector (17) from control box (18).

c. Test.

(1) Mode Selector Switch.

(a) Using multimeter, place and hold one probe on the input terminal and place the other probe on terminal 4 of mode selector switch.

(b) Check for continuity between input terminal and terminal 4.

(c) Turn shaft of mode selector switch fully clockwise.

(d) Check for continuity between input terminal and terminal 3.

(e) Rotate mode selector switch one position counter clockwise and check for continuity between the input and terminal 2.

3-41. CONTROL PANEL ASSEMBLY. - Continued

a. Test. - Continued

(f) Rotate mode selector switch one more position counter clockwise and check for continuity between the input and terminal 1.

(g) If mode selector switch fails to show continuity in any of the tests in steps (c) through (f), replace mode selector switch.

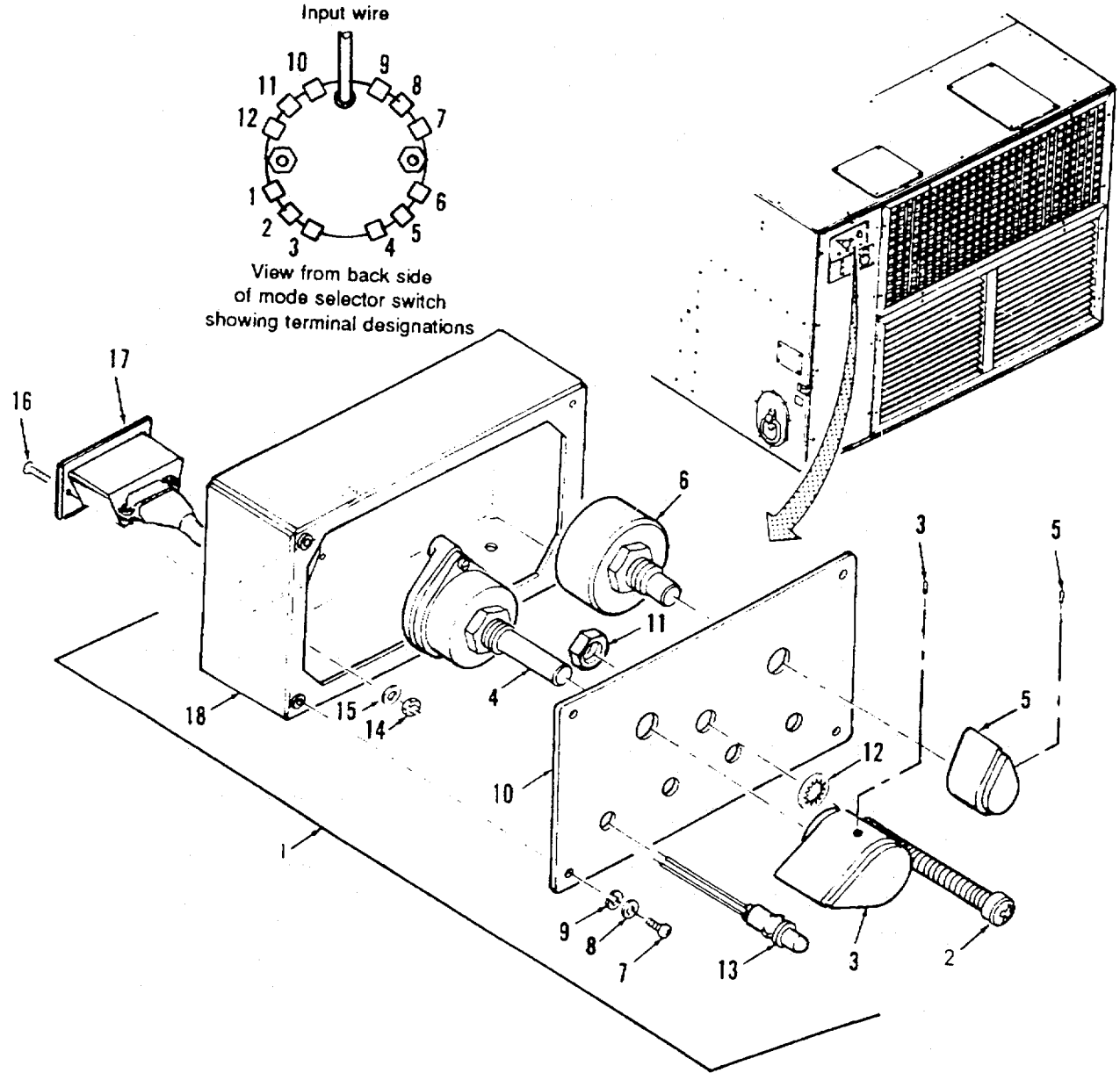


Figure 3-30. Control Panel Assembly

(2) Potentiometer.

(a) Using multimeter set on scale for measuring 5000 ohms, place probes on terminals 1 and 2.

(b) Turn potentiometer shaft fully clockwise.

(c) Check that multimeter indicate 5000 ± 50 ohms.

(d) Slowly turn shaft counterclockwise while watching dial on multimeter. Indicated ohms resistance should smoothly and gradually decrease.

(e) Continue to turn shaft until the fully counter clockwise position is reached. Multimeter should now indicate between 5 and 50 ohms.

(f) Replace potentiometer if it fails any of the above tests.

(3) Light Emitting Diodes.

(a) Apply a 5-6 volts DC across leads of each light emitting diode.

(b) If any light emitting diode does not shine, replace it.

d. Repair.

Repair of control panel assembly is limited to replacement of defective parts found during testing.

e. Assembly.

(1) Attach P6 connector (17) to control box (18) and install two screws (16), two flat washers (15), and two nuts (14).

(2) Install four light emitting diodes (13) into control panel (10).

(3) Install potentiometer (6) and mode selector switch (4) into control panel (10).

(4) Refer to tags installed during removal and reconnect all wires to mode selector switch (4), potentiometer (6), and four light emitting diodes (13), and then remove tags.

(5) Install screw (2), star washer (12), and nut (11) into control panel (10).

(6) Install control panel (10), four lock washers (9), four flat washers (8), and four screws (7).

3-41. CONTROL PANEL ASSEMBLY. - Continued

e. ***Assembly.*** - Continued.

(7) Install knob (5) and two set screws onto potentiometer (6).

(8) Install knob (3) and two set screws onto mode selector switch (4).

f. ***Installation.***

(1) Place control panel assembly (1) into control panel opening in front of unit and fasten control panel assembly in place by tightening screw (2).

(2) Reconnect connector J6 to P6 on back of control panel assembly (1).

(3) Install front cover (see para. 3-27).

(4) Reconnect air conditioner to power source.

3-42. EMIFILTER (FL1).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from unit.
Front cover removed (see para. 3-27).
Heater elements removed (see para. 3-29).
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-31).

WARNING
HIGH VOLTAGE
is used in operation of this equipment.
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Disconnect P15 and P16 from EMI filter (1).

3-42. EMI FILTER (FL1). - Continued

(2) Remove four nuts (2), four lock washers (3), and four flat washers (4), and remove EMI filter (1) from unit.

b. Test.

(1) Perform continuity check by testing continuity between terminals A, B, C, D, and E of J15 with terminals A, B, C, D, and E of J16 respectively.

(2) If any test shows an infinite reading, filter must be replaced.

(3) Perform continuity check between E of each plug J15 and J16 and the case. Reading should be zero.

(4) Perform continuity check between E of each plug J15 and J16 and all other terminals. Reading should be infinity.

c. Installation.

(1) Install EMI filter (1), four flat washers (4), four lock washers (3), and four nuts (2).

(2) Attach P15 to J15 of EMI filter (1).

(3) Attach P16 to J16 of EMI filter (1).

(4) Install heating elements (see para. 3-29).

(5) Install front cover and rear cover (see para. 3-27).

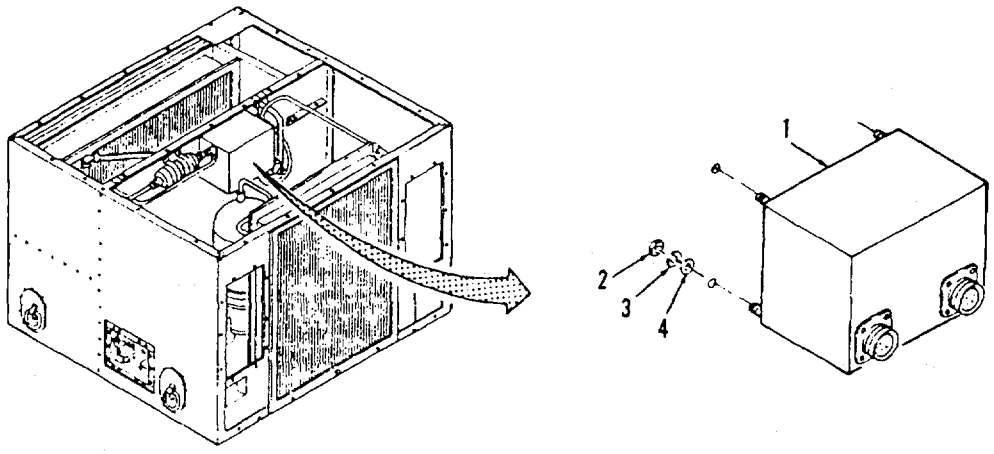


Figure 3-31. EMI Filter.

3-43. RELAY (K2).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Power supply (Item 3, Appendix B)

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from air conditioner.
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-32).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

3-43. RELAY (K2). - Continued

(1) Tag and disconnect wires attached to relay (1).

(2) Remove four screws (2), four lock washers (3), four flat washers (4) and relay (1) from unit.

(3) Remove diode (5) from relay (1).

b. Test.

(1) Using a multimeter set on lowest OHMS scale, check for continuity across terminals A1 & A2, B1 & B2, and C1 & C2. Continuity should not be indicated.

(2) Check for continuity between terminal X1 and X2. There should be a low ohms reading.

(3) Apply 28 vdc power across X1 and X2.

(4) Using a multimeter set on lowest ohms reading scale, check the reading across terminals A1 & A2, B1 & B2, and C1 & C2. Continuity should now be indicated.

(5) Replace relay if it fails any of the above tests.

(6) Use a multimeter to test that diode (5) has infinite resistance when tested. Reverse multimeter test leads and check that diode now has continuity.

c. Installation.

CAUTION

Improper diode installation will damage unit. Be sure "+" end of diode is installed to terminal X1 of relay.

(1) Install diode (5) onto relay (1).

(2) Place relay (1) into position in unit and install four screws (2), four lock washers (3), and four flat washers (4).

(3) Refer to wire tags installed during removal and reconnect wires to relay (1) and remove tags.

(4) Install rear cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

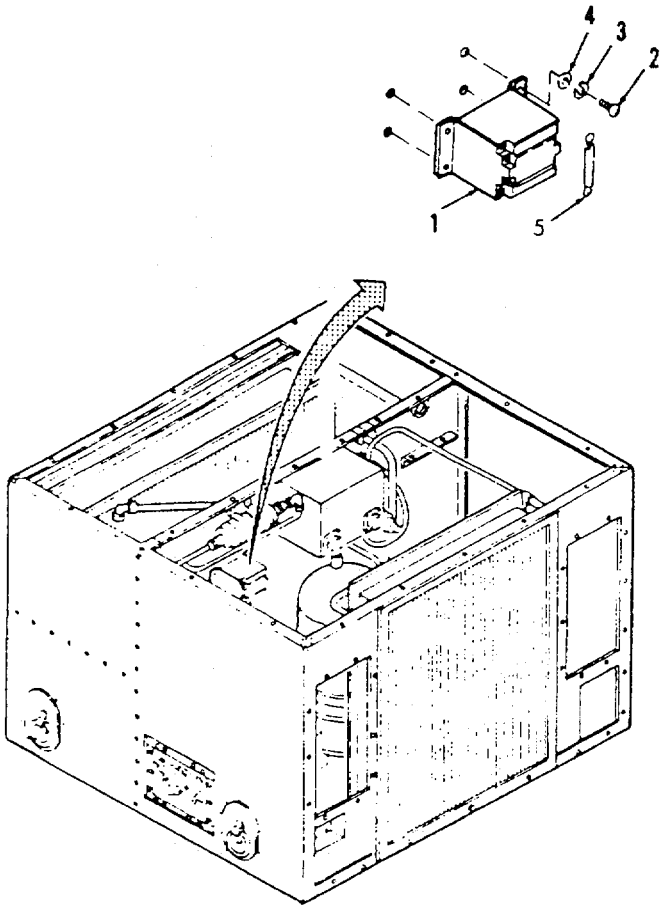


Figure 3-32. Relay (K2).

3-44. COIL FROST SWITCH (S2).

This Task Covers:

a. Removal b. Test c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from air conditioner.
Front cover removed (see para. 3-27).

a. ***Removal.*** (Refer to Figure 3-33).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections of 208 volts ac input when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag and disconnect all wires connected to coil frost switch (1).

CAUTION

Use care when removing capillary from evaporator coil. Damaging the capillary tube of the coil frost switch will cause the unit to malfunction.

(2) Carefully remove capillary tube (6) of coil frost switch from evaporator coil (5).

(3) Remove two screws (2), two lock washers (3), two nuts (4), and remove coil frost switch (1) from unit.

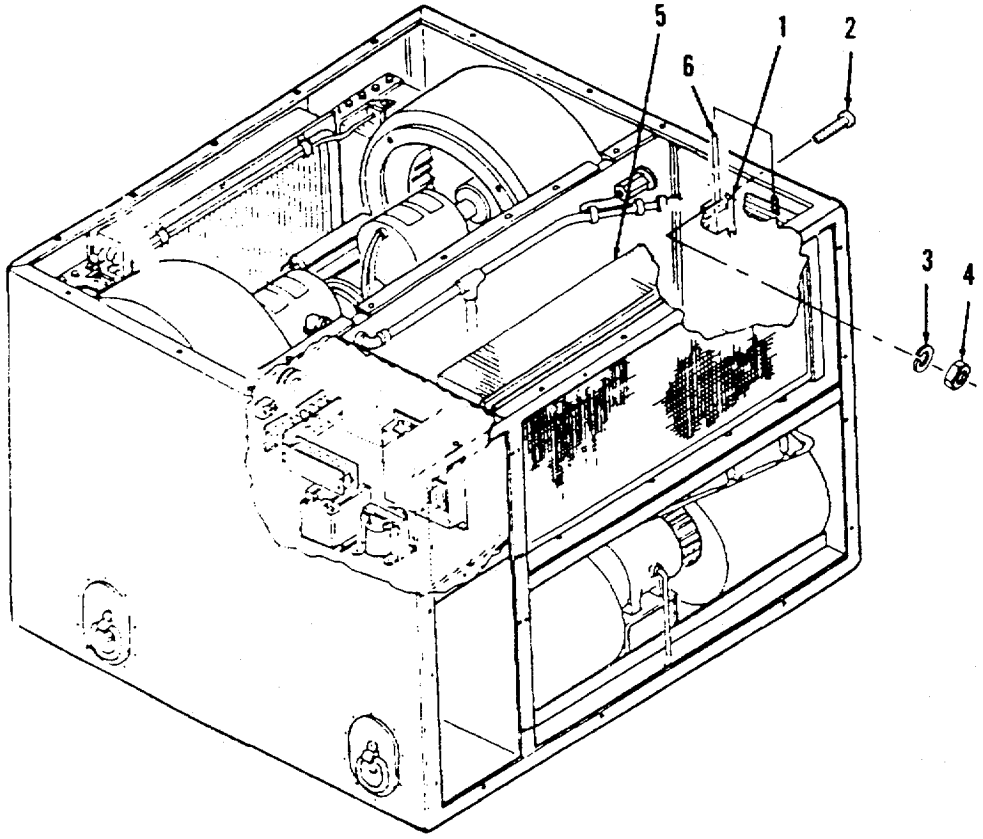


Figure 3-33. Coil Frost Switch.

3-44. COIL FROST SWITCH (S2). - Continued

b. Test.

(1) Using a multimeter, place probes on each of the two terminals of the coil frost switch.

(2) If no frost is present on evaporator coil, there should be continuity across terminals.

(3) If frost is present on evaporator coil, there should be an infinity reading across terminals.

(4) If coil frost switch fails either of the above tests, it must be replaced.

c. Installation.

(1) Install two nuts (4), two lock washers (3), two screws (2), and coil frost switch (t}.

CAUTION

Use care when removing capillary from evaporator coil. Damaging the capillary tube of the coil frost switch will cause the unit to malfunction.

(2) Carefully position capillary tube (6) of coil frost switch (1) in an area close to the evaporator coil (5).

(3) Refer to wire tags installed during removal and reconnect all wires to the coil frost switch (1) and then remove tags.

(4) Install front cover (see para. 3-27).

(5) Reconnect air conditioner to power source.

3-45. TERMINAL BOARDS (TB1), (TB2), and (TB3).

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from unit.
Condenser motor nearest terminal board TB3 removed (see para. 3-34).
Rear cover removed (see para. 3-27).
Front cover removed (see para. 3-27).

a. Removal. (Refer to Figure 3-34).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

3-45. TERMINAL BOARDS (TB1), (TB2), and (TB3).- Continued

a. Removal. - Continued

(1) Tag and disconnect all wires connected to terminal board TB1 (1), terminal board TB2 (2), and terminal board TB3 (3).

(2) Remove two screws (4), cover (5), two spacers (6), two flat washers (7), two lock washers (8), and two nuts (9).

(3) Remove two screws (10), two flat washers (11), two lock washers (12), two nuts (13), marker strip (14), and terminal board TB1 (1).

(4) Remove two screws (15), cover (16), two spacers (17), two flat washers (18), two lock washers (19), and two nuts (20).

(5) Remove two screws (21), two flat washers (22), two lock washers (23), two nuts (24), marker strip (25), and terminal board TB2 (2).

(6) Remove two screws (26), two lock washers (27), two flat washers (28), cover (29), and two spacers (30).

(7) Remove two screws (31), two lock washers (32), two flat washers (33), marker strip (34), and terminal board TB3 (3).

b. Installation.

(1) Install terminal board TB3 (3), marker strip (34), two flat washers (33), two lock washers (32), and two screws (31).

(2) Install two spacers (30), cover (29), two flat washers (28), two lock washers (27), and two screws (26).

(3) Install terminal board TB2 (2), marker strip (25), two nuts (24), two lock washers (23), two flat washers (22), and two screws (21).

(4) Install two nuts (20), two lock washers (19), two flat washers (18), two spacers (17), cover (16), and two screws (15).

(5) Install terminal board TB1 (1), marker strip (14), two nuts (13), two lock washers (12), two flat washers (11), and two screws (10).

(6) Install two nuts (9), two lock washers (8), two flat washers (7), two spacers (6), cover (5), and two screws (4).

(7) Refer to wire tags installed during removal and reconnect all wires to terminal boards TB1 (1), TB2 (2), and TB3 (3) and remove tags.

(8) Install condenser fan motor (see para. 3-34).

(9) Install front cover (see para. 3-27).

(10) Install rear cover (see para. 3-27).

(11) Reconnect air conditioner to power source.

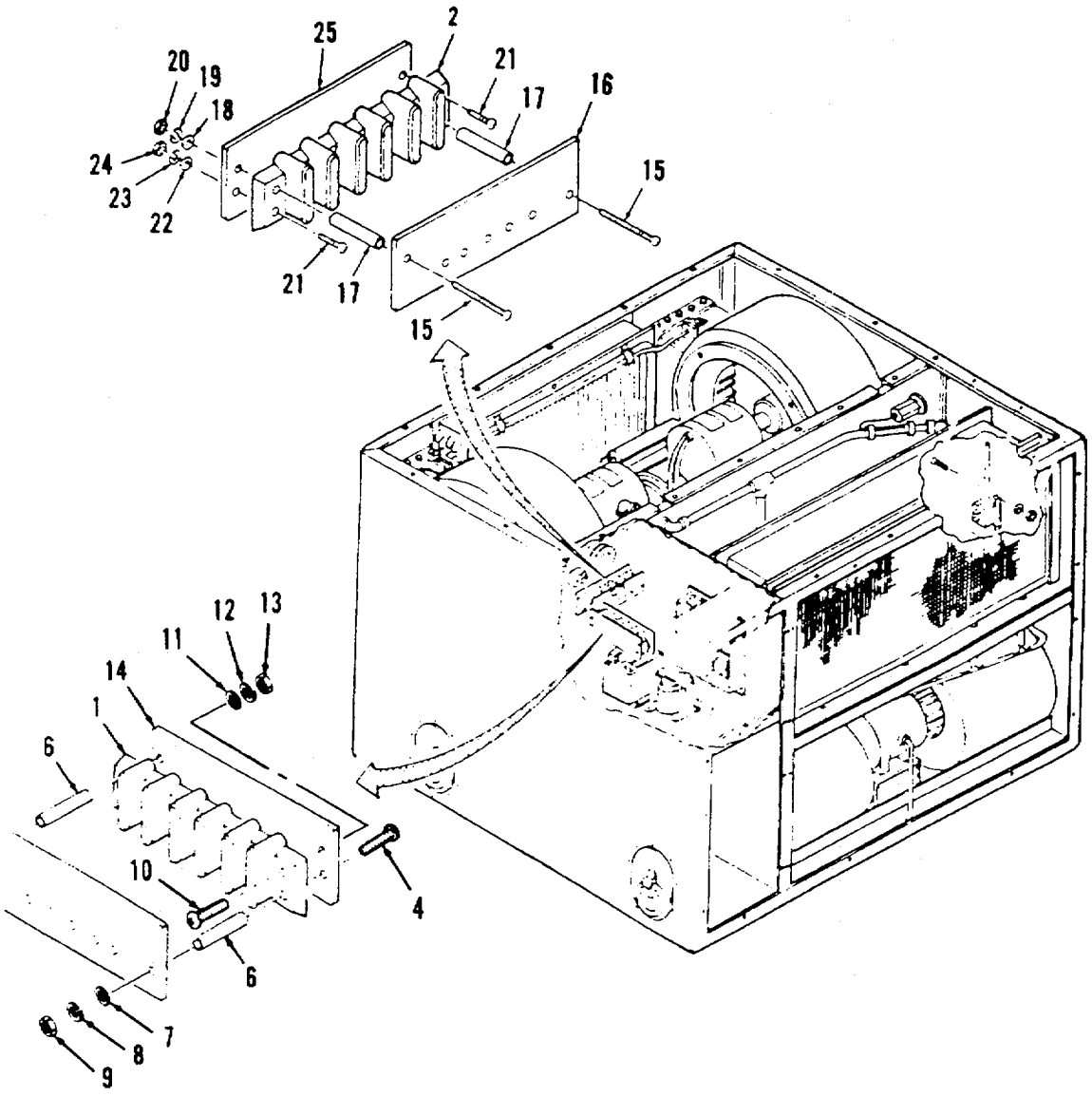


Figure 3-34. Terminal Boards (TB1), (TB2), and (TB3). (Sheet 1 of 2).

3-45. TERMINAL BOARDS (TB1), (TB2), and (TB3). - Continued

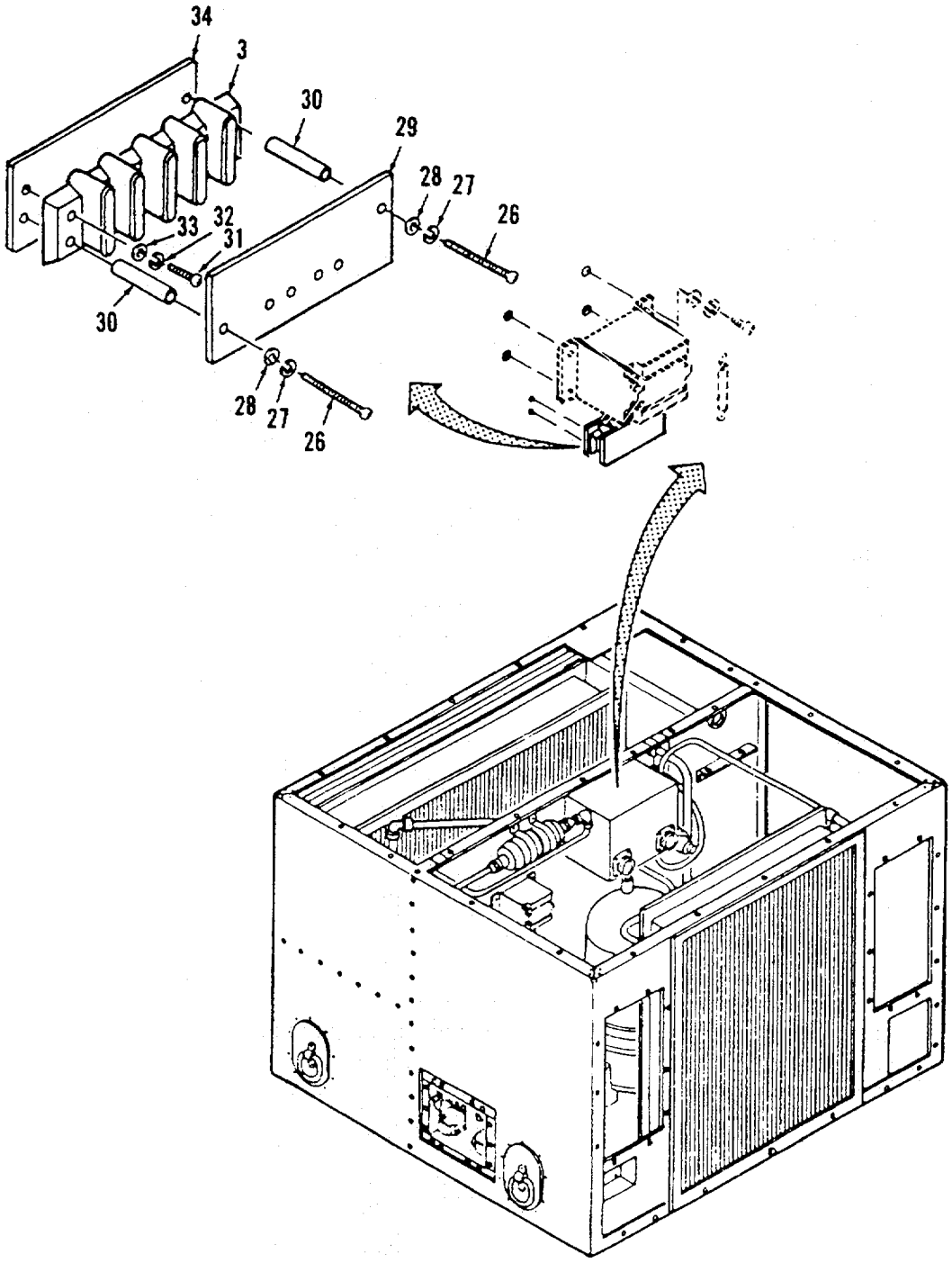


Figure 3-34. Terminal Boards (TB1), (TB2),and (TB3). (Sheet 2 of 2).

3-46. WIRING HARNESSES.

This Task Covers:

a. Test b. Removal c. Repair d. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Soldering Gun Kit (Item 2, Appendix B)
Heat Gun (Item 5, Appendix B)

Material/Parts Required

Wire tags (Item 21, Appendix E)
Solder (Item 1, Appendix E)
Flux (Item 6, Appendix E)
Heat Shrink (Item 17, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Power disconnected from unit.
Front cover removed (see para 3-27).
Rear cover removed (see para. 3-27).

a. Test. If it is suspected that a particular wiring harness may be faulty, it should be tested if at all possible before it is removed. To test any wiring harness, perform procedures (1) through (4). Take careful notes during testing to identify which wire on a wiring harness has been tested and whether any wires or circuits are faulty.

WARNING
HIGH VOLTAGE
is used in operation of this equipment.
DEATH ON CONTACT
may result if personnel fail to observe safety precautions.
Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

3-46. WIRING HARNESSES. - Continued

a. ***Test***. - Continued

WARNING

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag and disconnect all wires connected to the wiring harness to be tested.

(2) Using a multimeter set on the lowest ohms reading, check each wire in the wiring harness for continuity. Any wire found to be not continuous must be replaced.

(3) Using a multimeter set on the lowest ohms reading, check one of the wires in the wiring harness with all other wires of the wiring harness for continuity. If continuity is found, replace the wire selected and the wire shown to be continuous with the selected wire.

(4) Repeat step (3) until all wires in the wiring harness have been checked against all other wires of the wiring harness.

b. ***Removal***.

(1) Tag and disconnect all wires connected to the wiring harness to be tested.

(2) Remove all wire ties and clamps used to keep the wiring harness in position in the unit.

(3) Carefully remove wiring harness from unit by slowly pulling harness through grommets, brackets, and clamps.

CAUTION

Wiring harnesses installed without required braided tubing can short out and severely damage the unit. If a harness was removed which had a wire braid cover, be sure the wire braid cover is assembled to the harness before the harness is installed.

c. ***Repair***. If any wire in a wiring harness is found to be shorted or discontinuous when conducting the tests in step a. above, the harness must be removed, the defective wire repaired and then the wiring harness must be replaced. For detailed procedures for electrical repair of wiring, refer to para. 3-17. For details of circuits refer to Figure 1-5, Electrical Schematic.

d. Installation.

WARNING

Use extreme care when threading and routing a wiring harness into the components of the air conditioner. Forcing, jerking, cutting, or crimping of a wiring harness can damage the wiring and result in severe injury or death to personnel or damage to the air conditioner.

(1) Carefully route wiring harness into unit and through any grommets, brackets, and clamps.

(2) Position harness into position within the unit and install cable ties as required to secure harness and prevent any unnecessary movement of harness.

(3) Position harness into any harness clamps and tighten clamp hardware to hold harness.

(4) Refer to wire tags installed during removal and reconnect wiring harness as indicated and then remove tags.

(5) Install front cover and rear cover (see para. 3-27).

(6) Reconnect air conditioner to power source.

3-47. COIL (Solenoid Valve).

This Task Covers

a. Test b. Removal c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Wire tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Rear cover removed (see para. 3-27).

a. Test.

WARNING
HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Using multimeter set on lowest OHMS scale, check for continuity between leads of coil. If continuity is not found, coil is open and must be replaced.

(2) Using multimeter set on lowest OHMS scale, check for continuity between each lead and coil casing. If continuity is found between either lead and the casing, the coil is grounded and must be replaced.

b. Removal. (Refer to Figure 3-35).

(1) Tag and disconnect wires connected to solenoid valve (1).

(2) Remove nut (2), washer (3), and coil (4).

c. Installation.

(1) Install coil (4), washer (3), and nut (2) onto solenoid valve (1).

(2) Refer to wire tags installed during removal and reconnect wires of coil as indicated and then remove tags.

(3) Install rear cover (see pare. 3-27).

(4) Reconnect air conditioner to power source.

3-47. COIL (Solenoid Valve) - Continued

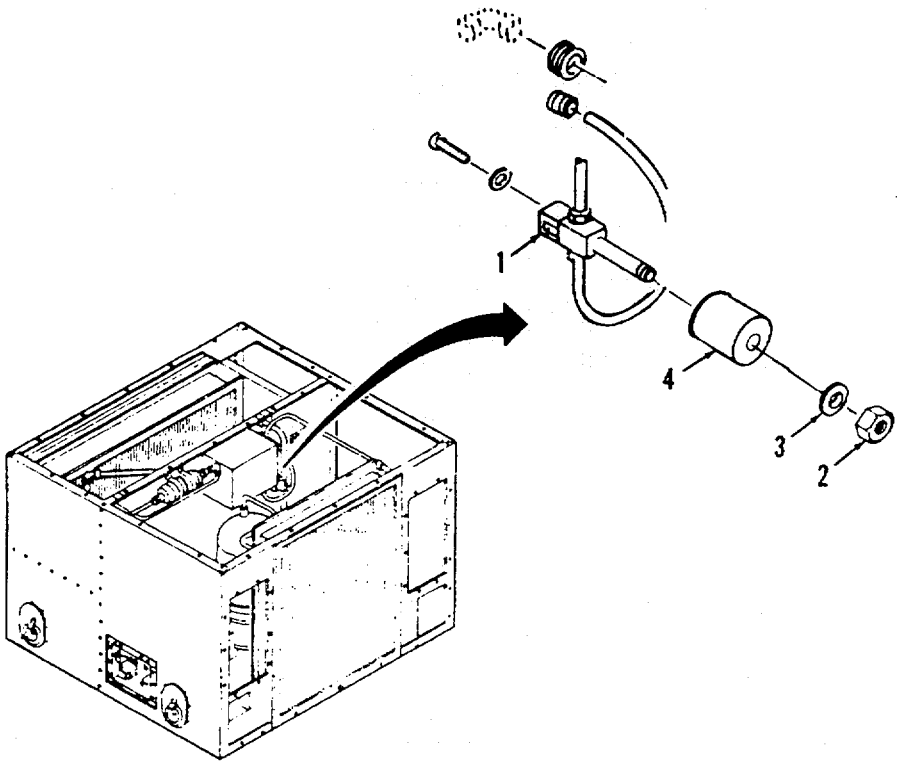


Figure 3-35. Coil (Solenoid Valve).

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

3-48. PREPARATION FOR STORAGE.

a. Administrative Storage of Equipment.

(1) 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 determined by the directing authority. During the storage period, appropriate maintenance records will be kept.

(2) Before placing equipment in administrative storage, current Preventive Maintenance Checks and Services should be completed, shortcomings and deficiencies should be corrected, and all Modification Work Orders (MWO's) should be applied.

(3) 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.

b. Intermediate Storage (46 to 180 days). No special handling is required other than protection from damage and the elements.

(1) Unroll the fabric cover.

(2) Snap the cover in place.

(3) Place the air conditioner in a dry, covered area.

c. Long Term or Flyable Storage (Indefinite time).

(1) Unroll the fabric cover.

(2) Snap the cover in place.

(3) Bolt the unit to a skid base, preferably the original used to ship the unit if it has been preserved.

(4) Wrap the unit with two layers of heavy plastic sheet or barrier paper.

(5) Tape and strap the wrapping in place.

(6) Mark the air conditioner in accordance with the standard Army procedures contained in TM 740-90-1, Administrative Storage of Equipment.

CHAPTER 4

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TEST, MEASUREMENT, AND DIAGNOSTIC EQUIPMENT (TMDE), AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS AND EQUIPMENT. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. No special tools are required for maintenance of the equipment. Test, Measurement, and Diagnostic Equipment (TMDE) and Support Equipment include standard equipment found in any maintenance shop.

4-3. REPAIR PARTS. Repair parts are listed and illustrated in the Repair Parts and Special Tools List (RPSTL), TM 9-4120-404-24P, covering unit, direct support, and general support maintenance for this equipment.

Section II. DIRECT SUPPORT TROUBLESHOOTING PROCEDURES

4-4. GENERAL.

a. Table 4-1. contains Direct Support troubleshooting information for location and correcting most of the operating troubles which may develop in the air conditioner and can be repaired at the direct support maintenance level. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions, If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. The following malfunction index is provided to assist you in locating malfunctions within this table.

MALFUNCTION **PAGE NO.**

Table 4-1. Direct Support Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
1. DISCHARGE PRESSURE TOO HIGH.
Step 1. Check for dirty or clogged condenser coil. Clean condenser coil.
Step 2. Check for refrigerant overcharge. See paragraph 4-6.
Step 3. Check to see if condenser fan is loose on shaft. Tighten condenser fan on shaft per para. 4-15.
2. DISCHARGE PRESSURE TOO LOW.
Step 1. Check refrigerant pressure for low refrigerant charge. Charge the refrigerant system per paragraph 4-6.
Step 2. Check compressor operation. Replace defective compressor per para. 4-28.
Step 3. Check for faulty solenoid valve. Test solenoid valve per para. 4-19.
3. SUCTION PRESSURE TOO HIGH.
Step 1. Check to see if solenoid valve is stuck open. Replace valve if defective per para. 4-19.
Step 2. Check for defective actuator and actuator cables. Check for defective actuator cylinder (see para. 4-20) and broken or loose louver actuator cables (see para. 3-35). Repair or replace actuator cylinder and/or louver actuator cables.

Table 4-1. Direct Support Troubleshooting.

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
Step 3. Test for defective expansion valve. Test for properly functioning expansion valve per para. 4-26. Replace defective expansion valve. If expansion valve is not defective, replace compressor (see para. 4-28).
4. SUCTION PRESSURE TOO LOW.
Step 1. Airflow across evaporator coil is restricted. Check for clogged evaporator coil. Clean as required. Check for defective evaporator fan motor. Replace if defective (see para. 4-12). Check for clogged mist eliminator. Clean as required. Check for clogged return air filter. Clean as required.
Step 2. Check for restricted dryer. Replace dryer if clogged (see para. 4-18).
Step 3. Check for defective expansion valve. Test for defective expansion valve. Replace if defective (see para. 4-26).
Step 4. Check for mashed or crimped refrigerant tubing. Repair or replace any damaged tubing (see para. 4-31).
Step 5. Check for low refrigerant charge. Refer to servicing refrigerant system para. 4-6 and recharge system as required.

Section III. DIRECT SUPPORT MAINTENANCE PROCEDURES

4-5. GENERAL.

a. The procedures in this section cover items which appear in the direct support maintenance level on the Maintenance Allocation Chart (MAC) which is in Appendix B.

b. When working on the refrigeration system there are certain general maintenance procedures which may need to be performed at some point during the specific repair or replacement of items within the refrigeration system. Paragraph 4-6 covers these general procedures.

c. The refrigeration system must be completely recovered before any maintenance is performed on system components. Read and understand all instructions prior to attempting repairs. Leak testing and dehydrator replacement are required after any system component has been removed and replaced. The system must be evacuated before it is charged. The system must be properly charged to function properly.

WARNING
DANGEROUS CHEMICAL
(R22)
is used in this equipment.

DEATH
or severe injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant gas being recovered under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

WARNING
REFRIGERANT UNDER PRESSURE
is used in the operation of this equipment.

DEATH
or severe injury may result if you fail to observe safety precautions. Never use a heating torch on any part that contains refrigerant 22. Do not let liquid refrigerant touch you, and do not inhale refrigerant gas.

4-6. SERVICING THE REFRIGERANT SYSTEM.

This Task Covers:

a. Equipment Setup
b. Refrigerant recovery
c. Purging the System
d. Leak Testing the System
e. Evacuating the System
f. Charging the System
g. System Pressure Check
h. Equipment Removal

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Gloves (Item 2, Appendix B)
Goggles (Item 2, Appendix B)
Refrigerant Recovery and Recycling Unit (Item 4, Appendix B)
Regulator Assembly (Item 6, Appendix B)
Nitrogen Cylinder (Item 2, Appendix E)
Vacuum Pump (Item 1, Appendix B)
Refrigerant, R-22 (Item 16, Appendix E)
Oil (Item 22, Appendix E)

Personnel Required

Two EPA Certified Refrigeration Technicians

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.

WARNING
DANGEROUS CHEMICAL
(R22)
is used in this equipment.

DEATH or severe injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant gas being recovered under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

WARNING
REFRIGERANT UNDER PRESSURE
is used in the operation of this equipment.

DEATH or severe injury may result if you fail to observe safety precautions. Never use a heating torch on any part that contains refrigerant 22. Do not let liquid refrigerant touch you, and do not inhale refrigerant gas.

4-6. SERVICING THE REFRIGERANT SYSTEM. - Continued.

NOTE
Always use recycled refrigerant when available.

a. Equipment Set UP. (Refer to Figure 4-1).

(1) Remove eight screws (1) and access cover (2).

(2) Remove protective caps (3) from service valves (4).

(3) Connect service hoses to high and low pressure service valves (4) as indicated by data plates near service valve area.

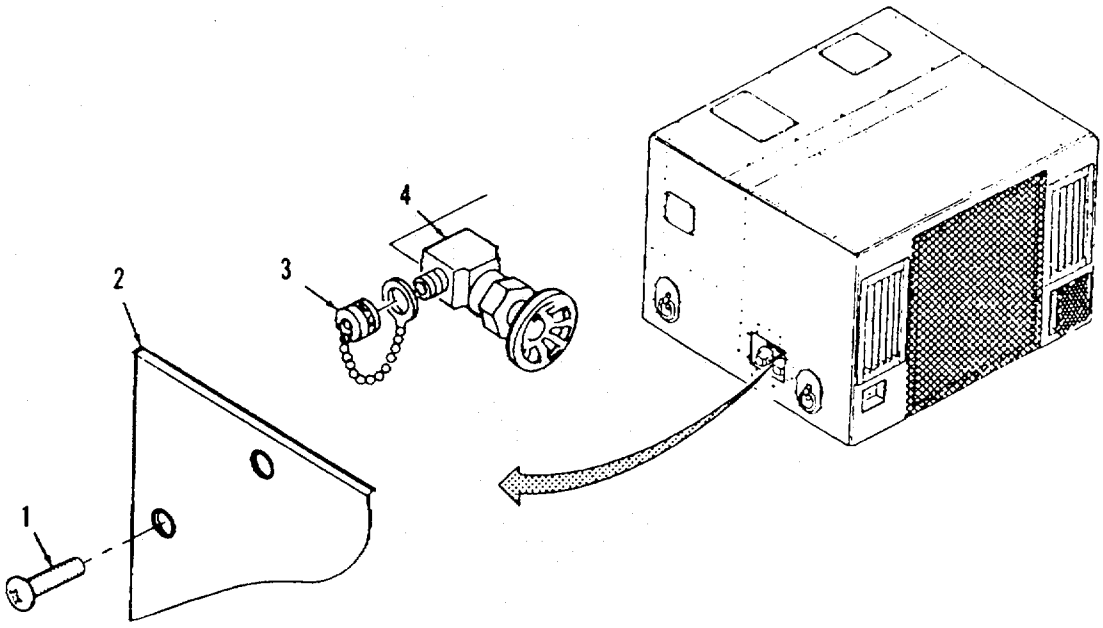


Figure 4-1. Refrigerant Equipment Set Up.

b. Refrigerant Recovery.

(1) Connect recovery unit to manifold charging valve.

(2) Operate recovery unit in accordance with recovery unit operator's manual.

(3) Record amount of oil collected in recovery unit after completing refrigerant recovery. This oil quantity indicates the amount of oil to be replaced in the refrigerant system.

(4) Remove the recovery unit from manifold charging valve.

c. Purging the System.

(1) Remove safety cap from nitrogen cylinder and install regulator onto nitrogen cylinder.

(2) Connect regulator and nitrogen cylinder to manifold.

(3) Disconnect manifold hose from low pressure service valve.

(4) Open nitrogen cylinder valve and adjust regulator so that 1-2 psig of nitrogen flows through the system.

(5) Allow nitrogen to sweep through the system at a rate of not less than 1-2 psig for not less than 5 minutes before beginning any brazing or debrazing operations. Allow nitrogen to continue to flow through the system at the same rate until all brazing or debrazing operations are complete.

(6) When brazing operations are complete, close valve on nitrogen cylinder.

(7) Disconnect manifold hose from nitrogen cylinder and regulator.

(8) Remove regulator from nitrogen cylinder and install safety cap onto cylinder.

d. Leak Testing the System.

(1) Recover refrigerant from system per step b.

(2) ***When to Test.*** The entire repaired area should be thoroughly leak tested after repair or replacement of any component, before it is recharged with refrigerant 22. Leak testing is also the method for troubleshooting when a system has lost all or part of its refrigerant charge through an undetermined cause.

4-6. SERVICING THE REFRIGERANT SYSTEM. - Continued.

(3) ***Testing Method.*** There are two acceptable methods for leak testing the refrigeration system.

(a) ***Refrigerant gas leak detector.*** 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.

NOTE

The electronic refrigerant gas leak detector is highly sensitive to the presence of a minute quantity of gas in the air, and due to this factor is quite effective in the detection of small leaks. However, due to the rapid dispersion of refrigerant gas into the surrounding air, difficulty may be encountered in pinpointing large leaks. The detector must be used in a well ventilated but draft-free area.

(b) ***Soap solutions.*** In this method, a strong solution of a liquid detergent and water is brushed onto all points of possible leakage while closely watching for the formation of bubbles.

CAUTION

If the soap solution testing method is used, thoroughly rinse with fresh water after testing is completed. A residual soap film will attract and accumulate an excessive amount of dust and dirt during operation.

(4) ***Testing Procedures.*** To perform leak testing by use of the electronic detector, it is necessary that the system be pressurized with a proportion of refrigerant gas. To perform leak testing by use of the soap solution method, the system may be pressurized with dry nitrogen alone.

CAUTION

Connect the refrigerant 22 cylinder so that only gas will be used for pressurization.

(a) Connect a drum of refrigerant 22 to the manifold.

(b) Open the charging manifold valves.

(c) Open the refrigerant drum valve slightly and adjust as needed to prevent formation of frost, and allow system pressure to build up until the gauges read 30 psig (2.1 kg/cm ^{2}).

(d) Close the charging manifold valves and the refrigerant drum valve.

(e) Remove the refrigerant 22 cylinder from the center hose connection.

(f) Connect a nitrogen regulator and cylinder of dry nitrogen to the manifold.

(g) Open the charging manifold valves and the nitrogen cylinder and regulator valve. Allow system pressure to build up until gages read 350 psig (24.7 kg/cm2).

(h) Perform leak tests, then recover and purge the system, in accordance with steps b. and c. of this paragraph before performing maintenance, or before evacuating and charging the system, as appropriate.

(5) Always perform a final leak test after performing any repair or replacement of components before the air conditioner is reassembled and the refrigeration system is evacuated and charged.

CAUTION

Refrigerant/nitrogen mixture will damage recovery unit. DO NOT attempt to recover refrigerant/nitrogen combination used for leak test. Discharge this test mixture to open air.

e. Evacuating the System.

(1) Attach vacuum pump to manifold.

(2) Start vacuum pump.

(3) Open high pressure and low pressure service valves.

(4) Run the vacuum pump for at least two hours. If the refrigerant system is larger or has been opened for a long period of time, the vacuum pump must be run longer as required by maintenance technician.

(5) Refer to amount of oil removed during refrigerant recovery and add an equal amount of clean new oil into the system by siphoning method.

(6) Close high pressure and low pressure service valves.

(7) Disconnect vacuum pump from manifold.

(8) Stop vacuum pump.

4-6. SERVICING THE REFRIGERANT SYSTEM. - Continued.

f. Charging the System.

(1) Recover refrigerant from system per step b.

(2) Remove safety cap from R-22 refrigerant cylinder.

(3) Attach refrigerant cylinder to manifold.

(4) Open high pressure and low pressure service valves.

(5) Close the low pressure (suction) charging manifold valve.

(6) Position the refrigerant 22 cylinder so that liquid will be used for charging. (Some cylinders must be inverted and some are equipped with a selector valve).

(7) Open the refrigerant 22 cylinder valve.

(8) Allow liquid refrigerant to enter the system until the cylinder weight has decreased by 11.0 pounds (4.9 kg) or until system pressure has equalized.

(9) Close the refrigerant cylinder valve and the high pressure (discharge) manifold valve.

(10) Connect power.

(11) Be sure circuit breakers are on.

(12) Press and release both pressure switch reset buttons.

(13) Turn air conditioner on and operate in the COOL mode with the temperature control thermostat set at a maximum COOL position.

(14) If the 11.0 pound (4.9 kg) full charge was obtained, skip steps (15) through (17). If the system pressure equalized prior to obtaining a full charge of 11.0 pounds (5.0 kg), proceed with step (18).

(15) Switch the refrigerant cylinder to the gas only position.

(16) Be sure that the refrigerant cylinder has been switched to the gas position and open the refrigerant cylinder valve and the low (suction) pressure charging manifold valve.

(17) Monitor the weight of the refrigerant cylinder as the air conditioner compressor pulls additional refrigerant gas into the system until the full 11.0 pound (4.9 kg) charge is obtained. When the system is fully charged, immediately close the refrigerant cylinder valve.

(18) Run the air conditioner in COOL mode with temperature control thermostat in full COOL position for a minimum of 15 minutes.

CAUTION
Do not skip the next step.

(19) After 15 minutes, observe the liquid sight indicator. Green center means the refrigerant moisture content is acceptable. Yellow center means there is too much moisture in the system. It must be recovered, evacuated, and charged again.

NOTE
Milky white or bubbly liquid means the system has a low charge. Clear bubble-free liquid around the center means the system is fully charged.

g. System Pressure Check.

(1) Be sure air conditioner mode selector switch is set to COOL and temperature selector knob is set to maximum COOL. Allow system to run for a minimum of 15 minutes.

(2) Add 30° to ambient temperature and refer to Table 4-2 for proper corresponding required pressure reading.

(3) Check gauge reading on manifold. If gauge pressure is less than indicated table pressure, the system does not contain enough refrigerant. Check system for leaks and/or recharge system as needed and then repeat pressure check.

(4) If manifold gauge readings closely match appropriate value in Table 4-2, refrigerant system is properly charged.

(5) Turn mode selector switch to OFF position.

h. Equipment Removal. (Refer to Figure 4-1).

(1) Close service valves on unit.

(2) Disconnect manifold from high and low pressure service valves (4) on unit.

(3) Install caps (3) onto high and low pressure service valves.

(4) Install access cover (2) and eight screws (1).

(5) Recover refrigerant from service manifold.

Table 4-2. Pressure-Temperature Relationship of Saturated Refrigerant 22.

Temperature		Pressure		Temperature		Pressure	
Deg F	Deg C	Psig	kg/cm'	Deg F	Deg C	Psig	kg/cm'
10	-12.3	32.93	2.315	74	23.3	131.2	9.225
12	-11.1	34.68	2.439	76	24.4	135.7	9.541
14	-10.0	36.89	2.593	78	25.6	140.3	9.864
16	-8.9	38.96	2.739				
18	-7.8	41.09	2.889	80	26.7	145.0	10.195
				82	27.8	149.8	10.522
20	-6.6	43.28	3.043	84	28.9	154.7	10.877
22	-5.5	45.23	3.180	86	30.0	159.8	11.236
24	-4.3	47.85	3.364	88	31.1	164.9	11.594
26	-3.4	50.24	3.532				
28	-2.2	52.70	3.705	90	32.2	170.1	11.960
				92	33.3	175.4	12.332
30	-1.1	55.23	3.883	94	34.5	180.9	12.719
32	0.0	57.83	4.066	96	35.6	186.5	13.113
34	1.1	60.51	4.254	98	36.7	192.1	13.506
36	2.2	63.27	4.448				
38	3.3	66.11	4.648	100	37.8	197.9	13.914
				102	38.9	203.8	14.329
40	4.4	69.02	4.853	104	40.0	209.9	14.758
42	5.5	71.99	5.062	106	41.4	216.0	15.187
44	6.6	75.04	5.276	108	42.2	222.3	15.630
46	7.7	78.18	5.497				
48	8.8	81.40	5.723	110	43.3	228.7	16.080
				112	44.4	235.2	16.537
50	10.0	84.70	5.955	114	45.6	241.9	17.008
52	11.1	88.10	6.257	116	46.7	248.7	17.486
54	12.2	91.5	6.433	118	47.8	255.6	17.971
56	13.3	95.1	6.686				
58	14.5	98.8	6.947	120	48.9	262.5	18.456
				125	51.7	277.9	19.539
60	15.6	102.5	7.206	130	54.4	296.8	20.868
62	16.7	106.3	7.474	135	57.2	316.6	22.260
64	17.8	110.2	7.748	140	60.0	337.3	23.716
66	18.9	114.2	8.029				
68	20.0	118.3	8.318	145	62.8	358.9	25.234
				150	65.6	381.5	26.823
70	21.1	122.5	8.612	155	68.3	405.1	28.483
72	22.2	126.8	8.915	160	71.1	429.8	30.219

4-7. BRAZING / DEBRAZING PROCEDURES.

This Task Covers:

a. General b. Filler Alloy c. Debrazing d. Cleaning Debrazed Joints e. Reassembly f. Brazing

Initial Setup:

Took Required

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

Material/Parts Required

Brazing Alloy, B cup 5 (Item 4, Appendix E)
Nitrogen Cylinder (Item 2, Appendix E)
Brazing Flux (Item 5, Appendix E)
Abrasive Cloth (Item 7, Appendix E)
Rags (Item 8, Appendix E)

Equipment Condition

Air conditioner shut down and cool.

WARNING
DANGEROUS CHEMICAL
(R22)
is used in this equipment

DEATH

or severe injury may result if personnel fail to observe safety precautions. Use great care to avoid contact with liquid refrigerant gas being recovered under pressure. Sudden and irreversible tissue damage can result from freezing. Wear thermal protective gloves and a face protector or goggles in any situation where skin-eye-contact is possible. Prevent contact of refrigerant gas with flame or hot surfaces. Heat causes refrigerant to break down and form carbonyl chloride (phosgene), a highly poisonous and corrosive gas.

4-7. BRAZING/DEBRAZING PROCEDURES. - Continued

WARNING
REFRIGERANT UNDER PRESSURE
is used in the operation of this equipment.
DEATH
or severe injury may result if you fail to observe safety precautions. Never use a heating torch on any part that contains refrigerant 22. Do not let liquid refrigerant touch you, and do not inhale refrigerant gas.

a. General. All tubing in the refrigeration system is seamless copper with a bright internal finish that permits thorough cleaning and prevents entrapment of moisture or other impurities. Rigid grade copper is used for straight sections and soft grade for sections that must be bent. All interconnecting fittings, such as elbows, tees, etc., are also copper. The bodies of all valves and all connections on other components are brass. 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.

b. Filler Alloy. Use brazing alloy, silver and flux, for all copper to brass joints. Use brazing alloy, copper for all copper to copper joints without flux.

c. Debrazing. Debraze joints for removal of refrigeration system components as follows:

WARNING
All refrigerant 22 must be recovered from system and entire system must be purged with dry nitrogen before beginning any debrazing operation.

(1) Determine which joints are to be debrazed. Due to the limited work space inside the air conditioner, it may be more convenient to remove a part of the interconnecting tubing with the component rather than debrazing the joints on the component itself.

(2) Before debrazing a joint on a valve, disassemble the valve to the extent possible, then apply heat sink to all nearby surfaces but the joint. (If heat sink is not available a wet rag may be used).

WARNING
Polyurethane foam used as insulation in air conditioner will break down to form toxic gases if exposed to flame of a torch at brazing temperature.

(3) Protect insulation, wiring harnesses, cabinet, and other surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of 1 to 2 psi.

(5) Apply sufficient heat uniformly around the joint to quickly melt the filler alloy. 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. Remove heat as soon as the joint separates.

d. Cleaning debrazed joints. All filler alloy must be cleaned from debrazed joints before reassembly. Heat each piece of the joint until the filler alloy is melted and then wipe it away with a damp cloth. Be sure no filler alloy or other debris are left inside any tubing, fitting, or component.

e. Reassembly. If tubing sections or fittings were removed with a component, debraze them from the component, clean the joints, and braze them to the new component before reinstallation.

f. Brazing. Braze joints within the air conditioner as follows:

(1) Position the component to be installed.

(2) To prepare a joint on a valve for brazing, disassemble the valve to the extent possible. Then apply heat sink to all nearby surfaces but the joint. (If heat sink is not available a wet rag may be used).

(3) Protect insulation, wiring harnesses, and surrounding components with appropriate shields.

(4) Be sure the work area is well ventilated and that dry nitrogen is flowing through the refrigeration system at a rate of 1 to 2 psi.

(5) Apply sufficient heat uniformly around the joint to quickly raise it to a temperature that will melt the filler alloy. Remove heat as soon as brazing is completed.

4-8. CONDENSATE DRAIN ASSEMBLY.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Return air louver removed (see para. 3-21).
Evaporator fan assembly removed (see para. 4-9).
Condenser fan scroll nearest condensate drain assembly removed (see para. 4-14).

a. Removal (Refer to Figure 4-2).

(1) Loosen clamp (1) and remove tubing (2).

(2) Remove two clamps (3) and tubing (4).

b. Installation.

(1) Install tubing (4) and two clamps (3).

(2) Install tubing (2) and install and tighten clamp (1).

(3) Install condenser fan scroll (see para. 4-14).

(4) Install evaporator fan assembly (see para. 4-9).

(5) Install return air louver (see para. 3-21).

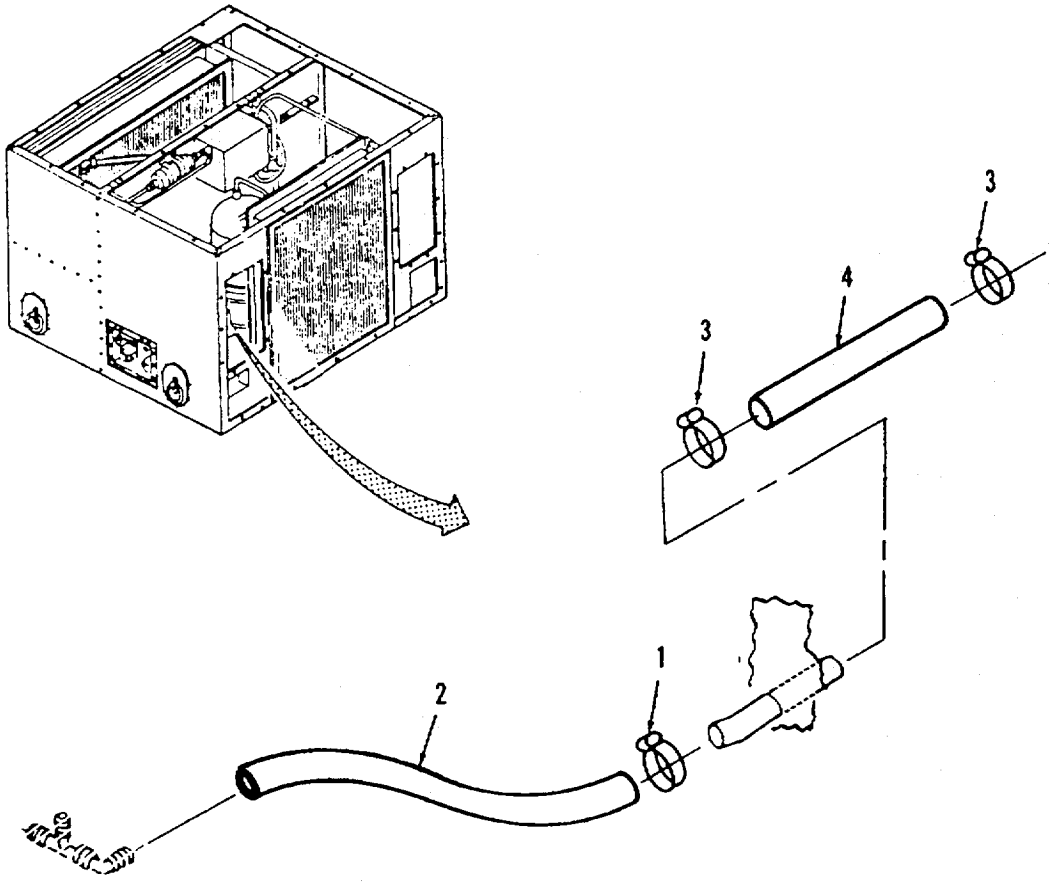


Figure 4-2. Condensate Drain Assembly.

4-9. EVAPORATOR FAN ASSEMBLY.

This Task Covers:

a. Removal b. Repair c. Installation

Initial Setup:

Tool Required

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

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Heating elements removed (see para. 3-29).
Return air louver removed (see para. 3-21).

a. Removal. (Refer to Figure 4-3).

WARNING
HIGH VOLTAGE
is used in operation of this equipment.

DEATH ON CONTACT
may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Tag all evaporator fan wires connected to terminal on cabinet frame.

CAUTION

Damage to motor controller or wiring will cause the air conditioner to fail. Use caution when pulling motor controller from unit.

(2) Remove motor controller from air conditioner, but do not disconnect any wires attached to motor controller (see para. 3-38).

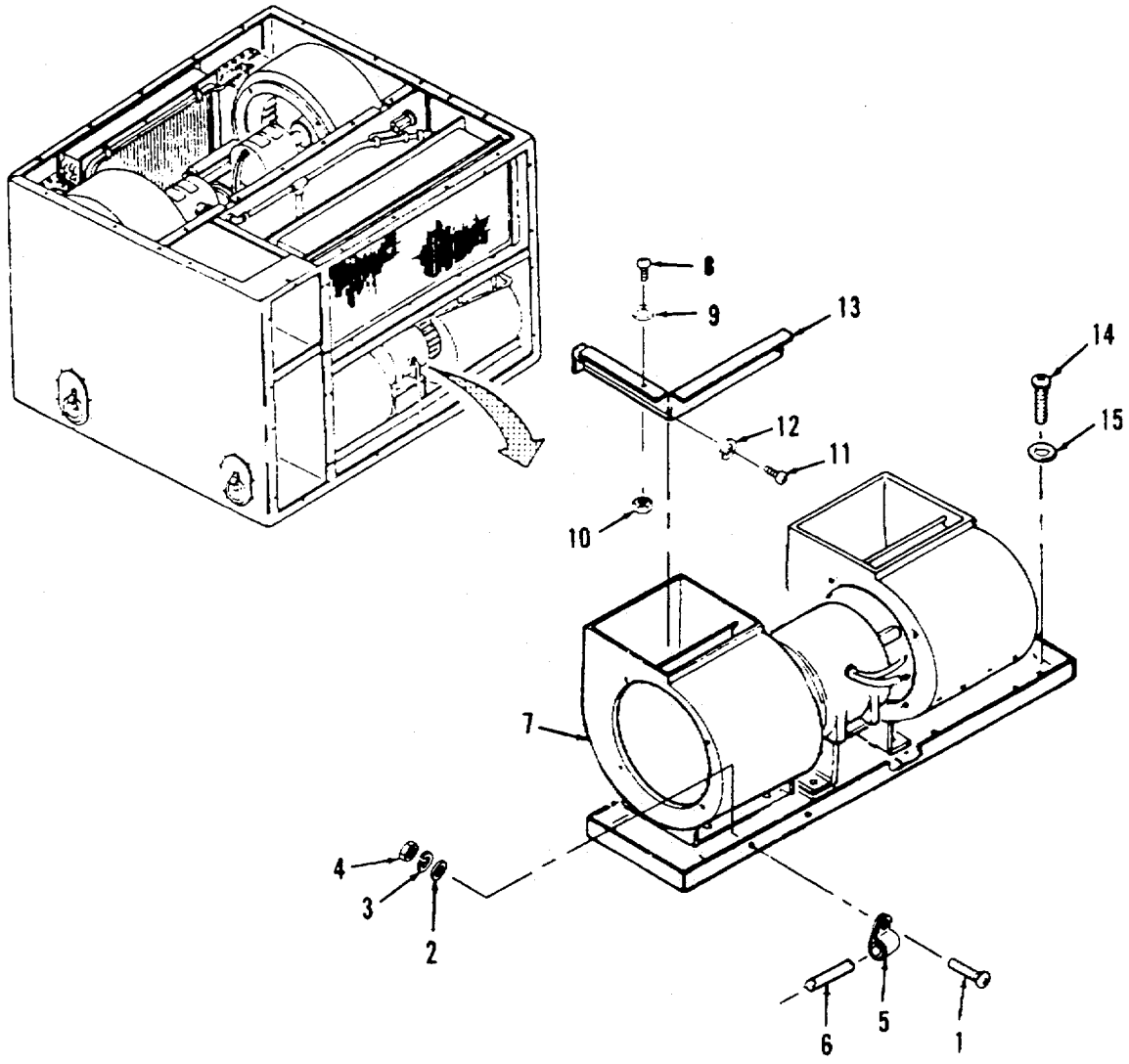


Figure 4-3. Evaporator Fan Assembly.

4-9. EVAPORATOR FAN ASSEMBLY. - Continued**.**

CAUTION

Damage to thermistor on wiring harness may cause the unit to fail. Be very careful in moving thermistor and thermistor wiring.

(3) Remove two screws (1), two flat washers (2), two lock washers (3), two nuts (4), two clamps (5), and wiring harness (6) from evaporator fan assembly (7).

(4) Remove two screws (8), two flat washers (9), and two nuts (10).

(5) Remove two screws (11), two lock washers (12), and two scroll ducts (13).

(6) Remove four screws (14) and four flat washers (15) holding evaporator fan assembly (7) to cabinet.

(7) Disconnect evaporator fan motor wires from wiring harness.

(8) Remove evaporator fan assembly (7) from unit.

b. Repair.

Repair is limited to replacement of defective parts.

c. Installation.

(1) Place evaporator fan assembly (7) into unit.

(2) Install four flat washers (15) and four screws (14) to attach the evaporator fan assembly (7) to cabinet.

(3) Install two scroll ducts (13), two lock washers (12), and two screws (11).

(4) Install two nuts (10), two flat washers (9), and two screws (8).

(5) Install wiring harness (6), two clamps (5), two nuts (4), two lock washers (3), two flat washers (2), and two screws (1) onto evaporator fan assembly (7) frame.

(6) Install motor controller into unit (see para. 3-38).

(7) Connect all evaporator fan wires to terminal on cabinet frame and remove tags.

(8) Install heating elements (see para. 3-29).

(9) Install return air louver (see para. 3-21).

(10) Reconnect air conditioner to power source.

4-10. EVAPORATOR FAN SCROLLS.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tool Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Return air louver removed (see para 3-21).
Evaporator fan assembly removed (see para. 4-9).

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

(1) Remove four screws (1), four flat washers (2), and inlet bell (3).

(2) Remove four screws (4), four flat washers (5), and inlet bell (6).

(3) Remove four screws (7), four flat washers (8), and evaporator fan scroll (9) from evaporator impeller fan (10) on evaporator fan assembly.

(4) Repeat for other side if other evaporator fan scroll is being replaced.

b. Installation.

(1) Place evaporator fan scroll (9) onto evaporator fan assembly.

(2) Loosely install four flat washers (8) and four screws (7).

(3) Adjust evaporator fan scroll (9) until it is centered around evaporator impeller fan (10).

(4) Tighten four flat washers (8) and four screws (7).

(5) Install inlet bell (6), four flat washers (5), and four screws (4).

(6) Install inlet bell (3), four flat washers (2), and four screws (1).

(7) Repeat for other side if both evaporator fan scrolls were removed.

4-10. EVAPORATOR FAN SCROLLS. - Continued.

(8) Install evaporator fan assembly (see para. 4-9).

(9) Install return air louver (see para. 3-21).

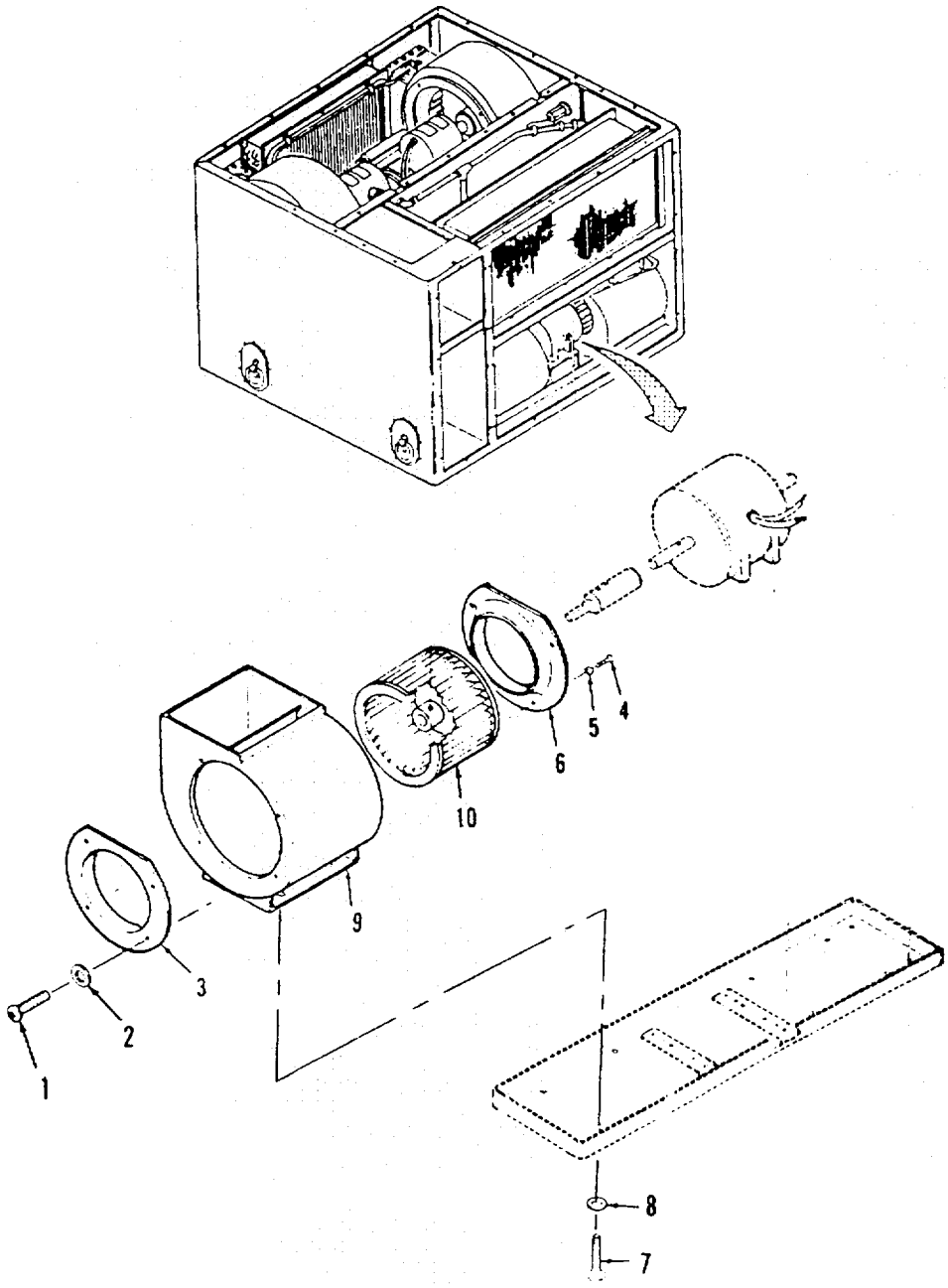


Figure 4-4. Evaporator Fan Scrolls.

4-11. EVAPORATOR IMPELLER FANS.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tool Required

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

Material/Parts Rewired

None

Equipment Condition

Air conditioner shut down and cool.
Return air louver removed (see para. 3-21).
Evaporator fan assembly removed (see para. 4-9).
Evaporator fan scrolls removed (see para. 4-10).

a. Removal. (Refer to Figure 4-5).

(1) Loosen set screw (1) and impeller fan ***(2)*** from evaporator fan assembly.

(2) Loosen two set screws **(3)** and remove extension shaft (4) from evaporator fan assembly.

(3) Remove inlet ring (5).

(4) Repeat for other impeller fan if other fan is being replaced.

b. Installation.

(1) Install extension shaft (4) and two set screws (3) to evaporator fan assembly.

(2) Place inlet ring (5) onto extension shaft (4).

(3) Install impeller fan (2) onto extension shaft (4) and loosely tighten set screw (1).

(4) Repeat for other impeller fan.

(5) Install evaporator fan scrolls (see para. 4-10).

(6) Center impeller fan (2) in evaporator fan scroll and tighten set screw (1).

4-11. EVAPORATOR IMPELLER FANS. - Continued**.**

(7) Spin both impeller fans to insure fans do not rub against scrolls.

(8) Repeat for other impeller fan if removed.

(9) Install evaporator fan assembly (see para. 4-9).

(10) Install return air louver (see para. 3-21).

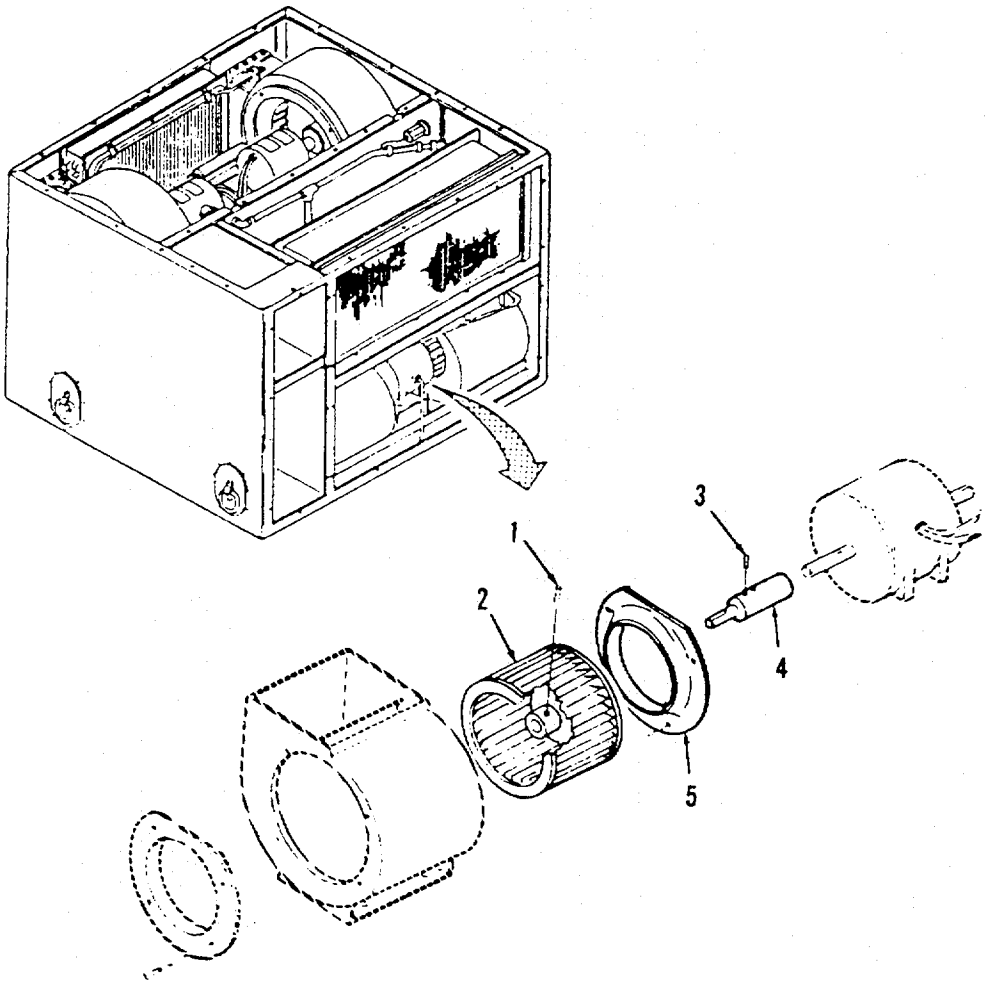


Figure 4-5. Evaporator Impeller Fans.

4-12. EVAPORATOR MOTOR.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tool Required

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

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Air conditioner disconnected from power source.
Return air louver removed (see para. 3-21).
Evaporator fan assembly removed (see para. 4-9).
Evaporator fan scrolls removed (see para. 4-10).
Evaporator impeller fans removed (see para. 4-11).

a. Removal. (Refer to Figure 4-6).

WARNING

HIGH VOLTAGE
is used in operation of this equipment.
DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

4-12. EVAPORATOR MOTOR. - Continued.

(1) Before removing motor, mark the direction of motor rotation on chassis.

(2) Remove four screws (1) and four flat washers (2).

(3) Remove evaporator motor (3) from evaporator motor bracket (4).

b. Installation.

NOTE

Install evaporator motor so that direction of rotation arrow matches rotation mark on motor chassis.

(1) Place evaporator motor (3) onto evaporator motor bracket (4).

(2) Install four flat washers (2) and four screws (1).

(3) Refer to wire tags installed during removal and install motor wiring as required. Remove temporary wire tags.

(4) Install evaporator impeller fans (see para. 4-11).

(5) Install evaporator fan scrolls (see para. 4-10).

(6) Install evaporator fan assembly (see para. 4-9).

(7) Install return air louver (see para. 3-21).

(8) Reconnect air conditioner to power source.

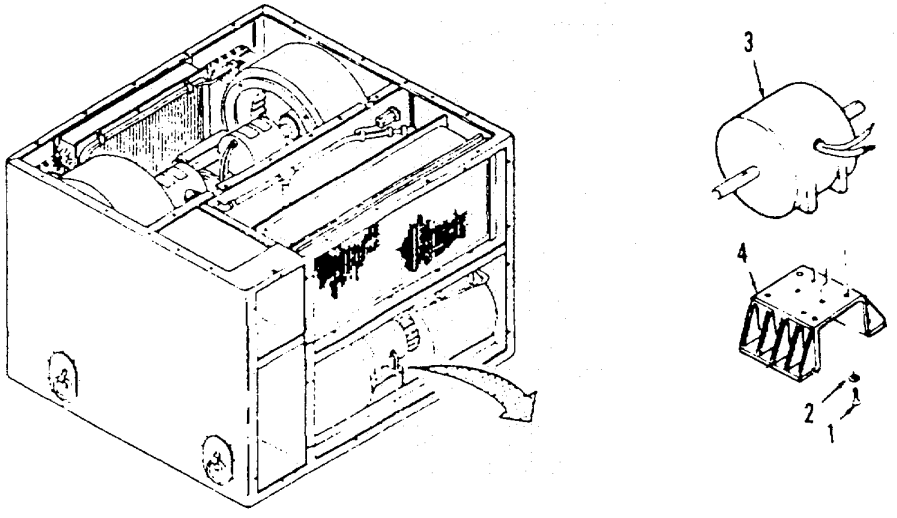


Figure 4-6. Evaporator Motor.

4-13. EVAPORATOR MOTOR BRACKET AND CHASSIS.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tool Required

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

Material/Parts Rewired

None

Equipment Condition

Air conditioner shut down and cool.
Return air louver removed (see para. 3-21).
Evaporator fan assembly removed (see para. 4-9).
Evaporator fan scrolls removed (see para. 4-10).
Evaporator impeller fans removed (see para. 4-11).
Evaporator motor removed (see para. 4-12).

a. Removal. (Refer to Figure 4-7).

(1) Remove four screws (1), four flat washers (2), four nuts (3), four flat washers (4), and two spacers (5).

(2) Remove evaporator motor bracket (6) from chassis (7).

b. Installation.

(1) Install evaporator motor bracket (6) onto chassis (7) and loosely install two spacers (5), four flat washers (4), four nuts (3), four flat washers (2), and four screws (1).

(2) Refer to para. 4-12 and attach evaporator motor to evaporator motor bracket (6) and loosely install motor mounting hardware.

(3) Refer to para. 4-11 and install evaporator impeller fans and loosely install fan mounting hardware.

(4) Refer to para. 4-10 and install evaporator fan scrolls and loosely install scroll mounting hardware.

(5) Center all components to eliminate contact between all rotating components and then tighten all hardware.

4-13. EVAPORATOR MOTOR BRACKET AND CHASSIS. - Continued**.**

(6) Install evaporator fan assembly (see para. 4-9).

(7) Install return air louver (see para. 3-21).

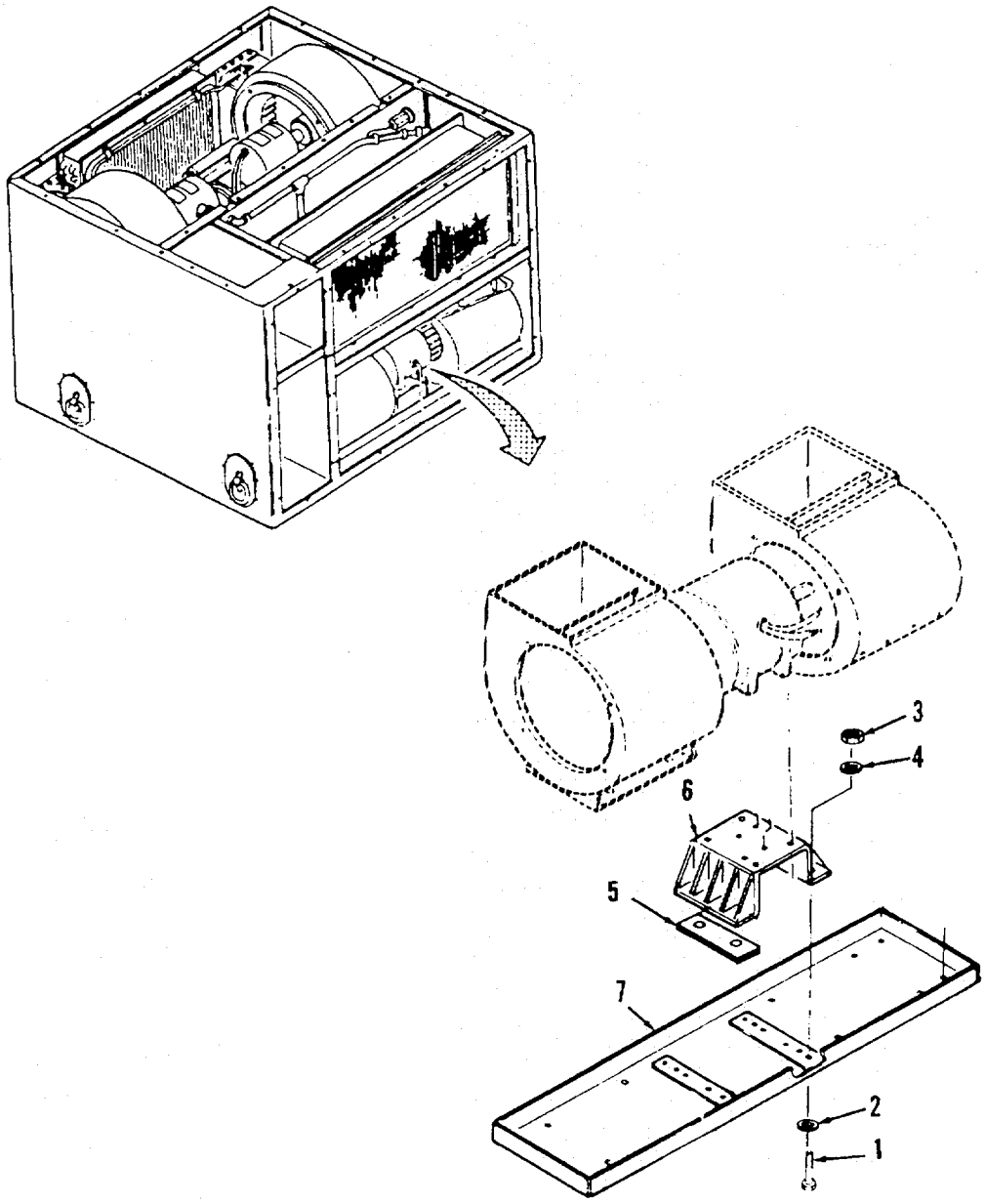


Figure 4-7. Evaporator Motor Bracket and Chassis.

4-14. CONDENSER FAN SCROLLS.

This Task Covers

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para 3-27).
Liquid sight indicator mounting hardware removed (see para. 4-27)
Dehydrator removed (see para. 4-18).
Louver actuator cables removed (see para. 3-35).
Condenser motors removed (see para. 3-34).
Condenser exhaust louvers removed (see para. 3-22).

a. Removal. (Refer to Figure 4-8).

(1) Remove two screws (1) and two flat washers (2).

(2) Remove two screws (3), two lock washers (4), two flat washers (5), spacer (6), and two clamps (7).

(3) Remove two screws (8), two flat washers (9), and two grommets (10).

(4) Remove condenser scroll (11), two grommets (12), and two spacers (13).

(5) Remove screw (14), lock washer (15), flat washer (16), clamp (17), and spacer (18).

NOTE

Left rear condenser fan scroll can only be removed after carefully moving refrigerant tubing away from condenser fan scroll mounting area.

(6) Remove four screws (19), four flat washers (20), four nuts (21), and scroll support (22).

(7) Repeat for other condenser fan scroll as required.

4-14. CONDENSER FAN SCROLLS. - Continued**.**

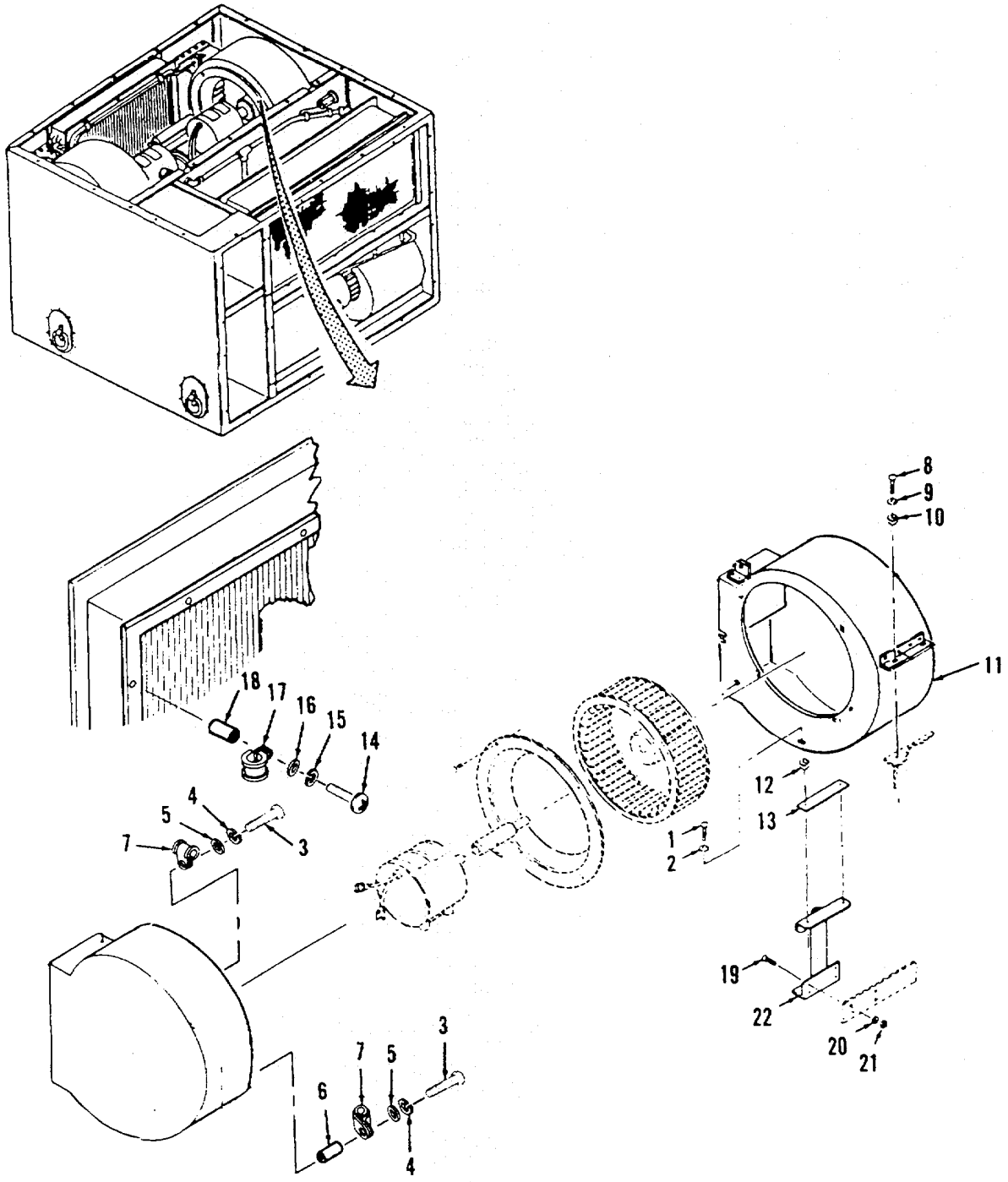


Figure 4-8. Condenser Fan Scrolls.

b. Installation.

(1) Install scroll support (22), four nuts (21), four flat washers (20), and four screws (19).

(2) Install spacer (18), clamp (17), flat washer (16), lock washer (15), and screw (14).

(3) Install two spacers (13), two grommets (12), and condenser scroll (11) into unit.

(4) Install two grommets (10), two flat washers (9), and two screws (8).

(5) Install two clamps (7), spacer (6), two flat washers (5), two lock washers (4), and two screws (3).

(6) Install two flat washers (2) and two screws (1).

(7) Repeat for other condenser scroll.

(8) Install condenser exhaust louver (see para. 3-22).

(9) Install condenser motors (see para. 3-34).

(10) Install louver actuator cables (see para. 3-35).

(11) Install dehydrator (see para. 4-18).

(12) Install liquid sight indicator hardware (see para. 4-27).

(13) Install rear cover (see para. 3-27).

4-15. CONDENSER IMPELLER FANS.

This Task Covers:

a. Removal b. Installation

Install Setup:

Tools Required

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

Material/Parts Rewired

None

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para. 3-27).
Condenser fan scrolls removed (see para. 4-14).
Condenser fan motors removed (see para. 3-34).

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

(1) Remove four screws (1), four flat washers (2), and inlet bell (3).

CAUTION

Mismatching fans and scrolls will cause air conditioner to operate improperly. Match mark fans and scrolls to insure proper reassembly.

(2) Remove condenser impeller fan (4) from condenser fan scroll (5).

(3) Repeat for other condenser impeller fan as required.

b. Installation.

(1) Install condenser impeller fan (4) into condenser fan scroll (5).

(2) Install inlet bell (3), four flat washers (2), and four screws (1).

(3) Repeat for other condenser impeller fan.

(4) Install condenser fan scrolls (see para. 4-14).

(5) Install condenser fan motor (see para. 3-34).

(6) Install rear cover (see para. 3-27).

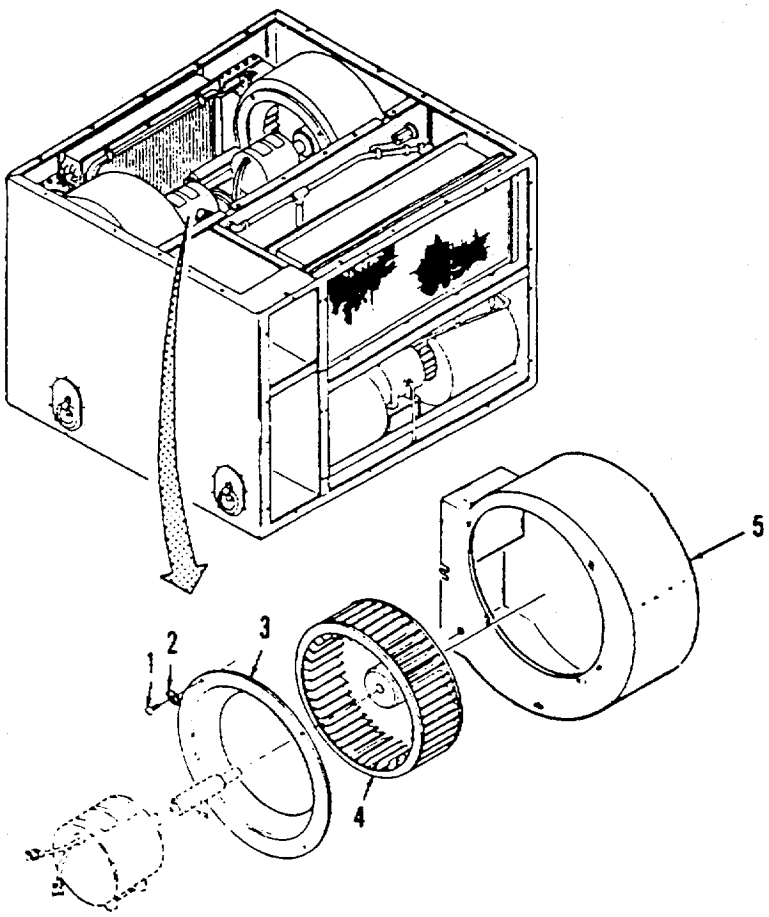


Figure 4-9. Condenser Impeller Fans,

4-16. CONDENSER FAN BRACES AND SUPPORT.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para 3-27).
EMI filter removed (see para. 3-42).
Relay (K2) removed (see para. 3-43).
Terminal board TB3 removed (see para. 3-45).
Condenser motors removed (see para. 3-34).
Condenser impeller fans removed (see para. 4-15).
Condenser scrolls removed (see para. 4-14).

a. Removal. (Refer to Figure 4-10).

(1) Remove four screws (1), four lock washers (2), and angle (3).

(2) Remove eight screws (4), four screws (5), four lock washers (6), motor mounting plate (7), and motor mounting plate (8).

(3) Remove four screws (9), four flat washers (10), and two condenser motor braces (11).

(4) Remove two nuts (12), two lock washers (13), and actuator cylinder (14) from angle (3).

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

(5) Carefully lift air conditioner onto a stand to expose bottom of air conditioner and remove six screws (15) and condenser motor support (16).

b. Installation.

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

(1) Carefully lift air conditioner onto a stand to expose bottom of air conditioner and install condenser motor support (16) and six screws (15).

(2) Install actuator cylinder (14), two lock washers (13), and two nuts (12) onto angle (3).

(3) Install two condenser motor braces (11), four flat washers (10), and four screws (9).

(4) Install motor mounting plate (8), motor mounting plate (7), four lock washers (6), four screws (5), and eight screws (4).

(5) Install angle (3), four lock washers (2), and four screws (1).

(6) Install condenser fan scrolls (see para. 4-14).

(7) Install condenser impeller fans (see para. 4-15).

(8) Install condenser fan motor (see para. 3-34).

(9) Install terminal board TB3 (see para. 3-45).

(10) Install relay (K2) (see para. 3-43).

(11) Install EMI filter (see para. 3-42).

(12) Install rear cover (see para. 3-27).

4-16. CONDENSER FAN BRACES AND SUPPORT. - Continued**.**

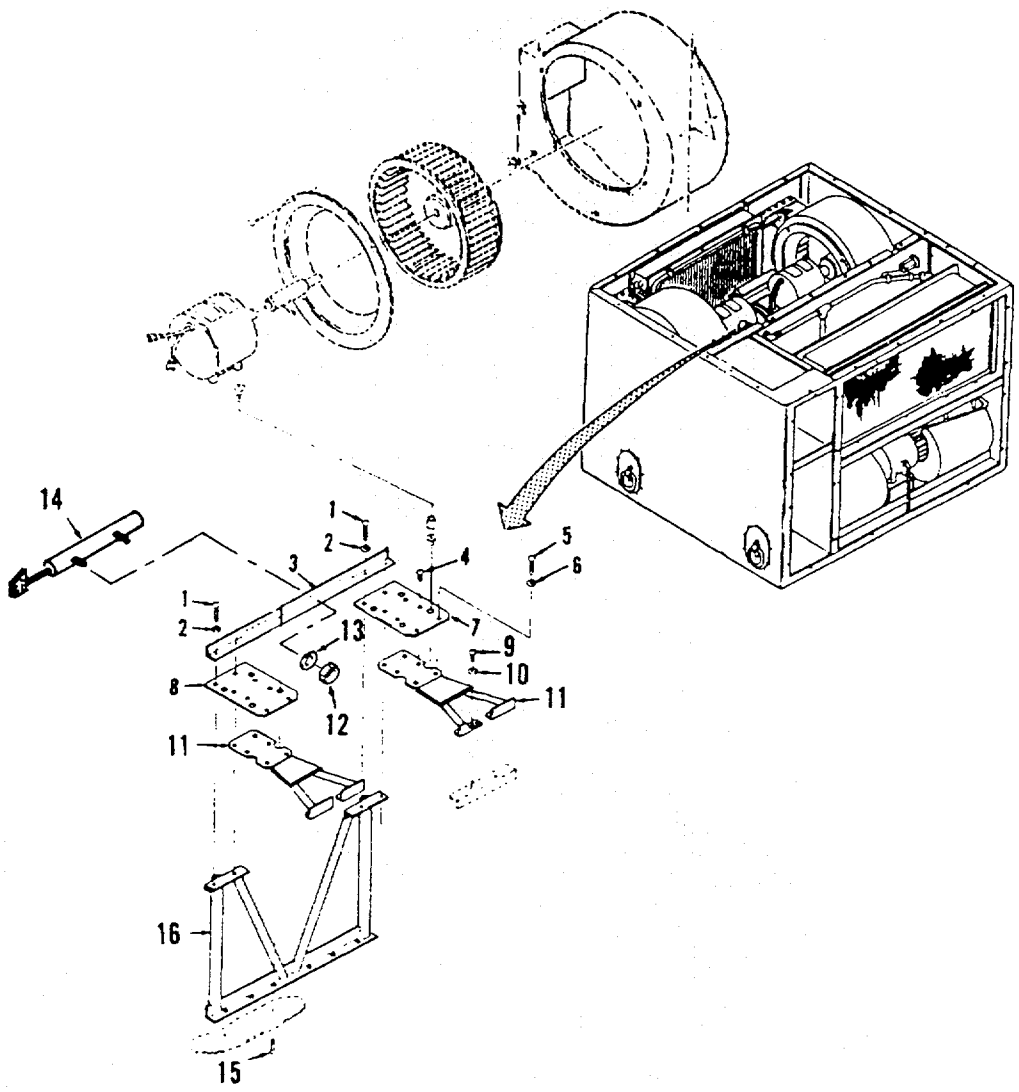


Figure 4-10. Condenser Fan Braces and Support.

4-17. DAMPER ACTUATOR AND VENTILATION DAMPER.

This Task Covers:

a. Removal b. Installation c. Adjustment

Initial Setup:

Tools Required

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

Material/Parts Required

None

Personnel Required

Two

Equipment Condition

Air conditioner shut down and cool.
Ventilation air filter and guard removed (see para. 3-23).
Motor controller pulled away from unit, but still electrically connected (see para. 3-38).
Rear cover removed (see para. 3-27).
Condenser fan scrolls closest to damper removed (see para. 4-14).

a. Removal. (Refer to Figure 4-11).

(1) Loosen set screw (1) on damper actuator (2).

(2) Remove screw (3), nut (4), screw (5), screw (6), lock washer (7), and bracket.

(3) Compress two clamps (8) and pull end of control cable assembly (9) through bracket of housing.

(4) Remove actuator nut (10) and damper actuator (2).

(5) Remove bushing (11) from bracket (12).

(6) Remove two screws (13), two lock washers (14), and two flat washers (15).

(7) Remove two screws (16), two lock washers (17), and two flat washers (18).

(8) Pull assembled damper assembly from opening in front of air conditioner cabinet.

(9) Remove nut (19) and screw (20) from damper (21).

4-17. DAMPER ACTUATOR AND VENTILATION DAMPER. - Continued**.**

(10) Compress clamp (22) and pull control cable assembly (9) through control bracket (23) and then remove clamp (24) from control cable assembly.

(11) Remove two cotter pins (25), four flat washers (26), and damper shaft (27).

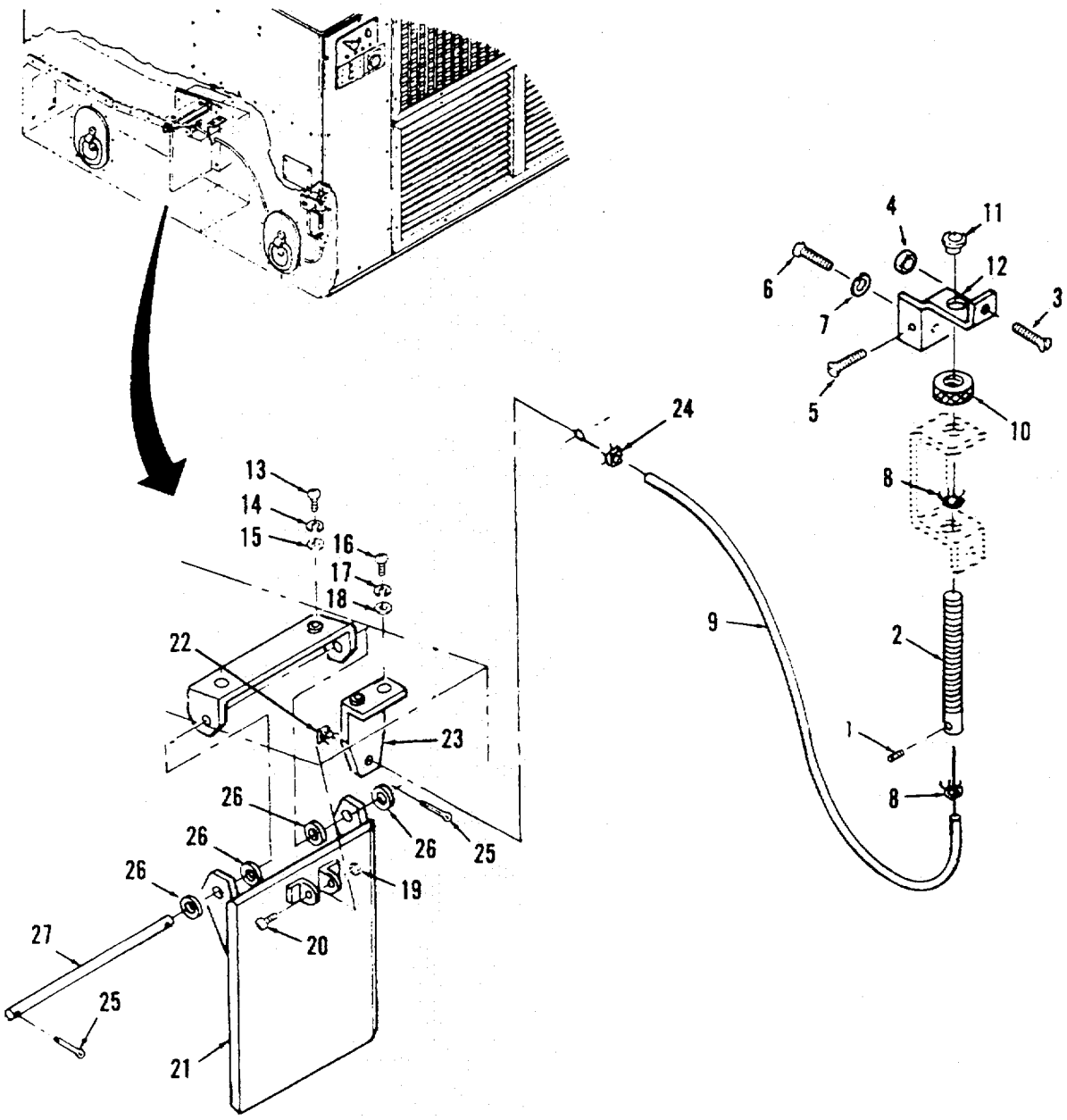


Figure 4-11. Damper Actuator and Ventilation Damper.

b. Installation.

(1) Install damper shaft (27), four flat washers (26), and two cotter pins (25).

(2) Install clamp (24) onto control cable assembly (9), install control cable assembly through control bracket (23), and then compress and install clamp (22) onto control cable assembly.

(3) Install screw (20) and nut (19) onto damper (21).

(4) Slide damper assembly into opening in front of air conditioner cabinet.

(5) Install two flat washers (18), two lock washers (17), and two screws (16).

(6) Install two flat washers (15), two lock washers (14), and two screws (13).

(7) Install bushing (11) onto bracket (12).

(8) Install damper actuator (2) and actuator nut (10).

(9) Install two clamps (8) and control cable assembly (9) through bracket of housing.

(10) Install lock washer (7), screw (6), screw (5), nut (4), and screw (3).

(11) Tighten set screw (1) on damper actuator (2).

c. Adjustment.

(1) Adjustment to the damper actuator mechanism is done by moving the clamps on each end of the control cable assembly (9).

(2) With ventilation damper (21) in fully closed (down) position, compress and adjust clamps (22) and (24) until no slack is left on eyelet end of control cable assembly and clamps are hard against each side of control bracket (23).

(3) Compress and move two clamps (8) away from bracket welded on housing until control cable assembly (9) is free to move through bracket.

(4) Rotate actuator nut (10) until only the top .25 inch of damper actuator (2) is sticking through the top of the actuator nut.

(5) Compress and move both clamps (8) until each clamp is hard against the top and bottom of the bracket welded on housing.

4-17. DAMPERACTUATOR AND VENTILATION DAMPER. - Continued.

(6) Open and close ventilation damper (21) by rotating actuator nut (10) and check damper actuator mechanism for smooth operation. If binding occurs or door does not open as required. Repeat steps (2) through (5) until proper operation is observed.

(7) Install condenser fan scroll (see para. 4-14).

(8) Install rear cover (see para. 3-27).

(9) Install motor controller into unit (see para. 3-38).

(10) Install ventilation air filter and guard (see para. 3-23).

4-18. DEHYDRATOR.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tool Required

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

Material/Parts Required

Oil (Item 22, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para. 3-27).
Recover refrigerant from system (see para. 4-6).

a. Removal. (Refer to Figure 4-12).

NOTE

The dehydrator must be replaced each time the refrigeration system has been opened. It should be installed just before unit is leak tested.

(1) Disconnect two flare nuts (1) and (2).

(2) Remove two screws (3), two lock washers (4), two spacers (5), and two clamps (6).

(3) Remove dehydrator (7).

b. Installation.

CAUTION

Replacement dehydrators are packaged with sealing caps on the flare fittings to prevent moisture contamination of the desiccant filtering media. Remove these caps immediately prior to installation. Never install a dehydrator from which caps have been removed for an extended or unknown period of time.

CAUTION

Improper installation of dehydrator may damage components. Be sure to install dehydrator with proper direction flow.

(1) Install dehydrator (7) into two clamps (6).

4-18. DEHYDRATOR. - Continued.

(2) Install dehydrator (7) and two clamps (6) with two spacers (5), two lock washers (4), and two screws (3).

(3) Apply oil to threads of dehydrator and install two flare nuts (1) and (2) to dehydrator (7).

(4) Install rear cover (see para. 3-27).

(5) Service the refrigeration system (see para. 4-6).

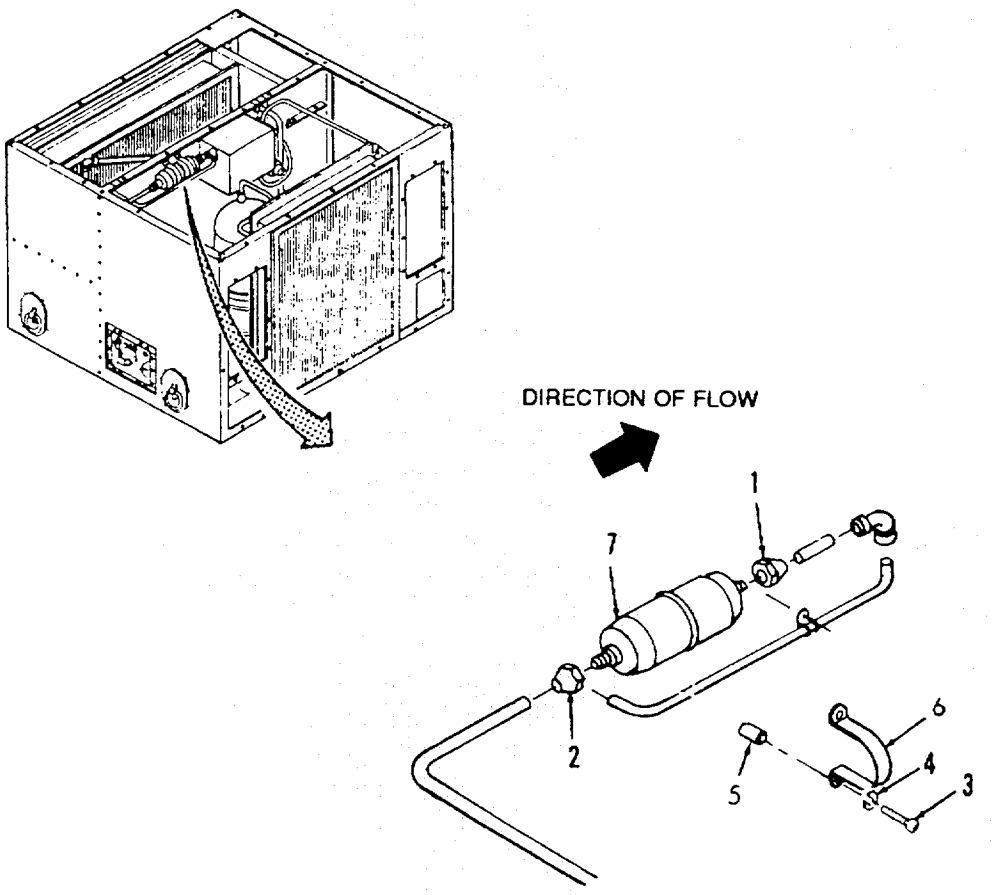


Figure 4-12. Dehydrator.

4-19. SOLENOID VALVE.

This Task Covers:

a. Test b. Removal c. Repair d. Installation

Initial Setup:

Tools Required

Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

Wire Tags (Item 21, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
If solenoid is to be replaced, recover refrigerant from system (see para. 4-6).
Front cover removed (see para. 3-27).
Rear cover removed (see para. 3-27).

a. Test. (Refer to Figure 4-13).

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

4-19. SOLENOID VALVE. - Continued.

a. Test. (Continued).

(1) Start air conditioner and set mode selector switch to COOL while listening closely to solenoid valve. If solenoid valve does not click, replace valve.

(2) If solenoid valve does click, let it run for 10 minutes and then touch inlet and outlet tubing of solenoid valve. If inlet and outlet tubing are both hot to the touch, solenoid valve is defective and must be replaced.

b. Removal.

(1) Tag and disconnect coil wires.

(2) Debraze all tubing connected to solenoid valve (1) per para. 4-7.

(3) Remove two screws (2) and two flat washers (3).

(4) Remove solenoid valve (1) from unit.

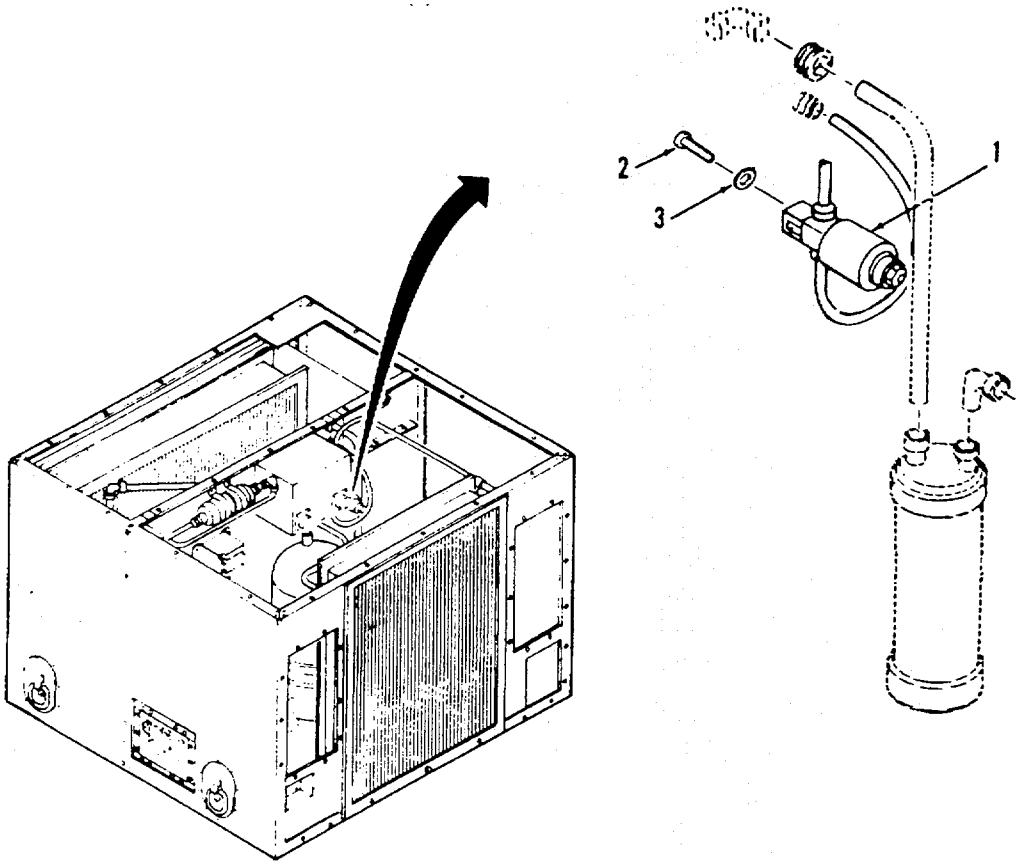


Figure 4-13. Solenoid Valve.

c. Repair.

Repair is limited to replacement of coil (see para. 3-47).

d. Installation.

(1) Place solenoid valve (1) into unit and install two flat washers (3) and two screws (2).

(2) Apply heat sink to outlets of solenoid valve and braze all tube connections to solenoid valve (1) per para. 4-7.

(3) Replace dehydrator (see para. 4-18).

(4) Install front cover (see para. 3-27).

(5) Install rear cover (see para. 3-27).

(6) Service refrigerant system per para. 4-6.

4-20. DAMPER ACTUATOR CYLINDER.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

Oil (Item 22, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Recover refrigerant from system (see para. 4-6).
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 4-14).

(1) Loosen flare nut (1) on damper actuator cylinder (2).

(2) Remove two mechanical posts (3) from control assembly cables (4) and (5).

(3) Remove two nuts (6), two lock washers (7) that secure the damper actuator cylinder (2) to angle (8).

(4) Remove damper actuator cylinder (2) from unit.

b. Installation.

(1) Install damper actuator cylinder (2) to angle (8) with two lock washers (7) and two nuts (6).

(2) Install control assembly cable (5), control assembly cable (4), and two mechanical posts (3).

(3) Apply oil to threads of damper actuator cylinder (2) and secure flare nut (1) to damper actuator cylinder.

(4) Replace dehydrator (see para. 4-18).

(5) Adjust damper actuator mechanism (see para. 4-17).

(6) Replace rear cover (see para. 3-27).

(7) Service refrigeration system per para. 4-6.

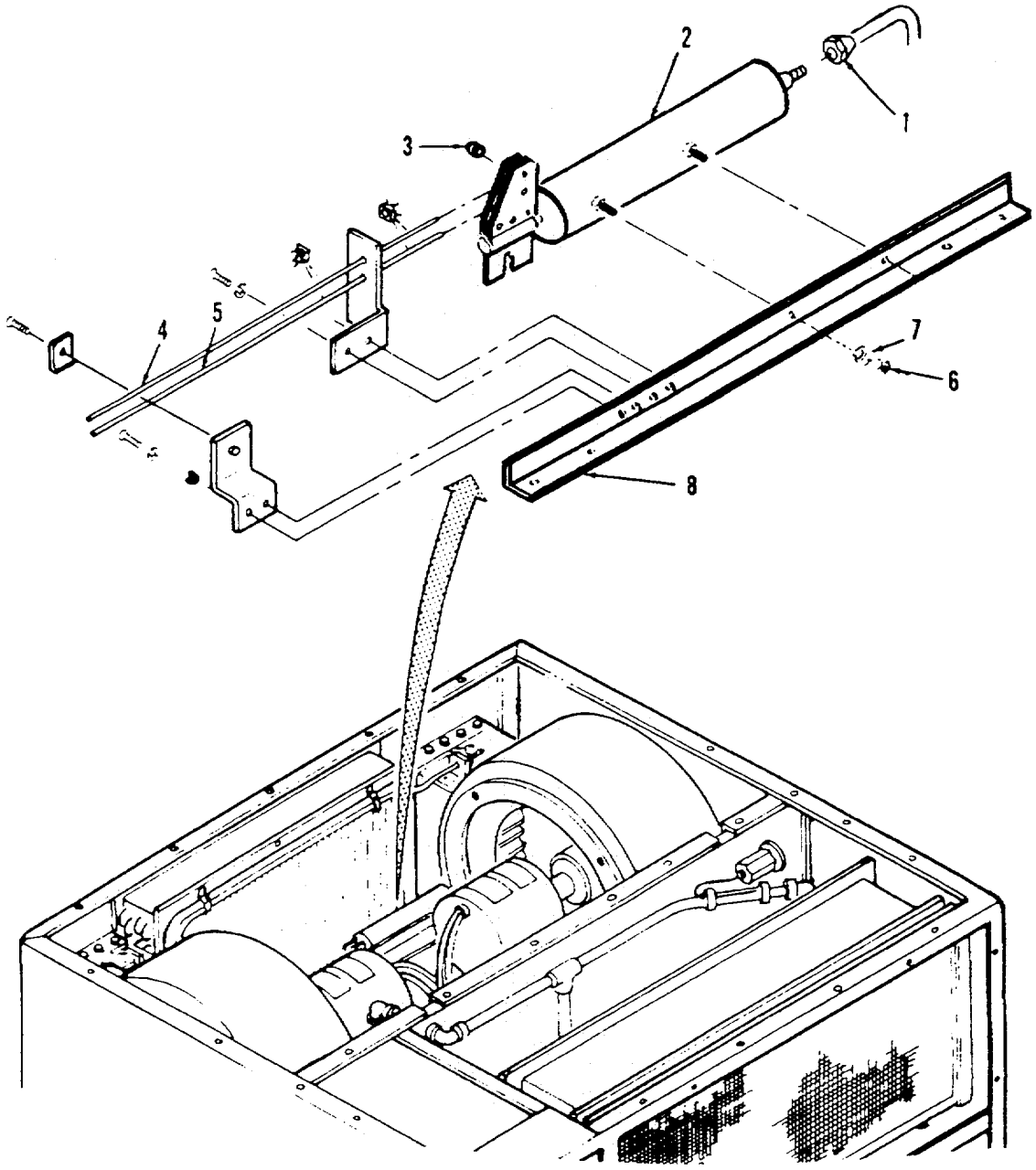


Figure 4-14. Damper Actuator Cylinder.

4-21. RECEIVER.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Rear cover removed (see para. 3-27).
Condenser fan motor nearest receiver removed (see para. 3-34).
Condenser fan scroll and bracket nearest receiver removed (see para. 4-14).
Recover refrigerant from system (see para. 4-6).
System purged with nitrogen (see para. 4-6).
Debraze related tube connections (see para. 4-7).

a. Removal. (Refer to Figure 4-15).

(1) Remove four screws (1), four lock washers (2), and receiver clamp (3) holding receiver (4) onto bracket (5).

(2) Remove receiver (4) from unit.

b. Installation.

(1) Place receiver (4) into unit and loosely install receiver clamp (3), four lock washers (2), and four screws (1).

(2) Place tubing connections onto receiver (4).

(3) Braze the tube joints (see para. 4-7).

(4) Tighten hardware installed in step (1).

(5) Replace dehydrator (see para 4-18).

(6) Install rear cover (see para. 3-27).

(7) Replace condenser fan scroll (see para. 4-14).

(8) Replace condenser fan motor (see para. 3-34).

(9) Service the refrigeration system (see para. 4-6).

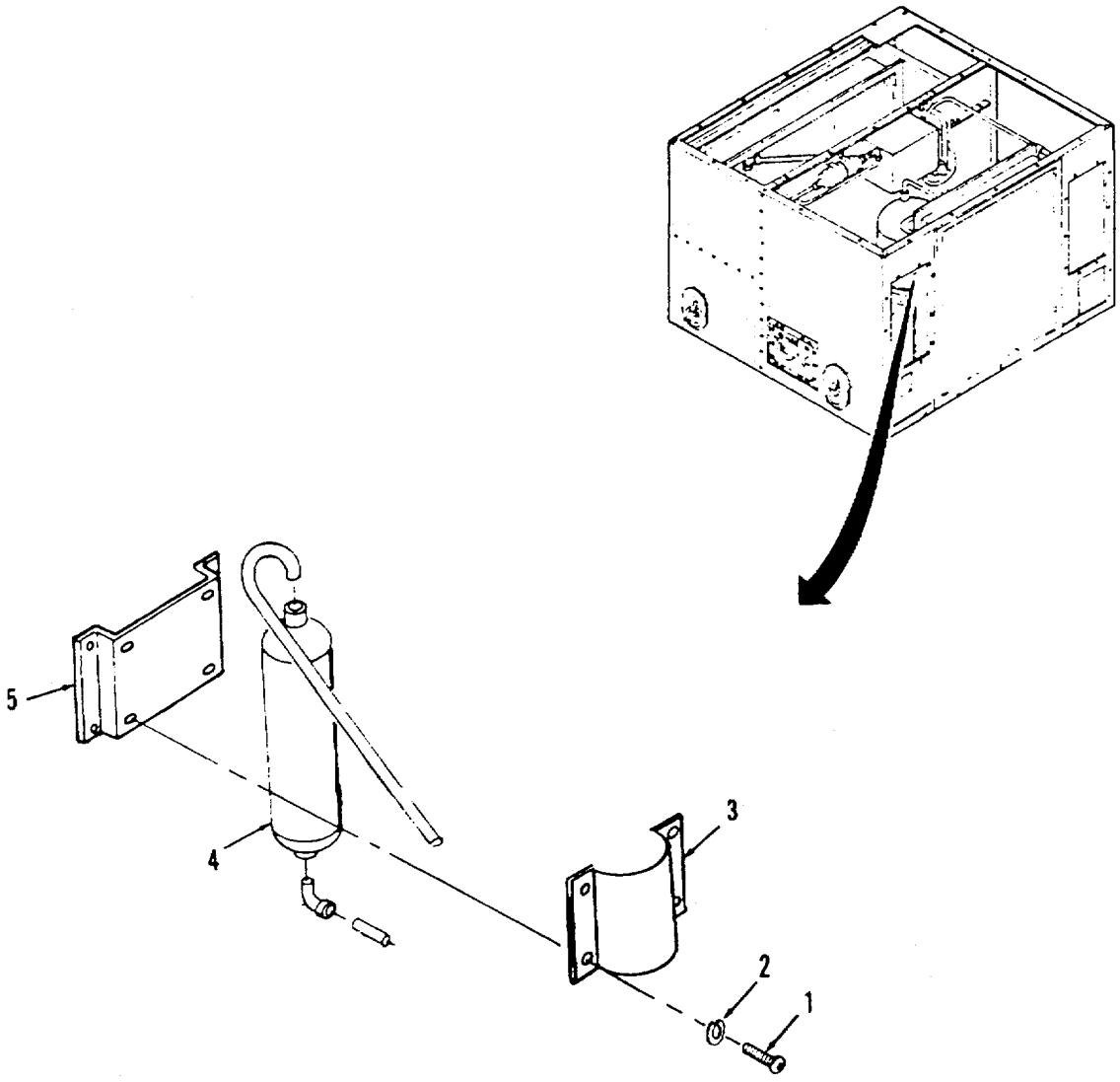


Figure 4-15. Receiver.

4-22. PRESSURE RELIEF VALVE.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

Oil (Item 22, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Condenser fan motor nearest pressure relief valve removed (see para. 3-34).
Condenser fan scroll nearest pressure relief valve removed (see para. 4-14).
Recover refrigerant from system (see para. 4-6).
Rear cover removed (see para. 3-27).

a. Removal. (Refer to Figure 4-16).

Hold tee (1) so that it cannot be twisted and remove pressure relief valve (2).

b. Installation.

(1) Apply oil to the threads of the pressure relief valve (2) and install pressure relief valve into tee (1).

(2) Replace dehydrator (see para. 4-18).

(3) Replace rear cover (see para. 3-27).

(4) Replace condenser fan scroll (see para. 4-14).

(5) Replace condenser fan motor (see para. 3-34),

(6) Service refrigeration system per para. 4-6.

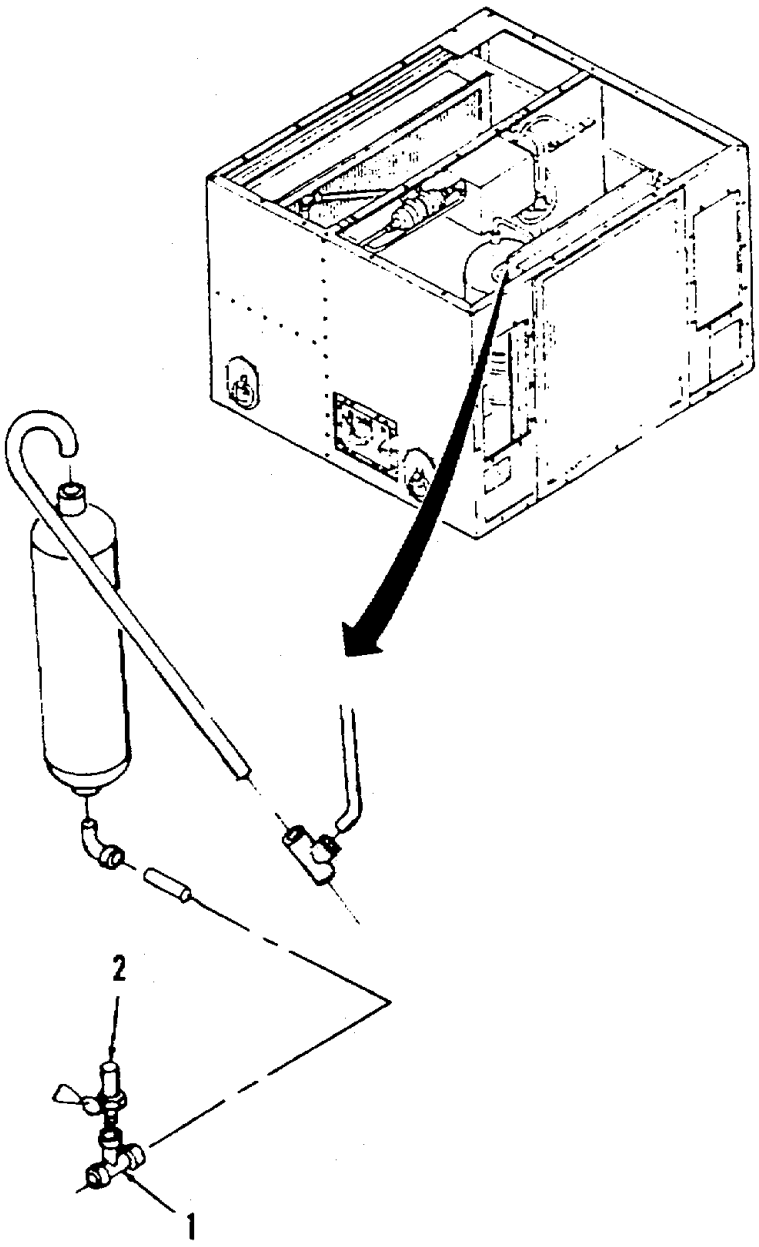


Figure 4-16. Pressure Relief Valve.

4-23. ACCUMULATOR.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

Insulation (Item 19, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Condenser fan motor nearest accumulator valve removed (see para. 3-34).
Condenser fan scroll nearest accumulator valve removed (see para. 4-14).
Recover refrigerant from system (see para. 4-6).
Rear cover removed (see para. 3-27).

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

(1) Remove insulation and adjacent wrapping sufficient to debraze tube connections.

(2) Debraze tubes connected to accumulator (1) (see para. 4-7).

(3) Remove nut (2), flat washer (3), accumulator (1) from bracket (4).

NOTE

Observe direction of flow indicated on accumulator and install it to match Figure 4-17 flow direction,

b. Installation.

(1) Place accumulator (1) on bracket (4).

(2) Install nut (2) and flat washer (3) onto stud of accumulator (1).

(3) Braze the tube connections (see para. 4-7).

(4) Replace the dehydrator (see para. 4-18).

(5) Install insulation on accumulator (1) and tubing.

(6) Install condenser fan scroll (see para. 4-14).

(7) Install condenser fan motor (see para. 3-34).

(8) Install rear cover (see para. 3-27).

(9) Service the refrigeration system (see para. 4-6).

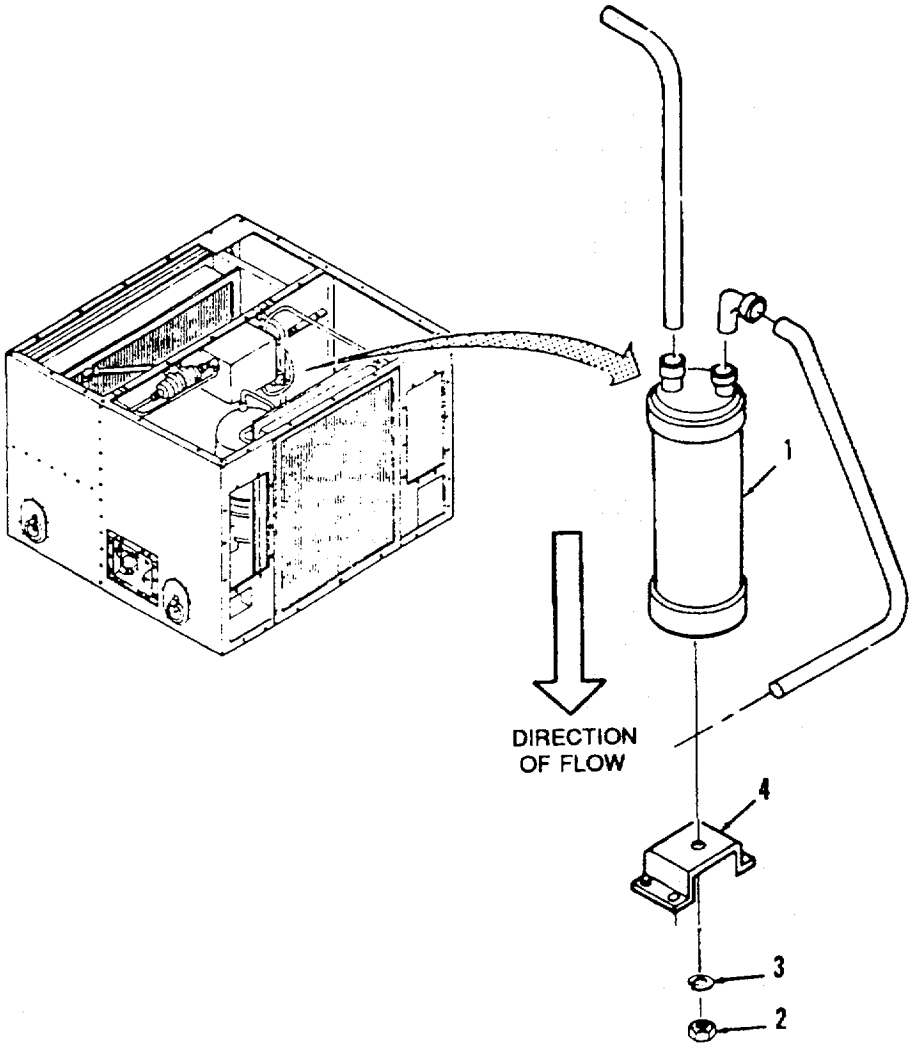


Figure 4-17. Accumulator.

4-24. PRESSURE SWITCHES (S5) AND (S6).

This Task Covers:

a. Removal b. Installation c. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Cable ties (Item 25, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Condenser fan motor nearest pressure switches removed (see para. 3-34).
Condenser fan scroll nearest pressure switches removed (see para. 4-14).
Recover refrigerant from system (see para. 4-6) (after pressure switch testing),
Pressure switch access panel removed (see para. 3-19).

a. Test.

(1) Install manifold gauges to service valves.

(2) Press and release reset button to be sure that each switch is not tripped.

(3) Tag and disconnect leads on each pressure switch.

(4) Using multimeter set on lowest OHMS scale, check for continuity between terminals 1 and 2 on each pressure switch. Check that continuity exists on both pressure switches if gauge reading is more than 15 psi or less than 480 psi.

(5) If there is no continuity, replace pressure switch.

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

(1) Remove cable ties as needed.

(2) Tag and remove all wiring attached to pressure switches.

(3) Restrain adapter (1) and loosen flare nut (2).

(4) Restrain adapter (3) and loosen flare nut (4).

(5) Remove flare nuts (2) and (4) from adapters (1) and (3).

(6) Remove four screws (5), four lock washers (6), and grommet (7).

(7) Remove pressure switches S5 (8) and S6 (9).

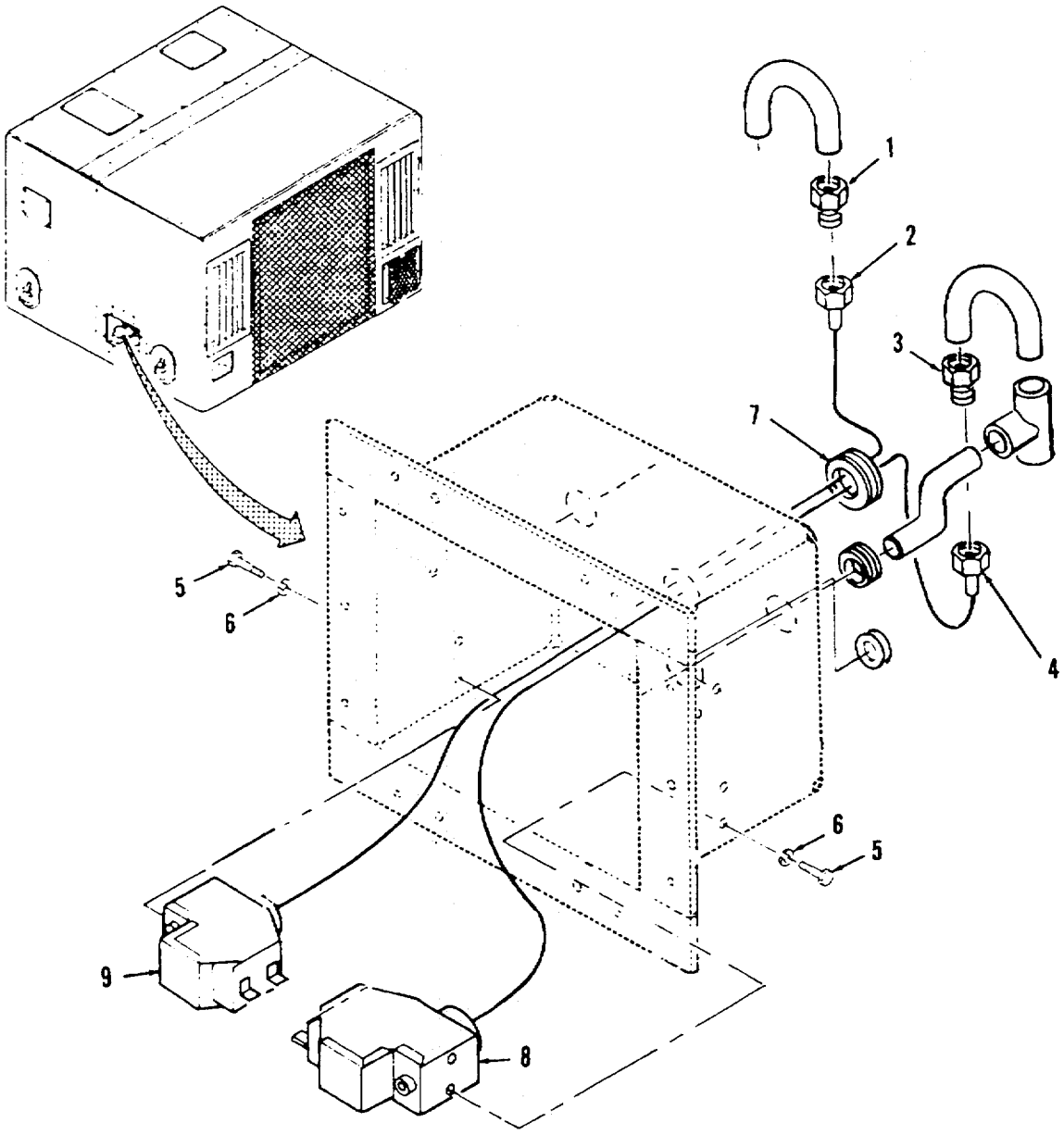


Figure 4-18. Pressure Switches (S5) and (S6).

4-24. PRESSURE SWITCHES (S5) AND (S6) - Continued.

c. Installation.

CAUTION

Be sure that the high pressure switches are installed correctly. If switches are improperly installed, unit will not function correctly and damage to unit could occur.

(1) Place low pressure switch (9) into position inside service box and install two lock washers (6) and two screws (5).

(2) Repeat step (1) for high pressure switch (8).

(3) Carefully feed capillary tubing of each pressure switch through back of service box.

(4) Install flare nut (4) to adapter (3) and flare nut (2) to adapter (1).

(5) Restrain adapter (4) and install flare nut (3).

(6) Restrain adapter (2) and install flare nut (1).

(7) Refer to tags installed during removal and reconnect all wiring to pressure switches. Remove tags and replace cable ties.

(8) Replace dehydrator (see para. 4-18).

(9) Install condenser fan scroll (see para. 4-14).

(10) Install condenser fan motor (see para. 3-34).

(11) Install pressure switch access cover (see para. 3-19).

(12) Service refrigeration system per para. 4-6.

4-25. SERVICE VALVES.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

Oil (Item 22, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Condenser fan motor nearest service valves removed (see para. 3-34).
Condenser fan scroll nearest service valves removed (see para. 4-14).
Pressure switch access panel removed (see para. 3-19).
Recover refrigerant from system (see para. 4-6).

a. Removal. (Refer to Figure 4-19).

(1) Remove two caps and gaskets (1) and (2).

(2) Remove four screws (3) and four lock washers (4).

(3) Loosen flare nuts (5) and (6).

(4) Remove service valves (7) and (8) from service box.

b. Installation.

(1) Apply oil to the threads of the service valves and place service valves (8) and (7) into service box.

(2) Install flare nuts (6) and (5) onto service valves (8) and (7).

(3) Install four screws (3) and four lock washers (4).

(4) Install two caps and gaskets (1) and (2) onto service valves (7) and (8).

(5) Replace dehydrator (see para. 4-18).

4-25. SERVICE VALVES. - Continued.

(6) Install condenser fan scrolls (see para. 4-14).

(7) Install condenser fan motor (see para. 3-34).

(8) Service refrigeration system per para. 4-6.

(9) Install pressure switch access panel (see para 3-19).

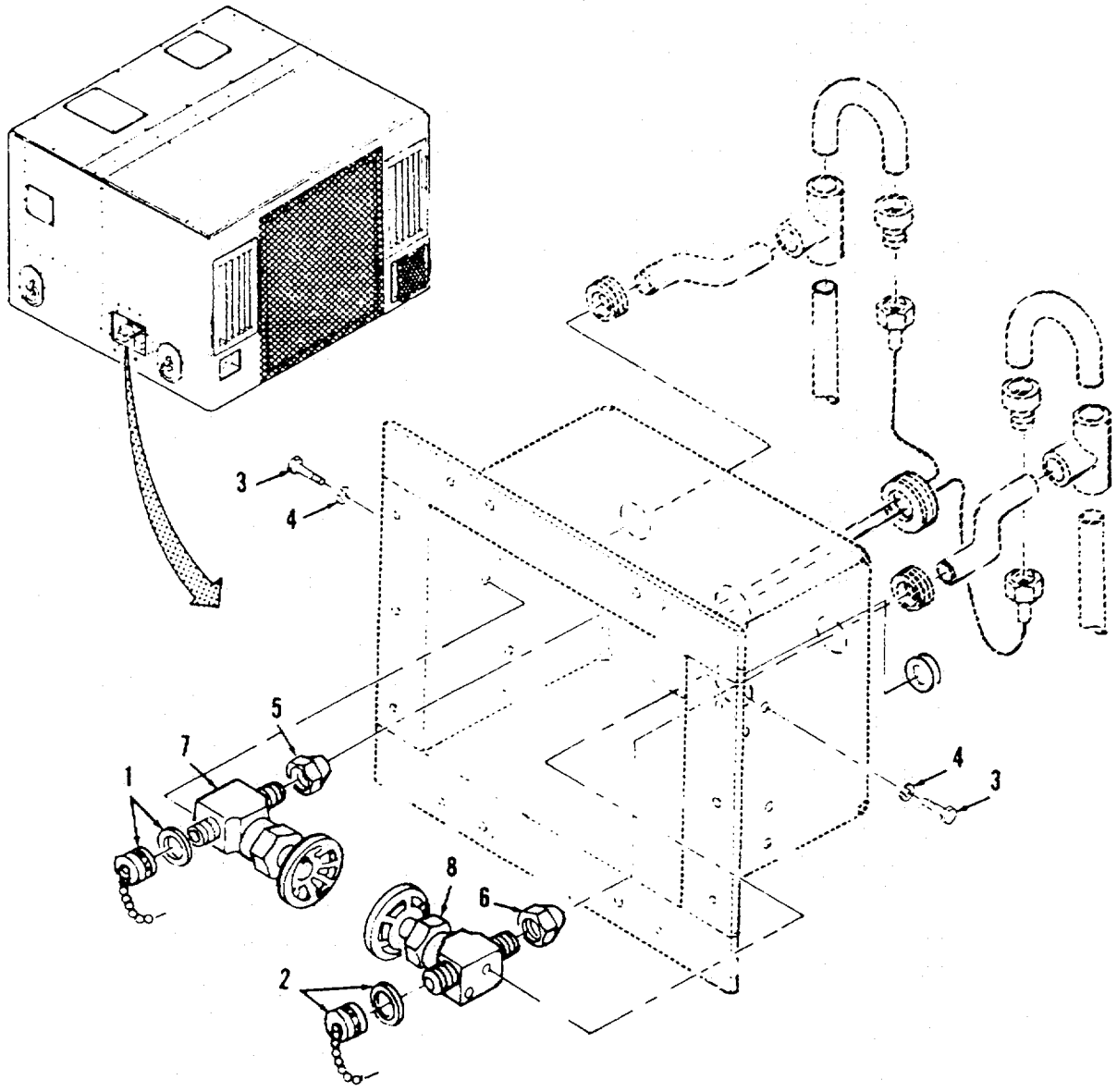


Figure 4-19. Service Valves.

4-26. EXPANSION VALVE.

This Task Covers:

a. Removal b. Installation c. Installation

Initial Setup:

Tools Required

Tool Kit, Semite, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)
Thermometer Set (Item 8, Appendix B)

Material/Parts Required

Tape, Duct (Item 3, Appendix E)
Silicone (Item 24, Appendix E)
Cable ties (Item 25, Appendix E)
Plastic Material (Item 26, Appendix E)
Straps (Item 27, Appendix E)

Equipment Condition

Air conditioner shut down and cool.
Recover refrigerant from system (see para. 4-6).
Refrigeration system purged (see para. 4-6).
Front cover removed (see para. 3-27).

a. Test. (Refer to Figure 4-20).

(1) Perform a refrigerant pressure check on unit in accordance with para. 4-6. Leave gages or service manifold attached.

(2) Remove the suction line insulation from the area of the sensing bulb (1). Observe location and position of bulb for reinstallation.

(3) Remove screw (2), lock washer (3), and post spacer (4) holding clamp (5) on sensing bulb (1).

(4) Remove cable ties (6) from capillary of sensing bulb (1).

(5) Place mode selector switch to COOL mode and set temperature control to maximum COOL. Run unit for a minimum of 30 minutes.

WARNING

High voltages can kill or seriously injure personnel, Exercise extreme caution since the following test must be conducted with the power on.

4-26. EXPANSION VALVE. - Continued.

CAUTION

Damage to the capillary tube will cause the unit to malfunction. Use care not to damage or kink the capillary.

NOTE

If air conditioner cycles on and off during expansion valve testing, pull coil frost switch sensor out of the evaporator coil and manually control thermistor to maintain unit operation.

(6) Place the sensing bulb (1) in a container of ice water or crushed ice so that it is reduced to a temperature of 32° F (0 °C) and a gauge reading of 41 psi.

(7) Remove sensing bulb from ice water and check that gauge reading quickly increases.

(8) If gauge readings on either test are incorrect, replace expansion valve.

CAUTION

If the test conditions are continued more than a few seconds, the expansion valve will fully open and an excessive flood-back of liquid refrigerant may damage or destroy the compressor. When performing the next test, turn the air conditioner to OFF as soon as a definite drop in temperature is felt on the suction return line.

NOTE

The expansion valve as supplied with the unit is preset at the factory. This valve cannot be adjusted. The factory set superheat setting for the expansion valve is 12°F(35 psig) above the saturation temperature of the refrigerant at operating suction line pressure. This setting will provide maximum efficiency of the evaporator coil.

b. ***Removal.*** (Refer to Figure 4-20).

(1) Remove two screws (7), two lock washers (8), and block off plate (9).

(2) Restrain expansion valve (10).

(3) Debraze tubing attached to expansion valve (10) (see para. 4-7).

(4) Unwrap existing suction line insulation from around sensing bulb (1) and remove expansion valve (10) from unit.

c. ***Installation.***

CAUTION

Damaged capillary will cause unit to malfunction. Use care not to damage or kink capillary.

(1) Coil sensing bulb (1) capillary into two loops having same size diameter as the old coil had before removal.

(2) Place sensing bulb (1) in same position it was before removal and secure to suction line (11) with two cable ties (6).

(3) Place expansion valve (10) into position within tubing and braze tubing to expansion valve (see para. 4-7).

(4) Place coiled capillary of sensing bulb (1) into clamp (5) and install screw (2), lock washer (3), post spacer (4), and clamp.

(5) Rewrap suction line insulation around sensing bulb (1) and suction line (11).

(6) Install block off plate (9), two lock washers (8), and two screws (7).

(7) Replace dehydrator (see para. 4-18).

(8) Install front cover (see para. 3-27).

(9) Service refrigeration system per para. 4-6.

4-26. EXPANSION VALVE. - Continued.

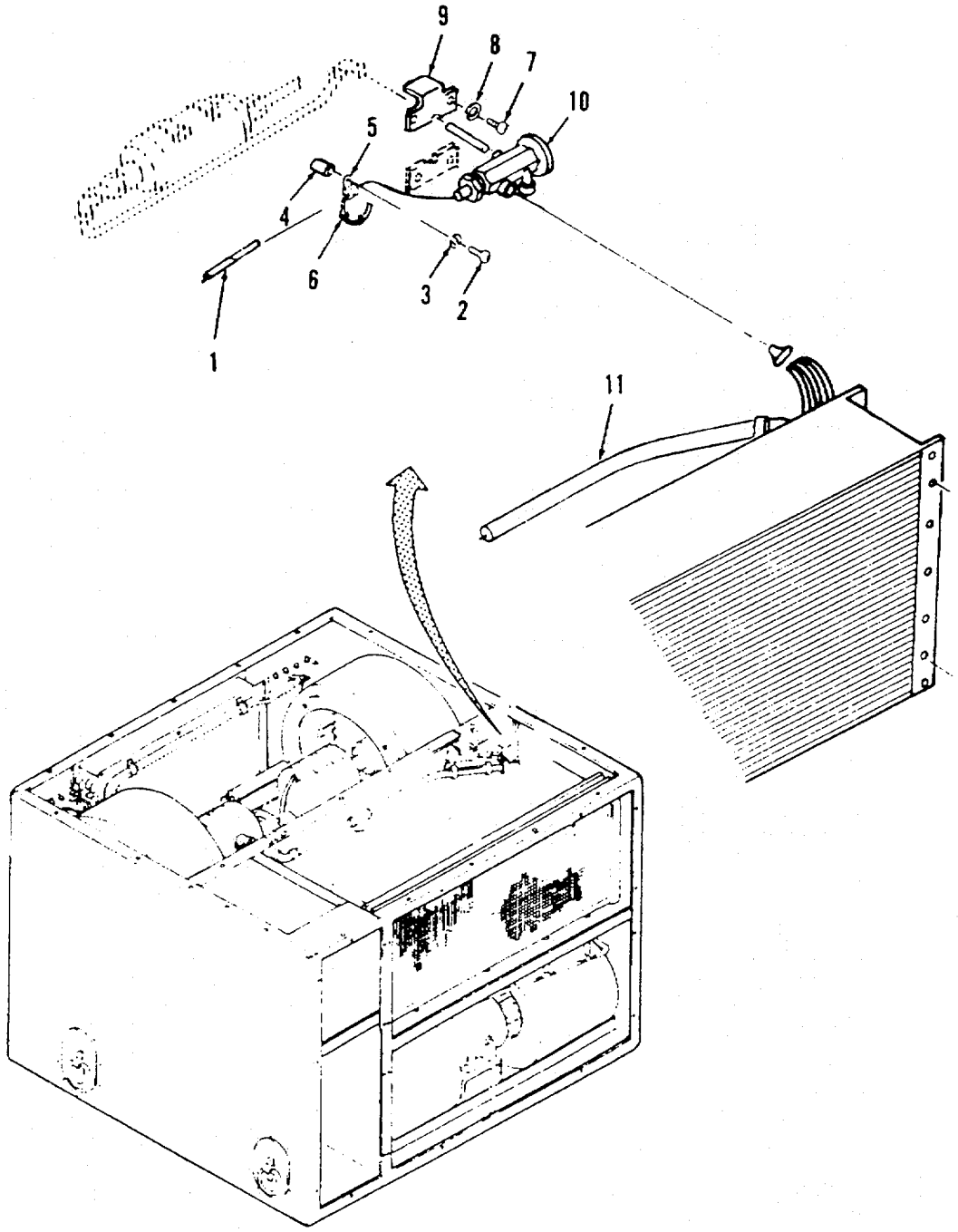


Figure 4-20. Expansion Valve.

4-27. LIQUID SIGHT INDICATOR (SIGHT GLASS).

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Recover refrigerant from system (see para. 4-6).
Condenser fan scroll nearest liquid sight indicator removed (see para. 4-14).
Related tube connections debrazed (see para. 4-7).

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

(1) Remove two screws (1), two lock washers (2) and mounting plate (3).

(2) Remove liquid sight indicator (4) from unit.

b. Installation.

(1) Position liquid sight indicator (4) on related tubing.

(2) Braze the tube connections (see para. 4-7).

(3) Replace the dehydrator (see para. 4-18).

(4) Secure mounting plate (3) and liquid sight indicator (4) to unit with two screws (1) and two lock washers (2).

(5) Install rear cover (see para. 3-27).

(6) Install condenser fan scrolls (see para. 4-14).

(7) Service refrigeration system per para. 4-6.

4-27. LIQUID SIGHT INDICATOR (SIGHT GLASS). - Continued.

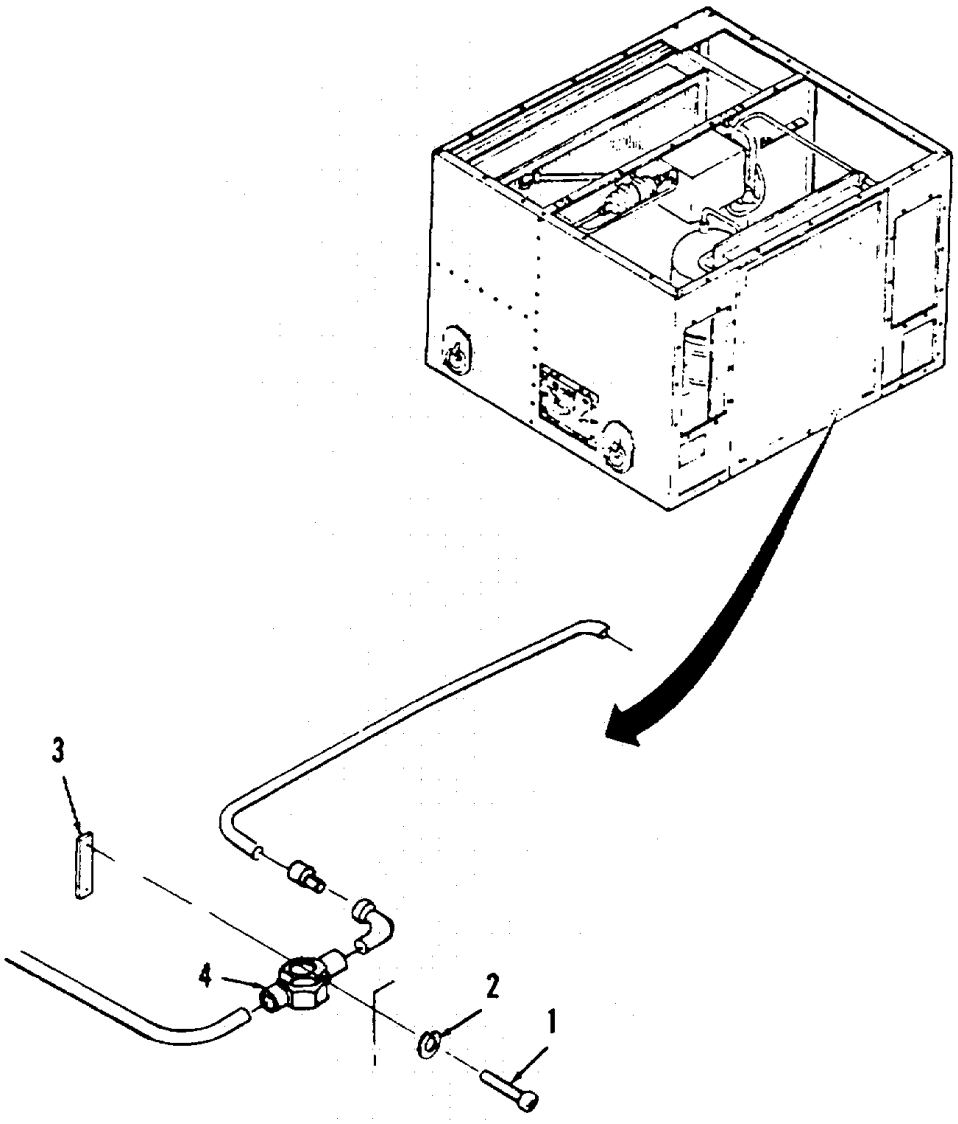


Figure 4-21. Liquid Sight Indicator (Sight Glass).

4-28. COMPRESSOR (B1).

This Task Covers:

a. Test b. Repair c. Removal d. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

Dry nitrogen cylinder (Item 2, Appendix E)
Insulation (Item 19, Appendix E)
Wire tags (Item 21, Appendix E)
Solder (Item 1, Appendix E)
Thermal mastic (Item 18, Appendix E)

Personnel Required

Two personnel (For compressor removal only.)

Equipment Condition

Air conditioner shut down and cool.
Recover refrigerant from system (see para. 4-6).
Rear cover removed (see para. 3-27).
Remove wiring harnesses as needed (see para. 3-46).
Condenser fans removed (see para. 4-15).
Condenser fan scrolls removed (see para. 4-14).
Condenser fan supports and braces removed (see para. 4-16).
Damper actuator cylinder removed (see para. 4-20).
EMI Filter removed (see para. 3-42).
Solenoid valve removed (see para. 4-19).

WARNING

Do not allow the unit to swing while suspended from a lifting device. Failure to observe this warning may result in injury to personnel and damage to the 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 supported by the base of the shipping container.

Air conditioner placed on stand.

4-28. COMPRESSOR (B1). - Continued.

The compressor and motor assembly are hermetically sealed in a metal canister and are not repairable. The following items may be replaced without opening the refrigerant system.

- Connector (J4)
- Crankcase Heater
- Crankcase Thermostat

a. Test. (Refer to Figure 4-22).

WARNING

HIGH VOLTAGE

is used in operation of this equipment.

DEATH ON CONTACT

may result if personnel fail to observe safety precautions.

Never work on electrical equipment unless there is another person nearby who is familiar with operation and hazards of equipment and who is competent in administering first aid. When technician is aided by operators, he must warn them about dangerous areas.

Whenever possible, input power supply to equipment must be shut off before beginning work. When working inside, after power has been turned off, always ground every part before touching it. Be careful not to contact high voltage connections when installing or operating this equipment.

WARNING

Whenever nature of operation permits, keep one hand away from equipment to reduce hazard to current flowing through vital organs of body. Do Not operate equipment without all guards, louvers, and covers in place and tightly secured.

(1) Allow heater to cool before touching.

(2) Check compressor motor, compressor motor thermal cutout switch, and compressor crankcase heater as follows:

(a) Disconnect P4 connector and harness from J4 connector located on compressor junction box (1).

(b) Remove two screws (2) and two lock washers (3) from compressor junction box and pull junction box (1) away from compressor.

(c) Check that wire connections in junction box area are in good condition.

(d) Using multimeter, check continuity between connector J4 contacts D to E, D to F, and F. to F. Multimeter should indicate identical ohms resistance. If proper resistance is not indicated, check that wires are properly connected. If wires are properly connected and proper resistance is still not indicated, compressor motor is defective and compressor must be replaced.

(e) Check continuity between J4 contacts A and B. If there is no continuity and wires are properly connected, the compressor motor thermal cutout switch is defective. Replace thermal cutout switch.

(f) Scratch paint on compressor casing and set multimeter to highest ohm setting. Check continuity between J4 contacts A, B, D, E, and F, and compressor casing. If wires are properly connected and there is any reading other than infinity indicated, there is an internal ground. Replace compressor.

(g) Check continuity between J4 contacts G and H. If there is continuity between these pins, the crankcase heater element is all right. If there is not continuity between pin G and pin H, the compressor crankcase heater is defective and must be replaced.

(h) If compressor hums and then cycles off on overload, check current draw of compressor motor. Check current draw on each power lead connected to compressor. If amperage draw is 45 or greater, compressor rotor is locked and compressor must be replaced.

b. Repair. (Refer to Figure 4-22).

(1) Connector J4 Replacement. (Refrigerant system discharge is not required.)

(a) Removal.

WARNING

Be sure that the power has been disconnected at the power source.

1. Remove two screws (2) and two lock washers (3).

2. Remove four nuts (4), four lock washers (5), and four screws (6) from connector J4 (7). Pull the connector out of the box to gain access to the solder connections.

3. Tag and unsolder wires from connector J4 (7).

(b) Installation.

1. Using wire tags installed during removal and wiring diagram Figure 1-5, solder wires to new J4 connector (7). Remove the tags.

4-28. COMPRESSOR (B1). - Continued.

2. Secure the connector (7) with four screws (6), four lock washers (5), and four nuts (4).

3. Install junction box (1), two lock washers (3), and two screws (2).

(2) Compressor Crankcase Heater Replacement (Refrigerant system discharge is not required.)

(a) Removal.

WARNING

Severe bums can result from touching hot heater. Allow heater to cool before touching.

1. Remove two screws (2) and two lock washers (3).

2. Pull junction box (1) away from compressor.

3. Disconnect crankcase heater wires from butt splices and from jumper wires of connector.

4. Remove spring clip (8) from insertion port of crankcase heater (9) and remove from compressor.

(b) Installation.

1. Fill crankcase heater insertion port with thermal mastic.

2. Install crankcase heater (9) and spring clip (8) into crankcase of compressor.

3. Reconnect crankcase heater wires to butt splice connector of connector (7).

4. Install junction box (1), two lock washers (3), and two screws (2).

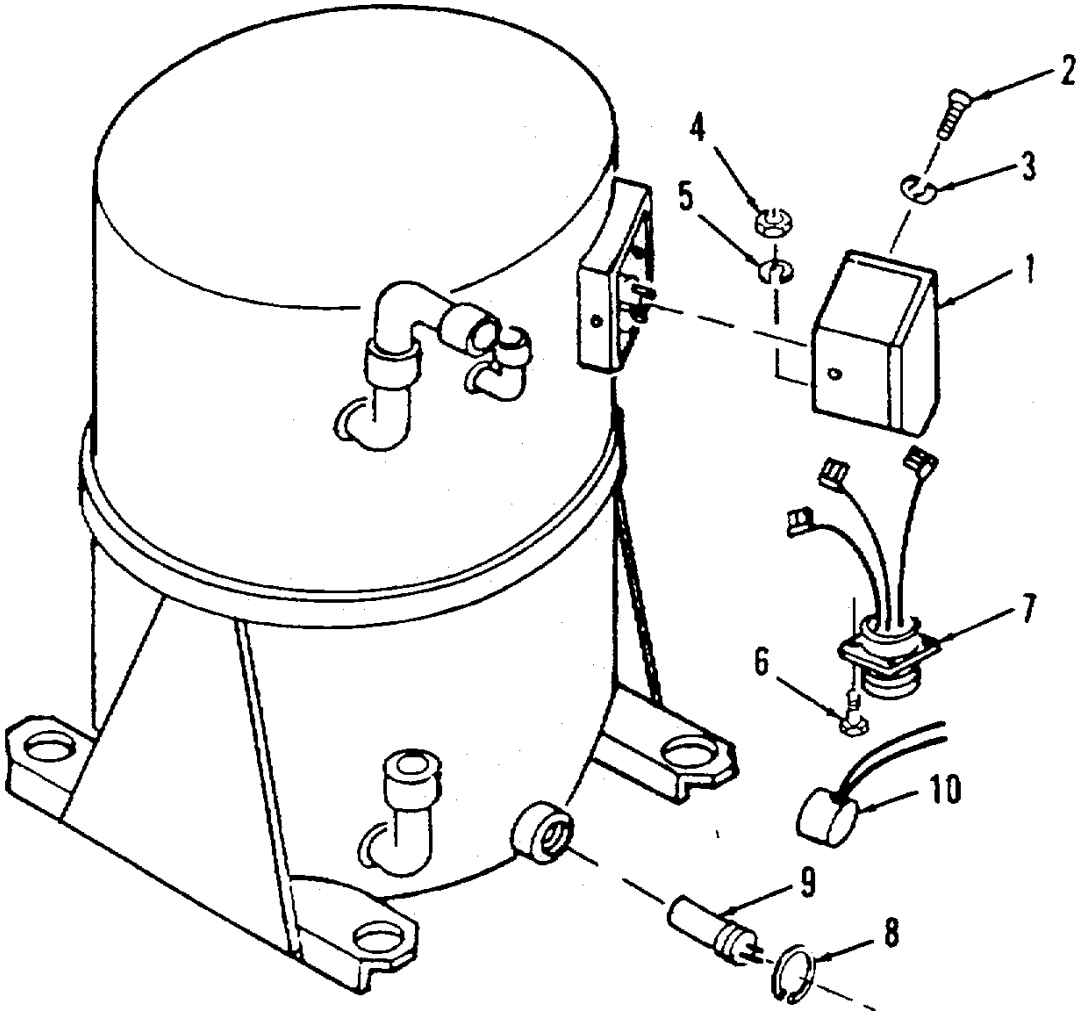


Figure 4-22. Compressor Repair.

(3) Thermal Cutout Switch Replacement. (Refrigerant system discharge is not required)

(a) Removal.

1. Remove two screws (2) and two lock washers (3).
2. Pull junction box (1) away from compressor.
3. Tag and unsolder thermal cutout switch wires from terminal H of connector J4 (7) and from jumper wires of connector.

4-28. COMPRESSOR (B1). - Continued.

4. Remove thermal cutout switch (10) and remove from compressor.

(b) Installation.

1. Install thermal cutout switch (10) into crankcase of compressor.

2. Refer to tags installed during thermal cutout switch removal and solder thermal cutout switch wires to jumper wires of connector and to terminal H of J4 connector (7).

3. Install junction box (1), two lock washers (3), and two screws (2).

c. Compressor Removal. (Refer to Figure 4-23).

(1) Remove four nuts (1), four flat washers (2), and four large flat washers (3).

(2) Remove four bolts (4), four flat washers (5), four large flat washers (6), and four resilient washers (7).

(3) Lift or tilt the compressor (8) and remove four resilient washers (9), four large flat washers (10), and four compressor mounting bushings (11) from beneath the four mounting feet of the compressor.

(4) Debraze tubing attached to compressor (see para. 4-7).

WARNING

Acid in sludge can cause bums. If compressor bum out is suspected, use care when handling compressor to avoid touching compressor sludge.

WARNING

Serious injury could occur if heavy equipment is moved or lifted without sufficient personnel to do the job. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective Clothing.

(5) Carefully lift compressor (8) from air conditioner.

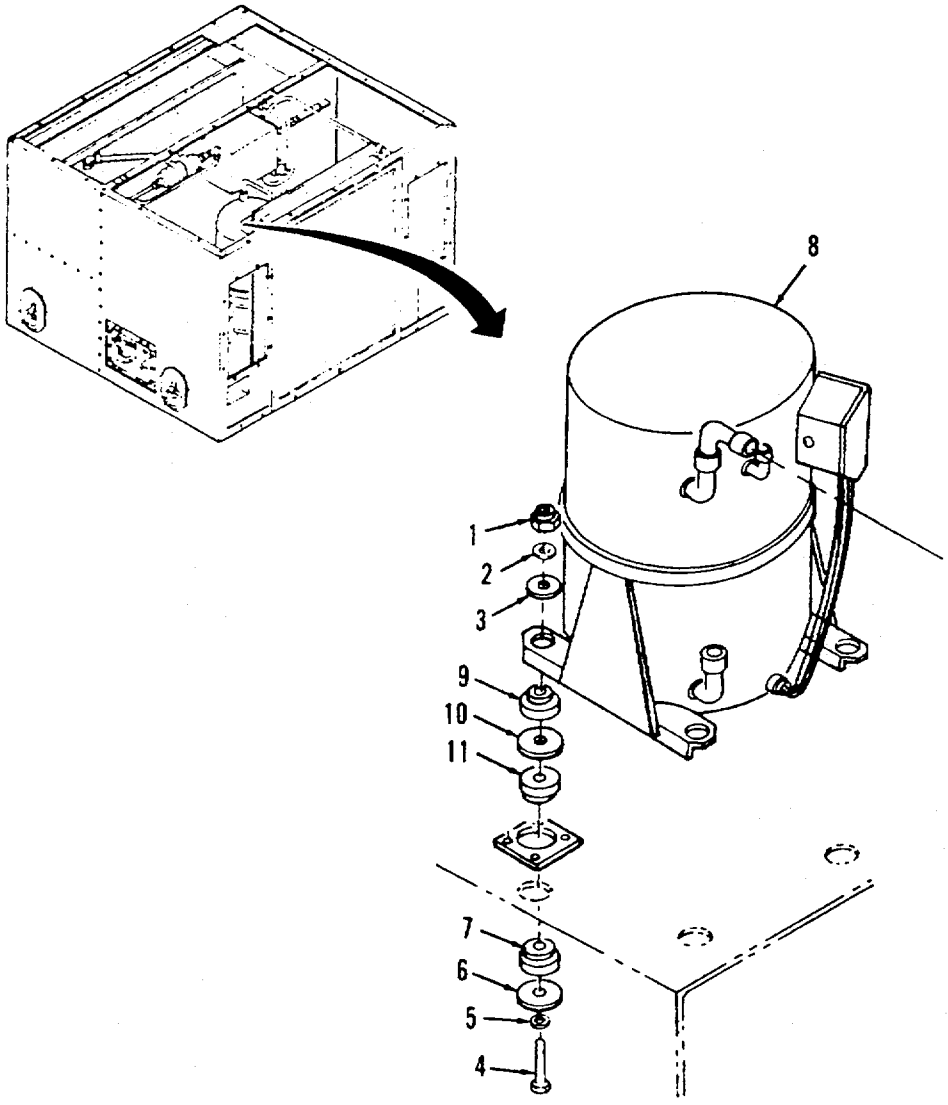


Figure 4-23. Compressor (B1).

4-28. COMPRESSOR (B1). - Continued.

d. Compressor Installation. (Refer to Figure 4-12).

WARNING

Serious injury could occur if heavy equipment is moved or lifted without sufficient personnel to do the job. Use proper physical lifting procedures or use a suitable lifting device or dolly. Wear safety shoes, gloves, and other suitable protective Clothing.

CAUTION

Running unit with improper oil level will damage unit. The compressor is supplied with a complete charge of oil. Take care that oil is not lost when handling and installing compressor.

(1) Place compressor (8) into position on mounting base in unit.

(2) Lift or tilt the compressor (8) and install four compressor mounting bushings (11), four large flat washers (10), and four resilient washers (9) between each of the four compressor mounting holes and the holes in the compressor mounting base.

(3) Install four resilient washers (7), four large flat washers (6), four flat washers (5), four bolts (4), four large flat washers (3), four flat washers (2), and four nuts (1).

CAUTION

Heat from brazing can damage compressor. Wrap wet rags around compressor at connection points and while brazing direct flame away from compressor during brazing.

(4) Rebraze tubing onto compressor (see para. 4-7).

(5) Replace dehydrator (see para. 4-18).

(6) Connect electrical connector plug P4 to connector J4 on compressor junction box.

(7) Install solenoid valve (see para. 4-19).

(8) Install EMI filter (see para. 3-42).

(9) Install damper actuator cylinder (see para. 4-20).

(10) Install condenser fan supports (see para. 4-16), condenser fan scrolls (see para. 4-14), and condenser fans (see para. 4-15).

(11) Install rear cover (see para. 3-27) and service refrigeration system per para. 4-6.

4-29. EVAPORATOR COIL.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Front cover removed (see para. 3-27).
Conditioned air louver removed (see para. 3-20).
Mist eliminator removed (see para. 3-28).
Coil frost switch removed (see para. 3-44).
Heater elements removed (see para. 3-29).
Recover refrigerant from system (see para. 4-6).
Purge the system with nitrogen (see para. 4-6).

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

(1) Debraze the distributor (1) from expansion valve (2) (see para. 4-7).

(2) Debraze suction return line (3) from evaporator coil (4) (see para. 4-7).

(3) Remove six screws (5), six lock washers (6), left mist eliminator bracket (7), and right mist eliminator bracket (8).

(4) Remove the evaporator coil (4).

b. Installation.

(1) Place evaporator coil (4) into unit.

(2) Install right mist eliminator bracket (8), left mist eliminator bracket (7), six lock washers (6) and six screws (5).

(3) Purge the system with nitrogen (see para. 4-6).

4-29. EVAPORATOR COIL. - Continued.

(4) Braze distributor (1) to expansion valve (2) and suction return line (3) to evaporator coil (4) (see para. 4-7).

(5) Replace dehydrator (see para. 4-18).

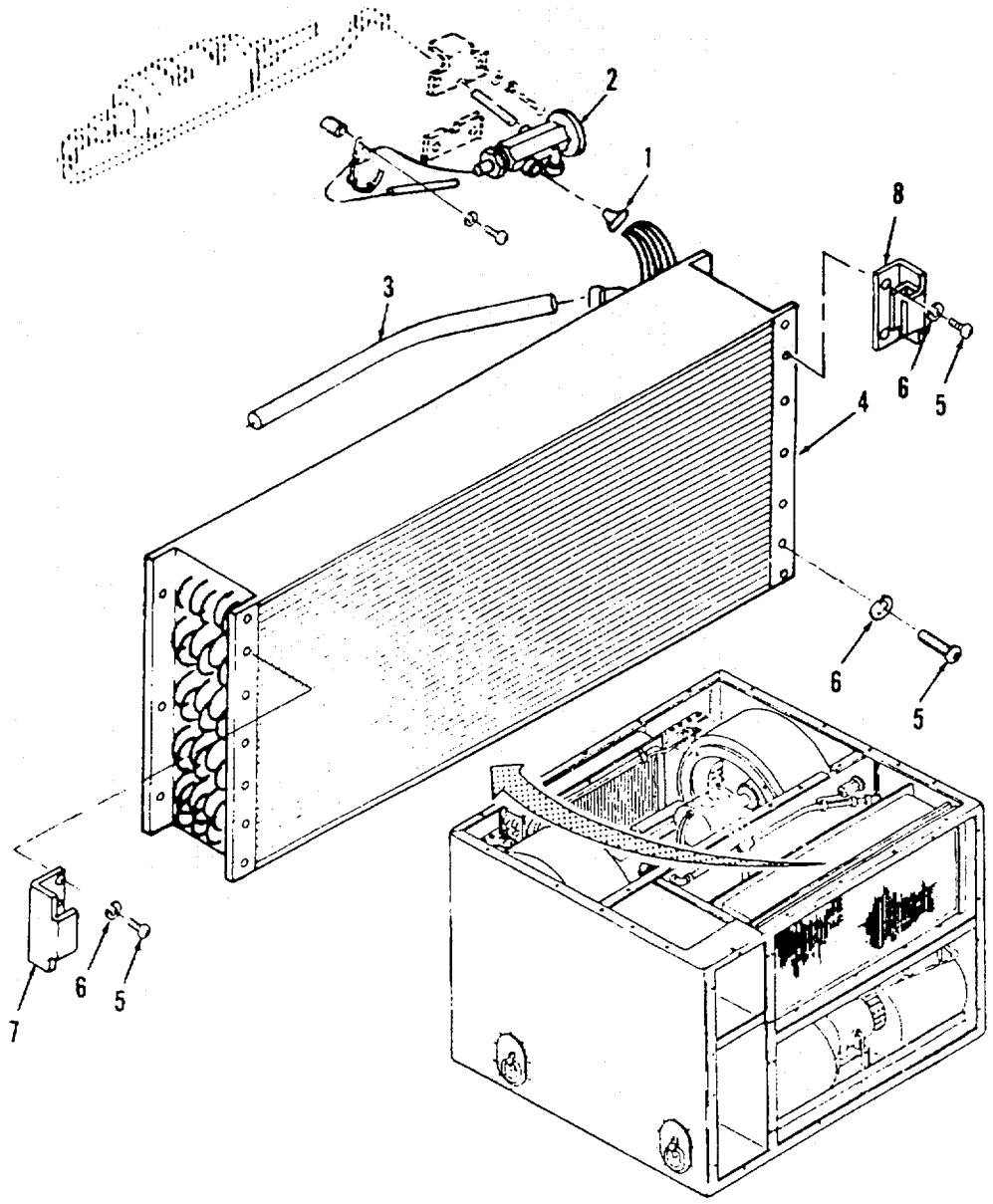


Figure 4-24. Evaporator Coil.

(6) Install heating elements (see para. 3-29).

(7) Install coil frost switch (see para. 3-44).

(8) Install mist eliminator (see para. 3-28).

(9) Install conditioned air louver (see para. 3-20).

(10) Install front cover (see para. 3-27).

(11) Semite refrigeration system per para. 4-6.

4-30. CONDENSER COIL.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and COOL
Condenser coil guard removed (see para. 3-25).
Condenser scrolls removed (see para. 4-14).
Damper actuator cylinder removed (see para 4-20).
Auxiliary power connection wiring harness removed.
Recover refrigerant from system (see para, 4-6).
Refrigeration system purged (see para. 4-6).
Debraze related tube connections (see para. 4-7).

a. Removal. (Refer to Figure 4-25).

(1) Remove five screws (1) from unit.

(2) Remove condenser coil (2) from unit.

b. Installation.

(1) Place condenser coil (2) in unit.

(2) Install five screws (1).

(3) Install auxiliary power connection wiring harness.

(4) Install damper actuator cylinder (see para. 4-20).

(5) Install condenser scrolls (see para. 4-14).

(6) Install condenser guard (see para. 3-25).

(7) Purge the system with nitrogen (see para. 4-6).

(8) Braze the tube connections (see para. 4-7).

(9) Replace dehydrator (see para. 4-18).

(10) Install rear cover (see para. 3-27).

(11) Service refrigeration system per para. 4-6.

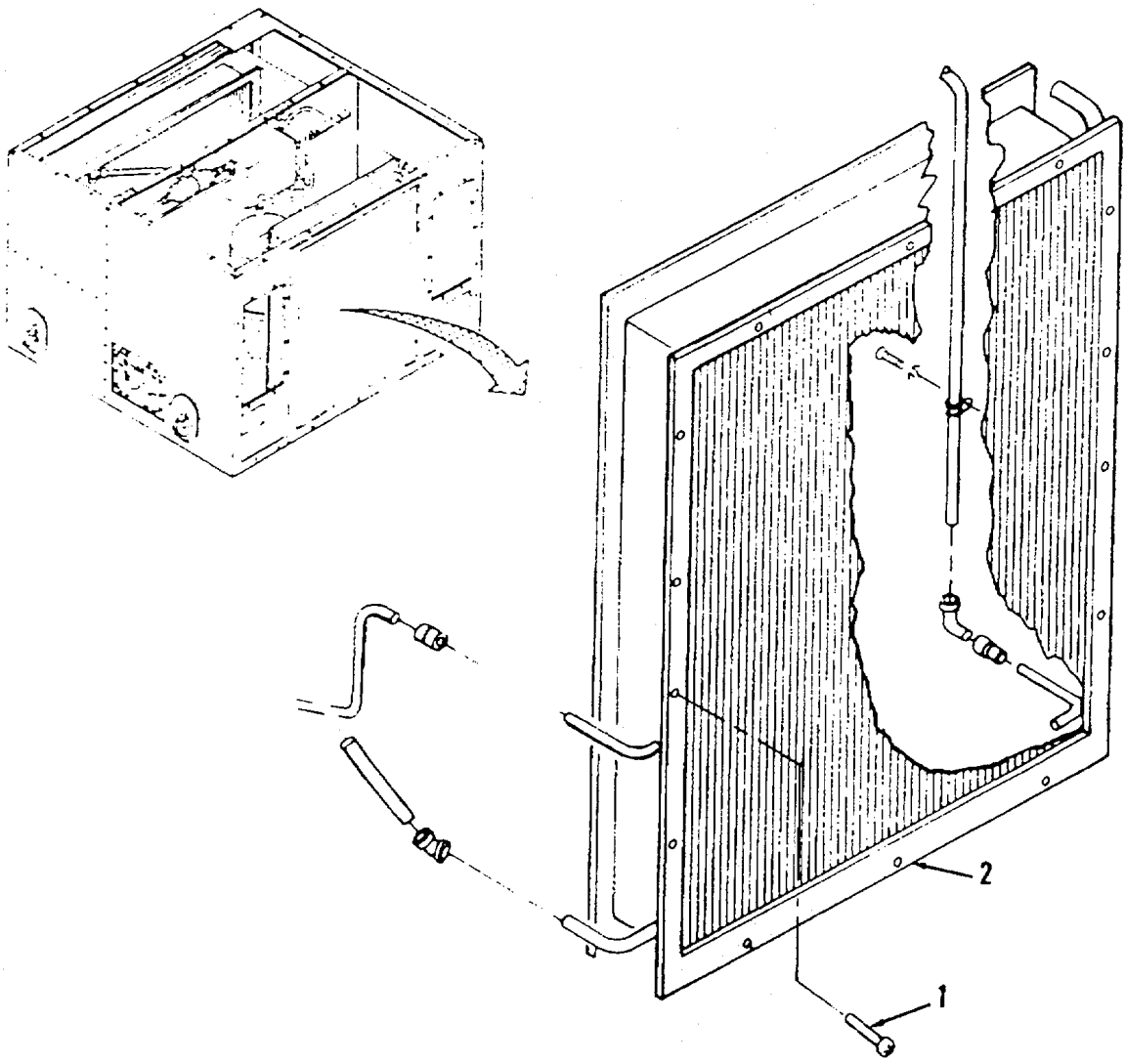


Figure 4-25. Condenser Coil.

4-31. TUBING AND FITTINGS.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Pump, Vacuum (Item 1, Appendix B)
Regulator Assembly (Item 6, Appendix B)

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Front and rear covers removed required for access to repair area (see para. 3-27).
Recover refrigerant from system (see para. 4-6).
Purge the system with nitrogen (see para. 4-6).

The refrigeration system contains a number of pieces of copper tubing in a variety of material grades, sizes, lengths, and shapes, and a number of elbows, tees, and adapters in several sizes. Observe the following when replacing any piece of tubing or fitting in the system.

a. Removal.

(1) Debraze tube connections of parts to be removed (see para. 4-7).

(2) Remove part(s) to be replaced.

b. Installation.

(1) Install replacement part onto tube ends.

(2) Braze the tube connections (see para. 4-7).

(3) Replace the dehydrator (see para. 4-18).

(4) Service refrigeration system per para. 4-6.

4-32. SERVICE BOX.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Condenser scroll nearest service box removed (see para. 4-14).
Pressure switches removed (see para. 4-24).
Service valves removed (see para. 4-25).

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

(1) Remove six screws (1) and service box (2).

(2) Remove grommet (3), grommet (4), grommet (5), and grommet (6).

b. Installation.

(1) Install grommet (3), grommet (4), grommet (5), and grommet (6).

(2) Install six screws (1) and service box (2).

(3) Install service valves (see para. 4-25).

(4) Install pressure switches (see para. 4-24).

(5) Install condenser scroll (see para. 4-14).

(6) Service refrigeration system (see para. 4-6).

4-32. SERVICE BOX. - Continued.

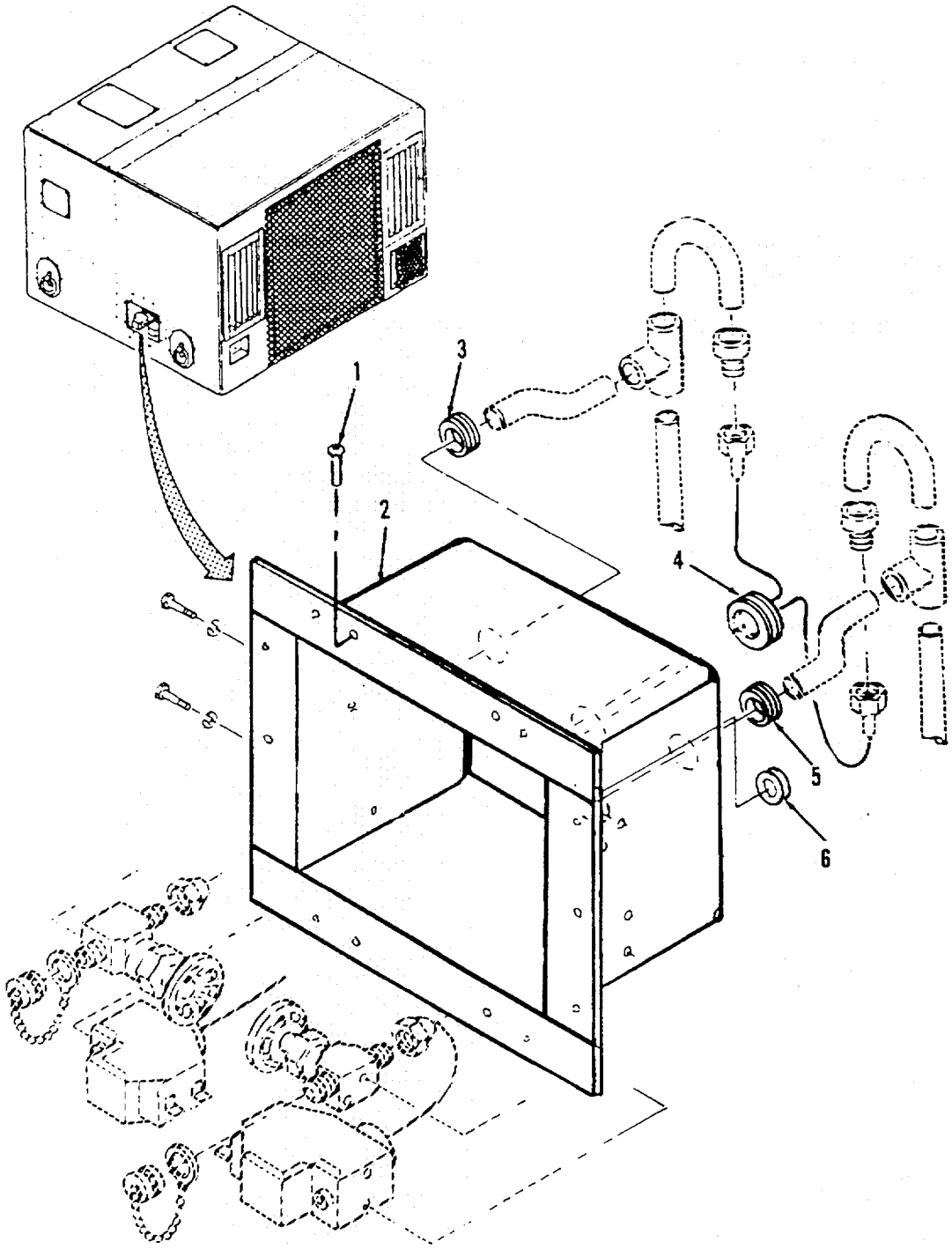


Figure 4-26. Service Box.

4-33. LIFTING RING AND CLIPS.

This Task Covers:

a. Removal b. Installation

Initial Setup:

Tools Required

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

Material/Parts Required

None

Equipment Condition

Air conditioner shut down and cool.
Necessary components removed to access the lifting ring hardware being removed.

a. Removal (Refer to Figure 4-27).

(1) Remove two screws (1), two lock washers (2), two nuts (3), and lifting ring and clip (4).

(2) Repeat for other three lifting rings and clips.

b. Installation.

(1) Install lifting ring and clip (4), two nuts (3), two lock washers (2), and two screws (1).

(2) Repeat for other three lifting rings and clips.

4-33. LIFTING RING AND CLIPS. - Continued.

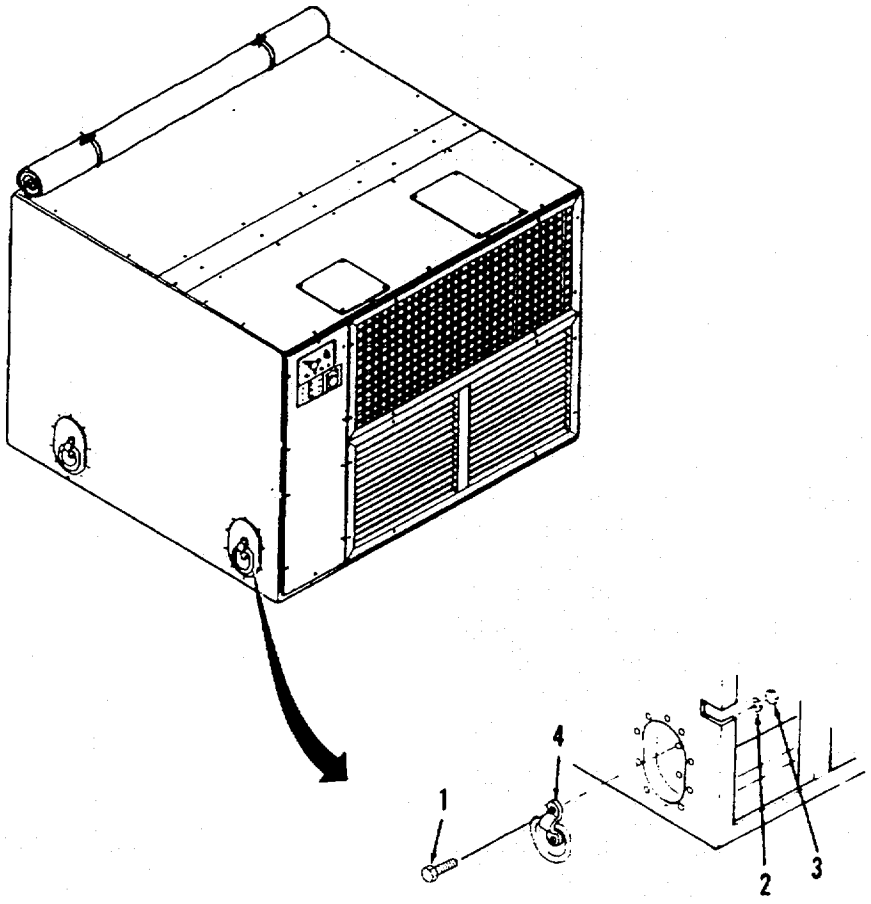


Figure 4-27. Lifting Ring and Clips.

CHAPTER 5

GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. GENERAL SUPPORT MAINTENANCE PROCEDURES

5-1. GENERAL. The procedures in this section cover all items which appear in the general support maintenance level on the Maintenance Allocation Chart (MAC) which is provided in Appendix B.

5-2. HOUSING REPAIR.

This Task Covers:

a. Blind Nuts and Nut Plates b. Insulation, Casing c. Housing Replacement

Initial Setup:

Tools Required

Tool Kit, Service, Refrigeration, Unit (Item 1, Appendix B)
Drill, Electric, Portable (Item 2, Appendix B)
Drill Set, Twist (Item 2, Appendix B)

Material/Parts Required

Methyl-ethyl Ketone (Item 10, Appendix E)
Adhesive (Item 15, Appendix E)
Rivets (Refer to TM 9-4120-404-24P)

Equipment Condition

Air conditioner shut down and cool.

a. Blind Nuts and Nut Plates.

(1) To replace blind nuts (rivnuts) use a drill slightly smaller than the body of the blind nut,

(a) Carefully drill the old blind nut out,

(b) Install replacement part.

(2) To replace nut plates, use a drill slightly smaller than the body of the rivets securing the nut plate.

(a) Carefully drill the rivets loose.

(b) Remove the old nut plate.

(c) Install new nut plate with properly sized rivets.

5-2. HOUSING REPAIR. (Continued.)

b. Installation, Casing.

(1) Inspection. Check that insulation is not loose, missing, burnt, or otherwise damaged. Replace if missing or damaged. Reglue if loose.

(2) Removal.

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(a) Remove as much old insulation material as possible, by pulling or scraping it away from the metal surface.

WARNING

Methyl-ethyl ketone (MEK) is flammable, and its vapors can be explosive. Repeated or prolonged skin contact or inhalation of vapors can be toxic. Use a well ventilated area, wear gloves, and keep away from sparks or flame.

(b) Soften and remove old adhesive and insulation residue, using methyl-ethyl ketone (MEK) and a stiff brush.

(3) Installation.

NOTE

Prior to removal of old insulation, cut the new replacement material to size using the old item as a sample.

(a) Refer to Appendix F and manufacture the required insulation part needed.

(b) Be sure that the surface to which the insulation is to be applied is clean and free of paint and old adhesive material.

(c) Coat the mating surfaces of the metal and the insulation with adhesive. Let both surfaces air dry until the adhesive is tacky, but will not stick to the fingers.

(d) Starting with an end, carefully attach the insulation to the metal. Press into firm contact all over.

c. Housing Replacement.

Replacement consists of removing all attaching hardware and reinstalling it on new casing.

APPENDIX A
REFERENCES

A-1. SCOPE.

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS.

Equipment Inspection and Maintenance Worksheet ..... DA Form 2404
Maintenance Request ..... DA Form 5504
Packaging Improvement Report ..... DD Form 6
Product Quality Deficiency Report ..... SF 368
Recommend Changes to Equipment Technical Publications ..... DA Form 2028-2
Recommended Changes to Publications and Blank Forms ..... DA Form 2028

A-3. FIELD MANUALS.

First Aid For Soldiers ..... FM 21-11
NBC Contamination Avoidance ..... FM 3-3
NBC Protection ..... FM 3-4
NBC Decontamination ..... FM 3-5

A-4. TECHNICAL MANUALS.

Administrative Storage of Equipment ..... TM 740-90-1
Unit, Direct Support, and General Support Repair Parts and Special Tools List ..... TM 9-4120-404-24P
Procedure for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command) ..... TM 750-244-3
Leak Detector, Refrigerant Gas ..... TM 9-4940-435-14
Solder and Soldering ..... TB SIG 222
Warranty Technical Bulletin ..... TB 9-4120-404-24

A-5. MISCELLANEOUS PUBLICATIONS.

The Army Maintenance Management System (TAMMS) ..... DA PAM 738-750
Abbreviations for Use on Drawings, Specifications, Standards, and in Technical Documents MIL-STD-12
Army Medical Department Expendable/Durable Items ..... CTA 8-100
Brazing of Steels, Copper, Copper Alloys and Nickel Alloys, Aluminum, and Aluminum Alloys MIL-B-7883
Consolidated Index of Army Publications and Blank Forms ..... DA PAM 25-30
Expendable Items (Except Medical Class V, Repair Parts and Heraldic Items) ..... CTA 50-970
Environmental Control of Small Shelters MIL-HDBK-116

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and 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 H.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS.

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test, measuring, and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3rd position code of the SMR code.

i. Repair. The application of maintenance services, including fault location/trouble-shooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army 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 is 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 Function. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed

maintenance function 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 Maintenance
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. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. Column 1, Reference Code. The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. Column 2, Maintenance Category. The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. Column 4, National Stock Number. The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. Column 1, Reference Code. The code recorded in column 6, Section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE Allocation CHART FOR AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
01	**Fabric Cover and Access Panels**								
	Fabric Cover	Inspect	0.1						
		Repair		0.1				1	N
		Replace		0.2				1	
	Access Panels	Inspect	0.1						
		Repair		0.2				1	
		Replace		0.4				1	
02	**Louvers, Guards, Filters, Metal Covers and Information Plates**								
	Conditioned Air Louver	Inspect	0.1						
		Repair		0.2				1	
		Replace		0.3				1	
		Service		0.1					E
	Return Air Louver	Inspect	0.1						
		Repair		0.2				1	F
		Replace		0.3				1	
		Service		0.1					E
	Condenser Exhaust Louver	Inspect	0.2						
		Repair		0.8				1	
		Replace		0.5				1	
	Ventilation Guard	Inspect	0.1						
		Replace		0.2				1	
	Ventilation Air Filter	Inspect	0.2						
		Service		0.2					G
		Replace		0.2				1	

Section II. MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Filter, Air Conditioning	Inspect	0.1						
		Service		0.5					G
		Replace		1.2				1	
	Condenser Coil Guard	Inspect	0.1						
		Replace		0.5				1	
		Service		0.5					G
	Information Plates	Inspect	0.2						
		Replace		0.5					
	Metal Covers	Inspect	0.1						
		Repair		0.3				1	D, C
		Replace		0.5				1	
	Mist Eliminator	Inspect		0.2					
		Service		0.9					G
		Replace		0.9				1	
03	**Heating Elements and Switches**								
	Heating Elements	Inspect		0.2					
		Test		0.5				1	H
		Replace		1.8				1	
	Heater Cutout Switch	Inspect		0.2					
		Test		0.5				1	H
		Replace		1.4				1	
	Heater Relay	Inspect		0.2					
		Test		0.5				1	H
		Replace		0.5				1	
04	**Condensate Drain**								
	Condensate Drain Assembly	Inspect	0.2						
		Service		0.5					
		Repair		0.5	0.5			1	F
		Replace		1.2	4.5			1	

Section II. MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
05	**Evaporator Fan Assembly**								
	Evaporator Fan Assembly	Inspect		0.3					
		Repair			6.0			1	F
	Evaporator Fan Scrolls	Inspect		0.1					
		Replace			6.3			1	
	Evaporator Impeller Fans	Inspect		0.2					
		Service		0.5					
		Replace			6.6			1	
	Evaporator Motor	Inspect		0.2					
		Test		0.5				1	H
		Replace			7.5			1	
	Motor Bracket and Chassis	Inspect		0.2					
		Replace			7.5			1	
06	**Condenser Fans and Condenser Louver Controls**								
	Condenser Fan Motors	Inspect		0.2					
		Test			0.5			1	H
		Replace			2.0			1	
	Condenser Fan Scrolls	Inspect		0.1					
		Replace			8.0			1	
	Condenser Impeller Fans	Inspect		0.2					
		Service		0.5					
		Replace			8.2			1	
	Condenser Fan Braces and Support	Inspect		0.2					
		Replace			9.5			1	

SECTION II. MAINTENANCE ALLOCATION CHART

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Louver Actuator	Inspect		0.1					
	Cables	Repair		1.0				1	F
		Replace		1.2				1	
		Adjust		1.2				1	
07	**Ventilation Damper and Actuator**								
	Damper Actuator	Inspect		0.2					
		Adjust			0.2			1	
		Replace			1.2			1	
		Service			0.1				J
	Ventilation Damper	Inspect		0.2					
		Replace			1.0			1	
08	**Electrical System**								
	Circuit Breaker	Inspect		0.1					
		Replace		0.5				1	
		Test		0.2				1	H
	Logic Box Assembly	Inspect		0.3					
		Replace		1.5					
		Test		1.0					
		Repair				3.5		1-8	O
	Motor Controller	Inspect		0.3					
		Replace		1.5					
		Repair				3.5		1-8	O
	Transformer	Inspect		0.1					
		Replace		0.4				1	
		Test		0.2				1	H, I
	Rectifier	Inspect		0.1					
		Replace		0.3				1	
		Test		0.2				1	H

Section II. MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Control Panel Assembly	Inspect		0.2					
		Repair		0.8				1, 3, 5	F
		Replace		0.5				1	
		Test		0.5				1	H
	EMI Filter	Inspect		0.1					
		Replace		0.5				1	
		Test		0.5				1	H
	Relay	Inspect		0.2					
		Replace		0.6				1	
		Test		0.2				1	H, I
	Coil Frost Switch	Inspect		0.1					
		Test		0.2				1	H
		Replace		0.5				1	
	Terminal Boards	Inspect		0.2					
		Replace		0.8				1	
	Wiring Harnesses	Inspect		0.5					
		Repair		2.5				1	F
		Replace		1.5				1, 3, 5	
		Test		1.0				1	H
09	**Refrigeration System**								
	Dehydrator	Inspect			0.1				
		Replace			1.0			1, 2,4	A, K
	Solenoid Valve	Inspect			0.2				
		Test			0.3			1, 2	
		Repair			7.5			1, 2	A, K
		Replace			7.5			1, 2, 4, 6	A, K
	Coil	Inspect		0.2					
		Test		0.2					H
		Replace		0.2				1	B

Section II. MAINTENANCE ALLOCATION CHART
FOR
AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
	Damper Actuator	Inspect			0.1				
	Cylinder	Replace			1.0			1, 2, 4, 6	A, K
		Adjust			0.2			1	
	Receiver	Inspect			0.2				
		Replace			9.0			1, 2, 4, 6	A, K
	Pressure	Inspect			0.2				
	Relief Valve	Replace			7.0			1, 2, 4, 6	A, K
	Accumulator	Inspect			0.2				
		Replace			9.0			1, 2, 4, 6	A, K
	Pressure	Inspect		0.2					
	Switches	Replace			1.5			1, 2, 4	A, K
		Test			0.1			1	J
	Service Valves	Inspect			0.2				
		Replace			1.5			1, 2, 4	A, K
	Expansion Valve	Inspect			0.2				
		Test			1.0			1, 8	
		Replace			8.5			1, 2, 4, 6	A, K
	Liquid Sight	Inspect			0.1				
	Indicator	Replace			7.5			1, 2, 4, 6	A, K
	Compressor	Inspect			0.5				
		Test			1.0				H, I
		Repair			3.0				L
		Replace			9.0			1, 2, 4, 6	A, K
	Evaporator Coil	Inspect		0.3					
		Service		0.8				1, 7	M
		Replace			11.0			1, 2, 4, 6	A, K
	Condenser Coil	Inspect		0.3					
		Service		1.0				1, 7	M
		Replace			11.0			1, 2, 4, 6	A, K
	Tubing and	Inspect			0.5				
	Fittings	Replace			10.0			1, 2, 4, 6	A, K

Section II. MAINTENANCE ALLOCATION CHART FOR AIR CONDITIONER, HORIZONTAL, COMPACT, MULTIPOWER, 36,000 Btu/hr

(1) GROUP No.	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			C	O	F	H	D		
10	HOUSING								
	Service Box	Inspect		0.1					
		Replace			16.5			1	
	Lifting Ring and Clips	Inspect		0.2					
		Replace			7.8			1	
	Housing	Repair				8.0		1	F
		Replace				24.0		1, 3	

Section III. SPECIAL TOOLS AND TEST EQUIPMENT REQUIREMENTS

(1) REFERENCE TOOL CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL/AUTO STOCK NUMBER	(5) TOOL NUMBER
		Standard tools and test equipment contained in the following kits are adequate to perform the maintenance functions listed in Section II.		
1	O, F, H	Tool Kit, Service, Refrigeration, Unit	5180-00-596-1474	SC5180-90 -CL N18 (19099)
2	O	Tool Kit, Shop Equipment, Automotive Maintenance and Repair, Common No. 1	4910-00-919-0098	SC4910-95-CL-A74 (19099)
3	O	Power Supply, 28V	6130-01-143-5947	
4	F, H	Recovery and Recycle Unit	4130-01-338-2707	
		SPECIAL TOOLS		
5	O, F, H	Heat Gun	4940-01-042-4855	
6	F, H	Regulator Assembly (Nitrogen)	6680-00-503-1327	
7	O, F, H	Straightener, Fin	5120-00-157-2180	
8	F, H	Thermometer Set	6685-00-874-5834	

SECTION IV. REMARKS

MAINTENANCE ALLOCATION CHART

Reference Code	Remarks
A	Includes evacuating and refrigerant charging.
B	Replace coil only.
C	Replace gaskets.
D	Replace gaskets, insulation, and information plates.
E	Clean and lightly lubricate.
F	Replace components.
G	Clean with mild detergent and water.
H	Test for continuity.
I	Test for AC voltage application.
J	Lightly grease.
K	Leak testing and dehydrator replacement are required after any refrigeration component has been removed or replaced.
L	Repair limited to replacement of external components.
M	Straighten damaged fins and vacuum clean.
N	Repair minor cuts, tears, and rips with duct tape.
O	Repair performed by Specialized Repair Activity (SRA).

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 issue items for the Model MH-40-MP Air Conditioner to help you inventory items required for safe and efficient operation of the equipment.

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 air conditioner, but are to be 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 essential items are required to place the air conditioner in operation, to operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the air conditioner during operation and whenever it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement, based on authorization of the end item by TOE/MTOE. Illustrations are furnished to help you find and identify the items.

C-3. EXPLANATION OF COLUMNS.

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illus. Number. This column indicates the number of the item illustrated.

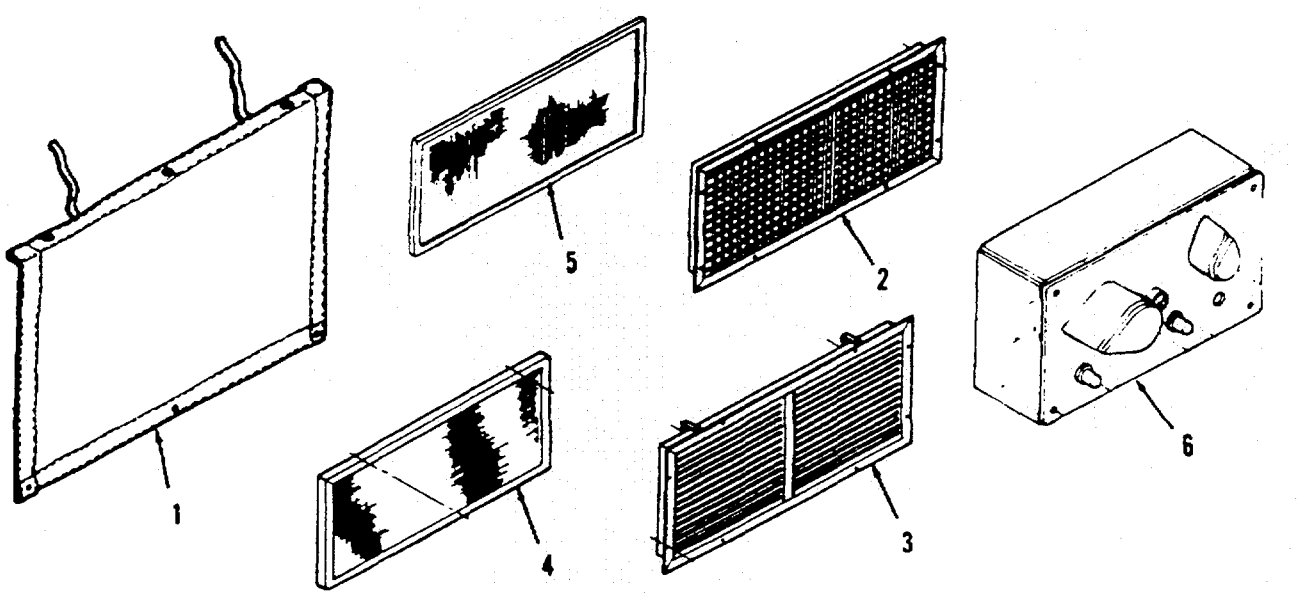
b. Column (2) - National Stock Number. Identifies the National stock number of the item to be used for requisitioning purposes.

c. Column (3) - Description and Usable On Code. Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the CAGEC (Commercial and Government Entity Code) (in parentheses) and the part number.

d. Column (4) - U/I. Indicates how the item is issued for the National Stock Number shown in column two.

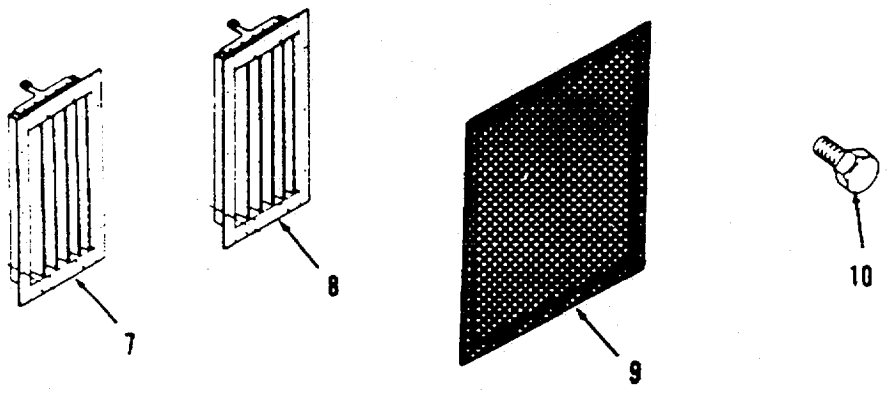
e. Column (5) - Qty rqd). Indicates the quantity required.

Section II. COMPONENTS OF END ITEM



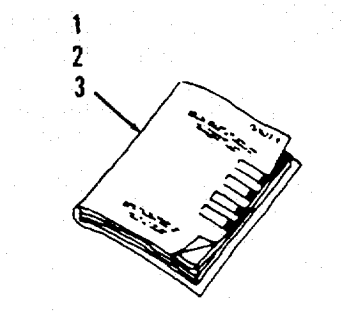
(1) Illus. Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On code	(4) U/I	(5) Qty Reqd
1	4130-0-156-8666	COVER, FABRIC (97403) 13216E6361		EA	1
2		LOUVER, METAL (97403) 13216E6318		EA	1
3		LOUVER, WITH CLIPS (97403) 13216E6080-5		EA	1
4		FILTER, AIR CONDITIONER (97403) 13216E6292-3		EA	1
5	4130-01-123-9112	MIST ELIMINATOR (97403) 13219E1032		EA	1
6		CONTROL PANEL ASSEMBLY (97403) 13229E4190		EA	1

Section II. COMPONENTS OF END ITEM - Continued.



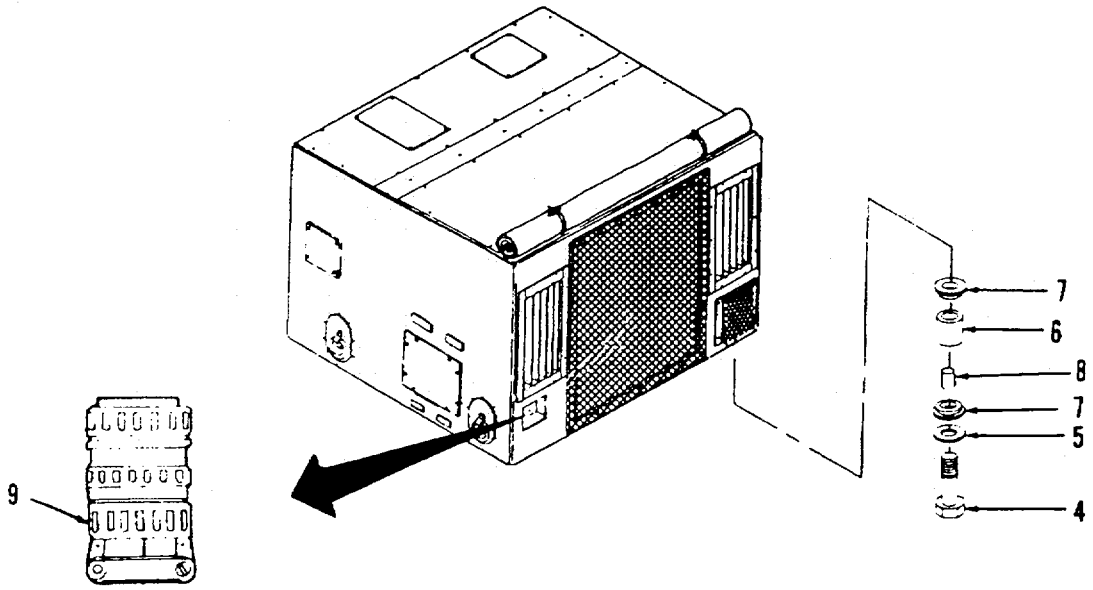
(1) Illus. Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On code	(4) U/I	(5) Qty Reqd
7		LOUVER ASSEMBLY (97403) 13225E9521		EA	1
8		LOUVER ASSEMBLY (97403) 13225E9520		EA	1
9		GUARD, CONDENSER (97403) 13225E9514		EA	1
10		PLUG, PIPE (81348) WW-P-471, A CA AA B		EA	1

Section III. BASIC ISSUE ITEM



(1) Illus. Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On code	(4) U/I	(5) Qty Reqd
1	TM 9-4120-404-14	TECHNICAL MANUAL: OPERATOR'S. UNIT. DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL		EA	1
2	TM 9-4120-404-24P	TECHNICAL MANUAL: UNIT. DIRECT SUPPORT, AND GENERAL SUPPORT REPAIR PARTS AND SPECIAL TOOLS LIST		EA	1
3	TB 9-4120-404-24	WARRANTY TECHNICAL BULLETIN		EA	1

Section III. BASIC ISSUE ITEMS - Continued



(1) Illus. Number	(2) National Stock Number	(3) Description CAGEC and Part Number	Usable On code	(4) U/I	(5) Qty Reqd
4	5935-00-369-2083	SCREW, CAP, HEX HEAD (96906) MS90726-65		EA	6
5	5310-00-566-9504	WASHER (97403) 13216E6138-2		EA	6
6	5310-00-566-9504	SPACER (97403) 13216E6152		EA	6
7	5340-01-041-5742	MOUNT, RESILIENT (97403) 13216E6137		EA	12
8	4730-01-036-2334	TUBE, ELASTOMERIC (97403) 13216E6153		EA	6
9		CONNECTOR, RECEPTACLE (97403) 13229E6718-2		EA	1

APPENDIX D
ADDITIONAL AUTHORIZATION LIST (AAL)

SECTION I. INTRODUCTION

D-1. SCOPE.

This appendix lists additional items you are authorized for the support of the Model MH-40-MP 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 turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING.

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name. If the item you require differs between the serial numbers of the same model, effective serial numbers are shown in the last line of the description. If the item required differs for different models of this equipment, the model number is shown under the "Usable On" heading in the description column.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION CAGEC & PART NUMBER USABLE ON CODE	(3) U/I	(4) QTY. RECM
4730-00-080-7042	1/4-18 NPT Pipe to Tube Fitting (96906) MS24519-4	EA	1

APPENDIX E
EXPENDABLE, DURABLE, SUPPLIES AND MATERIALS ITEMS LIST (EDSML)

Section I. INTRODUCTION

E-1. SCOPE.

This appendix lists expendable and durable items you will need to operate and maintain the air conditioner. This listing is for information only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-790, Expendable/Durable Items (except medical, class V repair parts, and heraldic items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

E-2. EXPLANATION OF COLUMNS.

a. Column (1) - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, Appendix E").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3) - National Stock Number. This is the National stock number assigned to the item which you can use to requisition it.

d. Column (4) - Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number. This provides the other information you need to identify the item.

e. Column (5) - U/M. This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

Section II. EXPENDABLE AND DURABLE ITEMS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION CAGEC, PART NUMBER	(5) U/M
1	F		Solder, Lead-Tin, QQ-S-571 Type Sb5	oz
2	F	6830-00-292-0732	Nitrogen Cylinder	cy
3	C, O, F	5640-00-103-2254	Tape, Duct	roll
4	F	3439-00-188-6982	Brazing Alloy, Silver QQ-B-654 Grade Bcup5	rod
5	F	3439-00-640-3713	Flux, Brazing, O-F-499, Type B	qt
6	F	3439-00-255-4566	Flux, Soldering, O-F-506, Type I	qt
7	F	5350-00-192-5047	Abrasive Cloth A-A-1200 (58536)	ea
8	O, F	7920-00-205-1711	Rags	bl
9	O, F	6850-00-264-9037	Dry Cleaning Solvent, P-D-680 (81348)	gl
10	F		Methyl-Ethyl-Ketone	qt
11	F	9150-00-189-5727	Oil, Lubricating MIL-L-2104	gl
12	O, F	7920-00-205-1711	Cloth, Lint-Free	ea
13	O, F	8020-00-207-6658	Brush, Medium, Oval	ea
14	O	7930-00-068-1669	Soap, Mild	gl
15	O	3040-00-664-0439	Adhesive, General Purpose	ea

Section II. EXPENDABLE AND DURABLE ITEMS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION CAGEC, PART NUMBER	(5) U/M
16	O	6850-00-837-9927	Monochlorodifluoromethane, Technical (Refrigerant R-22) BB-F-1421, Type 22 (81348)	cy
17	F		Heat Shrink Tubing	roll
18	F	5610-01-042-2456	Thermal Mastic	qt.
19	F	5970-00-419-4291	Tape, Insulation	roll
20	O	4130-00-860-0042	Coater, Air, Filter, One Pint Container	ea
21	O		Wire Tags	ea
22	F		Oil, Compressor (81349) BB-L-825	qt
23	O	6135-00-120-1020	Battery, Dry, 1.5 Volt	ea
24	F		Silicone	oz
25	O, F		Cable Ties (96906) MS3357-3-9	ea
26	F		Plastic Material Unicellular, Tube, 1.50 ID x .50 wall per (81349) MIL-P- 15280	ft
27	F		Strap, Tie Down, Adjustable Corrosion Resistant Steel, Type VI per (81349) MIL-S-23190/3	ea

APPENDIX F

ILLUSTRATED LIST OF MANUFACTURED ITEMS

SECTION I. INTRODUCTION

a. This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance level.

b. A part number index in numeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

c. All bulk materials needed for manufacture of an item are listed by the part number or specification in a tabular list on the illustration.

PART NUMBER INDEX

Part Number to Be Manufactured	Part Name	Manufacturing Figure
N/A	Remote Control Cable	F-1
N/A	Input Power Cable	F-2
N/A	Logic Box Assembly Test Fixture	F-3
13216E6282/5	Insulation Sheet	F-4
13216E6314/4	Insulation Sheet	F-5
13216E6314-5	Insulation Sheet	F-6
13229E6695-4	Insulation Sheet	F-7
13229E6701-73	Insulation Sheet	F-8
13229E6701-74	Rubber	F-9
13229E6701-77	Flexible Foam	F-10
13229E6701-78	Flexible Foam	F-11
13229E6701-79	Flexible Foam	F-12
13229E6701-80	Flexible Foam	F-13
13229E6701-81	Flexible Foam	F-14
13229E6701-82	Flexible Foam	F-15
13229E6701-83	Flexible Foam	F-16
13229E6701-84	Flexible Foam	F-17
13229E6701-85	Flexible Foam	F-18
13229E6701-86	Flexible Foam	F-19

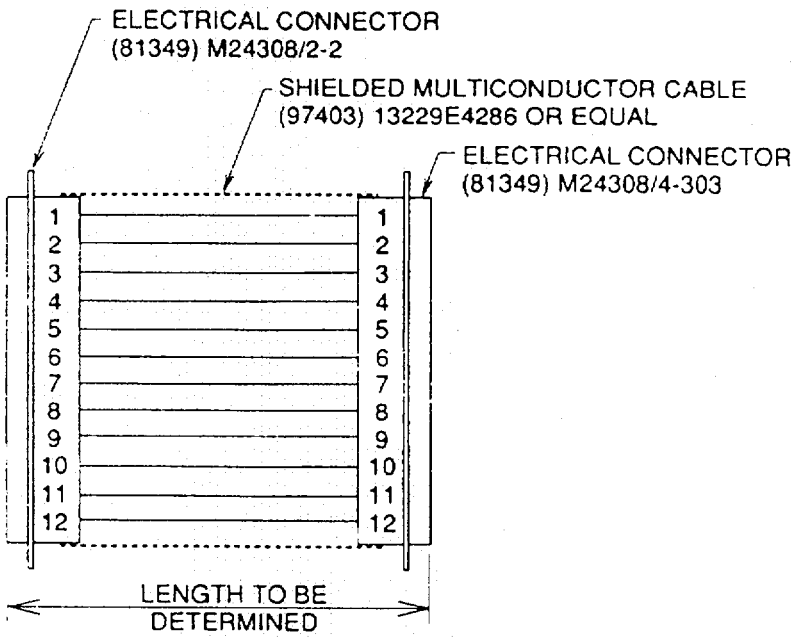


Figure F-1. Remote Control Cable.

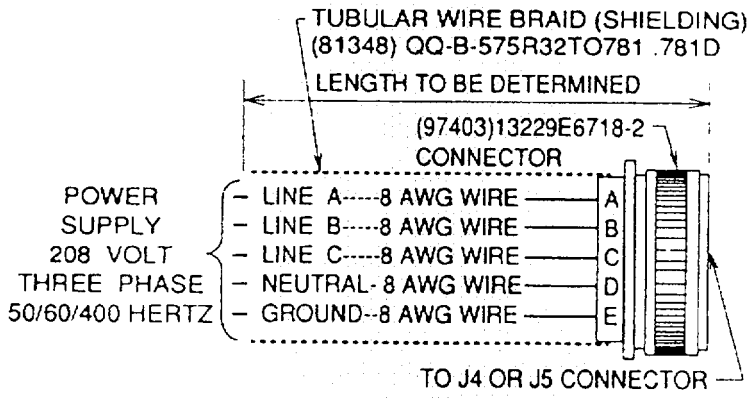


Figure F-2. Input Power Cable.

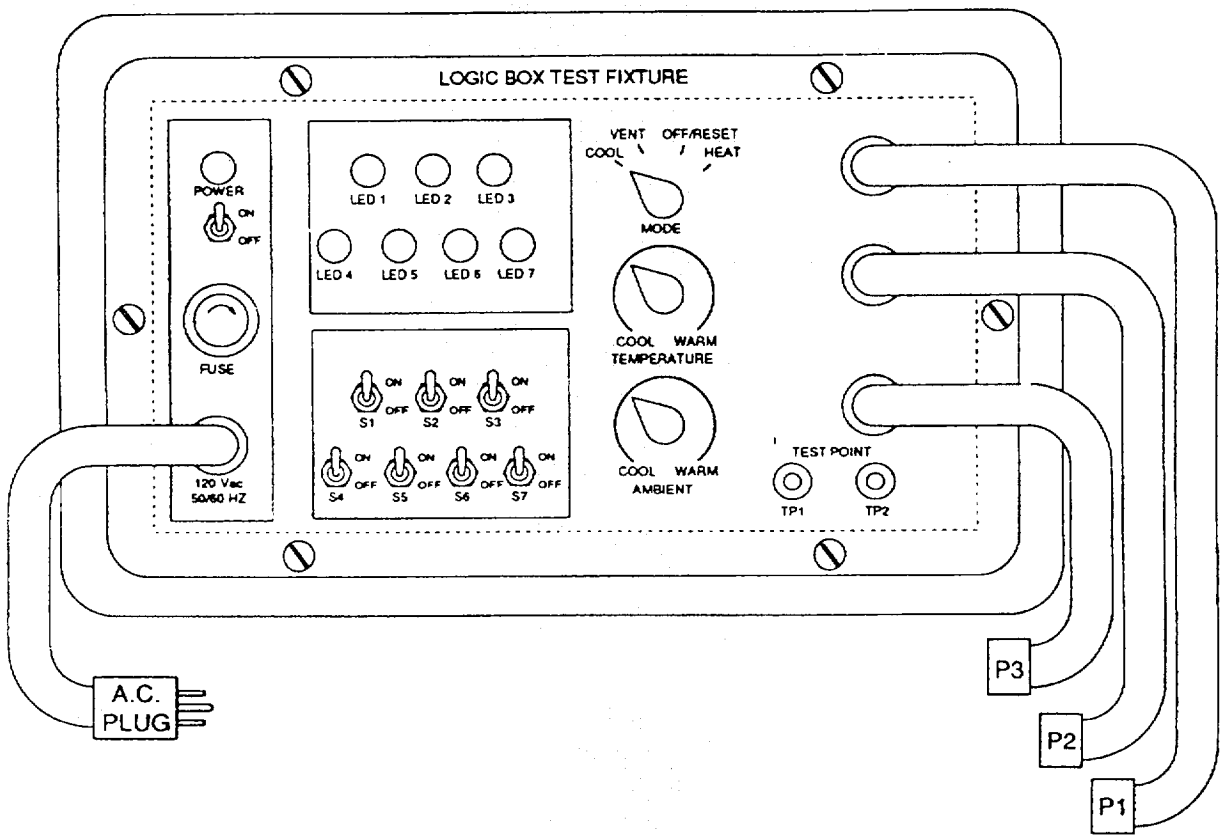
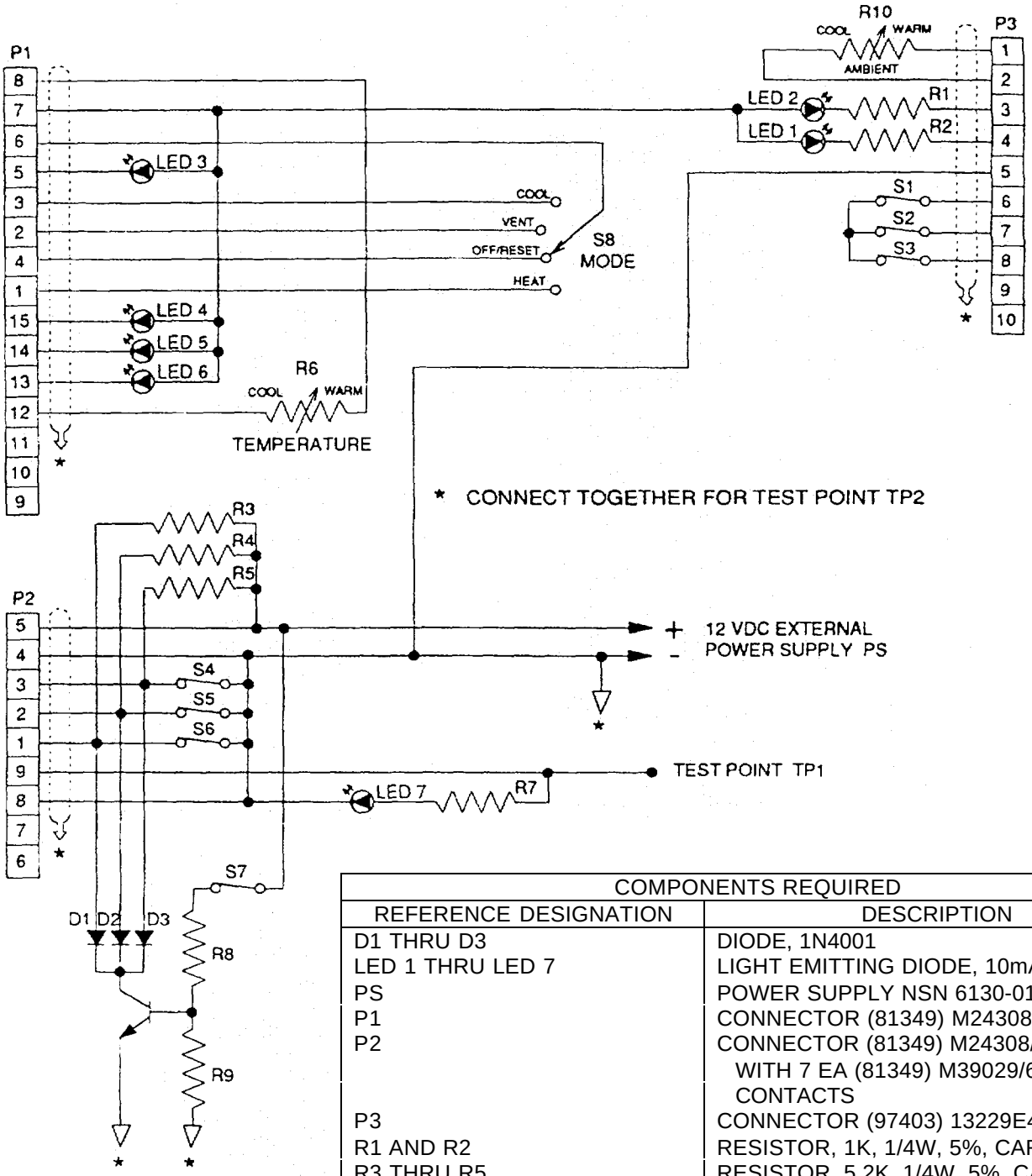
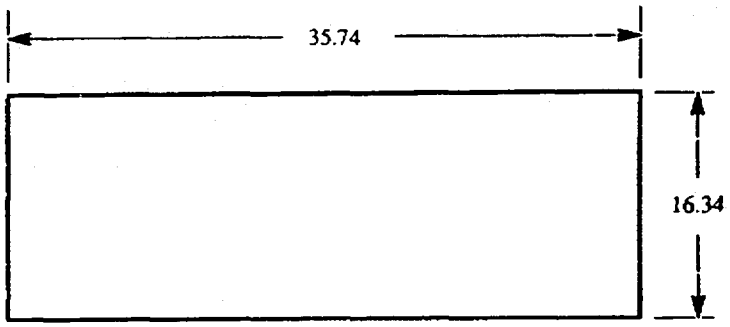


Figure F-3. Logic Box Test Fixture (Sheet 1 of 2).



COMPONENTS REQUIRED	
REFERENCE DESIGNATION	DESCRIPTION
D1 THRU D3	DIODE, 1N4001
LED 1 THRU LED 7	LIGHT EMITTING DIODE, 10mA
PS	POWER SUPPLY NSN 6130-01-143-5947
P1	CONNECTOR (81349) M24308/2-2
P2	CONNECTOR (81349) M24308/2-281 WITH 7 EA (81349) M39029/63-368 CONTACTS
P3	CONNECTOR (97403) 13229E4183
R1 AND R2	RESISTOR, 1K, 1/4W, 5%, CARBON
R3 THRU R5	RESISTOR, 5.2K, 1/4W, 5%, CARBON
R6	POTENTIOMETER, 5K, WW, 10%
R7	RESISTOR, 0.68K, 1/4W, 5%, CARBON
R8 AND R9	RESISTOR, 1K, 1/4W, 5%, CARBON
R10	POTENTIOMETER, 100K, WW, 10%
S1 THRU S7	TOGGLE SWITCH, SPST
S8	ROTARY SWITCH, 1 POLE 4 POSITION NON SHORTING
TR	TRANSISTOR, 2N2222

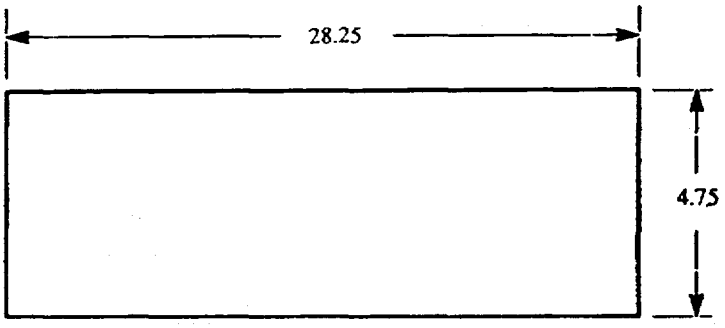
Figure F-3. Logic Box Test Fixture (Sheet 2 of 2).



MATERIALS:
Insulation per MIL-I-14511, .25 in. thick.

PROCEDURE:
Cut material to indicated sizes.

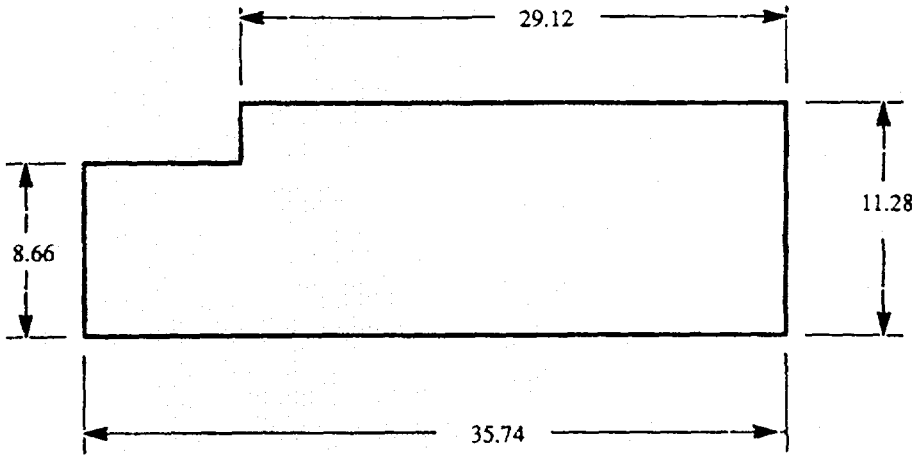
Figure F-4. Insulation Sheet; Part Number 13216E6282/5.



MATERIALS:
Insulation per MIL-I-14511, .25 in. thick.

PROCEDURE:
Cut material to indicated sizes.

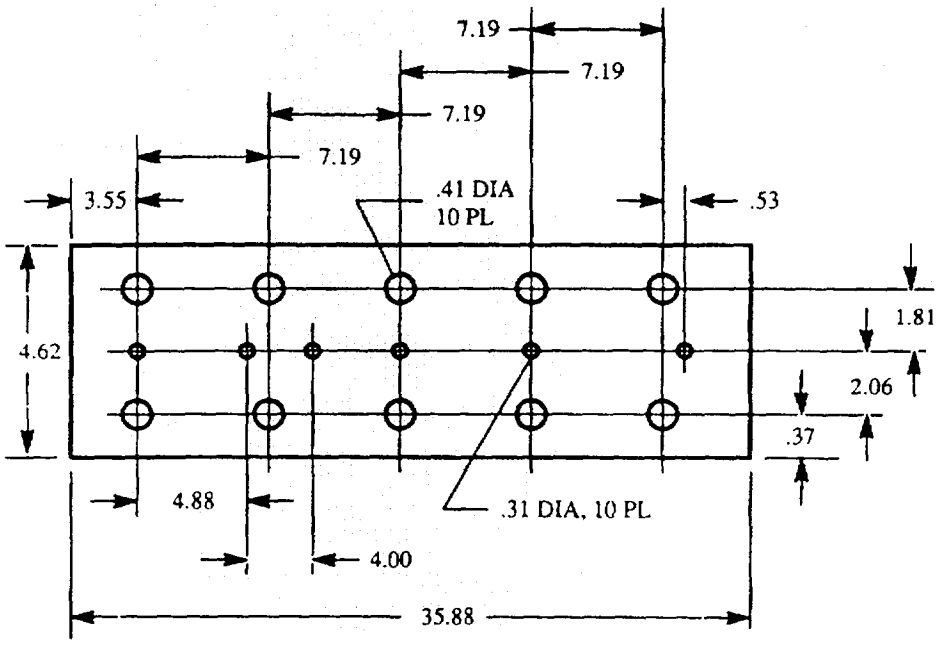
Figure F-5. Insulation Sheet: Part Number 13216E6314/4.



MATERIALS:
Insulation per MIL-I-14511, .25 in. thick,

PROCEDURE:
Cut material to indicated sizes.

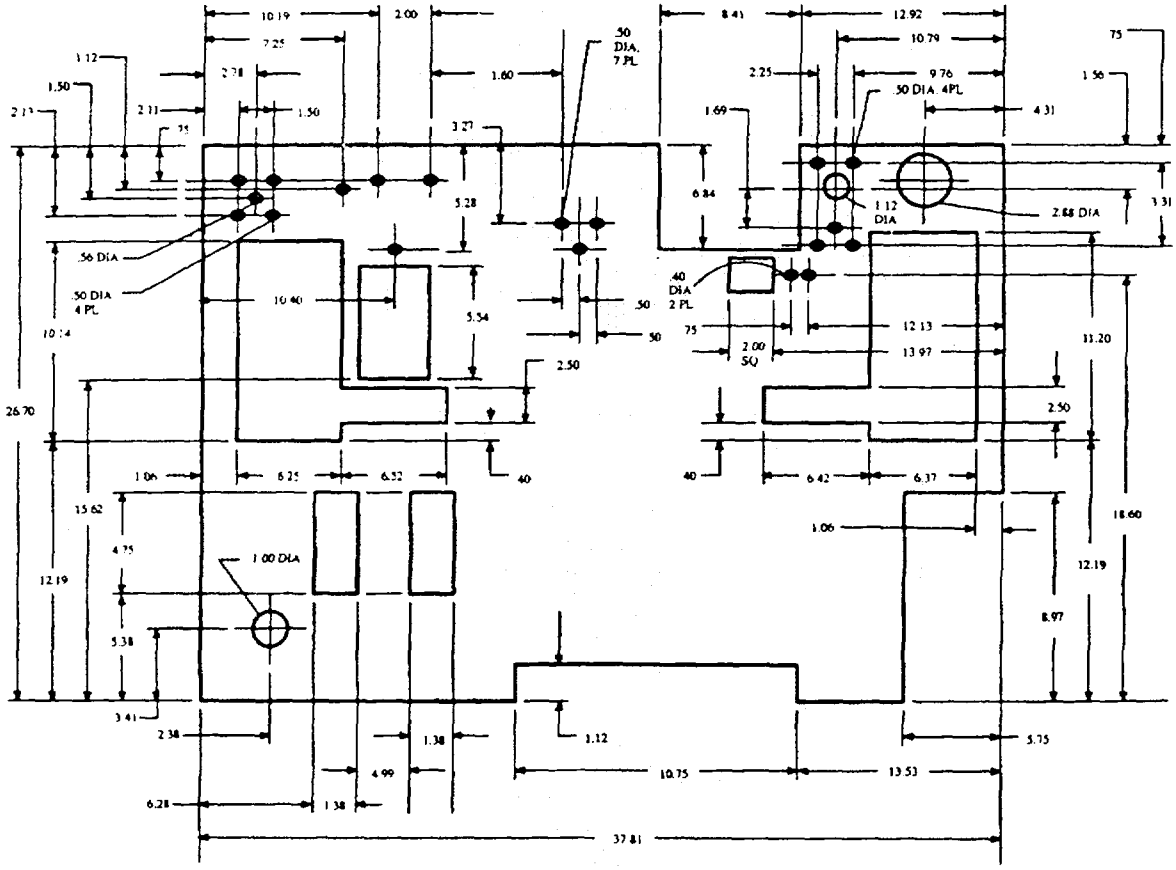
Figure F-6. Insulation Sheet; Part Number 13216E6314-5.



MATERIALS:
Insulation per AMS 3570, .25 in. thick, Foam Flex. Poly.

PROCEDURE:
Cut material to indicated sizes.

Figure F-7. Insulation Sheet; Part Number 13229E6695-4.



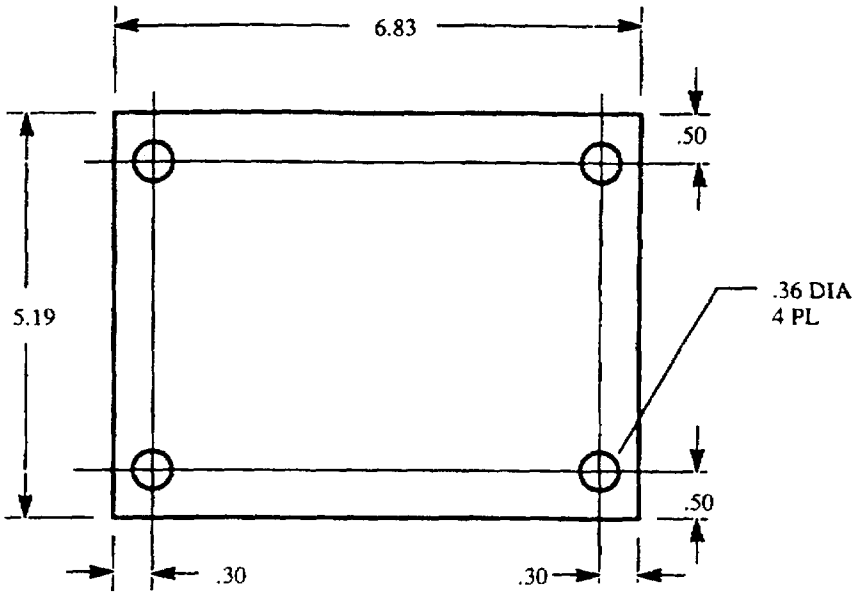
MATERIALS:

Insulation per AMS 3570, .50 in. thick, Foam Flex. Poly.

PROCEDURE:

Cut material to indicated sizes.

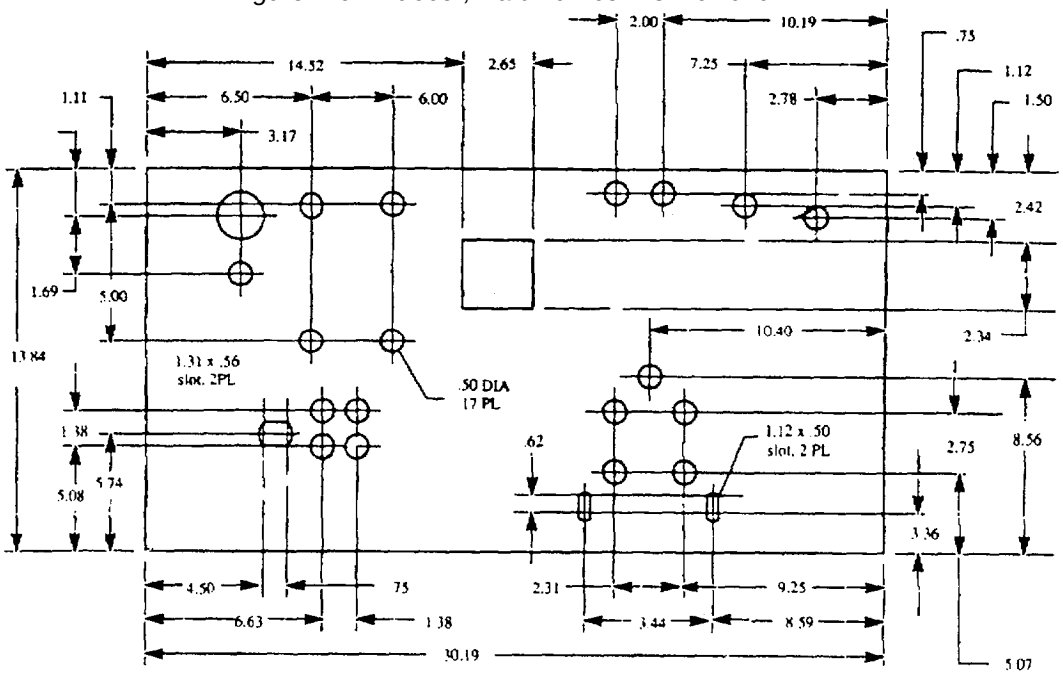
Figure F-8. Insulation Sheet; Part Number 13229E6701-73.



MATERIALS:
Insulation per MIL-R-6130, Gasket, Type II, Grade A, .25 in. thick.

PROCEDURE:
Cut material to indicated sizes.

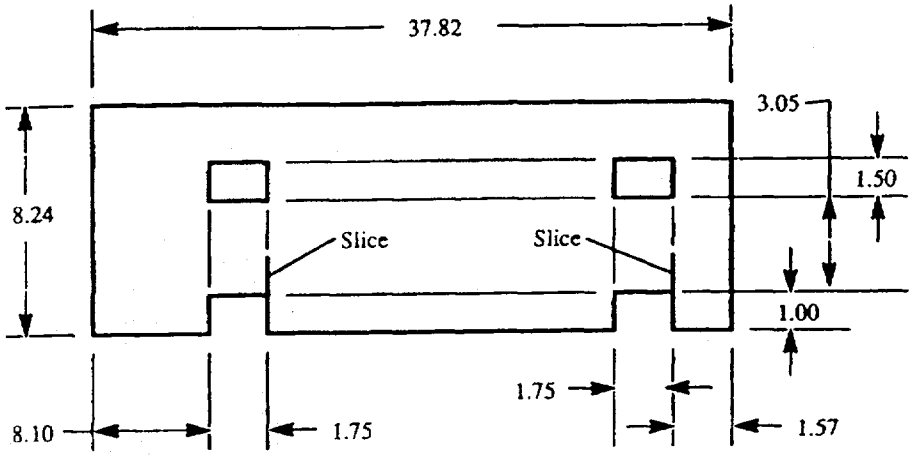
Figure F-9. Rubber; Part Number 13229E6701-74.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick.

PROCEDURE:
Cut material to indicated sizes.

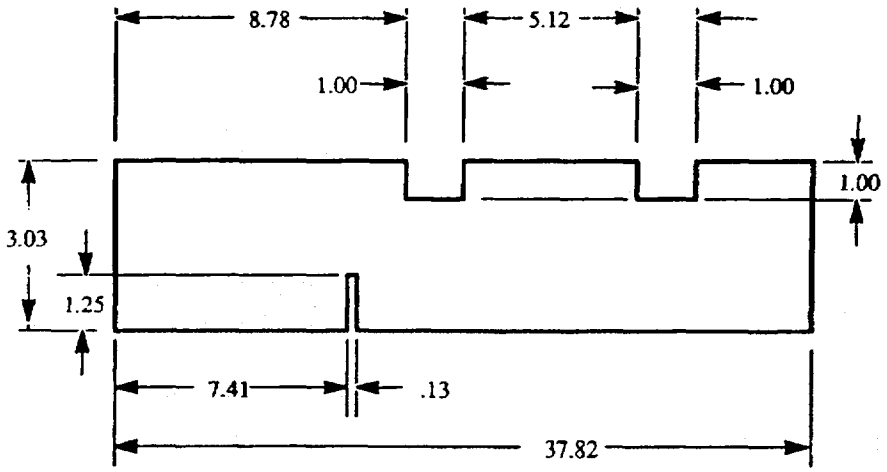
Figure F-10. Flexible Foam; Part Number 13229E6701-77.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick

PROCEDURE:
Cut material to indicated sizes.

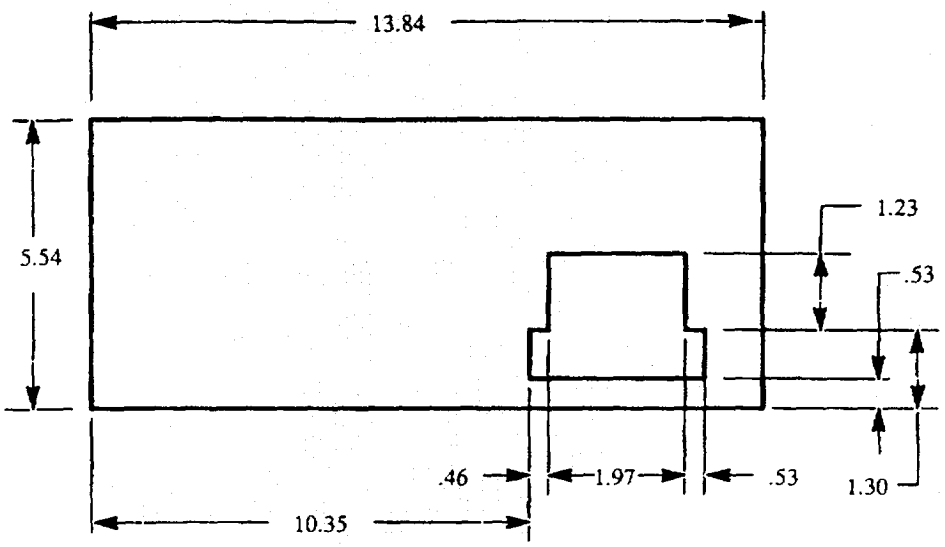
Figure F-11. Flexible Foam; Part Number 13229E6701-78.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick.

PROCEDURE:
Cut material to indicated sizes.

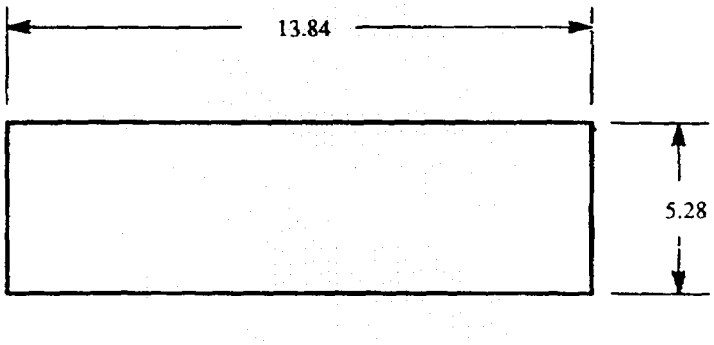
Figure F-12. Flexible Foam; Part Number 13229E6701-79.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick

PROCEDURE:
Cut material to indicated sizes.

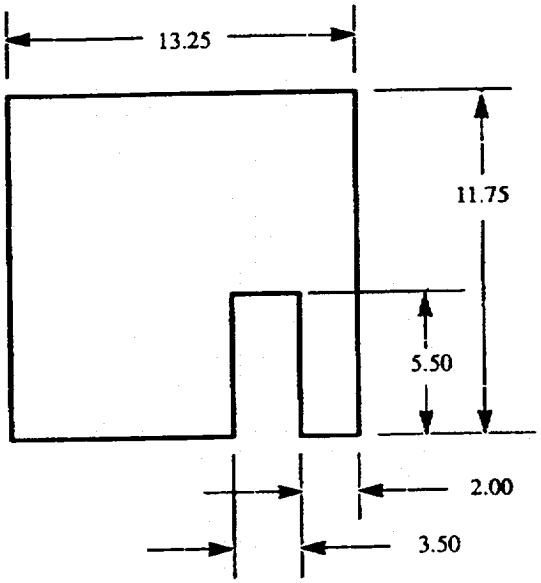
Figure F-13. Flexible Foam; Part Number 13229E6701-80.



MATERIALS:
Insulation per MIL-P-15280, .50 in. thick.

PROCEDURE:
Cut material to indicated sizes.

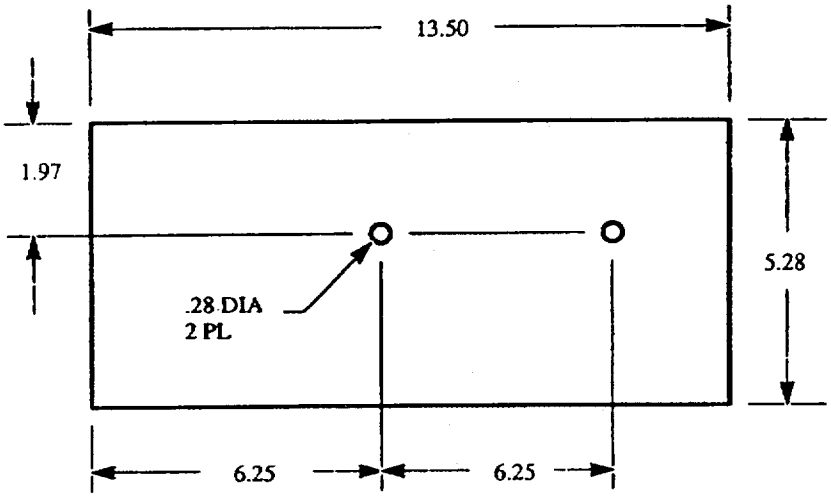
Figure F-14. Flexible Foam; Part Number 13229E6701-81.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick

PROCEDURE:
Cut material to indicated sizes.

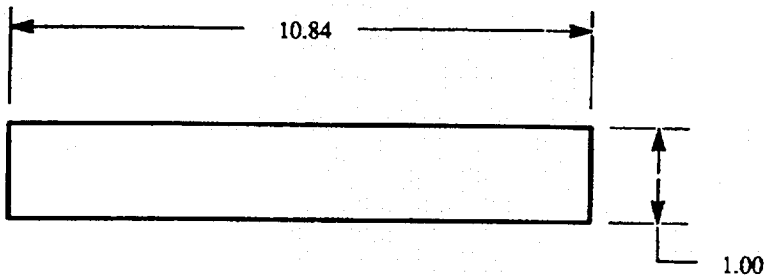
Figure F-15. Flexible Foam; Part Number 13229E6701-82.



MATERIALS:
Insulation per MIL-P-15280, .50 in. thick.

PROCEDURE:
Cut material to indicated sizes.

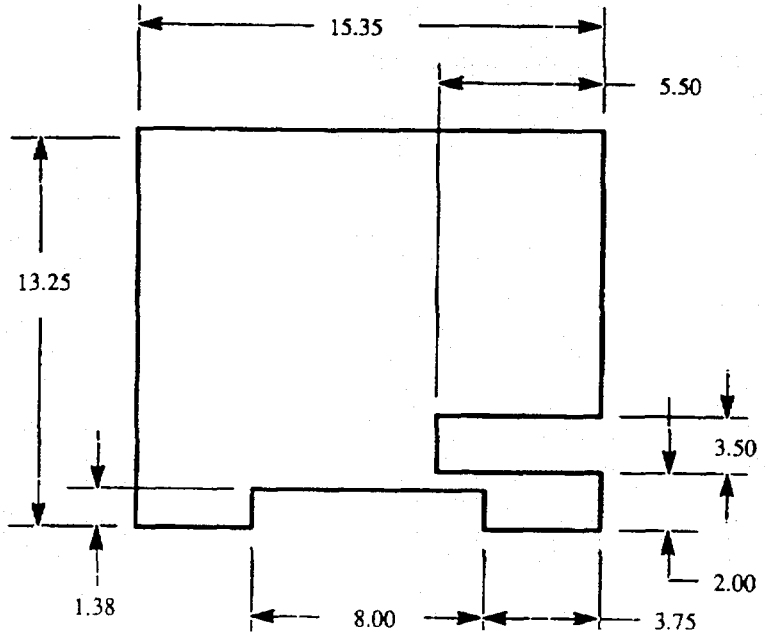
Figure F-16. Flexible Foam; Part Number 13229E6701-83.



MATERIALS:
Insulation per AMS 3570, .25 in. thick

PROCEDURE:
Cut material to indicated sizes.

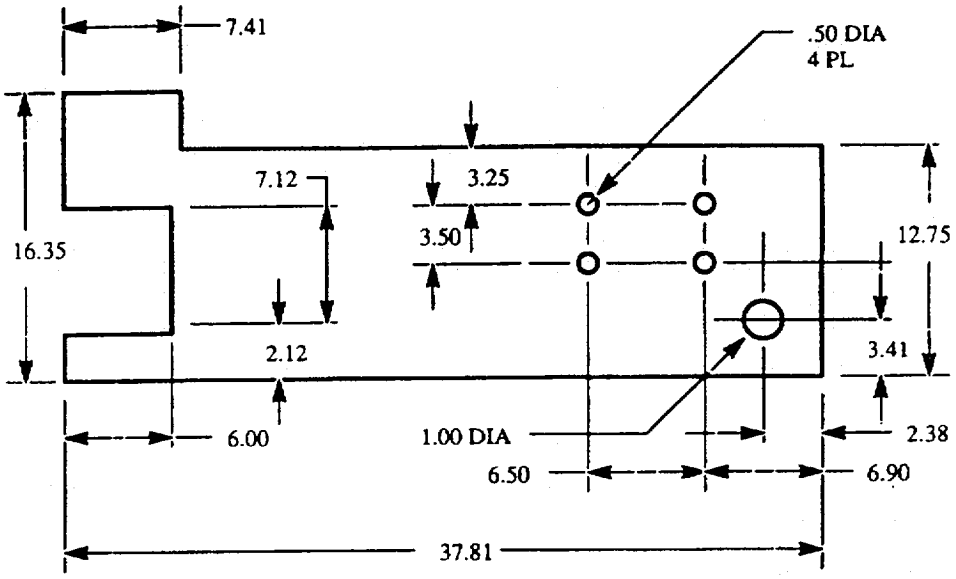
Figure F-17. Flexible Foam; Part Number 13229E6701-84.



MATERIALS:
Insulation per AMS 3570, 1.00 in. thick.

PROCEDURE:
Cut material to indicated sizes.

Figure F-18. Flexible Foam; Part Number 13229E6701-85.



MATERIALS:

Insulation per AMS 3570, 1.00 in. thick.

PROCEDURE:

Cut material to indicated sizes.

Figure F-19. Flexible Foam; Part Number 13229E6701-86.

ALPHABETICAL INDEX

ALPHABETICAL INDEX - Continued

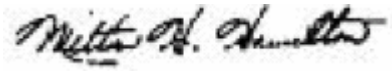
ALPHABETICAL INDEX

ALPHABETICAL INDEX - Continued

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:



MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
07427

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THEN JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL.

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FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-4120-404-14	31 Aug 94	AIR CONDITIONER, HORIZONTAL

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the Other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME GRADE OR TITLE AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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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
I hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3.280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
I gram = 10 decigrams = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1.076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 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 hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

PIN: 073187-001